# Power Panel 100/200

## User's Manual

Version: **2.40 (July 2009)**

Model no.: **MAPP100.200-ENG**

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Chapter 1: General information

Chapter 2: Technical data

Chapter 3: Commissioning

Chapter 4: Software

Chapter 5: Standards and certifications

Chapter 6: Accessories

Chapter 7: Maintenance / Servicing

Appendix A

Figure index

Table index

Model number index

Index

## Chapter 1: General information ..... 23

1. Manual history ..... 23
2. Safety guidelines ..... 28
   2.1 Intended use ..... 28
   2.2 Protection against electrostatic discharges ..... 28
      2.2.1 Packaging ..... 28
      2.2.2 Guidelines for proper ESD handling ..... 28
   2.3 Policy and procedures ..... 29
   2.4 Transport and storage ..... 29
   2.5 Installation ..... 30
   2.6 Operation ..... 30
      2.6.1 Protection against touching electrical parts ..... 30
      2.6.2 Protection against dust, humidity ..... 30
      2.6.3 Programs, viruses and dangerous programs ..... 30
   2.7 Environmentally-friendly disposal ..... 31
      2.7.1 Separation of materials ..... 31
3. Organization of safety notices ..... 32
4. Guidelines ..... 32
5. Model numbers ..... 33
   5.1 Power Panel 100 with Automation Runtime ..... 33
   5.2 Power Panel 200 with Automation Runtime ..... 34
   5.3 Power Panel 100 with BIOS ..... 37
   5.4 Accessories ..... 38
   5.5 Software ..... 40
   5.6 Documentation ..... 41

## Chapter 2: Technical data ..... 43

1. General information ..... 43
   1.1 Features ..... 44
2. Power Panel 100 with Automation Runtime ..... 45
   2.1 Device interfaces ..... 45
      2.1.1 Supply voltage ..... 45
      2.1.2 Grounding clip ..... 46
      2.1.3 COM interface ..... 46
      2.1.4 USB port ..... 47
      2.1.5 Mode / Node switches ..... 48
      2.1.6 Status LEDs ..... 49
      2.1.7 Ethernet connection ..... 49
      2.1.8 Reset button ..... 50
      2.1.9 CompactFlash slot ..... 51
   2.2 Stickers ..... 52
      2.2.1 Safety sticker ..... 52
      2.2.2 Device label ..... 52
      2.2.3 Serial number sticker ..... 53
   2.3 Device 4PP120.0571-01 ..... 54
      2.3.1 Technical data ..... 55

2.3.2 Temperature humidity diagram ..... 58
2.3.3 Dimensions ..... 58
2.3.4 Cutout installation ..... 59
2.3.5 Contents of delivery ..... 59
2.4 Device 4PP120.0571-21 ..... 60
2.4.1 Technical data ..... 61
2.4.2 Temperature humidity diagram ..... 64
2.4.3 Dimensions ..... 64
2.4.4 Cutout installation ..... 65
2.4.5 Contents of delivery ..... 65
2.5 Device 4PP120.1043-31 ..... 66
2.5.1 Technical data ..... 67
2.5.2 Temperature humidity diagram ..... 70
2.5.3 Dimensions ..... 70
2.5.4 Cutout installation ..... 71
2.5.5 Contents of delivery ..... 71
2.6 Device 4PP120.1505-31 ..... 72
2.6.1 Technical data ..... 73
2.6.2 Temperature humidity diagram ..... 76
2.6.3 Dimensions ..... 76
2.6.4 Cutout installation ..... 77
2.6.5 Contents of delivery ..... 77
2.7 Device 4PP151.0571-01 ..... 78
2.7.1 Technical data ..... 79
2.7.2 Temperature humidity diagram ..... 82
2.7.3 Dimensions ..... 82
2.7.4 Cutout installation ..... 83
2.7.5 Contents of delivery ..... 83
2.8 Device 4PP151.0571-21 ..... 84
2.8.1 Technical data ..... 85
2.8.2 Temperature humidity diagram ..... 88
2.8.3 Dimensions ..... 88
2.8.4 Cutout installation ..... 89
2.8.5 Contents of delivery ..... 89
2.9 Device 4PP151.1043-31 ..... 90
2.9.1 Technical data ..... 91
2.9.2 Temperature humidity diagram ..... 94
2.9.3 Dimensions ..... 94
2.9.4 Cutout installation ..... 95
2.9.5 Contents of delivery ..... 95
2.10 Device 4PP151.1505-31 ..... 96
2.10.1 Technical data ..... 97
2.10.2 Temperature humidity diagram ..... 100
2.10.3 Dimensions ..... 100
2.10.4 Cutout installation ..... 101
2.10.5 Contents of delivery ..... 101
2.11 Device 4PP152.0571-01 ..... 102

2.11.1 Technical data ... 103
2.11.2 Temperature humidity diagram ... 106
2.11.3 Dimensions ... 106
2.11.4 Cutout installation ... 107
2.11.5 Contents of delivery ... 107
2.12 Device 4PP152.0571-21 ... 108
2.12.1 Technical data ... 109
2.12.2 Temperature humidity diagram ... 112
2.12.3 Dimensions ... 112
2.12.4 Cutout installation ... 113
2.12.5 Contents of delivery ... 113
2.13 Device 4PP152.1043-31 ... 114
2.13.1 Technical data ... 115
2.13.2 Temperature humidity diagram ... 118
2.13.3 Dimensions ... 118
2.13.4 Cutout installation ... 119
2.13.5 Contents of delivery ... 119
2.14 Device 4PP180.1043-31 ... 120
2.14.1 Technical data ... 121
2.14.2 Temperature humidity diagram ... 124
2.14.3 Dimensions ... 124
2.14.4 Cutout installation ... 125
2.14.5 Contents of delivery ... 125
2.15 Device 4PP180.1505-31 ... 126
2.15.1 Technical data ... 127
2.15.2 Temperature humidity diagram ... 130
2.15.3 Dimensions ... 130
2.15.4 Cutout installation ... 131
2.15.5 Contents of delivery ... 131
2.16 Device 4PP181.1043-31 ... 132
2.16.1 Technical data ... 133
2.16.2 Temperature humidity diagram ... 136
2.16.3 Dimensions ... 136
2.16.4 Cutout installation ... 137
2.16.5 Contents of delivery ... 137
2.17 Device 4PP181.1505-31 ... 138
2.17.1 Technical data ... 139
2.17.2 Temperature humidity diagram ... 142
2.17.3 Dimensions ... 142
2.17.4 Cutout installation ... 143
2.17.5 Contents of delivery ... 143
2.18 Device 4PP182.1043-31 ... 144
2.18.1 Technical data ... 145
2.18.2 Temperature humidity diagram ... 148
2.18.3 Dimensions ... 148
2.18.4 Cutout installation ... 149
2.18.5 Contents of delivery ... 149

3. Power Panel 200 with Automation Runtime ..... 150
3.1 Interface descriptions ..... 150
3.1.1 Supply voltage ..... 150
3.1.2 Grounding clip ..... 151
3.1.3 COM interface ..... 151
3.1.4 USB port ..... 152
3.1.5 Mode / Node switches ..... 153
3.1.6 Status LEDs ..... 154
3.1.7 Ethernet connection ..... 154
3.1.8 Reset button ..... 155
3.1.9 CompactFlash slot ..... 155
3.2 Stickers ..... 156
3.2.1 Safety sticker ..... 156
3.2.2 Device label ..... 156
3.2.3 Serial number sticker ..... 157
3.3 Device 4PP210.0000-95 ..... 158
3.3.1 Technical data ..... 159
3.3.2 Temperature humidity diagram ..... 162
3.3.3 Dimensions ..... 162
3.3.4 Drilling template ..... 163
3.3.5 Contents of delivery ..... 163
3.4 Device 4PP220.0571-45 ..... 164
3.4.1 Technical data ..... 165
3.4.2 Temperature humidity diagram ..... 168
3.4.3 Dimensions ..... 168
3.4.4 Cutout installation ..... 169
3.4.5 Contents of delivery ..... 169
3.5 Device 4PP220.0571-65 ..... 170
3.5.1 Technical data ..... 171
3.5.2 Temperature humidity diagram ..... 174
3.5.3 Dimensions ..... 174
3.5.4 Cutout installation ..... 175
3.5.5 Contents of delivery ..... 175
3.6 Device 4PP220.0571-85 ..... 176
3.6.1 Technical data ..... 177
3.6.2 Temperature humidity diagram ..... 180
3.6.3 Dimensions ..... 180
3.6.4 Cutout installation ..... 181
3.6.5 Contents of delivery ..... 181
3.7 Device 4PP220.0571-A5 ..... 182
3.7.1 Technical data ..... 183
3.7.2 Temperature humidity diagram ..... 186
3.7.3 Dimensions ..... 186
3.7.4 Cutout installation ..... 187
3.7.5 Contents of delivery ..... 187
3.8 Device 4PP220.1043-75 ..... 188
3.8.1 Technical data ..... 189

3.8.2 Temperature humidity diagram ..... 192
3.8.3 Dimensions ..... 192
3.8.4 Cutout installation ..... 193
3.8.5 Contents of delivery ..... 193
3.9 Device 4PP220.1043-B5 ..... 194
3.9.1 Technical data ..... 195
3.9.2 Temperature humidity diagram ..... 198
3.9.3 Dimensions ..... 198
3.9.4 Cutout installation ..... 199
3.9.5 Contents of delivery ..... 199
3.10 Device 4PP220.1505-75 ..... 200
3.10.1 Technical data ..... 201
3.10.2 Temperature humidity diagram ..... 204
3.10.3 Dimensions ..... 204
3.10.4 Cutout installation ..... 205
3.10.5 Contents of delivery ..... 205
3.11 Device 4PP220.1505-B5 ..... 206
3.11.1 Technical data ..... 207
3.11.2 Temperature humidity diagram ..... 210
3.11.3 Dimensions ..... 210
3.11.4 Cutout installation ..... 211
3.11.5 Contents of delivery ..... 211
3.12 Device 4PP251.0571-45 ..... 212
3.12.1 Technical data ..... 213
3.12.2 Temperature humidity diagram ..... 216
3.12.3 Dimensions ..... 216
3.12.4 Cutout installation ..... 217
3.12.5 Contents of delivery ..... 217
3.13 Device 4PP251.0571-65 ..... 218
3.13.1 Technical data ..... 219
3.13.2 Temperature humidity diagram ..... 222
3.13.3 Dimensions ..... 222
3.13.4 Cutout installation ..... 223
3.13.5 Contents of delivery ..... 223
3.14 Device 4PP251.0571-85 ..... 224
3.14.1 Technical data ..... 225
3.14.2 Temperature humidity diagram ..... 228
3.14.3 Dimensions ..... 228
3.14.4 Cutout installation ..... 229
3.14.5 Contents of delivery ..... 229
3.15 Device 4PP251.0571-A5 ..... 230
3.15.1 Technical data ..... 231
3.15.2 Temperature humidity diagram ..... 234
3.15.3 Dimensions ..... 234
3.15.4 Cutout installation ..... 235
3.15.5 Contents of delivery ..... 235
3.16 Device 4PP251.1043-75 ..... 236

3.16.1 Technical data ... 237
3.16.2 Temperature humidity diagram ... 240
3.16.3 Dimensions ... 240
3.16.4 Cutout installation ... 241
3.16.5 Contents of delivery ... 241
3.17 Device 4PP251.1043-B5 ... 242
3.17.1 Technical data ... 243
3.17.2 Temperature humidity diagram ... 246
3.17.3 Dimensions ... 246
3.17.4 Cutout installation ... 247
3.17.5 Contents of delivery ... 247
3.18 Device 4PP251.1505-75 ... 248
3.18.1 Technical data ... 249
3.18.2 Temperature humidity diagram ... 252
3.18.3 Dimensions ... 252
3.18.4 Cutout installation ... 253
3.18.5 Contents of delivery ... 253
3.19 Device 4PP251.1505-B5 ... 254
3.19.1 Technical data ... 255
3.19.2 Temperature humidity diagram ... 258
3.19.3 Dimensions ... 258
3.19.4 Cutout installation ... 259
3.19.5 Contents of delivery ... 259
3.20 Device 4PP252.0571-45 ... 260
3.20.1 Technical data ... 261
3.20.2 Temperature humidity diagram ... 264
3.20.3 Dimensions ... 264
3.20.4 Cutout installation ... 265
3.20.5 Contents of delivery ... 265
3.21 Device 4PP252.0571-65 ... 266
3.21.1 Technical data ... 267
3.21.2 Temperature humidity diagram ... 270
3.21.3 Dimensions ... 270
3.21.4 Cutout installation ... 271
3.21.5 Contents of delivery ... 271
3.22 Device 4PP252.0571-85 ... 272
3.22.1 Technical data ... 273
3.22.2 Temperature humidity diagram ... 276
3.22.3 Dimensions ... 276
3.22.4 Cutout installation ... 277
3.22.5 Contents of delivery ... 277
3.23 Device 4PP252.0571-A5 ... 278
3.23.1 Technical data ... 279
3.23.2 Temperature humidity diagram ... 282
3.23.3 Dimensions ... 282
3.23.4 Cutout installation ... 283
3.23.5 Contents of delivery ... 283

3.24 Device 4PP252.1043-75 ..... 284
3.24.1 Technical data ..... 285
3.24.2 Temperature humidity diagram ..... 288
3.24.3 Dimensions ..... 288
3.24.4 Cutout installation ..... 289
3.24.5 Contents of delivery ..... 289
3.25 Device 4PP252.1043-B5 ..... 290
3.25.1 Technical data ..... 291
3.25.2 Temperature humidity diagram ..... 294
3.25.3 Dimensions ..... 294
3.25.4 Cutout installation ..... 295
3.25.5 Contents of delivery ..... 295
3.26 Device 4PP280.1043-75 ..... 296
3.26.1 Technical data ..... 297
3.26.2 Temperature humidity diagram ..... 300
3.26.3 Dimensions ..... 300
3.26.4 Cutout installation ..... 301
3.26.5 Contents of delivery ..... 301
3.27 Device 4PP280.1043-B5 ..... 302
3.27.1 Technical data ..... 303
3.27.2 Temperature humidity diagram ..... 306
3.27.3 Dimensions ..... 306
3.27.4 Cutout installation ..... 307
3.27.5 Contents of delivery ..... 307
3.28 Device 4PP280.1505-75 ..... 308
3.28.1 Technical data ..... 309
3.28.2 Temperature humidity diagram ..... 312
3.28.3 Dimensions ..... 312
3.28.4 Cutout installation ..... 313
3.28.5 Contents of delivery ..... 313
3.29 Device 4PP280.1505-B5 ..... 314
3.29.1 Technical data ..... 315
3.29.2 Temperature humidity diagram ..... 318
3.29.3 Dimensions ..... 318
3.29.4 Cutout installation ..... 319
3.29.5 Contents of delivery ..... 319
3.30 Device 4PP281.1043-75 ..... 320
3.30.1 Technical data ..... 321
3.30.2 Temperature humidity diagram ..... 324
3.30.3 Dimensions ..... 324
3.30.4 Cutout installation ..... 325
3.30.5 Contents of delivery ..... 325
3.31 Device 4PP281.1043-B5 ..... 326
3.31.1 Technical data ..... 327
3.31.2 Temperature humidity diagram ..... 330
3.31.3 Dimensions ..... 330
3.31.4 Cutout installation ..... 331

3.31.5 Contents of delivery ..... 331
3.32 Device 4PP281.1505-75 ..... 332
3.32.1 Technical data ..... 333
3.32.2 Temperature humidity diagram ..... 336
3.32.3 Dimensions ..... 336
3.32.4 Cutout installation ..... 337
3.32.5 Contents of delivery ..... 337
3.33 Device 4PP281.1505-B5 ..... 338
3.33.1 Technical data ..... 339
3.33.2 Temperature humidity diagram ..... 342
3.33.3 Dimensions ..... 342
3.33.4 Cutout installation ..... 343
3.33.5 Contents of delivery ..... 343
3.34 Device 4PP282.1043-75 ..... 344
3.34.1 Technical data ..... 345
3.34.2 Temperature humidity diagram ..... 348
3.34.3 Dimensions ..... 348
3.34.4 Cutout installation ..... 349
3.34.5 Contents of delivery ..... 349
3.35 Device 4PP282.1043-B5 ..... 350
3.35.1 Technical data ..... 351
3.35.2 Temperature humidity diagram ..... 354
3.35.3 Dimensions ..... 354
3.35.4 Cutout installation ..... 355
3.35.5 Contents of delivery ..... 355
4. Power Panel 100 with BIOS ..... 356
4.1 Interface descriptions ..... 356
4.1.1 Supply voltage ..... 356
4.1.2 Grounding clip ..... 356
4.1.3 COM interface ..... 357
4.1.4 USB port ..... 357
4.1.5 Mode / Node switches ..... 358
4.1.6 Status LEDs ..... 360
4.1.7 Ethernet connection ..... 360
4.1.8 Reset button ..... 361
4.1.9 CompactFlash slot ..... 361
4.2 Stickers ..... 362
4.2.1 Safety sticker ..... 362
4.2.2 Device label ..... 362
4.2.3 Serial number sticker ..... 363
4.3 Device 5PP120.0571-27 ..... 364
4.3.1 Technical data ..... 365
4.3.2 Temperature humidity diagram ..... 368
4.3.3 Dimensions ..... 368
4.3.4 Cutout installation ..... 369
4.3.5 Contents of delivery ..... 369
4.4 Device 5PP120.1043-37 ..... 370

4.4.1 Technical data ... 371
4.4.2 Temperature humidity diagram ... 374
4.4.3 Dimensions ... 374
4.4.4 Cutout installation ... 375
4.4.5 Contents of delivery ... 375
4.5 Device 5PP120.1043-37A ... 376
4.5.1 Technical data ... 377
4.5.2 Temperature humidity diagram ... 380
4.5.3 Dimensions ... 380
4.5.4 Cutout installation ... 381
4.5.5 Contents of delivery ... 381
4.6 Device 5PP120.1214-37 ... 382
4.6.1 Technical data ... 383
4.6.2 Temperature humidity diagram ... 386
4.6.3 Dimensions ... 386
4.6.4 Cutout installation ... 387
4.6.5 Contents of delivery ... 387
4.7 Device 5PP120.1214-37A ... 388
4.7.1 Technical data ... 389
4.7.2 Temperature humidity diagram ... 392
4.7.3 Dimensions ... 392
4.7.4 Cutout installation ... 393
4.7.5 Contents of delivery ... 393
4.8 Device 5PP120.1505-37 ... 394
4.8.1 Technical data ... 395
4.8.2 Temperature humidity diagram ... 398
4.8.3 Dimensions ... 398
4.8.4 Cutout installation ... 399
4.8.5 Contents of delivery ... 399
4.9 Device 5PP120.1505-37A ... 400
4.9.1 Technical data ... 401
4.9.2 Temperature humidity diagram ... 404
4.9.3 Dimensions ... 404
4.9.4 Cutout installation ... 405
4.9.5 Contents of delivery ... 405
5. Power Panel light / compact ... 406
5.1 Power Panel 200 light / compact ... 407
5.1.1 Technical data - Power Panel 200 light ... 407
5.1.2 Temperature humidity diagram - Power Panel 200 light - Monochrome LCD ... 410
5.1.3 Temperature humidity diagram - Power Panel 200 light - Color LCD ... 410
5.1.4 Technical data - Power Panel 200 compact ... 411
5.1.5 Temperature humidity diagram - Power Panel 200 compact - Monochrome LCD 414
5.1.6 Temperature humidity diagram - Power Panel 200 compact - Color LCD ... 414
5.1.7 Dimensions ... 415
5.1.8 Cutout installation ... 415
5.1.9 Contents of delivery ... 415
5.2 Power Panel 251 light / compact ... 416

5.2.1 Technical data - Power Panel 251 light ..... 416
5.2.2 Temperature humidity diagram - Power Panel 251 light - Monochrome LCD ..... 419
5.2.3 Temperature humidity diagram - Power Panel 251 light - Color LCD ..... 419
5.2.4 Technical data - Power Panel 251 compact ..... 420
5.2.5 Temperature humidity diagram - Power Panel 251 compact - Monochrome LCD 423
5.2.6 Temperature humidity diagram - Power Panel 251 compact - Color LCD ..... 423
5.2.7 Dimensions ..... 424
5.2.8 Cutout installation ..... 424
5.2.9 Contents of delivery ..... 424
5.3 Power Panel 252 light / compact ..... 425
5.3.1 Technical data - Power Panel 252 light ..... 425
5.3.2 Temperature humidity diagram - Power Panel 252 light - Monochrome LCD ..... 428
5.3.3 Temperature humidity diagram - Power Panel 252 light - Color LCD ..... 428
5.3.4 Technical data - Power Panel 252 compact ..... 429
5.3.5 Temperature humidity diagram - Power Panel 252 compact - Monochrome LCD 432
5.3.6 Temperature humidity diagram - Power Panel 252 compact - Color LCD ..... 432
5.3.7 Dimensions ..... 433
5.3.8 Cutout installation ..... 433
5.3.9 Contents of delivery ..... 433

**Chapter 3: Commissioning ..... 435**

1. Mounting instructions ..... 435
2. Mounting orientation ..... 437
3. Key and LED configurations ..... 439
3.1 Power Panel 5.7" QVGA ..... 440
3.1.1 Format - Vertical1 ..... 440
3.1.2 Format - Horizontal2 ..... 441
3.2 Power Panel 10.4" VGA ..... 442
3.2.1 Format - Horizontal1 ..... 442
3.2.2 Format - Vertical1 ..... 443
3.2.3 Format - Horizontal2 ..... 444
3.3 Power Panel 15" XGA ..... 445
3.3.1 Format - Horizontal1 ..... 445
3.3.2 Format - Vertical1 ..... 446
4. Touch screen calibration ..... 447
4.1 Windows CE ..... 447
4.2 Windows XP Embedded ..... 447
4.3 Automation Runtime / Visual Components ..... 447
5. Screen rotation ..... 448
5.1 Power Panel 100 BIOS ..... 448
5.1.1 Windows XP embedded ..... 448
5.1.2 Windows CE ..... 448
5.2 PowerPanel 100/200 Automation Runtime ..... 448
5.2.1 Automation Runtime / Visual Components ..... 448
5.3 Power Panel light / compact Automation Runtime ..... 448
5.3.1 Automation Runtime / Visual Components ..... 448

# Chapter 4: Software ..... 449

1. Power Panel 100/200 with Automation Runtime ..... 449
1.1 General information ..... 449
1.1.1 Summary screen ..... 449
1.2 Power Panel 100 as an intelligent visualization system ..... 451
1.3 Power Panel 200 with Power Panel 100 terminals ..... 452
1.4 Automation Runtime and SMC ..... 453
1.4.1 Voltage dips (power failures) ..... 454
1.4.2 Watchdog events ..... 454
1.4.3 Reset button ..... 454
1.4.4 Over-temperature ..... 454
1.4.5 Software reset ..... 454
2. Power Panel with BIOS ..... 455
2.1 General information ..... 455
2.2 BIOS settings for VGA, SVGA and XGA Power Panel devices ..... 458
2.2.1 BIOS setup main menu ..... 458
2.2.2 Time ..... 459
2.2.3 Date ..... 460
2.2.4 Motherboard device configuration ..... 461
2.2.5 Memory optimization ..... 466
2.2.6 Advanced BIOS features ..... 469
2.2.7 Special OEM features ..... 471
2.2.8 Device information ..... 472
2.2.9 Firmware configuration ..... 474
2.2.10 Restore CMOS values ..... 475
2.2.11 Load optimized defaults ..... 476
2.2.12 Load previous values ..... 477
2.2.13 Save values without exit ..... 477
2.2.14 Exit without save ..... 478
2.2.15 Save values and exit ..... 479
2.3 BIOS settings for QVGA Power Panel devices ..... 480
2.3.1 BIOS setup main menu ..... 480
2.3.2 Motherboard device configuration ..... 481
2.3.3 Memory optimization ..... 488
2.3.4 Advanced BIOS features ..... 492
2.3.5 Special OEM features ..... 493
2.3.6 Device information ..... 494
2.3.7 Firmware configuration ..... 497
2.3.8 Restore CMOS values ..... 498
2.3.9 Load optimized defaults ..... 498
2.3.10 Load previous values ..... 499
2.3.11 Save values without exit ..... 499
2.3.12 Exit without save ..... 500
2.3.13 Save values and exit ..... 500
2.3.14 Help ..... 501
2.4 BIOS upgrade und utilities ..... 502
2.4.1 BIOS upgrade disk ..... 503

2.4.2 aPCI firmware upgrade disk ..... 505
2.4.3 User boot logo upgrade disk ..... 507
2.4.4 REMHOST utility disk ..... 509
2.5 CMOS backup ..... 513
2.6 Distribution of resources ..... 513
2.6.1 RAM address assignment ..... 513
2.6.2 DMA channel assignment ..... 514
2.6.3 I/O address assignment ..... 514
2.6.4 Interrupt assignment ..... 515
3. Power Panel 100 with BIOS and Windows CE ..... 517
3.1 General information ..... 517
3.1.1 Advantages ..... 517
3.2 Differences between the Windows CE 5.0 versions (Pro - PropPlus) ..... 518
3.3 Requirements ..... 518
3.4 Installation ..... 518
3.4.1 B&R eMbedded OS Installer ..... 518
4. Power Panel 100 with BIOS and Windows XP Embedded ..... 519
4.1 General information ..... 519
4.2 Features with FP2007 (Feature Pack 2007) ..... 519
4.3 Installation ..... 520
5. HMI Drivers & Utilities DVD 5SWHMI.0000-00 ..... 521

**Chapter 5: Standards and certifications ..... 525**

1. Applicable European guidelines ..... 525
2. Overview of standards ..... 525
3. Emission requirements ..... 527
3.1 Network-related emissions ..... 528
3.2 Emissions, electromagnetic emissions ..... 529
3.3 Harmonic currents for devices ≤ 16 A ..... 530
3.4 Voltage fluctuations and flickering ≤ 16 A ..... 531
3.5 Voltage fluctuations and flickering ≤ 75 A ..... 531
4. Requirements for immunity to disturbances ..... 532
4.1 Electrostatic discharge (ESD) ..... 533
4.2 High-frequency electromagnetic fields (HF field) ..... 533
4.3 High-speed transient electrical disturbances (burst) ..... 534
4.4 Surges ..... 534
4.5 Conducted disturbances ..... 534
4.6 Magnetic fields with electrical frequencies ..... 535
4.7 Voltage dips, fluctuations, and short-term interruptions ..... 535
4.8 Damped vibration ..... 536
5. Mechanical conditions ..... 537
5.1 Vibration operation ..... 537
5.2 Vibration during transport (packaged) ..... 538
5.3 Shock during operation ..... 538
5.4 Shock during transport (packaged) ..... 538
5.5 Toppling ..... 539

5.6 Free fall (packaged) ..... 539
6. Climate conditions ..... 540
6.1 Worst case operation ..... 540
6.2 Dry heat ..... 540
6.3 Dry cold ..... 540
6.4 Large temperature fluctuations ..... 541
6.5 Temperature fluctuations in operation ..... 541
6.6 Humid heat, cyclic ..... 541
6.7 Humid heat, constant (storage) ..... 541
6.8 Sprayed water (front side) ..... 542
7. Safety ..... 543
7.1 Ground resistance ..... 543
7.2 Insulation resistance ..... 544
7.3 High voltage ..... 544
7.4 Residual voltage ..... 544
7.5 Leakage current ..... 545
7.6 Overload ..... 545
7.7 Defective component ..... 545
7.8 Voltage range ..... 545
8. Other tests ..... 546
8.1 Impact resistance ..... 546
8.2 Protection type ..... 546
8.3 Degree of pollution ..... 546
9. International certifications ..... 547

**Chapter 6: Accessories ..... 549**

1. Overview ..... 549
2. Lithium battery ..... 552
2.1 General information ..... 552
2.2 Order data ..... 552
2.3 Technical data ..... 552
3. TB103 3-pin supply voltage connector ..... 553
3.1 General information ..... 553
3.2 Order data ..... 553
4. aPCI slot cover ..... 555
4.1 Installation ..... 555
5. Legend strip templates ..... 556
5.1 Order data ..... 557
6. CompactFlash cards 5CFCRD.xxxx-03 ..... 558
6.1 General information ..... 558
6.2 Order data ..... 558
6.3 Technical data ..... 559
6.3.1 Temperature humidity diagram - Operation and storage ..... 560
6.4 Dimensions ..... 561
7. CompactFlash cards 5CFCRD.xxxx-02 ..... 562
7.1 General information ..... 562

7.2 Order data ... 562
7.3 Technical data ... 562
7.4 Dimensions ... 563
7.5 Calculating the lifespan ... 564
8. CompactFlash cards 5CFCRD.0xxx-01 ... 570
8.1 General information ... 570
8.2 Order data ... 570
8.3 Technical data ... 570
9. USB flash drive ... 572
9.1 General information ... 572
9.2 Order data ... 572
9.3 Technical data ... 573
9.3.1 Temperature humidity diagram - Operation and storage ... 574
9.4 Creating a bootable USB flash drive ... 575
9.4.1 Requirements ... 575
9.4.2 Procedure ... 575
10. Null modem cable ... 576
10.1 Order data ... 576
10.2 Technical data ... 576
10.3 Cable specifications ... 577

**Chapter 7: Maintenance / Servicing ... 579**
1. Operating guidelines for the touch screen ... 579
2. Cleaning the touch screen ... 579
2.1 Cleaning agents ... 579
3. Changing the battery ... 580
3.1 Procedure for changing the battery ... 580
4. Preventing after-image effect in LCD/TFT monitors ... 582
4.1 What measures can be taken against this? ... 582

**Appendix A ... 583**
1. Touch screen ... 583
1.1 Elo ... 583
1.1.1 Temperature humidity diagram - Operation and storage ... 584
1.1.2 Cleaning ... 584
1.2 3M touch ... 585
1.2.1 Cleaning ... 585
1.3 Gunze touch ... 586
1.3.1 Cleaning ... 586
2. Décor foil ... 587
3. Filter glass ... 588
3.1 Mechanical characteristics ... 588
3.2 Chemical properties ... 588
4. Viewing angles ... 589
5. B&R Key Editor information ... 590
6. Mounting compatibilities ... 592

6.1 Compatibility overview ..... 592
6.2 Compatibility details ..... 594
6.2.1 5.7" devices ..... 594
6.2.2 10.4" devices ..... 596
6.2.3 12.1" devices ..... 598
6.2.4 15" devices ..... 599
7. Glossary ..... 600

# Chapter 1 • General information

## Information:

**B&R does its best to keep the printed versions of its user's manuals as current as possible. However, any newer versions of the User's Manual can always be downloaded in electronic form (pdf) from the B&R homepage www.br-automation.com.**

## 1. Manual history

| Version | Date | Change |
|---|---|---|
| 1.0 | May 2, 2002 | - First version |
| 1.1 | Aug 20, 2002 | - Model numbers added for 24 VDC supply voltage plug<br>- Metal housing for PP120 versions 4PP120.0571-01 and 4PP120.0571-21 added<br>- CompactFlash cards (5CFCRD.0xxx-00) added |
| 1.2 | Oct 30, 2002 | - Layout changes |
| 1.3 | Dec 6, 2002 | - Layout changes<br>- Restructuring of the manual<br>- The following model numbers have either been updated or added: 4PP120.0571-01, 4PP120.0571-21, 4PP120.1043-31, 4PP120.1505-31, 4PP220.0571-45, 4PP220.0571-65, 4PP220.0571-85, 4PP220.0571-A5, 4PP220.1043-75, 4PP220.1043-B5, 4PP220.1505-75, 4PP220.1505-B5, 5PP120.0571-27, 5PP120.1043-37, 5PP120.1505-37, 0AC201.9, 0TB103.9 0TB103.91, 0TB704.9, 0TB704.91, 3IF772.9, 3IF786.9, 3IF787.9, 3IF789.9, 9A0013.01, 9S0001.13-010, 9S0001.13-02<br>New Chapter 3, 4, 5, 6, 7 added |
| 1.4 | March 27, 2003 | - Description of BIOS revised (table formatting, content) |
| 1.5 | April 28, 2003 | - Technical data for the 3-pin supply plug updated<br>- Mounting instructions (distance) and mounting position updated<br>- Following Power Panel devices added: 4PP210.0000-95, 4PP251.0571-65, 4PP251.0571-A5<br>- Battery change, battery buffer time updated<br>- Power consumption and operating temperatures added<br>- BIOS Upgrade description added<br>- REMHOST description added<br>- CMOS backup description added<br>- Windows CE section updated<br>- Distribution of resources by BIOS added<br>- Contents of delivery for each Power Panel device added |

Table 1: Manual history

| Version | Date | Change |
|---|---|---|
| 1.6 | July 1, 2004 | - Changeover to a new A5 book template V3.3<br>- Ground resistance information added to the "Technical data" for the individual Power Panel devices<br>- New figure for "Power Panel 100 and Power Panel 200 devices" on page 43.<br>- "Features" on page 44 revised<br>- Chapter 4 "Software", section 2 "Power Panel with BIOS" revised, separate BIOS descriptions for VGA, SVGA and XGA and for QVGA Power Panel devices<br>- Section "BIOS upgrade und utilities" on page 502 regarding the new BIOS Upgrade disk set (3 disks) revised<br>- Section "Power Panel 100 with BIOS and Windows XP Embedded" on page 519 as well as the model number for Windows XP Embedded image added<br>- Device 4PP151.0571-01 added (see section "Device 4PP151.0571-01" on page 78)<br>- Device 4PP151.0571-21 added (see section "Device 4PP151.0571-21" on page 84)<br>- Device 4PP152.0571-01 added (See section "Device 4PP152.0571-01" on page 102)<br>- Device 4PP152.0571-21 added (see section "Device 4PP152.0571-21" on page 108)<br>- Device 4PP251.0571-45 added (see section "Device 4PP251.0571-45" on page 212)<br>- Device 4PP251.0571-85 added (see section "Device 4PP251.0571-85" on page 224)<br>- Device 4PP251.1043-75 added (see section "Device 4PP251.1043-75" on page 236)<br>- Device 4PP251.1043-B5 added (see section "Device 4PP251.1043-B5" on page 242)<br>- Device 4PP252.0571-65 added (see section "Device 4PP252.0571-65" on page 266)<br>- Device 4PP252.0571-85 added (see section "Device 4PP252.0571-85" on page 272)<br>- Device 4PP252.0571-A5 added (see section "Device 4PP252.0571-A5" on page 278)<br>- Device 4PP252.1043-75 added (see section "Device 4PP252.1043-75" on page 284)<br>- Device 4PP252.1043-B5 added (see section "Device 4PP252.1043-B5" on page 290)<br>- Device 4PP280.1043-75 added (see section "Device 4PP280.1043-75" on page 296)<br>- Device 4PP280.1043-B5 added (see section "Device 4PP280.1043-B5" on page 302)<br>- Device 4PP280.1505-75 added (see section "Device 4PP280.1505-75" on page 308)<br>- Device 4PP280.1505-B5 added (see section "Device 4PP280.1505-B5" on page 314)<br>- Device 4PP281.1043-75 added (see section "Device 4PP281.1043-75" on page 320)<br>- Device 4PP281.1043-B5 added (see section "Device 4PP281.1043-B5" on page 326)<br>- Device 4PP281.1505-75 added (see section "Device 4PP281.1505-75" on page 332)<br>- Device 4PP281.1505-B5 added (see section "Device 4PP281.1505-B5" on page 338)<br>- Device 4PP282.1043-75 added (see section "Device 4PP282.1043-75" on page 344)<br>- Device 4PP282.1043-B5 added (see section "Device 4PP282.1043-B5" on page 350)<br>- Device 5PP120.1214-37 added (see section "Device 5PP120.1214-37" on page 382)<br>- aPCI Interface Modules section deleted from the the Accessories chapter and Model Numbers Overview<br>- Weight and dimension specifications for Power Panel devices corrected<br>- Power Panel light / compact device types added (see section "Power Panel light / compact" on page 406)<br>- 2 GB CompactFlash card (5CFCRD.2048-02) added<br>- USB flash drives (5MMUSB.0128-00, 5MMUSB.0256-00, 5MMUSB.0512-00) added<br>- Legend strip templates 5AC900.057X-00, 5AC900.057X-01, 5AC900.104X-00, 5AC900.104X-01, 5AC900.104X-02, 5AC900.150X-00 added |

Table 1: Manual history (cont.)

| Version | Date | Change |
|---|---|---|
| 1.7 | May 17, 2005 | - Section "Power Panel 100 as an intelligent visualization system" on page 451 added<br>- Section "Power Panel 200 with Power Panel 100 terminals" on page 452 added<br>- Error correction at an ambient temperature for 15" Power Panel devices (all 0-45°C)<br>- Memory of Power Panel 100 devices with Automation Runtime expanded to 64 MB SDRAM<br>- Accessory 4A0006.00-000 lithium battery 1 pc. added<br>- Device 4PP151.1043-31 added (see section "Device 4PP151.1043-31" on page 90)<br>- Device 4PP151.1505-31 added (see section "Device 4PP151.1505-31" on page 96)<br>- Device 4PP152.1043-31 added (see section "Device 4PP152.1043-31" on page 114)<br>- Device 4PP180.1043-31 added (see section "Device 4PP180.1043-31" on page 120)<br>- Device 4PP180.1505-31 added (see section "Device 4PP180.1505-31" on page 126)<br>- Device 4PP181.1505-31 added (see section "Device 4PP181.1043-31" on page 132)<br>- Device 4PP181.1505-31 added (see section "Device 4PP181.1505-31" on page 138)<br>- Device 4PP182.1043-31 added (see section "Device 4PP182.1043-31" on page 144)<br>- Device 4PP251.1505-75 added (see section "Device 4PP251.1505-75" on page 248)<br>- Device 4PP251.1505-B5 added (see section "Device 4PP251.1505-B5" on page 254)<br>- Device 4PP120.1043-37A added (see section "Device 5PP120.1043-37A" on page 376)<br>- Device 4PP120.1214-37A added (see section "Device 5PP120.1214-37A" on page 388)<br>- Device 4PP120.1505-37A added (see section "Device 5PP120.1505-37A" on page 400)<br>- aPCI slot cover 4AC200.1000-00 added (see section "aPCI slot cover" on page 555)<br>- Lifespan calculation (white paper from SanDisk) for CompactFlash cards added (see section "Calculating the lifespan" on page 564)<br>- Automation Runtime and SMC section added (see "Automation Runtime and SMC" on page 453)<br>- Standards and certifications section added (see section 5 "Standards and certifications" on page 525)<br>- Appendix A data (touch screen and mylar properties) added from page 583<br>- BIOS upgrade and utilities section revised for new BIOS version 1.12 |
| 1.8 | Jan 31, 2006 | - Conductor cross section and AWG change for the supply plug.<br>- Safety guidelines revised<br>- IP65 protection specified in more detail<br>- Legend strip position and color specifications added for each display front<br>- Installation diagrams and tolerance information revised for the dimensions sections<br>- Operating environment temperature of 15" Power Panel devices changed to 0 - 50°C<br>- Rear view photos added for devices 4PP120.1505-31, 4PP151.1043-31, 4PP151.1505-31, 4PP152.1043-31, 4PP180.1043-31, 4PP180.1505-31, 4PP181.1043-31, 4PP181.1505-31, and 4PP182.1043-31<br>- International European (CE) certification symbol changed<br>- Section "Standards and certifications" revised<br>- 1 GB flash drive (mod. no 5MMUSB.1024-00) added, 128 MB flash drive cancelled<br>- Silicon Systems CompactFlash cards 5CFCRD.xxxx-03 added.<br>- Note for pressing several keys simultaneously<br>- Power Panel display contrast and viewing angle specifications added<br>- Null modem cable (9A0017.01 and 9A0017.02) added in the "Accessories" section |
| 1.90 | Sept 13, 2006 | - Safety guidelines updated to include ESD.<br>- Maximum holding torque for aPCI modules included.<br>- Storage and transport temperature for all 5.7" B/W Power Panel devices increased from -20°C .. +60°C to<br>-20°C .. +70°.<br>- New BIOS function "Auto (+Timing)" described for the video and flat panel configuration resolution settings.<br>- Elo touch screen specification updated (see Appendix A). |

Table 1: Manual history (cont.)

| Version | Date | Change |
|---|---|---|
| 2.00 | Nov 30, 2006 | - New model number for the PP100/200 documentation MAPP100.200-ENG.<br>- Chapter 3 renamed to "Commissioning".<br>- Document now includes the chm tag "Filename".<br>- 2 GB USB San Disk flash drive 5MMUSB.2048-00 added.<br>- "Viewing angles" on page 589 added.<br>- Perspective information modified<br>- "B&R Key Editor information" on page 590 added.<br>- "Mounting compatibilities" on page 592 added.<br>- "Glossary" on page 600 added.<br>- "Key and LED configurations" on page 439 added.<br>- "Creating a bootable USB flash drive" added on page 575.<br>- Figure 44 "Rear view - 4PP151.1043-31" on page 90 added<br>- New model number for Windows CE<br>- "HMI Drivers & Utilities DVD 5SWHMI.0000-00" on page 521 added. |
| 2.10 | April 25, 2007 | Changes / new features<br>- USB flash drive 5MMUSB.0256-00 and USB flash drive 5MMUSB.1024-00 cancelled<br>- Section 1.1 "Features" on page 44: "Software compatible with B&R 2000 **PCC** family" changed to "Software compatible with B&R 2000 **PLC** family"<br>- Section "USB flash drive" on page 572 updated. |
| 2.20 | Nov 10, 2008 | Changes / new features<br>- Section "Protection against dust, humidity" on page 30 added<br>- Section "Touch screen calibration" on page 447 added<br>- Section "Preventing after-image effect in LCD/TFT monitors" on page 582 added<br>- Additional temperature humidity diagram information<br>- Real-time clock specifications updated in technical data of Power Panel devices<br>- Text change from "Compact Flash" to "CompactFlash".<br>- New Windows CE order numbers added.<br>- Section "Power Panel 100 with BIOS and Windows CE" on page 517 and section "Power Panel 100 with BIOS and Windows XP Embedded" on page 519 updated.<br>- Section "Lithium battery" on page 552 updated.<br>- Section "Changing the battery" on page 580 updated.<br>- Vibration / shock specifications for all Power Panel 100/200 devices updated.<br>- USB flash drive 5MMUSB.0512-00 discontinued.<br>- Screen rotation information added for every device / section "Screen rotation" on page 448.<br>- Footnote added to battery lifespan specification in the technical data for the devices: "Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on)".<br>- Term "Grounding resistance" changed to "bleeder resistance".<br>- Note for pressing several keys simultaneously (phantom keys). |
| 2.30 | Feb 13, 2009 | - Nomenclature and formatting of safety guidelines changed according to specifications.<br>- Topologies (symbol language) updated in chapter "Software" on page 449.<br>- Section "Environmentally-friendly disposal" on page 31 added<br>- Mounting orientation -45° and +45° added on page 438.<br>- CompactFlash image replaced.<br>- Section "USB flash drive" on page 572 updated.<br>- Figure 14 "Rear view - 4PP120.0571-01" on page 54, figure 19 "Rear view - 4PP120.0571-21" on page 60 and updated.<br>- Temperature humidity diagrams added for devices.<br>- B&R Key Editor information revised on page 590.<br>- Section "Screen rotation" on page 448 added.<br>- Section "Differences between the Windows CE 5.0 versions (Pro - PropPlus)" on page 518 added |

Table 1: Manual history (cont.)

| Version | Date | Change |
|---|---|---|
| 2.40 | July 22, 2009 | - "Key lifespan" added to the "Technical data" tables for the individual components.<br>- "Actuating force" deleted form table 101 "Technical data - 4PP280.1043-B5" on page 303.<br>- Display section in table 30 "Technical data - 4PP151.1505-31" on page 97 and table 137 "Technical data - 5PP120.1505-37A" on page 401 was updated.<br>- Display diagonal for the 15 inch devices corrected from 380 mm to 381 mm (Table: Technical data).<br>- Page 259 - 4PP251.1043-B5 - Mech. char. Depth = 108 mm, Height = 358 mm<br>- Page 253 - 4PP251.1043-75 - Mech. char. Height = 358 mm<br>- Figure 36 "Dimensions - 4PP151.0571-01" on page 82 and figure 41 "Dimensions - 4PP151.0571-21" on page 88 added.<br>- CompactFlash information updated in chapter 6, Accessories (arrangement/order, detailed information concerning 5CFCRD.xxxx-03 changed and/or added)<br>- Information text (Information!) on the décor foil and filter glass in Appendix A changed.<br>- Section "Known problems" was removed from the Software chapter (Power Panel 100 with BIOS and Windows CE).<br>- Information (General) for Windows XP Embedded on page 538 updated.<br>- Information concerning the LED status check (Ethernet connection) on pages 50, 155 and 361 changed.<br>- "Compact Flash" changed to "CompactFlash" in the images (rear view of the devices and CompactFlash slot).<br>- Information for touch screen calibration on page 447 updated.<br>- Temperature humidity diagrams and temperature specifications for the devices updated.<br>- The "Touch screen type" table entry was added to the technical data for the devices. |

Table 1: Manual history (cont.)

# 2. Safety guidelines

## 2.1 Intended use

Programmable logic controllers (PLCs), operating and monitoring devices (industrial PCs, Power Panels, Mobile Panels, etc.), and B&R uninterruptible power supplies have been designed, developed, and manufactured for conventional use in industry. They were not designed, developed, and manufactured for any use involving serious risks or hazards that could lead to death, injury, serious physical damage, or loss of any kind without the implementation of exceptionally stringent safety precautions. In particular, such risks and hazards include the use of these devices to monitor nuclear reactions in nuclear power plants, as well as flight control systems, flight safety, the control of mass transit systems, medical life support systems and the control of weapons systems.

## 2.2 Protection against electrostatic discharges

Electrical components that are vulnerable to electrostatic discharge (ESD) must be handled accordingly.

### 2.2.1 Packaging

- Electrical components with housing
  … do not require special ESD packaging, but must be handled properly
  (see "Electrical components with housing").
- Electrical components without housing
  … must be protected by ESD-suitable packaging.

### 2.2.2 Guidelines for proper ESD handling

#### Electrical components with housing

- Do not touch the contacts of connectors on connected cables.
- Do not touch the contact tips on the circuit boards.

#### Electrical components without housing

In addition to "Electrical components with housing", the following also applies:

- Any persons handling electrical components or devices that will be installed in the electrical components must be grounded.
- Components can only be touched on the small sides or on the front plate.
- Components should always be stored in a suitable medium (ESD packaging, conductive foam, etc.).
  Metallic surfaces are not suitable storage surfaces!

- Electrostatic discharges should be avoided on the components (e.g. through charged plastics).
- A minimum distance of 10 cm must be kept from monitors and TV sets.
- Measurement devices and equipment must be grounded.
- Measurement probes on potential-free measurement devices must be discharged on sufficiently grounded surfaces before taking measurements.

### Individual components

- ESD protective measures for individual components are thoroughly integrated at B&R (conductive floors, footwear, arm bands, etc.).

The increased ESD protective measures for individual components are not necessary for our customers for handling B&R products.

## 2.3 Policy and procedures

Electronic devices are generally not failsafe. In the event of a failure on the programmable control system, operating or monitoring device, or uninterruptible power supply, the user is responsible for ensuring that other devices that may be connected, e.g. motors, are in a secure state.

Both when using programmable logic controllers and when using operating and monitoring devices as control systems in conjunction with a soft PLC (e.g. B&R Automation Runtime or comparable products) or a slot PLC (e.g. B&R LS251 or comparable products), the safety precautions applying to industrial control systems (e.g. the provision of safety devices such as emergency stop circuits, etc.) must be observed in accordance with applicable national and international regulations. The same applies for all other devices connected to the system, such as drives.

All tasks such as installation, commissioning, and maintenance are only permitted to be carried out by qualified personnel. Qualified personnel are persons who are familiar with the transport, mounting, installation, commissioning, and operation of the product and who have the appropriate qualifications (e.g. IEC 60364). National accident prevention guidelines must be followed.
The safety guidelines, connection descriptions (rating plate and documentation) and limit values listed in the technical data must be read carefully and must be observed before installation and commissioning.

## 2.4 Transport and storage

During transport and storage, devices must be protected from excessive stress (mechanical load, temperature, humidity, aggressive atmospheres, etc.).

## 2.5 Installation

- Installation must take place according to the documentation, using suitable equipment and tools.
- Devices must be installed without voltage applied and by qualified personnel.
- General safety regulations and nationally applicable accident prevention guidelines must be observed.
- Electrical installation must be carried out according to the relevant guidelines (e.g. line cross section, fuse, protective ground connection).

## 2.6 Operation

### 2.6.1 Protection against touching electrical parts

To operate programmable logic controllers, operating and monitoring devices, and uninterruptible power supplies, certain components must carry dangerous voltage levels of over 42 VDC. A life-threatening electrical shock could occur if you come into contact with these parts. This could result in death, severe injury or material damage.

Before turning on the programmable logic controller, the operating and monitoring devices and the uninterruptible power supply, ensure that the housing is properly grounded (PE rail). The ground connection must be established when testing the operating and monitoring devices or the uninterruptible power supply, even when operating them for only a short time.

Before turning the device on, make sure that all parts with voltage applied are securely covered. During operation, all covers must remain closed.

### 2.6.2 Protection against dust, humidity

For operation in dusty or humid conditions, correctly installed (cutout installation) operating and monitoring devices such as Automation Panel or Power Panel are protected on the front side. IPCs should never be used in very dusty environments as the active cooling fans can clog (bus unit and processor), and can no longer guarantee sufficient cooling.
The rear side of all devices must be protected from dust and humidity and must be cleaned at suitable intervals.

### 2.6.3 Programs, viruses and dangerous programs

The system is subject to potential danger each time data is exchanged or software is installed from a data medium (e.g. diskette, CD-ROM, USB flash drive, etc.), a network connection, or the Internet. The user is responsible for assessing these dangers, implementing preventative measures such as virus protection programs, firewalls, etc. and obtaining software from reliable sources.

## 2.7 Environmentally-friendly disposal

All B&R programmable controllers, operating and monitoring devices, and uninterruptible power supplies are designed to inflict as little harm on the environment as possible.

### 2.7.1 Separation of materials

It is necessary to separate different materials so the device can undergo an environmentally-friendly recycling process.

| Component | Disposal |
|---|---|
| Programmable logic controllers<br>Operating and monitoring devices<br>Uninterruptible power supply<br>Cables | Electronics recycling |
| Cardboard box / paper packaging | Paper / cardboard recycling |
| Plastic packaging | Plastic recycling |

Table 2: Environmentally-friendly separation of materials

Disposal must comply with the respective legal regulations.

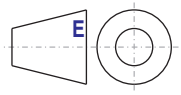
# 3. Organization of safety notices

The safety notices in this manual are organized as follows:

| Safety notice | Description |
|---|---|
| **Danger!** | Disregarding the safety regulations and guidelines can be life-threatening. |
| **Caution!** | Disregarding the safety regulations and guidelines can result in severe injury or major damage to material. |
| **Warning!** | Disregarding the safety regulations and guidelines can result in injury or damage to material. |
| **Information:** | Important information for preventing errors. |

Table 3: Organization of safety notices

# 4. Guidelines




European dimension standards apply to all dimensions (e.g. dimension diagrams, etc.).

# 5. Model numbers

## 5.1 Power Panel 100 with Automation Runtime

| Model number | Description | Note |
|---|---|---|
| 4PP120.0571-01 | **Power Panel 120 LCD B/W QVGA 5.7" T MH**<br>Power Panel PP120; 5.7" QVGA b/w LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; metal housing, IP 65 protection (front side); 24 VDC. | See page 54 |
| 4PP120.0571-21 | **Power Panel 120 LCD C QVGA 5.7" T MH**<br>Power Panel PP120; 5.7" QVGA color LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; metal housing, IP65 protection (front side); 24 VDC. | See page 60 |
| 4PP120.1043-31 | **Power Panel 120 TFT C VGA 10.4" T MH**<br>Power Panel PP120; 10.4" VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; metal housing, IP65 protection (front side); 24 VDC. | See page 66 |
| 4PP120.1505-31 | **Power Panel 120 TFT C XGA 15" T MH**<br>Power Panel PP120; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; metal housing, IP65 protection (front side); 24 VDC. | See page 72 |
| 4PP151.0571-01 | **Power Panel 151 LCD B/W QVGA 5.7" F MH**<br>Power Panel PP151; 5.7" QVGA b/w LC display; 6 soft keys; 16 function keys and 20 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; metal housing, IP65 protection (front side); 24 VDC. | See page 78 |
| 4PP151.0571-21 | **Power Panel 151 LCD C QVGA 5.7" F MH**<br>Power Panel PP151; 5.7" QVGA color LC display; 6 soft keys; 16 function keys and 20 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; metal housing, IP65 protection (front side); 24 VDC. | See page 84 |
| 4PP151.1043-31 | **Power Panel 151 TFT C VGA 10.4" F MH**<br>Power Panel PP151; 10.4" VGA color TFT display; 10 soft keys; 28 function keys and 20 system keys; 64 MB SDRAM; CompactFlash Slot (type I); ETH 10/100; RS 232; 2x USB; metal housing, IP65 protection (front side); 24 VDC. | See page 90 |
| 4PP151.1505-31 | **Power Panel 151 TFT C XGA 15" F MH**<br>Power Panel 151; 15" XGA color TFT display; 12 soft keys; 20 function keys and 92 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; metal housing, IP65 protection (front side); 24 VDC. | See page 96 |
| 4PP152.0571-01 | **Power Panel 152 LCD B/W QVGA 5.7" F MH**<br>Power Panel PP152; 5.7" QVGA b/w LC display; 20 function keys and 20 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; metal housing, IP65 protection (front side); 24 VDC. | See page 102 |
| 4PP152.0571-21 | **Power Panel 152 LCD C QVGA 5.7" F MH**<br>Power Panel PP152; 5.7" QVGA color LC display; 20 function keys and 20 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; metal housing, IP65 protection (front side); 24 VDC. | See page 108 |
| 4PP152.1043-31 | **Power Panel 152 TFT VGA 10.4" F MH**<br>Power Panel PP152; 10.4" VGA color TFT display; 44 function keys and 20 system keys; 64 MB SDRAM; CompactFlash Slot (type I); ETH 10/100; RS 232; 2x USB; metal housing, IP65 protection (front side); 24 VDC. | See page 114 |

Table 4: Power Panel 100 with Automation Runtime

| Model number | Description | Note |
|---|---|---|
| 4PP180.1043-31 | **Power Panel 180 TFT VGA 10.4" F T MH**<br>Power Panel PP180; 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys; 12 function keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; metal housing, IP65 protection (front side); 24 VDC. | See page 120 |
| 4PP180.1505-31 | **Power Panel 180 TFT VGA 15" F T MH**<br>Power Panel PP180; 15" XGA color TFT display with touch screen (resistive); 12 soft keys and 20 function keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; metal housing, IP65 protection (front side); 24 VDC. | See page 126 |
| 4PP181.1043-31 | **Power Panel 181 TFT VGA 10.4" F T MH**<br>Power Panel PP181; 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys; 28 function keys and 20 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; metal housing, IP65 protection (front side); 24 VDC. | See page 132 |
| 4PP181.1505-31 | **Power Panel 181 TFT VGA 15" F T MH**<br>Power Panel PP151; 15" XGA color TFT display with touch screen (resistive); 12 soft keys; 20 function keys and 92 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; metal housing, IP65 protection (front side); 24 VDC. | See page 138 |
| 4PP182.1043-31 | **Power Panel 182 TFT VGA 10.4" F T MH**<br>Power Panel PP152; 10.4" VGA color TFT display with touch screen (resistive); 44 function keys and 20 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; metal housing, IP65 protection (front side); 24 VDC. | See page 144 |

Table 4: Power Panel 100 with Automation Runtime (cont.)

## 5.2 Power Panel 200 with Automation Runtime

| Model number | Description | Note |
|---|---|---|
| 4PP210.0000-95 | **Power Panel 210 Controller MH 2aPCI**<br>Power Panel PP210 controller, CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC. | See page 158 |
| 4PP220.0571-45 | **Power Panel 220 LCD B/W QVGA 5.7" T MH 1aPCI**<br>Power Panel PP220; 5.7" QVGA b/w LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 1 aPCI Slot; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 164 |
| 4PP220.0571-65 | **Power Panel 220 LCD C QVGA 5.7" T MH 1aPCI**<br>Power Panel PP220; 5.7" QVGA color LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 1 aPCI slot; 256 kB SRAM;<br>battery; metal housing, IP65 protection (front side); 24 VDC. | See page 170 |
| 4PP220.0571-85 | **Power Panel 220 LCD B/W QVGA 5.7" T MH 2aPCI**<br>Power Panel PP220; 5.7" QVGA b/w LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 176 |
| 4PP220.0571-A5 | **Power Panel 220 LCD C QVGA 5.7" T MH 2aPCI**<br>Power Panel PP220; 5.7" QVGA color LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 182 |
| 4PP220.1043-75 | **Power Panel 220 TFT C VGA 10.4" T MH 1aPCI**<br>Power Panel PP220; 10.4" VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 1 aPCI slot; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 188 |

Table 5: Power Panel 200 with Automation Runtime

| Model number | Description | Note |
|---|---|---|
| 4PP220.1043-B5 | **Power Panel 220 TFT C VGA 10.4" T MH 2aPCI**<br>Power Panel PP220; 10.4" VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 194 |
| 4PP220.1505-75 | **Power Panel 220 TFT C XGA 15" T MH 1aPCI**<br>Power Panel PP220; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 1 aPCI slot; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 200 |
| 4PP220.1505-B5 | **Power Panel 220 TFT C XGA 15" T MH 2aPCI**<br>Power Panel PP220; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 206 |
| 4PP251.0571-45 | **Power Panel 251 LCD B/W QVGA 5.7" F MH 1aPCI**<br>Power Panel PP251; 5.7" QVGA b/w LC display; 6 soft keys; 16 function keys and 20 system keys; 1 aPCI slot; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 212 |
| 4PP251.0571-65 | **Power Panel 251 LCD C QVGA 5.7" F MH 1aPCI**<br>Power Panel PP251; 5.7" QVGA color LC display; 6 soft keys; 16 function keys and 20 system keys; 1 aPCI Slot; 64 MB SDRAM; 256 KB SRAM CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 218 |
| 4PP251.0571-85 | **Power Panel 251 LCD B/W QVGA 5.7" F MH 2aPCI**<br>Power Panel PP251 5.7" QVGA color LC display; 6 soft keys; 16 function keys and 20 system keys; 2 aPCI slots; 64 MB SDRAM; 256 kB SRAM CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 224 |
| 4PP251.0571-A5 | **Power Panel 251 LCD C QVGA 5.7" F MH 2aPCI**<br>Power Panel PP251 5.7" QVGA color LC display; 6 soft keys; 16 function keys and 20 system keys ; 2 aPCI slots; 64 MB SDRAM; 256 kB SRAM CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery metal housing, IP65 protection (front side); 24 VDC. | See page 230 |
| 4PP251.1043-75 | **Power Panel 251 TFT C VGA 10.4" F MH 1aPCI**<br>Power Panel PP251; 10" VGA color TFT display; 10 soft keys; 28 function keys and 20 system keys; 1 aPCI slot; 64 MB SDRAM; 256 kB SRAM CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 236 |
| 4PP251.1043-B5 | **Power Panel 251 TFT C VGA 10.4" F MH 2aPCI**<br>Power Panel PP251; 10" VGA color TFT display; 10 soft keys; 28 function keys and 20 system keys; 2 aPCI slot; 64 MB SDRAM; 256 kB SRAM CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 242 |
| 4PP251.1505-75 | **Power Panel 251 TFT C XGA 15" F MH 1aPCI**<br>Power Panel PP281; 15" XGA color TFT display; 12 soft keys; 20 function keys and 92 system keys; 1 aPCI slot; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 248 |
| 4PP251.1505-B5 | **Power Panel 251 TFT C XGA 15" F MH 2aPCI**<br>Power Panel PP251; 15" XGA color TFT display; 12 soft keys; 20 function keys and 92 system keys; 2 aPCI slots; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 254 |
| 4PP252.0571-45 | **Power Panel 252 LCD B/W QVGA 5.7" F MH 1aPCI**<br>Power Panel PP252; 5.7" QVGA b/w LC display with touch screen (resistive); 20 function and 20 system keys; 1 aPCI slot; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 260 |
| 4PP252.0571-65 | **Power Panel 252 LCD C QVGA 5.7" F MH 1aPCI**<br>Power Panel PP252; 5.7" QVGA color LC display; 20 function and 20 system keys; 1 aPCI slot; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 266 |

Table 5: Power Panel 200 with Automation Runtime (cont.)

| Model number | Description | Note |
|---|---|---|
| 4PP252.0571-85 | **Power Panel 252 LCD B/W QVGA 5.7" F MH 2aPCI**<br>Power Panel PP252; 5.7" QVGA b/w LC display; 20 functions and 20 system keys; 2 aPCI slots; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 272 |
| 4PP252.0571-A5 | **Power Panel 252 LCD C QVGA 5.7" F MH 2aPCI**<br>Power Panel PP252; 5.7" QVGA color LC display; 20 function and 20 system keys; 2 aPCI slots; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 278 |
| 4PP252.1043-75 | **Power Panel 252 TFT C VGA 10.4" F MH 1aPCI**<br>Power Panel PP252; 10.4" VGA color TFT display; 32 function keys and 32 system keys; 1 aPCI slots; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 284 |
| 4PP252.1043-B5 | **Power Panel 252 TFT C VGA 10.4" F MH 2aPCI**<br>Power Panel PP252; 10.4" VGA color TFT display; 32 function keys and 32 system keys; 2 aPCI slots; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 290 |
| 4PP280.1043-75 | **Power Panel 280 TFT C VGA 10.4" FT MH 1aPCI**<br>Power Panel PP280; 10" VGA color TFT display with touch screen (resistive); 10 soft keys and 12 function keys; 1 aPCI slot; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 296 |
| 4PP280.1043-B5 | **Power Panel 280 TFT C VGA 10.4" FT MH 2aPCI**<br>Power Panel PP280; 10" VGA color TFT display with touch screen (resistive); 10 soft keys and 12 function keys; 2 aPCI slots; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 302 |
| 4PP280.1505-75 | **Power Panel 280 TFT C XGA 15" FT MH 1aPCI**<br>Power Panel PP280; 15" XGA color TFT display with touch screen (resistive); 12 soft keys and 20 function keys; 1 aPCI slot; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 308 |
| 4PP280.1505-B5 | **Power Panel 280 TFT C XGA 15" FT MH 2aPCI**<br>Power Panel PP280; 15" XGA color TFT display with touch screen (resistive); 12 soft keys and 20 function keys; 2 aPCI slots; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH10/100; RS232; 2x USB; battery; metal housing, IP65 protection (front side); 24VDC. | See page 314 |
| 4PP281.1043-75 | **Power Panel 281 TFT C VGA 10.4" FT MH 1aPCI**<br>Power Panel PP281; 10.4" VGA color TFT display with touch screen (resistive), 10 soft keys, 28 function keys and 20 system keys, CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 1 aPCI slot; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 320 |
| 4PP281.1043-B5 | **Power Panel 281 TFT C VGA 10.4" FT MH 2aPCI**<br>Power Panel PP281; 10.4" VGA color TFT display with touch screen (resistive), 10 soft keys, 28 function keys and 20 system keys, CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 326 |
| 4PP281.1505-75 | **Power Panel 281 TFT C XGA 15" FT MH 1aPCI**<br>Power Panel PP281; 15" XGA color TFT display with touch screen (resistive); 12 soft keys; 20 function keys and 92 system keys; 1 aPCI slot; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 332 |
| 4PP281.1505-B5 | **Power Panel 281 TFT C XGA 15" FT MH 2aPCI**<br>Power Panel PP281; 15" XGA color TFT display with touch screen (resistive); 12 soft keys; 20 function keys and 92 system keys; 2 aPCI slots; 64 MB SDRAM; 256 kB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 338 |

Table 5: Power Panel 200 with Automation Runtime (cont.)

| Model number | Description | Note |
|---|---|---|
| 4PP282.1043-75 | **Power Panel 282 TFT C VGA 10.4" FT MH 1aPCI**<br>Power Panel PP282; 10.4" VGA color TFT display with touch screen (resistive), 12 soft keys, 32 function keys and 20 system keys, CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 1 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 344 |
| 4PP282.1043-B5 | **Power Panel 282 TFT C VGA 10.4" FT MH 2aPCI**<br>Power Panel PP282; 10.4" VGA color TFT display with touch screen (resistive), 12 soft keys, 32 function keys and 20 system keys, CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 350 |

Table 5: Power Panel 200 with Automation Runtime (cont.)

## 5.3 Power Panel 100 with BIOS

| Model number | Description | Note |
|---|---|---|
| 5PP120.0571-27 | **Power Panel 120 LCD C QVGA 5.7" T MH**<br>Power Panel PP120 BIOS; 5.7" QVGA color LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 128 MB SDRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 364 |
| 5PP120.1043-37 | **Power Panel 120 TFT C VGA 10.4" T (3M) MH**<br>Power Panel PP120 BIOS; 10.4" VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 128 MB SDRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 370 |
| 5PP120.1043-37A | **Power Panel 120 TFT C VGA 10.4" T MH**<br>Power Panel PP120 BIOS; 10.4" VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 128 MB SDRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 376 |
| 5PP120.1214-37 | **Power Panel 120 TFT C VGA 12.1" T (3M) MH**<br>Power Panel PP120 BIOS; 12.1" SVGA color TFT display with touch screen (resistive); 128 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 382 |
| 5PP120.1214-37A | **Power Panel 120 TFT C VGA 12.1" T MH**<br>Power Panel PP120 BIOS; 12.1" SVGA color TFT display with touch screen (resistive); 128 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 388 |
| 5PP120.1505-37 | **Power Panel 120 TFT C XGA 15" T (3M) MH**<br>Power Panel PP120 BIOS; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 128 MB SDRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 394 |
| 5PP120.1505-37A | **Power Panel 120 TFT C XGA 15" T MH**<br>Power Panel PP120 BIOS; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 128 MB SDRAM; battery; metal housing, IP65 protection (front side); 24 VDC. | See page 400 |

Table 6: Model numbers - Power Panel 100 with BIOS

## 5.4 Accessories

| Model number | Description | Note |
|---|---|---|
| 0AC201.9 | **Lithium batteries (5x)**<br>Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell | See page 552 |
| 4A0006.00-000 | **Lithium battery (1x)**<br>Lithium battery, 1 pc., 3 V / 950 mAh, button cell | See page 552 |
| 0TB103.9 | **Plug 24V 5.08 3-pin screw clamps**<br>24 VDC 3-pin connector, female. Screw clamp, 3.31 mm², protected against vibration by the screw flange. | See page 553 |
| 0TB103.91 | **Plug 24V 5.08 3-pin cage clamps**<br>24 VDC 3-pin connector, female. Cage clamps, 3.31 mm², protected against vibration by the screw flange. | See page 553 |
| 4AC200.1000-00 | **aPCI slot cover, 1 pc.**<br>Optional aPCI slot cover for inserting into an available aPCI slot on a Power Panel 200 device | See page 555 |
| 5AC900.057X-00 | **Legend strips 3x 5.7" Vertical1**<br>Legend strip template for Power Panels 4PP151.0571-01, 4PP151.0571-21, 4PP251.0571-45, 4PP251.0571-65, 4PP251.0571-85, 4PP251.0571-A5. For 3 devices. | See page 556 |
| 5AC900.057X-01 | **Legend strips 2x 5.7" Horizontal2**<br>Legend strip template for Power Panels 4PP152.0571-01, 4PP152.0571-21, 4PP252.0571-45, 4PP252.0571-65, 4PP252.0571-85, 4PP252.0571-A5. For 2 devices. | See page 556 |
| 5AC900.104X-00 | **Legend strip 1x 10.4" Vertical1**<br>Legend strip template for Power Panels 4PP151.1043-31, 4PP181.1043-31, 4PP251.1043-75, 4PP251.1043-B5, 4PP281.1043-75, 4PP281.1043-B5. For 1 device. | See page 556 |
| 5AC900.104X-01 | **Legend strip 1x 10.4" Horizontal2**<br>Legend strip template for Power Panels 4PP152.1043-31, 4PP182.1043-31, 4PP252.1043-75, 4PP252.1043-B5, 4PP282.1043-75, 4PP282.1043-B5. For 1 device. | See page 556 |
| 5AC900.104X-02 | **Legend strips 3x 10.4" Horizontal1**<br>Legend strip template for Power Panels 4PP180.1043-31, 4PP280.1043-75, 4PP280.1043-B5. For 3 devices. | See page 556 |
| 5AC900.150X-00 | **Legend strips 4x 15"**<br>Legend strip template for Power Panels 4PP151.1505-31, 4PP180.1505-31, 4PP181.1505-31, 4PP251.1505-75, 4PP251.1505-B5, 4PP280.1505-75, 4PP280.1505-B5, 4PP281.1505-75, 4PP281.1505-B5. For 4 devices. | See page 556 |
| 5CFCRD.0032-01 | **CompactFlash 32 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 32 MB flash PROM and True IDE/ATA interface | Cancelled since 11/2003 |
| 5CFCRD.0032-02 | **CompactFlash 32 MB TrueIDE SanDisk/A**<br>CompactFlash card with 32 MB flash PROM and True IDE/ATA interface | Cancelled since 12/2005 |
| 5CFCRD.0064-01 | **CompactFlash 64 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 64 MB flash PROM and True IDE/ATA interface | Cancelled since 11/2003 |
| 5CFCRD.0064-02 | **CompactFlash 64 MB TrueIDE SanDisk/A**<br>CompactFlash card with 64 MB flash PROM and True IDE/ATA interface | Cancelled since 12/2005 |
| 5CFCRD.0064-03 | **CompactFlash 64 MB TrueIDE SSI**<br>CompactFlash card with 64 MB SLC NAND flash, and True IDE/ATA interface | See page 558 |
| 5CFCRD.0128-01 | **CompactFlash 128 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 128 MB flash PROM and True IDE/ATA interface | Cancelled since 11/2003 |
| 5CFCRD.0128-02 | **CompactFlash 128 MB TrueIDE SanDisk/A**<br>CompactFlash card with 128 MB flash PROM and True IDE/ATA interface | Cancelled since 12/2005 |

Table 7: Model numbers - Accessories

| Model number | Description | Note |
|---|---|---|
| 5CFCRD.0128-03 | **CompactFlash 128 MB TrueIDE SSI**<br>CompactFlash card with 128 MB SLC NAND flash, and True IDE/ATA interface | See page 558 |
| 5CFCRD.0128-01 | **CompactFlash 196 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 196 MB flash PROM and True IDE/ATA interface | Cancelled since 07/2003 |
| 5CFCRD.0256-01 | **CompactFlash 256 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 256 MB flash PROM and True IDE/ATA interface | Cancelled since 11/2003 |
| 5CFCRD.0256-02 | **CompactFlash 256 MB TrueIDE SanDisk/A**<br>CompactFlash card with 256 MB flash PROM and True IDE/ATA interface | Cancelled since 12/2005 |
| 5CFCRD.0256-03 | **CompactFlash 256 MB TrueIDE SSI**<br>CompactFlash card with 256 MB SLC NAND flash, and True IDE/ATA interface | See page 558 |
| 5CFCRD.0384-01 | **CompactFlash 384 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 384 MB flash PROM and True IDE/ATA interface | Cancelled since 07/2003 |
| 5CFCRD.0512-01 | **CompactFlash 512 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 512 MB flash PROM and True IDE/ATA interface | Cancelled since 11/2003 |
| 5CFCRD.0512-02 | **CompactFlash 512 MB TrueIDE SanDisk/A**<br>CompactFlash card with 512 MB flash PROM and True IDE/ATA interface | Cancelled since 12/2005 |
| 5CFCRD.0512-03 | **CompactFlash 512 MB TrueIDE SSI**<br>CompactFlash card with 512 MB SLC NAND flash, and True IDE/ATA interface | See page 558 |
| 5CFCRD.1024-02 | **CompactFlash 1024 MB TrueIDE SanDisk/A**<br>CompactFlash card with 1024 MB flash PROM and True IDE/ATA interface | Cancelled since 12/2005 |
| 5CFCRD.1024-03 | **CompactFlash 1024 MB TrueIDE SSI**<br>CompactFlash card with 1024 MB SLC NAND flash, and True IDE/ATA interface | See page 558 |
| 5CFCRD.2048-02 | **CompactFlash 2048 MB TrueIDE SanDisk/A**<br>CompactFlash card with 2048 MB flash PROM and True IDE/ATA interface | Cancelled since 12/2005 |
| 5CFCRD.2048-03 | **CompactFlash 2048 MB TrueIDE SSI**<br>CompactFlash card with 2048 MB SLC NAND flash, and True IDE/ATA interface | See page 558 |
| 5CFCRD.4096-03 | **CompactFlash 4096 MB TrueIDE SSI**<br>CompactFlash card with 4096 MB SLC NAND flash, and True IDE/ATA interface | See page 558 |
| 5CFCRD.8192-03 | **CompactFlash 8192 MB TrueIDE SSI**<br>CompactFlash card with 8192 MB SLC NAND flash, and True IDE/ATA interface | See page 558 |
| 5MMUSB.0128-00 | **USB flash drive 128 MB SanDisk**<br>USB 2.0 flash drive 128 MB | Cancelled since 03/2007 Replaced by 5MMUSB.2048-00 |
| 5MMUSB.0256-00 | **USB flash drive 256 MB SanDisk**<br>USB 2.0 flash drive 256 MB | Cancelled since 07/2007 Replaced by 5MMUSB.2048-00 |
| 5MMUSB.0512-00 | **USB flash drive 512 MB SanDisk**<br>USB 2.0 flash drive 512 MB | Cancelled since 03/2007 Replaced by 5MMUSB.2048-00 |

Table 7: Model numbers - Accessories (cont.)

| Model number | Description | Note |
|---|---|---|
| 5MMUSB.1024-00 | **USB flash drive 1 GB SanDisk**<br>USB 2.0 flash drive 1 GB | Cancelled since 03/2007<br>Replaced by 5MMUSB.2048-00 |
| 5MMUSB.2048-00 | **USB flash drive 2 GB SanDisk**<br>USB 2.0 flash drive 2 GB | See page 572 |
| 9A0017.01 | **RS232 DB9 null modem cable 0.6 m**<br>Null modem cable RS232 0.6 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket). | See page 576 |
| 9A0017.02 | **RS232 DB9 null modem cable 1.8 m**<br>Null modem cable RS232, 1.8 m, to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket). | See page 576 |
| 9A0013.01 | **Pen for resistive touch screen** | |

Table 7: Model numbers - Accessories (cont.)

## 5.5 Software

| Model number | Description | Note |
|---|---|---|
| 5SWHMI.0000-00 | **HMI Drivers & Utilities DVD**<br>Contains drivers, utilities, software upgrades and user's manuals for B&R panel system products (see B&R homepage – Industrial PCs, Visualization and Operation). | See page 521 |
| 9S0001.13-010 | **OEM MS Win CE4.1 German**<br>Only delivered with a Power Panel BIOS device | |
| 9S0001.13-020 | **OEM MS Win CE4.1 English**<br>Only delivered with a Power Panel BIOS device | |
| 9S0001.17-020 | **OEM Microsoft Windows CE 4.2 English**<br>OEM Microsoft Windows CE 4.2 English license<br>Only delivered with a Power Panel BIOS device | |
| 9S0001.29-020 | **OEM Microsoft Windows CE 5.0 English**<br>OEM Microsoft Windows CE 5.0 English license<br>Only delivered with a Power Panel BIOS device. | Cancelled since 07/2007 |
| 5SWWCE.0517-ENG | **WinCE5.0 Pro PP100 SCx200**<br>Microsoft Windows CE 5.0 Professional, English; for PP100 BIOS units 5PP120.0571-27, 5PP120.1043-37A, 5PP120.1214-37A, 5PP120.1505-37A, order CompactFlash separately (at least 128 MB). | |
| 5SWWCE.0617-ENG | **WinCE5.0 ProPlus PP100 SCX200**<br>Microsoft Windows CE 5.0 Professional Plus, English; for PP100 BIOS units 5PP120.0571-27, 5PP120.1043-37A, 5PP120.1214-37A, 5PP120.1505-37A, order CompactFlash separately (at least 128 MB). | |
| 5SWWXP.0417-ENG | **WinXPe FP2007 PP100 SCx200**<br>Microsoft Windows XP embedded English, Feature Pack 2007; for PP100 BIOS units 5PP120.1043-37A, 5PP120.1214-37A, 5PP120.1505-37A, order CompactFlash separately (at least 512 MB). Only delivered with a new PC. | |
| 9S0001.16-020 | **OEM MS WinXPe PP100/200 w/CF**<br>OEM MS WinXP Embedded Runtime PP100 preinstalled on CompactFlash 256 MB; for Power Panel 100 BIOS.<br>Only delivered with a Power Panel BIOS device | Cancelled since 07/2007<br>Replacement type:<br>5SWWXP.0417-ENG |
| 9S0001.25-020 | **OEM MS WinXPe PP100/200 w/CF SP2**<br>OEM Microsoft Windows XP embedded SP2 for PP100 BIOS, English; preinstalled on CompactFlash 256 MB.<br>Only delivered with a Power Panel BIOS device | Cancelled since 07/2007<br>Replacement type:<br>5SWWXP.0417-ENG |

Table 8: Model numbers - Software

## 5.6 Documentation

| Model number | Description | Note |
|---|---|---|
| MAPP100.200-GER | Power Panel 100 / 200 User's Manual, German | |
| MAPP100.200-ENG | Power Panel 100 / 200 User's Manual, English | |

Table 9: Model numbers - Documentation

# Chapter 2 • Technical data



## 1. General information

B&R offers the B&R Power Panel 100 and Power Panel 200 product ranges for automating small to mid-sized machines and systems.

The Power Panel 100 and Power Panel 200 product range encompasses a line of devices from operator panels with QVGA, VGA or XGA displays to visualization and machine control. Programmable with Automation Studio (Visual Components), these devices close the gap between Panelware and IPC-based systems. Depending on the design, the devices contain the embedded operating system Automation Runtime or a BIOS-based operating system such as Windows CE or Windows XP Embedded. The number of onboard interfaces is reduced to a minimum and size is optimized to the smallest dimensions.

Depending on the variant, the devices have a 5.7" QVGA touch screen available in color or black/white, a 10.4" VGA, a 12.1" SVGA, or a 15" XGA touch screen in color. In addition, there are horizontally or vertically formatted devices available (numeric and alphanumeric keys, with/without legend strips) for all display sizes (exception: 12.1" SVGA - only available without keys and with touch screen).

Figure 1: Power Panel 100 and Power Panel 200 devices

## 1.1 Features

- 24 VDC supply voltage
- 2 USB 1.1 connections
- Ethernet 10/100 MBit interface
- CompactFlash card (type I) slot
- RS232 interface, modem-capable, not electrically isolated
- 2 operating mode switches (2 x 16 digit)
- 2 status LEDs (User or CompactFlash card access)
- Fan-free operation
- Touch screen (analog resistive), function keys or both[1)]
- Filter glass (multiple-coated, non-reflective)[1)]
- Horizontal and vertical mounting orientations, numeric and alphanumeric keys[1)]
- Software compatible with B&R 2000 PLC family
- Maximum 2 aPCI slots (see B&R System 2005 User's Manual for available aPCI interface modules)[1)]
- BIOS or Automation Runtime operating system[1)]
- Real-time clock (battery-buffered)[1)]
- Up to 128 MB SDRAM main memory[1)]

1) Depending on the design of the Power Panel device version

# 2. Power Panel 100 with Automation Runtime

## 2.1 Device interfaces

The following section provides a description of all interfaces and plugs possible with a Power Panel 100 device with Automation Runtime.

### 2.1.1 Supply voltage

Input voltage: 24 VDC ±25%

The 3-pin socket required for the supply voltage connection is not included in delivery. This can be ordered from B&R using the model number 0TB103.9 (screw clamps) or 0TB103.91 (cage clamps). The cable required for the connection must be supplied by the customer (see also section "TB103 3-pin supply voltage connector" on page 553).

The supply voltage is internally protected so that the device cannot be damaged if there is an overload or if the voltage supply is connected incorrectly.

Pin assignments can be found either in the following table or printed on the Power Panel plate or device label (see section 2.2.2 "Device label" on page 52).

| Supply voltage | |
|---|---|
| **Pin** | **Description** |
| 1 | + |
| 2 | Functional ground |
| 3 | - |
| **Accessories** | |
| 0TB103.9 | Plug 24 V 5.08 3p screw clamps |
| 0TB103.91 | Plug 24 V 5.08 3p cage clamps |

Figure 2: Supply voltage connection

## Warning!

**The pin's connection to the functional ground (pin 2) should be as short as possible.**

### 2.1.2 Grounding clip

Should be connected to ground using the shortest route possible.

| Grounding clip |
| --- |
| |

Figure 3: Grounding clip

### 2.1.3 COM interface

The Power Panel is equipped with a PC-compatible serial interface with a 16-byte FIFO buffer. This non-electrically isolated interface is primarily intended for programming Power Panel devices using Automation Studio.

The RS232 can also be used as a general interface (e.g. third-party connections, barcode reader, etc.).

| Serial interface COM | |
| --- | --- |
| RS232 interface<br>Modem-capable, not electrically isolated<br>Up to 115 kBaud | 9-pin DSUB plug<br> |
| **Pin** | **RS232** |
| 1 | DCD |
| 2 | RxD |
| 3 | TxD |
| 4 | DTR |
| 5 | GND |
| 6 | DSR |
| 7 | RTS |
| 8 | CTS |
| 9 | RI |

Table 10: Pin assignments - COM

### 2.1.4 USB port

The Power Panel is equipped with a USB (Universal Serial Bus) host controller with two USB ports.

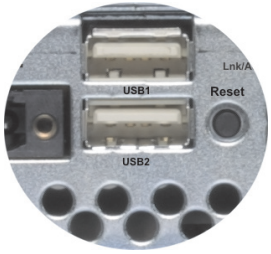
| Universal serial bus |
|---|
|  |



Figure 4: USB port

| Technical data - USB port | |
|---|---|
| Transfer rate | 1.5 MBit/s to 12 MBit/s |
| Power supply | 500 mA for each port |
| Maximum cable length | 5 m (can be extended using a USB hub) |

Table 11: Technical data for USB connection

## Warning!

- **Only the USB devices tested and verified by B&R and found in the section "Accessories" on page 549 may be connected to the USB interface.**
- **Because of general PC specifications, this interface should be handled with extreme care with regard to EMC, location of cables, etc.**

### 2.1.5 Mode / Node switches

Power Panel devices are equipped with 2 hex switches that serve as operating mode switches. Switch positions 01 to FD are available for any purpose in an application and can be evaluated by the application program.

**Mode/Node switch**

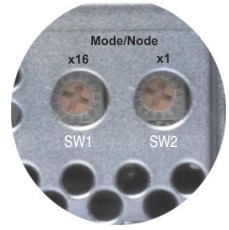



Figure 5: Mode/Node switch

| Switch position | | Function | Description |
|---|---|---|---|
| SW1 (x16) | SW2 (x1) | Operating mode switch | |
| 0 | 0 | Boot | Automation Runtime boot mode for operating system (firmware) upgrade (default: Automation Runtime).<br>In this position, a new or missing operating system can be downloaded. |
| 0 to F | 0 to F | Node | Automation Runtime run mode with node 01-FD (CompactFlash Automation Runtime or terminal operation).<br>Freely available for use in an application, e.g. setting the INA2000 node number for the Ethernet interface. |
| F | E | Dyn. mode | Automation Runtime run mode with node 01-FD (CompactFlash Automation Runtime or terminal operation).<br>Device addresses can be assigned through the software. |
| F | F | Diagnostics | Automation Runtime diagnostics mode (CompactFlash Automation Runtime or terminal operation). |

Table 12: Switch settings for the Mode / Node switch

### 2.1.6 Status LEDs

Power Panels are equipped with two status LEDs that are visible on the outside.

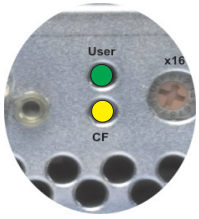
| Status LEDs |
|---|
|  |



Figure 6: Status LEDs

| LED | Color | Function |
|---|---|---|
| User | Green | Available for use by the user (corresponding libraries for Automation Studio in preparation) |
| CF | Yellow | Indicates that a CompactFlash card is being accessed. |

Table 13: Status LEDs

### 2.1.7 Ethernet connection

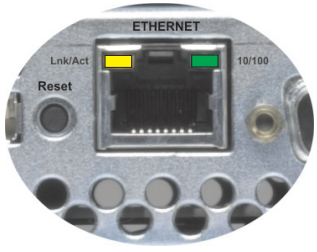
| Ethernet connection |
|---|
|  |



Figure 7: Ethernet connection

| Ethernet | 10/100 MBit/s [1] |
|---|---|
| Connection | RJ45 twisted pair (10BaseT/100BaseT) |
| Controller | MacPhyter DP83815 or DP83816 - depends on the revision |
| Cabling | S/STP (category 5) |

Table 14: Ethernet controller

1) Both operating modes are possible. Switching takes place automatically.

The onboard Ethernet controller for Power Panel devices provides an RJ45 twisted pair connection where 2 LEDs are attached for status checking:

| LED | On | Off |
|---|---|---|
| Green | 100 MBit/s | 10 MBit/s |
| Yellow | Link (LED blinks during transfer) | No link |

Table 15: Status LEDs - Ethernet controller

### 2.1.8 Reset button

The reset button can be accessed through a small hole between the USB and the Ethernet connections. In order to avoid accidental activation, a reset can only be triggered with a pointed object.

| Reset button |
|---|
| |

Figure 8: Reset button

### 2.1.9 CompactFlash slot

Power Panel devices are equipped with a CompactFlash slot that is accessible from the side. Type I CompactFlash cards are supported.

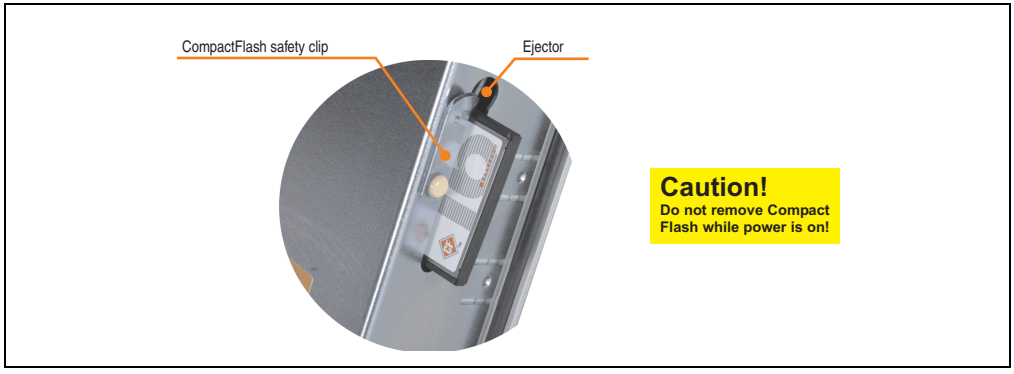



Figure 9: CompactFlash slot

It is possible to secure the CompactFlash slot using the latch provided. By pressing the ejector (using a pointed object is the best way to do this), the CompactFlash card can be changed quickly and safely.

## Warning!

**The power must be turned off before inserting or removing the CompactFlash card! As a safety measure, a sticker is also attached to Power Panel devices stating this.**

## 2.2 Stickers

### 2.2.1 Safety sticker

A safety sticker attached over the CompactFlash slot advises that the power to the Power Panel device must be switched off when inserting or removing a CompactFlash card.

Figure 10: Safety sticker

### 2.2.2 Device label

The following label is attached to a suitable location on the Power Panel and shows brief descriptions for all of the interfaces:

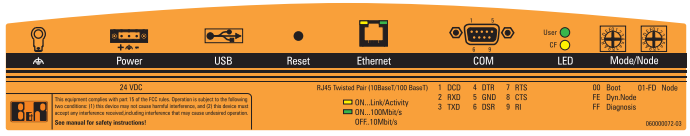



Figure 11: Device label

### 2.2.3 Serial number sticker

#### General information

Each B&R device is given a unique serial number sticker with a barcode that allows the device to be clearly identified.

#### Design / dimensions

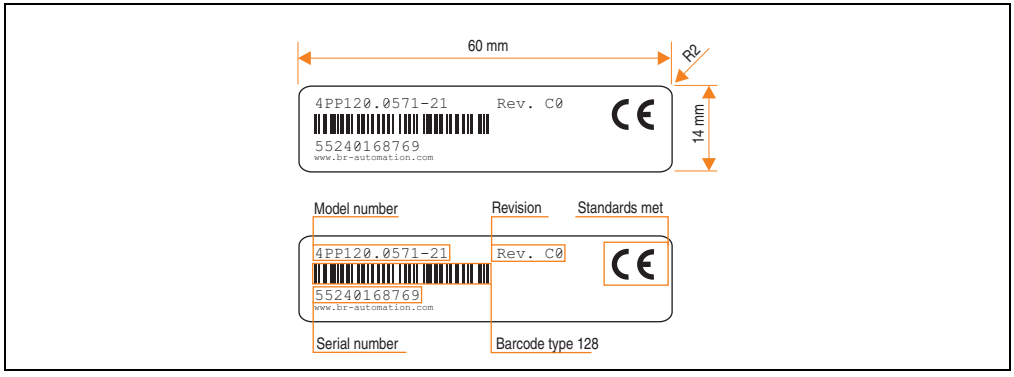



Figure 12: Design / dimensions - Serial number sticker

## 2.3 Device 4PP120.0571-01

Figure 13: Front view - 4PP120.0571-01

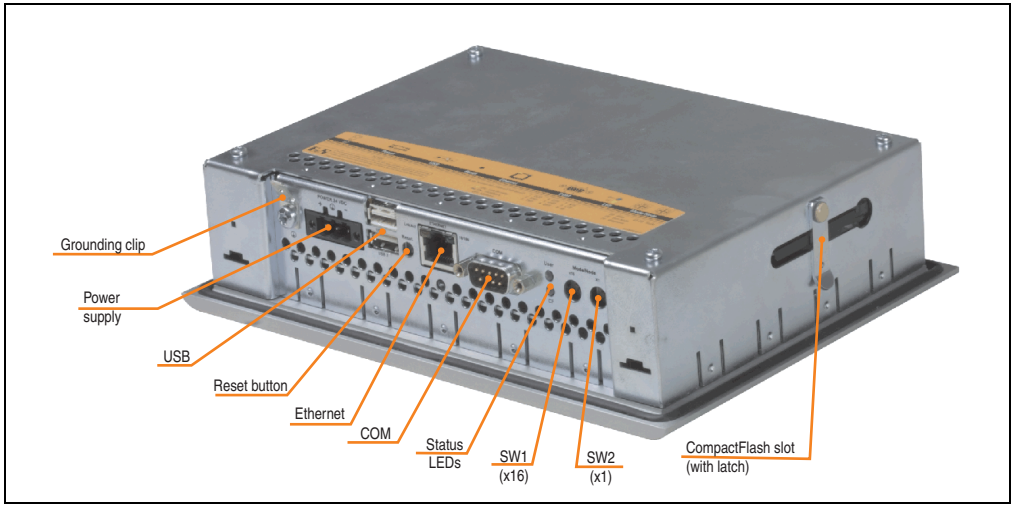



Figure 14: Rear view - 4PP120.0571-01

### 2.3.1 Technical data

| Features | 4PP120.0571-01 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB (Rev. < H0: 16 MB)<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < D0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 16: Technical data - 4PP120.0571-01

| Features | 4PP120.0571-01 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | LCD monochrome |
| Diagonal | 5.7 in (144 mm) |
| Colors | 8 shades of gray |
| Resolution | QVGA, 320 x 240 pixels |
| Contrast | 25:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =40° |
| Vertical | Direction U = 40°/ direction D = 50° |
| Background lighting | |
| Brightness | 140 cd/m² |
| Half-brightness time | 50,000 hours |
| Touch screen | |
| Touch screen type | Gunze |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 84% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 10 W typical, 15 W max. |
| Electrical isolation | - |
| Bleeder resistance | 0 Ohm |

Table 16: Technical data - 4PP120.0571-01 (cont.)

| Mechanical characteristics | 4PP120.0571-01 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 212 mm |
| Height | 156 mm |
| Depth | 55.5 mm |
| Weight | Approx. 1.4 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 2.3.2 "Temperature humidity diagram" on page 58 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 16: Technical data - 4PP120.0571-01 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.3.2 Temperature humidity diagram

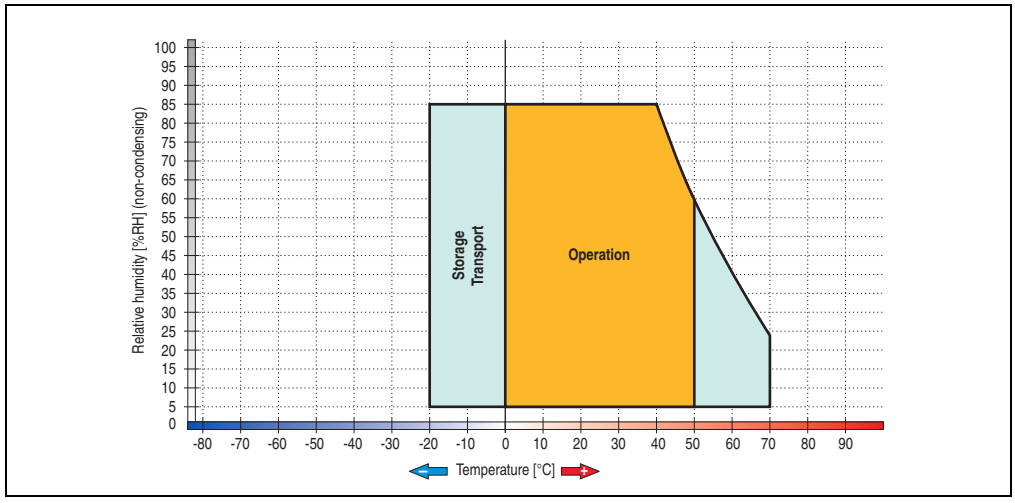



Figure 15: Temperature humidity diagram - 4PP120.0571-01

### 2.3.3 Dimensions

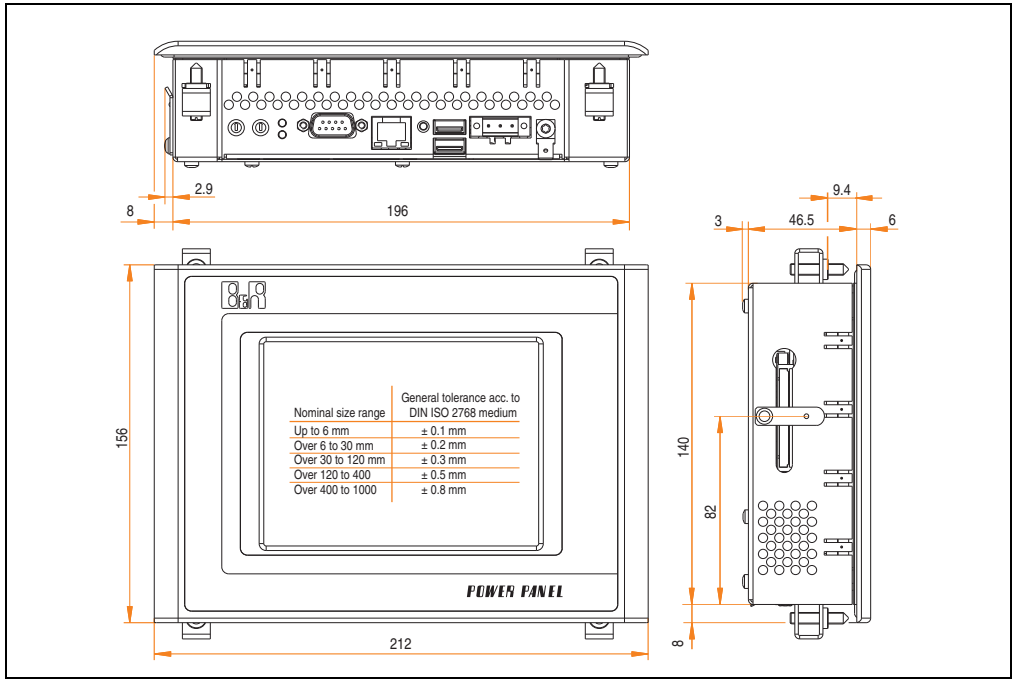



Figure 16: Dimensions - 4PP120.0571-01

### 2.3.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 16 "Dimensions - 4PP120.0571-01" on page 58) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

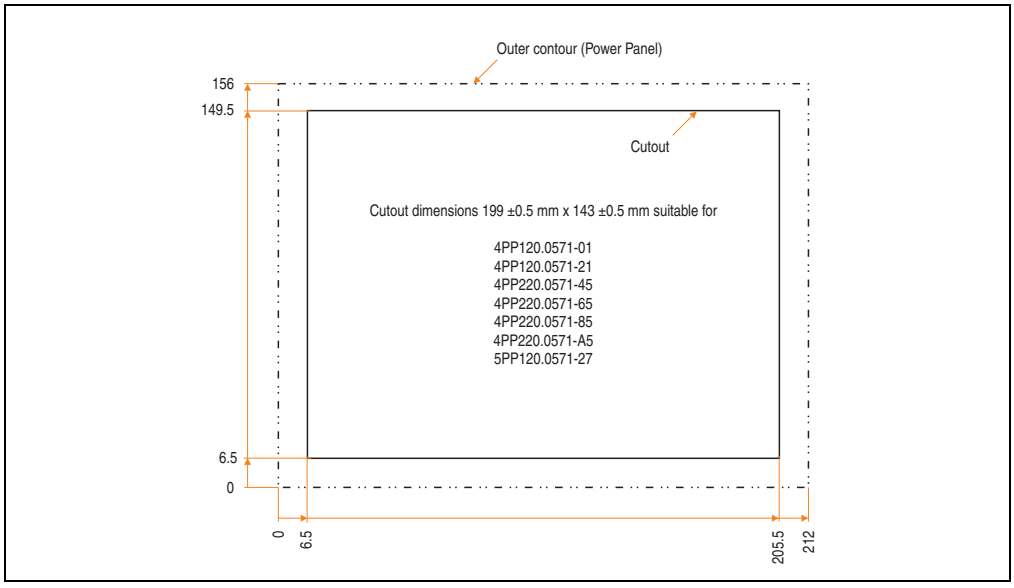



Figure 17: Cutout dimensions

### 2.3.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 120 LCD B/W QVGA 5.7" T MH |
| 4 | Retaining clips included |

Table 17: Contents of delivery - 4PP120.0571-01

## 2.4 Device 4PP120.0571-21

Figure 18: Front view - 4PP120.0571-21

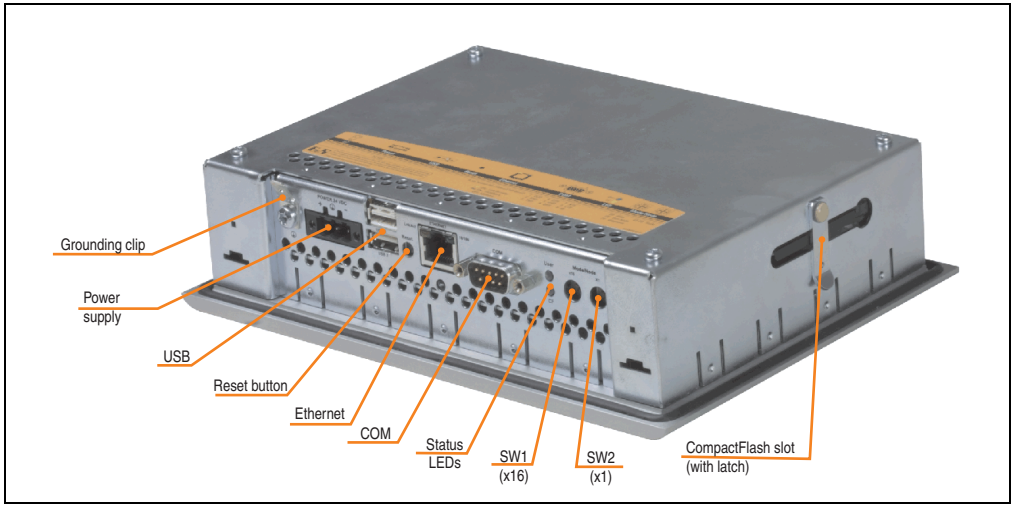



Figure 19: Rear view - 4PP120.0571-21

### 2.4.1 Technical data

| Features | 4PP120.0571-21 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB (Rev. < H0: 16 MB)<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < D0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 18: Technical data - 4PP120.0571-21

| Features | 4PP120.0571-21 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color LCD |
| Diagonal | 5.7 in (144 mm) |
| Colors | 256 colors |
| Resolution | QVGA, 320 x 240 pixels |
| Contrast | 40:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =40° |
| Vertical | Direction U = 40°/ direction D = 50° |
| Background lighting | |
| Brightness | 150 cd/m² |
| Half-brightness time | 50,000 hours |
| Touch screen | |
| Touch screen type | Gunze |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 84% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 10 W typical, 15 W max. |
| Electrical isolation | - |
| Bleeder resistance | 0 Ohm |

Table 18: Technical data - 4PP120.0571-21 (cont.)

| Mechanical characteristics | 4PP120.0571-21 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 212 mm |
| Height | 156 mm |
| Depth | 55.5 mm |
| Weight | Approx. 1.4 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 2.4.2 "Temperature humidity diagram" on page 64 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 18: Technical data - 4PP120.0571-21 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.4.2 Temperature humidity diagram

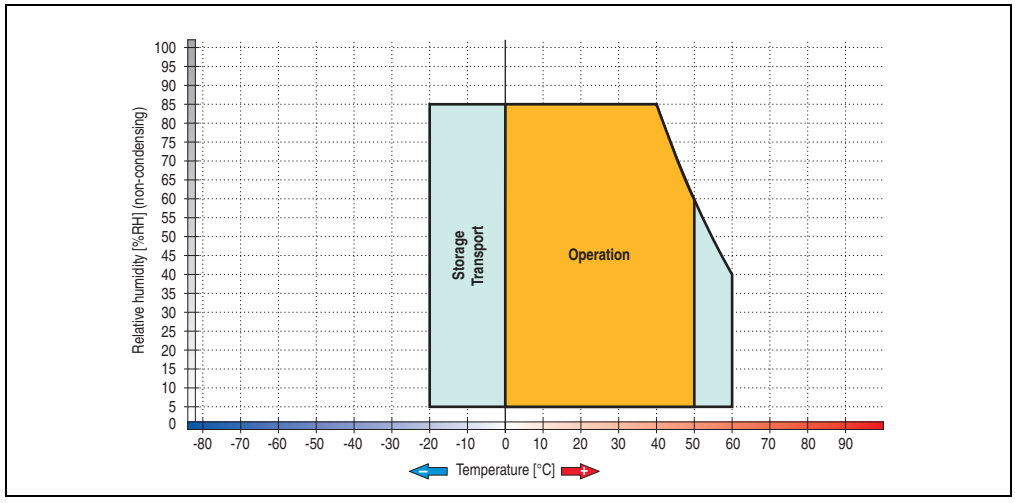



Figure 20: Temperature humidity diagram - 4PP120.0571-21

### 2.4.3 Dimensions

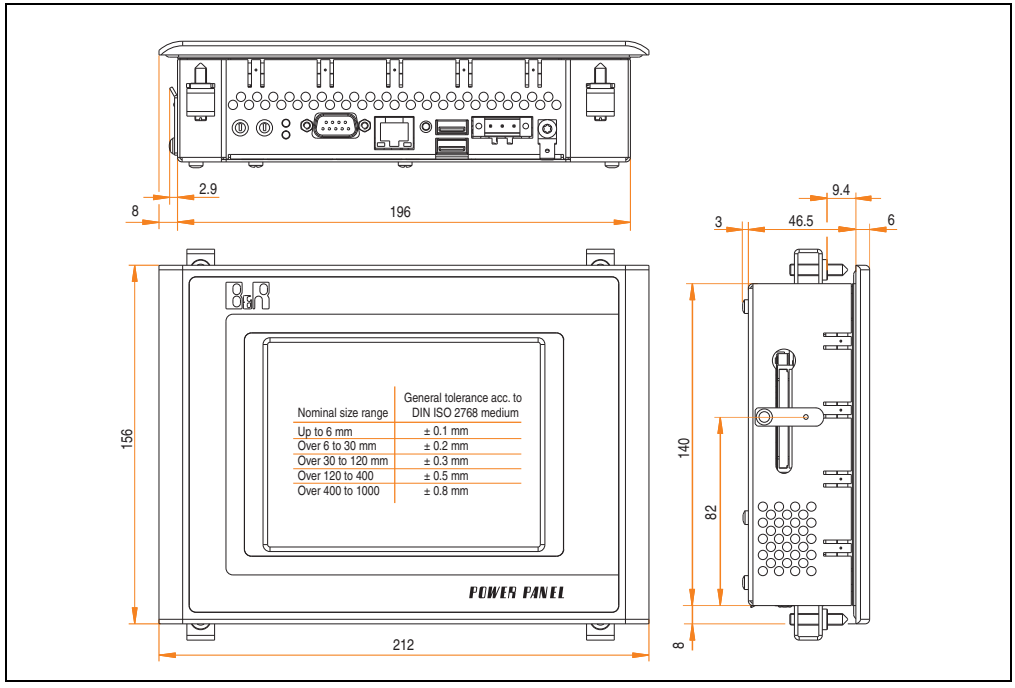



Figure 21: Dimensions - 4PP120.0571-21

### 2.4.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 21 "Dimensions - 4PP120.0571-21" on page 64) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

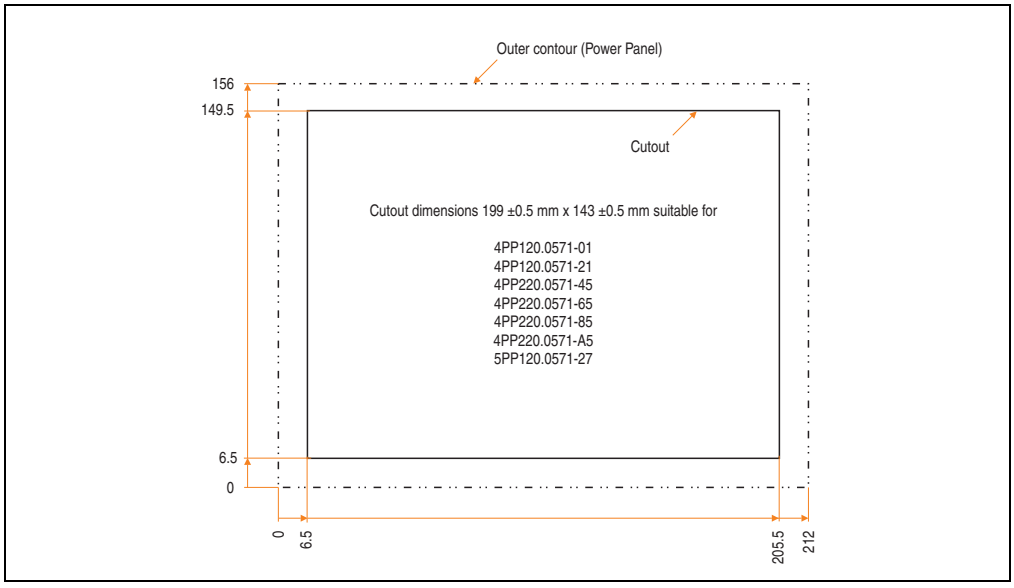



Figure 22: Cutout dimensions

### 2.4.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 120 LCD C QVGA 5.7" T MH |
| 4 | Retaining clips included |

Table 19: Contents of delivery - 4PP120.0571-21

## 2.5 Device 4PP120.1043-31

Figure 23: Front view - 4PP120.1043-31

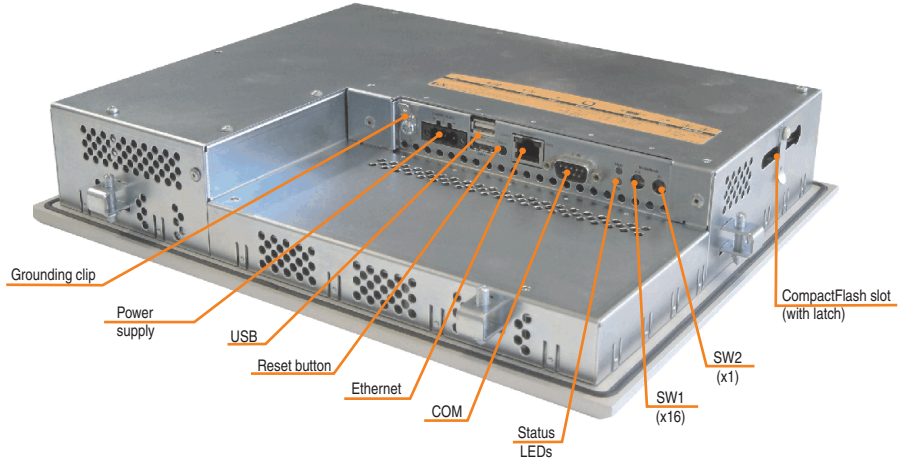



Figure 24: Rear view - 4PP120.1043-31

### 2.5.1 Technical data

| Features | 4PP120.1043-31 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB (Rev. < H0: 16 MB)<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < C7 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 20: Technical data - 4PP120.1043-31

| Features | 4PP120.1043-31 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | |
| Touch screen type | Elo (Rev. < I0: 3M) |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 15 W typical, 20 W max. |
| Electrical isolation | - |
| Bleeder resistance | ≤ 24 kOhm |

Table 20: Technical data - 4PP120.1043-31 (cont.)

| Mechanical characteristics | 4PP120.1043-31 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 323 mm |
| Height | 260 mm |
| Depth | 65.5 mm |
| Weight | Approx. 3.7 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 2.5.2 "Temperature humidity diagram" on page 70 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 20: Technical data - 4PP120.1043-31 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.5.2 Temperature humidity diagram

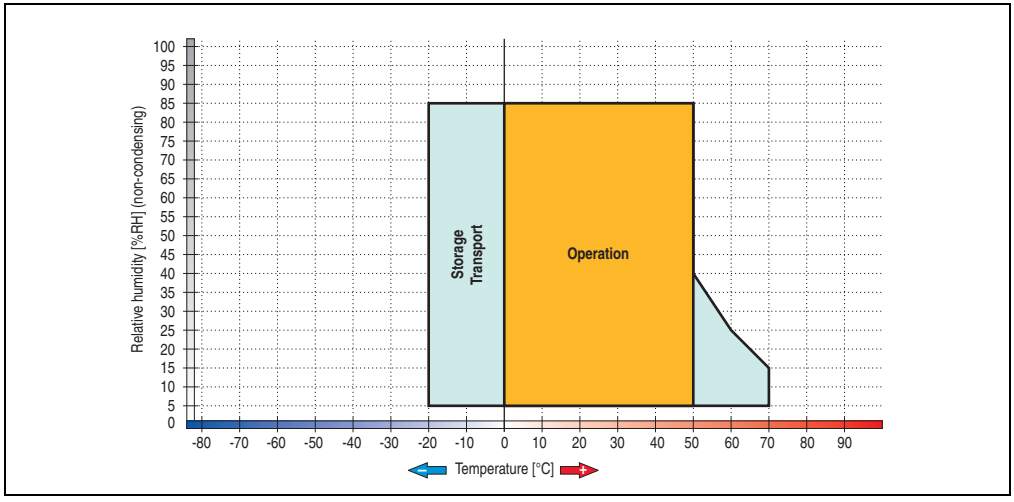



Figure 25: Temperature humidity diagram - 4PP120.1043-31

### 2.5.3 Dimensions

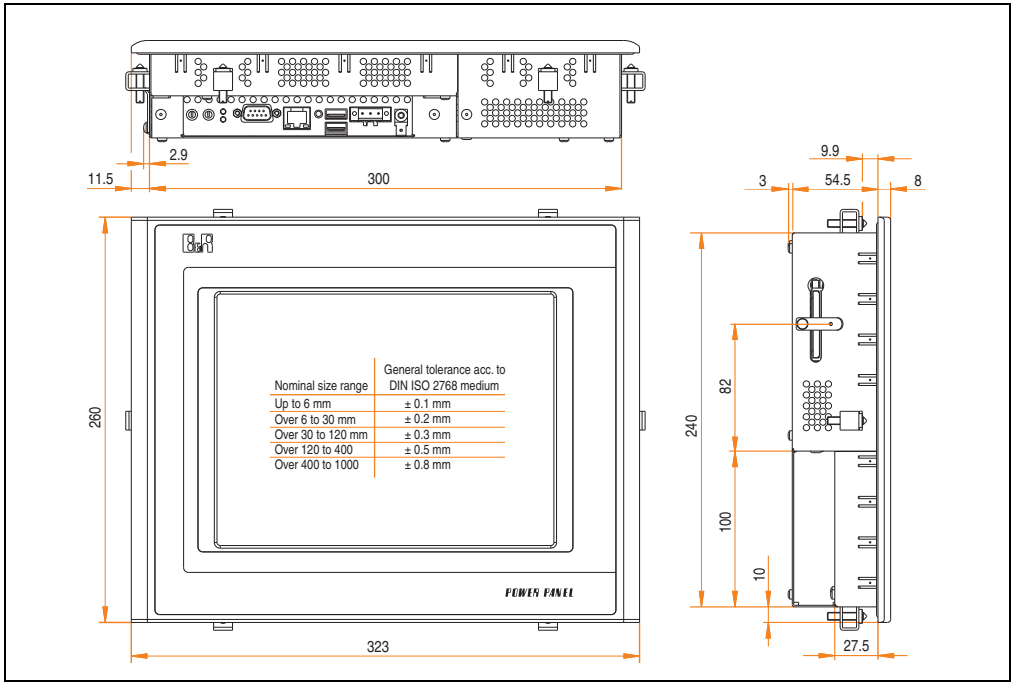



Figure 26: Dimensions - 4PP120.1043-31

### 2.5.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 26 "Dimensions - 4PP120.1043-31" on page 70) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

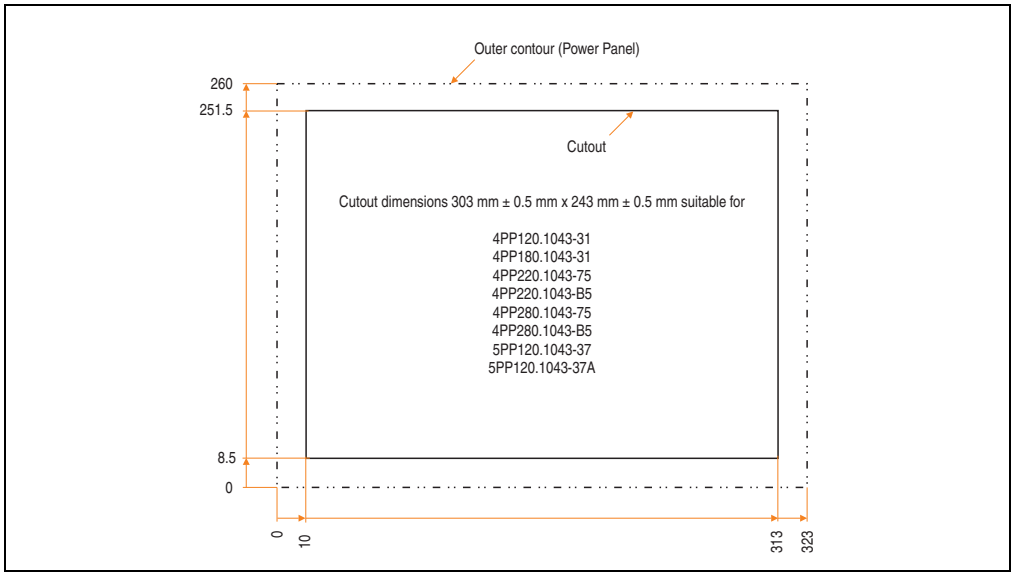



Figure 27: Cutout dimensions

### 2.5.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 120 TFT C VGA 10.4" T MH |
| 6 | Retaining clips included |

Table 21: Contents of delivery - 4PP120.1043-31

## 2.6 Device 4PP120.1505-31

Figure 28: Front view - 4PP120.1505-31

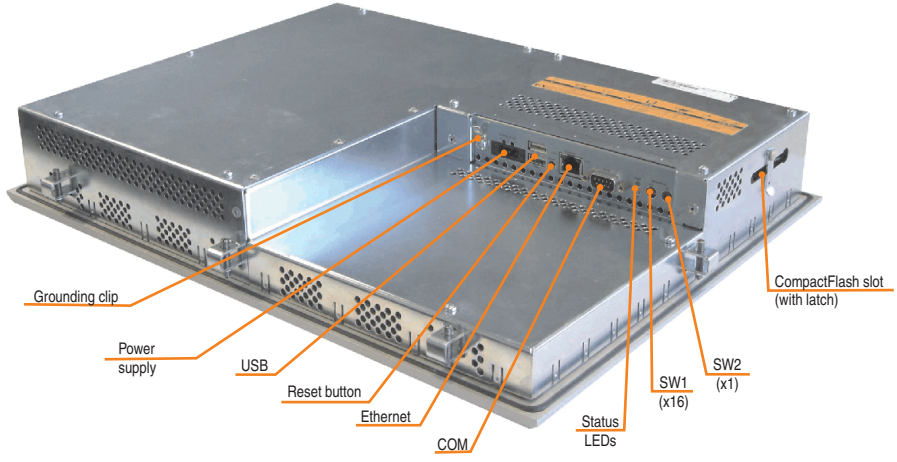



Figure 29: Rear view - 4PP120.1505-31

### 2.6.1 Technical data

| Features | 4PP120.1505-31 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB (Rev. < K0: 16 MB)<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < E0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 22: Technical data - 4PP120.1505-31

| Features | 4PP120.1505-31 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 256 colors |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | |
| Touch screen type | Elo (Rev. < L0: 3M) |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 30 W typical, 35 W max. |
| Electrical isolation | Yes |
| Bleeder resistance | ≤ 24 kOhm |

Table 22: Technical data - 4PP120.1505-31 (cont.)

| Mechanical characteristics | 4PP120.1505-31 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 435 mm |
| Height | 330 mm |
| Depth | 71.5 mm |
| Weight | Approx. 6.3 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 2.6.2 "Temperature humidity diagram" on page 76 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 22: Technical data - 4PP120.1505-31 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.6.2 Temperature humidity diagram

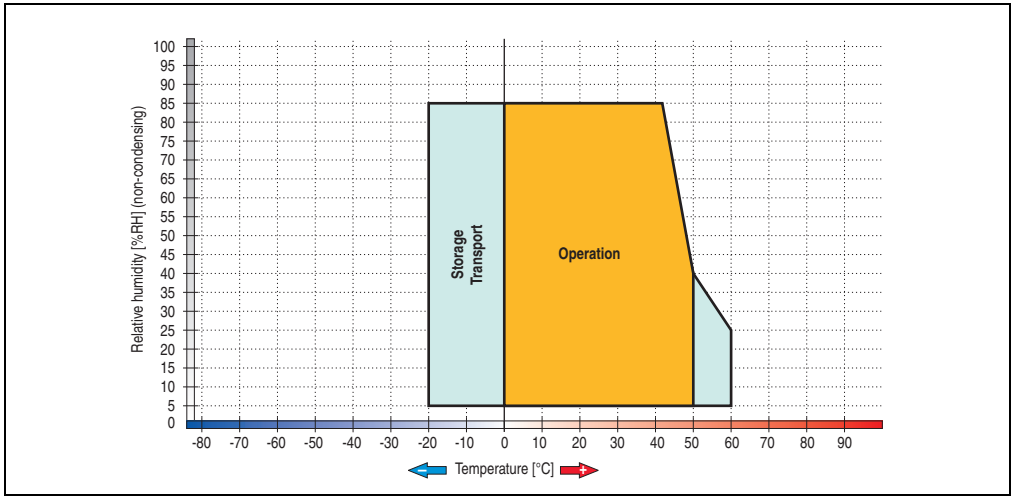



Figure 30: Temperature humidity diagram - 4PP120.1505-31

### 2.6.3 Dimensions

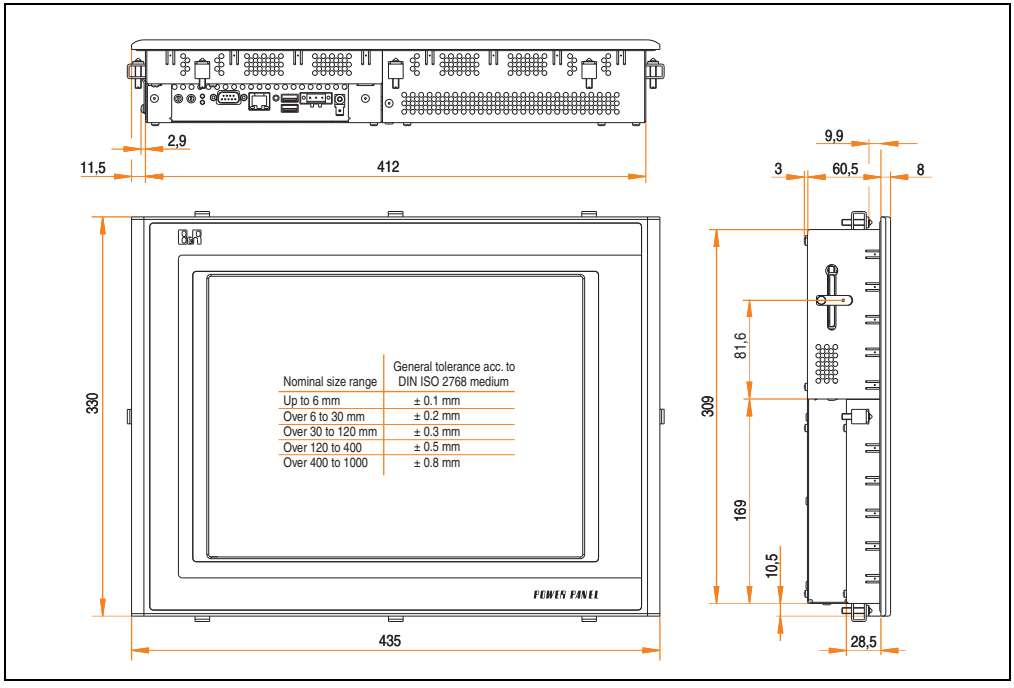



Figure 31: Dimensions - 4PP120.1505-31

### 2.6.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 31 "Dimensions - 4PP120.1505-31" on page 76) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

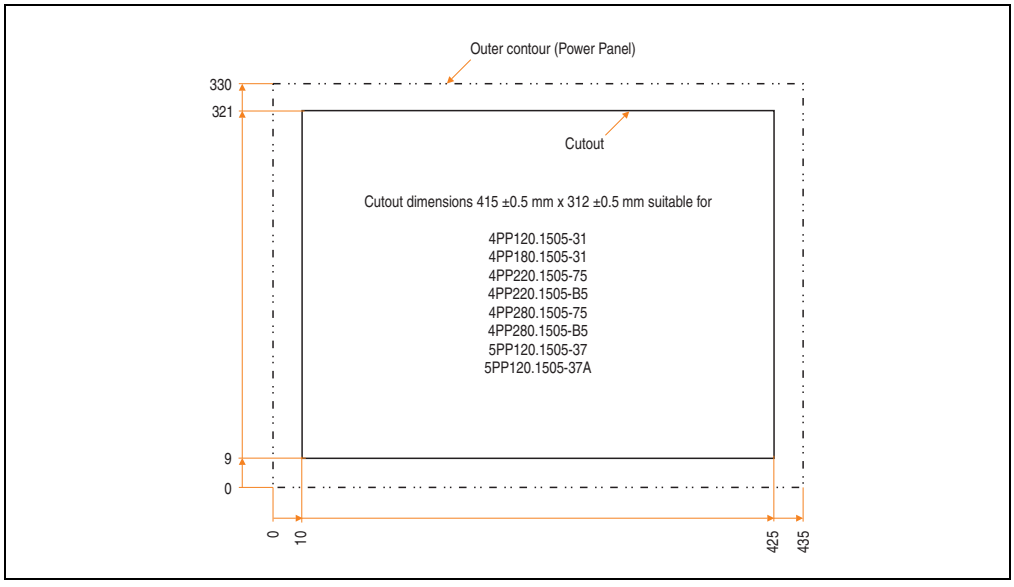



Figure 32: Cutout dimensions

### 2.6.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 120 TFT C XGA 15" T MH |
| 8 | Retaining clips included |

Table 23: Contents of delivery - 4PP120.1505-31

## 2.7 Device 4PP151.0571-01

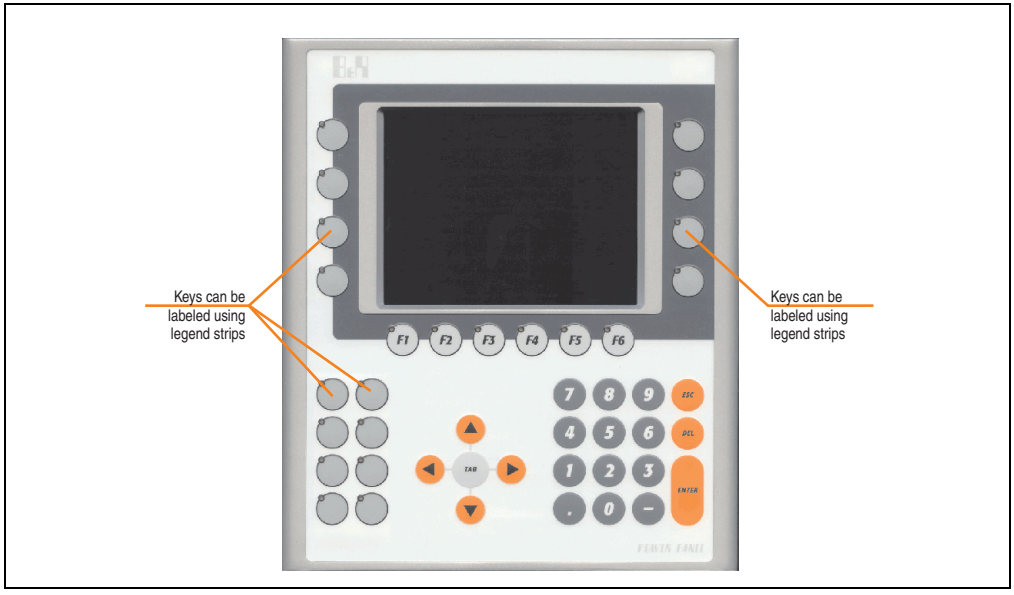



Figure 33: Front view - 4PP151.0571-01

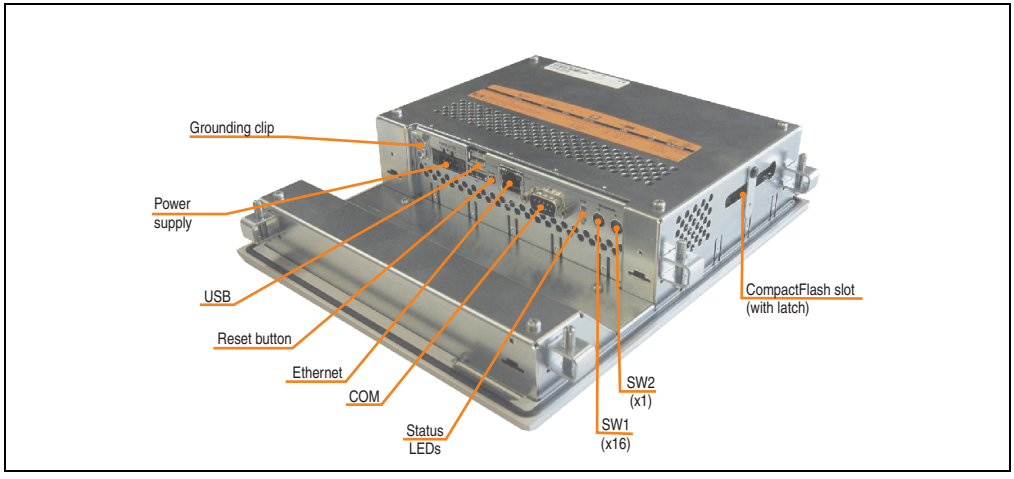



Figure 34: Rear view - 4PP151.0571-01

### 2.7.1 Technical data

| Features | 4PP151.0571-01 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB (Rev. < E0: 16 MB)<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 24: Technical data - 4PP151.0571-01

| Features | 4PP151.0571-01 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | - |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>LCD monochrome<br>5.7 in (144 mm)<br>8 shades of gray<br>QVGA, 320 x 240 pixels<br>25:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>140 cd/m²<br>50,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - |
| Filter glass<br>Degree of transmission<br>Coating | <br>95%<br>On both sides |
| Keys/LED<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | <br>> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force<br>16 with LED<br>6 with LED<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>13 W typical, 18 W max.<br>- |

Table 24: Technical data - 4PP151.0571-01 (cont.)

| Electrical characteristics | 4PP151.0571-01 |
|---|---|
| Bleeder resistance | 0 Ohm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 212 mm |
| Height | 245 mm |
| Depth | 55.5 mm |
| Weight | Approx. 2 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 2.7.2 "Temperature humidity diagram" on page 82 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 24: Technical data - 4PP151.0571-01 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.7.2 Temperature humidity diagram

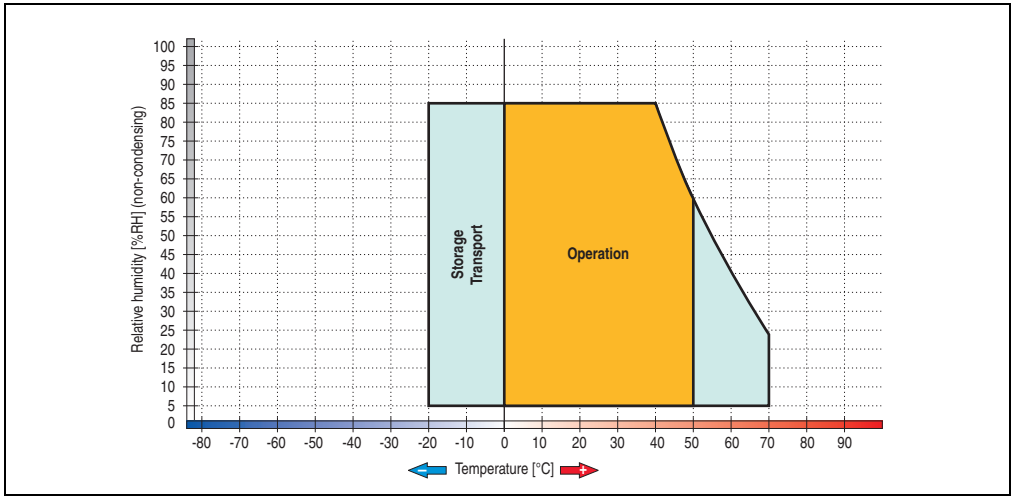



Figure 35: Temperature humidity diagram - 4PP151.0571-01

### 2.7.3 Dimensions

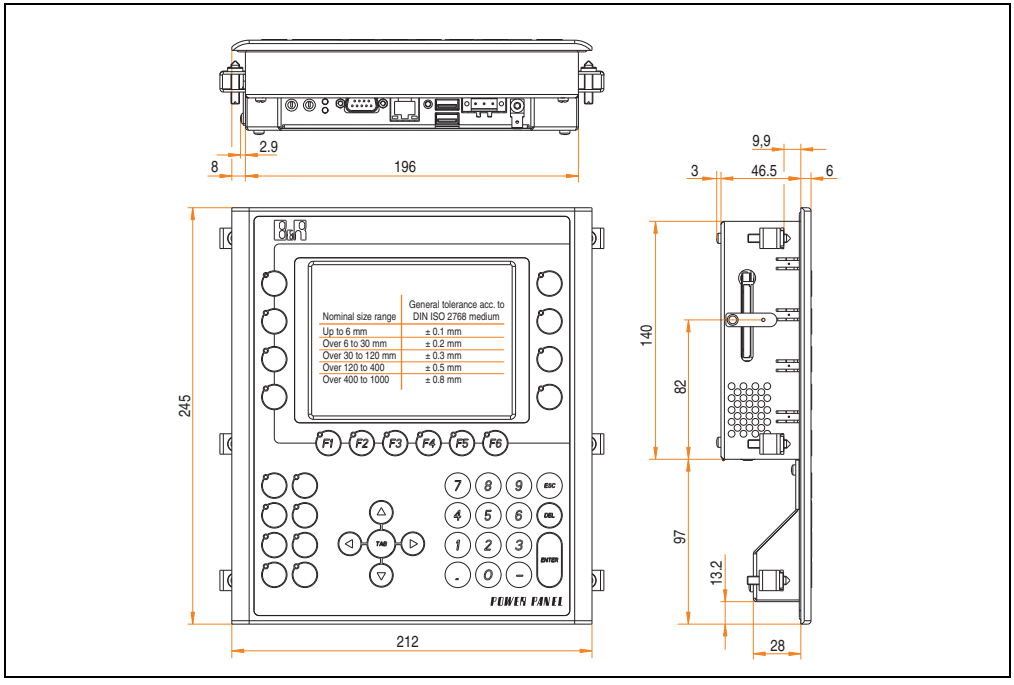



Figure 36: Dimensions - 4PP151.0571-01

### 2.7.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 36 "Dimensions - 4PP151.0571-01" on page 82) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

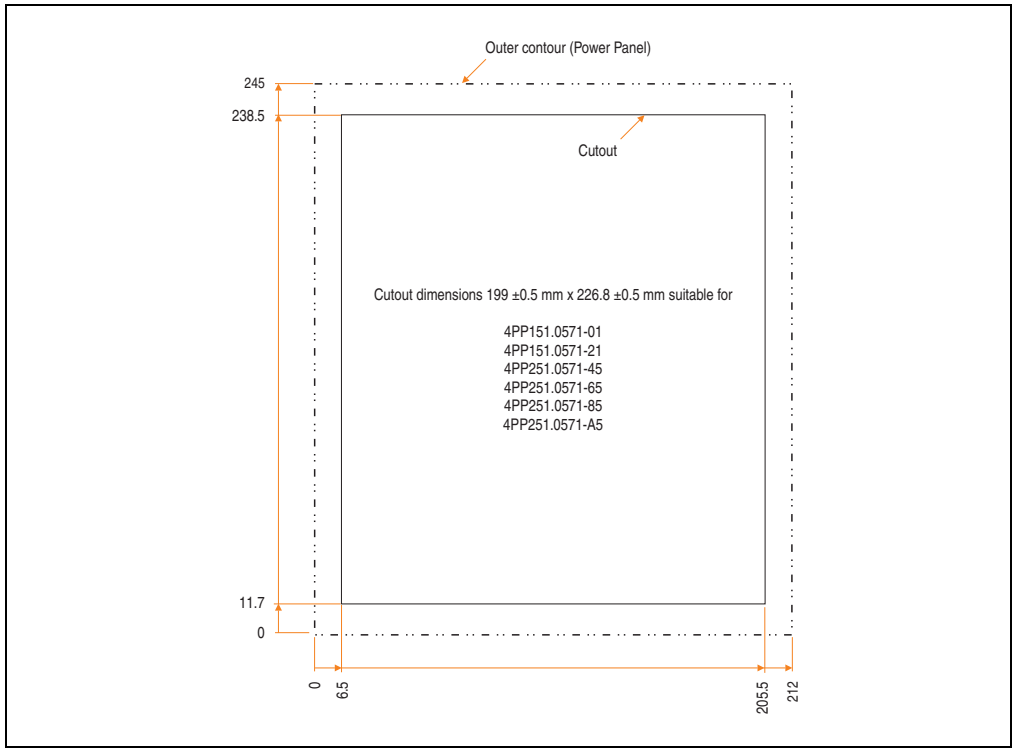



Figure 37: Cutout dimensions

### 2.7.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 151 LCD B/W QVGA 5.7" F MH |
| 6 | Retaining clips included |
| 4 | Legend strips (inserted in the front) |

Table 25: Contents of delivery - 4PP151.0571-01

## 2.8 Device 4PP151.0571-21

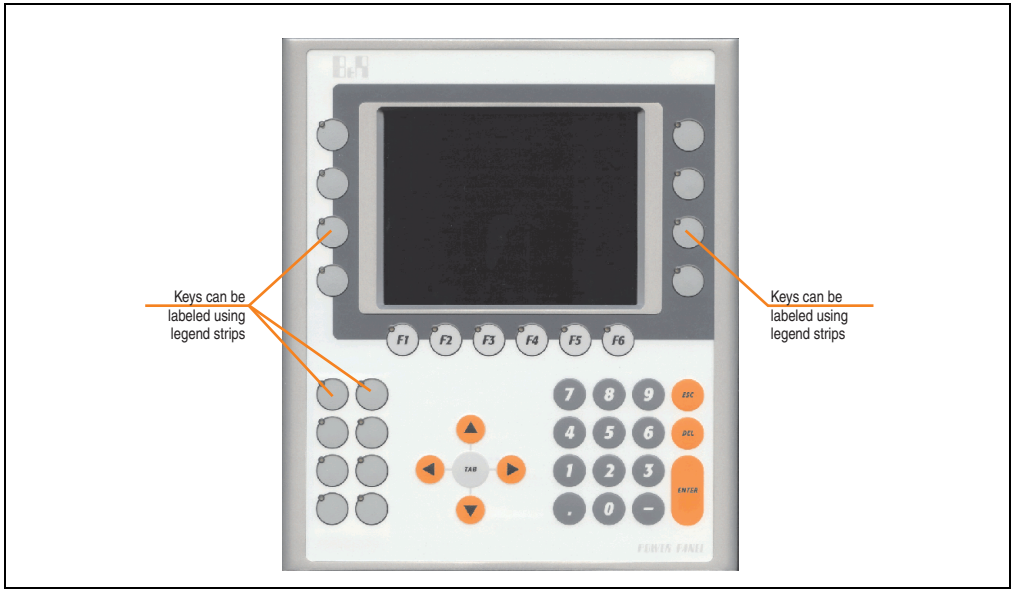



Figure 38: Front view - 4PP151.0571-21

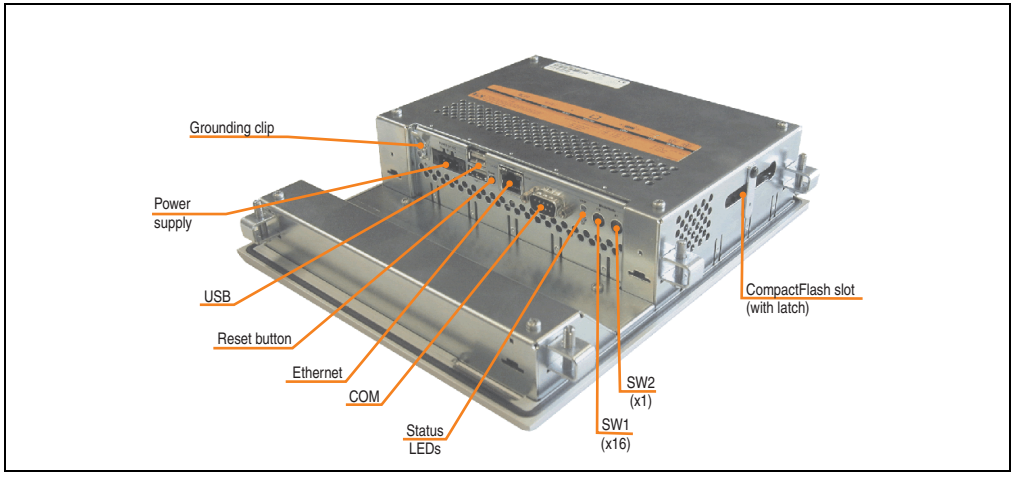



Figure 39: Rear view - 4PP151.0571-21

### 2.8.1 Technical data

| Features | 4PP151.0571-21 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB (Rev. < E0: 16 MB)<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 26: Technical data - 4PP151.0571-21

| Features | 4PP151.0571-21 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color LCD |
| Diagonal | 5.7 in (144 mm) |
| Colors | 256 colors |
| Resolution | QVGA, 320 x 240 pixels |
| Contrast | 40:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =40° |
| Vertical | Direction U = 40°/ direction D = 50° |
| Background lighting | |
| Brightness | 150 cd/m² |
| Half-brightness time | 50,000 hours |
| Touch screen | - |
| Touch screen type | |
| Technology | |
| Controller | |
| Degree of transmission | |
| Filter glass | |
| Degree of transmission | 95% |
| Coating | On both sides |
| Keys | |
| Key lifespan | > 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force |
| Function keys | 16 with LED |
| Soft keys | 6 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 13 W typical, 18 W max. |
| Electrical isolation | - |

Table 26: Technical data - 4PP151.0571-21 (cont.)

| Electrical characteristics | 4PP151.0571-21 |
|---|---|
| Bleeder resistance | 0 Ohm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Orange keys<br>Dark gray keys<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 151CV<br>Similar to Pantone 431CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>212 mm<br>245 mm<br>55.5 mm |
| Weight | Approx. 2 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +60°C<br>-20 to +60°C |
| Relative humidity | See 2.8.2 "Temperature humidity diagram" on page 88 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 26: Technical data - 4PP151.0571-21 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.8.2 Temperature humidity diagram

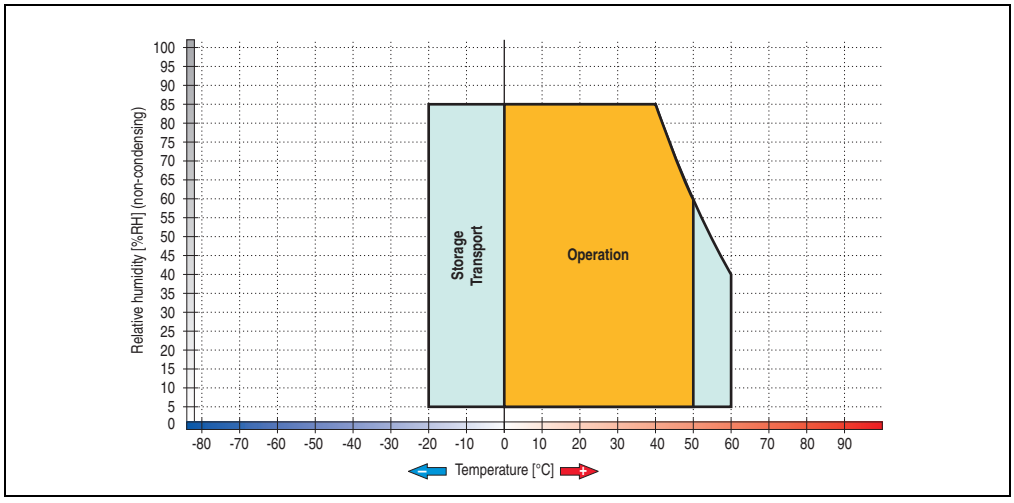



Figure 40: Temperature humidity diagram - 4PP151.0571-21

### 2.8.3 Dimensions

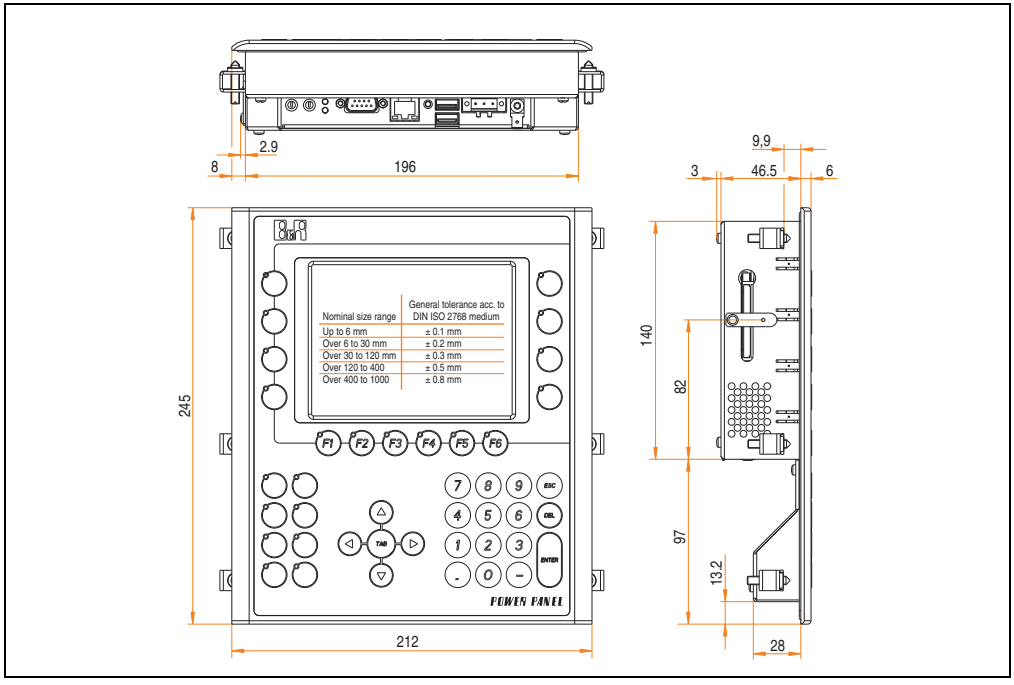



Figure 41: Dimensions - 4PP151.0571-21

### 2.8.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 41 "Dimensions - 4PP151.0571-21" on page 88) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

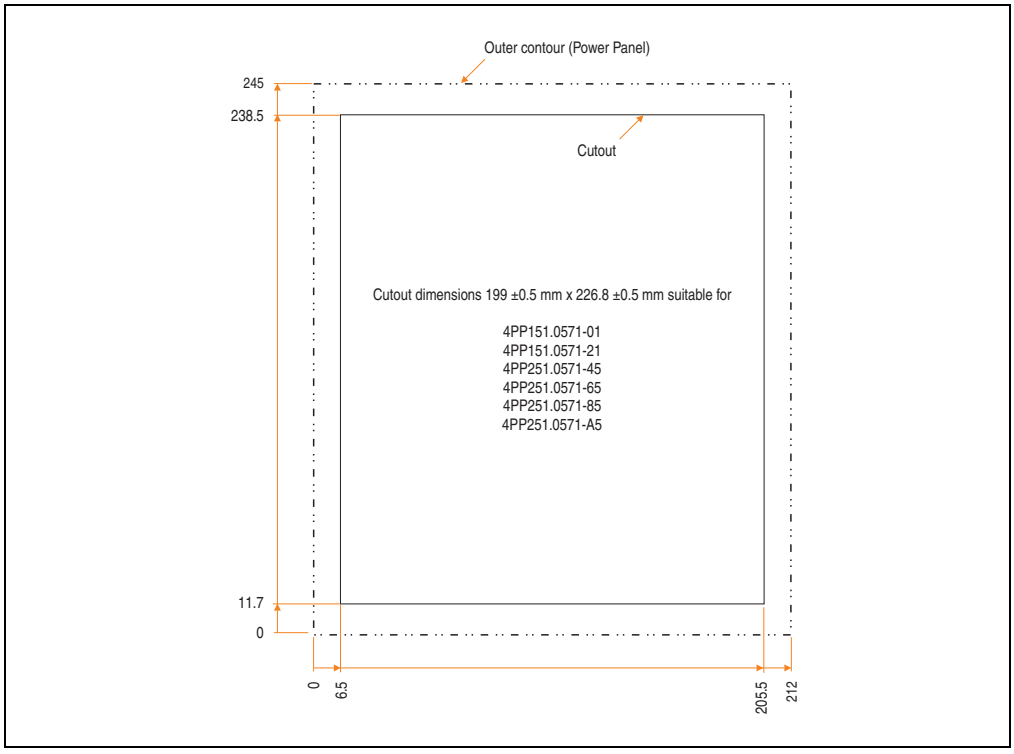



Figure 42: Cutout dimensions

### 2.8.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 120 LCD C QVGA 5.7" T MH |
| 6 | Retaining clips included |
| 4 | Legend strips (inserted in the front) |

Table 27: Contents of delivery - 4PP151.0571-21

## 2.9 Device 4PP151.1043-31

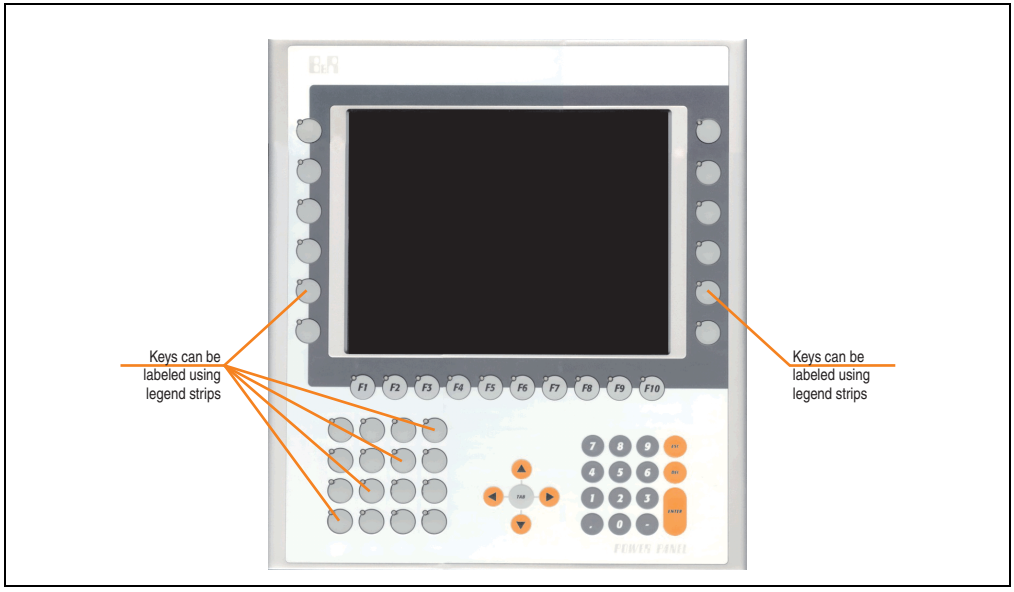



Figure 43: Front view - 4PP151.1043-31

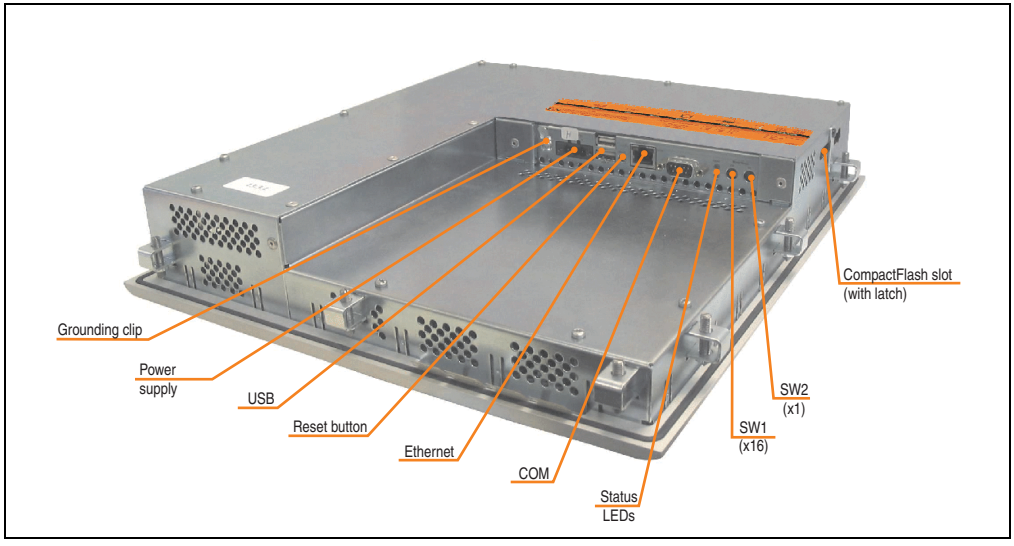



Figure 44: Rear view - 4PP151.1043-31

### 2.9.1 Technical data

| Features | 4PP151.1043-31 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 28: Technical data - 4PP120.1043-31

| Features | 4PP151.1043-31 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | - |
| Touch screen type | |
| Technology | |
| Controller | |
| Degree of transmission | |
| Filter glass | |
| Degree of transmission | 95% |
| Coating | On both sides |
| Keys | |
| Key lifespan | > 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force |
| Function keys | 28 with LED |
| Soft keys | 10 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 18 W typical, 23 W max. |
| Electrical isolation | - |

Table 28: Technical data - 4PP120.1043-31 (cont.)

| Electrical characteristics | 4PP151.1043-31 |
|---|---|
| Bleeder resistance | ≤ 24 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 323 mm |
| Height | 358 mm |
| Depth | 65.5 mm |
| Weight | Approx. 4.6 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 2.9.2 "Temperature humidity diagram" on page 94 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 28: Technical data - 4PP120.1043-31 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.9.2 Temperature humidity diagram

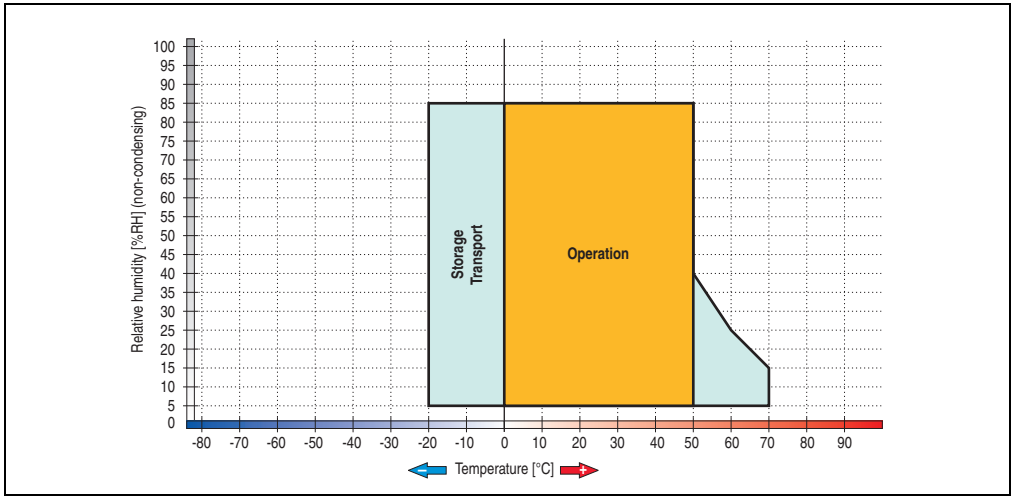



Figure 45: Temperature humidity diagram - 4PP151.1043-31

### 2.9.3 Dimensions

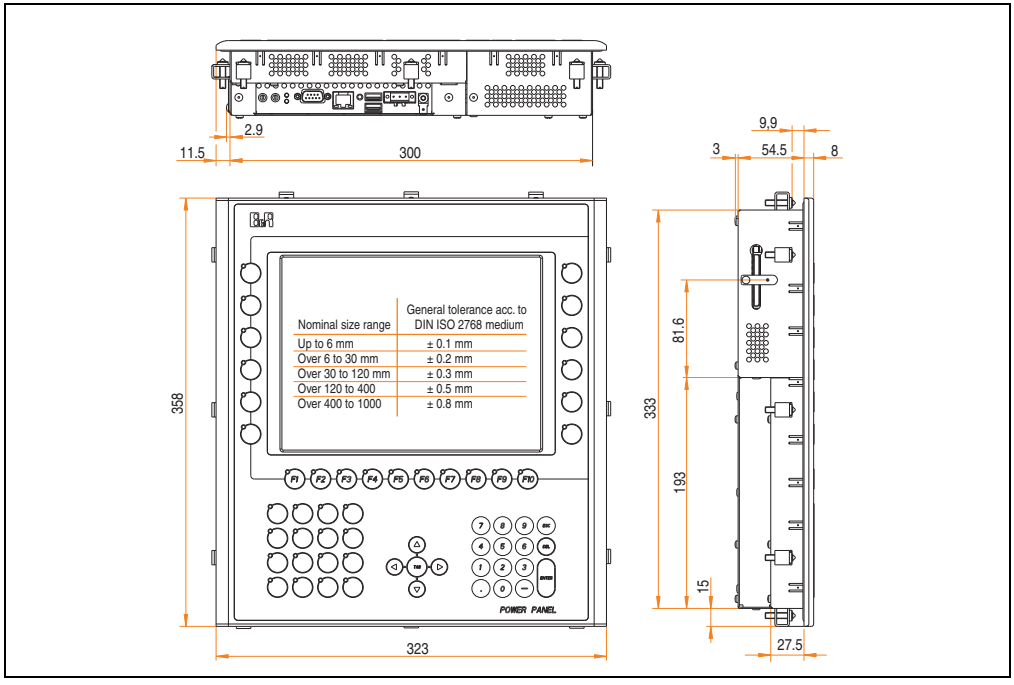



Figure 46: Dimensions - 4PP151.1043-31

### 2.9.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 46 "Dimensions - 4PP151.1043-31" on page 94) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

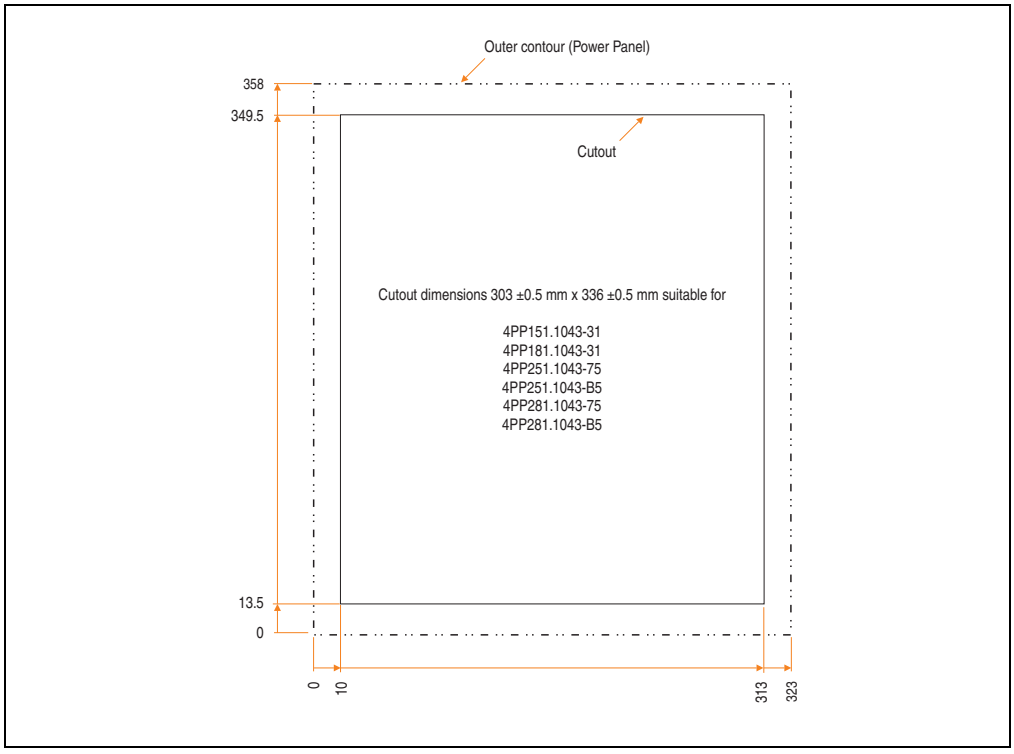



Figure 47: Cutout dimensions

### 2.9.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 151 TFT C VGA 10.4" F MH |
| 12 | Retaining clips included |
| 6 | Legend strips (inserted in the front) |

Table 29: Contents of delivery - 4PP151.1043-31

## 2.10 Device 4PP151.1505-31

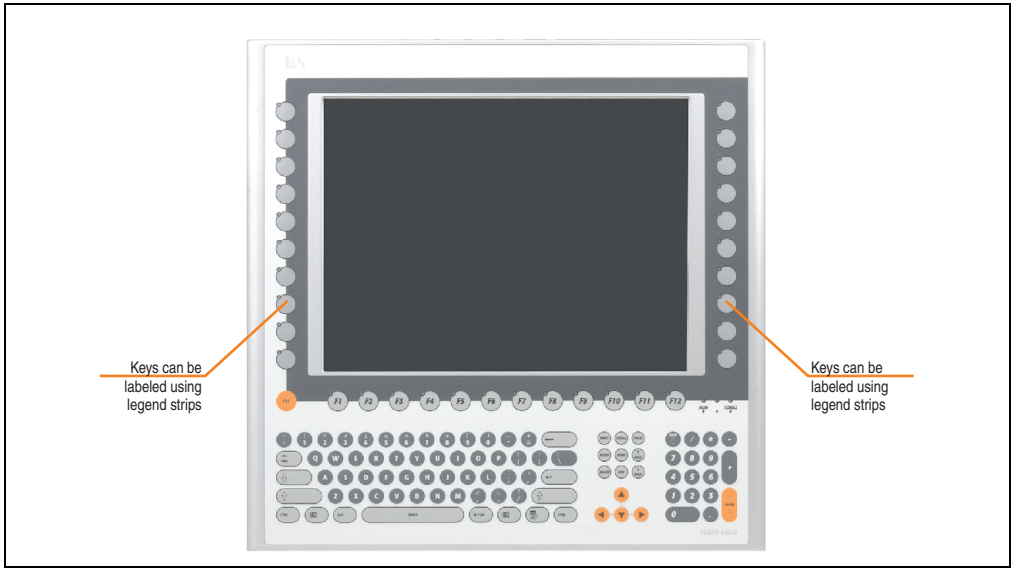



Figure 48: Front view - 4PP151.1505-31

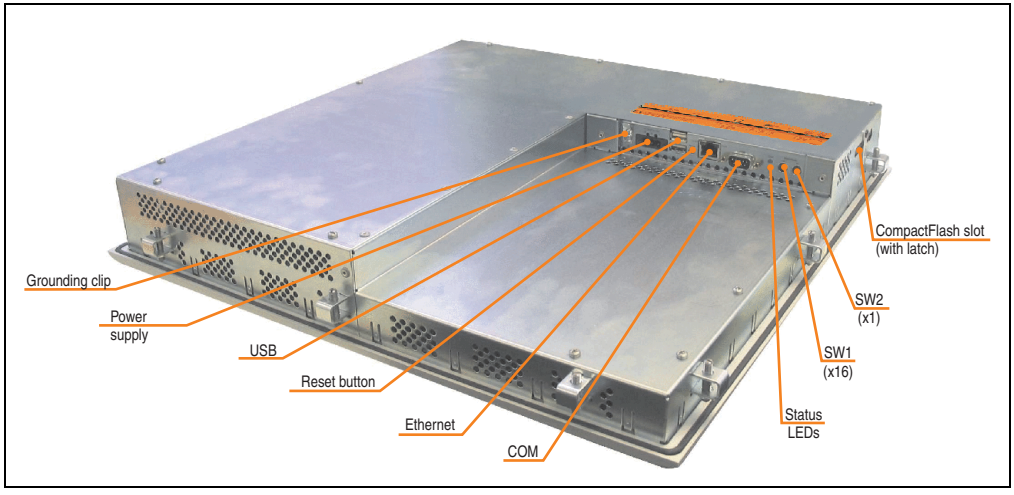



Figure 49: Rear view - 4PP151.1505-31

### 2.10.1 Technical data

| Features | 4PP151.1505-31 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 30: Technical data - 4PP151.1505-31

| Features | 4PP151.1505-31 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 256 colors |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | - |
| Touch screen type | |
| Technology | |
| Controller | |
| Degree of transmission | |
| Filter glass | |
| Degree of transmission | 95% |
| Coating | On both sides |
| Keys | |
| Key lifespan | > 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force |
| Function keys | 20 with LED |
| Soft keys | 12 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 77 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 33 W typical, 38 W max. |
| Electrical isolation | Yes |

Table 30: Technical data - 4PP151.1505-31 (cont.)

| Electrical characteristics | 4PP151.1505-31 |
|---|---|
| Bleeder resistance | ≤ 24 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 435 mm |
| Height | 430 mm |
| Depth | 71.5 mm |
| Weight | Approx. 7.6 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 2.10.2 "Temperature humidity diagram" on page 100 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 30: Technical data - 4PP151.1505-31 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

## 2.10.2 Temperature humidity diagram

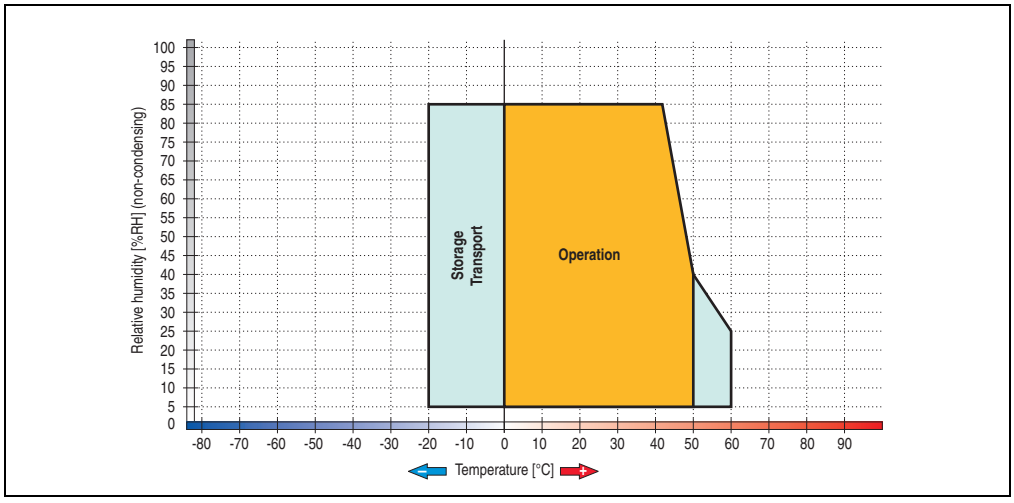



Figure 50: Temperature humidity diagram - 4PP151.1505-31

## 2.10.3 Dimensions

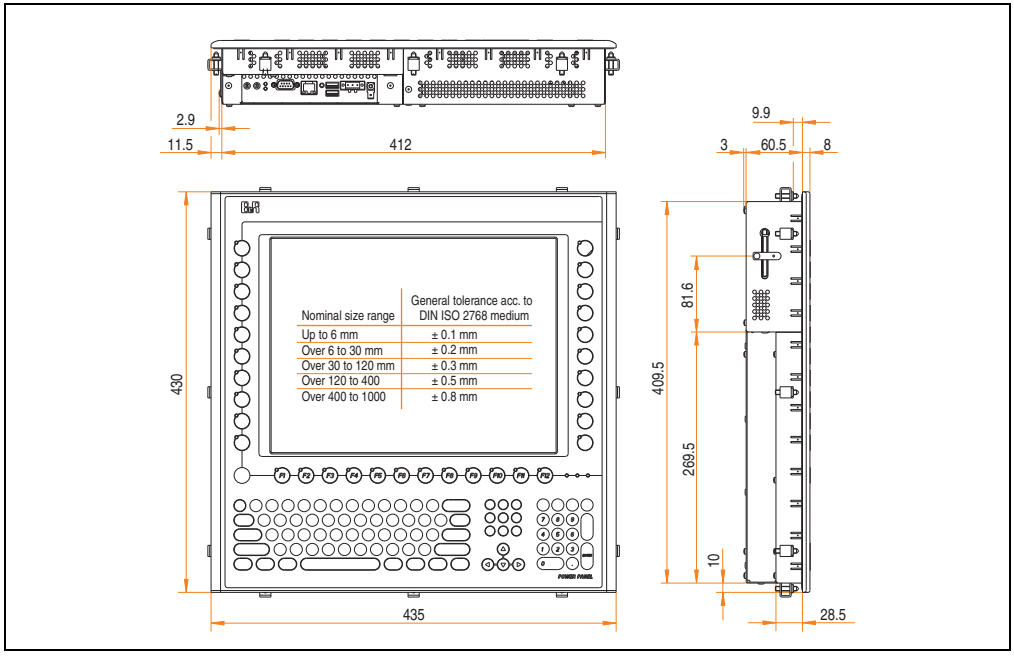



Figure 51: Dimensions - 4PP151.1505-31

### 2.10.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 51 "Dimensions - 4PP151.1505-31" on page 100) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

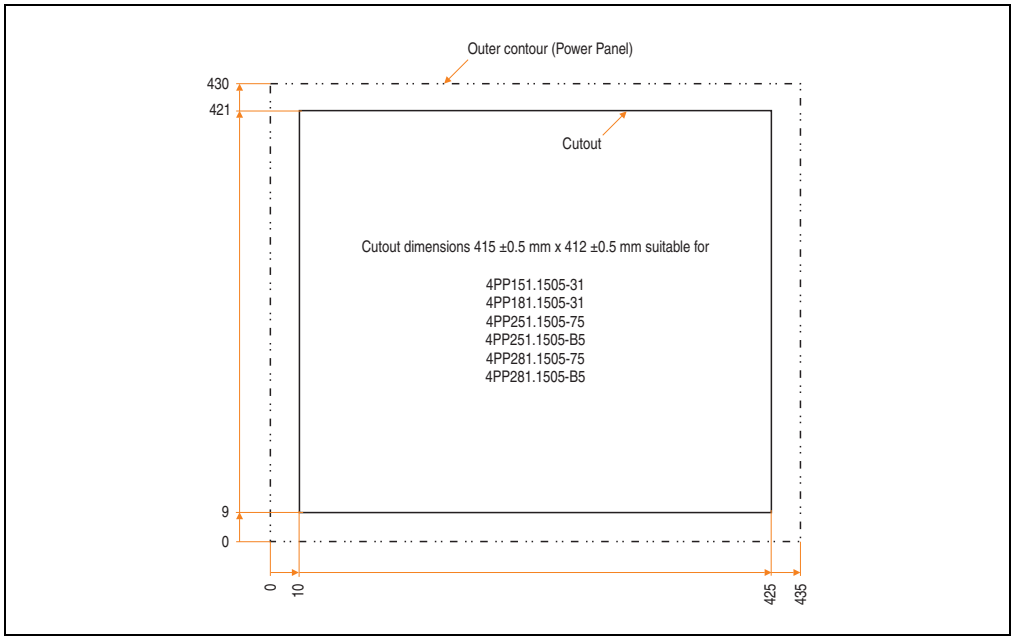



Figure 52: Cutout dimensions

### 2.10.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 151 TFT C XGA 15" F MH |
| 12 | Retaining clips included |
| 2 | Legend strips (inserted in the front) |

Table 31: Contents of delivery - 4PP151.1505-31

## 2.11 Device 4PP152.0571-01

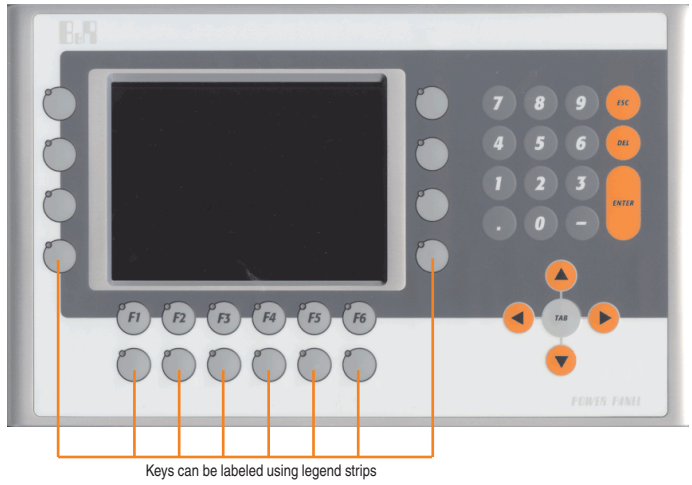



Figure 53: Front view - 4PP152.0571-01

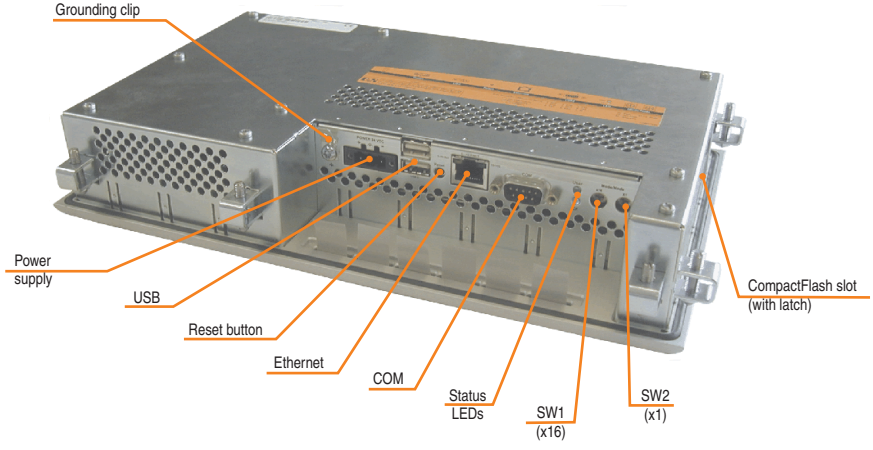



Figure 54: Rear view - 4PP152.0571-01

### 2.11.1 Technical data

| Features | 4PP152.0571-01 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB (Rev. < D0: 16 MB)<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 32: Technical data - 4PP152.0571-01

| Features | 4PP152.0571-01 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | - |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>LCD monochrome<br>5.7 in (144 mm)<br>8 shades of gray<br>QVGA, 320 x 240 pixels<br>25:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>140 cd/m²<br>50,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - |
| Filter glass<br>Degree of transmission<br>Coating | <br>95%<br>On both sides |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | <br>> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force<br>20 with LED<br>-<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>13 W typical, 18 W max.<br>- |

Table 32: Technical data - 4PP152.0571-01 (cont.)

| Electrical characteristics | 4PP152.0571-01 |
|---|---|
| Bleeder resistance | 0 Ohm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 302 mm |
| Height | 187 mm |
| Depth | 55.5 mm |
| Weight | Approx. 2.2 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 2.11.2 "Temperature humidity diagram" on page 106 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 32: Technical data - 4PP152.0571-01 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.11.2 Temperature humidity diagram

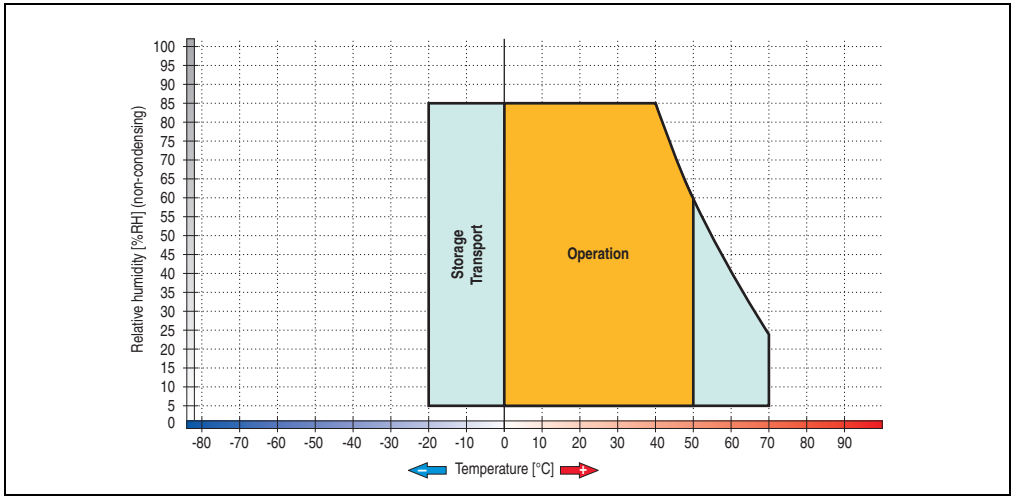



Figure 55: Temperature humidity diagram - 4PP152.0571-01

### 2.11.3 Dimensions

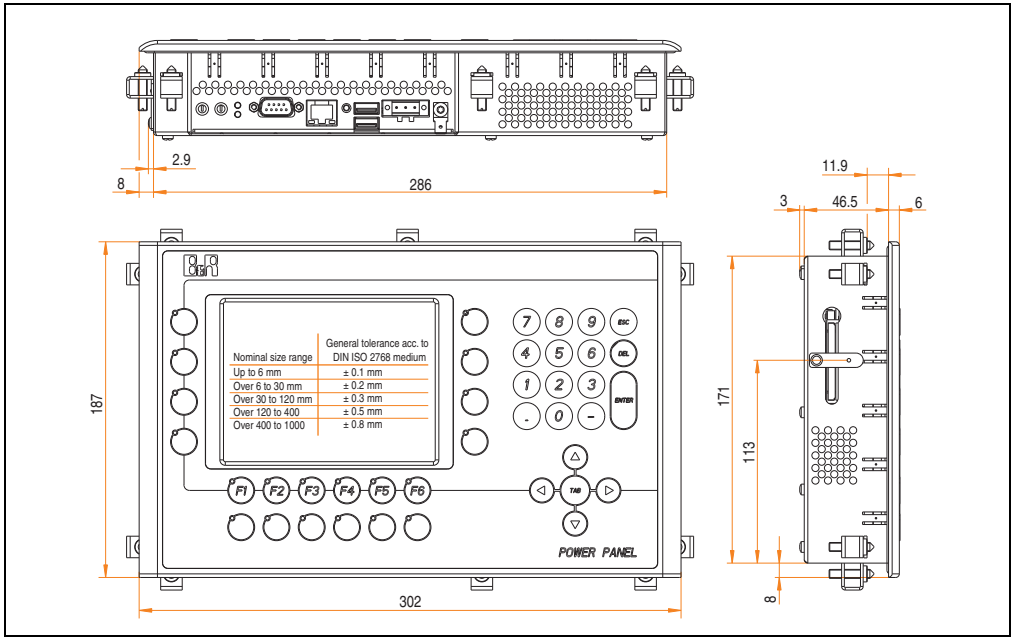



Figure 56: Dimensions - 4PP152.0571-01

### 2.11.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 56 "Dimensions - 4PP152.0571-01" on page 106) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

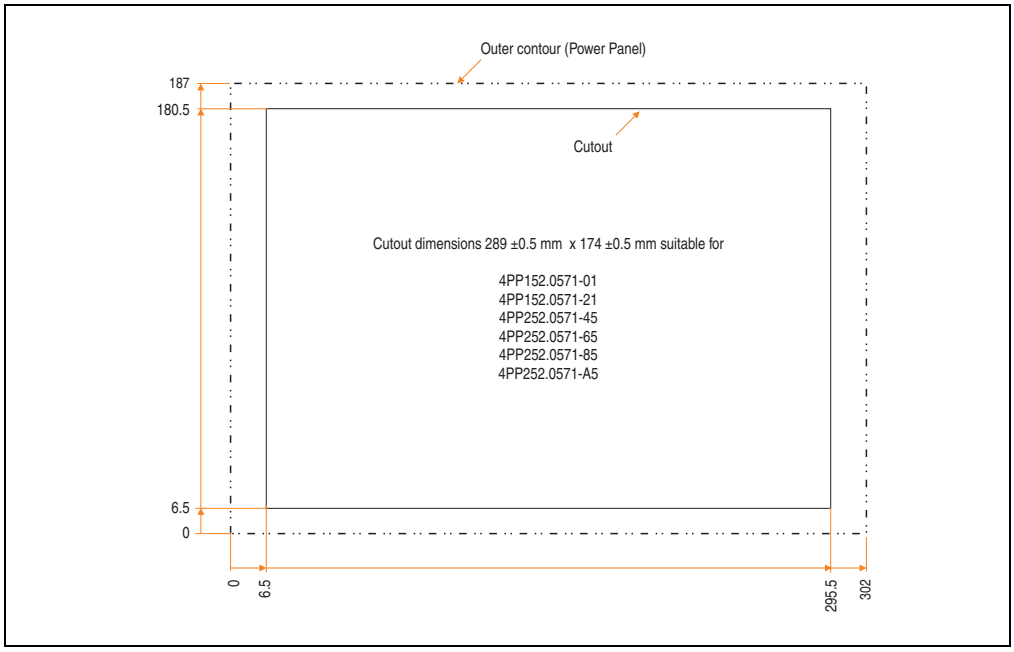



Figure 57: Cutout dimensions

### 2.11.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 152 LCD B/W QVGA 5.7" F MH |
| 10 | Retaining clips included |
| 8 | Legend strips (inserted in the front) |

Table 33: Contents of delivery - 4PP152.0571-01

## 2.12 Device 4PP152.0571-21

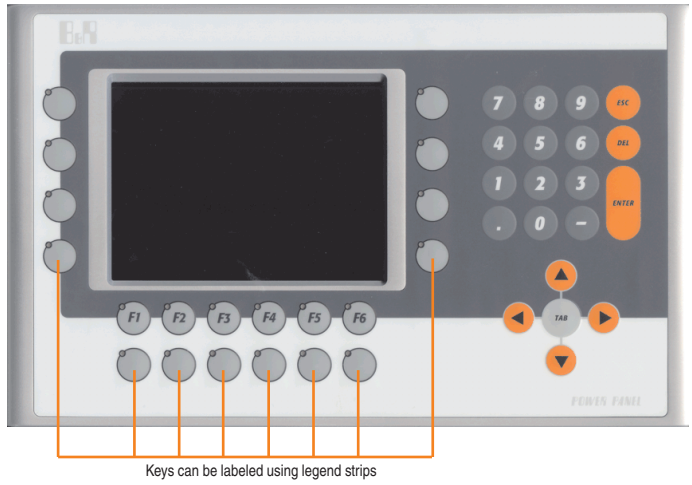



Figure 58: Front view - 4PP152.0571-21

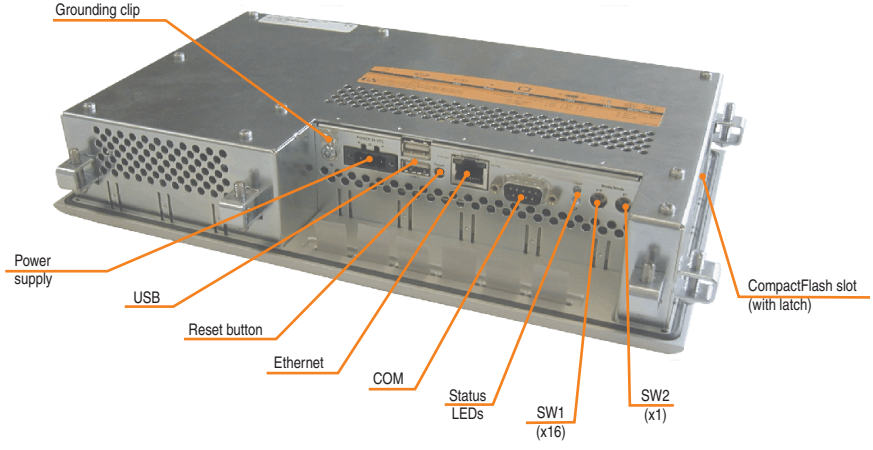



Figure 59: Rear view - 4PP152.0571-21

### 2.12.1 Technical data

| Features | 4PP152.0571-21 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB (Rev. < F0: 16 MB)<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 34: Technical data - 4PP152.0571-21

| Features | 4PP152.0571-21 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | - |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color LCD<br>5.7 in (144 mm)<br>256 colors<br>QVGA, 320 x 240 pixels<br>40:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>150 cd/m²<br>50,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - |
| Filter glass<br>Degree of transmission<br>Coating | <br>95%<br>On both sides |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | <br>> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force<br>20 with LED<br>-<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>13 W typical, 18 W max.<br>- |

Table 34: Technical data - 4PP152.0571-21 (cont.)

| Electrical characteristics | 4PP152.0571-21 |
|---|---|
| Bleeder resistance | 0 Ohm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 302 mm |
| Height | 187 mm |
| Depth | 55.5 mm |
| Weight | Approx. 2.2 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 2.12.2 "Temperature humidity diagram" on page 112 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 34: Technical data - 4PP152.0571-21 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.12.2 Temperature humidity diagram

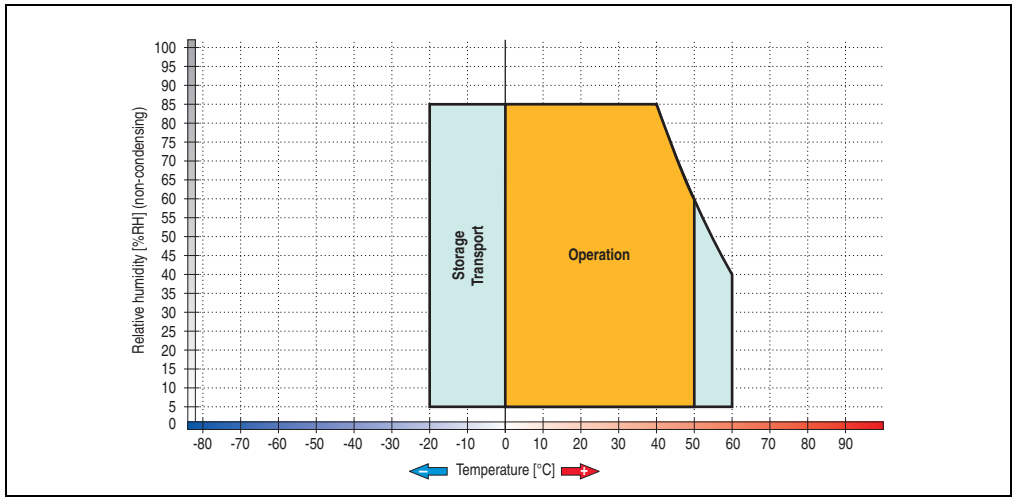



Figure 60: Temperature humidity diagram - 4PP152.0571-21

### 2.12.3 Dimensions

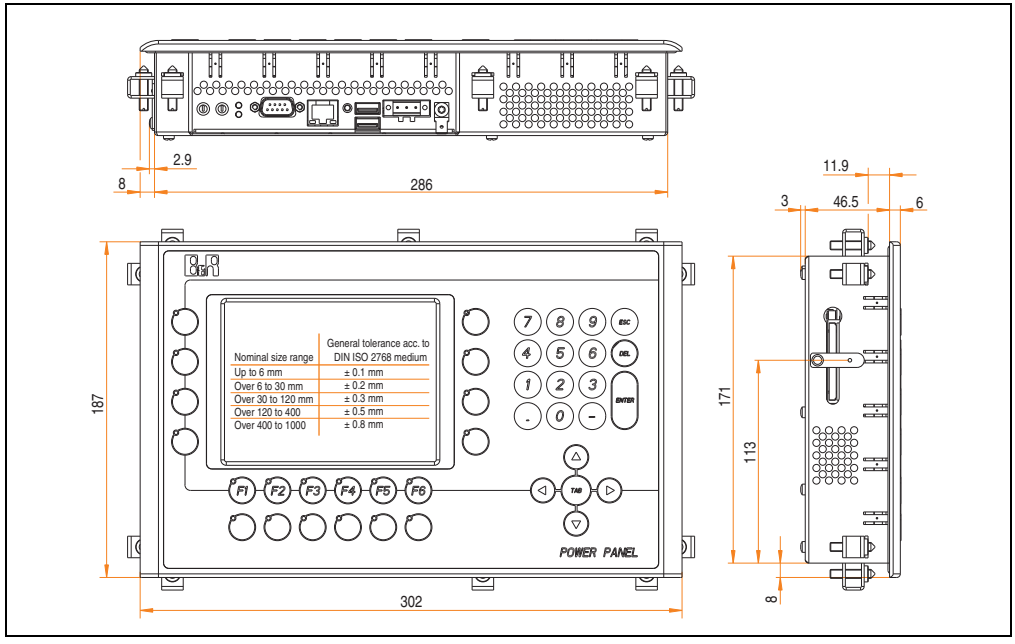



Figure 61: Dimensions - 4PP152.0571-21

### 2.12.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 61 "Dimensions - 4PP152.0571-21" on page 112) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

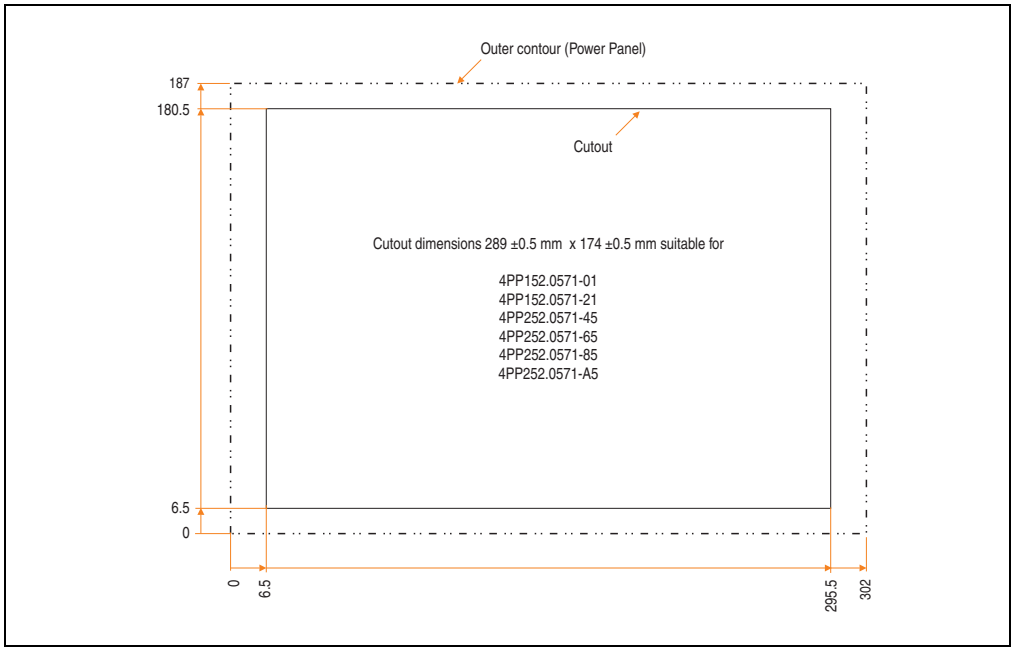



Figure 62: Cutout dimensions

### 2.12.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 152 LCD C QVGA 5.7" F MH |
| 10 | Retaining clips included |
| 8 | Legend strips (inserted in the front) |

Table 35: Contents of delivery - 4PP152.0571-21

## 2.13 Device 4PP152.1043-31

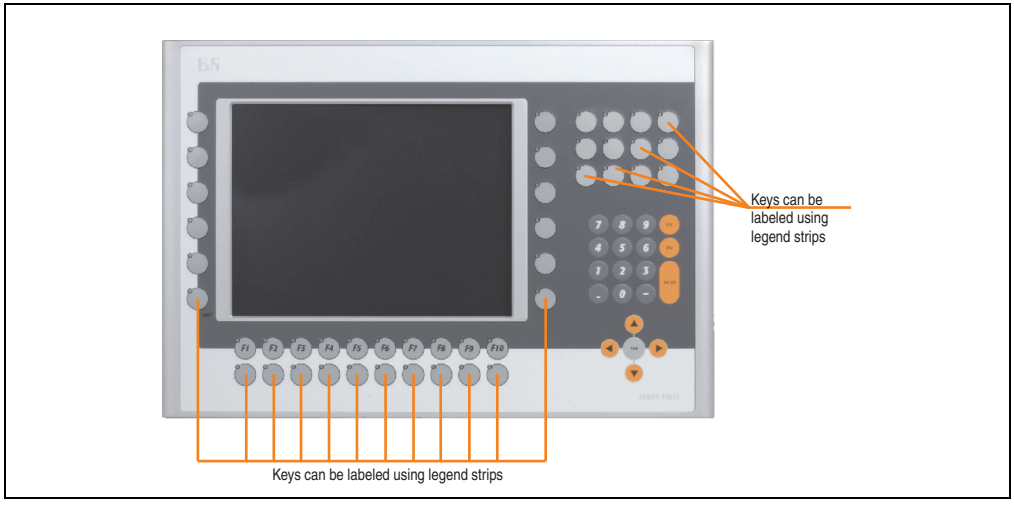



Figure 63: Front view - 4PP152.1043-31

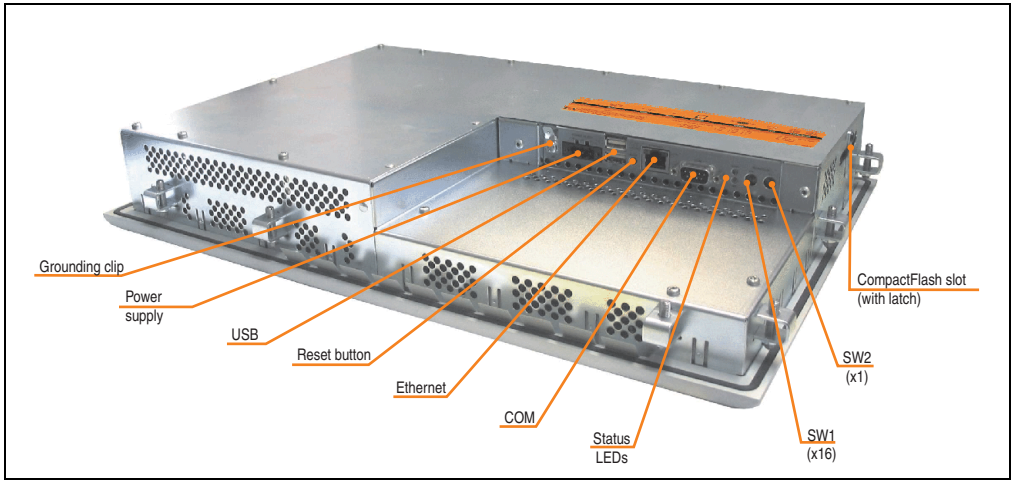



Figure 64: Rear view - 4PP152.1043-31

### 2.13.1 Technical data

| Features | 4PP152.1043-31 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 36: Technical data - 4PP152.1043-31

| Features | 4PP152.1043-31 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | - |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color TFT<br>10.4 inch (264 mm)<br>256 colors<br>VGA, 640 x 480 pixels<br>600:1<br><br>Direction R / direction L =70°<br>Direction U = 45°/ direction D = 55°<br><br>350 cd/m²<br>55,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - |
| Filter glass<br>Degree of transmission<br>Coating | <br>95%<br>On both sides |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | <br>> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force<br>44 with LED<br>-<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>18 W typical, 23 W max.<br>- |

Table 36: Technical data - 4PP152.1043-31 (cont.)

| Electrical characteristics | 4PP152.1043-31 |
|---|---|
| Bleeder resistance | ≤ 24 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 423 mm |
| Height | 288 mm |
| Depth | 65.5 mm |
| Weight | Approx. 4.8 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 2.13.2 "Temperature humidity diagram" on page 118 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 36: Technical data - 4PP152.1043-31 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.13.2 Temperature humidity diagram

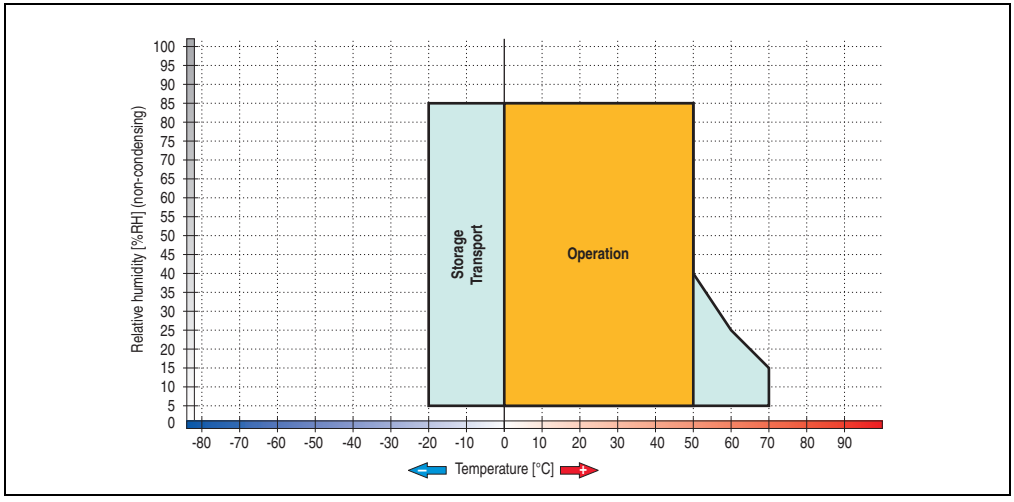



Figure 65: Temperature humidity diagram - 4PP152.1043-31

### 2.13.3 Dimensions

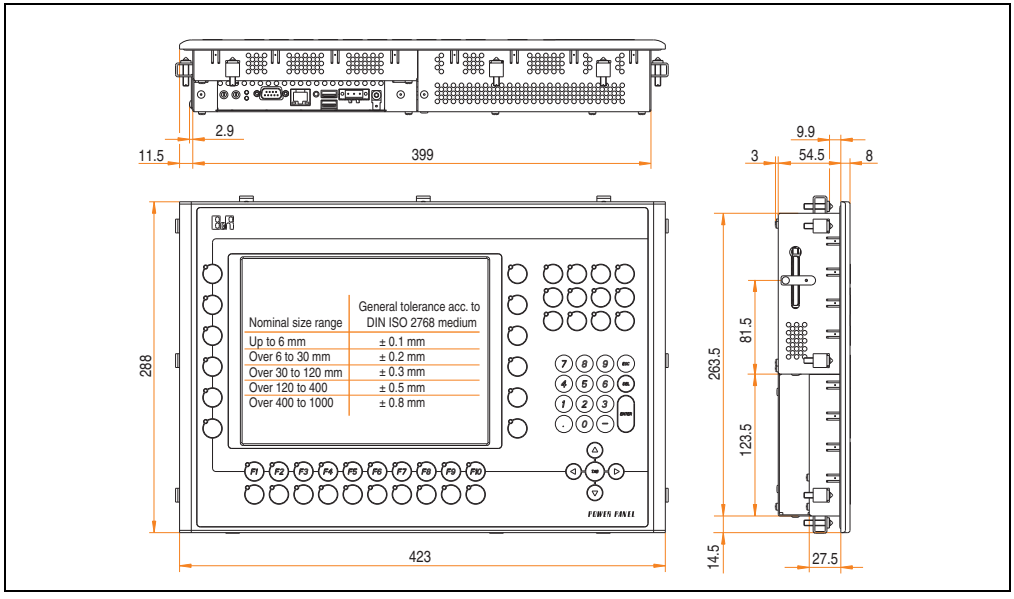



Figure 66: Dimensions - 4PP152.1043-31

### 2.13.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 66 "Dimensions - 4PP152.1043-31" on page 118) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

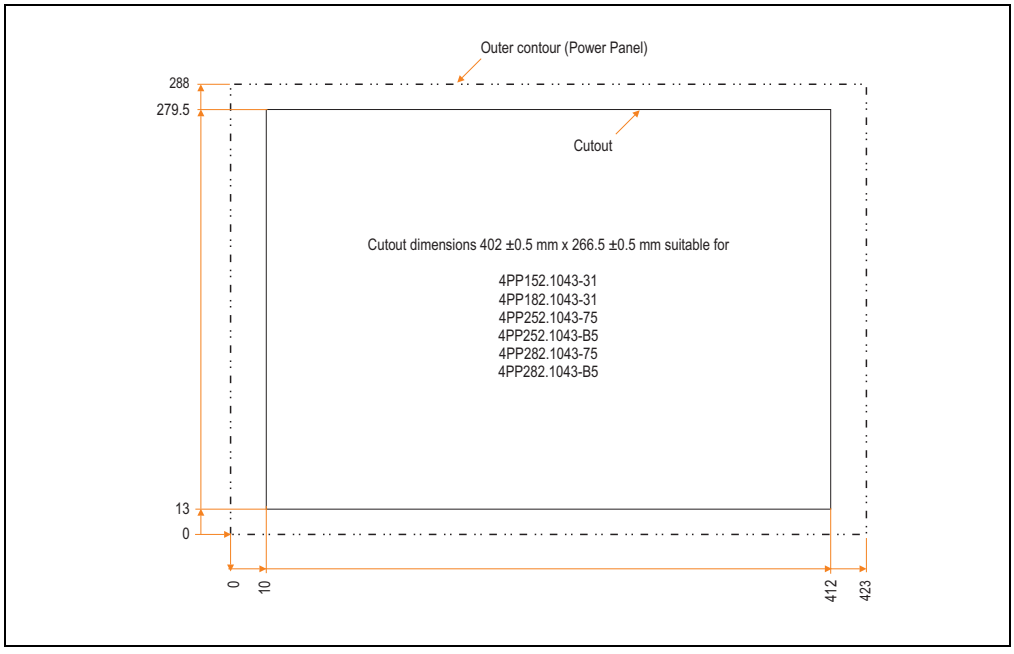



Figure 67: Cutout dimensions

### 2.13.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 152 TFT VGA 10.4" F MH |
| 12 | Retaining clips included |
| 16 | Legend strips (inserted in the front) |

Table 37: Contents of delivery - 4PP152.1043-31

## 2.14 Device 4PP180.1043-31

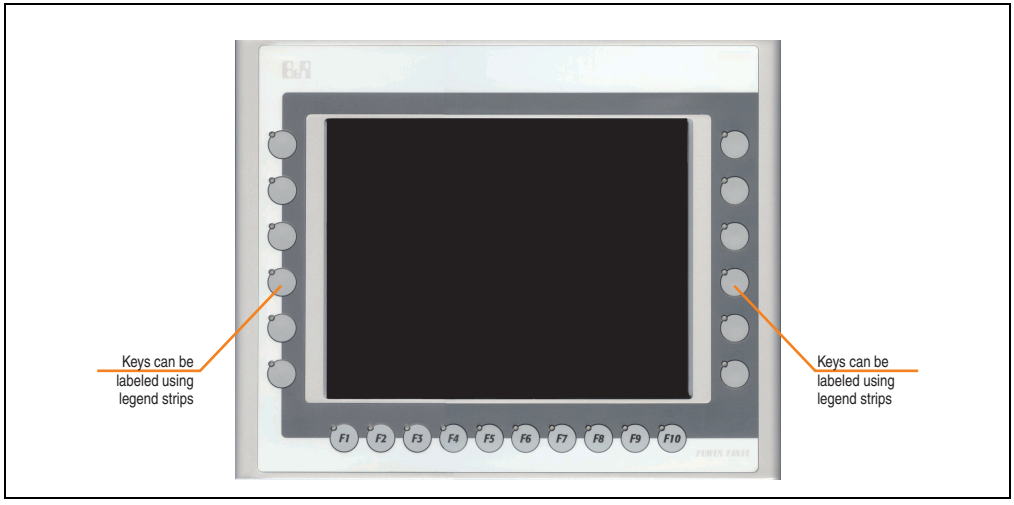



Figure 68: Front view - 4PP180.1043-31

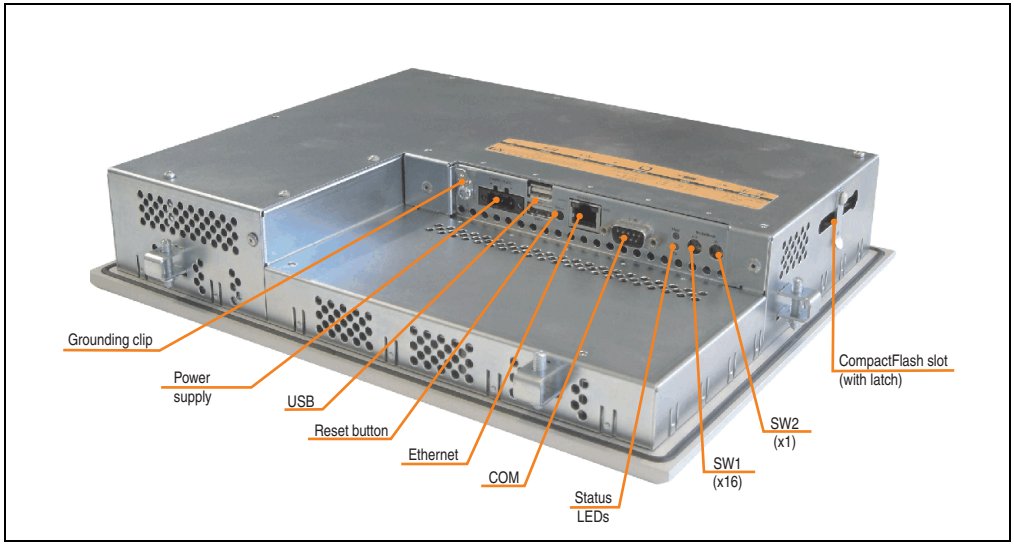



Figure 69: Rear view - 4PP180.1043-31

### 2.14.1 Technical data

| Features | 4PP180.1043-31 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 38: Technical data - 4PP180.1043-31

| Features | 4PP180.1043-31 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force |
| Function keys | 12 with LED |
| Soft keys | 10 with LED |
| Cursor keys | - |
| Number block | - |
| Other keys | - |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 18 W typical, 23 W max. |
| Electrical isolation | - |

Table 38: Technical data - 4PP180.1043-31 (cont.)

| Electrical characteristics | 4PP180.1043-31 |
|---|---|
| Bleeder resistance | ≤ 24 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>323 mm<br>260 mm<br>65.5 mm |
| Weight | Approx. 3.7 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +70°C<br>-20 to +70°C |
| Relative humidity | See 2.14.2 "Temperature humidity diagram" on page 124 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 38: Technical data - 4PP180.1043-31 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.14.2 Temperature humidity diagram

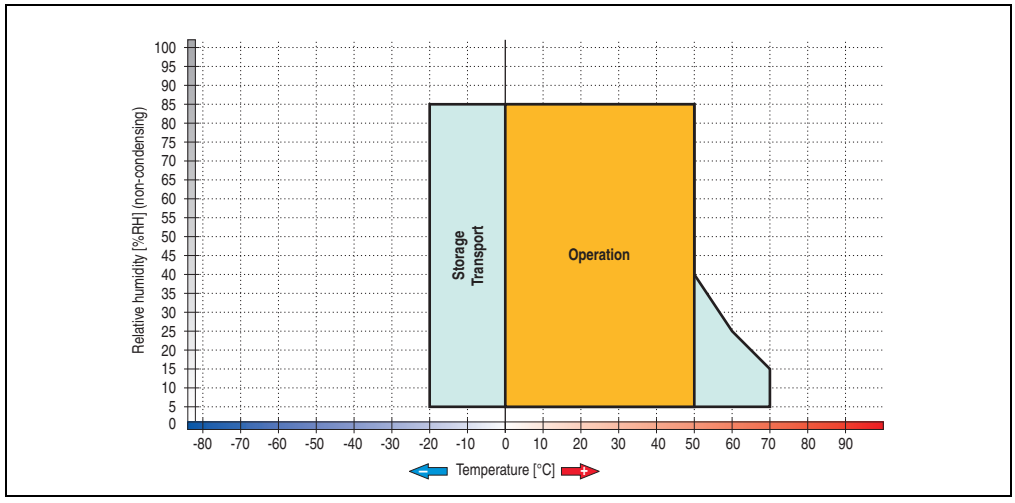



Figure 70: Temperature humidity diagram - 4PP180.1043-31

### 2.14.3 Dimensions

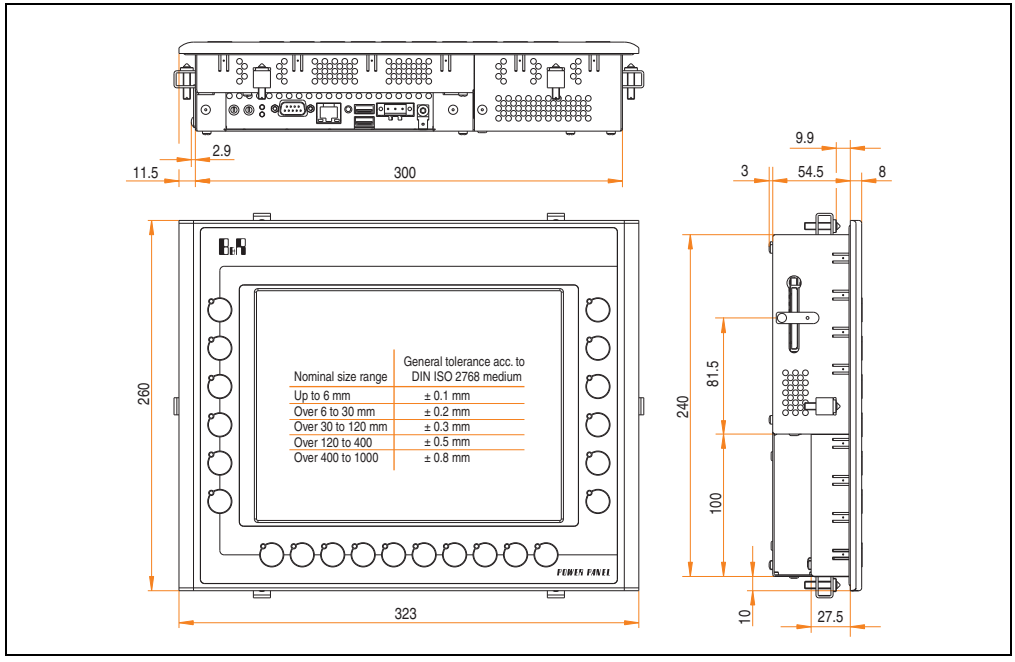



Figure 71: Dimensions - 4PP180.1043-31

### 2.14.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 71 "Dimensions - 4PP180.1043-31" on page 124) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

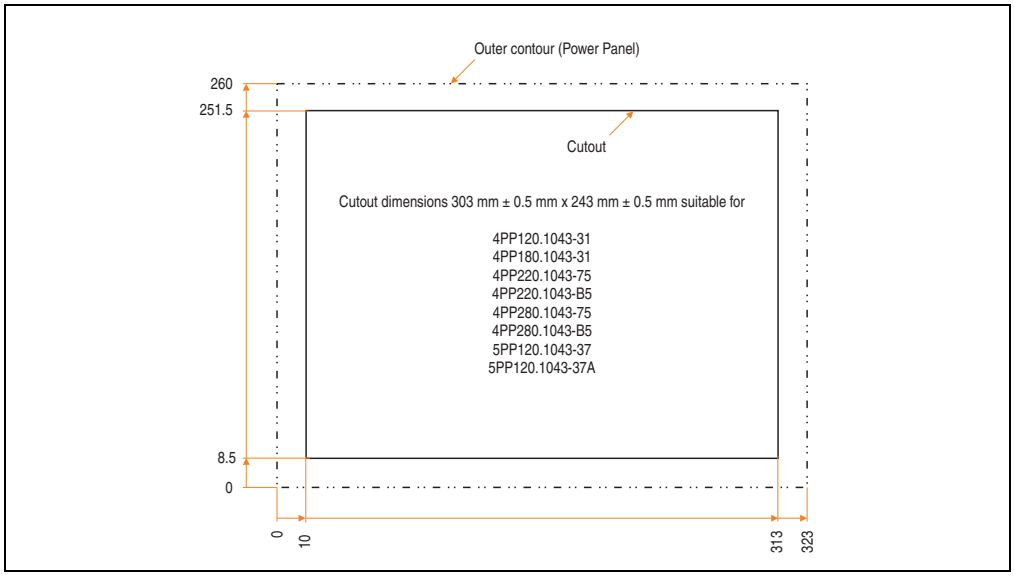



Figure 72: Cutout dimensions

### 2.14.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 180 TFT VGA 10.4" F T MH |
| 6 | Retaining clips included |
| 2 | Legend strips (inserted in the front) |

Table 39: Contents of delivery - 4PP180.1043-31

## 2.15 Device 4PP180.1505-31

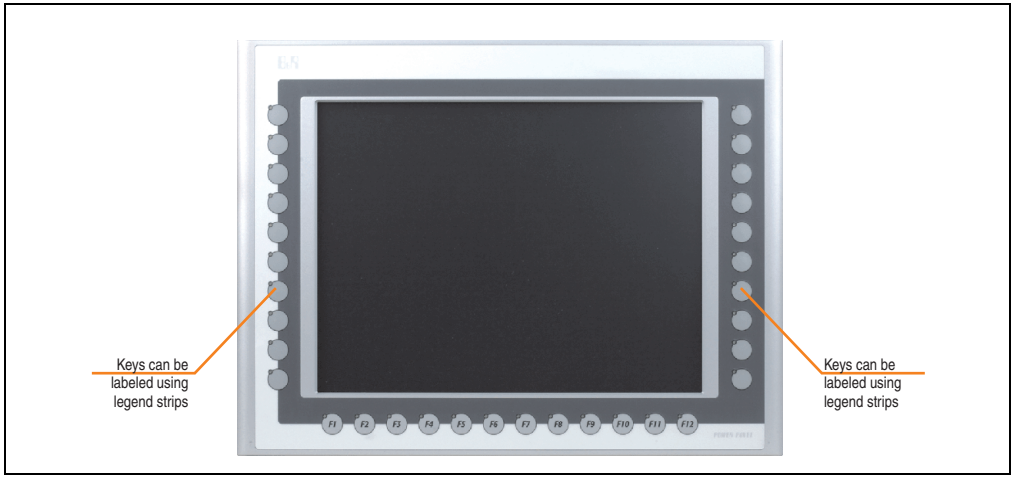



Figure 73: Front view - 4PP180.1505-31

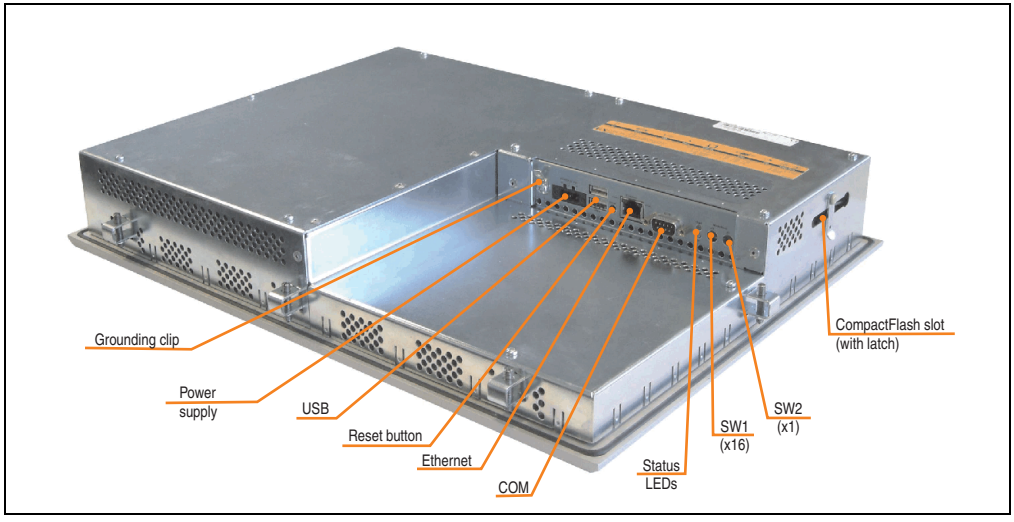



Figure 74: Rear view - 4PP180.1505-31

### 2.15.1 Technical data

| Features | 4PP180.1505-31 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 40: Technical data - 4PP180.1505-31

| Features | 4PP180.1505-31 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 256 colors |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force |
| Function keys | 20 with LED |
| Soft keys | 12 with LED |
| Cursor keys | - |
| Number block | - |
| Other keys | - |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 33 W typical, 38 W max. |
| Electrical isolation | Yes |

Table 40: Technical data - 4PP180.1505-31 (cont.)

| Electrical characteristics | 4PP180.1505-31 |
|---|---|
| Bleeder resistance | ≤ 24 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>435 mm<br>330 mm<br>71.5 mm |
| Weight | Approx. 6.3 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +60°C<br>-20 to +60°C |
| Relative humidity | See 2.15.2 "Temperature humidity diagram" on page 130 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 40: Technical data - 4PP180.1505-31 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.15.2 Temperature humidity diagram

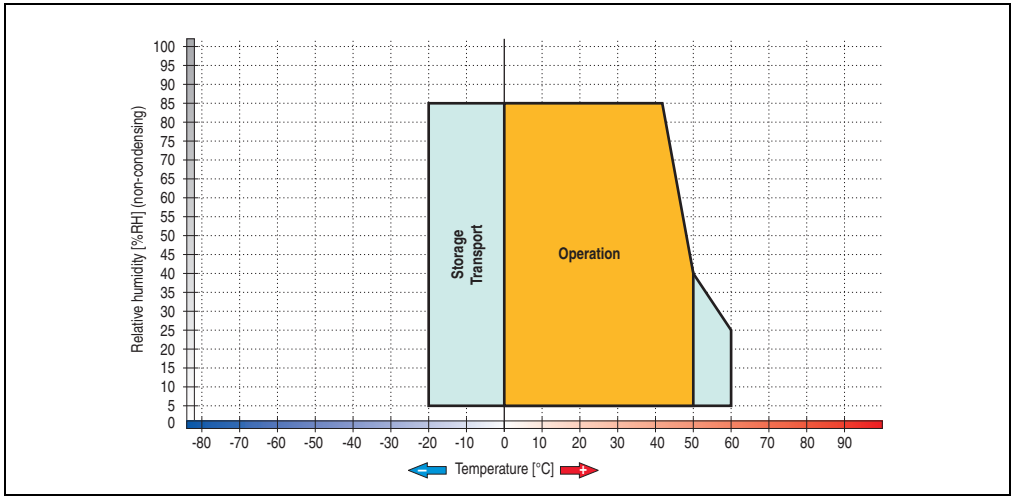



Figure 75: Temperature humidity diagram - 4PP180.1505-31

### 2.15.3 Dimensions

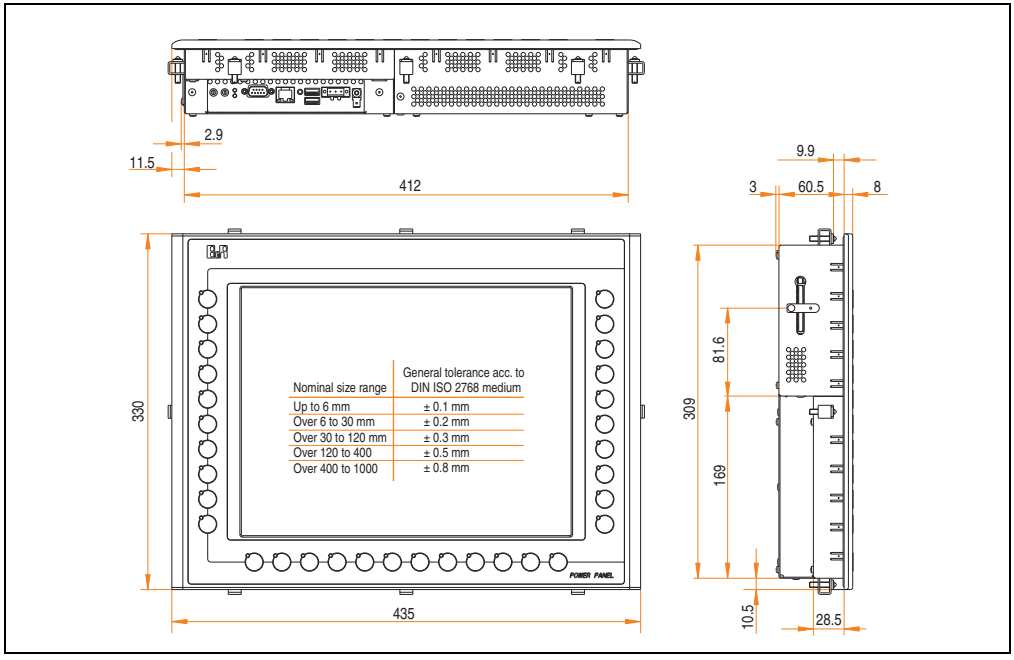



Figure 76: Dimensions - 4PP180.1505-31

### 2.15.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 76 "Dimensions - 4PP180.1505-31" on page 130) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

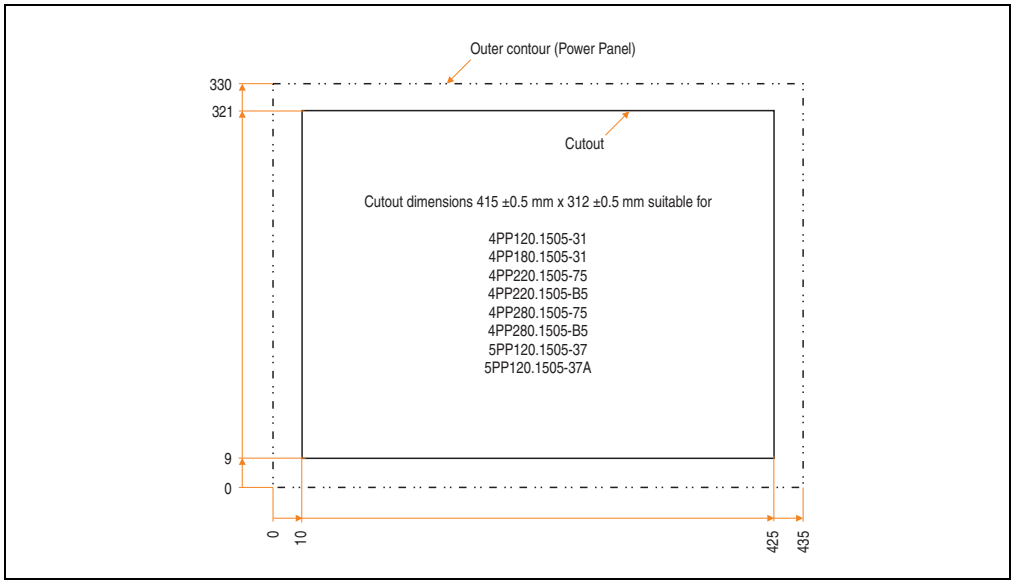



Figure 77: Cutout dimensions

### 2.15.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 180 TFT VGA 15" F T MH |
| 8 | Retaining clips included |
| 2 | Legend strips (inserted in the front) |

Table 41: Contents of delivery - 4PP180.1505-31

## 2.16 Device 4PP181.1043-31

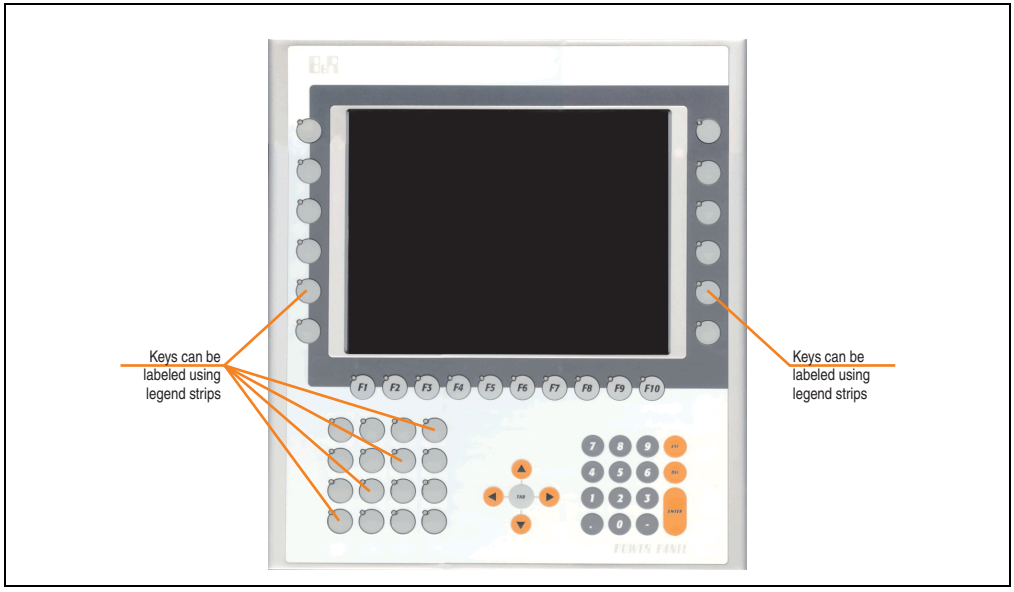



Figure 78: Front view - 4PP181.1043-31

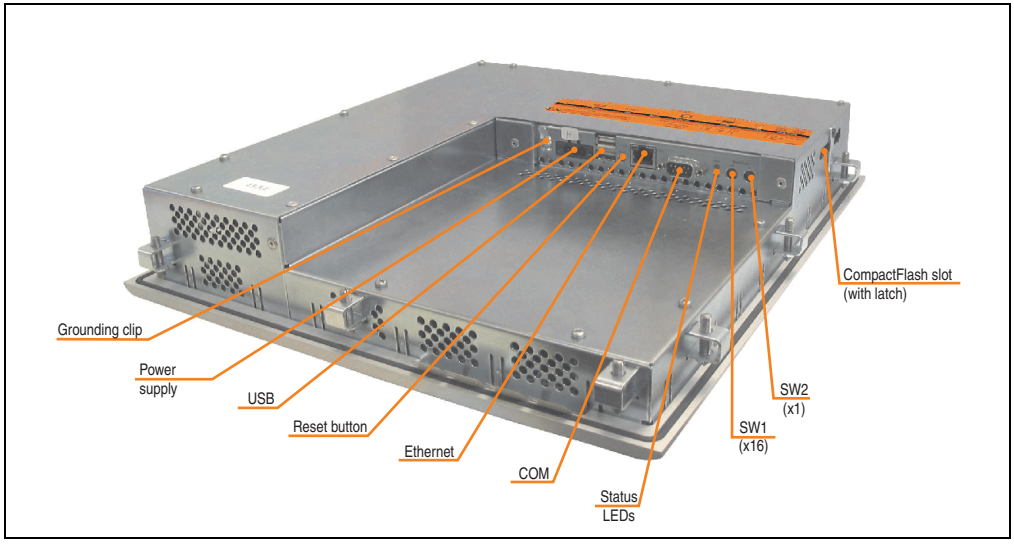



Figure 79: Rear view - 4PP181.1043-31

### 2.16.1 Technical data

| Features | 4PP181.1043-31 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 42: Technical data - 4PP181.1043-31

| Features | 4PP181.1043-31 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force |
| Function keys | 28 with LED |
| Soft keys | 10 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 17 W typical, 23 W max. |
| Electrical isolation | - |

Table 42: Technical data - 4PP181.1043-31 (cont.)

| Electrical characteristics | 4PP181.1043-31 |
|---|---|
| Bleeder resistance | ≤ 24 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 323 mm |
| Height | 358 mm |
| Depth | 65.5 mm |
| Weight | Approx. 4.6 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 2.16.2 "Temperature humidity diagram" on page 136 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 42: Technical data - 4PP181.1043-31 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

## 2.16.2 Temperature humidity diagram

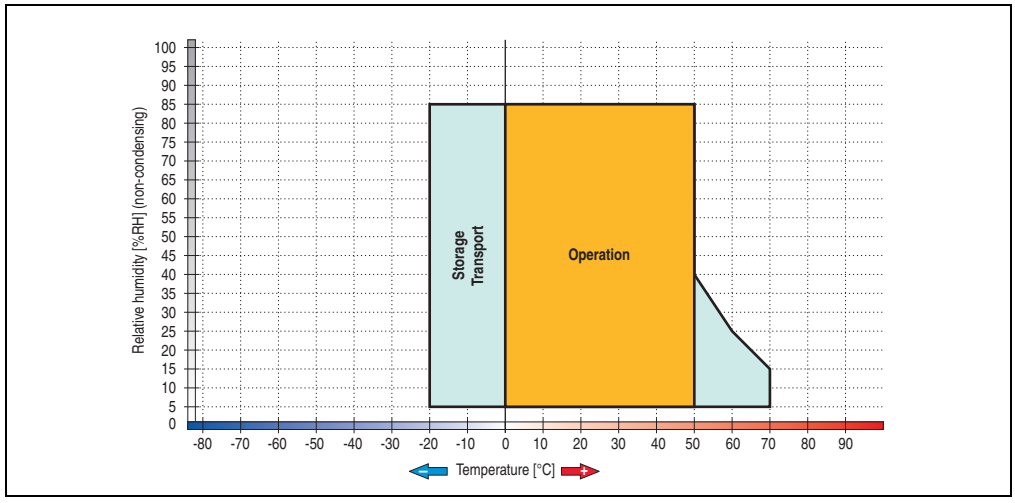



Figure 80: Temperature humidity diagram - 4PP181.1043-31

## 2.16.3 Dimensions

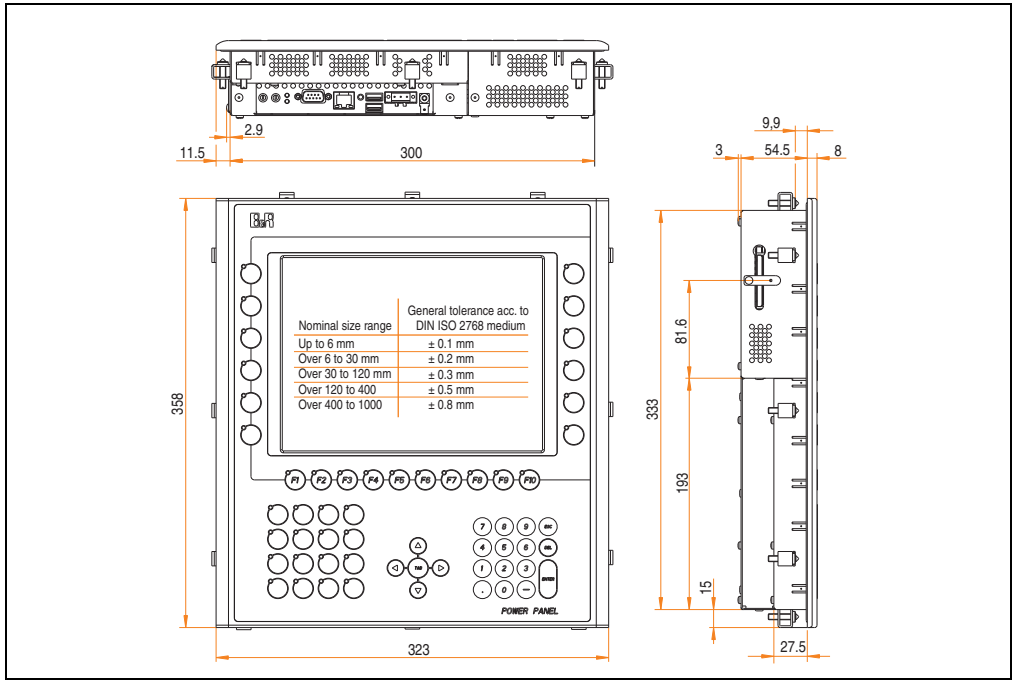



Figure 81: Dimensions - 4PP181.1043-31

### 2.16.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 81 "Dimensions - 4PP181.1043-31" on page 136) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

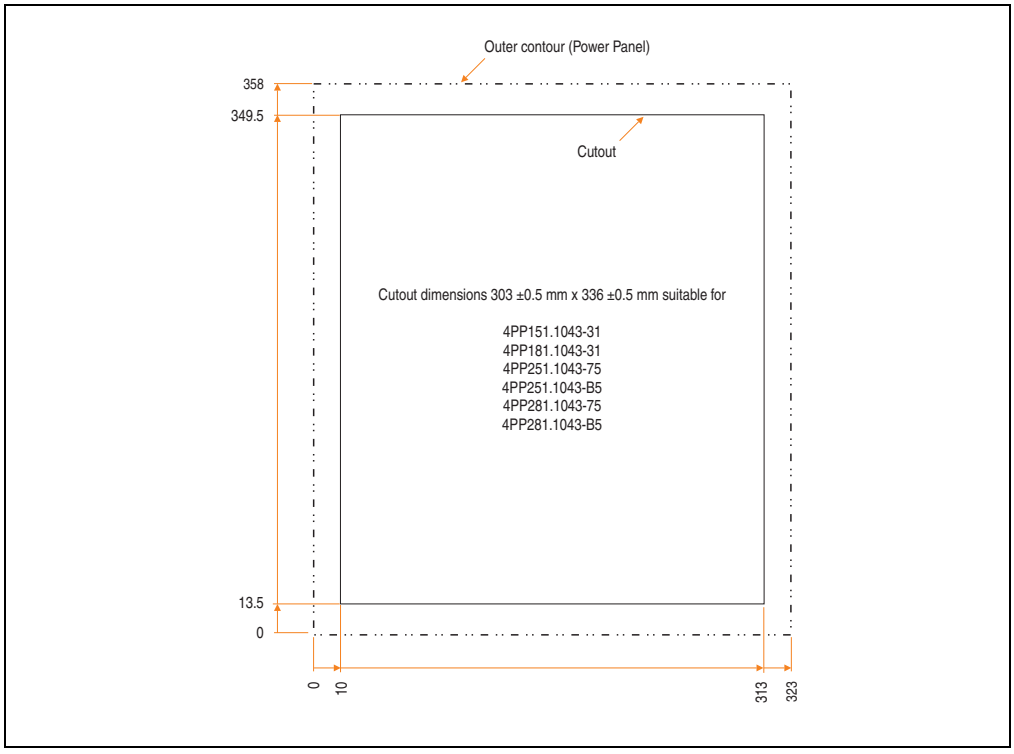



Figure 82: Cutout dimensions

### 2.16.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 181 TFT C VGA 10.4" F T MH |
| 12 | Retaining clips included |
| 6 | Legend strips (inserted in the front) |

Table 43: Contents of delivery - 4PP181.1043-31

## 2.17 Device 4PP181.1505-31

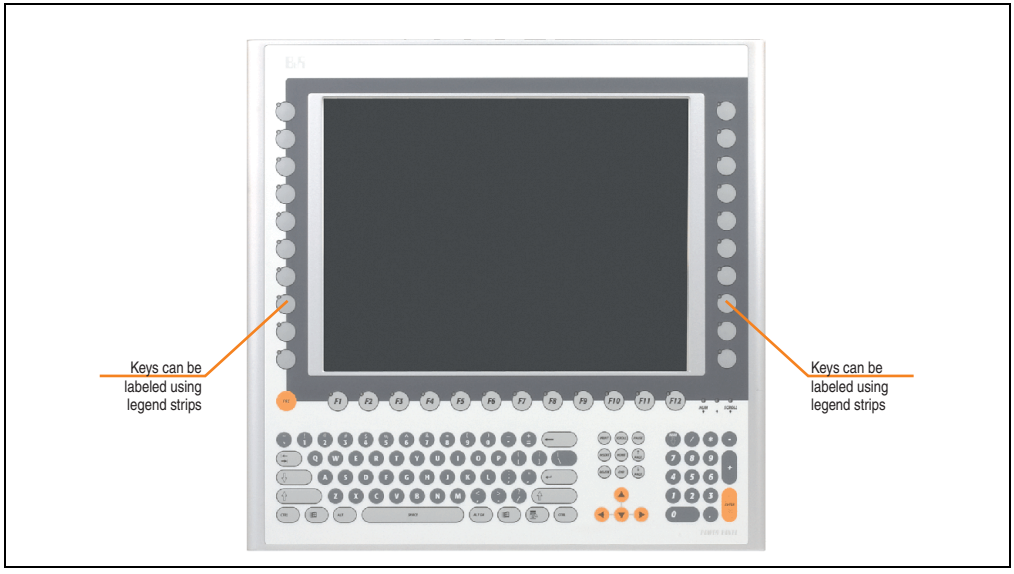



Figure 83: Front view - 4PP181.1505-31

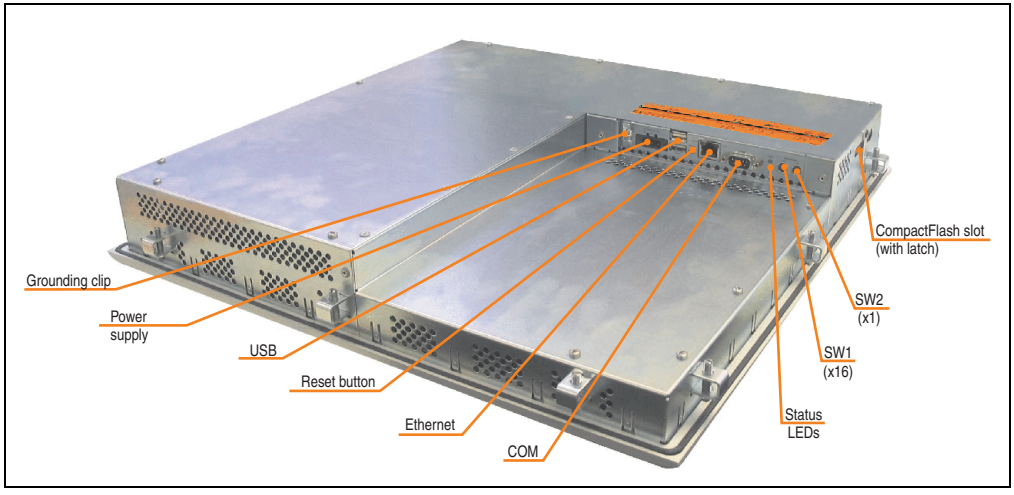



Figure 84: Rear view - 4PP181.1505-31

### 2.17.1 Technical data

| Features | 4PP181.1505-31 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 44: Technical data - 4PP181.1505-31

| Features | 4PP181.1505-31 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 256 colors |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force |
| Function keys | 20 with LED |
| Soft keys | 12 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 77 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 33 W typical, 38 W max. |
| Electrical isolation | Yes |

Table 44: Technical data - 4PP181.1505-31 (cont.)

| Electrical characteristics | 4PP181.1505-31 |
|---|---|
| Bleeder resistance | ≤ 24 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 435 mm |
| Height | 430 mm |
| Depth | 71.5 mm |
| Weight | Approx. 7.6 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 2.17.2 "Temperature humidity diagram" on page 142 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 44: Technical data - 4PP181.1505-31 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.17.2 Temperature humidity diagram

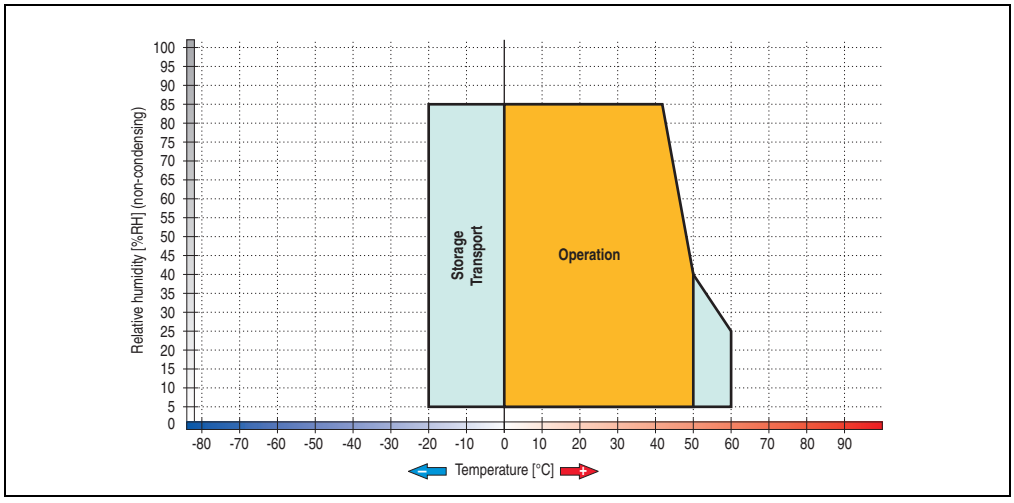



Figure 85: Temperature humidity diagram - 4PP181.1505-31

### 2.17.3 Dimensions

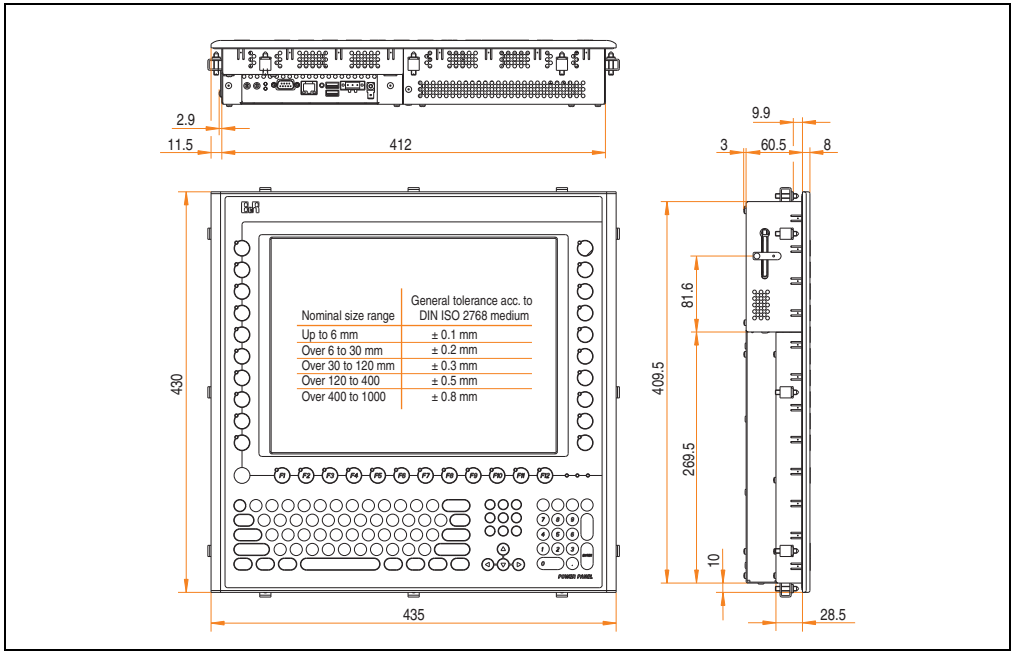



Figure 86: Dimensions - 4PP181.1505-31

### 2.17.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 86 "Dimensions - 4PP181.1505-31" on page 142) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

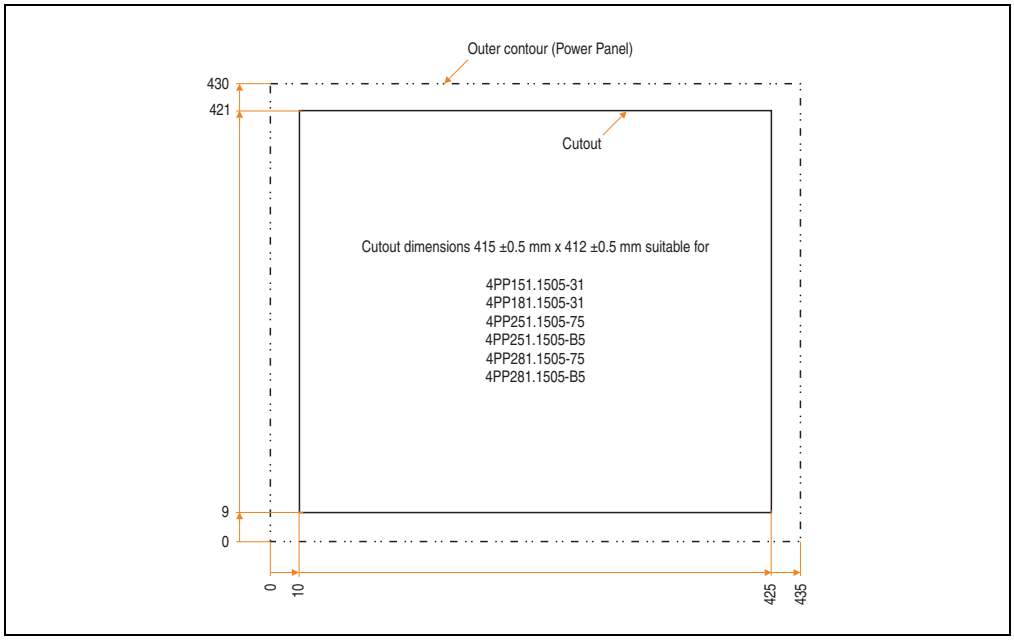



Figure 87: Cutout dimensions

### 2.17.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 181 TFT VGA 15" F T MH |
| 12 | Retaining clips included |
| 6 | Legend strips (inserted in the front) |

Table 45: Contents of delivery - 4PP181.1505-31

## 2.18 Device 4PP182.1043-31

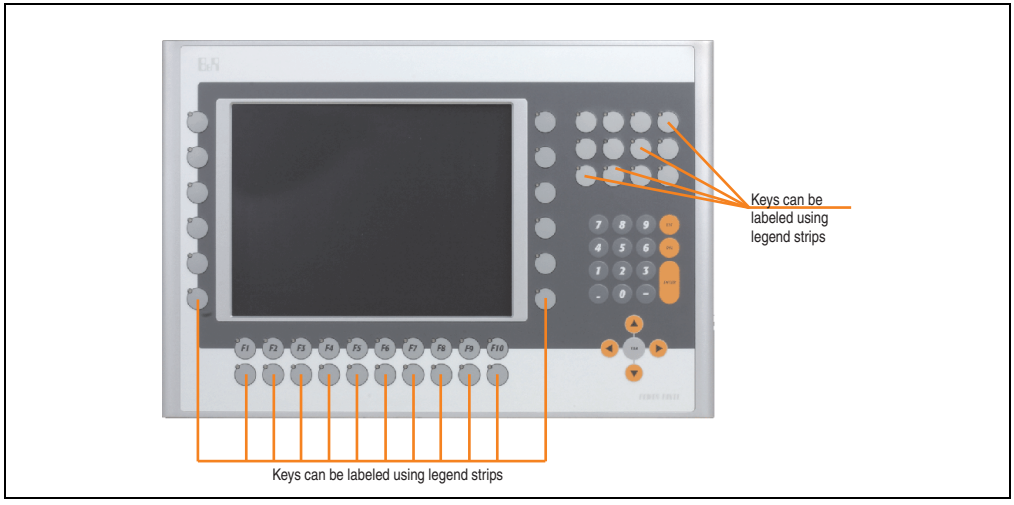



Figure 88: Front view - 4PP182.1043-31

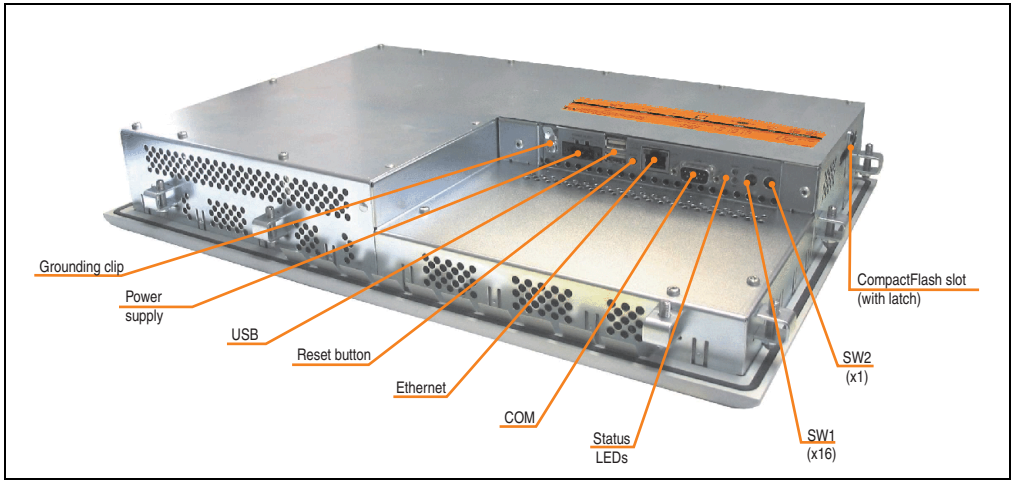



Figure 89: Rear view - 4PP182.1043-31

### 2.18.1 Technical data

| Features | 4PP182.1043-31 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>2 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>-<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>- |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 46: Technical data - 4PP182.1043-31

| Features | 4PP182.1043-31 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force |
| Function keys | 44 with LED |
| Soft keys | - |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 18 W typical, 23 W max. |
| Electrical isolation | - |

Table 46: Technical data - 4PP182.1043-31 (cont.)

| Electrical characteristics | 4PP182.1043-31 |
|---|---|
| Bleeder resistance | ≤ 24 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 423 mm |
| Height | 288 mm |
| Depth | 65.5 mm |
| Weight | Approx. 4.8 kg |
| **Environmental characteristics** | |
| Ambient temperature[2)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 2.18.2 "Temperature humidity diagram" on page 148 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 46: Technical data - 4PP182.1043-31 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

## 2.18.2 Temperature humidity diagram

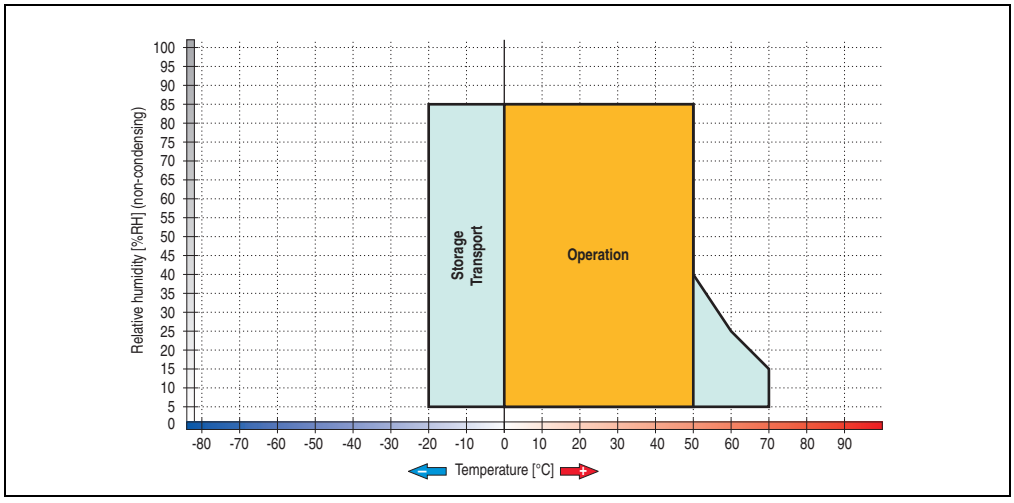



Figure 90: Temperature humidity diagram - 4PP182.1043-31

## 2.18.3 Dimensions

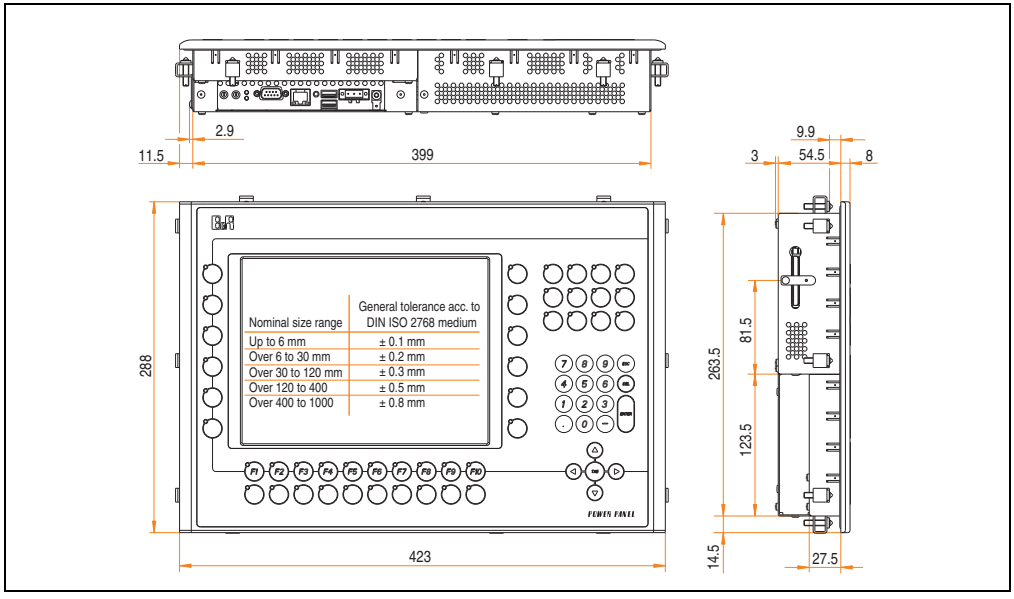



Figure 91: Dimensions - 4PP182.1043-31

### 2.18.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 81 "Dimensions - 4PP181.1043-31" on page 136) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

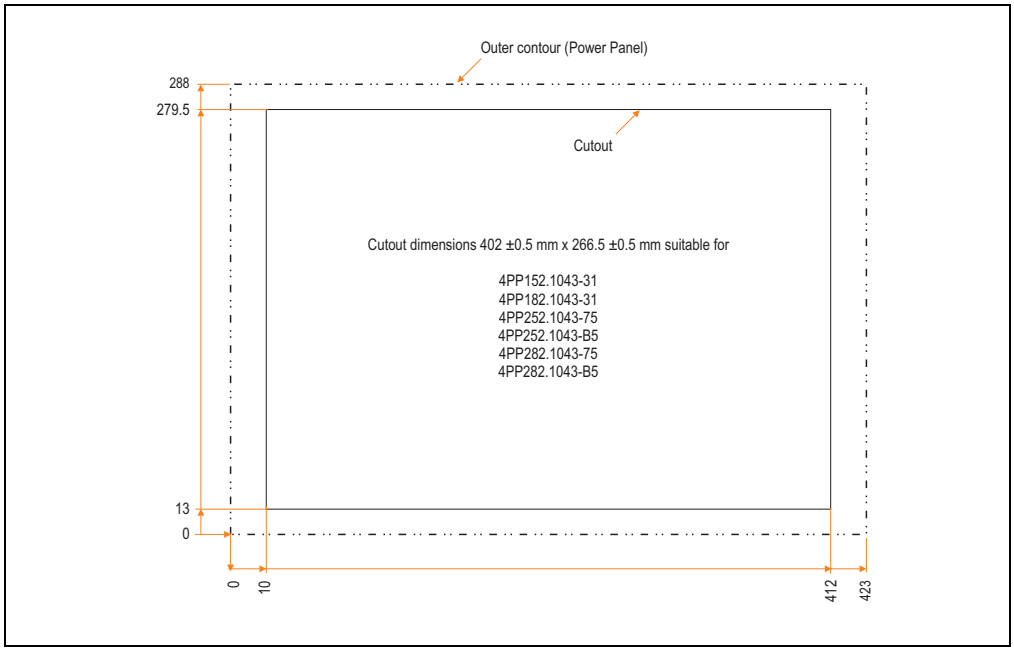



Figure 92: Cutout dimensions

### 2.18.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 182 TFT VGA 10.4" F T MH |
| 12 | Retaining clips included |
| 16 | Legend strips (inserted in the front) |

Table 47: Contents of delivery - 4PP182.1043-31

# 3. Power Panel 200 with Automation Runtime

## 3.1 Interface descriptions

The following section provides a description of all interfaces and plugs possible with a Power Panel 200 device with Automation Runtime.

### 3.1.1 Supply voltage

Input voltage: 24 VDC ±25%

The 3-pin socket required for the supply voltage connection is not included in delivery. This can be ordered from B&R using the model number 0TB103.9 (screw clamps) or 0TB103.91 (cage clamps). The cable required for the connection must be supplied by the customer (see also section "TB103 3-pin supply voltage connector" on page 553).

The supply voltage is internally protected so that the device cannot be damaged if there is an overload or if the voltage supply is connected incorrectly.

Pin assignments can be found either in the following table or printed on the Power Panel plate or device label (see section 3.2.2 "Device label" on page 156).

| Supply voltage | |
|---|---|
| | |
| **Pin** | **Description** |
| 1 | + |
| 2 | Functional ground |
| 3 | - |
| **Accessories** | |
| 0TB103.9 | Plug 24 V 5.08 3p screw clamps |
| 0TB103.91 | Plug 24 V 5.08 3p cage clamps |

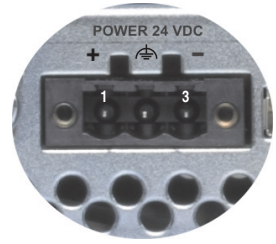



Figure 93: Supply voltage connection

## Warning!

**The pin's connection to the functional ground (pin 2) should be as short as possible.**

### 3.1.2 Grounding clip

Should be connected to ground using the shortest route possible.

| Grounding clip |
| --- |
| |

Figure 94: Grounding clip



### 3.1.3 COM interface

The Power Panel is equipped with a PC-compatible serial interface with a 16-byte FIFO buffer. This non-electrically isolated interface is primarily intended for programming Power Panel devices using Automation Studio.

The RS232 can also be used as a general interface (e.g. third-party connections, barcode reader, etc.).

| Serial interface COM | |
| --- | --- |
| RS232 interface<br>Modem-capable, not electrically isolated<br>Up to 115 kBaud | 9-pin DSUB plug<br> |
| **Pin** | **RS232** |
| 1 | DCD |
| 2 | RxD |
| 3 | TxD |
| 4 | DTR |
| 5 | GND |
| 6 | DSR |
| 7 | RTS |
| 8 | CTS |
| 9 | RI |

Table 48: Pin assignments - COM

### 3.1.4 USB port

The Power Panel is equipped with a USB (Universal Serial Bus) host controller with two USB ports.

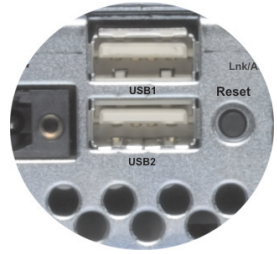
| Universal serial bus |
|---|
|  |



Figure 95: USB port

| Technical data - USB port | |
|---|---|
| Transfer rate | 1.5 MBit/s to 12 MBit/s |
| Power supply | 500 mA for each port |
| Maximum cable length | 5 m (can be extended using a USB hub) |

Table 49: Technical data for USB connection

## Warning!

**Only the USB devices tested and verified by B&R and found in the section "Accessories" on page 549 may be connected to the USB interface.**

## Warning!

**Because of general PC specifications, this interface should be handled with extreme care with regard to EMC, location of cables, etc.**

### 3.1.5 Mode / Node switches

Power Panel devices are equipped with 2 hex switches that serve as operating mode switches. Switch positions 01 to FD are available for any purpose in an application and can be evaluated by the application program.

**Mode/Node switch**

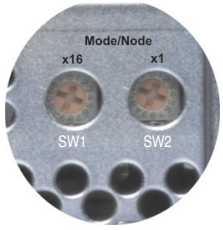


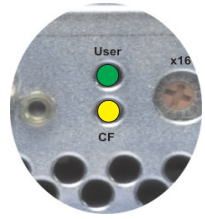

Figure 96: Mode/Node switch

| Switch position | | Function | Description |
|---|---|---|---|
| SW1 (x16) | SW2 (x1) | Operating mode switch | |
| 0 | 0 | Boot | Automation Runtime boot mode for operating system (firmware) upgrade (default: Automation Runtime).<br>In this position, a new or missing operating system can be downloaded. |
| 0 to F | 0 to F | Node | Automation Runtime run mode with node 01-FD (CompactFlash Automation Runtime or terminal operation).<br>Freely available for use in an application, e.g. setting the INA2000 node number for the Ethernet interface. |
| F | E | Dyn. mode | Automation Runtime run mode with node 01-FD (CompactFlash Automation Runtime or terminal operation).<br>Device addresses can be assigned through the software. |
| F | F | Diagnostics | Automation Runtime diagnostics mode (CompactFlash Automation Runtime or terminal operation). |

Table 50: Switch settings for the Mode / Node switch

### 3.1.6 Status LEDs

Power Panels are equipped with two status LEDs that are visible on the outside.

| Status LEDs |
|---|
|  |

| LED | Color | Function |
|---|---|---|
| User | Green | Freely available for use in an application (corresponding libraries for Automation Studio in preparation) |
| CF | Yellow | Indicates that a CompactFlash card is being accessed |

Figure 97: Status LEDs

### 3.1.7 Ethernet connection

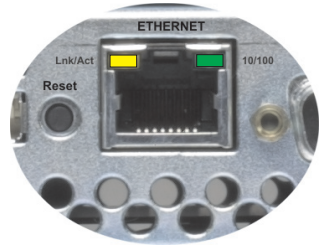
| Ethernet connection |
|---|
|  |

Figure 98: Ethernet connection

| Ethernet | 10/100 MBit/s [1] |
|---|---|
| Connection | RJ45 twisted pair (10BaseT/100BaseT) |
| Controller | MacPhyter DP83815 or DP83816 - depends on the revision |
| Cabling | S/STP (category 5) |

Table 51: Ethernet controller

1) Both operating modes are possible. Switching takes place automatically.

The onboard Ethernet controller for Power Panel devices provides an RJ45 twisted pair connection where 2 LEDs are attached for status checking:

| LED | On | Off |
|---|---|---|
| Green | 100 MBit/s | 10 MBit/s |
| Yellow | Link (LED blinks during transfer) | No link |

Table 52: Status LEDs - Ethernet controller



### 3.1.8 Reset button

The reset button can be accessed through a small hole between the USB and the Ethernet connections. In order to avoid accidental activation, a reset can only be triggered with a pointed object.

| Reset button |
|---|
| |



Figure 99: Reset button

### 3.1.9 CompactFlash slot

Power Panel devices are equipped with a CompactFlash slot that is accessible from the side. Type I CompactFlash cards are supported.

Figure 100: CompactFlash slot

It is possible to secure the CompactFlash slot using the latch provided. By pressing the ejector (using a pointed object is the best way to do this), the CompactFlash card can be changed quickly and safely.

## Warning!

**The power must be turned off before inserting or removing the CompactFlash card! As a safety measure, a sticker is also attached to Power Panel devices stating this.**

## 3.2 Stickers

### 3.2.1 Safety sticker

A safety sticker attached over the CompactFlash slot advises that the power to the Power Panel device (depending on revision) must be switched off when inserting or removing a CompactFlash card.

An ESD warning sticker is attached next to the battery compartment. This indicates the components at risk from electrostatic discharge inside the Power Panel devices.

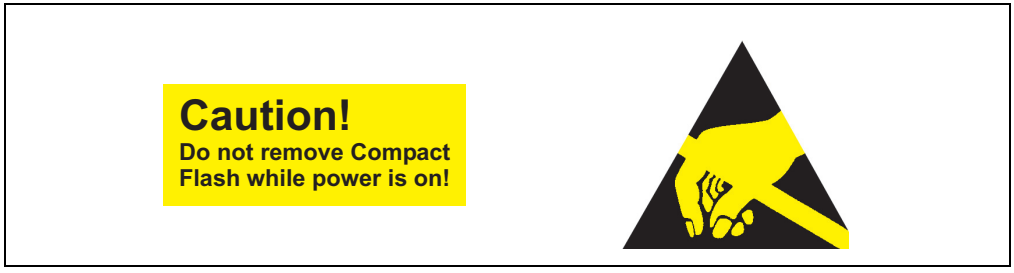



Figure 101: Safety sticker

### 3.2.2 Device label

The following label is attached to a suitable location on the Power Panel and shows brief descriptions for all of the interfaces:

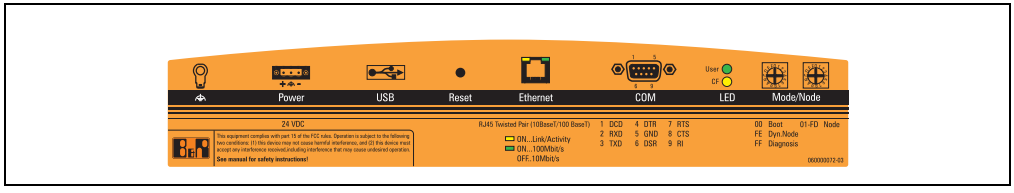



Figure 102: Device label

### 3.2.3 Serial number sticker

#### General information

Each B&R device is given a unique serial number sticker with a barcode that allows the device to be clearly identified.

#### Design / dimensions

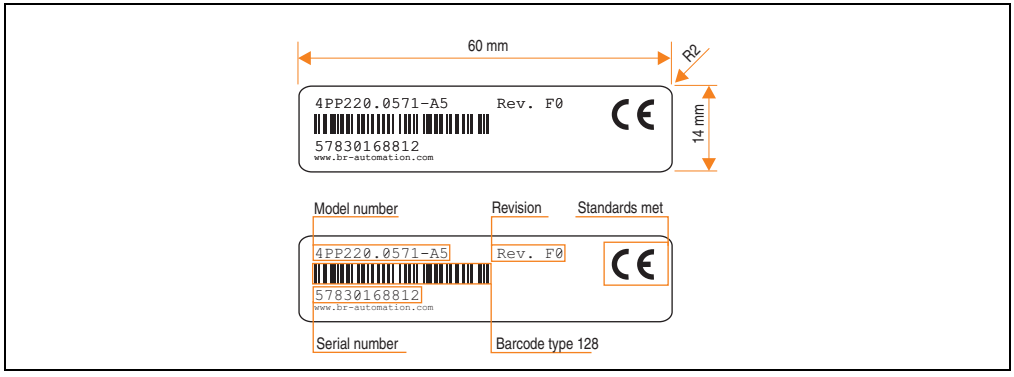



Figure 103: Design / dimensions - Serial number sticker

## 3.3 Device 4PP210.0000-95

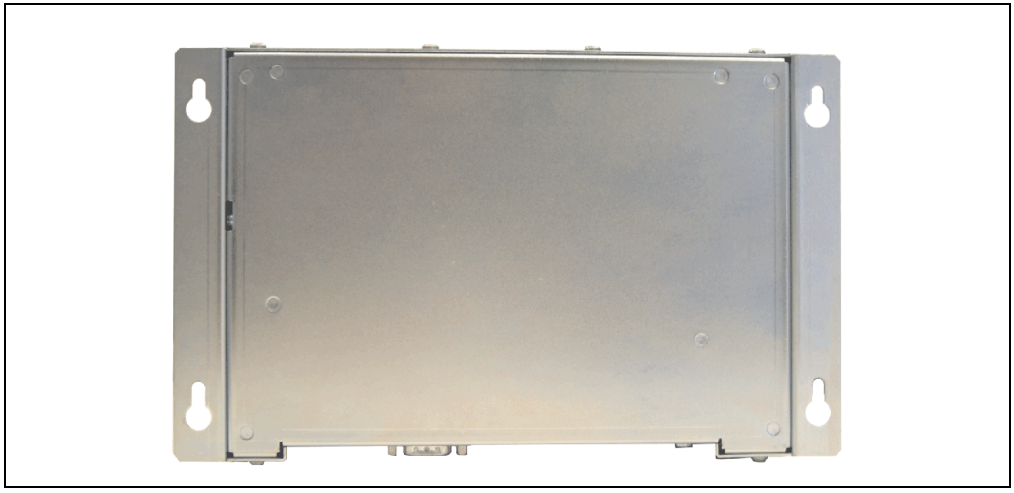


Figure 104: Front view - 4PP210.0000-95

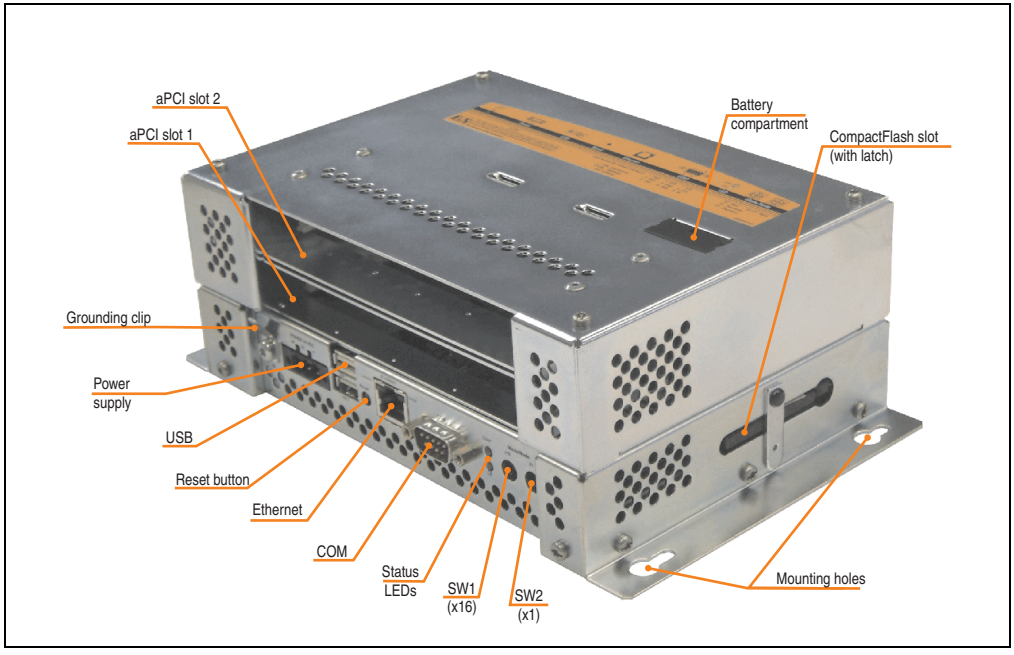



Figure 105: Rear view - 4PP210.0000-95

### 3.3.1 Technical data

| Features | 4PP210.0000-95 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 4 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>-<br>- |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < E0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 53: Technical data - 4PP210.0000-95

| Features | 4PP210.0000-95 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holdingtorque for aPCI module | 2 (see B&R System 2005 manual for available aPCI interface modules)<br>Max. 0.7 Nm |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | - |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - |
| Filter glass<br>Degree of transmission<br>Coating | - |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | - |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>12 W typical, 17 W max.<br>Yes |
| Bleeder resistance | ≥ 47 kOhm |

Table 53: Technical data - 4PP210.0000-95 (cont.)

| Mechanical characteristics | 4PP210.0000-95 |
|---|---|
| Front<br>Frame<br>Membrane<br>Design<br>Gasket | - |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>230 mm<br>146 mm<br>80.5 mm |
| Weight | Approx. 1.4 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +80°C<br>-20 to +80°C |
| Relative humidity | See 3.3.2 "Temperature humidity diagram" on page 162 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed aPCI interface modules and Compact Flash card) |
| Altitude | Max. 3000 m |

Table 53: Technical data - 4PP210.0000-95 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.3.2 Temperature humidity diagram

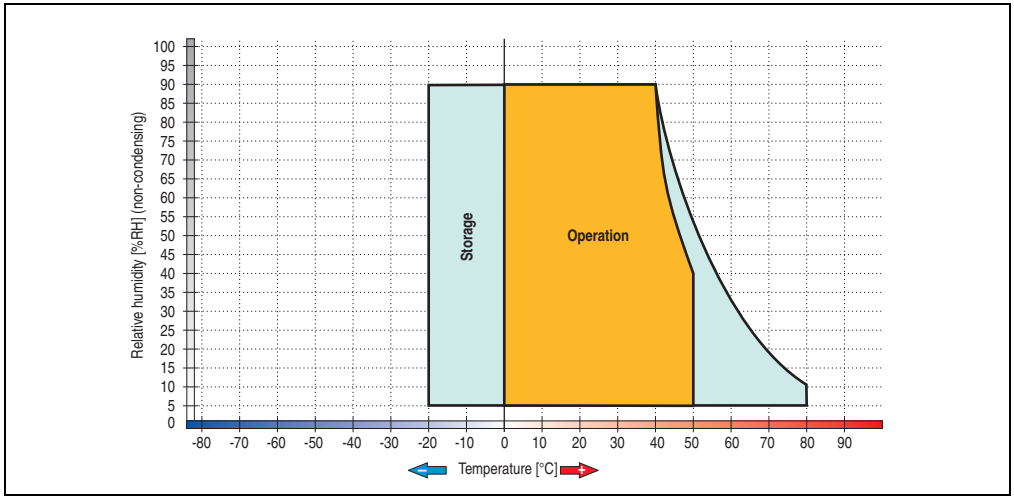



Figure 106: Temperature humidity diagram - 4PP210.0000-95

### 3.3.3 Dimensions

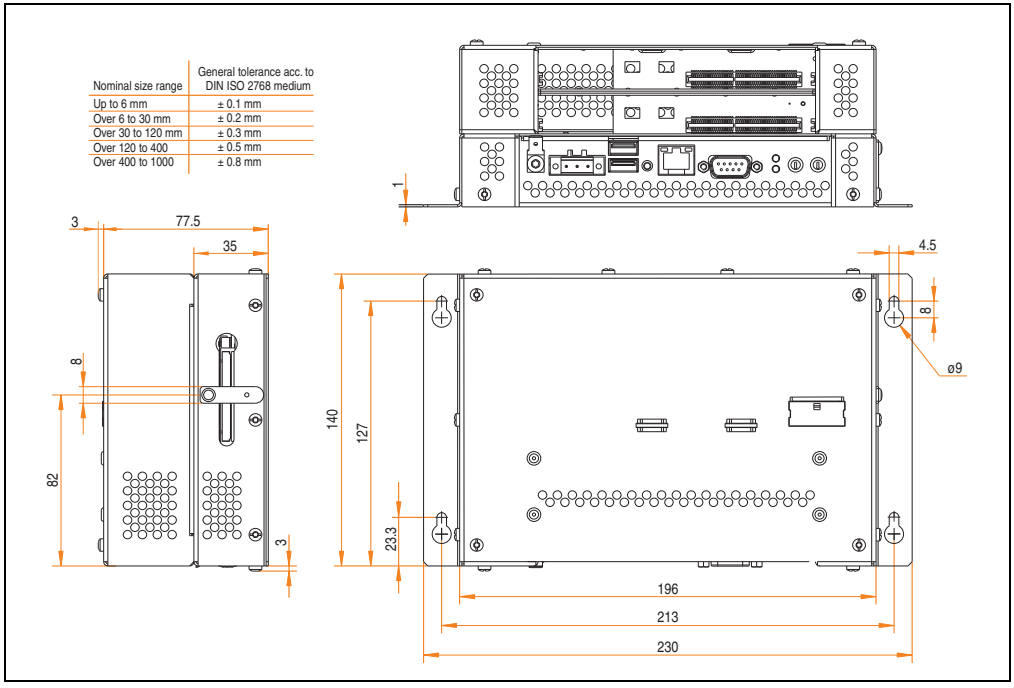



Figure 107: Dimensions - 4PP210.0000-95

### 3.3.4 Drilling template

For mounting, the drillings must be made according to the following diagram. For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

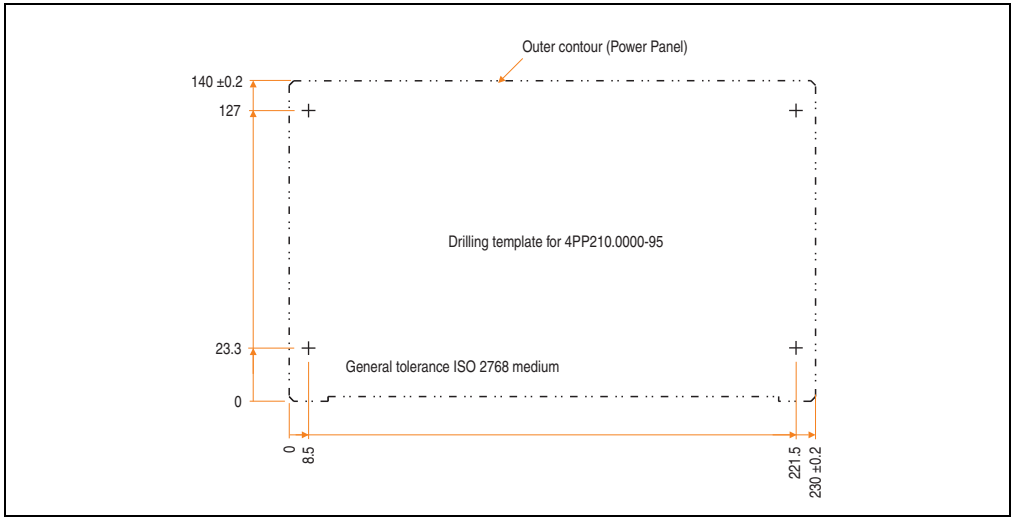



Figure 108: Cutout dimensions

### 3.3.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 210 Controller MH 2aPCI |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 54: Contents of delivery - 4PP210.0000-95

## 3.4 Device 4PP220.0571-45

Figure 109: Front view - 4PP220.0571-45

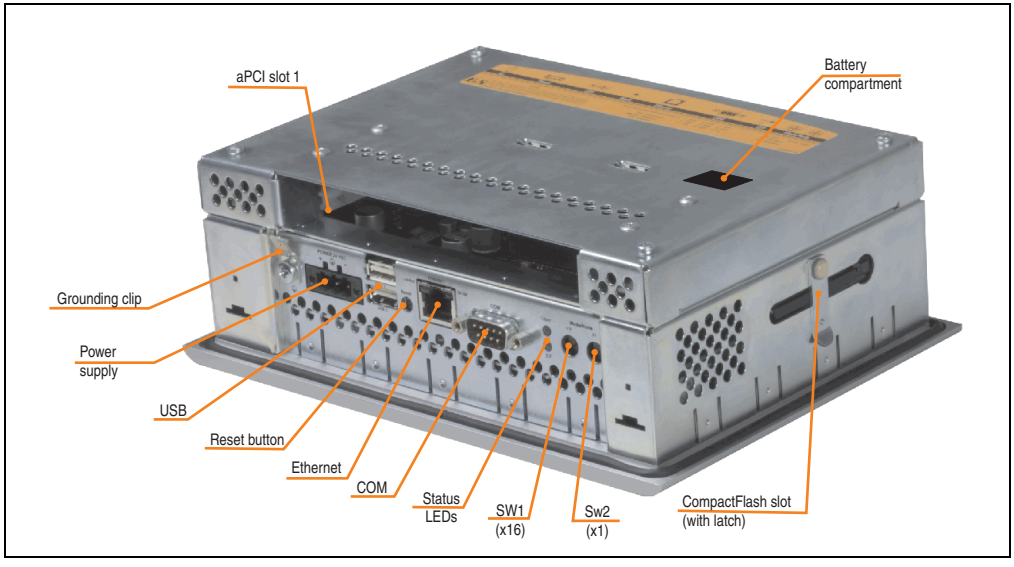



Figure 110: Rear view - 4PP220.0571-45

### 3.4.1 Technical data

| Features | 4PP220.0571-45 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < G0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 55: Technical data - 4PP220.0571-45

| Features | 4PP220.0571-45 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 1 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | LCD monochrome |
| Diagonal | 5.7 in (144 mm) |
| Colors | 8 shades of gray |
| Resolution | QVGA, 320 x 240 pixels |
| Contrast | 25:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =40° |
| Vertical | Direction U = 40°/ direction D = 50° |
| Background lighting | |
| Brightness | 140 cd/m² |
| Half-brightness time | 50,000 hours |
| Touch screen | |
| Touch screen type | Gunze |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 84% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 12 W typical, 17 W max. |
| Electrical isolation | Yes |
| Bleeder resistance | ≥ 47 kOhm |

Table 55: Technical data - 4PP220.0571-45 (cont.)

| Mechanical characteristics | 4PP220.0571-45 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 212 mm |
| Height | 156 mm |
| Depth | 76 mm |
| Weight | Approx. 1.7 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 3.4.2 "Temperature humidity diagram" on page 168 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 55: Technical data - 4PP220.0571-45 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.4.2 Temperature humidity diagram

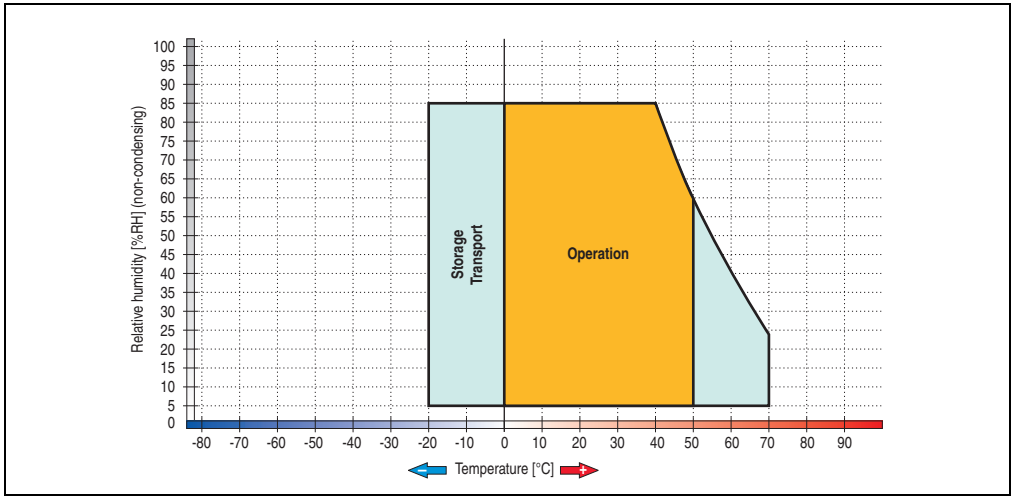



Figure 111: Temperature humidity diagram - 4PP220.0571-45

### 3.4.3 Dimensions

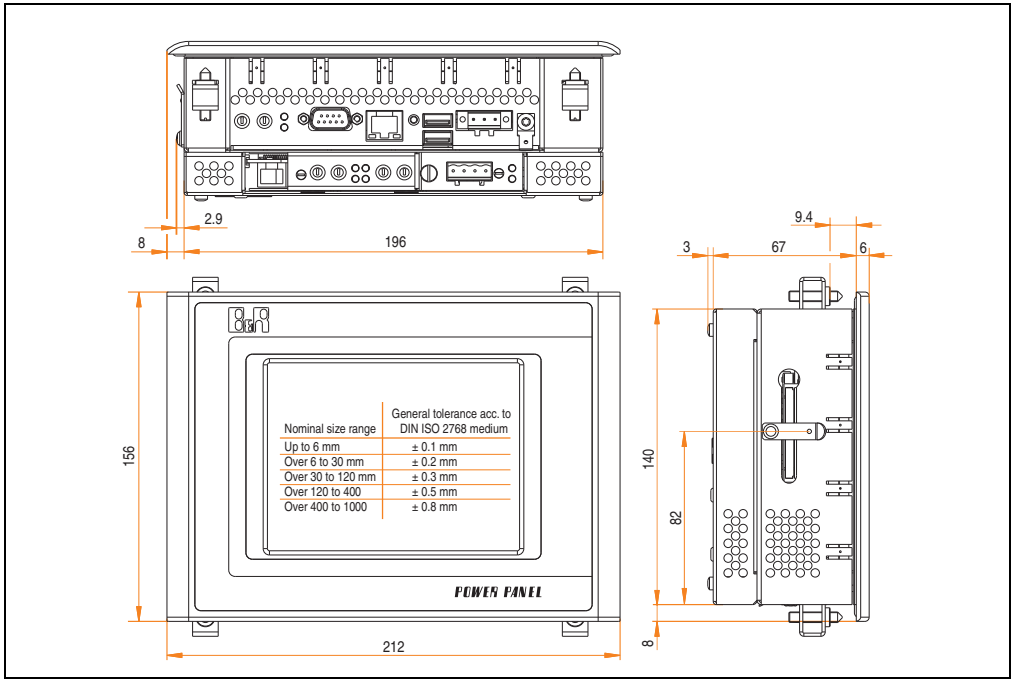



Figure 112: Dimensions - 4PP220.0571-45

### 3.4.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 112 "Dimensions - 4PP220.0571-45" on page 168) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

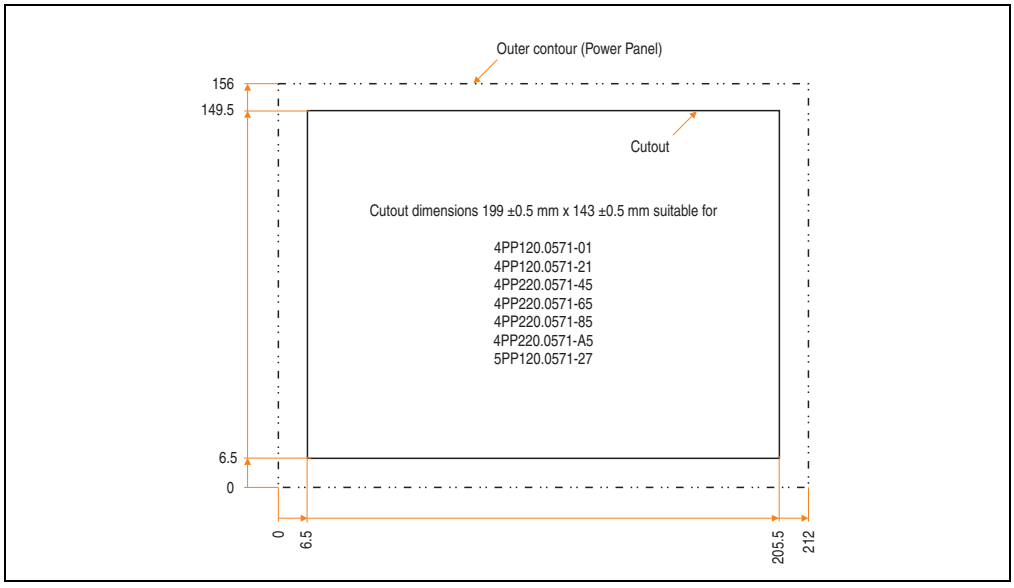



Figure 113: Cutout dimensions

### 3.4.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 220 LCD B/W QVGA 5.7" T MH 1aPCI |
| 4 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 56: Contents of delivery - 4PP220.0571-45

## 3.5 Device 4PP220.0571-65

Figure 114: Front view - 4PP220.0571-65

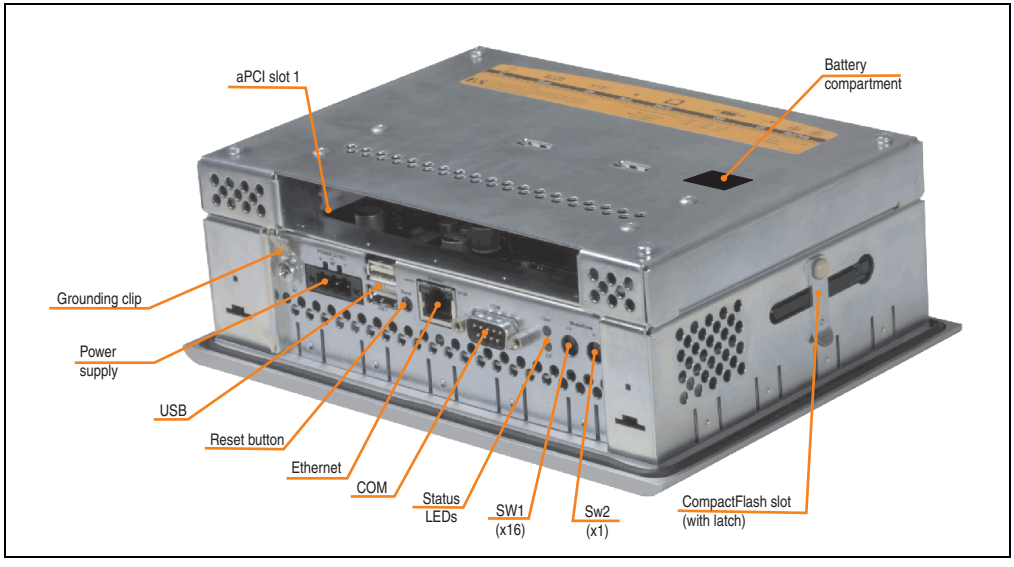



Figure 115: Rear view - 4PP220.0571-65

### 3.5.1 Technical data

| Features | 4PP220.0571-65 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < G0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 57: Technical data - 4PP220.0571-65

| Features | 4PP220.0571-65 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 1 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color LCD |
| Diagonal | 5.7 in (144 mm) |
| Colors | 256 colors |
| Resolution | QVGA, 320 x 240 pixels |
| Contrast | 40:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =40° |
| Vertical | Direction U = 40°/ direction D = 50° |
| Background lighting | |
| Brightness | 150 cd/m² |
| Half-brightness time | 50,000 hours |
| Touch screen | |
| Touch screen type | Gunze |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 84% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 12 W typical, 17 W max. |
| Electrical isolation | Yes |
| Bleeder resistance | ≥ 47 kOhm |

Table 57: Technical data - 4PP220.0571-65 (cont.)

| Mechanical characteristics | 4PP220.0571-65 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 212 mm |
| Height | 156 mm |
| Depth | 76 mm |
| Weight | Approx. 1.7 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 3.5.2 "Temperature humidity diagram" on page 174 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 57: Technical data - 4PP220.0571-65 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.5.2 Temperature humidity diagram

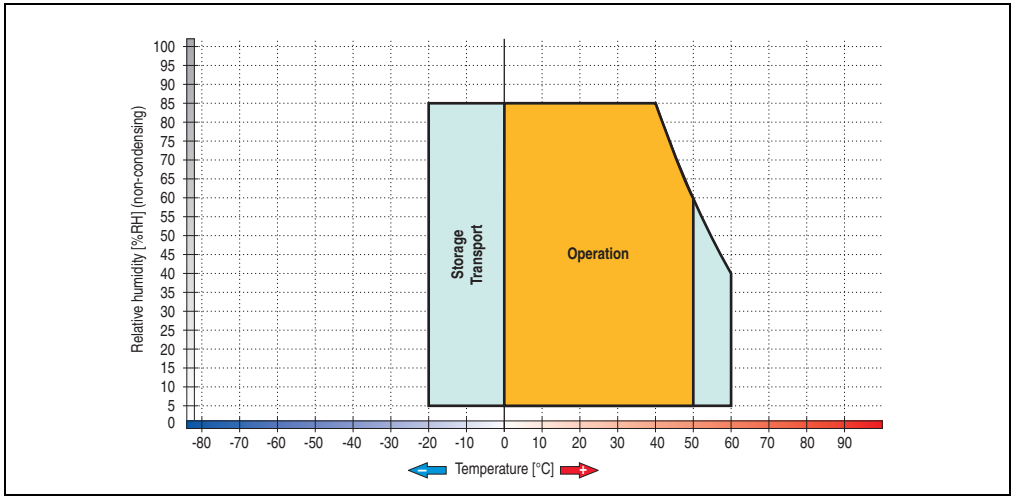



Figure 116: Temperature humidity diagram - 4PP220.0571-65

### 3.5.3 Dimensions

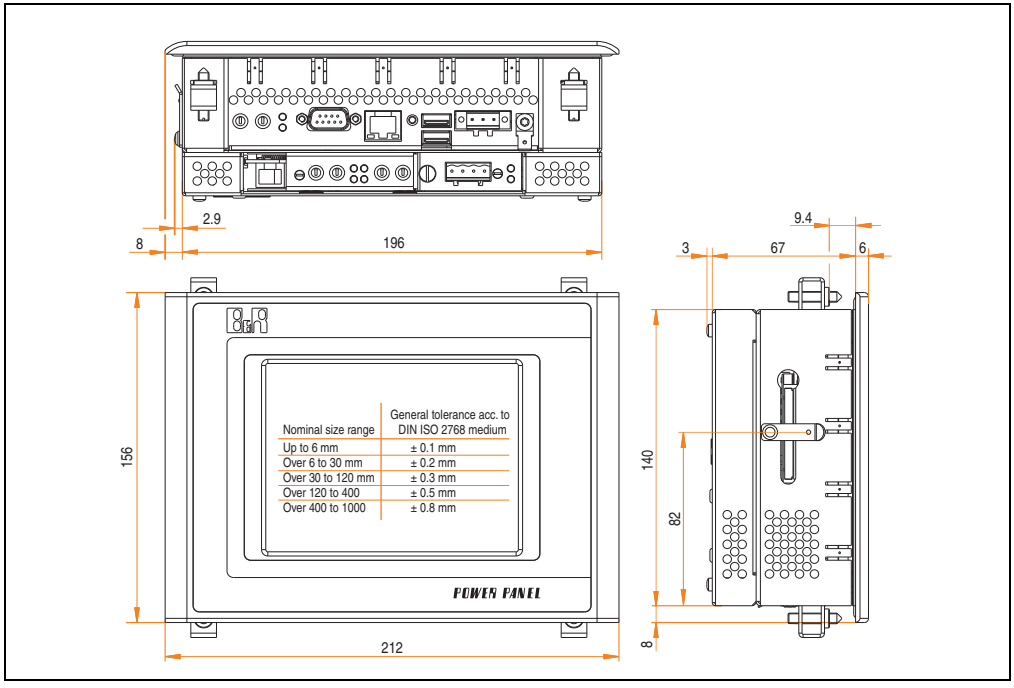



Figure 117: Dimensions - 4PP220.0571-65

### 3.5.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 117 "Dimensions - 4PP220.0571-65" on page 174) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

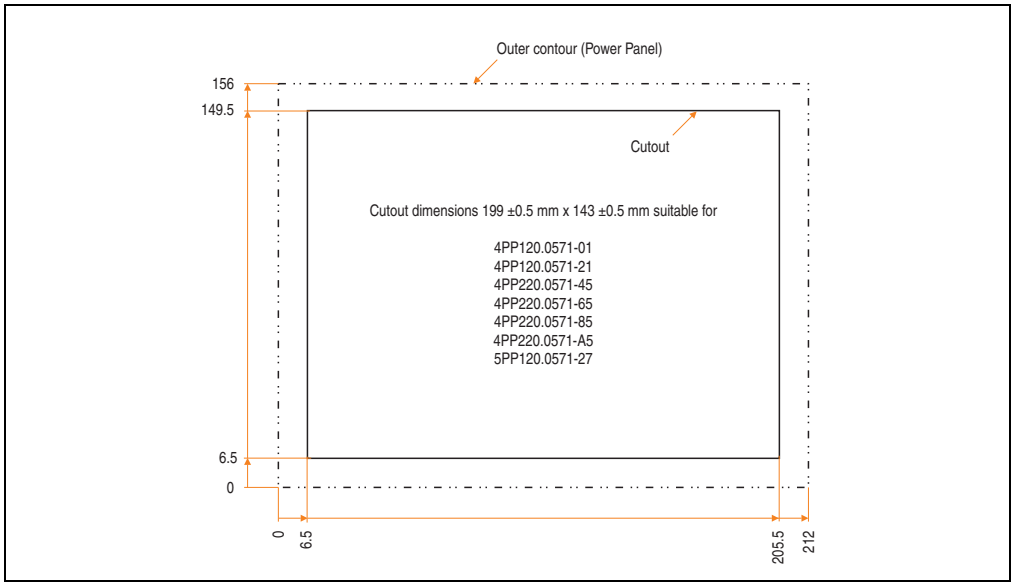



Figure 118: Cutout dimensions

### 3.5.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 220 LCD C QVGA 5.7" T MH 1aPCI |
| 4 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 58: Contents of delivery - 4PP220.0571-65

## 3.6 Device 4PP220.0571-85

Figure 119: Front view - 4PP220.0571-85

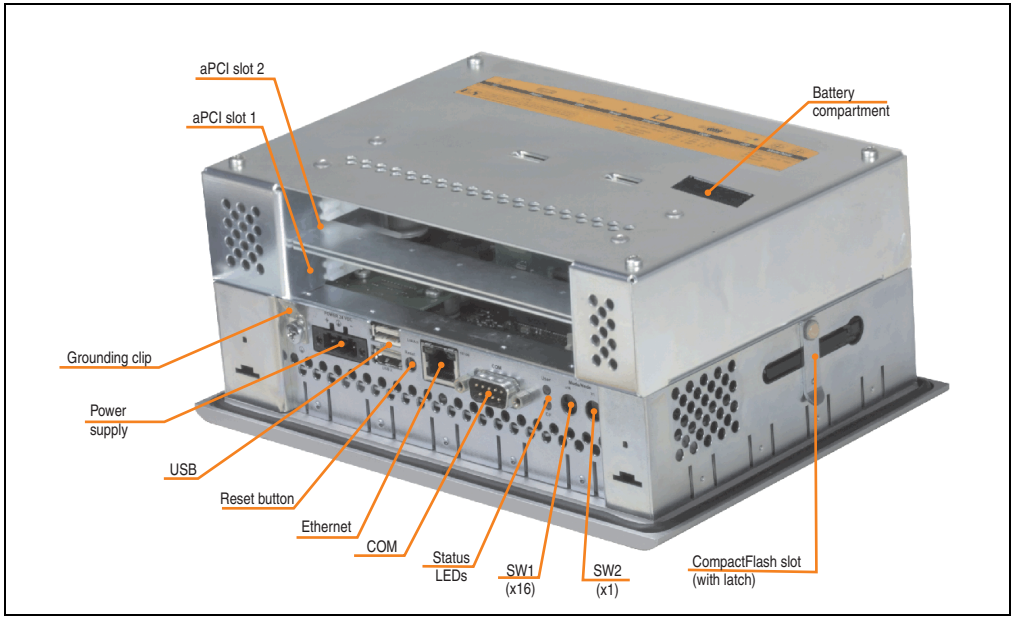



Figure 120: Rear view - 4PP220.0571-85

### 3.6.1 Technical data

| Features | 4PP220.0571-85 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1)] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1)]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < G0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 59: Technical data - 4PP220.0571-85

| Features | 4PP220.0571-85 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | LCD monochrome |
| Diagonal | 5.7 in (144 mm) |
| Colors | 8 shades of gray |
| Resolution | QVGA, 320 x 240 pixels |
| Contrast | 25:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =40° |
| Vertical | Direction U = 40°/ direction D = 50° |
| Background lighting | |
| Brightness | 140 cd/m² |
| Half-brightness time | 50,000 hours |
| Touch screen | |
| Touch screen type | Gunze |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 84% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 12 W typical, 17 W max. |
| Electrical isolation | Yes |
| Bleeder resistance | ≥ 47 kOhm |

Table 59: Technical data - 4PP220.0571-85 (cont.)

| Mechanical characteristics | 4PP220.0571-85 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 212 mm |
| Height | 156 mm |
| Depth | 98 mm |
| Weight | Approx. 2 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 3.6.2 "Temperature humidity diagram" on page 180 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 59: Technical data - 4PP220.0571-85 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.6.2 Temperature humidity diagram

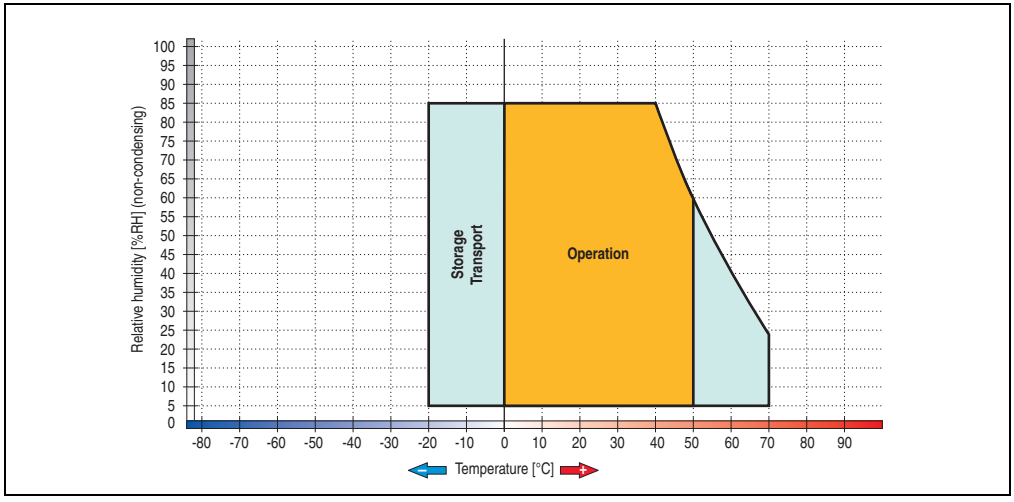



Figure 121: Temperature humidity diagram - 4PP220.0571-85

### 3.6.3 Dimensions

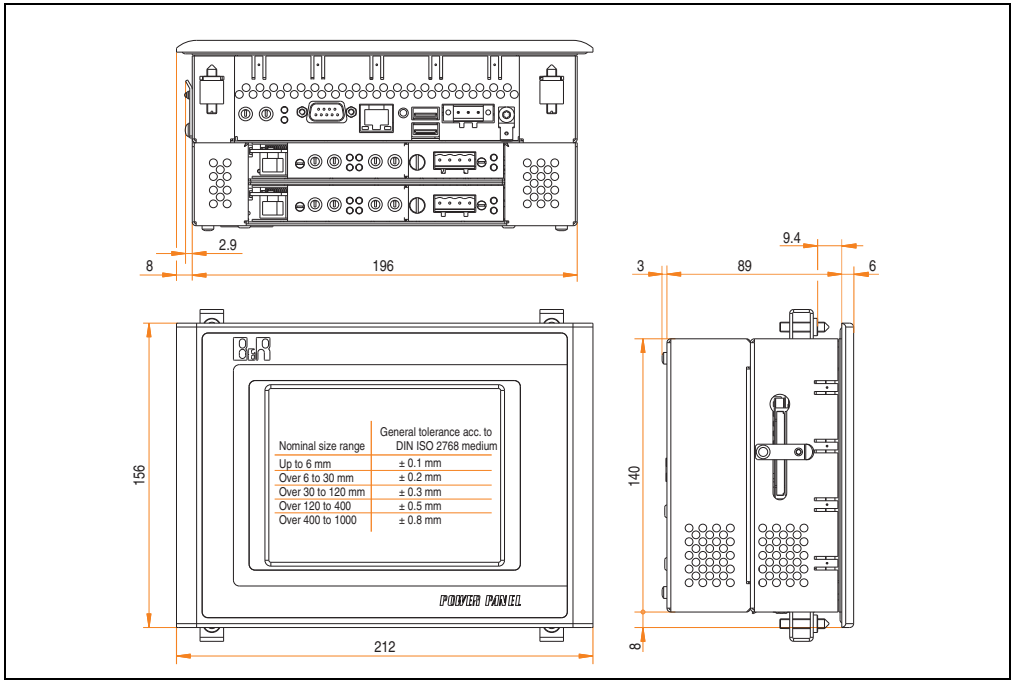



Figure 122: Dimensions - 4PP220.0571-85

### 3.6.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 122 "Dimensions - 4PP220.0571-85" on page 180) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

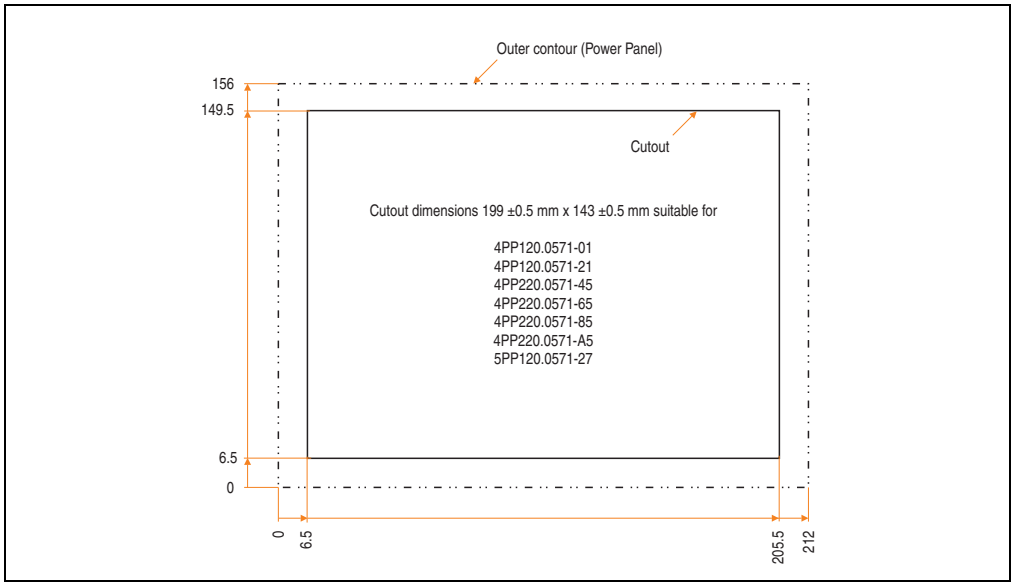



Figure 123: Cutout dimensions

### 3.6.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 220 LCD B/W QVGA 5.7" T MH 2aPCI |
| 4 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 60: Contents of delivery - 4PP220.0571-85

## 3.7 Device 4PP220.0571-A5

Figure 124: Front view - 4PP220.0571-A5

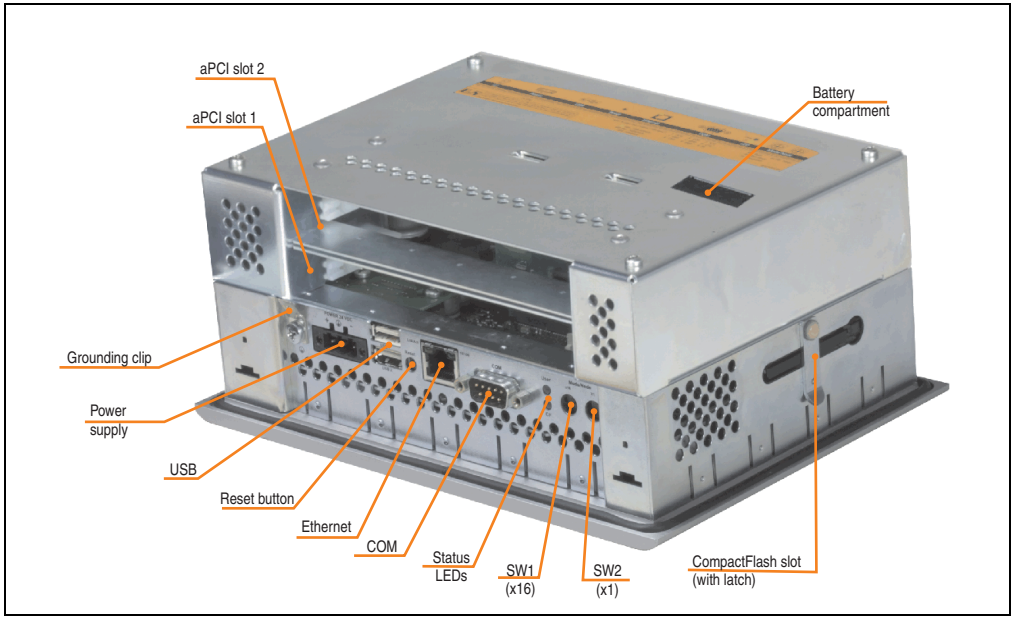



Figure 125: Rear view - 4PP220.0571-A5

### 3.7.1 Technical data

| Features | 4PP220.0571-A5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1)] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1)]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < G0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 61: Technical data - 4PP220.0571-A5

| Features | 4PP220.0571-A5 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color LCD |
| Diagonal | 5.7 in (144 mm) |
| Colors | 256 colors |
| Resolution | QVGA, 320 x 240 pixels |
| Contrast | 40:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =40° |
| Vertical | Direction U = 40°/ direction D = 50° |
| Background lighting | |
| Brightness | 150 cd/m² |
| Half-brightness time | 50,000 hours |
| Touch screen | |
| Touch screen type | Gunze |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 84% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 12 W typical, 17 W max. |
| Electrical isolation | Yes |
| Bleeder resistance | ≥ 47 kOhm |

Table 61: Technical data - 4PP220.0571-A5 (cont.)

| Mechanical characteristics | 4PP220.0571-A5 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 212 mm |
| Height | 156 mm |
| Depth | 98 mm |
| Weight | Approx. 2 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 3.7.2 "Temperature humidity diagram" on page 186 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 61: Technical data - 4PP220.0571-A5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.7.2 Temperature humidity diagram

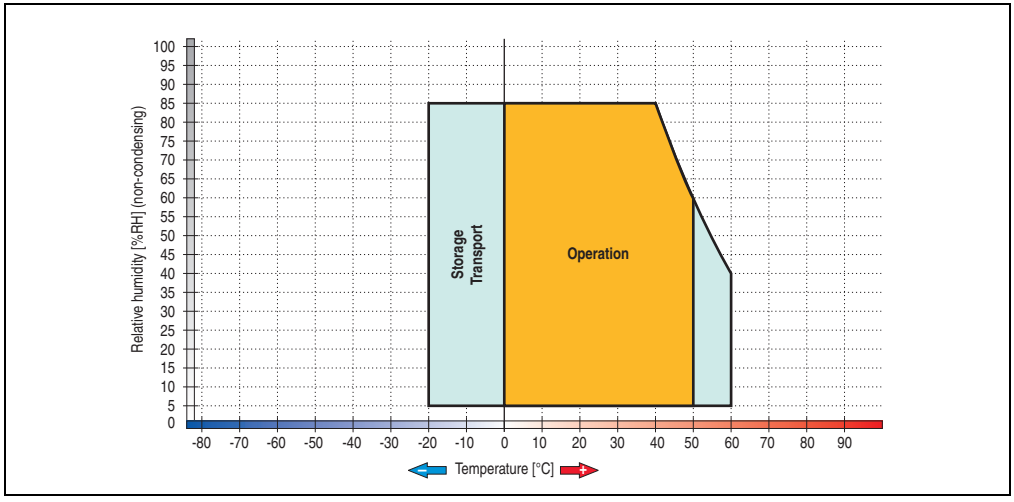



Figure 126: Temperature humidity diagram - 4PP220.0571-A5

### 3.7.3 Dimensions

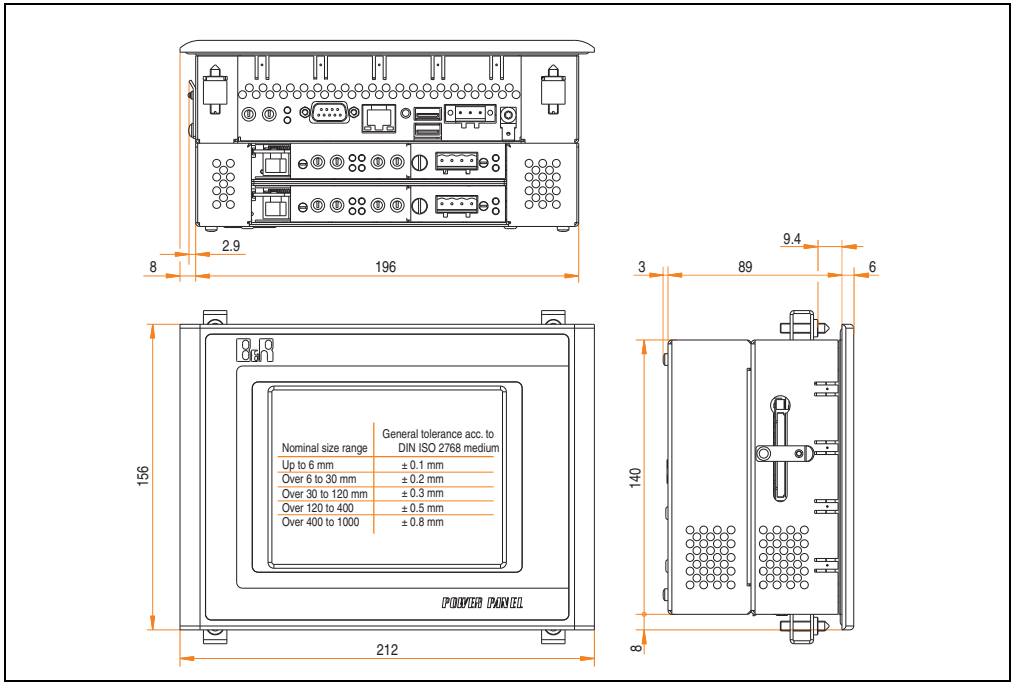



Figure 127: Dimensions - 4PP220.0571-A5

### 3.7.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 127 "Dimensions - 4PP220.0571-A5" on page 186) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

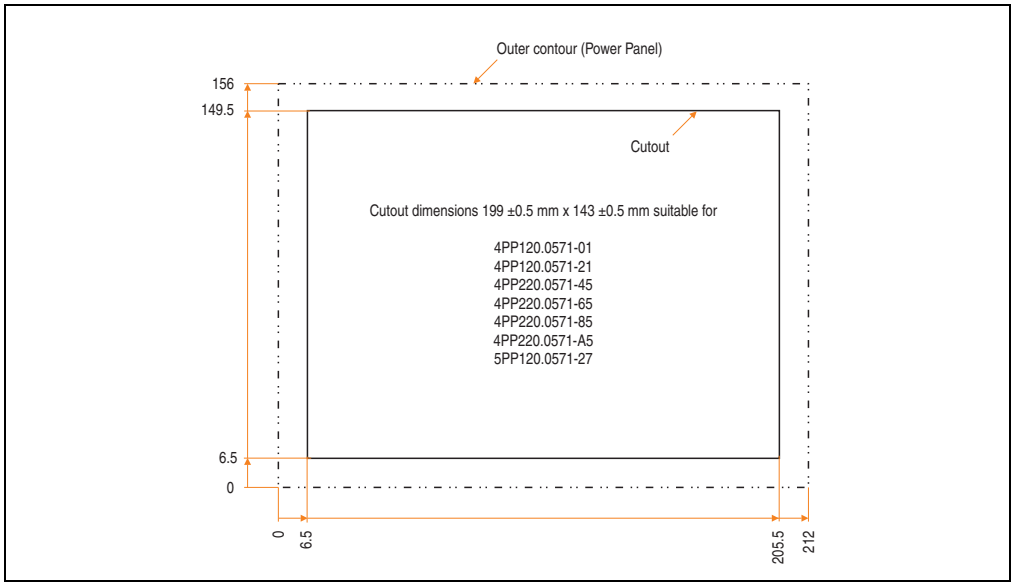



Figure 128: Cutout dimensions

### 3.7.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 220 LCD C QVGA 5.7" T MH 2aPCI |
| 4 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 62: Contents of delivery - 4PP220.0571-A5

## 3.8 Device 4PP220.1043-75

Figure 129: Front view - 4PP220.1043-75

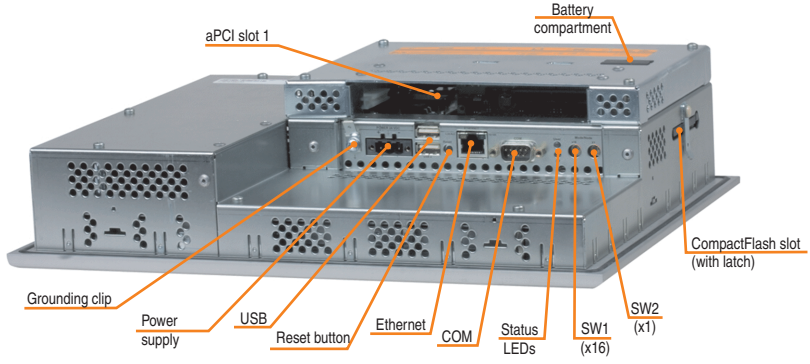



Figure 130: Rear view - 4PP220.1043-75

### 3.8.1 Technical data

| Features | 4PP220.1043-75 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < F0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 63: Technical data - 4PP220.1043-75

| Features | 4PP220.1043-75 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 1 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | |
| Touch screen type | Elo (Rev. < M0: 3M) |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 17 W typical, 22 W max. |
| Electrical isolation | Yes |
| Bleeder resistance | ≥ 47 kOhm |

Table 63: Technical data - 4PP220.1043-75 (cont.)

| Mechanical characteristics | 4PP220.1043-75 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 323 mm |
| Height | 260 mm |
| Depth | 86 mm |
| Weight | Approx. 3.9 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 3.8.2 "Temperature humidity diagram" on page 192 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 63: Technical data - 4PP220.1043-75 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.8.2 Temperature humidity diagram

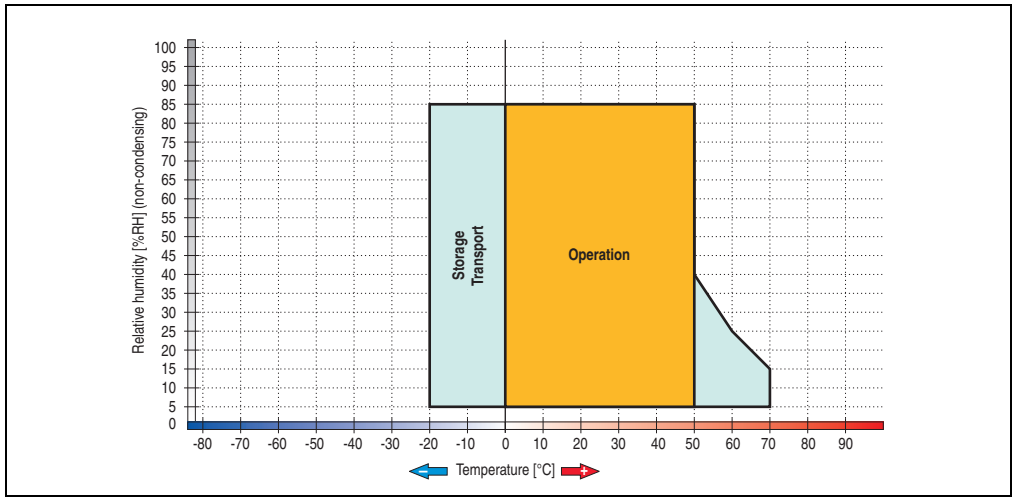



Figure 131: Temperature humidity diagram - 4PP220.1043-75

### 3.8.3 Dimensions

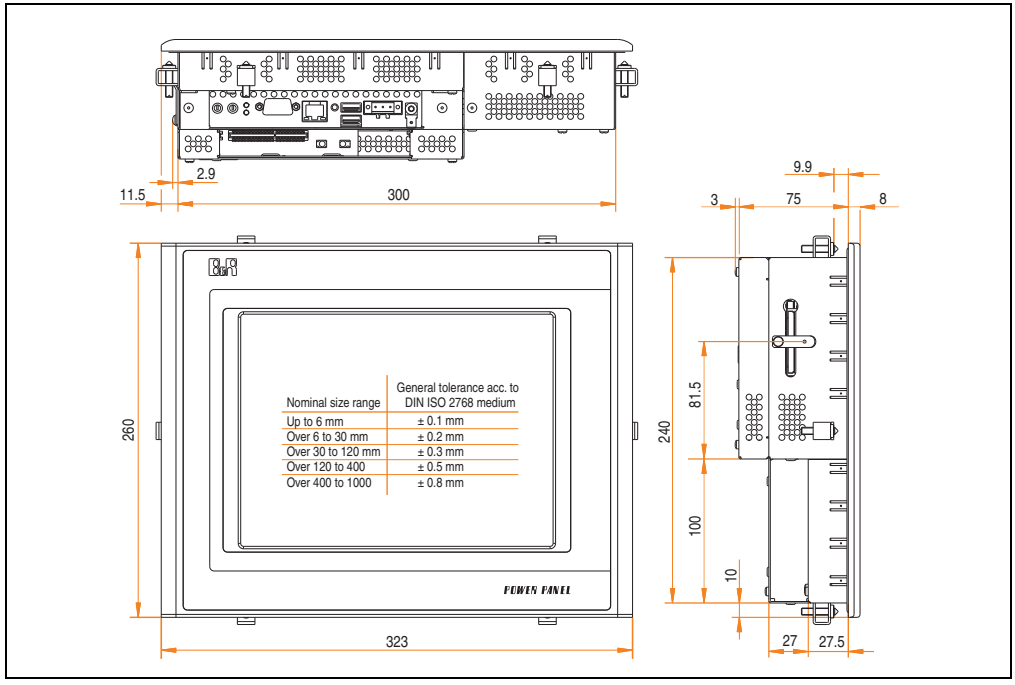



Figure 132: Dimensions - 4PP220.1043-75

### 3.8.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 132 "Dimensions - 4PP220.1043-75" on page 192) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

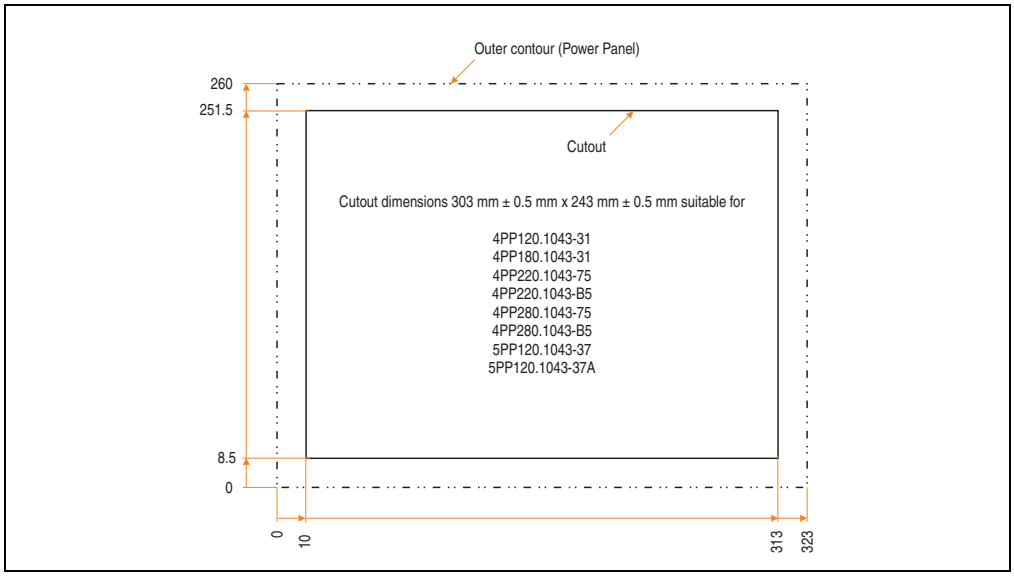



Figure 133: Cutout dimensions

### 3.8.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 220 TFT C VGA 10.4" T MH 1aPCI |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 64: Contents of delivery - 4PP220.1043-75

## 3.9 Device 4PP220.1043-B5

Figure 134: Front view - 4PP220.1043-B5

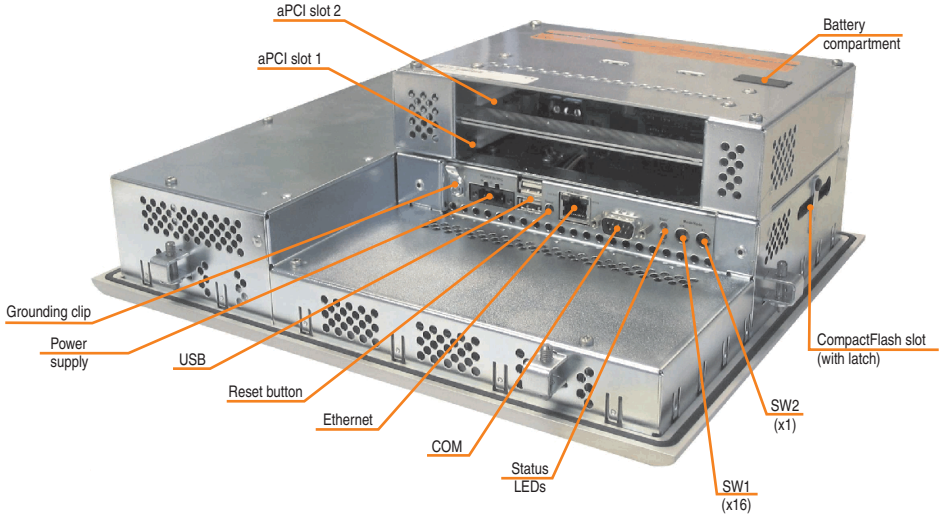



Figure 135: Rear view - 4PP220.1043-B5

### 3.9.1 Technical data

| Features | 4PP220.1043-B5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < G0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 65: Technical data - 4PP220.1043-B5

| Features | 4PP220.1043-B5 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | |
| Touch screen type | Elo (Rev. < O0: 3M) |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 17 W typical, 22 W max. |
| Electrical isolation | Yes |
| Bleeder resistance | ≥ 47 kOhm |

Table 65: Technical data - 4PP220.1043-B5 (cont.)

| Mechanical characteristics | 4PP220.1043-B5 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 323 mm |
| Height | 260 mm |
| Depth | 108 mm |
| Weight | Approx. 4.2 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 3.9.2 "Temperature humidity diagram" on page 198 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 65: Technical data - 4PP220.1043-B5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.9.2 Temperature humidity diagram

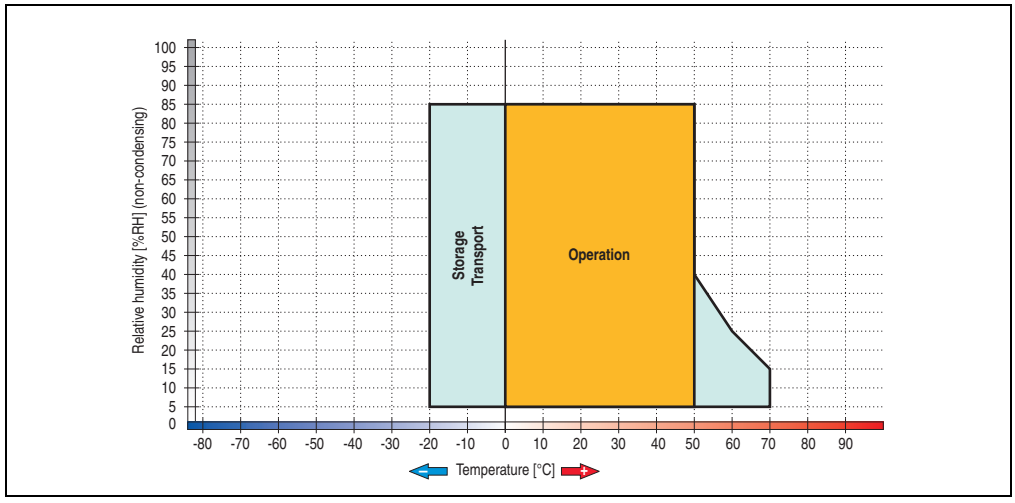



Figure 136: Temperature humidity diagram - 4PP220.1043-B5

### 3.9.3 Dimensions

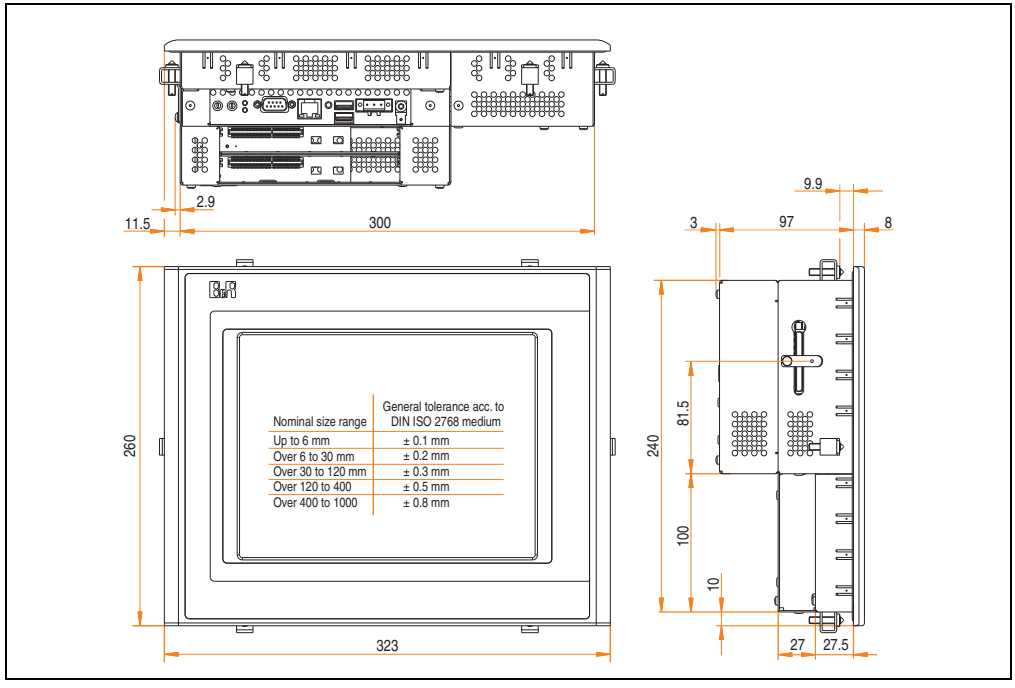



Figure 137: Dimensions - 4PP220.1043-B5

### 3.9.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 137 "Dimensions - 4PP220.1043-B5" on page 198) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

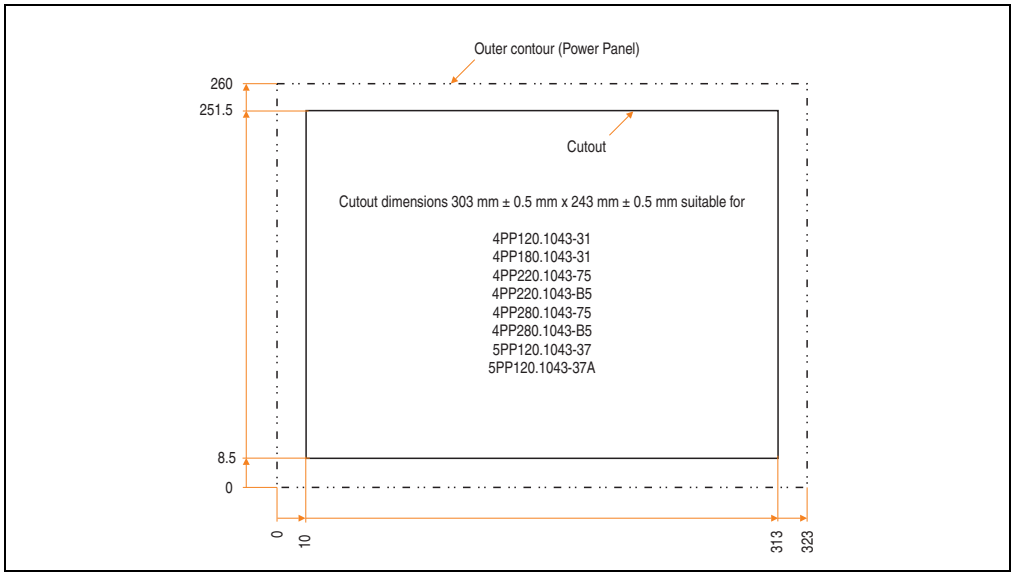



Figure 138: Cutout dimensions

### 3.9.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 220 TFT C VGA 10.4" T MH 2aPCI |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 66: Contents of delivery - 4PP220.1043-B5

## 3.10 Device 4PP220.1505-75

Figure 139: Front view - 4PP220.1505-75

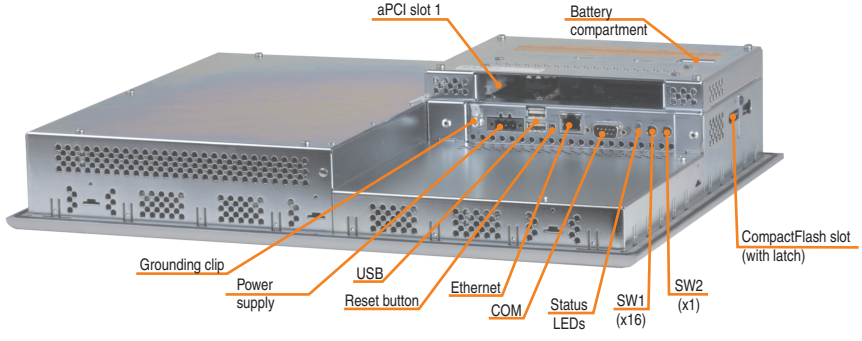



Figure 140: Rear view - 4PP220.1505-75

### 3.10.1 Technical data

| Features | 4PP220.1505-75 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < G0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 67: Technical data - 4PP220.1505-75

| Features | 4PP220.1505-75 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 1 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 256 colors |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | |
| Touch screen type | Elo (Rev. < N0: 3M) |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 30 W typical, 35 W max. |
| Electrical isolation | Yes |
| Bleeder resistance | ≥ 47 kOhm |

Table 67: Technical data - 4PP220.1505-75 (cont.)

| Mechanical characteristics | 4PP220.1505-75 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 435 mm |
| Height | 330 mm |
| Depth | 86 mm |
| Weight | Approx. 6.7 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 3.10.2 "Temperature humidity diagram" on page 204 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 67: Technical data - 4PP220.1505-75 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.10.2 Temperature humidity diagram

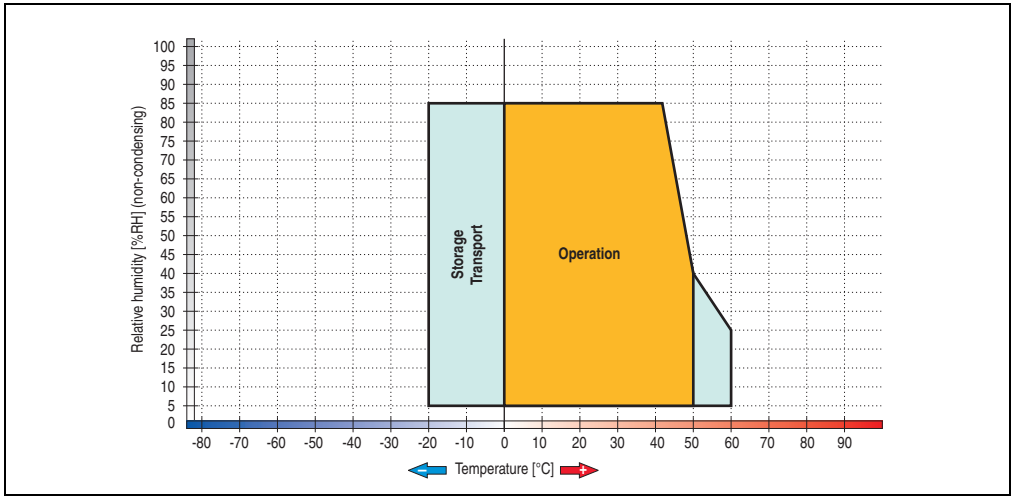



Figure 141: Temperature humidity diagram - 4PP220.1505-75

### 3.10.3 Dimensions

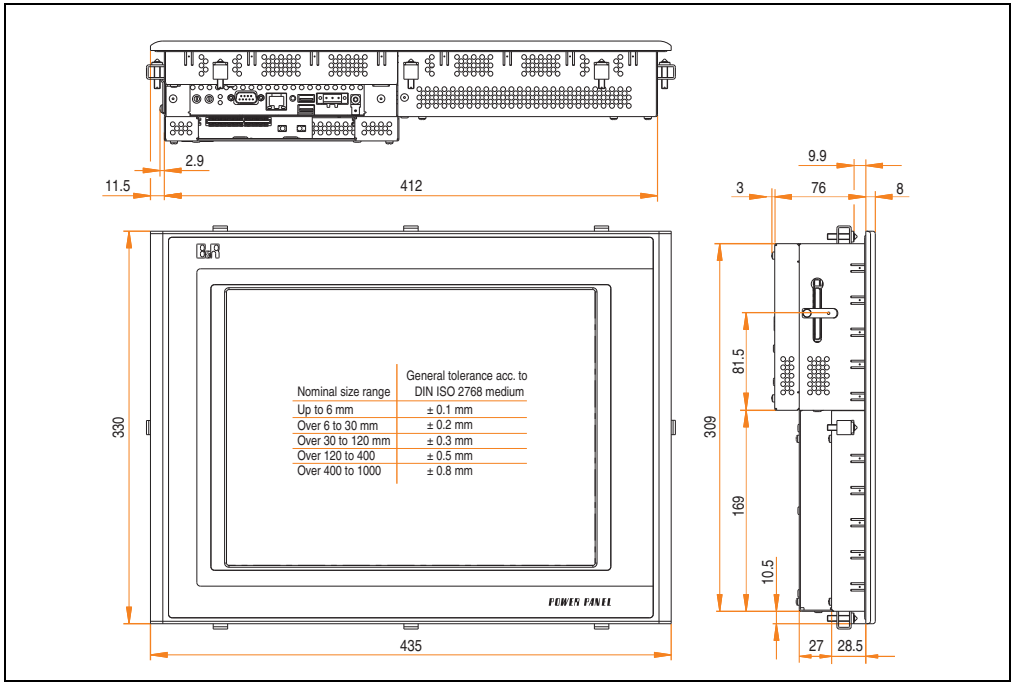



Figure 142: Dimensions - 4PP220.1505-75

### 3.10.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 142 "Dimensions - 4PP220.1505-75" on page 204) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

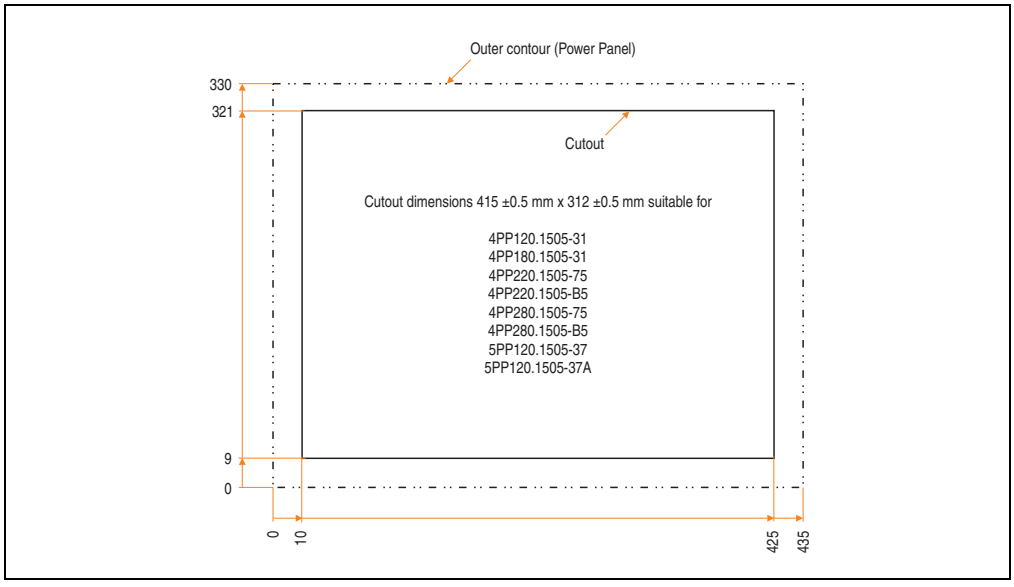



Figure 143: Cutout dimensions

### 3.10.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 220 TFT C XGA 15" T MH 1aPCI |
| 8 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 68: Contents of delivery - 4PP220.1505-75

## 3.11 Device 4PP220.1505-B5

Figure 144: Front view - 4PP220.1505-B5

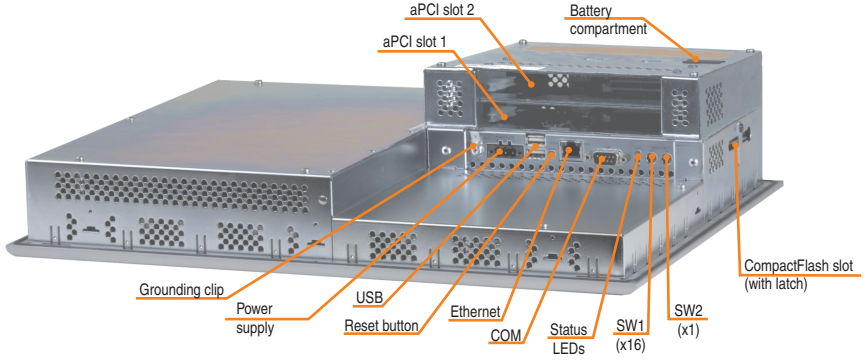



Figure 145: Rear view - 4PP220.1505-B5

### 3.11.1 Technical data

| Features | 4PP220.1505-B5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < G0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 69: Technical data - 4PP220.1505-B5

| Features | 4PP220.1505-B5 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 256 colors |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | |
| Touch screen type | Elo (Rev. < N0: 3M) |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 30 W typical, 35 W max. |
| Electrical isolation | Yes |
| Bleeder resistance | ≥ 47 kOhm |

Table 69: Technical data - 4PP220.1505-B5 (cont.)

| Mechanical characteristics | 4PP220.1505-B5 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 435 mm |
| Height | 330 mm |
| Depth | 109 mm |
| Weight | Approx. 6.8 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 3.11.2 "Temperature humidity diagram" on page 210 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 69: Technical data - 4PP220.1505-B5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.11.2 Temperature humidity diagram

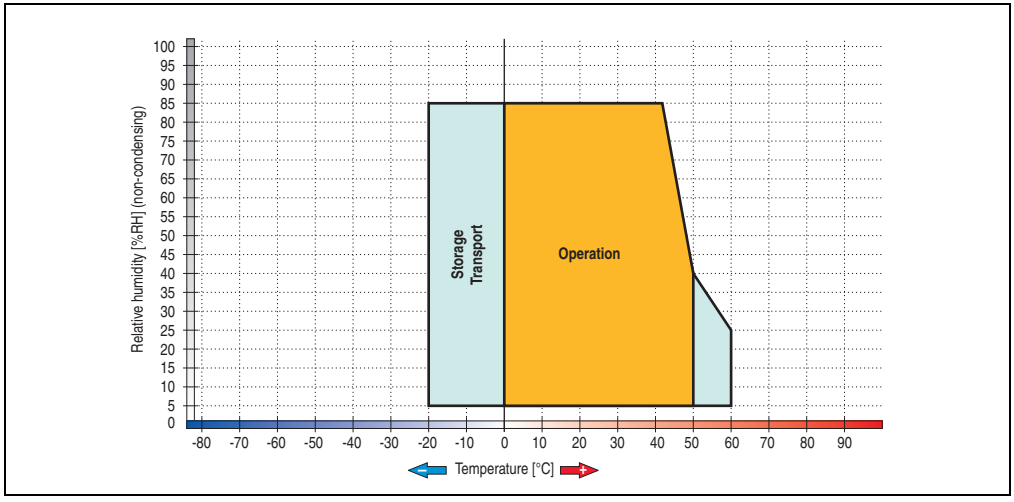



Figure 146: Temperature humidity diagram - 4PP220.1505-B5

### 3.11.3 Dimensions

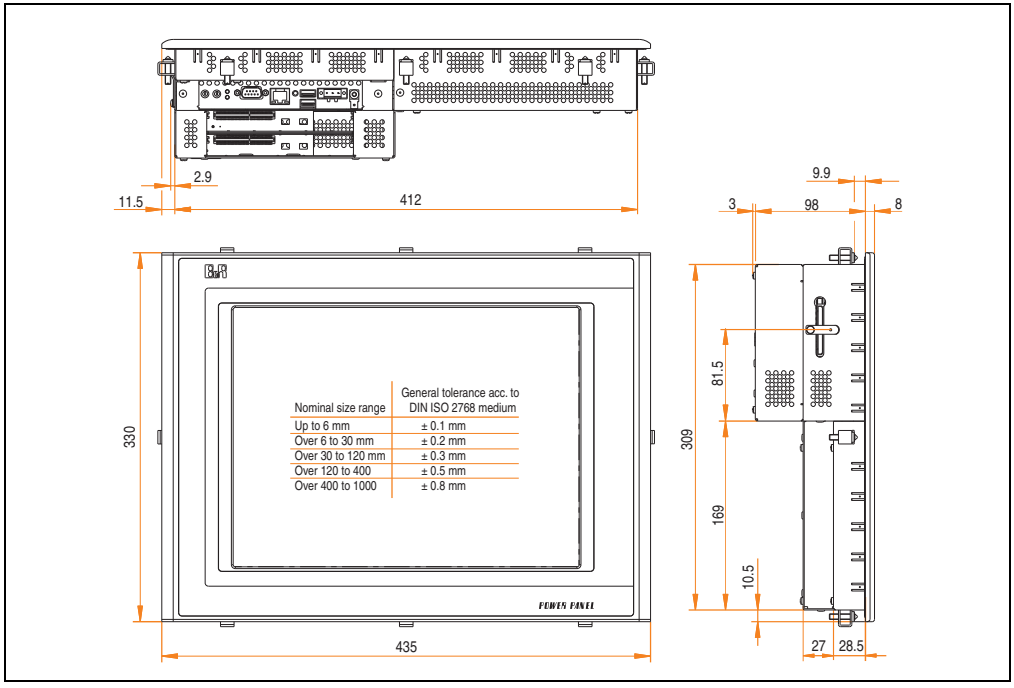



Figure 147: Dimensions - 4PP220.1505-B5

### 3.11.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 147 "Dimensions - 4PP220.1505-B5" on page 210) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

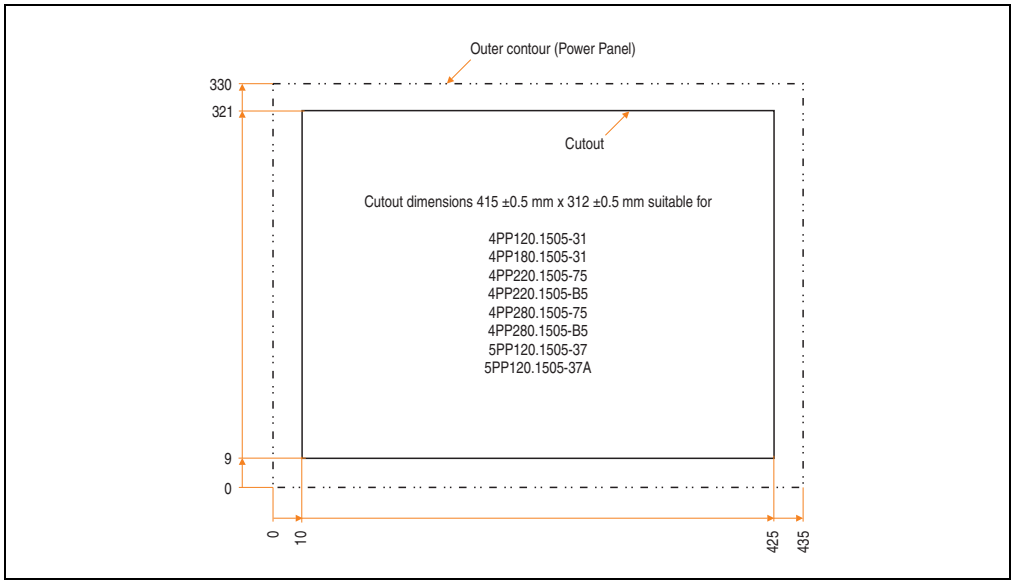



Figure 148: Cutout dimensions

### 3.11.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 220 TFT C XGA 15" T MH 2aPCI |
| 8 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 70: Contents of delivery - 4PP220.1505-B5

## 3.12 Device 4PP251.0571-45

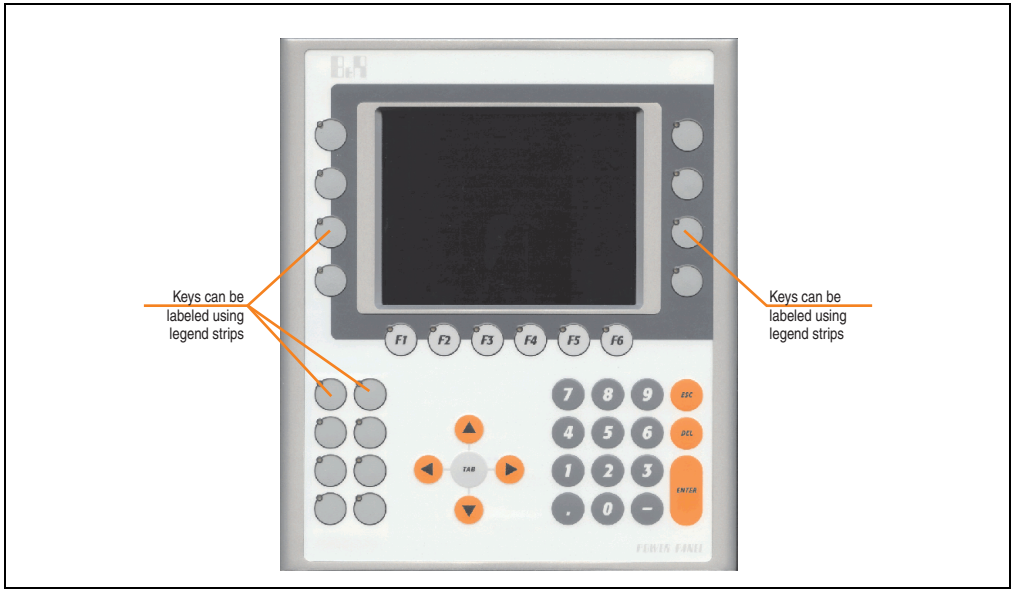



Figure 149: Front view - 4PP251.0571-45

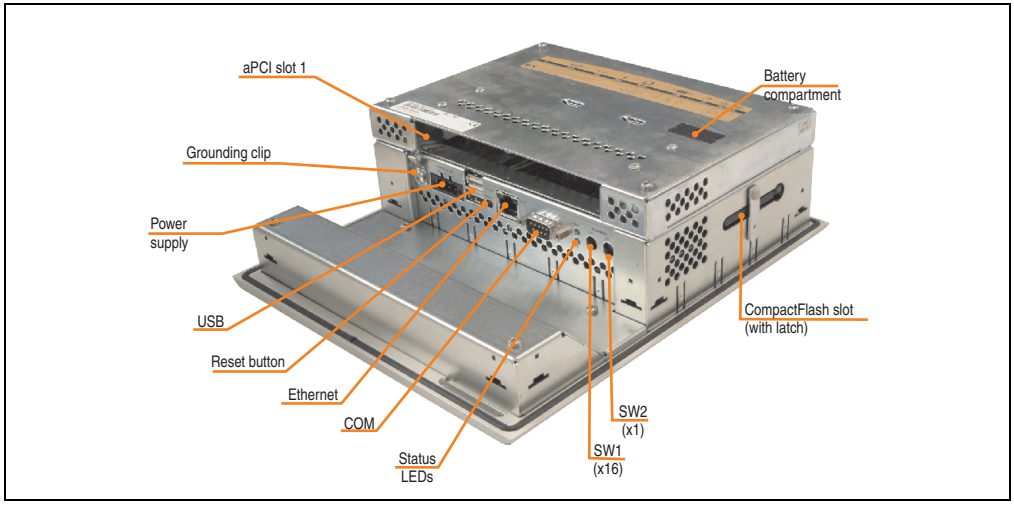



Figure 150: Rear view - 4PP251.0571-45

### 3.12.1 Technical data

| Features | 4PP251.0571-45 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 71: Technical data - 4PP251.0571-45

| Features | 4PP251.0571-45 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 1 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | LCD monochrome |
| Diagonal | 5.7 in (144 mm) |
| Colors | 8 shades of gray |
| Resolution | QVGA, 320 x 240 pixels |
| Contrast | 25:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =40° |
| Vertical | Direction U = 40°/ direction D = 50° |
| Background lighting | |
| Brightness | 140 cd/m² |
| Half-brightness time | 50,000 hours |
| Touch screen | - |
| Touch screen type | |
| Technology | |
| Controller | |
| Degree of transmission | |
| Filter glass | |
| Degree of transmission | 95% |
| Coating | On both sides |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 16 with LED |
| Soft keys | 6 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 15 W typical, 20 W max. |
| Electrical isolation | Yes |

Table 71: Technical data - 4PP251.0571-45 (cont.)

| Electrical characteristics | 4PP251.0571-45 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 212 mm |
| Height | 245 mm |
| Depth | 76 mm |
| Weight | Approx. 2.4 kg (without aPCi interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 3.12.2 "Temperature humidity diagram" on page 216 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 71: Technical data - 4PP251.0571-45 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.12.2 Temperature humidity diagram

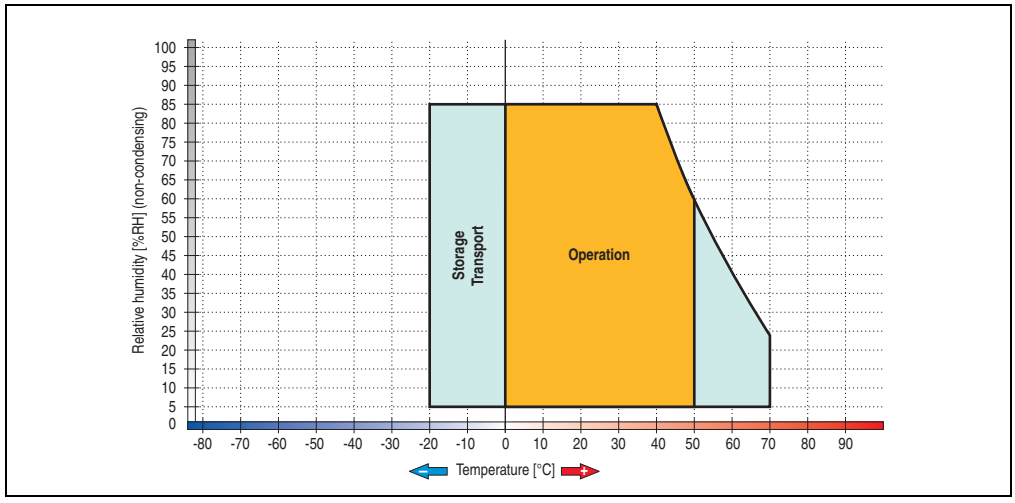



Figure 151: Temperature humidity diagram - 4PP251.0571-45

### 3.12.3 Dimensions

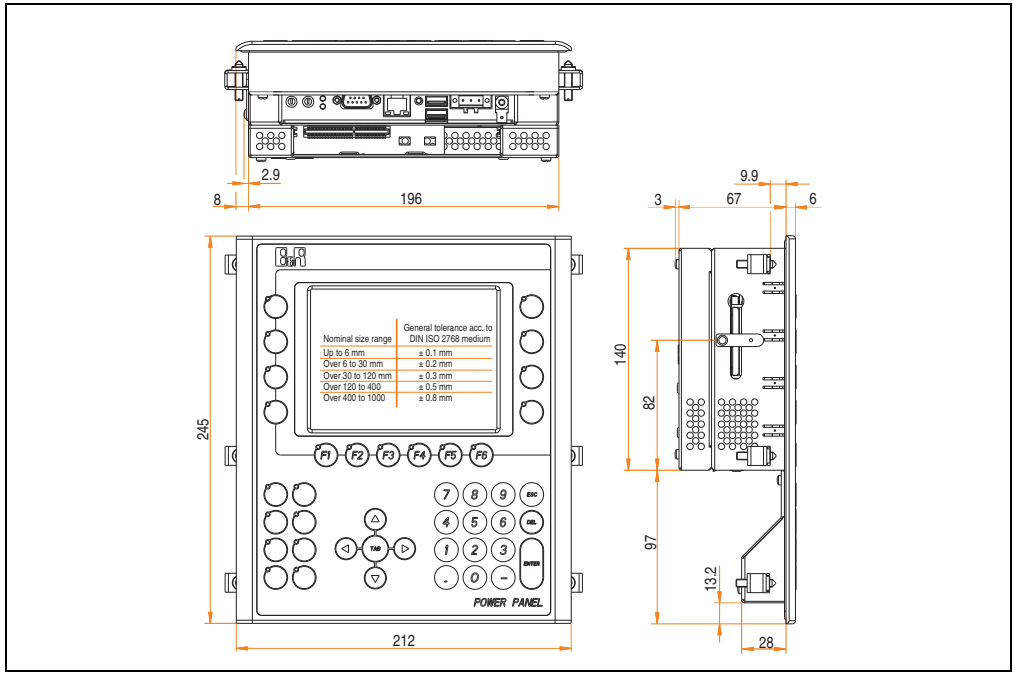



Figure 152: Dimensions - 4PP251.0571-45

### 3.12.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 152 "Dimensions - 4PP251.0571-45" on page 216) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

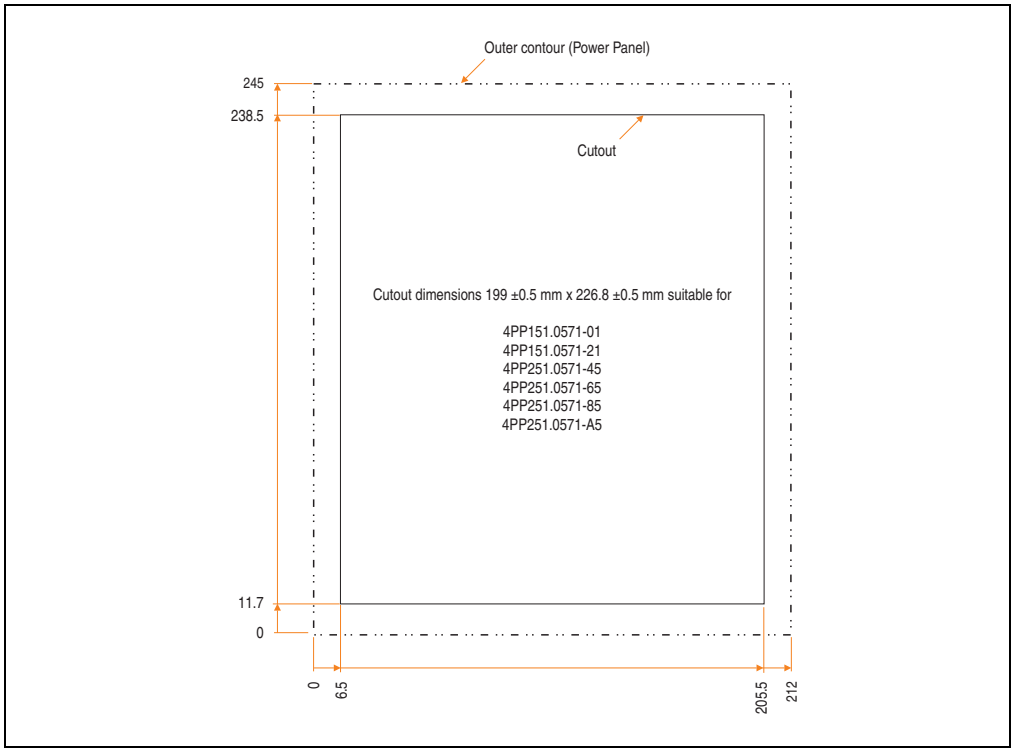



Figure 153: Cutout dimensions

### 3.12.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 251 LCD B/W QVGA 5.7" F MH 1aPCI |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 4 | Legend strips (inserted in the front) |

Table 72: Contents of delivery - 4PP251.0571-45

## 3.13 Device 4PP251.0571-65

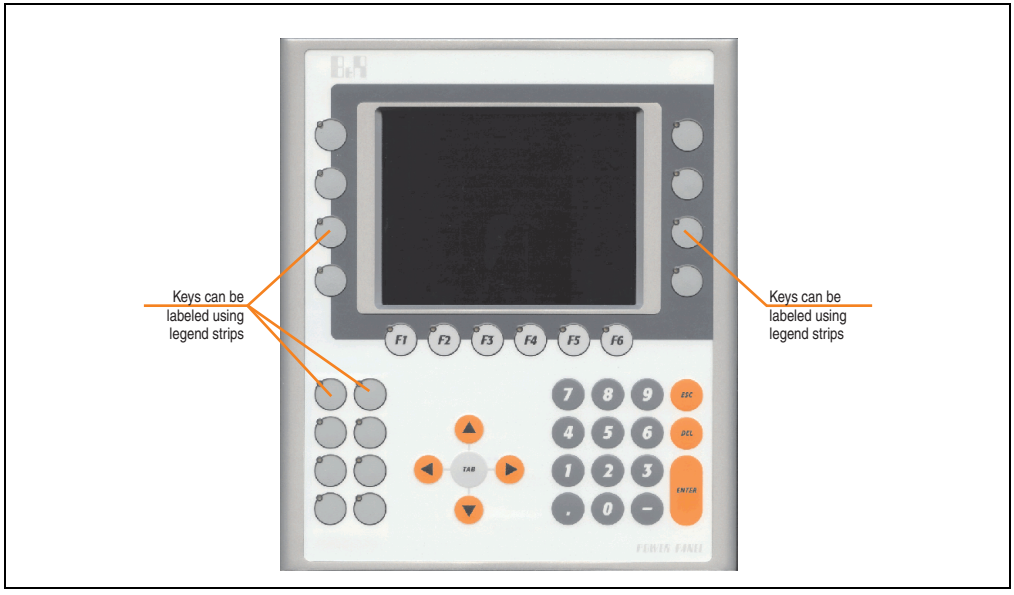



Figure 154: Front view - 4PP251.0571-65

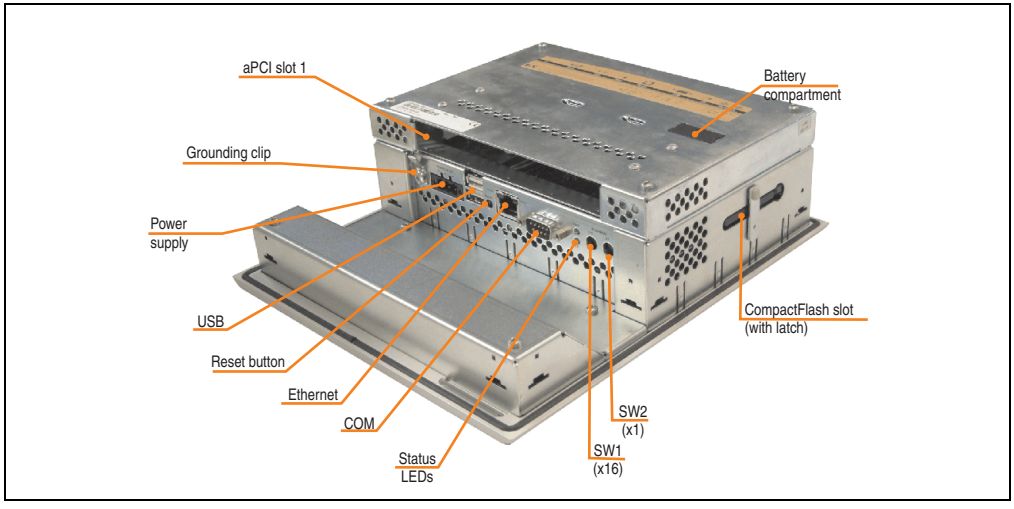



Figure 155: Rear view - 4PP251.0571-65

### 3.13.1 Technical data

| Features | 4PP251.0571-65 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 73: Technical data - 4PP251.0571-65

| Features | 4PP251.0571-65 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | 1 (see B&R System 2005 manual for available aPCI interface modules)<br>Max. 0.7 Nm |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color LCD<br>5.7 in (144 mm)<br>256 colors<br>QVGA, 320 x 240 pixels<br>40:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>150 cd/m²<br>50,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | -<br><br><br><br> |
| Filter glass<br>Degree of transmission<br>Coating | <br>95%<br>On both sides |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | <br>> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force<br>16 with LED<br>6 with LED<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>Yes |

Table 73: Technical data - 4PP251.0571-65 (cont.)

| Electrical characteristics | 4PP251.0571-65 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 212 mm |
| Height | 245 mm |
| Depth | 76 mm |
| Weight | Approx. 2.4 kg (without aPCi interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 3.13.2 "Temperature humidity diagram" on page 222 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 73: Technical data - 4PP251.0571-65 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.13.2 Temperature humidity diagram

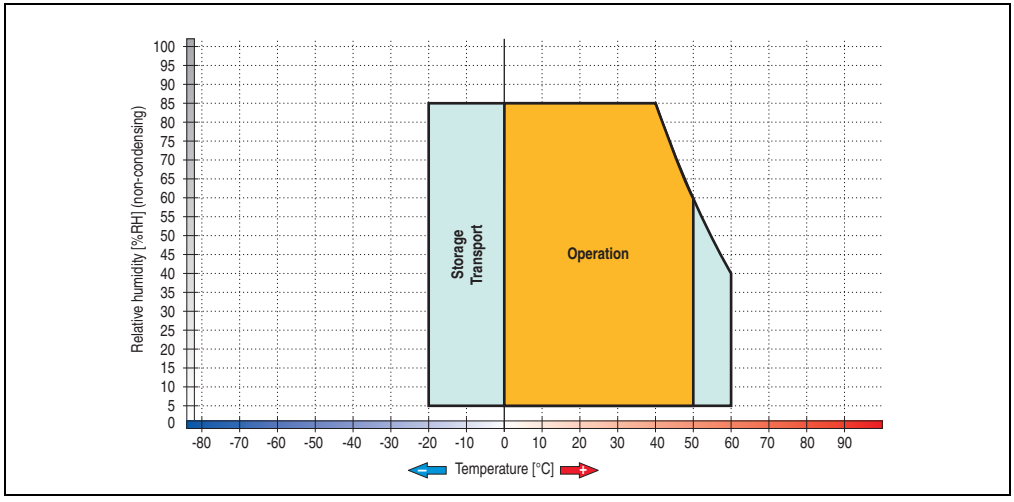



Figure 156: Temperature humidity diagram - 4PP251.0571-65

### 3.13.3 Dimensions

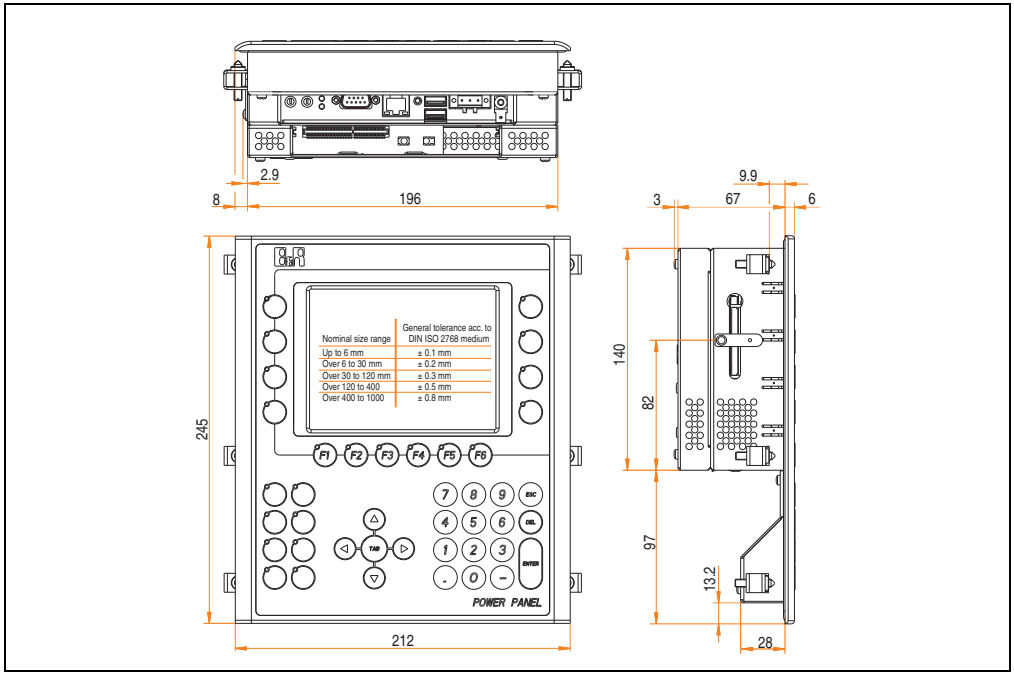



Figure 157: Dimensions - 4PP251.0571-65

### 3.13.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 157 "Dimensions - 4PP251.0571-65" on page 222) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

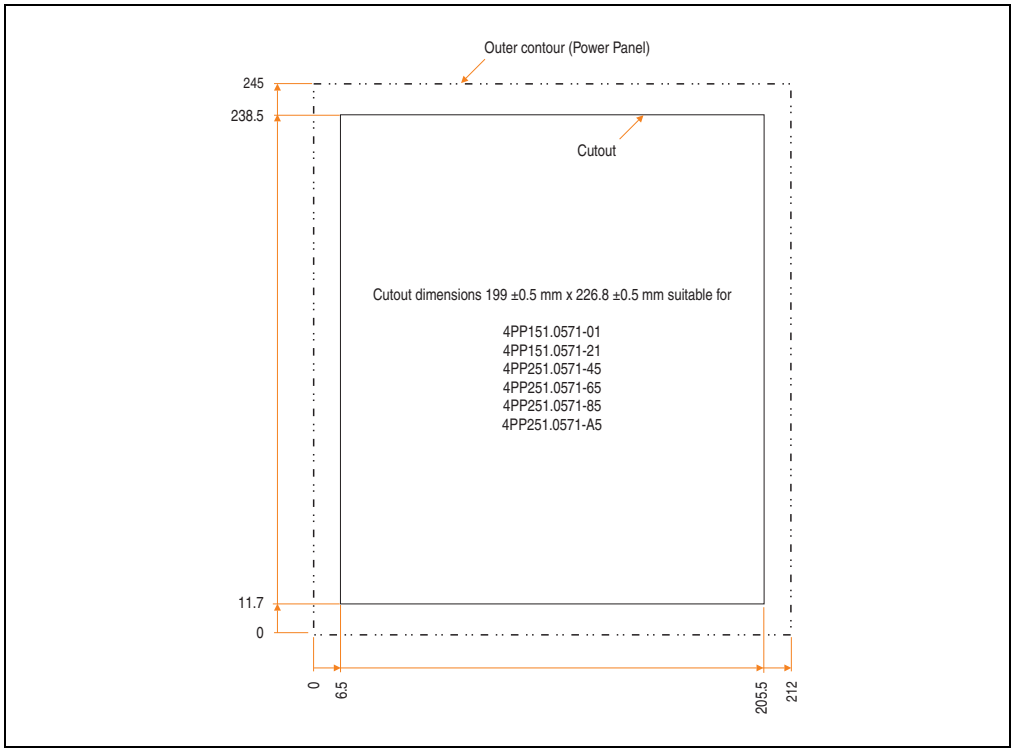



Figure 158: Cutout dimensions

### 3.13.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 251 LCD C QVGA 5.7" F MH 1aPCI |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 4 | Legend strips (inserted in the front) |

Table 74: Contents of delivery - 4PP251.0571-65

## 3.14 Device 4PP251.0571-85

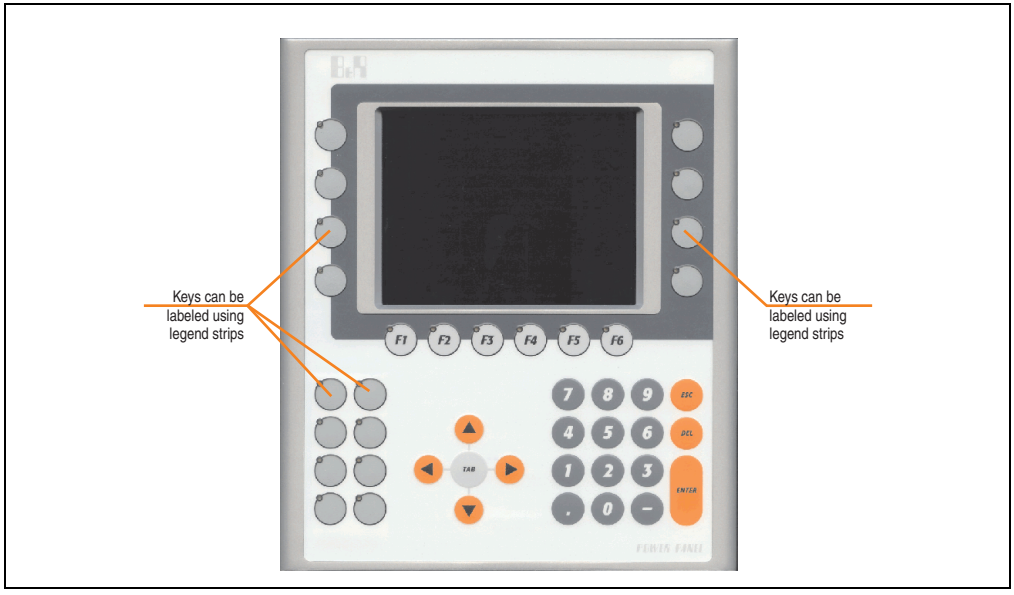



Figure 159: Front view - 4PP251.0571-85

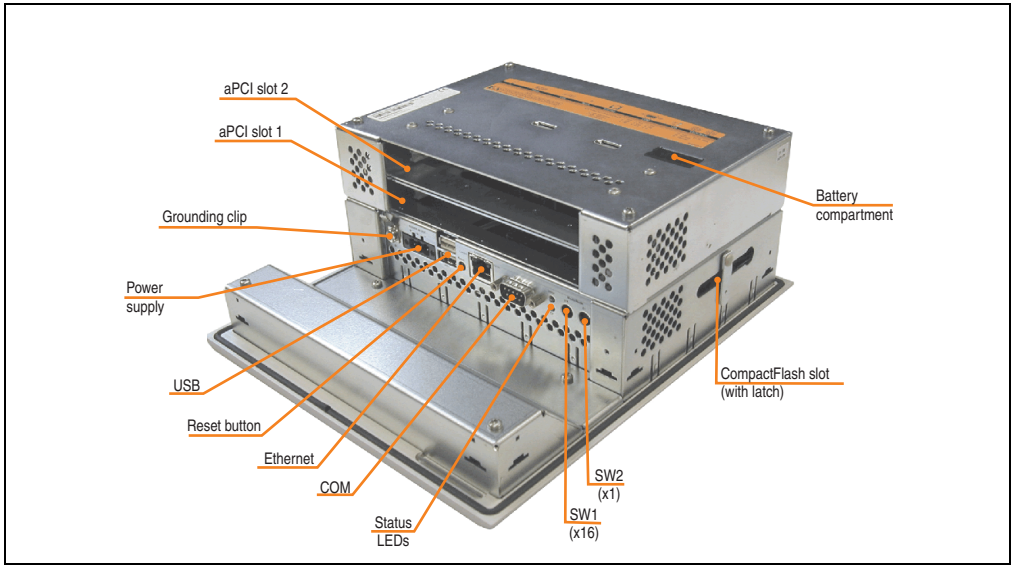



Figure 160: Rear view - 4PP251.0571-85

### 3.14.1 Technical data

| Features | 4PP251.0571-85 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 75: Technical data - 4PP251.0571-85

| Features | 4PP251.0571-85 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | LCD monochrome |
| Diagonal | 5.7 in (144 mm) |
| Colors | 8 shades of gray |
| Resolution | QVGA, 320 x 240 pixels |
| Contrast | 25:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =40° |
| Vertical | Direction U = 40°/ direction D = 50° |
| Background lighting | |
| Brightness | 140 cd/m² |
| Half-brightness time | 50,000 hours |
| Touch screen | - |
| Touch screen type | |
| Technology | |
| Controller | |
| Degree of transmission | |
| Filter glass | |
| Degree of transmission | 95% |
| Coating | On both sides |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 16 with LED |
| Soft keys | 6 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 15 W typical, 20 W max. |
| Electrical isolation | Yes |

Table 75: Technical data - 4PP251.0571-85 (cont.)

| Electrical characteristics | 4PP251.0571-85 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 212 mm |
| Height | 245 mm |
| Depth | 98 mm |
| Weight | Approx. 2.7 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 3.14.2 "Temperature humidity diagram" on page 228 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 75: Technical data - 4PP251.0571-85 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.14.2 Temperature humidity diagram

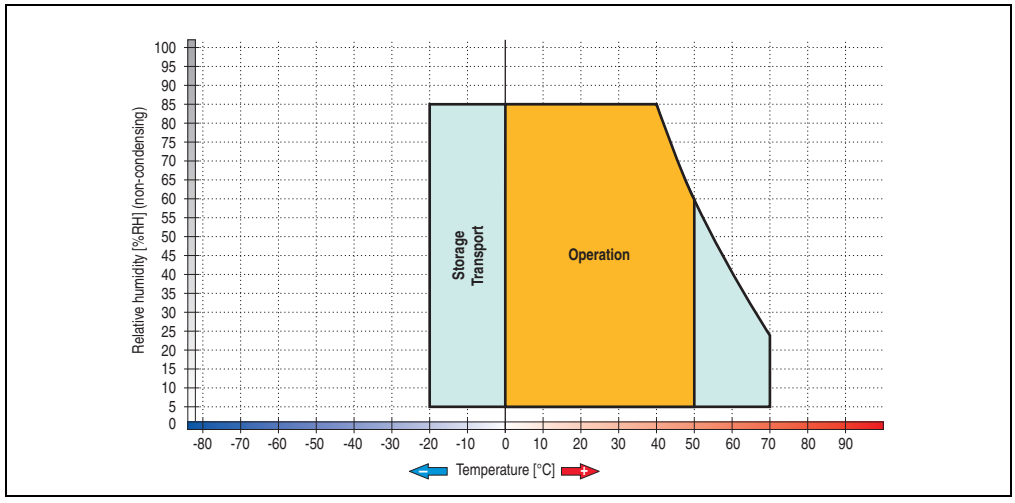



Figure 161: Temperature humidity diagram - 4PP251.0571-85

### 3.14.3 Dimensions

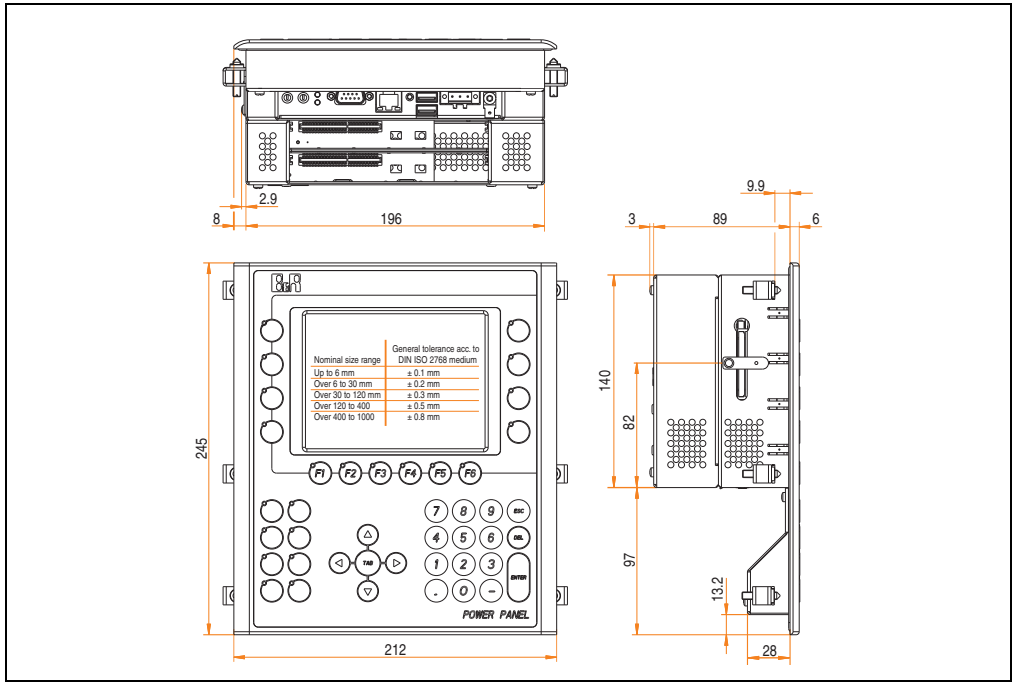



Figure 162: Dimensions - 4PP251.0571-85

### 3.14.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 162 "Dimensions - 4PP251.0571-85" on page 228) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

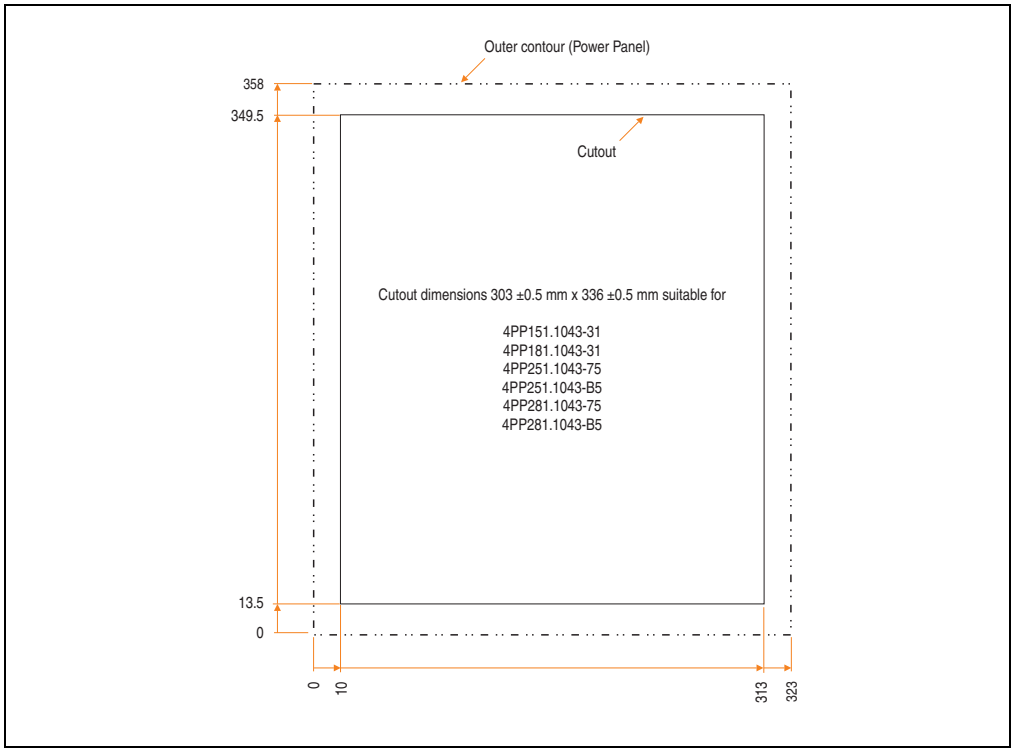



Figure 163: Cutout dimensions

### 3.14.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 251 LCD B/W QVGA 5.7" F MH 2aPCI |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 4 | Legend strips (inserted in the front) |

Table 76: Contents of delivery - 4PP251.0571-85

## 3.15 Device 4PP251.0571-A5

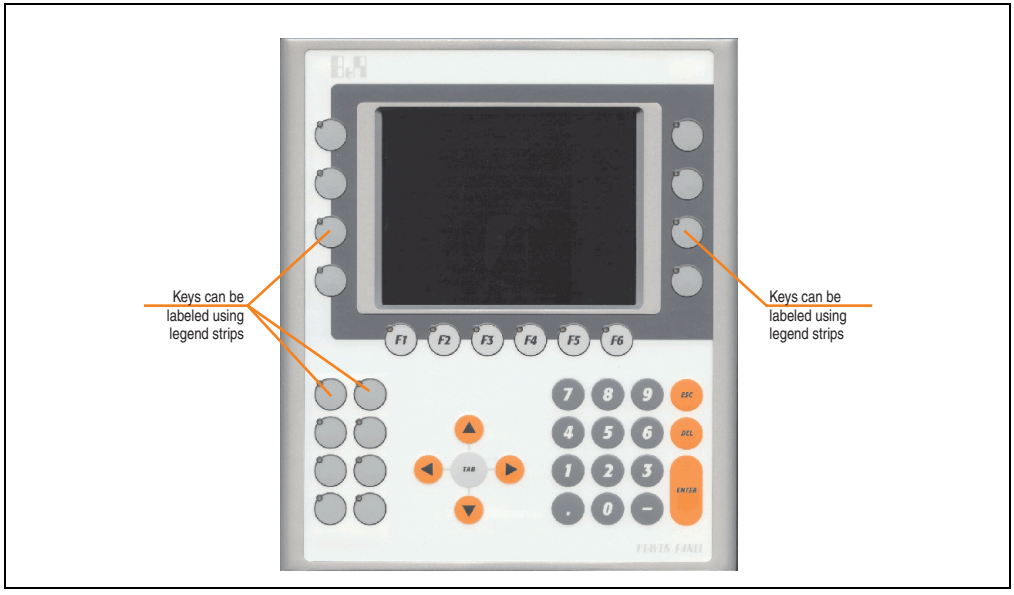



Figure 164: Front view - 4PP251.0571-A5

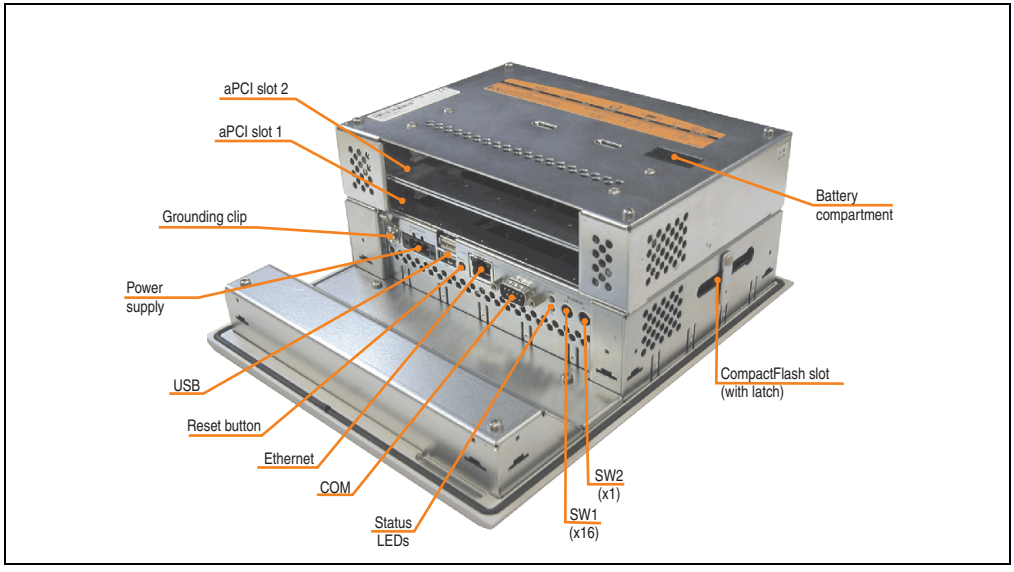



Figure 165: Rear view - 4PP251.0571-A5

### 3.15.1 Technical data

| Features | 4PP251.0571-A5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 77: Technical data - 4PP251.0571-A5

| Features | 4PP251.0571-A5 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color LCD |
| Diagonal | 5.7 in (144 mm) |
| Colors | 256 colors |
| Resolution | QVGA, 320 x 240 pixels |
| Contrast | 40:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =40° |
| Vertical | Direction U = 40°/ direction D = 50° |
| Background lighting | |
| Brightness | 150 cd/m² |
| Half-brightness time | 50,000 hours |
| Touch screen | - |
| Touch screen type | |
| Technology | |
| Controller | |
| Degree of transmission | |
| Filter glass | |
| Degree of transmission | 95% |
| Coating | On both sides |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 16 with LED |
| Soft keys | 6 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 15 W typical, 20 W max. |
| Electrical isolation | Yes |

Table 77: Technical data - 4PP251.0571-A5 (cont.)

| Electrical characteristics | 4PP251.0571-A5 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 212 mm |
| Height | 245 mm |
| Depth | 98 mm |
| Weight | Approx. 2.7 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 3.15.2 "Temperature humidity diagram" on page 234 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 77: Technical data - 4PP251.0571-A5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.15.2 Temperature humidity diagram

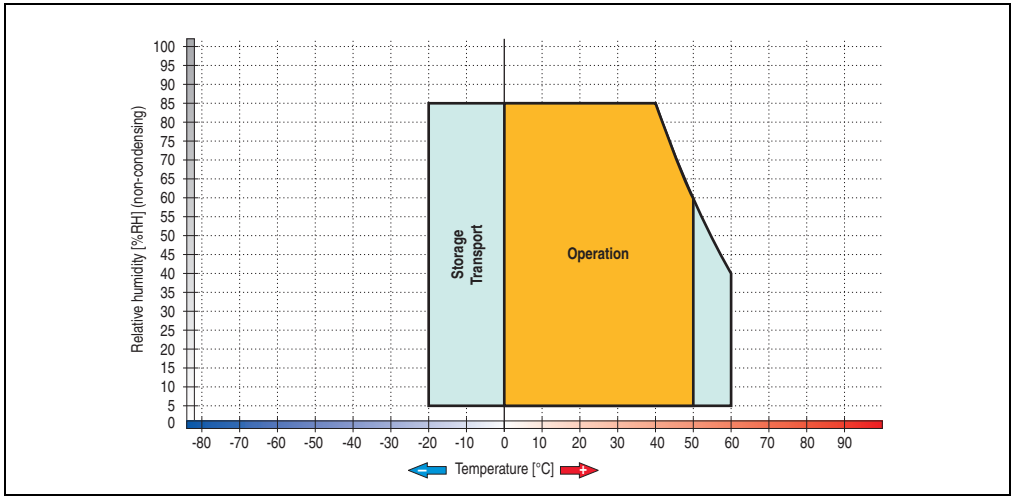



Figure 166: Temperature humidity diagram - 4PP251.0571-A5

### 3.15.3 Dimensions

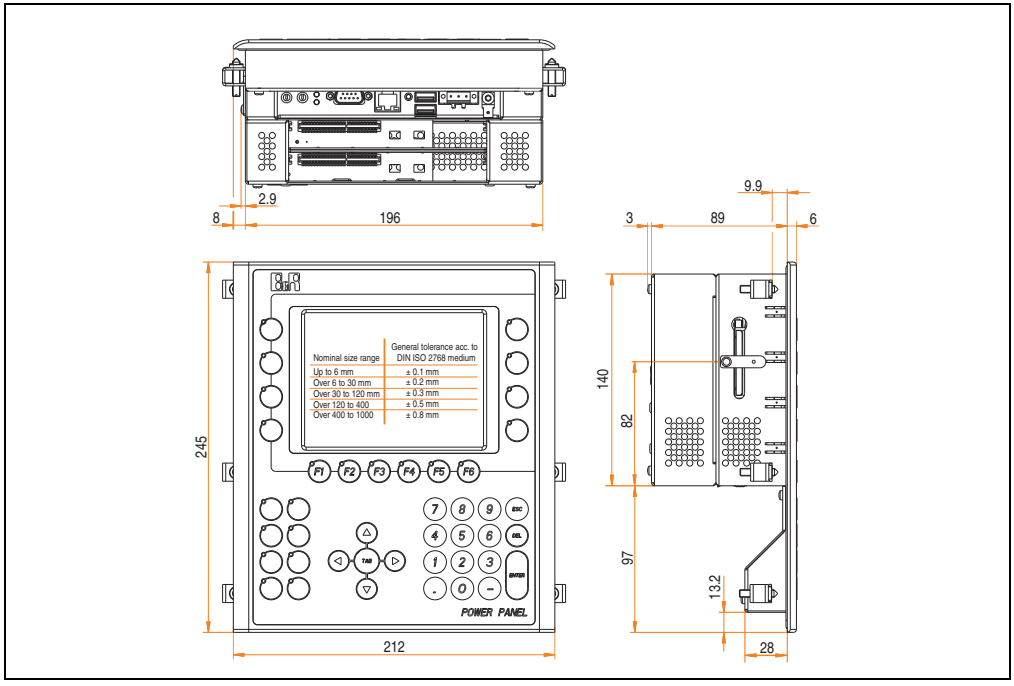



Figure 167: Dimensions - 4PP251.0571-A5

### 3.15.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 167 "Dimensions - 4PP251.0571-A5" on page 234) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

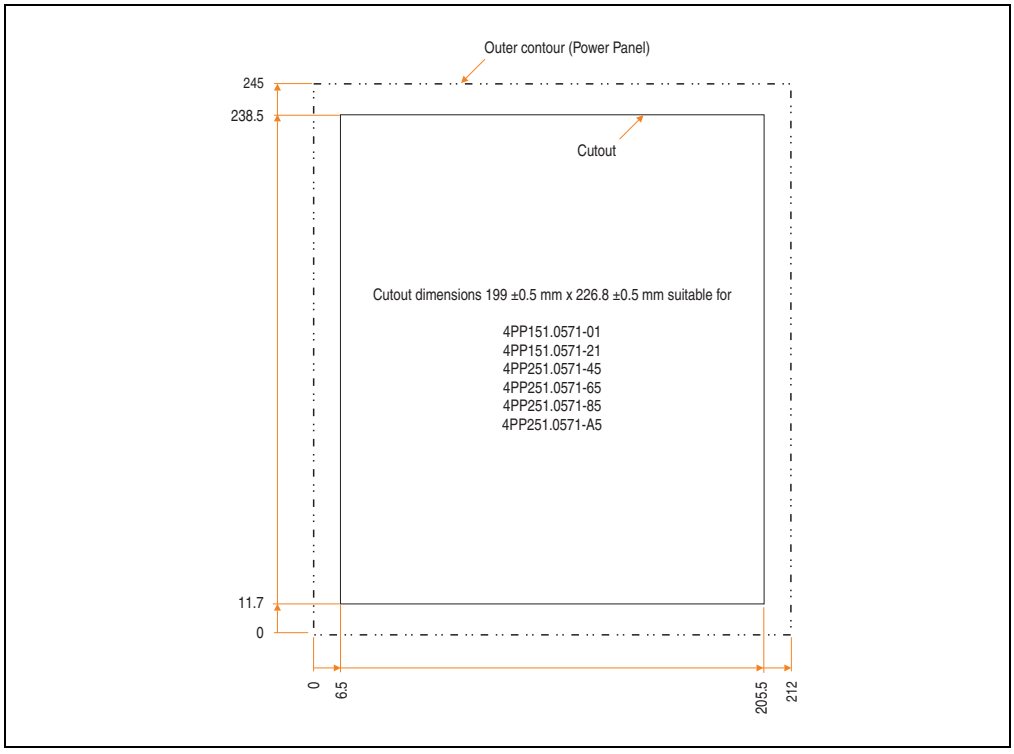



Figure 168: Cutout dimensions

### 3.15.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 251 LCD C QVGA 5.7" F MH 2aPCI |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 4 | Legend strips (inserted in the front) |

Table 78: Contents of delivery - 4PP251.0571-A5

## 3.16 Device 4PP251.1043-75

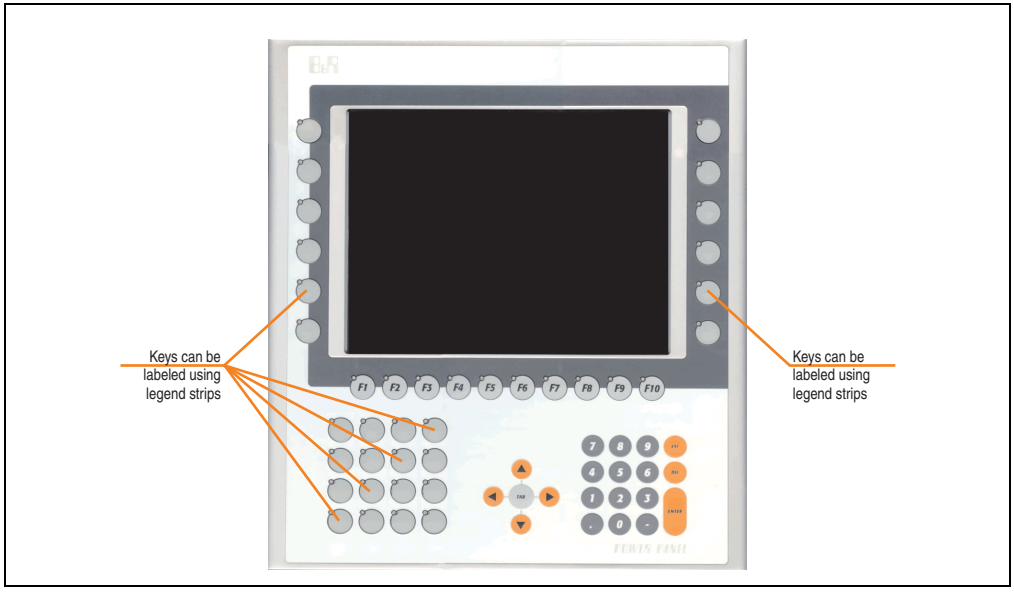



Figure 169: Front view - 4PP251.1043-75

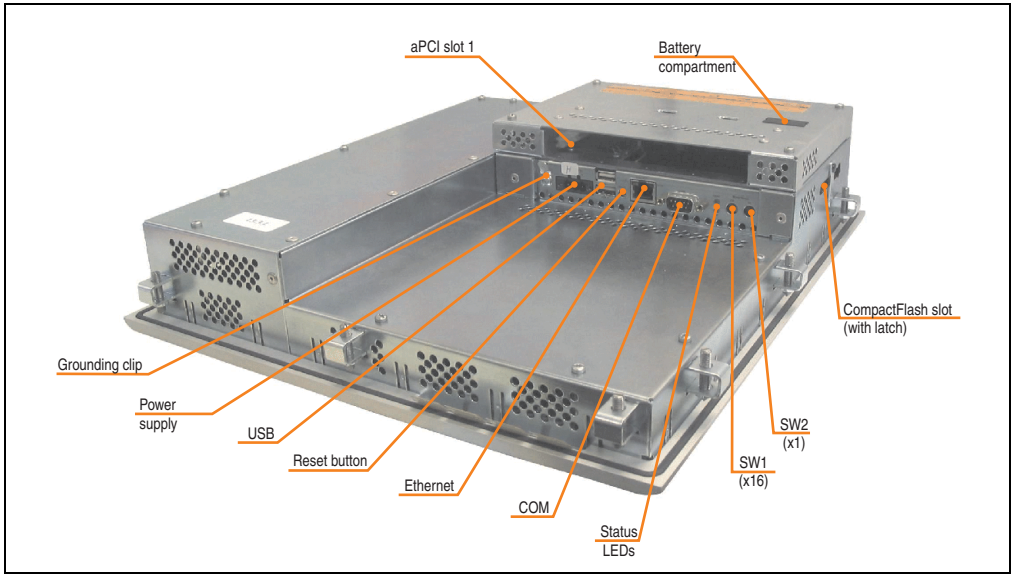



Figure 170: Rear view - 4PP251.1043-75

### 3.16.1 Technical data

| Features | 4PP251.1043-75 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 79: Technical data - 4PP251.1043-75

| Features | 4PP251.1043-75 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | 1 (see B&R System 2005 manual for available aPCI interface modules)<br>Max. 0.7 Nm |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color TFT<br>10.4 inch (264 mm)<br>256 colors<br>VGA, 640 x 480 pixels<br>600:1<br><br>Direction R / direction L =70°<br>Direction U = 45°/ direction D = 55°<br><br>350 cd/m²<br>55,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - |
| Filter glass<br>Degree of transmission<br>Coating | <br>95%<br>On both sides |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | <br>> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force<br>28 with LED<br>10 with LED<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>20 W typical, 25 W max.<br>Yes |

Table 79: Technical data - 4PP251.1043-75 (cont.)

| Electrical characteristics | 4PP251.1043-75 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 323 mm |
| Height | 358 mm |
| Depth | 86 mm |
| Weight | Approx. 5 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 3.16.2 "Temperature humidity diagram" on page 240 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 79: Technical data - 4PP251.1043-75 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.16.2 Temperature humidity diagram

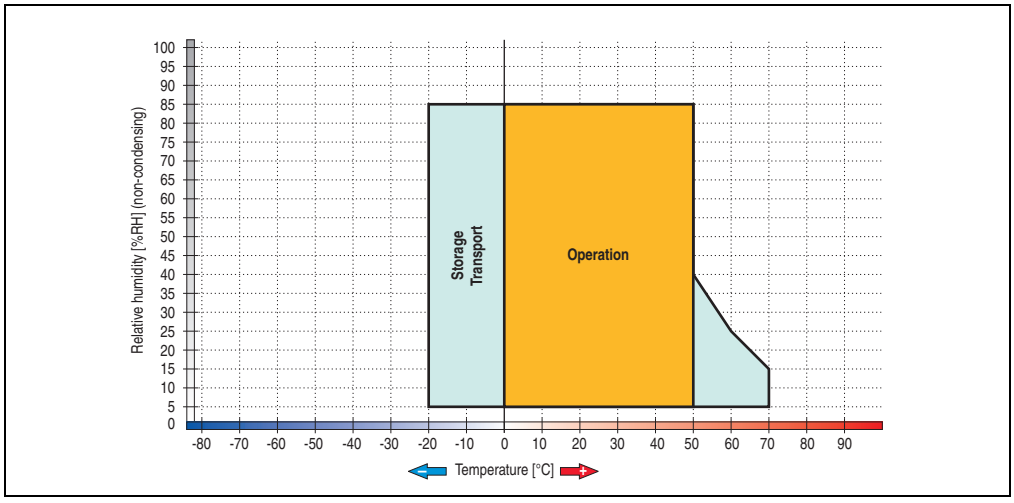



Figure 171: Temperature humidity diagram - 4PP251.1043-75

### 3.16.3 Dimensions

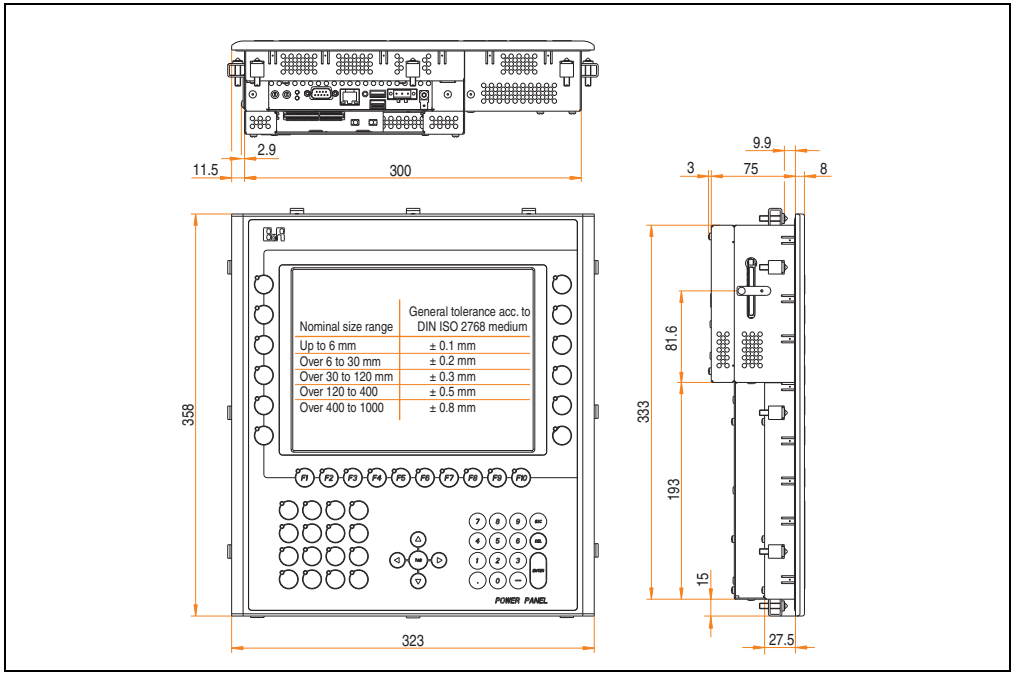



Figure 172: Dimensions - 4PP251.1043-75

### 3.16.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 172 "Dimensions - 4PP251.1043-75" on page 240) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

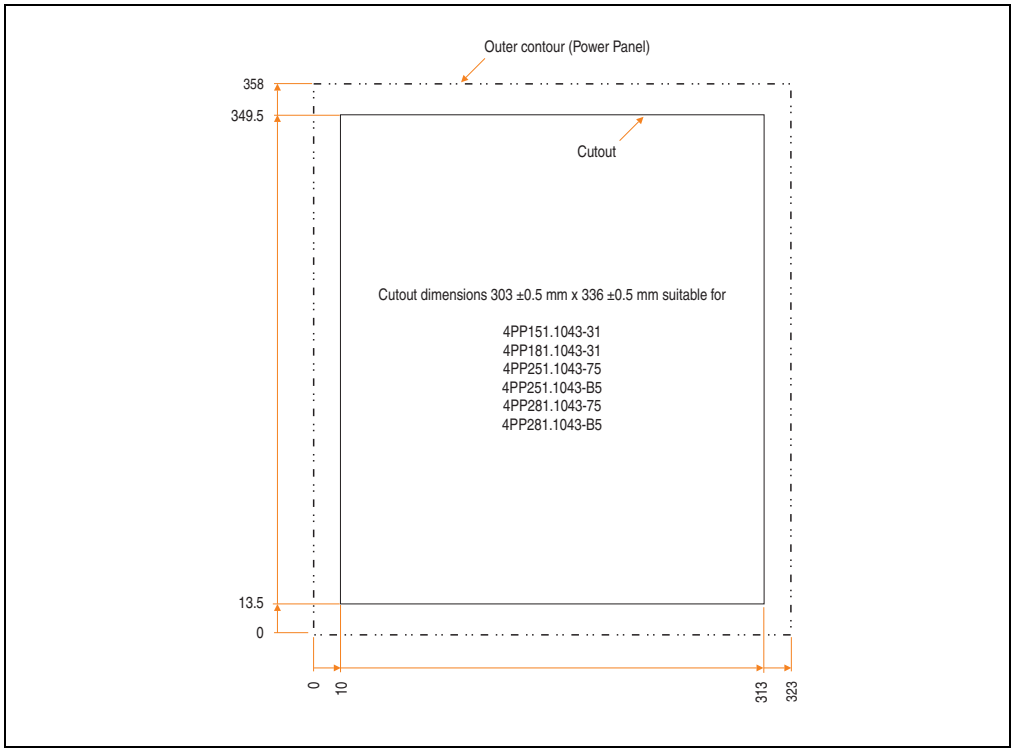



Figure 173: Cutout dimensions

### 3.16.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 251 TFT C VGA 10.4" F MH 1aPCI |
| 12 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 4 | Legend strips (inserted in the front) |

Table 80: Contents of delivery - 4PP251.1043-75

## 3.17 Device 4PP251.1043-B5

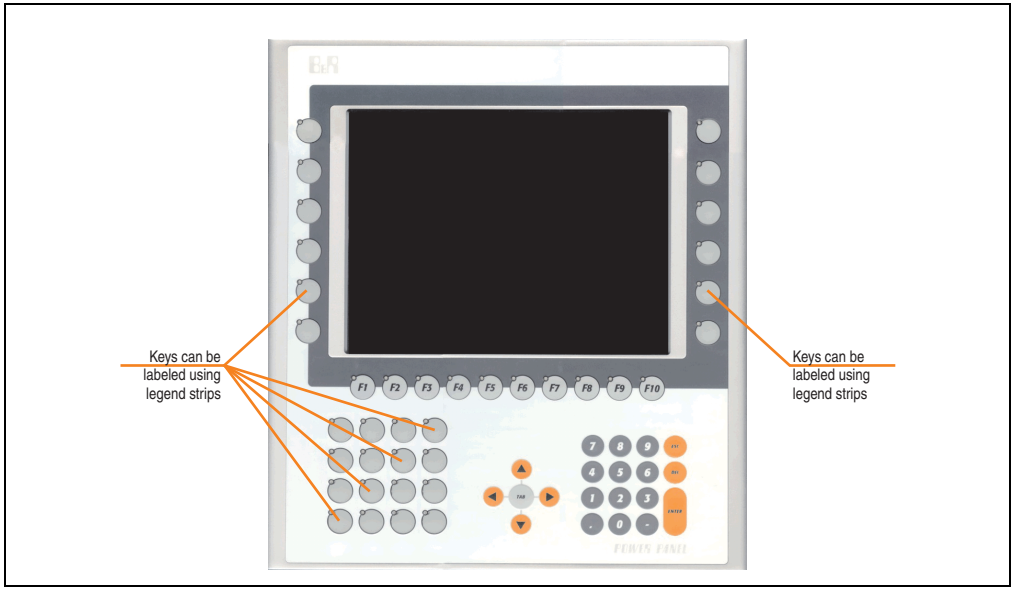



Figure 174: Front view - 4PP251.1043-B5

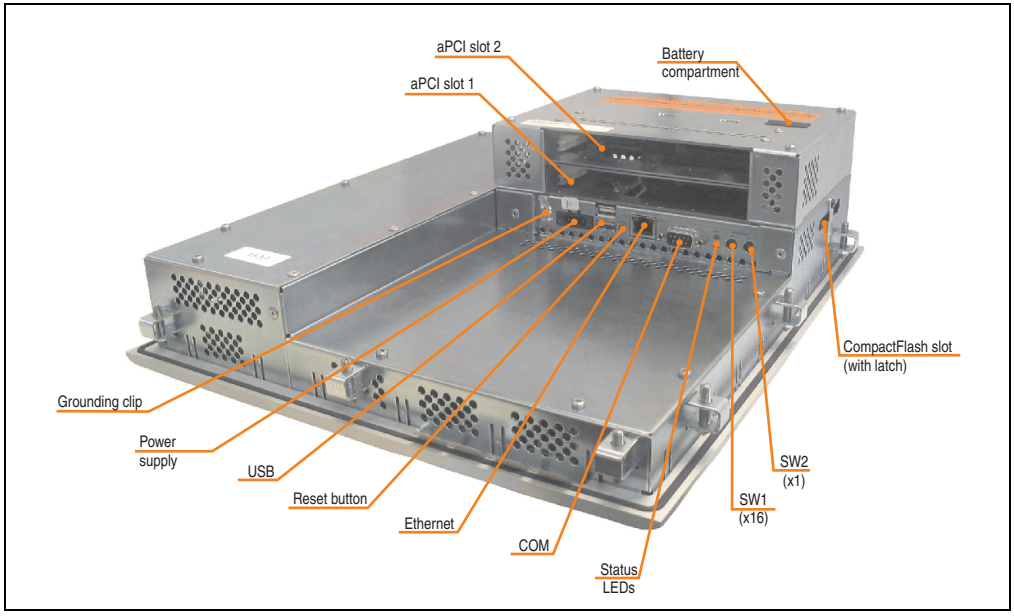



Figure 175: Rear view - 4PP251.1043-B5

### 3.17.1 Technical data

| Features | 4PP251.1043-B5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 81: Technical data - 4PP251.1043-B5

| Features | 4PP251.1043-B5 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | - |
| Touch screen type | |
| Technology | |
| Controller | |
| Degree of transmission | |
| Filter glass | |
| Degree of transmission | 95% |
| Coating | On both sides |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 28 with LED |
| Soft keys | 10 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 20 W typical, 25 W max. |
| Electrical isolation | Yes |

Table 81: Technical data - 4PP251.1043-B5 (cont.)

| Electrical characteristics | 4PP251.1043-B5 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Orange keys<br>Dark gray keys<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 151CV<br>Similar to Pantone 431CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>323 mm<br>358 mm<br>108 mm |
| Weight | Approx. 5.3 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +70°C<br>-20 to +70°C |
| Relative humidity | See 3.17.2 "Temperature humidity diagram" on page 246 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 81: Technical data - 4PP251.1043-B5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.17.2 Temperature humidity diagram

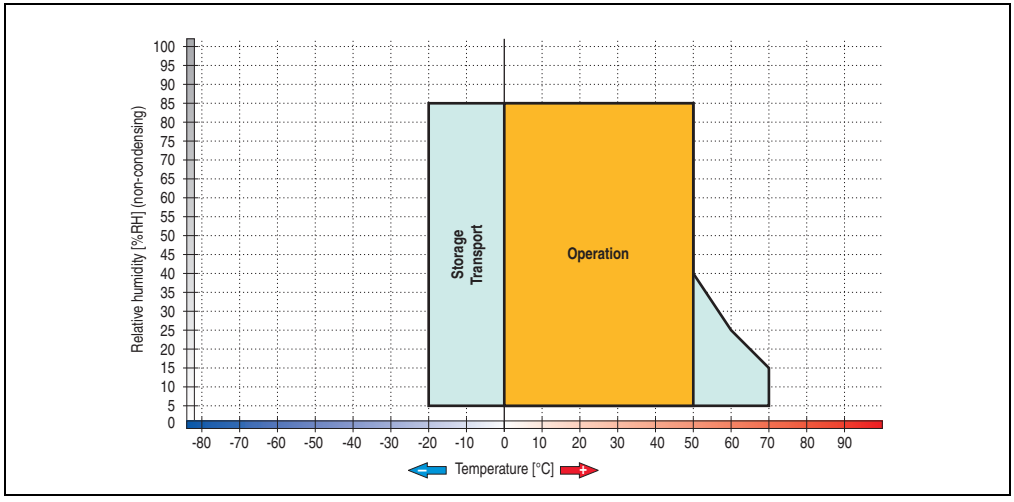



Figure 176: Temperature humidity diagram - 4PP251.1043-B5

### 3.17.3 Dimensions

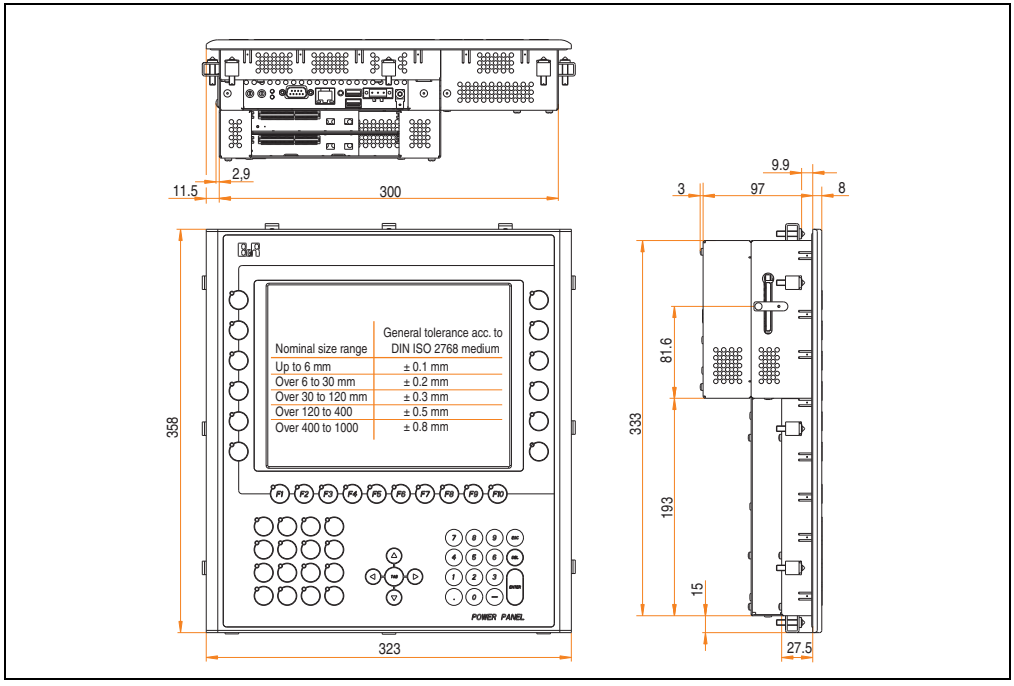



Figure 177: Dimensions - 4PP251.1043-B5

### 3.17.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 177 "Dimensions - 4PP251.1043-B5" on page 246) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

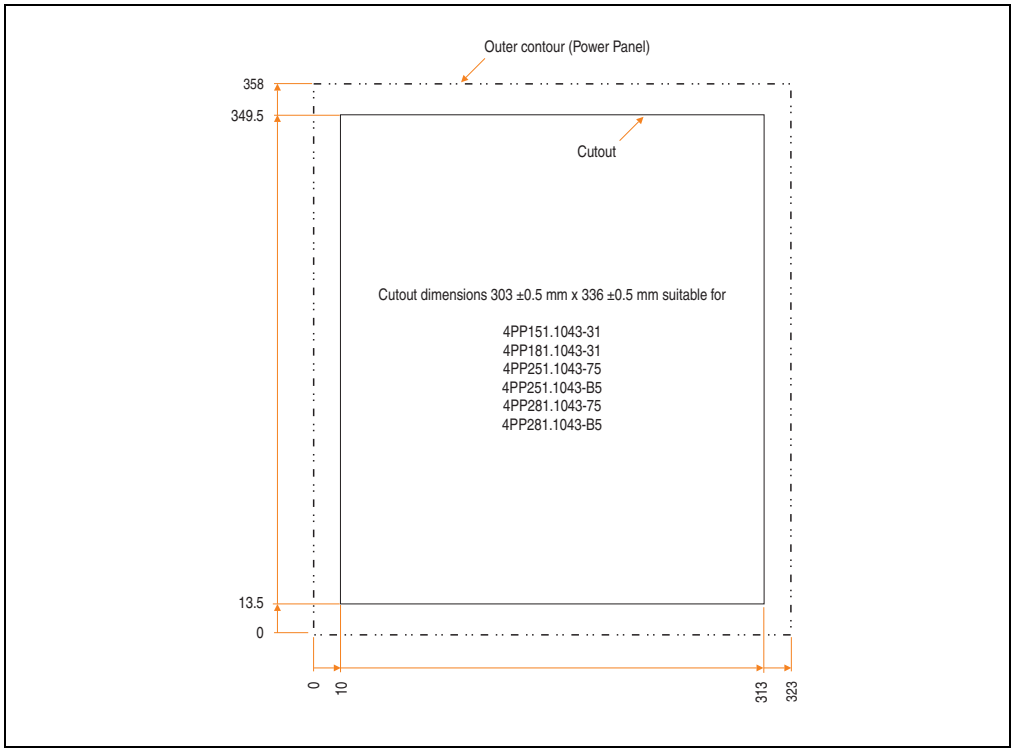



Figure 178: Cutout dimensions

### 3.17.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 251 TFT C VGA 10.4" F MH 2aPCI |
| 12 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 4 | Legend strips (inserted in the front) |

Table 82: Contents of delivery - 4PP251.1043-B5

## 3.18 Device 4PP251.1505-75

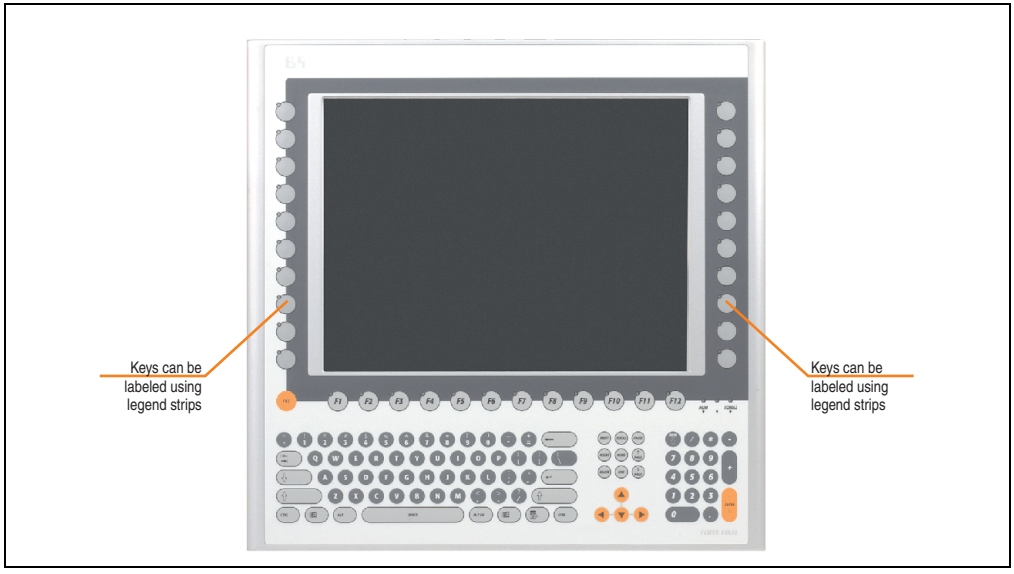



Figure 179: Front view - 4PP251.1505-75

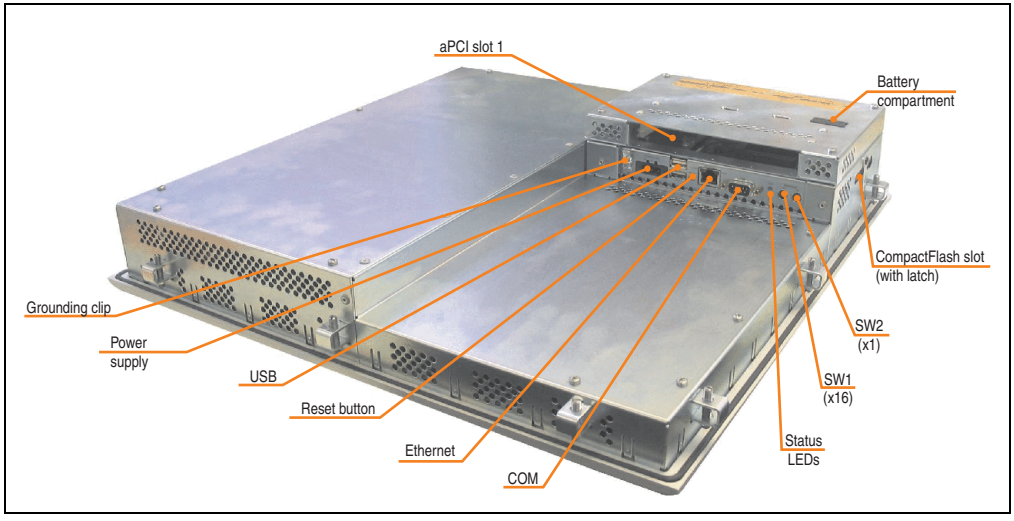



Figure 180: Rear view - 4PP251.1505-75

### 3.18.1 Technical data

| Features | 4PP251.1505-75 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 83: Technical data - 4PP251.1505-75

| Features | 4PP251.1505-75 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | 1 (see B&R System 2005 manual for available aPCI interface modules)<br>Max. 0.7 Nm |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color TFT<br>15 inch (381 mm)<br>256 colors<br>XGA, 1024 x 768 pixels<br>300:1<br><br>Direction R / direction L =65°<br>Direction U = 45°/ direction D = 55°<br><br>330 cd/m²<br>35,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - |
| Filter glass<br>Degree of transmission<br>Coating | <br>95%<br>On both sides |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | <br>> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force<br>20 with LED<br>12 with LED<br>-<br>15 without LED<br>77 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>35 W typical, 40 W max.<br>Yes |

Table 83: Technical data - 4PP251.1505-75 (cont.)

| Electrical characteristics | 4PP251.1505-75 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 435 mm |
| Height | 430 mm |
| Depth | 87 mm |
| Weight | Approx. 8 kg |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 3.18.2 "Temperature humidity diagram" on page 252 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 83: Technical data - 4PP251.1505-75 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.18.2 Temperature humidity diagram

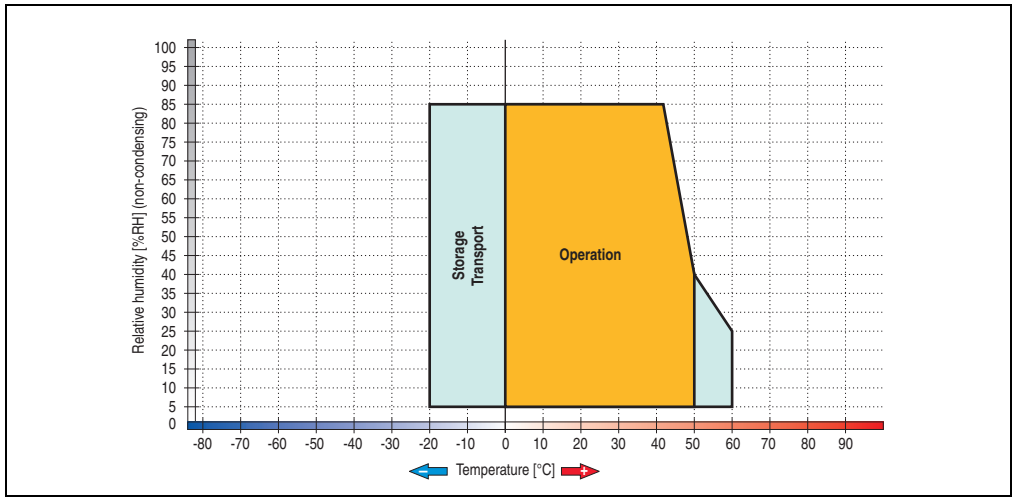



Figure 181: Temperature humidity diagram - 4PP251.1505-75

### 3.18.3 Dimensions

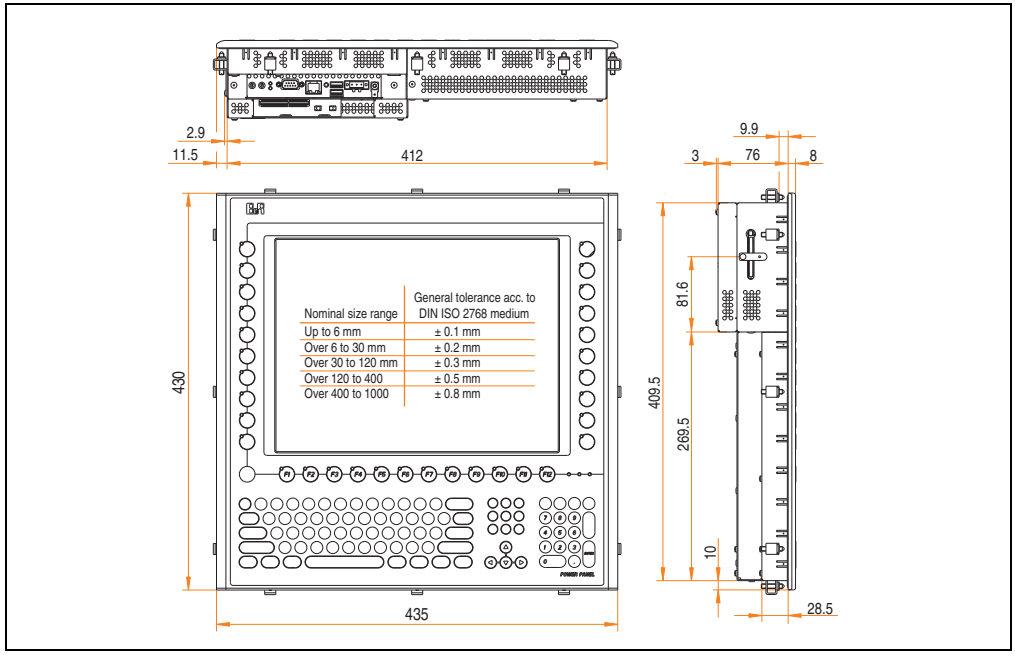



Figure 182: Dimensions - 4PP251.1505-75

### 3.18.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 182 "Dimensions - 4PP251.1505-75" on page 252) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

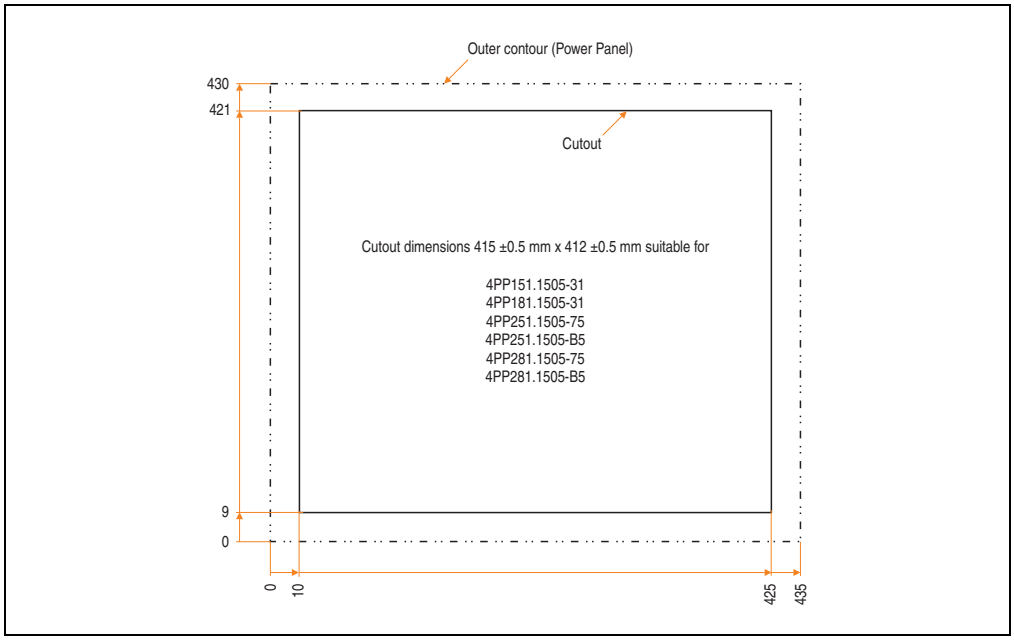



Figure 183: Cutout dimensions

### 3.18.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 251 TFT C XGA 15" F MH 1aPCI |
| 12 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 2 | Legend strips (inserted in the front) |

Table 84: Contents of delivery - 4PP251.1505-75

## 3.19 Device 4PP251.1505-B5

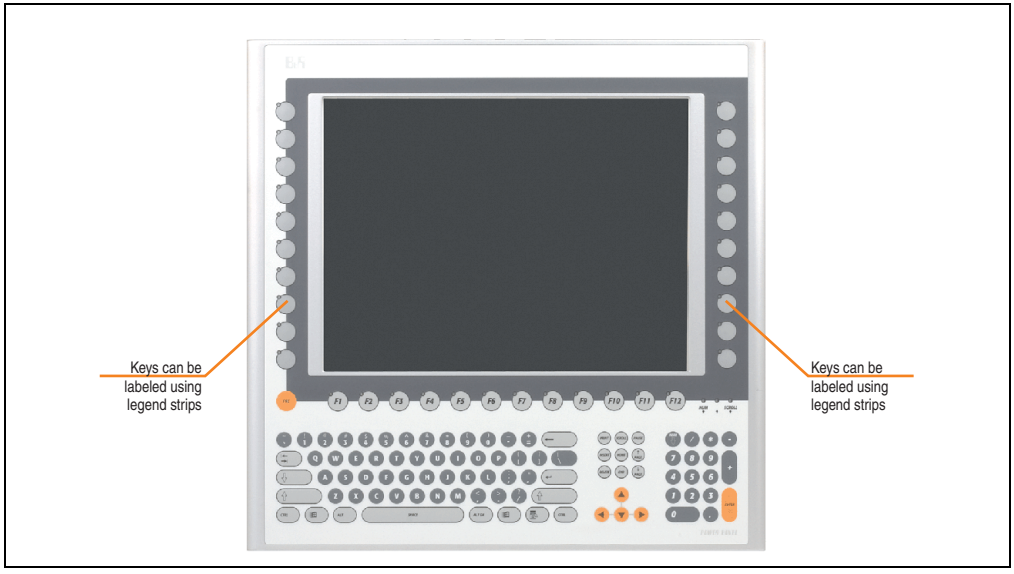



Figure 184: Front view - 4PP251.1505-B5

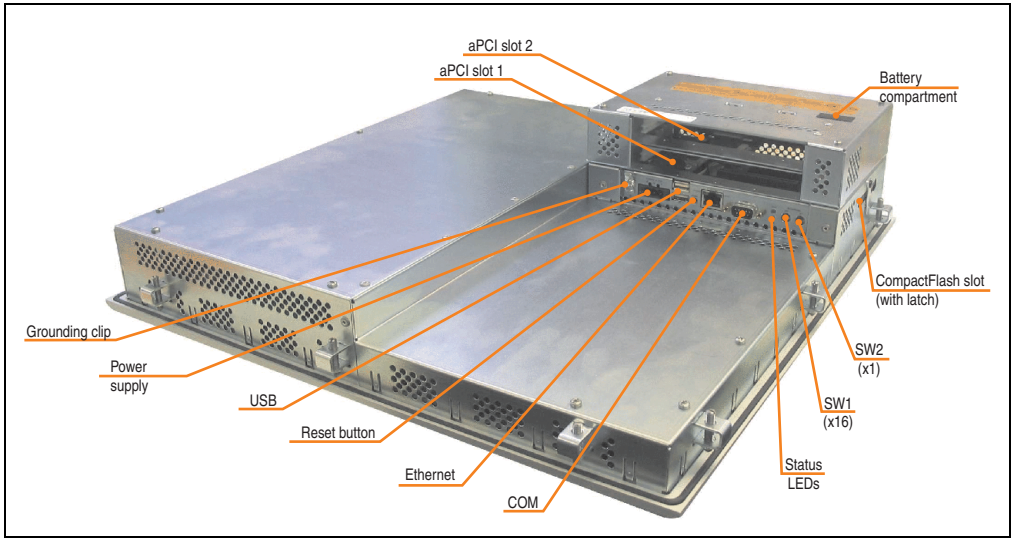



Figure 185: Rear view - 4PP251.1505-B5

### 3.19.1 Technical data

| Features | 4PP251.1505-B5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 85: Technical data - 4PP251.1505-B5

| Features | 4PP251.1505-B5 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 256 colors |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | - |
| Touch screen type | |
| Technology | |
| Controller | |
| Degree of transmission | |
| Filter glass | |
| Degree of transmission | 95% |
| Coating | On both sides |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 20 with LED |
| Soft keys | 12 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 77 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 35 W typical, 40 W max. |
| Electrical isolation | Yes |

Table 85: Technical data - 4PP251.1505-B5 (cont.)

| Electrical characteristics | 4PP251.1505-B5 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 435 mm |
| Height | 430 mm |
| Depth | 109 mm |
| Weight | Approx. 8.3 kg |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 3.19.2 "Temperature humidity diagram" on page 258 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 85: Technical data - 4PP251.1505-B5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.19.2 Temperature humidity diagram

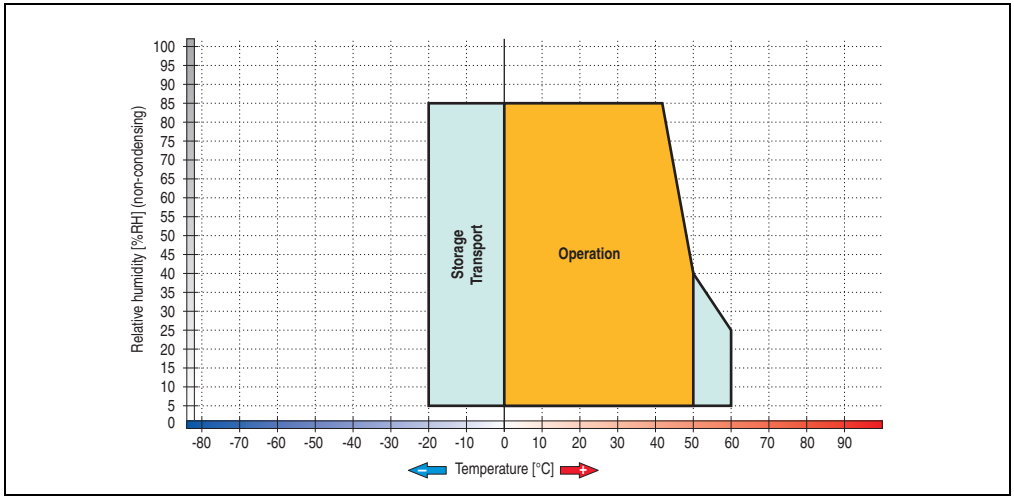



Figure 186: Temperature humidity diagram - 4PP251.1505-B5

### 3.19.3 Dimensions

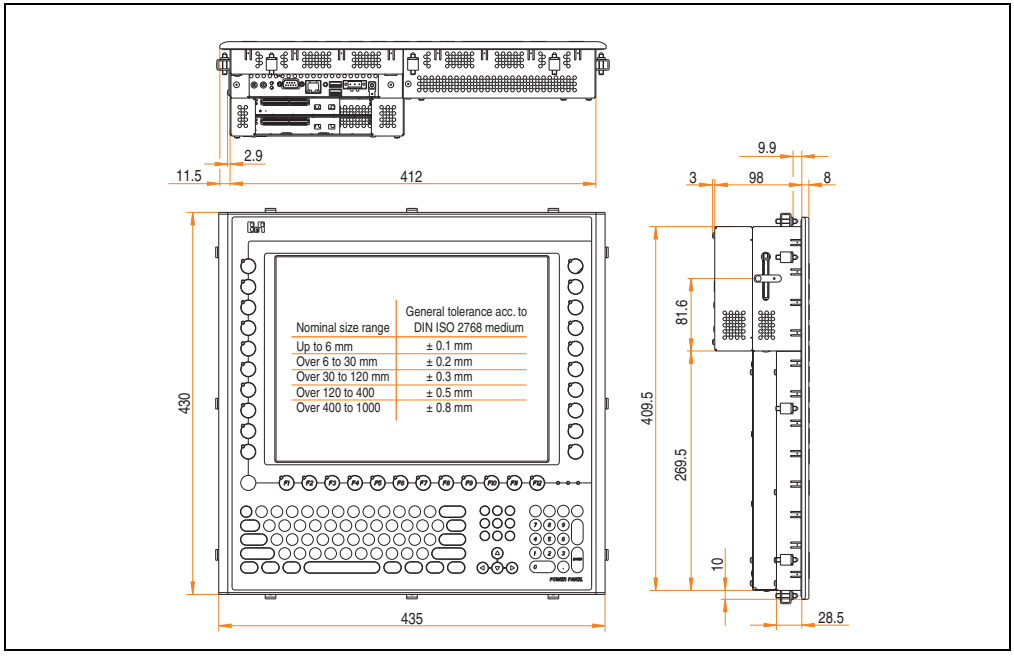



Figure 187: Dimensions - 4PP251.1505-B5

### 3.19.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 187 "Dimensions - 4PP251.1505-B5" on page 258) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

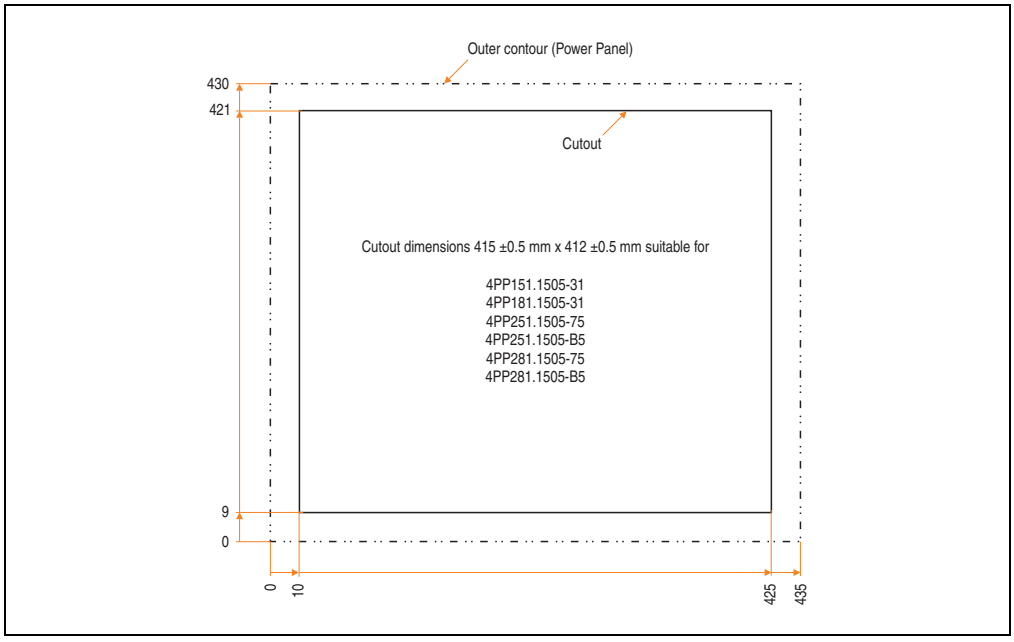



Figure 188: Cutout dimensions

### 3.19.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 251 TFT C XGA 15" F MH 2aPCI |
| 12 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 2 | Legend strips (inserted in the front) |

Table 86: Contents of delivery - 4PP251.1505-B5

## 3.20 Device 4PP252.0571-45

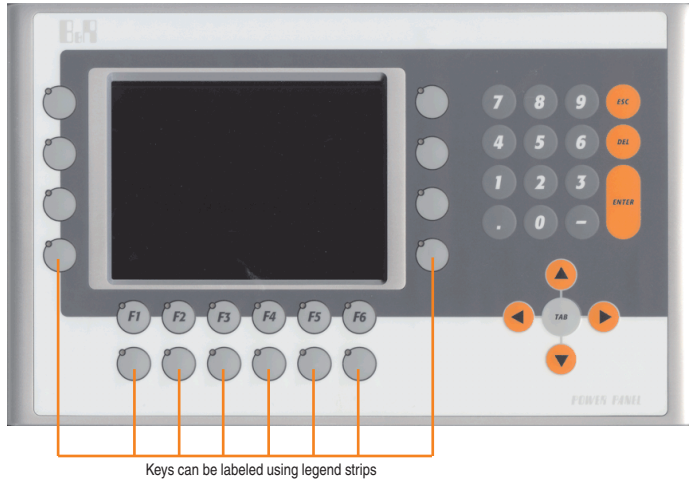



Figure 189: Front view - 4PP252.0571-45

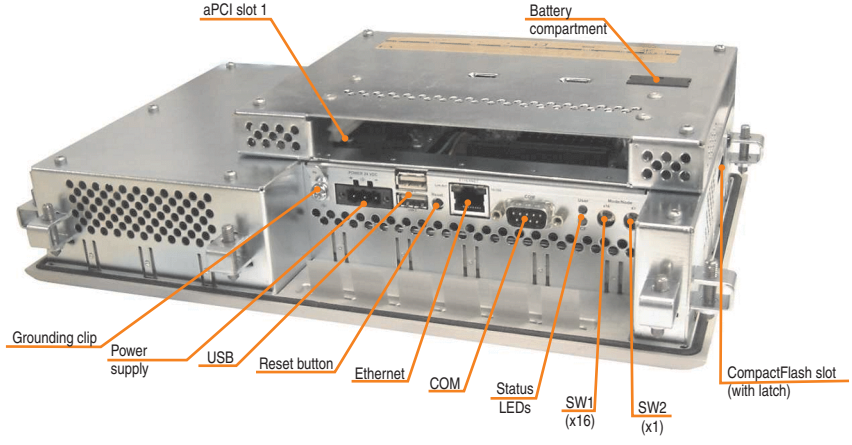



Figure 190: Rear view - 4PP252.0571-45

### 3.20.1 Technical data

| Features | 4PP252.0571-45 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 87: Technical data - 4PP252.0571-45

| Features | 4PP252.0571-45 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | 1 (see B&R System 2005 manual for available aPCI interface modules)<br>Max. 0.7 Nm |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>LCD monochrome<br>5.7 in (144 mm)<br>8 shades of gray<br>QVGA, 320 x 240 pixels<br>25:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>140 cd/m²<br>50,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - |
| Filter glass<br>Degree of transmission<br>Coating | <br>95%<br>On both sides |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | <br>> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force<br>20 with LED<br>-<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>Yes |

Table 87: Technical data - 4PP252.0571-45 (cont.)

| Electrical characteristics | 4PP252.0571-45 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 302 mm |
| Height | 187 mm |
| Depth | 76 mm |
| Weight | Approx. 2.6 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 3.20.2 "Temperature humidity diagram" on page 264 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 87: Technical data - 4PP252.0571-45 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.20.2 Temperature humidity diagram

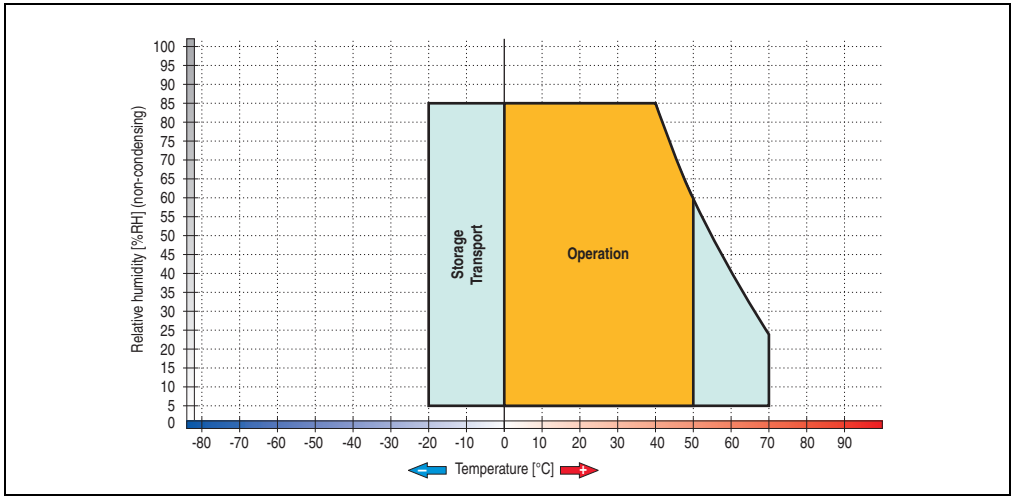



Figure 191: Temperature humidity diagram - 4PP252.0571-45

### 3.20.3 Dimensions

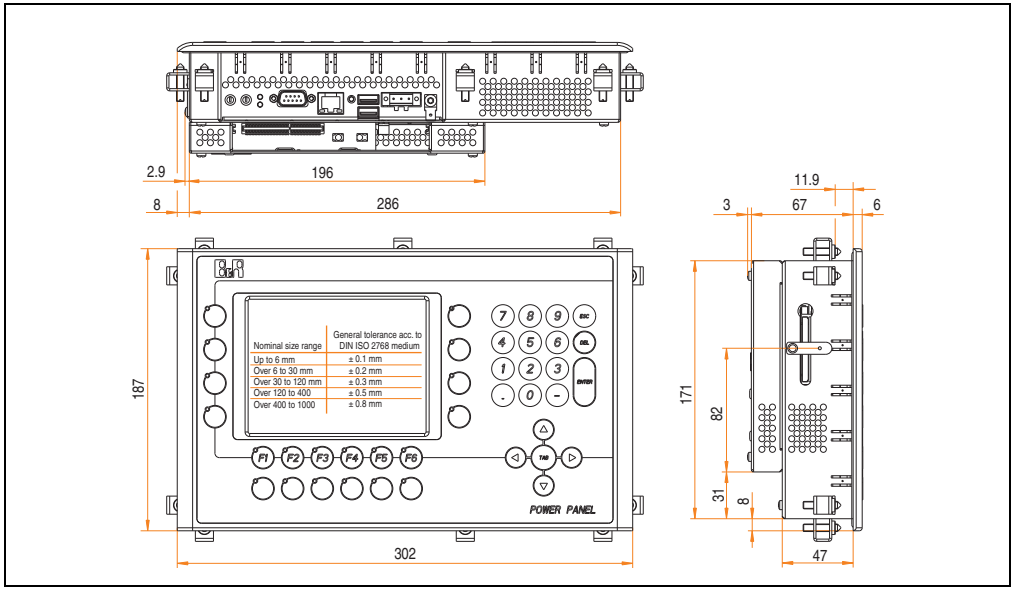



Figure 192: Dimensions - 4PP252.0571-45

### 3.20.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 192 "Dimensions - 4PP252.0571-45" on page 264) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

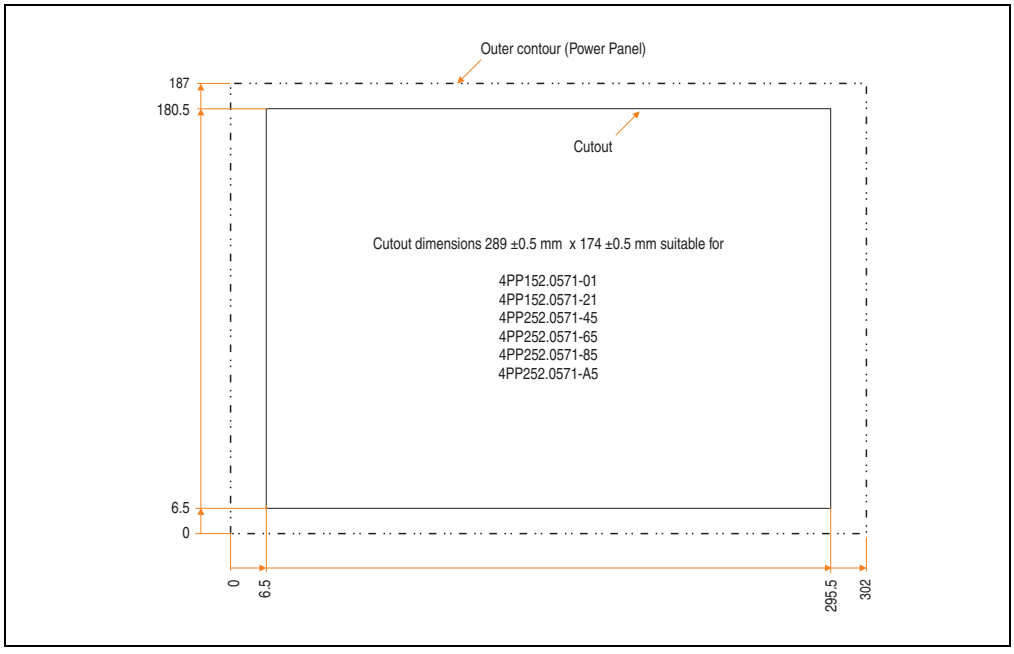



Figure 193: Cutout dimensions

### 3.20.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 252 LCD B/W QVGA 5.7" F MH 1aPCI |
| 10 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 8 | Legend strips (inserted in the front) |

Table 88: Contents of delivery - 4PP252.0571-45

## 3.21 Device 4PP252.0571-65

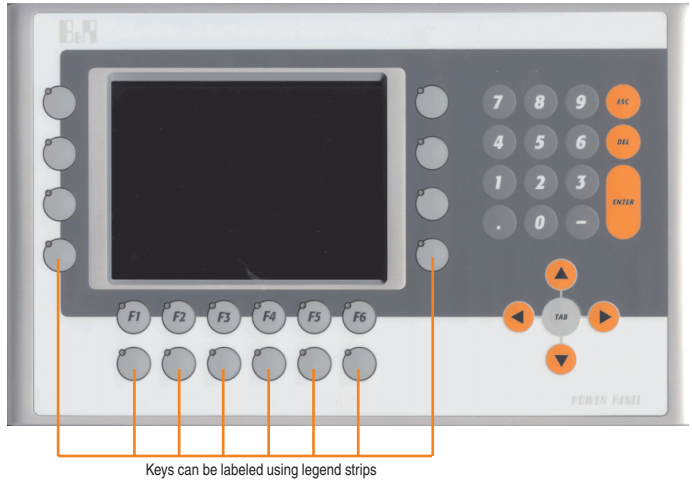



Figure 194: Front view - 4PP252.0571-65

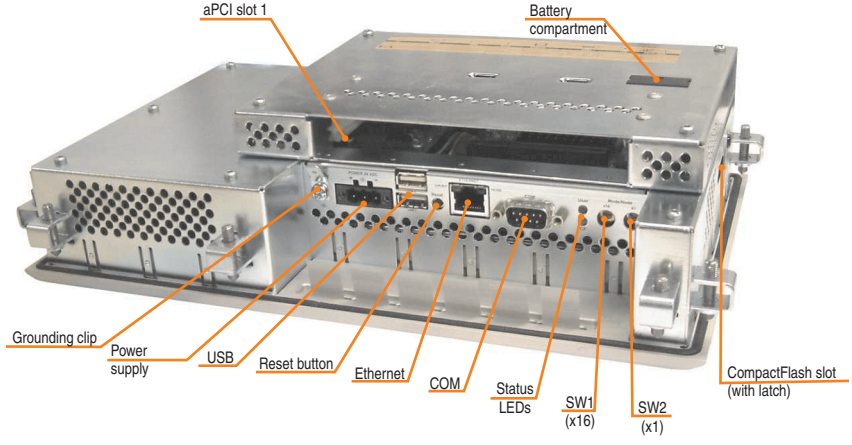



Figure 195: Rear view - 4PP252.0571-65

### 3.21.1 Technical data

| Features | 4PP252.0571-65 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 89: Technical data - 4PP252.0571-65

| Features | 4PP252.0571-65 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | 1 (see B&R System 2005 manual for available aPCI interface modules)<br>Max. 0.7 Nm |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color LCD<br>5.7 in (144 mm)<br>256 colors<br>QVGA, 320 x 240 pixels<br>40:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>150 cd/m²<br>50,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - |
| Filter glass<br>Degree of transmission<br>Coating | <br>95%<br>On both sides |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | <br>> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force<br>20 with LED<br>-<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>Yes |

Table 89: Technical data - 4PP252.0571-65 (cont.)

| Electrical characteristics | 4PP252.0571-65 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Orange keys<br>Dark gray keys<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 151CV<br>Similar to Pantone 431CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>302 mm<br>187 mm<br>76 mm |
| Weight | Approx. 2.6 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +60°C<br>-20 to +60°C |
| Relative humidity | See 3.21.2 "Temperature humidity diagram" on page 270 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 89: Technical data - 4PP252.0571-65 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.21.2 Temperature humidity diagram

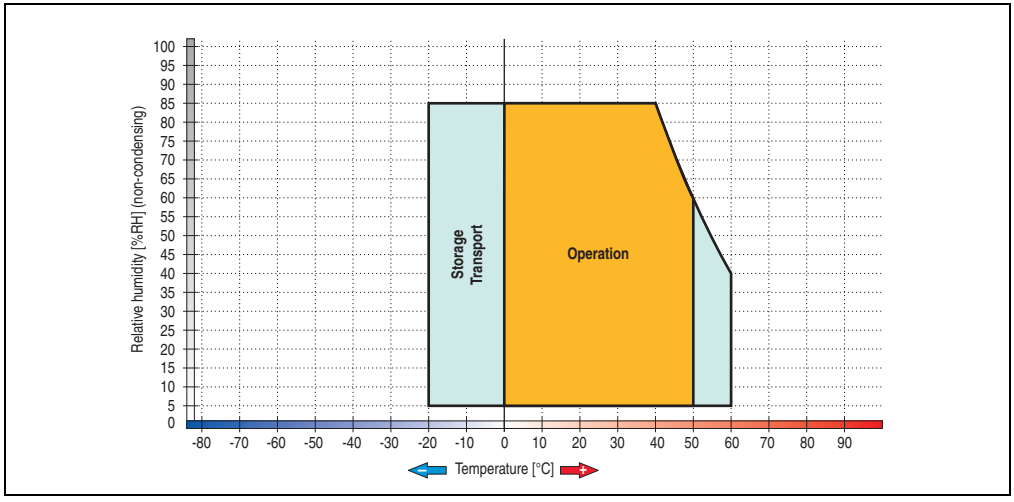



Figure 196: Temperature humidity diagram - 4PP252.0571-65

### 3.21.3 Dimensions

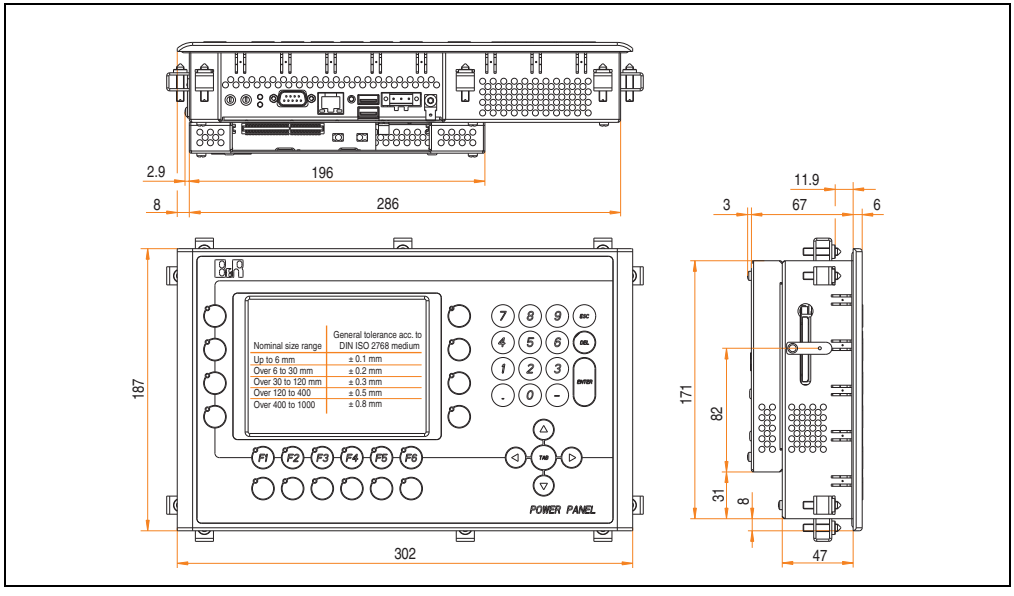



Figure 197: Dimensions - 4PP252.0571-65

### 3.21.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 197 "Dimensions - 4PP252.0571-65" on page 270) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

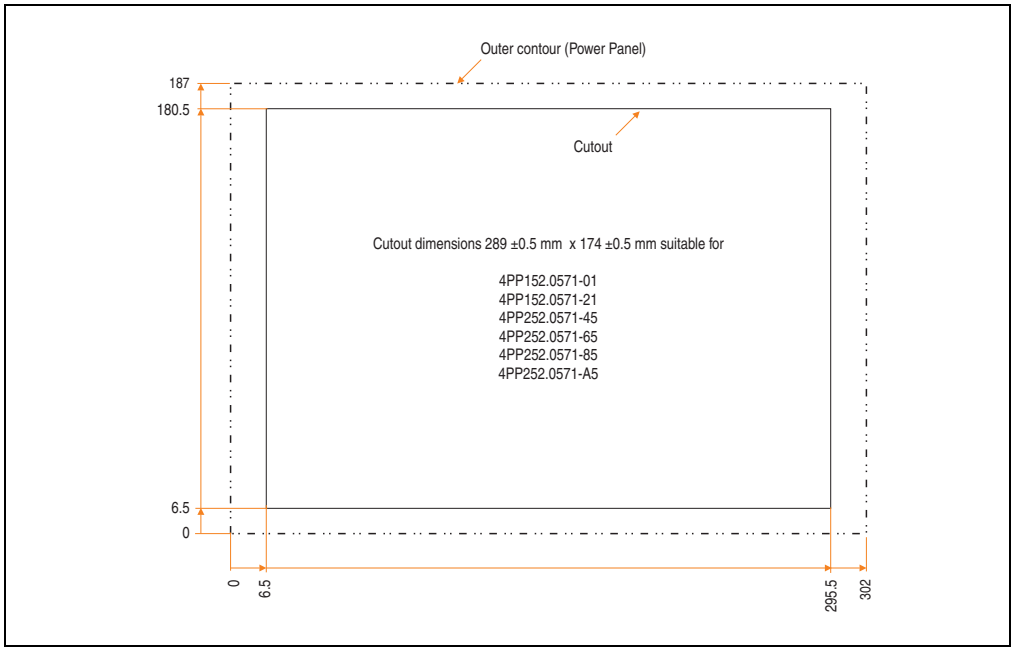



Figure 198: Cutout dimensions

### 3.21.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 252 LCD C QVGA 5.7" F MH 1aPCI |
| 10 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 8 | Legend strips (inserted in the front) |

Table 90: Contents of delivery - 4PP252.0571-65

## 3.22 Device 4PP252.0571-85

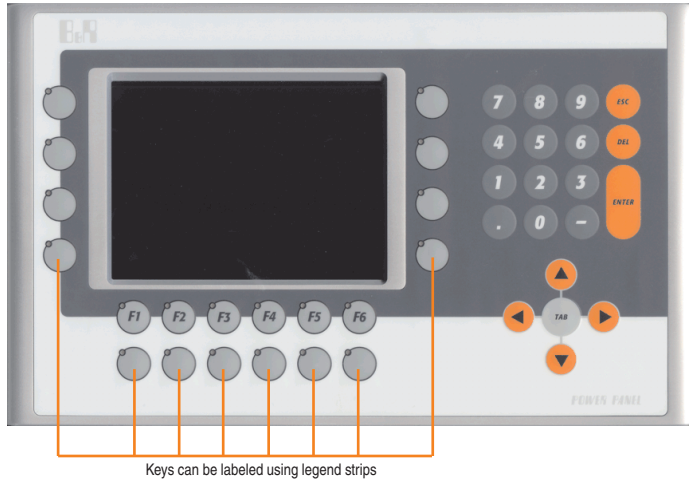



Figure 199: Front view - 4PP252.0571-85

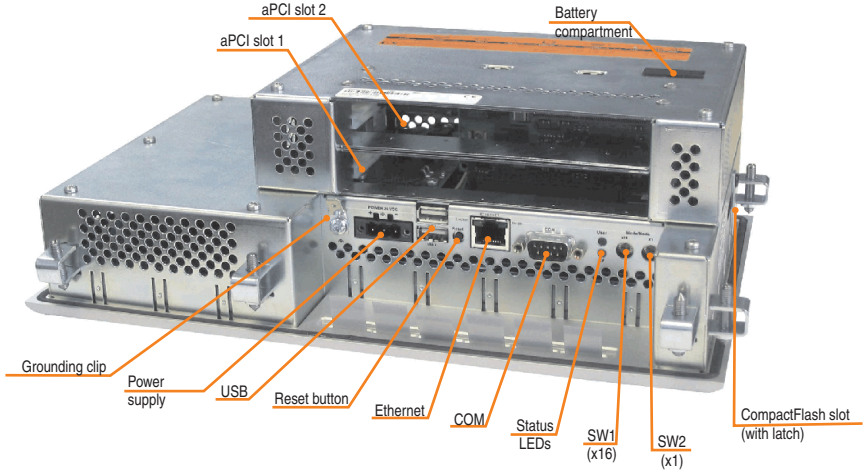



Figure 200: Rear view - 4PP252.0571-85

### 3.22.1 Technical data

| Features | 4PP252.0571-85 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 91: Technical data - 4PP252.0571-85

| Features | 4PP252.0571-85 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | 2 (see B&R System 2005 manual for available aPCI interface modules)<br>Max. 0.7 Nm |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>LCD monochrome<br>5.7 in (144 mm)<br>8 shades of gray<br>QVGA, 320 x 240 pixels<br>25:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>140 cd/m²<br>50,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - |
| Filter glass<br>Degree of transmission<br>Coating | <br>95%<br>On both sides |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | <br>> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force<br>20 with LED<br>-<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>Yes |

Table 91: Technical data - 4PP252.0571-85 (cont.)

| Electrical characteristics | 4PP252.0571-85 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 302 mm |
| Height | 187 mm |
| Depth | 98 mm |
| Weight | Approx. 2.9 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 3.22.2 "Temperature humidity diagram" on page 276 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 91: Technical data - 4PP252.0571-85 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.22.2 Temperature humidity diagram

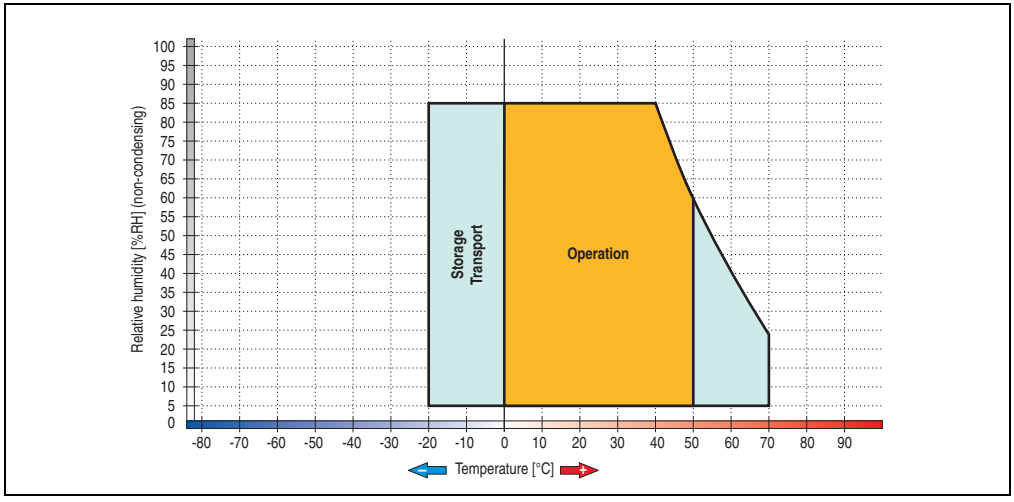



Figure 201: Temperature humidity diagram - 4PP252.0571-85

### 3.22.3 Dimensions

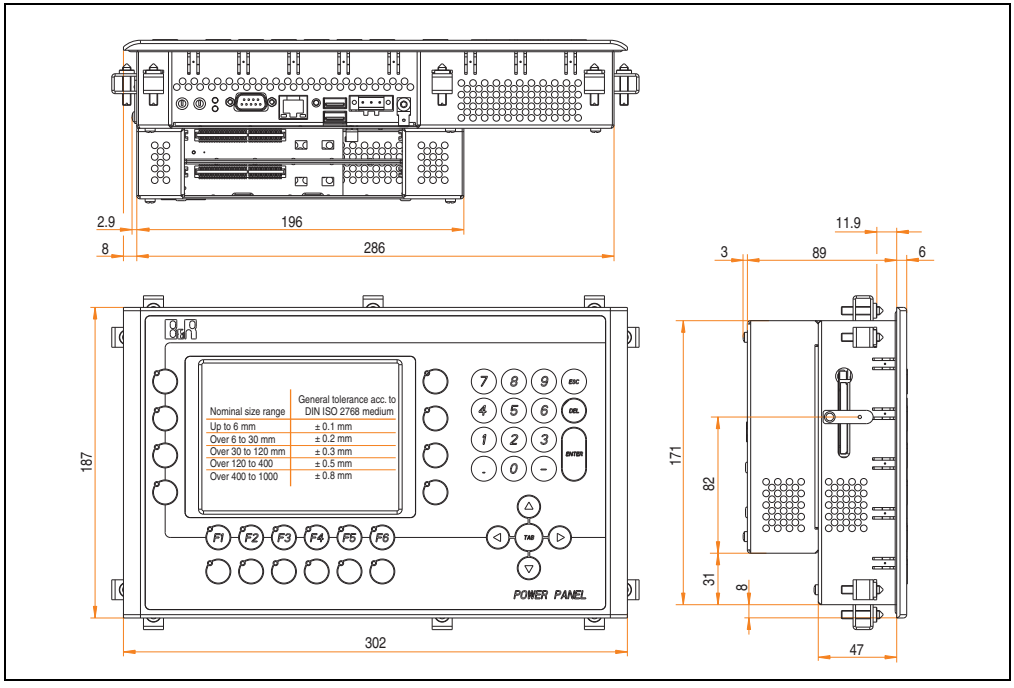



Figure 202: Dimensions - 4PP252.0571-85

### 3.22.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 202 "Dimensions - 4PP252.0571-85" on page 276) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

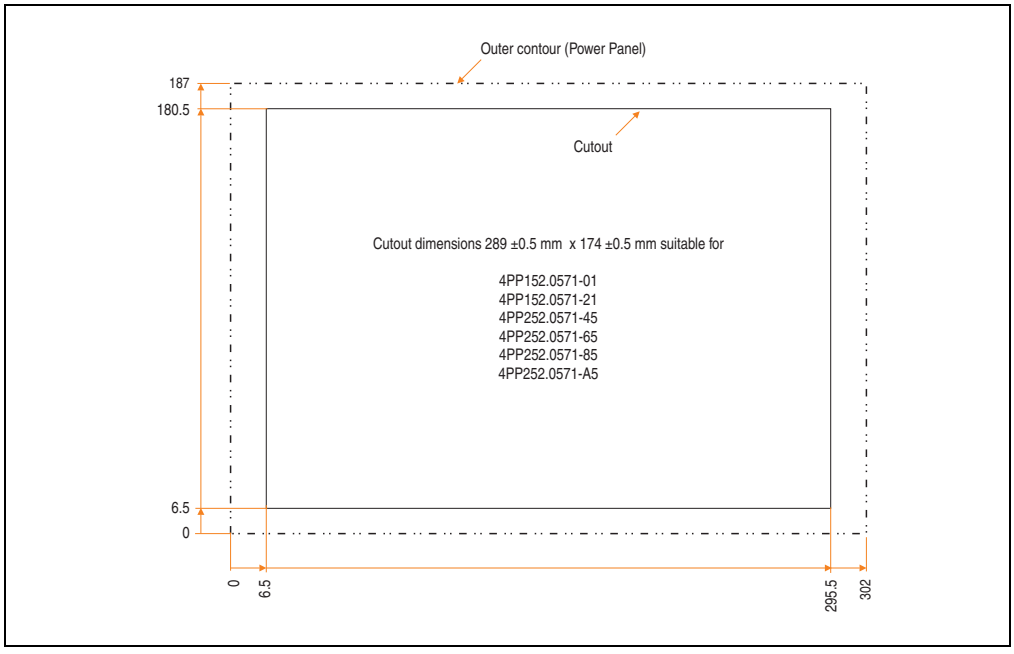



Figure 203: Cutout dimensions

### 3.22.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 252 LCD B/W QVGA 5.7" F MH 2aPCI |
| 10 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 8 | Legend strips (inserted in the front) |

Table 92: Contents of delivery - 4PP252.0571-85

## 3.23 Device 4PP252.0571-A5

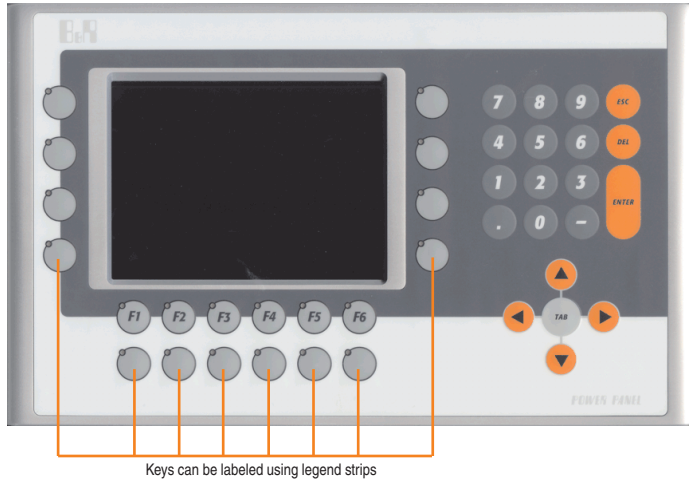



Figure 204: Front view - 4PP252.0571-A5

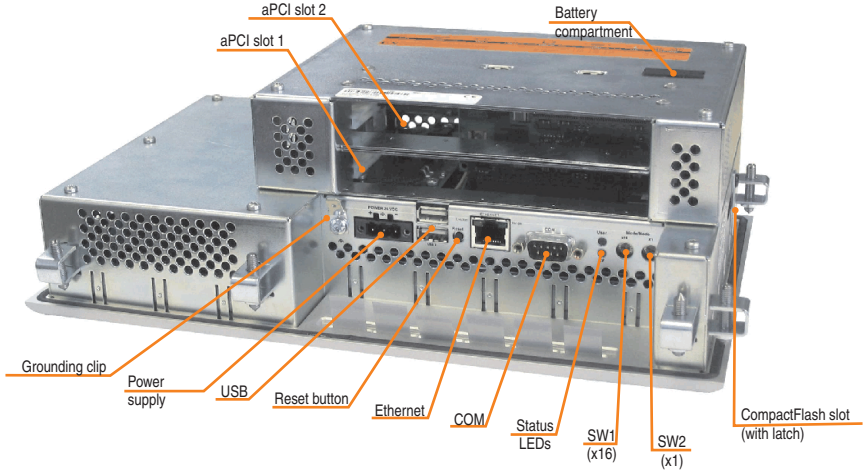



Figure 205: Rear view - 4PP252.0571-A5

### 3.23.1 Technical data

| Features | 4PP252.0571-A5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1)] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1)]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 93: Technical data - 4PP252.0571-A5

| Features | 4PP252.0571-A5 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | 2 (see B&R System 2005 manual for available aPCI interface modules)<br>Max. 0.7 Nm |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color LCD<br>5.7 in (144 mm)<br>256 colors<br>QVGA, 320 x 240 pixels<br>40:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>150 cd/m²<br>50,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - |
| Filter glass<br>Degree of transmission<br>Coating | <br>95%<br>On both sides |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | <br>> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force<br>20 with LED<br>-<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>Yes |

Table 93: Technical data - 4PP252.0571-A5 (cont.)

| Electrical characteristics | 4PP252.0571-A5 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 302 mm |
| Height | 187 mm |
| Depth | 98 mm |
| Weight | Approx. 2.9 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 3.23.2 "Temperature humidity diagram" on page 282 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 93: Technical data - 4PP252.0571-A5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.23.2 Temperature humidity diagram

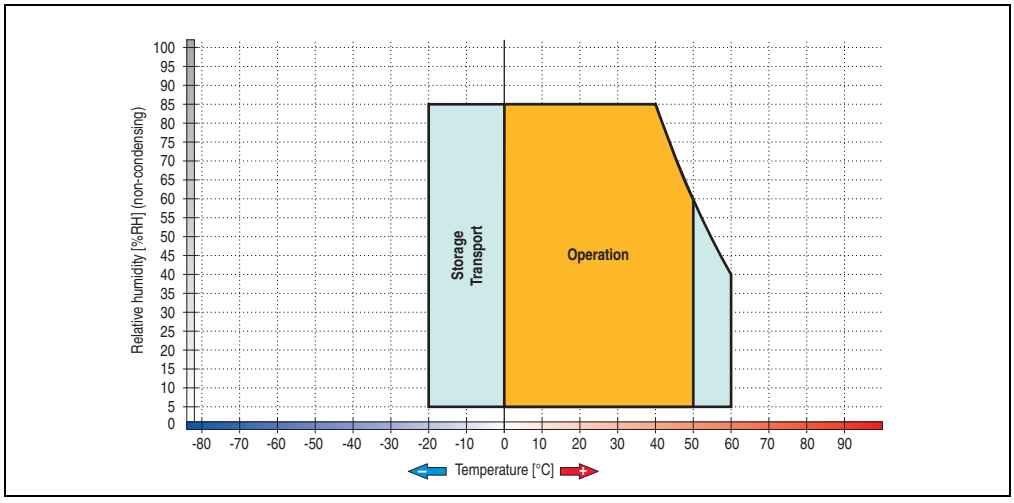



Figure 206: Temperature humidity diagram - 4PP252.0571-A5

### 3.23.3 Dimensions

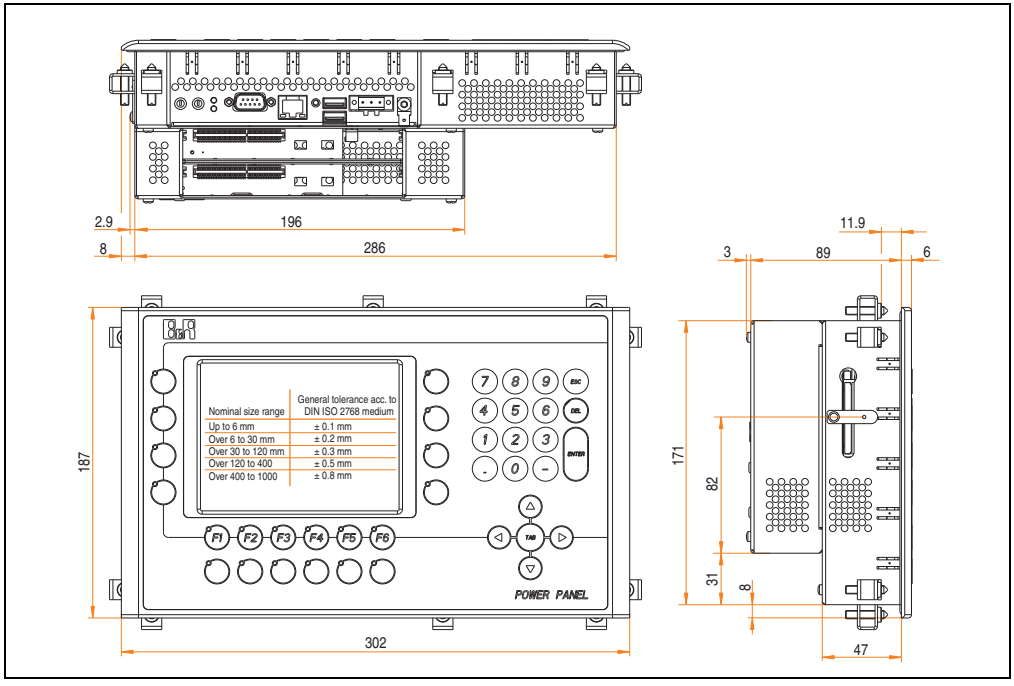



Figure 207: Dimensions - 4PP252.0571-A5

### 3.23.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 207 "Dimensions - 4PP252.0571-A5" on page 282) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

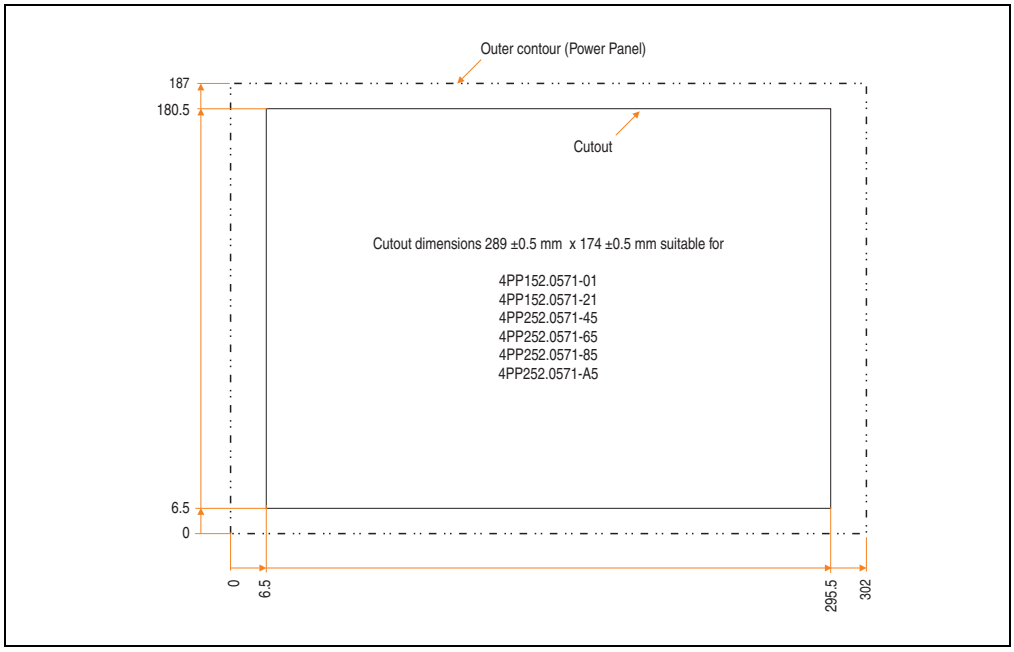



Figure 208: Cutout dimensions

### 3.23.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 252 LCD C QVGA 5.7" F MH 2aPCI |
| 10 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 8 | Legend strips (inserted in the front) |

Table 94: Contents of delivery - 4PP252.0571-A5

## 3.24 Device 4PP252.1043-75

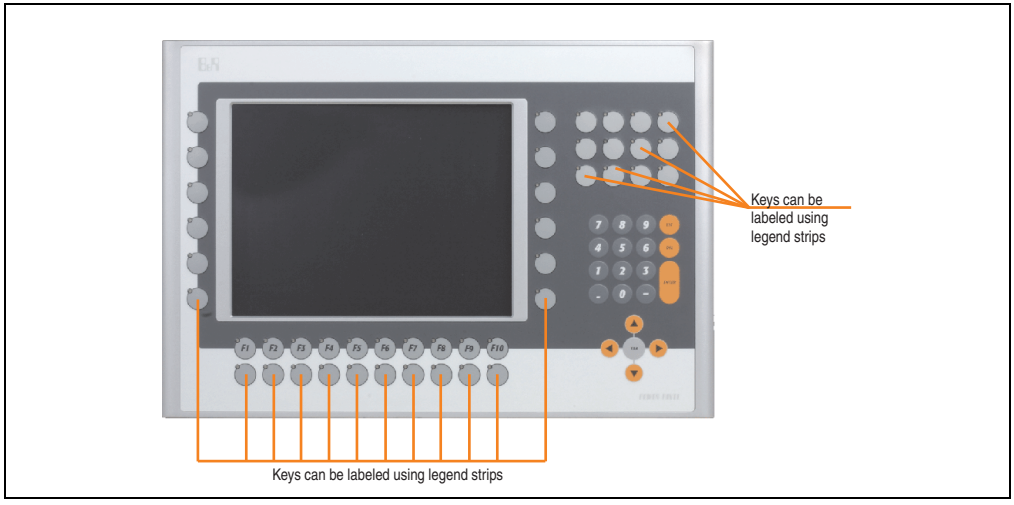



Figure 209: Front view - 4PP252.1043-75

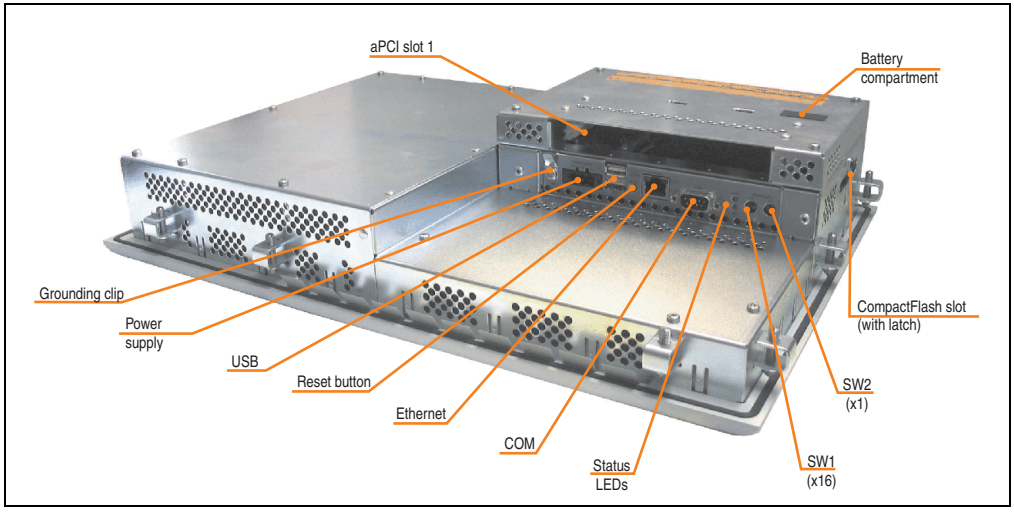



Figure 210: Rear view - 4PP252.1043-75

### 3.24.1 Technical data

| Features | 4PP252.1043-75 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1)] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1)]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 95: Technical data - 4PP252.1043-75

| Features | 4PP252.1043-75 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | 1 (see B&R System 2005 manual for available aPCI interface modules)<br>Max. 0.7 Nm |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color TFT<br>10.4 inch (264 mm)<br>256 colors<br>VGA, 640 x 480 pixels<br>600:1<br><br>Direction R / direction L =70°<br>Direction U = 45°/ direction D = 55°<br><br>350 cd/m²<br>55,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - |
| Filter glass<br>Degree of transmission<br>Coating | <br>95%<br>On both sides |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | <br>> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force<br>44 with LED<br>-<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>20 W typical, 25 W max.<br>Yes |

Table 95: Technical data - 4PP252.1043-75 (cont.)

| Electrical characteristics | 4PP252.1043-75 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 423 mm |
| Height | 288 mm |
| Depth | 86 mm |
| Weight | Approx. 5.2 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 3.24.2 "Temperature humidity diagram" on page 288 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 95: Technical data - 4PP252.1043-75 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.24.2 Temperature humidity diagram

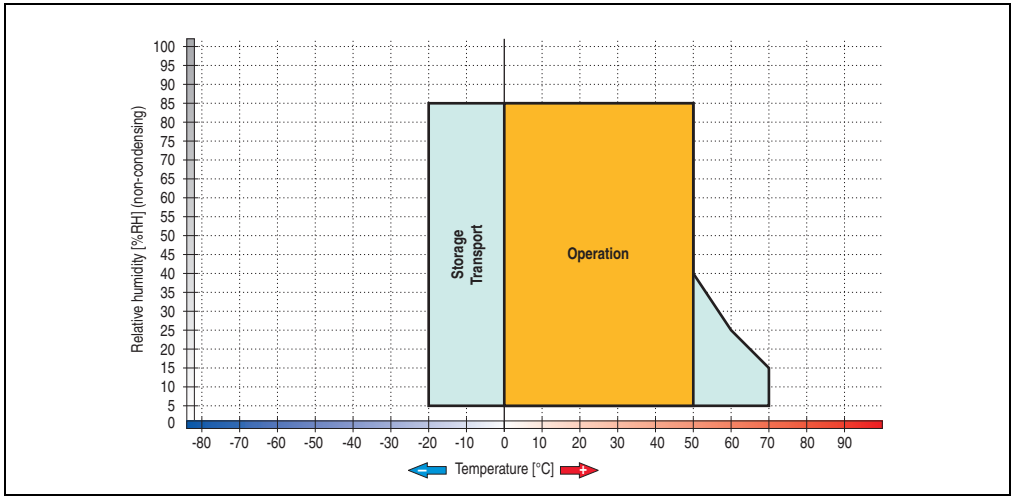



Figure 211: Temperature humidity diagram - 4PP252.1043-75

### 3.24.3 Dimensions

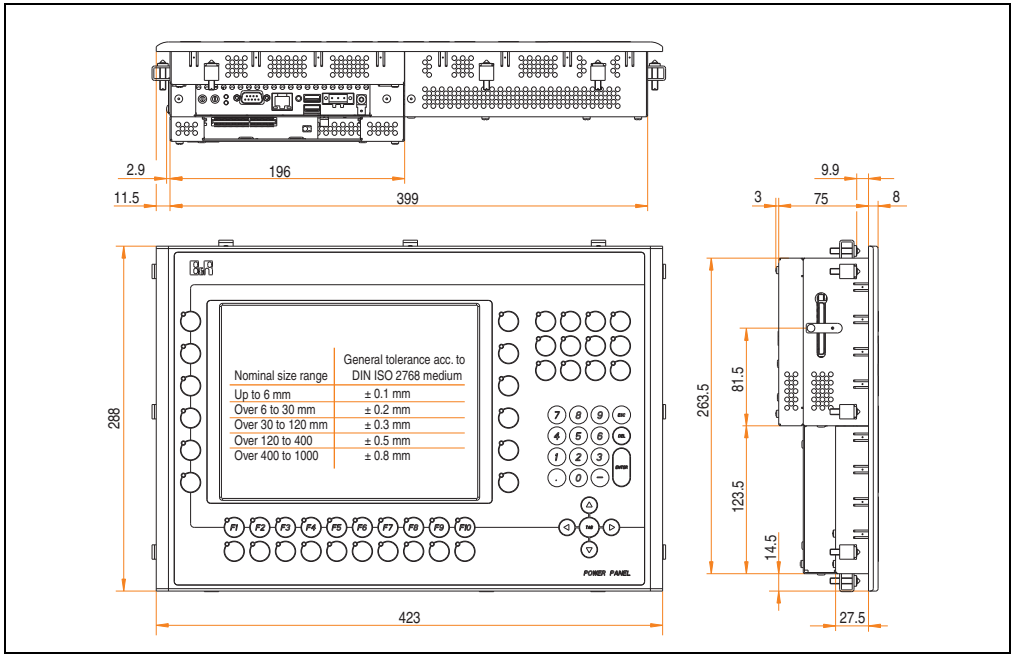



Figure 212: Dimensions - 4PP252.1043-75

### 3.24.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 212 "Dimensions - 4PP252.1043-75" on page 288) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

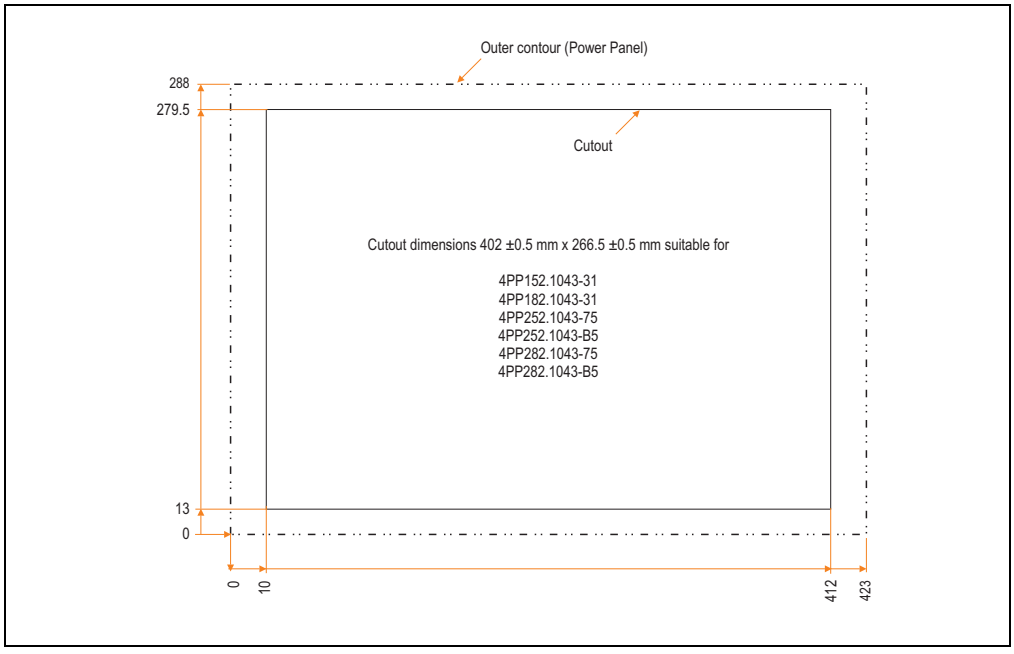



Figure 213: Cutout dimensions

### 3.24.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 252 TFT C VGA 10.4" F MH 1aPCI |
| 12 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 16 | Legend strips (inserted in the front) |

Table 96: Contents of delivery - 4PP252.1043-75

## 3.25 Device 4PP252.1043-B5

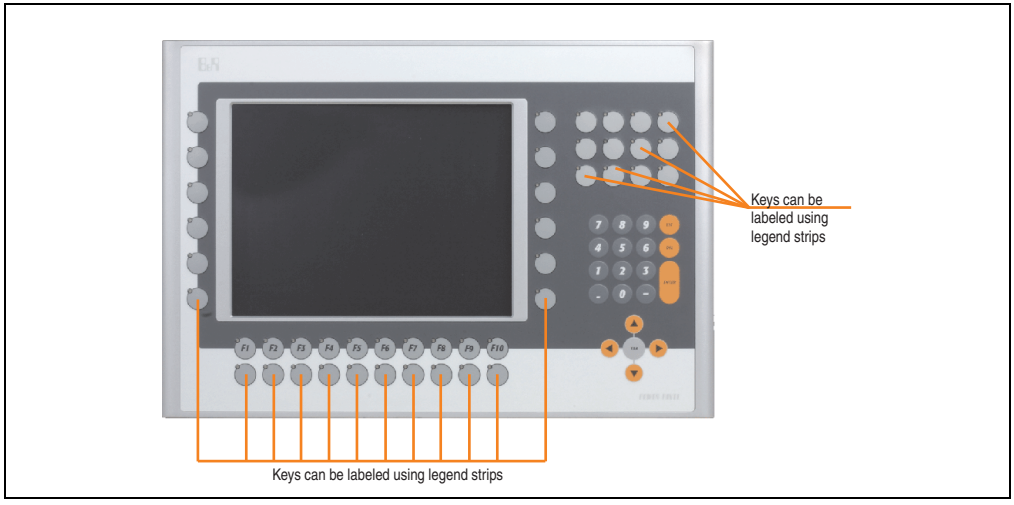



Figure 214: Front view - 4PP252.1043-B5

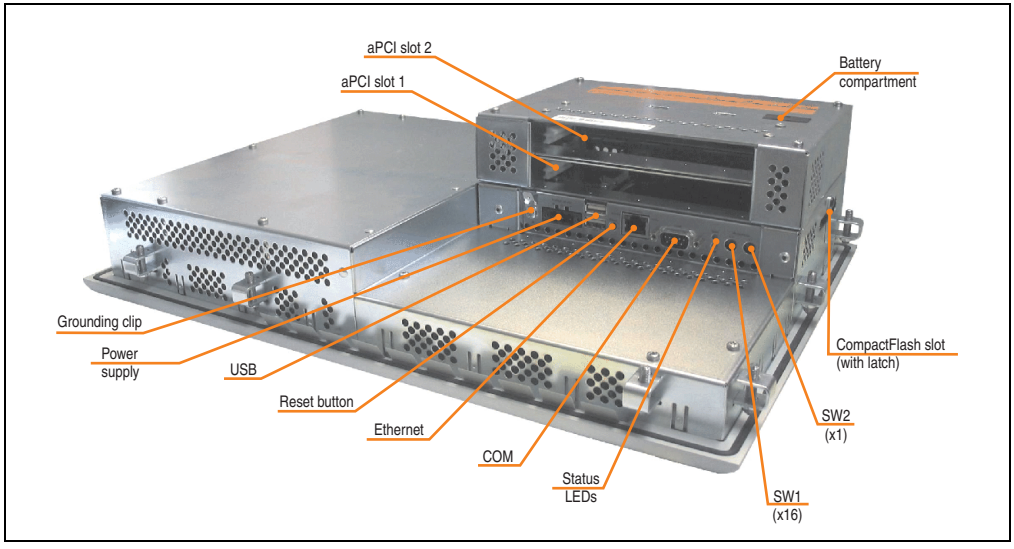



Figure 215: Rear view - 4PP252.1043-B5

### 3.25.1 Technical data

| Features | 4PP252.1043-B5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 97: Technical data - 4PP252.1043-B5

| Features | 4PP252.1043-B5 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | - |
| Touch screen type | |
| Technology | |
| Controller | |
| Degree of transmission | |
| Filter glass | |
| Degree of transmission | 95% |
| Coating | On both sides |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 44 with LED |
| Soft keys | - |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 20 W typical, 25 W max. |
| Electrical isolation | Yes |

Table 97: Technical data - 4PP252.1043-B5 (cont.)

| Electrical characteristics | 4PP252.1043-B5 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Orange keys<br>Dark gray keys<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 151CV<br>Similar to Pantone 431CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>423 mm<br>288 mm<br>108 mm |
| Weight | Approx. 5.5 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +70°C<br>-20 to +70°C |
| Relative humidity | See 3.25.2 "Temperature humidity diagram" on page 294 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 97: Technical data - 4PP252.1043-B5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.25.2 Temperature humidity diagram

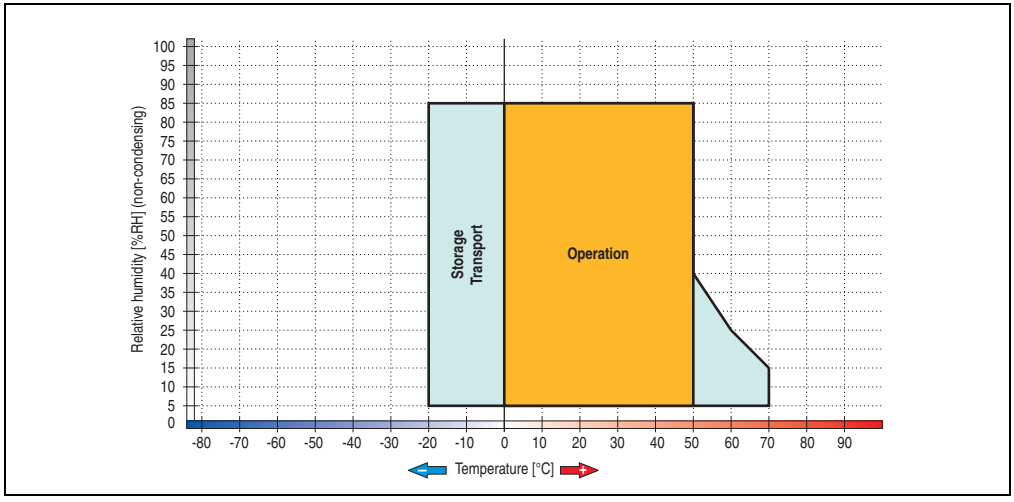



Figure 216: Temperature humidity diagram - 4PP252.1043-B5

### 3.25.3 Dimensions

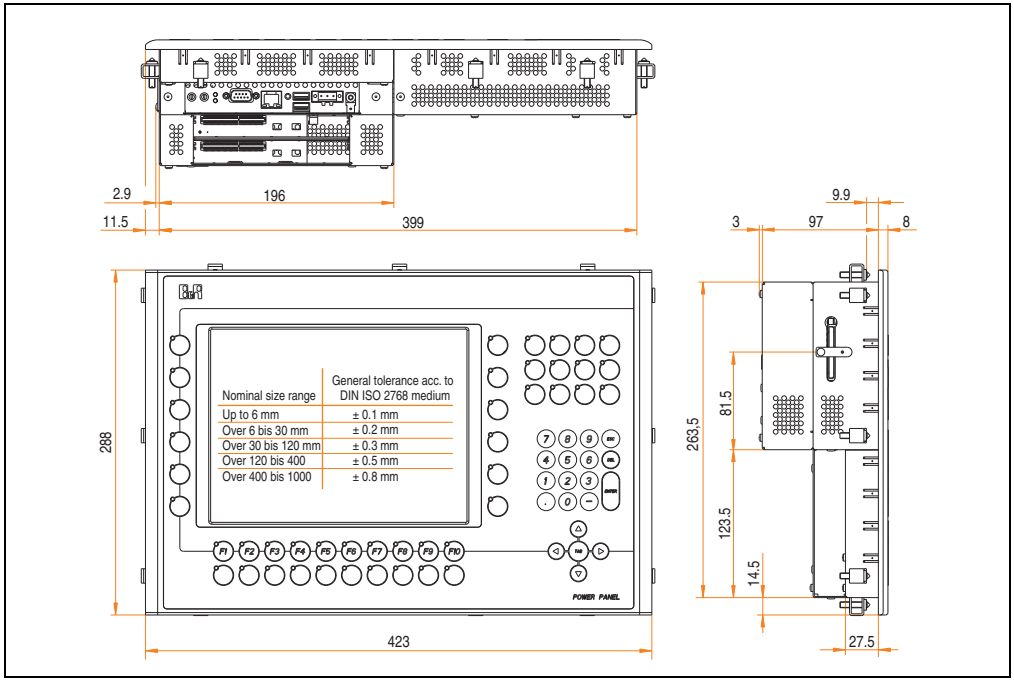



Figure 217: Dimensions - 4PP252.1043-B5

### 3.25.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 217 "Dimensions - 4PP252.1043-B5" on page 294) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

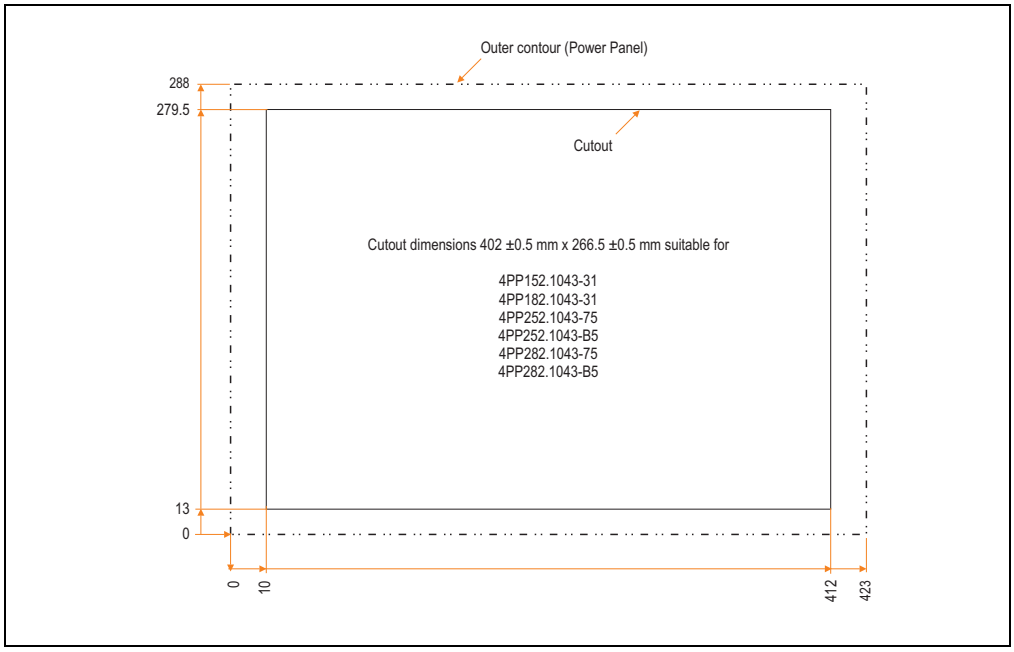



Figure 218: Cutout dimensions

### 3.25.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 252 TFT C VGA 10.4" F MH 2aPCI |
| 12 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 16 | Legend strips (inserted in the front) |

Table 98: Contents of delivery - 4PP252.1043-B5

## 3.26 Device 4PP280.1043-75

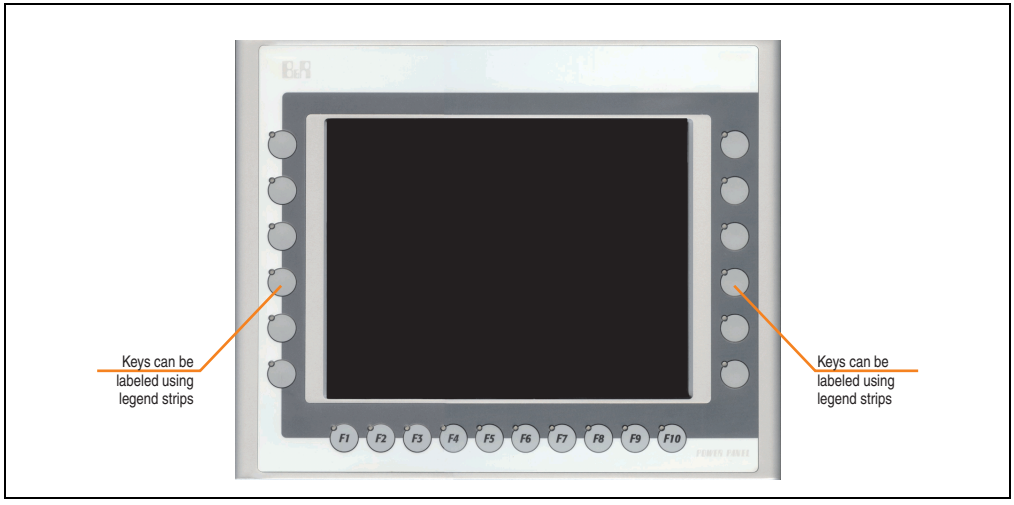



Figure 219: Front view - 4PP280.1043-75

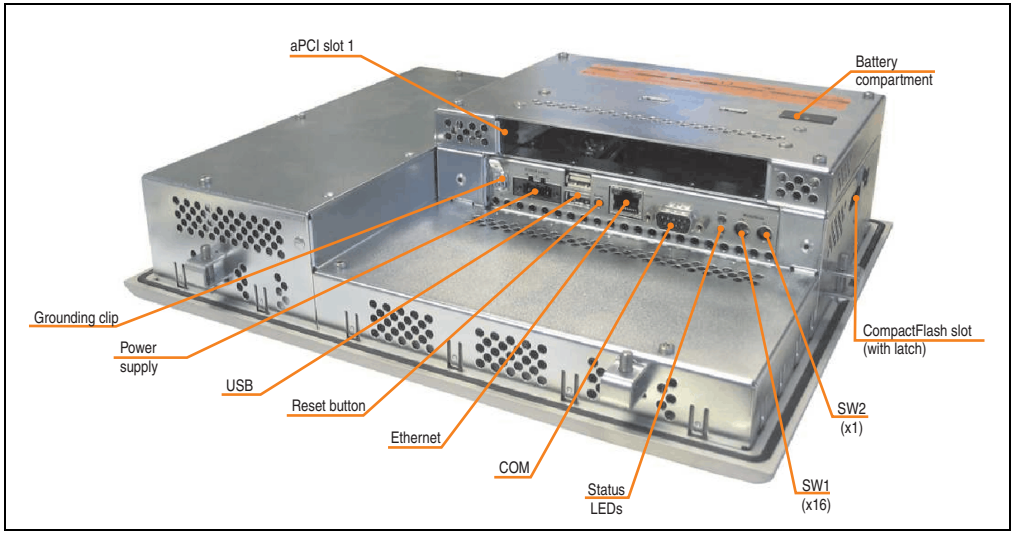



Figure 220: Rear view - 4PP280.1043-75

### 3.26.1 Technical data

| Features | 4PP280.1043-75 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1)] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1)]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 99: Technical data - 4PP280.1043-75

| Features | 4PP280.1043-75 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 1 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 12 with LED |
| Soft keys | 10 with LED |
| Cursor keys | - |
| Number block | - |
| Other keys | - |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 20 W typical, 25 W max. |
| Electrical isolation | - |

Table 99: Technical data - 4PP280.1043-75 (cont.)

| Electrical characteristics | 4PP280.1043-75 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>323 mm<br>260 mm<br>86 mm |
| Weight | Approx. 3.9 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +70°C<br>-20 to +70°C |
| Relative humidity | See 3.26.2 "Temperature humidity diagram" on page 300 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 99: Technical data - 4PP280.1043-75 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.26.2 Temperature humidity diagram

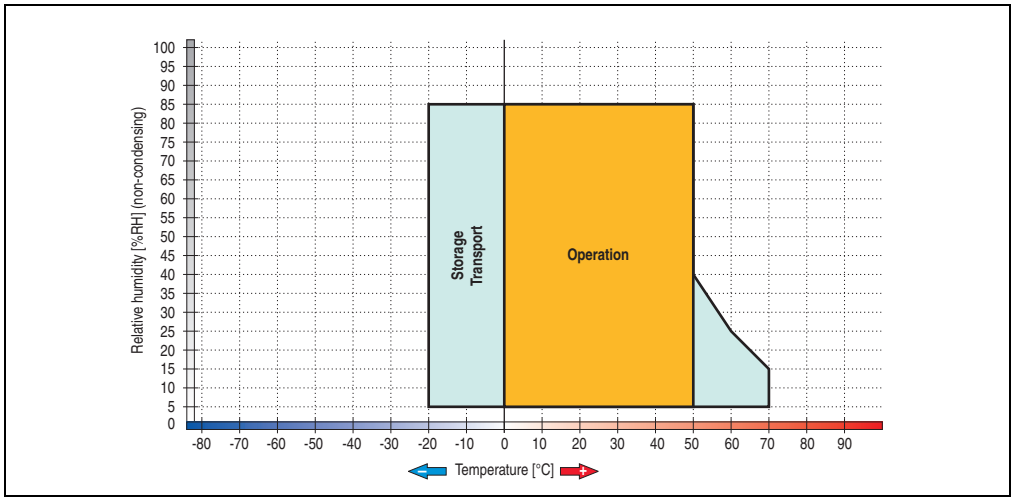



Figure 221: Temperature humidity diagram - 4PP280.1043-75

### 3.26.3 Dimensions

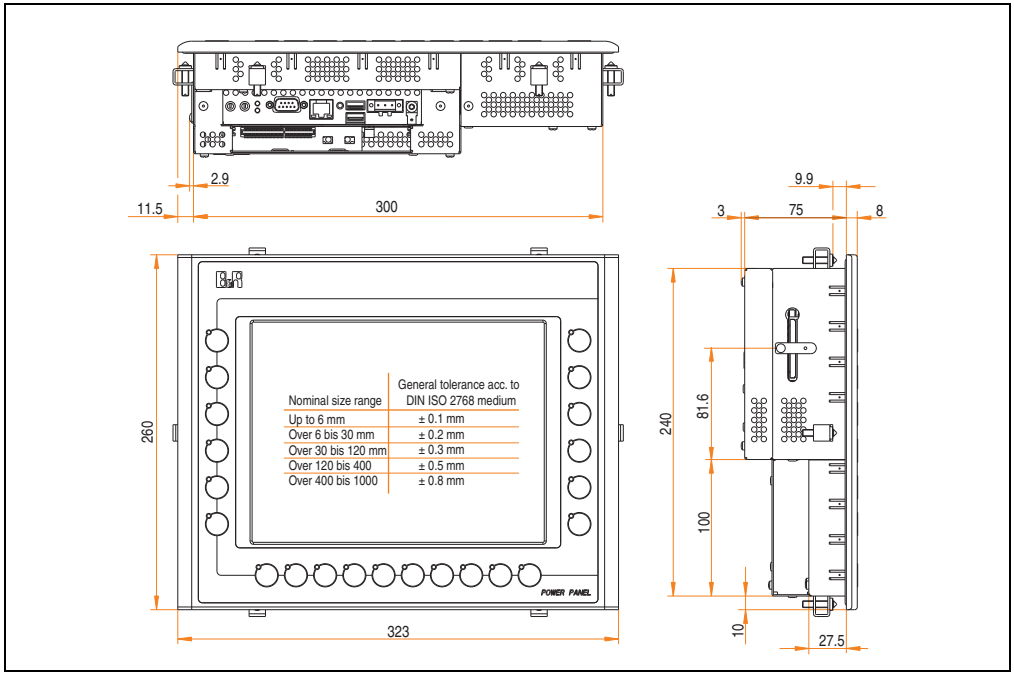



Figure 222: Dimensions - 4PP280.1043-75

### 3.26.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 222 "Dimensions - 4PP280.1043-75" on page 300) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

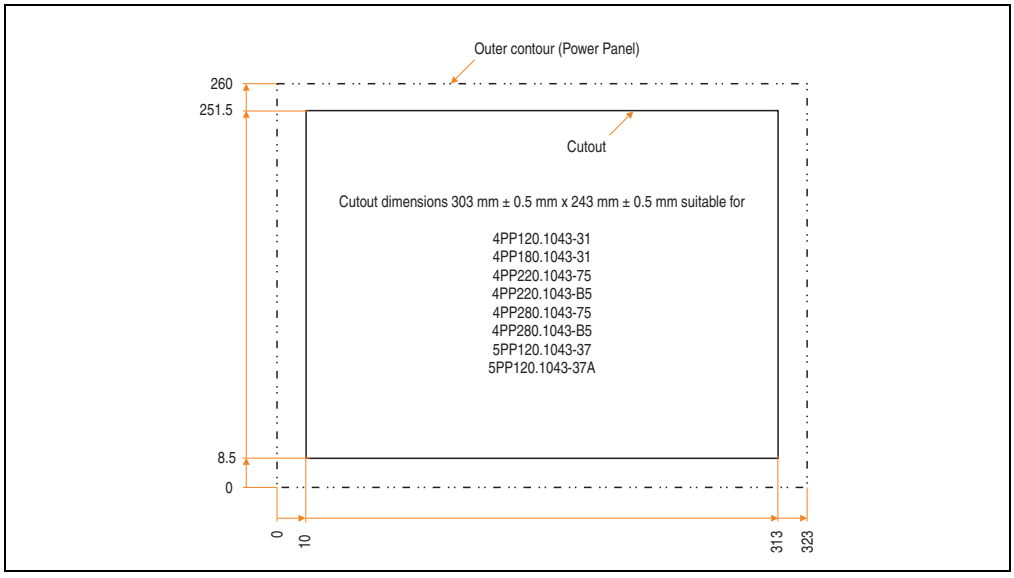



Figure 223: Cutout dimensions

### 3.26.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 280 TFT C VGA 10.4" FT MH 1aPCI |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 2 | Legend strips (inserted in the front) |

Table 100: Contents of delivery - 4PP280.1043-75

## 3.27 Device 4PP280.1043-B5

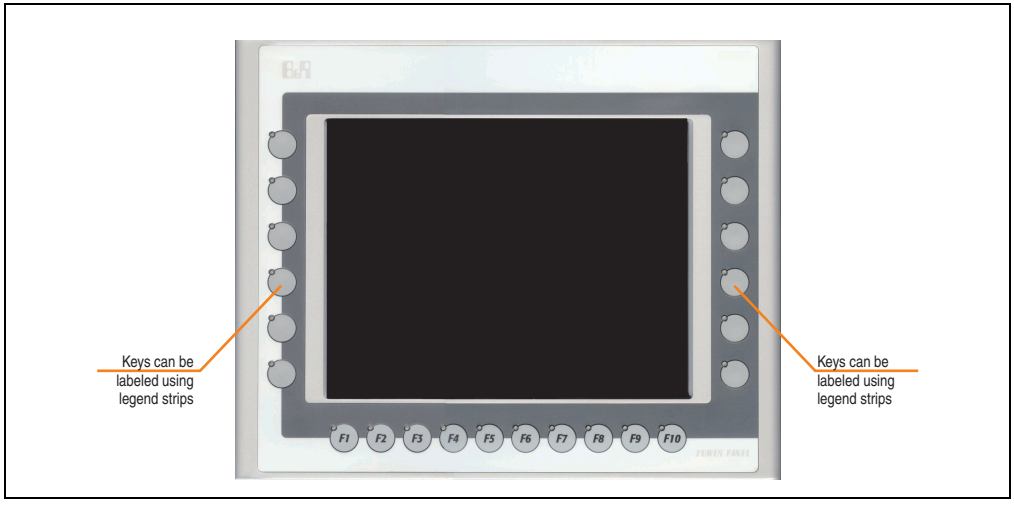



Figure 224: Front view - 4PP280.1043-B5

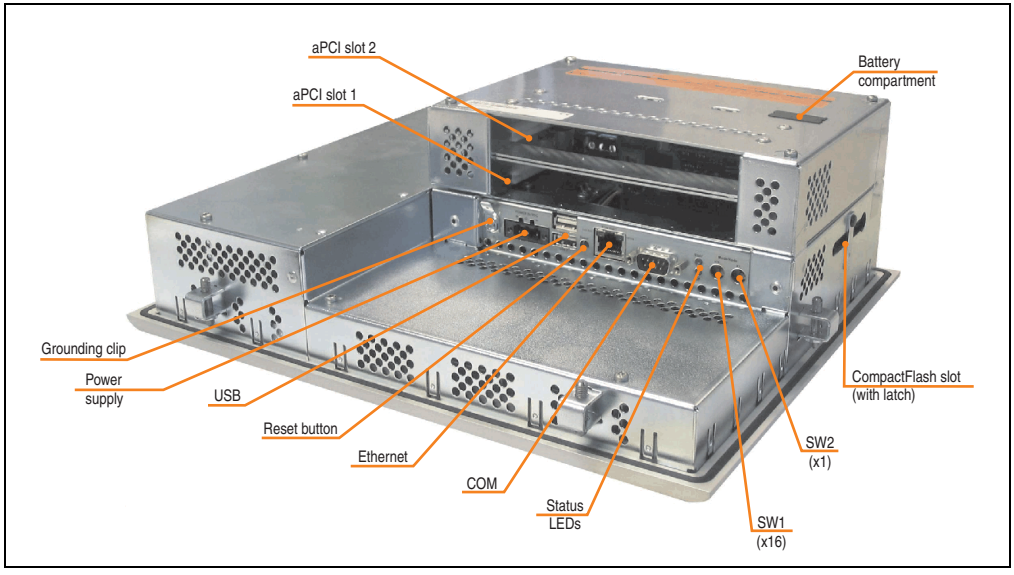



Figure 225: Rear view - 4PP280.1043-B5

### 3.27.1 Technical data

| Features | 4PP280.1043-B5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 101: Technical data - 4PP280.1043-B5

| Features | 4PP280.1043-B5 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 operations at 1±0.3 to 3±0.3 N operating force |
| Function keys | 12 with LED |
| Soft keys | 10 with LED |
| Cursor keys | - |
| Number block | - |
| Other keys | - |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 20 W typical, 25 W max. |
| Electrical isolation | - |

Table 101: Technical data - 4PP280.1043-B5 (cont.)

| Electrical characteristics | 4PP280.1043-B5 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>323 mm<br>260 mm<br>108 mm |
| Weight | Approx. 4.2 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +70°C<br>-20 to +70°C |
| Relative humidity | See 3.27.2 "Temperature humidity diagram" on page 306 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 101: Technical data - 4PP280.1043-B5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.27.2 Temperature humidity diagram

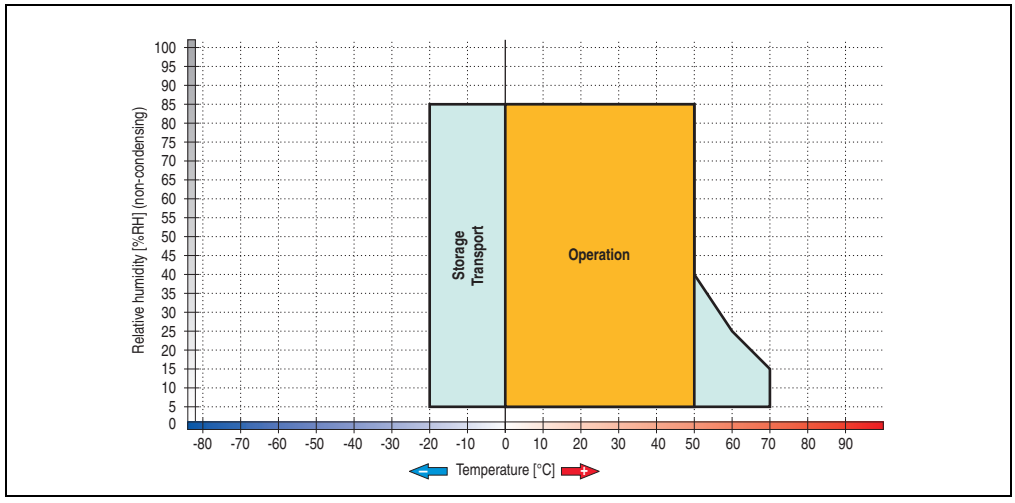



Figure 226: Temperature humidity diagram - 4PP280.1043-B5

### 3.27.3 Dimensions

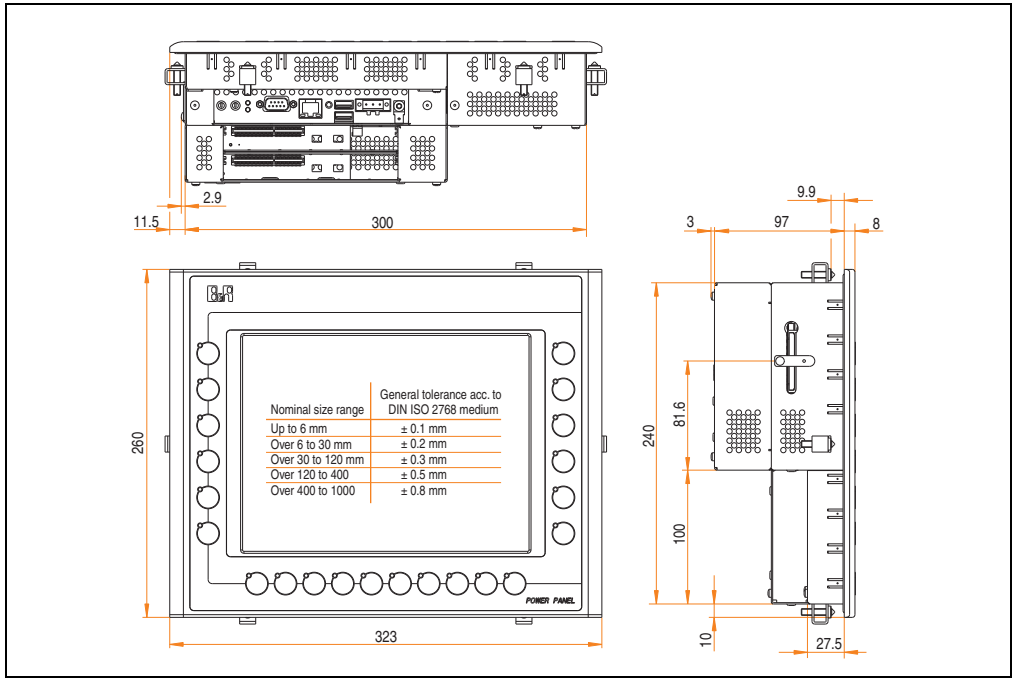



Figure 227: Dimensions - 4PP280.1043-B5

### 3.27.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 227 "Dimensions - 4PP280.1043-B5" on page 306) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

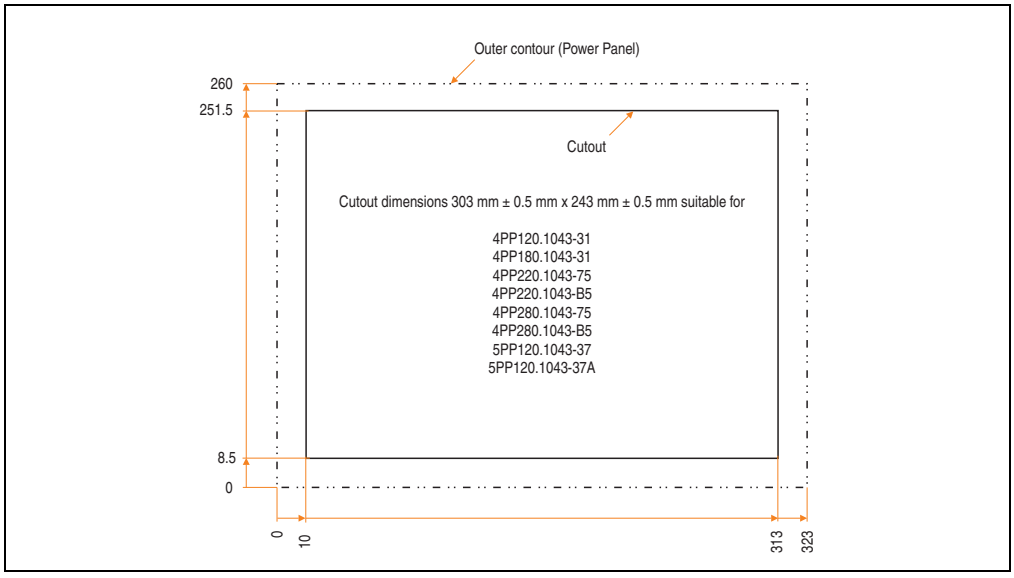



Figure 228: Cutout dimensions

### 3.27.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 280 TFT C VGA 10.4" FT MH 2aPCI |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 2 | Legend strips (inserted in the front) |

Table 102: Contents of delivery - 4PP280.1043-B5

## 3.28 Device 4PP280.1505-75

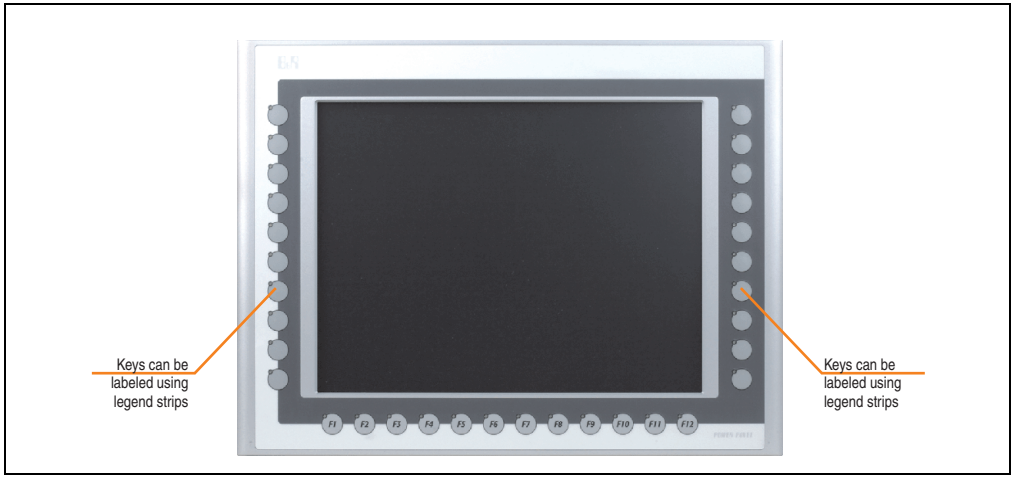



Figure 229: Front view - 4PP280.1505-75

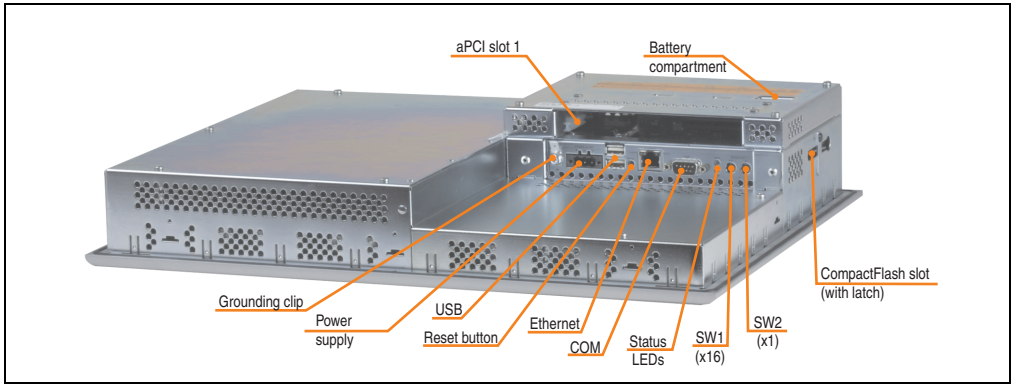



Figure 230: Rear view - 4PP280.1505-75

### 3.28.1 Technical data

| Features | 4PP280.1505-75 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 103: Technical data - 4PP280.1505-75

| Features | 4PP280.1505-75 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 1 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 256 colors |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 20 with LED |
| Soft keys | 12 with LED |
| Cursor keys | - |
| Number block | - |
| Other keys | - |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 35 W typical, 40 W max. |
| Electrical isolation | - |

Table 103: Technical data - 4PP280.1505-75 (cont.)

| Electrical characteristics | 4PP280.1505-75 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>435 mm<br>330 mm<br>87 mm |
| Weight | Approx. 6.5 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +60°C<br>-20 to +60°C |
| Relative humidity | See 3.28.2 "Temperature humidity diagram" on page 312 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 103: Technical data - 4PP280.1505-75 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.28.2 Temperature humidity diagram

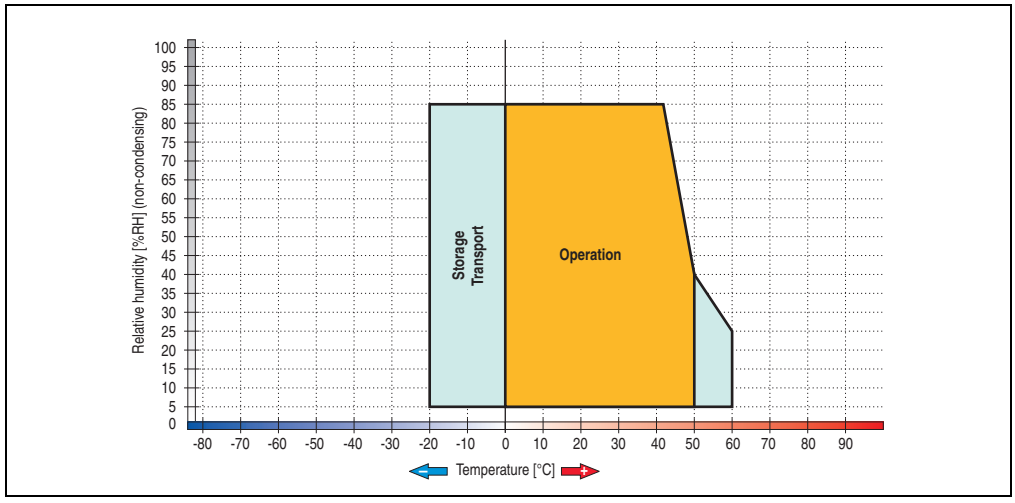



Figure 231: Temperature humidity diagram - 4PP280.1505-75

### 3.28.3 Dimensions

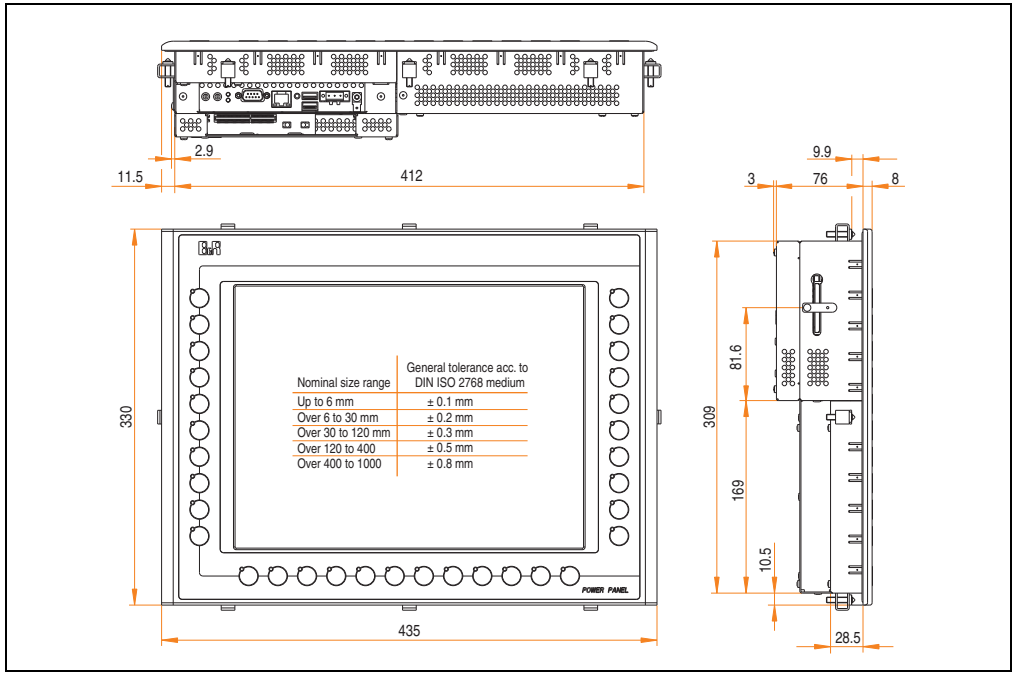



Figure 232: Dimensions - 4PP280.1505-75

### 3.28.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 232 "Dimensions - 4PP280.1505-75" on page 312) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

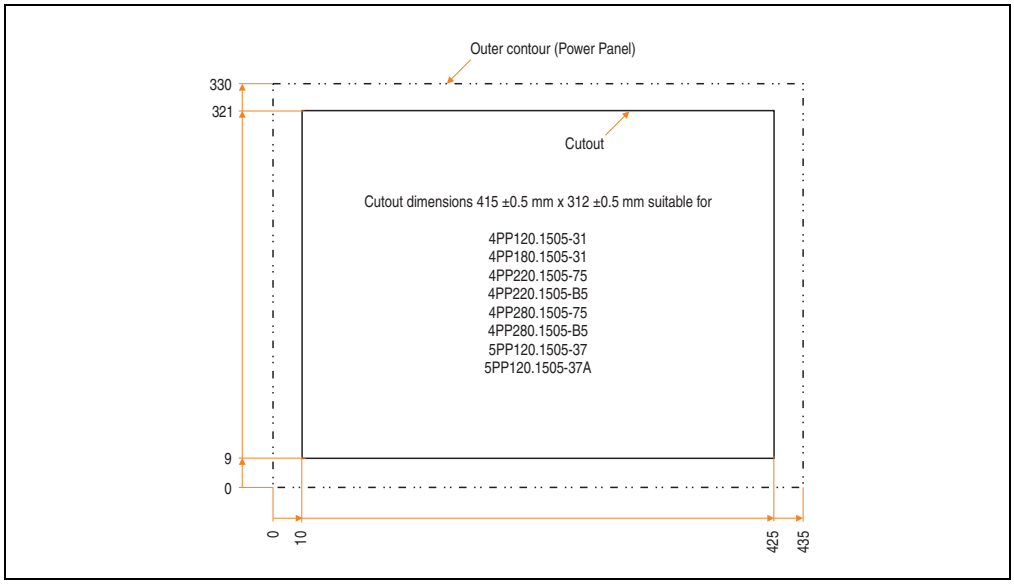



Figure 233: Cutout dimensions

### 3.28.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 280 TFT C XGA 15" FT MH 1aPCI |
| 8 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 2 | Legend strips (inserted in the front) |

Table 104: Contents of delivery - 4PP280.1505-75

## 3.29 Device 4PP280.1505-B5

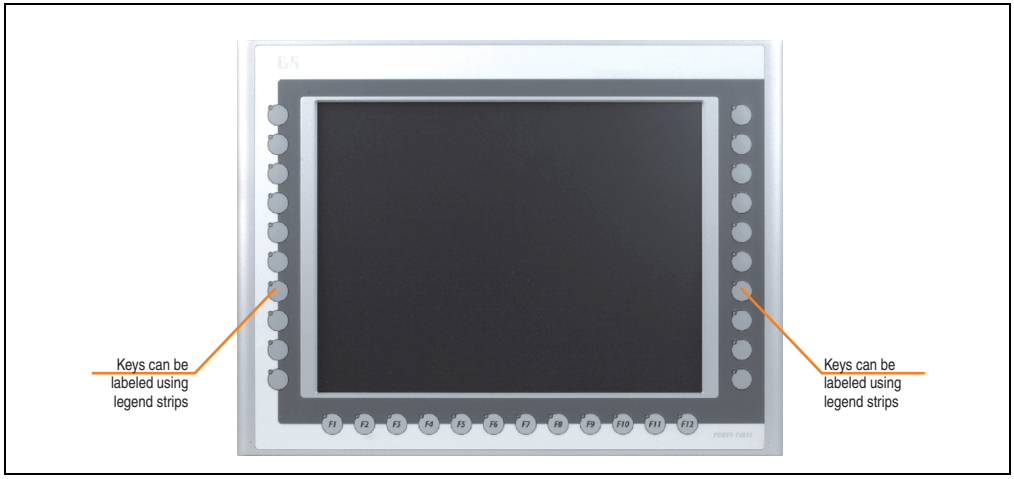



Figure 234: Front view - 4PP280.1505-B5

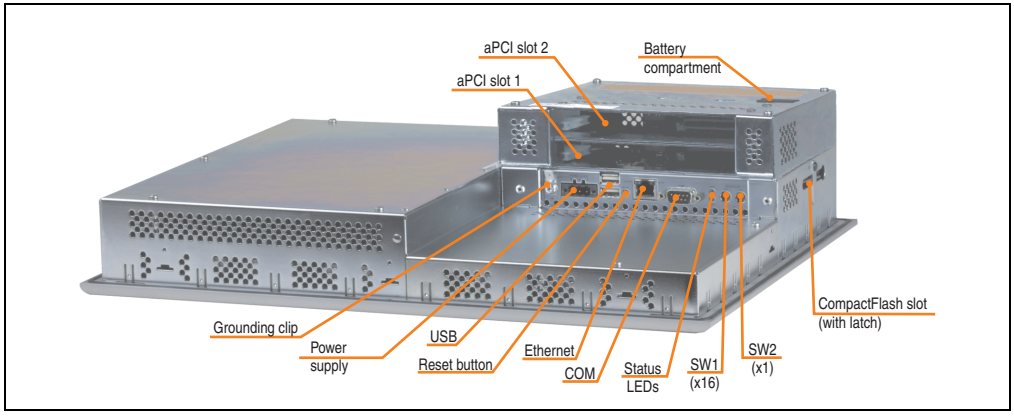



Figure 235: Rear view - 4PP280.1505-B5

### 3.29.1 Technical data

| Features | 4PP280.1505-B5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 105: Technical data - 4PP280.1505-B5

| Features | 4PP280.1505-B5 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 256 colors |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 20 with LED |
| Soft keys | 12 with LED |
| Cursor keys | - |
| Number block | - |
| Other keys | - |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 35 W typical, 40 W max. |
| Electrical isolation | - |

Table 105: Technical data - 4PP280.1505-B5 (cont.)

| Electrical characteristics | 4PP280.1505-B5 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>435 mm<br>330 mm<br>109 mm |
| Weight | Approx. 6.8 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +60°C<br>-20 to +60°C |
| Relative humidity | See 3.29.2 "Temperature humidity diagram" on page 318 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 105: Technical data - 4PP280.1505-B5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.29.2 Temperature humidity diagram

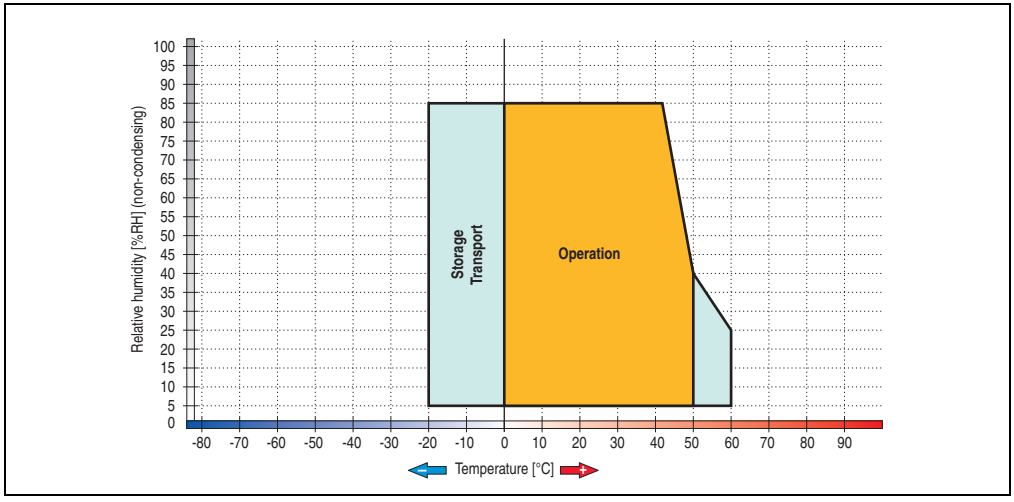



Figure 236: Temperature humidity diagram - 4PP280.1505-B5

### 3.29.3 Dimensions

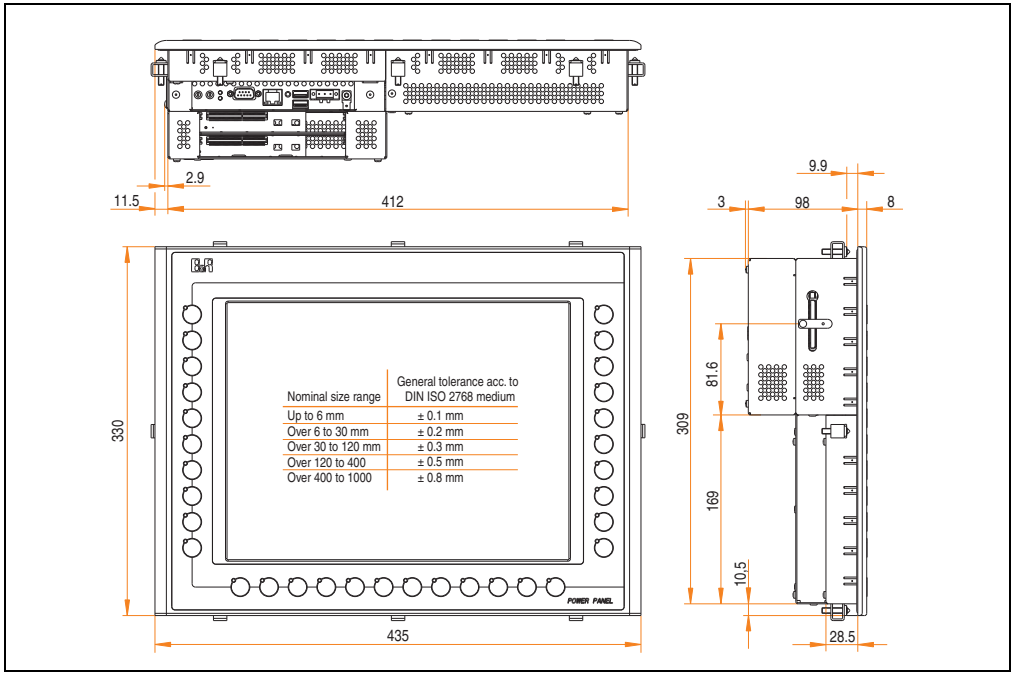



Figure 237: Dimensions - 4PP280.1505-B5

### 3.29.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 237 "Dimensions - 4PP280.1505-B5" on page 318) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

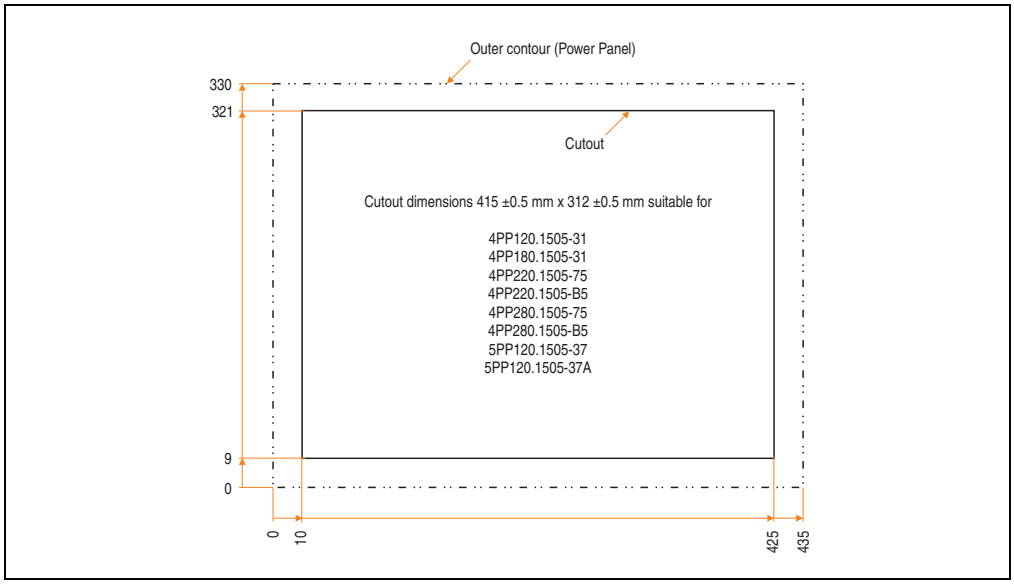



Figure 238: Cutout dimensions

### 3.29.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 280 TFT C XGA 15" FT MH 2aPCI |
| 8 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 2 | Legend strips (inserted in the front) |

Table 106: Contents of delivery - 4PP280.1505-B5

## 3.30 Device 4PP281.1043-75

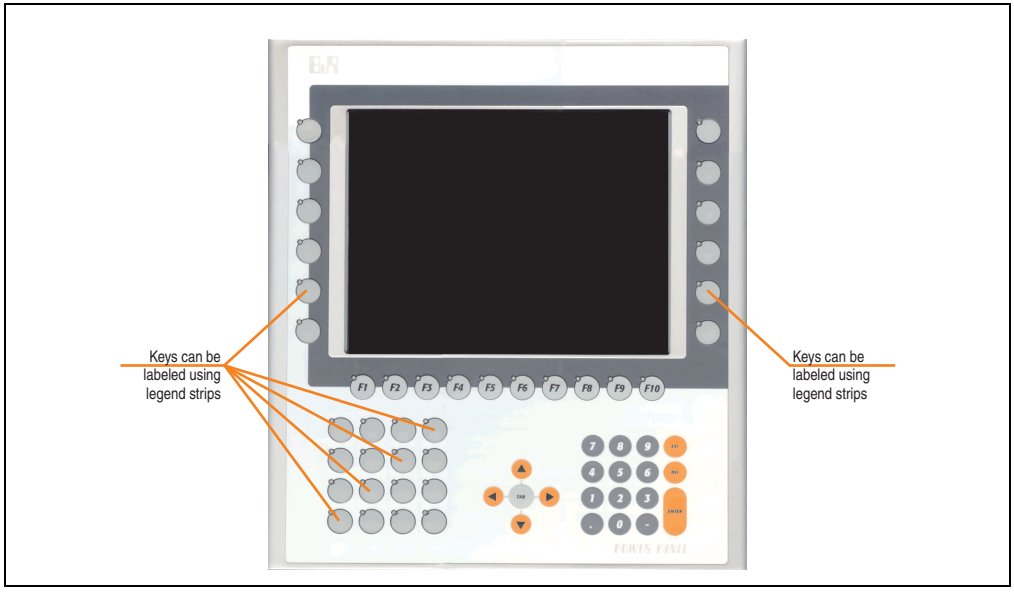



Figure 239: Front view - 4PP281.1043-75

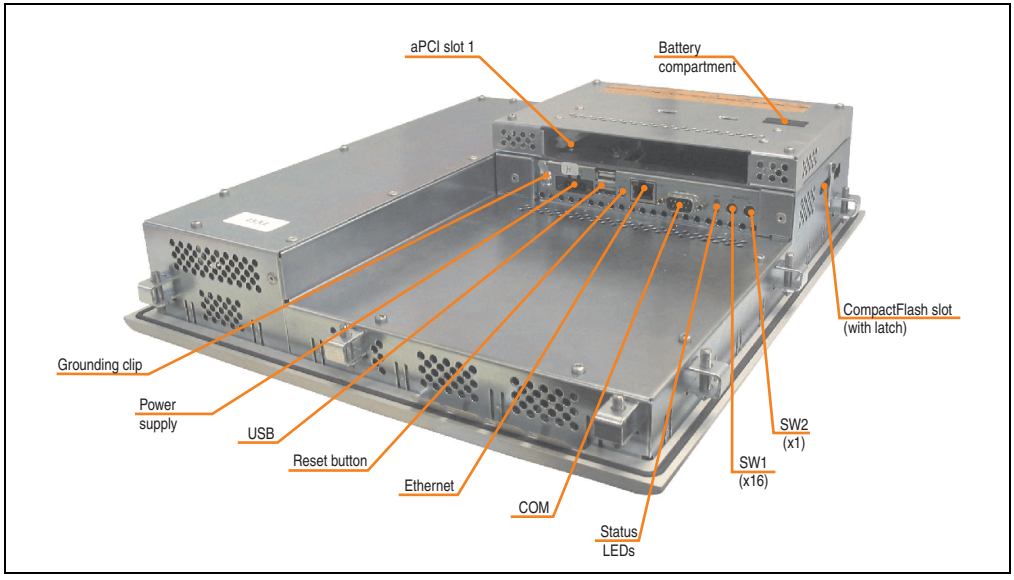



Figure 240: Rear view - 4PP281.1043-75

### 3.30.1 Technical data

| Features | 4PP281.1043-75 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 107: Technical data - 4PP281.1043-75

| Features | 4PP281.1043-75 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 1 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 28 with LED |
| Soft keys | 10 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 20 W typical, 25 W max. |
| Electrical isolation | - |

Table 107: Technical data - 4PP281.1043-75 (cont.)

| Electrical characteristics | 4PP281.1043-75 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 323 mm |
| Height | 358 mm |
| Depth | 86 mm |
| Weight | Approx. 5 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 3.30.2 "Temperature humidity diagram" on page 324 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 107: Technical data - 4PP281.1043-75 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.30.2 Temperature humidity diagram

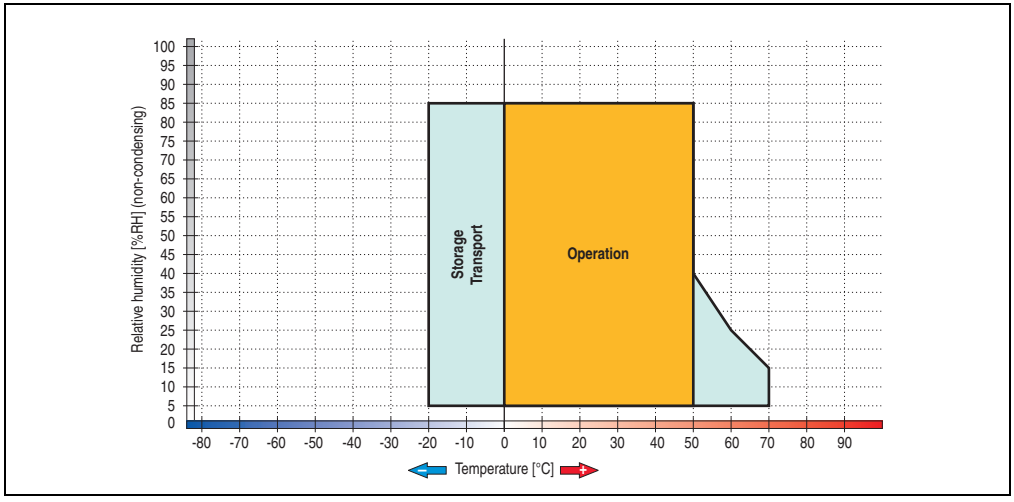



Figure 241: Temperature humidity diagram - 4PP281.1043-75

### 3.30.3 Dimensions

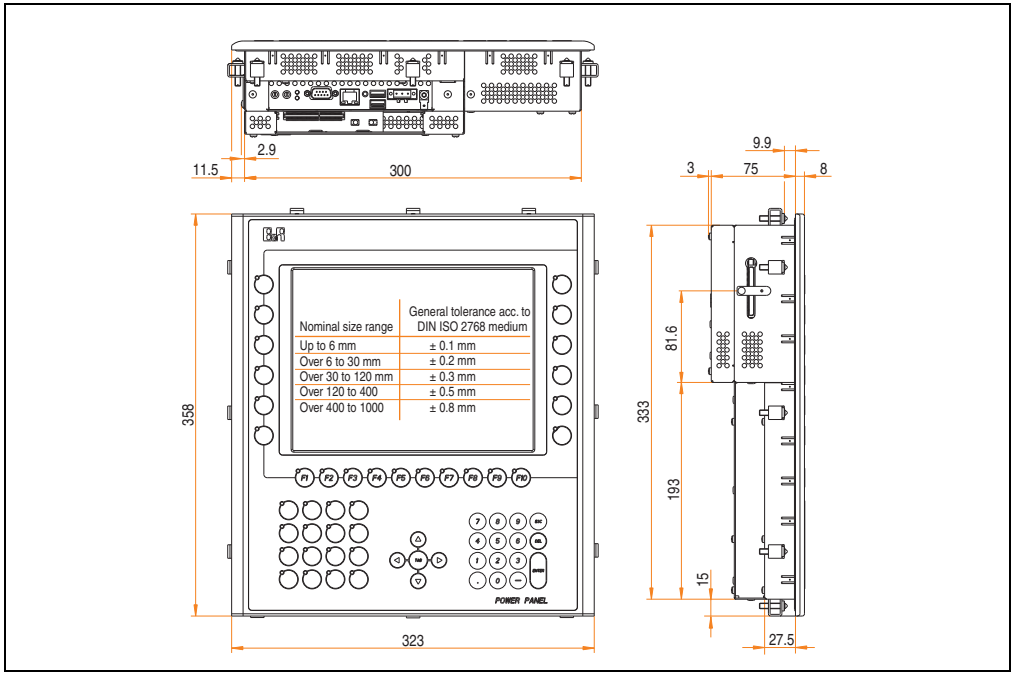



Figure 242: Dimensions - 4PP281.1043-75

### 3.30.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 242 "Dimensions - 4PP281.1043-75" on page 324) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

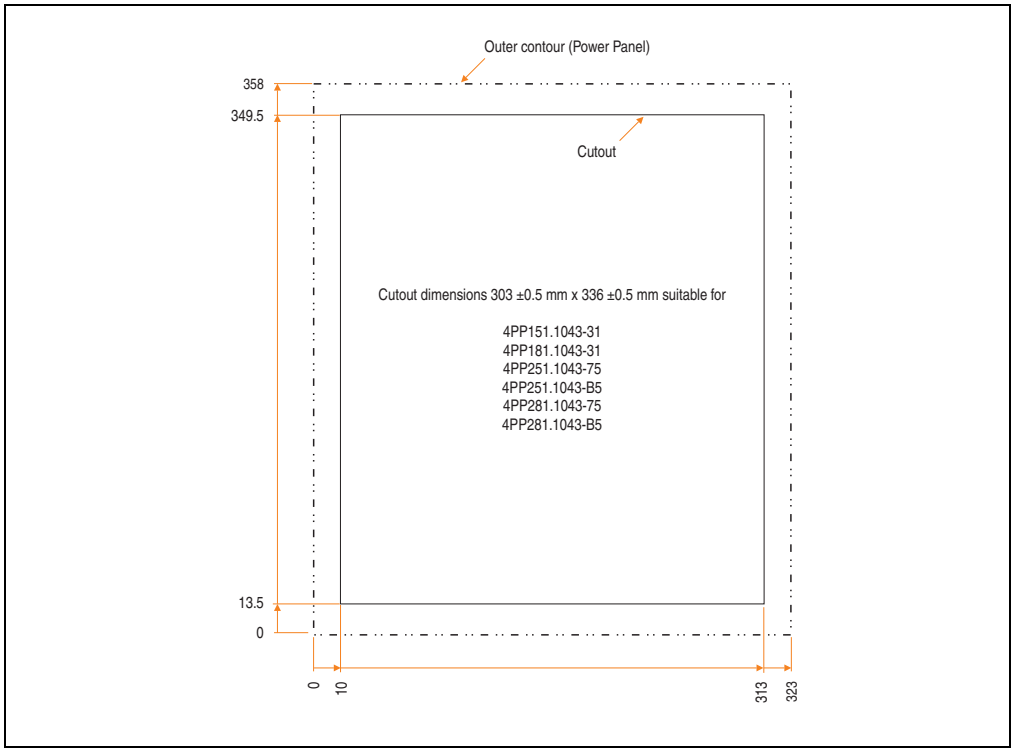



Figure 243: Cutout dimensions

### 3.30.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 281 TFT C VGA 10.4" FT MH 1aPCI |
| 12 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 2 | Legend strips (inserted in the front) |

Table 108: Contents of delivery - 4PP281.1043-75

## 3.31 Device 4PP281.1043-B5

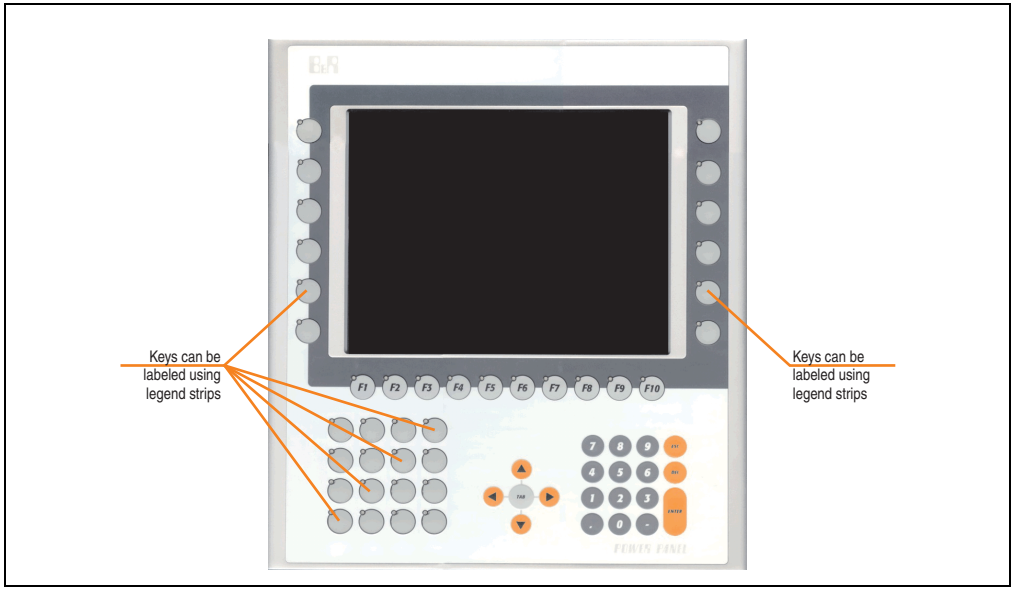



Figure 244: Front view - 4PP281.1043-B5

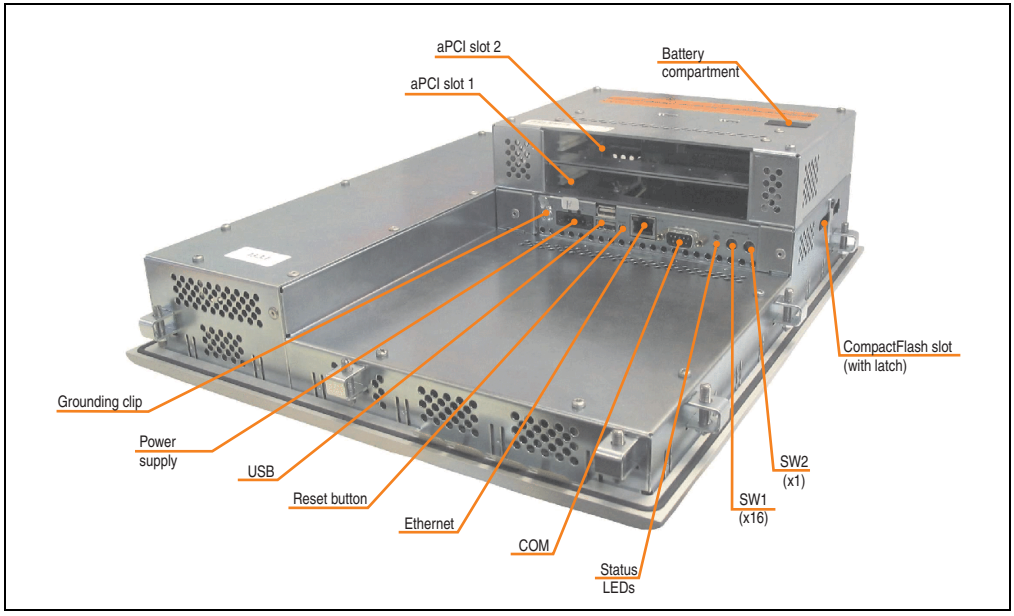



Figure 245: Rear view - 4PP281.1043-B5

### 3.31.1 Technical data

| Features | 4PP281.1043-B5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1)] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1)]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 109: Technical data - 4PP281.1043-B5

| Features | 4PP281.1043-B5 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 28 with LED |
| Soft keys | 10 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 20 W typical, 25 W max. |
| Electrical isolation | - |

Table 109: Technical data - 4PP281.1043-B5 (cont.)

| Electrical characteristics | 4PP281.1043-B5 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Orange keys<br>Dark gray keys<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 151CV<br>Similar to Pantone 431CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>323 mm<br>358 mm<br>108 mm |
| Weight | Approx. 5.3 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +70°C<br>-20 to +70°C |
| Relative humidity | See 3.31.2 "Temperature humidity diagram" on page 330 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 109: Technical data - 4PP281.1043-B5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.31.2 Temperature humidity diagram

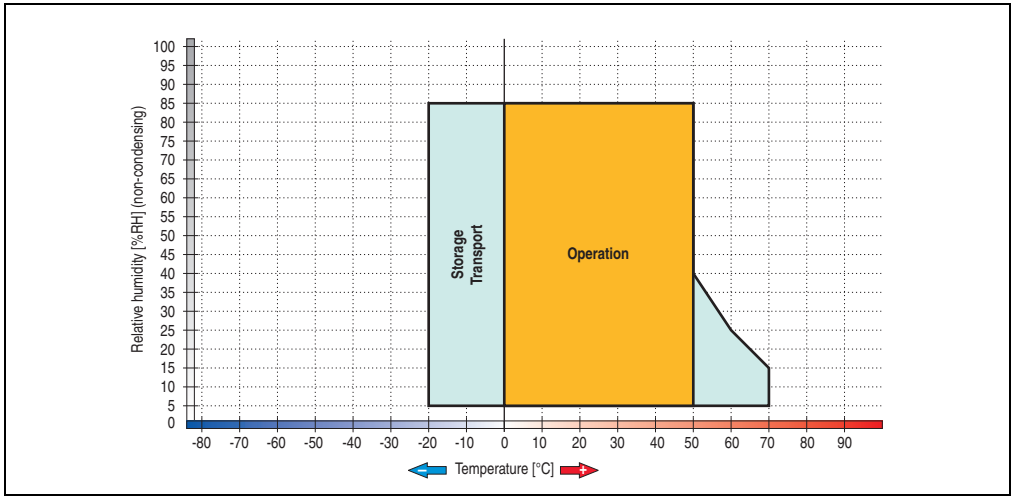



Figure 246: Temperature humidity diagram - 4PP281.1043-B5

### 3.31.3 Dimensions

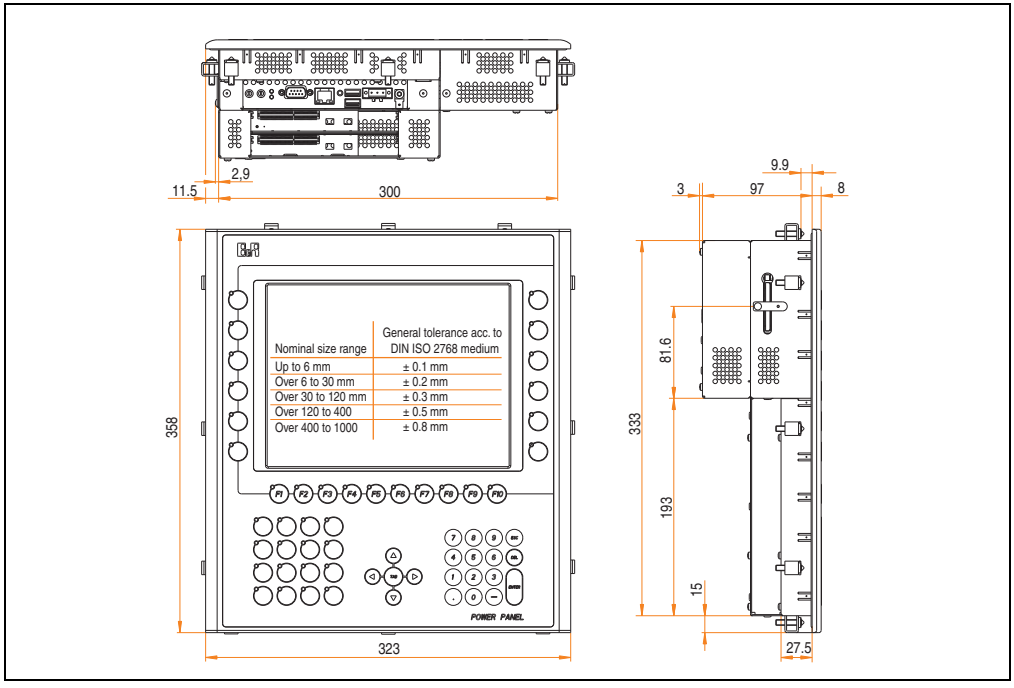



Figure 247: Dimensions - 4PP281.1043-B5

### 3.31.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 247 "Dimensions - 4PP281.1043-B5" on page 330) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

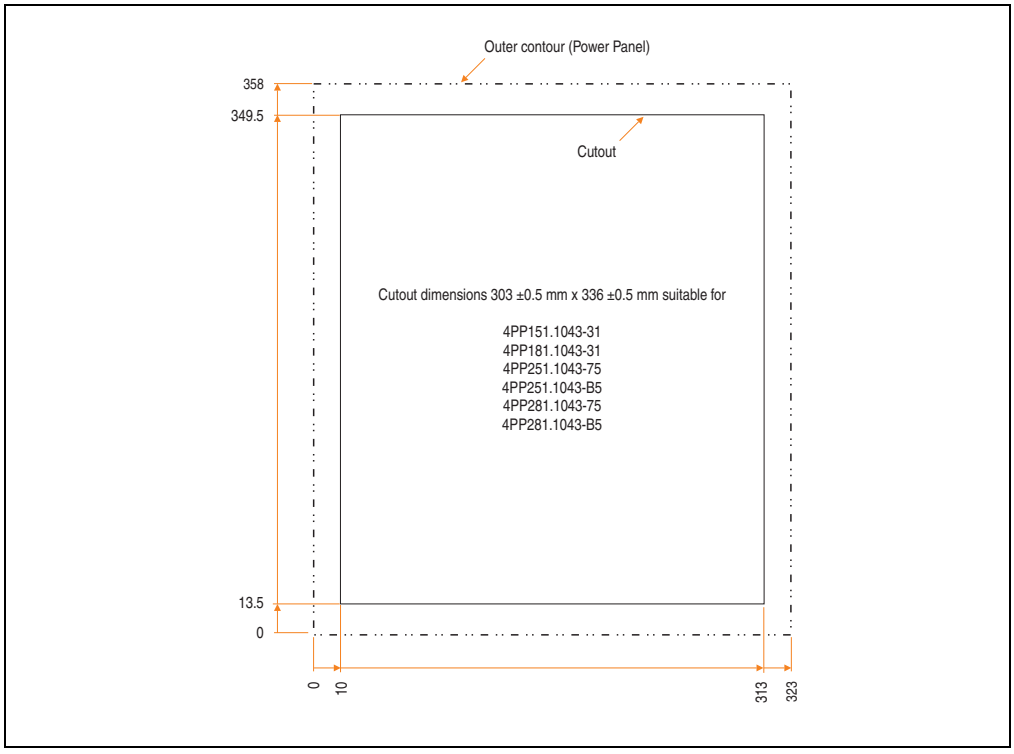



Figure 248: Cutout dimensions

### 3.31.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 281 TFT C VGA 10.4" FT MH 2aPCI |
| 12 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 2 | Legend strips (inserted in the front) |

Table 110: Contents of delivery - 4PP281.1043-B5

## 3.32 Device 4PP281.1505-75

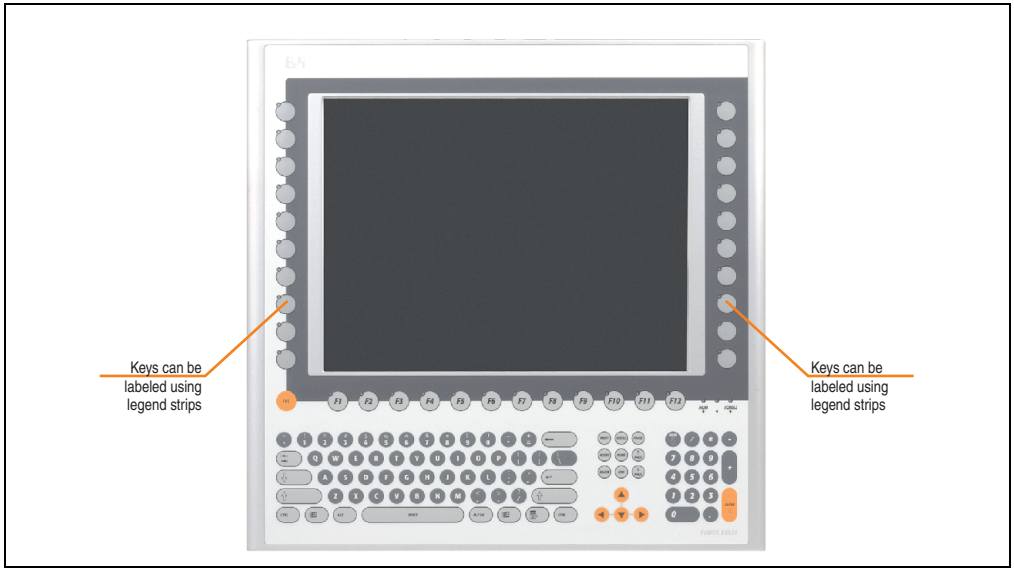



Figure 249: Front view - 4PP281.1505-75

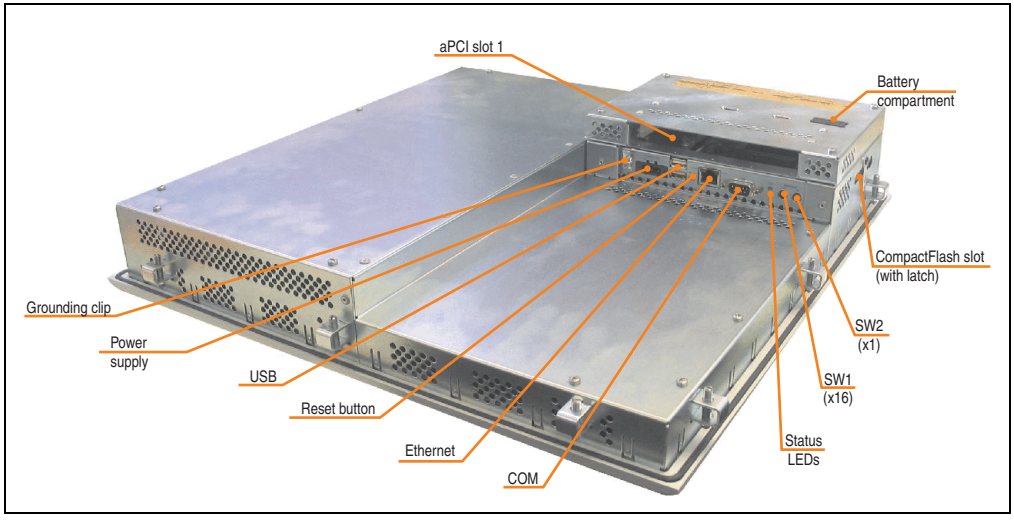



Figure 250: Rear view - 4PP281.1505-75

### 3.32.1 Technical data

| Features | 4PP281.1505-75 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 111: Technical data - 4PP281.1505-75

| Features | 4PP281.1505-75 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 1 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 256 colors |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 20 with LED |
| Soft keys | 12 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 77 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 35 W typical, 40 W max. |
| Electrical isolation | Yes |

Table 111: Technical data - 4PP281.1505-75 (cont.)

| Electrical characteristics | 4PP281.1505-75 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Orange keys<br>Dark gray keys<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 151CV<br>Similar to Pantone 431CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>435 mm<br>430 mm<br>87 mm |
| Weight | Approx. 8 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +60°C<br>-20 to +60°C |
| Relative humidity | See 3.32.2 "Temperature humidity diagram" on page 336 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 111: Technical data - 4PP281.1505-75 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.32.2 Temperature humidity diagram

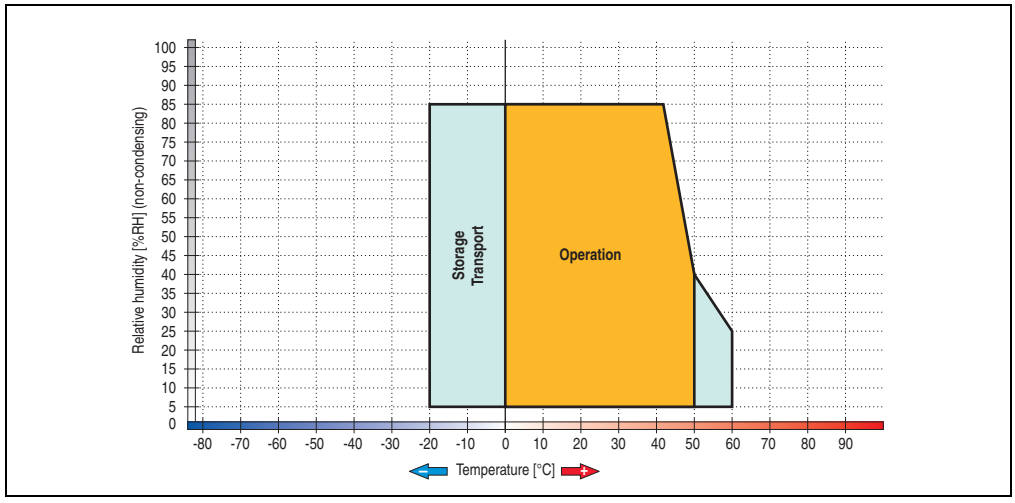



Figure 251: Temperature humidity diagram - 4PP281.1505-75

### 3.32.3 Dimensions

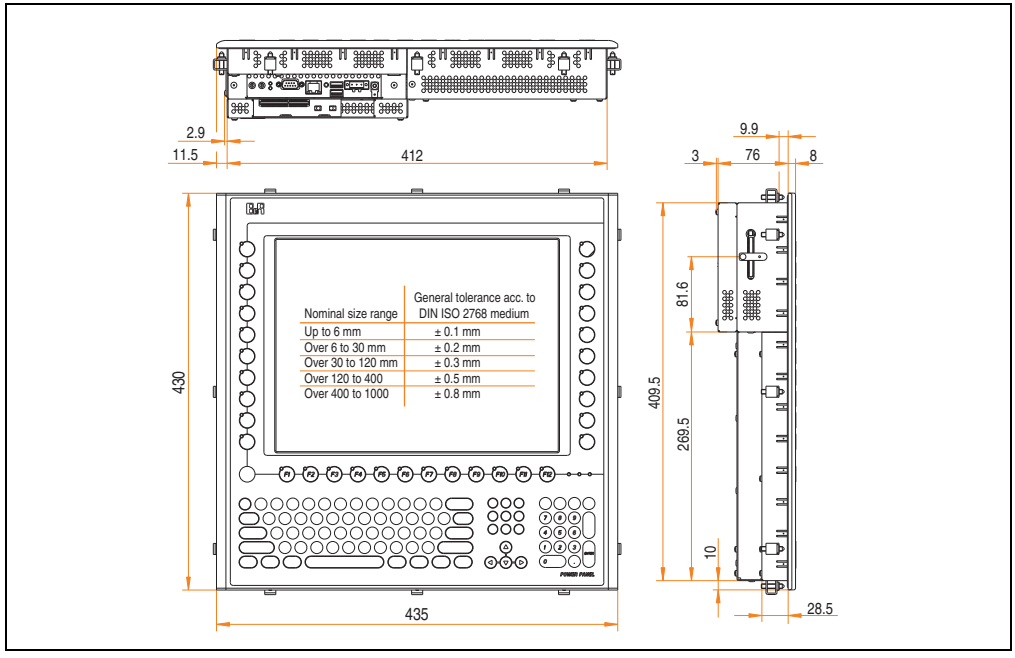



Figure 252: Dimensions - 4PP281.1505-75

### 3.32.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 252 "Dimensions - 4PP281.1505-75" on page 336) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

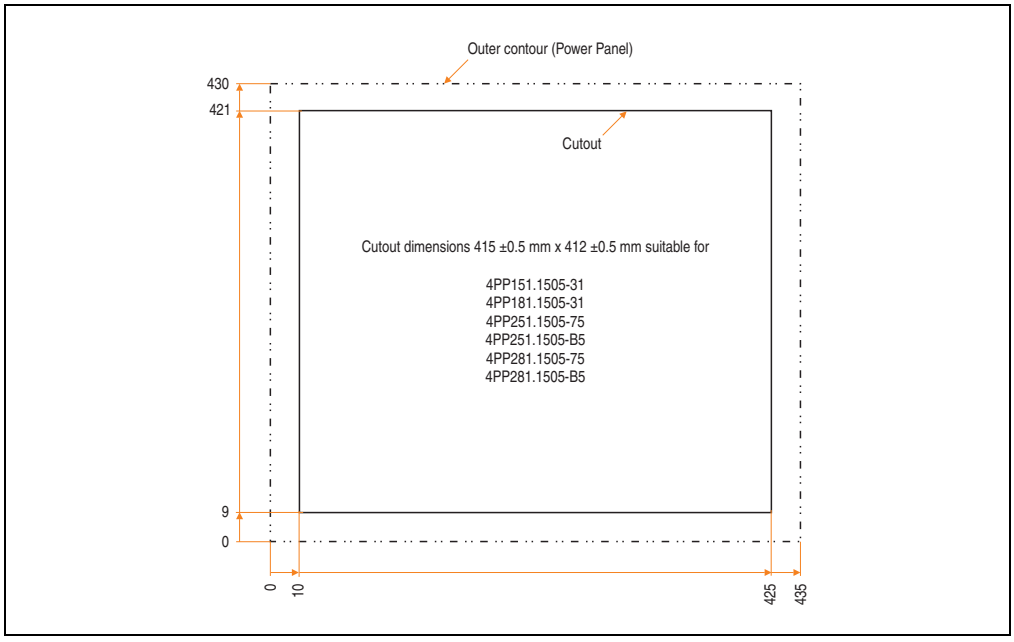



Figure 253: Cutout dimensions

### 3.32.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 281 TFT C XGA 15" FT MH 1aPCI |
| 12 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 2 | Legend strips (inserted in the front) |

Table 112: Contents of delivery - 4PP281.1505-75

## 3.33 Device 4PP281.1505-B5

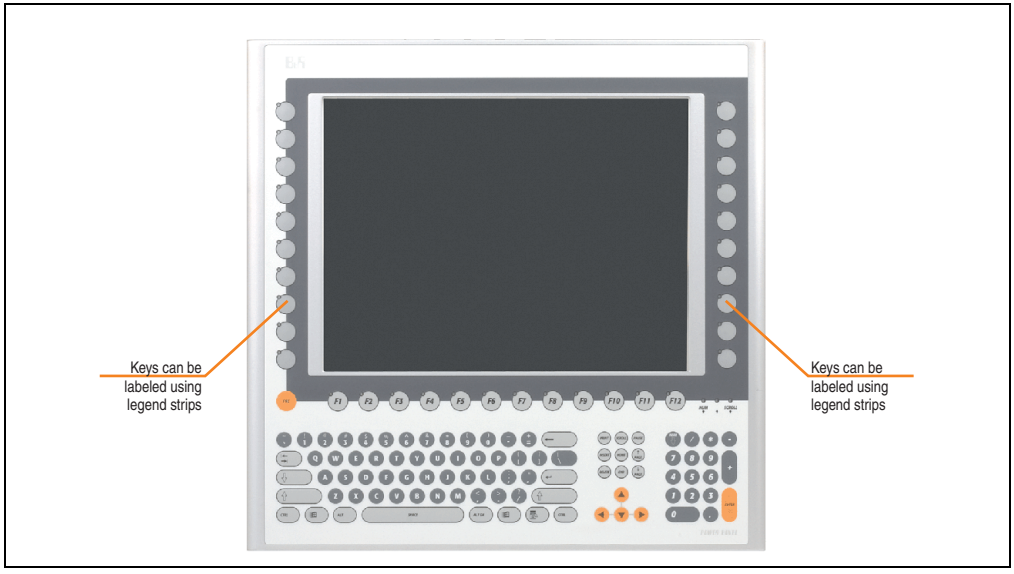



Figure 254: Front view - 4PP281.1505-B5

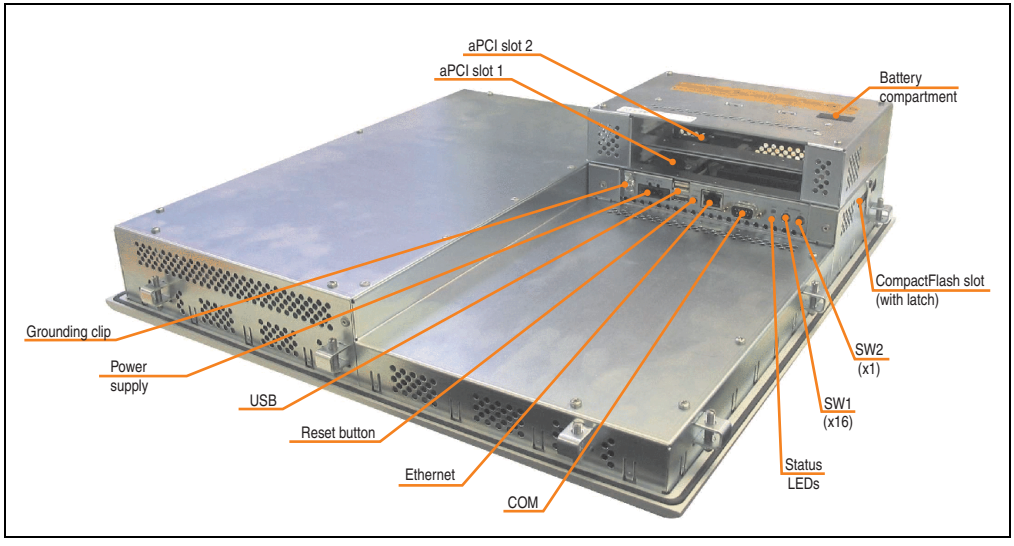



Figure 255: Rear view - 4PP281.1505-B5

### 3.33.1 Technical data

| Features | 4PP281.1505-B5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 113: Technical data - 4PP281.1505-B5

| Features | 4PP281.1505-B5 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 256 colors |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 20 with LED |
| Soft keys | 12 with LED |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 77 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 35 W typical, 40 W max. |
| Electrical isolation | Yes |

Table 113: Technical data - 4PP281.1505-B5 (cont.)

| Electrical characteristics | 4PP281.1505-B5 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Dark gray border around display | Similar to Pantone 432CV |
| Light background | Similar to Pantone 427CV |
| Orange keys | Similar to Pantone 151CV |
| Dark gray keys | Similar to Pantone 431CV |
| Legend strips (gray) | Similar to Pantone 429CV |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 435 mm |
| Height | 430 mm |
| Depth | 109 mm |
| Weight | Approx. 8.3 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 3.33.2 "Temperature humidity diagram" on page 342 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 113: Technical data - 4PP281.1505-B5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.33.2 Temperature humidity diagram

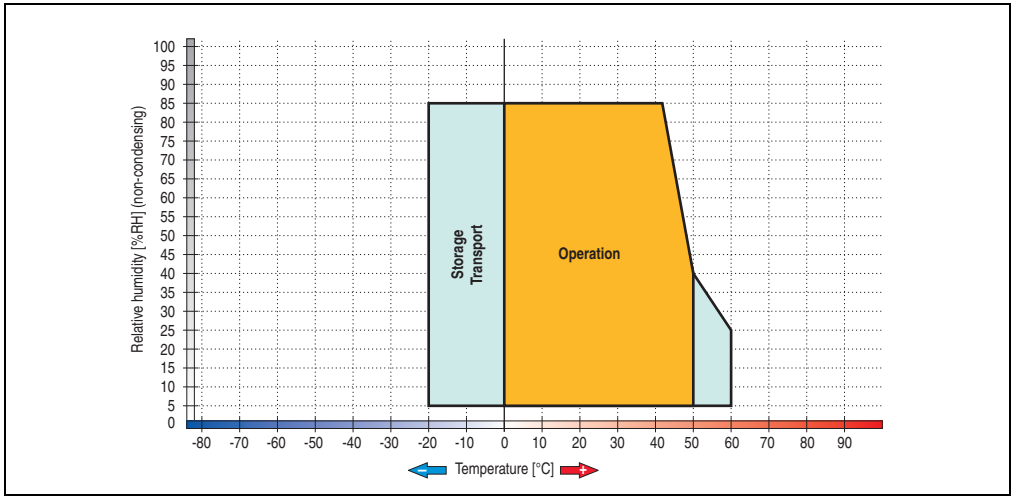



Figure 256: Temperature humidity diagram - 4PP281.1505-B5

### 3.33.3 Dimensions

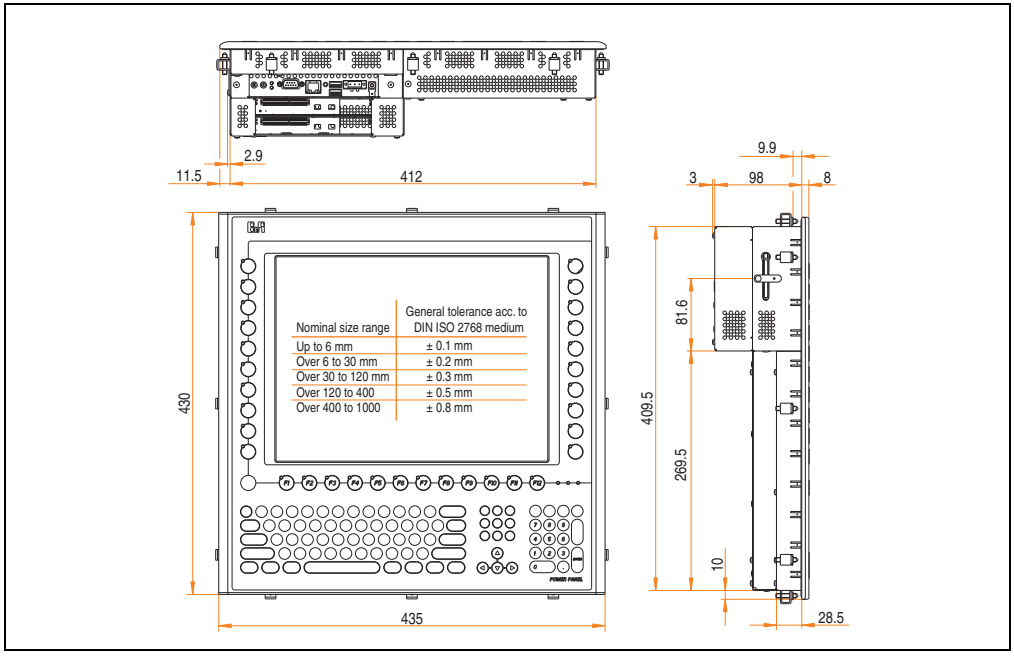



Figure 257: Dimensions - 4PP281.1505-B5

### 3.33.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 257 "Dimensions - 4PP281.1505-B5" on page 342) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

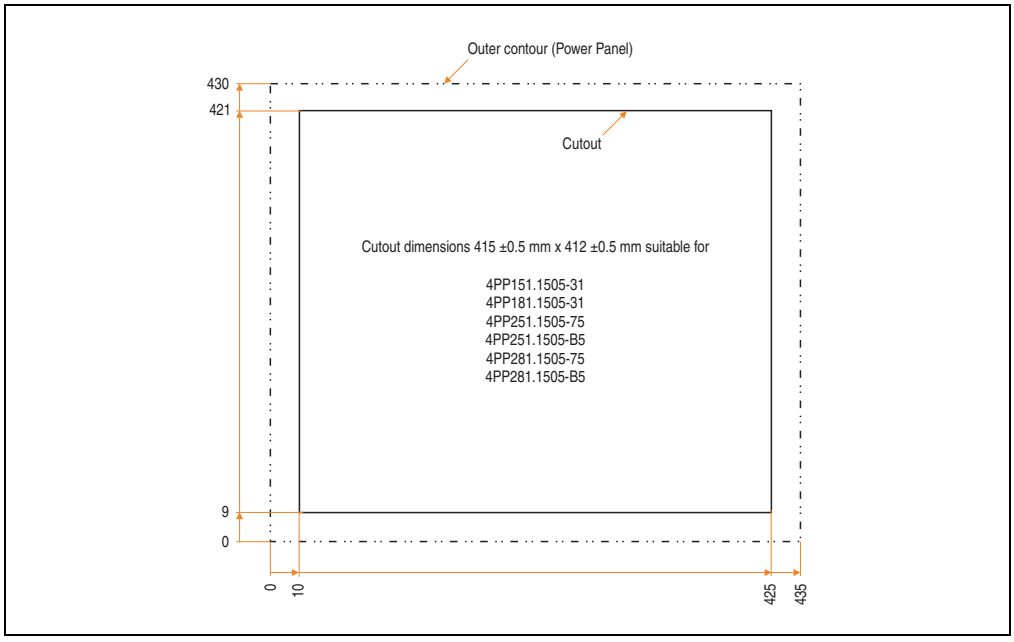



Figure 258: Cutout dimensions

### 3.33.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 281 TFT C XGA 15" FT MH 2aPCI |
| 12 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 2 | Legend strips (inserted in the front) |

Table 114: Contents of delivery - 4PP281.1505-B5

## 3.34 Device 4PP282.1043-75

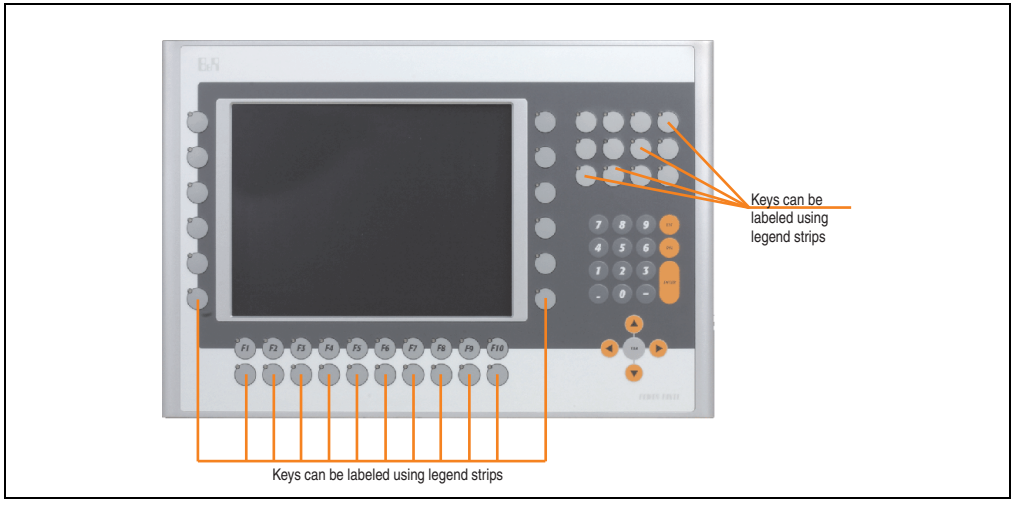



Figure 259: Front view - 4PP282.1043-75

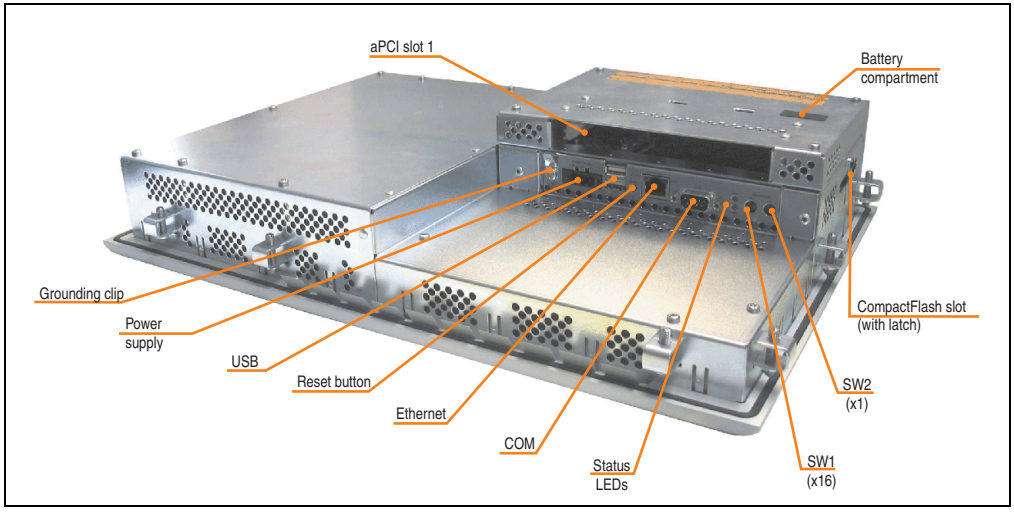



Figure 260: Rear view - 4PP282.1043-75

### 3.34.1 Technical data

| Features | 4PP282.1043-75 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1)] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1)]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 115: Technical data - 4PP282.1043-75

| Features | 4PP282.1043-75 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 1 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 44 with LED |
| Soft keys | - |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 20 W typical, 35 W max. |
| Electrical isolation | Yes |

Table 115: Technical data - 4PP282.1043-75 (cont.)

| Electrical characteristics | 4PP282.1043-75 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Orange keys<br>Dark gray keys<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 151CV<br>Similar to Pantone 431CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>423 mm<br>288 mm<br>86 mm |
| Weight | Approx. 5.2 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +70°C<br>-20 to +70°C |
| Relative humidity | See 3.34.2 "Temperature humidity diagram" on page 348 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 115: Technical data - 4PP282.1043-75 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.34.2 Temperature humidity diagram

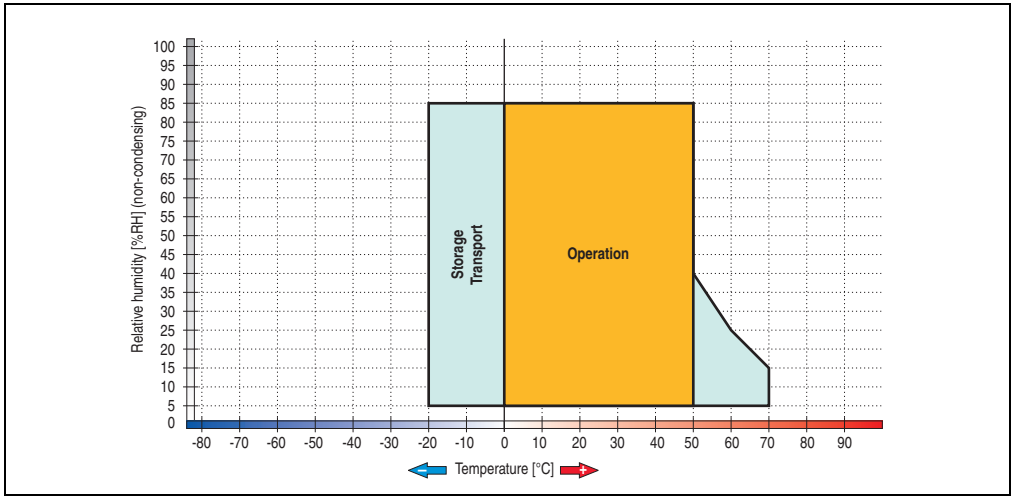



Figure 261: Temperature humidity diagram - 4PP282.1043-75

### 3.34.3 Dimensions

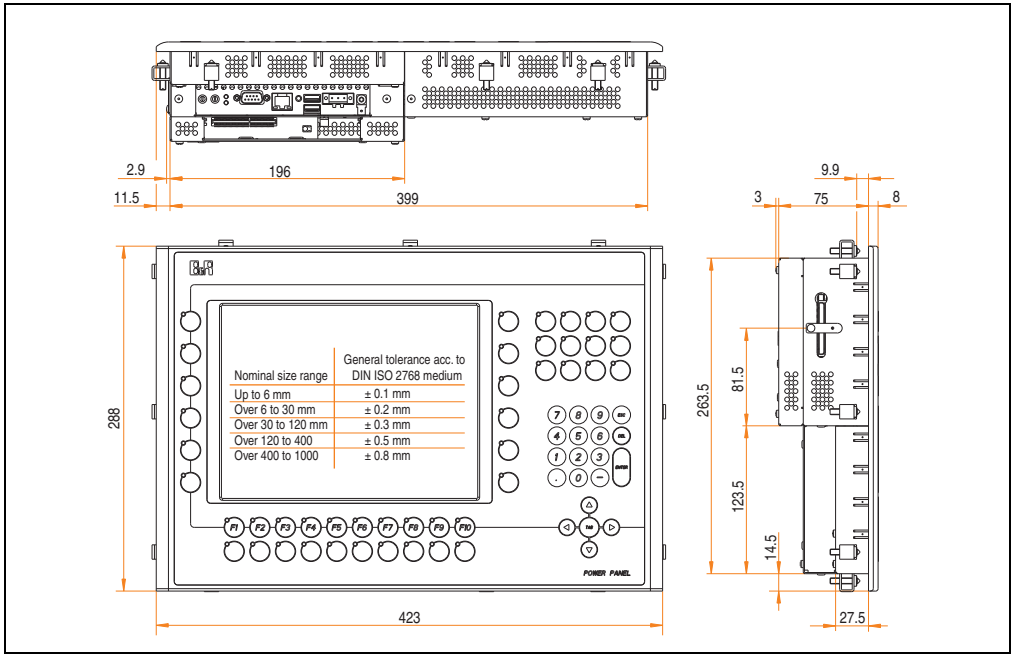



Figure 262: Dimensions - 4PP282.1043-75

### 3.34.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 262 "Dimensions - 4PP282.1043-75" on page 348) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

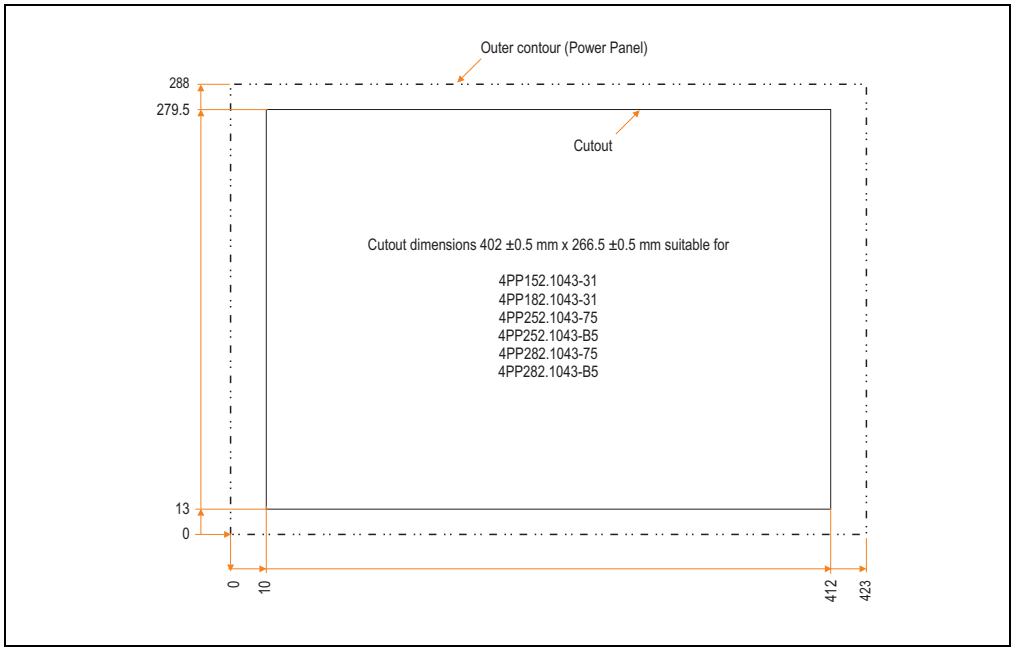



Figure 263: Cutout dimensions

### 3.34.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 282 TFT C VGA 10.4" FT MH 1aPCI |
| 12 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 16 | Legend strips (inserted in the front) |

Table 116: Contents of delivery - 4PP282.1043-75

## 3.35 Device 4PP282.1043-B5

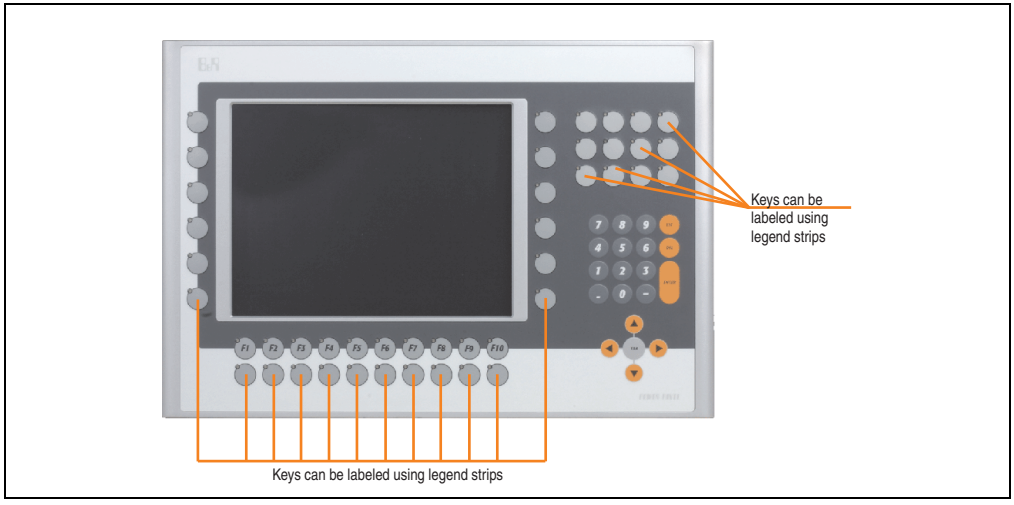



Figure 264: Front view - 4PP282.1043-B5

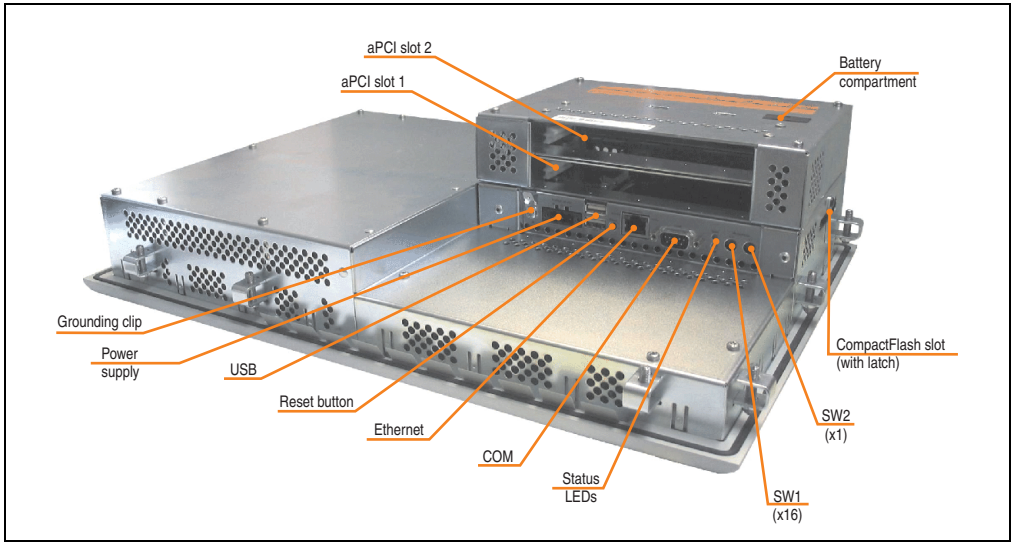



Figure 265: Rear view - 4PP282.1043-B5

### 3.35.1 Technical data

| Features | 4PP282.1043-B5 |
|---|---|
| Boot loader / Operating system | Automation Runtime |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>64 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>256 KB<br>Yes |
| Watchdog<br>Controller | <br>SMC [1] |
| Power failure logic<br>Controller<br>Buffer time | <br>SMC [1]<br>10 ms |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 117: Technical data - 4PP282.1043-B5

| Features | 4PP282.1043-B5 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | 2 (see B&R System 2005 manual for available aPCI interface modules) |
| Holding torque for aPCI module | Max. 0.7 Nm |
| Display | |
| Type | Color TFT |
| Diagonal | 10.4 inch (264 mm) |
| Colors | 256 colors |
| Resolution | VGA, 640 x 480 pixels |
| Contrast | 600:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =70° |
| Vertical | Direction U = 45°/ direction D = 55° |
| Background lighting | |
| Brightness | 350 cd/m² |
| Half-brightness time | 55,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | |
| Key lifespan | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force |
| Function keys | 44 with LED |
| Soft keys | - |
| Cursor keys | - |
| Number block | 15 without LED |
| Other keys | 5 without LED |
| | **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption [4)] | 20 W typical, 35 W max. |
| Electrical isolation | Yes |

Table 117: Technical data - 4PP282.1043-B5 (cont.)

| Electrical characteristics | 4PP282.1043-B5 |
|---|---|
| Bleeder resistance | ≥ 47 kOhm |
| **Mechanical characteristics** | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Orange keys<br>Dark gray keys<br>Legend strips (gray)<br>Design<br>Gasket | <br>Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 151CV<br>Similar to Pantone 431CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front |
| Housing | Metal |
| Outer dimensions<br>Width<br>Height<br>Depth | <br>423 mm<br>288 mm<br>108 mm |
| Weight | Approx. 5.5 kg (without aPCI interface modules) |
| **Environmental characteristics** | |
| Ambient temperature[5)]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +70°C<br>-20 to +70°C |
| Relative humidity | See 3.35.2 "Temperature humidity diagram" on page 354 |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 117: Technical data - 4PP282.1043-B5 (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.35.2 Temperature humidity diagram

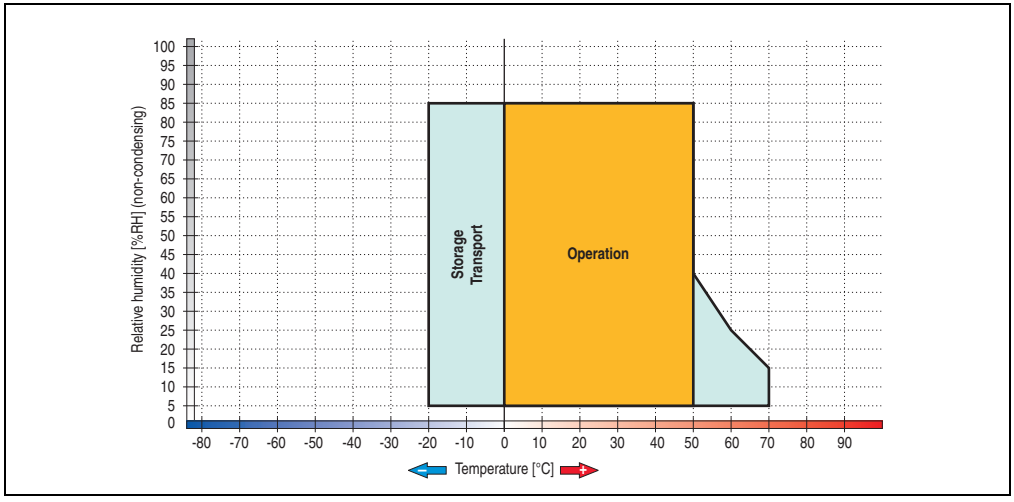



Figure 266: Temperature humidity diagram - 4PP282.1043-B5

### 3.35.3 Dimensions

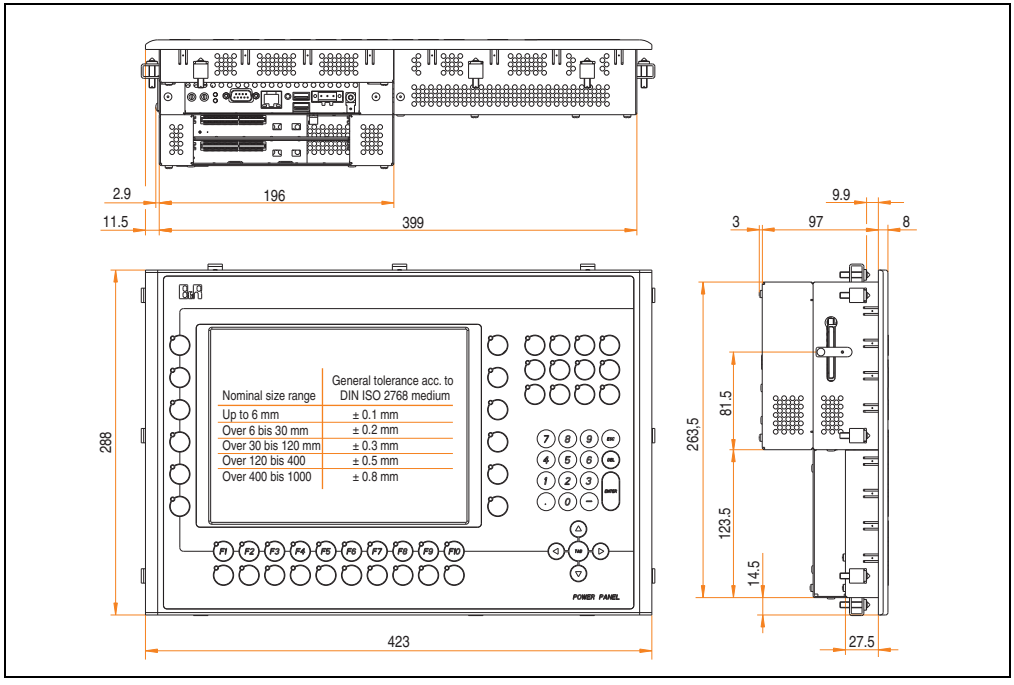



Figure 267: Dimensions - 4PP282.1043-B5

### 3.35.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 267 "Dimensions - 4PP282.1043-B5" on page 354) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

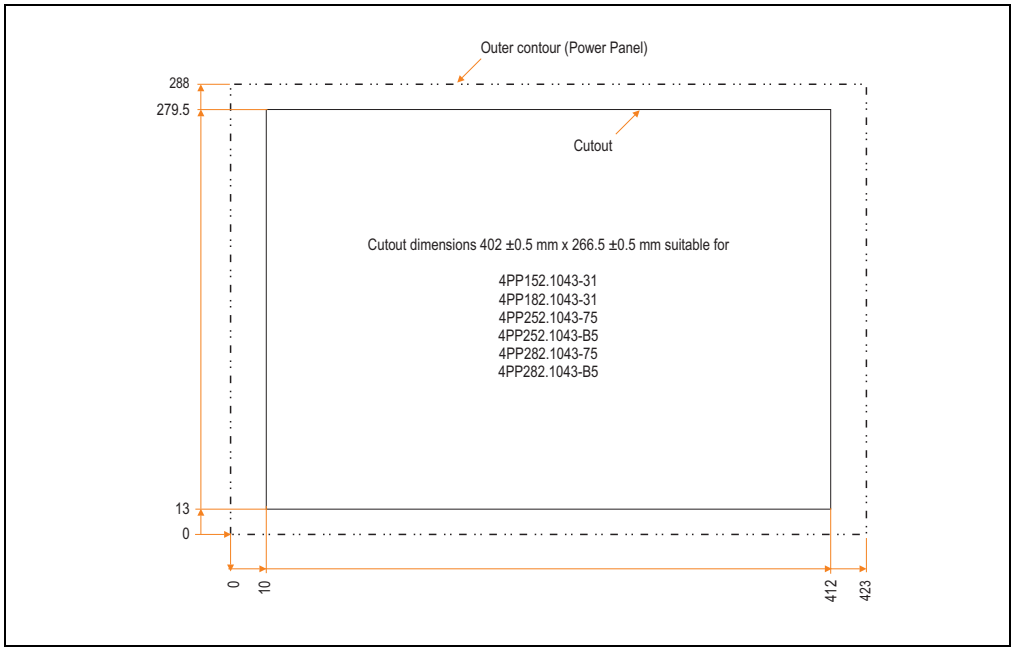



Figure 268: Cutout dimensions

### 3.35.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 282 TFT C VGA 10.4" FT MH 2aPCI |
| 12 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 16 | Legend strips (inserted in the front) |

Table 118: Contents of delivery - 4PP282.1043-B5

# 4. Power Panel 100 with BIOS

## 4.1 Interface descriptions

The following pages provide information about all interfaces and connectors present on the Power Panel.

### 4.1.1 Supply voltage

Input voltage: 24 VDC ±25%

The 3-pin socket required for the supply voltage connection is not included in delivery. This can be ordered from B&R using the model number 0TB103.9 (screw clamps) or 0TB103.91 (cage clamps). The cable required for the connection must be supplied by the customer (see also section "TB103 3-pin supply voltage connector" on page 553).

The supply voltage is internally protected so that the device cannot be damaged if there is an overload or if the voltage supply is connected incorrectly.

Pin assignments can be found either in the following table or printed on the Power Panel plate or device label (see section 4.2.2 "Device label" on page 362).

| Supply voltage | |
|---|---|
| | |
| **Pin** | **Description** |
| 1 | + |
| 2 | Functional ground |
| 3 | - |
| **Accessories** | |
| 0TB103.9 | Plug 24 V 5.08 3p screw clamps |
| 0TB103.91 | Plug 24 V 5.08 3p cage clamps |

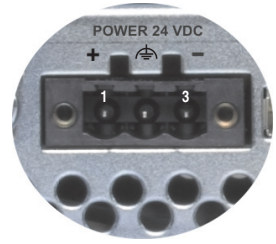



Figure 269: Supply voltage connection

## Warning!

**The pin's connection to the functional ground (pin 2) should be as short as possible.**

### 4.1.2 Grounding clip

Should be connected to ground using the shortest route possible.

| Grounding clip |
| --- |
| |

Figure 270: Grounding clip



### 4.1.3 COM interface

The Power Panel is equipped with a PC-compatible serial interface with a 16-byte FIFO buffer.

The RS232 can also be used as a general interface (e.g. third-party connection, bar code reader, etc.).

| Serial interface COM | | |
| --- | --- | --- |
| RS232 interface<br>Modem-capable, not electrically isolated<br>Up to 115 kBaud | | 9-pin DSUB plug<br> |
| Pin | RS232 | |
| 1 | DCD | |
| 2 | RxD | |
| 3 | TxD | |
| 4 | DTR | |
| 5 | GND | |
| 6 | DSR | |
| 7 | RTS | |
| 8 | CTS | |
| 9 | RI | |

Table 119: Pin assignments - COM

### 4.1.4 USB port

The Power Panel is equipped with a USB (Universal Serial Bus) host controller with two USB ports.

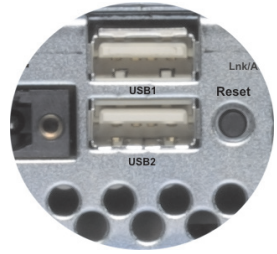
| Universal serial bus |
|---|
|  |



Figure 271: USB port connection

| Technical data - USB port | |
|---|---|
| Transfer rate | 1.5 MBit/s to 12 MBit/s |
| Power supply | 500 mA for each port |
| Maximum cable length | 5 m (can be extended using a USB hub) |

Table 120: Technical data for USB connection

## Warning!

**Only the USB devices tested and verified by B&R and found in the section "Accessories" on page 549 may be connected to the USB interface.**

## Warning!

**Because of general PC specifications, this interface should be handled with extreme care with regard to EMC, location of cables, etc.**

### 4.1.5 Mode / Node switches

Power Panel devices are equipped with 2 hex switches that serve as operating mode switches. Switch positions 01 up to FF are available for any purpose in an application. The switch's position can be evaluated from an application program.

**Mode/Node switch**

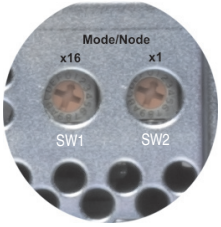



Figure 272: Mode / Node switches

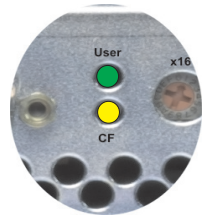
| Switch position | | Function | Description |
|---|---|---|---|
| SW1 (x16) | SW2 (x1) | Operating mode switch | |
| 0 | 0 | Service mode | • The resolution for the display used is automatically set (see also section "Video and flat panel configuration" on page 464).<br>• Contrast and brightness settings for the display are set to default values (see also section "Video and flat panel configuration" on page 464).<br>• Legacy USB support is always set to "enabled" regardless of the BIOS setting (see section "Advanced BIOS features" on page 469).<br>• With incorrect factory settings (e.g. if the checksum is wrong), the Power Panel boots but the display is not initialized. This error is signalized by a continuous **lighting of the user LED**.<br>Video output is then only possible using the REMHOST utility (see section "REMHOST utility disk" on page 509).<br>• When switching on the Power Panel, the Power Panel can be controlled by the user using a serial connection to a PC and the REMHOST tool, e.g. to make changes in the BIOS.<br>REMHOST supports text mode only for video output. This means that output from programs that write directly to the video memory is not displayed correctly.<br>• The Power Panel attempts to establish a connection to the REMHOST utility (a "ping" is sent to the serial interface). |
| x | x | Other switch positions have no significance. | |

Table 121: Switch settings for the Mode / Node switch

### 4.1.6 Status LEDs

Power Panels are equipped with two status LEDs that are visible on the outside.

**Status LEDs**




| LED | Color | Function |
|---|---|---|
| User | Green | Freely available for use in an application |
| CF | Yellow | Indicates that a CompactFlash card is being accessed |

Table 122: Status LEDs

### 4.1.7 Ethernet connection

**Ethernet connection**

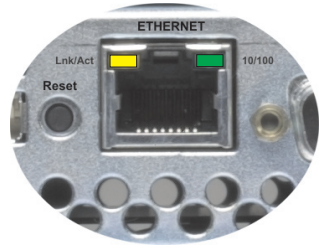



Figure 273: Ethernet connection

| Ethernet | 10/100 MBit/s [1)] |
|---|---|
| Connection | RJ45 twisted pair (10BaseT/100BaseT) |
| Controller | MacPhyter DP83815 or DP83816 - depends on the revision |
| Cabling | S/STP (category 5) |

Table 123: Ethernet controller

1) Both operating modes are possible. Switching takes place automatically.

The onboard Ethernet controller for Power Panel devices provides an RJ45 twisted pair connection where 2 LEDs are attached for status checking:

| LED | On | Off |
|---|---|---|
| Green | 100 MBit/s | 10 MBit/s |
| Yellow | Link (LED blinks during transfer) | No link |

Table 124: Status LEDs - Ethernet controller



### 4.1.8 Reset button

The reset button can be accessed through a small hole between the USB and the Ethernet connections. In order to avoid accidental activation, a reset can only be triggered with a pointed object.

| Reset button |
|---|
| |



Figure 274: Reset button

### 4.1.9 CompactFlash slot

Power Panel devices are equipped with a CompactFlash slot that is accessible from the side. Type I CompactFlash cards are supported.

Figure 275: CompactFlash slot

It is possible to secure the CompactFlash slot using the latch provided. By pressing the ejector (using a pointed object is the best way to do this), the CompactFlash card can be changed quickly and safely.

## Warning!

**The power must be turned off before inserting or removing the CompactFlash card! As a safety measure, a sticker is also attached to Power Panel devices stating this.**

## 4.2 Stickers

### 4.2.1 Safety sticker

A safety sticker attached over the CompactFlash slot advises that the power to the Power Panel device (depending on revision) must be switched off when inserting or removing a CompactFlash card.

An ESD warning sticker is attached next to the battery compartment. This indicates the components at risk from electrostatic discharge inside the Power Panel devices.

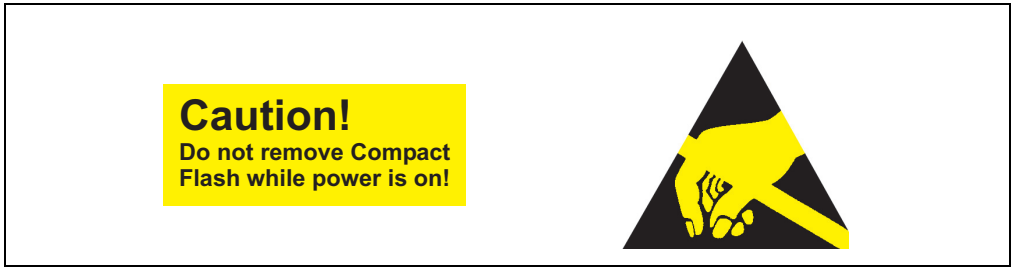



Figure 276: Safety sticker

### 4.2.2 Device label

The following label is attached to a suitable location on the Power Panel and shows brief descriptions for all of the interfaces:

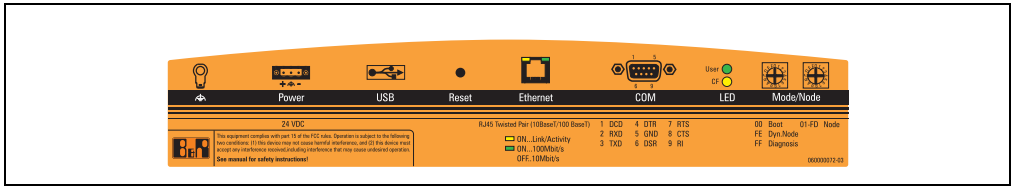



Figure 277: Device label

### 4.2.3 Serial number sticker

## General information

Each B&R device is given a unique serial number sticker with a barcode that allows the device to be clearly identified.

## Design / dimensions

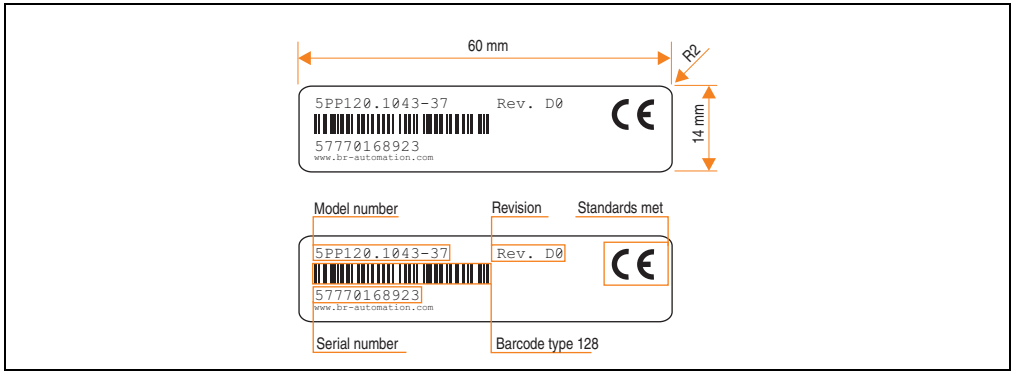



Figure 278: Design / dimensions - Serial number sticker

## 4.3 Device 5PP120.0571-27

Figure 279: Front view - 5PP120.0571-27

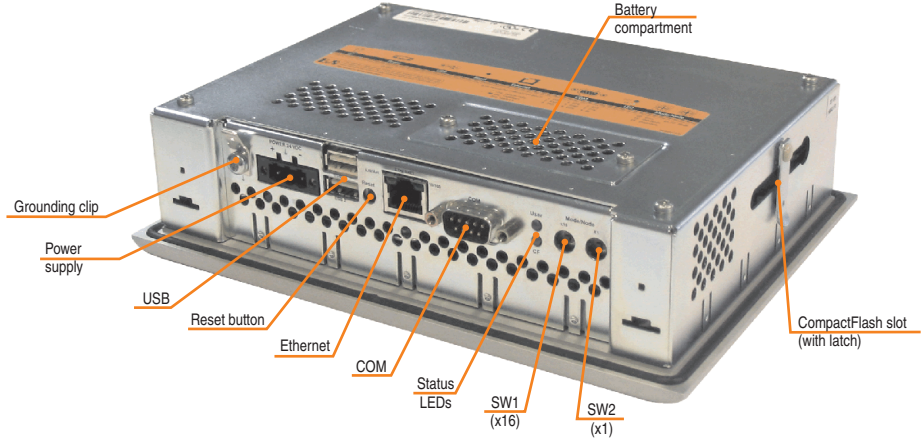



Figure 280: Rear view - 5PP120.0571-27

### 4.3.1 Technical data

| Features | 5PP120.0571-27 |
|---|---|
| Boot loader / Operating system | BIOS |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>128 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [2)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816 (Rev. < D0 DP83615)<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 125: Technical data - 5PP120.0571-27

| Features | 5PP120.0571-27 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | - |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color LCD<br>5.7 in (144 mm)<br>512 colors [3)]<br>QVGA, 320 x 240 pixels<br>40:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>150 cd/m²<br>50,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | <br>Gunze<br>Analog, resistive<br>Hampshire, serial, 12-bit<br>84% |
| Filter glass<br>Degree of transmission<br>Coating | - |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | - |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>10 W typical, 15 W max.<br>- |
| Bleeder resistance | 0 Ohm |

Table 125: Technical data - 5PP120.0571-27 (cont.)

| Mechanical characteristics | 5PP120.0571-27 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 212 mm |
| Height | 156 mm |
| Depth | 55.5 mm |
| Weight | Approx. 1.4 kg |
| **Environmental characteristics** | |
| Ambient temperature[4)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 4.3.2 "Temperature humidity diagram" on page 368 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 125: Technical data - 5PP120.0571-27 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

4) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.3.2 Temperature humidity diagram

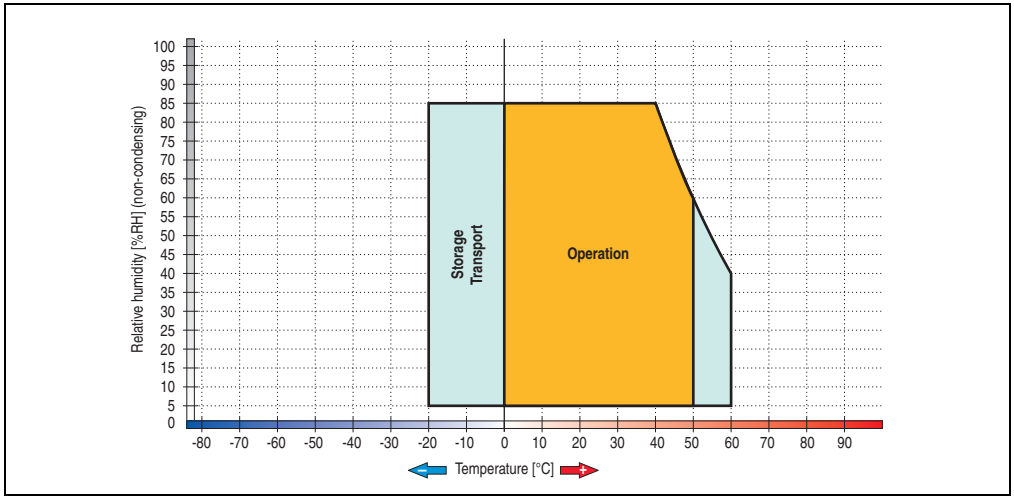



Figure 281: Temperature humidity diagram - 5PP120.0571-27

### 4.3.3 Dimensions

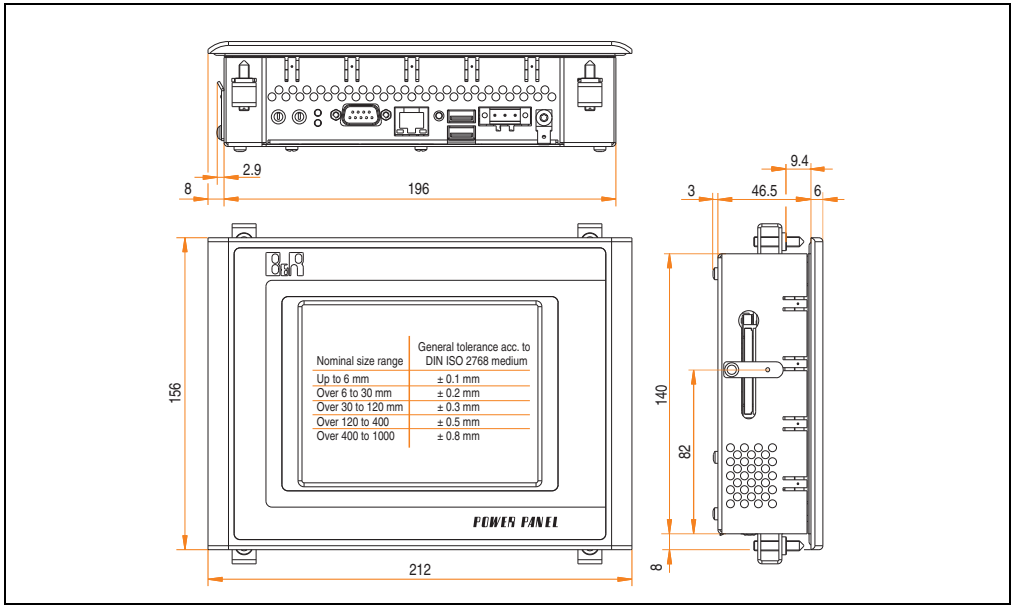



Figure 282: Dimensions - 5PP120.0571-27

### 4.3.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 282 "Dimensions - 5PP120.0571-27" on page 368) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

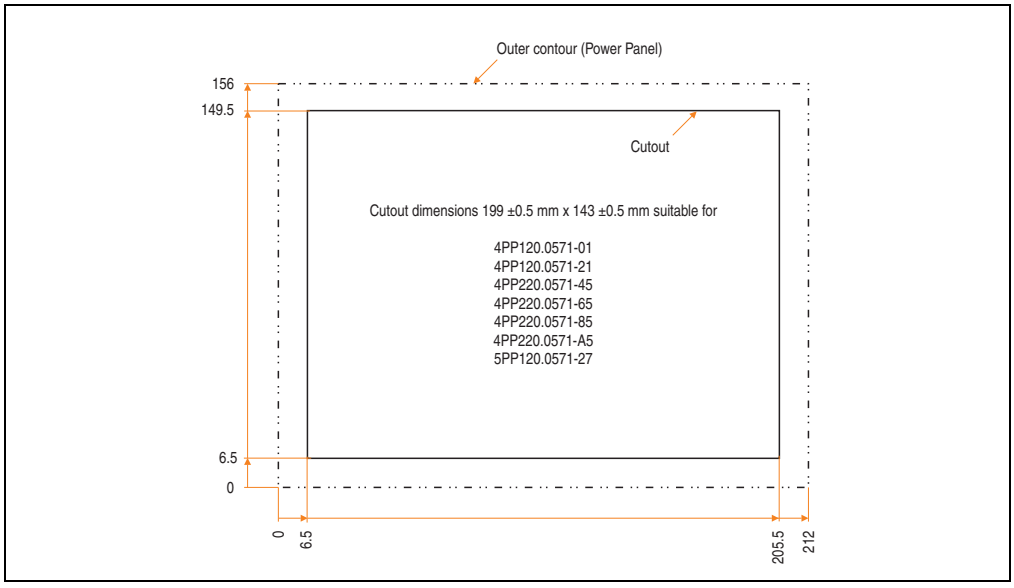



Figure 283: Cutout dimensions

### 4.3.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 120 LCD C QVGA 5.7" T MH |
| 4 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 126: Contents of delivery - 5PP120.0571-27

## 4.4 Device 5PP120.1043-37

Figure 284: Front view - 5PP120.1043-37

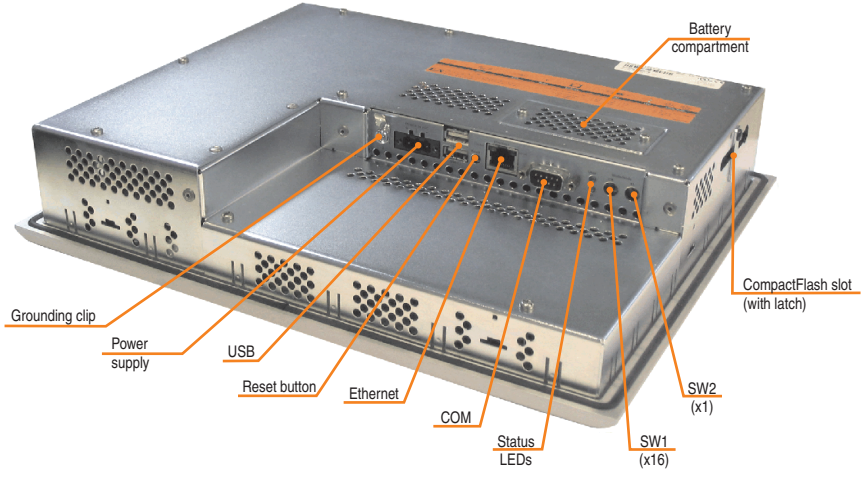



Figure 285: Rear view - 5PP120.1043-37

### 4.4.1 Technical data

| Features | 5PP120.1043-37 |
|---|---|
| Boot loader / Operating system | BIOS |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>128 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [2)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 127: Technical data - 5PP120.1043-37

| Features | 5PP120.1043-37 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | - |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color TFT<br>10.4 inch (264 mm)<br>262144 colors [3)]<br>VGA, 640 x 480 pixels<br>600:1<br><br>Direction R / direction L =70°<br>Direction U = 45°/ direction D = 55°<br><br>350 cd/m²<br>55,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | <br>3M<br>Analog, resistive<br>Hampshire, serial, 12-bit<br>78% |
| Filter glass<br>Degree of transmission<br>Coating | - |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | - |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>- |
| Bleeder resistance | ≤ 24 kOhm |

Table 127: Technical data - 5PP120.1043-37 (cont.)

| Mechanical characteristics | 5PP120.1043-37 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 323 mm |
| Height | 260 mm |
| Depth | 65.5 mm |
| Weight | Approx. 3.7 kg |
| **Environmental characteristics** | |
| Ambient temperature[4)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 4.4.2 "Temperature humidity diagram" on page 374 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 127: Technical data - 5PP120.1043-37 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

4) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.4.2 Temperature humidity diagram

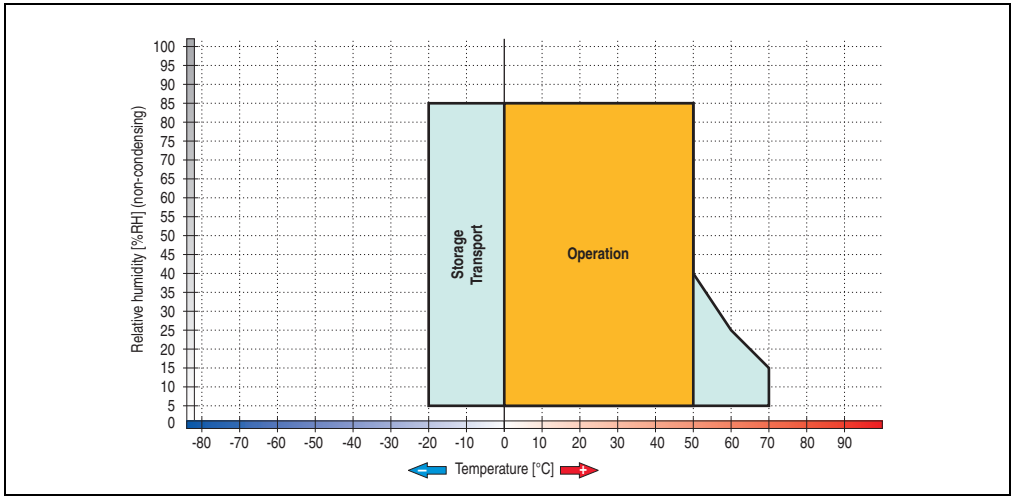



Figure 286: Temperature humidity diagram - 5PP120.1043-37

### 4.4.3 Dimensions

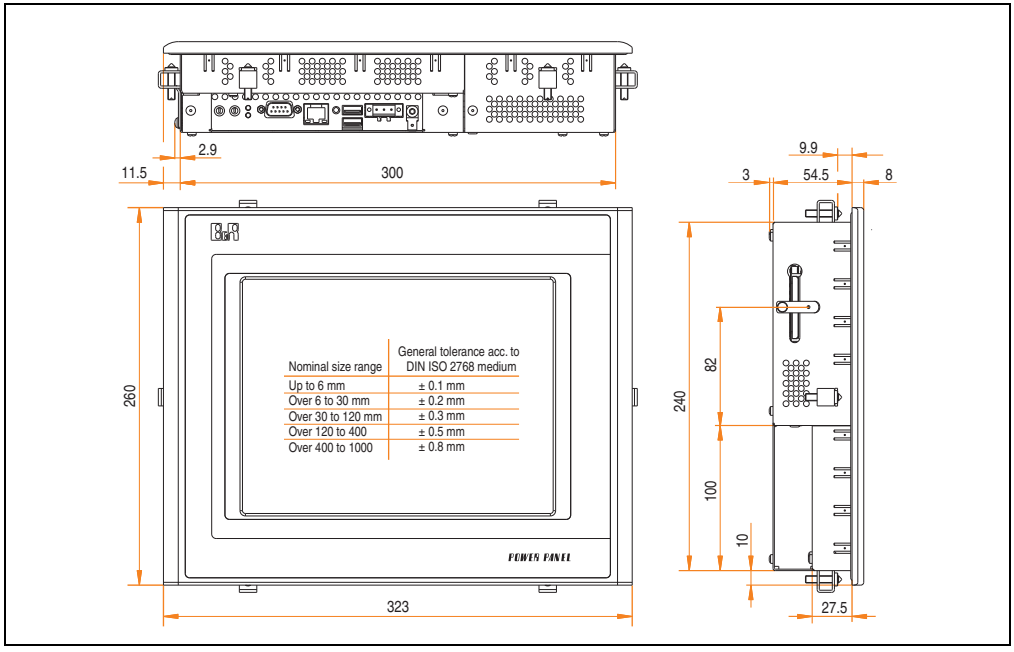



Figure 287: Dimensions - 5PP120.1043-37

### 4.4.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 287 "Dimensions - 5PP120.1043-37" on page 374) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

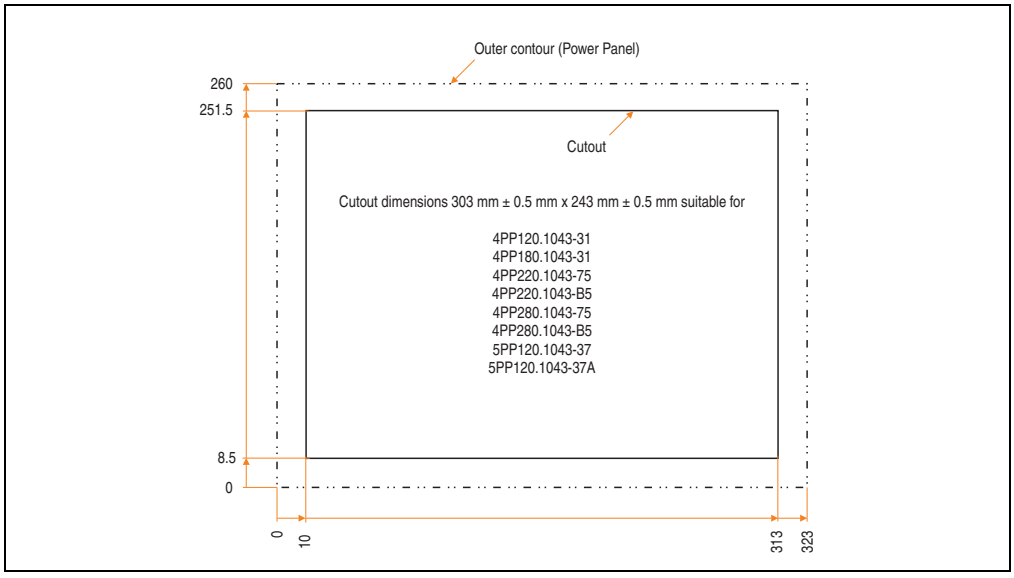



Figure 288: Cutout dimensions

### 4.4.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 120 TFT C VGA 10.4" T (3M) MH |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 128: Contents of delivery - 5PP120.1043-37

## 4.5 Device 5PP120.1043-37A

Figure 289: Front view - 5PP120.1043-37A

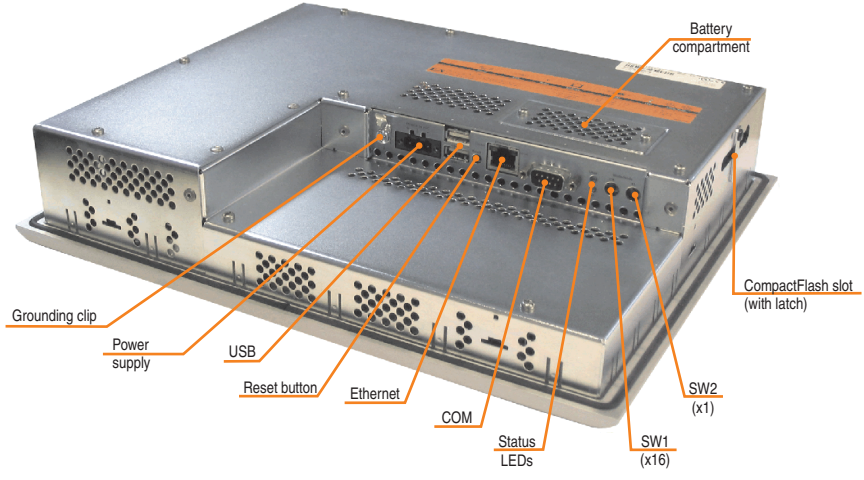



Figure 290: Rear view - 5PP120.1043-37A

### 4.5.1 Technical data

| Features | 5PP120.1043-37A |
|---|---|
| Boot loader / Operating system | BIOS |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>128 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [2)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 129: Technical data - 5PP120.1043-37A

| Features | 5PP120.1043-37A |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | - |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color TFT<br>10.4 inch (264 mm)<br>262144 colors [3)]<br>VGA, 640 x 480 pixels<br>600:1<br><br>Direction R / direction L =70°<br>Direction U = 45°/ direction D = 55°<br><br>350 cd/m²<br>55,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | <br>Elo<br>Analog, resistive<br>Hampshire, serial, 12-bit<br>78% |
| Filter glass<br>Degree of transmission<br>Coating | - |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | - |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>- |
| Bleeder resistance | ≤ 24 kOhm |

Table 129: Technical data - 5PP120.1043-37A (cont.)

| Mechanical characteristics | 5PP120.1043-37A |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 323 mm |
| Height | 260 mm |
| Depth | 65.5 mm |
| Weight | Approx. 3.7 kg |
| **Environmental characteristics** | |
| Ambient temperature[4)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +70°C |
| Transport | -20 to +70°C |
| Relative humidity | See 4.5.2 "Temperature humidity diagram" on page 380 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 129: Technical data - 5PP120.1043-37A (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

4) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.5.2 Temperature humidity diagram

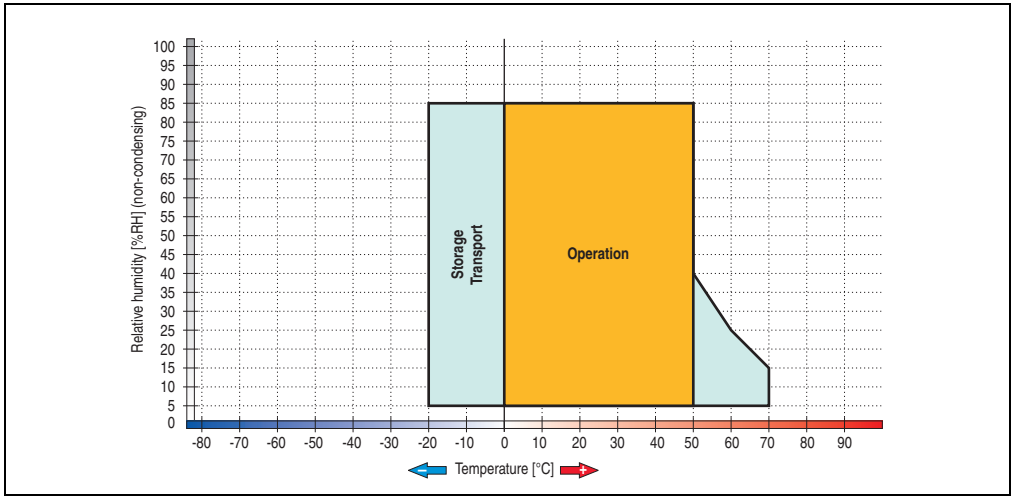



Figure 291: Temperature humidity diagram - 5PP120.1043-37A

### 4.5.3 Dimensions

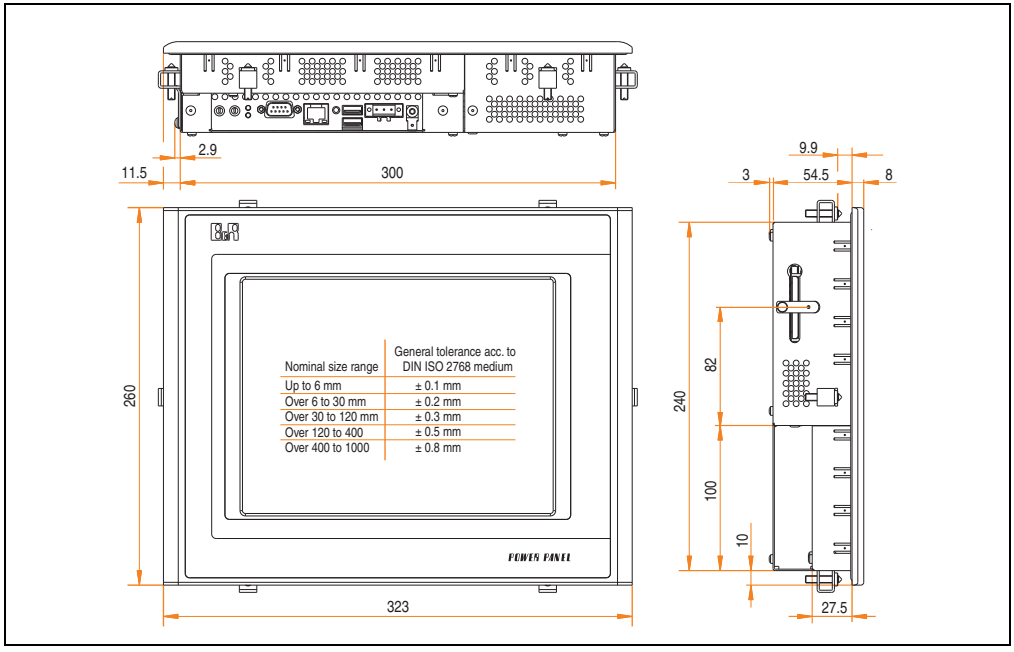



Figure 292: Dimensions - 5PP120.1043-37A

### 4.5.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 292 "Dimensions - 5PP120.1043-37A" on page 380) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

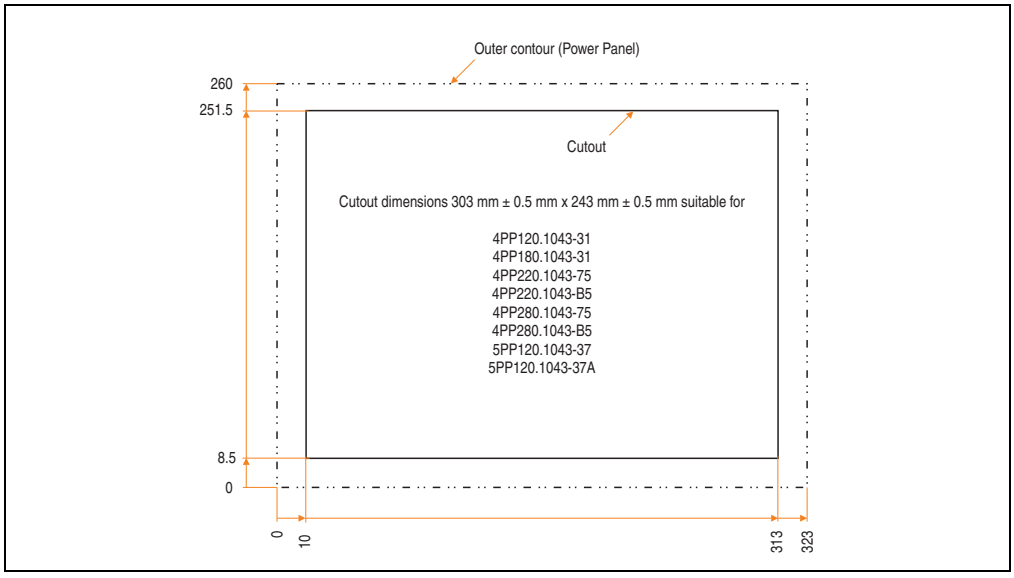



Figure 293: Cutout dimensions

### 4.5.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 120 TFT C VGA 10.4" T MH |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 130: Contents of delivery - 5PP120.1043-37A

## 4.6 Device 5PP120.1214-37

Figure 294: Front view - 5PP120.1214-37

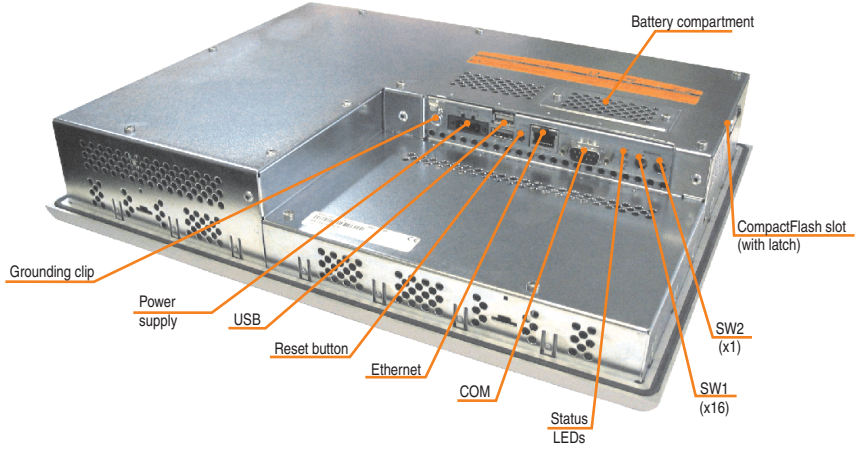



Figure 295: Rear view - 5PP120.1214-37

### 4.6.1 Technical data

| Features | 5PP120.1214-37 |
|---|---|
| Boot loader / Operating system | BIOS |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>128 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [2)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 131: Technical data - 5PP120.1214-37

| Features | 5PP120.1214-37 |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | - |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color TFT<br>12.1 inch (307 mm)<br>262144 colors [3)]<br>VGA, 800 x 600 pixels<br>300:1<br><br>Direction R / direction L =70°<br>Direction U = 50°/ direction D = 60°<br><br>350 cd/m²<br>55,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | <br>3M<br>Analog, resistive<br>Hampshire, serial, 12-bit<br>78% |
| Filter glass<br>Degree of transmission<br>Coating | - |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | - |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>- |
| Bleeder resistance | ≤ 24 kOhm |

Table 131: Technical data - 5PP120.1214-37 (cont.)

| Mechanical characteristics | 5PP120.1214-37 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 362 mm |
| Height | 284 mm |
| Depth | 65.5 mm |
| Weight | Approx. 4.1 kg |
| **Environmental characteristics** | |
| Ambient temperature[4)] | |
| Operation | 0 to +45°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 4.6.2 "Temperature humidity diagram" on page 386 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 131: Technical data - 5PP120.1214-37 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

4) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.6.2 Temperature humidity diagram

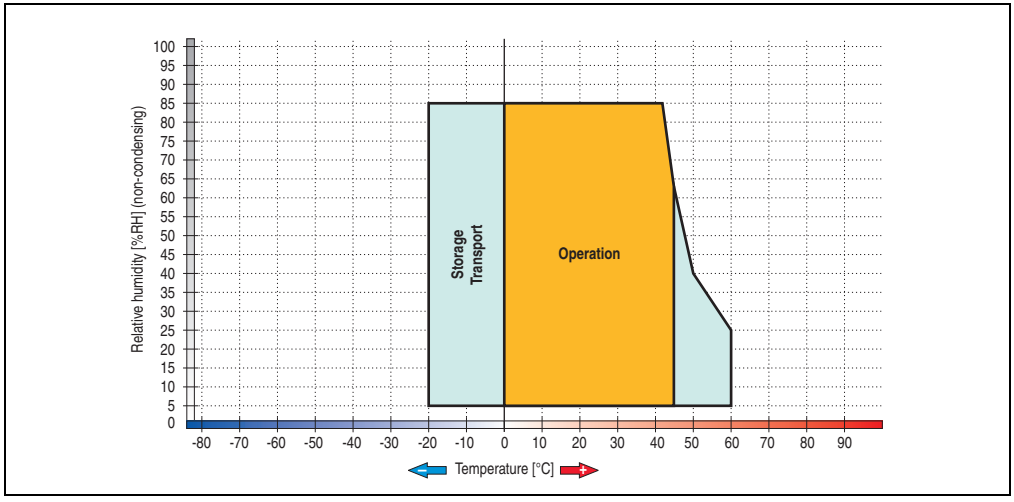



Figure 296: Temperature humidity diagram - 5PP120.1214-37

### 4.6.3 Dimensions

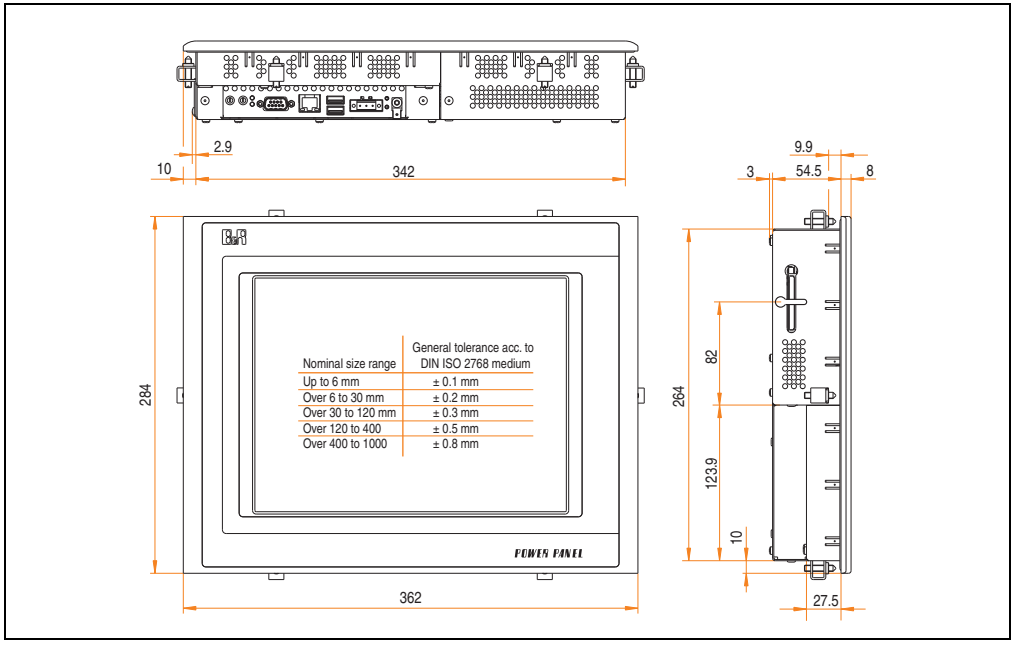



Figure 297: Dimensions - 5PP120.1214-37

### 4.6.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 297 "Dimensions - 5PP120.1214-37" on page 386) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

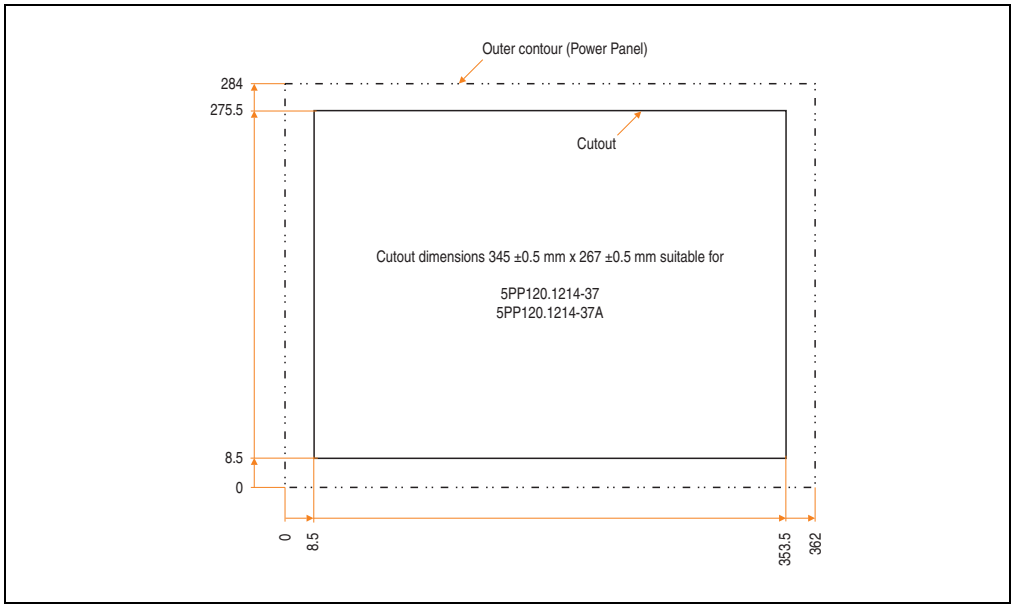



Figure 298: Cutout dimensions

### 4.6.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 120 TFT C VGA 12.1" T (3M) MH |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 132: Contents of delivery - 5PP120.1214-37

## 4.7 Device 5PP120.1214-37A

Figure 299: Front view - 5PP120.1214-37A

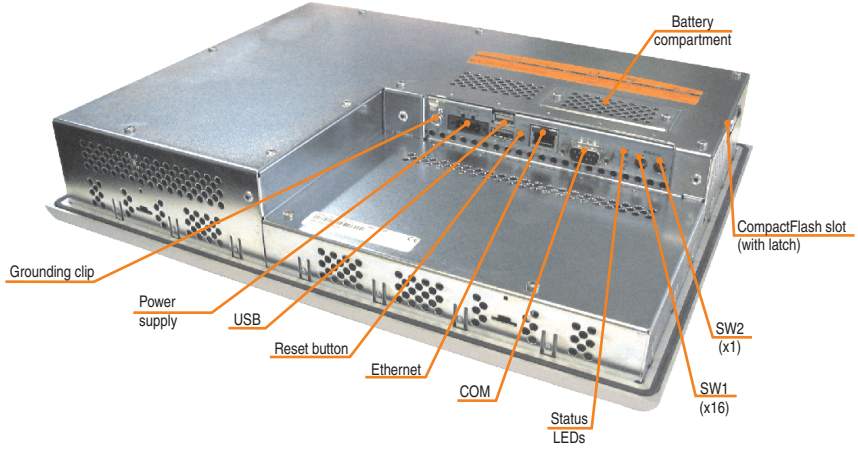



Figure 300: Rear view - 5PP120.1214-37A

### 4.7.1 Technical data

| Features | 5PP120.1214-37A |
|---|---|
| Boot loader / Operating system | BIOS |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>128 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [2)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 133: Technical data - 5PP120.1214-37A

| Features | 5PP120.1214-37A |
|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | <br>RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | <br>USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots<br>Holding torque for aPCI module | - |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | <br>Color TFT<br>12.1 inch (307 mm)<br>262144 colors [3)]<br>VGA, 800 x 600 pixels<br>300:1<br><br>Direction R / direction L =70°<br>Direction U = 50°/ direction D = 60°<br><br>350 cd/m²<br>55,000 hours |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | <br>Elo<br>Analog, resistive<br>Hampshire, serial, 12-bit<br>78% |
| Filter glass<br>Degree of transmission<br>Coating | - |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | - |
| **Electrical characteristics** | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption<br>Electrical isolation | <br>24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>- |
| Bleeder resistance | ≤ 24 kOhm |

Table 133: Technical data - 5PP120.1214-37A (cont.)

| Mechanical characteristics | 5PP120.1214-37A |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 362 mm |
| Height | 284 mm |
| Depth | 65.5 mm |
| Weight | Approx. 4.1 kg |
| **Environmental characteristics** | |
| Ambient temperature[4)] | |
| Operation | 0 to +45°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 4.7.2 "Temperature humidity diagram" on page 392 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 133: Technical data - 5PP120.1214-37A (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

4) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.7.2 Temperature humidity diagram

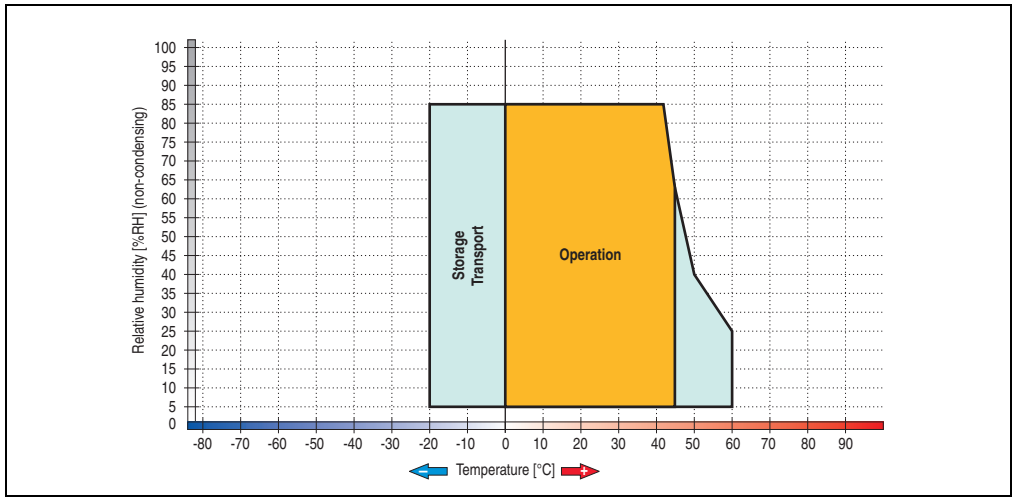



Figure 301: Temperature humidity diagram - 5PP120.1214-37A

### 4.7.3 Dimensions

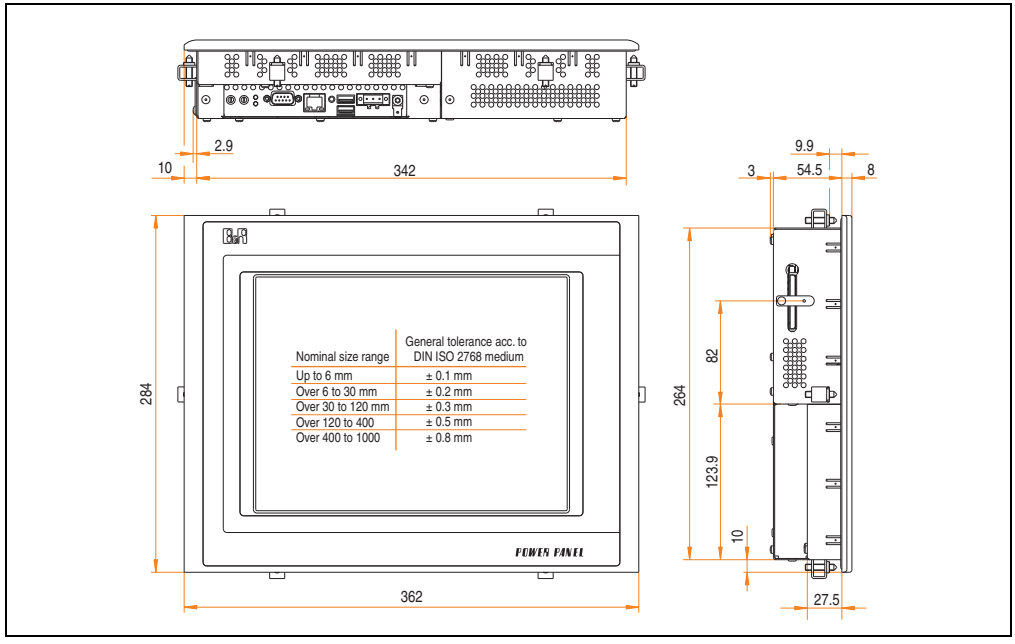



Figure 302: Dimensions - 5PP120.1214-37A

### 4.7.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 302 "Dimensions - 5PP120.1214-37A" on page 392) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

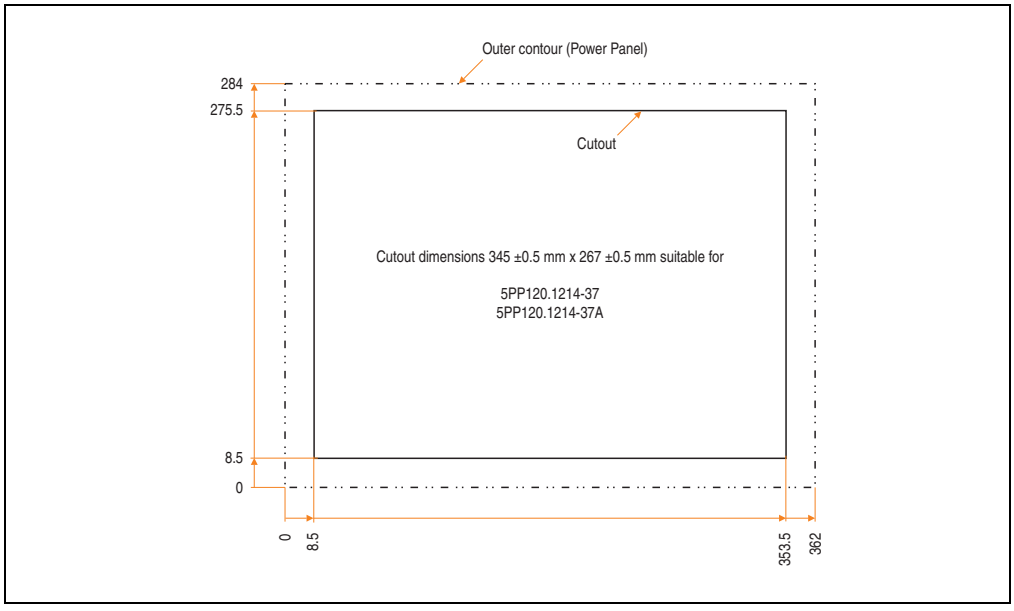



Figure 303: Cutout dimensions

### 4.7.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 120 TFT C VGA 12.1" T MH |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 134: Contents of delivery - 5PP120.1214-37A

## 4.8 Device 5PP120.1505-37

Figure 304: Front view - 5PP120.1505-37

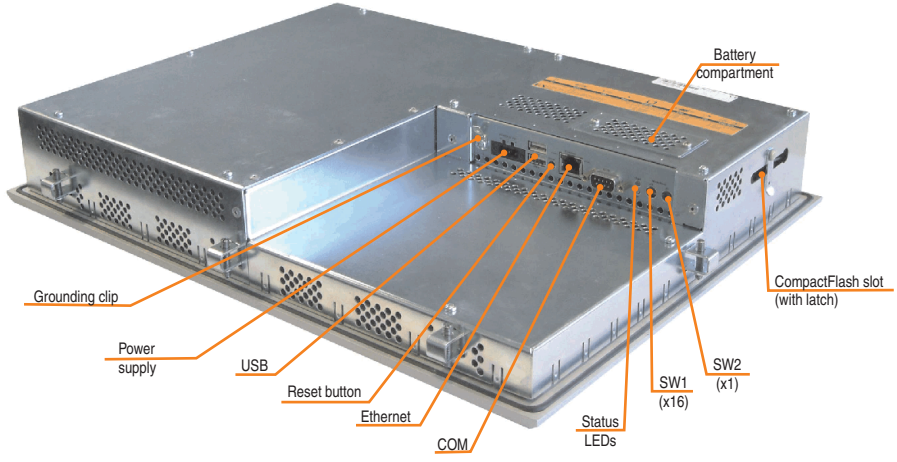



Figure 305: Rear view - 5PP120.1505-37

### 4.8.1 Technical data

| Features | 5PP120.1505-37 |
|---|---|
| Boot loader / Operating system | BIOS |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>128 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [2)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 135: Technical data - 5PP120.1505-37

| Features | 5PP120.1505-37 |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 262144 colors [3)] |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | |
| Touch screen type | 3M |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 30 W typical, 35 W max. |
| Electrical isolation | Yes |
| Bleeder resistance | ≤ 24 kOhm |

Table 135: Technical data - 5PP120.1505-37 (cont.)

| Mechanical characteristics | 5PP120.1505-37 |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 435 mm |
| Height | 330 mm |
| Depth | 71.5 mm |
| Weight | Approx. 6.3 kg |
| **Environmental characteristics** | |
| Ambient temperature[4)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 4.8.2 "Temperature humidity diagram" on page 398 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 135: Technical data - 5PP120.1505-37 (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

4) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.8.2 Temperature humidity diagram

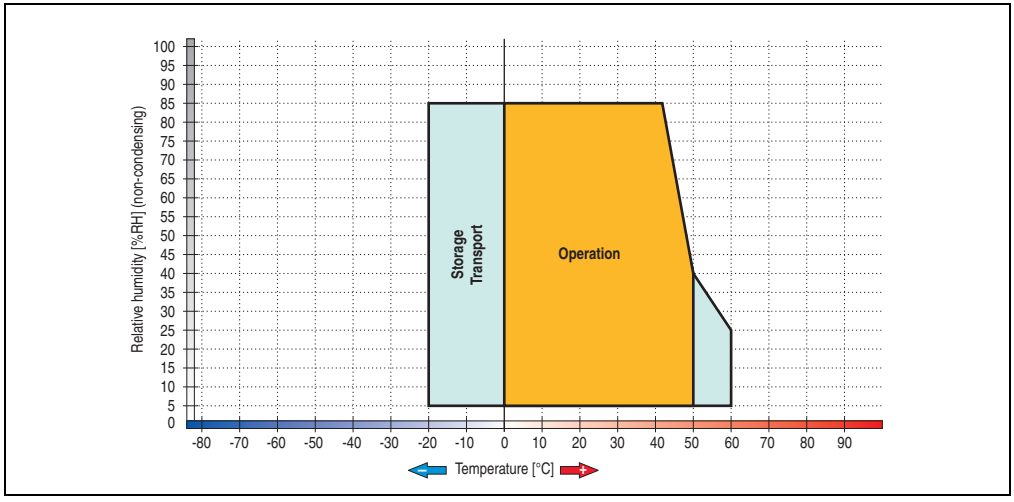



Figure 306: Temperature humidity diagram - 5PP120.1505-37

### 4.8.3 Dimensions

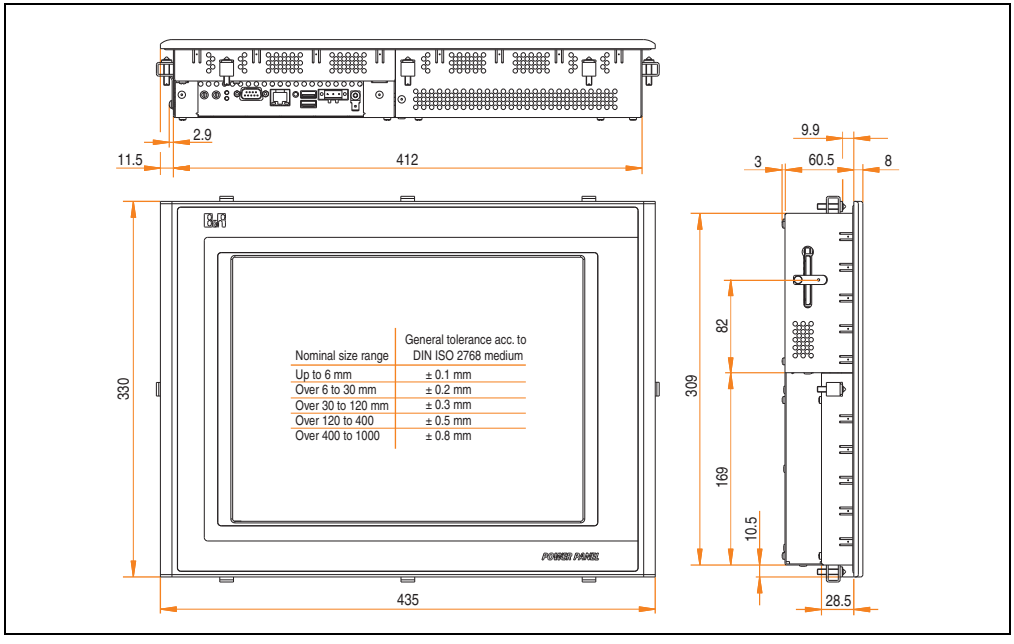



Figure 307: Dimensions - 5PP120.1505-37

### 4.8.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 307 "Dimensions - 5PP120.1505-37" on page 398) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

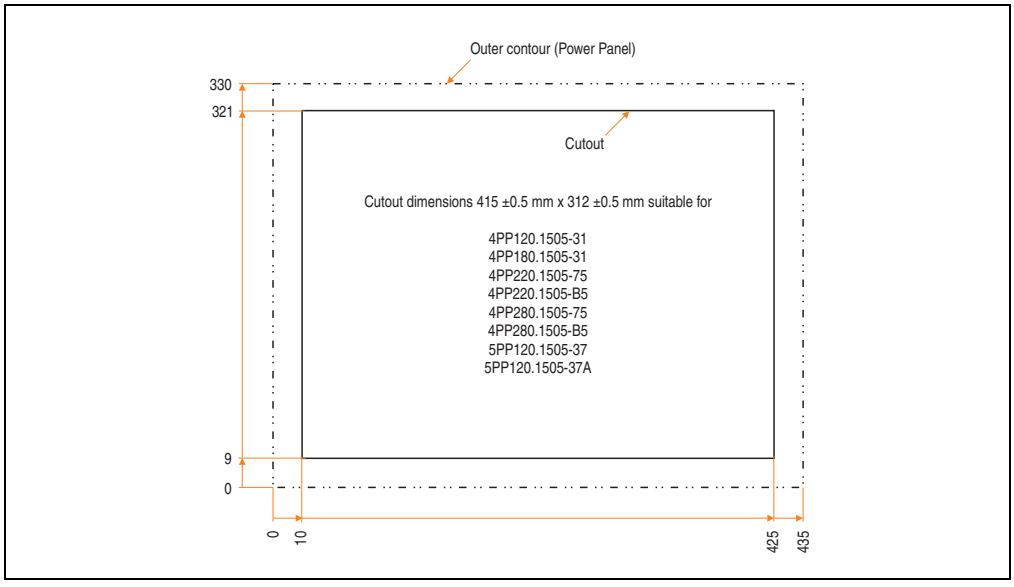



Figure 308: Cutout dimensions

### 4.8.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 120 TFT C XGA 15" T (3M) MH |
| 8 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 136: Contents of delivery - 5PP120.1505-37

## 4.9 Device 5PP120.1505-37A

Figure 309: Front view - 5PP120.1505-37A

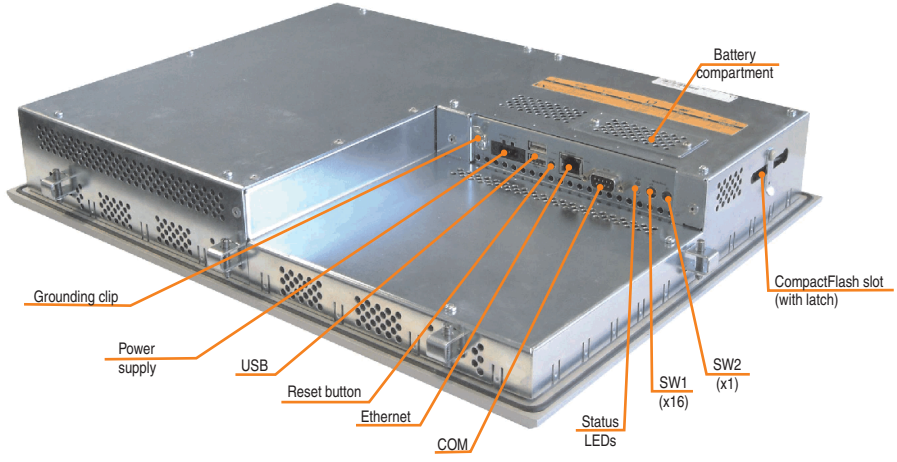



Figure 310: Rear view - 5PP120.1505-37A

### 4.9.1 Technical data

| Features | 5PP120.1505-37A |
|---|---|
| Boot loader / Operating system | BIOS |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | <br>Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) |
| Flash | 2 MB (for firmware) |
| Memory<br>Type<br>Quantity<br>Socket | <br>DRAM<br>128 MB<br>SO-DIMM 144-pin |
| Graphics<br>Controller<br>Memory<br>Screen rotation | <br>Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) |
| SRAM<br>Quantity<br>Battery-buffered | <br>- |
| Watchdog<br>Controller | <br>- |
| Power failure logic<br>Controller<br>Buffer time | <br>- |
| Real-time clock<br>Battery-buffered<br>Accuracy | <br>Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[1)] |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [2)]<br><br>10 minutes |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | <br>MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- |
| CompactFlash<br>Type<br>Amount<br>Connection | <br>Type I<br>1 slot<br>Primary IDE device |

Table 137: Technical data - 5PP120.1505-37A

| Features | 5PP120.1505-37A |
|---|---|
| Serial interface COM | |
| Type | RS232, modem-capable, not electrically isolated |
| UART | 16550-compatible, 16-byte FIFO |
| Transfer rate | Max. 115 kBaud |
| Connection | 9-pin DSUB |
| USB interface | |
| Type | USB 1.1 |
| Amount | 2 |
| Transfer rate | 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) |
| Connection | Type A |
| Current load | Max. 500 mA per connection |
| Reset button | Yes, accessible from the outside |
| LEDs | 1x user (green), 1x CF (yellow) |
| Mode/Node switch | 2, 16 digits each |
| aPCI slots | - |
| Holding torque for aPCI module | |
| Display | |
| Type | Color TFT |
| Diagonal | 15 inch (381 mm) |
| Colors | 262144 colors [3)] |
| Resolution | XGA, 1024 x 768 pixels |
| Contrast | 300:1 |
| Viewing angle (see page 589) | |
| Horizontal | Direction R / direction L =65° |
| Vertical | Direction U = 50°/ direction D = 55° |
| Background lighting | |
| Brightness | 330 cd/m² |
| Half-brightness time | 35,000 hours |
| Touch screen | |
| Touch screen type | Elo |
| Technology | Analog, resistive |
| Controller | Hampshire, serial, 12-bit |
| Degree of transmission | 78% |
| Filter glass | - |
| Degree of transmission | |
| Coating | |
| Keys | - |
| Key lifespan | |
| Function keys | |
| Soft keys | |
| Cursor keys | |
| Number block | |
| Other keys | |
| **Electrical characteristics** | |
| Power supply | |
| Rated voltage | 24 VDC ±25% |
| Starting current | Max. 20 A for < 1 ms |
| Power consumption | 30 W typical, 35 W max. |
| Electrical isolation | Yes |
| Bleeder resistance | ≤ 24 kOhm |

Table 137: Technical data - 5PP120.1505-37A (cont.)

| Mechanical characteristics | 5PP120.1505-37A |
|---|---|
| Front | |
| Frame | Naturally anodized aluminum |
| Membrane | Polyester |
| Design | Gray |
| Gasket | Flat gasket around display front |
| Housing | Metal |
| Outer dimensions | |
| Width | 435 mm |
| Height | 330 mm |
| Depth | 71.5 mm |
| Weight | Approx. 6.3 kg |
| **Environmental characteristics** | |
| Ambient temperature[4)] | |
| Operation | 0 to +50°C |
| Storage | -20 to +60°C |
| Transport | -20 to +60°C |
| Relative humidity | See 4.9.2 "Temperature humidity diagram" on page 404 |
| Vibration | |
| Operation (continuous) | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g |
| Operation (occasional) | 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g |
| Storage | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Transport | 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g |
| Shock | |
| Operation | 15 g, 11 ms |
| Storage | 30 g, 15 ms |
| Transport | 30 g, 15 ms |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) |
| Altitude | Max. 3000 m |

Table 137: Technical data - 5PP120.1505-37A (cont.)

1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

4) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.9.2 Temperature humidity diagram

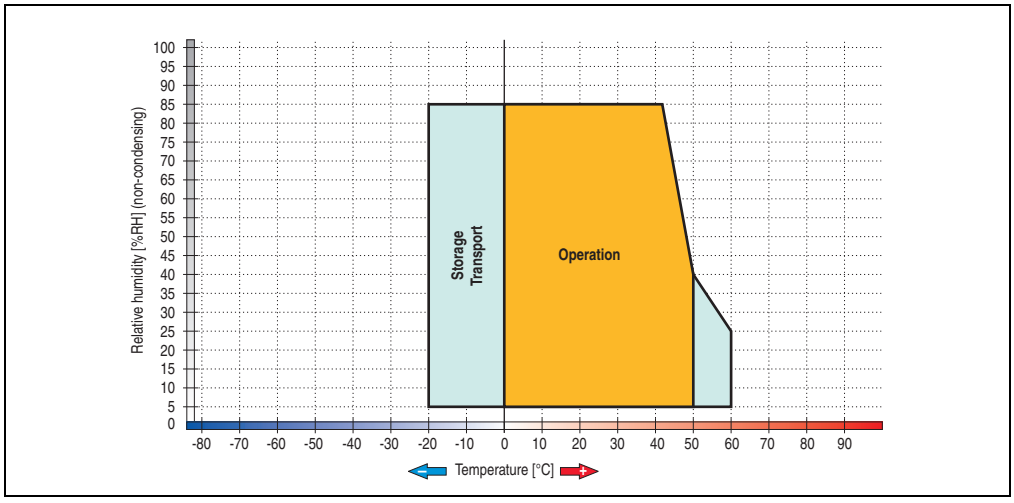



Figure 311: Temperature humidity diagram - 5PP120.1505-37A

### 4.9.3 Dimensions

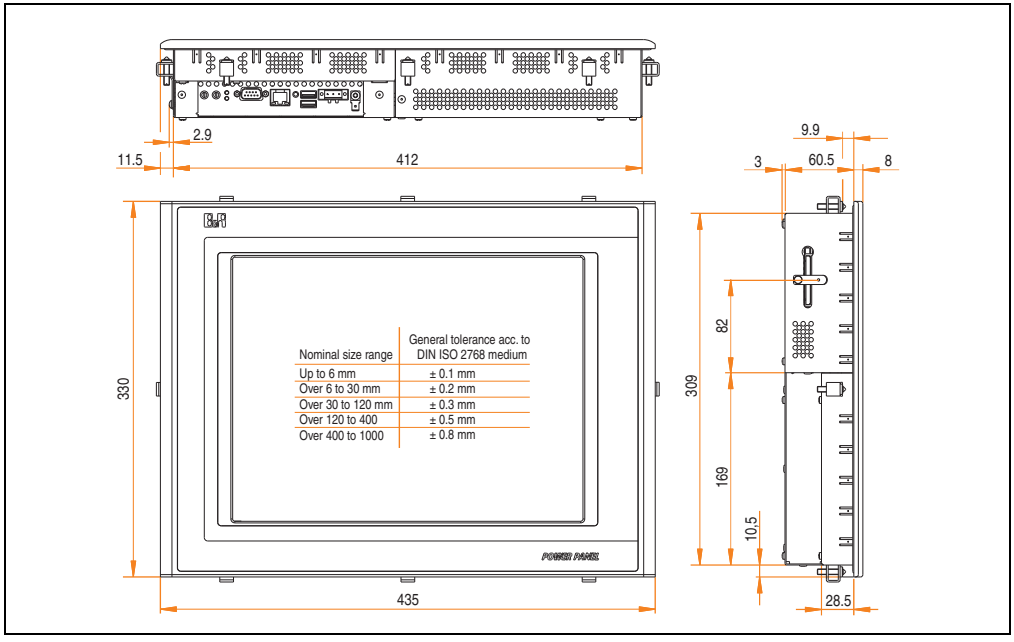



Figure 312: Dimensions - 5PP120.1505-37A

### 4.9.4 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 312 "Dimensions - 5PP120.1505-37A" on page 404) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

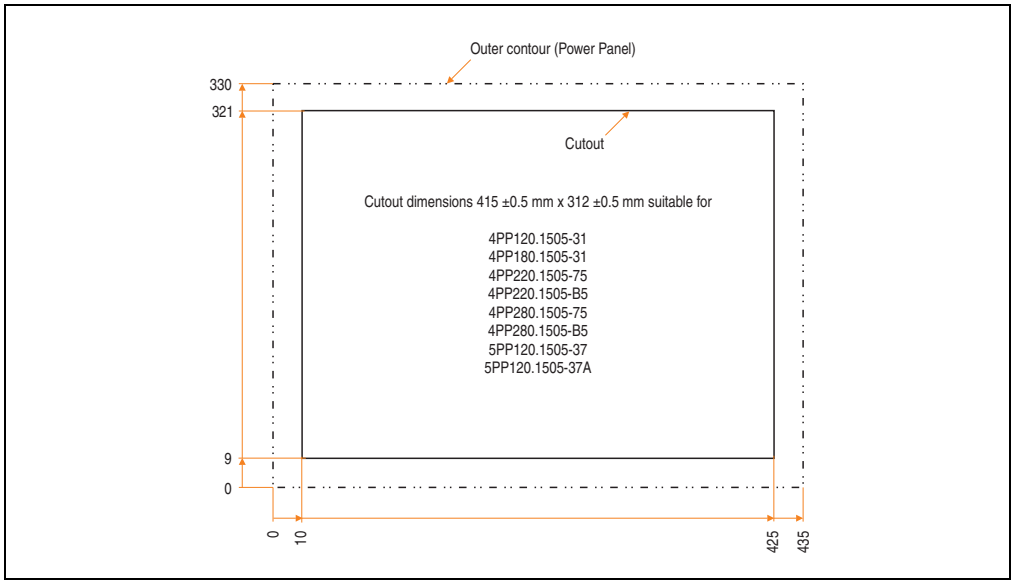



Figure 313: Cutout dimensions

### 4.9.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel 120 TFT C XGA 15" T MH |
| 8 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |

Table 138: Contents of delivery - 5PP120.1505-37A

# 5. Power Panel light / compact

Power Panel 200 light / compact series devices have QVGA operator panels with an integrated controller.

Power Panel 200 light devices are primarily intended for applications which rely on CAN bus or X2X interfaces for connecting peripherals without requiring Ethernet.
Devices from the compact series are also equipped with a 10/100 Ethernet interface, making them the ideal choice anywhere a network connection to a higher-level computer is required.

Power Panel devices are delivered as B&R sets, i.e. already with an inserted aPCI module. The following QVGA Power Panel light / compact versions are available:

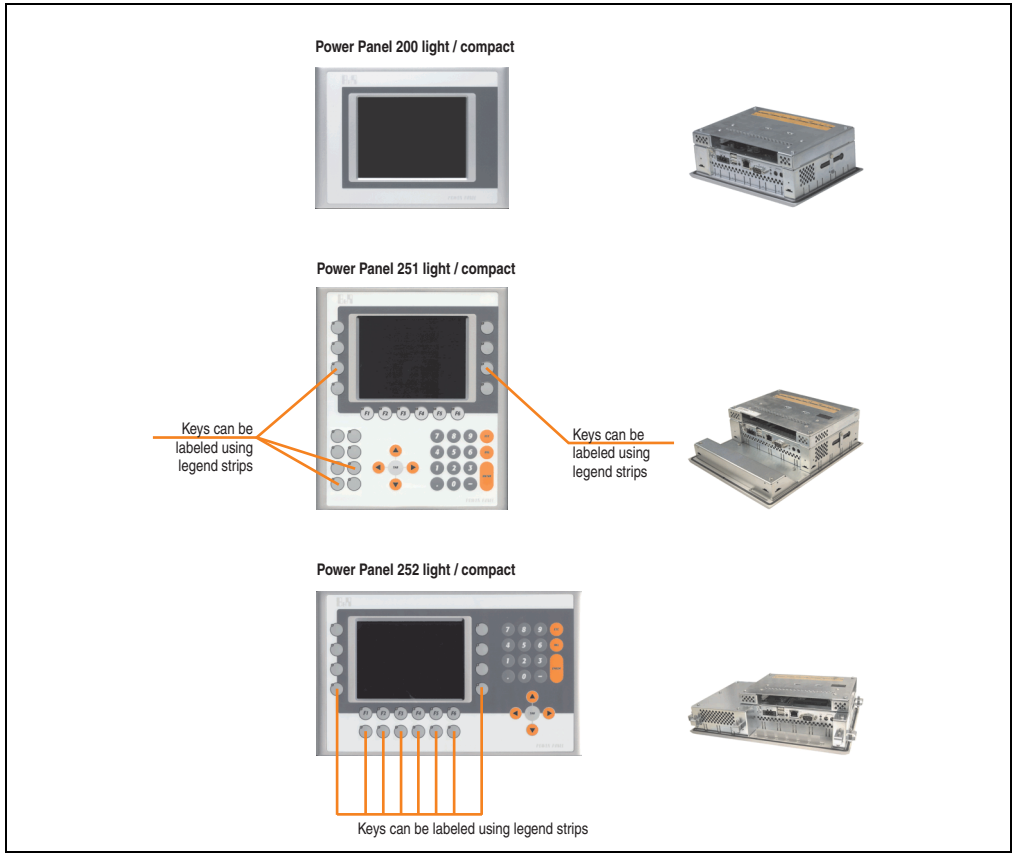



Figure 314: Power Panel light / compact overview

## 5.1 Power Panel 200 light / compact

### 5.1.1 Technical data - Power Panel 200 light

| Features | 4PP220:0571-L05 | 4PP220:0571-L45 | 4PP220:0571-L25 | 4PP220:0571-L65 |
|---|---|---|---|---|
| Boot loader / Operating system | Automation Runtime | | | |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) | | | |
| Flash | 2 MB (for firmware) | | | |
| Memory<br>Type<br>Quantity<br>Socket | DRAM<br>64 MB<br>SO-DIMM 144-pin | | | |
| Graphics<br>Controller<br>Memory<br>Screen rotation | Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) | | | |
| SRAM<br>Quantity<br>Battery-buffered | 256 KB<br>Yes | | | |
| Watchdog<br>Controller | SMC [1] | | | |
| Power failure logic<br>Controller<br>Buffer time | SMC [1]<br>10 ms | | | |
| Real-time clock<br>Battery-buffered<br>Accuracy | Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] | | | |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes | | | |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | - | | | |
| CompactFlash<br>Type<br>Amount<br>Connection | Type I<br>1 slot<br>Primary IDE device | | | |

Table 139: Technical data - Power Panel 200 light

| Features | 4PP220:0571-L05 | 4PP220:0571-L45 | 4PP220:0571-L25 | 4PP220:0571-L65 |
|---|---|---|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB | | | |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection | | | |
| Reset button | Yes, accessible from the outside | | | |
| LEDs | 1x user (green), 1x CF (yellow) | | | |
| Mode/Node switch | 2, 16 digits each | | | |
| aPCI slots | 1 pcs.<br>CAN aPCI module<br>(3IF771.9) inserted | 1 pcs.<br>X2X aPCI module<br>(3IF791.9) inserted | 1 pcs.<br>CAN aPCI module<br>(3IF771.9) inserted | 1 pcs.<br>X2X aPCI module<br>(3IF791.9) inserted |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | LCD monochrome<br>5.7 in (144 mm)<br>8 shades of gray<br>QVGA, 320 x 240 pixels<br>25:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>140 cd/m²<br>50,000 hours | | Color LCD<br>5.7 in (144 mm)<br>256 colors<br>QVGA, 320 x 240 pixels<br>40:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>150 cd/m²<br>50,000 hours | |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | Gunze<br>Analog, resistive<br>Hampshire, serial, 12-bit<br>84% | | | |
| Filter glass<br>Degree of transmission<br>Coating | - | | | |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | - | | | |
| **Electrical characteristics** | | | | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | 24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>Yes | | | |
| Bleeder resistance | ≥ 47 kOhm | | | |

Table 139: Technical data - Power Panel 200 light (cont.)

| Mechanics | 4PP220:0571-L05 | 4PP220:0571-L45 | 4PP220:0571-L25 | 4PP220:0571-L65 |
|---|---|---|---|---|
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Design<br>Gasket | Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Gray<br>Flat gasket around display front | | | |
| Housing | Metal | | | |
| Outer dimensions<br>Width<br>Height<br>Depth | 212 mm<br>156 mm<br>76 mm | | | |
| Weight | Approx. 1.9 kg (with aPCI interface module) | | | |
| **Environmental characteristics** | | | | |
| Ambient temperature[5]<br>Operation<br>Storage<br>Transport | 0 to +50°C<br>-20 to +70°C<br>-20 to +70°C | | 0 to +50°C<br>-20 to +60°C<br>-20 to +60°C | |
| Relative humidity | See temperature humidity diagram, on page 410 | | | |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g | | | |
| Shock<br>Operation<br>Storage<br>Transport | 15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms | | | |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) | | | |
| Altitude | Max. 3000 m | | | |

Table 139: Technical data - Power Panel 200 light (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values with inserted aPCI interface module

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.1.2 Temperature humidity diagram - Power Panel 200 light - Monochrome LCD

The following diagram is valid for the devices 4PP220:0571-L05 and 4PP220:0571-L45.

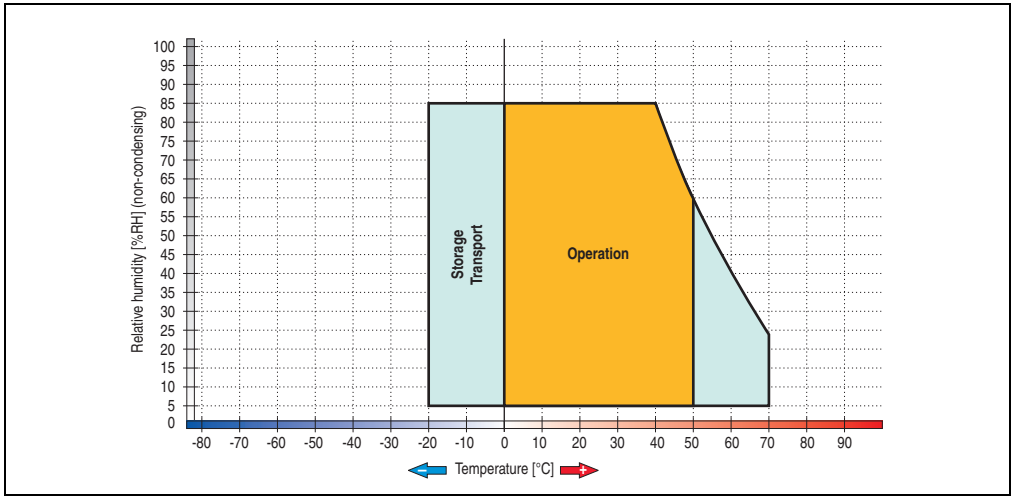



Figure 315: Temperature humidity diagram - Power Panel 200 light - Monochrome LCD

### 5.1.3 Temperature humidity diagram - Power Panel 200 light - Color LCD

The following diagram is valid for the devices 4PP220:0571-L25 and 4PP220:0571-L25.

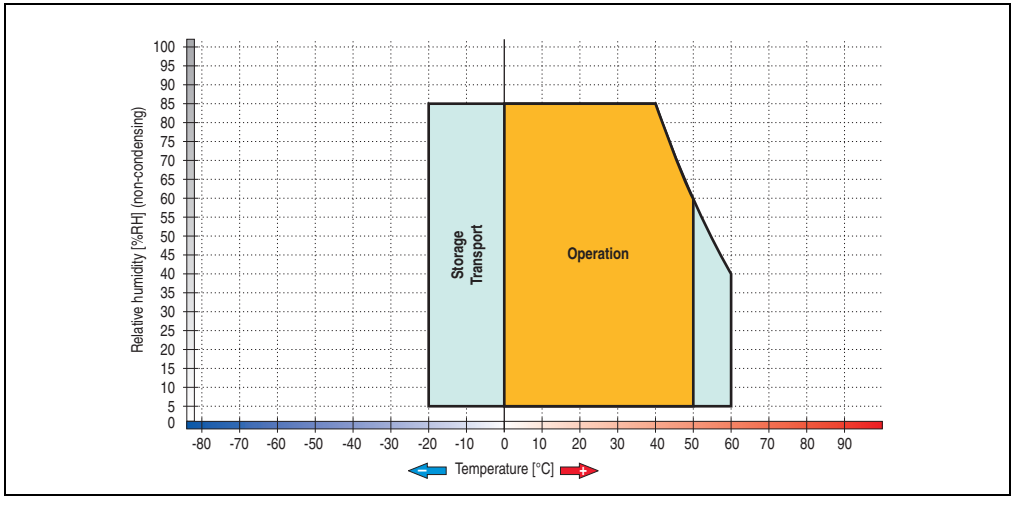



Figure 316: Temperature humidity diagram - Power Panel 200 light - Color LCD

### 5.1.4 Technical data - Power Panel 200 compact

| Features | 4PP220:0571-C05 | 4PP220:0571-C45 | 4PP220:0571-C25 | 4PP220:0571-C65 |
|---|---|---|---|---|
| Boot loader / Operating system | Automation Runtime | | | |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) | | | |
| Flash | 2 MB (for firmware) | | | |
| Memory<br>Type<br>Quantity<br>Socket | DRAM<br>64 MB<br>SO-DIMM 144-pin | | | |
| Graphics<br>Controller<br>Memory<br>Screen rotation | Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) | | | |
| SRAM<br>Quantity<br>Battery-buffered | 256 KB<br>Yes | | | |
| Watchdog<br>Controller | SMC [1] | | | |
| Power failure logic<br>Controller<br>Buffer time | SMC [1]<br>10 ms | | | |
| Real-time clock<br>Battery-buffered<br>Accuracy | Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] | | | |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes | | | |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- | | | |
| CompactFlash<br>Type<br>Amount<br>Connection | Type I<br>1 slot<br>Primary IDE device | | | |

Table 140: Technical data - Power Panel 200 compact

| Features | 4PP220:0571-C05 | 4PP220:0571-C45 | 4PP220:0571-C25 | 4PP220:0571-C65 |
|---|---|---|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB | | | |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection | | | |
| Reset button | Yes, accessible from the outside | | | |
| LEDs | 1x user (green), 1x CF (yellow) | | | |
| Mode/Node switch | 2, 16 digits each | | | |
| aPCI slots | 1 pcs.<br>CAN aPCI module<br>(3IF771.9) inserted | 1 pcs.<br>X2X aPCI module<br>(3IF791.9) inserted | 1 pcs.<br>CAN aPCI module<br>(3IF771.9) inserted | 1 pcs.<br>X2X aPCI module<br>(3IF791.9) inserted |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | LCD monochrome<br>5.7 in (144 mm)<br>8 shades of gray<br>QVGA, 320 x 240 pixels<br>25:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>140 cd/m²<br>50,000 hours | | Color LCD<br>5.7 in (144 mm)<br>256 colors<br>QVGA, 320 x 240 pixels<br>40:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>150 cd/m²<br>50,000 hours | |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | Gunze<br>Analog, resistive<br>Hampshire, serial, 12-bit<br>84% | | | |
| Filter glass<br>Degree of transmission<br>Coating | - | | | |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | - | | | |
| **Electrical characteristics** | | | | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | 24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>Yes | | | |
| Bleeder resistance | ≥ 47 kOhm | | | |

Table 140: Technical data - Power Panel 200 compact (cont.)

| Mechanics | 4PP220:0571-C05 | 4PP220:0571-C45 | 4PP220:0571-C25 | 4PP220:0571-C65 |
|---|---|---|---|---|
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Design<br>Gasket | Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Gray<br>Flat gasket around display front | | | |
| Housing | Metal | | | |
| Outer dimensions<br>Width<br>Height<br>Depth | 212 mm<br>156 mm<br>76 mm | | | |
| Weight | Approx. 1.9 kg (with aPCI interface module) | | | |
| **Environmental characteristics** | | | | |
| Ambient temperature[5]<br>Operation<br>Storage<br>Transport | 0 to +50°C<br>-20 to +70°C<br>-20 to +70°C | | 0 to +50°C<br>-20 to +60°C<br>-20 to +60°C | |
| Relative humidity | See temperature humidity diagram, on page 414 | | | |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g | | | |
| Shock<br>Operation<br>Storage<br>Transport | 15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms | | | |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) | | | |
| Altitude | Max. 3000 m | | | |

Table 140: Technical data - Power Panel 200 compact (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values with inserted aPCI interface module

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.1.5 Temperature humidity diagram - Power Panel 200 compact - Monochrome LCD

The following diagram is valid for the devices 4PP220:0571-C05 and 4PP220:0571-C45.

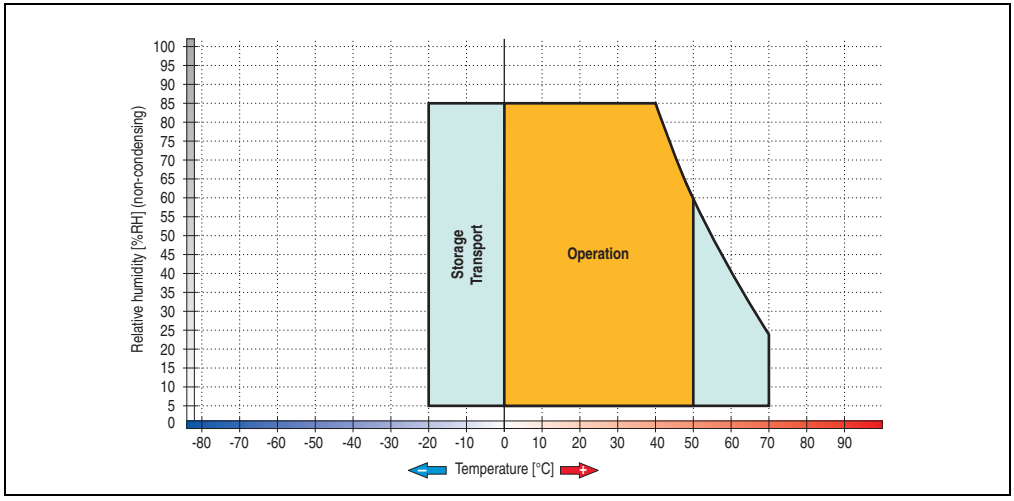



Figure 317: Temperature humidity diagram - Power Panel 200 compact - Monochrome LCD

### 5.1.6 Temperature humidity diagram - Power Panel 200 compact - Color LCD

The following diagram is valid for the devices 4PP220:0571-C25 and 4PP220:0571-C25.

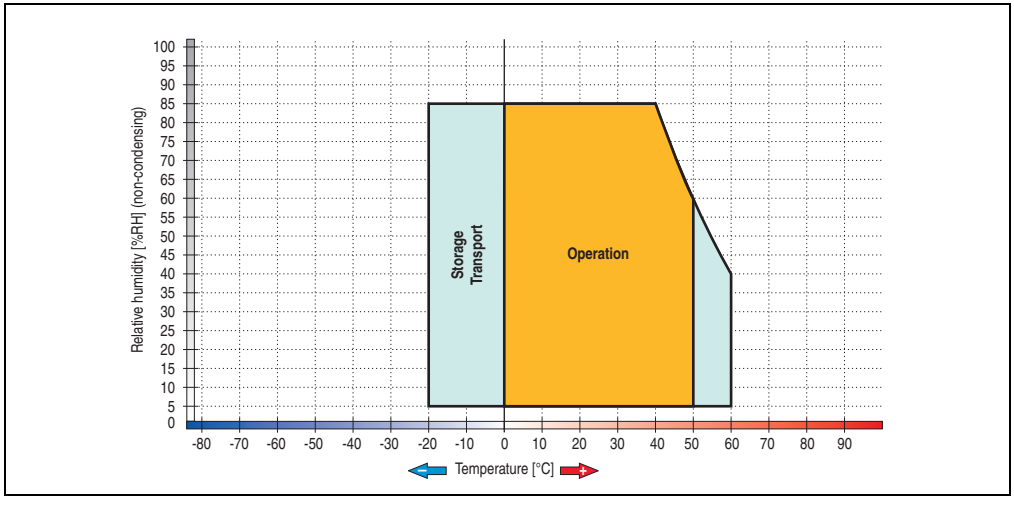



Figure 318: Temperature humidity diagram - Power Panel 200 compact - Color LCD

### 5.1.7 Dimensions

These Power Panel versions are the same size as a Power Panel 220 device with an aPCI interface module. The dimensions can be found in diagram 112 "Dimensions - 4PP220.0571-45" on page 168.

### 5.1.8 Cutout installation

These Power Panel versions are the same size as a Power Panel 220 device with an aPCI interface module. The dimensions can be found in diagram 113 "Cutout dimensions" on page 169.

### 5.1.9 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel device (Power Panel 220 LCD B/W QVGA 5.7" T MH 1aPCI or Power Panel 220 LCD C QVGA 5.7" T MH 1aPCI) |
| 4 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 1 | aPCI interface module (3IF771.9 - aPCI interface 1x CAN or 3IF791.9 - aPCI interface 1x X2X Link) |

Table 141: Contents of delivery - Power Panel 200 light / compact

## 5.2 Power Panel 251 light / compact

### 5.2.1 Technical data - Power Panel 251 light

| Features | 4PP251:0571-L05 | 4PP251:0571-L45 | 4PP251:0571-L25 | 4PP251:0571-L65 |
|---|---|---|---|---|
| Boot loader / Operating system | Automation Runtime | | | |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) | | | |
| Flash | 2 MB (for firmware) | | | |
| Memory<br>Type<br>Quantity<br>Socket | DRAM<br>64 MB<br>SO-DIMM 144-pin | | | |
| Graphics<br>Controller<br>Memory<br>Screen rotation | Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) | | | |
| SRAM<br>Quantity<br>Battery-buffered | 256 KB<br>Yes | | | |
| Watchdog<br>Controller | SMC [1] | | | |
| Power failure logic<br>Controller<br>Buffer time | SMC [1]<br>10 ms | | | |
| Real-time clock<br>Battery-buffered<br>Accuracy | Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] | | | |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes | | | |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | - | | | |
| CompactFlash<br>Type<br>Amount<br>Connection | Type I<br>1 slot<br>Primary IDE device | | | |

Table 142: Technical data - Power Panel 251 light

| Features | 4PP251:0571-L05 | 4PP251:0571-L45 | 4PP251:0571-L25 | 4PP251:0571-L65 |
|---|---|---|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB | | | |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection | | | |
| Reset button | Yes, accessible from the outside | | | |
| LEDs | 1x user (green), 1x CF (yellow) | | | |
| Mode/Node switch | 2, 16 digits each | | | |
| aPCI slots | 1 pcs.<br>CAN aPCI module<br>(3IF771.9) inserted | 1 pcs.<br>X2X aPCI module<br>(3IF791.9) inserted | 1 pcs.<br>CAN aPCI module<br>(3IF771.9) inserted | 1 pcs.<br>X2X aPCI module<br>(3IF791.9) inserted |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | LCD monochrome<br>5.7 in (144 mm)<br>8 shades of gray<br>QVGA, 320 x 240 pixels<br>25:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>140 cd/m²<br>50,000 hours | | Color LCD<br>5.7 in (144 mm)<br>256 colors<br>QVGA, 320 x 240 pixels<br>40:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>150 cd/m²<br>50,000 hours | |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - | | | |
| Filter glass<br>Degree of transmission<br>Coating | 95%<br>On both sides | | | |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force<br>16 with LED<br>6 with LED<br>-<br>15 without LED<br>5 without LED<br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** | | | |

Table 142: Technical data - Power Panel 251 light (cont.)

| Electrical characteristics | 4PP251:0571-L05 | 4PP251:0571-L45 | 4PP251:0571-L25 | 4PP251:0571-L65 |
|---|---|---|---|---|
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4]<br>Electrical isolation | 24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>Yes | | | |
| Bleeder resistance | ≥ 47 kOhm | | | |
| **Mechanical characteristics** | | | | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Orange keys<br>Dark gray keys<br>Legend strips (gray)<br>Design<br>Gasket | Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 151CV<br>Similar to Pantone 431CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front | | | |
| Housing | Metal | | | |
| Outer dimensions<br>Width<br>Height<br>Depth | 212 mm<br>245 mm<br>76 mm | | | |
| Weight | Approx. 2.6 kg (with aPCi interface module) | | | |
| **Environmental characteristics** | | | | |
| Ambient temperature[5]<br>Operation<br>Storage<br>Transport | 0 to +50°C<br>-20 to +70°C<br>-20 to +70°C | | 0 to +50°C<br>-20 to +60°C<br>-20 to +60°C | |
| Relative humidity | See temperature humidity diagram, on page 419 | | | |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g | | | |
| Shock<br>Operation<br>Storage<br>Transport | 15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms | | | |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) | | | |
| Altitude | Max. 3000 m | | | |

Table 142: Technical data - Power Panel 251 light (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values with inserted aPCI interface module

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.2.2 Temperature humidity diagram - Power Panel 251 light - Monochrome LCD

The following diagram is valid for the devices 4PP251:0571-L05 and 4PP251:0571-L45.

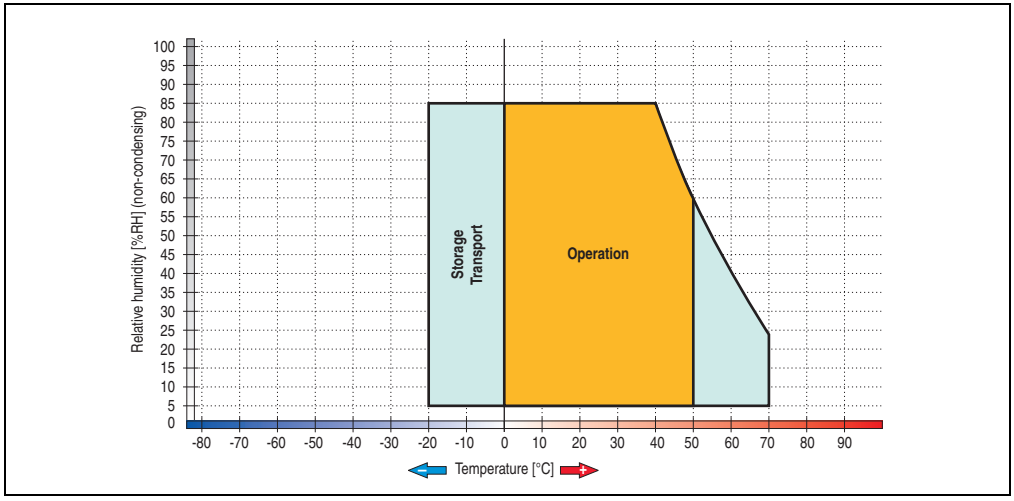



Figure 319: Temperature humidity diagram - Power Panel 251 light - Monochrome LCD

### 5.2.3 Temperature humidity diagram - Power Panel 251 light - Color LCD

The following diagram is valid for the devices 4PP251:0571-L25 and 4PP251:0571-L65.

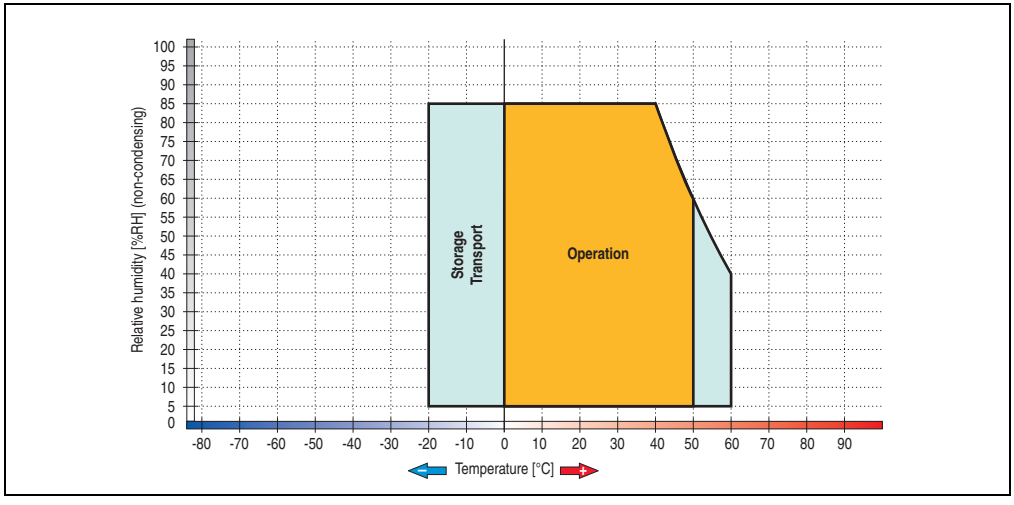



Figure 320: Temperature humidity diagram - Power Panel 251 light - Color LCD

## 5.2.4 Technical data - Power Panel 251 compact

| Features | 4PP251:0571-C05 | 4PP251:0571-C45 | 4PP251:0571-C25 | 4PP251:0571-C65 |
|---|---|---|---|---|
| Boot loader / Operating system | Automation Runtime | | | |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) | | | |
| Flash | 2 MB (for firmware) | | | |
| Memory<br>Type<br>Quantity<br>Socket | DRAM<br>64 MB<br>SO-DIMM 144-pin | | | |
| Graphics<br>Controller<br>Memory<br>Screen rotation | Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) | | | |
| SRAM<br>Quantity<br>Battery-buffered | 256 KB<br>Yes | | | |
| Watchdog<br>Controller | SMC [1] | | | |
| Power failure logic<br>Controller<br>Buffer time | SMC [1]<br>10 ms | | | |
| Real-time clock<br>Battery-buffered<br>Accuracy | Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] | | | |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes | | | |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- | | | |
| CompactFlash<br>Type<br>Amount<br>Connection | Type I<br>1 slot<br>Primary IDE device | | | |

Table 143: Technical data - Power Panel 251 compact

| Features | 4PP251:0571-C05 | 4PP251:0571-C45 | 4PP251:0571-C25 | 4PP251:0571-C65 |
|---|---|---|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB | | | |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection | | | |
| Reset button | Yes, accessible from the outside | | | |
| LEDs | 1x user (green), 1x CF (yellow) | | | |
| Mode/Node switch | 2, 16 digits each | | | |
| aPCI slots | 1 pcs.<br>CAN aPCI module<br>(3IF771.9) inserted | 1 pcs.<br>X2X aPCI module<br>(3IF791.9) inserted | 1 pcs.<br>CAN aPCI module<br>(3IF771.9) inserted | 1 pcs.<br>X2X aPCI module<br>(3IF791.9) inserted |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | LCD monochrome<br>5.7 in (144 mm)<br>8 shades of gray<br>QVGA, 320 x 240 pixels<br>25:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>140 cd/m²<br>50,000 hours | | Color LCD<br>5.7 in (144 mm)<br>256 colors<br>QVGA, 320 x 240 pixels<br>40:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>150 cd/m²<br>50,000 hours | |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - | | | |
| Filter glass<br>Degree of transmission<br>Coating | 95%<br>On both sides | | | |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force<br>16 with LED<br>6 with LED<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** | | | |
| **Electrical characteristics** | | | | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | 24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>Yes | | | |

Table 143: Technical data - Power Panel 251 compact (cont.)

| Electrical characteristics | 4PP251:0571-C05 | 4PP251:0571-C45 | 4PP251:0571-C25 | 4PP251:0571-C65 |
|---|---|---|---|---|
| Bleeder resistance | ≥ 47 kOhm | | | |
| **Mechanical characteristics** | | | | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Orange keys<br>Dark gray keys<br>Legend strips (gray)<br>Design<br>Gasket | Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 151CV<br>Similar to Pantone 431CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front | | | |
| Housing | Metal | | | |
| Outer dimensions<br>Width<br>Height<br>Depth | 212 mm<br>245 mm<br>76 mm | | | |
| Weight | Approx. 2.6 kg (with aPCi interface module) | | | |
| **Environmental characteristics** | | | | |
| Ambient temperature[5]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +70°C<br>-20 to +70°C | | <br>0 to +50°C<br>-20 to +60°C<br>-20 to +60°C | |
| Relative humidity | See temperature humidity diagram, on page 423 | | | |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g | | | |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms | | | |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) | | | |
| Altitude | Max. 3000 m | | | |

Table 143: Technical data - Power Panel 251 compact (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values with inserted aPCI interface module

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.2.5 Temperature humidity diagram - Power Panel 251 compact - Monochrome LCD

The following diagram is valid for the devices 4PP251:0571-C05 and 4PP251:0571-C45.

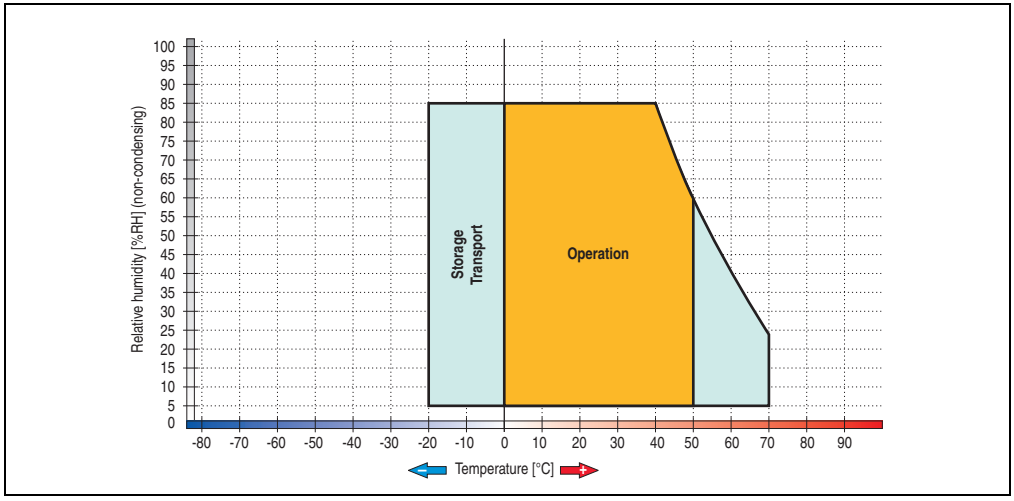



Figure 321: Temperature humidity diagram - Power Panel 251 compact - Monochrome LCD

### 5.2.6 Temperature humidity diagram - Power Panel 251 compact - Color LCD

The following diagram is valid for the devices 4PP251:0571-C25 and 4PP251:0571-C25.

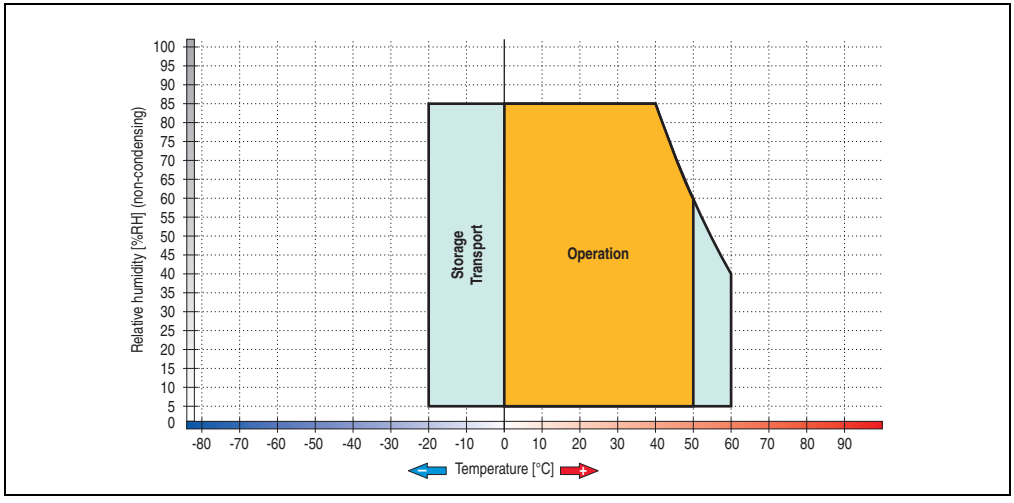



Figure 322: Temperature humidity diagram - Power Panel 251 compact - Color LCD

### 5.2.7 Dimensions

These Power Panel versions are the same size as a Power Panel 220 device with an aPCI interface module. The dimensions can be found in diagram 152 "Dimensions - 4PP251.0571-45" on page 216.

### 5.2.8 Cutout installation

These Power Panel versions are the same size as a Power Panel 220 device with an aPCI interface module. The dimensions can be found in diagram 153 "Cutout dimensions" on page 217.

### 5.2.9 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel device (Power Panel 251 LCD B/W QVGA 5.7" F MH 1aPCI or Power Panel 251 LCD C QVGA 5.7" F MH 1aPCI) |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 4 | Legend strips (inserted in the front) |
| 1 | aPCI interface module (3IF771.9 - aPCI interface 1x CAN or 3IF791.9 - aPCI interface 1x X2X Link) |

Table 144: Contents of delivery - Power Panel 251 light / compact

## 5.3 Power Panel 252 light / compact

### 5.3.1 Technical data - Power Panel 252 light

| Features | 4PP252:0571-L05 | 4PP252:0571-L45 | 4PP252:0571-L25 | 4PP252:0571-L65 |
|---|---|---|---|---|
| Boot loader / Operating system | Automation Runtime | | | |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) | | | |
| Flash | 2 MB (for firmware) | | | |
| Memory<br>Type<br>Quantity<br>Socket | DRAM<br>64 MB<br>SO-DIMM 144-pin | | | |
| Graphics<br>Controller<br>Memory<br>Screen rotation | Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) | | | |
| SRAM<br>Quantity<br>Battery-buffered | 256 KB<br>Yes | | | |
| Watchdog<br>Controller | SMC [1] | | | |
| Power failure logic<br>Controller<br>Buffer time | SMC [1]<br>10 ms | | | |
| Real-time clock<br>Battery-buffered<br>Accuracy | Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] | | | |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes | | | |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | - | | | |
| CompactFlash<br>Type<br>Amount<br>Connection | Type I<br>1 slot<br>Primary IDE device | | | |

Table 145: Technical data - Power Panel 252 light

| Features | 4PP252:0571-L05 | 4PP252:0571-L45 | 4PP252:0571-L25 | 4PP252:0571-L65 |
|---|---|---|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB | | | |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection | | | |
| Reset button | Yes, accessible from the outside | | | |
| LEDs | 1x user (green), 1x CF (yellow) | | | |
| Mode/Node switch | 2, 16 digits each | | | |
| aPCI slots | 1 pcs.<br>CAN aPCI module<br>(3IF771.9) inserted | 1 pcs.<br>X2X aPCI module<br>(3IF791.9) inserted | 1 pcs.<br>CAN aPCI module<br>(3IF771.9) inserted | 1 pcs.<br>X2X aPCI module<br>(3IF791.9) inserted |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | LCD monochrome<br>5.7 in (144 mm)<br>8 shades of gray<br>QVGA, 320 x 240 pixels<br>25:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>140 cd/m²<br>50,000 hours | | Color LCD<br>5.7 in (144 mm)<br>256 colors<br>QVGA, 320 x 240 pixels<br>40:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>150 cd/m²<br>50,000 hours | |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - | | | |
| Filter glass<br>Degree of transmission<br>Coating | 95%<br>On both sides | | | |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force<br>20 with LED<br>-<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** | | | |
| **Electrical characteristics** | | | | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | 24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>Yes | | | |

Table 145: Technical data - Power Panel 252 light (cont.)

| Electrical characteristics | 4PP252:0571-L05 | 4PP252:0571-L45 | 4PP252:0571-L25 | 4PP252:0571-L65 |
|---|---|---|---|---|
| Bleeder resistance | ≥ 47 kOhm | | | |
| **Mechanical characteristics** | | | | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Orange keys<br>Dark gray keys<br>Legend strips (gray)<br>Design<br>Gasket | Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 151CV<br>Similar to Pantone 431CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front | | | |
| Housing | Metal | | | |
| Outer dimensions<br>Width<br>Height<br>Depth | 302 mm<br>187 mm<br>76 mm | | | |
| Weight | Approx. 2.8 kg (with aPCi interface module) | | | |
| **Environmental characteristics** | | | | |
| Ambient temperature[5]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +70°C<br>-20 to +70°C | | <br>0 to +50°C<br>-20 to +60°C<br>-20 to +60°C | |
| Relative humidity | See temperature humidity diagram, on page 428 | | | |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g | | | |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms | | | |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) | | | |
| Altitude | Max. 3000 m | | | |

Table 145: Technical data - Power Panel 252 light (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values with inserted aPCI interface module

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.3.2 Temperature humidity diagram - Power Panel 252 light - Monochrome LCD

The following diagram is valid for the devices 4PP252:0571-L05 and 4PP252:0571-L45.

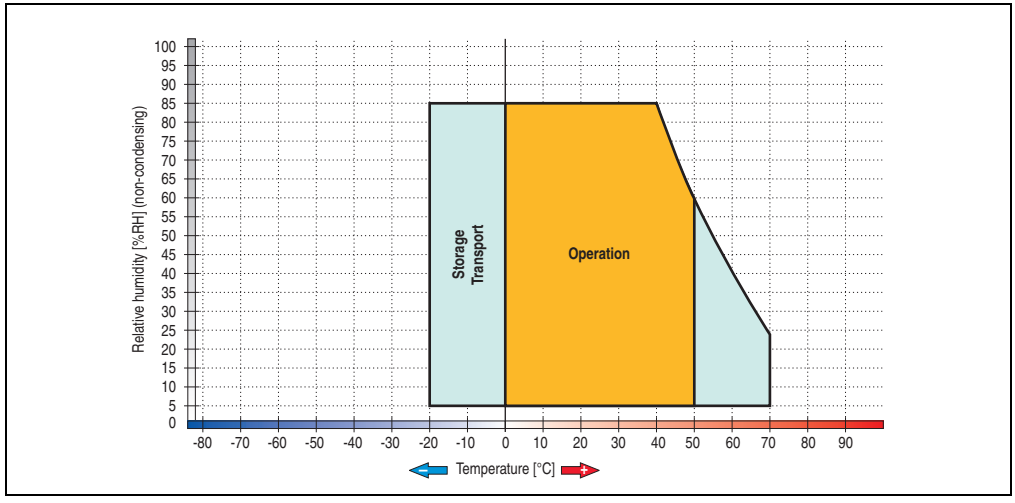



Figure 323: Temperature humidity diagram - Power Panel 251 light - Monochrome LCD

### 5.3.3 Temperature humidity diagram - Power Panel 252 light - Color LCD

The following diagram is valid for the devices 4PP252:0571-L25 and 4PP252:0571-L65.

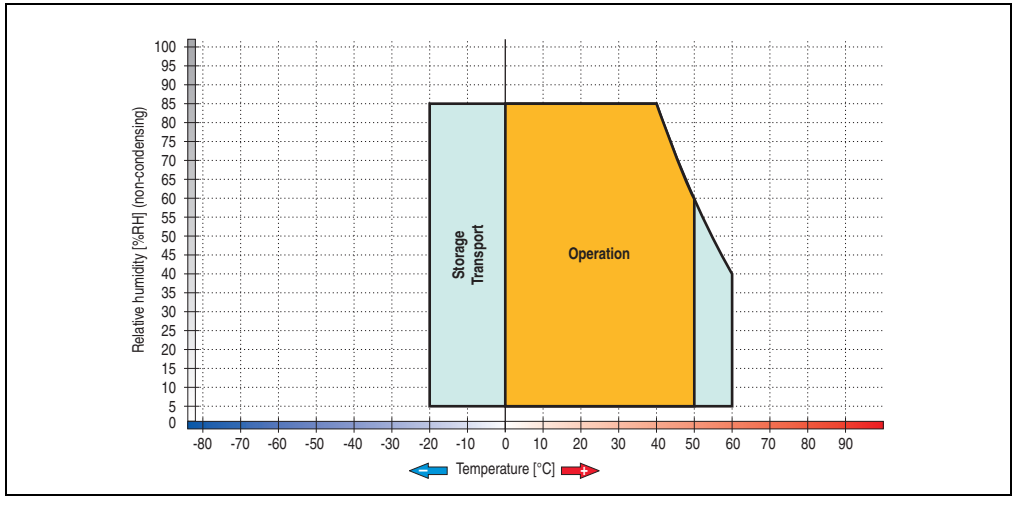



Figure 324: Temperature humidity diagram - Power Panel 251 light - Color LCD

### 5.3.4 Technical data - Power Panel 252 compact

| Features | 4PP252:0571-C05 | 4PP252:0571-C45 | 4PP252:0571-C25 | 4PP252:0571-C65 |
|---|---|---|---|---|
| Boot loader / Operating system | Automation Runtime | | | |
| Processor<br>Type<br>Expanded command set<br>L1 cache<br>L2 cache<br>Floating point unit (FPU)<br>Cooling<br>Method | Geode SC2200 266MHz, 32-bit x86<br>MMX technology, streaming SIMD extension<br>16 KB<br>-<br>Yes<br><br>Passive (heat sink) | | | |
| Flash | 2 MB (for firmware) | | | |
| Memory<br>Type<br>Quantity<br>Socket | DRAM<br>64 MB<br>SO-DIMM 144-pin | | | |
| Graphics<br>Controller<br>Memory<br>Screen rotation | Geode SC2200<br>4 MB shared memory (reserved from the main memory)<br>Yes (See also Section "Screen rotation" on page 448) | | | |
| SRAM<br>Quantity<br>Battery-buffered | 256 KB<br>Yes | | | |
| Watchdog<br>Controller | SMC [1] | | | |
| Power failure logic<br>Controller<br>Buffer time | SMC [1]<br>10 ms | | | |
| Real-time clock<br>Battery-buffered<br>Accuracy | Yes<br>At 25°C: Typically 10 ppm (1 seconds) per day[2] | | | |
| Battery<br>Type<br>Removable<br>Lifespan<br>Backup capacitor (for changing battery)<br>Buffer time | Renata 950 mAh<br>Yes, accessible from the outside<br>4 years [3]<br><br>10 minutes | | | |
| Ethernet<br>Controller<br>Transfer rate<br>Connection<br>Cables<br>NE2000-compatible | MacPhyter DP83816<br>10/100 Mbps<br>RJ45 twisted pair (10 Base T / 100 Base T)<br>S/STP (category 5)<br>- | | | |
| CompactFlash<br>Type<br>Amount<br>Connection | Type I<br>1 slot<br>Primary IDE device | | | |

Table 146: Technical data - Power Panel 252 compact

| Features | 4PP252:0571-C05 | 4PP252:0571-C45 | 4PP252:0571-C25 | 4PP252:0571-C65 |
|---|---|---|---|---|
| Serial interface COM<br>Type<br>UART<br>Transfer rate<br>Connection | RS232, modem-capable, not electrically isolated<br>16550-compatible, 16-byte FIFO<br>Max. 115 kBaud<br>9-pin DSUB | | | |
| USB interface<br>Type<br>Amount<br>Transfer rate<br>Connection<br>Current load | USB 1.1<br>2<br>1.5 Mbit/s (low speed), 12 Mbit/s (full speed)<br>Type A<br>Max. 500 mA per connection | | | |
| Reset button | Yes, accessible from the outside | | | |
| LEDs | 1x user (green), 1x CF (yellow) | | | |
| Mode/Node switch | 2, 16 digits each | | | |
| aPCI slots | 1 pcs.<br>CAN aPCI module<br>(3IF771.9) inserted | 1 pcs.<br>X2X aPCI module<br>(3IF791.9) inserted | 1 pcs.<br>CAN aPCI module<br>(3IF771.9) inserted | 1 pcs.<br>X2X aPCI module<br>(3IF791.9) inserted |
| Display<br>Type<br>Diagonal<br>Colors<br>Resolution<br>Contrast<br>Viewing angle (see page 589)<br>Horizontal<br>Vertical<br>Background lighting<br>Brightness<br>Half-brightness time | LCD monochrome<br>5.7 in (144 mm)<br>8 shades of gray<br>QVGA, 320 x 240 pixels<br>25:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>140 cd/m²<br>50,000 hours | | Color LCD<br>5.7 in (144 mm)<br>256 colors<br>QVGA, 320 x 240 pixels<br>40:1<br><br>Direction R / direction L =40°<br>Direction U = 40°/ direction D = 50°<br><br>150 cd/m²<br>50,000 hours | |
| Touch screen<br>Touch screen type<br>Technology<br>Controller<br>Degree of transmission | - | | | |
| Filter glass<br>Degree of transmission<br>Coating | 95%<br>On both sides | | | |
| Keys<br>Key lifespan<br>Function keys<br>Soft keys<br>Cursor keys<br>Number block<br>Other keys | > 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force<br>20 with LED<br>-<br>-<br>15 without LED<br>5 without LED<br><br>**Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.** | | | |
| **Electrical characteristics** | | | | |
| Power supply<br>Rated voltage<br>Starting current<br>Power consumption [4)]<br>Electrical isolation | 24 VDC ±25%<br>Max. 20 A for < 1 ms<br>15 W typical, 20 W max.<br>Yes | | | |

Table 146: Technical data - Power Panel 252 compact (cont.)

| Electrical characteristics | 4PP252:0571-C05 | 4PP252:0571-C45 | 4PP252:0571-C25 | 4PP252:0571-C65 |
|---|---|---|---|---|
| Bleeder resistance | ≥ 47 kOhm | | | |
| **Mechanical characteristics** | | | | |
| Front<br>Frame<br>Membrane<br>Dark gray border around display<br>Light background<br>Orange keys<br>Dark gray keys<br>Legend strips (gray)<br>Design<br>Gasket | Naturally anodized aluminum<br>Polyester<br>Similar to Pantone 432CV<br>Similar to Pantone 427CV<br>Similar to Pantone 151CV<br>Similar to Pantone 431CV<br>Similar to Pantone 429CV<br>Gray<br>Flat gasket around display front | | | |
| Housing | Metal | | | |
| Outer dimensions<br>Width<br>Height<br>Depth | 302 mm<br>187 mm<br>76 mm | | | |
| Weight | Approx. 2.8 kg (with aPCi interface module) | | | |
| **Environmental characteristics** | | | | |
| Ambient temperature[5]<br>Operation<br>Storage<br>Transport | <br>0 to +50°C<br>-20 to +70°C<br>-20 to +70°C | | <br>0 to +50°C<br>-20 to +60°C<br>-20 to +60°C | |
| Relative humidity | See temperature humidity diagram, on page 432 | | | |
| Vibration<br>Operation (continuous)<br>Operation (occasional)<br>Storage<br>Transport | <br>2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g<br>2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g<br>2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g | | | |
| Shock<br>Operation<br>Storage<br>Transport | <br>15 g, 11 ms<br>30 g, 15 ms<br>30 g, 15 ms | | | |
| Protection type | IP20 back side (only with installed CompactFlash card)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side) | | | |
| Altitude | Max. 3000 m | | | |

Table 146: Technical data - Power Panel 252 compact (cont.)

1) **S**ystem **M**anagement **C**ontroller

2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).

4) Values with inserted aPCI interface module

5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.3.5 Temperature humidity diagram - Power Panel 252 compact - Monochrome LCD

The following diagram is valid for the devices 4PP252:0571-C05 and 4PP252:0571-C45.

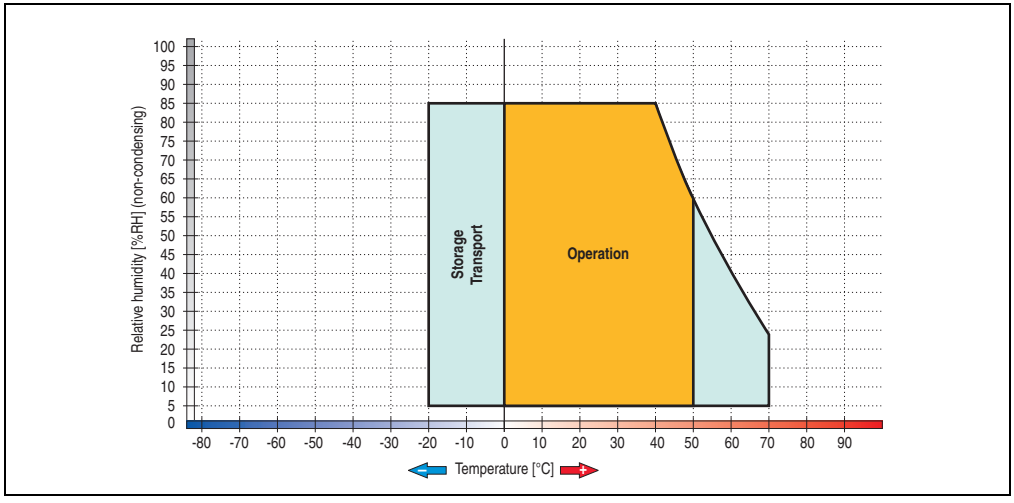



Figure 325: Temperature humidity diagram - Power Panel 252 compact - Monochrome LCD

### 5.3.6 Temperature humidity diagram - Power Panel 252 compact - Color LCD

The following diagram is valid for the devices 4PP252:0571-C25 and 4PP252:0571-C25.

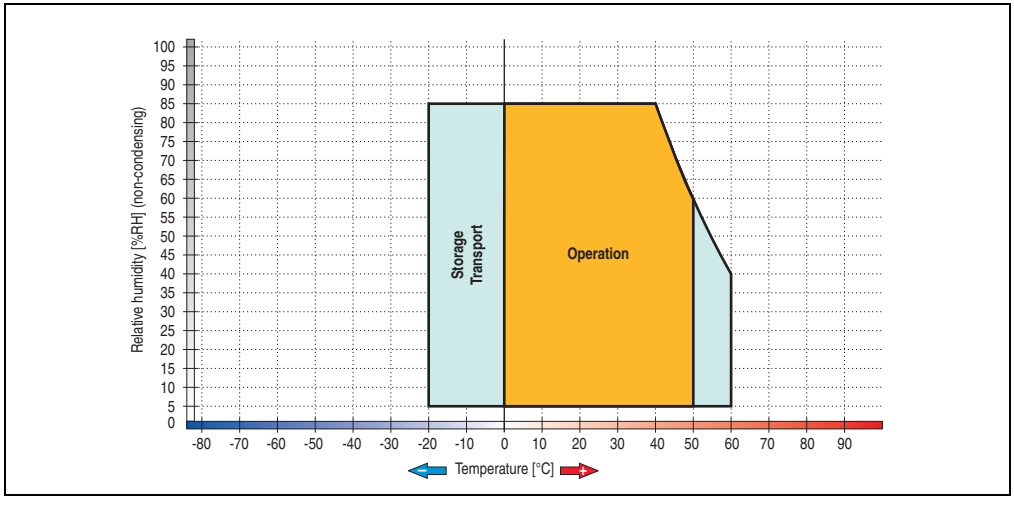



Figure 326: Temperature humidity diagram - Power Panel 252 compact - Color LCD

### 5.3.7 Dimensions

These Power Panel versions are the same size as a Power Panel 220 device with an aPCI interface module. The dimensions can be found in diagram 192 "Dimensions - 4PP252.0571-45" on page 264.

### 5.3.8 Cutout installation

These Power Panel versions are the same size as a Power Panel 220 device with an aPCI interface module. The dimensions can be found in diagram 193 "Cutout dimensions" on page 265.

### 5.3.9 Contents of delivery

The following components are included in the delivery of the Power Panel device:

| Amount | Component |
|---|---|
| 1 | Power Panel device (Power Panel 252 LCD B/W QVGA 5.7" F MH 1aPCI or Power Panel 252 LCD C QVGA 5.7" F MH 1aPCI) |
| 6 | Retaining clips included |
| 1 | Lithium battery 3 V / 950 mAh included |
| 8 | Legend strips (inserted in the front) |
| 1 | aPCI interface module (3IF771.9 - aPCI interface 1x CAN or 3IF791.9 - aPCI interface 1x X2X Link) |

Table 147: Contents of delivery - Power Panel 252 light / compact

# Chapter 3 • Commissioning

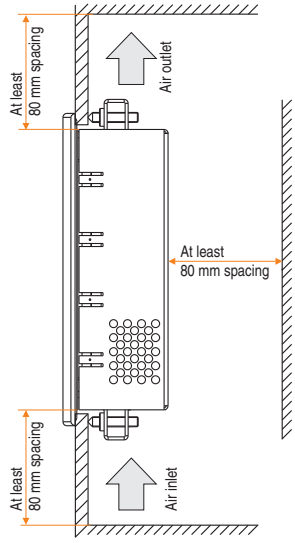
## 1. Mounting instructions

- The Power Panel must be mounted using the retaining clips included in delivery. Depending on the Power Panel version, a corresponding number of retaining clips are included.

Figure 327: Retaining clip

- In order to guarantee proper air circulation, allow a sufficient amount of space above, below, to the side and behind the Power Panel device. The minimum specified free space can be found in the diagram below. Free space specifications apply to all Power Panel versions (with/without aPCI slots and keys).

**Side view**




**Rear view**

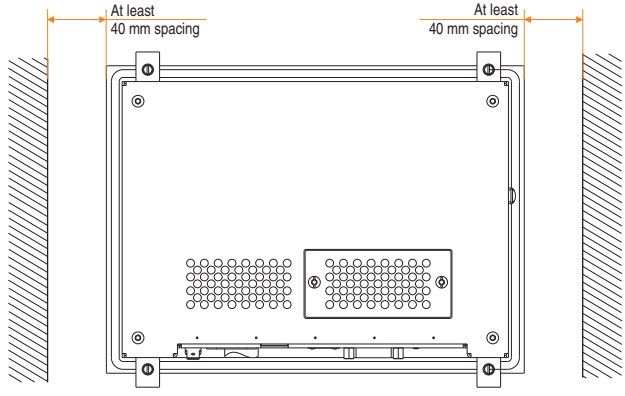



Figure 328: Space for air circulation

# 2. Mounting orientation

The following diagram displays the specified mounting orientation for the Power Panel device. The mounting orientation applies to all Power Panel versions (with/without aPCI slots and keys).

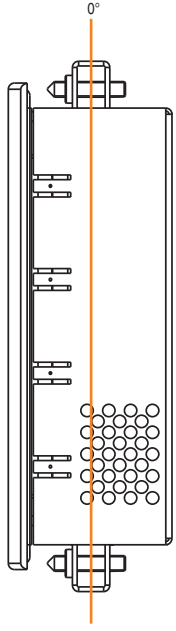
| Mounting orientation 0° |
| --- |
|  |

Table 148: Mounting orientation 0°

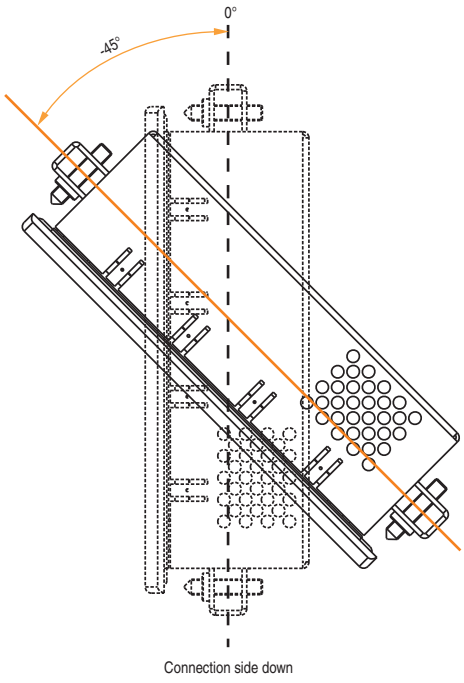
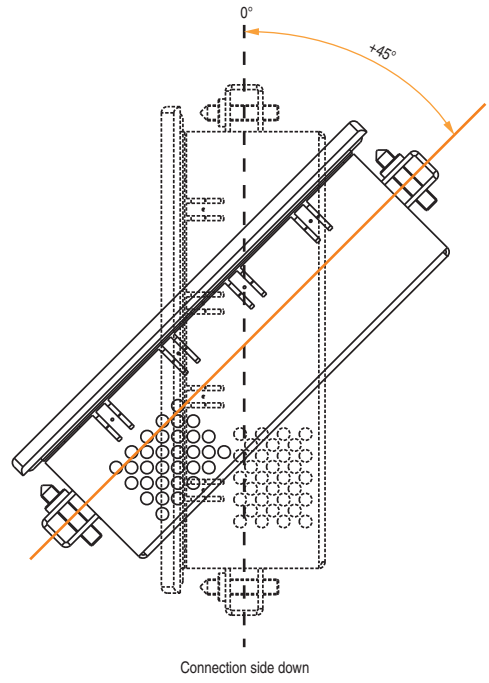
| Mounting orientation up to -45° | Mounting orientation up to +45° |
|---|---|
|  |  |

Table 149: Mounting orientation -45° and +45°.

## Caution!

**The maximum permitted ambient temperature can be found in the technical data for the respective Power Panel device.**

# 3. Key and LED configurations

Each key or LED can be configured individually and adjusted to suit the application. Various B&R tools are available for this purpose:

- B&R Key Editor for Windows operating systems
- Visual Components for Automation Runtime

Keys and LEDs from each device are processed by the matrix controller in a bit sequence of 128 bits each.

The positions of the keys and LEDs in the matrix are shown as hardware numbers. The hardware numbers can be read directly on the target system, for example with the B&R Key Editor and the B&R Control Center.

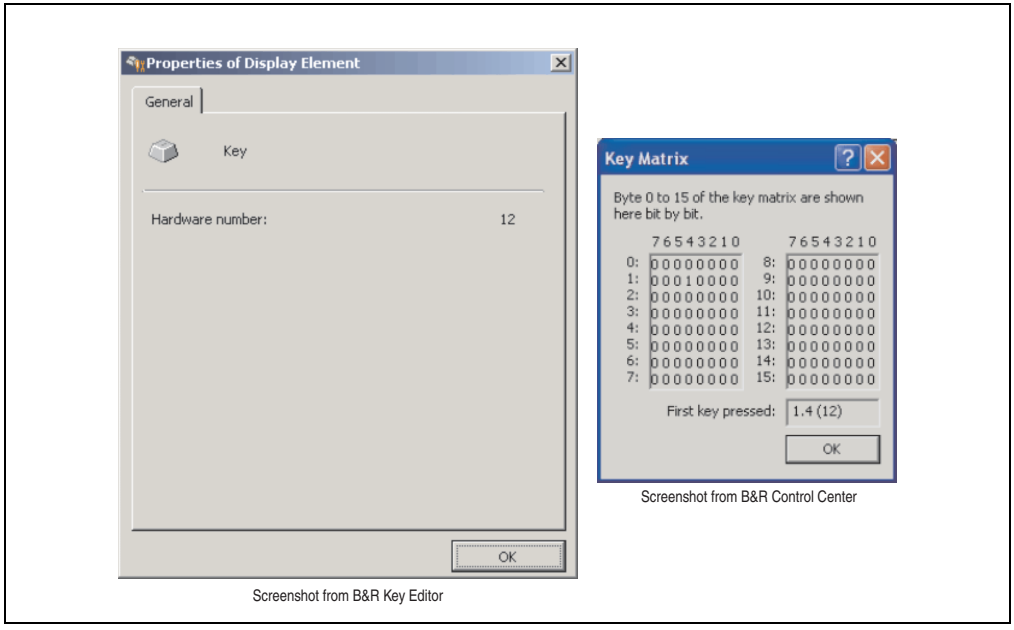



Figure 329: Example - Hardware number in the B&R Key Editor or in the B&R Control Center

The following graphics show the positions of the keys and LEDs in the matrix. They are shown as follows.

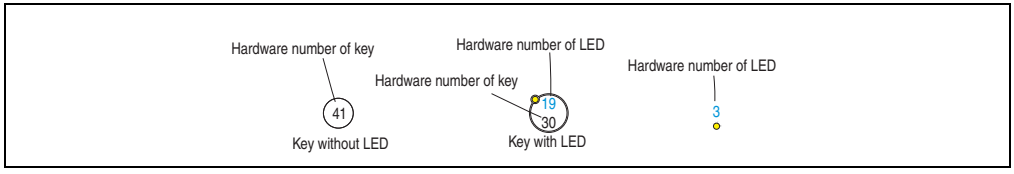



Figure 330: Display - Keys and LEDs in the matrix

## 3.1 Power Panel 5.7" QVGA

### 3.1.1 Format - Vertical1

Hardware numbers for 4PP151.0571-01, 4PP151.0571-21, 4PP251.0571-45, 4PP251.0571-65, 4PP251.0571-85 and 4PP251.0571-A5.

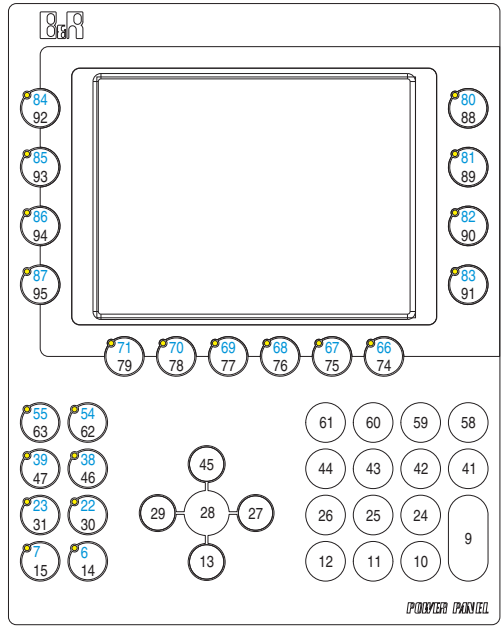



Figure 331: Hardware numbers - 5.7" device format - Vertical1

### 3.1.2 Format - Horizontal2

Hardware numbers for 4PP152.0571-01, 4PP152.0571-21, 4PP252.0571-45, 4PP252.0571-65, 4PP2520571-85 and 4PP252.0571-A5.

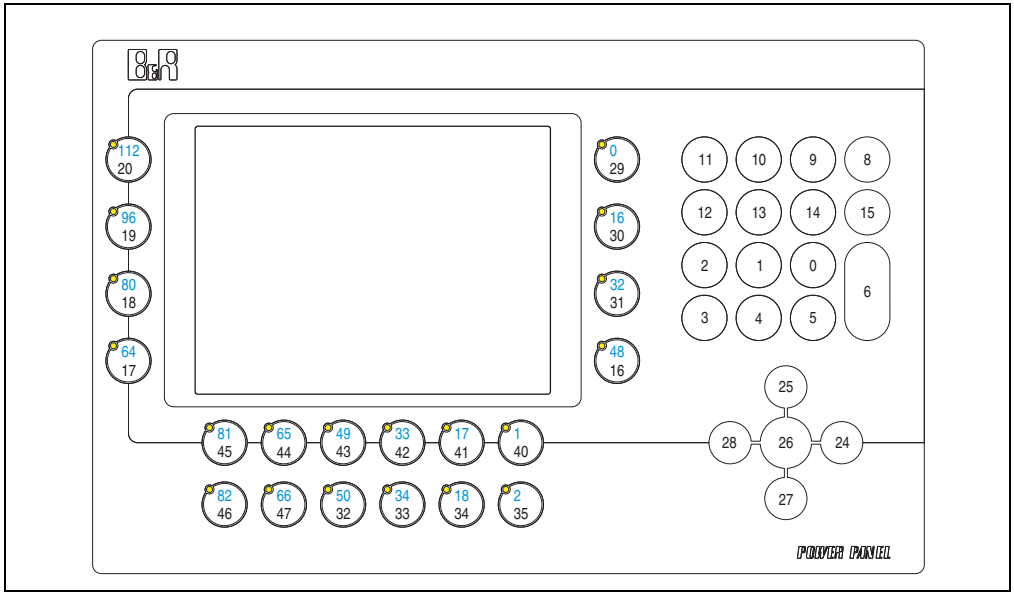



Figure 332: Hardware numbers - 5.7" device format - Horizontal2

## 3.2 Power Panel 10.4" VGA

### 3.2.1 Format - Horizontal1

Hardware numbers for 4PP180.1043-31, 4PP280.1043-75 and 4PP280.1043-B5.

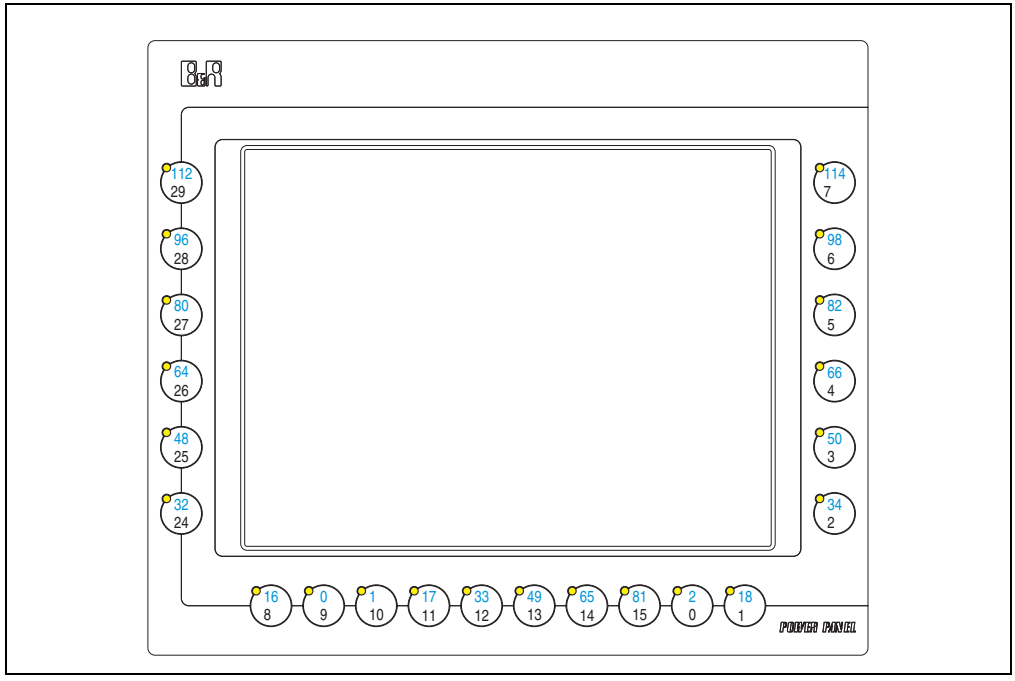



Figure 333: Hardware numbers - 10.4" device format - Horizontal1

### 3.2.2 Format - Vertical1

Hardware numbers for 4PP151.1043-31, 4PP181.1043-31, 4PP281.1043-75 and 4PP281.1043-B5.

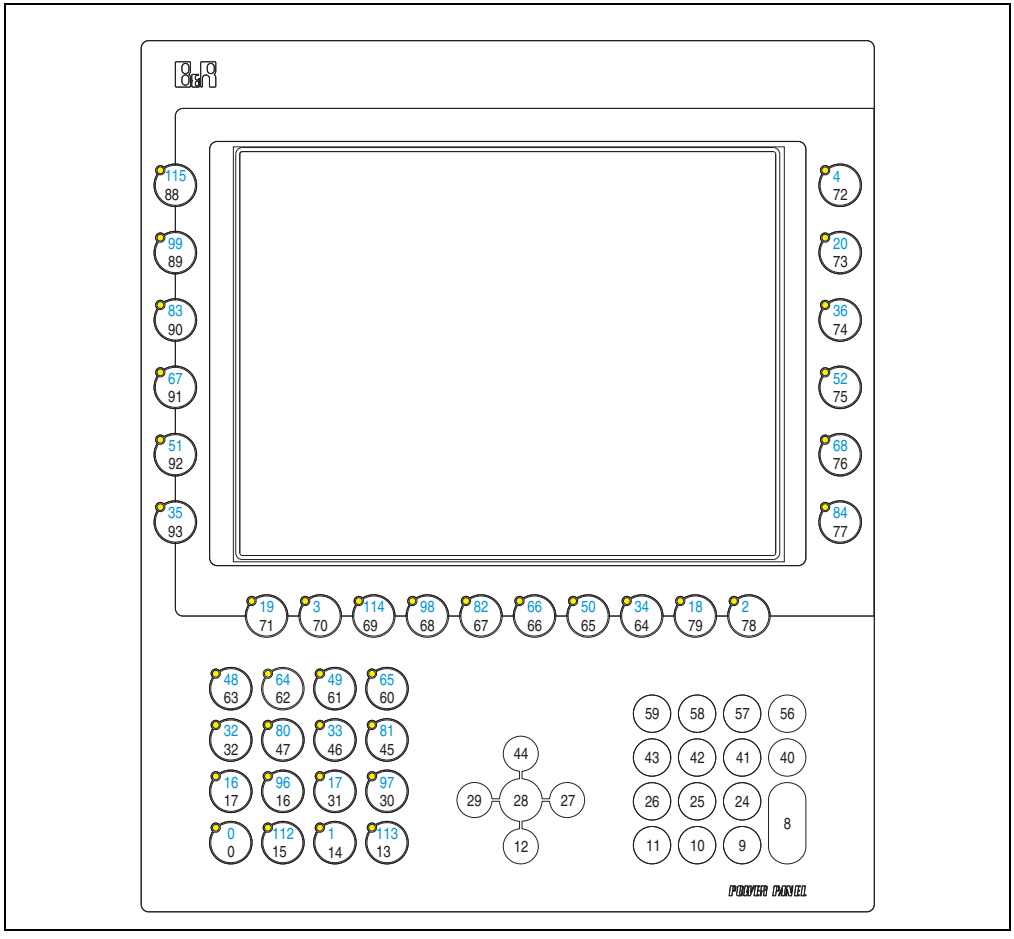



Figure 334: Hardware numbers - 10.4" device format - Vertical1

### 3.2.3 Format - Horizontal2

Hardware numbers for 4PP152.1043-3.1, 4PP182.1043-31, 4PP252.1043-75, 4PP252.1043-B5, 4PP282.1043-75 and 4PP282.1043-B5

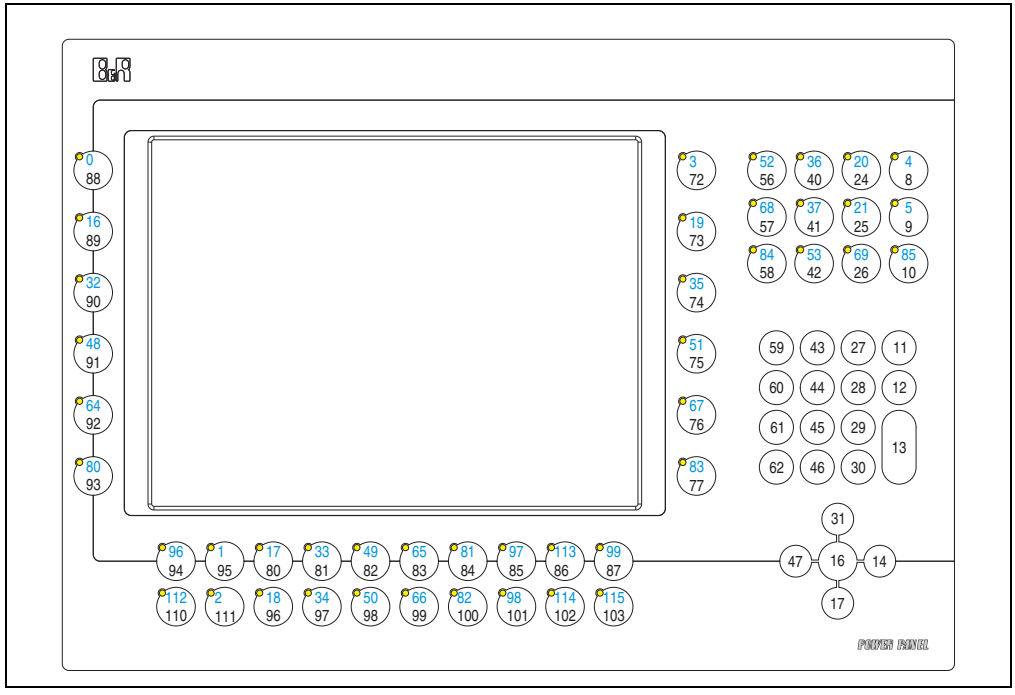



Figure 335: Hardware numbers - 10.4" device format - Horizontal2

## 3.3 Power Panel 15" XGA

### 3.3.1 Format - Horizontal1

Hardware numbers for 4PP180.1505-31, 4PP280.1505-75 and 4PP280.1505-B5.

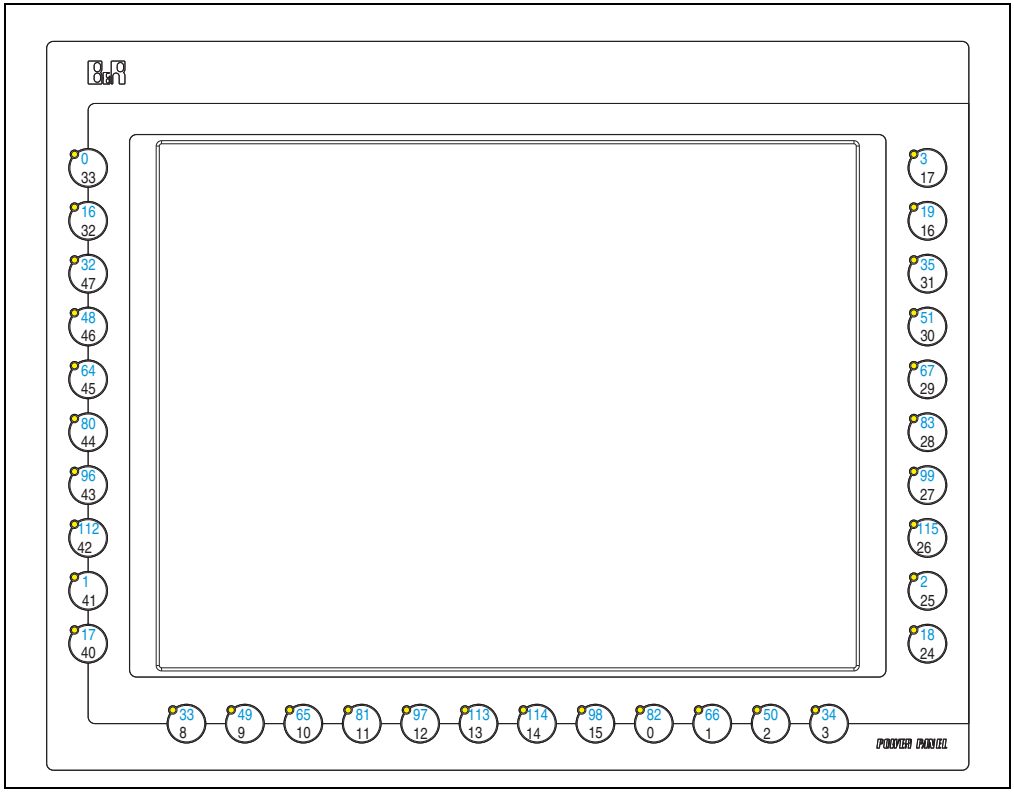



Figure 336: Hardware numbers - 15" device format - Horizontal1

### 3.3.2 Format - Vertical1

Hardware numbers for 4PP151.1505-31, 4PP181.1505-31, 4PP251.1505-75, 4PP251.1505-B5, 4PP281.1505-75 and 4PP281.1505-B5.

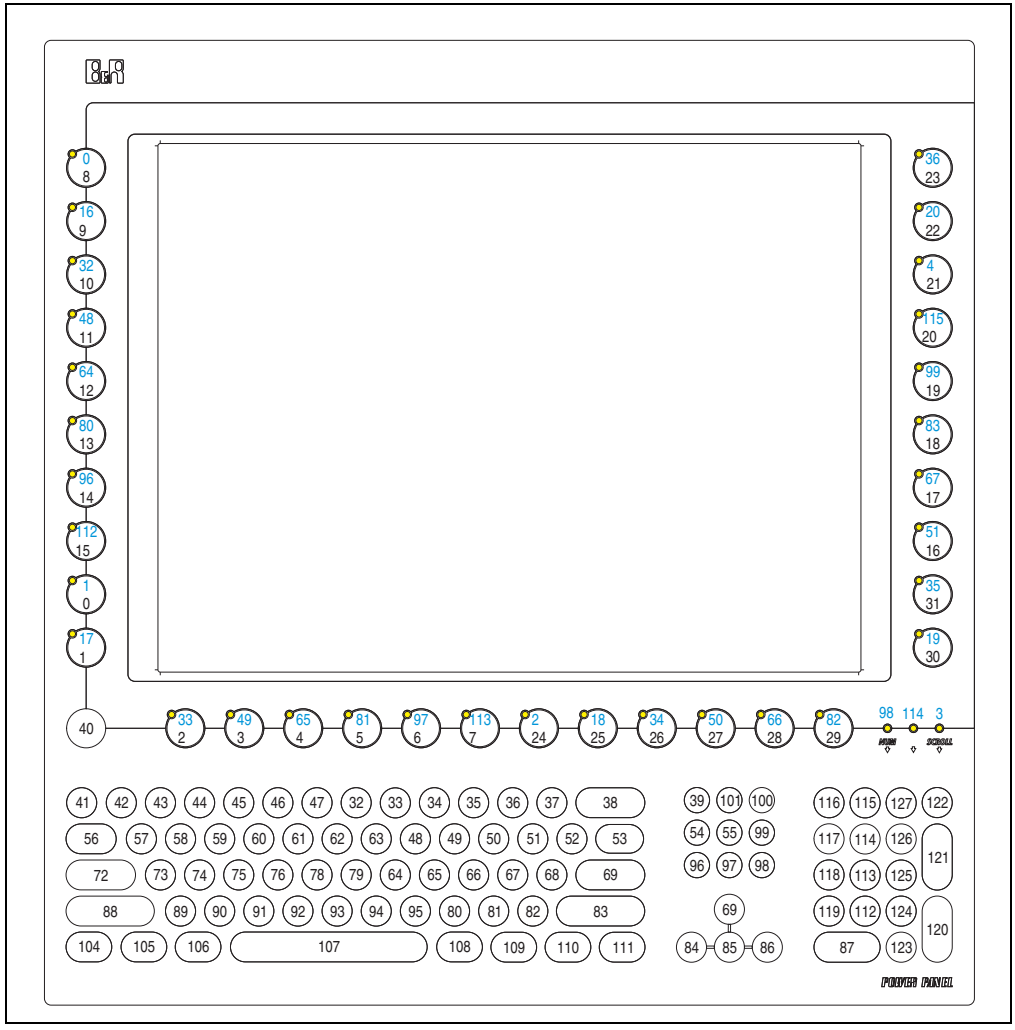



Figure 337: Hardware numbers - 15" device format - Vertical1

# 4. Touch screen calibration

## 4.1 Windows CE

Windows CE starts the touch screen calibration sequence during its first boot in the default configuration / delivered state.

## 4.2 Windows XP Embedded

After first starting Windows XP embedded (First Boot Agent), the touch screen driver must be installed in the device in order to operate the touch screen. The corresponding drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). The touch screen should be calibrated while installing the driver.

## 4.3 Automation Runtime / Visual Components

The devices are already set up at the plant (pre-calibration). This feature proves advantageous in the case of a replacement part because a new calibration is no longer required when exchanging devices (identical model / type). Nevertheless, we recommend calibrating the device in order to achieve the best results and to better readjust the touch screen to the user's preferences.

If the touch screen is calibrated manually, the pre-calibrated setting are overwritten.

# 5. Screen rotation

It is possible to rotate the image content by 90° using the graphic driver's screen rotation function (must support the function).

## 5.1 Power Panel 100 BIOS

### 5.1.1 Windows XP embedded

The graphics driver does not support the screen rotation function.

### 5.1.2 Windows CE

The graphics driver supports the screen rotation function. The touch screen must be recalibrated after rotation 1 (manual restart or when prompted by the operating system).

## 5.2 PowerPanel 100/200 Automation Runtime

### 5.2.1 Automation Runtime / Visual Components

Automation Runtime supports the screen rotation function. When developing a project using Automation Studio 2.7.x or 3.0.x, you can select the orientation of the display before getting started.

## 5.3 Power Panel light / compact Automation Runtime

### 5.3.1 Automation Runtime / Visual Components

Automation Runtime supports the screen rotation function. When developing a project using Automation Studio 2.7.x or 3.0.x, you can select the orientation of the display before getting started.

# Chapter 4 • Software

## 1. Power Panel 100/200 with Automation Runtime

### 1.1 General information

B&R Automation Runtime guarantees a uniform runtime environment for Automation Studio programs on all target systems. This ensures uniform programming and operation on all devices.

Automation Runtime possesses a multitasking operating system adapted specially for use with control technology. The cycle time for your application can be separated among several task classes. Automation Runtime ensures that all application programs are executed within defined time periods, proving itself to be a configurable, deterministic real-time multitasking system.

An extensive project can be divided into small individual tasks. This way of working increases modularity and makes it much easier to maintain projects.

#### 1.1.1 Summary screen

When switching on a Power Panel 100 or Power Panel 200 device, a summary screen appears after the "Booting, please wait..." message. It displays the most important parameters of an Automation Runtime Power Panel device:

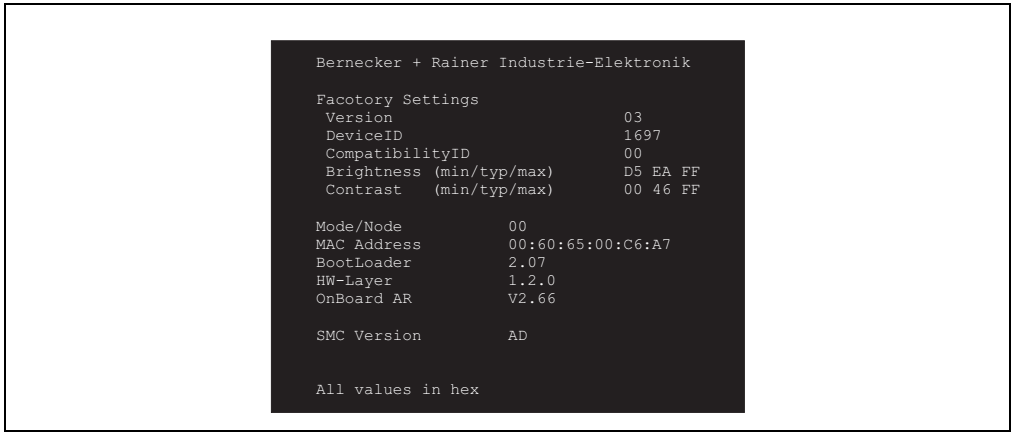



Figure 338: Automation Runtime summary screen

| Information | Example value | Meaning |
|---|---|---|
| Version | 03 | Displays the factory settings version. These factory settings determine the device ID, display ID, display-specific initialization sequences, and other important parameters.<br>**Information:**<br>**Factory settings are set by B&R and cannot be changed by the user!** |
| Device ID | 1697 | Displays the hexadecimal value of the hardware device number. |
| Compatibility ID | 00 | Displays the hardware device revision. |
| Brightness (min / typ / max) | D5 EA FF | Indicates the minimum, typical and maximum value as a hex value for the brightness settings of the display. |
| Contrast (min / typ / max) | 00 46 FF | Indicates the minimum, typical and maximum value as a hex value for the contrast settings of the display. |
| Mode/Node | 00 | Displays the current operating mode switch positions. |
| MAC address | 00:60:65:00:C6:A7 | Displays the assigned media access control (MAC) address. |
| Boot loader | 2.07 | Displays the version of the boot loader. |
| HW layer | 1.2.0 | Displays the version of the hardware layer. |
| Onboard AR | V2.66 | Displays the current onboard Automation Runtime version. |
| SMC version | AD | Displays the current SMC (system management controller) software version. |

Table 150: Automation Runtime summary screen

## 1.2 Power Panel 100 as an intelligent visualization system

The visualization project runs on the Power Panel 100. Serial RS232 or Ethernet TCP/IP provides the communication to the controller system. Flexible programming with frame drivers or Ethernet socket services allows a connection to be made to any control system. I/O peripherals and drives are connected to the controller.

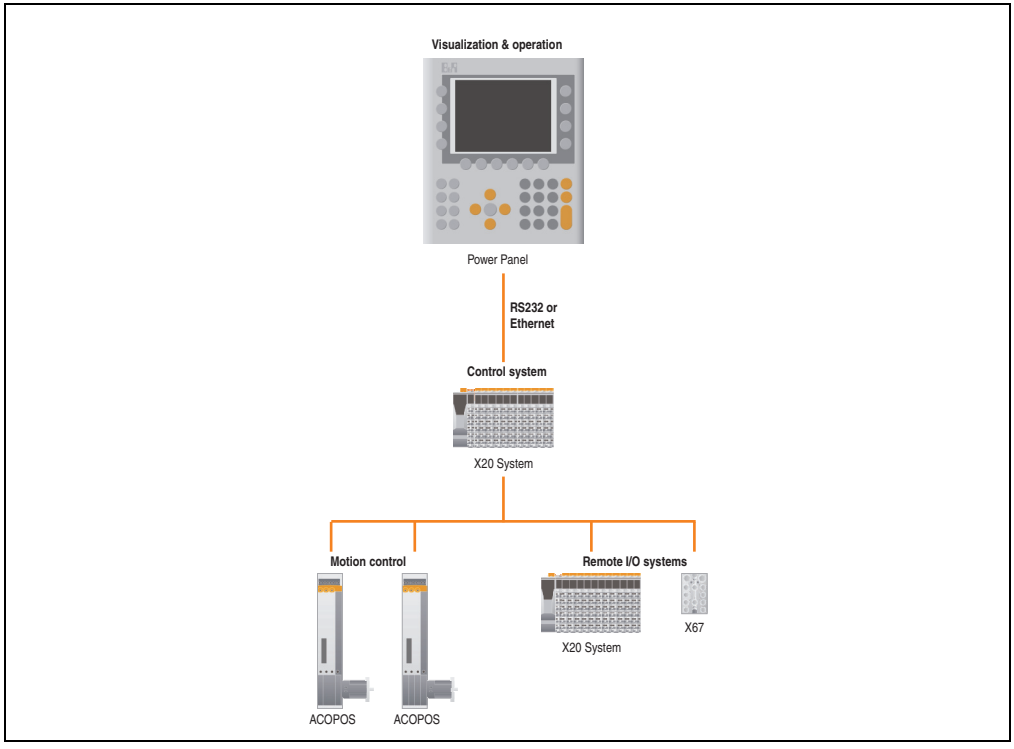



Figure 339: Power Panel 100 as an intelligent visualization system

## 1.3 Power Panel 200 with Power Panel 100 terminals

The control program and visualization run on the Power Panel 200. I/O peripherals and drives are connected via CAN, X2X and ETHERNET Powerlink. Other Power Panel 100 units are connected as terminals via Ethernet TCP/IP. The central data storage occurs on the Power Panel 200.

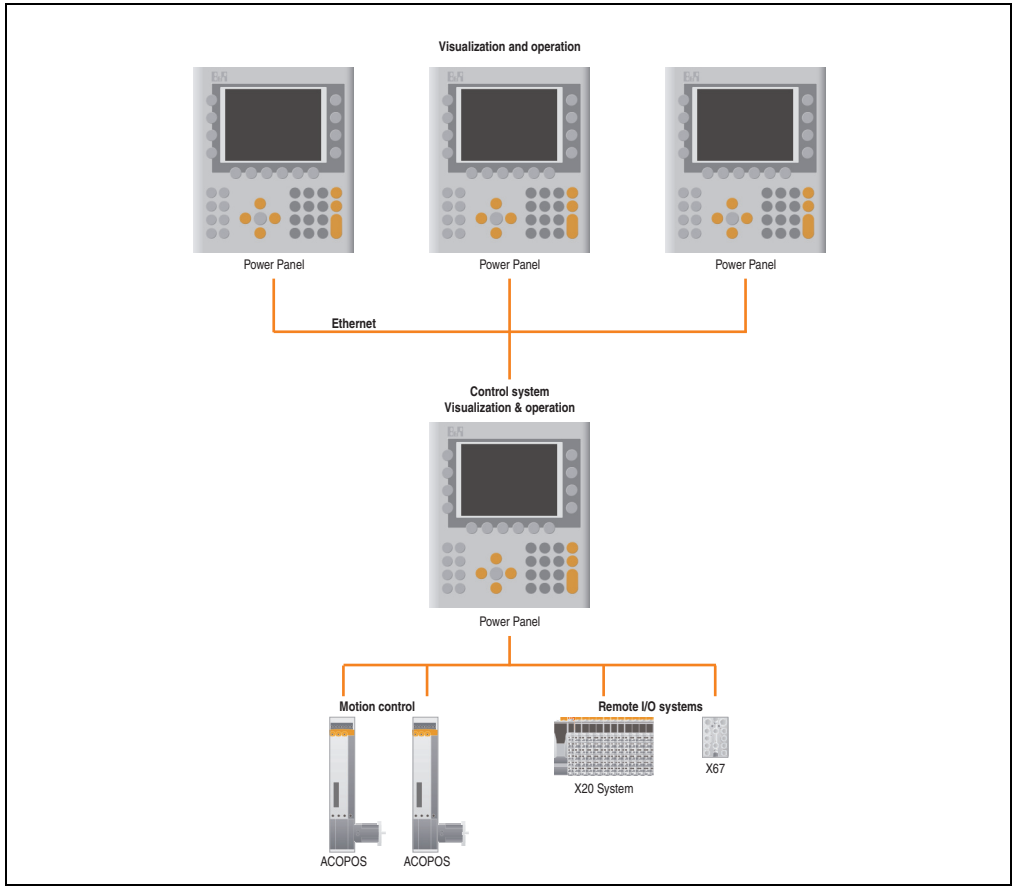



Figure 340: Power Panel 200 with Power Panel 100 terminals

## 1.4 Automation Runtime and SMC

The SMC (system management controller) monitors the following events on a Power Panel device.

- Voltage dips (power failures)
- Watchdog events
- Reset button
- Overtemperature
- Software reset

Data communication between the SMC and the Geode processor takes place over the serial I²C bus.

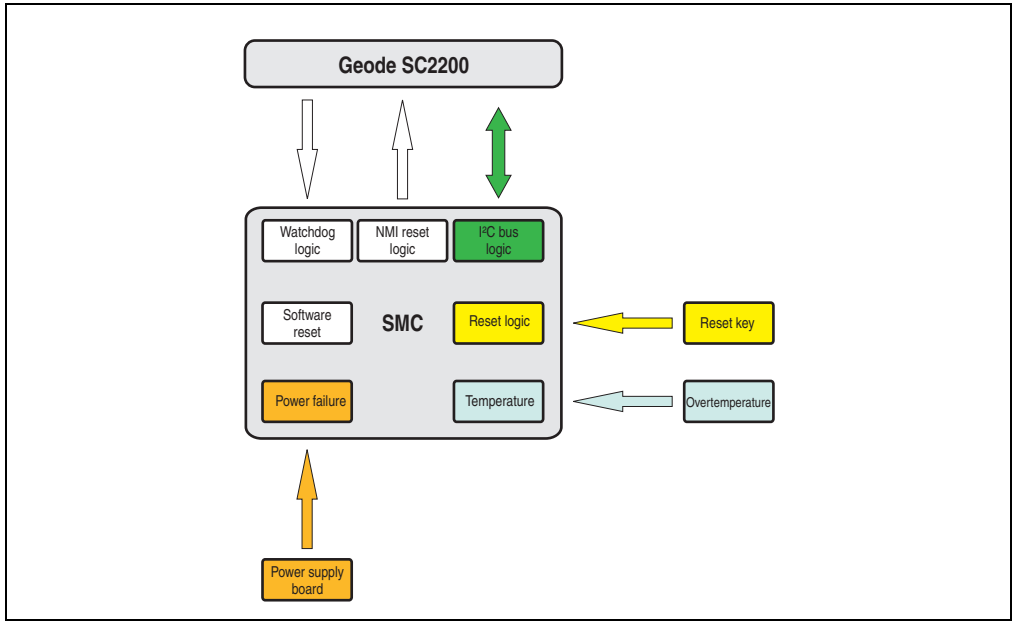



Figure 341: Block diagram of SMC and Geode processor data communication

If one of these events occurs, the SMC triggers the Automation Runtime NMI (non-maskable interrupt) ISR (interrupt service routine). In 10 ms, the NMI ISR saves 64 KB of remanent PVs (process variables) from the DRAM on the Power Panel device to the battery-buffered SRAM. When the 10 ms elapse, the Power Panel device is reset.

The reason for an NMI is logged in the error logbook. The error logbook can be read with either the B&R Automation Studio programming system or with standard functions (see SYS_Lib library in the Automation Studio help).

### 1.4.1 Voltage dips (power failures)

An NMI is triggered if the supply voltage falls below 18 VDC.

### 1.4.2 Watchdog events

Watchdog events are monitored by the SMC. Automation Runtime triggers the watchdog every 20 ms. An NMI is triggered if a signal is not detected by the SMC after 100 ms.

The watchdog window is made up of the minimum and maximum time. The minimum time must be less than the maximum time. If the watchdog is disabled, the minimum and maximum times are defined as 0000h. The watchdog is active starting with the first toggle event. The watchdog is disabled after a reset.

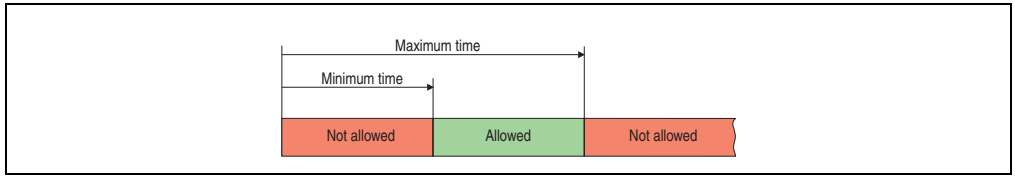



Figure 342: Watchdog events

The watchdog function is not implemented for Power Panel BIOS devices.

### 1.4.3 Reset button

An NMI is triggered if the reset button is pressed by the user.

### 1.4.4 Over-temperature

Two internal temperature values (processor and I/O) in the Power Panel device are measured cyclically (every second). An NMI / reset is triggered if overtemperature is detected three times in a row. The Power Panel remains reset until the temperature that reached the alarm limit is reduced by 5°C.
The various temperature alarm limits depend on the boot loader version being used (see figure 338 "Automation Runtime summary screen" on page 449).

| | Alarm limit until boot loader version 3.12 | Alarm limit starting with boot loader version 3.12 |
|---|---|---|
| Processor (diode line in Geode processor) | 95°C | 125°C |
| I/O (sensor on the circuit board near the processor) | 80°C | 80°C |

Table 151: Differences in the boot loader temperature alarm limits

### 1.4.5 Software reset

The Power Panel device can also be reset with a software command. This also triggers an NMI.

# 2. Power Panel with BIOS

## Information:

**The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.05. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.**

## 2.1 General information

BIOS is an abbreviation for "**B**asic **I**nput and **O**utput **S**ystem". It is the most basic standardized communication between the user and the system (hardware). A B&R-modified BIOS from Insyde is used in the Power Panel devices.

BIOS setup lets you modify basic system configuration settings. These settings are saved in CMOS RAM.

The CMOS RAM is a nonvolatile, battery-backed memory that retains information when power is not applied to the Power Panel.

BIOS is immediately activated when switching on the power supply of the Power Panel.

BIOS reads the system configuration information in CMOS RAM, checks the system, and configures it using the power-on self-test (POST).

## Information:

**After 3 unsuccessful attempts at booting the Power Panel device, BIOS overwrites the current CMOS settings with the CMOS backup values. If there is no valid CMOS backup present, then CMOS settings are set to their default values (as with "Load optimized defaults").**

When these preliminaries are finished, the BIOS seeks an operating system in the data storage devices available (CompactFlash card, drive, floppy drive). BIOS launches the operating system and hands over control of system operations to it.

Optionally, a BIOS summary screen can be displayed at the end of the POST. This displays the following information depending on the Power Panel display diagonal:

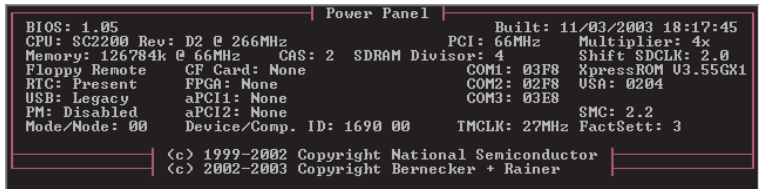



Figure 343: BIOS summary screen for VGA, SVGA, XGA Power Panel devices

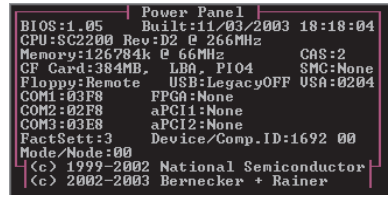



Figure 344: BIOS summary screen for QVGA Power Panel devices

To disable this summary screen, see the section "Advanced BIOS features" on page 469 for VGA, SVGA and XGA Power Panel devices and the section 2.3.4 "Advanced BIOS features" on page 492 for QVGA Power Panel devices.

To make changes in the BIOS setup, the DEL key must be pressed when booting the Power Panel device as soon as the following message appears in the upper margin of the display (during the POST):

Figure 345: Press DEL for setup

If the message disappears before DEL has been pressed[1)] , then the Power Panel must be booted again in order to enter BIOS setup.

## Information:

**The following general rule applies: Only modify those settings that you completely understand. On no account should settings be changed without a good reason. The BIOS settings have been carefully chosen by B&R to guarantee ideal performance and reliability. Even a seemingly minor change to the settings may cause the system to become unstable.**

1) A USB keyboard or the REMHOST program is required to enter characters and operate BIOS setup pages.

# Information:

**The settings recommended by B&R can be loaded with "Load optimized defaults".**

The following keys[1)] help you navigate in BIOS setup:

| Key | Function |
|---|---|
| Cursor ↑ | Moves to the previous item. |
| Cursor ↓ | Go to the next item. |
| Cursor ← | Moves to the previous item. |
| Cursor → | Go to the next item. |
| ESC | Exits the submenu. |
| Enter or press highlighted character shortcut | Changes to the selected menu. |
| F1 and ALT+H | Opens up a help window that describes the possible values for the highlighted item. Press ESC to exit the help window. In a help window, the cursor ↑, Cursor ↓, Home, End, Page Up, and Page Down keys can be used to navigate when help texts are longer than the displayable area. |
| Home | Jumps to the first BIOS menu item or object. |
| End | Jumps to the last BIOS menu item or object. |
| ALT+Q and ALT+X | Enters the BIOS main menu. |
| - (Minus) | Decreases the numerical value or selects the previous parameter value. |
| + (Plus) | Increases the numerical value or selects the next parameter value. |

Table 152: BIOS-relevant keys



1) A USB keyboard or the REMHOST program is required to enter characters and operate BIOS setup pages.

## 2.2 BIOS settings for VGA, SVGA and XGA Power Panel devices

# Information:

**The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.05. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.**

The individual BIOS setup pages for a VGA, SVGA and XGA Power Panel device are described on the following pages.

### 2.2.1 BIOS setup main menu

Immediately after the DEL button is pressed during startup, the main BIOS setup menu appears.

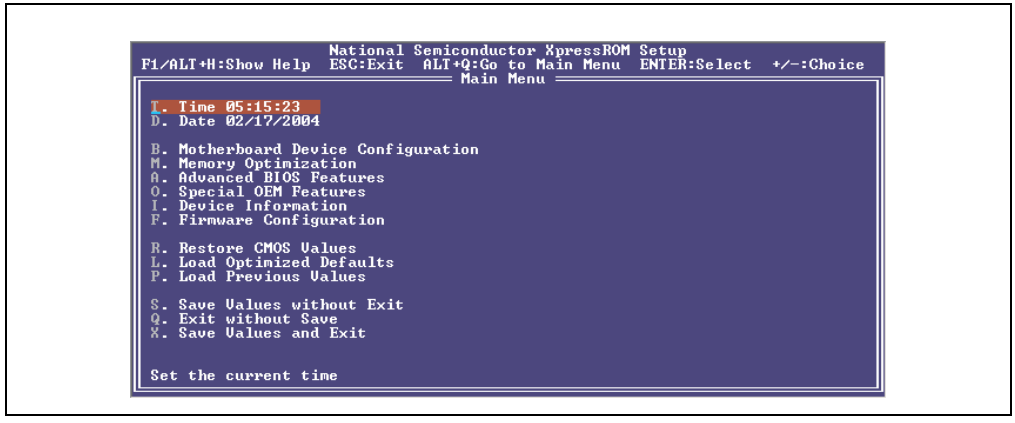



Figure 346: BIOS setup main menu

The individual menu items are explained in detail in the following sections.

| Shortcut | BIOS setup menu | Function |
|---|---|---|
| T | Time 05:15:23 AM | The system time can be configured here. |
| D | Date 02/17/2004 | The system date can be configured here. |
| B | Motherboard device configuration | Motherboard resources can be configured here. |
| M | Memory optimization | The settings for memory management can be made here. |
| A | Advanced BIOS features | Advanced BIOS options (boot logo, summary screen, cache areas) can be configured here. |
| O | Special OEM features | Specific B&R settings can be made here. |
| I | Device information | Important parameters (e.g. temperature, mode/node position, etc.) for a Power Panel device are displayed here. |
| F | Firmware configuration | Onboard firmware for FPGA and aPCI modules can be configured here. |

Table 153: Overview of BIOS main menu functions

| Shortcut | BIOS setup menu | Function |
|---|---|---|
| R | Restore CMOS values | Restores the last saved CMOS values from flash memory. |
| L | Load optimized defaults | Load the optimal BIOS settings for best performance. |
| P | Load previous values | Reloads values configured when BIOS setup was opened. All changes are lost. |
| S | Save values without exit | Saves BIOS values without exiting BIOS setup. |
| Q | Exit without save | Exits BIOS setup without saving any changes. |
| X | Save values and exit | Saves settings and exits BIOS setup. |

Table 153: Overview of BIOS main menu functions (cont.)

# Information:

**If using a German keyboard, press the "z" key to enter "y".**

### 2.2.2 Time

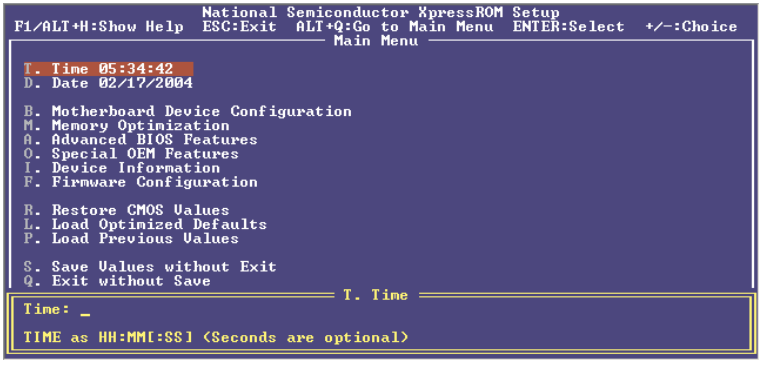



Figure 347: BIOS time menu

The currently configured system time is displayed here. The time is buffered by a battery (CMOS battery) after the Power Panel device has been switched off.

By selecting the item "Time" and the confirming by pressing Enter, or using the shortcut "A", you can enter a new system time. The format HH:MM[:SS] must be entered as follows:

Example: Set time to 13:00:00.

The entry can be made in three different ways using the keyboard:

- 13:00:00 - Confirm with Enter
- 01:00:00 PM - Confirm with Enter
- 13: - Confirm with Enter

## Information:

**If using a German keyboard, press the "Shift+ö" key to enter ":".**

### 2.2.3 Date

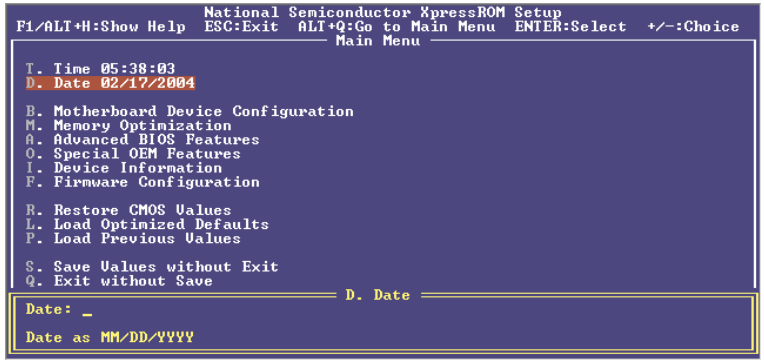



Figure 348: BIOS date menu

The current system date is displayed here. The date is buffered by a battery (CMOS battery) after the Power Panel device has been switched off.

By selecting the item "Date" and the confirming by pressing Enter, or using the shortcut "B", you can enter a new system date. The format MM:DD:YYYY must be entered as shown in the following example:

Example: Set date to 2.12.2003.

Entry using keyboard:

- 02/12/2003 - Confirm with Enter

## Information:

**If using a German keyboard, press the "-" key (next to the Shift key) to enter "/".**

### 2.2.4 Motherboard device configuration

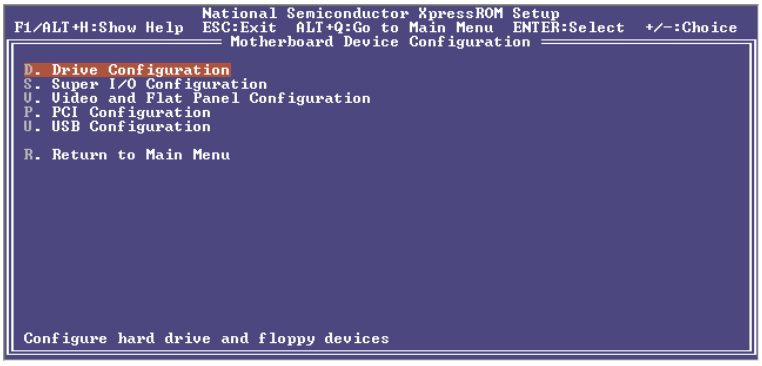



Figure 349: BIOS motherboard device configuration menu

| Shortcut | BIOS setup menu | Function |
|---|---|---|
| D | **Drive configuration** | Settings for the floppy drive and CompactFlash card. |
| S | **Super I/O configuration** | Configures the super I/O device. |
| V | **Video and flat panel configuration** | Displays the video settings and configuration for resolution, brightness, and contrast display parameters. |
| P | **PCI configuration** | Configures PCI bus settings. |
| U | **USB configuration** | Configures USB settings. |
| R | **Return to main menu** | Exits the current page and returns to the BIOS main menu. |

Table 154: BIOS motherboard device configuration menu



#### Drive configuration

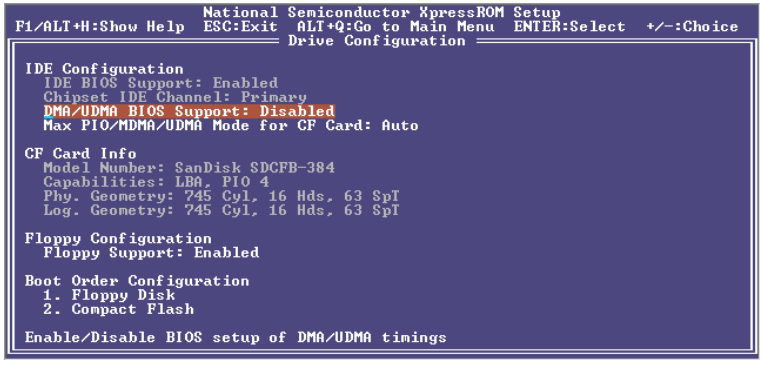



Figure 350: BIOS drive configuration menu

| BIOS setting | Meaning | Setting options | | Effect |
|---|---|---|---|---|
| IDE BIOS support | Displays the IDE configuration for the Power Panel device. | None | | - |
| Chipset IDE channel | Displays the IDE channel used. | None | | - |
| DMA/UDMA BIOS support | DMA/UDMA BIOS support can be configured here. | Enabled | | Enables this function. |
| | | Disabled | | Only PIO modes for data transfer to and from CompactFlash cards are used. |
| Max PIO/MDMA/UDMA mode for CF card | The maximum data transfer mode to and from a CompactFlash card can be configured here.<br>**Information:**<br>**If a mode is configured that is not supported by the CompactFlash card, then the fastest supported mode is configured.** | Auto | | Configures the fastest mode supported by the inserted CompactFlash card. |
| | | PIO 0 to PIO 4 | | Manual configuration option for PIO mode. |
| | | MDMA 0 to MDMA 2 | | Manual configuration option for MDMA mode. |
| | | UDMA 0 to UDMA 2 | | Manual configuration option for UDMA mode. |
| Model number | Displays the CompactFlash model ID. | None | | - |
| Capabilities | Displays the possible data transfer mode speeds to and from an inserted CompactFlash card. | None | | - |
| Phy. geometry | Displays the physical geometry of the inserted CompactFlash card in cylinders, heads and sectors. | None | | - |
| Log. geometry | Displays the logical geometry of the inserted CompactFlash card in cylinders, heads and sectors. | None | | - |
| Floppy configuration | Floppy support (USB) can be enabled here.<br>It is also possible to access a remote floppy drive and e.g. upgrade BIOS using the REMHOST program (see section "REMHOST utility disk" on page 509). | Enabled | | Enables USB floppy support. |
| | | Disabled | | Disables USB floppy support. |
| Boot order configuration | Configures the order in which memory media is booted.<br>**Information:**<br>**If two identical devices are selected, a conflict warning is displayed.** | 1 | Floppy disk [1)] | The device attempts to boot from this drive first. |
| | | | CompactFlash | |
| | | | NONE | |
| | | 2 | Floppy disk [1)] | The device attempts to boot from this drive second. |
| | | | CompactFlash | |
| | | | NONE | |

Table 155: BIOS drive configuration menu

1) Only HD diskettes (1.44 MB) are supported by BIOS.

## Super I/O configuration

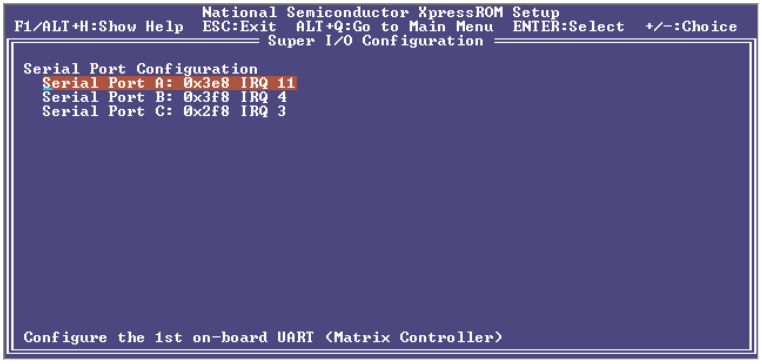



Figure 351: BIOS super I/O configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Serial port A: | Configures the first UART address range and the corresponding interrupt for the matrix controller.<br>**BIOS default setting: 0x3e8 IRQ 11.**<br>**Information:**<br>**Two ports cannot use the same address range and interrupt.** | Disabled | No assignment. |
| | | 0x3e8 IRQ 11 | Use this address range and interrupt. |
| | | 0x3f8 IRQ 4 | |
| | | 0x2f8 IRQ 3 | |
| | | 0x3e8 IRQ 4 | |
| | | 0x2f8 IRQ 3 | |
| | | 0x2f8 IRQ 11 | |
| Serial port B: | Configures the second UART address range and the corresponding interrupt for the serial interface.<br>**BIOS default setting: 0x3f8 IRQ 4.**<br>**Information:**<br>**Two ports cannot use the same address range and interrupt.** | Disabled | No assignment. |
| | | 0x3f8 IRQ 4 | Use this address range and interrupt. |
| | | 0x2f8 IRQ 3 | |
| | | 0x3e8 IRQ 4 | |
| | | 0x2f8 IRQ 3 | |
| | | 0x3e8 IRQ 11 | |
| | | 0x2f8 IRQ 11 | |
| Serial port C: | Configures the third UART address range and the corresponding interrupt for the touch controller.<br>**BIOS default setting: 0x2f8 IRQ 3.**<br>**Information:**<br>**Two ports cannot use the same address range and interrupt.** | Disabled | No assignment. |
| | | 0x2f8 IRQ 3 | Use this address range and interrupt. |
| | | 0x3f8 IRQ 4 | |
| | | 0x2f8 IRQ 3 | |
| | | 0x3e8 IRQ 4 | |
| | | 0x3e8 IRQ 11 | |
| | | 0x2f8 IRQ 11 | |

Table 156: BIOS super I/O configuration menu

## Video and flat panel configuration

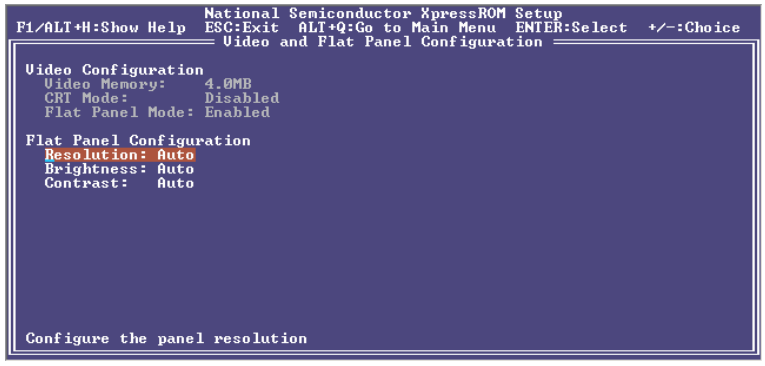



Figure 352: BIOS video configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Video memory | Displays the current video memory reserved by the main memory. | None | - |
| CRT mode | Displays on an external screen. | None | - |
| Flat panel mode | Displays on a Power Panel display. | None | - |
| Resolution | Setting for the maximum resolution for the display.<br>**Information:**<br>**Only the resolution specified for the Power Panel device should be configured! Otherwise, the display can be damaged by incorrect timing values.**<br>**If the mode/node switch is set to 0/0, then the resolution is automatically reset every time the Power Panel device is restarted.** | Auto | The maximum resolution is read from the factory settings and correctly configured automatically. |
| | | Auto (+Timing) | The maximum resolution and display timing are read from the factory settings and correctly configured automatically. If the display timing cannot be set, the internal default values are used. |
| | | QVGA(320x240) LCD | Optimal setting for a QVGA LCD Power Panel. |
| | | QVGA(320x240) TFT | Optimal setting for a QVGA TFT Power Panel. |
| | | VGA (640x480) | Optimal setting for a VGA Power Panel. |
| | | SVGA (800x600) | Optimal setting for a SVGA Power Panel. |
| | | XGA(1024x768) | Optimal setting for a XGA Power Panel. |
| Brightness | Setting for the background lighting of the display.<br>**Information:**<br>**If the mode/node switch is set to 0/0, then brightness settings are automatically set to the default values from the factory settings every time the Power Panel device is restarted.** | Auto | The optimal brightness is automatically configured using the factory settings. A brightness value between 100% and 0% is set. |
| | | 0% to 100% | Manual setting of the desired brightness within factory settings limits. |

Table 157: BIOS video configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Contrast | Setting for the contrast of the display.<br>**Information:**<br>**Contrast settings can only be configured for passive displays. If the mode/node switch is set to 0/0, then contrast settings are automatically set to the default factory settings every time the Power Panel device is restarted.** | Auto | The optimal contrast is automatically configured using the factory settings. A contrast value between 100% and 0% is set. |
| | | 0% to 100% | Manual setting of the desired contrast within factory settings limits. |

Table 157: BIOS video configuration menu (cont.)

## PCI configuration

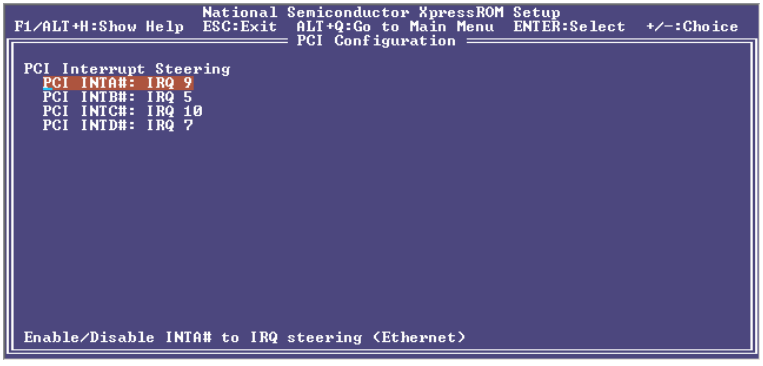



Figure 353: BIOS PCI configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| PCI INTA# | Activates the IRQ for the Ethernet controller.<br>**BIOS default setting: IRQ 9.** | Disabled | No IRQ is reserved. |
| | | 3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15 | Assigns these IRQs. |
| PCI INTB# | Activates IRQ for aPCI slot 1.<br>**BIOS default setting: IRQ 5.**<br>First IRQ for aPCI Slot 1 and IRQ for USB controller. | Disabled | No IRQ is reserved. |
| | | 3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15 | Assigns these IRQs. |
| PCI INTC# | Activates IRQ for aPCI slot 2.<br>**BIOS default setting: IRQ 10.**<br>First IRQ for aPCI slot 2 and second IRQ for aPCI slot 1. | Disabled | No IRQ is reserved. |
| | | 3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15 | Assigns these IRQs. |
| PCI INTD# | Activates IRQ for the USB controller.<br>**BIOS default setting: IRQ 7.**<br>Second IRQ for aPCI slot 2. | Disabled | No IRQ is reserved. |
| | | 3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15 | Assigns these IRQs. |

Table 158: BIOS PCI configuration menu

### USB configuration

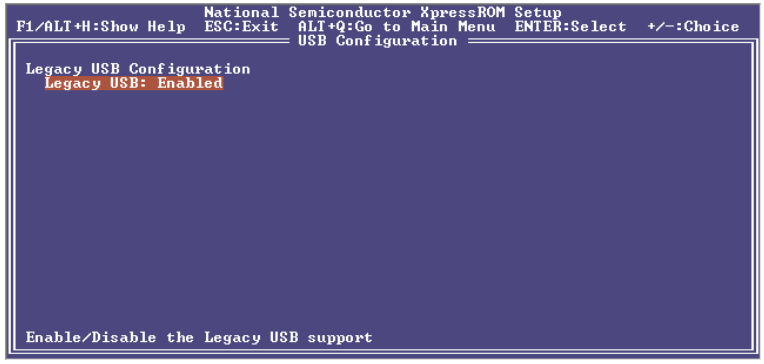



Figure 354: BIOS USB configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Legacy USB | This function enables USB support in order to make BIOS settings, e.g. using a USB keyboard, even before the operating system with USB support is loaded.<br>**Information:**<br>**If the mode/node switch is set to 0/0, then Legacy USB support is always set to "enabled".** | Enabled | Enables USB Legacy support. |
| | | Disabled | Disables USB Legacy support.<br>**Information:**<br>**After deactivating this support, booting from a USB floppy drive is no longer possible.** |

Table 159: BIOS USB configuration menu

### 2.2.5 Memory optimization

## Warning!

**The parameters in this screen are for system designers, service personnel, and technically competent users only. Only modify those settings that you completely understand.**

**Incorrectly setting "Memory optimization" values can cause instability and even cause the entire system not to boot. If the Power Panel device can no longer be booted, then the default values can be restored by restarting three times.**

## Information:

**More detailed information about the meaning and effects of the settings can also be found in the corresponding user's manual for the processor.**

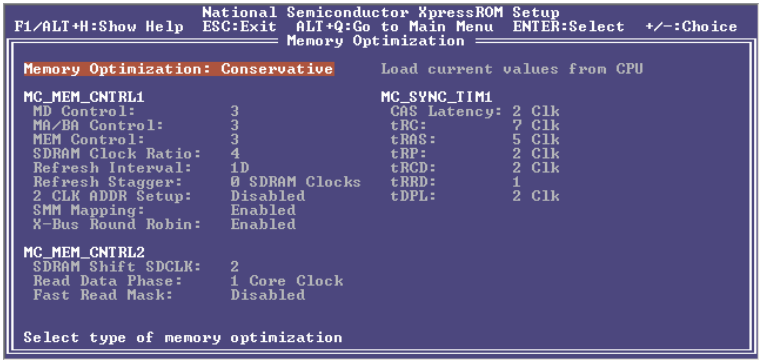



Figure 355: BIOS memory optimization menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Memory optimization | Defines how memory optimization is handled.<br>With this option, it is recommended that the user upload the current base values being used by the system from the CPU to this BIOS page when setting values manually for the first time. | Conservative | The BIOS automatically uses PC66 timing. |
| | | Optimized | BIOS uses optimized memory settings for the memory chips used. This allows faster timing. |
| | | Aggressive | BIOS uses "aggressive" memory settings based on the SPD and CPU speed.<br>**Information:**<br>**Aggressive memory settings can cause stability problems for the system.** |
| | | Manual | If "Manual" is selected, then the remaining values can be configured on this BIOS menu page. Values only become active when the user saves them before exiting BIOS and the Power Panel is rebooted. |
| Load current values from CPU | All the specified values are configured on this BIOS setup page with the current configured values. | None | The memory timing values currently used are uploaded by the CPU.<br>It is recommended that when using this option, the user uploads optimal base values (that the system uses) from the CPU to this BIOS page when setting the values manually for the first time. |
| MD control | Configures MD[63:0] drive strength. | 0 to 3 | 0 = weakest, 3 = strongest |
| MA/BA control | Configures MA[12:0] and BA[1:0] drive strength. | 0 to 3 | 0 = weakest, 3 = strongest |
| MEM control | Configures RASA#, CASA#, WEA#, CS[1:0]#, CKEA, DQM[7:0] drive strength. | 0 to 3 | 0 = weakest, 3 = strongest |
| SDRAM clock ratio | Configures SDRAM timing. | 2; 2.5; 3; 3.5; 4; 4.5; 5 | Sets DRAM clock timing. |
| Refresh interval | This parameter defines the number of processor core clocks that are multiplied by 64 between refresh cycles of the DRAM memory. | 00 to FF | |

Table 160: BIOS memory optimization menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Refresh stagger | This parameter defines the number of cycles between the RFSH command and each of the four rows. | 0 SDRAM clocks to 3 SDRAM clocks | |
| 2 CLK ADDR setup | Enables the two-clock address setup function. | Enabled | Enables this function. |
| | | Disabled | Disables this function. |
| SMM mapping | Maps the SMM memory area from GX_BASE+400000 to the physical address A0000 to BFFFF in SDRAM. | Enabled | Enables this function. |
| | | Disabled | Disables this function. |
| X-bus round robin | Configures the priority levels for processor, graphic and display controller requests. | Enabled | Processor, graphic and display controller requests are treated with the same priority level. |
| | | Disabled | Processor requests are given a higher priority level. Display controller requests always have the highest priority. |
| SDRAM shift SDCLK | This function makes switching possible for SDCLK SDRAM hold time requests. | 0.5, 1, 1.5, 2, 2.5, or 3 | |
| | | No shift | No switching. |
| Read data phase | Configures the read data phase. Regulates whether read data is latched to one or two core clocks for the rising edges of the SDCLK. | 1 core clock | After one core clock. |
| | | 2 core clocks | After two core clocks. |
| Fast read mask | Prevents the bypassing of FIFO requests via the core. | Enabled | Enables this function. |
| | | Disabled | Disables this function. |
| CAS latency | Column Address Strobe (CAS) latency describes the time it takes between addressing in a RAM block and preparing the data stored at this address. The higher the subsequent value, the greater the delay. | 2, 3, 4, 5, 6, or 7 clk | Sets the desired cycle time. |
| tRC | Sets the minimum number of SDRAM cycles between RFSH and RFSH/ACT commands. | 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15 or 16 Clk | Sets the desired cycle time. |
| tRAS | Sets the minimum number of SDRAM cycles between ACT and PRE commands. | 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15 or 16 Clk | Sets the desired cycle time. |
| tRP | Sets the minimum number of SDRAM cycles between PRE and ACT commands. | 1; 2; 3; 4; 5; 6 or 7 Clk | Sets the desired cycle time. |
| tRCD | Configures the delay between the ACT and READ/WRITE command. (tRCD) Sets the minimum number of SDRAM cycles between ACT and READ/WRITE commands. | 1; 2; 3; 4; 5; 6 or 7 Clk | Sets the desired cycle time. |
| tRRD | Configures the time between ACT(0) to ACT(1) command period. | 0-7 | |
| tDPL | Sets the minimum number of SDRAM cycles between the time for the last record date until the memory area is reloaded. | 1; 2; 3; 4; 5; 6; 7 Clk | Sets the desired cycle time. |

Table 160: BIOS memory optimization menu (cont.)

### 2.2.6 Advanced BIOS features

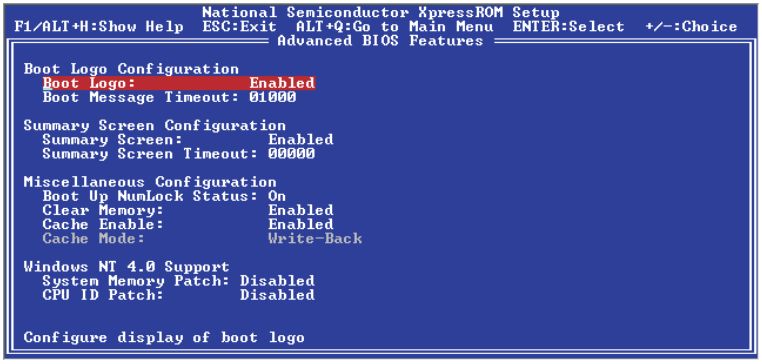



Figure 356: Advanced BIOS features menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Boot logo | Displays a boot logo while the Power Panel is starting. | Disabled | No boot logo displayed during booting. |
| | | Enabled | A B&R boot logo is displayed during booting as long as a bitmap created by a user has not been added. |
| Boot message timeout | Defines the duration of the "Press DEL for Setup" message on the display and how much time the user has to change to the BIOS configuration.<br>**Information:**<br>**Can be resumed before the timeout expires by pressing any button.** | 0 | No waiting. |
| | | 1-65535 [milliseconds] | The system waits for the manually set value in milliseconds and then resumes the boot procedure. |
| Summary screen | Displays information about BIOS, VGA, VSA versions, devices found, etc. | Enabled | Shows the summary screen. |
| | | Disabled | Hides the summary screen. |
| Summary screen timeout | Defines how long the summary screen is displayed.<br>**Information:**<br>**Can be resumed before the timeout expires by pressing any button.** | 0 | No waiting. |
| | | 1-65535 [milliseconds] | The manually set value in milliseconds that must pass. |
| Boot up NumLock status | Defines the status of an existing numeric keypad when the system is booted. | On | Enables the numeric keypad. |
| | | Off | Disables the numeric keypad. |
| Clear memory | After starting, the BIOS automatically clears the entire main memory.<br>**Information:**<br>**Clearing e.g. 256 MB RAM takes approximately 3 seconds.** | Enabled | The entire main memory is cleared.<br>This makes sense, e.g. when the system to be booted requires initialized main memory when booting. |
| | | Disabled | Disables this function. |

Table 161: Advanced BIOS features menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Cache enable | The processor has a 16 kB fast L1 cache. The data for fast access is provided in this memory. | Enabled | Recurring commands are processed in the fast L1 cache. |
| | | Disabled | Disables this function. |
| Cache mode | Using cache mode, write accesses are determined on the cache. This option is permanently set to "Write back". The information is only written in the main memory if necessary (main memory and cache do not have the same information content). | None | - |
| System memory patch | When activated, the buffer address length is not returned as zero from the national specific software interrupt 15h, the system service function E8h and the sub-function 20h (Get system memory map).<br>**Information:**<br>**This function should be activated only when using the Windows NT 4.0 operating system.** | Enabled | Enables this function. |
| | | Disabled | Disables this function. |
| CPU ID patch | If Windows NT 4.0 checks the CPU ID and recognizes a Geode CPU, it will not be able to be operated with it. Recognition is implemented starting from Service Pack 6. For this reason, this function must be enabled during installation of Windows NT 4.0 until Service Pack 6 has been installed.<br>**Information:**<br>**This function should be activated only when using the Windows NT 4.0 operating system.** | Enabled | Enables this function. |
| | | Disabled | Disables this function. |

Table 161: Advanced BIOS features menu (cont.)

### 2.2.7 Special OEM features

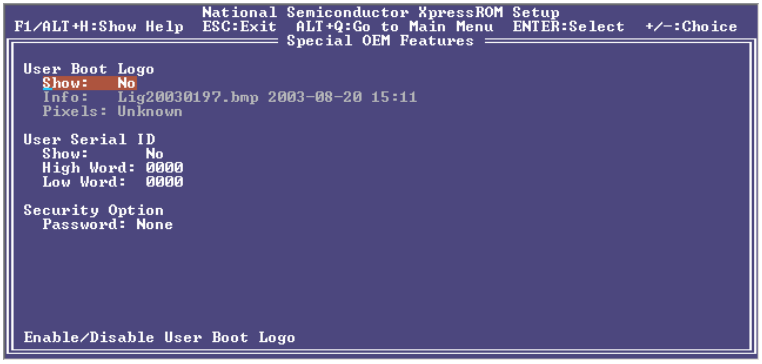



Figure 357: BIOS special OEM features menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Show (user boot logo) | A boot logo that has been created by a user can be displayed here instead of the B&R boot logo.[1)] | Yes | Display |
| | | No | |
| Info | Displays the name and the creation date of the user boot logo. | None | - |
| Pixels | Displays the resolution of the user boot logo. | None | - |
| User serial ID show | A user serial number can be displayed in the summary screen using this function when the system is started. | Yes | Displays the assigned user serial ID. |
| | | No | Hides the assigned user serial ID. |
| High word | Input possibilities for the first 4 bytes for the user serial number. | 0000-FFFF | The hexadecimal value entered defines the first 4 positions of the user serial ID. |
| Low word | Input possibilities for the second 4 bytes of the user serial number. | 0000-FFFF | The hexadecimal value entered defines the second 4 positions of the user serial ID. |
| Password | A password can be defined here which must be entered by the user when the BIOS setup is opened. | Max. 8 characters | The password must be confirmed by being entered a second time. The password can be removed again by entering a blank password (just pressing Enter).<br>**Information:**<br>**The password is also saved in the CMOS backup and is impossible to delete.** |

Table 162: BIOS special functions menu

1) See section 2.4.3 "User boot logo upgrade disk" on page 507 regarding guidelines for creating a user boot logo.

### 2.2.8 Device information

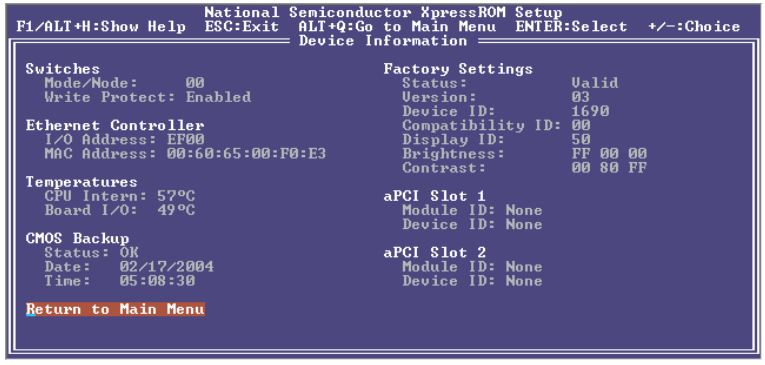



Figure 358: BIOS device information menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Mode/Node | Displays the current mode/node switch position. | None | - |
| Write protect | Displays the switch position for the "write protect" switch. | None | - |
| I/O address | Displays the Ethernet I/O address. | None | - |
| MAC address | Displays the assigned MAC address. | None | - |
| CPU intern | Displays the current internal processor temperature. | None | - |
| Board I/O | Indicates the current board I/O temperature. | None | - |
| Status | The status for the last automatically saved CMOS backup is displayed here. | None | If the boot procedure is successful, then the CMOS values are automatically saved by BIOS in flash memory. Values are therefore only saved in flash memory if the backup is not equal to the current CMOS, the backup is not available, or the backup checksum is incorrect. |
| Date | Date of the last automatically saved CMOS backup. | None | |
| Time | Time of the last automatically created CMOS backup. | None | |
| Status | Status display for factory settings. | None | - |
| Version | Version display for factory settings. | None | - |
| Device ID | Hex value for the device code of the Power Panel device. | None | - |
| Compatibility ID | The compatibility code of the Power Panel device is displayed here. | None | - |

Table 163: BIOS device information menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Display ID | Shows the display ID used.<br>Possible display IDs are:<br>00h - Unknown<br>10h - Passive displays (STN)<br>11h - LCD B/W QVGA<br>12h - LCD COL QVGA<br>20h - Active displays (TFT) with QVGA<br>30h - Active displays (TFT) with VGA<br>40h - Active displays (TFT) with SVGA<br>50h - Active displays (TFT) with XVGA | None | - |
| Brightness | The defined brightness values (minimum, default, maximum) for the display used are shown here as hex values. | None | - |
| Contrast | The defined contrast values (minimum, default, maximum) for the display used are shown here as hex values. | None | - |
| aPCI slot 1<br>Module ID<br>Device ID | Information about an installed aPCI module in aPCI slot 1 of the Power Panel device is displayed here. | None | - |
| aPCI slot 1<br>Module ID<br>Device ID | Information about an installed aPCI module in aPCI slot 2 of the Power Panel device is displayed here. | None | - |

Table 163: BIOS device information menu (cont.)

## 2.2.9 Firmware configuration

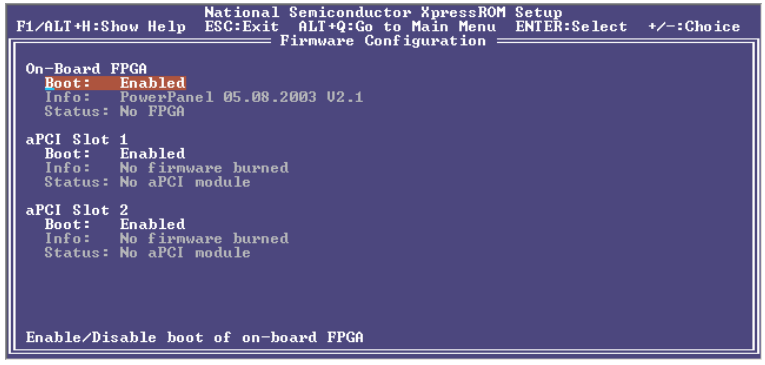



Figure 359: BIOS firmware configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Onboard FPGA Boot | The onboard FPGA controls the image output for Power Panel 200 devices with BIOS. | Enabled | The onboard FPGA is enabled and initialized. |
| | | Disabled | Deactivates the FPGA.<br>If this function is deactivated, then no picture is output on Power Panel 200 devices. This function can only be re-enabled using the program "REMHOST" (see section "REMHOST utility disk" on page 509). |
| Info | Information about the FPGA firmware. | None | - |
| Status | Status display for the onboard FPGA. | None | - |
| aPCI slot 1 Boot | A connected aPCI module in the aPCI slot 1 is initialized and booted as long as valid firmware is available. | Enabled | The aPCI module is booted if a corresponding firmware file is burned in flash memory of the Power Panel. |
| | | Disabled | The aPCI module is not booted by BIOS. |
| Info | Information about a stored boot file for the aPCI slot 1 in flash memory. | None | - |
| Status | Status display for aPCI slot 1 modules. | None | - |
| aPCI slot 2 Boot | A connected aPCI module in the aPCI slot 2 is initialized and booted as long as valid firmware is available. | Enabled | The aPCI module is booted if a corresponding firmware file is burned in flash memory of the Power Panel. |
| | | Disabled | The aPCI module is not booted by BIOS. |
| Info | Information about a stored boot file for the aPCI slot 2 in flash memory. | None | - |
| Status | Status display for aPCI slot 2 modules. | None | - |

Table 164: BIOS firmware configuration menu

### 2.2.10 Restore CMOS values

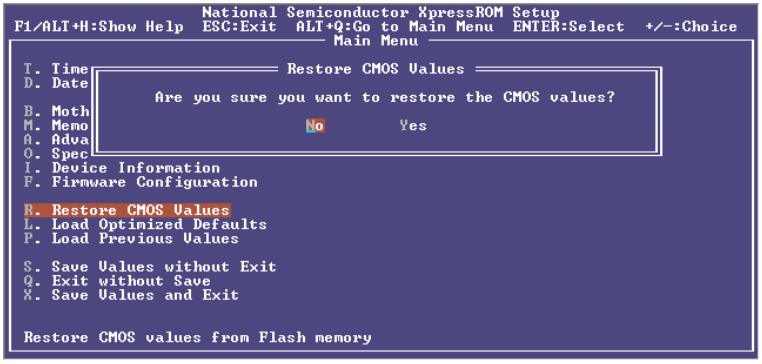



Figure 360: BIOS restore CMOS values menu

Selecting "Yes" under this BIOS menu (R shortcut) restores the last CMOS values stored in flash memory. All configurable CMOS values (besides date and time) are restored again in the BIOS setup.

## Information:

**If the boot procedure is successful, then the CMOS values are automatically saved by BIOS in flash memory. Values are therefore only saved in flash memory if the backup is not equal to the current CMOS, the backup is not available, or the backup checksum is incorrect.**

To protect CMOS data, a CMOS backup was integrated into BIOS. If the BIOS setup was ended using "Save values and exit" and the Power Panel device was correctly restarted, then the CMOS data is burned to flash memory. If the CMOS checksum is incorrect during startup (battery dead) or the Power Panel device cannot be booted correctly three times consecutively, then the salvaged data from flash memory is copied again to CMOS. Setup is back to its original state, except for the time.

## Information:

**If using a German keyboard, press the "z" key to enter "y".**

### 2.2.11 Load optimized defaults

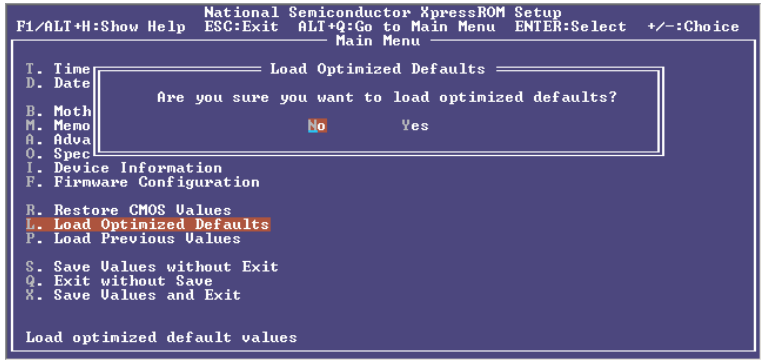



Figure 361: BIOS load optimized defaults menu

By clicking on "Yes", optimal BIOS settings for best performance can be loaded using this BIOS menu item (L shortcut).

## Information:

**These settings are also recommended by B&R.**

## Information:

**If using a German keyboard, press the "z" key to enter "y".**

### 2.2.12 Load previous values

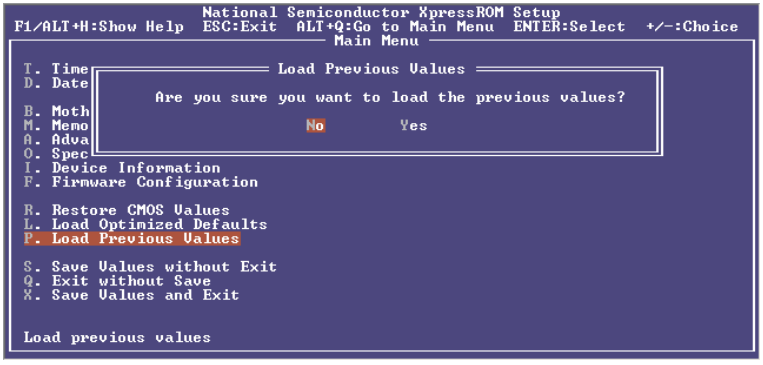



Figure 362: BIOS load previous values menu

Selecting "yes" under this BIOS menu item (P shortcut) reloads the values at the point when BIOS setup was opened. All changes are lost.

## Information:

**If using a German keyboard, press the "z" key to enter "y".**

### 2.2.13 Save values without exit

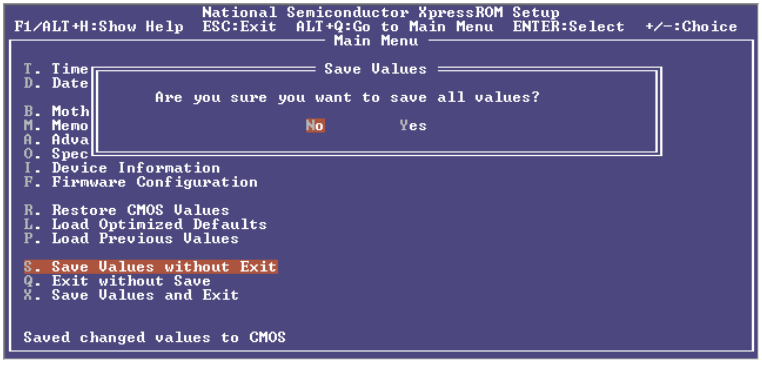



Figure 363: BIOS save values without exit menu

BIOS values are saved using this menu item (S shortcut) by selecting "Yes". The user can then make additional settings or exit BIOS setup.

# Information:

**If using a German keyboard, press the "z" key to enter "y".**

### 2.2.14 Exit without save

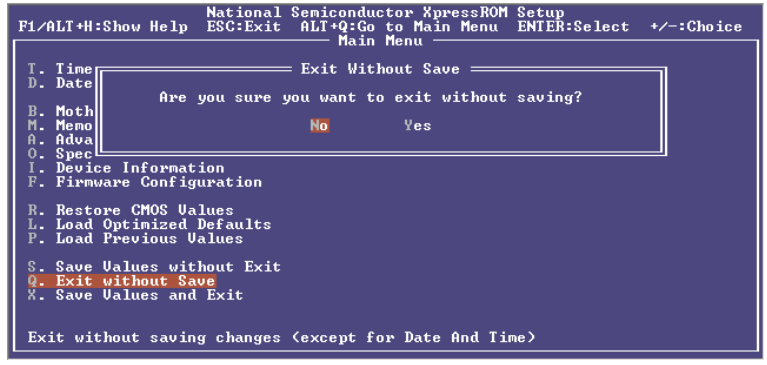



Figure 364: BIOS exit without save menu

BIOS setup can be exited by selecting "Yes" under this menu item (shortcut "Q") without saving any changes that might have been made. The system is then automatically restarted.

# Information:

**If using a German keyboard, press the "z" key to enter "y".**

### 2.2.15 Save values and exit

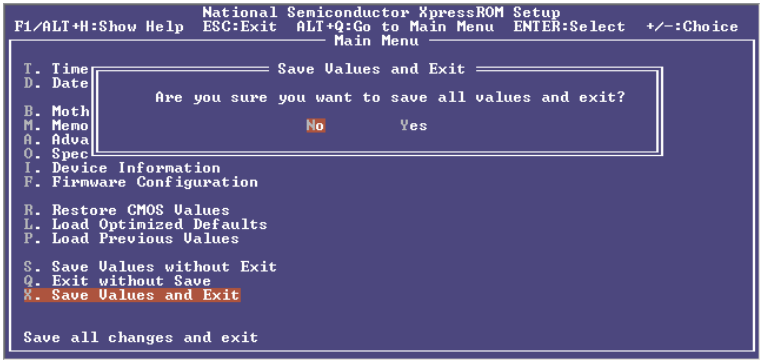



Figure 365: BIOS save values and exit menu

If "Yes" is selected under this menu item (X shortcut), the system saves the settings, automatically exits BIOS setup, and reboots the system.

For more information about the CMOS backup, see the section 2.5 "CMOS backup".

## Information:

**If using a German keyboard, press the "z" key to enter "y".**

## 2.3 BIOS settings for QVGA Power Panel devices

# Information:

**The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.05. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.**

In the following pages, the individual BIOS setup pages for a QVGA Power Panel device will be described in more detail.

### 2.3.1 BIOS setup main menu

Immediately after the DEL button is pressed during startup, the main BIOS setup menu appears.

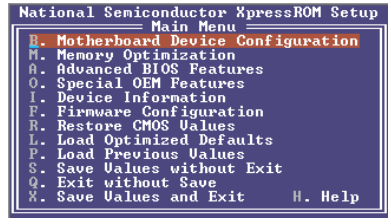



Figure 366: BIOS setup main menu

The individual menu items are explained in detail in the following sections.

| Shortcut | BIOS setup menu | Function |
|---|---|---|
| B | Motherboard device configuration | Motherboard resources such as date, time, USB, PCI, etc. can be configured here. |
| M | Memory optimization | The settings for memory management can be made here. |
| A | Advanced BIOS features | Advanced BIOS options (boot logo, summary screen, cache areas) can be configured here. |
| O | Special OEM features | Specific B&R settings can be made here. |
| I | Device information | Important parameters (e.g. temperature, mode/node position, etc.) for a Power Panel device are displayed here. |
| F | Firmware configuration | Onboard firmware for FPGA and aPCI modules can be configured here. |
| R | Restore CMOS values | Restores the last saved CMOS values from flash memory. |
| L | Load optimized defaults | Load the optimal BIOS settings for best performance. |
| P | Load previous values | Reloads values configured when BIOS setup was opened. All changes are lost. |
| S | Save values without exit | Saves BIOS values without exiting BIOS setup. |
| Q | Exit without save | Exits BIOS setup without saving any changes. |
| X | Save values and exit | Saves settings and exits BIOS setup. |

Table 165: Overview of BIOS main menu functions

# Information:

**If using a German keyboard, press the "z" key to enter "y".**

### 2.3.2 Motherboard device configuration

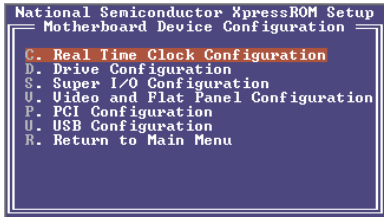



Figure 367: BIOS motherboard device configuration

| Shortcut | BIOS setup menu | Function |
|---|---|---|
| C | **Real-time clock configuration** | Sets the system date and the system time. |
| D | **Drive configuration** | Settings for the floppy drive and CompactFlash card. |
| S | **Super I/O configuration** | Configures the super I/O device. |
| V | **Video and flat panel configuration** | Displays the video settings and configuration for resolution, brightness, and contrast display parameters. |
| P | **PCI configuration** | Configures PCI bus settings. |
| U | **USB configuration** | Configures USB settings. |
| R | **Return to main menu** | Exits the current page and returns to the BIOS main menu. |

Table 166: BIOS motherboard device configuration menu

## Real-time clock configuration

Figure 368: BIOS real-time clock configuration

| Shortcut | BIOS setup menu | Function |
|---|---|---|
| T | Time | Sets the system time. |
| D | Date | Sets the system date. |

Table 167: BIOS real-time clock configuration menu

Time

The currently configured system time is displayed here. The time is buffered by a battery (CMOS battery) after the Power Panel device has been switched off.

By selecting the item "Time" and the confirming by pressing Enter, or using the shortcut "A", you can enter a new system time. The format HH:MM[:SS] must be entered as follows:

Example: Set time to 13:00:00.

The entry can be made in three different ways using the keyboard:

- 13:00:00 - Confirm with Enter
- 01:00:00 PM - Confirm with Enter
- 13: - Confirm with Enter

# Information:

**If using a German keyboard, press the "Shift+ö" key to enter ":".**

Date

The current system date is displayed here. The date is buffered by a battery (CMOS battery) after the Power Panel device has been switched off.

By selecting the item "Date" and the confirming by pressing Enter, or using the shortcut "B", you can enter a new system date. The format MM:DD:YYYY must be entered as shown in the following example:

Example: Set date to 2.12.2003.

Entry using keyboard:

- 02/12/2003 - Confirm with Enter

## Information:

**If using a German keyboard, press the "-" key (next to the Shift key) to enter "/".**

### Drive configuration

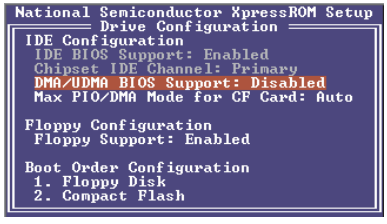



Figure 369: BIOS drive configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| IDE BIOS support | Displays the IDE configuration of the Power Panel. | None | - |
| Chipset IDE channel | Displays the IDE channel used. | None | - |
| DMA/UDMA BIOS support | DMA/UDMA BIOS support can be configured here. | Enabled | Enables this function. |
| | | Disabled | Only PIO modes for data transfer to and from CompactFlash cards are used. |

Table 168: BIOS drive configuration menu

| BIOS setting | Meaning | Setting options | | Effect |
|---|---|---|---|---|
| Max PIO/MDMA/UDMA mode for CF card | The maximum data transfer mode to and from a CompactFlash card can be configured here.<br>**Information:**<br>**If a mode is configured that is not supported by the CompactFlash card, then the fastest supported mode is configured.** | Auto | | Configures the fastest mode supported by the inserted CompactFlash card. |
| | | PIO 0 to PIO 4 | | Manual configuration option for PIO mode. |
| | | MDMA 0 to MDMA 2 | | Manual configuration option for MDMA mode. |
| | | UDMA 0 to UDMA 2 | | Manual configuration option for UDMA mode. |
| Floppy configuration | Floppy support (USB) can be enabled here.<br>It is also possible to access a remote floppy drive and e.g. upgrade BIOS using the REMHOST program (see section "REMHOST utility disk" on page 509). | Enabled | | Enables USB floppy support. |
| | | Disabled | | Disables USB floppy support. |
| Boot order configuration | Configures the order in which memory media is booted.<br>**Information:**<br>**If two identical devices are selected, a conflict warning is displayed.** | 1 | Floppy disk [1] | The device attempts to boot from this drive first. |
| | | | CompactFlash | |
| | | | NONE | |
| | | 2 | Floppy disk [1] | The device attempts to boot from this drive second. |
| | | | CompactFlash | |
| | | | NONE | |

Table 168: BIOS drive configuration menu (cont.)

1) Only HD diskettes (1.44 MB) are supported by BIOS.

## Super I/O configuration

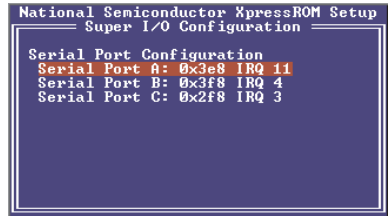



Figure 370: BIOS super I/O configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Serial port A: | Configures the first UART address range and the corresponding interrupt for the matrix controller.<br>**BIOS default setting: 0x3e8 IRQ 11.**<br>**Information:**<br>**Two ports cannot use the same address range and interrupt.** | Disabled | No assignment. |
| | | 0x3e8 IRQ 11 | Use this address range and interrupt. |
| | | 0x3f8 IRQ 4 | |
| | | 0x2f8 IRQ 3 | |
| | | 0x3e8 IRQ 4 | |
| | | 0x2f8 IRQ 3 | |
| | | 0x2f8 IRQ 11 | |
| Serial port B: | Configures the second UART address range and the corresponding interrupt for the serial interface.<br>**BIOS default setting: 0x3f8 IRQ 4.**<br>**Information:**<br>**Two ports cannot use the same address range and interrupt.** | Disabled | No assignment. |
| | | 0x3f8 IRQ 4 | Use this address range and interrupt. |
| | | 0x2f8 IRQ 3 | |
| | | 0x3e8 IRQ 4 | |
| | | 0x2f8 IRQ 3 | |
| | | 0x3e8 IRQ 11 | |
| | | 0x2f8 IRQ 11 | |
| Serial port C: | Configures the third UART address range and the corresponding interrupt for the touch controller.<br>**BIOS default setting: 0x2f8 IRQ 3.**<br>**Information:**<br>**Two ports cannot use the same address range and interrupt.** | Disabled | No assignment. |
| | | 0x2f8 IRQ 3 | Use this address range and interrupt. |
| | | 0x3f8 IRQ 4 | |
| | | 0x2f8 IRQ 3 | |
| | | 0x3e8 IRQ 4 | |
| | | 0x3e8 IRQ 11 | |
| | | 0x2f8 IRQ 11 | |

Table 169: BIOS super I/O configuration menu

## Video and flat panel configuration

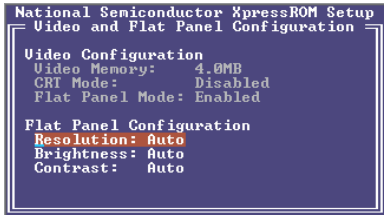



Figure 371: BIOS video configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Video memory | Displays the current video memory reserved by the main memory. | None | - |
| CRT mode | Displays on an external screen. | None | - |

Table 170: BIOS video configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Flat panel mode | Displays on a Power Panel display. | None | - |
| Resolution | Setting for the maximum resolution for the display.<br>**Information:**<br>**Only the resolution specified for the Power Panel device should be configured! Otherwise, the display can be damaged by incorrect timing values.**<br>**If the mode/node switch is set to 0/0, then the resolution is automatically reset every time the Power Panel device is restarted.** | Auto | The maximum resolution is read from the factory settings and correctly configured automatically. |
| | | Auto (+Timing) | The maximum resolution and display timing are read from the factory settings and correctly configured automatically. If the display timing cannot be set, the internal default values are used. |
| | | QVGA(320x240) LCD | Optimal setting for a QVGA LCD Power Panel. |
| | | QVGA(320x240) TFT | Optimal setting for a QVGA TFT Power Panel. |
| | | VGA (640x480) | Optimal setting for a VGA Power Panel. |
| | | SVGA (800x600) | Optimal setting for a SVGA Power Panel. |
| | | XGA(1024x768) | Optimal setting for a XGA Power Panel. |
| Brightness | Setting for the background lighting of the display.<br>**Information:**<br>**If the mode/node switch is set to 0/0, then brightness settings are automatically set to the default values from the factory settings every time the Power Panel device is restarted.** | Auto | The optimal brightness is automatically configured using the factory settings. A brightness value between 100% and 0% is set. |
| | | 0% to 100% | Manual setting of the desired brightness within factory settings limits. |
| Contrast | Setting for the contrast of the display.<br>**Information:**<br>**Contrast settings can only be configured for passive displays. If the mode/node switch is set to 0/0, then contrast settings are automatically set to the default factory settings every time the Power Panel device is restarted.** | Auto | The optimal contrast is automatically configured using the factory settings. A contrast value between 100% and 0% is set. |
| | | 0% to 100% | Manual setting of the desired contrast within factory settings limits. |

Table 170: BIOS video configuration menu (cont.)

## PCI configuration

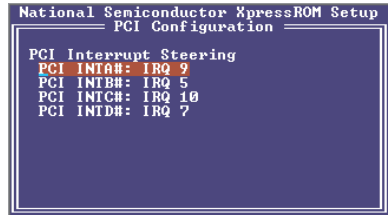



Figure 372: BIOS PCI configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| PCI INTA# | Activates the IRQ for the Ethernet controller.<br>**BIOS default setting: IRQ 9.** | Disabled | No IRQ is reserved. |
| | | 3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15 | Assigns these IRQs. |
| PCI INTB# | Activates IRQ for aPCI slot 1.<br>**BIOS default setting: IRQ 5.**<br>First IRQ for aPCI Slot 1 and IRQ for USB controller. | Disabled | No IRQ is reserved. |
| | | 3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15 | Assigns these IRQs. |
| PCI INTC# | Activates IRQ for aPCI slot 2.<br>**BIOS default setting: IRQ 10.**<br>First IRQ for aPCI slot 2 and second IRQ for aPCI slot 1. | Disabled | No IRQ is reserved. |
| | | 3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15 | Assigns these IRQs. |
| PCI INTD# | Activates IRQ for the USB controller.<br>**BIOS default setting: IRQ 7.**<br>Second IRQ for aPCI slot 2. | Disabled | No IRQ is reserved. |
| | | 3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15 | Assigns these IRQs. |

Table 171: BIOS PCI configuration menu

## USB configuration

Figure 373: BIOS USB configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Legacy USB | This function enables USB support in order to make BIOS settings, e.g. using a USB keyboard, even before the operating system with USB support is loaded.<br>**Information:**<br>**If the mode/node switch is set to 0/0, then Legacy USB support is always set to "enabled".** | Enabled | Enables USB Legacy support. |
| | | Disabled | Disables USB Legacy support.<br>**Information:**<br>**After deactivating this support, booting from a USB floppy drive is no longer possible.** |

Table 172: BIOS USB configuration menu

### 2.3.3 Memory optimization

## Warning!

**The parameters in this screen are for system designers, service personnel, and technically competent users only. Only modify those settings that you completely understand.**

**Incorrectly setting "Memory optimization" values can cause instability and even cause the entire system not to boot. If the Power Panel device can no longer be booted, then the default values can be restored by restarting three times.**

## Information:

**More detailed information about the meaning and effects of the settings can also be found in the corresponding user's manual for the processor.**

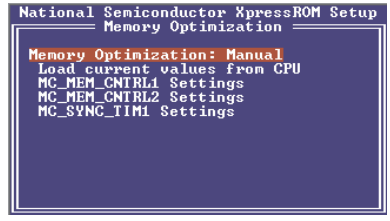



Figure 374: BIOS memory optimization menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Memory optimization | Defines how memory optimization is handled.<br>With this option, it is recommended that the user upload the current base values being used by the system from the CPU to this BIOS page when setting values manually for the first time. | Conservative | The BIOS automatically uses PC66 timing. |
| | | Optimized | BIOS uses optimized memory settings for the memory chips used. This allows faster timing. |
| | | Aggressive | BIOS uses "aggressive" memory settings based on the SPD and CPU speed.<br>**Information.**<br>**Aggressive memory settings can cause stability problems for the system.** |
| | | Manual | If "Manual" is selected then the remaining 3 submenus are active, in order to be able to make the changes. |

Table 173: BIOS memory optimization menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Load current values from CPU | All the specified values are configured on this BIOS setup page with the current configured values. | None | The memory timing values currently used are uploaded by the CPU.<br>It is recommended that when using this option, the user uploads optimal base values (that the system uses) from the CPU to this BIOS page when setting the values manually for the first time. |
| MC_MEM_CNTRL1 settings | The memory control register MC_MEM_CNTRL1 can be configured here. Only active if "Memory optimization" is set to "Manual". See section "MC_MEM_CNTRL1 settings" on page 489. | None | - |
| MC_MEM_CNTRL2 settings | The memory control register MC_MEM_CNTRL2 can be configured here. Only active if "Memory optimization" is set to "Manual". See section "MC_MEM_CNTRL2 settings" on page 490. | None | - |
| MC_SYNC_TIM1 settings | The memory control register MC_SYNC_TIM1 can be configured here. Only active if "Memory optimization" is set to "Manual". See section "MC_SYNC_TIM1 Settings" on page 491. | None | - |

Table 173: BIOS memory optimization menu (cont.)

## MC_MEM_CNTRL1 settings

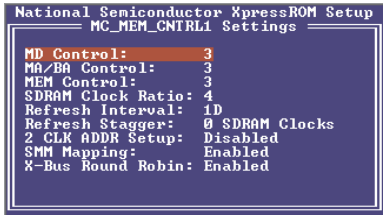



Figure 375: MC_MEM_CNTRL1 settings

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| MD control | Configures MD[63:0] drive strength. | 0 to 3 | 0 = weakest, 3 = strongest |
| MA/BA control | Configures MA[12:0] and BA[1:0] drive strength. | 0 to 3 | 0 = weakest, 3 = strongest |
| MEM control | Configures RASA#, CASA#, WEA#, CS[1:0]#, CKEA, DQM[7:0] drive strength. | 0 to 3 | 0 = weakest, 3 = strongest |
| SDRAM clock ratio | Configures SDRAM timing. | 2; 2.5; 3; 3.5; 4; 4.5; 5 | Sets DRAM clock timing. |

Table 174: BIOS MC_MEM_CNTRL1 settings menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Refresh interval | This parameter defines the number of processor core clocks that are multiplied by 64 between refresh cycles of the DRAM memory. | 00 to FF | |
| Refresh stagger | This parameter defines the number of cycles between the RFSH command and each of the four rows. | 0 SDRAM clocks to 3 SDRAM clocks | |
| 2 CLK ADDR setup | Enables the two-clock address setup function. | Enabled | Enables this function. |
| | | Disabled | Disables this function. |
| SMM mapping | Maps the SMM memory area from GX_BASE+400000 to the physical address A0000 to BFFFF in SDRAM. | Enabled | Enables this function. |
| | | Disabled | Disables this function. |
| X-bus round robin | Configures the priority levels for processor, graphic and display controller requests. | Enabled | Processor, graphic and display controller requests are treated with the same priority level. |
| | | Disabled | Processor requests are given a higher priority level. Display controller requests always have the highest priority. |

Table 174: BIOS MC_MEM_CNTRL1 settings menu (cont.)

## MC_MEM_CNTRL2 settings

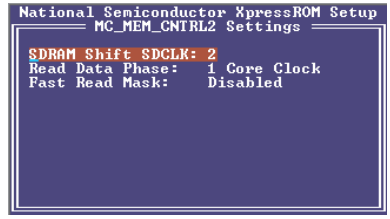



Figure 376: MC_MEM_CNTRL2 settings

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| SDRAM shift SDCLK | This function makes switching possible for SDCLK SDRAM hold time requests. | 0.5, 1, 1.5, 2, 2.5, or 3 | |
| | | No shift | No switching. |
| Read data phase | Configures the read data phase. Regulates whether read data is latched to one or two core clocks for the rising edges of the SDCLK. | 1 core clock | After one core clock. |
| | | 2 core clocks | After two core clocks. |
| Fast read mask | Prevents the bypassing of FIFO requests via the core. | Enabled | Enables this function. |
| | | Disabled | Disables this function. |

Table 175: BIOS MC_MEM_CNTRL2 settings menu

## MC_SYNC_TIM1 Settings

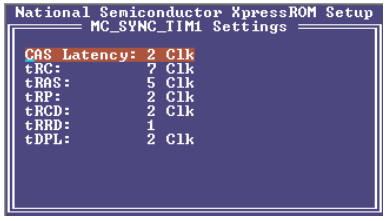



Figure 377: MC_SYNC_TIM1 settings

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| CAS latency | Column Address Strobe (CAS) latency describes the time it takes between addressing in a RAM block and preparing the data stored at this address. The higher the subsequent value, the greater the delay. | 2, 3, 4, 5, 6, or 7 clk | Sets the desired cycle time. |
| tRC | Sets the minimum number of SDRAM cycles between RFSH and RFSH/ACT commands. | 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15 or 16 Clk | Sets the desired cycle time. |
| tRAS | Sets the minimum number of SDRAM cycles between ACT and PRE commands. | 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15 or 16 Clk | Sets the desired cycle time. |
| tRP | Sets the minimum number of SDRAM cycles between PRE and ACT commands. | 1; 2; 3; 4; 5; 6 or 7 Clk | Sets the desired cycle time. |
| tRCD | Configures the delay between the ACT and READ/WRITE command. (tRCD) Sets the minimum number of SDRAM cycles between ACT and READ/WRITE commands. | 1; 2; 3; 4; 5; 6 or 7 Clk | Sets the desired cycle time. |
| tRRD | Configures the time between ACT(0) to ACT(1) command period. | 0-7 | |
| tDPL | Sets the minimum number of SDRAM cycles between the time for the last record date until the memory area is reloaded. | 1; 2; 3; 4; 5; 6; 7 Clk | Sets the desired cycle time. |

Table 176: BIOS MC_SYNC_TIM1 settings menu

### 2.3.4 Advanced BIOS features

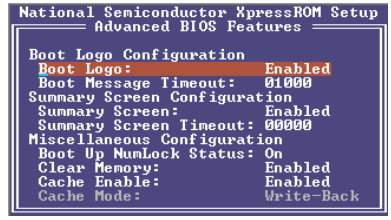



Figure 378: Advanced BIOS features menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Boot logo | Displays a boot logo while the Power Panel is starting. | Disabled | No boot logo displayed during booting. |
| | | Enabled | A B&R boot logo is displayed during booting as long as a bitmap created by a user has not been added. |
| Boot message timeout | Defines the duration of the "Press DEL for Setup" message on the display and how much time the user has to change to the BIOS configuration.<br>**Information:**<br>**Can be resumed before the timeout expires by pressing any button.** | 0 | No waiting. |
| | | 1-65535 [milliseconds] | The system waits for the manually set value in milliseconds and then resumes the boot procedure. |
| Summary screen | Displays information about BIOS, VGA, VSA versions, devices found, etc. | Enabled | Shows the summary screen. |
| | | Disabled | Hides the summary screen. |
| Summary screen timeout | Defines how long the summary screen is displayed.<br>**Information:**<br>**Can be resumed before the timeout expires by pressing any button.** | 0 | No waiting. |
| | | 1-65535 [milliseconds] | The manually set value in milliseconds that must pass. |
| Boot up NumLock status | Defines the status of an existing numeric keypad when the system is booted. | On | Enables the numeric keypad. |
| | | Off | Disables the numeric keypad. |
| Clear memory | After starting, the BIOS automatically clears the entire main memory.<br>**Information:**<br>**Clearing e.g. 256 MB RAM takes approximately 3 seconds.** | Enabled | The entire main memory is cleared.<br>This makes sense, e.g. when the system to be booted requires initialized main memory when booting. |
| | | Disabled | Disables this function. |
| Cache enable | The processor has a 16 kB fast L1 cache. The data for fast access is provided in this memory. | Enabled | Recurring commands are processed in the fast L1 cache. |
| | | Disabled | Disables this function. |

Table 177: Advanced BIOS features menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Cache mode | Using cache mode, write accesses are determined on the cache. This option is permanently set to "Write back". The information is only written in the main memory if necessary (main memory and cache do not have the same information content). | None | - |

Table 177: Advanced BIOS features menu (cont.)

### 2.3.5 Special OEM features

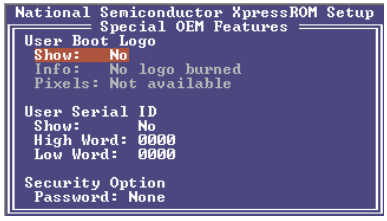



Figure 379: BIOS special OEM features menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Show (user boot logo) | A boot logo that has been created by a user can be displayed here instead of the B&R boot logo.[1)] | Yes | Display |
| | | No | |
| Info | Displays the name and the creation date of the user boot logo. | None | - |
| Pixels | Displays the resolution of the user boot logo. | None | - |
| User serial ID show | A user serial number can be displayed in the summary screen using this function when the system is started. | Yes | Displays the assigned user serial ID. |
| | | No | Hides the assigned user serial ID. |
| High word | Input possibilities for the first 4 bytes for the user serial number. | 0000-FFFF | The hexadecimal value entered defines the first 4 positions of the user serial ID. |
| Low word | Input possibilities for the second 4 bytes of the user serial number. | 0000-FFFF | The hexadecimal value entered defines the second 4 positions of the user serial ID. |
| Password | A password can be defined here which must be entered by the user when the BIOS setup is opened. | Max. 8 characters | The password must be confirmed by being entered a second time. The password can be removed again by entering a blank password (just pressing Enter).<br>**Information:**<br>**The password is also saved in the CMOS backup and is impossible to delete.** |

Table 178: BIOS special functions menu

1) See section 2.4.3 "User boot logo upgrade disk" on page 507 regarding guidelines for creating a user boot logo.

### 2.3.6 Device information

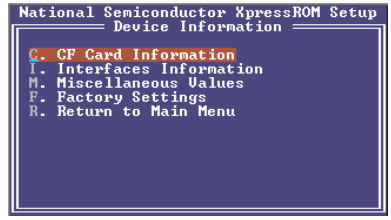



Figure 380: BIOS device information menu

| Shortcut | BIOS setup menu | Function |
|---|---|---|
| C | **CF card information** | Information about the inserted CompactFlash card is displayed here. |
| T | **Interface information** | Information about the mode/node switch position, the Ethernet controller and available aPCI modules is displayed here. |
| M | **Miscellaneous values** | Displays CPU and board I/O temperature and information about the last CMOS backup. |
| F | **Factory settings** | Information for factory settings. |
| R | **Return to main menu** | Exits current page and return to Main Menu. |

Table 179: BIOS real-time clock configuration menu

### CF card information

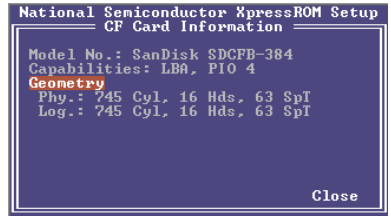



Figure 381: BIOS CF card information menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Model number | Displays the CompactFlash model ID. | None | - |
| Capabilities | Displays the possible data transfer mode speeds to and from an inserted CompactFlash card. | None | - |
| Phy. geometry | Displays the physical geometry of the inserted CompactFlash card in cylinders, heads and sectors. | None | - |

Table 180: BIOS CF card information menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Log. geometry | Displays the logical geometry of the inserted CompactFlash card in cylinders, heads and sectors. | None | - |

Table 180: BIOS CF card information menu (cont.)

## Interface information

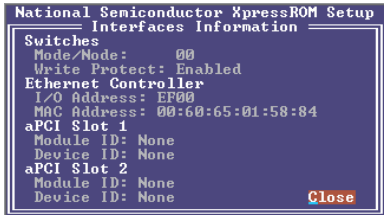



Figure 382: BIOS interface information menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Mode/Node | Displays the current mode/node switch position. | None | - |
| Write protect | Displays the switch position for the "write protect" switch. | None | - |
| I/O address | Displays the Ethernet I/O address. | None | - |
| MAC address | Displays the assigned MAC address. | None | - |
| aPCI slot 1<br>Module ID<br>Device ID | Information about an installed aPCI module in aPCI slot 1 of the Power Panel device is displayed here. | None | - |
| aPCI slot 1<br>Module ID<br>Device ID | Information about an installed aPCI module in aPCI slot 2 of the Power Panel device is displayed here. | None | - |

Table 181: BIOS interface information menu

## Miscellaneous values

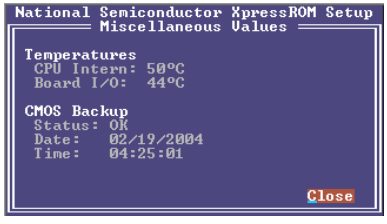



Figure 383: BIOS miscellaneous values menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| CPU intern | Displays the current internal processor temperature. | None | - |
| Board I/O | Indicates the current board I/O temperature. | None | - |
| Status | The status for the last automatically saved CMOS backup is displayed here. | None | If the boot procedure is successful, then the CMOS values are automatically saved by BIOS in flash memory. Values are therefore only saved in flash memory if the backup is not equal to the current CMOS, the backup is not available, or the backup checksum is incorrect. |
| Date | Date of the last automatically saved CMOS backup. | None | |
| Time | Time of the last automatically created CMOS backup. | None | |

Table 182: BIOS miscellaneous values menu

## Factory settings

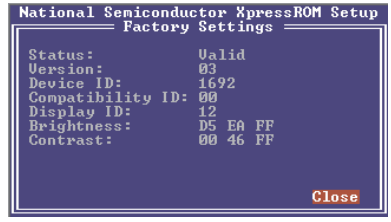



Figure 384: BIOS factory settings menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Status | Status display for factory settings. | None | Status |
| Version | Version display for factory settings. | None | Version |
| Device ID | Hex value for the device code of the Power Panel device. | None | Device ID |
| Compatibility ID | The compatibility code of the Power Panel device is displayed here. | None | Compatibility ID |
| Display ID | Shows the display ID used.<br>Possible display IDs are:<br>00h - Unknown<br>10h - Passive displays (STN)<br>11h - LCD B/W QVGA<br>12h - LCD COL QVGA<br>20h - Active displays (TFT) with QVGA<br>30h - Active displays (TFT) with VGA<br>40h - Active displays (TFT) with SVGA<br>50h - Active displays (TFT) with XVGA | None | - |
| Brightness | The defined brightness values (minimum, default, maximum) for the display used are shown here as hex values. | None | - |

Table 183: BIOS factory settings menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Contrast | The defined contrast values (minimum, default, maximum) for the display used are shown here as hex values. | None | - |

Table 183: BIOS factory settings menu (cont.)

### 2.3.7 Firmware configuration

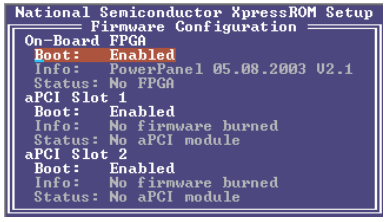



Figure 385: BIOS firmware configuration menu

| BIOS setting | Meaning | Setting options | Effect |
|---|---|---|---|
| Onboard FPGA Boot | The onboard FPGA controls the image output for Power Panel 200 devices with BIOS. | Enabled | The onboard FPGA is enabled and initialized. |
| | | Disabled | Deactivates the FPGA. If this function is deactivated, then no picture is output on Power Panel 200 devices. This function can only be re-enabled using the program "REMHOST" (see section "REMHOST utility disk" on page 509). |
| Info | Information about the FPGA firmware. | None | - |
| Status | Status display for the onboard FPGA. | None | - |
| aPCI slot 1 Boot | A connected aPCI module in the aPCI slot 1 is initialized and booted as long as valid firmware is available. | Enabled | The aPCI module is booted if a corresponding firmware file is burned in flash memory of the Power Panel. |
| | | Disabled | The aPCI module is not booted by BIOS. |
| Info | Information about a stored boot file for the aPCI slot 1 in flash memory. | None | - |
| Status | Status display for aPCI slot 1 modules. | None | - |
| aPCI slot 2 Boot | A connected aPCI module in the aPCI slot 2 is initialized and booted as long as valid firmware is available. | Enabled | The aPCI module is booted if a corresponding firmware file is burned in flash memory of the Power Panel. |
| | | Disabled | The aPCI module is not booted by BIOS. |
| Info | Information about a stored boot file for the aPCI slot 2 in flash memory. | None | - |
| Status | Status display for aPCI slot 2 modules. | None | - |

Table 184: BIOS firmware configuration menu

### 2.3.8 Restore CMOS values

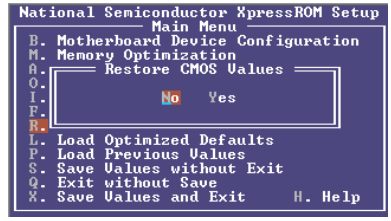



Figure 386: BIOS restore CMOS values menu

Selecting "Yes" under this BIOS menu (R shortcut) restores the last CMOS values stored in flash memory. All configurable CMOS values (besides date and time) are restored again in the BIOS setup.

## Information:

**If the boot procedure is successful, then the CMOS values are automatically saved by BIOS in flash memory. Values are therefore only saved in flash memory if the backup is not equal to the current CMOS, the backup is not available, or the backup checksum is incorrect.**

To protect CMOS data, a CMOS backup was integrated into BIOS. If the BIOS setup was ended using "Save values and exit" and the Power Panel device was correctly restarted, then the CMOS data is burned to flash memory. If the CMOS checksum is incorrect during startup (battery dead) or the Power Panel device cannot be booted correctly three times consecutively, then the salvaged data from flash memory is copied again to CMOS. Setup is back to its original state, except for the time.

### 2.3.9 Load optimized defaults

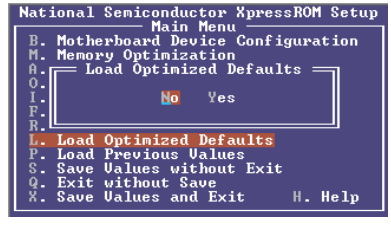



Figure 387: BIOS load optimized defaults menu

By clicking on "Yes", optimal BIOS settings for best performance can be loaded using this BIOS menu item (L shortcut).

## Information:

**These settings are also recommended by B&R.**

## Information:

**If using a German keyboard, press the "z" key to enter "y".**

### 2.3.10 Load previous values

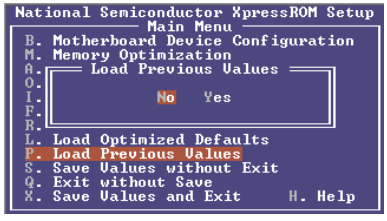



Figure 388: BIOS load previous values menu

Selecting "yes" under this BIOS menu item (P shortcut) reloads the values at the point when BIOS setup was opened. All changes are lost.

## Information:

**If using a German keyboard, press the "z" key to enter "y".**

### 2.3.11 Save values without exit

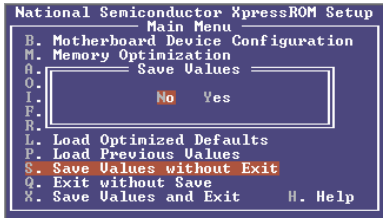



Figure 389: BIOS save values without exit menu

BIOS values are saved using this menu item (S shortcut) by selecting "Yes". The user can then make additional settings or exit BIOS setup.

## Information:

**If using a German keyboard, press the "z" key to enter "y".**

### 2.3.12 Exit without save

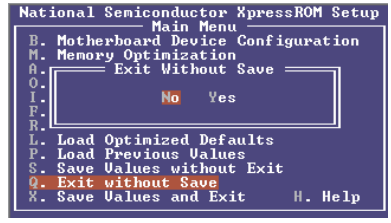



Figure 390: BIOS exit without save menu

BIOS setup can be exited by selecting "Yes" under this menu item (shortcut "Q") without saving any changes that might have been made. The system is then automatically restarted.

## Information:

**If using a German keyboard, press the "z" key to enter "y".**

### 2.3.13 Save values and exit

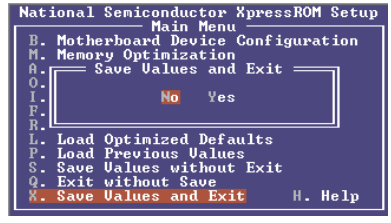



Figure 391: BIOS save values and exit menu

If "Yes" is selected under this menu item (X shortcut), the system saves the settings, automatically exits BIOS setup, and reboots the system.

For more information about the CMOS backup, see the section 2.5 "CMOS backup".

## Information:

**If using a German keyboard, press the "z" key to enter "y".**

### 2.3.14 Help

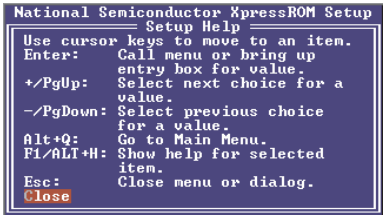



Figure 392: BIOS help menu

This menu item (H shortcut) displays a help page containing the most important key assignments.

## 2.4 BIOS upgrade und utilities

# Information:

**The following diagrams and BIOS menu items including descriptions refer to BIOS Version 1.12. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.**

BIOS Upgrade & Utilities consists of the following parts:

- BIOS upgrade disk
- aPCI firmware upgrade disk
- User boot logo upgrade disk
- REMHOST utility disk

### 2.4.1 BIOS upgrade disk

An upgrade might be necessary for the following reason:

- To update implemented functions or to add newly implemented functions or components to the BIOS setup (information about changes can be found in the Readme files of the BIOS upgrade).

A current BIOS upgrade can be found on the HMI Drivers & Utilities CD-ROM (model number 5S0000.01-090 starting from version 1.49) or directly downloaded from the download area on the B&R homepage (**www.br-automation.com**).

#### Procedure

The following steps should be carried out to upgrade or save BIOS:

- First, a blank HD disk must be made bootable (command line "sys a:" or "format a: /s"). or "format a: /s").

## Information:

**For the upgrade, a boot disk must be created (or a bootable CompactFlash card) with Windows ME, Windows XP or MS-DOS 6.22.**

**MS-DOS boot disks function with BIOS versions earlier than 1.02 only with REMHOST.**

- Copy the contents of the *.zip file to this diskette.
- Insert diskette in the USB floppy disk drive and reboot the Power Panel device (possibly from the floppy disk drive of a remote PCs using REMHOST, see also section 2.4.4 "REMHOST utility disk" on page 509). For more on the settings required for the Power Panel device when booting from a disk, please refer to section "Drive configuration" on page 461 for VGA, SVGA and XGA Power Panel devices and section "Drive configuration" on page 483 for QVGA Power Panel devices.
- After booting from the diskette, the following start menu opens up:

```
Microsoft Windows Startup Menu
==================================

1. Upgrade complete System (BIOS,FPGA)
2. Upgrade XpressROM BIOS
3. Upgrade FPGA Firmware
4. Save complete System (BIOS, FPGA)
5. Save XpressROM BIOS
6. Save FPGA Firmware
7. Exit

Enter a choice:_
```

Figure 393: BIOS upgrade start menu

| Item | Menu item | Description |
|---|---|---|
| 1 | Upgrade complete system (BIOS, FPGA) | All BIOS areas (XpressROM and FPGA firmware) are automatically updated (default after 5 sec). |
| 2 | Upgrade XpressROM BIOS only | Only the XpressROM BIOS is automatically updated. |
| 3 | Upgrade FPGA firmware only | Only the FPGA firmware is automatically updated. |
| 4 | Save complete system | All BIOS areas (XpressROM and FPGA firmware) are automatically protected.<br>**Information:**<br>**It's necessary to have up to 448 KB of free space on the disk.** |
| 5 | Save XpressROM BIOS only | Only the XpressROM BIOS is automatically protected.<br>**Information:**<br>**It's necessary to have approximately 256 KB of free space on the disk.** |
| 6 | Save FPGA firmware only | Only the FPGA firmware is automatically protected.<br>**Information:**<br>**It's necessary to have up to 192 KB of free space on the disk.** |
| 7 | Exit | Returns to the shell (MS-DOS). |

Table 185: BIOS upgrade menu description

## Information:

**If you do not press a button within 5 seconds, then step 1 "Upgrade complete system" (BIOS, FPGA) is automatically carried out and the Power Panel is independently updated.**

If you want to individually upgrade the XpressROM or the FPGA firmware, then these options can be selected in the start menu (2 or 3). It is also possible to protect the existing BIOS or individual components. For this, there must be approximately 448 KB free space on the disk. Otherwise, "Save..." functions might not be able to be executed.

- The system must be rebooted after a successful upgrade.

### 2.4.2 aPCI firmware upgrade disk

A software tool for backing up or upgrading aPCI firmware can be downloaded directly from the service portal of the B&R homepage (**www.br-automation.com**).

#### Procedure

The following steps should be taken to upgrade or save the firmware for aPCI modules:

- First, a blank HD disk must be made bootable (command line "sys a:" or "format a: /s"). or "format a: /s").

## Information:

**For the upgrade, a boot disk must be created (or a bootable CompactFlash card) with Windows ME, Windows XP or MS-DOS 6.22.**

**MS-DOS boot disks function with BIOS versions earlier than 1.02 only with REMHOST.**

- Copy the contents of the *.zip file to this diskette.
- If a user wants to upgrade the aPCI firmware, then aPCI firmware files (FPGA files) for aPCI modules must be copied to this disk. If there are already aPCI modules connected to the Power Panel and BIOS V1.04 is installed, then the file name can be determined automatically by XFLASH.EXE. Otherwise, the filename is queried by XFLASH.EXE or a default file name is used: "apci1.rom" for aPCI slot 1, "apci2.rom" for aPCI slot 2 -> the aPCI firmware file must be renamed beforehand!

## Information:

**The appropriate aPCI firmware files are available from B&R.**

- Insert diskette in the USB floppy disk drive and reboot the Power Panel device (possibly from the floppy disk drive of a remote PCs using REMHOST, see also section 2.4.4 "REMHOST utility disk" on page 509). For more on the settings required for the Power Panel device when booting from a disk, please refer to section "Drive configuration" on page 461 for VGA, SVGA and XGA Power Panel devices and section "Drive configuration" on page 483 for QVGA Power Panel devices.
- After booting from the diskette, the following start menu opens up:

```
Microsoft Windows Startup Menu
==================================

1. Upgrade Firmware of both aPCI Slots
2. Upgrade Firmware of aPCI Slot 1
3. Upgrade Firmware of aPCI Slot 2
4. Save Firmware of both aPCI Slots
5. Save Firmware of aPCi Slot 1
6. Save Firmware of aPCi Slot 2
7. Exit

Enter a choice:_
```

Figure 394: aPCI firmware upgrade start menu

| Item | Menu item | Description |
|---|---|---|
| 1 | Upgrade firmware of both aPCI slots | The firmware for both aPCI slots is automatically updated (default after 5 seconds). |
| 2 | Upgrade firmware of aPCI slot 1 | Only firmware from aPCI slot 1 is updated. |
| 3 | Upgrade firmware of aPCI slot 2 | Only firmware from aPCI slot 2 is updated. |
| 4 | Save firmware of both aPCI slots | Firmware for both aPCI slots are automatically saved.<br>**Information:**<br>**It's necessary to have up to 384 KB of free space on the disk.** |
| 5 | Save firmware of aPCI slot 1 | Only firmware from aPCI slot 1 is saved.<br>**Information:**<br>**It's necessary to have up to 192 KB of free space on the disk.** |
| 6 | Save firmware of aPCI slot 2 | Only firmware from aPCI slot 2 is saved.<br>**Information:**<br>**It's necessary to have up to 192 KB of free space on the disk.** |
| 7 | Exit | Returns to the shell (MS-DOS). |

Table 186: aPCI firmware upgrade menu description

## Information:

**If you do not press a button within 5 seconds, then step 1 "Upgrade firmware of both aPCI Slots" is automatically carried out and the Power Panel is independently updated.**

- The system must be rebooted after a successful upgrade.

### 2.4.3 User boot logo upgrade disk

A software tool for updating, backing up, or deleting the user boot logo can be downloaded directly from the service portal of the B&R homepage (www.br-automation.com).

#### Procedure

The following steps should be taken to update, save or delete a user boot:

- First, a blank HD disk must be made bootable (command line "sys a:" or "format a: /s"). or "format a: /s").

## Information:

**For the upgrade, a boot disk must be created (or a bootable CompactFlash card) with Windows ME, Windows XP or MS-DOS 6.22.**

**MS-DOS boot disks function with BIOS versions earlier than 1.02 only with REMHOST.**

- Copy the contents of the *.zip file to this diskette.
- Create the user boot logo according to section "Guidelines for creating a user boot logo" on page 508 and copy to the disk.
- Insert diskette in the USB floppy disk drive and reboot the Power Panel device (possibly from the floppy disk drive of a remote PCs using REMHOST, see also section 2.4.4 "REMHOST utility disk" on page 509). For more on the settings required for the Power Panel device when booting from a disk, please refer to section "Drive configuration" on page 461 for VGA, SVGA and XGA Power Panel devices and section "Drive configuration" on page 483 for QVGA Power Panel devices.
- After booting from the diskette, the following start menu opens up:

```
Microsoft Windows Startup Menu
==================================

1. Update User Boot Logo
2. Save User Boot Logo
3. Delete User Boot Logo
4. Exit

Enter a choice:_
```

Figure 395: User boot logo upgrade start menu

| Item | Menu item | Description |
|---|---|---|
| 1 | Update user boot logo | The user boot logo is automatically updated with the file USERLOGO.ROM (default after 5 seconds). |

Table 187: User boot logo upgrade menu description

| Item | Menu item | Description |
|---|---|---|
| 2 | Save user boot logo | The user boot logo is automatically saved in the file USERLOGO.SAV.<br>**Information:**<br>**It's necessary to have up to 192 KB of free space on the disk.** |
| 3 | Delete user boot logo | An existing user boot logo is deleted in the flash.<br>**Information:**<br>**The B&R boot logo is then automatically displayed again by BIOS.** |
| 4 | Exit | Returns to the shell (MS-DOS). |

Table 187: User boot logo upgrade menu description (cont.)

# Information:

**If you do not press a button within 5 seconds, then step 1 "Update User Boot Logo" is automatically carried out and the Power Panel is independently updated.**

- The system must be rebooted after a successful upgrade.
- In the CMOS setup for BIOS, the display for the boot logo must be set from "No" to "Yes" (for more on this, see section 2.2.7 "Special OEM features" on page 471 for VGA, SVGA and XGA Power Panel devices and also section 2.3.5 "Special OEM features" on page 493 for QVGA Power Panel devices.

### Guidelines for creating a user boot logo

To update the user boot logo, a bitmap must be created according to the following guidelines and then copied to the user boot logo upgrade disk:

1) A Windows bitmap with a maximum of 256 colors must be created with the appropriate resolution for the Power Panel: 320x240 (QVGA), 640x480 (VGA), 800x600 (SVGA) or 1024x768 (XGA). The bitmap is not allowed to be compressed.

2) Since status messages are output on the top of the display when booting the Power Panel, there should not be any user boot logo pixels positioned here in the bitmap (approximately 10 pixel stripes), as these will be cross-faded. These status messages use bitmap palette index 0 as the background color and index 7 as the foreground color (starting from BIOS V1.05; index 63 with older versions).

3) Using the utility USERLOGO.EXE, the bitmap file must then be converted into a ROM file that can be read by BIOS (please refer to the online help for the utility for more instructions about this).

4) The userlogo.rom file created by the utility is only permitted to have a maximum size of 192 KB. If this size is exceeded, a warning appears. The user can e.g. reduce the details in the Windows bitmap in order not to exceed the maximum byte size.

5) After this, the userlogo.rom file should be copied to the disk.

### 2.4.4 REMHOST utility disk

The REMHOST (remote host) software tool can be downloaded directly from the service portal on the B&R homepage (www.br-automation.com).

#### General information

REMHOST is an MS-DOS program (REMHOST.EXE) that can be used by a remote PC to operate a BIOS Power Panel device. The Power Panel receives keyboard entries from a remote PC using REMHOST. Screen outputs for the Power Panel device are redirected to the screen of the remote PC. The Power Panel can access the floppy drive (internal or external) of the remote PC or an individual floppy drive (USB) and boot from this as well.

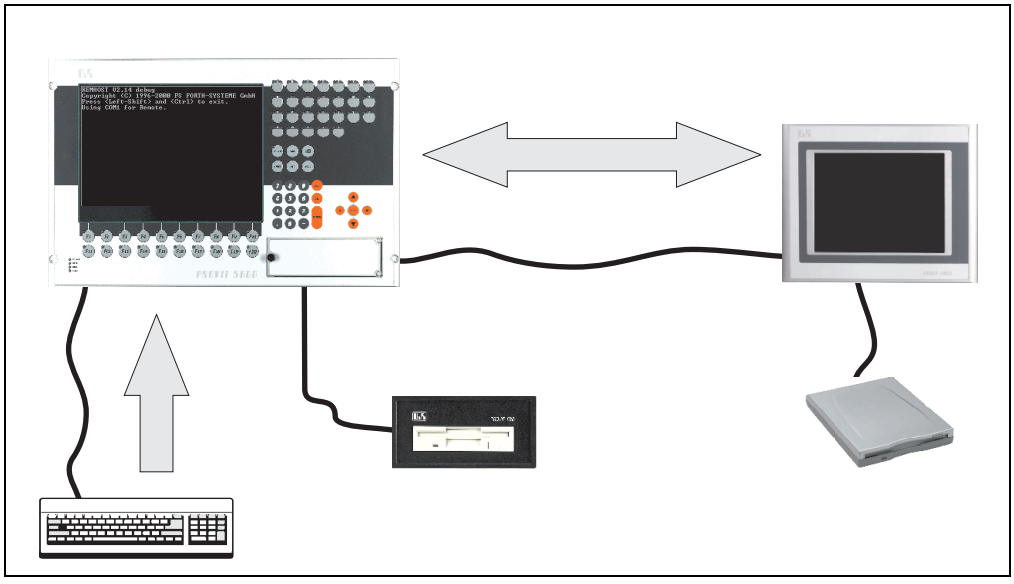


Figure 396: REMHOST communication model

REMHOST can be used if :

- The display for the Power Panel device is not functioning.
- Brightness and contrast settings for the Power Panel display are adjusted in such a way that outputs can no longer be detected.
- BIOS setup settings must be made for a Power Panel with a QVGA display[1)] .
- There is no USB floppy present and the BIOS for the Power Panel device should be updated.

1) With BIOS versions earlier than V1.04

### Requirements

The Power Panel must be connected to the remote PC using a serial cable (e.g. a null modem cable or PG online cable, see figure "REMHOST pin assignment - Power Panel connection cable" on page 512 for the necessary assignment). The serial cable must be connected to a COM interface for the remote PC and to the COM interface for the Power Panel device (see figure 396 "REMHOST communication model"). The mode/node switch for the Power Panel device must be set to 00 (service mode) see figure 272 "Mode / Node switches" on page 359.

### Important notes

## Information:

- **REMHOST only functions when the "diverted" functions for the Power Panel device are operated using BIOS calls. For example, that means if a program writes directly to the video memory on the Power Panel, then these outputs cannot be redirected to the screen of a remote PC. Generally, only programs which work in text mode should be used. Therefore, an MS-DOS start diskette must be used when booting the Power Panel using REMHOST. If a Windows start diskette is used, illegible symbols are output on the remote screen and the user's inputs are not correctly displayed.**
- **REMHOST must be run from MS-DOS. In the MS-DOS command prompt in Windows, error-free operation of REMHOST is not guaranteed: e.g. very slow screen outputs (in Windows NT4.0 and 2000), errors with write accesses to the remote floppy, etc.**

## Warning!

**When upgrading BIOS using REMHOST, note that the Power Panel, the remote PC and the serial connection are all connected to each other for the whole period while the upgrade is taking place.**

## Caution!

**The Power Panel can no longer be started if the BIOS upgrade is aborted. Therefore, when upgrading BIOS with REMHOST, REMHOST should be started in MS-DOS (not in the MS-DOS command prompt from Windows).**

### REMHOST configuration

The function of REMHOST is controlled by a REMHOST.INI configuration file. REMHOST.INI is an ASCII text file that can be opened and edited with any text editor (e.g. Notepad).

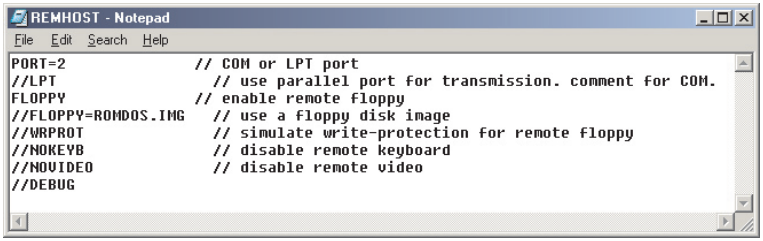



Figure 397: Example of REMHOST.INI

The following table lists all commands supported by REMHOST. If the commands begin with consecutive slash symbols ("//") , then these are evaluated as the beginning of a comment. This can be used to disable individual parameters.

| Setting option | Description |
|---|---|
| PORT=x | Specifies the COM interface on the remote PC that's being used for the serial connection to the Power Panel. "x" stands for the COM number, e.g. COM2 is used for PORT=2. |
| LPT | The parallel interface is used for communication. This option cannot be used with the Power Panel. |
| FLOPPY | The floppy disk drive for the remote PC is used as the floppy disk drive for the Power Panel. Therefore, a connected USB floppy disk drive on the Power Panel cannot be used. |
| FLOPPY=ROMDOS.IMG | A floppy image file can be used for the simulation of a floppy disk drive on the hard disk of the remote PC. A floppy image can be created with the program WINIMAGE (a shareware version can be downloaded from www.winimage.com). In this way, several versions of BIOS upgrades can be easily stored on the hard disk of the remote PC. |
| WRPROT | Write protection for the floppy disk drive can be simulated using this parameter. |
| NOKEYB | If this parameter is activated, then the keyboard of the remote PC is not used by REMHOST. Input must then take place on the Power Panel, e.g. using a USB keyboard. |
| NOVIDEO | If this parameter is activated, then the screen output is not made on the remote PC. Outputs take place on the display of the Power Panel device. |
| DEBUG | REMHOST outputs debug information. |

Table 188: Description of REMHOST.INI configuration options



## Program start

The name of the configuration file can be specified when starting the program. If no name is specified, then the REMHOST.INI file is used by default.

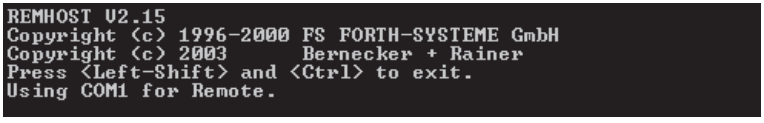



Figure 398: REMHOST program start

After the program is started, REMHOST displays the current version as well as the COM interface used for communication with the Power Panel of the remote PC.

The connection is established using a Power Panel device, if this is rebooted and the mode/node switch is set to 00h on the Power Panel.

## Information:

**If the Power Panel is already started, then NO connection can be established using a subsequent REMHOST start.**

### Program end

REMHOST can be ended by pressing the left SHIFT key and the CTRL key simultaneously.

## Information:

**The Power Panel must be restarted in order to undo the redirections for keyboard, floppy disk drive and display.**

### Pin assignments - Connection cable

The connection cable required for REMHOST must have two 9-pin DSUB sockets. The appropriate cable can be ordered directly from B&R using model number 9A0017.01 (length = 0.6 m) and 9A0017.02 (length = 1.8 m).

The cable can also be made by the user. A self-made cable can have a maximum length of 15 meters. The pins must be connected as follows:

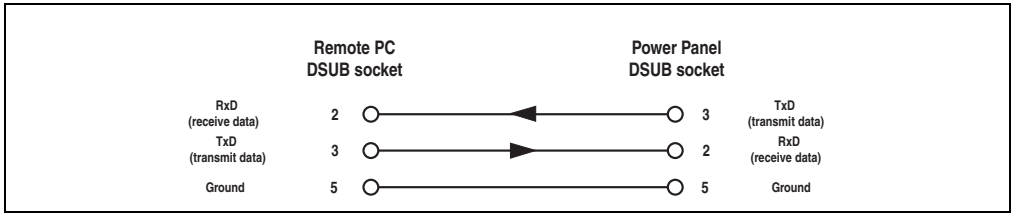



Figure 399: REMHOST pin assignment - Power Panel connection cable

## 2.5 CMOS backup

To protect CMOS data, a CMOS backup has been integrated into BIOS. If BIOS setup was exited with "Save values and exit" (see section 2.2.15 "Save values and exit" on page 479 for VGA, SVGA and XGA Power Panel devices and also section 2.3.13 "Save values and exit" on page 500 for QVGA Power Panel devices) and the Power Panel devices was correctly restarted, then the CMOS data is burned to flash memory. If the CMOS checksum is incorrect during startup (battery dead) or the Power Panel device cannot be booted correctly three times consecutively, then the salvaged data from flash memory is copied again to CMOS. Setup is back to its original state, except for the time.

## 2.6 Distribution of resources

### 2.6.1 RAM address assignment

| RAM address | Resource |
|---|---|
| 00000000 - 000003FF | Interrupt vectors |
| 00000400 - 000004FF | BIOS data area |
| 00000500 - 0009FBFF | Freely available for the operating system (MS-DOS program area) |
| 0009FC00 - 0009FFFF | Advanced BIOS data area |
| 000A0000 - 000BFFFF | VGA memory |
| 000C0000 - 000C7FFF | VGA BIOS |
| 000C8000 - 000CBFFF | Reserved |
| 000CC000 - 000EFFFF | XpressROM expansion ROMS. Unused areas can be used for HMA. |
| 000F0000 - 000FFFFF | XpressROM BIOS |
| 00100000 - BC_RAM_TOP | Remaining DRAM |
| 40000000 | GX_Base register (defined by BIOS, can also be 40000000, 80000000 or C0000000) |
| 40000000 - 40000BFF | L1 scratchpad |
| 40008000 - 400080FF | Internal BUS IF unit registers |
| 40008100 - 400082FF | Graphics pipeline registers |
| 40008300 - 400083FF | Display controller registers |
| 40008400 - 400084FF | Memory controller registers |
| 40009000 - 403FFFFF | PCI Accessible |
| 40010000 - 40010FFF | Video configuration registers |
| 40011000 - 40011FFF | Audio configuration registers |
| 40015000 - 40015FFF | VIP interface registers |
| 40800000 - 40BFFFFF | VGA frame buffer |
| D0000000 - FBFFFFFF | PCI memory and PCI ROM (are dynamically assigned during POST) |
| FFE00000 - FFFFFFFF | High BIOS area (flash memory) |

Table 189: RAM address assignment

### 2.6.2 DMA channel assignment

| DMA channel | Resource |
|---|---|
| 0 | Freely available |
| 1 | Freely available |
| 2 | Disk drive |
| 3 | Freely available |
| 4 | Freely available |
| 5 | Freely available |
| 6 | Freely available |
| 7 | Freely available |

Table 190: DMA channel assignment

### 2.6.3 I/O address assignment

| I/O address | Resource |
|---|---|
| 0000 - 000F | DMA controller channels 0-3 |
| 0020 - 0021 | Master programmable interrupt controller |
| 0022 - 0023 | CPU configuration registers |
| 0040 - 0043 | Programmable interval timer |
| 0060 - 0066 | Keyboard controller (emulated by Legacy USB) |
| 0070 - 0071 | RTC (real-time clock) |
| 0072 - 0073 | Extended RTC (real-time clock) |
| 0080 | BIOS POST debug output port |
| 0081 - 0083 | DMA channel low page registers |
| 0084 | VSA debug output port |
| 0085 - 008F | DMA channel low page registers |
| 0092 | Port A control register |
| 00A0 - 00A1 | Slave programmable interrupt controller |
| 00C0 - 00CF | DMA controller channels 4-7 |
| 00D0 - 00DF | DMA status/control/mode registers channel 0-7 |
| 00F0 - 00F1 | Co-processor error register |
| 015C - 015D | On-chip SIO configuration |
| 0170 - 0177 | Primary IDE |
| 01F0 - 01F7 | Primary IDE |
| 0220 - 022F | Audio (not supported) |
| 02F8 - 02FF | COM2 |
| 0376 - 0377 | Secondary IDE channel |
| 03B0 - 03BB | Video controller |

Table 191: I/O address assignment

| I/O address | Resource |
|---|---|
| 03C0 - 03DF | Video controller |
| 03E8 - 03EF | COM3 |
| 03F0 - 03F5 | Floppy controller (emulated by Legacy USB) |
| 03F6 - 03F7 | Primary IDE |
| 03F8 - 03FF | COM1 |
| 0480 - 048F | DMA channel high page registers |
| 04D0 - 04D1 | Interrupt edge/level registers |
| 0CF8 - 0CFF | PCI configuration registers |
| 5000 - 500F | IDE controller configuration registers (F2BAR4) |
| 6000 - 60FF | SMI status and aPCI registers (F1BAR0) |
| 6200 - 623F | X-Bus expansion support registers (F5BAR0) |
| 6400 - 643F | GPIO runtime and configuration registers (F0BAR0) |
| 6600 - 663F | LPC support registers (F0BAR1) |
| 9000 - 903F | CPU configuration registers |
| AC00 - ACFF | aCPI registers (F1BAR1) |
| AD00 - AFFF | PCI assignment (dynamically assigned during POST) |
| B000 - BFFF | PCI assignment (dynamically assigned during POST) |
| C000 - CFFF | PCI assignment (dynamically assigned during POST) |
| D000 - DFFF | PCI assignment (dynamically assigned during POST) |
| E000 - EFFF | PCI assignment (dynamically assigned during POST) |
| F000 - FFFF | Reserved |

Table 191: I/O address assignment (cont.)

### 2.6.4 Interrupt assignment

| Interrupt | Resource |
|---|---|
| IRQ 0 | System timer |
| IRQ 1 | Keyboard (Legacy USB emulation) |
| IRQ 2 | 2nd PIC IRQ cascade |
| IRQ 3 | COM2 [1)] |
| IRQ 4 | COM1 [1)] |
| IRQ 5 | USB and aPCI slot 1 (first interrupt) [1)] |
| IRQ 6 | Disk drive |
| IRQ 7 | aPCI slot 2 [1)] (second interrupt) |
| IRQ 8 | RTC (real-time clock) |
| IRQ 9 | Ethernet (MacPhyter) [1)] |
| IRQ 10 | aPCI slot 2 (first interrupt) and aPCI slot 1 (second interrupt)[1)] |

Table 192: Interrupt assignment

| Interrupt | Resource |
|---|---|
| IRQ 11 | COM3 [1)] |
| IRQ 12 | PS/2 mouse (Legacy USB emulation) |
| IRQ 13 | FPU (co-processor) |
| IRQ 14 | Primary IDE (primary hard disk) |
| IRQ 15 | Secondary IDE (secondary hard disk) |

Table 192: Interrupt assignment (cont.)

1) BIOS setup default setting

# 3. Power Panel 100 with BIOS and Windows CE

## 3.1 General information

Windows CE is an operating system which is optimally tailored to B&R's devices. It includes only the functions and modules which are required by each device. This makes this operating system extremely robust and stable.

## Information:

- **The real-time capabilities of Microsoft Windows CE operating systems you receive from B&R have not been tested.**
- **B&R assumes no responsibility for the real-time capabilities of Microsoft Windows CE.**

### 3.1.1 Advantages

- Internet Explorer 6.0 for Windows® CE - standard components
- Fonts for attractive text display
- TCP/IP for network and Internet communication
- Remote Desktop Protocol (RDP) for thin clients
- ActiveSync for synchronization with the PC
- Windows® Media Player application
- Compact Framework V1.0 Service Pack 2
- Network utilities
- VBScript 6.0
- JScript 6.0
- Viewers for Excel, Word, images, PDFs, PowerPoint (only in Windows CE 5.0 ProPlus)
- Windows CE is also less expensive than other Windows licenses.

## 3.2 Differences between the Windows CE 5.0 versions (Pro - PropPlus)

| Features | Pro<br>5SWWCE.0517-ENG | ProPlus<br>5SWWCE.0617-ENG |
|---|---|---|
| Windows CE Version | 5.0 | |
| Screen resolution | QVGA (LCD), QVGA (TFT), VGA (TFT), SVGA (TFT), XGA (TFT) | |
| Color depth[1)] | 16-bit / 65,536 colors | |
| Graphics card driver | AMD Geode SC1200/SC2200 graphics card driver with screen rotation without DirectX | |
| RAM | Automatic detection and use of up to 512 MB RAM | |
| Boot time | Approx. 20 seconds | |
| Screen rotation | The desktop can be turned in 90° intervals | |
| Web browser | Internet Explorer 6.0 for Windows CE | |
| .NET | Compact Framework 1.0 with SP3 | |
| Image size | Approx. 26 MB uncompressed | Approx. 28 MB uncompressed |
| PVI | Yes | |
| Automation Device Interface | Yes | |
| Serial interfaces | 1 available for use | |
| PDF, Excel, Word, Power Point and Image viewer | Yes | |

Table 193: Differences between the Windows CE versions (Pro - PropPlus)

1) The color depth depends on the display being used.

## 3.3 Requirements

The device must fulfill the following criteria to be able run the Windows CE operating system.

- At least 128 MB main memory
- At least one 128 MB CompactFlash card (size should be specified when ordered)

## 3.4 Installation

Windows CE is usually preinstalled at the B&R plant.

### 3.4.1 B&R eMbedded OS Installer

The B&R eMbedded OS Installer allows you to install existing B&R Windows CE images. The four files (NK.BIN, BLDR, LOGOXRES.BMP, and LOGOQVGA.BMP) must be provided from an already functioning B&R Windows CE installation.

The B&R eMbedded OS Installer can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). Further information is available in the online help for the B&R eMbedded OS Installer.

# 4. Power Panel 100 with BIOS and Windows XP Embedded

## 4.1 General information

Windows XP embedded is the modular version of the desktop operating system Windows XP Professional. Windows XP embedded is based on the same binary files as Windows XP Professional and is optimally tailored to the hardware being used. In other words, only the functions and modules required by the respective device are included. Windows XP embedded is also based on the same reliable code as Windows XP Professional. It provides industry with leading reliability, improvements in security and performance, and the latest technology for Web browsing and extensive device support.

## 4.2 Features with FP2007 (Feature Pack 2007)

The feature list shows the most important device functions in Windows XP embedded with Feature Pack 2007 (FP2007).

| Function | Present |
|---|---|
| Enhanced write filter (EWF) | ✓ |
| File Based Write Filter | ✓ |
| Page file | configurable |
| Administrator account | ✓ |
| User account | configurable |
| Explorer shell | ✓ |
| Registry Filter | ✓ |
| Internet Explorer 6.0 + SP2 | ✓ |
| Internet information service (IIS) | - |
| Terminal service | ✓ |
| Windows Firewall | ✓ |
| MSN-Explorer | - |
| Outlook Express | - |
| Administrative Tools | ✓ |
| Remote Desktop | ✓ |
| Remote Assistance | - |

Table 194: Device functions in Windows XP embedded with FP2007

| Function | Present |
|---|---|
| .NET Framework | - |
| ASP.NET | - |
| Codepages/User Locale/Keyboard | ✓ |
| Disk Management Service | ✓ |
| Windows Installer Service | ✓ |
| Class Installer | ✓ |
| CoDevice Installer | ✓ |
| Media Player | - |
| DirectX | - |
| Accessories | ✓ |
| Number of fonts | 89 |

Table 194: Device functions in Windows XP embedded with FP2007

## 4.3 Installation

Windows XP embedded is usually preinstalled at B&R Austria on a suitable CompactFlash card (at least 512 MB - must be specified when placing order). The system is then automatically configured after it has been switched on for the first time. This procedure takes approximately 30 minutes, and the device will be rebooted a number of times.

Brief instructions for creating your own Windows XP embedded images or a suitable Target Designer export file can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

# 5. HMI Drivers & Utilities DVD 5SWHMI.0000-00

Figure 400: HMI Drivers & Utilities DVD 5SWHMI.0000-00

| Model number | Short description | Note |
|---|---|---|
| 5SWHMI.0000-00 | **HMI Drivers & Utilities DVD**<br>Contains drivers, utilities, software upgrades and user's manuals for B&R panel system products (see B&R homepage – Industrial PCs, Visualization and Operation). | |

Table 195: Model number - HMI Drivers & Utilities DVD

This DVD contains drivers, utilities, software upgrades and user's manuals for B&R Panel system products (see B&R homepage – Industrial PCs, Visualization and Operation).

Information in detail:

### BIOS upgrades for the products

- Automation PC 620
- Panel PC 700
- Automation PC 680
- Provit 2000 product family - IPC2000/2001/2002
- Provit 5000 product family - IPC5000/5600/5000C/5600C
- Power Panel 100 BIOS devices
- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 user boot logo
- Power Panel 100 / Mobile Panel 100 REMHOST utility

### Drivers for the devices

- Automation Device Interface (ADI)
- Audio
- Chipset
- CD-ROM
- LS120
- Graphics
- Network
- PCI RAID controller
- Touch screen
- Touchpad
- Interface board

### Updates

- Firmware upgrades (e.g. MTCX, SMXC)

### Utilities/Tools

- Automation Device Interface (ADI)
- Miscellaneous
- MTC utilities
- Key editor
- MTC & Mkey utilities
- Mkey utilities
- UPS configuration software
- ICU ISA configuration
- Intel PCI NIC boot ROM
- Diagnostics
- CompactFlash lifespan calculation for Silicon Systems CompactFlash cards 5CFCRD.xxxx-03

### Windows and embedded operating systems

- Thin client
- Windows CE
- Windows NT Embedded
- Windows XP Embedded

### MCAD templates for

- Industrial PCs
- Visualization and operating devices
- Legend strip templates

### Documentation for

- B&R Windows CE
- Automation PC 620
- Automation PC 680
- Automation Panel 900
- Panel PC 700
- Power Panel 15/21/35/41
- Power Panel 100/200
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows NT Embedded application guide
- Windows XP Embedded application guide
- Uninterruptible power supply

### Service tools

- Acrobat Reader 5.0.5 (freeware in German, English, and French)
- Power Archiver 6.0 (freeware in German, English, and French)
- Internet Explorer 5.0 (German and English)
- Internet Explorer 6.0 (German and English)

# Chapter 5 • Standards and certifications

## 1. Applicable European guidelines

- EMC guidelines 2004/108/EG
- Low-voltage guidelines 2006/95/EG
- Machine guidelines 98/37/EG beginning 12/29/2009: 2006/42/EG

## 2. Overview of standards

| Standard | Description |
|---|---|
| EN 55011<br>Class A, B | Electromagnetic compatibility (EMC), radio disturbance product standard, industrial, scientific, and medical high-frequency devices (ISM devices), limit values and measurement procedure; group 1 (devices that do not create HF during material processing) and group 2 (devices that create HF during material processing) |
| EN 55014-1 | Electromagnetic compatibility (EMC), requirements for household appliances, electric tools, and similar apparatus - part 1: Emissions |
| EN 55014-2 | Electromagnetic compatibility (EMC), requirements for household appliances, electric tools, and similar apparatus - part 2: Immunity; product family standard |
| EN 55022<br>Class A, B | Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement |
| EN 55024<br>Class A or B | Electromagnetic compatibility (EMC), immunity characteristics, information technology equipment (ITE devices), limits and methods of measurement |
| EN 60060-2 | High-voltage test techniques - part 2: Measuring systems |
| EN 60068-2-1 | Environmental testing - part 2: Tests; test A: Cold |
| EN 68068-2-2 | Environmental testing - part 2: Tests; test B: Dry heat |
| EN 60068-2-3 | Environmental testing - part 2: Tests; test and guidance: Damp heat, constant |
| EN 60068-2-6 | Environmental testing - part 2: Tests; test: Vibration (sinusoidal) |
| EN 60068-2-14 | Environmental testing - part 2: Tests; test N: Change of temperature |
| EN 60068-2-27 | Environmental testing - part 2: Tests; test and guidance: Shock |
| EN 60068-2-30 | Environmental testing - part 2: Tests; test and guidance: Damp heat, cyclic |
| EN 60068-2-31 | Environmental testing - part 2: Tests; test: Drop and topple, primarily for equipment-type specimens |
| EN 60068-2-32 | Environmental testing - part 2: Tests; test: Free fall |
| EN 60204-1 | Safety of machinery, electrical equipment on machines - part 1: General requirements |
| EN 60529 | Degrees of protection provided by enclosures (IP code) |

Table 196: Overview of standards

| Standard | Description |
|---|---|
| EN 60664-1 | Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests |
| EN 60721-1 | Classification of environmental conditions - part 1: Environmental parameters and their severities |
| EN 60721-3-2 | Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 2: Transport |
| EN 60721-3-3 | Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 3: Stationary use at weather-protected locations |
| EN 60950 | Information technology equipment - safety |
| EN 61000-3-11 | Electromagnetic compatibility (EMC) - part 3-11: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 75 A and subject to conditional connection |
| EN 61000-3-2<br>Class A, B, C, D | Electromagnetic compatibility (EMC) - part 3-2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase) |
| EN 61000-3-3 | Electromagnetic compatibility (EMC) - part 3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection |
| EN 61000-4-2 | Electromagnetic compatibility (EMC) - part 4-2: Testing and measuring techniques; electrostatic discharge immunity test |
| EN 61000-4-3 | Electromagnetic compatibility (EMC) - part 4-3: Testing and measuring techniques; radiated radio-frequency electromagnetic field immunity test |
| EN 61000-4-4 | Electromagnetic compatibility (EMC) - part 4-4: Testing and measuring techniques; electrical fast transient/burst immunity test |
| EN 61000-4-5 | Electromagnetic compatibility (EMC) - part 4-5: Testing and measuring techniques; surge immunity test |
| EN 61000-4-6 | Electromagnetic compatibility (EMC) - part 4-6: Testing and measuring techniques; immunity to conducted disturbances, induced by radio-frequency fields |
| EN 61000-4-8 | Electromagnetic compatibility (EMC) - part 4-8: Testing and measuring techniques; power frequency magnetic field immunity test |
| EN 61000-4-11 | Electromagnetic compatibility (EMC) - part 4-11: Testing and measuring techniques; voltage dips, short interruptions and voltage variations immunity tests |
| EN 61000-4-12 | Electromagnetic compatibility (EMC) - part 4-12: Testing and measuring techniques; oscillatory waves immunity test |
| EN 61000-4-17 | Electromagnetic compatibility (EMC) - part 4-12: Testing and measuring techniques; ripple on DC input power port immunity test |
| EN 61000-4-29 | Electromagnetic compatibility (EMC) - part 4-29: Testing and measuring techniques; voltage dips, short interruptions and voltage variations on DC input power port immunity tests |
| EN 61000-6-1 | Electromagnetic compatibility (EMC), generic immunity standard - part 1: Residential, business and commercial areas |
| EN 61000-6-2 | Electromagnetic compatibility (EMC), generic immunity standard - part 2: industrial environment |
| EN 61000-6-3 | Electromagnetic compatibility (EMC), generic emission standard - part 1: Residential, business and commercial areas |
| EN 61000-6-4 | Electromagnetic compatibility (EMC), generic emission standard - part 2: industrial environment |
| EN 61131-2<br>IEC 61131-2 | Product standard, programmable logic controllers - part 2: Equipment requirements and tests |

Table 196: Overview of standards (cont.)

| Standard | Description |
|---|---|
| EN 61508-1 | Functional safety of electrical/electronic/programmable electronic safety-related systems - part 1: General requirements |
| EN 61508-2 | Functional safety of electrical/electronic/programmable electronic safety-related systems - part 2: Requirements for electrical/electronic/programmable electronic safety-related systems |
| NEMA 250 Type 4X | UL protection against sprayed water |
| UL 508 | Industrial control equipment (UL = Underwriters Laboratories) |
| VDE 0701-1 | Service, modification, and testing of electrical devices - part 1: General requirements |
| VDE 0801 | Principles for computers in systems with safety tasks |
| 47 CFR | Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A |

Table 196: Overview of standards (cont.)

# 3. Emission requirements

| Emissions | Test carried out according to | Limits according to |
|---|---|---|
| Network-related emissions | EN 55011 / EN 55022 | EN 61000-6-3: Generic standard (residential areas) |
| | | EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class B (residential areas) |
| | | EN 55022: Information technology equipment (ITE devices), class B (residential areas) |
| | | EN 61000-6-4: Generic standard (industrial areas) |
| | | EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas) |
| | | EN 55022: Information technology equipment (ITE devices), class A (industrial areas) |
| | | EN 61131-2: Programmable logic controllers |
| | | 47 CFR Part 15 Subpart B Class A (FCC) |
| Emissions, Electromagnetic emissions | EN 55011 / EN 55022 | EN 61000-6-3: Generic standard (residential areas) |
| | | EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class B (residential areas) |
| | | EN 55022: Information technology equipment (ITE devices), class B (residential areas) |
| | | EN 61000-6-4: Generic standard (industrial areas) |
| | | EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas) |
| | | EN 55022: Information technology equipment (ITE devices), class A (industrial areas) |
| | | EN 61131-2: Programmable logic controllers |
| | | 47 CFR Part 15 Subpart B Class A (FCC) |
| Harmonic currents for devices with an input current of ≤ 16 A per line | EN 61000-3-2 | EN 61000-3-2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase) |

Table 197: Overview of limits and testing guidelines for emissions

| Emissions | Test carried out according to | Limits according to |
|---|---|---|
| Voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current less than or equal to ≤ 16 A per phase and not subject to conditional connection | EN 61000-3-3 | EN 61000-3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current less than or equal to ≤ 16 A per phase and not subject to conditional connection, class A/D |
| Voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 75 A per phase and subject to conditional connection | EN 61000-3-11 | EN 61000-3-11: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 75 A per phase and subject to conditional connection, class A/D |

Table 197: Overview of limits and testing guidelines for emissions (cont.)

## 3.1 Network-related emissions

| Test carried out according to EN 55011 / EN 55022 | Limits according to EN 61000-6-3 | Limits according to EN 55011 class B | Limits according to EN 55022 class B |
|---|---|---|---|
| Power mains connections [1)]<br>150 kHz - 500 kHz | 66 - 56 dB (µV)<br>Quasi-peak value<br>56 - 46 dB (µV)<br>Average | 66 - 56 dB (µV)<br>Quasi-peak value<br>56 - 46 dB (µV)<br>Average | 66 - 56 dB (µV)<br>Quasi-peak value<br>56 - 46 dB (µV)<br>Average |
| Power mains connections<br>500 kHz - 5 MHz | 56 dB (µV)<br>Quasi-peak value<br>46 dB (µV)<br>Average | 56 dB (µV)<br>Quasi-peak value<br>46 dB (µV)<br>Average | 56 dB (µV)<br>Quasi-peak value<br>46 dB (µV)<br>Average |
| Power mains connections<br>5 MHz - 30 MHz | 60 dB (µV)<br>Quasi-peak value<br>50 dB (µV)<br>Average | 60 dB (µV)<br>Quasi-peak value<br>50 dB (µV)<br>Average | 60 dB (µV)<br>Quasi-peak value<br>50 dB (µV)<br>Average |
| Other connections [2)]<br>150 kHz - 500 kHz | 40 - 30 dB (µA)<br>Quasi-peak value<br>30 - 20 dB (µA)<br>Average | - | 84 - 74 dB (µV) and<br>40 - 30 dB (µA)<br>Quasi-peak value<br>74 - 64 dB (µV) and<br>30 - 20 (µA)<br>Average |
| Other connections<br>500 kHz - 30 MHz | 74 dB (µV) and 30 dB (µA)<br>Quasi-peak value<br>64 dB (µV) and 20 dB (µA)<br>Average | - | 74 dB (µV) and 30 dB (µA)<br>Quasi-peak value<br>64 dB (µV) and 20 dB (µA)<br>Average |

Table 198: Test requirements - Network-related emissions for residential areas

1) AC network connections only with EN 61000-6-3

2) DC voltage inputs and outputs as well for EN 61000-6-3.

| Test carried out according to EN 55011 / EN 55022 | Limits according to EN 61000-6-4 | Limits according to EN 55011 class A | Limits according to EN 55022 class A |
|---|---|---|---|
| Power mains connections<br>150 kHz - 500 kHz | 79 dB (µV)<br>Quasi-peak value<br>66 dB (µV)<br>Average | 79 dB (µV)<br>Quasi-peak value<br>66 dB (µV)<br>Average | 79 dB (µV)<br>Quasi-peak value<br>66 dB (µV)<br>Average |
| Power mains connections<br>500 kHz - 30 MHz | 73 dB (µV)<br>Quasi-peak value<br>60 dB (µV)<br>Average | 73 dB (µV)<br>Quasi-peak value<br>60 dB (µV)<br>Average | 73 dB (µV)<br>Quasi-peak value<br>60 dB (µV)<br>Average |
| Other connections<br>150 kHz - 500 kHz | - | - | 97 - 87 dB (µV) and<br>53 - 43 dB (µA)<br>Quasi-peak value<br>84 - 74 dB (µV) and<br>40 - 30 dB (µA)<br>Average |
| Other connections<br>500 kHz - 30 MHz | - | - | 87 dB (µV) and 43 dB (µA)<br>Quasi-peak value<br>74 dB (µV) and 30 dB (µA)<br>Average |
| **Test carried out according to EN 55011 / EN 55022** | **Limits according to EN 61131-2** | **Limits according to 47 CFR Part 15 Subpart B class A** | |
| Power mains connections [1)]<br>150 kHz - 500 kHz | 79 dB (µV)<br>Quasi-peak value<br>66 dB (µV)<br>Average | 79 dB (µV)<br>Quasi-peak value<br>66 dB (µV)<br>Average | |
| Power mains connections<br>500 kHz - 30 MHz | 73 dB (µV)<br>Quasi-peak value<br>60 dB (µV)<br>Average | 73 dB (µV)<br>Quasi-peak value<br>60 dB (µV)<br>Average | |
| Other connections<br>150 kHz - 500 kHz | - | | |
| Other connections<br>500 kHz - 30 MHz | - | | |

Table 199: Test requirements - Network-related emissions for industrial areas

1) AC network connections only with EN 61131-2

## 3.2 Emissions, electromagnetic emissions

| Test carried out according to EN 55011 / EN 55022 | Limits according to EN 61000-6-3 | Limits according to EN 55011 class B | Limits according to EN 55022 class B |
|---|---|---|---|
| 30 MHz - 230 MHz<br>measured at a distance of 10 m | < 30 dB (µV/m)<br>Quasi-peak value | < 30 dB (µV/m)<br>Quasi-peak value | < 30 dB (µV/m)<br>Quasi-peak value |
| 230 MHz - 1 GHz<br>measured at a distance of 10 m | < 37 dB (µV/m)<br>Quasi-peak value | < 37 dB (µV/m)<br>Quasi-peak value | < 37 dB (µV/m)<br>Quasi-peak value |

Table 200: : Test requirements - Electromagnetic emissions for residential areas

| Test carried out according to EN 55011 / EN 55022 | Limits according to EN 61000-6-4 | Limits according to EN 55011 class A | Limits according to EN 55022 class A |
|---|---|---|---|
| 30 MHz - 230 MHz<br>measured at a distance of 10 m | < 40 dB (µV/m)<br>Quasi-peak value | < 40 dB (µV/m)<br>Quasi-peak value | < 40 dB (µV/m)<br>Quasi-peak value |
| 230 MHz - 1 GHz<br>measured at a distance of 10 m | < 47 dB (µV/m)<br>Quasi-peak value | < 47 dB (µV/m)<br>Quasi-peak value | < 47 dB (µV/m)<br>Quasi-peak value |
| **Test carried out according to EN 55011 / EN 55022** | **Limits according to EN 61131-2** | | |
| 30 MHz - 230 MHz<br>measured at a distance of 10 m | < 40 dB (µV/m)<br>Quasi-peak value | | |
| 230 MHz - 1 GHz<br>measured at a distance of 10 m | < 47 dB (µV/m)<br>Quasi-peak value | | |
| **Test carried out** | **Limits according to 47 CFR Part 15 Subpart B class A** | | |
| 30 MHz - 88 MHz<br>measured at a distance of 10 m | < 90 dB (µV/m)<br>Quasi-peak value | | |
| 88 MHz - 216 MHz<br>measured at a distance of 10 m | < 150 dB (µV/m)<br>Quasi-peak value | | |
| 216 MHz - 960 MHz<br>measured at a distance of 10 m | < 210 dB (µV/m)<br>Quasi-peak value | | |
| >960 MHz<br>measured at a distance of 10 m | < 300 dB (µV/m)<br>Quasi-peak value | | |

Table 201: : Test requirements - Electromagnetic emissions for industrial areas

## 3.3 Harmonic currents for devices ≤ 16 A

| Test carried out according to EN 61000-3-2 | Limits according to EN 61000-3-2 | | | | |
|---|---|---|---|---|---|
| Largest permissible value of harmonic current according to the order (n) | Only odd harmonics | | | | |
| | **n** | **mA/W** | **A** | | |
| | 3 | 3.4 | 2.30 | | |
| | 5 | 1.9 | 1.14 | | |
| | 7 | 1.0 | 0.77 | | |
| | 9 | 0.5 | 0.40 | | |
| | 11 | 0.35 | 0.33 | | |
| | 13 ≤ n ≤ 39 | 3.85/n | 0.15 x 15/n | | |

Table 202: : Test requirement - harmonic currents for devices with an input current ≤ 16 A

## 3.4 Voltage fluctuations and flickering ≤ 16 A

| Test carried out according to EN 61000-3-3 | Limits according to EN 61000-3-3 | | |
|---|---|---|---|
| | $P_{st} \leq 1.0$<br>$P_{lt} \leq 0.65$<br>d(t): 3.3% for max. 500 ms<br>$d_c \leq 3.3\%$<br>$d_{max} \leq 4\%$ | | |

Table 203: : Test requirements - Voltage fluctuations and flickering in low-voltage systems ≤ 16 A

## 3.5 Voltage fluctuations and flickering ≤ 75 A

| Test carried out according to EN 61000-3-11 | Limits according to EN 61000-3-11 | | |
|---|---|---|---|
| | TBD | | |

Table 204: : Test requirements - Voltage fluctuations and flickering in low-voltage systems ≤ 75 A

# 4. Requirements for immunity to disturbances

| Immunity | Test carried out according to | Limits according to |
|---|---|---|
| Electrostatic discharge (ESD) | EN 61000-4-2 | EN 61000-6-1: Generic standard (residential areas) |
| | | EN 61000-6-2: Generic standard (industrial areas) |
| | | EN 61131-2: Programmable logic controllers |
| | | EN 55024: Information technology equipment (ITE devices) |
| Immunity against high-frequency electromagnetic fields (HF field) | EN 61000-4-3 | EN 61000-6-1: Generic standard (residential areas) |
| | | EN 61000-6-2: Generic standard (industrial areas) |
| | | EN 61131-2: Programmable logic controllers |
| | | EN 55024: Information technology equipment (ITE devices) |
| Immunity to high-speed transient electrical disturbances (burst) | EN 61000-4-4 | EN 61000-6-1: Generic standard (residential areas) |
| | | EN 61000-6-2: Generic standard (industrial areas) |
| | | EN 61131-2: Programmable logic controllers |
| | | EN 55024: Information technology equipment (ITE devices) |
| Immunity to surge voltages | EN 61000-4-5 | EN 61000-6-1: Generic standard (residential areas) |
| | | EN 61000-6-2: Generic standard (industrial areas) |
| | | EN 61131-2: Programmable logic controllers |
| | | EN 55024: Information technology equipment (ITE devices) |
| Immunity to conducted disturbances | EN 61000-4-6 | EN 61000-6-1: Generic standard (residential areas) |
| | | EN 61000-6-2: Generic standard (industrial areas) |
| | | EN 61131-2: Programmable logic controllers |
| | | EN 55024: Information technology equipment (ITE devices) |
| Immunity against magnetic fields with electrical frequencies | EN 61000-4-8 | EN 61000-6-1: Generic standard (residential areas) |
| | | EN 61000-6-2: Generic standard (industrial areas) |
| | | EN 61131-2: Programmable logic controllers |
| | | EN 55024: Information technology equipment (ITE devices) |
| Immunity to voltage dips, short-term interruptions and voltage fluctuations | EN 61000-4-11 | EN 61000-6-2: Generic standard (industrial areas) |
| | | EN 61131-2: Programmable logic controllers |
| | | EN 55024: Information technology equipment (ITE devices) |
| Immunity to damped vibration | EN 61000-4-12 | EN 61000-6-2: Generic standard (industrial areas) |
| | | EN 61000-6-2: Generic standard (industrial areas) |
| | | EN 61131-2: Programmable logic controllers |
| | | EN 55024: Information technology equipment (ITE devices) |

Table 205: Overview of limits and testing guidelines for immunity

## Evaluation criteria according to EN 61000-6-2

Criteria A:
The operating equipment must continue to work as intended **during** the test. There should be no interference in the operating behavior and no system failures below a minimum operating quality as defined by the manufacturer.

Criteria B:
The operating equipment must continue to work as intended **after** the test. There should be no interference in the operating behavior and no system failures below a minimum operating quality as defined by the manufacturer.

Criteria C:
A temporary function failure is permitted when the function restores itself, or the function can be restored by activating configuration and control elements.

Criteria D:
Impairment or failure of the function, which can no longer be established (operating equipment destroyed).

## 4.1 Electrostatic discharge (ESD)

| Test carried out according to EN 61000-4-2 | Limits according to EN 61000-6-2 | Limits according to EN 61131-2 | Limits according to EN 55024 |
|---|---|---|---|
| Contact discharge to powder-coated and bare metal housing parts | ±4 kV, 10 discharges, criteria B | ±4 kV, 10 discharges, criteria B | ±4 kV, 10 discharges, criteria B |
| Discharge through the air to plastic housing parts | ±8 kV, 10 discharges, criteria B | ±8 kV, 10 discharges, criteria B | ±8 kV, 10 discharges, criteria B |

Table 206: Test requirements - Electrostatic discharge (ESD)

## 4.2 High-frequency electromagnetic fields (HF field)

| Test carried out according to EN 61000-4-3 | Limits according to EN 61000-6-2 | Limits according to EN 61131-2 | Limits according to EN 55024 |
|---|---|---|---|
| Housing, completely wired | 80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A | 80 MHz - 1 GHz, 1.4 - 2 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A<br>800-960 MHz (GSM), 10 V/m, pulse modulation with 50% duty cycle, criteria A | 80 MHz - 1 GHz, 1.4 - 2 GHz, 3 V/m, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A |

Table 207: Test requirements - High-frequency electromagnetic fields (HF field)

## 4.3 High-speed transient electrical disturbances (burst)

| Test carried out according to EN 61000-4-4 | Limits according to EN 61000-6-2 | Limits according to EN 61131-2 | Limits according to EN 55024 |
|---|---|---|---|
| AC power I/O | ±2 kV, criteria B | - | ±1 kV, criteria B |
| AC power inputs | - | ±2 kV, criteria B | - |
| AC power outputs | - | ±1 kV, criteria B | - |
| DC power I/O >10 m [1)] | ±2 kV, criteria B | - | ±0.5 kV, criteria B |
| DC power inputs >10 m | - | ±2 kV, criteria B | - |
| DC power outputs >10 m | - | ±1 kV, criteria B | - |
| Functional ground connections, signal lines and I/Os >3 m | ±1 kV, criteria B | ±1 kV, criteria B | ±0.5 kV, criteria B |
| Unshielded AC I/O >3 m | - | ±2 kV, criteria B | - |
| Analog I/O | ±1 kV, criteria B | ±1 kV, criteria B | - |

Table 208: Test requirements - High-speed transient electrical disturbances (burst)

1) For EN 55024 without length limitation.

## 4.4 Surges

| Test carried out according to EN 61000-4-5 | Limits according to EN 61000-6-2 | Limits according to EN 61131-2 | Limits according to EN 55024 |
|---|---|---|---|
| AC power I/O, L to L | ±1 kV, criteria B | ±1 kV, criteria B | ±1 kV, criteria B |
| AC power I/O, L to PE | ±2 kV, criteria B | ±2 kV, criteria B | ±2 kV, criteria B |
| DC power I/O, L+ to L-, >10 m | ±0.5 kV, criteria B | - | - |
| DC power I/O, L to PE, >10 m | ±0.5 kV, criteria B | - | ±0.5 kV, criteria B |
| DC power inputs, L+ to L- | - | ±0.5 kV, criteria B | - |
| DC power inputs, L to PE | - | ±1 kV, criteria B | - |
| DC power outputs, L+ to L- | - | ±0.5 kV, criteria B | - |
| DC power outputs, L to PE | - | ±0.5 kV, criteria B | - |
| Signal connections >30 m | ±1 kV, criteria B | ±1 kV, criteria B | ±1 kV, criteria B |
| All shielded cables | - | ±1 kV, criteria B | - |

Table 209: Test requirements - Surge voltages

## 4.5 Conducted disturbances

| Test carried out according to EN 61000-4-6 | Limits according to EN 61000-6-2 | Limits according to EN 61131-2 | Limits according to EN 55024 |
|---|---|---|---|
| AC power I/O | 150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A | 150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A | 150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, criteria A |

Table 210: Test requirements - Conducted disturbances

| Test carried out according to EN 61000-4-6 | Limits according to EN 61000-6-2 | Limits according to EN 61131-2 | Limits according to EN 55024 |
|---|---|---|---|
| DC power I/O | 150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A | 150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A | 150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, criteria A |
| Functional ground connections | 0.15 - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, Length 3 seconds, criteria A | 150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A | - |
| Signal connections >3 m | 0.15 - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, Length 3 seconds, criteria A | 150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A | 150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, criteria A |

Table 210: Test requirements - Conducted disturbances (cont.)

## 4.6 Magnetic fields with electrical frequencies

| Test carried out according to EN 61000-4-8 | Limits according to EN 61000-6-2 | Limits according to EN 61131-2 | Limits according to EN 55024 |
|---|---|---|---|
| Test direction x, test in the field of an induction coil 1 m x 1 m | 30 A/m, criteria A | 30 A/m, criteria A | 50 Hz, 1 A/m, criteria A |
| Test direction y, test in the field of an induction coil 1 m x 1 m | 30 A/m, criteria A | 30 A/m, criteria A | 50 Hz, 1 A/m, criteria A |
| Test direction z, test in the field of an induction coil 1 m x 1 m | 30 A/m, criteria A | 30 A/m, criteria A | 50 Hz, 1 A/m, criteria A |

Table 211: Test requirements - Magnetic fields with electrical frequencies

## 4.7 Voltage dips, fluctuations, and short-term interruptions

| Test carried out according to EN 61000-4-11 | Limits according to EN 61000-6-2 | Limits according to EN 61131-2 | Limits according to EN 55024 |
|---|---|---|---|
| AC power inputs | Voltage dip 70% (30% reduction), 0.5 periods, criteria B | - | Voltage dip < 5% (> 95% reduction), 0.5 half-oscillations, criteria B |
| AC power inputs | Voltage dip 40% (60% reduction), 5 periods, criteria C | - | Voltage dip 70% (30% reduction), 25 half-oscillations, criteria C |
| AC power inputs | Voltage dip 40% (60% reduction), 50 periods, criteria C | - | - |
| AC power inputs | Voltage interruptions < 5% (> 95% reduction), 250 periods, criteria C | - | Voltage interruptions < 5% (> 95% reduction), 250 half-oscillations, criteria C |
| AC power inputs | - | 20 interruptions, 0.5 periods, criteria A | - |
| DC power inputs | - | 20 interruptions for 10 ms < UN - 15%, criteria A | - |

Table 212: Test requirements - Voltage dips, fluctuations, and short-term interruptions

## 4.8 Damped vibration

| Test carried out according to EN 61000-4-12 | Limits according to EN 61131-2 | | |
|---|---|---|---|
| Power I/O, L to L | ±1 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B | | |
| Power I/O, L to PE | ±2.5 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B | | |

Table 213: Test requirements - Damped vibration

# 5. Mechanical conditions

| Vibration | Test carried out according to | Limits according to |
|---|---|---|
| Vibration operation | EN 60068-2-6 | EN 61131-2: Programmable logic controllers |
| | | EN 60721-3-3 class 3M4 |
| Vibration during transport (packaged) | EN 60068-2-6 | EN 60721-3-2 class 2M1 |
| | | EN 60721-3-2 class 2M2 |
| | | EN 60721-3-2 class 2M3 |
| | | B&R |
| Shock during operation | EN 60068-2-27 | EN 61131-2: Programmable logic controllers |
| | | EN 60721-3-3 class 3M4 |
| Shock during transport (packaged) | EN 60068-2-27 | EN 60721-3-2 class 2M1 |
| | | EN 60721-3-2 class 2M2 |
| | | EN 60721-3-2 class 2M3 |
| | | B&R |
| Toppling (packaged) | EN 60068-2-31 | EN 60721-3-2 class 2M1 |
| | | EN 60721-3-2 class 2M2 |
| | | EN 60721-3-2 class 2M3 |
| Free fall (packaged) | EN 60068-2-32 | EN 61131-2: Programmable logic controllers |
| | | B&R |

Table 214: Overview of limits and testing guidelines for vibration

## 5.1 Vibration operation

| Test carried out according to EN 60068-2-6 | Limits according to EN 61131-2 | | Limits according to EN 60721-3-3 class 3M4 | | |
|---|---|---|---|---|---|
| Vibration during operation: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z), 1 octave per minute | 10 sweeps for each axis | | 10 sweeps for each axis | | |
| | **Frequency** | **Limit value** | **Frequency** | **Limit value** | |
| | 5 - 9 Hz | Amplitude 3.5 mm | 2 - 9 Hz | Amplitude 3 mm | |
| | 9 - 150 Hz | Acceleration 1 g | 9 - 200 Hz | Acceleration 1 g | |

Table 215: Test requirements - Vibration during operation

## 5.2 Vibration during transport (packaged)

| Test carried out according to EN 60068-2-6 | Limits according to EN 60721-3-2 class 2M1 | | Limits according to EN 60721-3-2 class 2M2 | | Limits according to EN 60721-3-2 class 2M3 | |
|---|---|---|---|---|---|---|
| Vibration during transport: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z) | 10 sweeps for each axis, packaged | | 10 sweeps for each axis, packaged | | 10 sweeps for each axis, packaged | |
| | **Frequency** | **Limit value** | **Frequency** | **Limit value** | **Frequency** | **Limit value** |
| | 2 - 9 Hz | Amplitude 3.5 mm | 2 - 9 Hz | Amplitude 3.5 mm | 2 - 8 Hz | Amplitude 7.5 mm |
| | 9 - 200 Hz | Acceleration 1 g | 9 - 200 Hz | Acceleration 1 g | 8 - 200 Hz | Acceleration 2 g |
| | 200 - 500 Hz | Acceleration 1.5 g | 200 - 500 Hz | Acceleration 1.5 g | 200 - 500 Hz | Acceleration 4 g |
| | Limit values according to B&R | | | | | |
| | 10 sweeps per axis, not packaged | | | | | |
| | 2 - 8 Hz | Amplitude 7.5 mm | | | | |
| | 8 - 200 Hz | Acceleration 2 g | | | | |
| | 200 - 500 Hz | Acceleration 4 g | | | | |

Table 216: Test requirements - Vibration during transport (packaged)

## 5.3 Shock during operation

| Test carried out according to EN 60068-2-27 | Limits according to EN 61131-2 | Limits according to EN 60721-3-3 class 3M4 | |
|---|---|---|---|
| Shock during operation: Pulse (half-sine) stress in all 3 axes (x, y, z) | Acceleration 15 g, length 11 ms, 18 shocks | Acceleration 15 g, length 11 ms | |

Table 217: Test requirements - Shock during operation

## 5.4 Shock during transport (packaged)

| Test carried out according to EN 60068-2-27 | Limits according to EN 60721-3-2 class 2M1 | Limits according to EN 60721-3-2 class 2M2 | Limits according to EN 60721-3-2 class 2M3 |
|---|---|---|---|
| Pulse (half-sine) stress in all 3 axes (x, y, z) | Acceleration 10 g, Length 11 ms, each 3 shocks, packaged | Acceleration 30 g, Length 6 ms, each 3 shocks, packaged | Acceleration 100 g, Length 6 ms, each 3 shocks, packaged |
| | **Limits according to B&R** | | |
| | Acceleration 30 g, Length 11 ms, each 3 shocks, not packaged | | |

Table 218: Test requirements - Shock during transport

## 5.5 Toppling

| Test carried out according to EN 60068-2-31 | Limits according to EN 60721-3-2 class 2M1 | | Limits according to EN 60721-3-2 class 2M2 | | Limits according to EN 60721-3-2 class 2M3 | |
|---|---|---|---|---|---|---|
| Drop and topple | Devices: Drop/topple on each edge | | Devices: Drop/topple on each edge | | Devices: Drop/topple on each edge | |
| | **Weight** | **Required** | **Weight** | **Required** | **Weight** | **Required** |
| | <20 kg | Yes | <20 kg | Yes | <20 kg | Yes |
| | 20 - 100 kg | - | 20 - 100 kg | Yes | 20 - 100 kg | Yes |
| | >100 kg | - | >100 kg | - | >100 kg | Yes |

Table 219: Test requirements - Toppling

## 5.6 Free fall (packaged)

| Test carried out according to EN 60068-2-32 | Limits according to EN 61131-2 | | Limits according to EN 60721-3-2 class 2M1 | | Limits according to EN 60721-3-2 class 2M2 | | Limits according to EN 60721-3-2 class 2M3 | |
|---|---|---|---|---|---|---|---|---|
| Free fall | Devices with delivery packaging each with 5 fall tests | | Devices packaged | | Devices packaged | | Devices packaged | |
| | **Weight** | **Height** | **Weight** | **Height** | **Weight** | **Height** | **Weight** | **Height** |
| | <10 kg | 1.0 m | <20 kg | 0.25 m | <20 kg | 1.2 m | <20 kg | 1.5 m |
| | 10 - 40 kg | 0.5 m | 20 - 100 kg | 0.25 m | 20 - 100 kg | 1.0 m | 20 - 100 kg | 1.2 m |
| | >40 kg | 0.25 m | >100 kg | 0.1 m | >100 kg | 0.25 m | >100 kg | 0.5 m |
| | Devices with product packaging each with 5 fall tests | | | | | | | |
| | **Weight** | **Height** | | | | | | |
| | <10 kg | 0.3 m | | | | | | |
| | 10 - 40 kg | 0.3 m | | | | | | |
| | >40 kg | 0.25 m | | | | | | |
| | **Limits according to B&R** | | | | | | | |
| | Devices packaged | | | | | | | |
| | **Weight** | **Height** | | | | | | |
| | <40 kg | 1 m | | | | | | |

Table 220: Test requirements - Toppling

# 6. Climate conditions

| Temperature / humidity | Test carried out according to | Limits according to |
|---|---|---|
| Worst case operation | UL 508 | UL 508: Industrial control equipment<br>EN 61131-2: Programmable logic controllers |
| Dry heat | EN 60068-2-2 | EN 61131-2: Programmable logic controllers |
| Dry cold | EN 60068-2-1 | EN 61131-2: Programmable logic controllers |
| Large temperature fluctuations | EN 60068-2-14 | EN 61131-2: Programmable logic controllers |
| Temperature fluctuations in operation | EN 60068-2-14 | EN 61131-2: Programmable logic controllers |
| Humid heat, cyclic | EN 60068-2-30 | EN 61131-2: Programmable logic controllers |
| Humid heat, constant (storage) | EN 60068-2-3 | EN 61131-2: Programmable logic controllers |
| Sprayed water (from front) | NEMA 250 Type 4X | UL 50 - NEMA 250 4X: Degree of protection provided by housing |

Table 221: Overview of limits and testing guidelines for temperature and humidity

## 6.1 Worst case operation

| Test carried out according to UL 508 | Limits according to UL 508 | Limits according to EN 61131-2 | |
|---|---|---|---|
| Worst case during operation. Operation of the device with the max. ambient temperature specified in the data sheet at the max. specified load | 3 hours at max. ambient temperature (min. +40°C) duration approx. 5 hours | 3 hours at max. ambient temperature (min. +40°C) duration approx. 5 hours | |

Table 222: Test requirements - Worst case during operation

## 6.2 Dry heat

| Test carried out according to EN 60068-2-2 | Limits according to EN 61131-2 | | |
|---|---|---|---|
| Dry heat | 16 hours at +70°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours | | |

Table 223: Test requirements - Dry heat

## 6.3 Dry cold

| Test carried out according to EN 60068-2-1 | Limits according to EN 61131-2 | | |
|---|---|---|---|
| Dry cold | 16 hours at -40°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours | | |

Table 224: Test requirements - Dry cold

## 6.4 Large temperature fluctuations

| Test carried out according to EN 60068-2-14 | Limits according to EN 61131-2 | | |
|---|---|---|---|
| Large temperature fluctuations | 3 hours at -40° C and 3 hours at +70°C, 2 cycles, then 2 hours acclimatization and function testing, duration approximately 14 hours | | |

Table 225: Test requirements - Large temperature fluctuations

## 6.5 Temperature fluctuations in operation

| Test carried out according to EN 60068-2-14 | Limits according to EN 61131-2 | | |
|---|---|---|---|
| Open devices: These can also have a housing and are installed in switching cabinets | 3 hours at +5° C and 3 hours at 55°C, 5 cycles, temperature gradient 3°C / min, the unit is occasionally supplied with voltage during testing, duration approximately 30 hours | | |
| Closed devices: These are devices whose data sheet specifies a surrounding housing (enclosure) with the corresponding safety precautions | 3 hours at +5°C and 3 hours at +55°C, 5 cycles, temperature gradient 3°C / min, the unit is occasionally supplied with voltage during testing, duration approximately 30 hours | | |

Table 226: Test requirements - Temperature fluctuations in operation

## 6.6 Humid heat, cyclic

| Test carried out according to EN 60068-2-30 | Limits according to EN 61131-2 | | |
|---|---|---|---|
| Alternating climate | 24 hours at +25°C / +55°C and 97% / 83% RH, 2 cycles, then 2 hours acclimatization, function testing and insulation, duration approximately 50 hours | | |

Table 227: Test requirements - Humid heat, cyclic

## 6.7 Humid heat, constant (storage)

| Test carried out according to EN 60068-2-3 | Limits according to EN 61131-2 | | |
|---|---|---|---|
| Humid heat, constant (storage) | 48 hours at +40°C and 92.5% RH, then insulation test within 3 hours, duration approximately 49 hours | | |

Table 228: Test requirements - Humid heat, constant (storage)

## 6.8 Sprayed water (front side)

| Test carried out according to UL 50 | Limits according to NEMA 250 Type 4X | | |
|---|---|---|---|
| Sprayed water (front side) | Spraying using a 25.4 mm (diameter) water jet nozzle<br>Distance: 3 to 3.7 meters (all angles)<br>Water flow: 246 liters/minute<br>Duration: 48 seconds, 5 seconds minimum | | |

Table 229: Test requirements - Sprayed water (front side)

# 7. Safety

| Safety | Test carried out according to | Limits according to |
|---|---|---|
| Ground resistance | EN 61131-2 | EN 60204-1: Electrical equipment of machines |
| | | EN 61131-2: Programmable logic controllers |
| Insulation resistance | | EN 60204-1: Electrical equipment of machines |
| High voltage | EN 60060-1 | EN 61131-2: Programmable logic controllers |
| | | UL 508: Industrial control equipment |
| Residual voltage | EN 61131-2 | EN 60204-1: Electrical equipment of machines |
| | | EN 61131-2: Programmable logic controllers |
| Leakage current | | VDE 0701-1: Service, changes and testing of electrical devices |
| | | B&R |
| Overload | UL 508 | EN 61131-2: Programmable logic controllers |
| | | UL 508: Industrial control equipment |
| Simulation component defect | UL 508 | EN 61131-2: Programmable logic controllers |
| | | UL 508: Industrial control equipment |
| Voltage range | | EN 61131-2: Programmable logic controllers |

Table 230: Overview of limits and testing guidelines for safety

## 7.1 Ground resistance

| Test carried out according to EN 61131-2 | Limits according to EN 60204-1[1)] | | Limits according to EN 61131-2 |
|---|---|---|---|
| Ground resistance: housing (from any metal part to the ground terminal) | Smallest effective cross section of the protective ground conductor for the branch being tested | Maximum measured voltage drop at a test current of 10 A | Test current 30 A for 2 min, < 0.1 Ohm |
| | 1.0 mm² | 3.3 V | |
| | 1.5 mm² | 2.6 V | |
| | 2.5 mm² | 1.9 V | |
| | 4.0 mm² | 1.4 V | |
| | > 6.0 mm² | 1.0 V | |

Table 231: Test requirements - Ground resistance

1) See EN 60204-1:1997 page 62, table 9.

## 7.2 Insulation resistance

| Test carried out | Limits according to EN 60204-1[1)] | | |
|---|---|---|---|
| Insulation resistance: main circuits to protective ground conductor | > 1 MOhm at 500 VDC voltage | | |

Table 232: Test requirements - Insulation resistance

1) See EN 60204-1:1997 page 62, table 9.

## 7.3 High voltage

| Test carried out according to EN 60060-1 | Limits according to EN 61131-2[1)] | | | | Limits according to UL 508 | | |
|---|---|---|---|---|---|---|---|
| High voltage: Primary circuit to secondary circuit and to protective ground circuit (transformers, coils, varistors, capacitors and components used to protect against over-voltage can be removed before the test) | Input voltage | Test voltage | | | Input voltage | Test voltage | |
| | | 1.2/50 µs voltage surge peak | AC, 1 min | DC, 1 min | | AC, 1 min | DC, 1 min |
| | 0 - 50 VAC<br>0 - 60 VDC | 850 V | 510 V | 720 V | ≤ 50 V | 500 V | 707 V |
| | 50 - 100 VAC<br>60 - 100 VDC | 1360 V | 740 V | 1050 V | > 50 V | 1000 V + 2 x $U_N$ | (1000 V + 2 x $U_N$) x 1.414 |
| | 100 - 150 VAC<br>100 - 150 VDC | 2550 V | 1400 V | 1950 V | | | |
| | 150 - 300 VAC<br>150 - 300 VDC | 4250 V | 2300 V | 3250 V | | | |
| | 300 - 600 VAC<br>300 - 600 VDC | 6800 V | 3700 V | 5250 V | | | |
| | 600 - 1000 VAC<br>600 - 1000 VDC | 10200 V | 5550 V | 7850 V | | | |

Table 233: Test requirements - High voltage

1) See EN 61131-2:2003 page 104, table 59.

## 7.4 Residual voltage

| Test carried out according to EN 61131-2 | Limits according to EN 60204-1 | Limits according to EN 61131-2 | |
|---|---|---|---|
| Residual voltage after switching off | < 60 V after 5 sec (active parts)<br>< 60 V after 1 sec (plug pins) | < 60 V after 5 sec (active parts)<br>< 60 V after 1 sec (plug pins) | |

Table 234: Test requirements - Residual voltage

## 7.5 Leakage current

| Test carried out | Limits according to VDE 0701-1 | B&R | |
|---|---|---|---|
| Leakage current: Phase to ground | < 3.5 mA | < 1 mA | |

Table 235: Test requirements - Leakage current

## 7.6 Overload

| Test carried out according to UL 508 | Limits according to EN 61131-2 | Limits according to UL 508 | |
|---|---|---|---|
| Overload of transistor outputs | 50 switches, 1.5 $I_N$, 1 sec on / 9 sec off | 50 switches, 1.5 $I_N$, 1 sec on / 9 sec off | |

Table 236: Test requirements - Overload

## 7.7 Defective component

| Test carried out according to UL 508 | Limits according to EN 61131-2 | Limits according to UL 508 | |
|---|---|---|---|
| Simulation of how components in power supply became defective | Non-flammable surrounding cloth<br>No contact with conductive parts | Non-flammable surrounding cloth<br>No contact with conductive parts | |

Table 237: Test requirements - Defective component

## 7.8 Voltage range

| Test carried out according to | Limits according to EN 61131-2 | | | |
|---|---|---|---|---|
| Supply voltage | Measurement value | Tolerance min/max | | |
| | 24 VDC<br>48 VDC<br>125 VDC | -15%<br>+20% | | |
| | 24 VAC<br>48 VAC<br>100 VAC<br>110 VAC<br>120 VAC<br>200 VAC<br>230 VAC<br>240 VAC<br>400 VAC | 15%<br>+10% | | |

Table 238: Test requirements - Voltage range

# 8. Other tests

| Other tests | Test carried out according to | Limits according to |
|---|---|---|
| Function test | - | - |
| Optical test | - | - |
| Hot spot measurement | - | - |
| Impact resistance | - | - |
| Protection type | - | EN 60529: Degrees of protection provided by enclosures (IP code) |
| Degree of pollution | - | EN 60664-1: Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests |
| Mounting dimensions | - | B&R |

Table 239: Overview of limits and testing guidelines for other tests

## 8.1 Impact resistance

| Test carried out according to | Limits according to | | |
|---|---|---|---|
| | TBD | | |

Table 240: Test requirements - Impact resistance

## 8.2 Protection type

| Test carried out according to | Limits according to EN 60529 | Limits according to EN 60529 | |
|---|---|---|---|
| Protection of the operating equipment | IP2.<br>Protection against large solid foreign bodies =12.5 mm diameter | IP.6<br>Protection against large solid foreign bodies:<br>dust-proof | |
| Protection of personnel | IP2.<br>Protection against touching dangerous parts with finger | IP.6<br>Protection against touching dangerous parts with conductor | |
| Protection against water permeation with damaging consequences | IP.0<br>Not protected | IP.5<br>Protected against sprayed water | |

Table 241: Test requirements - Protection

## 8.3 Degree of pollution

| Test carried out according to | Limits according to EN 60664-1 | | |
|---|---|---|---|
| Definition | Degree of pollution II | | |

Table 242: Test requirements - Degree of pollution

# 9. International certifications

B&R products and services comply with applicable standards. They are international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We give special consideration to the reliability of our products in an industrial environment.

| Certifications | |
|---|---|
| USA and Canada | All important B&R products are tested and listed by Underwriters Laboratories and checked quarterly by a UL inspector.<br>This mark is valid for the USA and Canada and simplifies certification of your machines and systems in these areas. |
| Europe | All harmonized EN standards for the applicable guidelines are met. |

Table 243: International certifications

# Chapter 6 • Accessories

## 1. Overview

| Model number | Description | Note |
|---|---|---|
| 0AC201.9 | **Lithium batteries (5x)**<br>Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell | |
| 0TB103.9 | **Plug 24V 5.08 3-pin screw clamps**<br>24 VDC 3-pin connector, female. Screw clamps, 3.31 mm², protected against vibration by the screw flange | |
| 0TB103.91 | **Plug 24V 5.08 3-pin cage clamps**<br>24 VDC 3-pin connector, female. Cage clamps, 3.31 mm², protected against vibration by the screw flange | |
| 4A0006.00-000 | **Lithium battery (1x)**<br>Lithium battery, 1 pc., 3 V / 950 mAh, button cell | |
| 4AC200.1000-00 | **aPCI slot cover, 1 pc.**<br>Optional aPCI slot cover for inserting into an available aPCI slot on a Power Panel 200 device | |
| 5AC900.057X-00 | **Legend strips 3x 5.7" Vertical1**<br>Legend strip template for 4PP151.0571-01, 4PP151.0571-21, 4PP251.0571-45, 4PP251.0571-65, 4PP251.0571-85, 4PP251.0571-A5 | |
| 5AC900.057X-01 | **Legend strips 2x 5.7" Horizontal2**<br>Legend strip template for 4PP152.0571-01, 4PP152.0571-21, 4PP252.0571-45, 4PP252.0571-65, 4PP252.0571-85, 4PP252.0571-A5 | |
| 5AC900.104X-00 | **Legend strip 1x 10.4" Vertical1**<br>Legend strip template for 4PP151.1043-31, 4PP181.1043-31, 4PP251.1043-75, 4PP251.1043-B5, 4PP281.1043-75, 4PP281.1043-B5 | |
| 5AC900.104X-01 | **Legend strip 1x 10.4" Horizontal2**<br>Legend strip template for 4PP152.1043-31, 4PP182.1043-31, 4PP252.1043-75, 4PP252.1043-B5, 4PP282.1043-75, 4PP282.1043-B5 | |
| 5AC900.104X-02 | **Legend strips 3x 10.4" Horizontal1**<br>Legend strip template for 4PP180.1043-31, 4PP280.1043-75, 4PP280.1043-B5 | |
| 5AC900.150X-00 | **Legend strips 4x 15"**<br>Legend strip template for 4PP280.1505-75, 4PP280.1505-B5, 4PP281.1505-75, 4PP281.1505-B5 | |
| 5CFCRD.0032-01 | **CompactFlash 32 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 32 MB flash PROM and True IDE/ATA interface | *Cancelled since 11/2003* |
| 5CFCRD.0032-02 | **CompactFlash 32 MB TrueIDE SanDisk/A**<br>CompactFlash card with 32 MB flash PROM and True IDE/ATA interface | *Cancelled since 12/2005* |
| 5CFCRD.0064-01 | **CompactFlash 64 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 64 MB flash PROM and True IDE/ATA interface | *Cancelled since 11/2003* |
| 5CFCRD.0064-02 | **CompactFlash 64 MB TrueIDE SanDisk/A**<br>CompactFlash card with 64 MB flash PROM and True IDE/ATA interface | *Cancelled since 12/2005* |

Table 244: Model numbers - Accessories

| Model number | Description | Note |
|---|---|---|
| 5CFCRD.0064-03 | **CompactFlash 64 MB TrueIDE SSI**<br>CompactFlash card with 64 MB SLC NAND flash and True IDE/ATA interface | |
| 5CFCRD.0128-01 | **CompactFlash 128 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 128 MB flash PROM and True IDE/ATA interface | *Cancelled since 11/2003* |
| 5CFCRD.0128-02 | **CompactFlash 128 MB TrueIDE SanDisk/A**<br>CompactFlash card with 128 MB flash PROM and True IDE/ATA interface | *Cancelled since 12/2005* |
| 5CFCRD.0128-03 | **CompactFlash 128 MB TrueIDE SSI**<br>CompactFlash card with 128 MB SLC NAND flash and True IDE/ATA interface | |
| 5CFCRD.0192-01 | **CompactFlash 196 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 196 MB flash PROM and True IDE/ATA interface | *Cancelled since 07/2003* |
| 5CFCRD.0256-01 | **CompactFlash 256 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 256 MB flash PROM and True IDE/ATA interface | *Cancelled since 11/2003* |
| 5CFCRD.0256-02 | **CompactFlash 256 MB TrueIDE SanDisk/A**<br>CompactFlash card with 256 MB flash PROM and True IDE/ATA interface | *Cancelled since 12/2005* |
| 5CFCRD.0256-03 | **CompactFlash 256 MB TrueIDE SSI**<br>CompactFlash card with 256 MB SLC NAND flash and True IDE/ATA interface | |
| 5CFCRD.0384-01 | **CompactFlash 384 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 384 MB flash PROM and True IDE/ATA interface | *Cancelled since 07/2003* |
| 5CFCRD.0512-01 | **CompactFlash 512 MB TrueIDE SanDisk/R2**<br>CompactFlash card with 512 MB flash PROM and True IDE/ATA interface | *Cancelled since 11/2003* |
| 5CFCRD.0512-02 | **CompactFlash 512 MB TrueIDE SanDisk/A**<br>CompactFlash card with 512 MB flash PROM and True IDE/ATA interface | *Cancelled since 12/2005* |
| 5CFCRD.0512-03 | **CompactFlash 512 MB TrueIDE SSI**<br>CompactFlash card with 512 MB SLC NAND flash and True IDE/ATA interface | |
| 5CFCRD.1024-02 | **CompactFlash 1024 MB TrueIDE SanDisk/A**<br>CompactFlash card with 1024 MB flash PROM and True IDE/ATA interface | *Cancelled since 12/2005* |
| 5CFCRD.1024-03 | **CompactFlash 1024 MB TrueIDE SSI**<br>CompactFlash card with 1024 MB SLC NAND flash and True IDE/ATA interface | |
| 5CFCRD.2048-02 | **CompactFlash 2024 MB TrueIDE SanDisk/A**<br>CompactFlash card with 2048 MB flash PROM and True IDE/ATA interface | *Cancelled since 12/2005* |
| 5CFCRD.2048-03 | **CompactFlash 2048 MB TrueIDE SSI**<br>CompactFlash card with 2048 MB SLC NAND flash and True IDE/ATA interface | |
| 5CFCRD.4096-03 | **CompactFlash 4096 MB TrueIDE SSI**<br>CompactFlash card with 4096 MB SLC NAND flash and True IDE/ATA interface | |
| 5CFCRD.8192-03 | **CompactFlash 8192 MB TrueIDE SSI**<br>CompactFlash card with 8192 MB SLC NAND flash and True IDE/ATA interface | *In preparation* |
| 5MMUSB.0128-00 | **USB flash drive 128 MB SanDisk**<br>USB 2.0 flash drive 128 MB | *Cancelled since 12/2005* |
| 5MMUSB.0256-00 | **USB flash drive 256 MB SanDisk**<br>USB 2.0 flash drive 256 MB | *Cancelled since 03/2007* |

Table 244: Model numbers - Accessories (cont.)

| Model number | Description | Note |
|---|---|---|
| 5MMUSB.0512-00 | **USB flash drive 512 MB SanDisk**<br>USB 2.0 flash drive 512 MB | |
| 5MMUSB.1024-00 | **USB flash drive 1 GB SanDisk**<br>USB 2.0 flash drive 1 GB | *Cancelled since 03/2007* |
| 5MMUSB.2048-00 | **USB flash drive 2 GB SanDisk**<br>USB 2.0 flash drive 2 GB | |
| 9A0017.01 | **RS232 DB9 null modem cable 0.6 m**<br>Null modem cable RS232 0.6 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket). | |
| 9A0017.02 | **RS232 DB9 null modem cable 1.8 m**<br>Null modem cable RS232 1.8 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket). | |

Table 244: Model numbers - Accessories (cont.)

# 2. Lithium battery

## 2.1 General information

The lithium battery is needed for buffering the BIOS CMOS data, the real-time clock, and SRAM data.

The battery is subject to wear and must be replaced when the battery power ("Bad" status) is insufficient (see "Changing the battery" on page 580).

## 2.2 Order data

| Model number | Description | Figure |
|---|---|---|
| 0AC201.9 | Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell | |
| 4A0006.00-000 | Lithium battery, 1 pc., 3 V / 950 mAh, button cell | |
| | | |

Table 245: Order data - Lithium batteries

## 2.3 Technical data

### Information:

**The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.**

| Features | 0AC201.9 | 4A0006.00-000 |
|---|---|---|
| Capacity | 950 mAh | |
| Voltage | 3 V | |
| Self discharge at 23°C | < 1% per year | |
| Storage time | Max. 3 years at 30°C | |
| **Environment** | | |
| Storage temperature | -20 to +60°C | |
| Relative humidity | 0 to 95%, non-condensing | |

Table 246: Technical data - Lithium batteries

# 3. TB103 3-pin supply voltage connector

## 3.1 General information

This single row 3-pin terminal block is mainly used to connect the supply voltage.

## 3.2 Order data

| Model number | Description | Figure |
|---|---|---|
| 0TB103.9 | Plug for the 24 V supply voltage (screw clamps) | <br>0TB103.9<br> <br>0TB103.91 |
| 0TB103.91 | Plug for the 24 V supply voltage (cage clamps) | |

Table 247: Order data - TB103

## Information:

**The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.**

| Name | 0TB103.9 | 0TB103.91 |
|---|---|---|
| Number of pins | 3 | |
| Type of terminal | Screw clamps | Cage clamps |
| Distance between contacts | 5.08 mm | |
| Resistance between contacts | ≤5 mΩ | |

Table 248: Technical data - TB103

| Name | 0TB103.9 | 0TB103.91 |
|---|---|---|
| Nominal voltage according to VDE / UL,CSA | 250 V / 300 V | |
| Current load according to VDE / UL,CSA | 14.5 A / 10 A per contact | |
| Terminal size | 0.08 mm² - 3.31 mm² | |
| Cable type | Copper wires only (no aluminum wires!) | |

Table 248: Technical data - TB103 (cont.)

# 4. aPCI slot cover

The aPCI slot cover can be installed when an aPCI slot on a Power Panel 200 device is not in use for whatever reason. This can also be necessary e.g. for EMC reasons.

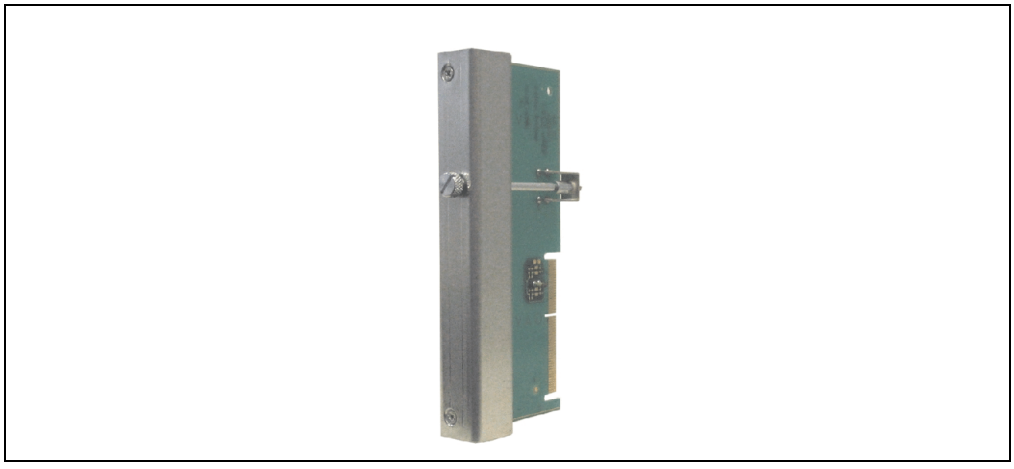


Figure 401: aPCI slot cover 4AC200.1000-00

## 4.1 Installation

Because it has the same mechanical dimensions as a B&R aPCI module, it can easily be inserted into a free aPCI slot and tightly fastened to the Power Panel using a knurled screw.

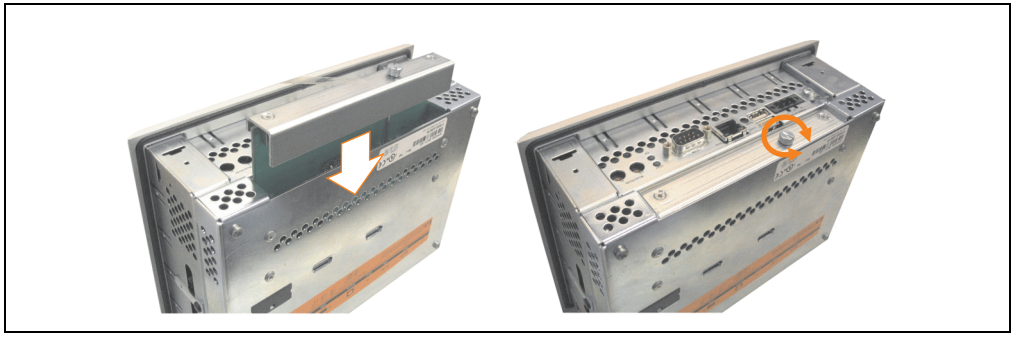


Figure 402: aPCI slot cover installation

# 5. Legend strip templates

Power Panel devices with keys are delivered with partially pre-labeled key legend strips (F1, F2, etc.). The key legend strip slots are accessible on the back of the Power Panel device (above and below).

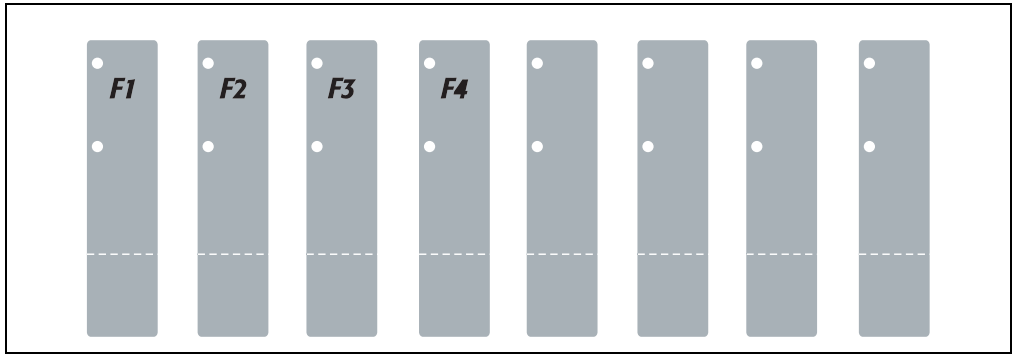



Figure 403: Legend strip templates

Printable legend strips (A4 format) can be ordered from B&R (see table 249 "Order data - Legend strip templates" on page 557). They can be printed using a standard laser printer (b/w or color) in a temperature range from -40  to +125°C. A print template (available for Corel Draw versions 7, 9 and 10) for the respective legend strip template can be downloaded from the B&R homepage at **www.br-automation.com**.

## 5.1 Order data

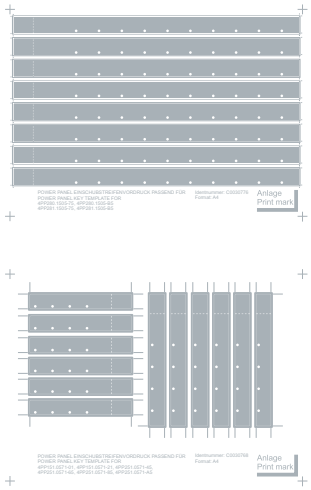
| Model number | Description | Figure |
|---|---|---|
| 5AC900.057X-00 | **Legend strips 3x 5.7" Vertical1**<br>Legend strip template for Power Panels 4PP151.0571-01, 4PP151.0571-21, 4PP251.0571-45, 4PP251.0571-65, 4PP251.0571-85, 4PP251.0571-A5. For 3 devices. | Examples of legend strip templates<br>  |
| 5AC900.057X-01 | **Legend strips 2x 5.7" Horizontal2**<br>Legend strip template for Power Panels 4PP152.0571-01, 4PP152.0571-21, 4PP252.0571-45, 4PP252.0571-65, 4PP252.0571-85, 4PP252.0571-A5. For 2 devices. | |
| 5AC900.104X-00 | **Legend strip 1x 10.4" Vertical1**<br>Legend strip template for Power Panels 4PP151.1043-31, 4PP181.1043-31, 4PP251.1043-75, 4PP251.1043-B5, 4PP281.1043-75, 4PP281.1043-B5. For 1 device. | |
| 5AC900.104X-01 | **Legend strip 1x 10.4" Horizontal2**<br>Legend strip template for Power Panels 4PP152.1043-31, 4PP182.1043-31, 4PP252.1043-75, 4PP252.1043-B5, 4PP282.1043-75, 4PP282.1043-B5. For 1 device. | |
| 5AC900.104X-02 | **Legend strips 3x 10.4" Horizontal1**<br>Legend strip template for Power Panels 4PP180.1043-31, 4PP280.1043-75, 4PP280.1043-B5. For 3 devices. | |
| 5AC900.150X-00 | **Legend strips 4x 15"**<br>Legend strip template for Power Panels 4PP151.1505-31, 4PP180.1505-31, 4PP181.1505-31, 4PP251.1505-75, 4PP251.1505-B5, 4PP280.1505-75, 4PP280.1505-B5, 4PP281.1505-75, 4PP281.1505-B5. For 4 devices. | |

Table 249: Order data - Legend strip templates

# 6. CompactFlash cards 5CFCRD.xxxx-03

## 6.1 General information

### Information:

**On Windows CE 5.0 devices, 5CFCRD.xxxx-03 CompactFlash cards up to 1GB are supported.**

## 6.2 Order data

| Model number | Description | Figure |
|---|---|---|
| 5CFCRD.0064-03 | CompactFlash 64 MB SSI | CompactFlash card |
| 5CFCRD.0128-03 | CompactFlash 128 MB SSI | |
| 5CFCRD.0256-03 | CompactFlash 256 MB SSI | |
| 5CFCRD.0512-03 | CompactFlash 512 MB SSI | |
| 5CFCRD.1024-03 | CompactFlash 1024 MB SSI | |
| 5CFCRD.2048-03 | CompactFlash 2048 MB SSI | |
| 5CFCRD.4096-03 | CompactFlash 4096 MB SSI | |
| 5CFCRD.8192-03 | CompactFlash 8192 MB SSI | |

Table 250: Order data - CompactFlash cards

## 6.3 Technical data

# Caution!

**A sudden loss of power can cause data to be lost! In very rare cases, the mass memory may also become damaged.**

**To prevent damage and loss of data, B&R recommends that you use a UPS device.**

# Information:

**The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.**

| Features | 5CFCRD. 0064-03 | 5CFCRD. 0128-03 | 5CFCRD. 0256-03 | 5CFCRD. 0512-03 | 5CFCRD. 1024-03 | 5CFCRD. 2048-03 | 5CFCRD. 4096-03 | 5CFCRD. 8192-03 |
|---|---|---|---|---|---|---|---|---|
| MTBF (at 25°C) | > 4,000,000 hours | | | | | | | |
| Maintenance | None | | | | | | | |
| Data reliability | < 1 unrecoverable error in $10^{14}$ bit read accesses | | | | | | | |
| Data retention | 10 years | | | | | | | |
| Lifetime monitoring | Yes | | | | | | | |
| Supported operating modes | PIO Mode 0-4, Multiword DMA Mode 0-2 | | | | | | | |
| Continuous reading | Typically 8 MB/s | | | | | | | |
| Continuous writing | Typically 6 MB/s | | | | | | | |
| **Endurance** | | | | | | | | |
| Clear/write cycles<br>Typical | > 2.000.000 | | | | | | | |
| SLC flash | Yes | | | | | | | |
| Wear leveling | Static | | | | | | | |
| Error Correction Coding (ECC) | Yes | | | | | | | |
| **Support** | | | | | | | | |
| Hardware | MP100/200, PP100/200, PP300/400, PPC700, PPC300,<br>Provit 2000, Provit 5000, APC620, APC680, APC810, APC820 | | | | | | | |
| Windows XP Professional | - | - | - | - | - | - | Yes | Yes |
| Windows XP Embedded | - | - | - | Yes | Yes | Yes | Yes | Yes |
| Windows CE 6.0 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes [1)] |
| Windows CE 5.0 | Yes | Yes | Yes | Yes | Yes | - | - | - |

Table 251: Technical data - CompactFlash cards 5CFCRD.xxxx-03

| Support | 5CFCRD.0064-03 | 5CFCRD.0128-03 | 5CFCRD.0256-03 | 5CFCRD.0512-03 | 5CFCRD.1024-03 | 5CFCRD.2048-03 | 5CFCRD.4096-03 | 5CFCRD.8192-03 |
|---|---|---|---|---|---|---|---|---|
| PVI Transfer Tool | ≥ V2.57 (part of PVI Development Setup ≥ V2.5.3.3005) | | | | | | | |
| B&R Embedded OS Installer | ≥ V2.21 | | | | | | | |
| **Mechanical characteristics** | | | | | | | | |
| Dimensions<br>Length<br>Width<br>Thickness | 36.4 ±0.15 mm<br>42.8 ±0.10 mm<br>3.3 ±0.10 mm | | | | | | | |
| Weight | 11.4 g | | | | | | | |
| **Environmental characteristics** | | | | | | | | |
| Ambient temperature<br>Operation<br>Storage<br>Transport | 0 to +70°C<br>-50 to +100°C<br>-50 to +100°C | | | | | | | |
| Relative humidity<br>Operation / Storage / Transport | 8 to 95%, non-condensing | | | | | | | |
| Vibration<br>Operation<br>Storage / Transport | max. 16.3 g (159 m/s$^2$ 0-peak)<br>max. 30 g (294 m/s$^2$ 0-peak) | | | | | | | |
| Shock<br>Operation<br>Storage / Transport | max. 1000 g (9810 m/s$^2$ 0-peak)<br>max. 3000 g (29430 m/s$^2$ 0-peak) | | | | | | | |
| Altitude | Maximum 80,000 feet (24,383 meters) | | | | | | | |

Table 251: Technical data - CompactFlash cards 5CFCRD.xxxx-03 (cont.)

1) Not supported by B&R Embedded OS installer.

### 6.3.1 Temperature humidity diagram - Operation and storage

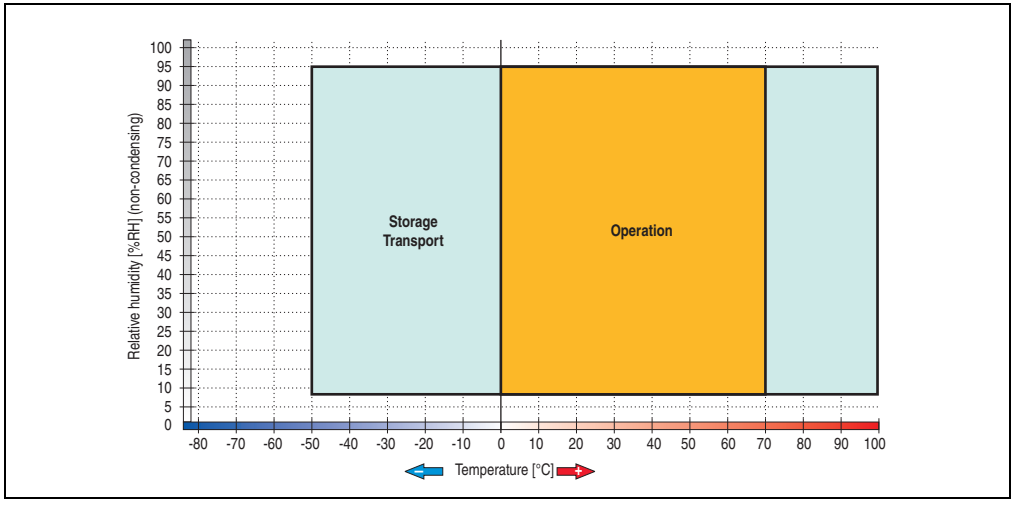



Figure 404: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

## 6.4 Dimensions

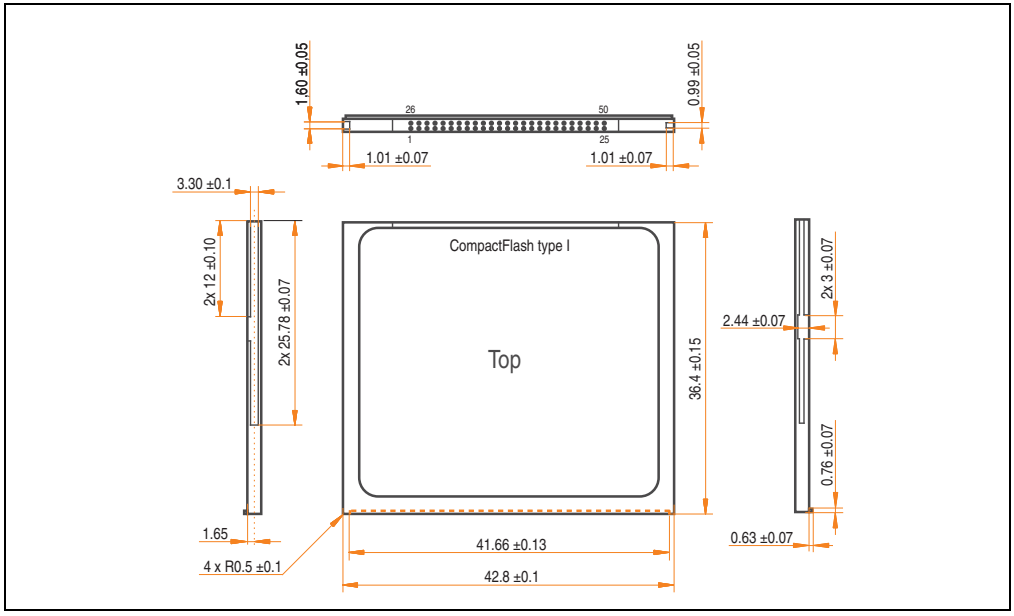



Figure 405: Dimensions - CompactFlash card Type I

# 7. CompactFlash cards 5CFCRD.xxxx-02

## 7.1 General information

CompactFlash cards are easy-to-exchange storage media. Due to their robustness against environmental influences (e.g. temperature, shock, vibration, etc.), CompactFlash cards are ideal for use as storage media in industrial environments.

## 7.2 Order data

| Model number | Description | Figure |
|---|---|---|
| 5CFCRD.0032-02 | CompactFlash 32 MB TrueIDE SanDisk/A | |
| 5CFCRD.0064-02 | CompactFlash 64 MB TrueIDE SanDisk/A | |
| 5CFCRD.0128-02 | CompactFlash 128 MB TrueIDE SanDisk/A | |
| 5CFCRD.0256-02 | CompactFlash 256 MB TrueIDE SanDisk/A | |
| 5CFCRD.0512-02 | CompactFlash 512 MB TrueIDE SanDisk/A | |
| 5CFCRD.1024-02 | CompactFlash 1024 MB TrueIDE SanDisk/A | |
| 5CFCRD.2048-02 | CompactFlash 2048 MB TrueIDE SanDisk/A | |
| | | |

Table 252: Order data - CompactFlash cards 5CFCRD.xxxx-02

## 7.3 Technical data

### Information:

**The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.**

| Features | 5CFCRD.xxxx-02 |
|---|---|
| MTBF (@ 25°C) | > 3,000,000 hours |
| Maintenance | None |
| Data reliability | < 1 unrecoverable error in $10^{14}$ bit read accesses<br>< 1 faulty correction in $10^{20}$ bit read accesses |
| Write/erase procedures | > 2,000,000 times |

Table 253: Technical data - CompactFlash cards 5CFCRD.xxxx-02

| Mechanics | 5CFCRD.xxxx-02 |
|---|---|
| Dimensions<br>Length<br>Width<br>Thickness | <br>36.4 ±0.15 mm<br>42.8 ±0.10 mm<br>3.3 ±0.10 mm |
| Weight | 11.4 g |
| **Environment** | |
| Ambient temperature<br>Operation<br>Storage<br>Transport | <br>0 to +70°C<br>-25 to +85°C<br>-25 to +85°C |
| Relative humidity<br>Operation / Storage | <br>8 to 95%, non-condensing |
| Vibration<br>Operation / Storage | <br>Maximum 30 G (point to point) |
| Shock<br>Operation / Storage | <br>Maximum 3,000 G |
| Altitude | 24000 meters |

Table 253: Technical data - CompactFlash cards 5CFCRD.xxxx-02 (cont.)

## 7.4 Dimensions

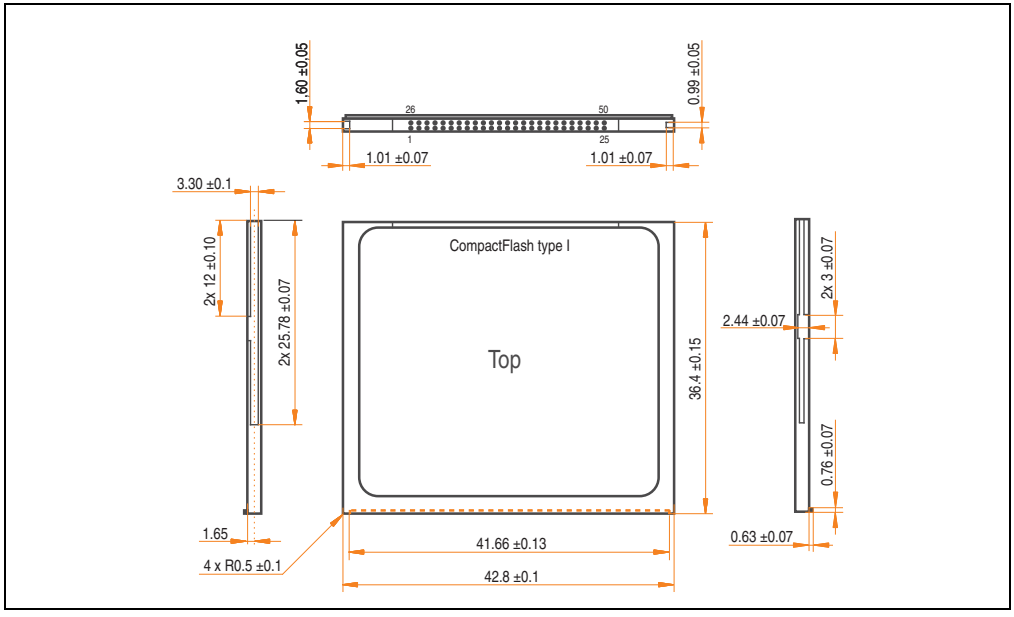



Figure 406: Dimensions - CompactFlash card Type I

## 7.5 Calculating the lifespan

SanDisk provides a 6-page "white paper" for the lifespan calculation of CompactFlash cards (see following pages). This document can also be found on the SanDisk homepage.

SanDisk

WHITE PAPER

SANDISK FLASH MEMORY CARDS

WEAR LEVELING

October 2003

140 Caspian Court • Sunnyvale, California 94089 • Phone: 408-542-0500 • Fax: 408-542-0503

Figure 407: SanDisk white paper - Page 1

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*Lit. No. 80-36-00278 10/03 Printed in U.S.A.*



Figure 408: SanDisk white paper - Page 2

## OVERVIEW

This purpose of this white paper is to help SanDisk customers understand the benefits of wear leveling and to assist customers in calculating life expectancy of SanDisk cards in specific applications.

Flash memory is susceptible to wear as a result of the repeated program and erase cycles that are inherent in typical data storage applications. Applications in which this is a major concern include hard disk replacement applications where write operations occur frequently. How a storage system manages the wear of the memory is key to understanding the extended reliability of the host that relies on these storage systems.

## WEAR LEVELING METHODOLOGY

Current products available in the industrial channel use NAND flash memory. It is important to understand the NAND memory architecture to gain insight into the wear leveling mechanism.

Each memory chip is divided into blocks. A block is an array of memory cells organized as sectors. The number of blocks and sectors vary from product to product. The minimum unit for a write or read operation is a page (or sector). The minimum unit for an erase operation is a block. Physical blocks are logically grouped into zones. For the current technology, a typical zone size is 4 MB. However, this may change from product to product. Wear leveling is done within a zone. The current firmware does not spread the wear across the capacity of the card. Each zone has about 3% additional “spare blocks” beyond what is assigned to meet the logical capacity of the flash card. This group of blocks is commonly referred to as the “Erase Pool”.

With the introduction of SanDisk’s Write-before-Erase architecture, each time a host writes data to the same logical address (CHS or LBA), data is written into a newly assigned, empty physical block from the “Erase Pool”. The intrinsic nature of writing to a new physical location each time a logical address is written to is the basis for wear leveling found in SanDisk cards. This action spreads the writes over the zone, thus greatly extending the overall life of the card. The methodology of using a large number of physical addresses to manage a smaller logical address table allows for rotation of the physical addresses among the entire group of physical blocks within a zone. The resulting wear leveling optimizes the effective life of the media and avoids prematurely reaching the end of life on frequently written to host addresses.

When a card detects that a block has reached the end of its useful life, it removes that block from the blocks that are available for write operations. The result is a reduction of the size of the erase pool. This does not affect the capacity of the card as seen by the host. When the pool of blocks available for write operations has been exhausted due to wear, the card will reach the end of its useful life for write operations.



Figure 409: SanDisk white paper - Page 3

Current SanDisk products do not preempt wear leveling events during normal operation of the card. Applications typically don't require such management beyond the natural wear leveling that occurs during normal host operations. As a result, the effectiveness of wear leveling in current SanDisk products is dependent upon host usage. It is important for customers whose applications do not fall into this typical usage pattern to understand how their applications will affect the lifetime of the card.

## LIFE EXPECTANCY SCENARIOS

### ►best case analysis

In a typical application, large data files are written to the card occupying contiguous sequential logical address space. This results in optimal wear leveling and provides card life exceeding the specification for card endurance. This increased endurance is achieved as follows: The 2,000,000 endurance cycles specification (I-Grade only) is a result of large amounts of test data collected from a very large sample set that accounts for the extreme limits of the test population. With the 3% additional erase pool being used in an ideal fashion, the distribution is narrowed and the card will survive beyond its specified lifetime.

### ►worst case analysis

In the worst-case application, data will be written as single sectors to random addresses across the card. These single sector writes will exercise the erase pool more rapidly, requiring the system to perform a "garbage collection" operation to free up new blocks for subsequent write operations. At the extreme, each single sector write would cause one block to be programmed and erased. As a typical block size is 16kB or 32 sectors, the amount of wear is increased by a factor of 31 since 32 physical sectors are written and erased for each sector the host writes. Spreading this wear across the erase pool results in an effective 1/30 usable lifetime. This case is an extreme example and is only included to show the range of application dependence. This result is comparable to other vendor's cards based on memory with a 16kB erase block.

### ►analysis of host dependence

In assessing the life expectancy of a card in a given system several factors need to be understood. These factors include the types of files and their corresponding sizes, frequency of card write operations and file system behavior (including data structures). The types of files must be considered since some files, such as operating systems or executable files, typically remain in fixed locations once they are stored in the card. This limits the number of physical blocks available for circulation into the erase pool. The remaining capacity after these files have been accounted for can then be divided by the typical size of files that will be updated over the lifetime of the card. Related to this calculation is how the file system overwrites existing files. Typical operating system behavior, such as DOS, will allocate new blocks from the file allocation table, or FAT, and so repeated file writes will occupy a new set of addresses on the card. This is very beneficial in spreading wear across the card since it forces the card to cycle the entire physical



Figure 410: SanDisk white paper - Page 4

area being used for such files. Special cases to consider include those where the files being updated are very small. Typically an operating system uses a minimum number of sectors to store a file, referred to as a cluster. Typical cluster sizes range from 8 to 64 sectors in size. The cluster size is important for files that are the same or smaller than the 32-sector block since these may trigger garbage collection operations. If these updates happen in a random fashion (sequential updates would not be affected by cluster size) lifetime may be reduced as a result. Finally, the frequency of such updates is then used to determine how long it will take before the card reaches its statistical limit for endurance. These factors can be combined in an equation that can be used to calculate the minimum time a card will function in that application:

$$lifetime = 2{,}000{,}000 \times \frac{\left(C_{zone} - C_{fixed}\right) \times \left(1 - k_r \times \frac{32 - N_{cluster}}{32}\right)}{FS_{typ}} \times \frac{1}{f_w}$$

where Czone is the total capacity of the zone, Cfixed is the capacity used by fixed files, Ncluster is the cluster size, FStyp is the average file size and fw is the average frequency at which files are updated. kr is a factor that is 0 for file sizes that are typically over 16kB or for applications that are not random in the order in which such files are updated.

**Example 1**

In this example 128 KB of data is updated once a day. The zone has 500 KB worth of fixed files. A 4 MB zone size is assumed.

$$lifetime = 2{,}000{,}000 \times \frac{(4000 - 500) \times (1 - 0)}{128} \times \frac{1}{1/day}$$

$$lifetime = 149828\,years$$

**Example 2**

This example is a data logging operation using a 1GB card where a 4kB file is updated every five seconds. This would result in sequential address being written.

$$lifetime = 2{,}000{,}000 \times \frac{4000}{4} \times \frac{1}{1/5\,\mathrm{sec}}$$

$$lifetime = 317\,years$$



Figure 411: SanDisk white paper - Page 5

**Example 3**

This example is a data logging operation using the same 1GB card where a new 4kB file is written every five seconds. But in this case the cluster size is 4kB and it is expected that, due to file system fragmentation, the logical addresses will be written randomly.

$$lifetime = 2{,}000{,}000 \times \frac{4 \times \left(1 - 1 \times \frac{32-8}{32}\right)}{.004} \times \frac{1}{1/5\,\text{sec}}$$

$$lifetime = 79.3\,years$$

## CONCLUSION

These examples are general in nature but show how the equation can be used as a guideline for calculating card lifetime in different applications. They also demonstrate that SanDisk card architecture exceeds reasonable life expectancy in typical applications. If a particular applications behaves in such a way that this equation cannot be applied, the SanDisk Applications Engineering group can assist in performing card lifetime analysis.

For more information, please visit the SanDisk Web site at: www.sandisk.com

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Figure 412: SanDisk white paper - Page 6

# 8. CompactFlash cards 5CFCRD.0xxx-01

## 8.1 General information

CompactFlash cards are easy-to-exchange storage media. Due to their robustness against environmental influences (e.g. temperature, shock, vibration, etc.), CompactFlash cards are ideal for use as storage media in industrial environments.

## 8.2 Order data

| Model number | Description | Figure |
|---|---|---|
| 5CFCRD.0032-01 | CompactFlash 32 MB ATA/True IDE | |
| 5CFCRD.0064-01 | CompactFlash 64 MB ATA/True IDE | |
| 5CFCRD.0128-01 | CompactFlash 128 MB ATA/True IDE | |
| 5CFCRD.0128-01 | CompactFlash 196 MB ATA/True IDE | |
| 5CFCRD.0256-01 | CompactFlash 256 MB ATA/True IDE | |
| 5CFCRD.0384-01 | CompactFlash 384 MB ATA/True IDE | |
| 5CFCRD.0512-01 | CompactFlash 512 MB ATA/True IDE | |
| | | |

Table 254: Order data - CompactFlash cards 5CFCRD.0xxx-01

## 8.3 Technical data

### Information:

**The specified limits listed here, such as temperature, relative humidity, shock and vibration, only apply to his accessory and do not automatically apply to the whole terminal.**

| Features | 5CFCRD.xxxx-01 |
|---|---|
| Temperature<br>Operation<br>Storage | <br>0 to 60°C<br>-25 to 85°C |
| Relative humidity<br>Operation / Storage | <br>8 to 95%, non-condensing |
| Vibration<br>Operation / Storage | <br>Maximum 30 G point-to-point |
| Shock<br>Operation / Storage | <br>Maximum 3,000 G |

Table 255: Technical data - CompactFlash cards 5CFCRD.xxxx-01

| Features | 5CFCRD.xxxx-01 |
|---|---|
| Altitude | 24000 meters |
| MTBF (@ 25°C) | > 3,000,000 hours |
| Maintenance | None |
| Data reliability | <1 unrecoverable error in $10^{14}$ bit read accesses<br><1 faulty correction in $10^{20}$ bit read accesses |
| Write/erase procedures | > 2,000,000 times |
| Weight | 11.4 grams |
| Dimensions<br>Length<br>Width<br>Thickness | <br>36.4 ±0.15 mm<br>42.8 ±0.10 mm<br>3.3 ±0.10 mm |

Table 255: Technical data - CompactFlash cards 5CFCRD.xxxx-01 (cont.)

# 9. USB flash drive

## Information:

**We reserve the right to supply alternative products due to the vast quantity of flash drives available on the market and their corresponding short product lifecycle. As a result, the following measures may be necessary (e.g. using the SanDisk Cruzer Micro flash drive with 512 MB) to take the following measures in order to boot from these flash drives:**

- **The flash drive must be reformatted or in some cases even re-partitioned (set active partition).**
- **The flash drive must be at the top of the BIOS boot order, or alternatively the IDE controllers can also be deactivated in the BIOS. This can be avoided in most cases if a "`fdisk /mbr`" command is also executed on the USB flash drive.**

## 9.1 General information

USB flash drives are easy-to-exchange storage media. Because of the fast data transfer (USB 2.0), the USB flash drives are ideal for use as a portable memory medium. Without requiring additional drivers ("Hot Plug & Play" - except with Windows 98SE), the USB flash drive can be converted immediately into an additional drive where data can be read or written. Only USB flash drives from the memory specialists SanDisk are used.

## 9.2 Order data

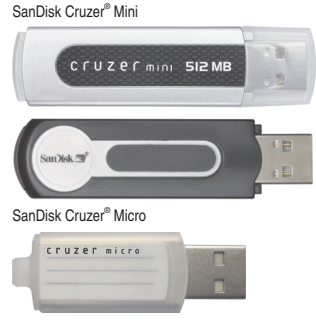
| Model number | Description | Figure |
|---|---|---|
| 5MMUSB.0128-00 | USB flash drive 128 MB SanDisk Cruzer Mini |   |
| 5MMUSB.0256-00 | USB flash drive 256 MB SanDisk Cruzer Mini | |
| 5MMUSB.0512-00 | USB flash drive 512 MB SanDisk Cruzer Mini up to Rev. E0 or Cruzer Micro starting with Rev. E0 | |
| 5MMUSB.1024-00 | USB flash drive 1 GB SanDisk Cruzer Mini up to Rev. C0 or Cruzer Micro starting with Rev. C0 | |
| 5MMUSB.2048-00 | USB flash drive 2 GB SanDisk Cruzer Micro | |
| | | |

Table 256: Order data - USB flash drives

## 9.3 Technical data

# Information:

**The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.**

| Features | 5MMUSB.0128-00 | 5MMUSB.0256-00 | 5MMUSB.0512-00 | 5MMUSB.1024-00 | 5MMUSB.2048-00 |
|---|---|---|---|---|---|
| LED<br>Cruzer Mini / Cruzer Micro | 1 LED (green), signals data transfer (send and receive) | | | | |
| Power supply<br>Current requirements Cruzer Mini / Cruzer Micro | Via the USB port<br>650 µA sleep mode, 150 mA read/write | | | | |
| Interface Cruzer Mini / Cruzer Micro<br>Type<br>Transfer rate<br>Sequential reading<br>Sequential writing<br>Connection | USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified<br>USB 1.1 and 2.0 compatible<br>Up to 480 MBit (high speed)<br>Max. 8.7 MB/second<br>Max. 1.7 MB/second<br>To each USB type A interface | | | | |
| MTBF (at 25°C)<br>Cruzer Mini / Cruzer Micro | 100,000 hours | | | | |
| Data retention<br>Cruzer Mini / Cruzer Micro | 10 years | | | | |
| Maintenance<br>Cruzer Mini / Cruzer Micro | None | | | | |
| Operating system support<br>Cruzer Mini<br>Cruzer Micro | Windows CE 4.1, CE 4.2, 98SE[1)] , ME, 2000, XP, Mac OS 9.1.x and Mac OS X 10.1.2<br>Windows CE 4.2, CE 5.0, ME, 2000, XP and Mac OS 9.1.x+, OS X v10.1.2+ | | | | |
| **Mechanical characteristics** | | | | | |
| Dimensions<br>Height - Cruzer Mini / Cruzer Micro<br>Width - Cruzer Mini / Cruzer Micro<br>Depth - Cruzer Mini / Cruzer Micro | 62 mm / 52.2 mm<br>19 mm / 19 mm<br>11 mm / 7.9 mm | | | | |
| **Environmental characteristics** | | | | | |
| Environmental temperature Cruzer Mini / Cruzer Micro<br>Operation<br>Storage<br>Transport | 0 to +45°C<br>-20 to +60°C<br>-20 to +60°C | | | | |
| Humidity Cruzer Mini / Cruzer Micro<br>Operation<br>Storage<br>Transport | 10 to 90%, non-condensing<br>5 to 90%, non-condensing<br>5 to 90%, non-condensing | | | | |

Table 257: Technical data - USB flash drive 5MMUSB.xxxx-00

| Features | 5MMUSB.0128-00 | 5MMUSB.0256-00 | 5MMUSB.0512-00 | 5MMUSB.1024-00 | 5MMUSB.2048-00 |
|---|---|---|---|---|---|
| Vibration Cruzer Mini / Cruzer Micro | | | | | |
| Operation | At 10 - 500 Hz: 2 g (19.6 m/s$^2$ 0 peak), oscillation rate 1/minute | | | | |
| Storage | At 10 - 500 Hz: 4 g (39.2 m/s$^2$ 0 peak), oscillation rate 1/minute | | | | |
| Transport | At 10 - 500 Hz: 4 g (39.2 m/s$^2$ 0 peak), oscillation rate 1/minute | | | | |
| Shock Cruzer Mini / Cruzer Micro | | | | | |
| Operation | Max. 40 g (392 m/s$^2$ 0-peak) and 11 ms length | | | | |
| Storage | Max. 80 g (784 m/s$^2$ 0-peak) and 11 ms length | | | | |
| Transport | Max. 80 g (784 m/s$^2$ 0-peak) and 11 ms length | | | | |
| Altitude Cruzer Mini / Cruzer Micro | | | | | |
| Operation | 3048 meters | | | | |
| Storage | 12192 meters | | | | |
| Transport | 12192 meters | | | | |

Table 257: Technical data - USB flash drive 5MMUSB.xxxx-00 (cont.)

1) For Win 98SE, a driver can be downloaded from the SanDisk homepage.

### 9.3.1 Temperature humidity diagram - Operation and storage

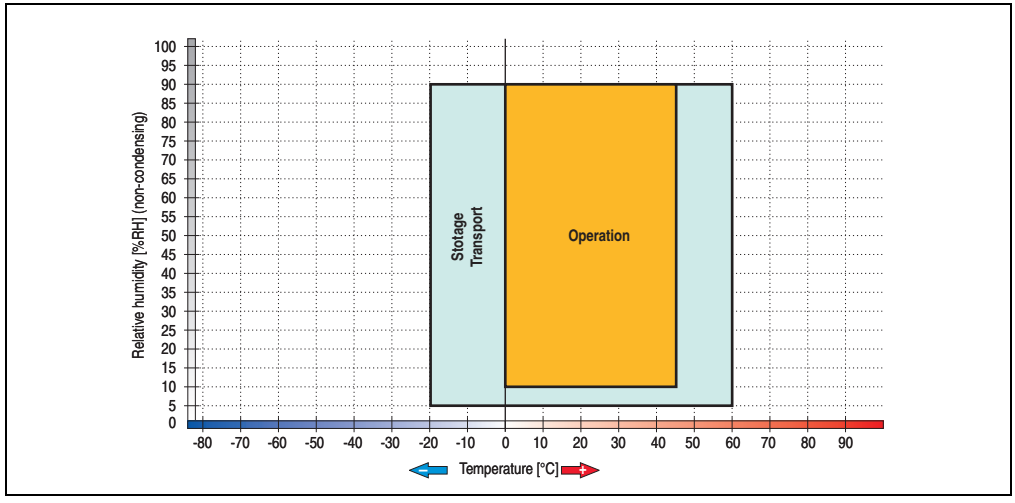



Figure 413: Temperature humidity diagram - USB flash drive - 5MMUSB.xxxx-00

Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

## 9.4 Creating a bootable USB flash drive

When used in connection with a B&R industrial PC, it is possible to boot the system from one of the flash drives available from B&R. The flash drive must be specially prepared for this.

### 9.4.1 Requirements

The following peripherals are required for creating a bootable USB flash drive:

- B&R USB flash drive
- B&R Industrial PC
- USB floppy drive (external)
- USB keyboard
- A start disk created using MS-DOS 6.22 or Windows 98 - 1.44MB HDD (Windows Millennium, NT4.0, 2000, XP start disks cannot be used).
  The tools "`format.com`" and "`fdisk.exe`" must be located on the diskette!

### 9.4.2 Procedure

- Plug in the flash drive and boot from the start disk.
- Set active partition on the flash drive using "`fdisk`" and follow the further instructions.
- Reboot the system from the start disk.
- Format and simultaneously transfer the system files to the flash drive with the command "`format c: /s`".

# 10. Null modem cable

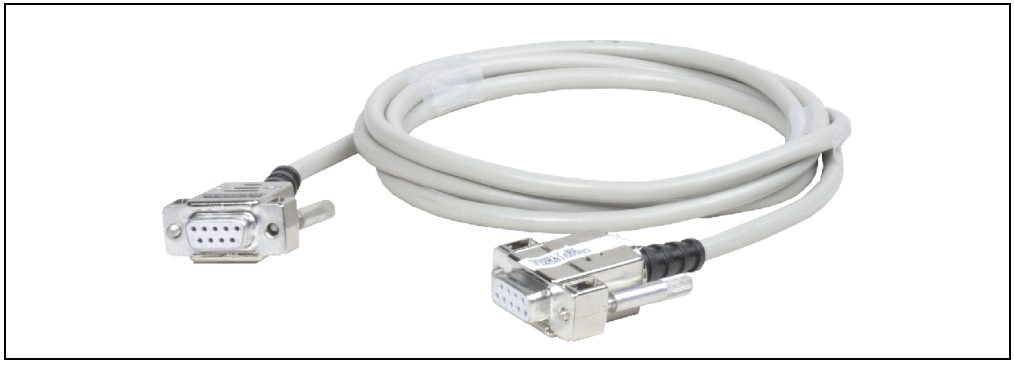


Figure 414: Null modem cable 9A0017.0x

## 10.1 Order data

| Model number | Description | Note |
|---|---|---|
| 9A0017.01 | **RS232 DB9 null modem cable 0.6 m**<br>Null modem cable RS232 0.6 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket). | |
| 9A0017.02 | **RS232 DB9 null modem cable 1.8 m**<br>Null modem cable RS232 1.8 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket). | |

Table 258: Model numbers - USB cables

## 10.2 Technical data

| Features | 9A0017.01 | 9A0017.02 |
|---|---|---|
| Length | 0.6 m ±10 mm | 1.8 m ±30 mm |
| Outer diameter | Max. 5 mm | |
| Shielding | Entire cable | |
| Connector type | 2 9-pin DSUB sockets - female | |
| Wire cross section | AWG 22 | |
| Flexibility | Flexible | |
| Flex radius | Min. 100 mm | |

Table 259: Technical data - Null modem cable

## 10.3 Cable specifications

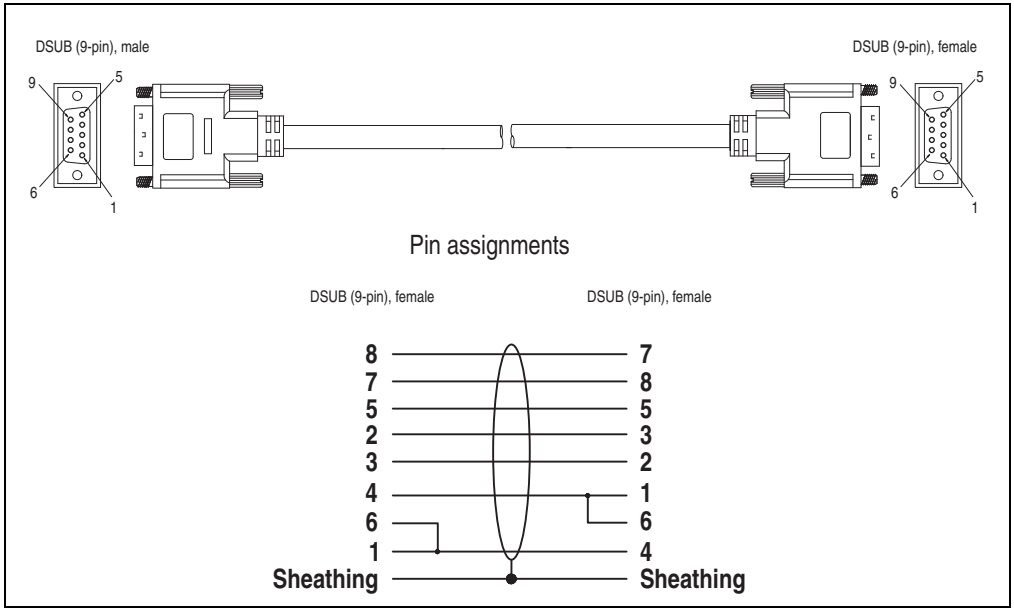



Figure 415: Pin assignments - Null modem cable

# Chapter 7 • Maintenance / Servicing

The following section describes service/maintenance work that can be performed by the user.

| Maintenance work on | Maintenance work | Change interval |
|---|---|---|
| Power Panel | Cleaning the touch screen | Depends on how dirty the touch membrane is<br>Approximately once a week |
| | Changing the battery [1)] | For the lifespan, see the technical data for the individual devices. |

Table 260: Maintenance work

1) Change intervals are recommended by B&R and refer to average life span and operating conditions.

## 1. Operating guidelines for the touch screen

- Do not use pointed objects such as pens, knives, etc. A specially designed pen for the touch screen is optional and can be ordered from B&R (model no. 9A0013.01).
- Do not place any heavy objects on the touch screen.

## 2. Cleaning the touch screen

Displays with touch screens should be cleaned at regular intervals.

### 2.1 Cleaning agents

A damp cloth should be used for cleaning the touch screen. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand and not sprayed directly onto the touch screen itself. Never use aggressive solvents, chemicals, or scouring agents.

### Information:

**Only clean the device when it has been switched off, as touching the screen will trigger unintended functions to be executed.**

# 3. Changing the battery

Changing the battery is only necessary for devices with a lithium battery (see section "Technical data" on page 43 for Power Panel devices).

The lithium battery buffers the internal real-time clock (RTC), SRAM data, and individually saved BIOS settings. The battery status (good or bad) can be queried using software.

### Battery check

The battery status (good or bad) is checked every time the device is turned on, as well as every 24 hours. The check involves applying a load to the battery for a short time (approx. 1 second), followed by an evaluation. The evaluated battery status is displayed in the BIOS Setup pages and in the B&R Control Center (ADI driver), but can also be read in a customer application via the ADI Library.

| Battery status | Meaning |
|---|---|
| OK | Data buffering is guaranteed |
| Bad | Data buffering is guaranteed for approx. another 500 hours from the point in time that the battery capacity is determined to be BAD (insufficient). |

Table 261: Meaning of battery status OK - Bad

From this point, starting from when battery capacity is recognized as insufficient, data buffering is guaranteed for approximately another 500 hours. When changing the battery, data is buffered for approximately another 10 minutes by a gold leaf capacitor.

## Information:

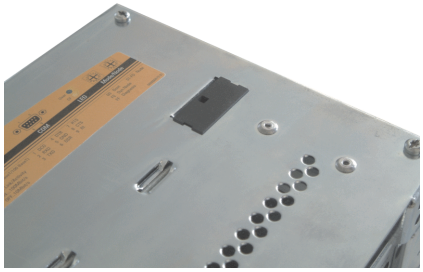
**The battery should only be changed by qualified personnel.**

### Technical data

See section 2 "Lithium battery" on page 552.

## 3.1 Procedure for changing the battery

- Disconnect the power supply to the Power Panel
- Touch the housing or earth connection (not the power supply!) in order to discharge any electrostatic charge from your body
- Remove the battery cover: The battery cover is found on the rear side of the Power Panel device.

| 0 aPCI slot Power Panel devices | 1 or 2 aPCI slot Power Panel devices |
|---|---|
| |  |

- Remove the battery from the holder (don't use uninsulated tools --> risk of short circuiting). The battery should not be held by its edges. **Insulated** tweezers may also be used for removing the battery.

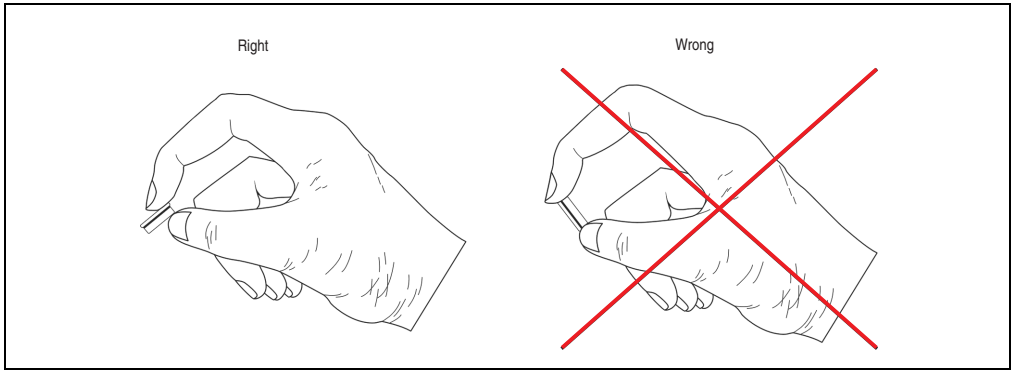



Figure 416: Battery handling

- After removing the battery, the data is buffered for at least another 10 minutes by a gold leaf capacitor so that data is not lost.
- Insert the new battery with correct polarity.
- Put on the battery cover and fasten the screws.
- Reconnect the power supply to the Power Panel.
- The data and time in BIOS may have to be set again (see section "Power Panel with BIOS" on page 455).

## Warning!

**Lithium batteries are considered hazardous waste. Used batteries should be disposed of accordingly.**

# 4. Preventing after-image effect in LCD/TFT monitors

Burn-in effect (after images, display memory effect, image retention or also image sticking) occurs in LCD/TFT monitors when a static image is displayed for a long period of time. This static screen content causes the build-up of parasitic capacities within the LCD components that prevent the liquid crystal molecules from returning to their original states. This condition may arise, is not predictable and depends on the following factors:

- Type of image displayed
- Color composition of the image
- Length of image output
- Ambient temperature

## 4.1 What measures can be taken against this?

There is no total solution, however, measures can be taken to significantly reduce this effect:

- Avoid static pictures or screen content
- Use screen savers (moving) when the display is not in use
- Frequent picture change
- Shut off the display when not in use

Turning off the background lighting (backlight) does not influence the prevention of the after-image effect.

# Appendix A



The following characteristics, features, and limit values only apply to the individual components used on a Power Panel device and do not apply to the Power Panel device as a whole. The specifications in Chapter 2 "Technical data" beginning on Page 43 apply.

## 1. Touch screen

### 1.1 Elo

This touch screen is used in the 10.4", 12.1" and 15" Power Panel designs (depending on the revision).

## Information:

**The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device. For the entire device in which this individual component is used, refer to the data given specifically for the entire device.**

| Elo Accu touch screen | Specifications |
|---|---|
| Manufacturer | Elo |
| Accuracy<br>For < 18" diagonals<br><br>For > 18" diagonals | <br>Typically < than 0.080 inches (2.032 mm)<br>Maximum error in all directions 0.180 inches (4.752 mm)<br>Maximum 1% of the diagonal for the active area of the touch screens |
| Response time | <10 ms |
| Release pressure | < 113 grams |
| Resolution | 4096 x 4096 touch points |
| Light permeability | up to 80% ± 5% |
| Temperature<br>Operation<br>Storage<br>Transport | <br>- 10 to + 50°C<br>- 40 to + 71°C<br>- 40 to + 71°C |
| Relative humidity<br>Operation<br>Storage<br>Transport | <br>Max. 90% at max. +50°C<br>Max. 90% at max. 50°C for 240 hours, non-condensing<br>Max. 90% at max. 50°C for 240 hours, non-condensing |

Table 262: Technical data - Elo Accu touch screen 5-wire

| Elo Accu touch screen | Specifications |
|---|---|
| Waterproofing | IP65 |
| Lifespan | 35 million touch operations on the same point |
| Chemical resistance [1)] | Acetone, ammonia-based glass cleaner, normal food and drinks, hexane, methylene chloride, methylethylketone, mineral spirits, turpentine, isopropyl alcohol |
| Activation | Finger, pointer, credit card, glove |
| Drivers | Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). Additionally, they can also be found on the B&R HMI Driver and Utilities DVD (Mod. No. 5SWHMI.0000-00). |

Table 262: Technical data - Elo Accu touch screen 5-wire (cont.)

1) The active area of the touch screen is resistant to these chemicals for a timeframe of one hour at 21°C.

### 1.1.1 Temperature humidity diagram - Operation and storage

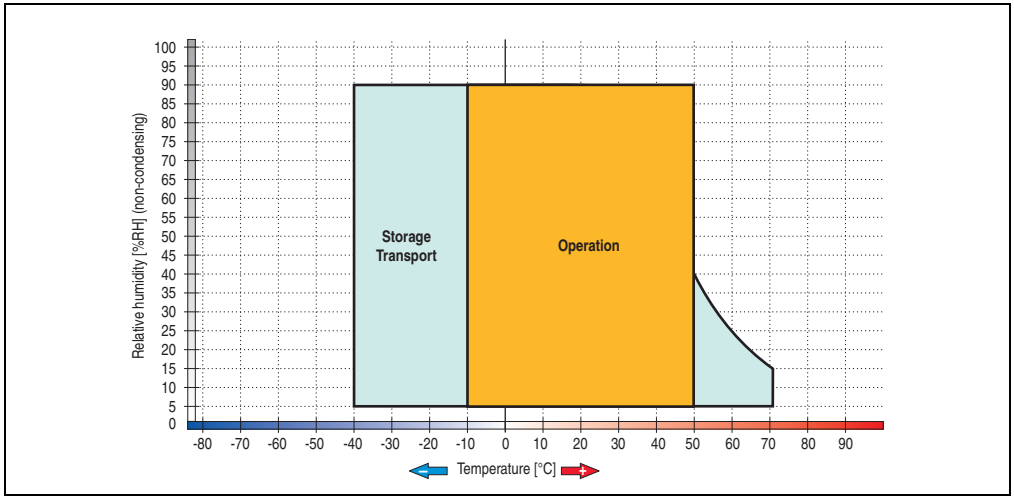



Figure 417: Temperature humidity diagram - Elo Accu touch screen 5-wire

Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 1.1.2 Cleaning

The touch screen should be cleaned with a moist lint-free cloth. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand and not sprayed directly onto the touch screen itself. Never use aggressive solvents, chemicals, or scouring agents.

## 1.2 3M touch

This touch screen is used in the 10.4", 12.1" and 15" Power Panel designs (depending on the revision).

# Information:

**The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device. For the entire device in which this individual component is used, refer to the data given specifically for the entire device.**



| 3M touch | Specifications |
|---|---|
| Manufacturer | 3M |
| Accuracy | - |
| Response time | - |
| Release pressure | 10 to 80 grams |
| Resolution | - |
| Light permeability | Up to 85% |
| Temperature<br>Operation<br>Storage<br>Transport | <br>-20 to +50°C<br>-40 to +70°C<br>-40 to +70°C |
| Waterproofing | - |
| Lifespan | 35 million touch operations on the same point |
| Chemical resistance [1)] | Tea, coffee, ketchup, mustard, vinegar, beer, cola, red wine, cooking oil, whiskey, universal cleaning agents, washing detergent, bleach (5.25%), hydrogen peroxide (3%), Lysol, ethyl, alcohol, isopropyl alcohol, acetone, methyl ethyl ketone (MEK), toluene, concentrated hydrochloric acid, naphtha, mineral oil, motor oil, diesel, gear fluid, brake fluid, antifreeze, hydraulic oil |
| Activation | Finger, pointer, credit card, glove |

Table 263: 3M touch

1) The active area of the touch screen is resistant to these chemicals for one hour at 22°C and 45% relative humidity.

### 1.2.1 Cleaning

The touch screen should be cleaned with a moist lint-free cloth. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand and not sprayed directly onto the touch screen itself. Never use aggressive solvents, chemicals, or scouring agents.

## 1.3 Gunze touch

This touch screen is used in 5.7" Power Panel designs.

# Information:

**The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device. For the entire device in which this individual component is used, refer to the data given specifically for the entire device.**

| Gunze touch | Specifications |
|---|---|
| Manufacturer | Gunze |
| Accuracy | - |
| Response time | - |
| Release pressure | < 50 grams (with finger) |
| Resolution | - |
| Light permeability | Up to 84% |
| Temperature<br>Operation<br>Storage<br>Transport | <br>-10 to +60°C<br>-20 to +70°C<br>-20 to +70°C |
| Waterproofing | - |
| Lifespan | 1 million touch operations on the same point |
| Chemical resistance | Alcoholic-based compound, such as ethanol. |
| Activation | Finger, pointer, credit card, glove |

Table 264: Gunze touch

### 1.3.1 Cleaning

The touch screen should be cleaned with a moist lint-free cloth. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand and not sprayed directly onto the touch screen itself. Never use aggressive solvents, chemicals, or scouring agents.

## 2. Décor foil

# Information:

**The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device.**



The décor foil conforms to DIN 42115 (section 2). This means it is resistant to exposure to the following chemicals for a 24-hour period with no visible signs of damage:

| | | |
|---|---|---|
| Ethanol<br>Cyclohexanol<br>Diacetone alcohol<br>Glycol<br>Isopropanol<br>Glycerine<br>Methanol<br>Triacetin<br>Dowandol<br>DRM/PM | Formaldehyde 37%-42%<br>Acetaldehyde<br>Aliphatic hydrocarbons<br>Toluene<br>Xylene<br>White spirits | 1.1.1.Trichloroethane<br>Ethyl acetate<br>Diethyl ether<br>N-Butyl acetate<br>Amyl acetate<br>Butylcellosolve<br>Ether |
| Acetone<br>Methyl ethyl ketone<br>Dioxan<br>Cyclohexanone<br>MIBK<br>Isophorone | Formic acid <50%<br>Acetic acid <50%<br>Phosphoric acid <30%<br>Hydrochloric acid <36%<br>Nitric acid <10%<br>Trichloracetic acid <50%<br>Sulphuric acid <10% | Sodium hypochlorite <20%<br>Hydrogen peroxide <25%<br>Potassium carbonate<br>Washing agents<br>Fabric conditioner<br>Ferric chloride<br>Ferrous chloride (FeCl2)<br>Ferrous chloride (FeCl3)<br>Dibutyl phthalate<br>Dioctyl phthalate<br>Sodium carbonate |
| Ammonia <40%<br>Caustic soda <40%<br>Potassium hydroxide<br>Alkali carbonate<br>Bichromate<br>Potassium<br>Acetonitrile<br>Sodium bisulphate | Cutting oil<br>Diesel oil<br>Linseed oil<br>Paraffin oil<br>Blown castor oil<br>Silicon oil<br>Turpentine oil substitute<br>Universal brake fluid<br>Aviation fuel<br>Gasoline<br>Water<br>Sea water<br>Decon | |

Table 265: Chemical resistance of the décor foil

The décor foil conforms to DIN 42115 section 2 for exposure to glacial acetic acid for less than one hour without visible damage.

# 3. Filter glass

If the Power Panel is not equipped with a touch screen, then a filter glass with the following properties is used.

## Information:

**The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device.**

### 3.1 Mechanical characteristics

Abrasion-resistant according to DIN 52347

Adhesive strength according to DIN 58 196-K2 (section 6)

### 3.2 Chemical properties

Durability according to DIN 50021 - CASS

# 4. Viewing angles

The viewing angle information of the display types (R, L, U, D) can be seen in the technical data for the individual components.

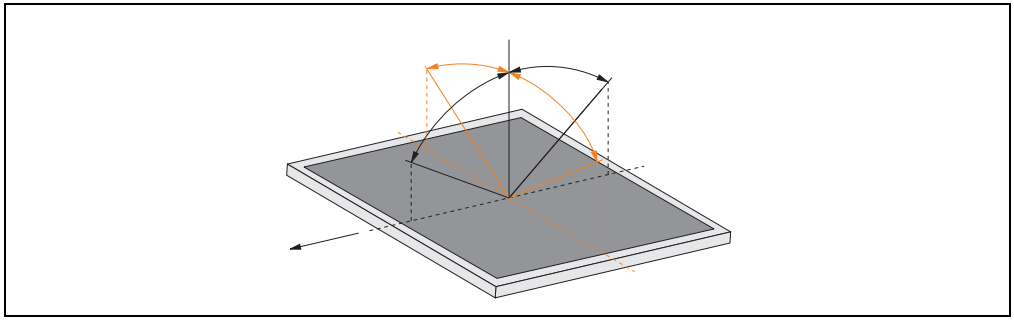


Figure 418: Viewing angles

# 5. B&R Key Editor information

On display units, it is often necessary to adjust the function keys and LEDs for the application software being used. With the B&R Key Editor, it is possible to quickly and easily set up the application individually.

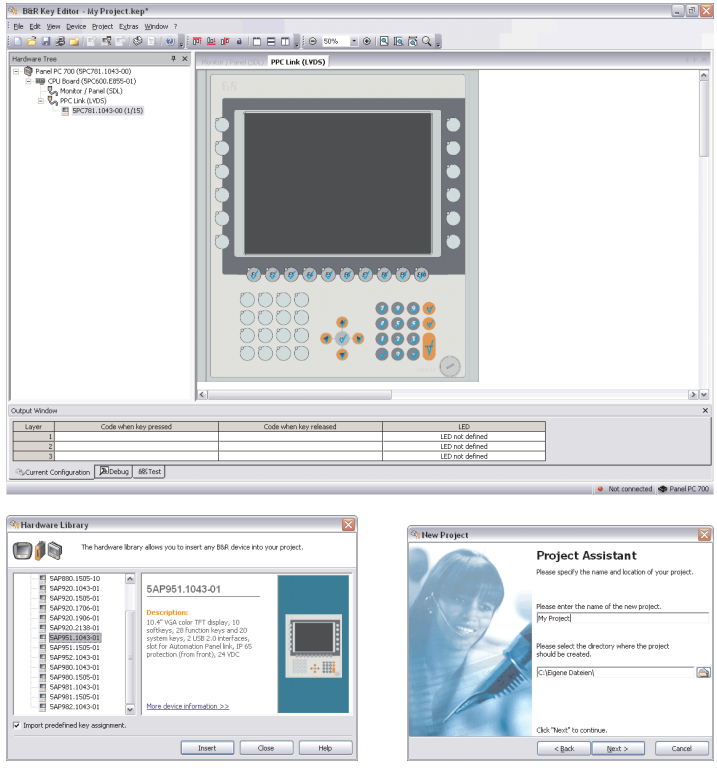



Figure 419: B&R Key Editor screenshots (Version 2.70)

Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assign functions to LEDs (HDD access, power, etc.)
- 4 assignments per key possible (using layer function)
- Configuration of panel locking time when multiple Automation Panel 900 devices are connected to Automation PC 620 and Panel PC 700 devices

Supports following systems (Version 2.80):

- Automation PC 810
- Automation PC 620 (ETX, XTX, Embedded)
- Panel PC 300
- Panel PC 700 (ETX, XTX)
- Power Panel 100/200
- Power Panel 300/400
- Mobile Panel 40/50
- Mobile Panel 100/200
- Provit 2000
- Provit 5000

A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's online help.

The B&R Key Editor can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**). Additionally, it can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

# 6. Mounting compatibilities

This section describes the compatibility of the installation dimensions for the Power Panel 100/200, Power Panel 300/400, Automation Panel 900 and Panel PC 700 units according to the respective device diagonals.

The outer dimensions of the device types are identical for the respective diagonals.
The different device types are abbreviated as follows:

| Device type | Abbreviation |
|---|---|
| Power Panel 100/200 | PP100/200 |
| Power Panel 300/400 | PP300/400 |
| Automation Panel 900 | AP900 |
| Panel PC 700 | PPC700 |

Table 266: Product abbreviations

## 6.1 Compatibility overview

The following table offers a brief overview of the devices PP100/200, PP300/400, AP900 and PPC700. Detailed information can be found in the section "Compatibility details" on page 594.

Compatibility between the device types is represented on each line using matching symbols.

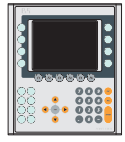
| Quantity | Format | Image | Compatible | PP100/200 | PP300/400 | AP900 | PPC700 |
|---|---|---|---|---|---|---|---|
| 5.7" | Horizontal1 | | Outer dimensions | ■ | ■ | - | - |
| | | | Installation dimensions | ● | ● | - | - |
| | Horizontal2 | | Outer dimensions | ■ | ■ | - | - |
| | | | Installation dimensions | ● | ● | - | - |
| | Vertical1 |  | Outer dimensions | ■ | ■ | - | - |
| | | | Installation dimensions | ● | ● | - | - |

Table 267: Device compatibility overview

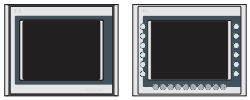
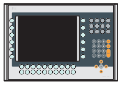
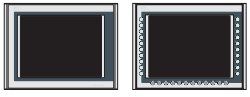
| Quantity | Format | Image | Compatible | PP100/200 | PP300/400 | AP900 | PPC700 |
|---|---|---|---|---|---|---|---|
| 10.4“ | Horizontal1 |  | Outer dimensions | ■ | ■ | ■ | ■ |
| | | | Installation dimensions | ● | ● | ● | ● |
| | Horizontal2 |  | Outer dimensions | ■ | ■ | ■ | ■ |
| | | | Installation dimensions | ● | ● | ▲ | ▲ |
| | Vertical1 | | Outer dimensions | ■ | ■ | ■ | ■ |
| | | | Installation dimensions | ● | ● | ▲ | ▲ |
| 12.1“ | Horizontal1 | | Outer dimensions | ■ | ■ | ■ | ■ |
| | | | Installation dimensions | ● | ● | ▲ | ▲ |
| 15“ | Horizontal1 |  | Outer dimensions | ■ | ■ | ■ | ■ |
| | | | Installation dimensions | ● | ● | ● | ● |
| | Vertical1 | | Outer dimensions | ■ | ■ | ■ | ■ |
| | | | Installation dimensions | ● | ● | ● | ● |

Table 267: Device compatibility overview

## 6.2 Compatibility details

The measurement values (all in mm) in the following figures have the following meaning.

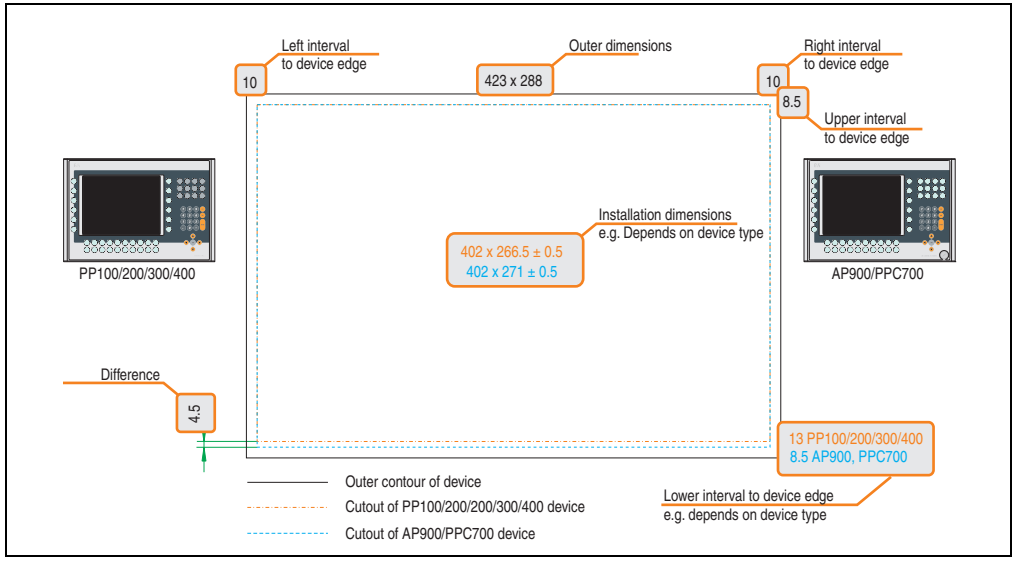



Figure 420: Compatibility details - figure structure

### 6.2.1 5.7" devices

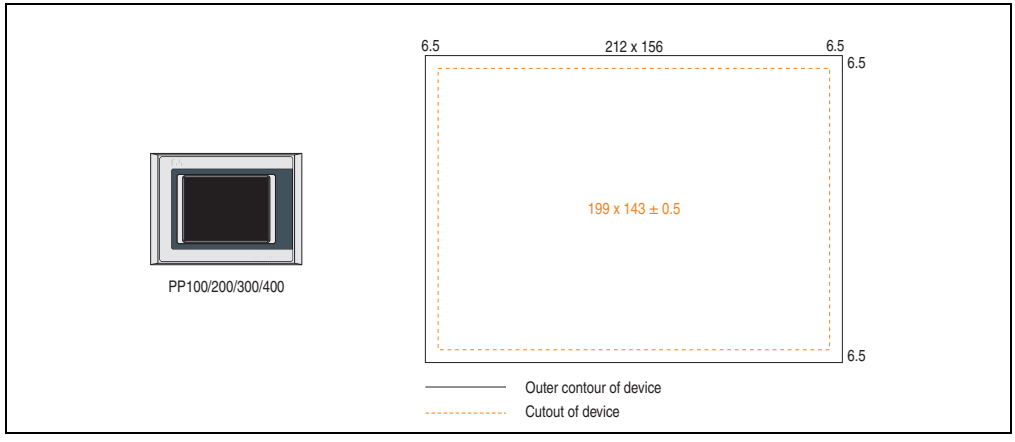



Figure 421: Mounting compatibility - 5.7" device format - Horizontal1

5.7" Power Panel 100/200 and Power Panel 300/400 devices in **Horizontal1 format** are 100% mounting compatible.

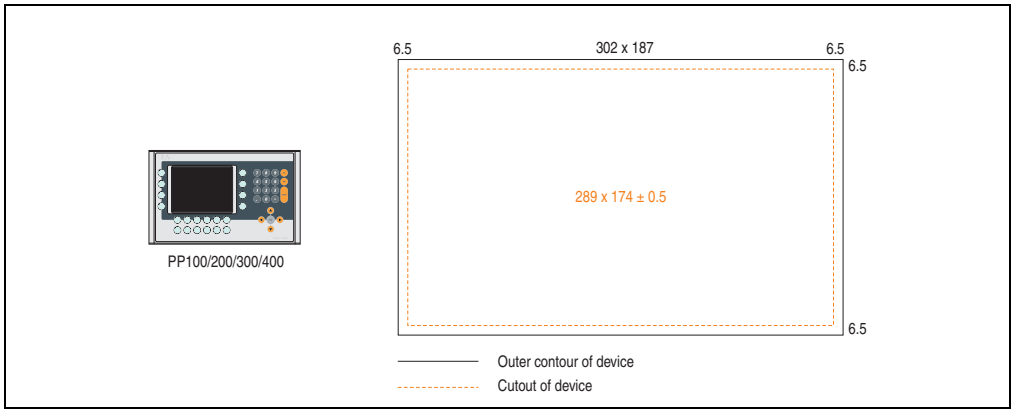



Figure 422: Mounting compatibility - 5.7" device format - Horizontal2

5.7" Power Panel 100/200 and Power Panel 300/400 devices in **Vertical1 format** are 100% mounting compatible.

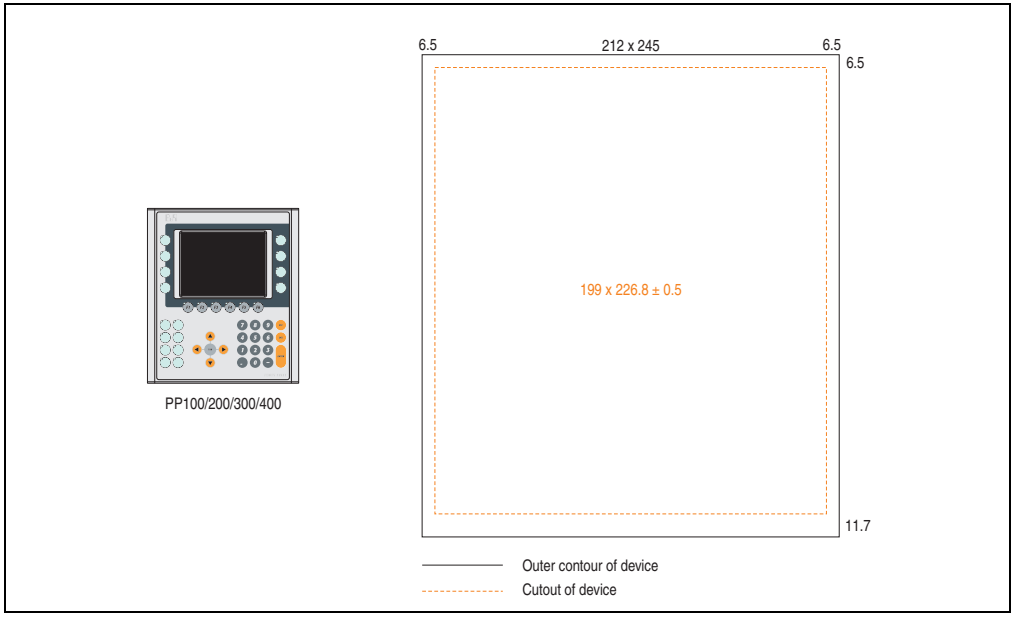



Figure 423: Mounting compatibility - 5.7" device format - Vertical1

5.7" Power Panel 100/200 and Power Panel 300/400 devices in **Vertical1 format** are 100% mounting compatible.

### 6.2.2 10.4" devices

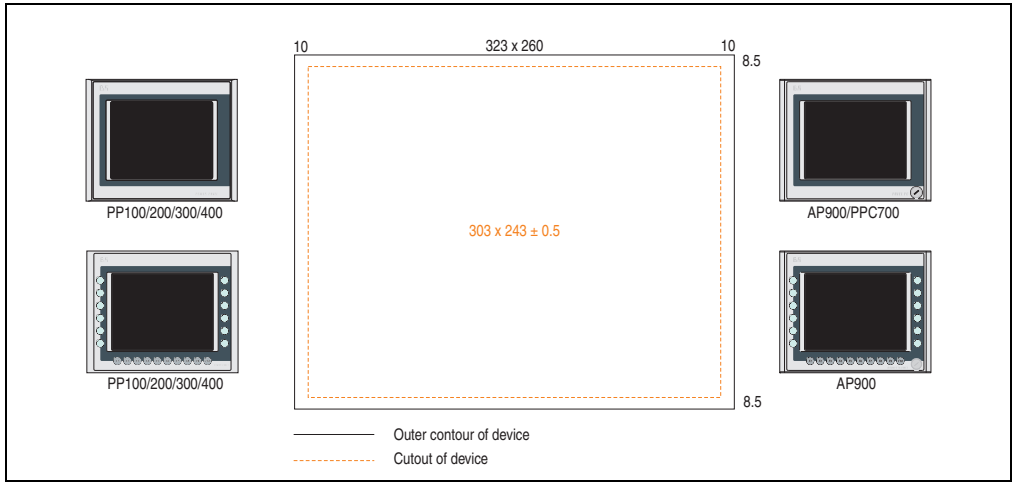



Figure 424: Mounting compatibility - 10.4" device format - Horizontal1

10.4" Power Panel 100/200, Power Panel 300/400, Automation Panel 900 and Panel PC 700 devices in **Horizontal1 format** are 100% mounting compatible.

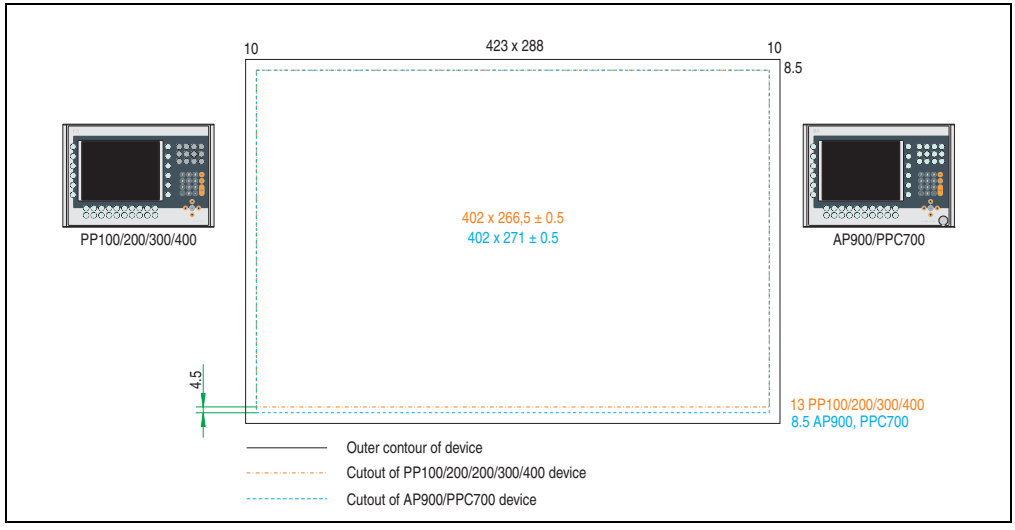



Figure 425: Mounting compatibility - 10.4" device format - Horizontal2

10.4" Power Panel 100/200 and Power Panel 300/400 are are *not 100% mounting compatible* with the **Horizontal2 format** Automation Panel 900 and Panel PC 700 devices. The Automation Panel 900 and Panel PC 700 devices require a cutout that is 4.5 mm larger vertically (lower edge).

The larger cutout can can be conditionally used for all devices:

- When mounting, make sure that the PP100/200/300/400 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a firm seal is no longer guaranteed with the gasket (IP65).

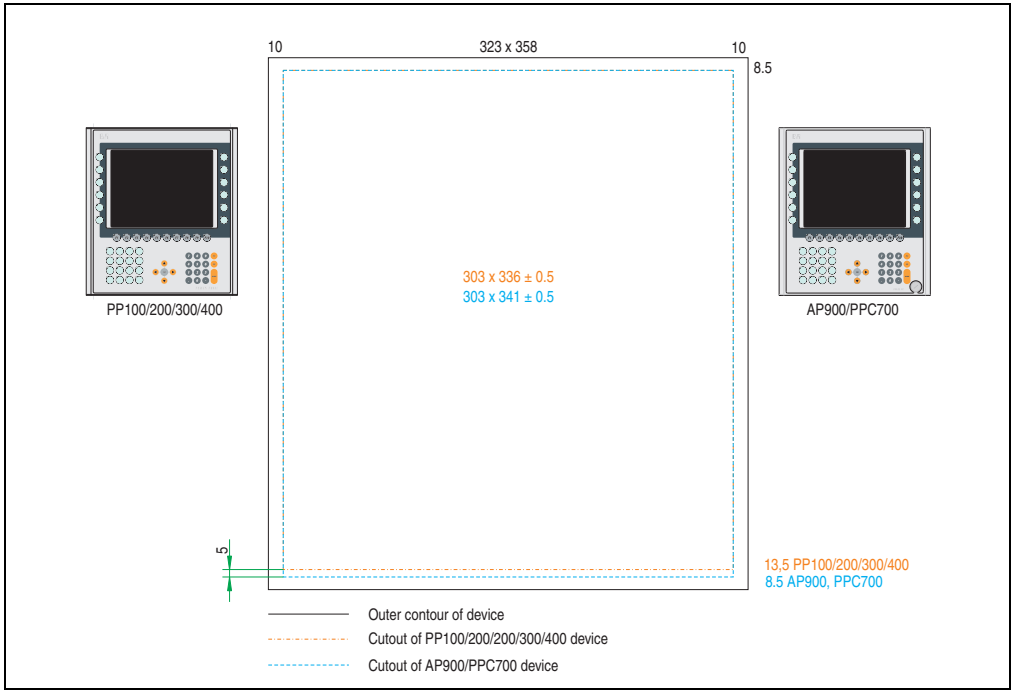



Figure 426: Mounting compatibility - 10.4" device format - Vertical1

10.4" Power Panel 100/200 and Power Panel 300/400 are *not 100% mounting compatible* with the **Vertical1 format** for the Automation Panel 900 and Panel PC 700 devices. The Automation Panel 900 and Panel PC 700 devices require a cutout that is 5 mm larger vertically (lower edge).

The larger cutout can can be conditionally used for all devices:

- When mounting, make sure that the PP100/200/300/400 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a firm seal is no longer guaranteed with the gasket (IP65).

### 6.2.3 12.1" devices

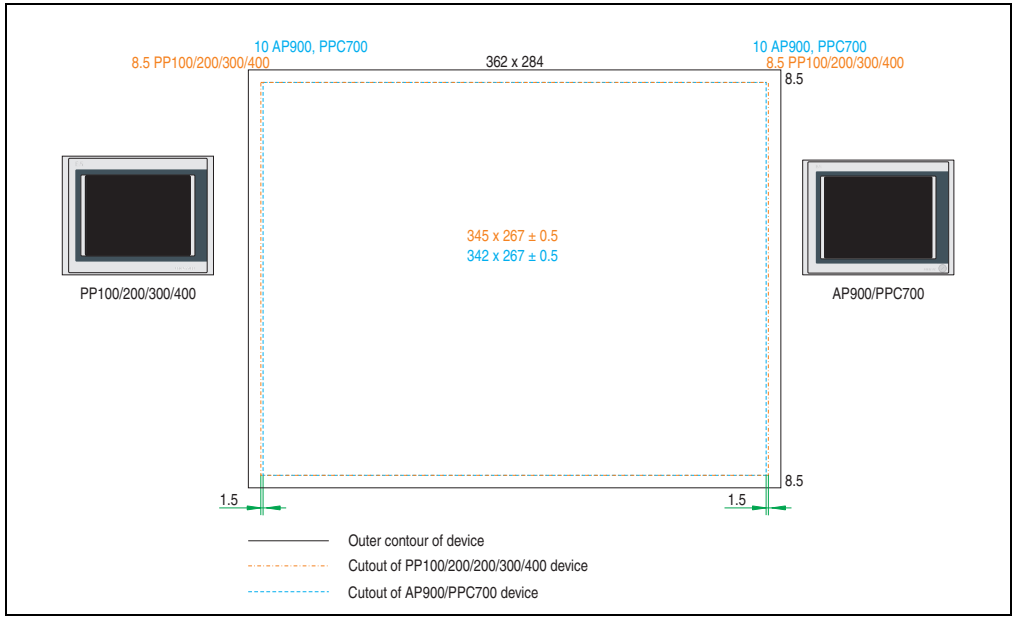



Figure 427: Mounting compatibility - 12.1" device format - Horizontal1

12.1" Power Panel 100/200 and Power Panel 300/400 are *not 100% mounting compatible* with the **Horizontal1 format** for the Automation Panel 900 and Panel PC 700 devices. The Power Panel 100/200 and Power Panel 300/400 devices require a cut that is 1.5 mm wider (left and right).

The larger cutout can can be conditionally used for all devices:

- When mounting, make sure that the AP900 and PPC700 devices can be placed and mounted as close to the center of the cutout as possible.

### 6.2.4 15" devices

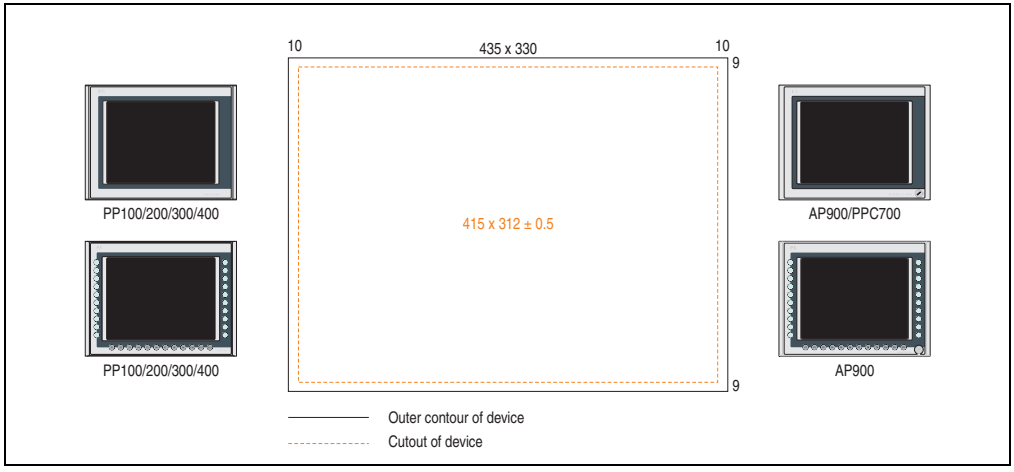



Figure 428: Mounting compatibility - 15" device format - Horizontal1

15" Power Panel 100/200, Power Panel 300/400, Automation Panel 900 and Panel PC 700 devices in **Horizontal1 format** are 100% mounting compatible.

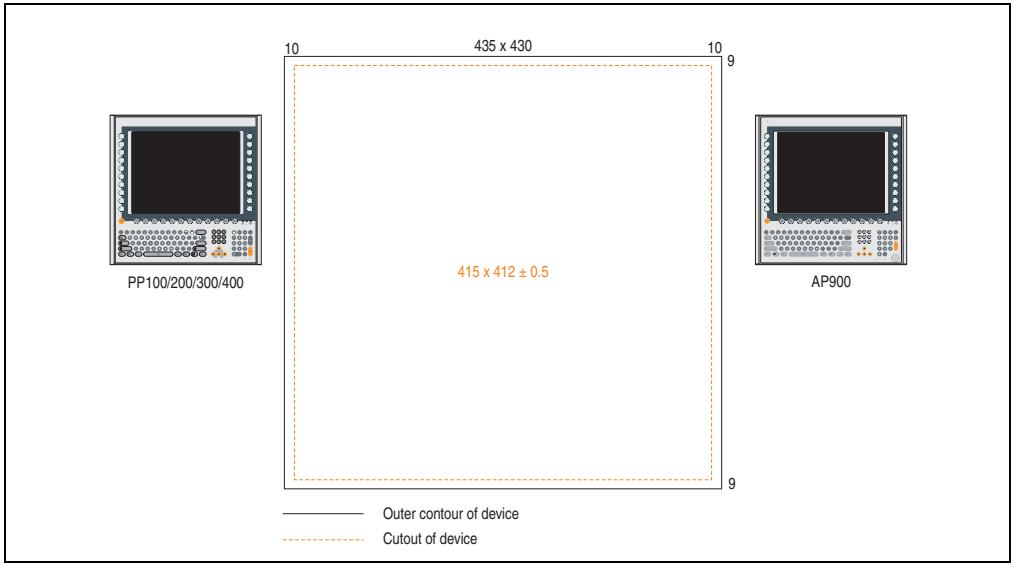



Figure 429: Mounting compatibility - 15" device format - Vertical1

15" Power Panel 100/200, Power Panel 300/400, Automation Panel 900 and Panel PC 700 devices in **Vertical1 format** are 100% mounting compatible.

# 7. Glossary

## A

ACPI

Abbreviation for "**A**dvanced **C**onfiguration and **P**ower **I**nterface". Configuration interface that enables the operating system to control the power supply for each device connected to the PC. With ACPI, the computer's BIOS is only responsible for the details of communication with the hardware.

APC

Abbreviation for "**A**utomation **PC**".

API

Abbreviation for "**A**pplication **P**rogram **I**nterface" The interface, which allows applications to communicate with other applications or with the operating system.

Automation Runtime

A uniform runtime system for all B&R automation components.

## B

BIOS

An abbreviation for "**B**asic **I**nput/**O**utput **S**ystem". Core software for computer systems with essential routines for controlling input and output processes on hardware components, for performing tests after system start, and for loading the operating system. Although BIOS is used to configure a system's performance, the user does not usually come into contact with it.

Bit

Binary digit > binary position, binary character, smallest discrete unit of information. A bit can have the value 0 or 1.

Bit rate

The number of bits that can be transferred within a specified time unit. 1 bit/sec = 1 baud.

Bootstrap loader

A program that automatically runs when the computer is switched on or restarted. After some basic hardware tests have been carried out, the bootstrap loader starts a larger loader and hands over control to it, which in turn boots the operating system. The bootstrap loader is typically found in ROM on the computer.

Byte

Data format [1 byte = 8 bits] and a unit for characterizing information amounts and memory capacity. The following units are the commonly used units of progression: KB, MB, GB.

B&R Automation Runtime

Windows-based program for creating installation disks to install B&R Automation Runtime™ on the target system.

## C

Cache

Background memory, also known as non-addressable memory or fast buffer memory. It is used to relieve the fast main memory of a computer. For example, data that should be output to slower components by the working memory (e.g. disk storage, printers) is stored temporarily in cache memory and output from there at an appropriate speed for the target devices.

CAN

An abbreviation for "**C**ontroller **A**rea **N**etwork" (serial bus system). Structure according to ISO 11898. Bus medium: twisted pair. Good transfer properties in short distances less than 40 m with a 1 MBit/sec data transfer rate. Maximum number of stations: unlimited in theory, up to 64 with real-time capability in practice, i.e. defined maximum delay times for messages with high priority. High reliability using error detection, error handling, troubleshooting. Hamming distance.

CD-ROM

Abbreviation for "**C**ompact **D**isc **R**ead-**O**nly **M**emory". A removable data medium with a capacity of ~700 MB. CD-ROMs are optically scanned.

CE mark

A CE mark for a product. It consists of the letters "CE" and indicates conformity to all EU guidelines for the labeled product. It indicates that the individual or corporate body who has performed or attached the label assures that the product conforms to all EU guidelines for complete harmonization. It also indicates that all mandatory conformity evaluation procedures have taken place.

CMOS

"CMOS" is a battery powered memory area where fundamental parameters of an IBM (or compatible) personal computer are stored. Information such as the type of hard drive, size of the working memory and the current date and time are required when booting the computer. As the name suggests, the memory is based on CMOS technology standards.

COM

A device name used to access serial ports in MS-DOS. The first serial port can be accessed under COM1, the second under COM2, etc. A modem, mouse, or serial printer is typically connected to a serial port.

COM1

Device name for the first serial port in a PC system. The input/output area for COM1 is usually found at address 03F8H. Generally, the COM1 port is assigned to IRQ 4. In many systems, an RS232 serial mouse is connected to COM1.

COM2

Device name for the second serial port in a PC system. The input/output area for COM2 is usually found at address 02F8H. Generally, the COM2 port is assigned to IRQ 3. In many systems, a modem is connected to COM2.

COM3

Device name for a serial port in a PC system. The input/output area for COM3 is usually found at address 03E8H. Generally, the COM3 port is assigned to IRQ 4. In many systems, COM3 is used as an alternative for COM1 or COM2 if peripheral devices are already connected to COM1 and COM2.

CompactFlash®

CompactFlash memory cards [CF cards] are exchangeable nonvolatile mass memory systems with very small dimensions [43 x 36 x 3.3 mm, approximately half the size of a credit card]. In addition to the flash memory chips, the controller is also present on the cards. CF cards provide complete PC card / ATA functionality and compatibility. A 50-pin CF card can be simply inserted in a passive 68-pin type II adapter card. It conforms to all electrical and mechanical PC card interface specifications. CF cards were launched by SanDisk back in 1994. Currently, memory capacities reach up to 8 GB per unit. Since 1995, CompactFlash Association [CFA] has been looking after standardization and the worldwide distribution of CF technology

Controller

A device component which allows access to other devices on a computer subsystem. A disk controller, for example, allows access to hard disks and disk drives and is responsible both for physical and logic drive access.

CPU

An abbreviation for "**C**entral **P**rocessing **U**nit". Interprets and executes commands. It is also known as a "microprocessor" or "processor" for short. A processor is able to receive, decode and execute commands, as well as transfer information to and from other resources via the computer bus.

CRT

An abbreviation for "**C**athode **R**ay **T**ube". The main component of a television set or a standard computer screen. A cathode ray tube consists of a vacuum tube that contains one or more electron guns. Each electron gun creates a horizontal electron beam that appears on the front of the tube (the screen). The inner surface of the screen is coated with phosphor, which is lit when hit by the electrons. Each of the electron beams move in a line from top to bottom. In order to prevent flickering, the screen content is updated at least 25 times per second. The sharpness of the picture is determined by the number of pixels on the screen.

CTS

An abbreviation for "**C**lear **T**o **S**end". A signal used when transferring serial data from modem to computer, indicating its readiness to send the data. CTS is a hardware signal which is transferred via line number 5 in compliance with the RS-232-C standard.

## D

DCD

An abbreviation for " **D**ata **C**arrier **D**etected". A signal used in serial communication that is sent by the modem to the computer it is connected to, indicating that it is ready for transfer.

Dial-up

Data is transferred over the telephone network using a modem or an ISDN adapter.

DIMM

"Double In-line Memory Module" consisting of one or more RAM chips on a small circuit board that is connected with the motherboard of a computer.

DMA

**D**irect **M**emory **A**ccess >. Accelerated direct access to a computer's RAM by bypassing the CPU.

DRAM

An abbreviation for "**D**ynamic **R**andom **A**ccess **M**emory". Dynamic RAM consists of an integrated semiconductor circuit that stores information based on the capacitor principle. Capacitors lose their charge in a relatively short time. Therefore, dynamic RAM circuit boards must contain a logic that allows continual recharging of RAM chips. Since the processor cannot access dynamic RAM while it is being recharged, one or more waiting states can occur when reading or writing data. Although it is slower, dynamic RAM is used more often than static RAM since the simple design of the circuits means that it can store four times more data than static RAM.

DSR

An abbreviation for "**D**ata **S**et **R**eady". A signal used in serial data transfer that is sent by the modem to the computer it is connected to, indicating its readiness for processing. DSR is a hardware signal which is sent via line number 6 in compliance with the RS-232-C standard.

DTR

An abbreviation for "**D**ata **T**erminal **R**eady". A signal used in serial data transfer that is sent by the computer to the modem it is connected to, indicating the computer's readiness to accept incoming signals.

DVD

An abbreviation for "**D**igital **V**ersatile **D**isc". The next generation of optical data carrier technology. Using this technology it is possible to encode video, audio and computer data on CD. DVDs can store a higher volume of data than conventional CDs. Standard DVDs, which have a single layer, can hold 4.7 GB. Dual-layer DVDs can hold 8.5 GB. Double-sided DVDs can therefore hold up to 17 GB. A special drive is needed for DVDs. Conventional CDs can also be played on DVD drives.

## E

EDID data

Abbreviation for "**E**xtended **D**isplay **I**dentification **D**ata". EDID data contains the characteristics of monitors / TFT displays transferred as 128 KB data blocks to the graphics card via the Display Data Channel (DDC). This EDID data can be used to set the graphics card to the monitor properties.

EDO-RAM

An abbreviation for "**E**xtended **D**ata **O**ut **R**andom **A**ccess **M**emory". Dynamic RAM that provides data for the CPU while the next memory access is being initialized. This increases speed.

EIDE

An abbreviation for "**E**nhanced **I**ntegrated **D**rive **E**lectronics". An expansion of the IDE standard. Enhanced IDE is considered the standard for hardware interfaces. This interface is designed for drives with an integrated drive controller.

EMC

"**E**lectro**m**agnetic **C**ompatibility". The ability of a device or a system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment [IEV 161-01-07].

Encode, encoding

When processing information, it is often necessary to change the information from one form of representation to another. This conversion process is called encoding, and the rules used to assign one character set to another are referred to as encoding rules. A differentiation is made between ambiguous and unambiguous encoding depending on if one set is a direct reflection of the other. Most codes use unambiguous encoding with one set directly reflecting the other. A differentiation is also made between redundant and non-redundant encoding. With non-redundant encoding, the full range of the available character set is used, i.e. each code is defined. With redundant encoding, the available character set also contains codes that are not used. This differentiation is important during data transfer when detecting and, if necessary, correcting data transfer errors.

EPROM

**E**rasable **PROM** >(completely with ultraviolet light).

Ethernet

An IEEE 802.3 standard for networks. Ethernet uses bus or star topology and controls the traffic on communication lines using the access procedure CSMA/CD (Carrier Sense Multiple Access with Collision Detection). Network nodes are connected using coaxial cables, fiber optic cables or twisted pair cabling. Data transfer on an Ethernet network takes place in frames of variable lengths that consist of supply and controller information as well as 1500 bytes of data. The Ethernet standard provides base band transfers at 10 megabit and 100 megabit per second.

Ethernet POWERLINK

An enhancement of standard Ethernet. It enables data exchange under strict real-time conditions with cycle times down to 200 µs and jitter under 1 µs. This makes Ethernet power available on all communication levels of automation technology – from control levels to I/O. Ethernet POWERLINK was initiated by the company B&R Industrie-Elektronik and is now managed by the open end user and vendor association, EPSG - Ethernet POWERLINK Standardization Group (www.ethernet-powerlink.org).



## F

FDD

Abbreviation for "**F**loppy **D**isk **D**rive". Reading device for removable magnetic memory from the early days of PC technology. Due to their sensitivity and moving components, FDDs have been almost completely replaced by CompactFlash memory in modern automation solutions.

FIFO

An abbreviation for "**F**irst **I**n **F**irst **O**ut". A queuing organization method whereby elements are removed in the same order as they were inserted. The first element inserted is the first one removed. Such an organization method is typical for a list of documents that are waiting to be printed.

Firmware

Programs stored permanently in read-only memory. Firmware is software used to operate computer-controlled devices that generally stays in the device throughout its lifespan or over a long period of time. Such software includes operating systems for CPUs and application programs for industrial PCs as well as programmable logic controllers (e.g. the software in a washing machine controller). This software is written in read-only memory (ROM, PROM, EPROM) and cannot be easily replaced.

Floppy

Also known as a diskette. A round plastic disk with an iron oxide coating that can store a magnetic field. When the floppy disk is inserted in a disk drive, it rotates so that the different areas (or sectors) of the disk's surface are moved under the read/write head. This allows the magnetic orientation of the particle to be modified and recorded. Orientation in one direction represents binary 1, while the reverse orientation represents binary 0.

FPC

An abbreviation for "**F**lat **P**anel **C**ontroller".

FPD

An abbreviation for "**F**lat **P**anel **D**isplay".

FTP

"**F**ile **T**ransfer **P**rotocol". Rules for transferring data over a network from one computer to another computer. This protocol is based on TCP/IP, which has established itself as the standard for transferring data over Ethernet networks. FTP is one of the most used protocols on the Internet. It is defined in RFC 959 in the official regulations for Internet communication.

## G

GB

Gigabyte (1 GB = 230 or 1,073,741,824 bytes)

## H

Handshake

Method of synchronization for data transfer when data is sent at irregular intervals. The sender signals that data can be sent, and the receiver signals when new data can be received.

HDD

An abbreviation for "**H**ard **D**isk **D**rive". Fixed magnetic mass memory with high capacities, e.g. 120 GB.

## I

IDE

An abbreviation for "**I**ntegrated **D**rive **E**lectronics". A drive interface where the controller electronics are integrated in the drive.

Interface

From the hardware point of view, an interface is the connection point between two modules/devices/systems. The units on both sides of the interface are connected by the interface lines so that data, addresses, and control signals can be exchanged. The term interface includes all functional, electrical and constructive conditions [encoding, signal level, pin assignments] that characterize the connection point between the modules, devices, or systems. Depending on the type of data transfer, a differentiation is made between parallel [e.g. Centronics, IEEE 488] and serial interfaces [e.g. V.24, TTY, RS232, RS422, RS485], which are

set up for different transfer speeds and transfer distances. From the point of view of software, the term "interface" describes the transfer point between program modules using specified rules for transferring the program data.

IPC

An abbreviation for "**I**ndustrial **PC**".

ISA

An abbreviation for "**I**ndustry **S**tandard **A**rchitecture". A term given for the bus design which allows expansion of the system with plug-in cards that can be inserted in PC expansion slots.

ISO

International Organization for Standardization > Worldwide federation of national standardization institutions from over 130 countries. ISO is not an acronym for the name of the organization; it is derived from the Greek word "isos", meaning "equal" (www.iso.ch).

## J

Jumper

A small plug or wire link for adapting the hardware configuration used to connect the different points of an electronic circuit.

## K

Keypad modules

Keypad modules are divided into two groups: **standard keypad modules** (can be cascaded to a controller) and **special keypad modules** (must be connected by an electrician according to function, e.g. E-stop).

## L

LCD

An abbreviation for "**L**iquid **C**rystal **D**isplay". A display type, based on liquid crystals that have a polarized molecular structure and are enclosed between two transparent electrodes as a thin layer. If an electrical field is applied to the electrodes, the molecules align themselves with the field and form crystalline arrangements that polarize the light passing through. A polarization filter, which is arranged using lamellar electrodes, blocks the polarized light. In this way, a cell (pixel) containing liquid crystals can be switched on using electrode gates, thus coloring this pixel black. Some LCD displays have an electroluminescent plate behind the LCD screen for lighting. Other types of LCD displays can use color.

LED

An abbreviation for "**L**ight **E**mitting **D**iode". A semiconductor diode which converts electrical energy into light. LEDs work on the principle of electroluminescence. They are highly efficient because they do not produce much heat in spite of the amount of light they emit. For example, "operational status indicators" on floppy disk drives are LEDs.

LPT

Logical device name for line printers. In MS-DOS, names are reserved for up to three parallel printer ports with the names LPT1, LPT2 and LPT3. The first parallel port (LPT1) is usually identical to the primary parallel output device PRN (in MS-DOS the logical device name for the printer). The abbreviation LPT stands for "Line Printer Terminal".

## M

MB

Megabyte (1 MB = 220 or 1,048,576 bytes).

Microprocessor

Highly integrated circuit with the functionality of a CPU, normally housed on a single chip. It comprises a control unit, arithmetic and logic unit, several registers and a link system for connecting memory and peripheral components. The main performance features are the internal and external data bus and address bus widths, the command set and the clock frequency. Additionally, a choice can be made between CISC and RISC processors. The first commercially available worldwide microprocessor was the Intel 4004. It came on the market in 1971.

MIPS

Million instructions per second > Measurement for the computing speed of computers.

Mkey

An abbreviation for "**M**odule **key**block". A common term given to keys found on Provit display units. They can be freely configured with Mkey utilities.

Modem

Modulator/demodulator. > Modulation/demodulation device, add-on card, or external device that allows information to be exchanged between computers over the telephone network using digital/analog or analog/digital signal conversion.

Motherboard

A circuit board that houses the main components of a computer such as the CPU switching circuit, co-processors, RAM, ROM for firmware, interface circuits, and expansion slots for hardware expansions.

MTBF

An abbreviation for "**M**ean **t**ime **b**etween **f**ailure". The average time which passes before a hardware component fails and repair is needed. This time is usually expressed in thousands or ten thousands of hours, sometimes known as power-on hours (POH).

MTC

An abbreviation for "**M**ain**t**enance **C**ontroller". The MTC is an independent processor system that provides additional functions for a B&R industrial PC that are not available with a normal PC. The MTC communicates with the B&R industrial PC via the ISA bus (using a couple register).

MTCX

Abbreviation for "**M**ain**T**enance **C**ontroller E**X**tended".

Multitasking

Multitasking is an operating mode in an operating system that allows several computer tasks to be executed virtually simultaneously.

## N

.NET

DOTNET, Microsoft's new development platform that provides a common runtime library and type system for all programming languages. DOTNET is the umbrella term for the following products, strategies and technologies: .NET Framework, a new software platform, Visual Studio .NET, a new development environment that supports several .NET programming languages (e.g. C# or VB.NET, specially created for .NET), .NET My Services, a group of services taking over functions such as authentication, .NET Enterprise Server, which, apart from its name, is independent of the other technologies and includes the products Exchange Server 2000, Application Center 2000, and SQL Server 2000. .NET devices, supported by a slimmed down version of .NET Framework (.NET Compact Framework).

Node

Branching point in a network.

## O

OEM

**O**riginal **E**quipment **M**anufacturer. A company that integrates third-party and in-house manufactured components into their own product range and then distributes these products under its own name.

OPC

OLE for Process Control > A communication standard for components in the area of automation. The goal of OPC development is to provide an open interface that builds on Windows-based technologies such as OLE, COM and DCOM. It allows problem-free standardized data transfer

between controllers, operating and monitoring systems, field devices and office applications from different manufacturers. This development is promoted by the OPC Foundation, which is made up of over 200 companies from around the world, including Microsoft and other leading companies. Lately, OPC is interpreted as a synonym for "openness, productivity, and connectivity", symbolizing the new possibilities that this standard opens up.

OPC server

The missing link between connection modules for the Interbus and the visualization application. It communicates serially with the connection modules via the ISA or PCI bus or Ethernet.

## P

Panel

A common term for B&R display units (with or without keys).

Panelware

A generic term given for standard and special keypad modules offered by B&R.

PC card

Registered trademark of PCMCIA for add-on cards conforming to PCMCIA specifications.

PCI bus

**P**eripheral **C**omponent **I**nterconnect bus. Developed by Intel as an intermediary/local bus for the latest PC generations. It is basically a synchronous bus. The main clock of the CPU is used for synchronization. The PCI bus is microprocessor-independent, 32-bit and 64-bit compatible, and supports both 3.3 V and 5 V cards and devices.

PCMCIA

An abbreviation for "**P**ersonal **C**omputer **M**emory **C**ard **I**nternational **A**ssociation". An association of manufacturers and dealers who are dedicated to the cultivation and further development of common standards for peripheral devices based on PC cards with a slot for such cards. PC cards are mainly used for laptops, palmtops (and other portable computers), and intelligent electronic devices. Version 1 of the PCMCIA standard was introduced in 1990.

PICMG

PCI Industrial Computers Manufacturers Group. Goal: Use of commercial PCI bus for industrial environments, especially CompactPCI bus (www.picmg.org).

PnP

An abbreviation for "**P**lug and **P**lay". Specifications developed by Intel. Using Plug and Play allows a PC to automatically configure itself so that it can communicate with peripheral devices (e.g. monitors, modems, and printers). Users can connect a peripheral device (plug) and it immediately runs (play) without having to manually configure the system. A Plug and Play PC requires a BIOS that supports Plug and Play and a respective expansion card.

POH

An abbreviation for "**P**ower **O**n **H**ours". See MTBF.

POST

An abbreviation for "**P**ower-**O**n **S**elf **T**est". A set of routines that are stored in ROM on the computer and that test different system components, e.g. RAM, disk drive and the keyboard in order to determine that the connection is operating correctly and ready for operation. POST routines notify the user of problems that occur. This is done using several signal tones or by displaying a message that frequently accompanies a diagnosis value on the standard output or standard error devices (generally the monitor). If the POST runs successfully, control is transferred over to the system's bootstrap loader.

Power Panel

Power Panel is part of the B&R product family and is a combination of an operator panel and controller in one device. This covers the PP21 and PP41 products.

POWERLINK

See "Ethernet POWERLINK".

PP21

B&R Power Panel type. It is equipped with an RS232 interface, a CAN interface, a PCMCIA slot and integrated digital input/output channels. Additionally, up to six B&R SYSTEM 2003 screw-in modules can be connected. LCD 4 x 20 characters.

PP41

B&R Power Panel type. It is equipped with an RS232 interface, a CAN interface, a PCMCIA slot and integrated digital input/output channels. Additionally, up to six B&R SYSTEM 2003 screw-in modules can be connected. 5.7" QVGA b/w LCD.

PROFIBUS DP

PROFIBUS for "decentralized peripherals". PROFIBUS DP can be used to allow simple digital and analog I/O modules as well as intelligent signal and data processing units to be installed in the machine room, which among other things can significantly reduce cabling costs. Often used for time-critical factory automation applications.

PV

Process variable. Logical storage location for values and states in a program.

## Q

QVGA

Abbreviation for **Q**uarter **V**ideo **G**raphics **A**rray. Usually a screen resolution of 320 × 240 pixels.

## R

RAM

An abbreviation for "**R**andom **A**ccess **M**emory". Semiconductor memory which can be read or written to by the microprocessor or other hardware components. Memory locations can be accessed in any order. The various ROM memory types do allow random access, but they cannot be written to. The term RAM refers to a more temporary memory that can be written to as well as read.

Real time

A system is operating in real time or has real-time capability if the input sizes (e.g. signals, data) are received and processed in a defined time period, and the results are made available in real time for a partner system or the system environment. See also "real-time demands" and "real-time system".

ROM

An abbreviation for "**R**ead-**O**nly **M**emory". Semiconductor memory where programs or data were permanently stored during the production process.

RS232

**R**ecommended **S**tandard **N**umber **232**. Oldest and most widespread interface standard, also called a V.24 interface. All signals are referenced to ground making this an unbalanced interface. High level: -3 ... -30 V, low level: +3 ... +30 V. Cable lengths up to 15 m, transfer rates up to 20 kBit/s. For point-to-point connections between 2 participants.

RS422

**R**ecommended **S**tandard **N**umber **422**. Interface standard, balanced operation, increased immunity to disturbances. High level: 2 ... -6 V, low level: +2 ... +6 V. 4-wire connection [inverted/not inverted], cable lengths up to 1200 m, transfer rates up to 10 Mbit/s, 1 sender can carry out simplex communication with up to 10 receivers.

RS485

**R**ecommended **S**tandard **N**umber **485**. Interface standard upgraded from RS422. High level: 1.5 ... -6 V, low level: +1.5 ... +6 V; 2-wire connection [half duplex operation] or 4-wire connection [full duplex operation. Cable lengths up to 1200 m, transfer rates up to 10 Mbit/s. Up to 32 participants can be connected to an RS485 bus [sender/receiver].

RTS

An abbreviation for "**R**equest **T**o **S**end". A signal used in serial data transfer for requesting send permission. For example, it is sent from a computer to the modem connected to it. The RTS signal is assigned to pin 4 according to the hardware specifications of the RS-232-C standard.

RXD

An abbreviation for "Receive (**RX**) **D**ata". A line for transferring serial data received from one device to another, e.g. from a modem to a computer. For connections complying with the RS-232-C standard, the RXD is connected to pin 3 of the plug.

## S

SCADA

**S**upervision, **C**ontrol **A**nd **D**ata **A**cquisition. SCADA systems are used to control, monitor, and log industrial processes. A high degree of configurability allows customization for various processes.

SDRAM

An abbreviation for "**S**ynchronous **D**ynamic **R**andom **A**ccess **M**emory". A construction of dynamic semiconductor components (DRAM) that can operate with higher clock rates than conventional DRAM switching circuits. This is made possible using block access. For each access, the DRAM determines the next memory addresses to be accessed.

SFC

Sequential function chart > Graphic input language for PLCs used to represent sequential control.

SRAM

An abbreviation for "**S**tatic **R**andom **A**ccess **M**emory". A semiconductor memory (RAM) made up of certain logic circuits (flip-flop) that only keeps stored information while powered. In computers, static RAM is generally only used for cache memory.

Switch

Device similar to a hub that takes data packets received in a network and, unlike a hub, passes them only to the respective addressee, not to all network nodes. Unlike a hub, a switch provides targeted communication within a network that only takes place between sender and receiver. Other network nodes are not involved.

## T

Task

Program unit that is assigned a specific priority by the real-time operating system. It contains a complete process and can consist of several modules.

TCP/IP

Transmission Control Protocol/Internet Suit of Protocols. Network protocol that has become the generally accepted standard for data exchange in heterogeneous networks. TCP/IP is used both in local networks for communication between various computer and also for LAN to WAN access.

TFT display

LCD (Liquid Crystal Display) technology where the display consists of a large grid of LCD cells. Each pixel is represented by a cell, whereby electrical fields produced in the cells are supported by thin film transistors (TFT) that result in an active matrix. In its simplest form, there is exactly one thin film transistor per cell. Displays with an active matrix are generally used in laptops and notebooks because they are thin, offer high-quality color displays and can be viewed from all angles.

Touch screen

Screen with touch sensors for activating an item with the finger.

TXD

An abbreviation for "Transmit (**TX**) **D**ata". A line for the transfer of serial data sent from one device to another, e.g. from a computer to a modem. For connections complying with the RS-232-C standard, the TXD is connected to pin 2 of the plug.

## U

UART

An abbreviation for "**U**niversal **A**synchronous **R**eceiver-**T**ransmitter". A module generally consisting of a single integrated circuit that combines the circuits required for asynchronous serial communication for both sending and receiving. UART represents the most common type of circuit in modems for connecting to a personal computer.

UDMA

An abbreviation for "**U**ltra **D**irect **M**emory **A**ccess". A special IDE data transfer mode that allows high data transfer rates for drives. There have been many variations in recent times.
UDMA33 mode transfers 33 megabytes per second.
UDMA66 mode transfers 66 megabytes per second.
UDMA100 mode transfers 100 megabytes per second.
Both the mainboard and the hard drive must support the specification to implement modifications.

UPS

Abbreviation for "**U**ninterruptible **P**ower **S**upply". See "UPS".

USB

An abbreviation for "**U**niversal **S**erial **B**us". A serial bus with a bandwidth of up to 12 megabits per second (Mbit/s) for connecting a peripheral device to a microcomputer. Up to 127 devices can be connected to the system using a single multipurpose connection, the USB bus (e.g. external CD drives, printers, modems as well as the mouse and keyboard). This is done by connecting the devices in a row. USB allows devices to be changed when the power supply is switched on (hot plugging) and multi-layered data flow.

UPS

An abbreviation for "**U**ninterruptible **P**ower **S**upply". The UPS supplies power to systems that cannot be connected directly to the power mains for safety reasons because a power failure could lead to loss of data. The UPS allows the PC to be shut down securely without losing data if a power failure occurs.

## V

Visual Components

Integrated in B&R Automation Studio. Visual Components can be used to configure visualization projects that use text and graphics.

VGA

An abbreviation for "**V**ideo **G**raphics **A**dapter". A video adapter which can handle all EGA (Enhanced Graphics Adapter) video modes and adds several new modes.

## W

Windows CE

Compact 32-bit operating system with multitasking and multithreading that Microsoft developed especially for the OEM market. It can be ported for various processor types and has a high degree of real-time capability. The development environment uses proven, well-established development tools. It is an open and scalable Windows operating system platform for many different devices. Examples of such devices are handheld PCs, digital wireless receivers, intelligent mobile phones, multimedia consoles, etc. In embedded systems, Windows CE is also an excellent choice for automation technology.

## X

XGA

An abbreviation for "E**X**tended **G**raphics **A**rray". An expanded standard for graphics controllers and monitors that was introduced by IBM in 1990. This standard supports 640x480 resolution with 65,536 colors or 1024x768 resolution with 256 colors. This standard is generally used in workstation systems.

XML

eXtensible Markup Language > Corresponds to: expandable display language. This new language was officially recommended in 1998 by the World Wide Web Consortium W3C as a standard for Web publishing and document management in client/server environments. Further development of the SGML standard. Unlike SGML documents, XML documents do not require a schema description in the form of a DTD file. XML is already supported completely in the newer versions of many ERP und MES systems. XML is accepted as an industrial standard thanks to its simple notation. Information is represented using the ASCII character set. This makes XML easy to read and transparent, and its portability of text is usually superior to binary structures (www.xml.com).

Figure 1: Power Panel 100 and Power Panel 200 devices ..... 43
Figure 2: Supply voltage connection ..... 45
Figure 3: Grounding clip ..... 46
Figure 4: USB port ..... 47
Figure 5: Mode/Node switch ..... 48
Figure 6: Status LEDs ..... 49
Figure 7: Ethernet connection ..... 49
Figure 8: Reset button ..... 50
Figure 9: CompactFlash slot ..... 51
Figure 10: Safety sticker ..... 52
Figure 11: Device label ..... 52
Figure 12: Design / dimensions - Serial number sticker ..... 53
Figure 13: Front view - 4PP120.0571-01 ..... 54
Figure 14: Rear view - 4PP120.0571-01 ..... 54
Figure 15: Temperature humidity diagram - 4PP120.0571-01 ..... 58
Figure 16: Dimensions - 4PP120.0571-01 ..... 58
Figure 17: Cutout dimensions ..... 59
Figure 18: Front view - 4PP120.0571-21 ..... 60
Figure 19: Rear view - 4PP120.0571-21 ..... 60
Figure 20: Temperature humidity diagram - 4PP120.0571-21 ..... 64
Figure 21: Dimensions - 4PP120.0571-21 ..... 64
Figure 22: Cutout dimensions ..... 65
Figure 23: Front view - 4PP120.1043-31 ..... 66
Figure 24: Rear view - 4PP120.1043-31 ..... 66
Figure 25: Temperature humidity diagram - 4PP120.1043-31 ..... 70
Figure 26: Dimensions - 4PP120.1043-31 ..... 70
Figure 27: Cutout dimensions ..... 71
Figure 28: Front view - 4PP120.1505-31 ..... 72
Figure 29: Rear view - 4PP120.1505-31 ..... 72
Figure 30: Temperature humidity diagram - 4PP120.1505-31 ..... 76
Figure 31: Dimensions - 4PP120.1505-31 ..... 76
Figure 32: Cutout dimensions ..... 77
Figure 33: Front view - 4PP151.0571-01 ..... 78
Figure 34: Rear view - 4PP151.0571-01 ..... 78
Figure 35: Temperature humidity diagram - 4PP151.0571-01 ..... 82
Figure 36: Dimensions - 4PP151.0571-01 ..... 82
Figure 37: Cutout dimensions ..... 83
Figure 38: Front view - 4PP151.0571-21 ..... 84
Figure 39: Rear view - 4PP151.0571-21 ..... 84
Figure 40: Temperature humidity diagram - 4PP151.0571-21 ..... 88
Figure 41: Dimensions - 4PP151.0571-21 ..... 88
Figure 42: Cutout dimensions ..... 89
Figure 43: Front view - 4PP151.1043-31 ..... 90
Figure 44: Rear view - 4PP151.1043-31 ..... 90
Figure 45: Temperature humidity diagram - 4PP151.1043-31 ..... 94
Figure 46: Dimensions - 4PP151.1043-31 ..... 94
Figure 47: Cutout dimensions ..... 95

Figure 48: Front view - 4PP151.1505-31 ... 96
Figure 49: Rear view - 4PP151.1505-31 ... 96
Figure 50: Temperature humidity diagram - 4PP151.1505-31 ... 100
Figure 51: Dimensions - 4PP151.1505-31 ... 100
Figure 52: Cutout dimensions ... 101
Figure 53: Front view - 4PP152.0571-01 ... 102
Figure 54: Rear view - 4PP152.0571-01 ... 102
Figure 55: Temperature humidity diagram - 4PP152.0571-01 ... 106
Figure 56: Dimensions - 4PP152.0571-01 ... 106
Figure 57: Cutout dimensions ... 107
Figure 58: Front view - 4PP152.0571-21 ... 108
Figure 59: Rear view - 4PP152.0571-21 ... 108
Figure 60: Temperature humidity diagram - 4PP152.0571-21 ... 112
Figure 61: Dimensions - 4PP152.0571-21 ... 112
Figure 62: Cutout dimensions ... 113
Figure 63: Front view - 4PP152.1043-31 ... 114
Figure 64: Rear view - 4PP152.1043-31 ... 114
Figure 65: Temperature humidity diagram - 4PP152.1043-31 ... 118
Figure 66: Dimensions - 4PP152.1043-31 ... 118
Figure 67: Cutout dimensions ... 119
Figure 68: Front view - 4PP180.1043-31 ... 120
Figure 69: Rear view - 4PP180.1043-31 ... 120
Figure 70: Temperature humidity diagram - 4PP180.1043-31 ... 124
Figure 71: Dimensions - 4PP180.1043-31 ... 124
Figure 72: Cutout dimensions ... 125
Figure 73: Front view - 4PP180.1505-31 ... 126
Figure 74: Rear view - 4PP180.1505-31 ... 126
Figure 75: Temperature humidity diagram - 4PP180.1505-31 ... 130
Figure 76: Dimensions - 4PP180.1505-31 ... 130
Figure 77: Cutout dimensions ... 131
Figure 78: Front view - 4PP181.1043-31 ... 132
Figure 79: Rear view - 4PP181.1043-31 ... 132
Figure 80: Temperature humidity diagram - 4PP181.1043-31 ... 136
Figure 81: Dimensions - 4PP181.1043-31 ... 136
Figure 82: Cutout dimensions ... 137
Figure 83: Front view - 4PP181.1505-31 ... 138
Figure 84: Rear view - 4PP181.1505-31 ... 138
Figure 85: Temperature humidity diagram - 4PP181.1505-31 ... 142
Figure 86: Dimensions - 4PP181.1505-31 ... 142
Figure 87: Cutout dimensions ... 143
Figure 88: Front view - 4PP182.1043-31 ... 144
Figure 89: Rear view - 4PP182.1043-31 ... 144
Figure 90: Temperature humidity diagram - 4PP182.1043-31 ... 148
Figure 91: Dimensions - 4PP182.1043-31 ... 148
Figure 92: Cutout dimensions ... 149
Figure 93: Supply voltage connection ... 150
Figure 94: Grounding clip ... 151

Figure 95: USB port ... 152
Figure 96: Mode/Node switch ... 153
Figure 97: Status LEDs ... 154
Figure 98: Ethernet connection ... 154
Figure 99: Reset button ... 155
Figure 100: CompactFlash slot ... 155
Figure 101: Safety sticker ... 156
Figure 102: Device label ... 156
Figure 103: Design / dimensions - Serial number sticker ... 157
Figure 104: Front view - 4PP210.0000-95 ... 158
Figure 105: Rear view - 4PP210.0000-95 ... 158
Figure 106: Temperature humidity diagram - 4PP210.0000-95 ... 162
Figure 107: Dimensions - 4PP210.0000-95 ... 162
Figure 108: Cutout dimensions ... 163
Figure 109: Front view - 4PP220.0571-45 ... 164
Figure 110: Rear view - 4PP220.0571-45 ... 164
Figure 111: Temperature humidity diagram - 4PP220.0571-45 ... 168
Figure 112: Dimensions - 4PP220.0571-45 ... 168
Figure 113: Cutout dimensions ... 169
Figure 114: Front view - 4PP220.0571-65 ... 170
Figure 115: Rear view - 4PP220.0571-65 ... 170
Figure 116: Temperature humidity diagram - 4PP220.0571-65 ... 174
Figure 117: Dimensions - 4PP220.0571-65 ... 174
Figure 118: Cutout dimensions ... 175
Figure 119: Front view - 4PP220.0571-85 ... 176
Figure 120: Rear view - 4PP220.0571-85 ... 176
Figure 121: Temperature humidity diagram - 4PP220.0571-85 ... 180
Figure 122: Dimensions - 4PP220.0571-85 ... 180
Figure 123: Cutout dimensions ... 181
Figure 124: Front view - 4PP220.0571-A5 ... 182
Figure 125: Rear view - 4PP220.0571-A5 ... 182
Figure 126: Temperature humidity diagram - 4PP220.0571-A5 ... 186
Figure 127: Dimensions - 4PP220.0571-A5 ... 186
Figure 128: Cutout dimensions ... 187
Figure 129: Front view - 4PP220.1043-75 ... 188
Figure 130: Rear view - 4PP220.1043-75 ... 188
Figure 131: Temperature humidity diagram - 4PP220.1043-75 ... 192
Figure 132: Dimensions - 4PP220.1043-75 ... 192
Figure 133: Cutout dimensions ... 193
Figure 134: Front view - 4PP220.1043-B5 ... 194
Figure 135: Rear view - 4PP220.1043-B5 ... 194
Figure 136: Temperature humidity diagram - 4PP220.1043-B5 ... 198
Figure 137: Dimensions - 4PP220.1043-B5 ... 198
Figure 138: Cutout dimensions ... 199
Figure 139: Front view - 4PP220.1505-75 ... 200
Figure 140: Rear view - 4PP220.1505-75 ... 200
Figure 141: Temperature humidity diagram - 4PP220.1505-75 ... 204

Figure 142: Dimensions - 4PP220.1505-75 ... 204
Figure 143: Cutout dimensions ... 205
Figure 144: Front view - 4PP220.1505-B5 ... 206
Figure 145: Rear view - 4PP220.1505-B5 ... 206
Figure 146: Temperature humidity diagram - 4PP220.1505-B5 ... 210
Figure 147: Dimensions - 4PP220.1505-B5 ... 210
Figure 148: Cutout dimensions ... 211
Figure 149: Front view - 4PP251.0571-45 ... 212
Figure 150: Rear view - 4PP251.0571-45 ... 212
Figure 151: Temperature humidity diagram - 4PP251.0571-45 ... 216
Figure 152: Dimensions - 4PP251.0571-45 ... 216
Figure 153: Cutout dimensions ... 217
Figure 154: Front view - 4PP251.0571-65 ... 218
Figure 155: Rear view - 4PP251.0571-65 ... 218
Figure 156: Temperature humidity diagram - 4PP251.0571-65 ... 222
Figure 157: Dimensions - 4PP251.0571-65 ... 222
Figure 158: Cutout dimensions ... 223
Figure 159: Front view - 4PP251.0571-85 ... 224
Figure 160: Rear view - 4PP251.0571-85 ... 224
Figure 161: Temperature humidity diagram - 4PP251.0571-85 ... 228
Figure 162: Dimensions - 4PP251.0571-85 ... 228
Figure 163: Cutout dimensions ... 229
Figure 164: Front view - 4PP251.0571-A5 ... 230
Figure 165: Rear view - 4PP251.0571-A5 ... 230
Figure 166: Temperature humidity diagram - 4PP251.0571-A5 ... 234
Figure 167: Dimensions - 4PP251.0571-A5 ... 234
Figure 168: Cutout dimensions ... 235
Figure 169: Front view - 4PP251.1043-75 ... 236
Figure 170: Rear view - 4PP251.1043-75 ... 236
Figure 171: Temperature humidity diagram - 4PP251.1043-75 ... 240
Figure 172: Dimensions - 4PP251.1043-75 ... 240
Figure 173: Cutout dimensions ... 241
Figure 174: Front view - 4PP251.1043-B5 ... 242
Figure 175: Rear view - 4PP251.1043-B5 ... 242
Figure 176: Temperature humidity diagram - 4PP251.1043-B5 ... 246
Figure 177: Dimensions - 4PP251.1043-B5 ... 246
Figure 178: Cutout dimensions ... 247
Figure 179: Front view - 4PP251.1505-75 ... 248
Figure 180: Rear view - 4PP251.1505-75 ... 248
Figure 181: Temperature humidity diagram - 4PP251.1505-75 ... 252
Figure 182: Dimensions - 4PP251.1505-75 ... 252
Figure 183: Cutout dimensions ... 253
Figure 184: Front view - 4PP251.1505-B5 ... 254
Figure 185: Rear view - 4PP251.1505-B5 ... 254
Figure 186: Temperature humidity diagram - 4PP251.1505-B5 ... 258
Figure 187: Dimensions - 4PP251.1505-B5 ... 258
Figure 188: Cutout dimensions ... 259

Figure 189: Front view - 4PP252.0571-45 ... 260
Figure 190: Rear view - 4PP252.0571-45 ... 260
Figure 191: Temperature humidity diagram - 4PP252.0571-45 ... 264
Figure 192: Dimensions - 4PP252.0571-45 ... 264
Figure 193: Cutout dimensions ... 265
Figure 194: Front view - 4PP252.0571-65 ... 266
Figure 195: Rear view - 4PP252.0571-65 ... 266
Figure 196: Temperature humidity diagram - 4PP252.0571-65 ... 270
Figure 197: Dimensions - 4PP252.0571-65 ... 270
Figure 198: Cutout dimensions ... 271
Figure 199: Front view - 4PP252.0571-85 ... 272
Figure 200: Rear view - 4PP252.0571-85 ... 272
Figure 201: Temperature humidity diagram - 4PP252.0571-85 ... 276
Figure 202: Dimensions - 4PP252.0571-85 ... 276
Figure 203: Cutout dimensions ... 277
Figure 204: Front view - 4PP252.0571-A5 ... 278
Figure 205: Rear view - 4PP252.0571-A5 ... 278
Figure 206: Temperature humidity diagram - 4PP252.0571-A5 ... 282
Figure 207: Dimensions - 4PP252.0571-A5 ... 282
Figure 208: Cutout dimensions ... 283
Figure 209: Front view - 4PP252.1043-75 ... 284
Figure 210: Rear view - 4PP252.1043-75 ... 284
Figure 211: Temperature humidity diagram - 4PP252.1043-75 ... 288
Figure 212: Dimensions - 4PP252.1043-75 ... 288
Figure 213: Cutout dimensions ... 289
Figure 214: Front view - 4PP252.1043-B5 ... 290
Figure 215: Rear view - 4PP252.1043-B5 ... 290
Figure 216: Temperature humidity diagram - 4PP252.1043-B5 ... 294
Figure 217: Dimensions - 4PP252.1043-B5 ... 294
Figure 218: Cutout dimensions ... 295
Figure 219: Front view - 4PP280.1043-75 ... 296
Figure 220: Rear view - 4PP280.1043-75 ... 296
Figure 221: Temperature humidity diagram - 4PP280.1043-75 ... 300
Figure 222: Dimensions - 4PP280.1043-75 ... 300
Figure 223: Cutout dimensions ... 301
Figure 224: Front view - 4PP280.1043-B5 ... 302
Figure 225: Rear view - 4PP280.1043-B5 ... 302
Figure 226: Temperature humidity diagram - 4PP280.1043-B5 ... 306
Figure 227: Dimensions - 4PP280.1043-B5 ... 306
Figure 228: Cutout dimensions ... 307
Figure 229: Front view - 4PP280.1505-75 ... 308
Figure 230: Rear view - 4PP280.1505-75 ... 308
Figure 231: Temperature humidity diagram - 4PP280.1505-75 ... 312
Figure 232: Dimensions - 4PP280.1505-75 ... 312
Figure 233: Cutout dimensions ... 313
Figure 234: Front view - 4PP280.1505-B5 ... 314
Figure 235: Rear view - 4PP280.1505-B5 ... 314

Figure 236: Temperature humidity diagram - 4PP280.1505-B5 ... 318
Figure 237: Dimensions - 4PP280.1505-B5 ... 318
Figure 238: Cutout dimensions ... 319
Figure 239: Front view - 4PP281.1043-75 ... 320
Figure 240: Rear view - 4PP281.1043-75 ... 320
Figure 241: Temperature humidity diagram - 4PP281.1043-75 ... 324
Figure 242: Dimensions - 4PP281.1043-75 ... 324
Figure 243: Cutout dimensions ... 325
Figure 244: Front view - 4PP281.1043-B5 ... 326
Figure 245: Rear view - 4PP281.1043-B5 ... 326
Figure 246: Temperature humidity diagram - 4PP281.1043-B5 ... 330
Figure 247: Dimensions - 4PP281.1043-B5 ... 330
Figure 248: Cutout dimensions ... 331
Figure 249: Front view - 4PP281.1505-75 ... 332
Figure 250: Rear view - 4PP281.1505-75 ... 332
Figure 251: Temperature humidity diagram - 4PP281.1505-75 ... 336
Figure 252: Dimensions - 4PP281.1505-75 ... 336
Figure 253: Cutout dimensions ... 337
Figure 254: Front view - 4PP281.1505-B5 ... 338
Figure 255: Rear view - 4PP281.1505-B5 ... 338
Figure 256: Temperature humidity diagram - 4PP281.1505-B5 ... 342
Figure 257: Dimensions - 4PP281.1505-B5 ... 342
Figure 258: Cutout dimensions ... 343
Figure 259: Front view - 4PP282.1043-75 ... 344
Figure 260: Rear view - 4PP282.1043-75 ... 344
Figure 261: Temperature humidity diagram - 4PP282.1043-75 ... 348
Figure 262: Dimensions - 4PP282.1043-75 ... 348
Figure 263: Cutout dimensions ... 349
Figure 264: Front view - 4PP282.1043-B5 ... 350
Figure 265: Rear view - 4PP282.1043-B5 ... 350
Figure 266: Temperature humidity diagram - 4PP282.1043-B5 ... 354
Figure 267: Dimensions - 4PP282.1043-B5 ... 354
Figure 268: Cutout dimensions ... 355
Figure 269: Supply voltage connection ... 356
Figure 270: Grounding clip ... 357
Figure 271: USB port connection ... 358
Figure 272: Mode / Node switches ... 359
Figure 273: Ethernet connection ... 360
Figure 274: Reset button ... 361
Figure 275: CompactFlash slot ... 361
Figure 276: Safety sticker ... 362
Figure 277: Device label ... 362
Figure 278: Design / dimensions - Serial number sticker ... 363
Figure 279: Front view - 5PP120.0571-27 ... 364
Figure 280: Rear view - 5PP120.0571-27 ... 364
Figure 281: Temperature humidity diagram - 5PP120.0571-27 ... 368
Figure 282: Dimensions - 5PP120.0571-27 ... 368

Figure 283: Cutout dimensions ... 369
Figure 284: Front view - 5PP120.1043-37 ... 370
Figure 285: Rear view - 5PP120.1043-37 ... 370
Figure 286: Temperature humidity diagram - 5PP120.1043-37 ... 374
Figure 287: Dimensions - 5PP120.1043-37 ... 374
Figure 288: Cutout dimensions ... 375
Figure 289: Front view - 5PP120.1043-37A ... 376
Figure 290: Rear view - 5PP120.1043-37A ... 376
Figure 291: Temperature humidity diagram - 5PP120.1043-37A ... 380
Figure 292: Dimensions - 5PP120.1043-37A ... 380
Figure 293: Cutout dimensions ... 381
Figure 294: Front view - 5PP120.1214-37 ... 382
Figure 295: Rear view - 5PP120.1214-37 ... 382
Figure 296: Temperature humidity diagram - 5PP120.1214-37 ... 386
Figure 297: Dimensions - 5PP120.1214-37 ... 386
Figure 298: Cutout dimensions ... 387
Figure 299: Front view - 5PP120.1214-37A ... 388
Figure 300: Rear view - 5PP120.1214-37A ... 388
Figure 301: Temperature humidity diagram - 5PP120.1214-37A ... 392
Figure 302: Dimensions - 5PP120.1214-37A ... 392
Figure 303: Cutout dimensions ... 393
Figure 304: Front view - 5PP120.1505-37 ... 394
Figure 305: Rear view - 5PP120.1505-37 ... 394
Figure 306: Temperature humidity diagram - 5PP120.1505-37 ... 398
Figure 307: Dimensions - 5PP120.1505-37 ... 398
Figure 308: Cutout dimensions ... 399
Figure 309: Front view - 5PP120.1505-37A ... 400
Figure 310: Rear view - 5PP120.1505-37A ... 400
Figure 311: Temperature humidity diagram - 5PP120.1505-37A ... 404
Figure 312: Dimensions - 5PP120.1505-37A ... 404
Figure 313: Cutout dimensions ... 405
Figure 314: Power Panel light / compact overview ... 406
Figure 315: Temperature humidity diagram - Power Panel 200 light - Monochrome LCD ... 410
Figure 316: Temperature humidity diagram - Power Panel 200 light - Color LCD ... 410
Figure 317: Temperature humidity diagram - Power Panel 200 compact - Monochrome LCD 414
Figure 318: Temperature humidity diagram - Power Panel 200 compact - Color LCD ... 414
Figure 319: Temperature humidity diagram - Power Panel 251 light - Monochrome LCD ... 419
Figure 320: Temperature humidity diagram - Power Panel 251 light - Color LCD ... 419
Figure 321: Temperature humidity diagram - Power Panel 251 compact - Monochrome LCD 423
Figure 322: Temperature humidity diagram - Power Panel 251 compact - Color LCD ... 423
Figure 323: Temperature humidity diagram - Power Panel 251 light - Monochrome LCD ... 428
Figure 324: Temperature humidity diagram - Power Panel 251 light - Color LCD ... 428

Figure 325: Temperature humidity diagram - Power Panel 252 compact - Monochrome LCD 432
Figure 326: Temperature humidity diagram - Power Panel 252 compact - Color LCD ... 432
Figure 327: Retaining clip ... 435
Figure 328: Space for air circulation ... 436
Figure 329: Example - Hardware number in the B&R Key Editor or in the B&R Control Center 439
Figure 330: Display - Keys and LEDs in the matrix ... 439
Figure 331: Hardware numbers - 5.7" device format - Vertical1 ... 440
Figure 332: Hardware numbers - 5.7" device format - Horizontal2 ... 441
Figure 333: Hardware numbers - 10.4" device format - Horizontal1 ... 442
Figure 334: Hardware numbers - 10.4" device format - Vertical1 ... 443
Figure 335: Hardware numbers - 10.4" device format - Horizontal2 ... 444
Figure 336: Hardware numbers - 15" device format - Horizontal1 ... 445
Figure 337: Hardware numbers - 15" device format - Vertical1 ... 446
Figure 338: Automation Runtime summary screen ... 449
Figure 339: Power Panel 100 as an intelligent visualization system ... 451
Figure 340: Power Panel 200 with Power Panel 100 terminals ... 452
Figure 341: Block diagram of SMC and Geode processor data communication ... 453
Figure 342: Watchdog events ... 454
Figure 343: BIOS summary screen for VGA, SVGA, XGA Power Panel devices ... 456
Figure 344: BIOS summary screen for QVGA Power Panel devices ... 456
Figure 345: Press DEL for setup ... 456
Figure 346: BIOS setup main menu ... 458
Figure 347: BIOS time menu ... 459
Figure 348: BIOS date menu ... 460
Figure 349: BIOS motherboard device configuration menu ... 461
Figure 350: BIOS drive configuration menu ... 461
Figure 351: BIOS super I/O configuration menu ... 463
Figure 352: BIOS video configuration menu ... 464
Figure 353: BIOS PCI configuration menu ... 465
Figure 354: BIOS USB configuration menu ... 466
Figure 355: BIOS memory optimization menu ... 467
Figure 356: Advanced BIOS features menu ... 469
Figure 357: BIOS special OEM features menu ... 471
Figure 358: BIOS device information menu ... 472
Figure 359: BIOS firmware configuration menu ... 474
Figure 360: BIOS restore CMOS values menu ... 475
Figure 361: BIOS load optimized defaults menu ... 476
Figure 362: BIOS load previous values menu ... 477
Figure 363: BIOS save values without exit menu ... 477
Figure 364: BIOS exit without save menu ... 478
Figure 365: BIOS save values and exit menu ... 479
Figure 366: BIOS setup main menu ... 480
Figure 367: BIOS motherboard device configuration ... 481
Figure 368: BIOS real-time clock configuration ... 482
Figure 369: BIOS drive configuration menu ... 483

Figure 370: BIOS super I/O configuration menu ..... 484
Figure 371: BIOS video configuration menu ..... 485
Figure 372: BIOS PCI configuration menu ..... 486
Figure 373: BIOS USB configuration menu ..... 487
Figure 374: BIOS memory optimization menu ..... 488
Figure 375: MC_MEM_CNTRL1 settings ..... 489
Figure 376: MC_MEM_CNTRL2 settings ..... 490
Figure 377: MC_SYNC_TIM1 settings ..... 491
Figure 378: Advanced BIOS features menu ..... 492
Figure 379: BIOS special OEM features menu ..... 493
Figure 380: BIOS device information menu ..... 494
Figure 381: BIOS CF card information menu ..... 494
Figure 382: BIOS interface information menu ..... 495
Figure 383: BIOS miscellaneous values menu ..... 495
Figure 384: BIOS factory settings menu ..... 496
Figure 385: BIOS firmware configuration menu ..... 497
Figure 386: BIOS restore CMOS values menu ..... 498
Figure 387: BIOS load optimized defaults menu ..... 498
Figure 388: BIOS load previous values menu ..... 499
Figure 389: BIOS save values without exit menu ..... 499
Figure 390: BIOS exit without save menu ..... 500
Figure 391: BIOS save values and exit menu ..... 500
Figure 392: BIOS help menu ..... 501
Figure 393: BIOS upgrade start menu ..... 504
Figure 394: aPCI firmware upgrade start menu ..... 506
Figure 395: User boot logo upgrade start menu ..... 507
Figure 396: REMHOST communication model ..... 509
Figure 397: Example of REMHOST.INI ..... 511
Figure 398: REMHOST program start ..... 511
Figure 399: REMHOST pin assignment - Power Panel connection cable ..... 512
Figure 400: HMI Drivers & Utilities DVD 5SWHMI.0000-00 ..... 521
Figure 401: aPCI slot cover 4AC200.1000-00 ..... 555
Figure 402: aPCI slot cover installation ..... 555
Figure 403: Legend strip templates ..... 556
Figure 404: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03 ... 560
Figure 405: Dimensions - CompactFlash card Type I ..... 561
Figure 406: Dimensions - CompactFlash card Type I ..... 563
Figure 407: SanDisk white paper - Page 1 ..... 564
Figure 408: SanDisk white paper - Page 2 ..... 565
Figure 409: SanDisk white paper - Page 3 ..... 566
Figure 410: SanDisk white paper - Page 4 ..... 567
Figure 411: SanDisk white paper - Page 5 ..... 568
Figure 412: SanDisk white paper - Page 6 ..... 569
Figure 413: Temperature humidity diagram - USB flash drive - 5MMUSB.xxxx-00 ..... 574
Figure 414: Null modem cable 9A0017.0x ..... 576
Figure 415: Pin assignments - Null modem cable ..... 577
Figure 416: Battery handling ..... 581

Figure 417: Temperature humidity diagram - Elo Accu touch screen 5-wire ..... 584
Figure 418: Viewing angles ..... 589
Figure 419: B&R Key Editor screenshots (Version 2.70) ..... 590
Figure 420: Compatibility details - figure structure ..... 594
Figure 421: Mounting compatibility - 5.7" device format - Horizontal1 ..... 594
Figure 422: Mounting compatibility - 5.7" device format - Horizontal2 ..... 595
Figure 423: Mounting compatibility - 5.7" device format - Vertical1 ..... 595
Figure 424: Mounting compatibility - 10.4" device format - Horizontal1 ..... 596
Figure 425: Mounting compatibility - 10.4" device format - Horizontal2 ..... 596
Figure 426: Mounting compatibility - 10.4" device format - Vertical1 ..... 597
Figure 427: Mounting compatibility - 12.1" device format - Horizontal1 ..... 598
Figure 428: Mounting compatibility - 15" device format - Horizontal1 ..... 599
Figure 429: Mounting compatibility - 15" device format - Vertical1 ..... 599

Table 1: Manual history ... 23
Table 2: Environmentally-friendly separation of materials ... 31
Table 3: Organization of safety notices ... 32
Table 4: Power Panel 100 with Automation Runtime ... 33
Table 5: Power Panel 200 with Automation Runtime ... 34
Table 6: Model numbers - Power Panel 100 with BIOS ... 37
Table 7: Model numbers - Accessories ... 38
Table 8: Model numbers - Software ... 40
Table 9: Model numbers - Documentation ... 41
Table 10: Pin assignments - COM ... 46
Table 11: Technical data for USB connection ... 47
Table 12: Switch settings for the Mode / Node switch ... 48
Table 13: Status LEDs ... 49
Table 14: Ethernet controller ... 49
Table 15: Status LEDs - Ethernet controller ... 50
Table 16: Technical data - 4PP120.0571-01 ... 55
Table 17: Contents of delivery - 4PP120.0571-01 ... 59
Table 18: Technical data - 4PP120.0571-21 ... 61
Table 19: Contents of delivery - 4PP120.0571-21 ... 65
Table 20: Technical data - 4PP120.1043-31 ... 67
Table 21: Contents of delivery - 4PP120.1043-31 ... 71
Table 22: Technical data - 4PP120.1505-31 ... 73
Table 23: Contents of delivery - 4PP120.1505-31 ... 77
Table 24: Technical data - 4PP151.0571-01 ... 79
Table 25: Contents of delivery - 4PP151.0571-01 ... 83
Table 26: Technical data - 4PP151.0571-21 ... 85
Table 27: Contents of delivery - 4PP151.0571-21 ... 89
Table 28: Technical data - 4PP120.1043-31 ... 91
Table 29: Contents of delivery - 4PP151.1043-31 ... 95
Table 30: Technical data - 4PP151.1505-31 ... 97
Table 31: Contents of delivery - 4PP151.1505-31 ... 101
Table 32: Technical data - 4PP152.0571-01 ... 103
Table 33: Contents of delivery - 4PP152.0571-01 ... 107
Table 34: Technical data - 4PP152.0571-21 ... 109
Table 35: Contents of delivery - 4PP152.0571-21 ... 113
Table 36: Technical data - 4PP152.1043-31 ... 115
Table 37: Contents of delivery - 4PP152.1043-31 ... 119
Table 38: Technical data - 4PP180.1043-31 ... 121
Table 39: Contents of delivery - 4PP180.1043-31 ... 125
Table 40: Technical data - 4PP180.1505-31 ... 127
Table 41: Contents of delivery - 4PP180.1505-31 ... 131
Table 42: Technical data - 4PP181.1043-31 ... 133
Table 43: Contents of delivery - 4PP181.1043-31 ... 137
Table 44: Technical data - 4PP181.1505-31 ... 139
Table 45: Contents of delivery - 4PP181.1505-31 ... 143
Table 46: Technical data - 4PP182.1043-31 ... 145
Table 47: Contents of delivery - 4PP182.1043-31 ... 149

Table 48: Pin assignments - COM ... 151
Table 49: Technical data for USB connection ... 152
Table 50: Switch settings for the Mode / Node switch ... 153
Table 51: Ethernet controller ... 154
Table 52: Status LEDs - Ethernet controller ... 155
Table 53: Technical data - 4PP210.0000-95 ... 159
Table 54: Contents of delivery - 4PP210.0000-95 ... 163
Table 55: Technical data - 4PP220.0571-45 ... 165
Table 56: Contents of delivery - 4PP220.0571-45 ... 169
Table 57: Technical data - 4PP220.0571-65 ... 171
Table 58: Contents of delivery - 4PP220.0571-65 ... 175
Table 59: Technical data - 4PP220.0571-85 ... 177
Table 60: Contents of delivery - 4PP220.0571-85 ... 181
Table 61: Technical data - 4PP220.0571-A5 ... 183
Table 62: Contents of delivery - 4PP220.0571-A5 ... 187
Table 63: Technical data - 4PP220.1043-75 ... 189
Table 64: Contents of delivery - 4PP220.1043-75 ... 193
Table 65: Technical data - 4PP220.1043-B5 ... 195
Table 66: Contents of delivery - 4PP220.1043-B5 ... 199
Table 67: Technical data - 4PP220.1505-75 ... 201
Table 68: Contents of delivery - 4PP220.1505-75 ... 205
Table 69: Technical data - 4PP220.1505-B5 ... 207
Table 70: Contents of delivery - 4PP220.1505-B5 ... 211
Table 71: Technical data - 4PP251.0571-45 ... 213
Table 72: Contents of delivery - 4PP251.0571-45 ... 217
Table 73: Technical data - 4PP251.0571-65 ... 219
Table 74: Contents of delivery - 4PP251.0571-65 ... 223
Table 75: Technical data - 4PP251.0571-85 ... 225
Table 76: Contents of delivery - 4PP251.0571-85 ... 229
Table 77: Technical data - 4PP251.0571-A5 ... 231
Table 78: Contents of delivery - 4PP251.0571-A5 ... 235
Table 79: Technical data - 4PP251.1043-75 ... 237
Table 80: Contents of delivery - 4PP251.1043-75 ... 241
Table 81: Technical data - 4PP251.1043-B5 ... 243
Table 82: Contents of delivery - 4PP251.1043-B5 ... 247
Table 83: Technical data - 4PP251.1505-75 ... 249
Table 84: Contents of delivery - 4PP251.1505-75 ... 253
Table 85: Technical data - 4PP251.1505-B5 ... 255
Table 86: Contents of delivery - 4PP251.1505-B5 ... 259
Table 87: Technical data - 4PP252.0571-45 ... 261
Table 88: Contents of delivery - 4PP252.0571-45 ... 265
Table 89: Technical data - 4PP252.0571-65 ... 267
Table 90: Contents of delivery - 4PP252.0571-65 ... 271
Table 91: Technical data - 4PP252.0571-85 ... 273
Table 92: Contents of delivery - 4PP252.0571-85 ... 277
Table 93: Technical data - 4PP252.0571-A5 ... 279
Table 94: Contents of delivery - 4PP252.0571-A5 ... 283

Table 95: Technical data - 4PP252.1043-75 ... 285
Table 96: Contents of delivery - 4PP252.1043-75 ... 289
Table 97: Technical data - 4PP252.1043-B5 ... 291
Table 98: Contents of delivery - 4PP252.1043-B5 ... 295
Table 99: Technical data - 4PP280.1043-75 ... 297
Table 100: Contents of delivery - 4PP280.1043-75 ... 301
Table 101: Technical data - 4PP280.1043-B5 ... 303
Table 102: Contents of delivery - 4PP280.1043-B5 ... 307
Table 103: Technical data - 4PP280.1505-75 ... 309
Table 104: Contents of delivery - 4PP280.1505-75 ... 313
Table 105: Technical data - 4PP280.1505-B5 ... 315
Table 106: Contents of delivery - 4PP280.1505-B5 ... 319
Table 107: Technical data - 4PP281.1043-75 ... 321
Table 108: Contents of delivery - 4PP281.1043-75 ... 325
Table 109: Technical data - 4PP281.1043-B5 ... 327
Table 110: Contents of delivery - 4PP281.1043-B5 ... 331
Table 111: Technical data - 4PP281.1505-75 ... 333
Table 112: Contents of delivery - 4PP281.1505-75 ... 337
Table 113: Technical data - 4PP281.1505-B5 ... 339
Table 114: Contents of delivery - 4PP281.1505-B5 ... 343
Table 115: Technical data - 4PP282.1043-75 ... 345
Table 116: Contents of delivery - 4PP282.1043-75 ... 349
Table 117: Technical data - 4PP282.1043-B5 ... 351
Table 118: Contents of delivery - 4PP282.1043-B5 ... 355
Table 119: Pin assignments - COM ... 357
Table 120: Technical data for USB connection ... 358
Table 121: Switch settings for the Mode / Node switch ... 359
Table 122: Status LEDs ... 360
Table 123: Ethernet controller ... 360
Table 124: Status LEDs - Ethernet controller ... 361
Table 125: Technical data - 5PP120.0571-27 ... 365
Table 126: Contents of delivery - 5PP120.0571-27 ... 369
Table 127: Technical data - 5PP120.1043-37 ... 371
Table 128: Contents of delivery - 5PP120.1043-37 ... 375
Table 129: Technical data - 5PP120.1043-37A ... 377
Table 130: Contents of delivery - 5PP120.1043-37A ... 381
Table 131: Technical data - 5PP120.1214-37 ... 383
Table 132: Contents of delivery - 5PP120.1214-37 ... 387
Table 133: Technical data - 5PP120.1214-37A ... 389
Table 134: Contents of delivery - 5PP120.1214-37A ... 393
Table 135: Technical data - 5PP120.1505-37 ... 395
Table 136: Contents of delivery - 5PP120.1505-37 ... 399
Table 137: Technical data - 5PP120.1505-37A ... 401
Table 138: Contents of delivery - 5PP120.1505-37A ... 405
Table 139: Technical data - Power Panel 200 light ... 407
Table 140: Technical data - Power Panel 200 compact ... 411
Table 141: Contents of delivery - Power Panel 200 light / compact ... 415

Table 142: Technical data - Power Panel 251 light ... 416
Table 143: Technical data - Power Panel 251 compact ... 420
Table 144: Contents of delivery - Power Panel 251 light / compact ... 424
Table 145: Technical data - Power Panel 252 light ... 425
Table 146: Technical data - Power Panel 252 compact ... 429
Table 147: Contents of delivery - Power Panel 252 light / compact ... 433
Table 148: Mounting orientation 0° ... 437
Table 149: Mounting orientation -45° and +45°. ... 438
Table 150: Automation Runtime summary screen ... 450
Table 151: Differences in the boot loader temperature alarm limits ... 454
Table 152: BIOS-relevant keys ... 457
Table 153: Overview of BIOS main menu functions ... 458
Table 154: BIOS motherboard device configuration menu ... 461
Table 155: BIOS drive configuration menu ... 462
Table 156: BIOS super I/O configuration menu ... 463
Table 157: BIOS video configuration menu ... 464
Table 158: BIOS PCI configuration menu ... 465
Table 159: BIOS USB configuration menu ... 466
Table 160: BIOS memory optimization menu ... 467
Table 161: Advanced BIOS features menu ... 469
Table 162: BIOS special functions menu ... 471
Table 163: BIOS device information menu ... 472
Table 164: BIOS firmware configuration menu ... 474
Table 165: Overview of BIOS main menu functions ... 480
Table 166: BIOS motherboard device configuration menu ... 481
Table 167: BIOS real-time clock configuration menu ... 482
Table 168: BIOS drive configuration menu ... 483
Table 169: BIOS super I/O configuration menu ... 485
Table 170: BIOS video configuration menu ... 485
Table 171: BIOS PCI configuration menu ... 487
Table 172: BIOS USB configuration menu ... 487
Table 173: BIOS memory optimization menu ... 488
Table 174: BIOS MC_MEM_CNTRL1 settings menu ... 489
Table 175: BIOS MC_MEM_CNTRL2 settings menu ... 490
Table 176: BIOS MC_SYNC_TIM1 settings menu ... 491
Table 177: Advanced BIOS features menu ... 492
Table 178: BIOS special functions menu ... 493
Table 179: BIOS real-time clock configuration menu ... 494
Table 180: BIOS CF card information menu ... 494
Table 181: BIOS interface information menu ... 495
Table 182: BIOS miscellaneous values menu ... 496
Table 183: BIOS factory settings menu ... 496
Table 184: BIOS firmware configuration menu ... 497
Table 185: BIOS upgrade menu description ... 504
Table 186: aPCI firmware upgrade menu description ... 506
Table 187: User boot logo upgrade menu description ... 507
Table 188: Description of REMHOST.INI configuration options ... 511

Table 189: RAM address assignment ..... 513
Table 190: DMA channel assignment ..... 514
Table 191: I/O address assignment ..... 514
Table 192: Interrupt assignment ..... 515
Table 193: Differences between the Windows CE versions (Pro - PropPlus) ..... 518
Table 194: Device functions in Windows XP embedded with FP2007 ..... 519
Table 195: Model number - HMI Drivers & Utilities DVD ..... 521
Table 196: Overview of standards ..... 525
Table 197: Overview of limits and testing guidelines for emissions ..... 527
Table 198: Test requirements - Network-related emissions for residential areas ..... 528
Table 199: Test requirements - Network-related emissions for industrial areas ..... 529
Table 200: : Test requirements - Electromagnetic emissions for residential areas ..... 529
Table 201: : Test requirements - Electromagnetic emissions for industrial areas ..... 530
Table 202: : Test requirement - harmonic currents for devices with an input current ≤ 16 A .... 530
Table 203: : Test requirements - Voltage fluctuations and flickering in low-voltage systems ≤ 16 A ..... 531
Table 204: : Test requirements - Voltage fluctuations and flickering in low-voltage systems ≤ 75 A ..... 531
Table 205: Overview of limits and testing guidelines for immunity ..... 532
Table 206: Test requirements - Electrostatic discharge (ESD) ..... 533
Table 207: Test requirements - High-frequency electromagnetic fields (HF field) ..... 533
Table 208: Test requirements - High-speed transient electrical disturbances (burst) ..... 534
Table 209: Test requirements - Surge voltages ..... 534
Table 210: Test requirements - Conducted disturbances ..... 534
Table 211: Test requirements - Magnetic fields with electrical frequencies ..... 535
Table 212: Test requirements - Voltage dips, fluctuations, and short-term interruptions .... 535
Table 213: Test requirements - Damped vibration ..... 536
Table 214: Overview of limits and testing guidelines for vibration ..... 537
Table 215: Test requirements - Vibration during operation ..... 537
Table 216: Test requirements - Vibration during transport (packaged) ..... 538
Table 217: Test requirements - Shock during operation ..... 538
Table 218: Test requirements - Shock during transport ..... 538
Table 219: Test requirements - Toppling ..... 539
Table 220: Test requirements - Toppling ..... 539
Table 221: Overview of limits and testing guidelines for temperature and humidity ..... 540
Table 222: Test requirements - Worst case during operation ..... 540
Table 223: Test requirements - Dry heat ..... 540
Table 224: Test requirements - Dry cold ..... 540
Table 225: Test requirements - Large temperature fluctuations ..... 541
Table 226: Test requirements - Temperature fluctuations in operation ..... 541
Table 227: Test requirements - Humid heat, cyclic ..... 541
Table 228: Test requirements - Humid heat, constant (storage) ..... 541
Table 229: Test requirements - Sprayed water (front side) ..... 542
Table 230: Overview of limits and testing guidelines for safety ..... 543
Table 231: Test requirements - Ground resistance ..... 543
Table 232: Test requirements - Insulation resistance ..... 544

Table 233: Test requirements - High voltage ... 544
Table 234: Test requirements - Residual voltage ... 544
Table 235: Test requirements - Leakage current ... 545
Table 236: Test requirements - Overload ... 545
Table 237: Test requirements - Defective component ... 545
Table 238: Test requirements - Voltage range ... 545
Table 239: Overview of limits and testing guidelines for other tests ... 546
Table 240: Test requirements - Impact resistance ... 546
Table 241: Test requirements - Protection ... 546
Table 242: Test requirements - Degree of pollution ... 546
Table 243: International certifications ... 547
Table 244: Model numbers - Accessories ... 549
Table 245: Order data - Lithium batteries ... 552
Table 246: Technical data - Lithium batteries ... 552
Table 247: Order data - TB103 ... 553
Table 248: Technical data - TB103 ... 553
Table 249: Order data - Legend strip templates ... 557
Table 250: Order data - CompactFlash cards ... 558
Table 251: Technical data - CompactFlash cards 5CFCRD.xxxx-03 ... 559
Table 252: Order data - CompactFlash cards 5CFCRD.xxxx-02 ... 562
Table 253: Technical data - CompactFlash cards 5CFCRD.xxxx-02 ... 562
Table 254: Order data - CompactFlash cards 5CFCRD.0xxx-01 ... 570
Table 255: Technical data - CompactFlash cards 5CFCRD.xxxx-01 ... 570
Table 256: Order data - USB flash drives ... 572
Table 257: Technical data - USB flash drive 5MMUSB.xxxx-00 ... 573
Table 258: Model numbers - USB cables ... 576
Table 259: Technical data - Null modem cable ... 576
Table 260: Maintenance work ... 579
Table 261: Meaning of battery status OK - Bad ... 580
Table 262: Technical data - Elo Accu touch screen 5-wire ... 583
Table 263: 3M touch ... 585
Table 264: Gunze touch ... 586
Table 265: Chemical resistance of the décor foil ... 587
Table 266: Product abbreviations ... 592
Table 267: Device compatibility overview ... 592

## 0

0AC201.9 ..... 38, 552
0TB103.9 ..... 38, 553
0TB103.91 ..... 38, 553

## 4

4A0006.00-000 ..... 38, 552
4AC200.1000-00 ..... 38, 555
4PP120.0571-01 ..... 33, 54
4PP120.0571-21 ..... 33, 60
4PP120.1043-31 ..... 33, 66
4PP120.1505-31 ..... 33, 72
4PP151.0571-01 ..... 33, 78
4PP151.0571-21 ..... 33, 84
4PP151.1043-31 ..... 33, 90
4PP151.1505-31 ..... 33, 96
4PP152.0571-01 ..... 33, 102
4PP152.0571-21 ..... 33, 108
4PP152.1043-31 ..... 33, 114
4PP180.1043-31 ..... 34, 120
4PP180.1505-31 ..... 34, 126
4PP181.1043-31 ..... 34, 132
4PP181.1505-31 ..... 34, 138
4PP182.1043-31 ..... 34, 144
4PP210.0000-95 ..... 34, 158
4PP220.0571-45 ..... 34, 164
4PP220.0571-65 ..... 34, 170
4PP220.0571-85 ..... 34, 176
4PP220.0571-A5 ..... 34, 182
4PP220.1043-75 ..... 34, 188
4PP220.1043-B5 ..... 35, 194
4PP220.1505-75 ..... 35, 200
4PP220.1505-B5 ..... 35, 206
4PP251.0571-45 ..... 35, 212
4PP251.0571-65 ..... 35, 218
4PP251.0571-85 ..... 35, 224
4PP251.0571-A5 ..... 35, 230
4PP251.1043-75 ..... 35, 236
4PP251.1043-B5 ..... 35, 242
4PP251.1505-75 ..... 35, 248
4PP251.1505-B5 ..... 35, 254
4PP252.0571-45 ..... 35, 260
4PP252.0571-65 ..... 35, 266
4PP252.0571-85 ..... 36, 272
4PP252.0571-A5 ..... 36, 278
4PP252.1043-75 ..... 36, 284
4PP252.1043-B5 ..... 36, 290
4PP280.1043-75 ..... 36, 296
4PP280.1043-B5 ..... 36, 302
4PP280.1505-75 ..... 36, 308
4PP280.1505-B5 ..... 36, 314
4PP281.1043-75 ..... 36, 320
4PP281.1043-B5 ..... 36, 326
4PP281.1505-75 ..... 36, 332
4PP281.1505-B5 ..... 36, 338
4PP282.1043-75 ..... 37, 344
4PP282.1043-B5 ..... 37, 350

## 5

5AC900.057X-00 ..... 38, 557
5AC900.057X-01 ..... 38, 557
5AC900.104X-00 ..... 38, 557
5AC900.104X-01 ..... 38, 557
5AC900.104X-02 ..... 38, 557
5AC900.150X-00 ..... 38, 557
5CFCRD.0032-01 ..... 38, 570
5CFCRD.0032-02 ..... 38, 562
5CFCRD.0064-01 ..... 38, 570
5CFCRD.0064-02 ..... 38, 562
5CFCRD.0064-03 ..... 38, 558
5CFCRD.0128-01 ..... 38, 570
5CFCRD.0128-02 ..... 38, 562
5CFCRD.0128-03 ..... 39, 558
5CFCRD.0192-01 ..... 39, 570
5CFCRD.0256-01 ..... 39, 570
5CFCRD.0256-02 ..... 39, 562
5CFCRD.0256-03 ..... 39, 558
5CFCRD.0384-01 ..... 39, 570
5CFCRD.0512-01 ..... 39, 570
5CFCRD.0512-02 ..... 39, 562
5CFCRD.0512-03 ..... 39, 558
5CFCRD.1024-02 ..... 39, 562
5CFCRD.1024-03 ..... 39, 558
5CFCRD.2048-02 ..... 39, 562
5CFCRD.2048-03 ..... 39, 558
5CFCRD.4096-03 ..... 39, 558
5CFCRD.8192-03 ..... 39, 558
5MMUSB.0128-00 ..... 39, 572
5MMUSB.0256-00 ..... 39, 572
5MMUSB.0512-00 ..... 39, 572
5MMUSB.1024-00 ..... 40, 572

5MMUSB.2048-00 ..... 40, 572
5PP120.0571-27 ..... 37, 364
5PP120.1043-37 ..... 37, 370
5PP120.1043-37A ..... 37, 376
5PP120.1214-37 ..... 37, 382
5PP120.1214-37A ..... 37, 388
5PP120.1505-37 ..... 37, 394
5PP120.1505-37A ..... 37, 400
5SWHMI.0000-00 ..... 40, 521
5SWWCE.0517-ENG ..... 40
5SWWCE.0617-ENG ..... 40
5SWWXP.0417-ENG ..... 40

## 9

9A0013.01 ..... 40
9A0017.01 ..... 40, 576
9A0017.02 ..... 40, 576
9S0001.13-010 ..... 40
9S0001.13-020 ..... 40
9S0001.16-020 ..... 40
9S0001.17-020 ..... 40
9S0001.25-020 ..... 40
9S0001.29-020 ..... 40

## M

MAPP100.200-ENG ..... 41
MAPP100.200-GER ..... 41

## Symbole

.NET ..... 609

## A

Accessories ..... 549
ACPI ..... 600
Advanced BIOS features ..... 469, 492
After-images ..... 582
Air circulation ..... 436
APC ..... 600
aPCI firmware upgrade disk ..... 505
API ..... 600
Appendix A ..... 583
Automation Runtime ..... 449, 600
  Summary screen ..... 449

## B

B&R Automation Runtime ..... 601
B&R eMbedded OS Installer ..... 518
B&R Key Editor ..... 590
Battery handling ..... 581
BIOS ..... 455, 600
  QVGA ..... 480
  Summary screen ..... 456
  VGA, SVGA and XGA ..... 458
BIOS setup main menu ..... 458, 480
BIOS upgrade disk ..... 503
BIOS upgrade und utilities ..... 502
Bit ..... 600
Bit rate ..... 600
Boot loader ..... 450
Bootstrap loader ..... 614
burn-in effect ..... 582
Byte ..... 601

## C

Cache ..... 601
CAN ..... 601
CD-ROM ..... 601
CE mark ..... 601
Certifications ..... 547
CF card information ..... 494
Changing the battery ..... 580
Cleaning agents ..... 579
Cleaning the touch screen ..... 579
CMOS ..... 601
CMOS backup ..... 513
Code ..... 604
Coding ..... 604
COM ..... 601
COM interface ..... 46, 151, 357
COM1 ..... 602
COM2 ..... 602
COM3 ..... 602
CompactFlash ..... 602
  Calculating the lifespan ..... 564
  Dimensions ..... 561, 563
  General information ..... 558
  Order data ..... 558
  Technical data ..... 559, 562
CompactFlash cards ..... 562
CompactFlash slot ..... 51, 155, 361
Compatibility ID ..... 450
Controller ..... 602
CPU ..... 602
CRT ..... 602
CTS ..... 603

## D

Data buffering ..... 580
Date ..... 460
DCD ..... 603
Device ID ..... 450
Device information ..... 472, 494
Device label ..... 52, 156, 362
Dial-up ..... 603
Dimension standards ..... 32
DIMM ..... 603
Display memory effect ..... 582
Disposal ..... 31
Distribution of resources ..... 513
  DMA channel assignment ..... 514
  I/O address assignment ..... 514
  Interrupt assignment ..... 515
  RAM address assignment ..... 513
DMA ..... 603
Documentation ..... 41
DOTNET ..... 609

DRAM ..... 603
Drive configuration ..... 461, 483
DSR ..... 603
DTR ..... 603
DVD ..... 604

## E

EDID ..... 604
EDO-RAM ..... 604
EIDE ..... 604
eMbedded OS Installer ..... 518
EMC ..... 604
EPROM ..... 604
ESD ..... 28
  Electrical components with housing ..... 28
  Electrical components without housing ..... 28
  Individual components ..... 29
  Packaging ..... 28
  Proper handling ..... 28
Ethernet ..... 605
Ethernet connection ..... 49, 154, 360
Ethernet POWERLINK ..... 605
Exit without save ..... 478, 500

## F

Factory settings ..... 496
FDD ..... 605
Features ..... 44
FIFO ..... 605
Filter glass ..... 588
Firmware ..... 605
Firmware configuration ..... 474, 497
Floppy ..... 605
FPC ..... 606
FPD ..... 606
FTP ..... 606

## G

GB ..... 606
Gold foil capacitor ..... 580, 581
Grounding clip ..... 46, 151, 356

## H

Handshake ..... 606
HDD ..... 606
Holding torque ..... 166
HW layer ..... 450

## I

IDE ..... 606
Image retention ..... 582
Image sticking ..... 582
Interface ..... 606
Interface information ..... 495
IPC ..... 607
ISA ..... 607
ISO ..... 607

## J

Jumper ..... 607

## K

Keypad modules ..... 613

## L

LCD ..... 607
LED ..... 608
Lithium battery ..... 552
Load optimized defaults ..... 476, 498
Load previous values ..... 477, 499
Locking time ..... 590
LPT ..... 608

## M

MAC address ..... 450
Manual history ..... 23
MB ..... 608
MC_MEM_CNTRL1 settings ..... 489
MC_MEM_CNTRL2 settings ..... 490
MC_SYNC_TIM1 settings ..... 491
Membrane ..... 587
Memory optimization ..... 466, 488

Microprocessor ..... 608
MIPS ..... 608
Miscellaneous values ..... 495
Mkey ..... 608
Mode/Node ..... 450
Mode/Node switch ..... 48, 153, 358
Model numbers ..... 33
  Accessories ..... 38
  Power Panel with Automation Runtime .. 33
  Power Panel with BIOS ..... 37
  Software ..... 40
Modem ..... 608
Motherboard ..... 608, 609
Motherboard device configuration ... 461, 481
Mounting instructions ..... 435
Mounting orientation ..... 437
MTBF ..... 609
MTC ..... 609
MTCX ..... 609
Multitasking ..... 609

## N

Node ..... 604
Null modem cable ..... 576

## O

OEM ..... 609
Onboard AR ..... 450
OPC ..... 609
OPC server ..... 610
Operation information ..... 579
Over-temperature ..... 453

## P

Panel ..... 610
Panelware ..... 610
PC card ..... 610
PCI ..... 610
PCI configuration ..... 465, 486
PCMCIA ..... 610
Phantomkeys ..... 26
PICMG ..... 610
PnP ..... 610
POH ..... 611
POST ..... 611
Power Panel ..... 611
Power Panel 100 with Automation Runtime .. 45
Power Panel 100 with BIOS ..... 356
Power Panel 200 with Automation Runtime .. 150
Power Panel light / compact ..... 406
POWERLINK ..... 611
PP21 ..... 611
PP41 ..... 611
pre calibration ..... 447
Preventing after-image effect in LCD/TFT monitors ..... 582
Process variable ..... 611
PROFIBUS ..... 611
PV ..... 611

## Q

QVGA ..... 611

## R

RAM ..... 612
Real time ..... 604
Real-Time Capability ..... 517
Real-time clock configuration ..... 482
REMHOST ..... 509
  Configuration ..... 510
  Connection cable ..... 512
  Program end ..... 512
  Program start ..... 511
  Requirements ..... 510
Reset button ..... 50, 155, 361
Restore CMOS values ..... 475, 498
Retaining clip ..... 435
ROM ..... 612
RS232 ..... 612
RS422 ..... 612
RS485 ..... 612
RTS ..... 612
RXD ..... 613

## S


Safety notices ..... 28
Environmentally-friendly disposal ..... 31
Installation ..... 30
Intended use ..... 28
Operation ..... 30
Organization ..... 32
Policy and procedures ..... 29
Programs ..... 30
Protection against electrostatic discharges 28
Touching electrical parts ..... 30
Transport and storage ..... 29
Viruses ..... 30
Safety sticker ..... 156, 362
Save values and exit ..... 479
Save values without exit ..... 477, 499
SCADA ..... 613
SDRAM ..... 613
Sequential Function Chart ..... 613
Serial number sticker ..... 53, 157, 363
SFC ..... 613
SMC ..... 453
SMC version ..... 450
Software reset ..... 453
Special OEM features ..... 471, 493
SRAM ..... 613
Standards ..... 525
Status LEDs ..... 49, 154, 360
Summary screen ..... 449
Super I/O configuration ..... 463, 484
Supply voltage ..... 45, 150, 356
Supply voltage connectors ..... 553
Switch ..... 613
System management controller, ..... 453


## T


Task ..... 613
TCP/IP ..... 613
TFT display ..... 614
Time ..... 459
Torque ..... 160
Touch screen ..... 583, 614
Touch screen calibration ..... 447
Automation Runtime ..... 447
Visual Components ..... 447
Windows CE ..... 447
Windows XP embedded ..... 447
TXD ..... 614


## U


UART ..... 614
UDMA ..... 614
UPS ..... 614
USB ..... 614
USB configuration ..... 466, 487
USB flash drive ..... 572, 575
General information ..... 572
Order data ..... 572
Technical data ..... 573
USB port ..... 47, 152, 357
User boot logo upgrade disk ..... 507


## V


VGA ..... 615
Video and flat panel configuration ... 464, 485
Viewing angles ..... 589
Visual Components ..... 439, 615
Voltage dips ..... 453


## W


Watchdog ..... 453
Windows CE ..... 517, 615
eMbedded OS Installer ..... 518
General information ..... 517
Installation ..... 518
Real-Time Capability ..... 517
Windows XP Embedded ..... 519
General information ..... 519
Installation ..... 520


## X


XGA ..... 615
XML ..... 615