Electric Drives and Controls | Hydraulics | Linear Motion and Assembly Technologies | Pneumatics | Service

Rexroth Bosch Group

Rexroth IndraControl VPP 21.2

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Purpose of Documentation This documentation describes the operator terminal IndraControl VPP 21.2.

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1 System Representation

1.1 Short Description

The hand-held terminal VPP 21.2 is a computer-based machine operator terminal consisting of

- an enclosed plastic housing (degree of protection, total device: IP 40, degree of protection, front panel: IP 64)
- a TFT display with and without touch screen,
- depending on the variant, different display and operating components and
- an integrated efficient industrial PC.

VPP 21-type operator terminals are provided for bracket mounting. Because of its design they are predestinated as "operator panel control". For this, special buttons (control ON, control OFF, E-STOP) are mounted in the housing. On the left and right three navigation keys are integrated. To communicate with external components standardized field bus systems are used.

The restricted extensible computer unit with power supply unit and field bus connection is located in the so-called VPP 21 box installed in the plastic housing of the VPP 21.

1.2 Device Variants

1.2.1 Overview

The hand-held terminals VPP 21 are available as device variant BQ (with keypad) or as device variant BP (with touch screen).

1.2.2 Device Variant BQ

This variant provides – below the 14" TFT display - for a keypad with function keys, a numeric block, cursor keys and further keys to be labeled by slide-in strips.

System Representation

Fig.1-1: Front panel – device variant BQ

1.2.3 Device Variant BP

In contrast, the VPP 21.2 BP has no keypad, but a 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.

Fig. 1-2: Front panel – device variant BP

1.3 Operating System

For license reasons the hand-held terminals VPP 21 are only delivered with already installed operating system. At present, Windows XP is used.

The delivered operating systems may only be used in the industrial environment. Use in the office area, e. g. on a secretary's computer, is not allowed.

1.4 BIOS Settings

When leaving the factory, the BIOS settings have been made according to the respective device variant.

1.5 Commissioning

Mount the device properly (for this, see chapter chapter 5.2 "Installation" on page 22). Then, connect the device to the power supply (24 V) and, if required, to the network.

2 Important Instructions on Use

2.1 Appropriate Use

2.1.1 Introduction

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

WARNING

Physical and property damage due to the inappropriate use of products!

The products are designed for their use within the industrial environment and may therefore only be used for the intended purpose. If the use is inappropriate, situations causing physical damage as well as property damage can occur.

☞ Rexroth disclaims as manufacturer any warranty, liability or for damages occurring due to inappropriate use of the products. Furthermore, Rexroth is not paying any compensation. The user is responsible for any risks resulting from the products not being used as intended.

Before using Rexroth products, the following pre-requisites must be fulfilled to ensure an appropriate use of the products:

- Anyone handling one of the Rexroth products in any way has to read and understand the respective safety instructions as well as the instructions on the appropriate use.
- Hardware products have to remain in their original state, in other words, no modification regarding the design are allowed. Software products may not be decompiled and their source codes may not be modified.
- Damaged or faulty products are not to be implemented or put into operation.
- It is to be ensured that the corresponding products are installed according to the specifications of the documentation.

2.1.2 Areas of Use and Application

hand-held terminal VPP 21.2 of Rexroth are machine operating fields developed for control tasks. Typical areas of application of the hand-held terminal VPP 21.2 are:

- Lathes
- Milling machines
- Processing machine

It can be necessary to connect additional sensors and actuators to control and monitor the hand-held terminal VPP 21.2.

☞ The hand-held terminal VPP 21.2may only be used with the accessories and add-on components specified in this documentation. Components that are not named explicitly may neither be mounted nor connected. Same is applicable for cables and wires.

Operation my only be carried out in the configurations and combinations of the components specified and with the software and firmware determined in the respective functional description.

Each drive control device has to be programmed before commissioning so that the motor carries out the specific functions for the application.

The hand-held terminal VPP 21.2 were developed for the single axis as well as for the multiple axes drive tasks and control tasks.

For the application-specific use of the hand-held terminal VPP 21.2, device types with a different drive performance and different interfaces are available.

For the application-specific use of the machine operating terminals and visualization terminals , device types with a different equipment and different interfaces are available.

Typical areas of application of the hand-held terminal VPP 21.2 are:

- [Handling systems and assembly systems]
- [Packaging and processing machines]
- [Printing machines and paper processing machines]
- [Machine tools]

hand-held terminal The VPP 21.2 may only be operated under the assembly conditions and installation conditions, in the specified position of application and under the specified ambient conditions (temperature, degree of protection, humidity, EMC etc.) given in this documentation.

2.2 Inappropriate Use

The application of hand-held terminal that are VPP 21.2 not within the specified areas of application or under operating conditions deviating from the operating conditions and technical data specified in the documentation is considered as "inappropriate".

hand-held terminal VPP 21.2 may not be used if ...

- they are exposed to operating conditions that do not fulfill the ambient conditions specified. Operation under water, under extreme temperature fluctuations or extreme maximum temperatures is not allowed for example:.
- the Rexroth applications that are not released explicitly. Please note the general statements in the general safety instructions!

3 Safety Instructions for Electric Drives and Controls

3.1 Safety Instructions - General Information

3.1.1 Using the Safety Instructions and Passing them on to Others

Do not attempt to install or commission this device without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with the device. If you do not have the user documentation for the device, contact your responsible Bosch Rexroth sales representative. Ask for these documents to be sent immediately to the person or persons responsible for the safe operation of the device.

If the device is resold, rented and/or passed on to others in any other form, these safety instructions must be delivered with the device in the official language of the user's country.

WARNING

Improper use of these devices, 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!

Observe the safety instructions!

3.1.2 How to Employ the Safety Instructions

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

- 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 commissioning 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 device.
- Only assign trained and qualified persons to work with electrical installations:
  - Only persons who are trained and qualified for the use and operation of the device may work on this device or within its proximity. The persons are qualified if they have sufficient knowledge of the assembly, installation and operation of the product, 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 devices 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 devices have been designed for installation in industrial machinery.
- The ambient conditions given in the product documentation must be observed.
- Only use safety-relevant applications that are clearly and explicitly approved in the Project Planning Manual. If this is not the case, they are excluded. Safety-relevant are all such applications which can cause danger to persons and material damage.
- 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.
- Commissioning 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.
- 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 section on EMC in the respective documentation (Project Planning Manuals of components and system).

  The machine or installation manufacturer is responsible for compliance with the limiting values as prescribed in the national regulations.
- Technical data, connection and installation conditions are specified in the product documentation and must be followed at all times.

National regulations which the user must take into account

- European countries: according to European EN standards
- United States of America (USA):
  – National Electrical Code (NEC)
  – National Electrical Manufacturers Association (NEMA), as well as local engineering regulations
  – regulations of the National Fire Protection Association (NFPA)
- Canada: Canadian Standards Association (CSA)
- Other countries:
  – International Organization for Standardization (ISO)
  – International Electrotechnical Commission (IEC)

3.1.3 Explanation of Warning Symbols and Degrees of Hazard Seriousness

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

Warning symbol	Signal word	Degree of hazard seriousness acc. to ANSI Z 535.4-2002
	Danger	Death or severe bodily harm will occur.
	Warning	Death or severe bodily harm may occur.
	Caution	Minor or moderate bodily harm or material damage may occur.

Fig.3-1: Hazard classification (according to ANSI Z 535)

3.1.4 Hazards by Improper Use

DANGER

High electric voltage and high working current! Risk of death or severe bodily injury by electric shock!

Observe the safety instructions!

DANGER

Dangerous movements! Danger to life, severe bodily harm or material damage by unintentional motor movements!

Observe the safety instructions!

WARNING

High electric voltage because of incorrect connection! Risk of death or bodily injury by electric shock!

Observe the safety instructions!

WARNING

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

Observe the safety instructions!

CAUTION

Hot surfaces on device housing! Danger of injury! Danger of burns!

Observe the safety instructions!

CAUTION

Risk of injury by improper handling! Risk of bodily injury by bruising, shearing, cutting, hitting or improper handling of pressurized lines!

Observe the safety instructions!

CAUTION

Risk of injury by improper handling of batteries!

Observe the safety instructions!

3.2 Instructions with Regard to Specific Dangers

3.2.1 Protection Against Contact with Electrical Parts and Housings

☞ This section concerns devices and drive components with voltages of **more than 50 Volt**.

Contact with parts conducting voltages above 50 Volts can cause personal danger and electric shock. When operating electrical equipment, it is unavoidable that some parts of the devices conduct dangerous voltage.

DANGER

High electrical voltage! Danger to life, electric shock and severe bodily injury!

- Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain and repair this equipment.
- Follow general construction and safety regulations when working on power installations.
- Before switching on the device, the equipment grounding conductor must have been non-detachably connected to all electrical equipment in accordance with the connection diagram.
- Do not operate electrical equipment at any time, even for brief measurements or tests, if the equipment grounding conductor is not permanently connected to the mounting points of the components provided for this purpose.
- Before working with electrical parts with voltage potentials higher than 50 V, the device must be disconnected from the mains voltage or power supply unit. Provide a safeguard to prevent reconnection.
- With electrical drive and filter components, observe the following:

  Wait **30 minutes** after switching off power to allow capacitors to discharge before beginning to work. Measure the electric voltage on the capacitors before beginning to work to make sure that the equipment is safe to touch.
- Never touch the electrical connection points of a component while power is turned on. Do not remove or plug in connectors when the component has been powered.
- Install the covers and guards provided with the equipment properly before switching the device on. Before switching the equipment on, cover and safeguard live parts safely to prevent contact with those parts.
- A residual-current-operated circuit-breaker or r.c.d. cannot be used for electric drives! Indirect contact must be prevented by other means, for example, by an overcurrent protective device according to the relevant standards.
- Secure built-in devices from direct touching of electrical parts by providing an external housing, for example a control cabinet.

For electrical drive and filter components with voltages of **more than 50 volts**, observe the following additional safety instructions.

DANGER

High housing voltage and high leakage current! Risk of death or bodily injury by electric shock!

- Before switching on, the housings of all electrical equipment and motors must be connected or grounded with the equipment grounding conductor to the grounding points. This is also applicable before short tests.
- The equipment grounding conductor of the electrical equipment and the devices must be non-detachably and permanently connected to the power supply unit at all times. The leakage current is greater than 3.5 mA.
- Over the total length, use copper wire of a cross section of a minimum of 10 mm^2 for this equipment grounding connection!
- Before commissioning, also in trial runs, always attach the equipment grounding conductor or connect to the ground wire. Otherwise, high voltages may occur at the housing causing electric shock.

3.2.2 Protection Against Electric Shock by Protective Extra-Low Voltage

Protective extra-low voltage is used to allow connecting devices with basic insulation to extra-low voltage circuits.

All connections and terminals with voltages between 5 and 50 volts at Rexroth products are PELV systems. [1] It is therefore allowed to connect devices equipped with basic insulation (such as programming devices, PCs, notebooks, display units) to these connections and terminals.

WARNING

High electric voltage by incorrect connection! Risk of death or bodily injury by electric shock!

If extra-low voltage circuits of devices containing voltages and circuits of more than 50 volts (e.g. the mains connection) are connected to Rexroth products, the connected extra-low voltage circuits must comply with the requirements for PELV. [2]

3.2.3 Protection Against Dangerous Movements

Dangerous movements can be caused by faulty control of 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.

1) *"Protective Extra-Low Voltage"*

2) *"Protective Extra-Low Voltage"*

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 harm 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.

  These measures have to be provided for by the user according to the specific conditions within the installation and a hazard and fault analysis. The safety regulations applicable for the installation have to be taken into consideration. Unintended machine motion or other malfunction is possible if safety devices are disabled, bypassed or not activated.

To avoid accidents, bodily harm and/or material damage:

- 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.
- Mount the emergency stop switch in the immediate reach of the operator. Verify that the emergency stop works before startup. Don't operate the device if the emergency stop is not working.
- Isolate the drive power connection by means of an emergency stop circuit or use a safety related starting lockout to prevent unintentional start.
- Make sure that the drives are brought to a safe standstill before accessing or entering the danger zone.
- Additionally 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 or
  - 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 devices 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.

3.2.4 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated by current-carrying conductors and permanent magnets in motors represent a serious personal danger to those 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 and metal implants are not permitted to enter following areas:
  - Areas in which electrical equipment and parts are mounted, being operated or commissioned.
  - Areas in which parts of motors with permanent magnets are being stored, repaired or mounted.
- If it is necessary for somebody with a pacemaker to enter such an area, a doctor must be consulted prior to doing so. The noise immunity of present or future implanted heart pacemakers differs greatly so that no general rules can be given.
- Those with metal implants or metal pieces, as well as with hearing aids, must consult a doctor before they enter the areas described above. Otherwise health hazards may occur.

3.2.5 Protection Against Contact with Hot Parts

CAUTION

Hot surfaces at motor housings, on drive controllers or chokes! Danger of injury! Danger of burns!

- Do not touch surfaces of device housings and chokes in the proximity of heat sources! Danger of burns!
- Do not touch housing surfaces of motors! Danger of burns!
- According to the operating conditions, temperatures can be **higher than 60 °C**, 140°F during or after operation.
- Before accessing motors after having switched them off, let them cool down for a sufficiently long time. Cooling down can require **up to 140 minutes**! Roughly estimated, the time required for cooling down is five times the thermal time constant specified in the Technical Data.
- After switching drive controllers or chokes off, wait 15 minutes to allow them to cool down before touching them.
- Wear safety gloves or do not work at hot surfaces.
- For certain applications, the manufacturer of the end product, machine or installation, according to the respective safety regulations, has to take measures to avoid injuries caused by burns in the end application. These measures can be, for example: warnings, guards (shielding or barrier), technical documentation.

3.2.6 Protection During Handling and Mounting

In unfavorable conditions, handling and mounting certain parts and components in an improper way can cause injuries.

CAUTION

Risk of injury by improper handling! Bodily injury by bruising, shearing, cutting, hitting!

- Observe the general construction and safety regulations on handling and mounting.
- Use suitable devices for mounting and transport.
- Avoid jamming and bruising by appropriate measures.
- Always use suitable tools. Use special tools if specified.
- Use lifting equipment and tools in the correct manner.
- If necessary, use suitable protective equipment (for example safety goggles, safety shoes, safety gloves).
- Do not stand under hanging loads.
- Immediately clean up any spilled liquids because of the danger of skidding.

3.2.7 Battery Safety

Batteries consist of active chemicals enclosed in a solid housing. Therefore, improper handling can cause injury or material damage.

CAUTION

Risk of injury by improper handling!

- Do not attempt to reactivate low batteries by heating or other methods (risk of explosion and cauterization).
- Do not recharge the batteries as this may cause leakage or explosion.
- Do not throw batteries into open flames.
- Do not dismantle batteries.
- When replacing the battery/batteries do not damage electrical parts installed in the devices.
- Only use the battery types specified by the manufacturer.

☞ Environmental protection and disposal! The batteries contained in the product are considered dangerous goods during land, air, and sea transport (risk of explosion) in the sense of the legal regulations. Dispose of used batteries separate from other waste. Observe the local regulations in the country of assembly.

3.2.8 Protection Against Pressurized Systems

According to the information given in the Project Planning Manuals, motors cooled with liquid and compressed air, as well as drive controllers, can be partially supplied with externally fed, pressurized media, such as compressed air, hydraulics oil, cooling liquids and cooling lubricating agents. Improper handling of the connected supply systems, supply lines or connections can cause injuries or material damage.

CAUTION

Risk of injury by improper handling of pressurized lines!

- Do not attempt to disconnect, open or cut pressurized lines (risk of explosion).
- Observe the respective manufacturer's operating instructions.
- Before dismounting lines, relieve pressure and empty medium.
- Use suitable protective equipment (for example safety goggles, safety shoes, safety gloves).
- Immediately clean up any spilled liquids from the floor.

☞ Environmental protection and disposal! The agents used to operate the product might not be economically friendly. Dispose of ecologically harmful agents separately from other waste. Observe the local regulations in the country of assembly.

4 Technical Data

4.1 Front Panel

	VPP 21.2 BQ	VPP 21.2 BP
Display	14" TFT, 1024 × 768 pixels	
Operation	Keys	Touch screen
Interface	Bosch Rexroth Design	
Degree of protection	Front panel IP 64 according to DIN 40 050, IEC 529	

Fig.4-1: Technical data of the front panel

4.2 Technical Data of the Total Device

Degree of protection	IP 40 (for closed doors)	
Weight	11 kg (key device VPP 21.2 BQ) 9.15 kg (touch device VPP 21.2 BP)	
Nominal input voltage	24 VDC	
Input voltage range	24 VDC +20%, -15%	
Noise and surge immunity	U_{max} = 35 V (for t < 100 ms)	
24 volts power supply unit:		
Maximum power consumption	48 W[1)]	
Input current	2.0 A for nominal voltage 24 V[1)]	
Output voltages **+ 5 V ...** **+ 12 V ...**	Current (max.) 6 A 0.7 A	Tolerance (incl. residual ripple) +/- 5 % +/- 5 %
Max. output power	38.4 W	
Efficiency	0,8	

Fig.4-2: Technical data of the total device

4.3 PC

Processor	Celeron M with 1.3 GHz and integrated graphic controller with a maximum of 8 MB video memory
Random access memory (RAM)	1 GB SO-DIMM DRAM

1) The power supply unit requires a maximum of 48 W (24 V, 2 A) from the 24 VDC supply. Additionally, a maximum of 24 W (24 V, 2 x 0,5 A) is required for the two 24 V outputs that are also supplied from the 24 VDC supply.

Interfaces	• 1 x external VGA connection (15-pin, HD-Sub) • 2 x Ethernet connection (RJ 45, 10/100 Base-T) • 1 x USB interface • 1 x serial standard interface • 1 x keyboard connection (PS/2) • 1 x mouse connection (PS/2) • 2 x 24 V outputs
Additional interface via a Hilscher COM module	• Profibus DP Master/Slave
Slots for connector panel	1 x slot for Compact Flash Card 1 x slot for 2.5" hard disk
Slot	1 x PCI slot for short cards

Fig.4-3: Technical data PC

4.4 Ambient Conditions

	In operation	**Storage / Transport**
Ambient temperature (surrounding air temperature)	+5 ... +45 °C For operation of the housing ventilator refer to chapter "Pin 3 and Pin 4: Fan Supply" on page 50	-20 °C to +60 °C
Max. temperature gradient	Temporal temperature changes up to 3 °C per minute	Temporal temperature changes up to 3 °C per minute
Relative humidity	Climatic class 3K3 according to EN 60721, non-condensing. 80 % humidity max. for 25 °C	Climatic class 3K3 according to EN 60721, non-condensing. 80 % humidity max. for 25 °C
Air pressure	Up to 2,187.23 yd above MSL according to DIN 60204	Up to 3,280.84 yd above MSL according to DIN 60204
Mechanical strength	Max. vibration: Frequency range: 10 ... 150 Hz Excursion: 0.075 mm at 10 ... 57 Hz Acceleration: 1 g at 57...150 Hz Test duration for each axis: 10 frequency cycles Frequency sweep rate: 1 octaver/min According to EN 60068-2-6, test Fc	Max. shock: 15 g according to EN 60 068-2-27, no disturbance of the function

Fig.4-4: Ambient Conditions

☞ A slot for a 2.5" hard disk is integrated in the connector panel of the VPP 21 box. If you use a hard disk, which is not suitable for the ambient conditions mentioned in the chapter 4.4 "Ambient Conditions" on page 18, you must ensure the ambient conditions required by the hard disk manufacturer for the VPP 21.

4.5 Used Standards

The system components of the VPP 21.2 correspond to the following standards:

Standard	Meaning
EN 60 204-1	Electrical equipment of machines
EN 61 131-2	PLC product standard
EN 50 081-2	Basic technical standard, emitted interference (industrial environment)
EN 60 529	Degrees of protection (incl. housings and installation compartments)
EN 60 068-2	Vibration, free fall and shock
EN 50 178	Clearances and creepage distances
EN 61 000-6-2	Basic technical standard, noise immunity (industrial environment)

Fig.4-5: Used standards

Concerning delivered VPP 21.2 all CE requirements are fulfilled.

UL/CSA certified

The devices of the VPP 21.2 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.

To guarantee an UL/CSA-compliant operation, the following conditions have to be fulfilled:

- Use 140/167 F insulated copper wire only.
- Use Class 1 wire only or equivalent.

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.

4.6 Wear Parts

There is no warranty for the following wear parts:

Backlight

The service life of the backlight in the LC display is limited to a certain number of operating hours. After this time the backlight will produce only 50 % of its original brightness. For the used display this time is 10,000 hours. The backlight cannot be separately exchanged. To exchange the display, please contact the Bosch Rexroth Service.

Lithium battery

The lithium battery to buffer the static memory has a service life of at least 5 years. Thus, the battery has to be exchanged after 5 years to prevent data loss by a discharged battery. More details regarding the exchange can be found under chapter 8.4 "Buffer Battery" on page 54.

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 or 20,000 operation hours in consideration of the following conditions:

Operating conditions	Temperature	5 to 55 °C
	Relative humidity	8 to 90 %
	Height	-300 to 3,280.84 yd
	Accesses	< 20 % of the operating hours

Fig.4-6: Typical operating conditions of the hard disc

Storage conditions	Temperature	-40 to 185.00 °F
	Relative humidity	5 to 95 %
	Duration	< 6 months

Fig.4-7: Typical storage conditions of the hard disc

The operation out of this typical conditions is permissible, whereby, however, the service life of the hard disk may reduce. However, the ambient conditions specified for the overall device in chapter chapter 4.4 "Ambient Conditions" on page 18 have to be absolutely kept.

Additionally, for a Mean time between failures (MTBF) of 300,000 hours the operating hours (power on hours) must be limited to 250 hours/month or 3,000 hours/year. Detailed information regarding the exchange of the hard disc can be found under chapter 8.2 "Hard Disc" on page 53.

Ventilator

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

Surrounding air temperature	Service life
40 °C	70,000 hours
70 °C	35,000 hours

Fig.4-8: Service life of the fan

4.7 Compatibility Test

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

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

5.1.1 Housing Dimensions of the VPP 21 BQ

The dimensions of the VPP 21.2 with keypad are:

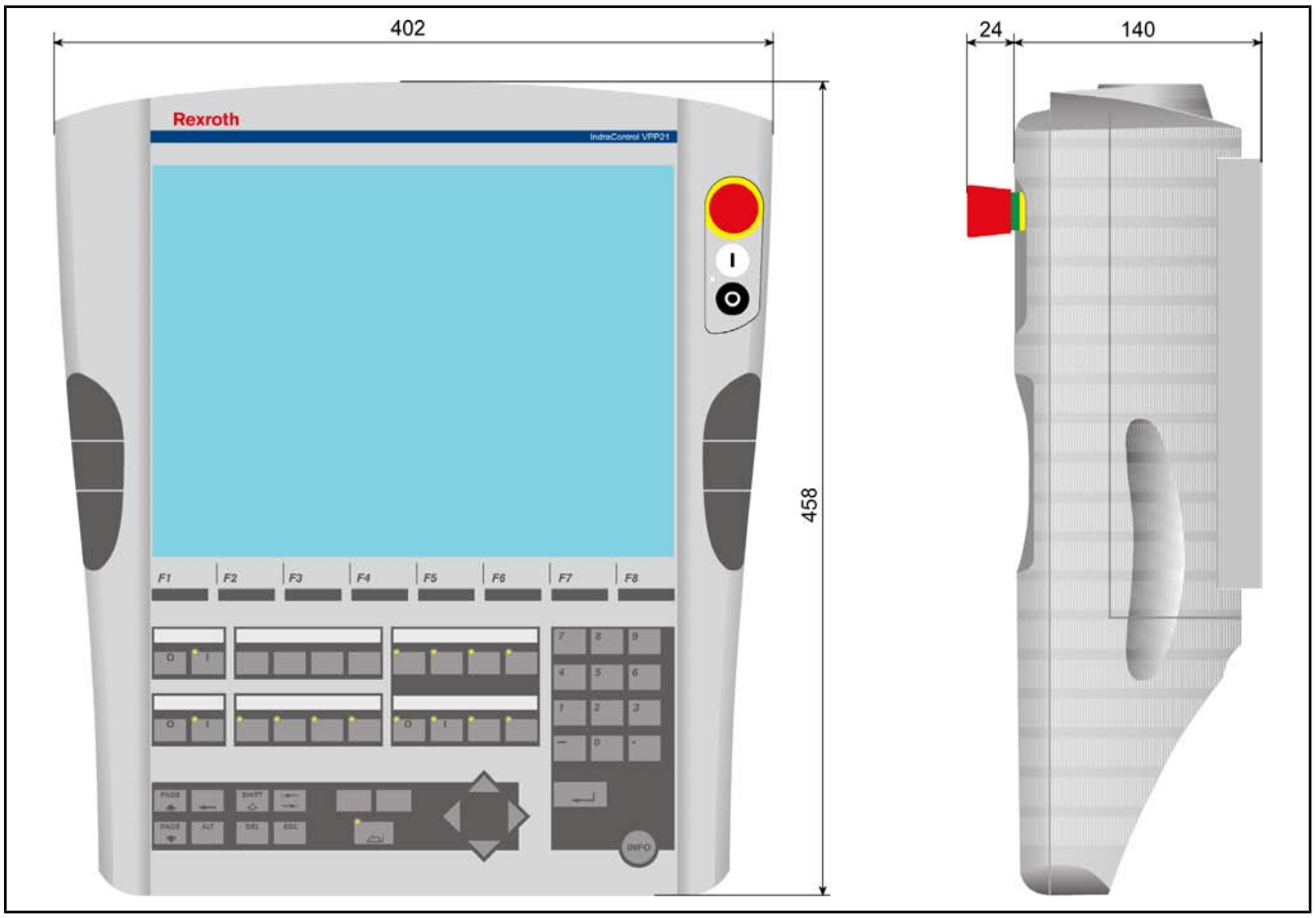

Fig.5-1: Housing dimensions VPP 21 with keypad

5.1.2 Housing Dimensions of the VPP 21 BP

The dimensions of the VPP 21.2 with touch screen are:

Dimensions

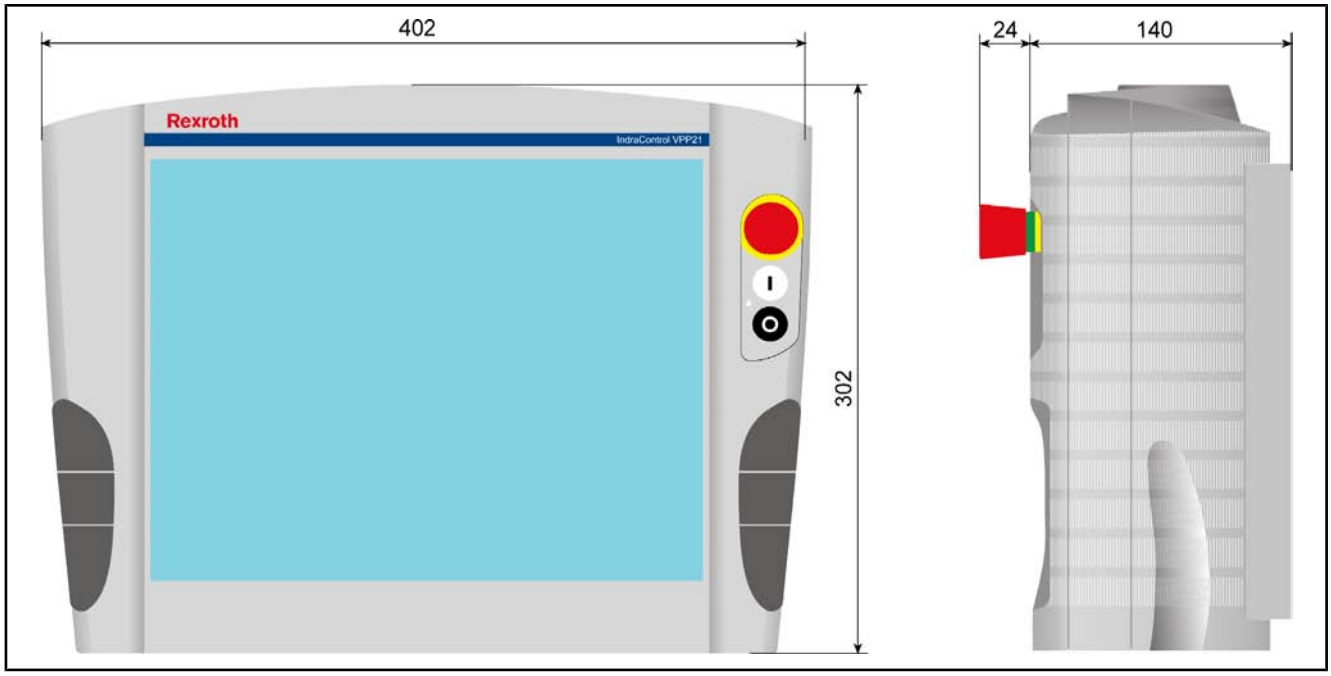

Fig.5-2: Housing dimensions VPP 21 with touch screen

5.2 Installation

5.2.1 Installation Notes

- When installing the VPP 21.2observe to ensure an ergonomic operation. Additionally, ensure that all moving system/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.
- Provide a sufficient minimum clearance of 100 mm for cooling around the VPP 21.2.
- Lay all connecting cables in loops and use drag chain suitable cables. Provide the cables with strain reliefs.
- Keep a suitably large distance from sources of interference.

5.2.2 Installation

The VPP 21.2 is provided for gibbet mounting. As Bosch Rexroth accessories you can order a bracket (see chapter 10 "Ordering Information" on page 61).

☞ The cables are supplied through the gibbet to the VPP 21.2. Accordingly, it could be reasonable to pull a cable into the section to mount already while mounting the VPP 21.2 to the gibbet.

Attach the bracket professionally, e. g, at the machine, according to the respective requirements.

For example, the bracket and the VPP 21.2 can be connected by a mounting tube.

For professional, comfortable and easy mounting of the bracket at the machine and the VPP 21.2, Haseke offers a comprehensive range of additional retainers especially adapted to the bracket delivered by Bosch Rexroth:

Haseke GmbH & Co. KG

Sandtrift 1

32457 Porta Westfalica, Germany

Phone ++49 (0) 57 31 / 7 60 70

Fax ++49 (0) 57 31 / 76 07 50

E-mail: info@haseke.de

Internet http://www.haseke.de

The following figure shows a mounting example of the VPP 21.2 to a bracket, whereby the kind of mounting and the selection of suitable retainers has to be specified according to the respective requirements. Please consider the installation notes mentioned above.

Fig.5-3: Exemplary mounting of the bracket

6 Display and Operating Components

6.1 Display

6.1.1 General Information

All device variants of the VPP 21 are equipped with a TFT display of size 14".

When leaving the factory, brightness and contrast are already set. The colors can be adapted to the requirements of the environment via the operating system or the application software.

6.1.2 Backlight Switch-off

General Information

The backlight as background lighting of the display has a limited lifetime (see chapter 4.6 "Wear Parts" on page 19).

To extend the service life of the TFT 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.

Activate Backlight Switch-off:

- Select in the BIOS setup program menu item "Power Management Set-up" 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.

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".

6.2 Operator Terminals with Keypad

6.2.1 Overview

The operator terminals hand-held terminals.VPP 21.2 BQ are equipped with a keypad (IP 64) with 57 keys.

Furthermore, three buttons (START, STOP, E-STOP) are integrated in the front panel top right as well as three navigation keys are integrated in the handle bar on the left and the right of the display.

Display and Operating Components

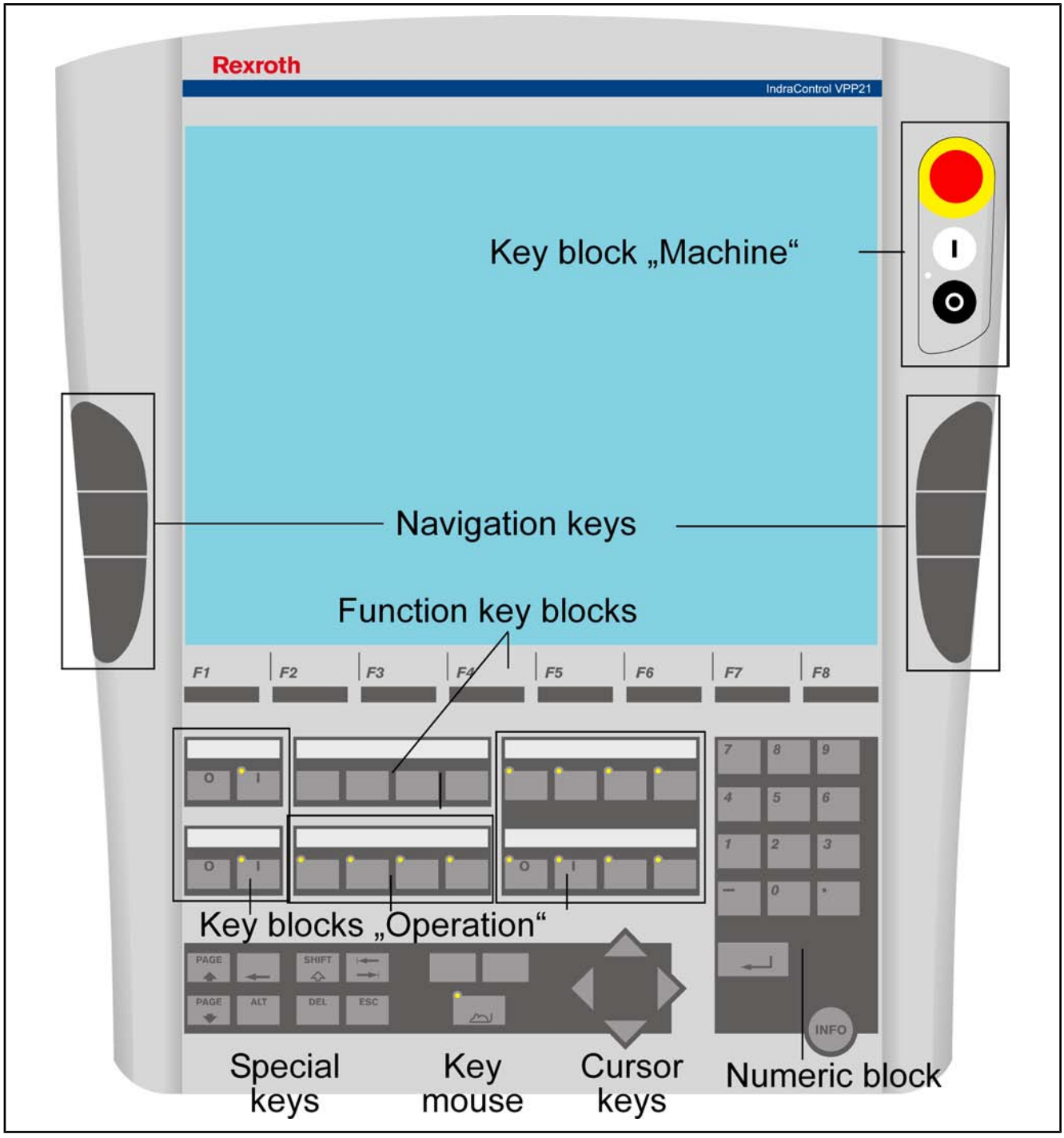

Fig.6-1: Key blocks of the device variant VPP 21 BQ

6.2.2 Navigation Keys

Three navigation keys without designation are arranged in the two handle bars on the right and the left of the display. The function of the keys can be specified by application programs.

Each of the two middle keys controls one digital output. All navigation keys generate MF2 codes (see chapter "Transmission of the Key Codes" on page 30).

6.2.3 Key Block "Machine"

The key block "Machine" consists of the following three keys:

- E-STOP (red, circumvention-proof according to EN 418)
- START button (white, backlit)
- STOP button (black)

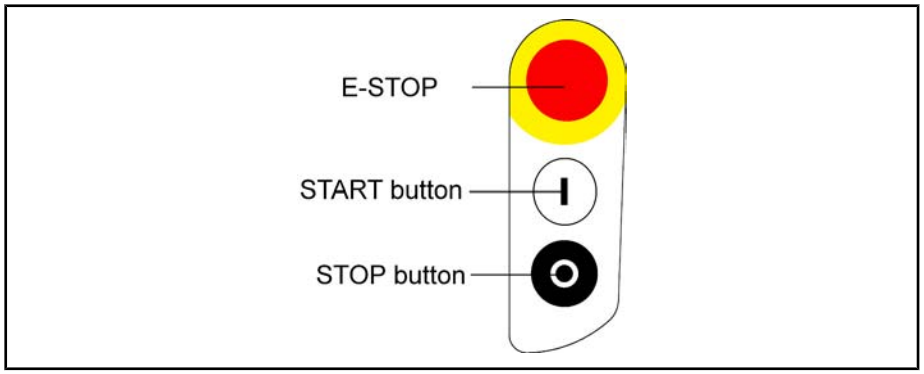

Fig.6-2: Key block "Machine"

6.2.4 Function Key Blocks

Also the function of the following keys can be specified by application programs:

- 8 soft keys F1 to F8 horizontally arranged below the display.
- 4 keys F9 to F12 below the soft keys F2 to F4, whose designation is specified by the user with the help of slide-in strips.

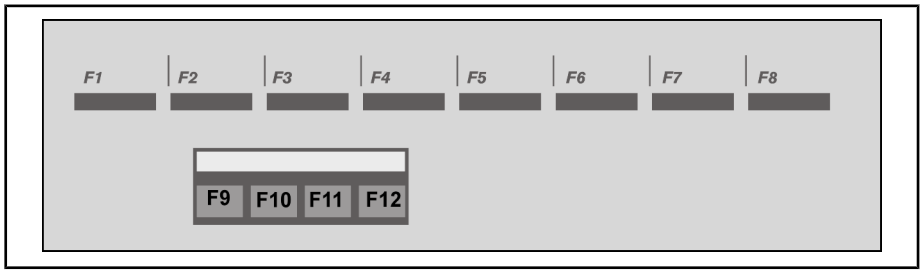

Fig.6-3: Function key blocks F1 to F12

6.2.5 Key Blocks "Operation"

The programmable key blocks "Operation 1/2/3" contain 16 keys. 14 out of the 16 keys are equipped with integrated LEDs

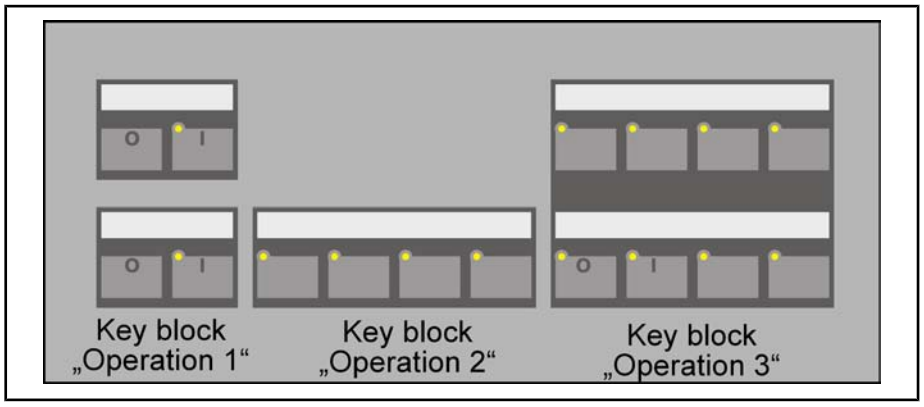

Fig.6-4: Key blocks "Operation"

6.2.6 Numeric Block

The numeric block provides the following keys:

- Character 0 to 9
- -
- .
- ↲ (Return)
- Info

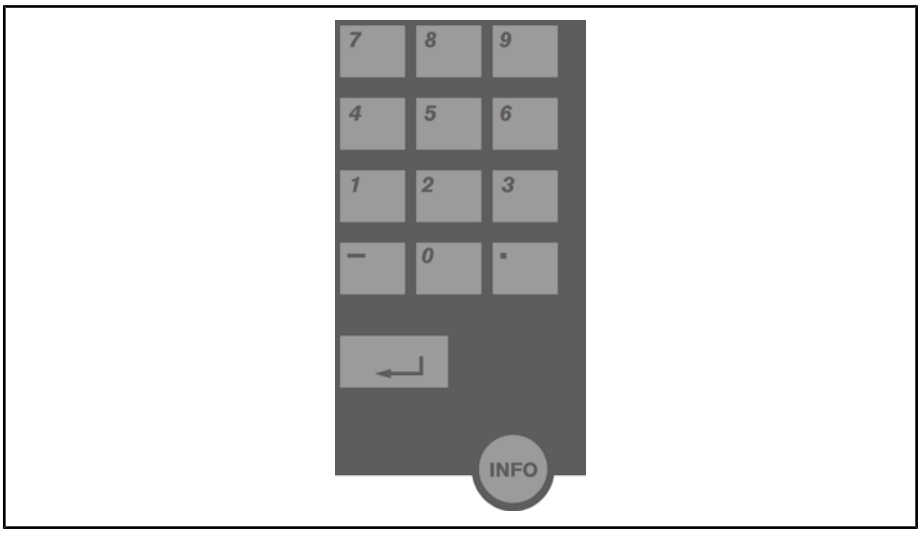

Fig.6-5: Numeric block

6.2.7 Block with Cursor and Special Keys

This block joins cursor keys, special keys and the operation of the key mouse:

- Cursor keys:
  right
  left
  up
  down
- Special keys:
  Page up (to the beginning of the page)
  Page dn (to the end of the page)
  Shift (match case)
  Alt (alternate)
  ← (Backspace, character back)
  Del (Delete)
- Key mouse:
  Activate / deactivates key mouse
  Right mouse button
  Left mouse button

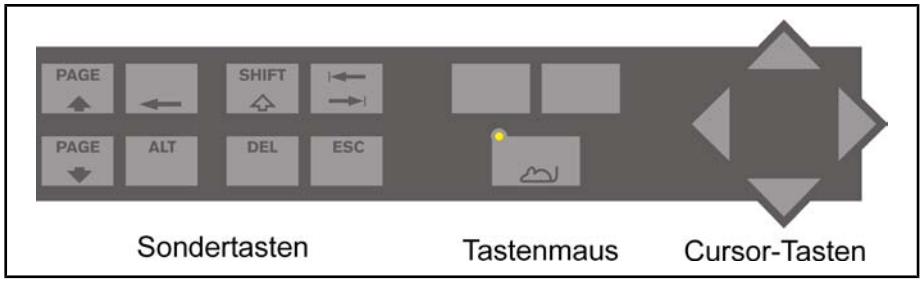

Fig.6-6: Key blocks with key mouse, cursor and special keys

6.2.8 Key Mouse

The key mouse is activated (LED on) or deactivated (LED off) by the key labeled with the mouse icon. The two keys above this key represent the left and the right mouse key. The mouse pointer is moved by the four cursor keys.

☞ If the key mouse is active, this keys are not available as cursor keys.

If while booting the PC an external mouse is connected, it is automatically recognized and the key mouse is switched off. In this case, the key mouse cannot be activated, even if the external mouse is disconnected. Only after booting again the key mouse is reactivated.

6.2.9 Labeling the Front Panel

The four function keys F9 to F12 and the twelve keys of the three key blocks "Operation" can be individually labeled by .

Two slide-in strips are delivered with the VPP 21. The slide-in strips consist of plastic or laminated paper. Their height is 12 mm and their length is approximately 240 mm. The visible cut-out height for labeling is maximum 7 mm.

The slide-in openings for this strips are hidden by the left handle bar.

To insert the slide-in strips labeled according to your individual requirements, proceed as follows:

1. Switch off the VPP 21.
2. Remove the four screws that retain the handle bar and are accessible from the rear side of the housing.
3. Remove the handle bar in your direction.
4. Insert the slide-in strips from the left into the now accessible slide-in openings.

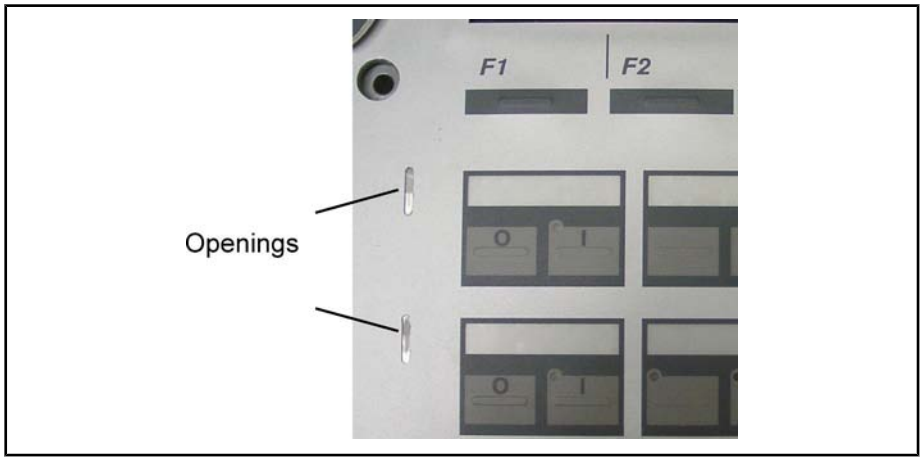

Fig.6-7: Two openings for slide-in strips

5. Put the handle bar to its place and retain it with the four screws.

Ensure that the labeling is well readable.

WARNING

Incorrect operation because of wrong labeling!

Wrong labeling can lead to incorrect operation. Make sure that the labeling of the slide-in strips describes correctly the function of every key.

6.2.10 Keyboard Controller

General Information

The keypad as well as, if required, an externally connected keyboard are controlled by a controller, that scans the keys and, on the one hand, transmits their key codes to the PC and, on the other hand provides the key codes at 24 volts outputs.

Transmission of the Key Codes

The key codes of the keypad are transmitted to the PC via MF2 as well as to the two 24 V outputs according to the following table. The key numbers specified in the table are illustrated in the following drawing:

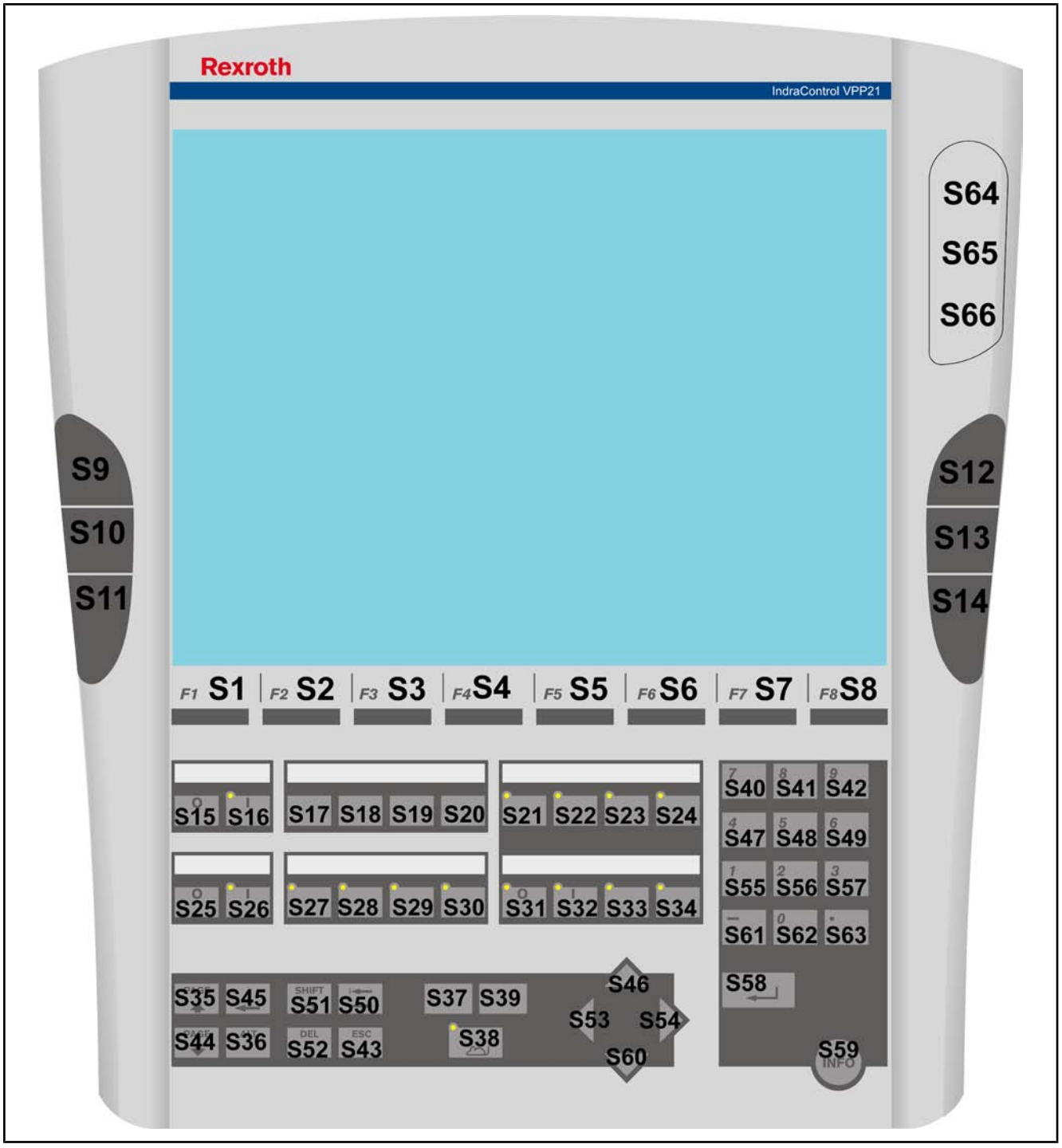

Fig.6-8: Key numbers

Key numbers	MF2	Mouse	Repeat	Serial	Digital outputs Out 24V	LED
S01	F1	-	No	-	-	-
S02	F2	-	No	-	-	-
S03	F3	-	No	-	-	-
S04	F4	-	No	-	-	-

Display and Operating Components

Key numbers	MF2	Mouse	Repeat	Serial	Digital outputs Out 24V	LED
S05	F5	-	No	-	-	-
S06	F6	-	No	-	-	-
S07	F7	-	No	-	-	-
S08	F8	-	No	-	-	-
S09	CTRL-U	-	Yes	-	-	-
S10	CTRL-L	-	Yes	-	Bit 1	-
S11	CTRL-D	-	Yes	-	-	-
S12	CTRL-U	-	Yes	-	-	-
S13	CTRL-R	-	Yes	-	Bit 2	-
S14	CTRL-D	-	Yes	-	-	-
S15	-	-	-	Bit 1	-	-
S16	-	-	-	Bit 2	-	yellow
S17	F9	-	Yes		-	-
S18	F10	-	Yes		-	-
S19	F11	-	Yes		-	-
S20	F12	-	Yes		-	-
S21	-	-	-	Bit 3	-	yellow
S22	-	-	-	Bit 4	-	yellow
S23	-	-	-	Bit 5	-	yellow
S24	-	-	-	Bit 6	-	yellow
S25	-	-	-	Bit 7	-	-
S26	-	-	-	Bit 8	-	yellow
S27	-	-	-	Bit 9	-	yellow
S28	-	-	-	Bit 10	-	yellow
S29	-	-	-	Bit 11	-	yellow
S30	-	-	-	Bit 12	-	yellow
S31	-	-	-	Bit 13	-	yellow
S32	-	-	-	Bit 14	-	yellow
S33	-	-	-	Bit 15	-	yellow
S34	-	-	-	Bit 16	-	yellow
S35	Page up	-	Yes	-	-	-
S36	Old	-	Yes	-	-	-
S37	-	Mouse Key left	-	-	-	-

Key numbers	MF2	Mouse	Repeat	Serial	Digital outputs Out 24V	LED
S38	-	Mouse active	-	Bit 32	-	yellow
S39	-	Mouse Key right	-	-	-	-
S40	7	-	Yes	-	-	-
S41	8	-	Yes	-	-	-
S42	9	-	Yes	-	-	-
S43	ESC	-	Yes	-	-	-
S44	Page down	-	Yes	-	-	-
S45	Backspace	-	Yes	-	-	-
S46	Cursor on	Mouse on	Yes	-	Bit 4	-
S47	4	-	Yes	-	-	-
S48	5	-	Yes	-	-	-
S49	6	-	Yes	-	-	-
S50	Tab	-	Yes	-	-	-
S51	Shift	-	Yes	-	-	-
S52	Del	-	Yes	-	-	-
S53	Cursor left	Mouse left	Yes	-	-	-
S54	Cursor right	Mouse right	Yes	-	-	-
S55	1	-	Yes	-	-	-
S56	2	-	Yes	-	-	-
S57	3	-	Yes	-	-	-
S58	Enter	-	Yes	-	-	-
S59	CTRL-I	-	Yes	-	-	-
S60	Cursor down	Mouse down	Yes	-	Bit 4	-
S61	‘-’	-	Yes	-	-	-
S62	0	-	Yes	-	-	-
S63	.	-	-	-	-	-
S64 E-STOP	-	-	-	-	-	-

Key numbers	MF2	Mouse	Repeat	Serial	Digital outputs Out 24V	LED
S65 START	-	-	-	-	-	-
S66 STOP	-	-	-	-	-	-

Fig.6-9: Key codes

START, STOP, E-STOP

The contacts of the E-STOP button and the keys START and STOP (S64 to S66) are supplied to a connector strip. This connector strip is situated at the upper edge on the rear side of the VPP 21 under the left door.

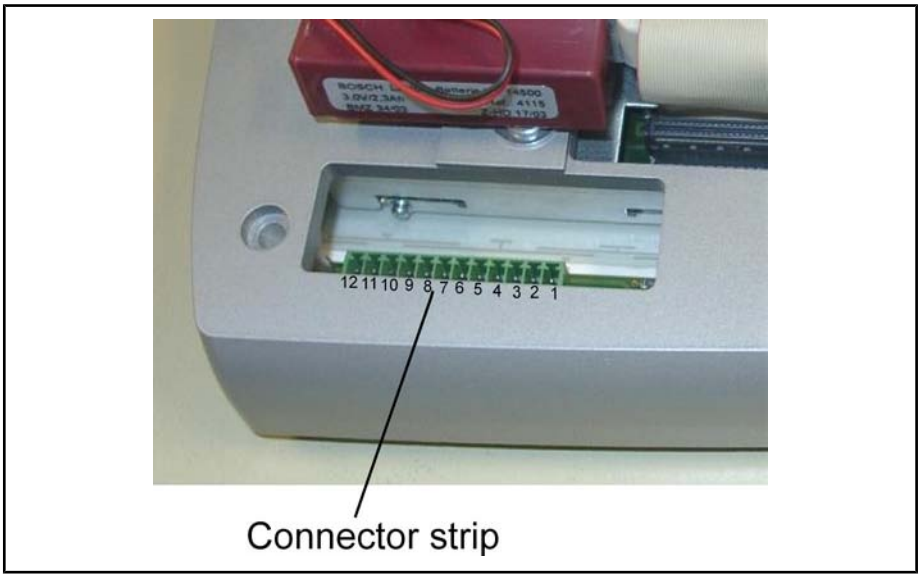

Fig.6-10: Connections of E-STOP, START, STOP

This connections are available for user-specific wirings according to the following connection diagram:

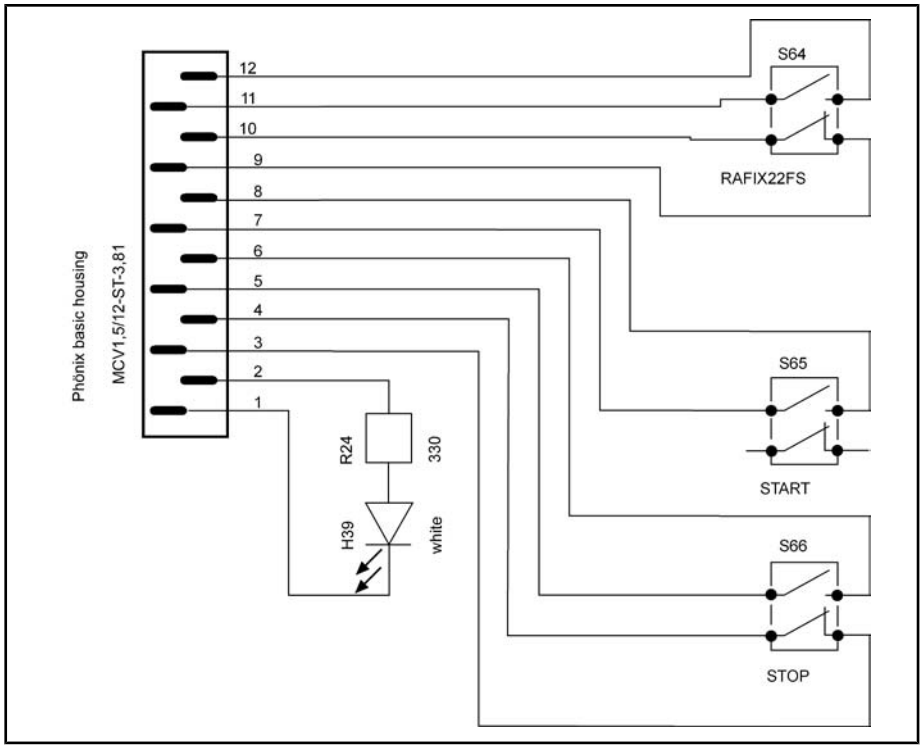

Fig.6-11: Wiring of E-STOP, START, STOP

The maximum load for each contact must not exceed 1 ampere.

6.3 Operator Terminal with Touch Screen

6.3.1 Overview

The operator terminals VPP 21.2 BP are equipped with a resistive 4-wire touch screen, that allows the operation of programs via the touch-sensitive surface of the displays without keyboard and mouse.

In addition, the following key blocks are available:

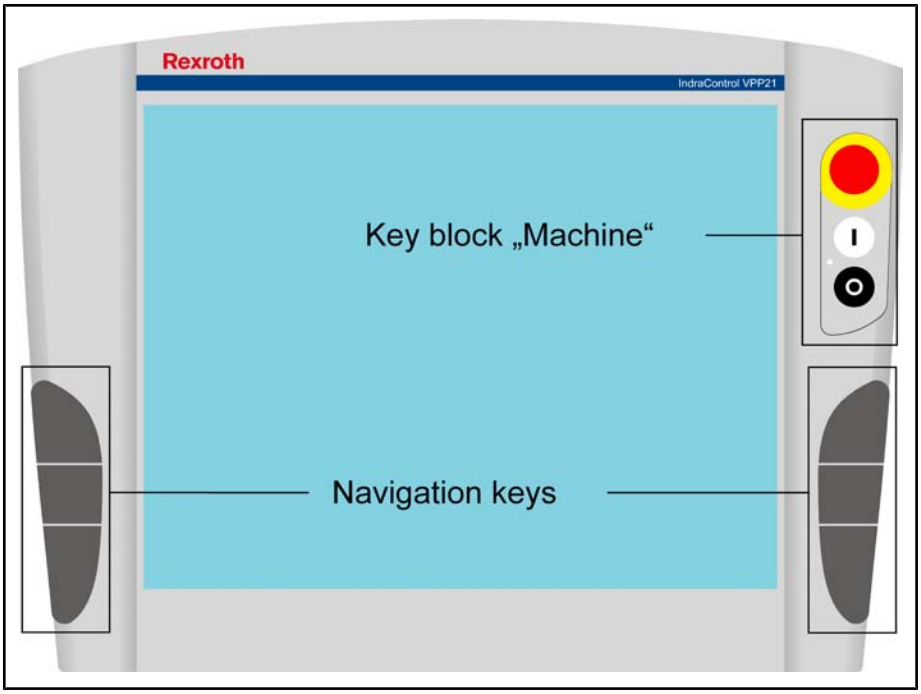

Fig.6-12: Key blocks of the device variants BP

6.3.2 Navigation Keys

Three navigation keys without designation are arranged in the two handle bars on the right and the left of the display. The function of the keys can be specified by application programs.

The wiring of the contacts is described on page fig. 6-8 "Key numbers" on page 31.

6.3.3 Key Block "Machine"

The key block "Machine" consists of the following three keys:

- E-STOP (red, circumvention-proof according to EN 418)
- START button (white, backlit)
- STOP button (black)

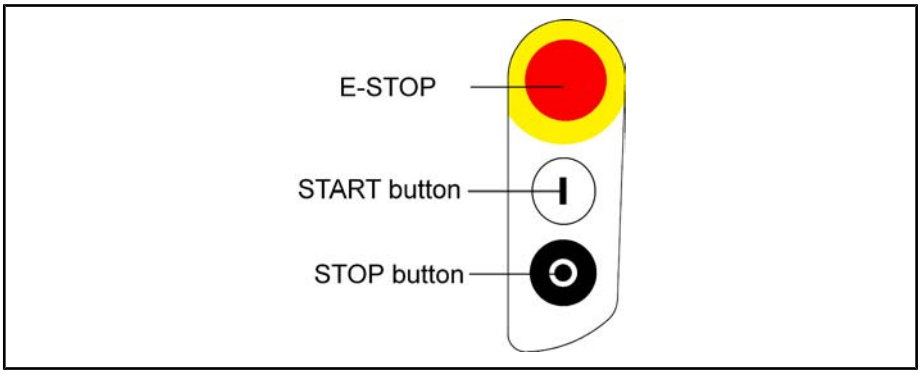

Fig.6-13: Key block "Machine"

The wiring of the contacts is described on page fig. 6-11 "Wiring of E-STOP, START, STOP" on page 35.

6.3.4 Touch Screen Controller

The operator terminals VPP 21 are delivered with a touch screen controller. The touch screen allows the manual operation via the touch-sensitive display surface and thus, replaces mouse and keyboard.

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. The same setup program can also be found via **Start ▸ Programs ▸ UPDD ▸ Settings**.

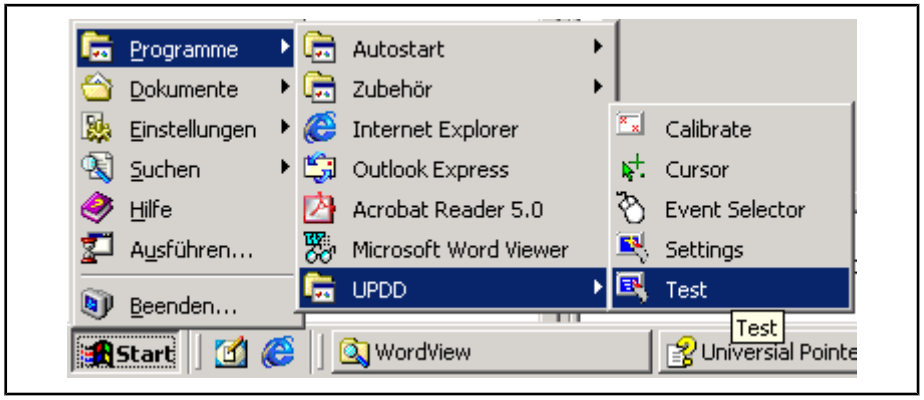

Fig.6-14: UPDD setup programs for the touch screen

A dialog window appears for the different settings:

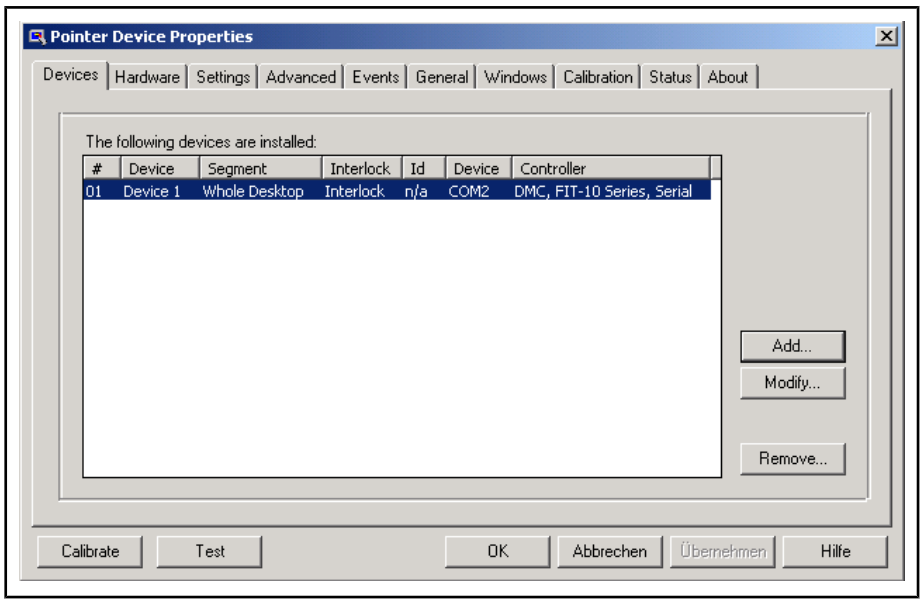

Fig.6-15: Dialog window to set the touch screen

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:\ProgramFiles\UPDD\".

7 VPP 21-Box

7.1 Connector Panel

The connector panel of the VPP 21 box is accessible by opening the cover on the rear side of the VPP 21's plastic housing.

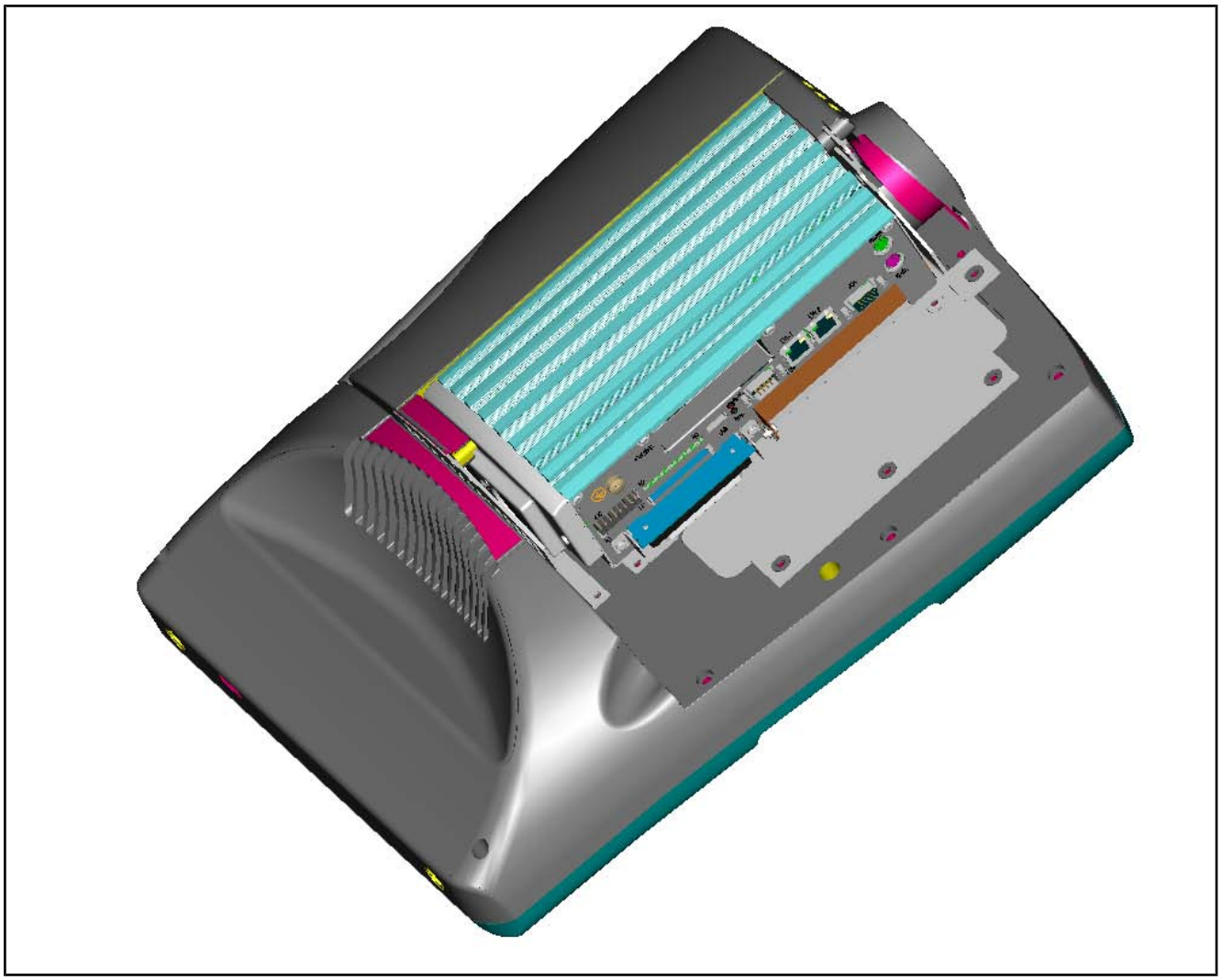

Fig.7-1: View of the VPP 21 from the rear side with opened cover

VPP 21-Box

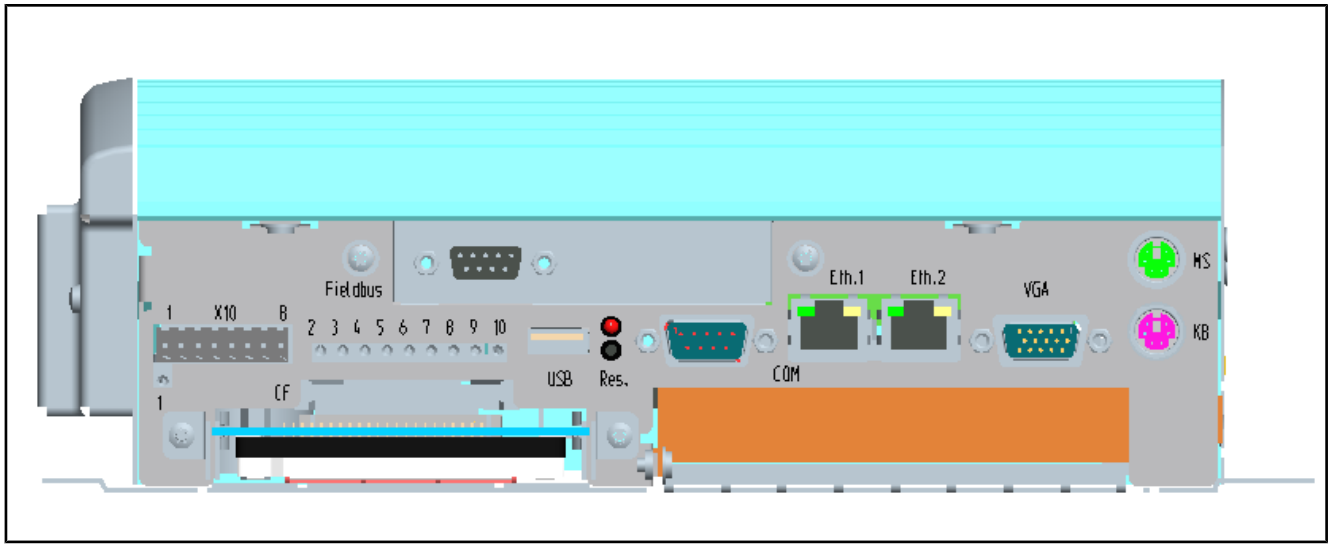

Fig.7-2: Connector panel of the box build in the VPP 21

7.2 Operating Display and Error Display

To indicate device states and errors 10 LEDs arranged at the connector panel of the VPP 21 box are provided.

Start the measures specified in the following table, if one of the succeeding LEDs indicates an error or a note.

LED	Designation	Display	Meaning	Measure
1	VIN	LED green	Normal mode	-
		LED OFF	24 V DC missing	Verify supply voltage
2	VOUT	LED green	Normal mode	-
		LED OFF	Internal voltages missing	Verify supply voltage
3	HD	LED yellow	Hard disk access	-
4	BATT ERR	LED red	Battery error, voltage below the limit value.	Exchange battery
5	RDY_REL	LED green	READY contact closed, no error	-
6	TEMP	LED red	Temperature early warning	-
7	COM_RDY	LED yellow	Ready of the COM module	-
8	COM_RUN	LED green	Run of the COM module	-
9	COM_ERR	LED red	Error of the COM module	-
10	COM_STA	LED yellow	Status of the COM module	-

Fig.7-3: LEDs at the VPP 21 box

7.3 Interfaces

7.3.1 General Information

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

7.3.2 Overview

Des. on the housing	Type of connection	Type of connector (integrated)	Mating connector or cable (from outside)
MS	PS/2 mouse	Mini-DIN PS/2 female connector, 6-pin	Mini-DIN PS/2 male connector, 6-pin
KB	PS/2 Keyboard/Mouse	Mini-DIN PS/2 female connector, 6-pin	Mini-DIN PS/2 male connector, 6-pin
VGA	VGA connection of an external CRT monitor	VGA HD female connector, 15-pin	VGA HD male connector, 15-pin
Eth.1, Eth.2	Network connection: Ethernet 10Base T / 100Base X	RJ45 female connector, 8-pin	RJ45 connector (twisted pair, 8-core)
Field bus (optional)	Profibus DP	D-Sub female connector, 9-pin	D-Sub male connector, IP 20, 9-pin
Field bus (optional)	CAN	D-Sub male connector, 9-pin	D-Sub male connector, IP 20, 9-pin
COM	Serial interface: RS232 (UART 16550), not assigned	D-Sub male connector, 9-pin	D-Sub female connector, 9-pin
USB	USB interface, type 1	USB female connector, 4-pin, type A	USB male connector, 4-pin
CF	Slot for Compact-Flash card as boot medium		
	Slot for 2.5" hard disk		
X10	24 VDC, digital outputs, ready contact	Weidmüller male connector terminal, MSTB 1.5, 8-pin	Female connector terminal, MSTB 1.5, 8-pin

Fig.7-4: Connector types VPP 21

Furthermore, a reset button (Res.) is provided.

☞ The contacts for E-STOP as well as the START and STOP button are described on fig. 6-11 "Wiring of E-STOP, START, STOP" on page 35.

7.3.3 Serial Interface COM1

COM1 - Serial Interface The COM1 interface is provided as serial standard interface.

☞ The interfaces COM2 and COM3 are used for the touch and the keyboard controller and thus, are not assigned.

VPP 21-Box

D-Sub male connector, 9-pin	
Type:	RS232
Cable length:	15 m max.
Cable type:	Shielded, cross section min. 0.14 mm^2
Transmission rate:	Max. 115200 bits/s
Handshake:	Hardware and software handshake (XON, XOFF)
Interrupt (IRQ):	4
I/O address:	AUTO (or 3F8H)
BIOS presettings:	Enabled

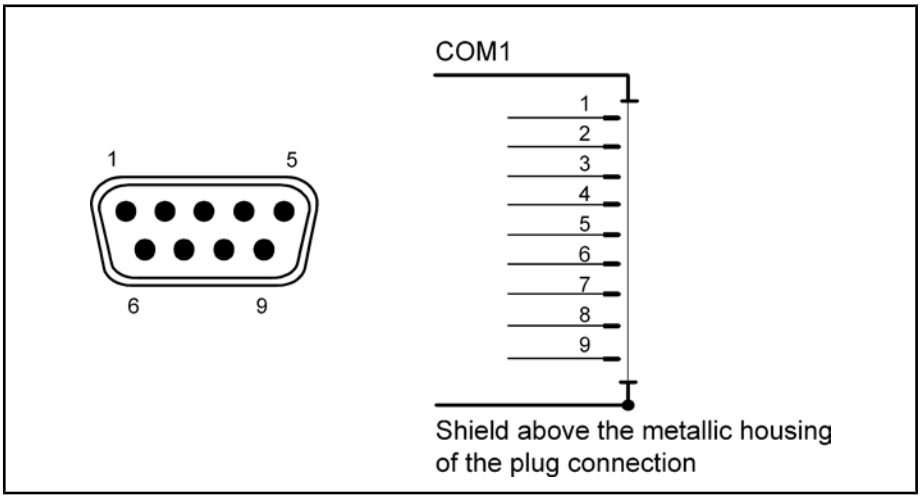

Fig.7-5: Pin assignment COM1

7.3.4 Settings of the Serial Interface

Control Panel

To find out settings of the transfer parameters for the serial interface please refer to the description of the installed operating system.

Under Windows XP, these setting can be found via **Settings ▸ System Panel ▸ Hardware ▸ Device Manager**

BIOS

The standard BIOS setting of 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

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

7.3.5 USB Interface

USB – Serial Interface for Printer, Scanner, CD-ROM Drive

An USB interface is provided at the VPP 21 box.

Via the USB interface up to 128 devices can be connected in series, that are also provided with USB (Universal Serial Bus).

☞ 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.

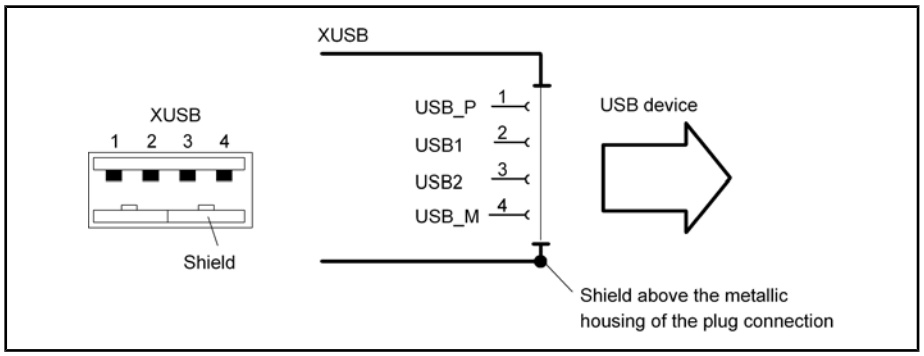

Fig.7-6: USB interfaces

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

7.3.6 Ethernet Interfaces

Ethernet – Network connection

The VPP 21 can be connected with Ethernet networks via the interfaces Eth.1 and Eth.2.

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

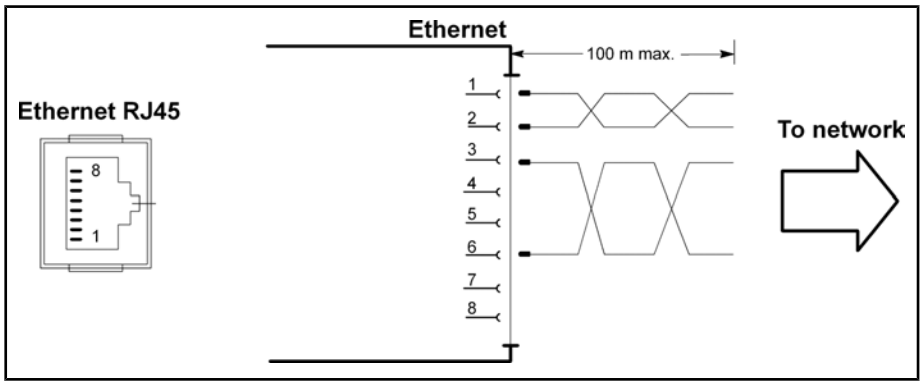

Fig.7-7: Ethernet Interface

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 transmission shall occur with 10 Mbits/s and/or with 100 Mbits/s.

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

7.3.7 PROFIBUS DP (Optional)

Field bus

Optionally, the VPP 21 provides a PROFIBUS interface according to DIN EN 50170, Part 2.

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

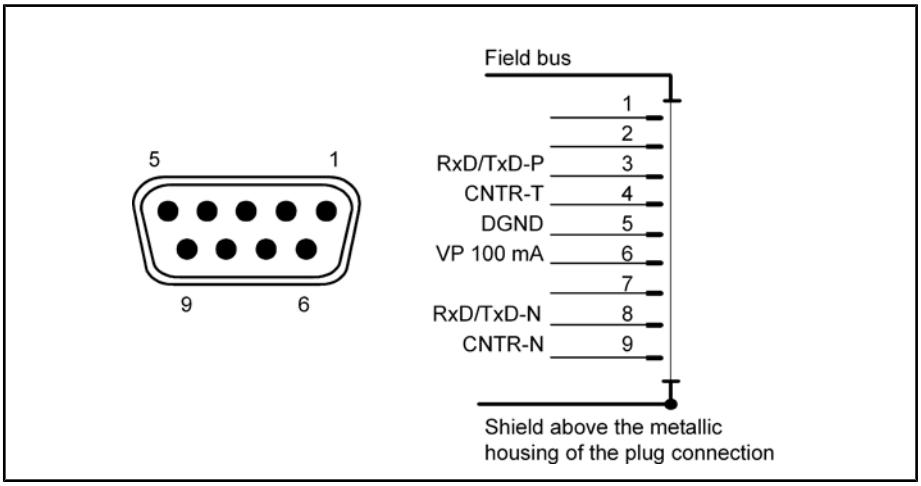

Fig.7-8: PROFIBUS DP interface

The bus line is specified as cable type A according to EN 50170, part 8-2 and must comply with the cable parameters named in "Field bus" on page 44.

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 Ohm/km
Outside diameter	> 0.03 in
Core cross-section	> 0,34 mm^2

Fig.7-9: 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.7-10: Maximum segment length in relation to the transmission rate

7.3.8 CAN (Optional)

Field bus

D-Sub female connector, 9-pin	
Type:	CAN
Cable type:	Shielded, cross section min. 0.14 mm^2

Cable length:	25 m max. at 1 MBit/s 200 m max. at 128 kBit/s
Transmission rate:	1 bits/s max.
Data driver:	Short-circuit proof, electrically isolated
Bus termination:	No internal bus termination

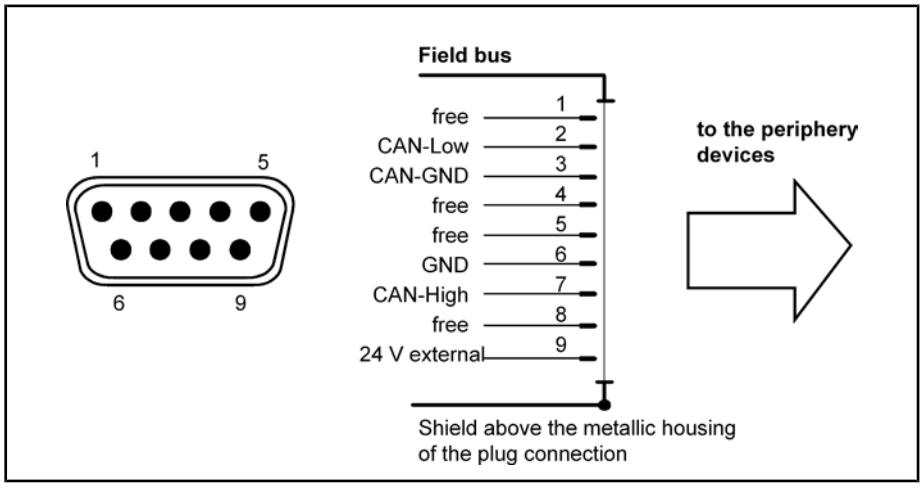

Fig.7-11: CAN Interface

7.3.9 VGA Interface

Graphic – Connection for an external monitor

An external monitor (CRT) can be connected to the VGA connection and can be operated parallel to the integrated flat screen via the integrated video adapter.

- Video RAM: 4 MB max.

☞ 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.

HD female connector, 15-pin	
Cable length:	1.5 m max.
Cable type:	Shielded, cross section min. 0.14 mm^2
Max. resolution:	1600 x 1200 pixels, 4294 mill. colors max.

VPP 21-Box

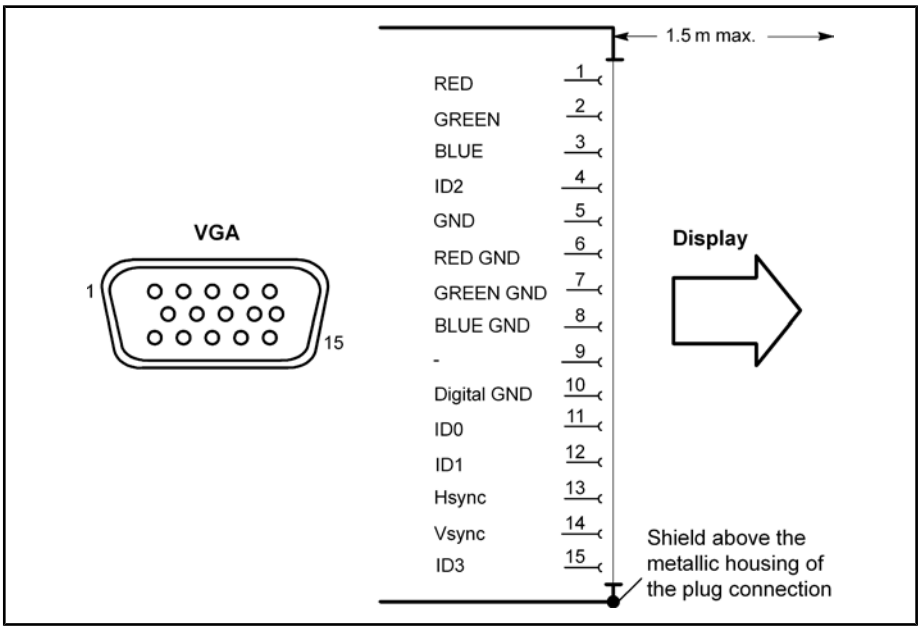

Fig.7-12: VGA interface

Resolution

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

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

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

WARNING

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.

7.3.10 Combined Keyboard/Mouse Interface

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

PS/2 Mini DIN female connector, 6-pin	
Cable length:	1.5 m max.
Cable type:	Shielded, cross section min. 0.14 mm^2

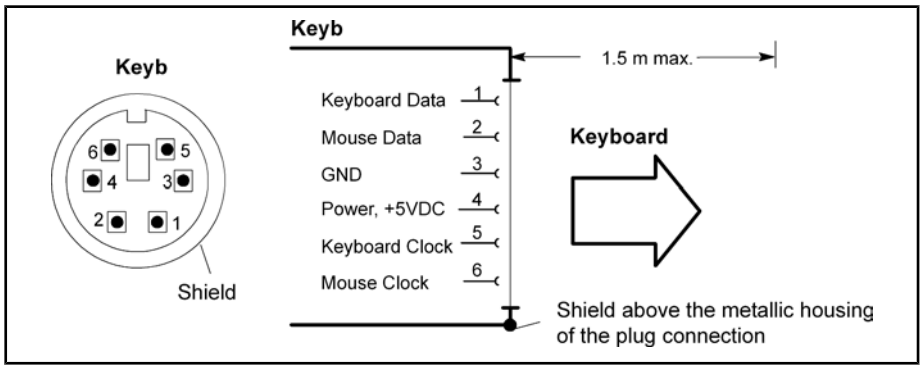

Fig.7-13: Combined Keyboard/Mouse Interface

7.3.11 Mouse Interface

Mouse – PS/2 Mouse Interface

PS/2 Mini DIN female connector, 6-pin	
Cable length:	1.5 m max.
Cable type:	Shielded, cross section min. 0.14 mm^2
Interrupt (IRQ):	12
BIOS presettings:	PS/2 mouse support: EnabledPS/2 Mouse: Auto detect

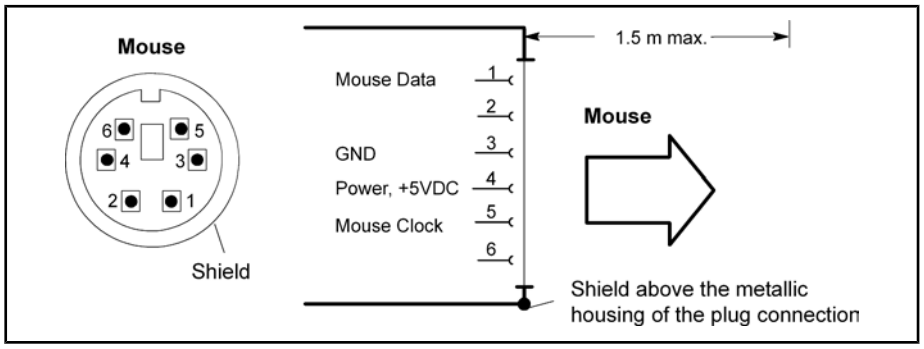

Fig.7-14: Mouse Interface

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.

7.3.12 Power Supply, Digital Outputs, Ready Contact

Overview

X10 – 24-VDC power supply, digital outputs, ready-contact

The power supply 24 VDC is applied to pin 1 and 2 of the 8-pin male connector terminal X10. All internally required voltages are generated with electrical isolation via a DC/DC converter.

The fan is connected to pin 3 and 4.

Two further pins of this connection provide two digital 24 V outputs, that are activated via the middle navigation keys (see fig. 6-9 "Key codes" on page 31).

Finally, the two connections of the isolated ready contact are supplied to this connector terminal.

The connection X10 is designed as connector terminal MSTB 1.5, 8-pin. To this connector terminal, cables with a cross section of maximum 1.5 mm^2 can be connected.

VPP 21-Box

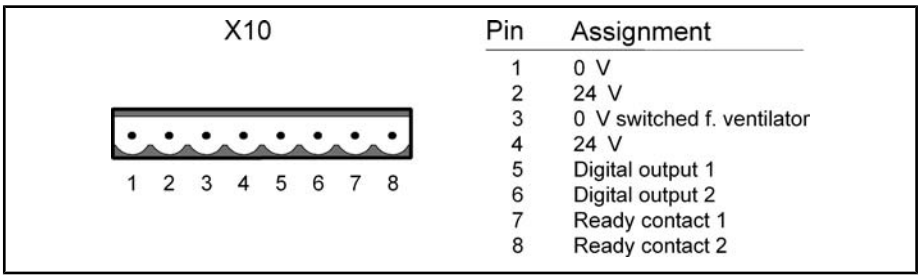

Fig.7-15: Assignment X10

Pin 1 and Pin 2: 24 VDC Supply

Parameters	Value
Rated voltage U_N	24 VDC +20 %, -15 %
Residual ripple at U_N	See chapter "Pin 1 and Pin 2: 24 VDC Supply" on page 48
Noise and surge immunity	U_{max} = 35 V (for t < 100 ms)
Power consumption at U_N	4.8 A max.
Line-side fuse	M5A (5x20) medium time-lag
Reverse voltage protection	Via isolating diode
Holding time of the logic voltages and the measuring system voltages in case of voltage breakdown of the 24 V supply	> 15 ms

Fig.7-16: Technical data of the 24 VDC supply

Ensure that the supply voltage is bounce-free switched on! Otherwise, malfunctions of the device are possible.

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!

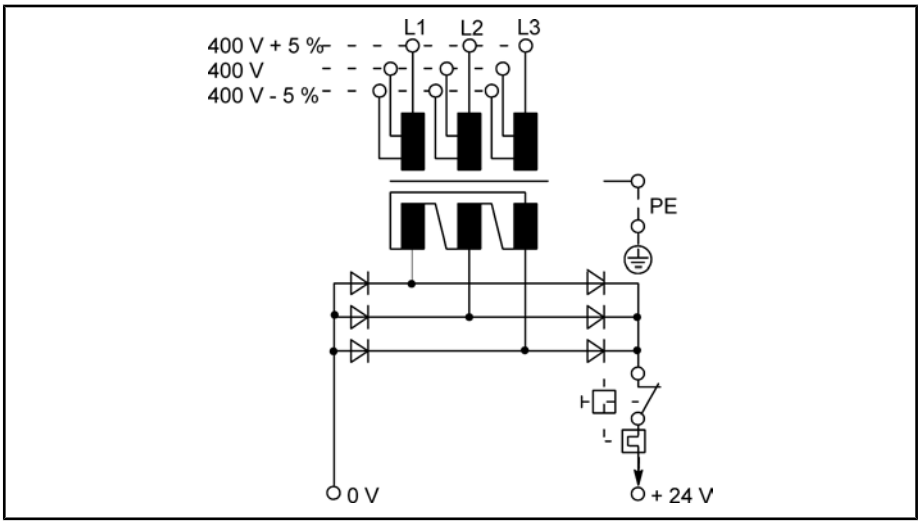

Fig.7-17: Safety transformer according to EN 60742

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.

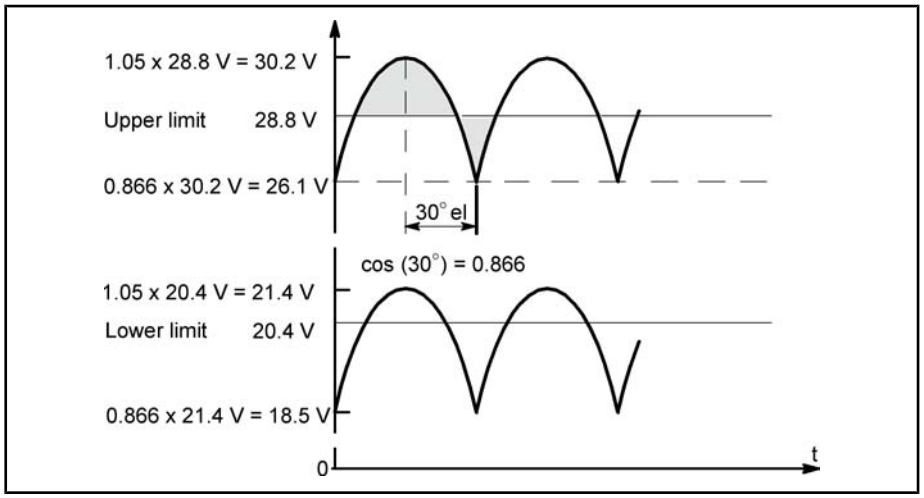

Fig.7-18: Illustration of the limit values for the 24 VDC voltage

VPP 21-Box

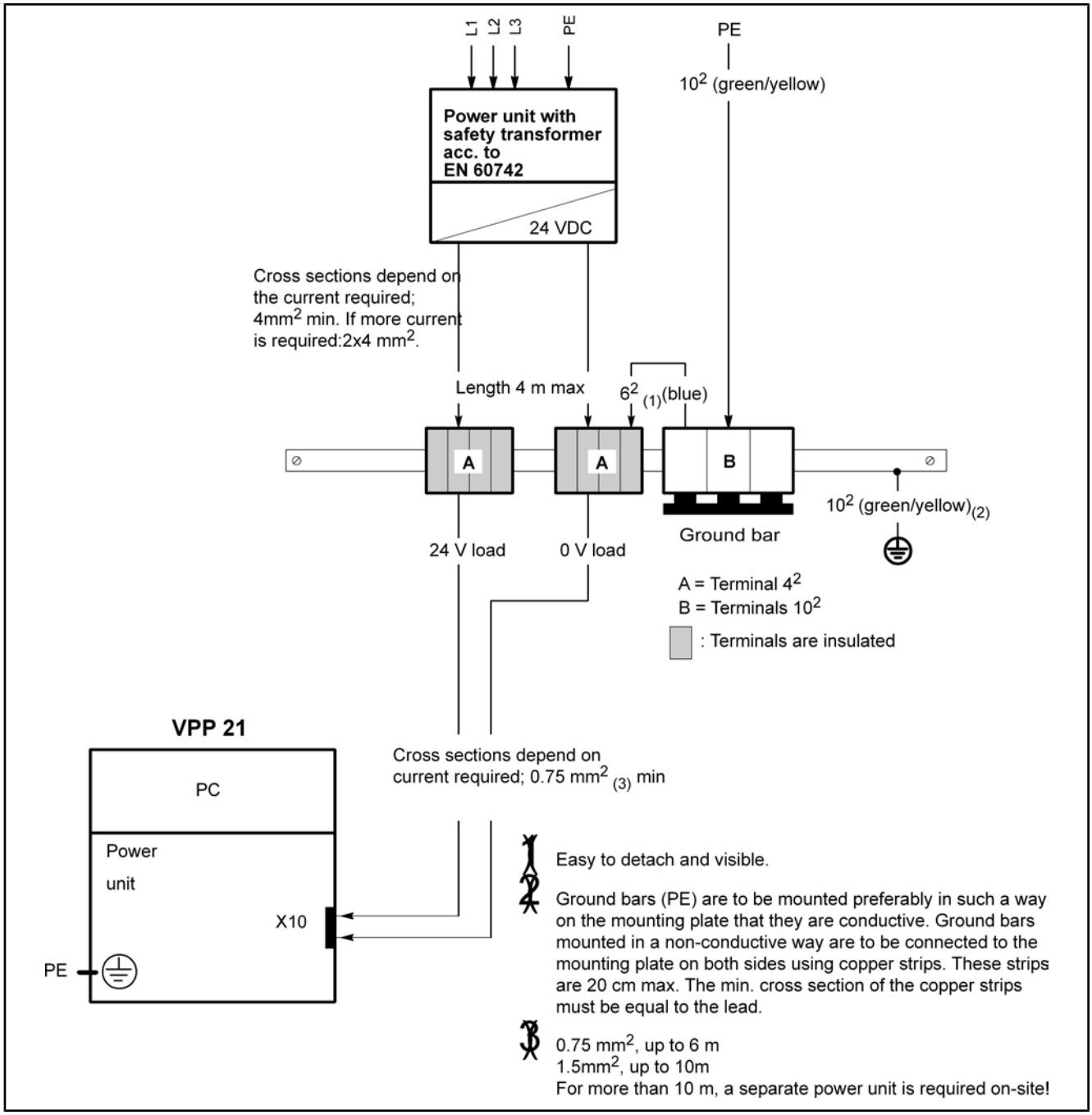

Fig.7-19: Wiring of the power connection 24 VDC to the VPP 21

Pin 3 and Pin 4: Fan Supply

When leaving the factory, there are two fans connected at this pins. This fans are switched on by the VPP 21 box, if the temperature in the box exceeds 50° C. If the inside temperature falls below 45°C, the ventilators are switched off.

Pin 5 and Pin 6: Digital Outputs 1 and 2

Parameters	Value
Number of the outputs	2 semiconductor outputs, non-saving, protected, with automatic restart
Electrical isolation	Yes (to the system)
Output voltage U_N	24 V
Rated output current I_N General Purpose Tungsten	Signal 1: 2 mA ... 0.6 A Signal 0 (leakage current): < 0.5 mA 0.5 A Max. ≤0.5 A according to EN 61131-2 5 watts, 24 V
Overload protection	0.6 A (min. typ. 1,2 A) automat. Restart after approx. 10 ms
Simultaneity factor	100 %
Output delay	< 500 µs
Switching frequency with - ohmic load - inductive load	 100 Hz 1 Hz
Contact load capacity	8 A per contact max. / T_U = 55 °C
Supply voltage	24 V, 19.2 ... 30 V /EN 61131-2

Fig.7-20: Technical data: Digital outputs 1 and 2

Pin 7 and Pin 8: Ready Contact

The ready contact has a single-channel setup.

Relay characteristics	
Switching capacity	0.5 A / 30 VDC
Response time	4 ms
Dropout time	3 ms
Bounce time	2 ms

Fig.7-21: Characteristic data of the ready contact

If it is in the release status, the ready contact is open. It is closed after booting the assembly. This is indicated by LED 5. The contact is opened again, if one of the states listed below occurs:

- The 24 VDC supply falls below the permissible limit.
- One of the monitored voltages leaves the permissible range.
- The temperature exceeds the permissible limit.
- The ready watchdog runs and indicates WD_ERR.
- The reset button situated at the connector panel is activated.

7.3.13 Hard Disk

The 2.5" hard disk is build in a case and plugged in a special slot at the connector panel. For exchange the case can be pulled out (see chapter 8.2).

7.3.14 Compact Flash Card

It is possible to insert in slot CF Compact Flash cards with a memory volume of 32 Mbytes to 1 Gbyte and a ATA (IDE) interface. These cards behave like an DIE hard disk.

8 Maintenance and Installation

8.1 General

VPP 21-type operator terminals are maintenance-free. A few parts are subject to wear and must be replaced after a certain number of operating hours.

WARNING

Maintenance work in the device is only permissible by skilled staff!

If hardware and/or software components have to be exchanged, please contact the Bosch Rexroth Service or ensure that only skilled staff changes the respective components.

Maintenance

Include the following measures in the maintenance schedule:

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

WARNING

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. Verify that lines and cables are not broken or squeezed. 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.

☞ Concerning spare parts function compatibility is ensured for at least 5 years.

8.2 Hard Disc

The hard disk is plugged in the connector field of the VPP 21 box. Thus, the hard disk can easily be exchanged.

WARNING

Loss of data!

Backup all required application data as well as operating system settings to an external storage medium!

WARNING

Risk to damage the operator terminal by electrostatic discharges!

Comply with all ESD-protection measures during working with modules and components! Avoid electrostatic discharges!

☞ 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.

The hard disk to be installed must already be provided with an installed operating system. 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. Shut down the PC.
3. Disconnect the power supply.
4. Open the right door on the rear side of the VPP 21.
5. Remove the hard disk.
6. Insert the new hard disk.
7. The new hard disk parameters are automatically recognized by the system. If the operating system does not boot, interrupt the power supply for at least 10 seconds and restart.
8. After properly booting the PC the user data and the operating system settings for the normal operating mode have to be restored.

8.3 Display

A fading backlight causes a progressive deterioration of the LCD display's readability, so that a display exchange is necessary. Exchanging the backlight is not possible. To exchange the display, please contact the Bosch Rexroth Service.

8.4 Buffer Battery

The build-in lithium battery buffers the SRAM modules and the clock, if the power supply (24 VDC) is switched off. The buffer time is at least five years, so that after five years a battery exchange might occur. To avoid the loss of data during battery exchange, a gold capacitor provides for the buffering (10 minutes).

The battery is permanently checked by a monitoring circuit. If the voltage falls below its minimum value, LED H4 at the connector panel is activated. Then, you should exchange the battery. For this, please contact the Bosch Rexroth service.

If you decide that the battery should be exchanged by your own skilled staff, consider the following instructions:

DANGER

Fire or explosion hazard by use of wrong battery types!

Replace the battery only by a type for the VPP 21 permitted by Bosch Rexroth.

This is currently: Lithium battery 3.0 V; 2.3 Ah with Bosch Rexroth part number 1070922650.

DANGER

Risk of injury through improper treatment of the battery!

The battery in this device can cause fire or chemical burn, if it is treated in the wrong way.

The battery must not be charged, opened, heated over 100 °C and burn.

The lithium element is designed for the use under normal temperature conditions. The temperatures to be expected must not exceed values of 212.00 °F.

The lithium cells must not be connected in series with a power source, as this would increase the forward current through the cells to an impermissible value.

DANGER

Fire, explosion or burns due to wrong battery treatment!

The battery must not be charged, opened, heated over 100 °C and burn.

1. Shut down the PC.
2. Disconnect the power supply.
3. Open the left door on the rear side of the VPP 21.

Fig.8-1: The battery is situated behind the left door.

4. Plug off the connector, with which the battery is connected.
5. Remove the battery fixed by a Velcro strip. Dispose it immediately and properly and observe the notes given in this chapter.
6. Fix the new battery. Consider that the inserted battery type is designed for the VPP 21 and permitted by Bosch Rexroth.

   This is currently: Lithium battery 3.0 V; 2.3 Ah with Bosch Rexroth part number 1070.922.650.
7. Plug in the connector.
8. Close the door of the VPP 21.

Dispose the used battery immediately. Keep it away from children.

8.5 Extension cards

8.5.1 General Notes

There is a PCI slot available in the VPP 21 box. A short PCI card can be put into that slot by means of the PCI adapter. Only cards released by Bosch Rexroth may be used.

WARNING

Risk of damage to the VPB 21 or the extension cards by electrostatic discharges!

Comply with all ESD-protection measures during working with modules and components! Avoid electrostatic discharges!

WARNING

Risk of damage to the operator terminal or corruption of application software by integrating non-released extension cards!

Install only released extension cards, and have them installed by skilled employees.

The PCI slot is provided with the following voltages:

Voltage	Maximum current permissible
+5 V	1.2 A
+12 V	1 A

Fig.8-2: Voltages for the PCI card

The voltages are not protected separately, but they are monitored together with the power supply. Thus, the maximum current cannot be exceeded or a short-circuit cannot result in a voltage breakdown and therefore not lead to switching-off of the device.

The voltages -12 V and +3,3 V are not available at the PCI slot.

Maximum card size

For the VPP 21, the maximum dimension of an extension card can be:

Height: 123 mm

Width: 20 mm

Depth: 176 mm

8.5.2 PCI Card Installation

If a PCI card should be installed, the following is to be carried out:

1. Switch off the VPP 21.
2. Open the left door of the rear of the VPP 21. Remove the two ribbon cables by using the release lever at the shorter sides of the connectors.

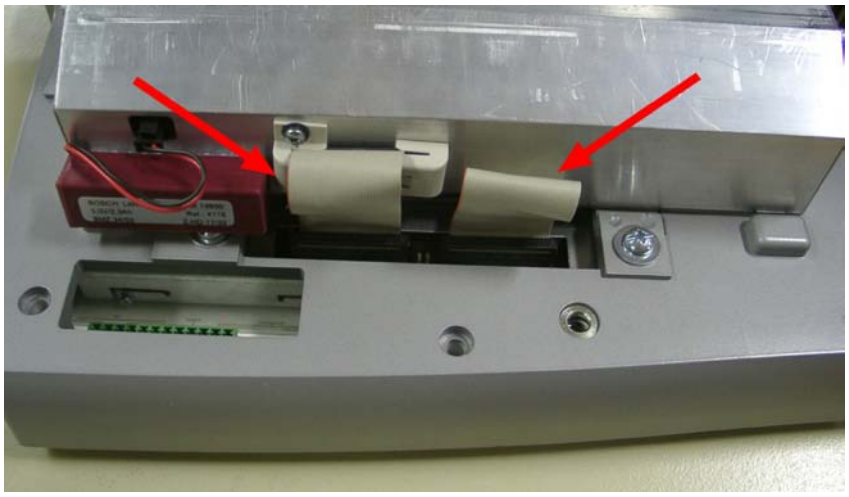

Fig.8-3: Position of the ribbon cables

3. Open the right door on the rear of the VPP 21 and remove the cables connected to the connector panel.
4. Remove both the screws used to fasten the VPP 21 in the housing.

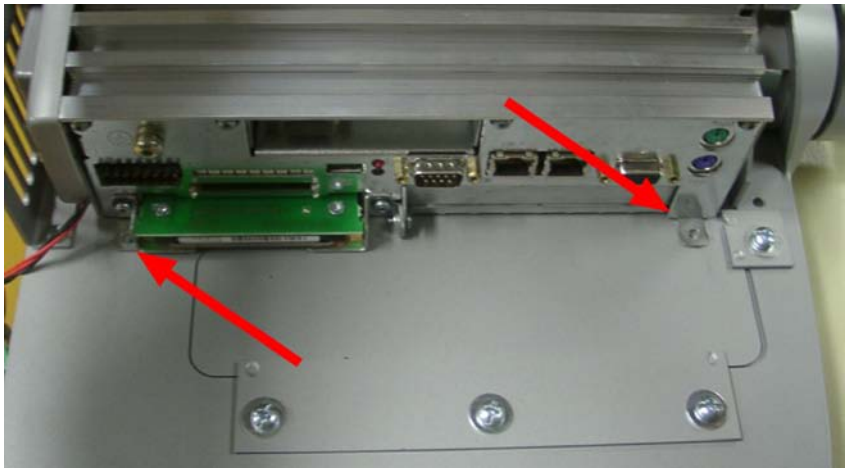

Fig.8-4: Fastening screws of the PC box

5. Pull the VPP 21 box to the right out of the VPP 21 plastic housing.
6. Place the VPP 21 box with the cooling fins down on a plane ground.
7. Remove the screws that fasten the ventilator on the housing and remove the ventilator.
8. Remove the cover of the VPP 21 box fastened with 4 screws. Remove the cover of the lower part of the housing.
9. Remove the screw that fastens the metal sheet of the slot.
10. Remove the angle plug from the motherboard. Plug the PCI adapter on the PCI card. Then, insert the PCI card into the corresponding female connector strip using the angle adapter.

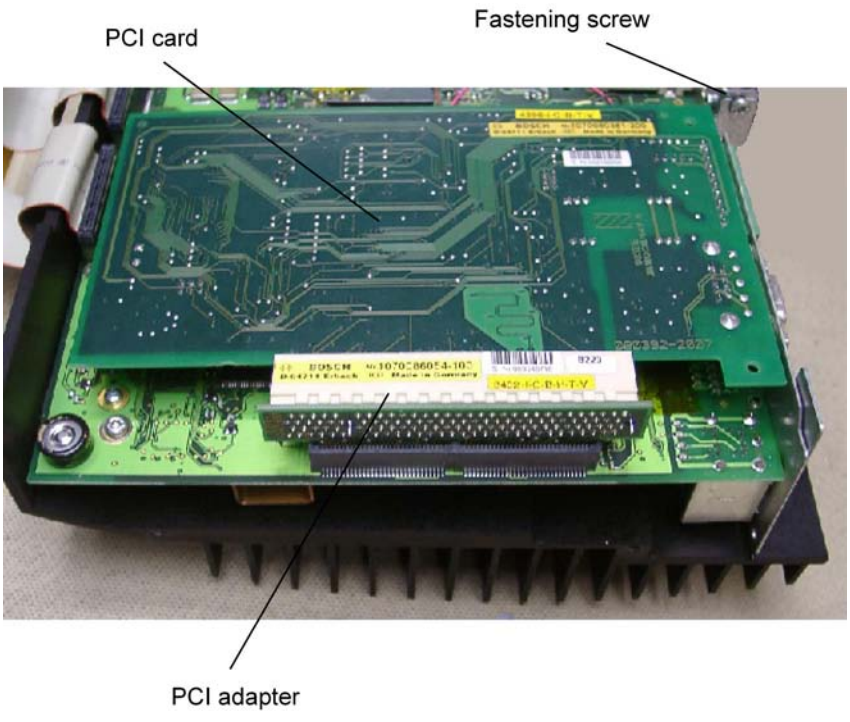

Fig.8-5: Installed PCI card

11. Attach the aperture of the PCI card using the fastening screw.

12. Place the cover and fasten it using the four screws on the housing of the VPP 21 box.
13. Implement the VPP 21 box again by introducing it into the plastic housing from the right. The two flaps on the left (below the left door) have to slide into the corresponding holders. Fix the two fastening screws on the right , the two ribbon cables on the left and the remaining cables on the connector panel and close the doors.

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.) exists.

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 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.

9 Disposal and Environmental Protection

9.1 Disposal

9.1.1 Products

Our products can be returned to us free of charge for disposal. However, it is a precondition that the products are free of oil, grease or other dirt.

Furthermore, the products returned for disposal must not contain any undue foreign matter or foreign component.

Please send the products free domicile to the following address:

Bosch Rexroth AG

Electric Drives and Controls

Bürgermeister-Dr.-Nebel-Strasse 2

D-97816 Lohr am Main

9.1.2 Packaging Materials

The packaging materials consist of cardboard, wood and polystyrene. These materials can be easily recycled in any municipal recycling system. For ecological reasons, please refrain from returning the empty packages to us.

9.2 Environmental Protection

9.2.1 No Release of Hazardous Substances

Our products do not contain any hazardous substances which may be released in the case of appropriate use. Accordingly, our products will normally not have any negative effect on the environment.

9.2.2 Materials Contained in the Products

Electronic Devices

Electronic devices mainly contain:

- steel
- aluminum
- copper
- synthetic materials
- electronic components and modules

Motors

Motors mainly contain:

- steel
- aluminum
- copper
- brass
- magnetic materials
- electronic components and modules

9.2.3 Recycling

Due to their high content of metal, most of the product components can be recycled. In order to recycle the metal in the best possible way, the products must be disassembled into individual modules.

Metals contained in electric and electronic modules can also be recycled by means of special separation processes. The synthetic materials remaining after these processes can be thermally recycled.

If the products contain batteries or rechargeable batteries, these batteries are to be removed before recycling and disposed of.

10 Ordering Information

10.1 Type Code

The VPP 21.2 are available in various versions according to the following type codes.

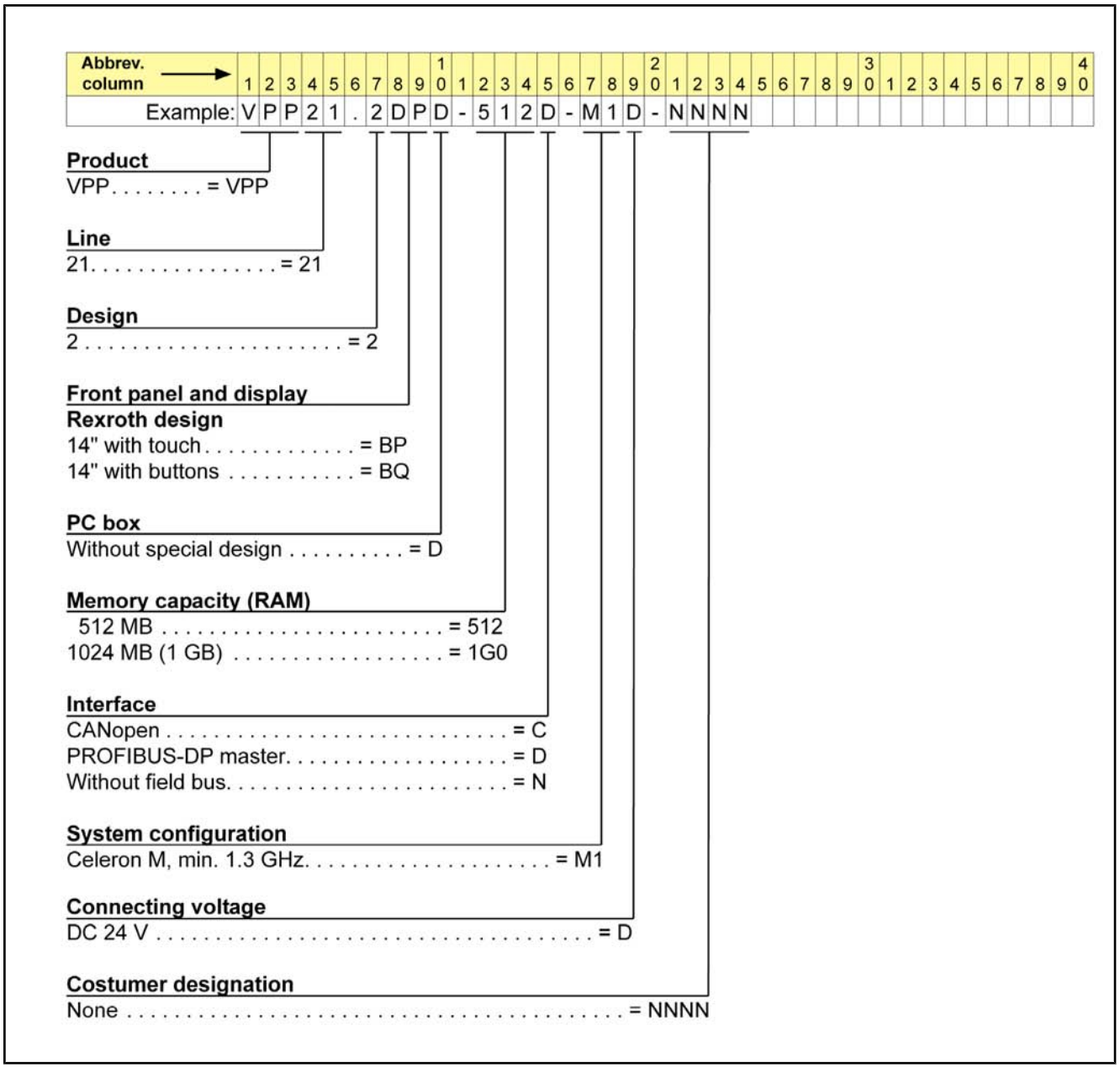

Fig.10-1: Type code of the VPP 21.2

10.2 Accessories

Ordering designation	Part number	Description
Rotating joint VPP 21	1070922829	Rotating joint to mount the VPP 21
Bracket VPP 21	1070922717	Bracket to mount the VPP 21
Lithium battery 3.0 V; 2.3 Ah	1070922650	Lithium battery to buffer the RAM

11 Service and Support

11.1 Helpdesk

Our service helpdesk at our headquarters in Lohr, Germany, will assist you with all kinds of inquiries.

Contact us:

- By phone through the Service Call Entry Center,
  Monday to Friday 7:00 am - 6:00 pm CET
  +49 (0) 9352 40 50 60
- By fax
  +49 (0) 9352 40 49 41
- By e-mail: service.svc@boschrexroth.de

11.2 Service Hotline

Out of helpdesk hours please contact our German service department directly:

+49 (0) 171 333 88 26

or

+49 (0) 172 660 04 06

Hotline numbers for other countries can be found in the addresses of each region (see below).

11.3 Internet

Additional notes regarding service, maintenance and training, as well as the current addresses of our sales and service offices can be found on

http://www.boschrexroth.com

Outwith Germany please contact our sales/service office in your area first.

11.4 Helpful Information

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

- Detailed description of the fault and the circumstances
- Information on the type plate of the affected products, especially type codes and serial numbers
- Your phone and fax numbers as well as your e-mail address so we can contact you in case of questions

Index

Notes

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