Automation PC 620 with 945GME N270 CPU board

User's Manual

Version **1.13 (March 2011)**

Model no.: **MAAPC620A-ENG**

All information contained in this manual is current as of its creation/publication. We reserve the right to change the contents of this manual without warning. The information contained herein is believed to be accurate as of the date of publication; however, Bernecker + Rainer Industrie-Elektronik Ges.m.b.H. makes no warranty, expressed or implied, with regard to the products or documentation contained within this manual. In addition, Bernecker + Rainer Industrie-Elektronik Ges.m.b.H. shall not be liable in the event of incidental or consequential damages in connection with or resulting from the furnishing, performance or use of these products. The software names, hardware names, and trademarks used in this manual are registered by the respective companies.

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 21

1. Manual history 21
2. Safety notices 22
   2.1 Intended use 22
   2.2 Protection against electrostatic discharge 22
      2.2.1 Packaging 22
      2.2.2 Guidelines for proper ESD handling 22
   2.3 Policy and procedures 23
   2.4 Transport and storage 23
   2.5 Installation 24
   2.6 Operation 24
      2.6.1 Protection against touching electrical parts 24
      2.6.2 Environmental conditions - dust, humidity, aggressive gases 24
      2.6.3 Programs, viruses, and dangerous programs 25
   2.7 Environmentally-friendly disposal 25
      2.7.1 Separation of materials 25
3. Organization of safety notices 26
4. Directives 26
5. Model numbers 27
   5.1 System units 27
   5.2 X945 CPU boards 28
   5.3 Heat sink 28
   5.4 Main memory 28
   5.5 Drives 28
   5.6 Interface options 29
   5.7 Fan kits 29
   5.8 AP Link cards 30
   5.9 Accessories 30
      5.9.1 Supply voltage connectors 30
      5.9.2 X2X and CAN plugs 30
      5.9.3 Batteries 30
      5.9.4 CompactFlash cards 30
      5.9.5 USB flash drives 31
      5.9.6 Cables 31
      5.9.7 UPS module + accessories 33
      5.9.8 PCI Ethernet cards 33
      5.9.9 Miscellaneous 33
   5.10 Software 35
6. Typical topologies 37
   6.1 APC620 embedded for central control and visualization 37
   6.2 APC620 as visualization device 38

Chapter 2: Technical data 39

1. Introduction 39
   1.1 Features 40
   1.2 Structure / configuration APC620 with 1, 2, 3 and 5 PCI slots 41

1.2.1 Selection guide - basic system 42
1.2.2 Selection guide - Optional components 43
1.3 Structure / configuration APC620 embedded 45
2. Entire device 46
2.1 APC620, 1 PCI slot variant 46
2.1.1 Interfaces 46
2.1.2 Technical data 48
2.1.3 Dimensions 51
2.2 APC620, 2 PCI slot variant 52
2.2.1 Interfaces 52
2.2.2 Technical data 54
2.2.3 Dimensions 57
2.3 APC620, 3 PCI slot variant 58
2.3.1 Interfaces 58
2.3.2 Technical data 60
2.3.3 Dimensions 62
2.4 APC620, 5 PCI slot variant 63
2.4.1 Interfaces 63
2.4.2 Technical data 65
2.4.3 Dimensions 68
2.5 APC620 embedded variant 69
2.5.1 Interfaces 69
2.5.2 Technical data 71
2.5.3 Dimensions 74
2.6 Ambient temperatures for systems with an X945 CPU board 75
2.6.1 Maximum ambient temperature 76
2.6.2 Minimum ambient temperature 77
2.6.3 How is the the maximum ambient temperature determined? 77
2.6.4 Temperature monitoring 78
2.7 Power management APC620 system unit with 1 PCI slot 79
2.7.1 Supply voltage for the 5PC600.SX01-00 revision >= I0 79
2.7.2 Power calculation with 5PC600.SX01-00 revision >= I0 80
2.7.3 Supply voltage for the 5PC600.SX01-00 revision < I0 81
2.7.4 Power calculation with 5PC600.SX01-00 revision < I0 82
2.8 Power management APC620 system units with 2 PCI slots 83
2.8.1 Supply voltage for the 5PC600.SX02-00 revision >= H0 and 5PC600.SX02-01 revision >= K0) 83
2.8.2 Power calculation with 5PC600.SX02-00 revision >= H0 84
2.8.3 Power calculation with 5PC600.SX02-01 revision >= K0 85
2.8.4 Supply voltage for the 5PC600.SX02-00 revision < H0 and 5PC600.SX02-01 revision < K0 86
2.8.5 Power calculation with 5PC600.SX02-00 revision < H0 87
2.8.6 Power calculation with 5PC600.SX02-01 revision < K0 88
2.9 Power management APC620 system unit with 3 PCI slots 89
2.9.1 5PC600.SF03-00 supply voltage 89
2.9.2 Power calculation with system unit 5PC600.SF03-00 90
2.10 Power management APC620 system units with 5 PCI slots 91

2.10.1 Supply voltage for the 5PC600.SX05-00 (revision >= H0) and 5PC600.SX05-01 (revision >= H0) 91
2.10.2 Power calculation with system unit 5PC600.SX05-00 (revision >= H0) 92
2.10.3 Power calculation with system unit 5PC600.SX05-01 (revision >= H0) 93
2.10.4 Supply voltage for the 5PC600.SX05-00 (revision < H0) and 5PC600.SX05-01 (revision <= H0) 94
2.10.5 Power calculation with system unit 5PC600.SX05-05 revision < H0 95
2.10.6 Power calculation with system unit 5PC600.SX05-01 revision < H0 97
2.11 Power management for the APC620 embedded system unit 98
2.11.1 Supply voltage for the 5PC600.SE00-00, 5PC600.SE00-01 and 5PC600.SE00-02 . 98
2.12 Humidity specifications 99
2.13 Device interfaces 100
2.13.1 Serial interface COM1 102
2.13.2 Serial interface COM2 103
2.13.3 X2X (only APC620 embedded) 104
2.13.4 CAN (only APC620 embedded) 104
2.13.5 CAN node number (only APC620 embedded) 105
2.13.6 CAN terminating switch / LED (only APC620 embedded) 105
2.13.7 Status LEDs CAN / X2X (only APC620 embedded) 106
2.13.8 POWERLINK (only APC620 embedded) 106
2.13.9 POWERLINK station number (only APC620 embedded) 108
2.13.10 Ethernet connection ETH (only APC620 embedded) 108
2.13.11 Ethernet connection ETH1 109
2.13.12 Ethernet connection ETH2 111
2.13.13 USB ports 112
2.13.14 USB connection (only APC620 embedded) 113
2.13.15 +24 VDC supply voltage 113
2.13.16 Monitor / Panel interface 117
2.13.17 MIC, Line IN and Line OUT ports 123
2.13.18 Add-on interface slot 124
2.13.19 Add-on UPS module slot 125
2.13.20 AP Link Slot 126
2.13.21 PCI slots 126
2.13.22 Status LEDs 129
2.13.23 Status LEDs Power, CF, Link (only APC620 embedded) 130
2.13.24 CompactFlash slot (CF1) 131
2.13.25 Hard disk / CompactFlash slot (HDD/CF2) 132
2.13.26 CompactFlash slots (only APC620 embedded) 134
2.13.27 Power button 135
2.13.28 Reset button 135
2.13.29 PS/2 keyboard / mouse 136
2.13.30 Battery 137
2.13.31 Hardware security key 139
2.13.32 Slide-in slot 1 drive slot 140
2.13.33 Slide-in slot 2 drive slot 141
2.14 Serial number sticker 141

2.15 Block diagram 144
2.15.1 Entire device with system unit 5PC600.SX01-00 144
2.15.2 Entire device with system unit 5PC600.SX02-00 145
2.15.3 Entire device with system unit 5PC600.SX02-01 146
2.15.4 Entire device with system unit 5PC600.SF03-00 147
2.15.5 Entire device with system unit 5PC600.SX05-00 148
2.15.6 Entire device with system unit 5PC600.SX05-01 149
2.15.7 Entire device with system unit 5PC600.SE00-00 150
2.15.8 Entire device with system unit 5PC600.SE00-01 151
2.15.9 Entire device with system unit 5PC600.SE00-02 152
3. Individual components 153
3.1 System units 153
3.1.1 APC620 with 1, 2, 3 and 5 PCI slots 153
3.1.2 APC620 embedded variations 155
3.2 X945 CPU board 158
3.2.1 Technical data 158
3.3 Heat sink 160
3.3.1 Technical data 160
3.4 Main memory 161
3.4.1 Technical data 161
3.5 Drives 162
3.5.1 Add-on hard disk 40 GB 24x7 ET - 5AC600.HDDI-05 162
3.5.2 Add-on hard disk 80 GB 24x7 ET - 5AC600.HDDI-06 165
3.5.3 Add-on CompactFlash slot - 5AC600.CFSI-00 168
3.5.4 Slide-in USB FDD - 5AC600.FDDS-00 169
3.6 RAID system 172
3.6.1 PCI SATA RAID 2 x 160 GB 24x7 ET - 5ACPCI.RAIC-03 173
3.6.2 Replacement SATA HDD 160 GB - 5ACPCI.RAIC-04 178
3.6.3 PCI SATA RAID 2 x 250 GB - 5ACPCI.RAIC-05 181
3.6.4 Replacement SATA HDD 250 GB - 5MMHDD.0250-00 185
3.7 Interface options 188
3.7.1 Add-on CAN interface - 5AC600.CANI-00 188
3.7.2 Add-on RS232/422/485 interface - 5AC600.485I-00 192
3.8 Fan kits 196
3.8.1 Fan kit 1 PCI - 5PC600.FA01-00 196
3.8.2 Fan kit 2 PCI - 5PC600.FA02-00 197
3.8.3 Fan kit 3PCI - 5PC600.FA03-00 199
3.8.4 Fan kit 5 PCI - 5PC600.FA05-00 200
3.9 AP Link cards 202
3.9.1 AP Link SDL transmitter - 5AC600.SDL0-00 202

Chapter 3: Commissioning 207

1. Installation 207
1.1 Important mounting information 207
1.2 Drilling templates 208
1.3 Mounting orientation 211

1.3.1 Standard mounting ... 211
1.3.2 Optional mounting orientations ... 213
2. Cable connections ... 217
2.1 Ethernet cable lengths for ETH1 ... 217
3. Grounding concept ... 218
4. Connection examples ... 219
4.1 Selecting the display units ... 220
4.2 One Automation Panel 900 via DVI (onboard) ... 221
4.2.1 Basic system requirements ... 221
4.2.2 Link modules ... 221
4.2.3 Cables ... 222
4.2.4 Possible Automation Panel units, resolutions und segment lengths ... 222
4.2.5 BIOS settings ... 222
4.2.6 Windows graphics driver settings ... 223
4.2.7 Windows touch screen driver settings ... 223
4.3 An Automation Panel 900 via SDL (onboard) ... 224
4.3.1 Basic system requirements ... 224
4.3.2 Link modules ... 224
4.3.3 Cables ... 224
4.3.4 BIOS settings ... 227
4.3.5 Windows graphics driver settings ... 227
4.3.6 Windows touch screen driver settings ... 227
4.4 An Automation Panel 800 via SDL (onboard) ... 228
4.4.1 Basic system requirements ... 228
4.4.2 Cables ... 228
4.4.3 BIOS settings ... 230
4.4.4 Windows graphics driver settings ... 230
4.4.5 Windows touch screen driver settings ... 230
4.5 An AP900 and an AP800 via SDL (onboard) ... 231
4.5.1 Basic system requirements ... 231
4.5.2 Cables ... 231
4.5.3 BIOS settings ... 233
4.5.4 Windows graphics driver settings ... 233
4.5.5 Windows touch screen driver settings ... 233
4.6 Four Automation Panel 900 units via SDL (onboard) ... 234
4.6.1 Basic system requirements ... 234
4.6.2 Link modules ... 235
4.6.3 Cables ... 235
4.6.4 BIOS settings ... 237
4.6.5 Windows graphics driver settings ... 237
4.6.6 Windows touch screen driver settings ... 237
4.7 One Automation Panel 900 unit via SDL (AP Link) ... 238
4.7.1 Basic system requirements ... 238
4.7.2 Link modules ... 238
4.7.3 Cables ... 238
4.7.4 BIOS settings ... 241
4.7.5 Windows graphics driver settings ... 241

4.7.6 Windows touch screen driver settings 241
4.8 Four Automation Panel 900 units via SDL (AP Link) 242
4.8.1 Basic system requirements 242
4.8.2 Link modules 243
4.8.3 Cables 243
4.8.4 BIOS settings 245
4.8.5 Windows graphics driver settings 245
4.8.6 Windows touch screen driver settings 245
4.9 Four Automation Panel 900 units via SDL (AP Link) and RGB (onboard) 246
4.9.1 Basic system requirements 247
4.9.2 Link modules 247
4.9.3 Cables 247
4.9.4 BIOS settings 250
4.9.5 Windows graphics driver settings 250
4.9.6 Windows touch screen driver settings 250
4.10 Three AP900 units and one AP800 via SDL (AP Link) and RGB (onboard) 251
4.10.1 Basic system requirements 252
4.10.2 Link modules 252
4.10.3 Cables 252
4.10.4 BIOS settings 254
4.10.5 Windows graphics driver settings 254
4.10.6 Windows touch screen driver settings 254
4.11 Internal numbering of extension units in AP800 devices 255
5. Configuration of a SATA RAID array 256
5.1 Create RAID set 257
5.1.1 Create RAID set - Striped 258
5.1.2 Create RAID set - Mirrored 259
5.2 Delete RAID set 260
5.3 Rebuild mirrored set 261
5.4 Resolve conflicts 262
5.5 Low level format 263
6. Connection of USB peripheral devices 264
6.1 Local on the APC620 264
6.2 Remote connection to Automation Panel 900 via DVI 265
6.3 Remote connection to Automation Panel 800/900 via SDL 266
7. Known problems / issues 267

Chapter 4: Software 269

1. BIOS options 269
1.1 General information 269
1.2 BIOS setup and boot procedure 269
1.2.1 BIOS setup keys 270
1.3 Main 272
1.4 Advanced 273
1.4.1 ACPI configuration 274
1.4.2 PCI Configuration 276

1.4.3 Graphics configuration 280
1.4.4 CPU configuration 282
1.4.5 Chipset configuration 284
1.4.6 I/O interface configuration 286
1.4.7 Clock Configuration 287
1.4.8 IDE Configuration 288
1.4.9 USB configuration 294
1.4.10 Keyboard/mouse configuration 296
1.4.11 Remote access configuration 297
1.4.12 CPU board monitor 299
1.4.13 Main Board/Panel Features 300
1.5 Boot 305
1.6 Security 307
1.6.1 Hard disk security user password 308
1.6.2 Hard disk security master password 309
1.7 Power 310
1.8 Exit 312
1.9 BIOS default settings 312
1.9.1 Main 314
1.9.2 Advanced 314
1.9.3 Boot 321
1.9.4 Security 322
1.9.5 Power 322
1.10 BIOS Error signals (beep codes) 324
1.10.1 BIOS X945 324
1.11 Distribution of resources 325
1.11.1 RAM address assignment 325
1.11.2 DMA channel assignment 325
1.11.3 I/O address assignment 326
1.11.4 Interrupt assignments in PCI mode 327
1.11.5 Interrupt assignments in APIC mode 328
1.11.6 Inter-IC (I^2C) bus 330
1.11.7 System Management (SM) bus 330
2. Upgrade information 331
2.1 BIOS upgrade 331
2.1.1 What information do I need? 331
2.1.2 Upgrade BIOS for X945 334
2.1.3 Windows XP Embedded and BIOS upgrade 335
2.2 Upgrading the firmware 336
2.2.1 Procedure 336
2.2.2 Possible upgrade problems and version dependencies 339
2.3 Creating an MS-DOS boot diskette in Windows XP 341
2.4 Creating a bootable USB flash drive for B&R upgrade files 342
2.4.1 Requirements 343
2.4.2 Procedure 343
2.4.3 Where do I get MS-DOS? 344
2.5 Creating a bootable CompactFlash card for B&R upgrade files 345

2.5.1 Requirements 345
2.5.2 Procedure 345
2.5.3 Where do I get MS-DOS? 346
2.6 Upgrade problems 346
3. Location of the DIP switch in APC620 system units 347
4. Automation PC 620 with Automation Runtime 348
4.1 General information 348
4.2 Support for Automation PC 620 embedded 348
4.2.1 ARwin 348
4.2.2 ARemb 348
4.3 Support for the Automation PC 620 with 5PC600.X945-00 CPU board 348
4.3.1 ARwin 348
4.3.2 ARemb 348
4.4 Selection of devices 349
4.5 Visual Components graphic engine support 349
5. Automation PC 620 with MS-DOS 350
5.1 Known problems 350
6. Automation PC 620 with Windows XP Professional 352
6.1 Installation 352
6.1.1 FAQ 353
6.2 Graphics drivers 354
6.2.1 Installing the graphics driver for X945 CPU boards 354
6.2.2 Graphics settings for Extended Desktop 355
6.2.3 Graphics settings for Dual Display Clone 357
6.3 Touch screen driver 359
6.3.1 Installation for Extended Desktop 359
6.3.2 Installation for Dual Display Clone 361
6.3.3 FAQ 363
6.4 Audio driver 363
6.4.1 Installation 363
6.5 Network driver 364
6.5.1 Installation ETH1 364
6.5.2 Installation ETH2 364
6.6 Automation PC 620 embedded 364
7. Automation PC 620 with Windows 7 365
7.1 Installation 365
7.1.1 Installation on PCI SATA RAID controller - 5ACPCI.RAIC-03, 5ACPCI.RAIC-05 365
7.2 Drivers 366
7.3 Special considerations, limitations: 366
8. Automation PC 620 with Windows XP Embedded 367
8.1 General information 367
8.2 Features with FP2007 (Feature Pack 2007) 367
8.3 Installation 368
8.4 Graphics drivers 368
8.5 Touch screen driver 368
8.6 Audio driver 369
8.6.1 After a BIOS upgrade 369

8.7 Network driver ... 369
8.8 FAQ ... 369
8.8.1 Why does the B&R device restart when shutdown? ... 369
9. Automation PC 620 with Windows Embedded Standard 2009 ... 370
9.1 General information ... 370
9.2 Features with WES2009 (Windows Embedded Standard 2009) ... 371
9.3 Installation ... 372
9.4 Drivers ... 372
9.4.1 Touch screen driver ... 372
10. Automation PC 620 with Windows Embedded Standard 7 ... 373
10.1 General information ... 373
10.2 Features with WES7 (Windows Embedded Standard 7) ... 374
10.3 Installation ... 375
10.4 Drivers ... 375
10.4.1 Touch screen driver ... 375
11. Automation PC 620 with Windows CE ... 376
11.1 General information ... 376
11.2 Windows CE 6.0 features ... 376
11.3 Requirements ... 377
11.4 Installation ... 377
11.4.1 B&R Embedded OS Installer ... 377
12. B&R Automation Device Interface (ADI) driver - Control Center ... 378
12.1 Features ... 379
12.2 Installation ... 380
12.3 SDL Equalizer setting ... 381
12.4 UPS configuration ... 381
12.4.1 Installing the UPS service for the B&R APC add-on UPS ... 382
12.4.2 Displaying UPS status values ... 383
12.4.3 Changing UPS battery settings ... 384
12.4.4 Updating UPS battery settings ... 385
12.4.5 Saving UPS battery settings ... 387
12.4.6 Configuring UPS system settings ... 387
12.4.7 Changing additional UPS settings ... 389
12.4.8 Procedure following power failure ... 391

Chapter 5: Standards and certifications ... 393

1. Applicable European directives ... 393
2. Overview of standards ... 393
3. Emission requirements ... 395
3.1 Network-related emissions ... 396
3.2 Emissions, electromagnetic emissions ... 397
4. Requirements for immunity to disturbances ... 398
4.1 Electrostatic discharge (ESD) ... 399
4.2 High-frequency electromagnetic fields (HF field) ... 399
4.3 High-speed transient electrical disturbances (burst) ... 400
4.4 Surges ... 400

4.5 Conducted disturbances 400
4.6 Magnetic fields with electrical frequencies 401
4.7 Voltage dips, fluctuations and short-term interruptions 402
4.8 Damped vibration 402
5. Mechanical conditions 403
5.1 Vibration operation 403
5.2 Vibration during transport (packaged) 404
5.3 Shock during operation 404
5.4 Shock during transport (packaged) 404
5.5 Toppling 404
5.6 Free fall (packaged) 405
6. Climate conditions 406
6.1 Worst case operation 406
6.2 Dry heat 406
6.3 Dry cold 406
6.4 Large temperature fluctuations 407
6.5 Temperature fluctuations in operation 407
6.6 Humid heat, cyclic 407
6.7 Humid heat, constant (storage) 407
7. Safety 408
7.1 Ground resistance 409
7.2 Insulation resistance 409
7.3 High voltage 410
7.4 Residual voltage 410
7.5 Leakage current 410
7.6 Overload 411
7.7 Defective component 411
7.8 Voltage range 411
8. Other tests 412
8.1 Protection 412
8.2 Degree of pollution 412
9. SDL flex cable - test description 413
9.1 Torsion 413
9.1.1 Test structure 413
9.1.2 Test conditions 413
9.1.3 Individual tests 413
9.2 Cable drag chain 414
9.2.1 Test structure 414
9.2.2 Test conditions 414
9.2.3 Individual tests: 414
10. International certifications 415

Chapter 6: Accessories 417

1. Overview 417
2. Supply voltage connector (TB103 3-pin) 421
2.1 General information 421

2.2 Order data 421
2.3 Technical data 421
3. X2X and CAN plugs (4-pin) 423
3.1 General information 423
3.2 Order data 423
3.3 Technical data 423
4. Replacement CMOS batteries 424
4.1 Order data 424
4.2 Technical data 424
5. Interface covers 5AC600.ICOV-00 426
5.1 Order data 426
5.2 Contents of delivery 426
6. DVI - monitor adapter 5AC900.1000-00 427
6.1 Order data 427
7. CompactFlash cards 5CFCRD.xxxx-04 428
7.1 General information 428
7.2 Order data 428
7.3 Technical data 429
7.3.1 Temperature humidity diagram 431
7.4 Dimensions 431
7.5 Benchmark 432
8. CompactFlash cards - 5CFCRD.xxxx-03 433
8.1 General information 433
8.2 Order data 433
8.3 Technical data 434
8.3.1 Temperature humidity diagram 436
8.4 Dimensions 436
9. USB Media Drive - 5MD900.USB2-01 437
9.1 Features 437
9.2 Technical data 438
9.3 Dimensions 440
9.4 Dimensions with front cover 441
9.5 Contents of delivery 441
9.6 Interfaces 441
9.7 Installation 442
9.7.1 Mounting orientation 442
9.8 Front cover 5A5003.03 for the USB Media Drive 442
9.8.1 Technical data 442
9.8.2 Dimensions 443
9.8.3 Installation 443
10. USB flash drive 444
10.1 General information 444
10.2 Order data 444
10.3 Technical data - 5MMUSB.2048-00 445
10.3.1 Temperature humidity diagram 446
10.4 Technical data - 5MMUSB.2048-01 447
10.4.1 Temperature humidity diagram 448

11. HMI Drivers & Utilities DVD 5SWHMI.0000-00 449
12. Cables 452
12.1 APC620 internal supply cable 5CAMSC.0001-00 452
12.1.1 Order data 452
12.1.2 Technical data 452
12.2 DVI cable 5CADVI.0xxx-00 453
12.2.1 Order data 453
12.2.2 Technical data 454
12.2.3 Flex radius specification 454
12.2.4 Cable specifications 455
12.3 SDL cable 5CASDL.0xxx-00 456
12.3.1 Order data 456
12.3.2 Technical data 457
12.3.3 Flex radius specification 457
12.3.4 Cable specifications 458
12.4 SDL cable with 45° plug 5CASDL.0xxx-01 459
12.4.1 Order data 459
12.4.2 Technical data 460
12.4.3 Flex radius specification 460
12.4.4 Cable specifications 461
12.5 SDL flex cable 5CASDL.0xxx-03 462
12.5.1 Order data 462
12.5.2 Technical data 463
12.5.3 Flex radius specification 464
12.5.4 Dimensions 464
12.5.5 Construction 465
12.5.6 Cable specifications 466
12.6 SDL flex cable with extender 5CASDL.0x00-13 467
12.6.1 Order data 467
12.6.2 Technical data 468
12.6.3 Flex radius specification 469
12.6.4 Dimensions 469
12.6.5 Cable connection 470
12.6.6 Cable specifications 471
12.7 RS232 cable 9A0014-xx 472
12.7.1 Order data 472
12.7.2 Technical data 472
12.7.3 Cable specifications 473
12.8 USB cable 5CAUSB.00xx-00 474
12.8.1 Order data 474
12.8.2 Technical data 474
12.8.3 Cable specifications 475
13. Uninterruptible power supply 476
13.1 Order data 477
13.2 Features 477
13.3 Requirements 477
13.4 Individual components 480

13.4.1 Add-on UPS module 5AC600.UPSI-00 480
13.4.2 Battery unit 5AC600.UPSB-00 482
13.4.3 UPS connection cable 486
14. External UPS 487
14.1 General information 487
14.2 Order data 488
15. PCI Ethernet cards 489
15.1 PCI Ethernet card 10/100 - 5ACPCI.ETH1-01 489
15.1.1 Technical data 489
15.1.2 Driver support 490
15.1.3 Dimensions 490
15.2 PCI Ethernet card 10/100 - 5ACPCI.ETH3-01 491
15.2.1 Technical data 491
15.2.2 Driver support 492
15.2.3 Dimensions 492
16. Replacement fan 493
17. SRAM module - 5AC600.SRAM-00 494
17.1 Technical data 494
17.2 Driver support 495
17.3 Installation 496
18. Power supplies 497
18.1 Model numbers and brief technical overview 498
18.1.1 Single-phase power supplies 498
18.1.2 Three-phase power supplies 498

Chapter 7: Maintenance / Servicing 499

1. Changing the battery 499
1.1 Battery status evaluation 500
1.2 Procedure 500
2. Fan kit installation and replacement 502
2.1 Procedure for APC620 with 1 PCI slot 502
2.2 Procedure for APC620 with 2 PCI slot 505
2.3 Procedure for APC620 with 3 PCI slot 508
2.4 Procedure for APC620 with 5 PCI slot 512
3. Slide-in drive - installation and exchange 517
3.1 Installation procedure 517
3.2 Exchange procedure 518
4. Installing the UPS module 520
4.1 Automation PC 620 without add-on interface module 520
4.1.1 APC620, 1 PCI slot 520
4.1.2 APC620, 2 PCI slot 523
4.1.3 APC620, 5 PCI slot 526
4.2 Automation PC 620 with add-on interface module 529
4.2.1 APC620, 1 PCI slot 529
4.2.2 APC620, 2 PCI slot 531
4.2.3 APC620, 5 PCI slot 534

5. Mounting the side cover 537
5.1 APC620 with 1 PCI slot 537
5.2 APC620 with 2 PCI slot 538
5.3 APC620 with 3 PCI slot 539
5.4 APC620 with 5 PCI slot 540
6. Exchanging a PCI SATA RAID hard disk 541
7. Replacing the front cover 543
7.1 Variation A - Front cover screwed-in 543
7.2 Variation B - Front cover attached without screws 545

Appendix A 547
1. Temperature sensor locations 547
2. Connection of an external device to the main board 548
3. Maintenance Controller Extended (MTCX) 549
3.1 SDL timing 550
3.2 Temperature monitoring - Fan control 552
4. B&R Key Editor information 553
5. B&R Automation Device Interface (ADI) development kit 555
6. Glossary 557

Chapter 1 • General information

Information:

B&R works hard 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
1.00	2009-10-07	- First version
1.05	2009-12-10	- Information in section 7 "Known problems / issues", on page 267 expanded. - Section 12 "Cables", on page 452 corrected. - 16 GB B&R CompactFlash 5CFCRD.016G-04 added. - Section 1 "Temperature sensor locations", on page 547 corrected.
1.10	2010-08-25	- Chapter 5 "Standards and certifications", on page 393 updated. - Section 9 "Automation PC 620 with Windows Embedded Standard 2009", on page 370 added - Section 12 "B&R Automation Device Interface (ADI) driver - Control Center", on page 378 updated. - B&R ID codes for system units added. - Technical data "Remanent variables for AR (Automation Runtime) in Power Fail Mode" added for the APC620 embedded system units and for the SRAM module 5AC600.SRAM-00. - The section "Creating a bootable USB flash drive" removed. - B&R USB flash drive added to the chapter 6 "Accessories" on page 447. - Section 2 "Upgrade information", on page 331 updated. - BIOS updated to V1.13.
1.11	2011-01-27	- The name "AR010" was changed to "ARwin". - The name "AR106" was changed to "ARemb".
1.12	2011-02-09	- BIOS updated to version 1.14. - "PCI SATA RAID 2 x 250 GB - 5ACPCI.RAIC-05", on page 181 updated. - "Replacement SATA HDD 250 GB - 5MMHDD.0250-00", on page 185 updated. - "Automation PC 620 with Windows 7", on page 365 updated. - "Automation PC 620 with Windows Embedded Standard 7", on page 373 updated.
1.13	2011-03-03	- The Windows Embedded Standard 7 Model number 5SWWI7.0730-ENG was corrected to 5SWWI.0730-MUL - Technical data from the system unit 5PC600.SE00-01 was changed - the Monitor / Panel plug connection is a DVI-A plug.

Table 1: Manual history

2. Safety notices

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 discharge

Electrical components that can be damaged by 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 connector contacts on connected cables.
- Do not touch the contact tips on the circuit boards.

Electrical components without housing

The following is valid in addition to "Electrical components with housing"

- 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 never completely 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 familiar with transport, mounting, installation, commissioning, and operation of the product who also have the respective qualifications (e.g. IEC 60364). National accident prevention guidelines must be followed.
The safety notices, connection descriptions (type plate and documentation) and limit values listed in the technical data are to be read carefully before installation and commissioning and must be observed.

2.4 Transport and storage

During transport and storage, devices must be protected against impermissible stress (mechanical loads, 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 by qualified personnel without voltage applied.
- 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 or uninterruptible power supplies, certain components must carry dangerous voltage levels of over 42 VDC. Touching one of these parts can result in a life-threatening electric shock. This could lead to death, severe injury or damage to equipment.

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, all parts that carry voltage must be securely covered. During operation, all covers must remain closed.

2.6.2 Environmental conditions - dust, humidity, aggressive gases

Use of operating and monitoring devices (e.g. industrial PCs, power panels, mobile panels, etc.) and uninterruptible power supplies in very dusty environments should be avoided. Dust collection on the devices influences their function and, especially in systems with active cooling (fans), sufficient cooling cannot be guaranteed.

The presence of aggressive gases in the environment can also lead to malfunctions. When combined with high temperature and humidity, aggressive gases - e.g. with sulfur, nitrogen and chlorine components - start chemical processes that can damage electronic components very quickly. Signs of the presence of aggressive gases are blackened copper surfaces and cable ends on existing installations.

For operation in dusty or humid conditions, correctly installed (cutout installation) operating and monitoring devices like Automation Panel or Power Panel are protected on the front side. 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 Operating and monitoring devices Uninterruptible power supply 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.

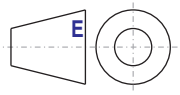
3. Organization of safety notices

The safety notices in this manual are organized as follows:

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

Table 3: Organization of safety notices

4. Directives



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

5. Model numbers

5.1 System units

Model number	Short description	Note
5PC600.SX01-00	**System 1 PCI** APC620 system unit 1 half size PCI slot, connection for 2 x RS232, 2 x USB 2.0, Short Display Link, 2 x ETH 10/100, AC97 sound, PS/2 keyboard/mouse; UPS module[1)]; 24 VDC (order 0TB103.9 screw clamp or 0TB103.91 cage clamp terminals separately).	See page 46
5PC600.SX02-00	**System 2 PCI, 1 disk drive slot, 1 AP Link slot** APC620 system unit 2 half size PCI slots, 1 drive slot, 1 slot for Automation Panel link transmitter; connections for 2 x RS232, 2 x USB 2.0, Short Display Link, 2 x ETH 10/100, AC97 sound, PS/2 keyboard/mouse, UPS module[2)]; 24 VDC (order 0TB103.9 screw clamp or 0TB103.91 cage clamp terminals separately).	See page 52
5PC600.SX02-01	**System 2 PCI, 1 disk drive slot** APC620 system unit 2 half size PCI slots, 1 drive slot; connections for 2 x RS232, 2 x USB 2.0, Short Display Link, 2 x ETH 10/100, AC97 sound, PS/2 keyboard/mouse, UPS module[1)]; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp sold separately).	See page 52
5PC600.SF03-00	**System 3 PCI, 1 disk drive, 1 AP Link slot** APC620 system unit, 3 full-size PCI slots; 1 slot for Automation Panel link transmitter; 1 drive slot; Smart Display Link / DVI / monitor, connections for 2 x RS232, 2 x USB 2.0, 2 x ETH 10/100, AC97 sound, PS/2 keyboard/mouse; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp sold separately).	See page 58
5PC600.SX05-00	**System 5 PCI, 2 disk drive slots, 1 AP Link slot** APC620 system unit 5 half size PCI slots, 2 drive slot; 1 slot for Automation Panel Link Transmitter; connections for 2 x RS232, 2 x USB 2.0, Short Display Link, 2 x ETH 10/100, AC97 sound, PS/2 keyboard/mouse, UPS module[3)]; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp sold separately).	See page 63
5PC600.SX05-01	**System 5 PCI, 2 disk drive slots** APC620 system unit 5 half size PCI slots, 2 drive slots; connections for 2 x RS232, 2 x USB 2.0, Short Display Link, 2 x ETH 10/100, AC97 sound, PS/2 keyboard/mouse, UPS module[3)]; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp sold separately).	See page 63
5PC600.SE00-00	**APC620e System SDL EPL X2X CAN 512kB** APC620 embedded system unit, connections for 2x RS232, 4x USB 2.0, Smart Display Link, 1x ETH 10/100, 1x POWERLINK, 1x CAN, 1x X2X, UPS module, 512kB SRAM; (0TB103.9 screw clamp or 0TB103.91 cage clamp sold separately).	See page 69
5PC600.SE00-01	**APC620e System CRT EPL X2X CAN 512KB** APC620 embedded system unit, connections for 2x RS232, 4x USB 2.0, CRT, 1x ETH 10/100, 1x POWERLINK, 1x CAN, 1x X2X, UPS module, 512kB SRAM; (0TB103.9 screw clamp or 0TB103.91 cage clamp sold separately).	See page 69
5PC600.SE00-02	**APC620e System SDL EPL X2X CAN 1MB** APC620 embedded system unit, connections for 2x RS232, 4x USB 2.0, Smart Display Link, 1x ETH 10/100, 1x POWERLINK, 1x CAN, 1x X2X, UPS module, 1MB SRAM; (0TB103.9 screw clamp or 0TB103.91 cage clamp sold separately).	See page 69

Table 4: Model numbers - system units

1) Slot only available on system units with revision H0 or later.
2) Slot only available on system units with revision G0 or later.
3) Slot only available on system units with revision F0 or later.

5.2 X945 CPU boards

Model number	Short description	Note
5PC600.X945-00	**X945 CPU board** CPU board Intel Atom, 1600 MHz, 533 MHz FSB, 512 KB L2 cache; chipset 945GME; 1 socket for an SO-DIMM DDR2 RAM module.	See page 158

Table 5: Model numbers - X945 CPU boards

5.3 Heat sink

Model number	Short description	Note
5AC600.HS01-03	**APC620 heat sink X945 12.8 mm** For APC620 system units with X945 CPU boards.	See page 160
5AC600.HS02-03	**APC620f heat sink X945 12.8 mm** For APC620 full-size system units with X945 CPU boards.	See page 160
5AC600.HS03-02	**APC620e heat sink X945 12.8 mm** For APC620 embedded system units with X945 CPU boards.	See page 160

Table 6: Model numbers - Heat sinks

5.4 Main memory

Model number	Short description	Note
5MMDDR.0512-01	**SO-DIMM DDR2 512MB PC2-5300**	See page 161
5MMDDR.1024-01	**SO-DIMM DDR2 1024MB PC2-5300**	See page 161
5MMDDR.2048-01	**SO-DIMM DDR2 2048MB PC2-5300**	See page 161

Table 7: Model numbers - Main memory

5.5 Drives

Model number	Short description	Note
5AC600.HDDI-05	**Add-on hard disk 40 GB, 24x7, ET** 40 GB hard disk (add-on); Suitable for 24 hour operation (24x7) as well as for operation in the extended temperature range (ET). For installation in an APC620 or PPC700.	See page 162
5AC600.HDDI-06	**Add-on hard disk 80 GB, 24x7, ET** 80 GB hard disk (add-on); Suitable for 24 hour operation (24x7) as well as for operation in the extended temperature range (ET). For installation in an APC620 or PPC700.	See page 165
5AC600.CFSI-00	**Add-on CompactFlash slot** CompactFlash slot (add-on); for installation in an APC620 or PPC700.	See page 168
5AC600.FDDS-00	**Slide-in USB floppy disk drive** FDD drive (slide-in); for operation in a slide-in drive slot in an APC620 or PPC700 system.	See page 169
5ACPCI.RAIC-03	**PCI SATA RAID system 2 x 160 GB 24x7, ET** PCI Raid controller + 2 x 160 GB SATA hard disk; Suitable for 24 hour operation (24x7) as well as for operation in the extended temperature range (ET). Requires a free PCI slot.	See page 173

Table 8: Model numbers - Drives

Model number	Short description	Note
5ACPCI.RAIC-04	**Replacement SATA-HDD 160 GB** 1 piece Hard disk 160 GB SATA, replacement part for 5ACPCI.RAIC-03	See page 178
5ACPCI.RAIC-05	**PCI RAID system SATA 2x250GB (M5400.6)** PCI RAID controller + 2 x 250 GB SATA hard disks; requires a free PCI slot.	See page 181
5MMHDD.0250-00	**Replacement SATA-HDD 250GB (M5400.6)** Hard disk 250 GB SATA, replacement part for 5ACPCI.RAIC-03 and 5ACPCI.RAIC-05.	See page 185

Table 8: Model numbers - Drives (Forts.)

5.6 Interface options

Model number	Short description	Note
5AC600.CANI-00	**Add-on CAN interface** CAN interface for installation in an APC620 or PPC700.	See page 188
5AC600.485I-00	**Add-on RS232/422/485 interface** Add-on RS232/422/485 interface for installation in an APC620 and PPC700.	See page 192

Table 9: Model numbers - Interfaces

5.7 Fan kits

Model number	Short description	Note
5PC600.FA01-00	**Fan kit 1PCI** APC620 fan kit, for system units with 1 PCI slot.	See page 196
5PC600.FA02-00	**Fan kit 2PCI** APC620 fan kit + filter clasp for system units with 2 PCI slots.	See page 197
5PC600.FA03-00	**Fan kit 3PCI** APC620 fan kit + filter clasp for system units with 3 PCI slots.	See page 199
5PC600.FA05-00	**Fan kit 5PCI** APC620 fan kit + filter clasp for system units with 5 PCI slots.	See page 200

Table 10: Model numbers - Fan kits

5.8 AP Link cards

Model number	Short description	Note
5AC600.SDL0-00	**AP Link SDL transmitter** APC620 Smart Display Link Transmitter, to connect an Automation Panel via SDL to an APC620.	See page 202

Table 11: Model numbers - AP Link graphics adapter

5.9 Accessories

5.9.1 Supply voltage connectors

Model number	Short description	Note
0TB103.9	**Plug 24V 5.08 3-pin screw clamp** 24 VDC 3-pin connector, female. Screw clamp, 3.31mm²; protected against vibration by the screw flange.	See page 421
0TB103.91	**Plug 24V 5.08 3-pin cage clamp** 24 VDC 3-pin connector, female. cage clamps, 3.31mm²; protected against vibration by the screw flange.	See page 421

Table 12: Model numbers - Supply voltage connectors

5.9.2 X2X and CAN plugs

Model number	Short description	Note
0TB704.9	**Terminal block, 4-pin,** Screw clamp, 1.5 mm²	See page 423
0TB704.91	**Terminal block, 4-pin,** cage clamps, 2.5 mm²	See page 423

Table 13: Model numbers - X2X and CAN plug

5.9.3 Batteries

Model number	Short description	Note
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	See page 424
4A0006.00-000	**Lithium battery, 1 pc.** Lithium batteries, 1 pcs., 3 V / 950 mAh, button cell	See page 424

Table 14: Model numbers - Batteries

5.9.4 CompactFlash cards

Model number	Short description	Note
5CFCRD.0512-04	**CompactFlash 512 MB B&R** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 428

Table 15: Model numbers - CompactFlash cards

Model number	Short description	Note
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 428
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 428
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 428
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 428
5CFCRD.016G-04	**CompactFlash 16 GB B&R** CompactFlash card with 16 GB SLC NAND flash, and IDE/ATA interface	See page 428
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	See page 433
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	See page 433
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	See page 433
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 433
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 433
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 433
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 433
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 433

Table 15: Model numbers - CompactFlash cards (Forts.)

5.9.5 USB flash drives

Model number	Short description	Note
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	See page 445
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	See page 447

Table 16: Model numbers - USB flash drives

5.9.6 Cables

Model number	Description	Note
5CADVI.0018-00	**DVI-D cable 1.8 m** Single cable, DVI-D/m:DVI-D/m; length: 1.8 m	See page 453
5CADVI.0050-00	**DVI-D cable 5 m** Single cable, DVI-D/m:DVI-D/m; length: 5 m	See page 453

Table 17: Model numbers - Cables

Model number	Description	Note
5CADVI.0100-00	**DVI-D cable 10 m** Single cable, DVI-D/m:DVI-D/m; length: 10 m	See page 453
5CAMSC.0001-00	**APC620 internal supply cable**	See page 452
5CASDL.0018-00	**SDL cable 1.8 m** SDL cable for a fixed type of layout; length: 1.8 m	See page 456
5CASDL.0018-01	**SDL cable 1.8 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 1.8 m	See page 459
5CASDL.0018-03	**SDL flex cable 1.8 m** SDL cable for fixed and flexible type of layout; length: 1.8 m	See page 462
5CASDL.0050-00	**SDL cable 5 m** SDL cable for a fixed type of layout; length: 5 m	See page 456
5CASDL.0050-01	**SDL cable 5 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 5 m	See page 459
5CASDL.0050-03	**SDL flex cable 5 m** SDL cable for fixed and flexible type of layout; length: 5 m	See page 462
5CASDL.0100-00	**SDL cable 10 m** SDL cable for a fixed type of layout; length: 10 m	See page 456
5CASDL.0100-01	**SDL cable 10 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 10 m	See page 459
5CASDL.0100-03	**SDL flex cable 10 m** SDL cable for fixed and flexible type of layout; length: 10 m	See page 462
5CASDL.0150-00	**SDL cable 15 m** SDL cable for a fixed type of layout; length: 15 m	See page 456
5CASDL.0150-01	**SDL cable 15 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 15 m	See page 459
5CASDL.0150-03	**SDL flex cable 15 m** SDL cable for fixed and flexible type of layout; length: 15 m	See page 462
5CASDL.0200-00	**SDL cable 20 m** SDL cable for a fixed type of layout; length: 20 m	See page 456
5CASDL.0200-03	**SDL flex cable 20 m** SDL cable for fixed and flexible type of layout; length: 20 m	See page 462
5CASDL.0250-00	**SDL cable 25 m** SDL cable for a fixed type of layout; length: 25 m	See page 456
5CASDL.0250-03	**SDL flex cable 25 m** SDL cable for fixed and flexible type of layout; length: 25 m	See page 462
5CASDL.0300-00	**SDL cable 30 m** SDL cable for a fixed type of layout; length: 30 m	See page 456
5CASDL.0300-03	**SDL flex cable 30 m** SDL cable for fixed and flexible type of layout; length: 30 m	See page 462
5CASDL.0300-13	**SDL flex cable with extender 30 m** SDL cable with extender for fixed and flexible type of layout; length: 30 m	See page 467
5CASDL.0400-13	**SDL flex cable with extender 40 m** SDL cable with extender for fixed and flexible type of layout; length: 40 m	See page 467
5CAUSB.0018-00	**USB 2.0 cable, A/m:B/m 1.8 m** USB 2.0 connection cable; plug type A - type B; length 1.8 m	See page 474

Table 17: Model numbers - Cables (Forts.)

Model number	Description	Note
5CAUSB.0050-00	**USB 2.0 cable, A/m:B/m 5 m** USB 2.0 connection cable; plug type A - type B; length 5 m	See page 474
9A0014.02	**RS232 cable DB9/f:DB9/m 1.8 m** RS232 extension cable for remote operation of a display unit with touch screen, length 1.8 m.	See page 472
9A0014.05	**RS232 cable DB9/f:DB9/m 5 m** RS232 extension cable for remote operation of a display unit with touch screen, length 5 m.	See page 472
9A0014.10	**RS232 cable DB9/f:DB9/m 10 m** RS232 extension cable for remote operation of a display unit with touch screen, length 10 m.	See page 472

Table 17: Model numbers - Cables (Forts.)

5.9.7 UPS module + accessories

Model number	Short description	Note
5AC600.UPSI-00	**Add-on UPS module** UPS module for APC620 / APC810 system units 5PC600.SX01-00 (starting with Rev. H0), 5PC600.SX02-00 (starting with Rev. G0), 5PC600.SX02-01 (starting with Rev. H0), 5PC600.SX05-00 (starting with Rev. F0), 5PC600.SX05-01 (starting with Rev. F0), 5PC600.SF03-00 (starting with Rev. A0), 5PC600.SE00-00 (starting with Rev. A0), 5PC600.SE00-01 (starting with Rev. A0), 5PC600.SE00-02 (starting with Rev. A0), 5PC810.SX*. Order cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	See page 480
5AC600.UPSB-00	**Battery unit 5 Ah** UPS battery unit for the add-on UPS module	See page 482
5CAUPS.0005-00	**APC620 UPS cable 0.5 m** Connection cable between add-on UPS module and UPS battery unit, length 0.5 meters	See page 486
5CAUPS.0030-00	**APC620 UPS cable 3 m** Connection cable between add-on UPS module and UPS battery unit, length 3 meters	See page 486

Table 18: Model numbers - UPS module + accessories

5.9.8 PCI Ethernet cards

Model number	Short description	Note
5ACPCI.ETH1-01	**PCI Ethernet card 10/100** half size PCI Ethernet card, 1 Ethernet connection	See page 489
5ACPCI.ETH3-01	**PCI Ethernet card 10/100 3port** half size PCI Ethernet card, 3 Ethernet connections	See page 491

Table 19: Model numbers - PCI Ethernet cards

5.9.9 Miscellaneous

Model number	Short description	Note
5A5003.03	**Front cover** Front cover for the USB 2.0 Media Drive 5MD900.USB2-00.	See page 441
5AC600.ICOV-00	**Interface covers** Interface covers for APC620 and PPC700 devices; 5 pieces	See page 426

Table 20: Model numbers - Other items

Model number	Short description	Note
5AC900.1000-00	**Adapter DVI-A/m to CRT DB15HD/f** Adapter DVI (plug) to CRT (socket), for connecting a standard monitor DVI-I interface.	See page 427
5AC600.SRAM-00	**APC620/PPC700 SRAM module 512kB** SRAM module for APC620 and PPC700 512 KB.	See page 494
5MD900.USB2-01	**USB 2.0 drive DVD-RW/CD-RW FDD CF USB** USB 2.0 drive combination, consists of DVD-R/RW/DVD+R/RW/CD-RW, FDD, CompactFlash slot (type II), USB connection (type A front, type B back); 24 V DC.	See page 437
5AC600.FA01-00	**APC620 replacement fan filter 1PCI 5 piece** APC620 replacement fan filter for system unit with 1 PCI Slot (5PC600.SX01-00).	See page 493
5AC600.FA02-00	**APC620 replacement fan filter 1PCI 5 piece** APC620 replacement fan filter for system unit with 2 PCI slot (5PC600.SX02-00, 5PC600.SX02-01).	See page 493
5AC600.FA03-00	**APC620f replacement fan filter 1PCI 5 piece** APC620 replacement fan filter for system unit with 3 PCI Slots (5PC600.SF03-00).	See page 493
5AC600.FA05-00	**APC620 replacement fan filter 1PCI 5 piece** APC620 replacement fan filter for system units with 5 PCI slot (5PC600.SX02-00, 5PC600.SX02-01).	See page 493
0PS102.0	**Power supply, 1-phase, 2.1 A** 24 VDC power supply, 1 phase, 2.1 A, input 100-240 VAC, wide range, DIN rail installation	See page 497
0PS104.0	**Power supply, 1-phase, 4.2 A** 24 VDC power supply, 1 phase, 4.2 A, input 115/230 VAC, auto select, DIN rail mounting	See page 497
0PS105.1	**Power supply, 1-phase, 5 A** 24 VDC power supply, 1 phase, 5 A, input 115/230 VAC, manual select, DIN rail mounting	See page 497
0PS105.2	**Power supply, 1-phase, 5 A, redundant** 24 VDC power supply, 1 phase, 5 A, redundant through parallel operation, input 115/230 VAC, manual select, DIN rail mounting	See page 497
0PS110.1	**Power supply, 1-phase, 10 A** 24 VDC power supply, 1 phase, 10 A, input 115/230 VAC, manual select, DIN rail mounting	See page 497
0PS110.2	**Power supply, 1-phase, 10 A, redundant** 24 VDC power supply, 1 phase, 10 A, redundant through parallel operation, input 115/230 VAC, manual select, DIN rail mounting	See page 497
0PS120.1	**Power supply, 1-phase, 20 A** 24 VDC power supply, 1 phase, 20 A, input 115/230 VAC, auto select, DIN rail mounting	See page 497
0PS305.1	**Power supply, 3-phase, 5 A** 24 VDC power supply, 3-phase, 5 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	See page 497
0PS310.1	**Power supply, 3-phase, 10 A** 24 VDC power supply, 3-phase, 10 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	See page 497
0PS320.1	**Power supply, 3-phase, 20 A** 24 VDC power supply, 3-phase, 20 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	See page 497
0PS340.1	**Power supply, 1-phase, 40 A** 24 VDC power supply, 3 phase, 40 A, input 115/230 VAC, auto select, DIN rail mounting	See page 497

Table 20: Model numbers - Other items (Forts.)

5.10 Software

Model number	Short description	Note
5SWHMI.0000-00	**HMI Drivers & Utilities 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).	See page 449
9S0000.01-010	**OEM MS-DOS 6.22 German (disk)** OEM MS-DOS 6.22 German disks Only delivered with a new PC.	See page 350
9S0000.01-020	**OEM MS-DOS 6.22 English (disk)** OEM MS-DOS 6.22 English disks Only delivered with a new PC.	See page 350
5SWWXP.0600-GER	**WinXP Professional with SP3, CD German** Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	See page 352
5SWWXP.0600-ENG	**WinXP Professional with SP3, CD English** Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device.	See page 352
5SWWXP.0600-MUL	**WinXP Professional with SP3, CD, Multi-language** Microsoft OEM Windows XP Professional Service Pack 3, CD, multi-language. Only available with a new device.	See page 352
5SWWXP.0500-GER	**WinXP Professional with SP2c, CD German** Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a new device.	See page 352
5SWWXP.0500-ENG	**WinXP Professional with SP2c, CD English** Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a new device.	See page 352
5SWWXP.0500-MUL	**WinXP Professional with SP2c, CD English** Microsoft OEM Windows XP Professional Service Pack 2c, CD, multi-language. Only available with a new device.	See page 352
5SWWI7.0100-GER	**Win7 Pro 32-bit DVD, GER** Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.	See page 365
5SWWI7.0100-ENG	**Win7 Pro 32-bit DVD, ENG** Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.	See page 365
5SWWI7.0300-MUL	**Win7 Ult 32-bit DVD, MUL** Microsoft OEM Windows 7 Ultimate 32-bit, DVD, Multilanguage. Only available with a new device.	See page 365
5SWWI7.0530-ENG	**Windows Embedded Standard 7 APC620 945GME** Microsoft OEM Windows Embedded, Standard 7 32-bit, English; for APC620 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 8 GB).	See page 373
5SWWI7.0730-MUL	**Windows Embedded Standard 7 Premium APC620 945GME** Microsoft OEM Windows Embedded, Standard 7 Premium 32-bit, Multilanguage; for APC620 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 8 GB).	See page 373
5SWWXP.0430-ENG	**WinXPe FP2007 APC620 945GME XTX** Microsoft OEM Windows XP Embedded Feature Pack 2007, English; for APC620 with CPU board 5PC600.X945-00; order CompactFlash separately (at least 512 MB).	See page 367

Table 21: Model numbers - Software

Model number	Short description	Note
5SWWXP.0730-ENG	**Windows Embedded Standard 2009 APC620 945GME** Microsoft OEM Windows Embedded, Standard 2009, English; for APC620 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	See page 370
5SWWCE.0830-ENG	**WinCE6.0 Pro APC620 945GME XTX** Microsoft OEM Windows CE 6.0 Professional, English; for APC620 with CPU board 5PC600.X945-00; order CompactFlash separately (at least 128 MB).	See page 376

Table 21: Model numbers - Software (Forts.)

6. Typical topologies

6.1 APC620 embedded for central control and visualization

The control program runs on the APC620 embedded. The visualization project is integrated with Visual Components. A display unit is connected to the PC. The PC is networked over Ethernet TCP/IP; additional Power Panel-based operator terminals can also be connected via Ethernet. Communication to I/O systems with axes is handled via fieldbus systems (CAN bus, POWERLINK).

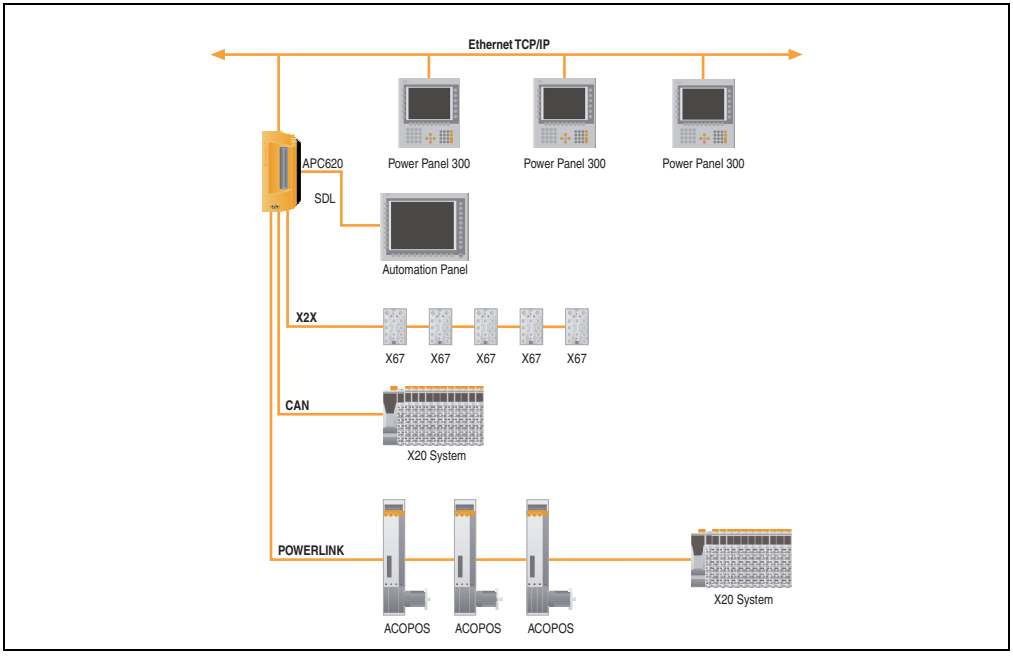


Figure 1: APC620 embedded for central control and visualization

6.2 APC620 as visualization device

The visualization runs on the APC620 as a SCADA application. Two display units are connected to the PC either locally or remotely. The control tasks interact with one or more underlying PLC stations where I/O systems and drives are connected locally or remotely over fieldbus systems. Additional SCADA stations can be networked via Ethernet TCP/IP.

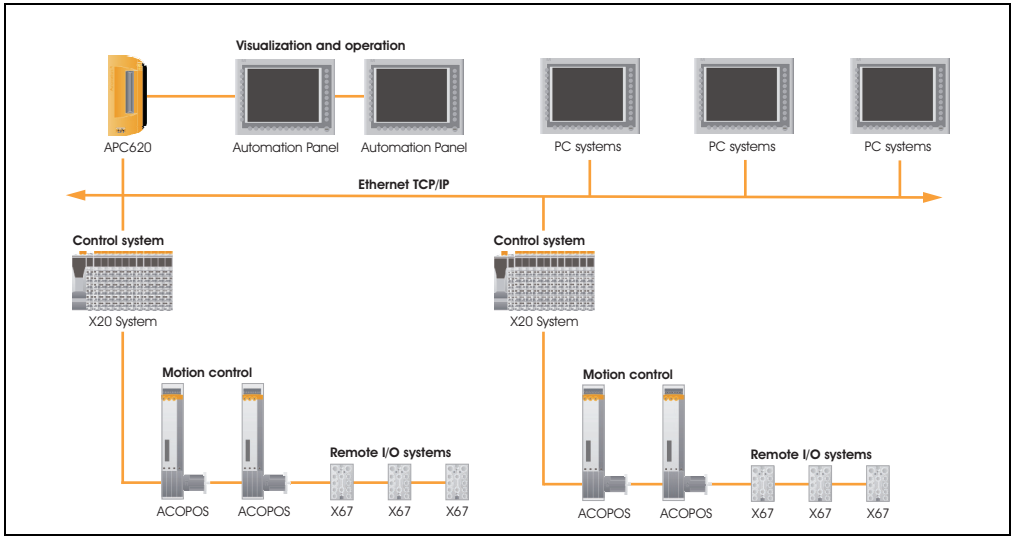


Figure 2: APC620 as visualization device

Chapter 2 • Technical data

1. Introduction

With its structure, its many slots and well thought-out placement of interfaces and drives, the APC620 provides optimal adaptability and ergonomics. The APC620 saves space in the control cabinet. Drive inserts (HDD, USB floppy) and up to two CompactFlash slots are hidden behind a cover on the front of the device.
The APC620 embedded additionally unites the fieldbus interfaces POWERLINK, CAN and X2X in a compact housing.

Figure 3: Automation PC 620 system overview

The APC620 with an Intel® Atom™ processor and Intel® 945GME chipset is available for applications with low processing demands. These processors, developed specially for mobile computing, offer many advantages for industrial applications as well. They combine high computing capacity with low power consumption. The chipset contains an integrated graphic solution which provides optimal use of memory for the system and graphics.

1.1 Features

- Intel® Atom™ N270 1.6 GHz processor
- CompactFlash slot (type I)
- Half-size / full-size PCI slots (PCI standard 2.2, 32-bit, PCI bus speed 33 MHz)
- AC97 sound
- USB 2.0
- 24 VDC supply voltage
- 2x Ethernet 10/100 Mbit interfaces
- 2x RS232 Interface, modem compatible
- PS/2 keyboard/mouse (combined)
- CAN add-on interface
- Fieldbus interfaces[1)] (POWERLINK, CAN and X2X)
- RS232/422/485 add-on interface
- Fan-free operation[2)]
- BIOS
- Real-time clock, (RTC) battery-buffered
- Up to 2 GB main memory
- Connection of various display devices to the "Monitor/Panel" video output (supports RGB, DVI, and SDL - Smart Display Link - signals)
- Optional installation of add-on UPS APC620 module[3)]
- Optional SRAM module[4)] battery backed

1) Only on APC620 embedded system units.

2) Dependent on the device configuration and the ambient temperature.

3) Installation depends on the revision of the system unit: 5PC600.SX01-00 from Rev. H0, 5PC600.SX02-00 from Rev. G0, 5PC600.SX02-01 from Rev. H0, 5PC600.SX05-00 from Rev. F0, 5PC600.SX05-01 from Rev. F0.

4) Installation depends on the revision of the system unit: 5PC600.SX01-00 from Rev. I0, 5PC600.SX02-00 from Rev. H0, 5PC600.SX02-01 from Rev. K0, 5PC600.SX05-00 from Rev. H0, 5PC600.SX05-01 from Rev. H0.

1.2 Structure / configuration APC620 with 1, 2, 3 and 5 PCI slots

The APC620 system can be assembled to meet individual requirements and operational conditions.

The following components are absolutely essential for operation:

- System unit
- CPU board
- Heat sink
- Main memory
- Drive (mass memory such as CompactFlash card or hard disk) for the operating system
- Software

1.2.1 Selection guide - basic system

Configuration - Base system APC620 with 1, 2, 3 and 5 PCI slots				
System unit	Select 1			
A system unit consists of a housing and main board Variants: PCI slots (1,2 or 5) Slide-in slots (0,1 or 2) AP Link slot (0 or 1) Example: 2 / 1 / 1 = 2 PCI, 1 slide-in, 1 AP Link	 5PC600.SX01-00 (1/0/0)	 5PC600.SX02-01 (2/1/0) 5PC600.SX02-00 (2/1/1)	 5PC600.SF03-00 (3/1/1)	 5PC600.SX05-01 (5/2/0) 5PC600.SX05-00 (5/2/1)
CPU board - Main memory - Heat sink - choose one of each 1 component				
CPU board				
	5PC600.X945-00			
Main memory				
	5MMDDR.0512-01 - 512 MB 5MMDDR.1024-01 - 1 GB 5MMDDR.2048-01 - 2 GB			
Heat sink				
	5AC600.HS01-03 5AC600.HS02-03			

Figure 4: Selection guide - APC620 basic system with 1, 2, 3, and 5 PCI slots

1.2.2 Selection guide - Optional components

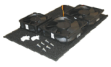
Configuration - optional				
System unit				
The system unit consists of the housing and base board. Variants: PCI slots (1,2, 3 or 5) Slide-in slots (0,1 or 2) AP Link slot (0 or 1) Example: 2 / 1 / 1 = 2 PCI, 1 slide-in, 1 AP Link	 5PC600.SX01-00 (1/0/0)	 5PC600.SX02-01 (2/1/0) 5PC600.SX02-00 (2/1/1)	 5PC600.SF03-00 (3/1/1)	 5PC600.SX05-01 (5/2/0) 5PC600.SX05-00 (5/2/1)
Fan kit (select 1)				
A fan kit may be required for some system configurations.	 5PC600.FA01-00	 5PC600.FA02-00	 5PC600.FA03-00	 5PC600.FA05-00
Add-on drive	Select 1			
	5AC600.HDDI-05 (40 GB HDD - 24x7 operation and extended temperature range) 5AC600.HDDI-06 (80 GB HDD - 24x7 operation and extended temperature range) 5AC600.CFSI-00 (CompactFlash slot)			
Slide-in drive	not possible	Select max. 1		Select max. 2
	/	5AC600.FDDS-00 (USB floppy)		
AP Link insert cards	not possible	Select 1		
 For implementing a second graphic line	/	5AC600.SDL0-00 Only possible with 5PC600.SX02-00, 5PC600.SX05-00, 5PC600.SF03-00!		
RAID system	Select 1			
	5ACPCI.RAIC-05 (occupies 1 PCI slot) 5MMHDD.0250-00 - Replacement hard disk for 5ACPCI.RACI-05			
Interface option	Select 1			
	5AC600.CANI-00 (CAN) 5AC600.485I-00 (combined RS232/RS422/RS485)			
UPS module				
	5AC600.UPSI-00 (Add-on UPS module) Can only be installed starting with the following system unit revisions: 5PC600.SX01-00 Rev. H0, 5PC600.SX02 Rev. G0, 5PC600.SX02-01 Rev. H0, 5PC600.SX05-00 Rev. F0, 5PC600.SX05-01 Rev. F0			
SRAM module	Select 1			
	5AC600.SRAM-00 (Add-on SRAM module 512kB) Can only be installed starting with the following system unit revisions: 5PC600.SX01-00 Rev. I0, 5PC600.SX02 Rev. H0, 5PC600.SX02-01 Rev. K0, 5PC600.SX05-00 Rev. H0, 5PC600.SX05-01 Rev. H0			
Supply voltage plugs	Select 1			
	0TB103.9 (screw clamp) 0TB103.91 (cage clamp)			

Figure 5: Selection guide - APC620 optional components with 1, 2, 3, and 5 PCI slots

Information:

- Depending on the system unit, a compatible fan kit can be installed in the APC620. Required for certain system configurations and ambient temperatures (see also section 2.6 "Ambient temperatures for systems with an X945 CPU board", on page 75)
- Select optional drive(s) (add-on / slide-in), based on the system unit. One add-on drive can be installed in each system unit. Slide-in drives (1 or 2) are only available in certain system units.
- AP Link cards create a second graphics line (possibility of extended desktop or display clone operation) on the APC620. Only possible with system units 5PC600.SX02-00, 5PC600.SX05-00, 5PC600.SF03-00 and with an X945 CPU board.
- An add-on interface adds an optional connection possibility.
- Depending on the revision of the system unit (see graphic), an optional integrated UPS add-on module can be installed.
- Depending on the revision of the system unit (see graphic), an optional integrated SRAM module (battery backed) can be installed.
- The appropriate power supply plugs ensure simple connection to the power supply.

1.3 Structure / configuration APC620 embedded

The following components are absolutely essential for operation: System unit, CPU board, main memory and heat sink.

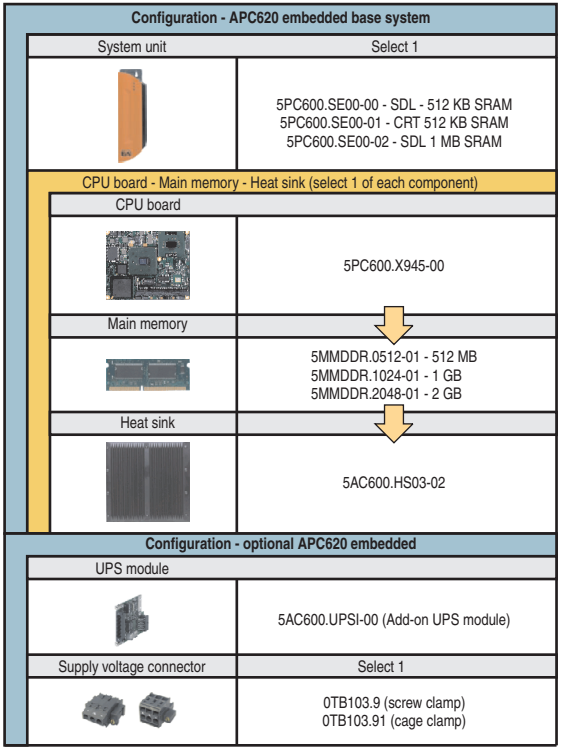


Figure 6: Selection guide - Basic system and optional components APC620 embedded

Explanation:

1) Select a system unit.

2) Select a CPU board.

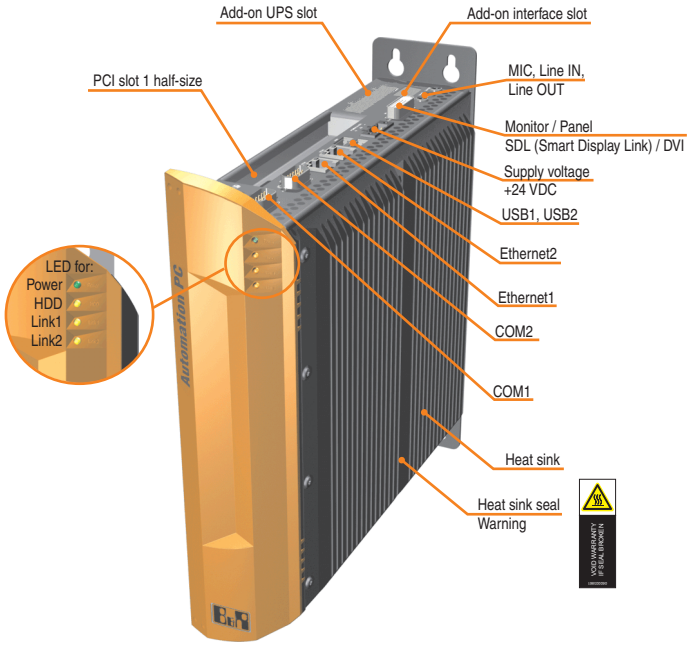
3) Select main memory and heat sink (selection 1 each).

4) Select optional components.

2. Entire device

2.1 APC620, 1 PCI slot variant

2.1.1 Interfaces



1) Slot only provided on 5PC600.SX01-00 devices with Rev. H0 or higher.

Figure 7: Interface overview - APC620, 1 PCI slot variant (top)

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. Should this connection be broken, the APC620 must be sent for repair. Removal of the mounting screws, which can be determined by a broken seal, voids all warranty.

During operation, surface temperatures of the heat sink may reach 70°C (warning "hot surface").

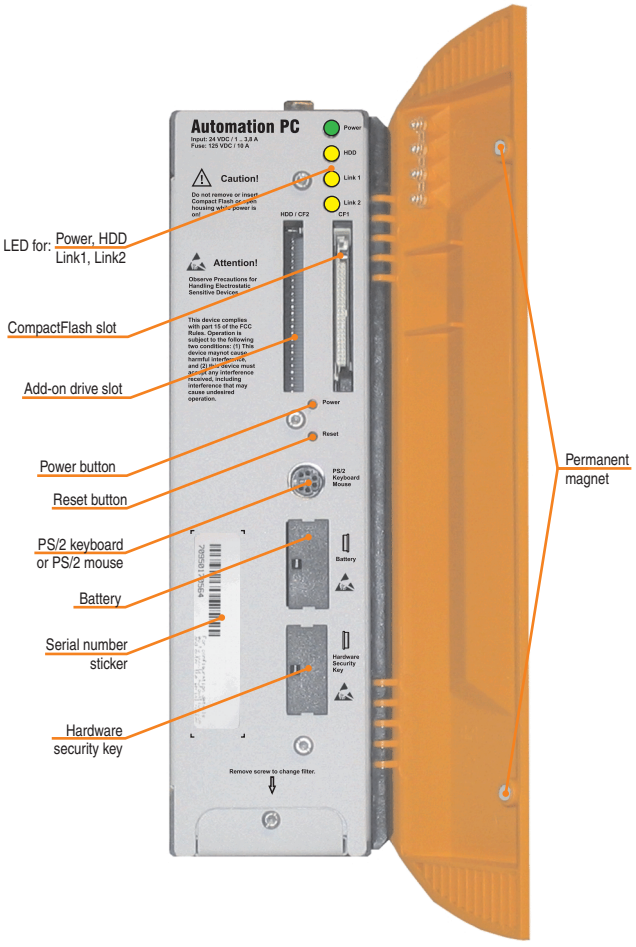


Figure 8: Interface overview - APC620, 1 PCI slot variant (front)

Information:

The orange front doors contain two permanent magnets. Contact between a data carrier that saves data magnetically (hard disk, diskette, the magnetic strip of a credit card, etc.) and a magnet can cause loss of data.

2.1.2 Technical data

Features	APC620, 1 PCI slot variant
B&R ID code	Component-dependent, see 3.1 "System units", on page 153
Boot loader / Operating system	BIOS / see the chapter 4 "Software", on page 269
Processor Cooling Method	Component-dependent, see technical data for the CPU board Passive via heat sink and optionally supported with an active fan kit
Main memory	Max. 2 GB
Graphics Controller	 Component-dependent, see technical data for the CPU board
Power failure logic Controller Buffer time	 MTCX[1] (see also page 549) 10 ms, dependent on the system unit revision, TBD
Real-time clock Battery-buffered Accuracy	 Yes Component-dependent, see technical data for the CPU board
Battery Type Removable Service life	See also page 137 Renata 950 mAh Yes, accessible behind the orange cover 4 years[2) 3)]
Ethernet Controller Amount	 See also page 109 or page 111 2
CAN bus	Optional using add-on interface (5AC600.CANI-00)
CompactFlash Type Amount	See also page 131 or page 132 Type I 1 (max. 4 using optional components)
Serial interface Amount Type UART Transfer rate Connection	See also page 102 or page 103 2 RS232, modem-capable, not electrically isolated 16550 compatible, 16 byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Amount Transfer rate Connection Current load	See also section "USB ports", on page 112 USB 2.0 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) Type A Max. 500 mA per connection
Reset button	Yes, accessible behind the orange cover
LEDs	4 directed outwards via fiber optic lines, also see section "Status LEDs", on page 129
PCI slots half-size full-size	See also section "PCI slots", on page 126 1 -
Add-on UPS internal slot	Yes 5PC600.SX01-00 starting with revision H0 See also section "Add-on UPS module slot", on page 125

Table 22: Technical data - APC620, 1 PCI slot variant

Features	APC620, 1 PCI slot variant
SRAM internal slot options	Yes 5PC600.SX01-00 starting with revision I0
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	 24 VDC ±25% 3.8 A Typ. 7 A, max. 40 A for < 300 µs Component-dependent, see section 2.7 "Power management APC620 system unit with 1 PCI slot"
Mechanical characteristics	
Housing[4)] Material Paint Front cover	 Galvanized plate, plastic Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV) Colored orange plastic (similar to Pantone 144CV)
Outer dimensions	See "Dimensions", on page 51
Weight	Approx. 3.4 kg (component-dependent)
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 Component-dependent, see the section about ambient temperature on page 75 -20 to +60°C -20 to +60°C
Relative humidity Operation Bearings Transport	 Component-dependent, see section "Humidity specifications", on page 99 Component-dependent, see section "Humidity specifications", on page 99 Component-dependent, see section "Humidity specifications", on page 99
Vibration[5)] Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock[5)] Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20
Altitude Operation	 max. 3000 m[6)] (component-dependent)
Electromagnetic compatibility	
Emissions Network-related emissions Emissions	 EN 61000-6-4, EN 55022 A EN 61000-6-4, EN 55011 class A, EN 55022 class A, EN 61131-2, 47 CFR Part 15

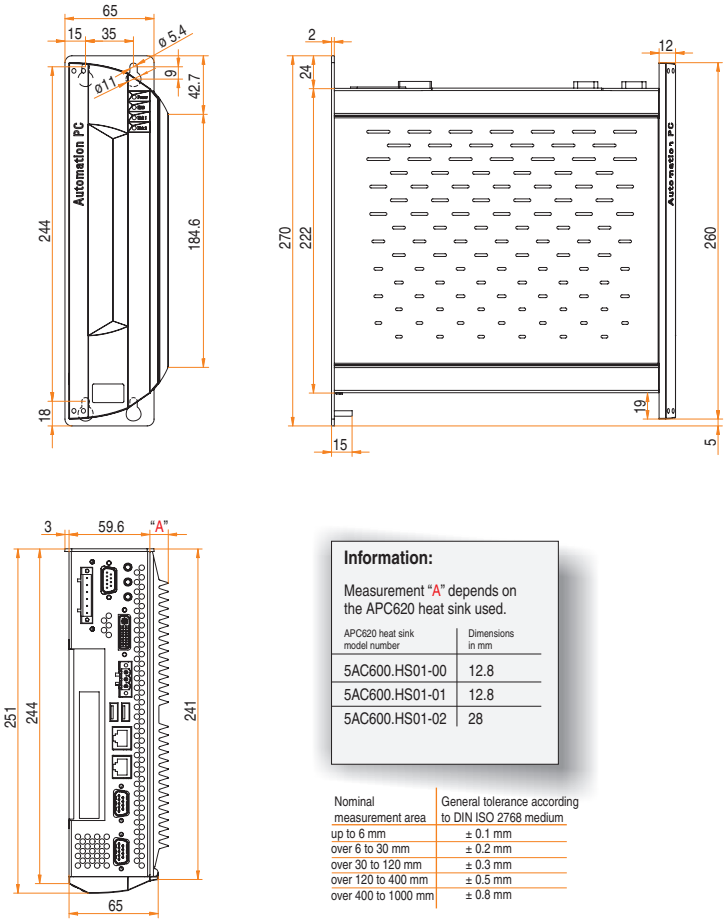
Table 22: Technical data - APC620, 1 PCI slot variant (Forts.)

Electromagnetic compatibility	APC620, 1 PCI slot variant
Immunity	
Electrostatic discharge (ESD)	EN 61000-6-2, EN 61131-2, EN 55024
High-frequency electromagnetic fields	EN 61000-6-2, EN 61131-2, EN 55024
High-speed transient disturbances (Burst)	EN 61000-6-2, EN 61131-2, EN 55024
Surges	EN 61000-6-2, EN 61131-2, EN 55024
Conducted values	EN 61000-6-2, EN 61131-2, EN 55024
Magnetic fields with electrical frequencies	EN 61000-6-2, EN 61131-2, EN 55024
Voltage dips, interruptions	EN 61000-6-2, EN 61131-2, EN 55024
Damped vibration	EN 61000-6-2, EN 61131-2, EN 55024

Table 22: Technical data - APC620, 1 PCI slot variant (Forts.)

1) Maintenance controller extended.
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) If an SRAM module (Mod. No. 5AC600.SRAM-00) is installed, the buffer duration is 2 1/2 years.
4) Depending on the process or batch, there may be visible deviations in the color and surface structure.
5) Maximum values, as long as no other individual component specifies any other.
6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

2.1.3 Dimensions



Information:

Measurement "A" depends on the APC620 heat sink used.

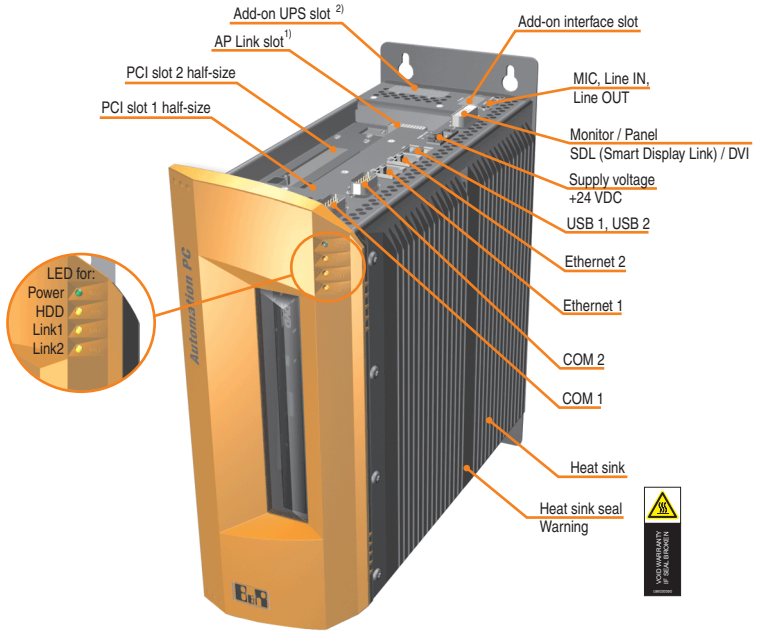
APC620 heat sink model number	Dimensions in mm
5AC600.HS01-00	12.8
5AC600.HS01-01	12.8
5AC600.HS01-02	28

Nominal measurement area	General tolerance according to DIN ISO 2768 medium
up to 6 mm	± 0.1 mm
over 6 to 30 mm	± 0.2 mm
over 30 to 120 mm	± 0.3 mm
over 120 to 400 mm	± 0.5 mm
over 400 to 1000 mm	± 0.8 mm

Figure 9: Dimensions - APC620, 1 PCI slot variant

2.2 APC620, 2 PCI slot variant

2.2.1 Interfaces



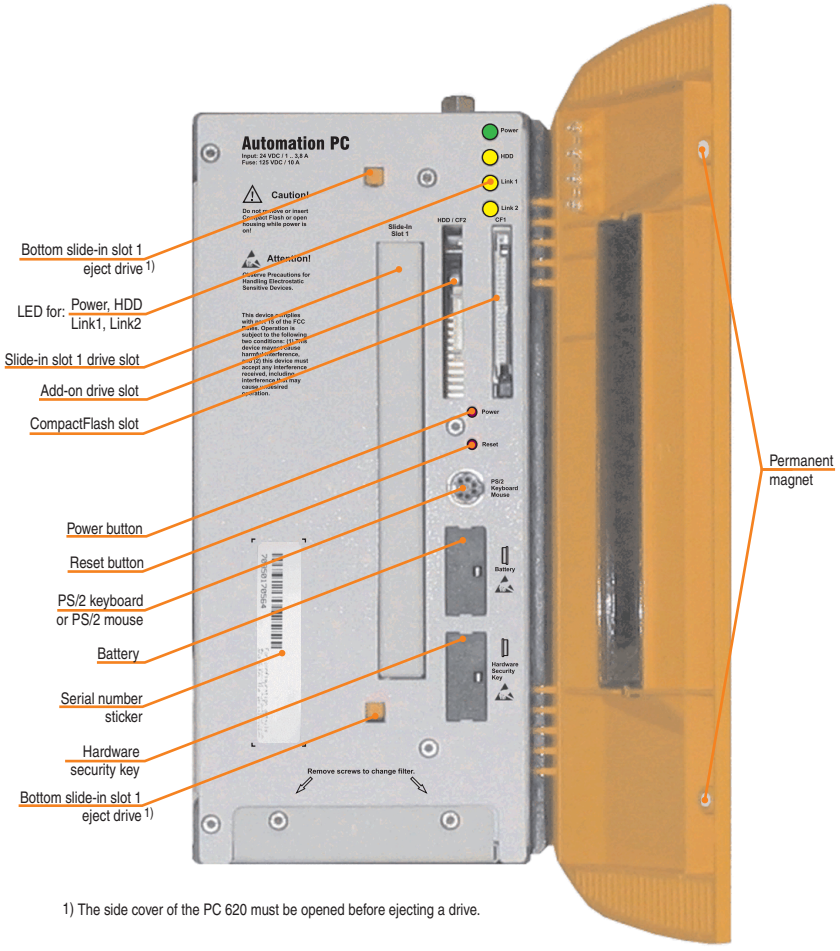
1) Can only be used with system unit 5PC600.SX02-00
2) Slot is only provided on 5PC600.SX02-00 devices with Rev. G0 or higher and 5PC600.SX02-01 with Rev. H0 or higher

Figure 10: Interface overview - APC620, 2 PCI slot variant (top)

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. Should this connection be broken, the APC620 must be sent for repair. Removal of the mounting screws, which can be determined by a broken seal, voids all warranty.

During operation, surface temperatures of the heat sink may reach 70°C (warning "hot surface").



1) The side cover of the PC 620 must be opened before ejecting a drive.

Figure 11: Interface overview - APC620, 2 PCI slot variant (front)

Information:

The orange front doors contain two permanent magnets. Contact between a data carrier that saves data magnetically (hard disk, diskette, the magnetic strip of a credit card, etc.) and a magnet can cause loss of data.

2.2.2 Technical data

Features	APC620, 2 PCI slot variant
B&R ID code	Component-dependent, see 3.1 "System units", on page 153
Boot loader / Operating system	BIOS / see the chapter 4 "Software", on page 269
Processor Cooling Method	Component-dependent, see technical data for the CPU board Passive via heat sink and optionally supported with an active fan kit
Main memory	Max. 2 GB
Graphics Controller	 Component-dependent, see technical data for the CPU board
Power failure logic Controller Buffer time	 MTCX[1] (see also page 549) 10 ms, dependent on the system unit revision, TBD
Real-time clock Battery-buffered Accuracy	 Yes Component-dependent, see technical data for the CPU board
Battery Type Removable Service life	See also page 137 Renata 950 mAh Yes, accessible behind the orange cover 4 years[2) 3)]
Ethernet Controller Amount	 See also page 109 or page 111 2
CAN bus	Optional using add-on interface (5AC600.CANI-00)
CompactFlash Type Amount	See also page 131 or page 132 Type I 2 (max. 4 using optional components)
Serial interface Amount Type UART Transfer rate Connection	See also page 102 or page 103 2 RS232, modem-capable, not electrically isolated 16550 compatible, 16 byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Amount Transfer rate Connection Current load	See also section "USB ports", on page 112 USB 2.0 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) Type A Max. 500 mA per connection
Reset button	Yes, accessible behind the orange cover
LEDs	4 directed outwards via fiber optic lines, also see section "Status LEDs", on page 129
PCI slots half-size full-size	See also section "PCI slots", on page 126 2 -
Add-on UPS internal slot	Yes 5PC600.SX02-00 starting with revision G0, 5PC600.SX02-01 starting with revision H0 present See also section "Add-on UPS module slot", on page 125

Table 23: Technical data - APC620, 2 PCI slot variant

Features	APC620, 2 PCI slot variant
SRAM internal slot options	Yes 5PC600.SX02-00 starting with revision H0, 5PC600.SX02-01 starting with revision K0 present
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	 24 VDC ±25% 3.8 A Typ. 7 A, max. 40 A for < 300 µs Component-dependent, see section 2.7 "Power management APC620 system unit with 1 PCI slot"
Mechanical characteristics	
Housing[4)] Material Paint Front cover	 Galvanized plate, plastic Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV) Colored orange plastic (similar to Pantone 144CV)
Outer dimensions	See "Dimensions", on page 57
Weight	Approx. 4.5 kg (component-dependent)
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 Component-dependent, see the section about ambient temperature on page 75 -20 to +60°C -20 to +60°C
Relative humidity Operation Bearings Transport	 Component-dependent, see section "Humidity specifications", on page 99 Component-dependent, see section "Humidity specifications", on page 99 Component-dependent, see section "Humidity specifications", on page 99
Vibration[5)] Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock[5)] Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20
Altitude Operation	 max. 3000 m[6)] (component-dependent)
Electromagnetic compatibility	
Emissions Network-related emissions Emissions	 EN 61000-6-4, EN 55022 A EN 61000-6-4, EN 55011 class A, EN 55022 class A, EN 61131-2, 47 CFR Part 15

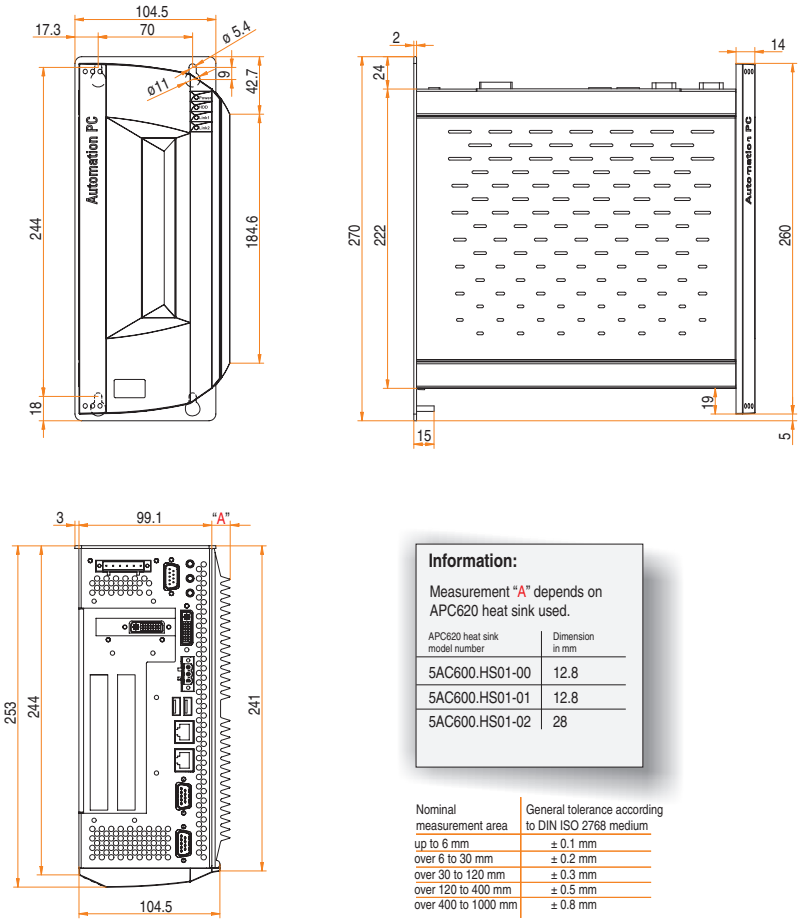
Table 23: Technical data - APC620, 2 PCI slot variant (Forts.)

Electromagnetic compatibility	APC620, 2 PCI slot variant
Immunity	
Electrostatic discharge (ESD)	EN 61000-6-2, EN 61131-2, EN 55024
High-frequency electromagnetic fields	EN 61000-6-2, EN 61131-2, EN 55024
High-speed transient disturbances (Burst)	EN 61000-6-2, EN 61131-2, EN 55024
Surges	EN 61000-6-2, EN 61131-2, EN 55024
Conducted values	EN 61000-6-2, EN 61131-2, EN 55024
Magnetic fields with electrical frequencies	EN 61000-6-2, EN 61131-2, EN 55024
Voltage dips, interruptions	EN 61000-6-2, EN 61131-2, EN 55024
Damped vibration	EN 61000-6-2, EN 61131-2, EN 55024

Table 23: Technical data - APC620, 2 PCI slot variant (Forts.)

1) Maintenance controller extended.
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) If an SRAM module (Mod. No. 5AC600.SRAM-00) is installed, the buffer duration is 2 1/2 years.
4) Depending on the process or batch, there may be visible deviations in the color and surface structure.
5) Maximum values, as long as no other individual component specifies any other.
6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

2.2.3 Dimensions



Information:

Measurement "A" depends on APC620 heat sink used.

APC620 heat sink model number	Dimension in mm
5AC600.HS01-00	12.8
5AC600.HS01-01	12.8
5AC600.HS01-02	28

Nominal measurement area	General tolerance according to DIN ISO 2768 medium
up to 6 mm	± 0.1 mm
over 6 to 30 mm	± 0.2 mm
over 30 to 120 mm	± 0.3 mm
over 120 to 400 mm	± 0.5 mm
over 400 to 1000 mm	± 0.8 mm

Figure 12: Dimensions - APC620, 2 PCI slot variant

2.3 APC620, 3 PCI slot variant

2.3.1 Interfaces

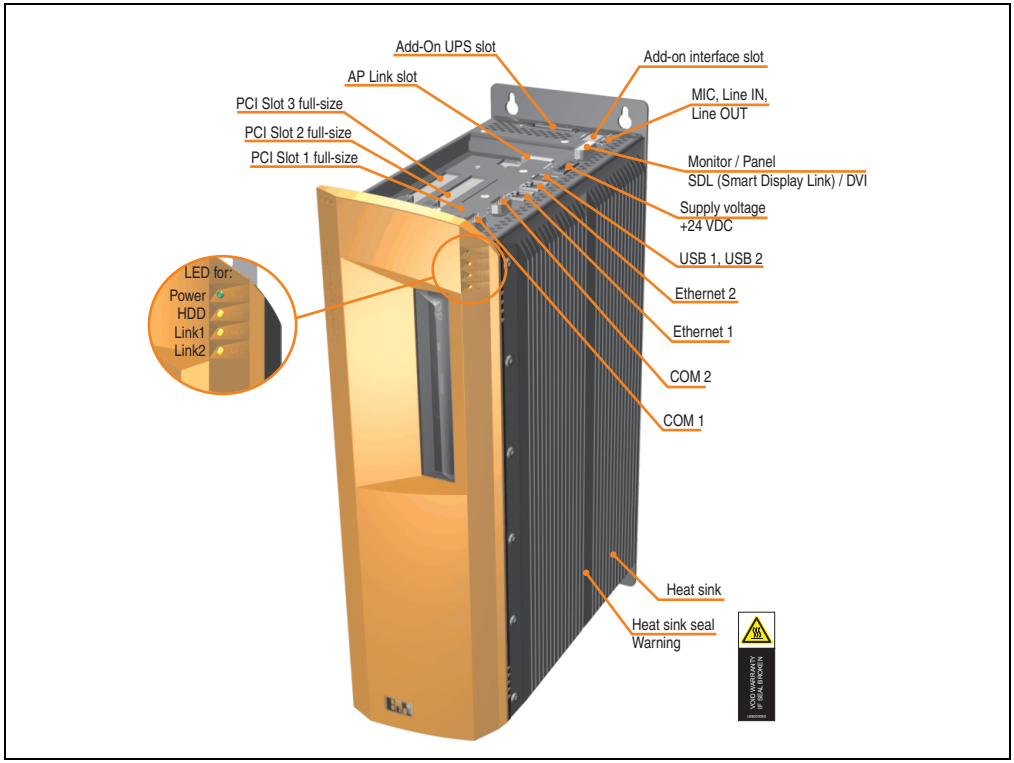
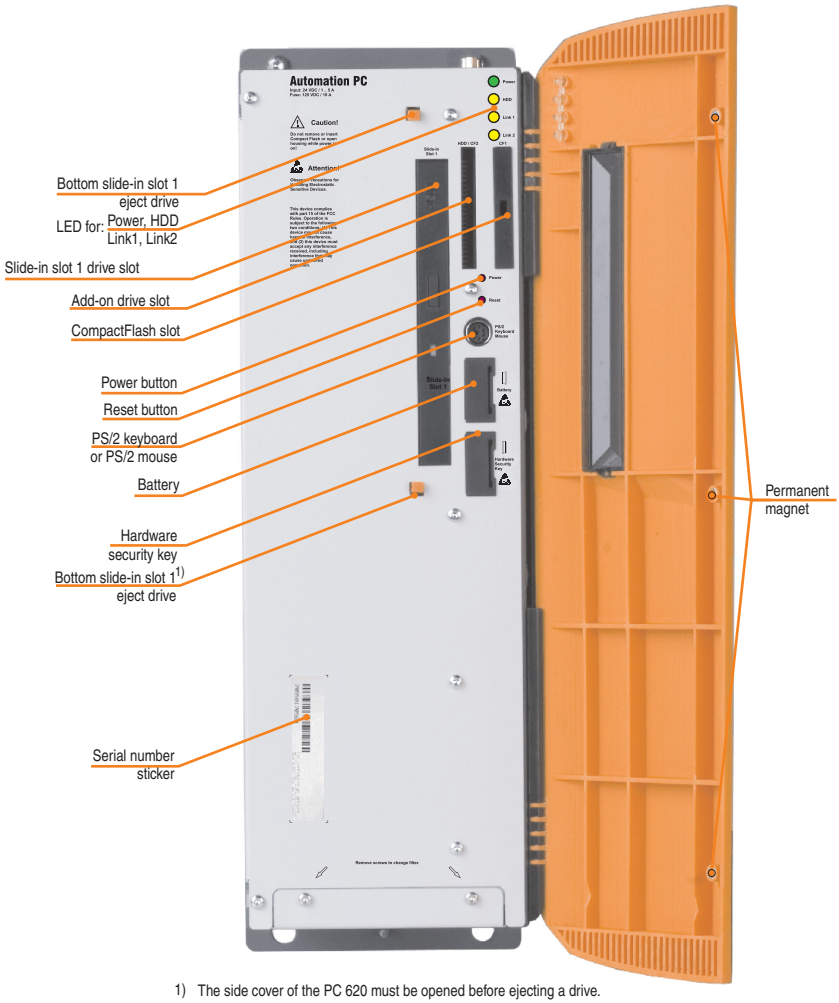


Figure 13: Interface overview - APC620, 3 PCI slot variant (top)

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. Should this connection be broken, the APC620 must be sent for repair. Removal of the mounting screws, which can be determined by a broken seal, voids all warranty.

During operation, surface temperatures of the heat sink may reach 70°C (warning "hot surface").



1) The side cover of the PC 620 must be opened before ejecting a drive.

Figure 14: Interface overview - APC620, 3 PCI slot variant (front)

Information:

The orange front doors contain three permanent magnets. Contact between a data carrier that saves data magnetically (hard disk, diskette, the magnetic strip of a credit card, etc.) and a magnet can cause loss of data.

2.3.2 Technical data

Features	APC620, 3 PCI slot variant
B&R ID code	Component-dependent, see 3.1 "System units", on page 153
Boot loader / Operating system	BIOS / see the chapter 4 "Software", on page 269
Processor Cooling Method	Component-dependent, see technical data for the CPU board Passive via heat sink and optionally supported with an active fan kit
Main memory	Max. 2 GB
Graphics Controller	 Component-dependent, see technical data for the CPU board
Power failure logic Controller Buffer time	 MTCX[1] (see also page 549) 10 ms, dependent on the system unit revision, TBD
Real-time clock Battery-buffered Accuracy	 Yes Component-dependent, see technical data for the CPU board
Battery Type Removable Service life	See also page 137 Renata 950 mAh Yes, accessible behind the orange cover 4 years[2) 3)]
Ethernet Controller Amount	 See also page 109 or page 111 2
CAN bus	Optional using add-on interface (5AC600.CANI-00)
CompactFlash Type Amount	See also page 131 or page 132 Type I 2 (max. 4 using optional components)
Serial interface Amount Type UART Transfer rate Connection	See also page 102 or page 103 2 RS232, modem-capable, not electrically isolated 16550 compatible, 16 byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Amount Transfer rate Connection Current load	See also section "USB ports", on page 112 USB 2.0 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) Type A Max. 500 mA per connection
Reset button	Yes, accessible behind the orange cover
LEDs	4 directed outwards via fiber optic lines, also see section "Status LEDs", on page 129
PCI slots half-size full-size	See also section "PCI slots", on page 126 - 3
Add-on UPS internal slot	Yes See also section "Add-on UPS module slot", on page 125
SRAM internal slot options	Yes

Table 24: Technical data - APC620, 3 PCI slot variant

Electrical characteristics	APC620, 3 PCI slot variant
Power supply Rated voltage Rated current Starting current Power consumption	 24 VDC ±25% 5 A Typ. 10 A, max. 40 A for < 300 µs Component-dependent, see section 2.9 "Power management APC620 system unit with 3 PCI slots"
Mechanical characteristics	
Housing[4)] Material Paint Front cover	 Galvanized plate, plastic Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV) Colored orange plastic (similar to Pantone 144CV)
Outer dimensions	See "Dimensions", on page 62
Weight	Approx. 4.5 kg (component-dependent)
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 Component-dependent, see the section about ambient temperature on page 75 -20 to +60°C -20 to +60°C
Relative humidity Operation Bearings Transport	 Component-dependent, see section "Humidity specifications", on page 99 Component-dependent, see section "Humidity specifications", on page 99 Component-dependent, see section "Humidity specifications", on page 99
Vibration[5)] Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock[5)] Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20
Altitude Operation	 max. 3000 m[6)] (component-dependent)
Electromagnetic compatibility	
Emissions Network-related emissions Emissions	 EN 61000-6-4, EN 55022 A EN 61000-6-4, EN 55011 class A, EN 55022 class A, EN 61131-2, 47 CFR Part 15
Immunity Electrostatic discharge (ESD) High-frequency electromagnetic fields High-speed transient disturbances (Burst) Surges Conducted values Magnetic fields with electrical frequencies Voltage dips, interruptions Damped vibration	 EN 61000-6-2, EN 61131-2, EN 55024 EN 61000-6-2, EN 61131-2, EN 55024 EN 61000-6-2, EN 61131-2, EN 55024 EN 61000-6-2, EN 61131-2, EN 55024 EN 61000-6-2, EN 61131-2, EN 55024 EN 61000-6-2, EN 61131-2, EN 55024 EN 61000-6-2, EN 61131-2, EN 55024 EN 61000-6-2, EN 61131-2, EN 55024

Table 24: Technical data - APC620, 3 PCI slot variant (Forts.)

1) Maintenance controller extended.

2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) If an SRAM module (Mod. No. 5AC600.SRAM-00) is installed, the buffer duration is 2 1/2 years.
4) Depending on the process or batch, there may be visible deviations in the color and surface structure.
5) Maximum values, as long as no other individual component specifies any other.
6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

2.3.3 Dimensions

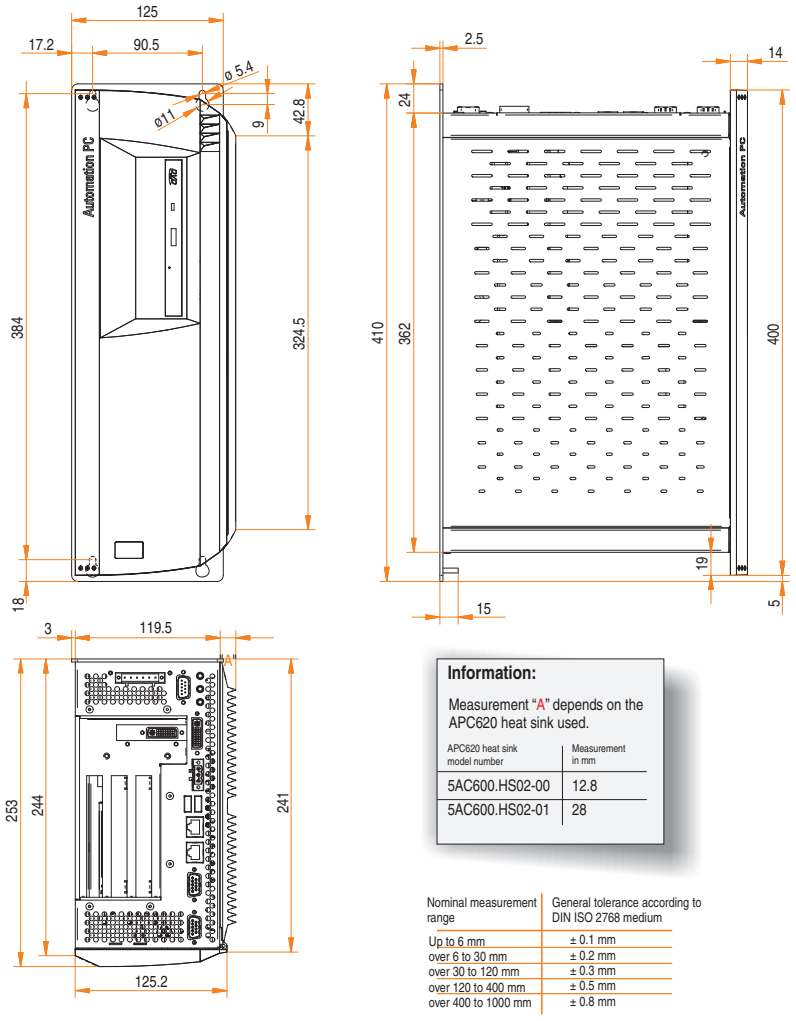
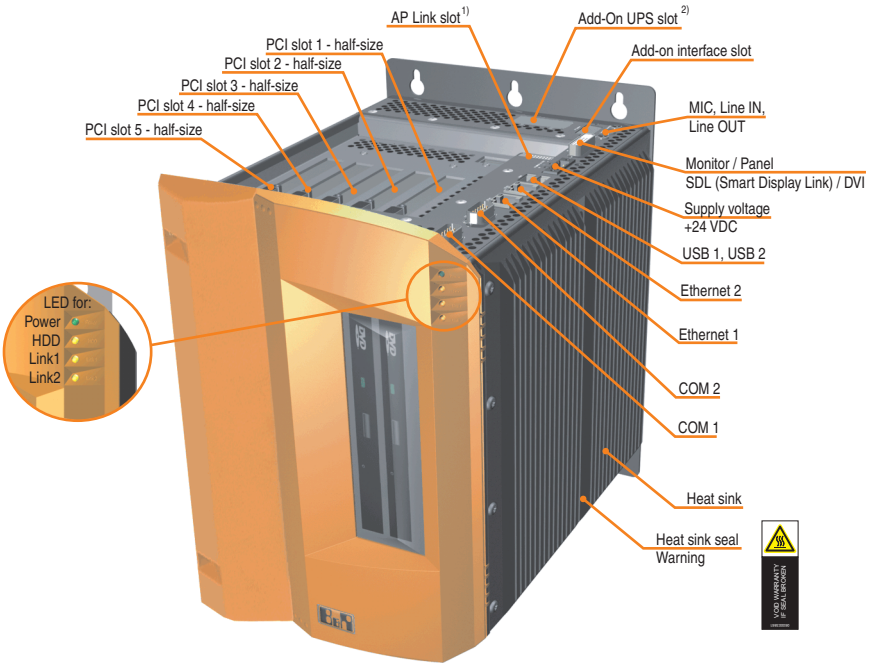


Figure 15: Dimensions - APC620, 3 PCI slot variant

2.4 APC620, 5 PCI slot variant

2.4.1 Interfaces



1) Can only be used with a 5PC600.SX05-00 system unit.
2) Slot only provided on 5PC600.SX05-00 devices with Rev. F0 or higher and 5PC600.SX05-01 with Rev. F0 or higher.

Figure 16: Interface overview - APC620, 5 PCI slot variant (top)

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. Should this connection be broken, the APC620 must be sent for repair. Removal of the mounting screws, which can be determined by a broken seal, voids all warranty.

During operation, surface temperatures of the heat sink may reach 70°C (warning "hot surface").

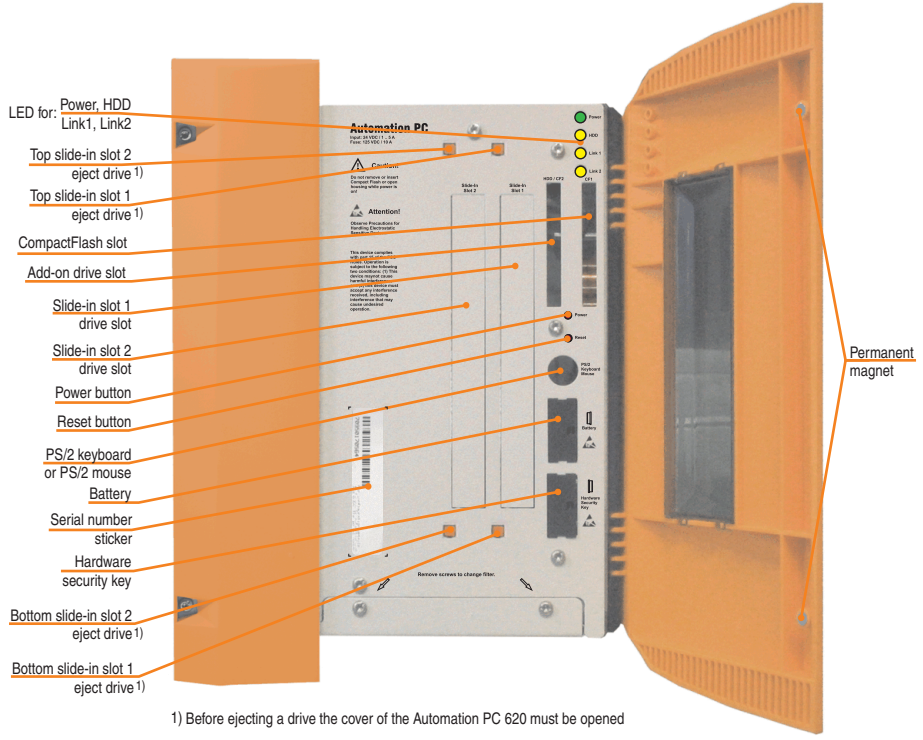


Figure 17: Interface overview - APC620, 5 PCI slot variant (front)

Information:

The orange front doors contain two permanent magnets. Contact between a data carrier that saves data magnetically (hard disk, diskette, the magnetic strip of a credit card, etc.) and a magnet can cause loss of data.

2.4.2 Technical data

Features	APC620, 5 PCI slot variant
B&R ID code	Component-dependent, see 3.1 "System units", on page 153
Boot loader / Operating system	BIOS / see the chapter 4 "Software", on page 269
Processor Cooling Method	Component-dependent, see technical data for the CPU board Passive via heat sink and optionally supported with an active fan kit
Main memory	Max. 2 GB
Graphics Controller	 Component-dependent, see technical data for the CPU board
Power failure logic Controller Buffer time	 MTCX[1] (see also page 549) 10 ms, dependent on the system unit revision, TBD
Real-time clock Battery-buffered Accuracy	 Yes Component-dependent, see technical data for the CPU board
Battery Type Removable Service life	See also page 137 Renata 950 mAh Yes, accessible behind the orange cover 4 years[2) 3)]
Ethernet Controller Amount	 See also page 109 or page 111 2
CAN bus	Optional using add-on interface (5AC600.CANI-00)
CompactFlash Type Amount	See also page 131 or page 132 Type I 2 (max. 4 using optional components)
Serial interface Amount Type UART Transfer rate Connection	See also page 102 or page 103 2 RS232, modem-capable, not electrically isolated 16550 compatible, 16 byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Amount Transfer rate Connection Current load	See also section "USB ports", on page 112 USB 2.0 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) Type A Max. 500 mA per connection
Reset button	Yes, accessible behind the orange cover
LEDs	4 directed outwards via fiber optic lines, also see section "Status LEDs", on page 129
PCI slots half-size full-size	See also section "PCI slots", on page 126 5 -
Add-on UPS internal slot	Yes 5PC600.SX05-00 starting with revision F0, 5PC600.SX05-01 starting with revision F0 present See also section "Add-on UPS module slot", on page 125

Table 25: Technical data - APC620, 5 PCI slot variant

Features	APC620, 5 PCI slot variant
SRAM internal slot options	Yes 5PC600.SX05-00 starting with revision H0, 5PC600.SX05-01 starting with revision H0 present
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	 24 VDC ±25% 5 A Typ. 10 A, max. 40 A for < 300 µs Component-dependent, see section 2.10 "Power management APC620 system units with 5 PCI slots"
Mechanical characteristics	
Housing[4)] Material Paint Front cover	 Galvanized plate, plastic Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV) Colored orange plastic (similar to Pantone 144CV)
Outer dimensions	See "Dimensions", on page 68
Weight	Approx. 5.7 kg (component-dependent)
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 Component-dependent, see the section about ambient temperature on page 75 -20 to +60°C -20 to +60°C
Relative humidity Operation Bearings Transport	 Component-dependent, see section "Humidity specifications", on page 99 Component-dependent, see section "Humidity specifications", on page 99 Component-dependent, see section "Humidity specifications", on page 99
Vibration[5)] Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock[5)] Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20
Altitude Operation	 max. 3000 m[6)] (component-dependent)
Electromagnetic compatibility	
Emissions Network-related emissions Emissions	 EN 61000-6-4, EN 55022 A EN 61000-6-4, EN 55011 class A, EN 55022 class A, EN 61131-2, 47 CFR Part 15

Table 25: Technical data - APC620, 5 PCI slot variant (Forts.)

Electromagnetic compatibility	APC620, 5 PCI slot variant
Immunity	
Electrostatic discharge (ESD)	EN 61000-6-2, EN 61131-2, EN 55024
High-frequency electromagnetic fields	EN 61000-6-2, EN 61131-2, EN 55024
High-speed transient disturbances (Burst)	EN 61000-6-2, EN 61131-2, EN 55024
Surges	EN 61000-6-2, EN 61131-2, EN 55024
Conducted values	EN 61000-6-2, EN 61131-2, EN 55024
Magnetic fields with electrical frequencies	EN 61000-6-2, EN 61131-2, EN 55024
Voltage dips, interruptions	EN 61000-6-2, EN 61131-2, EN 55024
Damped vibration	EN 61000-6-2, EN 61131-2, EN 55024

Table 25: Technical data - APC620, 5 PCI slot variant (Forts.)

1) Maintenance controller extended.
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) If an SRAM module (Mod. No. 5AC600.SRAM-00) is installed, the buffer duration is 2 1/2 years.
4) Depending on the process or batch, there may be visible deviations in the color and surface structure.
5) Maximum values, as long as no other individual component specifies any other.
6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

2.4.3 Dimensions

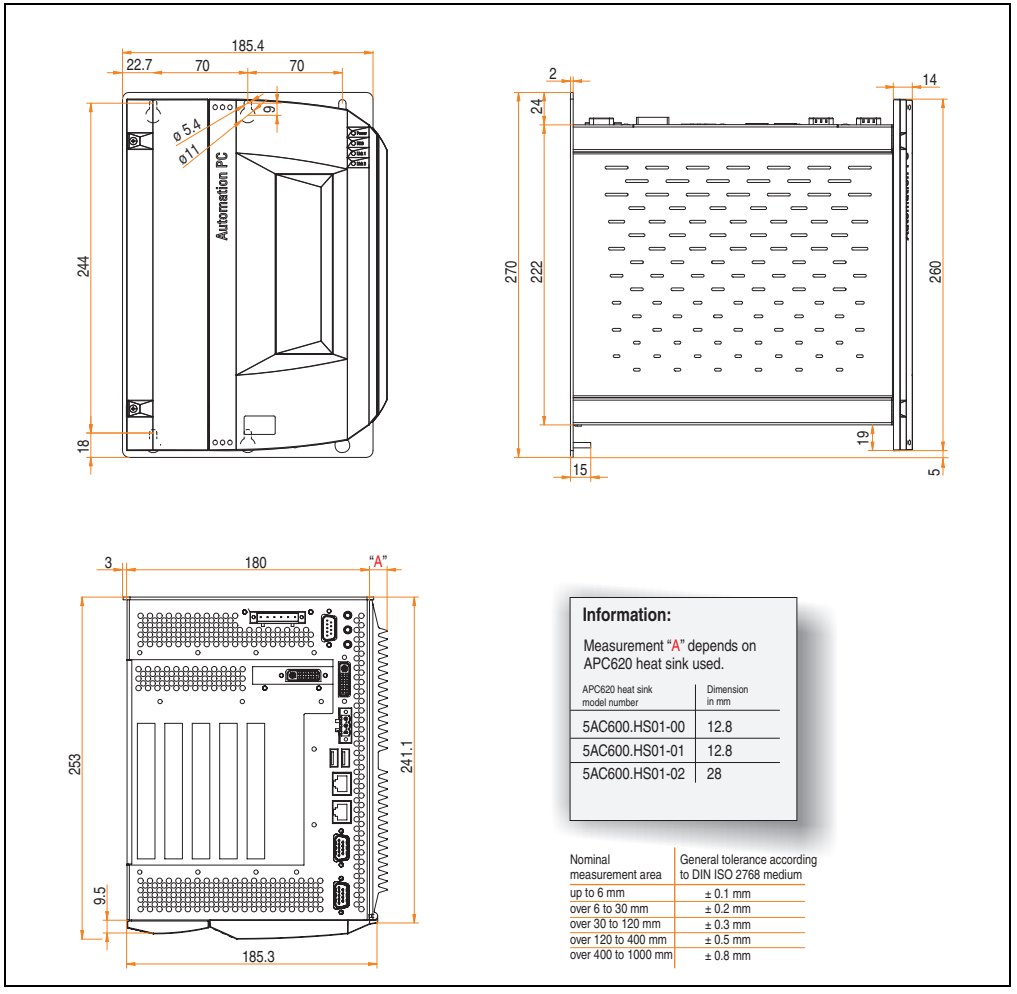


Figure 18: Dimensions - APC620, 5 PCI slot variant

2.5 APC620 embedded variant

2.5.1 Interfaces

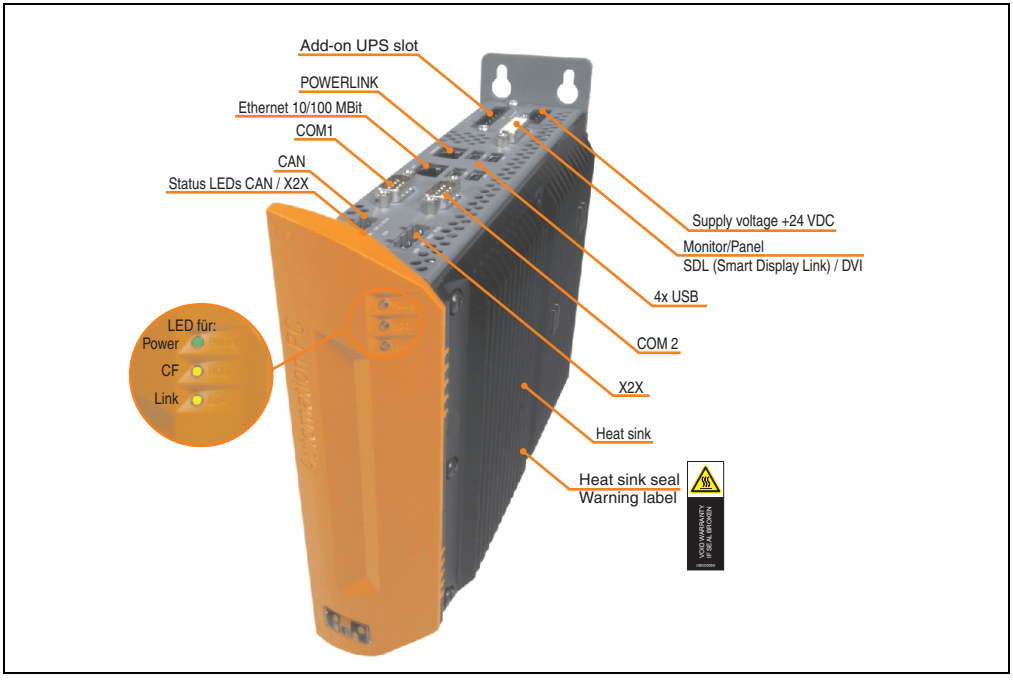


Figure 19: APC620 embedded variant interface overview - top side

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. Should this connection be broken, the APC620 embedded must be sent for repair. Removal of the mounting screws, which can be determined by a broken seal, voids all warranty.

During operation, surface temperatures of the heat sink may reach 70°C (warning "hot surface").

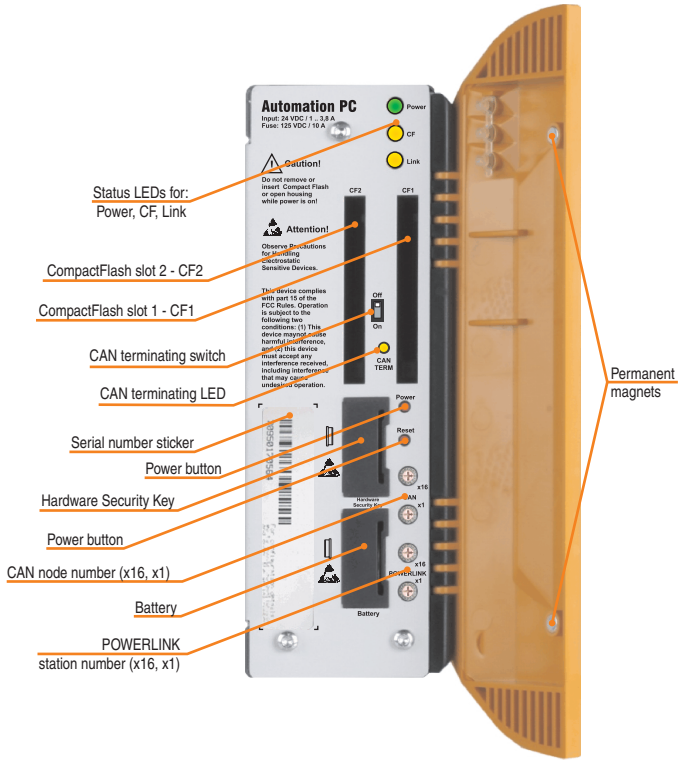


Figure 20: APC620 embedded variant interface overview - front side

Information:

The orange front doors contain two permanent magnets. Contact between a data carrier that saves data magnetically (hard disk, diskette, the magnetic strip of a credit card, etc.) and a magnet can cause loss of data.

2.5.2 Technical data

Features	APC620 embedded variant
B&R ID code	Component-dependent, see 3.1 "System units", on page 153
Boot loader / Operating system	BIOS / see the chapter 4 "Software", on page 269
Processor Cooling Method	Component-dependent, see technical data for the CPU board Passive via heat sink
Main memory	Max. 2 GB
Graphics Controller	 Component-dependent, see technical data for the CPU board
Power failure logic Controller Buffer time	 MTCX[1] (see also page 549) 10 ms, dependent on the system unit revision, TBD
Real-time clock Battery-buffered Accuracy	 Yes Component-dependent, see technical data for the CPU board
Battery Type Removable Service life	See also page 137 Renata 950 mAh Yes, accessible behind the orange cover 2 1/2 years[2]
Ethernet Controller Amount	Yes See also page 108 1
POWERLINK Amount Station number switches	Yes, also see page 106 1 2 pcs.
X2X Link Amount Status LED	Yes, also see page 104 1 Yes, see page 106
CAN bus Amount Transfer rate Node switch Terminating resistor Status LED	See also page 104 1 Max. 500 kbit/s Yes Yes, can be activated using a switch Yes, see page 106
CompactFlash Type Amount	See also page 134 Type I 2
Serial interface Amount Type UART Transfer rate Connection	See also page 102 or page 103 2 RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Amount Transfer rate Connection Current load	See also page 113 USB 2.0 4 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) Type A Max. 500 mA or 1 A per connection

Table 26: Technical data - APC620 embedded variant

Features	APC620 embedded variant
Reset button	Yes, accessible behind the orange cover
LEDs	3 directed outwards via fiber optic lines, also see section "Status LEDs Power, CF, Link (only APC620 embedded)", on page 130
Add-on UPS slot	Yes
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	 24 VDC ±25% 3.8 A Typ. 7 A, max. 40 A for < 300 µs Component-dependent, see section 2.11 "Power management for the APC620 embedded system unit"
Mechanical characteristics	
Housing[3)] Material Paint Front cover	 Galvanized plate, plastic Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV) Colored orange plastic (similar to Pantone 144CV)
Outer dimensions	See "Dimensions", on page 74
Weight	Approx. 1.4 kg (component-dependent)
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 Component-dependent, see the section about ambient temperature on page 75 -20 to +60°C -20 to +60°C
Relative humidity Operation Bearings Transport	 Component-dependent, see section "Humidity specifications", on page 99 Component-dependent, see section "Humidity specifications", on page 99 Component-dependent, see section "Humidity specifications", on page 99
Vibration[4)] Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock[5)] Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20
Altitude Operation	 max. 3000 m[5)] (component-dependent)
Electromagnetic compatibility	
Emissions Network-related emissions Emissions	 EN 61000-6-4, EN 55022 A EN 61000-6-4, EN 55011 class A, EN 55022 class A, EN 61131-2, 47 CFR Part 15

Table 26: Technical data - APC620 embedded variant (Forts.)

Electromagnetic compatibility	APC620 embedded variant
Immunity	
Electrostatic discharge (ESD)	EN 61000-6-2, EN 61131-2, EN 55024
High-frequency electromagnetic fields	EN 61000-6-2, EN 61131-2, EN 55024
High-speed transient disturbances (Burst)	EN 61000-6-2, EN 61131-2, EN 55024
Surges	EN 61000-6-2, EN 61131-2, EN 55024
Conducted values	EN 61000-6-2, EN 61131-2, EN 55024
Magnetic fields with electrical frequencies	EN 61000-6-2, EN 61131-2, EN 55024
Voltage dips, interruptions	EN 61000-6-2, EN 61131-2, EN 55024
Damped vibration	EN 61000-6-2, EN 61131-2, EN 55024

Table 26: Technical data - APC620 embedded variant (Forts.)

1) Maintenance controller extended.

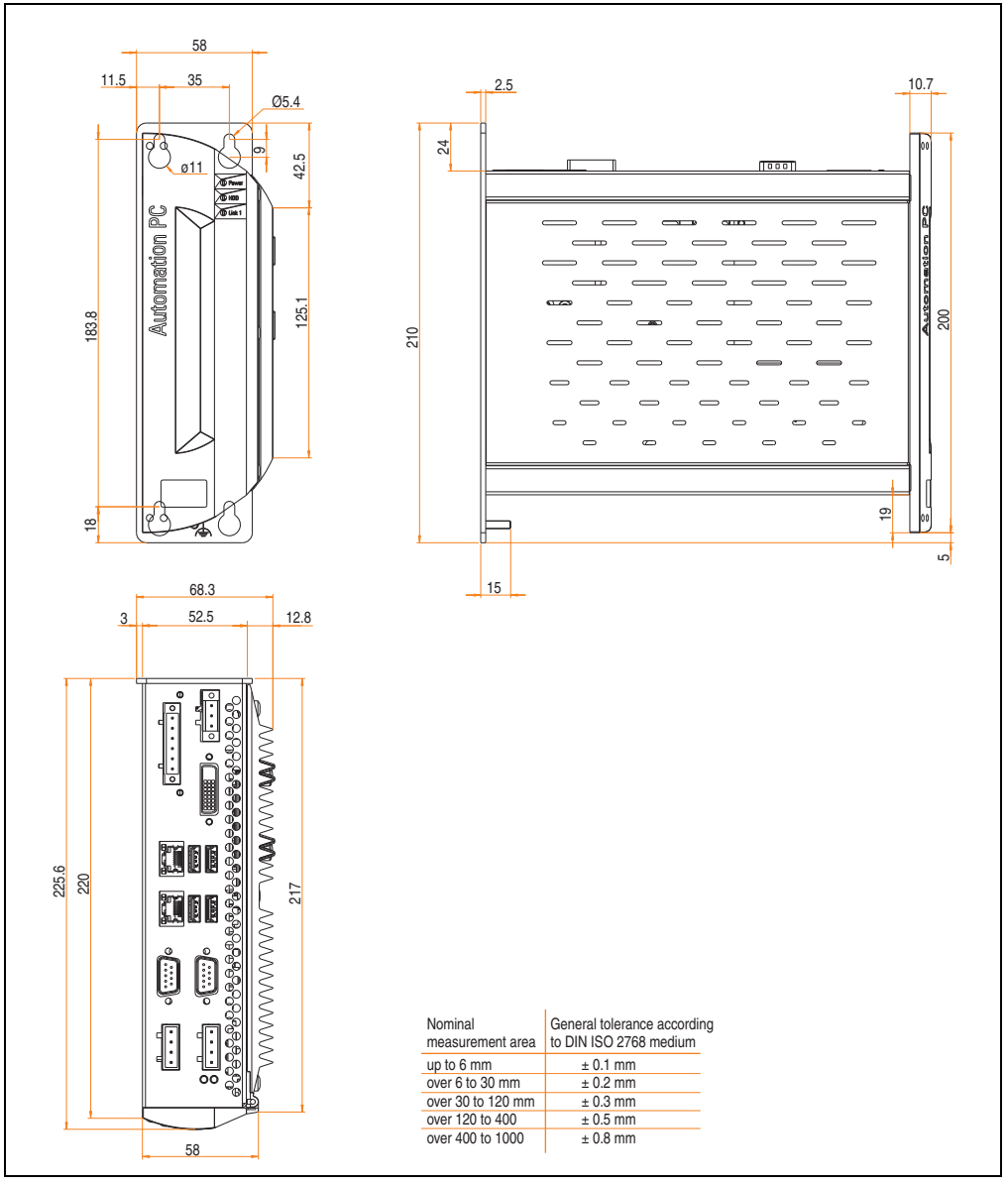
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.

3) Depending on the process or batch, there may be visible deviations in the color and surface structure.

4) Maximum values, as long as no other individual component specifies any other.

5) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

2.5.3 Dimensions



Nominal measurement area	General tolerance according to DIN ISO 2768 medium
up to 6 mm	± 0.1 mm
over 6 to 30 mm	± 0.2 mm
over 30 to 120 mm	± 0.3 mm
over 120 to 400	± 0.5 mm
over 400 to 1000	± 0.8 mm

Figure 21: APC620 embedded variant - dimensions

2.6 Ambient temperatures for systems with an X945 CPU board

It is possible to combine CPU boards with various other components, such as drives, main memory, additional insert cards, etc. dependent on system unit and fan kit. The various configurations result in varying maximum possible ambient temperatures, which can be seen in the following graphic (see figure 2.6 "Ambient temperatures for systems with an X945 CPU board", on page 75).

Information:

The maximum specified ambient temperatures were determined under worst-case conditions.

Experience has shown that higher ambient temperatures can be reached under typical conditions, e.g. using Microsoft Windows. The testing and evaluation is to be done on-site by the user (temperatures can be read in BIOS or using the B&R Control Center, see the chapter 4 "Software", on page 269).

Worst-case conditions for systems with an X945 CPU board

- Thermal Analysis Tool V1.4 from Intel for simulating 100% processor load.
- BurnIn testing tool (BurnIn V4.0 Pro from Passmark Software) to simulate a 100% load on the interface via loop-back adapters (serial interfaces, add-on and slide-in drives, USB ports, audio outputs)
- Maximum system extension and power consumption.

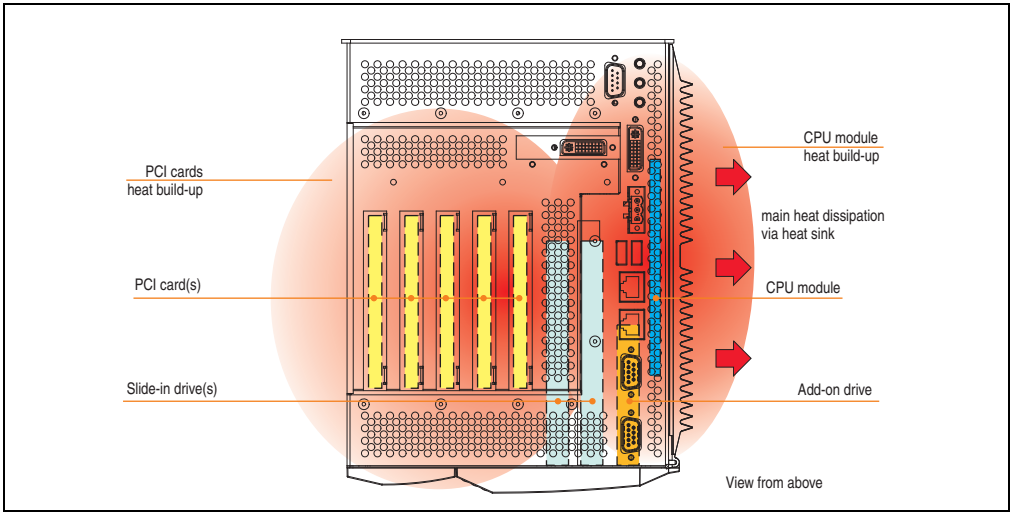


Figure 22: Example of worst-case conditions for temperature measurement

2.6.1 Maximum ambient temperature

All temperature values in degrees celsius (°C) at 500 meters above sea level.

Derating of the maximum ambient temperature, generally 1°C per 1000 meters start at 500 meters above sea level.

③	② Maximale Umgebungstemperatur What can also be operated at the max. ambient temperature, or are there limits?	① Without fan kit N270 5PC600.X945-00	① With fan kit N270 5PC600.X945-00	Temperature limits	Location of sensor(s)
		50	55		
Add-on drive	On-board CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-00 (24 hours / standard)	-/30	30/40	45/55	
	5AC600.HDDI-05	✓	✓	80	
	5AC600.HDDI-06	✓	✓	80	
Slide-in drive	5AC600.FDDS-00	40	45	50	Slide-in drive 1 and 2
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
System units	5PC600.SX01-00	✓	✓	95	Power supply
	5PC600.SX02-00 / -01	✓	✓	95	
	5PC600.SF03-00	✓	✓	95	
	5PC600.SX05-00 / -01	✓	✓	95	
Additional insert cards interfaces / AP Link	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	
	5AC600.SDL0-00	✓	✓	-	
	5ACPCI.RAIC-03 (24 hours/default) [1]	✓	✓	-	
	5ACPCI.RAIC-05 (24 hours/default)	45	50	-	

1) 24 hour operation = 732 POH (Power On Hours) per month, standard operation = 250 POH or 333 POH (Power On Hours) per month.

Figure 23: Ambient temperatures for systems with an X945 CPU board

All temperatures in °C
at 500 m above sea level.

Derating of the maximum
ambient temperature typically 1°C
per 1000 m after 500 m above sea level.

	① Without fan kit		
	N270 5PC600.X945-00	Temperature limits	Sensor(s) in this location
② Maximum ambient temperature	50		
What can still be operated at maximum ambient temperature and what limits are there?			
③ System units embedded			
5PC600.SE00-00 < Rev C0	45	95	Power supply
5PC600.SE00-01 < Rev D0	45	95	
5PC600.SE00-02 < Rev D0	45	95	
5PC600.SE00-00 ≥ Rev C0	✓	95	
5PC600.SE00-01 ≥ Rev D0	✓	95	
5PC600.SE00-02 ≥ Rev D0	✓	95	

Figure 24: Ambient temperatures for embedded systems with an X945 CPU board

2.6.2 Minimum ambient temperature

For systems containing one of the following components, the minimum ambient temperature is +5°C: 5AC600.FDDS-00.
If none of these components are used, then the minimum ambient temperature is 0°C.

2.6.3 How is the the maximum ambient temperature determined?

1) Selection of the CPU board (use **with** or **without** fan kit).

2) The "maximum ambient temperature" line shows the maximum ambient temperature for the entire system when using this CPU board.

Information:

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

3) Incorporating additional drives (add-on, slide-in), main memory, additional insert cards, etc. can change the temperature limits of an APC620 system.

If there is a ✓ (checkmark) next to the component, it can be used at the maximum ambient temperature of the whole system without problems.

If there is a specific temperature, for example "35", next to the component, then the ambient temperature of the whole APC620 system cannot exceed this temperature.

Special case - RAID hard disks

For these hard disks, the limits will depend on whether the system is intended for 24-hour[1] or standard[1] operation.

Example 1: A temperature limit of "30/35" means
30°C for 24-hour operation and 35°C for standard operation.

Example 2: A temperature limit of "-/25" means
not intended for 24-hour operation and 25°C for standard operation.

Information:

It is generally recommended to use a fan kit when using RAID hard disks (5ACPCI.RAIC-03).

2.6.4 Temperature monitoring

The APC620 has temperature sensors in various places (I/O, power supply, slide-in drive 1, slide-in drive 2). The locations of the temperature sensors can be found in the figure "Temperature sensor locations", on page 547. The value listed in the table represents the defined maximum temperature for this measurement point[2]. An alarm is not triggered when this temperature is exceeded. The temperatures[2] can be read in BIOS (menu item "Advanced" - Baseboard/panel features - Baseboard monitor) or in Microsoft Windows XP/Embedded, using the B&R Control Center.
Additionally, the hard disks for APC620 systems available from B&R are equipped with S.M.A.R.T, or Self Monitoring, Analysis, and Reporting Technology. This makes it possible to read various parameters, for example the temperature, using software (e.g. HDD thermometer - freeware) in Microsoft Windows XP/Embedded.

1) 24-hour operation = 732 POH (Power On Hours) per month, standard operation = 250 POH or 333 POH (Power On Hours) per month.
2) The measured temperature is a guideline for the immediate ambient temperature, but can be influenced by neighboring components.

2.7 Power management APC620 system unit with 1 PCI slot

2.7.1 Supply voltage for the 5PC600.SX01-00 revision >= I0

The following block diagram presents the simplified structure of the APC620 supply voltage for 5PC600.SX01-00 system units starting with revision I0.

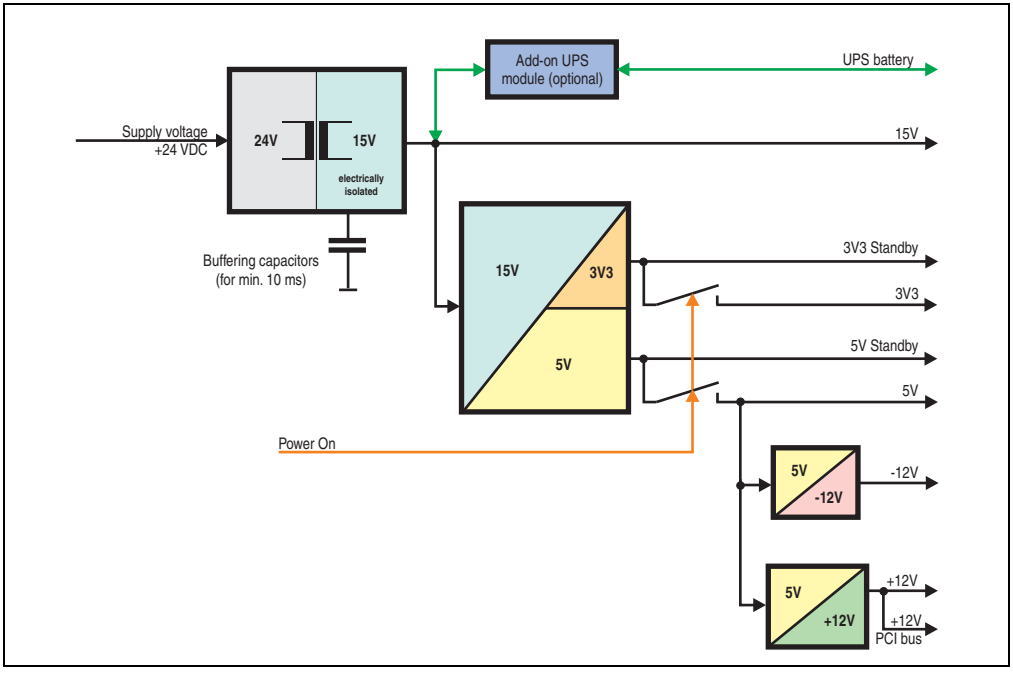


Figure 25: Supply voltage for the 5PC600.SX01-00 revision >= I0

Explanation:

The supply voltage is converted to 15 V with a DC/DC converter. These electrically isolated 15 V feed four further DC/DC converters, which generate the remaining voltages.

After the system is turned on (e.g. using the power button), the voltages 3V3 and 5 V are placed on the bus. Two additional DC/DC converters at the 5 V output generate
-12 V and -12 V, which is then applied to the bus.

The optional APC620 add-on UPS and battery unit is supplied with 15 V and provides an uninterrupted power supply from the 15 V bus during power failures.

2.7.2 Power calculation with 5PC600.SX01-00 revision >= I0

Information:	5PC600.SX01-00	This system
All entries in watts The values for the **suppliers** are maximum values. The values for the **devices** are average maximum values, but not peak values.	N270 5PC600.X945-00	Enter values in this column
Total power supply (maximum)		**70**
Add-on UPS module, optional	7,5	
Maximum possible at 5V		**70**
CPU board, fixed device	16	
Per CompactFlash, optional (add-on, slide-in)	1	
Hard Disk, optional (add-on, slide-in)	4	
External keyboard PS/2, optional	1	
USB peripheral, optional (max. 2.5 watts per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) [1]		
External device, optional (via BaseBoard)	5	
Devices 5V ∑		
Maximum possible at +12V		**12**
Fan kit, optional	2.5	
External device, optional (via BaseBoard)	10	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 12 watts with fan kit) [1]		
Devices +12V ∑		
Maximum possible at -12V		**1.2**
PCI card manufacturer limit, optional (max. 1.2 watts with and without fan kit)[1]		
Devices -12V ∑		
Devices total 5V ∑		
Maximum possible at 3V3		**23**
System unit, fixed device	4	
Interface option (add-on interface), optional	0.25	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) [1]		
Devices 3V3 ∑		
Devices total ∑		

Total power supply; 5V; +12V; -12V; 3V3

1) The total performance of one PCI card per PCI slot (= sum of power consumption for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

See section "Starting current", on page 115 for starting current values.

2.7.3 Supply voltage for the 5PC600.SX01-00 revision < I0

The following block diagram presents the simplified structure of the APC620 supply voltage for 5PC600.SX01-00 system units starting with revision < I0.

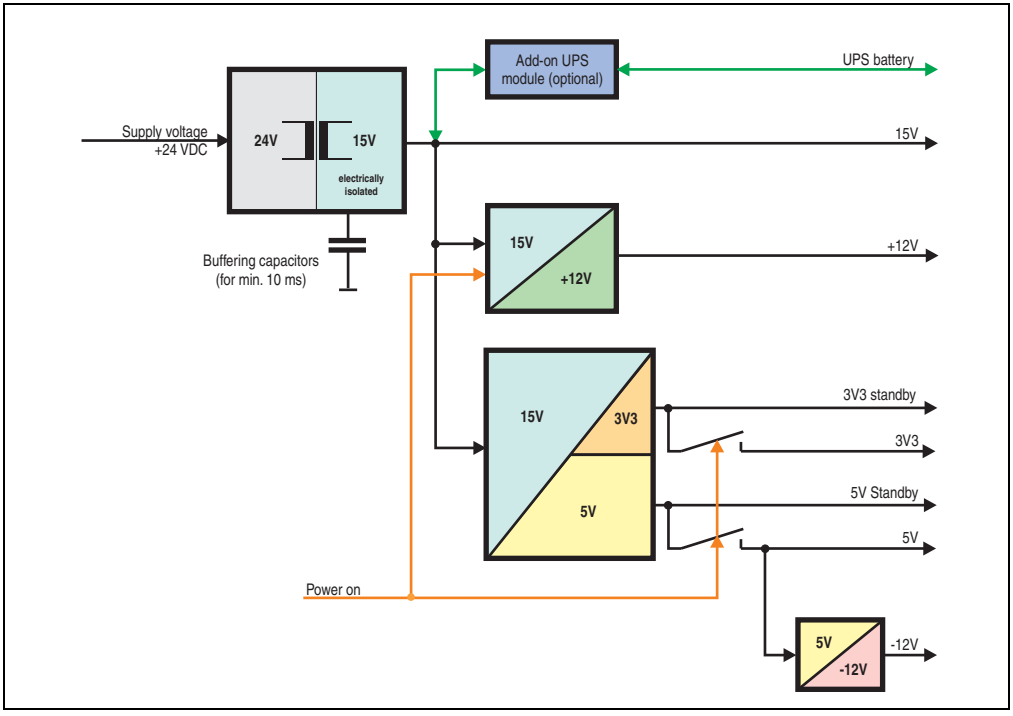


Figure 26: Supply voltage for the 5PC600.SX01-00 revision < I0

Explanation:

The supply voltage is converted to 15 V with a DC/DC converter. These electrically isolated 15 volts feed two further DC/DC converters. One generates +12 V, and the other 3V3 and 5V standby.

After the system is turned on (e.g. using the power button), the voltages 3V3, 5 V, +12 V are placed on the bus. At the 5 V output, yet another DC/DC converter generates -12 V, and places these on the bus.

The optional APC620 add-on UPS and battery unit is supplied with 15 V and provides an uninterrupted power supply from the 15 V bus during power failures.

2.7.4 Power calculation with 5PC600.SX01-00 revision < I0

Information:	5PC600.SX01-00	This system
All entries in watts The values for the **suppliers** are maximum values. The values for the **devices** are average maximum values, but not peak values.	N270 5PC600.X945-00	Enter values in this column
Total power supply (maximum)		**70**
Add-on UPS module, optional	7.5	
5V – Maximum possible at 5V		**55**
CPU board, fixed device	16	
Per CompactFlash, optional (add-on, slide-in)	1	
Hard disk, optional (add-on, slide-in)	4	
External keyboard PS/2, optional	1	
USB peripheral, optional (max. 2.5 watts per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) [1]		
External device, optional (via BaseBoard)	5	
Devices 5V $\sum$		
-12V – Maximum possible at -12V		**1.2**
PCI card manufacturer limit, optional (max. 1.2 watts with and without fan kit)[1]		
Devices -12V $\sum$		
Devices total 5V $\sum$		
3V3 – Maximum possible at 3V3		**23**
System unit, fixed device	4	
Interface option (add-on interface), optional	0.25	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) [1]		
Devices 3V3 $\sum$		
+12V – Maximum possible at +12V		**12**
Fan kit, optional	2.5	
External device, optional (via BaseBoard)	10	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 12 watts with fan kit) [1]		
Devices +12V $\sum$		
Devices total $\sum$		

1) The total performance of one PCI card per PCI slot (= sum of power consumption for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

See section "Starting current", on page 115 for starting current values.

2.8 Power management APC620 system units with 2 PCI slots

2.8.1 Supply voltage for the 5PC600.SX02-00 revision >= H0 and 5PC600.SX02-01 revision >= K0)

The following block diagram presents the simplified structure of the APC620 supply voltage for system units 5PC600.SX02-00 (revision H0 and higher), 5PC600.SX02-01 (revision K0 and higher).

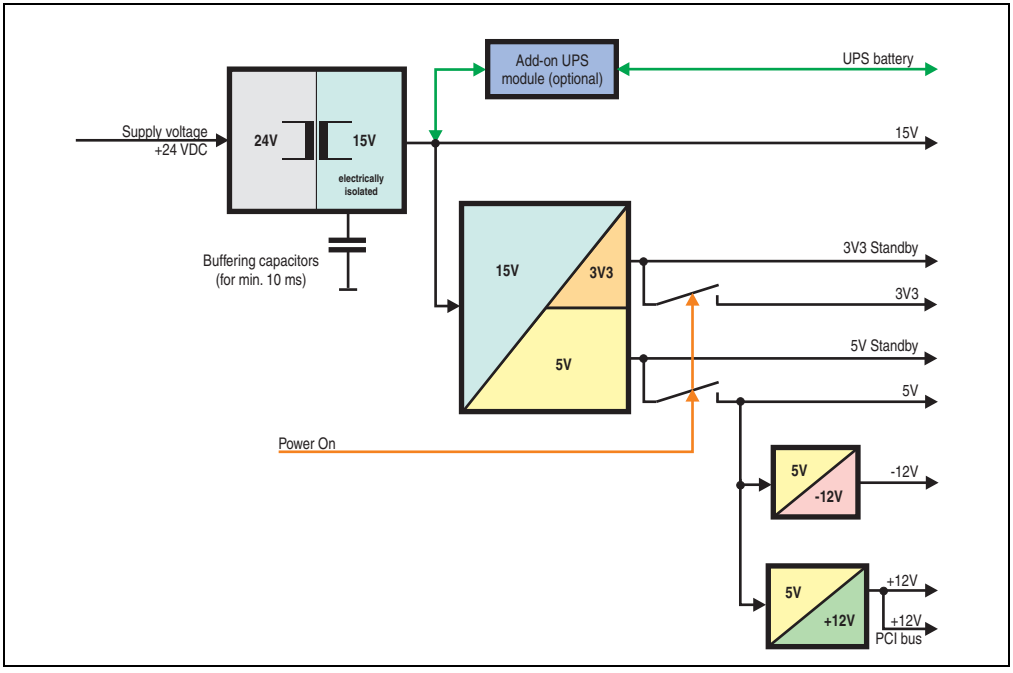


Figure 27: Supply voltage for the 2 PCI slots (dependent on system unit version)

Explanation:

The supply voltage is converted to 15 V with a DC/DC converter. These electrically isolated 15 V feed four further DC/DC converters, which generate the remaining voltages.

After the system is turned on (e.g. using the power button), the voltages 3V3 and 5 V are placed on the bus. Two additional DC/DC converters at the 5 V output generate
-12 V and -12 V, which is then applied to the bus.

The optional APC620 add-on UPS and battery unit is supplied with 15 V and provides an uninterrupted power supply from the 15 V bus during power failures.

2.8.2 Power calculation with 5PC600.SX02-00 revision >= H0

Information:	5PC600.SX02-00	This system
All entries in watts The values for the **suppliers** are maximum values. The values for the **devices** are average maximum values, but not peak values.	N270 5PC600.X945-00	Enter values in this column
Total power supply (maximum)		**70**
Add-on UPS module, optional	7.5	
Maximum possible at 5V		**70**
CPU board, fixed device	16	
Per CompactFlash, optional (add-on, slide-in)	1	
Hard disk, optional (add-on, slide-in)	4	
Per drive, optional (slide-in CD,DVD CD-RW)	4	
External keyboard PS/2, optional	1	
USB peripheral, optional (max. 2.5 watts per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
Graphics adapter (AP Link), optional	5	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) 1)		
External device, optional (via BaseBoard)	5	
Devices 5V $\sum$		
Maximum possible at +12V		**12**
Fan kit, optional	2.5	
External device, optional (via BaseBoard)	10	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 12 watts with fan kit) 1)		
Devices +12V $\sum$		
Maximum possible at -12V		**1.2**
PCI card manufacturer limit, optional (max. 1.2 watts with and without fan kit)1)		
Devices -12V $\sum$		
Devices total 5V $\sum$		
Maximum possible at 3V3		**23**
System unit, fixed device	4	
Graphics adapter (AP Link), optional	5	
Interface option (add-on interface), optional	0.25	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) 1)		
Devices 3V3 $\sum$		
Devices total $\sum$		

Total power supply; 5V; +12V; -12V; 3V3

1) The total performance of one PCI card per PCI slot (= sum of power consumption for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

See section "Starting current", on page 115 for starting current values.

2.8.3 Power calculation with 5PC600.SX02-01 revision >= K0

Information:	5PC600.SX02-01	This system
All entries in watts The values for the **suppliers** are maximum values. The values for the **devices** are average maximum values, but not peak values.	N278 5PC600.X945-00	Enter values in this column
Total power supply (maximum)		**70**
Add-on UPS module, optional	7.5	
Maximum possible at 5V		**70**
CPU board, fixed device	16	
Per CompactFlash, optional (add-on, slide-in)	1	
Hard disk, optional (add-on, slide-in)	4	
Per drive, optional (slide-in CD, DVD, CD-RW)	4	
External keyboard PS/2, optional	1	
USB peripheral, optional (max. 2.5 watts per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) [1]		
External device, optional (via BaseBoard)	5	
Devices 5V Σ		
Maximum possible at -12V		**1.2**
PCI card manufacturer limit, optional (max. 1.2 watts with and without fan kit)[1]		
Devices -12V Σ		
Devices total 5V Σ		
Maximum possible at 3V3		**23**
System unit, fixed device	4	
Interface option (add-on interface), optional	0.25	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) [1]		
Devices 3V§ Σ		
Maximum possible at +12V		**12**
Fan kit, optional	2.5	
External device, optional (via BaseBoard)	10	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 12 watts with fan kit)[1]		
Devices +12V Σ		
Devices total Σ		

Total power supply; 5V; -12V; 3V3; +12V

1) The total performance of one PCI card per PCI slot (= sum of power consumption for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

See section "Starting current", on page 115 for starting current values.

2.8.4 Supply voltage for the 5PC600.SX02-00 revision < H0 and 5PC600.SX02-01 revision < K0

The following block diagram presents the simplified structure of the APC620 supply voltage for system units 5PC600.SX02-00 (revision < H0 and higher), 5PC600.SX02-01 (revision < K0 and higher).

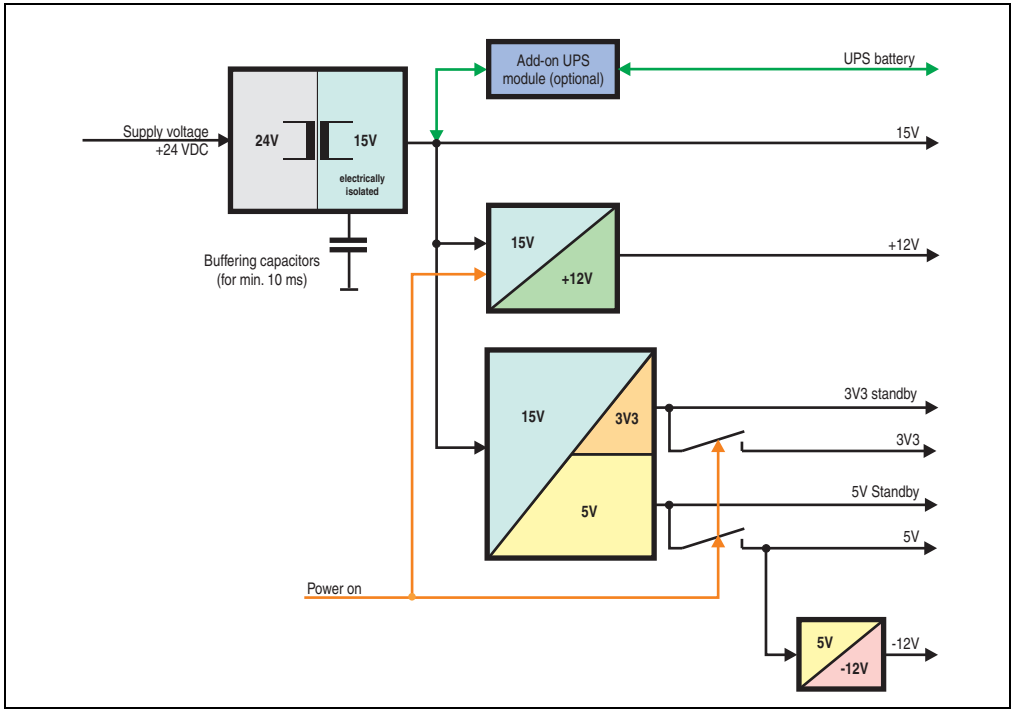


Figure 28: Supply voltage for the 2 PCI slots (dependent on system unit version)

Explanation:

The supply voltage is converted to 15 V with a DC/DC converter. These electrically isolated 15 volts feed two further DC/DC converters. One generates +12 V, and the other 3V3 and 5V standby.

After the system is turned on (e.g. using the power button), the voltages 3V3, 5 V, +12 V are placed on the bus. At the 5 V output, yet another DC/DC converter generates -12 V, and places these on the bus.

The optional APC620 add-on UPS and battery unit is supplied with 15 V and provides an uninterrupted power supply from the 15 V bus during power failures.

2.8.5 Power calculation with 5PC600.SX02-00 revision < H0

Information:	5PC600.SX02-00	This system
All entries in watts The values for the **suppliers** are maximum values. The values for the **devices** are average maximum values, but not peak values.	N270 5PC600.X945-00	Enter values in this column
Total power supply (maximum)		**70**
Add-on UPS module, optional	7.5	
Maximum possible at 5V		**55**
CPU board, fixed device	16	
Per CompactFlash, optional (add-on, slide-in)	1	
Hard disk, optional (add-on, slide-in)	4	
Per drive, optional (slide-in CD, DVD, CD-RW)	4	
External keyboard PS/2, optional	1	
USB peripheral, optional (max. 2.5 watts per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
Graphics adapter (AP Link), optional	5	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) 1)		
External device, optional (via BaseBoard)	5	
Devices 5V $\sum$		
Maximum possible at -12V		**1.2**
PCI card manufacturer limit, optional (max. 1.2 watts with and without fan kit)1)		
Devices -12V $\sum$		
Devices total 5V $\sum$		
Maximum possible at 3V3		**23**
System unit, fixed device	4	
Graphics adapter (AP Link), optional	5	
Interface option (add-on interface), optional	0.25	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) 1)		
Devices 3V3 $\sum$		
Maximum possible at +12V		**12**
Fan kit, optional	2.5	
External device, optional (via BaseBoard)	10	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 12 watts with fan kit)1)		
Devices +12V $\sum$		
Devices total $\sum$		

Total power supply: 5V; -12V; 3V3; +12V

1) The total performance of one PCI card per PCI slot (= sum of power consumption for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

See section "Starting current", on page 115 for starting current values.

2.8.6 Power calculation with 5PC600.SX02-01 revision < K0

Information:	5PC600.SX02-01	This system
All entries in watts The values for the **suppliers** are maximum values. The values for the **devices** are average maximum values, but not peak values.	N270 5PC600.X945-00	Enter values in this column
Total power supply (maximum)		**70**
Add-on UPS module, optional	7.5	
Maximum possible at 5V		**55**
CPU board, fixed device	16	
Per CompactFlash, optional (add-on, slide-in)	1	
Hard disk, optional (add-on, slide-in)	4	
Per drive, optional (slide-in CD, DVD, CD-RW)	4	
External keyboard PS/2, optional	1	
USB peripheral, optional (max. 2.5 watts per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) [1]		
External device, optional (via BaseBoard)	5	
Devices 5V $\sum$		
Maximum possible at -12V		**1.2**
PCI card manufacturer limit, optional (max. 1.2 watts with and without fan kit)[1]		
Devices -12V $\sum$		
Devices total 5V $\sum$		
Maximum possible at 3V3		**23**
System unit, fixed device	4	
Interface option (add-on interface), optional	0.25	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) [1]		
Devices 3V3 $\sum$		
Maximum possible at +12V		**12**
Fan kit, optional	2.5	
External device, optional (via BaseBoard)	10	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 12 watts with fan kit)[1]		
Devices +12V $\sum$		
Devices total $\sum$		

Total power supply; 5V; -12V; 3V3; +12V

1) The total performance of one PCI card per PCI slot (= sum of power consumption for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

See section "Starting current", on page 115 for starting current values.

2.9 Power management APC620 system unit with 3 PCI slots

2.9.1 5PC600.SF03-00 supply voltage

The following block diagram presents the simplified structure of the APC620 supply voltage for system units 5PC600.SF03-00.

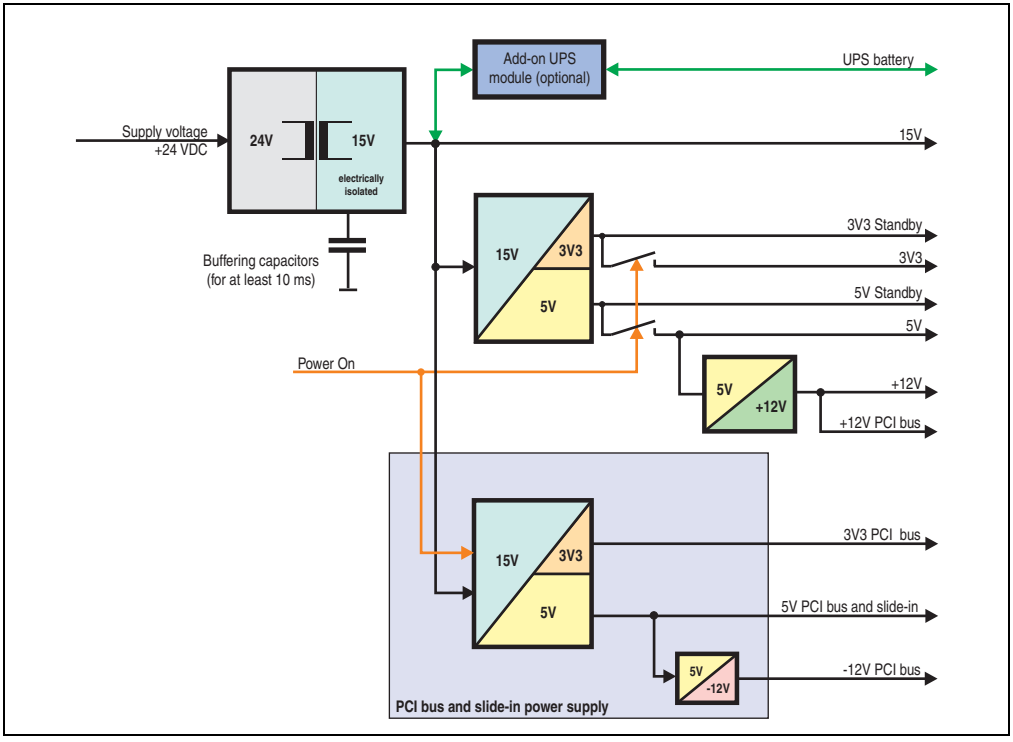


Figure 29: Supply voltage block diagram 3 PCI slots

Explanation:

Systems with 3 PCI slots have an additional power supply for the PCI buses and the slide-in drive. The supply voltage is converted to 15 V with a DC/DC converter. These electrically isolated 15 volts feed two further DC/DC converters. One generates 5 V for an additional DC/DC converter, which produces +12 V and +12V PCI bus voltage. The other DC/DC converter produces 3V3 and 5V standby.
After the system is turned on (e.g. using the power button), the voltages 3V3, 5 V, +12 V are placed on the bus. At the 5 V output, yet another DC/DC converter generates -12 V, and places these on the bus.

The optional APC620 add-on UPS and battery unit is supplied with 15 V and provides an uninterrupted power supply from the 15 V bus during power failures.

2.9.2 Power calculation with system unit 5PC600.SF03-00

Information:	5PC600.SF03-00	This system
All entries in watts The values for the **suppliers** are maximum values. The values for the **devices** are average maximum values, but not peak values.	5PC600.X945-00 N270	Enter values in this column
Total power supply (maximum)		**110**
Add-on UPS module, optional	7.5	
5V – Maximum possible at 5V		**70**
CPU board, fixed device	16	
Per CompactFlash, optional (add-on)	1	
Hard disk, optional (add-on)	4	
External keyboard PS/2, optional	1	
USB peripheral, optional (max. 2.5 watts per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
Graphics adapter (AP Link), optional	5	
External device, optional (via BaseBoard)	5	
+12V – Maximum possible at +12V		**24**
Fan kit, optional	2.5	
External device, optional (via BaseBoard)	10	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 12 watts with fan kit) [1]		
Devices total 5V ∑		
3V3 – Maximum possible at 3V3		**23**
System unit, fixed device	4	
Graphics adapter (AP Link), optional	5	
Interface option (add-on interface), optional	0.25	
Devices ∑		
PCI bus and slide-in power supply rating (maximum)		**50**
5V – Maximum possible at 5V PCI bus and slide-in		**50**
Pro CompactFlash, optional (slide-in)	1	
Pro Hard Disk, optional (slide-in)	4	
Pro Laufwerk, optional (slide-in - CD/DVD)	4	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) [1]		
-12V – Maximum possible at -12V PCI bus and slide-in		**1.2**
PCI card manufacturer limit, optional (max. 1.2 watts with and without fan kit) [1]		
Devices -12V ∑		
Devices total 5V ∑		
3V3 – Maximum possible at 3V3 PCI bus and slide-in		**23**
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) [1]		
Devices 3V3 ∑		
PCI bus and slide-in total ∑		
Devices total ∑		

1) The total performance of one PCI card per PCI slot (= sum of power consumption for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

See section "Starting current", on page 115 for starting current values.

2.10 Power management APC620 system units with 5 PCI slots

2.10.1 Supply voltage for the 5PC600.SX05-00 (revision >= H0) and 5PC600.SX05-01 (revision >= H0)

The following block diagram presents the simplified structure of the APC620 supply voltage for system units 5PC600.SX05-00 (Revision H0), 5PC600.SX05-01 (Revision H0).

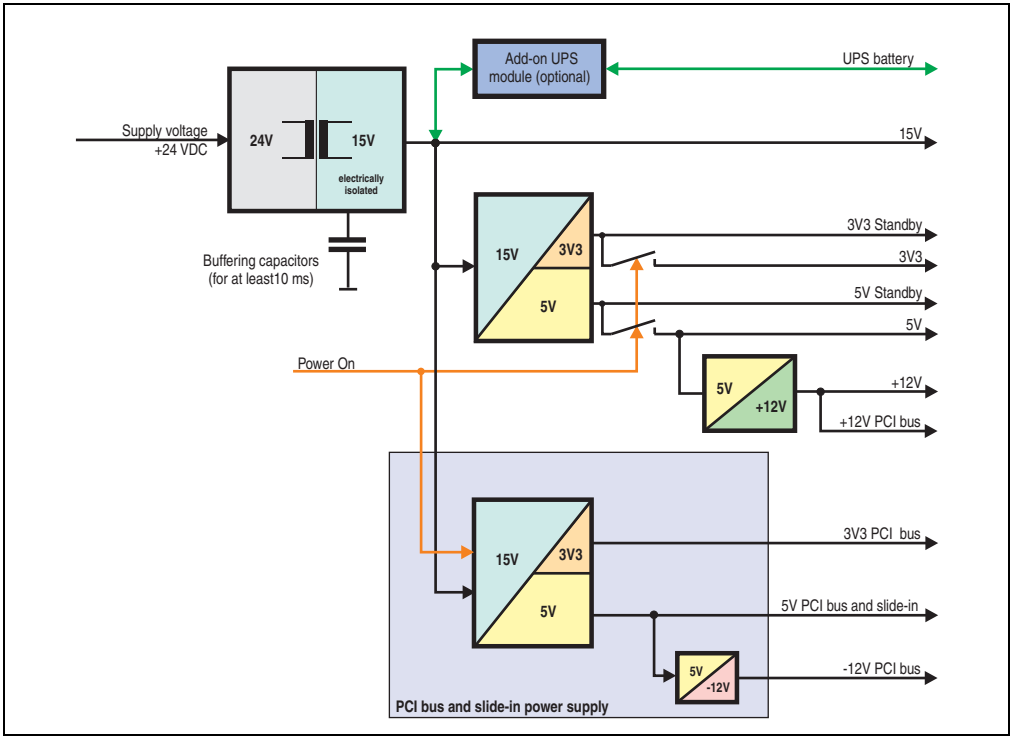


Figure 30: Supply voltage for the 5 PCI slots (dependent on system unit version)

Explanation:

Systems with 5 PCI slots have an additional power supply for the PCI buses and the slide-in drive. The supply voltage is converted to 15 V with a DC/DC converter. These electrically isolated 15 volts feed two further DC/DC converters. One generates 5 V for an additional DC/DC converter, which produces +12 V and +12V PCI bus voltage. The other DC/DC converter produces 3V3 and 5V standby.
After the system is turned on (e.g. using the power button), the voltages 3V3, 5 V, +12 V are placed on the bus. At the 5 V output, yet another DC/DC converter generates -12 V, and places these on the bus.

The optional APC620 add-on UPS and battery unit is supplied with 15 V and provides an uninterrupted power supply from the 15 V bus during power failures.

2.10.2 Power calculation with system unit 5PC600.SX05-00 (revision >= H0)

Information:	5PC600.SX05-00	This system
All entries in watts The values for the **suppliers** are maximum values. The values for the **devices** are average maximum values, but not peak values.	N270 5PC600.X945-00	Enter values in this column
Total power supply (maximum)		**110**
Add-on UPS module, optional	7.5	
Maximum possible at 5V		**70**
CPU board, fixed device	16	
Per CompactFlash, optional (add-on)	1	
Hard disk, optional (add-on)	4	
External keyboard PS/2, optional	1	
USB peripheral, optional (max. 2.5 watts per USB1 and USB2 connection)	5	
Schnittstellenoption (Add-On Interface), optional	0.5	
Grafikadapter (AP Link), optional	5	
External device, optional (via BaseBoard)	5	
Maximum possible at +12V		**24**
Fan kit, optional	2.5	
External device, optional (via BaseBoard)	10	
PCI card manufacturer limit, optional [1] (max. 3 watts without fan kit, max. 17 watts with fan kit)		
Devices total 5V $\sum$		
Maximum possible at 3V3		**23**
System unit, fixed device	4	
Grafikadapter (AP Link), optional	5	
Interface option (add-on interface), optional	0.25	
Devices 3V3 $\sum$		
PCI bus and slide-in power supply rating (maximum)		**50**
Maximum possible at 5V PCI bus and slide-in		**50**
Per CompactFlash, optional (slide-in)	1	
Per hard disk, optional (slide-in)	4	
Per drive, optional (slide-in - CD/DVD)	4	
PCI card manufacturer limit, optional [1] (max. 3 watts without fan kit, max. 17 watts with fan kit)		
Devices 5V $\sum$		
Maximum possible at -12V PCI bus		**1.2**
PCI card manufacturer limit,optional [1] (max. 1.2 watts with and without fan kit)		
Devices -12V $\sum$		
Devices total +5V $\sum$		
Maximum possible at 3V3 PCI bus		**23**
PCI card manufacturer limit, optional [1] (max. 3 watts without fan kit, max. 17 watts with fan kit)		
Devices 3V3 $\sum$		
PCI bus and slide-in total $\sum$		
Devices total $\sum$		

Total power supply; 5V; +12V; 3V3; PCI bus and slide-in power supply; 5V; -12V; 3V3

1) The total performance of one PCI card per PCI slot (= sum of power consumption for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

See section "Starting current", on page 115 for starting current values.

2.10.3 Power calculation with system unit 5PC600.SX05-01 (revision >= H0)

Information:	5PC600.SX05-01	This system
All entries in watts The values for the **suppliers** are maximum values. The values for the **devices** are average maximum values, but not peak values.	N270 5PC600.X945-00	Enter values in this column
Total power supply (maximum)		**110**
Add-on UPS module, optional	7.5	
Maximum possible at 5V		**70**
CPU board, fixed device	16	
Per CompactFlash, optional (add-on)	1	
Hard disk, optional (add-on)	4	
Externe Tastatur PS/2, optional	1	
USB peripheral, optional (max. 2.5 watts per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
External device, optional (via BaseBoard)	5	
Maximum possible at +12V		**24**
Fan kit, optional	2.5	
External device, optional (via BaseBoard)	10	
PCI card manufacturer limit, optional 1) (max. 3 watts without fan kit, max. 12 watts with fan kit)		
Devices total 5V $\sum$		
Maximum possible at 3V3		**23**
System unit, fixed device	4	
Interface option (add-on interface), optional	0.25	
Devices 3V3 $\sum$		
PCI bus and slide-in power supply rating (maximum)		**50**
Maximum possible at 5V PCI bus and slide-in		**50**
Per CompactFlash, optional (slide-in)	1	
Per hard disk, optional (slide-in)	4	
Per drive, optional (slide-in - CD/DVD)	4	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) 1)		
Maximum possible at -12V PCI bus and slide-in		**1.2**
PCI card manufacturer limit, optional (max. 1.2 watts with and without fan kit) 1)		
Devices -12V $\sum$		
Devices total 5V $\sum$		
Maximum possible at 3V3 PCI bus and slide-in		**23**
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) 1)		
Devices 3V3 $\sum$		
PCI bus and slide-in total $\sum$		
Devices total $\sum$		

Total power supply: 5V; +12V; 3V3
PCI bus and slide-in power supply: 5V; -12V; 3V3

1) The total performance of one PCI card per PCI slot (= sum of power consumption for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

See section "Starting current", on page 115 for starting current values.

2.10.4 Supply voltage for the 5PC600.SX05-00 (revision < H0) and 5PC600.SX05-01 (revision <= H0)

The following block diagram presents the simplified structure of the APC620 supply voltage for system units 5PC600.SX05-00 (Revision < H0), 5PC600.SX05-01 (Revision < H0).

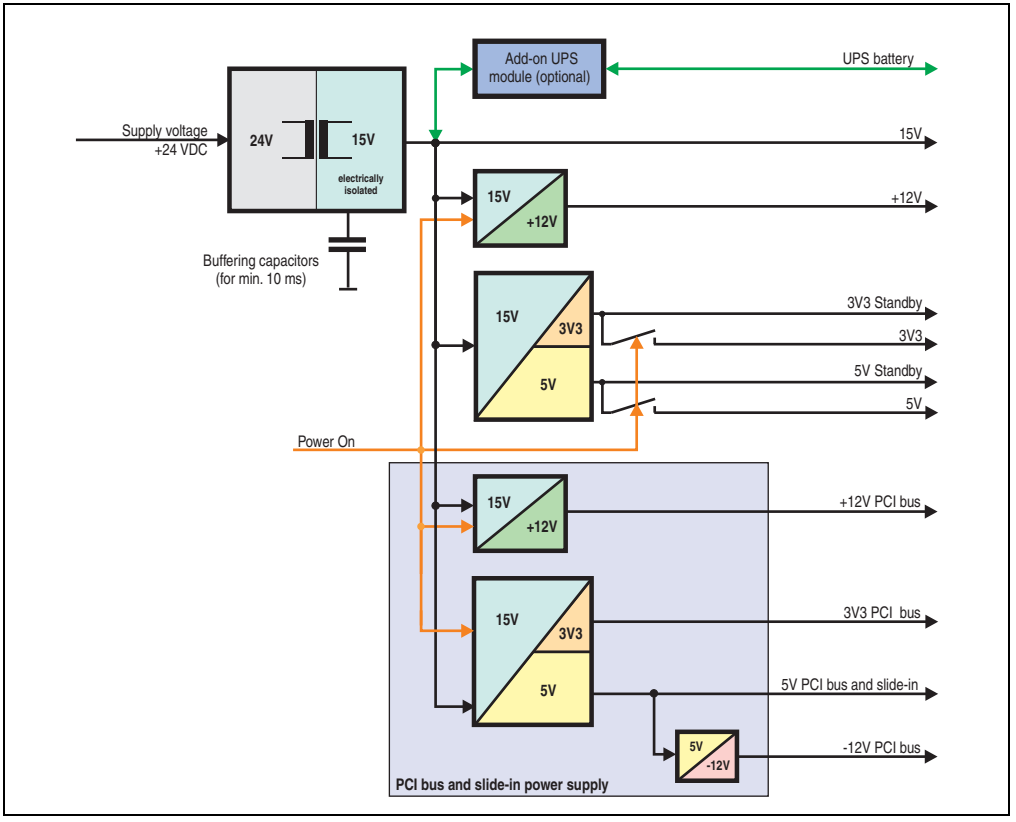


Figure 31: Supply voltage block diagram 5 PCI slots (dependent on system unit version)

Explanation:

Systems with 5 PCI slots have two additional power supplies for the PCI bus and the slide-in drives. The supply voltage is converted to 15 V with a DC/DC converter. These electrically isolated 15 V feed four further DC/DC converters. Two generate +12 V, and the others generate 3V3 and 5V standby. After the system is turned on (e.g. using the power button), the voltages 3V3, 5 V, +12 V are placed on the bus. At the 5 V output, yet another DC/DC converter generates -12 V , and places these on the bus.

The optional APC620 add-on UPS and battery unit is supplied with 15 V and provides an uninterrupted power supply from the 15 V bus during power failures.

2.10.5 Power calculation with system unit 5PC600.SX05-05 revision < H0

Information:	5PC600.SX05-00	This system
All entries in watts The values for the **suppliers** are maximum values. The values for the **devices** are average maximum values, but not peak values.	5PC600.X945-00 N270	Enter values in this column
Total power supply (maximum)		**110**
Add-on UPS module, optional	7.5	
5V: Maximum possible at 5V		**55**
CPU board, fixed device	16	
Per CompactFlash, optional (add-on)	1	
Hard disk, optional (add-on)	4	
External keyboard PS/2, optional	1	
USB peripheral, optional (max. 2.5 watts per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
Graphics adapter (AP Link), optional	5	
External device, optional (via BaseBoard)	5	
Devices 5V ∑		
3V3: Maximum possible at 3V3		**23**
System unit, fixed device	4	
Graphics adapter (AP Link), optional	5	
Interface option (add-on interface), optional	0.25	
Devices 3V3 ∑		
+12V: Maximum possible at +12V		**12**
Fan kit, optional	2.5	
External device, optional (via BaseBoard)	10	
Devices +12V ∑		
PCI bus and slide-in power supply rating (maximum)		**50**
5V: Maximum possible at 5V PCI bus and slide-in		**50**
Per CompactFlash, optional (slide-in)	1	
Per hard disk, optional (slide-in)	4	
Per drive, optional (slide-in - CD/DVD)	4	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) [1]		
-12V: Maximum possible at -12V PCI bus and slide-in		**1.2**
PCI card manufacturer limit, optional (max. 1.2 watts with and without fan kit) [1]		
Devices total 5V ∑		
3V3: Maximum possible at 3V3 PCI bus and slide-in		**23**
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) [1]		
Devices 3V3 ∑		
+12V: Maximum possible at +12V PCI bus and slide-in		**12**
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 12 watts with fan kit) [1]		
Devices +12V ∑		
PCI bus and slide-in total ∑		
Devices total ∑		

1) The total performance of one PCI card per PCI slot (= sum of power consumption for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

See section "Starting current", on page 115 for starting current values.

2.10.6 Power calculation with system unit 5PC600.SX05-01 revision < H0

Information:	5PC600.SX05-01	This system
All entries in watts The values for the **suppliers** are maximum values. The values for the **devices** are average maximum values, but not peak values.	5PC600.X945-00 N270	Enter values in this column
Total power supply (maximum)		**110**
Add-on UPS module, optional	7.5	
5V – Maximum possible at 5V		**55**
CPU board, fixed device	16	
Per CompactFlash, optional (add-on)	1	
Hard disk, optional (add-on)	4	
External keyboard PS/2, optional	1	
USB peripheral, optional (max. 2.5 watts per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
External device, optional (via BaseBoard)	5	
Devices 5V Σ		
3V3 – Maximum possible at 3V3		**23**
System unit, fixed device	4	
Interface option (add-on interface), optional	0.25	
Devices 3V3 Σ		
+12V – Maximum possible at +12V		**12**
Fan kit, optional	2.5	
External device, optional (via BaseBoard)	10	
Devices +12V Σ		
PCI bus and slide-in power supply rating (maximum)		**50**
5V – Maximum possible at 5V PCI bus and slide-in		**50**
Per CompactFlash, optional (slide-in)	1	
Per hard disk, optional (slide-in)	4	
Per drive, optional (slide-in - CD/DVD)	4	
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) 1)		
-12V – Maximum possible at -12V PCI bus and slide-in		**1.2**
PCI card manufacturer limit, optional (max. 1.2 watts with and without fan kit) 1)		
Devices total 5V Σ		
3V3 – Maximum possible at 3V3 PCI bus and slide-in		**23**
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 17 watts with fan kit) 1)		
Devices 3V3 Σ		
+12V – Maximum possible at +12V PCI bus and slide-in		**12**
PCI card manufacturer limit, optional (max. 3 watts without fan kit, max. 12 watts with fan kit) 1)		
Devices +12V Σ		
PCI bus and slide-in total Σ		
Devices total Σ		

1) The total performance of one PCI card per PCI slot (= sum of power consumption for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

See section "Starting current", on page 115 for starting current values.

2.11 Power management for the APC620 embedded system unit

2.11.1 Supply voltage for the 5PC600.SE00-00, 5PC600.SE00-01 and 5PC600.SE00-02

The following block diagram presents the simplified structure of the APC620 embedded supply voltage for system units 5PC600.SE00-00, 5PC600.SE00-01 and 5PC600.SE00-02.

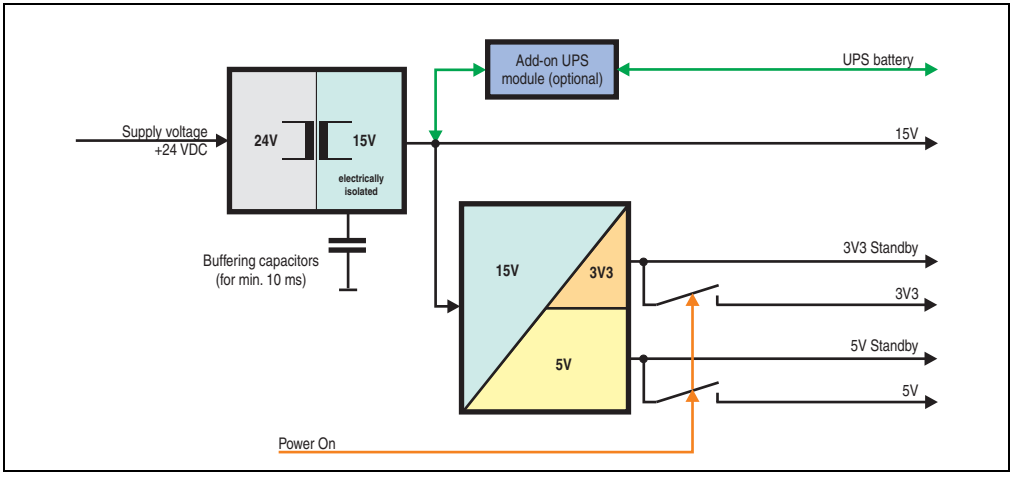


Figure 32: Supply voltage for the 5PC600.SE00-00, 5PC600.SE00-01 and 5PC600.SE00-02

Explanation:

The supply voltage is converted to 15 V with a DC/DC converter. These electrically isolated 15 V feed four further DC/DC converters, which generate the remaining voltages.

After the system is turned on (e.g. using the power button), the voltages 3V3 and 5 V are placed on the bus.

The optional APC620 add-on UPS and battery unit is supplied with 15 V and provides an uninterrupted power supply from the 15 V bus during power failures.

2.12 Humidity specifications

The following table displays the minimum and maximum humidity for the individual components that are relevant for the humidity limitations of the entire device. The lowest and highest common values are always used when establishing these limits.

Component		Operation	Storage / Transport
X945 CPU board		10 - 90%	5 - 95%
System units (all models)		5- 90%	5 - 95%
Main memory for CPU board		10 - 90%	5 - 95%
Add-on drives	5AC600.HDDI-05 (ET, 24x7)	5 - 90%	5 - 95%
	5AC600.HDDI-06 (ET, 24x7)	5 - 90%	5 - 95%
Slide-in drive	5AC600.FDDS-00	20 - 80%	5 - 90%
Additional insert cards Interfaces AP Link	5AC600.CANI-00	5 - 90%	5 - 95%
	5AC600.485I-00	5 - 90%	5 - 95%
	5AC600.SDL0-00	5 - 90%	5 - 95%
	5ACPCI.RAIC-02 (24 hours/default)	5 - 90%	5 - 95%
	5ACPCI.RAIC-03 (24 hours/default)	8 - 90%	5 - 95%
	5ACPCI.RAIC-04 (24 hours/default)	8 - 90%	5 - 95%
	5ACPCI.RAIC-05 (24 hours/default)	5 - 95%	5 - 95%
	5MMHDD.0250-00 (24 hours/default)	5 - 95%	5 - 95%
Accessories	CompactFlash cards 5CFCRD.xxxx-04	85%	85%
	CompactFlash cards - 5CFCRD.xxxx-03	8 - 95%	8 - 95%
	Flash drive 5MMUSB.2048-00	10 - 90%	5 - 90%
	Flash drive 5MMUSB.2048-01	10 - 90%	5 - 90%
	USB Media Drive 5MD900.USB2-01	20 - 80%	5 - 90%

Table 27: Overview of humidity specifications for individual components

The listed specifications correspond to the relative humidity at an ambient temperature of 30°C. More detailed information about the specific temperature-dependent humidity values can be found in the technical data for the individual components.

2.13 Device interfaces

The following two graphics show the general and optional device interfaces on an APC620 complete device with 5 PCI slots or an APC620 embedded device.

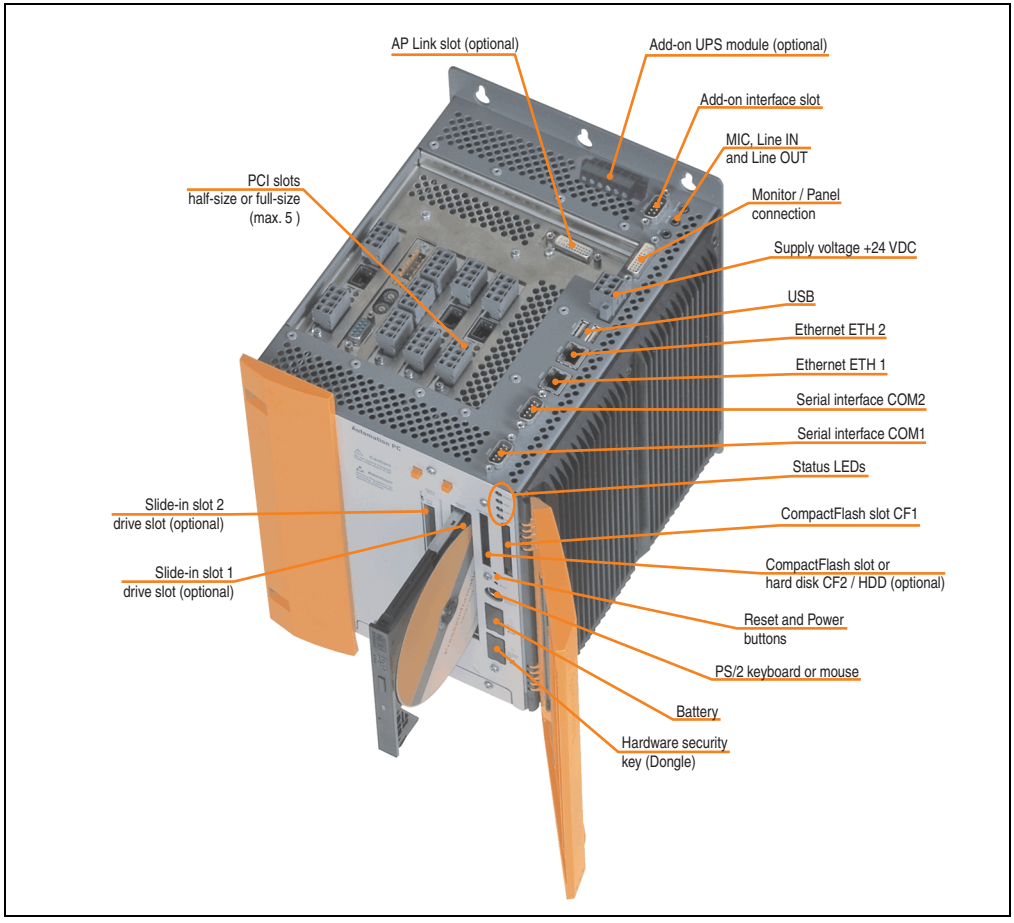


Figure 33: General device interfaces example - APC620 with 5 PCI slots

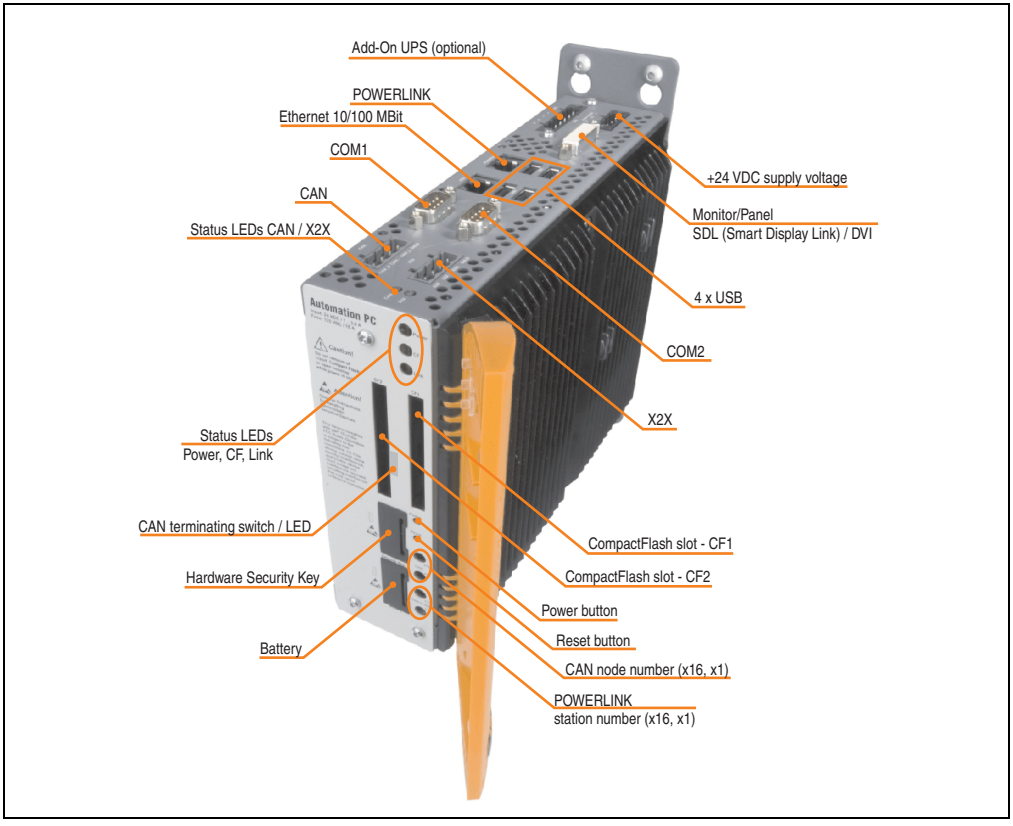


Figure 34: General device interfaces example - APC620 embedded

Each individual device interface is explained in greater detail on the following pages.

2.13.1 Serial interface COM1

Serial interfaces - COM1[1)]		
Type	RS232, modem-capable, not electrically isolated	9-pin DSUB, male
UART	16550-compatible, 16-byte FIFO	
Transfer rate	Max. 115 kBaud	
Cable length	Max. 15 meters	
Pin	**Assignment**	
1	DCD	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 28: Pin assignments - COM1

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.

I/O address and IRQ

Resource	Default setting	Additional setting options
I/O address	3F8	2F8, 3E8, 2E8
IRQ	IRQ4	IRQ3

Table 29: COM1 - I/O address and IRQ

The setting for the I/O address and the IRQ can be changed in the BIOS setup (under "Advanced" - submenu "I/O Device Configuration" setting "Serial port A"). Please note any potential conflicts with other resources when changing this setting.

2.13.2 Serial interface COM2

Serial interfaces - COM2[1)]		
Type	RS232, modem-capable, not electrically isolated	9-pin DSUB, male
UART	16550 compatible, 16 byte FIFO	
Transfer rate	Max. 115 kBaud	
Cable length	Max. 15 meters	
Pin	**Assignment**	
1	DCD	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 30: Pin assignments - COM2

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.

I/O address and IRQ

Resource	Default setting	Additional setting options
I/O address	2F8	3F8, 3E8, 2E8
IRQ	IRQ3	IRQ4

Table 31: COM2 - I/O address and IRQ

The setting for the I/O address and the IRQ can be changed in the BIOS setup (under "Advanced" - submenu "I/O Device Configuration" setting "Serial port B"). Please note any potential conflicts with other resources when changing this setting.

2.13.3 X2X (only APC620 embedded)

X2X Link interface (only APC620 embedded)	
The electrically isolated X2X Link is a 4-pin multipoint plug.	
Pin	**X2X Link**
1	X2X
2	X2X⊥
3	X2X\
4	SHLD (shield)

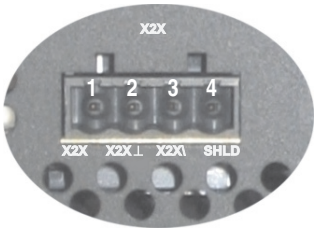


Table 32: X2X pin assignments (only APC620 embedded)

Driver support

The fieldbus interface X2X is only supported together with Automation Runtime.

2.13.4 CAN (only APC620 embedded)

CAN	
The electrically isolated CAN bus interface is a 4-pin multipoint plug.	
Transfer rate	Max. 500 kbit/s
Bus length	Max. 1000 meters
Pin	**CAN bus**
1	CAN_H (CAN High)
2	CAN⊥ (CAN ground)
3	CAN_L (CAN Low)
4	SHLD (shield)

Table 33: CAN pin assignments (only APC620 embedded)

Driver support

The fieldbus interface CAN is only supported together with Automation Runtime.

2.13.5 CAN node number (only APC620 embedded)

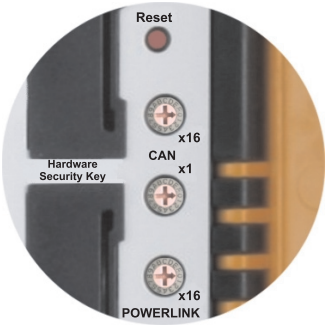
CAN node number switch (x1, x16) - only APC620 embedded			
Both of these hex switches (x16, x1) are used to configure the node number for the CAN interface.			
Switch position			
x16	x1	Description	
0 ... F	0 ... F	Any	

Table 34: CAN node number switch (x1, x16) - only APC620 embedded

2.13.6 CAN terminating switch / LED (only APC620 embedded)

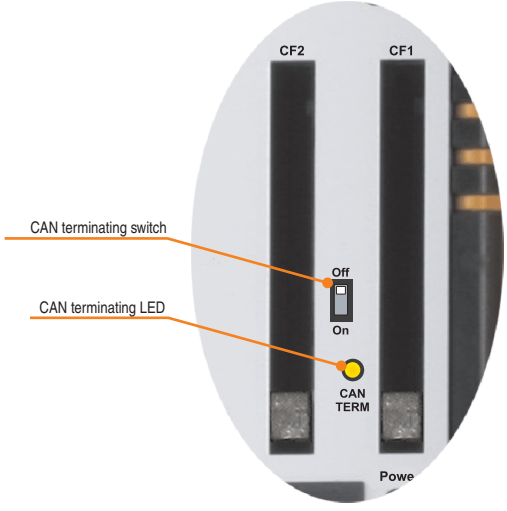
CAN terminating switch / LED (only APC620 embedded)			
CAN networks are cabled using a bus structure where both ends of the bus are equipped with terminating resistors. The APC620 embedded has an integrated terminating resistor (delivery state: disabled with the setting "Off").			
LED	On	vOff	
Yellow	The terminating resistor integrated in the bus controller is turned on.	The terminating resistor integrated in the bus controller is turned off.	
vCAN terminating switch	Position Off	Position On	
Can be pressed using a pointed object.	Terminating resistor is turned off.	Terminating resistor is turned on.	

Table 35: CAN terminating switch / LED (only APC620 embedded)

2.13.7 Status LEDs CAN / X2X (only APC620 embedded)

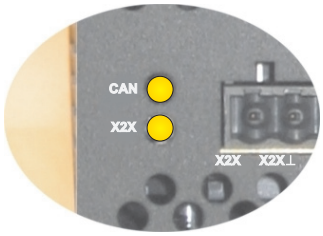
Status LEDs CAN / X2X (only APC620 embedded)			
			
Yellow LED for	**On**	**Off**	
CAN	Sends data	Receives data	
X2X	Sends data	Receives data	

Table 36: Status LEDs CAN / X2X (only APC620 embedded)

2.13.8 POWERLINK (only APC620 embedded)

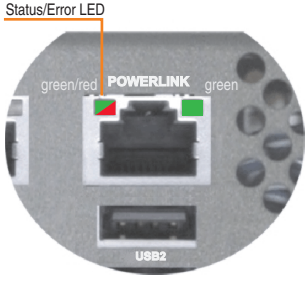
POWERLINK (only APC620 embedded)			
Controller			
Cabling	S/STP (Cat5e)		
Transfer rate			
Cable length	max. 100 m (min. Cat5e)		
LED color	**On**	**Off**	
Green/red	see Status / Error LED		
Green	Link (POWERLINK network connection available)	Activity (blinking) (Data transfer in progress)	

Table 37: POWERLINK (only APC620 embedded)

Driver support

The fieldbus interface POWERLINK is only supported together with Automation Runtime.

Status / Error LED

The status/error LED is a green/red dual LED. The color green (status) is superimposed on the color red (error).

Red - error	Description
On	The POWERLINK interface has encountered an error (failed Ethernet frames, increased number of collisions on the network, etc.).

Table 38: Status / Error LED as error LED - POWERLINK V2 operating mode

Green - status	Description
Off NOT_ACTIVE	**Managing Node (MN)** The bus is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface goes directly into PRE_OPERATIONAL_1 status (single flash). If, however, POWERLINK communication is detected before this time passes, the interface goes directly into the BASIC_ETHERNET status (flickering). **Controlled Node (CN)** The bus is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface goes directly into BASIC_ETHERNET status (flickering). If, however, POWERLINK communication is detected during this time, the interface goes directly into the PRE_OPERATIONAL_1 status (single flash).
Green flickering (approx. 10 Hz) BASIC_ETHERNET	The interface is in BASIC_ETHERNET status, and is operated purely as an Ethernet TCP/IP interface. **Managing Node (MN)** This status can only be changed by resetting the interface. **Controlled Node (CN)** If POWERLINK communication is detected while in this status, the interface goes into the PRE_OPERATIONAL_1 state (single flash).
Single flash (approx. 1 Hz) PRE_OPERATIONAL_1	The interface status is PRE_OPERATIONAL_1. **Managing Node (MN)** The MN starts the operation of the "reduced cycle". Collisions are allowed on the bus. There is not yet any cyclic communication. **Controlled Node (CN)** The CN waits until it receives an SoC frame and then switches to PRE_OPERATIONAL_2 status (double flash).
Double flash (approx. 1 Hz) PRE_OPERATIONAL_2	The interface status is PRE_OPERATIONAL_2. **Managing Node (MN)** The MN begins with the cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this status. **Controlled Node (CN)** In this status, the interface is normally configured by the manager. After this, a command changes the status to READY_TO_OPERATE (triple flash).
Triple flash (approx. 1 Hz) READY_TO_OPERATE	The interface status is READY_TO_OPERATE. **Managing Node (MN)** Normal cyclic and asynchronous communication. Received PDO data is ignored. **Controlled Node (CN)** The configuration of the interface is complete. Normal cyclic and asynchronous communication. The PDO data sent corresponds to the PDO mapping used. However, cyclic data is not yet evaluated.
On OPERATIONAL	The interface status is OPERATIONAL.
Blinking (approx. 2.5 Hz) STOPPED	The interface status is STOPPED. **Managing Node (MN)** This status is not possible for the MN. **Controlled Node (CN)** No output data is produced and no input data is received. Only the appropriate command from the manager can enter or leave this state.

Table 39: Status / Error LED as status LED - POWERLINK V2 operating mode

2.13.9 POWERLINK station number (only APC620 embedded)

POWERLINK station number (x1, x16)			
Both of these hex switches (x16, x1) are used to configure the station number for the POWERLINK. Station numbers are permitted between #00 and #FD.			
Switch position			
x16	x1	Description	
0	0	Operation as managing node	
0 ... F	1 ... D	station number Operation as controlled node	
F	E	Reserved	
F	F	Reserved	

Table 40: POWERLINK station number (x1, x16) - only APC620 embedded

2.13.10 Ethernet connection ETH (only APC620 embedded)

This Ethernet connection is integrated in the CPU board being used.

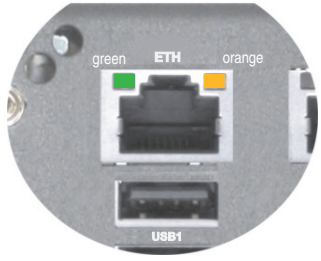
Ethernet connection ETH (only APC620 embedded)			
Controller	Intel 82562		RJ45 twisted pair (10BaseT/100BaseT), female 
Cabling	S/STP (Cat5e)		
Transfer rate	10/100 Mbit/s [1]		
Cable length	max. 100 m (min. Cat5e)		
LED	On	Off	
Green	100 Mbit/s	10 Mbit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 41: Ethernet connection ETH (only APC620 embedded)

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

2.13.11 Ethernet connection ETH1

This Ethernet connection is integrated in the CPU board being used.

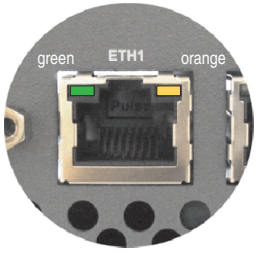
Ethernet connection (ETH1[1])			
Controller	Intel 82562		RJ45 twisted pair (10BaseT/100BaseT), female 
Cabling	S/STP (Cat5e)		
Transfer rate	10/100 Mbit/s [2]		
Cable length	See table 43 "Ethernet cable lengths when using 5PC600.X945-00 CPU boards", on page 110.		
LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 42: Ethernet connection (ETH1)

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.

2) Both operating modes possible. Switching takes place automatically.

Driver support

A special driver is necessary for operating the Intel Ethernet controller 82562. Drivers for Windows XP Professional, Windows XP Embedded, and DOS are available for download on the B&R Homepage in the download area (www.br-automation.com).

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

Ethernet cable lengths when X945 CPU boards are used

When using Intel X945 CPU boards (5PC600.X945-00), the supported cable length depends on the system unit revision.

System unit	Cable length with CAT5e cable	
	Up to 50 meters	Up to 100 meters[1)]
5PC600.SX01-00	Revision < H0	Starting with Revision H0
5PC600.SX02-00	Revision < F5	Starting with Revision F5
5PC600.SX02-01	Revision < G5	Starting with revision G5
5PC600.SF03-00	-	Starting with revision A0
5PC600.SX05-00	Revision < G0	Starting with revision G0
5PC600.SX05-01	Revision < G0	Starting with revision G0

Table 43: Ethernet cable lengths when using 5PC600.X945-00 CPU boards

1) When higher quality cable is used (e.g.: category CAT7), greater distances are possible.

2.13.12 Ethernet connection ETH2

This Ethernet connection is integrated in the system unit.

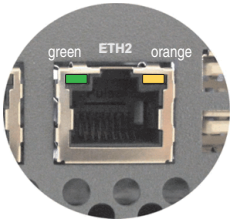
Ethernet connection (ETH2[1])			
Controller	Intel 82551ER		RJ45 twisted pair (10BaseT/100BaseT), female 
Cabling	S/STP (Cat5e)		
Transfer rate	10/100 Mbit/s [2]		
Cable length	max. 100 m (min. Cat5e)		
LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 44: Ethernet connection (ETH2)

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.

2) Both operating modes possible. Switching takes place automatically.

Driver support

A special driver is necessary for operating the Intel Ethernet controller 82551ER. Drivers for Windows XP Professional, Windows XP Embedded, and DOS are available for download on the B&R Homepage in the download area (**www.br-automation.com**).

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

2.13.13 USB ports

The APC620 devices have a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, two of which are on the outside for easy user access.

See the section "USB connection (only APC620 embedded)", on page 113 for a description of the USB connections on APC620 embedded devices.

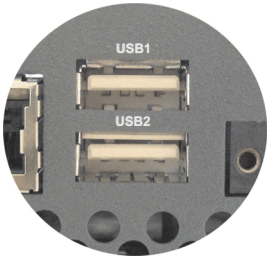
Universal Serial Bus (USB1 und USB2)[1]		
Transfer rate	Low speed (1.5 Mbit/s), Full speed (12 Mbit/s) up to High speed (480 Mbit/s)	2x USB Type A, female 
Power supply	Max. 500 mA per port[2]	
Maximum Cable length	5 m (without hub)	

Table 45: USB ports

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.

2) For safety, every USB port is equipped with a maintenance free "USB current-limiting circuit breaker" (max. 500 mA)

Warning!

Peripheral USB devices can be connected to the USB ports. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. B&R does ensure the performance of all USB devices that they provide.

Warning!

Because of general PC specifications, these interfaces should be handled with extreme care with regard to EMC, location of cables, etc.

Driver support

For optimal functionality of USB 2.0 (transfer speed up to 480 Mbit/s) with Windows XP, at least Service Pack 1 must be installed. Without Service Pack 1, Windows XP will only support USB 1.1.
USB 2.0 comes already integrated in B&R's XP embedded operating systems.

2.13.14 USB connection (only APC620 embedded)

The APC620 embedded devices have a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, two of which are on the outside for easy access.

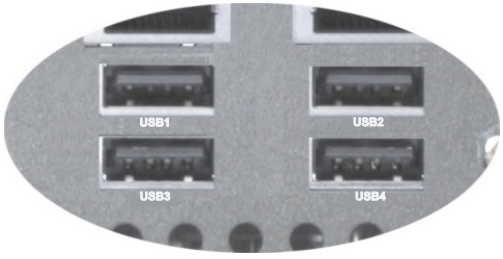
Universal Serial Bus (USB1, USB2, USB3, USB4)[1] - only APC620 embedded		
Transfer rate	Low speed (1.5 Mbit/s), Full speed (12 Mbit/s) up to High speed (480 Mbit/s)	4 x USB type A, female 
Power supply[2] USB1, USB3 USB2, USB4	 Max. 500 mA Max. 1 A	
Maximum Cable length	5 m (without hub)	

Table 46: USB connections 4 x - only APC620 embedded

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.

2) For safety, every USB port is equipped with a maintenance free "USB current-limiting circuit breaker" (max. 500 mA or 1 A). The sum of all 4 USB ports must not exceed the limit of 2 A.

Warning!

Peripheral USB devices can be connected to the USB ports. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. B&R does ensure the performance of all USB devices that they provide.

Warning!

Because of general PC specifications, these interfaces should be handled with extreme care with regard to EMC, location of cables, etc.

2.13.15 +24 VDC supply voltage

The Automation PC 620 has a 24 VDC ATX compatible power supply. Depending on the system unit, the power supply provides the following maximum performances (in watts).

System unit	Max. power at + 5 V	Max. power at + 3V3	Max. power at + 12 V	Max. power at - 12 V	Max. total power
5PC600.SX01-00	55	23	12	1.2	70
5PC600.SX02-00	55	23	12	1.2	70
5PC600.SX02-01	55	23	12	1.2	70
5PC600.SF03-00	105	46	24	1.2	110
5PC600.SX05-00	105	46	24	1.2	110
5PC600.SX05-01	105	46	24	1.2	110
5PC600.SE00-00	55	23	12	1.2	55
5PC600.SE00-01	55	23	12	1.2	55
5PC600.SE00-02	55	23	12	1.2	55

Table 47: Power supply depending on the system unit

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 clamp) or 0TB103.91 (cage clamp).

The pin assignments can be found either in the following table or printed on the APC620 housing. The supply voltage is internally protected (10A, fast-acting), so that the device cannot be damaged if there is an overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection - fuse replacement not necessary).

Supply voltage	
Protected against reverse polarity	3-pin, male
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

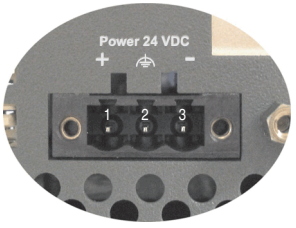


Figure 35: Supply voltage connection

Ground

Caution!

The pin's connection to the functional ground (pin 2) should be as short as possible (e.g. in the control cabinet). We recommend using the largest possible conductor cross section on the supply plug.

The grounding connection can be found on the bottom of the APC620 systems. The M4 self-locking nut can be used, for example, to fasten a copper strip that is built into the APC620 at a central grounding point in the control cabinet or system. The largest possible conductor cross section should be used (at least 2.5 mm²).

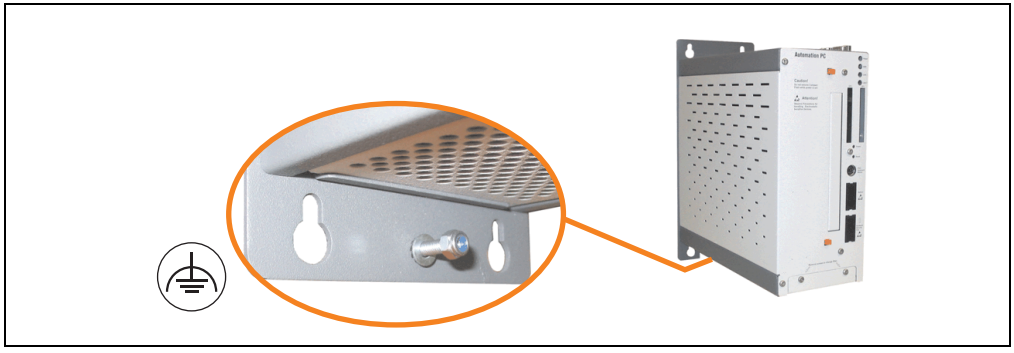


Figure 36: Ground connection

Also see the section "Grounding concept", on page 218.

Starting current

System unit	Typical	Maximum
5PC600.SX01-00	7 A	40 A (time < 300 µs)
5PC600.SX02-00	7 A	40 A (time < 300 µs)
5PC600.SX02-01	7 A	40 A (time < 300 µs)
5PC600.SF03-00	10 A	40 A (time < 300 µs)
5PC600.SX05-00	10 A	40 A (time < 300 µs)
5PC600.SX05-01	10 A	40 A (time < 300 µs)

Table 48: Starting currents in the voltage supply to the system units

Quick switching on/off of the power supply

If the APC620 is in Standby mode (e.g. Windows XP shutdown), then buffering takes a little more time due to capacitors and low power consumption. If the "Power Loss Control" option is set to "Power On" or "Last State" in BIOS, then a system with one of the system unit revisions in table 49 "System unit revisions for at least 10 seconds turn-off time" might not restart because a Power Off/On was not detected. To make sure that these system units will restart after a Power Off/On, the turn-off time should be set to at least 10 seconds.

Model number	Description	Revision
5PC600.SX01-00	System 1 PCI	Starting with revision B0
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Starting with revision B0

Table 49: System unit revisions for at least 10 seconds turn-off time

Model number	Description	Revision
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Starting with revision B0
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Starting with revision A0
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Starting with revision A0

Table 49: System unit revisions for at least 10 seconds turn-off time

Thanks to a workaround, the turn-off time can be set as needed in systems with one of the following system unit revisions or higher.

Model number	Description	Revision
5PC600.SX01-00	System 1 PCI	Starting with F0
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Starting with revision E0
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Starting with F0
5PC600.SF03-00	System 3 PCI, 1 disk drive slot, 1 AP Link slot	Starting with revision A0
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Starting with revision D0
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Starting with revision D0

Table 50: System unit revisions for any turn-off times

2.13.16 Monitor / Panel interface

When using this video output, understand that the video signals that are available (RGB, DVI, and SDL - Smart Display Link) will vary depending on the system unit and CPU board.

Monitor / Panel		
The following will provide an overview of the video signals available with different system units and CPU boards.		24-pin DVI-I with special functions, female
System unit	**X945 board**	
5PC600.SX01-00	RGB, DVI, SDL	
5PC600.SX02-00	RGB	
5PC600.SX02-01	RGB, DVI, SDL	
5PC600.SF03-00	RGB	
5PC600.SX05-00	RGB	
5PC600.SX05-01	RGB, DVI, SDL	
5PC600.SE00-00	RGB, DVI, SDL	
5PC600.SE00-01	RGB	
5PC600.SE00-02	RGB, DVI, SDL	

Figure 37: Monitor / Panel interface

Hotplug for a display device is not supported in any combination. The plugs are specified for 100 connection cycles.

Caution!

The RGB, DVI and SDL cables can only be plugged in and unplugged when the APC620 and display device (Automation Panel 900, Automation Panel 800, monitor) are turned off.

See "Definitions for RGB, DVI, SDL", on page 121 for descriptions of RGB, DVI and SDL.

Pin assignments

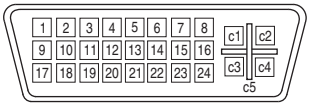
Pin	Assignment	Pin	Assignment	
1	T.M.D.S. Data 2-	16	Hot Plug detect	DVI-I 24 pin, female 
2	T.M.D.S. Data 2+	17	T.M.D.S. Data 0-	
3	T.M.D.S. Data 2/SDL Shield	18	T.M.D.S. Data 0+	
4	SDL-	19	T.M.D.S. DATA 0/XUSB1 Shield	
5	SDL+	20	XUSB1-	
6	DDC clock	21	XUSB1+	
7	DDC data	22	T.M.D.S. Clock Shield	
8	Analog vertical sync	23	T.M.D.S. Clock +	
9	T.M.D.S. DATA 1-	24	T.M.D.S. Clock -	
10	T.M.D.S. DATA 1+	c1	Analog red video out	
11	T.M.D.S. DATA 1/XUBS0 Shield	c2	Analog green video out	
12	XUSB0-	c3	Analog blue video out	
13	XUSB0+	c4	Analog horizontal sync	
14	+ 5 V power [1]	c5	Analog ground (analog R, G and B return)	
15	Ground (return for + 5V, HSync and VSync)			

Table 51: Pin assignments - Monitor / panel connection

1) Protected internally by a multifuse

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cables	Resolution				
Segment length [m]	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03
5	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03
10	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00[1] 5CASDL.0100-01[1] 5CASDL.0100-03[1]

Table 52: Segment lengths, resolutions and SDL cables

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
15	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00[1)] 5CASDL.0150-01[1)] 5CASDL.0150-03[1)]	- - -
20	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	-
25	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	- -	- -
30	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	- -
40	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	- -

Table 52: Segment lengths, resolutions and SDL cables (Forts.)

1) See table 53 "Requirements for SDL cable with automatic cable adjustment (equalizer)", on page 119

2) See table 54 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)", on page 120

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 53: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SF03-00	System 3 PCI, 1 disk drive slot, 1 AP Link slot	Rev. A0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 54: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

Definitions for RGB, DVI, SDL

RGB means:

- It is possible to connect RGB monitors (with adapter, model no. 5AC900.1000-00) and office RGB TFT displays.

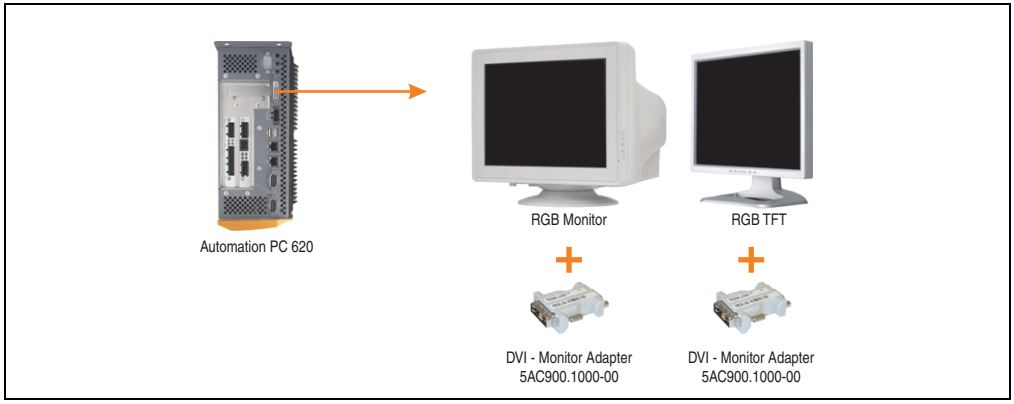


Figure 38: Monitor / Panel connection with RGB video signal

DVI means:

- Connection of B&R Automation Panel 900 display units with Automation Panel Link DVI Receiver (Model no. 5DLDVI.1000-01), Office Digital/DVI Monitors and Office DVI TFT Displays is possible.

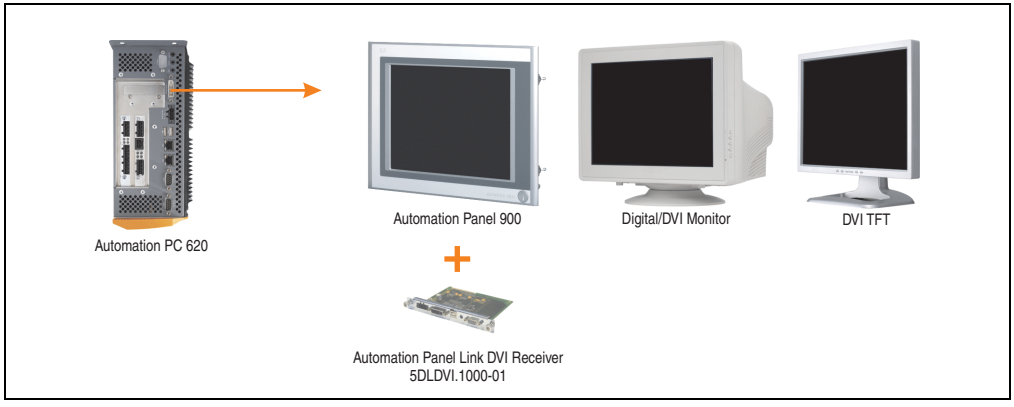


Figure 39: Monitor / Panel connection with DVI video signal

For examples and possibilities for connecting Automation Panel 900 display units via DVI, see Appendix A, chapter 3 "Commissioning", section 4 "Connection examples", starting on page 219.

SDL (Smart Display Link) means:

- Connection of B&R Automation Panel 800 and Automation Panel 900 display units with Automation Panel Link SDL receiver (Model no. 5DLSDL.1000-01) or SDL transceiver (Model no. 5DLSDL.1000-01).

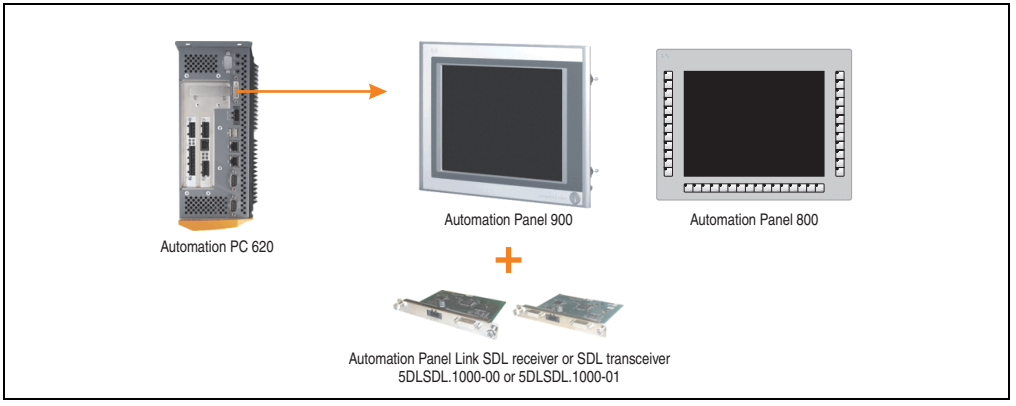


Figure 40: Monitor / Panel connection with SDL video signal

For examples and possibilities for connecting Automation Panel 900 and Automation Panel 800 display units via SDL, see Appendix A, chapter 3 "Commissioning", section 4 "Connection examples", starting on page 219.

2.13.17 MIC, Line IN and Line OUT ports

All APC620 systems include an AC97 (specification 2.2) compatible sound chip with access to the channels MIC, Line IN and Line OUT from the outside.

Information:

APC620 embedded devices do not have these connections.

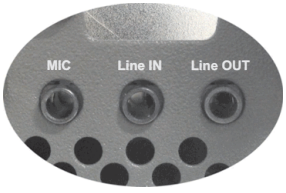
MIC, Line IN and Line OUT		
Controller	Realtek AC97	3.5 mm socket, female 
MIC	Connection of a mono microphone with a 3.5 mm stereo (headphone) jack.	
Line IN	Stereo Line IN signal supplied via 3.5 mm jack.	
Line OUT	Connection of a stereo sound device (e.g. amplifier) via a 3.5 mm jack.	

Table 55: Technical data - MIC, Line IN and Line OUT port

Driver support

A special driver is necessary for operating the AC97 sound chip (Realtek). Drivers for Windows XP Professional and Windows XP Embedded are available for download on the B&R Homepage in the download area (**www.br-automation.com**).

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

2.13.18 Add-on interface slot

An optional add-on interface (e.g. CAN, RS485) can be installed here. See also section 3.7 "Interface options", on page 188.

Information:

APC620 embedded devices do not have this option.

Add-on interface slot		
Available add-on interfaces		
5AC600.CANI-00	Add-on CAN interface	
5AC600.485I-00	Add-on RS232/422/485 interface	

Table 56: Add-on interface slot

Information:

An add-on interface module is only available factory-installed.

2.13.19 Add-on UPS module slot

An optional APC620 add-on UPS module can be installed here.

Add-on UPS module slot		
APC620 add-on UPS module + accessories		
5AC600.UPSI-00	Add-on UPS module	
5AC600.UPSB-00	Battery unit 5 Ah	
5CAUPS.0005-00	APC620 UPS cable 0.5 m	
5CAUPS.0030-00	APC620 UPS cable 3 m	

Table 57: Add-on UPS module slot

Information:

An add-on UPS module can be installed with the following system unit revisions or later:

- **5PC600.SX01-00 starting with H0**
- **5PC600.SX02-00 starting with G0**
- **5PC600.SX02-01 starting with H0**
- **5PC600.SF03-00 starting with A0**
- **5PC600.SX05-00 starting with F0**
- **5PC600.SX05-01 starting with F0**
- **5PC600.SE00-00 starting with A0**
- **5PC600.SE00-01 starting with A0**
- **5PC600.SE00-02 starting with A0**

For more on the UPS module, see chapter 6 "Accessories", section 13 "Uninterruptible power supply", on page 476.

For info on configuring the UPS module, see chapter 4 "Software", section 12.4 "UPS configuration", on page 381.

For info on installing the UPS module, see chapter 7 "Maintenance / Servicing", section 4 "Installing the UPS module", on page 520.

2.13.20 AP Link Slot

The option of inserting and using an AP Link card is only possible with system units 5PC600.SX02-00, 5PC600.SF03-00 and 5PC600.SX05-00.

For more information see section 3.9 "AP Link cards", on page 202.

Information:

APC620 embedded devices do not have this option.

2.13.21 PCI slots

Information:

APC620 embedded devices do not have a PCI slot.

Up to 5 PCI slots are available, depending on the system unit. 5-volt cards or universal cards that comply with the PCI half-size standard 2.2, and that do not exceed the following dimensions can be inserted.

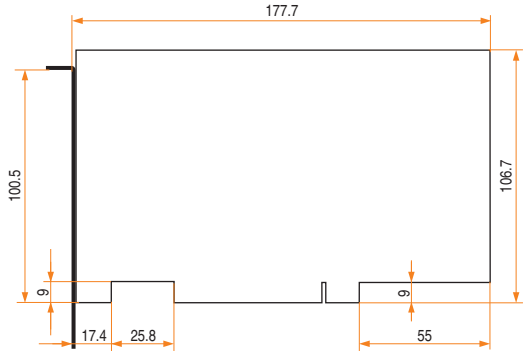


Figure 41: Dimensions - Standard half-size PCI cards

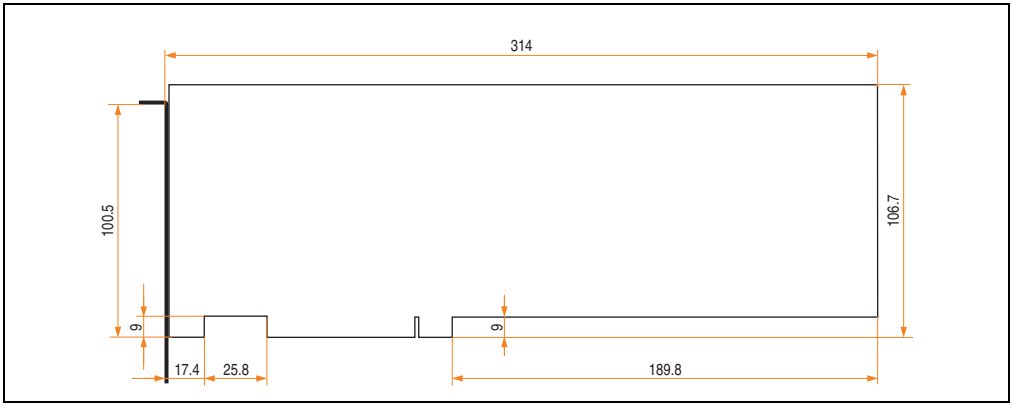


Figure 42: Dimensions - Standard full-size PCI cards

Information:

The total performance of one PCI card per PCI slot should not exceed the limit with or without a fan kit (see section "Power management APC620 system unit with 1 PCI slot", on page 79 or section "Power management APC620 system unit with 3 PCI slots", on page 89 and "Power management APC620 system units with 5 PCI slots", on page 91).

Technical data

Features	PCI bus properties
Standard	PCI 2.2
Design	Half-size PCI or full-size PCI[1] 5 Volt connector
PCI bus type	32-bit
PCI bus speed	33 MHz

Table 58: Technical data - PCI bus

1) Only in conjunction with system unit 5PC600.SF03-00.

Voltages on the PCI slot plug (plug-in PCI cards)

The plug design for the PCI slot is the same as the design for a 5-volt PCI plug. The supply is applied at 3.3 volts and 5 volts on the actual plug.

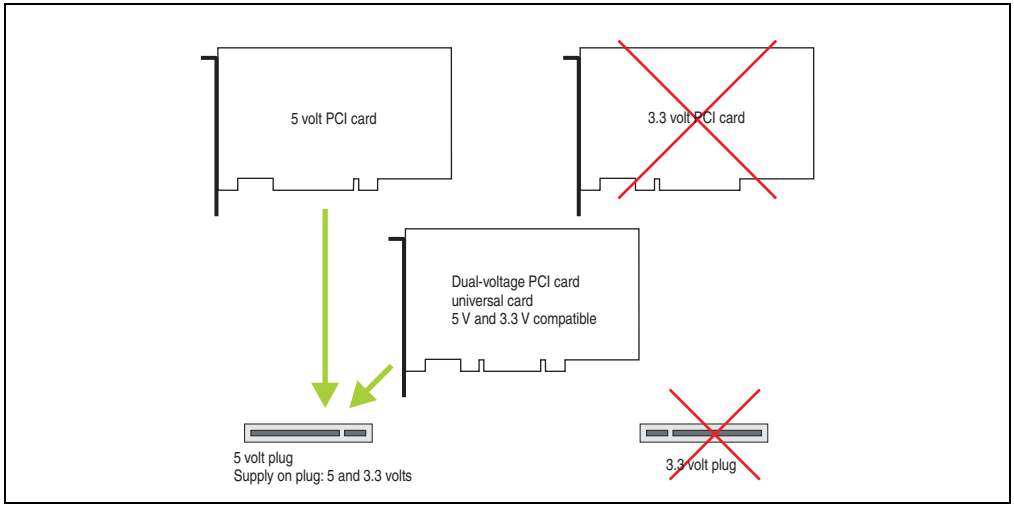


Figure 43: PCI connector type: 5 volt

2.13.22 Status LEDs

The status LEDs are integrated in the system unit behind the orange front cover.

See the section "Status LEDs Power, CF, Link (only APC620 embedded)", on page 130 for a description of the status LEDs on APC620 embedded devices.

Status LEDs				
LED	**Color**		**Meaning**	
Power	Green	On	Supply voltage OK	
	Red	On	The system is in standby mode (S5: soft-off mode or S4: Hibernate mode -Suspend-to-Disk)	
	Orange 1)	On	Supply voltage not OK; the system is operating on battery power.	
HDD	Yellow	On	Signals IDE drive access (CF, HDD, CD, etc.)	
Link 1	Yellow	On	Active SDL connection.	
		blinking	An active SDL connection has been interrupted by a loss of power in the display unit.	
		Off	No active SDL connection available.	
Link 2	Yellow	On	Active SDL connection on the AP Link slot.	
		blinking	An active SDL connection on the AP Link slot has been interrupted by a loss of power in the display unit.	
		Off	No active SDL connection on the AP Link slot available.	

Table 59: Technical data - Status LEDs

1) Only lit when add-on UPS module is installed.

The light for the Status LEDs is fed to the front cover via fiber optic lines.

Figure 44: Front-side status LEDs

2.13.23 Status LEDs Power, CF, Link (only APC620 embedded)

The status LEDs are integrated in the system unit behind the orange front cover.

Status LEDs Power, CF, Link (only APC620 embedded)			
LED	**Color**		**Meaning**
Power	Green	On	Supply voltage OK
	Red	On	The system is in standby mode (S5: soft-off mode or S4: Hibernate mode -Suspend-to-Disk)
	Orange 1)	On	Supply voltage not OK; the system is operating on battery power.
CF	Yellow	On	Indicates access to CompactFlash (read or write)
Link	Yellow	On	Active SDL connection on the monitor/panel connection
		blinking	An active SDL connection has been interrupted by a loss of power in the display unit.
		Off	No active SDL connection

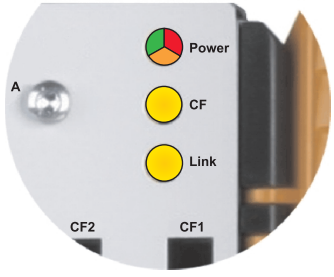


Table 60: Status LEDs Power, CF, Link (only APC620 embedded)

1) Only lit when add-on UPS module is installed.

2.13.24 CompactFlash slot (CF1)

This CompactFlash slot is a fixed component of an APC620 system, and is defined in BIOS as the primary master drive. Type I CompactFlash cards are supported. Available CompactFlash cards - see table 15 "Model numbers - CompactFlash cards", on page 30.

See the section "CompactFlash slots (only APC620 embedded)", on page 134 for a description of the CompactFlash slots on APC620 embedded devices.

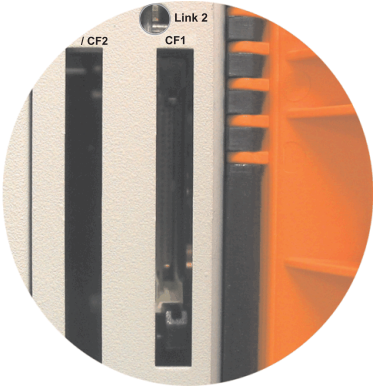
CompactFlash slot (CF1)		
Connection	Primary master IDE device	
CompactFlash Type	Type I	
Accessories	**Short description**	
5CFCRD.0512-04	512 MB B&R CompactFlash card	
5CFCRD.1024-04	1024 MB B&R CompactFlash card	
5CFCRD.2048-04	2048 MB B&R CompactFlash card	
5CFCRD.4096-04	4096 MB B&R CompactFlash card	
5CFCRD.8192-04	8192 MB B&R CompactFlash card	
5CFCRD.0064-03	CompactFlash 64 MB SSI	
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 61: Technical data - CompactFlash slot (CF1)

Warning!

Inserting and removing the CompactFlash card can only take place without power applied!

2.13.25 Hard disk / CompactFlash slot (HDD/CF2)

This slot allows for the installation of a hard disk or a second CompactFlash slot (type I CompactFlash card) as add-on drives (see table 5.5 "Drives" for available add-on drives). The add-on drive is referred to in BIOS as the primary slave drive.

See the section "CompactFlash slots (only APC620 embedded)", on page 134 for a description of the CompactFlash slots on APC620 embedded devices.

Information:

Add-on drives are only available factory-installed. Therefore, they need to be requested when placing an order.

Hard disk / CompactFlash slot (HDD/CF2)		
Connection	Primary slave IDE device	
Add-on hard disks 2.5" drive (internal)		
5AC600.HDDI-05	Add-on hard disk 40 GB ET, 24/7	
5AC600.HDDI-06	Add-on hard disk 80 GB ET, 24/7	
Add-on CompactFlash slot		
5AC600.CFSI-00	Add-on CompactFlash slot	
CompactFlash Type	Type I	
Accessories	**Short description**	
5CFCRD.0512-04	512 MB B&R CompactFlash card	
5CFCRD.1024-04	1024 MB B&R CompactFlash card	
5CFCRD.2048-04	2048 MB B&R CompactFlash card	
5CFCRD.4096-04	4096 MB B&R CompactFlash card	
5CFCRD.8192-04	8192 MB B&R CompactFlash card	
5CFCRD.0064-03	CompactFlash 64 MB SSI	
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 62: Technical data - Hard disk / CompactFlash slot (HDD/CF2)

Warning!

Inserting and removing the CompactFlash card can only take place without power applied!

2.13.26 CompactFlash slots (only APC620 embedded)

These CompactFlash slots are a fixed part of an APC620 embedded system and are defined in the BIOS as Primary Master (CF1) and Primary Slave (CF2) drive. Type I CompactFlash cards are supported.

CompactFlash slot (CF1 / CF2)		
Connection CF1 CF2	 Primary master IDE device Primary slave IDE device	
CompactFlash Type	Type I	
Accessories	**Short description**	
5CFCRD.0512-04	512 MB B&R CompactFlash card	
5CFCRD.1024-04	1024 MB B&R CompactFlash card	
5CFCRD.2048-04	2048 MB B&R CompactFlash card	
5CFCRD.4096-04	4096 MB B&R CompactFlash card	
5CFCRD.8192-04	8192 MB B&R CompactFlash card	
5CFCRD.0064-03	CompactFlash 64 MB SSI	
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 63: CompactFlash slots (CF1 / CF2) - APC620 embedded

Warning!

Inserting and removing the CompactFlash card can only take place without power applied!

2.13.27 Power button

Due to the complete ATX power supply support, the power button serves various functions. These functions can be configured either in the BIOS setup (see BIOS function "Power button function" in section "Power", on page 310 for X945 CPU boards) or, for example, in the operating system Windows XP.

Power button	
The power button can be pressed with a pointed object (e.g. paper clip or tip of a pen). The power button acts like the on/off switch on a normal desktop PC with ATX power supply: **Press and release** ... Switches on APC620 or shuts down operating system and switches off the APC620. **Press and hold** ... ATX power supply switches off without shutting down the APC620 (**data could be lost!**). Pressing the power button does not reset the MTCX processor.	

Table 64: Technical data - Power button

2.13.28 Reset button

Reset button	
The reset button can be pressed with a pointed object (e.g. paper clip or tip of a pen). Pushing the reset button triggers a hardware and PCI reset. The APC620 is restarted (cold restart). The MTCX processor is not reset when the reset button is pressed.	

Table 65: Technical data - Reset button

Warning!

A system reset can result in data loss!

2.13.29 PS/2 keyboard / mouse

Slot for a standard PS/2 mouse or a PS/2 AT-Enhanced keyboard. BIOS automatically determines whether a mouse or a keyboard has been connected and passes this information to the operating system.

Information:

APC620 embedded devices do not have a PS/2 interface.

With a PS/2 Y-cable, both keyboard and mouse can be operated simultaneously. They must be connected before the system is switched on.

This interface has a "hot plug" function for PS/2 keyboards (only when no PS/2 mouse has ever been connected and used!).

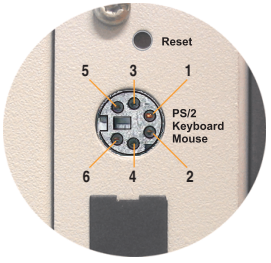
Connection for keyboard/mouse (PS/2)		
Pin	Assignment	PS/2 socket, female
1	DATA 0	
2	DATA 1	
3	GND	
4	+5 V[1)]	
5	CLK 0	
6	CLK 1	

Table 66: Technical data - PS/2 keyboard/mouse (external PS/2)

1) The PS/2 keyboard/mouse interface is protected by a multifuse (1 A).

Warning!

Because of general PC specifications, this interface should be used with extreme care concerning EMC, location of cables, etc.. It should therefore only be used for service!

Information:

The BIOS setup defaults only allow for the operation of a PS/2 keyboard. If a PS/2 mouse is connected, it must be enabled in BIOS. In order to do this, set "PS/2 mouse" in the BIOS setup menu to "Enabled" and save. (Located under "Advanced" / "Miscellaneous" / "PS/2 mouse").

2.13.30 Battery

The lithium battery (3 V, 950 mAh) buffers the internal real-time clock (RTC) as well as the individually saved BIOS settings and is located behind the black cover. The buffer duration of the battery is at least 4 years (2½ years with the SRAM module model number 5AC600.SRAM-00 or with an APC620 embedded system unit and at 50°C, 8.5 mA current requirements of the supplied components and a self discharge of 40%). The battery is subject to wear and should be replaced regularly (at least in accordance with the specified buffer duration).

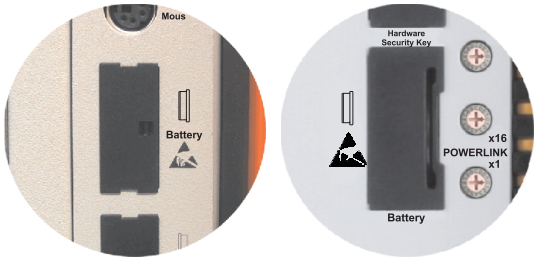
Battery		
Battery Type Removable Service life	 Renata 950 mAh Yes, accessible from the outside 4 years[1) 2)]	
Accessories	**Short description**	
0AC201.91	**Lithium batteries, 4 pcs.** Lithium batteries (4 pcs.), 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery (1 pcs.), 3 V / 950 mAh, button cell	

Table 67: Technical data - battery

1) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.

2) The buffer duration is 2 1/2 years if a SRAM module (Mod. no. 5AC600.SRAM-00) is installed or in conjunction with an APC620 embedded system unit.

For more on changing the lithium battery, see chapter 7 "Maintenance / Servicing", section "Changing the battery", on page 499.

For technical information on the lithium battery, see chapter 6 "Accessories", section 4 "Replacement CMOS batteries", on page 424.

Battery status evaluation

The battery status is evaluated immediately following start-up of the device and is subsequently checked by the system every 24 hours. The battery is subjected to a brief load (1 second) during the measurement and then evaluated. The evaluated battery status is displayed in the BIOS Setup pages (under Advanced - Baseboard monitor) 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
N/A	Hardware, i.e. firmware used is too old and does not support read.
GOOD	Data buffering is guaranteed

Table 68: Meaning of battery status

Battery status	Meaning
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 68: Meaning of battery status

Hardware requirements (system unit)

- 5PC600.SX01-00 starting with Rev I0
- 5PC600.SX01-00 starting with Rev. H0
- 5PC600.SX02-01 starting with Rev. K0
- 5PC600.SF03-00 starting with Rev. A0
- 5PC600.SX05-00 starting with Rev. H0
- 5PC600.SX05-01 starting with Rev. H0

Firmware / BIOS requirements

- APC620 / Panel PC 700 Firmware Upgrade V1.19 (MTCX PX32: V1.63, MTCX FPGA V1.19)

2.13.31 Hardware security key

B&R recommends a hardware security key (dongle) based on the DS1425 from MAXIM (previously Dallas Semiconductors) for software copy protection.

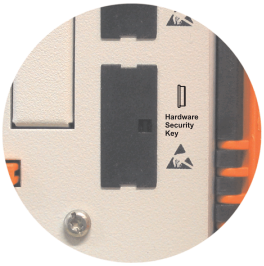
Hardware security key	
A hardware security key (dongle) can be inserted behind the black cover.	

Table 69: Technical data - Hardware security key

Warning!

Turn off power before adding or removing the hardware security key.

I/O address and IRQ

Resource	Default setting	Additional setting options
I/O address	378	278, 3BC
IRQ	-	-

Table 70: Hardware security key - I/O address and IRQ

The setting for the I/O address and the IRQ can be changed in the BIOS Setup ("Advanced" / "I/O Device Configuration" / "Parallel port").

2.13.32 Slide-in slot 1 drive slot

The "slide-in slot 1" drive slot exists only in APC620 system units with 2, 3 or 5 PCI slots. It is possible to insert a number of slide-in drives into it. See table for available slide-in drives 8 "Model numbers - Drives", on page 28.

For instructions about installing and replacing a slide-in, see chapter 7 "Maintenance / Servicing", section 3 "Slide-in drive - installation and exchange", on page 517.

The slide-in USB FDD drive (5AC600.FDDS-00) is referred to as USB.

Information:

- **It is possible to add, remove, or modify the slide-in drive at any time.**
- **In system units with 5 PCI slots, the slide-in USB FDD (5AC600.FDDS-00) drive must be inserted in slide-in slot 1 for mechanical reasons.**

Caution!

Turn off power before adding or removing a slide-in drive.

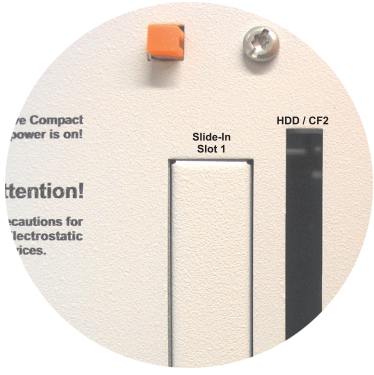
Slide-in slot 1		
Connection	USB	
Accessories	**Short description**	
5AC600.FDDS-00	Slide-in USB FDD	

Table 71: Technical data - Slide-in slot 1

2.13.33 Slide-in slot 2 drive slot

The "slide-in slot 2" drive slot exists only in APC620 system units with 5 PCI slots. It is possible to insert a number of slide-in drives into it. See table for available slide-in drives 8 "Model numbers - Drives", on page 28.

For instructions about installing and replacing a slide-in, see chapter 7 "Maintenance / Servicing", section 3 "Slide-in drive - installation and exchange", on page 517.

The slide-in USB FDD drive (5AC600.FDDS-00) is referred to as USB.

Information:

- **It is possible to add or remove a slide-in drive at any time.**
- **In system units with 5 PCI slots, the slide-in USB FDD (5AC600.FDDS-00) drive must be inserted in slide-in slot 1 for mechanical reasons.**

Caution!

Turn off power before adding or removing a slide-in drive.

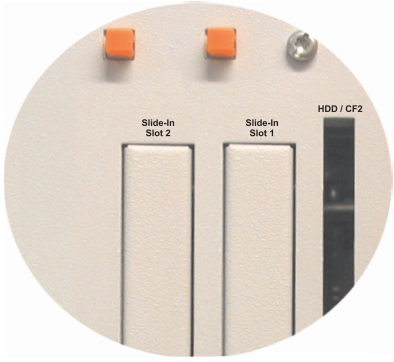
Slide-in slot 2		
Connection	USB	
Accessories	**Short description**	
5AC600.FDDS-00	Slide-in USB FDD	

Table 72: Technical data - Slide-in slot 2

2.14 Serial number sticker

Each B&R device is assigned a unique serial number label with a bar code (type 128), which allows the device to be clearly identified.

The serial number for the entire device is located behind the front door. This serial number represents all of the components built into the system (model number, name, revision, serial number, delivery date and duration of warranty).

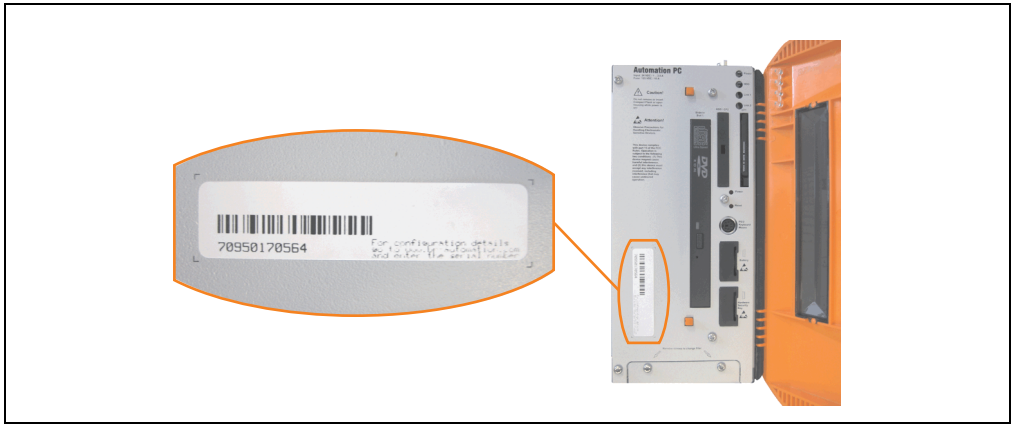


Figure 45: APC620 serial number sticker on front-side

A sticker with detailed information about the individual components can also be found on the back side of the mounting plate.

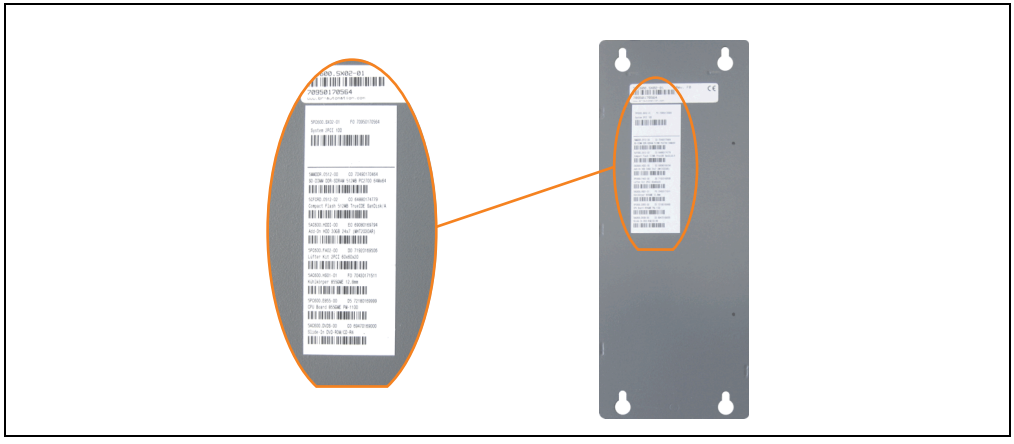
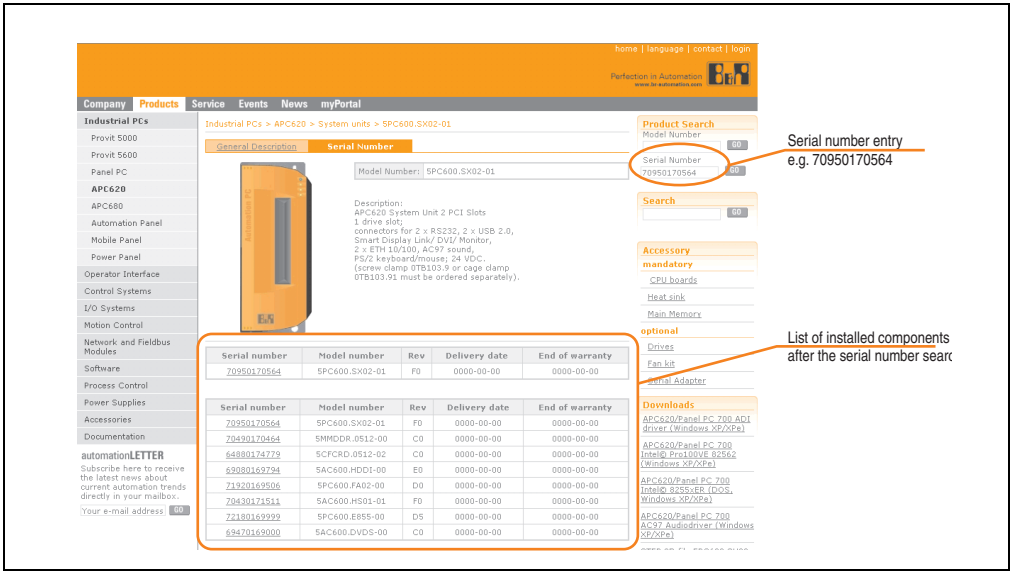


Figure 46: APC620 serial number sticker on back-side

This information can also be found on the B&R homepage. Enter the serial number of the entire device (found behind the front door) in the serial number search field on the start page **www.br-automation.com**. The search provides you with a detailed list of the individual components.



Serial number	Model number	Rev	Delivery date	End of warranty
70950170564	5PC600.SX02-01	F0	0000-00-00	0000-00-00

Serial number	Model number	Rev	Delivery date	End of warranty
70950170564	5PC600.SX02-01	F0	0000-00-00	0000-00-00
70490170464	5MMDDR.0512-00	C0	0000-00-00	0000-00-00
64880174779	5CFCRD.0512-02	C0	0000-00-00	0000-00-00
69080169794	5AC600.HDD1-00	E0	0000-00-00	0000-00-00
71920169506	5PC600.FA02-00	D0	0000-00-00	0000-00-00
70430171511	5AC600.HS01-01	F0	0000-00-00	0000-00-00
72180169999	5PC600.E855-00	D5	0000-00-00	0000-00-00
69470169000	5AC600.DVDS-00	C0	0000-00-00	0000-00-00

Figure 47: Example of serial number search: 70950170564

2.15 Block diagram

The following block diagrams show the simplified structure according to the system unit being used with a X945 CPU board.

2.15.1 Entire device with system unit 5PC600.SX01-00

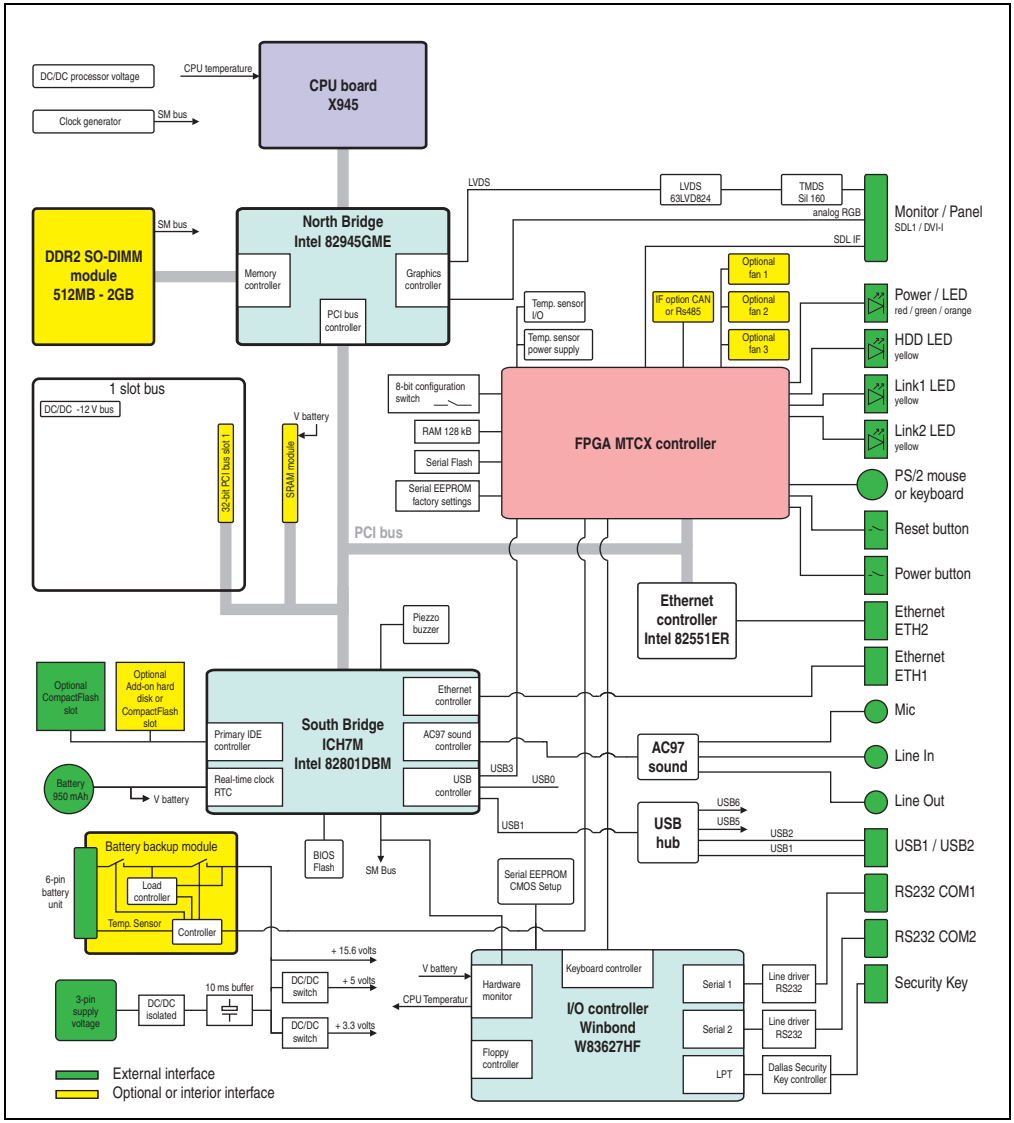


Figure 48: Block diagram of entire device with system unit 5PC600.SX01-00 and X945 CPU board

2.15.2 Entire device with system unit 5PC600.SX02-00

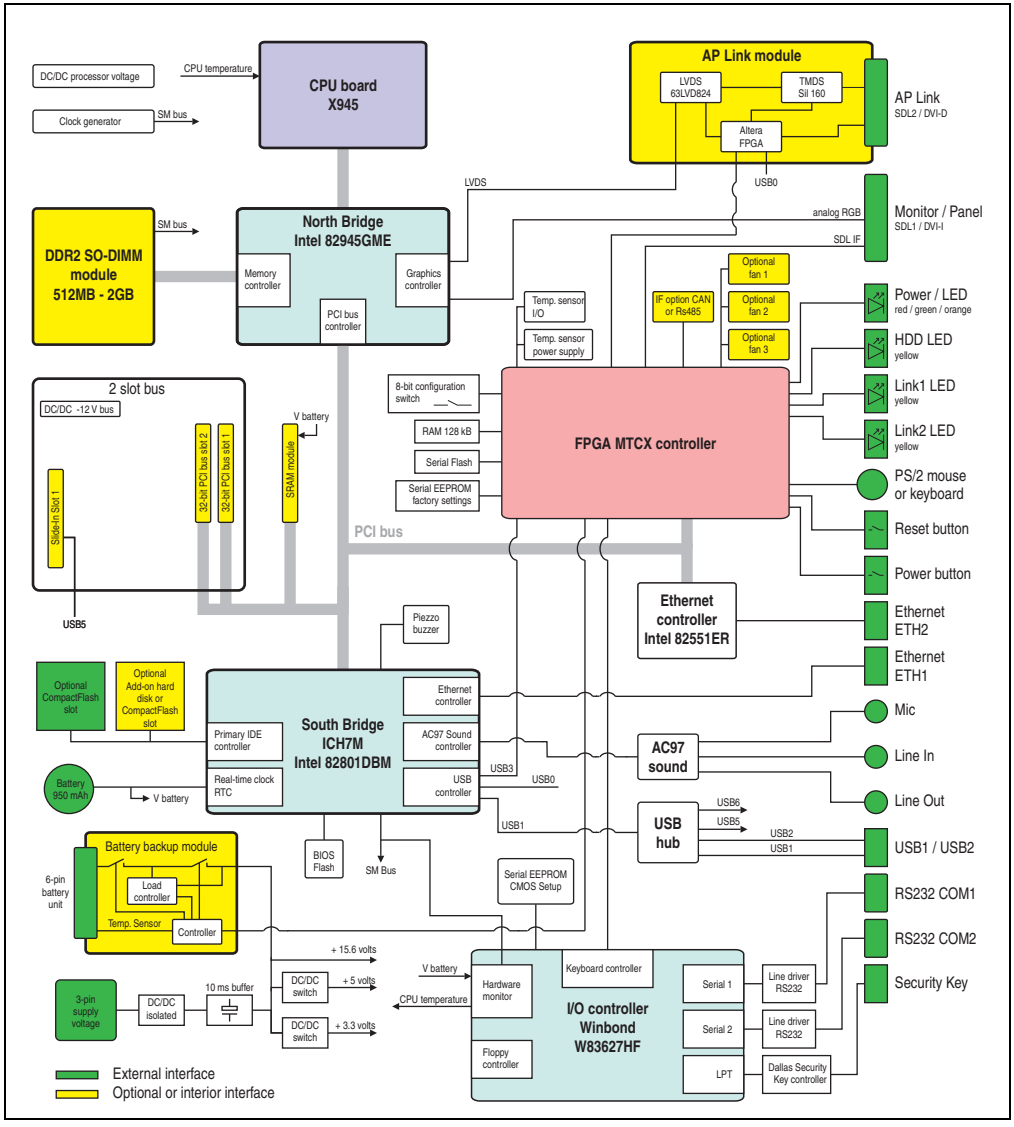


Figure 49: Block diagram of entire device with system unit 5PC600.SX02-00 and X945 CPU board

2.15.3 Entire device with system unit 5PC600.SX02-01

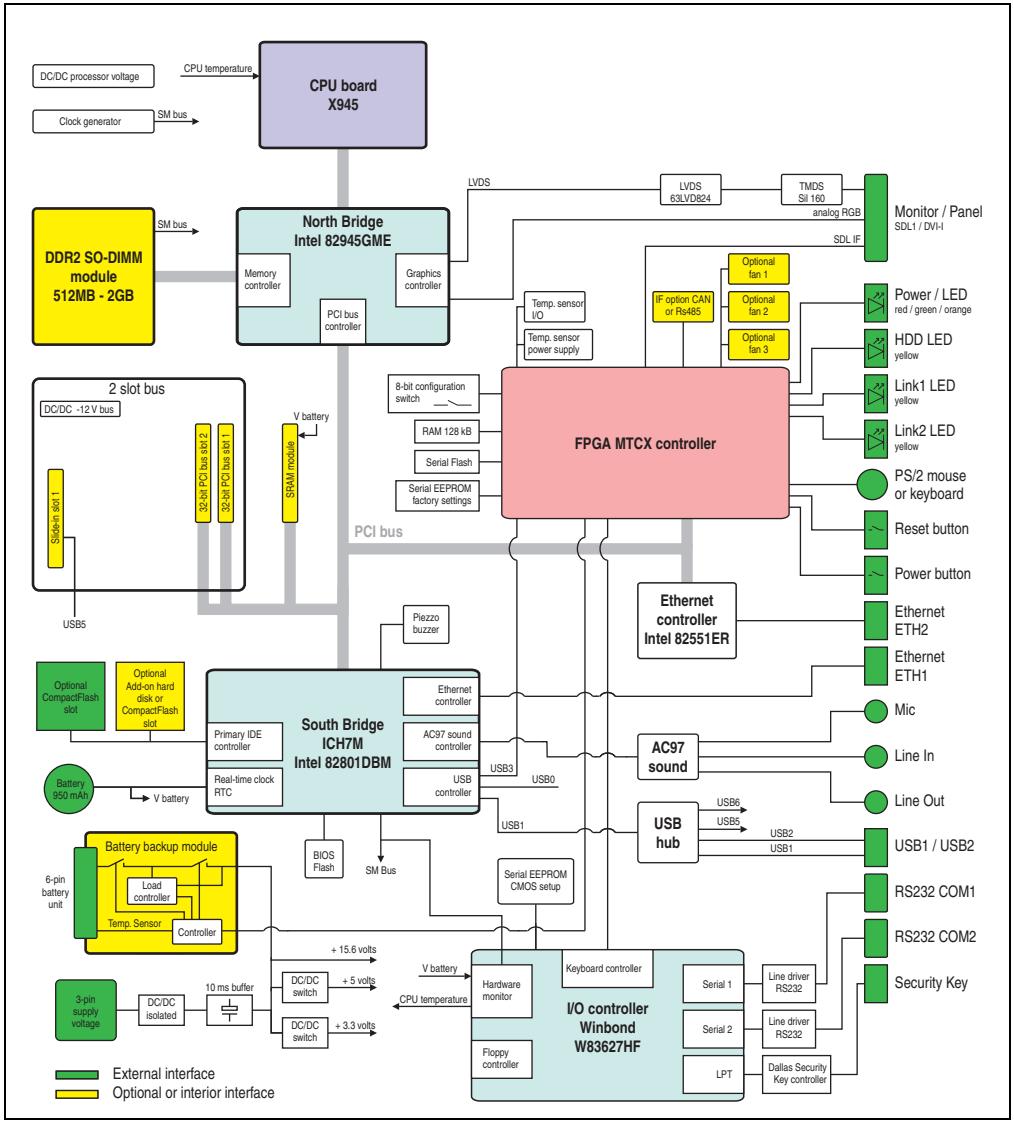


Figure 50: Block diagram of entire device with system unit 5PC600.SX02-01 and X945 CPU board

2.15.4 Entire device with system unit 5PC600.SF03-00

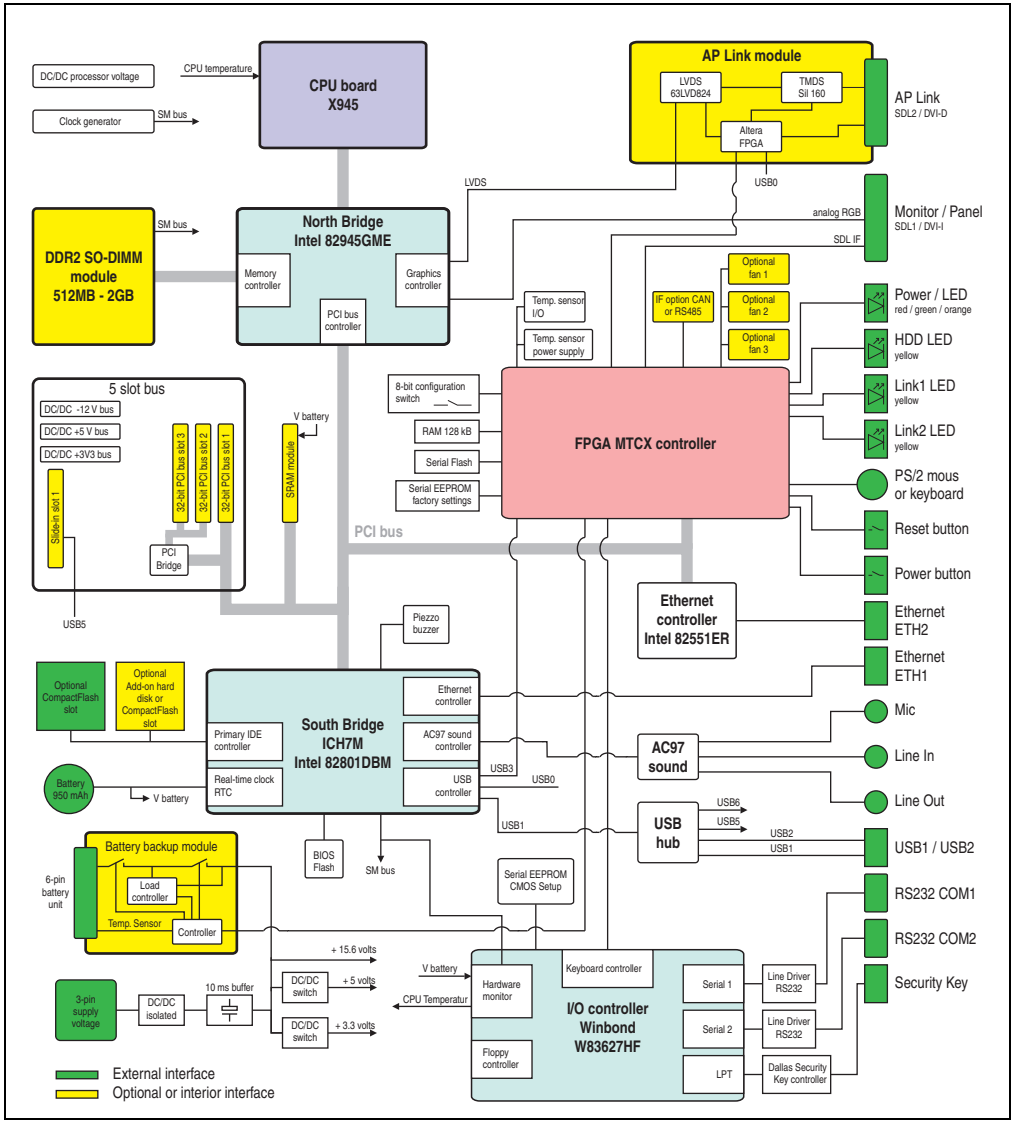


Figure 51: Block diagram of entire device with system unit 5PC600.SX03-00 and X945 CPU board

2.15.5 Entire device with system unit 5PC600.SX05-00

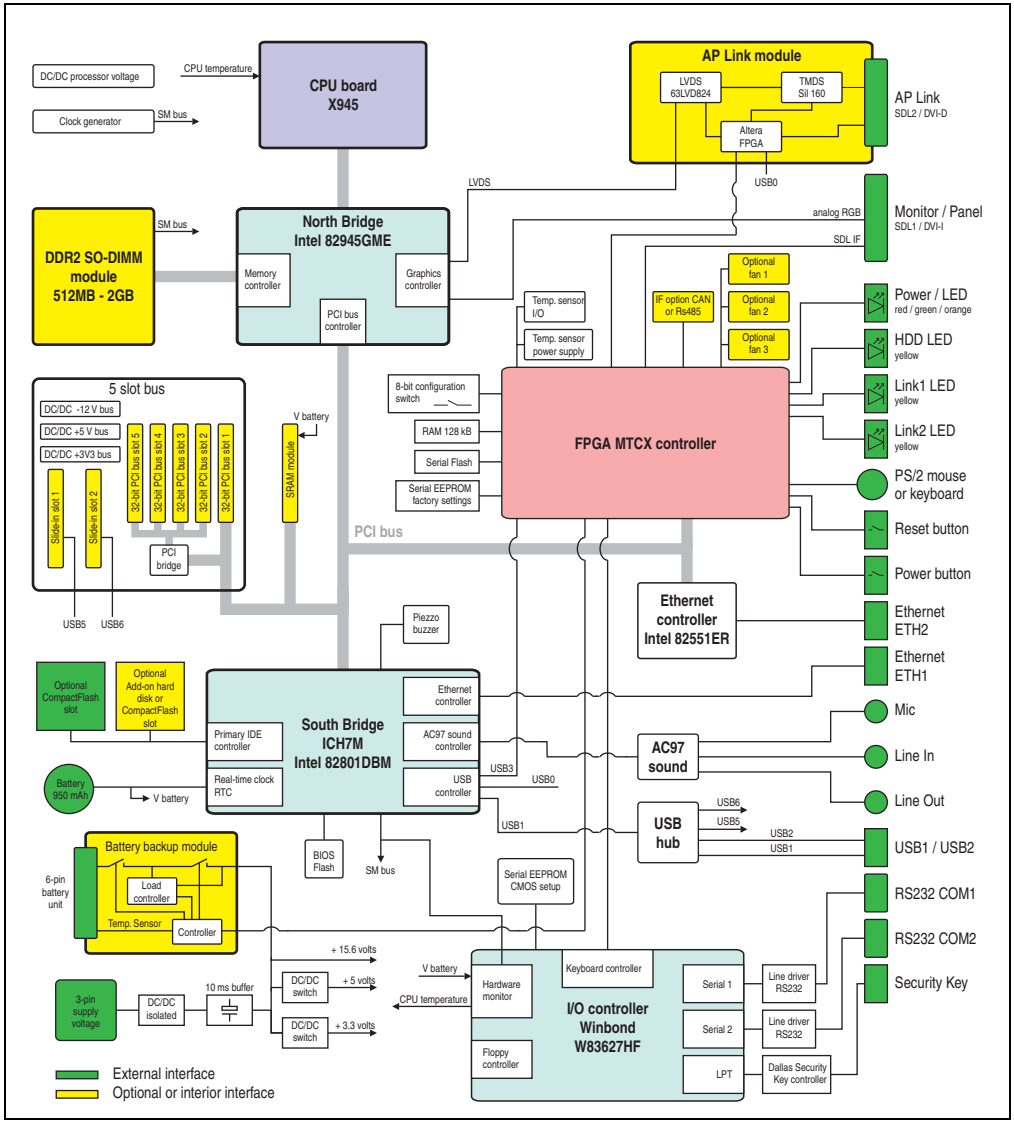


Figure 52: Block diagram of entire device with system unit 5PC600.SX05-00 and X945 CPU board

2.15.6 Entire device with system unit 5PC600.SX05-01

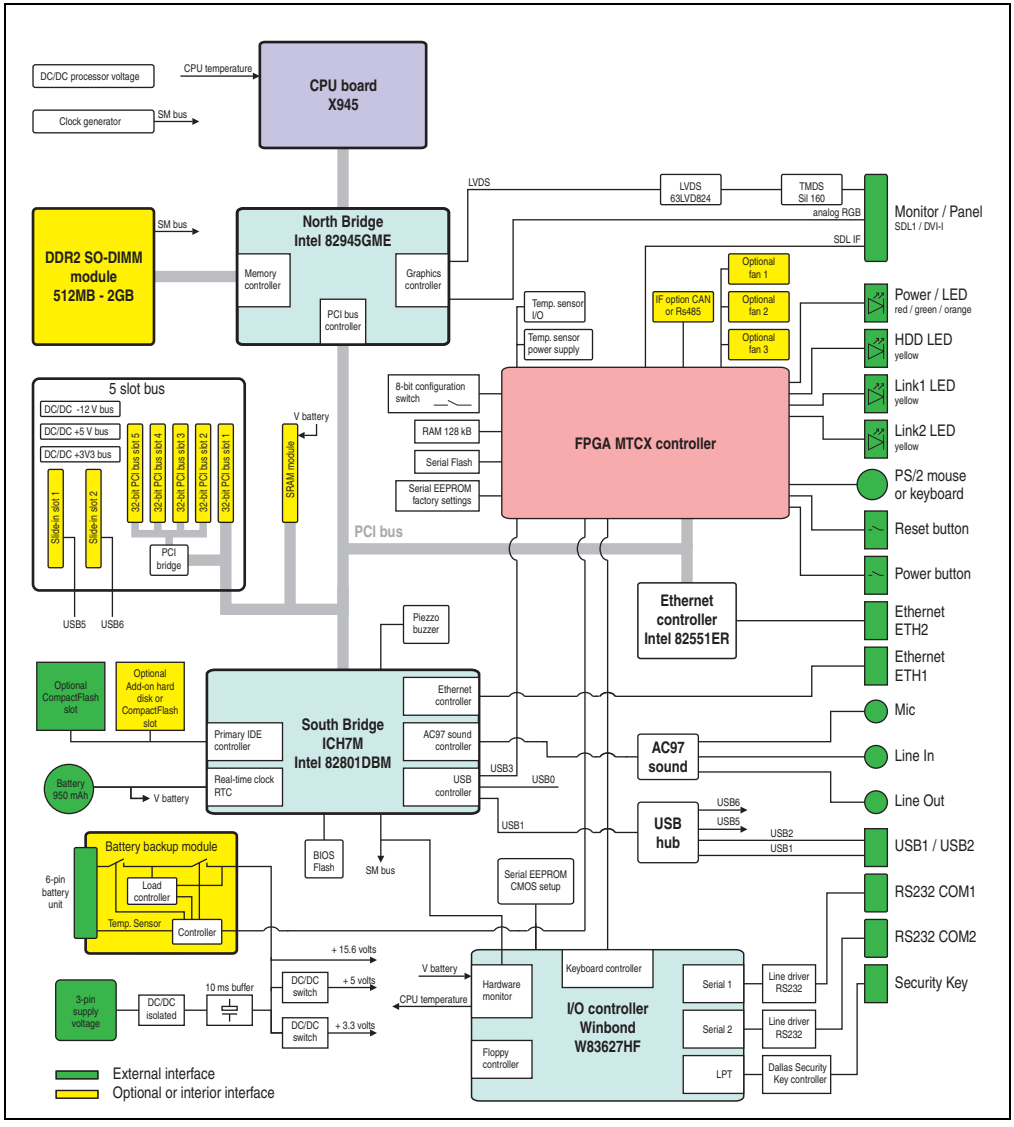


Figure 53: Block diagram of entire device with system unit 5PC600.SX05-01 and X945 CPU board

2.15.7 Entire device with system unit 5PC600.SE00-00

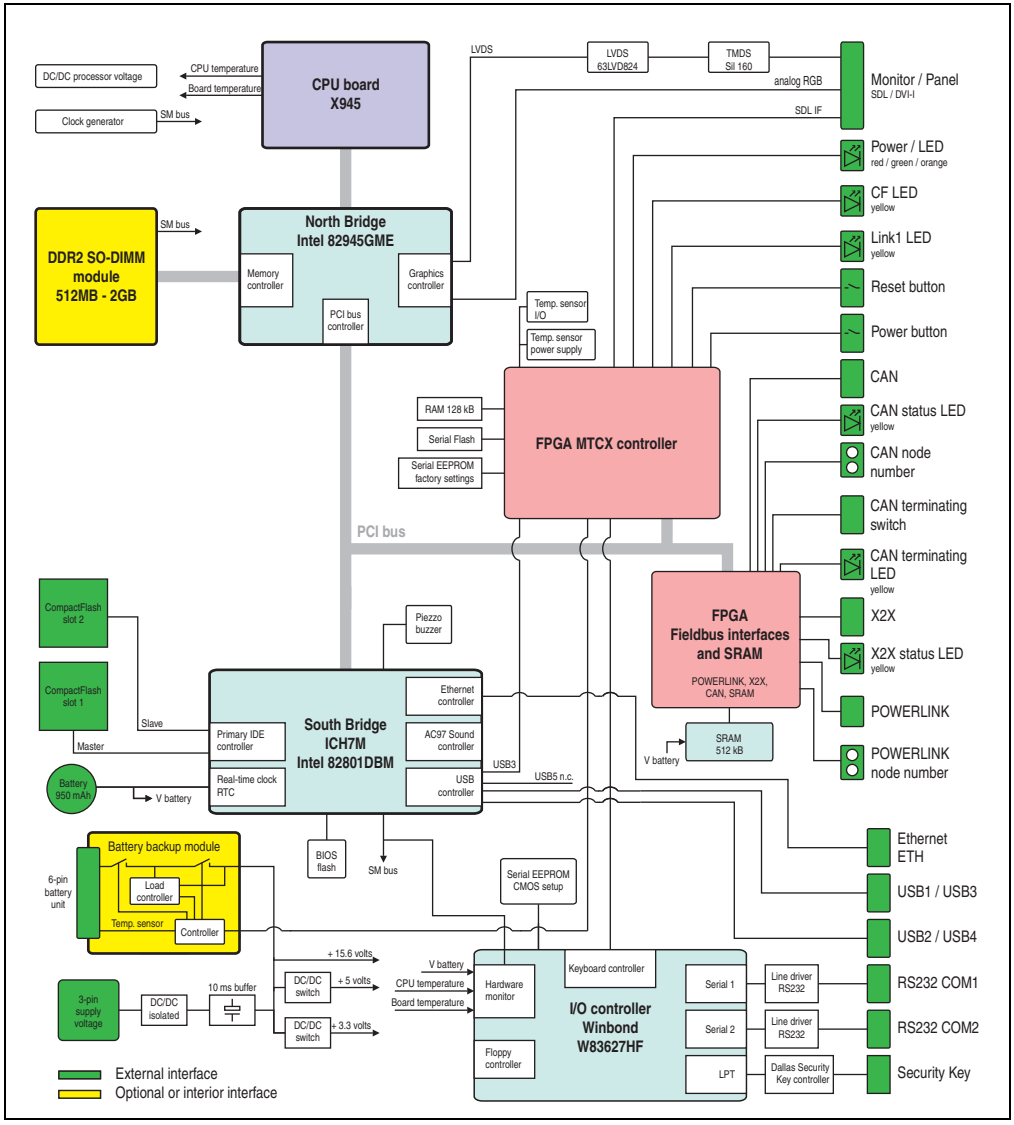


Figure 54: Block diagram of entire device with system unit 5PC600.SX00-00 and X945 CPU board

2.15.8 Entire device with system unit 5PC600.SE00-01

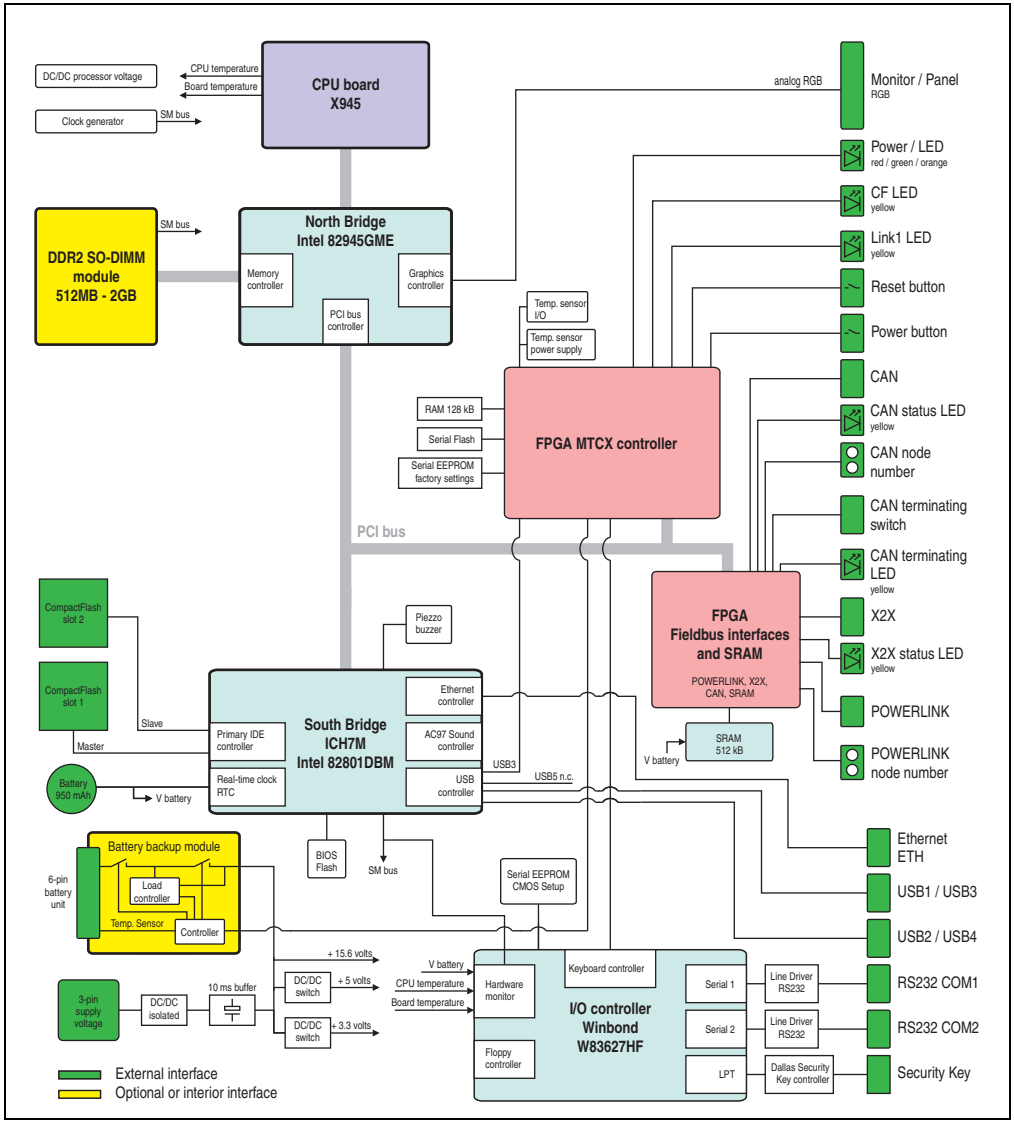


Figure 55: Block diagram of entire device with system unit 5PC600.SX00-01 and X945 CPU board

2.15.9 Entire device with system unit 5PC600.SE00-02

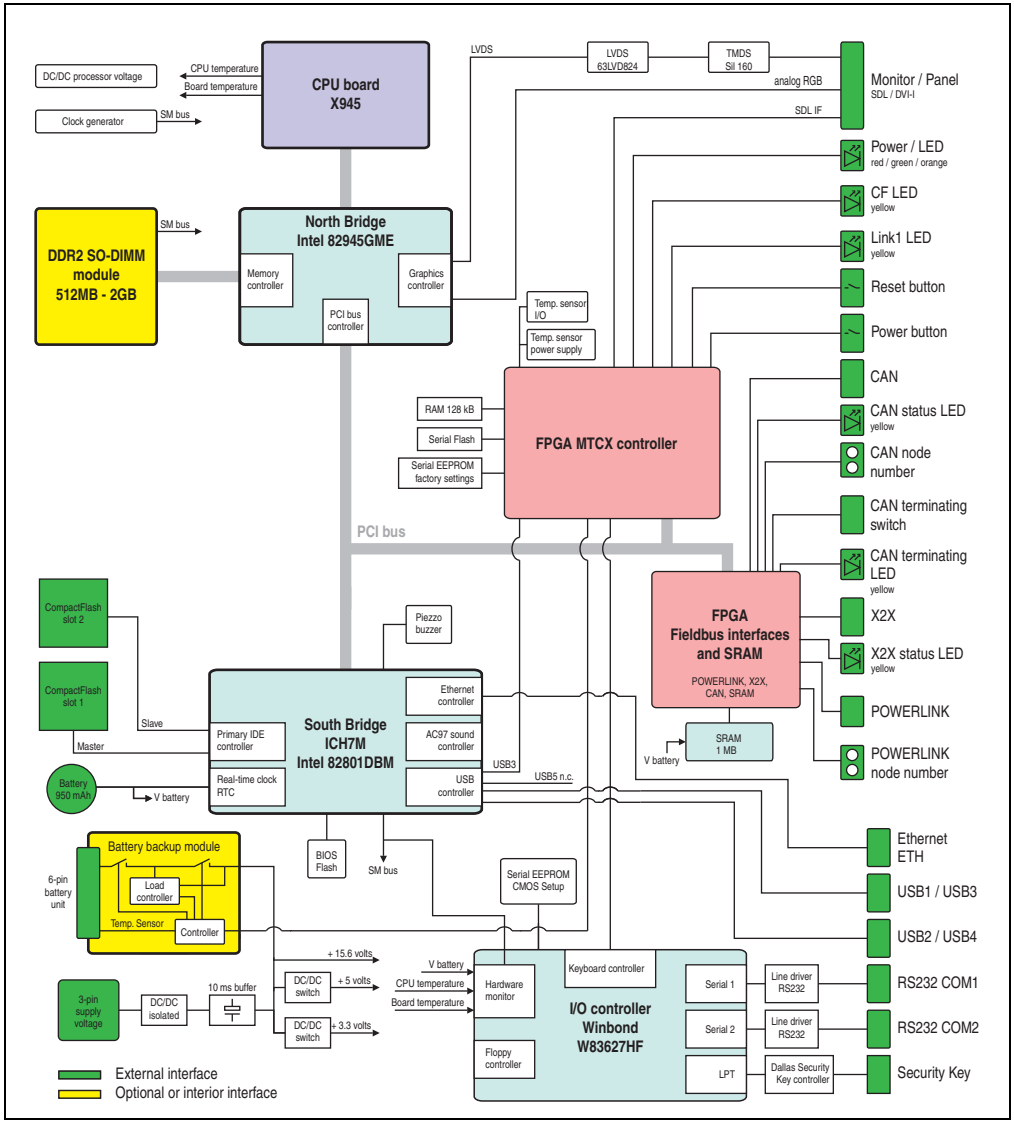


Figure 56: Block diagram of entire device with system unit 5PC600.SX00-02 and X945 CPU board

3. Individual components

3.1 System units

All of the individual components of the Automation PC620 system come together inside the system unit. The system unit consists of an APC620 housing with an integrated main board. The housing units are available in variations with 1, 2, 3 and 5 PCI slots and in APC620 embedded. Units with 2, 3 or 5 PCI slots have an additional 1 or 2 slide-in drives, respectively.

3.1.1 APC620 with 1, 2, 3 and 5 PCI slots

Features	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SF03-00	5PC600.SX05-00	5PC600.SX05-01
Photo						
B&R ID code	$1B7D	$1BB6	$1BB7	$A0B7	$1D13	$1D14
Serial interfaces Type Amount UART Transfer rate Connection	 RS232, modem capable 2 16550 compatible, 16 byte FIFO Max. 115 kBaud 9-pin DSUB, male					
Ethernet Controller Transfer rate Connection	 See "Ethernet connection ETH1", on page 109 and "Ethernet connection ETH2", on page 111 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)					
USB interface Type Amount Transfer rate Connection	 USB 2.0 2 Up to 480 Mbit (high speed) Type A					
Monitor / Panel	DVI-I, female					
AC97 sound	Mic., line in, line out					
IF optional slot	1					
PCI slots half-size full-size PCI standard Bus speed	 1 - 2.2 33 MHz	 2 - 2.2 33 MHz		 - 3 2.2 33 MHz	 5 - 2.2 33 MHz	
CompactFlash slot 1 (CF1) Internal organization	integrated Primary master					

Table 73: Technical data - 1, 2, 3 and 5 PCI slot types

Features	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SF03-00	5PC600.SX05-00	5PC600.SX05-01
Combined CompactFlash slot 2 / hard disk (HDD/CF2) Internal organization	Yes, optional add-on CompactFlash slot or add-on hard disk Primary slave					
Insert for slide-in drive 1 Internal organization	-	Yes USB				
Insert for slide-in drive 2 Internal organization	-	-	-	-	Yes USB	
APC620 UPS module optional	Yes, starting with Rev. H0	Yes, starting with Rev. G0	Yes, starting with Rev. H0	Yes	Yes, starting with Rev. F0	Yes, starting with Rev. H0
SRAM module optional	Yes, starting with Rev. I0	Yes, starting with Rev. H0	Yes, starting with Rev. K0	Yes	Yes, starting with Rev. H0	Yes, starting with Rev. H0
Reset button	Yes					
Power button	Yes					
PS/2 keyboard / mouse	Yes, combined, will be automatically detected					
Battery slot	Yes					
Hardware security key slot	Yes (DS1425 from MAXIM/Dallas)					
Fan slot	Yes					
Automation Panel Link slot	-	1	-	1	1	-
Status LEDs	Power, HDD, Link1, Link2					
Real-time clock (RTC) Battery-buffered Accuracy	Yes See the technical data for CPU boards					
MTCX[1)]	Yes					
Electrical characteristics						
Power supply Rated voltage Starting current Power consumption	24 VDC ±25% Typically 7A Maximum 40 A for < 300 µs See 2.7 "Power management APC620 system unit with 1 PCI slot"			24 VDC ±25% Typically 10 A Maximum 40 A for < 300 µs See section 2.9 "Power management APC620 system unit with 3 PCI slots" or 2.10 "Power management APC620 system units with 5 PCI slots"		
Mechanical characteristics						
Housing[2)] Material Paint Front cover	Galvanized steel plate Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV) Colored plastic (similar to Pantone 144CV)					
Outer dimensions Width Length Height	65 mm 251 mm 270 mm	104.5 mm 253 mm 270 mm		125 mm 253 mm 410 mm	185.4 mm 253 mm 270 mm	
Weight	Approx. 1.5 kg	Approx. 2.6 kg		Approx. 4.5 kg	Approx. 3.8 kg	
Mounting plates (for M4 screws)	4			4	6	
Drilling templates for mounting	(see chapter 3 "Commissioning", section 1.2 "Drilling templates")					

Table 73: Technical data - 1, 2, 3 and 5 PCI slot types (Forts.)

1) **M**ain**t**enance **C**ontroller E**x**tended, for more information, see the section "Maintenance Controller Extended (MTCX)", on page 549.

2) Depending on the process or batch, there may be visible deviations in the color and surface structure.

3.1.2 APC620 embedded variations

Features	5PC600.SE00-00	5PC600.SE00-01	5PC600.SE00-02
Photo			
B&R ID code	$A3BA	$A3BB	$A52B
Serial interfaces Type Amount UART Transfer rate Connection	 RS232, modem capable 2 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB, male		
Ethernet Controller Transfer rate Connection	 See "Ethernet connection ETH (only APC620 embedded)", on page 108 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)		
POWERLINK Amount Station number switches	 1 2 pcs.		
X2X Link Amount Status LED	 1 Yes, see page 106		
CAN bus Amount Transfer rate Node switch Terminating resistor Status LED	See also page 104 1 Max. 500 kbit/s Yes Yes, can be activated using a switch Yes, see page 106		
USB interface Type Amount Transfer rate Connection	 USB 2.0 4 Up to 480 Mbit (high speed) Type A		
Monitor / Panel	DVI-I, female	DVI-A, female	DVI-I, female
AC97 sound	-		
IF optional slot	-		
PCI slots half-size full-size PCI standard Bus speed	-		
CompactFlash slot 1 (CF1) Internal organization	integrated Primary master		

Table 74: Technical data - APC620 embedded variations

Features	5PC600.SE00-00	5PC600.SE00-01	5PC600.SE00-02
CompactFlash slot 2 (CF2) Internal organization	integrated Primary slave		
Insert for slide-in drive 1 Internal organization	-		
Insert for slide-in drive 2 Internal organization	-		
APC620 UPS module optional	Yes		
SRAM Size Remanent variables for AR (Automation Runtime) in power fail mode	Yes 512 kB 256 kB with CPU board 5PC600.X855-xx 192 kB with CPU board 5PC600.X945-00		Yes 1 MB 256 kB with CPU board 5PC600.X855-xx 192 kB with CPU board 5PC600.X945-00
Reset button	Yes		
Power button	Yes		
PS/2 keyboard / mouse	-		
Battery slot	Yes		
Hardware security key slot	Yes (DS1425 from MAXIM/Dallas)		
Fan slot	-		
Automation Panel Link slot	-		
Status LEDs	Power, HDD, Link1		
Real-time clock (RTC) Battery-buffered Accuracy	 Yes See the technical data for the CPU board		
MTCX[1)]	Yes		
Electrical characteristics			
Power supply Rated voltage Starting current Power consumption	 24 VDC ±25% Typically 7 A maximum 40 A for < 300 µs See 2.11 "Power management for the APC620 embedded system unit"		
Mechanical characteristics			
Housing[2)] Material Paint Front cover	 Galvanized steel plate Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV) Colored plastic (similar to Pantone 144CV)		
Outer dimensions Width Length Height	 68.3 mm 225.6 mm 210 mm		
Weight	Approx. 1.3 kg		
Mounting plates (for M4 screws)	4		
Drilling templates for mounting	(see chapter 3 "Commissioning", section 1.2 "Drilling templates")		

Table 74: Technical data - APC620 embedded variations (Forts.)

1) **M**aint**e**nance **C**ontroller E**x**tended, for more information, see the section "Maintenance Controller Extended (MTCX)", on page 549.

2) Depending on the process or batch, there may be visible deviations in the color and surface structure.

3.2 X945 CPU board

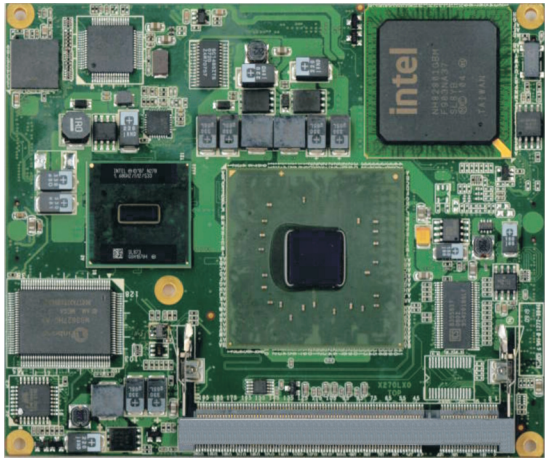


Figure 57: X945 CPU board

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.

3.2.1 Technical data

Features	5PC600.X945-00
Boot loader / Operating system	BIOS AMI (see BIOS section 1 "BIOS options", on page 269)
Processor Architectures Type Name Clock frequency Expanded command set L1 cache L2 cache Floating point unit (FPU)	 45 nm Intel® Atom™ N270 1.6 GHz Hyper-threading technology, enhanced speed step SSE, SSE2, SSE3 (Streaming SIMD extensions) 24 KB 512 KB Yes
Chipset	Intel® 945GME / Intel 82801DBM (ICH7M-DH)

Table 75: Technical data - CPU board X945

Features	5PC600.X945-00
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At 25°C, typically 12 ppm (1sec)[1] per day
Front side bus	533 MHz
Mass memory management	1x EIDE
Memory Type Size Socket	 DDR2 Max. 2 GB SO-DIMM 200-pin
Graphics Controller Memory Color depth Resolution RGB GE1[2] = LVDS	 Intel® Graphics Media Accelerator 950 Up to 224 MB (reserved from main memory) Max 32 Bit 400 MHz RAMDAC, up to 2048 x 1536 @75 Hz (QXGA) including 1920 x 1080 @ >85 Hz (HDTV) From 640 x 480 up to 1920 x 1200 (Embedded Panel Interface based on VESA EDID™ 1.3)

Table 75: Technical data - CPU board X945 (Forts.)

1) At max. specified ambient temperature: typically 58 ppm (5 seconds) - worst-case 220 ppm (19 seconds).

2) GE = Graphics Engine

Driver support

In order for the CPU board with the Intel 945GME chipset to work properly, it is necessary to install the Intel chipset driver (e.g. special USB driver) and the graphics chip. The necessary software can be downloaded from the download area on the B&R homepage (www.br-automation.com).

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

3.3 Heat sink

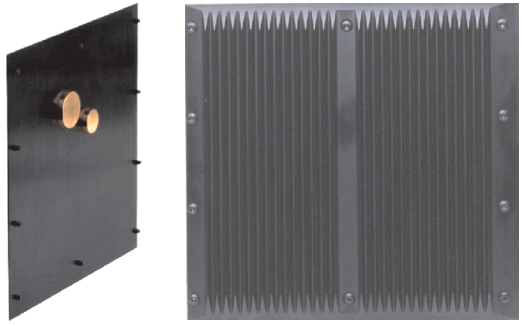


Figure 58: Heat sink

Information:

A heat sink can only be replaced at the B&R plant.

3.3.1 Technical data

Mechanical characteristics	5AC600.HS01-03	5AC600.HS02-03	5AC600.HS03-02
Ideal for CPU boards	5PC800.X945-00		
Suitable for the following system units	5PC600.SX01-00 5PC600.SX02-00 5PC600.SX02-01 5PC600.SX05-00 5PC600.SX05-01	5PC600.SF03-00	5PC600.SE00-00 5PC600.SE00-01 5PC600.SE00-02
Material	Black-coated aluminum		
Outer dimensions Width Height Depth	 228.7 mm 218 mm 12.8 mm	 228.7 mm 358 mm 12.8 mm	 203.9 mm 158 mm 12.8 mm
Weight	Approx. TBD g	Approx. TBD g	Approx. TBD g

Table 76: Technical data - Heat sink

3.4 Main memory

When choosing a main memory, it is important to consider the 2 GB maximum memory capacity of the CPU boards.

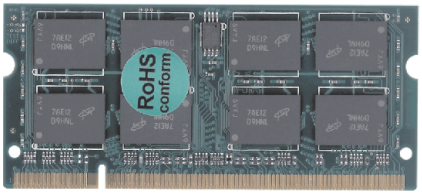


Figure 59: Main memory module

3.4.1 Technical data

Features	5MMDDR.0512-01	5MMDDR.1024-01	5MMDDR.2048-01
Size	512 MB	1 GB	2 GB
Type	DDR2 SDRAM / PC2-5300		
Construction	200 Pin SO-DIMM		
Organization	64M x 64-bit	128M x 64-bit	256M x 64-bit

Table 77: Technical data - Main memory

Information:

A main memory module can only be replaced at the B&R plant.

3.5 Drives

3.5.1 Add-on hard disk 40 GB 24x7 ET - 5AC600.HDDI-05

This hard disk is specified for 24-hour operation (24x7) and also provides an extended temperature specification (ET). The add-on drive is referred to internally as the primary slave drive.

Information:

Add-on drives are only available factory-installed. Therefore, they need to be requested when placing an order.

Figure 60: Add-on hard disk 40 GB - 5AC600.HDDI-05

Technical data

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.

Features	5AC600.HDDI-05 < Revision D0	5AC600.HDDI-05 Revision D0
Manufacturer's product ID	Seagate ST940813AM	Seagate ST940817AM
Formatted capacity	40 GB	
Number of heads	2	
Number of sectors (user)	78,140,160	
Bytes per sector	512	

Table 78: Technical data - Add-on hard disk 5AC600.HDDI-05

Features	5AC600.HDDI-05 < Revision D0	5AC600.HDDI-05 Revision D0
Revolution speed	5400 rpm ±1%	
Access time (average)	12.5 ms	
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 12.5 ms 22 ms	
Starting time (0 rpm to read access)	3 seconds (typically)	
Interface	ATA-6	
Data transfer rate On the medium To/from host	 Max. 321 Mbit/s Max. 100 MB/s (Ultra-DMA Mode 5)	 Max. 450 Mbit/s Max. 100 MB/s (Ultra-DMA Mode 5)
Cache	8 MB	
S.M.A.R.T. Support	Yes	
MTBF	550,000 hours[1)]	750,000 hours[1)]
Mechanical characteristics		
Add-on mounting	Fixed	
Outer dimensions (without slide-in) Width Length Height	 70 mm 100 mm 9.5 mm	
Weight	100 g	
Environmental characteristics		
Ambient temperature[2)] Operation - Standard / 24-hour Storage Transport	 -30 to +85°C -40 to +95°C -40 to +95°C	
Relative humidity Operation Storage Transport	 5 to 90%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing	
Vibration Operation Storage	 10 - 500 Hz: 1 g; no non-recovered errors 5 - 500 Hz: 5 g; no non-recovered errors	 5 - 500 Hz: 2 g; no non-recovered errors 5 - 500 Hz: 5 g; no non-recovered errors
Shock (pulse with a sine half-wave) Operation Storage	 Max. 200 g, 2 ms; no non-recovered errors Max. 110 g, 11 ms; no non-recovered errors Max. 800 g, 2 ms; no damage Max. 400 g, 0.5 ms; no damage	 Max. 300 g, 2 ms; no non-recovered errors Max. 150 g, 11 ms; no non-recovered errors Max. 800 g, 2 ms; no damage Max. 400 g, 0.5 ms; no damage
Altitude Operation Storage	 - 300 to 4419 meters - 300 to 12,192 meters	 - 300 to 5000 meters - 300 to 12,192 meters

Table 78: Technical data - Add-on hard disk 5AC600.HDDI-05 (Forts.)

1) With 8760 POH (Power On Hours) per year and 70°C surface temperature.

2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.

Temperature humidity diagram

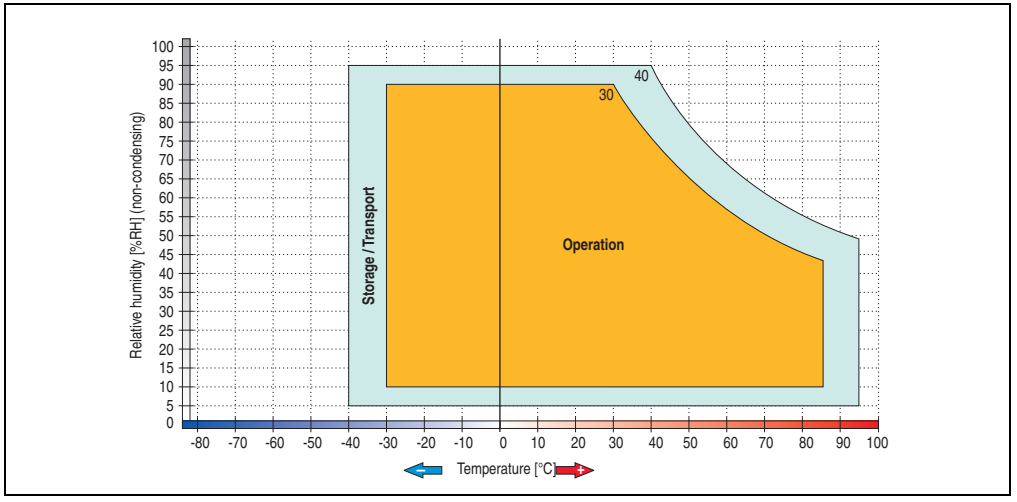


Figure 61: Temperature humidity diagram - Add-on hard disk 5AC600.HDDI-05

Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.

3.5.2 Add-on hard disk 80 GB 24x7 ET - 5AC600.HDDI-06

This hard disk is specified for 24-hour operation (24x7) and also provides an extended temperature specification (ET). The add-on drive is referred to internally as the primary slave drive.

Information:

Add-on drives are only available factory-installed. Therefore, they need to be requested when placing an order.

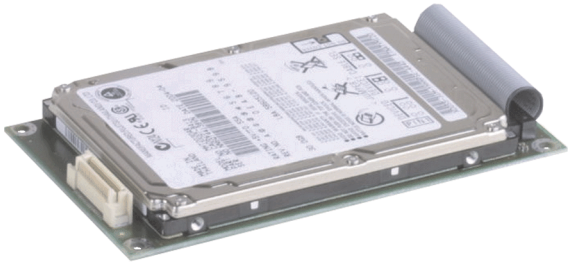


Figure 62: Add-on hard disk 80 GB - 5AC600.HDDI-06

Technical data

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.

Features	5AC600.HDDI-06
Manufacturer's product ID	Seagate ST980817AM
Formatted capacity	80 GB
Number of heads	2
Number of sectors (user)	156,301,488
Bytes per sector	512
Revolution speed	5400 rpm ±1%
Access time (average)	10 ms

Table 79: Technical data - add-on hard disk - 5AC600.HDDI-06

Features	5AC600.HDDI-06
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 12.5 ms 22 ms
Starting time (0 rpm to read access)	4 seconds (typically)
Interface	ATA-6
Data transfer rate On the medium To/from host	 Max. 450 Mbit/s Max. 100 MB/s (Ultra-DMA Mode 5)
S.M.A.R.T. Support	Yes
Cache	8 MB
MTBF	750,000 hours[1)]
Mechanical characteristics	
Add-on mounting	Fixed
Outer dimensions (without slide-in) Width Length Height	 70 mm 100 mm 9.5 mm
Weight	120 g
Environmental characteristics	
Ambient temperature[2)] Operation - Standard / 24-hour Storage Transport	 -30 to +85°C -40 to +95°C -40 to +95°C
Relative humidity Operation Storage Transport	 5 to 90%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration Operation Storage	 5 - 500 Hz: 2 g; no non-recovered errors 5 - 500 Hz: 5 g; no non-recovered errors
Shock (pulse with a sine half-wave) Operation Storage	 Max. 300 g, 2 ms; no non-recovered errors Max. 150 g, 11 ms; no non-recovered errors Max. 800 g, 2 ms; no damage Max. 400 g, 0.5 ms; no damage
Altitude Operation Storage	 - 300 to 5000 meters - 300 to 12,192 meters

Table 79: Technical data - add-on hard disk - 5AC600.HDDI-06 (Forts.)

1) With 8760 POH (Power On Hours) per year and 70°C surface temperature.

2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.

Temperature humidity diagram

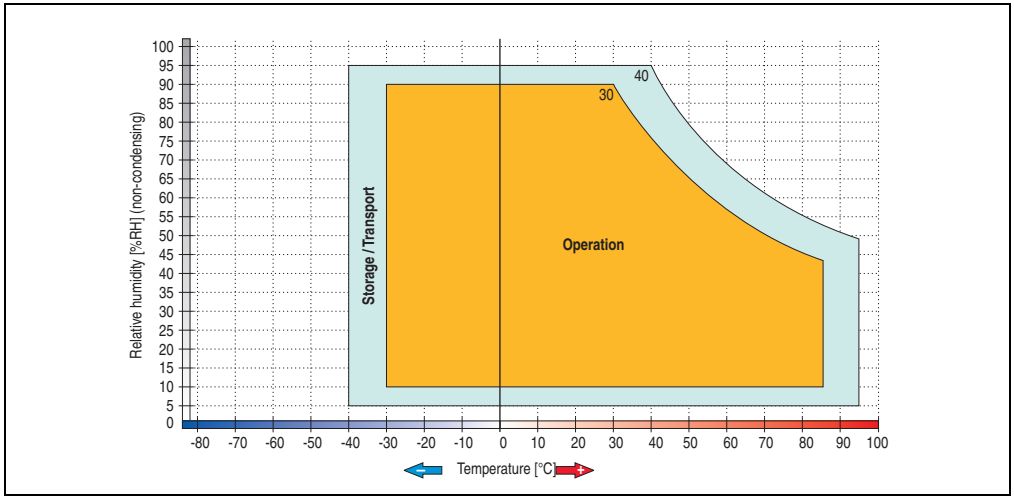


Figure 63: Temperature humidity diagram - Add-on hard disk 5AC600.HDDI-06

Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.

3.5.3 Add-on CompactFlash slot - 5AC600.CFSI-00

A CompactFlash card inserted in the add-on drive is referred to internally as the "primary slave drive."

Information:

Add-on drives are only available factory-installed. Therefore, they need to be requested when placing an order.

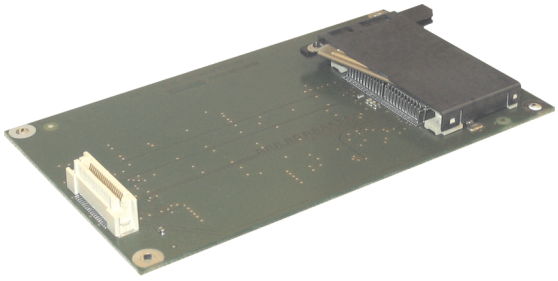


Figure 64: Add-on CompactFlash slot - 5AC600.CFSI-00

Technical data

Features	5AC600.CFSI-00
CompactFlash Type Amount Connection	 Type I 1 slot Primary slave
Weight	100 g

Table 80: Technical data - Add-on CompactFlash slot 5AC600.CFSI-00

Warning!

Inserting and removing the CompactFlash card can only take place without power applied!

3.5.4 Slide-in USB FDD - 5AC600.FDDS-00

The slide-in drive can be used in system units with 2, 3 or 5 PCI slots. In these units it is connected to the system via USB.

Information:

- **It is possible to add, remove, or modify the slide-in drive at any time.**
- **In system units with 5 PCI slots, the slide-in USB FDD drive must be inserted in slide-in slot 1 for mechanical reasons.**

Caution!

Turn off power before adding or removing a slide-in drive.

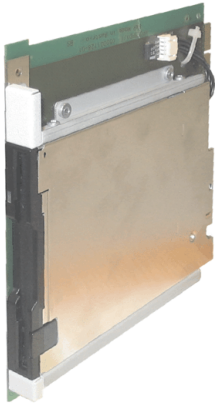


Figure 65: Slide-in USB FDD - 5AC600.FDDS-00

Technical data

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.

Features	5AC600.FDDS-00
Data capacity	720 KB / 1.25 MB / 1.44 MB (formatted)
USB transfer rate	Full speed (12 Mbps)
Data transfer rate	250 kbits (720 KB) or 500 kbits (1.25 MB and 1.44 MB)
Rotation speed	Up to 360 rpm
Diskette media	High density (2HD) or normal density (2DD) 3.5" diskettes
MTBF	30,000 POH (Power-On Hours)
Environmental characteristics	
Ambient temperature[1)] Operation Storage Transport	 +4 to +50°C -20 to +60°C -20 to +60°C
Relative humidity Operation Storage Transport	 20 to 80%, non-condensing 5 to 90%, non-condensing 5 to 90%, non-condensing
Vibration Operation Storage Transport	 At max. 5 - 500 Hz and 0.3 g At max. 10 - 100 Hz and 2 g At max. 10 - 100 Hz and 2 g
Shock (pulse with a sine half-wave) Operation Storage Transport	 At max. 5 g for 11 ms At max. 60 g for 11 ms At max. 60 g for 11 ms
Altitude	Max. 3000 meters

Table 81: Technical data - Slide-in USB diskette drive - 5AC600.FDDS-00

1) 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).

Temperature humidity diagram

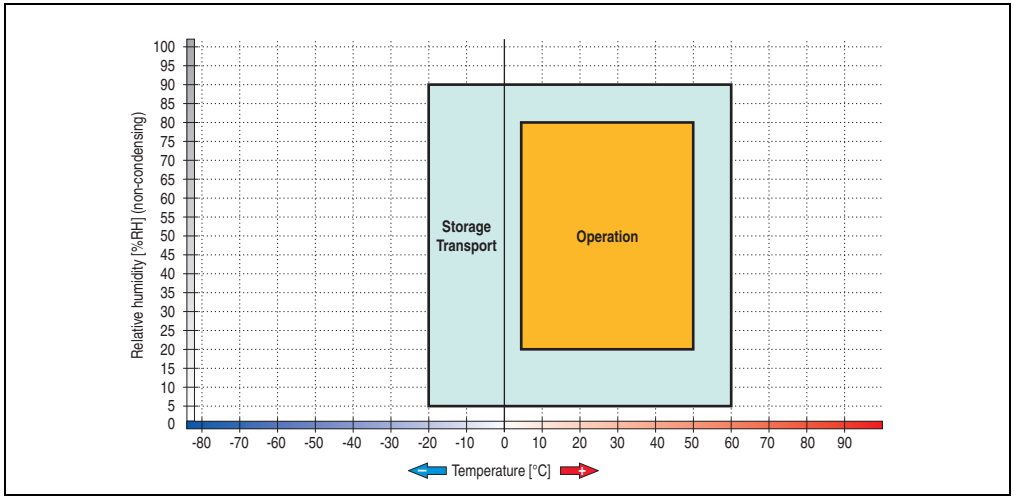


Figure 66: Temperature humidity diagram - Slide-in USB diskette drive 5AC600.FDDS-00

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).

3.6 RAID system

Sometimes it is simply not possible to avoid using hard disks due to the amount of data that needs to be saved. In this case, a RAID provides high system availability. All data is simultaneously and automatically stored on two hard drives. This double data storage means that when one hard disk fails, the system will continue to run on the second hard disk.

Advantages for the user:

- No data loss when hard drive fails.
- The system continues to run with a hard disk.
- Data redundancy is automatically restored by the system when the faulty hard disk has been replaced.

Depending on the type, the RAID 1 system is designed in the form of 1 or 2 PCI cards.

1 PCI slot: PCI SATA RAID controller - 5ACPCI.RAIC-03 (2x160GB)

2 PCI slot: PCI RAID controller (5ACPCI.RAIC-00) and PCI card with two hard disks (5ACPCI.RAIS-00 or 5ACPCI.RAIS-01)

The system can be flexibly implemented in all APC620 und PPC700s with 1 free PCI slot (depending on the RAID system design). The system also supports RAID 0 applications. As a result, parallel access to two hard drives with a relatively high data throughput is the main focus, in addition to the high availability.

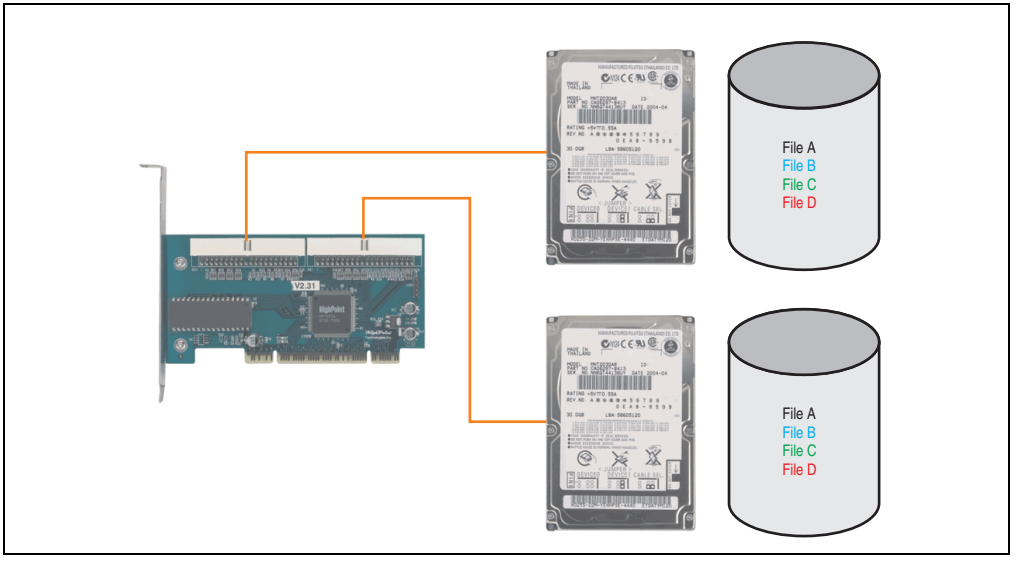


Figure 67: RAID 1 system schematic

3.6.1 PCI SATA RAID 2 x 160 GB 24x7 ET - 5ACPCI.RAIC-03

The hard disks being used are specified for 24-hour operation (24x7) and also provides an extended temperature specification (ET).

Features

- SATA RAID controller
- RAID Level 0 (striped) and 1 (mirrored)
- 2 SATA hard disk drives (suitable for 24 hour operation)
- Only requires 1 PCI slot
- Transfer rates up to 150 MB/s

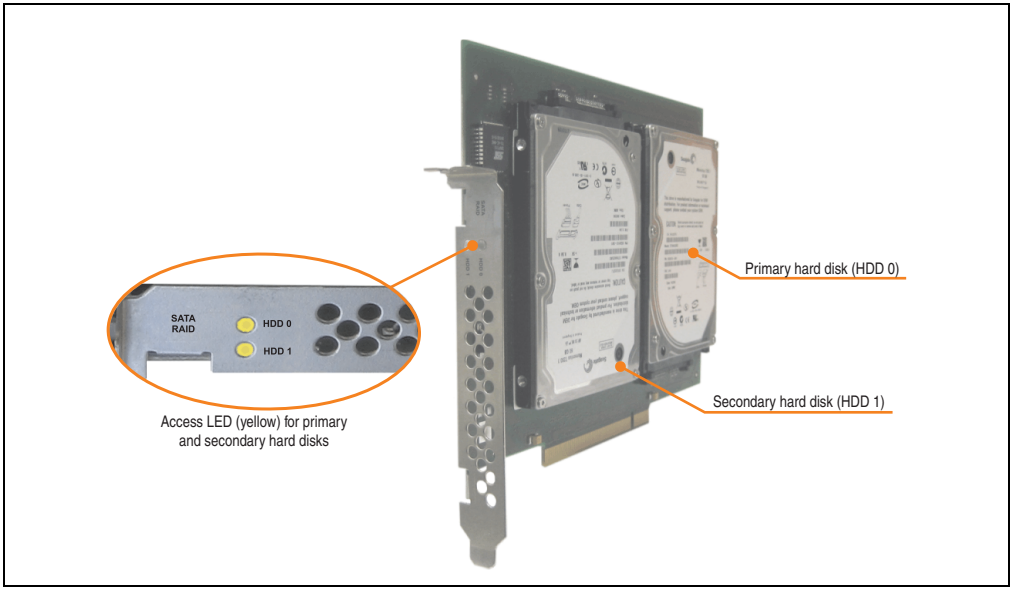


Figure 68: PCI SATA RAID controller - 5ACPCI.RAIC-03

Information:

The PCI SATA RAID controller can not be used in place of a Universal Power Supply (UPS). If the operating system is shut down improperly, the next time it is started it is detected as an error by the RAID 1, and a complete rebuild is executed. This generally takes at least 50 minutes (configurable) to complete.

Technical data

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.

Features	5ACPCI.RAIC-03
SATA RAID controller Type Specifications Data transfer rate RAID level BIOS Extension ROM - requirements	 Sil 3512 SATA link Serial ATA 1.0 Max. 1.5 GB/s (150 MB/s) Supports RAID 0, 1 Approx. 32 KB
Hard disks Amount	Fujitsu M120-ESW MHY2160BH-ESW 2
Formatted capacity (512 bytes/sector)	160 GB
Number of heads	3
Number of sectors (user)	312,581,808
Bytes per sector	512
Revolution speed	5400 rpm ±1%
Access time (average)	5.56 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1.5 ms 12 ms 22 ms
Starting time (0 rpm to read access)	4 seconds (typically)
Supported transfer mode	SATA 1.0, PIO mode 0-4, multiword DMA mode 0-2, UDMA 0-5
Data transfer rate On the medium To/from host	 Max. 84.6 Mbit/s Max. 150 MB/s
Cache	8 MB
S.M.A.R.T. Support	Yes
Lifespan	5 years
Electrical characteristics	
Power consumption	0.3 A at 3.3 V (PCI bus) 1 A at 5 V (PCI bus)
Mechanical characteristics	
Mounted on PCI insert	Fixed
Weight	350 g

Table 82: Technical data - RAID hard disk - 5ACPCI.RAIC-03

Environmental characteristics	5ACPCI.RAIC-03
Ambient temperature[1)] Operation - Standard / 24-hour[2)] Storage Transport	 -15 to +80°C -40 to +95°C -40 to +95°C
Relative humidity Operation Storage Transport	 8 to 90% non-condensing (maximum humidity at +29°C) 5 to 95% non-condensing (maximum humidity at +40°C) 5 to 95% non-condensing (maximum humidity at +40°C)
Vibration[3)] Operation (continuous) Operation (occasional) Storage Transport	 5 - 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors 5 - 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors 5 - 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage 5 - 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage
Shock (pulse with a sine half-wave) Operation Storage	 Max. 125 g, 2 ms; no unrecoverable errors Max. 400 g, 2 ms; no damage Max. 450 g, 1 ms; no damage Max. 200 g, 0.5 ms; no damage
Altitude Operation Storage	 - 300 to 3048 meters - 300 to 12,192 meters

Table 82: Technical data - RAID hard disk - 5ACPCI.RAIC-03 (Forts.)

1) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.

2) 24-hour operation means 732 POH (power-on hours) per month.

3) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).

Temperature humidity diagram

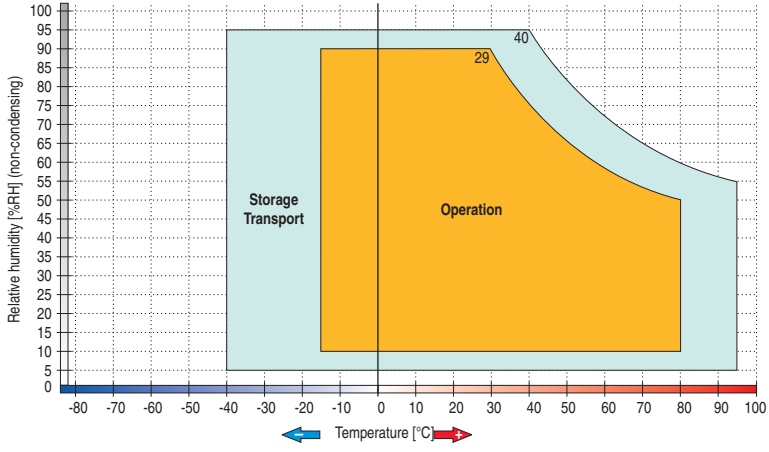


Figure 69: Temperature humidity diagram - SATA RAID hard disk 5ACPCI.RAIC-03

Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.

Driver support

Special drivers are necessary for operating the PCI SATA RAID controller. Drivers for Windows XP Professional and Windows XP Embedded are available for download on the B&R Homepage in the download area (**www.br-automation.com**).

The .NET-based SATARaid™ serial ATA RAID management software can also be found on the B&R homepage.

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

Known limitations in a RAID 1 configuration

If one of the two hard disks is physically damaged, when the system is booted the SATA RAID BIOS displays the following error message for approx. 5 seconds: "RAID1 set is in critical status". After this time the operating system is automatically started on the functioning hard disk. The installed SATA Raid™ serial ATA RAID management software does not detect this error status. After repairing the cause of the error (e.g. replacing the hard disk) the SATARaid™ Serial ATA RAID management software automatically executes a rebuild (mirroring of the hard disk). This process takes approximately 50 minutes to complete, regardless of the amount of data and with the highest possible setting for "Rebuild rate".

A hard disk that becomes faulty during operation is detected by the SATA Raid™ Serial ATA RAID management software and indicated with an error message.

Important notes / BIOS Extension ROM

For PCI cards with BIOS Extension ROM, there is a limited area of 64 KB available in the Phoenix BIOS. A B&R PCI SATA RAID controller requires a free area of approx. 32 KB. The remaining area can be used as desired.

If a PCI card requiring BIOS extension ROM is plugged into PCI slot 1 on an AP620 with 5 PCI slots (see figure 70 "PCI slot numbering on APC620 systems with 5 PCI slots") and the B&R PCI SATA RAID controller is plugged-in at a different position (e.g. PCI slot 4), then the BIOS menu item *Advanced - PCI/PnP Configuration - PCI Device, Slot #2* must be set from "*Option ROM Scan*" to "*Disabled*" so that this device can be used for booting. The BIOS default setting is to always attempt to load the BIOS Extension ROM from the PCI slot 1. Alternatively, the two PCI cards can be switched.

This setting does not have to be changed if a PCI card without BIOS extension ROM is plugged-in.

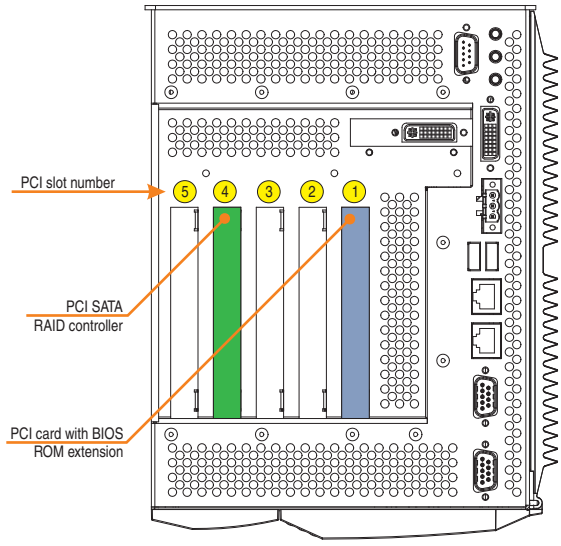


Figure 70: PCI slot numbering on APC620 systems with 5 PCI slots

Configuration of a PCI SATA RAID array

Instructions for configuration of a PCI SATA RAID array using RAID BIOS can be found in chapter 3 "Commissioning", section "Configuration of a SATA RAID array", on page 256.

3.6.2 Replacement SATA HDD 160 GB - 5ACPCI.RAIC-04

The hard disk can be used as a replacement part for 5ACPCI.RAIC-03.

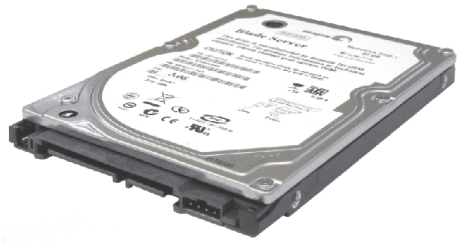


Figure 71: Replacement SATA HDD 160 GB - 5ACPCI.RAIC-04

Technical data

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.

Features	5ACPCI.RAIC-04
Hard disks Amount	Fujitsu M120-ESW MHY2160BH-ESW 1
Formatted capacity (512 bytes/sector)	160 GB
Number of heads	3
Number of sectors (user)	312,581,808
Bytes per sector	512
Revolution speed	5400 rpm ±1%
Access time (average)	5.56 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1.5 ms 12 ms 22 ms
Starting time (0 rpm to read access)	4 seconds (typically)
Supported transfer mode	SATA 1.0, PIO mode 0-4, multiword DMA mode 0-2, UDMA 0-5
Data transfer rate On the medium To/from host	 Max. 84.6 Mbit/s Max. 150 MB/s

Table 83: Technical data - RAID hard disk - 5ACPCI.RAIC-04

Features	5ACPCI.RAIC-04
Cache	8 MB
S.M.A.R.T. Support	Yes
Lifespan	5 years
Environmental characteristics	
Ambient temperature[1)] Operation - Standard / 24-hour[2)] Storage Transport	 -15 to +80°C -40 to +95°C -40 to +95°C
Relative humidity Operation Storage Transport	 8 to 90% non-condensing (maximum humidity at +29°C) 5 to 95% non-condensing (maximum humidity at +40°C) 5 to 95% non-condensing (maximum humidity at +40°C)
Vibration[3)] Operation (continuous) Operation (occasional) Storage Transport	 5 - 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors 5 - 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors 5 - 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage 5 - 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage
Shock (pulse with a sine half-wave) Operation Storage	 Max. 125 g, 2 ms; no unrecoverable errors Max. 400 g, 2 ms; no damage Max. 450 g, 1 ms; no damage Max. 200 g, 0.5 ms; no damage
Altitude Operation Storage	 - 300 to 3048 meters - 300 to 12,192 meters

Table 83: Technical data - RAID hard disk - 5ACPCI.RAIC-04 (Forts.)

1) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.

2) 24-hour operation means 732 POH (power-on hours) per month.

3) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).

Temperature humidity diagram

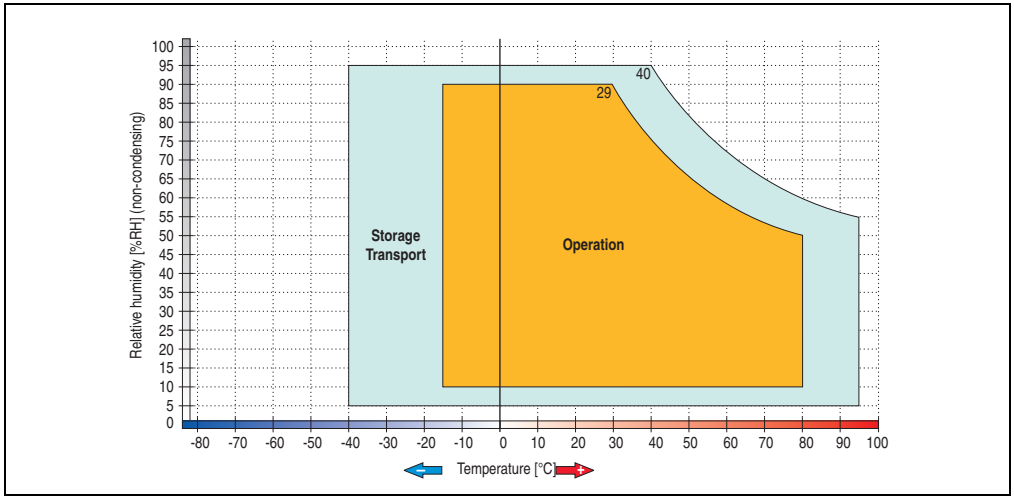


Figure 72: Temperature humidity diagram - SATA RAID hard disk 5ACPCI.RAIC-04

Exchanging a PCI SATA RAID hard disk

Instructions for exchanging a SATA hard disk can be found in chapter 7 "Maintenance / Servicing", section "Exchanging a PCI SATA RAID hard disk", on page 541.

3.6.3 PCI SATA RAID 2 x 250 GB - 5ACPCI.RAIC-05

The hard disks that are used are specified for 24-hour operation (24x7).

Features

- SATA RAID controller
- RAID Level 0 (striped) and 1 (mirrored)
- 2 SATA hard disk drives (suitable for 24 hour operation)
- Only requires 1 PCI slot
- Transfer rates up to 150 MB/s

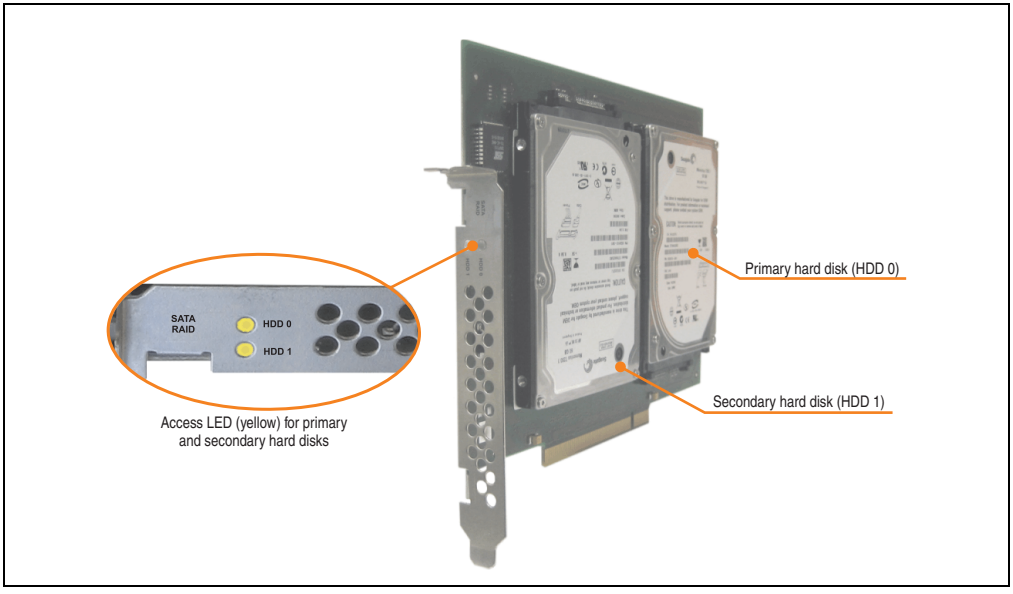


Figure 73: PCI SATA RAID controller - 5ACPCI.RAIC-05

Information:

The PCI SATA RAID controller can not be used in place of a Universal Power Supply (UPS). If the operating system is shut down improperly, the next time it is started it is detected as an error by the RAID 1, and a complete rebuild is executed. This generally takes at least 120 minutes (configurable) to complete.

Technical data

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.

Features	5ACPCI.RAIC-05
SATA RAID controller Type Specifications Data transfer rate RAID level BIOS Extension ROM - requirements	 Sil 3512 SATA link Serial ATA 1.0 Max. 1.5 GB/s (150 MB/s) Supports RAID 0, 1 Approx. 32 KB
Hard disks Amount	Seagate ST9250315AS 2
Formatted capacity (512 bytes/sector)	250 GB
Number of heads	1
Number of sectors (user)	488,397,168
Bytes per sector	512
Revolution speed	5400 rpm ±0.2%
Access time (average)	5.56 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 14 ms 30 ms
Starting time (0 rpm to read access)	3.6 seconds (typically)
Supported transfer modes	SATA 1.0, Serial ATA Revision 2.6 PIO mode 0-4, multiword DMA mode 0-2, UDMA mode 0-6
Data transfer rate On the medium To/from host	 Max. 1175 Mbits/s Max. 150 MB/s
Cache	8 MB
S.M.A.R.T. Support	Yes
Electrical characteristics	
Power consumption	0.3 A at 3.3 V (PCI bus) 1 A at 5 V (PCI bus)
Mechanical characteristics	
Mounted on PCI insert	Fixed
Weight	350 g

Table 84: Technical data - RAID Hard Disk - 5ACPCI.RAIC-05

Environmental characteristics	5ACPCI.RAIC-05
Ambient temperature[1)] Operation - Standard / 24-hour[2)] Storage Transport	 0 to 60°C -40 to 70°C -40 to 70°C
Relative humidity[3)] Operation Storage Transport	 5 to 95%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration[4)] Operation (continuous) Operation (occasional) Storage Transport	 5 - 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors 5 - 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors 5 - 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage 5 - 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage
Shock[4)] (pulse with a sine half-wave) Operation Storage	 Max. 125 g, 2 ms; no unrecoverable errors Max. 400 g, 2 ms; no damage Max. 500 g, 1 ms; no damage Max. 300 g, 0.5 ms; no damage
Altitude Operation Storage	 - 300 to 3048 m - 300 to 12,192 m

Table 84: Technical data - RAID Hard Disk - 5ACPCI.RAIC-05 (Forts.)

1) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 20°C per hour.

2) 24-hour operation means 732 POH (power-on hours) per month.

3) Humidity gradient: Maximum 30% per hour.

4) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).

Temperature humidity diagram

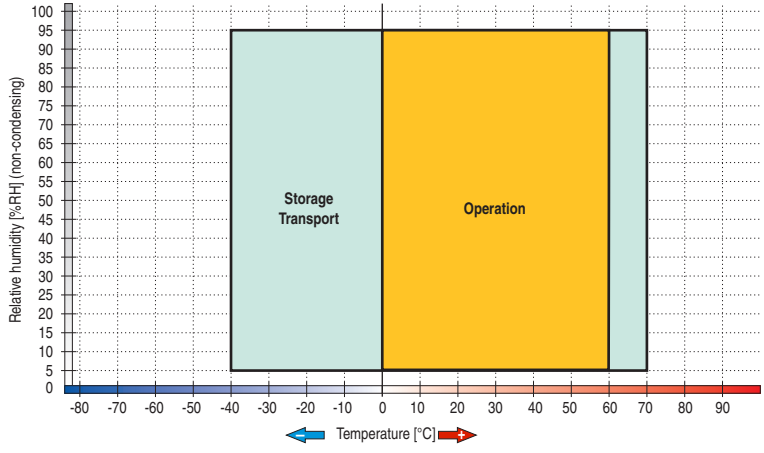


Figure 74: Temperature humidity diagram - SATA RAID Hard Disk - 5ACPCI.RAIC-05

Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 20°C per hour.

Driver support

Special drivers are necessary for operating the PCI SATA RAID controller. Drivers for Windows XP Professional and Windows XP Embedded are available for download on the B&R Homepage in the download area (**www.br-automation.com**).

The .NET-based SATARaid™ serial ATA RAID management software can also be found on the B&R homepage.

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

Configuration

For configuration of a SATA RAID network, see Chapter 3 "Inbetriebnahme", section "Konfiguration eines SATA RAID Verbundes", on page 230.

Exchanging a HDD

A hard drive can be easily exchanged in the event of an error when using the RAID1 (mirroring) configuration without having to re-install the system. The replacement SATA HDD 250GB 5MMHDD.0250-00 is available as a replacement part for a HDD.

For instructions on exchanging the drive, see Chapter 7 "Wartung / Instandhaltung", section "Seitendeckeldemontage", on page 481.

3.6.4 Replacement SATA HDD 250 GB - 5MMHDD.0250-00

The hard disk can be used as a replacement part for 5ACPCI.RAIC-05.

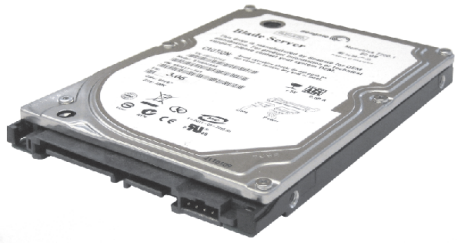


Figure 75: Replacement SATA HDD 250 GB - 5MMHDD.0250-00

Technical data

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.

Features	5MMHDD.0250-00
Hard disks Amount	Seagate ST9250315AS 1
Formatted capacity (512 bytes/sector)	250 GB
Number of heads	1
Number of sectors (user)	488,397,168
Bytes per sector	512
Revolution speed	5400 rpm ±0.2%
Access time (average)	5.56 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 14 ms 30 ms
Starting time (0 rpm to read access)	3.6 seconds (typically)
Supported transfer modes	SATA 1.0, Serial ATA Revision 2.6 PIO mode 0-4, multiword DMA mode 0-2, UDMA mode 0-6
Interface	SATA

Table 85: Technical data - RAID hard disk - 5MMHDD.0250-00

Features	5MMHDD.0250-00
Data transfer rate On the medium To/from host	 Max. 1175 Mbits/s Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)
Cache	8 MB
S.M.A.R.T. Support	Yes
MTBF	550,000 Power On Hours[1)]
Environmental characteristics	
Ambient temperature[2)] Operation - Standard / 24-hour[3)] Storage Transport	 0 to 60°C -40 to 70°C -40 to 70°C
Relative humidity[4)] Operation Storage Transport	 5 to 95%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration Operation Storage	 0.5 g at 5 - 500 Hz, no non-recovered errors 5 g at 5 - 500 Hz, no non-recovered errors
Shock (pulse with a sine half-wave) Operation Storage	 350 g and 2 ms duration, no non-recovered errors 800 g and 2 ms duration, no non-recovered errors 1000 g and 1 ms duration, no non-recovered errors 600 g and 0.5 ms duration, no non-recovered errors
Altitude Operation Storage	 - 300 to 3048 m - 300 to 12,192 m

Table 85: Technical data - RAID hard disk - 5MMHDD.0250-00 (Forts.)

1) With 8760 POH (Power On Hours) per year and 25°C surface temperature.

2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 20°C per hour.

3) 24-hour operation means 732 POH (power-on hours) per month.

4) Humidity gradient: Maximum 30% per hour.

Temperature humidity diagram

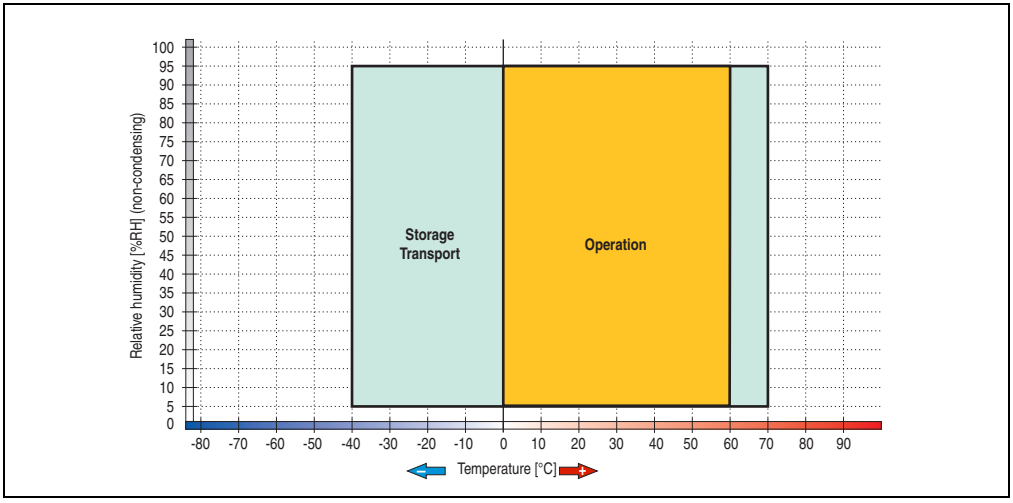


Figure 76: Temperature humidity diagram - SATA RAID hard disk - 5MMHDD.0250-00

Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 20°C per hour.

3.7 Interface options

An add-on interface (CAN or combined RS232/422/485) can be inserted.

Information:

It is possible to add or remove an add-on interface at any time.

Caution!

Turn off power before adding or removing an add-on interface.

3.7.1 Add-on CAN interface - 5AC600.CANI-00

The add-on CAN interface is equipped with a Bosch CC770 CAN controller (compatible with an Intel 82527 CAN controller), which conforms to CAN specifications 2.0 part A/B. The CAN controller can trigger an NMI (non-maskable interrupt).

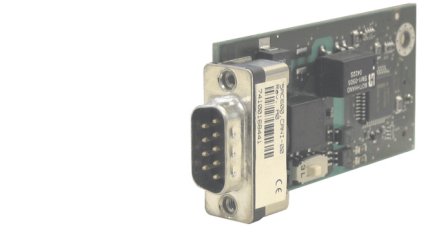


Figure 77: Add-on CAN interface - 5AC600.CANI-00

Technical data

Features	5AC600.CANI-00
CAN interface Controller Amount Connection	 Bosch CC770 (compatible with Intel 82527 CAN controller) 1 9-pin DSUB, male
Terminating resistor Default setting	Can be activated and deactivated using a sliding switch Disabled

Table 86: Technical data - Add-on CAN interface - 5AC600.CANI-00

Pin assignments

Add-on CAN		
Type	Electrically isolated	
Transfer rate	Max. 500 kbit/s	
Bus length	Max. 1000 Meter	
Pin	**Assignment**	
1	n.c.	9-pin DSUB connector
2	CAN low	
3	GND	
4	n.c.	
5	n.c.	
6	Reserved	
7	CAN high	
8	n.c.	
9	n.c.	

Table 87: Pin assignments - CAN

I/O address and IRQ

Resource	Default setting	Additional setting options
I/O address	384 / 385	-
IRQ	IRQ10	NMI [1)]

Table 88: Add-on CAN - I/O Adresse und IRQ

1) NMI = Non Maskable Interrupt.

The setting for the IRQ can be changed in the BIOS setup (under "Advanced" - submenu "Baseboard/Panel Features" - submenu "Legacy Devices", setting "CAN"). Please note any potential conflicts with other resources when changing this setting.

I/O address	Register	Function
384h	Address register	Defines the register number to access.
385h	Data register	Access to the register defined in the address register.

Table 89: CAN address register

Bus length and cable type

The type of cable used depends largely on the required bus length and the number of nodes. The bus length is mainly determined by the bit rate. In accordance with CiA (CAN in Automation) the maximum bus length is 1000 meters.

The following bus lengths are permitted with a maximum oscillator tolerance of 0.121%:

Distance [m]	Transfer rate [kbit/s]
≤ 1000	Typ. 50
≤ 200	Typ. 250
≤ 60	Typ. 500

Table 90: Bus length and transfer rate - CAN

The material used for the cable should preferably have all or most of the following properties in order to reach an optimal transfer rate.

CAN cable	Property
Signal lines	
Cable cross section	2 x 0.25 mm² (24AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤ 82 Ω / km
Stranding	Wires stranded in pairs
Shielding	Paired shield with aluminum foil
Grounding line	
Cable cross section	1 x 0.34 mm² (22AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤ 59 Ω / km
Outer sheathing	
Material	PUR mixture
Characteristics	Halogen free
Total shielding	From tinned cu wires

Table 91: CAN cable requirements

Terminating resistor

CAN networks are cabled using a bus structure where both ends of the bus are equipped with terminating resistors. The add-on CAN interface has an integrated terminating resistor (delivery state: disabled with the setting "Off").

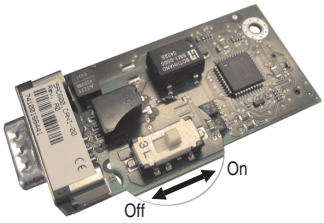


Figure 78: Terminating resistor - Add-on CAN interface 5AC600.CANI-00

Contents of delivery

The screws included in the mounting kit are to be used for installation.

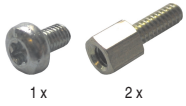


Figure 79: Contents of the delivery / mounting material - 5AC600.CANI-00

3.7.2 Add-on RS232/422/485 interface - 5AC600.485I-00

The serial interface is a combined RS232/RS422/RS485 interface. The operating mode (RS232/RS422/RS485) is selected automatically, depending on the electrical connection.

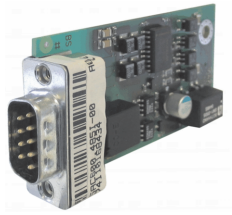


Figure 80: Add-on RS232/422/485 interface - 5AC600.485I-00

Pin assignments

Add-on RS232/422/485			
Features	**RS232**	**RS422/485**	
Type	RS232 not modem compatible; Electrically isolated		
UART	16550 compatible, 16 byte FIFO		
Transfer rate	Max. 115 kbit/s		
Bus length	Max. 15 meters	Max. 1200 meters	
Pin	**Assignments (RS232)**	**Assignments (RS422)**	9-pin DSUB connector
1	n.c.	TXD\	
2	RXD	n.c.	
3	TXD	n.c.	
4	n.c.	TXD	
5	GND	GND	
6	n.c.	RXD\	
7	RTS	n.c.	
8	CTS	n.c.	
9	n.c.	RXD	

Table 92: Pin assignments - RS232/RS422

I/O address and IRQ

Resource	Default setting	Additional setting options
I/O address	2E8	238, 2F8, 338, 3E8, 3F8
IRQ	IRQ10	IRQ 3, 4, 5, 7, 11, 12

Table 93: Add-on RS232/422/485 - I/O address and IRQ

The setting for the I/O address and the IRQ can be changed in the BIOS setup (under "Advanced" - submenu "Main board/Panel Features" - submenu "Legacy Devices", setting "COM E"). Please note any potential conflicts with other resources when changing this setting.

Bus length and cable type RS232

The maximum transfer rate of 115 kbit/s depends on the cable type being used.

Distance [m]	Transfer rate [kbit/s]
≤ 15	Typ. 64
≤ 10	Typ. 115
≤ 5	Typ. 115

Table 94: RS232 - Bus length and transfer rate

The material used for the cable should preferably have all or most of the following properties in order to reach an optimal transfer rate.

RS232 cable	Property
Signal lines Cable cross section Wire insulation Conductor resistance Stranding Shielding	 4 x 0.16 mm² (26AWG), tinned Cu wire PE ≤ 82 Ω / km Wires stranded in pairs Paired shield with aluminum foil
Grounding line Cable cross section Wire insulation Conductor resistance	 1 x 0.34 mm² (22AWG/19), tinned Cu wire PE ≤ 59 Ω / km
Outer sheathing Material Characteristics Total shielding	 PUR mixture Halogen free From tinned cu wires

Table 95: RS232 - Cable requirements

RS422 - Bus length and cable type

The RTS line must be switched on to activate the sender.

The maximum transfer rate of 115 kbit/s depends on the cable type being used.

Distance [m]	Transfer rate [kbit/s]
1200	Typ. 115

Table 96: RS422 - Bus length and transfer rate

The material used for the cable should preferably have all or most of the following properties in order to reach an optimal transfer rate.

RS422 cable	Property
Signal lines Cable cross section Wire insulation Conductor resistance Stranding Shielding	 4 x 0.25 mm² (24AWG/19), tinned Cu wire PE ≤ 82 Ω / km Wires stranded in pairs Paired shield with aluminum foil
Grounding line Cable cross section Wire insulation Conductor resistance	 1 x 0.34 mm² (22AWG/19), tinned Cu wire PE ≤ 59 Ω / km
Outer sheathing Material Characteristics Total shielding	 PUR mixture Halogen free From tinned cu wires

Table 97: RS422 - Cable requirements

RS485 interface operation

The pins of the RS422 default interface (1,4,6 and 9) should be used for operation. The pins should be connected as shown.

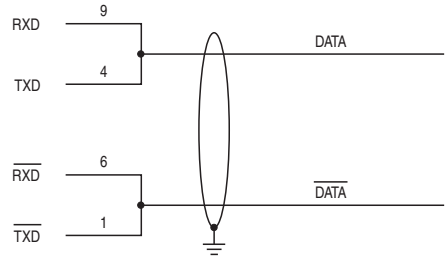


Figure 81: Add-on RS232/422/485 interface - operated in RS485 mode

The RTS line must be switched each time the driver is sent and received; there is no automatic switch back. This cannot be configured in Windows.

The voltage drop caused by long line lengths can lead to greater potential differences between the bus stations, which can hinder communication. This can be improved by running ground wire with the others.

The line ends of the RS485 interface should (at least for longer line lengths or larger transfer rates) be closed. Normally a passive terminator can be used on the bus ends by connecting each of the signal lines with 120 Ω resistance.

RS485 - Bus length and cable type

The maximum transfer rate of 115 kbit/s depends on the cable type being used.

Distance [m]	Transfer rate [kbit/s]
1200	Typ. 115

Table 98: RS485 - Bus length and transfer rate

The material used for the cable should preferably have all or most of the following properties in order to reach an optimal transfer rate.

RS485 cable	Property
Signal lines Cable cross section Wire insulation Conductor resistance Stranding Shielding	 4 x 0.25 mm² (24AWG/19), tinned Cu wire PE ≤ 82 Ω / km Wires stranded in pairs Paired shield with aluminum foil
Grounding line Cable cross section Wire insulation Conductor resistance	 1 x 0.34 mm² (22AWG/19), tinned Cu wire PE ≤ 59 Ω / km
Outer sheathing Material Characteristics Total shielding	 PUR mixture Halogen free From tinned cu wires

Table 99: RS485 - Cable requirements

Contents of delivery

The screws included in the mounting kit are to be used for installation.

Figure 82: Contents of the delivery / mounting material - 5AC600.485I-00

3.8 Fan kits

Information:

Fans are necessary when using components which must work within certain temperature limits, e.g. hard disks, DVD combos, PCI cards, etc.

The fan and dust filter are subject to wear and must be checked with appropriate frequency and cleaned or replaced when not functioning properly (e.g. due to dirt and grime).

3.8.1 Fan kit 1 PCI - 5PC600.FA01-00

This fan kit is an optional addition for system units with 1 PCI slots. For available replacement dust filters for this fan kit, see section "Replacement fan", on page 493.

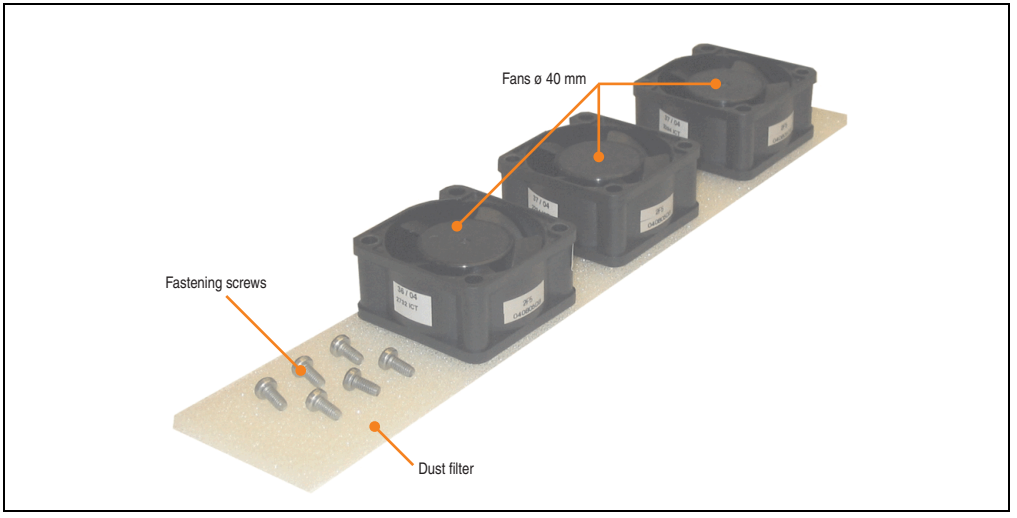


Figure 83: Fan kit - 5PC600.FA01-00

Technical data

Features	5PC600.FA01-00
Fan type Width Length Height	Double ball bearings 40 mm 40 mm 20 mm
Revolution speed	5600 rpm ±10%
Noise level	24 dB
Service life	80,000 hours at 30°C

Table 100: Technical data - 5PC600.FA01-00

Features	5PC600.FA01-00
Maintenance interval	The fans are subject to wear. Depending on the work environment, the dust filter should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.

Table 100: Technical data - 5PC600.FA01-00 (Forts.)

Contents of delivery

Amount	Component
3	Fans with 40 mm diameter
1	Dust filter
6	Mounting screws

Table 101: Contents of delivery - 5PC600.FA01-00

Installation

For a description of how to install the fan kit, see chapter 7 "Maintenance / Servicing", section 2 "Fan kit installation and replacement", starting on page 502.

3.8.2 Fan kit 2 PCI - 5PC600.FA02-00

This fan kit is an optional addition for system units with 2 PCI slots. For available replacement dust filters for this fan kit, see section "Replacement fan", on page 493.

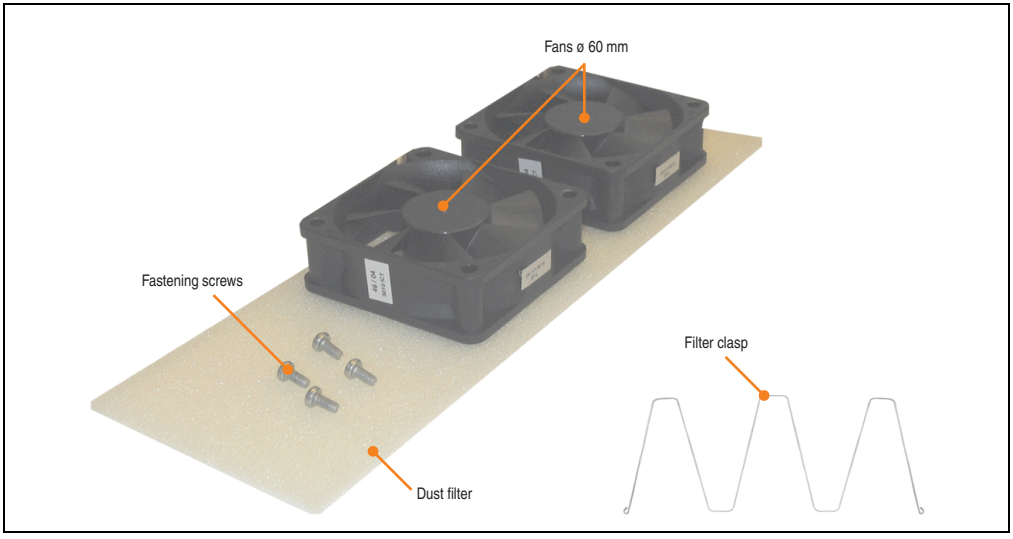


Figure 84: Fan kit - 5PC600.FA02-00

Technical data

Features	5PC600.FA02-00
Fan type Width Length Height	Double ball bearings 60 mm 60 mm 20 mm
Revolution speed	3600 rpm ±10%
Noise level	30.5 dB
Service life	80,000 hours at 30°C
Maintenance interval	The fans are subject to wear. Depending on the work environment, the dust filter should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.

Table 102: Technical data - 5PC600.FA02-00

Contents of delivery

Amount	Component
2	Fans with 60 mm diameter
1	Dust filter
1	Filter clasp
4	Mounting screws

Table 103: Contents of delivery - 5PC600.FA02-00

Installation

For a description of how to install the fan kit, see chapter 7 "Maintenance / Servicing", section 2 "Fan kit installation and replacement", starting on page 505.

3.8.3 Fan kit 3PCI - 5PC600.FA03-00

This fan kit is an optional addition for system units with 3 PCI slots. For available replacement dust filters for this fan kit, see section "Replacement fan", on page 493.

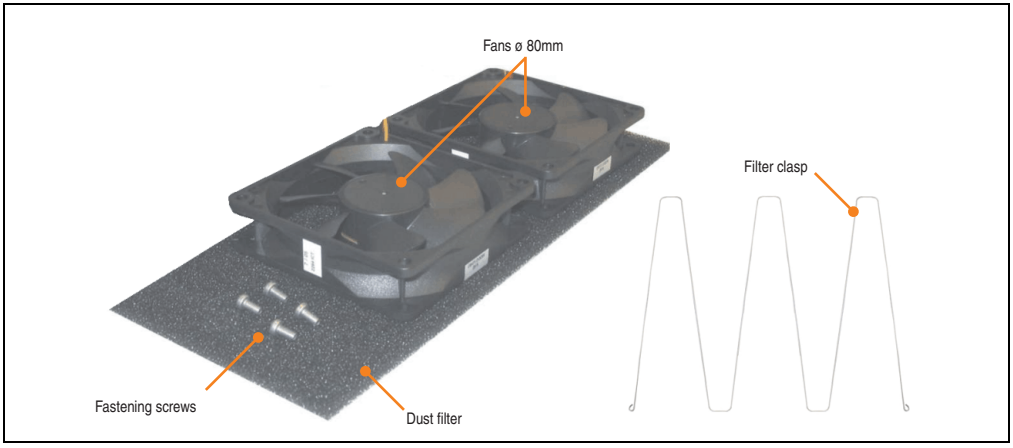


Figure 85: Fan kit - 5PC600.FA03-00

Technical data

Features	5PC600.FA03-00
Fan type Amount Width Length Height	Double ball bearings 2 80 mm 80 mm 20 mm
Revolution speed	2600 rpm ±10%
Noise level	27 dB
Service life	80,000 hours at 30°C
Maintenance interval	The fans are subject to wear. Depending on the work environment, the dust filter should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.

Table 104: Technical data - 5PC600.FA03-00

Contents of delivery

Amount	Component
2	Fans with 80 mm diameter
1	Dust filter
1	Filter clasp
4	Mounting screws

Table 105: Contents of delivery - 5PC600.FA03-00

Amount	Component
2	Cable fastener

Table 105: Contents of delivery - 5PC600.FA03-00

Installation

For a description of how to install the fan kit, see chapter 7 "Maintenance / Servicing", section 2 "Fan kit installation and replacement", starting on page 508.

3.8.4 Fan kit 5 PCI - 5PC600.FA05-00

This fan kit is an optional addition for system units with 5 PCI slots. For available replacement dust filters for this fan kit, see section "Replacement fan", on page 493.

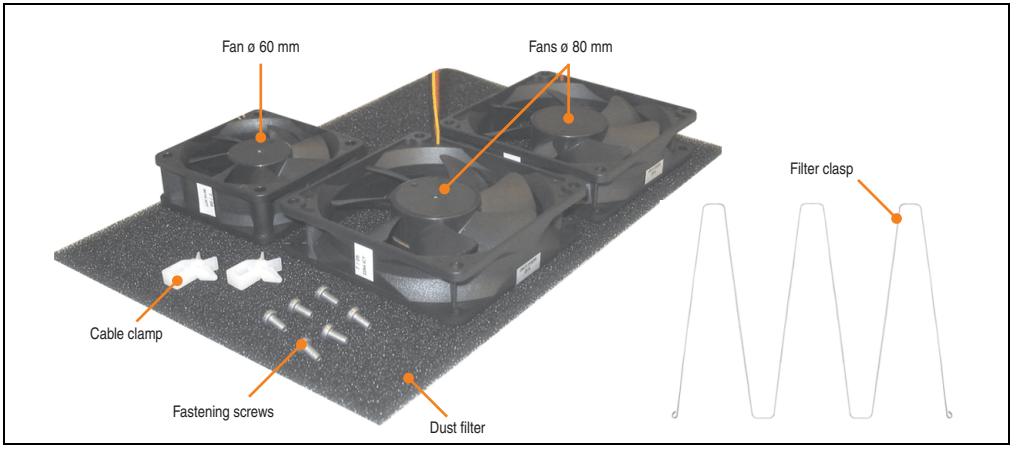


Figure 86: Fan kit - 5PC600.FA05-00

Technical data

Features	5PC600.FA05-00	
Fan type Amount Width Length Height	Double ball bearings 1 60 mm 60 mm 20 mm	Double ball bearings 2 80 mm 80 mm 20 mm
Revolution speed	3600 rpm ±10%	2600 rpm ±10%
Noise level	30.5 dB	27 dB
Service life	80,000 hours at 30°C	
Maintenance interval	The fans are subject to wear. Depending on the work environment, the dust filter should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.	

Table 106: Technical data - 5PC600.FA05-00

Contents of delivery

Amount	Component
1	Fans with 60 mm diameter
2	Fans with 80 mm diameter
1	Dust filter
1	Filter clasp
4	Mounting screws
2	Cable fastener

Table 107: Contents of delivery - 5PC600.FA05-00

Installation

For a description of how to install the fan kit, see chapter 7 "Maintenance / Servicing", section 2 "Fan kit installation and replacement", starting on page 512.

3.9 AP Link cards

For the APC620 system units 5PC600.SX02-00, 5PC600.SF03-00 and 5PC600.SX05-00 and an X945 CPU board, a second graphics line can be created using the AP Link graphics adapter cards.

3.9.1 AP Link SDL transmitter - 5AC600.SDL0-00

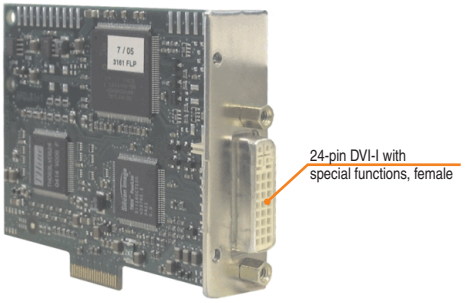


Figure 87: AP Link card

Model number	Short description	Note
5AC600.SDL0-00	AP Link SDL transmitter	

Table 108: Model numbers - AP Link graphics adapter

The following video signals are available via AP Link and monitor/panel output. The plugs are specified for 100 connection cycles.

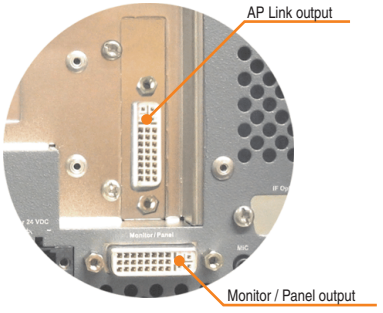
AP Link slot (AP Link card inserted)			
AP Link card	Signal with X945 board on		
	AP Link	Monitor/Panel	
5AC600.SDL0-00	DVI, SDL	RGB	

Table 109: AP Link slot (AP Link card inserted)

Hotplug for a display device is not supported in any combination.

Caution!

The RGB, DVI and SDL cables can only be plugged in and unplugged when the APC620 and display device (Automation Panel 900, Automation Panel 800, monitor) are turned off.

Pin assignments

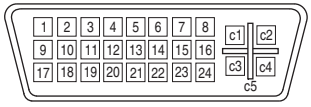
Pin	Assignment	Pin	Assignment	
1	T.M.D.S. Data 2-	16	Hot Plug detect	DVI-I 24 pin, female 
2	T.M.D.S. Data 2+	17	T.M.D.S. Data 0-	
3	T.M.D.S. Data 2/SDL Shield	18	T.M.D.S. Data 0+	
4	SDL-	19	T.M.D.S. DATA 0/XUSB1 Shield	
5	SDL+	20	XUSB1-	
6	DDC clock	21	XUSB1+	
7	DDC data	22	T.M.D.S. Clock Shield	
8	n.c.	23	T.M.D.S. Clock +	
9	T.M.D.S. DATA 1-	24	T.M.D.S. Clock -	
10	T.M.D.S. DATA 1+	c1	n.c.	
11	T.M.D.S. DATA 1/XUBS0 Shield	c2	n.c.	
12	XUSB0-	c3	n.c.	
13	XUSB0+	c4	n.c.	
14	+ 5 V power [1)]	c5	n.c.	
15	Ground (return for + 5V, HSync and VSync)			

Table 110: Pin assignment for AP Link connection

1) Protected internally by a multifuse

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03
5	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03
10	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00[1)] 5CASDL.0100-01[1)] 5CASDL.0100-03[1)]
15	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00[1)] 5CASDL.0150-01[1)] 5CASDL.0150-03[1)]	- - -
20	5CASDL.0200-00[1)] 5CASDL.0200-30[1)]	5CASDL.0200-00[1)] 5CASDL.0200-30[1)]	5CASDL.0200-00[1)] 5CASDL.0200-30[1)]	5CASDL.0200-00[1)] 5CASDL.0200-30[1)]	- -
25	5CASDL.0250-00[1)] 5CASDL.0250-30[1)]	5CASDL.0250-00[1)] 5CASDL.0250-30[1)]	5CASDL.0250-00[1)] 5CASDL.0250-30[1)]	- -	- -
30	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	-
40	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	- -

Table 111: Segment lengths, resolutions and SDL cables

1) See table 112 "Requirements for SDL cable with automatic cable adjustment (equalizer)", on page 204

2) See table 113 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)", on page 205

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 112: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SF03-00	System 3 PCI, 1 disk drive slot, 1 AP Link slot	Rev. A0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	

Table 113: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

DVI, SDL description

DVI means:

- Connection of B&R Automation Panel 900 display units with Automation Panel Link DVI Receiver (Model no. 5DLDVI.1000-01), Office Digital/DVI Monitors and Office DVI TFT Displays is possible.

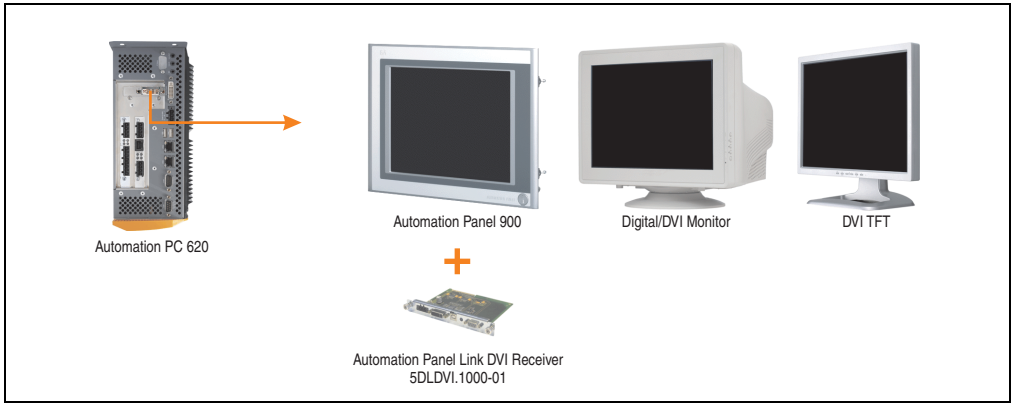


Figure 88: AP Link device connection with DVI video signal

For examples and possibilities for connecting Automation Panel 900 display units via DVI, see Appendix A, chapter 3 "Commissioning", section 4 "Connection examples", starting on page 219.

SDL (Smart Display Link) means:

- Connection of B&R Automation Panel 900 display units with Automation Panel Link SDL receiver (Model no. 5DLSDL.1000-01) or SDL transceiver (Model no. 5DLSDL.1000-01).

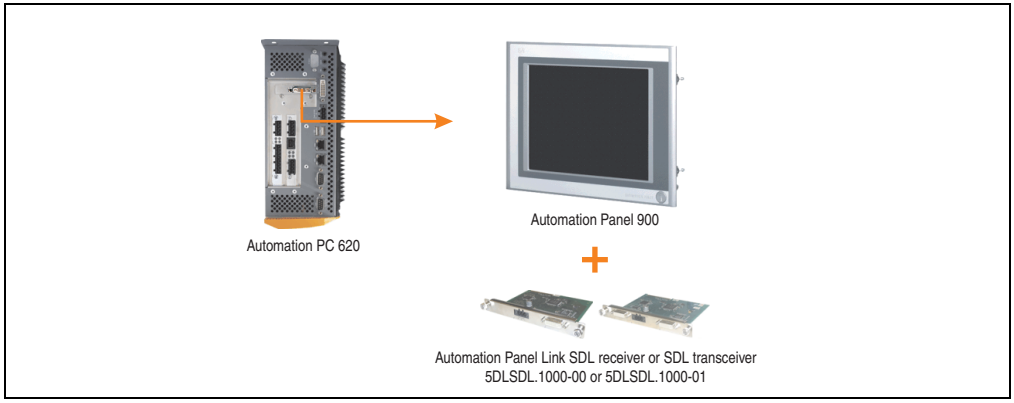


Figure 89: AP Link device connection with SDL video signal

For examples and possibilities for connecting Automation Panel 900 and Automation Panel 800 display units via SDL, see Appendix A, chapter 3 "Commissioning", section 4 "Connection examples", starting on page 219.

Chapter 3 • Commissioning

1. Installation

The APC620 systems are mounted with the mounting plates found on the housing. The plates are designed for M5 screws.

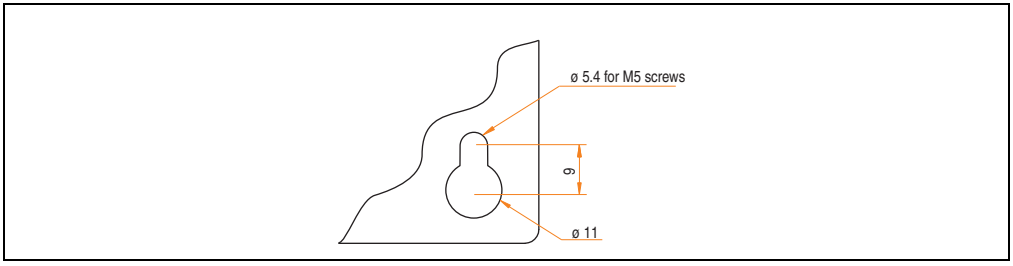


Figure 90: Mounting plates for the APC620

The exact positioning of the mounting holes can be seen in the following drilling templates.

1.1 Important mounting information

- The environmental conditions must be taken into consideration (see chapter 2 "Technical data", section 2.6 "Ambient temperatures for systems with an X945 CPU board", on page 75).
- The APC620 is only for operation in closed rooms.
- The APC620 cannot be situated in direct sunlight.
- The ventilation holes cannot be covered.
- When mounting the device, be sure to adhere to the allowable mounting orientations (see section 1.3 "Mounting orientation", on page 211).
- Be sure the wall or control cabinet can withstand four times the total weight of the the PC620.
- When connecting certain cable types (DVI, SDL, USB, etc.), keep the flex radius in mind. (see section 2 "Cable connections", on page 217).

1.2 Drilling templates

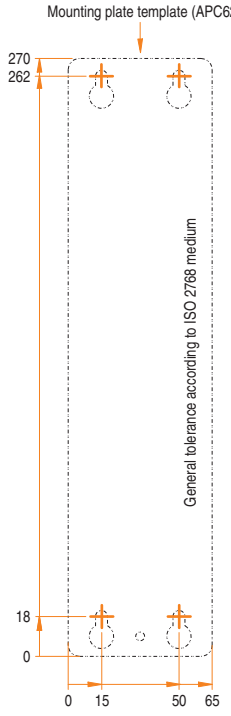
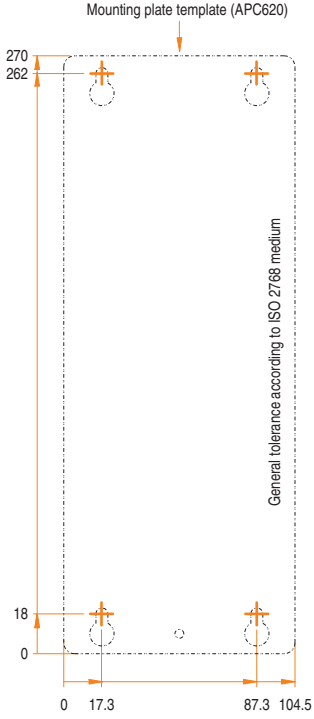
APC620 with 1 PCI slot	APC620 with 2 PCI slots
	

Table 114: Drilling templates - 1 and 2 PCI slots

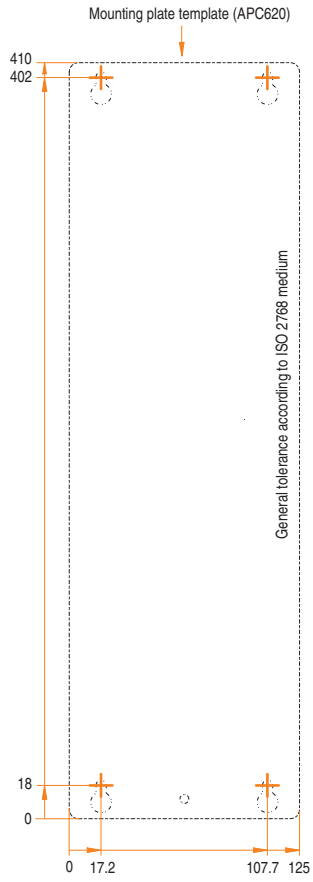
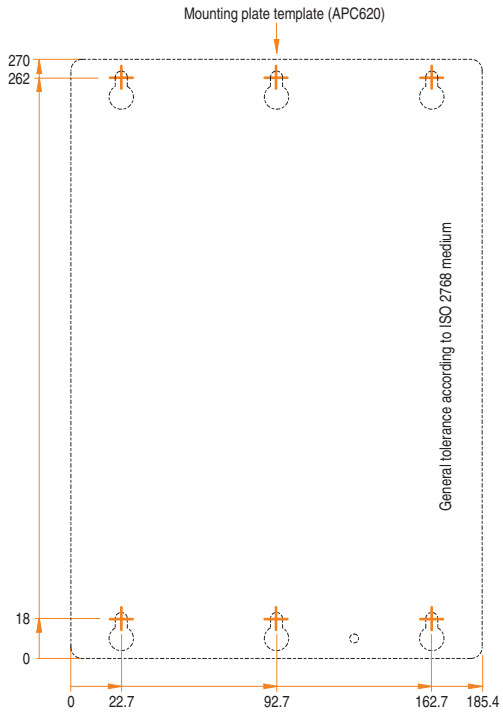
APC620 with 3 PCI slots	APC620 with 5 PCI slots
	

Table 115: Drilling templates - 3 and 5 PCI slots

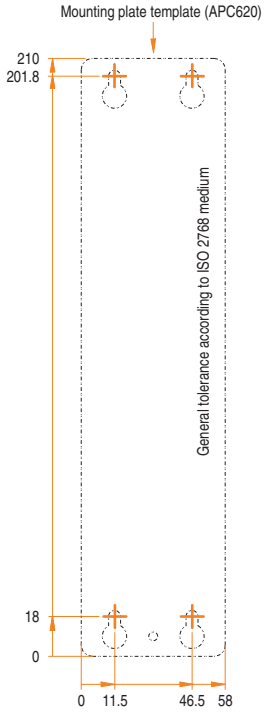
APC620 embedded


Table 116: Drilling templates - APC620 embedded

1.3 Mounting orientation

The Automation PC620 system must be mounted as described in the following sections.

1.3.1 Standard mounting

Standard mounting refers to vertical mounting orientation.

APC620 systems with and without fan kit can be mounted this way.

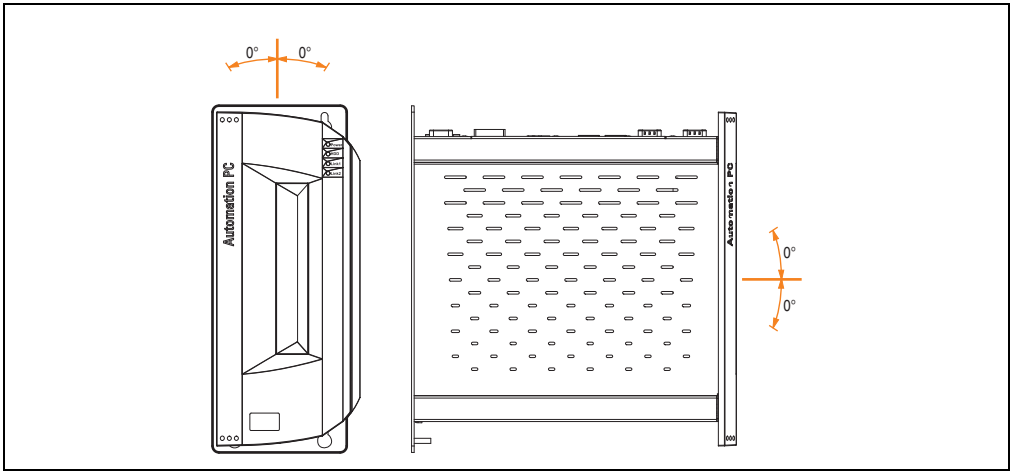


Figure 91: Mounting orientation - Standard

In order to guarantee natural air circulation, mount the system so that the spacing on the top, bottom, and sides is as follows.

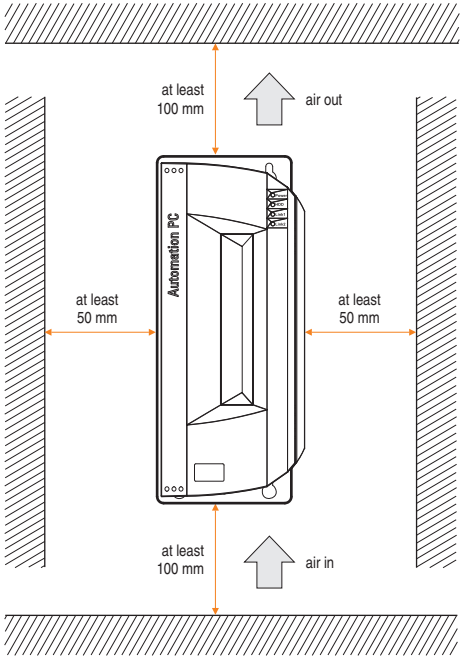


Figure 92: Air circulation spacing - Standard

1.3.2 Optional mounting orientations

Caution!

A fan kit must be used if the system is mounted in the following orientations. In addition, it is important to be sure that the components used are installed in a way that complies with the specifications of the drives being used (hard disk, etc.). See the following pages for information regarding the specifications for mounting orientation.

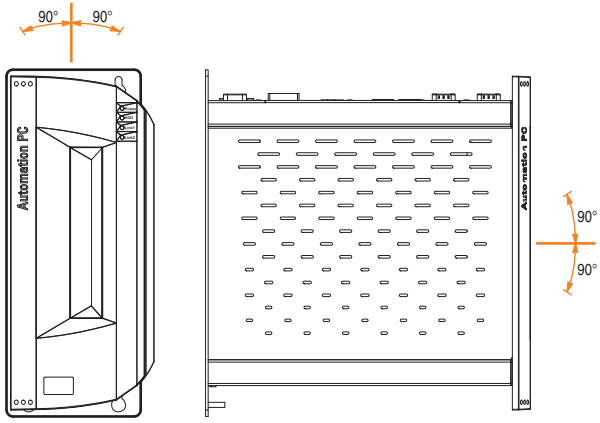


Figure 93: Mounting orientation - Optional

In order to guarantee natural air circulation, mount the system so that the spacing on the top, bottom, and sides is as follows.

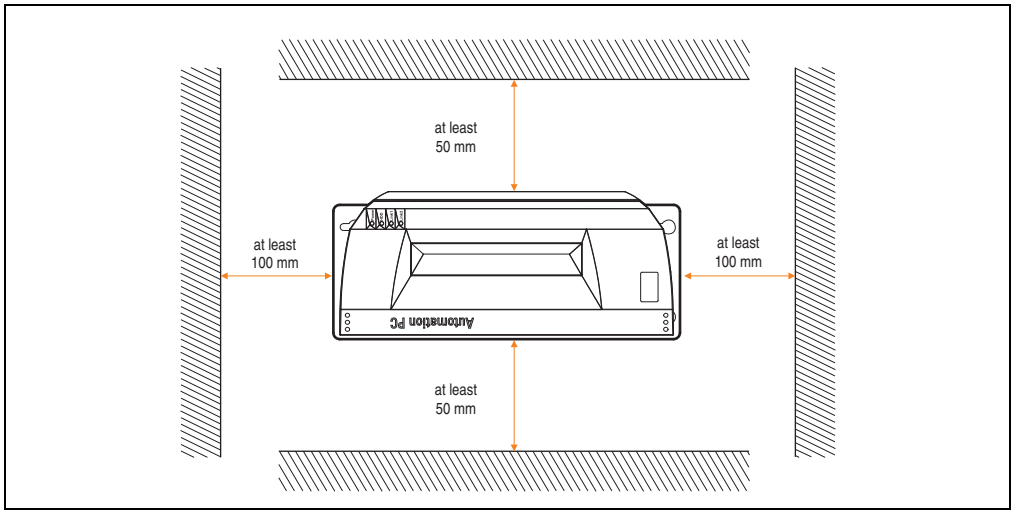


Figure 94: Optional circulation spacing

CompactFlash slot add-on

No limitation on mounting orientation. Permissible mounting orientations are shown in figure 93 "Mounting orientation - Optional", on page 213.

Add-on or slide-in hard disks 20, 30 and 40 GB.

The following figure shows the possible mounting orientations for an APC620 device with an add-on (5AC600.HDDI-00 or 5AC600.HDDI-01) or slide-in hard disk (5AC600.HDDS-00 or 5AC600.HDDS-02).

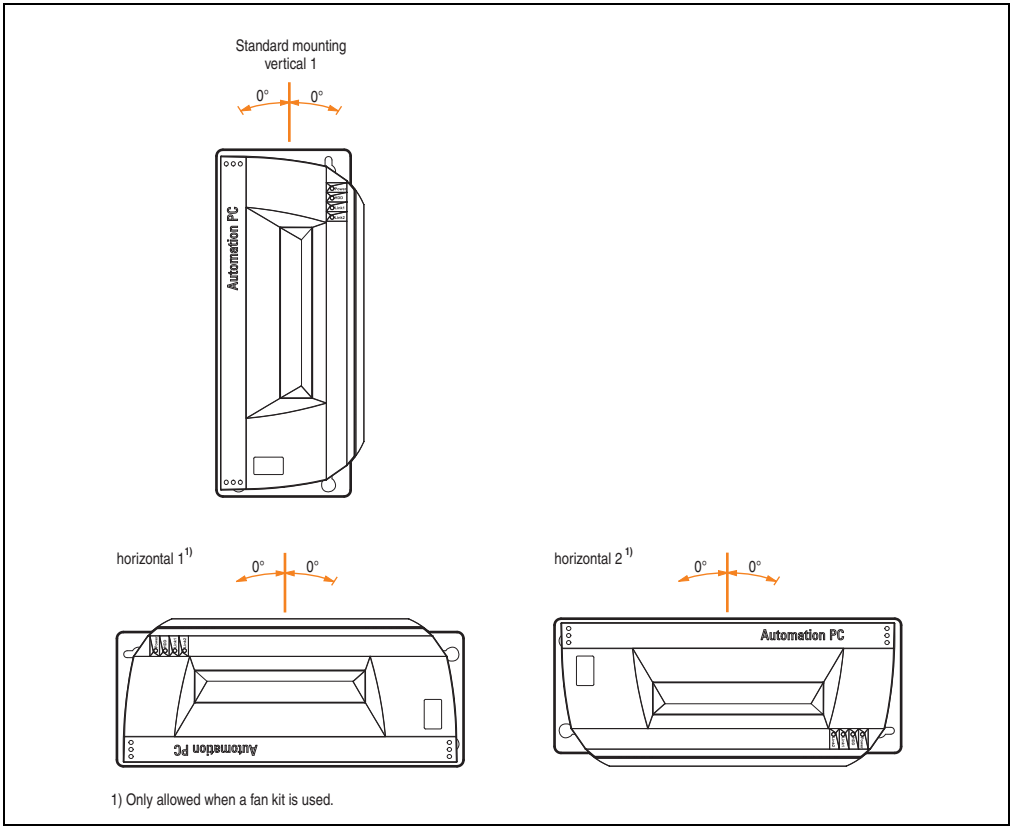
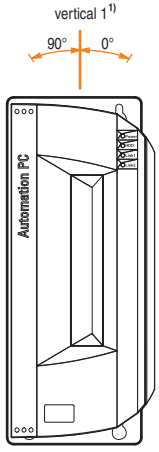


Figure 95: Mounting orientations for an APC620 with hard disk drive

The mounting orientations "horizontal 1" and "horizontal 2" require the use of a fan kit.

Slide-in USB FDD

The following figure shows the possible mounting orientations for an APC620 device with a slide-in USB FDD drive (5AC600.FDDS-00).



1) Only allowed when a fan kit is used.

Figure 96: Mounting orientations for an APC620 with a slide-in USB FDD drive

Mounting orientation "vertical 1" can also be used at 0° without a fan kit.

2. Cable connections

When making cable connections and installing cables, it is not permitted to have a flex radius smaller than the minimum value specified.

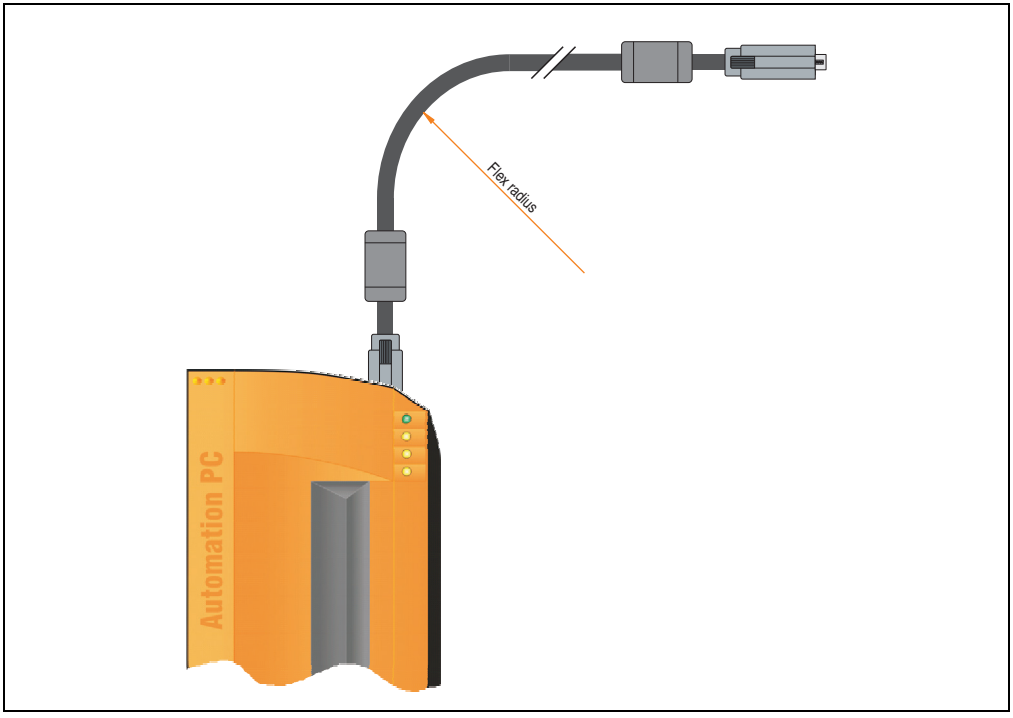


Figure 97: Flex radius - Cable connection

Information:

The value specified for the minimum flex radius can be found in the technical data for the cable that is being used.

2.1 Ethernet cable lengths for ETH1

For error free data transfer, take note of the cable length information in section "Ethernet connection ETH1", on page 109.

3. Grounding concept

The functional ground is a current path with low impedance between isolated circuits and ground, which is not a protective measure, but rather provides e.g. increased immunity to disturbances. It serves only as disturbance dissipation and not as contact protection for persons.

The APC620 functional ground has 2 connections:

- Supply voltage
- Ground connection

To guarantee secure dissipation of electric disturbances, the following points should be observed:

- The device should be connected to the ground using the shortest route possible.
- Use cable with a minimum cross section of 2.5 mm^2 per connection.
- Note the line shielding concept, all connected data cables are used as shielded lines.

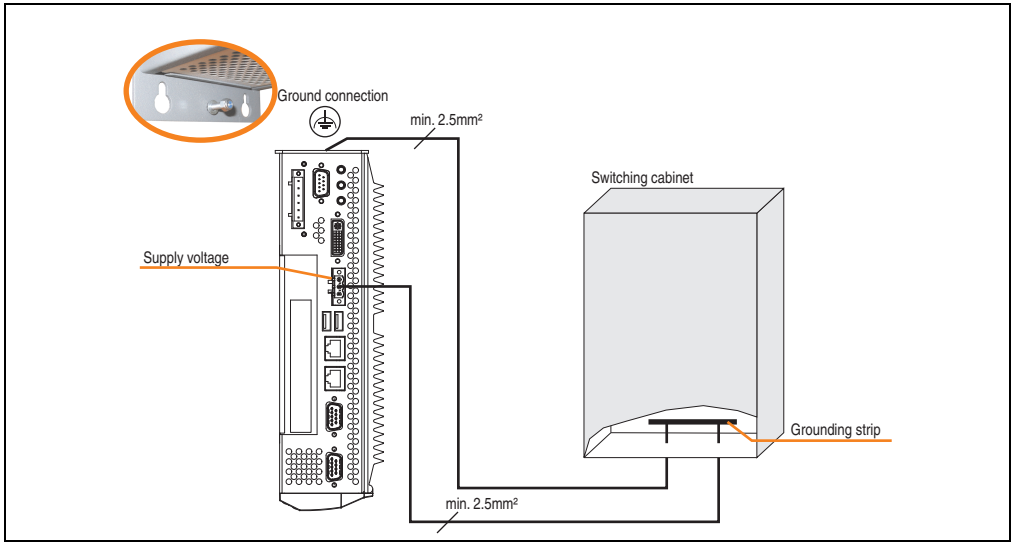


Figure 98: Grounding concept

4. Connection examples

The following examples provide an overview of the configuration options for connecting Automation Panel 800 and Automation Panel 900 and/or Automation Panel 800 devices with the APC620. The following questions will be answered:

- How are Automation Panel 900 devices connected to the monitor / panel output of the APC620, and what needs to be considered?
- How are Automation Panel 800 devices connected to the monitor / panel output of the APC620, and what needs to be considered?
- How are Automation Panel 900 devices connected simultaneously to the Monitor / Panel output on the optional SDL AP Link of the APC620 and what needs to be considered?
- What are "Display Clone" and "Extended Desktop" modes?
- How many Automation Panel 900 devices can be connected per line?
- How many Automation Panel 900 devices can be connected to an Automation Panel 800 device per line?
- How are the connected devices internally numbered?
- Are there limitations to the segment length and if so, what are they?
- What cables and link modules are needed?
- Do BIOS settings have to be changed for a specific configuration?

Information:

An RGB monitor / flat-screen can always be connected to the monitor / panel output of the APC620 (necessary DVI to CRT adapter can be ordered under the model number 5AC900.1000-00).

4.1 Selecting the display units

If an Automation Panel 800 and an Automation Panel 900 should be connected on the same line, the devices must have the same display type.
The following table lists the AP900 devices that can be connected on the same line with an AP800 device.

Automation Panel 800	Automation Panel 900
5AP820.1505-00	5AP920.1505-01 5AP951.1505-01 5AP980.1505-01 5AP981.1505-01
5AP880.1505-00	5AP920.1505-01 5AP951.1505-01 5AP980.1505-01 5AP981.1505-01

Table 117: Selecting the display units

4.2 One Automation Panel 900 via DVI (onboard)

An Automation Panel 900 with max. SXGA resolution is connected to the integrated DVI interface (onboard). As an alternative, an office TFT with DVI interface or an analog monitor (using adapter with model no. 5AC900.1000-00) can also be operated. A separate cable is used for touch screen and USB. If USB devices are to be operated on the Automation Panel 900, the maximum distance is 5 meters. USB devices can only be connected directly to the Automation Panel (without a hub).

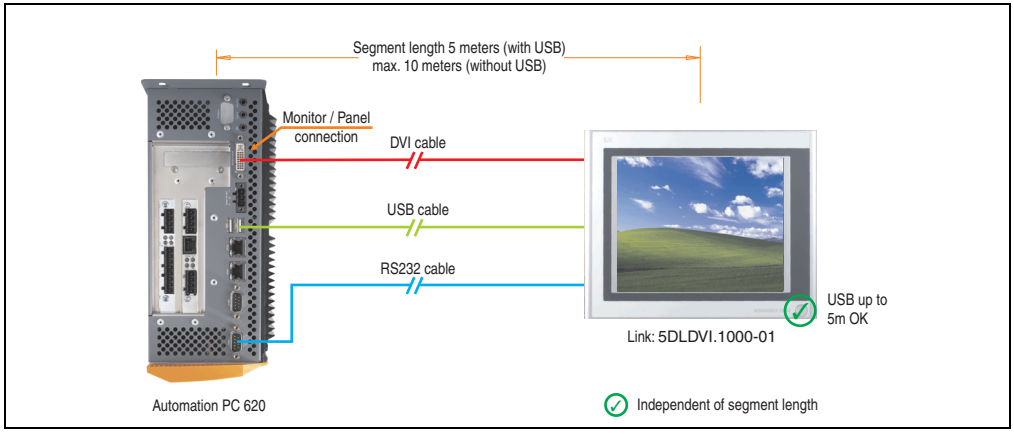


Figure 99: Configuration - One Automation Panel 900 via DVI (onboard)

4.2.1 Basic system requirements

The following table shows the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit							Restriction Resolution
	5PC600.SX01 -00	5PC600.SX02 -00	5PC600.SX02 -01	5PC600.SF03 -00	5PC600.SX05 -00	5PC600.SX05 -01	5PC600.SE00 -00 / -02	
5PC600.X945-00	✓	-	✓	-	-	✓	✓	Max. SXGA

Table 118: Possible combinations of system unit and CPU board

4.2.2 Link modules

Model number	Description	Note
5DLDVI.1000-01	**Automation Panel Link DVI receiver** connections for DVI-D, RS232 and USB 2.0 (Type B); 24VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900

Table 119: Link module for the configuration - One Automation Panel 900 via DVI

4.2.3 Cables

Select one cable each from the 3 required types.

Model number	Type	Length
5CADVI.0018-00	DVI cable	1.8 m
5CADVI.0050-00	DVI cable	5 m
5CADVI.0100-00	DVI cable	10 m[1)]
9A0014.02	Touch screen cable - serial	1.8 m
9A0014.05	Touch screen cable - serial	5 m
9A0014.10	Touch screen cable - serial	10 m[1)]
5CAUSB.0018-00	USB cable	1.8 m
5CAUSB.0050-00	USB cable	5 m

Table 120: Cables for DVI configurations

1) USB support is not possible on the Automation Panel 900 because USB is limited to 5 m.

4.2.4 Possible Automation Panel units, resolutions und segment lengths

The following Automation Panel 900 units can be used. In rare cases, the segment length is limited according to the resolution.

Model number	Diagonal	Resolution	Touch screen	Keys	Max. segment length
5AP920.1043-01	10.4"	VGA	✓	-	5 m / 10 m[1)]
5AP920.1214-01	12.1"	SVGA	✓	-	5 m / 10 m[1)]
5AP920.1505-01	15.0"	XGA	✓	-	5 m / 10 m[1)]
5AP920.1706-01	17.0"	SXGA	✓	-	5 m / 10 m[1)]
5AP920.1906-01	19.0"	SXGA	✓	-	5 m / 10 m[1)]

Table 121: Possible Automation Panel units, resolutions und segment lengths

1) USB support is not possible on the Automation Panel 900 because USB is limited to 5 m.

Information:

The DVI transfer mode does not allow reading statistical values on Automation Panel 900 units.

4.2.5 BIOS settings

No special BIOS settings are necessary for operation.

4.2.6 Windows graphics driver settings

See chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.2.7 Windows touch screen driver settings

See chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.3 An Automation Panel 900 via SDL (onboard)

An Automation Panel 900 is connected to the integrated SDL interface (onboard) via an SDL cable. USB devices can only be connected directly to the Automation Panel (without a hub).

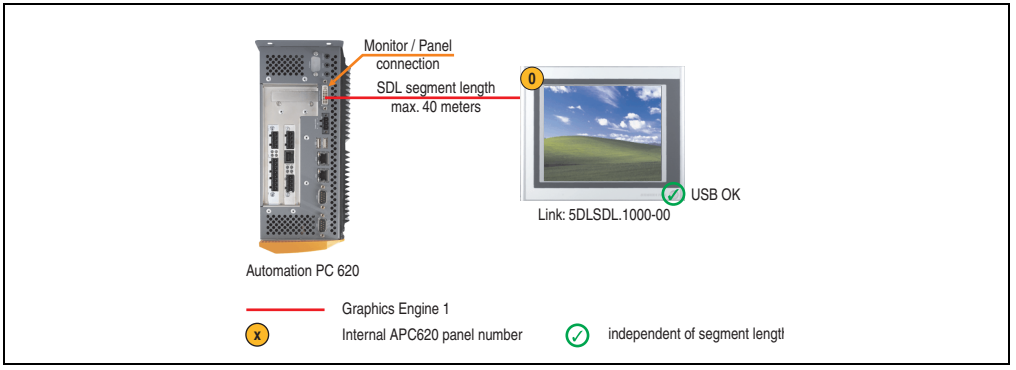


Figure 100: Configuration - An Automation Panel 900 via SDL (onboard)

4.3.1 Basic system requirements

The following table shows the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit							Restriction Resolution
	5PC600.SX01 -00	5PC600.SX02 -00	5PC600.SX02 -01	5PC600.SF03 -00	5PC600.SX05 -00	5PC600.SX05 -01	5PC600.SE00 -00 / -02	
5PC600.X945-00	✓	-	✓	-	-	✓	✓	Max. UXGA

Table 122: Possible combinations of system unit and CPU board

4.3.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900

Table 123: Link module for the configuration - One Automation Panel 900 via SDL

4.3.3 Cables

Select a cable from the following table.

Model number	Type	Length
5CASDL.0018-00	SDL cable for a fixed type of layout	1.8 m
5CASDL.0018-01	SDL cable with 45° plug for fixed type of layout	1.8 m
5CASDL.0018-03	SDL cable for fixed and flexible type of layout	1.8 m
5CASDL.0050-00	SDL cable for a fixed type of layout	5 m
5CASDL.0050-01	SDL cable with 45° plug for fixed type of layout	5 m
5CASDL.0050-03	SDL cable for fixed and flexible type of layout	5 m
5CASDL.0100-00	SDL cable for a fixed type of layout	10 m
5CASDL.0100-01	SDL cable with 45° plug for fixed type of layout	10 m
5CASDL.0100-03	SDL cable for fixed and flexible type of layout	10 m
5CASDL.0150-00	SDL cable for a fixed type of layout	15 m
5CASDL.0150-01	SDL cable with 45° plug for fixed type of layout	15 m
5CASDL.0150-03	SDL cable for fixed and flexible type of layout	15 m
5CASDL.0200-00	SDL cable for a fixed type of layout	20 m
5CASDL.0200-03	SDL cable for fixed and flexible type of layout	20 m
5CASDL.0250-00	SDL cable for a fixed type of layout	25 m
5CASDL.0250-30	SDL cable for fixed and flexible type of layout	25 m
5CASDL.0300-00	SDL cable for a fixed type of layout	30 m
5CASDL.0300-03	SDL cable for fixed and flexible type of layout	30 m
5CASDL.0300-10	SDL cable with extender for a fixed type of layout	30 m
5CASDL.0300-13	SDL cable with extender for fixed and flexible type of layout	30 m
5CASDL.0400-10	SDL cable with extender for a fixed type of layout	40 m
5CASDL.0400-13	SDL cable with extender for fixed and flexible type of layout	40 m

Table 124: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cables	Resolution				
Segment length [m]	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03
5	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03
10	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00[1)] 5CASDL.0100-01[1)] 5CASDL.0100-03[1)]

Table 125: Segment lengths, resolutions and SDL cables

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
15	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00[1)] 5CASDL.0150-01[1)] 5CASDL.0150-03[1)]	- - -
20	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	- -
25	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	- -	- -
30	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	- -
40	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	- -

Table 125: Segment lengths, resolutions and SDL cables (Forts.)

1) See table 126 "Requirements for SDL cable with automatic cable adjustment (equalizer)", on page 226

2) See table 127 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)", on page 226

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 126: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	

Table 127: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

Firmware	Name	Version	Note
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SF03-00	System 3 PCI, 1 disk drive slot, 1 AP Link slot	Rev. A0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 127: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) (Forts.)

4.3.4 BIOS settings

No special BIOS settings are necessary for operation without touch.

To operate Automation Panel 900 panels with a touch screen (Extended Desktop or Dual Display Clone), the serial interfaces COM C and COM D must be activated in BIOS (BIOS default setting = disabled).

4.3.5 Windows graphics driver settings

"Digital display" must be defined as output device in the graphics driver.

For more information on this, see chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.3.6 Windows touch screen driver settings

For more information on this, see chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.4 An Automation Panel 800 via SDL (onboard)

An Automation Panel 800 is connected to the integrated SDL interface (onboard) via an SDL cable. USB devices can only be connected directly to the extension keyboard (without a hub).

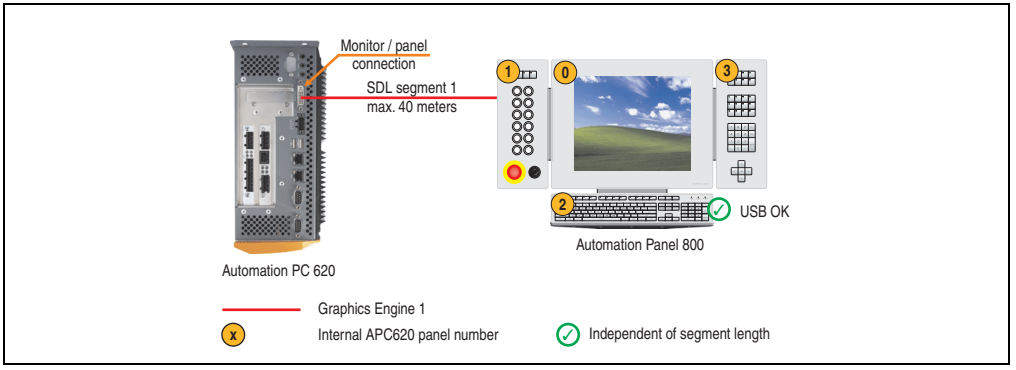


Figure 101: Configuration - An Automation Panel 800 via SDL (onboard)

4.4.1 Basic system requirements

The following table shows the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table.

CPU board	with system unit							Restriction Resolution
	5PC600.SX01 -00	5PC600.SX02 -00	5PC600.SX02 -01	5PC600.SF03 -00	5PC600.SX05 -00	5PC600.SX05 -01	5PC600.SE00 -00 / -02	
5PC600.X945-00	✓	-	✓	-	-	✓	✓	max. XGA

Table 128: Possible combinations of system unit and CPU board

4.4.2 Cables

Select an SDL cable from the following table.

Model number	Type	Length
5CASDL.0018-20	SDL w/o extender	1.8 m
5CASDL.0050-20	SDL w/o extender	5 m
5CASDL.0100-20	SDL w/o extender	10 m
5CASDL.0150-20	SDL w/o extender	15 m
5CASDL.0200-20	SDL w/o extender	20 m
5CASDL.0250-20	SDL w/o extender	25 m
5CASDL.0300-30	SDL w/ extender	30 m
5CASDL.0400-30	SDL w/ extender	40 m

Table 129: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cables Segment length [m]	Resolution XGA 1024 x 768
1.8	5CASDL.0018-20
5	5CASDL.0050-20
10	5CASDL.0100-20
15	5CASDL.0150-20
20	5CASDL.0200-20[1)]
25	5CASDL.0250-20[1)]
30	5CASDL.0300-30[2)]
40	5CASDL.0400-30[2)]

Table 130: Segment lengths, resolutions and SDL cables

1) See table 131 "Requirements for SDL cable with automatic cable adjustment (equalizer)"
2) See table 132 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)"

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	

Table 131: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
Hardware	**Name**	**Revision**	**Note**
5PC600.SX01-00	System 1 PCI	Rev. E0	-
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	-

Table 132: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

Firmware	Name	Version	Note
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	-
5PC600.SF03-00	System 3 PCI, 1 disk drive slot, 1 AP Link slot	Rev. A0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	-
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	-

Table 132: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) (Forts.)

4.4.3 BIOS settings

No special BIOS settings are necessary for operation.

4.4.4 Windows graphics driver settings

"Digital display" must be defined as output device in the graphics driver.

For more information on this, see chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.4.5 Windows touch screen driver settings

For more information on this, see chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.5 An AP900 and an AP800 via SDL (onboard)

An Automation Panel 900 and an Automation Panel 800 are connected to the integrated SDL interface (onboard) via SDL.

USB is supported up to a maximum distance (segment 1 + segment 2) of 30 m on the two displays. Starting at a distance of 30 m, USB is only available on the first display (front and back) up to a maximum of 40 m. USB devices can only be connected directly to the Automation Panel 900 or extension keyboard (without a hub).

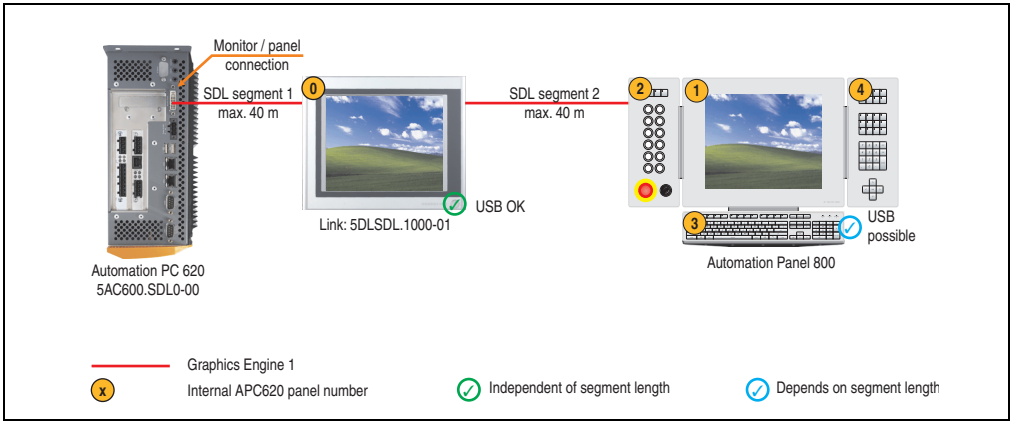


Figure 102: Configuration - One AP900 and an AP800 via SDL (onboard)

4.5.1 Basic system requirements

The following table shows the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table.

CPU board	with system unit							Restriction Resolution
	5PC600.SX01 -00	5PC600.SX02 -00	5PC600.SX02 -01	5PC600.SF03 -00	5PC600.SX05 -00	5PC600.SX05 -01	5PC600.SE00 -00 / -02	
5PC600.X945-00	✓	-	✓	-	-	✓	✓	Max. UXGA

Table 133: Possible combinations of system unit and CPU board

4.5.2 Cables

How to select an SDL cable for connecting the AP900 display to the AP900 display4.3 "An Automation Panel 900 via SDL (onboard)".

How to select an SDL cable for connecting the AP800 display to the AP900 display4.4 "An Automation Panel 800 via SDL (onboard)".

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cables Segment length [m]	Resolution XGA 1024 x 768
1.8	5CASDL.0018-20
5	5CASDL.0050-20
10	5CASDL.0100-20
15	5CASDL.0150-20
20	5CASDL.0200-20[1)]
25	5CASDL.0250-20[1)]
30	5CASDL.0300-30[2)]
40	5CASDL.0400-30[2)]

Table 134: Segment lengths, resolutions and SDL cables

1) See table 135 "Requirements for SDL cable with automatic cable adjustment (equalizer)"
2) See table 136 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)"

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	

Table 135: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
Hardware	**Name**	**Revision**	**Note**
5PC600.SX01-00	System 1 PCI	Rev. E0	-
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	-
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	-
5PC600.SF03-00	System 3 PCI, 1 disk drive slot, 1 AP Link slot	Rev. A0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	-
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	-

Table 136: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

4.5.3 BIOS settings

No special BIOS settings are necessary for operation.

4.5.4 Windows graphics driver settings

"Digital display" must be defined as output device in the graphics driver.

For more information on this, see chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.5.5 Windows touch screen driver settings

For more information on this, see chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.6 Four Automation Panel 900 units via SDL (onboard)

An Automation Panel 900 is connected to the integrated SDL interface (onboard) via an SDL cable. Up to three other Automation Panels of the same type are connected to this Automation Panel and operated via SDL. All four panels show the same content (Display Clone).

USB is supported up to a maximum distance (SDL segment 1 + SDL segment 2) of 30 m on the first two panels (front and back side). From a distance of 30 m and longer, USB is only available for the first panel (front and back side). USB devices can only be connected directly to the Automation Panel (without a hub).

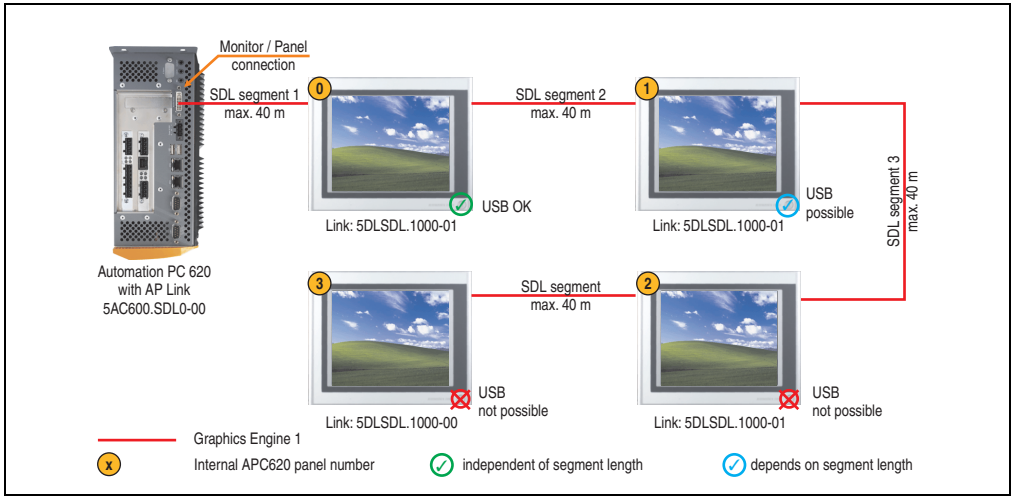


Figure 103: Configuration - Four Automation Panel 900 units via SDL (onboard)

4.6.1 Basic system requirements

The following table shows the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit							Restriction Resolution
	5PC600.SX01 -00	5PC600.SX02 -00	5PC600.SX02 -01	5PC600.SF03 -00	5PC600.SX05 -00	5PC600.SX05 -01	5PC600.SE00 -00 / -02	
5PC600.X945-00	✓	-	✓	-	-	✓	✓	Max. UXGA

Table 137: Possible combinations of system unit and CPU board

4.6.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900 3 pieces required

Table 138: Link modules for the configuration: 4 Automation Panel 900 via SDL on 1 line

4.6.3 Cables

Select an Automation Panel 900 cable from the following table.

Model number	Type	Length
5CASDL.0018-00	SDL cable for a fixed type of layout	1.8 m
5CASDL.0018-01	SDL cable with 45° plug for fixed type of layout	1.8 m
5CASDL.0018-03	SDL cable for fixed and flexible type of layout	1.8 m
5CASDL.0050-00	SDL cable for a fixed type of layout	5 m
5CASDL.0050-01	SDL cable with 45° plug for fixed type of layout	5 m
5CASDL.0050-03	SDL cable for fixed and flexible type of layout	5 m
5CASDL.0100-00	SDL cable for a fixed type of layout	10 m
5CASDL.0100-01	SDL cable with 45° plug for fixed type of layout	10 m
5CASDL.0100-03	SDL cable for fixed and flexible type of layout	10 m
5CASDL.0150-00	SDL cable for a fixed type of layout	15 m
5CASDL.0150-01	SDL cable with 45° plug for fixed type of layout	15 m
5CASDL.0150-03	SDL cable for fixed and flexible type of layout	15 m
5CASDL.0200-00	SDL cable for a fixed type of layout	20 m
5CASDL.0200-03	SDL cable for fixed and flexible type of layout	20 m
5CASDL.0250-00	SDL cable for a fixed type of layout	25 m
5CASDL.0250-30	SDL cable for fixed and flexible type of layout	25 m
5CASDL.0300-00	SDL cable for a fixed type of layout	30 m
5CASDL.0300-03	SDL cable for fixed and flexible type of layout	30 m
5CASDL.0300-10	SDL cable with extender for a fixed type of layout	30 m
5CASDL.0300-13	SDL cable with extender for fixed and flexible type of layout	30 m
5CASDL.0400-10	SDL cable with extender for a fixed type of layout	40 m
5CASDL.0400-13	SDL cable with extender for fixed and flexible type of layout	40 m

Table 139: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03
5	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03
10	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00[1)] 5CASDL.0100-01[1)] 5CASDL.0100-03[1)]
15	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00[1)] 5CASDL.0150-01[1)] 5CASDL.0150-03[1)]	- - -
20	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	--
25	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	- -	- -
30	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	-
40	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	-

Table 140: Segment lengths, resolutions and SDL cables

1) See table 141 "Requirements for SDL cable with automatic cable adjustment (equalizer)", on page 236

2) See table 142 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)", on page 237

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 141: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SF03-00	System 3 PCI, 1 disk drive slot, 1 AP Link slot	Rev. A0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 142: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

4.6.4 BIOS settings

No special BIOS settings are necessary for operation.

4.6.5 Windows graphics driver settings

"Display Clone" must be defined as output device in the graphics driver, with "Digital Display" as primary device.

For more information on this, see chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.6.6 Windows touch screen driver settings

For more information on this, see chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.7 One Automation Panel 900 unit via SDL (AP Link)

An Automation Panel 900 unit is connected to the optional SDL transmitter (AP Link) via an SDL cable. USB devices can only be connected directly to the Automation Panel (without a hub).

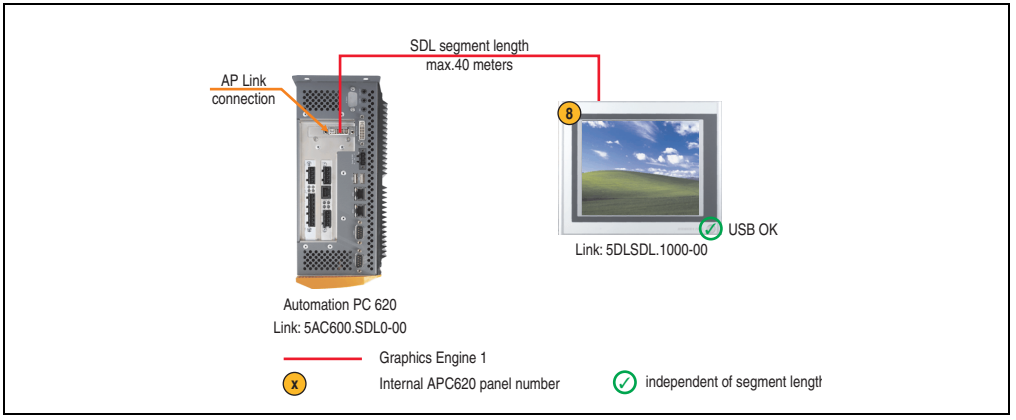


Figure 104: Configuration - One Automation Panel 900 via SDL (AP Link)

4.7.1 Basic system requirements

The following table shows the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit							Restriction Resolution
	5PC600.SX01 -00	5PC600.SX02 -00	5PC600.SX02 -01	5PC600.SF03 -00	5PC600.SX05 -00	5PC600.SX05 -01	5PC600.SE00 -00 / -02	
5PC600.X945-00	-	✓	-	✓	✓	-	-	Max. UXGA

Table 143: Possible combinations of system unit and CPU board

4.7.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5AC600.SDL0-00	**APC620 Smart Display Link transmitter** For connecting Automation Panels to an APC620 via SDL.	For Automation PC 620

Table 144: Link modules for the configuration: 1 Automation Panel 900 via SDL (optional)

4.7.3 Cables

Select a cable from the following table.

Model number	Type	Length
5CASDL.0018-00	SDL cable for a fixed type of layout	1.8 m
5CASDL.0018-01	SDL cable with 45° plug for fixed type of layout	1.8 m
5CASDL.0018-03	SDL cable for fixed and flexible type of layout	1.8 m
5CASDL.0050-00	SDL cable for a fixed type of layout	5 m
5CASDL.0050-01	SDL cable with 45° plug for fixed type of layout	5 m
5CASDL.0050-03	SDL cable for fixed and flexible type of layout	5 m
5CASDL.0100-00	SDL cable for a fixed type of layout	10 m
5CASDL.0100-01	SDL cable with 45° plug for fixed type of layout	10 m
5CASDL.0100-03	SDL cable for fixed and flexible type of layout	10 m
5CASDL.0150-00	SDL cable for a fixed type of layout	15 m
5CASDL.0150-01	SDL cable with 45° plug for fixed type of layout	15 m
5CASDL.0150-03	SDL cable for fixed and flexible type of layout	15 m
5CASDL.0200-00	SDL cable for a fixed type of layout	20 m
5CASDL.0200-03	SDL cable for fixed and flexible type of layout	20 m
5CASDL.0250-00	SDL cable for a fixed type of layout	25 m
5CASDL.0250-30	SDL cable for fixed and flexible type of layout	25 m
5CASDL.0300-00	SDL cable for a fixed type of layout	30 m
5CASDL.0300-03	SDL cable for fixed and flexible type of layout	30 m
5CASDL.0300-10	SDL cable with extender for a fixed type of layout	30 m
5CASDL.0300-13	SDL cable with extender for fixed and flexible type of layout	30 m
5CASDL.0400-10	SDL cable with extender for a fixed type of layout	40 m
5CASDL.0400-13	SDL cable with extender for fixed and flexible type of layout	40 m

Table 145: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cables	Resolution				
Segment length [m]	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03
5	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03
10	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00[1)] 5CASDL.0100-01[1)] 5CASDL.0100-03[1)]

Table 146: Segment lengths, resolutions and SDL cables

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
15	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-0[1)] 5CASDL.0150-01[1)] 5CASDL.0150-03[1)]	- - -
20	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	- -
25	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	- -	- -
30	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	- -
40	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	- -

Table 146: Segment lengths, resolutions and SDL cables (Forts.)

1) See table 147 "Requirements for SDL cable with automatic cable adjustment (equalizer)", on page 240

2) See table 148 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)", on page 240

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 147: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	

Table 148: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

Firmware	Name	Version	Note
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SF03-00	System 3 PCI, 1 disk drive slot, 1 AP Link slot	Rev. A0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 148: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) (Forts.)

4.7.4 BIOS settings

No special BIOS settings are necessary for operation without touch.

To operate Automation Panel 900 panels with a touch screen (Extended Desktop or Dual Display Clone), the serial interfaces COM C and COM D must be activated in BIOS (BIOS default setting = disabled).

4.7.5 Windows graphics driver settings

"Notebook" must be defined as output device in the graphics driver.

For more information on this, see chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.7.6 Windows touch screen driver settings

For more information on this, see chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.8 Four Automation Panel 900 units via SDL (AP Link)

An Automation Panel 900 unit is connected to the optional SDL transmitter (AP Link) via an SDL cable. Three other Automation Panels of the same type are connected to this Automation Panel and operated via SDL. All four panels show the same content (Display Clone).

USB is supported up to a maximum distance (SDL segment 1 + SDL segment 2) of 30 m on the first two panels (front and back side). From a distance of 30 m and longer, USB is only available for the first panel (front and back side). USB devices can only be connected directly to the Automation Panel (without a hub).

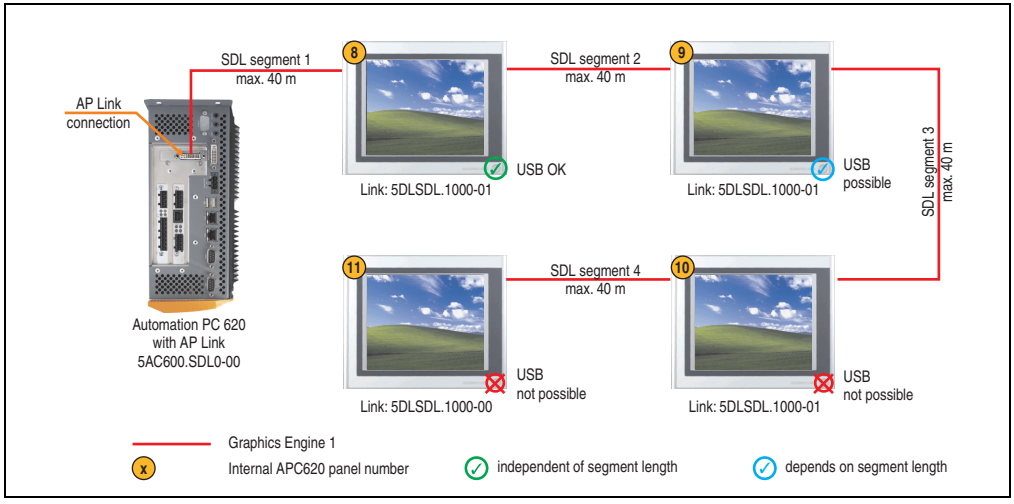


Figure 105: Configuration - Four Automation Panel 900 units via SDL (AP Link)

4.8.1 Basic system requirements

The following table shows the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit							Restriction Resolution
	5PC600.SX01 -00	5PC600.SX02 -00	5PC600.SX02 -01	5PC600.SF03 -00	5PC600.SX05 -00	5PC600.SX05 -01	5PC600.SE00 -00 / -02	
5PC600.X945-00	-	✓	-	✓	✓	-	-	Max. UXGA

Table 149: Possible combinations of system unit and CPU board

4.8.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900 3 pieces required
5AC600.SDL0-00	**APC620 Smart Display Link transmitter** For connecting Automation Panels to an APC620 via SDL.	For Automation PC 620

Table 150: Link modules for configuration: 4 Automation Panel 900 units via SDL (optional) on 1 line

4.8.3 Cables

Selection of 4 cables from the following tables.

Model number	Type	Length
5CASDL.0018-00	SDL cable for a fixed type of layout	1.8 m
5CASDL.0018-01	SDL cable with 45° plug for fixed type of layout	1.8 m
5CASDL.0018-03	SDL cable for fixed and flexible type of layout	1.8 m
5CASDL.0050-00	SDL cable for a fixed type of layout	5 m
5CASDL.0050-01	SDL cable with 45° plug for fixed type of layout	5 m
5CASDL.0050-03	SDL cable for fixed and flexible type of layout	5 m
5CASDL.0100-00	SDL cable for a fixed type of layout	10 m
5CASDL.0100-01	SDL cable with 45° plug for fixed type of layout	10 m
5CASDL.0100-03	SDL cable for fixed and flexible type of layout	10 m
5CASDL.0150-00	SDL cable for a fixed type of layout	15 m
5CASDL.0150-01	SDL cable with 45° plug for fixed type of layout	15 m
5CASDL.0150-03	SDL cable for fixed and flexible type of layout	15 m
5CASDL.0200-00	SDL cable for a fixed type of layout	20 m
5CASDL.0200-03	SDL cable for fixed and flexible type of layout	20 m
5CASDL.0250-00	SDL cable for a fixed type of layout	25 m
5CASDL.0250-30	SDL cable for fixed and flexible type of layout	25 m
5CASDL.0300-00	SDL cable for a fixed type of layout	30 m
5CASDL.0300-03	SDL cable for fixed and flexible type of layout	30 m
5CASDL.0300-10	SDL cable with extender for a fixed type of layout	30 m
5CASDL.0300-13	SDL cable with extender for fixed and flexible type of layout	30 m
5CASDL.0400-10	SDL cable with extender for a fixed type of layout	40 m
5CASDL.0400-13	SDL cable with extender for fixed and flexible type of layout	40 m

Table 151: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03
5	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03
10	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00[1)] 5CASDL.0100-01[1)] 5CASDL.0100-03[1)]
15	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00[1)] 5CASDL.0150-01[1)] 5CASDL.0150-03[1)]	- - -
20	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	- -
25	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	- -	- -
30	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	-
40	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	-

Table 152: Segment lengths, resolutions and SDL cables

1) See table 153 "Requirements for SDL cable with automatic cable adjustment (equalizer)", on page 244

2) See table 154 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)", on page 245

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 153: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SF03-00	System 3 PCI, 1 disk drive slot, 1 AP Link slot	Rev. A0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 154: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

4.8.4 BIOS settings

No special BIOS settings are necessary for operation.

4.8.5 Windows graphics driver settings

"Notebook" must be defined as output device in the graphics driver.

For more information on this, see chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.8.6 Windows touch screen driver settings

For more information on this, see chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.9 Four Automation Panel 900 units via SDL (AP Link) and RGB (onboard)

A CRT monitor (max. UXGA) is connected to the integrated monitor/panel interface (onboard) via RGB. Four additional Automation Panel 900 units (max. UXGA) are connected to the optional SDL transmitter (AP Link). The Automation Panels must be the same type. The two lines display different content (Extended Desktop), but panels show the same content (Display Clone).

USB is supported up to a maximum distance (SDL segment 1 + SDL segment 2) of 30 m on the first two panels (front and back side). From a distance of 30 m and longer, USB is only available for the first panel. USB devices can only be connected directly to the Automation Panel (without hub).

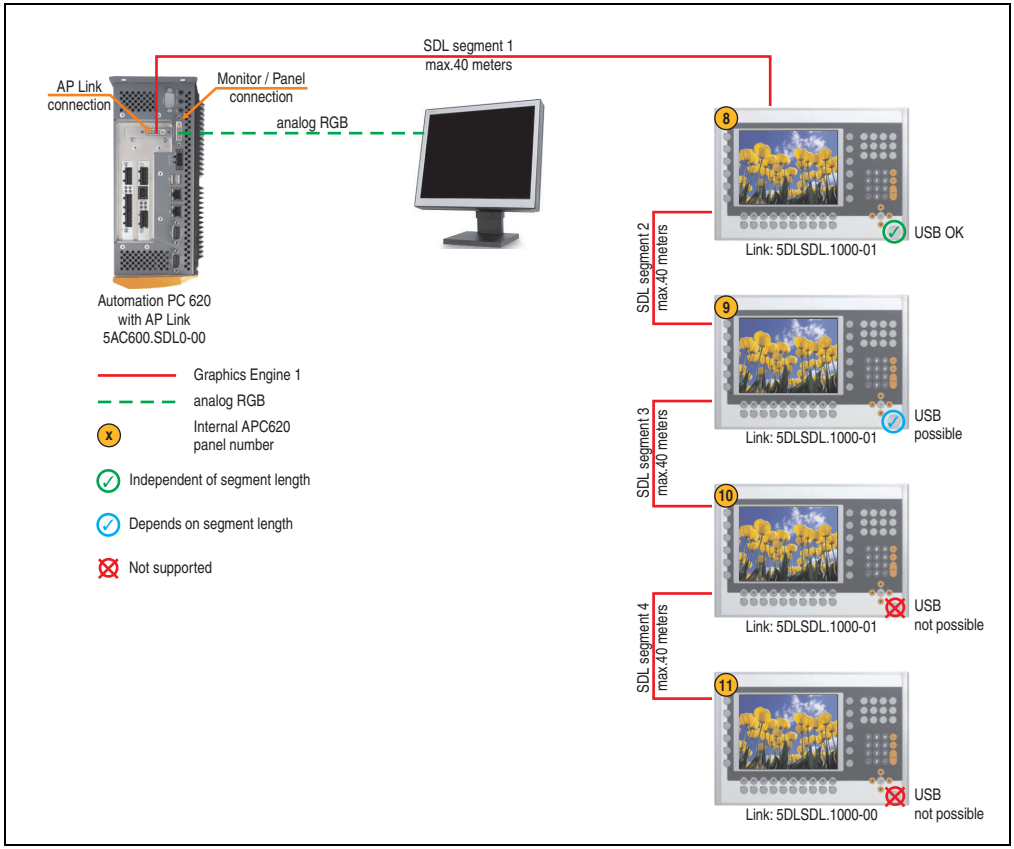


Figure 106: Configuration - Four Automation Panel 900 units via SDL (AP Link) and CRT (onboard)

4.9.1 Basic system requirements

The following table shows the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit							Restriction Resolution
	5PC600.SX01 -00	5PC600.SX02 -00	5PC600.SX02 -01	5PC600.SF03 -00	5PC600.SX05 -00	5PC600.SX05 -01	5PC600.SE00 -00 / -02	
5PC600.X945-00	-	✓	-	✓	✓	-	-	Max. UXGA

Table 155: Possible combinations of system unit and CPU board

4.9.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900 3 pieces required
5AC600.SDL0-00	**APC620 Smart Display Link transmitter** For connecting Automation Panels to an APC620 via SDL.	For Automation PC 620 1 pieces required

Table 156: Link modules for configuration: 4 Automation Panel 900 units via SDL (AP Link) and RGB (onboard)

4.9.3 Cables

Selection of 8 cables from the following tables.

Model number	Type	Length
5CASDL.0018-00	SDL cable for a fixed type of layout	1.8 m
5CASDL.0018-01	SDL cable with 45° plug for fixed type of layout	1.8 m
5CASDL.0018-03	SDL cable for fixed and flexible type of layout	1.8 m
5CASDL.0050-00	SDL cable for a fixed type of layout	5 m
5CASDL.0050-01	SDL cable with 45° plug for fixed type of layout	5 m
5CASDL.0050-03	SDL cable for fixed and flexible type of layout	5 m
5CASDL.0100-00	SDL cable for a fixed type of layout	10 m
5CASDL.0100-01	SDL cable with 45° plug for fixed type of layout	10 m
5CASDL.0100-03	SDL cable for fixed and flexible type of layout	10 m
5CASDL.0150-00	SDL cable for a fixed type of layout	15 m
5CASDL.0150-01	SDL cable with 45° plug for fixed type of layout	15 m

Table 157: Cables for SDL configurations

Model number	Type	Length
5CASDL.0150-03	SDL cable for fixed and flexible type of layout	15 m
5CASDL.0200-00	SDL cable for a fixed type of layout	20 m
5CASDL.0200-03	SDL cable for fixed and flexible type of layout	20 m
5CASDL.0250-00	SDL cable for a fixed type of layout	25 m
5CASDL.0250-30	SDL cable for fixed and flexible type of layout	25 m
5CASDL.0300-00	SDL cable for a fixed type of layout	30 m
5CASDL.0300-03	SDL cable for fixed and flexible type of layout	30 m
5CASDL.0300-10	SDL cable with extender for a fixed type of layout	30 m
5CASDL.0300-13	SDL cable with extender for fixed and flexible type of layout	30 m
5CASDL.0400-10	SDL cable with extender for a fixed type of layout	40 m
5CASDL.0400-13	SDL cable with extender for fixed and flexible type of layout	40 m

Table 157: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03
5	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03
10	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00[1)] 5CASDL.0100-01[1)] 5CASDL.0100-03[1)]
15	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00[1)] 5CASDL.0150-01[1)] 5CASDL.0150-03[1)]	- - -
20	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	5CASDL.0200-00[1)] 5CASDL.0200-03[1)]	- -
25	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	5CASDL.0250-00[1)] 5CASDL.0250-03[1)]	- -	- -
30	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-00[1)] 5CASDL.0300-03[1)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	5CASDL.0300-10[2)] 5CASDL.0300-13[2)]	- -
40	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	5CASDL.0400-10[2)] 5CASDL.0400-13[2)]	- -

Table 158: Segment lengths, resolutions and SDL cables

1) See table 159 "Requirements for SDL cable with automatic cable adjustment (equalizer)", on page 249

2) See table 160 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)", on page 250

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 159: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	v 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	v 00.02	
Hardware	**Name**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SF03-00	System 3 PCI, 1 disk drive slot, 1 AP Link slot	Rev. A0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 160: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

4.9.4 BIOS settings

No special BIOS settings are necessary for operation without touch.

To operate Automation Panel 900 panels with a touch screen (Extended Desktop or Dual Display Clone), the serial interfaces COM C and COM D must be activated in BIOS (BIOS default setting = disabled).

4.9.5 Windows graphics driver settings

See chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

If all connected Automation Panel 900 panels (line 1 + line 2) should display the same content, then "Dual Display Clone" mode must be set in the graphics driver (see chapter 4 "Software", section 6.2.3 "Graphics settings for Dual Display Clone", on page 357).

4.9.6 Windows touch screen driver settings

See chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.10 Three AP900 units and one AP800 via SDL (AP Link) and RGB (onboard)

A CRT monitor (max. UXGA) is connected to the integrated monitor/panel interface (onboard). Three additional Automation Panel 900 units (max. UXGA) are connected to the optional SDL transmitter. The Automation Panels must be the same type. The two lines display different content (Extended Desktop), but panels show the same content (Display Clone).

USB is supported up to a maximum distance (segment 1 + segment 2) of 30 m on the first two displays. Starting at a distance of 30 m, USB is only available on the first display (front and back) up to a maximum of 40 m. USB devices can only be connected directly to Automation Panel 900 devices (without a hub).

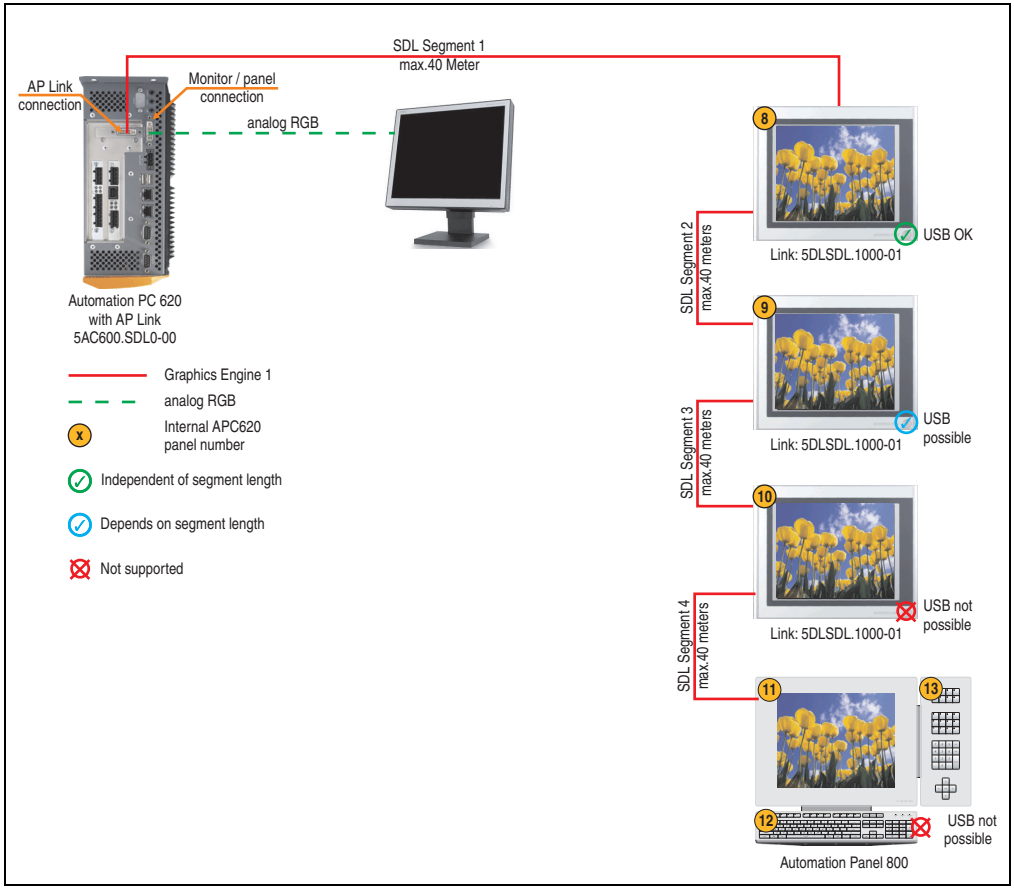


Figure 107: Configuration - Three AP900 units and one AP800 via SDL (AP Link) and RGB (onboard)

4.10.1 Basic system requirements

The following table shows the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table.

If an Automation Panel 800 and an Automation Panel 900 should be connected on the same line, the devices must have the same display type.

CPU board	with system unit							Restriction Resolution
	5PC600.SX01 -00	5PC600.SX02 -00	5PC600.SX02 -01	5PC600.SF03 -00	5PC600.SX05 -00	5PC600.SX05 -01	5PC600.SE00 -00 / -02	
5PC600.X945-00	-	✓	-	✓	✓	-	-	max. XGA

Table 161: Possible combinations of system unit and CPU board

4.10.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900 2 pieces required
5AC600.SDL0-00	**APC620 Smart Display Link transmitter** For connecting Automation Panels to an APC620 via SDL.	For Automation PC 620 1 pieces required

Table 162: Link modules for configuration: 3 AP900 units and one AP800 via SDL (AP Link) and RGB (onboard)

4.10.3 Cables

How to select an SDL cable for connecting the AP900 display to the AP900 display4.3 "An Automation Panel 900 via SDL (onboard)".

How to select an SDL cable for connecting the AP800 display to the AP900 display4.4 "An Automation Panel 800 via SDL (onboard)".

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	- - - -	- - - -	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-20 5CASDL.0018-03	- - - -	- - - -
5	- - - -	- - - -	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-02 5CASDL.0050-03	- - - -	- - - -
10	- - - -	- - - -	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-02 5CASDL.0100-03	- - - -	- - - -
15	- - - -	- - - -	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-02 5CASDL.0150-03	- - - -	- - - -
20	- - -	- - -	5CASDL.0200-00[1)] 5CASDL.0200-02[1)] 5CASDL.0200-03[1)]	- - -	- - -
25	- - -	- - -	5CASDL.0250-00[1)] 5CASDL.0250-02[1)] 5CASDL.0250-03[1)]	- - -	- - -
30	- - -	- - -	5CASDL.0300-10[1)] 5CASDL.0300-13[2)] 5CASDL.0300-30[2)]	- - -	- - -
40	- -	- -	5CASDL.0400-10[2)] 5CASDL.0400-13[2)] 5CASDL.0400-30[2)]	- -	- -

Table 163: Segment lengths, resolutions and SDL cables

1) See table 164 "Requirements for SDL cable with automatic cable adjustment (equalizer)", on page 253

2) See table 165 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)", on page 254

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	

Table 164: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	v 01.15	The version is read from BIOS - see the BIOS description. Supported starting with the APC620 / PPC 700 Firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	v 01.55	
Hardware	**Name**	**Revision**	**Note**
5PC600.SX01-00	System 1 PCI	Rev. E0	-
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	-
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	-
5PC600.SF03-00	System 3 PCI, 1 disk drive slot, 1 AP Link slot	Rev. A0	-
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	-
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	-

Table 165: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

4.10.4 BIOS settings

No special BIOS settings are necessary for operation without touch.

To operate Automation Panel 900 panels with a touch screen (Extended Desktop or Dual Display Clone), the serial interfaces COM C and COM D must be activated in BIOS (BIOS default setting = disabled).

4.10.5 Windows graphics driver settings

See chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

If all connected Automation Panel 900 panels and Automation Panel 800 panels (line 1 + line 2) should display the same content, then "Dual Display Clone" mode must be set in the graphics driver (see chapter 4 "Software", section 6.2.3 "Graphics settings for Dual Display Clone", on page 357).

4.10.6 Windows touch screen driver settings

See chapter 4 "Software", section 6 "Automation PC 620 with Windows XP Professional", on page 352.

4.11 Internal numbering of extension units in AP800 devices

An extension unit for an AP800 device is numbered like another device. The numbering of the extension units starts from the display unit and goes in the counter-clockwise direction; all extension unit slots that are not used are left out.
The following graphic shows numbering examples.

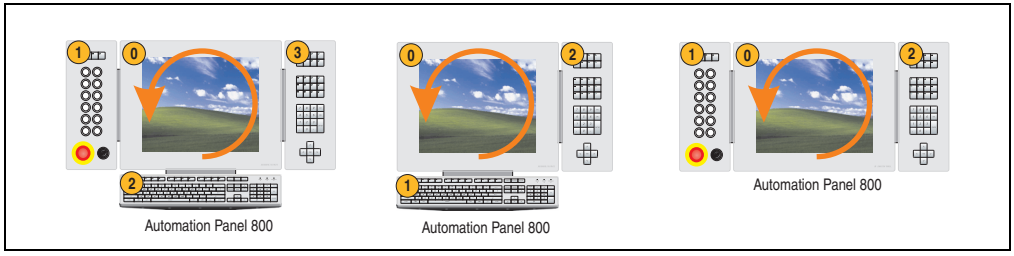


Figure 108: Examples - internal numbering of the extension units

5. Configuration of a SATA RAID array

You must enter the BIOS "RAID Configuration Utility" in order to make the necessary settings. After the POST, enter <Ctrl+S> or <F4> to open RAID BIOS.

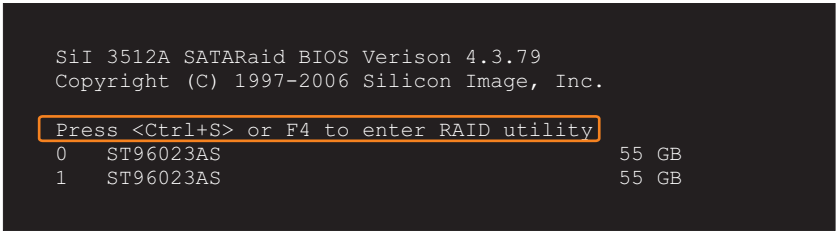


Figure 109: Open the RAID Configuration Utility

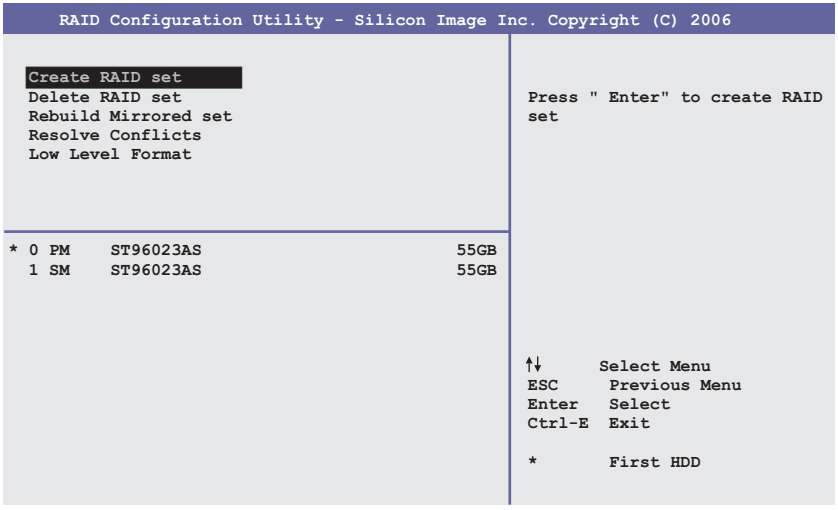


Figure 110: RAID Configuration Utility - Menu

The following keys can be used after entering the BIOS setup:

Key	Function
Cursor ↑	Go to previous item.
Cursor ↓	Go to the next item.
Enter	Select an item or open a submenu.

Table 166: BIOS-relevant keys in the RAID Configuration Utility

Key	Function
ESC	Go back to previous menu.
Ctrl+E	Exit setup and save the changed settings.

Table 166: BIOS-relevant keys in the RAID Configuration Utility

5.1 Create RAID set

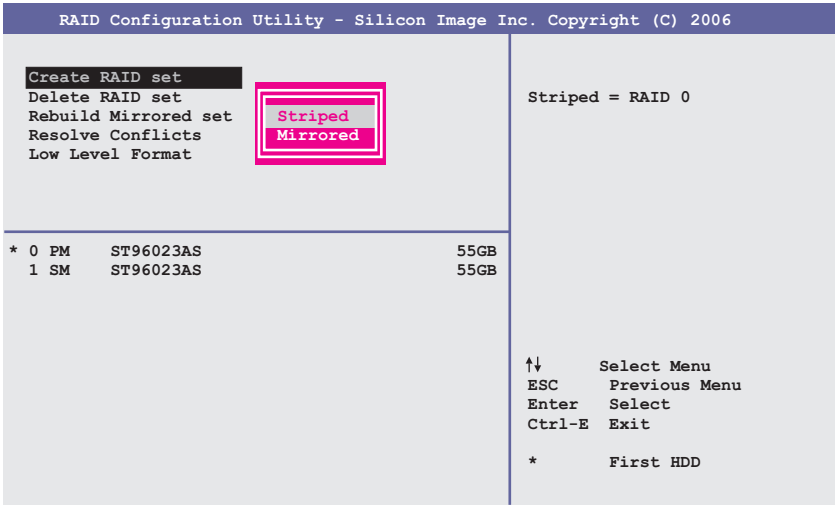


Figure 111: RAID Configuration Utility - Menu

The RAID system can be recreated as "Striped" = RAID0 or "Mirrored" = RAID1 using the menu "Create RAID set".

5.1.1 Create RAID set - Striped

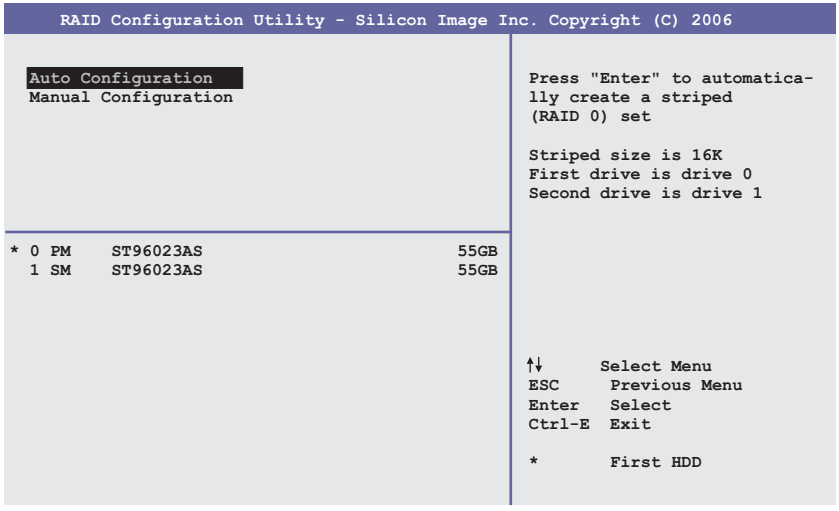


Figure 112: RAID Configuration Utility - Create RAID set - Striped

Auto Configuration

Auto Configuration optimizes all settings.

Manual Configuration

It is possible to specify the first and second HDD as well as the "Chunk Size" (= block size, application-dependent).

5.1.2 Create RAID set - Mirrored

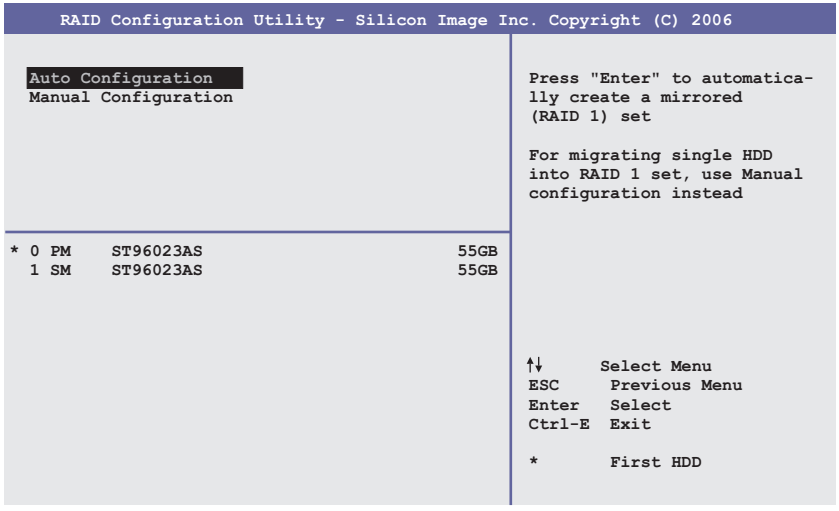


Figure 113: RAID Configuration Utility - Create RAID set - Mirrored

Auto Configuration

Auto Configuration optimizes all settings.

Manual Configuration

It is possible to specify the "Source" and "Target" HDD, and also to specify whether a rebuild (mirror) should be performed immediately (approx. 50 minutes).

5.2 Delete RAID set

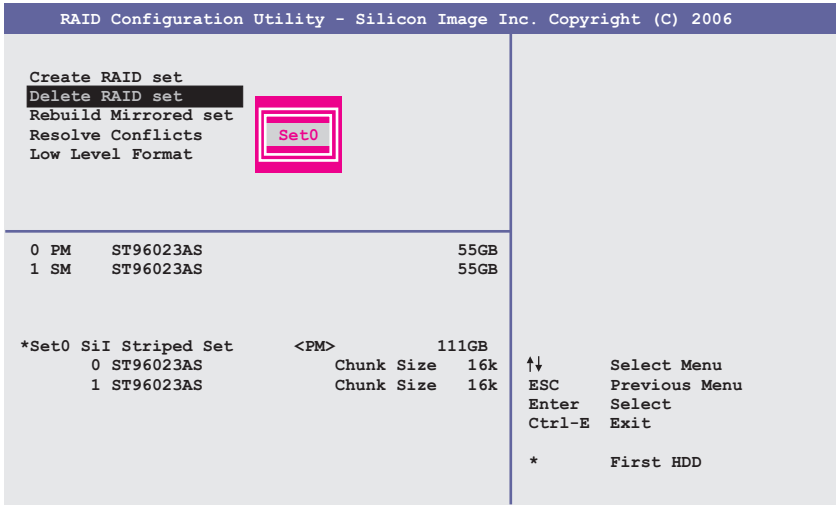


Figure 114: RAID Configuration Utility - Delete RAID set

An existing RAID set can be deleted using the menu "Delete RAID set".

5.3 Rebuild mirrored set

```
RAID Configuration Utility - Silicon Image Inc. Copyright (C) 2006

 Create RAID set                                  Rebuild help
 Delete RAID set
 Rebuild Mirrored set
 Resolve Conflicts
 Low Level Format

 0 PM    ST96023AS                          55GB
 1 SM    ST96023AS                          55GB

* Set0 SiI Mirrored Set  <PM>               55GB
       0 ST96023AS                        Current   ↑↓      Select Menu
       1 ST96023AS                        Current   ESC     Previous Menu
                                                    Enter   Select
                                                    Ctrl-E  Exit

                                                    *       First HDD
```

Figure 115: RAID Configuration Utility - Rebuild mirrored set

The "Rebuild mirrored set" menu can be used to restart a rebuild procedure in a RAID 1 set if an error occurs, after first interrupting the rebuild procedure or when exchanging a hard disk.

If "onlinerebuild" is selected, then the rebuild is executed during operation after the system is booted. E.g. an event pop-up is displayed by the installed SATA RAID configuration program: `SATARaid detected a new event` and the rebuild is started. The entire rebuild lasts approximately 50 minutes.

If "offlinerebuild" is selected, then a rebuild is performed immediately before starting the operating system (lasts approximately 30 minutes).

5.4 Resolve conflicts

```
RAID Configuration Utility - Silicon Image Inc. Copyright (C) 2006

 Create RAID set                                  Help for resolving
 Delete RAID set                                  conflicts
 Rebuild Mirrored set
 Resolve Conflicts
 Low Level Format

 0 PM    ST96023AS                          55GB
 1 SM    ST96023AS                          55GB

* Set0 SiI Mirrored Set  <PM>               55GB
       0 ST96023AS                       Current   ↑↓      Select Menu
       1 ST96023AS                       Current   ESC     Previous Menu
                                                   Enter   Select
                                                   Ctrl-E  Exit

                                                   *       First HDD
```

Figure 116: RAID Configuration Utility - Resolve conflicts

Conflicts in a RAID set can be resolved using the "Resolve conflicts" menu. This function is only available if the status of the hard disk is "conflict".

5.5 Low level format

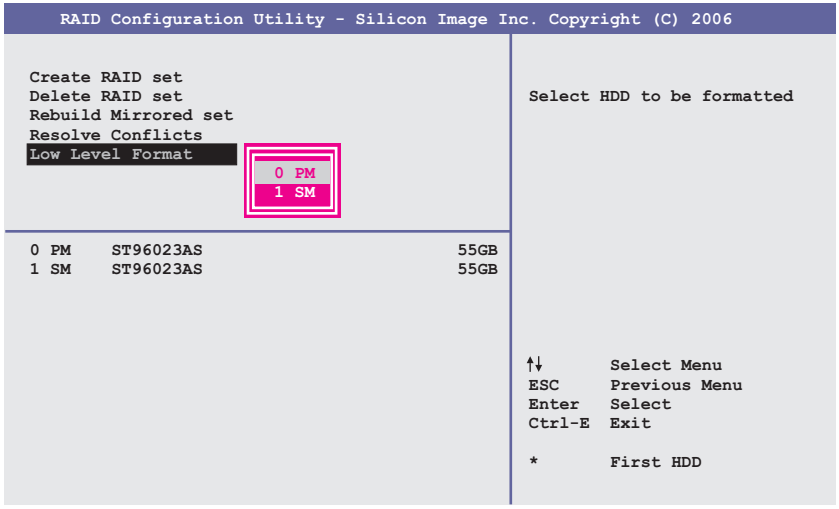


Figure 117: RAID Configuration Utility - Low level format

Individual hard disks can be configured using the "Low Level Format" menu. This can only be done if a RAID set is not configured. A low level format of a hard disk takes approx. 40 minutes.

6. Connection of USB peripheral devices

Warning!

Peripheral USB devices can be connected to the USB ports. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. B&R does ensure the performance of all USB devices that they provide.

6.1 Local on the APC620

Many different peripheral USB devices can be connected to the 2 or 4 (APC embedded) USB ports. The maximum current load values and transfer speeds can be found in Sections "USB ports", on page 112 and "USB connection (only APC620 embedded)", on page 113.

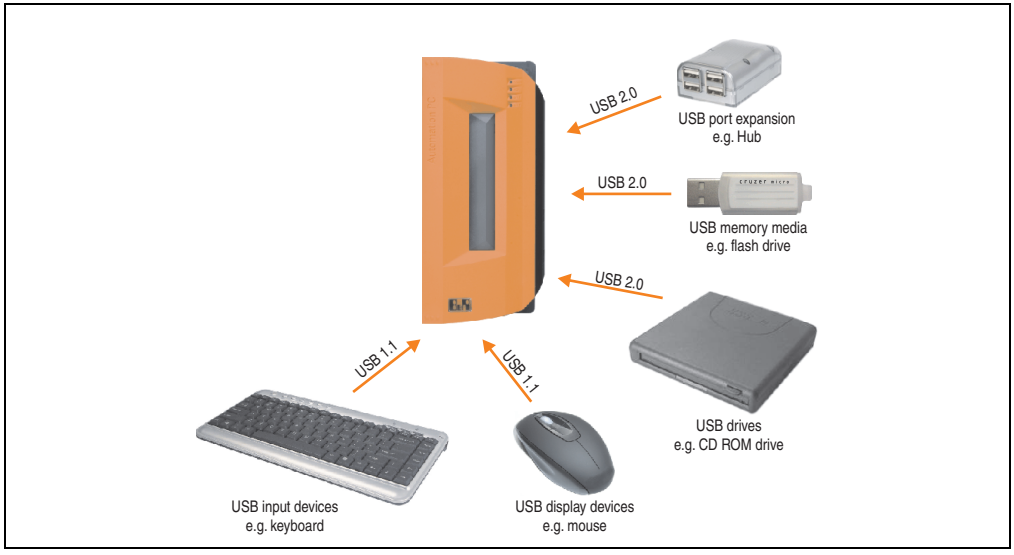


Figure 118: Local connection of USB peripheral devices on the APC620

6.2 Remote connection to Automation Panel 900 via DVI

Many different peripheral USB devices can be connected to the 2 or 3 USB ports on the Automation Panel 900. These can each handle a load of 500 mA. The maximum transfer rate is USB 2.0.

Information:

Only end devices (no hubs) can be connected to the Automation Panel 900.

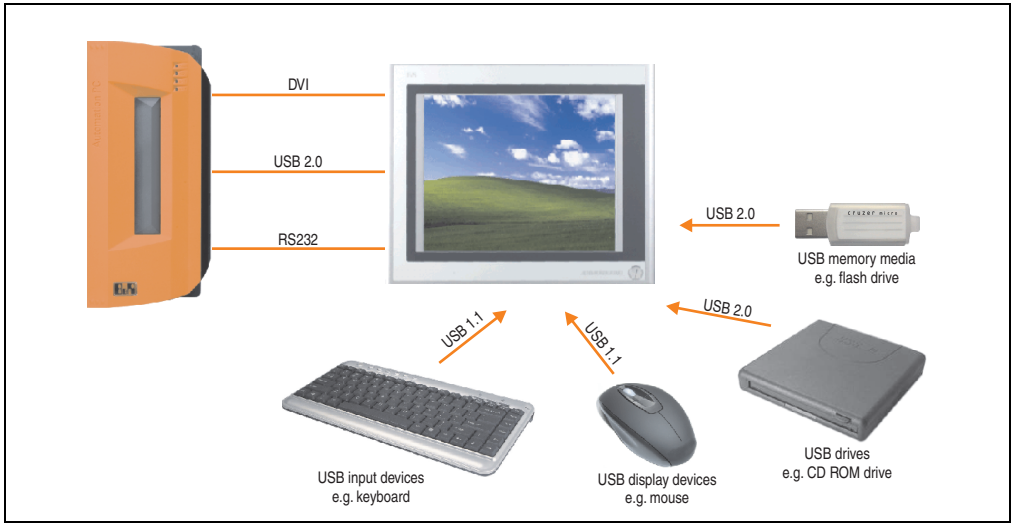


Figure 119: Remote connection of USB peripheral devices to the APC900 via DVI

6.3 Remote connection to Automation Panel 800/900 via SDL

Many different peripheral USB devices can be connected to the 2 or 3 USB ports on Automation Panel 900 and/or USB connections on the Automation Panel 800 devices. These can each handle a load of 500 mA. The maximum transfer rate is USB 1.1.

Information:

Only end devices (no hubs) can be connected to the Automation Panel 800/900.

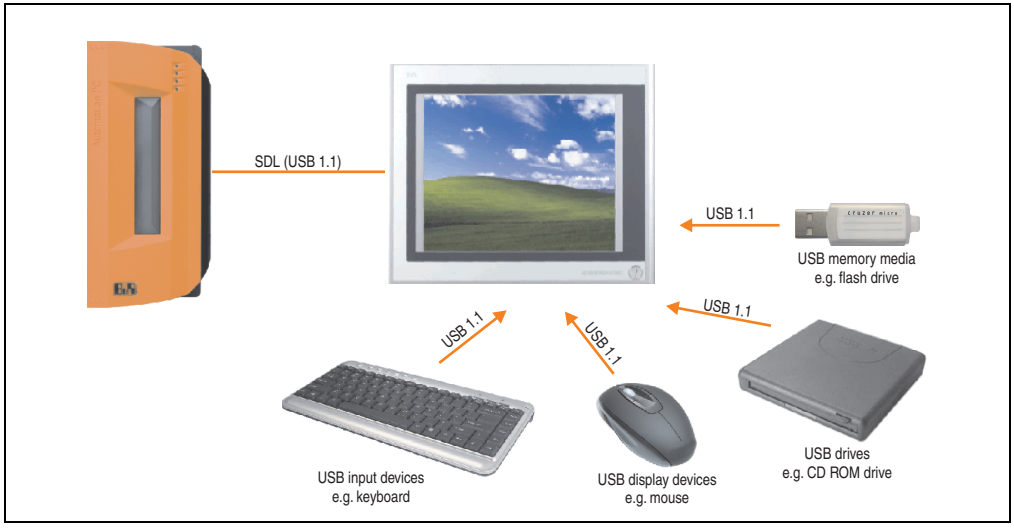


Figure 120: Remote connection of USB peripheral devices to the APC800/900 via SDL

7. Known problems / issues

The following issues for the APC620/PPC700 devices are known:

- No support for IDE-based slide-in drives. Only USB slide-in drives are supported.
- Graphics Engine 2 (GE2) interface not supported. Only GE1 and analog RGB are supported.
- In Windows XP, the Windows Standby mode is not supported in combination with the add-on hard disk (5AC600.HDDI-05 and 5AC600.HDDI-06) in IDE Slave Only mode. A blue screen or Windows crash can occur sporadically when returning from Windows Standby mode. Windows Standby mode will function if a CompactFlash card is connected to the IDE Master in addition the HDD on the slave slot. The same problem also occurs if the "Turn off hard disks" function is activated in the Power Options in the Control Panel (must be set to "Never").
- If the Intel GMA driver (Graphics Media Accelerator) is installed in the system (e.g. in Windows XP / Windows 7), then an analog RGB monitor will always be detected, regardless of whether one is connected or not.
- Using two different types of CompactFlash cards can cause problems in Automation PCs and Panel PCs. This can result in one of the two cards not being detected during system startup. This is caused by varying startup speeds. CompactFlash cards with older technology require significantly more time during system startup than CompactFlash cards with newer technology. This behavior occurs near the limits of the time frame provided for startup. The problem described above can occur because the startup time for the CompactFlash cards fluctuates due to the variance of the components being used. Depending on the CompactFlash cards being used, this error might never, sometimes or always occur.
- During daisy chain operation of multiple AP800/AP900 devices via SDL, it's possible that the touch controller status shows a red "X" in the Control Center applet for the touch screen driver when the touch controller is detected. The functionality of the touch system is not affected by this. This can be avoided by setting a panel locking time of 50 ms. The panel locking time can be configured with the B&R Key Editor.

Chapter 4 • Software

1. BIOS options

The BIOS settings available for the X945 CPU boards are described in the following sections.

Information:

- **The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.14. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.**
- **The setup defaults are the settings recommended by B&R. The setup defaults are dependant on the DIP switch configuration on the baseboard (see section 1.9 "BIOS default settings", on page 312).**

1.1 General information

BIOS stands for "Basic Input Output System". It is the most basic standardized communication between the user and the system (hardware). The BIOS system used in the Automation PC 620 systems is produced by American Megatrends Inc.

The BIOS Setup Utility lets you modify basic system configuration settings. These settings are stored in CMOS and in EEPROM (as a backup).

The CMOS data is buffered by a battery, and remains in the APC620 even when the power is turned off (no 24VDC supply).

1.2 BIOS setup and boot procedure

BIOS is immediately activated when switching on the power supply of the Automation PC 620 system or pressing the power button. The system checks if the setup data from the EEPROM is "OK". If the data is "OK", then it is transferred to the CMOS. If the data is "not OK", then the CMOS data is checked for validity. An error message is output if the CMOS data contains errors and the boot procedure can be continued by pressing the <F1> key. To prevent the error message from appearing at each restart, open the BIOS setup by pressing the <Del> key and re-save the settings.

BIOS reads the system configuration information in CMOS RAM, checks the system, and configures it using the Power On Self Test (POST).

When these "preliminaries" are finished, BIOS seeks an operating system in the data storage devices available (hard drive, floppy drive, etc.). BIOS launches the operating system and hands over control of system operations to it.

To enter BIOS Setup, the DEL key must be pressed as soon as the following message appears on the monitor (during POST):

"Press DEL to run SETUP"

```
AMIBIOS(C)2005 American Megatrends, Inc.
[APC7R114] Bernecker + Rainer  Industrie-Elektronik L1.14
Serial Number     : 316862
CPU : Intel(R) Atom(TM) CPU  N270   @ 1.16GHz
 Speed : 1.60 Ghz

Press DEL to run Setup
Press F11 for BBS POPUP
The MCH is operating with DDR2-533/CL4 in Single-Channel Mode
Initializing USB Controllers .. Done.
1016MB OK
USB Device(s): 2 Hubs
Auto-Detecting Pri Slave...ATAPI CDROM
Auto-Detecting Sec Slave...IDE Hard Disk
Pri Slave : DW-224E-A V.RA
            Ultra DMA Mode-2
Sec Slave : ST980817AM 3.AAB
            Ultra DMA Mode-5, S.M.A.R.T Capable and Status OK
Auto-detecting USB Mass Storage Devices ..
00 USB mass storage devices found and configured.
```

Figure 121: X945 - BIOS diagnostics screen

1.2.1 BIOS setup keys

The following keys are enabled during the POST:

Key	Function
ESC	The system RAM check can be skipped by pressing ESC.
Del	Enters the BIOS setup menu.
F12	Using the F12 key, you can boot from the network.
F11	Cues the boot menu. Lists all bootable devices that are connected to the system. With cursor ↑ and cursor ↓ and by pressing <ENTER>, select the device from which will be booted.
<Break>	Pressing the <pause> key stops the POST. Press any other key to resume the POST.

Table 167: X945 bios-relevant keys at POST

The following keys can be used after entering the BIOS setup:

Key	Function
F1	General help
Cursor ↑	Moves to the previous item.
Cursor ↓	Go to the next item.
Cursor ←	Moves to the previous item.
Cursor →	Go to the next item.
+ -	Changes the setting of the selected function.
Enter	Changes to the selected menu.
PageUp ↑	Change to the previous page.
PageDown ↓	Change to the previous page.
Pos 1	Jumps to the first BIOS menu item or object.
End	Jumps to the last BIOS menu item or object.
F2 / F3	The colors of the BIOS Setup are switched.
F7	Changes are reset.
F9	These settings are loaded for all BIOS configurations.
F10	Save and close.
Esc	Exits the submenu.

Table 168: X945 bios-relevant keys in the BIOS menu

The following sections explain the individual BIOS main menu items in detail.

BIOS setup menu item	Function	From page
Main	You can configure the ground configuration time and date in this menu.	272
Advanced	Advanced BIOS options such as cache areas, PnP, keyboard repeat rate, as well as settings specific to B&R integrated hardware, can be configured here.	273
Boot	The boot order can be set here.	305
Security	For setting up the system's security functions.	307
Power	Setup of various APM (Advanced Power Management) options.	310
Exit	To end the BIOS setup.	312

Table 169: X945 - Overview of BIOS menu items

1.3 Main

Immediately after the DEL button is pressed during startup, the main BIOS setup menu appears.

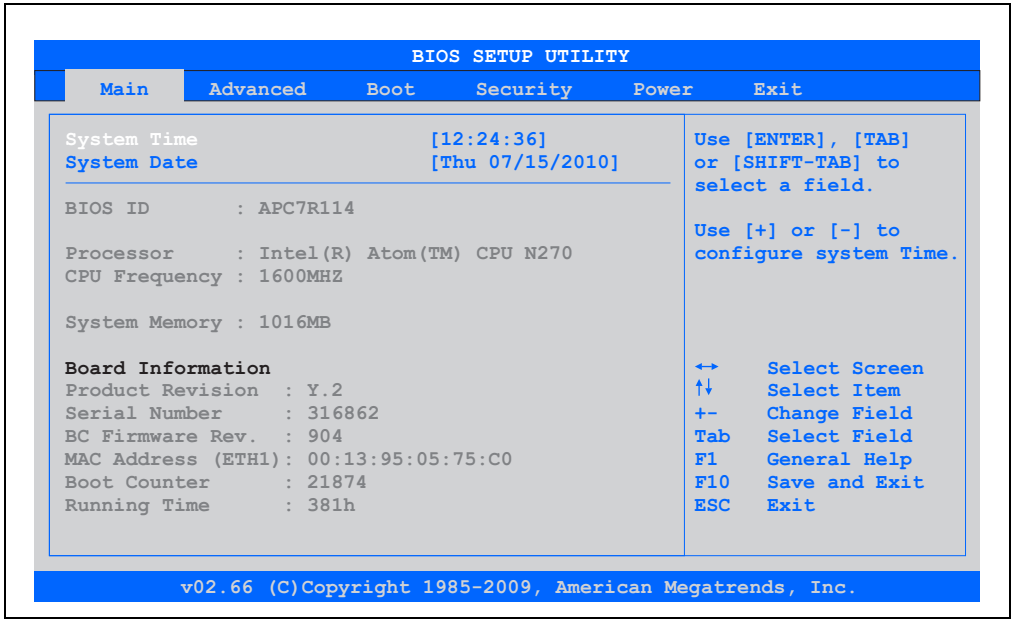


Figure 122: X945 BIOS Main Menu

BIOS setting	Meaning	Setting options	Effect
System Time	This is the current system time setting. The time is buffered by a battery (CMOS battery) after the system has been switched off.	Changes the System time	Set the system time in the format Hour:Minute:Second (hh:mm:ss).
System Date	This is the current system date setting. The time is buffered by a battery (CMOS battery) after the system has been switched off.	Changes the system date	Sets the system date in the format Month:Day:Year (mm:dd:yyyy).
BIOS ID	Displays the BIOS recognition.	None	-
Processor	Displays the processor type.	None	-
CPU Frequency	Displays the processor frequency.	None	-
System Memory	Displays the system memory size.	None	-
Product Revision	Displays the CPU board HW revision.	None	-
Serial number	Displays the CPU board serial number.	None	-
BC Firmware Rev.	Displays the CPU board controller firmware revision.	None	-
MAC Address (ETH1)	Displays the MAC addresses assigned for the ETH1 interface.	None	-

Table 170: X945 Main Menu setting options

BIOS setting	Meaning	Setting options	Effect
Boot Counter	Displays the boot counter - each restart increments the counter by one (max. 16777215).	None	-
Running Time	Displays the runtime in whole hours. (max. 65535).	None	-

Table 170: X945 Main Menu setting options (Forts.)

1.4 Advanced

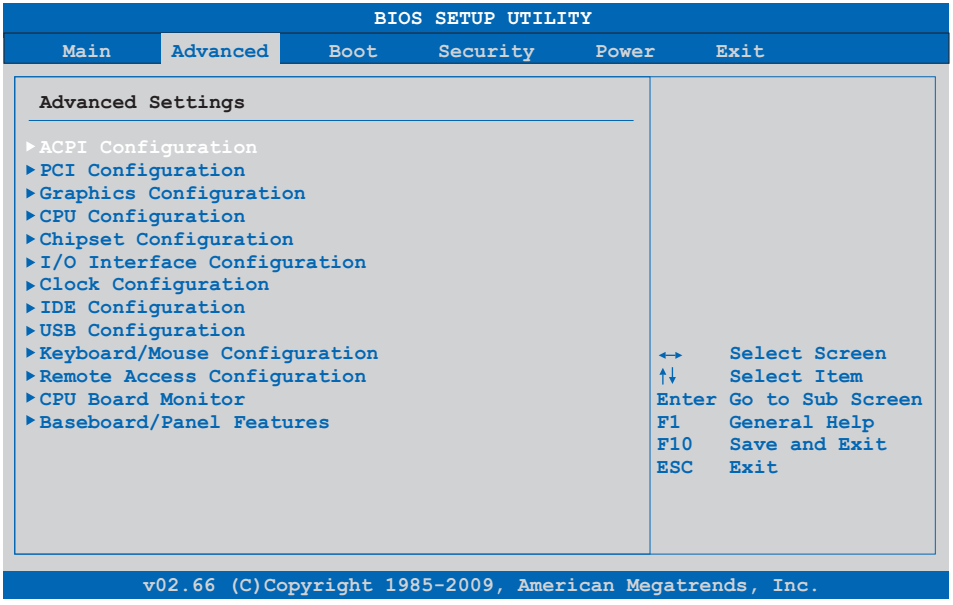


Figure 123: X945 Advanced Menu

BIOS setting	Meaning	Setting options	Effect
ACPI configuration	Configures the APCI devices.	Enter	Opens the submenu See "ACPI configuration", on page 274.
PCI Configuration	Configures PCI devices.	Enter	Opens the submenu See "PCI Configuration", on page 276.
Graphics configuration	Configures the graphics settings.	Enter	Opens the submenu See "Graphics configuration", on page 280.
CPU configuration	Configures the CPU settings.	Enter	Opens the submenu See "CPU configuration", on page 282.
Chipset configuration	Configures the chipset functions.	Enter	Opens the submenu See "Chipset configuration", on page 284.

Table 171: X945 Advanced Menu setting options

BIOS setting	Meaning	Setting options	Effect
I/O interface configuration	Configures the I/O devices.	Enter	Opens the submenu See "I/O interface configuration", on page 286.
Clock Configuration	Configures the clock settings.	Enter	Opens the submenu See "Clock Configuration", on page 287.
IDE Configuration	Configures the IDE functions.	Enter	Opens the submenu See "IDE Configuration", on page 288.
USB configuration	Configures the USB settings.	Enter	Opens the submenu See "USB configuration", on page 294.
Keyboard/mouse configuration	Configures the keyboard/mouse options.	Enter	Opens the submenu See "Keyboard/mouse configuration", on page 296.
Remote access configuration	Configures the remote access settings.	Enter	Opens the submenu See "Remote access configuration", on page 297.
CPU board monitor	Displays the current voltages and temperature of the processor in use.	Enter	Opens the submenu See "CPU board monitor", on page 299.
Main Board/Panel Features	Displays device specific information and setup of device specific values.	Enter	Opens the submenu See "Main Board/Panel Features", on page 300.

Table 171: X945 Advanced Menu setting options (Forts.)

1.4.1 ACPI configuration

```
BIOS SETUP UTILITY
Advanced

ACPI Settings                                  Enable / Disable
                                               ACPI support for
ACPI Aware O/S                    [Yes]        Operating System.

ACPI Version Features             [ACPI v2.0]  ENABLE: If OS
ACPI APIC support                 [Enabled]    supports ACPI.
Suspend mode                      [S1 (POS)]
USB Device Wakeup from S3/S4      [Disabled]   DISABLE: If OS
                                               does not support
Active Cooling Trip Point         [Disabled]   ACPI.
Passive Cooling Trip Point        [Disabled]
Critical Trip Point               [105°C]

                                               ←→    Select Screen
                                               ↑↓    Select Item
                                               +-    Change Option
                                               F1    General Help
                                               F10   Save and Exit
                                               ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 124: X945 Advanced ACPI configuration

BIOS setting	Meaning	Setting options	Effect
ACPI Aware O/S	This function determines if the operating system supports the ACPI function (Advanced Configuration and Power Interface).	Yes	The operating system supports ACPI.
		No	The operating system does not support ACPI.
ACPI Version Features	Option for setting the power option specifications to be supported. The ACPI functions must be supported by the drivers and operating systems being used.	ACPI v1.0	ACPI functions in accordance with v1.0
		ACPI v2.0	ACPI functions in accordance with v2.0
		ACPI v3.0	ACPI functions in accordance with v3.0
ACPI APIC support	This option controls the support of the advanced programmable interrupt controller in the processor.	Enabled	Enables this function.
		Disabled	Disables the function
Suspend mode	Selects the ACPI status to be used when Suspend Mode is enabled.	S1 (POS)	Sets S1 as Suspend mode. Only a few functions are disabled and are available again at the touch of a button
		S3 (STR)	Sets S3 as Suspend Mode. The current state of the operating system is written to the RAM, which is then supplied solely with power.
USB Device Wakeup from S3/S4	This options makes it possible for activity on a connected USB device to wake the system up from the S3/S4 standby mode.	Enabled	Enables this function.
		Disabled	Disables the function
Active Cooling Trip Point	With this function, an optional CPU fan above the operating system can be set to turn on when the CPU reaches the set temperature.	Disabled	Disables this function.
		50°C, 60°C, 70°C, 80°C, 90°C	Temperature setting for the active cooling trip point. Can be set in 10 degree increments.
Passive Cooling Trip Point	With this function, a temperature can be set at which the CPU automatically reduces its speed.	Disabled	Disables this function.
		50°C, 60°C, 70°C, 80°C, 90°C	Temperature setting for the passive cooling trip point. Can be set in 10 degree increments.
Critical Trip Point	With this function, a temperature can be set at which the operating system automatically shuts itself down.	80°C, 85°C, 90°C, 95°C, 100°C, 105°C, 110°C	Temperature setting for the critical trip point. Can be set in 5 degree increments.

Table 172: X945 Advanced ACPI configuration setting options

1.4.2 PCI Configuration

```
BIOS SETUP UTILITY
Advanced

Advanced PCI/PnP Settings

Plug & Play O/S                [Yes]
PCI Latency Timer              [64]
Allocate IRQ to PCI VGA        [Yes]
Allocate IRQ to SMBUS HC       [Yes]

▶ PCI IRQ Resource Exclusion

▶ PCI Interrupt Routing

NO: lets the BIOS configure all the devices in the system.
YES: lets the operating system configure Plug and Play (PnP) devices not required for boot if your system has a Plug and Play operating system.

←→    Select Screen
↑↓    Select Item
+-    Change Option
F1    General Help
F10   Save and Exit
ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 125: X945 Advanced PCI Configuration

BIOS setting	Meaning	Setting options	Effect
Plug & Play O/S	BIOS is informed if Plug & Play is capable on the operating system.	Yes	The operating system handles the distribution of resources.
		No	BIOS handles the distribution of resources.
PCI Latency Timer	This option controls how long (in PCI ticks) one PCI bus card can continue to use the master after another PCI card has requested access.	32, 64, 96, 128, 160, 192, 224, 248	Manually sets the value in PCI ticks.
Allocate IRQ to PCI VGA	This function is used to determine if an interrupt is assigned to the PCI VGA.	Yes	Automatic assignment of an interrupt.
		No	No assignment of an interrupt.
Allocate IRQ to SMBUS HC	Use this function to set whether or not the SM (System Management) bus controller is assigned a PCI interrupt.	Yes	Automatic assignment of a PCI interrupt.
		No	No assignment of an interrupt.
PCI IRQ Resource Exclusion	Configures the PCI IRQ resource settings for ISA Legacy devices.	Enter	Opens the submenu See "PCI IRQ Resource Exclusion", on page 277
PCI Interrupt Routing	Configures PCI interrupt routing	Enter	Opens the submenu See "PCI Interrupt Routing", on page 278

Table 173: X945 Advanced PCI configuration setting options

PCI IRQ Resource Exclusion

```
BIOS SETUP UTILITY
Advanced

PCI IRQ Resource Exclusion

IRQ3                    [Allocated]
IRQ4                    [Allocated]
IRQ5                    [Available]
IRQ6                    [Available]
IRQ7                    [Available]
IRQ9                    [Allocated]
IRQ10                   [Available]
IRQ11                   [Available]
IRQ12                   [Available]
IRQ14                   [Allocated]
IRQ15                   [Available]

Available: Specified IRQ is available to be used by PCI/PnP devices.
Reserved: Specified IRQ is reserved for use by Legacy ISA devices.

←→    Select Screen
↑↓    Select Item
+-    Change Option
F1    General Help
F10   Save and Exit
ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 126: X945 Advanced PCI IRQ Resource Exclusion

BIOS setting	Meaning	Setting options	Effect
IRQx	IRQ interrupt routing for Legacy ISA devices.	Allocated	Allocated by the system - cannot be used.
		Available	Available - can be used.
		Reserved	Reserved - cannot be used.

Table 174: X945 Advanced PCI IRQ Resource Exclusion setting options

PCI Interrupt Routing

```
BIOS SETUP UTILITY
Advanced

PCI Interrupt Routing                          Select fixed IRQ or
                                               set AUTO to let the
PIRQ A (VGA)                    [Auto]         BIOS and OS route an
PIRQ B (AC97,INTD)              [Auto]         IRQ to this line.
PIRQ C (PATA,INTC)              [Auto]
PIRQ D (SATA,UHCI1,SMB)         [Auto]         Make sure that the
PIRQ E (ETH1)                   [Auto]         selected IRQ is not
PIRQ F (INTA,ETH2)              [Auto]         assigned to legacy IO.
PIRQ G (INTB)                   [5]
PIRQ H (UHCI0,EHCI)             [6]

1 st Exclusive PCI              [None]
2 nd Exclusive PCI              [None]

INTn   : External PCI Bus INTn Line            ↔    Select Screen
PATA   : Parallel ATA in Enhanced/Native Mode  ↑↓    Select Item
SATA   : Serial ATA in Enhanced/Native Mode    +-    Change Option
SMB    : System Management Bus Controller      F1    General Help
                                               F10   Save and Exit
                                               ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 127: X945 Advanced PCI Interrupt Routing

BIOS setting	Meaning	Setting options	Effect
PIRQ A (VGA)	Option for setting the PIRQ A.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment
PIRQ B (AC97, INTD)	Option for setting the PIRQ B.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ C (PATA,INTC)	Option for setting the PIRQ C.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ D (SATA,UHCI1,SMB)	Option for setting the PIRQ D.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ E (ETH1)	Option for setting the PIRQ E.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.

Table 175: X945 Advanced PCI Interrupt Routing setting options

BIOS setting	Meaning	Setting options	Effect
PIRQ F (INTA, ETH2)	Option for setting the PIRQ F.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ G (INTB)	Option for setting the PIRQ G.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ H (UHCI0, EHCI)	Option for setting the PIRQ H.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
1st Exclusive PCI	With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing). **Information:** **Is only displayed if a PIRQ is manually set (e.g. 5).**	None	No interrupt is assigned.
		x	Assigns the PIRQ as 1st exclusive PCI IRQ.
2nd Exclusive PCI	With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing). **Information:** **Only displayed when two PIRQs are set manually.**	None	No interrupt is assigned.
		x	Assigns the PIRQ as 2nd exclusive PCI IRQ.
3rd Exclusive PCI	With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing). **Information:** **Only displayed in connection with an APC620e and if three PIRQs are set manually.**	None	No interrupt is assigned.
		x	Assigns the PIRQ as 3rd exclusive PCI IRQ.

Table 175: X945 Advanced PCI Interrupt Routing setting options (Forts.)

1.4.3 Graphics configuration

```
BIOS SETUP UTILITY
Advanced

Graphics Configuration                                  Select primary video
                                                        adapter to be used
Primary Video Device              [PCI / Int. VGA]      during boot up.

Internal Graphics Mode Select     [Enabled, 8MB]
DVMT Mode Select                  [DVMT Mode]
  DVMT/FIXED Memory               [128MB]

Boot Display Device               [Auto]
Always Try Auto Panel Detect      [No]
Local Flat Panel Type             [Auto]

Local Flat Panel Scaling          [Expand Text & Grap]  ←→    Select Screen
Display Mode Persistence          [Enabled]             ↑↓    Select Item
                                                        +-    Change Option
                                                        F1    General Help
                                                        F10   Save and Exit
                                                        ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 128: X945 Advanced Graphics configuration

BIOS setting	Meaning	Setting options	Effect
Primary Video Device	Option for selecting the primary video device.	Internal VGA	The internal graphics chip on the CPU board is used as video device (monitor / panel connection).
		PCI / Int. VGA	The graphics chip of a connected graphics card is used as video device.
Internal Graphics Mode Select	Option for setting the memory size that can be used for the internal graphics controller.	Disabled	No reservation - Disables the graphics controller.
		Enabled, 1MB	1MB main memory provided.
		Enabled, 8MB	8MB main memory provided.
DVMT Mode Select	Option for determining the DVMT mode (Dynamic Video Memory Technology) of the DVMT graphics driver.	Fixed Mode	A fixed amount of memory is allocated to the graphics chip, which is no longer available to the PC.
		DVMT Mode	Memory consumption is controlled dynamically by the DVMT graphics driver. Only the amount of memory that is required is used.
		Combo Mode	The DVMT graphics driver reserves at least 64MB, but can use up to 224MB if necessary.

Table 176: X945 Advanced Graphics configuration setting options

BIOS setting	Meaning	Setting options	Effect
DVMT/FIXED Memory	Option for setting the amount of memory used for the DVMT mode.	64MB	64MB of main memory can be used.
		128MB	128MB of main memory can be used.
		Maximum DVMT	The remaining available main memory can be used.
Boot Display Device	Determines which video channel should be enabled for a video device during the boot procedure.	Auto	Automatic selection.
		CRT only	Only use the CRT (Cathode Ray Tube) channel.
		LFP only	Only use the LFP (Local Flat Panel) channel.
		CRT + LFP	Use CRT + LFP channel.
Always Try Auto Panel Detect	This option first searches for EDID data in an external EEPROM to configure the LFP. If no EDID data is found, then the data selected under "Local Flat Panel Type" is used.	No	Disables this function.
		Yes	Enables this function.
Local Flat Panel Type	This option can be used to set a pre-defined profile for the LVDS channel.	Auto	Automatic detection and setting using the EDID data.
		VGA 1x18 (002h)	640 x 480
		VGA 1x18 (013h)	640 x 480
		SVGA 1x18 (01Ah)	800 x 600
		XGA 1x18 (006h)	1024 x 768
		XGA 2x18 (007h)	1024 x 768
		XGA 1x24 (008h)	1024 x 768
		XGA 2x24 (012h)	1024 x 768
		SXGA 2x24 (00Ah)	1280 x 1024
		SXGA 2x24 (018h)	1280 x 1024
		UXGA 2x24 (00Ch)	1600 x 1200
		Customized EDID 1	User-defined profile
		Customized EDID 2	User-defined profile
		Customized EDID 3	User-defined profile
Local flat panel scaling	Determines the screen content should be output according to the defined Local Flat Panel Type.	Centering	The screen content is output centered on the display.
		Expand Text	The text is stretched across the entire surface of the display.
		Expand Graphics	The graphics are stretched across the entire surface of the display.
		Expand Text & Graphics	Text and graphics are stretched across the entire surface of the display.
Display Mode Persistence	When enabled, the operating system graphics driver attempts to restore the most recent configuration.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 176: X945 Advanced Graphics configuration setting options (Forts.)

1.4.4 CPU configuration

```
BIOS SETUP UTILITY
Advanced

Configure advanced CPU settings                  Select the revsion
Module Version:3F.12                             of the multi processor
                                                 support interface that
Manufacturer:Intel                               should be offered by
Intel(R) Atom(TM) CPU N270  @ 1.60 GHz           the BIOS.
Frequency    :1.60GHz
FSB Speed    :532MHz
Cache L1     :24 KB
Cache L2     :512 KB
Ratio Actual Value:12

MPS Revision                  [1.4]

Max CPUID Value Limit         [Disabled]         ←→    Select Screen
Execute-Disable Bit Capability[Enabled]          ↑↓    Select Item
Hyper Threading Technology    [Enabled]          +-    Change Option
Intel(R) SpeedStep(tm) tech   [Enabled]          F1    General Help
Boot CPU Speed On AC          [Maximum]          F10   Save and Exit
Intel(R) C-STATE tech         [Enabled]          ESC   Exit
Enhanced C-States             [Enabled]

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 129: X945 Advanced CPU Configuration

BIOS setting	Meaning	Setting options	Effect
Module Version	BIOS Module Version	None	-
Manufacturer	Manufacturer's display.	None	-
Frequency	Processor speed display	None	-
FSB speed	Cycle display of all addressed components. (Front side bus)	None	-
L1 cache	Displays first level cache memory area.	None	-
L2 cache	Displays first level cache memory area.	None	-
Ratio Actual Value	Displays the Ratio Actual Value.	None	-
MPS Revision	This option supports the use of multiple CPUs (MPS=multi-processor system).	1.1	Sets MPS support Revision 1.1
		1.4	Sets MPS support Revision 1.4
Max CPUID value limit	Option for limiting the CPUID input value. This could be necessary for older operating systems.	Enabled	The processor limits the maximum CPUID input value to 03h if necessary when the the processor supports a higher value.
		Disabled	The processor returns the current maximum value upon request of the CPUID input value.

Table 177: X945 Advanced CPU Configuration setting options

BIOS setting	Meaning	Setting options	Effect
Execute-Disable Bit Capability	Option for enabling or disabling hardware support for prevention of data execution.	Enabled	Enables this function.
		Disabled	Disables this function.
Hyper Threading Technology	Hyper threading technology enables a single physical processor to appear as a multitude of logical processors. This technology allows the operating system to get more out of the internal processor resources, which in turns leads to increased performance. **Information:** **This setting should only be disabled when using an operating system older than Windows XP.**	Enabled	Enables this function.
		Disabled	Disables this function.
Intel (R) SpeedStep (tm) tech	Option for controlling the Intel(R) SpeedStep(TM) technology. The processor clock speed is increased or decreased according to the amount of calculations that must be made. As a result, the power consumption depends largely on the processor load.	Enabled	SpeedStep technology enabled.
		Disabled	Disables SpeedStep technology.
Boot CPU Speed On AC	This setting is used to define the maximum or minimum CPU speed during the boot procedure. However, the operating system can change the speed during operation.	Minimum	CPU starts with minimum speed during the boot procedure.
		Maximum	CPU starts with maximum speed during the boot procedure.
Intel(R) C-STATE tech	This setting allows the operating system to set processor clock rates on its own, thereby saving energy.	Enabled	Enables this function. The processors are run at different frequencies, thereby saving energy.
		Disabled	Disables this function. Both processors are run at the same frequency.
Enhanced C-States[1)]	This setting allows the operating system to set processor clock rates on its own, thereby saving energy.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 177: X945 Advanced CPU Configuration setting options

1) This setting is only shown if *Intel(R) C-State Tech.* is set to *Enabled*.

1.4.5 Chipset configuration

```
BIOS SETUP UTILITY
Advanced

Advanced Chipset Settings                    Options

DRAM Frequency                [Auto]         Auto
DRAM Refresh Rate             [Auto]         400 MHz
Memory Hole                   [Disabled]     533 MHz
DIMM Thermal Control          [Disabled]
DT in SPD                     [Disabled]
TS on DIMM                    [Disabled]

High Precision Event Timer    [Disabled]
IOAPIC                        [Enabled]
APIC ACPI SCI IRQ             [Disabled]     ←→   Select Screen
C4 On C3                      [Disabled]     ↑↓   Select Item
                                             +-   Change Option
                                             F1   General Help
                                             F10  Save and Exit
                                             ESC  Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 130: X945 Advanced Chipset Configuration

BIOS setting	Meaning	Setting options	Effect
DRAM Frequency	Option for setting the RAM frequency.	Auto	Frequency set automatically by the BIOS.
		400, 533 MHz	Desired clock frequency set manually.
DRAM Refresh Rate	Option for setting the DRAM refresh rate.	Auto	DRAM Refresh is read from the SPD data of the DRAM module.
		7.8 µs	Manual setting for the DRAM refresh rate.
		3.9 µs	Manual setting for the DRAM refresh rate.
Memory Hole	Option for ISA cards with frame buffer. Not relevant for an APC620.	Disabled	Disables this function.
		15MB-16MB	This address area is reserved.
DIMM Thermal Control	Option for setting the maximum surface temperature of the DIMM module. The module is cooled by limiting the memory bandwidth if the defined surface temperature is reached.	Disabled	Surface temperature not limited.
		40°C, 50°C, 60°C, 70°C, 80°C, 85°C, 90°C	Temperature limit value for the limitation.
DT in SPD	Option to determine whether the GMCH (Graphics and Memory Controller Hub) supports DT (Delta Temperature) in the SPD (Serial Presence Detect) Management Algorithm of the DIMM module.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 178: X945 Advanced Chipset setting options

BIOS setting	Meaning	Setting options	Effect
TS on DIMM	Option to determine whether the GMCH (Graphics and Memory Controller Hub) supports TS (Thermal Sensor) in the Thermal Management Algorithm of the DIMM module.	Disabled	Disables this function.
		Enabled	Enables this function.
High Precision Event Timer	The HPET is a timer inside the PC. It is able to trigger an interrupt with a high degree of accuracy, which allows other programs to better synchronize a variety of applications.	Disabled	Disables this function.
		Enabled	Enables this function. This function is recommended for multimedia applications.
IOAPIC	This option is used to activate or deactivate the APIC (Advanced Programmable Interrupt Controller). **Information:** **The IRQ resources available to the system are expanded when the APIC mode is enabled.**	Disabled	Disables this function.
		Enabled	The IRQ resources available to the system are expanded when the APIC mode is enabled.
APIC ACPI SCI IRQ	This option is used to modify the SCI IRQ when in APIC (Advanced Programmable Interrupt Controller) mode.	Disabled	IRQ9 is used for SCI.
		Enabled	IRQ20 is used for SCI.
C4 On C3	Fine-tunes the power saving function on an ACPI operating system.	Disabled	Disables this function.
		Enabled	Processor is needed in C4 if the operating system is initiated in a C3 state.

Table 178: X945 Advanced Chipset setting options

1.4.6 I/O interface configuration

```
BIOS SETUP UTILITY
Advanced

I/O Interface Configuration                    Options

Onboard AC'97 Audio                [Enabled]   Enabled
OnBoard LAN (ETH1)                 [Enabled]   Disabled

Serial Port1 Configuration         [3F8/IRQ4]
Serial Port1 Configuration         [2F8/IRQ3]
  Serial Port2 Mode                [Normal]
Parallel Port Adress               [378]

                                               ←→   Select Screen
                                               ↑↓   Select Item
                                               +-   Change Option
                                               F1   General Help
                                               F10  Save and Exit
                                               ESC  Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 131: X945 Advanced I/O Interface Configuration

BIOS setting	Meaning	Setting options	Effect
Onboard AC'97 Audio	For turning the AC97 Sound on and off.	Enabled	Enables AC'97 sound.
		Disabled	Disables AC'97 sound.
Onboard LAN (ETH1)	For turning the on-board LAN controller (for ETH1) on and off.	Enabled	Activates the LAN controller or the ETH1 interface.
		Disabled	Deactivates the LAN controller or the ETH1 interface.
Serial port 1 configuration	For the configuration of serial port 1 (COM1).	Disabled	Port 1 deactivated.
		3F8/IRQ4	Assignment of the base I/O address and the interrupt.
		3E8 / IRQ4	Assignment of the base I/O address and the interrupt.
Serial port 2 configuration	For the configuration of serial port 2 (COM1).	Disabled	Port 1 deactivated.
		2F8/IRQ3	Assignment of the base I/O address and the interrupt.
		2E8 / IRQ3	Assignment of the base I/O address and the interrupt.

Table 179: X945 Advanced I/O Interface Configuration setting options

BIOS setting	Meaning	Setting options	Effect
Serial port 2 mode	This option is for setting the serial port B as either a standard interface or as an infrared interface (not currently supported).	Normal	Standard interface.
		IrDA	IrDA interface (compliant serial infrared port).
		ASK IR	Interface for IR devices (amplitude shift keyed infrared port).
Parallel port address	The address of the parallel interface can be defined with this option. **Information:** **Address is automatically set, even if the function is disabled.**	Disabled	Deactivates the port.
		378, 278, 3BC	Manual assignment of the port address.

Table 179: X945 Advanced I/O Interface Configuration setting options

1.4.7 Clock Configuration

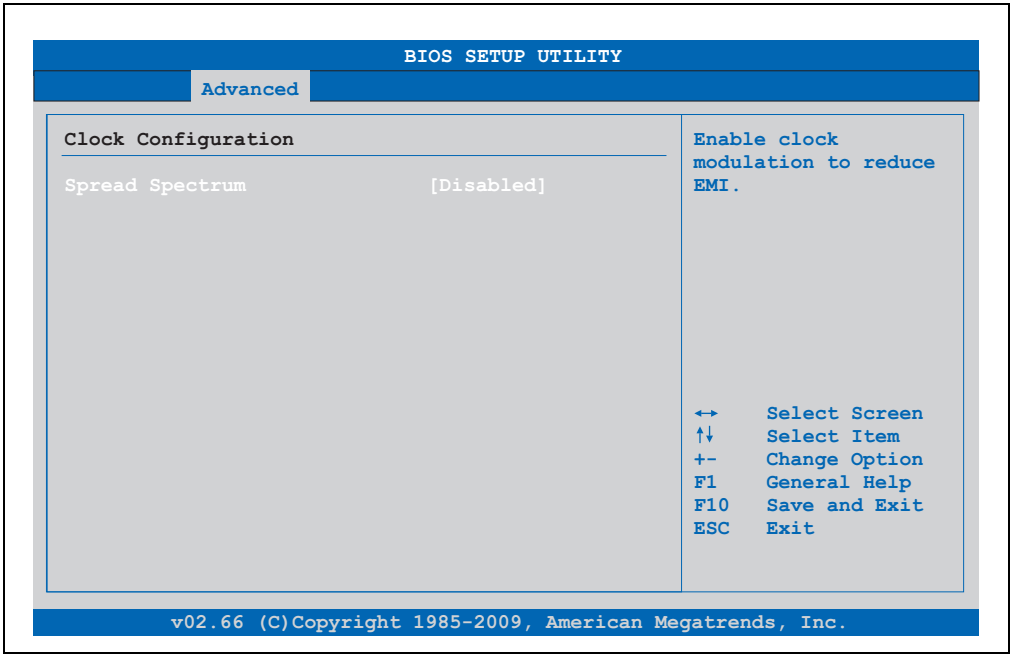


Figure 132: X945 Advanced Clock Configuration

BIOS setting	Meaning	Setting options	Effect
Spread spectrum	With this option, the cycle frequency can be modulated by reducing electromagnetic disturbances.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 180: X945 Advanced Clock Configuration setting options

1.4.8 IDE Configuration

```
BIOS SETUP UTILITY
Advanced

IDE Configuration                                  Options

ATA/IDE Configuration          [Compatible]        Disabled
IDE Channel Control            [PATA only]         Compatible
                                                   Enhanced

▶ Primary IDE Master             : [Not Detected]
▶ Primary IDE Slave              : [Hard Disk]

Hard Disk Write Protect        [Disabled]
PATA Detect Time Out (Sec)     [35]                ←→    Select Screen
SATA Detect Time Out (Sec)     [3]                 ↑↓    Select Item
ATA(PI) 80Pin Cable Detection  [Host & Device]     +-    Change Option
                                                   F1    General Help
                                                   F10   Save and Exit
                                                   ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 133: X945 Advanced IDE Configuration

BIOS setting	Meaning	Setting options	Effect
ATA/IDE Configuration	Option for configuring the integrated PATA and SATA controller.	Disabled	Both controllers disabled.
		Compatible	Both controllers run in Legacy or Compatible Mode.
		Enhanced	Both controllers run in Enhanced or Native Mode.
IDE Channel Control[1)]	Option for configuring the IDE channels in "Compatible" mode.	SATA only	Only use SATA drives.
		SATA Pri, PATA Sec	SATA drives are address primarily and PATA drive secondarily.
		PATA only[2)]	Only use PATA drives.
Primary IDE Master	The drive in the system that is connected to the IDE primary master port is configured here.	Enter	Opens the submenu See "Primary IDE Master", on page 290
Primary IDE slave	The drive in the system that is connected to the IDE primary slave port is configured here.	Enter	Opens the submenu See "Primary IDE slave", on page 292
Secondary IDE Master	The drive in the system that is connected to the IDE secondary master port is configured here.	Enter	Opens the submenu

Table 181: X945 Advanced IDE Configuration setting options

BIOS setting	Meaning	Setting options	Effect
Secondary IDE Slave	The drive in the system that is connected to the IDE secondary slave port is configured here.	Enter	Opens the submenu
Third IDE Master[3)]	The drive in the system that is connected to the IDE third master port is configured here.	Enter	Opens the submenu
Third IDE Slave[4)]	The drive in the system that is connected to the IDE third slave port is configured here.	Enter	Opens the submenu
Hard disk write protect	Write protection for the hard drive can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
PATA Detect Time Out (Sec)	Configuring the time overrun limit value for the PATA device identification.	0, 5, 10, 15, 20, 25, 30, 35	Value set manually.
SATA Detect Time Out (Sec)	Configuring the time overrun limit value for the SATA device identification.	0, 1, 2, 3, 5, 10, 15, 30	Value set manually.
ATA(PI) 80Pin Cable Detection	Detects whether an 80 pin cable is connected to the drive, the controller or to both. **Information:** **This option is not available on the APC620 CPU board. Therefore this setting is not relevant.**	Host & device	Using both IDE controllers (motherboard, disk drive).
		Host	IDE controller motherboard used.
		Device	IDE disk drive controller used.

Table 181: X945 Advanced IDE Configuration setting options

1) These settings are only possible if *ATA/IDE Configuration* is set to *Compatible* or *Enhanced*.

2) If this setting is enabled and *ATA/IDE Configuration* is set to *Compatible*, then only the submenus *Primary IDE Master* and *Primary IDE Slave* will be shown.

3) This submenu is only open if *ATA/IDE Configuration* is set to *Enhanced*.

4) This submenu is only open if *ATA/IDE Configuration* is set to *Enhanced*.

Primary IDE Master

```
BIOS SETUP UTILITY
Advanced

Primary IDE Master                          Select the type
                                            of device connected
Device      :Not Detected                   to the system.

Type                              [Auto]
LBA/Large Mode                    [Auto]
Block (Multi-Sector Transfer)     [Auto]
PIO Mode                          [Auto]
DMA Mode                          [Auto]
S.M.A.R.T.                        [Auto]
32Bit Data Transfer               [Enabled]

                                            ←→    Select Screen
                                            ↑↓    Select Item
                                            +-    Change Option
                                            F1    General Help
                                            F10   Save and Exit
                                            ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 134: X945 Primary IDE Master

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the primary master is configured here.	Not installed	No drive installed.
		Auto	Automatic recognition of the drive and setup of appropriate values.
		CD/DVD	CD -/ DVD drive.
		ARMD	ARMD - drive (zip drive)
LBA/Large Mode	This option activates the logical block addressing / large mode for IDE.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
Block (Multi-Sector Transfer)	This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.

Table 182: X945 Primary IDE Master setting options

BIOS setting	Meaning	Setting options	Effect
PIO Mode	The PIO mode determines the data rate of the hard drive. **Information:** **This option is not available on the APC620. Therefore this setting is not relevant.**	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
DMA Mode	The data transfer rate to and from the primary master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Disabled	Disables this function.
		Enabled	Enables this function.
32 Bit Data Transfer	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 182: X945 Primary IDE Master setting options (Forts.)

Primary IDE slave

```
BIOS SETUP UTILITY
Advanced

Primary IDE Slave                                  Select the type
                                                   of device connected
Device        :Not Detected                        to the system.

Type                                [Auto]
LBA/Large Mode                      [Auto]
Block (Multi-Sector Transfer)       [Auto]
PIO Mode                            [Auto]
DMA Mode                            [Auto]
S.M.A.R.T.                          [Auto]
32Bit Data Transfer                 [Enabled]

                                    ←→    Select Screen
                                    ↑↓    Select Item
                                    +-    Change Option
                                    F1    General Help
                                    F10   Save and Exit
                                    ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 135: X945 Primary IDE Slave

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the secondary slave is configured here.	Not installed	No drive installed.
		Auto	Automatic recognition of the drive and setup of appropriate values.
		CD/DVD	CD -/ DVD drive.
		ARMD	ARMD - drive (zip drive)
LBA/Large Mode	This option activates the logical block addressing / large mode for IDE.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
Block (Multi-Sector Transfer)	This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.

Table 183: X945 Primary IDE Slave setting options

BIOS setting	Meaning	Setting options	Effect
PIO Mode	The PIO mode determines the data rate of the hard drive. **Information:** **This option is not available on the APC620. Therefore this setting is not relevant.**	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
DMA Mode	The data transfer rate to and from the secondary slave drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Disabled	Disables this function.
		Enabled	Enables this function.
32 Bit Data Transfer	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 183: X945 Primary IDE Slave setting options (Forts.)

1.4.9 USB configuration

```
BIOS SETUP UTILITY
Advanced

USB Configuration                                  Options

USB Devices Enabled  :                             Disabled
  1 Keyboard, 1 Hub                                2 USB Ports
                                                   4 USB Ports
USB Functions                  [4 USB Ports]       6 USB Ports
USB 2.0 Controller             [Enabled]

Legacy USB Support             [Enabled]
USB Legacy POST-Always         [Enabled]
USB Keyboard Legacy Support    [Enabled]
USB Mouse Legacy Support       [Disabled]
USB Storage Device Support     [Enabled]          ←→    Select Screen
Port 64/60 Emulation           [Disabled]         ↑↓    Select Item
USB 2.0 Controller Mode        [HiSpeed]          +-    Change Option
BIOS EHCI Hand-Off             [Disabled]         F1    General Help
USB Beep Message               [Enabled]          F10   Save and Exit
USB Stick Default Emulation    [Hard Disk]        ESC   Exit
USB Mass Storage Reset Delay   [20 Sec]

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 136: X945 Advanced USB Configuration

BIOS setting	Meaning	Setting options	Effect
USB Function	USB ports can be enabled/disabled here. The USB numbers (e.g. USB1, USB3, etc.) are printed on the APC620 housing).	Disabled	Disables the USB port.
		2 USB Ports	USB1, USB3 are enabled.
		4 USB Ports	USB1, USB2, USB3, USB4 are enabled.
		6 USB Ports	USB1, USB2, USB3, USB4, USB5 are enabled.
		8 USB Ports	USB1, USB2, USB3, USB4, USB5, USB are enabled on an AP via SDL.
USB 2.0 Controller	Option for enabling or disabling USB 2.0 mode.	Enabled	All USB ports run in USB 2.0 mode.
		Disabled	All USB ports run in USB 1.1 mode.
Legacy USB Support	Legacy USB support can be enabled/disabled here. USB ports do not function during startup. USB is supported again after the operating system has started. A USB keyboard is still recognized during the POST.	Disabled	Disables this function.
		Enabled	Enables this function.
		Auto	Automatic enabling.
USB Legacy POST-Always	Option to enable Legacy USB Support during the POST (Power On Self Test) the same as the Legacy USB Support setting.	Enabled	The BIOS Setup can be called up during the POST using a USB keyboard.
		Disabled	Disables this function.

Table 184: X945 Advanced USB Configuration setting options

BIOS setting	Meaning	Setting options	Effect
USB Keyboard Legacy Support	USB keyboard support can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
USB Mouse Legacy Support	USB mouse support can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
USB Storage Device Support	USB storage device support can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
Port 64/60 Emulation	Port 64/60 emulation can be enabled/disabled here.	Disabled	USB keyboard functions in all systems excluding Windows NT.
		Enabled	USB keyboard functions in Windows NT.
USB 2.0 Controller Mode	Settings can be made for the USB controller.	Full Speed	12 MBps
		Hi Speed	480 MBps
BIOS EHCI Hand-Off	The support for the operating system can be set up without the fully automatic EHCI function.	Disabled	Disables the function
		Enabled	Enables this function.
USB Beep Message	Option for outputting a tone each time a USB device is detected by the BIOS during the POST.	Disabled	Disables this function.
		Enabled	Enables this function.
USB Stick Default Emulation	You can set how the USB device is to be used.	Auto	USB devices with fewer than 530MB of memory are simulated as floppy disk drives and devices with larger capacities are simulated as hard drives.
		Hard disk	An HDD-formatted drive can be used as an FDD (e.g. zip drive) for starting the system.
USB Mass Storage Reset Delay	The waiting time that the USB device POST requires after the device start command can be set. **Information:** **The message "No USB mass storage device detected" is displayed if no USB memory device has been installed.**	10 Sec, 20 Sec, 30 Sec, 40 Sec	Value set manually.

Table 184: X945 Advanced USB Configuration setting options (Forts.)

1.4.10 Keyboard/mouse configuration

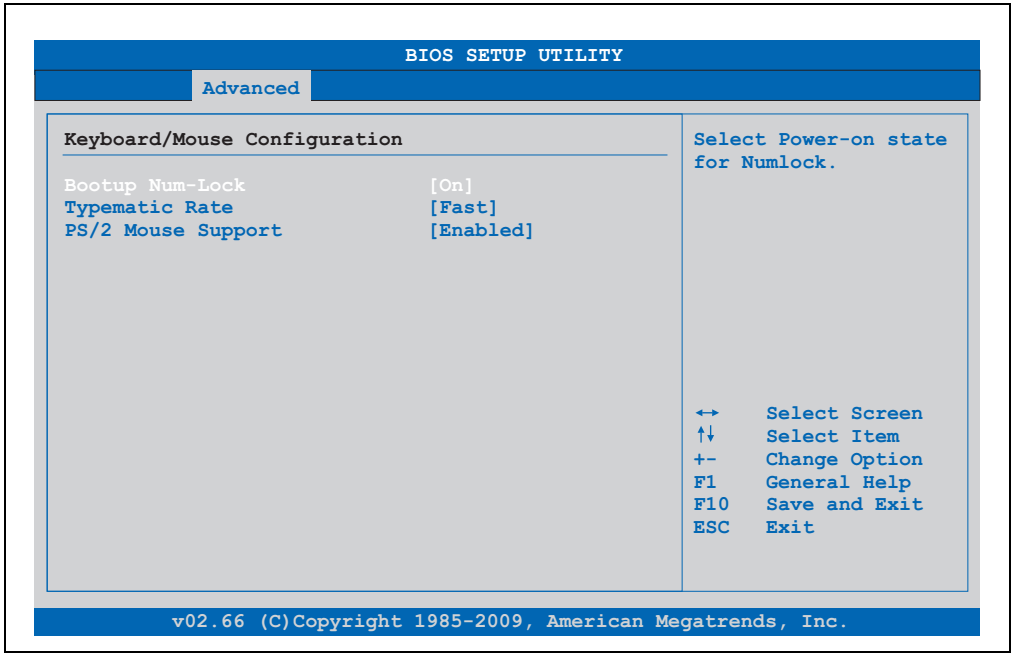


Figure 137: X945 Advanced Keyboard/Mouse Configuration

BIOS setting	Meaning	Setting options	Effect
Boot-up Num-lock	This option sets the status of the numeric keypad when the the system is booted.	Off	Only the cursor functions of the numerical keypad are enabled.
		On	Numeric keypad is enabled.
Typematic rate	The key repeat function is set here.	Slow	Slow key repeat.
		Fast	Fast key repeat.
PS/2 mouse support	Sets whether the PS/2 mouse port should be activated.	Disabled	Disables this function.
		Enabled	Enables this function.
		Auto	Automatic activation of the function if PS/2 mouse port is supported.

Table 185: X945 Advanced Keyboard/Mouse Configuration setting options

1.4.11 Remote access configuration

```
                    BIOS SETUP UTILITY
                    Advanced

Configure Remote Access type and parameters        Select Remote Access
                                                   type.
Remote Access                  [Enabled]

Serial Port number             [COM1]
     Base Address, IRQ         [3F8h, 4]
Serial Port Mode               [115200 8,n,1]
Flow Control                   [None]
Redirection After BIOS POST    [Always]
Terminal Type                  [ANSI]
VT-UTF8 Combo Key Support      [Enabled]
Sredir Memory Display Delay    [No Delay]

Serial Port BIOS Update        [Disabled]          ←→    Select Screen
                                                   ↑↓    Select Item
                                                   +-    Change Option
                                                   F1    General Help
                                                   F10   Save and Exit
                                                   ESC   Exit

        v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 138: X945 Advanced Remote Access Configuration

BIOS setting	Meaning	Setting options	Effect
Remote access	The remote access function can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
Serial port number	The serial interface can be set using this option, as long as disabled is not entered in the *remote access* field.	COM1	Enables the COM1 interface as remote access interface.
		COM2	Enables the COM2 interface as remote access interface.
Base address, IRQ	Serial connection display for the logical address and interrupt, as long as disabled is not entered in the *remote access* field.	None	-
Serial port mode	The serial interface transfer rate is defined here, as long as disabled is not entered in the *remote access* field.	115200 8,n,1 57600 8,n,1 38400 8,n,1 19200 8,n,1 09600 8,n,1	Value set manually.
Flow control	This setting determines how the transfer is controlled via the interface. **Information:** **The setting must be the same on the terminal and the server.**	None	The interface is operated without transfer control.
		Hardware	The interface transfer control is carried out through hardware. This mode must be supported by a cable.
		Software	The interface transfer control is carried out through software.

Table 186: X945 Advanced Remote Access Configuration setting options

BIOS setting	Meaning	Setting options	Effect
Redirection after BIOS POST	The redirection after start up can be set here, as long as disabled is not entered in the *remote access* field.	Disabled	The redirection is switched off after start up.
		Boot loader	Redirection is enabled during system start up and charging.
		Always	Redirection is always enabled.
Terminal type	The type of connection can be chosen here, as long as disabled is not entered in the *remote access* field.	ANSI, VT100, VT-UTF8	Manual configuration of the connection type.
VT-UTF8 Combo Key Support	With this option, the VT-UTF8 Combo Key Support for the ANSI and VT100 connections can be enabled, as long as disabled is not entered in the *remote access* field.	Disabled	Disables this function.
		Enabled	Enables this function.
Sredir Memory Display Delay	The memory output delay can be set using this option, as long as disabled is not entered in the *remote access* field (Sredir -> serial redirection).	No delay	No delay.
		Delay 1 sec, Delay 2 sec, Delay 4 sec	Value set manually.
Serial port BIOS update	During system start up, the update is loaded via the serial interface in the processor. **Information:** **If this option is disabled, the boot time is reduced.**	Disabled	Disables this function.
		Enabled	Enables this function.

Table 186: X945 Advanced Remote Access Configuration setting options (Forts.)

1.4.12 CPU board monitor

Information:

The displayed voltage values (e.g. core voltage, battery voltage) on this BIOS Setup page represent uncalibrated information values. These cannot be used to draw any conclusions about any hardware alarms or error conditions. The hardware components used have automatic diagnostics functions that can be applied in the event of error.

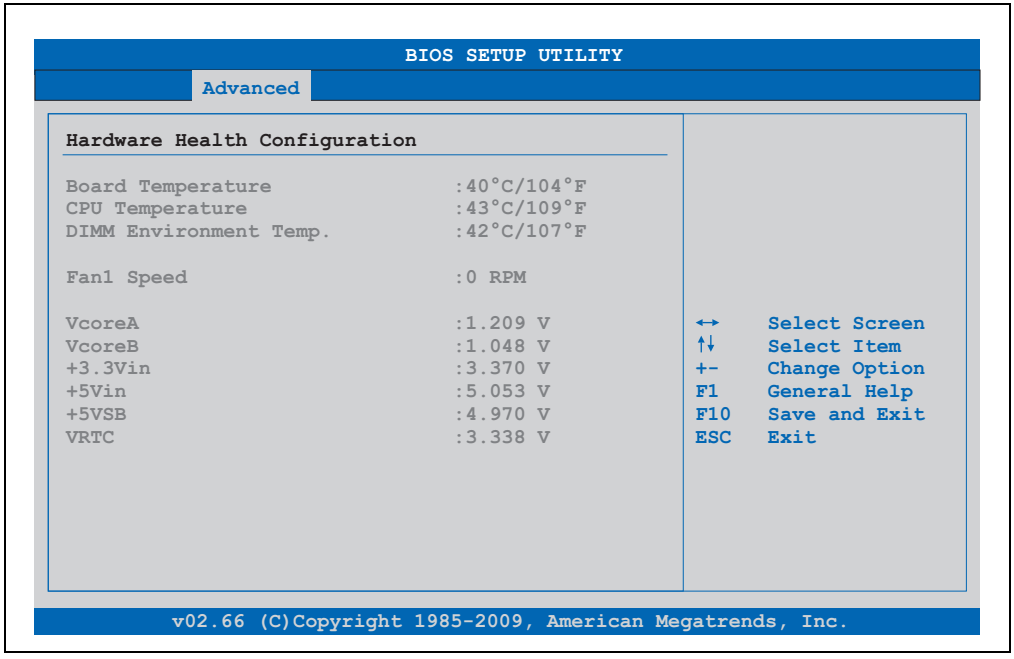


Figure 139: X945 Advanced CPU board monitor

BIOS setting	Meaning	Setting options	Effect
Board temperature	Displays the board temperature in degrees Celsius and Fahrenheit.	None	-
CPU temperature	Displays the processor's temperature (in degrees Celsius and Fahrenheit).	None	-
DIMM Environment Temp.	Displays the temperature of the DRAM module.	None	-
Fan1 Speed	Displays the rotating speed of the processor fan.	None	-
VcoreA	Displays the processor's core voltage A in volts.	None	-

Table 187: X945 Advanced Remote Access Configuration setting options

BIOS setting	Meaning	Setting options	Effect
VcoreB	Displays the DDR's core voltage B in volts.	None	-
+3.3Vin	Displays the current voltage of the 3.3 volt supply.	None	-
+5Vin	Displays the current voltage of the 5 volt supply.	None	-
+5VSB	Displays the current level of the jumper.	None	-
VRTC	Displays the battery voltage (in volts).	None	-

Table 187: X945 Advanced Remote Access Configuration setting options (Forts.)

1.4.13 Main Board/Panel Features

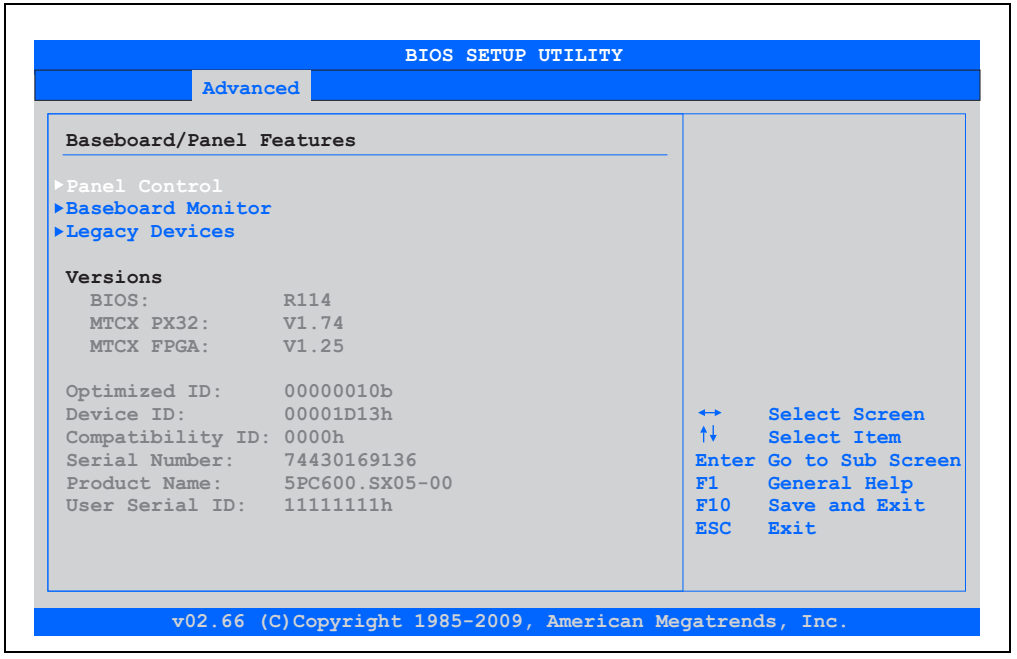


Figure 140: X945 Advanced Baseboard/Panel Features

BIOS setting	Meaning	Setting options	Effect
Panel control	For special setup of connected panels (display units).	Enter	Opens the submenu See "Panel control", on page 302
Baseboard monitor	Display of various temperatures and fan speeds.	Enter	Opens the submenu See "Baseboard monitor", on page 303
Legacy devices	Special settings for the interface can be changed here.	Enter	Opens the submenu See "Legacy devices", on page 304
BIOS	Displays the BIOS version.	None	-

Table 188: X945 Advanced Baseboard/Panel Features setting options

BIOS setting	Meaning	Setting options	Effect
MTCX PX32	Displays the MTCX PX32 firmware version.	None	-
MTCX FPGA	Displays the MTCX FPGA firmware version.	None	-
Optimized ID	Displays the DIP switch setting of the configuration switch.	None	-
Device ID	Displays the hexadecimal value of the hardware device ID.	None	-
Compatibility ID	Displays the version of the device within the same B&R device code. This ID is needed for Automation Runtime.	None	-
Serial number	Displays the B&R serial number.	None	-
Product name	Displays the B&R model number.	None	-
User serial ID	Displays the user serial ID. This 8 digit hex value can be freely assigned by the user (e.g. to give the device a unique ID) and can only be changed with using the "B&R Control Center" via the ADI driver.	None	-

Table 188: X945 Advanced Baseboard/Panel Features setting options (Forts.)

Panel control

```
BIOS SETUP UTILITY
Advanced

Panel Control

Select Panel Number          [8]
  Version:            V1.17
  Brightness:                [100%]
  Temperature:        39°C/102°F
  Fan Speed:          00 RPM
  Keys/Leds:          128/128

Panel 0-14: connected
to Automation Panel
Link or Monitor/Panel
connector.
Panel 15: connected on
Panel PC Link.
Note: DVI and PPC Link
will show no valid
values. On PPC Link
only the brightness
option will work.

←→    Select Screen
↑↓    Select Item
+-    Change Option
F1    General Help
F10   Save and Exit
ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 141: X945 Panel Control

BIOS setting	Meaning	Setting options	Effect
Select panel number	Selection of the panel number for which the values should be read out and/or changed.	0...15	Selection of panel 0 ... 15. Panel 15 is specifically intended for panel PC 700 systems.
Version	Displays the firmware version of the SDLR controller.	None	-
Brightness	For setting the brightness of the selected panel.	0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%	For setting the brightness (in %) of the selected panel. Changes take effect after saving and restarting the system (e.g. by pressing <F10>).
Temperature	Displays the selected panel's temperature (in degrees Celsius and Fahrenheit).	None	-
Fan speed	Displays fan speed for the selected panel.	None	-
Keys/LEDs	Displays the available keys and LEDs on the selected panel.	None	-

Table 189: X945 Panel Control setting options

Baseboard monitor

```
BIOS SETUP UTILITY
Advanced

Baseboard Monitor

CMOS Battery:          Good

Temperatures
  I/O:                 37°C/98°F
  Power Supply:        31°C/87°F
  Slide-In Drive 1:    00°C/32°F
  Slide-In Drive 2:    26°C/78°F

Fan Speeds
  Case 1:              1524 RPM
  Case 2:              2376 RPM
  Case 3:              1512 RPM
  Case 4:              00 RPM
  CPU:                 00 RPM

←→    Select Screen
↑↓    Select Item
F1    General Help
F10   Save and Exit
ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 142: X945 Baseboard Monitor

BIOS setting	Meaning	Setting options	Effect
CMOS battery	Displays the battery status. **n.a.** - not available **Good** - Battery is OK **Bad** - Battery is damaged.	None	-
I/O	Displays the temperature in the I/O area in degrees Celsius and Fahrenheit.	None	-
Power supply	Displays the temperature in the power supply in degrees Celsius and Fahrenheit.	None	
Slide-in drive 1	Displays the temperature of the slide-in drive 1 in degrees Celsius and Fahrenheit.	None	-
Slide-in drive 2	Displays the temperature of the slide-in drive 2 in degrees Celsius and Fahrenheit.	None	-
Case 1	Displays the fan speed of housing fan 1.	None	-
Case 2	Displays the fan speed of housing fan 2.	None	-
Case 3	Displays the fan speed of housing fan 3.	None	-
Case 4	Displays the fan speed of housing fan 4.	None	-
CPU	Displays the rotational speed of the CPU fan.	None	-

Table 190: X945 Baseboard Monitor setting options

Legacy devices

```
BIOS SETUP UTILITY
Advanced

Legacy Devices                                  Enable/Disable the
                                                internal COM port
COM C:                          [Disabled]      for touch
COM D:                          [Disabled]
COM E:                          [Disabled]      Fot detailed
CAN:                            [Disabled]      descrpition see user
                                                manual.
ETH2 LAN controller:            [Enabled]
ETH2 MAC Address:               00:60:65:04:D0:F8

                                                ←→    Select Item
                                                ↑↓    Select Screen
                                                +-    Change Option
                                                F1    General Help
                                                F10   Save and Exit
                                                ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 143: X945 Legacy Devices

BIOS setting	Meaning	Setting options	Effect
COM C	Setting of the COM port for the **touch screen on the monitor/panel** connector.	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 328, 338, 3E8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11	Selected interrupt is assigned.
COM D	Setting of the COM port for the **touch screen on the AP Link** connector.	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 328, 338, 3E8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11	Selected interrupt is assigned.
COM E	Configuration of the COM port on the B&R add-on interface 5AC600.485I-00 (IF option).	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 328, 338, 3E8	Selected base I/O address is assigned.

Table 191: X945 Legacy Devices setting options

BIOS setting	Meaning	Setting options	Effect
Interrupt	Selection of the interrupt for the COM port.	IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11	Selected interrupt is assigned.
CAN	Configuration of the CAN port of the B&R add-on CAN interface card 5AC600.CANI-00 (IF option).	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the CAN port.	None	-
Interrupt	Selection of the interrupt for the CAN port.	IRQ 10, NMI	Selected interrupt is assigned.
ETH2 LAN controller	For turning the onboard LAN controller (ETH2) on and off.	Disabled	Disables the controller.
		Enabled	Enables the controller.
ETH2 MAC Address	Displays the Ethernet 2 controller MAC address.	None	-

Table 191: X945 Legacy Devices setting options (Forts.)

1.5 Boot

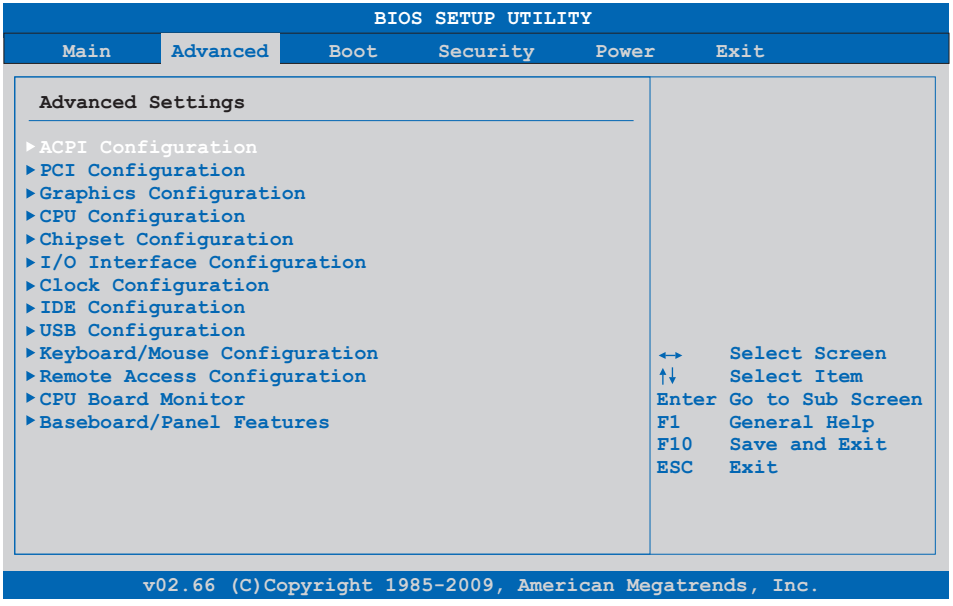


Figure 144: X945 Boot Menu

BIOS setting	Meaning	Setting options	Effect
Boot Priority Selection	The method for when the drives should be booted can be set here.	Device Based	Only the devices that are recognized by the system are listed. The sequence of this list can be changed.
		Type Based	The boot sequence of a device type list can be changed. Device types that are not connected can also be entered to this list.
1st Boot Device	The boot drives can be set using this option.	Disabled, Primary Master, Primary Slave, Secondary Master, Secondary Slave, Legacy Floppy, USB Floppy, USB Hard disk, USB CDROM, USB Removable Device, Onboard LAN, External LAN, PCI Mass Storage, PCI SCSI Card, Any PCI BEV Device, Third Master, Third Slave, PCI RAID, Local BEV ROM	Select the desired sequence.
2nd Boot Device			
3rd Boot Device			
4th Boot Device			
5th Boot Device			
6th Boot Device			
7th Boot Device			
8th Boot Device			
Quick Boot	This function reduces the boot time by skipping some POST procedures.	Disabled	Disables this function.
		Enabled	Enables this function.
Quiet Boot	Determines if POST message or OEM logo (default = black background) is displayed.	Disabled	POST message display.
		Enabled	OEM logo display instead of POST message.
Automatic Boot List Retry	With this option, the operating system attempts to automatically restart following startup failure.	Disabled	Disables this function.
		Enabled	Enables this function.
Add-On ROM Display Mode	Sets the display mode for the ROM (during the booting procedure).	Force BIOS	An additional BIOS part can be displayed.
		Keep Current	BIOS information is displayed.
Halt On Error	This option sets whether the system should pause the Power On Self Test (POST) when it encounters an error.	Disabled	The system does not pause. All errors are ignored.
		Enabled	The system pauses. The system pauses every time an error is encountered.
Hit 'DEL' Message Display	Settings can be made here for the "Hit 'DEL' Message" display. **Information:** **When quiet boot is activated the message is not displayed.**	Disabled	The message is not displayed.
		Enabled	The message is displayed.
Interrupt 19 Capture	This function can be used to incorporate the BIOS interrupt.	Disabled	Disables this function.
		Enabled	Enables this function.
PXE boot to LAN (ETH1)	Enables/disables the function to boot from LAN (ETH1).	Disabled	Disables this function.
		Enabled	Enables this function.
Power Loss Control	Determines if the system is on/off following power loss.	Remain Off	Remains off.
		Turn On	Powers on.
		Last State	Enables the previous state.

Table 192: X945 Boot Menu setting options

1.6 Security

```
BIOS SETUP UTILITY
Main   Advanced   Boot   Security   Power   Exit

Security Settings                          Install or Change the
                                           password.
Supervisor Password   :Not Installed
User Password         :Not Installed

Change Supervisor Password
Change User Password

Boot Sector Virus Protection   [Disabled]
HDD Security Freeze Lock

Hard Disk Security
                                           ←→    Select Screen
Ask HDD Password on Every Boot[No]         ↑↓    Select Item
▶Hard Disk Security User Passwords         Enter Change
▶Hard Disk Security Master Passwords       F1    General Help
                                           F10   Save and Exit
END-Key Loads CMOS Defaults    [No]        ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 145: X945 Security Menu

BIOS setting	Meaning	Setting options	Effect
Supervisor Password	Displays whether or not a supervisor password has been set.	None	-
User Password	Displays whether or not a user password has been set.	None	-
Change Supervisor Password	To enter/change a supervisor password. A supervisor password is necessary to edit all BIOS settings.	Enter	Enter password.
Change User Password	To enter/change a user password. A user password allows the user to edit only certain BIOS settings.	Enter	Enter password.
Boot Sector Virus Protection	With this option, a warning is issued when the boot sector is accessed through a program or virus. **Information:** **With this option, only the boot sector is protected, not the entire hard drive.**	Disabled	Disables this function.
		Enabled	Enables this function.

Table 193: X945 Security Menu setting options

BIOS setting	Meaning	Setting options	Effect
HDD Security Freeze Lock	This option can be used to define whether the BIOS sends the HDD Security Freeze Lock command to every connected hard disk that supports the Security command. This prevents the setting or changing of a hard disk password after the POST.	Disabled	Deactivates this function.
		Enabled	Activates this function.
Ask HDD Password on Every Boot	This function can be used to select whether the hard disk password must be entered each time the system boots. **Information:** **Can only be used if a hard disk user password has been created.**	Yes	Deactivates this function.
		No	Activates this function.
Hard Disk Security User Passwords	The hard disk security user password can be created here.	Enter	Opens the submenu See "Hard disk security user password", on page 308
Hard Disk Security Master Passwords	The hard disk security master password can be created here.	Enter	Opens the submenu See "Hard disk security master password", on page 309
End-Key Load CMOS Defaults	Using this function, CMOS can be loaded by pressing the END key during POST.	No	Disables this function.
		Yes	Enables this function.

Table 193: X945 Security Menu setting options (Forts.)

1.6.1 Hard disk security user password

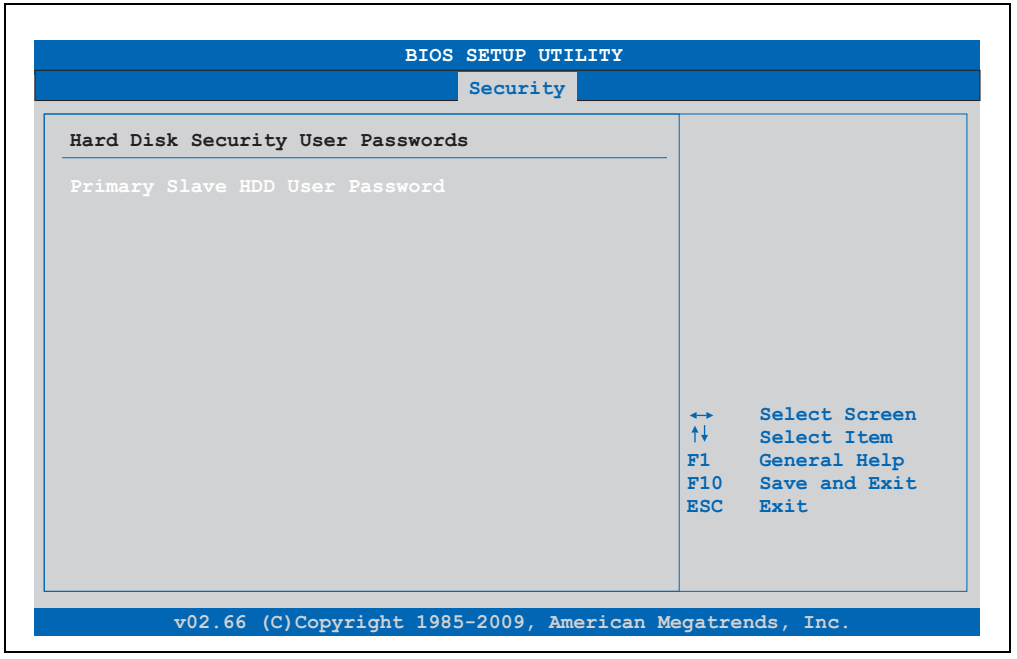


Figure 146: X945 Hard Disk Security User Password

BIOS setting	Meaning	Setting options	Effect
Primary slave HDD user password	This function makes it possible to use the user password to change or configure each hard drive without having to reboot the device. A user password allows the user to edit only certain BIOS settings.	Enter	Enter password.

Table 194: X945 Hard Disk Security User Password

1.6.2 Hard disk security master password

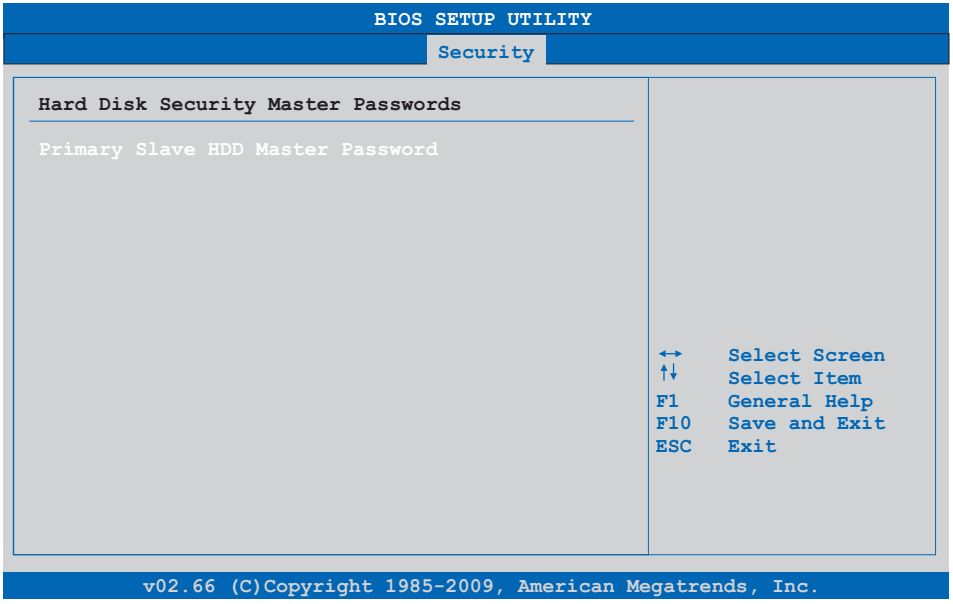


Figure 147: X945 Hard Disk Security Master Password

BIOS setting	Meaning	Setting options	Effect
Primary Slave HDD Master Password	This function makes it possible to use the user password to change or configure each hard drive without having to reboot the device.	Enter	Enter password.

Table 195: X945 Hard Disk Security Master Password

1.7 Power

```
BIOS SETUP UTILITY
Main   Advanced   Boot   Security   Power   Exit

Congigure power management and control

Power Management/APM          [Enabled]
Suspend Time Out              [Disabled]
Video Power Down Mode         [Suspend]
Hard Disk Power Down Mode     [Suspend]
Keyboard & PS/2 Mouse         [MONITOR]
FDC/LPT/COM Ports             [MONITOR]
Primary Master IDE            [MONITOR]
Primary Slave IDE             [MONITOR]
Secondary Master IDE          [MONITOR]
Secondary Slave IDE           [MONITOR]

Resume On Ring                [Disabled]
Resume On PME#                [Disabled]
Resume On RTC Alarm           [Disabled]

Power Button Mode             [On/Off]

Enable or disable
APM.

←→    Select Screen
↑↓    Select Item
+-    Change Option
F1    General Help
F10   Save and Exit
ESC   Exit

v02.66 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Figure 148: X945 Power Menu

BIOS setting	Meaning	Setting options	Effect
Power Management/APM	This option switches the APM function on or off. This is an advanced plug & play and power management functionality.	Disabled	Disables this function.
		Enabled	Enables this function.
Suspend Time Out	Using this option, you can configure how long the system stays inactive (all components but the CPU are shut off, if possible) before entering suspend mode.	Disabled	Disables this function.
		1 Min, 2 Min, 4 Min, 8 Min, 10 Min, 20 Min, 30 Min, 40 Min, 50 Min, 60 Min;	Value set manually.
Video Power Down Mode	This option allows you to set the energy saving mode for the monitor.	Disabled	Do not switch off the monitor.
		Standby	Monitor goes to standby mode.
		Suspend	Monitor goes to suspend mode.
Hard Disk Power Down Mode	This option allows you to set the energy saving mode for the hard drive.	Disabled	Do not switch off the hard drive.
		Standby	Monitor goes to standby mode.
		Suspend	Hard drive goes to suspend mode.
Keyboard & PS/2 Mouse	The monitoring of activities during power saving mode is determined here.	MONITOR	Keyboard or PS/2 mouse activities return the system to its normal state from a particular energy saving mode.
		IGNORE	Activities are ignored.

Table 196: X945 Power Menu setting options

BIOS setting	Meaning	Setting options	Effect
FDC/LPT/COM ports	The monitoring of activities during power saving mode is determined here.	MONITOR	Activity on the parallel port, the serial 1&2 port, or the floppy port returns the system to its normal state from an energy saving mode.
		IGNORE	Activities are ignored.
Primary Master IDE	The monitoring of activities during power saving mode is determined here.	MONITOR	Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.
		IGNORE	Activities are ignored.
Primary Slave IDE	The monitoring of activities during power saving mode is determined here.	MONITOR	Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.
		IGNORE	Activities are ignored.
Secondary Master IDE	The monitoring of activities during power saving mode is determined here.	MONITOR	Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.
		IGNORE	Activities are ignored.
Secondary Slave IDE	The monitoring of activities during power saving mode is determined here.	MONITOR	Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.
		IGNORE	Activities are ignored.
Resume On Ring	When the modem receives an incoming call, the PC is brought out of power saving mode.	Disabled	Disables this function.
		Enabled	Enables this function.
Resume on PME#	With this option, you can switch the PME wakeup function on or off.	Disabled	Disables this function.
		Enabled	Enables this function.
Resume On RTC Alarm	With this option, you can activate the alarm and enter the date and time for the system start.	Disabled	Disables this function.
		Enabled	Enables this function.
Power Button Mode	This function determines the function of the power button.	On/Off	Power button switches on/off.
		Suspend	Suppresses the function.

Table 196: X945 Power Menu setting options (Forts.)

1.8 Exit

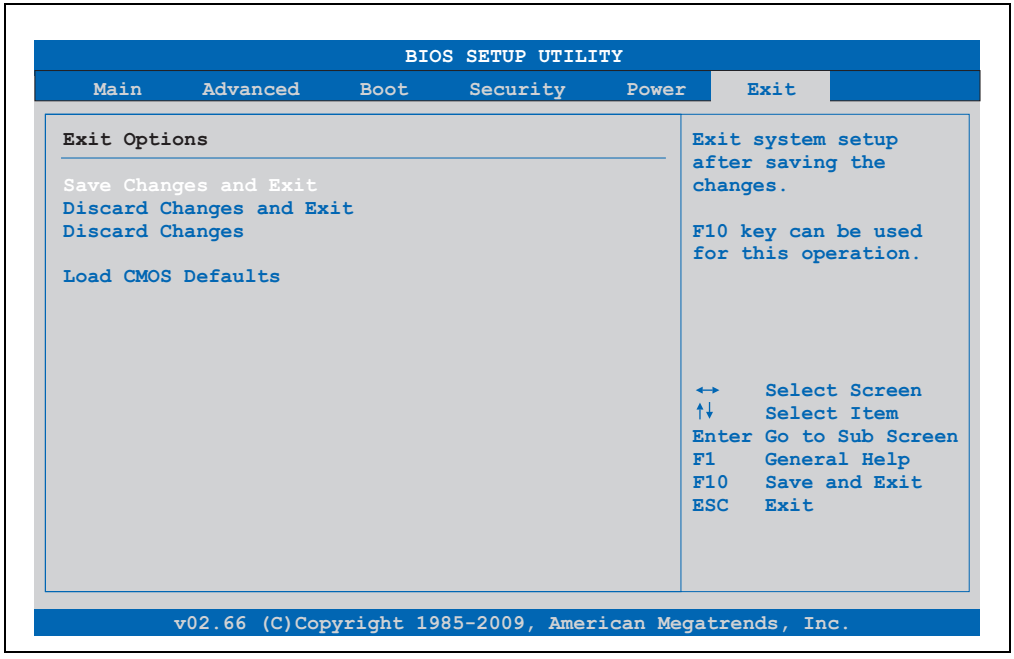


Figure 149: X945 Exit Menu

BIOS setting	Meaning	Setting options	Effect
Save Changes and Exit	BIOS setup is closed with this item. Changes made are saved in CMOS after confirmation, and the system is rebooted.	OK / Cancel	
Discard Changes and Exit	With this item you can close BIOS setup without saving the changes made. The system is then rebooted.	OK / Cancel	
Discard Changes	In the event that settings were made which the user can no longer remember, changes can be reset as long as they haven't been saved.	OK / Cancel	
Load CMOS Defaults	This item loads the CMOS default values, which are defined by the DIP switch settings. These settings are loaded for all BIOS configurations.	OK / Cancel	

Table 197: X945 Exit Menu setting options

1.9 BIOS default settings

If the function "load setup defaults" is chosen in the main BIOS setup menu, or if exit is selected (or <F9> is pressed) in the individual setup screens, the following BIOS default settings are the optimized values that will be used.

DIP switch position see Section 3 "Location of the DIP switch in APC620 system units", on page 347).

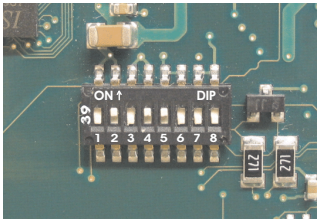


Figure 150: CMOS profile hex switch

Information:

The switch position that is set upon delivery represents the optimum BIOS default values for this system and should therefore not be changed.

The first six DIP switches (1-6) are used to set the profiles. The rest (7,8) are reserved.

Profile number	Optimized for	DIP switch setting							
		1	2	3	4	5	6	7[1)]	8[1)]
Profile 0	Automation PC 620 system units 5PC600.SX01-00.	Off	Off	Off	Off	Off	Off	-	-
Profile 1	Reserved	On	Off	Off	Off	Off	Off	-	-
Profile 2	Automation PC 620 system units 5PC600.SX02-00, 5PC600.SX02-01, 5PC600.SF03-00, 5PC600.SX05-00 and 5PC600.SX05-01.	Off	On	Off	Off	Off	Off	-	-
Profile 3	Panel PC 700 system unit 5PC720.1043-00, 5PC720.1214-00, 5PC720.1505-00, 5PC720.1706-00, 5PC720.1906-00, 5PC781.1043-00, 5PC781.1505-00 and 5PC782.1043-00.	On	On	Off	Off	Off	Off	-	-
Profile 4	Panel PC 700 system unit 5PC720.1043-01, 5PC720.1214-01, 5PC720.1505-01 and 5PC720.1505-02.	Off	Off	On	Off	Off	Off	-	-
Profile 5	Automation PC 620 embedded system units 5PC600.SE00-00 und 5PC600.SE00-01.	On	Off	On	Off	Off	Off	-	-
Profile 6	Panel PC 700 system unit 5PC725.1505-00	Off	On	On	Off	Off	Off	-	-

Table 198: Profile overview

1) Reserved.

The following pages provide an overview of the BIOS default settings for the different DIP switch position. Settings highlighted in yellow are variations from the BIOS default profile (=profile 1).

1.9.1 Main

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
System Time	-	-	-	-	-	-	-	
System Date	-	-	-	-	-	-	-	
BIOS ID	-	-	-	-	-	-	-	
Processor	-	-	-	-	-	-	-	
CPU Frequency	-	-	-	-	-	-	-	
System Memory	-	-	-	-	-	-	-	
Product Revision	-	-	-	-	-	-	-	
Serial number	-	-	-	-	-	-	-	
BC Firmware Rev.	-	-	-	-	-	-	-	
MAC Address (ETH1)	-	-	-	-	-	-	-	
Boot Counter	-	-	-	-	-	-	-	
Running Time	-	-	-	-	-	-	-	

Table 199: X945 - Main profile setting overview

1.9.2 Advanced

ACPI configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
ACPI Aware O/S	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
ACPI Version Features	ACPI v2.0	ACPI v2.0	ACPI v2.0	ACPI v2.0	ACPI v2.0	ACPI v2.0	ACPI v2.0	
ACPI APIC support	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Suspend mode	S1 (POS)	S1 (POS)	S1 (POS)	S1 (POS)	S1 (POS)	S1 (POS)	S1 (POS)	
USB Device Wakeup from S3/S4	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Active Cooling Trip Point	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Passive Cooling Trip Point	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Critical Trip Point	105°C	105°C	105°C	105°C	105°C	105°C	105°C	

Table 200: X945 Advanced - ACPI Configuration profile setting overview

PCI Configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Plug & Play O/S	Yes	**No**	Yes	Yes	Yes	Yes	Yes	
PCI Latency Timer	64	64	64	64	64	64	64	
Allocate IRQ to PCI VGA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Allocate IRQ to SMBUS HC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
PCI IRQ Resource Exclusion								
IRQ3	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	
IRQ4	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	
IRQ5	Available	Available	Available	Available	Available	**Allocated**	Available	
IRQ6	Available	Available	Available	Available	Available	**Allocated**	Available	
IRQ7	Available	Available	Available	Available	Available	**Allocated**	Available	
IRQ9	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	
IRQ10	Available	Available	Available	Available	Available	Available	Available	
IRQ11	Available	**Allocated**	Available	**Allocated**	**Allocated**	Available	Available	
IRQ12	Available	**Allocated**	Available	Available	Available	Available	Available	
IRQ14	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	
IRQ15	Available	Available	Available	Available	Available	Available	Available	
PCI Interrupt Routing								
PIRQ A (VGA)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIRQ B (AC97,INTD)	Auto	Auto	Auto	Auto	Auto	**7**	Auto	
PIRQ C (PATA,INTC)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIRQ D (SATA,UHCI1,SMB)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIRQ E (ETH1)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIRQ F (INTA,ETH2)	Auto	Auto	Auto	Auto	Auto	**5**	Auto	
PIRQ G (INTB)	Auto	Auto	Auto	Auto	Auto	**6**	Auto	
PIRQ H (UHCI0,EHCI)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
1st Exclusive PCI	-	-	-	-	-	**5**	-	
2nd Exclusive PCI	-	-	-	-	-	**6**	-	
3rd Exclusive PCI	-	-	-	-	-	**7**	-	

Table 201: X945 Advanced - PCI Configuration Profile setting overview

Graphics configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Primary Video Device	Internal VGA	Internal VGA	Internal VGA	Internal VGA	Internal VGA	Internal VGA	Internal VGA	
Internal Graphics Mode Select	Enabled, 8MB	Enabled, 8MB	Enabled, 8MB	Enabled, 8MB	Enabled, 8MB	Enabled, 8MB	Enabled, 8MB	
DVMT Mode Select	DVMT Mode	DVMT Mode	DVMT Mode	DVMT Mode	DVMT Mode	DVMT Mode	DVMT Mode	
DVMT/FIXED Memory	128MB	128MB	128MB	128MB	128MB	128MB	128MB	
Boot Display Device	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
Always Try Auto Panel Detect	No	No	No	No	No	No	No	
Local Flat Panel Type	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
Local flat panel scaling	Expand Text & Graphics	Expand Text & Graphics	Expand Text & Graphics	Expand Text & Graphics	Expand Text & Graphics	Expand Text & Graphics	Expand Text & Graphics	
Display Mode Persistence	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	

Table 202: X945 Advanced - Graphics Configuration Profile setting overview

CPU configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Module Version	-	-	-	-	-	-	-	
Manufacturer	-	-	-	-	-	-	-	
Frequency	-	-	-	-	-	-	-	
FSB speed	-	-	-	-	-	-	-	
L1 cache	-	-	-	-	-	-	-	
L2 cache	-	-	-	-	-	-	-	
Ratio Actual Value	-	-	-	-	-	-	-	
MPS Revision	1.4	1.4	1.4	1.4	1.4	1.4	1.4	
Max CPUID value limit	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Execute-Disable Bit Capability	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Hyper Threading Technology	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Intel(R) SpeedStep (tm) tech	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Boot CPU Speed On AC	Maximum	Maximum	Maximum	Maximum	Maximum	Maximum	Maximum	
Intel(R) C-STATE tech	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Enhanced C-States	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 203: X945 Advanced - CPU Configuration Profile setting overview

Chipset configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
DRAM Frequency	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
DRAM Refresh Rate	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
Memory Hole	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
DIMM Thermal Control	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
DT in SPD	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
TS on DIMM	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
High Precision Event Timer	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
IOAPIC	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
APIC ACPI SCI IRQ	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
C4 On C3	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 204: X945 Advanced - Chipset Configuration Profile setting overview

I/O interface configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Onboard AC'97 Audio	Enabled	Enabled	Enabled	Enabled	Enabled	**Disabled**	**Disabled**	
Onboard LAN (ETH1)	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Serial port 1 configuration	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	**Disabled**	
Serial port 2 configuration	2F8/IRQ3	2F8/IRQ3	2F8/IRQ3	2F8/IRQ3	2F8/IRQ3	2F8/IRQ3	2F8/IRQ3	
Serial port 2 mode	Normal	Normal	Normal	Normal	Normal	Normal	Normal	
Parallel port address	378	378	378	378	378	378	**Disabled**	

Table 205: X945 Advanced - I/O Interface Configuration profile setting overview

Clock Configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Spread spectrum	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 206: X945 Advanced - Clock Configuration Profile setting overview

IDE Configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
ATA/IDE Configuration	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	
Legacy IDE Channels	PATA Only	PATA Only	PATA Only	PATA Only	PATA Only	PATA Only	PATA Only	
Hard disk write protect	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
PATA Detect Time Out (Sec)	35	35	35	35	35	35	35	

Table 207: X945 Advanced - IDE Configuration Profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
SATA Detect Time Out (Sec)	3	3	3	3	3	3	3	
ATA(PI) 80Pin Cable Detection	Host & device	Host & device	Host & device	Host & device	Host & device	Host & device	Host & device	
Primary IDE Master								
Type	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
LBA/Large Mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
Block (Multi-Sector Transfer)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIO Mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
DMA Mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
S.M.A.R.T.	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
32Bit data transfer	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Primary IDE slave								
Type	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
LBA/Large Mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
Block (Multi-Sector Transfer)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIO Mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
DMA Mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
S.M.A.R.T.	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
32Bit data transfer	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	

Table 207: X945 Advanced - IDE Configuration Profile setting overview (Forts.)

USB configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
USB Function	4 USB Ports	4 USB Ports	4 USB Ports	4 USB Ports	4 USB Ports	**6 USB Ports**	4 USB Ports	
USB 2.0 Controller	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Legacy USB Support	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
USB Legacy POST-Always	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
USB Keyboard Legacy Support	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
USB Mouse Legacy Support	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
USB Storage Device Support	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Port 64/60 Emulation	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
USB 2.0 Controller Mode	HiSpeed	HiSpeed	HiSpeed	HiSpeed	HiSpeed	HiSpeed	HiSpeed	

Table 208: X945 Advanced - USB Configuration Profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
BIOS EHCI Hand-Off	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
USB Beep Message	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
USB Stick Default Emulation	Hard disk	Hard disk	Hard disk	Hard disk	Hard disk	Hard disk	Hard disk	
USB Mass Storage Reset Delay	20 Sec	20 Sec	20 Sec	20 Sec	20 Sec	20 Sec	20 Sec	

Table 208: X945 Advanced - USB Configuration Profile setting overview (Forts.)

Keyboard/mouse configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Boot-up Num-lock	On	On	On	On	On	On	On	
Typematic rate	Fast	Fast	Fast	Fast	Fast	Fast	Fast	
PS/2 mouse support	Disabled	**Enabled**	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 209: X945 Advanced Keyboard/Mouse Configuration profile setting overview

Remote access configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Remote access	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Serial port BIOS update	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 210: X945 Advanced Remote Access Configuration profile setting overview

CPU board monitor

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Board temperature	-	-	-	-	-	-	-	
CPU temperature	-	-	-	-	-	-	-	
DIMM Environment Temp.	-	-	-	-	-	-	-	
Fan1 Speed	-	-	-	-	-	-	-	
VcoreA	-	-	-	-	-	-	-	
VcoreB	-	-	-	-	-	-	-	
+3.3Vin	-	-	-	-	-	-	-	
+5Vin	-	-	-	-	-	-	-	
+5VSB	-	-	-	-	-	-	-	
VRTC	-	-	-	-	-	-	-	

Table 211: X945 Advanced CPU board monitor profile setting overview

Main Board/Panel Features

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
BIOS	-	-	-	-	-	-	-	
MTCX PX32	-	-	-	-	-	-	-	
MTCX FPGA	-	-	-	-	-	-	-	
Optimized ID	-	-	-	-	-	-	-	
Device ID	-	-	-	-	-	-	-	
Compatibility ID	-	-	-	-	-	-	-	
Serial number	-	-	-	-	-	-	-	
Product name	-	-	-	-	-	-	-	
User serial ID	-	-	-	-	-	-	-	
Panel control								
Select panel number	-	-	-	-	-	-	-	
Version	-	-	-	-	-	-	-	
Brightness	100%	100%	100%	100%	100%	100%	100%	
Temperature	-	-	-	-	-	-	-	
Fan speed	-	-	-	-	-	-	-	
Keys/LEDs	-	-	-	-	-	-	-	
Baseboard monitor								
CMOS battery	-	-	-	-	-	-	-	
I/O	-	-	-	-	-	-	-	
Power supply								
Slide-in drive 1	-	-	-	-	-	-	-	
Slide-in drive 2	-	-	-	-	-	-	-	
Case 1	-	-	-	-	-	-	-	
Case 2	-	-	-	-	-	-	-	
Case 3	-	-	-	-	-	-	-	
Case 4	-	-	-	-	-	-	-	
CPU	-	-	-	-	-	-	-	
Legacy devices								
COM C	Disabled	**Enabled**	Disabled	**Enabled**	**Enabled**	Disabled	**Enabled**	
Base I/O address	-	**3E8**	-	**3E8**	**3E8**	-	**3E8**	
Interrupt	-	**11**	-	**11**	**11**	-	**11**	
COM D	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	-	-	
Interrupt	-	-	-	-	-	-	-	
COM E	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	-	-	

Table 212: X945 Advanced - Baseboard/Panel Features profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
BIOS	-	-	-	-	-	-	-	
MTCX PX32	-	-	-	-	-	-	-	
MTCX FPGA	-	-	-	-	-	-	-	
Optimized ID	-	-	-	-	-	-	-	
Device ID	-	-	-	-	-	-	-	
Compatibility ID	-	-	-	-	-	-	-	
Serial number	-	-	-	-	-	-	-	
Product name	-	-	-	-	-	-	-	
User serial ID	-	-	-	-	-	-	-	
Interrupt	-	-	-	-	-	-	-	
CAN	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	-	-	
Interrupt	-	-	-	-	-	-	-	
ETH2 LAN Controller	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
ETH2 MAC Address	-	-	-	-	-	-	-	

Table 212: X945 Advanced - Baseboard/Panel Features profile setting overview (Forts.)

1.9.3 Boot

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Boot Priority Selection	Type Based	Type Based	Type Based	Type Based	Type Based	Type Based	Type Based	
1st Boot Device	Primary master	**Onboard LAN**	Primary master	Primary master	Primary master	Primary master	Primary master	
2nd Boot Device	Primary slave	**Primary master**	Primary slave	Primary slave	Primary slave	Primary slave	Primary slave	
3rd Boot Device	USB floppy	**Primary slave**	USB floppy	USB floppy	USB floppy	USB floppy	USB floppy	
4th Boot Device	USB removable device	**USB floppy**	USB removable device	USB removable device	USB removable device	USB removable device	USB removable device	
5th Boot Device	USB hard disk	**USB removable device**	USB hard disk	USB hard disk	USB hard disk	USB hard disk	USB hard disk	
6th Boot Device	USB CDROM	**USB HDD**	USB CDROM	USB CDROM	USB CDROM	USB CDROM	USB CDROM	
7th Boot Device	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
8th Boot Device	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Quick Boot	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Quiet Boot	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Automatic Boot List Retry	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 213: X945 Boot profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Add-On ROM Display Mode	Keep Current	Keep Current	Keep Current	Keep Current	Keep Current	Keep Current	Keep Current	
Halt On Error	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Hit "DEL" Message Display	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Interrupt 19 Capture	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
PXE Boot to LAN	Disabled	**Enabled**	Disabled	Disabled	Disabled	Disabled	Disabled	
Power Loss Control	Turn On	Turn On	Turn On	Turn On	Turn On	Turn On	Turn On	

Table 213: X945 Boot profile setting overview

1.9.4 Security

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Supervisor Password	-	-	-	-	-	-	-	
User Password	-	-	-	-	-	-	-	
Boot Sector Virus Protection	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
HDD Security Freeze Lock	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Ask HDD Password on Every Boot	No	No	No	No	No	No	No	
Hard disk security user password	-	-	-	-	-	-	-	
Hard disk security master password	-	-	-	-	-	-	-	
END-key loads CMOS defaults	No	No	No	No	No	No	No	

Table 214: X945 Security profile setting overview

1.9.5 Power

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Power Management/APM	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Suspend Time Out	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Video Power Down Mode	Suspend	Suspend	Suspend	Suspend	Suspend	Suspend	Suspend	
Hard Disk Power Down Mode	Suspend	Suspend	Suspend	Suspend	Suspend	Suspend	Suspend	
Keyboard & PS/2 Mouse	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	
FDC/LPT/COM ports	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	
Primary Master IDE	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	
Primary Slave IDE	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	
Secondary Master IDE	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	

Table 215: X945 Power profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Secondary Slave IDE	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	
Resume On Ring	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Resume on PME#	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Resume On RTC Alarm	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Power Button Mode	On/Off	On/Off	On/Off	On/Off	On/Off	On/Off	On/Off	

Table 215: X945 Power profile setting overview

1.10 BIOS Error signals (beep codes)

While the Automation PC 620 is booting, the following messages and errors can occur with BIOS. These errors are signaled by different beeping codes.

1.10.1 BIOS X945

Beeping code	Meaning	Necessary user action
1 x short	Memory refresh failed.	Load BIOS defaults. In the event that the error persists, send industrial PC to B&R for testing.
2 x short	Parity error: POST error (error in one of the hardware testing procedures)	Load BIOS defaults. In the event that the error persists, send industrial PC to B&R for testing.
3 x short	Base 64 KB memory failure: Basic memory defect, RAM error within the initial 64 KB.	Check the placement of the inserted card. In the event that the error persists, send industrial PC to B&R for testing.
4 x short	Timer not operational: System timer.	Send industrial PC to B&R for checking.
5 x short	Processor error: Processor defect.	Send industrial PC to B&R for checking.
6 x short	8042 gate A20 failure: Keyboard controller defect (block 8042/ A20 gate). Processor cannot switch to protected mode.	Send industrial PC to B&R for checking.
7 x short	Processor exception interrupt error: Virtual mode exception error (CPU generated an interrupt error.	Send industrial PC to B&R for checking.
8 x short	Display memory read/write error: Video memory not accessible; graphic card defect or not built in (no fatal error).	Check inserted graphic card position and eventually exchange. In the event that the error persists, send industrial PC to B&R for testing.

Table 216: BIOS post code messages BIOS X945

1.11 Distribution of resources

1.11.1 RAM address assignment

RAM address	Resource
000000h - 0003FFh	Interrupt vectors
000400h - 09FBFFh	MS-DOS program area
09FC00h - 09FFFFh	Advanced BIOS data
0A0000h - 0CFFFFh	VGA BIOS and memory
0D0000h - 0DFFFFh	Available
0E0000h - 0FFFFFh	System BIOS (AMI)
100000h - (TOM[1)] -8MB-192kB)	SDRAM
(TOM-8MB-192kB) - (TOM-192kB)	VGA frame buffer[2)]
(TOM-192kB) - TOM	ACPI reclaim, MPS and NVS area[3)]

Table 217: RAM address assignment

1) T.O.M. = Top of memory = Max. installed DRAM.
2) The VGA frame buffer can be reduced to 1 MB in the setup.
3) Only if *ACPI Aware OS* is set to *YES* in the setup.

1.11.2 DMA channel assignment

DMA channel	Resource
0	Available
1	Available
2	Floppy disk drive (FDC)
3	LPT (ECP) [1)]
4	Reserved (Cascade DMA Controller)
5	Available
6	Available
7	Available

Table 218: DMA channel assignment

1) Not available if the parallel port is not used in ECP mode.

1.11.3 I/O address assignment

I/O address	Resource
000h -01Fh	DMA controller 1
020h - 03Fh	Interrupt controller 1
040h - 05Fh	Timer
060h - 06Fh	Keyboard controller
070h - 071h	Real-time clock, NMI mask, CMOS
080h	Debug port (POST code)
081h - 09Fh	Page register - DMA controller
0A0h - 0BFh	Interrupt controller 2
0C0h - 0DFh	DMA controller 2
0F0h - 0FFh	FPU
170h - 177h	Secondary Hard Disk IDE channel
1F0h - 1F7h	Primary Hard Disk IDE channel
238h - 023F	COM5
278h - 27Fh	Hardware Security Key (LPT2)
2E8h - 2EFh	COM4
2F8h - 2FFh	COM2
376h - 376h	Secondary Hard Disk IDE channel
378h - 37Fh	LPT1 (printer connection)
384h - 385h	CAN controller
3B0h - 3BBh	VGA controller
3BCh - 3BFh	LPT3
3C0h - 3DFh	VGA controller
3E8h - 3EFh	COM3
3F6h - 3F6h	Primary Hard Disk IDE channel
3F0h - 3F7h	FDD controller
3F8h - 3FFh	COM1
LPT1 + 400h	ECP Port, LPT+400h
CF8h - CFBh	PCI config address register
CFCh - CFFh	PCI config data register
4100h - 417Fh	MTCX
FF00h - FF07h	IDE bus master register

Table 219: I/O address assignment

1.11.4 Interrupt assignments in PCI mode

IRQ		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	NMI	NONE
System timer		●																	
Keyboard			●																
IRQ cascade				●															
COM1 (Serial port A)					❍	●													
COM2 (Serial port B)					●	❍													
LPT1					❍	❍	❍	❍	❍		❍	❍	❍	❍		❍			●
LPT2					❍	❍	❍	❍	❍		❍	❍	❍	❍		❍			●
LPT3					❍	❍	❍	❍	❍		❍	❍	❍	❍		❍			●
PS/2 mouse														●					
ACPI[1)]											●								
FDD								●											❍
Real-time clock										●									
Coprocessor (FPU)															●				
Primary IDE channel																●			
Secondary IDE channel																	❍		
B&R	COM3 (COM C)				❍	❍	❍		❍			❍	❍	❍					●
	COM4 (COM D)				❍	❍	❍		❍			❍	❍	❍					●
	COM5 (COM E)				❍	❍	❍		❍			❍	❍	❍					●
	CAN											❍						❍	●

Table 220: IRQ interrupt assignments in PCI mode

1) **A**dvanced **C**onfiguration and **P**ower **I**nterface.

● ... Default setting
❍ ... Optional setting

1.11.5 Interrupt assignments in APIC mode

A total of 23 IRQs are available in the APIC mode (**A**dvanced **P**rogrammable **I**nterrupt **C**ontroller). The activation of this option is only effective if it takes place before the operating system (Windows XP) is activated. There are then 23 IRQs available.

IRQ		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	NMI	NONE
System timer		●																									
Keyboard			●																								
IRQ cascade				●																							
COM1 (Serial port A)					❍	●																					
COM2 (Serial port B)					●	❍																					
LPT1					❍	❍	❍	❍	❍		❍	❍	❍	❍		❍											●
LPT2					❍	❍	❍	❍	❍		❍	❍	❍	❍		❍											●
PS/2 mouse														●													
ACPI[1)]											●																
FDD								●																			❍
Real-time clock										●																	
Coprocessor (FPU)															●												
Primary IDE channel																●											
Secondary IDE channel																	❍										
B&R	COM3 (COM C)				❍	❍	❍		❍			❍	❍	❍													●
	COM4 (COM D)				❍	❍	❍		❍			❍	❍	❍													●
	COM5 (COM E)				❍	❍	❍		❍			❍	❍	❍													●
	CAN											❍														❍	●
PIRQ A [2)]																		●									
PIRQ B [3)]																			●								
PIRQ C [4)]																				●							
PIRQ D [5)]																					●						
PIRQ E [6)]																						●					
PIRQ F[7)]																							●				
PIRQ G[8)]																								●			
PIRQ H [9)]																									●		

Table 221: IRQ interrupt assignments in APIC mode

1) **A**dvanced **C**onfiguration and **P**ower **I**nterface.
2) PIRQ A: Graphics controller.
3) PIRQ B: INTD + AC97 audio controller.
4) PIRQ C: INTC + Native IDE.
5) PIRQ D: USB UHCI controller #1 + SM bus.
6) PIRQ E: LAN controller (ETH1).
7) PIRQ F: INTA + ETH2
8) PIRQ G: INTB
9) PIRQ H: USB EHCI controller + UHCI0.

● ... Default setting
❍ ... Optional setting

The PCI resources are assigned to fixed IRQ lines when the APIC function is enabled. The following image shows the connections to the individual PCI slots.

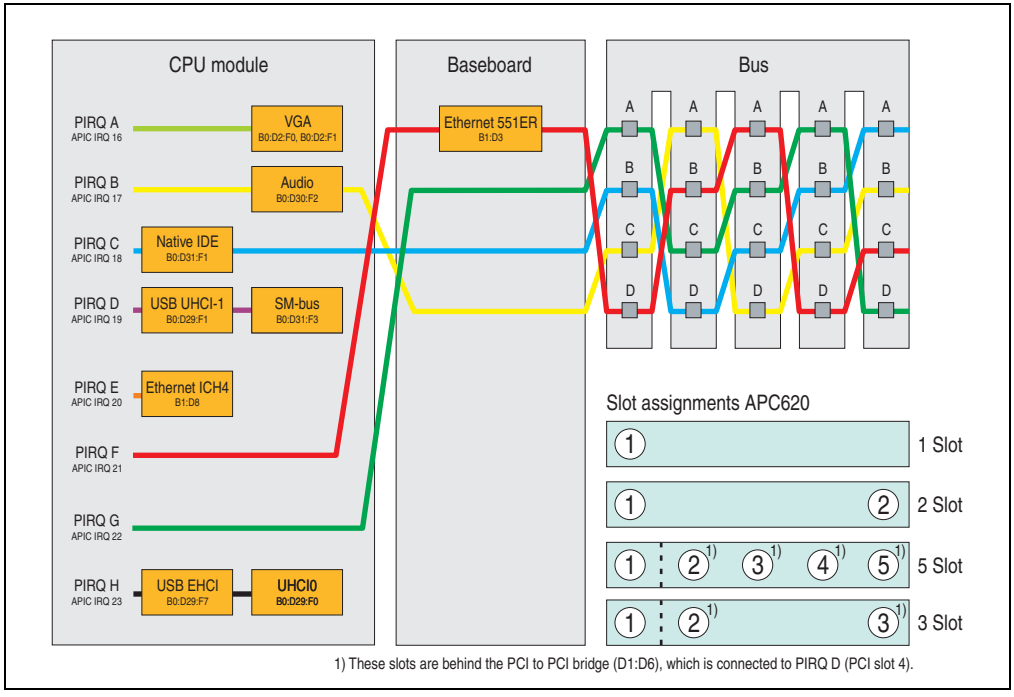


Figure 151: PCI Routing with activated APIC CPU board X945

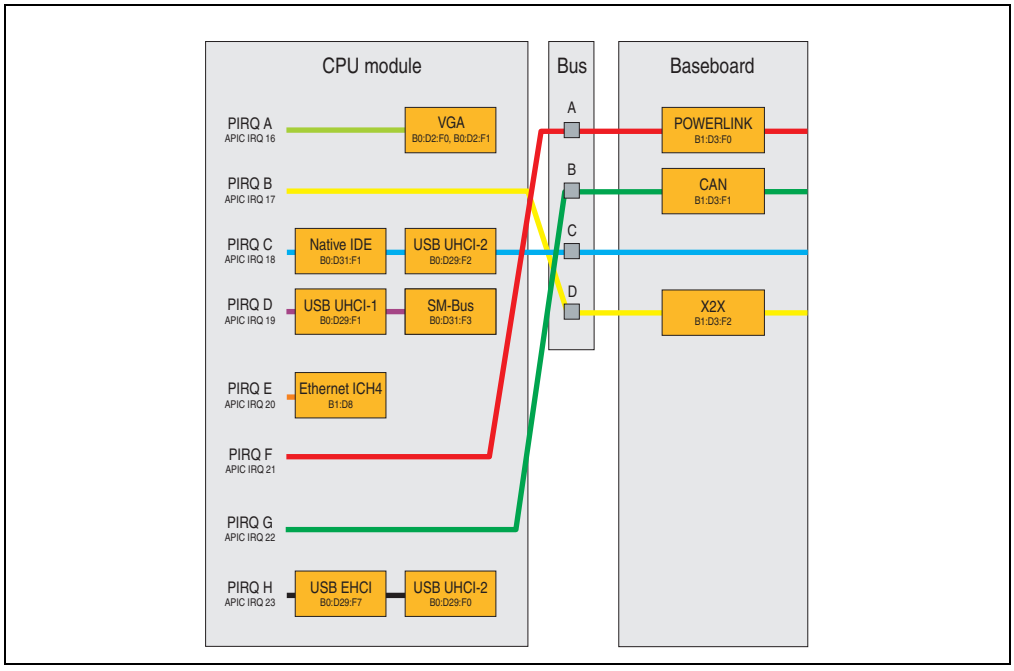


Figure 152: PCI Routing with activated APIC CPU board X945 on the APC620e

1.11.6 Inter-IC (I²C) bus

I²C address	Resource	Note
A0h	EEPROM	EEPROM for CMOS data - cannot be used
B0h	Reserved	Cannot be used
58h	Reserved	Cannot be used

Table 222: Inter-IC (I²C) bus resources

1.11.7 System Management (SM) bus

SM Bus address	SM device	Note
12h	SMART_CHARGER	
14h	SMART_SELECTOR	
16h	SMART_BATTERY	
D2h	Clock Generator	

Table 223: Inter-IC (I²C) bus resources

2. Upgrade information

Warning!

The BIOS and firmware on APC620 systems must be kept up to date. New versions can be downloaded from the B&R homepage (www.br-automation.com).

2.1 BIOS upgrade

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).

2.1.1 What information do I need?

Information:

Individually saved BIOS settings are deleted when upgrading the BIOS.

Before you begin the upgrade, it helps to determine the various software versions.

Which BIOS version and firmware are already installed on the APC620?

This information can be found on the same BIOS setup page for both the X945 CPU boards:

- After switching on the APC620, you can get to the BIOS Setup by pressing "F2" or "DEL".
- From the BIOS main menu "advanced" (top), select "baseboard/panel features" (bottom):

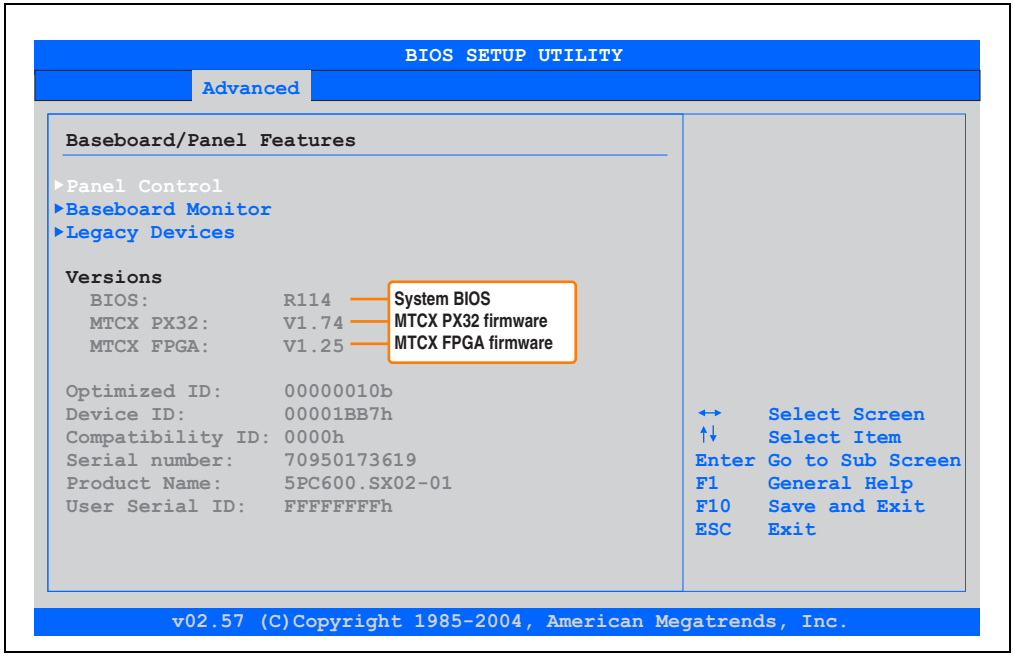


Figure 153: Software versions

Which firmware is installed on the Automation Panel Link Transceiver/Receiver?

This information can be found on the following BIOS setup page:

- After switching on the APC620, you can get to the BIOS Setup by pressing "F2" or "DEL".
- From the BIOS main menu "advanced" (top), select "baseboard/panel features" (bottom) and then "panel control":

Information:

The version can only be shown if an Automation Panel with Automation Panel Link SDL transceiver (5DLSDL.1000-01) and Automation Panel Link SDL receiver (5DLSDL.1000-00) is connected.

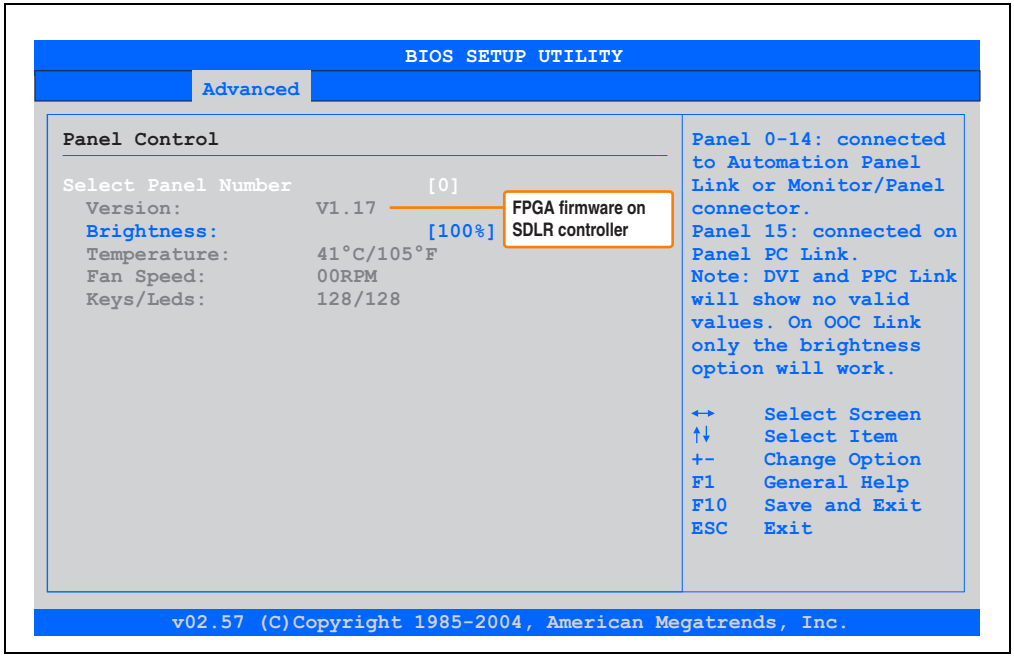


Figure 154: Firmware version of Automation Panel Link SDL transceiver/receiver

2.1.2 Upgrade BIOS for X945

- Download and unzip the zip file from the B&R homepage.
- Create bootable media.

Information:

In MS-DOS, Win95 and Win98, a blank HD disk can be made bootable using the command line command "sys a:" or "format a: /s".
Information concerning creating a bootable diskette in Windows XP can be found on page 341.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 342.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 345.

- Copy the contents of the *.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
- Connect the bootable media to the APC620 and reboot the device.
- The following boot menu will be shown after startup:

```
1. Upgrade AMI BIOS for X945/N270 (5PC600.X945-xx)

2. Exit to MS-DOS
```

Concerning item 1:
BIOS is automatically upgraded (default after 5 seconds).

Concerning item 2:
Returns to the shell (MS-DOS).

- The system must be rebooted after a successful upgrade.

Information:

After the system restart, the warning "CMOS checksum BAD" is displayed, but BIOS boots through it. The setup can be opened using the "Del" key and the setup defaults must be loaded again and saved using either the "F9" key or the menu item "Exit" - "Load CMOS defaults".

2.1.3 Windows XP Embedded and BIOS upgrade

If the following error message appears after upgrading BIOS:

```
"Copy Error"
```

```
"Setup cannot copy the file Audio3d.dll"
```

then the audio driver must be reinstalled.

To do this, use the audio driver from the B&R Homepage (**www.br-automation.com**).

During the installation of the audio driver, the following 2 files must be manually selected from the following directories.

ksuser.dll in the directory ...\Windows\system32

ks.sys in the directory ...\Windows\system32\drivers

2.2 Upgrading the firmware

With the APC620 / Panel PC firmware upgrade (MTCX, SDLR, SDLT), the firmware of a number of controllers (MTCX, SDLR, SDLT, UPS) can be updated, depending on the construction of the APC620 system.

2.2.1 Procedure

- Download and unzip the zip file from the B&R homepage.
- Create bootable media.

Information:

In MS-DOS, Win95 and Win98, a blank HD disk can be made bootable using the command line command "sys a:" or "format a: /s".
Information concerning creating a bootable diskette in Windows XP can be found on page 341.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 342.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 345.

- Copy the contents of the *.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
- Connect the bootable media to the APC620 and reboot the device.
- The following boot menu will be shown after startup:

Information:

The following boot menu options including descriptions are based on version 1.27 of the APC620 / Panel PC Firmware upgrade (MTCX, SDLR, SDLT) disk. In some cases, these descriptions might not match the version you are currently using.

Boot menu options:

```
1. Upgrade MTCX (APC620/PPC700) PX32 and FPGA

2. Upgrade SDLT (APC620) only

3. Upgrade SDLR (AP800/AP900) on monitor/panel

   3.1 Upgrade SDLR on AP 0 (AP800/AP900)

   3.2 Upgrade SDLR on AP 1 (AP800/AP900)
```

```
   3.3 Upgrade SDLR on AP 2 (AP800/AP900)

   3.4 Upgrade SDLR on AP 3 (AP800/AP900)

   3.5 Upgrade all SDR (AP800/AP900)

   3.6 Return to main menu

4. Upgrade SDLR (AP800/AP900) on AP link slot

   4.1 Upgrade SDLR on AP 8 (AP800/AP900)

   4.2 Upgrade SDLR on AP 9 (AP800/AP900)

   4.3 Upgrade SDLR on AP 10 (AP800/AP900)

   4.4 Upgrade SDLR on AP 11 (AP800/AP900)

   4.5 Upgrade all SDLR (AP800/AP900)

   4.6 Return to main menu

5. Upgrade add-on UPS (firmware and battery settings)

   5.1 Upgrade Add-on UPS Firmware (5AC600.UPSI-00)

   5.2 Upgrade Battery Settings (5AC600.UPSB-00)

   5.3 Return to main menu

6. Exit
```

Concerning item 1:
Automatically upgrade PX32 and FPGA for MTCX (default after 5 seconds).

Concerning item 2:
The FPGA of the SDLT controller on the AP Link slot is automatically updated.

Concerning item 3:
A submenu is opened for upgrading the SDLR controller on the Monitor/Panel plug.

3.1. Upgrade SDLR on AP 0 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 0.

3.2 Upgrade SDLR on AP 1 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 1.

3.3 Upgrade SDLR on AP 2 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 2.

3.4 Upgrade SDLR on AP 3 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 3.

3.5. Upgrade all SDLR (AP800/AP900)
All SDLR controllers are automatically updated on all Automation Panels on the Monitor/Panel
(by default, after 5 sec).

3.6. Return to main menu
Returns to the main menu.

Concerning item 4:
A submenu is opened for upgrading the SDLR controller on the AP Link slot.

4.1. Upgrade SDLR on AP 8 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 8.

4.2. Upgrade SDLR on AP 9 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 9.

4.3 Upgrade SDLR on AP 10 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 10.

4.4 Upgrade SDLR on AP 11 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 11.

4.5 Upgrade all SDLR (AP800/AP900)
All SDLR controllers are automatically updated on all Automation Panels on the AP Link slot (by default, after 5 sec).

4.6 Return to main menu
Returns to the main menu.

Concerning item 5:
The submenu for the add-on UPS firmware and upgrade and the battery settings upgrade is opened - this is irrelevant for PPC700 systems.

Concerning item 6:
Returns to the shell (MS-DOS).

Information:

The system must be powered off and on again after a successful controller upgrade.

2.2.2 Possible upgrade problems and version dependencies

1. The SDLR firmware can only be updated if an Automation Panel with Automation Panel Link Transceiver (5DLSDL.1000-01) and Automation Panel Link Receiver (5DLSDL.1000-00) is connected. This update is only permitted in an office environment (clean environment - no disturbances) because a software error in versions older than V0.03 can cause errors. This error can cause the Automation Panel to remain off after an update. If this error occurs, the Automation Panel Link Transceiver (5DLSDL.1000-01) or Automation Panel Link Receiver (5DLSDL.1000-00) must be exchanged or sent in for repair.

2. Daisy Chain operation of 2 Automation Panel 900 units is supported starting with SDLR version V00.08 or V01.01 and MTCX PX32 V01.33 and MTCX FPGA V01.11 (contents of the MTCX upgrade disk V01.04).

3. Operation of an SDLT adapter in the AP Link slot is supported starting with MTCX PX32 V01.50 and MTCX FPGA V01.12 (contents of the MTCX upgrade disk V01.07).

4. When using a functional SDL connection with an installed SDLR version V00.03 or lower, the SDLR must first be updated to version V00.05 or higher. Only then can the MTCX PX32 and FPGA be updated. If the MTCX PX32 and FPGA is updated first, then the SDLR FW can no longer be updated.

5. Starting with SDLR version V00.05 or V01.01, the MTCX PX32 must be higher than or equal to V01.23 and the MTCX FPGA must higher than or equal to V01.09. Otherwise, full SDL functionality is not possible.

6. SDL with equalizer is first supported starting with SDLR version V01.04 and MTCX PX32 version V01.55 and MTCX FPGA version V01.15. An SDLT with version V00.02 is required on the AP Link slot (contents of the MTCX upgrade disk V01.10). SDL with equalizer allows longer distances (max. 40m) depending on the AP being used. Detailed information for this can be found in the APC620 or PPC700 user's manual.

7. Automation Panel Link transceivers (5DLSDL.1000-01) or Automation Panel Link receivers (5DLSDL.1000-00) with a Firmware version lower than or equal to V00.10 can no longer be combined with Automation Panel Link transceivers (5DLSDL.1000-01) or Automation Panel Link receivers (5DLSDL.1000-00) with a Firmware higher than or equal to V01.04. Daisy Chain mode is not possible with such a combination.

8. The menu items "2. Upgrade MTCX PX32 only" and "3. Upgrade MTCX FPGA only" have been removed from the boat menu starting with MTCX Upgrade Disk V01.13.

9. The menu items "3. Upgrade SDLR on Monitor/Panel" and "4. Upgrade SDLR on AP Link Slot" (starting with MTCX upgrade disk V01.13) for upgrading the Automation Panel 800 series have been expanded.

10. The ID AP8H was changed to SDL8 (AP800 series).

11. The menu item "5. Upgrade add-on UPS (firmware and battery settings)", starting with MTCX upgrade disk V01.16, has been inserted.

12. Starting with MTCX upgrade disk V01.16, all firmware files are equipped with an XML header; as a result, the name assignment has changed (compatible with Automation Studio and Automation Runtime).

13. If a UPS (e.g. 5AC600.UPSI-00) + battery unit (e.g.: 5AC600.UPSB-00) is connected to the system and operable, then after an upgrade of the MTCX or SDLT you must either disconnect the battery or push the Power button (to put the system in Standby mode), before executing the required power off/on. If not, the firmware upgrade will not work because the UPS buffers the system.

14. Starting with UPS firmware V01.10, the APC620/PPC700 ADI driver + Control Center V01.80 should be used in order to configure the new options "configurable LowBatteryShutdownTime" and UL compliant "OverCurrentEnable".

15. The IF option Add-On Module CAN with SJA1000 (5AC600.CANI-01) is only supported starting with MTCX FPGA V01.23 (MTCX Upgrade DISK V01.24).

2.3 Creating an MS-DOS boot diskette in Windows XP

- Place an empty 1.44 MB HD diskette in the disk drive
- Open Windows Explorer
- Right-click on the 3½" floppy icon and select "**Format...**".

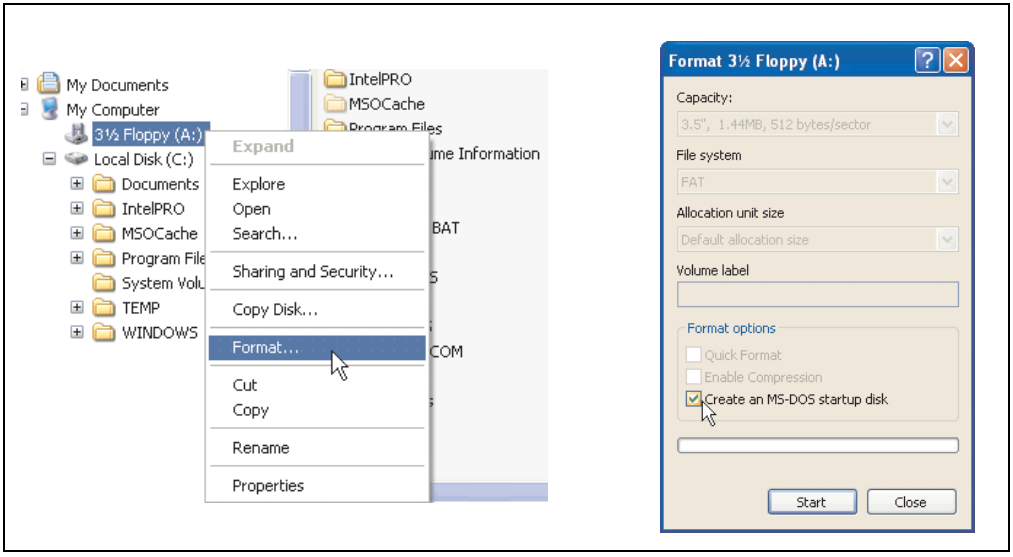


Figure 155: Creating a bootable diskette in Windows XP - step 1

- Then select the checkbox **"Create an MS-DOS startup disk"**, press **"Start"** and acknowledge the warning message with "OK".

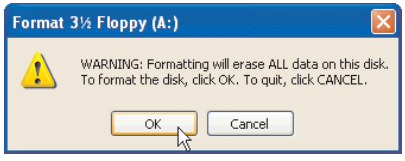


Figure 156: Creating a bootable diskette in Windows XP - step 2

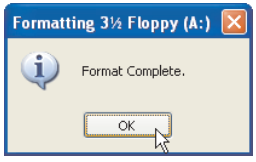


Figure 157: Creating a bootable diskette in Windows XP - step 3

After creating the startup disk, some of the files must be deleted because of the size of the update.

When doing this, all files (hidden, system files, etc.) must be shown on the diskette.

In Explorer, go to the Tools menu, select Folder Options... and open the View tab. Now deactivate the option Hide protected operating system files (Recommended) (activated by default) and activate the option Show hidden files and folders.

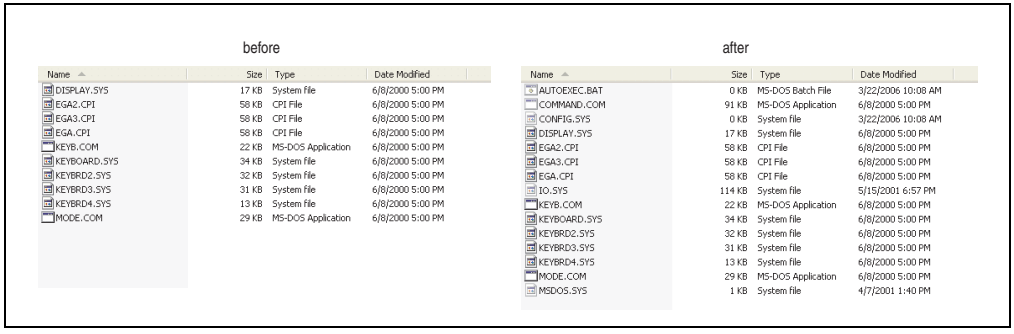


Figure 158: Creating a bootable diskette in Windows XP - step 4

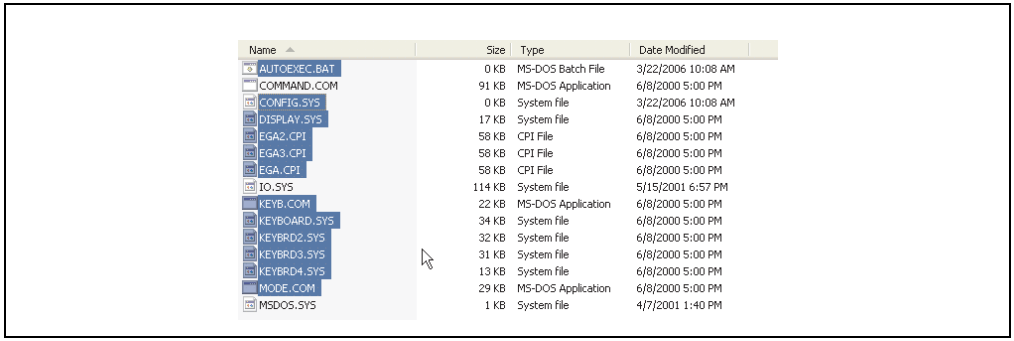


Figure 159: Creating a bootable diskette in Windows XP - step 5

Now all files (marked) except Command.com, IO.sys and MSDOS.sys can be deleted.

2.4 Creating a bootable USB flash drive for B&R upgrade files

When used in connection with a B&R industrial PC, it is possible to upgrade BIOS from one of the USB flash drives available from B&R. To do this, the USB flash drive must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded for free from the B&R homepage (www.br-automation.com).

2.4.1 Requirements

The following peripherals are required for creating a bootable USB flash drive:

- B&R USB flash drive
- B&R Industrial PC
- USB Media Drive
- B&R Embedded OS Installer (V3.00 or higher)

2.4.2 Procedure

- Connect the USB flash drive to the PC.
- If the drive list is not refreshed automatically, the list must be updated using the command **Drives > Refresh**.
- Mark the desired USB flash drive in the drive list.
- Change to the **Action** tab and select **Install a B&R Update to a USB flash drive** as type of action.
- Enter the path to the MS-DOS operating system files. If the files are part of a ZIP archive, then click on the button **By ZIP file...**. If the files are stored in a directory on the hard drive, then click on the button **By folder...**.
- In the **B&R Upgrade** text box, it's also possible to enter the path to the ZIP file for the B&R Upgrade Disk and select the file.
- Click on the **Start action** button in the toolbar.

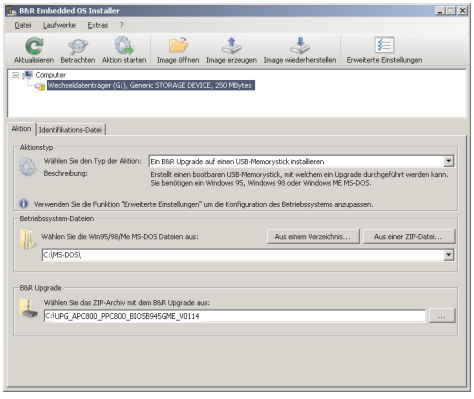


Figure 160: Creating a USB flash drive for B&R upgrade files

2.4.3 Where do I get MS-DOS?

Information concerning creating an MS-DOS boot diskette can be found in section 2.3 "Creating an MS-DOS boot diskette in Windows XP", on page 341. Then the files from the diskette are to be copied to your hard drive.

2.5 Creating a bootable CompactFlash card for B&R upgrade files

When used in connection with a B&R industrial PC, it is possible to upgrade BIOS from one of the CompactFlash cards available from B&R. To do this, the CompactFlash card must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded for free from the B&R homepage (www.br-automation.com).

2.5.1 Requirements

The following peripherals are required for creating a bootable CompactFlash card:

- CompactFlash card
- B&R Industrial PC
- B&R Embedded OS Installer (V3.10 or higher)

2.5.2 Procedure

- Insert the CompactFlash card in the CF slot on the industrial PC.
- If the drive list is not refreshed automatically, the list must be updated using the command **Drives > Refresh**.
- Select the desired CompactFlash card from the drive list.
- Change to the **Action** tab and select **Install a B&R Update to a CompactFlash card** as type of action.
- Enter the path to the MS-DOS operating system files. If the files are part of a ZIP archive, then click on the button **By ZIP file...**. If the files are stored in a directory on the hard drive, then click on the button **By folder...**.
- In the **B&R Upgrade** text box, it's also possible to enter the path to the ZIP file for the B&R Upgrade Disk and select the file.
- Click on the **Start action** button in the toolbar.

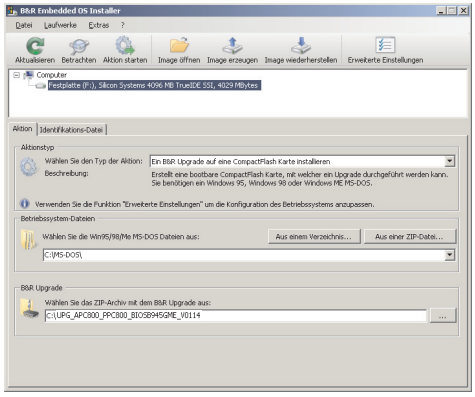


Figure 161: Creating a CompactFlash card for B&R upgrade files

2.5.3 Where do I get MS-DOS?

Information concerning creating an MS-DOS boot diskette can be found in section 2.3 "Creating an MS-DOS boot diskette in Windows XP", on page 341. Then the files from the diskette are to be copied to your hard drive.

2.6 Upgrade problems

Potential upgrade problems are listed in the Liesmich.txt or Readme.txt files on the upgrade disks.

3. Location of the DIP switch in APC620 system units

Warning!

The following procedure is only permitted with the power switched off and the supply voltage disconnected!

To get to the DIP switches, it is necessary to open the front cover. To do this, loosen the five Torx screws (T10) marked and pull the cover off towards the front. Then the DIP switches can be accessed at the location marked in yellow. The setting can now be made using a pointed object. If the system has a slide-in drive, it must be removed first to get to the DIP switches.

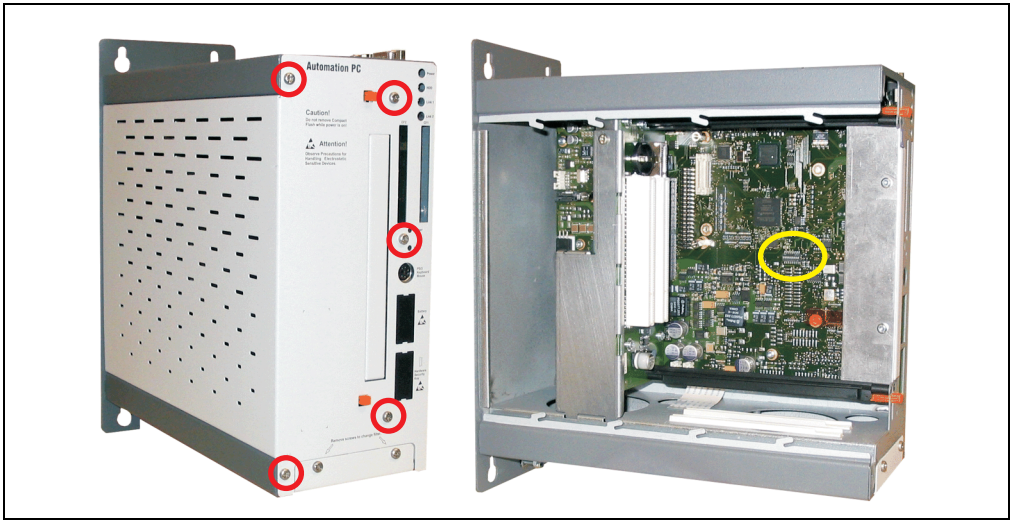


Figure 162: Location of DIP switch

4. Automation PC 620 with Automation Runtime

4.1 General information

An integral component of Automation Studio™ is Automation Runtime, the software kernel which allows applications to run on a target system. This runtime environment offers numerous important advantages:

- Guaranteed highest possible performance for the hardware being used
- Runs on all B&R target systems
- Makes the application hardware-independent
- Applications can be easily ported between B&R target systems
- Cyclic system guarantees deterministic behavior
- Configurable jitter tolerance in all task classes
- Supports all relevant programming language such as IEC 61131-3 and C
- Extensive function library conforming to IEC 61131-3 as well as the expanded B&R Automation library
- Integrated into Automation NET. Access to all networks and bus systems via function calls or the Automation Studio™ configuration

4.2 Support for Automation PC 620 embedded

4.2.1 ARwin

The fieldbus interfaces CAN, X2X, and POWERLINK are supported by ARwin with an AS 2.6 upgrade.

4.2.2 ARemb

The fieldbus interfaces CAN, X2X, and POWERLINK are supported by AR 2.94 together with an AS 2.7.

4.3 Support for the Automation PC 620 with 5PC600.X945-00 CPU board

4.3.1 ARwin

The system is supported by ARwin with an AS 3.0.80 upgrade.

4.3.2 ARemb

In preparation.

4.4 Selection of devices

Power supply buffering of 10 ms is guaranteed starting with the following system unit revisions:

Model number	Description	Revision
5PC600.SX01-00	System 1 PCI	B0
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	B0
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	B0
5PC600.SF03-00	System 3 PCI, 1 disk drive slot, 1 AP Link slot	A0
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	A0
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	A0
5PC600.SE00-00	APC620e System SDL EPL X2X CAN 512kB	A0
5PC600.SE00-01	APC620e System CRT EPL X2X CAN 512KB	A0
5PC600.SE00-02	APC620e System SDL EPL X2X CAN 1MB	A0

Table 224: System unit support for buffering with Automation Runtime

4.5 Visual Components graphic engine support

The output of graphics with Visual Components is only supported by graphic engine 1. Graphic engine 2 is not supported. The following table should clarify the mapping and stretching function of the graphic engine in connection with the different system unit variations.

System unit	Graphic engine (GE) Number	Graphic engine number on		Stretch support on graphic connection
		Monitor / Panel	AP Link slot (5AC600.SDL0-00)	
5PC600.SX01-00	1	GE1	-	Monitor / Panel
5PC600.SX02-00	2	analog RGB	GE1	AP Link slot (5AC600.SDL0-00)
5PC600.SX02-01	1	GE1	-	Monitor / Panel
5PC600.SF03-00	2	analog RGB	GE1	AP Link slot (5AC600.SDL0-00)
5PC600.SX05-00	2	analog RGB	GE1	AP Link slot (5AC600.SDL0-00)
5PC600.SX05-01	1	GE1	-	Monitor / Panel
5PC600.SE00-00	1	GE1	-	Monitor / Panel
5PC600.SE00-01	1	GE1	-	Monitor / Panel
5PC600.SE00-02	1	GE1	-	Monitor / Panel

Table 225: Visual Components video output with different system units

A graphic engine 1 (GE1) is only available in connection with AP Link SDL transmitter 5AC600.SDL0-00 for system units 5PC600.SX02-00, 5PC600.SX05-00 and 5PC600.SF03-00. If no AP Link SDL transmitter is present in the system units listed, then video output is not possible with Visual Components.

5. Automation PC 620 with MS-DOS

Figure 163: Automation PC 620 with MS-DOS

Model number	Short description	Note
9S0000.01-010	**OEM MS-DOS 6.22 German (disk)** OEM MS-DOS 6.22 German disks Only delivered with a new PC.	
9S0000.01-020	**OEM MS-DOS 6.22 English (disk)** OEM MS-DOS 6.22 English disks Only delivered with a new PC.	

Table 226: Model numbers - MS-DOS

5.1 Known problems

Either no drivers are available for the following hardware components or only with limitations:

- AC97 Sound - no support.
- USB 2.0 - only USB 1.1 rates can be reached.
  USB Support - only BIOS output USB is supported.
- Graphics Support - No special drivers available.
- A few "ACPI control" BIOS functions cannot be used.

The following table shows the tested resolutions and color depths on the Monitor / Panel connector with X945 CPU boards.

Resolutions for DVI	Color depth		
	8-bit	16-bit	24-bit
640 x 480	✓	✓	✓
800 x 600	✓	✓	✓
1024 x 768	✓	✓	✓
1280 x 1024	✓	✓	✓
Resolutions for RGB	**Color depth**		
	8-bit	**16-bit**	**24-bit**
640 x 480	✓	✓	✓
800 x 600	✓	✓	✓
1024 x 768	✓	✓	✓
1280 x 1024	✓	✓	✓
1600 x 1200	✓	✓	✓
1920 x 1440	✓	✓	

Table 227: Tested resolutions and color depths for DVI and RGB signals

6. Automation PC 620 with Windows XP Professional

Figure 164: Windows XP Professional Logo

Model number	Short description	Note
5SWWXP.0600-GER	**WinXP Professional with SP3, CD German** Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	
5SWWXP.0600-ENG	**WinXP Professional with SP3, CD English** Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device.	
5SWWXP.0600-MUL	**WinXP Professional with SP3, CD, Multi-language** Microsoft OEM Windows XP Professional Service Pack 3, CD, multi-language. Only available with a new device.	
5SWWXP.0500-GER	**WinXP Professional with SP2c, CD German** Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a new device.	
5SWWXP.0500-ENG	**WinXP Professional with SP2c, CD English** Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a new device.	
5SWWXP.0500-MUL	**WinXP Professional with SP2c, CD English** Microsoft OEM Windows XP Professional Service Pack 2c, CD, multi-language. Only available with a new device.	

Table 228: Model numbers - Windows XP Professional

6.1 Installation

Upon request, B&R will pre-install Windows XP Professional on the desired mass memory (add-on hard disk, slide-in hard disk). All of the drivers required for operation (graphics, network, etc.) are also installed when doing so.

6.1.1 FAQ

Installation on PCI SATA RAID controller - 5ACPCI.RAIC-03, 5ACPCI.RAIC-05

The following steps are necessary for installing Windows XP Professional on the PCI SATA RAID controller:

1) Download the RAID driver from the B&R homepage (**www.br-automation.com**) and copy the files to a diskette.
2) Connect the Media Drive (5MD900.USB2-01 or 5MD900.USB2-00) to the USB port.
3) Insert the diskette and Windows XP Professional CD in the the Media Drive and boot from the CD.
4) Press the F6 key during setup to install a third-party SCSI or a driver.
5) Press the "s" key when asked about installing an additional drive. Insert the disk in the floppy drive. Press "Enter" and select the driver.
6) Follow the setup instructions.
7) The setup copies the files to the Windows XP Professional folder and restarts the APC620.

6.2 Graphics drivers

For operation modes "extended desktop" and "dual display clone", the Intel Extreme graphics chip driver must be installed. Graphics drivers for X945 CPU boards are available for approved operating systems in the download area (Service - Material Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

6.2.1 Installing the graphics driver for X945 CPU boards

Information:

The following screenshots and descriptions refer to the graphics driver version 14.32.4 for X945 CPU boards. Therefore, it is possible that the screenshots and descriptions might not correspond with the installed driver version.

After the driver is installed, it can be configured in the Control Panel (called up through the icon in the taskbar or Start - Control Panel - Display - Settings - Advanced).

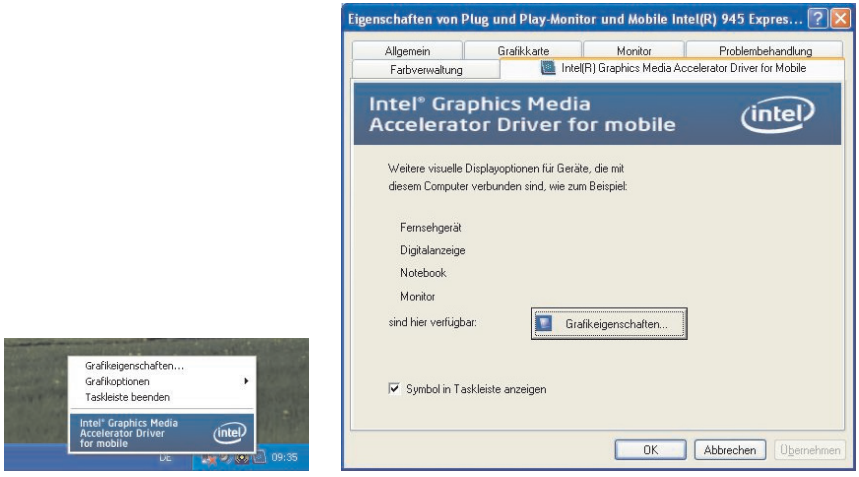


Figure 165: Accessing the graphics driver via Control Panel

6.2.2 Graphics settings for Extended Desktop

Under the "Extended desktop" settings, "Notebook" can be set as the primary device (Graphics Engine 1) and "Monitor" as secondary device. The two lines show different content (Extended Desktop).

The following table is valid for 5PC600.SX02-00, 5PC600.SX05-00 and 5PC600.SF03-00:

Driver settings		Effect on APC620	
Primary device	Notebook	AP Link output	Graphics engine 1
Secondary device	Monitor	Monitor / Panel	Monitor
Primary device	Monitor	Monitor / Panel	Monitor
Secondary device	Notebook	AP Link output	Graphics engine 1

Table 229: Relationship between driver settings and graphics engine for 5PC600.SX02-00, 5PC600.SX05-00 und 5PC600.SF03-00

The following table is valid for 5PC600.SX01-00, 5PC600.SX02-01, 5PC600.SX05-01, 5PC600.SE00-00 and 5PC600.SE00-02:

Driver settings		Effect on APC620	
Primary device	Notebook	Monitor / Panel	Graphics engine 1
Secondary device	Monitor	Monitor / Panel	Monitor
Primary device	Monitor	Monitor / Panel	Monitor
Secondary device	Notebook	Monitor / Panel	Graphics engine 1

Table 230: Relationship between driver settings and graphics engine for 5PC600.SX01-00, 5PC600.SX02-01, 5PC600.SX05-01, 5PC600.SE00-00 and 5PC600.SE00-02

Resolution and color depth can be configured separately for each line via the device settings for notebook and monitor.

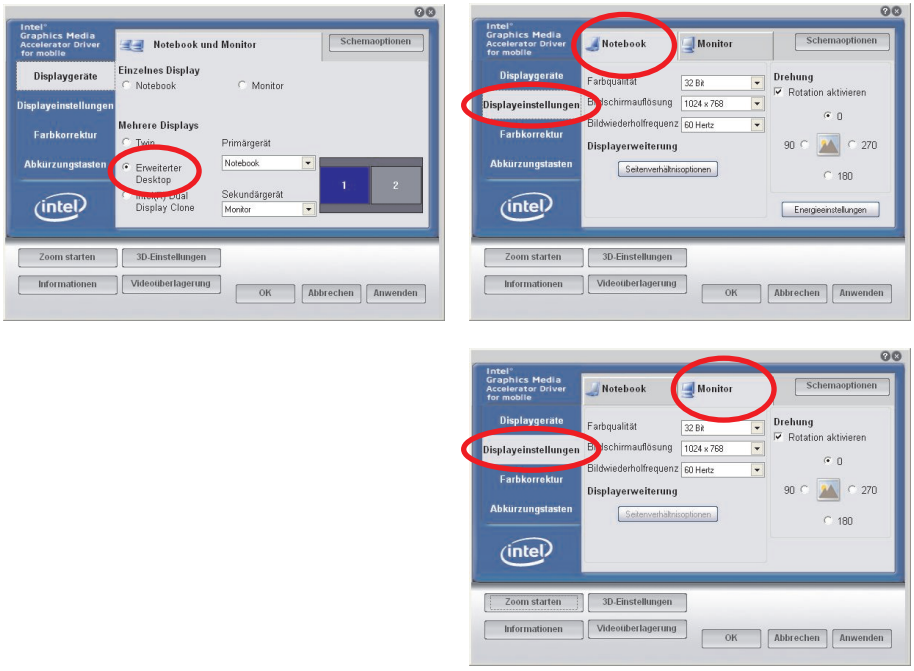


Figure 166: Extended desktop settings - primary device and monitor

The internal serial interface COM C on the APC620 must be activated in BIOS (under Advanced - Baseboard/Panel Features - Legacy Devices) for the Automation 900 devices' touch screens. See the section 6.3.1 "Installation for Extended Desktop", on page 359 for information about installing the touch screen driver.

A panel locking time can be set in the B&R Control Center to prevent simultaneous operation of the Automation Panel 900 (see the .chm help file for the B&R Control Center).

Information:

- **The panel locking time is reset to the value configured in the key configuration (KCF - Key Configuration File) when the system is restarted.**

6.2.3 Graphics settings for Dual Display Clone

In "Dual display clone" mode, the same content is displayed on every connected Automation Panel 900 unit on both lines (Graphics Engine 1 and Monitor). This enables operation of the application from every display.

The following table is valid for 5PC600.SX02-00, 5PC600.SX05-00 and 5PC600.SF03-00:

Driver settings		Effect on APC620	
Primary device	Notebook	AP Link output	Graphics engine 1
Secondary device	Monitor	Monitor / Panel	Monitor
Primary device	Monitor	Monitor / Panel	Monitor
Secondary device	Notebook	AP Link output	Graphics engine 1

Table 231: Relationship between driver settings and graphics engine (DDC) for 5PC600.SX02-00, 5PC600.SX05-00 und 5PC600.SF03-00

The following table is valid for 5PC600.SX01-00, 5PC600.SX02-01, 5PC600.SX05-01, 5PC600.SE00-00 and 5PC600.SE00-02:

Driver settings		Effect on APC620	
Primary device	Notebook	Monitor / Panel	Graphics engine 1
Secondary device	Monitor	Monitor / Panel	Monitor
Primary device	Monitor	Monitor / Panel	Monitor
Secondary device	Notebook	Monitor / Panel	Graphics engine 1

Table 232: Relationship between driver settings and graphics engine (DDC) for 5PC600.SX01-00, 5PC600.SX02-01, 5PC600.SX05-01, 5PC600.SE00-00 and 5PC600.SE00-02

Resolution and color depth can only be set on the line designated as the primary device.

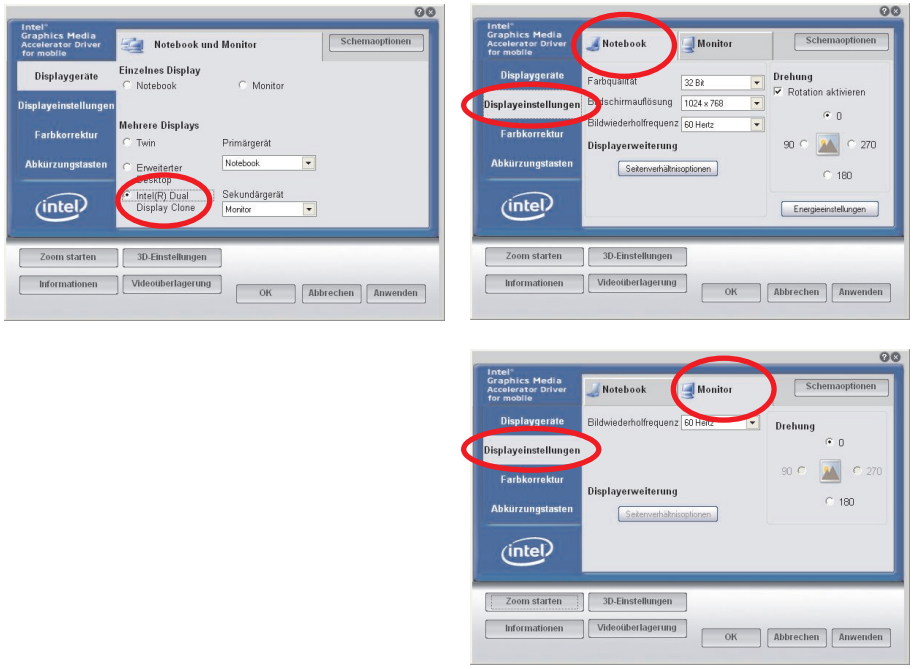


Figure 167: Dual display clone settings - primary and monitor

The internal serial interface COM C on the APC620 must be activated in BIOS (under Advanced - Baseboard/Panel Features - Legacy Devices) for the Automation 900 devices' touch screens. See the section 6.3.2 "Installation for Dual Display Clone", on page 361 for information about installing the touch screen driver.

A panel locking time can be set in the B&R Control Center to prevent simultaneous operation of the Automation Panel 900 (see the .chm help file for the B&R Control Center).

Information:

- **The panel locking time is reset to the value configured in the key configuration (KCF - Key Configuration File) when the system is restarted.**

6.3 Touch screen driver

For operation modes "extended desktop" and "dual display clone", the Elo touch screen driver must be installed. This can be found in the download area (Service - Material Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (www.br-automation.com).

Information:

The touch screen drivers are based on the Windows mouse system. That means that either a mouse (USB or PS/2) must have been connected during the Windows installation or the mouse drivers must be installed additionally (e.g. automatically installed when later connecting a USB mouse). The BIOS function "PS/2 Mouse" must be set to "Enabled" when using a PS/2 mouse. This is located on the BIOS setup page "Advanced" - "Miscellaneous" (the default setting is "Disabled").

6.3.1 Installation for Extended Desktop

Information:

- Activate COM C and COM D in BIOS.
- During installation the panel locking time must be set to 0 ms ("Auto detect" of the driver could only recognize 1 touch screen).

- Executing setup
- The Automation Panel 900 unit's touch screen is connected with the APC620 serially, so the serial touch screen drivers must be installed.

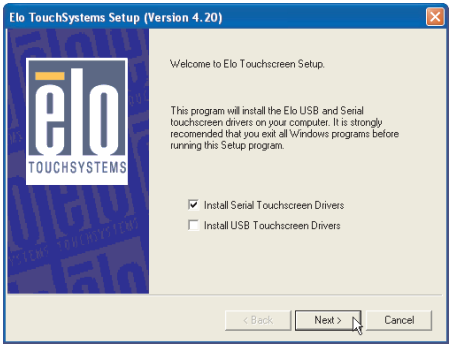


Figure 168: Touch screen driver - serial touch screen

- The driver's auto-detect function sends data packets to every existing serial interface. It then returns a list of all the ports on which an Elo touch screen is connected. The panel locking time must be set to 0 ms (auto-detect only found 1 touch screen)

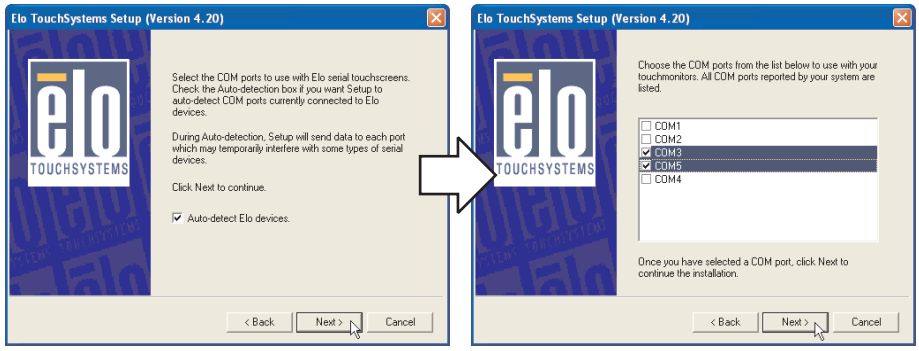


Figure 169: Touch screen driver - auto-detect

- After selecting the COM ports on which Elo touch screens are connected, the system must be rebooted.
- After restarting, each line of touch screens must be calibrated separately. This is done in the menus "Properties 1" and "Properties 2" with the "Align" button. When one touch screen is being calibrated, the others are automatically locked.

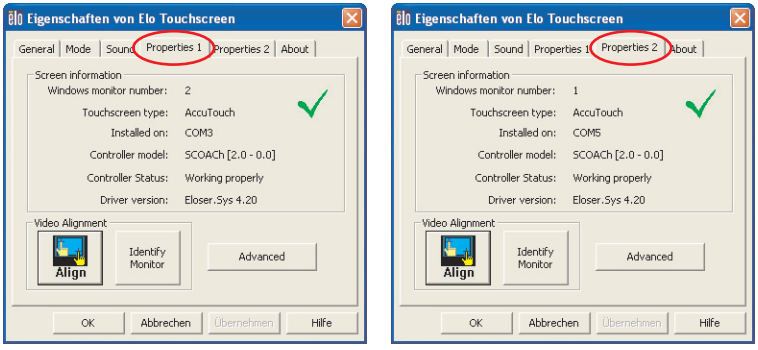


Figure 170: Touch screen calibration

6.3.2 Installation for Dual Display Clone

Information:

- Activate COM C in BIOS.
- During installation the panel locking time must be set to 0 ms ("Auto detect" of the driver could only recognize 1 touch screen).

- Executing setup
- The Automation Panel 900 unit's touch screen is connected with the APC620 serially, so the serial touch screen drivers must be installed.

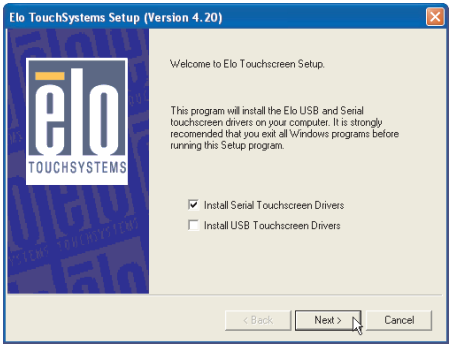


Figure 171: Touch screen driver - serial touch screen

- The driver's auto-detect function sends data packets to every existing serial interface. It then returns a list of all the ports on which an Elo touch screen is connected. The panel locking time must be set to 0 ms (auto-detect only found 1 touch screen)

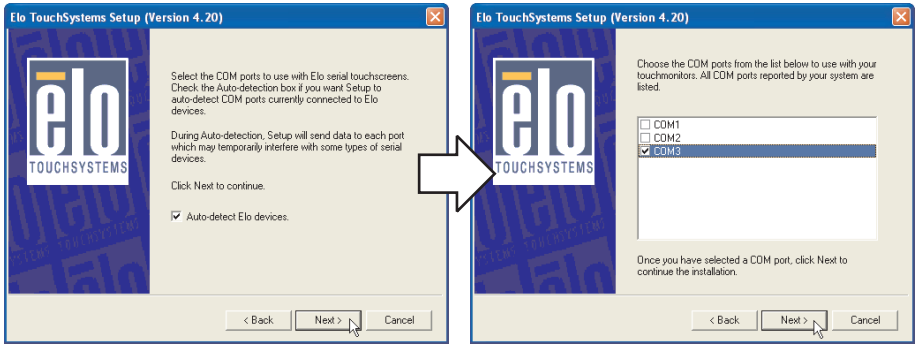


Figure 172: Touch screen driver - auto-detect

- After selecting the COM ports on which Elo touch screens are connected, the system must be rebooted.
- After restarting, only one touch screen must be calibrated. These settings are then applied to other touch screens.

Figure 173: Touch screen calibration

6.3.3 FAQ

Power options and touch screen

The power options allow a few different settings (e.g. Turn off monitor, Turn off hard disks and System standby for a Windows XP system).

Caution!

If the "Turn off monitor" function is enabled and a time has been set, then touching the dark touch display after the time has expired presents the risk of "blindly" activating one of the commands in the application and unintentionally triggering functions.

This can be avoided by activating a screen saver. As a result, the next time the touch screen is touched, the screen saver is deactivated.

6.4 Audio driver

An audio driver can be found in the download area (Service - Material Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

See the section "MIC, Line IN and Line OUT ports", on page 123 for information about the audio driver type.

6.4.1 Installation

Execute the downloaded setup.

Information:

The option "AC97 Audio controller" must be set to "Enabled" (default setting) in BIOS under Advanced - I/O Device Configuration.

6.5 Network driver

The APC620 has 2 different networks controllers. Drivers for both network connections (ETH1 and ETH2) are available for approved operating systems in the download area (Service - Material Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

See the sections "Ethernet connection ETH1", on page 109 and "Ethernet connection ETH2", on page 111 for information about network controller types.

6.5.1 Installation ETH1

Execute the downloaded setup.

6.5.2 Installation ETH2

Installation is performed via the Windows device manager using the Net559ER.inf file.

6.6 Automation PC 620 embedded

The fieldbus interfaces CAN, X2X and POWERLINK are not supported by Microsoft Windows XP (no drivers present).

7. Automation PC 620 with Windows 7

Figure 174: Windows 7 Logo

Model number	Short description	Note
5SWWI7.0100-GER	**Win7 Pro 32-bit DVD, GER** Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.	
5SWWI7.0100-ENG	**Win7 Pro 32-bit DVD, ENG** Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.	
5SWWI7.0300-MUL	**Win7 Ult 32-bit DVD, MUL** Microsoft OEM Windows 7 Ultimate 32-bit, DVD, Multilanguage. Only available with a new device.	

Table 233: Model numbers - Windows 7

7.1 Installation

Upon request, B&R can pre-install the required Windows 7 version on the desired mass memory (add-on hard disk). All of the drivers required for operation (graphics, network, etc.) are also installed when doing so.

7.1.1 Installation on PCI SATA RAID controller - 5ACPCI.RAIC-03, 5ACPCI.RAIC-05

The following steps are necessary for installing Windows 7 on the PCI SATA RAID controller:

1) Download the RAID driver for Windows 7 from the B&R homepage (**www.br-automation.com**) and copy the data to a folder on a flash drive.

2) Boot using the Windows7 DVD.

3) Follow the installation steps until a page appears asking "Where do you want to install Windows?".

4) Plug the USB flash drive with the RAID drivers into an available USB port.

5) Click on "Load driver", and navigate to the directory containing the RAID drivers. Then click Next to continue.

6) Remove the USB flash drive.

7) The Windows 7 installation can now be performed as usual.

7.2 Drivers

The latest drivers for all released operating systems can be found in the download area (Service - Material Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

7.3 Special considerations, limitations:

- Windows 7 system evaluation (system classification) is not currently supported.
- Windows 7 does not contain a Beep.sys file, which means that audible signal is no longer played (i.e. when touching a key or button).

8. Automation PC 620 with Windows XP Embedded

Figure 175: Windows XP Embedded Logo

Model number	Short description	Note
5SWWXP.0430-ENG	**WinXPe FP2007 APC620 945GME XTX** Microsoft OEM Windows XP Embedded Feature Pack 2007, English; for APC620 with CPU board 5PC600.X945-00; order CompactFlash separately (at least 512 MB).	

Table 234: Model numbers - Windows XP Embedded

8.1 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.

8.2 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	✓

Table 235: Device functions in Windows XP Embedded with FP2007

Function	Present
Windows Firewall	✓
MSN-Explorer	-
Outlook Express	-
Administrative Tools	✓
Remote Desktop	✓
Remote Assistance	-
.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 235: Device functions in Windows XP Embedded with FP2007

8.3 Installation

Upon request, Windows XP Embedded can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 512 MB). The APC620 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 for X945 CPU boards can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

8.4 Graphics drivers

Already included in the B&R Windows XP Embedded image for X945 CPU boards.

8.5 Touch screen driver

The touch screen driver must be manually installed in order to operate Automation Panel 900 touch screen devices. The driver installation is identical to the driver installation for Windows XP Professional Systems. For more information, see 6.3 "Touch screen driver", on page 359

The driver can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

8.6 Audio driver

Already integrated in the B&R Windows XP Embedded image for X945 CPU boards.

8.6.1 After a BIOS upgrade

If the following error message appears after upgrading BIOS:

```
"Copy Error"
```

```
"Setup cannot copy the file Audio3d.dll"
```

then the audio driver must be reinstalled.

To do this, use the audio driver from the B&R Homepage (**www.br-automation.com**).

During the installation of the audio driver, the following 2 files must be manually selected from the following directories.

ksuser.dll in the directory ...\Windows\system32

ks.sys in the directory ...\Windows\system32\drivers

8.7 Network driver

Already integrated in the B&R Windows XP Embedded image for X945 CPU boards.

8.8 FAQ

8.8.1 Why does the B&R device restart when shutdown?

If the APC620 is connected with a B&R device, then the option "USB root hubs" must be disabled in the Windows XP Embedded device manager under "Universal Serial Bus controllers" using the following dialog box: **Properities > Power Management > Allow the computer to turn off this device to save power**.

9. Automation PC 620 with Windows Embedded Standard 2009

Figure 176: Windows Embedded Standard 2009 Logo

Model number	Short description	Note
5SWWXP.0730-ENG	**Windows Embedded Standard 2009 APC620 945GME** Microsoft OEM Windows Embedded, Standard 2009, English; for APC620 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	

Table 236: Model numbers - Windows Embedded Standard 2009

9.1 General information

Windows XP Embedded Standard 2009 is the modular version of the desktop operating system Windows XP Professional with Service Pack 3. Windows Embedded Standard 2009 is based on the same binary files as Windows XP Professional with Service Pack 3 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 Embedded Standard 2009 is also based on the same reliable code as Windows XP Professional with SP3. It provides industry with leading reliability, improvements in security and performance, and the latest technology for Web browsing and extensive device support.

9.2 Features with WES2009 (Windows Embedded Standard 2009)

The feature list shows the most important device functions in Windows Embedded Standard 2009.

Function	Present
Enhanced write filter (EWF)	✓
File Based Write Filter	✓
Page file	Configurable
Administrator account	✓
User account	Configurable
Explorer shell	✓
Registry filter	✓
Internet Explorer 7.0	✓
Internet information service (IIS)	-
Terminal service	✓
Windows Firewall	✓
MSN-Explorer	-
Outlook Express	-
Administrative Tools	✓
Remote Desktop	✓
Remote Assistance	-
.NET Framework	-
ASP.NET	-
Local Network Bridge	✓
Codepages/User Locale/Keyboard	✓
Disk Management Service	✓
Windows Installer Service	✓
Class Installer	✓
CoDevice Installer	✓
Media Player 6.4	✓
DirectX 9.0c	✓
Accessories	✓
Number of fonts	89

Table 237: Device functions in Windows Embedded Standard 2009

9.3 Installation

Upon request, Windows Embedded Standard 2009 can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 1GB). The APC620 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.

9.4 Drivers

All drivers required for operation are preinstalled on the operating system. If an older driver version is installed, the latest version can be downloaded from the B&R homepage (**www.br-automation.com**) and installed. A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

9.4.1 Touch screen driver

The touch screen driver must be manually installed in order to operate Automation Panel 800 or Automation Panel 900 touch screen devices. The driver can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

10. Automation PC 620 with Windows Embedded Standard 7

Figure 177: Windows Embedded Standard 7 Logo

Model number	Short description	Note
5SWWI7.0530-ENG	**Windows Embedded Standard 7 APC620 945GME** Microsoft OEM Windows Embedded, Standard 7 32-bit, English; for APC620 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 8 GB).	
5SWWI7.0730-MUL	**Windows Embedded Standard 7 Premium APC620 945GME** Microsoft OEM Windows Embedded, Standard 7 Premium 32-bit, Multilanguage; for APC620 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 8 GB).	

Table 238: Model numbers - Windows Embedded Standard 2009

10.1 General information

The successor to Windows® XP Embedded has been given the name Windows® Embedded Standard 7. As with previous versions, this embedded operating system offers full system support of Automation PC 620, Automation PC 810, Panel PC 700, Panel PC 800 and Power Panel 500 devices. In addition to brand new features that are also included in Windows ® 7 Professional, Windows® Embedded Standard 7 includes embedded components such as Enhanced Write Filter, File-Based Write Filter, Registry Filter and USB Boot. Windows® Embedded Standard 7 is available in two different versions. The main difference between them has to do with multilanguage support. Windows® Embedded Standard 7 is only available in a single language, whereas Windows® Embedded Standard 7 Premium supports the installation of several languages simultaneously.

With Windows® Embedded Standard 7, Microsoft has made substantial improvements in the area of security. The AppLocker program, available in the premium version, can prevent the execution of unknown or potentially unwanted applications that should be installed over a network or from drives that are directly connected. A tiered approach allows the differentiation between scripts (.ps1, .bat, .cmd, .vbs and .js), installer files (.msi, .msp) and libraries (.dll, .ocx). AppLocker can also be configured to record undesired activity and display it in the Event Viewer. Windows® Embedded Standard 7 is available in both 32-bit and 64-bit versions, which ensures that even the most demanding applications have the level of support they need.

10.2 Features with WES7 (Windows Embedded Standard 7)

The feature list shows the most important device functions in Windows Embedded Standard 7.

Function	Windows Embedded Standard 7	Windows Embedded Standard 7 Professional
Enhanced write filter (EWF)	✓	✓
File Based Write Filter	✓	✓
Administrator account	✓	✓
User account	Configurable	Configurable
Windows Explorer Shell	✓	✓
Registry filter	✓	✓
Internet Explorer 8.0	✓	✓
Internet Information Service (IIS) 7.0	✓	✓
AntiMalware (Windows Defender)	-	✓
Add-ons (Snipping tool, Sticky Notes)	-	✓
Windows Firewall	✓	✓
.NET Framework 3.5	✓	✓
Remote Desktop Protocol 7.0	✓	✓
File Compression Utility	✓	✓
Windows Installer Service	✓	✓
Windows XP Mode	-	✓
Media Player 12	✓	✓
DirectX	✓	✓
Multilingual User Interface Packs in the same image	-	✓
International Components and Language Services	✓	✓
Language Pack Setup	✓	✓
Windows Update	Configurable	Configurable
Windows PowerShell 2.0	✓	✓
Bitlocker	-	✓
Applocker	-	✓
Tablet PC Support	-	✓
Windows Touch	-	✓
Boot from USB Stick	✓	✓
Accessories	✓	✓
Page file	Configurable	Configurable
Number of fonts	134	134

Table 239: Device functions in Windows Embedded Standard 7

10.3 Installation

Upon request, Windows Embedded Standard 7 can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 8 GB). The APC620 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.

10.4 Drivers

All drivers required for operation are preinstalled on the operating system. If an older driver version is installed, the latest version can be downloaded from the B&R homepage (**www.br-automation.com**) and installed. A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

10.4.1 Touch screen driver

A touch screen driver will be automatically installed if a touch controller is detected during the Windows Embedded Standard 7 setup.

The touch screen driver must be installed manually if a touch controller was not detected during the Windows Embedded Standard 7 setup or if a an Automation Panel 800/900 has been connected after setup. The driver can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

11. Automation PC 620 with Windows CE

Model number	Short description	Note
5SWWCE.0830-ENG	**WinCE6.0 Pro APC620 945GME XTX** Microsoft OEM Windows CE 6.0 Professional, English; for APC620 with CPU board 5PC600.X945-00; order CompactFlash separately (at least 128 MB).	

Table 240: Model numbers - Windows CE

11.1 General information

B&R 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. A further advantage of B&R Windows CE compared to other operating systems are the low licensing costs.

11.2 Windows CE 6.0 features

Detailed information about Windows CE for B&R devices can be downloaded in the download area on the B&R homepage (www.br-automation.com).

Features	Windows CE 6.0
Supported screen resolutions	VGA (TFT), SVGA (TFT), XGA (TFT)
Chipset	Intel 945GME
Color depth	16-bit or 65,536 colors[1)]
Graphics card driver	Intel(R) embedded graphics driver
Main memory	Automatic detection and use of up to 512 MB RAM
Boot time / Startup time	Approx. 20 seconds
Screen rotation	not supported
Web browser	Internet Explorer
.NET	Compact Framework
Image size	Approx. 38 MB, uncompressed[2)]

Table 241: Windows CE 6.0 features

Features	Windows CE 6.0
Custom keys	Supported
PVI	Supported
Automation Device Interface	Supported
Remote Desktop Protocol for thin clients	Supported
B&R VNC Viewer	Supported
B&R Task Manager	Supported
B&R Picture Viewer	Supported
Compatible with zenOn	Yes
Compatible with Wonderware	No
Serial interfaces for any use	3
DirectX	No
Audio ports	"Line OUT" and "MIC" are supported. "Line IN" is not supported.

Table 241: Windows CE 6.0 features

1) The color depth depends on the display used.
2) Use the function *"Compress Windows CE Image"* in the B&R Embedded OS Installer to reduce the image size.

11.3 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)

11.4 Installation

Windows CE is usually preinstalled at the B&R plant.

11.4.1 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.

12. B&R Automation Device Interface (ADI) driver - Control Center

The ADI (Automation Device Interface) driver enables access to specific functions of B&R devices. Settings for this device can be read and edited using the B&R Control Center applet in the control panel.

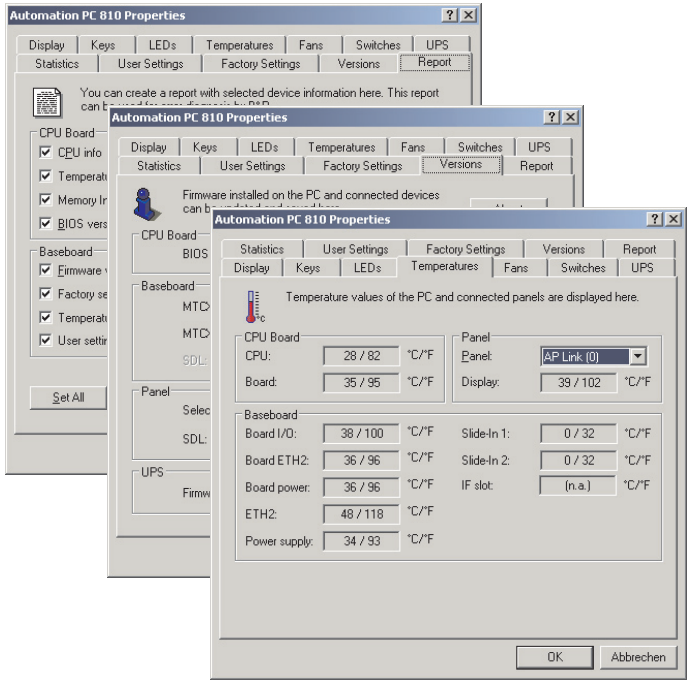


Figure 178: ADI Control Center screenshots - Examples (symbol photo)

Information:

The displayed temperature and voltage values (e.g. CPU temperature, core voltage, battery voltage) on the corresponding ADI page represent uncalibrated information values. These cannot be used to draw any conclusions about any hardware alarms or error conditions. The hardware components used have automatic diagnostics functions that can be applied in the event of error.

12.1 Features

Information:

The functions provided by the Automation Device Interface (ADI) - Control Center vary according to device series.

- Adjusting the display-specific parameters of connected Panels
- Reading of device-specific keys
- Activation of device specific LEDs on a foil keypad
- Reading temperatures, fan speeds, statistical data, and switch settings
- Reading user settings and factory settings
- Reading software versions
- Updating and securing firmware
- Creating reports about the current system (support assistance)
- Setting the SDL equalizer value for the SDL cable adjustment
- Configuring an optional mounted UPS
- Change the user serial ID.

Supports following systems:

System	Operating system	Note
Automation PC 820	Windows XP Professional	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Automation PC 810	Windows XP Professional	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Automation PC 620	Windows XP Professional	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows CE	Content of B&R Windows CE image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Panel PC 700	Windows XP Professional	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
	Windows CE	Content of B&R Windows CE image

Table 242: System support - ADI driver

System	Operating system	Note
Panel PC 725	Windows XP Professional	Installation using its own setup
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
	Windows CE	Content of B&R Windows CE image
Panel PC 800	Windows XP Professional	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Power Panel BIOS devices	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows CE	Content of B&R Windows CE image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Mobile Panel BIOS devices	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows CE	Content of B&R Windows CE image
Automation Panel 800	-	Together with APC620/ APC810/ APC820/ PPC700/ PPC800
Automation Panel 900	-	Together with APC620/ APC810/ APC820/ PPC700/ PPC800

Table 242: System support - ADI driver

A detailed description of the Control Center can be found in the integrated online help.

The B&R Automation Device Interface (ADI) driver (also contains Control Center) can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**).

12.2 Installation

The latest version of the ADI driver for the existing target system can be found in the download area (Service - Material Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

1) Download and unzip the ZIP archive

2) Close all applications.

3) Start BrSetup.exe (e.g. by double clicking in Explorer) or right click on BrSetup.inf in explorer and select "Install".

Information:

The ADI driver and B&R control center are already included in the Windows XP Embedded and Windows Embedded Standard 2009 operating system.

If a more current ADI driver version exists (see the B&R homepage download area), it can be installed later. A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration when installing.

12.3 SDL Equalizer setting

1) Start the **Control Center** in the **Control Panel**.

2) Then select the **Display** tab.

3) Click on **Settings**. This opens the following dialog box:

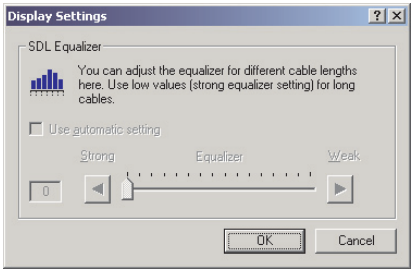


Figure 179: ADI Control Center - SDL equalizer settings

You can change the display's SDL equalizer settings in this dialog box. The equalizer is integrated in the Automation Panel and adapts the DVI signal to various cable lengths. The equalizer value is automatically calculated based on the cable length: You may set a different equalizer value in order to obtain the best possible display quality (e.g. with low-quality cables or poor DVI signal quality).

The value is optimally defined for the cable length when using the "Automatic setting".

Information:

The equalizer value can only be changed if the function is supported by the panel (panel firmware version 1.04 or higher) and if MTCX PX32 version 1.54 or higher is installed. Otherwise, the dialog fields are disabled.

12.4 UPS configuration

Here you can view the status values for an optionally installed B&R APC add-on UPS as well as change, update or save the battery settings for the UPS. You can also configure the system settings for the UPS.

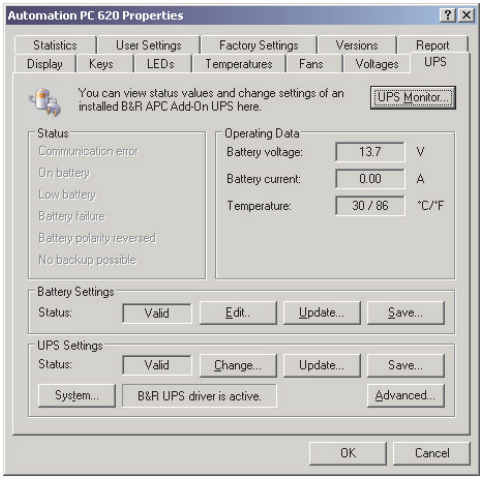


Figure 180: ADI Control Center - UPS settings

Caution!

The installed UPS must be selected and configured in the Control Panel using the energy options in order for battery operation to be supported.

Information for Windows XP Embedded:

The UPS service is supported starting with B&R Windows Embedded Version 2.10 or higher.

12.4.1 Installing the UPS service for the B&R APC add-on UPS

1) Open the **Control Center** in the **Control** Panel.

2) Select **UPS** tab.

3) Under **UPS settings**, click on **System**. This opens the **Power Options** in the **Control Panel**. (The **Power Options** can also be opened directly from the **Control Panel**.)

4) Select the **UPS** tab and click **Select...**.

5) Choose 'Bernecker + Rainer' as manufacturer and 'APC Add-On UPS' as model and then click **Finish**. The value for the COM connection is only required for a serially connected UPS and is ignored by the APC add-on UPS driver.

6) Click on **Apply** to start the UPS service. After a few seconds the UPS status and details are displayed.

7) Click **OK**.

8) The text field beside **System** (on the **UPS** tab in the **Control Center**) also indicates whether the B&R UPS driver is active.

Information:

- **Administrator rights are required in order to change the energy options or display the UPS status.**

12.4.2 Displaying UPS status values

1) Open the **Control Center** in the **Control** Panel.

2) Select **UPS** tab.

The displayed values are updated automatically.

Information:

The "reversed battery polarity" status is only displayed in UPS firmware version 1.08 or higher.

In UPS firmware Version 1.07 or smaller, a change between battery operation and normal operation can lead to communication errors.

3) **Select UPS monitor** to display UPS status changes since the last time the system or UPS driver was started.

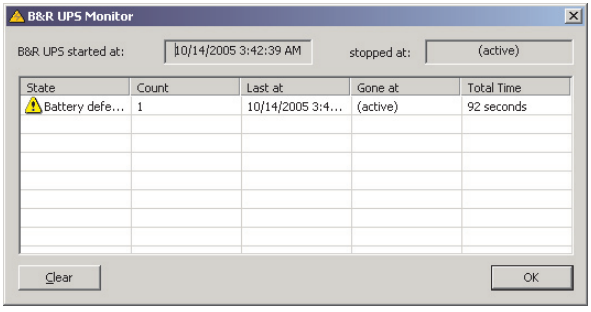


Figure 181: ADI Control Center - UPS monitor

The dialog box is updated automatically when the status changes.

To remove a status from the list, click on **delete**.

Information:

The current status of the UPS is also displayed when the UPS service is started in the Windows Control Panel on the UPS page in the energy options.

Information:

In a German version of Windows XP Professional the battery status is displayed as "low" in the energy options, even if the battery is OK (Windows error). In an English version, three battery status levels are displayed: unknown, OK, replace A low battery status is never displayed.

12.4.3 Changing UPS battery settings

1) Open the **Control Center** in the **Control** Panel.
2) Select **UPS** tab.
3) Under Battery settings, click on **Edit**. Clicking on "Open" opens a dialog box.
4) Select and **open** the file containing the battery settings.

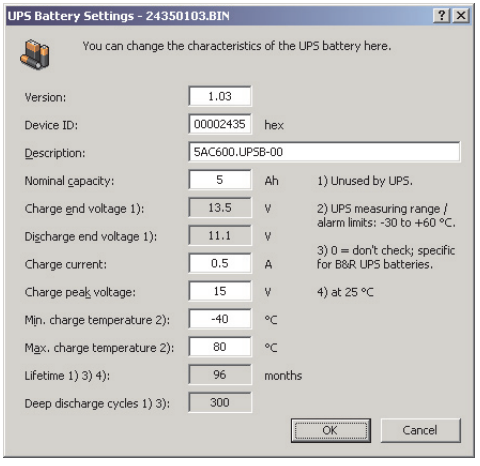


Figure 182: ADI Control Center - UPS battery settings

In this dialog box you can change the settings for the UPS battery.

The changed settings are written to the file by clicking on the **OK** button. The battery settings for the UPS can then be updated with this file.

Information:

To make settings for batteries not from B&R, it is best to make a copy of a file with battery settings from B&R under a new name and make adjust the settings in this file for the battery being used.

Current files with settings for batteries from B&R can be found on the B&R APC620 / PPC700 firmware upgrade disk (starting with V1.16) and can also be updated using these.

Information:

- **The current UPS firmware version 1.10 does not use charge end voltage, deep discharge voltage, lifespan and deep discharge cycles.**
- **Lifespan is only included in version 2 (and higher) of the UPS battery settings and only valid for B&R UPS batteries at 25°C ambient temperature.**
- **Deep discharge cycles are only included in version 3 (and higher) of the UPS battery settings and only valid for B&R UPS batteries.**

Information:

If you would like to change the current battery settings on the UPS, they must first be saved in a file.

12.4.4 Updating UPS battery settings

1) Open the **Control Center** in the **Control** Panel.
2) Select **UPS** tab.
3) Under **Battery settings**, click on **Update**. Clicking on "Open" opens a dialog box.
4) Select and **open** the file containing the battery settings. The "Download" dialog box is opened.

The transfer can be aborted by clicking on **Cancel** in the Download dialog box. **Cancel** is disabled when the flash memory is being written to.

Caution!

- **The UPS cannot be operated while updating the battery settings.**
- **If the transfer is interrupted, then the procedure must be repeated until the battery settings have been updated successfully. Otherwise battery operation will no longer be possible.**

Deleting the data in flash memory can take several seconds depending on the memory block being used. The progress indicator is not updated during this time.

Information:

The UPS is automatically restarted after a successful download. This can cause a brief failure in the UPS communication.

12.4.5 Saving UPS battery settings

1) Open the **Control Center** in the **Control** Panel.
2) Select **UPS** tab.
3) Under Battery settings, click on **Save**. Clicking on "Save under" opens a dialog box.
4) Enter a file name or select an existing file and click on **Save**.

Information:

UPS settings can only be saved using UPS firmware version 1.10 and higher.

The transfer can be aborted by clicking on **Cancel** in the Download dialog box.

12.4.6 Configuring UPS system settings

1) Open the **Control Center** in the **Control** Panel.
2) Select **UPS** tab.
3) Under **UPS settings**, click on **System**. The energy options dialog box in the Control Panel is opened.

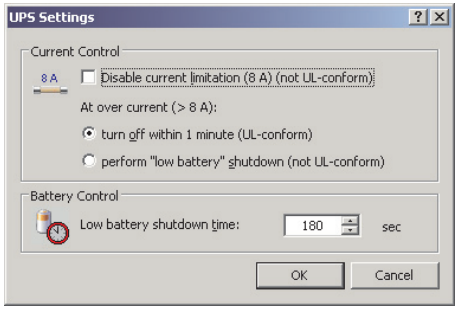


Figure 183: ADI Control Center - UPS settings

Further information regarding the UPD system settings can be found in the Windows help.

Information:

- **UPS settings can only be changed using UPS firmware version 1.10 and higher. If there are no changed settings on the UPS, then the factory or default settings are used.**
- **The UPS is automatically restarted after UPS settings have been changed. This can cause a brief disruption in communication with the UPS.**
- **Administrator rights are required in order to change the energy options or display the UPS status.**

Disabling 8 A current limitation

Information:

It is not UL compliant to switch off the 8 A current limitation on devices during battery operation!

"Low Battery" shutdown caused by an overcurrent > 8 A on devices during battery operation is not UL compliant!

Select the checkbox **Disable current limitation** (8 A).

If current limitation is enabled (checkbox deselected), then the UPS uses battery operation to check whether the UPS battery is discharged with 8 A for longer than 16 seconds. If so, then an overcurrent alarm is sent to the PC.

Information:

Current limitation is only supported with UPS firmware version 1.10 and higher.

Enabling one of the two following options determines how the UPS should perform when an overcurrent alarm occurs:

If **Turn-off within 1 minute** is selected, then the UPS will turn-off within one when an overcurrent alarm occurs.

Warning!

The operating system will not be properly shut down if an overcurrent alarm occurs!

If Perform **"low battery"** shutdown is selected, then the UPS will also signal a "Low battery alarm" in addition to the overcurrent alarm and will turn off after the defined **Low battery shutdown time**. This will allow the operating system to shut down properly when UPS service is enabled.

Changing the UPS shutdown time when battery is low

Enter the **"Low Battery" shutdown time** in seconds. This is the amount of time that the UPS will wait before shutting off the power supply when the battery level is low.

This prevents the UPS battery from becoming too discharged if the Windows UPS service is not enabled and the UPS is therefore not turned off by the operating system.

If the UPS service is enabled, then the UPS will be turned off by the operating system when the battery level is low, based on the Windows UPS service **Shutdown time** (see 12.4.7 "Changing additional UPS settings"). The **low battery** shutdown time will then be ignored.

Information:

- **The low battery shutdown time must be set to at least 60 seconds, so that the operating system has enough time to send the shutdown command to the UPS when the battery level is low (normally occurs after approximately 30 seconds).**
- **The low battery shutdown time can only be set in UPS firmware version 1.10 and later. UPS firmware version 1.08 always uses a turn off delay time of 180 seconds. UPS firmware versions earlier than 1.08 do not shut down automatically when the battery level is low.**

12.4.7 Changing additional UPS settings

1) Open the **Control Center** in the **Control** Panel.

2) Select **UPS** tab.

3) Under **UPS settings**, click on **Advanced**. This opens the following dialog box:

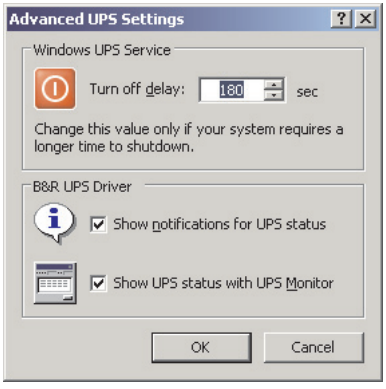


Figure 184: ADI Control Center - Advanced UPS settings

Information:

Administer rights are required in order to display this dialog box.

Change shutdown time for UPS

Under **Windows UPS Service**, you can enter the **turn-off time** in seconds. This is the length of time that the UPS waits before switching off the power supply. When a critical alarm occurs (e.g. at low battery level), the Windows UPS service will send a shutdown command with the turn off delay time to the UPS and will shut down the system.

Information:

This time is evaluated by the Windows UPS Service, but can not be set in the UPS system settings of the energy options. This value should only be changed if the system requires longer than the default setting of 180 seconds to shut down.

Caution!

The time entered must be longer than the time required to shut down the operating system.

Activate UPS messages

Under "B&R UPS driver", activate the checkbox "UPS status messages". Any changes to the UPS status will then trigger a message from the B&R UPS driver.

Information:

Shutting down the system is only reported by the Windows UPS Service. The UPS Service also sends other messages if they are activated in the UPS system settings energy options. These messages are only displayed when the Windows Alerter and Windows Messenger[1)] are active and the PC is logged on to a network. Additionally, some conditions of the B&R APC620 UPS are not detected by the Windows UPS Service, and are therefore do not trigger messages (e.g. when there are no battery settings on the UPS). The Windows Services can be found in the Control Panel under Administrative Tools - Services.

1) The Windows Alerter is supported starting with B&R Windows Embedded Version 2.10 or higher.

If the checkbox **Display UPS status with UPS monitor** is also activated, a new message is not displayed for every change, but only a general message and request for you to start the B&R UPS monitor. As long as the UPS monitor is active, no new messages are displayed.

Information:

Regardless of these options, all changes to the UPS status are logged in Windows event protocol (under "Application").

12.4.8 Procedure following power failure

Overcurrent shutdown

If an overcurrent >8 A is present during battery operation for a duration of 16 seconds, the overcurrent shutdown is executed. A turn-off time of one minute is available to the system.

If the supply is regenerated during this time, then the shut down process is aborted.

Information:

The overcurrent shutdown has the highest priority.

Low battery shutdown

If the LowBatteryFlag is set during power failure, then the "low battery" shutdown is executed, preventing the battery from fully discharging. Once the turn-off time expires (3 minutes by default), the UPS shuts down.

If an "overcurrent" shutdown or "standard" shutdown is detected during the shutdown process, the "low battery" shutdown is replaced by the respective process.

Standard shutdown

The standard shutdown is effective when the UPS service is active, the turn-off time is 3 minutes by default.

If the supply voltage returns during the turn-off time, then the shutdown procedure will be stopped.

If the supply voltage returns during the shutdown process, then the shutdown timer will run until the APC620 enters standby mode and will then reboot the system.

Chapter 5 • Standards and certifications

1. Applicable European directives

- EMC directive 2004/108/EC
- Low-voltage directive 2006/95/EC
- Machine directives 98/37/EC beginning 12/29/2009: 2006/42/EC

2. Overview of standards

Standard	Description
EN 55011 Class A	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 55022 Class A	Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 60060-1	High-voltage test techniques - part 1: General specifications and testing conditions
EN 60068-2-1	Environmental testing - part 2: Tests; test A: Dry cold
EN 60068-2-2	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)
EN 60664-1	Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests
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

Table 243: Overview of standards

Standard	Description
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 61000-6-2	Electromagnetic compatibility (EMC), generic immunity standard - part 2: Industrial environment
EN 61000-6-4	Electromagnetic compatibility (EMC), generic emission standard - part 2: Industrial environment
EN 61131-2	Product standard, programmable logic controllers - part 2: Equipment requirements and tests
UL 508	Industrial control equipment (UL = Underwriters Laboratories)
47 CFR	Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A

Table 243: Overview of standards (Forts.)

3. Emission requirements

Emissions	Test carried out according to	Limits according to
Network-related emissions	EN 55011 / EN 55022	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 61000-6-4: 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)

Table 244: Overview of limits and testing guidelines for emissions

3.1 Network-related emissions

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 150 kHz - 500 kHz	-	79 dB (µV) Quasi-peak value 66 dB (µV) Average	79 dB (µV) Quasi-peak value 66 dB (µV) Average
Power mains connections 500 kHz - 30 MHz	-	73 dB (µV) Quasi-peak value 60 dB (µV) Average	73 dB (µV) Quasi-peak value 60 dB (µV) Average
AC mains connections 150 kHz - 500 kHz	79 dB (µV) Quasi-peak value 66 dB (µV) Average	-	-
AC mains connections 500 kHz - 30 MHz	73 dB (µV) Quasi-peak value 60 dB (µV) Average	-	-
Other connections 150 kHz - 500 kHz	-	-	97 - 87 dB (µV) und 53 - 43 dB (µA) Quasi-peak value 84 - 74 dB (µV) und 40 - 30 dB (µA) Average
Other connections 500 kHz - 30 MHz	-	-	87 dB (µV) and 43 dB (µA) Quasi-peak value 74 dB (µV) and 30 dB (µA) 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)] 150 kHz - 500 kHz	79 dB (µV) Quasi-peak value 66 dB (µV) Average	-	
Power mains connections 500 kHz - 30 MHz	73 dB (µV) Quasi-peak value 60 dB (µV) Average	-	
AC mains connections 150 kHz - 500 kHz	-	79 dB (µV) Quasi-peak value 66 dB (µV) Average	
AC mains connections 500 kHz - 30 MHz	-	73 dB (µV) Quasi-peak value 60 dB (µV) Average	

Table 245: Test requirements - Network-related emissions for industrial areas

Other connections 150 kHz - 500 kHz	Only informative for cable lengths > 10 m 40 - 30 dB (µA) Quasi-peak value 30 - 20 dB (µA) Average	-	-
Other connections 500 kHz - 30 MHz	Only informative for cable lengths > 10 m 30 dB (µA) Quasi-peak value 20 dB (µA) Average	-	-

Table 245: Test requirements - Network-related emissions for industrial areas (Forts.)

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 61000-6-4	Limits according to EN 55011 Class A	Limits according to EN 55022 Class A
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value
Test carried out according to EN 55011 / EN 55022	**Limits according to EN 61131-2**		
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (µV/m) Quasi-peak value		
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (µV/m) Quasi-peak value		
Test carried out	**Limits according to 47 CFR Part 15 Subpart B class A**		
30 MHz - 88 MHz measured at a distance of 10 m	< 90 dB (µV/m) Quasi-peak value		
88 MHz - 216 MHz measured at a distance of 10 m	< 150 dB (µV/m) Quasi-peak value		
216 MHz - 960 MHz measured at a distance of 10 m	< 210 dB (µV/m) Quasi-peak value		
> 960 MHz measured at a distance of 10 m	< 300 dB (µV/m) Quasi-peak value		

Table 246: : Test requirements - Electromagnetic emissions for industrial areas

4. Requirements for immunity to disturbances

Immunity	Test carried out according to	Limits according to
Electrostatic discharge (ESD)	EN 61000-4-2	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity against high-frequency electromagnetic fields (HF field)	EN 61000-4-3	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to high-speed transient electrical disturbances (burst)	EN 61000-4-4	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to surge voltages	EN 61000-4-5	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to conducted disturbances	EN 61000-4-6	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity against magnetic fields with electrical frequencies	EN 61000-4-8	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
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
Immunity to damped vibration	EN 61000-4-12	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers

Table 247: Overview of limits and testing guidelines for immunity

Evaluation criteria in accordance with 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 directed **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 if 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	
Contact discharge to powder-coated and bare metal housing parts	±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	

Table 248: 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	
Housing, completely wired	80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	2 GHz - 2.7 GHz, 1 V/m, 1.4 GHz - 2 GHz, 3 V/m, 80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation at 1 kHz, duration 3 seconds, criteria A	

Table 249: 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	
AC mains inputs/outputs	±2 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	-	
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	
Unshielded AC I/O >3 m	-	±2 kV, criteria B	
Analog I/O	±1 kV, criteria B	±1 kV, criteria B	

Table 250: 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	
AC power I/O, L to L	±1 kV, criteria B	±1 kV, criteria B	
AC power I/O, L to PE	±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	-	
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	
All shielded cables	-	±1 kV, criteria B	

Table 251: 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	
AC mains inputs/outputs	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	

Table 252: 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	
DC mains inputs/outputs	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	
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	

Table 252: Test requirements - Conducted disturbances (Forts.)

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	
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	
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	
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	

Table 253: 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	
AC power inputs	Voltage dip 70% (30% reduction), 0.5 periods, criteria B	-	
AC power inputs	Voltage dip 40% (60% reduction), 5 periods, 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	-	
AC power inputs	-	20 interruptions, 0.5 periods, criteria A	
DC power inputs	-	20 interruptions for 10 ms < UN - 15%, criteria A	

Table 254: 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		
Mains inputs/outputs, 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 255: 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
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
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

Table 256: 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 257: 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

Table 258: 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, duration 11 ms, 18 shocks	Acceleration 15 g, duration 11 ms	

Table 259: 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, Duration 11 ms, each 3 shocks, packaged	Acceleration 30 g, Duration 6 ms, each 3 shocks, packaged	Acceleration 100 g, Duration 6 ms, each 3 shocks, packaged

Table 260: 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 261: 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						

Table 262: 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 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

Table 263: 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 264: 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 265: 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 266: 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 267: 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 control 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 268: Test requirements - Temperature fluctuations during 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 269: 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 270: Test requirements - Humid heat, constant (storage)

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
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 271: 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 Ω
	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 272: 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 MΩ at 500 V DC voltage		

Table 273: 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 overvoltage 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 0 - 60 VDC	850 V	510 V	720 V	≤ 50 V	500 V	707 V
	50 - 100 VAC 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 100 - 150 VDC	2550 V	1400 V	1950 V			
	150 - 300 VAC 150 - 300 VDC	4250 V	2300 V	3250 V			
	300 - 600 VAC 300 - 600 VDC	6800 V	3700 V	5250 V			
	600 - 1000 VAC 600 - 1000 VDC	10200 V	5550 V	7850 V			

Table 274: 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) < 60 V after 1 sec (plug pins)	< 60 V after 5 sec (active parts) < 60 V after 1 sec (plug pins)	

Table 275: Test requirements - Residual voltage

7.5 Leakage current

Test carried out	Limits according to VDE 0701-1		
Leakage current: Phase to ground	< 3.5 mA		

Table 276: 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 277: 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 No contact with conductive parts	Non-flammable surrounding cloth No contact with conductive parts	

Table 278: 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 48 VDC 125 VDC	-15% +20%		
	24 VAC 48 VAC 100 VAC 110 VAC 120 VAC 200 VAC 230 VAC 240 VAC 400 VAC	-15% +10%		

Table 279: Test requirements - Voltage range

8. Other tests

Other tests	Test carried out according to	Limits according to
Protection	-	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

Table 280: Overview of limits and testing guidelines for other tests

8.1 Protection

Test carried out according to	Limits according to EN 60529	Limits according to EN 60529	
Protection of the operating equipment	IP2. Protection against large solid foreign bodies =12.5 mm diameter	IP.6 Protection against large solid foreign bodies: Dust-proof	
Protection of personnel	IP2. Protection against touching dangerous parts with finger	IP.6 Protection against touching dangerous parts with conductor	
Protection against water permeation with damaging consequences	IP.0 Not protected	IP.5 Protected against sprayed water	

Table 281: Test requirements - Protection

8.2 Degree of pollution

Test carried out according to	Limits according to EN 60664-1		
Definition	Degree of pollution II		

Table 282: Test requirements - Degree of pollution

9. SDL flex cable - test description

9.1 Torsion

9.1.1 Test structure

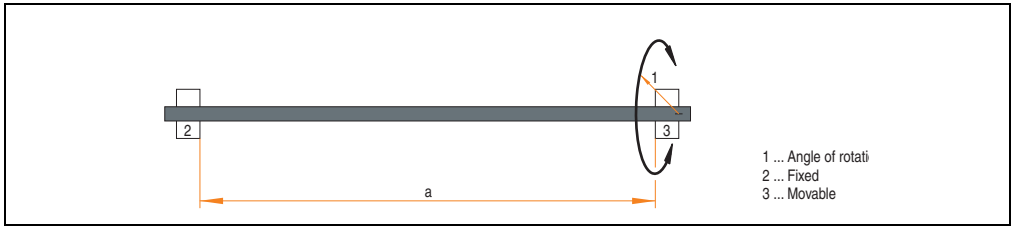


Figure 185: Test structure - torsion

9.1.2 Test conditions

- Distance a: 450 mm
- Rotation angle: ±85°
- Velocity: 50 cycles / minute
- Special feature: The cable was clamped down twice in the machine.

9.1.3 Individual tests

- Visible pixel errors: At the beginning of the test, the minimum equalizer setting was determined. This is the value between 0-15 at which no more pixel errors are visible. If the equalizer setting is changed due to the mechanical load, this is noted.
- Touch screen for function (with a 21.3" Automation Panel - 5AP920.2138-01)
- USB mouse function
- Hot plug function tested by unplugging the USB plug
- After a test duration of 15000 cycles, the test was ended with a result of "OK".

9.2 Cable drag chain

9.2.1 Test structure

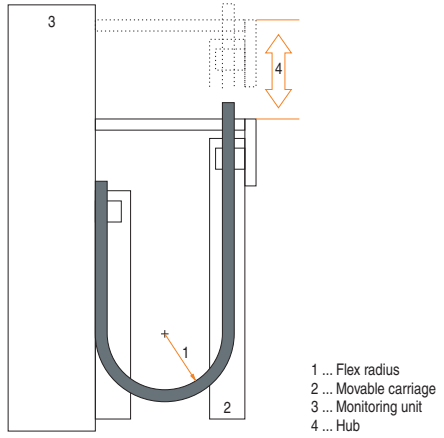


Figure 186: Test structure - Cable drag chain

9.2.2 Test conditions

- Flex radius: 180 mm (= 15 x cable diameter)
- Hub: 460 mm
- Velocity: 4800 cycles / hour
- Special feature: The cable was clamped down twice in the machine.

9.2.3 Individual tests:

- Visible pixel errors: At the beginning of the test, the minimum equalizer setting is determined. This is the value between 0-15 at which no more pixel errors are visible. If the equalizer setting is changed due to the mechanical load, this is noted.
- Touch screen for function (with a 21.3" Automation Panel - 5AP920.2138-01)
- USB mouse function
- Hot plug function tested by unplugging the USB plug
- After a test duration of 30,000 cycles, the test was ended with a result of "OK".

10. 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. 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 directives are met.

Table 283: International certifications

Chapter 6 • Accessories

1. Overview

Model number	Short description	Note
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	
0TB103.9	**Plug 24V 5.08 3-pin screw clamp** 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 clamp** 24 VDC 3-pin connector, female. Cage clamps, 3.31 mm², protected against vibration by the screw flange	
0TB704.9	**Terminal block, 4-pin,** Screw clamp, 1.5 mm²	
0TB704.91	**Terminal block, 4-pin,** cage clamps, 2.5 mm²	
5A5003.03	**Front cover** Front cover for the USB 2.0 Media Drive 5MD900.USB2-00.	
5AC600.ICOV-00	**Interface covers** Interface covers for APC620 and PPC700 devices; 5 pieces	
5AC600.UPSI-00	**Add-on UPS module** UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (starting with Rev. H0), 5PC600.SX02-00 (starting with Rev. G0), 5PC600.SX02-01 (starting with Rev. H0), 5PC600.SX05-00 (starting with Rev. F0), 5PC600.SX05-01 (starting with Rev. F0), 5PC600.SF03-00 (starting with Rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00 Order cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	
5AC600.UPSB-00	**Battery unit 5 Ah** Battery unit 5Ah; for APC620, APC810 or PPC800 UPS.	
5ACPCI.ETH1-01	**PCI Ethernet card 10/100** half size PCI Ethernet card, 1 Ethernet connection	
5ACPCI.ETH3-01	**PCI Ethernet card 10/100 3port** half size PCI Ethernet card, 3 Ethernet connections	
5AC900.1000-00	**Adapter DVI-A/m to CRT** Adapter DVI (plug) to CRT (socket), for connecting a standard monitor to a DVI-I interface.	
5AC600.SRAM-00	**APC620/PPC700 SRAM module 512kB** SRAM module for APC620 and PPC700 512 KB.	
5CAMSC.0001-00	**APC620 internal supply cable**	

Table 284: Model numbers - Accessories

Model number	Short description	Note
5CADVI.0018-00	**DVI-D cable 1.8 m** Single cable, DVI-D/m:DVI-D/m; length: 1.8 m	
5CADVI.0050-00	**DVI-D cable 5 m** Single cable, DVI-D/m:DVI-D/m; length: 5 m	
5CADVI.0100-00	**DVI-D cable 10 m** Single cable, DVI-D/m:DVI-D/m; length: 10 m	
5CASDL.0018-00	**SDL cable 1.8 m** SDL cable for a fixed type of layout; length: 1.8 m	
5CASDL.0018-01	**SDL cable 1.8 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 1.8 m	
5CASDL.0018-03	**SDL flex cable 1.8 m** SDL cable for fixed and flexible type of layout; length: 1.8 m	
5CASDL.0050-00	**SDL cable 5 m** SDL cable for a fixed type of layout; length: 5 m	
5CASDL.0050-01	**SDL cable 5 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 5 m	
5CASDL.0050-03	**SDL flex cable 5 m** SDL cable for fixed and flexible type of layout; length: 5 m	
5CASDL.0100-00	**SDL cable 10 m** SDL cable for a fixed type of layout; length: 10 m	
5CASDL.0100-01	**SDL cable 10 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 10 m	
5CASDL.0100-03	**SDL flex cable 10 m** SDL cable for fixed and flexible type of layout; length: 10 m	
5CASDL.0150-00	**SDL cable 15 m** SDL cable for a fixed type of layout; length: 15 m	
5CASDL.0150-01	**SDL cable 15 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 15 m	
5CASDL.0150-03	**SDL flex cable 15 m** SDL cable for fixed and flexible type of layout; length: 15 m	
5CASDL.0200-00	**SDL cable 20 m** SDL cable for a fixed type of layout; length: 20 m	
5CASDL.0200-03	**SDL flex cable 20 m** SDL cable for fixed and flexible type of layout; length: 20 m	
5CASDL.0250-00	**SDL cable 25 m** SDL cable for a fixed type of layout; length: 25 m	
5CASDL.0250-03	**SDL flex cable 25 m** SDL cable for fixed and flexible type of layout; length: 25 m	
5CASDL.0300-00	**SDL cable 30 m** SDL cable for a fixed type of layout; length: 30 m	
5CASDL.0300-03	**SDL flex cable 30 m** SDL cable for fixed and flexible type of layout; length: 30 m	
5CASDL.0300-13	**SDL flex cable with extender 30 m** SDL cable with extender for fixed and flexible type of layout; length: 30 m	
5CASDL.0400-13	**SDL flex cable with extender 40 m** SDL cable with extender for fixed and flexible type of layout; length: 40 m	

Table 284: Model numbers - Accessories (Forts.)

Model number	Short description	Note
5CAUPS.0005-00	**APC620 UPS cable 0.5 m** Connection cable between add-on UPS module and UPS battery unit, length 0.5 meters	
5CAUPS.0030-00	**APC620 UPS cable 3 m** Connection cable between add-on UPS module and UPS battery unit, length 3 meters	
5CAUSB.0018-00	**USB 2.0 cable, A/m:B/m 1.8 m** USB 2.0 connection cable; plug type A - type B; length 1.8 m	
5CAUSB.0050-00	**USB 2.0 cable, A/m:B/m 5 m** USB 2.0 connection cable; plug type A - type B; length 5 m	
9A0014.02	**RS232 cable DB9/f:DB9/m 1.8 m** RS232 extension cable for remote operation of a display unit with touch screen, length 1.8 m.	
9A0014.05	**RS232 cable DB9/f:DB9/m 5 m** RS232 extension cable for remote operation of a display unit with touch screen, length 5 m.	
9A0014.10	**RS232 cable DB9/f:DB9/m 10 m** RS232 extension cable for remote operation of a display unit with touch screen, length 10 m.	
5CFCRD.0512-04	**CompactFlash 512 MB B&R** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.016G-04	**CompactFlash 16 GB B&R** CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface	
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5MD900.USB2-01	**USB 2.0 drive DVD-RW/CD-RW FDD CF USB** USB 2.0 drive combination, consists of DVD-R/RW/DVD+R/RW/CD-RW, FDD, CompactFlash slot (type II), USB connection (type A front, type B back); 24 V DC.	
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	

Table 284: Model numbers - Accessories (Forts.)

Model number	Short description	Note
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	
5AC600.FA01-00	**APC620 replacement fan filter 1PCI 5 piece** APC620 replacement fan filter for system unit with 1 PCI Slot (5PC600.SX01-00).	
5AC600.FA02-00	**APC620 replacement fan filter 1PCI 5 piece** APC620 replacement fan filter for system unit with 2 PCI slot (5PC600.SX02-00, 5PC600.SX02-01).	
5AC600.FA03-00	**APC620f replacement fan filter 1PCI 5 piece** APC620 replacement fan filter for system unit with 3 PCI Slots (5PC600.SF03-00).	
5AC600.FA05-00	**APC620 replacement fan filter 1PCI 5 piece** APC620 replacement fan filter for system units with 5 PCI slot (5PC600.SX02-00, 5PC600.SX02-01).	
0PS102.0	**Power supply, 1-phase, 2.1 A** 24 VDC power supply, 1-phase, 2.1 A, input 100-240 VAC, wide range, DIN rail mounting	
0PS104.0	**Power supply, 1-phase, 4.2 A** 24 VDC power supply, 1 phase, 4.2 A, input 115/230 VAC, auto select, DIN rail mounting	
0PS105.1	**Power supply, 1-phase, 5 A** 24 VDC power supply, 1 phase, 5 A, input 115/230 VAC, manual select, DIN rail mounting	
0PS105.2	**Power supply, 1-phase, 5 A, redundant** 24 VDC power supply, 1 phase, 5 A, redundant through parallel operation, input 115/230 VAC, manual select, DIN rail mounting	
0PS110.1	**Power supply, 1-phase, 10 A** 24 VDC power supply, 1 phase, 10 A, input 115/230 VAC, manual select, DIN rail mounting	
0PS110.2	**Power supply, 1-phase, 10 A, redundant** 24 VDC power supply, 1 phase, 10 A, redundant through parallel operation, input 115/230 VAC, manual select, DIN rail mounting	
0PS120.1	**Power supply, 1-phase, 20 A** 24 VDC power supply, 1 phase, 20 A, input 115/230 VAC, auto select, DIN rail mounting	
0PS305.1	**Power supply, 3-phase, 5 A** 24 VDC power supply, 3-phase, 5 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	
0PS310.1	**Power supply, 3-phase, 10 A** 24 VDC power supply, 3-phase, 10 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	
0PS320.1	**Power supply, 3-phase, 20 A** 24 VDC power supply, 3-phase, 20 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	
0PS340.1	**Power supply, 1-phase, 40 A** 24 VDC power supply, 3 phase, 40 A, input 115/230 VAC, auto select, DIN rail mounting	

Table 284: Model numbers - Accessories (Forts.)

2. Supply voltage connector (TB103 3-pin)

2.1 General information

This single row 3-pin terminal block is mainly used to connect the supply voltage.

2.2 Order data

Model number	Description	Image
0TB103.9	Plug for the 24 V supply voltage (screw clamps)	0TB103.9
0TB103.91	Plug for the 24 V supply voltage (cage clamps)	0TB103.91

Table 285: Order data - TB103

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.

Name	0TB103.9	0TB103.91
Number of pins	3	
Type of terminal	Screw clamps	Cage clamps

Table 286: Technical data - TB103 supply plug

Name	0TB103.9	0TB103.91
Distance between contacts	5.08 mm	
Resistance between contacts	≤ 5 mΩ	
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 286: Technical data - TB103 supply plug (Forts.)

3. X2X and CAN plugs (4-pin)

3.1 General information

This 4-pin plug is needed for connecting to the X2X and CAN interface.

3.2 Order data

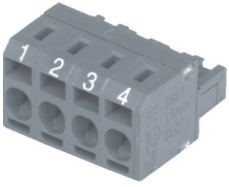
Model number	Description	Image
0TB704.9	4-pin screw clamp	0TB704.9
0TB704.91	4-pin cage clamps	 0TB704.91

Table 287: Order data - 0TB704.9 and 0TB704.91

3.3 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.

Name	0TB704.9	0TB704.91
Number of pins	4	
Type of terminal	Screw clamps	Cage clamps

Table 288: Technical data - TB103 supply plug

4. Replacement CMOS batteries

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 should be replaced regularly (at least in accordance with the specified buffer duration).

4.1 Order data

Model number	Description	Image
0AC201.91	Lithium batteries, 5 pcs., 3 V / 950 mAh button cell	
4A0006.00-000	Lithium battery, 1 piece, 3 V / 950 mAh button cell	

Table 289: Order data - Lithium batteries

4.2 Technical data

Warning!

Replace battery with Renata, type CR2477N only. Use of another battery may present a risk of fire or explosion.

Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

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	0AC201.91	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	

Table 290: Technical data - Lithium batteries

Features	0AC201.91	4A0006.00-000
Environmental characteristics		
Storage temperature	-20 to +60°C	
Relative humidity	0 to 95% (non-condensing)	

Table 290: Technical data - Lithium batteries (Forts.)

5. Interface covers 5AC600.ICOV-00

The interface covers protect interfaces from dirt and dust when not in use.

5.1 Order data

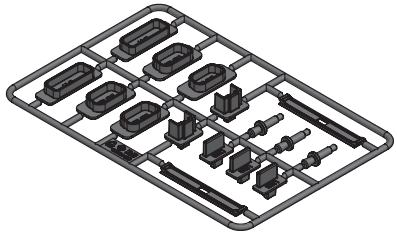
Model number	Description	Image
5AC600.ICOV-00	**Interface covers** Interface covers for APC620 and PPC700 devices; 5 pieces	

Table 291: Order data - APC620 interface cover

5.2 Contents of delivery

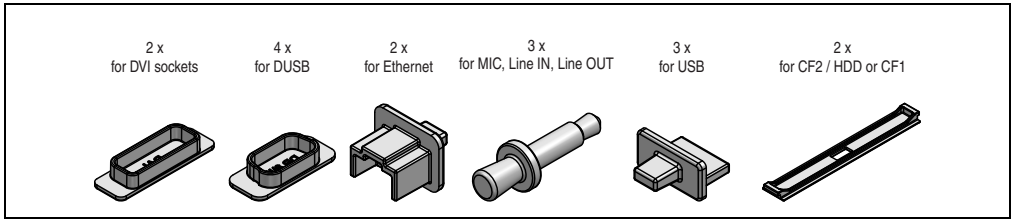


Figure 187: Contents of delivery - interface cover

6. DVI - monitor adapter 5AC900.1000-00

This adapter enables a standard monitor to be connected to the DVI-I interface.

6.1 Order data

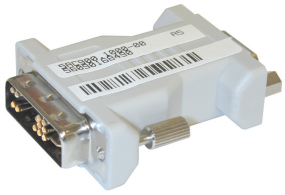
Model number	Description	Image
5AC900.1000-00	**Adapter DVI-A/m to CRT DB15HD/f** Adapter DVI (plug) to CRT (socket), for connecting a standard monitor to a DVI-I interface.	

Table 292: Order data - DVI - CRT adapter

7. CompactFlash cards 5CFCRD.xxxx-04

7.1 General information

Information:

B&R CompactFlash cards 5CFCRD.xxxx-04 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by the different boot times.

See chapter 3 "Commissioning", section 7 "Known problems / issues", on page 267.

Information:

The 5CFCRD.xxxx-04 CompactFlash cards are supported on B&R devices with WinCE Version 6.0 or higher.

7.2 Order data

Model number	Description	Image
5CFCRD.0512-04	512 MB B&R CompactFlash card	CompactFlash card
5CFCRD.1024-04	1024 MB B&R CompactFlash card	
5CFCRD.2048-04	2048 MB B&R CompactFlash card	
5CFCRD.4096-04	4096 MB B&R CompactFlash card	
5CFCRD.8192-04	8192 MB B&R CompactFlash card	
5CFCRD.016G-04	16 GB B&R CompactFlash card	

Table 293: Order data - CompactFlash cards

7.3 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, it is recommended to 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.0512-04	5CFCRD.1024-04	5CFCRD.2048-04	5CFCRD.4096-04	5CFCRD.8192-04	5CFCRD.016G-04
MTBF (at 25°C)	> 3,000,000 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 0-6, Multiword DMA Mode 0-4, Ultra DMA Mode 0-4					
Continuous reading	Typically 35 MB/s(240X)[1)2)] Max. 37 MB/s (260X)[1) 2)]	Typically 35 MB/s (240X)[1) 2)] Max. 37 MB/s (260X)[1) 2)]	Typically 35 MB/s (240X)[1) 2)] Max. 37 MB/s (260X)[1) 2)]	Typically 33 MB/s (220X)[1) 2)] Max. 34 MB/s (226X)[1) 2)]	Typically 27 MB/s (180X)[1) 2)] Max. 28 MB/s (186X)[1) 2)]	Typically 36 MB/s (240X)[1) 2)] Max. 37 MB/s (247X)[1) 2)]
Continuous writing	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 16 MB/s (106X) Max. 18 MB/s (120X)	Typically 15 MB/s (100X) Max. 17 MB/s (110X)	Typically 18 MB/s (120X) Max. 19 MB/s (126X)
Endurance						
Guaranteed amount of data [3)] Results in 5 years [3)]	50 TB 27.40 GB/day	100 TB 54.79 GB/day	200 TB 109.59 GB/day	400 TB 219.18 GB/day	800 TB 438.36 GB/day	1600 TB 876.72 GB/day
Clear/write cycles Guaranteed Typical[4)]	100,000 2,000,000					
SLC flash	Yes					
Wear leveling	Static					
Endurance	**5CFCRD.0512-04**	**5CFCRD.1024-04**	**5CFCRD.2048-04**	**5CFCRD.4096-04**	**5CFCRD.8192-04**	**5CFCRD.016G-04**
Error Correction Coding (ECC)	Yes					

Table 294: Technical data - CompactFlash cards 5CFCRD.xxxx-04

Support						
Hardware	PP300/400, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820					
Windows XP Professional	-	-	-	Yes	Yes	Yes
Windows XP Embedded	Yes	Yes	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	-	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes [5)]
Windows CE 5.0	-	-	-	-	-	-
PVI Transfer Tool	V3.2.3.8 (part of PVI Development Setup V2.06.00.3011)					-
B&R Embedded OS Installer	V3.10					-
Mechanical characteristics						
Dimensions Length Width Thickness	 36.4 ±0.15 mm 42.8 ±0.10 mm 3.3 ±0.10 mm					
Weight	10 g					
Environmental characteristics						
Ambient temperature Operation Storage Transport	 0 to +70°C -65 to +150°C -65 to +150°C					
Relative humidity Operation/Storage/Transport	 Max. 85% at 85°C					
Vibration Operation/Storage/Transport	 20 G peak, 20- 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 G RMS, 15 min per level (IEC 68-2-6)					
Shock Operation/Storage/Transport	 1.5k G peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 G, 11 ms 1 time (IEC 68-2-27)					
Altitude	Max. 15,000 feet (4,572 m)					

Table 294: Technical data - CompactFlash cards 5CFCRD.xxxx-04 (Forts.)

1) Speed specification with 1X = 150 KB/s. All specifications refer to the Samsung Flash chips, CompactFlash cards in UDMA mode 4, 30 ns cycle time in True-IDE mode with sequential write/read test.

2) The file is written/read sequentially in True IDE mode with the DOS program Thruput.exe.

3) Endurance of B&R CF cards (linear written block size with 128 KB)

4) Depending on the average file size.

5) Not supported by B&R Embedded OS installer.

7.3.1 Temperature humidity diagram

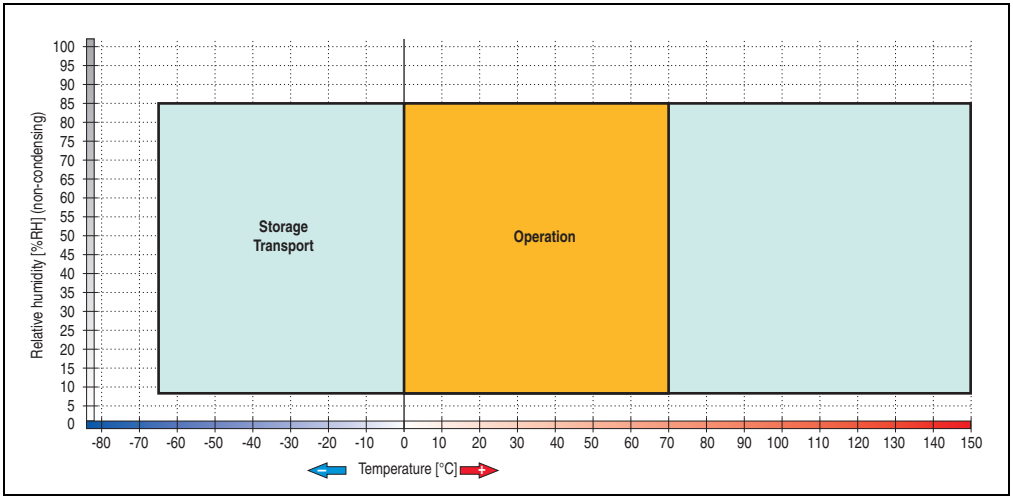


Figure 188: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-04

7.4 Dimensions

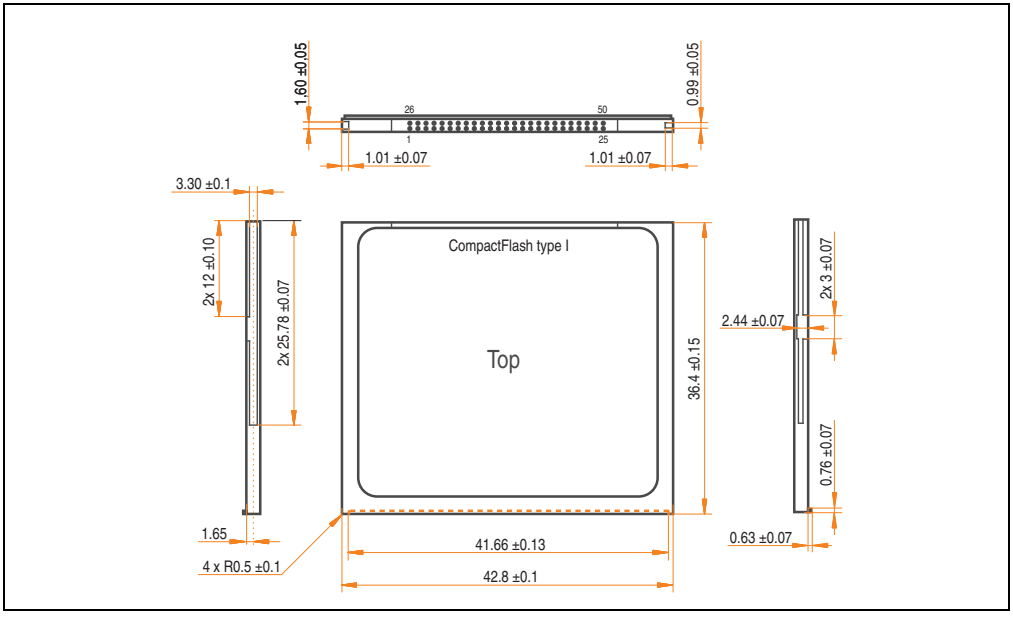


Figure 189: Dimensions - CompactFlash card Type I

7.5 Benchmark

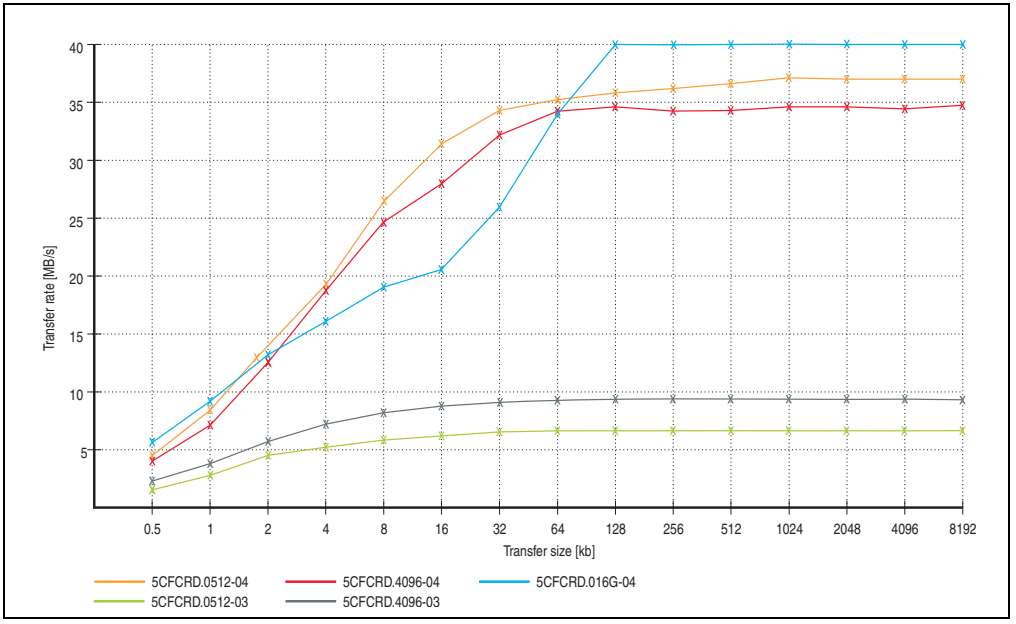


Figure 190: ATTO disk benchmark v2.34 comparison (reading)

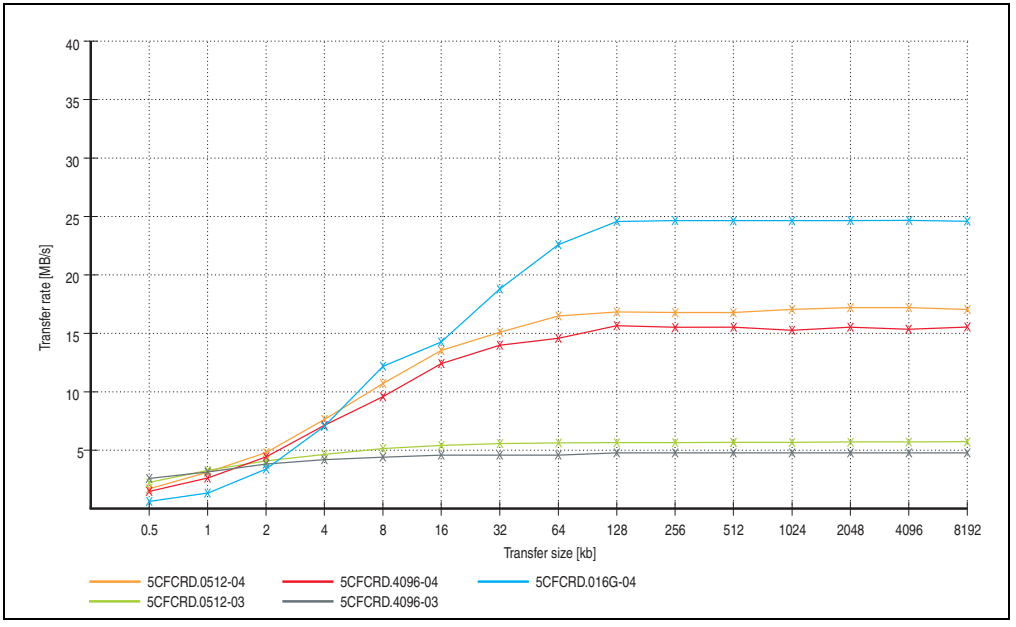


Figure 191: ATTO disk benchmark v2.34 comparison (writing)

8. CompactFlash cards - 5CFCRD.xxxx-03

8.1 General information

Information:

Silicon Systems CompactFlash cards 5CFCRD.xxxx-03 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by the different boot times.

See chapter 3 "Commissioning", section 7 "Known problems / issues", on page 267.

Information:

On Windows CE 5.0 devices, 5CFCRD.xxxx-03 CompactFlash cards up to 1GB are supported.

8.2 Order data

Model number	Description	Image
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 295: Order data - CompactFlash cards

8.3 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 Typical	> 2,000,000							
SLC flash	Yes							
Wear leveling	Static							
Error Correction Coding (ECC)	Yes							
Support								
Hardware	MP100/200, PP100/200, PP300/400, PPC300, PPC700, PPC725, PPC800, Provit 2000, Provit 5000, APC620, APC680, APC810, APC820							
Windows XP Professional	-	-	-	-	-	-	Yes	Yes
Windows XP Embedded	-	-	-	Yes	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	-	-	-	-	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes[1)]

Table 296: 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
Windows CE 5.0	Yes	Yes	Yes	Yes	Yes	-	-	-
PVI Transfer Tool	V2.57 (part of PVI Development Setup V2.5.3.3005)							
B&R Embedded OS Installer	V2.21							
Mechanical characteristics								
Dimensions Length Width Thickness	 36.4 ±0.15 mm 42.8 ±0.10 mm 3.3 ±0.10 mm							
Weight	11.4 g							
Environmental characteristics								
Ambient temperature Operation Storage Transport	 0 to +70°C -50 to +100°C -50 to +100°C							
Relative humidity Operation/Storage/Transport	 8 to 95%, non-condensing							
Vibration Operation Storage/Transport	 Max. 16.3 g (159 m/s^2 0-peak) Max. 30 g (294 m/s^2 0-peak)							
Shock Operation Storage/Transport	 Max. 1000 g (9810 m/s^2 0-peak) Max. 3000 g (29430 m/s^2 0-peak)							
Altitude	Maximum 80,000 feet (24,383 meters)							

Table 296: Technical data - CompactFlash cards 5CFCRD.xxxx-03 (Forts.)

1) Not supported by B&R Embedded OS installer.

8.3.1 Temperature humidity diagram

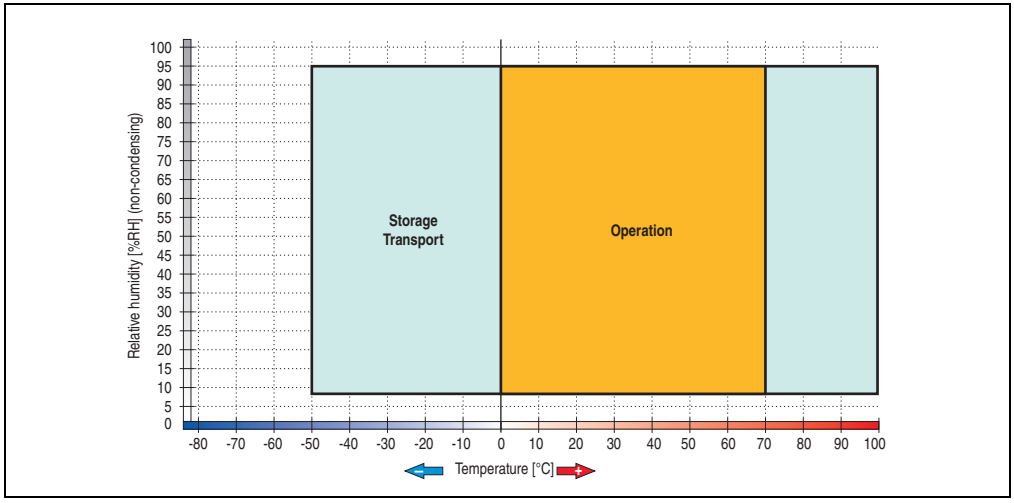


Figure 192: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

8.4 Dimensions

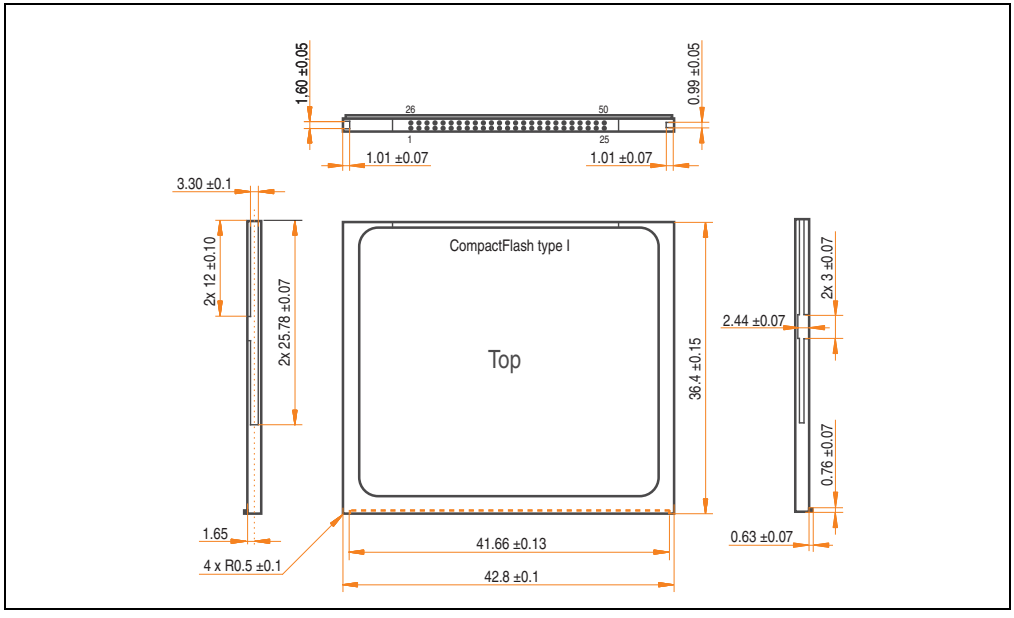


Figure 193: Dimensions - CompactFlash card Type I

9. USB Media Drive - 5MD900.USB2-01

Figure 194: USB Media Drive - 5MD900.USB2-01

9.1 Features

- Desk-top or rack-mount operation (mounting rail brackets)
- Integrated USB diskette drive
- Integrated DVD-RW/CD-RW drive
- Integrated CompactFlash slot IDE/ATAPI (Hot Plug capable)
- Integrated USB 2.0 connection (up to 480 Mbit high speed)
- +24 VDC supply (back side)
- USB/B 2.0 connection (back side)
- Optional front cover (model number 5A5003.03 see also section 9.8 "Front cover 5A5003.03 for the USB Media Drive", on page 442)

9.2 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 - entire device	5MD900.USB2-01
Transfer rate	Low speed (1.5 Mbit/s), Full Speed (12 Mbit/s) to high speed (480 Mbit/s)
Maximum cable length	5 m (not including hub)
Power supply Rated voltage	 24 VDC ±25%
Features - diskette drive	
Data capacity	720 KB / 1.25 MB / 1.44 MB (formatted)
Data transfer rate	250 kbit/s (720 KB) or 500 kbit/s (1.25 MB and 1.44 MB)
Rotation speed	Up to 360 rpm
Diskette media	High density (2HD) or normal density (2DD) 3.5" diskettes
MTBF	30,000 POH (Power-On Hours)
Features - DVD-RW/CD-RW drive	
Write speed CD-R CD-RW DVD-R DVD-RW DVD-RAM[1)] DVD+R DVD+R (Double Layer) DVD+RW	 24x, 16x, 10x and 4x 10x and 4x 8x, 4x and 2x 4x and 2x 3x and 2x 8x, 4x and 2x 2x,4x 4x and 2x
Reading rate CD DVD	 24x 8x
Data transfer rate	Max. 33.3 MB/s
Access time (average) CD DVD	 130 ms (24x) 130 ms (8x)
Revolution speed	Max. 5090 rpm ±1%
Starting time (0 rpm to read access) CD DVD	 14 seconds (maximum) 15 seconds (maximum)
Host interface	IDE (ATAPI)
Laser class	Class 1 laser

Table 297: Technical data - USB Media Drive 5MD900.USB2-01

Features - DVD-ROM/CD-RW drive	5MD900.USB2-01
Readable media CD DVD	 CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW DVD-ROM, DVD-R, DVD-RW. DVD-RAM, DVD+R, DVD+R (double layer), DVD+RW
Non-write protected media CD DVD	 CD-R, CD-RW DVD-R/RW, DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer)
Compatible formats	CD-DA, CD-ROM mode 1/mode 2 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session), Enhanced CD, CD text DVD-ROM, DVD-R, DVD-RW, DVD-Video DVD-RAM (4.7 GB, 2.6 GB) DVD+R, DVD+R (double layer), DVD+RW
Write-methods CD DVD	 Disk at once, session at once, packet write, track at once Disk at once, incremental, over-write, sequential, multi-session
Data buffer capacity	8 MB
Noise level (complete read access)	Approx. 48 dBA at 50 cm
Service life Opening/closing the drawer	60,000 POH (Power-On Hours) > 10,000 times
CompactFlash slot layout	
CompactFlash Type Amount Connection	 Type I 1 slot IDE/ATAPI
CompactFlash LED	Signals read or write access to an inserted CompactFlash card
Hot Plug capable	Yes
Features - USB connections	
USB A on the front side Power supply Type Transfer rate	Connection of further peripheral devices Max. 500 mA 2.0 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)
USB B back side	Connection to the system
Mechanical characteristics	
Outer dimensions (without slide-in) Width Length Height	 70 mm 100 mm 9.5 mm
Weight	Approx. 1.1 kg (without front cover)
Environmental characteristics	
Ambient temperature Operation Storage Transport	 +5 to +45°C -20 to +60°C -40 to +60°C

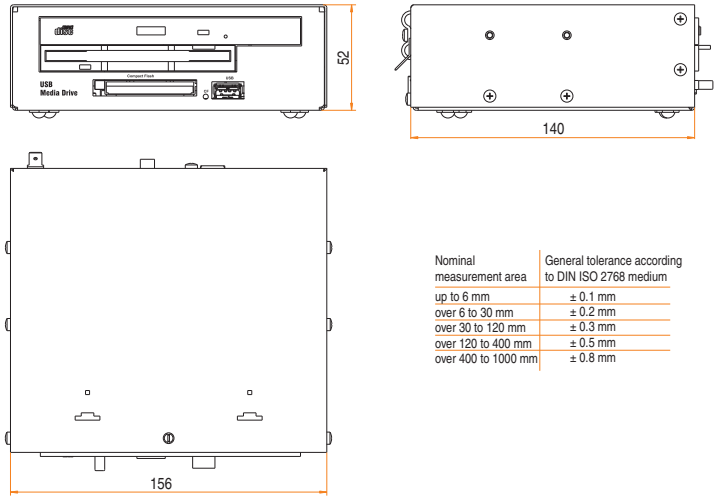
Table 297: Technical data - USB Media Drive 5MD900.USB2-01 (Forts.)

Environmental characteristics	5MD900.USB2-01
Relative humidity Operation Storage Transport	 20 to 80%, non-condensing 5 to 90%, non-condensing 5 to 95%, non-condensing
Vibration Operation Storage Transport	 At max. 5 - 500 Hz and 0.3 g At max. 10 - 100 Hz and 2 g At max. 10 - 100 Hz and 2 g
Shock (pulse with a sine half-wave) Operation Storage (packaged) Transport (packaged)	 At max. 5 g for 11 ms At max. 60 g for 11 ms At max. 60 g for 11 ms
Altitude	Max. 3000 meters

Table 297: Technical data - USB Media Drive 5MD900.USB2-01 (Forts.)

1) RAM drivers are not provided by the manufacturer. Support of RAM function by the burning software "Nero" (model number 5SWUTI.0000-00) or other burning software packages and drivers from third party providers.

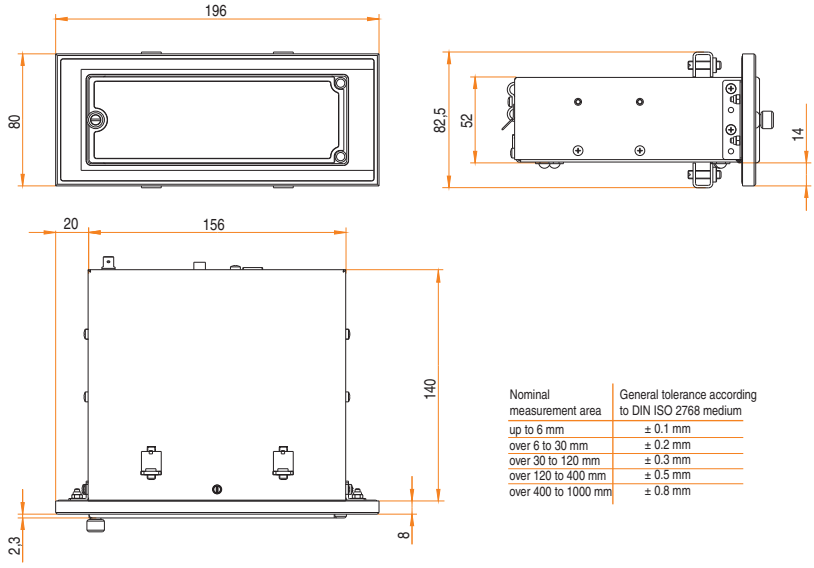
9.3 Dimensions



Nominal measurement area	General tolerance according to DIN ISO 2768 medium
up to 6 mm	± 0.1 mm
over 6 to 30 mm	± 0.2 mm
over 30 to 120 mm	± 0.3 mm
over 120 to 400 mm	± 0.5 mm
over 400 to 1000 mm	± 0.8 mm

Figure 195: Dimensions - 5MD900.USB2-01

9.4 Dimensions with front cover



Nominal measurement area	General tolerance according to DIN ISO 2768 medium
up to 6 mm	± 0.1 mm
over 6 to 30 mm	± 0.2 mm
over 30 to 120 mm	± 0.3 mm
over 120 to 400 mm	± 0.5 mm
over 400 to 1000 mm	± 0.8 mm

Figure 196: Dimensions - USB Media Drive with front cover

9.5 Contents of delivery

Amount	Component
1	USB Media Drive complete unit
2	Mounting rail brackets

Table 298: Contents of delivery - USB Media Drive - 5MD900.USB2-01

9.6 Interfaces

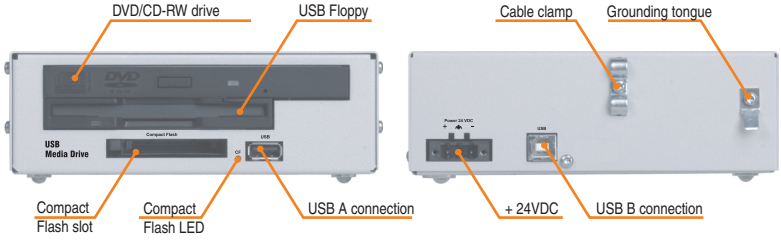


Figure 197: Interfaces - 5MD900.USB2-01

9.7 Installation

The USB Media Drive can be operated as a desk-top device (rubber feet) or as a rack-mount device (2 mounting rail brackets included).

9.7.1 Mounting orientation

Because of limits to the mounting orientation with the components used (floppy, DVD-CDRW drive), the USB media drive is only permitted to be mounted and operated as shown in the following figure.

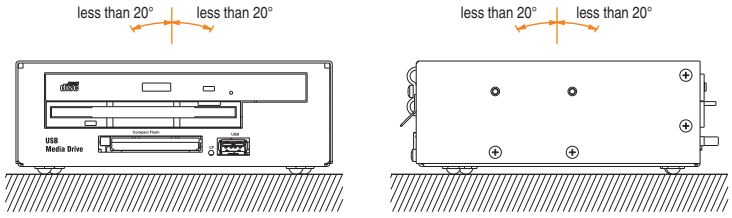


Figure 198: Mounting orientation - 5MD900.USB2-01

9.8 Front cover 5A5003.03 for the USB Media Drive

This front cover can also be mounted on the front of the USB media drive (model number 5MD900.USB2-00 or 5MD900.USB2-01) to protect the interface.

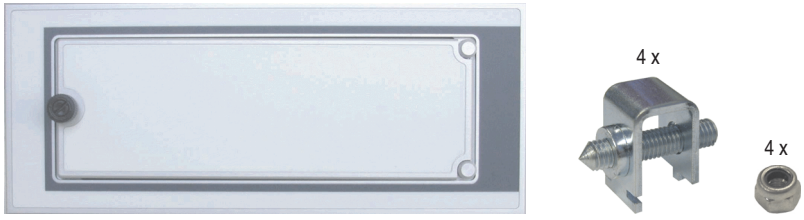


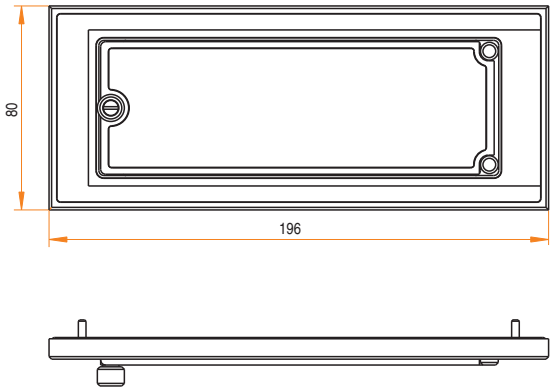
Figure 199: Front cover 5A5003.03

9.8.1 Technical data

Features	5A5003.03
Front cover design / colors Dark gray border around the cover Light gray background	 Similar to Pantone432CV Similar to Pantone 427CV

Table 299: Technical data - 5A5003.03

9.8.2 Dimensions



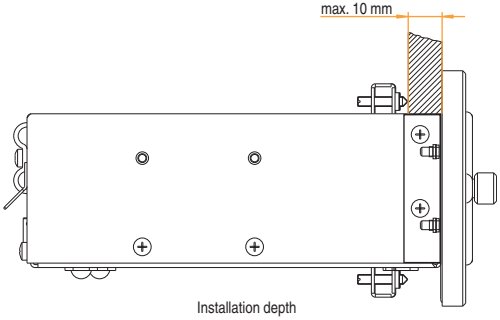
Nominal measurement area	General tolerance according to DIN ISO 2768 medium
up to 6 mm	± 0.1 mm
over 6 to 30 mm	± 0.2 mm
over 30 to 120 mm	± 0.3 mm
over 120 to 400 mm	± 0.5 mm
over 400 to 1000 mm	± 0.8 mm

Figure 200: Dimensions - 5A5003.03

9.8.3 Installation

The front cover is attached with 2 mounting rail brackets (included with USB Media Drive) and 4 locknuts. The USB media drive and front cover can be mounted as a whole in (for example) a control cabinet door.

Mounting



Installation depth

Figure 201: Front cover mounting and installation depth

10. 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. Therefore, the following measures might be necessary 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.**

10.1 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.

10.2 Order data

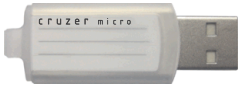
Model number	Description	Image
5MMUSB.2048-00	USB flash drive 2 GB SanDisk Cruzer Micro	
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	

Table 300: Order data - USB flash drives

10.3 Technical data - 5MMUSB.2048-00

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.2048-00
LED	1 LED (green), signals data transfer (send and receive)
Power supply Power consumption	Via the USB port 650 µA in sleep mode, 150 mA read/write
Interface Type Transfer rate Sequential reading Sequential writing Connection	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified USB 1.1 and 2.0 compatible Up to 480 Mbit (high speed) Max. 8.7 MB/second Max. 1.7 MB/second To each USB type A interface
MTBF (at 25°C)	100,000 hours
Data retention	10 years
Maintenance	None
Operating system support	Windows CE 4.2, CE 5.0, ME, 2000, XP and Mac OS 9.1.x+, OS X v10.1.2+
Mechanical characteristics	
Dimensions Length Width Thickness	 52.2 mm 19 mm 7.9 mm
Environmental characteristics	
Ambient temperature Operation Storage Transport	 0 to +45°C -20 to +60°C -20 to +60°C
Relative humidity Operation Storage Transport	 10 to 90%, non-condensing 5 to 90%, non-condensing 5 to 90%, non-condensing
Vibration Operation Storage Transport	 At 10 - 500 Hz: 2 g (19,6 m/s^2 0-peak), oscillation rate 1/minute At 10 - 500 Hz: 4 g (39,2 m/s^2 0-peak), oscillation rate 1/minute At 10 - 500 Hz: 4 g (39,2 m/s^2 0-peak), oscillation rate 1/minute
Shock Operation Storage Transport	 Max. 40 g (392 m/s^2 0-peak) and 11 ms duration Max. 80 g (784 m/s^2 0-peak) and 11 ms duration Max. 80 g (784 m/s^2 0-peak) and 11 ms duration

Table 301: Technical data - USB flash drive 5MMUSB.2048-00

Environmental characteristics	5MMUSB.2048-00
Altitude	
Operation	3,048 meters
Storage	12,192 meters
Transport	12,192 meters

Table 301: Technical data - USB flash drive 5MMUSB.2048-00 (Forts.)

10.3.1 Temperature humidity diagram

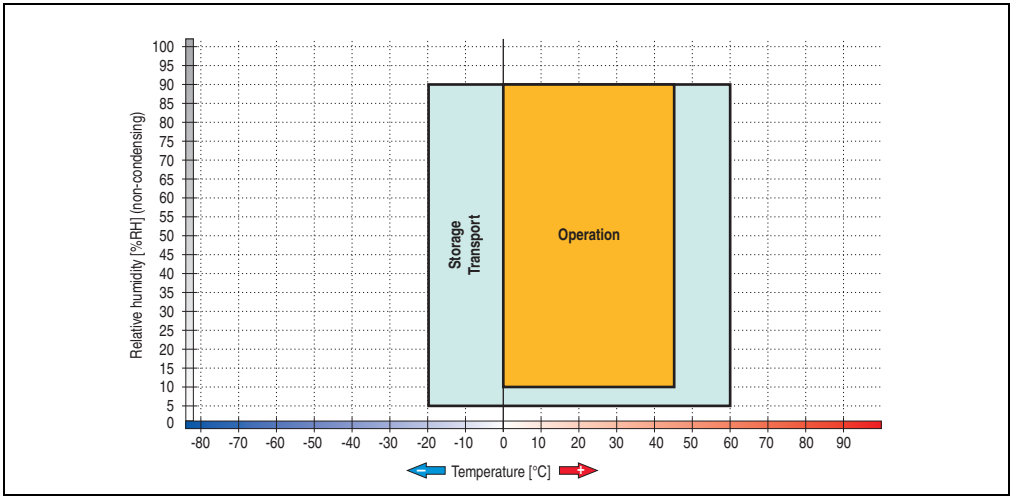


Figure 202: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00

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).

10.4 Technical data - 5MMUSB.2048-01

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.2048-01
LED	1 LED (green), signals data transfer (send and receive)
Power supply Power consumption	Via the USB port max. 500 µA sleep mode, max. 120 mA read/write
Interface Type Transfer rate Sequential reading Sequential writing Connection	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified USB 1.1 and 2.0 compatible Up to 480 Mbit (high speed) Max. 31 MB/second Max. 30 MB/second To each USB type A interface
MTBF	> 3,000,000 hours
Data retention	> 10 years
Maintenance	None
Operating system support	Windows CE, ME, 2000, XP, Vista und Mac OS 9 or newer, Linux 2.4 or newer
Mechanical characteristics	
Dimensions Length Width Thickness	 67.85 mm 17.97 mm 8.35 mm
Environmental characteristics	
Ambient temperature Operation Storage Transport	 0 to +70°C -50 to +100°C -50 to +100°C
Relative humidity Operation Storage Transport	 85%, non-condensing 85%, non-condensing 85%, non-condensing
Vibration Operation Storage Transport	 At 20 - 2000 Hz: 20 g (peak) At 20 - 2000 Hz: 20 g (peak) At 20 - 2000 Hz: 20 g (peak)
Shock Operation Storage Transport	 max. 1500 g (peak) max. 1500 g (peak) max. 1500 g (peak)

Table 302: Technical data - USB flash drive 5MMUSB.2048-01

Environmental characteristics	5MMUSB.2048-01
Altitude	
Operation	3,048 meters
Storage	12,192 meters
Transport	12,192 meters

Table 302: Technical data - USB flash drive 5MMUSB.2048-01 (Forts.)

10.4.1 Temperature humidity diagram

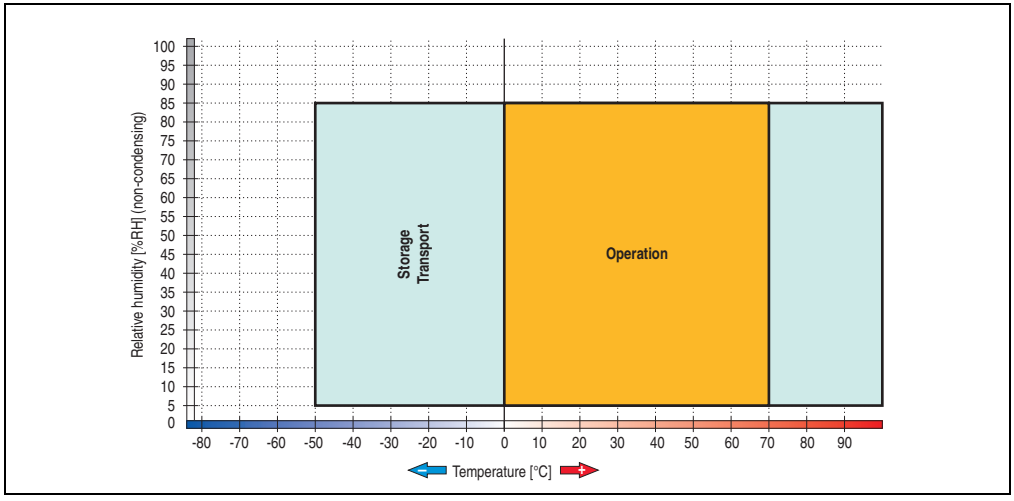


Figure 203: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-01

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).

11. HMI Drivers & Utilities DVD 5SWHMI.0000-00

Figure 204: HMI Drivers & Utilities DVD 5SWHMI.0000-00

Model number	Short description	Note
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	

Table 303: 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)

12. Cables

12.1 APC620 internal supply cable 5CAMSC.0001-00

This supply cable is used internally e.g. to supply special PCI cards. It is connected to the APC620 main board. For requirements and procedures, see appendix A, section "Connection of an external device to the main board", on page 548.

Figure 205: APC620 internal supply cable 5CAMSC.0001-00

12.1.1 Order data

Model number	Description	Note
5CAMSC.0001-00	**APC620 internal supply cable**	

Table 304: Model number - APC620 internal supply cable

12.1.2 Technical data

Features	5CAMSC.0001-00
Length	100 mm ±5 mm
Connector type	1x 4-pin male disk drive power plug, 1x 4-pin female plug housing
Wire cross section	AWG 22
Flexibility	Flexible

Table 305: Technical data - 5CAMSC.0001-00

12.2 DVI cable 5CADVI.0xxx-00

The DVI cables 5CADVI.0xxx-00 are designed for fixed layout.

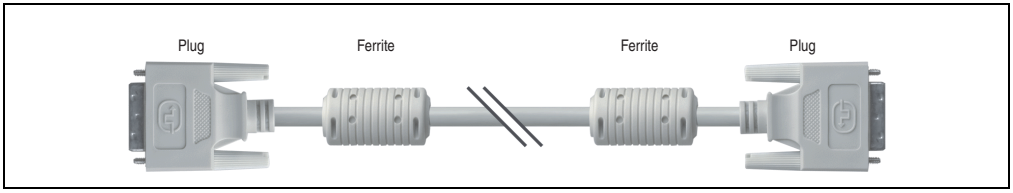


Figure 206: DVI extension cable (similar)

Caution!

DVI cables can only be plugged in and unplugged when the APC620 and display device (Automation Panel 900, monitor) are turned off.

12.2.1 Order data

Model number	Description	Note
5CADVI.0018-00	**DVI-D cable 1.8 m** Single cable, DVI-D/m:DVI-D/m; length: 1.8 m	
5CADVI.0050-00	**DVI-D cable 5 m** Single cable, DVI-D/m:DVI-D/m; length: 5 m	
5CADVI.0100-00	**DVI-D cable 10 m** Single cable, DVI-D/m:DVI-D/m; length: 10 m	

Table 306: Model numbers - DVI cables

12.2.2 Technical data

Features	5CADVI.0018-00	5CADVI.0050-00	5CADVI.0100-00
Length Tolerance	1.8 m ±30 mm	5 m ±50 mm	10 m ±100 mm
Cable diameter Maximum	8.5 mm		
Shielding	Individual cable pairs and entire cable		
Connector type Connection cycles	2x DVI-D (18+1), male 100		
Wire cross section	AWG 28		
Line resistance	Max. 237 Ω/km		
Insulation resistance	Min. 100 MΩ/km		
Flexibility	Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute)		
Flex radius Fixed layout	See figure "Flex radius specification", on page 454 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)		
Weight	Approx. 300 g	Approx. 590 g	Approx. 2100 g

Table 307: Technical data - DVI cable 5CADVI.0xxx-00

12.2.3 Flex radius specification

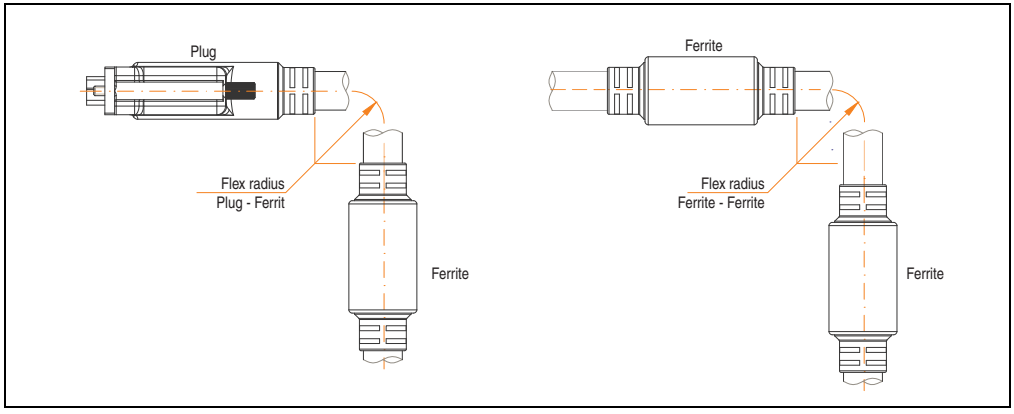


Figure 207: Flex radius specification

12.2.4 Cable specifications

The following figure shows the pin assignments for the DVI cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

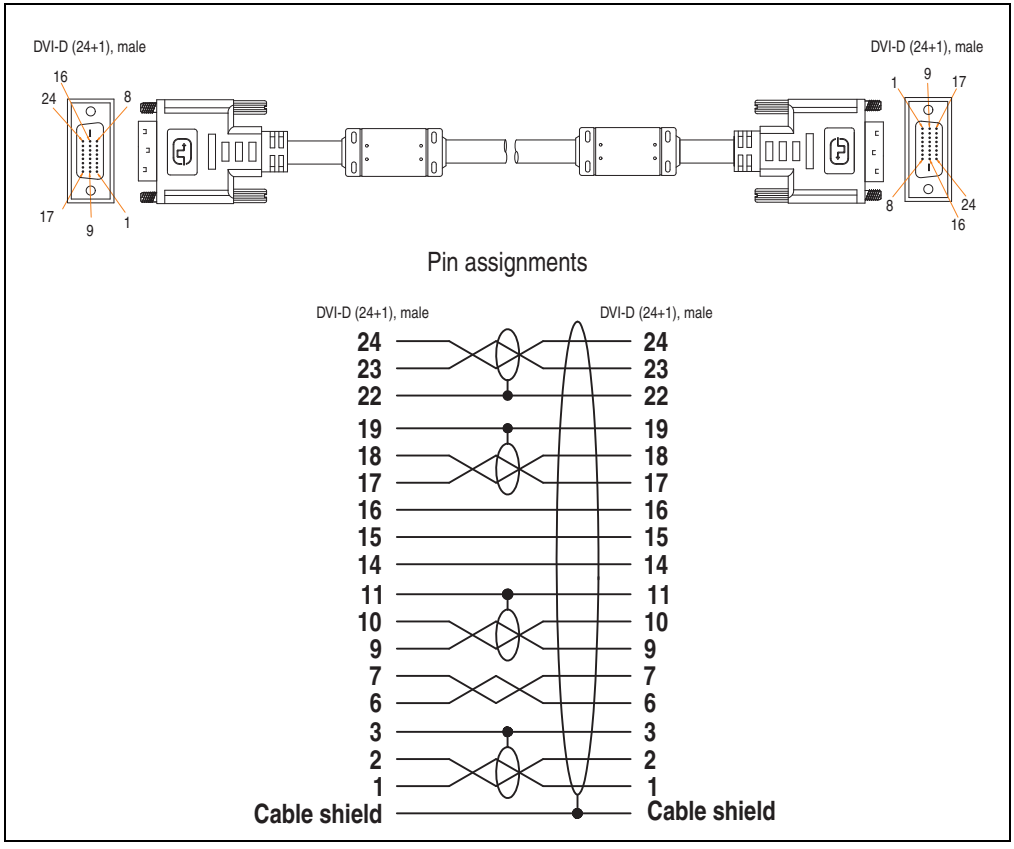


Figure 208: Pin assignments - DVI cable

12.3 SDL cable 5CASDL.0xxx-00

The SDL cables 5CASDL.0xxx-00 are designed for fixed layout. Use of the SDL flex cable 5CASDL.0xxx-03 is required for a flexible installation (e.g. in swing arm systems).

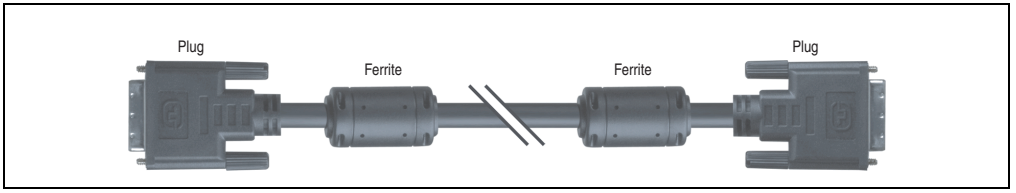


Figure 209: SDL extension cable (similar)

Caution!

The SDl cable can only be plugged in and unplugged when the device is turned off.

12.3.1 Order data

Model number	Description	Note
5CASDL.0018-00	**SDL cable 1.8 m** SDL cable for a fixed type of layout; length: 1.8 m	
5CASDL.0050-00	**SDL cable 5 m** SDL cable for a fixed type of layout; length: 5 m	
5CASDL.0100-00	**SDL cable 10 m** SDL cable for a fixed type of layout; length: 10 m	
5CASDL.0150-00	**SDL cable 15 m** SDL cable for a fixed type of layout; length: 15 m	
5CASDL.0200-00	**SDL cable 20 m** SDL cable for a fixed type of layout; length: 20 m	
5CASDL.0250-00	**SDL cable 25 m** SDL cable for a fixed type of layout; length: 25 m	
5CASDL.0300-00	**SDL cable 30 m** SDL cable for a fixed type of layout; length: 30 m	

Table 308: Model numbers - SDL cables

12.3.2 Technical data

Features	5CASDL.0018-00	5CASDL.0050-00	5CASDL.0100-00	5CASDL.0150-00	5CASDL.0200-00	5CASDL.0250-00	5CASDL.0300-00
Length Tolerance	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm	15 m ±120 mm	20 m ±150 mm	25 m ±200 mm	30 m ±200 mm
Cable diameter Typical Maximum	8.6 ±0.2 mm 9 mm		11 ±0.2 mm 11.5 mm				
Shielding	Individual cable pairs and entire cable						
Connector type Connection cycles	2x DVI-D (24+1), male 100						
Wire cross section	AWG 28		AWG 24				
Line resistance	Max. 237 Ω/km		Max. 93 Ω/km				
Insulation resistance	Min. 10 MΩ/km						
Flexibility	Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute)						
Halogen-free	No						
Flex radius Fixed layout	See figure "Flex radius specification", on page 457 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)						
Weight	Approx. 300 g	Approx. 590 g	Approx. 2100 g	Approx. 3000 g	Approx. 4100 g	Approx. 5100 g	Approx. 6100 g

Table 309: Technical data - SDL cables 5CASDL.0xxx-00

12.3.3 Flex radius specification

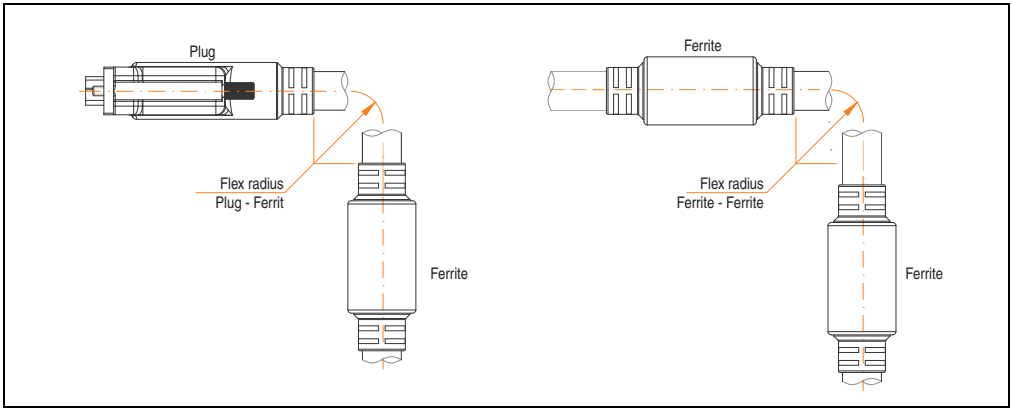


Figure 210: Flex radius specification

12.3.4 Cable specifications

The following figure shows the pin assignments for the SDL cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

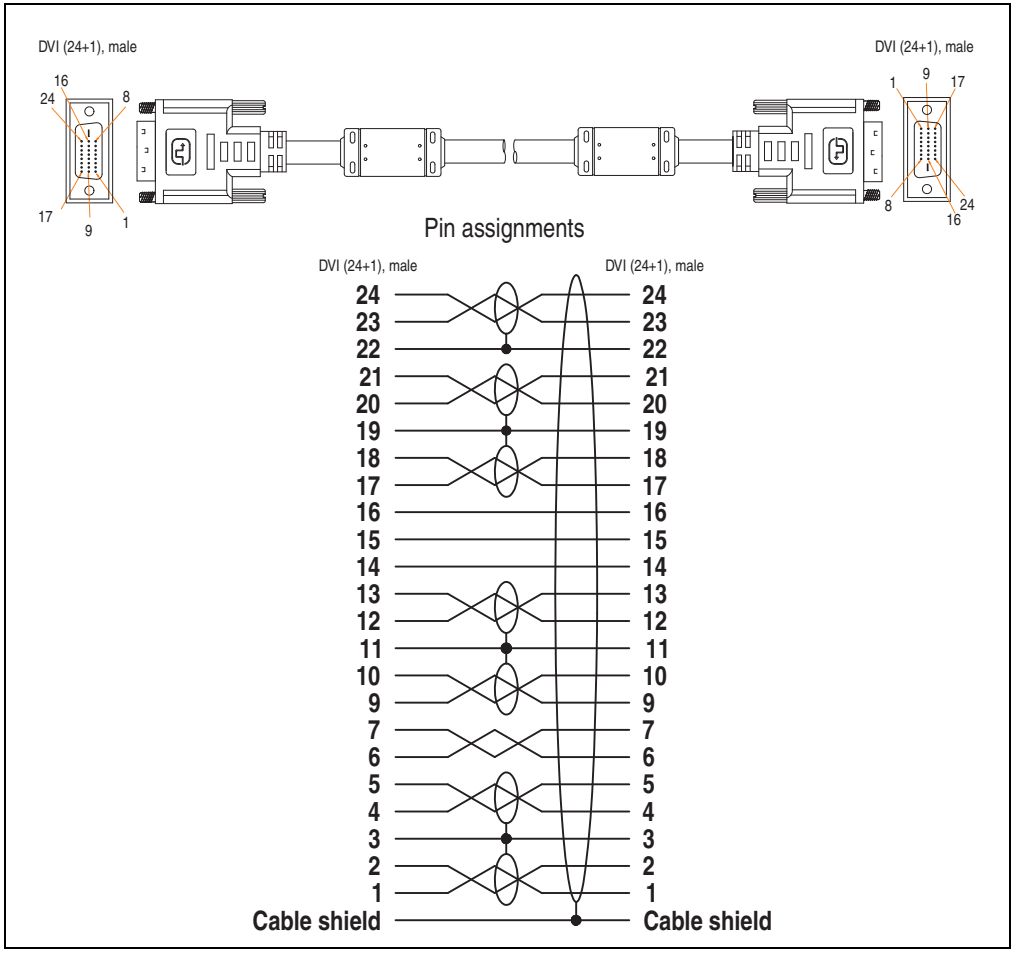


Figure 211: Pin assignments - SDL cable 5CASDL.0xxx-00

12.4 SDL cable with 45° plug 5CASDL.0xxx-01

The SDL cables 5CASDL.0xxx-01 are designed for fixed layout.

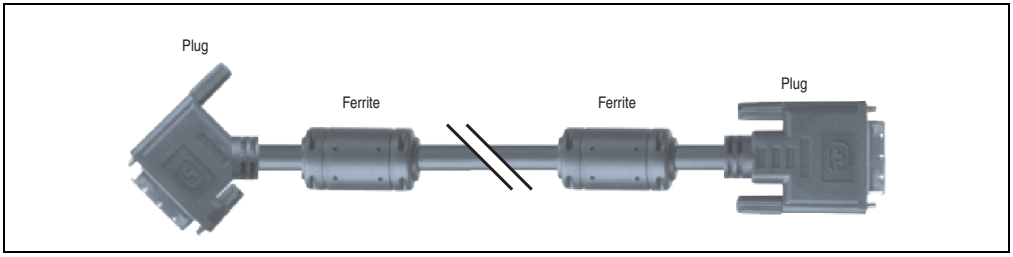


Figure 212: SDL cable with 45° plug (similar)

Caution!

The SDI cable can only be plugged in and unplugged when the device is turned off.

12.4.1 Order data

Model number	Description	Note
5CASDL.0018-01	**SDL cable 1.8 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 1.8 m	
5CASDL.0050-01	**SDL cable 5 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 5 m	
5CASDL.0100-01	**SDL cable 10 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 10 m	
5CASDL.0150-01	**SDL cable 15 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 15 m	

Table 310: Model numbers - SDL cables with 45° plug

12.4.2 Technical data

Features	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
Length Tolerance	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm	15 m ±120 mm
Cable diameter Maximum	9 mm		11.5 mm	
Shielding	Individual cable pairs and entire cable			
Connector type Connection cycles	2x DVI-D (24+1), male 100			
Wire cross section	AWG 28		AWG 24	
Line resistance	Max. 237 Ω/km		Max. 93 Ω/km	
Insulation resistance	Min. 10 MΩ/km			
Flexibility	Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute)			
Halogen-free	No			
Flex radius Fixed layout	See figure "Flex radius specification", on page 460 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)			
Weight	Approx. 300 g	Approx. 590 g	Approx. 2100 g	Approx. 3000 g

Table 311: Technical data - SDL cable with 45° plug 5CASDL.0xxx-01

12.4.3 Flex radius specification

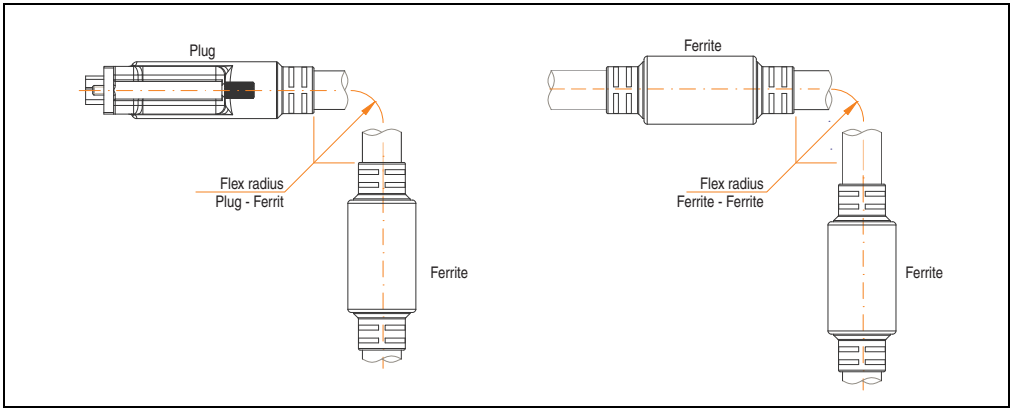


Figure 213: Flex radius specification

12.4.4 Cable specifications

The following figure shows the pin assignments for the SDL cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

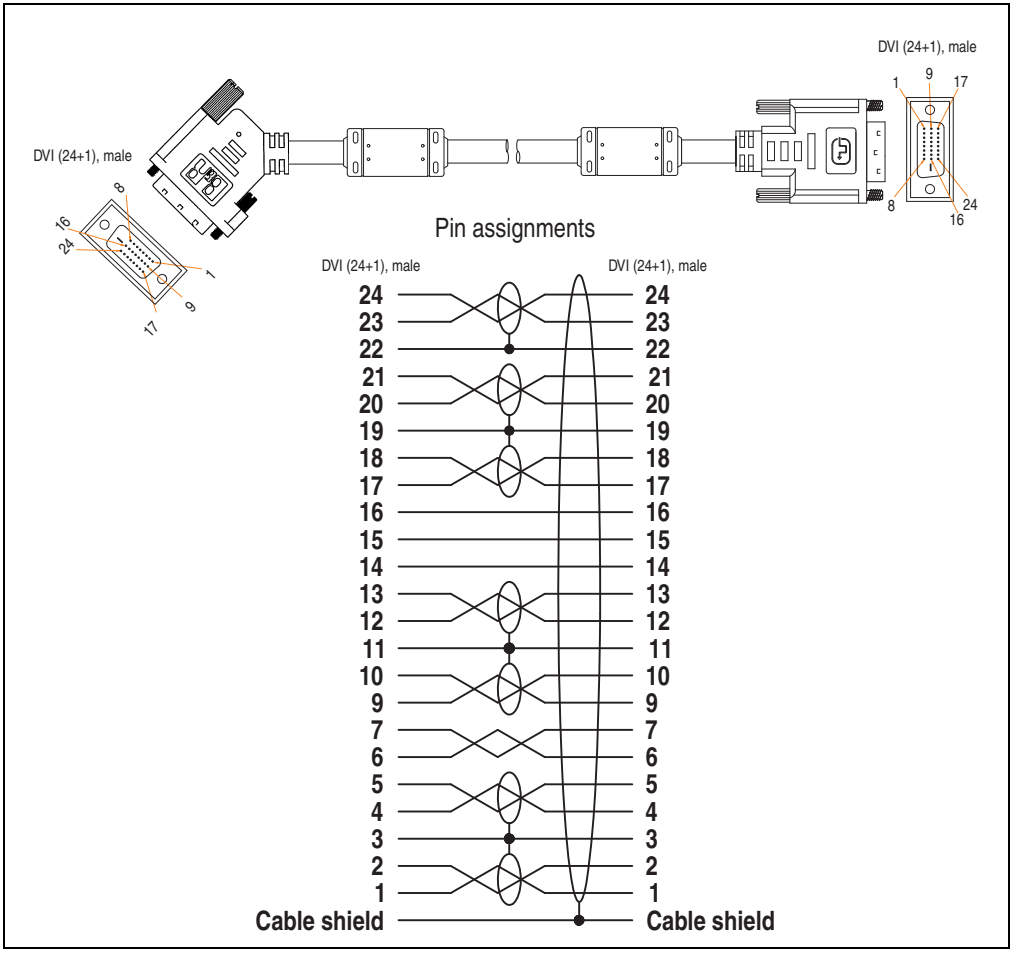


Figure 214: Pin assignments - SDL cable with 45° plug 5CASDL.0xxx-01

12.5 SDL flex cable 5CASDL.0xxx-03

The SDL flex cables 5CASDL.0xxx-03 are designed for both fixed and flexible installations (e.g. in swing arm systems).

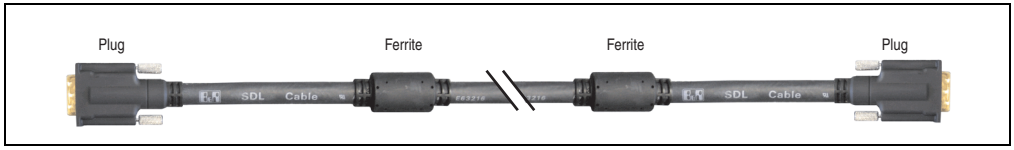


Figure 215: SDL cable 5CASDL.0xxx-03 (similar)

Caution!

The SDl cable can only be plugged in and unplugged when the device is turned off.

12.5.1 Order data

Model number	Description	Note
5CASDL.0018-03	**SDL flex cable 1.8 m** SDL cable for fixed and flexible type of layout; length: 1.8 m	
5CASDL.0050-03	**SDL flex cable 5 m** SDL cable for fixed and flexible type of layout; length: 5 m	
5CASDL.0100-03	**SDL flex cable 10 m** SDL cable for fixed and flexible type of layout; length: 10 m	
5CASDL.0150-03	**SDL flex cable 15 m** SDL cable for fixed and flexible type of layout; length: 15 m	
5CASDL.0200-03	**SDL flex cable 20 m** SDL cable for fixed and flexible type of layout; length: 20 m	
5CASDL.0250-03	**SDL flex cable 25 m** SDL cable for fixed and flexible type of layout; length: 25 m	
5CASDL.0300-03	**SDL flex cable 30 m** SDL cable for fixed and flexible type of layout; length: 30 m	

Table 312: Model numbers - SDL cable 5CASDL.0xxx-03

12.5.2 Technical data

Mechanical characteristics	5CASDL.0018-03	5CASDL.0050-03	5CASDL.0100-03	5CASDL.0150-03	5CASDL.0200-03	5CASDL.0250-03	5CASDL.0300-03
Length Tolerance	1.8 m ±20 mm	5 m ±45 mm	10 m ±90 mm	15 m ±135 mm	20 m ±180 mm	25 m ±225 mm	30 m ±270 mm
Cable diameter Maximum	12 mm						
Shielding	Individual cable pairs and entire cable						
Connector type Connection cycles Contacts Mechanical protection	2x DVI-D (24+1), male Min. 200 Gold plated Metal cover with crimped stress relief						
Max. tension During installation During operation	≤ 400 N ≤ 50 N						
Materials Cable shield Color	RoHS compliant Aluminum foil clad + tinned copper mesh Black (similar to RAL 9005)						
Flexibility	Flexible; valid for ferrite magnet - ferrite magnet (tested 300,000 cycles with 15x cable diameter, 4800 cycles / hour)						
Halogen-free	Yes						
Flex radius Fixed layout flexible installation	See figure "Flex radius specification", on page 464 6x cable diameter (of plug - ferrite magnet) 10x cable diameter (of ferrite magnet - ferrite magnet) 15x cable diameter (of ferrite magnet - ferrite magnet)						
Weight	Approx. 450 g	Approx. 1000 g	Approx. 2000 g	Approx. 3000 g	Approx. 4000 g	Approx. 5000 g	Approx. 6000 g
Electrical properties (at +20°C)							
Wire cross section	24 AWG (control wires) 26 AWG (DVI, USB, data)						
Line resistance 24 AWG 26 AWG	≤ 95 Ω/km ≤ 145 Ω/km						
Insulation resistance	> 200 MΩ/km						
Wave impedance	100 ±10 Ω						
Test voltage Wire / wire Wire / shield	1 kV_{eff} 0.5 kV_{eff}						
Operating voltage	≤ 30 V						
Environmental characteristics							
Temperature resistance Fixed installation Moving Storage	-20 to +80°C -5 to +60°C -20 to +80°C						
Fire resistance	Fire resistant in accordance with UL758 (cable vertical flame test)						

Table 313: Technical data - SDL cable 5CASDL.0xxx-03

Standards and certifications	5CASDL.0018-03	5CASDL.0050-03	5CASDL.0100-03	5CASDL.0150-03	5CASDL.0200-03	5CASDL.0250-03	5CASDL.0300-03
Torsion load	100,000 cycles (tested angle of rotation: ±85° speed: 50 cycles / minute)						
Cable drag chain	300,000 cycles Tested flex radius: 180 mm;15x cable diameter; hub: 460 mm; speed: 4800 cycles / hour						
Approbation	UL AWM 20236 80°C 30 V						
Oil and hydrolysis resistance	According to VDE 0282-10						

Table 313: Technical data - SDL cable 5CASDL.0xxx-03 (Forts.)

12.5.3 Flex radius specification

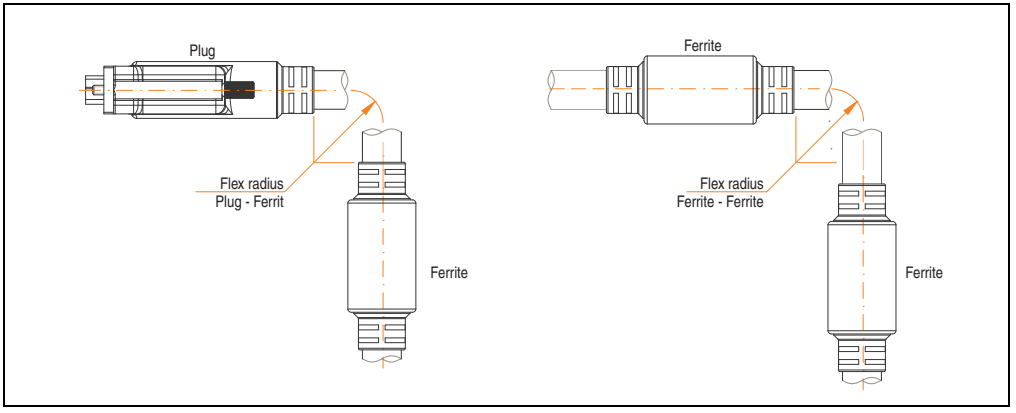


Figure 216: Flex radius specification

12.5.4 Dimensions

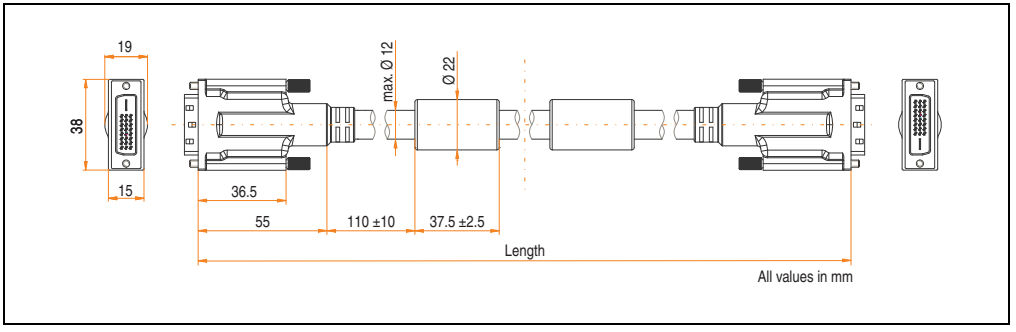


Figure 217: Dimensions - SDL cable 5CASDL.0xxx-03

12.5.5 Construction

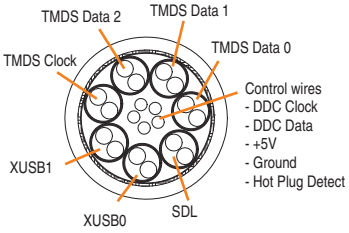
Element	Assignment	Cross section	
DVI	TMDS data 0	26 AWG	 Schematic display
	TMDS data 1	26 AWG	
	TMDS data 2	26 AWG	
	TMDS cycle	26 AWG	
USB	XUSB0	26 AWG	
	XUSB1	26 AWG	
Data	SDL	26 AWG	
Control wires	DDC cycle	24 AWG	
	DDC data	24 AWG	
	+ 5 V	24 AWG	
	mass	24 AWG	
	Hot Plug detect	24 AWG	

Table 314: Structure - SDL cable 5CASDL.0xxx-03

12.5.6 Cable specifications

The following figure shows the pin assignments for the SDL cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

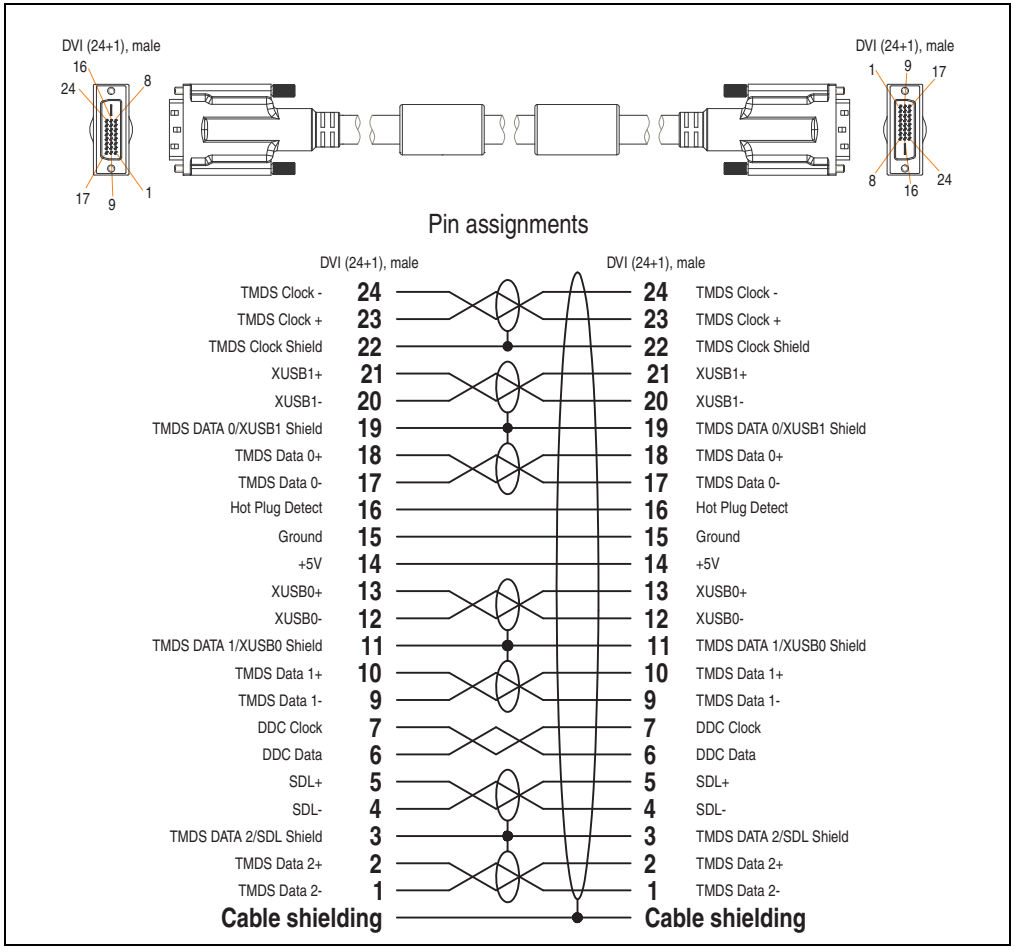


Figure 218: Pin assignments - SDL cable 5CASDL.0xxx-03

12.6 SDL flex cable with extender 5CASDL.0x00-13

The SDL flex cables (with extender) 5CASDL.0x00-13 are designed for both fixed and flexible installations (e.g. in swing arm systems).

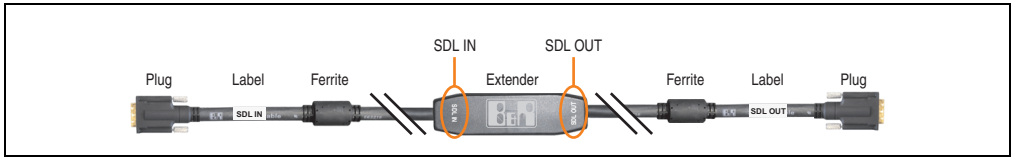


Figure 219: SDL flex cable with extender - 5CASDL.0x00-13 (similar)

Caution!

SDL cables with extender can only be plugged in and unplugged when the device is turned off. The correct direction of connection (SDL IN, SDL OUT) for the wiring is illustrated on the middle of the extender and between the ferrite magnet and plug (with a sticker).

12.6.1 Order data

Model number	Description	Note
5CASDL.0300-13	**SDL flex cable with extender 30 m** SDL cable with extender for fixed and flexible type of layout; length: 30 m	
5CASDL.0400-13	**SDL flex cable with extender 40 m** SDL cable with extender for fixed and flexible type of layout; length: 40 m	

Table 315: Model numbers - SDL flex cable with extender

12.6.2 Technical data

Features	5CASDL.0300-13	5CASDL.0400-13
Length Tolerance	30 m ±200 mm	40 m ±200 mm
Dimensions - Extender box	Height 18.5 mm, width 35 mm, length 125 mm	
Cable diameter Maximum	12 mm	
Shielding	Individual cable pairs and entire cable	
Connector type Connection cycles Contacts Mechanical protection	2x DVI-D (24+1), male Min. 200 Gold plated Metal cover with crimped stress relief	
Max. tension During installation During operation	≤ 400 N ≤ 50 N	
Materials Cable shield Color	RoHS compliant Aluminum foil clad + tinned copper mesh Black (similar to RAL 9005)	
Flexibility	Flexible; valid for ferrite magnet - ferrite magnet (tested 300,000 cycles with 15x cable diameter, 4800 cycles / hour)	
Halogen-free	Yes	
Flex radius Fixed layout flexible installation	See figure "Flex radius specification", on page 469 6x cable diameter (of plug - ferrite magnet) 10x cable diameter (of ferrite magnet - extender) 15x cable diameter (of ferrite magnet - ferrite magnet)	
Weight	Approx. 6200 g	Approx. 8000 g
Electrical properties (at +20°C)		
Wire cross section	24 AWG (control wires) 26 AWG (DVI, USB, data)	
Line resistance 24 AWG 26 AWG	≤ 95 Ω/km ≤ 145 Ω/km	
Insulation resistance	> 200 MΩ/km	
Wave impedance	100 ±10 Ω	
Test voltage Wire / wire Wire / shield	1 kV_{eff} 0.5 kV_{eff}	
Operating voltage	≤ 30 V	
Environmental characteristics		
Temperature resistance Fixed installation Moving Storage	-20 to +60°C -5 to +60°C -20 to +60°C	
Fire resistance	Fire resistant in accordance with UL758 (cable vertical flame test)	

Table 316: Technical data - SDL flex cable with extender 5CASDL.0x00-13

Standards and certifications	5CASDL.0300-13	5CASDL.0400-13
Torsion load	100,000 cycles (tested angle of rotation: ±85° speed: 50 cycles / minute)	
Cable drag chain	300,000 cycles Tested flex radius: 180 mm;15x cable diameter; hub: 460 mm; speed: 4800 cycles / hour	
Approbation	UL AWM 20236 80°C 30 V	
Oil and hydrolysis resistance	According to VDE 0282-10	

Table 316: Technical data - SDL flex cable with extender 5CASDL.0x00-13 (Forts.)

12.6.3 Flex radius specification

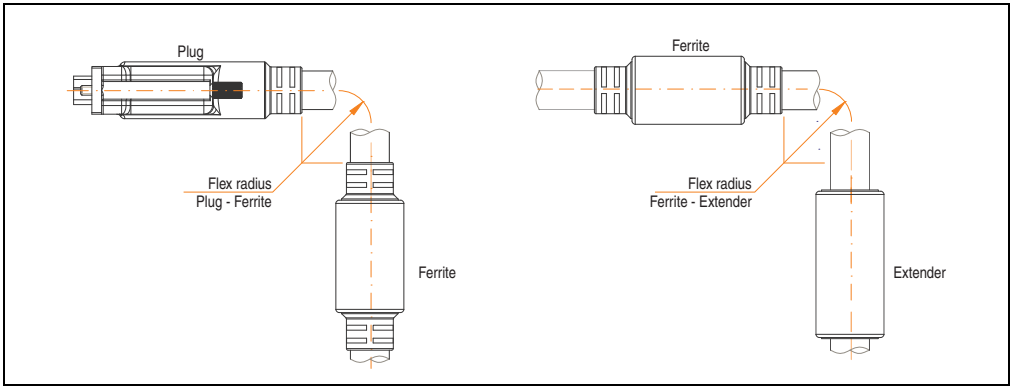


Figure 220: Flex radius specification

12.6.4 Dimensions

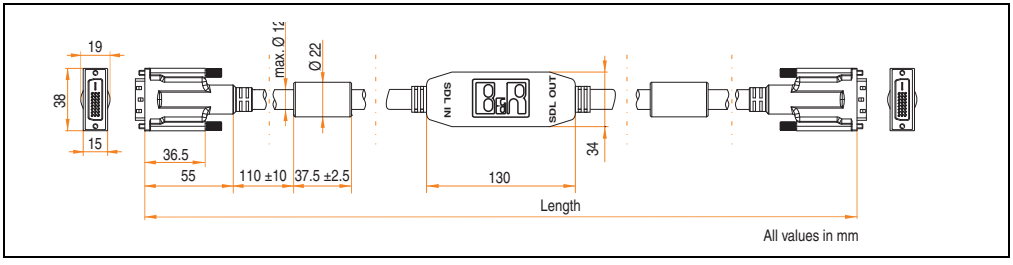


Figure 221: Dimensions - SDL flex cable with extender 5CASDL.0x00-13

12.6.5 Cable connection

The SDL flex cable with extender must be connected between the Industrial PC and Automation Panel 900 display unit in the correct direction. The signal direction is indicated on the extender unit for this purpose:

- Connect the end labeled "SDL IN" with the video output of the Automation PC 620 or Panel PC 700 (monitor/panel output) or Panel OUT of an AP900 AP Link card.
- The "SDL OUT" end should be connected to the display unit (e.g. Automation Panel 900) via the Automation Panel Link insert card (Panel IN).

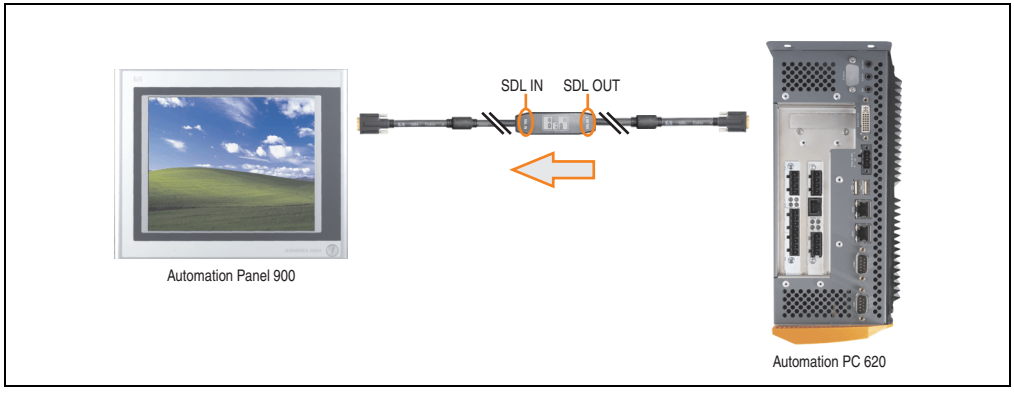


Figure 222: Example of the signal direction for the SDL flex cable with extender - APC620

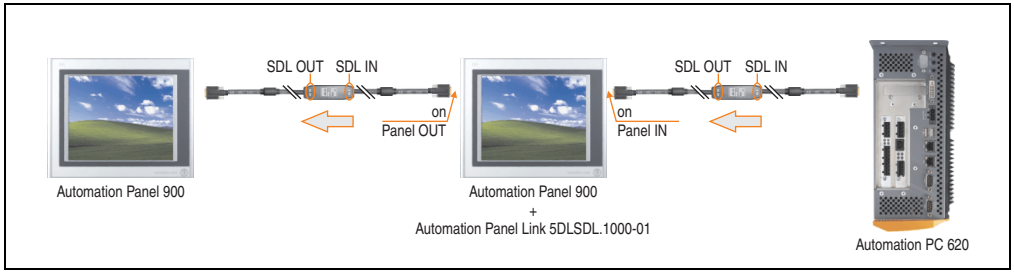


Figure 223: Example of signal direction display - SDL flex cable with extender

12.6.6 Cable specifications

The following figure shows the pin assignments for the SDL flex cable with extender available at B&R.

Information:

Only B&R SDL flex cables with extender can be used.

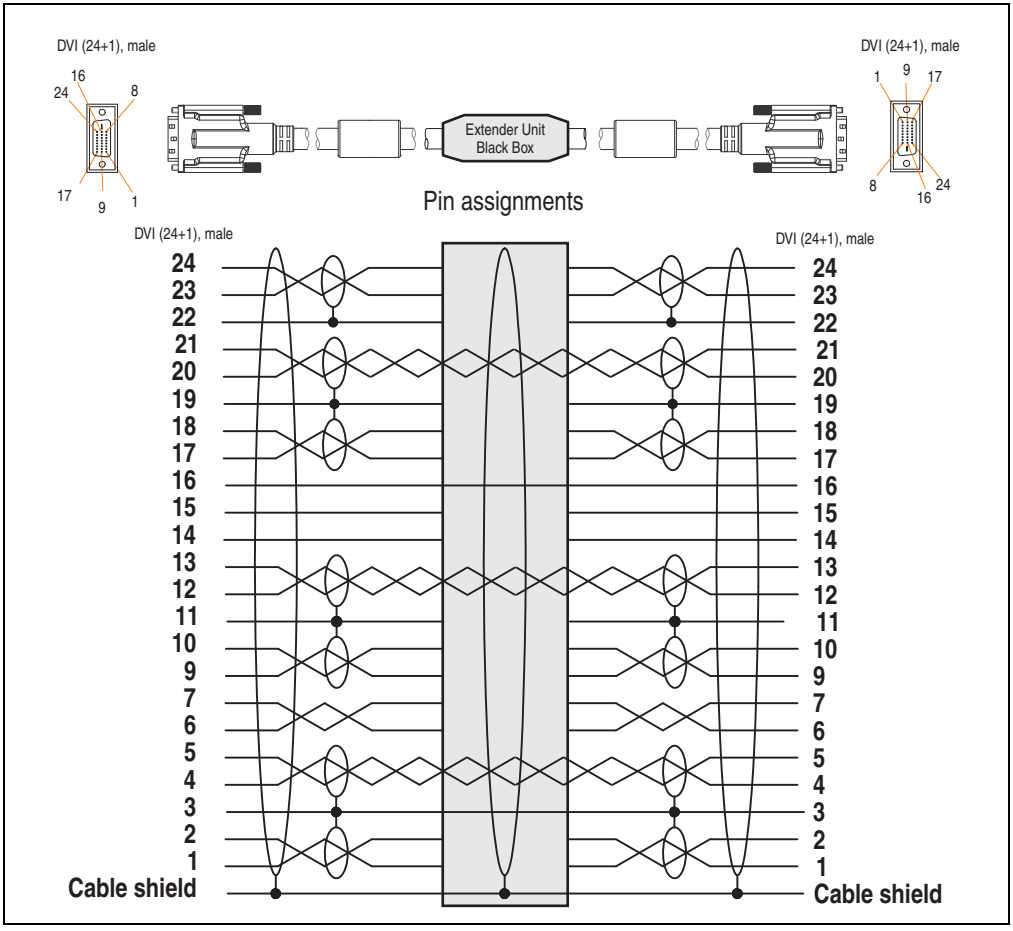


Figure 224: Pin assignments - SDL flex cable with extender 5CASDL.0x00-13

12.7 RS232 cable 9A0014-xx

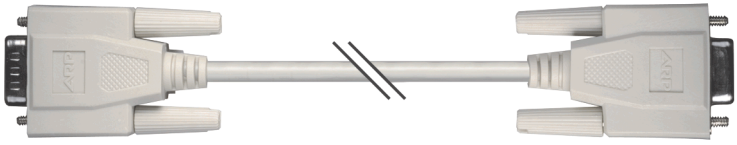


Figure 225: RS232 extension cable (similar)

12.7.1 Order data

Model number	Description	Note
9A0014.02	**RS232 cable DB9/f:DB9/m 1.8 m** RS232 extension cable for remote operation of a display unit with touch screen, length 1.8 m.	
9A0014.05	**RS232 cable DB9/f:DB9/m 5 m** RS232 extension cable for remote operation of a display unit with touch screen, length 5 m.	
9A0014.10	**RS232 cable DB9/f:DB9/m 10 m** RS232 extension cable for remote operation of a display unit with touch screen, length 10 m.	

Table 317: Model numbers - RS232 cables

12.7.2 Technical data

Features	9A0014.02	9A0014.05	9A0014.10
Length Tolerance	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm
Outer diameter	Max. 5 mm		
Shielding	Entire cable		
Connector type	DSUB (9-pin), male / female		
Wire cross section	AWG 26		
Flexibility	Flexible		
Flex radius	Min. 70 mm		

Table 318: Technical data - RS232 cables

12.7.3 Cable specifications

The following figure shows the pin assignments for the RS232 cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

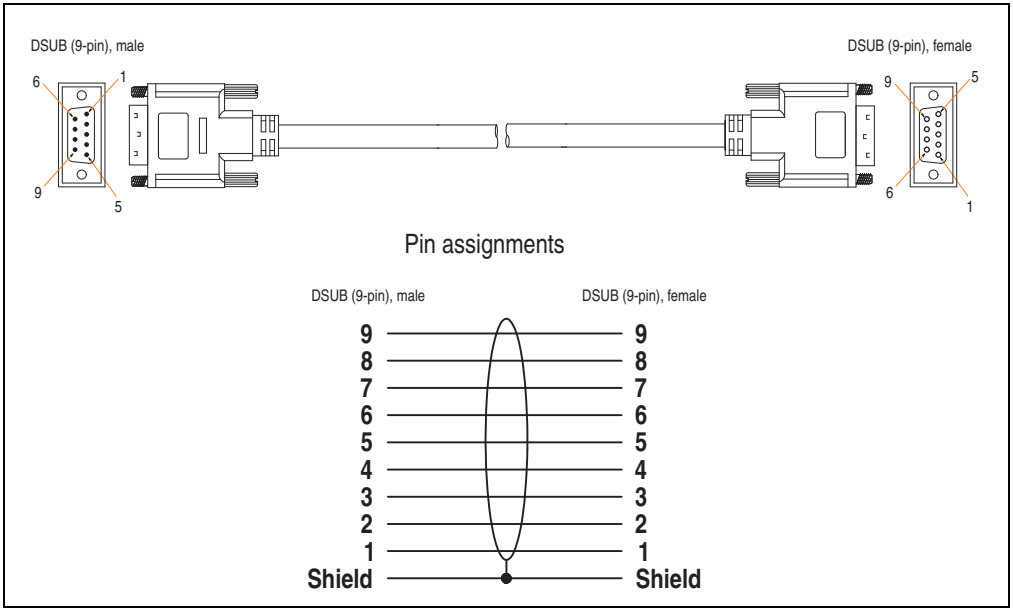


Figure 226: Pin assignments - RS232 cable

12.8 USB cable 5CAUSB.00xx-00

Figure 227: USB extension cable (similar)

12.8.1 Order data

Model number	Description	Note
5CAUSB.0018-00	**USB 2.0 cable, A/m:B/m 1.8 m** USB 2.0 connection cable; plug type A - type B; length 1.8 m	
5CAUSB.0050-00	**USB 2.0 cable, A/m:B/m 5 m** USB 2.0 connection cable; plug type A - type B; length 5 m	

Table 319: Model numbers - USB cables

12.8.2 Technical data

Features	5CAUSB.0018-00	5CAUSB.0050-00
Length Tolerance	1.8 m ±30 mm	5 m ±50 mm
Outer diameter	Max. 5 mm	
Shielding	Entire cable	
Connector type	USB type A male and USB type B male	
Wire cross section	AWG 24, 28	
Flexibility	Flexible	
Flex radius	Min. 100 mm	

Table 320: Technical data - USB cables

12.8.3 Cable specifications

The following figure shows the pin assignments for the USB cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

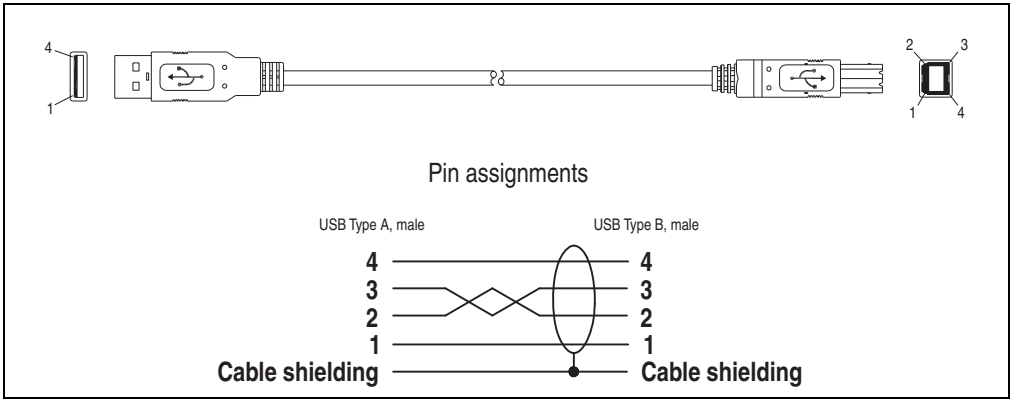


Figure 228: Pin assignments - USB cable

13. Uninterruptible power supply

With the optionally integrated UPS, the Automation PC 620 makes sure that the PC system completes write operations even after a power failure occurs. When the UPS detects a power failure, it switches to battery operation immediately without interruption. This means that all running programs will be ended properly by the UPS software. This prevents the possibility of inconsistent data (only functions if the UPC is already configured and the driver is activated).

Information:

More detailed information about uninterruptible power supplies can be found in the UPS manual. This can be downloaded from the B&R homepage.

Information:

The monitor is not buffered by the UPS and will shut off when the power fails.

By integrating the charging circuit in the Automation PC 620 housing, the installation has been reduced to merely attaching the connection cable to the battery unit mounted next to the PC.

Special emphasis was placed on ease of maintenance when the battery unit was designed. The batteries are easily accessible from the front and can be switched in just a few moments when servicing.

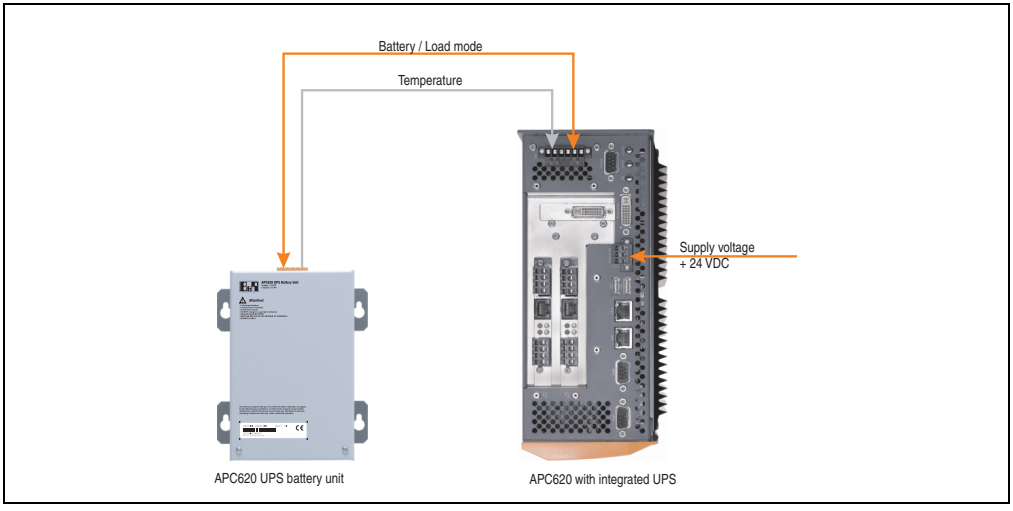


Figure 229: UPS principle

13.1 Order data

Model number	Description	Note
5AC600.UPSI-00	**Add-on UPS module** Order UPS module for Automation PC, cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	
5AC600.UPSB-00	**5Ah battery unit** UPS battery unit for the add-on UPS module	
5CAUPS.0005-00	**0.5 meter UPS cable** Connection cable between add-on UPS module and UPS battery unit, length 0.5 meters	
5CAUPS.0030-00	**3 meter UPS cable** Connection cable between add-on UPS module and UPS battery unit, length 3 meters	

Table 321: Order data - Uninterruptible power supply

13.2 Features

- Long-lasting, maintenance-free rechargeable batteries
- Communication via integrated interfaces
- Temperature sensor
- Driver software
- Deep discharge protection

13.3 Requirements

1) An appropriate system unit.
   The add-on UPS module (5AC600.UPSI-00) can only be installed with the following APC620 system unit revisions:

System unit	Revision
5PC600.SX01-00	Starting with revision H0
5PC600.SX02-00	Starting with revision G0
5PC600.SX02-01	Starting with revision H0
5PC600.SX05-00	Starting with F0
5PC600.SX05-01	Starting with F0
5PC600.SF03-00	Starting with revision A0
5PC600.SE00-00	Starting with revision A0
5PC600.SE00-01	Starting with revision A0
5PC600.SE00-02	Starting with revision A0
5PC810.SX*.	Starting with revision A0

Table 322: System unit revisions - Add-on UPS module

2) Add-on UPS module 5AC600.UPSI-00
For more on installing the add-on modules, see chapter 7 "Maintenance / Servicing", section 4 "Installing the UPS module", on page 520.

3) Battery unit 5AC600.UPSB-00

4) UPS connection cable 0.5 m (5CAUPS.0005-00) or 3 m (5CAUPS.0030-00)

5) APC620 firmware versions:
To read the status or make changes to the settings of the APC620 add-on UPS (5AC600.UPSI-00) and the APC620 battery unit (5AC600.UPSB-00), the following software components are necessary:

Software name	Type	Version
MTCX PX32[1)]	Firmware	1.61 or higher
MTCX FPGA[1)]	Firmware	1.18 or higher
ADI Control Center[1)]	Driver / Control Center	1.60 or higher

Table 323: Firmware and software required for the UPS

1) The software can be downloaded from the B&R homepage (**www.br-automation.com**).

For info regarding upgrading the firmware, see chapter 4 "Software", section 2.2 "Upgrading the firmware", on page 336.

The APC620 firmware version can be read in BIOS under the main menu item "Advanced", submenu item "Baseboard/Panel Features", or in the B&R Control Center.

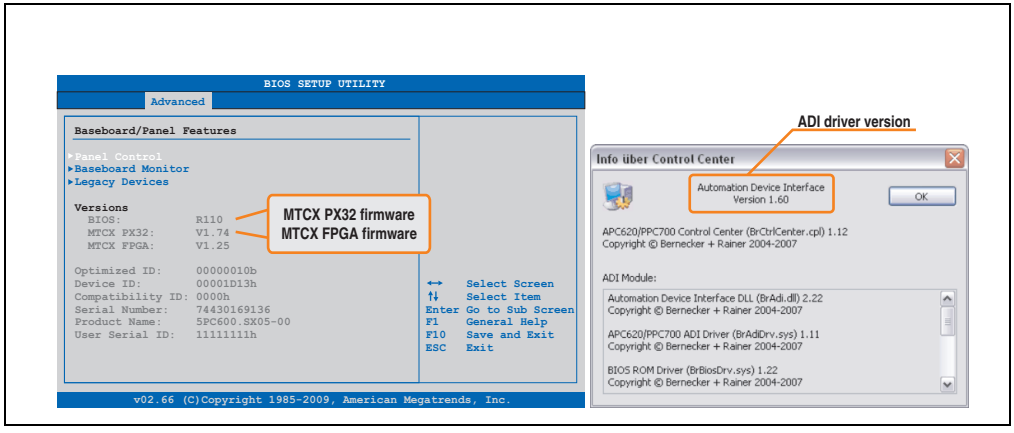


Figure 230: Firmware and software required for the UPS

The required firmware versions can be found in the APC620 / Panel PC firmware upgrade (MTCX, SDLR, SDLT) V1.16[1)] .

1) The software can be downloaded from the B&R homepage (**www.br-automation.com**).

6) To configure: Automation Device Interface driver version 1.60 or higher (for the ADI Control Center)

   For info regarding configuration of the B&R UPS using the ADI Control Center, see chapter 4 "Software", section 12.4 "UPS configuration", on page 381.

13.4 Individual components

13.4.1 Add-on UPS module 5AC600.UPSI-00

The add-on UPS module can easily be installed in an appropriate APC620 system unit (List of required revisions: see section "Requirements", on page 477).

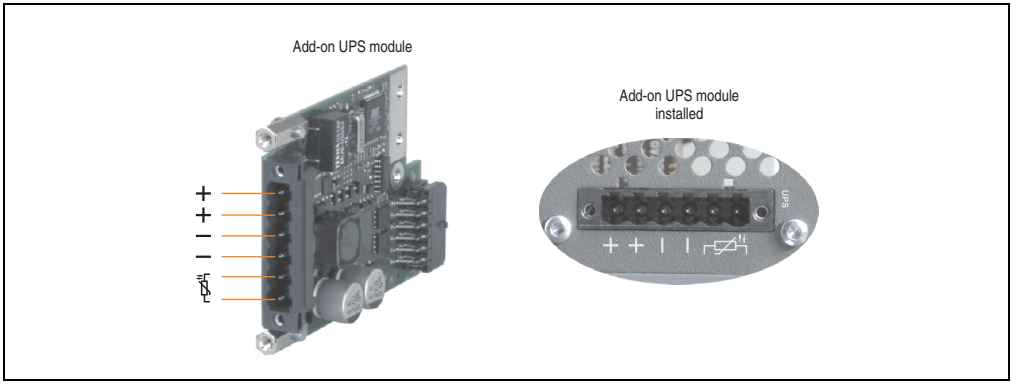


Figure 231: Add-on UPS module 5AC600.UPSI-00

Technical data

Features	5AC600.UPSI-00
Switching threshold mains / battery operation	15 / 13 V
Mains failure bridging	Max. 20 min at 150 W load
Charging current	Max. 0.5 A
Deep discharge protection	Yes, at 10 V on the battery unit
Short circuit protection	No
Power requirements	Max. 7.5 W
Status indicators	Via the ADI Control Center (see section "UPS configuration", on page 381)
Configuration	Via the ADI Control Center (see section "UPS configuration", on page 381)

Table 324: Technical data - 5AC600.UPSI-00

Installation

The module is installed using the materials included in the delivery. For installation instructions, see chapter 7 "Maintenance / Servicing", section 4 "Installing the UPS module", on page 520.

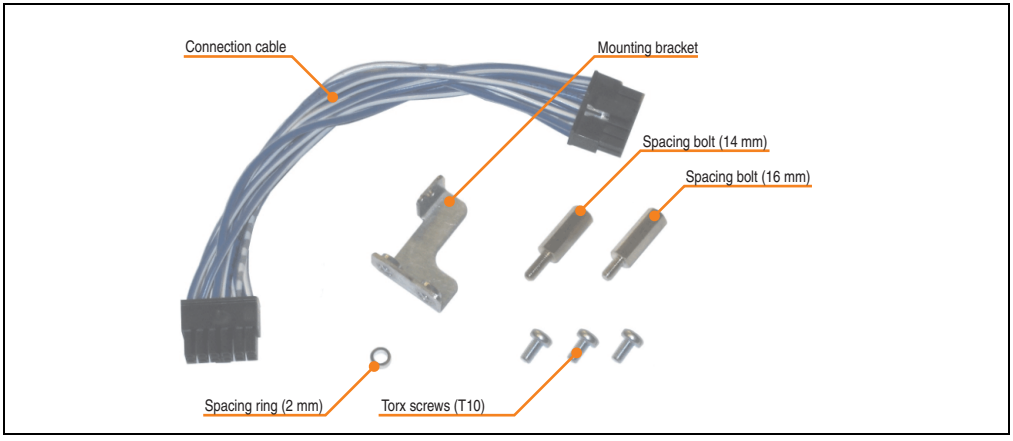


Figure 232: Add-on UPS module 5AC600.UPSI-00 - Installation materials

13.4.2 Battery unit 5AC600.UPSB-00

The battery unit is subject to wear and should be replaced regularly (at least following the specified lifespan).

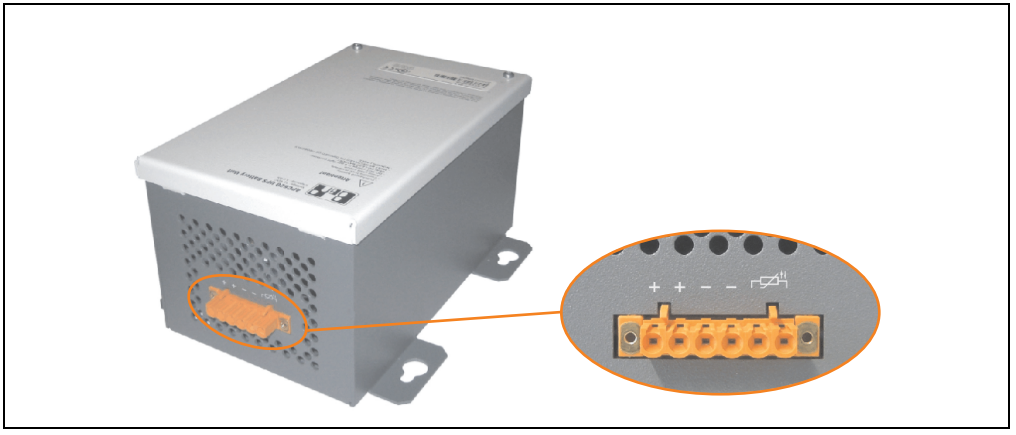


Figure 233: Battery unit 5AC600.UPSB-00

Technical data

Features	5AC600.UPSB-00
Battery Type Method	 Enersys Cyclon 2 V 5 Ah; (6 connected in series) Single cell (X cell)
Operating current	Max. 8 A
Deep discharge voltage	10 V
Dimensions (W x H x D)	Image 236 "Dimensions - 5AC600.UPSB-00", on page 484
Temperature sensor	NTC resistance
Weight	Approx. 3.2 kg
Ambient temperature Operation Storage Transport	 -40 to +80°C -65 to +80°C -65 to +80°C
Relative humidity Operation Storage Transport	 5 to 95% (non-condensing) 5 to 95% (non-condensing) 5 to 95% (non-condensing)
Altitude	Max. 3000 meters
Mounting instructions	See "Mounting instructions", on page 485
Service life	10 years at 25°C (up to 80% battery capacity)
Maintenance interval during storage	6 month interval between charges

Table 325: Technical data - 5AC600.UPSB-00

Temperature life span diagram up to 20% battery capacity.

Temperature	Lifespan (days)
25	14600
30	9467
35	6139
40	3980
45	2581
50	1674
55	1085
60	704
65	456
70	296
75	192
80	124

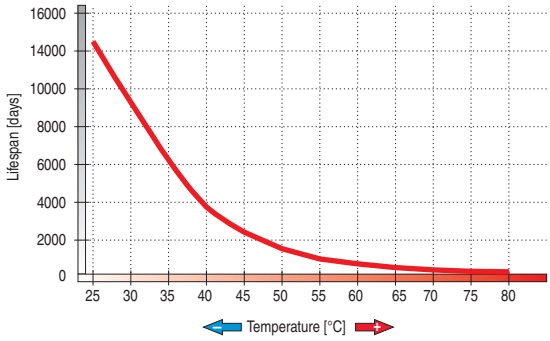


Figure 234: Temperature life span diagram

Deep discharge cycles

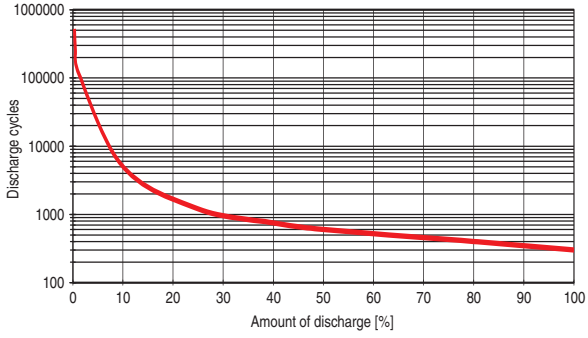


Figure 235: Deep discharge cycles

Dimensions

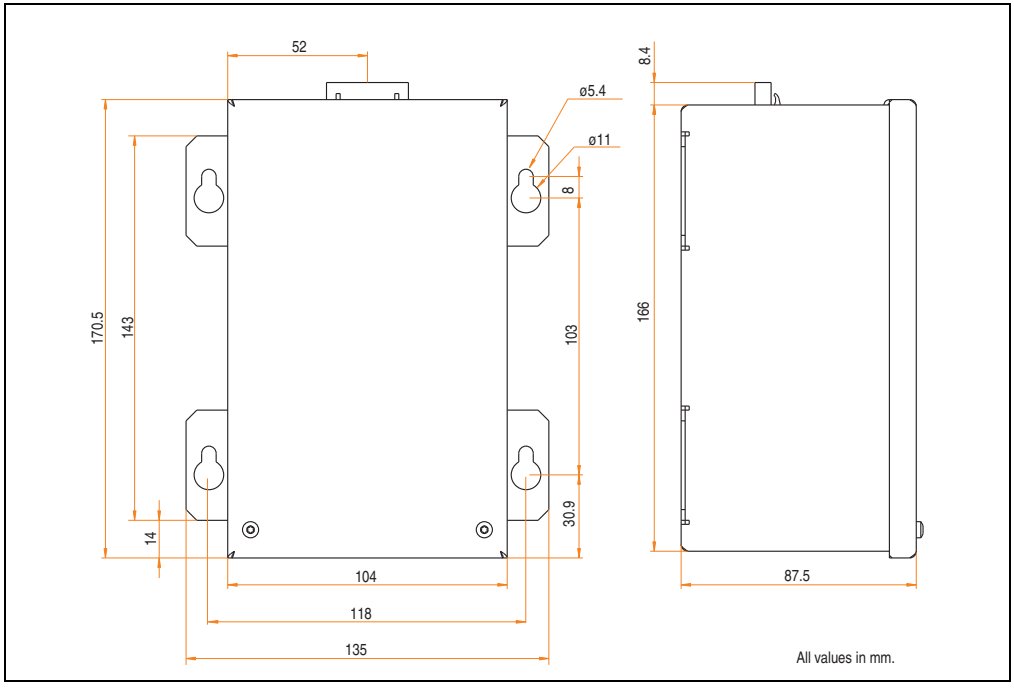


Figure 236: Dimensions - 5AC600.UPSB-00

Drilling template

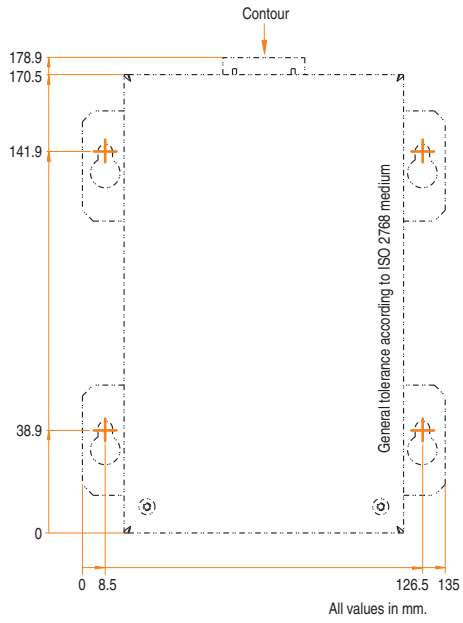


Figure 237: Drilling template for the battery unit

Mounting instructions

Due to the unique construction of these batteries, they can be stored and operated in any position.

13.4.3 UPS connection cable

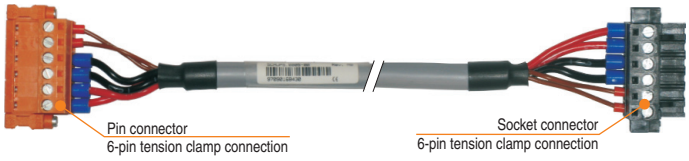


Figure 238: UPS connection cable

Technical data

Features	5CAUPS.0005-00	5CAUPS.0030-00
Length	0.5 m	3 m
Outer diameter	8.5 mm ±0.2 mm	
Connector type	6-pin plug connectors, tension clamp connection / 6-pin socket connectors, tension clamp connection	
Wire cross section Temperature sensor wire Voltage wire	 2 x 0.5 mm^2 (AWG 20) 4 x 2.5 mm^2 (AWG 13)	
Line resistance 0.5 mm^2 2.5 mm^2	 Max. 39 Ω/km Max. 7.98 Ω/km	
Flex radius Fixed installation Free-moving	 5 x wire cross-section 10 x wire cross-section	
Temperature range Moving Non-moving	 -5 to +80°C -30 to +80°C	
Weight	Approx. 143 kg/km	
Materials Cable shield Color	 Thermoplastic PVC-based material Window gray (similar to RAL 7040)	
Peak operating voltage	12 V DC	
Testing AC voltage Wire / wire	 1500 V	
Operating voltage	Max. 300 V	
Current load	10 A at +20°C	

Table 326: Technical data - UPS connection cable

14. External UPS

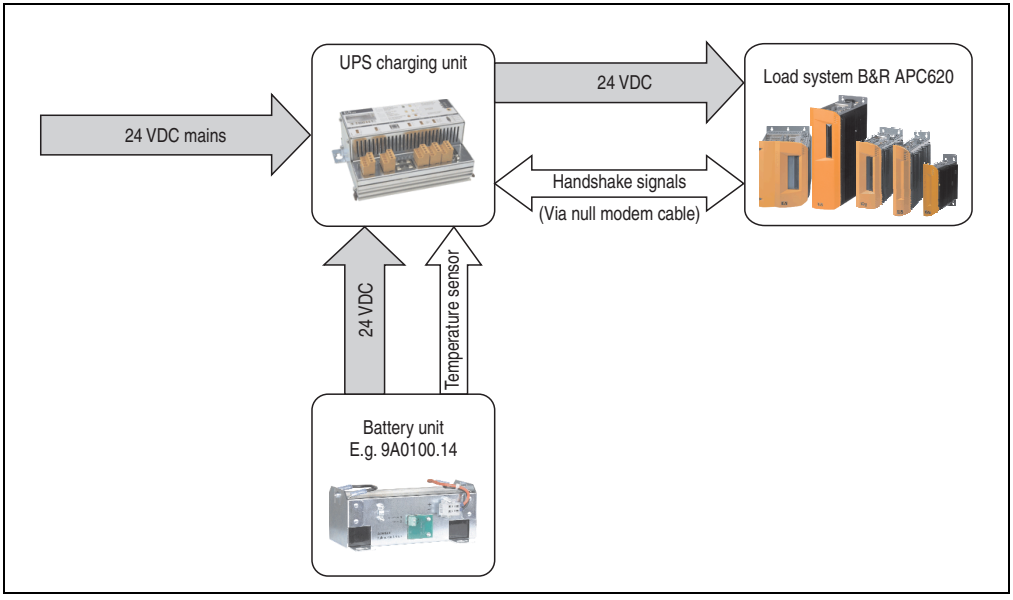


Figure 239: Block diagram of the UPS

14.1 General information

For supply with an external UPS, a UPS charging unit, a battery unit and a null modem cable are required.

In normal operation, the 24 VDC supply voltage is put straight through to the load system. If the supply voltage fails, the rechargeable UPS batteries power the PC to allow controlled shutdown without loss of data.

Data and commands are exchanged between the UPS and the load system via the handshake signals for an RS232 interface.

More information concerning an external UPS is available in the "UPS manual", which can be downloaded from the B&R homepage (**www.br-automation.com**).

14.2 Order data

Model number	Description	Note
9A0100.11	**UPS 24 VDC** 24 VDC input, 24 VDC output, serial interface	
9A0100.14	**UPS battery unit type B** 24 V; 2.2 Ah; including battery cage	
9A0100.15	**UPS battery unit type B (replacement part)** 2 x 12 V; 2.2 Ah; for battery unit 9A0100.14	
9A0017.01	**RS232 Null Modem Cable, 0.6 m** To connect UPS and load system (9-pin DSUB socket - 9-pin DSUB socket)	
9A0017.02	**RS232 Null Modem Cable, 1.8 m** To connect UPS and load system (9-pin DSUB socket - 9-pin DSUB socket)	

Table 327: UPS - Order data

15. PCI Ethernet cards

15.1 PCI Ethernet card 10/100 - 5ACPCI.ETH1-01

The universal (3.3 V and 5 V) half-size PCI Ethernet card has a 10/100 Mbit/s network connection and can be inserted in a 16-bit PCI slot and operated as an additional network interface.

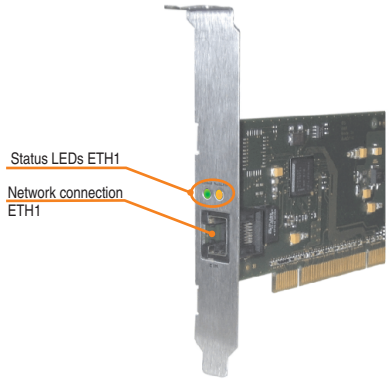


Figure 240: PCI Ethernet card 10/100 - 5ACPCI.ETH1-01

15.1.1 Technical data

Ethernet connection			
Controller	Intel 82551ER		RJ45 twisted pair (10BaseT/100BaseT), female
Power supply	Universal card (2 notches) for 3.3 V or 5 V		
Cabling	S/STP (Cat5e)		
Transfer rate	10/100 Mbit/s [1]		
Cable length	max. 100 m (min. Cat5e)		
LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 328: Ethernet connection ETH

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

15.1.2 Driver support

A special driver is necessary for operating the Intel Ethernet controller 82551ER. Drivers for Windows XP Professional, Windows XP Embedded, and DOS are available for download on the B&R Homepage in the download area (**www.br-automation.com**).

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

15.1.3 Dimensions

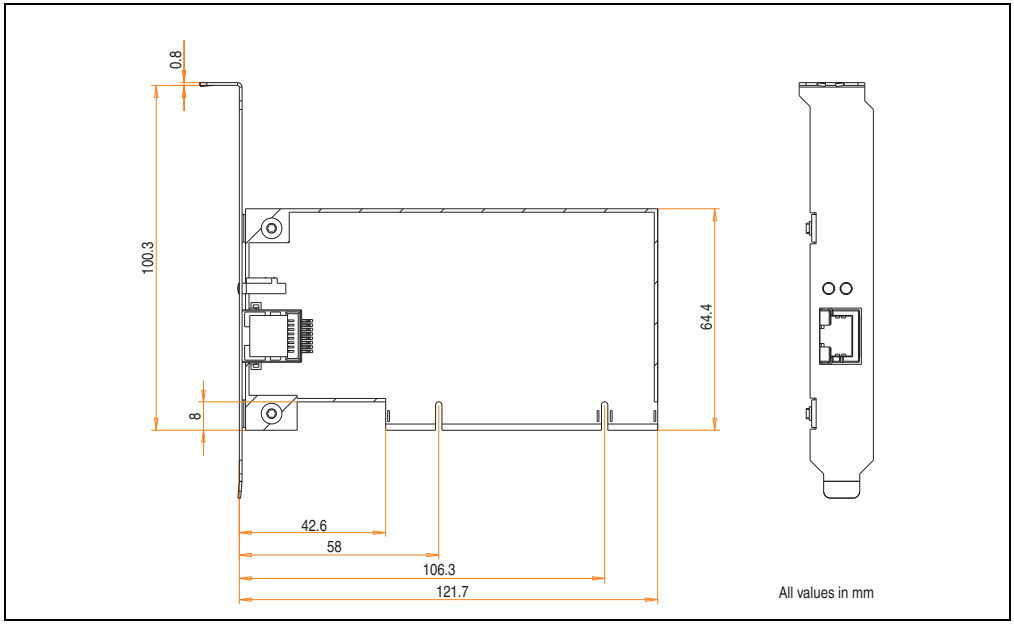


Figure 241: Dimensions - 5ACPCI.ETH1-01

15.2 PCI Ethernet card 10/100 - 5ACPCI.ETH3-01

The universal (3.3 V and 5 V) half-size PCI Ethernet card has three 10/100 Mbit/s network connections and can be inserted in a 16-bit PCI slot and operated as an additional network interface.

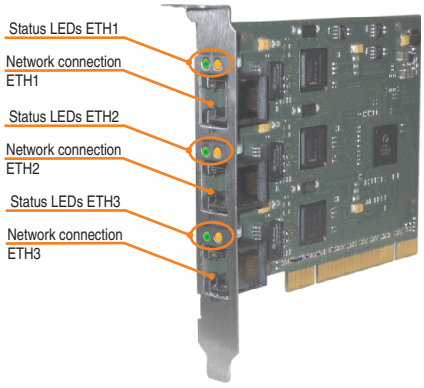


Figure 242: PCI Ethernet card 10/100 - 5ACPCI.ETH3-01

15.2.1 Technical data

Ethernet connections			
Controller	each with Intel 82551ER		3 x RJ45 twisted pair (10BaseT/100BaseT), female
Power supply	Universal card (2 notches) for 3.3 V or 5 V		
Cabling	each S/STP (Cat5e)		
Transfer rate	each 10/100 Mbit/s [1]		
Cable length	each max. 100 m (min. Cat5e)		
LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

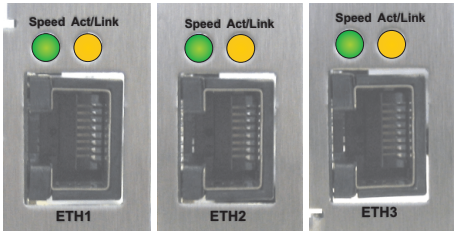


Table 329: Ethernet connections ETH1, ETH2, ETH3

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

15.2.2 Driver support

A special driver is necessary for operating the Intel Ethernet controller 82551ER. Drivers for Windows XP Professional, Windows XP Embedded, and DOS are available for download on the B&R Homepage in the download area (**www.br-automation.com**).

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

15.2.3 Dimensions

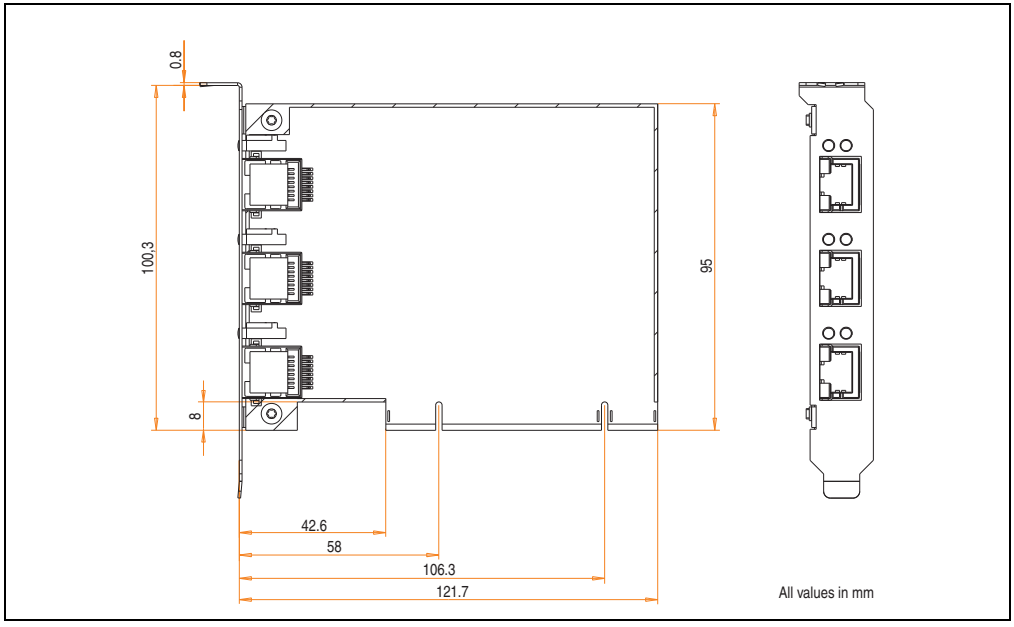


Figure 243: Dimensions - 5ACPCI.ETH3-01

16. Replacement fan

Information:

The fan filters are subject to wear , and should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.

Figure 244: Replacement fan

Model number	Short description	Note
5AC600.FA01-00	**APC620 replacement fan filter 1PCI 5 piece** This fan filter is an optional addition for system units with 1 PCL slot (5PC600.SX01-00).	
5AC600.FA02-00	**APC620 replacement fan filter 1PCI 5 piece** This fan filter is an optional addition for system units with 2 PCL slots (5PC600.SX02-00, 5PC600.SX02-01).	
5AC600.FA03-00	**APC620 replacement fan filter 3PCI 5 piece** This fan filter is an optional addition for system units with 3 PCL slots (5PC600.SF03-00).	
5AC600.FA05-00	**APC620 replacement fan filter 1PCI 5 piece** This fan filter is an optional addition for system units with 5 PCL slots (5PC600.SX05-00, 5PC600.SX05-01).	

Table 330: Model numbers - Replacement fan filters

17. SRAM module - 5AC600.SRAM-00

The 512 KB SRAM module increases APC620 application possibilities. It is inserted internally on the baseboard (depending on revision) and doesn't require a PCI slot. Nonvolatile data can be stored on it. The module is backed up by the APC620 battery.

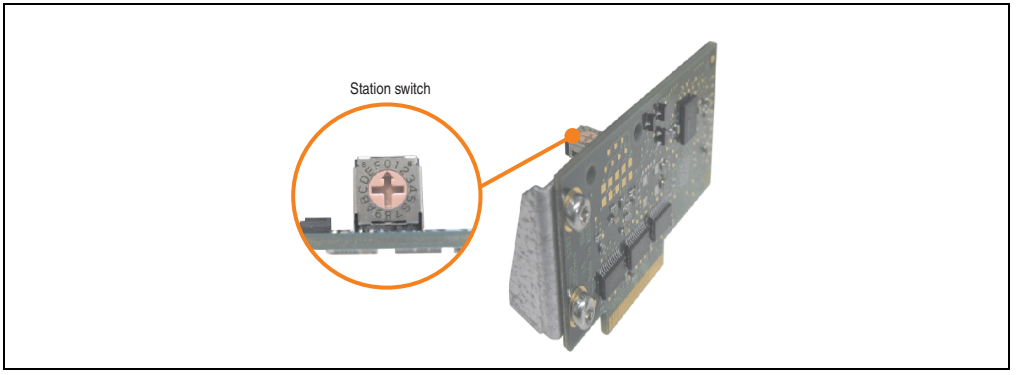


Figure 245: 5AC600.SRAM-00

The following system unit hardware revisions are required before mounting the SRAM module:

- 5PC600.SX01-00 starting with Rev I0
- 5PC600.SX01-00 starting with Rev. H0
- 5PC600.SX02-01 starting with Rev. K0
- 5PC600.SF03-00 all revisions
- 5PC600.SX05-00 starting with Rev. H0
- 5PC600.SX05-01 starting with Rev. H0

17.1 Technical data

Features	5AC600.SRAM-00
Connection to system	via the PCI bus (PCI PnP)
Memory Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	SRAM 512 kB Yes 256 kB with CPU board 5PC600.E855-xx and 5PC600.X855-xx 192 kB with CPU board 5PC600.X945-00
Station switch	16 digits (0-F)
Data rate	Up to 31 MB/s for write access Up to 25 MB/s for read access

Table 331: Technical data - 5AC600.SRAM-00

Features	5AC600.SRAM-00	
PCI configuration space	**Value**	**Meaning**
Vendor ID	1677h	B & R
Device ID	A085h	5AC600.SRAM-00
Status	0200h	DEVSEL timing medium
HeaderType	00h	Single function device
The card is registered in the PCI Configuration Space as Single Function Device	**Value**	**Meaning**
Device 0		
Base class	05h	Memory controller
Sub class	00h	RAM
Command	0000h	Bus master (not used)
IRQ	-	Not used
BAR0	512	kByte memory area
BAR1	4	Byte I/O area

Table 331: Technical data - 5AC600.SRAM-00

17.2 Driver support

The module is presently only supported in an Automation Runtime environment. Driver for other operating systems (e.g. Windows XP) are available upon request.

17.3 Installation

Installation is described in the example with system unit 5PC600.SF03-00 with inserted AP Link cards and APC620 UPS module.

- Remove side cover from APC620 (see chapter 7 "Maintenance / Servicing", section 5 "Mounting the side cover", on page 537).
- Screw on the M3x5 Torx included in the delivery to the baseboard of the module.

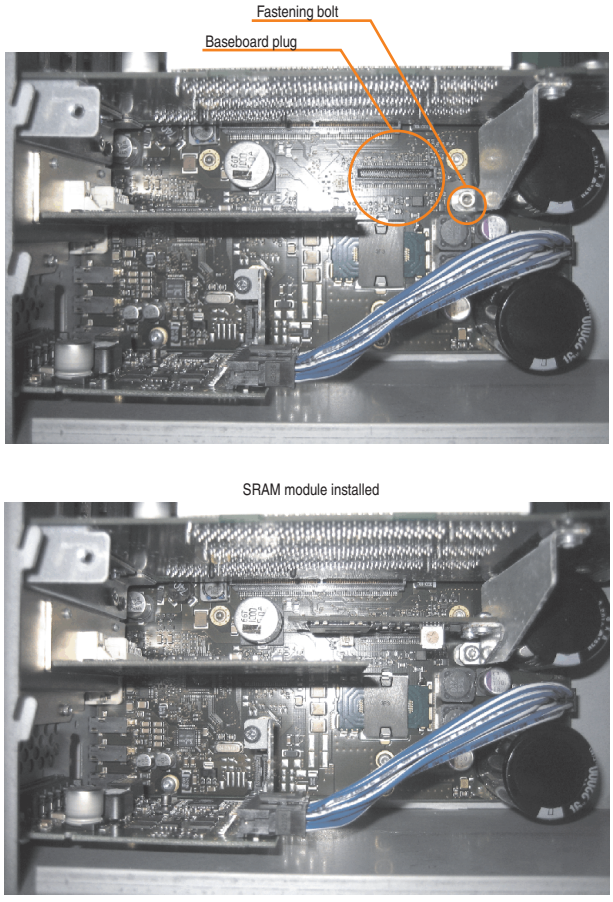


Figure 246: SRAM module installation

18. Power supplies

In order to meet demands for complete, comprehensive system solutions, power supplies are available in the B&R product line for mounting rail installation. This extensive spectrum ranges from single-phase power supplies that supply 2.1 A up to three-phase power supplies that supply 40 A. All switching power supplies can handle a wide range of AC and DC input voltages. This input ranges from 100 to 240 VAC or 400 to 500 VAC and from 85 to 375 VDC. Devices are protected against short circuit, overload, and open circuit, which allows them to be operated without functional limitations or derating even when overloads between 15% and 25% occur.

Figure 247: B&R power supplies (examples)

Two mini power supplies (PS102 and PS104) in robust plastic housing are available in the lower performance range. A well-designed cooling concept allows several different mounting orientations. The functional DIN rail allows fast mounting and removal. Wiring is essentially performed in seconds thanks to the spring clamps being used. The compact design, easy mounting and several different mounting orientations make the two smallest power supplies in this product line components that can be used practically anywhere.

18.1 Model numbers and brief technical overview

The technical data listed in the following tables should act as a brief selection guide. For more detailed technical data, data sheets are available for download from production description section of the B&R homepage (**www.br-automation.com**).

18.1.1 Single-phase power supplies

Features	0PS102.0	0PS104.0	0PS105.1	0PS105.2	0PS110.1	0PS110.2	0PS120.1
Output Power	50 W	100 W	120 W	120 W	240 W	240 W	480 W
AC input voltage	85-264 V	85-132 V 184-264 V	85-132 V 176-264 V	85-132 V 176-264 V	85-132 V 176-264 V	85-132 V 176-264 V	85-132 V 176-264 V
DC input voltage	85-375 V	220-375 V	210-375 V	210-375 V	210-375 V	210-375 V	-
Output voltage	24-28 V	24-28 V	24 V	24 V	24-28 V	24-28 V	24-28 V
Output current at 24 V	2.1 A	4.2 A	5 A	5 A	10 A	10 A	20 A
Parallel operation	No	Yes	Yes	Yes	Yes	Yes	Yes
Current balancing	No	Yes	No	Yes	No	Yes	Yes

Table 332: Single-phase power supplies

18.1.2 Three-phase power supplies

Features	0PS305.1	0PS310.1	0PS320.1	0PS340.1
Output Power	120 W	240 W	490 W	960 W
AC input voltage	340-576 V	340-576 V	340-576 V	340-576 V
DC input voltage	450-820 V	450-820 V	450-820 V	450-820 V
Output voltage	24-28 V	24-28 V	24 V	24 V
Output current at 24 V	5 A	10 A	20 A	40 A
Parallel operation	Yes	Yes	Yes	Yes
Current balancing	No	Yes	Yes	Yes

Table 333: Three-phase power supplies

Chapter 7 • Maintenance / Servicing

The following chapter describes service/maintenance work which can be carried out by a trained, qualified user.

1. Changing the battery

The lithium battery buffers the internal real-time clock (RTC) and the CMOS data. The buffer duration of the battery is at least 4 years (2 1/2 years with the SRAM module model number 5AC600.SRAM-00 and at 50°C, 8.5 mA current requirements of the supplied components and a self discharge of 40%).

Information:

- **The product design allows the battery to be changed with the APC620 switched either on or off. In some countries, safety regulations do not allow batteries to be changed while the module is switched on.**
- **Any BIOS settings that have been made will remain when the battery is changed with the power turned off (stored in non-volatile EEPROM). The date and time must be reset later because this data is lost when the battery is changed.**
- **The battery should only be changed by qualified personnel.**

The following replacement lithium batteries are available: 4A0006.00-000 (single) and 0AC201.91 (4 pcs.).

1.1 Battery status evaluation

The battery status is evaluated immediately following start-up of the device and is subsequently checked by the system every 24 hours. The battery is subjected to a brief load (1 second) during the measurement and then evaluated. The evaluated battery status is displayed in the BIOS Setup pages (under Advanced - Baseboard monitor) 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
N/A	Hardware, i.e. firmware used is too old and does not support read.
GOOD	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 334: Meaning of battery status

From the point 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.

1.2 Procedure

- Disconnect the power supply to the Automation PC 620 (also see information on page 499).
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the black plastic cover from the battery compartment and carefully pull out the battery using the removal strips.

Figure 248: Battery removal

- Insert the new battery with correct polarity. The battery should not be held by its edges. Insulated tweezers may also be used for inserting the battery.

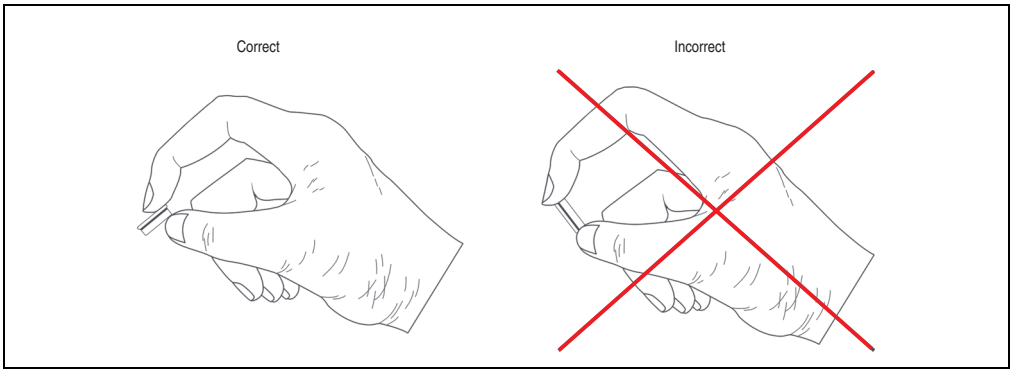


Figure 249: Battery handling

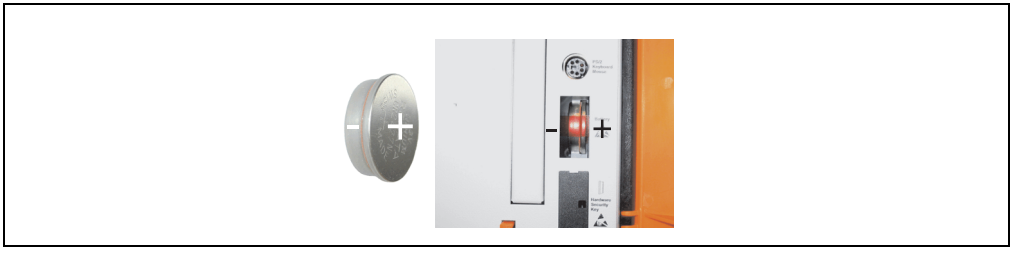


Figure 250: Battery polarity

- To make the next battery change easier, be sure the removal strip is in place when inserting battery.
- Reconnect the power supply to the PC 620 by plugging the power cable back in and pressing the power button (also see information on page 499).
- Reset the data and time in BIOS (see information on page 499).

Warning!

Lithium batteries are considered hazardous waste. Used batteries should be disposed of according to local requirements.

2. Fan kit installation and replacement

2.1 Procedure for APC620 with 1 PCI slot

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 4 Torx screws (T10) that must be removed.

Figure 251: APC620 1PCI slot - Remove screws to install/ remove filter kit

- After the screws have been removed, the side cover and the fan kit cover can be removed toward the front.

Figure 252: APC620 1PCI slot - Remove side cover and fan kit cover

- If a PCI card is in place, it must be removed before moving on to the next step.

- There are two arrows on the fans that indicate the direction of air flow and the direction of fan rotation.

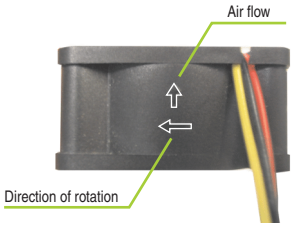


Figure 253: Markings for direction of airflow / fan rotation

Warning!

The fans must be inserted so that the air flows toward the inside of the housing.

- Align fans over the fastening bolts (see arrows). Feed cables through the openings in the housing (see circles) into the main board of the APC620.

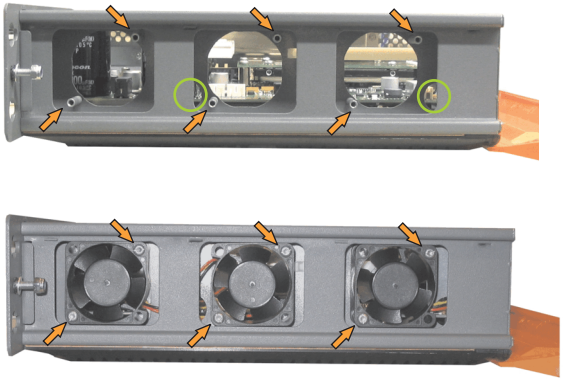


Figure 254: APC620 1PCI slot - Fan installation

- Secure fans with the 6 included Torx (T10) screws.

- The fan connection cable must be connected to the main circuit board at the right position (fan 1 at position 1, fan 2 at position 2, fan 3 at position 3).

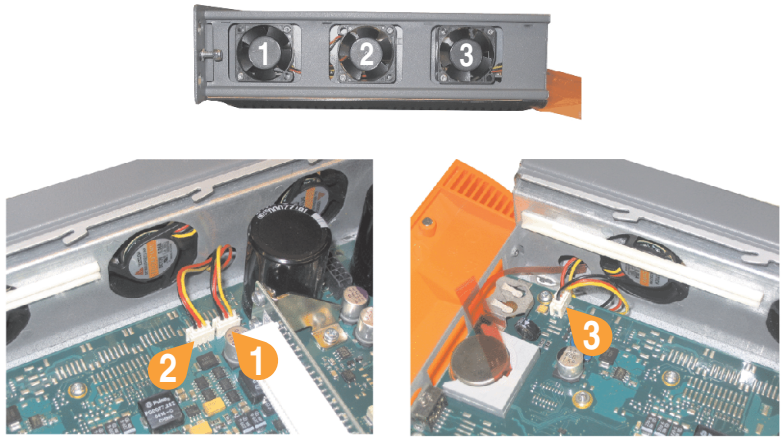


Figure 255: APC620 1PCI slot - Fan cable connection to the main board

- If a PCI card was previously in place, it can now be re-inserted.
- Place dust filter in the fan kit cover and replace removed components (filter kit cover, side cover) in reverse order.

2.2 Procedure for APC620 with 2 PCI slot

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 4 Torx screws (T10) that must be removed.

Figure 256: APC620 2PCI slots - Remove screws to install/ remove filter kit

- After the screws have been removed, the side cover and the fan kit cover can be removed toward the front.

Figure 257: APC620 2PCI slots - Remove side cover and fan kit cover

- If one or more PCI cards are in place, they must be removed before moving on to the next step.
- If a slide-in drive is in place, it also must be removed before moving on to the next step.
- There are two arrows on the fans that indicate the direction of air flow and the direction of fan rotation.

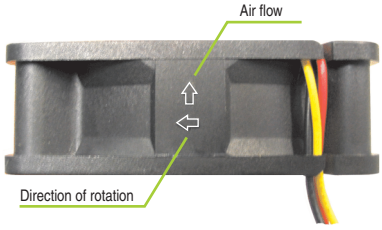


Figure 258: Markings for direction of airflow / fan rotation

Warning!

The fans must be inserted so that the air flows toward the inside of the housing.

- Align fans over the fastening bolts (see arrows). Feed cables through the openings in the housing (see circles) into the main board of the APC620.

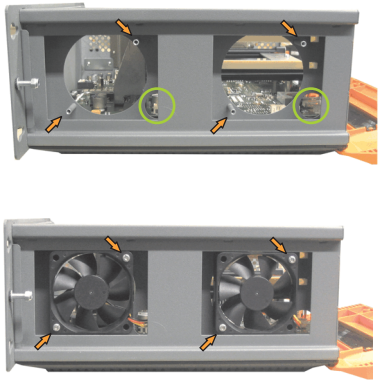


Figure 259: APC620 2PCI slots - Fan installation

- Secure fans with the 4 included Torx (T10) screws.

- The fan connection cable must be connected to the main circuit board at the right position (fan 1 at position 1, fan 2 at position 2).

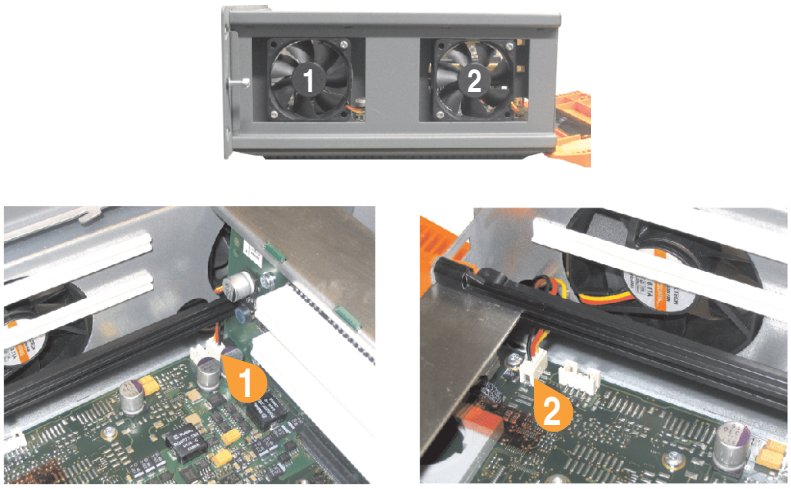


Figure 260: APC620 2PCI slots - Fan cable connection to the main board

- If one or more PCI cards were previously in place, they can now be re-inserted.
- If a slide-in drive was previously in place, it too can now be re-inserted.
- Place the dust filter in the fan kit cover and secure with the filter clasp.

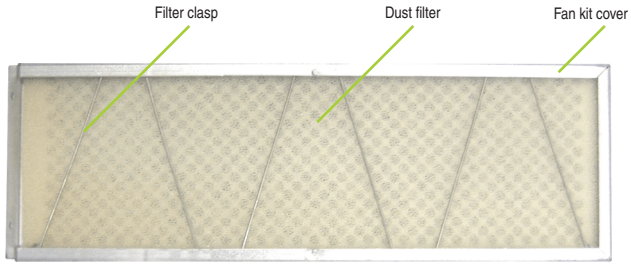


Figure 261: Dust filter in the fan kit cover and filter clasp

- Replace any removed components (filter kit cover, side cover) in the reverse order.

2.3 Procedure for APC620 with 3 PCI slot

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 4 Torx screws (T10) that must be removed.

Figure 262: APC620 3PCI slot - Remove screws to install/ remove filter kit

- After the screws have been removed, the side cover and the fan kit cover can be removed toward the front.

Figure 263: APC620 3PCI slots - Remove side cover and fan kit cover

- There are two arrows on the fans that indicate the direction of air flow and the direction of fan rotation.

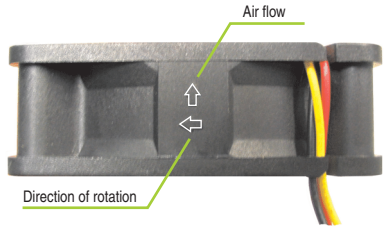


Figure 264: Markings for direction of airflow / fan rotation

Warning!

The fans must be inserted so that the air flows toward the inside of the housing.

- Align fans over the fastening bolts (see arrows). Feed cables through the openings in the housing (see circles) into the main board of the APC620.

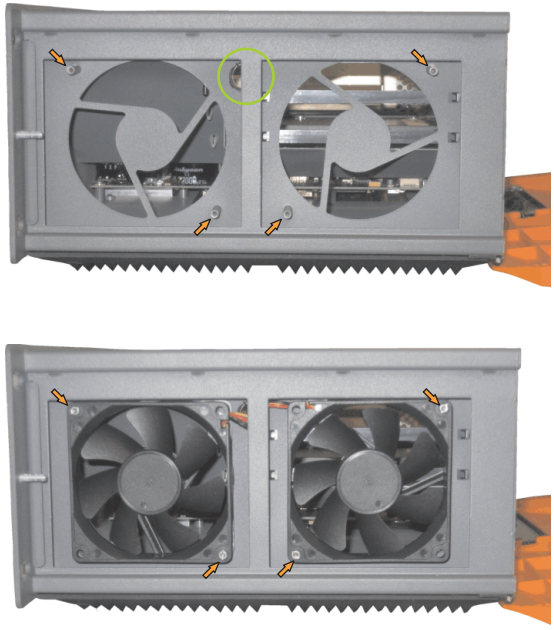


Figure 265: APC620 3PCI slot - Fan installation

- Secure fans with the 4 included Torx (T10) screws.

- The fan connection cable must be connected to the main circuit board at the right position (fan 1 at position 1, fan 2 at position 2).

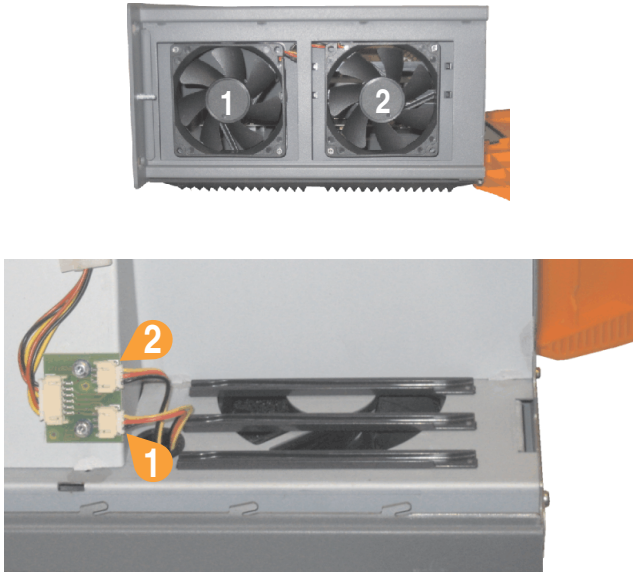


Figure 266: APC620 3PCI slot - Fan cable connection to the main board

- Place the dust filter in the fan kit cover and secure with the filter clasp.

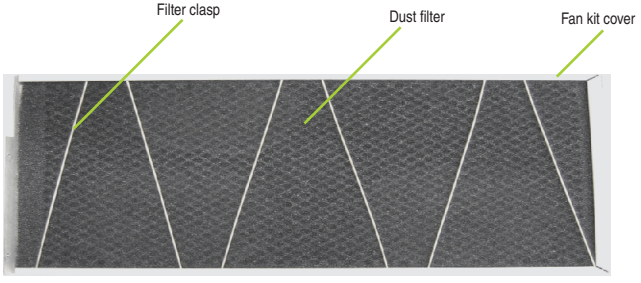


Figure 267: Dust filter in the fan kit cover and filter clasp

- Replace any removed components (filter kit cover, side cover) in the reverse order.

2.4 Procedure for APC620 with 5 PCI slot

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 4 Torx screws (T10) that must be removed.

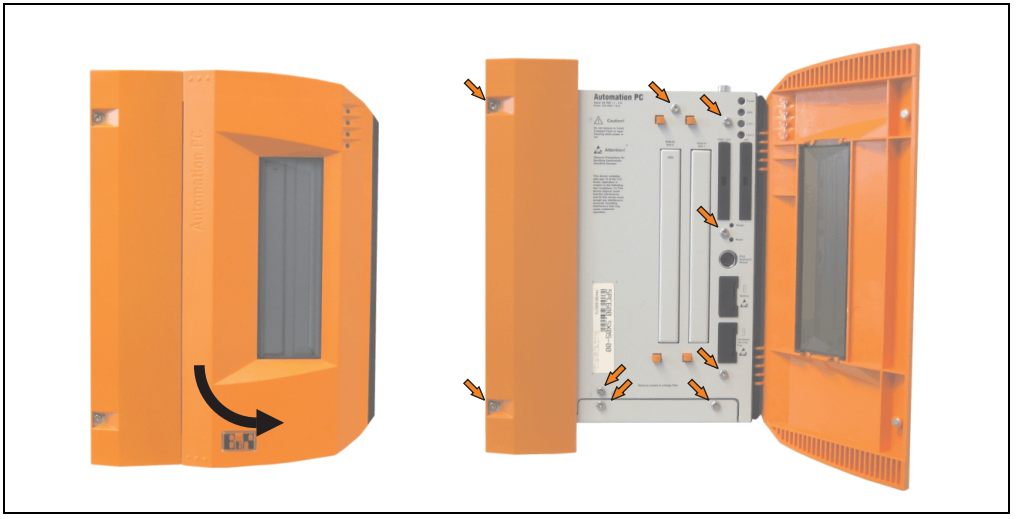


Figure 268: APC620 5PCI slot - Remove screws to install/ remove filter kit

- After the screws have been removed, the side cover and the fan kit cover can be removed toward the front.

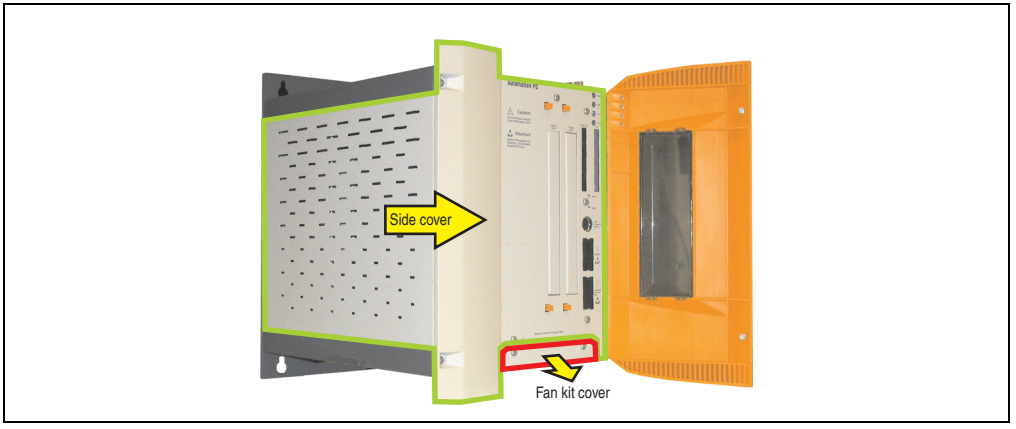


Figure 269: APC620 5PCI slot - Remove side cover and fan kit cover

- If one or more PCI cards are in place, they must be removed before moving on to the next

step.

- If a slide-in drive is in place, it also must be removed before moving on to the next step.
- Attach the two included cable fasteners in the appropriate holes.

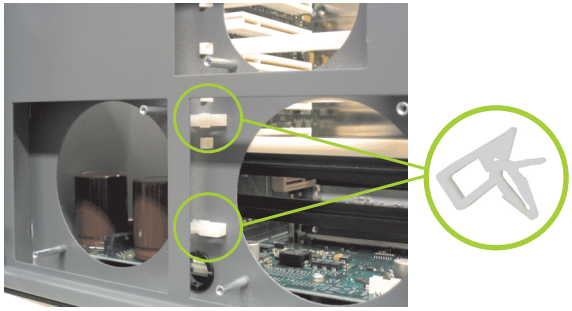


Figure 270: APC620 5PCI attach cable fasteners

- There are two arrows on the fans that indicate the direction of air flow and the direction of fan rotation.

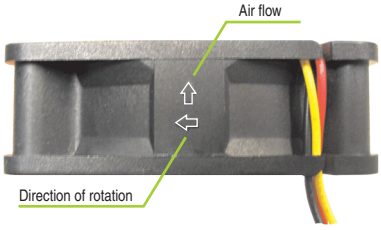


Figure 271: Markings for direction of airflow / fan rotation

Warning!

The fans must be inserted so that the air flows toward the inside of the housing.

- Align fans over the fastening bolts (see arrows). Feed cables through the openings in the housing (see circles) into the main board of the APC620.
  The fan connector cable for the 40 mm fan should be placed in the cable fastener.

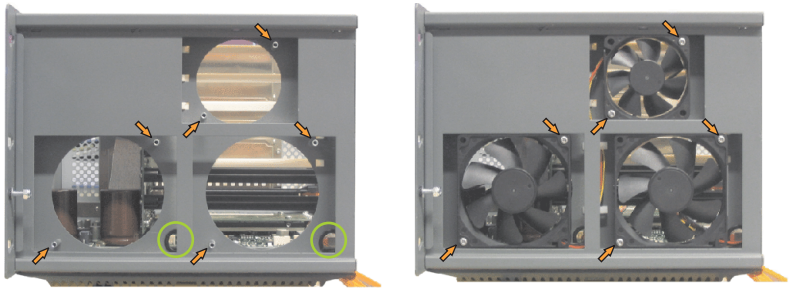


Figure 272: APC620 5PCI slot - Fan installation

- Secure fans with the 6 included Torx (T10) screws.

- The fan connection cable must be connected to the main circuit board at the right position (fan 1 at position 1, fan 2 at position 2, fan 3 at position 3).

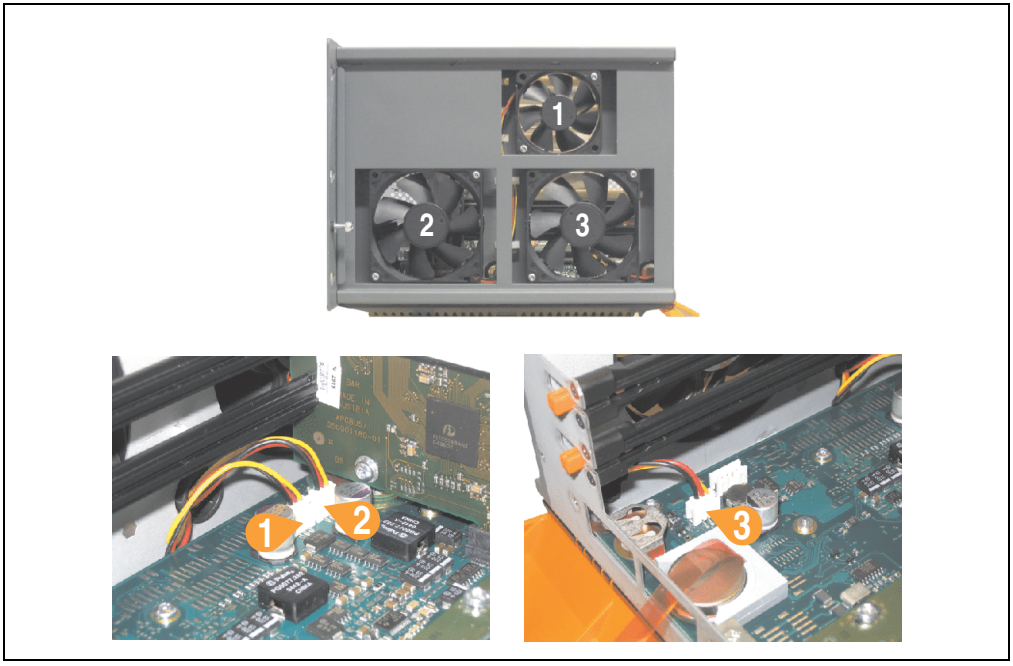


Figure 273: APC620 5PCI slot - Fan cable connection to the main board

- If one or more PCI cards were previously in place, they can now be re-inserted.
- If a slide-in drive was previously in place, it too can now be re-inserted.
- Place the dust filter in the fan kit cover and secure with the filter clasp.

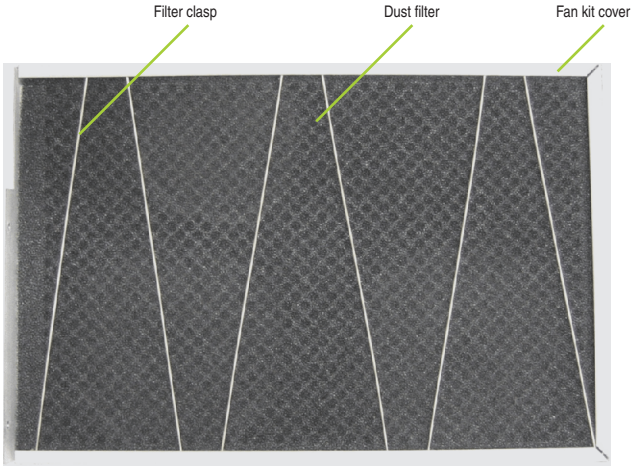


Figure 274: Dust filter in the fan kit cover and filter clasp

- Replace any removed components (filter kit cover, side cover) in the reverse order.

3. Slide-in drive - installation and exchange

Slide-in drives can be installed and exchanged in system units with 2 or 5 PCI slots.

3.1 Installation procedure

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the side cover, see section 5 "Mounting the side cover", on page 537.
- Remove the slide-in dummy module.

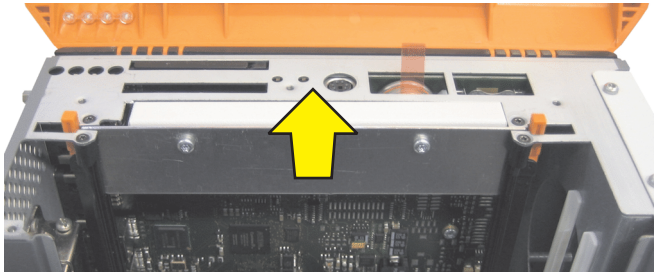


Figure 275: Removing the slide-in dummy module

- Insert the slide-in drive.

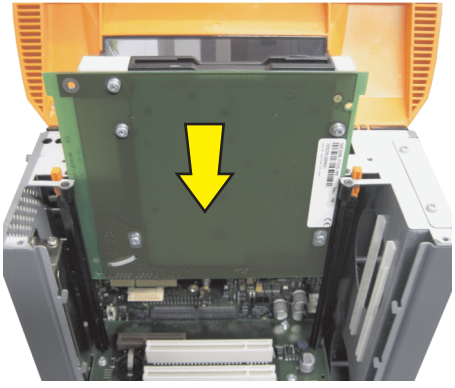


Figure 276: Installing the slide-in drive

- Attach the side cover.

3.2 Exchange procedure

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the side cover, see section 5 "Mounting the side cover", on page 537.
- Simultaneously remove both slide-in slot releasing mechanisms outwards The slide-in drive is pushed a few mm upwards for easy removal.

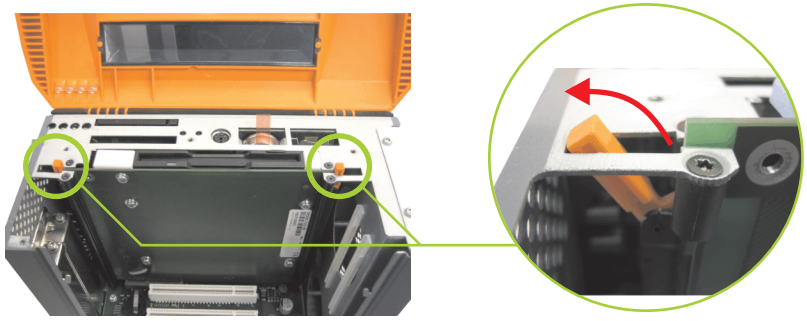


Figure 277: Release the slide-in slot releasing mechanisms

- Removing the slide-in drive.

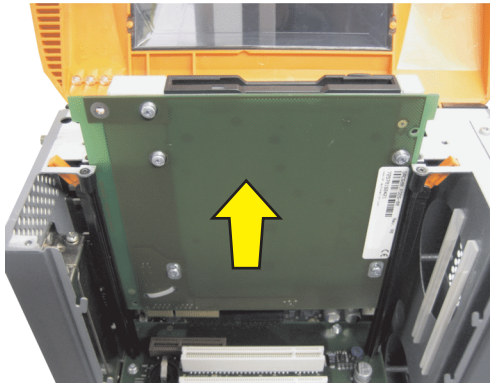


Figure 278: Removing the slide-in drive

- Move the slide-in slot releasing mechanisms to the start position.

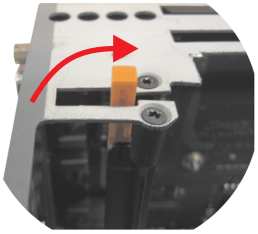


Figure 279: Slide-in slot releasing mechanism start position

- Insert the new slide-in drive or re-attach the side cover.

4. Installing the UPS module

The module is installed using the materials included in the delivery. Different parts are used depending on the system unit and whether the add-on interface module is **installed** (description starting on page 529) or **not installed** (description follows).

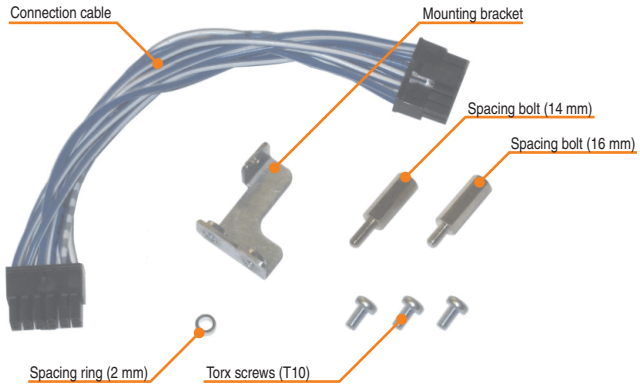


Figure 280: Add-on UPS module 5AC600.UPSI-00 - Installation materials

4.1 Automation PC 620 without add-on interface module

4.1.1 APC620, 1 PCI slot

- Remove side cover (see section 5 "Mounting the side cover", on page 537).
- Remove UPS module cover by removing the 2 marked Torx screws (T10).

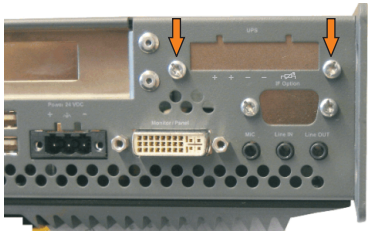


Figure 281: Remove UPS module cover

- Screw in spacing bolt and spacing ring (using M5 hex socket screwdriver).

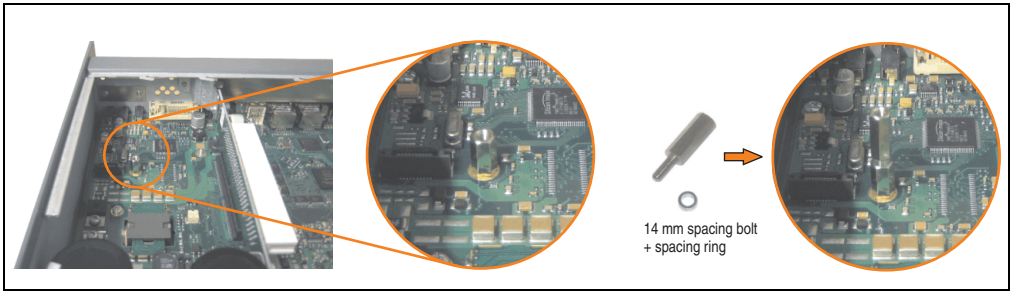


Figure 282: Screw in spacing bolt and spacing ring

- Install UPS module with 2 Torx screws (T10) and 1 Torx screw (T10). Use the previously removed Torx screws and one Torx screw from the mounting materials.

Figure 283: Install UPS module

- Plug in connection cable (see marked socket).

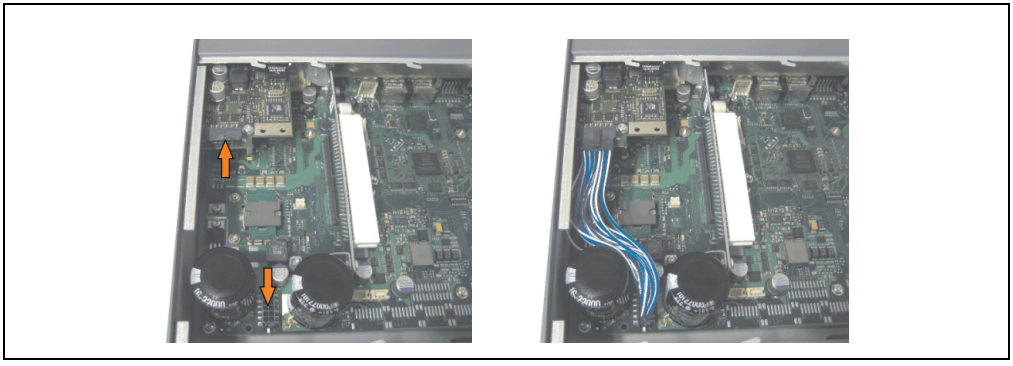


Figure 284: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

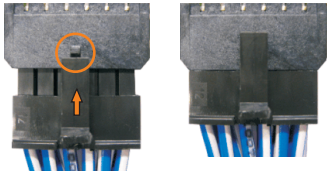


Figure 285: Connector locking mechanism

- Attach the side cover.

4.1.2 APC620, 2 PCI slot

- Remove side cover (see section 5 "Mounting the side cover", on page 537).
- Remove UPS module cover by removing the 2 marked Torx screws (T10).

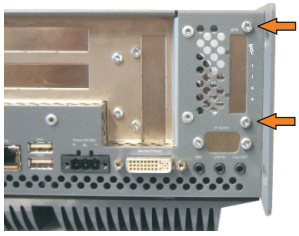


Figure 286: Remove UPS module cover

- Remove cover plate by removing the marked Torx screw (T10).

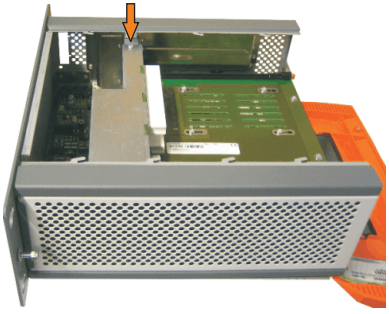


Figure 287: Remove cover plate

- Screw in spacing bolt and spacing ring (using M5 hex socket screwdriver).

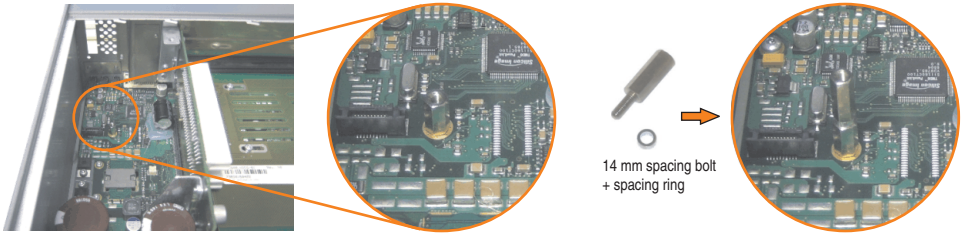


Figure 288: Screw in spacing bolt and spacing ring

- Install mounting bracket on UPS module using 2 Torx screws (T10).

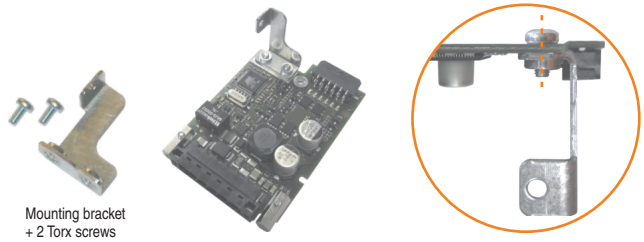


Figure 289: Install mounting bracket

- Install UPS module with 2 Torx screws (T10) and 1 Torx screw (T10). Use the previously removed Torx screws and one Torx screw from the mounting materials.

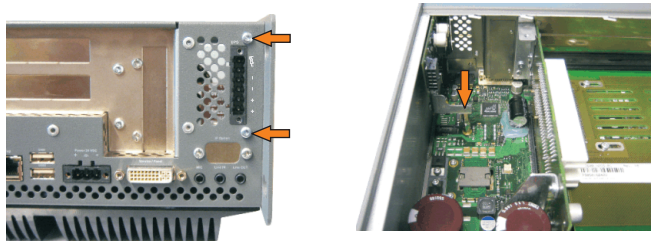


Figure 290: Install UPS module

- Plug in connection cable (see marked socket).

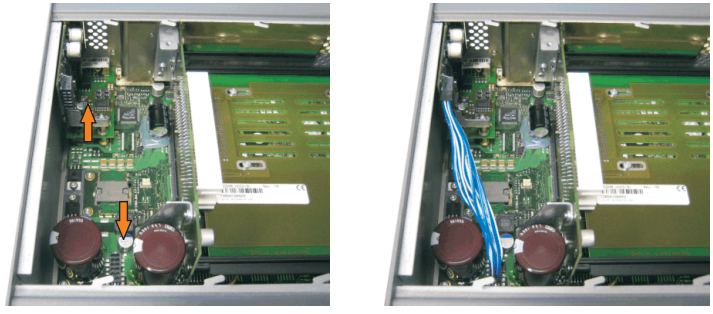


Figure 291: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

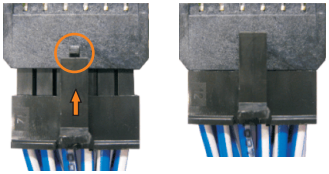


Figure 292: Connector locking mechanism

- Attach cover plate and side cover.

4.1.3 APC620, 5 PCI slot

- Remove side cover (see section 5 "Mounting the side cover", on page 537).
- Remove UPS module cover by removing the 2 marked Torx screws (T10).

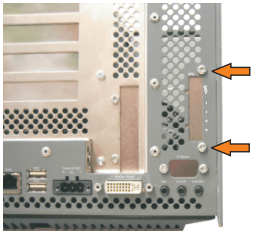


Figure 293: Remove UPS module cover

- Remove cover plate by removing the marked Torx screw (T10).

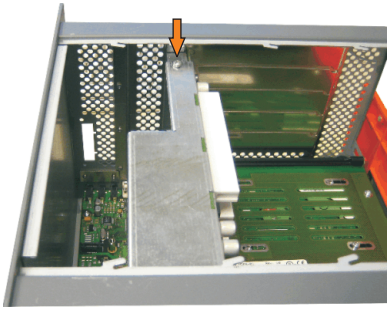


Figure 294: Remove cover plate

- Screw in spacing bolt and spacing ring (using M5 hex socket screwdriver).

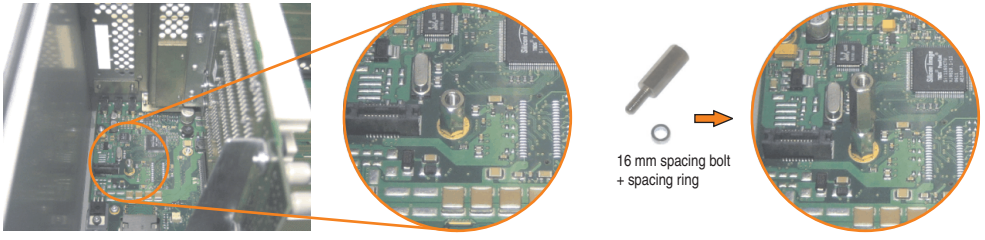


Figure 295: Screw in spacing bolt and spacing ring

- Install mounting bracket on UPS module using 2 Torx screws (T10).

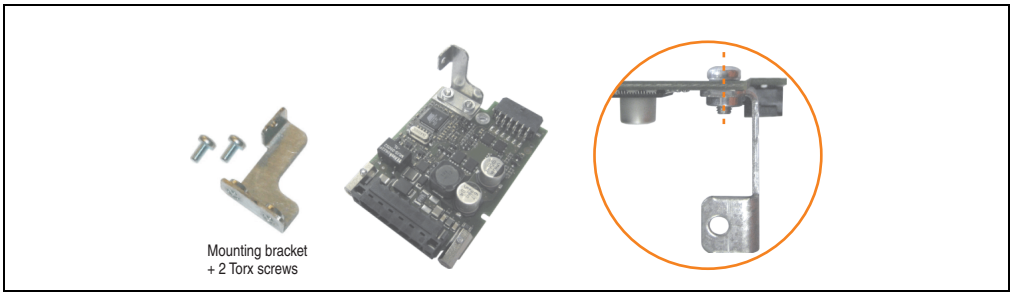


Figure 296: Install mounting bracket

- Install UPS module with 2 Torx screws (T10) and 1 Torx screw (T10). Use the previously removed Torx screws and one Torx screw from the mounting materials.

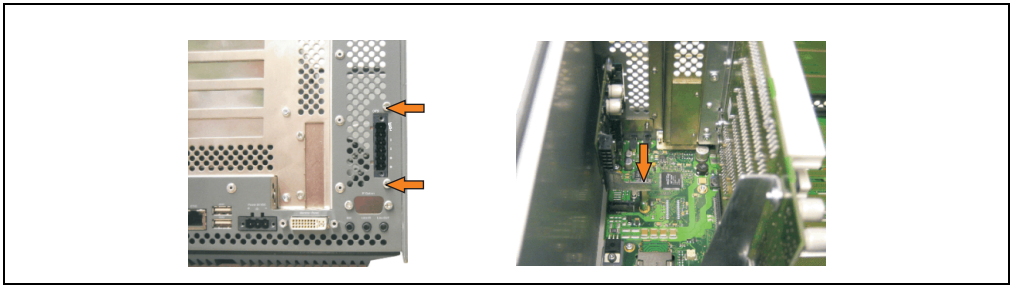


Figure 297: Install UPS module

- Attach connection cable (see marked socket).

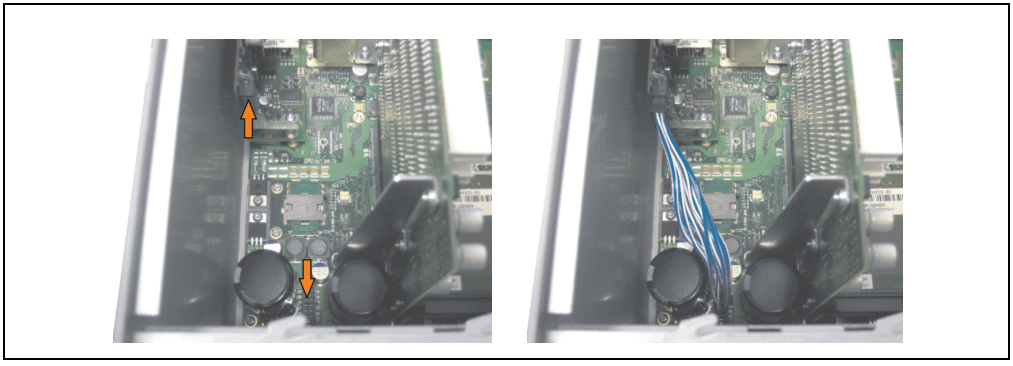


Figure 298: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

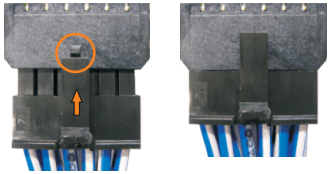


Figure 299: Connector locking mechanism

- Attach cover plate and side cover.

4.2 Automation PC 620 with add-on interface module

4.2.1 APC620, 1 PCI slot

- Remove side cover (see section 5 "Mounting the side cover", on page 537).
- Remove UPS module cover by removing the 2 marked Torx screws (T10).

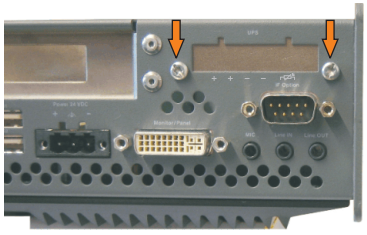


Figure 300: Remove UPS module cover

- Screw in spacing bolt (using M5 hex socket screwdriver).

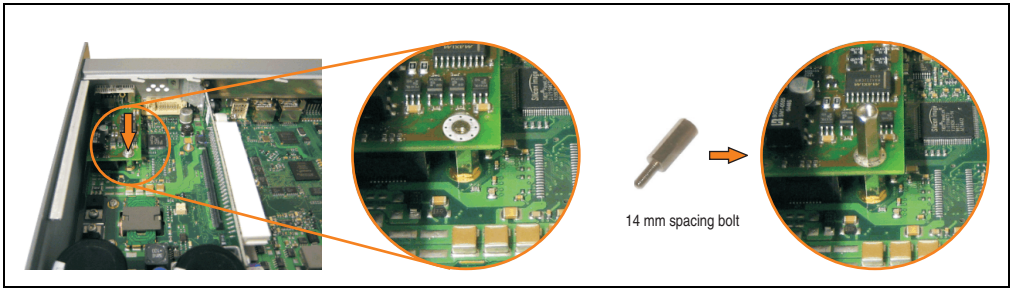


Figure 301: Screw in spacing bolt

- Install UPS module with 2 Torx screws (T10) and 1 Torx screw (T10). Use the previously removed Torx screws and one Torx screw from the mounting materials.

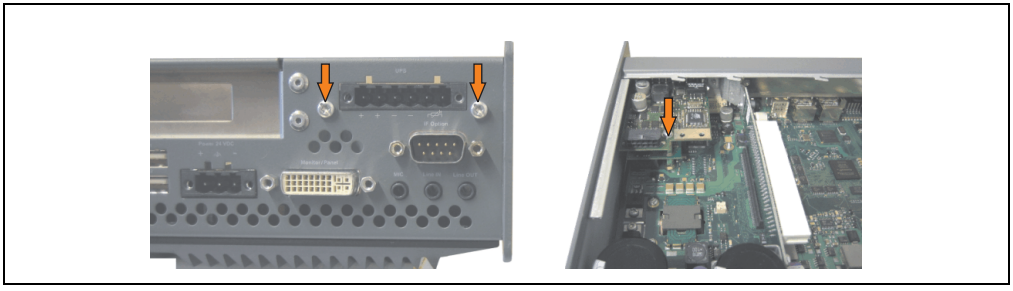


Figure 302: Install UPS module

- Plug in connection cable (see marked socket).

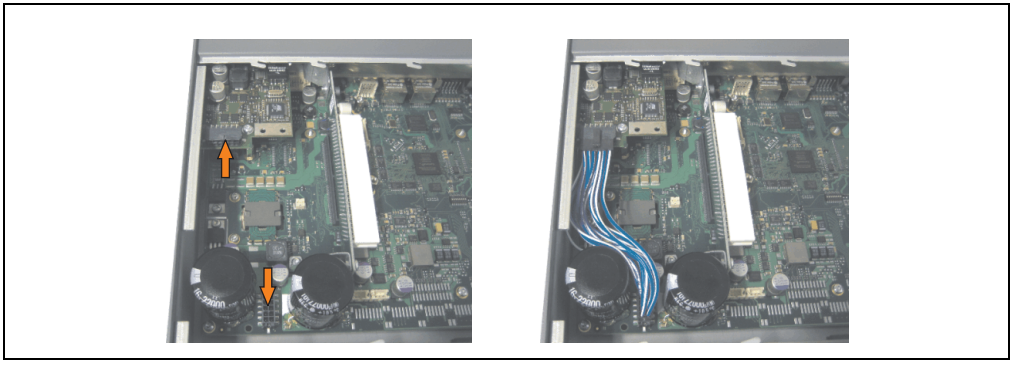


Figure 303: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

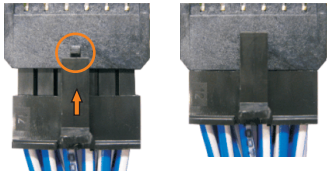


Figure 304: Connector locking mechanism

- Attach the side cover.

4.2.2 APC620, 2 PCI slot

- Remove side cover (see section 5 "Mounting the side cover", on page 537).
- Remove UPS module cover by removing the 2 marked Torx screws (T10).

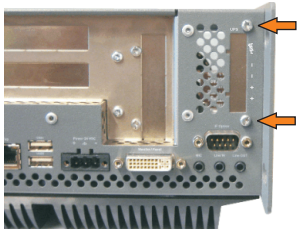


Figure 305: Remove UPS module cover

- Remove cover plate by removing the marked Torx screw (T10).

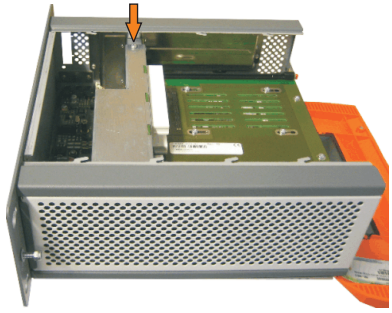


Figure 306: Remove cover plate

- Screw in spacing bolt (using M5 hex socket screwdriver).

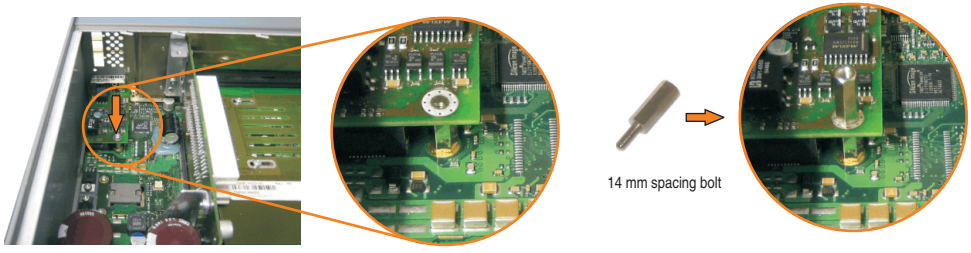


Figure 307: Screw in spacing bolt

- Install mounting bracket on UPS module using 2 Torx screws (T10).

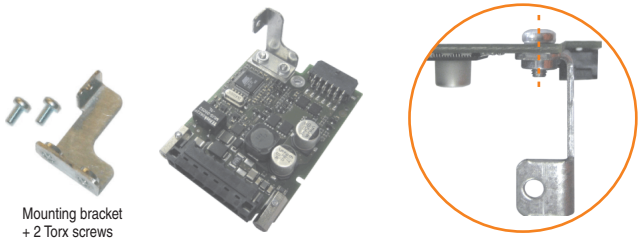


Figure 308: Install mounting bracket

- Install UPS module with 2 Torx screws (T10) and 1 Torx screw (T10). Use the previously removed Torx screws and one Torx screw from the mounting materials.

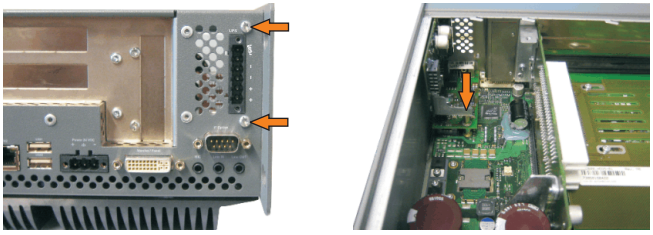


Figure 309: Install UPS module

- Plug in connection cable (see marked socket).

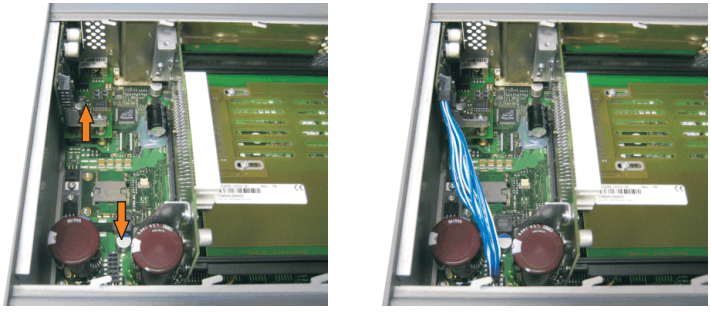


Figure 310: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

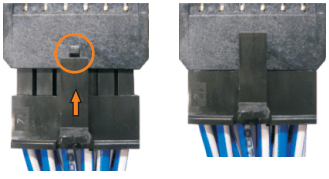


Figure 311: Connector locking mechanism

- Attach cover plate and side cover.

4.2.3 APC620, 5 PCI slot

- Remove side cover (see section 5 "Mounting the side cover", on page 537).
- Remove UPS module cover by removing the 2 marked Torx screws (using T10 screwdriver).

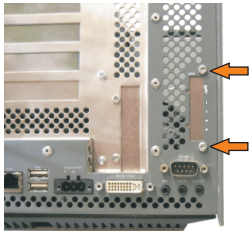


Figure 312: Remove UPS module cover

- Remove cover plate by removing the marked Torx screw (T10).

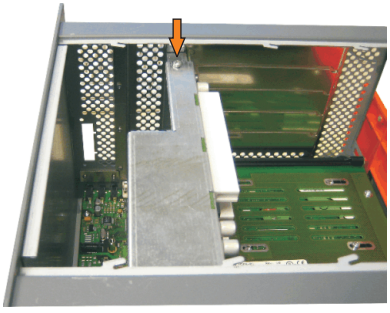


Figure 313: Remove cover plate

- Screw in spacing bolt (using M5 hex socket screwdriver).

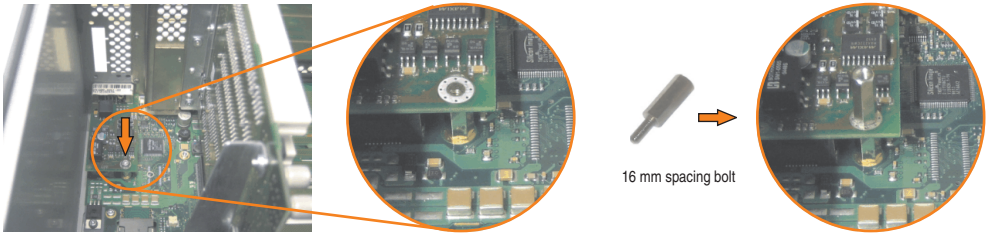


Figure 314: Screw in spacing bolt

- Install mounting bracket on UPS module using 2 Torx screws (T10).

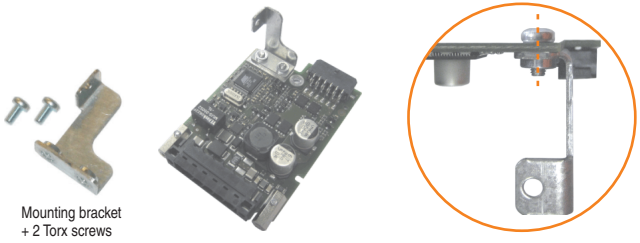


Figure 315: Install mounting bracket

- Install UPS module with 2 Torx screws (T10) and 1 Torx screw (T10). Use the previously removed Torx screws and one Torx screw from the mounting materials.

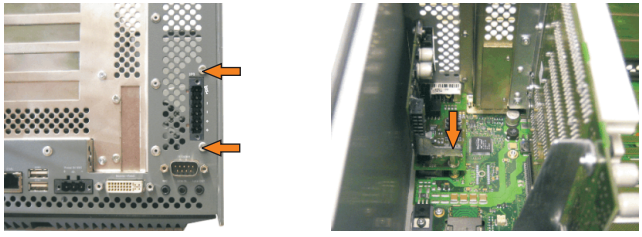


Figure 316: Install UPS module

- Plug in connection cable (see marked socket).

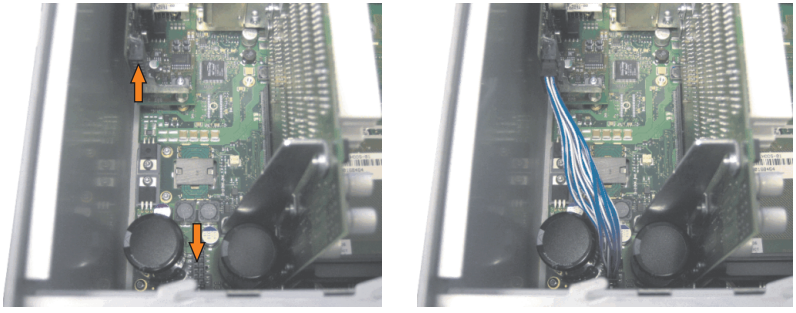


Figure 317: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

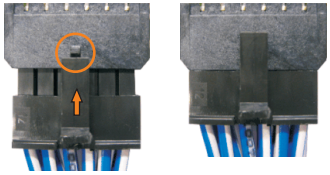


Figure 318: Connector locking mechanism

- Attach cover plate and side cover.

5. Mounting the side cover

The number of Torx (T10) screws varies depending on the system (1, 2, 3 or 5 PCI slots).

5.1 APC620 with 1 PCI slot

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 3 Torx screws (T10) that must be removed.

Figure 319: Mounting the side cover - APC620, 1 PCI slot

- After the screws have been removed, the side cover can be removed by sliding it toward the front.

5.2 APC620 with 2 PCI slot

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 5 Torx screws (T10) that must be removed.

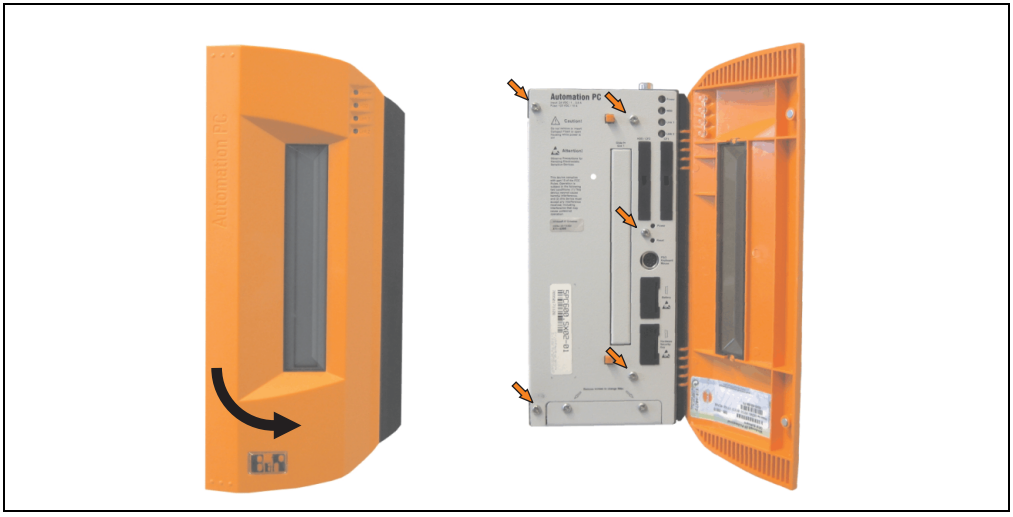


Figure 320: Mounting the side cover - APC620, 2 PCI slot

- After the screws have been removed, the side cover can be removed by sliding it toward the front.

5.3 APC620 with 3 PCI slot

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 7 Torx screws (T10) that must be removed.

Figure 321: Mounting the side cover - APC620, 3 PCI slot

- After the screws have been removed, the side cover can be removed by sliding it toward the front.

5.4 APC620 with 5 PCI slot

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 7 Torx screws (T10) that must be removed.

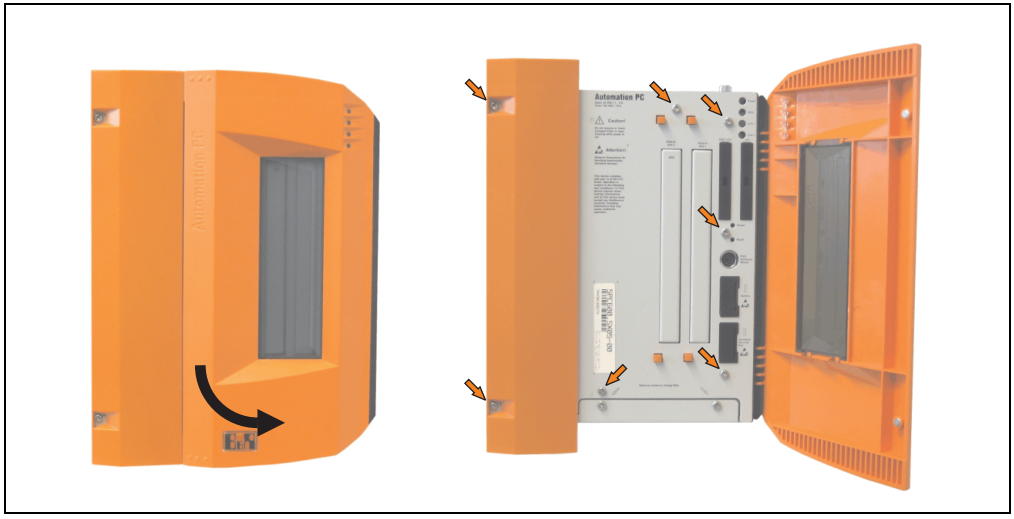


Figure 322: Mounting the side cover - APC620, 5 PCI slot

- After the screws have been removed, the side cover can be removed by sliding it toward the front.

6. Exchanging a PCI SATA RAID hard disk

In the example, the assumption is made that the secondary hard disk (HDD1) is defective. In such a case, the defective hard disk can be replaced by the replacement drive SATA hard disk.

A size 10 Torx screwdriver is needed for exchanging the hard disk.

Exchange procedure

- Remove the power supply to the device (Automation PC 620 / Panel PC 700).
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the side cover.
- Remove the SATA RAID insert.
- Loosen the 4 appropriate mounting screws (M3x5) - see Figure 323 "Screw assignment on the back side of the SATA RAID controller", on page 541.

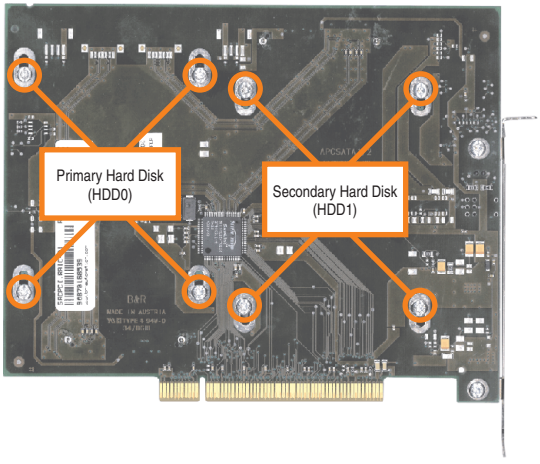


Figure 323: Screw assignment on the back side of the SATA RAID controller

- On the front side, slide the hard disk down and away (image 1).
- Carefully plug the new hard disk into the connector (image 2).

Information:

When doing this, make sure that the hard disk is only touched on the front side, and not on the top side.

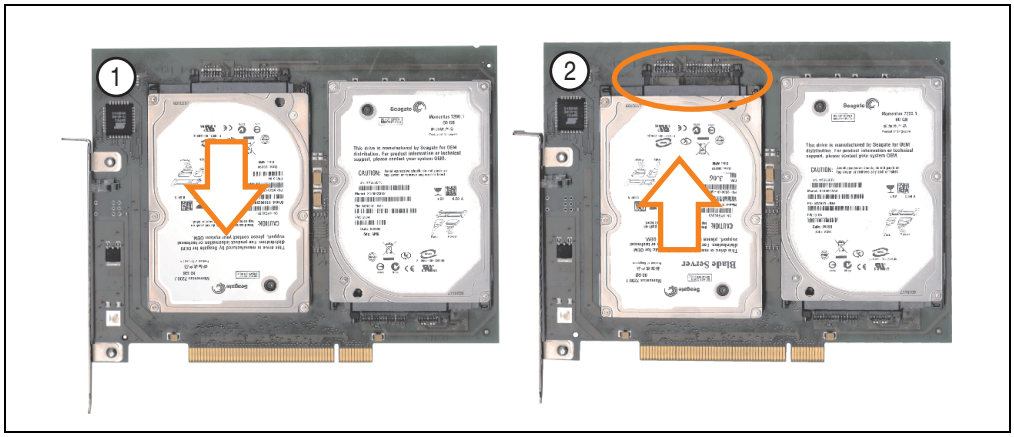


Figure 324: Hard disk exchange

- Re-secure the hard disk using the 4 fastening screws (M3x5) used earlier.
- Reassemble device in the reverse order.
- An error message is output by the RAID BIOS after starting the system "`RAID1 set is in Critical status - press any key to enter Configuration Utility`".

A rebuild must be executed in the SATA RAID BIOS - for more information on this, see the section "Rebuild mirrored set", on page 261.

7. Replacing the front cover

Depending on how the front cover is attached, the following points must be taken into consideration when replacing.

7.1 Variation A - Front cover screwed-in

- On the side of the APC620 there are Torx screws (T12) that must be removed (3, 4 or 6 screws, depending on the APC620 design).
  Pull the cover in the direction of the arrows, thereby pulling the hinge bar under the heat sink.

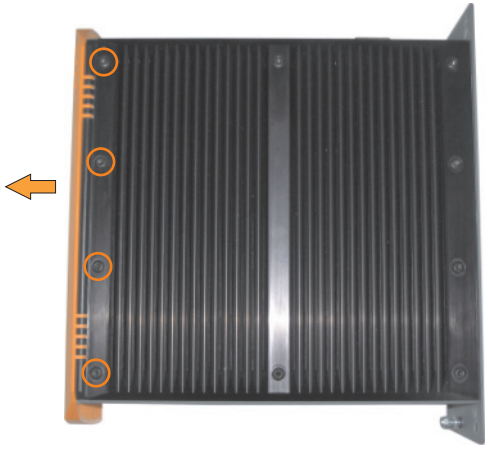


Figure 325: Removing the APC620 front cover

- Slide the new hinge bar under the heat sink and screw it back on using the screws removed earlier.

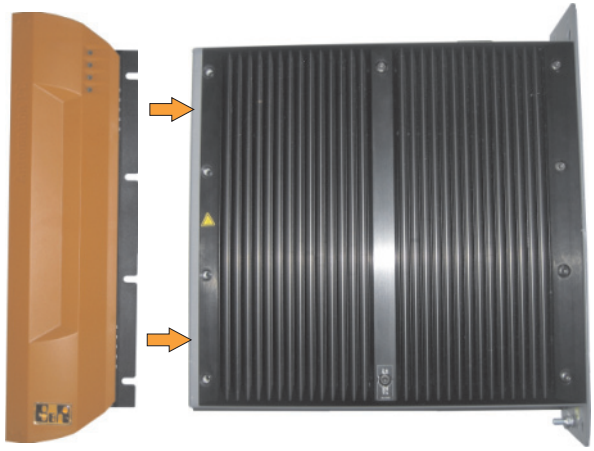


Figure 326: Mounting the APC620 front cover

7.2 Variation B - Front cover attached without screws

- A label on the side of the hinge bar "PULL TO REMOVE" indicates that the front cover is attached without screws.

Figure 327: APC620 front cover label

- Open the front cover approximately 1-2 cm. Now remove the cover by pulling it in the direction of the red arrow.

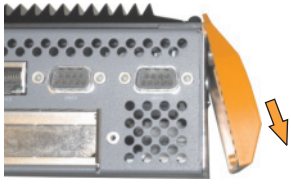


Figure 328: Removing the APC620 front cover

- Attach the new cover to the hinge bar from the side.

Figure 329: Attaching the front cover

Appendix A

1. Temperature sensor locations

Sensors monitor temperature values at different locations in the APC620 (inside CPU, CPU board, power supply, slide-in drive 1, slide-in drive 2, I/O). The temperatures[1)] can be read out in the BIOS (menu item Advanced - Baseboard/Panel Features - Baseboard Monitor) or via the B&R Control Center[2)] using Microsoft Windows XP/Embedded and Embedded Standard 2009.

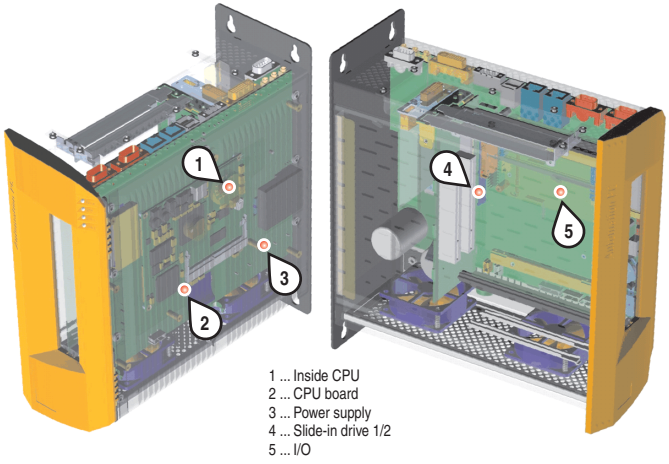


Figure 330: Temperature sensor locations

Position	Measurement point for	Measurement	Max. specified
1	CPU internal	Processor temperature (sensor integrated on the processor).	90°C
2	CPU board	CPU board temperature (sensor integrated on the CPU board).	95°C
3	Power supply	Power supply temperature (sensor on the power supply).	95°C
4	Slide-in drive 1/2	Temperature of a slide-in drive (the sensor is integrated on the slide-in drive)	Drive dependent
5	I/O	Temperature under an add-on drive (sensor on the baseboard).	Max. 80°C Drive dependent

Table 335: Temperature sensor locations

1) The measured temperature is a guideline for the immediate ambient temperature, but can be influenced by neighboring components.

2) The B&R Control Center - ADI driver - can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**).

2. Connection of an external device to the main board

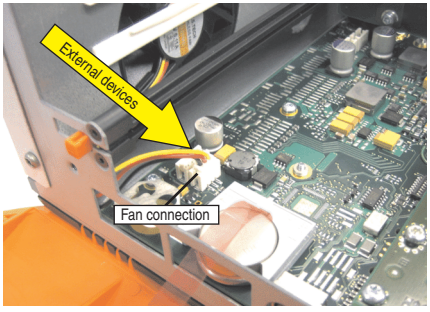
A plug on the main board enables branching of +5 VDC and +12 VDC for the internal supply of e.g. special PCI cards.

The connector is only provided starting with the following system unit revisions:

Model number	Short description	Starting with revision
5PC600.SX01-00	System 1 PCI	B7
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	B0
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	B9
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	A0
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	A0

Table 336: Revision information for connecting an external device

The voltage can be accessed using the "APC620 internal supply cable 5CAMSC.0001-00", on page 452. Depending on the system unit revision, the connector is located close to the fan connector. The APC620 side cover and possibly also the slide-in drive and PCI cards must be removed to reach the connector.



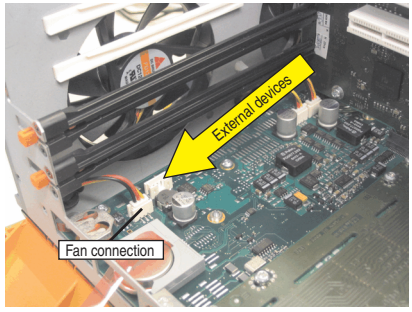


Figure 331: Connector location for external devices

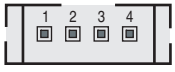
Connector for the external devices			
Pin	Assignment	Power	4-pin connector, male
1	+12 VDC	Max. 10 W	
2	GND		
3	GND	Max. 5 W	
4	+5 VDC		

Table 337: Pin assignments - Connector on main board

Connections are protected by a 1 A multi-fuse.

3. Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the main board (part of every system unit) of the APC620 device.

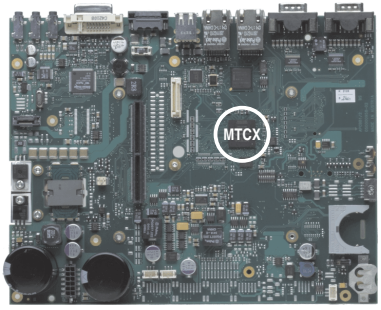


Figure 332: MTCX controller location

The MTCX is responsible for the following monitoring and control functions:

- Power on (power OK sequencing) and power fail logic
- Watchdog handling (NMI and reset handling)
- Temperature monitoring (I/O area, power supply, slide-in drive 1/2)
- Fan control (3 housing fans)
- Key handling / coordination (matrix keyboard on Automation Panel 900 devices configurable using B&R Key Editor, PS/2 keyboard)
- LED handling (matrix keyboard with LEDs on Automation Panel 900 devices configurable using B&R Key Editor)
- Advanced desktop operation (keys, USB forwarding)
- Daisy chain display operation (touch screen, USB forwarding)
- Panel locking mechanism (configurable using B&R Control Center - ADI driver)
- Backlight control for a connected B&R display
- Statistical data recording (power cycles - each power on, power on and fan hours are recorded - every full hour is counted e.g. 50 minutes no increase)
- SDL data transfer (display, matrix keyboard, touch screen, service data, USB)
- Status LEDs (HDD, Panel Lock, Link 1, Link 2)

The functions of the MTCX can be expanded via Firmware upgrade[1]. The version can be read in BIOS (menu item "advanced" - baseboard/panel features) or in Microsoft Windows XP/embedded, using B&R Control Center.

1) Can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

3.1 SDL timing

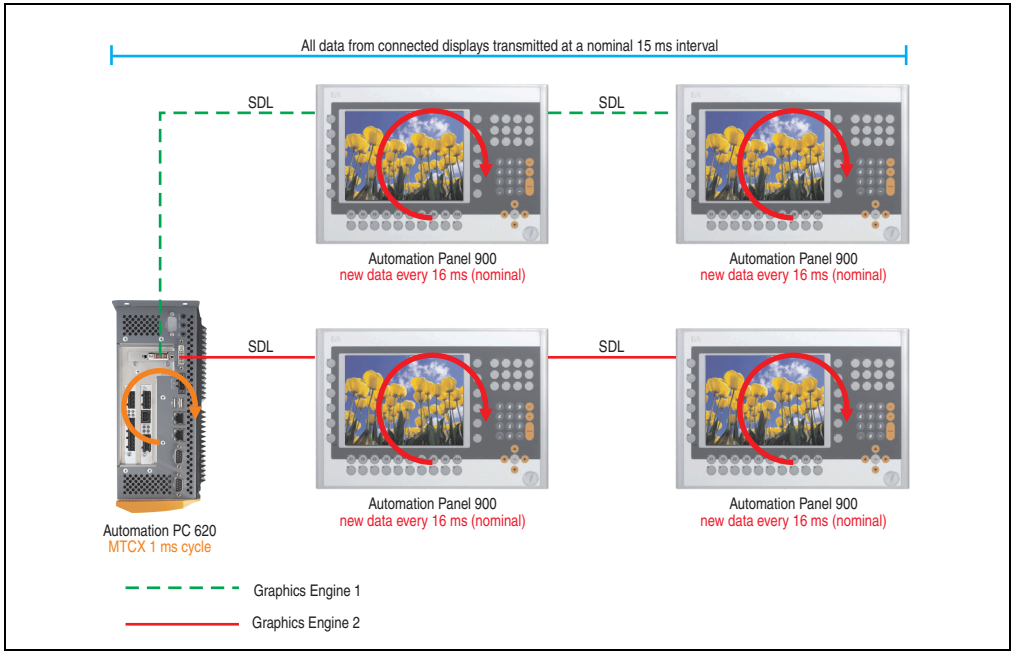


Figure 333: Sample configuration for SDL timing

Basic procedure:

1) On every Automation Panel 900 display unit, the data (button and LED, touch screen, service data) is nominally determined asynchronously every 16 ms, saved and made available.

2) The MTCX in the APC620 samples one display unit after another asynchronously in 1 ms increments. The status is requested within the 15 ms nominal cycle (maximum 15 display units x 1 ms), regardless of the total number of display units connected in the system (Graphics Engine 1 + Graphics Engine 2), and the information is saved in the MTCX's Dual-Ported RAM.

3) An application can access the MTXC data using the programming interface (API) ADI (Automation Device Interface). Reading or writing data does not affect the asynchronous acquisition of data from the connected display units.
Further information about this can be found in the "ADI Development Kit" and the "Automation PC 620 / Panel PC 700 Implementation Guide" (both available on the B&R Homepage).

Caution!

Due to safety requirements regulated by international standards, implementing an E-stop element via SDL (using Matrix) is NOT allowed. Instead, such an element must be wired according to the safety requirements.

Information:

Display data will not be updated and cannot be read by the MTCX while a display unit is in upgrade mode (e.g. SDL firmware upgrade).

The nominal time specifications are not guaranteed maximum lengths of time, but may be increased due to e.g. transfer disturbances and external influences.

Schematic display

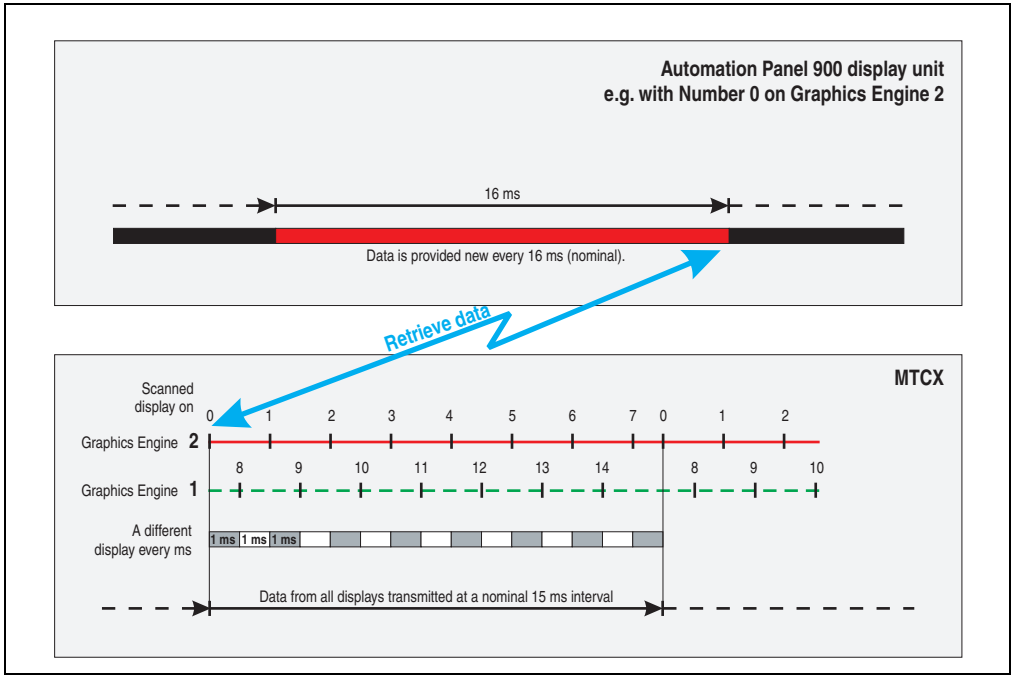


Figure 334: SDL timing - Example for Automation Panel 900 with the number 0

3.2 Temperature monitoring - Fan control

The MTCX constantly monitors the temperature using temperature sensors (see section 1 "Temperature sensor locations", on page 547), which directly determine how the fan is controlled. The RPM depends on the temperature measured. The limit values depend on the MTCX firmware version being used.

Sensor range	Start-up temperature	Max fan speed at:
CPU	+39°C	+55°C
Power supply	+39°C	+55°C
Slide-in drive 1/2	+39°C	+55°C
I/O	+39°C	+55°C

Table 338: Temperature limits for fan control

The fans stop again when the temperature drops below +37°C.

4. 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. The B&R Key Editor makes it quick and easy to adapt the application to a unique configuration.

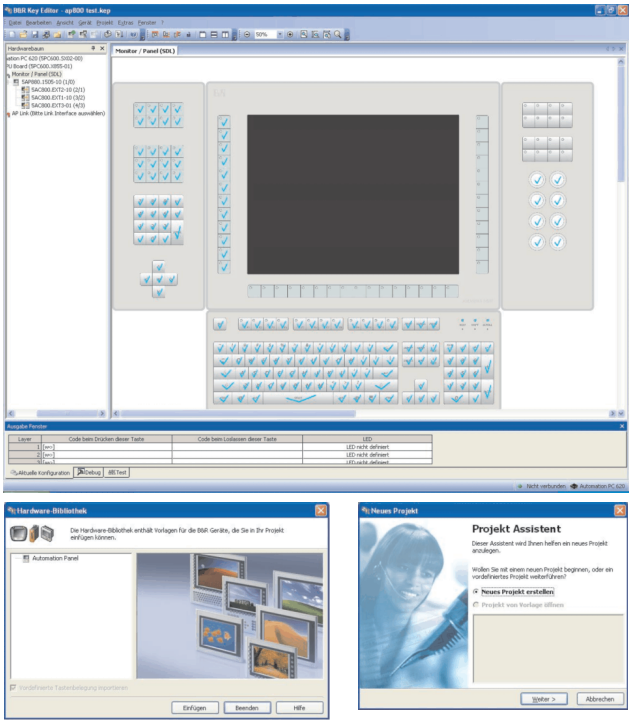


Figure 335: B&R Key Editor screenshots (Version 2.70)

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, Automation PC 810 and Panel PC 700 devices.

Supports following systems (Version 2.70):

- Automation PC 800
- 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).

5. B&R Automation Device Interface (ADI) development kit

The ADI development kit is used to access the functions of the ADI driver. The programming languages C (with import libraries for Microsoft Visual C++ 6.0 and Microsoft eMbedded Visual C++ 4.0) and Visual Basic (for Microsoft Visual Basic 6.0) are supported.

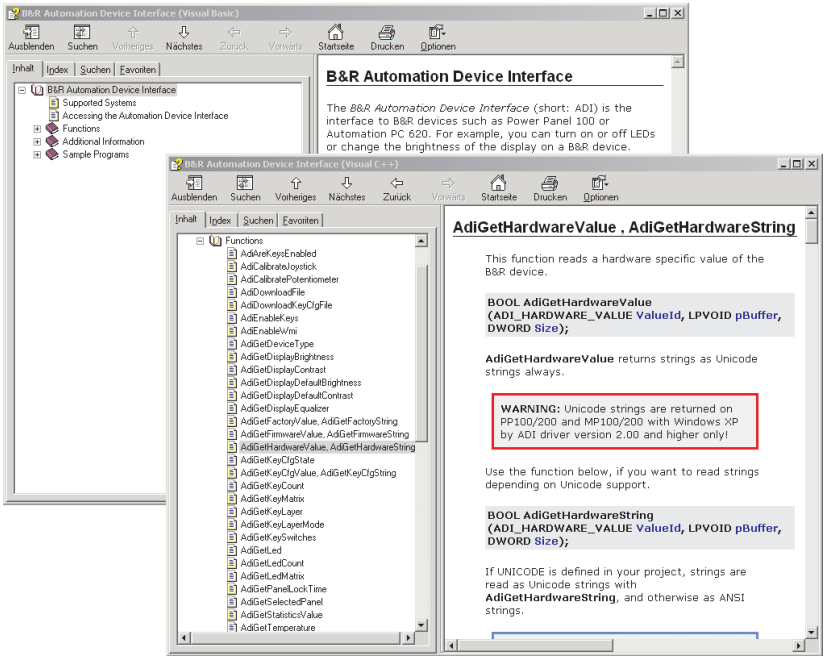


Figure 336: ADI development kit screenshots (Version 2.40)

Features:

- One Microsoft Visual Basic module with declarations for the ADI functions.
- Header files and import libraries for Microsoft Visual C++ 6.0 and Microsoft eMbedded Visual C++ 4.0.
- Help files for Visual Basic and Visual C++.
- Sample projects for Visual Basic and Visual C++.
- ADI DLL (for testing the applications, if no ADI drive is installed).

Supports following systems (Version 2.40 and higher):

- Automation PC 620
- Automation PC 810
- Automation PC 820

- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400

The ADI driver suitable for the device must be installed to the stated product series (for Windows XP, Windows XP+SP2). The ADI driver is already included in the Windows XP embedded and Windows CE operating systems offered by B&R and does not have to be additionally installed.

The programming languages C (with import libraries for Microsoft Visual C++ 6.0 and Microsoft eMbedded Visual C++ 4.0) and Visual Basic (for Microsoft Visual Basic 6.0) are supported. A detailed description of using the ADI functions can be found in the integrated online help.

The B&R Automation Device Interface (ADI) development kit can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**).

6. 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

An 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

Baud rate

Measurement unit for data transfer speed. It indicates the number of states for a transferred signal per second and is measured using the baud unit of measurement. 1 baud = 1 bit/sec or 1 bps.

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: Theoretically unlimited, but practically limited up to 64. Real-time capable (i.e. defined maximum latency 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

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.

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

Direct **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, which 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 is able to 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.

DVI

Abbreviation for "**D**igital **V**isual **I**nterface" An interface for the digital transfer of video data.

DVI-A

Analog only

DVI-D

Digital only

DVI-I

Integrated, i.e. analog and digital

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.

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].

EPROM

Erasable **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.

ETX

Abbreviation for "**E**mbedded **T**echnology e**X**tended" This established standard offers complete PC functionality on a very compact form factor of just 114 mm x 100 mm (´4.5" x 4"). The flexibility offered by ETX® in the development of system specific main boards allows easy requirement fulfillment in a number of different applications.

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.

Fiber optics

Fiber optic cable

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.

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

Jitter

Jitter is a term that describes time deviations of cyclic events. If, for example, an event should take place every 200ìs and it actually occurs every 198 to 203ìs, then the jitter is 5ìs. Jitter has many causes. It originates in the components and transfer media of networks because of noise, crosstalk, electromagnetic interference and many other random occurrences. In automation technology, jitter is a measure of the quality of synchronization and timing.

Jumper

A small plug or wire link for adapting the hardware configuration used to connect the different points of an electronic circuit.

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.

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).

MTCX

An abbreviation for »**M**ain**t**enance **C**ontroller E**X**tended«. The MTCX 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).

Multitasking

Multitasking is an operating mode in an operating system that allows several computer tasks to be executed virtually simultaneously.

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. Nowadays, OPC is also 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).

PCI Bus

Abbreviation for "**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.

PLC

Programmable Logic Controller; Computer-based control device that functions using an application program. The application program is relatively easy to create using standardized programming languages [IL, FBD, LAD, AS, ST]. Because of its serial functionality, reaction times are slower compared to connection-oriented control. Today, PLCs are available in device families with matched modular components for all levels of an automation hierarchy.

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.

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. 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**).

Q

QVGA

Abbreviation for "**Q**uarter **V**ideo **G**raphics **A**rray". Usually a screen resolution of 320 × 240 pixels.

QUXGA

Abbreviation for "**Q**uad **U**ltra E**x**tended **G**raphics **A**rray". Generally a screen resolution of 3200 × 2400 pixels (4:3). Quad implies the 4x greater pixel resolution compared to the UXGA.

QWUXGA

Abbreviation for "**Q**uad **WUXGA"**; Generally a screen resolution of 3840 × 2400 pixels (8:5, 16:10).

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

Recommended **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 to -30 V, low level: +3 to +30 V; cable lengths up to 15 m, transfer rates up to 20 kbit/s; for point-to-point connections between 2 stations.

RS422

Recommended **S**tandard **N**umber **422**. Interface standard, balanced operation, increased immunity to disturbances. High level: 2 to -6 V, low level: +2 to +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

Recommended **S**tandard **N**umber **485**. Interface standard upgraded from RS422. High level: 1.5 to -6 V, low level: +1.5 to +6 V; two-line connection [half-duplex mode] or four-line connection [full-duplex mode]; permissible cable length up to 1200 m, transfer rates up to 10 Mbit/s. Up to 32 stations (sender/receiver) can be connected to an RS485 bus.

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

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.

Slot PLC

PC insert card that has full PLC functionality. On the PC, it is coupled via a DPR with the process using a fieldbus connection. It is programmed externally or using the host PC.

SoftPLC

Synonym for SoftPLC.

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.

SUXGA

Abbreviation for **S**uper **U**ltra **E**xtended **G**raphics **A**rray; Generally a screen resolution of 2048×1536 pixels (4:3). An alternative name is QXGA (**Q**uad **E**xtended **G**raphics **A**rray), which is 4x the pixel resolution of XGA.

SVGA

Abbreviation for "**S**uper **V**ideo **G**raphics **A**rray"; Graphics standard with a resolution of at least 800×600 pixels and at least 256 colors.

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.

SXGA

Abbreviation for Super Extended Graphics Array. Graphics standard with a screen resolution of 1280 × 1024 pixels (aspect ratio 5:4).

SXGA+

Abbreviation for SXGA Plus; Generally 1400 × 1050 pixels.

System units

Provit system units consist of a mainboard (without processor), slots for RAM modules, VGA controller, serial and parallel interfaces, and connections for the FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, Ethernet (for system units with Intel Celeron and Pentium III processors), Panelware keypad modules and external FDD.

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 selecting options in a displayed menu using the tip of 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.

UXGA

Abbreviation for "**U**ltra **E**xtended **G**raphics **A**rray" Generally a screen resolution of 1600 × 1200 pixels (aspect ratio 4:3, 12:9).

V

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.

WSXGA

Wide SXGA, generally 1600 × 900 pixels (16:9).

WUXGA

Wide UXGA, generally 1920 × 1200 pixels (16:10).

WXGA

Wide XGA, generally 1280 × 768 pixels.

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.

XTX

Abbreviation for "e**X**press **T**echnologoy for ET**X**" A further development consistent with the proven ETX® standard. The newest I/O technology is implemented on a reliable form factor in XTX. The ETX® interface X2 is equipped with new serial buses like PCI Express™ und Serial ATA®, instead of the unpopular ISA bus. All other signals on the X1, X3 and X4 interfaces remain completely compatible with the ETX® Standard (Rev. 2.7). However, if ISA signals are needed, a PCI-ISA can be implemented on the base board. The use of an LPC bus already in XTX™ is considerably cheaper than a bridge solution.

Figure 1: APC620 embedded for central control and visualization 37
Figure 2: APC620 as visualization device 38
Figure 3: Automation PC 620 system overview 39
Figure 4: Selection guide - APC620 basic system with 1, 2, 3, and 5 PCI slots 42
Figure 5: Selection guide - APC620 optional components with 1, 2, 3, and 5 PCI slots 43
Figure 6: Selection guide - Basic system and optional components APC620 embedded .. 45
Figure 7: Interface overview - APC620, 1 PCI slot variant (top) 46
Figure 8: Interface overview - APC620, 1 PCI slot variant (front) 47
Figure 9: Dimensions - APC620, 1 PCI slot variant 51
Figure 10: Interface overview - APC620, 2 PCI slot variant (top) 52
Figure 11: Interface overview - APC620, 2 PCI slot variant (front) 53
Figure 12: Dimensions - APC620, 2 PCI slot variant 57
Figure 13: Interface overview - APC620, 3 PCI slot variant (top) 58
Figure 14: Interface overview - APC620, 3 PCI slot variant (front) 59
Figure 15: Dimensions - APC620, 3 PCI slot variant 62
Figure 16: Interface overview - APC620, 5 PCI slot variant (top) 63
Figure 17: Interface overview - APC620, 5 PCI slot variant (front) 64
Figure 18: Dimensions - APC620, 5 PCI slot variant 68
Figure 19: APC620 embedded variant interface overview - top side 69
Figure 20: APC620 embedded variant interface overview - front side 70
Figure 21: APC620 embedded variant - dimensions 74
Figure 22: Example of worst-case conditions for temperature measurement 75
Figure 23: Ambient temperatures for systems with an X945 CPU board 76
Figure 24: Ambient temperatures for embedded systems with an X945 CPU board 77
Figure 25: Supply voltage for the 5PC600.SX01-00 revision >= I0 79
Figure 26: Supply voltage for the 5PC600.SX01-00 revision < I0 81
Figure 27: Supply voltage for the 2 PCI slots (dependent on system unit version) 83
Figure 28: Supply voltage for the 2 PCI slots (dependent on system unit version) 86
Figure 29: Supply voltage block diagram 3 PCI slots 89
Figure 30: Supply voltage for the 5 PCI slots (dependent on system unit version) 91
Figure 31: Supply voltage block diagram 5 PCI slots (dependent on system unit version) .. 94
Figure 32: Supply voltage for the 5PC600.SE00-00, 5PC600.SE00-01 and 5PC600.SE00-02 98
Figure 33: General device interfaces example - APC620 with 5 PCI slots 100
Figure 34: General device interfaces example - APC620 embedded 101
Figure 35: Supply voltage connection 114
Figure 36: Ground connection 115
Figure 37: Monitor / Panel interface 117
Figure 38: Monitor / Panel connection with RGB video signal 121
Figure 39: Monitor / Panel connection with DVI video signal 121
Figure 40: Monitor / Panel connection with SDL video signal 122
Figure 41: Dimensions - Standard half-size PCI cards 126
Figure 42: Dimensions - Standard full-size PCI cards 127
Figure 43: PCI connector type: 5 volt 128
Figure 44: Front-side status LEDs 130

Figure 45: APC620 serial number sticker on front-side 142
Figure 46: APC620 serial number sticker on back-side 142
Figure 47: Example of serial number search: 70950170564 143
Figure 48: Block diagram of entire device with system unit 5PC600.SX01-00 and X945 CPU board 144
Figure 49: Block diagram of entire device with system unit 5PC600.SX02-00 and X945 CPU board 145
Figure 50: Block diagram of entire device with system unit 5PC600.SX02-01 and X945 CPU board 146
Figure 51: Block diagram of entire device with system unit 5PC600.SX03-00 and X945 CPU board 147
Figure 52: Block diagram of entire device with system unit 5PC600.SX05-00 and X945 CPU board 148
Figure 53: Block diagram of entire device with system unit 5PC600.SX05-01 and X945 CPU board 149
Figure 54: Block diagram of entire device with system unit 5PC600.SX00-00 and X945 CPU board 150
Figure 55: Block diagram of entire device with system unit 5PC600.SX00-01 and X945 CPU board 151
Figure 56: Block diagram of entire device with system unit 5PC600.SX00-02 and X945 CPU board 152
Figure 57: X945 CPU board 158
Figure 58: Heat sink 160
Figure 59: Main memory module 161
Figure 60: Add-on hard disk 40 GB - 5AC600.HDDI-05 162
Figure 61: Temperature humidity diagram - Add-on hard disk 5AC600.HDDI-05 164
Figure 62: Add-on hard disk 80 GB - 5AC600.HDDI-06 165
Figure 63: Temperature humidity diagram - Add-on hard disk 5AC600.HDDI-06 167
Figure 64: Add-on CompactFlash slot - 5AC600.CFSI-00 168
Figure 65: Slide-in USB FDD - 5AC600.FDDS-00 169
Figure 66: Temperature humidity diagram - Slide-in USB diskette drive 5AC600.FDDS-00 171
Figure 67: RAID 1 system schematic 172
Figure 68: PCI SATA RAID controller - 5ACPCI.RAIC-03 173
Figure 69: Temperature humidity diagram - SATA RAID hard disk 5ACPCI.RAIC-03 .. 175
Figure 70: PCI slot numbering on APC620 systems with 5 PCI slots 177
Figure 71: Replacement SATA HDD 160 GB - 5ACPCI.RAIC-04 178
Figure 72: Temperature humidity diagram - SATA RAID hard disk 5ACPCI.RAIC-04 .. 180
Figure 73: PCI SATA RAID controller - 5ACPCI.RAIC-05 181
Figure 74: Temperature humidity diagram - SATA RAID Hard Disk - 5ACPCI.RAIC-05 183
Figure 75: Replacement SATA HDD 250 GB - 5MMHDD.0250-00 185
Figure 76: Temperature humidity diagram - SATA RAID hard disk - 5MMHDD.0250-00 187
Figure 77: Add-on CAN interface - 5AC600.CANI-00 188
Figure 78: Terminating resistor - Add-on CAN interface 5AC600.CANI-00 191
Figure 79: Contents of the delivery / mounting material - 5AC600.CANI-00 191

Figure 80: Add-on RS232/422/485 interface - 5AC600.485I-00 ... 192
Figure 81: Add-on RS232/422/485 interface - operated in RS485 mode ... 194
Figure 82: Contents of the delivery / mounting material - 5AC600.485I-00 ... 195
Figure 83: Fan kit - 5PC600.FA01-00 ... 196
Figure 84: Fan kit - 5PC600.FA02-00 ... 197
Figure 85: Fan kit - 5PC600.FA03-00 ... 199
Figure 86: Fan kit - 5PC600.FA05-00 ... 200
Figure 87: AP Link card ... 202
Figure 88: AP Link device connection with DVI video signal ... 205
Figure 89: AP Link device connection with SDL video signal ... 206
Figure 90: Mounting plates for the APC620 ... 207
Figure 91: Mounting orientation - Standard ... 211
Figure 92: Air circulation spacing - Standard ... 212
Figure 93: Mounting orientation - Optional ... 213
Figure 94: Optional circulation spacing ... 214
Figure 95: Mounting orientations for an APC620 with hard disk drive ... 215
Figure 96: Mounting orientations for an APC620 with a slide-in USB FDD drive ... 216
Figure 97: Flex radius - Cable connection ... 217
Figure 98: Grounding concept ... 218
Figure 99: Configuration - One Automation Panel 900 via DVI (onboard) ... 221
Figure 100: Configuration - An Automation Panel 900 via SDL (onboard) ... 224
Figure 101: Configuration - An Automation Panel 800 via SDL (onboard) ... 228
Figure 102: Configuration - One AP900 and an AP800 via SDL (onboard) ... 231
Figure 103: Configuration - Four Automation Panel 900 units via SDL (onboard) ... 234
Figure 104: Configuration - One Automation Panel 900 via SDL (AP Link) ... 238
Figure 105: Configuration - Four Automation Panel 900 units via SDL (AP Link) ... 242
Figure 106: Configuration - Four Automation Panel 900 units via SDL (AP Link) and CRT (onboard) ... 246
Figure 107: Configuration - Three AP900 units and one AP800 via SDL (AP Link) and RGB (onboard) ... 251
Figure 108: Examples - internal numbering of the extension units ... 255
Figure 109: Open the RAID Configuration Utility ... 256
Figure 110: RAID Configuration Utility - Menu ... 256
Figure 111: RAID Configuration Utility - Menu ... 257
Figure 112: RAID Configuration Utility - Create RAID set - Striped ... 258
Figure 113: RAID Configuration Utility - Create RAID set - Mirrored ... 259
Figure 114: RAID Configuration Utility - Delete RAID set ... 260
Figure 115: RAID Configuration Utility - Rebuild mirrored set ... 261
Figure 116: RAID Configuration Utility - Resolve conflicts ... 262
Figure 117: RAID Configuration Utility - Low level format ... 263
Figure 118: Local connection of USB peripheral devices on the APC620 ... 264
Figure 119: Remote connection of USB peripheral devices to the APC900 via DVI ... 265
Figure 120: Remote connection of USB peripheral devices to the APC800/900 via SDL 266
Figure 121: X945 - BIOS diagnostics screen ... 270
Figure 122: X945 BIOS Main Menu ... 272
Figure 123: X945 Advanced Menu ... 273
Figure 124: X945 Advanced ACPI configuration ... 274

Figure 125: X945 Advanced PCI Configuration ... 276
Figure 126: X945 Advanced PCI IRQ Resource Exclusion ... 277
Figure 127: X945 Advanced PCI Interrupt Routing ... 278
Figure 128: X945 Advanced Graphics configuration ... 280
Figure 129: X945 Advanced CPU Configuration ... 282
Figure 130: X945 Advanced Chipset Configuration ... 284
Figure 131: X945 Advanced I/O Interface Configuration ... 286
Figure 132: X945 Advanced Clock Configuration ... 287
Figure 133: X945 Advanced IDE Configuration ... 288
Figure 134: X945 Primary IDE Master ... 290
Figure 135: X945 Primary IDE Slave ... 292
Figure 136: X945 Advanced USB Configuration ... 294
Figure 137: X945 Advanced Keyboard/Mouse Configuration ... 296
Figure 138: X945 Advanced Remote Access Configuration ... 297
Figure 139: X945 Advanced CPU board monitor ... 299
Figure 140: X945 Advanced Baseboard/Panel Features ... 300
Figure 141: X945 Panel Control ... 302
Figure 142: X945 Baseboard Monitor ... 303
Figure 143: X945 Legacy Devices ... 304
Figure 144: X945 Boot Menu ... 305
Figure 145: X945 Security Menu ... 307
Figure 146: X945 Hard Disk Security User Password ... 308
Figure 147: X945 Hard Disk Security Master Password ... 309
Figure 148: X945 Power Menu ... 310
Figure 149: X945 Exit Menu ... 312
Figure 150: CMOS profile hex switch ... 313
Figure 151: PCI Routing with activated APIC CPU board X945 ... 329
Figure 152: PCI Routing with activated APIC CPU board X945 on the APC620e ... 330
Figure 153: Software versions ... 332
Figure 154: Firmware version of Automation Panel Link SDL transceiver/receiver ... 333
Figure 155: Creating a bootable diskette in Windows XP - step 1 ... 341
Figure 156: Creating a bootable diskette in Windows XP - step 2 ... 341
Figure 157: Creating a bootable diskette in Windows XP - step 3 ... 341
Figure 158: Creating a bootable diskette in Windows XP - step 4 ... 342
Figure 159: Creating a bootable diskette in Windows XP - step 5 ... 342
Figure 160: Creating a USB flash drive for B&R upgrade files ... 343
Figure 161: Creating a CompactFlash card for B&R upgrade files ... 346
Figure 162: Location of DIP switch ... 347
Figure 163: Automation PC 620 with MS-DOS ... 350
Figure 164: Windows XP Professional Logo ... 352
Figure 165: Accessing the graphics driver via Control Panel ... 354
Figure 166: Extended desktop settings - primary device and monitor ... 356
Figure 167: Dual display clone settings - primary and monitor ... 358
Figure 168: Touch screen driver - serial touch screen ... 359
Figure 169: Touch screen driver - auto-detect ... 360
Figure 170: Touch screen calibration ... 360
Figure 171: Touch screen driver - serial touch screen ... 361

Figure 172: Touch screen driver - auto-detect ... 361
Figure 173: Touch screen calibration ... 362
Figure 174: Windows 7 Logo ... 365
Figure 175: Windows XP Embedded Logo ... 367
Figure 176: Windows Embedded Standard 2009 Logo ... 370
Figure 177: Windows Embedded Standard 7 Logo ... 373
Figure 178: ADI Control Center screenshots - Examples (symbol photo) ... 378
Figure 179: ADI Control Center - SDL equalizer settings ... 381
Figure 180: ADI Control Center - UPS settings ... 382
Figure 181: ADI Control Center - UPS monitor ... 383
Figure 182: ADI Control Center - UPS battery settings ... 384
Figure 183: ADI Control Center - UPS settings ... 387
Figure 184: ADI Control Center - Advanced UPS settings ... 389
Figure 185: Test structure - torsion ... 413
Figure 186: Test structure - Cable drag chain ... 414
Figure 187: Contents of delivery - interface cover ... 426
Figure 188: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-04 ... 431
Figure 189: Dimensions - CompactFlash card Type I ... 431
Figure 190: ATTO disk benchmark v2.34 comparison (reading) ... 432
Figure 191: ATTO disk benchmark v2.34 comparison (writing) ... 432
Figure 192: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03 ... 436
Figure 193: Dimensions - CompactFlash card Type I ... 436
Figure 194: USB Media Drive - 5MD900.USB2-01 ... 437
Figure 195: Dimensions - 5MD900.USB2-01 ... 440
Figure 196: Dimensions - USB Media Drive with front cover ... 441
Figure 197: Interfaces - 5MD900.USB2-01 ... 441
Figure 198: Mounting orientation - 5MD900.USB2-01 ... 442
Figure 199: Front cover 5A5003.03 ... 442
Figure 200: Dimensions - 5A5003.03 ... 443
Figure 201: Front cover mounting and installation depth ... 443
Figure 202: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00 ... 446
Figure 203: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-01 ... 448
Figure 204: HMI Drivers & Utilities DVD 5SWHMI.0000-00 ... 449
Figure 205: APC620 internal supply cable 5CAMSC.0001-00 ... 452
Figure 206: DVI extension cable (similar) ... 453
Figure 207: Flex radius specification ... 454
Figure 208: Pin assignments - DVI cable ... 455
Figure 209: SDL extension cable (similar) ... 456
Figure 210: Flex radius specification ... 457
Figure 211: Pin assignments - SDL cable 5CASDL.0xxx-00 ... 458
Figure 212: SDL cable with 45° plug (similar) ... 459
Figure 213: Flex radius specification ... 460
Figure 214: Pin assignments - SDL cable with 45° plug 5CASDL.0xxx-01 ... 461
Figure 215: SDL cable 5CASDL.0xxx-03 (similar) ... 462
Figure 216: Flex radius specification ... 464
Figure 217: Dimensions - SDL cable 5CASDL.0xxx-03 ... 464
Figure 218: Pin assignments - SDL cable 5CASDL.0xxx-03 ... 466

Figure 219: SDL flex cable with extender - 5CASDL.0x00-13 (similar) 467
Figure 220: Flex radius specification 469
Figure 221: Dimensions - SDL flex cable with extender 5CASDL.0x00-13 469
Figure 222: Example of the signal direction for the SDL flex cable with extender - APC620 . 470
Figure 223: Example of signal direction display - SDL flex cable with extender 470
Figure 224: Pin assignments - SDL flex cable with extender 5CASDL.0x00-13 471
Figure 225: RS232 extension cable (similar) 472
Figure 226: Pin assignments - RS232 cable 473
Figure 227: USB extension cable (similar) 474
Figure 228: Pin assignments - USB cable 475
Figure 229: UPS principle 476
Figure 230: Firmware and software required for the UPS 478
Figure 231: Add-on UPS module 5AC600.UPSI-00 480
Figure 232: Add-on UPS module 5AC600.UPSI-00 - Installation materials 481
Figure 233: Battery unit 5AC600.UPSB-00 482
Figure 234: Temperature life span diagram 483
Figure 235: Deep discharge cycles 483
Figure 236: Dimensions - 5AC600.UPSB-00 484
Figure 237: Drilling template for the battery unit 485
Figure 238: UPS connection cable 486
Figure 239: Block diagram of the UPS 487
Figure 240: PCI Ethernet card 10/100 - 5ACPCI.ETH1-01 489
Figure 241: Dimensions - 5ACPCI.ETH1-01 490
Figure 242: PCI Ethernet card 10/100 - 5ACPCI.ETH3-01 491
Figure 243: Dimensions - 5ACPCI.ETH3-01 492
Figure 244: Replacement fan 493
Figure 245: 5AC600.SRAM-00 494
Figure 246: SRAM module installation 496
Figure 247: B&R power supplies (examples) 497
Figure 248: Battery removal 500
Figure 249: Battery handling 501
Figure 250: Battery polarity 501
Figure 251: APC620 1PCI slot - Remove screws to install/ remove filter kit 502
Figure 252: APC620 1PCI slot - Remove side cover and fan kit cover 502
Figure 253: Markings for direction of airflow / fan rotation 503
Figure 254: APC620 1PCI slot - Fan installation 503
Figure 255: APC620 1PCI slot - Fan cable connection to the main board 504
Figure 256: APC620 2PCI slots - Remove screws to install/ remove filter kit 505
Figure 257: APC620 2PCI slots - Remove side cover and fan kit cover 505
Figure 258: Markings for direction of airflow / fan rotation 506
Figure 259: APC620 2PCI slots - Fan installation 506
Figure 260: APC620 2PCI slots - Fan cable connection to the main board 507
Figure 261: Dust filter in the fan kit cover and filter clasp 507
Figure 262: APC620 3PCI slot - Remove screws to install/ remove filter kit 508
Figure 263: APC620 3PCI slots - Remove side cover and fan kit cover 509
Figure 264: Markings for direction of airflow / fan rotation 509

Figure 265: APC620 3PCI slot - Fan installation ... 510
Figure 266: APC620 3PCI slot - Fan cable connection to the main board ... 511
Figure 267: Dust filter in the fan kit cover and filter clasp ... 511
Figure 268: APC620 5PCI slot - Remove screws to install/ remove filter kit ... 512
Figure 269: APC620 5PCI slot - Remove side cover and fan kit cover ... 512
Figure 270: APC620 5PCI attach cable fasteners ... 513
Figure 271: Markings for direction of airflow / fan rotation ... 513
Figure 272: APC620 5PCI slot - Fan installation ... 514
Figure 273: APC620 5PCI slot - Fan cable connection to the main board ... 515
Figure 274: Dust filter in the fan kit cover and filter clasp ... 516
Figure 275: Removing the slide-in dummy module ... 517
Figure 276: Installing the slide-in drive ... 517
Figure 277: Release the slide-in slot releasing mechanisms ... 518
Figure 278: Removing the slide-in drive ... 518
Figure 279: Slide-in slot releasing mechanism start position ... 519
Figure 280: Add-on UPS module 5AC600.UPSI-00 - Installation materials ... 520
Figure 281: Remove UPS module cover ... 520
Figure 282: Screw in spacing bolt and spacing ring ... 521
Figure 283: Install UPS module ... 521
Figure 284: Plug in connection cable ... 521
Figure 285: Connector locking mechanism ... 522
Figure 286: Remove UPS module cover ... 523
Figure 287: Remove cover plate ... 523
Figure 288: Screw in spacing bolt and spacing ring ... 523
Figure 289: Install mounting bracket ... 524
Figure 290: Install UPS module ... 524
Figure 291: Plug in connection cable ... 524
Figure 292: Connector locking mechanism ... 525
Figure 293: Remove UPS module cover ... 526
Figure 294: Remove cover plate ... 526
Figure 295: Screw in spacing bolt and spacing ring ... 526
Figure 296: Install mounting bracket ... 527
Figure 297: Install UPS module ... 527
Figure 298: Plug in connection cable ... 527
Figure 299: Connector locking mechanism ... 528
Figure 300: Remove UPS module cover ... 529
Figure 301: Screw in spacing bolt ... 530
Figure 302: Install UPS module ... 530
Figure 303: Plug in connection cable ... 530
Figure 304: Connector locking mechanism ... 531
Figure 305: Remove UPS module cover ... 531
Figure 306: Remove cover plate ... 532
Figure 307: Screw in spacing bolt ... 532
Figure 308: Install mounting bracket ... 532
Figure 309: Install UPS module ... 533
Figure 310: Plug in connection cable ... 533
Figure 311: Connector locking mechanism ... 533

Figure 312: Remove UPS module cover ... 534
Figure 313: Remove cover plate ... 534
Figure 314: Screw in spacing bolt ... 534
Figure 315: Install mounting bracket ... 535
Figure 316: Install UPS module ... 535
Figure 317: Plug in connection cable ... 535
Figure 318: Connector locking mechanism ... 536
Figure 319: Mounting the side cover - APC620, 1 PCI slot ... 537
Figure 320: Mounting the side cover - APC620, 2 PCI slot ... 538
Figure 321: Mounting the side cover - APC620, 3 PCI slot ... 539
Figure 322: Mounting the side cover - APC620, 5 PCI slot ... 540
Figure 323: Screw assignment on the back side of the SATA RAID controller ... 541
Figure 324: Hard disk exchange ... 542
Figure 325: Removing the APC620 front cover ... 543
Figure 326: Mounting the APC620 front cover ... 544
Figure 327: APC620 front cover label ... 545
Figure 328: Removing the APC620 front cover ... 545
Figure 329: Attaching the front cover ... 546
Figure 330: Temperature sensor locations ... 547
Figure 331: Connector location for external devices ... 548
Figure 332: MTCX controller location ... 549
Figure 333: Sample configuration for SDL timing ... 550
Figure 334: SDL timing - Example for Automation Panel 900 with the number 0 ... 551
Figure 335: B&R Key Editor screenshots (Version 2.70) ... 553
Figure 336: ADI development kit screenshots (Version 2.40) ... 555

Table 1: Manual history ... 21
Table 2: Environmentally-friendly separation of materials ... 25
Table 3: Organization of safety notices ... 26
Table 4: Model numbers - system units ... 27
Table 5: Model numbers - X945 CPU boards ... 28
Table 6: Model numbers - Heat sinks ... 28
Table 7: Model numbers - Main memory ... 28
Table 8: Model numbers - Drives ... 28
Table 9: Model numbers - Interfaces ... 29
Table 10: Model numbers - Fan kits ... 29
Table 11: Model numbers - AP Link graphics adapter ... 30
Table 12: Model numbers - Supply voltage connectors ... 30
Table 13: Model numbers - X2X and CAN plug ... 30
Table 14: Model numbers - Batteries ... 30
Table 15: Model numbers - CompactFlash cards ... 30
Table 16: Model numbers - USB flash drives ... 31
Table 17: Model numbers - Cables ... 31
Table 18: Model numbers - UPS module + accessories ... 33
Table 19: Model numbers - PCI Ethernet cards ... 33
Table 20: Model numbers - Other items ... 33
Table 21: Model numbers - Software ... 35
Table 22: Technical data - APC620, 1 PCI slot variant ... 48
Table 23: Technical data - APC620, 2 PCI slot variant ... 54
Table 24: Technical data - APC620, 3 PCI slot variant ... 60
Table 25: Technical data - APC620, 5 PCI slot variant ... 65
Table 26: Technical data - APC620 embedded variant ... 71
Table 27: Overview of humidity specifications for individual components ... 99
Table 28: Pin assignments - COM1 ... 102
Table 29: COM1 - I/O address and IRQ ... 102
Table 30: Pin assignments - COM2 ... 103
Table 31: COM2 - I/O address and IRQ ... 103
Table 32: X2X pin assignments (only APC620 embedded) ... 104
Table 33: CAN pin assignments (only APC620 embedded) ... 104
Table 34: CAN node number switch (x1, x16) - only APC620 embedded ... 105
Table 35: CAN terminating switch / LED (only APC620 embedded) ... 105
Table 36: Status LEDs CAN / X2X (only APC620 embedded) ... 106
Table 37: POWERLINK (only APC620 embedded) ... 106
Table 38: Status / Error LED as error LED - POWERLINK V2 operating mode ... 106
Table 39: Status / Error LED as status LED - POWERLINK V2 operating mode ... 107
Table 40: POWERLINK station number (x1, x16) - only APC620 embedded ... 108
Table 41: Ethernet connection ETH (only APC620 embedded) ... 108
Table 42: Ethernet connection (ETH1) ... 109
Table 43: Ethernet cable lengths when using 5PC600.X945-00 CPU boards ... 110
Table 44: Ethernet connection (ETH2) ... 111
Table 45: USB ports ... 112
Table 46: USB connections 4 x - only APC620 embedded ... 113
Table 47: Power supply depending on the system unit ... 114

Table 48: Starting currents in the voltage supply to the system units ... 115
Table 49: System unit revisions for at least 10 seconds turn-off time ... 115
Table 50: System unit revisions for any turn-off times ... 116
Table 51: Pin assignments - Monitor / panel connection ... 118
Table 52: Segment lengths, resolutions and SDL cables ... 118
Table 53: Requirements for SDL cable with automatic cable adjustment (equalizer) ... 119
Table 54: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) ... 120
Table 55: Technical data - MIC, Line IN and Line OUT port ... 123
Table 56: Add-on interface slot ... 124
Table 57: Add-on UPS module slot ... 125
Table 58: Technical data - PCI bus ... 127
Table 59: Technical data - Status LEDs ... 129
Table 60: Status LEDs Power, CF, Link (only APC620 embedded) ... 130
Table 61: Technical data - CompactFlash slot (CF1) ... 131
Table 62: Technical data - Hard disk / CompactFlash slot (HDD/CF2) ... 132
Table 63: CompactFlash slots (CF1 / CF2) - APC620 embedded ... 134
Table 64: Technical data - Power button ... 135
Table 65: Technical data - Reset button ... 135
Table 66: Technical data - PS/2 keyboard/mouse (external PS/2) ... 136
Table 67: Technical data - battery ... 137
Table 68: Meaning of battery status ... 137
Table 69: Technical data - Hardware security key ... 139
Table 70: Hardware security key - I/O address and IRQ ... 139
Table 71: Technical data - Slide-in slot 1 ... 140
Table 72: Technical data - Slide-in slot 2 ... 141
Table 73: Technical data - 1, 2, 3 and 5 PCI slot types ... 153
Table 74: Technical data - APC620 embedded variations ... 155
Table 75: Technical data - CPU board X945 ... 158
Table 76: Technical data - Heat sink ... 160
Table 77: Technical data - Main memory ... 161
Table 78: Technical data - Add-on hard disk 5AC600.HDDI-05 ... 162
Table 79: Technical data - add-on hard disk - 5AC600.HDDI-06 ... 165
Table 80: Technical data - Add-on CompactFlash slot 5AC600.CFSI-00 ... 168
Table 81: Technical data - Slide-in USB diskette drive - 5AC600.FDDS-00 ... 170
Table 82: Technical data - RAID hard disk - 5ACPCI.RAIC-03 ... 174
Table 83: Technical data - RAID hard disk - 5ACPCI.RAIC-04 ... 178
Table 84: Technical data - RAID Hard Disk - 5ACPCI.RAIC-05 ... 182
Table 85: Technical data - RAID hard disk - 5MMHDD.0250-00 ... 185
Table 86: Technical data - Add-on CAN interface - 5AC600.CANI-00 ... 188
Table 87: Pin assignments - CAN ... 189
Table 88: Add-on CAN - I/O Adresse und IRQ ... 189
Table 89: CAN address register ... 189
Table 90: Bus length and transfer rate - CAN ... 190
Table 91: CAN cable requirements ... 190
Table 92: Pin assignments - RS232/RS422 ... 192
Table 93: Add-on RS232/422/485 - I/O address and IRQ ... 192

Table 94: RS232 - Bus length and transfer rate ... 193
Table 95: RS232 - Cable requirements ... 193
Table 96: RS422 - Bus length and transfer rate ... 193
Table 97: RS422 - Cable requirements ... 194
Table 98: RS485 - Bus length and transfer rate ... 195
Table 99: RS485 - Cable requirements ... 195
Table 100: Technical data - 5PC600.FA01-00 ... 196
Table 101: Contents of delivery - 5PC600.FA01-00 ... 197
Table 102: Technical data - 5PC600.FA02-00 ... 198
Table 103: Contents of delivery - 5PC600.FA02-00 ... 198
Table 104: Technical data - 5PC600.FA03-00 ... 199
Table 105: Contents of delivery - 5PC600.FA03-00 ... 199
Table 106: Technical data - 5PC600.FA05-00 ... 200
Table 107: Contents of delivery - 5PC600.FA05-00 ... 201
Table 108: Model numbers - AP Link graphics adapter ... 202
Table 109: AP Link slot (AP Link card inserted) ... 202
Table 110: Pin assignment for AP Link connection ... 203
Table 111: Segment lengths, resolutions and SDL cables ... 204
Table 112: Requirements for SDL cable with automatic cable adjustment (equalizer) ... 204
Table 113: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) ... 205
Table 114: Drilling templates - 1 and 2 PCI slots ... 208
Table 115: Drilling templates - 3 and 5 PCI slots ... 209
Table 116: Drilling templates - APC620 embedded ... 210
Table 117: Selecting the display units ... 220
Table 118: Possible combinations of system unit and CPU board ... 221
Table 119: Link module for the configuration - One Automation Panel 900 via DVI ... 221
Table 120: Cables for DVI configurations ... 222
Table 121: Possible Automation Panel units, resolutions und segment lengths ... 222
Table 122: Possible combinations of system unit and CPU board ... 224
Table 123: Link module for the configuration - One Automation Panel 900 via SDL ... 224
Table 124: Cables for SDL configurations ... 225
Table 125: Segment lengths, resolutions and SDL cables ... 225
Table 126: Requirements for SDL cable with automatic cable adjustment (equalizer) ... 226
Table 127: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) ... 226
Table 128: Possible combinations of system unit and CPU board ... 228
Table 129: Cables for SDL configurations ... 228
Table 130: Segment lengths, resolutions and SDL cables ... 229
Table 131: Requirements for SDL cable with automatic cable adjustment (equalizer) ... 229
Table 132: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) ... 229
Table 133: Possible combinations of system unit and CPU board ... 231
Table 134: Segment lengths, resolutions and SDL cables ... 232
Table 135: Requirements for SDL cable with automatic cable adjustment (equalizer) ... 232
Table 136: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) ... 233

Table 137: Possible combinations of system unit and CPU board 234
Table 138: Link modules for the configuration: 4 Automation Panel 900 via SDL on 1 line 235
Table 139: Cables for SDL configurations 235
Table 140: Segment lengths, resolutions and SDL cables 236
Table 141: Requirements for SDL cable with automatic cable adjustment (equalizer) 236
Table 142: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) 237
Table 143: Possible combinations of system unit and CPU board 238
Table 144: Link modules for the configuration: 1 Automation Panel 900 via SDL (optional) 238
Table 145: Cables for SDL configurations 239
Table 146: Segment lengths, resolutions and SDL cables 239
Table 147: Requirements for SDL cable with automatic cable adjustment (equalizer) 240
Table 148: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) 240
Table 149: Possible combinations of system unit and CPU board 242
Table 150: Link modules for configuration: 4 Automation Panel 900 units via SDL (optional) on 1 line 243
Table 151: Cables for SDL configurations 243
Table 152: Segment lengths, resolutions and SDL cables 244
Table 153: Requirements for SDL cable with automatic cable adjustment (equalizer) 244
Table 154: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) 245
Table 155: Possible combinations of system unit and CPU board 247
Table 156: Link modules for configuration: 4 Automation Panel 900 units via SDL (AP Link) and RGB (onboard) 247
Table 157: Cables for SDL configurations 247
Table 158: Segment lengths, resolutions and SDL cables 249
Table 159: Requirements for SDL cable with automatic cable adjustment (equalizer) 249
Table 160: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) 250
Table 161: Possible combinations of system unit and CPU board 252
Table 162: Link modules for configuration: 3 AP900 units and one AP800 via SDL (AP Link) and RGB (onboard) 252
Table 163: Segment lengths, resolutions and SDL cables 253
Table 164: Requirements for SDL cable with automatic cable adjustment (equalizer) 253
Table 165: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) 254
Table 166: BIOS-relevant keys in the RAID Configuration Utility 256
Table 167: X945 bios-relevant keys at POST 270
Table 168: X945 bios-relevant keys in the BIOS menu 271
Table 169: X945 - Overview of BIOS menu items 271
Table 170: X945 Main Menu setting options 272
Table 171: X945 Advanced Menu setting options 273
Table 172: X945 Advanced ACPI configuration setting options 275
Table 173: X945 Advanced PCI configuration setting options 276
Table 174: X945 Advanced PCI IRQ Resource Exclusion setting options 277

Table 175: X945 Advanced PCI Interrupt Routing setting options 278
Table 176: X945 Advanced Graphics configuration setting options 280
Table 177: X945 Advanced CPU Configuration setting options 282
Table 178: X945 Advanced Chipset setting options 284
Table 179: X945 Advanced I/O Interface Configuration setting options 286
Table 180: X945 Advanced Clock Configuration setting options 287
Table 181: X945 Advanced IDE Configuration setting options 288
Table 182: X945 Primary IDE Master setting options 290
Table 183: X945 Primary IDE Slave setting options 292
Table 184: X945 Advanced USB Configuration setting options 294
Table 185: X945 Advanced Keyboard/Mouse Configuration setting options 296
Table 186: X945 Advanced Remote Access Configuration setting options 297
Table 187: X945 Advanced Remote Access Configuration setting options 299
Table 188: X945 Advanced Baseboard/Panel Features setting options 300
Table 189: X945 Panel Control setting options 302
Table 190: X945 Baseboard Monitor setting options 303
Table 191: X945 Legacy Devices setting options 304
Table 192: X945 Boot Menu setting options 306
Table 193: X945 Security Menu setting options 307
Table 194: X945 Hard Disk Security User Password 309
Table 195: X945 Hard Disk Security Master Password 309
Table 196: X945 Power Menu setting options 310
Table 197: X945 Exit Menu setting options 312
Table 198: Profile overview 313
Table 199: X945 - Main profile setting overview 314
Table 200: X945 Advanced - ACPI Configuration profile setting overview 314
Table 201: X945 Advanced - PCI Configuration Profile setting overview 315
Table 202: X945 Advanced - Graphics Configuration Profile setting overview 316
Table 203: X945 Advanced - CPU Configuration Profile setting overview 316
Table 204: X945 Advanced - Chipset Configuration Profile setting overview 317
Table 205: X945 Advanced - I/O Interface Configuration profile setting overview 317
Table 206: X945 Advanced - Clock Configuration Profile setting overview 317
Table 207: X945 Advanced - IDE Configuration Profile setting overview 317
Table 208: X945 Advanced - USB Configuration Profile setting overview 318
Table 209: X945 Advanced Keyboard/Mouse Configuration profile setting overview 319
Table 210: X945 Advanced Remote Access Configuration profile setting overview 319
Table 211: X945 Advanced CPU board monitor profile setting overview 319
Table 212: X945 Advanced - Baseboard/Panel Features profile setting overview 320
Table 213: X945 Boot profile setting overview 321
Table 214: X945 Security profile setting overview 322
Table 215: X945 Power profile setting overview 322
Table 216: BIOS post code messages BIOS X945 324
Table 217: RAM address assignment 325
Table 218: DMA channel assignment 325
Table 219: I/O address assignment 326
Table 220: IRQ interrupt assignments in PCI mode 327
Table 221: IRQ interrupt assignments in APIC mode 328

Table 222: Inter-IC (I²C) bus resources ... 330
Table 223: Inter-IC (I²C) bus resources ... 330
Table 224: System unit support for buffering with Automation Runtime ... 349
Table 225: Visual Components video output with different system units ... 349
Table 226: Model numbers - MS-DOS ... 350
Table 227: Tested resolutions and color depths for DVI and RGB signals ... 351
Table 228: Model numbers - Windows XP Professional ... 352
Table 229: Relationship between driver settings and graphics engine for 5PC600.SX02-00, 5PC600.SX05-00 und 5PC600.SF03-00 ... 355
Table 230: Relationship between driver settings and graphics engine for 5PC600.SX01-00, 5PC600.SX02-01, 5PC600.SX05-01, 5PC600.SE00-00 and 5PC600.SE00-02 355
Table 231: Relationship between driver settings and graphics engine (DDC) for 5PC600.SX02-00, 5PC600.SX05-00 und 5PC600.SF03-00 ... 357
Table 232: Relationship between driver settings and graphics engine (DDC) for 5PC600.SX01-00, 5PC600.SX02-01, 5PC600.SX05-01, 5PC600.SE00-00 and 5PC600.SE00-02 ... 357
Table 233: Model numbers - Windows 7 ... 365
Table 234: Model numbers - Windows XP Embedded ... 367
Table 235: Device functions in Windows XP Embedded with FP2007 ... 367
Table 236: Model numbers - Windows Embedded Standard 2009 ... 370
Table 237: Device functions in Windows Embedded Standard 2009 ... 371
Table 238: Model numbers - Windows Embedded Standard 2009 ... 373
Table 239: Device functions in Windows Embedded Standard 7 ... 374
Table 240: Model numbers - Windows CE ... 376
Table 241: Windows CE 6.0 features ... 376
Table 242: System support - ADI driver ... 379
Table 243: Overview of standards ... 393
Table 244: Overview of limits and testing guidelines for emissions ... 395
Table 245: Test requirements - Network-related emissions for industrial areas ... 396
Table 246: : Test requirements - Electromagnetic emissions for industrial areas ... 397
Table 247: Overview of limits and testing guidelines for immunity ... 398
Table 248: Test requirements - Electrostatic discharge (ESD) ... 399
Table 249: Test requirements - High-frequency electromagnetic fields (HF field) ... 399
Table 250: Test requirements - High-speed transient electrical disturbances (burst) ... 400
Table 251: Test requirements - Surge voltages ... 400
Table 252: Test requirements - Conducted disturbances ... 400
Table 253: Test requirements - Magnetic fields with electrical frequencies ... 401
Table 254: Test requirements - Voltage dips, fluctuations, and short-term interruptions ... 402
Table 255: Test requirements - Damped vibration ... 402
Table 256: Overview of limits and testing guidelines for vibration ... 403
Table 257: Test requirements - Vibration during operation ... 403
Table 258: Test requirements - Vibration during transport (packaged) ... 404
Table 259: Test requirements - Shock during operation ... 404
Table 260: Test requirements - Shock during transport ... 404
Table 261: Test requirements - Toppling ... 404
Table 262: Test requirements - Toppling ... 405

Table 263: Overview of limits and testing guidelines for temperature and humidity 406
Table 264: Test requirements - Worst case during operation 406
Table 265: Test requirements - Dry heat 406
Table 266: Test requirements - Dry cold 406
Table 267: Test requirements - Large temperature fluctuations 407
Table 268: Test requirements - Temperature fluctuations during operation 407
Table 269: Test requirements - Humid heat, cyclic 407
Table 270: Test requirements - Humid heat, constant (storage) 407
Table 271: Overview of limits and testing guidelines for safety 408
Table 272: Test requirements - Ground resistance 409
Table 273: Test requirements - Insulation resistance 409
Table 274: Test requirements - High voltage 410
Table 275: Test requirements - Residual voltage 410
Table 276: Test requirements - Leakage current 410
Table 277: Test requirements - Overload 411
Table 278: Test requirements - Defective component 411
Table 279: Test requirements - Voltage range 411
Table 280: Overview of limits and testing guidelines for other tests 412
Table 281: Test requirements - Protection 412
Table 282: Test requirements - Degree of pollution 412
Table 283: International certifications 415
Table 284: Model numbers - Accessories 417
Table 285: Order data - TB103 421
Table 286: Technical data - TB103 supply plug 421
Table 287: Order data - 0TB704.9 and 0TB704.91 423
Table 288: Technical data - TB103 supply plug 423
Table 289: Order data - Lithium batteries 424
Table 290: Technical data - Lithium batteries 424
Table 291: Order data - APC620 interface cover 426
Table 292: Order data - DVI - CRT adapter 427
Table 293: Order data - CompactFlash cards 428
Table 294: Technical data - CompactFlash cards 5CFCRD.xxxx-04 429
Table 295: Order data - CompactFlash cards 433
Table 296: Technical data - CompactFlash cards 5CFCRD.xxxx-03 434
Table 297: Technical data - USB Media Drive 5MD900.USB2-01 438
Table 298: Contents of delivery - USB Media Drive - 5MD900.USB2-01 441
Table 299: Technical data - 5A5003.03 442
Table 300: Order data - USB flash drives 444
Table 301: Technical data - USB flash drive 5MMUSB.2048-00 445
Table 302: Technical data - USB flash drive 5MMUSB.2048-01 447
Table 303: Model number - HMI Drivers & Utilities DVD 449
Table 304: Model number - APC620 internal supply cable 452
Table 305: Technical data - 5CAMSC.0001-00 452
Table 306: Model numbers - DVI cables 453
Table 307: Technical data - DVI cable 5CADVI.0xxx-00 454
Table 308: Model numbers - SDL cables 456
Table 309: Technical data - SDL cables 5CASDL.0xxx-00 457

Table 310: Model numbers - SDL cables with 45° plug 459
Table 311: Technical data - SDL cable with 45° plug 5CASDL.0xxx-01 460
Table 312: Model numbers - SDL cable 5CASDL.0xxx-03 462
Table 313: Technical data - SDL cable 5CASDL.0xxx-03 463
Table 314: Structure - SDL cable 5CASDL.0xxx-03 465
Table 315: Model numbers - SDL flex cable with extender 467
Table 316: Technical data - SDL flex cable with extender 5CASDL.0x00-13 468
Table 317: Model numbers - RS232 cables 472
Table 318: Technical data - RS232 cables 472
Table 319: Model numbers - USB cables 474
Table 320: Technical data - USB cables 474
Table 321: Order data - Uninterruptible power supply 477
Table 322: System unit revisions - Add-on UPS module 477
Table 323: Firmware and software required for the UPS 478
Table 324: Technical data - 5AC600.UPSI-00 480
Table 325: Technical data - 5AC600.UPSB-00 482
Table 326: Technical data - UPS connection cable 486
Table 327: UPS - Order data 488
Table 328: Ethernet connection ETH 489
Table 329: Ethernet connections ETH1, ETH2, ETH3 491
Table 330: Model numbers - Replacement fan filters 493
Table 331: Technical data - 5AC600.SRAM-00 494
Table 332: Single-phase power supplies 498
Table 333: Three-phase power supplies 498
Table 334: Meaning of battery status 500
Table 335: Temperature sensor locations 547
Table 336: Revision information for connecting an external device 548
Table 337: Pin assignments - Connector on main board 548
Table 338: Temperature limits for fan control 552

0

0AC201.91 ..... 30, 137, 424
0PS102.0 ..... 34, 498
0PS104.0 ..... 34, 498
0PS105.1 ..... 34, 498
0PS105.2 ..... 34, 498
0PS110.1 ..... 34, 498
0PS110.2 ..... 34, 498
0PS120.1 ..... 34, 498
0PS305.1 ..... 34, 498
0PS310.1 ..... 34, 498
0PS320.1 ..... 34, 498
0PS340.1 ..... 34, 498
0TB103.9 ..... 30, 421
0TB103.91 ..... 30, 421
0TB704.9 423
0TB704.91 423

4

4A0006.00-000 ..... 30, 137, 424

5

5A5003.03 ..... 33, 442
5AC600.485I-00 29
5AC600.CANI-00 29
5AC600.CFSI-00 ..... 28, 168
5AC600.FA01-00 ..... 34, 493
5AC600.FA02-00 ..... 34, 493
5AC600.FA03-00 ..... 34, 493
5AC600.FA05-00 ..... 34, 493
5AC600.FDDS-00 ..... 28, 170
5AC600.HDDI-05 ..... 28, 162
5AC600.HDDI-06 ..... 28, 165
5AC600.HS01-03 28
5AC600.HS02-03 28
5AC600.HS03-02 28
5AC600.ICOV-00 ..... 33, 426
5AC600.SDL0-00 ..... 30, 202
5AC600.SRAM-00 ..... 34, 494
5AC600.UPSB-00 ..... 33, 477, 478, 482
5AC600.UPSI-00 ..... 33, 477, 480
5AC900.1000-00 ..... 34, 427
5ACPCI.ETH1-01 ..... 33, 489
5ACPCI.ETH3-01 ..... 33, 491
5ACPCI.RAIC-03 ..... 28, 173, 174, 182
5ACPCI.RAIC-04 ..... 29, 178, 179, 186
5ACPCI.RAIC-05 ..... 29, 181
5CADVI.0018-00 ..... 31, 453
5CADVI.0050-00 ..... 31, 453
5CADVI.0100-00 ..... 32, 453
5CAMSC.0001-00 ..... 32, 452
5CASDL.0018-00 ..... 32, 456
5CASDL.0018-01 ..... 32, 459
5CASDL.0018-03 ..... 32, 462
5CASDL.0050-00 ..... 32, 456
5CASDL.0050-01 ..... 32, 459
5CASDL.0050-03 ..... 32, 462
5CASDL.0100-00 ..... 32, 456
5CASDL.0100-01 ..... 32, 459
5CASDL.0100-03 ..... 32, 462
5CASDL.0150-00 ..... 32, 456
5CASDL.0150-01 ..... 32, 459
5CASDL.0150-03 ..... 32, 462
5CASDL.0200-00 ..... 32, 456
5CASDL.0200-03 ..... 32, 462
5CASDL.0250-00 ..... 32, 456
5CASDL.0250-03 ..... 32, 462
5CASDL.0300-00 ..... 32, 456
5CASDL.0300-03 ..... 32, 462
5CASDL.0300-13 ..... 32, 467
5CASDL.0400-13 ..... 32, 467
5CAUPS.0005-00 ..... 33, 477, 486
5CAUPS.0030-00 ..... 33, 477, 486
5CAUSB.0018-00 ..... 32, 474
5CAUSB.0050-00 ..... 33, 474
5CFCRD.0064-03 ..... 31, 131, 132, 134, 433
5CFCRD.0128-03 ..... 31, 131, 132, 134, 433
5CFCRD.016G-04 ..... 31, 428
5CFCRD.0256-03 ..... 31, 131, 132, 134, 433
5CFCRD.0512-03 ..... 31, 131, 132, 134, 433
5CFCRD.0512-04 ..... 30, 131, 132, 134, 428
5CFCRD.1024-03 ..... 31, 131, 132, 134, 433
5CFCRD.1024-04 ..... 31, 131, 132, 134, 428
5CFCRD.2048-03 ..... 31, 131, 132, 134, 433
5CFCRD.2048-04 ..... 31, 131, 132, 134, 428
5CFCRD.4096-03 ..... 31, 131, 132, 134, 433
5CFCRD.4096-04 ..... 31, 131, 132, 134, 428
5CFCRD.8192-03 ..... 31, 131, 132, 134, 433
5CFCRD.8192-04 ..... 31, 131, 132, 134, 428
5MD900.USB2-01 ..... 34, 437
5MMDDR.0512-01 ..... 28, 161

5MMDDR.1024-01 ..... 28, 161
5MMDDR.2048-01 ..... 28, 161
5MMHDD.0250-00 ..... 29, 185
5MMUSB.2048-00 ..... 31, 444
5MMUSB.2048-01 ..... 31, 444
5PC600.FA01-00 ..... 29, 196
5PC600.FA02-00 ..... 29, 197
5PC600.FA03-00 ..... 29, 199
5PC600.FA05-00 ..... 29, 200
5PC600.SE00-00 27
5PC600.SE00-01 27
5PC600.SE00-02 27
5PC600.SF03-00 ..... 27, 153
5PC600.SX01-00 ..... 27, 153
5PC600.SX02-00 ..... 27, 153
5PC600.SX02-01 ..... 27, 153
5PC600.SX05-00 ..... 27, 153
5PC600.SX05-01 ..... 27, 153
5PC600.X945-00 ..... 28, 158
5SWHMI.0000-00 ..... 35, 449
5SWWCE.0830-ENG 36, 376
5SWWI7.0100-ENG 35, 365
5SWWI7.0100-GER 35, 365
5SWWI7.0300-MUL 35, 365
5SWWI7.0530-ENG 35, 373
5SWWI7.0730-MUL 35, 373
5SWWXP.0430-ENG 35, 367
5SWWXP.0500-ENG 35, 352
5SWWXP.0500-GER 35, 352
5SWWXP.0500-MUL 35, 352
5SWWXP.0600-ENG 35, 352
5SWWXP.0600-GER 35, 352
5SWWXP.0600-MUL 35, 352
5SWWXP.0730-ENG 36, 370

9

9A0014.02 ..... 33, 472
9A0014.05 ..... 33, 472
9A0014.10 ..... 33, 472
9A0017.01 488
9A0017.02 488
9A0100.11 488
9A0100.14 488
9A0100.15 488
9S0000.01-010 ..... 35, 350
9S0000.01-020 ..... 35, 350

A

AC97 sound 40, 123, 153, 155, 350
ACPI 327, 328, 350, 557
Add-on 44, 48, 77, 124
Add-on CAN interface 188
Add-on CompactFlash slot 168
Add-on RS232/422/485 interface 192
Add-on UPS 40, 125
Add-on UPS module 477, 480
Address register 189
ADI 378, 549, 550
  Development kit 555
  Drivers 378
Administrative Tools 390
Air circulation 211
Ambient temperature
  X945 CPU board 75
AP Link 44, 126, 202
AP Link cards 202
AP Link Slot 126
APC 557
APC620 as visualization device 38
APC620 embedded 69, 100
APC620 UPS 476
APC620, 1 PCI slot variant 46
APC620, 2 PCI slot variant 52
APC620, 3 PCI slot variant 58
APC620, 5 PCI slot variant 63
API 557
ATX power supply 135
Audio driver 363
  Installation 363
Automation Device Interface 378
Automation Runtime 348, 495, 557

B

B&R Automation Device Interface 378
B&R Automation Runtime 558
B&R Control Center 378
B&R Embedded OS Installer 377
B&R Key Editor 553
Backup battery 137, 424
Barcodes 141
Battery 137, 424
  Change 499
Battery operation 382
Battery settings 384, 385
Battery status 137, 500
Battery unit 417, 482
  Maintenance interval 482
  Service life 482
Baud rate 557
Beep codes 324
Beeping code 324
BIOS 557
BIOS default settings 312
BIOS Error signals 324
BIOS Error Signals X945 324
BIOS Extension ROM 177
BIOS upgrade 331
BIOS X945
  ACPI configuration 274
  Advanced 273
  Baseboard monitor 303
  BIOS setup keys 270
  Boot 305
  Chipset configuration 284
  Clock Configuration 287
  CPU board monitor 299
  CPU configuration 282
  Exit 312
  Graphics configuration 280
  Hard disk security master password 309
  Hard disk security user password 308
  I/O interface configuration 286
  IDE Configuration 288
  Keyboard/mouse configuration 296
  Legacy devices 304
  Main 272
  Main Board/Panel Features 300
  Panel control 302
  PCI Configuration 276
  Power 310
  Remote access configuration 297
  Security 307
  USB configuration 294
Bit 557
Bit rate 557
Block diagram 144
  System unit 5PC600.SE00-00 150
  System unit 5PC600.SE00-01 151
  System unit 5PC600.SE00-02 152

System unit 5PC600.SF03-00 147
System unit 5PC600.SX01-00 144
System unit 5PC600.SX02-00 145
System unit 5PC600.SX02-01 146
System unit 5PC600.SX05-00 148
System unit 5PC600.SX05-01 149
Boot diskette 341
Creating with Windows XP 341
Bootstrap loader 558
Buffer duration 137
Burst 400
Bus length 190
Bus structure 191
Button cell 424
Byte 558

C

Cable drag chain 414
Cable type 190, 193, 194
Cables 452
DVI 453
RS232 472
SDL 456
SDL with 45° plug 459
USB 474
Cache 158, 558
Cage clamps 114, 421, 423
CAN 40, 104, 124, 558
Bus length 190
Cable type 190
Terminating resistor 191
CAN address register 189
CAN controller 188
CAN node number 105
CAN terminating switch 105
CD-ROM 558
CE mark 558
Centralized control and visualization devices 37
Certifications 415
Climate conditions 406
CMOS 559
CMOS battery 424
COM 559
COM1 ..... 102, 559
COM2 ..... 103, 559
COM3 559
CompactFlash 559
Dimensions 431, 436
General information 428, 433
Order data 428, 433
Technical data 429, 434
CompactFlash slot 131, 132, 134
Conducted disturbances 400
Configure 479
Connection cycles 117, 202
Connection examples 219
Construction 41
Control Center 378, 383, 547
CPU 559
CTS 560

D

Damp heat, constant 407
Damped vibration 402
Data loss 47, 53, 59, 64, 70, 135, 571
Data register 189
DCD 560
Deep discharge cycles 483
Deep discharge protection 477
Deep discharge voltage 482
Defective component 411
Degree of pollution 412
Derating 77
Development kit 555
Device ID 495
Device interfaces 100
Dial-up 560
Dimension standards 26
Dimensions 51
1 PCI slot variant 51
2 PCI slot variant 57
3 PCI slot variant 62
5 PCI slot variant 68
620 embedded variant 74
DIMM 560
DIP switch 347
Direction of air flow 503, 506, 509, 513
Directives 26
Display Clone 219
Disposal 25
Distribution of resources 325

DMA channel assignment 325
I/O address assignment 326
Interrupt assignments 327, 328
RAM address assignment 325
DMA 560
Dongle 139
DOS boot diskette 341
Double layer 438
DRAM 560
Drilling templates 208
Drives 162
Dry cold 406
Dry heat 406
DS1425 139
DSR 560
DTR 560
Dual display clone ...227, 241, 250, 254, 354, 357, ...359, 361
DVD 561
DVI 40, 121, 202, 205, 561
DVI - CRT adapter 427
DVI - Monitor adapter 427
DVI cable 453
Cable specifications 455
DVI-A 561
DVI-D 561
DVI-I 561

E

EDID 561
EIDE 561
Electromagnetic emissions 397
Electrostatic discharge 399
Embedded OS Installer 377
EMC 561
Emissions 395, 397
Energy options 390
Entire device 46
EPROM 561
Equalizer 381
Error signals 324
ESD 22, 399
Electrical components with housing 22
Electrical components without housing ..22
Individual components 23
Packaging 22
Proper handling 22
ETH1 .....109, 364
ETH2 .....111, 364
Ethernet 40, 562
Ethernet cable lengths 110
ETX 562
European directives 393
Extended desktop ..... 44, 219, 227, 241, 246, 250, ...251, 254, 355, 359, 549

F

Fan connection cable 504
Fan kit cover 512
Fan kit installation 502
Fan kit replacement 502
Fan kits 196
1 PCI variant 196
2 PCI variant 197
5 PCI variant 200
Fastening bolts 503
FDD 562
Features 40
Fiber optic cable 129
Fiber optics 562
FIFO 562
Filter clasp 29, 507, 511
Firmware 336, 478, 562
Flex radius 217, 414, 472, 474, 486
Floating Point Unit 158
Floppy 562
FPC 563
FPD 563
Free fall 405
Front cover 442
FTP 563
Full Speed 112, 113
Functional ground 114

G

GB 563
Graphics 159
Graphics driver installation 354
Graphics driver settings ..223, 227, 230, 233, 237, ...241, 245, 250, 254

Graphics drivers 354
Graphics engine 1 .....355, 357
Ground resistance 409
Grounding concept 218

H

Half-size 40
Handshake 563
Hard disk 132, 154
Hardware security key 139
HDD 129, 563
Heat sink 160
  Exchanging 160
HF field 399
Hibernate 129, 130
High speed 112, 113
High voltage 410
High-frequency electromagnetic fields 399
High-speed transient elect. disturbance value 400
Hot Plug 136
Hot surface 52, 58
Humid heat, cyclic 407

I

I/O address assignment 326
IDE 563
Identification 141
Immunity 398
Individual components 153
  AP Link cards 202
  Drives 162
  Fan kits 196
  Heat sink 160
  Interface options 188
  Main memory 161
  RAID system 172
  System unit 153
  X945 CPU board 158
Installation 211
Installing the UPS service 382
Insulation resistance 409
Interface cover 426
Interface options 188
Interrupt assignments 327, 328
ISA 563
ISO 563

J

Jitter 564
Jumper 564

K

KCF 356, 358
Key configuration file 356, 358
Key editor 553
Keyboard 136

L

L1 cache 158
L2 cache 158
LCD 564
Leakage current 410
LED 129, 564
Line IN 123
Line OUT 123
Lithium battery 137
Locking time 356, 358
Low battery shutdown 391
Low speed 112, 113
LPT 564

M

Magnetic fields with electrical frequencies 401
Main memory 40, 161
Maintenance Controller Extended .. 154, 156, 549
Maintenance free rechargeable batteries 477
Maintenance interval 482
Manual history 21
MAXIM 139
Maximum memory capacity 161
MB 564
Mechanical conditions 403
Memory capacity 161

Messages 324, 390
MIC 123
Microprocessor 565
MIPS 565
Mkey 565
Model numbers 27
Monitor / Panel 117
Motherboard 565
Mounting orientation 207, 211
  Optional mounting 213
  Standard mounting 211
Mounting plates 207
Mounting rail brackets 437
Mounting screws 52, 58
Mounting the side cover 537
  APC620 with 1 PCI slot 537
  APC620 with 2 PCI slot 538
  APC620 with 3 PCI slot 539
  APC620 with 5 PCI slot 540
Mouse 136
MS-DOS 350
MTBF 565
MTCX 135, 154, 156, 549, 565
Multitasking 565

N

Network driver 364
  Installation 364
Network-related emissions 396
NMI 188

O

OEM 565
OPC 565
OPC server 566
Optional mounting orientations 213
Overcurrent shutdown 391
Overload 114, 411

P

Panel 554, 566
Panel locking time 356, 358, 359, 361
Parallel port 139
Part subject to wear 137, 196, 197, 198, 199, 200, ...424, 482, 493
PCI 566
PCI configuration space 495
PCI Ethernet card 489, 491
PCI half-size standard 126
PCI slot 126
PCMCIA 566
Permanent magnet 47, 53, 59, 64, 70
PLC 566
PnP 566
POH 566
POST 567
Post codes 324
Power 79, 83, 129, 130
  APC620 systems, 1 PCI slot 79
  APC620 systems, 2 PCI slots 83
  APC620 systems, 3 PCI slots 89
  APC620 systems, 5 PCI slots 91
Power button ..79, 81, 83, 86, 89, 91, 94, 98, 135, ...154, 156
Power management 79, 83
Power supplies 497
Power supply 497
POWERLINK 39, 40, 106, 567
  Station number 108
  Status / Error LED 106
Procedure following power failure 391
Programs 25
Protection 412
Provit 554
PS/2 136
  Keyboard 136
  Mouse 136
  Y-cable 136

Q

QUXGA 567
QVGA 567
QWUXGA 567
QXGA 569

R

RAID 173, 181

RAM 567
Real time 567
Real-time clock 40, 137, 154, 156, 159
Removal strips 500, 501
Replacement fan 493
Replacement PCI SATA RAID HDD 185
Replacing the main memory 161
Requirements for emissions 395
Requirements for immunity to disturbances .. 398
Reset button 135, 154, 156
Residual voltage 410
Reverse polarity protection 114
RGB 40, 117, 121, 202, 351
ROM 568
RS232 ....193, 568
  Bus length 193
  Cable type 193
RS232 cable 472
  Cable specifications 473
RS232/422/485 124
RS422 ....193, 568
  Bus length 193
  Cable type 193
RS485 ....194, 568
  Bus length 194
  Cable type 194
RTC 40, 137, 154, 156, 159
RTS 568
RXD 568

S

Safety 408
Safety notices 22
  Dust, humidity, aggressive gases 24
  Environmentally-friendly disposal 25
  Installation 24
  Intended use 22
  Operation 24
  Organization 26
  Policy and procedures 23
  Protection against electrostatic discharge .. 22
  Transport and storage 23
SATA 172, 173, 181
Screw clamps 114, 421, 423
SDL 122, 206
SDL cables 456, 459, 462
  Cable specifications 458
SDL equalizer 381
SDL flex cable with extender 467
SDRAM 568
Security Key 139
Selection guide 42
Self discharging 137, 499
Sequential Function Chart 568
Serial number 141
Services 390
SFC 568
Shock during operation 404
Shock during transport 404
Short circuit protection 480
Short-term interruptions 402
Shutting down 390
Side cover 512
Single-phase power supplies 498
Slide-in slot 1 140
Slide-in slot 2 141
Slide-in USB FDD 169
Slot PLC 569
Smart Display Link 40, 117, 122, 206
Soft-off 129, 130
SoftPLC 569
SRAM 34, 417, 569
SRAM module 494
  Driver support 495
  Installation 496
  Technical data 494
Standard keypad module 569
Standard mounting 211
Standard shutdown 391
Standards 393
  Overview 393
Standards and certifications 393
Starting current 115, 154, 156
Station number 108
Status LED 129
  CF 130
  HDD 129
  Link 130
  Link 1 ....129, 130
  Link 2 129
  Power 129, 130

Status LEDs 130
Status LEDs CAN / X2X 106
Supply voltage 40, 113
Supply voltage connectors 421
Surface temperature 46, 52, 58, 63, 69
Surge 400
Surge voltages 400
Suspend-to-disk 129, 130
SUXGA 569
SVGA 569
Switch 569
Switching power supply 497
SXGA 569
SXGA+ 569
System units 569

T

Task 570
TCP/IP 570
Temperature 547
Temperature fluctuations 407
  Operation 407
Temperature monitoring 78
Temperature sensor 477, 547
Temperature sensor locations 547
Terminating LED 105
Terminating resistor 105, 191
Terminating switch 105
TFT display 570
Three-phase power supplies 498
Toppling 404
Torsion 413
Touch driver settings 223, 227, 230, 233, 237,
..... 241, 245, 250, 254
Touch screen 570
Touch screen driver
  Dual display clone 361
  Extended desktop 359
Touch screen driver installation 359
Turn-off time 390
TXD 570

U

UART 570
UDMA 570
Uninterruptible power supply 476
UPS 33, 40, 79, 81, 83, 86, 89, 91, 94, 98,
125, ... 129, 336, 520, 571
UPS configuration 381
UPS connection cable 478, 486
UPS driver 383
UPS installation 481, 520
  APC620, 1 PCI slot 520, 529
  APC620, 2 PCI slot 523, 531
  APC620, 5 PCI slot 526, 534
UPS monitor 383
UPS status 391
UPS status values 383
UPS system settings 387
USB 571
USB 2.0 ..... 112, 113
USB cable 474
  Cable specifications 475
USB flash drive 444
  General information 444
  Order data 444
  Technical data 445, 447
USB Media Drive 437
  Dimensions 440
  Dimensions with front cover 441
  Installation 442
  Interfaces 441
  Mounting orientation 442
  Technical data 438
USB peripheral devices 264
USB ports 112, 113
UXGA 571

V

Vendor ID 495
Ventilation holes 207
VGA 571
Vibration during transport 404
Vibration operation 403
Video signals 117
Viruses 25
Visualization 38
Voltage dips 402
Voltage fluctuations 402
Voltage range 411

W

WES2009 371
WES7 374
Windows 7 365
Windows CE 376, 571
  Embedded OS Installer 377
  General information 376
  Installation 377
Windows Embedded Standard 2009 370
Windows Embedded Standard 7 373
Windows XP Embedded 367
  Audio driver 369
  FAQ 369
  General information 367
  Graphics drivers 368
  Installation 368
  Network driver 369
  Touch screen driver 368, 372, 375
Windows XP Professional 352
  Audio driver 363
  FAQ 353
  Graphics drivers 354
  Installation 352, 365
  Network driver 364
  Touch screen driver 359
Worst case 406
WSXGA 571
WUXGA 571
WXGA 572

X

X2X 39, 40, 104
X945 CPU board 158
XGA 572
XTX 572