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Rexroth BTV 16.2
Rexroth BTV 40.2
Rexroth BTV 60.2

Project Planning Manual

Title	Rexroth BTV 16.2
	Rexroth BTV 40.2
	Rexroth BTV 60.2

Type of Documentation Project Planning Manual

Document Typecode DOK-SUPPL*-BTV16/40/60-PR02-EN-P

Internal File Reference Document Number, 120-2100-B364-02/EN

Purpose of Documentation This documentation describes the operator terminals BTV 16.2, BTV 40.2 and BTV 60.2.

Record of Revisions

Description	Release Date	Notes
120-2100-B364-02/EN	01/05	First Englisch Edition

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Note This document has been printed on chlorine-free bleached paper.

Contents

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1   System Presentation

1.1   Brief Description BTV 16.2, BTV 40.2 and BTV 60.2

The operator terminals BTV 16.2, BTV 40.2 and BTV 60.2 are PC-based machine operator terminals. Depending on the respective application or configuration they can also perform control functionalities. The number of plug-in cards that can be integrated depends on the used PC box; three or four slots are provided.

Note:	This documentation describes the operator terminals BTV 16.2, BTV 40.2 and BTV 60.2. Information about the models BTV 16.1 and BTV 40.1 (former models also named IndraView P16 and IndraView P40) you will find in the documentation "Rexroth BTV 16 and Rexroth BTV 40", DOK-SUPPL*-BTV16/40***-PR02-DE-P.

Operator Terminals with Keypad

The front panel with keypad consists of a 4 mm thick aluminum panel with tapered edges covered by a chemical resistant polyester foil with embossed keys.

Operator Terminals with Touch Screen

The front panel with touch screen allows to operate the application software via the touch-sensitive surface of the display without keyboard and mouse.

1.2   Variants

Distinguishing Features

The operator terminals are provided as different variants. Essentially, they differ in display seize and touch screen capability. The operator terminals BTV 60.2 feature additional alphanumeric keys.

BTV 16.2	**BB**	**BC**	**BK**
BTV 16.2 with customer-specific design for Bosch	-	**AC**	-
Display	12" TFT		
Touch screen	Yes	Yes	No
Keys and buttons	No	No	16 machine function keys
Purpose	Default applications	e. g. food industry	Default applications

Fig. 1-1:   Distinguishing features BTV 16.2

BTV 40.2	BE	BG	BI
BTV 40.2 with customer-specific design for Bosch	-	AG	-
Display	15" TFT		
Touch screen	Yes	Yes	No
Keys (keypad)	No	No	16 machine function keys
Purpose	Default applications	e. g. food industry	Default applications

Fig. 1-2:   Distinguishing features BTV 40.2

BTV 60.2	BL
Display	12"
Touch screen	No
Keys (keypad)	Machine function keys and alphanumeric keys

Fig. 1-3:   Features BTV 60.2

The operator terminals BTV 16.2, BTV 40.2 and BTV 60.2 can be equipped with a PC box providing 3 or 4 slots.

Variants BTV 16.2

BTV 16.2BB with Touch Screen
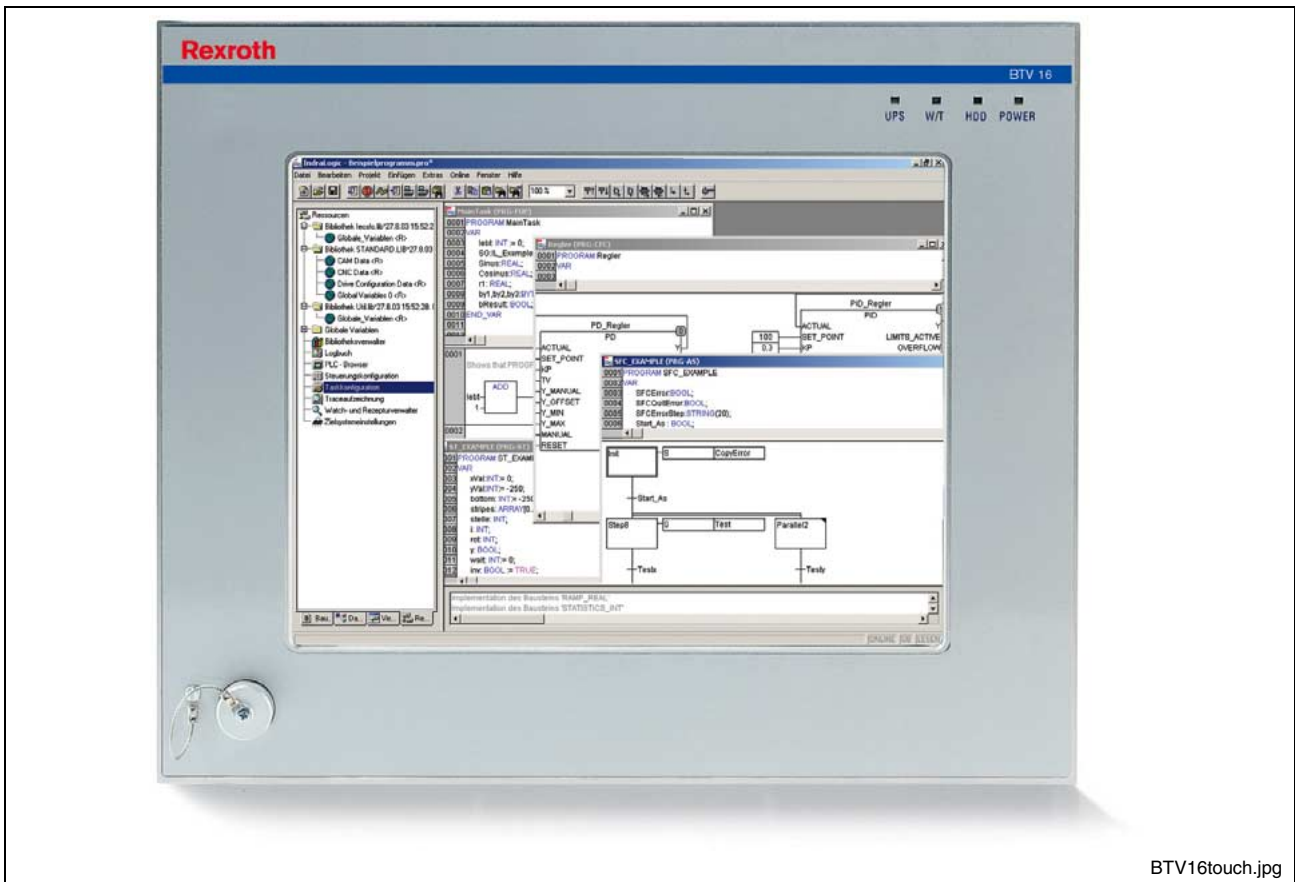
Fig. 1-4:   BTV 16.2 with touch screen

BTV 16.2BC with Touch Screen, Suitable for the Food Industry, without Front USB

BTV 16.2AC with Touch Screen, Suitable for the Food Industry, without Front USB, Customer-Specific Bosch Design

These two variants are available for special applications, e.g. for the food production, with special front panel. Principally, they differ from the standard variant in its tapered edges, the missing USB connection and the different mounting dimensions.

BTV 16.2BK with Keypad and 16 M-Keys, Standard Variant
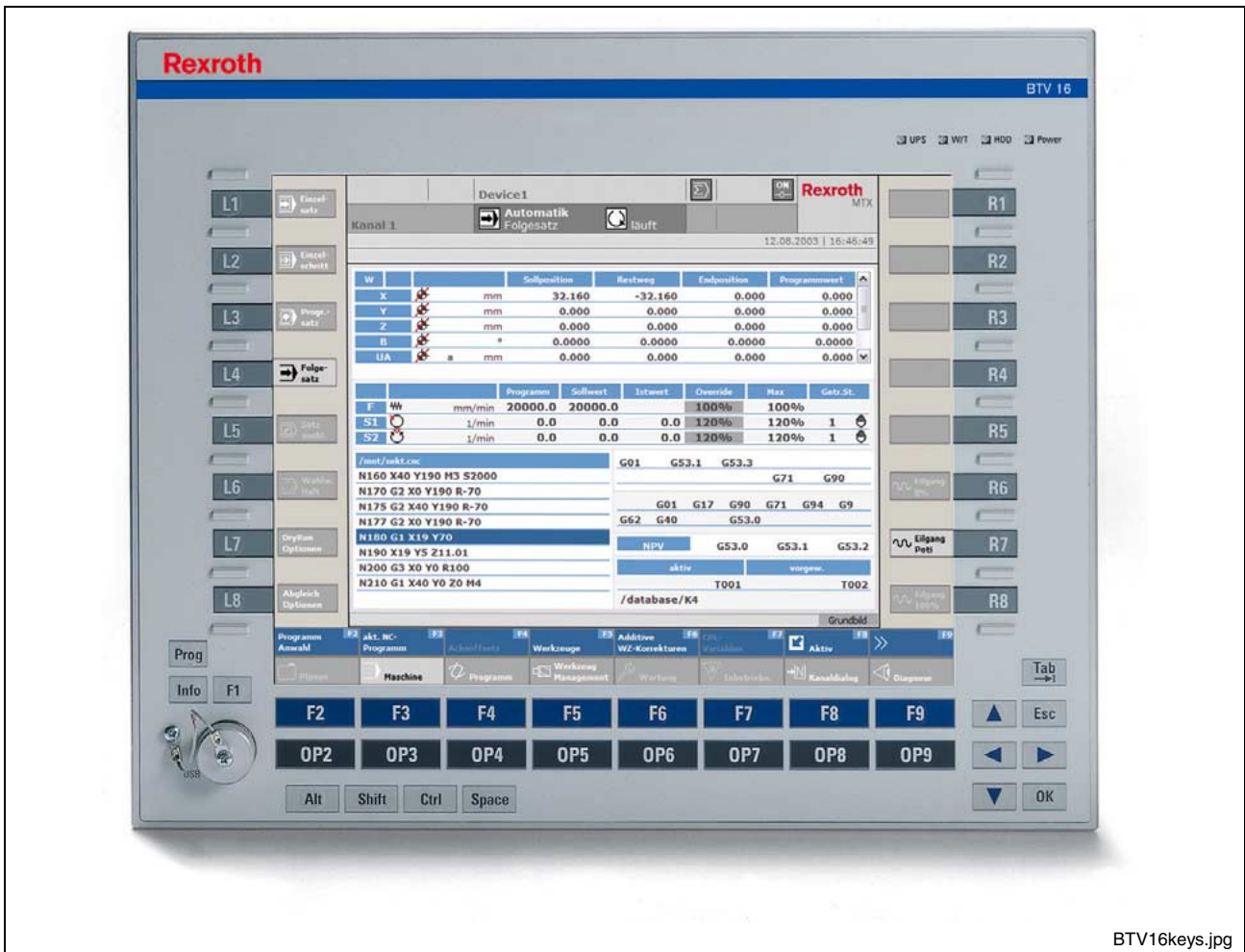
Fig. 1-5:   BTV 16.2 with keypad (machine function keys)

Variants BTV 40.2

BTV 40.2BE with Touch Screen
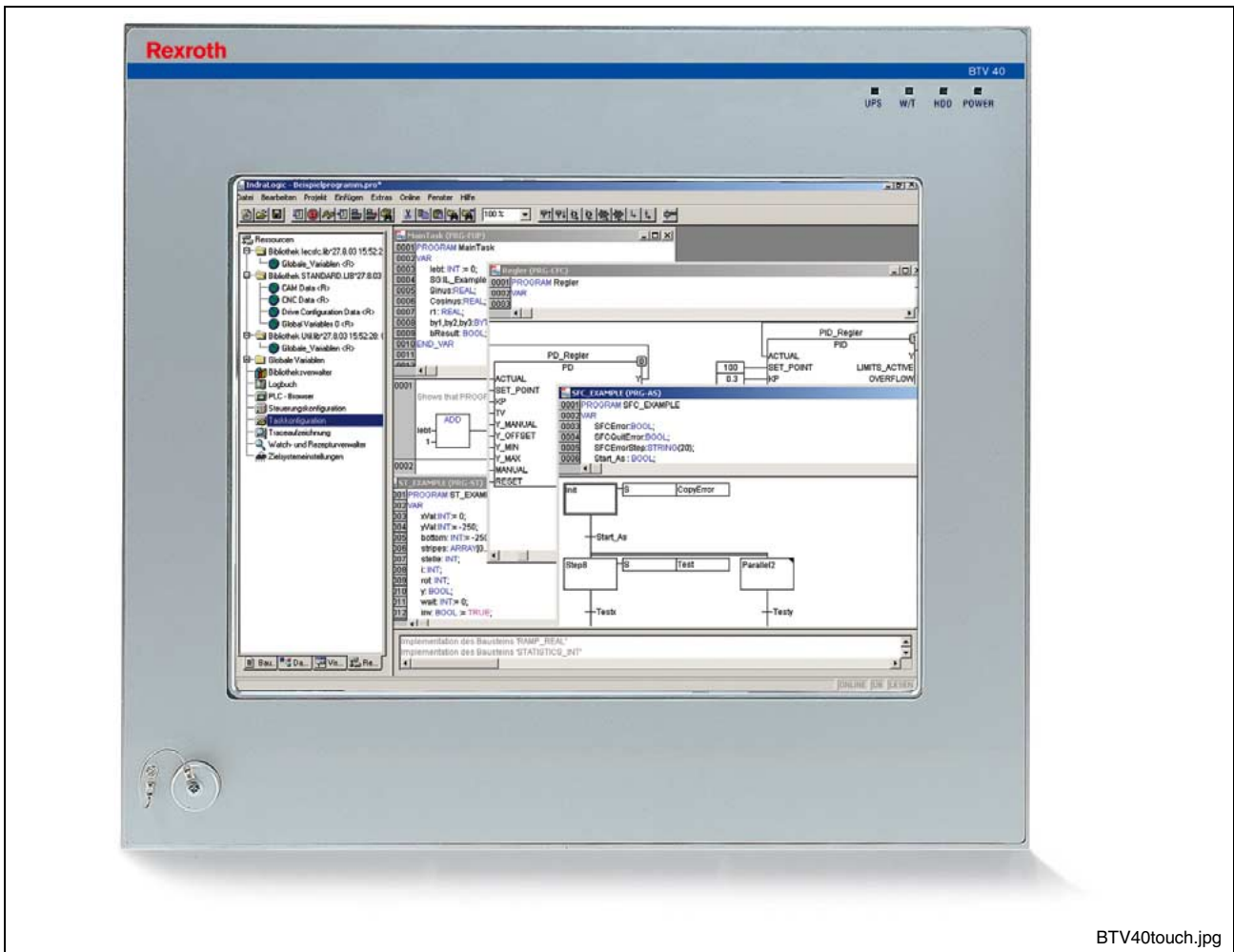
BTV40touch.jpg

Fig. 1-6:   BTV 40.2 with touch screen

BTV 40.2BG with Touch Screen, Suitable for the Food Industry, without Front USB

BTV 40.2AG with Touch Screen, Suitable for the Food Industry, without Front USB, Customer-Specific Bosch Design

These two variants are available for special applications, e.g. for the food production, with special front panel. Principally, they differ from the standard variant in its tapered edges, the missing USB connection and the different mounting dimensions.

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BTV 40.2BI with Keypad and 16 Machine Function Keys, Standard Variant

Fig. 1-7:   BTV 40.2 with keypad (machine function keys)

BTV 60.2

BTV 60.2BL with 16 Machine Function Keys, Alphanumeric Keys and 12" Display

Fig. 1-8:   BTV 60.2

1.3   Operating System

For license reasons the BTV devices are only delivered with already installed operating system.

1.4   Commissioning

Mount the device properly (for this, see chapter 5 "Dimensions"). Then, connect the device to the power supply and, if required, to the network.

2 Important Directions for Use

2.1 Appropriate Use

Introduction

Bosch Rexroth products represent state-of-the-art developments and manufacturing. They are tested prior to delivery to ensure operating safety and reliability.

The products may only be used in the manner that is defined as appropriate. If they are used in an inappropriate manner, then situations can develop that may lead to property damage or injury to personnel.

Note: Bosch Rexroth, as manufacturer, is not liable for any damages resulting from inappropriate use. In such cases, the guarantee and the right to payment of damages resulting from inappropriate use are forfeited. The user alone carries all responsibility of the risks.

Before using Bosch Rexroth products, make sure that all the pre-requisites for appropriate use of the products are satisfied:

- Personnel that in any way, shape or form uses our products must first read and understand the relevant safety instructions and be familiar with appropriate use.

- If the product takes the form of hardware, then they must remain in their original state, in other words, no structural changes are permitted. It is not permitted to decompile software products or alter source codes.

- Do not mount damaged or faulty products or use them in operation.

- Make sure that the products have been installed in the manner described in the relevant documentation.

Areas of Use and Application

BTV 16.2, BTV 40.2 and BTV 60.2 are PC-based machine and visualization terminals, that can – depending on the application and configuration – also perform control functionalities. These operator terminals made by Bosch Rexroth are defined for use in the following cases:

- as operator, visualization and programming terminal with integrated soft control in stand-alone machines,

- as operator, visualization and programming terminal for connected IndraControl controls

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Note: The operator terminals BTV 16.2, BTV 40.2 and BTV 60.2 may only be used with the accessories and parts specified in this document. If a component has not been specifically named, then it may not be either mounted or connected. The same applies to cables and lines.

Operation is only permitted in the specified configurations and combinations of components using the software and firmware as specified in the relevant function descriptions.

Typical applications of the operator terminals BTV 16.2, BTV 40.2 and BTV 60.2 are:

- lathes

- milling machines and

- machining centers.

The operator terminals BTV 16.2, BTV 40.2 and BTV 60.2 may only be operated under the assembly, installation and ambient conditions as described here (temperature, system of protection, humidity, EMC requirements, etc.) and in the position specified.

2.2   Inappropriate Use

Using the operator terminals BTV 16.2, BTV 40.2 and BTV 60.2 outside of the above-referenced areas of application or under operating conditions other than described in the document and the technical data specified is defined as "inappropriate use".

The operator terminals BTV 16.2, BTV 40.2 and BTV 60.2 may not be used, if

- they are subject to operating conditions that do not meet the above specified ambient conditions. This includes, for example, operation under water, in the case of extreme temperature fluctuations or extremely high maximum temperatures

  or, if

- Bosch Rexroth has not specifically released them for that intended purpose. Please note the specifications outlined in the general Safety Guidelines!

3   Safety Instructions for Electric Drives and Controls

3.1   Introduction

Read these instructions before the initial startup of the equipment in order to eliminate the risk of bodily harm or material damage. Follow these safety instructions at all times.

Do not attempt to install or start up this equipment without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation of the equipment prior to working with the equipment at any time. If you do not have the user documentation for your equipment, contact your local Bosch Rexroth representative to send this documentation immediately to the person or persons responsible for the safe operation of this equipment.

If the equipment is resold, rented or transferred or passed on to others, then these safety instructions must be delivered with the equipment.

⚠ **WARNING**	**Improper use of this equipment, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, may result in material damage, bodily harm, electric shock or even death!**

3.2   Explanations

The safety instructions describe the following degrees of hazard seriousness in compliance with ANSI Z535. The degree of hazard seriousness informs about the consequences resulting from non-compliance with the safety instructions.

Warning symbol with signal word	Degree of hazard seriousness according to ANSI
⚠ **DANGER**	Death or severe bodily harm will occur.
⚠ **WARNING**	Death or severe bodily harm may occur.
⚠ **CAUTION**	Bodily harm or material damage may occur.

Fig. 3-1:   Hazard classification (according to ANSI Z535)

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3.3   Hazards by Improper Use

<table>
<tr>
<td>⚠
DANGER</td>
<td>**High voltage and high discharge current! Danger to life or severe bodily harm by electric shock!**</td>
</tr>
<tr>
<td>⚠
DANGER</td>
<td>**Dangerous movements! Danger to life, severe bodily harm or material damage by unintentional motor movements!**</td>
</tr>
<tr>
<td>⚠
WARNING</td>
<td>**High electrical voltage due to wrong connections! Danger to life or bodily harm by electric shock!**</td>
</tr>
<tr>
<td>⚠
WARNING</td>
<td>**Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!**</td>
</tr>
<tr>
<td>⚠
CAUTION</td>
<td>**Surface of machine housing could be extremely hot! Danger of injury! Danger of burns!**</td>
</tr>
<tr>
<td>⚠
CAUTION</td>
<td>**Risk of injury due to improper handling! Bodily harm caused by crushing, shearing, cutting and mechanical shock or incorrect handling of pressurized systems!**</td>
</tr>
<tr>
<td>⚠
CAUTION</td>
<td>**Risk of injury due to incorrect handling of batteries!**</td>
</tr>
</table>

3.4   General Information

- Bosch Rexroth AG is not liable for damages resulting from failure to observe the warnings provided in this documentation.

- Read the operating, maintenance and safety instructions in your language before starting up the machine. If you find that you cannot completely understand the documentation for your product, please ask your supplier to clarify.

- Proper and correct transport, storage, assembly and installation as well as care in operation and maintenance are prerequisites for optimal and safe operation of this equipment.

- Only persons who are trained and qualified for the use and operation of the equipment may work on this equipment or within its proximity.

  - The persons are qualified if they have sufficient knowledge of the assembly, installation and operation of the equipment as well as an understanding of all warnings and precautionary measures noted in these instructions.

  - Furthermore, they must be trained, instructed and qualified to switch electrical circuits and equipment on and off in accordance with technical safety regulations, to ground them and to mark them according to the requirements of safe work practices. They must have adequate safety equipment and be trained in first aid.

- Only use spare parts and accessories approved by the manufacturer.

- Follow all safety regulations and requirements for the specific application as practiced in the country of use.

- The equipment is designed for installation in industrial machinery.

- The ambient conditions given in the product documentation must be observed.

- Use only safety features and applications that are clearly and explicitly approved in the Project Planning Manual. If this is not the case, they are excluded.
  The following areas of use and application, for example, include safety features and applications: construction cranes, elevators used for people or freight, devices and vehicles to transport people, medical applications, refinery plants, transport of hazardous goods, nuclear applications, applications in which electrical devices with vital functions can be electromagnetically disturbed, mining, food processing, control of protection equipment (also in a machine).

- The information given in the documentation of the product with regard to the use of the delivered components contains only examples of applications and suggestions.
  The machine and installation manufacturer must

  - make sure that the delivered components are suited for his individual application and check the information given in this documentation with regard to the use of the components,

  - make sure that his application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.

- Startup of the delivered components is only permitted once it is sure that the machine or installation in which they are installed complies with the national regulations, safety specifications and standards of the application.

- Technical data, connections and operational conditions are specified in the product documentation and must be followed at all times.

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- Operation is only permitted if the national EMC regulations for the application are met.
  The instructions for installation in accordance with EMC requirements can be found in the documentation "EMC in Drive and Control Systems".
  The machine or installation manufacturer is responsible for compliance with the limiting values as prescribed in the national regulations.

3.5 Protection Against Contact with Electrical Parts

Note: This section refers to equipment and drive components with voltages above 50 Volts.

Touching live parts with voltages of 50 Volts and more with bare hands or conductive tools or touching ungrounded housings can be dangerous and cause electric shock. In order to operate electrical equipment, certain parts must unavoidably have dangerous voltages applied to them.

DANGER

High electrical voltage! Danger to life, severe bodily harm by electric shock!

$\Rightarrow$ Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain or repair this equipment.

$\Rightarrow$ Follow general construction and safety regulations when working on high voltage installations.

$\Rightarrow$ Before switching on power the ground wire must be permanently connected to all electrical units according to the connection diagram.

$\Rightarrow$ Do not operate electrical equipment at any time, even for brief measurements or tests, if the ground wire is not permanently connected to the points of the components provided for this purpose.

$\Rightarrow$ Before working with electrical parts with voltage higher than 50 V, the equipment must be disconnected from the mains voltage or power supply. Make sure the equipment cannot be switched on again unintended.

$\Rightarrow$ The following should be observed with electrical drive and filter components:

$\Rightarrow$ Wait thirty (30) minutes after switching off power to allow capacitors to discharge before beginning to work. Measure the voltage on the capacitors before beginning to work to make sure that the equipment is safe to touch.

$\Rightarrow$ Never touch the electrical connection points of a component while power is turned on.

$\Rightarrow$ Install the covers and guards provided with the equipment properly before switching the equipment on. Prevent contact with live parts at any time.

$\Rightarrow$ A residual-current-operated protective device (RCD) must not be used on electric drives! Indirect contact must be prevented by other means, for example, by an overcurrent protective device.

$\Rightarrow$ Electrical components with exposed live parts and uncovered high voltage terminals must be installed in a protective housing, for example, in a control cabinet.

To be observed with electrical drive and filter components:

DANGER

High electrical voltage on the housing!
High leakage current! Danger to life, danger of injury by electric shock!

⇒ Connect the electrical equipment, the housings of all electrical units and motors permanently with the safety conductor at the ground points before power is switched on. Look at the connection diagram. This is even necessary for brief tests.

⇒ Connect the safety conductor of the electrical equipment always permanently and firmly to the supply mains. Leakage current exceeds 3.5 mA in normal operation.

⇒ Use a copper conductor with at least 10 mm² cross section over its entire course for this safety conductor connection!

⇒ Prior to startups, even for brief tests, always connect the protective conductor or connect with ground wire. Otherwise, high voltages can occur on the housing that lead to electric shock.

3.6 Protection Against Electric Shock by Protective Low Voltage (PELV)

All connections and terminals with voltages between 0 and 50 Volts on Rexroth products are protective low voltages designed in accordance with international standards on electrical safety.

WARNING

High electrical voltage due to wrong connections! Danger to life, bodily harm by electric shock!

⇒ Only connect equipment, electrical components and cables of the protective low voltage type (PELV = Protective Extra Low Voltage) to all terminals and clamps with voltages of 0 to 50 Volts.

⇒ Only electrical circuits may be connected which are safely isolated against high voltage circuits. Safe isolation is achieved, for example, with an isolating transformer, an opto-electronic coupler or when battery-operated.

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3.7   Protection Against Dangerous Movements

Dangerous movements can be caused by faulty control of the connected motors. Some common examples are:

- improper or wrong wiring of cable connections
- incorrect operation of the equipment components
- wrong input of parameters before operation
- malfunction of sensors, encoders and monitoring devices
- defective components
- software or firmware errors

Dangerous movements can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

The monitoring in the drive components will normally be sufficient to avoid faulty operation in the connected drives. Regarding personal safety, especially the danger of bodily injury and material damage, this alone cannot be relied upon to ensure complete safety. Until the integrated monitoring functions become effective, it must be assumed in any case that faulty drive movements will occur. The extent of faulty drive movements depends upon the type of control and the state of operation.

⚠️
DANGER

Dangerous movements! Danger to life, risk of injury, severe bodily harm or material damage!

⇒ Ensure personal safety by means of qualified and tested higher-level monitoring devices or measures integrated in the installation. Unintended machine motion is possible if monitoring devices are disabled, bypassed or not activated.

⇒ Pay attention to unintended machine motion or other malfunction in any mode of operation.

⇒ Keep free and clear of the machine's range of motion and moving parts. Possible measures to prevent people from accidentally entering the machine's range of motion:

  - use safety fences
  - use safety guards
  - use protective coverings
  - install light curtains or light barriers

⇒ Fences and coverings must be strong enough to resist maximum possible momentum, especially if there is a possibility of loose parts flying off.

⇒ Mount the emergency stop switch in the immediate reach of the operator. Verify that the emergency stop works before startup. Don't operate the machine if the emergency stop is not working.

⇒ Isolate the drive power connection by means of an emergency stop circuit or use a starting lockout to prevent unintentional start.

⇒ Make sure that the drives are brought to a safe standstill before accessing or entering the danger zone. Safe standstill can be achieved by switching off the power supply contactor or by safe mechanical locking of moving parts.

⇒ Secure vertical axes against falling or dropping after switching off the motor power by, for example:

- mechanically securing the vertical axes

- adding an external braking/ arrester/ clamping mechanism

- ensuring sufficient equilibration of the vertical axes

The standard equipment motor brake or an external brake controlled directly by the drive controller are not sufficient to guarantee personal safety!

⇒ Disconnect electrical power to the equipment using a master switch and secure the switch against reconnection for:

- maintenance and repair work

- cleaning of equipment

- long periods of discontinued equipment use

⇒ Prevent the operation of high-frequency, remote control and radio equipment near electronics circuits and supply leads. If the use of such equipment cannot be avoided, verify the system and the installation for possible malfunctions in all possible positions of normal use before initial startup. If necessary, perform a special electromagnetic compatibility (EMC) test on the installation.

3.8 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated near current-carrying conductors and permanent magnets in motors represent a serious health hazard to persons with heart pacemakers, metal implants and hearing aids.

WARNING

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!

⇒ Persons with heart pacemakers, hearing aids and metal implants are not permitted to enter the following areas:

- Areas in which electrical equipment and parts are mounted, being operated or started up.

- Areas in which parts of motors with permanent magnets are being stored, operated, repaired or mounted.

⇒ If it is necessary for a person with a heart pacemaker to enter such an area, then a doctor must be consulted prior to doing so. Heart pacemakers that are already implanted or will be implanted in the future, have a considerable variation in their electrical noise immunity. Therefore there are no rules with general validity.

⇒ Persons with hearing aids, metal implants or metal pieces must consult a doctor before they enter the areas described above. Otherwise, health hazards will occur.

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3.9   Protection Against Contact with Hot Parts

⚠ **CAUTION**

Housing surfaces could be extremely hot!
Danger of injury! Danger of burns!

⇒ Do not touch housing surfaces near sources of heat! Danger of burns!

⇒ After switching the equipment off, wait at least ten (10) minutes to allow it to cool down before touching it.

⇒ Do not touch hot parts of the equipment, such as housings with integrated heat sinks and resistors. Danger of burns!

3.10   Protection During Handling and Mounting

Under certain conditions, incorrect handling and mounting of parts and components may cause injuries.

⚠ **CAUTION**

Risk of injury by incorrect handling! Bodily harm caused by crushing, shearing, cutting and mechanical shock!

⇒ Observe general installation and safety instructions with regard to handling and mounting.

⇒ Use appropriate mounting and transport equipment.

⇒ Take precautions to avoid pinching and crushing.

⇒ Use only appropriate tools. If specified by the product documentation, special tools must be used.

⇒ Use lifting devices and tools correctly and safely.

⇒ For safe protection wear appropriate protective clothing, e.g. safety glasses, safety shoes and safety gloves.

⇒ Never stand under suspended loads.

⇒ Clean up liquids from the floor immediately to prevent slipping.

3.11 Battery Safety

Batteries contain reactive chemicals in a solid housing. Inappropriate handling may result in injuries or material damage.

CAUTION

Risk of injury by incorrect handling!

⇒ Do not attempt to reactivate discharged batteries by heating or other methods (danger of explosion and cauterization).

⇒ Never charge non-chargeable batteries (danger of leakage and explosion).

⇒ Never throw batteries into a fire.

⇒ Do not dismantle batteries.

⇒ Do not damage electrical components installed in the equipment.

Note: Be aware of environmental protection and disposal! The batteries contained in the product should be considered as hazardous material for land, air and sea transport in the sense of the legal requirements (danger of explosion). Dispose batteries separately from other waste. Observe the legal requirements in the country of installation.

3.12 Protection Against Pressurized Systems

Certain motors and drive controllers, corresponding to the information in the respective Project Planning Manual, must be provided with pressurized media, such as compressed air, hydraulic oil, cooling fluid and cooling lubricant supplied by external systems. Incorrect handling of the supply and connections of pressurized systems can lead to injuries or accidents. In these cases, improper handling of external supply systems, supply lines or connections can cause injuries or material damage.

CAUTION

Danger of injury by incorrect handling of pressurized systems !

⇒ Do not attempt to disassemble, to open or to cut a pressurized system (danger of explosion).

⇒ Observe the operation instructions of the respective manufacturer.

⇒ Before disassembling pressurized systems, release pressure and drain off the fluid or gas.

⇒ Use suitable protective clothing (for example safety glasses, safety shoes and safety gloves)

⇒ Remove any fluid that has leaked out onto the floor immediately.

Note: Environmental protection and disposal! The media used in the operation of the pressurized system equipment may not be environmentally compatible. Media that are damaging the environment must be disposed separately from normal waste. Observe the legal requirements in the country of installation.

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Notes

4 Technical Data

4.1 Front Panel

	BTV 16.2BB	**BTV 16.2BC**	**BTV 16.2AC**	**BTV 16.2BK**
Display	12"-TFT, 800 x 600 pixel 256.000 colors			
Operation	Touch screen			Keypad
Surface – Front panel	Color: RAL 7035 light gray		Graphite gray (Bosch design)	Color: RAL 7035 light gray
Degree of protection	Front panel IP 65 according to DIN 40 050, IEC 529			
Interface	USB connection, cover's degree of protection IP 65	No USB connection		USB connection, cover's degree of protection IP 65

Fig. 4-1: Technical data: front BTV 16.2

	BTV 40.2BE	**BTV 40.2BG**	**BTV 40.2AG**	**BTV 40.2BI**
Display	15"-TFT, 1024 x 768 pixel 256.000 colors			
Operation	Touch screen			Keypad
Surface – Front panel	Color: RAL 7035 light gray		Graphite gray (Bosch design)	Color: RAL 7035 light gray
Degree of protection	Front panel IP 65 according to DIN 40 050, IEC 529			
Interface	USB connection, cover's degree of protection IP 65	No USB connection		USB connection, cover's degree of protection IP 65

Fig. 4-2: Technical data: front BTV 40.2

	BTV 60.2BL
Display	12"-TFT, 800 x 600 pixel 256.000 colors
Operation	Keypad
Surface – Front panel	Color: RAL 7035 light gray
Degree of protection	Front panel IP 65 according to DIN 40 050, IEC 529
Interface	USB connection, cover's degree of protection IP 65

Fig. 4-3: Technical data: front BTV 60.2

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4.2   PC Box

PC box	Type A	Type C
Processor	Pentium III with minimum 933 MHz and integrated graphic controller with maximum 8 MB video memory	
Main memory	512 MB	
Hard disk	Min. 20 GB	
Optional drives	CD-ROM or DVD/CD-RW	
Interfaces available in all variants	• 1 x parallel interface (25-pin, D-Sub) • 1 x external VGA connection (15-pin, HD-Sub) • 2 x USB connection (type A) • 1 x Ethernet connection (RJ 45, 10/100 Base-T) • 1 x keyboard connection (PS/2) • 1 x mouse connection (PS/2) • 1 x external battery connection	
Additional interfaces		
For variant without special interfaces	• 2 to 3 serial standard interfaces RS232 (9-pin, D-Sub) [1]	
For variant with PROFIBUS DP slave	• 2 to 3 serial standard interfaces RS232 (9-pin, D-Sub) [1] • 1 x PROFIBUS DP slave (9-pin, D-Sub)	
Slots	2 x PCI, 1 x PCI / ISA	3 x PCI, 1 x PCI / ISA
Degree of protection	PC box IP 00	
Power supply	85/264 VAC or 24 VDC	
Max. power consumption	200 W	

Fig. 4-4:   Technical data: PC box

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[1] For devices with touch screen 2 serial interfaces

4.3   Power Supply Unit 115 V / 230 V

Nominal input voltage:	115 VAC / 230 VAC		
Input voltage range:	85 ... 264 VAC		
Input current:	1.0 A for nominal voltage 230 VAC 2.0 A for nominal voltage 115 VAC		
Max. inrush current (cold start 25 °C)	40 A for nominal voltage 230 VAC 20 A for nominal voltage 115 VAC		
Output voltages: +5 V +12 V -12 V +20 V ISO 6V	Current (max.)* 20 A 3 A 500 mA 2 A 200 mA	Tolerance (incl. residual ripple) +/-5 % +/-5 % +/-5 % +/-5 % +/-5 %	
Max. output power:	160 W*		
Efficiency:	0,8		

*) Note: During specifying the maximum output currents please observe that the currents separately considered are the maximum possible currents of the respective output voltage. However, it is not possible to create the maximum current from all output voltages, as the maximum total output power (= 160 W) must not be exceeded.

Fig. 4-5:   Technical data of the power supply unit 115 V / 230 V

4.4   Technical Data of the Power Supply Unit 24 V

Nominal input voltage:	24 VDC		
Input voltage range:	24 VDC +20 %, -15 %		
Noise and surge immunity	Umax = 35 V (for t < 100 ms)		
Max. input current:	6 A for nominal voltage 24 V		
Max. inrush current:	25 A for nominal voltage 24 V		
Output voltages: +5 V +12 V +24 V -12 V ISO 6V	Current (max.)* 13 A 3 A 2 A 500 mA 200 mA	Tolerance (incl. residual ripple) +/-5 % +/-5 % +/-5 % +/-5 % +/-5 %	
Max. output power:	110 W*		
Efficiency:	0,8		

*) Note: During specifying the maximum output currents please observe that the currents separately considered are the maximum possible currents of the respective output voltage. However, it is not possible to create the maximum current from all output voltages, as the maximum total output power (= 110 W) must not be exceeded.

Fig. 4-6:   Technical data of the power supply unit 24 V

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4.5   Ambient Conditions

	Operation	Storage/transport
Max. ambient temperature (surrounding air temperature)	+5 °C... +45 °C	-20 °C to +60 °C
Max. temperature gradient	Temporal temperature changes up to 3 °C per minute	Not defined
Relative humidity	Climatic class 3K3 according to EN 60721, condensation not permissible.	Climatic class 3K3 according to EN 60721, condensation not permissible.
Air pressure	Up to 2,000 m above MSL according to DIN 60204	

Mechanical strength	Max. vibration: Frequency range: 10 ... 150 Hz
	
	Excursion: 0.075 mm
	                        for 10 ... 57 Hz
	
	Acceleration: 1 g
	                        for 57 ... 150 Hz
	
	According to EN 60068-2-6
		Max. shock:
		15 g according to DIN IEC 68-2-27,
		no disturbance of the function

Fig. 4-7:   Ambient conditions

4.6   Used Standards

The system components of the operator terminals correspond to the following standards:

Standard	Meaning
EN 60,204-1	Electrical equipment of machines
EN 50,081-2	Basic technical standard, emitted interference (industrial environment)
EN 50,082-2	Basic technical standard, noise immunity (industrial environment)
EN 60,742	Transformer for 24 V power supply unit, protective separation
EN 60,950	Overvoltage category II
EN 61,131	Requirements concerning the 24 V outputs
EN 61 131-2	Requirements concerning the 24 power supply
EN 418	Machine safety, EMERGENCY STOP devices
EN 60 529	Degrees of protection (incl. housings and installation compartments)
EN 60 068-2-6	Vibration test
EN 60068-2-27	Shock test

Fig. 4-8:   Used standards

Note: Concerning delivered operator terminals all CE requirements are fulfilled. After plugging-in extension cards, however, a new CE test has to be executed.

UL/CSA Certification   The devices of the BTV family are basically certificated according to

- **UL508** (Industrial Control Equipment) and

- **C22.2 No. 14-M95** (CSA)

However, it is possible that there are combinations or extension stages with restricted or missing certification. Thus, verify the registration according to the UL marking on the device.

Note:	To guarantee an UL/CSA-compliant operation, you have to fulfill the following conditions: • Use 60/75 °C copper wire only. • Use Class 1 wire only or equivalent.

Note:	The UL/CSA marking is only valid for the device in its delivery status. After having modified the device, e. g. after plugging-in additional extension cards, the UL compliancy has to be verified.

4.7   Wear Parts

Wear parts without warranty   The service life of the backlight is limited to a certain number of operating hours. After this time the backlight will produce only 50 % of its original brightness. This time differs for the used displays:

12": 40,000 hours

15": 35,000 hours

CMOS battery: 5 to 7 years

Battery pack: The number of charging cycles of the battery pack and thus, its service life is dependent on the ambient temperature, in which the battery pack is used. Ambient temperature is defined as the temperature, in which the operator terminal or the battery pack is situated, e.g. the internal temperature of the control cabinet or in a operator panel housing.

Ambient temperature (surrounding air temperature)	Charging cycles	Maintenance interval
25 °C	4000 cycles	6 years
35 °C	2000 cycles	3 years
45 °C	1000 cycles	1.5 years

Fig. 4-9: Battery pack

If you don't exactly know the conditions, Bosch Rexroth recommends to exchange the battery pack every 1.5 years.

- Hard disk: The hard disk is an electromechanic wear part, that has to be changed during the operating time. According to the manufacturer's specifications the hard disk has been developed for a service life of 60 months in consideration of the following conditions:

Operating hours / month		Max. 333
Input/output cycles / month		Min. 10 and max. 150
Operating conditions	Temperature	40 °C
	Rel. humidity	30 %
	Height	< 500 m
	Accesses	30 % of the operating hours
Storage conditions	Temperature	< 30 °C
	Rel. humidity	< 70 %
	Duration	< 3 months

Fig. 4-10:   Typical operating and storage conditions of the hard disk

The operation out of this typical conditions is permissible, whereby, however, the service life of the hard disk may be reduced. However, the ambient conditions specified for the overall device in chapter 4.5 have to be absolutely kept.

- Also fans are mechanic wear components, whose service life is extremely temperature-dependent. For the fan integrated in the housing the manufacturer specifies the following service life:

Ambient temperature (surrounding air temperature)	Service life
40 °C	70,000 hours
70 °C	35,000 hours

Fig. 4-11:   Service life of the fan

4.8   Compatibility Test

All Rexroth controls and drives are developed and tested according to the latest state-of-the-art.

As it is impossible to follow the continuing development of all materials (e.g. lubricants in machine tools) which may interact with our controls and drives, it cannot be completely ruled out that any reactions with the materials used by Bosch Rexroth might occur.

For this reason, before using the respective material a compatibility test has to be carried out for new lubricants, cleaning agents etc. and our housings/our housing materials.

5   Dimensions

5.1   Housing Dimensions

Housing Dimensions BTV 16.2

Independent of the design of the BTV 16.2 standard variants with M-Keys or touch screen the front panel width is 350 mm and the height is 290 mm.
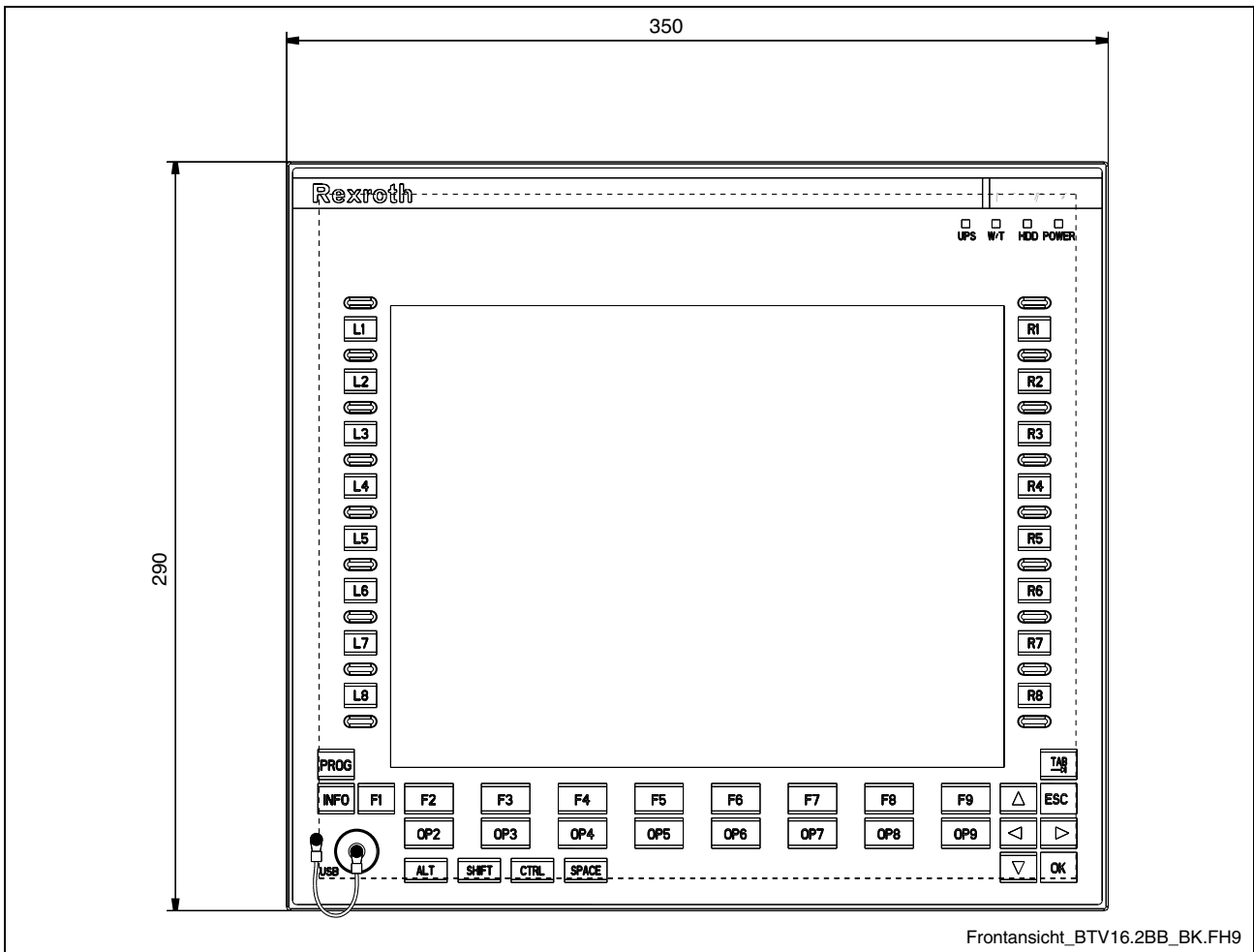
Fig. 5-1:   Dimensions – Front panel BTV 16.2BK
The front panel of variant BTV 16.2BB with touch screen has the same dimensions.

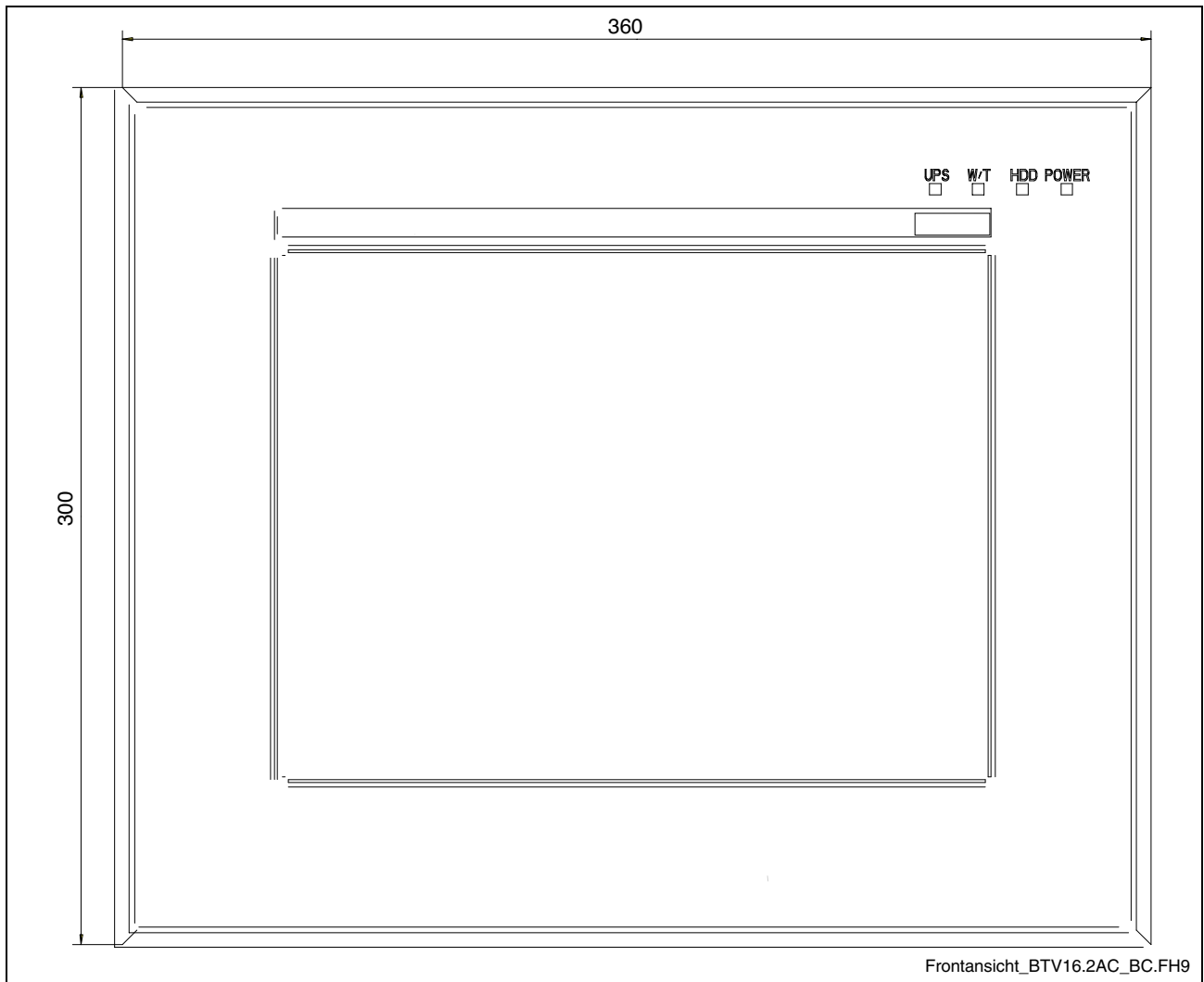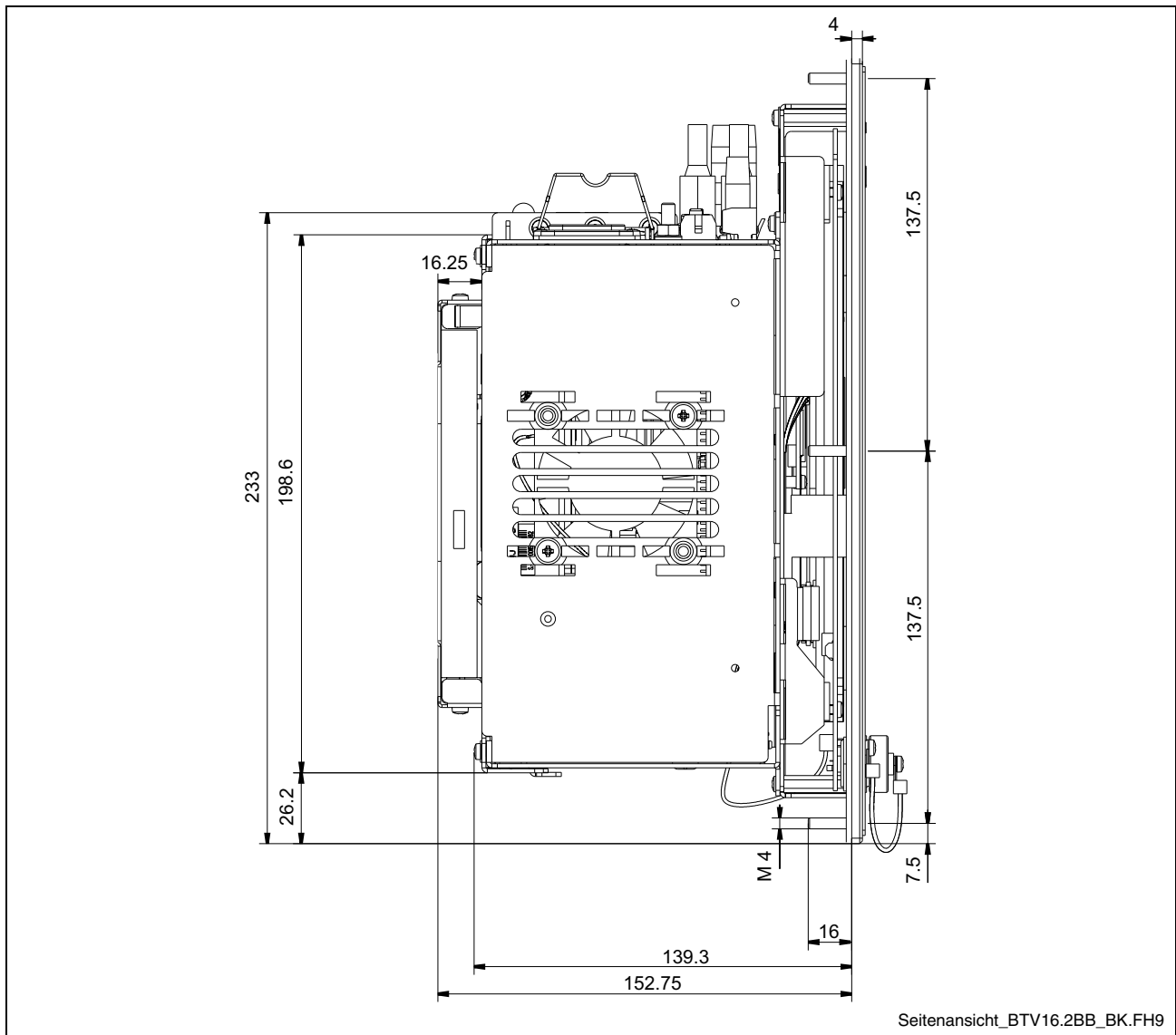The front panel width of the BTV 16.2 for the food industry is 360 mm and the height is 300 mm.

Fig. 5-2:   Dimensions – Front panel BTV 16.2BC and BTV 16.2AC (Variant for the food industry)

Fig. 5-3:   Side view BTV 16.2BB and BTV 16.2BK

Type A: 3 slots Type C: 4 slots	BTV 16.2BB and BTV 16.2BK
Installation depth PC box, type A	146.5 mm
Installation depth PC box, type A + CD drive	165.5 mm
Installation depth PC box, type C	167.0 mm
Installation depth PC box, type C + CD drive	186.0 mm

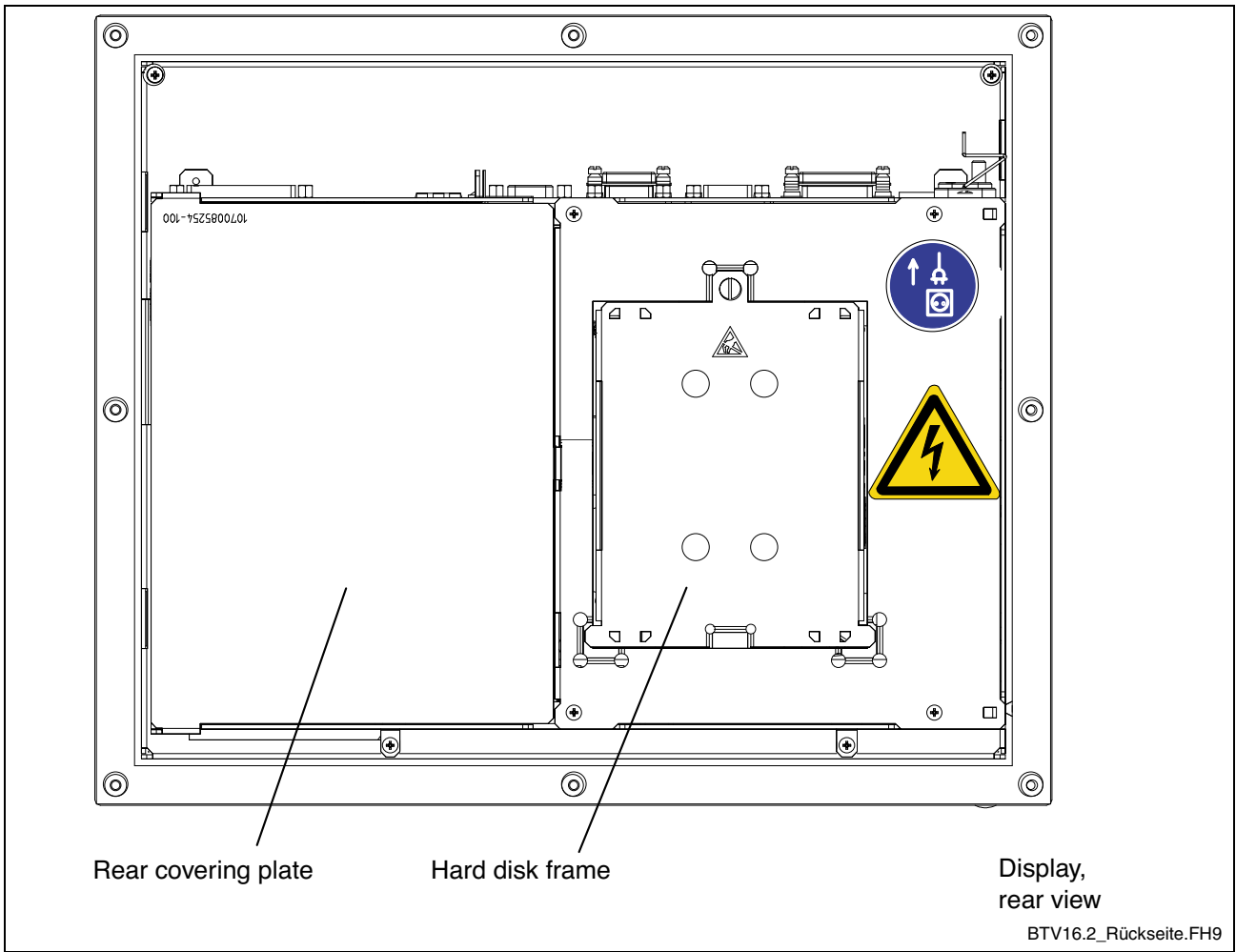Fig. 5-4:   Installation depth BTV 16.2BB and BTV 16.2BK

Seitenansicht_BTV16.2AC_BC.FH9
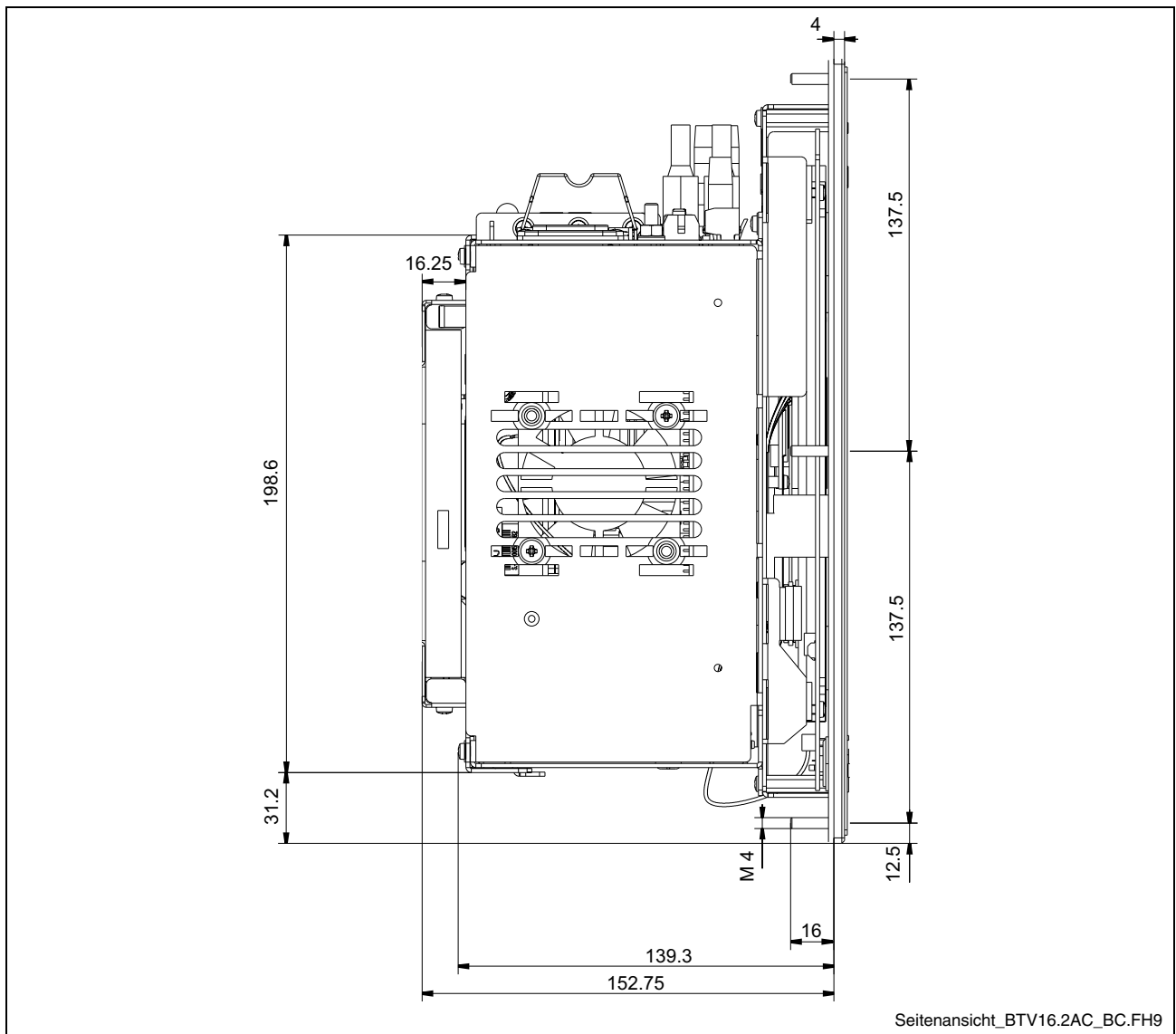
Fig. 5-5:   Side view BTV 16.2BC and BTV 16.2AC

Type A: 3 slots Type C: 4 slots	BTV 16.2BC and BTV 16.2AC
Installation depth PC box, type A	146.5 mm
Installation depth PC box, type A + CD drive	165.5 mm
Installation depth PC box, type C	167.0 mm
Installation depth PC box, type C + CD drive	186.0 mm

Fig. 5-6:   Installation depth BTV 16.2BC and BTV 16.2AC

Rear covering plate   Hard disk frame   Display, rear view

BTV16.2_Rückseite.FH9

Fig. 5-7:   Rear view BTV 16.2

Front key connection   M-Key connection

X23   X28

1070085262-500

BTV16.2_Unterseite.FH9
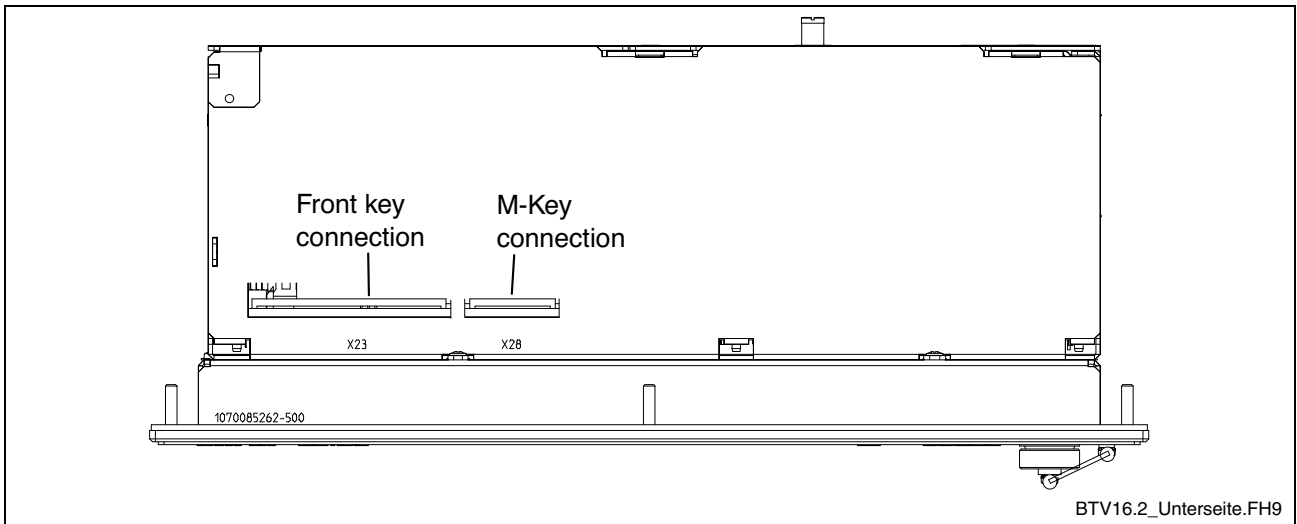
Fig. 5-8:   Bottom view BTV 16.2

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Housing Dimensions BTV 40.2

Independent of the design of the BTV 40.2 standard variants with M-Keys or touch screen the front panel width is 407 mm and the height is 370 mm.
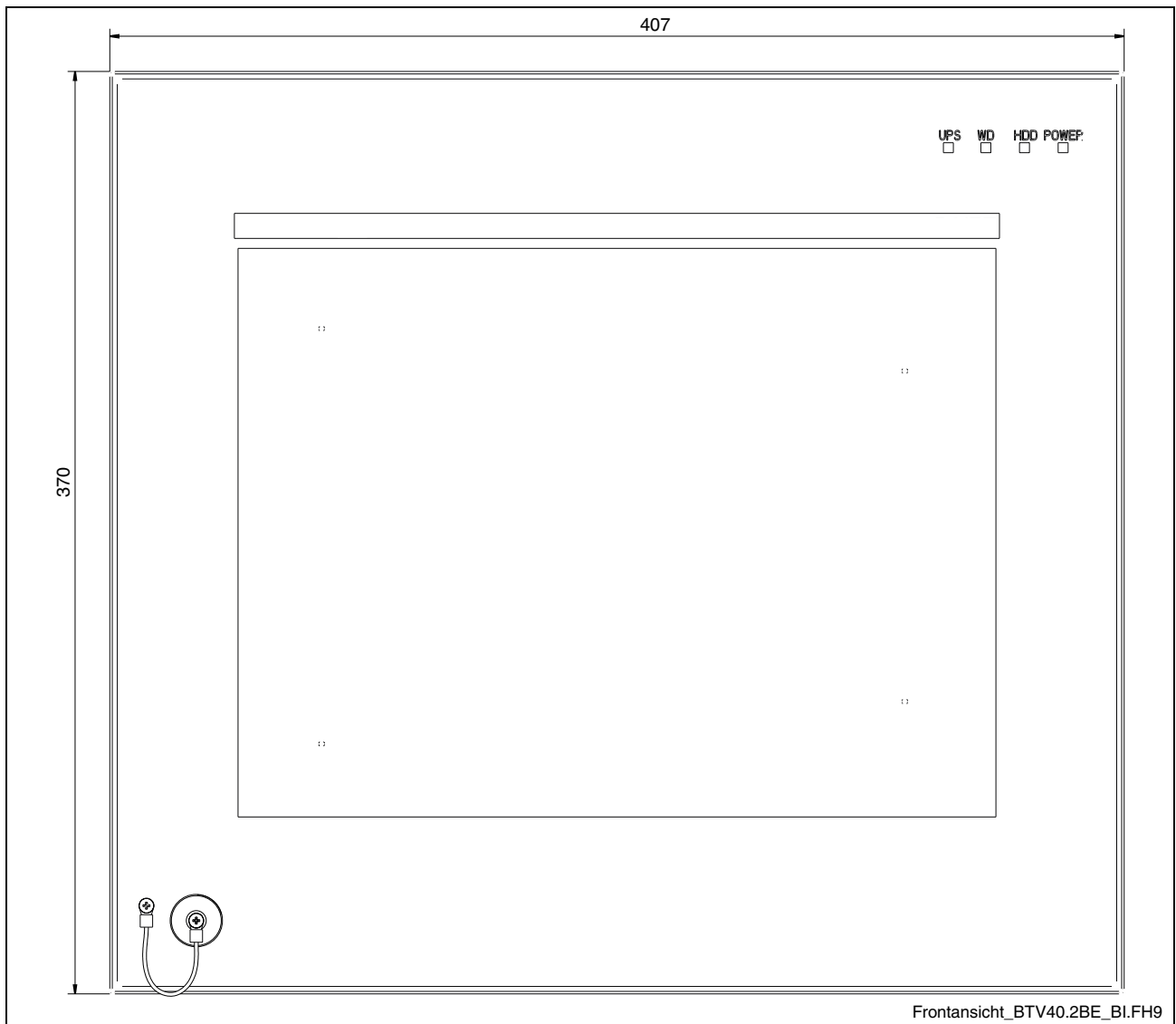

Frontansicht_BTV40.2BE_BI.FH9

Fig. 5-9: Dimensions – Front panel BTV 40.2BE and BTV 40.2BI

The front panel width of the BTV 40.2 for the food industry is 417 mm and the height is 380 mm.
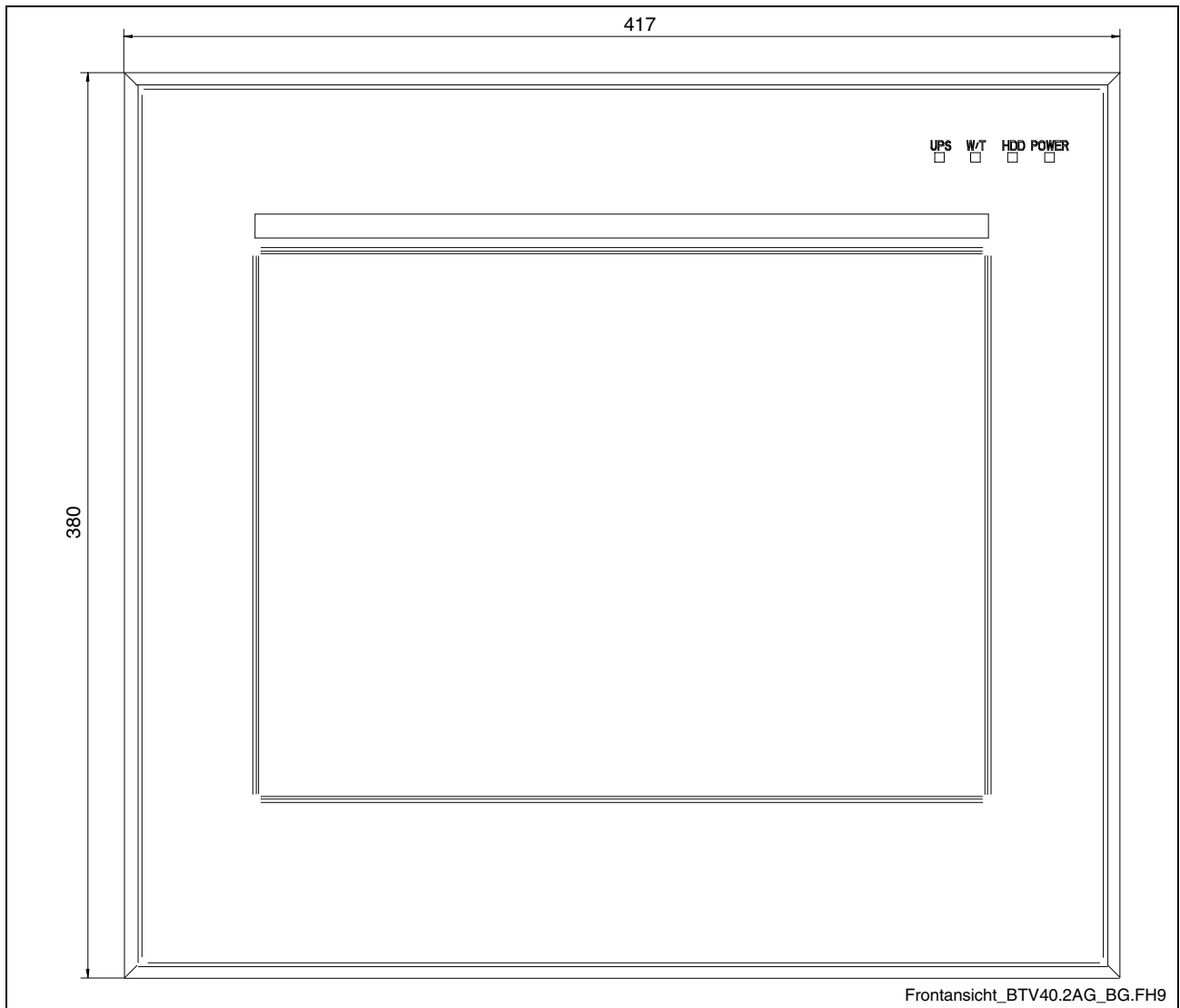

Fig. 5-10:   Dimensions – Front panel BTV 40.2BG and BTV 40.2AG
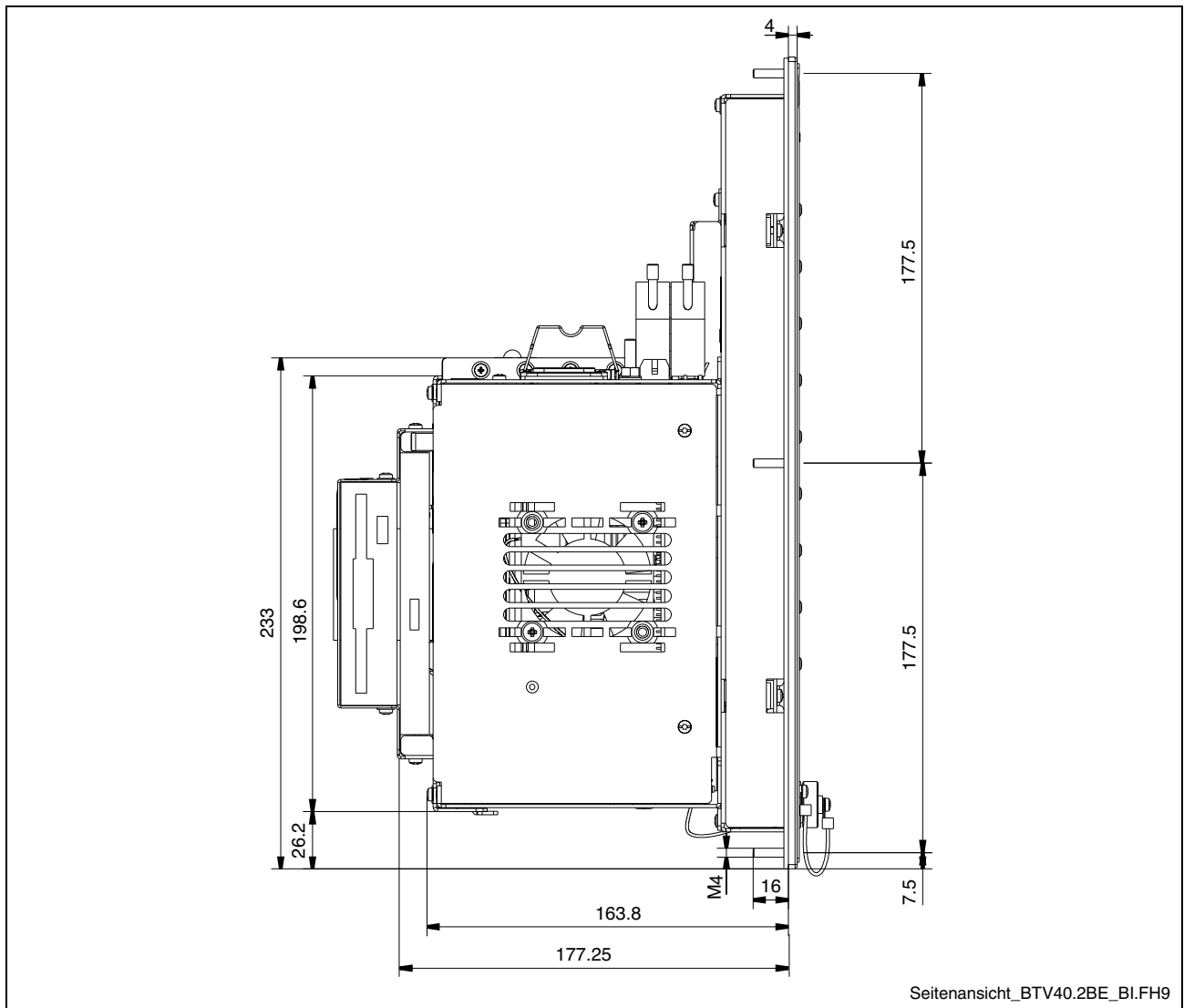(Variant for the food industry)

Seitenansicht_BTV40.2BE_BI.FH9

Fig. 5-11:   Side view BTV 40.2BE and BTV 40.2BI

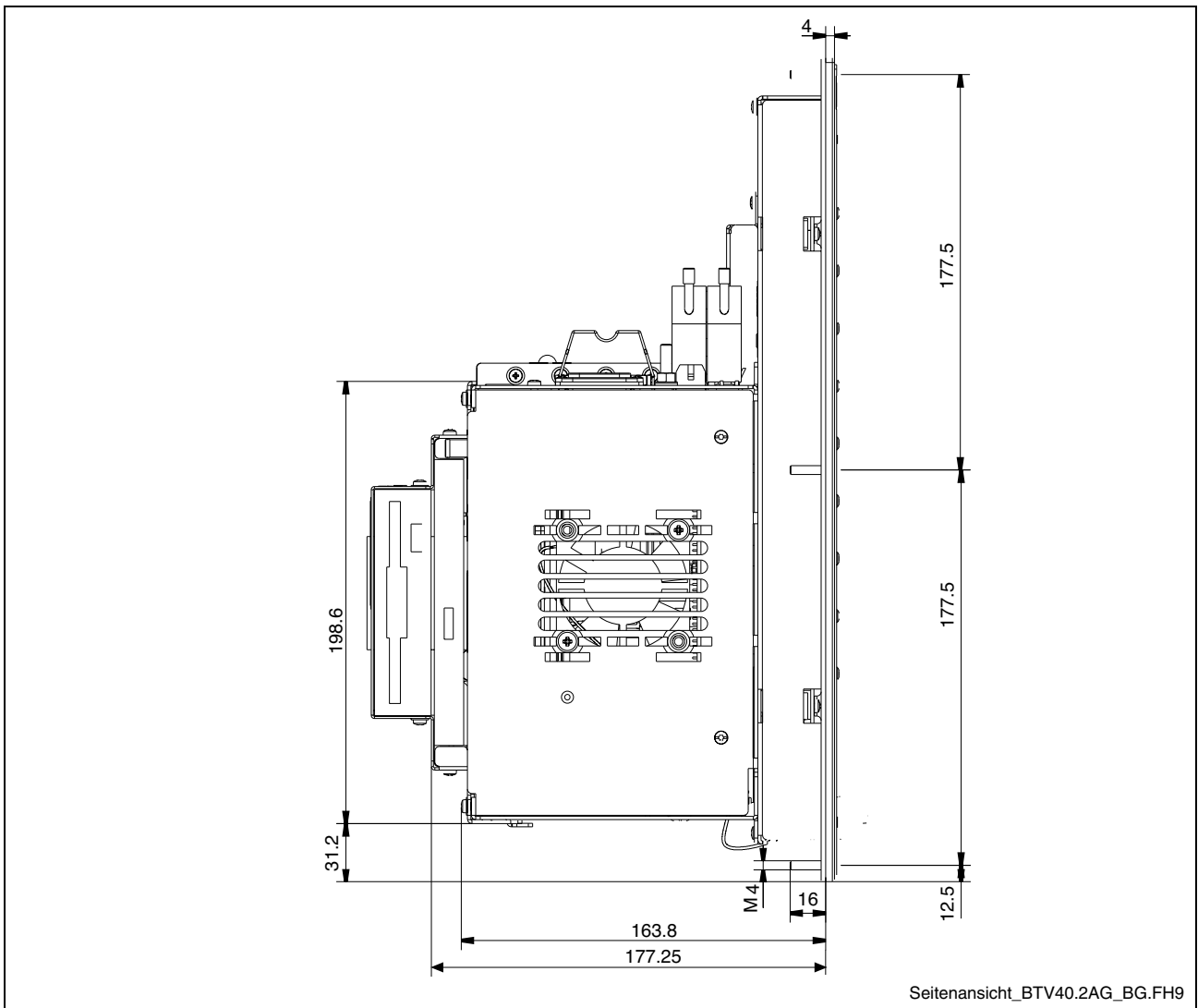| Type A: 3 slots Type C: 4 slots:	BTV 40.2BE and BTV 40.2BI
Installation depth PC box, type A	150.5 mm
Installation depth PC box, type A + CD drive	169.5 mm
Installation depth PC box, type C	171.0 mm
Installation depth PC box, type C + CD drive	192.0 mm

Fig. 5-12:   Installation depth BTV 40.2BE and BTV 40.2BI

Fig. 5-13:   Side view BTV 40.2BG and BTV 40.2AG

Type A: 3 slots Type C: 4 slots:	BTV 40.2BG and BTV 40.2AG
Installation depth PC box, type A	150.5 mm
Installation depth PC box, type A + CD drive	169.5 mm
Installation depth PC box, type C	171.0 mm
Installation depth PC box, type C + CD drive	192.0 mm

Fig. 5-14:   Installation depth BTV 40.2BG and BTV 40.2AG
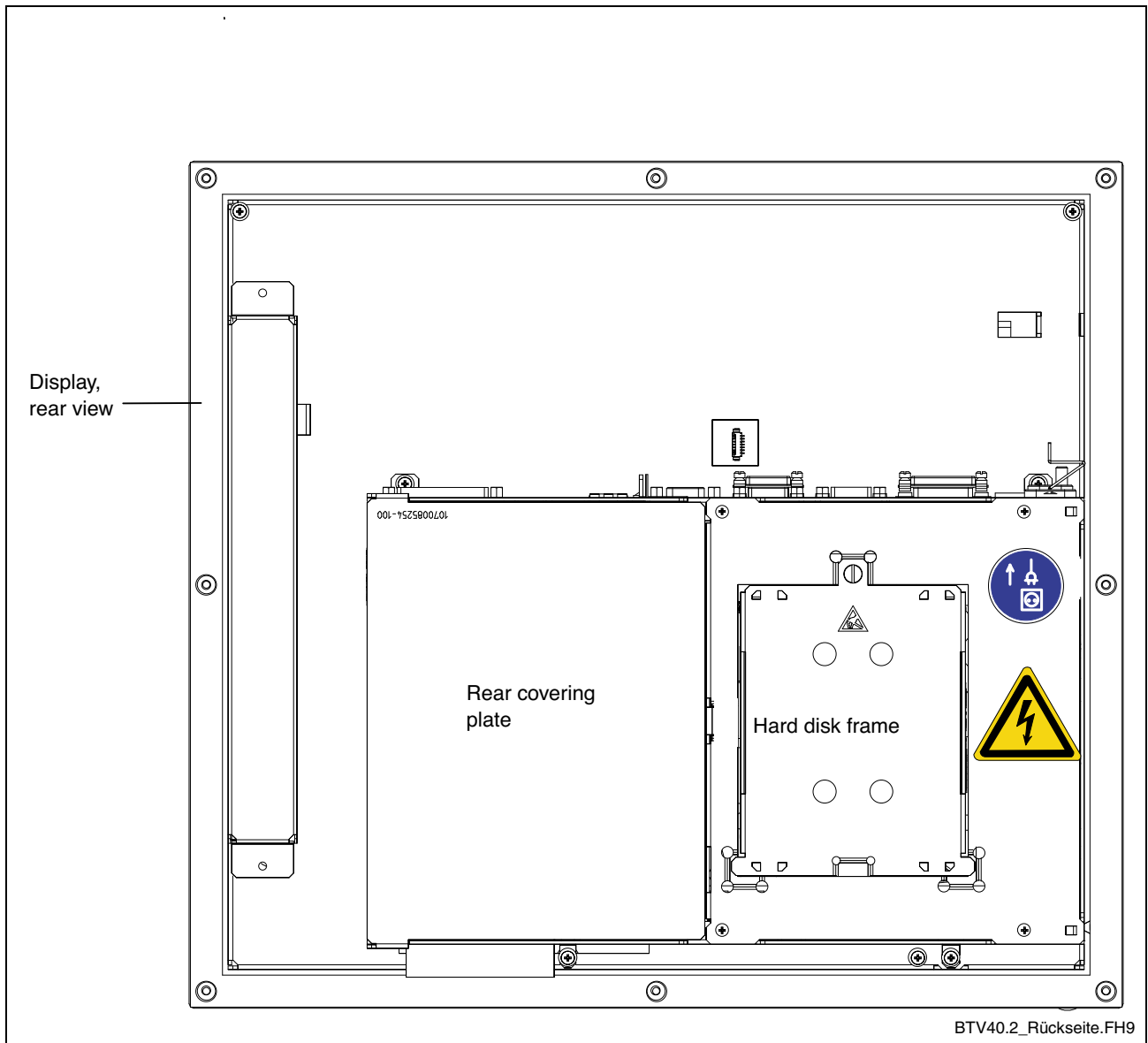
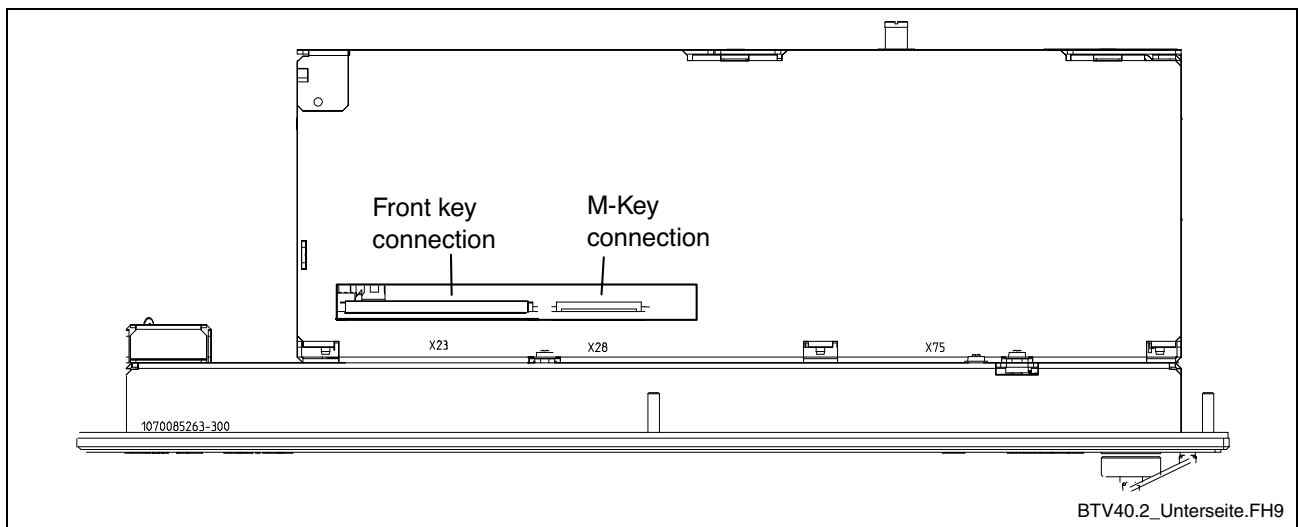Fig. 5-15:   Rear view BTV 40.2

Fig. 5-16:   Bottom view BTV 40.2

Housing Dimensions BTV 60.2

The front panel width of the operator terminal BTV 60.2BL is 483 (19") mm and the height is 266 mm.
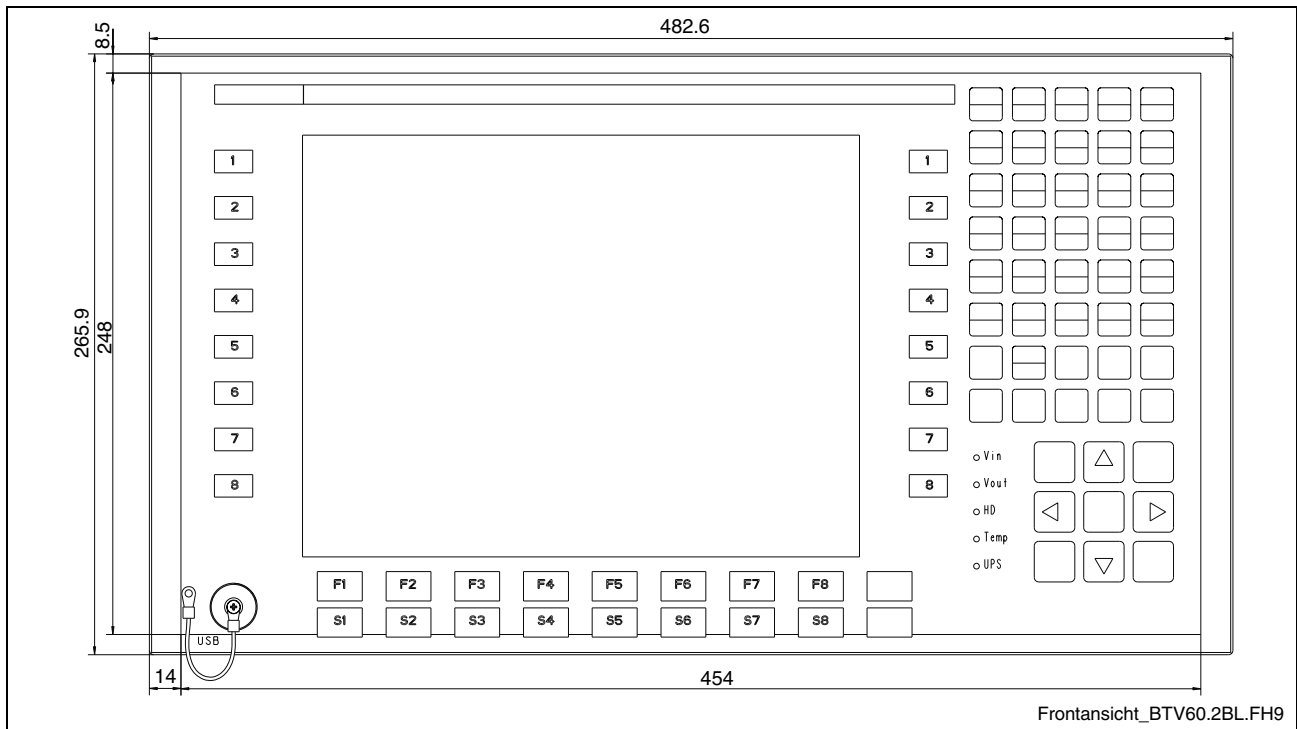

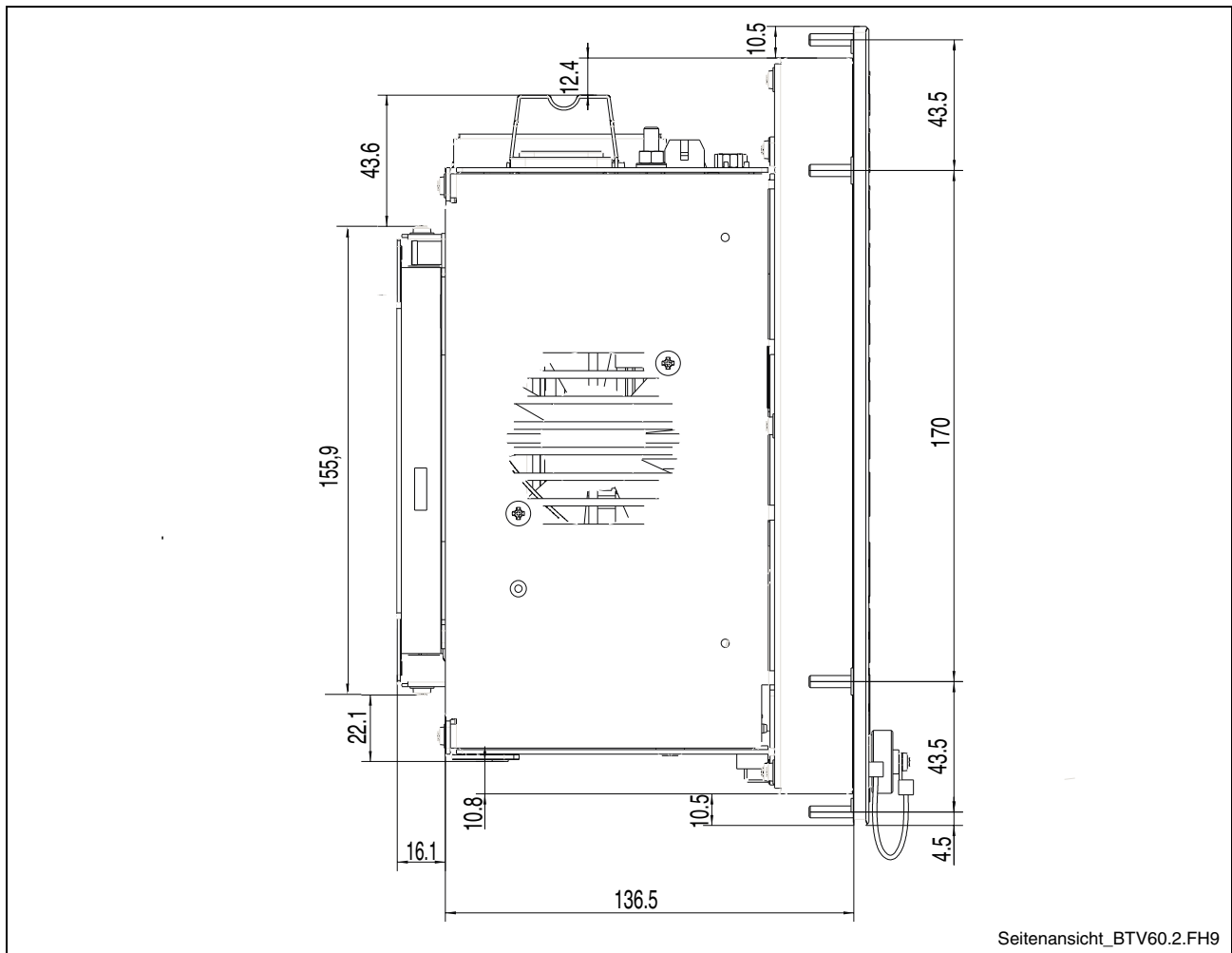Fig. 5-17:   Dimensions – Front panel BTV 60.2BL

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Fig. 5-18: Side view BTV 60.2BL

Type A: 3 slots Type C: 4 slots:	BTV 60.2BL
Installation depth PC box, type A	150.5 mm
Installation depth PC box, type A + CD drive	169.5 mm
Installation depth PC box, type C	171.0 mm
Installation depth PC box, type C + CD drive	192.0 mm

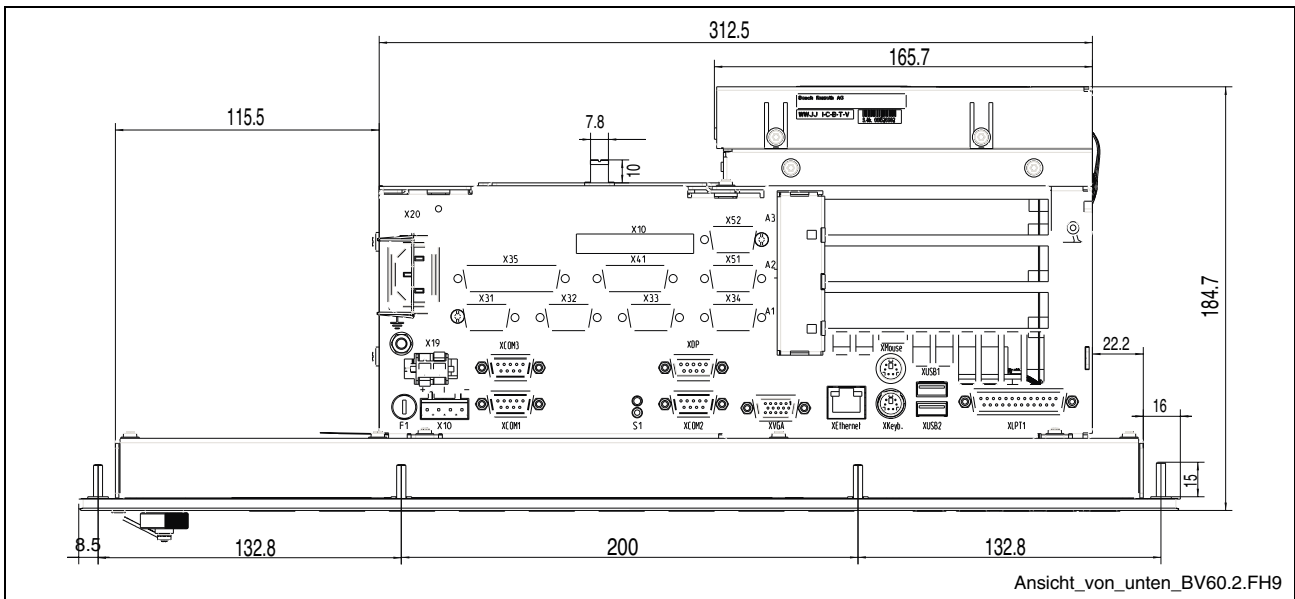Fig. 5-19: Installation depth BTV 60.2BL

Fig. 5-20:   Bottom view BTV 60.2BL

5.2   Installation

Installation Notes

- When installing the operator terminal observe to ensure an ergonomic operation. Additionally, ensure that all moving machine components are in sight of the operator.

- Avoid installation locations exposed to direct sunlight, as the screen readability is reduced and additional heat development can occur.

- Install the operator terminal in a manner ensuring easy access to the connector panel (top side).

- Observe that the LED displays on the front panel are not obstructed.

- Provide a sufficient minimum clearance of 50 mm for cooling and cable routing around the device.

- Lay all connecting cables in loops and use strain reliefs for all cables.

- Keep a suitably large distance from sources of interference.

Mounting Cut-Out

⚠️ **DANGER**

Loss of degree of protection IP 65!

The front panels of the BTV devices correspond to degree of protection IP 65. To ensure that this degree of protection also remains preserved in the mounted status, you have to take appropriate measures:

⇒ Remove – as mentioned below – immediately before mounting the device the paper strip from the seal at the rear side of the front panel.

⇒ Further required measures are to be taken depending on the mounting location, e. g. the stabilization of the mounting frame.

For mounting the operator terminal proceed as follows:

1. Create a mounting cut-out with 8 holes with a diameter of 5 mm, according to the three following illustrations "Mounting dimensions".
2. Remove the paper strip from the seal at the rear side of the front panel.
3. Insert the operator terminal from the front into the cut-out. Then insert the mounting bolts M4 into the drilled holes.
4. Fasten the operator terminal by screwing the nuts at the rear side of the mounting bolts.

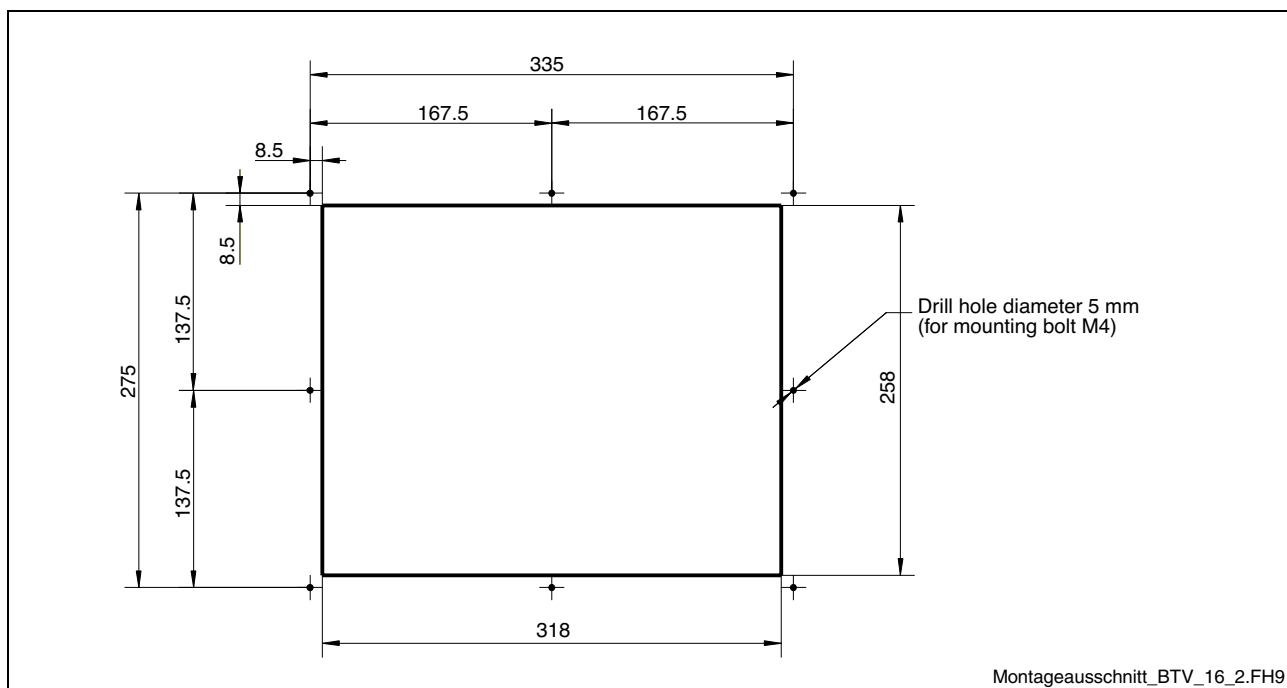# Mounting Dimensions BTV 16.2

Fig. 5-21:   Mounting dimensions BTV 16.2
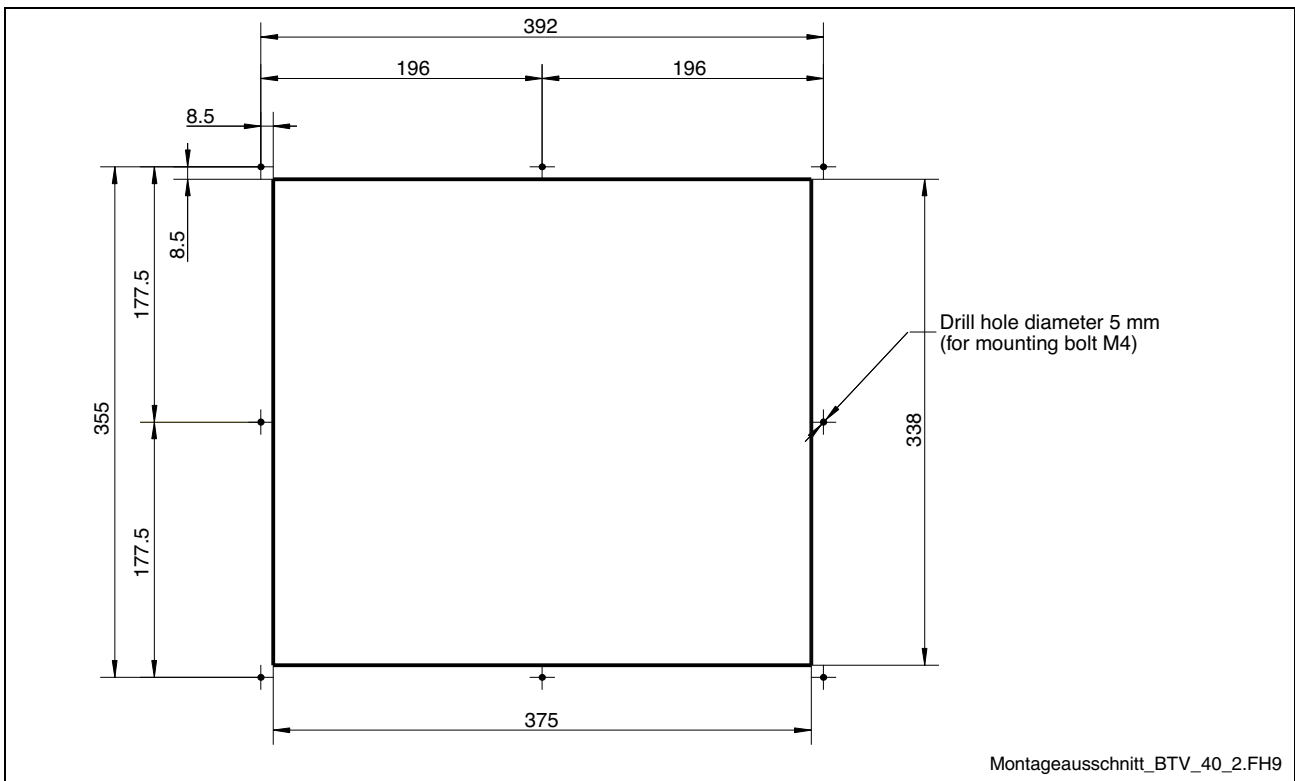
Mounting Dimensions BTV 40.2

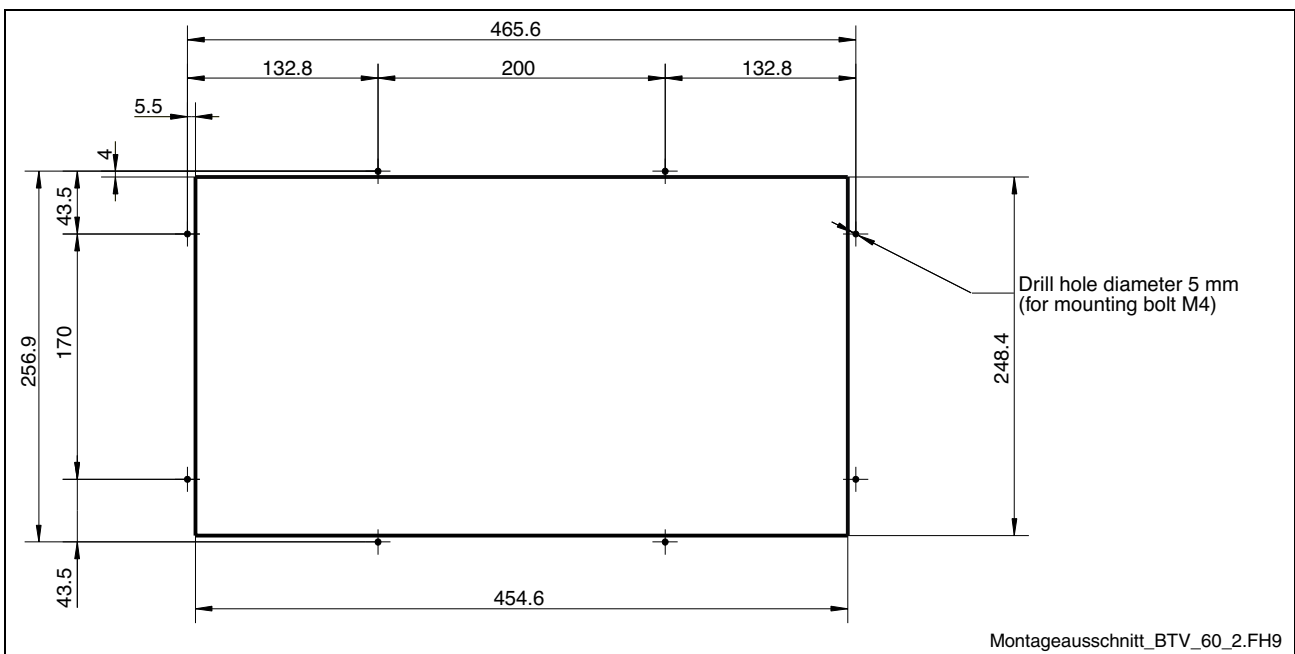Fig. 5-22:   Mounting dimensions BTV 40.2

Mounting Dimensions BTV 60.2

Fig. 5-23:   Mounting dimensions BTV 60.2

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6 Display and Operating Components

6.1 Backlight Switch-Off

The backlight as background lighting of the display has a limited lifetime (see chapter "Wear Parts" on page 4-5).

To extend the service life of the LCD backlight, the flat screen display features a backlight switch-off. This function "darkens" the display, if no operation of the operator terminal has occurred for a certain period of time. The length of the time interval can be specified in the BIOS settings and in the Windows Control Panel.

How to activate the backlight switch-off:

- Select in the BIOS setup program menu item "Power Management Setup" and then submenu item "OnBoard LCD Backlight Timer OFF" and choose as time interval between "28 sec and 14 min".

- Install a screen saver in the operating system, that will switch the display to a "black signal" (blank screen, i. e. no objects visible on the screen). Thereby, select the time interval, after which the screen saver might be activated. The selected time is added to the "Backlight Timer OFF" time set in the BIOS.

Note:	Ensure that the set interval for the screen saver activation is shorter than the time for the activation of the backlight switch-off. If this is not the case, problems to reactivate the display might occur.
	If the display is "darkened" and does not react to a keyboard input or mouse movement, generally, the backlight can be reactivated by pressing the key combination "CTRL" + "Tab".

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6.2   Operating and Error Indication

In the upper part of the front panel there are 4 LEDs to indicate the device states and errors. Depending on the variant the front panel provides labeled LEDs or illuminated symbols. Start the measures specified in the following table, if one of the succeeding LEDs indicates an error or a note.

Symbol / LED	Indicator	Meaning	Measure
⏻ Power	LED green	Normal mode	-
	LED OFF	No supply voltage 230/115 VAC or 24 VDC	Check supply voltage at the power supply unit!
⬭ HDD	LED yellow	Hard disk access	-
🌡 Temp	LED green	Temperature in the safe range	
	LED red flashing	Temperature > 50 °C	Reduce ambient temperature (surrounding air temperature)! Check fan at the PC!
▭ UPS	LED OFF	Normal mode	-
	LED red	Operator terminal is currently operating in battery mode, i. e. no power supply available!	Restore power supply and initiate controlled BTV restart!
	LED red flashing	Battery pack discharged, defective or not connected	Check battery pack! Maintain the charging time of 5 hours!

Fig. 6-1:   LEDs to indicate operations and errors on the front panel

6.3   Keypad

System Requirements

To operate the keypad, an English or US keyboard driver is required. Therefore, don't change the corresponding manufacturer's settings.
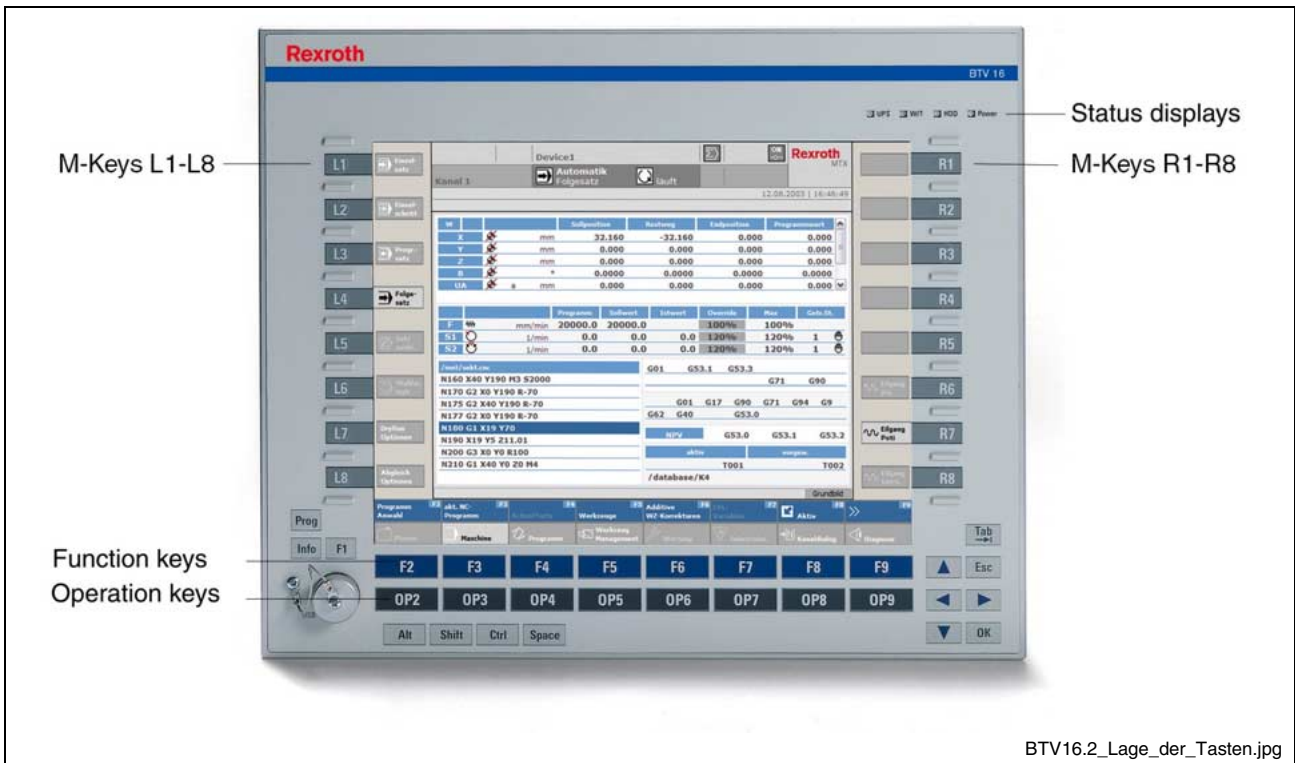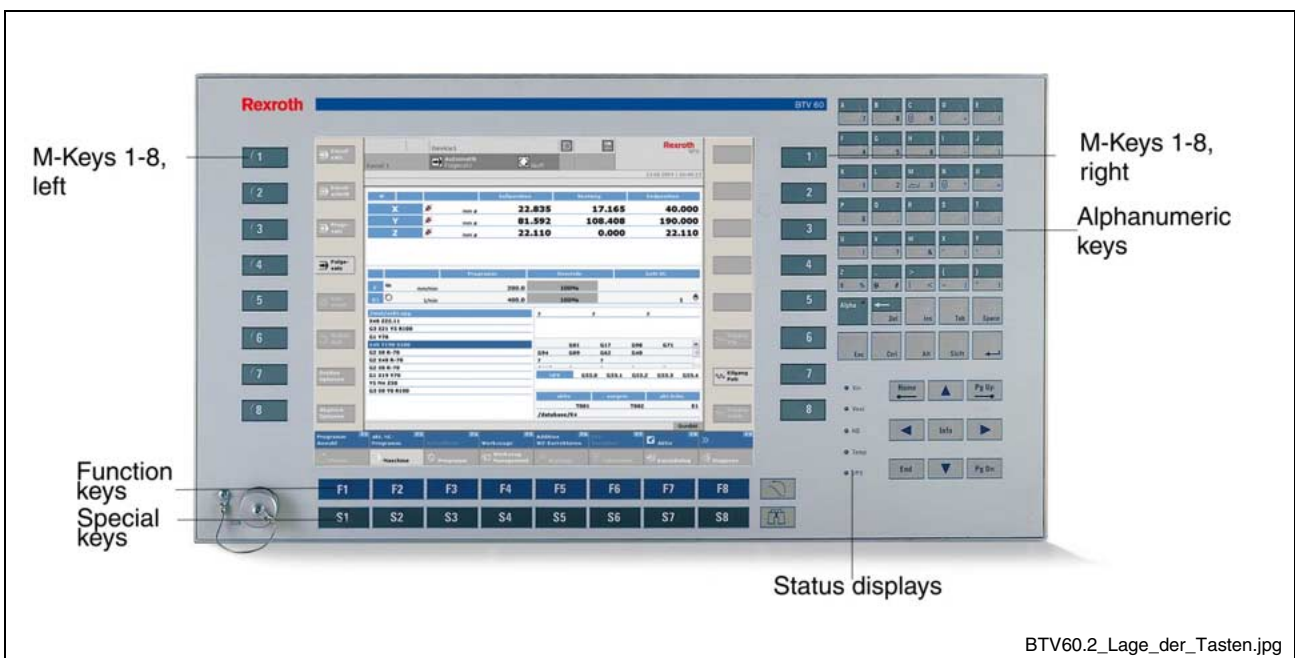
Position of the Keys

Fig. 6-2:   Position of the keys BTV 16.2BK and BTV 40.2BI

Fig. 6-3:   Position of the keys BTV 60.2BL

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BTV 16.2 and BTV 40.2

Function and Operation Keys (F... + OP...)

The assignment of the function and operation keys is determined by the respective application software / the used operating system.

Use of an External Keypad

Concerning the BTV 16.2BK and BTV 40.2BI keypad the key functions can also be activated with an external PC keyboard by pressing the following key combinations:

Key of the BTV 16.2BK and BTV 40.2BI	Corresponding key of a standard keyboard
OP2 to **OP9**	CTRL + SHIFT + ALT + F2 CTRL + SHIFT + ALT + F9
PROG	CTRL + SHIFT + ALT + Q
INFO	CTRL + SHIFT + ALT + I

Fig. 6-4:   Key combinations for the keys of the BTV 16.2BK + BTV 40.2BI

M-Keys

Eight M-Keys (machine function keys) are allocated at the right and the left side of the display (see Fig. 6-2 and Fig. 6-3). The keys on the right side of the display are labeled with R1 to R8, the keys on the left side of the display with L1 to L8.

Addressing of the M-Keys   The status of the M-Keys can be retrieved by several ways:

- Pressed M-Keys are transmitted as PS/2 signals to the PC.

- The states of the M-Keys can be requested via the ISA bus.

- They can be transferred to a soft control installed on the PC via the serial interface COM3.

- At last, the signals are output at the optional plug XDP as outputs of a PROFIBUS DP slave.

Requesting M-Keys via PS/2   The following key codes are output:

Key combinations for the keys of the BTV 16.2BK and BTV 40.2BI	Corresponding key of a standard keyboard
M-Keys, left **L1** to **L8**	CTRL + ALT + SHIFT LEFT + X ASCII block X: 1 ... 8 (not NUM block)
M-Keys, right **R1** to **R8**	CTRL + ALT + SHIFT RIGHT + X ASCII block X: 1 ... 8 (not NUM block)

Fig. 6-5:   Key combinations for the keys of the BTV 16.2BK + BTV 40.2BI

M-Keys may not be subject to a repeating operation (Key Controller -> Conti. Jogging of axes].

Requesting M-Keys via ISA Bus   The M-Keys can be requested via the ISA bus under address 0x142 (16 bit word access). **Pressed M-Keys have the value "0";** if the M-Keys are not pressed, they have the value "1". The following assignment applies:

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
L8	L7	L6	L5	L4	L3	L2	L1	R8	R7	R6	R5	R4	R3	R2	R1

Fig. 6-6:   Assignment of the M-Keys to address 0x142 of the ISA bus

Request M-Keys via COM3   The states of the M-Keys can be transferred to a soft control via the serial interface COM3. For this, select the setting "Keyboard-Controller" in the **ProfiBus / Mode COM3** tab described on page 9-10. The soft control has to send a request telegram and receives as response a keyboard telegram containing all key states.

The request telegram has to consist of one byte with value 0xB2.

The keyboard telegram is send not later than 10 ms after the reception of the request telegram. **Pressed M-Keys have the value "0";** if the keys are not pressed, they have the value "1". The keyboard telegram has the following structure:

Byte 3	Byte 2	Byte 1	Byte 0
CRC	Status	M-Keys right (Bit 0 = R1 to Bit 7 = R8)	M-Keys left (Bit 0 = L1 to Bit 7 = L8)

Fig. 6-7:   Keyboard telegram

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In byte 2 a status is transmitted with the following meaning:

Value	Meaning
0x00	No error
0x01	Directly after Reset, during the self test a M-Key is pressed
0x02	Incoming request telegram before the current keypad telegram is finished

Fig. 6-8:   Status byte

Value 0x01 means that during the self test executed directly after the reset, a M-Key was recognized as pressed. As, however, after a reset no key is activated, thus, a defective key can be recognized.

In byte 3 a CRC is transmitted. To calculate byte 3, byte 0 is bitwise linked with byte 1 by XOR. Then, the result is bitwise linked with byte 2 by XOR. After that, this result is transferred as CRC in byte 3.

Output of the M-Keys via Profibus DP   The M-Keys are output at the optionally provided connection XDP (see page 7-10) as output bits of a Profibus DP slave, so that they can be read by a connected Profibus DP master as inputs. (The corresponding GSD file is archived in folder C:\SUPPORT\PROFIBUS.) **Pressed M-Keys have the value "0";** if the keys are not pressed, they have the value "1".

Byte 1								Byte 0							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
R8	R7	R6	R5	R4	R3	R2	R1	L8	L7	L6	L5	L4	L3	L2	L1

Fig. 6-9:   Assignment of the M-Keys at the Profibus DP

BTV 60.2

Function and Special Keys (F... + S...)

Key combinations for the keys of the BTV 60.2BL	Corresponding key of a standard keyboard
Overview (binoculars)	SHIFT + SPACE
Calling-up the basic screen (stairs)	CTRL + HOME
Info **INFO**	SHIFT + RETURN
Function keys **F1** to **F8**	F1 - F8
Special keys **S1** to **S8**	SHIFT + F1 - SHIFT + F8

Fig. 6-10:　　　Key combinations for the keys of the BTV 60.2BL

M-Keys

Key combinations for the keys of the BTV 60.2BL	Corresponding key of a standard keyboard
M-Keys, left 1 - 4 **1** to **4**	F9 - F12
M-Keys, left 5 -8 **5** to **8**	SHIFT + F9 - SHIFT + F12
M-Keys, right 1 - 4 **1** to **4**	CTRL + F9 - CTRL + F12
M-Keys, right 5 -8 **5** to **8**	CTRL + SHIFT + F9 - CTRL + SHIFT + F12

Fig. 6-11:   Key combinations for the keys of the BTV 60.2BL

Alphanumeric Block

The keys of the alphanumeric block send the default PS/2 codes to the PC.

The alpha key is locking "toggeling" and its output is no code, but only controls the keyboard controller. If the alpha key is active, the key LED flashes. Additional signs like @ and " are entered while pressing the alpha key.

The alphanumeric block works exactly like a standard PC keyboard as for the behavior of the "CTRL", "ALT" and "SHIFT" keys.

Output of the M-Keys and Function Keys via the Profibus DP

Assignment and coding:

The keys are located in the first input byte. If no key is pressed, 0x00 is output.

The output of the M-Keys is code 0x10 to 0x1F.

M-Keys, left 1 -8	0x10 - 0x17
M-Keys, right 1 -8	0x18 - 0x1F

Fig. 6-12:   Code 0x10 to 0x1F

The output of the function keys is code 0x20 to 0x2F.

Function keys F1 - F8	0x20 - 0x27
Function keys S1 - S8	0x28 - 0x2F

Fig. 6-13:   Code 0x20 to 0x2F

6.4   Touch Screen

For the variants BTV 16.2BB/BC, BTV 16.2AC as well as BTV 40.2BE/BG and BTV 40.2AG a touch screen is used, that allows the operation of the application software via the touch-sensitive surface of the display.

Settings can be modified via setup programs (see chapter "Touch Screen Software" on page 9-12).

The icons available on the touch screen depend on the used application software.

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7 PC Box

7.1 View on the Connector Panel

Fig. 7-1:   Position of the interfaces

7.2 Interfaces

Note:	Not each variant provides all the described interfaces. Which interfaces are integrated in the respective device depends on the device configuration.

Note:	Malfunctions caused by insufficient shielding! Use only shielded cables and metallic/conductive connector or coupling covers with large-area screen contact.

Overview

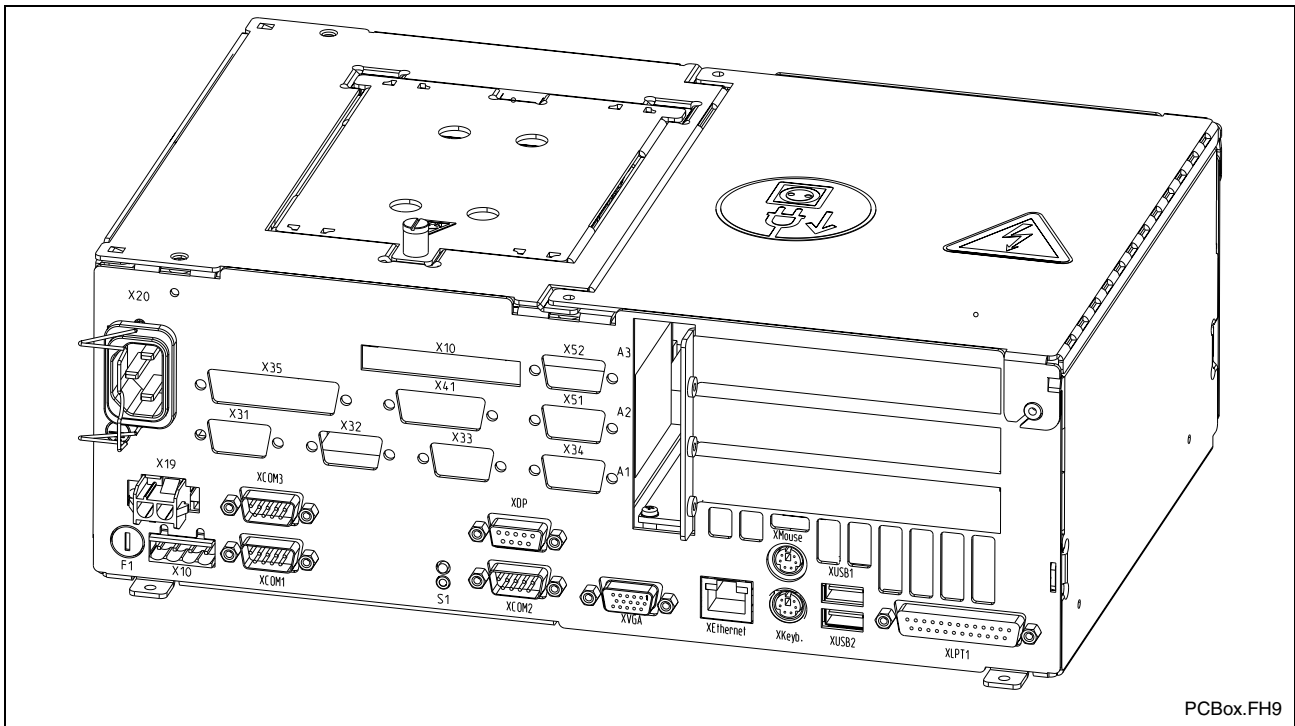|	Des. on the housing	Type of connection	Type of connector (integrated)	Mating connector or cable (from outside)
o	XCOM1, XCOM2, XCOM3	Serial interfaces: RS232 (UART 16550), not assigned	D-Sub male connector, 9-pin	D-Sub female connector, 9-pin
o	XLPT1	Parallel interface: supports standard SPP-, EPP-, ECP mode	D-Sub female connector, 25-pin	D-Sub male connector, 25-pin (e. g. printer cable)
o	XUSB1, XUSB2	USB interfaces	USB female connector, 4-pin, type A	USB male connector, 4-pin
o	XEthernet	Network connection: Ethernet 10Base T / 100Base X	RJ45 female connector, 8-pin	RJ45 connector (twisted pair, 8-core)
o	XVGA	VGA connection of an external CRT monitor	VGA HD female connector, 15-pin	VGA HD male connector, 15-pin
o	XKeyb.	PS/2-Keyboard/Mouse	Mini-DIN PS/2 female connector, 6-pin	Mini-DIN PS/2 male connector, 6-pin
o	XMouse	PS/2 mouse	Mini-DIN PS/2 female connector, 6-pin	Mini-DIN PS/2 male connector, 6-pin
o	XDP	DP-Bus Slave	D-Sub female connector, 9-pin	D-Sub male connector, 9-pin
o	X10	PC power supply: 24 VDC (as an alternative to X20)	Male connector terminal, MSTB 1.5, 4-pin	Female connector terminal, MSTB 1.5, 4-pin
o	X19	Battery for uninterruptible power supply	Tyco/AMP MATE-N-LOK, 2-pin	Cable to the battery of the UPS
o	X20	PC power supply: 230/115 VAC	Inlet male connector for non-heating apparatus	Inlet female connector for non-heating apparatus
c	-	M-Key (X128 on carrier board)	Male connector strip, 20-pin	
c	-	IDE Secondary hard disk (X111 on carrier board)	Male connector strip, 44-pin (on carrier board)	Female connector strip, 44-pin (IDE data for hard disk)
c	-	IDE Primary (X112 on carrier board)	Male connector strip, 40-pin (on carrier board)	Female connector strip, 40-pin (IDE data for hard disk)
c	-	IDE Primary (X113 on carrier board)	Male connector strip, 44-pin (on carrier board)	Female connector strip, 44-pin (IDE data for hard disk)
f	USB	USB interface	USB female connector, 4-pin, cap in degree of protection IP 65	USB male connector, 4-pin
c	USB	USB interface	USB female connector, 4-pin	USB male connector, 4-pin

Connection point: o= Top side of the housing,   f= Front of the operator terminal   c= On the carrier board (in the device)

Fig. 7-2:   Connector types for BTV 16 / BTV 40 / BTV 60

Serial Interfaces XCOM1 to XCOM3

XCOM1 to XCOM3 – Serial Interfaces

Depending on the device variant up to three serial standard interfaces are available at the connections XCOM1 to XCOM3.

D-Sub male connector, 9-pin			
Type:	RS232		
Cable length:	Max. 15 m		
Cable type:	Shielded, cross section min. 0.14 mm²		
Transmission rate:	Max. 115200 bits/s		
Handshake:	Hardware and software handshake (XON, XOFF)		
	XCOM1	**XCOM2**	**XCOM3**
Interrupt (IRQ):	4	3	10
I/O address:	AUTO (or 3F8H)	AUTO (or 2F8H)	3E8H
BIOS presettings:	Enabled	Enabled	Enabled
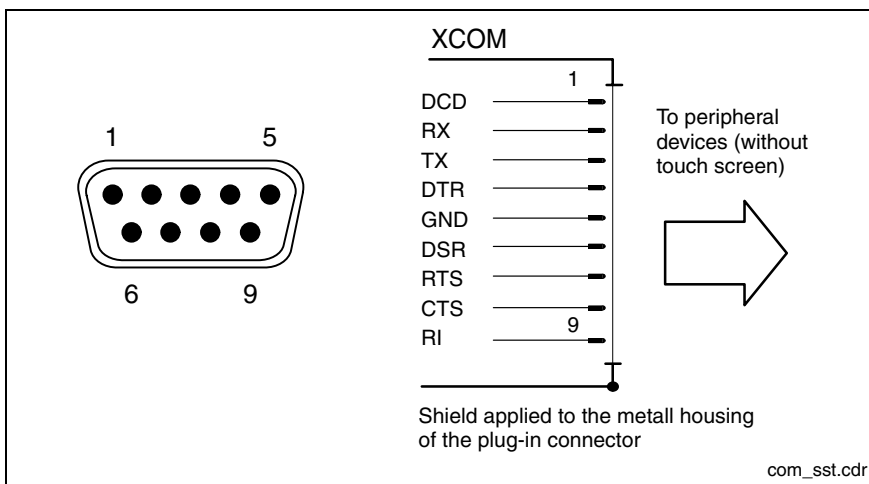
Fig. 7-3: Pin assignment XCOM1 to XCOM3

Note: Depending on the variant and the used software packages the interfaces can be already taken.

Settings of the Serial Interfaces

Control Panel

To find out settings of the transfer parameters for the serial interfaces please refer to the description of the installed operating system (for Windows 95/NT: select "Settings, Control Panel, ..."

BIOS

The standard BIOS setting of the COM1 (Serial Port A) and COM2 (Serial Port B) is **AUTO** (automatic parameter assignment). If a direct parameter assignment is required, you should choose the following settings:

COM1 = 3F8H COM2 = 2F8H

COM3 and COM4 are set ex works as "**Enabled**".

Note: Interrupt (IRQ) and I/O address must coincide with the settings made in BIOS.

If an address conflict regarding COM3 occurs, e. g., IRQ 10 or 11 are already occupied by other extension cards of the PC, free IRQs have to be used.

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Parallel Interface XLPT1

XLPT1 – Parallel Interface for Printer, Scanner, etc.

D-Sub female connector, 25-pin	
Type:	SPP (ex works), EPP, ECP
Cable length:	Max. 3 m
Cable type:	Shielded, cross section min. 0.14 mm²
Interrupt (IRQ):	7
I/O address:	AUTO or 378H (recommended)
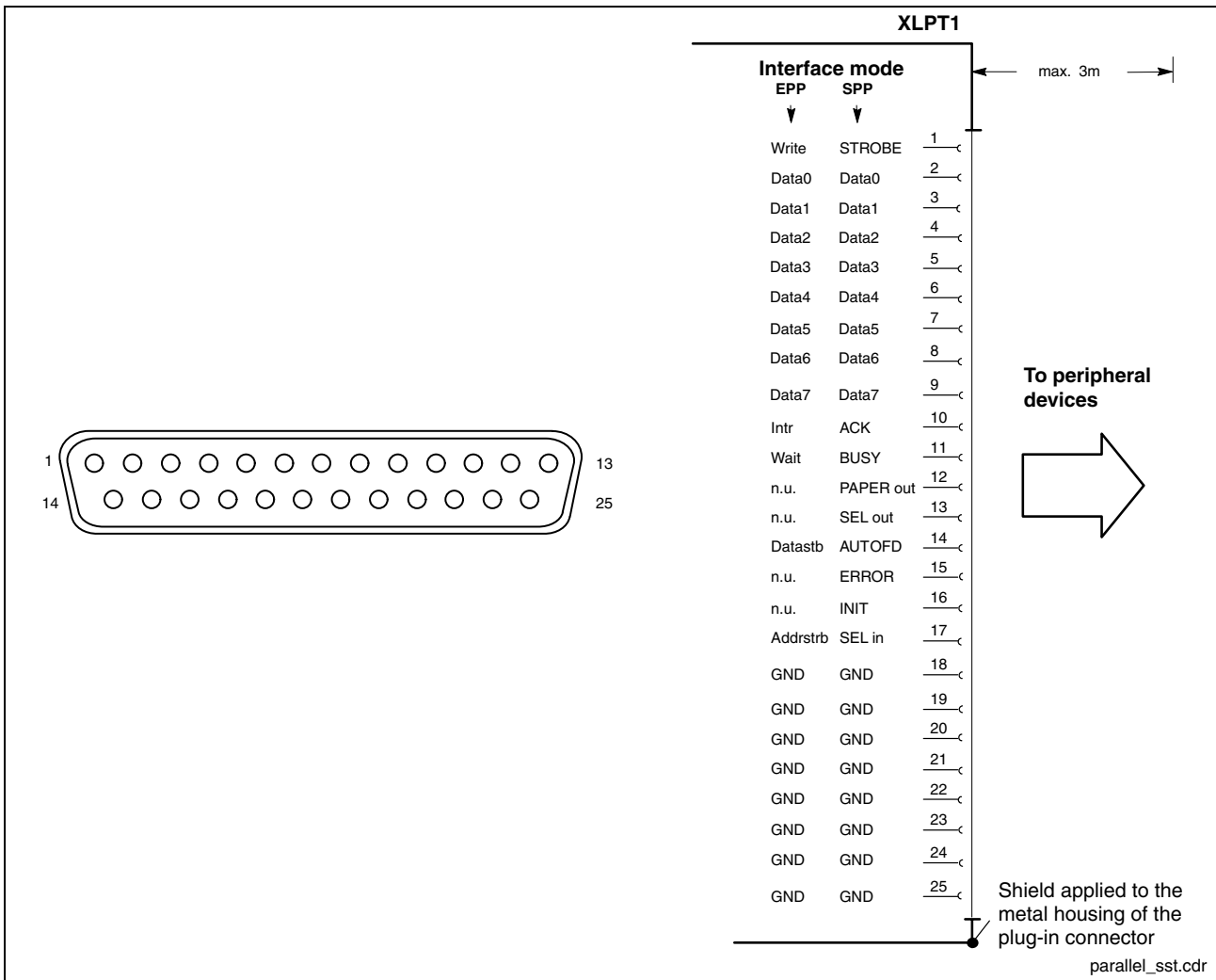
Fig. 7-4: XLPT1 interface

The parallel interface normally runs in the standard mode SPP. Furthermore, it can be operated in the EPP mode (Enhanced Parallel Port) or in the ECP mode (Extended Capabilities Port), if the suitable peripheral equipment is available. The mode can be changed in the BIOS settings.

USB Interfaces

XUSB – Serial Interfaces for Printer, Scanner, CD-ROM Drive

The devices feature two USB interfaces on the connector panel (XUSB1 and XUSB2), one in the device (on the carrier board) and one on the front panel (This is not the case for devices for the food industry.).

Note:	The maximum power consumption of the connected device must not exceed 500 mA. If the load exceeds 500 mA, the internal current monitoring is activated.

Note:	The USB interfaces are not supported by the operating system Windows NT4.0.
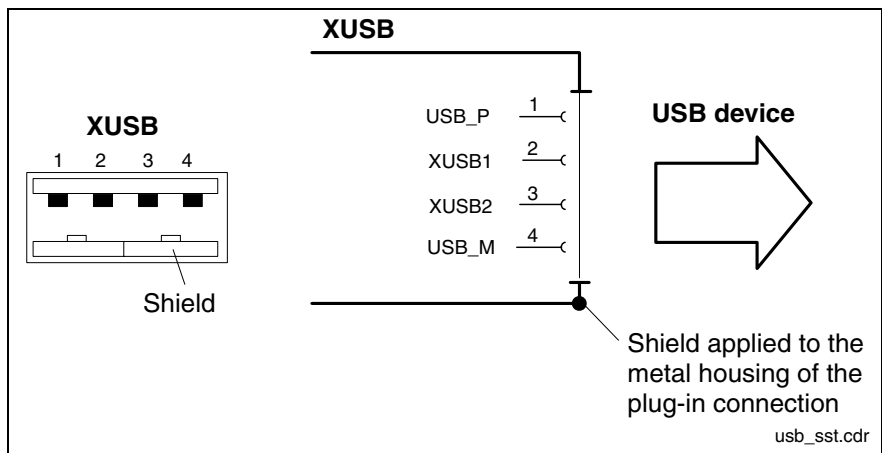
Fig. 7-5:   USB interfaces XUSB1 and XUSB2

Pin	Function
1	USB power supply (max. 500 mA)
2	Data -
3	Data +
4	USB ground

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Ethernet Interface XEthernet

XEthernet – Network connection   The operator terminal can be connected with an Ethernet network via the XEthernet interface.

RJ45 female connector, 8-pin	
Type:	Ethernet 10Base T / 100Base X
Cable length:	Max. 100 m
Cable type:	Shielded, twisted pair
Transmission rate:	10 or 100 Mbits/s
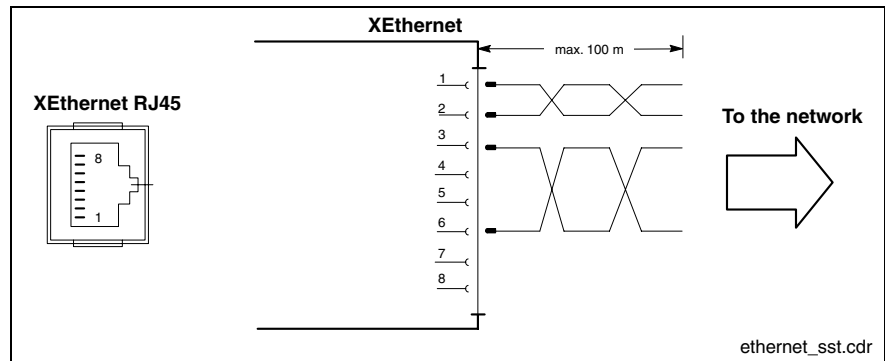
Fig. 7-6:   Ethernet interface XEthernet

The driver configuration of the network connection can be called up in the task bar or in the "Control Panel" with icon "Network Board". Here you can set among other values, if the data transfer shall occur with 10 Mbits/s and/or with 100 Mbits/s.

Note: Please observe that the network board of the outstation has to be able to process the same data transmission rate.

VGA Interface XVGA

XVGA – Connection for an External Monitor   An external monitor (CRT) can be connected to the VGA connection (XVGA) and can be operated parallel to the integrated flat screen via the integrated video adapter.

- Video RAM: Max. 8 MB

Note: Please observe that the external monitor has to be already connected during the booting process of the operator terminal, as otherwise the VGA interface is not initialized by the BIOS.

Note: Before plugging-in a graphic card the video adapter integrated in BIOS has to be switched off.

HD female connector, 15-pin	
Cable length:	Max. 1.5 m
Cable type:	Shielded, cross section min. 0.14 mm²
Max. resolution:	1600 x 1200 Pixel, max. 4294 mill. colors
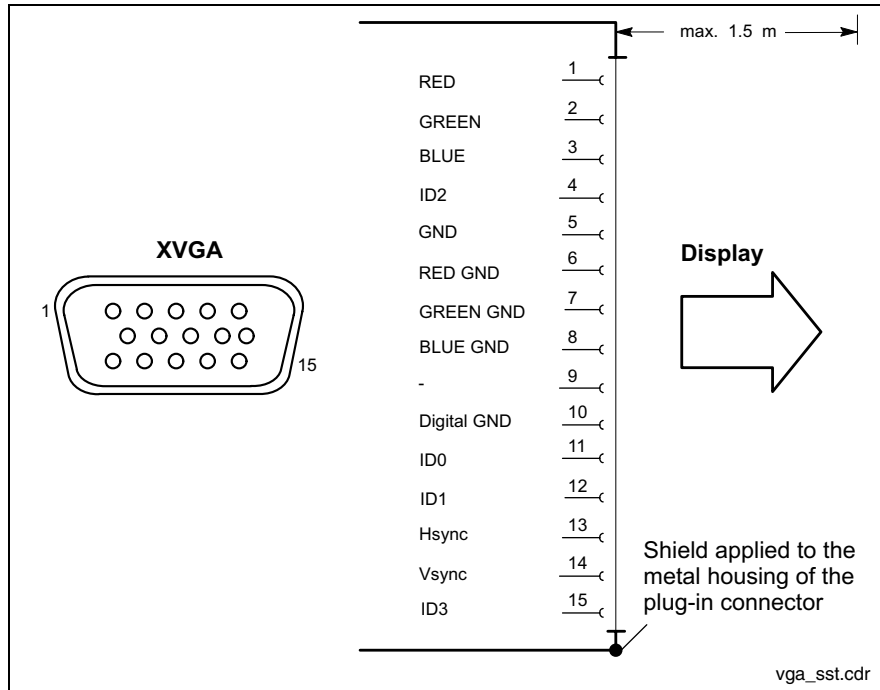
Fig. 7-7:   XVGA interface

Resolution   The following standard resolutions can be operated with an image refresh rate of min. 72 Hz.

- VGA mode: 640 x 480 pixels   32 bits colors
- SVGA mode: 800 x 600 pixels   32 bits colors
- XGA mode: 1024 x 768 pixels   32 bits colors
- SXGA mode: 1280 x 1024 pixels   24 bits colors

The resolution and number of the colors is set in the Control Panel of the operating system.

⚠️ **CAUTION!**

Setting incorrect resolutions and colors may destroy your monitor!

⇒   Please observe the technical data of your monitor and adapt the operating system parameters accordingly.

Recommended monitors for external use are low-radiation models according to TCO95. In addition, you should achieve the desired display resolution with a refresh rate of at least 72 Hz.

Combined Keyboard/Mouse Interface

XKeyb. – PS/2 Mini DIN Keyboard / Mouse Interface

PS/2 Mini-DIN female connector, 6-pin	
Cable length:	Max. 1.5 m
Cable type:	Shielded, cross section min. 0.14 mm²
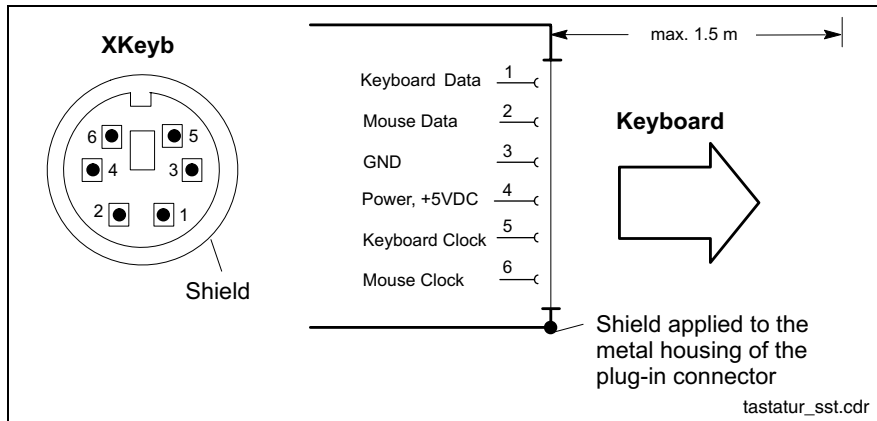
Fig. 7-8:   Combined keyboard/mouse interface XKeyb.

Mouse Interface

XMouse – PS/2 Mouse Interface

PS/2 Mini-DIN female connector, 6-pin	
Cable length:	Max. 1.5 m
Cable type:	Shielded, cross section min. 0.14 mm²
Interrupt (IRQ):	12
BIOS presettings:	PS/2 mouse support: Enabled PS/2 mouse: Auto detect
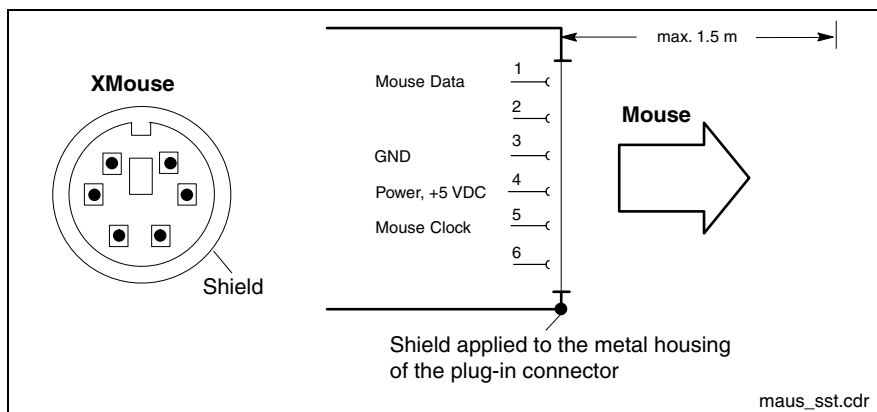
Fig. 7-9:   Mouse interface XMouse

If a PS/2 mouse is not recognized by the system, the mouse has to be activated in the BIOS by switching from "Disabled" to "Autodetect". The operating system will not recognize the plugging-in of an external mouse after completed startup, because the mouse initialization occurs during the booting process.

Note: The connected mouse must be PS/2-compatible. Normally, the BIOS reserves IRQ 12 for the PS/2 mouse. If there are address conflicts, e. g., if IRQ 12 has already been occupied by another PC extension card, you should change the IRQ of this extension card to another IRQ, that is still free.

PROFIBUS DP Interface XDP

XDP –
PROFIBUS DP Interface

Optionally, the connection XDP provides a PROFIBUS DP SLAVE interface according to DIN EN 50170, Part 2. This interface allows to request the states of the M-Keys available for devices with keypad (see section M-Keys in chapter 6).

D-Sub female connector, 9-pin	
Type:	RS485
Cable type:	Shielded, twisted pair
Transmission rate:	10 or 100 Mbits/s
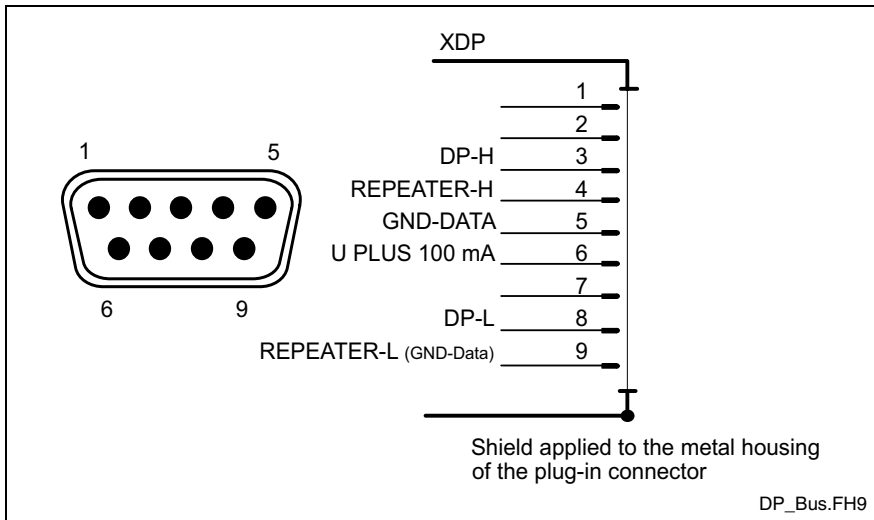
Fig. 7-10:   PROFIBUS DP interface

The bus cable is specified as cable type A according to EN 50170, part 8-2. It must comply with the following cable parameters:

Surge impedance at a frequency within a range from 3 to 20 MHz	135 to 156 ohms
Operating capacity	≤ 30 pF/m
Loop resistance	≤ 110 ohms/km
Outside diameter	> 0.64 mm
Core cross-section	> 0.34 mm²

Fig. 7-11:   Parameters for PROFIBUS DP line

The above mentioned cable parameters of a standard cable of cable type A result in the following length extensions of a bus segment for the particular transmission rates:

Transmission rate in kbits/s	9,6	19,2	45,45	93,75	187,5	500	1500	3000	6000	12000
Max. segment length in m	1200	1200	1200	1200	1000	400	200	100	100	100

Fig. 7-12:   Maximum segment length in relation to the transmission rate

Hinweis: The respective PROFIBUS slave address is set with the USP software (see page 9-10). The corresponding GSD file is C:\SUPPORT\PROFIBUS\Rx010135.gsd.

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PC Power Supply

X10 – 24-VDC Power Supply This connection is used for device variants for 24 VDC. All internally required voltages are generated with electrical isolation via a DC/DC converter. The connection is designed as connector terminal MSTB 1.5, 4-pin. To this connector terminal, cables with a cross section of maximum 1.5 mm² can be connected.

Note: Also for devices with a 230/115 VAC voltage connection an additional voltage of 24 V has to be applied, if the device features 24 V outputs.

X10		Pin	Assignment
+	−	1	24V
		2	24V
• • • •		3	0V
1 2 3 4		4	0V
			x10.cdr
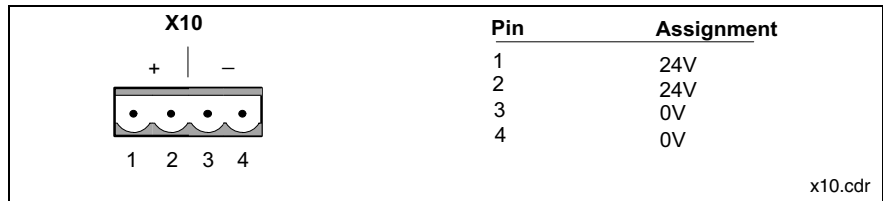
Fig. 7-13:   Pin assignment of the 24 VDC connection X10

Parameters	Value
Rated voltage U_N	24 VDC +20 %, -15 %
Residual ripple for U_N	See figure below
Noise and surge immunity	U_{max}= 35 V (for t < 100 ms)
Current consumption for U_N	Max. 4.8 A
Line-side fuse	M6,3A (5x20) medium time-lag
Reverse voltage protection	Via isolating diode The line-side fuse is activated when polarity reversal occurs.

Fig. 7-14:   Technical data of the 24 VDC connection

⚠ DANGER

Danger without protective separation!

⇒ The 24 VDC input voltage must comply with the requirements of the "Protective separation".

⇒ Plug and unplug the connector only in no-voltage condition!
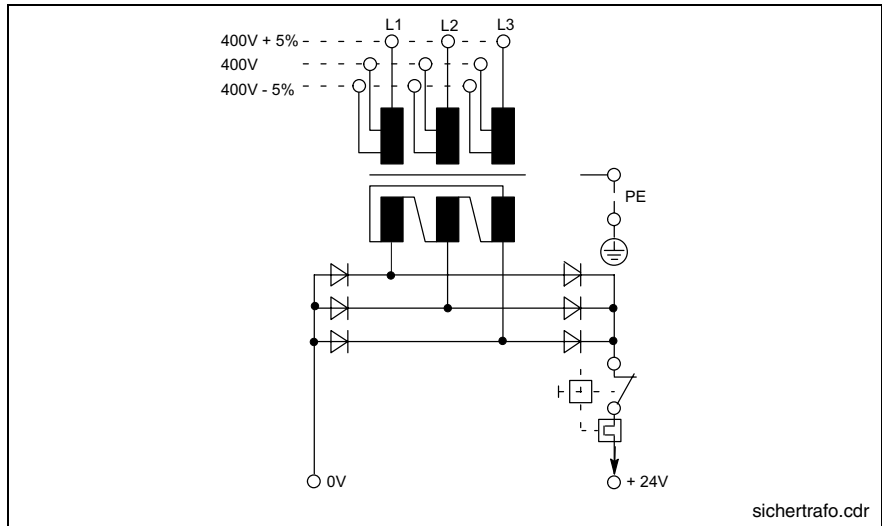
Fig. 7-15:   Safety transformer according to EN 60742

Interfering AC voltage components such as resulting from an uncontrolled 3-phase current bridge connection without smoothing with a ripple factor (see DIN 40110/10.75, section 1.2) of 5 % are permissible.

It follows from the above that as upper voltage limit the greatest absolute value is 30,2 V and as lower voltage limit the lowest absolute value is 18,5 V.
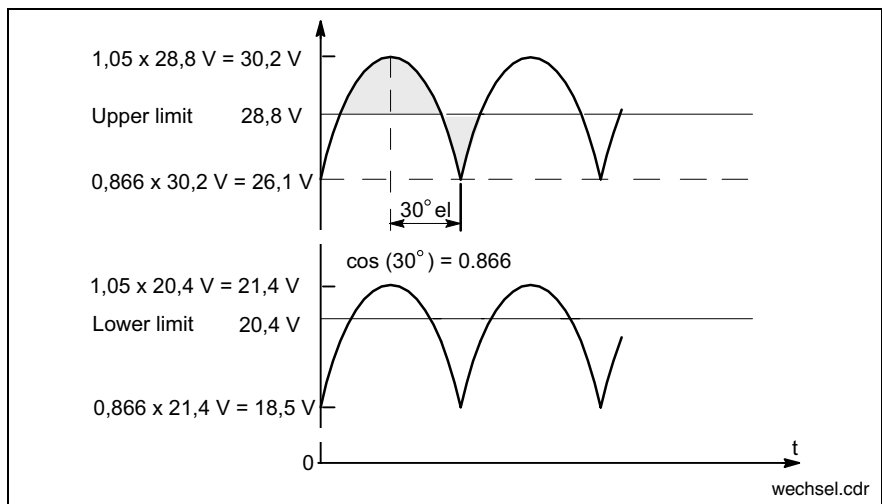
Fig. 7-16:   Illustration of the limit values for the 24 VDC voltage

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L1 L2 L3 PE   PE

10^2 (green/yellow)

**Power supply with
safety transformer
acc. to EN 60742**

24 VDC

Cross-sections depending
on current consumption,
min. of 4 mm^2.
For higher current con-
sumption use 2 x 4 mm^2.

6^2 (1)(blue)

Length max. 4 m

| A | A | B |

24 V load   0 V load

10^2 (green/yellow)(2)

Earth bar

A = Terminal block 4^2
B = Terminal block 10^2

☐ : Terminals in isolated arrangement

**Operator terminal
(24 VDC version)**

Display with front
keypad and PC

Cross sections depending
on current consumption,
but a min. of 0.75 mm^2(3)

Power supply

X10

PE

(1) Easily removable and visible

(2) PE bars should be preferablly installed on the mounting plate
in a conductive manner. In the case of isolated PE bars both
ends must be connected to mounting plate by means of copper
strips with a maximum length of 20 cm.
The cross section of the copper strips has to be, at least, equal
to that of the incoming mains cable.

(3) 0,75 mm^2 up to 6 m
1,5 mm^2 up to 10 m
Distances exceeding 10 m require
a separate local power supply unit!

24V_Trafo.FH9

Fig. 7-17:   Wiring of the power connection 24 VDC and the operator terminal

X20 – 230/115 VAC Power Supply

This connection is used for device variants for 230/115 VAC.

All internally required voltages are generated by the 230/115 VAC power supply unit.

⚠️ **CAUTION**

The supply voltage must comply with overvoltage category II! Otherwise the integrated power supply unit might be destructed.

⇒ Use an isolating transformer to generate the 230/115 VAC (see following page).

The 230/115 VAC connection occurs via a 3-pin inlet connector for non-heating apparatus on the connector panel. Maximum cable cross section for the connected cables is 1.5 mm^2.

X20

PE

Assignment

N1
PE
U2

230V_Buchse.cdr

Fig. 7-18:   Pin assignment of the 230/115 VAC connection X20

Parameters	Value
Rated voltage	85 VAC ... 264 VAC auto range
Power consumption for U_N = 230 VAC	0.7 A
Power consumption for U_N = 115 VAC	1.4 A
Inrush current for U_N = 230 VAC	30 A cold start 25 °C
Inrush current for U_N = 115 VAC	15 A cold start 25 °C
Line-side fuse	1.6 A (5x20)

Fig. 7-19: Technical data 230/115 VAC connection

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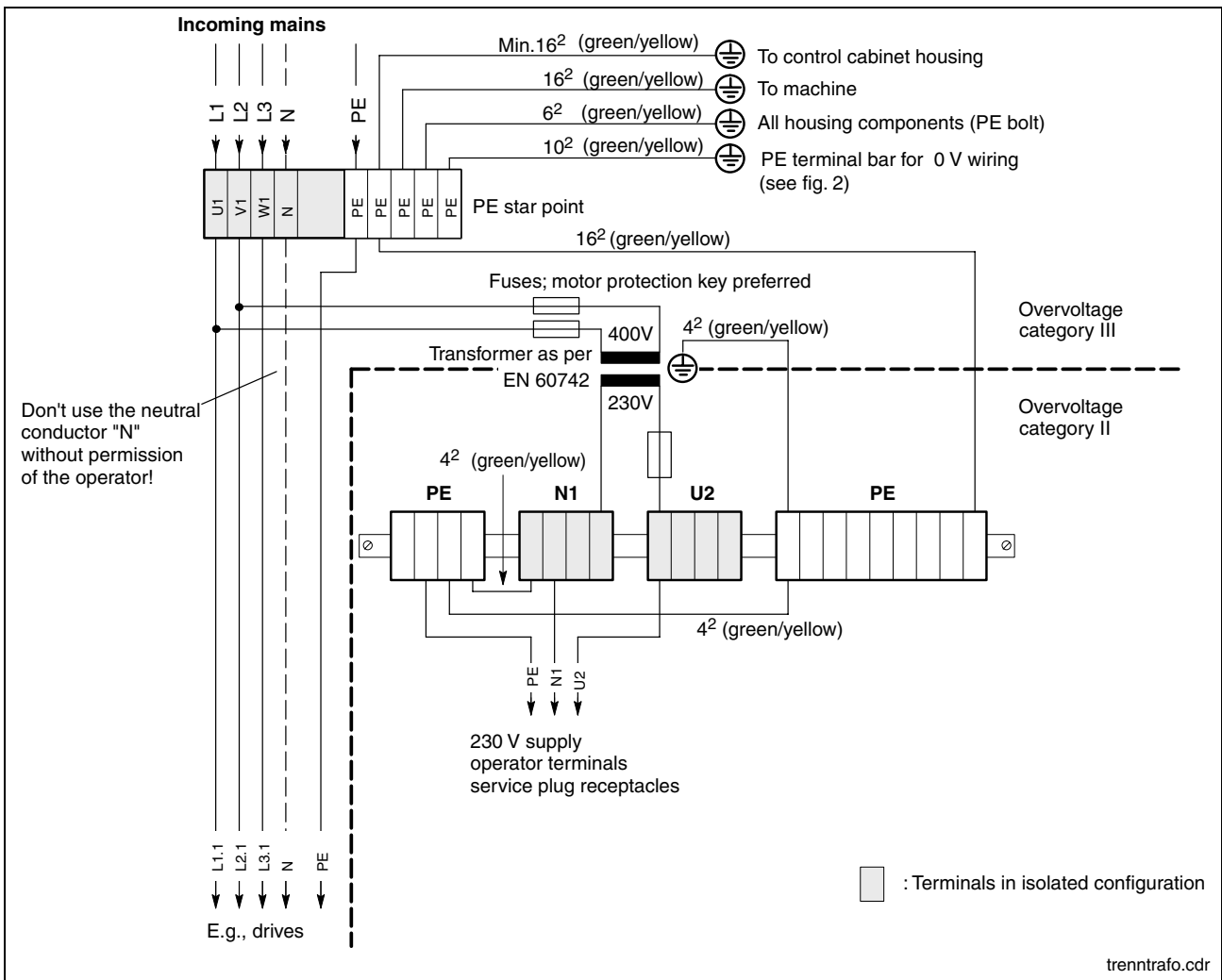Fig. 7-20:   Voltage connection 230 VAC via isolating transformer

Battery Connection

X19 – Battery Connection   Connection terminal for an external battery for the integrated UPS:

2-pin	
Cable length	Max. 3.0 m
Cable type	Unshielded, cross section 1.5 mm²
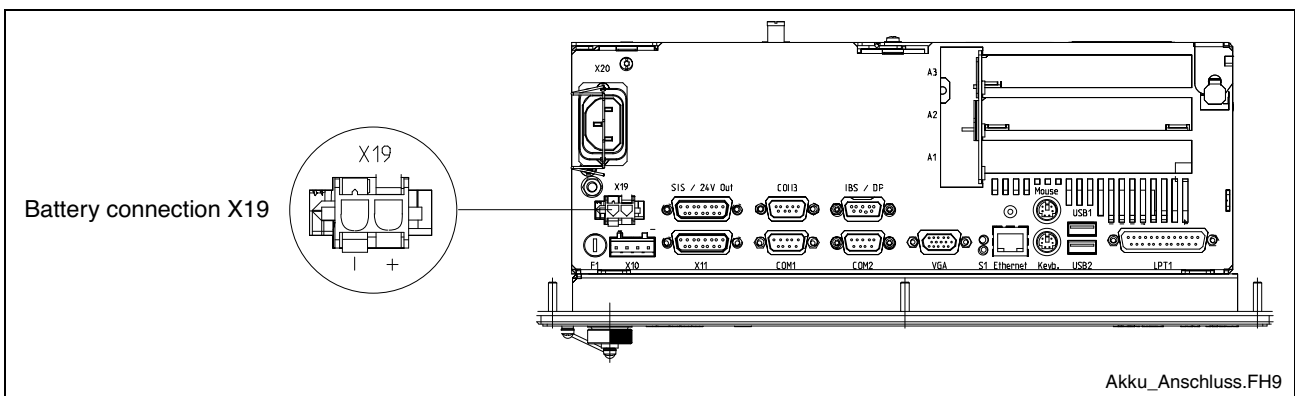
Fig. 7-21:   Battery Connection

8   Maintenance and Installation

8.1   General Information

The operator terminals are maintenance-free. However, some components are subject to wear and must be replaced (see chapter "Wear parts" on page 4-5).

Maintenance   Include the following measures in your maintenance schedule:

- Clean the screen surface at least once a week with an anti-static cloth or window cleaning agent containing denatured alcohol.

⚠ **CAUTION!**

Dissolution of the keypad surface and the display seal through contact with solvents!

⇒   Do not use any solvents (e. g. paint thinner)!

- At least once a year, check all plug and terminal connections for proper tightness and damage. Check that cables are not broken or crushed. Replace damaged parts immediately.
- Check the fan at least once a year.

⚠ **DANGER**

Risk of injury through rotating fan impeller!

⇒   Keep hands and fingers clear of the fan impeller, and do not insert any items.

- Ensure that the batteries of the operator terminal are fully functional. Activate the battery test of the UPS program, so that the battery pack is checked during each restart.

8.2 Hard Disk

The installation frame of the hard disk can be accessed from the rear side of the operator terminal. The hard disk can be replaced including the installation frame.

⚠ **CAUTION!**	**Loss of data!**
	⇒ Back up all required application data as well as operating system settings to an external storage medium!

⚠ **CAUTION!**	**Risk to damage the operator terminal by electrostatic discharges!**
	⇒ Comply with all ESD-protection measures during working with modules and components! Avoid electrostatic discharges!

Note: To store user data and to avoid the re-installation of the operating system and application programs after a hard disk exchange, you should back up the well-working hard disk at regular intervals.

Note: The hard disk to be inserted must already have an installed operating system, if no floppy disk drive is connected to the operator terminal. In any case, it is recommended to have a completely installed operating system on the hard disk, to shorten the installation time!

1. Save all required user data as well as the operating system settings of your system on an external storage medium or via the network connection!
2. Disconnect the power supply.
3. Wait until the power supply unit switches off automatically after UPS operation (the UPS LED on the front panel flashes red until the UPS switches off the power supply unit). If required, unplug all connectors and the battery cable at interface X19.
4. Loosen the retaining screw of the hard disk's installation frame on the rear side of the operator terminal (see Fig. 8-1). Lift the hard disk frame and after releasing the retaining spring unplug the ribbon cable, with which the hard disk is connected to the main board. Now, the installation frame with hard disk can be removed.
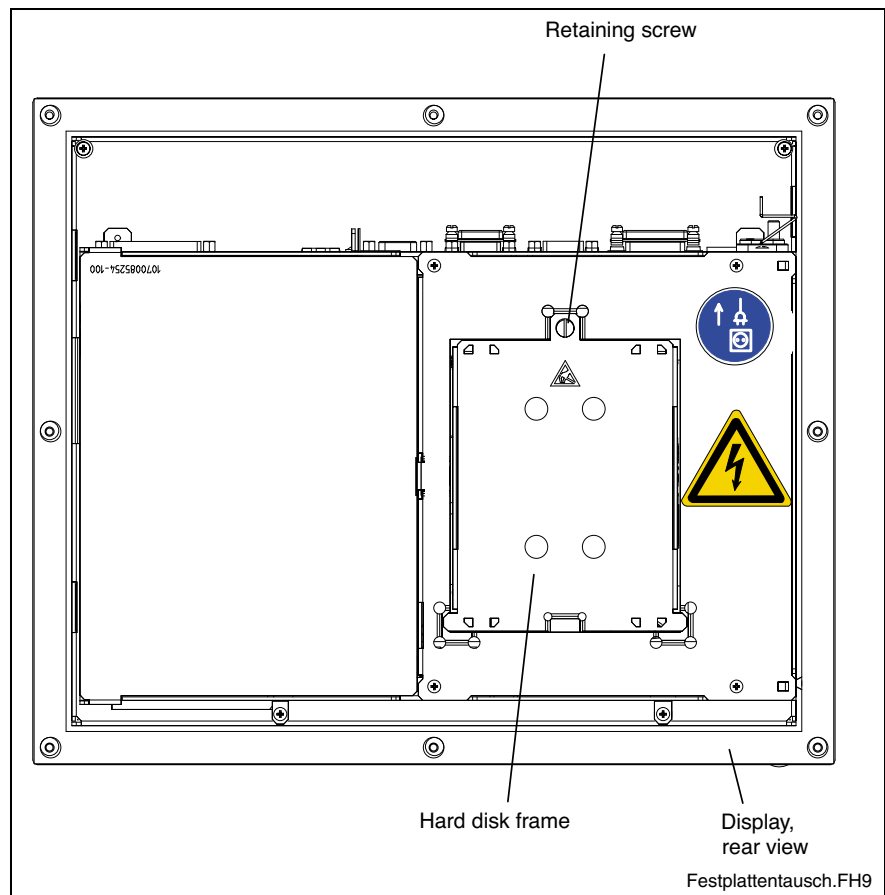
Fig. 8-1:   Position of the hard disk's installation frame and the retaining screw

5. The new hard disk is delivered including the installation frame. The new hard disk is always mounted with the installation frame in reverse order as described above.

Note: Check the cable connections leading to the hard disk and the interface connectors for tightness and verify, if the power supply is ready for use.

---

6. The new hard disk parameters are automatically recognized by the system. If the operating system does not boot automatically after switching on the operator terminal, interrupt the power supply for at least 10 seconds and restart.

7. After properly booting the PC the user data and the operating system settings for the normal operating mode have to be restored.

8.3   LCD Display

A fading backlight causes a progressive deterioration of the LCD display's readability, so that a backlight exchange is necessary. For further information please contact the Bosch Rexroth Service.

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8.4   CMOS Battery

The battery, with which RAM and clock are buffered, has a limited service life (see chapter "Wear parts" starting on page 4-5).

This lithium battery may not be changed by the user. The battery may only be exchanged by the Bosch Rexroth Service (see chapter "Service & Support" starting with page 13-1) or by personnel specially trained and authorized by the Service.

8.5   Rechargeable Battery Pack

⚠️
CAUTION!

Risk of data loss in the RAM during battery exchange!

⇒   Before replacing the battery back up important data, because during battery exchange a voltage breakdown might occur. Data in the RAM might be lost.

The battery pack must be replaced in the following cases:

- The battery test fails during system startup.

- The number of charging cycles exceeds the value depending on the ambient temperature and specified in the table below.

- The red LED "UPS" on the front panel flashes for longer than 8 hours.

A charging cycle is determined by switching the PC power supply unit on and off. As long as the operator terminal is connected to the supply system, a total discharge of the battery pack is avoided.

The number of charging cycles of the battery pack and thus, its service life is dependent on the ambient temperature, in which the battery pack is used. Ambient temperature (surrounding air temperature) is defined as the temperature, in which the operator terminal or the battery pack is situated, e. g. the internal temperature of the control cabinet or in an operator panel housing.

The following table can be used as guideline:

Ambient temperature (surrounding air temperature)	Charging cycles	Maintenance interval
+25 °C	4000 cycles	6 years
+35 °C	2000 cycles	3 years
+45 °C	1000 cycles	1.5 years

Fig. 8-2:   Number of charging cycles

Note: The used batteries are recyclable and can be returned to Bosch Rexroth after replacement. They must not be disposed in the standard household refuse.

External Battery   For the BTV devices an external battery pack for cabinet mounting is available.
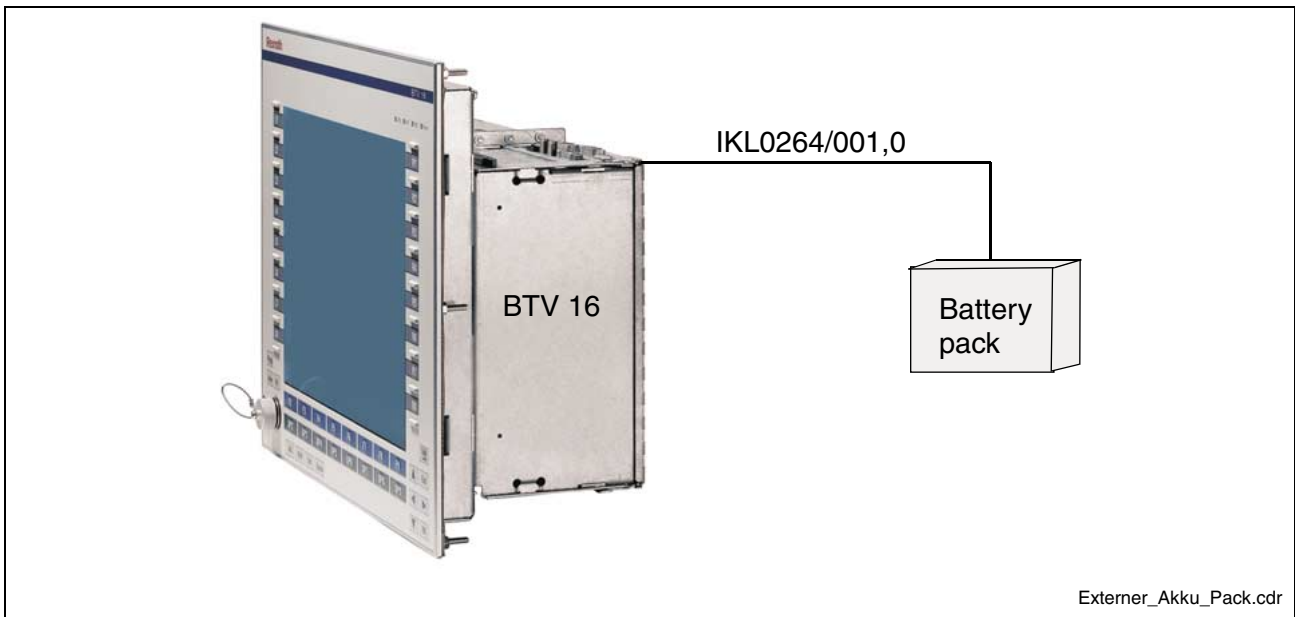

Fig. 8-3:   External battery pack

To connect the external batteries proceed as follows:

1. Fix the battery pack in the control cabinet.

2. Switch off the supply voltage for the operator terminal. If required, unplug all connectors from the operator terminal.

3. Connect the 2-pin battery cable to connection X19 of the operator terminal. The original cable is reverse voltage protected.
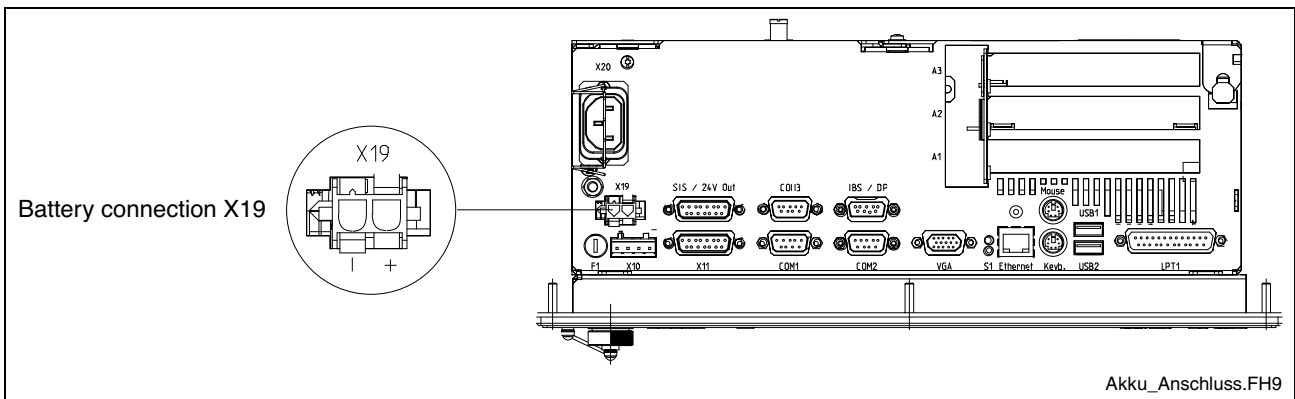
Fig. 8-4:   Position and pin assignment of the battery connection

⇒ Ensure that the polarity of the batteries is correct. In the case of a polarity reversal of the batteries a F10A (5x20) fuse is released on the power supply unit.

DANGER

Note: If the new battery pack is not yet charged, during the charging time there's no sufficient USP protection enabling a controlled shutdown of the PC. Therefore, use completely charged batteries, if possible. The charging time of a 2.5Ah battery is approximately 5 hours.

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Testing the New Component

4. Switch on the supply voltage for the operator terminal again.

5. Observe the "UPS" LED on the front panel:

   • UPS LED OFF: Batteries already charged

   • UPS LED flashes red: Batteries discharged

     Wait approximately 5 hours until the batteries are charged and the UPS LED extinguishes.

Battery Connection

The battery pack is connected with the 2-pin male connector strip X19 situated at the connector panel on the upper side of the PC box. For this, an unshielded cable with a cross section of at least 1.5 mm² is used. The cable length is maximum 3.0 m.

Bosch Rexroth provides ready-made cables with a length of 1.0 m and 3.0 m.

8.6   Extension Cards

To place extensions cards slots for PCI bus and ISA bus are available. Corresponding to the PC box type according to Fig. 4-4 on page 4-2 a maximum of four PCI cards and one ISA card are possible. The maximum permissible card length is 180 mm.

⚠ **CAUTION!**	**Risk of damage to the operator terminal or the extension cards by electrostatic discharges!** ⇒ Comply with all ESD-protection measures during working with modules and components! Avoid electrostatic discharges!

⚠ **CAUTION!**	**Risk of damage to the operator terminal or corruption of application software by integrating not-released extension cards!** ⇒ Install only released extension cards, and have them installed by skilled employees.

Installing an Extension Card

1. Disconnect the power supply. If required, unplug all connectors from the operator terminal.

2. Wait until the power supply unit switches off automatically after UPS operation (the UPS LED on the front panel flashes red until the UPS switches off the power supply unit).

3. Now, unplug the battery cable (interface X19).

4. Remove the housing cover at the rear side. For this, only the mounting screw at the side, at which the extension card slots are situated, has to be loosened. Then, this part of the housing cover can be removed.
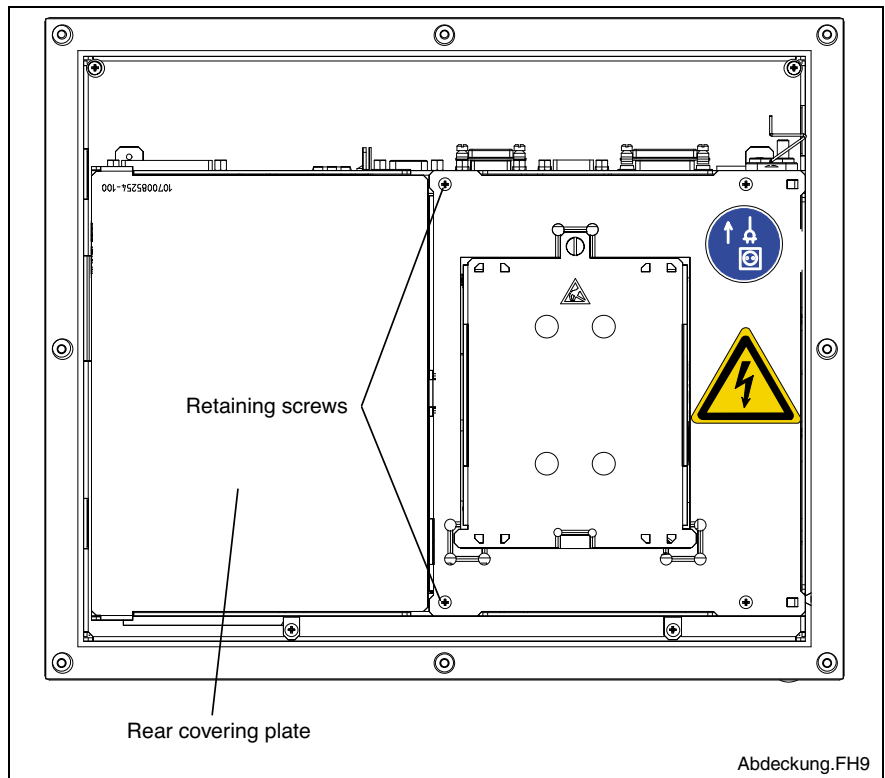
Abdeckung.FH9

Fig. 8-5:   Position of the housing cover and the mounting screw

5. The cover closing the air gap must be removed.
6. Remove the fastening screws from the slot cover.
7. Place the extension card and fix it with the fastening screw.
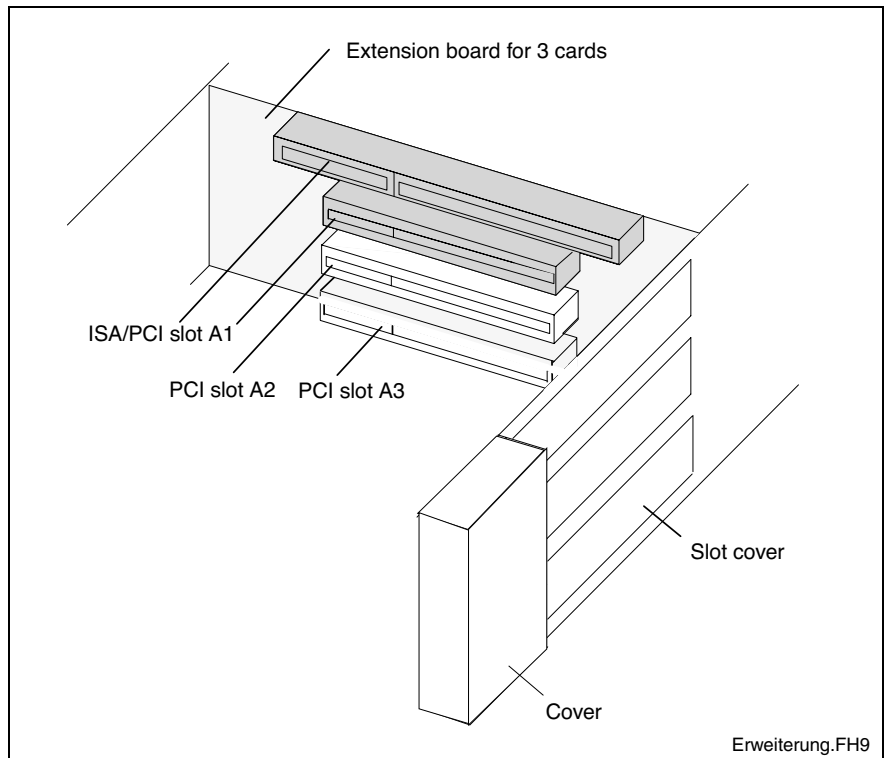

Erweiterung.FH9

Fig. 8-6:   Position of the slots for extension cards exemplified by variants BTV 16.2BBA, -BCA, -BKA and -ACA

8. Then, snap in the cover again.

9. Now, mount the slot cover.

10. Plug in the battery cable again.

| ⚠ **CAUTION!** | **Risk of destruction of the extension card or the main board!** |
| | ⇒ The combined PCI/ISA bus slot must never be equipped with a PCI card and an ISA card at the same time! |

If the card is equipped with a Plug and Play (PnP) function, it is automatically recognized by the operating system and integrated in the system, provided that no hardware conflicts (IRQ etc.) with other extension cards or connected devices occur.

In the event that after a system reboot the functions based on the new card are not available, there may be several reasons:

*   The card is not properly seated in the PCI or ISA slot.

*   The driver software of the card has not been installed or its installation is faulty.

*   IRQ (Interrupt) conflict with other PC hardware components.

*   The software of the card has not been installed.

| ⚠ **CAUTION!** | **Risk of destruction of the main board or the ISA card because of address conflicts (IRQ, memory access, I/O address)!** |
| | ⇒ Observe the information provided by the card manufacturer. You may have to set new configurations in the BIOS and the operating system (e. g. Control Panel of NT). |

BIOS Settings

Note:	IRQ0-IRQ6, IRQ8-IRQ13 and IRQ15 are already assigned and are not available for PCI and ISA extension cards!

PCI Slot

In the BIOS submenu "The Advanced Menu / PCI Configuration sub menu" you can assign each PCI slot to an IRQ address. By specifying the IRQ address you specify simultaneously the priority.

If solely PnP cards are used, keep the setting "AUTO"

BIOS selection: PCI IRQ line 1, PCI IRQ line 2, PCI IRQ line 3, PCI IRQ line 4

Option: Disabled, Auto, IRQ: 3, 4, 5, 7, 9, 10, 11, 12, 14, 15

Default: AUTO

ISA Slot (IRQ)

In the BIOS menu "The Advanced Menu / PCI Configuration sub menu /PCI/PNP ISA IRQ Resource Exclusion / IRQx" the IRQ address for not "Plug and Play"-compliant ISA cards (= Legacy ISA cards) is set.

BIOS selection: IRQ:3, 4, 5, 7, 9, 10, 11, 15

Option: Available, Reserved

Default: Available

ISA Slot (UMB)

In the BIOS menu "The Advanced Menu/PCI Configuration sub menu /PCI/PNP ISA UMB Region Exclusion" for Legacy ISA cards a specific block is reserved in the upper memory.

BIOS selection: C800 - CBFF, CC00 - CFFF, D000 - D3FF, D400 - D7FF, D800 - DBFF, DC00 - DFFF

Option: Available, Reserved

Default: Available

9   Software

9.1   Application Software of the Monitoring Function

Temperature Monitoring

The ambient air temperature (surrounding air temperature) of the operator terminal must not exceed +45 °C. To ensure operational reliability, a temperature monitoring function measures the internal housing temperature.

1. For **temperatures > 50 °C** in the housing a temperature warning is indicated:

    - via the red flashing LED "W/T" on the front panel or

    - via a message window displayed by the operating system. This message must also be evaluated by all application programs, especially by I/O processes.

    The temperature warning can be disabled by the program UPS$_{NT}$ for Windows (see section UPS Program, page 9-2).

2. If the temperature in the housing exceeds **65 °C,** all variants of the operator terminal will be **shut down and switched off** via the UPS logic circuit (see page 9-2).

⚠ DANGER	**Uncontrolled machine movements!**
	⇒ Always ensure that temperatures remain within the non-critical range. In the case of application-sensitive procedures, ensure that machine movements are terminated in a controlled manner before the temperature monitoring function switches off the operator terminal.

Uninterruptible Power Supply (UPS)

Operating Principle

In the event of a voltage breakdown or if the temperature exceeds 65 °C (see page 9-1) the UPS logic of the operator terminal's power supply unit allows a safe operating system shutdown by means of an battery pack.

If the voltage breakdown exceeds 20 ms, the UPS program switches over to battery operation (provided that the battery pack is ready for operation).

Note: The UPS logic of the operator terminal's power supply unit is designed for a safe shutdown of all application programs and the operating system. It is not designed to maintain the operation over a longer voltage breakdown!

⚠ **DANGER**	**Uncontrolled machine movements or data loss, if the batteries are defective!**
	$\Rightarrow$ If there are no batteries in the unit or if the batteries are discharged, the operator terminal will start a system RESET after a voltage breakdown greater than 20 ms!
	$\Rightarrow$ Possible consequences will be uncontrolled movements or a loss of data.

Voltage Breakdown < 800 ms   If the duration of the voltage breakdown is below 800 ms, the power supply unit switches automatically from battery operation to the normal operating mode.

Voltage Breakdown between 800 ms and 60 s   If the voltage breakdown is greater than 800 ms, the operation system initiates a system shutdown after a selectable delay time. This delay time shall be used to close all active applications by the user or by special routines.

If the supply voltage is available again within 60 seconds, the UPS interrupts the operating voltage for further 8 seconds. After that, the operating system is rebooted.

Voltage Breakdown > 60 s   If the interruption of the supply voltage lasts longer than 60 seconds, the UPS switches off the power supply unit.

Note: Set the delay time in the additional software "UPS$_{NT}$" (see page 9-2).

UPS Program – Functionality

The program "UPS$_{NT}$" serves to control and monitor the integrated uninterruptible power supply (UPS). In addition, the program has the task to:

- monitor the system temperature in the device
- monitor the function of the fans
- monitor the internal operating voltages
- check the charging status of the batteries, if required
- Select PROFIBUS Address
- set the COM interface for the touch screen controller
- set the SIS interface mode

The communication between program and UPS occurs via the serial interface.

The program consists of two parts, a Control Panel Applet and the Windows NT service.

The task of the UPS program is in case of a voltage breakdown within a determinable time (delay time: maximum 60 seconds) to

- send a message to all active applications, so that they can be closed by the user or via special user routines and

- to shutdown the operating system after the expiration of the delay time.

Once the voltage monitoring is activated, it is not possible to stop the system shutdown.

Closing all active applications prevents data loss in the event of an unexpected voltage interruption.
After a maximum of 60 seconds the USP switches off the PC power supply unit, if the supply voltage has not been restored (see Switch Off Conditions on page 9-2).

In the normal mode the user has no access to the UPS_{NT} program. Only if the user has special access rights and after re-starting the operating system operation is possible and settings can be made.

Note: Modifications of the parameters set in the UPS_{NT} may only be carried out after consulting Bosch Rexroth.

Operation and Configuration of UPS NT

Note: To operate UPS_{NT} administrator rights are necessary!

Start/Stop   During booting Windows NT the UPS_{NT} program is **automatically** started.

If the service shall be stopped, terminated or re-started (e.g. because of a re-installation or update), select the service manager in the Windows Control Panel.
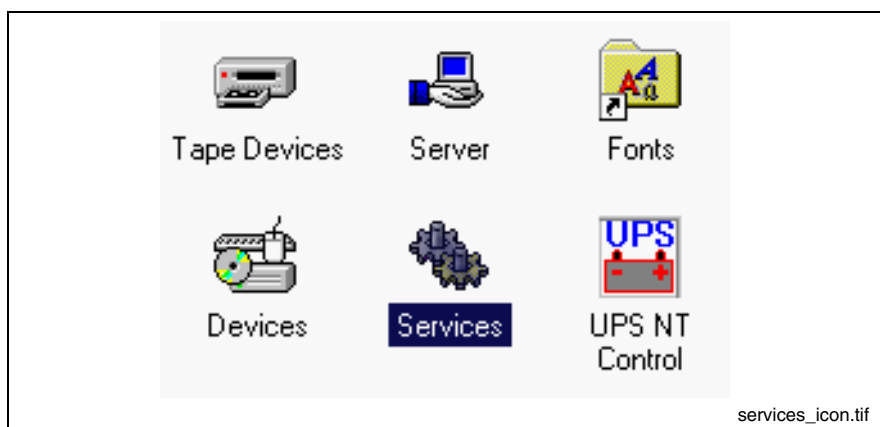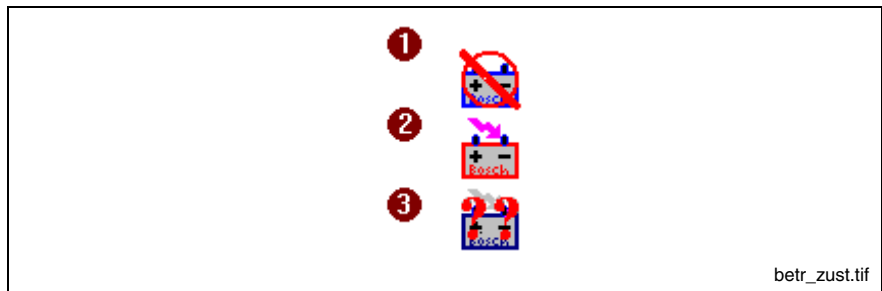

services_icon.tif

Fig. 9-1:   Service manager of the Windows Control Panel

The respective operating status of the service is indicated in the Windows task bar.

betr_zust.tif

Key: 1: Service has been started, but is not ready for operation yet
        2: Service is in operation
        3: Service is in operation, however errors have been indicated during
        the start (battery, temperature, fan and voltage errors)

Fig. 9-2:   Indication of the service's operating status in the Windows task bar

In the service manager of Windows NT the status of the UPS$_{NT}$ service is indicated:

- UPS$_{NT}$ stopped: No entry in the status column

- UPS$_{NT}$ started: Entry "Started" in the status column

The marked entry UPS$_{NT}$ service is started or stopped via the **Start** or **Stop** button.
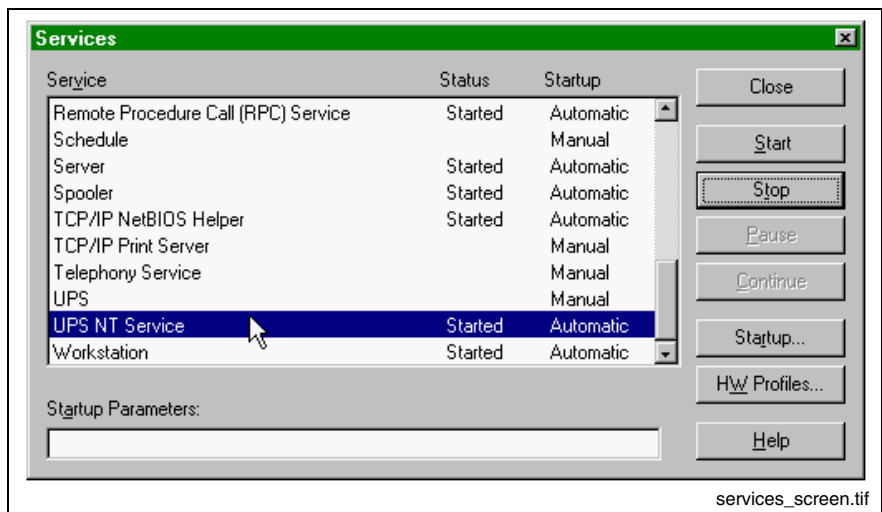

services_screen.tif

Fig. 9-3:   The window "Services"

Configuration   Select the UPS$_{NT}$ program **UPS NT Control** in the system control (see Fig. 9-4:).

Note: The UPS$_{NT}$ program always runs as a Windows NT service. User changes have no influence on this behavior. The user can not terminate the program without administration rights or stop the monitoring.
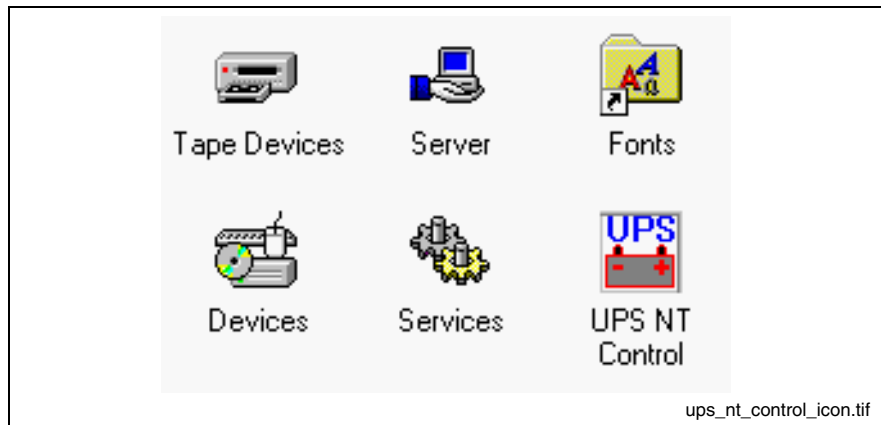
---

ups_nt_control_icon.tif

Fig. 9-4:   Symbol "UPS NT Control" in the Windows Control Panel

USV Properties and Maintenance   After selecting symbol **UPS NT Control** the window **USV Properties and Maintenance** appears.

The window offers the following tabs, in which further settings can be made.

- **UPS General** tab
- **System Health** tab
- **Profi Bus / Touch Mode** tab
- **SIS Bus Mode** tab
- **About** tab
- **Maintenance** tab.

UPS General After calling up **UPS Properties and Maintenance**, first, the **UPS General** tab is active, with which the basic settings of the starting and run time behavior of the UPS are specified.
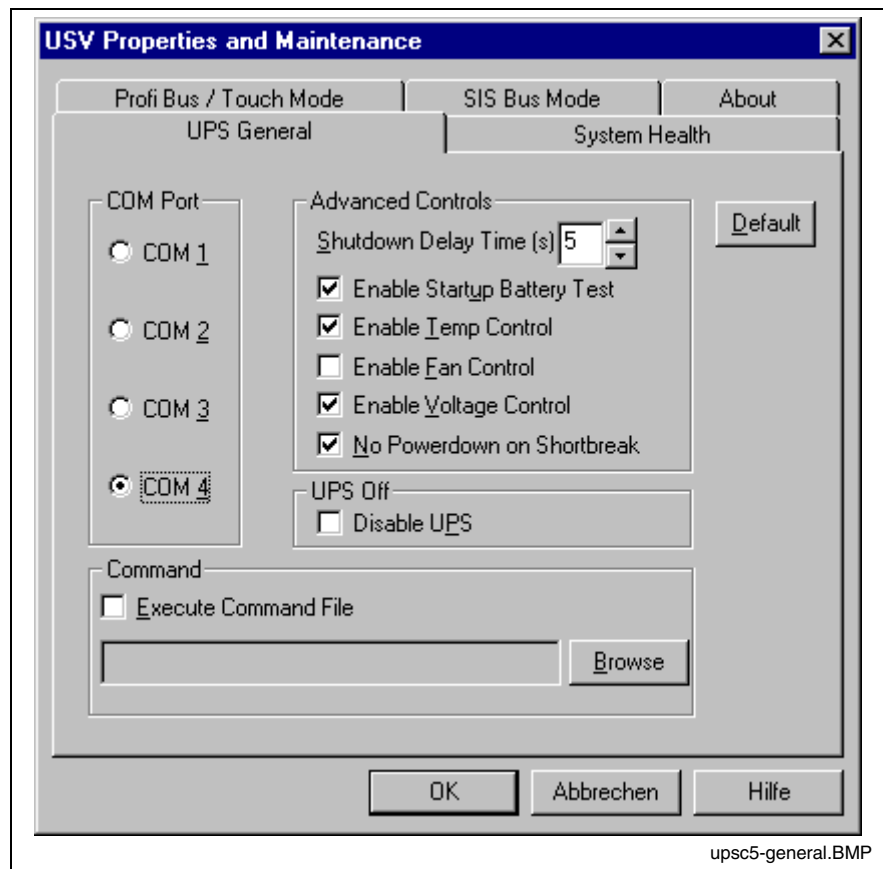

upsc5-general.BMP

Fig. 9-5:   "UPS General" tab

Note: To activate parameter modifications the UPS program is automatically stopped and re-started During this time (5...10 sec) no monitoring takes place.

COM Port: At this place, the serial communication interface is selected, to which the UPS is connected. If in BIOS one or more serial interfaces are deactivated, the remaining interfaces of Windows NT are re-numbered. Therefore, a new interface must be selected in the configuration dialog under COM port. If no interface is found during the starting process of the service, a corresponding dialog is opened and the service is terminated.

In the range **Advanced Controls** the following settings are possible:

Shutdown Delay Time: Here, a delay time for the shutdown from 0...45 s is determined. This is the time the user has to back up his data. After the expiration of the delay time all application programs are terminated without safety prompt.

When you determine the **Shutdown Delay Time,** observe that between the end of the **Shutdown Delay Time** and the expiration of the 60 seconds after the power down signal remains enough time to shut down the operating system (for closing the Windows system files and generating backups). If the time is too short, the shutdown process is interrupted, because the UPS interrupts the voltage of the power supply unit. This can cause a loss of data.

> **Note:** After the expiration of the **Shutdown Delay Time** the operating system is shut down without safety prompt. Data of opened application programs without backup are then lost.

Enable Startup Battery Test: If the check box is activated, a test of the battery pack is carried out after each restart of the system. In error case an error dialog is generated and a message is send to the whole system. The UPS program is still running.

After 12 hours the battery test is automatically repeated:

- If errors don't occur any longer, the battery test is automatically repeated every 12 hours.

- If an error occurs, an error dialog is generated, a message is send to the whole system and the UPS program is terminated.

Enable Temp Control: If this check box is activated a continuous monitoring of the ambient temperature takes place. If +50 °C are exceeded, a warning window and the LED Temp at the front of the device flashes. The temperature warning can be deactivated.

For temperatures greater than +65 °C the system is always shut down and switched off via the UPS logic.

The voltage monitoring is still active after a temperature warning.

Enable Fan Control: If this check box is activated, the existing housing and CPU fans are monitored. In error case a corresponding message is indicated and send to the whole system.

Enable Voltage Control: If the check box is activated, the internal supply voltages are monitored. In error case a corresponding message is indicated and send to the whole system.

No Powerdown on Shortbreak: If the check box is activated, interruptions of the supply voltage up to 5 sec are permissible and do not influence the operation. Only for voltage breakdowns greater than 5 sec the UPS logic is started and the shutdown of the system is introduced.

UPS Off, Disable UPS: The function **UPS Off, Disable UPS** deactivates the UPS monitoring and the delay, when the power supply unit is switched off:

- If a voltage breakdown occurs, the PC switches immediately off.

- After a conventional shutdown of the system, there's no waiting time of approximately 60 sec until the power supply unit switches off.

This function shortens the waiting time during commissioning and software installation. However, this check box must not be activated in the normal mode.

⚠ **CAUTION**

Loss of data!

⇒ If this check box is activated, a proper system shutdown is no longer possible during a voltage breakdown. The device switches off immediately!

In the **Command** area an executable program (*.exe; *.bat) can be entered or activated, that can still be started and carried out after the initialization of the shutdown. This is always reasonable, if applications which do not respond to the system messages, have to be backuped or stopped. For this, corresponding clearing and terminating programs can be entered and activated. If several programs have to be executed or if the programs have transfer parameters, they have to be combined and entered in a batchfile.

Note: The entry must not contain any request parameters and the specified program must not start any shutdown!

If you activate the **Default** button, all settings are reset to their **standard values**.

These are:

- COM Port: COM4
- Shutdown Delay Time: 30 sec
- Enable Startup Battery Test: active
- Enable Temp Control: active
- Enable Temp Control: active
- Enable Temp Control: active
- Disable UPS: inactive
- No Powerdown on Shortbreak: active
- Execute Command File: inactive

System Health   This tab indicates the current measured values of the internal operating voltages, the battery voltage, the system temperature and the status of the fan function.
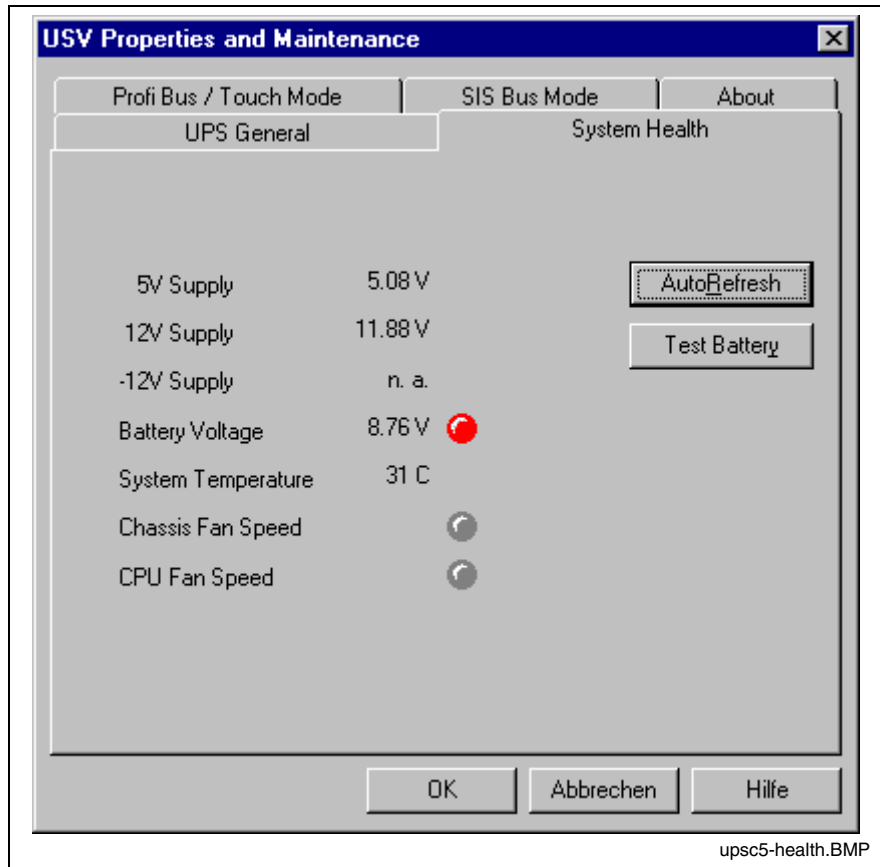

Fig. 9-6:   "System Health" tab

The value of the battery voltage (**Battery Voltage**) is only updated after a battery test. The battery test occurs automatically after a system start and then every 12 hours or after pressing the button **Test Battery**.

- The LED flashes red, if the value of the battery voltage measured on load is too low.

- The LED flashes green, if the battery pack is ready for operation.

Note: Excessive battery tests will discharge the battery pack. Never perform more than five battery tests within a period of 24 hours.

The following applies to the fan monitoring (**Fan Speed**):

- Red LED: Fan stands still, or fan speed is too low or too high.

- Green LED: Fan is working properly.

Pressing the button **StopAutoRefresh** disables the automatic updating of the measured values and the labeling on the button changes to **AutoRefresh**.

Pressing the button **AutoRefresh** disables the automatic updating of the measured values and the labeling on the button changes to **StopAutoRefresh**.

PROFIBUS and Further Settings

The **ProfiBus/Mode COM3** tab is divided into two segments:

- Select PROFIBUS Address
- Selection, if the COM3 interface is provided as serial interface at the XCOM3 plug or is internally connected with the keyboard controller.
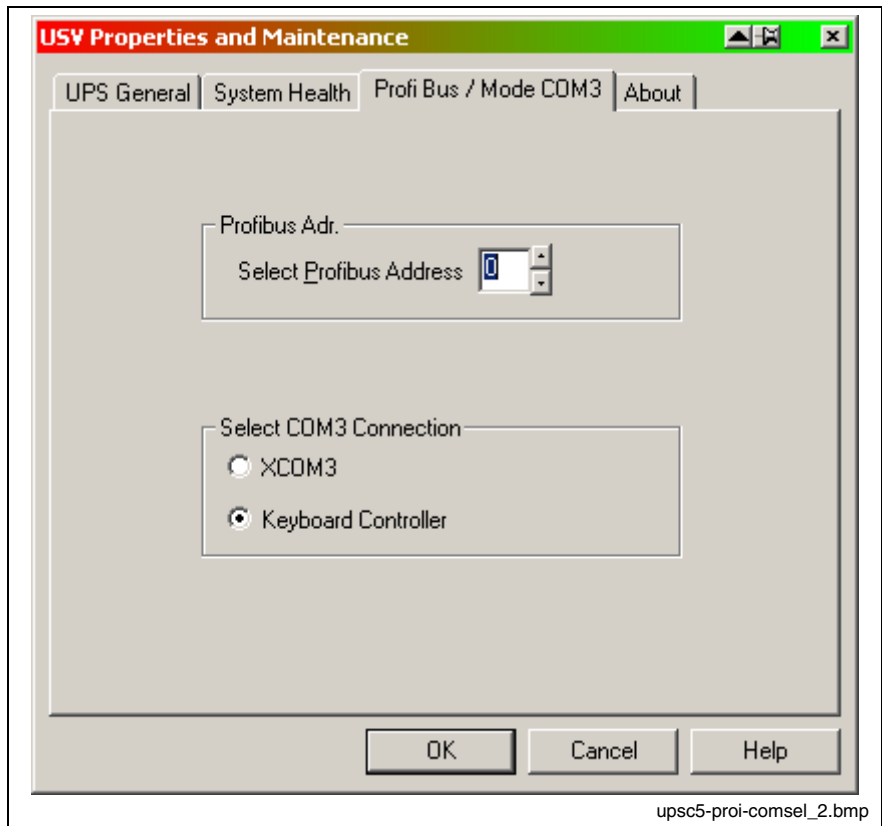

upsc5-proi-comsel_2.bmp

Fig. 9-7:   "Profi Bus /Mode COM3" tab

Select COM3 Connection	
XCOM3	COM3 is accessible at connection XCOM3
Keyboard Controller	COM3 is internally connected with the Keyboard Controller to - request the status of the M-Keys via the serial interface (see section M-Keys in chapter 6) or - reload firmware into the Keyboard Controller

Fig. 9-8:   Select COM3 Connection

Note: The following applies to all settings: The UPS service is stopped. All changes will only be effective, when the PC is restarted (switch off and switch on the supply voltage again).

About   The value **Shutdown Count** indicated in **About** tab indicates, how often the UPS has already shut down the system. A battery change is recommended after more than 3000 trips by the UPS, but not later than the recommended maintenance interval (see section 4.7).
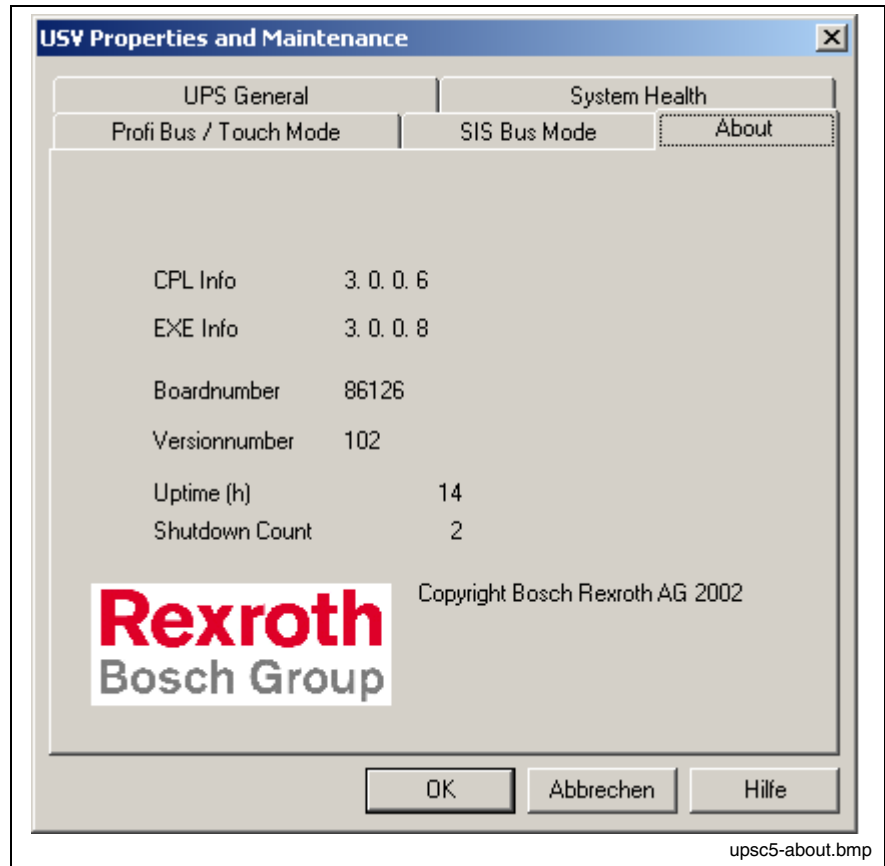

Fig. 9-9:   "About" tab

9.2   Touch Screen Software

For the variants BTV 16.2BB, BTV 16.2BC, BTV 16.2AC as well as BTV 40.2BE, BTV 40.2BG and BTV 40.2AG a touch screen is provided, that allows the operation of the application software via the touch-sensitive surface of the displays.

To ensure the communication of the touch screen controller with the PC, the serial interface COM2 is used. Therefore, concerning devices with touch screen the COM2 interface is not situated on the connector panel.

The required driver software is already installed ex works. Changes are possible in the application "Pointer Devices" in the Windows Control Panel. You can reach the same setup program via "Start -> programs -> UPDD
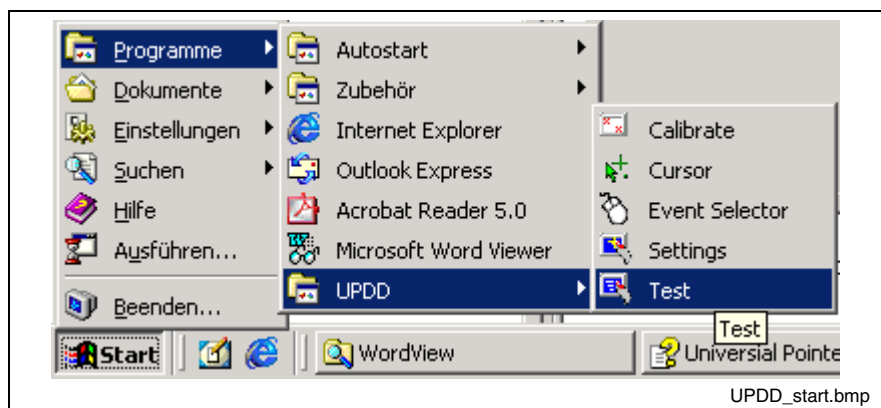-> Settings.

UPDD_start.bmp

Fig. 9-10:   UPDD setup programs for the touch screen

A dialog window appears for the different settings:
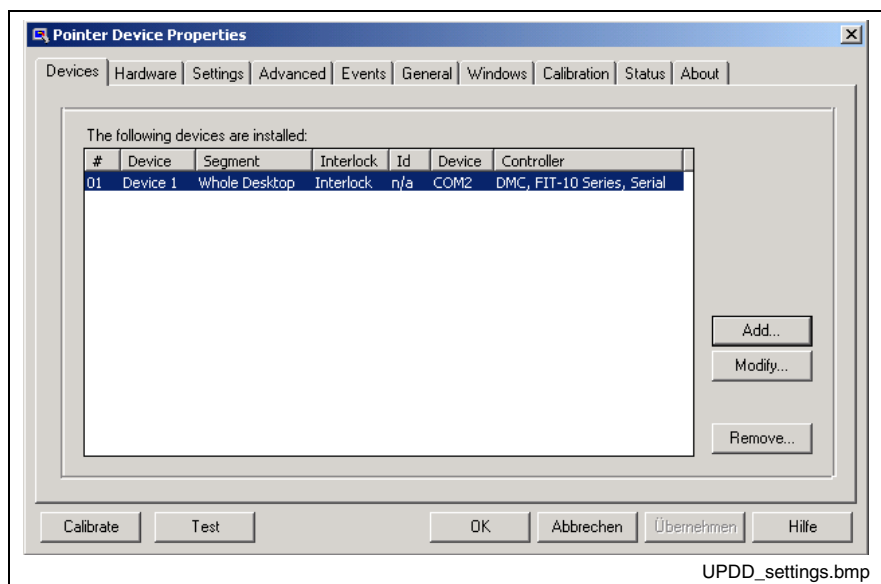

UPDD_settings.bmp

Fig. 9-11:   Dialog window to set the touch screen

For further information please select the **Help** button on the respective tab.

Via "Start -> Programs -> UPDD" you reach further useful programs, if required.

The program **Calibrate** might be of special interest. If required, you can calibrate the touch mouse with the help of this program. For this, touch, one after the other, the middle of the four crosses displayed on the screen.

For further information on this programs refer to the online help, which you can start directly as file GENER-EN.CHM in folder D:\Programs\UPDD\.

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10   Ordering Information

10.1   Type Code

According to the following type codes there are different variants of the operator terminals BTV 16.2, BTV 40.2 and BTV 60.2.
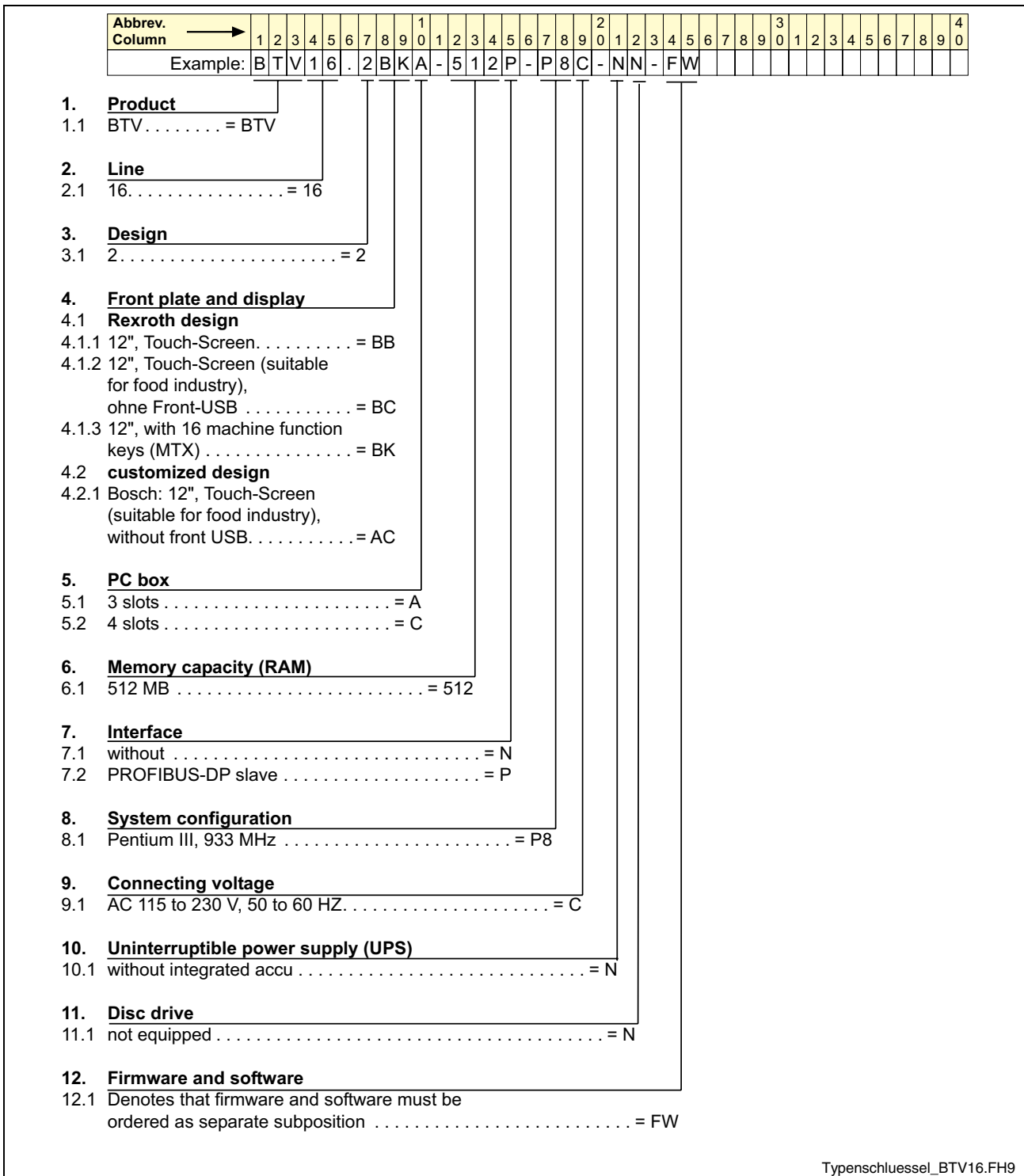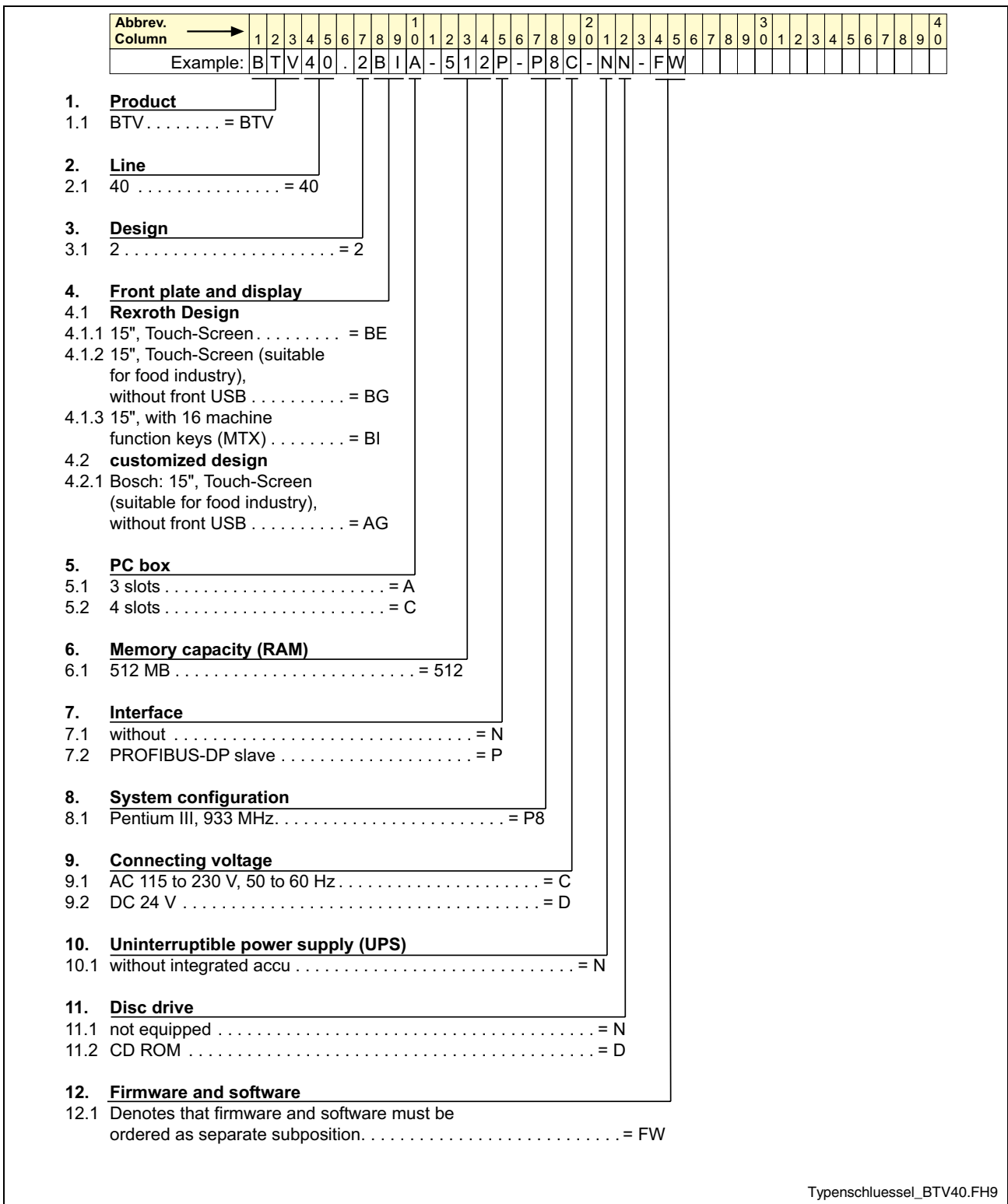
BTV 16.2

Abbrev. Column	1	2	3	4	5	6	7	8	9	1 0	1	2	3	4	5	6	7	8	9	2 0	1	2	3	4	5	6	7	8	9	3 0	1	2	3	4	5	6	7	8	9	4 0
Example:	B	T	V	1	6	.	2	B	K	A	-	5	1	2	P	-	P	8	C	-	N	N	-	F	W																

1.   Product
1.1   BTV . . . . = BTV

2.   Line
2.1   16 . . . . = 16

3.   Design
3.1   2 . . . . = 2

4.   Front plate and display
4.1   **Rexroth design**
4.1.1 12", Touch-Screen . . . . = BB
4.1.2 12", Touch-Screen (suitable
       for food industry),
       ohne Front-USB . . . . = BC
4.1.3 12", with 16 machine function
       keys (MTX) . . . . = BK
4.2   **customized design**
4.2.1 Bosch: 12", Touch-Screen
       (suitable for food industry),
       without front USB . . . . = AC

5.   PC box
5.1   3 slots . . . . = A
5.2   4 slots . . . . = C

6.   Memory capacity (RAM)
6.1   512 MB . . . . = 512

7.   Interface
7.1   without . . . . = N
7.2   PROFIBUS-DP slave . . . . = P

8.   System configuration
8.1   Pentium III, 933 MHz . . . . = P8

9.   Connecting voltage
9.1   AC 115 to 230 V, 50 to 60 HZ . . . . = C

10.   Uninterruptible power supply (UPS)
10.1   without integrated accu . . . . = N

11.   Disc drive
11.1   not equipped . . . . = N

12.   Firmware and software
12.1   Denotes that firmware and software must be
       ordered as separate subposition . . . . = FW

Typenschluessel_BTV16.FH9

Fig. 10-1:   Type code BTV 16.2

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BTV 40.2

Abbrev. Column →	1	2	3	4	5	6	7	8	9	1 0	1	2	3	4	5	6	7	8	9	2 0	1	2	3	4	5	6	7	8	9	3 0	1	2	3	4	5	6	7	8	9	4 0
Example:	B	T	V	4	0	.	2	B	I	A	-	5	1	2	P	-	P	8	C	-	N	N	-	F	W																

1. Product
1.1　BTV . . . . = BTV

2. Line
2.1　40 . . . . = 40

3. Design
3.1　2 . . . . = 2

4. Front plate and display
4.1　**Rexroth Design**
4.1.1　15", Touch-Screen . . . . = BE
4.1.2　15", Touch-Screen (suitable
　　　for food industry),
　　　without front USB . . . . = BG
4.1.3　15", with 16 machine
　　　function keys (MTX) . . . . = BI
4.2　**customized design**
4.2.1　Bosch: 15", Touch-Screen
　　　(suitable for food industry),
　　　without front USB . . . . = AG

5. PC box
5.1　3 slots . . . . = A
5.2　4 slots . . . . = C

6. Memory capacity (RAM)
6.1　512 MB . . . . = 512

7. Interface
7.1　without . . . . = N
7.2　PROFIBUS-DP slave . . . . = P

8. System configuration
8.1　Pentium III, 933 MHz. . . . . = P8

9. Connecting voltage
9.1　AC 115 to 230 V, 50 to 60 Hz . . . . = C
9.2　DC 24 V . . . . = D

10. Uninterruptible power supply (UPS)
10.1　without integrated accu . . . . = N

11. Disc drive
11.1　not equipped . . . . = N
11.2　CD ROM . . . . = D

12. Firmware and software
12.1　Denotes that firmware and software must be
　　　ordered as separate subposition. . . . . = FW

Typenschluessel_BTV40.FH9

Fig. 10-2:　Type code BTV 40.2

BTV 60.2

Abbrev. Column →	1	2	3	4	5	6	7	8	9	1 0	1	2	3	4	5	6	7	8	9	2 0	1	2	3	4	5	6	7	8	9	3 0	1	2	3	4	5	6	7	8	9	4 0
Example:	B	T	V	6	0	.	2	B	L	A	-	5	1	2	N	-	P	8	D	-	N	N	-	F	W																

1.   Product
1.1   BTV . . . . = BTV

2.   Line
2.1   60. . . . . = 60

3.   Design
3.1   2 . . . . = 2

4.   Front plate and display
4.1   **Rexroth Design**
4.1.1 12", with machine function keys
        and alphanumerical tasts . . . . = BL

5.   PC box
5.1   3 slots . . . . = A

6.   Memory capacity (RAM)
6.1   512 MB . . . . = 512

7.   Interface
7.1   PROFIBUS-DP Slave. . . . . = P

8.   System configuration
8.1   Pentium III, 933 MHz. = P8

9.   Connecting voltage
9.1   AC 115 to 230 V, 50 to 60 Hz . . . . = C

10. Uninterruptible power supply (UPS)
10.1 without integrated accu . . . . = N

11. Disc drive
11.1 DVD-ROM / CD-RW . . . . = E

12. Firmware and software
12.1 Denotes that firmware and software must be ordered
        as separate subposition . . . . = FW

Typenschluessel_BTV60.FH9

Fig. 10-3:   Type code BTV 60.2

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10.2 Accessories

Connectors and Ready-Made Cables

Ordering designation	Part number	Description of tag configured in the tags database
B-AC PLUG NET 230V	1070 912881	Mains connector 230 V, male inlet connector for non-heating apparatus, angular, for self-mounting
BKS-U-N-NTZKAB-IPCRHO-002,5-P	1070 048937	Mains cable 230 V with female inlet connector for non-heating apparatus, angular, cable length 2.5 m

Fig. 10-4:   Plugs and cables for BTV 16.1, BTV 40.2 and BTV 60.2

Battery Pack and Cables

Ordering designation	Part number	Description of tag configured in the tags database
SUP-E01-BTV 16/40	1070 170041	External battery pack BTV 16/40/60
IKL0265/003,0	1070 170040	Connection cable for external battery pack BTV 16/40/60, cable length 3.0 m
IKL0264/001,0	1070 170156	Connection cable for external battery pack BTV 16/40/60, cable length 1.0 m

Fig. 10-5:   Battery pack and cables for BTV 16.1, BTV 40.2 and BTV 60.2

Storage Media

Ordering designation	Part number	Description of tag configured in the tags database
MC OSFLASHUSB-064M	1070 170184	USB memory stick 64 Mbytes
PCD03.3UH	1070 170239	USB floppy disk drive for top-hat rail mounting
PCD03.3UF	1070 170238	USB floppy disk drive for front mounting

Fig. 10-6:   Storage media for BTV 16.2, BTV 40.2 and BTV 60.2

11   List of Figures

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13   Service & Support

13.1   Helpdesk

Unser Kundendienst-Helpdesk im Hauptwerk Lohr am Main steht Ihnen mit Rat und Tat zur Seite. Sie erreichen uns

Our service helpdesk at our headquarters in Lohr am Main, Germany can assist you in all kinds of inquiries. Contact us

- telefonisch - by phone:
  über Service Call Entry Center
  - via Service Call Entry Center

  +49 (0) 9352 40 50 60
  Mo-Fr 07:00-18:00
  Mo-Fr 7:00 am - 6:00 pm

- per Fax - by fax:

  +49 (0) 9352 40 49 41

- per e-Mail - by e-mail: **service.svc@boschrexroth.de**

13.2 Service-Hotline

Außerhalb der Helpdesk-Zeiten ist der Service direkt ansprechbar unter

After helpdesk hours, contact our service department directly at

+49 (0) 171 333 88 26

oder - or   **+49 (0) 172 660 04 06**

13.3 Internet

Unter **www.boschrexroth.com** finden Sie ergänzende Hinweise zu Service, Reparatur und Training sowie die **aktuellen** Adressen *) unserer auf den folgenden Seiten aufgeführten Vertriebs- und Servicebüros.

At **www.boschrexroth.com** you may find additional notes about service, repairs and training in the Internet, as well as the **actual** addresses *) of our sales- and service facilities figuring on the following pages.

| | Verkaufsniederlassungen |
| | Niederlassungen mit Kundendienst |

| | sales agencies |
| | offices providing service |

Außerhalb Deutschlands nehmen Sie bitte zuerst Kontakt mit unserem für Sie nächstgelegenen Ansprechpartner auf.

Please contact our sales / service office in your area first.

*) Die Angaben in der vorliegenden Dokumentation können seit Drucklegung überholt sein.

*) Data in the present documentation may have become obsolete since printing.

13.4   Vor der Kontaktaufnahme... - Before contacting us...

Wir können Ihnen schnell und effizient helfen wenn Sie folgende Informationen bereithalten:

For quick and efficient help, please have the following information ready:

1. detaillierte Beschreibung der Störung und der Umstände.

2. Angaben auf dem Typenschild der betreffenden Produkte, insbesondere Typenschlüssel und Seriennummern.

3. Tel.-/Faxnummern und e-Mail-Adresse, unter denen Sie für Rückfragen zu erreichen sind.

1. Detailed description of the failure and circumstances.

2. Information on the type plate of the affected products, especially type codes and serial numbers.

3. Your phone/fax numbers and e-mail address, so we can contact you in case of questions.

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13.5   Kundenbetreuungsstellen - Sales & Service Facilities

Deutschland – Germany

<u>vom Ausland:</u>   (0) nach Landeskennziffer weglassen!
<u>from abroad</u>:   don't dial (0) after country code!

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