Panel PC 700 with 945GME N270 CPU board

User's Manual

Version: **1.13 (June 2011)**

Model no.: **MAPPC700A-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 17

1. Manual history 17
2. Safety notices 19
   2.1 Intended use 19
   2.2 Protection against electrostatic discharge 19
      2.2.1 Packaging 19
      2.2.2 Guidelines for proper ESD handling 19
   2.3 Policy and procedures 20
   2.4 Transport and storage 20
   2.5 Installation 21
   2.6 Operation 21
      2.6.1 Protection against touching electrical parts 21
      2.6.2 Environmental conditions - dust, humidity, aggressive gases 21
      2.6.3 Programs, viruses, and dangerous programs 22
   2.7 Environmentally-friendly disposal 22
      2.7.1 Separation of materials 22
3. Organization of safety notices 23
4. Directives 23
5. Model numbers 24
   5.1 System units 24
   5.2 X945 CPU boards 25
   5.3 Heat sink 25
   5.4 Main memory 25
   5.5 Drives 26
   5.6 Interface options 26
   5.7 Fan kits 26
   5.8 Accessories 27
      5.8.1 Batteries 27
      5.8.2 Supply voltage connectors 27
      5.8.3 CompactFlash cards 27
      5.8.4 USB flash drives 28
      5.8.5 Cables 28
      5.8.6 Power supplies 29
      5.8.7 External UPS 30
      5.8.8 Ethernet PCI interface cards 30
      5.8.9 Miscellaneous 31
   5.9 Software 31
6. Typical topologies 33
   6.1 Panel PC 700 for central control and visualization 33

Chapter 2: Technical data 35

1. Introduction 35
   1.1 Features 36
   1.2 System components / configuration 37
      1.2.1 Selection guide - Basic system 38
      1.2.2 Selection guide - Optional components 39

2. Entire device 40
2.1 Ambient temperature with X945 CPU board 40
2.1.1 Ambient temperatures with system unit 5PC720.1043-00 42
2.1.2 Ambient temperatures with system unit 5PC720.1043-01 43
2.1.3 Ambient temperatures with system unit 5PC720.1214-00 44
2.1.4 Ambient temperatures with system unit 5PC720.1214-01 45
2.1.5 Ambient temperatures with system unit 5PC720.1505-00 46
2.1.6 Ambient temperatures with system unit 5PC720.1505-01 47
2.1.7 Ambient temperatures with system unit 5PC720.1505-02 48
2.1.8 Ambient temperatures with system unit 5PC720.1706-00 49
2.1.9 Ambient temperatures with system unit 5PC720.1906-00 50
2.1.10 Ambient temperatures with system unit 5PC781.1043-00 51
2.1.11 Ambient temperatures with system unit 5PC781.1505-00 52
2.1.12 Ambient temperatures with system unit 5PC782.1043-00 53
2.1.13 How is the the maximum ambient temperature determined? 54
2.1.14 Temperature monitoring 54
2.2 Humidity specifications 55
2.3 Power management 56
2.3.1 Power calculation for 10.4" Panel PC 700 57
2.3.2 Power calculation for 12.1" Panel PC 700 58
2.3.3 Power calculation for 15" Panel PC 700 59
2.3.4 Power calculation for 17" Panel PC 700 60
2.3.5 Power calculation for 19" Panel PC 700 61
2.3.6 Power management obsolete 62
2.4 Device interfaces 69
2.4.1 Serial interface COM1 70
2.4.2 Serial interface COM2 71
2.4.3 Ethernet connection ETH1 72
2.4.4 Ethernet connection ETH2 74
2.4.5 USB ports 75
2.4.6 Supply voltage 76
2.4.7 Monitor / Panel interface 78
2.4.8 MIC, Line IN and Line OUT ports 79
2.4.9 Add-on interface slot 80
2.4.10 PCI slots 81
2.4.11 Status LEDs 82
2.4.12 CompactFlash slot (CF1) 83
2.4.13 Hard disk / CompactFlash slot (HDD/CF2) 84
2.4.14 Power button 85
2.4.15 Reset button 85
2.4.16 PS/2 keyboard / mouse 86
2.4.17 Battery 87
2.4.18 Hardware security key 89
2.4.19 Slide-in slot 1 drive slot 90
2.5 Serial number sticker 91
3. Individual components 93
3.1 System units 93

3.1.1 Panel PC 5PC720.1043-00 93
3.1.2 Panel PC 5PC720.1043-01 99
3.1.3 Panel PC 5PC720.1214-00 105
3.1.4 Panel PC 5PC720.1214-01 111
3.1.5 Panel PC 5PC720.1505-00 117
3.1.6 Panel PC 5PC720.1505-01 123
3.1.7 Panel PC 5PC720.1505-02 129
3.1.8 Panel PC 5PC720.1706-00 135
3.1.9 Panel PC 5PC720.1906-00 141
3.1.10 Panel PC 5PC781.1043-00 147
3.1.11 Panel PC 5PC781.1505-00 153
3.1.12 Panel PC 5PC782.1043-00 159
3.2 X945 CPU boards 165
3.3 Heat sink 167
3.4 Main memory 168
3.4.1 Technical data 168
3.5 Drives 169
3.5.1 Add-on hard disk 40 GB - 5AC600.HDDI-05 169
3.5.2 Add-on hard disk 80 GB 24x7 ET - 5AC600.HDDI-06 172
3.5.3 Add-on CompactFlash slot - 5AC600.CFSI-00 175
3.5.4 Slide-in USB FDD - 5AC600.FDDS-00 176
3.6 RAID system 179
3.6.1 PCI SATA RAID 2 x 160 GB 24x7 ET - 5ACPCI.RAIC-03 180
3.6.2 Replacement SATA HDD 160 GB - 5ACPCI.RAIC-04 185
3.6.3 PCI SATA RAID 2 x 250 GB - 5ACPCI.RAIC-05 188
3.6.4 Replacement SATA HDD 250 GB - 5MMHDD.0250-00 192
3.7 Interface options 195
3.7.1 Add-on CAN interface - 5AC600.CANI-00 195
3.7.2 Add-on RS232/422/485 interface - 5AC600.485I-00 199
3.8 Fan kits 204
3.8.1 Fan kit 5PC700.FA00-01 204
3.8.2 Fan kit 5PC700.FA02-00 205
3.8.3 Fan kit 5PC700.FA02-01 207

Chapter 3: Commissioning 209

1. Installation 209
1.1 Important mounting information 210
1.2 Air circulation 211
1.3 Mounting orientation 212
2. Cable connections 213
2.1 Ethernet cable lengths for ETH1 213
3. Grounding concept 214
4. Touch screen calibration 215
4.1 Windows XP Professional 215
4.2 Windows CE 215
4.3 Windows XP embedded 215

4.4 Automation Runtime / Visual Components 215
5. Connection examples 216
5.1 An analog CRT device on the monitor/panel connector 217
5.1.1 Basic system requirements 217
5.1.2 BIOS settings 217
6. Connection of USB peripheral devices 218
6.1 Locally on the PPC700 218
7. Configuration of a SATA RAID array 219
7.1 Create RAID set 220
7.2 Create RAID set - Striped 221
7.3 Create RAID set - Mirrored 222
7.4 Delete RAID set 223
7.5 Rebuild mirrored set 224
7.6 Resolve conflicts 225
7.7 Low level format 226
8. Key and LED configurations 227
8.1 Panel PC 10.4" TFT 228
8.1.1 Panel PC 5PC781.1043-00 228
8.1.2 Panel PC 5PC782.1043-00 229
8.2 Panel PC 15" TFT 230
8.2.1 Panel PC 5PC781.1505-00 230
9. User tips for increasing the display lifespan 231
9.1 Backlight 231
9.1.1 How can the lifespan of backlights be extended? 231
9.2 Image sticking 231
9.2.1 What causes image sticking? 231
9.2.2 How can image sticking be avoided? 231
10. Pixel error 232
11. Known problems / issues 233

Chapter 4: Software 235

1. BIOS options 235
1.1 General Information 235
1.2 BIOS setup and boot procedure 235
1.2.1 BIOS setup keys 236
1.3 Main 238
1.4 Advanced 239
1.4.1 ACPI configuration 240
1.4.2 PCI Configuration 242
1.4.3 Graphics configuration 246
1.4.4 CPU configuration 248
1.4.5 Chipset configuration 250
1.4.6 I/O interface configuration 252
1.4.7 Clock Configuration 253
1.4.8 IDE Configuration 254
1.4.9 USB configuration 260

1.4.10 Keyboard/mouse configuration 262
1.4.11 Remote access configuration 263
1.4.12 CPU board monitor 265
1.4.13 Main Board/Panel Features 266
1.5 Boot 271
1.6 Security 273
1.6.1 Hard disk security user password 274
1.6.2 Hard disk security master password 275
1.7 Power 276
1.8 Exit 278
1.9 BIOS default settings 279
1.9.1 Main 280
1.9.2 Advanced 280
1.9.3 Boot 287
1.9.4 Security 288
1.9.5 Power 288
1.10 BIOS Error signals (beep codes) 290
1.10.1 BIOS X945 290
1.11 Distribution of resources 291
1.11.1 RAM address assignment 291
1.11.2 DMA channel assignment 291
1.11.3 I/O address assignment 292
1.11.4 Interrupt assignments in PCI mode 293
1.11.5 Interrupt assignments in APIC mode 294
1.11.6 Inter-IC (I^2C) bus 295
1.11.7 System Management (SM) bus 296
2. Upgrade information 297
2.1 BIOS upgrade 297
2.1.1 What information do I need? 297
2.1.2 Upgrade BIOS for X945 300
2.1.3 Windows XP Embedded and BIOS upgrade 301
2.2 Upgrading the firmware 302
2.2.1 Procedure 302
2.2.2 Possible upgrade problems and version dependencies 304
2.3 Creating an MS-DOS boot diskette in Windows XP 307
2.4 Creating a bootable USB flash drive for B&R upgrade files 309
2.4.1 Requirements 309
2.4.2 Procedure 309
2.4.3 Where do I get MS-DOS? 310
2.5 Creating a bootable CompactFlash card for B&R upgrade files 311
2.5.1 Requirements 311
2.5.2 Procedure 311
2.5.3 Where do I get MS-DOS? 312
2.6 Upgrade problems 312
3. Panel PC 700 with Automation Runtime 313
3.1 ARwin 313
3.2 ARemb 313

4. Panel PC 700 with Windows XP Professional 314
4.1 Installation 314
4.1.1 Installation auf PCI SATA RAID Controller - 5ACPCI.RAIC-03, 5ACPCI.RAIC-05 315
4.2 Drivers 315
5. Panel PC 700 mit Windows 7 316
5.1 Installation 316
5.1.1 Installation on PCI SATA RAID controller - 5ACPCI.RAIC-03, 5ACPCI.RAIC-05 316
5.2 Drivers 317
5.3 Special considerations, limitations: 317
6. Panel PC 700 with Windows XP Embedded 318
6.1 General Information 318
6.2 Features with FP2007 (Feature Pack 2007) 318
6.3 Installation 319
6.4 Touch screen driver 319
7. Panel PC 700 with Windows Embedded Standard 2009 320
7.1 General Information 320
7.2 Features mit WES2009 (Windows Embedded Standard 2009) 321
7.3 Installation 322
7.4 Drivers 322
7.4.1 Touch screen driver 322
8. Panel PC 700 with Windows Embedded Standard 7 323
8.1 General Information 323
8.2 Features with WES7 (Windows Embedded Standard 7) 324
8.3 Installation 325
8.4 Drivers 325
8.4.1 Touch screen driver 325
9. Panel PC 700 with Windows CE 326
9.1 General Information 326
9.2 Windows CE 6.0 features 326
9.3 Requirements 327
9.4 Installation 327
9.4.1 B&R Embedded OS Installer 327
10. B&R Automation Device Interface (ADI) driver - Control Center 328
10.1 Functions 329
10.2 Installation 330
10.3 SDL Equalizer Einstellung 331

Chapter 5: Standards and certifications 333

1. Applicable European directives 333
2. Overview of standards 333
3. Emission requirements 335
3.1 Network-related emissions 336
3.2 Emissions, electromagnetic emissions 337
4. Requirements for immunity to disturbances 338
4.1 Electrostatic discharge (ESD) 339

4.2 High-frequency electromagnetic fields (HF field) 339
4.3 High-speed transient electrical disturbances (burst) 340
4.4 Surges 340
4.5 Conducted disturbances 340
4.6 Magnetic fields with electrical frequencies 341
4.7 Voltage dips, fluctuations and short-term interruptions 342
4.8 Damped vibration 342
5. Mechanical conditions 343
5.1 Vibration operation 343
5.2 Vibration during transport (packaged) 344
5.3 Shock during operation 344
5.4 Shock during transport (packaged) 344
5.5 Toppling 344
5.6 Free fall (packaged) 345
6. Climate conditions 346
6.1 Worst case operation 346
6.2 Dry heat 346
6.3 Dry cold 346
6.4 Large temperature fluctuations 347
6.5 Temperature fluctuations in operation 347
6.6 Humid heat, cyclic 347
6.7 Humid heat, constant (storage) 347
7. Safety 348
7.1 Ground resistance 348
7.2 Insulation resistance 348
7.3 High voltage 349
7.4 Residual voltage 349
7.5 Overload 349
7.6 Defective component 350
7.7 Voltage range 350
8. Other tests 351
8.1 Protection 351
9. SDL flex cable - test description 352
9.1 Torsion 352
9.1.1 Test structure 352
9.1.2 Test conditions 352
9.1.3 Individual tests 352
9.2 Cable drag chain 353
9.2.1 Test structure 353
9.2.2 Test conditions 353
9.2.3 Individual tests: 353
10. International certifications 354

Chapter 6: Accessories 355
1. Overview 355
2. Replacement CMOS batteries 360

2.1 Order data 360
2.2 Technical data 360
3. Supply voltage connector (TB103 3-pin) 361
3.1 General Information 361
3.2 Order data 361
3.3 Technical data 361
4. Power supplies 363
4.1 Model numbers and brief technical overview 364
4.1.1 Single-phase power supplies 364
4.1.2 Three-phase power supplies 364
5. External UPS 365
5.1 General Information 365
5.2 Order data 366
6. Interface covers 5AC600.ICOV-00 367
6.1 Order data 367
6.2 Contents of delivery 367
7. DVI - monitor adapter 5AC900.1000-00 368
7.1 Order data 368
8. USB port cap (attached) - Discontinued 369
8.1 Order data 369
8.2 Installation 369
9. USB port cap (attached) 370
9.1 Order data 370
10. CompactFlash cards 5CFCRD.xxxx-04 371
10.1 General Information 371
10.2 Order data 371
10.3 Technical data 372
10.3.1 Temperature humidity diagram 374
10.4 Dimensions 374
10.5 Benchmark 375
11. CompactFlash cards - 5CFCRD.xxxx-03 376
11.1 General Information 376
11.2 Order data 376
11.3 Technical data 377
11.3.1 Temperature humidity diagram 378
11.4 Dimensions 379
12. USB Media Drive - 5MD900.USB2-01 380
12.1 Features 380
12.2 Technical data 381
12.3 Dimensions 383
12.4 Dimensions with front cover 384
12.5 Cutout installation 384
12.6 Contents of delivery 385
12.7 Interfaces 385
12.8 Installation 385
12.8.1 Mounting orientation 385
12.9 Front cover 5A5003.03 for the USB Media Drive 386

12.9.1 Technical data ... 386
12.9.2 Dimensions ... 386
12.9.3 Installation ... 387
13. USB flash drive ... 388
13.1 General Information ... 388
13.2 Order data ... 388
13.3 Technical data - 5MMUSB.2048-00 ... 389
13.3.1 Temperature humidity diagram ... 390
13.4 Technical data - 5MMUSB.2048-01 ... 391
13.4.1 Temperature humidity diagram ... 392
14. HMI Drivers & Utilities DVD 5SWHMI.0000-00 ... 393
15. Cables ... 398
15.1 DVI cable 5CADVI.0xxx-00 ... 398
15.1.1 Order data ... 398
15.1.2 Technical data ... 399
15.1.3 Cable specifications ... 401
15.2 SDL cable 5CASDL.0xxx-00 ... 401
15.2.1 Order data ... 402
15.2.2 Technical data ... 403
15.2.3 Cable specifications ... 405
15.3 SDL cable with 45° plug 5CASDL.0xxx-01 ... 406
15.3.1 Order data ... 406
15.3.2 Technical data ... 407
15.3.3 Cable specifications ... 409
15.4 SDL flex cable 5CASDL.0xxx-03 ... 410
15.4.1 Order data ... 410
15.4.2 Technical data ... 411
15.4.3 Cable specifications ... 414
15.5 SDL flex cable with extender 5CASDL.0xx0-13 ... 415
15.5.1 Order data ... 415
15.5.2 Technical data ... 416
15.5.3 Cable connection ... 418
15.5.4 Cable specifications ... 419
15.6 RS232 cable 9A0014.xx ... 420
15.6.1 Order data ... 420
15.6.2 Technical data ... 420
15.6.3 Cable specifications ... 421
15.7 USB cable 5CAUSB.00xx-00 ... 422
15.7.1 Order data ... 422
15.7.2 Technical data ... 422
15.7.3 Cable specifications ... 423
16. Legend strip templates ... 424
16.1 Order data ... 425
17. Replacement fan ... 426
17.1 5AC700.FA00-00 ... 426
17.2 5AC700.FA02-00 ... 426
18. SRAM module - 5AC600.SRAM-00 ... 427

18.1 Technical data 427
18.2 Driver support 428
18.3 Installation 429
19. Ethernet PCI interface cards 430
19.1 PCI Ethernet card 10/100 - 5ACPCI.ETH1-01 430
19.1.1 Technical data 430
19.1.2 Driver support 431
19.1.3 Dimensions 431
19.2 PCI Ethernet card 10/100 - 5ACPCI.ETH3-01 432
19.2.1 Technical data 432
19.2.2 Driver support 433
19.2.3 Dimensions 433

Chapter 7: Maintenance / Servicing 435

1. Changing the battery 435
1.1 Battery check 435
1.2 Procedure 436
2. Fan kit installation and replacement 438
2.1 Procedure - PPC700 without PCI slots 438
2.2 Procedure - PPC700 with 1 and 2 PCI slots 441
3. Slide-in drive - installation and exchange 444
3.1 Installation procedure 444
3.2 Exchange procedure 446
4. Exchanging the legend strips 448
4.1 Procedure 448
5. Preventing after-image effect in LCD/TFT monitors 449
5.1 What measures can be taken against this? 449
6. Exchanging a PCI SATA RAID hard disk 450

Appendix A 453

1. Temperature sensor locations 453
2. Maintenance Controller Extended (MTCX) 454
2.1 Temperature monitoring - Fan control 455
3. B&R Key Editor 456
4. B&R Automation Device Interface (ADI) development kit 458
5. B&R Automation Device Interface (ADI) .NET SDK 460
6. Touch Screen - Elo Accu Touch 462
6.1 Temperature humidity diagram 463
6.2 Cleaning 463
7. Membrane 464
8. Viewing angles 465
9. Glossary 466

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	2009-11-23	- First version
1.05	2009-12-10	- Section 1 "Temperature sensor locations", on page 453 corrected. - Section 15 "Cables", on page 398 changed and corrected. - One item added to Section 11 "Known problems / issues", on page 233. - Depth dimensions corrected for the device 5PC720.1043-00.
1.06	2010-01-19	- One item removed from Section 11 "Known problems / issues", on page 233.
1.10	2010-09-20	- Chapter 5 "Standards and certifications", on page 333 updated. - Section 7 "Panel PC 700 with Windows Embedded Standard 2009", on page 320 added - Section 10 "B&R Automation Device Interface (ADI) driver - Control Center", on page 328 updated. - B&R ID codes for system units added. - Technical data "Remanent variables for AR (Automation Runtime) in Power Fail" added for the SRAM module 5AC600.SRAM-00. - B&R USB flash drive added to the chapter 6 "Accessories", on page 355. - Section 2 "Upgrade information", on page 330 updated. - Section 8 "Key and LED configurations", on page 227 in chapter 3 "Commissioning" added. - BIOS updated to V1.13.
1.11	2011-02-09	- BIOS updated to version 1.14. - The name "AR010" was changed to "ARwin". - The name "AR106" was changed to "ARemb". - "PCI SATA RAID 2 x 250 GB - 5ACPCI.RAIC-05", on page 188 updated. - "Replacement SATA HDD 250 GB - 5MMHDD.0250-00", on page 192 updated. - "Panel PC 700 mit Windows 7", on page 316 updated. - "Panel PC 700 with Windows Embedded Standard 7", on page 323 updated. - Section 10 "Pixel error", on page 232 updated. - Section 9 "Panel PC 700 with Windows CE", on page 326 changed.
1.12	2011-03-03	- The Windows Embedded Standard 7 Model number 5SWWI7.0729-ENG was corrected to 5SWWI7.0729-MUL.

Table 1: Manual history

Version	Date	Change
1.13	2011-06-15	- Information of Thermal Analysis Tool at page 40 corrected (V1.4 -> V3.8.1). - Chipset information in sections "X945 CPU boards", on page 165 and "Panel PC 700 with Windows CE", on page 326 corrected. - Connection information of "Slide-in slot 1 drive slot", on page 90 corrected. - 5SWWI7.0900-MUL in section "Panel PC 700 with Windows Embedded Standard 7", on page 323 added. - Sections "B&R Automation Device Interface (ADI) driver - Control Center", on page 328, "HMI Drivers & Utilities DVD 5SWHMI.0000-00", on page 393, "B&R Key Editor", on page 456 and "B&R Automation Device Interface (ADI) development kit", on page 458 updated. - Section "B&R Automation Device Interface (ADI) .NET SDK", on page 460 added. - Information of ARemb in section "Panel PC 700 with Automation Runtime", on page 313 added. - Informations about Windows XP Mode in "Features with WES7 (Windows Embedded Standard 7)", on page 324 corrected.

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

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

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

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

Individual components

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

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

2.3 Policy and procedures

Electronic devices are 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.

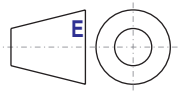
3. Organization of safety notices

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
5PC720.1043-00	**Panel PC 720 10.4" VGA T, 0 PCI slots** 10.4" VGA color TFT display with touch screen (resistive); connections for 2 x RS232, 3 x USB 2.0, monitor, 2 x Ethernet 10/100, AC97 sound, PS/2 keyboard/mouse; IP65 protection (front side); 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 93
5PC720.1043-01	**Panel PC 720 10.4" VGA T, 2 PCI slots, 1 disk drive slot** 10.4" VGA color TFT display with touch screen (resistive); 1 drive slot; connections for 2 x RS232, 3 x USB 2.0, monitor, 2 x Ethernet 10/100, AC97 sound, PS/2 keyboard/mouse; IP65 protection (front side); 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 99
5PC720.1214-00	**Panel PC 720 12.1" SVGA T, 0 PCI slots** 12.1" SVGA color TFT display with touch screen (resistive); connections for 2 x RS232, 3 x USB 2.0, monitor, 2 x Ethernet 10/100, AC97 sound, PS/2 keyboard/mouse; IP65 protection (front side); 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 105
5PC720.1214-01	**Panel PC 720 12.1" SVGA T, 2 PCI slots, 1 disk drive slot** 12.1" SVGA color TFT display with touch screen (resistive); 1 drive slot; connections for 2 x RS232, 3 x USB 2.0, monitor, 2 x Ethernet 10/100, AC97 sound, PS/2 keyboard/mouse; IP65 protection (front side); 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 111
5PC720.1505-00	**Panel PC 720 15" XGA T, 0 PCI slots** 15" XGA color TFT display with touch screen (resistive); connections for 2 x RS232, 3 x USB 2.0, monitor, 2 x Ethernet 10/100, AC97 sound, PS/2 keyboard/mouse; IP65 protection (front side); 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 117
5PC720.1505-01	**Panel PC 720 15" XGA T, 2 PCI slots, 1 disk drive slot** 15" XGA color TFT display with touch screen (resistive); 1 drive slot; connections for 2 x RS232, 3 x USB 2.0, monitor, 2 x Ethernet 10/100, AC97 sound, PS/2 keyboard/mouse; IP65 protection (front side); 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 123
5PC720.1505-02	**Panel PC 720 15" XGA T, 1 PCI slot, 1 disk drive slot** 15" XGA color TFT display with touch screen (resistive); 1 drive slot; connections for 2 x RS232, 3 x USB 2.0, monitor, 2 x Ethernet 10/100, AC97 sound, PS/2 keyboard/mouse; IP65 protection (front side); 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 129
5PC720.1706-00	**Panel PC 720 17" SXGA T, 0 PCI slots** 17" SXGA color TFT display with touch screen (resistive); connections for 2 x RS232, 3 x USB 2.0, monitor, 2 x Ethernet 10/100, AC97 sound, PS/2 keyboard/mouse; IP65 protection (front side); 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 135 *Discontinued since 04/2009*
5PC720.1906-00	**Panel PC 720 19" SXGA T, 0 PCI slots** 19" SXGA color TFT display with touch screen (resistive); connections for 2 x RS232, 3 x USB 2.0, monitor, 2 x Ethernet 10/100, AC97 sound, PS/2 keyboard/mouse; IP65 protection (front side); 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 141

Table 4: Model numbers - system units

Model number	Short description	Note
5PC781.1043-00	**Panel PC 781 10.4" VGA FT, 0 PCI slots** 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys; 28 function keys and 20 system keys; connections for 2x RS232, 3x USB 2.0, monitor, 2x Ethernet 10/100, AC97 sound, PS/2 keyboard/mouse; IP65 protection (front side); 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 147
5PC781.1505-00	**Panel PC 781 15" XGA FT, 0 PCI slots** 15" XGA color TFT display with touch screen (resistive); 12 soft keys; 20 function keys and 92 system keys; connections for 2 x RS232, 3 x USB 2.0, monitor, 2 x Ethernet 10/100, AC97 sound, PS/2 keyboard/mouse; IP65 protection (front side); 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 153
5PC782.1043-00	**Panel PC 782 10.4" VGA FT, 0 PCI slots** 10.4" VGA color TFT display with touch screen (resistive); 44 function keys and 20 system keys; connections for 2x RS232, 3x USB 2.0, monitor, 2x Ethernet 10/100, AC97 sound, PS/2 keyboard/mouse; IP65 protection (front side); 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 159

Table 4: Model numbers - system units (Forts.)

5.2 X945 CPU boards

Model number	Short description	Note
5PC600.X945-00	**X945 CPU board** CPU board Intel Atom, 1,600 MHz, 533 MHz FSB, 512 KB L2 cache; 945GME chipset; 1 socket for an SO-DIMM DDR2 RAM module.	See page 165

Table 5: Model numbers - X945 CPU boards

5.3 Heat sink

Model number	Short description	Note
5AC700.HS01-03	**Panel PC 700 heat sink 945GME 12.8 mm** For PPC700 systems with 945GME CPU boards that have Atom 1,600 MHz processors.	See page 167

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 168
5MMDDR.1024-01	**SO-DIMM DDR2 1024MB PC2-5300**	See page 168
5MMDDR.2048-01	**SO-DIMM DDR2 2048MB PC2-5300**	See page 168

Table 7: Model numbers - Main memory

5.5 Drives

Model number	Short description	Note
5AC600.HDDI-05	**Add-on hard disk 40 GB ET, 24x7** 40 GB hard disk (add-on); With extended temperature range and also ideal for 24 hour operation. For installation in an APC620 or PPC700.	See page 169
5AC600.HDDI-06	**Add-on hard disk 80 GB ET, 24x7** 80 GB hard disk (add-on); With extended temperature range and also ideal for 24 hour operation. For installation in an APC620 or PPC700.	See page 172
5AC600.CFSI-00	**Add-on CompactFlash slot** CompactFlash slot (add-on); for installation in an APC620 or PPC700.	See page 175
5AC600.FDDS-00	**Slide-in USB FDD** FDD drive (slide-in); for operation in a slide-in drive slot in an APC620 or PPC700 system.	See page 176
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 180
5ACPCI.RAIC-04	**Replacement SATA-HDD 160 GB** 1 piece Hard disk 160 GB SATA, replacement part for 5ACPCI.RAIC-03	See page 185
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 188
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 192

Table 8: Model numbers - Drives

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 195
5AC600.485I-00	**Add-on RS232/422/485 interface** Add-on RS232/422/485 interface for installation in an APC620 and PPC700.	See page 199

Table 9: Model numbers - Interfaces

5.7 Fan kits

Model number	Short description	Note
5PC700.FA00-01	**Panel PC 700 fan kit** For Panel PC 700 10.4", 12.1", 15", 17" and 19" with 0 PCI slots (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).	See page 204
5PC700.FA02-00	**Panel PC 700 fan kit** For Panel PC 700 10.4" with 2 PCI slots (5PC720.1043-01).	See page 205
5PC700.FA02-01	**Panel PC 700 fan kit** For Panel PC 12.1" and 15" with 1 and 2 PCI slots (5PC720.1214-01, 5PC720.1505-01 and 5PC720.1505-02).	See page 207

Table 10: Model numbers - Fan kits

5.8 Accessories

5.8.1 Batteries

Model number	Short description	Note
0AC201.91	**Lithium batteries, 4 pcs.** Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	See page 360
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	See page 360

Table 11: Model numbers - Batteries

5.8.2 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, 3.31 mm², protected against vibration by the screw flange.	See page 361
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.	See page 361

Table 12: Model numbers - Supply voltage connectors

5.8.3 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 371
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 371
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 371
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 371
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 371
5CFCRD.016G-04	**CompactFlash 16 GB B&R** CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface	See page 371
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	See page 376
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	See page 376
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	See page 376
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 376

Table 13: Model numbers - CompactFlash cards

Model number	Short description	Note
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 376
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 376
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 376
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 376

Table 13: Model numbers - CompactFlash cards (Forts.)

5.8.4 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 388
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	See page 388

Table 14: Model numbers - USB flash drives

5.8.5 Cables

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	See page 398
5CADVI.0050-00	**DVI-D cable 5 m** Single cable, DVI-D/m:DVI-D/m; length: 5 m	See page 398
5CADVI.0100-00	**DVI-D cable 10 m** Single cable, DVI-D/m:DVI-D/m; length: 10 m	See page 398
5CASDL.0018-00	**SDL cable 1.8 m** SDL cable for a fixed type of layout; length: 1.8 m	See page 401
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 406
5CASDL.0018-03	**SDL flex cable 1.8 m** SDL cable for fixed and flexible type of layout; length: 1.8 m	See page 410
5CASDL.0050-00	**SDL cable 5 m** SDL cable for a fixed type of layout; length: 5 m	See page 401
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 406
5CASDL.0050-03	**SDL flex cable 5 m** SDL cable for fixed and flexible type of layout; length: 5 m	See page 410
5CASDL.0100-00	**SDL cable 10 m** SDL cable for a fixed type of layout; length: 10 m	See page 401
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 406

Table 15: Model numbers - Cables

Model number	Short description	Note
5CASDL.0100-03	**SDL flex cable 10 m** SDL cable for fixed and flexible type of layout; length: 10 m	See page 410
5CASDL.0150-00	**SDL cable 15 m** SDL cable for a fixed type of layout; length: 15 m	See page 401
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 406
5CASDL.0150-03	**SDL flex cable 15 m** SDL cable for fixed and flexible type of layout; length: 15 m	See page 410
5CASDL.0200-00	**SDL cable 20 m** SDL cable for a fixed type of layout; length: 20 m	See page 401
5CASDL.0200-03	**SDL flex cable 20 m** SDL cable for fixed and flexible type of layout; length: 20 m	See page 410
5CASDL.0250-00	**SDL cable 25 m** SDL cable for a fixed type of layout; length: 25 m	See page 401
5CASDL.0250-03	**SDL flex cable 25 m** SDL cable for fixed and flexible type of layout; length: 25 m	See page 410
5CASDL.0300-00	**SDL cable 30 m** SDL cable for a fixed type of layout; length: 30 m	See page 401
5CASDL.0300-03	**SDL flex cable 30 m** SDL cable for fixed and flexible type of layout; length: 30 m	See page 410
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 415
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 415
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 422
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 422
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 420
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 420
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 420

Table 15: Model numbers - Cables (Forts.)

5.8.6 Power supplies

Model number	Short description	Note
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	See page 363
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 363
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 363

Table 16: Model numbers - Power supplies

Model number	Short description	Note
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 363
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 363
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 363
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 363
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 363
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 363
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 363
0PS340.1	**Power supply, 3-phase, 40 A** 24 VDC power supply, 3-phase, 40 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	See page 363

Table 16: Model numbers - Power supplies (Forts.)

5.8.7 External UPS

Model number	Short description	Note
9A0100.11	**UPS 24 VDC** 24 VDC input, 24 VDC output, serial interface	See page 365
9A0100.14	**UPS battery unit type B** 24 V; 2.2 Ah; including battery cage	See page 365
9A0100.15	**UPS battery unit type B (replacement part)** 2 x 12 V; 2.2 Ah; for battery unit 9A0100.14	See page 365
9A0017.01	**RS232 Null Modem Cable, 0.6 m** To connect UPS and load system (9-pin DSUB socket - 9-pin DSUB socket)	See page 365
9A0017.02	**RS232 Null Modem Cable, 1.8 m** To connect UPS and load system (9-pin DSUB socket - 9-pin DSUB socket)	See page 365

5.8.8 Ethernet PCI interface cards

Model number	Short description	Note
5ACPCI.ETH1-01	**PCI Ethernet card 10/100** half size PCI Ethernet card, 1 Ethernet connection	See page 430
5ACPCI.ETH3-01	**PCI Ethernet card 10/100 3port** half size PCI Ethernet card, 3 Ethernet connections	See page 430

Table 17: Model numbers for Ethernet PCI interface cards

5.8.9 Miscellaneous

Model number	Short description	Note
5AC600.ICOV-00	**Interface covers** Interface covers for APC620 and PPC700 devices; 5 pieces	See page 367
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.	See page 368
5AC900.104X-00	**Legend strip template 10.4" portrait format** For Panel PC 5PC781.1043-00. For 1 device.	See page 424
5AC900.104X-01	**Legend strip template 10.4" landscape format** For Panel PC 5PC782.1043-00. For 1 device.	See page 424
5AC900.150X-01	**Legend strip template 15"** For Panel PC 5PC781.1505-00. For 4 devices.	See page 424
5AC900.1200-00	**USB port cap (attached)** Front side USB port cover (attached) for Automation Panel 900 and Panel PC 700 devices.	See page 369 Discontinued
5AC900.1200-01	**USB port cap IP65 M20 /2** Front-side USB port cap (attached) knurled, short, not slotted.	
5AC900.1200-02	**USB port cap IP65 M20 /3** Front-side USB port cap (attached) knurled, tall, not slotted.	
5AC900.1200-03	**USB port cap IP65 M20 /4** Front-side USB port cap (attached) knurled, tall, slotted.	
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, FDD, CompactFlash slot (type II), USB connection (type A front, type B back); 24V DC; (Order 0TB103.9 screw clamp or 0TB103.91 cage clamps separately).	See page 380
5A5003.03	**Front cover** Front cover for the USB 2.0 Media Drive 5MD900.USB2-01.	See page 386
5AC600.SRAM-00	**APC620/PPC700 SRAM module 512kB** 512 KB SRAM module for APC620 and PPC700.	See page 427
5AC700.FA00-00	**PPC700 replacement fan filter 0PCI 5 piece** For Panel PC 700 10.4", 12.1", 15", 17" and 19" with 0 PCI slots (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).	See page 426
5AC700.FA02-00	**PPC700 replacement fan filter 1.2PCI 5 piece** For Panel PC 700 10.4" and 15" with 1 and 2 PCI slots (5PC720.1043-01, 5PC720.1214-01, 5PC720.1505-01 and 5PC720.1505-02).	See page 426
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	See page 393

Table 18: Model numbers - Other items

5.9 Software

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 industrial PC.	

Table 19: Model numbers - Software

Model number	Short description	Note
9S0000.01-020	**OEM MS-DOS 6.22 English (disk)** OEM MS-DOS 6.22 English disks Only delivered with a new industrial PC.	
5SWWXP.0600-GER	**WinXP Professional with SP3, GER** Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	See page 314
5SWWXP.0600-ENG	**WinXP Professional with SP3, ENG** Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device.	See page 314
5SWWXP.0600-MUL	**WinXP Professional with SP3, MUL** Microsoft OEM Windows XP Professional Service Pack 3, CD, multi-language. Only available with a new device.	See page 314
5SWWXP.0500-GER	**WinXP Professional with SP 2c, GER** Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a new device.	See page 314
5SWWXP.0500-ENG	**WinXP Professional with SP 2c, ENG** Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a new device.	See page 314
5SWWXP.0500-MUL	**WinXP Professional with SP 2c, MUL** Microsoft OEM Windows XP Professional Service Pack 2c, CD, multi-language. Only available with a new device.	See page 314
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 316
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 316
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 316
5SWWI7.0529-ENG	**Windows Embedded Standard 7 PPC700 945GME** Microsoft OEM Windows Embedded, Standard 7 32-bit, English; for PPC700 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	See page 323
5SWWI7.0729-MUL	**Windows Embedded Standard 7 Premium PPC700 945GME** Microsoft OEM Windows Embedded, Standard 7 Premium 32-bit, Multilanguage; for PPC700 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	See page 323
5SWWI7.0900-MUL	**WES7P 32bit Language Pack DVD**	See page 323
5SWWXP.0429-ENG	**WinXPe FP2007 PPC700 945GME XTX** Microsoft OEM Windows XP Embedded Feature Pack 2007, English; for PPC700 with CPU board 5PC600.X945-00; order CompactFlash separately (at least 512 MB).	See page 318
5SWWXP.0729-ENG	**WES2009 PPC700 945GME** Microsoft OEM Windows Embedded, Standard 2009, English; for PPC700 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	See page 320
5SWWCE.0829-ENG	**WinCE6.0 Pro PPC700 945GME XTX** Microsoft OEM Windows CE 6.0 Professional, English; for PPC700 with CPU board 5PC600.X945-00; order CompactFlash separately (at least 128 MB).	See page 326

Table 19: Model numbers - Software (Forts.)

6. Typical topologies

6.1 Panel PC 700 for central control and visualization

The control program runs on the Panel PC 700. The visualization project is integrated with Visual Components. The Panel PC 700 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, Ethernet POWERLINK™).

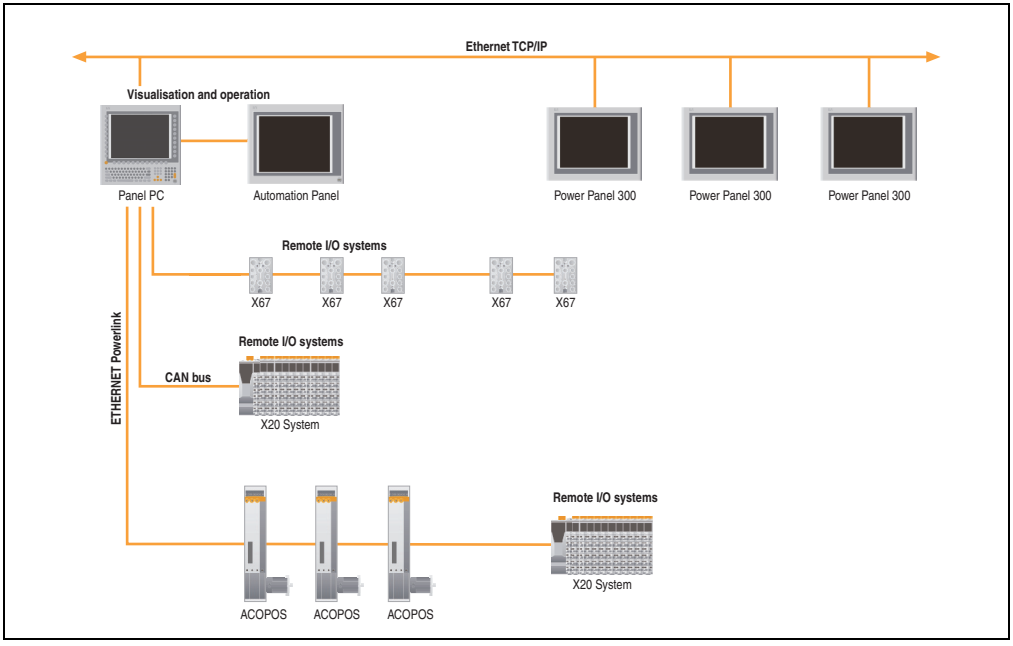


Figure 1: Typical topologies

Chapter 2 • Technical data

1. Introduction

The Panel PC 700 (PPC700) combines an industrial PC and display in one housing. This variant is the first choice anywhere a PC and display must be installed in a limited space.

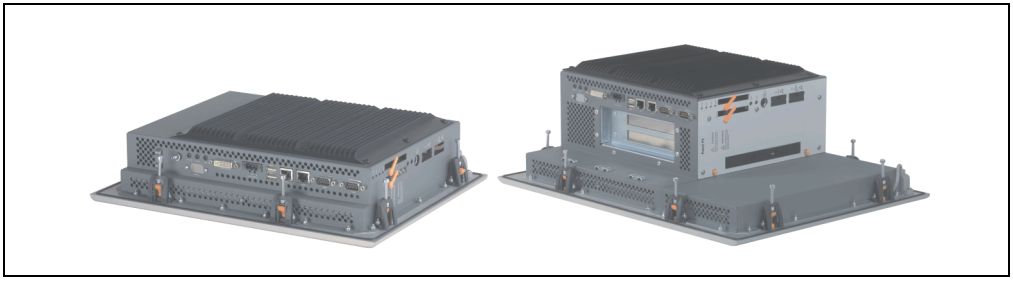
The Panel PC 700 and the Automation PC 620 are technically based on the same platform. Panel PCs are available as touch devices with 10.4" VGA, 12.1" SVGA, 15" XGA, 17" SXGA and 19" SXGA TFT displays. The housing is also a defining factor: From very flat devices without PCI slots to expandable devices with two PCI slots, the Panel PC can be optimized to meet the requirements of the application. Four additional Automation Panel 900s can be connected to the Panel PC 700 (dual independent display).

1.1 Features

- Diagonals up to 19"
- Intel® Atom™ N270 1.6 GHz processor
- CompactFlash slot (type I)
- Half-size PCI slots (PCI standard 2.2, PCI bus speed 33 MHz)
- AC97 sound
- USB 2.0
- 24 VDC supply voltage
- 2 x Ethernet 10/100 Mbit interfaces
- 2x RS232 Interface, modem compatible
- PS/2 keyboard/mouse (combined)
- CAN add-on interface
- RS232/422/485 add-on interface
- Fan-free operation[1)]
- BIOS
- Real-time clock, RTC (battery-buffered)
- Up to 2 GB main memory
- Optional SRAM module[2)] battery backed

1) Dependent on the device configuration and the ambient temperature.
2) Installation depends on the revision of the system unit.

1.2 System components / configuration



The PPC700 system can be assembled to meet individual requirements and operating conditions.

The following components are absolutely essential for operation:

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

1.2.1 Selection guide - Basic system

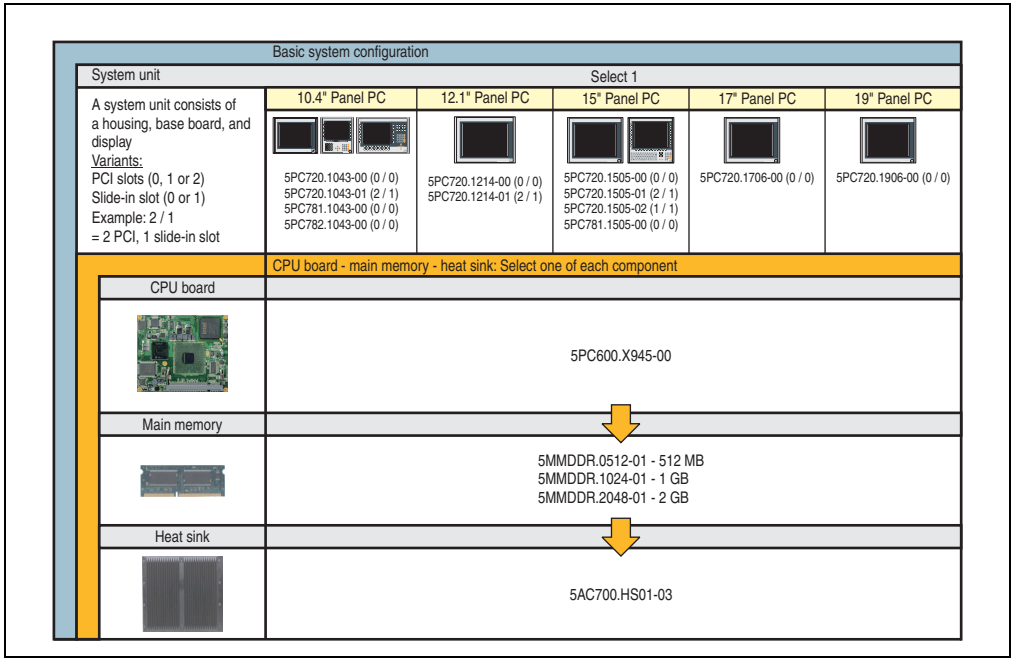


Figure 2: Configuration - Basic system

Explanation:

1) Select a system unit.

2) Select CPU board (select 1).

3) Select the main memory (select 1).

4) Select a heat sink (select 1).

5) Select optional components, based on selected system unit (see section 1.2.2 "Selection guide - Optional components", on page 39).

1.2.2 Selection guide - Optional components

Optional configuration			
System unit	Select 1		
	0 PCI slots	1 PCI slot	2 PCI slots
A system unit consists of a housing, base board, and display Variants: PCI slots (0, 1 or 2) Slide-in slot (0 or 1) Example: 2 / 1 = 2 PCI, 1 slide-in slot	5PC720.1043-00 (0 / 0) 5PC720.1214-00 (0 / 0) 5PC720.1505-00 (0 / 0) 5PC720.1706-00 (0 / 0) 5PC720.1906-00 (0 / 0) 5PC781.1043-00 (0 / 0) 5PC781.1505-00 (0 / 0) 5PC782.1043-00 (0 / 0)	5PC720.1505-02 (1 / 1)	5PC720.1043-01 (2 / 1) 5PC720.1214-01 (2 / 1) 5PC720.1505-01 (2 / 1)
Fan kit (select 1)			
A fan kit may be necessary for certain configurations.	 5PC700.FA00-01	 5PC700.FA02-01 (also for 5PC720.1505-01 and 5PC720.1214-01)	 5PC700.FA02-00 (only for 5PC720.1043-01)
Add-on drive	Select 1		
	5AC600.HDDI-05 (40 GB Hard disk - 24-hour hard disk and expanded temperature range) 5AC600.HDDI-06 (80 GB Hard disk - 24-hour hard disk and expanded temperature range) 5AC600.CFSI-00 (CompactFlash slot)		
Slide-in drives	Not possible	Select max. 1	
		5AC600.FDDS-00 (USB floppy)	
RAID system	Not possible	Select max. 1	
		5ACPCI.RAIC-05 (2 x250 GB)	
Interface option	Select 1		
	5AC600.CANI-00 (CAN) 5AC600.485I-00 (combined RS232/RS422/RS485)		
Voltage supply connectors	Select 1		
	0TB103.9 (screw clamps) 0TB103.91 (cage clamps)		

Figure 3: Configuration of optional components

- Depending on the system unit, a compatible fan kit can be installed in the PPC700. Required for certain system configurations and ambient temperatures (see also section 2.1 "Ambient temperature with X945 CPU board", on page 40)
- Select optional drive(s) (add-on / slide-in), based on the system unit. One add-on drive can be installed in each system unit. A slide-in drive is only available in certain system units.
- An optional interface can be added using an add-on interface.
- The appropriate power supply plugs ensure simple connection to the power supply.

2. Entire device

2.1 Ambient temperature with X945 CPU board

It is possible to combine CPU boards with various 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 the figure).

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").

Worst-case conditions for systems with an X945 CPU board

- Confidential Tool from Intel (Thermal Analysis Tool V3.8.1) 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.

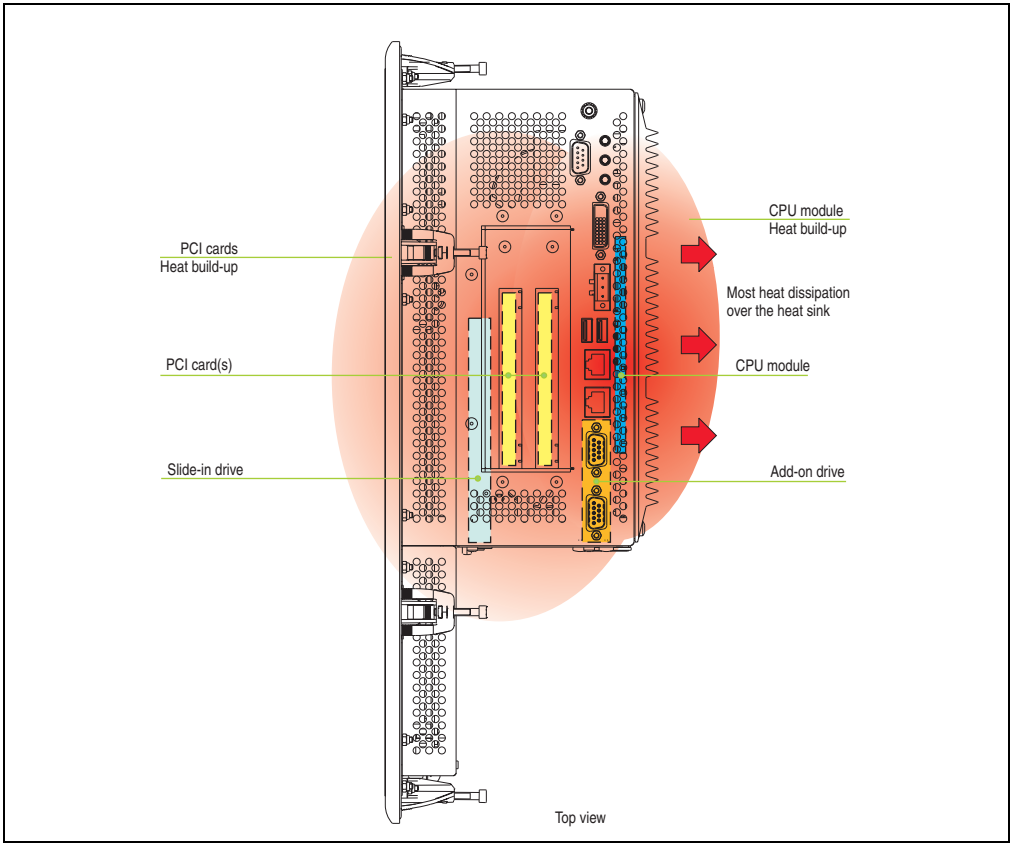


Figure 4: Example of worst-case conditions for temperature measurement

2.1.1 Ambient temperatures with system unit 5PC720.1043-00

Maximum ambient temperature

All temperatures in degrees Celsius (°C) at 500 meters NN Derating the maximum ambient temperature typically 1°C per 1000 meters above 500 NN.		① Without fan kit N270 5PC600.X945-00	① With fan kit N270 5PC600.X945-00	Temperature limits	Location of sensors
	② Maximum ambient temperature	45	55		
③	What can still be operated at the maximum ambient temperature, or are there limits?				
Add-on drive	Onboard CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-05	✓	✓	85	
	5AC600.HDDI-06	✓	✓	85	
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
Other insert card interfaces	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	

1) Only possible in connection with CompactFlash cards 5CFCRD.xxxx-04 and 5CFCRD.xxxx-03 available from B&R.

Figure 5: Ambient temperatures for 5PC720.1043-00 with an X945 CPU board

For a description of this image, see section 2.1.13 "How is the the maximum ambient temperature determined?".

Minimum ambient temperature

The minimum ambient temperature is 0°C.

2.1.2 Ambient temperatures with system unit 5PC720.1043-01

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 starting at 500 meters above sea level.

		① Without fan kit	① With fan kit		
		N270 5PC600.X945-00	N270 5PC600.X945-00		
	② Maximum ambient temperature	45	55	Temperature limits	Location of sensor(s)
③	What can also be operated at the max. ambient temperature, or are there limits?				
Add-on drive	On-board CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-05	✓	✓	85	
	5AC600.HDDI-06	✓	✓	85	
Slide-in drive	5AC600.FDDS-00	30	35	50	Slide-in drive 1
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
Additional insert cards Interfaces	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	
	5ACPCI.RAIC-03 (24 hours / default)	✓	✓	-	
	5ACPCI.RAIC-05 (24 hours / default)	✓	50	-	

1) Only possible with a CompactFlash card (5CFCRD.xxxx-04 or 5CFCRD.xxxx-03) from B&R.

Figure 6: Ambient temperatures for 5PC720.1043-01 with an X945 CPU board

For a description of this image, see section 2.1.13 "How is the the maximum ambient temperature determined?".

Minimum ambient temperature

For systems containing one of the following components, the minimum ambient temperature is +5°C: 5AC600.FDDS-00
If these components are not used, then the minimum ambient temperature is 0°C.

2.1.3 Ambient temperatures with system unit 5PC720.1214-00

Maximum ambient temperature

All temperatures in degrees Celsius (°C) at 500 meters NN Derating the maximum ambient temperature typically 1°C per 1000 meters above 500 NN.		① Without fan kit N270 5PC600.X945-00	① With fan kit N270 5PC600.X945-00	Temperature limits	Location of sensors
	② Maximum ambient temperature	45	55		
③	What can still be operated at the maximum ambient temperature, or are there limits?				
Add-on drive	Onboard CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-05	✓	✓	85	
	5AC600.HDDI-06	✓	✓	85	
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
Other insert card interfaces	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	

1) Only possible in connection with CompactFlash cards 5CFCRD.xxxx-04 and 5CFCRD.xxxx-03 available from B&R.

Figure 7: Ambient temperatures for 5PC720.1214-00 with an X945 CPU board

For a description of this image, see section 2.1.13 "How is the the maximum ambient temperature determined?".

Minimum ambient temperature

The minimum ambient temperature is 0°C.

2.1.4 Ambient temperatures with system unit 5PC720.1214-01

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 starting at 500 meters above sea level.		① Without fan kit N270 5PC600.X945-00	① With fan kit N270 5PC600.X945-00	Temperature limits	Location of sensor(s)
	② Maximum ambient temperature	45	55		
③	What can also be operated at the max. ambient temperature, or are there limits?				
Add-on drive	On-board CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-05	✓	✓	85	
	5AC600.HDDI-06	✓	✓	85	
Slide-in drive	5AC600.FDDS-00	30	35	50	Slide-in drive 1
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
Additional insert cards Interfaces	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	
	5ACPCI.RAIC-03 (24 hours / default)	✓	✓	-	
	5ACPCI.RAIC-05 (24 hours / default)	✓	50	-	

1) Only possible with CompactFlash card (5CFCRD.xxxx-04 or 5CFCRD.xxxx-03) from B&R.

Figure 8: Ambient temperatures for 5PC720.1214-01 with an X945 CPU board

For a description of this image, see section 2.1.13 "How is the the maximum ambient temperature determined?".

Minimum ambient temperature

For systems containing one of the following components, the minimum ambient temperature is +5°C: 5AC600.FDDS-00
If these components are not used, then the minimum ambient temperature is 0°C.

2.1.5 Ambient temperatures with system unit 5PC720.1505-00

Maximum ambient temperature

All temperatures in degrees Celsius (°C) at 500 meters NN Derating the maximum ambient temperature typically 1°C per 1000 meters above 500 NN.		① Without fan kit N270 5PC600.X945-00	① With fan kit N270 5PC600.X945-00	Temperature limits	Location of sensors
	② Maximum ambient temperature	45	50		
③	What can still be operated at the maximum ambient temperature, or are there limits?				
Add-on drive	Onboard CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-05	✓	✓	85	
	5AC600.HDDI-06	✓	✓	85	
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
Other insert card interfaces	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	

1) Only possible in connection with CompactFlash cards 5CFCRD.xxxx-04 and 5CFCRD.xxxx-03 available from B&R.

Figure 9: Ambient temperatures for 5PC720.1505-00 with an X945 CPU board

For a description of this image, see section 2.1.13 "How is the the maximum ambient temperature determined?".

Minimum ambient temperature

The minimum ambient temperature is 0°C.

2.1.6 Ambient temperatures with system unit 5PC720.1505-01

Maximum ambient temperature

All temperature values in degrees celsius (°C) at 500 meters above sea level Derating of the max. ambient temperature, generally 1°C per 1000 meters starting at 500 meters above sea level.		① Without fan kit N270 5PC600.X945-00	① With fan kit N270 5PC600.X945-00	Temperature limits	Location of sensor(s)
	② Maximum ambient temperature	45	50		
③	What can also be operated at the max. ambient temperature, or are there limits?				
Add-on drive	On-board CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-05	✓	✓	85	
	5AC600.HDDI-06	✓	✓	85	
Slide-in drive	5AC600.FDDS-00	30	35	50	Slide-in drive 1
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
Additional insert cards Interfaces	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	
	5ACPCI.RAIC-03 (24 hours / default)	✓	✓	-	
	5ACPCI.RAIC-05 (24 hours / default)	✓	✓	-	

1) Only possible with a CompactFlash card (5CFCRD.xxxx-04 or 5CFCRD.xxxx-03) from B&R.

Figure 10: Ambient temperatures for 5PC720.1505-01 with an X945 CPU board

For a description of this image, see section 2.1.13 "How is the the maximum ambient temperature determined?".

Minimum ambient temperature

For systems containing one of the following components, the minimum ambient temperature is +5°C: 5AC600.FDDS-00
If these components are not used, then the minimum ambient temperature is 0°C.

2.1.7 Ambient temperatures with system unit 5PC720.1505-02

Maximum ambient temperature

All temperature limits in degrees celsius (°C) at 500 meters above sea level Derating of the maximum ambient temperature, generally 1°C per 1000 meters starting at 500 meters above sea level		① Without fan kit N270 5PC600.X945-00	① With fan kit N270 5PC600.X945-00	Temperature limits	Location of sensor(s)
	② Maximum ambient temperature	45	50		
③	What can also be operated at the max. ambient temperature, or are there limits?				
Add-on drive	On-board CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-05	✓	✓	85	
	5AC600.HDDI-06	✓	✓	85	
Slide-in drive	5AC600.FDDS-00	30	35	50	Slide-in drive 1
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
Additional insert cards Interfaces	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	
	5ACPCI.RAIC-03 (24 hours / default)	✓	✓	-	
	5ACPCI.RAIC-05 (24 hours / default)	✓	✓	-	

1) Only possible with a CompactFlash card (5CFCRD.xxxx-04 or 5CFCRD.xxxx-03) from B&R.

Figure 11: Ambient temperatures for 5PC720.1505-02 with an X945 CPU board

For a description of this image, see section 2.1.13 "How is the the maximum ambient temperature determined?".

Minimum ambient temperature

For systems containing one of the following components, the minimum ambient temperature is +5°C: 5AC600.FDDS-00
If these components are not used, then the minimum ambient temperature is 0°C.

2.1.8 Ambient temperatures with system unit 5PC720.1706-00

Maximum ambient temperature

All temperatures in degrees Celsius (°C) at 500 meters NN Derating the maximum ambient temperature typically 1°C per 1000 meters above 500 NN.		① Without fan kit N270 5PC600.X945-00	① With fan kit N270 5PC600.X945-00	Temperature limits	Location of sensors
	② Maximum ambient temperature	40	40		
③	What can still be operated at the maximum ambient temperature, or are there limits?				
Add-on drive	Onboard CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-05	✓	✓	85	
	5AC600.HDDI-06	✓	✓	85	
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
Other insert card interfaces	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	

1) Only possible in connection with CompactFlash cards 5CFCRD.xxxx-04 and 5CFCRD.xxxx-03 available from B&R.

Figure 12: Ambient temperatures for 5PC720.1706-00 with an X945 CPU board

For a description of this image, see section 2.1.13 "How is the the maximum ambient temperature determined?".

Minimum ambient temperature

The minimum ambient temperature is 0°C.

2.1.9 Ambient temperatures with system unit 5PC720.1906-00

Maximum ambient temperature

Information:

The maximum ambient temperatures specified in the following figure are valid for 5PC720.1906-00 system units with a revision F0. In revisions ≤ E0, the valid maximum ambient temperature is 5°C smaller than specified.

All temperatures in degrees Celsius (°C) at 500 meters NN Derating the maximum ambient temperature typically 1°C per 1000 meters above 500 NN.		① Without fan kit N270 5PC600.X945-00	① With fan kit N270 5PC600.X945-00	Temperature limits	Location of sensors
	② Maximum ambient temperature	45	45		
③	What can still be operated at the maximum ambient temperature, or are there limits?				
Add-on drive	Onboard CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-05	✓	✓	85	
	5AC600.HDDI-06	✓	✓	85	
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
Other insert card interfaces	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	

1) Only possible in connection with CompactFlash cards 5CFCRD.xxxx-04 and 5CFCRD.xxxx-03 available from B&R.

Figure 13: Ambient temperatures for 5PC720.1906-00 with an X945 CPU board

For a description of this image, see section 2.1.13 "How is the the maximum ambient temperature determined?".

Minimum ambient temperature

The minimum ambient temperature is 0°C.

2.1.10 Ambient temperatures with system unit 5PC781.1043-00

Maximum ambient temperature

All temperatures in degrees Celsius (°C) at 500 meters NN Derating the maximum ambient temperature typically 1°C per 1000 meters above 500 NN.		① Without fan kit N270 5PC600.X945-00	① With fan kit N270 5PC600.X945-00	Temperature limits	Location of sensors
	② Maximum ambient temperature	45	55		
③	What can still be operated at the maximum ambient temperature, or are there limits?				
Add-on drive	Onboard CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-05	✓	✓	85	
	5AC600.HDDI-06	✓	✓	85	
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
Other insert card interfaces	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	

1) Only possible in connection with CompactFlash cards 5CFCRD.xxxx-04 and 5CFCRD.xxxx-03 available from B&R.

Figure 14: Ambient temperatures for 5PC781.1043-00 with an X945 CPU board

For a description of this image, see section 2.1.13 "How is the the maximum ambient temperature determined?".

Minimum ambient temperature

The minimum ambient temperature is 0°C.

2.1.11 Ambient temperatures with system unit 5PC781.1505-00

Maximum ambient temperature

All temperatures in degrees Celsius (°C) at 500 meters NN Derating the maximum ambient temperature typically 1°C per 1000 meters above 500 NN.		① Without fan kit N270 5PC600.X945-00	① With fan kit N270 5PC600.X945-00	Temperature limits	Location of sensors
	② Maximum ambient temperature	45	50		
③	What can still be operated at the maximum ambient temperature, or are there limits?				
Add-on drive	Onboard CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-05	✓	✓	85	
	5AC600.HDDI-06	✓	✓	85	
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
Other insert card interfaces	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	

1) Only possible in connection with CompactFlash cards 5CFCRD.xxxx-04 and 5CFCRD.xxxx-03 available from B&R.

Figure 15: Ambient temperatures for 5PC781.1505-00 with an X945 CPU board

For a description of this image, see section 2.1.13 "How is the the maximum ambient temperature determined?".

Minimum ambient temperature

The minimum ambient temperature is 0°C.

2.1.12 Ambient temperatures with system unit 5PC782.1043-00

Maximum ambient temperature

All temperatures in degrees Celsius (°C) at 500 meters NN Derating the maximum ambient temperature typically 1°C per 1000 meters above 500 NN.		① Without fan kit N270 5PC600.X945-00	① With fan kit N270 5PC600.X945-00	Temperature limits	Location of sensors
	② Maximum ambient temperature	45	55		
③	What can still be operated at the maximum ambient temperature, or are there limits?				
Add-on drive	Onboard CompactFlash [1]	✓	✓	80	I/O
	5AC600.CFSI-00 [1]	✓	✓	80	
	5AC600.HDDI-05	✓	✓	85	
	5AC600.HDDI-06	✓	✓	85	
Main memory	5MMDDR.0512-01	✓	✓	-	
	5MMDDR.1024-01	✓	✓	-	
	5MMDDR.2048-01	✓	✓	-	
Other insert card interfaces	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	

1) Only possible in connection with CompactFlash cards 5CFCRD.xxxx-04 and 5CFCRD.xxxx-03 available from B&R.

Figure 16: Ambient temperatures for 5PC782.1043-00 with an X945 CPU board

For a description of this image, see section 2.1.13 "How is the the maximum ambient temperature determined?".

Minimum ambient temperature

The minimum ambient temperature is 0°C.

2.1.13 How is the the maximum ambient temperature determined?

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

2) The lines under "Maximum ambient temperature" shows the maximum ambient temperature for the entire system (= system unit + CPU board).

3) Incorporating additional drives (add-on, slide-in), main memory, additional insert cards, etc. can change the temperature limits of a Panel PC 700 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 Panel PC 700 system cannot exceed this temperature.

Special case: 5AC600.HDDI-00, 5AC600.HDDS-00 and 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.

2.1.14 Temperature monitoring

The PPC700 has temperature sensors in various places (I/O, power supply, slide-in drive 1). The locations of the temperature sensors can be found in the figure "Temperature sensor locations", on page 453. 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 PPC700 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.

2.2 Humidity specifications

The following table displays the minimum and maximum relative 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 boards		10 - 90%	5 - 95%
Main memory for CPU board		10 - 90%	5 - 95%
Add-on drives	5AC600.HDDI-05	5 - 90%	5 - 95%
	5AC600.HDDI-06	5 - 90%	5 - 95%
Slide-in drives	5AC600.FDDS-00	20 - 80%	10 - 95%
Additional insert cards Interfaces AP Link	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%
	5AC600.CANI-00	5 - 90%	5 - 95%
	5AC600.485I-00	5 - 90%	5 - 95%
Accessories	CompactFlash cards 5CFCRD.xxxx-04	85%	85%
	CompactFlash cards - 5CFCRD.xxxx-03	8 - 95%	8 - 95%
	Flash drive 5MMUSB.2048-xx	10 - 90%	5 - 90%
	USB Media Drive 5MD900.USB2-01	20 - 80%	5 - 90%

Table 20: 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.

2.3 Power management

The following block diagram presents the simplified structure of the PPC700 supply voltage - valid starting with the following system unit revisions:

Model number	Short text	Starting with revision
5PC720.1043-00	Panel PC 720 10.4" VGA T, 0 PCI slots	K0
5PC720.1043-01	Panel PC 720 10.4" VGA T, 2 PCI slots, 1 disk drive slot	I0
5PC720.1214-00	Panel PC 720 12.1" SVGA T, 0 PCI slots	K0
5PC720.1214-01	Panel PC 720 12.1" SVGA T, 2 PCI slots, 1 disk drive slot	D0
5PC720.1505-00	Panel PC 720 15" XGA T, 0 PCI slots	M0
5PC720.1505-01	Panel PC 720 15" XGA T, 2 PCI slots, 1 disk drive slot	L0
5PC720.1505-02	Panel PC 720 15" XGA T, 1 PCI slot, 1 disk drive slot	K0
5PC720.1706-00	Panel PC 720 17" SXGA T, 0 PCI slots	E0
5PC720.1906-00	Panel PC 720 19" SXGA T, 0 PCI slots	G0
5PC781.1043-00	Panel PC 781 10.4" VGA FT, 0 PCI slots	H0
5PC781.1505-00	Panel PC 781 15" XGA FT, 0 PCI slots	J0
5PC782.1043-00	Panel PC 782 10.4" VGA FT, 0 PCI slots	H0

Table 21: Revision dependent block diagram

If an older system unit revision is used, its necessary to read the power management information in section 2.3.6 "Power management obsolete", on page 62.

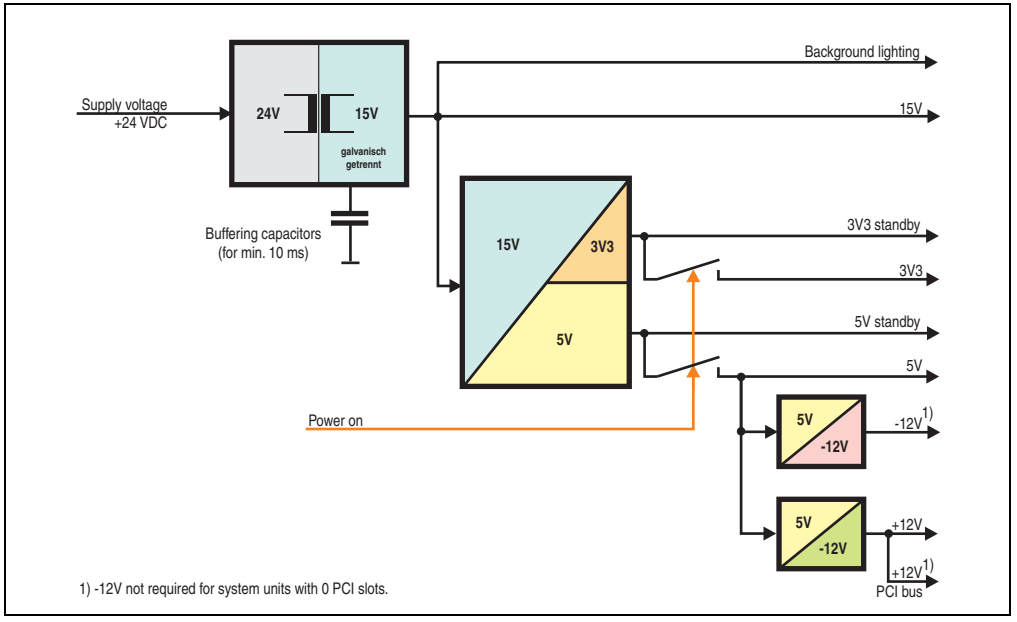


Figure 17: Block diagram - supply voltage

2.3.1 Power calculation for 10.4" Panel PC 700

Model number	Short text	Starting with revision
5PC720.1043-00	Panel PC 720 10.4" VGA T, 0 PCI slots	K0
5PC720.1043-01	Panel PC 720 10.4" VGA T, 2 PCI slots, 1 disk drive slot	I0
5PC781.1043-00	Panel PC 781 10.4" VGA FT, 0 PCI slots	H0
5PC782.1043-00	Panel PC 782 10.4" VGA FT, 0 PCI slots	H0

Table 22: Revision dependent 10.4" Panel PC 700

Information:	10.4" Panel PC 700	Current system
All values in Watts The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.	N270 5PC600.X945-00	Enter values in this column
Total power supply power (maximum)		**110**
Total power supply, permanent consumers	9	
Maximum possible at 5V		**70**
CPU board, permanent consumers	16	
Pro CompactFlash, optional (add-on, slide-in)	1	
Hard disk, optional (add-on, slide-in)	4	
Pro drive, optional (slide-in CD,DVD CD-RW)	4	
External PS/2 keyboard, optional	1	
USB peripheral, optional (max. 2.5 W per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 17 W with fan kit) 1)		
External consumers, optional (via base board)	5	
Keys/LEDs, perm. consumers (system unit dependant)	1.5	
5V consumers Σ		
Maximum possible at +12V		**24**
Fan kit, optional	2.5	
External consumers, optional (via base board)	10	
Power value from PCI card manufacturer, opt. (max. 3 W without fan kit, max. 12 W with fan kit) 1)		
+12V consumers Σ		
Maximum possible at -12V		**1.2**
Power value from PCI card manufacturer, opt. (max.1.23 W with or without fan kit) 1)		
-12V consumers Σ		
All 5V consumers Σ		
Maximum possible at 3V3		**23**
System unit, permanent consumers	5	
Interface option (add-on interface), optional	0.25	
Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 17 W with fan kit) 1)		
3V3 consumers Σ		
All consumers Σ		

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

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

Figure 18: Power calculation for 10.4" Panel PC 700 system units

2.3.2 Power calculation for 12.1" Panel PC 700

Model number	Short text	Starting with revision
5PC720.1214-00	Panel PC 720 12.1" SVGA T, 0 PCI slots	K0
5PC720.1214-01	Panel PC 720 12.1" SVGA T, 2 PCI slots, 1 disk drive slot	D0

Table 23: Revision dependent 12.1" Panel PC 700

Information:	12.1" Panel PC 700	Current system
All values in Watts The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.	N270 5PC600.X945-00	Enter values in this column
Total power supply power (maximum)		**110**
Total power supply, permanent consumers	10	
Maximum possible at 5V		**70**
CPU board, permanent consumers	16	
Pro CompactFlash, optional (add-on, slide-in)	1	
Hard disk, optional (add-on, slide-in)	4	
Pro drive, optional (slide-in CD,DVD CD-RW)	4	
External PS/2 keyboard, optional	1	
USB peripheral, optional (max. 2.5 W per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 17 W with fan kit) 1)		
External consumers, optional (via base board)	5	
5V consumers ∑		
Maximum possible at +12V		**24**
Fan kit, optional	2.5	
External consumers, optional (via base board)	10	
Power value from PCI card manufacturer, opt. (max. 3 W without fan kit, max. 12 W with fan kit) 1)		
+12V consumers ∑		
Maximum possible at -12V		**1.2**
Power value from PCI card manufacturer, opt. (max. 1.2 W with or without fan kit) 1)		
-12V consumers ∑		
5V consumers ∑		
Maximum possible at 3V3		**23**
System unit, permanent consumers	5	
Interface option (add-on interface), optional	0.25	
Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 17 W with fan kit) 1)		
3V3 consumers ∑		
All consumers ∑		

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

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

Figure 19: Power calculation for 12.1" Panel PC 700 system units

2.3.3 Power calculation for 15" Panel PC 700

Model number	Short text	Starting with revision
5PC720.1505-00	Panel PC 720 15" XGA T, 0 PCI slots	M0
5PC720.1505-01	Panel PC 720 15" XGA T, 2 PCI slots, 1 disk drive slot	L0
5PC720.1505-02	Panel PC 720 15" XGA T, 1 PCI slot, 1 disk drive slot	K0
5PC781.1505-00	Panel PC 781 15" XGA FT, 0 PCI slots	J0

Table 24: Revision dependent 15" Panel PC 700

Information:	15" Panel PC 700	Current system
All values in Watts The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.	N270 5PC600.X945-00	Enter values in this column
Total power supply power (maximum)		**110**
Total power supply, permanent consumers	22	
5V: Maximum possible at 5V		**70**
CPU board, permanent consumers	16	
Pro CompactFlash, optional (add-on, slide-in)	1	
Hard disk, optional (add-on, slide-in)	4	
Pro drive optional (slide-in CD,DVD CD-RW)	4	
External PS/2 keyboard, optional	1	
USB peripheral, optional (max. 2.5 W per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 17 W with fan kit) [1]		
External consumers, optional (via base board)	5	
Keys/LEDs, perm. consumers (system unit dependant)	1.5	
5V consumers Σ		
+12V: Maximum possible at +12V		**24**
Fan kit, optional	2.5	
External consumers, optional (via base board)	10	
Power value from PCI card manufacturer, opt. (max. 3 W without fan kit, max. 12 W with fan kit) [1]		
+12V consumers Σ		
-12V: Maximum possible at -12V		**1.2**
Power value from PCI card manufacturer, opt. (max. 1.2 W with or witouth fan kit) [1]		
-12V consumers Σ		
All 5V consumers Σ		
3V3: Maximum possible at 3V3		**23**
Systemeinheit, Fixverbraucher	7	
Schnittstellenoption (Add-On Interface), optional	0.25	
Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 17 W with fan kit) [1]		
3V3 consumers Σ		
All consumers Σ		

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

Figure 20: Power calculation for 15" Panel PC 700

2.3.4 Power calculation for 17" Panel PC 700

Model number	Short text	Starting with revision
5PC720.1706-00	Panel PC 720 17" SXGA T, 0 PCI slots	E0

Table 25: Revision dependent 17" Panel PC 700

Information:	17" Panel PC 700	Current system
All values in Watts The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.	N270 5PC600.X945-00	Enter values in this column
Total power supply	**Total power supply power (maximum)**	**110**
Total power supply, permanent consumers	25	
5V	**Maximum possible at 5V**	**70**
CPU board, permanent consumers	16	
Pro CompactFlash, optional (add-on, slide-in)	1	
Hard Disk, optional (add-on, slide-in)	4	
External PS/2 keyboard, optional	1	
USB peripheral, optional (max. 2.5 W per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
External consumers, optional (via base board)	5	
	5V consumers $\sum$	
+12V	**Maximum possible at +12V**	**24**
Fan kit, optional	2.5	
External consumers, optional (via base board)	10	
	+12V consumers $\sum$	
	All 5V consumers $\sum$	
3V3	**Maximum possible at 3V3**	**23**
System unit, permanent consumers	6	
Interface option (add-on interface), optional	0.25	
	3V3 consumers $\sum$	
	All consumers $\sum$	

Figure 21: Power calculation for 17" Panel PC 700

2.3.5 Power calculation for 19" Panel PC 700

Model number	Short text	Starting with revision
5PC720.1906-00	Panel PC 720 19" SXGA T, 0 PCI slots	G0

Table 26: Revision dependent 19" Panel PC 700

Information:	19" Panel PC 700	Current system
All values in Watts The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.	N270 5PC600.X945-00	Enter values in this column
Total power supply power (maximum)		**110**
Total power supply, permanent consumers	25	
Maximum possible at 5V		**70**
CPU board, permanent consumers	16	
Pro CompactFlash, optional (add-on, slide-in)	1	
Hard disk, optional (add-on, slide-in)	4	
External PS/2 keyboard, optional	1	
USB peripheral, optional (max. 2.5 W per USB1 and USB2 connection)	5	
Interface option (add-on interface), optional	0.5	
External consumers, optional (via base board)	5	
	5V consumers ∑	
Maximum possible at +12V		**24**
Fan kit, optional	2.5	
External consumers, optional (via base board)	10	
	+12V consumers ∑	
	All 5V consumers ∑	
Maximum possible at 3V3		**23**
System unit, permanent consumers	6	
Interface option (add-on interface), optional	0.25	
	3V3 consumers ∑	
	All consumers ∑	

Figure 22: Power calculation for 19" Panel PC 700

2.3.6 Power management obsolete

The following block diagram presents the simplified structure of the PPC700 supply voltage - valid starting with the following system unit revisions:

Model number	Short text	Lower revision
5PC720.1043-00	Panel PC 720 10.4" VGA T, 0 PCI slots	K0
5PC720.1043-01	Panel PC 720 10.4" VGA T, 2 PCI slots, 1 disk drive slot	I0
5PC720.1214-00	Panel PC 720 12.1" SVGA T, 0 PCI slots	K0
5PC720.1214-01	Panel PC 720 12.1" SVGA T, 2 PCI slots, 1 disk drive slot	D0
5PC720.1505-00	Panel PC 720 15" XGA T, 0 PCI slots	M0
5PC720.1505-01	Panel PC 720 15" XGA T, 2 PCI slots, 1 disk drive slot	L0
5PC720.1505-02	Panel PC 720 15" XGA T, 1 PCI slot, 1 disk drive slot	K0
5PC720.1706-00	Panel PC 720 17" SXGA T, 0 PCI slots	E0
5PC720.1906-00	Panel PC 720 19" SXGA T, 0 PCI slots	G0
5PC781.1043-00	Panel PC 781 10.4" VGA FT, 0 PCI slots	H0
5PC781.1505-00	Panel PC 781 15" XGA FT, 0 PCI slots	J0
5PC782.1043-00	Panel PC 782 10.4" VGA FT, 0 PCI slots	H0

Table 27: Revision dependent block diagram

If a newer system unit revision is used, it's necessary to read the power management information in section 2.3 "Power management", on page 56.

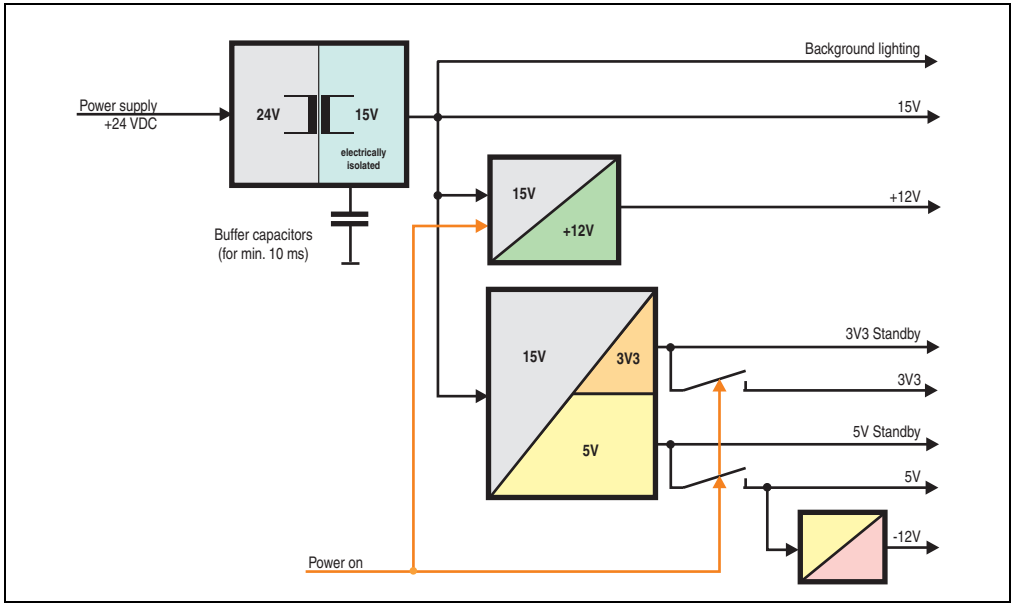


Figure 23: Block diagram - supply voltage

Explanation:

The supply voltage (+24 VDC) is converted to 15 V with a DC/DC converter. The electrically isolated 15 V is used to feed two further DC/DC converters (generation of +12 V, 3V3 and 5V standby) as well as the background lighting.

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

10.4" Panel PC 700

All entries in Watts		10.4" Panel PC 700 (N270, 5PC600.X945-00)	Current system
Total power supply	Total power supply power (maximum)		110
	Total power supply, permanent consumers	9	
5V	Maximum possible at 5V		55
	CPU board, permanent consumers	16	
	Pro CompactFlash, optional (add-on, slide-in)	1	
	Hard disk, optional (add-on, slide-in)	4	
	Pro drive, optional (slide-in CD,DVD CD-RW)	4	
	External PS/2 keyboard, optional	1	
	USB peripheral, optional (max. 2.5 W per USB1 and USB2 connection)	5	
	Interface option (add-on interface), optional	0.5	
	Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 17 W with fan kit) 1)		
	External consumers, optional (via base board)	5	
	Keys/LEDs, perm. Consumers (system unit dependant)	1.5	
	5V consumers ∑		
3V3	Maximum possible at 3V3		23
	System unit, permanent consumers	5	
	Interface option (add-on interface), optional	0.25	
	Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 17 W with fan kit) 1)		
	3V3 consumers ∑		
+12V	Maximum possible at +12V		12
	Fan kit, optional	2.5	
	External consumers, optional (via base board)	10	
	Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 12 W with fan kit) 1)		
	+12V consumers ∑		
-12V	Maximum possible at -12V		1.2
	Power value from PCI card manufacturer, optional (max. 1.2 W with or without fan kit) 1)		
	-12V consumers ∑		
	All consumers ∑		

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

Figure 24: Power management - 10.4" Panel PC 700

12.1" Panel PC 700

All values in Watts		12.1" Panel PC 700 (N270, 5PC600.X945-00)	Current system
Total power supply		Total power supply power (maximum)	110
		Total power supply, permanent consumers: 10	
5V		Maximum possible at 5V	55
	CPU board, permanent consumers	16	
	Pro CompactFlash, optional (add-on, slide-in)	1	
	Hard disk, optional (add-on, slide-in)	4	
	Pro drive, optional (slide-in CD,DVD CD-RW)	4	
	External PS/2 keyboard, optional	1	
	USB peripheral, optional (max. 2.5 W per USB1 and USB2 connection)	5	
	Interface option (add-on interface), optional	0.5	
	Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 17 W with fan kit) 1)		
	External consumers, optional (via base board)	5	
		5V consumers ∑	
3V3		Maximum possible at 3V3	23
	System unit, permanent consumers	5	
	Interface option (add-on interface), optional	0.25	
	Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 17 W with fan kit) 1)		
		3V3 consumers ∑	
+12V		Maximum possible at +12V	12
	Fan kit, optional	2.5	
	External consumers, optional (via base board)	10	
	Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 12 W with fan kit) 1)		
		+12V consumers ∑	
-12V		Maximum possible at -12V	1.2
	Power value from PCI card manufacturer, optional (max. 1.2 W with or without fan kit) 1)		
		-12V consumers ∑	
		All consumers ∑	

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

Figure 25: Power management - 12.1" Panel PC 700

15" Panel PC 700

All values in Watts		15" Panel PC 700 (N270, 5PC600.X945-00)	Current system
Total power supply	Total power supply power (maximum)		110
	Total power supply, permanent consumers	22	
5V	Maximum possible at 5V		55
	CPU board, permanent consumers	16	
	Pro CompactFlash, optional (add-on, slide-in)	1	
	Hard disk, optional (add-on, slide-in)	4	
	Pro drive, optional (slide-in CD,DVD CD-RW)	4	
	External PS/2 keyboard, optional	1	
	USB peripheral, optional (max. 2.5 W per USB1 and USB2 connection)	5	
	Interface option (add-on interface), optional	0.5	
	Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 17 W with fan kit) 1)		
	External consumers, optional (via base board)	5	
	Keys/LEDs, perm. consumers (system unit dependant)	1.5	
	5V consumers ∑		
3V3	Maximum possible at 3V3		23
	System unit, permanent consumers	7	
	Interface option (add-on interface), optional	0.25	
	Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 17 W with fan kit) 1)		
	3V3 consumers ∑		
+12V	Maximum possible at +12V		12
	Fan kit, optional	2.5	
	External consumers, optional (via base board)	10	
	Power value from PCI card manufacturer, optional (max. 3 W without fan kit, max. 12 W with fan kit) 1)		
	+12V consumers ∑		
-12V	Maximum possible at -12V		1.2
	Power value from PCI card manufacturer, optional (max. 1.2 W with or without fan kit) 1)		
	-12V consumers ∑		
	All consumers ∑		

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

Figure 26: Power management - 15" Panel PC 700

17" Panel PC 700

All values in Watts			17" Panel PC 700 (N270 5PC600.X945-00)	Current system
Total power supply		Total power supply power (maximum)		110
		Total power supply, permanent consumers	25	
	5V	Maximum possible at 5V		55
		CPU board, permanent consumers	16	
		Pro CompactFlash, optional (add-on, slide-in)	1	
		Hard disk, optional (add-on, slide-in)	4	
		External PS/2 keyboard, optional	1	
		USB peripheral, optional (max. 2.5 W per USB1 and USB2 connection)	5	
		Interface option (add-on interface), optional	0.5	
		External consumers, optional (via base board)	5	
		5V consumers ∑		
	3V3	Maximum possible at 3V3		23
		System unit, permanent consumers	6	
		Interface option (add-on interface), optional	0.25	
		3V3 consumers ∑		
	+12V	Maximum possible at +12V		12
		Fan kit, optional	2.5	
		External consumers, optional (via base board)	10	
		+12V consumers ∑		
		All consumers ∑		

Figure 27: Power management - 17" Panel PC 700

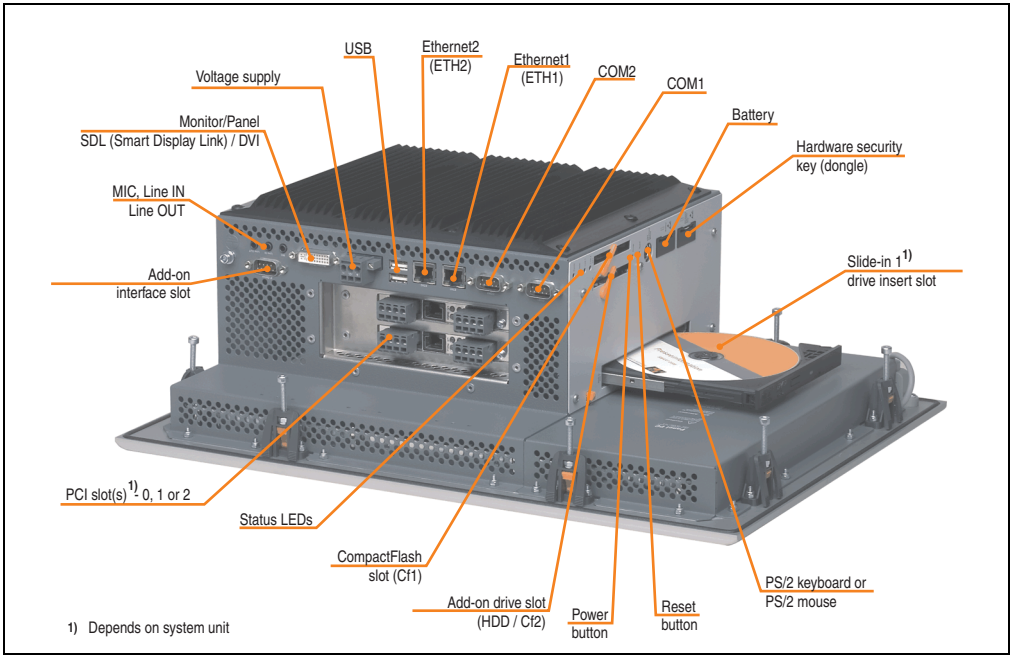
19" Panel PC 700

All values in Watts			19" Panel PC 700 (N270 5PC600.X945-00)	Current system
Total power supply		Total power supply power (maximum)		110
Total power supply		Total power supply, permanent consumers	25	
Total power supply	5V	Maximum possible at 5V		55
Total power supply	5V	CPU board, permanent consumers	16	
Total power supply	5V	Pro CompactFlash, optional (add-on, slide-in)	1	
Total power supply	5V	Hard disk, optional (add-on, slide-in)	4	
Total power supply	5V	External PS/2 keyboard, optional	1	
Total power supply	5V	USB peripheral, optional (max. 2.5 W per USB1 and USB2 connection)	5	
Total power supply	5V	Interface option (add-on interface), optional	0.5	
Total power supply	5V	External consumers, optional (via base board)	5	
Total power supply	5V	5V consumers ∑		
Total power supply	3V3	Maximum possible at 3V3		23
Total power supply	3V3	System unit, permanent consumers	6	
Total power supply	3V3	Interface option (add-on interface), optional	0.25	
Total power supply	3V3	3V3 consumers ∑		
Total power supply	+12V	Maximum possible at +12V		12
Total power supply	+12V	Fan kit, optional	2.5	
Total power supply	+12V	External consumers, optional (via base board)	10	
Total power supply	+12V	+12V consumers ∑		
Total power supply		All consumers ∑		

Figure 28: Power management - 19" Panel PC 700

2.4 Device interfaces

The following image shows the general and optional device interfaces for an entire Panel PC 700 unit.



Depending on system unit, the device interfaces will vary only in the number of PCI slots and the presence of a slide-in drive slot.

2.4.1 Serial interface COM1

Serial interfaces - COM1		
Type	RS232, modem-capable, not electrically isolated	9-pin DSUB, male
UART	16550 compatible, 16 byte FIFO	
Transfer rate	Max. 115 kBaud	
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

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.

2.4.2 Serial interface COM2

Serial interfaces - COM2		
Type	RS232, modem-capable, not electrically isolated	9-pin DSUB, male
UART	16550 compatible, 16 byte FIFO	
Transfer rate	Max. 115 kBaud	
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

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.

2.4.3 Ethernet connection ETH1

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

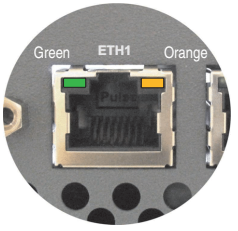
Ethernet connection (ETH1[1])			
Controller	Intel 82562		RJ45 twisted pair (10BaseT/100BaseT), female 
Cabling	S/STP (Cat5e)		
Transfer rate	10/100 Mbit/s [2]		
Cable length	See table 33 "Ethernet cable lengths when using X945 CPU boards", on page 73.		
LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 32: 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

Special drivers are 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 X945 CPU boards, 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
5PC720.1043-00	Revision < I0	Starting with revision I0
5PC720.1043-01	Revision < H0	Starting with Revision H0
5PC720.1214-00	Revision < J0	Starting with revision J0
5PC720.1214-01	-	Starting with revision C0
5PC720.1505-00	Revision < J0	Starting with revision J0
5PC720.1505-01	Revision < I0	Starting with revision I0
5PC720.1505-02	Revision < H0	Starting with Revision H0
5PC720.1706-00	-	Starting with revision C0
5PC720.1906-00	-	Starting with revision C0
5PC781.1043-00	Revision < G0	Starting with revision G0
5PC781.1505-00	Revision < H0	Starting with Revision H0
5PC782.1043-00	Revision < G0	Starting with revision G0

Table 33: Ethernet cable lengths when using X945 CPU boards

2.4.4 Ethernet connection ETH2

This Ethernet connection is integrated in the system unit.

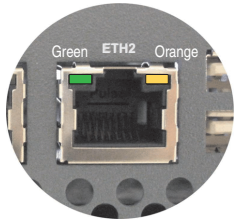
Ethernet connection (ETH1[1])			
Controller	Intel 82551ER		RJ45 twisted pair (10BaseT/100BaseT), female 
Cabling	S/STP (Cat5e)		
Transfer rate	10/100 Mbit/s [2]		
Cable length	max. 100 m (min. Cat5e)		
LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 34: 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

Special drivers are 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.

2.4.5 USB ports

All PPC700 devices have a USB 2.0 (Universal Serial Bus) Host Controller with multiple USB ports, 3 of which (2x back, 1x front) are on the outside for easy user access.

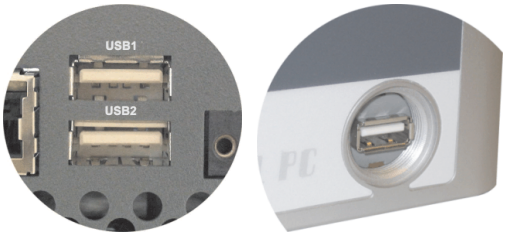
Universal Serial Bus (USB1 and UBS2)[1]		
Transfer rate	Low speed (1.5 Mbit/s), Full Speed (12 Mbit/s) to high speed (480 Mbit/s)	USB type A, female  Back side Front side
Power supply	Max. 500 mA per port[2]	
Maximum Cable length	5 m (not including hub)	

Table 35: USB port - back

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 the Service Pack, Windows XP will only support USB 1.1.
USB 2.0 comes already integrated in B&R's XP embedded operating system.

Information:

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

2.4.6 Supply voltage

The PPC700 system units have a 24 VDC ATX compatible power supply.

System unit	Max. performance at + 5 V	Max. performance at + 3V3	Max. power at + 12 V	Max. power at - 12 V	Max. total power
All types	55 W	23 W	12 W	1.2 W	110 W

Table 36: Power supply

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 Panel PC 700 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 29: Supply voltage connection

Ground

> **Warning!**
>
> **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.**

PPC700 systems are equipped with a ground connection. The M4 self-locking nut can be used, for example, to fasten a copper strip that is built into the PPC700 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 30: Ground connection

See the section "Grounding concept", on page 214.

2.4.7 Monitor / Panel interface

Monitor / Panel		
The following will provide an overview of the video signals available with different system units and CPU boards. For details, see technical data for the CPU board being used.		24-pin DVI-I with special functions, female
System unit	**X945 board**	
5PC720.1043-00	RGB	
5PC720.1043-01	RGB	
5PC720.1214-00	RGB	
5PC720.1214-01	RGB	
5PC720.1505-00	RGB	
5PC720.1505-01	RGB	
5PC720.1505-02	RGB	
5PC720.1706-00	RGB	
5PC720.1906-00	RGB	
5PC781.1043-00	RGB	
5PC781.1505-00	RGB	
5PC782.1043-00	RGB	

Figure 31: Monitor / Panel interface

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

Caution!

RGB cables can only be plugged in and unplugged when the PPC700 and display device (monitor) are turned off.

2.4.8 MIC, Line IN and Line OUT ports

All PPC700 systems include an AC97 (specification 2.2) compatible sound chip with access to the channels MIC, Line IN and Line OUT from the outside.

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 37: MIC, Line IN and Line OUT ports

Driver support

Special drivers are 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.

2.4.9 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 195.

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 38: Add-on interface slot

Information:

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

2.4.10 PCI slots

Up to 2 PCI slots are available, depending on the system unit. 5 volt cards and universal cards that comply with the PCI half-size standard 2.2 and do not exceed the following dimensions can be inserted.

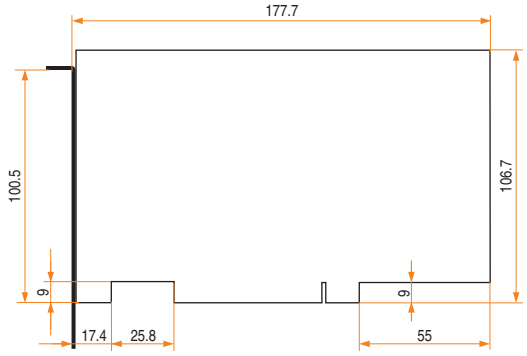


Figure 32: Dimensions - Standard half-size PCI cards

Information:

The total performance of one PCI card per PCI slot should not exceed the limit with or without a fan kit (see section 2.3 "Power management").

Technical data

Features	PCI bus properties
Standard	PCI 2.2
Design	Half-size PCI
PCI bus type	32-bit
PCI bus speed	33 MHz

Table 39: Technical data - PCI bus

Voltages on the PCI slot plug

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.

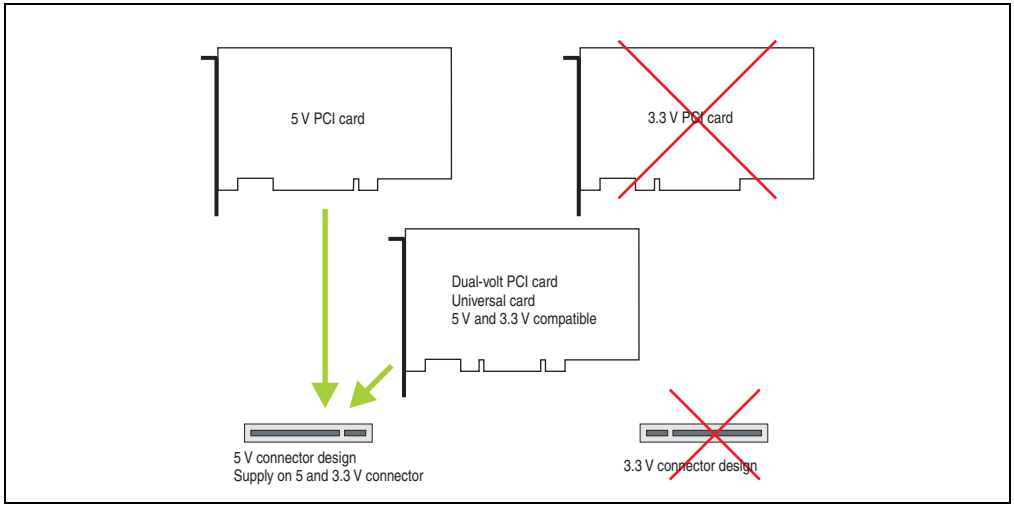


Figure 33: PCI connector type: 5 volt

2.4.11 Status LEDs

The status LEDs are integrated in the system unit.

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)	
HDD	Yellow	On	Signals IDE drive access (CF, HDD, CD, etc.)	
Link 1	Yellow	On	Indicates an active SDL connection on the monitor / panel plug.	
		blinking	An active SDL connection has been interrupted by a loss of power in the display unit.	
Link 2	-	-	No function	

Table 40: Status LEDs

2.4.12 CompactFlash slot (CF1)

This CompactFlash slot is a fixed component of an PPC700 system, and is defined in BIOS as the primary master drive. Available CompactFlash cards - see table 13 "Model numbers - CompactFlash cards", on page 27.

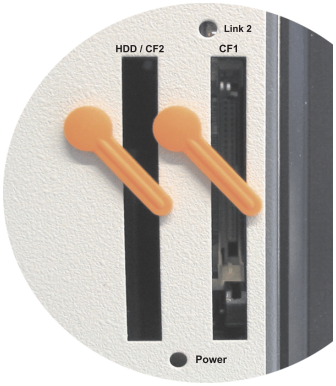
CompactFlash slot (CF1)		
Connection	Primary master IDE device	
CompactFlash Type	Type I	
Accessories	**Short description**	
5CFCRD.0512-04	CompactFlash 512 MB B&R	
5CFCRD.1024-04	CompactFlash 1024 MB B&R	
5CFCRD.2048-04	CompactFlash 2048 MB B&R	
5CFCRD.4096-04	CompactFlash 4096 MB B&R	
5CFCRD.8192-04	CompactFlash 8192 MB B&R	
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 41: CompactFlash slot (CF1)

Warning!

Turn off power before inserting or removing the CompactFlash card!

2.4.13 Hard disk / CompactFlash slot (HDD/CF2)

This slot allows for installation of a hard disk or a second CompactFlash slot as so-called add-on drives (see table 8 "Model numbers - Drives" for available add-on drives). The add-on drive is referred to in BIOS as the primary slave drive.

Information:

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

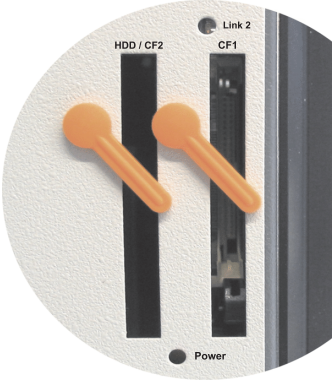
Hard disk / CompactFlash slot (HDD/CF2)		
Connection	Primary slave IDE device	
Add-on hard disks 2.5" drive (internal)		
5AC600.HDDI-05	Add-on hard disk 40 GB ET, 24/7	
5AC600.HDDI-06	Add-on hard disk 80 GB ET, 24/7	
Add-on CompactFlash slot		
5AC600.CFSI-00	Add-on CompactFlash slot	
CompactFlash Type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

Warning!

Turn off power before inserting or removing the CompactFlash card!

2.4.14 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 276 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 PPC700 or shuts down the operating system and switches off the PPC700. **Press and hold** ... ATX power supply switches off without shutting down the PPC700 (**data could be lost!**). Pressing the power button does not reset the MTCX processor.	

Table 43: Power button

2.4.15 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 PPC700 is restarted (cold restart). The MTCX processor is not reset when the reset button is pressed.	

Table 44: Reset button

Warning!

A system reset can result in data loss!

2.4.16 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.

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!).

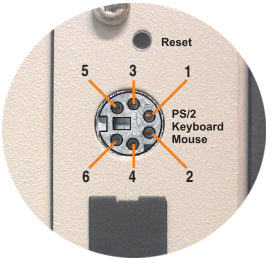
Connection for keyboard/mouse (PS/2)		
Pin	**Assignment**	PS/2 socket, female
1	DATA 0	
2	DATA 1	
3	GND	
4	+5 V[1)]	
5	CLK 0	
6	CLK 1	

Table 45: Connection for external keyboard/mouse (PS/2)

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

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").

2.4.17 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 (at 50°C, 8.5 µA 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).

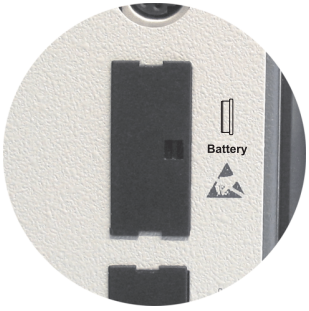
Battery		
Battery Type Removable Service life	 Renata 950 mAh Yes, accessible from the outside 4 years[1)]	
Accessories	**Short description**	
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery, 1 pc.,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

Table 46: Battery

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

For more on changing the lithium battery, see chapter 7 "Maintenance / Servicing", section 1 "Changing the battery", on page 435.

For technical information on the lithium battery, see chapter 6 "Accessories", section 2 "Replacement CMOS batteries", on page 360.

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 47: Meaning of battery status

Hardware requirements (system unit)

- 5PC720.1043-00 starting with Rev. K0
- 5PC720.1043-01 starting with Rev. I0
- 5PC720.1214-00 starting with Rev. K0
- 5PC720.1214-01 starting with Rev. D0
- 5PC720.1505-00 starting with Rev. M0
- 5PC720.1505-01 starting with Rev. L0
- 5PC720.1505-02 starting with Rev. K0
- 5PC720.1706-00 starting with Rev. E0
- 5PC720.1906-00 starting with Rev. G0
- 5PC781.1043-00 starting with Rev. H0
- 5PC781.1505-00 starting with Rev. J0
- 5PC782.1043-00 starting with Rev. H0

Firmware / BIOS requirements

- APC620 / Panel PC 700 Firmware Upgrade V1.19 (MTCX PX32: V1.63, MTCX FPGA V1.19)
- BIOS 855GME (ETX) V1.26, BIOS 855GME (XTX) V1.14

2.4.18 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 48: Hardware security key

Warning!

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

I/O address and IRQ

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

Table 49: 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").

2.4.19 Slide-in slot 1 drive slot

This slide-in slot 1 drive slot exists only in PPC700 system units with 1 or 2 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 26.

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.

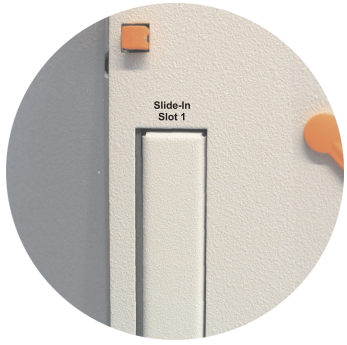
Slide-in slot 1		
Connection	USB	
Accessories	**Short description**	
5AC600.FDDS-00	Slide-in USB FDD	

Table 50: Slide-in slot 1

Caution!

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

2.5 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 on the back of the device. This serial number represents all of the components built into the system (model number, name, revision, serial number, delivery date and duration of warranty).

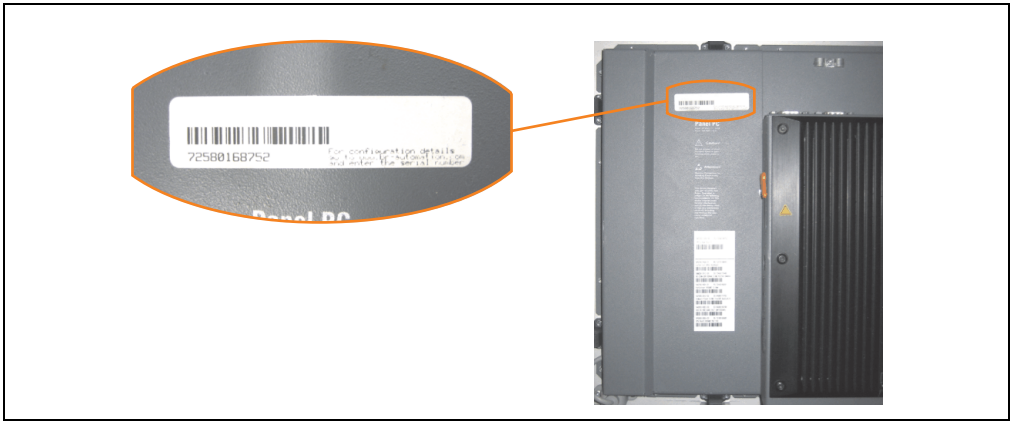


Figure 34: Serial number sticker for PPC700 assembly (back)

A sticker with detailed information about the individual components can also be found on the device.

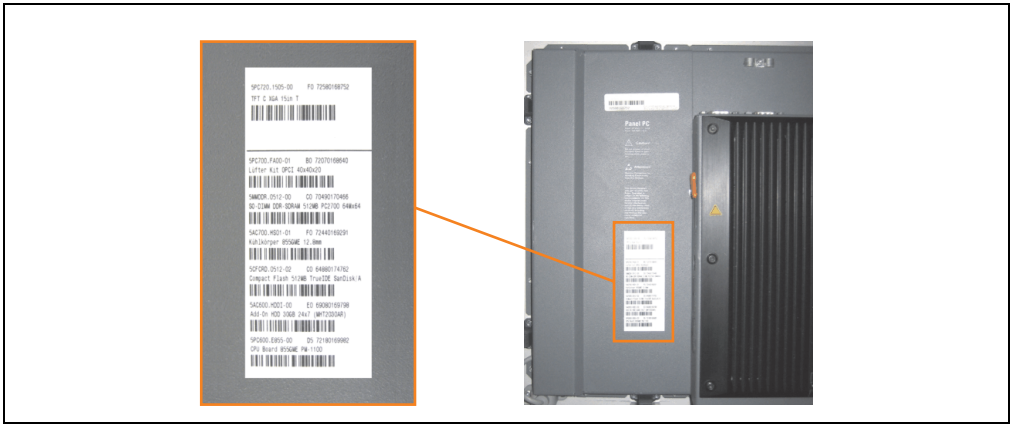


Figure 35: Serial number stickers for individual PPC700 components

This information can also be found on the B&R homepage. Enter the serial number for the entire device 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.

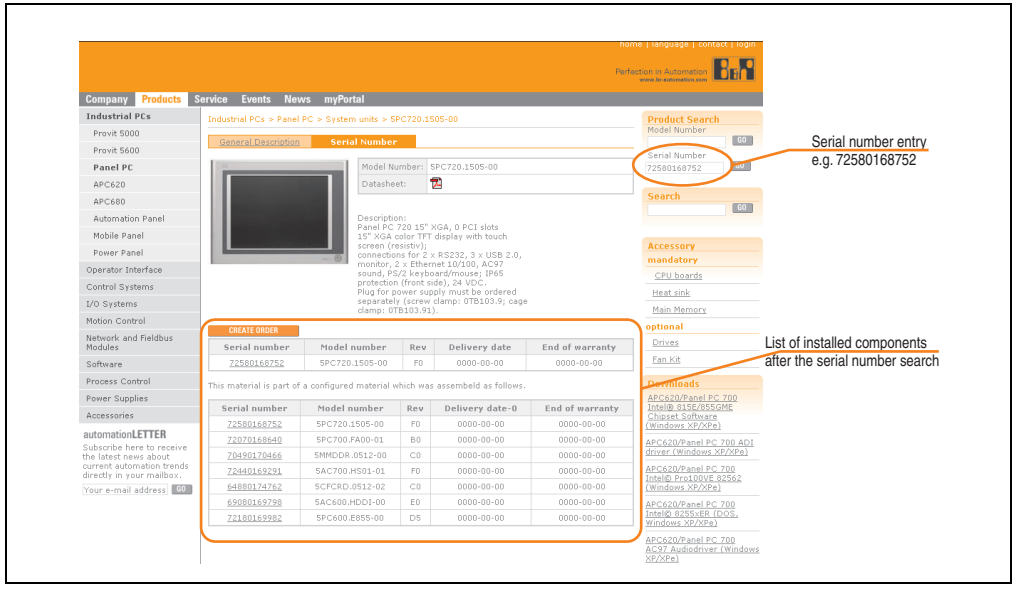


Figure 36: Example of serial number search: 72580168752

3. Individual components

3.1 System units

All components (CPU board, fan, main memory, drives) are connected together to form the system unit.

3.1.1 Panel PC 5PC720.1043-00

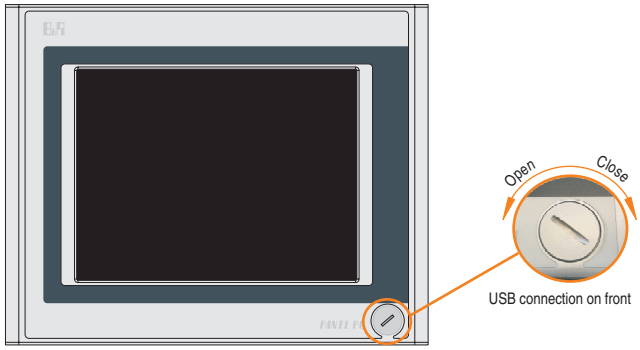


Figure 37: Front view 5PC720.1043-00

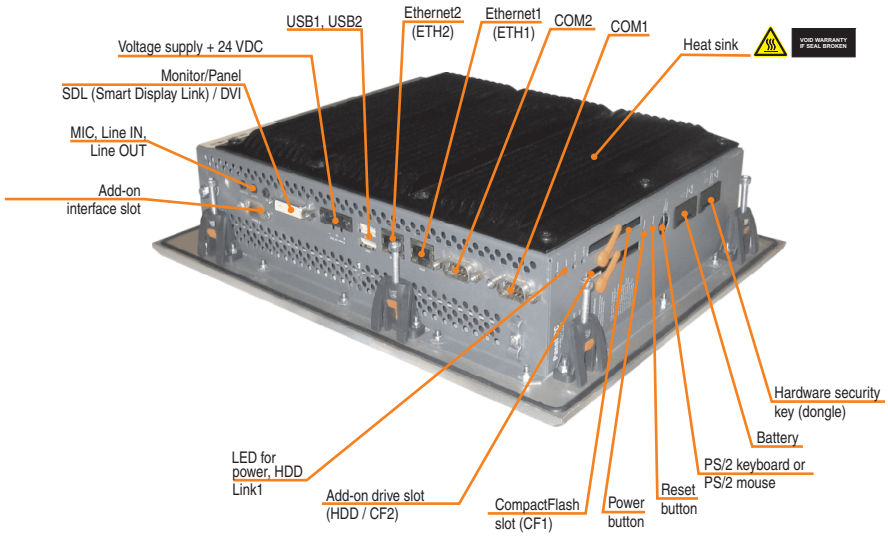


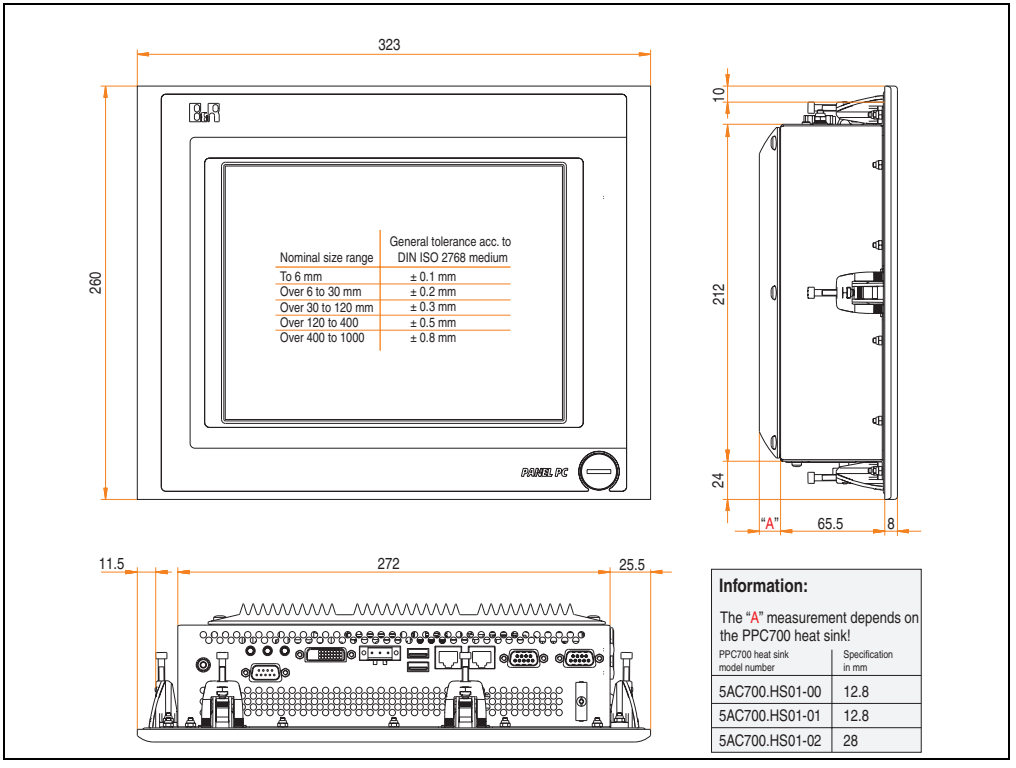
Figure 38: Rear view 5PC720.1043-00

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the PPC700 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").

Dimensions



Nominal size range	General tolerance acc. to DIN ISO 2768 medium
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

PPC700 heat sink model number	Specification in mm
5AC700.HS01-00	12.8
5AC700.HS01-01	12.8
5AC700.HS01-02	28

Figure 39: Dimensions - 5PC720.1043-00

Technical data

Features	5PC720.1043-00
B&R ID code	$1C5C
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM1", on page 70 and "Serial interface COM2", on page 71 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 72 and "Ethernet connection ETH2", on page 74 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 75 USB 2.0 3 (2x back side, 1x front side) Up to 480 Mbit [1] (high speed) Type A
Monitor / Panel Type	See also "Monitor / Panel interface", on page 78 DVI-I, female
AC97 sound Inputs Outputs	See also "MIC, Line IN and Line OUT ports", on page 79 Microphone, line in Line out
Add-on interface slot Amount	See also "Add-on interface slot", on page 80 1
PCI slots Amount Type Standard	-
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 83 Primary master
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 84 Combined Primary slave
Insert for slide-in drive 1 Internal organization	Yes, see also "Slide-in slot 1 drive slot", on page 90 Secondary Slave
SRAM internal slot options	No
Reset button	Yes, see also "Power button", on page 85
Power button	Yes, see also "Reset button", on page 85
PS/2 keyboard / mouse Type	Yes, see also "PS/2 keyboard / mouse", on page 86 Combined, automatically detected
Battery Type Removable Service life	Yes, see also "Battery", on page 87 Renata 950 mAh Yes, accessible from the outside 4 years [2]
Hardware security key compartment Optimized for	Yes, see also "Hardware security key", on page 89 DS1425 from MAXIM/Dallas

Table 51: Technical data - 5PC720.1043-00

Features	5PC720.1043-00
Fan insert for fan kit	Yes, compatible fan kit - see section 3.8.2 "Fan kit 5PC700.FA02-00", on page 205
LED Amount	See also "Status LEDs", on page 82 3 (Power, HDD, Link 1)
Touch screen[3)] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 465) Horizontal Vertical Background lighting Brightness Half-brightness time[4)]	 Color TFT 10.4 inch (264 mm) 262,144 colors VGA, 640 x 480 pixels 300:1 Direction R / direction L = 70° Direction U / direction D = 70° 350 cd/m² 50000 hours
Keys Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	See also "Supply voltage", on page 76 24 VDC ±25% 3.8 A Typ. 10 A, max. 40 A for < 300 µs See power management section "Power calculation for 10.4" Panel PC 700", on page 57 Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Gasket	 Naturally anodized aluminum[5)] Gray[5)] Polyester Similar to Pantone432CV[5)] Similar to Pantone 427CV[5)] Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	Also see diagram "Dimensions - 5PC720.1043-00", on page 94 323 mm 260 mm 86.3 mm (depending on the heat sink)
Weight	Approx. 3.6 kg

Table 51: Technical data - 5PC720.1043-00 (Forts.)

Environmental characteristics	5PC720.1043-00
Ambient temperature Operation Bearings Transport	 See 2.1.1 "Ambient temperatures with system unit 5PC720.1043-00", on page 42 -30 to +70°C -30 to +70°C
Relative humidity Operation / Storage / Transport	 T <= 40°C: 5% to 90%, non-condensing T > 40°C: < 90%, non-condensing
Vibration 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 Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 51: Technical data - 5PC720.1043-00 (Forts.)

1) Software must support USB 2.0 (e.g. Windows XP with at least Service Pack 1).
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).
4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
5) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Cutout installation

The Panel PC 700 with preassembled mounting blocks is installed e.g. in a housing cutout. A cutout that corresponds to the following drawing must be made.

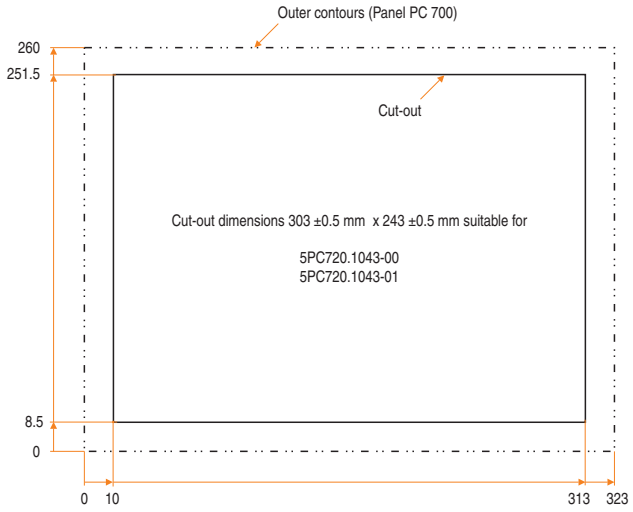


Figure 40: Cutout installation - 5PC720.1043-00

For further information regarding mounting and installation position, see chapter 3 "Commissioning", on page 209.

3.1.2 Panel PC 5PC720.1043-01

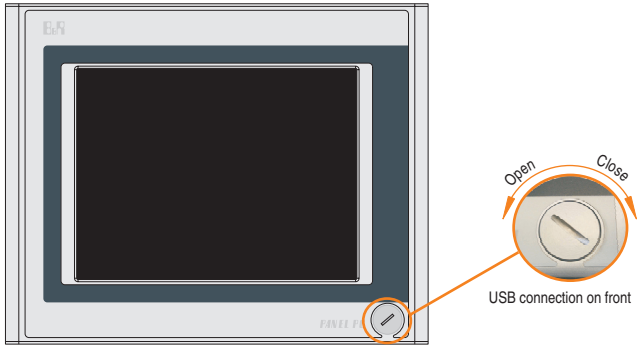
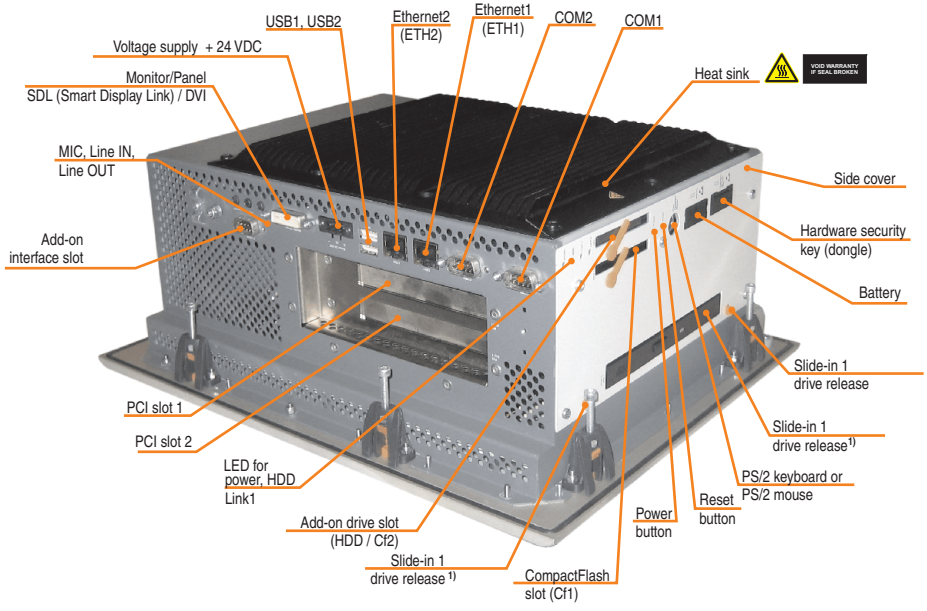


Figure 41: Front view 5PC720.1043-01



1) The side cover of the Panel PC 700 must be removed before releasing the drive!

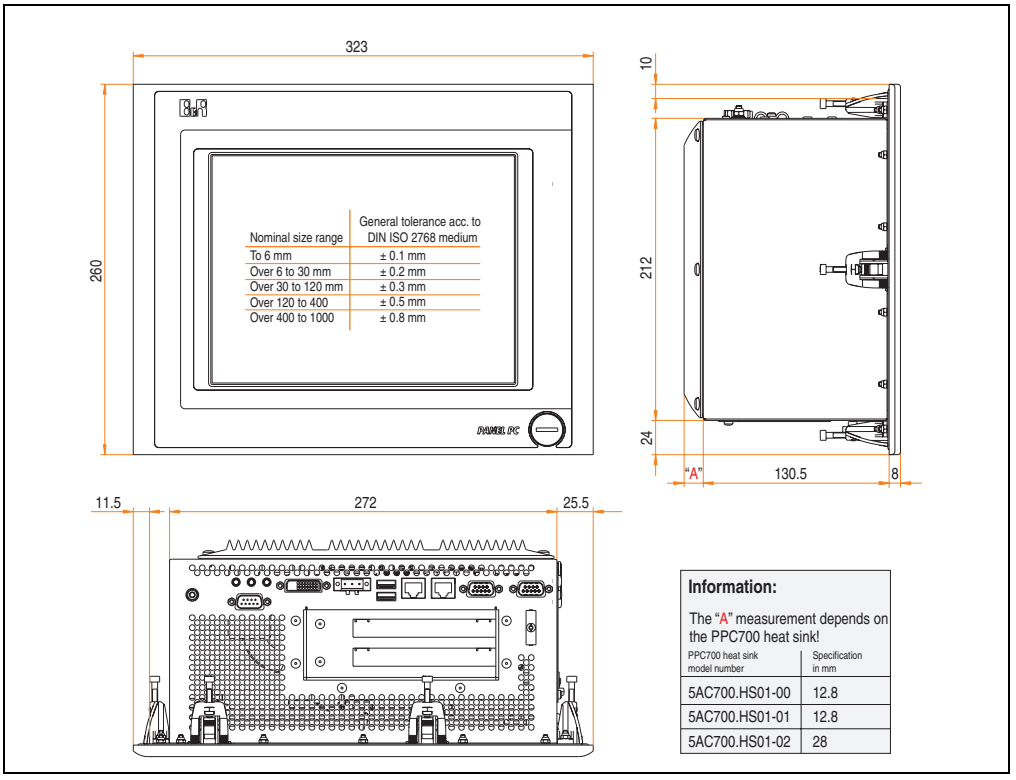
Figure 42: Rear view 5PC720.1043-01

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the PPC700 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").

Dimensions



Nominal size range	General tolerance acc. to DIN ISO 2768 medium
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

PPC700 heat sink model number	Specification in mm
5AC700.HS01-00	12.8
5AC700.HS01-01	12.8
5AC700.HS01-02	28

Figure 43: Dimensions - 5PC720.1043-01

Technical data

Features	5PC720.1043-01
B&R ID code	$1C5D
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM1", on page 70 and "Serial interface COM2", on page 71 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 72 and "Ethernet connection ETH2", on page 74 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 75 USB 2.0 3 (2x back side, 1x front side) Up to 480 Mbit [1] (high speed) Type A
Monitor / Panel Type	See also "Monitor / Panel interface", on page 78 DVI-I, female
AC97 sound Inputs Outputs	See also "MIC, Line IN and Line OUT ports", on page 79 Microphone, line in Line out
Add-on interface slot Amount	See also "Add-on interface slot", on page 80 1
PCI slots Amount Type Standard	See also "PCI slots", on page 81 2 Half-size According to PCI half-size standard 2.2
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 83 Primary master
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 84 Combined Primary slave
Insert for slide-in drive 1 Internal organization	Yes, see also "Slide-in slot 1 drive slot", on page 90 Secondary Slave
SRAM internal slot options	Yes (available starting with revision I0)
Reset button	Yes, see also "Power button", on page 85
Power button	Yes, see also "Reset button", on page 85
PS/2 keyboard / mouse Type	Yes, see also "PS/2 keyboard / mouse", on page 86 Combined, automatically detected
Battery Type Removable Service life	Yes, see also "Battery", on page 87 Renata 950 mAh Yes, accessible from the outside 4 years [2]
Hardware security key compartment Optimized for	Yes, see also "Hardware security key", on page 89 DS1425 from MAXIM/Dallas

Table 52: Technical data - 5PC720.1043-01

Features	5PC720.1043-01
Fan insert for fan kit	Yes, compatible fan kit - see section 3.8.2 "Fan kit 5PC700.FA02-00", on page 205
LED Amount	See also "Status LEDs", on page 82 3 (Power, HDD, Link 1)
Touch screen[3)] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 465) Horizontal Vertical Background lighting Brightness Half-brightness time[4)]	 Color TFT 10.4 inch (264 mm) 262,144 colors VGA, 640 x 480 pixels 300:1 Direction R / direction L =70° Direction U / direction D = 70° 350 cd/m² 50000 hours
Keys Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	See also "Supply voltage", on page 76 24 VDC ±25% 3.8 A Typ. 10 A, max. 40 A for < 300 µs See power management section "Power calculation for 10.4" Panel PC 700", on page 57 Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Gasket	 Naturally anodized aluminum[5)] Gray[5)] Polyester Similar to Pantone432CV[5)] Similar to Pantone 427CV[5)] Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	Also see diagram "Dimensions - 5PC720.1043-01", on page 100 323 mm 260 mm 151.3 mm (depending on the heat sink)
Weight	Approx. 4.5 kg

Table 52: Technical data - 5PC720.1043-01 (Forts.)

Environmental characteristics	5PC720.1043-01
Ambient temperature Operation Bearings Transport	 See 2.1.2 "Ambient temperatures with system unit 5PC720.1043-01", on page 43 -30 to +70°C -30 to +70°C
Relative humidity Operation / Storage / Transport	 T <= 40°C: 5% to 90%, non-condensing T > 40°C: < 90%, non-condensing
Vibration 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 Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 52: Technical data - 5PC720.1043-01 (Forts.)

1) Software must support USB 2.0 (e.g. Windows XP with at least Service Pack 1).
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).
4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
5) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Cutout installation

The Panel PC 700 with preassembled mounting blocks is installed e.g. in a housing cutout. A cutout that corresponds to the following drawing must be made.

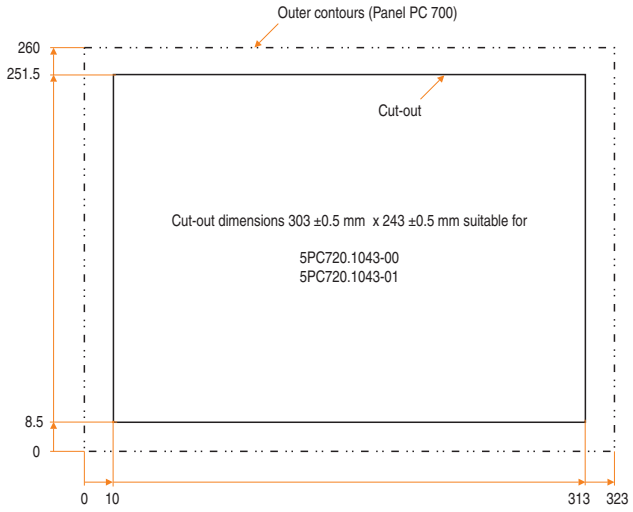


Figure 44: Cutout installation - 5PC720.1043-01

For further information regarding mounting and installation position, see chapter 3 "Commissioning", on page 209.

3.1.3 Panel PC 5PC720.1214-00

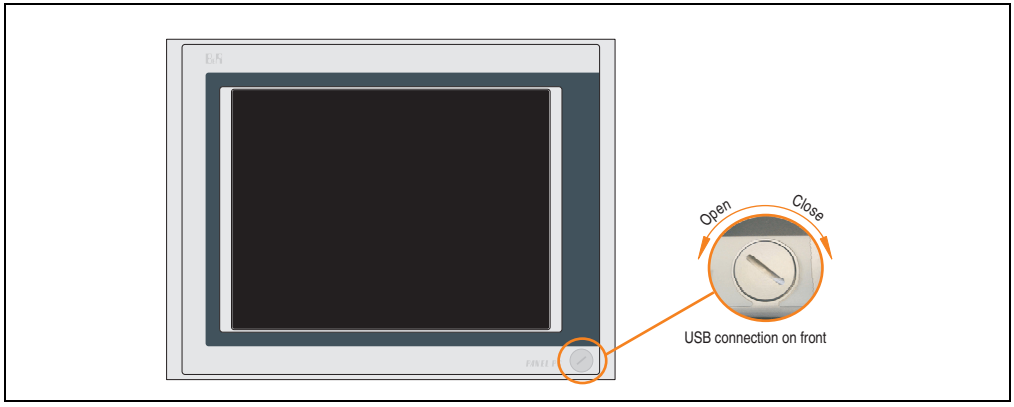


Figure 45: Front view 5PC720.1214-00

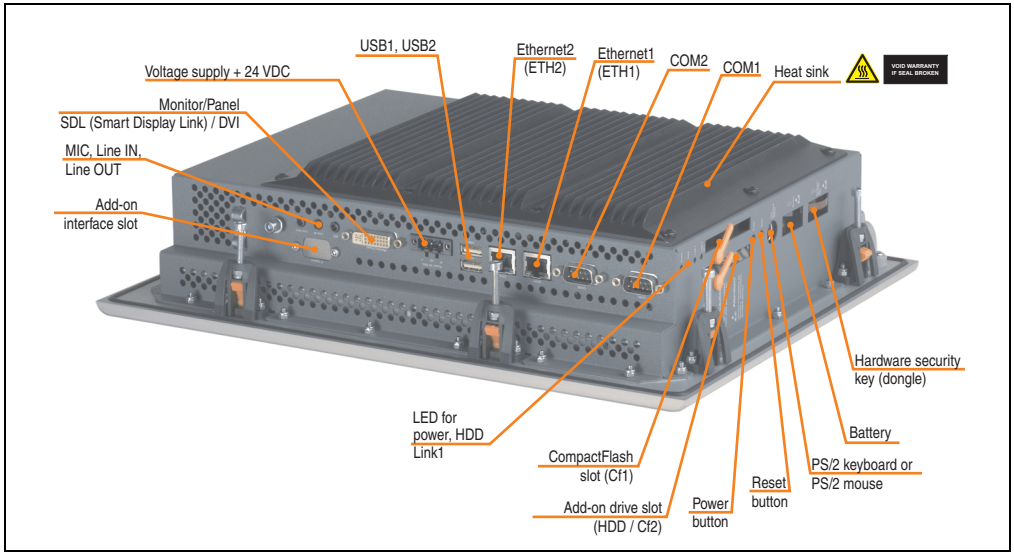


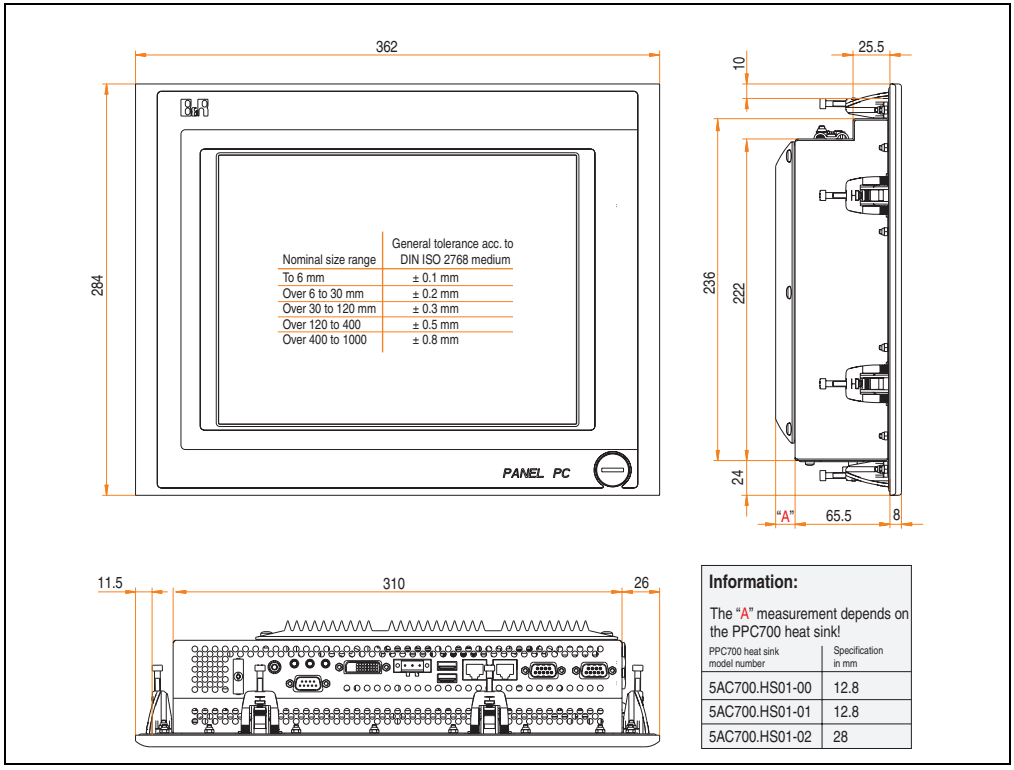
Figure 46: Rear view 5PC720.1214-00

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the PPC700 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").

Dimensions



Nominal size range	General tolerance acc. to DIN ISO 2768 medium
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

PPC700 heat sink model number	Specification in mm
5AC700.HS01-00	12.8
5AC700.HS01-01	12.8
5AC700.HS01-02	28

Figure 47: Dimensions - 5PC720.1214-00

Technical data

Features	5PC720.1214-00
B&R ID code	$1C5E
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM1", on page 70 and "Serial interface COM2", on page 71 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 72 and "Ethernet connection ETH2", on page 74 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)

Table 53: Technical data - 5PC720.1214-00

Features	5PC720.1214-00
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 75 USB 2.0 3 (2x back side, 1x front side) Up to 480 Mbit [1] (high speed) Type A
Monitor / Panel Type	See also "Monitor / Panel interface", on page 78 DVI-I, female
AC97 sound Inputs Outputs	See also "MIC, Line IN and Line OUT ports", on page 79 Microphone, line in Line out
Add-on interface slot Amount	See also "Add-on interface slot", on page 80 1
PCI slots Amount Type Standard	-
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 83 Primary master
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 84 Combined Primary slave
Insert for slide-in drive 1 Internal organization	-
SRAM internal slot options	No
Reset button	Yes, see also "Power button", on page 85
Power button	Yes, see also "Reset button", on page 85
PS/2 keyboard / mouse Type	Yes, see also "PS/2 keyboard / mouse", on page 86 Combined, automatically detected
Battery Type Removable Service life	Yes, see also "Battery", on page 87 Renata 950 mAh Yes, accessible from the outside 4 years [2]
Hardware security key compartment Optimized for	Yes, see also "Hardware security key", on page 89 DS1425 from MAXIM/Dallas
Fan insert for fan kit	Yes, compatible fan kit - see section 3.8.1 "Fan kit 5PC700.FA00-01", on page 204
LED Amount	See also "Status LEDs", on page 82 3 (Power, HDD, Link 1)
Touch screen[3] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%

Table 53: Technical data - 5PC720.1214-00 (Forts.)

Features	5PC720.1214-00
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 465) Horizontal Vertical Background lighting Brightness Half-brightness time[4)]	 Color TFT 12.1 inch (307 mm) 262,144 colors SVGA, 800 x 600 pixels 300:1 Direction R / direction L = 70° Direction U / direction D = 70° 350 cd/m² 50000 hours
Keys Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	See also "Supply voltage", on page 76 24 VDC ±25% 3.8 A Typ. 10 A, max. 40 A for < 300 µs See power management section "Power calculation for 12.1" Panel PC 700", on page 58 Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Gasket	 Naturally anodized aluminum[5)] Gray[5)] Polyester Similar to Pantone432CV[5)] Similar to Pantone 427CV[5)] Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	Also see diagram "Dimensions - 5PC720.1214-00", on page 106 362 mm 284 mm 86.3 mm (depending on the heat sink)
Weight	Approx. 4.2 kg

Table 53: Technical data - 5PC720.1214-00 (Forts.)

Environmental characteristics	5PC720.1214-00
Ambient temperature Operation Bearings Transport	 See 2.1.3 "Ambient temperatures with system unit 5PC720.1214-00", on page 44 -30 to +70°C -30 to +70°C
Relative humidity Operation / Storage / Transport	 T <= 40°C: 5% to 90%, non-condensing T > 40°C: < 90%, non-condensing
Vibration 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 Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 53: Technical data - 5PC720.1214-00 (Forts.)

1) Software must support USB 2.0 (e.g. Windows XP with at least Service Pack 1).
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).
4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
5) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Cutout installation

The Panel PC 700 with preassembled mounting blocks is installed e.g. in a housing cutout. A cutout that corresponds to the following drawing must be made.

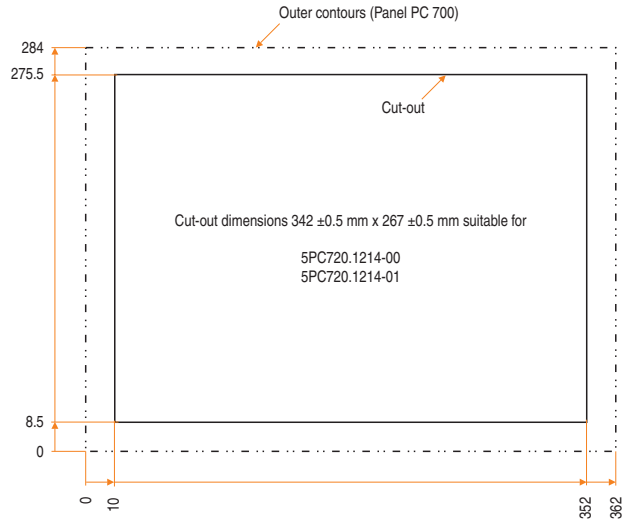


Figure 48: Cutout installation - 5PC720.1214-00

For further information regarding mounting and installation position, see chapter 3 "Commissioning", on page 209.

3.1.4 Panel PC 5PC720.1214-01

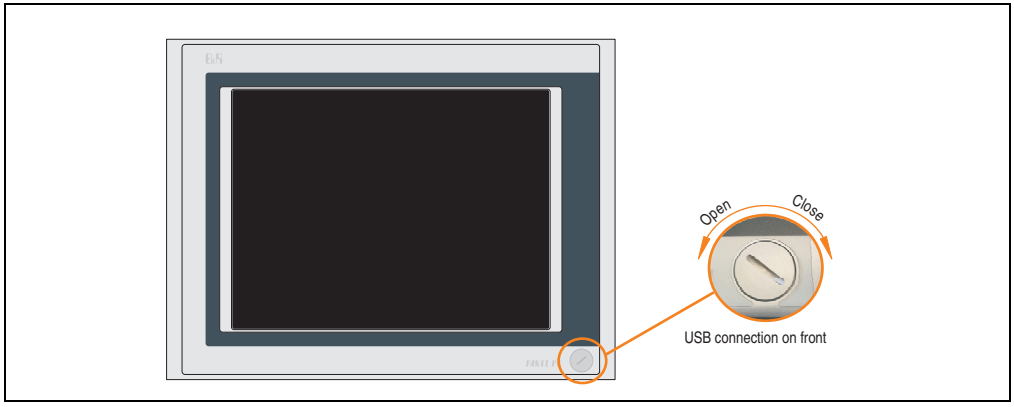


Figure 49: Front view 5PC720.1214-01

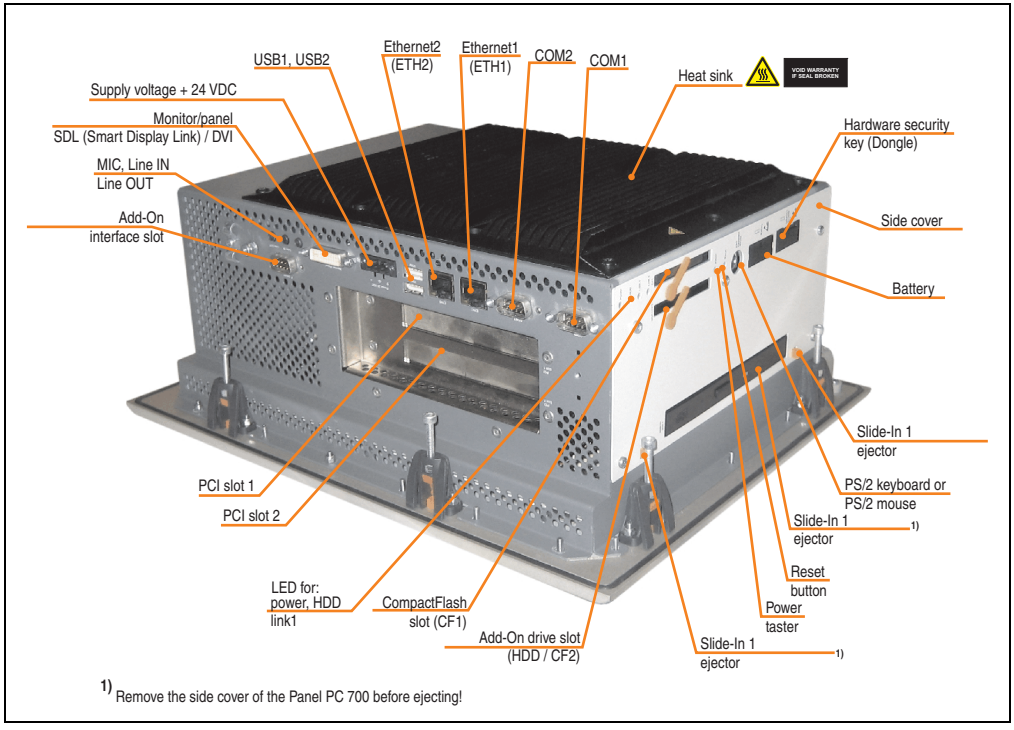


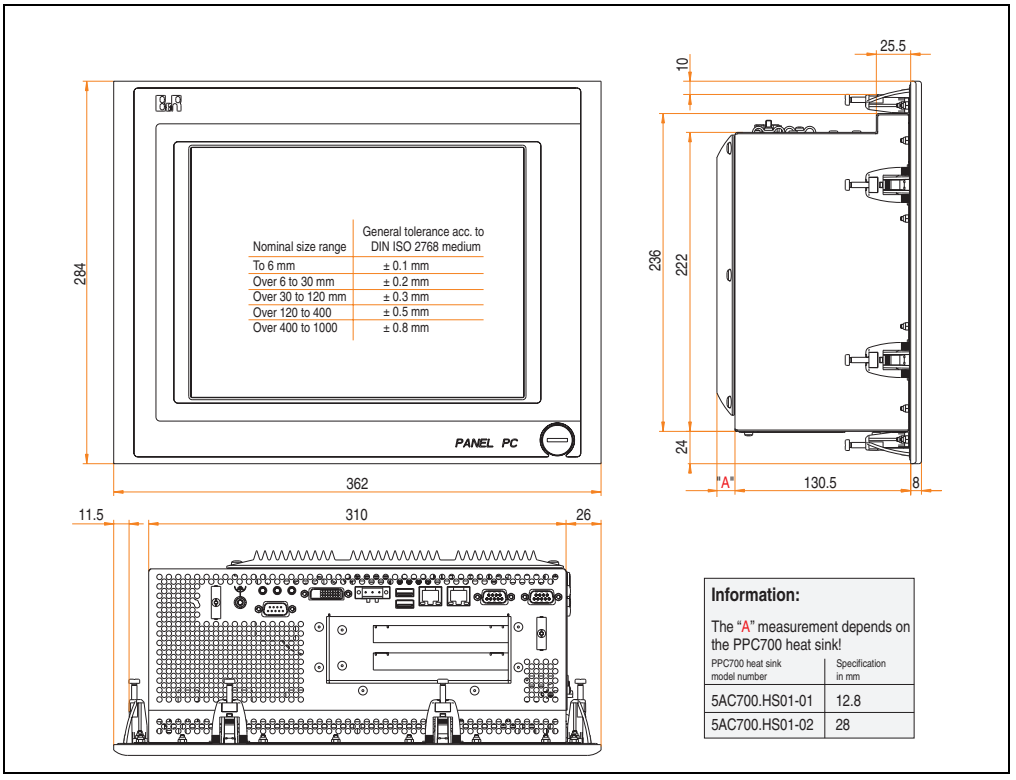
Figure 50: Rear view - 5PC720.1214-01

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the PPC700 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").

Dimensions



Nominal size range	General tolerance acc. to DIN ISO 2768 medium
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

PPC700 heat sink model number	Specification in mm
5AC700.HS01-01	12.8
5AC700.HS01-02	28

Figure 51: Dimensions - 5PC720.1214-01

Technical data

Features	5PC720.1214-01
B&R ID code	$254C
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM1", on page 70 and "Serial interface COM2", on page 71 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 72 and "Ethernet connection ETH2", on page 74 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 75 USB 2.0 3 (2x back side, 1x front side) Up to 480 Mbit [1] (high speed) Type A
Monitor / Panel Type	See also "Monitor / Panel interface", on page 78 DVI-I, female
AC97 sound Inputs Outputs	See also "MIC, Line IN and Line OUT ports", on page 79 Microphone, line in Line out
Add-on interface slot Amount	See also "Add-on interface slot", on page 80 1
PCI slots Amount Type Standard	See also "PCI slots", on page 81 2 Half-size According to PCI half-size standard 2.2
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 83 Primary master
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 84 Combined Primary slave
Insert for slide-in drive 1 Internal organization	-
SRAM internal slot options	Yes (available starting with revision D0)
Reset button	Yes, see also "Power button", on page 85
Power button	Yes, see also "Reset button", on page 85
PS/2 keyboard / mouse Type	Yes, see also "PS/2 keyboard / mouse", on page 86 Combined, automatically detected
Battery Type Removable Service life	Yes, see also "Battery", on page 87 Renata 950 mAh Yes, accessible from the outside 4 years [2]
Hardware security key compartment Optimized for	Yes, see also "Hardware security key", on page 89 DS1425 from MAXIM/Dallas

Table 54: Technical data - 5PC720.1214-01

Features	5PC720.1214-01
Fan insert for fan kit	Yes, compatible fan kit - see section 3.8.1 "Fan kit 5PC700.FA00-01", on page 204
LED Amount	See also "Status LEDs", on page 82 3 (Power, HDD, Link 1)
Touch screen[3)] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 465) Horizontal Vertical Background lighting Brightness Half-brightness time[4)]	 Color TFT 12.1 inch (307 mm) 262,144 colors SVGA, 800 x 600 pixels 300:1 Direction R / direction L = 70° Direction U / direction D = 70° 350 cd/m² 50000 hours
Keys Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	See also "Supply voltage", on page 76 24 VDC ±25% 3.8 A Typ. 10 A, max. 40 A for < 300 µs See power management section "Power calculation for 12.1" Panel PC 700", on page 58 Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Gasket	 Naturally anodized aluminum[5)] Gray[5)] Polyester Similar to Pantone432CV[5)] Similar to Pantone 427CV[5)] Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	Also see diagram "Dimensions - 5PC720.1214-01", on page 112 362 mm 284 mm 151.3 mm (depending on the heat sink)
Weight	Approx. 5.3 kg

Table 54: Technical data - 5PC720.1214-01 (Forts.)

Environmental characteristics	5PC720.1214-01
Ambient temperature Operation Bearings Transport	 See 2.1.4 "Ambient temperatures with system unit 5PC720.1214-01", on page 45 -30 to +70°C -30 to +70°C
Relative humidity Operation / Storage / Transport	 T <= 40°C: 5% to 90%, non-condensing T > 40°C: < 90%, non-condensing
Vibration 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 Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 54: Technical data - 5PC720.1214-01 (Forts.)

1) Software must support USB 2.0 (e.g. Windows XP with at least Service Pack 1).
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).
4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
5) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Cutout installation

The Panel PC 700 with preassembled mounting blocks is installed e.g. in a housing cutout. A cutout that corresponds to the following drawing must be made.

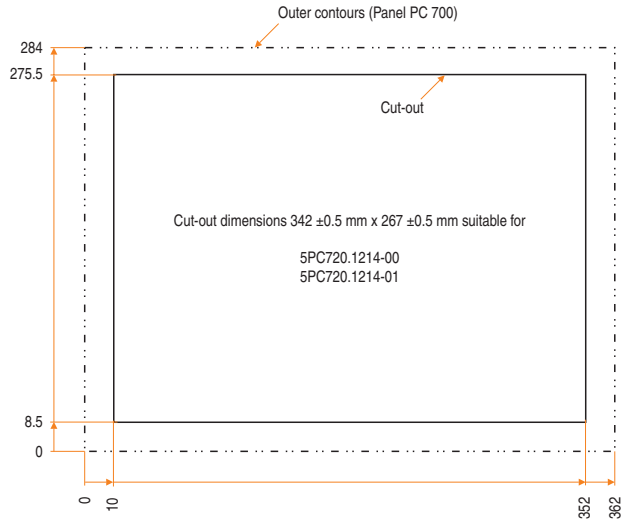


Figure 52: Cutout installation - 5PC720.1214-01

For further information regarding mounting and installation position, see chapter 3 "Commissioning", on page 209.

3.1.5 Panel PC 5PC720.1505-00

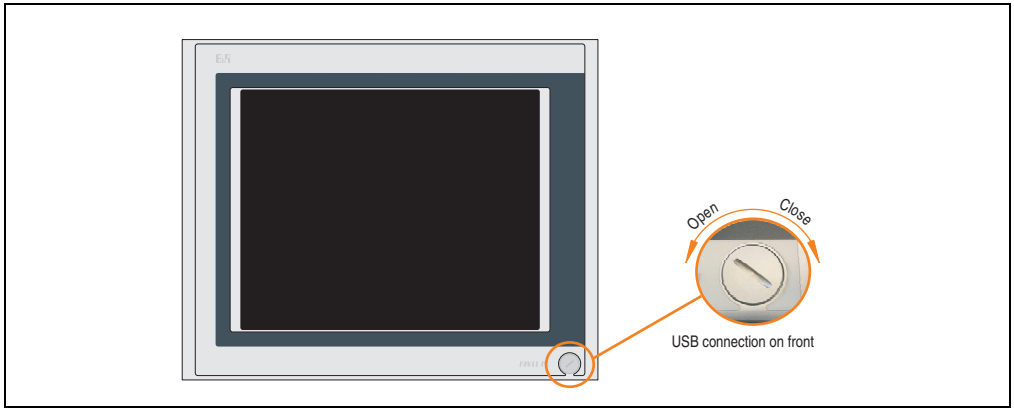


Figure 53: Front view 5PC720.1505-00

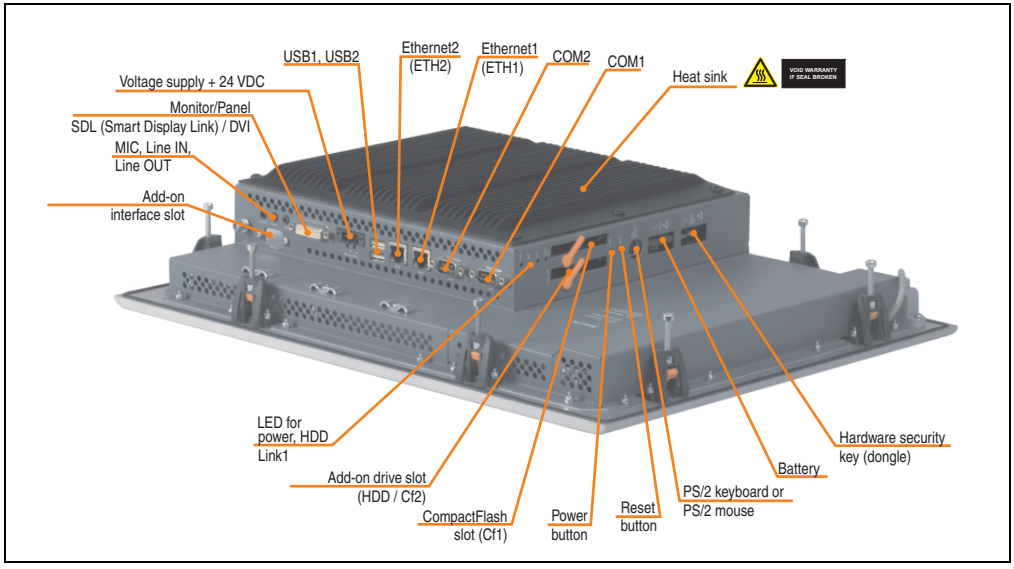


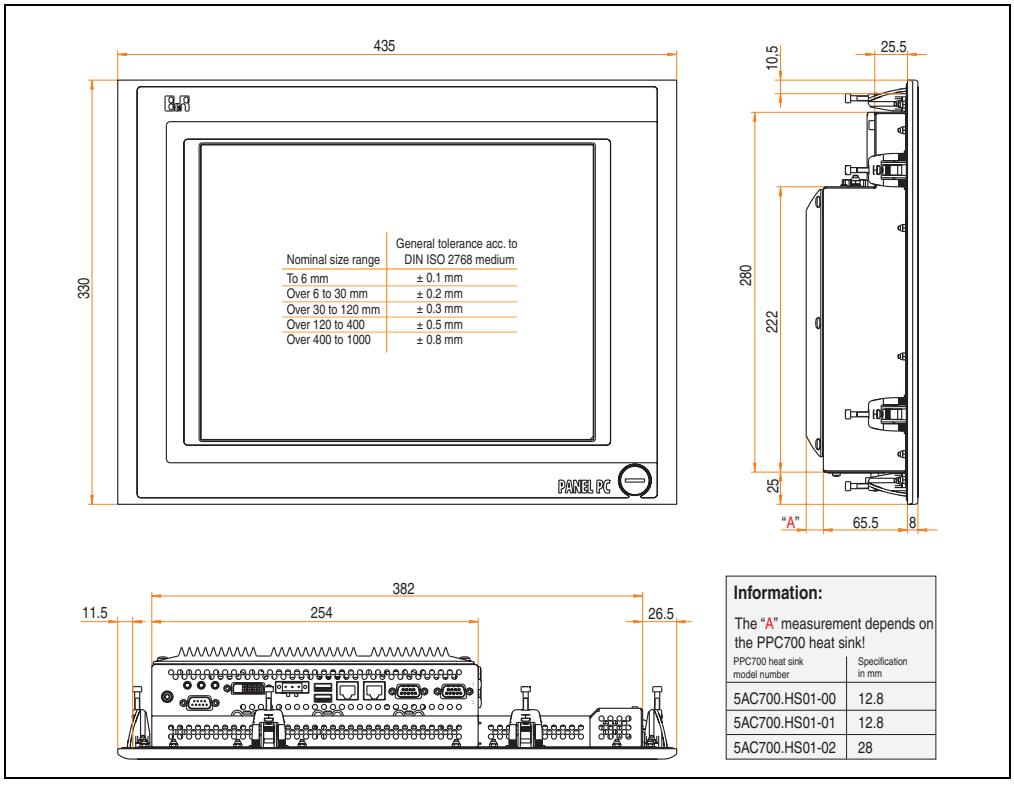
Figure 54: Rear view 5PC720.1505-00

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the PPC700 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").

Dimensions



Nominal size range	General tolerance acc. to DIN ISO 2768 medium
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

PPC700 heat sink model number	Specification in mm
5AC700.HS01-00	12.8
5AC700.HS01-01	12.8
5AC700.HS01-02	28

Figure 55: Dimensions - 5PC720.1505-00

Technical data

Features	5PC720.1505-00
B&R ID code	$1C5A
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM1", on page 70 and "Serial interface COM2", on page 71 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 72 and "Ethernet connection ETH2", on page 74 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 75 USB 2.0 3 (2x back side, 1x front side) Up to 480 Mbit [1] (high speed) Type A
Monitor / Panel Type	See also "Monitor / Panel interface", on page 78 DVI-I, female
AC97 sound Inputs Outputs	See also "MIC, Line IN and Line OUT ports", on page 79 Microphone, line in Line out
Add-on interface slot Amount	See also "Add-on interface slot", on page 80 1
PCI slots Amount Type Standard	-
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 83 Primary master
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 84 Combined Primary slave
Insert for slide-in drive 1 Internal organization	-
SRAM internal slot options	No
Reset button	Yes, see also "Power button", on page 85
Power button	Yes, see also "Reset button", on page 85
PS/2 keyboard / mouse Type	Yes, see also "PS/2 keyboard / mouse", on page 86 Combined, automatically detected
Battery Type Removable Service life	Yes, see also "Battery", on page 87 Renata 950 mAh Yes, accessible from the outside 4 years [2]
Hardware security key compartment Optimized for	Yes, see also "Hardware security key", on page 89 DS1425 from MAXIM/Dallas

Table 55: Technical data - 5PC720.1505-00

Features	5PC720.1505-00
Fan insert for fan kit	Yes, compatible fan kit - see section 3.8.1 "Fan kit 5PC700.FA00-01", on page 204
LED Amount	See also "Status LEDs", on page 82 3 (Power, HDD, Link 1)
Touch screen[3)] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 465) Horizontal Vertical Background lighting Brightness Half-brightness time[4)]	 Color TFT 15 inch (381 mm) 16 million XGA, 1024 x 768 pixels 400:1 Direction R / direction L = 85° Direction U / direction D = 85° 250 cd/m² 50000 hours
Keys Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	See also "Supply voltage", on page 76 24 VDC ±25% 3.8 A Typ. 10 A, max. 40 A for < 300 µs See power management section "Power calculation for 15" Panel PC 700", on page 59 Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Gasket	 Naturally anodized aluminum[5)] Gray[5)] Polyester Similar to Pantone432CV[5)] Similar to Pantone 427CV[5)] Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	Also see diagram "Dimensions - 5PC720.1505-00", on page 118 435 mm 330 mm 86.3 mm (depending on the heat sink)
Weight	Approx. 6 kg

Table 55: Technical data - 5PC720.1505-00 (Forts.)

Environmental characteristics	5PC720.1505-00
Ambient temperature Operation Bearings Transport	 See 2.1.5 "Ambient temperatures with system unit 5PC720.1505-00", on page 46 -20 to +60°C -20 to +60°C
Relative humidity Operation / Storage / Transport	 T <= 40°C: 5% to 90%, non-condensing T > 40°C: < 90%, non-condensing
Vibration 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 Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 55: Technical data - 5PC720.1505-00 (Forts.)

1) Software must support USB 2.0 (e.g. Windows XP with at least Service Pack 1).
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).
4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
5) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Cutout installation

The Panel PC 700 with preassembled mounting blocks is installed e.g. in a housing cutout. A cutout that corresponds to the following drawing must be made.

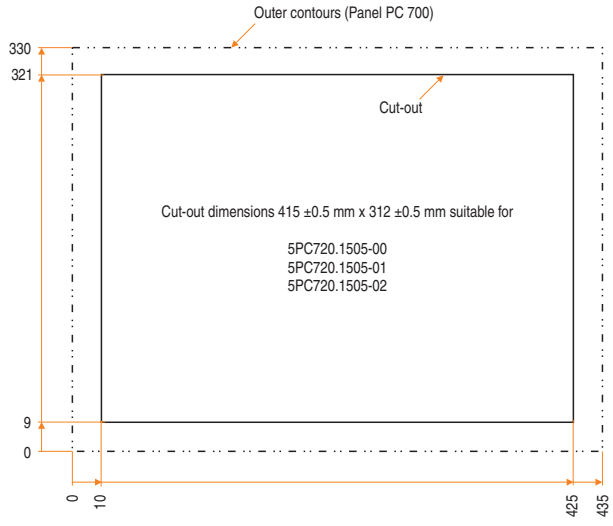


Figure 56: Cutout installation - 5PC720.1505-00

For further information regarding mounting and installation position, see chapter 3 "Commissioning", on page 209.

3.1.6 Panel PC 5PC720.1505-01

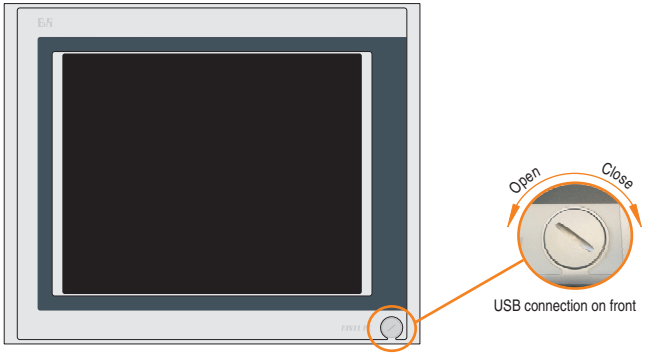
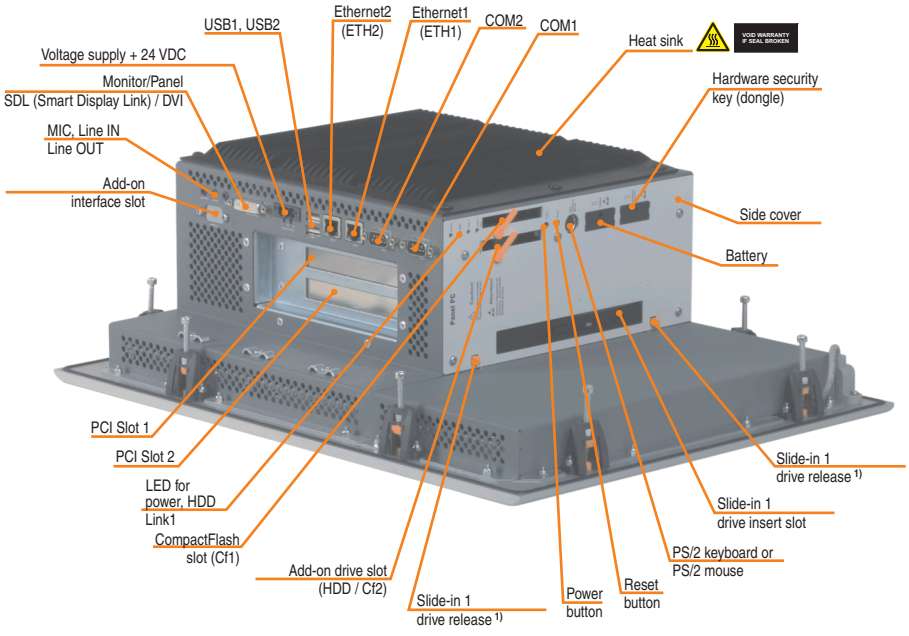


Figure 57: Front view 5PC720.1505-01



1) The side cover of the Panel PC 700 must be removed before releasing the drive!

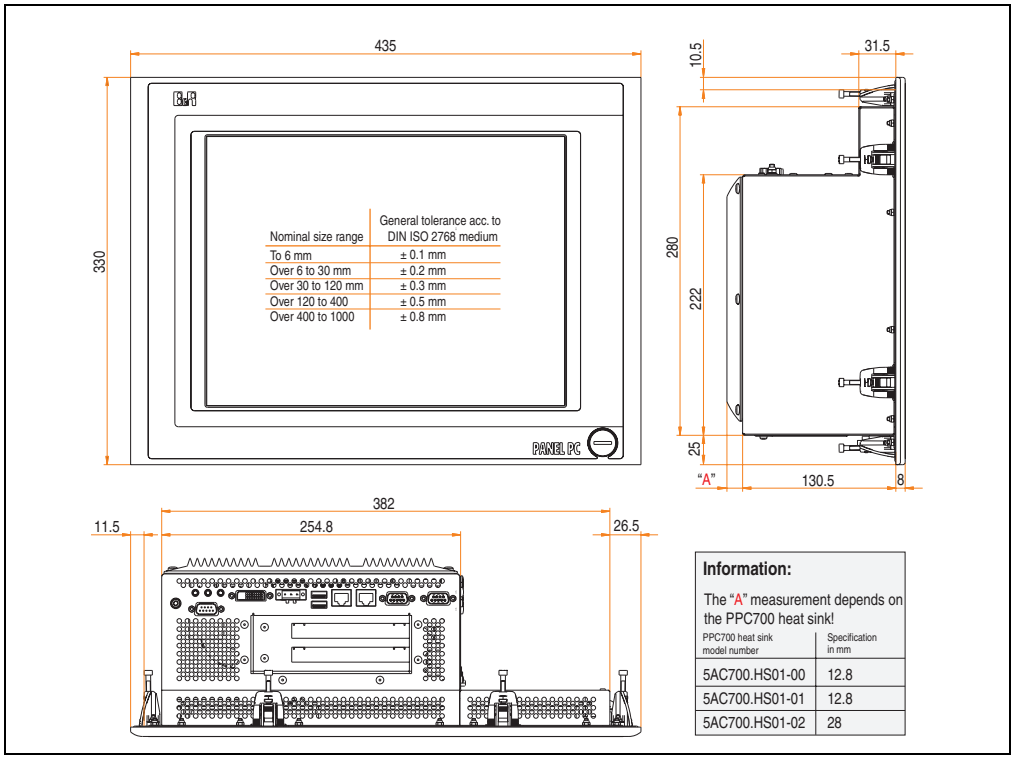
Figure 58: Rear view 5PC720.1505-01

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the PPC700 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").

Dimensions



Nominal size range	General tolerance acc. to DIN ISO 2768 medium
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

PPC700 heat sink model number	Specification in mm
5AC700.HS01-00	12.8
5AC700.HS01-01	12.8
5AC700.HS01-02	28

Figure 59: Dimensions - 5PC720.1505-01

Technical data

Features	5PC720.1505-01
B&R ID code	$1C5B
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM1", on page 70 and "Serial interface COM2", on page 71 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 72 and "Ethernet connection ETH2", on page 74 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 75 USB 2.0 3 (2x back side, 1x front side) Up to 480 Mbit [1] (high speed) Type A
Monitor / Panel Type	See also "Monitor / Panel interface", on page 78 DVI-I, female
AC97 sound Inputs Outputs	See also "MIC, Line IN and Line OUT ports", on page 79 Microphone, line in Line out
Add-on interface slot Amount	See also "Add-on interface slot", on page 80 1
PCI slots Amount Type Standard	See also "PCI slots", on page 81 2 Half-size According to PCI half-size standard 2.2
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 83 Primary master
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 84 Combined Primary slave
Insert for slide-in drive 1 Internal organization	Yes, see also "Slide-in slot 1 drive slot", on page 90 Secondary Slave
SRAM internal slot options	Yes (available starting with revision L0)
Reset button	Yes, see also "Power button", on page 85
Power button	Yes, see also "Reset button", on page 85
PS/2 keyboard / mouse Type	Yes, see also "PS/2 keyboard / mouse", on page 86 Combined, automatically detected
Battery Type Removable Service life	Yes, see also "Battery", on page 87 Renata 950 mAh Yes, accessible from the outside 4 years[2]
Hardware security key compartment Optimized for	Yes, see also "Hardware security key", on page 89 DS1425 from MAXIM/Dallas

Table 56: Technical data - 5PC720.1505-01

Features	5PC720.1505-01
Fan insert for fan kit	Yes, compatible fan kit - see section 3.8.3 "Fan kit 5PC700.FA02-01", on page 207
LED Amount	See also "Status LEDs", on page 82 3 (Power, HDD, Link 1)
Touch screen[3)] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 465) Horizontal Vertical Background lighting Brightness Half-brightness time[4)]	 Color TFT 15 inch (381 mm) 16 million XGA, 1024 x 768 pixels 400:1 Direction R / direction L = 85° Direction U / direction D = 85° 250 cd/m² 50000 hours
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	See also "Supply voltage", on page 76 24 VDC ±25% 3.8 A Typ. 10 A, max. 40 A for < 300 µs See power management section "Power calculation for 15" Panel PC 700", on page 59 Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Gasket	 Naturally anodized aluminum[5)] Gray[5)] Polyester Similar to Pantone 432CV[5)] Similar to Pantone 427CV[5)] Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	Also see diagram "Dimensions - 5PC720.1505-01", on page 124 435 mm 330 mm 151.3 mm (depending on the heat sink)
Weight	Approx. 6.7 kg

Table 56: Technical data - 5PC720.1505-01 (Forts.)

Environmental characteristics	5PC720.1505-01
Ambient temperature Operation Bearings Transport	 See 2.1.6 "Ambient temperatures with system unit 5PC720.1505-01", on page 47 -20 to +60°C -20 to +60°C
Relative humidity Operation / Storage / Transport	 T <= 40°C: 5% to 90%, non-condensing T > 40°C: < 90%, non-condensing
Vibration 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 Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 56: Technical data - 5PC720.1505-01 (Forts.)

1) Software must support USB 2.0 (e.g. Windows XP with at least Service Pack 1).
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).
4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
5) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Cutout installation

The Panel PC 700 with preassembled mounting blocks is installed e.g. in a housing cutout. A cutout that corresponds to the following drawing must be made.

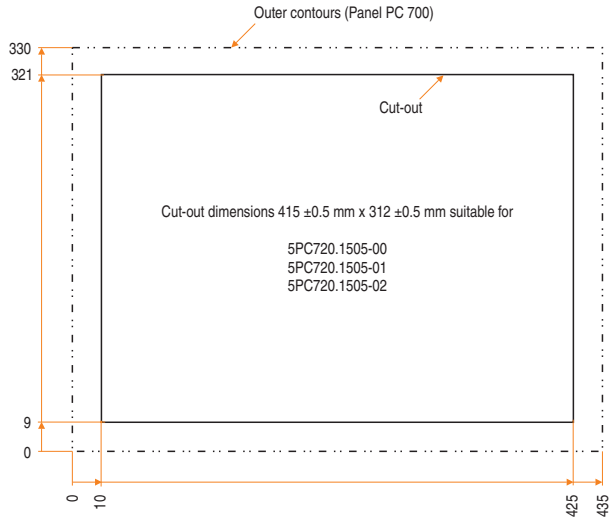


Figure 60: Cutout installation - 5PC720.1505-01

For further information regarding mounting and installation position, see chapter 3 "Commissioning", on page 209.

3.1.7 Panel PC 5PC720.1505-02

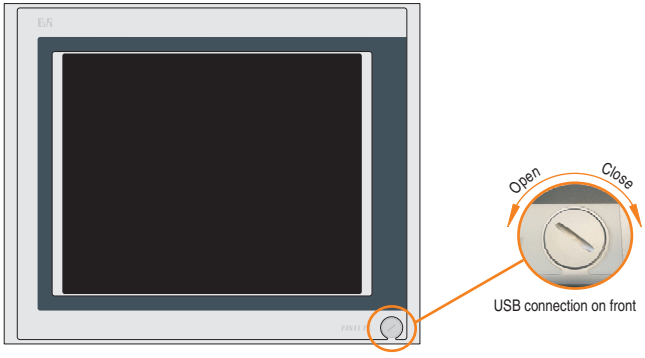
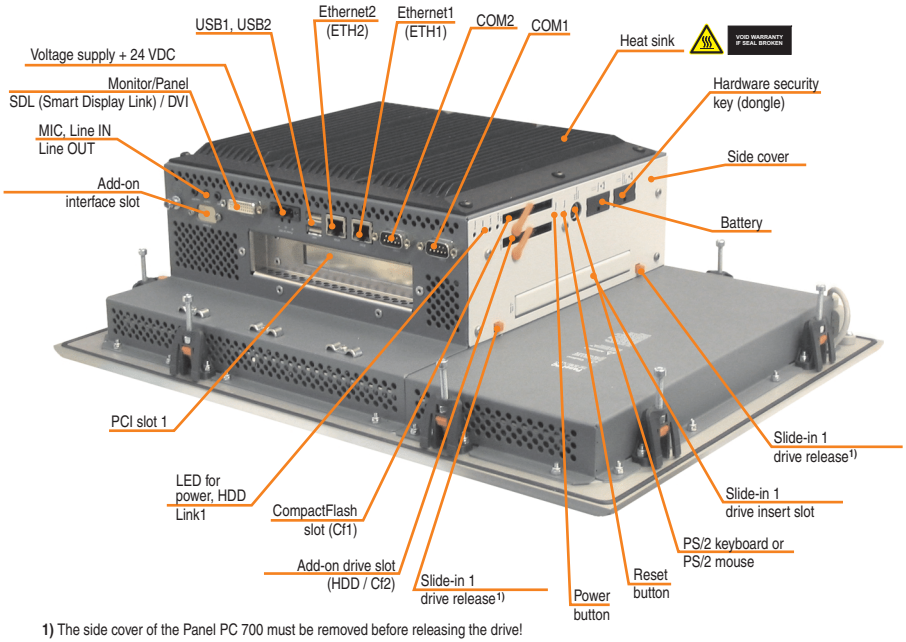


Figure 61: Front view 5PC720.1505-02



1) The side cover of the Panel PC 700 must be removed before releasing the drive!

Figure 62: Rear view 5PC720.1505-02

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the PPC700 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").

Dimensions

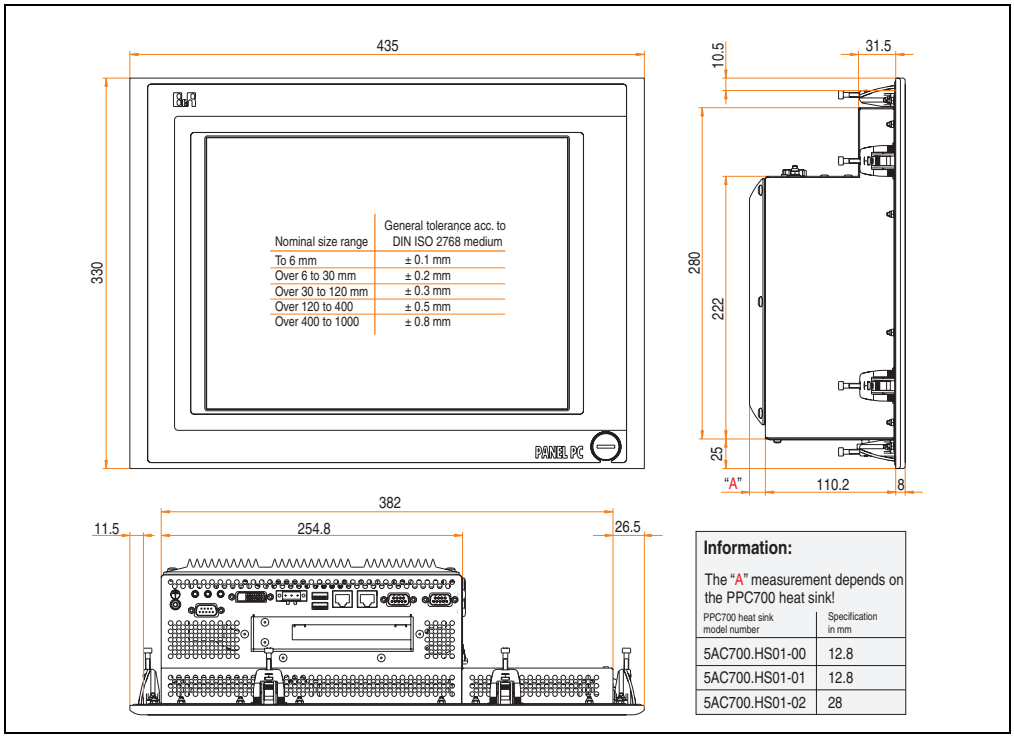


Figure 63: Dimensions - 5PC720.1505-02

Technical data

Features	5PC720.1505-02
B&R ID code	$1DA9
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM1", on page 70 and "Serial interface COM2", on page 71 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 72 and "Ethernet connection ETH2", on page 74 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 75 USB 2.0 3 (2x back side, 1x front side) Up to 480 Mbit [1] (high speed) Type A
Monitor / Panel Type	See also "Monitor / Panel interface", on page 78 DVI-I, female
AC97 sound Inputs Outputs	See also "MIC, Line IN and Line OUT ports", on page 79 Microphone, line in Line out
Add-on interface slot Amount	See also "Add-on interface slot", on page 80 1
PCI slots Amount Type Standard	See also "PCI slots", on page 81 1 Half-size According to PCI half-size standard 2.2
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 83 Primary master
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 84 Combined Primary slave
Insert for slide-in drive 1 Internal organization	Yes, see also "Slide-in slot 1 drive slot", on page 90 Secondary Slave
SRAM internal slot options	Yes (available starting with revision K0)
Reset button	Yes, see also "Power button", on page 85
Power button	Yes, see also "Reset button", on page 85
PS/2 keyboard / mouse Type	Yes, see also "PS/2 keyboard / mouse", on page 86 Combined, automatically detected
Battery Type Removable Service life	Yes, see also "Battery", on page 87 Renata 950 mAh Yes, accessible from the outside 4 years[2]
Hardware security key compartment Optimized for	Yes, see also "Hardware security key", on page 89 DS1425 from MAXIM/Dallas

Table 57: Technical data - 5PC720.1505-02

Features	5PC720.1505-02
Fan insert for fan kit	Yes, compatible fan kit - see section 3.8.3 "Fan kit 5PC700.FA02-01", on page 207
LED Amount	See also "Status LEDs", on page 82 3 (Power, HDD, Link 1)
Touch screen[3)] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 465) Horizontal Vertical Background lighting Brightness Half-brightness time[4)]	 Color TFT 15 inch (381 mm) 16 million XGA, 1024 x 768 pixels 400:1 Direction R / direction L = 85° Direction U / direction D = 85° 250 cd/m² 50000 hours
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	See also "Supply voltage", on page 76 24 VDC ±25% 3.8 A Typ. 10 A, max. 40 A for < 300 µs See power management section "Power calculation for 15" Panel PC 700", on page 59 Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Gasket	 Naturally anodized aluminum[5)] Gray[5)] Polyester Similar to Pantone 432CV[5)] Similar to Pantone 427CV[5)] Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	Also see diagram "Dimensions - 5PC720.1505-02", on page 130 435 mm 330 mm 131 mm (depending on the heat sink)
Weight	Approx. 6.5 kg

Table 57: Technical data - 5PC720.1505-02 (Forts.)

Environmental characteristics	5PC720.1505-02
Ambient temperature Operation Bearings Transport	 See 2.1.7 "Ambient temperatures with system unit 5PC720.1505-02", on page 48 -20 to +60°C -20 to +60°C
Relative humidity Operation / Storage / Transport	 T <= 40°C: 5% to 90%, non-condensing T > 40°C: < 90%, non-condensing
Vibration 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 Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 57: Technical data - 5PC720.1505-02 (Forts.)

1) Software must support USB 2.0 (e.g. Windows XP with at least Service Pack 1).
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).
4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
5) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Cutout installation

The Panel PC 700 with preassembled mounting blocks is installed e.g. in a housing cutout. A cutout that corresponds to the following drawing must be made.

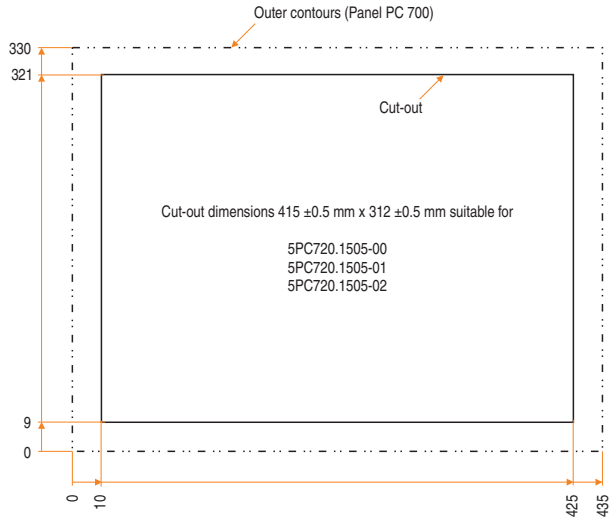


Figure 64: Cutout installation - 5PC720.1505-02

For further information regarding mounting and installation position, see chapter 3 "Commissioning", on page 209.

3.1.8 Panel PC 5PC720.1706-00

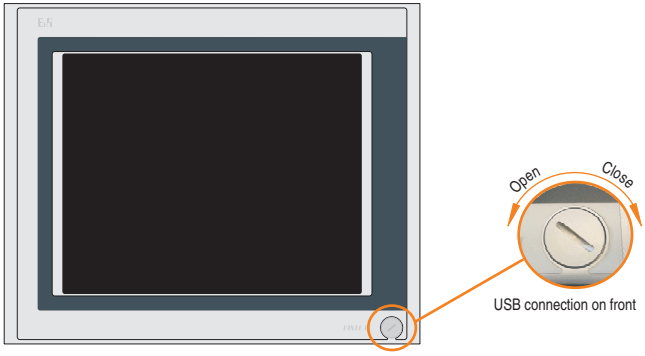


Figure 65: Front view 5PC720.1706-00

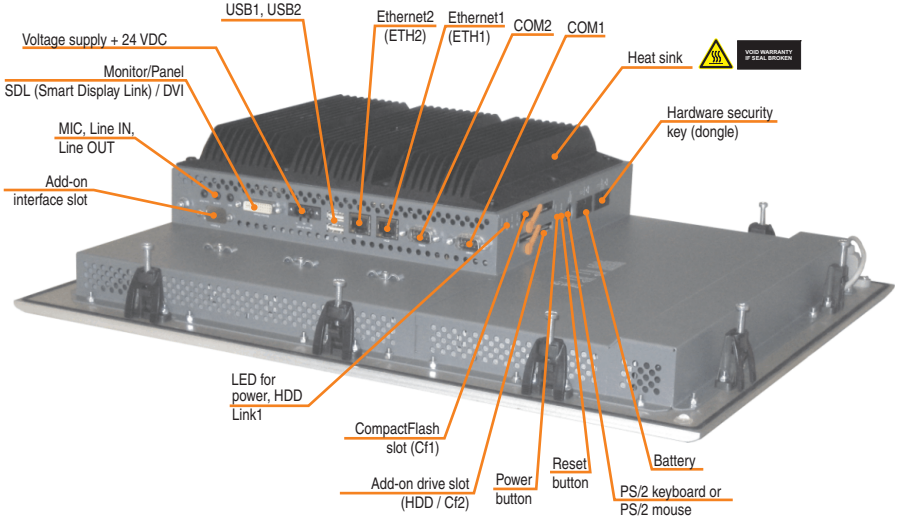


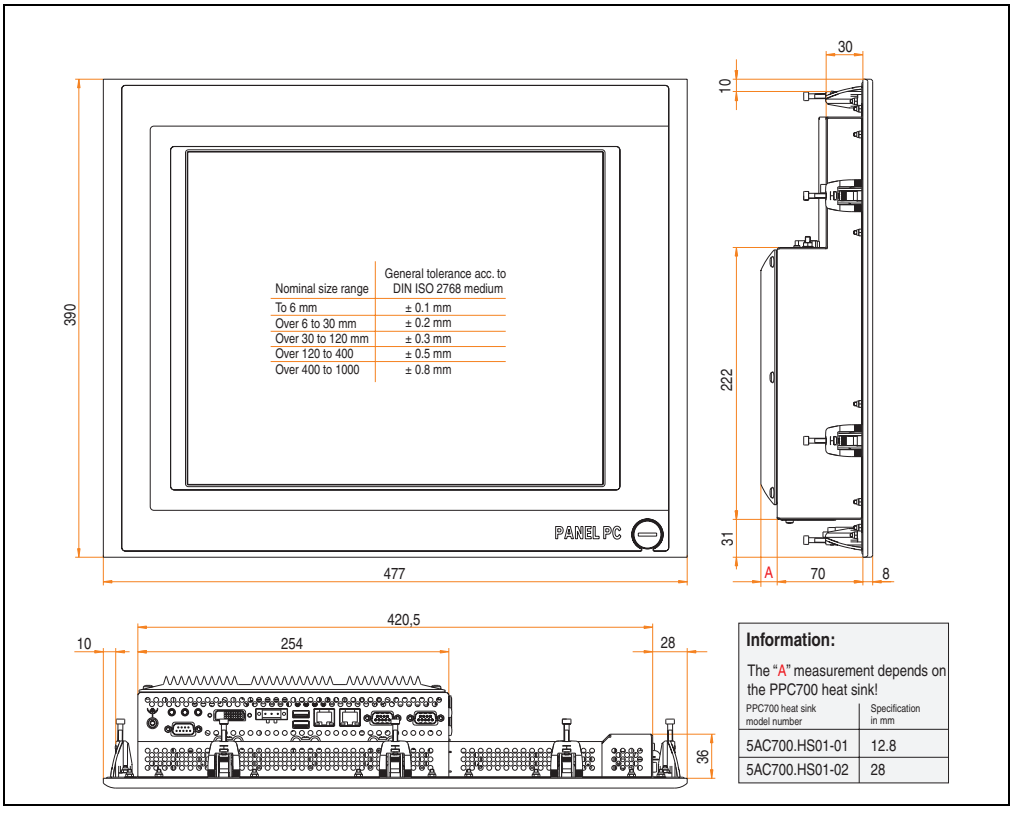
Figure 66: Rear view 5PC720.1706-00

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the PPC700 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").

Dimensions



Nominal size range	General tolerance acc. to DIN ISO 2768 medium
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

PPC700 heat sink model number	Specification in mm
5AC700.HS01-01	12.8
5AC700.HS01-02	28

Figure 67: Dimensions - 5PC720.1706-00

Technical data

Features	5PC720.1706-00
B&R ID code	$1C61
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM1", on page 70 and "Serial interface COM2", on page 71 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 72 and "Ethernet connection ETH2", on page 74 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 75 USB 2.0 3 (2x back side, 1x front side) Up to 480 Mbit [1] (high speed) Type A
Monitor / Panel Type	See also "Monitor / Panel interface", on page 78 DVI-I, female
AC97 sound Inputs Outputs	See also "MIC, Line IN and Line OUT ports", on page 79 Microphone, line in Line out
Add-on interface slot Amount	See also "Add-on interface slot", on page 80 1
PCI slots Amount Type Standard	-
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 83 Primary master
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 84 Combined Primary slave
Insert for slide-in drive 1 Internal organization	-
SRAM internal slot options	No
Reset button	Yes, see also "Power button", on page 85
Power button	Yes, see also "Reset button", on page 85
PS/2 keyboard / mouse Type	Yes, see also "PS/2 keyboard / mouse", on page 86 Combined, automatically detected
Battery Type Removable Service life	Yes, see also "Battery", on page 87 Renata 950 mAh Yes, accessible from the outside 4 years [2]
Hardware security key compartment Optimized for	Yes, see also "Hardware security key", on page 89 DS1425 from MAXIM/Dallas

Table 58: Technical data - 5PC720.1706-00

Features	5PC720.1706-00
Fan insert for fan kit	Yes, compatible fan kit - see section 3.8.1 "Fan kit 5PC700.FA00-01", on page 204
LED Amount	See also "Status LEDs", on page 82 3 (Power, HDD, Link 1)
Touch screen[3)] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 465) Horizontal Vertical Background lighting Brightness Half-brightness time[4)]	 Color TFT 17 inch (431.8 mm) 16 million SXGA, 1280 x 1024 pixels 400:1 Direction R / direction L = 85° Direction U / direction D = 85° 250 cd/m² 50000 hours
Keys Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	See also "Supply voltage", on page 76 24 VDC ±25% 3.8 A Typ. 10 A, max. 40 A for < 300 µs See power management section "Power calculation for 17" Panel PC 700", on page 60 Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Gasket	 Naturally anodized aluminum[5)] Gray[5)] Polyester Similar to Pantone432CV[5)] Similar to Pantone 427CV[5)] Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	Also see diagram "Dimensions - 5PC720.1706-00", on page 136 477 mm 390 mm 90.8 mm (depending on the heat sink)
Weight	Approx. 7.7 kg

Table 58: Technical data - 5PC720.1706-00 (Forts.)

Environmental characteristics	5PC720.1706-00
Ambient temperature Operation Bearings Transport	 See 2.1.8 "Ambient temperatures with system unit 5PC720.1706-00", on page 49 -20 to +60°C -20 to +60°C
Relative humidity Operation / Storage / Transport	 T <= 40°C: 5% to 90%, non-condensing T > 40°C: < 90%, non-condensing
Vibration 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 Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 58: Technical data - 5PC720.1706-00 (Forts.)

1) Software must support USB 2.0 (e.g. Windows XP with at least Service Pack 1).
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).
4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
5) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Cutout installation

The Panel PC 700 with preassembled mounting blocks is installed e.g. in a housing cutout. A cutout that corresponds to the following drawing must be made.

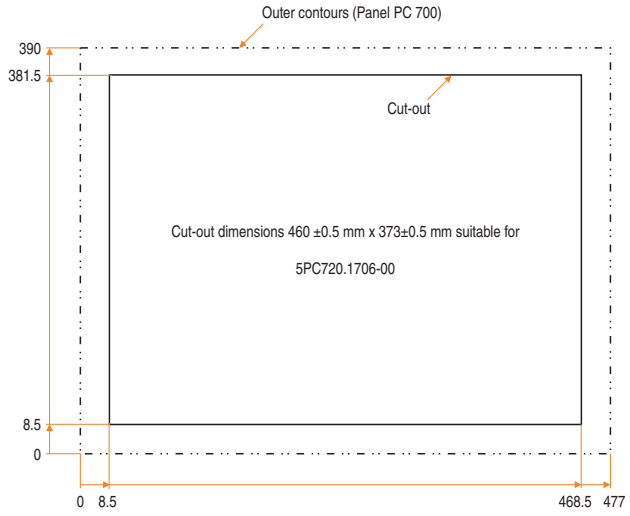


Figure 68: Cutout installation - 5PC720.1706-00

For further information regarding mounting and installation position, see chapter 3 "Commissioning", on page 209.

3.1.9 Panel PC 5PC720.1906-00

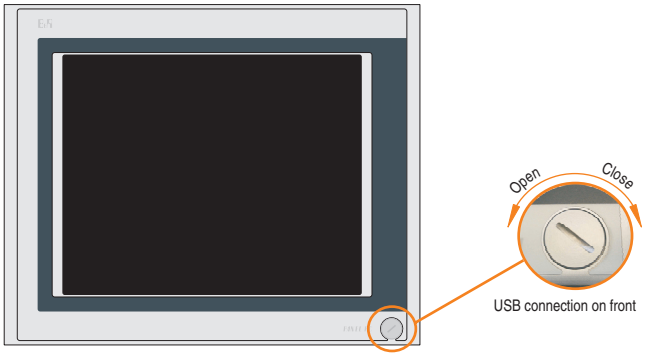


Figure 69: Front view 5PC720.1906-00

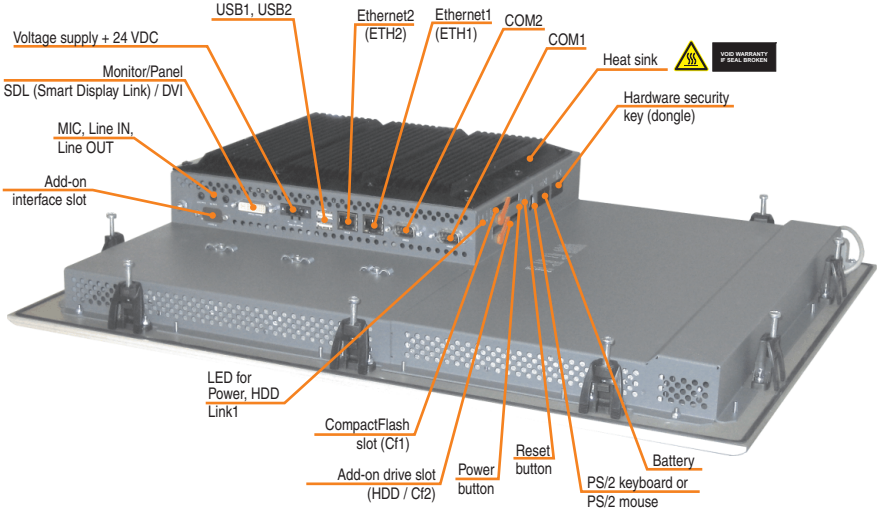


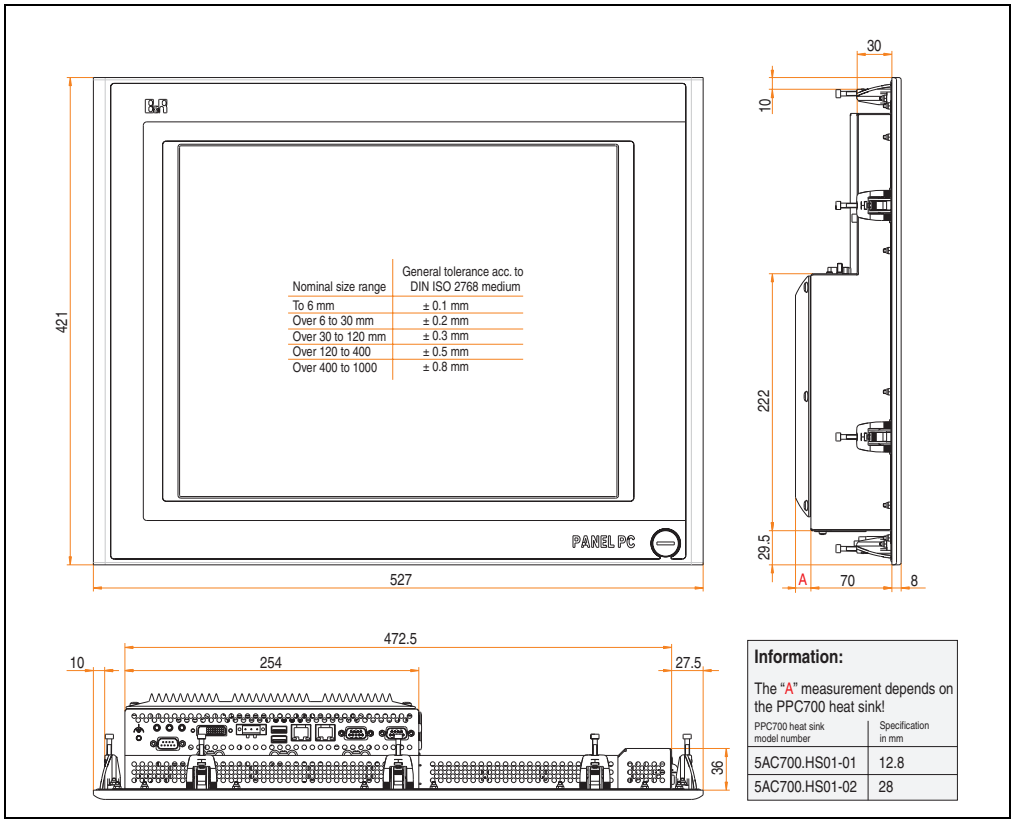
Figure 70: Rear view 5PC720.1906-00

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the PPC700 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").

Dimensions



Nominal size range	General tolerance acc. to DIN ISO 2768 medium
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

PPC700 heat sink model number	Specification in mm
5AC700.HS01-01	12.8
5AC700.HS01-02	28

Figure 71: Dimensions - 5PC720.1906-00

Technical data

Features	5PC720.1906-00
B&R ID code	$24E8
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM1", on page 70 and "Serial interface COM2", on page 71 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 72 and "Ethernet connection ETH2", on page 74 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 75 USB 2.0 3 (2x back side, 1x front side) Up to 480 Mbit [1] (high speed) Type A
Monitor / Panel Type	See also "Monitor / Panel interface", on page 78 DVI-I, female
AC97 sound Inputs Outputs	See also "MIC, Line IN and Line OUT ports", on page 79 Microphone, line in Line out
Add-on interface slot Amount	See also "Add-on interface slot", on page 80 1
PCI slots Amount Type Standard	-
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 83 Primary master
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 84 Combined Primary slave
Insert for slide-in drive 1 Internal organization	-
SRAM internal slot options	No
Reset button	Yes, see also "Power button", on page 85
Power button	Yes, see also "Reset button", on page 85
PS/2 keyboard / mouse Type	Yes, see also "PS/2 keyboard / mouse", on page 86 Combined, automatically detected
Battery Type Removable Service life	Yes, see also "Battery", on page 87 Renata 950 mAh Yes, accessible from the outside 4 years [2]
Hardware security key compartment Optimized for	Yes, see also "Hardware security key", on page 89 DS1425 from MAXIM/Dallas

Table 59: Technical data - 5PC720.1906-00

Features	5PC720.1906-00
Fan insert for fan kit	Yes, compatible fan kit - see section 3.8.1 "Fan kit 5PC700.FA00-01", on page 204
LED Amount	See also "Status LEDs", on page 82 3 (Power, HDD, Link 1)
Touch screen[3)] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 465) Horizontal Vertical Background lighting Brightness Half-brightness time[4)]	 Color TFT 19 inch (482.6 mm) 16 million SXGA, 1280 x 1024 pixels 400:1 Direction R / direction L = 85° Direction U / direction D = 85° 250 cd/m² 50000 hours
Keys Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	See also "Supply voltage", on page 76 24 VDC ±25% 3.8 A Typ. 10 A, max. 40 A for < 300 µs See power management section "Power calculation for 19" Panel PC 700", on page 61 Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Gasket	 Naturally anodized aluminum[5)] Gray[5)] Polyester Similar to Pantone432CV[5)] Similar to Pantone 427CV[5)] Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	Also see diagram "Dimensions - 5PC720.1906-00", on page 142 527 mm 421 mm 90.8 mm (depending on the heat sink)
Weight	Approx. 9 kg

Table 59: Technical data - 5PC720.1906-00 (Forts.)

Environmental characteristics	5PC720.1906-00
Ambient temperature Operation Bearings Transport	 See 2.1.9 "Ambient temperatures with system unit 5PC720.1906-00", on page 50 -20 to +60°C -20 to +60°C
Relative humidity Operation / Storage / Transport	 T <= 40°C: 5% to 90%, non-condensing T > 40°C: < 90%, non-condensing
Vibration 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 Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 59: Technical data - 5PC720.1906-00 (Forts.)

1) Software must support USB 2.0 (e.g. Windows XP with at least Service Pack 1).

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

3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.

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

Cutout installation

The Panel PC 700 with preassembled mounting blocks is installed e.g. in a housing cutout. A cutout that corresponds to the following drawing must be made.

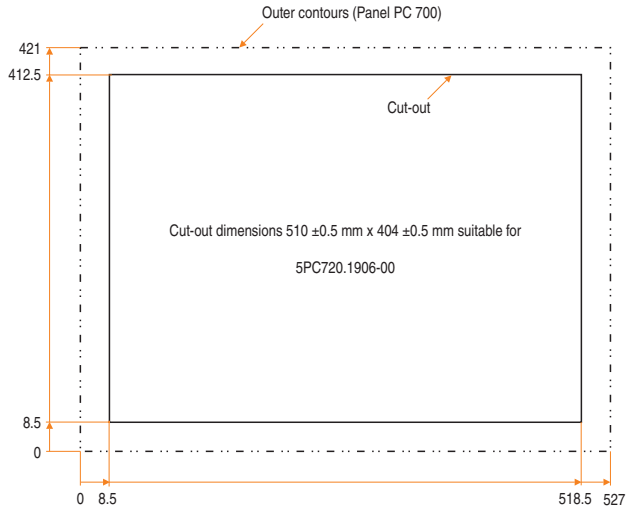


Figure 72: Cutout installation - 5PC720.1906-00

For further information regarding mounting and installation position, see chapter 3 "Commissioning", on page 209.

3.1.10 Panel PC 5PC781.1043-00

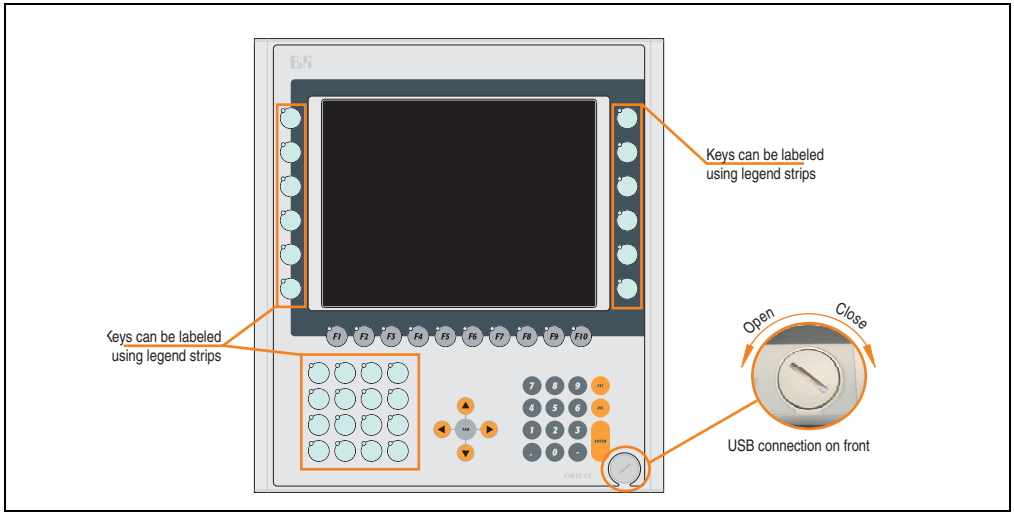


Figure 73: Front view 5PC781.1043-00

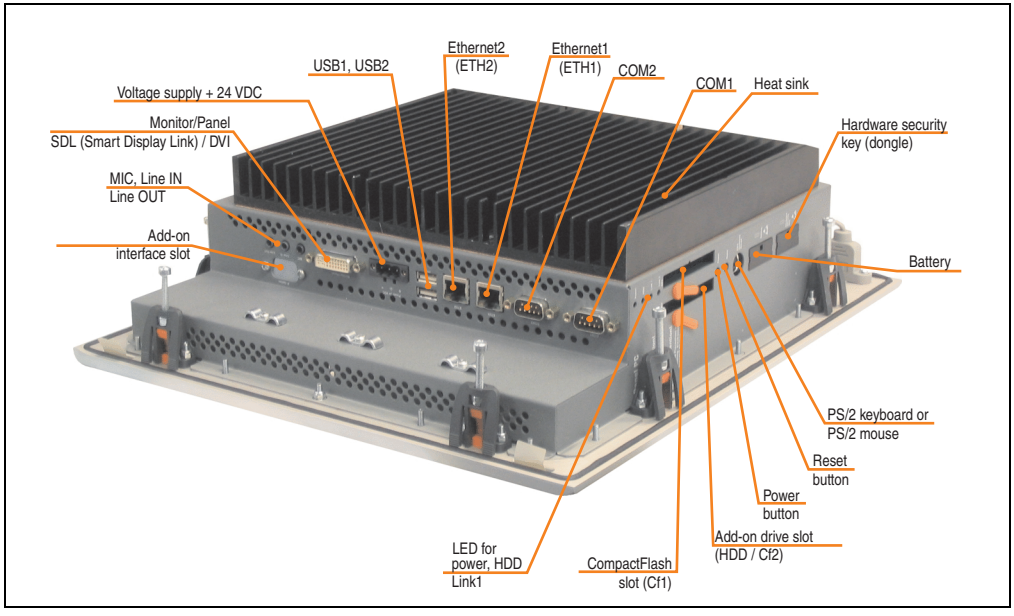


Figure 74: Rear view 5PC781.1043-00

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the PPC700 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").

Dimensions

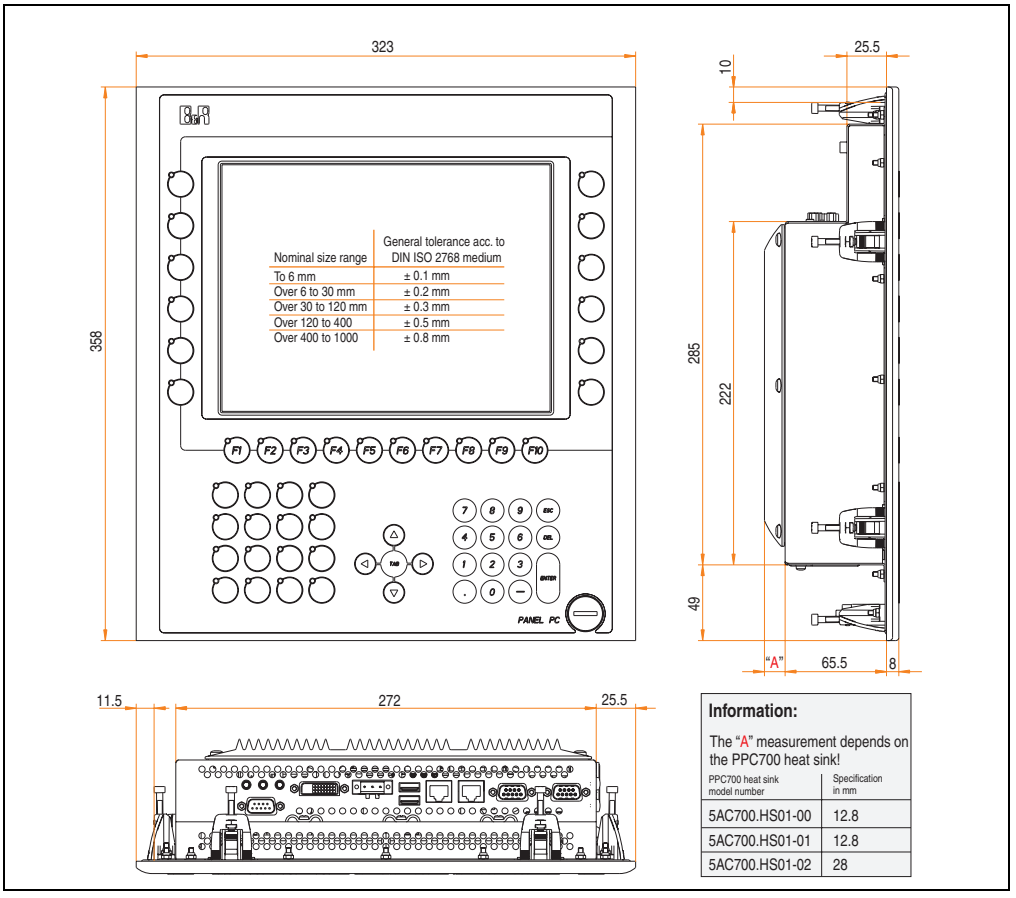


Figure 75: Dimensions - 5PC781.1043-00

Technical data

Features	5PC781.1043-00
B&R ID code	$1C60
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM1", on page 70 and "Serial interface COM2", on page 71 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 72 and "Ethernet connection ETH2", on page 74 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 75 USB 2.0 3 (2x back side, 1x front side) Up to 480 Mbit [1] (high speed) Type A
Monitor / Panel Type	See also "Monitor / Panel interface", on page 78 DVI-I, female
AC97 sound Inputs Outputs	See also "MIC, Line IN and Line OUT ports", on page 79 Microphone, line in Line out
Add-on interface slot Amount	See also "Add-on interface slot", on page 80 1
PCI slots Amount Type Standard	-
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 83 Primary master
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 84 Combined Primary slave
Insert for slide-in drive 1 Internal organization	-
SRAM internal slot options	No
Reset button	Yes, see also "Power button", on page 85
Power button	Yes, see also "Reset button", on page 85
PS/2 keyboard / mouse Type	Yes, see also "PS/2 keyboard / mouse", on page 86 Combined, automatically detected
Battery Type Removable Service life	Yes, see also "Battery", on page 87 Renata 950 mAh Yes, accessible from the outside 4 years[2]
Hardware security key compartment Optimized for	Yes, see also "Hardware security key", on page 89 DS1425 from MAXIM/Dallas

Table 60: Technical data - 5PC781.1043-00

Features	5PC781.1043-00
Fan insert for fan kit	Yes, compatible fan kit - see section 3.8.1 "Fan kit 5PC700.FA00-01", on page 204
LED Amount	See also "Status LEDs", on page 82 3 (Power, HDD, Link 1)
Touch screen[3)] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 465) Horizontal Vertical Background lighting Brightness Half-brightness time[4)]	 Color TFT 10.4 inch (264 mm) 262,144 colors VGA, 640 x 480 pixels 300:1 Direction R / direction L = 70° Direction U / direction D = 70° 350 cd/m² 50000 hours
Keys/LED[5)] Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	 28 with LED (yellow) 10 with LED (yellow) - 15 without LED 5 without LED > 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typically 12 mcd (yellow)
Caution! **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**	
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	See also "Supply voltage", on page 76 24 VDC ±25% 3.8 A Typ. 10 A, max. 40 A for < 300 µs See power management section "Power calculation for 10.4" Panel PC 700", on page 57 Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Orange keys Dark gray keys Color legend strips Gasket	 Naturally anodized aluminum[6)] Gray[6)] Polyester Similar to Pantone 432CV[6)] Similar to Pantone 427CV[6)] Similar to Pantone 151CV[6)] Similar to Pantone 431CV[6)] Similar to Pantone 429CV[6)] Flat gasket around display front
Housing	Metal

Table 60: Technical data - 5PC781.1043-00 (Forts.)

Mechanical characteristics	5PC781.1043-00
Outer dimensions Width Height Depth	Also see diagram "Dimensions - 5PC781.1043-00", on page 148 323 mm 358 mm 86.3 mm (depending on the heat sink)
Weight	Approx. 4.5 kg
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 See section 2.1.10 "Ambient temperatures with system unit 5PC781.1043-00", on page 51---30 to +70°C -30 to +70°C
Relative humidity Operation / Storage / Transport	 T <= 40°C: 5% to 90%, non-condensing T > 40°C: < 90%, non-condensing
Vibration 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 Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 60: Technical data - 5PC781.1043-00 (Forts.)

1) Software must support USB 2.0 (e.g. Windows XP with at least Service Pack 1).
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).
4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
5) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (**www.br-automation.com**) or on the B&R HMI Driver & Utilities DVD (model number 5SWHMI.0000-00).
6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Cutout installation

The Panel PC 700 with preassembled mounting blocks is installed e.g. in a housing cutout. A cutout that corresponds to the following drawing must be made.

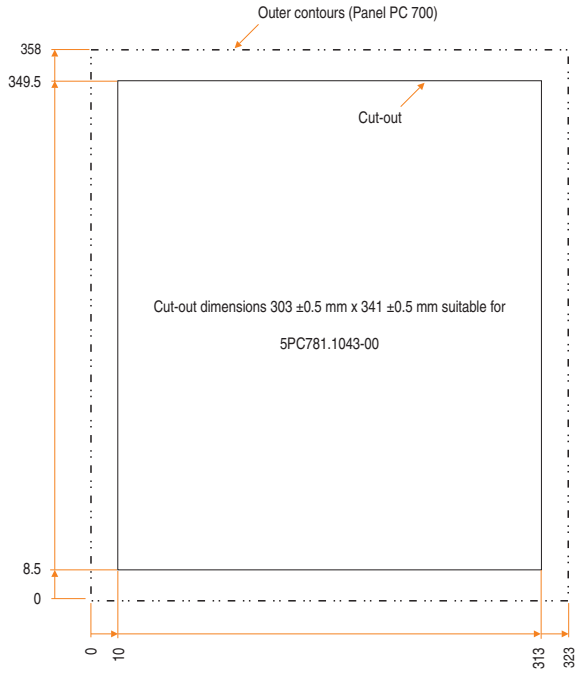


Figure 76: Cutout installation - 5PC781.1043-00

For further information regarding mounting and installation position, see chapter 3 "Commissioning", on page 209.

3.1.11 Panel PC 5PC781.1505-00

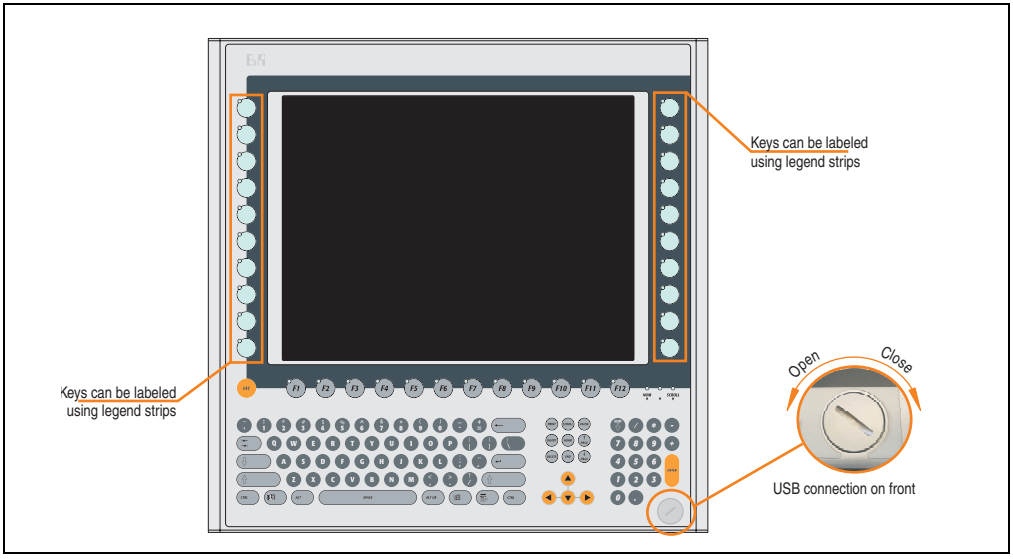


Figure 77: Front view 5PC781.1505-00

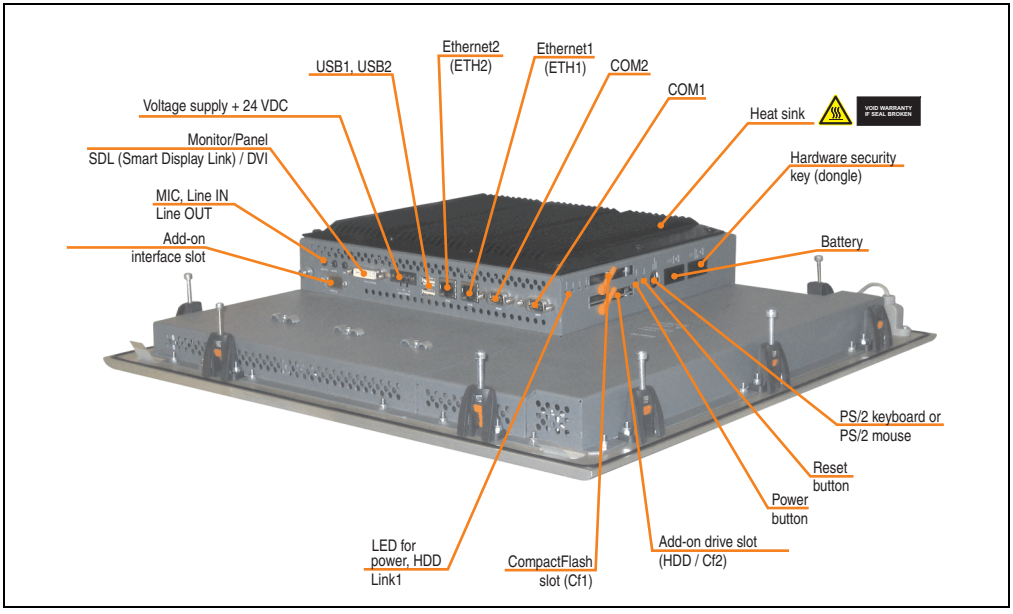


Figure 78: Rear view 5PC781.1505-00

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the PPC700 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").

Dimensions

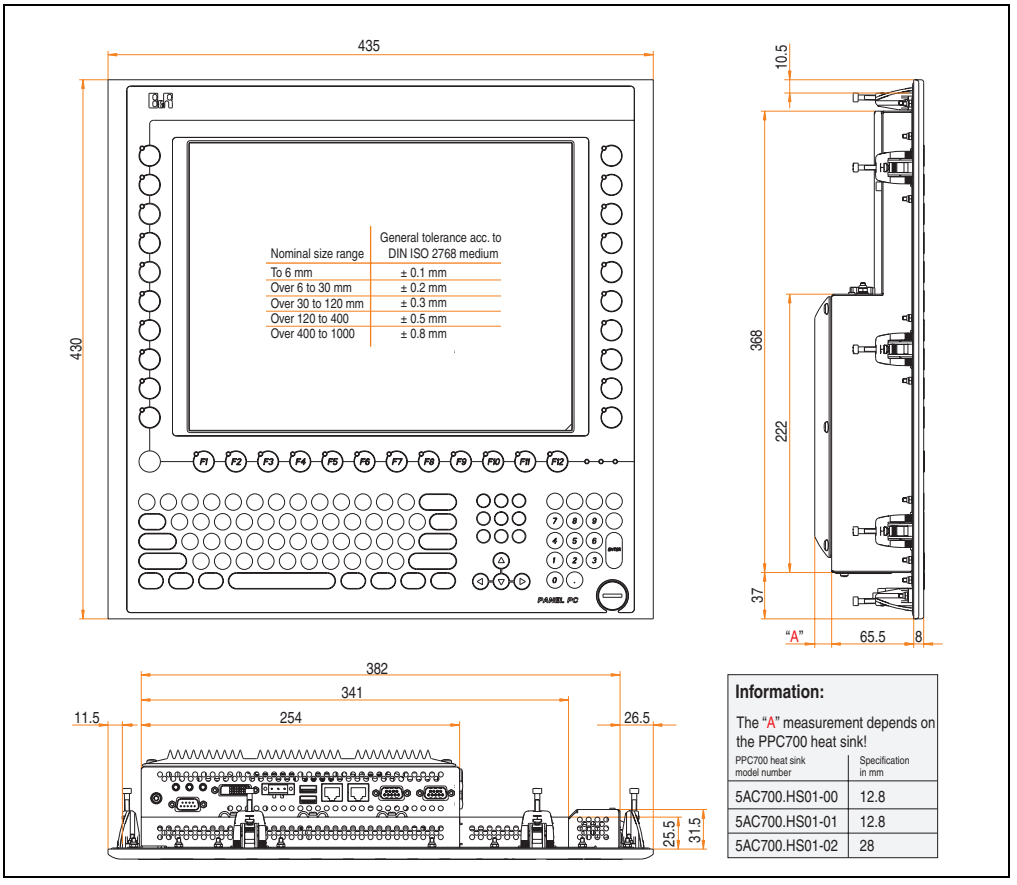


Figure 79: Dimensions - 5PC781.1505-00

Technical data

Features	5PC781.1505-00
B&R ID code	$1C5F
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM1", on page 70 and "Serial interface COM2", on page 71 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 72 and "Ethernet connection ETH2", on page 74 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 75 USB 2.0 3 (2x back side, 1x front side) Up to 480 Mbit [1] (high speed) Type A
Monitor / Panel Type	See also "Monitor / Panel interface", on page 78 DVI-I, female
AC97 sound Inputs Outputs	See also "MIC, Line IN and Line OUT ports", on page 79 Microphone, line in Line out
Add-on interface slot Amount	See also "Add-on interface slot", on page 80 1
PCI slots Amount Type Standard	-
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 83 Primary master
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 84 Combined Primary slave
Insert for slide-in drive 1 Internal organization	-
SRAM internal slot options	No
Reset button	Yes, see also "Power button", on page 85
Power button	Yes, see also "Reset button", on page 85
PS/2 keyboard / mouse Type	Yes, see also "PS/2 keyboard / mouse", on page 86 Combined, automatically detected
Battery Type Removable Service life	Yes, see also "Battery", on page 87 Renata 950 mAh Yes, accessible from the outside 4 years[2]
Hardware security key compartment Optimized for	Yes, see also "Hardware security key", on page 89 DS1425 from MAXIM/Dallas

Table 61: Technical data - 5PC781.1505-00

Features	5PC781.1505-00
Fan insert for fan kit	Yes, compatible fan kit - see section 3.8.1 "Fan kit 5PC700.FA00-01", on page 204
LED Amount	See also "Status LEDs", on page 82 3 (Power, HDD, Link 1)
Touch screen[3)] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 465) Horizontal Vertical Background lighting Brightness Half-brightness time[4)]	 Color TFT 15 inch (381 mm) 16 million XGA, 1024 x 768 pixels 400:1 Direction R / direction L = 85° Direction U / direction D = 85° 250 cd/m² 50000 hours
Keys/LED[5)] Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	 20 with LED (yellow) 12 with LED (yellow) - 15 without LED 77 without LED > 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typically 12 mcd (yellow)
Caution! **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**	
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	See also "Supply voltage", on page 76 24 VDC ±25% 3.8 A Typ. 10 A, max. 40 A for < 300 µs See power management section "Power calculation for 15" Panel PC 700", on page 59 Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Orange keys Dark gray keys Color legend strips Gasket	 Naturally anodized aluminum[6)] Gray[6)] Polyester Similar to Pantone 432CV[6)] Similar to Pantone 427CV[6)] Similar to Pantone 151CV[6)] Similar to Pantone 431CV[6)] Similar to Pantone 429CV[6)] Flat gasket around display front
Housing	Metal

Table 61: Technical data - 5PC781.1505-00 (Forts.)

Mechanical characteristics	5PC781.1505-00
Outer dimensions Width Height Depth	Also see diagram "Dimensions - 5PC781.1505-00", on page 154 435 mm 430 mm 86.3 mm (depending on the heat sink)
Weight	Approx. 7.5 kg
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 See 2.1.11 "Ambient temperatures with system unit 5PC781.1505-00", on page 52 -30 to +70°C -30 to +70°C
Relative humidity Operation / Storage / Transport	 T <= 40°C: 5% to 90%, non-condensing T > 40°C: < 90%, non-condensing
Vibration 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 Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 61: Technical data - 5PC781.1505-00 (Forts.)

1) Software must support USB 2.0 (e.g. Windows XP with at least Service Pack 1).
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).
4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
5) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (**www.br-automation.com**) or on the B&R HMI Driver & Utilities DVD (model number 5SWHMI.0000-00).
6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Cutout installation

The Panel PC 700 with preassembled mounting blocks is installed e.g. in a housing cutout. A cutout that corresponds to the following drawing must be made.

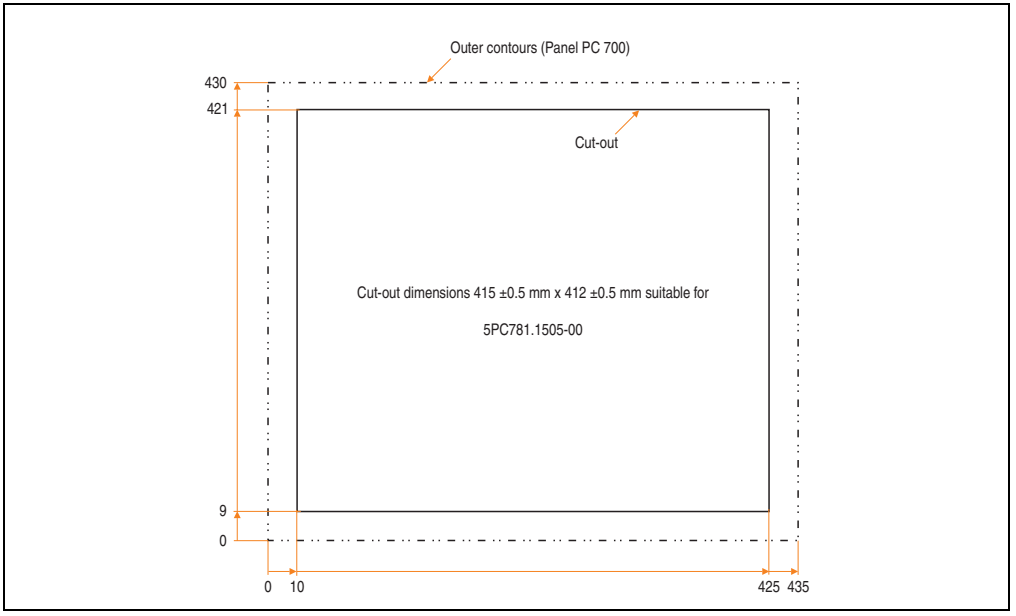


Figure 80: Cutout installation - 5PC781.1505-00

For further information regarding mounting and installation position, see chapter 3 "Commissioning", on page 209.

3.1.12 Panel PC 5PC782.1043-00

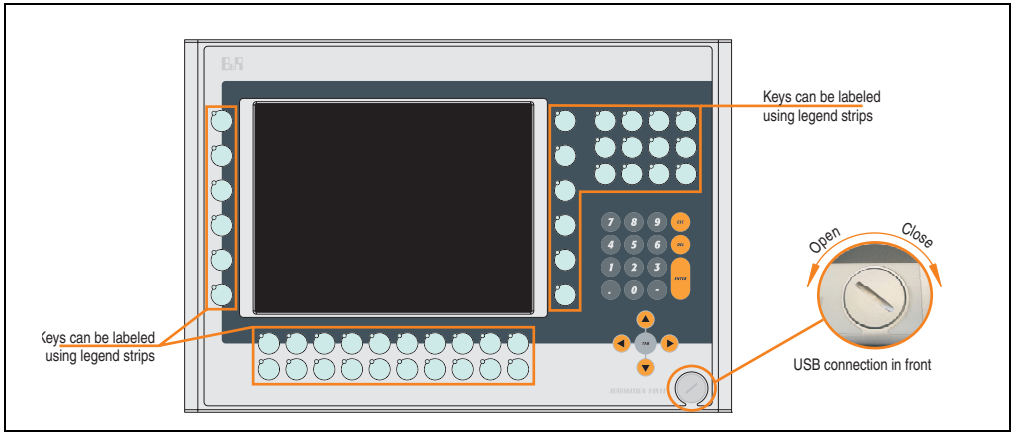


Figure 81: Front view 5PC782.1043-00

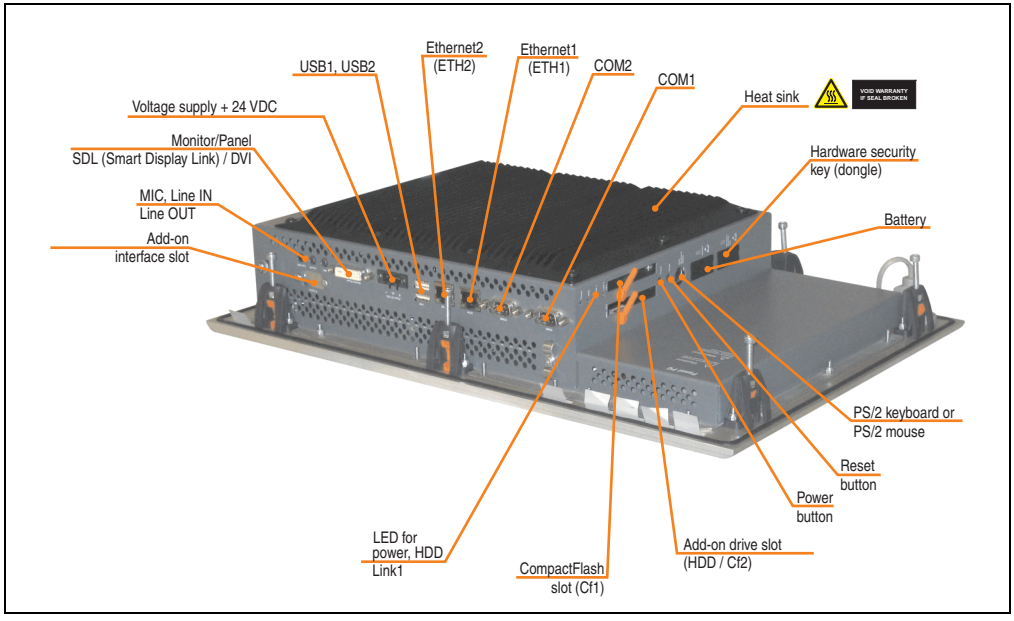


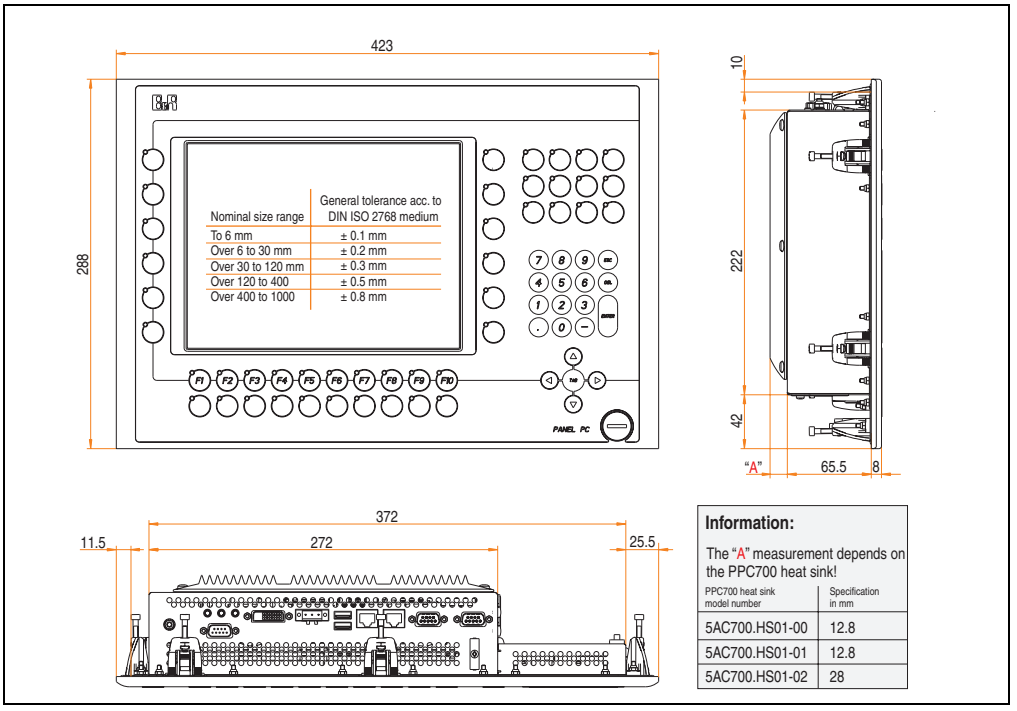
Figure 82: Rear view 5PC782.1043-00

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the PPC700 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").

Dimensions



Nominal size range	General tolerance acc. to DIN ISO 2768 medium
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

PPC700 heat sink model number	Specification in mm
5AC700.HS01-00	12.8
5AC700.HS01-01	12.8
5AC700.HS01-02	28

Figure 83: Dimensions - 5PC782.1043-00

Technical data

Features	5PC782.1043-00
B&R ID code	$1C62
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM1", on page 70 and "Serial interface COM2", on page 71 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 72 and "Ethernet connection ETH2", on page 74 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 75 USB 2.0 3 (2x back side, 1x front side) Up to 480 Mbit [1] (high speed) Type A
Monitor / Panel Type	See also "Monitor / Panel interface", on page 78 DVI-I, female
AC97 sound Inputs Outputs	See also "MIC, Line IN and Line OUT ports", on page 79 Microphone, line in Line out
Add-on interface slot Amount	See also "Add-on interface slot", on page 80 1
PCI slots Amount Type Standard	-
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 83 Primary master
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 84 Combined Primary slave
Insert for slide-in drive 1 Internal organization	-
SRAM internal slot options	No
Reset button	Yes, see also "Power button", on page 85
Power button	Yes, see also "Reset button", on page 85
PS/2 keyboard / mouse Type	Yes, see also "PS/2 keyboard / mouse", on page 86 Combined, automatically detected
Battery Type Removable Service life	Yes, see also "Battery", on page 87 Renata 950 mAh Yes, accessible from the outside 4 years[2]
Hardware security key compartment Optimized for	Yes, see also "Hardware security key", on page 89 DS1425 from MAXIM/Dallas

Table 62: Technical data - 5PC782.1043-00

Features	5PC782.1043-00
Fan insert for fan kit	Yes, compatible fan kit - see section 3.8.1 "Fan kit 5PC700.FA00-01", on page 204
LED Amount	See also "Status LEDs", on page 82 3 (Power, HDD, Link 1)
Touch screen[3)] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 465) Horizontal Vertical Background lighting Brightness Half-brightness time[4)]	 Color TFT 10.4 inch (264 mm) 262,144 colors VGA, 640 x 480 pixels 300:1 Direction R / direction L = 70° Direction U / direction D = 70° 350 cd/m² 50000 hours
Keys/LED[5)] Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	 44 with LED (yellow) - - 15 without LED 5 without LED > 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typically 12 mcd (yellow)
Caution! **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**	
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	See also "Supply voltage", on page 76 24 VDC ±25% 3.8 A Typ. 10 A, max. 40 A for < 300 µs See power management section "Power calculation for 10.4" Panel PC 700", on page 57 Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Orange keys Dark gray keys Color legend strips Gasket	 Naturally anodized aluminum[6)] Gray[6)] Polyester Similar to Pantone 432CV[6)] Similar to Pantone 427CV[6)] Similar to Pantone 151CV[6)] Similar to Pantone 431CV[6)] Similar to Pantone 429CV[6)] Flat gasket around display front
Housing	Metal

Table 62: Technical data - 5PC782.1043-00 (Forts.)

Mechanical characteristics	5PC782.1043-00
Outer dimensions Width Height Depth	Also see diagram "Dimensions - 5PC782.1043-00", on page 160 423 mm 288 mm 86.3 mm (depending on the heat sink)
Weight	Approx. 7.5 kg
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 See 2.1.12 "Ambient temperatures with system unit 5PC782.1043-00", on page 53 -30 to +70°C -30 to +70°C
Relative humidity Operation / Storage / Transport	 T <= 40°C: 5% to 90%, non-condensing T > 40°C: < 90%, non-condensing
Vibration 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 Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 62: Technical data - 5PC782.1043-00 (Forts.)

1) Software must support USB 2.0 (e.g. Windows XP with at least Service Pack 1).
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).
4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
5) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (**www.br-automation.com**) or on the B&R HMI Driver & Utilities DVD (model number 5SWHMI.0000-00).
6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Cutout installation

The Panel PC 700 with preassembled mounting blocks is installed e.g. in a housing cutout. A cutout that corresponds to the following drawing must be made.

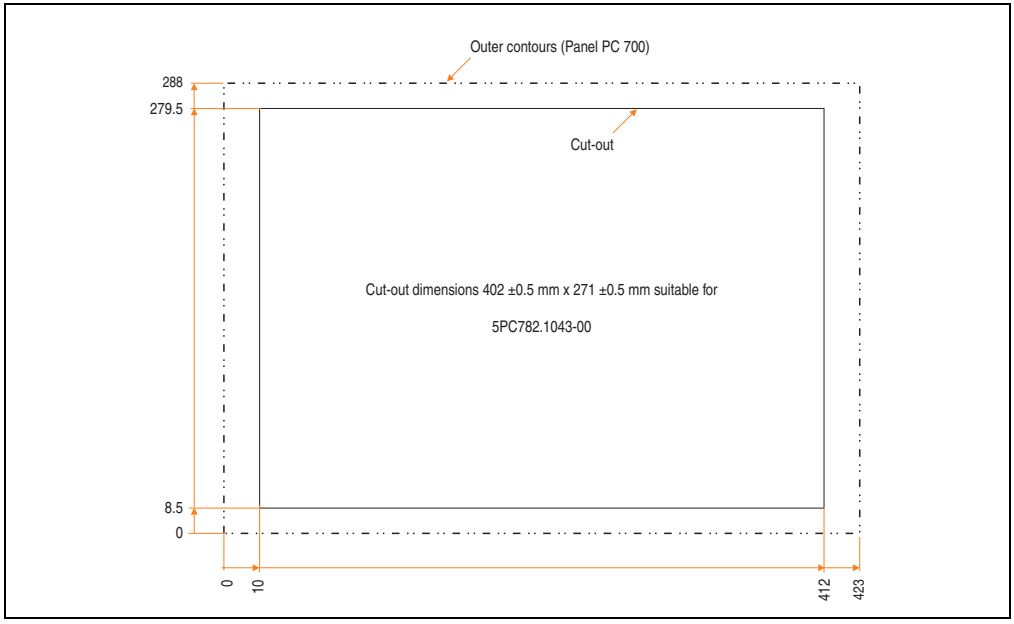


Figure 84: Cutout installation - 5PC782.1043-00

For further information regarding mounting and installation position, see chapter 3 "Commissioning", on page 209.

3.2 X945 CPU boards

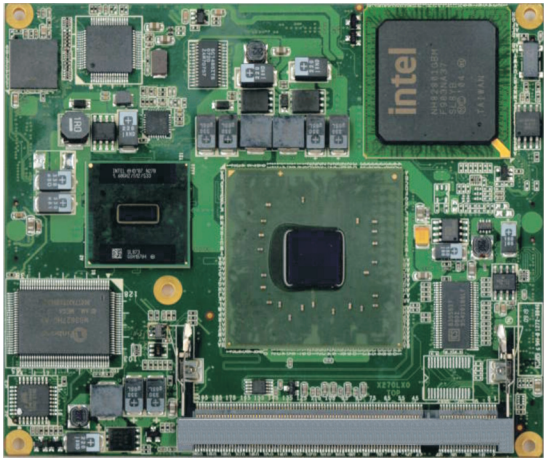


Figure 85: X945 CPU board

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.

Features	5PC600.X945-00
Boot loader / Operating system	BIOS AMI (see Section 1 "BIOS options", on page 235)
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 82801GBM (ICH7-M)
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At 25°C, typically 12 ppm (1sec)[1] per day

Table 63: Technical data - CPU board X945

Features	5PC600.X945-00
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 63: 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

There are a number of heat sink variants available to be used with different CPU boards.

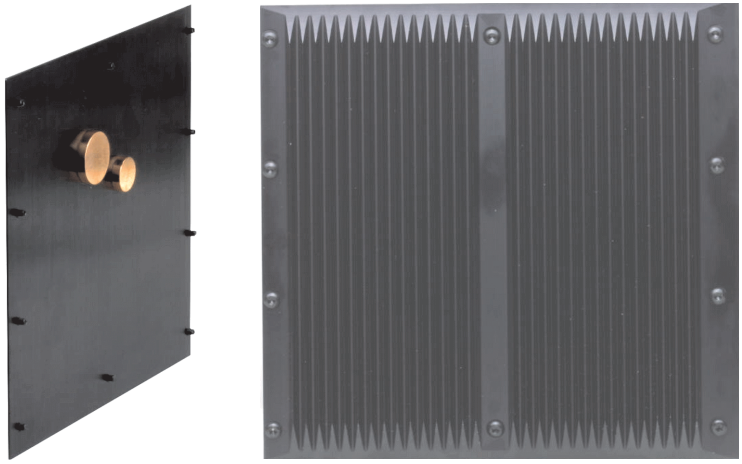


Figure 86: Heat sink

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.

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

Mechanical characteristics	5AC700.HS01-03
Ideal for CPU boards	5PC600.X945-00
Material	Black-coated aluminum
Outer dimensions Width Height Depth	 205 mm 208 mm 12.8 mm
Weight	1450 g

Table 64: 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.

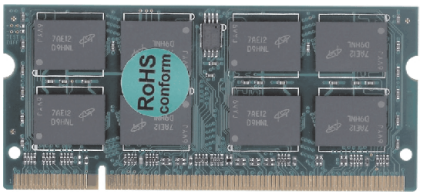


Figure 87: Main memory module

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 65: 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 - 5AC600.HDDI-05

This hard disk is specified for 24-hour operation and also provides an extended temperature specification. 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 88: 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
Manufacturer's product ID	Seagate ST940813AM
Formatted capacity	40 GB
Number of heads	2
Number of sectors (user)	78,140,160
Bytes per sector	512
Revolution speed	5400 rpm ±1%

Table 66: Technical data - Add-on hard disk 5AC600.HDDI-05

Features	5AC600.HDDI-05
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)
Cache	8 MB
S.M.A.R.T. Support	Yes
MTBF	550000 hours[1)]
Mechanical characteristics	
Add-on mounting	Fixed
Outer dimensions 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 (9.8 m/s^2 0-peak) no non-recovered errors 5 - 500 Hz: 5 g (49 m/s^2 0-peak) no non-recovered errors
Shock (pulse with a sine half-wave) Operation Storage	 No non-recovered errors at max. 200 g (1962 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 110 g (1079 m/s^2 0-peak) and 11 ms duration No damage at max. 800 g (7848 m/s^2 0-peak) and 2 ms duration No damage at max. 400 g (3924 m/s^2 0-peak) and 0.5 ms duration
Altitude Operation Storage	 - 300 to 4419 meters - 300 to 12192 meters

Table 66: 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

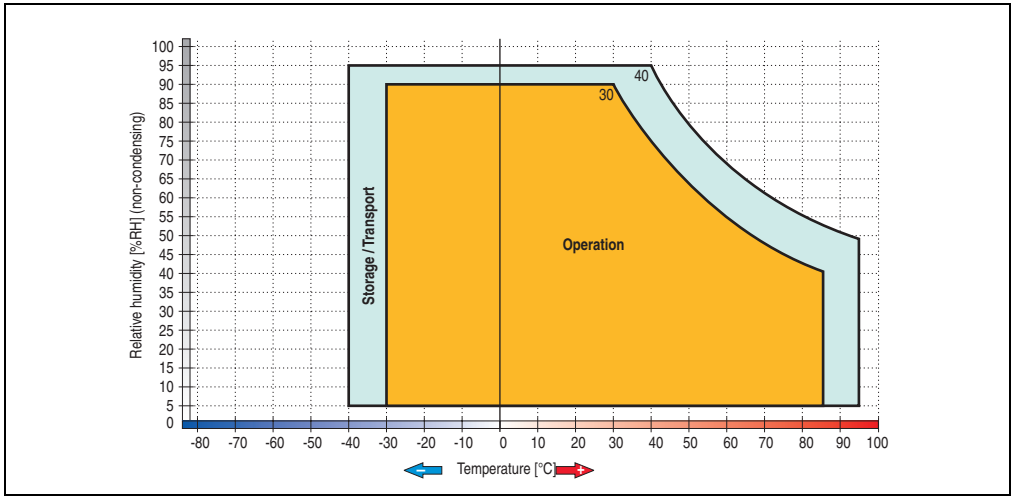


Figure 89: Temperature humidity diagram - Add-on hard disk 5AC600.HDDI-05

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

3.5.2 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 90: 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 67: 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	750000 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 12192 meters

Table 67: 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

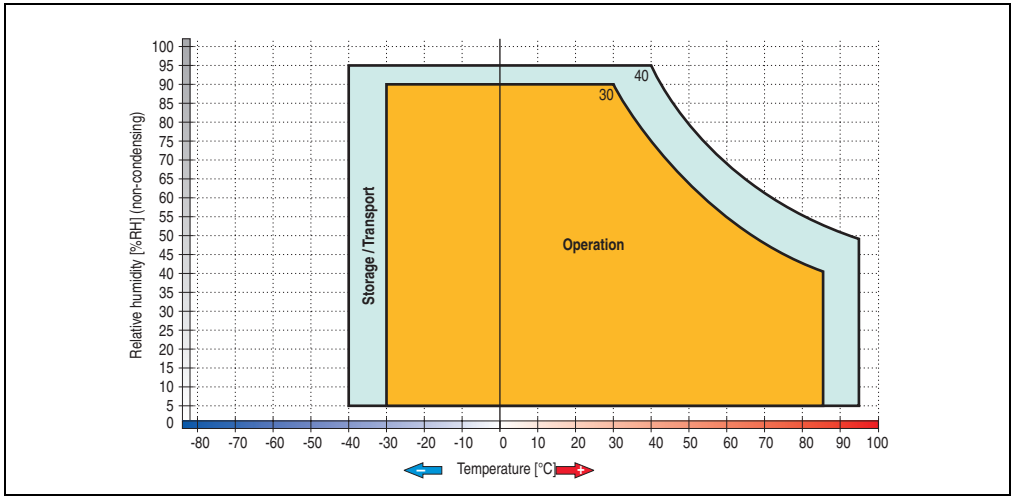


Figure 91: Temperature humidity diagram - Add-on hard disk 5AC600.HDDI-06

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.

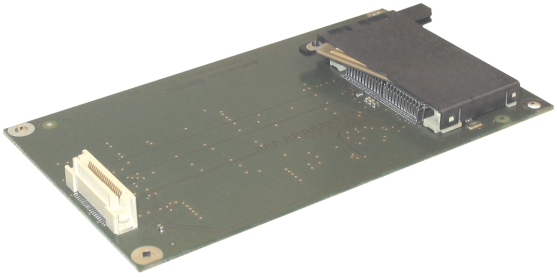


Figure 92: Add-on CompactFlash slot - 5AC600.CFSI-00

Technical data

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

Table 68: Technical data - Add-on CompactFlash slot 5AC600.CFSI-00

Warning!

Turn off power before inserting or removing the CompactFlash card!

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

The slide-in drive can be used in system units with 1 or 2 PCI slots. In these units it is connected to the system via USB.

Information:

It is possible to add or remove a slide-in drive at any time.

Caution!

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

Figure 93: 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	30000 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 69: 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

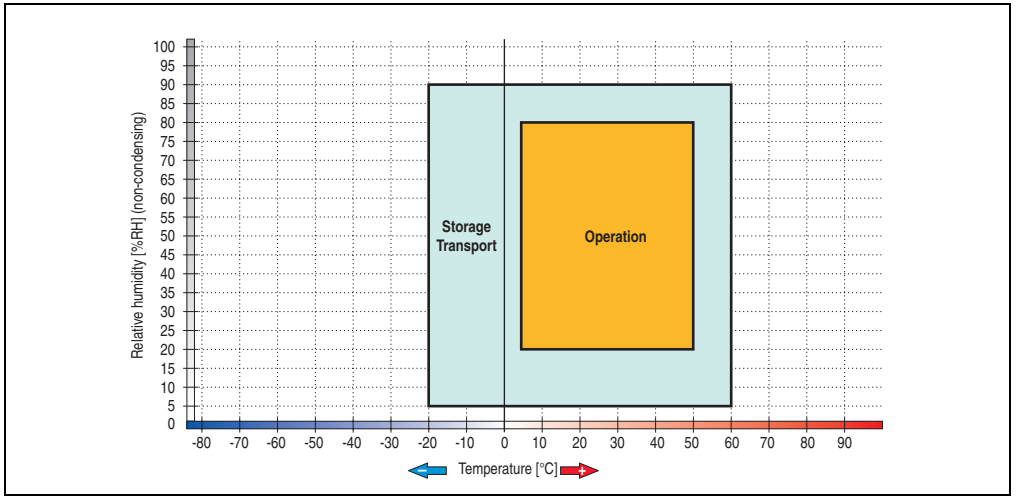


Figure 94: Temperature humidity diagram - Slide-in USB diskette drive 5AC600.FDDS-00

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.

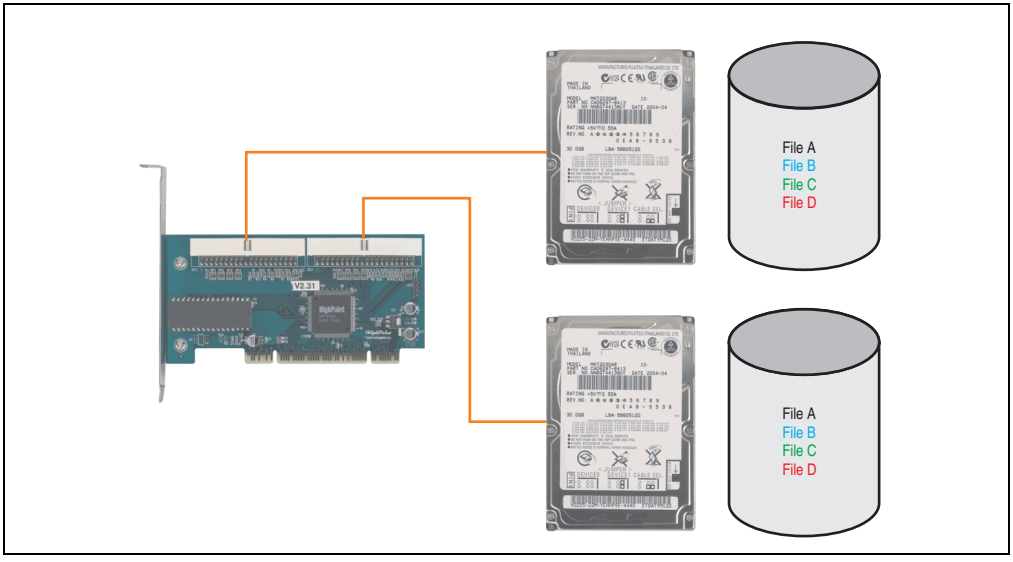


Figure 95: RAID 1 system schematic

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

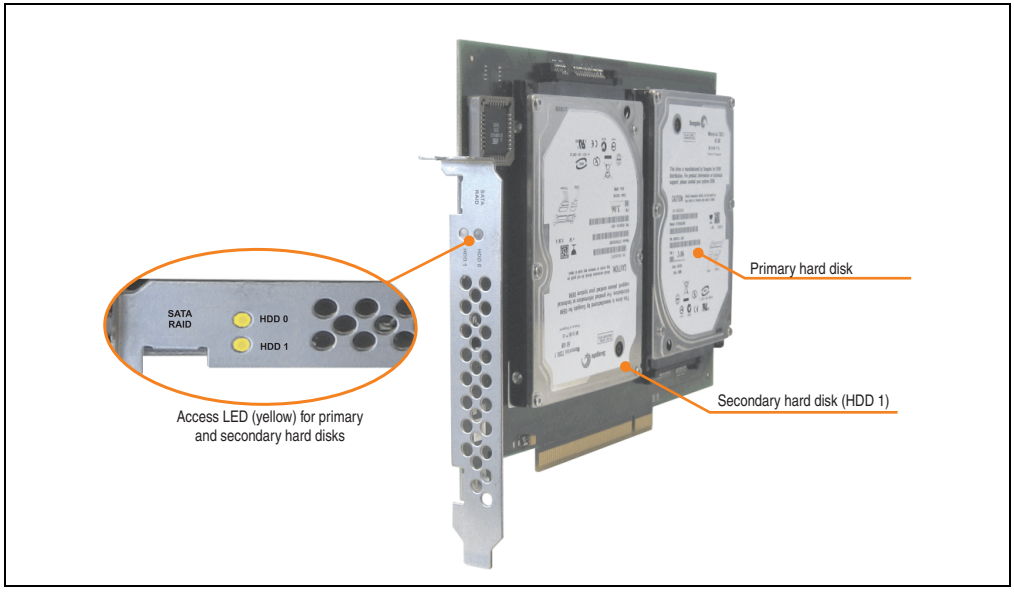


Figure 96: PCI SATA RAID controller - 5ACPCI.RAIC-03

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 70: 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 12192 meters

Table 70: 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

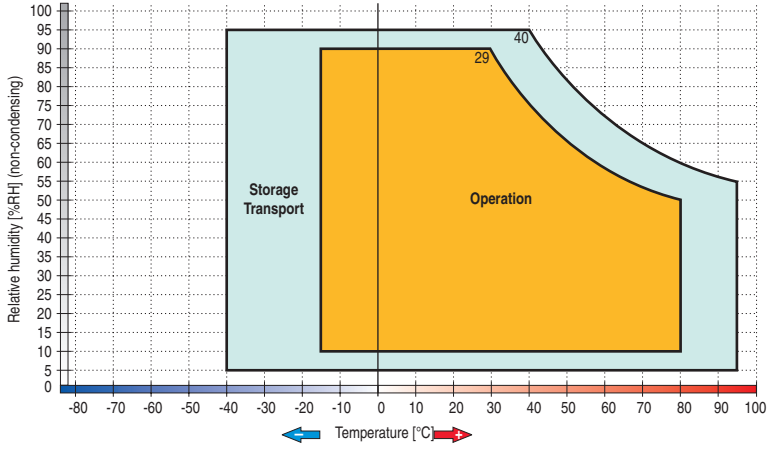


Figure 97: Temperature humidity diagram - SATA RAID hard disk 5ACPCI.RAIC-03

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 SATA RAID Installation Utility is also on the B&R homepage. This software detects all error states (also during operation) and signals this to the user using pop-up messages.

Information:

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

Behavior if an error occurs in a RAID1 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 management software detects this error status. After repairing the cause of the error (e.g. replacing the hard disk - see section "Exchanging a PCI SATA Hard Disk", on page 246 or section "Rebuild Mirrored Set", on page 306) the SATA 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".

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.

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 219.

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.

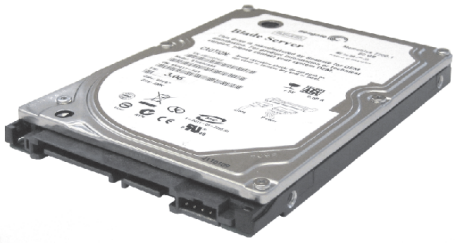


Figure 98: Replacement SATA HDD 160 GB - 5ACPCI.RAIC-04

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 71: 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 12192 meters

Table 71: 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

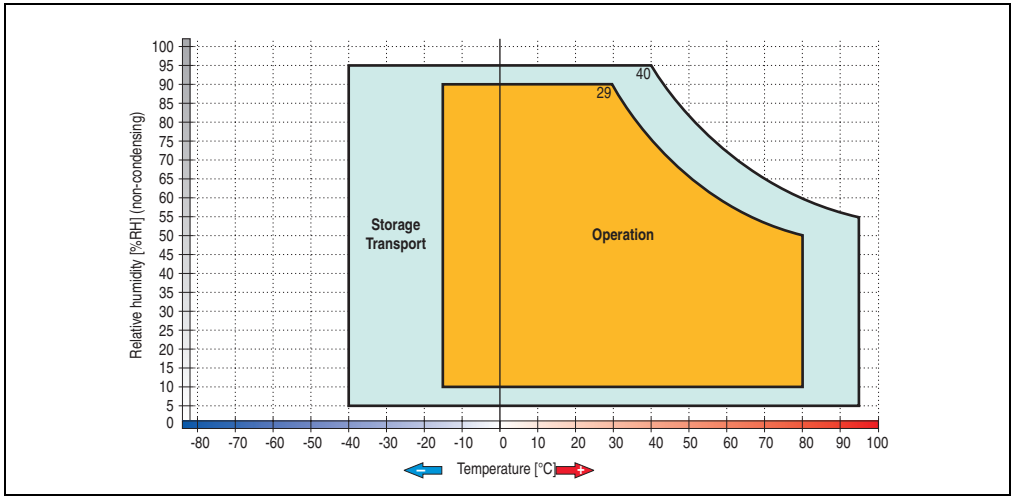


Figure 99: Temperature humidity diagram - SATA RAID hard disk 5ACPCI.RAIC-04

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 450.

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

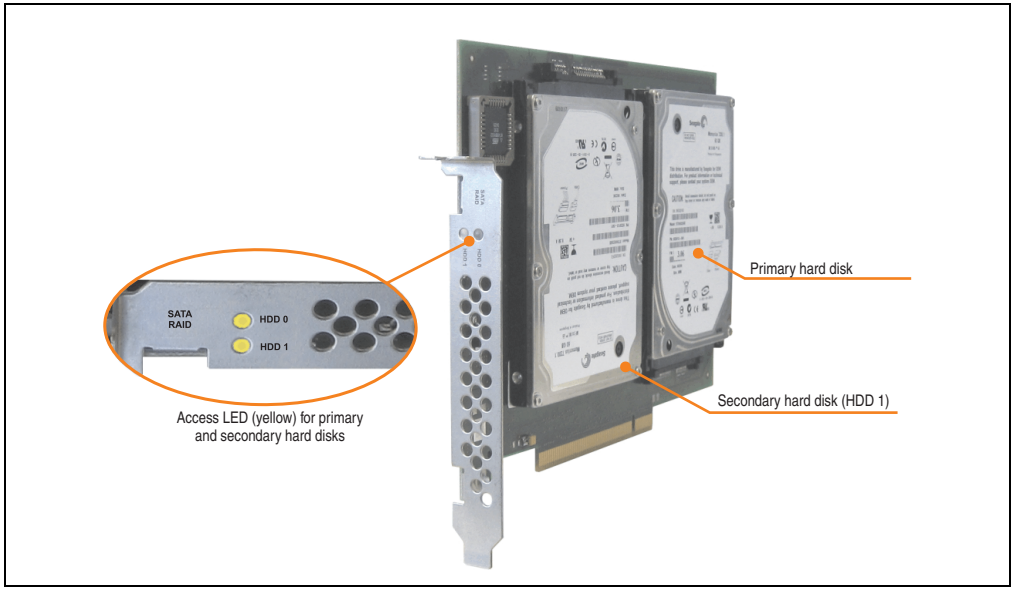


Figure 100: PCI SATA RAID controller - 5ACPCI.RAIC-05

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 72: 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 12192 m

Table 72: 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

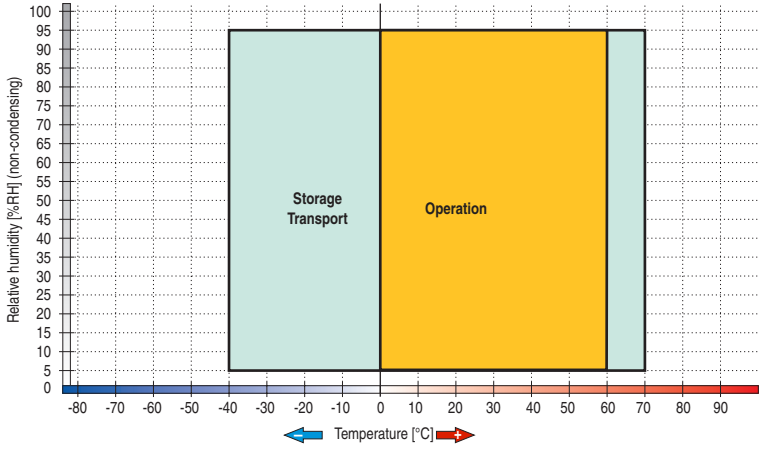


Figure 101: Temperature humidity diagram - SATA RAID Hard Disk - 5ACPCI.RAIC-05

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 "Commissioning", section "Configuration of a SATA RAID array", on page 219.

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 "Maintenance / Servicing", section "Slide-in drive - installation and exchange", on page 444.

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.

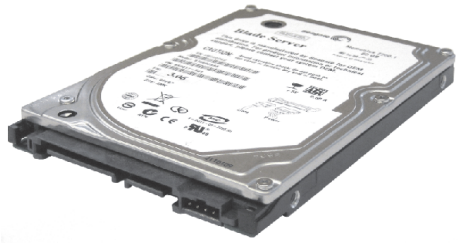


Figure 102: Replacement SATA HDD 250 GB - 5MMHDD.0250-00

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 73: 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 12192 m

Table 73: 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

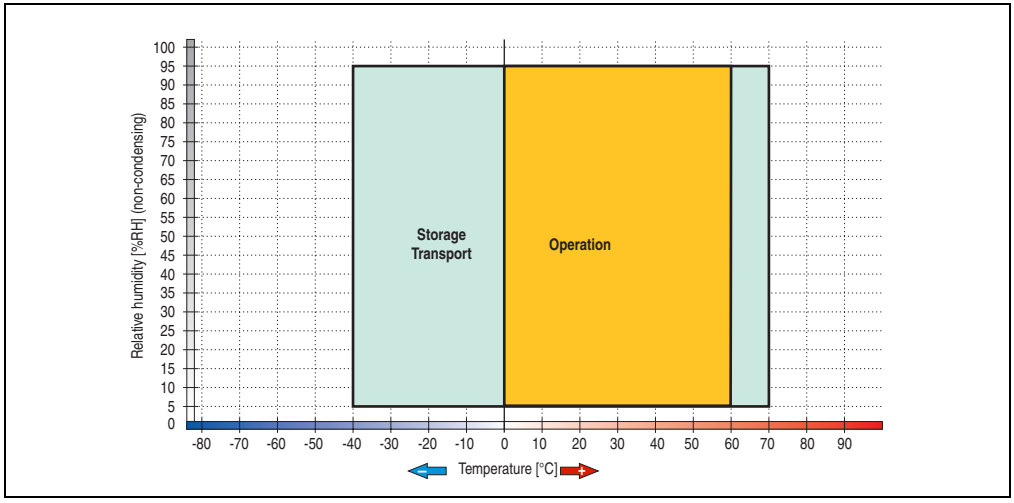


Figure 103: Temperature humidity diagram - SATA RAID hard disk - 5MMHDD.0250-00

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).

Order data

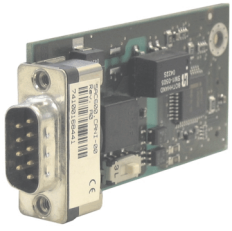
Model number	Description	Image
5AC600.CANI-00	**Add-on CAN interface** CAN interface for installation in an APC620 or PPC700.	

Table 74: 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 75: 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 76: Pin assignments - CAN

I/O address and IRQ

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

Table 77: 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 78: 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 79: 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 80: 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").

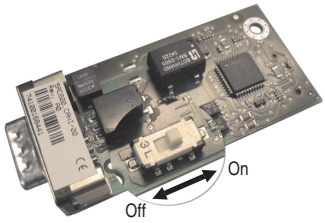


Figure 104: Terminating resistor - Add-on CAN interface 5AC600.CANI-00

Contents of the delivery / mounting material

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

Figure 105: 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.

Order data

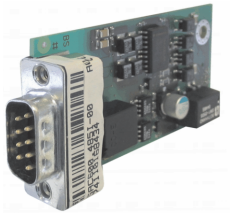
Model number	Description	Image
5AC600.485I-00	**Add-on RS232/422/485 interface** Add-on RS232/422/485 interface for installation in an APC620 and PPC700.	

Table 81: Add-on RS232/422/485 interface - 5AC600.485I-00

Pin assignments

Add-on RS232/422/485			
	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 82: 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 83: 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 84: 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 85: 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 86: 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 87: 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.

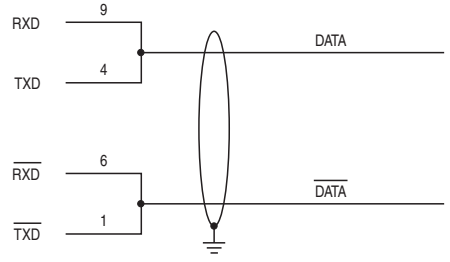


Figure 106: Add-on RS232/422/485 interface - operated in RS485 mode

The RTS line must be switched each time the driver is sent and received, and there is also 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 88: 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	4 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 89: RS485 - Cable requirements

Contents of the delivery / mounting material

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

Figure 107: 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 kits 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 5PC700.FA00-01

This fan kit can be used as an option for 10.4", 12.1", 15", 17" and 19" Panel PC 700 system units with 0 PCI slots (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).

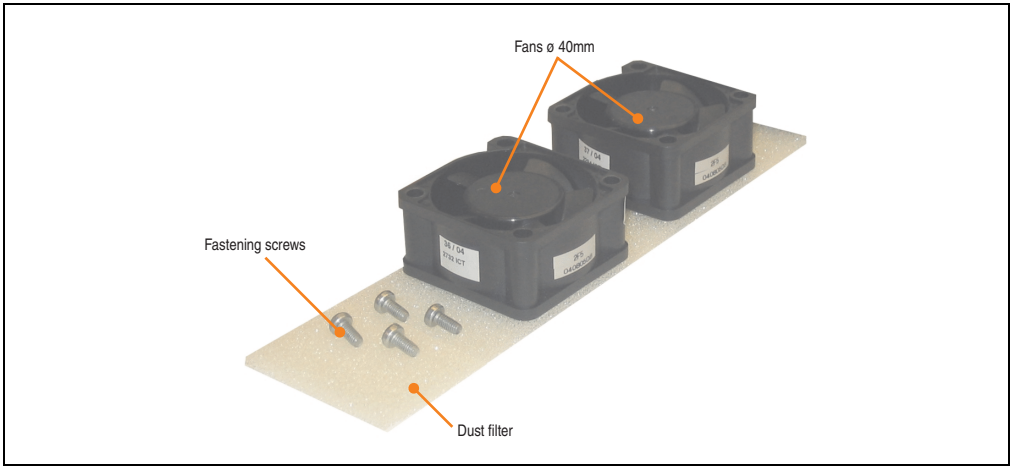


Figure 108: Fan kit 5PC700.FA00-01

Technical data

Features	5PC700.FA00-01
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	80000 hours at 30°C

Table 90: Technical data - 5PC700.FA00-01

Features	5PC700.FA00-01
Maintenance interval	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.
Installation	See "Procedure - PPC700 without PCI slots", on page 438

Table 90: Technical data - 5PC700.FA00-01 (Forts.)

Contents of delivery

- 2 fans with 40 mm diameter
- 1 dust filter
- Installation material - Mounting screws

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 438.

3.8.2 Fan kit 5PC700.FA02-00

This fan kit can be used as an option for 10.4" Panel PC 700 system units with 2 PCI slots (5PC720.1043-01).

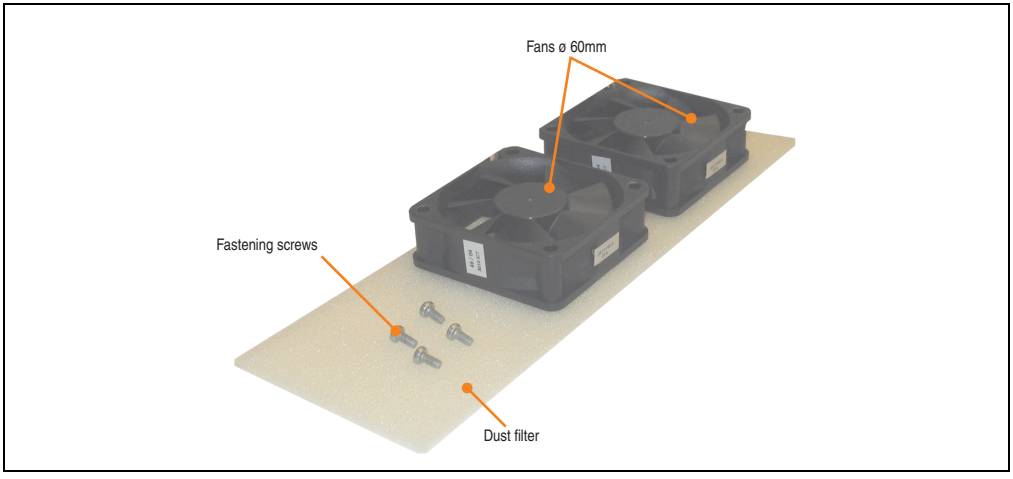


Figure 109: Fan kit 5PC700.FA02-00

Technical data

Features	5PC700.FA02-00
Fan type Width Length Height	Double ball bearings 60 mm 60 mm 10 mm
Revolution speed	3600 rpm ±10%
Noise level	30.5 dB
Service life	80000 hours at 30°C
Maintenance interval	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.
Installation	See "Procedure - PPC700 with 1 and 2 PCI slots", on page 441

Table 91: Technical data - 5PC700.FA02-00

Contents of delivery

- 2 fans with 60 mm diameter
- 1 dust filter
- Installation material - Mounting screws

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 441.

3.8.3 Fan kit 5PC700.FA02-01

This fan kit can be used as an option for 12.1" and 15" Panel PC 700 system units with 1 and 2 PCI slots (5PC720.1214-01, 5PC720.1505-01 and 5PC720.1505-02).

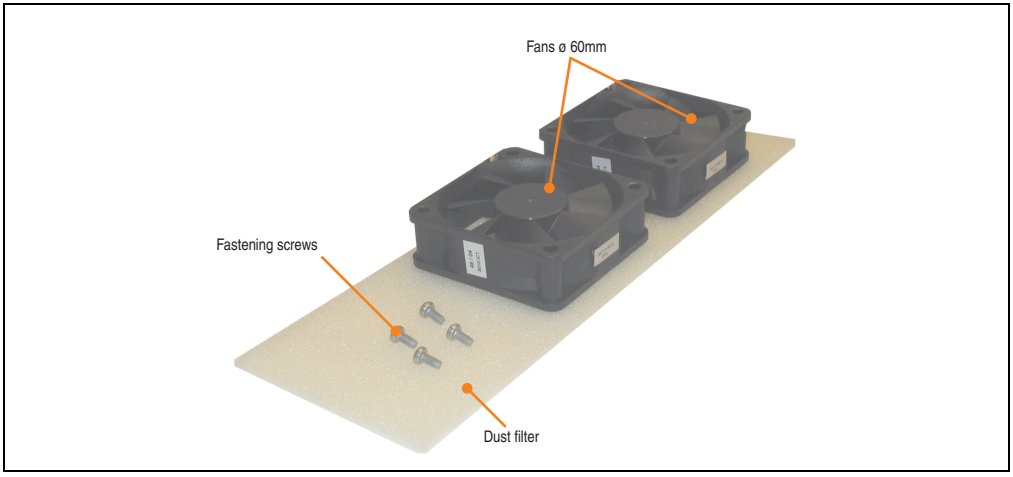


Figure 110: Fan kit 5PC700.FA02-01

Technical data

Features	5PC700.FA02-01
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	80000 hours at 30°C
Maintenance interval	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.
Installation	See "Procedure - PPC700 with 1 and 2 PCI slots", on page 441

Table 92: Technical data - 5PC700.FA02-01

Contents of delivery

- 2 fans with 60 mm diameter
- 1 dust filter
- Installation material - Mounting screws

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 441.

Chapter 3 • Commissioning

1. Installation

Panel PC 700 devices are best mounted in a housing cutout using the clamps found on the housing (different designs possible). The cutout dimensions for the respective Panel PC 700 device can be found in the technical data for the system units (see chapter 2 "Technical data" starting on page 35).

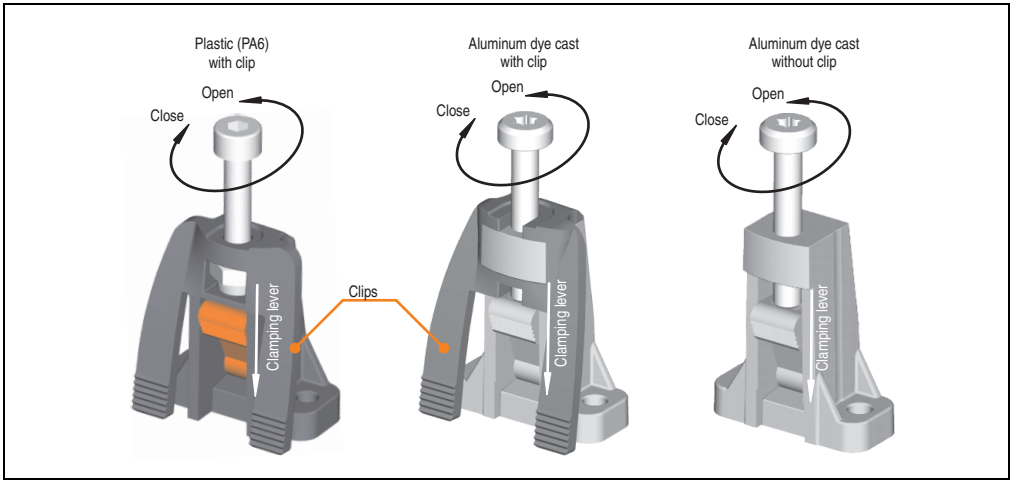


Figure 111: Terminal block

The mounting clamps are designed for a max. thickness of 10 mm for the material where the device is being clamped. The minimum thickness is 2 mm.

In order to tighten or loosen the screws, a hex key (size 3) is required for the plastic clamps and a Torx screwdriver (size 20) or a large flat-head screwdriver for the aluminum die casting.

The maximum torque when tightening the clamp is 0.5 Nm. A Panel PC 700 unit must be mounted to a flat surface. Uneven areas can cause damage to the display when the screws are tightened.

1.1 Important mounting information

- The environmental conditions must be taken into consideration (see chapter 2 "Technical data", section "Ambient temperature with X945 CPU board", on page 40).
- The PPC700 must be mounted to a planar surface.
- The PPC700 is only for operation in closed rooms.
- The PPC700 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 "Mounting orientation", on page 212).
- Be sure the wall or control cabinet can withstand four times the total weight of the the PPC700.
- When connecting certain cable types (DVI, SDL, USB, etc.), keep the flex radius in mind.

1.2 Air circulation

In order to guarantee proper air circulation, allow the specified amount of space above, below, to the side and behind the Panel PC 700. The minimum specified free space can be found in the diagram below.

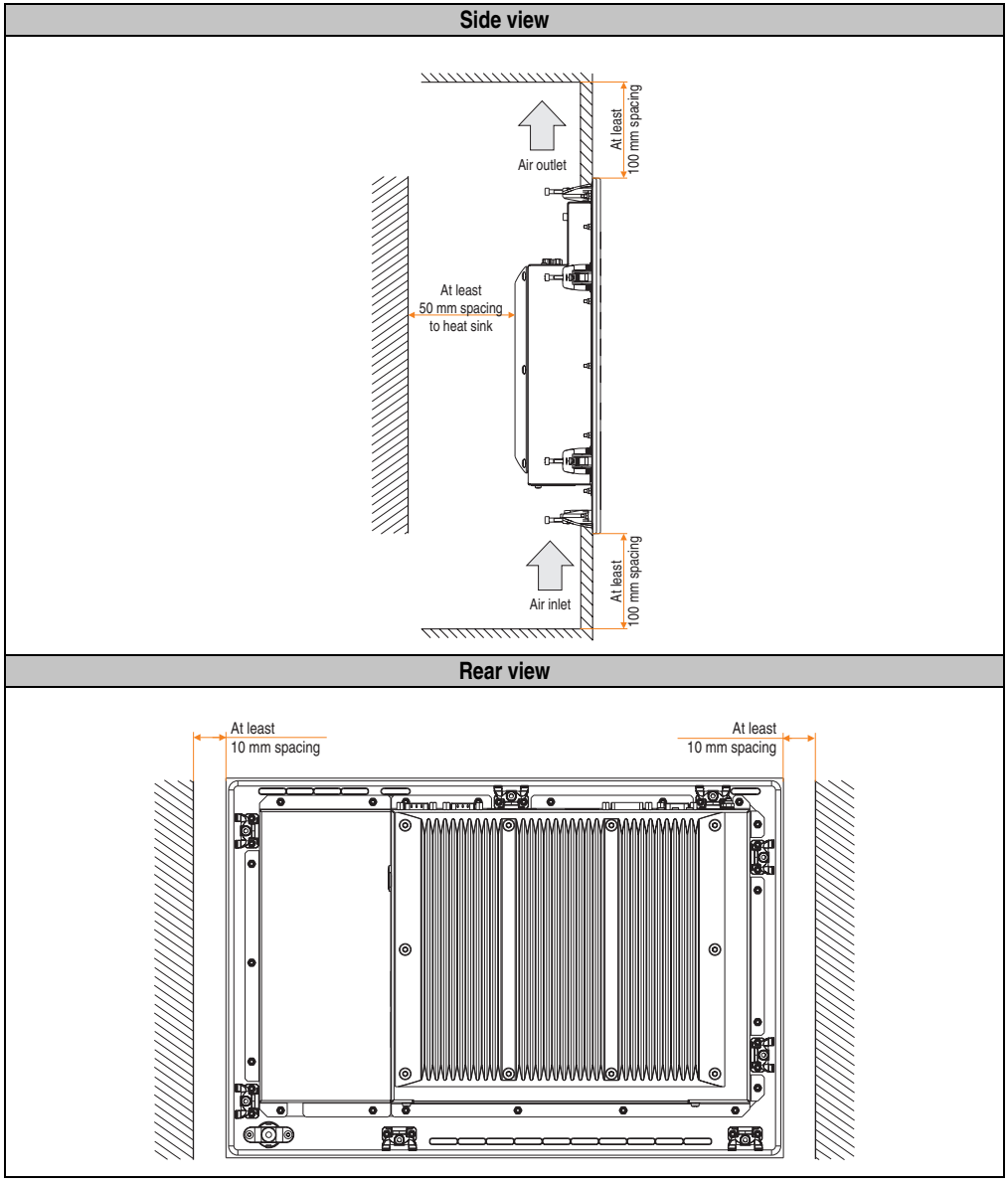


Figure 112: Spaces for air circulation

1.3 Mounting orientation

The following diagram displays the specified mounting orientation for the Panel PC 700 device.

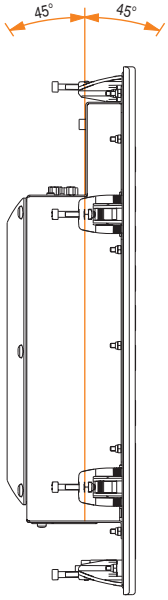
Mounting orientation


Table 93: Mounting orientation

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.

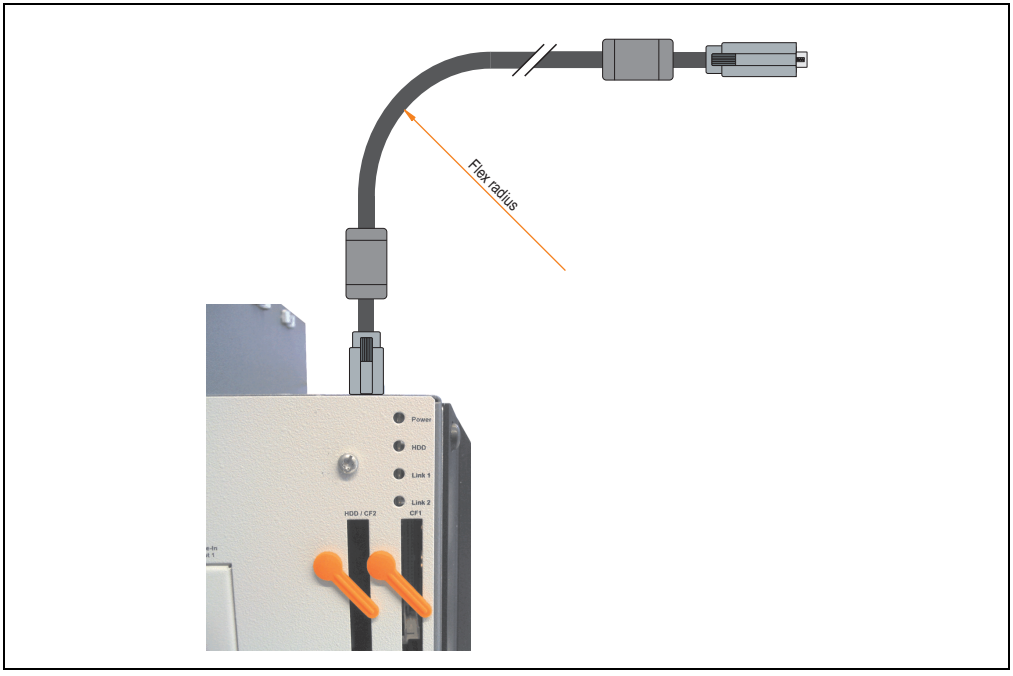


Figure 113: Flex radius - Cable connection

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

More information can be found in section "Ethernet connection ETH1", on page 72.

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 PPC700 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 data cables connected to the device must use shielded lines.

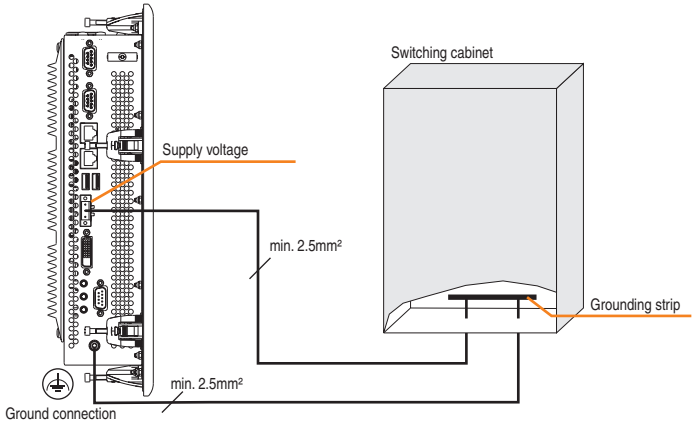


Figure 114: Grounding concept

4. Touch screen calibration

B&R touch screen devices are equipped with a touch controller that supports hardware calibration. This means that the devices are pre-calibrated from stock. This feature proves advantageous in the case of a replacement part because a new calibration is no longer required when exchanging devices (identical model / type). Nevertheless, we recommend calibrating the device in order to achieve the best results and to better readjust the touch screen to the user's preferences.

Regardless of this, the touch screen driver requires calibration following installation.

4.1 Windows XP Professional

After installing Windows XP Professional, the touch screen driver must be installed in the device in order to operate the touch screen. The corresponding drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). The touch screen should be calibrated during driver installation.

4.2 Windows CE

Windows CE starts the touch screen calibration sequence during its first boot in the default configuration / delivered state.

4.3 Windows XP embedded

After first starting Windows XP embedded (First Boot Agent), the touch screen driver must be installed in the device in order to operate the touch screen. The corresponding drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). The touch screen should be calibrated during driver installation.

4.4 Automation Runtime / Visual Components

The first time the touch screen is used, it must be calibrated once in the customer application for the existing device and project.

5. Connection examples

The following example provides an overview of the configuration possibilities regarding the way an analog RGB device can be connected with the PPC700. The following questions will be answered:

- Automation Panel 900 or Automation Panel 800 devices cannot be connected to the monitor/panel output on the PPC700.
- Do BIOS settings have to be changed for a specific configuration?

5.1 An analog CRT device on the monitor/panel connector

An analog RGB device is connected to the integrated SDL interface (onboard) using the monitor/panel connector.

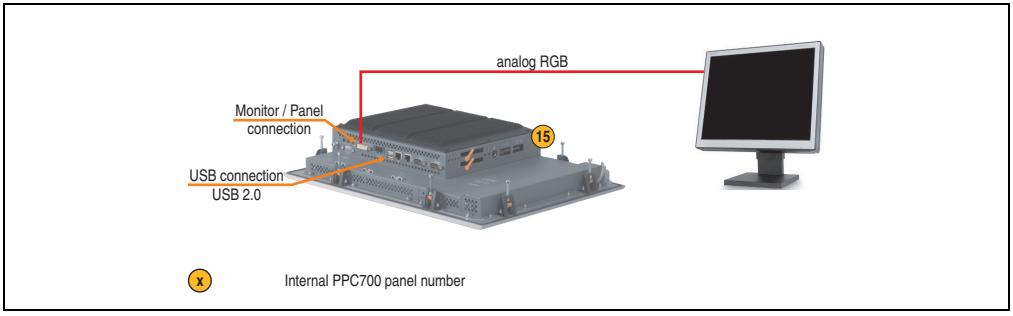


Figure 115: Configuration - An analog CRT device on the monitor/panel connector

5.1.1 Basic system requirements

The following table displays the possible combinations for the PPC700 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.

System unit	CPU board 5PC600.X945-00	Restriction Resolution
5PC720.1043-00	✓	Max. UXGA
5PC720.1043-01	✓	Max. UXGA
5PC720.1214-00	✓	Max. UXGA
5PC720.1214-01	✓	Max. UXGA
5PC720.1505-00	✓	Max. UXGA
5PC720.1505-01	✓	Max. UXGA
5PC720.1505-02	✓	Max. UXGA
5PC720.1706-00	✓	Max. UXGA
5PC720.1906-00	✓	Max. UXGA
5PC781.1043-00	✓	Max. UXGA
5PC781.1505-00	✓	Max. UXGA
5PC782.1043-00	✓	Max. UXGA

Table 94: Possible combinations of system unit and CPU board

5.1.2 BIOS settings

No special BIOS settings are necessary for operation.

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 Locally on the PPC700

Many different peripheral USB devices can be connected to the 2 or 3 USB ports on the Panel PC 700. These can each handle a load of 1A. The maximum transfer rate is USB 2.0.

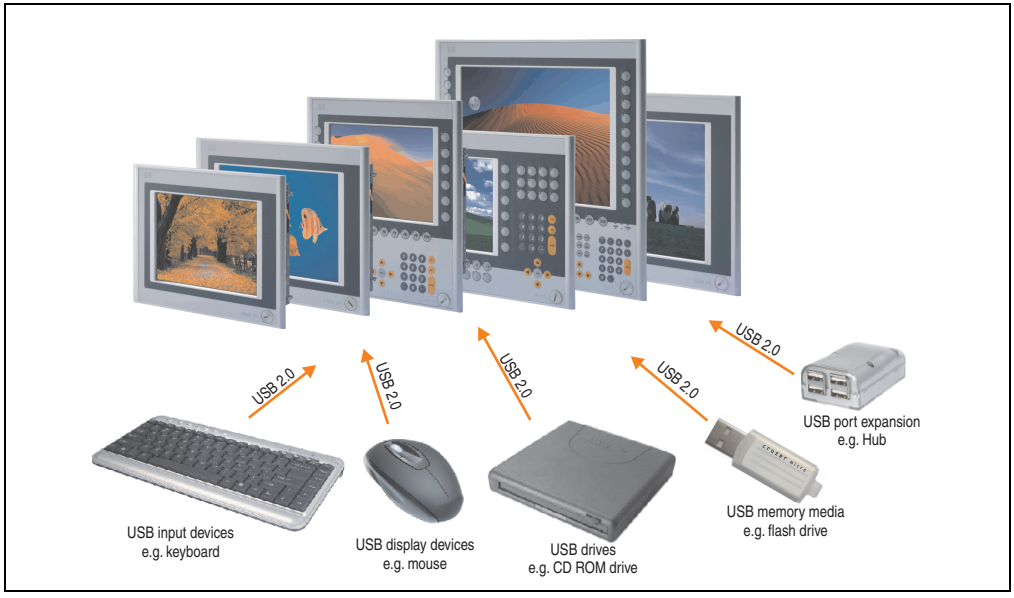


Figure 116: Local connection of USB peripheral devices on the PPC 700

7. 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.

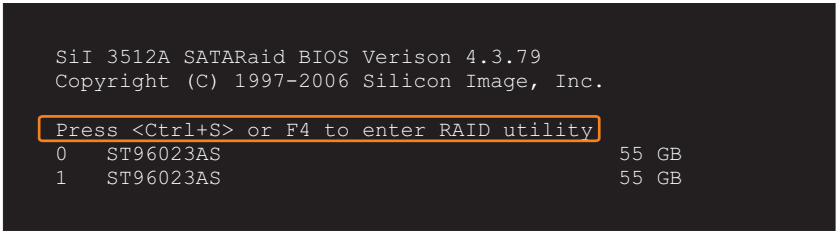


Figure 117: Open the RAID Configuration Utility

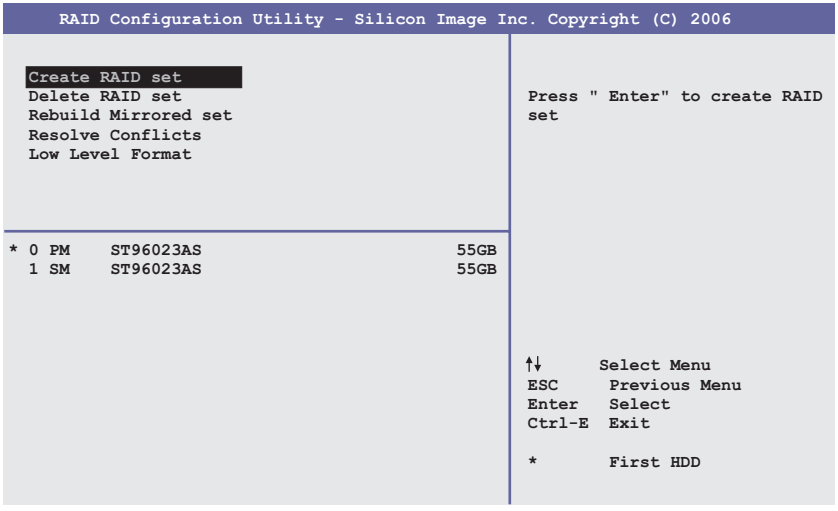


Figure 118: RAID Configuration Utility - Menu

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.
ESC	Go back to previous menu.

Table 95: BIOS-relevant keys in the RAID Configuration Utility

Key	Function
Ctrl+E	Exit setup and save the changed settings.

Table 95: BIOS-relevant keys in the RAID Configuration Utility

7.1 Create RAID set

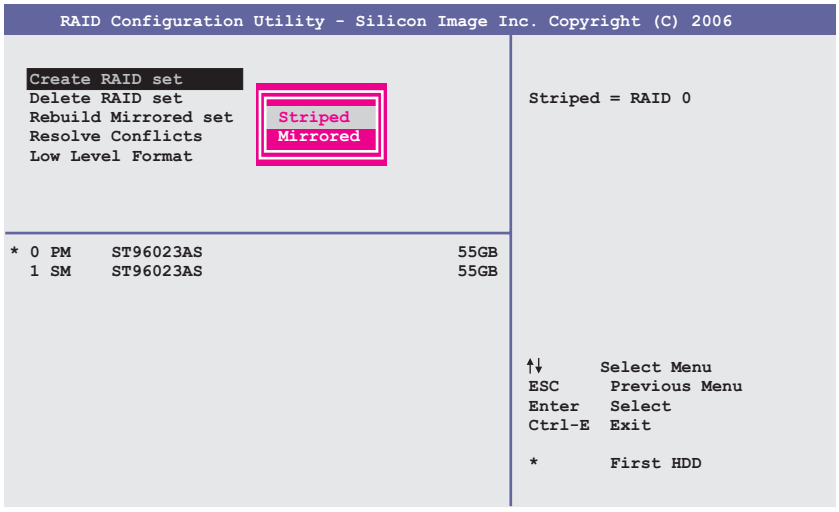


Figure 119: RAID Configuration Utility - Menu

The RAID system can be recreated as "Striped" = RAID0 or "Mirrored" = RAID1 using the menu "Create RAID set".

7.2 Create RAID set - Striped

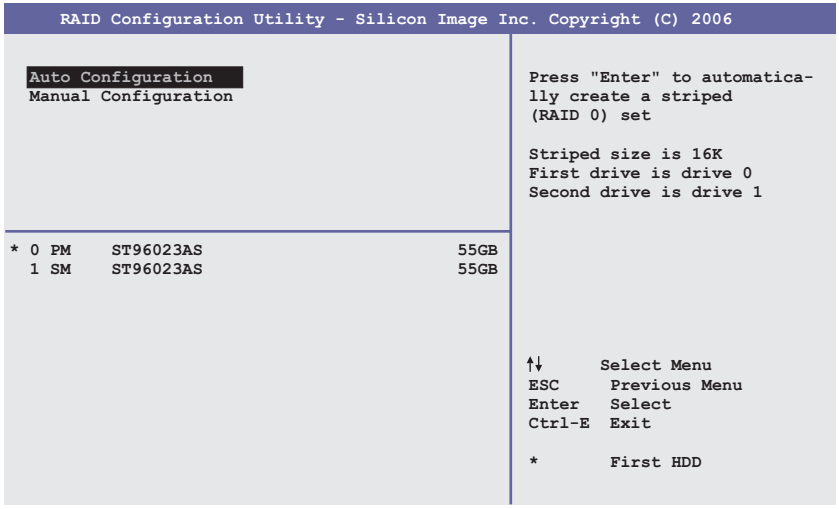


Figure 120: RAID Configuration Utility - Create RAID set - Striped

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).

7.3 Create RAID set - Mirrored

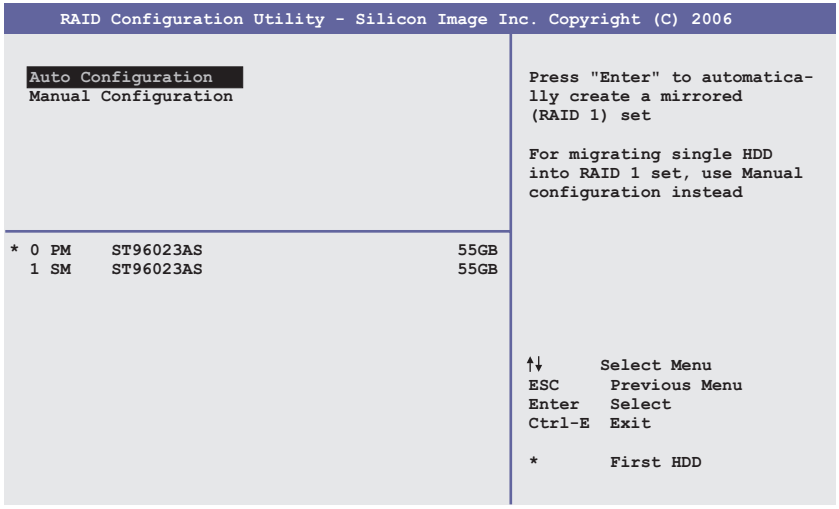


Figure 121: RAID Configuration Utility - Create RAID set - Mirrored

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).

7.4 Delete RAID set

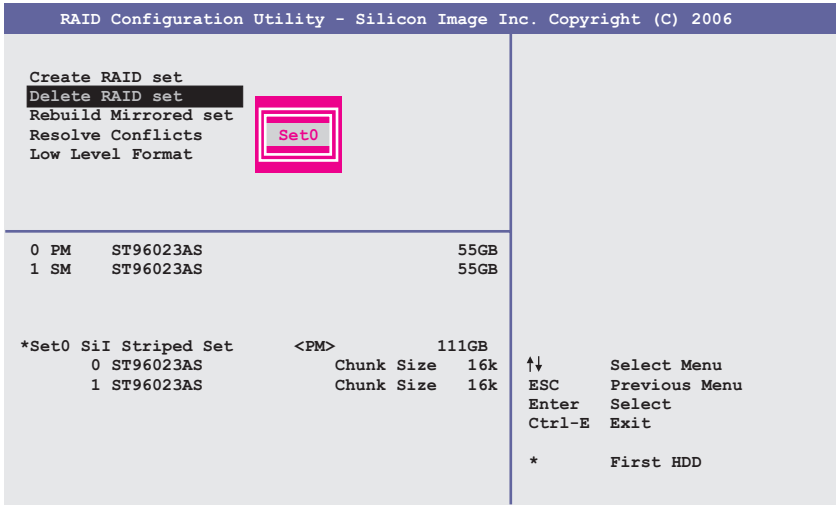


Figure 122: RAID Configuration Utility - Delete RAID set

An existing RAID set can be deleted using the menu "Delete RAID set".

7.5 Rebuild mirrored set

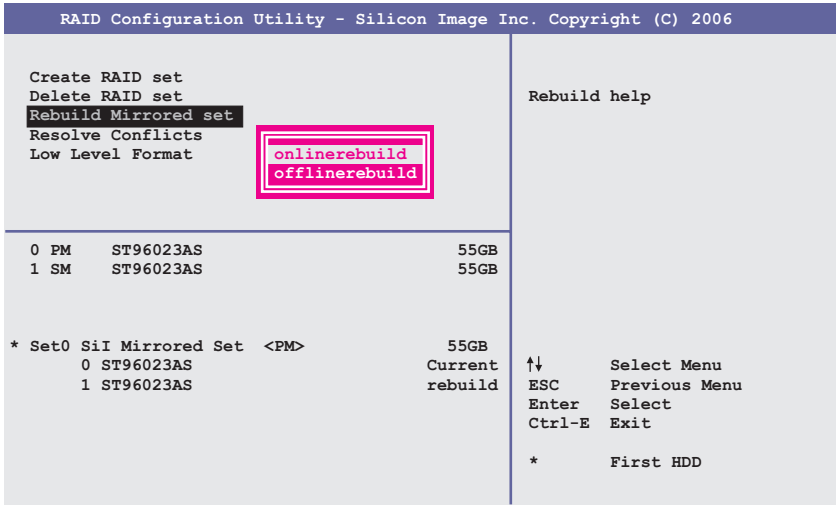


Figure 123: RAID Configuration Utility - Rebuild mirrored set

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).

7.6 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 124: 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".

7.7 Low level format

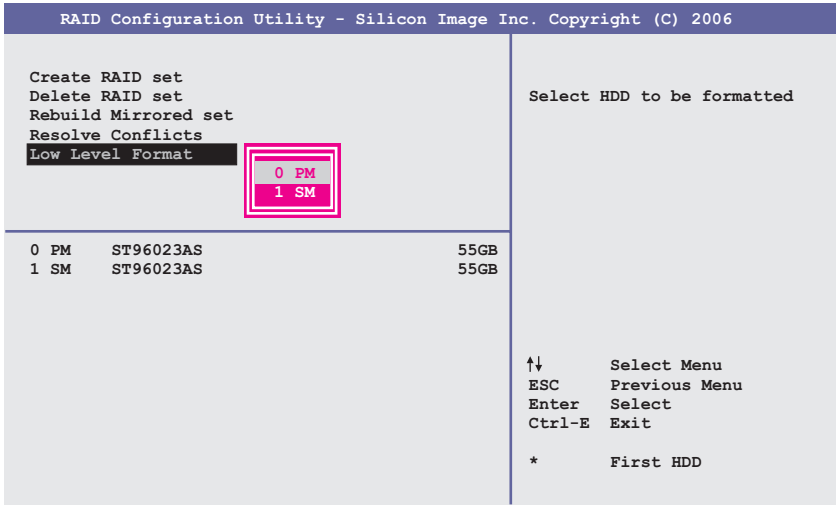


Figure 125: RAID Configuration Utility - Low level format

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.

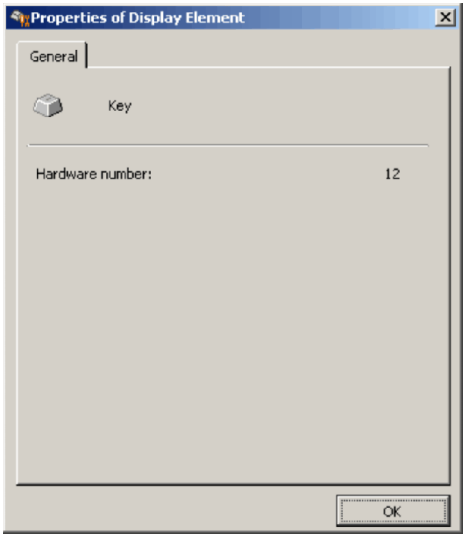
8. Key and LED configurations

Each key or LED can be configured individually and adjusted to suit the application. Various B&R tools are available for this purpose:

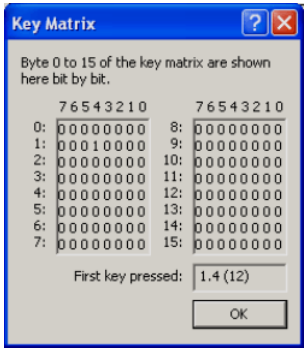
- B&R Key Editor for Windows operating systems
- Visual Components for Automation Runtime

Keys and LEDs from each device are processed by the matrix controller in a bit sequence of 128 bits each.

The positions of the keys and LEDs in the matrix are shown as hardware numbers. The hardware numbers can be read directly on the target system, for example with the B&R Key Editor and the B&R Control Center.



Screenshot B&R Key Editor



Screenshot B&R Control Center

Figure 126: Example - Hardware number in the B&R Key Editor or in the B&R Control Center

The following graphics show the positions of the keys and LEDs in the matrix. They are shown as follows.

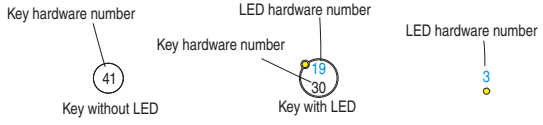


Figure 127: Display - Keys and LEDs in the matrix

8.1 Panel PC 10.4" TFT

8.1.1 Panel PC 5PC781.1043-00

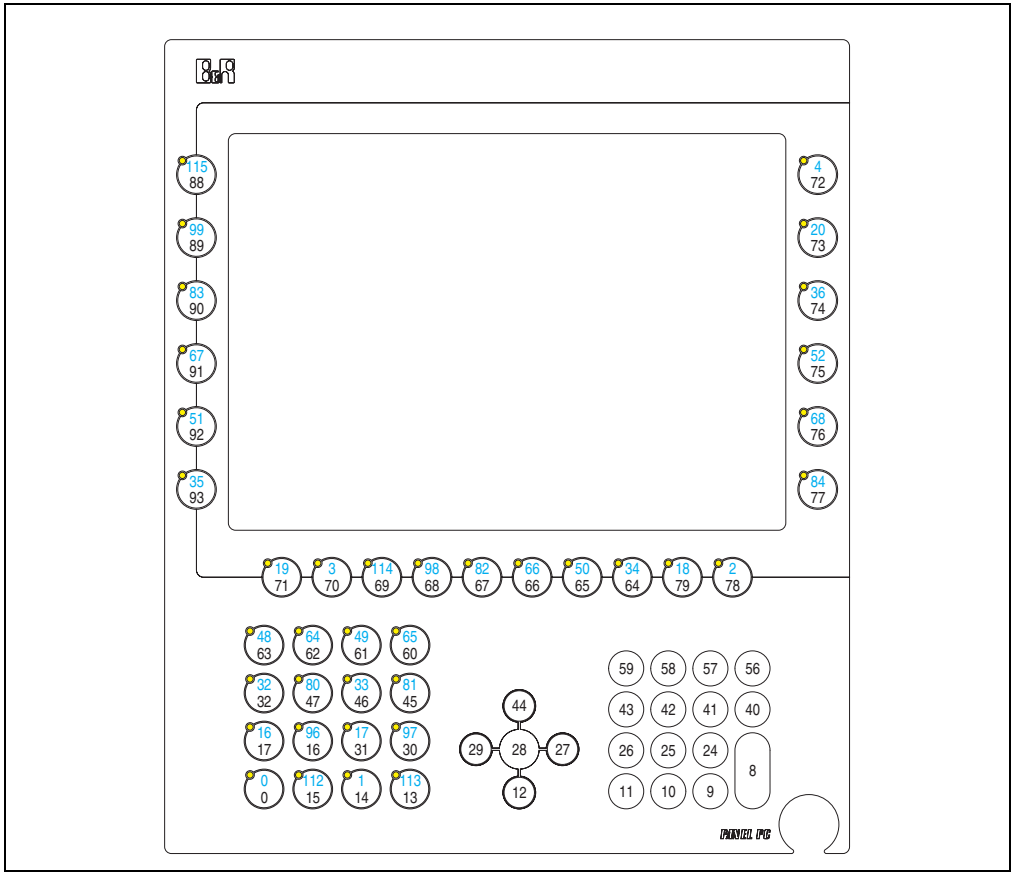


Figure 128: Hardware numbers - 5PC781.1043-00

8.1.2 Panel PC 5PC782.1043-00

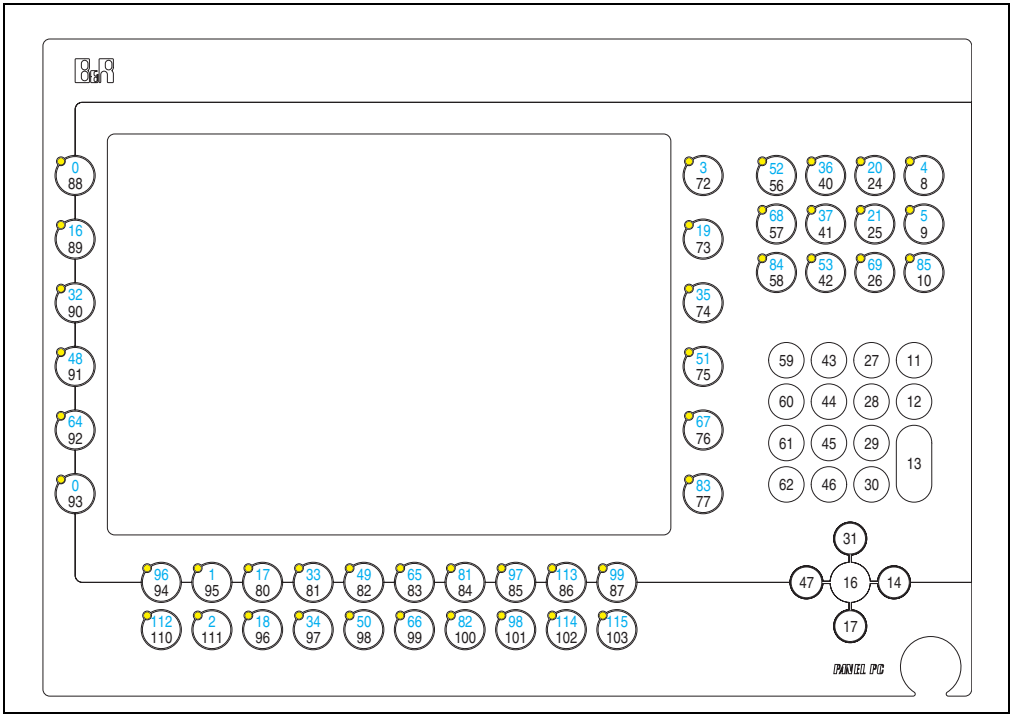


Figure 129: Hardware numbers - 5PC782.1043-00

8.2 Panel PC 15" TFT

8.2.1 Panel PC 5PC781.1505-00

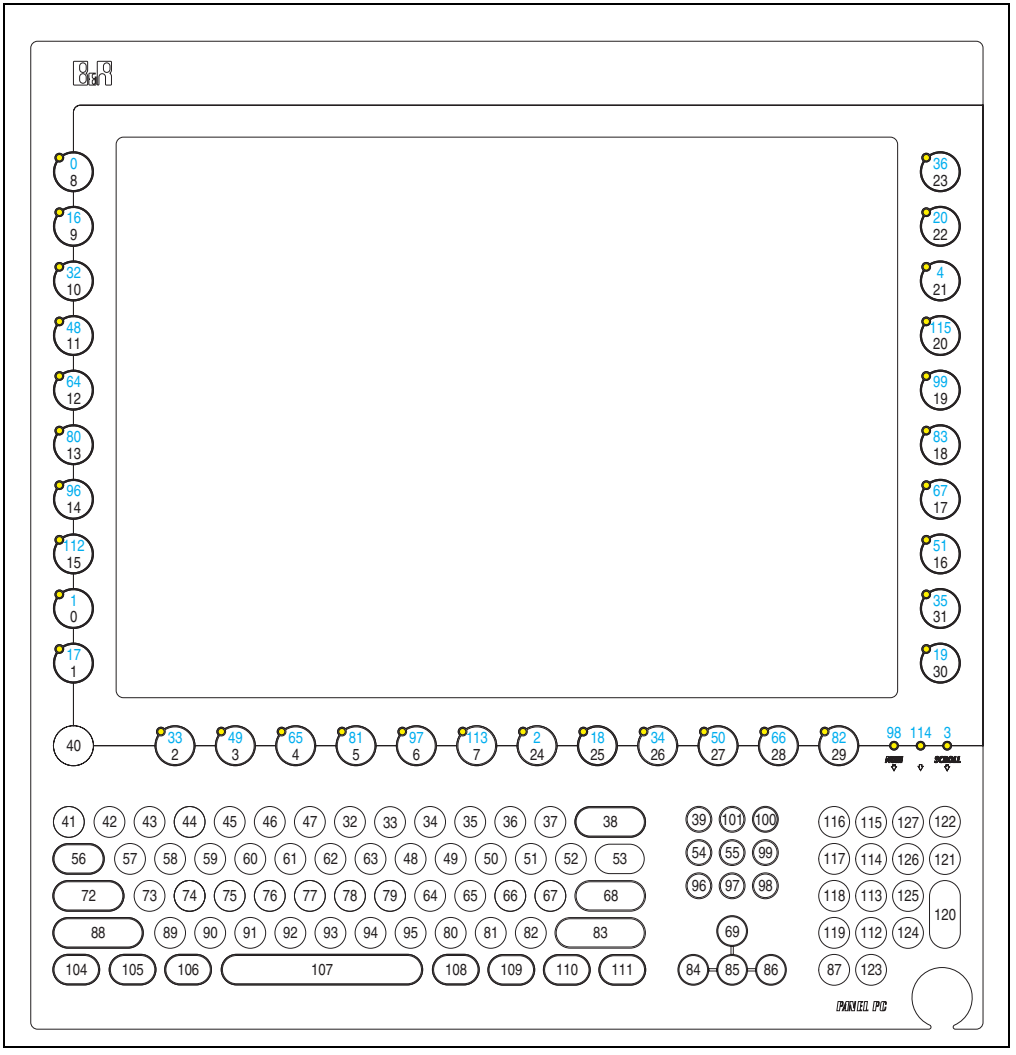


Figure 130: Hardware numbers - 5PC781.1505-00

9. User tips for increasing the display lifespan

9.1 Backlight

The lifespan of the backlight is specified in "Half Brightness Time". An operating time of 50,000 hours would mean that the display brightness would still be 50% after this time.

9.1.1 How can the lifespan of backlights be extended?

- Set the display brightness to the lowest value that is still comfortable for the eyes
- Use dark images
- Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.

9.2 Image sticking

Image sticking is the "burning in" of a static image on a display after being displayed for a prolonged period of time. However, this does not only occur with static images. Image sticking is known in technical literature as the "burn-in effect", "image retention", "memory effect", "memory sticking" or "ghost image".

There are 2 types of this:

- Area type: This is seen with a dark gray image. The effect disappears if the display is switched off for a longer period of time.
- Line type: This can cause lasting damage.

9.2.1 What causes image sticking?

- Static images
- Screensaver not enabled
- Sharp contrast transitions (e.g. black / white)
- High ambient temperatures
- Operation outside of the specifications

9.2.2 How can image sticking be avoided?

- continual change between static and dynamic images
- avoiding excessive brightness contrast between foreground and background display
- use of colors with similar brightness
- use of complementary colors in subsequent images
- use of screensavers

10. Pixel error

Information:

Displays can contain dead pixels that result from the manufacturing process. These flaws are not grounds claiming reclamation or warranty.

11. 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 hard disk is switched off under Control Panel -> Power Options.
- 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.

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 279).**

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 Panel PC 700 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 PPC700 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 Panel PC 700 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 131: 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 96: 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 97: 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.	238
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.	239
Boot	The boot order can be set here.	271
Security	For setting up the system's security functions.	273
Power	Setup of various APM (Advanced Power Management) options.	276
Exit	To end the BIOS setup.	278

Table 98: X945 - Overview of BIOS menu items

1.3 Main

Immediately after the DEL button is pressed during startup, the main BIOS setup menu appears.

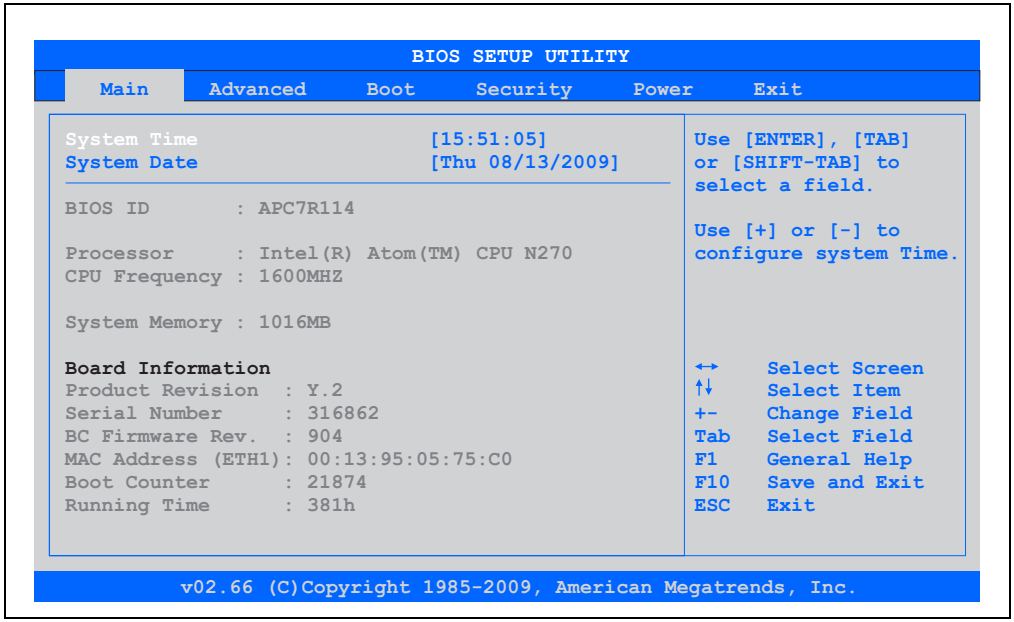


Figure 132: X945 BIOS Main Menu

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 99: 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 99: X945 Main Menu setting options (Forts.)

1.4 Advanced

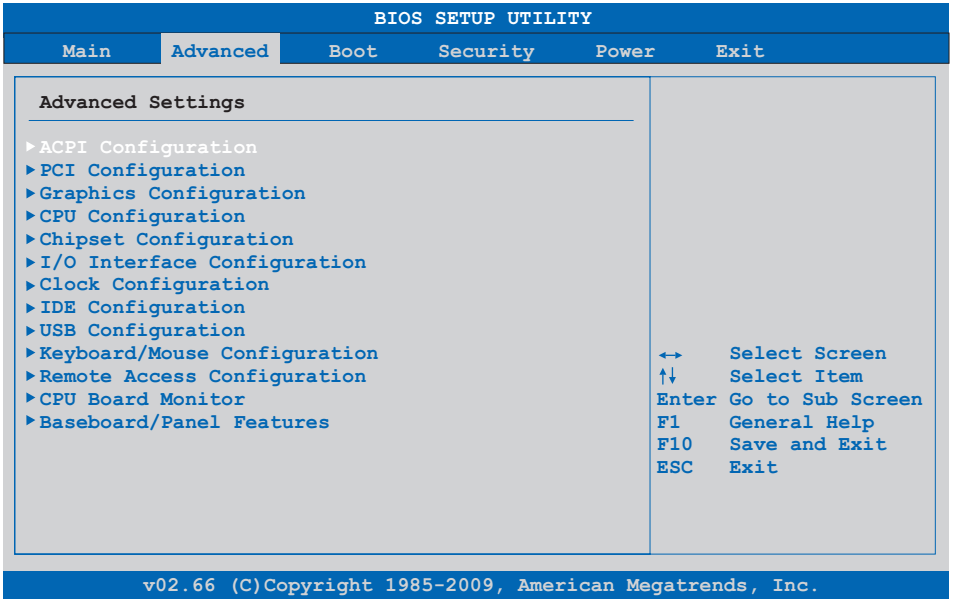


Figure 133: X945 Advanced Menu

BIOS setting	Meaning	Setting options	Effect
ACPI configuration	Configures the APCI devices.	Enter	Opens the submenu See "ACPI configuration", on page 240.
PCI Configuration	Configures PCI devices.	Enter	Opens the submenu See "PCI Configuration", on page 242.
Graphics configuration	Configures the graphics settings.	Enter	Opens the submenu See "Graphics configuration", on page 246.
CPU configuration	Configures the CPU settings.	Enter	Opens the submenu See "CPU configuration", on page 248.
Chipset configuration	Configures the chipset functions.	Enter	Opens the submenu See "Chipset configuration", on page 250.

Table 100: 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 252.
Clock Configuration	Configures the clock settings.	Enter	Opens the submenu See "Clock Configuration", on page 253.
IDE Configuration	Configures the IDE functions.	Enter	Opens the submenu See "IDE Configuration", on page 254.
USB configuration	Configures the USB settings.	Enter	Opens the submenu See "USB configuration", on page 260.
Keyboard/mouse configuration	Configures the keyboard/mouse options.	Enter	Opens the submenu See "Keyboard/mouse configuration", on page 262.
Remote access configuration	Configures the remote access settings.	Enter	Opens the submenu See "Remote access configuration", on page 263.
CPU board monitor	Displays the current voltages and temperature of the processor in use.	Enter	Opens the submenu See "CPU board monitor", on page 265.
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 266.

Table 100: 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 134: 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 is activated by the operating system when the CPU reaches the set temperature. Temperature reached.	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 the system 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 101: 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 135: 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 243
PCI Interrupt Routing	Configures PCI interrupt routing	Enter	Opens the submenu See "PCI Interrupt Routing", on page 244

Table 102: 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 136: 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 103: 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 137: 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 104: 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 104: 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 138: 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 105: 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 105: X945 Advanced Graphics configuration setting options (Forts.)

1.4.4 CPU configuration

```
BIOS SETUP UTILITY
Advanced

Configure advanced CPU settings
Module Version:3F.12

Manufacturer:Intel
Intel(R) Atom(TM) CPU N270  @ 1.60 GHz
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]
Execute-Disable Bit Capability  [Enabled]
Hyper Threading Technology      [Enabled]
Intel(R) SpeedStep(tm) tech     [Enabled]
Boot CPU Speed On AC            [Maximum]
Intel(R) C-STATE tech           [Enabled]
Enhanced C-States               [Enabled]

Select the revsion
of the multi processor
support interface that
should be offered by
the BIOS.

←→    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 139: 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 106: 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 106: 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 140: 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 PPC700.	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 107: 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 107: 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 141: 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 108: 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 108: X945 Advanced I/O Interface Configuration setting options

1.4.7 Clock Configuration

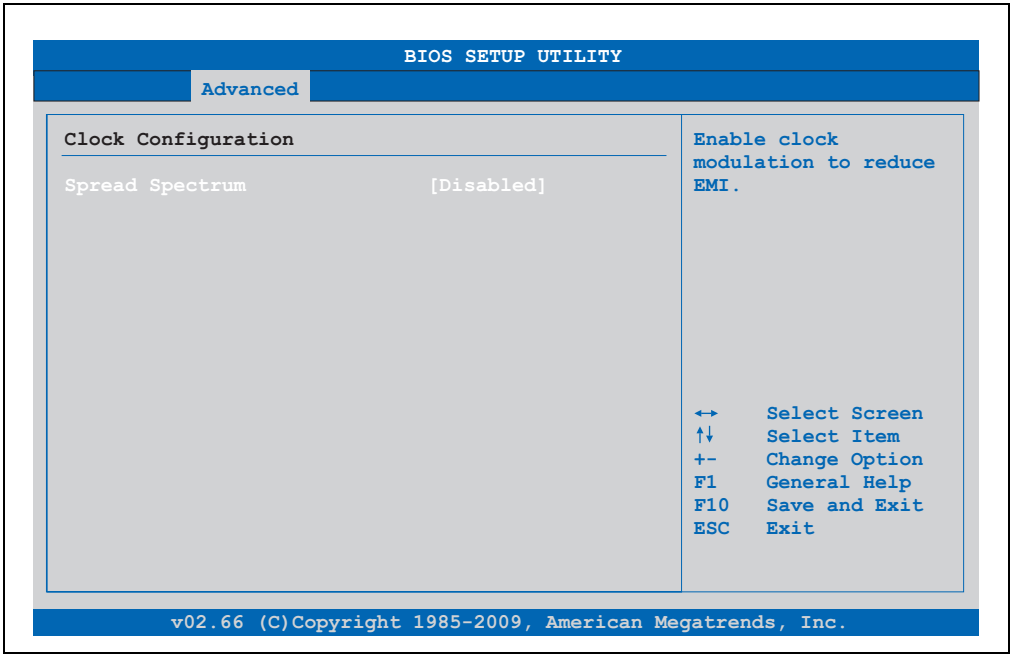


Figure 142: X945 Advanced Clock Configuration

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 109: 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 143: 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 256
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 258
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 110: 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 PPC700 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 110: 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 144: 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 111: 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 PPC700. 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 111: X945 Primary IDE Master setting options (Forts.)

Primary IDE slave

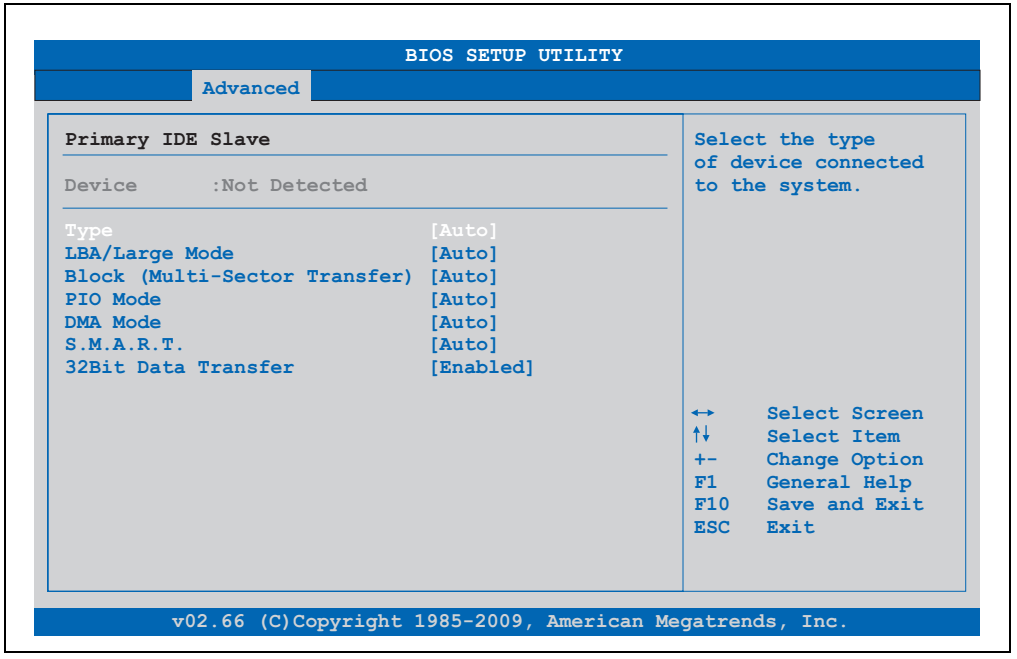


Figure 145: X945 Primary IDE Slave

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 112: 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 PPC700. 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 112: 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 146: 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 PPC700 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 113: 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 113: X945 Advanced USB Configuration setting options (Forts.)

1.4.10 Keyboard/mouse configuration

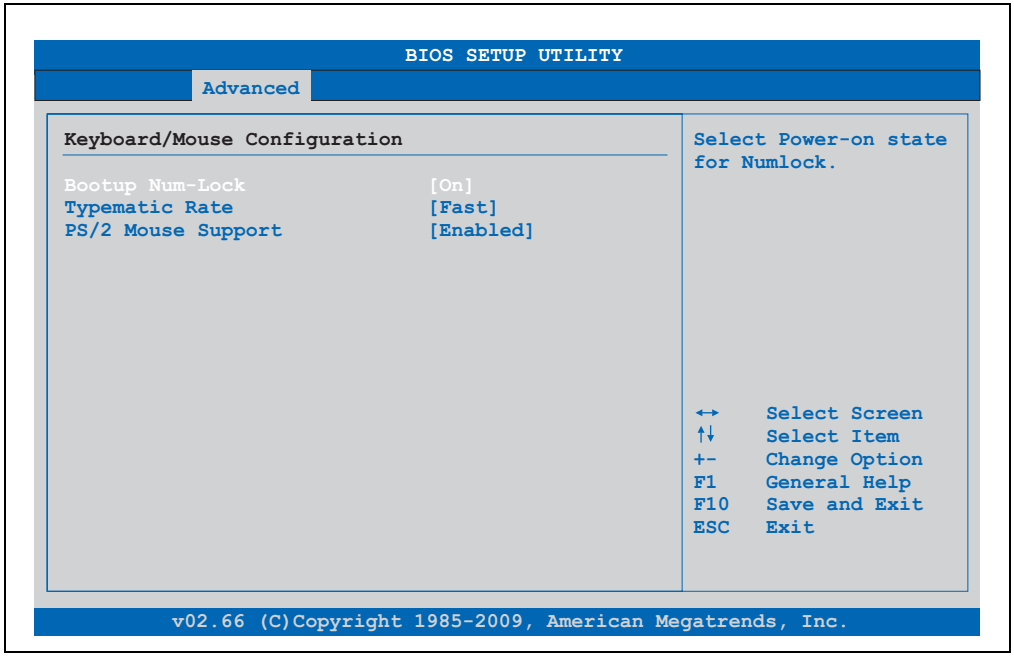


Figure 147: X945 Advanced Keyboard/Mouse Configuration

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 114: 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 148: 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 115: 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 115: 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.

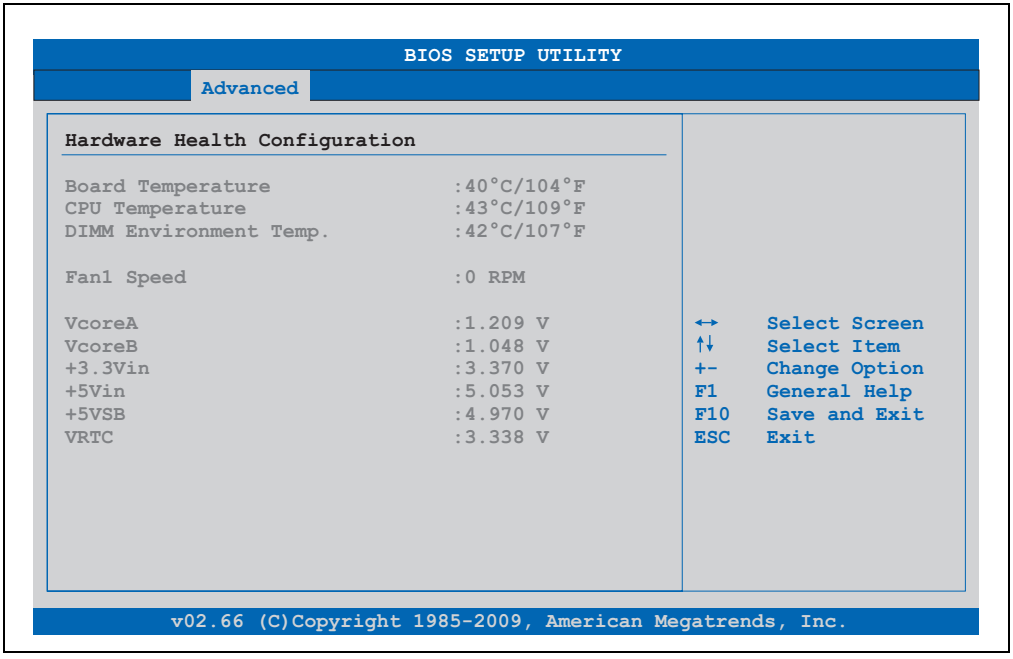


Figure 149: X945 Advanced CPU board monitor

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 116: 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 116: X945 Advanced Remote Access Configuration setting options (Forts.)

1.4.13 Main Board/Panel Features

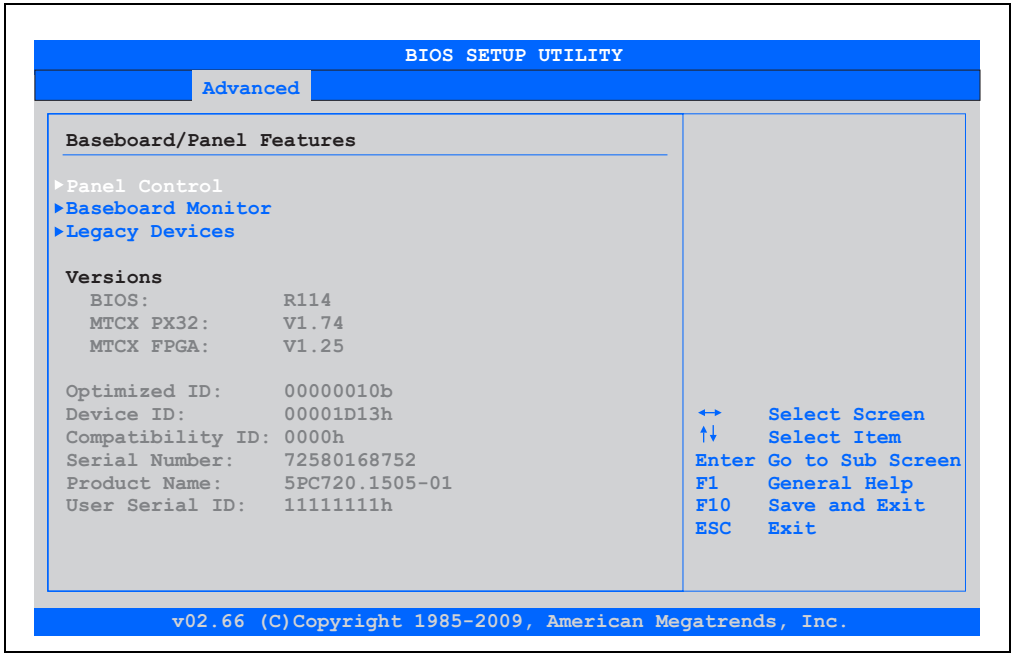


Figure 150: X945 Advanced Baseboard/Panel Features

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 268
Baseboard monitor	Display of various temperatures and fan speeds.	Enter	Opens the submenu See "Baseboard monitor", on page 269
Legacy devices	Special settings for the interface can be changed here.	Enter	Opens the submenu See "Legacy devices", on page 270
BIOS	Displays the BIOS version.	None	-

Table 117: 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 117: 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 151: 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 118: 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 152: 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 119: 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 153: 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 120: 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 120: X945 Legacy Devices setting options (Forts.)

1.5 Boot

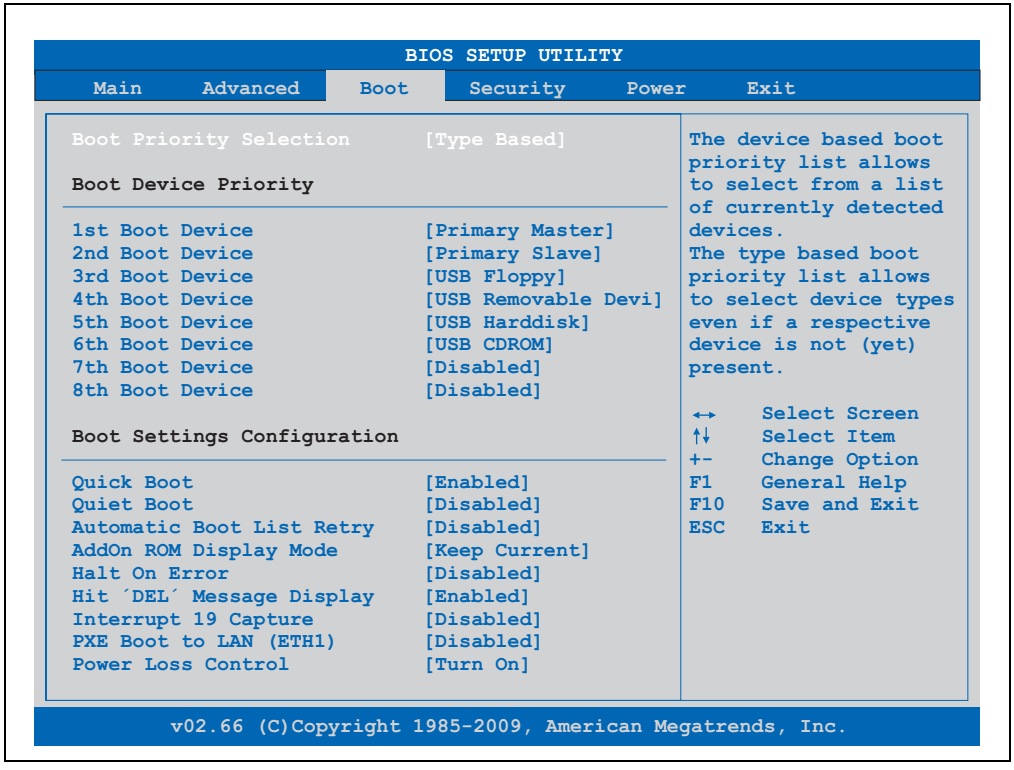


Figure 154: X945 Boot Menu

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 121: 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 155: 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 122: 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 274
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 275
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 122: X945 Security Menu setting options (Forts.)

1.6.1 Hard disk security user password

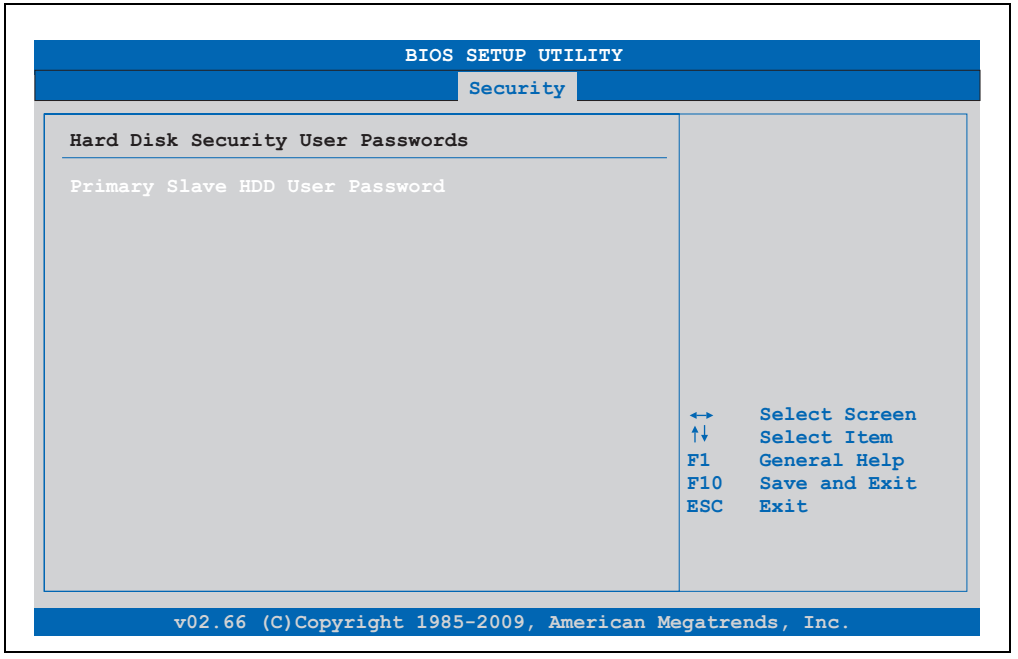


Figure 156: X945 Hard Disk Security User Password

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 123: X945 Hard Disk Security User Password

1.6.2 Hard disk security master password

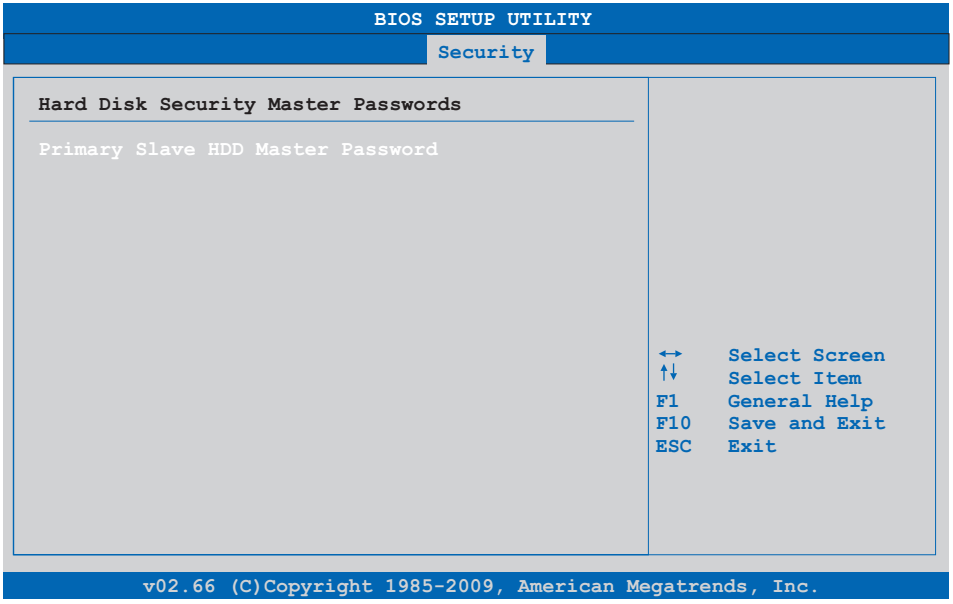


Figure 157: X945 Hard Disk Security Master Password

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 124: 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 158: 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 125: 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 125: X945 Power Menu setting options (Forts.)

1.8 Exit

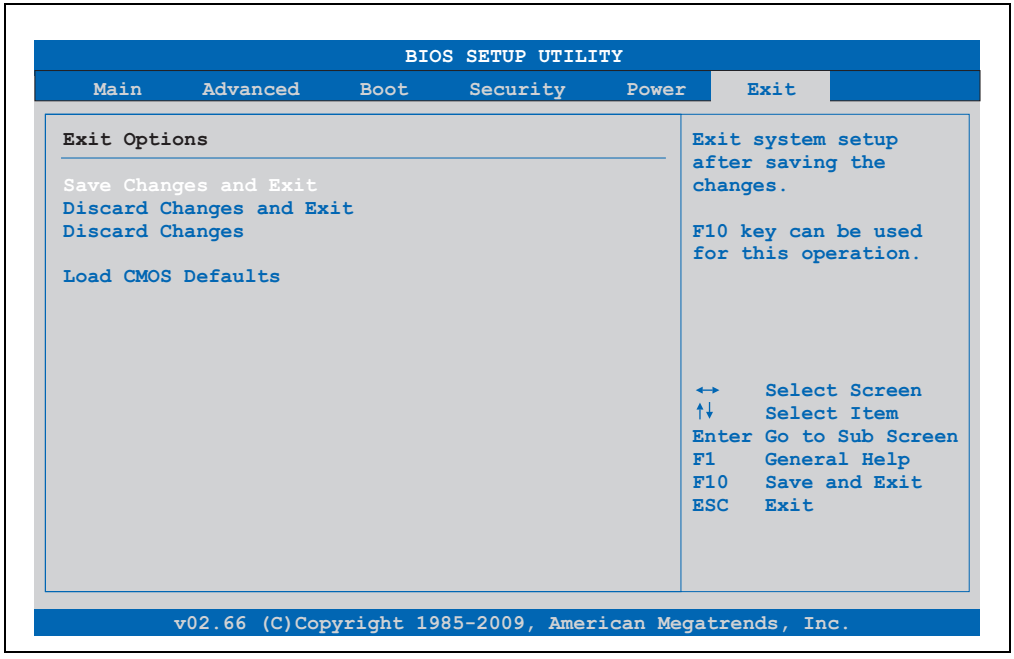


Figure 159: X945 Exit Menu

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 126: 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.

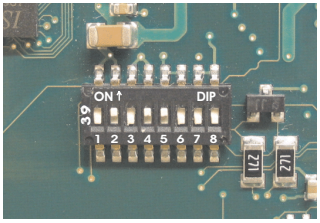


Figure 160: CMOS profile hex switch

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 127: 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 128: 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 129: 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 130: 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 131: 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 132: 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 133: 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 134: 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 135: 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 136: 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 136: 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 137: 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 137: 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 138: 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 139: 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 140: 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 141: 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 141: 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 142: 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 142: 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 143: 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 144: 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 144: X945 Power profile setting overview

1.10 BIOS Error signals (beep codes)

While the Panel PC 700 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 145: 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 146: 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 147: 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 148: 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 149: 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 150: 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.

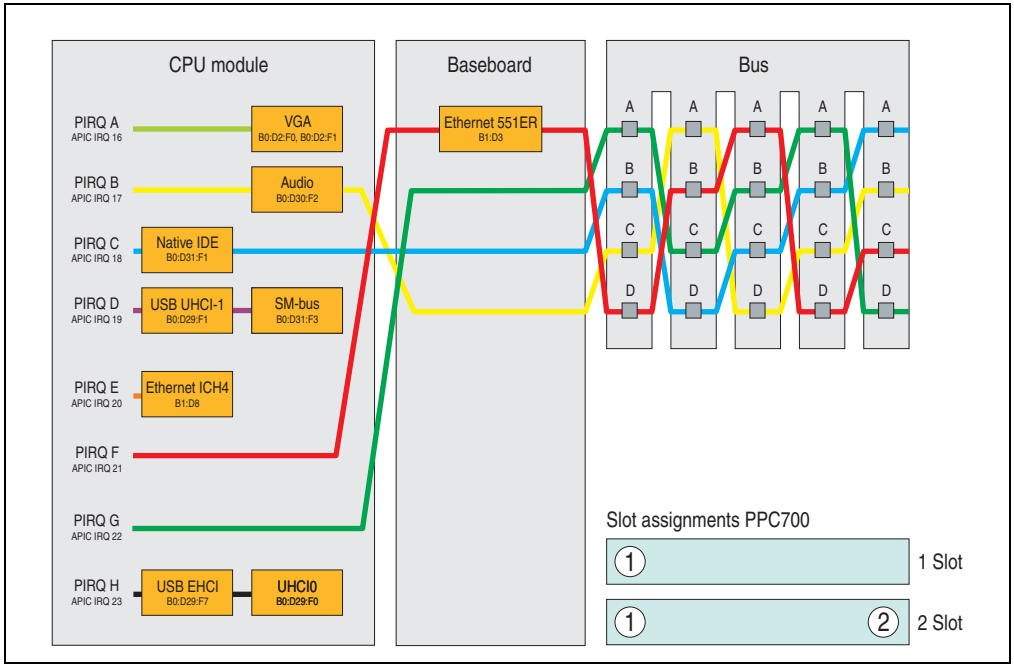


Figure 161: PCI Routing with activated APIC CPU board X945

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 151: 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 152: Inter-IC (I²C) bus resources

2. Upgrade information

Warning!

The BIOS and firmware on APC820 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 PPC700?

This information can be found on the same BIOS setup page for both the X945 CPU boards:

- After switching on the PPC700, you can get to the BIOS Setup by pressing "F2" or "DEL".
- From the BIOS main menu "advanced" (top), select "baseboard/panel features" (bottom):

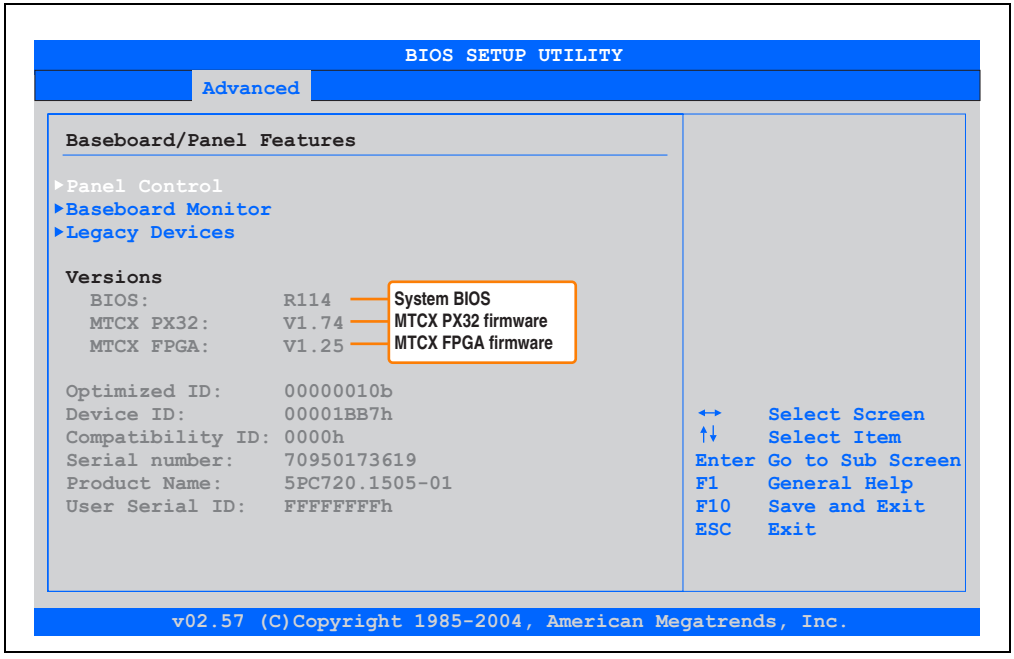


Figure 162: Software versions

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 PPC700, 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.

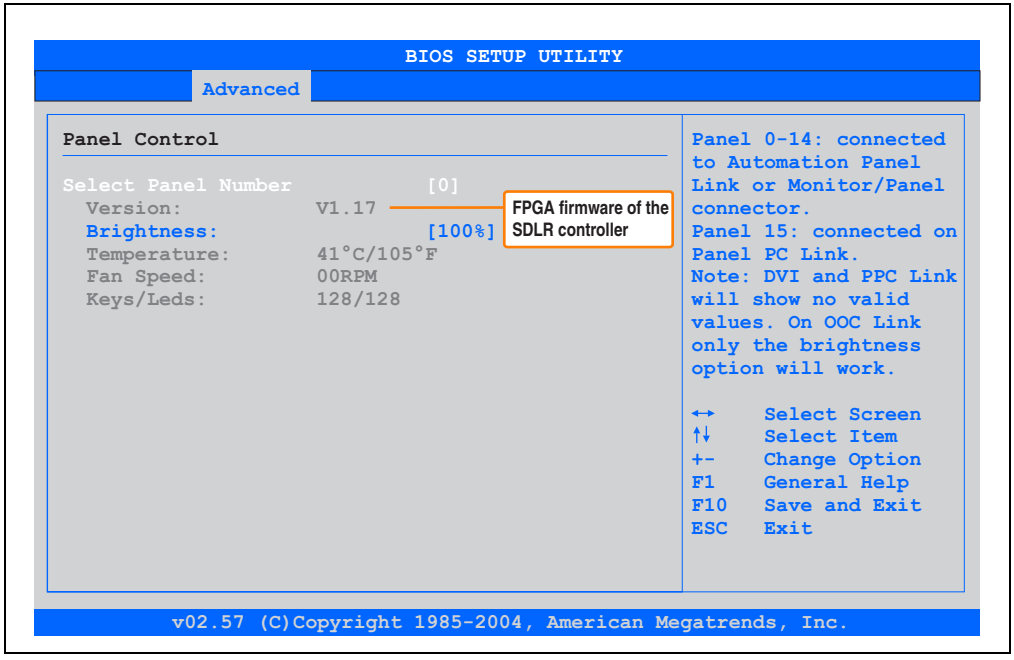


Figure 163: Firmware version of Automation Panel Link SDL transceiver/receiver

2.1.2 Upgrade BIOS for X945

- Download ZIP file from the B&R homepage (www.br-automation.com)
- 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 307.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 309.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 311.

- 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 PPC700 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 700 firmware upgrade (MTCX, SDLR), the firmware of a number of controllers (MTCX, SDLR) can be updated, depending on the construction of the PPC700 system.

2.2.1 Procedure

- 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 cab be found on page 438.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 309.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 311.

- 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 Panel PC 700 and reboot the device.

Information:

- **The following boot menu options including descriptions are based on version 1.28 of the APC620 / Panel PC Firmware upgrade (MTCX, SDLR) 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 SDLR (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:
Submenu 1 is opened for upgrading the SDLR controller on the Monitor/Panel plug.

3.1. Upgrade SDLR on AP 0 (AP800/AP900) - The SDLR controller on Automation Panel 0 is automatically updated.

3.2. Upgrade SDLR on AP 1 (AP800/AP900) - The SDLR controller on Automation Panel 1 is automatically updated.

3.3. Upgrade SDLR on AP 2 (AP800/AP900) - The SDLR controller on Automation Panel 2 is automatically updated.

3.4. Upgrade SDLR on AP 3 (AP800/AP900) - The SDLR controller on Automation Panel 3 is automatically updated.

3.5. Upgrade all SDLR (AP800/AP900) - All SDLR controllers on all Automation Panels on the monitor/panel are automatically upgraded (default after 5 sec).

3.6. Return to Main Menu

Concerning item 4:
Submenu 2 is opened for upgrading the SDLR controller on the AP Link slot.

4.1. Upgrade SDLR on AP 8 (AP800/AP900) - The SDLR controller on Automation Panel 8 is automatically updated.

4.2. Upgrade SDLR on AP 9 (AP800/AP900) - The SDLR controller on Automation Panel 9 is automatically updated.

4.3. Upgrade SDLR on AP 10 (AP800/AP900) - The SDLR controller on Automation Panel 10 is automatically updated.

4.4. Upgrade SDLR on AP 11 (AP800/AP900) - The SDLR controller on Automation Panel 11 is automatically updated.

4.5. Upgrade all SDLR (AP800/AP900) - All SDLR controllers on all Automation Panels on the AP Link slot are automatically upgraded (default after 5 sec).

4.6. Return to Main Menu

Concerning item 5:
Submenu 3 for the add-on UPS firmware and upgrade and the battery settings upgrade is opened.

5.1. Upgrade add-on UPS firmware (5AC600.UPSI-00)- The firmware for the add-on UPSI is automatically upgraded.

5.2. Upgrade battery settings (5AC600.UPSB-00) - The battery settings for 5AC600.UPSB-00 are automatically upgraded.

5.3. Return to Main Menu

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. Den Menuepunkt "5. Upgrade Add-on UPS (Firmware and Battery Settings)" ab MTCX Upgrade Disk V01.16 eingefuegt.

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...**".

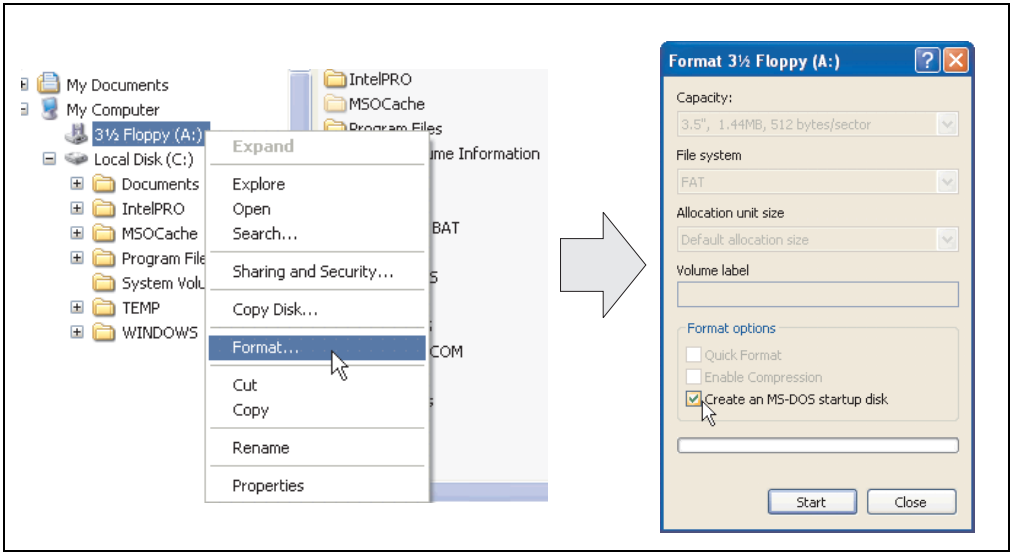


Figure 164: Creating a bootable diskette in Windows XP - step 1

- Then select the checkbox **"Create an MS-DOS startup disk"**, press **"Start"** and acknowledge the warning message with "OK".

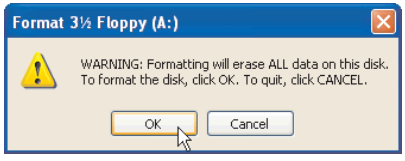


Figure 165: Creating a bootable diskette in Windows XP - step 2

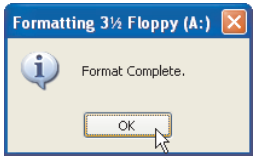
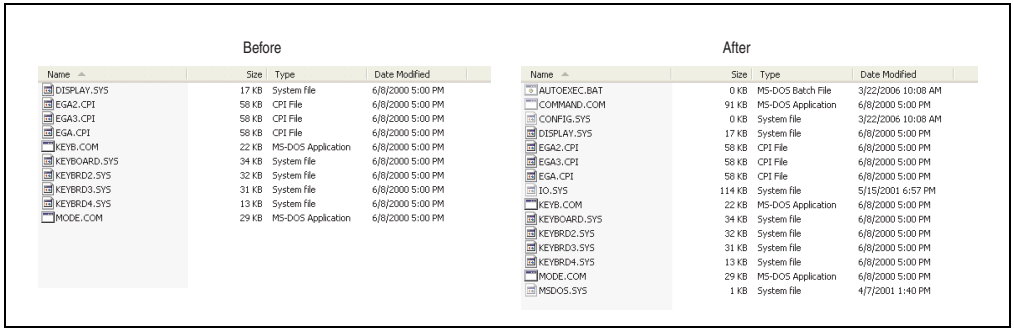


Figure 166: Creating a bootable diskette in Windows XP - step 3

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.

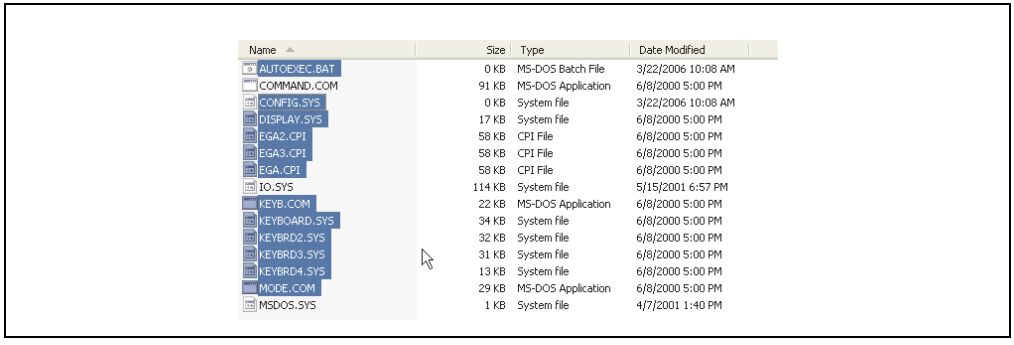
In Explorer, go to the Tools menu, select Folder Options... and open the View tab. Now deactivate the option Hide protected operating system files (Recommended) (activated by default) and activate the option Show hidden files and folders.



Name	Size	Type	Date Modified
DISPLAY.SYS	17 KB	System file	6/8/2000 5:00 PM
EGA2.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA3.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA.CPI	58 KB	CPI File	6/8/2000 5:00 PM
KEYB.COM	22 KB	MS-DOS Application	6/8/2000 5:00 PM
KEYBOARD.SYS	34 KB	System file	6/8/2000 5:00 PM
KEYBRD2.SYS	32 KB	System file	6/8/2000 5:00 PM
KEYBRD3.SYS	31 KB	System file	6/8/2000 5:00 PM
KEYBRD4.SYS	13 KB	System file	6/8/2000 5:00 PM
MODE.COM	29 KB	MS-DOS Application	6/8/2000 5:00 PM

Name	Size	Type	Date Modified
AUTOEXEC.BAT	0 KB	MS-DOS Batch File	3/22/2006 10:08 AM
COMMAND.COM	91 KB	MS-DOS Application	6/8/2000 5:00 PM
CONFIG.SYS	0 KB	System file	3/22/2006 10:08 AM
DISPLAY.SYS	17 KB	System file	6/8/2000 5:00 PM
EGA2.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA3.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA.CPI	58 KB	CPI File	6/8/2000 5:00 PM
IO.SYS	114 KB	System file	5/15/2001 6:57 PM
KEYB.COM	22 KB	MS-DOS Application	6/8/2000 5:00 PM
KEYBOARD.SYS	34 KB	System file	6/8/2000 5:00 PM
KEYBRD2.SYS	32 KB	System file	6/8/2000 5:00 PM
KEYBRD3.SYS	31 KB	System file	6/8/2000 5:00 PM
KEYBRD4.SYS	13 KB	System file	6/8/2000 5:00 PM
MODE.COM	29 KB	MS-DOS Application	6/8/2000 5:00 PM
MSDOS.SYS	1 KB	System file	4/7/2001 1:40 PM

Figure 167: Creating a bootable diskette in Windows XP - step 4



Name	Size	Type	Date Modified
AUTOEXEC.BAT	0 KB	MS-DOS Batch File	3/22/2006 10:08 AM
COMMAND.COM	91 KB	MS-DOS Application	6/8/2000 5:00 PM
CONFIG.SYS	0 KB	System file	3/22/2006 10:08 AM
DISPLAY.SYS	17 KB	System file	6/8/2000 5:00 PM
EGA2.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA3.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA.CPI	58 KB	CPI File	6/8/2000 5:00 PM
IO.SYS	114 KB	System file	5/15/2001 6:57 PM
KEYB.COM	22 KB	MS-DOS Application	6/8/2000 5:00 PM
KEYBOARD.SYS	34 KB	System file	6/8/2000 5:00 PM
KEYBRD2.SYS	32 KB	System file	6/8/2000 5:00 PM
KEYBRD3.SYS	31 KB	System file	6/8/2000 5:00 PM
KEYBRD4.SYS	13 KB	System file	6/8/2000 5:00 PM
MODE.COM	29 KB	MS-DOS Application	6/8/2000 5:00 PM
MSDOS.SYS	1 KB	System file	4/7/2001 1:40 PM

Figure 168: 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...**. Falls die Dateien in einem Verzeichnis auf der Festplatte gespeichert sind, auf die Schaltfläche **Aus einem Verzeichnis...** klicken.
- 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.

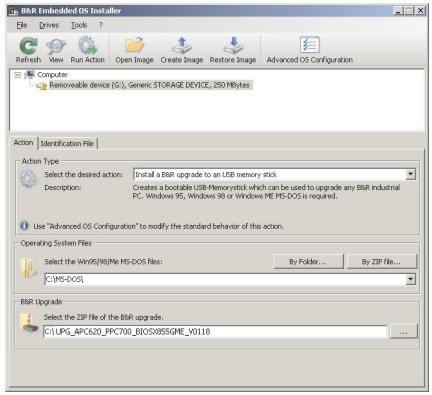


Figure 169: Creating a USB flash drive for B&R upgrade files

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 307. 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...**. Falls die Dateien in einem Verzeichnis auf der Festplatte gespeichert sind, auf die Schaltfläche **Aus einem Verzeichnis...** klicken.
- 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.

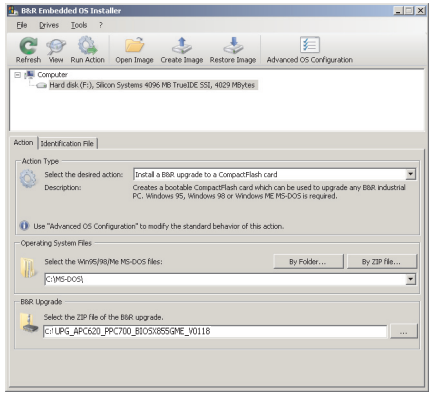


Figure 170: Creating a CompactFlash card for B&R upgrade files

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 307. 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. Panel PC 700 with Automation Runtime

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

3.1 ARwin

The system is supported by ARwin with an AS 3.0.80 upgrade.

3.2 ARemb

The system is supported by ARemb with an AS 3.0.90 / AR 4.00 upgrade.

4. Panel PC 700 with Windows XP Professional

Figure 171: Windows XP Professional Logo

Model number	Short description	Note
5SWWXP.0600-GER	**WinXP Professional with SP3, GER** Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	
5SWWXP.0600-ENG	**WinXP Professional with SP3, ENG** Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device.	
5SWWXP.0600-MUL	**WinXP Professional with SP3, MUL** Microsoft OEM Windows XP Professional Service Pack 3, CD, multi-language. Only available with a new device.	
5SWWXP.0500-GER	**WinXP Professional with SP 2c, GER** Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a new device.	
5SWWXP.0500-ENG	**WinXP Professional with SP 2c, ENG** Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a new device.	
5SWWXP.0500-MUL	**WinXP Professional with SP 2c, MUL** Microsoft OEM Windows XP Professional Service Pack 2c, CD, multi-language. Only available with a new device.	

Table 153: Model numbers - Windows XP Professional

4.1 Installation

Upon request, B&R can pre-install the required Windows XP Professional version 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.

4.1.1 Installation auf 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 Panel PC 700.

4.2 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.

5. Panel PC 700 mit Windows 7

Figure 172: 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 154: Model numbers - Windows 7

5.1 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.

5.1.1 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.

5.2 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.

5.3 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).

6. Panel PC 700 with Windows XP Embedded

Figure 173: Windows XP Embedded Logo

Model number	Short description	Note
5SWWXP.0429-ENG	**WinXPe FP2007 PPC700 945GME XTX** Microsoft OEM Windows XP Embedded Feature Pack 2007, English; for PPC700 with CPU board 5PC600.X945-00; order CompactFlash separately (at least 512 MB).	

Table 155: Model numbers - Windows XP Embedded

6.1 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.

6.2 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 156: 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 156: Device functions in Windows XP embedded with FP2007

6.3 Installation

Upon request, Windows XP Embedded can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 512 MB - must be specified when placing order). The system is then automatically configured after it has been switched on for the first time. This procedure takes approximately 30 minutes, and the device will be rebooted a number of times.

Brief instructions for creating your own Windows XP embedded images or a suitable "Target Designer Export Files Guide" can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

6.4 Touch screen driver

The touch screen driver (Elo) must be manually installed and calibrated. The driver can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

7. Panel PC 700 with Windows Embedded Standard 2009

Figure 174: Windows Embedded Standard 2009 Logo

Model number	Short description	Note
5SWWXP.0729-ENG	**WES2009 PPC700 945GME** Microsoft OEM Windows Embedded, Standard 2009, English; for PPC700 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	

Table 157: Model numbers - Windows Embedded Standard 2009

7.1 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.

7.2 Features mit 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 158: Device functions in Windows Embedded Standard 2009

7.3 Installation

Upon request, Windows Embedded Standard 2009 can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 1GB). The PPC700 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.

7.4 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.

7.4.1 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.

8. Panel PC 700 with Windows Embedded Standard 7

Figure 175: Windows Embedded Standard 7 Logo

Model number	Short description	Note
5SWWI7.0529-ENG	**Windows Embedded Standard 7 PPC700 945GME** Microsoft OEM Windows Embedded, Standard 7 32-bit, English; for PPC700 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	
5SWWI7.0729-MUL	**Windows Embedded Standard 7 Premium PPC700 945GME** Microsoft OEM Windows Embedded, Standard 7 Premium 32-bit, Multilanguage; for PPC700 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	
5SWWI7.0900-MUL	**WES7P 32bit Language Pack DVD**	

Table 159: Model numbers - Windows Embedded Standard 2009

8.1 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.

8.2 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 160: Device functions in Windows Embedded Standard 7

8.3 Installation

Upon request, Windows Embedded Standard 7 can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 8 GB). The PPC700 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.

8.4 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.

8.4.1 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.

9. Panel PC 700 with Windows CE

Model number	Short description	Note
5SWWCE.0829-ENG	**WinCE6.0 Pro PPC700 945GME XTX** Microsoft OEM Windows CE 6.0 Professional, English; for PPC700 with CPU board 5PC600.X945-00; order CompactFlash separately (at least 128 MB).	

Table 161: Model numbers - Windows CE

9.1 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.

9.2 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 65536 colors[1)]
Graphics card driver	Intel® 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	ca. 38 MByte[2)] , nicht komprimiert

Table 162: 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 162: 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.

9.3 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).

9.4 Installation

Windows CE is usually preinstalled at the B&R plant.

9.4.1 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.

10. B&R Automation Device Interface (ADI) driver - Control Center

The ADI (Automation Device Interface) 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.

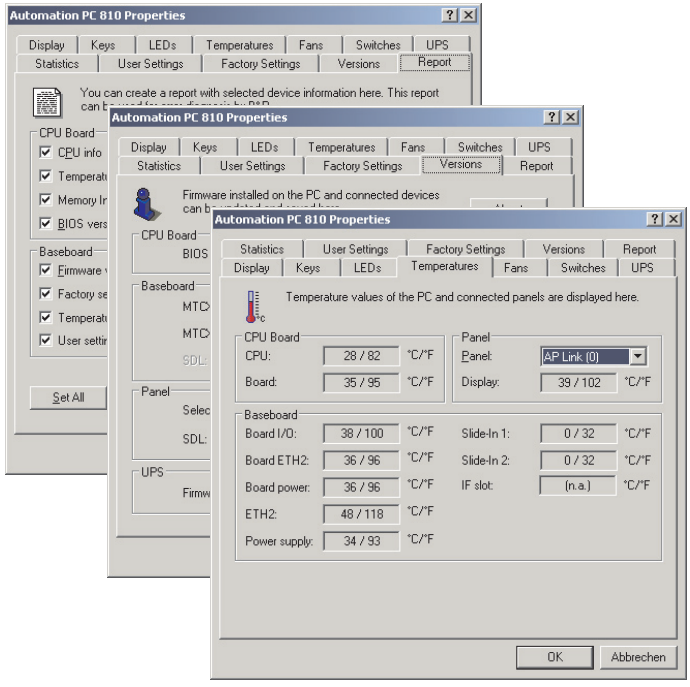


Figure 176: ADI Control Center screenshots - Examples (symbol photo)

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.

10.1 Functions

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:

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Panel PC 300
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 300/400 BIOS Geräte
- Power Panel 500
- Mobile Panel BIOS Geräte
- Automation Panel 800 (in connection with Automation PCs and Panel PCs)
- Automation Panel 900 (in connection with Automation PCs and Panel PCs)

10.2 Installation

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**).

1. Download and unzip the ZIP archive

2. Close all applications

3. Run BrSetup.exe (e.g. double-click on it in Explorer).

- or -

1. Right click on BrSetup.inf in explorer and select "Install".

Information:

The ADI driver is already included in the B&R images of embedded operating systems.

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.

10.3 SDL Equalizer Einstellung

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:

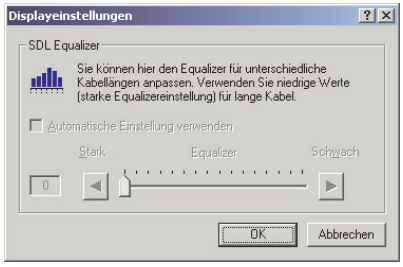


Figure 177: ADI Control Center - SDL equalizer settings

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".

The equalizer value can only be changed if the function is supported by Automation Panel 900 (starting with Panel Firmware version 1.04 or higher).

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 60721-3-2	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 2: Transport
EN 60721-3-3	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 3: Stationary use at weather-protected locations
EN 61000-4-2	Electromagnetic compatibility (EMC) - part 4-2: Testing and measuring techniques; electrostatic discharge immunity test

Table 163: Overview of standards

Standard	Description
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 61000-6-2	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 IEC 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 163: 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 164: 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
Tests in accordance with 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 165: Test requirements - Network-related emissions for industrial areas

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	
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 165: 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 166: : 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 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers

Table 167: 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:
Deterioration 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 168: 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 169: 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 170: 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 171: 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 172: 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 172: 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 173: 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 174: 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 175: 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 176: 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 177: 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 178: Test requirements - Vibration during transport (packaged)

5.3 Shock during operation

Test carried out according to EN 60068-2-27	Limits according to EN 61131-2	Limits according to EN 60721-3-3 class 3M4	
Shock during operation: Pulse (half-sine) stress in all 3 axes (x, y, z)	Acceleration 15 g, length 11 ms, 18 shocks	Acceleration 15 g, Duration 11 ms	

Table 179: 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 180: 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 181: 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 182: 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 183: 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 184: 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 185: 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 186: 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 187: 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 188: 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 189: 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 190: 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
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 191: 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 192: 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 193: 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 194: 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 195: Test requirements - Residual voltage

7.5 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 196: Test requirements - Overload

7.6 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 197: Test requirements - Defective component

7.7 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 198: 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)

Table 199: 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 200: Test requirements - Protection

9. SDL flex cable - test description

9.1 Torsion

9.1.1 Test structure

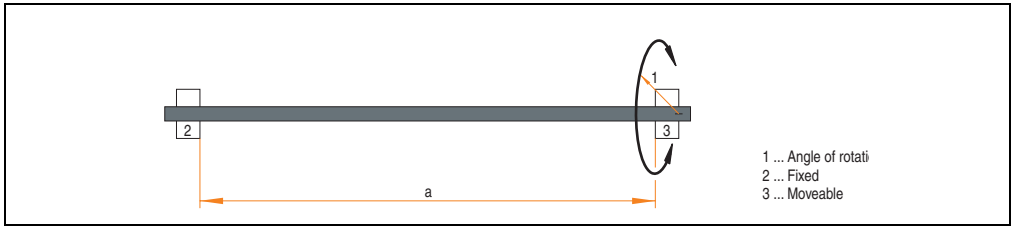


Figure 178: Test structure - torsion

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

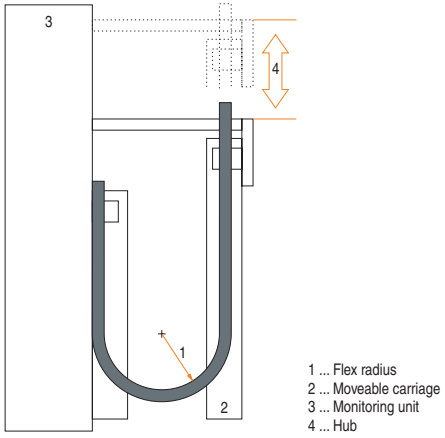


Figure 179: Test structure - Cable drag chain

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 30000 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 201: 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, 2.5 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, 2.5 mm², protected against vibration by the screw flange	
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	

Table 202: Model numbers - Accessories

Model number	Short description	Note
0PS340.1	**Power supply, 3-phase, 40 A** 24 VDC power supply, 3-phase, 40 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	
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)	
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	
5A5003.03	**Front cover** Front cover for the USB 2.0 Media Drive 5MD900.USB2-01.	
5AC600.ICOV-00	**Interface covers** Interface covers for APC620 and PPC700 devices; 5 pieces	
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.	
5AC900.104X-00	**Legend strip template 10.4"** For Panel PC 5PC781.1043-00. For 1 device.	
5AC900.104X-01	**Legend strip template 10.4"** For Panel PC 5PC782.1043-00. For 1 device.	
5AC900.150X-01	**Legend strip template 15"** For Panel PC 5PC781.1505-00. For 4 devices.	
5AC900.1200-00	**USB port cap (attached)** Front side USB port cap (attached) for Automation Panel 900 and Panel PC 700 devices.	
5AC900.1200-01	**USB port cap IP65 M20 /2** Front-side USB port cap (attached) knurled, short, not slotted.	
5AC900.1200-02	**USB port cap IP65 M20 /3** Front-side USB port cap (attached) knurled, tall, not slotted.	
5AC900.1200-03	**USB port cap IP65 M20 /4** Front-side USB port cap (attached) knurled, tall, slotted.	
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	

Table 202: Model numbers - Accessories

Model number	Short description	Note
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, FDD, CompactFlash slot (type II), USB connection (type A front, type B back); 24V DC; (Order 0TB103.9 screw clamp or 0TB103.91 cage clamps separately).	
5AC600.SRAM-00	**APC620/PPC700 SRAM module 512kB** 512 KB SRAM module for APC620 and PPC700.	
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	
5CADVI.0018-00	**DVI-D cable 1.8 m / single** Single cable, DVI-D/m:DVI-D/m; length: 1.8 m	
5CADVI.0050-00	**DVI-D cable 5 m / single** Single cable, DVI-D/m:DVI-D/m; length: 5 m	
5CADVI.0100-00	**DVI-D cable 10 m / single** 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	

Table 202: Model numbers - Accessories

Model number	Short description	Note
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	
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.	
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	
5AC700.FA00-00	**PPC700 replacement fan filter 0PCI 5 piece** For Panel PC 700 10.4", 12.1", 15", 17" and 19" with 0 PCI slots (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).	
5AC700.FA02-00	**PPC700 replacement fan filter 1.2PCI 5 piece** For Panel PC 700 10.4" and 15" with 1 and 2 PCI slots (5PC720.1043-01, 5PC720.1214-01, 5PC720.1505-01 and 5PC720.1505-02).	

Table 202: Model numbers - Accessories

Model number	Short description	Note
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	

Table 202: Model numbers - Accessories

2. Replacement CMOS batteries

The lithium battery is needed for buffering the BIOS and real-time clock.

The battery is subject to wear and must be replaced when the battery power ("Bad" status) is insufficient (see "Changing the battery", on page 435).

2.1 Order data

Model number	Description	Image
0AC201.91	Lithium batteries, 4 pcs., 3 V / 950 mAh button cell	
4A0006.00-000	Lithium battery, 1 piece, 3 V / 950 mAh button cell	

Table 203: Order data - Lithium batteries

2.2 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Features	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	
Environment		
Storage temperature	-20 to +60°C	
Relative humidity	0 to 95% (non-condensing)	

Table 204: Technical data - Lithium batteries

3. Supply voltage connector (TB103 3-pin)

3.1 General Information

This single row 3-pin terminal block is mainly used to connect the supply voltage.

3.2 Order data

Model number	Description	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 205: Order data - TB103

3.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Name	0TB103.9	0TB103.91
Number of pins	3	
Type of terminal	Screw clamps	Cage clamps
Distance between contacts	5.08 mm	

Table 206: TB103 Technical data

Name	0TB103.9	0TB103.91
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 206: TB103 Technical data (Forts.)

4. 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 180: 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.

4.1 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).

4.1.1 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 207: Single-phase power supplies

4.1.2 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 208: Three-phase power supplies

5. External UPS

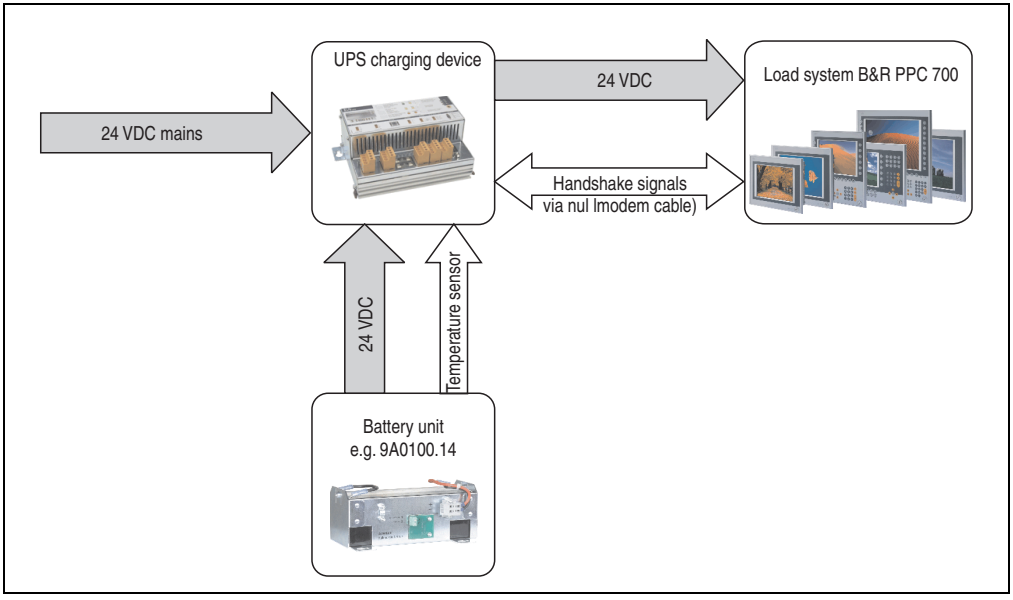


Figure 181: Block diagram of the UPS

5.1 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**).

5.2 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 209: UPS - Order data

6. Interface covers 5AC600.ICOV-00

The interface covers protect interfaces from dirt and dust when not in use.

6.1 Order data

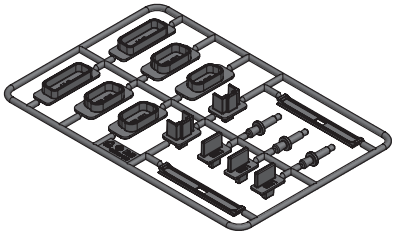
Model number	Description	Image
5AC600.ICOV-00	**Interface covers** Interface covers for APC620 and PPC700 devices; 5 pieces	

Table 210: Order data - PPC700 interface cover

6.2 Contents of delivery

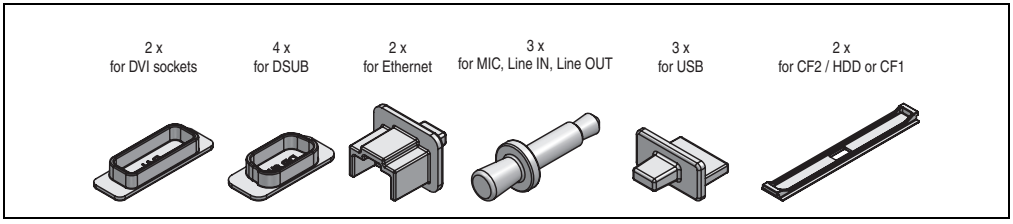


Figure 182: Interface cover - contents of delivery

Information:

THe CF card interface cover cannot be used on PPC700 devices.

7. DVI - monitor adapter 5AC900.1000-00

This adapter enables a standard monitor to be connected to the DVI-I interface.

7.1 Order data

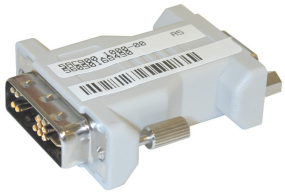
Model number	Description	Image
5AC900.1000-00	**Adapter DVI-A/m to CRT DB15HD/f** Adapter DVI (plug) to CRT (socket), for connecting a standard monitor to a DVI-I interface.	

Table 211: Order data - DVI - CRT adapter

8. USB port cap (attached) - Discontinued

Front side USB port cap (attached) for Automation Panel 900 and Panel PC 700 devices.

8.1 Order data

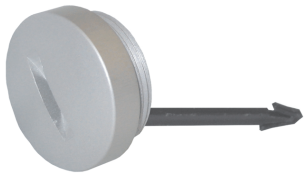
Model number	Description	Image
5AC900.1200-00	**USB port cap (attached)** Front side USB port cap (attached) for Automation Panel 900 and Panel PC 700 devices.	

Table 212: Order data - USB port cap (attached)

8.2 Installation

- Remove old cover.
- Feed the USB port cap through the small opening (see red markings).

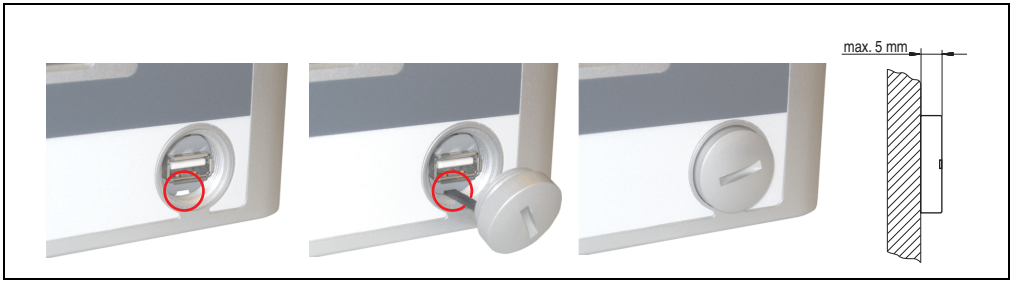


Figure 183: Front side USB port cap - installation

- With the cover screwed on, the front side of the display is raised a maximum of 5 mm.

9. USB port cap (attached)

Front side USB port cap (attached) for Automation Panel 900, Panel PC 700 and Panel PC 800 devices.

9.1 Order data

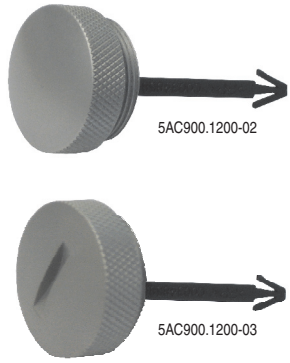
Model number	Description	Image
5AC900.1200-01	**USB port cap IP65 M20 /2** Front-side USB port cap (attached) knurled, short, not slotted.	
5AC900.1200-02	**USB port cap IP65 M20 /3** Front-side USB port cap (attached) knurled, tall, not slotted.	
5AC900.1200-03	**USB port cap IP65 M20 /4** Front-side USB port cap (attached) knurled, tall, slotted.	

Table 213: Order data - USB port cap (attached)

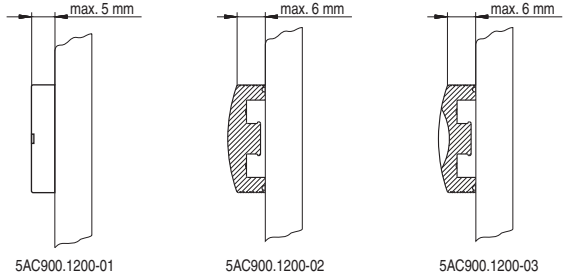


Figure 184: USB port cap (attached) - Height

10. CompactFlash cards 5CFCRD.xxxx-04

10.1 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 11 "Known problems / issues", on page 233.

Information:

The 5CFCRD.xxxx-04 CompactFlash cards are supported on B&R devices with WinCE Version 6.0 or higher.

10.2 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 214: Order data - CompactFlash cards

10.3 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 215: Technical data - CompactFlash cards 5CFCRD.xxxx-04

Support						
Hardware	PP300/400, PPC300, PPC700, PPC800, APC620, APC810, APC820					
Windows XP Professional	-	-	-	Yes	Yes	Yes
Windows XP Embedded	Yes	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 215: 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.

10.3.1 Temperature humidity diagram

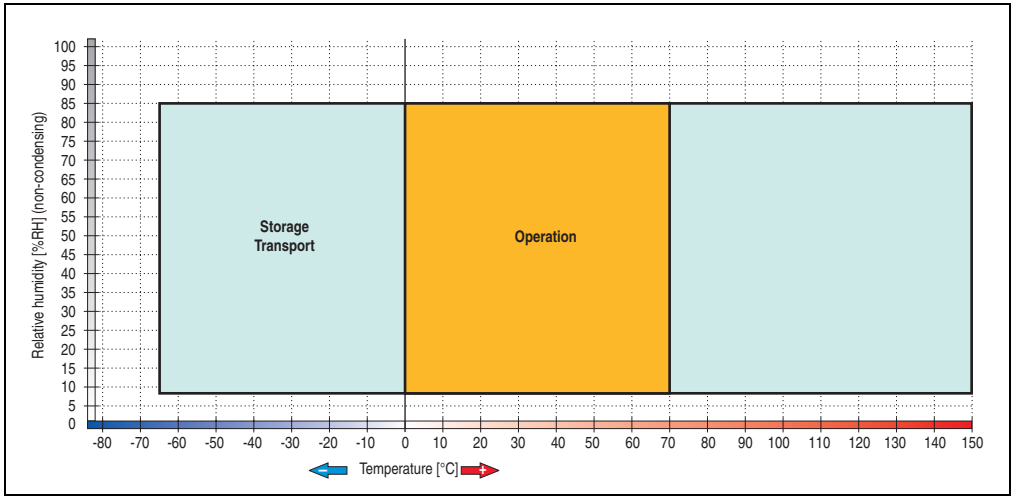


Figure 185: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-04

10.4 Dimensions

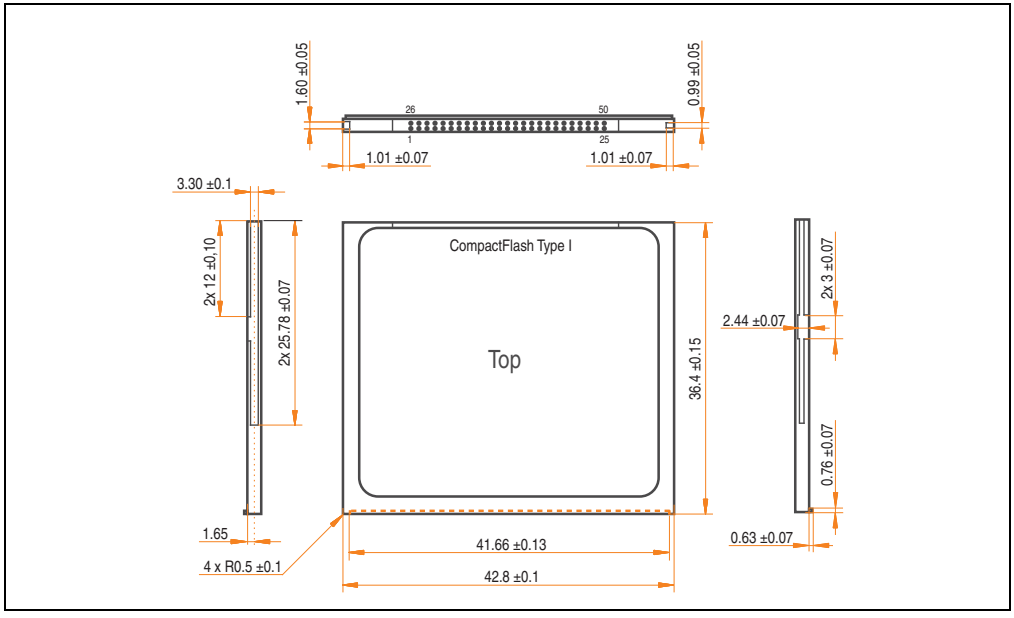


Figure 186: Dimensions - CompactFlash card Type I

10.5 Benchmark

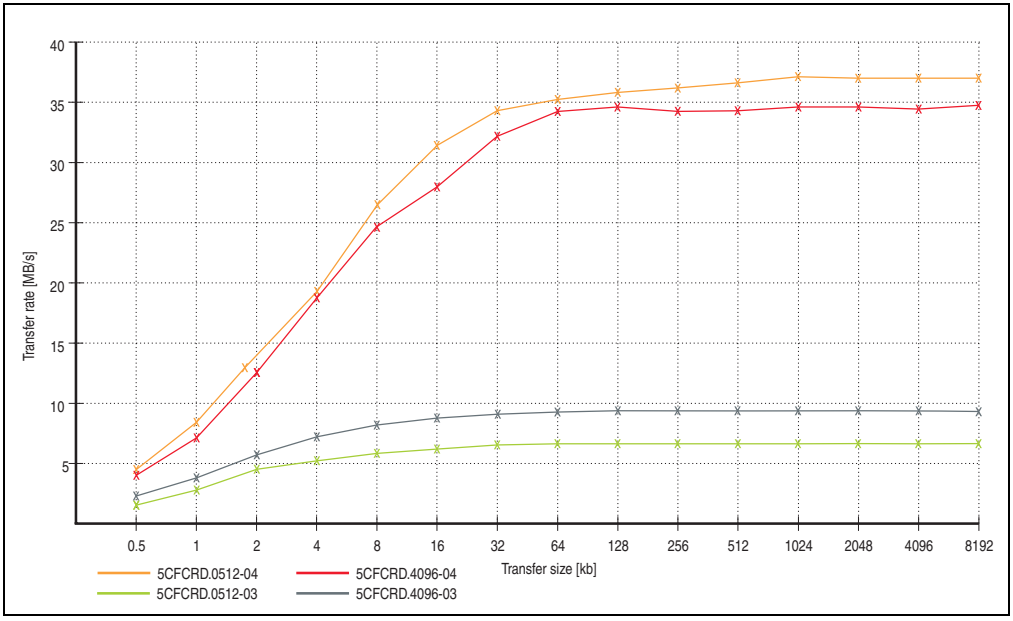


Figure 187: ATTO disk benchmark v2.34 comparison (reading)

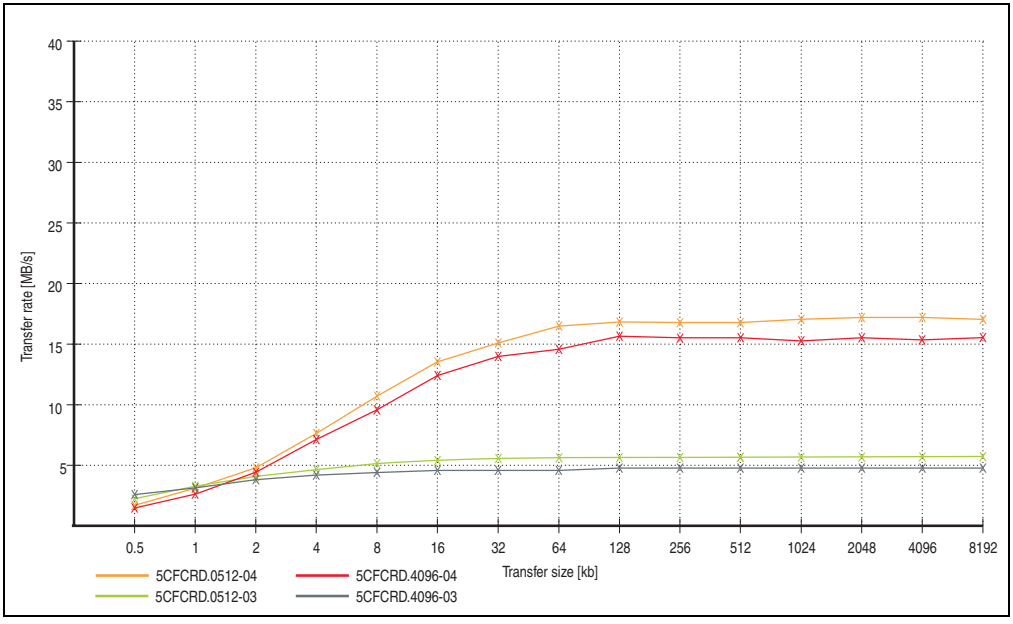


Figure 188: ATTO disk benchmark v2.34 comparison (writing)

11. CompactFlash cards - 5CFCRD.xxxx-03

11.1 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 11 "Known problems / issues", on page 233.

Information:

On Windows CE 5.0 devices, 5CFCRD.xxxx-03 CompactFlash cards up to 1GB are supported.

11.2 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 216: Order data - CompactFlash cards

11.3 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, PPC700, PPC300, Provit 2000, Provit 5000, APC620, APC680, APC810, APC820							
Windows XP Professional	-	-	-	-	-	-	Yes	Yes
Windows XP Embedded	-	-	-	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Windows CE 5.0	Yes	Yes	Yes	Yes	Yes	-	-	-

Table 217: Technical data - CompactFlash cards 5CFCRD.xxxx-03

Support	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
PVI Transfer Tool	V2.57 (part of PVI Development Setup V2.5.3.3005)							
B&R Embedded OS Installer	V2.21							
Mechanical characteristics								
Dimensions 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 217: Technical data - CompactFlash cards 5CFCRD.xxxx-03 (Forts.)

11.3.1 Temperature humidity diagram

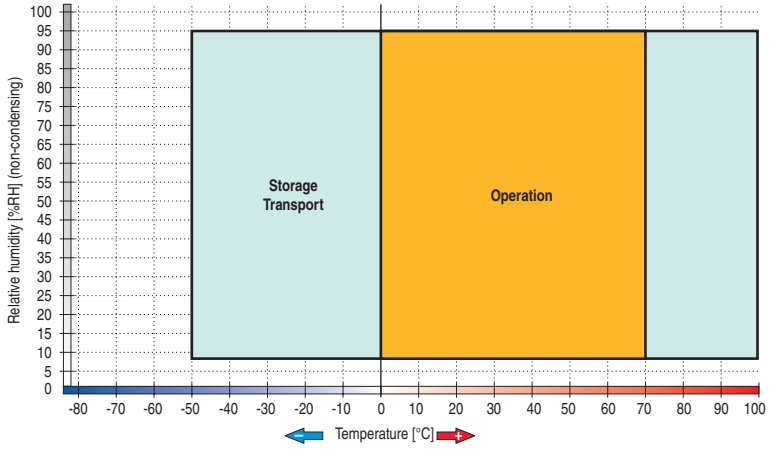


Figure 189: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

11.4 Dimensions

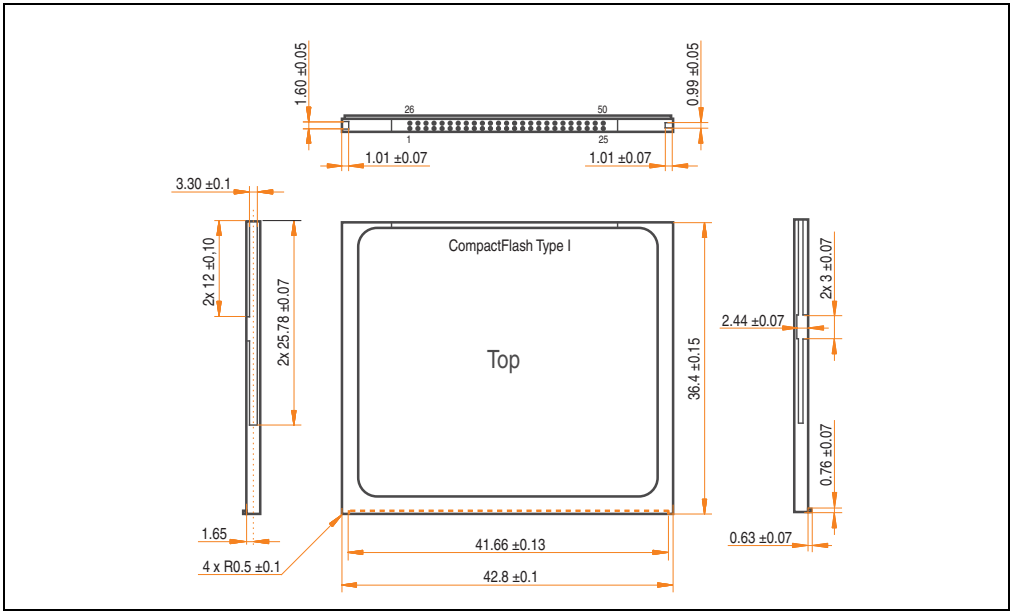


Figure 190: Dimensions - CompactFlash card Type I

12. USB Media Drive - 5MD900.USB2-01

Figure 191: USB Media Drive - 5MD900.USB2-01

12.1 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 (see also section 12.9 "Front cover 5A5003.03 for the USB Media Drive", on page 386)

12.2 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Features - 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 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	30000 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)
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

Table 218: Technical data - USB Media Drive 5MD900.USB2-01

Features - DVD-RW/CD-RW drive	5MD900.USB2-01
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
Laser class	Class 1 laser
Data buffer capacity	8 MB
Noise level (complete read access)	Approx. 48 dBA at 50 cm
Service life Opening/closing the drawer	60000 POH (Power-On Hours) > 10000 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
Relative humidity Operation Storage Transport	 20 to 80%, non-condensing 5 to 90%, non-condensing 5 to 95%, non-condensing

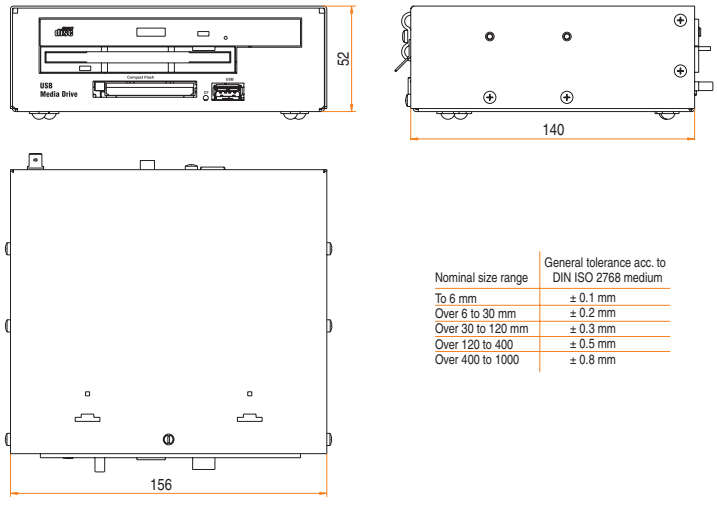
Table 218: Technical data - USB Media Drive 5MD900.USB2-01 (Forts.)

Environmental characteristics	5MD900.USB2-01
Vibration Operation Storage Transport	 5 - 500 Hz: 0.3 g (2.9 m/s^2 0-peak) 10 - 100 Hz: 2 g (19.6 m/s^2 0-peak) 10 - 100 Hz: 2 g (19.6 m/s^2 0-peak)
Shock Operation Storage Transport	 Max. 5 g (49 m/s^2 0-peak) and 11 ms duration Max. 60 g (588 m/s^2 0-peak) and 11 ms duration Max. 60 g (588 m/s^2 0-peak) and 11 ms duration
Altitude	Max. 3000 meters

Table 218: Technical data - USB Media Drive 5MD900.USB2-01 (Forts.)

1) DVD RAM drivers are not provided by the manufacturer. Support of DVD RAM function by the burning software "Nero" (model number 5SWUTI.0000-00) or other burning software packages and drivers from third party providers.

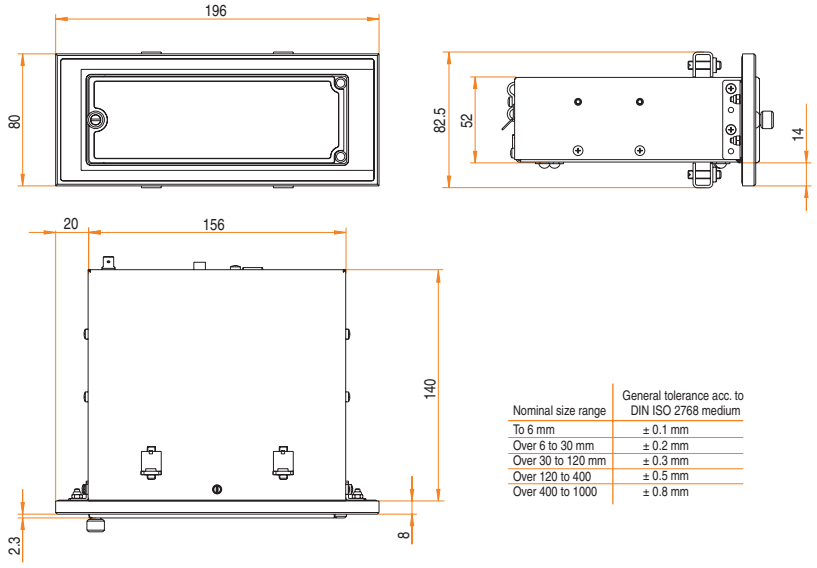
12.3 Dimensions



Nominal size range	General tolerance acc. to DIN ISO 2768 medium
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 192: Dimensions - 5MD900.USB2-01

12.4 Dimensions with front cover



Nominal size range	General tolerance acc. to DIN ISO 2768 medium
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 193: Dimensions - USB Media Drive with front cover

12.5 Cutout installation

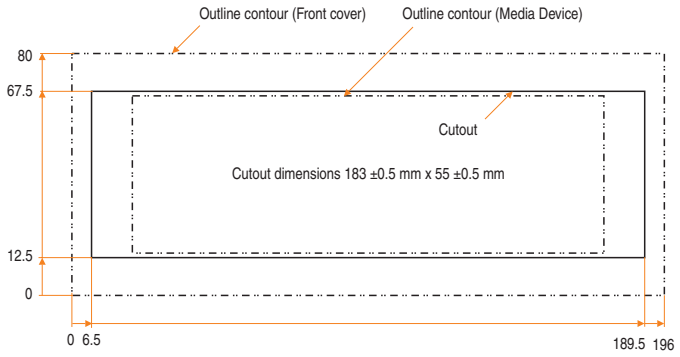


Figure 194: Installation cutout - USB Media Drive with front cover

12.6 Contents of delivery

Amount	Component
1	USB Media Drive complete unit
2	Mounting rail brackets

Table 219: Contents of delivery - USB Media Drive - 5MD900.USB2-01

12.7 Interfaces

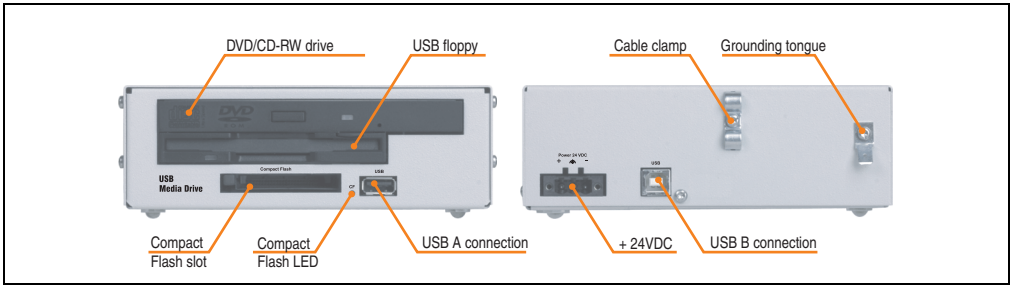


Figure 195: Interfaces - 5MD900.USB2-01

12.8 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).

12.8.1 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.

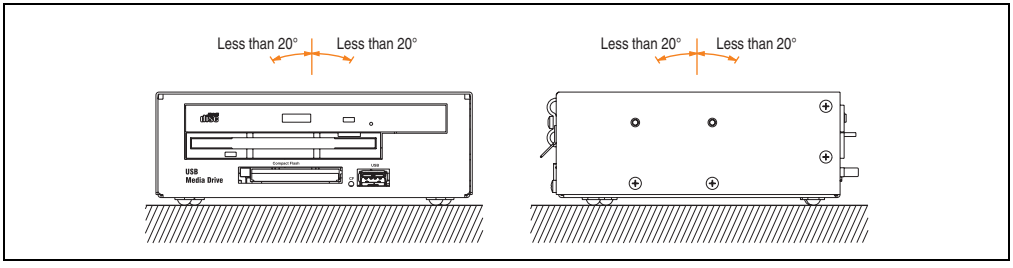


Figure 196: Mounting orientation - 5MD900.USB2-01

12.9 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.

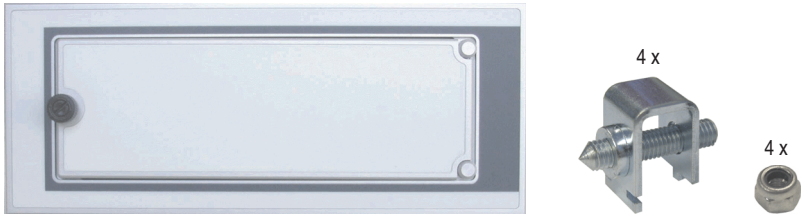


Figure 197: Front cover 5A5003.03

12.9.1 Technical data

Features	5A5003.03
Front cover design / colors Dark gray border around the cover Light gray background	 Pantone 432CV Pantone 427CV

Table 220: Technical data - 5A5003.03

12.9.2 Dimensions

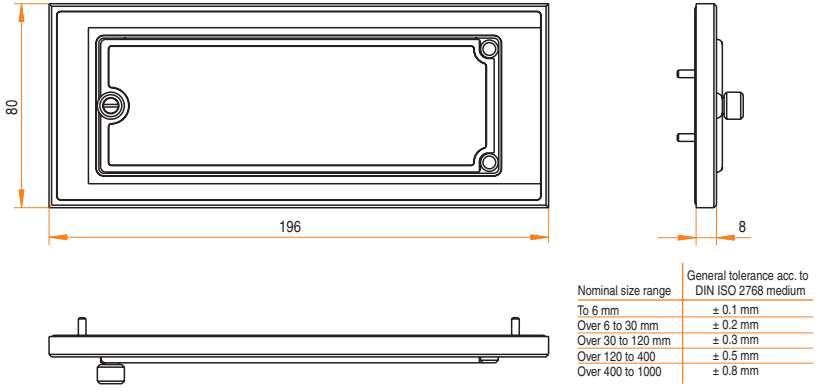
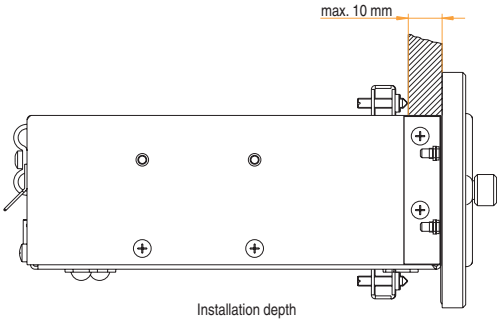


Figure 198: Dimensions - 5A5003.03

12.9.3 Installation

The front cover is attached with 2 mounting rail brackets (included with USB Media Drive) and 4 M3 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 199: Front cover mounting and installation depth

13. 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 (e.g. the SanDisk Cruzer Micro flash drive with 512 MB):

- **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.**

13.1 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.

13.2 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 221: Order data - USB flash drives

13.3 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)	100000 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 222: 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 222: Technical data - USB flash drive 5MMUSB.2048-00 (Forts.)

13.3.1 Temperature humidity diagram

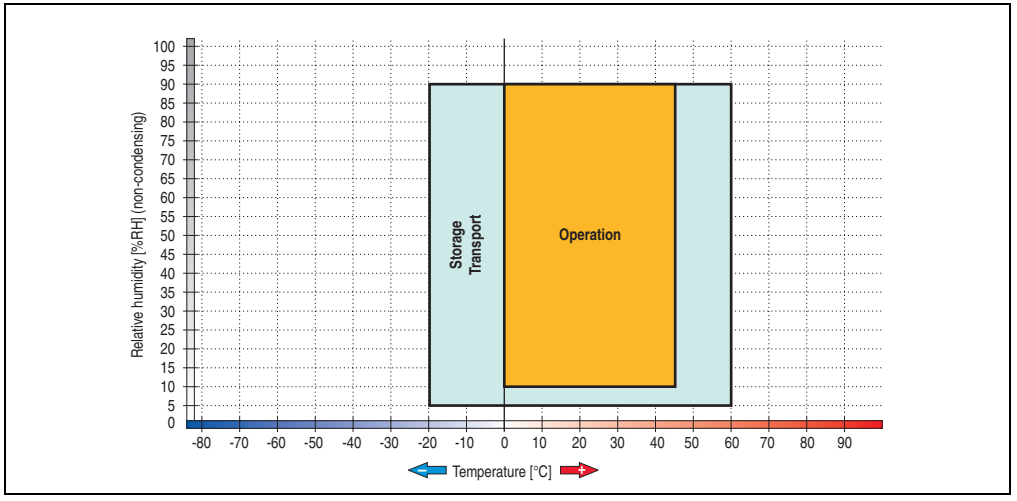


Figure 200: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00

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).

13.4 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 223: 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 223: Technical data - USB flash drive 5MMUSB.2048-01 (Forts.)

13.4.1 Temperature humidity diagram

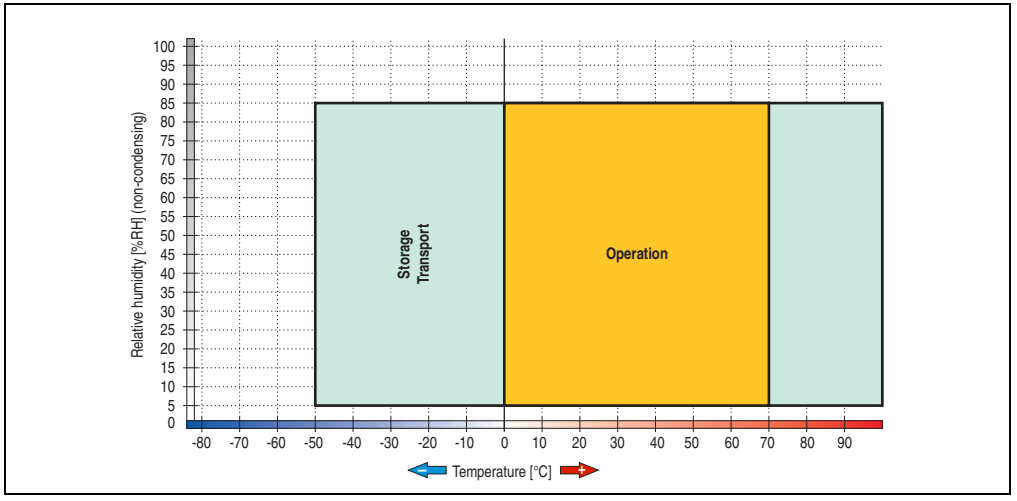


Figure 201: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-01

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).

14. HMI Drivers & Utilities DVD 5SWHMI.0000-00

Figure 202: HMI Drivers & Utilities DVD 5SWHMI.0000-00

Model number	Short description	Note
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	

Table 224: 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 **www.br-automation.com** – Industrial PCs, Visualization and Operation).

At the time of its creation, the content on the DVD is identical to the files found in the download area of the B&R homepage (under Service – “Material Related Downloads”).

BIOS upgrades for the products

- Automation PC 620 / Panel PC 700 CPU Board 815E und 855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board X855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board 945GME N270 BIOS
- Automation PC 680
- Automation PC 810 / Automation PC 820 / Panel PC 800 B945GME BIOS
- Automation PC 810 / Panel PC 800 945GME N270 CPU Board BIOS
- Automation PC 810 / Panel PC 800 GM45 CPU Board BIOS
- Provit 2000 products - IPC2000/2001/2002

- Provit 5000 products - 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
- Power Panel 300/400 BIOS devices
- Power Panel 300/400 BIOS User Boot Logo
- Panel PC 310

Drivers for the devices

- Automation Device Interface (ADI)
- Audio
- Chipset
- CD-ROM
- LS120
- Graphics
- Network
- PCI / SATA RAID controller
- Touch screen
- Touchpad
- Interfacecard

Firmware Upgrades

- Automation PC 620 / Panel PC 700 (MTCX, SDLR, SDLT)
- Automation PC 810 (MTCX, SDLR, SDLT)
- Automation PC 820 (MTCX, SDLR, SDLT)
- Mobile Panel 100 (SMCX)
- Panel PC 300 (MTCX)
- Power Panel 100 (aPCI)
- Power Panel 300/400 (aPCI)
- Power Panel 300/400 (MTCX)
- Panel PC 800 (MTCX, SDLR, SDLT)
- UPS firmware

Utilities / Tools

- B&R Embedded OS Installer
- Windows CE Tools
- User Boot Logo Conversion Utility
- SATA RAID Installations Utility
- Automation Device Interface (ADI)
- CompactFlash endurance calculator (Silicon Systems)
- Miscellaneous
- MTC Utilities
- Key Editor
- MTC & Mkey Utilities
- Mkey Utilities
- UPS configuration software
- ICU ISA configuration
- Intel PCI NIC Boot ROM
- Diagnostic Utilities

Windows

- Windows CE 6.0
- Windows CE 5.0
- Windows CE 4.2
- Windows CE 4.1
- Windows CE Tools
- Windows Embedded Standard 2009
- Thin Client
- Windows NT Embedded
- Windows XP Embedded
- VNC Viewer

MCAD templates for

- Industrial PCs
- Operator Interface devices
- Legend Strips templates
- Customized designs

ECAD templates for

- Industrial PCs
- Automation PCs
- Automation Panel 900
- Panel (Power Panel)

Documentation for

- Automation PC 620
- Automation PC 680
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- Panel PC 310
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 15/21/35/41
- Power Panel 100/200
- Power Panel 300/400
- Mobile Panel 40/50
- Mobile Panel 100/200
- Mobile Panel connection box
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows CE 5.0 help
- Windows CE 6.0 help
- Windows NT Embedded application guide
- Windows XP Embedded application guide
- UPS - uninterruptible power supply

- Implementation instructions
- B&R Hilscher feldbus cards (CANopen, DeviceNet, PROFIBUS, PROFINET)

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)

15. Cables

15.1 DVI cable 5CADVI.0xxx-00

The DVI cables 5CADVI.0xxx-00 are designed for fixed layout.

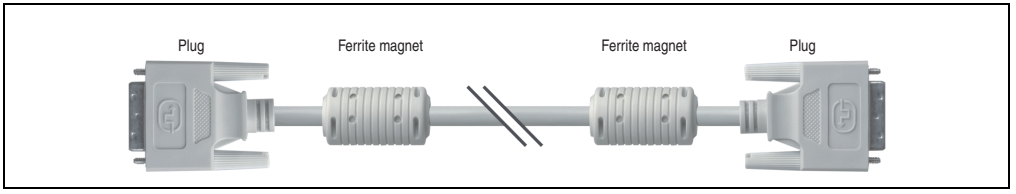


Figure 203: DVI extension cable - 5CADVI.0xxx-00 (similar)

Caution!

DVI cables can only be plugged in and unplugged when the device is turned off.

15.1.1 Order data

Model number	Description	Note
5CADVI.0018-00	**DVI-D cable 1.8 m / single** Single cable, DVI-D/m:DVI-D/m; length: 1.8 m	
5CADVI.0050-00	**DVI-D cable 5 m / single** Single cable, DVI-D/m:DVI-D/m; length: 5 m	
5CADVI.0100-00	**DVI-D cable 10 m / single** Single cable, DVI-D/m:DVI-D/m; length: 10 m	

Table 225: Model numbers - DVI cables

15.1.2 Technical data

Features	5CADVI.0018-00	5CADVI.0050-00	5CADVI.0100-00
Length Tolerance	1.8 m ±50 mm	5 m ±80 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 399 5 x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)		
Weight	Approx. 260 g	Approx. 460 g	Approx. 790 g

Table 226: Technical data - DVI cable 5CADVI.0xxx-00

Flex radius specification

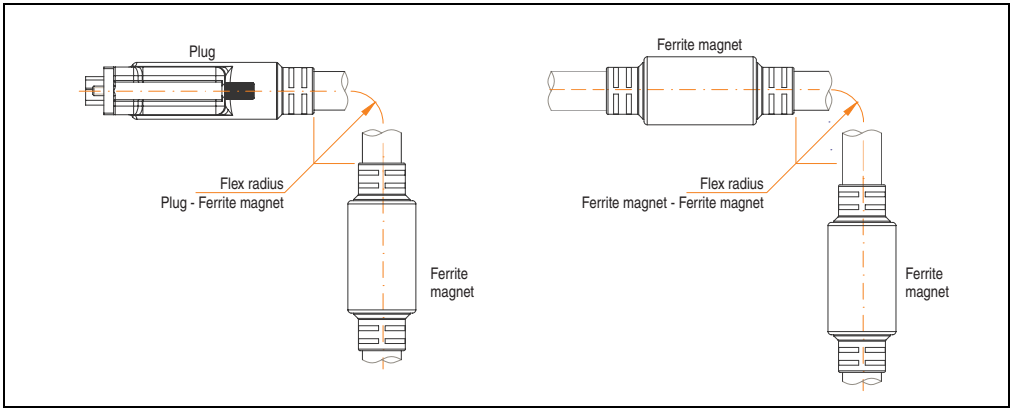


Figure 204: Flex radius specification

Dimensions

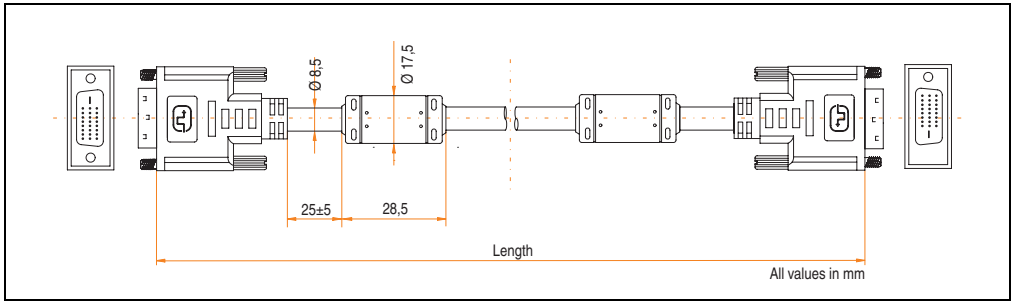


Figure 205: Dimensions - DVI cable 5CADVI.0xxx-00

Contents of delivery

Amount	Component
1	DVI cable in desired length, plug covers are attached at the cable ends.

Table 227: Contents of delivery - DVI cable 5CADVI.0xxx-00

15.1.3 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.

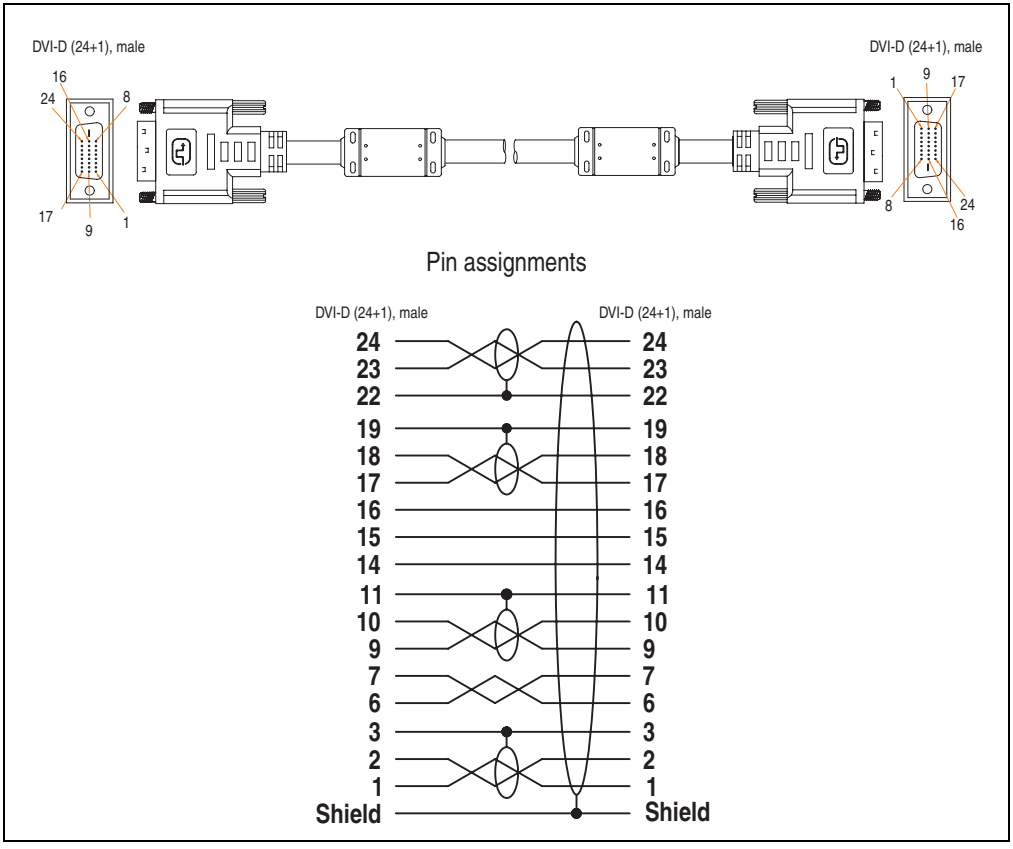


Figure 206: Pin assignments - DVI cable

15.2 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).

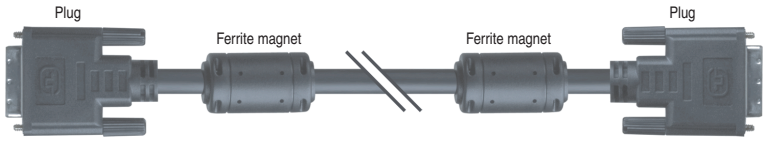


Figure 207: SDL cable 5CASDL.0xxx-00 (similar)

Caution!

SDL cables can only be plugged in and unplugged when the device is turned off.

15.2.1 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 228: Model numbers - SDL cables

15.2.2 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 ±30 mm	5 m ±30 mm	10 m ±50 mm	15 m ±100 mm	20 m ±100 mm	25 m ±100 mm	30 m ±100 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)						
Flex radius Fixed layout	See figure "Flex radius specification", on page 403 5 x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)						
Weight	Approx. 300 g	Approx. 580 g	Approx. 1500 g	Approx. 2250 g	Approx. 2880 g	Approx. 4800 g	Approx. 5520 g

Table 229: Technical data - SDL cables 5CASDL.0xxx-00

Flex radius specification

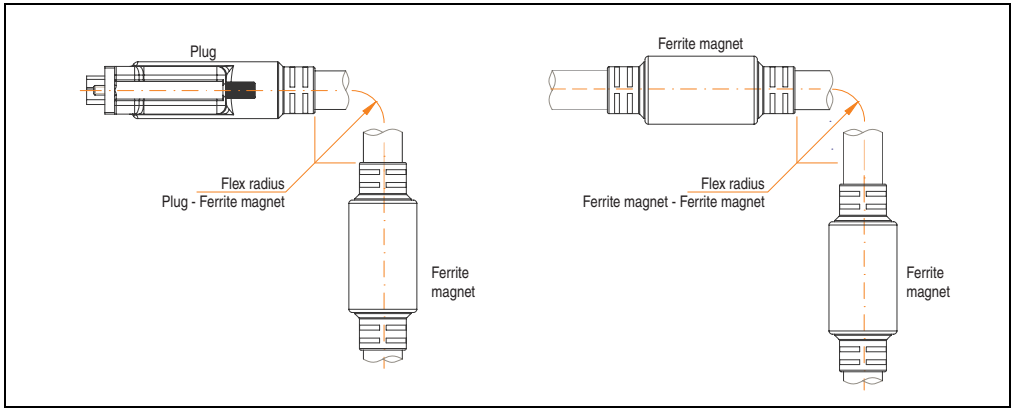


Figure 208: Flex radius specification

Dimensions

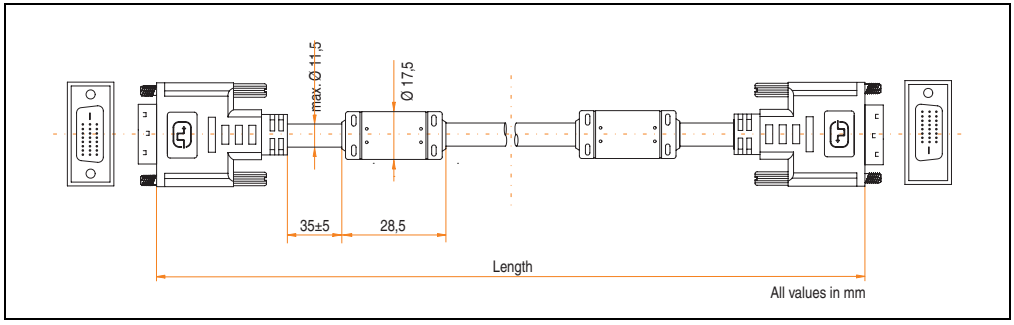


Figure 209: Dimensions - SDL cable 5CASDL.0xxx-00

Contents of delivery

Amount	Component
1	SDL cable in desired length, plug covers are attached at the cable ends.

Table 230: Contents of delivery - SDL cable 5CASDL.0xxx-00

15.2.3 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.

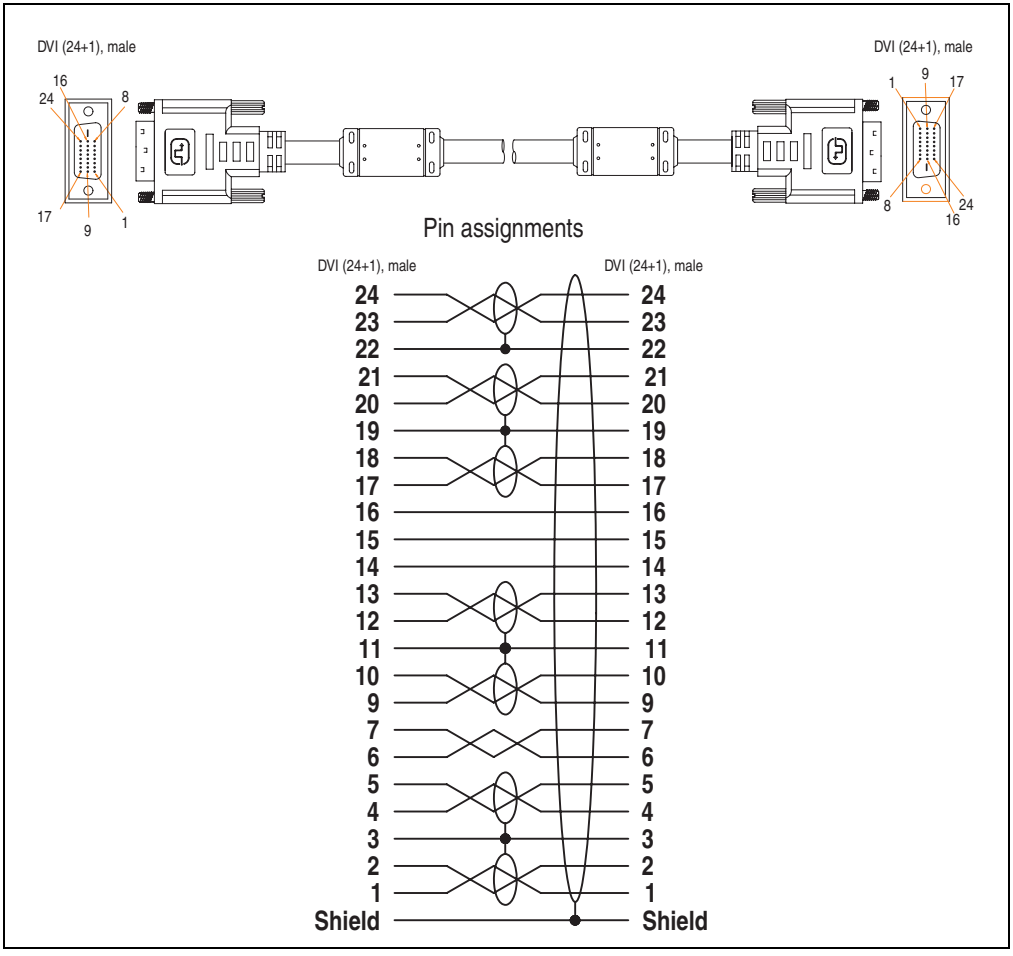


Figure 210: Pin assignments - SDL cable 5CASDL.0xxx-00

15.3 SDL cable with 45° plug 5CASDL.0xxx-01

The SDL cables 5CASDL.0xxx-01 are designed for fixed layout.

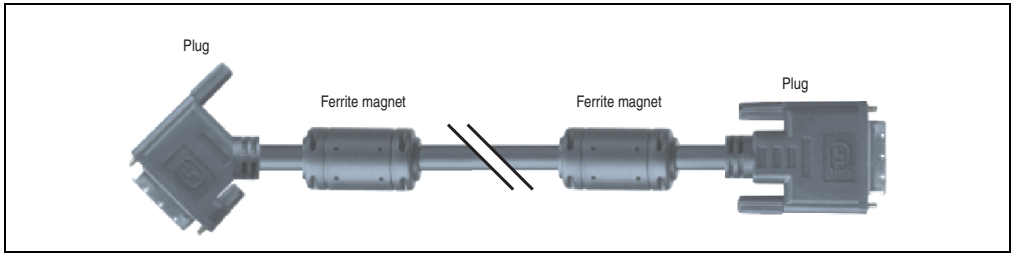


Figure 211: SDL cable with 45° plug (similar)

Caution!

SDL cables can only be plugged in and unplugged when the device is turned off.

15.3.1 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 231: Model numbers - SDL cables with 45° plug

15.3.2 Technical data

Features	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
Length Tolerance	1.8 m ±30 mm	5 m ±50 mm	10 m ±100 mm	15 m ±100 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)			
Flex radius Fixed layout	See figure "Flex radius specification", on page 407 5 x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)			
Weight	Approx. 300 g	Approx. 590 g	Approx. 2800 g	Approx. 2860 g

Table 232: Technical data - SDL cable with 45° plug 5CASDL.0xxx-01

Flex radius specification

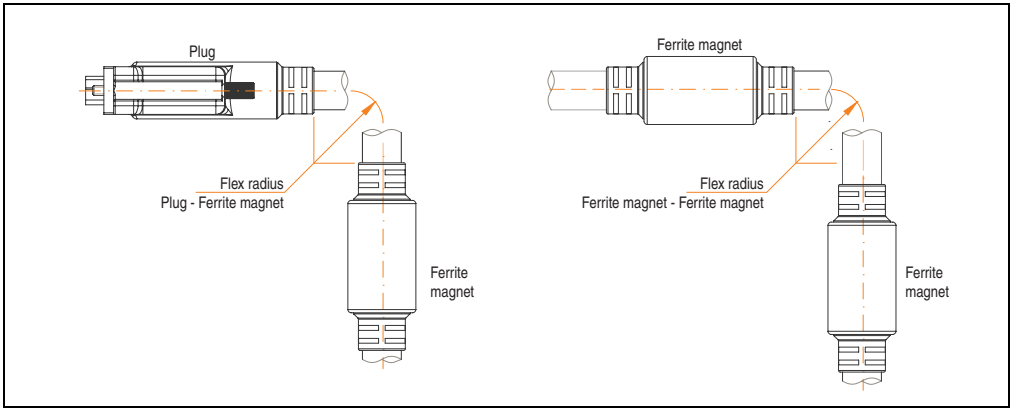


Figure 212: Flex radius specification

Dimensions

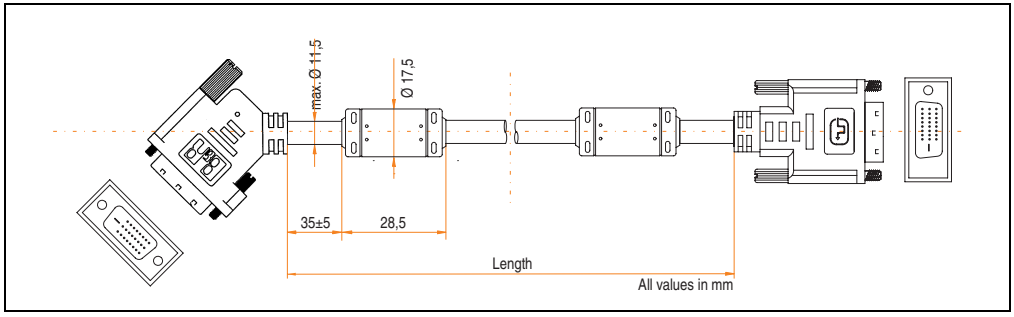


Figure 213: Dimensions - SDL cable with 45° plug 5CASDL.0xxx-01

Contents of delivery

Amount	Component
1	SDL cable with 45° plug in desired length, plug covers are attached at the cable ends.

Table 233: Contents of delivery - SDL cable with 45° plug 5CASDL.0xxx-01

15.3.3 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.

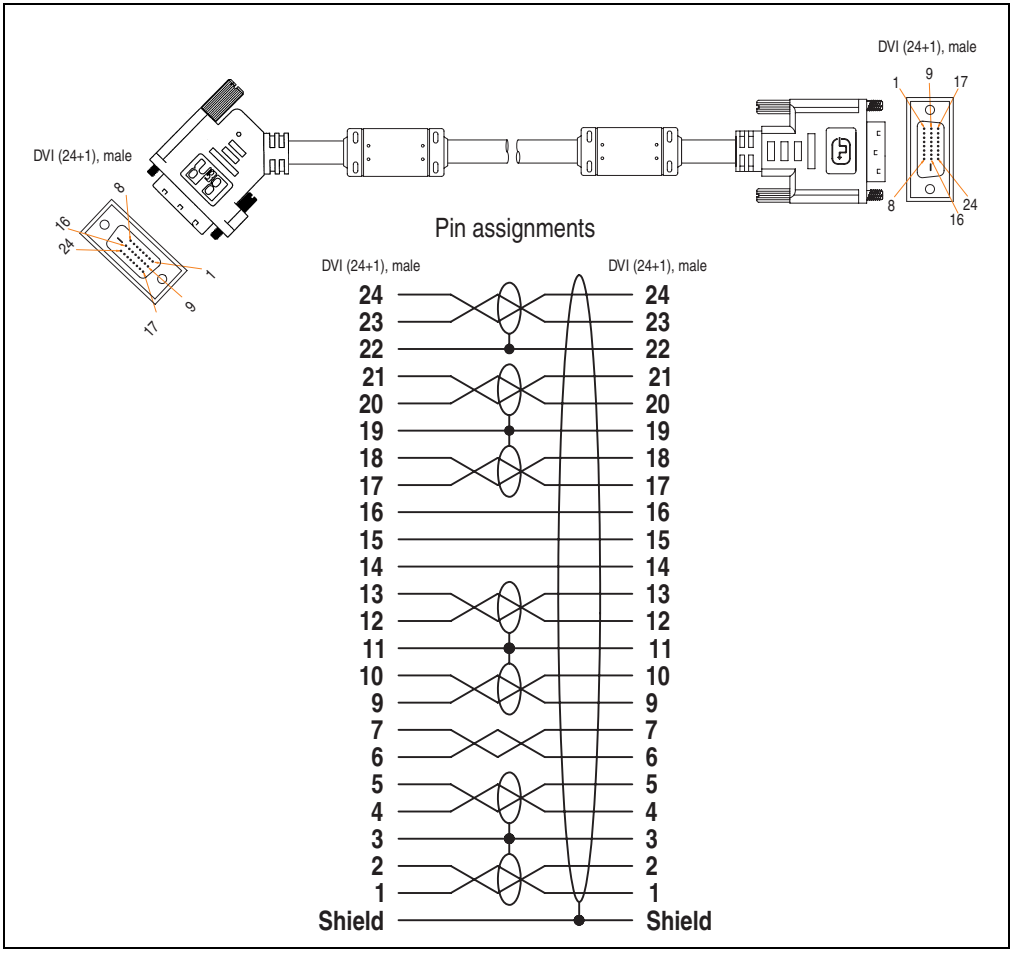


Figure 214: Pin assignments - SDL cable with 45° plug 5CASDL.0xxx-01

15.4 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).

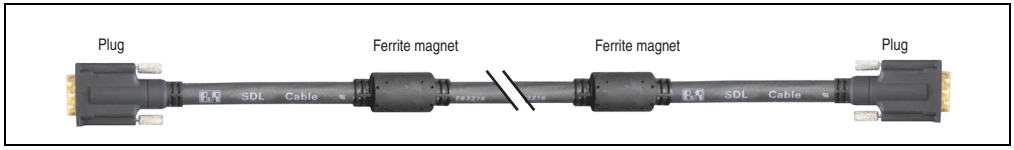


Figure 215: SDL cable 5CASDL.0xxx-03 (similar)

Caution!

SDL cables can only be plugged in and unplugged when the device is turned off.

15.4.1 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 234: Model numbers - SDL cable 5CASDL.0xxx-03

15.4.2 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)						
Flex radius Fixed layout flexible installation	See figure "Flex radius specification", on page 412 6 x cable diameter (from plug to ferrite magnet) 10x cable diameter (of ferrite magnet - ferrite magnet) 15x cable diameter (of ferrite magnet - ferrite magnet)						
Weight	Approx. 460 g	Approx. 1020 g	Approx. 1940 g	Approx. 2840 g	Approx. 3740 g	Approx. 4560 g	Approx. 5590 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						
Standards and certifications							
Torsion load	100000 cycles (tested angle of rotation: ±85° speed: 50 cycles / minute)						

Table 235: 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
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 235: Technical data - SDL cable 5CASDL.0xxx-03 (Forts.)

Flex radius specification

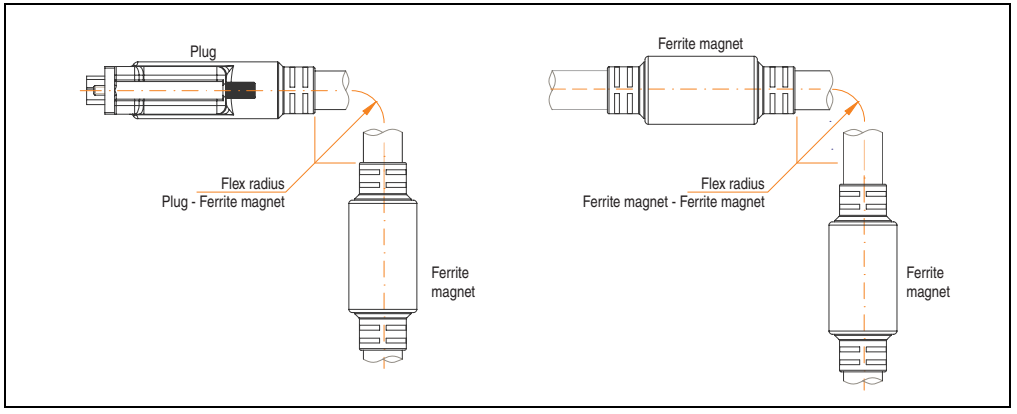


Figure 216: Flex radius specification

Dimensions

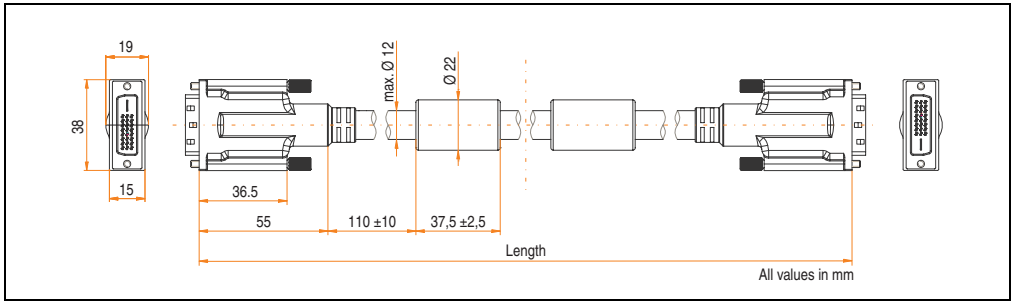


Figure 217: Dimensions - SDL cable 5CASDL.0xxx-03

Contents of delivery

Amount	Component
1	SDL flex cable in desired length, plug covers are attached at the cable ends.

Table 236: Contents of delivery - SDL flex cable 5CASDL.0xxx-03

Construction

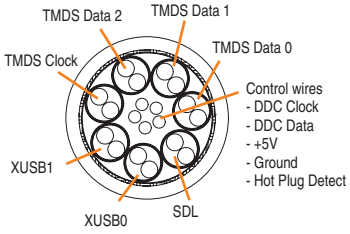
Element	Assignment	Cross section	
DVI	TMDS data 0	26 AWG	 Schematic display
	TMDS data 1	26 AWG	
	TMDS data 2	26 AWG	
	TMDS cycle	26 AWG	
USB	XUSB0	26 AWG	
	XUSB1	26 AWG	
Data	SDL	26 AWG	
Control wires	DDC cycle	24 AWG	
	DDC data	24 AWG	
	+5 V	24 AWG	
	mass	24 AWG	
	Hot Plug detect	24 AWG	

Table 237: Structure - SDL cable 5CASDL.0xxx-03

15.4.3 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.

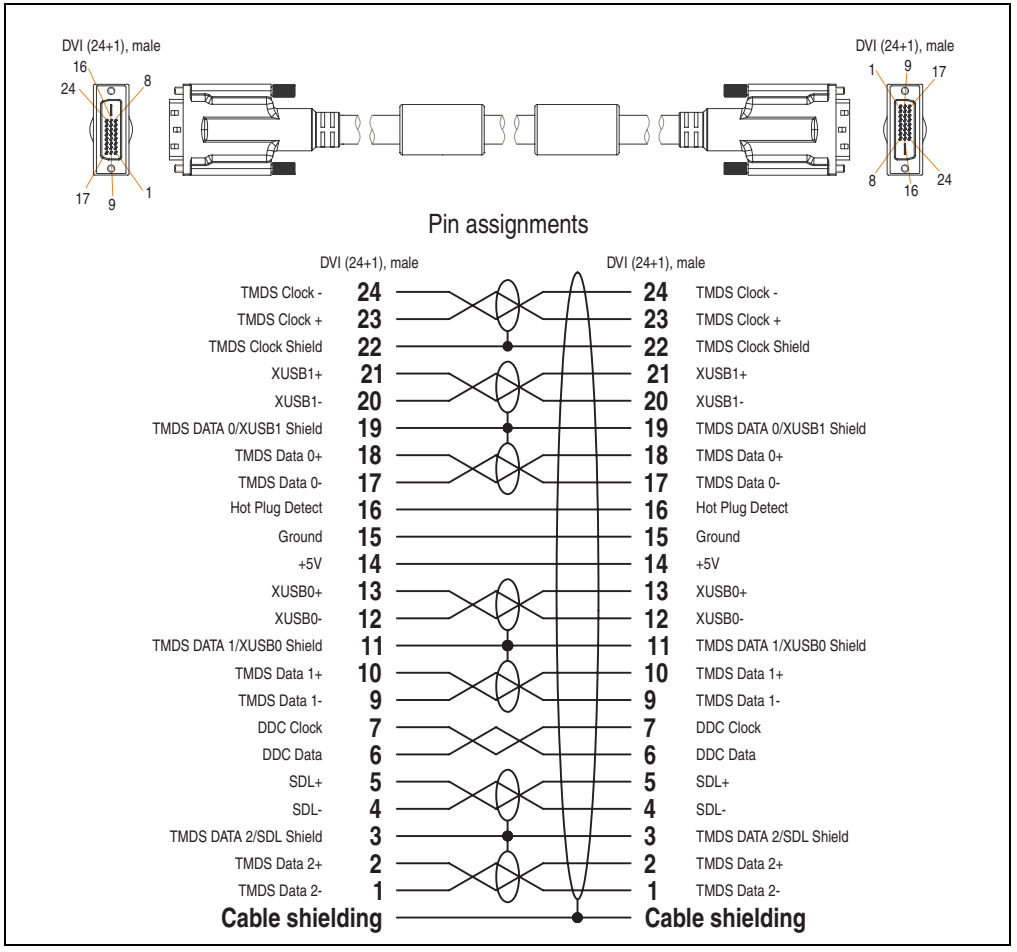


Figure 218: Pin assignments - SDL cable 5CASDL.0xxx-03

15.5 SDL flex cable with extender 5CASDL.0xx0-13

The SDL flex cables (with extender) 5CASDL.0xx0-13 are designed for both fixed and flexible installations (e.g. in swing arm systems).

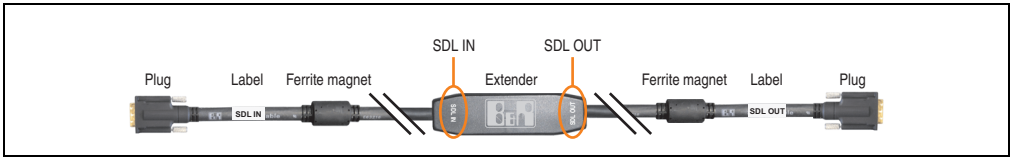


Figure 219: SDL flex cable with extender - 5CASDL.0xx0-13 (similar)

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).

15.5.1 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	
5CASDL.0430-13	**SDL flex cable with extender 43 m** SDL cable with extender for fixed and flexible type of layout; length: 43 m	

Table 238: Model numbers - SDL flex cable with extender 5CASDL.0xx0-13

15.5.2 Technical data

Features	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
Length Tolerance	30 m ±280 mm	40 m ±380 mm	43 m ±410 mm
Dimensions - Extender box Height Width Length	18.5 mm 35 mm 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)		
Flex radius Fixed layout flexible installation	See figure "Flex radius specification", on page 417 6 x cable diameter (from plug to ferrite magnet) 10 x cable diameter (of ferrite magnet - extender) 15x cable diameter (of ferrite magnet - ferrite magnet)		
Weight	Approx. 5430 g	Approx. 7200 g	Approx. 7790 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			
Ambient temperatures Fixed installation Moving Storage	-20 to +60°C -5 to +60°C -20 to +60°C		

Table 239: Technical data - SDL flex cable with extender 5CASDL.0xx0-13

Standards and certifications	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
Torsion load	100000 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 239: Technical data - SDL flex cable with extender 5CASDL.0xx0-13 (Forts.)

Flex radius specification

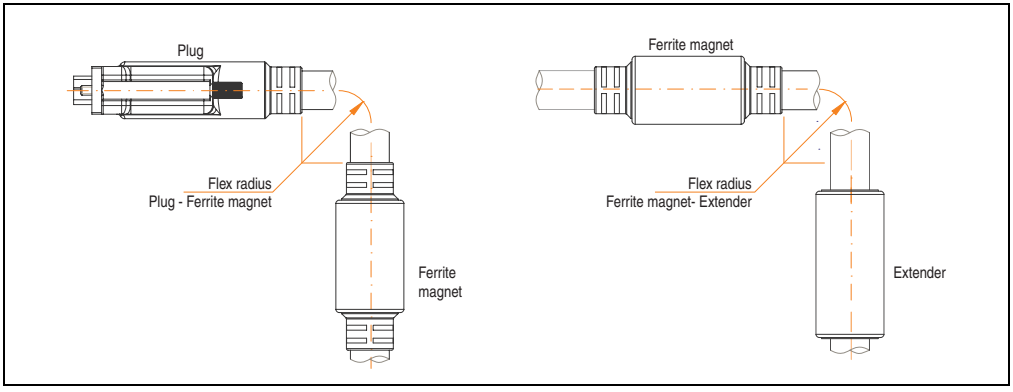


Figure 220: Flex radius specification

Dimensions

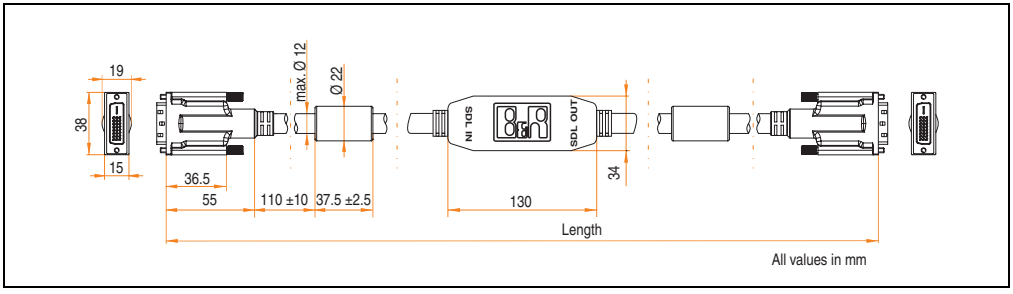


Figure 221: Dimensions - SDL flex cable with extender 5CASDL.0xx0-13

Contents of delivery

Amount	Component
1	SDL flex cable with extender in desired length, plug covers are attached at the cable ends.

Table 240: Contents of delivery - SDL flex cable with extender 5CASDL.0xx0-13

15.5.3 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 APC 620 / APC 810 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).

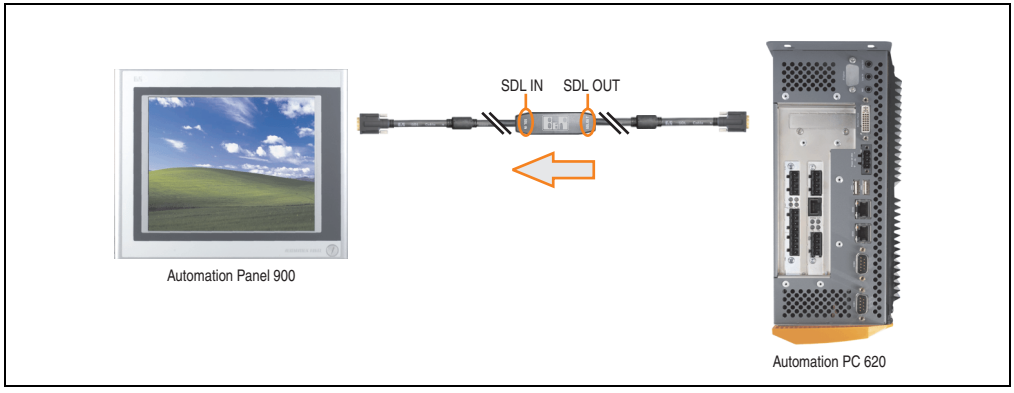


Figure 222: Example of the signal direction for the SDL flex cable with extender - APC620

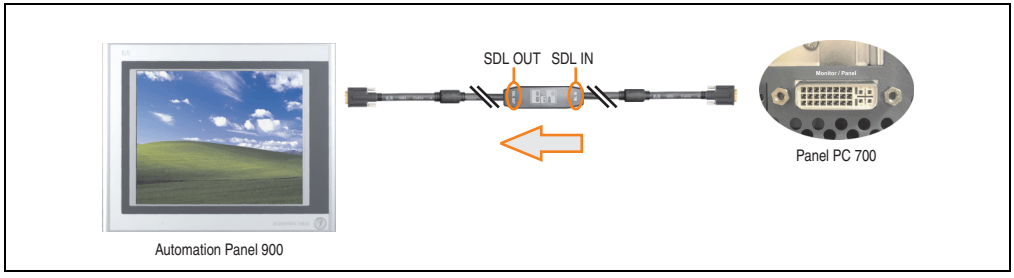


Figure 223: Example of signal direction for the SDL flex cable with extender - PPC700

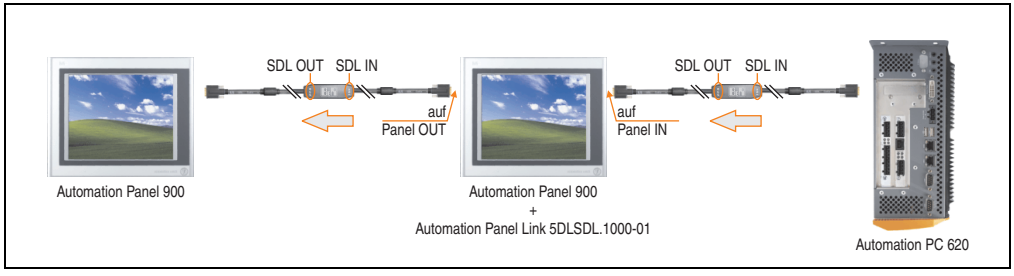


Figure 224: Example of signal direction display - SDL flex cable with extender

15.5.4 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.

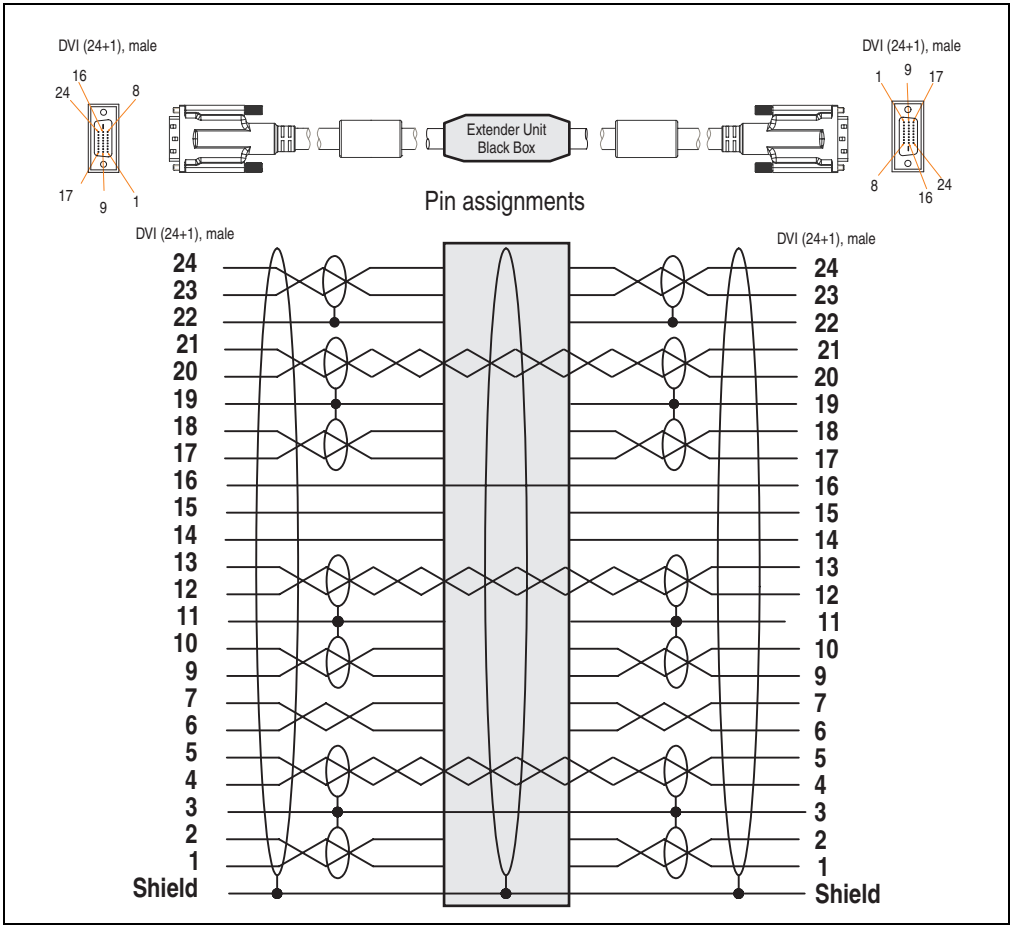


Figure 225: Pin assignments - SDL flex cable with extender 5CASDL.0xx0-13

15.6 RS232 cable 9A0014.xx

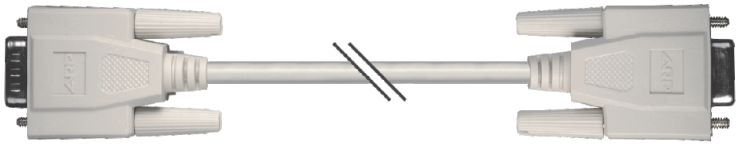


Figure 226: RS232 extension cable (similar)

15.6.1 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 241: Model numbers - RS232 cables

15.6.2 Technical data

Features	9A0014.02	9A0014.05	9A0014.10
Length	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 242: Technical data - RS232 cables

Contents of delivery

Amount	Component
1	RS232 cable in desired length

Table 243: Contents of delivery - RS232 cables 9A0014.xx

15.6.3 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.

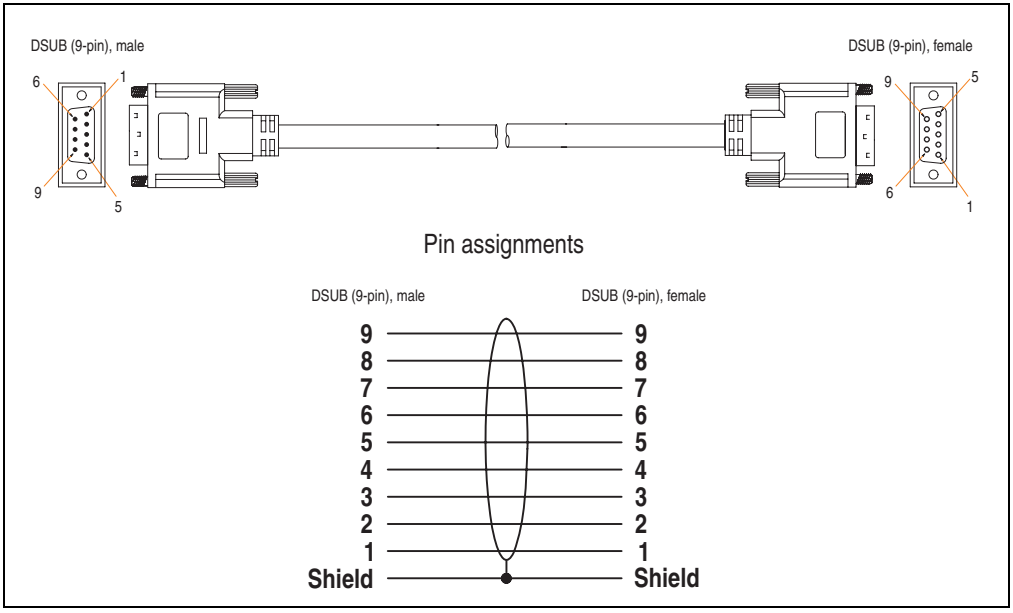


Figure 227: Pin assignments - RS232 cable

15.7 USB cable 5CAUSB.00xx-00

Figure 228: USB extension cable (similar)

15.7.1 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 244: Model numbers - USB cables

15.7.2 Technical data

Features	5CAUSB.0018-00	5CAUSB.0050-00
Length	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 245: Technical data - USB cables

Contents of delivery

Amount	Component
1	USB cable in desired length

Table 246: Contents of delivery - USB cable

15.7.3 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.

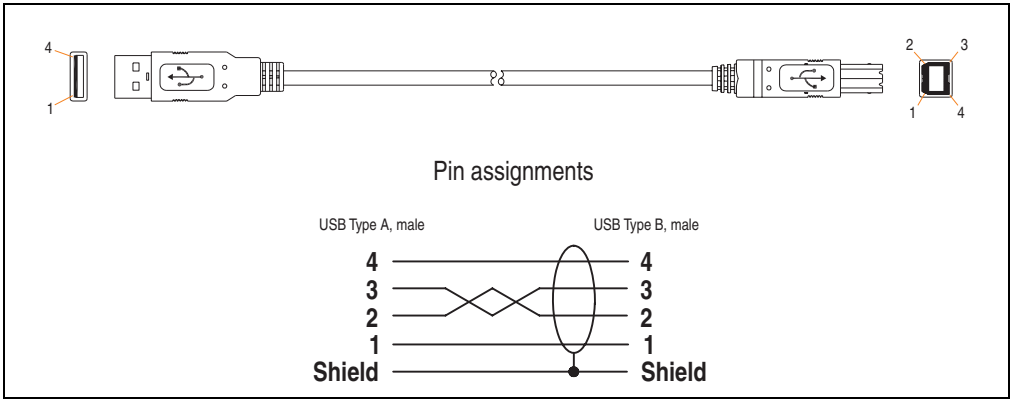


Figure 229: Pin assignments - USB cable

16. Legend strip templates

Panel PC 700 devices with keys are delivered with partially pre-labeled key legend strips (F1, F2, etc.). The key legend strip slots are accessible on the back of the Panel PC 700 device (above and below).

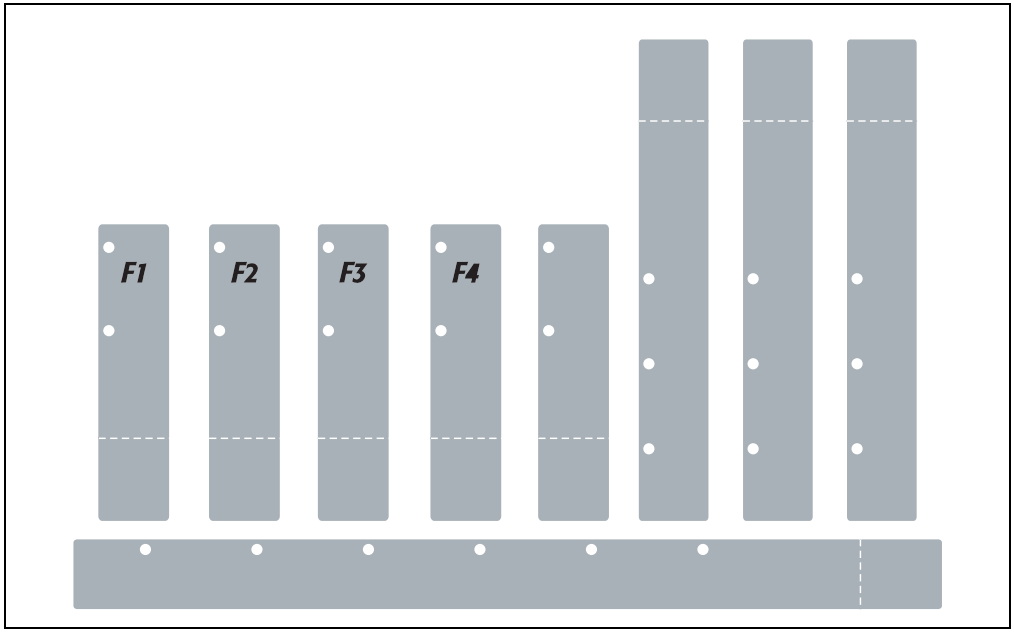


Figure 230: Legend strip templates

Printable legend strips (A4 format) can be ordered from B&R (see table 18 "Model numbers - Other items", on page 31). They can be printed using a standard laser printer (b/w or color) in a temperature range from -40°C to +125°C. A print template (available for Corel Draw version 7, 9 and 10) for the respective legend strip template can be downloaded from the B&R homepage (**www.br-automation.com**). The print templates can also be found on the HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

16.1 Order data

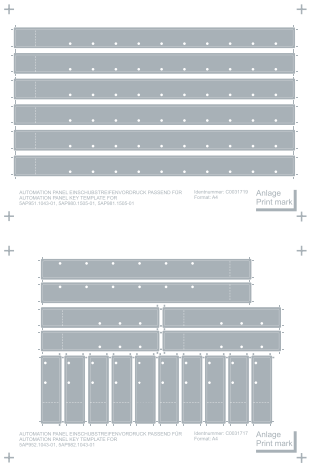
Model number	Description	Image
5AC900.104X-00	**Legend strip template 10.4" portrait format** Legend strip template for Panel PC 700 system unit 5PC781.1043-00. For 1 device.	Examples of legend strip templates 
5AC900.104X-01	**Legend strip template 10.4" landscape format** Legend strip template for Panel PC 700 system unit 5PC782.1043-00. For 1 device.	
5AC900.150X-01	**Legend strip template 15"** Legend strip template for Panel PC 700 system unit 5PC781.1505-00. For 4 devices.	

Table 247: Order data - Legend strip templates

17. 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 231: Replacement fan

17.1 5AC700.FA00-00

This fan filter can be used as an option for 10.4", 12.1", 15", 17" and 19" Panel PC 700 system units with 0 PCI slots (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).

17.2 5AC700.FA02-00

This fan filter can be used as an option for 10.4", 12.1" or 15" Panel PC 700 system units with 1 and 2 PCI slots (PC720.1043-01, 5PC720.1214-01, 5PC720.1505-01 and 5PC720.1505-02).

18. SRAM module - 5AC600.SRAM-00

The 512 KB SRAM module increases PPC700 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 PPC700 battery.

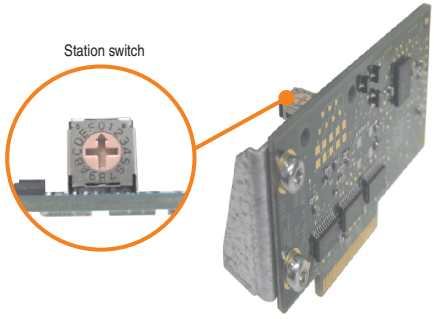


Figure 232: SRAM module - 5AC600.SRAM-00

The following system unit hardware revisions are required before mounting the SRAM module:

- 5PC720.1043-01 starting with Rev. I0
- 5PC720.1214-01 starting with Rev. D0
- 5PC720.1505-01 starting with Rev. L0
- 5PC720.1505-02 starting with Rev. K0

18.1 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 248: 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 248: Technical data - 5AC600.SRAM-00

18.2 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.

18.3 Installation

- Remove the side cover of the PPC700.
- Screw on the M3x5 Torx included in the delivery to the baseboard of the module.

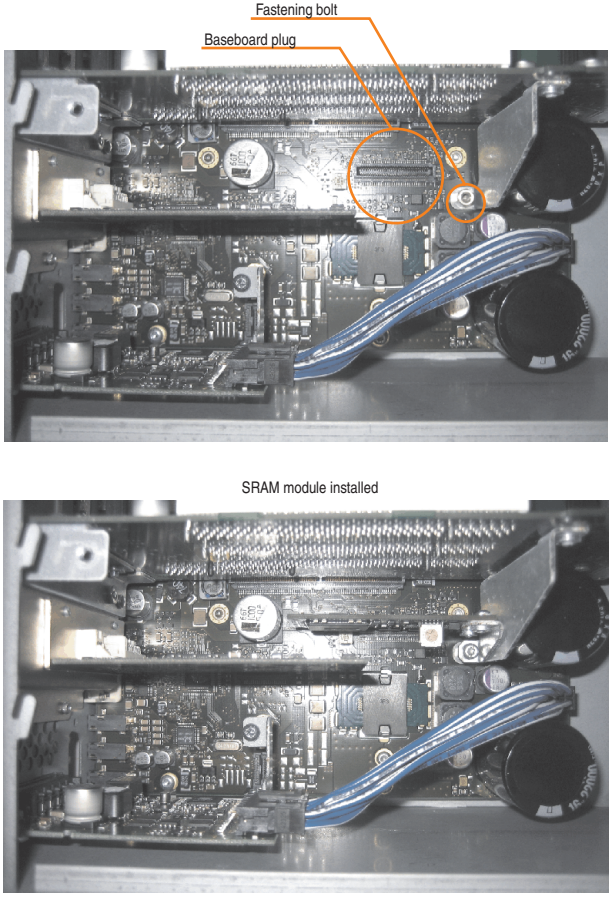


Figure 233: SRAM module installation

19. Ethernet PCI interface cards

19.1 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.

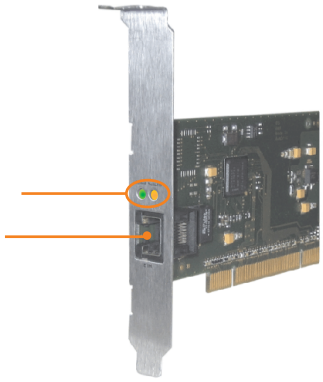


Figure 234: PCI Ethernet card 10/100 - 5ACPCI.ETH1-01

19.1.1 Technical data

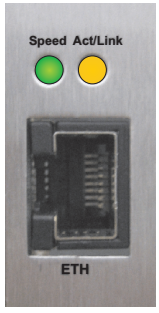
Ethernet connection			
Controller	Intel 82551ER		RJ45 twisted pair (10BaseT/100BaseT), female 
Power supply	Universal card (2 notches) for 3.3 V or 5 V		
Cabling	S/STP (Cat5e)		
Transfer rate	10/100 Mbit/s [1]		
Cable length	max. 100 m (min. Cat5e)		
LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 249: Ethernet connection ETH

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

19.1.2 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.

19.1.3 Dimensions

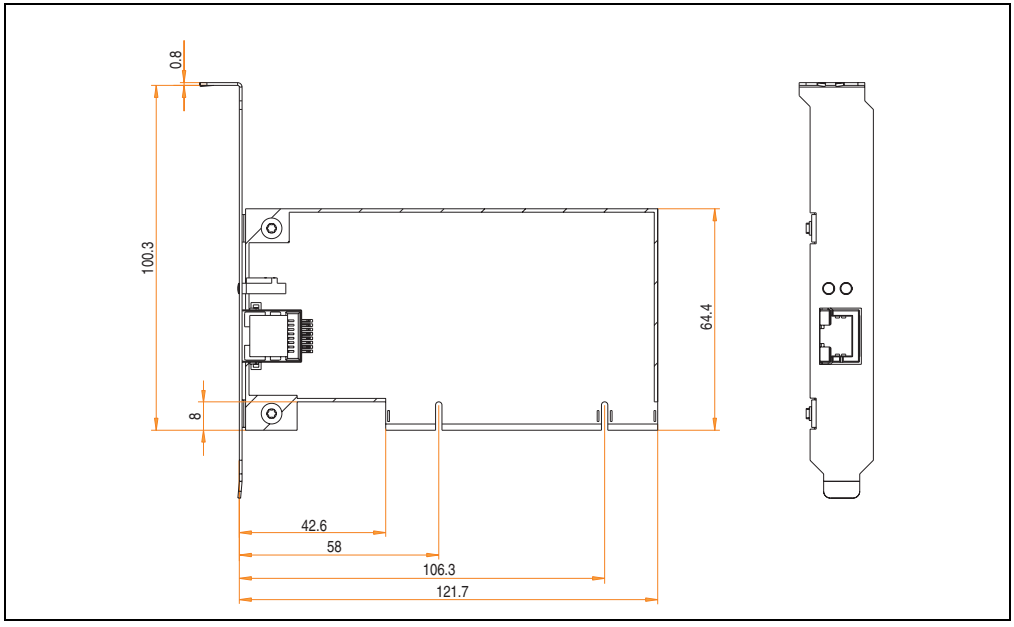


Figure 235: Dimensions - 5ACPCI.ETH1-01

19.2 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.

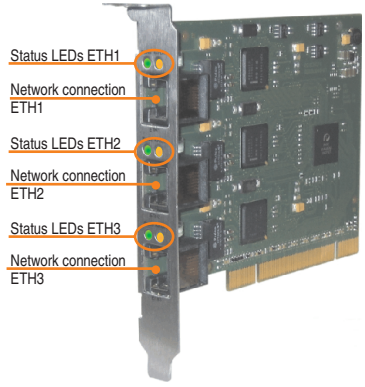


Figure 236: PCI Ethernet card 10/100 - 5ACPCI.ETH3-01

19.2.1 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)	

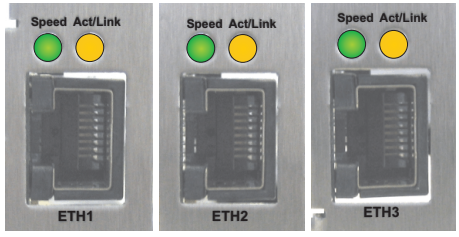


Table 250: Ethernet connections ETH1, ETH2, ETH3

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

19.2.2 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.

19.2.3 Dimensions

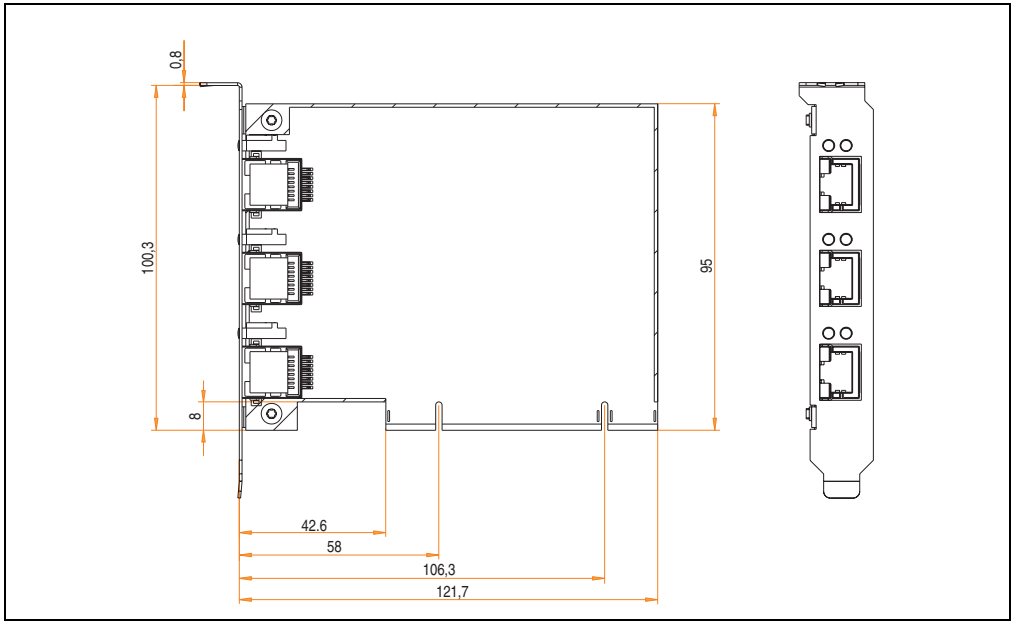


Figure 237: Dimensions - 5ACPCI.ETH3-01

Chapter 7 • Maintenance / Servicing

The following section 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 (at 50°C, 8.5 µA current requirements of the supplied components and a self discharge of 40%).

1.1 Battery check

The battery status (good or bad) is checked every time the device is turned on, as well as every 24 hours. The check involves applying a load to the battery for a short time (approx. 1 second), followed by an evaluation. The evaluated battery status is displayed in the BIOS Setup pages and in the B&R Control Center (ADI driver), but can also be read in a customer application via the ADI Library.

Battery status	Meaning
OK	Data buffering is guaranteed
Bad	Data buffering is guaranteed for approx. another 500 hours from the point in time that the battery capacity is determined to be BAD (insufficient).

Table 251: Meaning of battery status OK - Bad

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.

The following replacement lithium batteries are available:

- 4A0006.00-000 (1 piece)
- 0AC201.91 (4 pcs.)

Information:

- **The product design allows the battery to be changed with the PPC700 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.**

1.2 Procedure

- Disconnect the power supply to the Panel PC 700 (also see information on page 435).
- 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 238: 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.

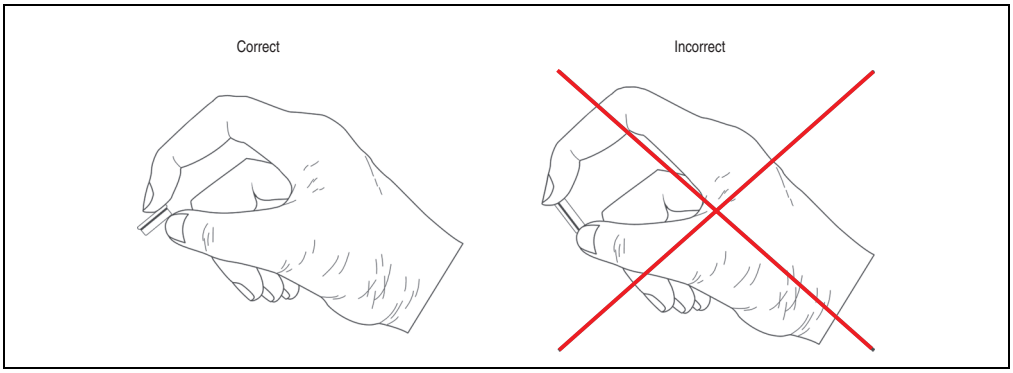


Figure 239: Battery handling

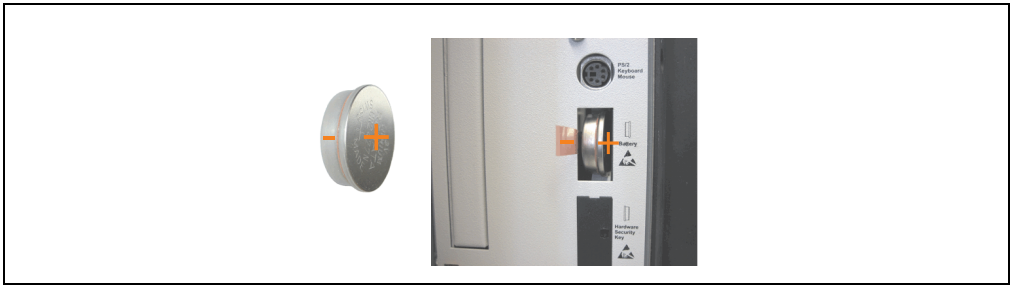


Figure 240: Battery polarity

- To make the next battery change easier, be sure the removal strip is in place when inserting battery.
- Reconnect the power supply to the Panel PC 700 by plugging the power cable back in and pressing the power button (also see information on page 435).
- Reset the data and time in BIOS (see information on page 435).

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 - PPC700 without PCI slots

The procedure for devices without PCI slots (5PC720.1043-00, 5PC720.1214-00, 5PC720.1505-00, 5PC720.1706-00, 5PC720.1906-00, 5PC781.1043-00, 5PC781.1505-00, 5PC782.1043-00) is explained step-by-step in the following example (5PC720.1505-00).

- Disconnect the power supply to the Panel PC 700.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Loosen the nuts on the clamp (using hex key) and lift the clamp to remove. Loosen the screws on the fan kit cover (using Torx screw driver size 10) and remove the cover.

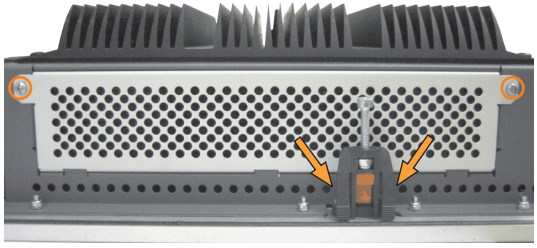


Figure 241: Removing the fan kit cover

- There are two arrows on the fans that indicate the direction of air flow and the direction of fan rotation.

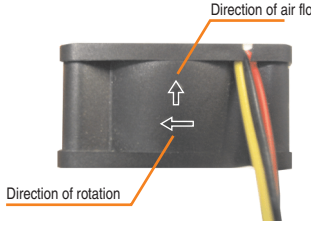


Figure 242: Marking for direction of airflow / fan rotation

Warning!

The fans must be installed so that the air flows toward the inside of the housing.

- Align fans over the fastening bolts (see arrows). Feed cables through the opening in the housing (see square) into the main board of the PPC700.

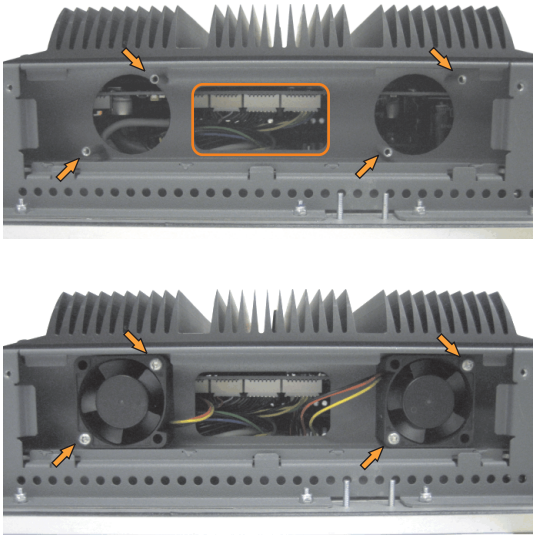


Figure 243: Fan Installation

- Secure fans with the 4 included Torx (T10) screws.
- Loosen the marked nuts (using hex key) and open the cover (open carefully because of cable).

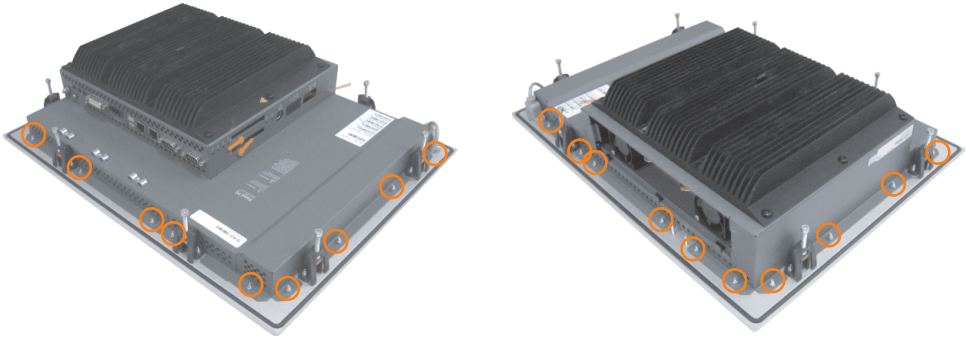


Figure 244: Removing the cover

- 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).

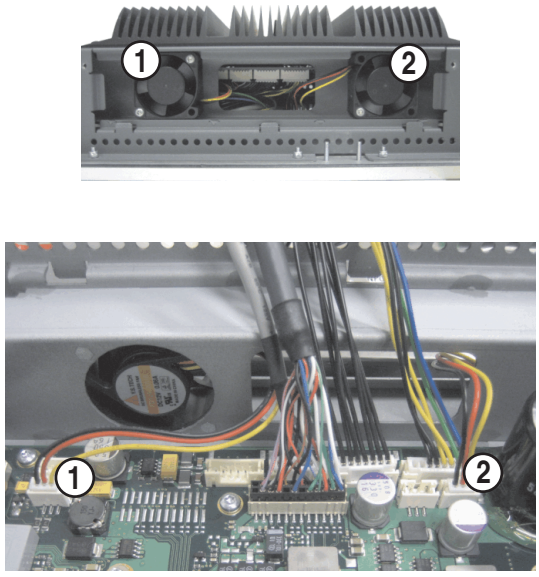


Figure 245: Fan cable connection on the main board

- Place dust filter in the fan kit cover and replace removed components (cover, filter kit cover) in reverse order.

2.2 Procedure - PPC700 with 1 and 2 PCI slots

The procedure for devices with 2 PCI slots (5PC720.1043-01, 5PC720.1214-01, 5PC720.1505-01, 5PC720.1505-02) is explained step-by-step in the following example (5PC720.1505-01).

- Disconnect the power supply to the Panel PC 700.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Loosen the screws on the fan kit cover (using Torx screw driver size 10) and remove the cover.

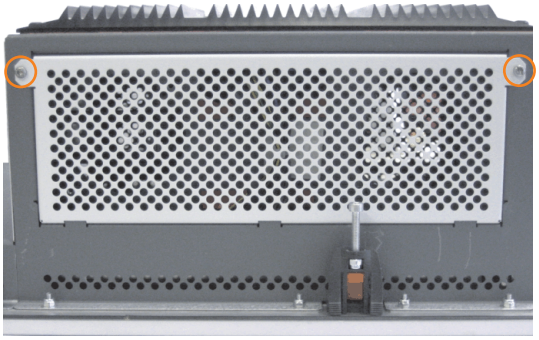


Figure 246: Removing the fan kit cover

- 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.

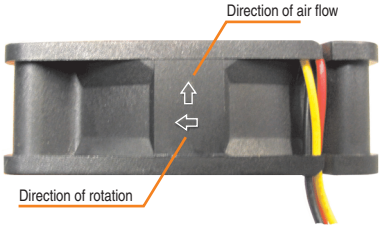


Figure 247: Marking for direction of airflow / fan rotation

Warning!

The fans must be inserted so that the air flows toward the inside of the housing.

- Remove the clamp screw (see circle). Align fans over the fastening bolts (see arrows). Feed cables through the opening in the housing (see square) into the main board of the PPC700.

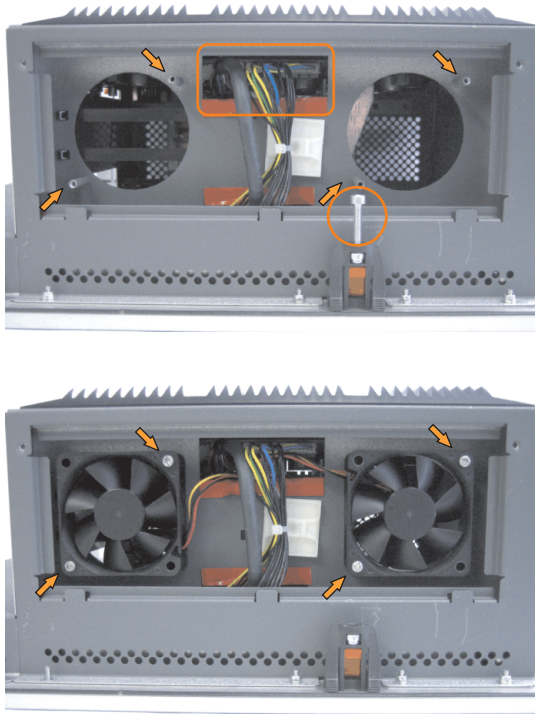


Figure 248: Fan Installation

- Secure fans with the 4 included Torx (T10) screws.

- Loosen the screws on the side cover (using Torx screw driver size 10) and remove the cover.

Figure 249: Removing the side cover

- 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).

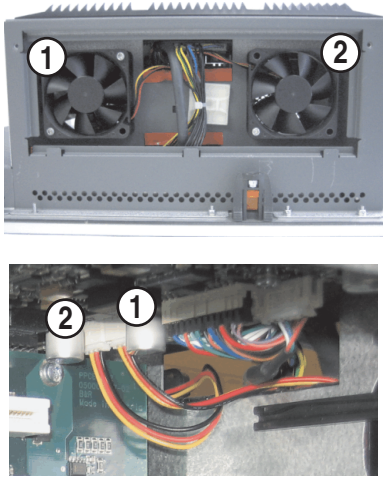


Figure 250: Fan cable connection on the main board

- 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.

3. Slide-in drive - installation and exchange

A slide-in drive can be installed and exchanged in system units with 1 or 2 PCI slots.

3.1 Installation procedure

- Disconnect the power supply to the 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 light-gray side cover. This generally requires removing 5 Torx screws (T10).

Figure 251: Example - Side cover removal on the system unit 5PC720.1505-02

- Remove the slide-in dummy module.

Figure 252: Removing the slide-in dummy module

- Insert the slide-in drive.

Figure 253: Installing the slide-in drive

- Attach the side cover.

3.2 Exchange procedure

- Disconnect the power supply to the 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 light-gray side cover. This generally requires removing 5 Torx screws (T10).

Figure 254: Example - Side cover removal on the system unit 5PC720.1505-02

- Remove both slide-in slot releasing mechanisms outwards. The slide-in drive is pushed a few mm upwards for easy removal.

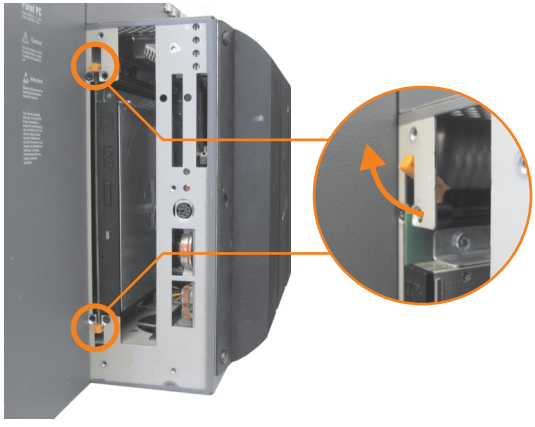


Figure 255: Release the slide-in slot releasing mechanisms

- Removing the slide-in drive.
- Move the slide-in slot releasing mechanism to the start position and insert the new slide-in drive.

Figure 256: Installing the slide-in drive

- Attach the side cover.

4. Exchanging the legend strips

The function keys can be individually labeled by simply exchanging the legend strips (see "Legend strip templates", on page 424). The designated slots for the legend strips can be accessed on the back of the PPC700 device.

4.1 Procedure

1) Place the Panel PC on a clean, even surface with the display facing down.

2) Remove blank legend strips and replace with printed ones.

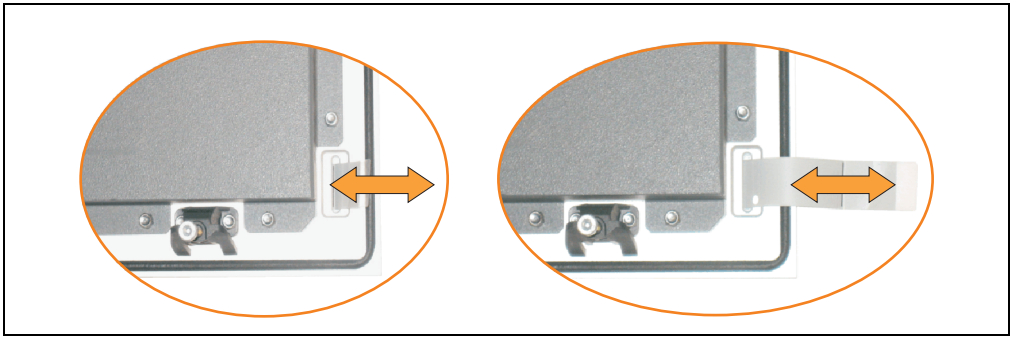


Figure 257: Exchange legend strips

5. Preventing after-image effect in LCD/TFT monitors

Burn-in effect (after images, display memory effect, image retention or also image sticking) occurs in LCD/TFT monitors when a static image is displayed for a long period of time. This static screen content causes the build-up of parasitic capacities within the LCD components that prevent the liquid crystal molecules from returning to their original states. This condition may arise, is not predictable and depends on the following factors:

- Type of image displayed
- Color composition of the image
- Length of image output
- Ambient temperature

5.1 What measures can be taken against this?

There is no total solution, however, measures can be taken to significantly reduce this effect:

- Avoid static pictures or screen content
- Use screen savers (moving) when the display is not in use
- Frequent picture change
- Shut off the display when not in use

Turning off the background lighting (backlight) does not influence the prevention of the after-image effect.

6. Exchanging a PCI SATA RAID hard disk

In the example, the assumption is made that the secondary hard disk (HDD1) is defective. 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 258 "Screw assignment on the back side of the SATA RAID controller", on page 450.

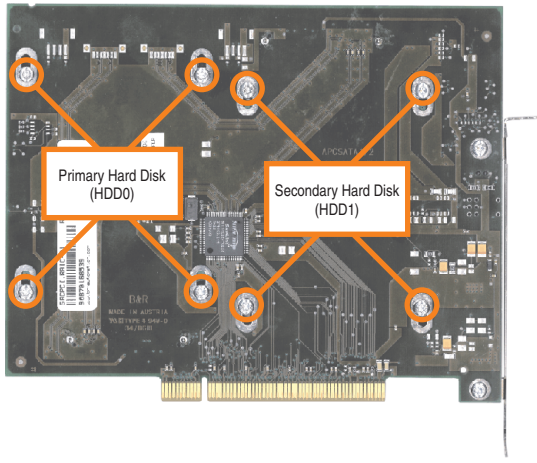


Figure 258: Screw assignment on the back side of the SATA RAID controller

- On the front side, slide the hard disk down and away (image 1).
- Carefully plug the new hard disk into the connector (image 2).

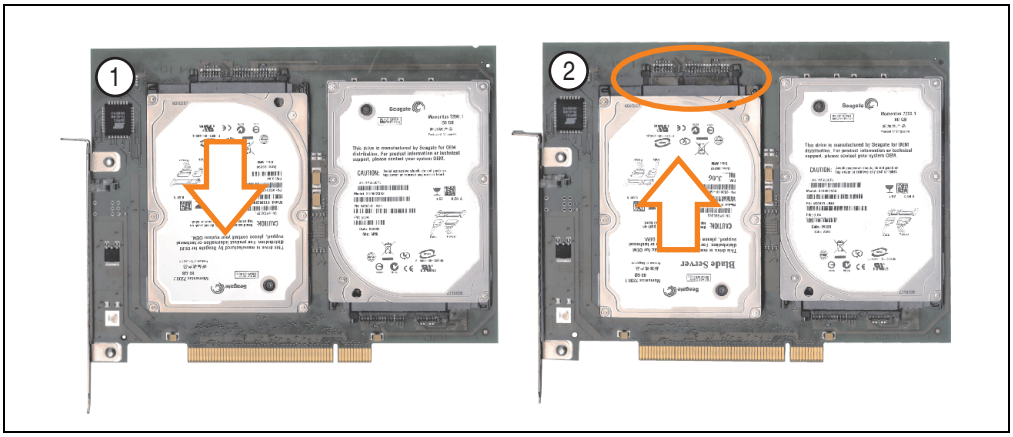


Figure 259: Hard disk exchange

- 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 224.

Appendix A

1. Temperature sensor locations

Sensors monitor temperature values at different locations in the PPC700 (inside CPU, CPU board, power supply, slide-in drive 1, slide-in drive 2, I/O). The temperatures[1] 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[2] .

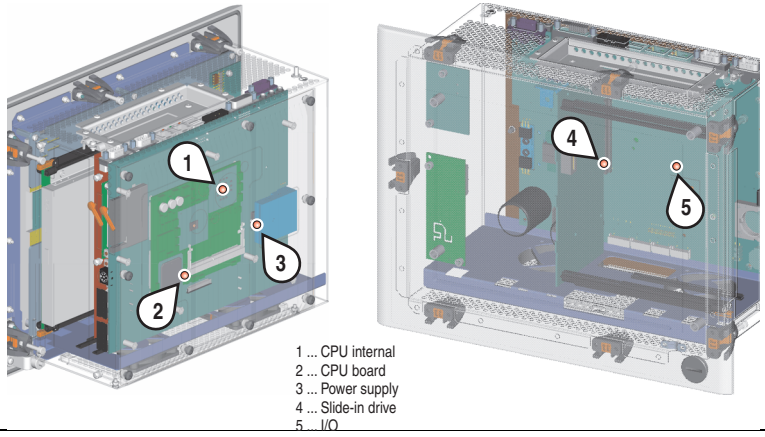


Figure 260: Temperature sensor locations

Position	Measurement point for	Monitoring	Max. specified
1	CPU internal	Processor temperature (sensor integrated on the processor).	90°C
2	CPU board	CPU board temperature (sensor integrated in 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. 85°C Drive dependent

Table 252: 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. Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the main board (part of every system unit) of Automation PC 620 and Panel PC 700 devices.

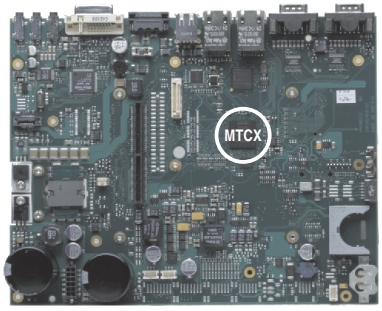


Figure 261: MTCX controller location

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)

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).

2.1 Temperature monitoring - Fan control

The MTCX constantly monitors the temperature using temperature sensors (see section 1 "Temperature sensor locations", on page 453), 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 253: Temperature limits for fan control

The fans stop again when the temperature drops below +37°C.

3. B&R Key Editor

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.

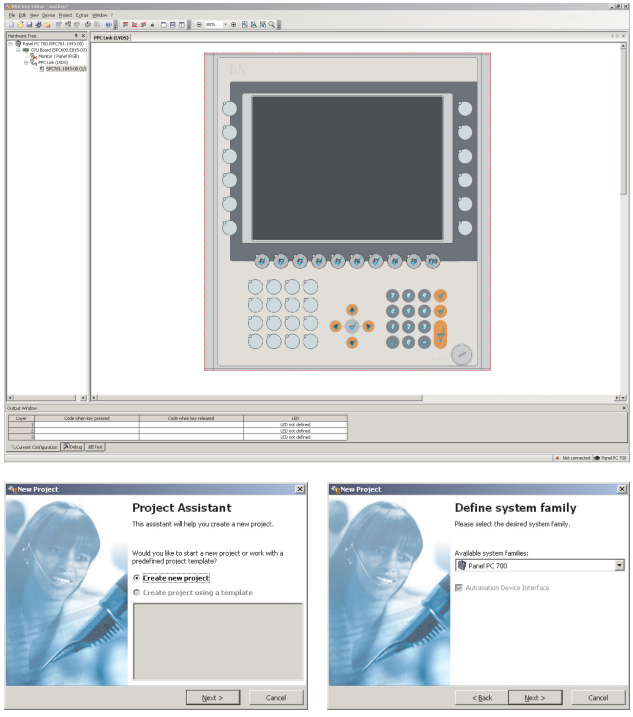


Figure 262: B&R Key Editor screenshots Version 3.10 (representation picture)

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 PCs and Panel PCs devices.

Supports following systems (Version 3.10):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C
- 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
- Power Panel 500 (the Key Editor device file must be downloaded separately from the B&R homepage)

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).

4. B&R Automation Device Interface (ADI) development kit

This software can be used to activate functions of the B&R Automation Device Interface (ADI) from Windows applications, which, for example, were created using the following development tools:

- Microsoft Visual C++ 6.0
- Microsoft Visual Basic 6.0
- Microsoft eMbedded Visual C++ 4.0
- Microsoft Visual Studio 2005 (or newer)

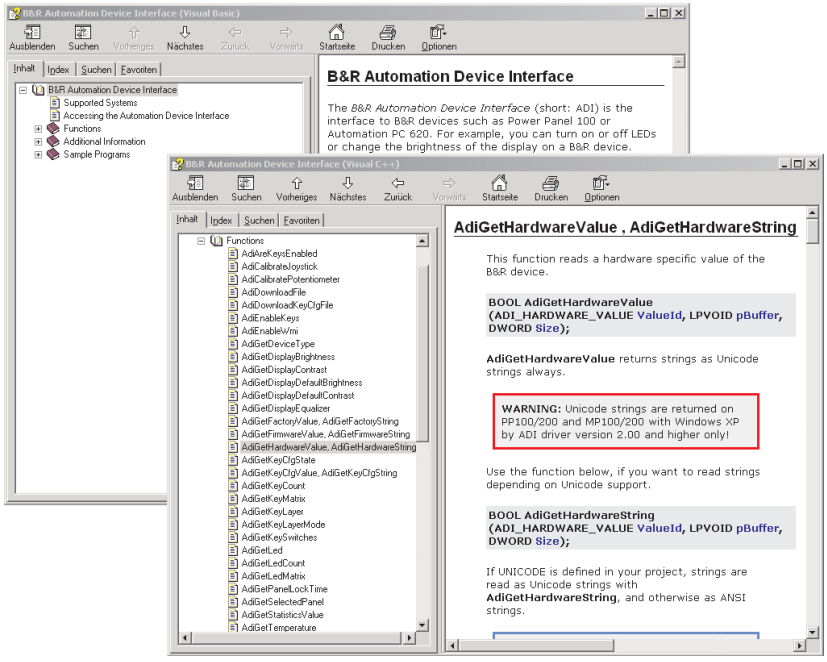


Figure 263: ADI development kit screenshots (Version 3.10)

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 driver is installed).

Supports following systems (Version 3.10 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
- Power Panel 500

The ADI driver suitable for the device must be installed on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

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**).

5. B&R Automation Device Interface (ADI) .NET SDK

This software can be used to activate functions of the B&R Automation Device Interface (ADI) from .NET applications, which were created using Microsoft Visual Studio 2005 (or newer).

Supported programming languages:

- Visual Basic
- Visual C++
- Visual C#
- Visual J#

System requirements:

- Developingsystem: PC with Windows XP/7 with
  - Microsoft Visual Studio 2005 or newer
  - Microsoft .NET Framework 2.0 and / or Microsoft .NET Compact Framework 2.0 or newer
  - Optional for Windows CE Systems: B&R Windows CE SDK

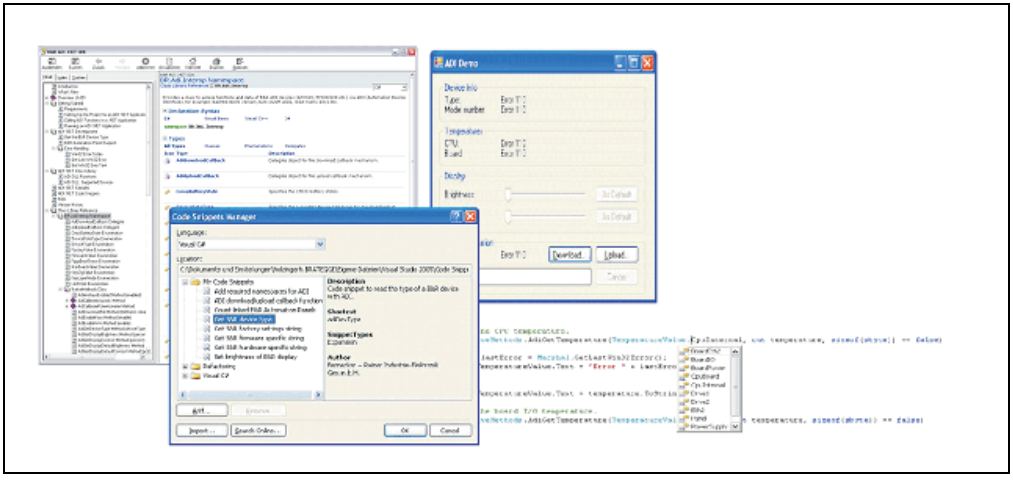


Figure 264: ADI .NET SDK Screenshots (Version 1.30)

Features:

- ADI .NET Class Library.
- Help files in HTML Help 1.0 format (.chm file) and MS Help 2.0 format (.HxS file).
- Sample projects and code snippets for Visual Basic, Visual C++, Visual C# and Visual J#.

- ADI DLL (for testing the applications, if no ADI driver is installed).

Supports following systems (Version 1.30 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 on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

A detailed description of using the ADI functions can be found in the integrated online help.

The ADI .NET SDK can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**).

6. Touch Screen - Elo Accu Touch

Information:

The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device. For the entire device in which this individual component is used, refer to the data given specifically for the entire device.

Elo Accu touch screen	Specifications
Manufacturer	Elo
Accuracy For < 18" diagonals For > 18" diagonals	 Typically < than 0.080 inches (2.032 mm) Maximum error in all directions 0.180 inches (4.752 mm) Maximum 1% of the diagonal for the active area of the touch screens
Response time	< 10 ms
Release pressure	< 113 grams
Resolution	4096 x 4096 touch points
Light permeability	Up to 80% ± 5%
Temperature Operation Storage Transport	 - 10°C to + 50°C - 40°C to + 71°C - 40°C to + 71°C
Relative humidity Operation Storage Transport	 Max. 90% at max. 35°C Max. 90% at max. 35°C for 240 hours, non-condensing Max. 90% at max. 35°C for 240 hours, non-condensing
Waterproofing	IP65
Service life	35 million touch operations on the same point
Chemical resistance [1)]	Acetone, ammonia-based glass cleaner, normal food and drinks, hexane, methylene chloride, methyl ethyl ketone, mineral spirits, turpentine, isopropyl alcohol
Activation	Finger, pointer, credit card, glove
Drivers	Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). Additionally, they can also be found on the B&R HMI Drivers and Utilities DVD (Mod. No. 5SWHMI.0000-00).

Table 254: Technical data - Elo Accu Touch

1) The active area of the touch screen is resistant to these chemicals for a timeframe of one hour at 21°C.

6.1 Temperature humidity diagram

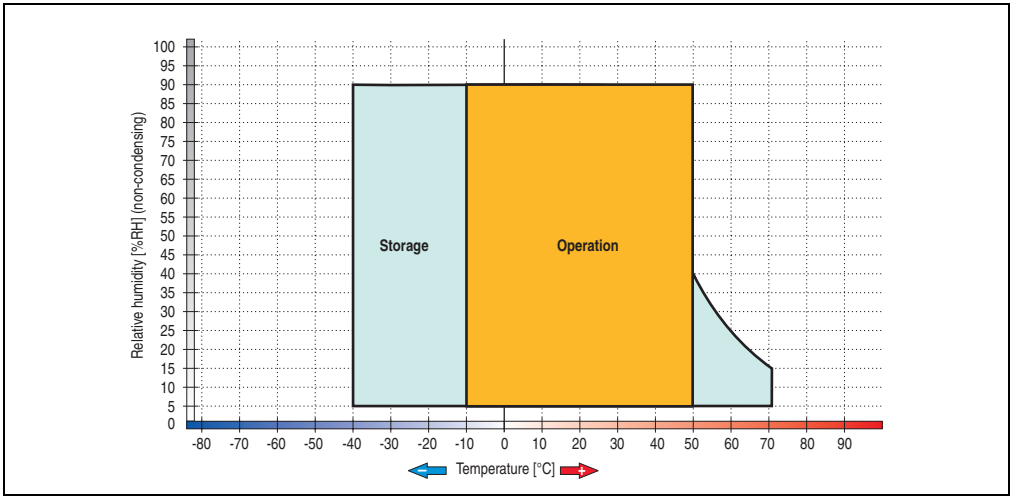


Figure 265: Temperature humidity diagram - Elo Accu touch screen 5-wire

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

6.2 Cleaning

The touch screen should be cleaned with a moist lint-free cloth. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand and not sprayed directly onto the touch screen itself. Never use aggressive solvents, chemicals, or scouring agents.

7. Membrane

The décor foil conforms to DIN 42115 (section 2). This means it is resistant to exposure to the following chemicals for a 24-hour period with no visible signs of damage:

Information:

The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device.

<table>
<tr><td>Ethanol
Cyclohexanol
Diacetone alcohol
Glycol
Isopropanol
Glycerine
Methanol
Triacetin
Dowandol
DRM/PM</td><td>Formaldehyde 37 - 42%
Acetaldehyde
Aliphatic hydrocarbons
Toluene
Xylene
White spirits</td><td>Trichloroethane
Ethyl acetate
Diethyl ether
N-Butyl acetate
Amyl acetate
Butylcellosolve
Ether</td></tr>
<tr><td>Acetone
Methyl ethyl ketone
Dioxan
Cyclohexanone
MIBK
Isophorone</td><td>Formic acid <50%
Acetic acid <50%
Phosphoric acid <30%
Hydrochloric acid <36%
Nitric acid <10%
Trichloracetic acid <50%
Sulphuric acid <10%</td><td rowspan="2">Sodium hypochlorite <20%
Hydrogen peroxide <25%
Potassium carbonate
Washing agents
Tenside
Fabric conditioner
Ferrous chloride (FeCl2)
Ferrous chloride (FeCl3)
Dibutyl phthalate
Dioctyl phthalate
Sodium carbonate</td></tr>
<tr><td>Ammonia <40%
Caustic soda <40%
Potassium hydroxide
Alkali carbonate
Bichromate
Potassium
Acetonitrile
Sodium bisulphate</td><td>Cutting oil
Diesel oil
Linseed oil
Paraffin oil
Blown castor oil
Silicon oil
Turpentine oil substitute
Universal brake fluid
Aviation fuel
Gasoline
Water
Sea water
Decon</td></tr>
</table>

Table 255: Chemical resistance of the décor foil

The décor foil conforms to DIN 42115 section 2 for exposure to glacial acetic acid for less than one hour without visible damage.

8. Viewing angles

The viewing angle information of the display types (R, L, U, D) can be seen in the technical data for the individual components.

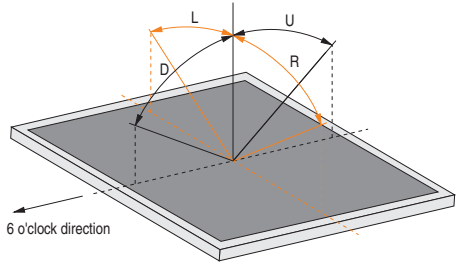


Figure 266: Viewing angle definition

9. 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.

ADI

Abbreviation for »Automation Device Interface« The ADI interface allows access to specific functions (e.g. brightness control, firmware updates, static value read) of B&R devices. The settings can be read or changed in the Control Panel with the B&R Control Center Applet (already included in the B&R embedded operating system).

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 64 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.

Ethernet POWERLINK

An enhancement of standard Ethernet. It enables data exchange under strict real-time conditions with cycle times down to 200 µs and jitter under 1 µs. This makes Ethernet power available on all communication levels of automation technology – from control levels to I/O. Ethernet POWERLINK was initiated by the company B&R Industrie-Elektronik and is now managed by the open end user and vendor association, EPSG - Ethernet POWERLINK Standardization Group (**www.ethernet-powerlink.org**).

F

FDD

Abbreviation for "**F**loppy **D**isk **D**rive". Reading device for removable magnetic memory from the early days of PC technology. Due to their sensitivity and moving components, FDDs have been almost completely replaced by CompactFlash memory in modern automation solutions.

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.

Interface

From the hardware point of view, an interface is the connection point between two modules/devices/systems. The units on both sides of the interface are connected by the interface lines so that data, addresses, and control signals can be exchanged. The term interface includes all functional, electrical and constructive conditions [encoding, signal level, pin assignments] that characterize the connection point between the modules, devices, or systems. Depending on the type of data transfer, a differentiation is made between parallel [e.g. Centronics, IEEE 488] and serial interfaces [e.g. V.24, TTY, RS232, RS422, RS485], which are set up for different transfer speeds and transfer distances. From the point of view of software, the term "interface" describes the transfer point between program modules using specified rules for transferring the program data.

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).

MTC

An abbreviation for "**M**ain**t**enance **C**ontroller". The MTC is an independent processor system that provides additional functions for a B&R industrial PC that are not available with a normal PC. The MTC communicates with the B&R industrial PC via the ISA bus (using a couple register).

MTCX

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

Abbreviation for "**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

See "Ethernet POWERLINK".

PROFIBUS-DP

PROFIBUS for "decentralized peripherals". PROFIBUS DB can be used to allow simple digital and analog I/O modules as well as intelligent signal and data processing units to be installed in the machine room, which among other things can significantly reduce cabling costs. Often used for time-critical factory automation applications.

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; four-line connection [inverted/non-inverted], permissible cable length up to 1200 m, transfer rates up to 10 MBit/s, 1 sender can transfer simplex 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.

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, does not pass them on to all network nodes, instead only to the respective addressee. 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.

Figure 1: Typical topologies ... 33
Figure 2: Configuration - Basic system ... 38
Figure 3: Configuration of optional components ... 39
Figure 4: Example of worst-case conditions for temperature measurement ... 41
Figure 5: Ambient temperatures for 5PC720.1043-00 with an X945 CPU board ... 42
Figure 6: Ambient temperatures for 5PC720.1043-01 with an X945 CPU board ... 43
Figure 7: Ambient temperatures for 5PC720.1214-00 with an X945 CPU board ... 44
Figure 8: Ambient temperatures for 5PC720.1214-01 with an X945 CPU board ... 45
Figure 9: Ambient temperatures for 5PC720.1505-00 with an X945 CPU board ... 46
Figure 10: Ambient temperatures for 5PC720.1505-01 with an X945 CPU board ... 47
Figure 11: Ambient temperatures for 5PC720.1505-02 with an X945 CPU board ... 48
Figure 12: Ambient temperatures for 5PC720.1706-00 with an X945 CPU board ... 49
Figure 13: Ambient temperatures for 5PC720.1906-00 with an X945 CPU board ... 50
Figure 14: Ambient temperatures for 5PC781.1043-00 with an X945 CPU board ... 51
Figure 15: Ambient temperatures for 5PC781.1505-00 with an X945 CPU board ... 52
Figure 16: Ambient temperatures for 5PC782.1043-00 with an X945 CPU board ... 53
Figure 17: Block diagram - supply voltage ... 56
Figure 18: Power calculation for 10.4" Panel PC 700 system units ... 57
Figure 19: Power calculation for 12.1" Panel PC 700 system units ... 58
Figure 20: Power calculation for 15" Panel PC 700 ... 59
Figure 21: Power calculation for 17" Panel PC 700 ... 60
Figure 22: Power calculation for 19" Panel PC 700 ... 61
Figure 23: Block diagram - supply voltage ... 62
Figure 24: Power management - 10.4" Panel PC 700 ... 64
Figure 25: Power management - 12.1" Panel PC 700 ... 65
Figure 26: Power management - 15" Panel PC 700 ... 66
Figure 27: Power management - 17" Panel PC 700 ... 67
Figure 28: Power management - 19" Panel PC 700 ... 68
Figure 29: Supply voltage connection ... 76
Figure 30: Ground connection ... 77
Figure 31: Monitor / Panel interface ... 78
Figure 32: Dimensions - Standard half-size PCI cards ... 81
Figure 33: PCI connector type: 5 volt ... 82
Figure 34: Serial number sticker for PPC700 assembly (back) ... 91
Figure 35: Serial number stickers for individual PPC700 components ... 91
Figure 36: Example of serial number search: 72580168752 ... 92
Figure 37: Front view 5PC720.1043-00 ... 93
Figure 38: Rear view 5PC720.1043-00 ... 93
Figure 39: Dimensions - 5PC720.1043-00 ... 94
Figure 40: Cutout installation - 5PC720.1043-00 ... 98
Figure 41: Front view 5PC720.1043-01 ... 99
Figure 42: Rear view 5PC720.1043-01 ... 99
Figure 43: Dimensions - 5PC720.1043-01 ... 100
Figure 44: Cutout installation - 5PC720.1043-01 ... 104
Figure 45: Front view 5PC720.1214-00 ... 105
Figure 46: Rear view 5PC720.1214-00 ... 105
Figure 47: Dimensions - 5PC720.1214-00 ... 106

Figure 48: Cutout installation - 5PC720.1214-00 ... 110
Figure 49: Front view 5PC720.1214-01 ... 111
Figure 50: Rear view - 5PC720.1214-01 ... 111
Figure 51: Dimensions - 5PC720.1214-01 ... 112
Figure 52: Cutout installation - 5PC720.1214-01 ... 116
Figure 53: Front view 5PC720.1505-00 ... 117
Figure 54: Rear view 5PC720.1505-00 ... 117
Figure 55: Dimensions - 5PC720.1505-00 ... 118
Figure 56: Cutout installation - 5PC720.1505-00 ... 122
Figure 57: Front view 5PC720.1505-01 ... 123
Figure 58: Rear view 5PC720.1505-01 ... 123
Figure 59: Dimensions - 5PC720.1505-01 ... 124
Figure 60: Cutout installation - 5PC720.1505-01 ... 128
Figure 61: Front view 5PC720.1505-02 ... 129
Figure 62: Rear view 5PC720.1505-02 ... 129
Figure 63: Dimensions - 5PC720.1505-02 ... 130
Figure 64: Cutout installation - 5PC720.1505-02 ... 134
Figure 65: Front view 5PC720.1706-00 ... 135
Figure 66: Rear view 5PC720.1706-00 ... 135
Figure 67: Dimensions - 5PC720.1706-00 ... 136
Figure 68: Cutout installation - 5PC720.1706-00 ... 140
Figure 69: Front view 5PC720.1906-00 ... 141
Figure 70: Rear view 5PC720.1906-00 ... 141
Figure 71: Dimensions - 5PC720.1906-00 ... 142
Figure 72: Cutout installation - 5PC720.1906-00 ... 146
Figure 73: Front view 5PC781.1043-00 ... 147
Figure 74: Rear view 5PC781.1043-00 ... 147
Figure 75: Dimensions - 5PC781.1043-00 ... 148
Figure 76: Cutout installation - 5PC781.1043-00 ... 152
Figure 77: Front view 5PC781.1505-00 ... 153
Figure 78: Rear view 5PC781.1505-00 ... 153
Figure 79: Dimensions - 5PC781.1505-00 ... 154
Figure 80: Cutout installation - 5PC781.1505-00 ... 158
Figure 81: Front view 5PC782.1043-00 ... 159
Figure 82: Rear view 5PC782.1043-00 ... 159
Figure 83: Dimensions - 5PC782.1043-00 ... 160
Figure 84: Cutout installation - 5PC782.1043-00 ... 164
Figure 85: X945 CPU board ... 165
Figure 86: Heat sink ... 167
Figure 87: Main memory module ... 168
Figure 88: Add-on hard disk 40 GB - 5AC600.HDDI-05 ... 169
Figure 89: Temperature humidity diagram - Add-on hard disk 5AC600.HDDI-05 ... 171
Figure 90: Add-on hard disk 80 GB - 5AC600.HDDI-06 ... 172
Figure 91: Temperature humidity diagram - Add-on hard disk 5AC600.HDDI-06 ... 174
Figure 92: Add-on CompactFlash slot - 5AC600.CFSI-00 ... 175
Figure 93: Slide-in USB FDD - 5AC600.FDDS-00 ... 176
Figure 94: Temperature humidity diagram - Slide-in USB diskette drive 5AC600.FDDS-00

178
Figure 95: RAID 1 system schematic 179
Figure 96: PCI SATA RAID controller - 5ACPCI.RAIC-03..... 180
Figure 97: Temperature humidity diagram - SATA RAID hard disk 5ACPCI.RAIC-03.. 182
Figure 98: Replacement SATA HDD 160 GB - 5ACPCI.RAIC-04..... 185
Figure 99: Temperature humidity diagram - SATA RAID hard disk 5ACPCI.RAIC-04.. 187
Figure 100: PCI SATA RAID controller - 5ACPCI.RAIC-05..... 188
Figure 101: Temperature humidity diagram - SATA RAID Hard Disk - 5ACPCI.RAIC-05 190
Figure 102: Replacement SATA HDD 250 GB - 5MMHDD.0250-00..... 192
Figure 103: Temperature humidity diagram - SATA RAID hard disk - 5MMHDD.0250-00 194
Figure 104: Terminating resistor - Add-on CAN interface 5AC600.CANI-00..... 198
Figure 105: Contents of the delivery / mounting material - 5AC600.CANI-00..... 198
Figure 106: Add-on RS232/422/485 interface - operated in RS485 mode..... 201
Figure 107: Contents of the delivery / mounting material 5AC600.485I-00..... 203
Figure 108: Fan kit 5PC700.FA00-01..... 204
Figure 109: Fan kit 5PC700.FA02-00..... 205
Figure 110: Fan kit 5PC700.FA02-01..... 207
Figure 111: Terminal block..... 209
Figure 112: Spaces for air circulation..... 211
Figure 113: Flex radius - Cable connection..... 213
Figure 114: Grounding concept..... 214
Figure 115: Configuration - An analog CRT device on the monitor/panel connector 217
Figure 116: Local connection of USB peripheral devices on the PPC 700 218
Figure 117: Open the RAID Configuration Utility..... 219
Figure 118: RAID Configuration Utility - Menu 219
Figure 119: RAID Configuration Utility - Menu 220
Figure 120: RAID Configuration Utility - Create RAID set - Striped..... 221
Figure 121: RAID Configuration Utility - Create RAID set - Mirrored..... 222
Figure 122: RAID Configuration Utility - Delete RAID set..... 223
Figure 123: RAID Configuration Utility - Rebuild mirrored set..... 224
Figure 124: RAID Configuration Utility - Resolve conflicts 225
Figure 125: RAID Configuration Utility - Low level format 226
Figure 126: Example - Hardware number in the B&R Key Editor or in the B&R Control Center 227
Figure 127: Display - Keys and LEDs in the matrix..... 227
Figure 128: Hardware numbers - 5PC781.1043-00 228
Figure 129: Hardware numbers - 5PC782.1043-00 229
Figure 130: Hardware numbers - 5PC781.1505-00 230
Figure 131: X945 - BIOS diagnostics screen 236
Figure 132: X945 BIOS Main Menu..... 238
Figure 133: X945 Advanced Menu..... 239
Figure 134: X945 Advanced ACPI configuration..... 240
Figure 135: X945 Advanced PCI Configuration..... 242
Figure 136: X945 Advanced PCI IRQ Resource Exclusion..... 243
Figure 137: X945 Advanced PCI Interrupt Routing 244

Figure 138: X945 Advanced Graphics configuration ... 246
Figure 139: X945 Advanced CPU Configuration ... 248
Figure 140: X945 Advanced Chipset Configuration ... 250
Figure 141: X945 Advanced I/O Interface Configuration ... 252
Figure 142: X945 Advanced Clock Configuration ... 253
Figure 143: X945 Advanced IDE Configuration ... 254
Figure 144: X945 Primary IDE Master ... 256
Figure 145: X945 Primary IDE Slave ... 258
Figure 146: X945 Advanced USB Configuration ... 260
Figure 147: X945 Advanced Keyboard/Mouse Configuration ... 262
Figure 148: X945 Advanced Remote Access Configuration ... 263
Figure 149: X945 Advanced CPU board monitor ... 265
Figure 150: X945 Advanced Baseboard/Panel Features ... 266
Figure 151: X945 Panel Control ... 268
Figure 152: X945 Baseboard Monitor ... 269
Figure 153: X945 Legacy Devices ... 270
Figure 154: X945 Boot Menu ... 271
Figure 155: X945 Security Menu ... 273
Figure 156: X945 Hard Disk Security User Password ... 274
Figure 157: X945 Hard Disk Security Master Password ... 275
Figure 158: X945 Power Menu ... 276
Figure 159: X945 Exit Menu ... 278
Figure 160: CMOS profile hex switch ... 279
Figure 161: PCI Routing with activated APIC CPU board X945 ... 295
Figure 162: Software versions ... 298
Figure 163: Firmware version of Automation Panel Link SDL transceiver/receiver ... 299
Figure 164: Creating a bootable diskette in Windows XP - step 1 ... 307
Figure 165: Creating a bootable diskette in Windows XP - step 2 ... 307
Figure 166: Creating a bootable diskette in Windows XP - step 3 ... 307
Figure 167: Creating a bootable diskette in Windows XP - step 4 ... 308
Figure 168: Creating a bootable diskette in Windows XP - step 5 ... 308
Figure 169: Creating a USB flash drive for B&R upgrade files ... 310
Figure 170: Creating a CompactFlash card for B&R upgrade files ... 312
Figure 171: Windows XP Professional Logo ... 314
Figure 172: Windows 7 Logo ... 316
Figure 173: Windows XP Embedded Logo ... 318
Figure 174: Windows Embedded Standard 2009 Logo ... 320
Figure 175: Windows Embedded Standard 7 Logo ... 323
Figure 176: ADI Control Center screenshots - Examples (symbol photo) ... 328
Figure 177: ADI Control Center - SDL equalizer settings ... 331
Figure 178: Test structure - torsion ... 352
Figure 179: Test structure - Cable drag chain ... 353
Figure 180: B&R power supplies (examples) ... 363
Figure 181: Block diagram of the UPS ... 365
Figure 182: Interface cover - contents of delivery ... 367
Figure 183: Front side USB port cap - installation ... 369
Figure 184: USB port cap (attached) - Height ... 370

Figure 185: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-04 ... 374
Figure 186: Dimensions - CompactFlash card Type I ... 374
Figure 187: ATTO disk benchmark v2.34 comparison (reading) ... 375
Figure 188: ATTO disk benchmark v2.34 comparison (writing) ... 375
Figure 189: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03 ... 378
Figure 190: Dimensions - CompactFlash card Type I ... 379
Figure 191: USB Media Drive - 5MD900.USB2-01 ... 380
Figure 192: Dimensions - 5MD900.USB2-01 ... 383
Figure 193: Dimensions - USB Media Drive with front cover ... 384
Figure 194: Installation cutout - USB Media Drive with front cover ... 384
Figure 195: Interfaces - 5MD900.USB2-01 ... 385
Figure 196: Mounting orientation - 5MD900.USB2-01 ... 385
Figure 197: Front cover 5A5003.03 ... 386
Figure 198: Dimensions - 5A5003.03 ... 386
Figure 199: Front cover mounting and installation depth ... 387
Figure 200: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00 ... 390
Figure 201: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-01 ... 392
Figure 202: HMI Drivers & Utilities DVD 5SWHMI.0000-00 ... 393
Figure 203: DVI extension cable - 5CADVI.0xxx-00 (similar) ... 398
Figure 204: Flex radius specification ... 399
Figure 205: Dimensions - DVI cable 5CADVI.0xxx-00 ... 400
Figure 206: Pin assignments - DVI cable ... 401
Figure 207: SDL cable 5CASDL.0xxx-00 (similar) ... 402
Figure 208: Flex radius specification ... 403
Figure 209: Dimensions - SDL cable 5CASDL.0xxx-00 ... 404
Figure 210: Pin assignments - SDL cable 5CASDL.0xxx-00 ... 405
Figure 211: SDL cable with 45° plug (similar) ... 406
Figure 212: Flex radius specification ... 407
Figure 213: Dimensions - SDL cable with 45° plug 5CASDL.0xxx-01 ... 408
Figure 214: Pin assignments - SDL cable with 45° plug 5CASDL.0xxx-01 ... 409
Figure 215: SDL cable 5CASDL.0xxx-03 (similar) ... 410
Figure 216: Flex radius specification ... 412
Figure 217: Dimensions - SDL cable 5CASDL.0xxx-03 ... 412
Figure 218: Pin assignments - SDL cable 5CASDL.0xxx-03 ... 414
Figure 219: SDL flex cable with extender - 5CASDL.0xx0-13 (similar) ... 415
Figure 220: Flex radius specification ... 417
Figure 221: Dimensions - SDL flex cable with extender 5CASDL.0xx0-13 ... 417
Figure 222: Example of the signal direction for the SDL flex cable with extender - APC620 . 418
Figure 223: Example of signal direction for the SDL flex cable with extender - PPC700 418
Figure 224: Example of signal direction display - SDL flex cable with extender ... 418
Figure 225: Pin assignments - SDL flex cable with extender 5CASDL.0xx0-13 ... 419
Figure 226: RS232 extension cable (similar) ... 420
Figure 227: Pin assignments - RS232 cable ... 421
Figure 228: USB extension cable (similar) ... 422
Figure 229: Pin assignments - USB cable ... 423
Figure 230: Legend strip templates ... 424

Figure 231: Replacement fan ... 426
Figure 232: SRAM module - 5AC600.SRAM-00 ... 427
Figure 233: SRAM module installation ... 429
Figure 234: PCI Ethernet card 10/100 - 5ACPCI.ETH1-01 ... 430
Figure 235: Dimensions - 5ACPCI.ETH1-01 ... 431
Figure 236: PCI Ethernet card 10/100 - 5ACPCI.ETH3-01 ... 432
Figure 237: Dimensions - 5ACPCI.ETH3-01 ... 433
Figure 238: Battery removal ... 436
Figure 239: Battery handling ... 437
Figure 240: Battery polarity ... 437
Figure 241: Removing the fan kit cover ... 438
Figure 242: Marking for direction of airflow / fan rotation ... 438
Figure 243: Fan Installation ... 439
Figure 244: Removing the cover ... 439
Figure 245: Fan cable connection on the main board ... 440
Figure 246: Removing the fan kit cover ... 441
Figure 247: Marking for direction of airflow / fan rotation ... 441
Figure 248: Fan Installation ... 442
Figure 249: Removing the side cover ... 443
Figure 250: Fan cable connection on the main board ... 443
Figure 251: Example - Side cover removal on the system unit 5PC720.1505-02 ... 444
Figure 252: Removing the slide-in dummy module ... 445
Figure 253: Installing the slide-in drive ... 445
Figure 254: Example - Side cover removal on the system unit 5PC720.1505-02 ... 446
Figure 255: Release the slide-in slot releasing mechanisms ... 446
Figure 256: Installing the slide-in drive ... 447
Figure 257: Exchange legend strips ... 448
Figure 258: Screw assignment on the back side of the SATA RAID controller ... 450
Figure 259: Hard disk exchange ... 451
Figure 260: Temperature sensor locations ... 453
Figure 261: MTCX controller location ... 454
Figure 262: B&R Key Editor screenshots Version 3.10 (representation picture) ... 456
Figure 263: ADI development kit screenshots (Version 3.10) ... 458
Figure 264: ADI .NET SDK Screenshots (Version 1.30) ... 460
Figure 265: Temperature humidity diagram - Elo Accu touch screen 5-wire ... 463
Figure 266: Viewing angle definition ... 465

Table 1: Manual history ... 17
Table 2: Environmentally-friendly separation of materials ... 22
Table 3: Organization of safety notices ... 23
Table 4: Model numbers - system units ... 24
Table 5: Model numbers - X945 CPU boards ... 25
Table 6: Model numbers - Heat sinks ... 25
Table 7: Model numbers - Main memory ... 25
Table 8: Model numbers - Drives ... 26
Table 9: Model numbers - Interfaces ... 26
Table 10: Model numbers - Fan kits ... 26
Table 11: Model numbers - Batteries ... 27
Table 12: Model numbers - Supply voltage connectors ... 27
Table 13: Model numbers - CompactFlash cards ... 27
Table 14: Model numbers - USB flash drives ... 28
Table 15: Model numbers - Cables ... 28
Table 16: Model numbers - Power supplies ... 29
Table 17: Model numbers for Ethernet PCI interface cards ... 30
Table 18: Model numbers - Other items ... 31
Table 19: Model numbers - Software ... 31
Table 20: Overview of humidity specifications for individual components ... 55
Table 21: Revision dependent block diagram ... 56
Table 22: Revision dependent 10.4" Panel PC 700 ... 57
Table 23: Revision dependent 12.1" Panel PC 700 ... 58
Table 24: Revision dependent 15" Panel PC 700 ... 59
Table 25: Revision dependent 17" Panel PC 700 ... 60
Table 26: Revision dependent 19" Panel PC 700 ... 61
Table 27: Revision dependent block diagram ... 62
Table 28: Pin assignments - COM1 ... 70
Table 29: COM1 - I/O address and IRQ ... 70
Table 30: Pin assignments - COM2 ... 71
Table 31: COM2 - I/O address and IRQ ... 71
Table 32: Ethernet connection (ETH1) ... 72
Table 33: Ethernet cable lengths when using X945 CPU boards ... 73
Table 34: Ethernet connection (ETH2) ... 74
Table 35: USB port - back ... 75
Table 36: Power supply ... 76
Table 37: MIC, Line IN and Line OUT ports ... 79
Table 38: Add-on interface slot ... 80
Table 39: Technical data - PCI bus ... 81
Table 40: Status LEDs ... 82
Table 41: CompactFlash slot (CF1) ... 83
Table 42: Hard disk / CompactFlash slot (HDD/CF2) ... 84
Table 43: Power button ... 85
Table 44: Reset button ... 85
Table 45: Connection for external keyboard/mouse (PS/2) ... 86
Table 46: Battery ... 87
Table 47: Meaning of battery status ... 87

Table 48: Hardware security key ... 89
Table 49: Hardware security key - I/O address and IRQ ... 89
Table 50: Slide-in slot 1 ... 90
Table 51: Technical data - 5PC720.1043-00 ... 95
Table 52: Technical data - 5PC720.1043-01 ... 101
Table 53: Technical data - 5PC720.1214-00 ... 106
Table 54: Technical data - 5PC720.1214-01 ... 113
Table 55: Technical data - 5PC720.1505-00 ... 119
Table 56: Technical data - 5PC720.1505-01 ... 125
Table 57: Technical data - 5PC720.1505-02 ... 131
Table 58: Technical data - 5PC720.1706-00 ... 137
Table 59: Technical data - 5PC720.1906-00 ... 143
Table 60: Technical data - 5PC781.1043-00 ... 149
Table 61: Technical data - 5PC781.1505-00 ... 155
Table 62: Technical data - 5PC782.1043-00 ... 161
Table 63: Technical data - CPU board X945 ... 165
Table 64: Technical data - Heat sink ... 167
Table 65: Technical data - Main memory ... 168
Table 66: Technical data - Add-on hard disk 5AC600.HDDI-05 ... 169
Table 67: Technical data - add-on hard disk - 5AC600.HDDI-06 ... 172
Table 68: Technical data - Add-on CompactFlash slot 5AC600.CFSI-00 ... 175
Table 69: Technical data - Slide-in USB diskette drive - 5AC600.FDDS-00 ... 177
Table 70: Technical data - RAID hard disk - 5ACPCI.RAIC-03 ... 181
Table 71: Technical data - RAID hard disk - 5ACPCI.RAIC-04 ... 185
Table 72: Technical data - RAID Hard Disk - 5ACPCI.RAIC-05 ... 189
Table 73: Technical data - RAID hard disk - 5MMHDD.0250-00 ... 192
Table 74: Add-on CAN interface - 5AC600.CANI-00 ... 195
Table 75: Technical data - Add-on CAN interface - 5AC600.CANI-00 ... 195
Table 76: Pin assignments - CAN ... 196
Table 77: Add-on CAN - I/O Adresse und IRQ ... 196
Table 78: CAN address register ... 196
Table 79: Bus length and transfer rate - CAN ... 197
Table 80: CAN cable requirements ... 197
Table 81: Add-on RS232/422/485 interface - 5AC600.485I-00 ... 199
Table 82: Pin assignments - RS232/RS422 ... 199
Table 83: Add-on RS232/422/485 - I/O address and IRQ ... 200
Table 84: RS232 - Bus length and transfer rate ... 200
Table 85: RS232 - Cable requirements ... 200
Table 86: RS422 - Bus length and transfer rate ... 201
Table 87: RS422 - Cable requirements ... 201
Table 88: RS485 - Bus length and transfer rate ... 202
Table 89: RS485 - Cable requirements ... 202
Table 90: Technical data - 5PC700.FA00-01 ... 204
Table 91: Technical data - 5PC700.FA02-00 ... 206
Table 92: Technical data - 5PC700.FA02-01 ... 207
Table 93: Mounting orientation ... 212
Table 94: Possible combinations of system unit and CPU board ... 217

Table 95: BIOS-relevant keys in the RAID Configuration Utility 219
Table 96: X945 bios-relevant keys at POST 236
Table 97: X945 bios-relevant keys in the BIOS menu 237
Table 98: X945 - Overview of BIOS menu items 237
Table 99: X945 Main Menu setting options 238
Table 100: X945 Advanced Menu setting options 239
Table 101: X945 Advanced ACPI configuration setting options 241
Table 102: X945 Advanced PCI configuration setting options 242
Table 103: X945 Advanced PCI IRQ Resource Exclusion setting options 243
Table 104: X945 Advanced PCI Interrupt Routing setting options 244
Table 105: X945 Advanced Graphics configuration setting options 246
Table 106: X945 Advanced CPU Configuration setting options 248
Table 107: X945 Advanced Chipset setting options 250
Table 108: X945 Advanced I/O Interface Configuration setting options 252
Table 109: X945 Advanced Clock Configuration setting options 253
Table 110: X945 Advanced IDE Configuration setting options 254
Table 111: X945 Primary IDE Master setting options 256
Table 112: X945 Primary IDE Slave setting options 258
Table 113: X945 Advanced USB Configuration setting options 260
Table 114: X945 Advanced Keyboard/Mouse Configuration setting options 262
Table 115: X945 Advanced Remote Access Configuration setting options 263
Table 116: X945 Advanced Remote Access Configuration setting options 265
Table 117: X945 Advanced Baseboard/Panel Features setting options 266
Table 118: X945 Panel Control setting options 268
Table 119: X945 Baseboard Monitor setting options 269
Table 120: X945 Legacy Devices setting options 270
Table 121: X945 Boot Menu setting options 272
Table 122: X945 Security Menu setting options 273
Table 123: X945 Hard Disk Security User Password 275
Table 124: X945 Hard Disk Security Master Password 275
Table 125: X945 Power Menu setting options 276
Table 126: X945 Exit Menu setting options 278
Table 127: Profile overview 279
Table 128: X945 - Main profile setting overview 280
Table 129: X945 Advanced - ACPI Configuration profile setting overview 280
Table 130: X945 Advanced - PCI Configuration Profile setting overview 281
Table 131: X945 Advanced - Graphics Configuration Profile setting overview 282
Table 132: X945 Advanced - CPU Configuration Profile setting overview 282
Table 133: X945 Advanced - Chipset Configuration Profile setting overview 283
Table 134: X945 Advanced - I/O Interface Configuration profile setting overview 283
Table 135: X945 Advanced - Clock Configuration Profile setting overview 283
Table 136: X945 Advanced - IDE Configuration Profile setting overview 283
Table 137: X945 Advanced - USB Configuration Profile setting overview 284
Table 138: X945 Advanced Keyboard/Mouse Configuration profile setting overview 285
Table 139: X945 Advanced Remote Access Configuration profile setting overview 285
Table 140: X945 Advanced CPU board monitor profile setting overview 285
Table 141: X945 Advanced - Baseboard/Panel Features profile setting overview 286

Table 142: X945 Boot profile setting overview 287
Table 143: X945 Security profile setting overview 288
Table 144: X945 Power profile setting overview 288
Table 145: BIOS post code messages BIOS X945 290
Table 146: RAM address assignment 291
Table 147: DMA channel assignment 291
Table 148: I/O address assignment 292
Table 149: IRQ interrupt assignments in PCI mode 293
Table 150: IRQ interrupt assignments in APIC mode 294
Table 151: Inter-IC (I^2C) bus resources 295
Table 152: Inter-IC (I^2C) bus resources 296
Table 153: Model numbers - Windows XP Professional 314
Table 154: Model numbers - Windows 7 316
Table 155: Model numbers - Windows XP Embedded 318
Table 156: Device functions in Windows XP embedded with FP2007 318
Table 157: Model numbers - Windows Embedded Standard 2009 320
Table 158: Device functions in Windows Embedded Standard 2009 321
Table 159: Model numbers - Windows Embedded Standard 2009 323
Table 160: Device functions in Windows Embedded Standard 7 324
Table 161: Model numbers - Windows CE 326
Table 162: Windows CE 6.0 features 326
Table 163: Overview of standards 333
Table 164: Overview of limits and testing guidelines for emissions 335
Table 165: Test requirements - Network-related emissions for industrial areas 336
Table 166: : Test requirements - Electromagnetic emissions for industrial areas 337
Table 167: Overview of limits and testing guidelines for immunity 338
Table 168: Test requirements - Electrostatic discharge (ESD) 339
Table 169: Test requirements - High-frequency electromagnetic fields (HF field) 339
Table 170: Test requirements - High-speed transient electrical disturbances (burst) 340
Table 171: Test requirements - Surge voltages 340
Table 172: Test requirements - Conducted disturbances 340
Table 173: Test requirements - Magnetic fields with electrical frequencies 341
Table 174: Test requirements - Voltage dips, fluctuations, and short-term interruptions 342
Table 175: Test requirements - Damped vibration 342
Table 176: Overview of limits and testing guidelines for vibration 343
Table 177: Test requirements - Vibration during operation 343
Table 178: Test requirements - Vibration during transport (packaged) 344
Table 179: Test requirements - Shock during operation 344
Table 180: Test requirements - Shock during transport 344
Table 181: Test requirements - Toppling 344
Table 182: Test requirements - Toppling 345
Table 183: Overview of limits and testing guidelines for temperature and humidity 346
Table 184: Test requirements - Worst case during operation 346
Table 185: Test requirements - Dry heat 346
Table 186: Test requirements - Dry cold 346
Table 187: Test requirements - Large temperature fluctuations 347
Table 188: Test requirements - Temperature fluctuations during operation 347

Table 189: Test requirements - Humid heat, cyclic ... 347
Table 190: Test requirements - Humid heat, constant (storage) ... 347
Table 191: Overview of limits and testing guidelines for safety ... 348
Table 192: Test requirements - Ground resistance ... 348
Table 193: Test requirements - Insulation resistance ... 348
Table 194: Test requirements - High voltage ... 349
Table 195: Test requirements - Residual voltage ... 349
Table 196: Test requirements - Overload ... 349
Table 197: Test requirements - Defective component ... 350
Table 198: Test requirements - Voltage range ... 350
Table 199: Overview of limits and testing guidelines for other tests ... 351
Table 200: Test requirements - Protection ... 351
Table 201: International certifications ... 354
Table 202: Model numbers - Accessories ... 355
Table 203: Order data - Lithium batteries ... 360
Table 204: Technical data - Lithium batteries ... 360
Table 205: Order data - TB103 ... 361
Table 206: TB103 Technical data ... 361
Table 207: Single-phase power supplies ... 364
Table 208: Three-phase power supplies ... 364
Table 209: UPS - Order data ... 366
Table 210: Order data - PPC700 interface cover ... 367
Table 211: Order data - DVI - CRT adapter ... 368
Table 212: Order data - USB port cap (attached) ... 369
Table 213: Order data - USB port cap (attached) ... 370
Table 214: Order data - CompactFlash cards ... 371
Table 215: Technical data - CompactFlash cards 5CFCRD.xxxx-04 ... 372
Table 216: Order data - CompactFlash cards ... 376
Table 217: Technical data - CompactFlash cards 5CFCRD.xxxx-03 ... 377
Table 218: Technical data - USB Media Drive 5MD900.USB2-01 ... 381
Table 219: Contents of delivery - USB Media Drive - 5MD900.USB2-01 ... 385
Table 220: Technical data - 5A5003.03 ... 386
Table 221: Order data - USB flash drives ... 388
Table 222: Technical data - USB flash drive 5MMUSB.2048-00 ... 389
Table 223: Technical data - USB flash drive 5MMUSB.2048-01 ... 391
Table 224: Model number - HMI Drivers & Utilities DVD ... 393
Table 225: Model numbers - DVI cables ... 398
Table 226: Technical data - DVI cable 5CADVI.0xxx-00 ... 399
Table 227: Contents of delivery - DVI cable 5CADVI.0xxx-00 ... 400
Table 228: Model numbers - SDL cables ... 402
Table 229: Technical data - SDL cables 5CASDL.0xxx-00 ... 403
Table 230: Contents of delivery - SDL cable 5CASDL.0xxx-00 ... 404
Table 231: Model numbers - SDL cables with 45° plug ... 406
Table 232: Technical data - SDL cable with 45° plug 5CASDL.0xxx-01 ... 407
Table 233: Contents of delivery - SDL cable with 45° plug 5CASDL.0xxx-01 ... 408
Table 234: Model numbers - SDL cable 5CASDL.0xxx-03 ... 410
Table 235: Technical data - SDL cable 5CASDL.0xxx-03 ... 411

Table 236: Contents of delivery - SDL flex cable 5CASDL.0xxx-03 413
Table 237: Structure - SDL cable 5CASDL.0xxx-03 413
Table 238: Model numbers - SDL flex cable with extender 5CASDL.0xx0-13 415
Table 239: Technical data - SDL flex cable with extender 5CASDL.0xx0-13 416
Table 240: Contents of delivery - SDL flex cable with extender 5CASDL.0xx0-13 417
Table 241: Model numbers - RS232 cables 420
Table 242: Technical data - RS232 cables 420
Table 243: Contents of delivery - RS232 cables 9A0014.xx 420
Table 244: Model numbers - USB cables 422
Table 245: Technical data - USB cables 422
Table 246: Contents of delivery - USB cable 422
Table 247: Order data - Legend strip templates 425
Table 248: Technical data - 5AC600.SRAM-00 427
Table 249: Ethernet connection ETH 430
Table 250: Ethernet connections ETH1, ETH2, ETH3 432
Table 251: Meaning of battery status OK - Bad 435
Table 252: Temperature sensor locations 453
Table 253: Temperature limits for fan control 455
Table 254: Technical data - Elo Accu Touch 462
Table 255: Chemical resistance of the décor foil 464

0

0AC201.91 ..... 27, 87, 355, 360
0PS102.0 ..... 29, 355, 364
0PS104.0 ..... 29, 355, 364
0PS105.1 ..... 29, 355, 364
0PS105.2 ..... 30, 355, 364
0PS110.1 ..... 30, 355, 364
0PS110.2 ..... 30, 355, 364
0PS120.1 ..... 30, 355, 364
0PS305.1 ..... 30, 355, 364
0PS310.1 ..... 30, 355, 364
0PS320.1 ..... 30, 355, 364
0PS340.1 ..... 30, 356, 364
0TB103.9 ..... 27, 355, 361
0TB103.91 ..... 27, 355, 361

4

4A0006.00-000 ..... 27, 87, 355, 356, 360

5

5A5003.03 ..... 31, 356, 386
5AC600.485I-00 ..... 26, 199
5AC600.CANI-00 ..... 26, 195
5AC600.CFSI-00 ..... 26, 84, 175
5AC600.FDDS-00 ..... 26, 90, 177
5AC600.HDDI-05 ..... 26, 84, 169
5AC600.HDDI-06 ..... 26, 84, 172
5AC600.ICOV-00 ..... 31, 356, 367
5AC600.SRAM-00 ..... 31, 357
5AC700.FA00-00 ..... 31, 358, 426
5AC700.FA02-00 ..... 31, 358
5AC700.HS01-03 ..... 25, 167
5AC900.1000-00 ..... 31, 356, 368
5AC900.104X-00 ..... 31, 356, 425
5AC900.104X-01 ..... 31, 356, 425
5AC900.1200-00 ..... 31, 356, 369
5AC900.1200-01 ..... 31, 356, 370
5AC900.1200-02 ..... 31, 356, 370
5AC900.1200-03 ..... 31, 356, 370
5AC900.150X-01 ..... 31, 356, 425
5ACPCI.ETH1-01 ..... 30, 359, 430
5ACPCI.ETH3-01 ..... 30, 359, 432
5ACPCI.RAIC-03 ..... 26, 180, 181, 189
5ACPCI.RAIC-04 ..... 26, 185, 186, 193
5ACPCI.RAIC-05 ..... 26, 188
5CADVI.0018-00 ..... 28, 357, 398
5CADVI.0050-00 ..... 28, 357, 398
5CADVI.0100-00 ..... 28, 357, 398
5CASDL.0018-00 ..... 28, 357, 402
5CASDL.0018-01 ..... 28, 357, 406
5CASDL.0018-03 ..... 28, 357, 410
5CASDL.0050-00 ..... 28, 357, 402
5CASDL.0050-01 ..... 28, 357, 406
5CASDL.0050-03 ..... 28, 358, 410
5CASDL.0100-00 ..... 28, 358, 402
5CASDL.0100-01 ..... 28, 358, 406
5CASDL.0100-03 ..... 29, 358, 410
5CASDL.0150-00 ..... 29, 358, 402
5CASDL.0150-01 ..... 29, 358, 406
5CASDL.0150-03 ..... 29, 358, 410
5CASDL.0200-00 ..... 29, 358, 402
5CASDL.0200-03 ..... 29, 358, 410
5CASDL.0250-00 ..... 29, 358, 402
5CASDL.0250-03 ..... 29, 358, 410
5CASDL.0300-00 ..... 29, 358, 402
5CASDL.0300-03 ..... 29, 358, 410
5CASDL.0300-13 ..... 29, 358, 415
5CASDL.0400-13 ..... 29, 358, 415
5CASDL.0430-13 415
5CAUSB.0018-00 ..... 29, 358, 422
5CAUSB.0050-00 ..... 29, 358, 422
5CFCRD.0064-03 ..... 27, 83, 84, 357, 376
5CFCRD.0128-03 ..... 27, 83, 84, 357, 376
5CFCRD.016G-04 ..... 27, 357, 371
5CFCRD.0256-03 ..... 27, 83, 84, 357, 376
5CFCRD.0512-03 ..... 27, 83, 84, 357, 376
5CFCRD.0512-04 ..... 27, 83, 84, 356, 371
5CFCRD.1024-03 ..... 28, 83, 84, 357, 376
5CFCRD.1024-04 ..... 27, 83, 84, 356, 371
5CFCRD.2048-03 ..... 28, 83, 84, 357, 376
5CFCRD.2048-04 ..... 27, 83, 84, 356, 371
5CFCRD.4096-03 ..... 28, 83, 84, 357, 376
5CFCRD.4096-04 ..... 27, 83, 84, 356, 371
5CFCRD.8192-03 ..... 28, 83, 84, 357, 376
5CFCRD.8192-04 ..... 27, 83, 84, 356, 371
5MD900.USB2-01 ..... 31, 357, 380
5MMDDR.0512-01 168
5MMDDR.1024-01 168
5MMDDR.2048-01 168
5MMHDD.0250-00 ..... 26, 192
5MMUSB 388

5MMUSB.2048-00 ..... 28, 357, 388
5MMUSB.2048-01 ..... 28, 357, 388
5PC600.X945-00 ..... 25, 165
5PC700.FA00-01 ..... 26, 204
5PC700.FA02-00 ..... 26, 206
5PC700.FA02-01 ..... 26, 207
5PC720.1043-00 ..... 24, 93
5PC720.1043-01 ..... 24, 99
5PC720.1214-00 ..... 24, 105
5PC720.1214-01 ..... 24, 111
5PC720.1505-00 ..... 24, 117
5PC720.1505-01 ..... 24, 123
5PC720.1505-02 ..... 24, 129
5PC720.1706-00 ..... 24, 135
5PC720.1906-00 ..... 24, 141
5PC781.1043-00 ..... 25, 147
5PC781.1505-00 ..... 25, 153
5PC782.1043-00 ..... 25, 159
5SWHMI.0000-00 ..... 31, 357, 393
5SWWCE.0829-ENG 32, 326
5SWWI7.0100-ENG 32, 316
5SWWI7.0100-GER 32, 316
5SWWI7.0300-MUL 32, 316
5SWWI7.0529-ENG 32, 323
5SWWI7.0729-MUL 32, 323
5SWWI7.0900-MUL 32, 323
5SWWXP.0429-ENG 32, 318
5SWWXP.0500-ENG 32, 314
5SWWXP.0500-GER 32, 314
5SWWXP.0500-MUL 32, 314
5SWWXP.0600-ENG 32, 314
5SWWXP.0600-GER 32, 314
5SWWXP.0600-MUL 32, 314
5SWWXP.0729-ENG 32, 320

9

9A0014.02 ..... 29, 358, 420
9A0014.05 ..... 29, 358, 420
9A0014.10 ..... 29, 358, 420
9A0017.01 ..... 30, 356, 366
9A0017.02 ..... 30, 356, 366
9A0100.11 ..... 30, 356, 366
9A0100.14 ..... 30, 356, 366
9A0100.15 ..... 30, 356, 366
9S0000.01-010 31
9S0000.01-020 32

A

AC97 sound 36, 79
ACPI 293, 294, 466
Add-on 80
Add-on CAN interface 195
Add-on CompactFlash slot 175
Add-on RS232/422/485 interface 199
Address register 196
ADI 328, 454, 466
  .NET SDK 460
  Development kit 458
  Drivers 328
After-images 449
APC 466
API 466
ATX power supply 85
Automation Runtime 313, 428, 466

B

B&R Automation Device Interface 328
B&R Automation Runtime 467
B&R Embedded OS Installer 327
B&R Key Editor 456
Backlight 231
Backup battery 87
Barcodes 91
Battery 87
Battery status 87
Baud rate 466
Beep codes 290
Beeping code 290
BIOS 466
BIOS default settings 279
BIOS Error signals 290
BIOS Error Signals X945 290
BIOS Extension ROM 184
BIOS upgrade 297
BIOS X945
  ACPI configuration 240
  Advanced 239
  Baseboard monitor 269
  BIOS setup keys 236
  Boot 271
  Chipset configuration 250
  Clock Configuration 253
  CPU board monitor 265
  CPU configuration 248
  Exit 278
  Graphics configuration 246
  Hard disk security master password 275
  Hard disk security user password 274
  I/O interface configuration 252
  IDE Configuration 254
  Keyboard/mouse configuration 262
  Legacy devices 270
  Main 238
  Main Board/Panel Features 266
  Panel control 268
  PCI Configuration 242
  Power 276
  Remote access configuration 263
  Security 273
  USB configuration 260
Bit 467
Bit rate 467
Bootstrap loader 467
Buffer duration 87
Burn-in effect 231, 449
Burst 340
Bus length 197
Bus structure 198
Byte 467

C

Cable drag chain 353
Cable type 197, 200, 201, 202
Cache 165, 467
Cage clamps 76
CAN 36, 467
  Bus length 197
  Cable type 197
CAN address register 196
CAN controller 195
CD-ROM 467
CE mark 468
Certifications 354
Climate conditions 346
CMOS 468
CMOS battery 360
COM 468
COM1 ..... 70, 468

COM2 ..... 71, 468
COM3 468
CompactFlash 371, 468
Dimensions 374, 379
General Information 371, 376
Order data 371, 376
Technical data 372, 377
CompactFlash slot 83, 84
Conducted disturbances 340
Construction 37
Control Center 453
CPU 469
Creating a CompactFlash card for B&R upgrade files 311
CTS 469

D

Damp heat, constant 347
Damped vibration 342
Data loss 85, 481
Data register 196
DCD 469
Defective component 350
Development kit 458
Device ID 428
Dial-up 469
Dimension standards 23
DIMM 469
Display lifespan 231
Display memory effect 449
Disposal 22
Distribution of resources 291
DMA channel assignment 291
I/O address assignment 292
Interrupt assignments 293, 294
RAM address assignment 291
DMA 469
Dongle 89
DOS boot diskette 307
DRAM 469
Drives 169
Dry cold 346
Dry heat 346
DS1425 89
DSR 470
DTR 470
DVD 470
DVI 470
DVI - CRT adapter 368
DVI cable 398
DVI-A 470
DVI-D 470
DVI-I 470

E

EDID 470, 471
EIDE 470
Electromagnetic emissions 337
Electrostatic discharge 339
Embedded OS Installer 327
EMC 471
Emissions 335, 337
EPROM 471
Error signals 290
ESD 19, 339
Electrical components with housing 19
Electrical components without housing 19
Individual components 20
Packaging 19
Proper handling 19
ETH1 72
ETH2 74
Ethernet 36, 471
ETHERNET Powerlink 471
European directives 333
Exchanging the legend strips 448
Extended desktop 454

F

Fan kit installation 438
Fan kit replacement 438
Fan kits 204
Fastening torque 209
FDD 471
Features 36
Fiber optics 471
FIFO 471
Firmware 302, 471
Flex radius 420, 422
Floating Point Unit 165

Floppy 472
FPC 472
FPD 472
Free fall 345
Front cover 386
FTP 472
Full Speed 75
Functional ground 76

G

GB 472
Graphics 166
Ground resistance 348
Grounding concept 214

H

Half-size 36
Handshake 472
Hard disk 84
Hardware security key 89
HDD 82, 472
Heat sink 167
HF field 339
Hibernate 82
High speed 75
High voltage 349
High-frequency electromagnetic fields 339
High-speed transient elect. disturbance value 340
Hot Plug 86
Humid heat, cyclic 347
Humidity specifications 55

I

I/O address assignment 292
IDE 472
Identification 91
Image retention 449
Image sticking 231, 449
Immunity 338
Individual components
  RAID system 179
  X945 CPU boards 165
Insulation resistance 348
Interface 473
Interrupt assignments 293, 294
ISA 473
ISO 473

J

Jitter 473
Jumper 473

K

Key editor 456
Keyboard 86

L

L1 cache 165
L2 cache 165
LCD 473
LED 82, 474
Line IN 79
Line OUT 79
Lithium battery 87
Low speed 75
LPT 474

M

Magnetic fields with electrical frequencies 341
Main memory 168
Maintenance Controller Extended 454
Manual history 17
MAXIM 89
Maximum memory capacity 168
MB 474
Mechanical conditions 343
Memory capacity 168
Messages 290
MIC 79
Microprocessor 474
MIPS 474
Mkey 474
Model numbers 24

Monitor / Panel 78
Motherboard 474, 475
Mounting orientation 212
Mounting rail brackets 380
Mouse 86
MS-DOS Boot diskette 307
MTBF 474
MTC 475
MTCX 85, 454, 475
Multitasking 475

N

Network-related emissions 336
NMI 195

O

OEM 475
OPC 475
OPC server 475
Overload 76, 349

P

Panel 475
Parallel port 89
Part subject to wear 87
PCI 476
PCI configuration space 428
PCI Ethernet card 430, 432
PCI slot 81
PCMCIA 476
PLC 476
PnP 476
POH 476
POST 476
Post codes 290
Power 82
Power button 85
Power supply 363
Powerlink 476
pre calibration 215
PROFIBUS 477
PROFIBUS-DP 477
Protection 351
PS/2 86
  Keyboard 86
  Mouse 86
  Y-cable 86

Q

QUXGA 477
QVGA 477
QWUXGA 477
QXGA 479

R

RAID 180, 188
RAID controller 315
RAM 477
Real time 477
Real-time clock 36, 87, 165
Replacement fan filter 5AC700.FA00-00 . 426
Replacement PCI SATA RAID HDD 192
Replacing the main memory 168
Requirements for emissions 335
Requirements for immunity to disturbances .. 338
Reset button 85
Residual voltage 349
Reverse polarity protection 76
ROM 477
RS232 ..... 200, 478
  Bus length 200
  Cable type 200
RS232 cable 420
RS422 ..... 201, 478
  Bus length 201
  Cable type 201
RS485 ..... 201, 478
  Bus length 202
  Cable type 202
RTC 36, 87, 165
RTS 478
RXD 478

S

Safety 348

Safety notices 19
Dust, humidity, aggressive gases 21
Environmentally-friendly disposal 22
Installation 21
Intended use 19
Operation 21
Organization 23
Policy and procedures 20
Programs 22
Protection against electrostatic discharge .. 19
Touching electrical parts 21
Transport and storage 20
Viruses 22
SATA 179, 180, 188
Screw clamps 76
SDL cable with 45° plug 406
SDL cables 401, 410
SDL equalizer 331
SDL flex cable with extender 415
SDRAM 478
Security Key 89
Self discharging 87
Sequential Function Chart 478
Serial number 91
SFC 478
Shock during operation 344
Shock during transport 344
Short-term interruptions 342
Single-phase power supplies 364
Slide-in slot 1 90
Slide-in USB FDD 176
Slot PLC 478
Soft-off 82
SoftPLC 479
Software 235
SRAM module
Driver support 428
Technical data 427
Standard keypad module 479
Standards 333
Overview 333
Status LED 82
HDD 82
Link 1 82
Link 2 82
Power 82
Supply voltage 36, 76
Supply voltage connectors 361
Surge 340
Surge voltages 340
Suspend-to-disk 82
SUXGA 479
SVGA 479
Switch 479
Switching power supply 363
SXGA 479
SXGA+ 479
System units 479

T

Task 479
TCP/IP 479
Temperature 453
Temperature fluctuations 347
Operation 347
Temperature monitoring 54
Temperature sensor 453
Temperature sensor locations 453
Terminal block 209
TFT display 480
Three-phase power supplies 364
Toppling 344
Torsion 352
Touch screen 480
Touch screen calibration 215
Automation Runtime 215
Visual Components 215
Windows CE 215
Windows XP embedded 215
Windows XP Professional 215
TXD 480

U

UART 480
UDMA 480
Upgrade information 297
UPS 480, 481
USB 480
USB 2.0 75
USB cable 422

USB flash drive 388
General Information 388
Order data 388
Technical data 389
USB flash drive for B&R update files 309
USB Media Drive 380
Dimensions 383
Dimensions with front cover 384
Installation 385
Interfaces 385
Mounting orientation 385
Technical data 381
USB port cap 370
USB ports 75
UXGA 481

V

Vendor ID 428
VGA 481
Vibration during transport 344
Vibration operation 343
Viewing angles 465
Voltage dips 342
Voltage fluctuations 342
Voltage range 350

W

WES2009 320
WES7 324
Windows 7 316
Windows CE 326, 481
eMbedded OS Installer 327
General Information 326
Installation 327
Windows CE 6.0
Features 326
Windows Embedded Standard 2009 320
Windows Embedded Standard 7 323
Windows XP Embedded
General Information 318
Installation 319
Touch screen driver 319, 322, 325
Windows XP Professional
Installation 316
Worst case 346
WSXGA 481
WUXGA 481
WXGA 481

X

X945 CPU board 165
XGA 481