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1 System Presentation

1.1 Brief Description VPP 21

The operator terminals VPP 21 are PC-based machine operator terminals 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 pushbuttons (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

The operator terminals VPP 21 are available as device variant BQ – with keypad – or BP – with touch screen.

VPP 21.1 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.



Fig. 1-1: VPP 21.1 BQ

VPP 21.1 BP

In contrast, the VPP 21.1 BP has no keypad, but a touch screen.

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

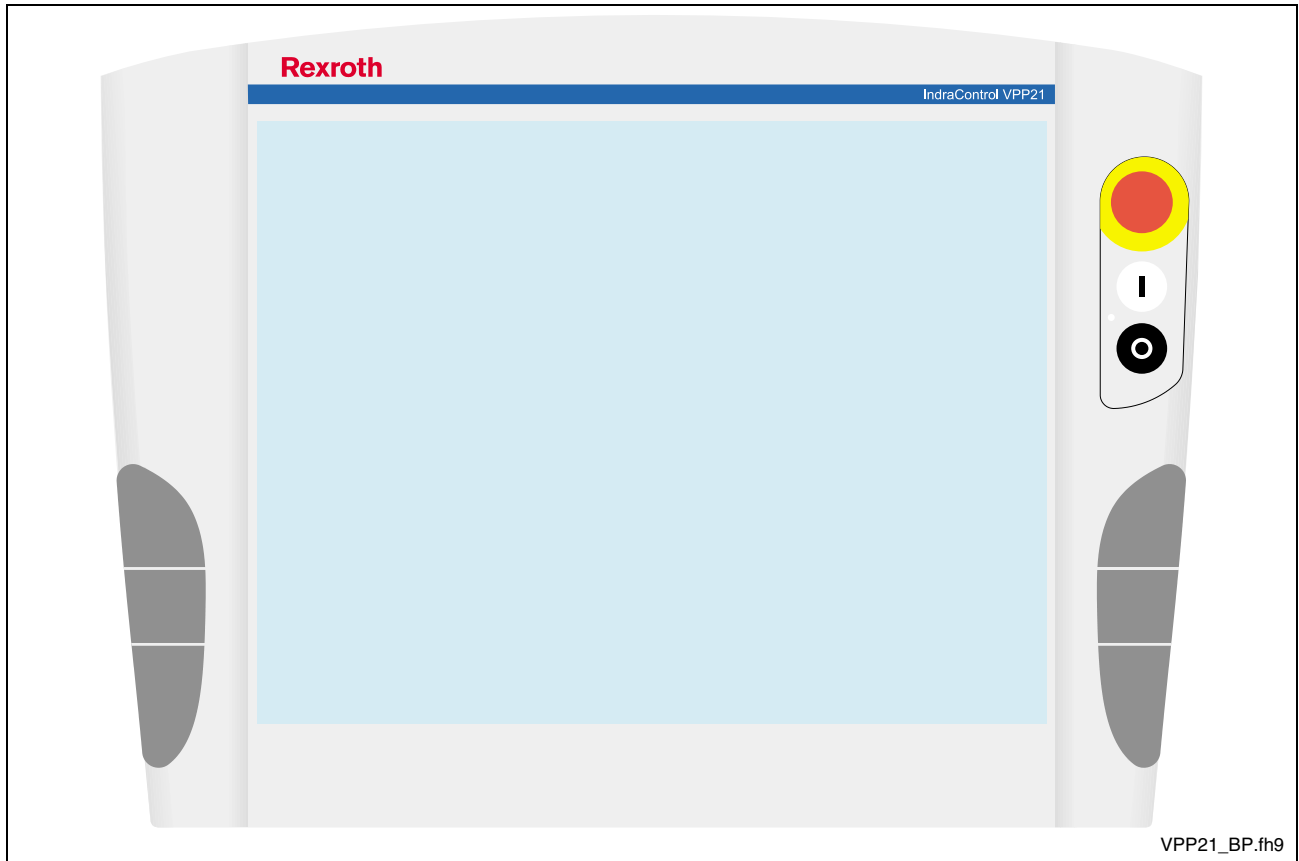


Fig. 1-2: VPP 21.1 BP

1.3 Operating System

For license reasons the operator 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 section 5.2 "Installation"). Then, connect the device to the power supply (24 V) 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 prerequisites 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

The operator terminals of Bosch Rexroth are PC-based machine operator and visualization terminals, that are mounted at the machine suspended on a bracket.

Note: The operator terminals VPP 21 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.

The operator terminals VPP 21 are designed for control tasks.

For the application-specific use of the operator terminals VPP 21 two device variants with different equipment and interfaces are available.

Typical applications of the VPP 21 are:

- Handling and assembly systems,
- Packaging machines.

VPP 21-type devices 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 operator terminals VPP 21 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 VPP 21 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)

3.3 Hazards by Improper Use



DANGER

**High voltage and high discharge current!
Danger to life or severe bodily harm by electric shock!**



DANGER

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



WARNING

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



WARNING

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



CAUTION

Surface of machine housing could be extremely hot! Danger of injury! Danger of burns!



CAUTION

Risk of injury due to improper handling! Bodily harm caused by crushing, shearing, cutting and mechanical shock or incorrect handling of pressurized systems!



CAUTION

Risk of injury due to incorrect handling of batteries!

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.

- 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!

- ⇒ Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain or repair this equipment.
 - ⇒ Follow general construction and safety regulations when working on high voltage installations.
 - ⇒ Before switching on power the ground wire must be permanently connected to all electrical units according to the connection diagram.
 - ⇒ 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.
 - ⇒ 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.
 - ⇒ The following should be observed with electrical drive and filter components:
 - ⇒ 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.
 - ⇒ Never touch the electrical connection points of a component while power is turned on.
 - ⇒ Install the covers and guards provided with the equipment properly before switching the equipment on. Prevent contact with live parts at any time.
 - ⇒ 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.
 - ⇒ 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.

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.



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.

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.

Notes

4 Technical Data

4.1 Front Panel

	VPP 21.1 BQ	VPP 21.1 BP
Display	14" TFT, 1024 * 768 pixels	
Operation	Keys	Touch
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	11.00 kg (key device VPP21.1 BQ) 9.15 kg (touch device VPP21.1 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	Current (max.)	Tolerance (incl. residual ripple)
+ 5 V	6 A	+/- 5 %
+ 12 V	0.7 A	+/- 5 %
Max. output power	38.4 W	
Efficiency	0,8	

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

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) required for the two 24 V outputs are also taken from the 24 VDC supply.

4.3 PC

Processor	Pentium III with minimum 700 MHz and integrated graphic controller with maximum 4 Mbytes video memory
Main memory	512 MB SO-DIMM DRAM
Interfaces	<ul style="list-style-type: none"> • 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 COM module	<ul style="list-style-type: none"> • Profibus DP Master/Slave
Slots for connector panel	<ul style="list-style-type: none"> • 1 x slot for Compact Flash Card • 1 x slot for 2.5" hard disk
Slot	<ul style="list-style-type: none"> • 1 x PCI slot for short cards

Fig. 4-3: Technical data: PC

4.4 Ambient Conditions

	Operation	Storage/transport
Ambient temperature (surrounding air temperature)	+5 ... +45 °C with housing fan +5 ... +25 °C without housing fan	-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. Max. 80 % humidity for 25 °C	Climatic class 3K3 according to EN 60721, non-condensing. Max. 80 % humidity for 25 °C
Air pressure	Up to 2,000 m above MSL according to DIN 60204	Up to 3,000 m 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 ... 57 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 malfunction

Fig. 4-4: Ambient conditions

Note: 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 Fig. 4-4:, 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 21.1 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

Note: Concerning delivered VPP 21.1 all CE requirements are fulfilled.

UL/CSA Certification



The devices of the VPP 21 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.

4.6 Wear Parts

Wear parts without warranty

- The service life of the backlight in the LCD 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.
- 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. You will find more details about the battery exchange in chapter 8.4 starting from page 8-3.
- 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
	Rel. humidity	8 to 90 %
	Height	-300 to 3,000 m
	Accesses	< 20 % of the operating hours
Storage conditions	Temperature	-40 to 85 °C
	Rel. humidity	5 to 95 %
	Duration	< 6 months

Fig. 4-6: 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 4.4 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.

You will find more details about the hard disk in chapter 8.2 starting from page 8-2.

- Also fans are mechanic wear components, whose service life is extremely temperature-dependent. For the two fans 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. 4-7: 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.

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 that reason, test new lubricants, cleaning agents, etc. for compatibility with our housings / our housing materials before using the particular material concerned.

5 Dimensions

5.1 Housing Dimensions

Housing Dimensions VPP 21.1 BQ

The dimensions of the VPP 21.1 with keypad are:

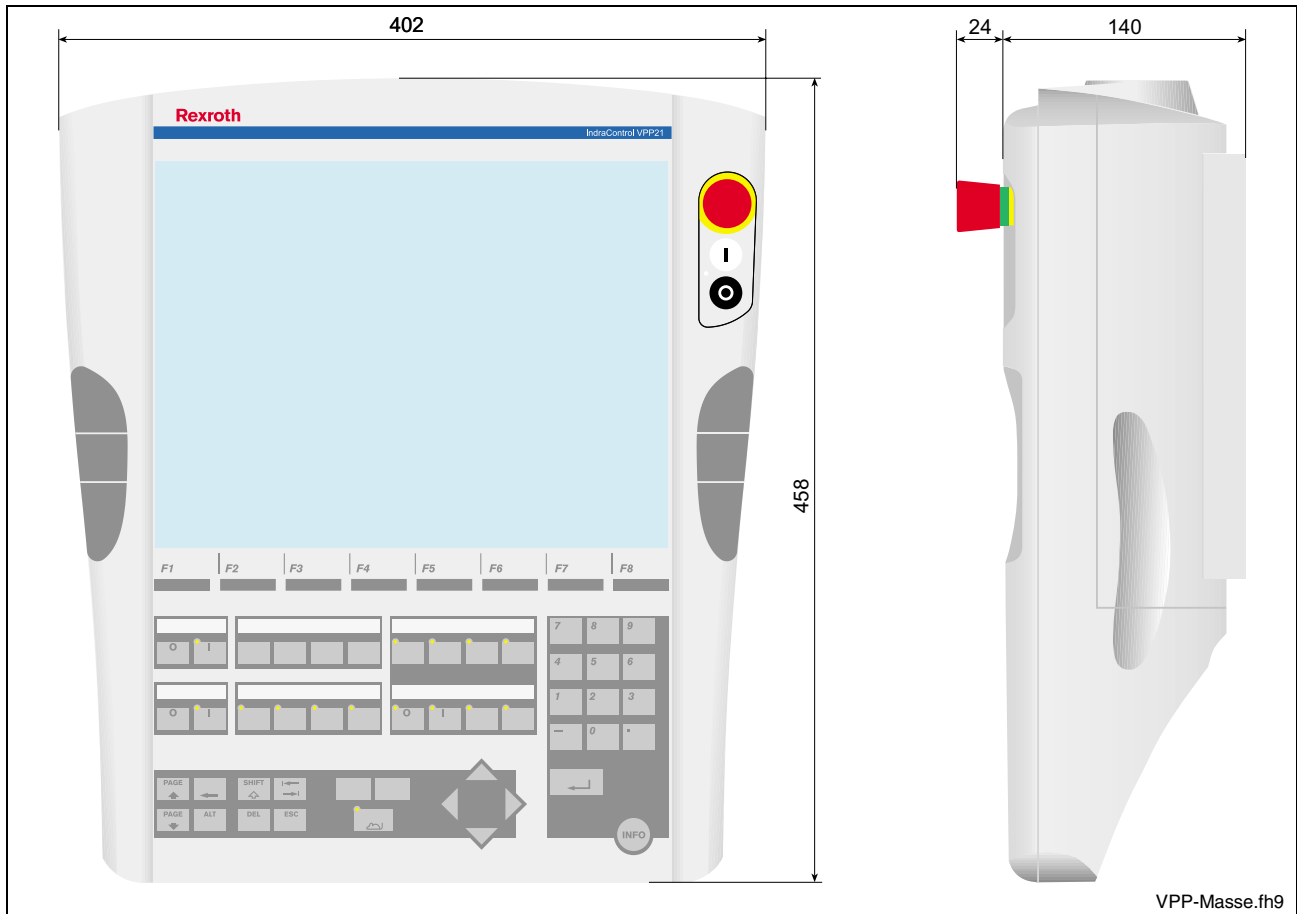


Fig. 5-1: Housing dimensions VPP 21 with keypad

Housing Dimensions VPP 21.1 BP

The dimensions of the VPP 21.1 with touch screen are:

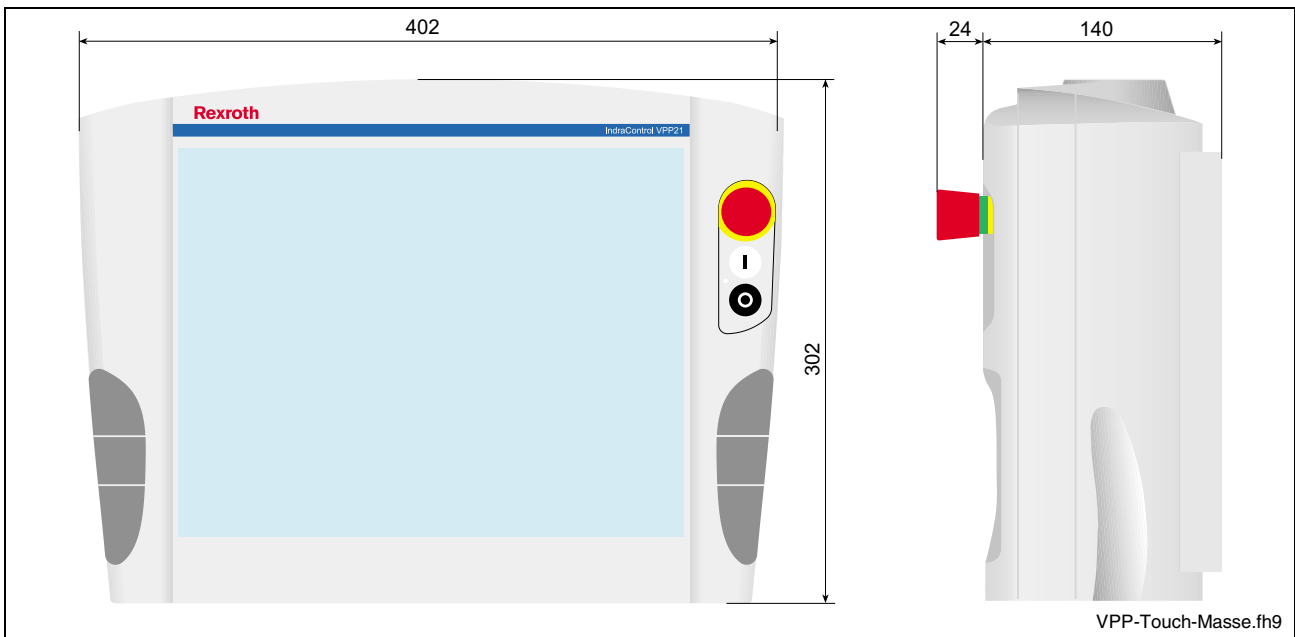


Fig. 5-2: Housing dimensions VPP 21 with touch screen

5.2 Installation

Installation Notes

- When installing the VPP 21 observe 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.
- 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.

Mounting

The VPP 21 is provided for gibbet mounting. As Bosch Rexroth accessories you can order a bracket (see chapter 9, "Ordering information").

Note: The cables are supplied through the gibbet to the VPP 21. Accordingly, it could be reasonable to pull a cable into the section to mount already while mounting the VPP 21 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 can be connected by a mounting tube.

Note: For professional, comfortable and easy mounting of the bracket at the machine and the VPP 21, Haseke offers a comprehensive range of additional retainers especially adapted to the bracket delivered by Bosch Rexroth:

Haseke GmbH & Co. KG

Sandtrift 1, D-32457 Porta Westfalica

Phone ++49(0)5731 / 7 60 70, Fax ++49(0)5731 / 76 07 50

e-mail: haseke@t-online.de

The following figure shows a mounting example of the VPP 21 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

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.

Backlight Switch-Off

The backlight as background lighting of the display has a limited lifetime (see section "Wear Parts" on page 4-8).

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.

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".

6.2 Operator Terminals with Keypad

The operator terminals VPP 21.1 BQ are equipped with a keypad (IP 64) with 57 keys.

Furthermore, three pushbuttons (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.

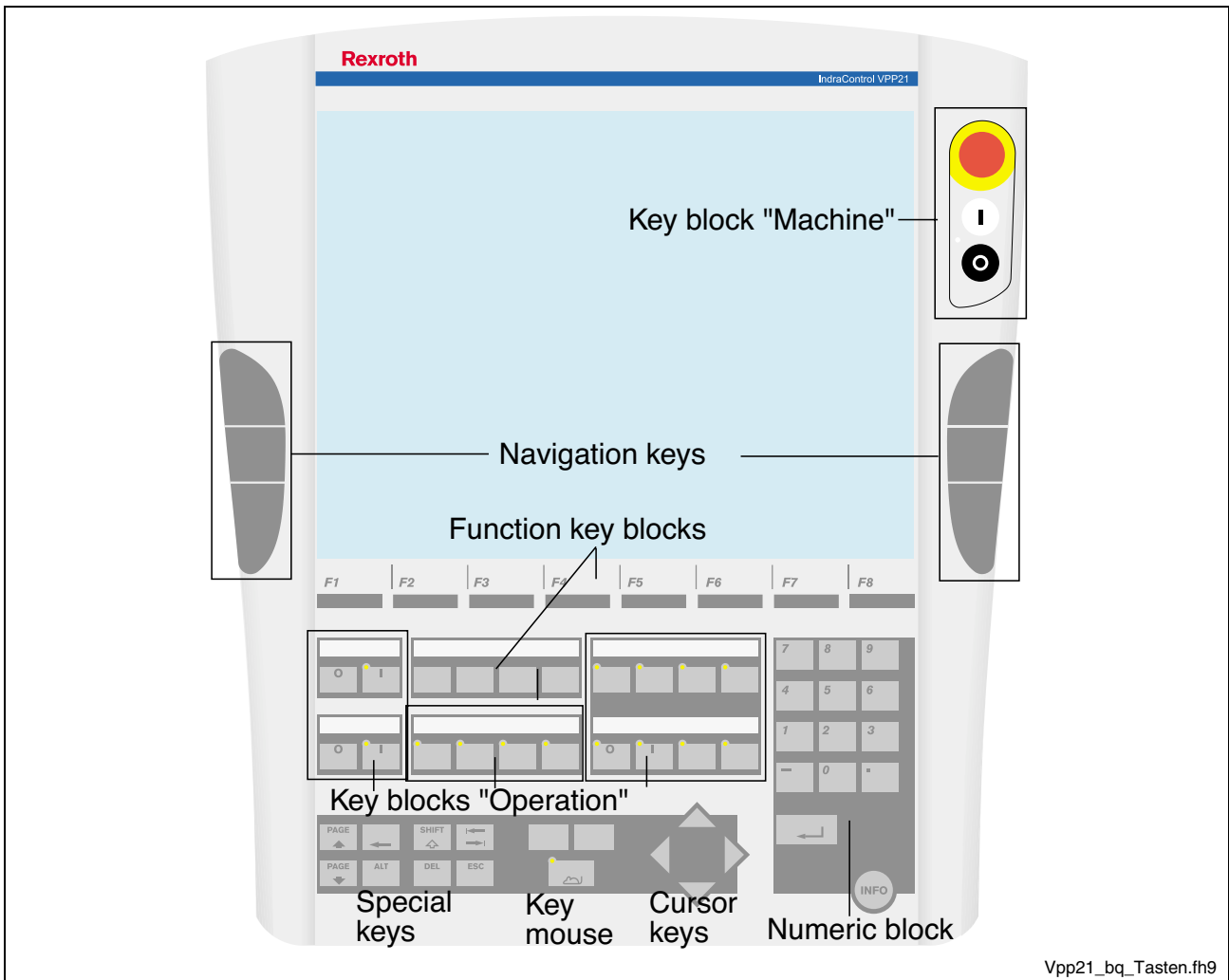


Fig. 6-1: Key blocks of the device variant VPP 21.1 BQ

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 Fig. 6.9).

Key Block "Machine"

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

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

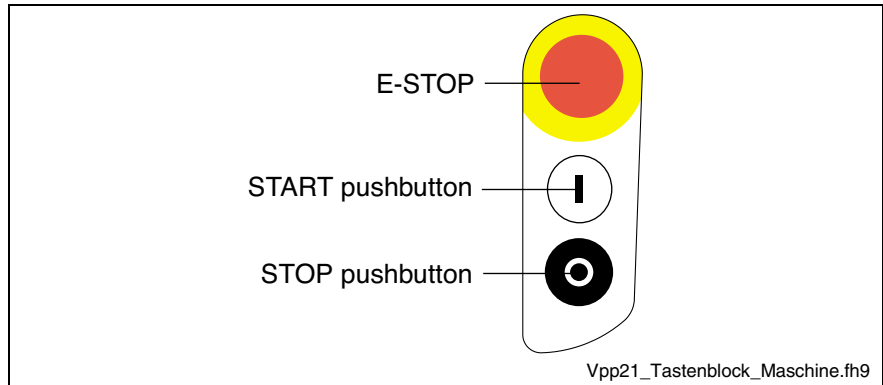


Fig. 6-2: Key block "Machine"

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.

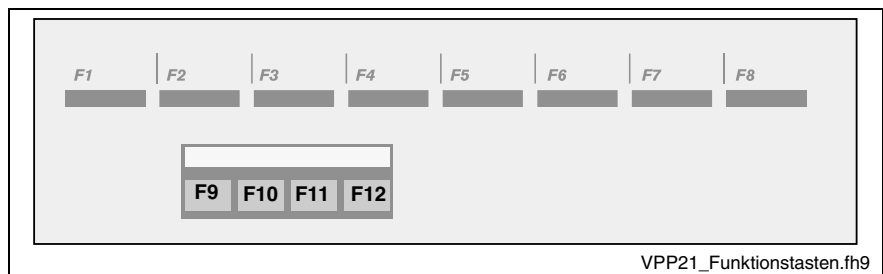


Fig. 6-3: Function key blocks F1 to F12

Key Blocks "Operation"

The programmable key blocks "Operation 1 .. 3" contain 16 keys; 14 are equipped with integrated LEDs.

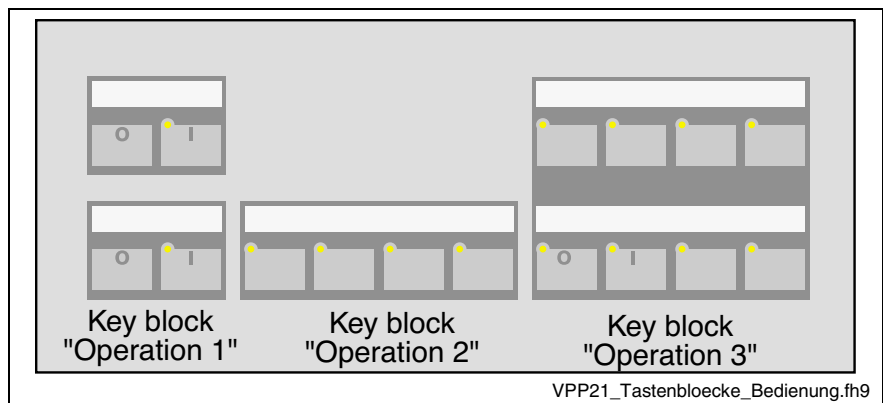


Fig. 6-4: Key blocks "Operation"

Numeric Block

The numeric block provides the following keys:

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

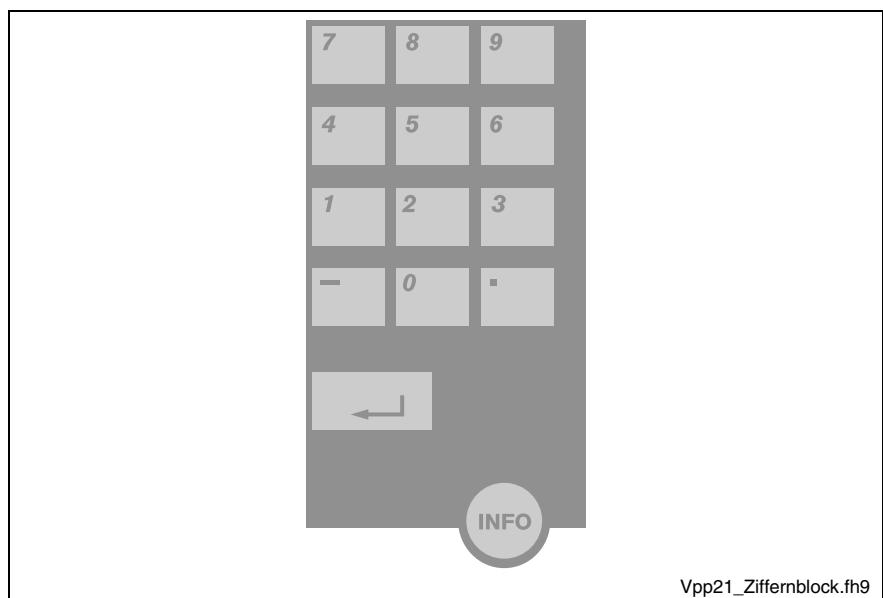


Fig. 6-5: Numeric block

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 top of the page)
Page dn (to the bottom of the page)
Shift (match case)
Alt (Alternate)
← (Backspace, character back)
Del (Delete)
- Key mouse:
Activate / deactivate key mouse
right mouse key
left mouse key

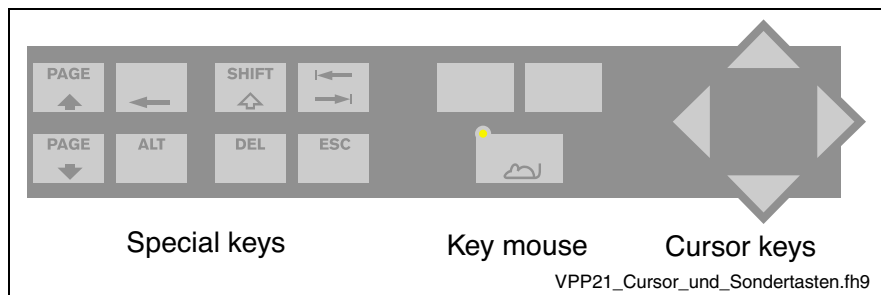


Fig. 6-6: Key blocks with key mouse, cursor and special keys

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.

Note: If the key mouse is active, these 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, also if the external mouse is disconnected. Only after booting again the key mouse is reactivated.

Labeling of 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 slide-in strips.

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 these 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.

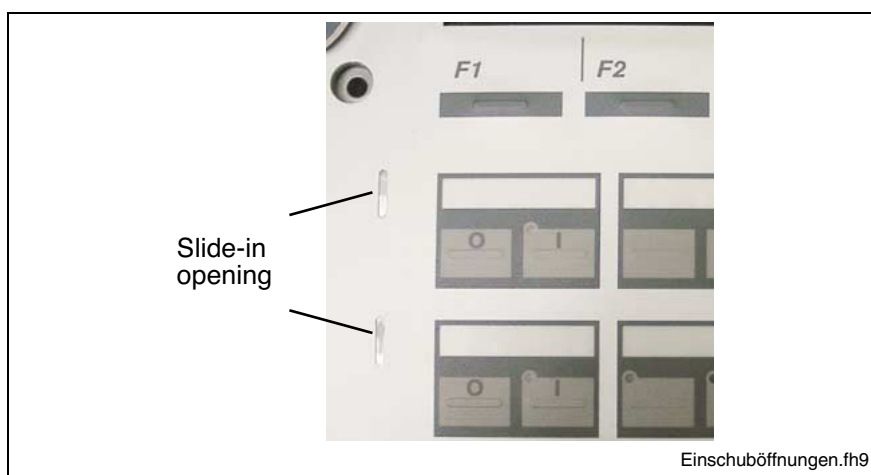


Fig. 6-7: Two openings for slide-in strips

5. Put the handle bar to its place and retain it with the four screws. Ensure that the labeling is well readable.



CAUTION!

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.

Keyboard Controller

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:

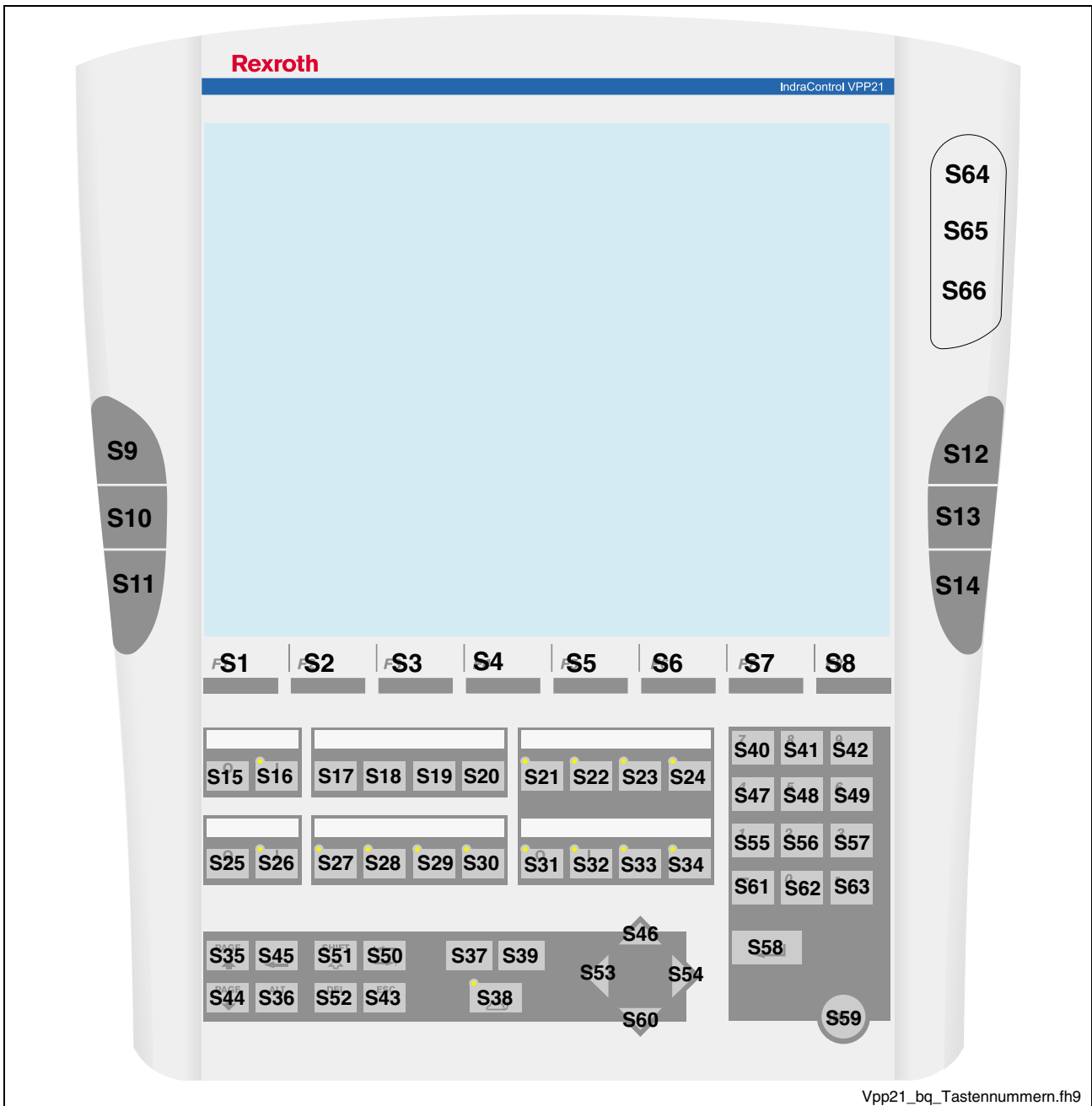


Fig. 6-8: Key numbers

Key numbers	MF2	Mouse	Repeat	Serial	Digital outputs Out 24V	LED
S01	F1	-	No	-	-	-
S02	F2	-	No	-	-	-
S03	F3	-	No	-	-	-
S04	F4	-	No	-	-	-
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	-	-	-	-
S38	-	Mouse active	-	Bit 32	-	yellow
S39	-	Mouse Key right	-	-	-	-
S40	7	-	Yes	-	-	-
S41	8	-	Yes	-	-	-

Key number	MF2	Mouse	Repeat	Serial	Digital outputs Out 24V	LED
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	0	-	Yes	-	-	-
S62	0	-	Yes	-	-	-
S63	.	-	-	-	-	-
S64 E-STOP	-	-	-	-	-	-
S65 START	-	-	-	-	-	-
S66 STOP	-	-	-	-	-	-

Fig. 6-9: Key codes

START, STOP, E-STOP

The contacts of the E-STOP pushbutton 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.

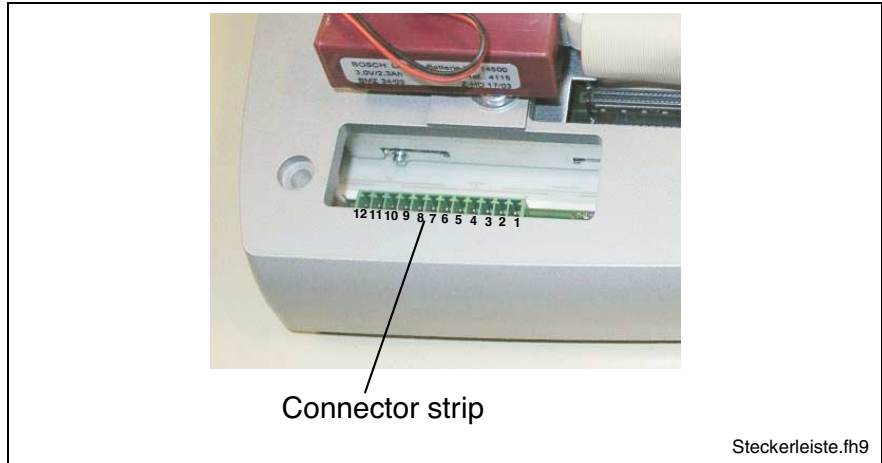


Fig. 6-10: Connections of E-STOP, START, STOP

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

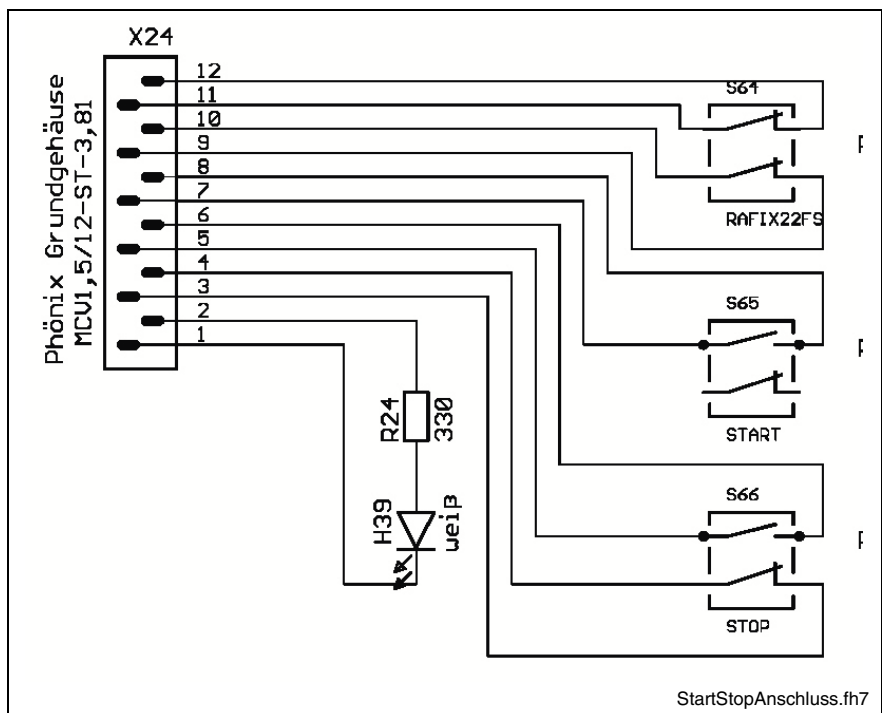


Fig. 6-11: Wiring of E-STOP, START, STOP

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

6.3 Operator Terminals with Touch Screen

The operator terminals VPP 21.1 BP are equipped with a resistive 4-wire touch screen, that allows the operation of the application software / firmware via the touch-sensitive surface of the displays without keyboard and mouse.

In addition, the following key blocks are available:

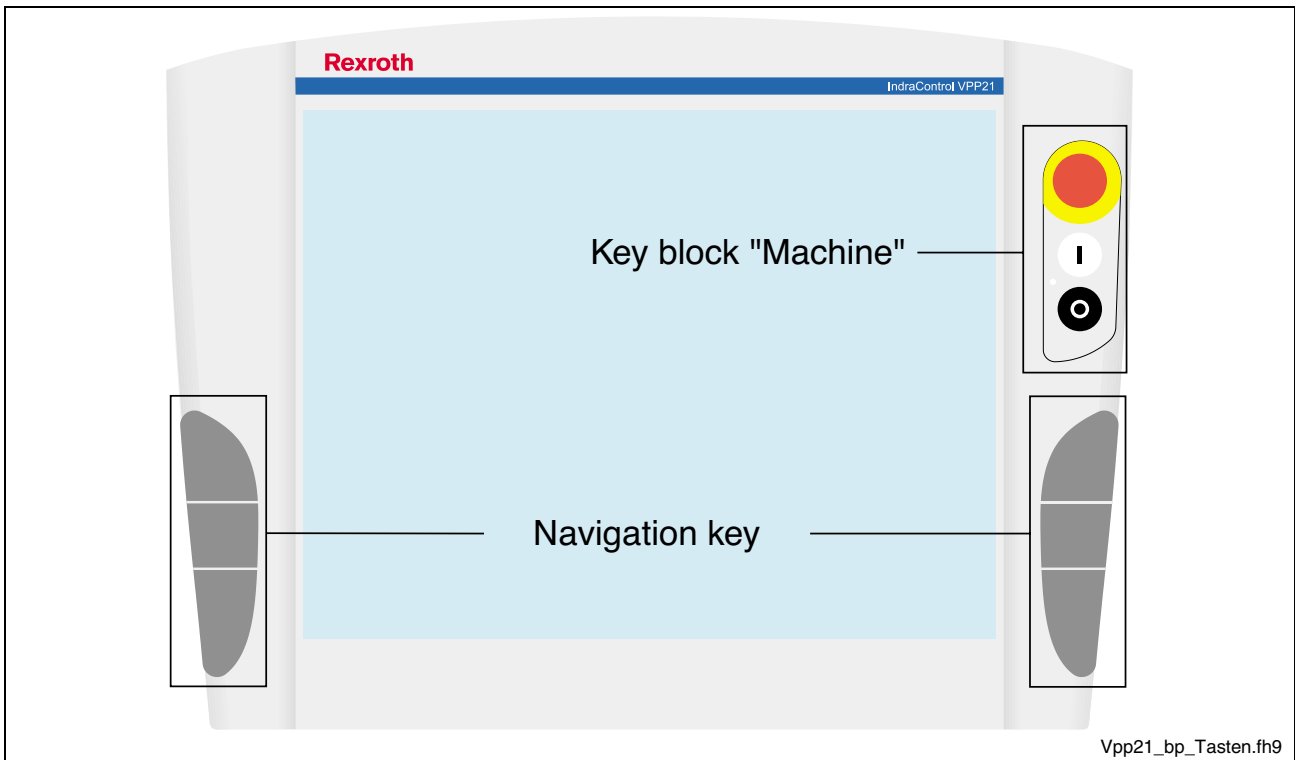


Fig. 6-12: Key blocks of the device variant VPP 21.1 BP

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 6-7.

Key Block "Machine"

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

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

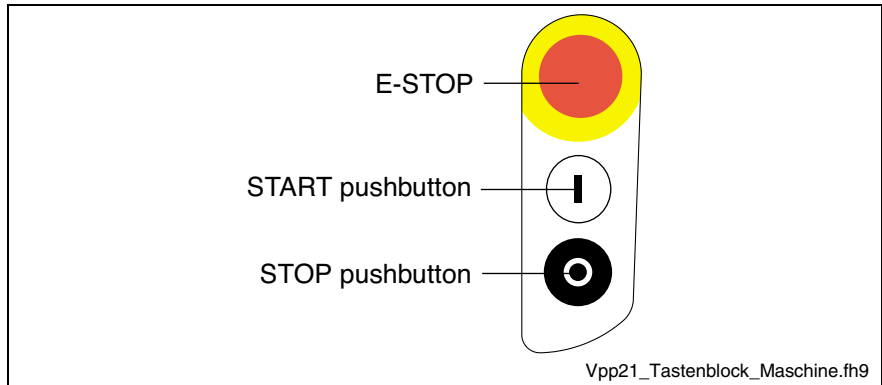


Fig. 6-13: Key block "Machine"

The wiring of the contacts is described on page 6-7.

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. You can reach the same setup program via "Start -> Programs -> UPDD -> Settings".

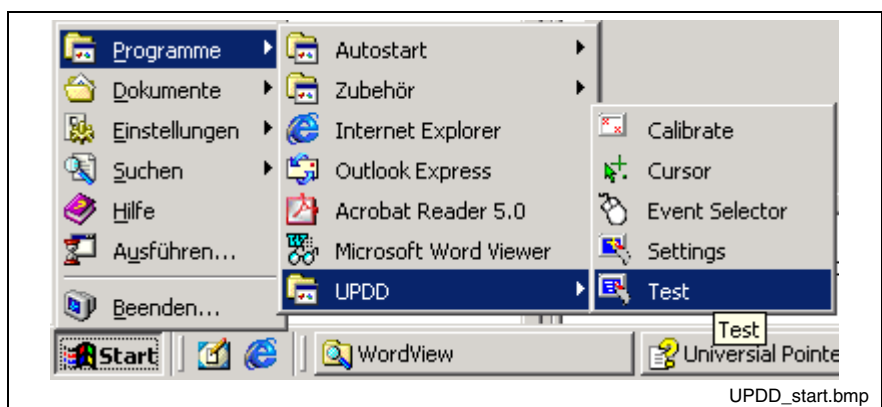


Fig. 6-14: UPDD setup programs for the touch screen

A dialog window appears for the different settings:

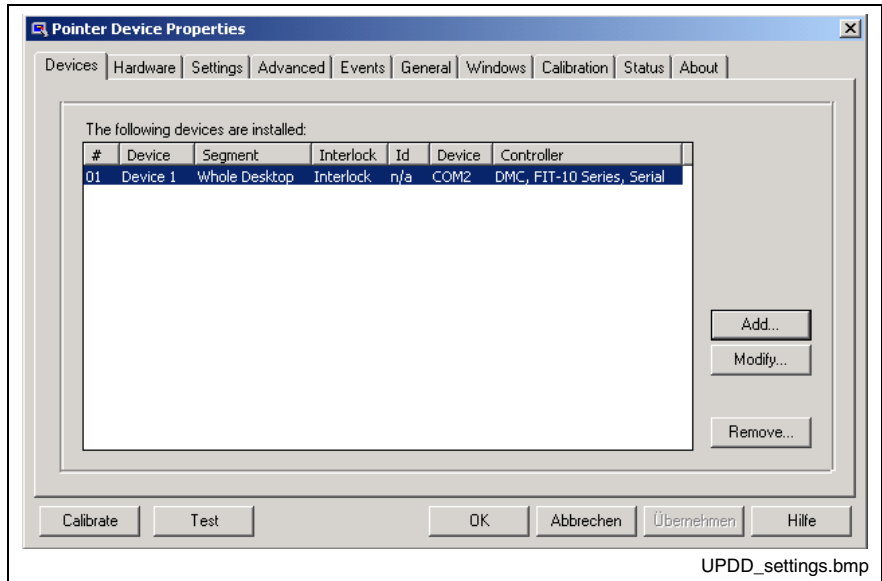


Fig. 6-15: Dialog window to set the touch screen

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:\Programs\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.

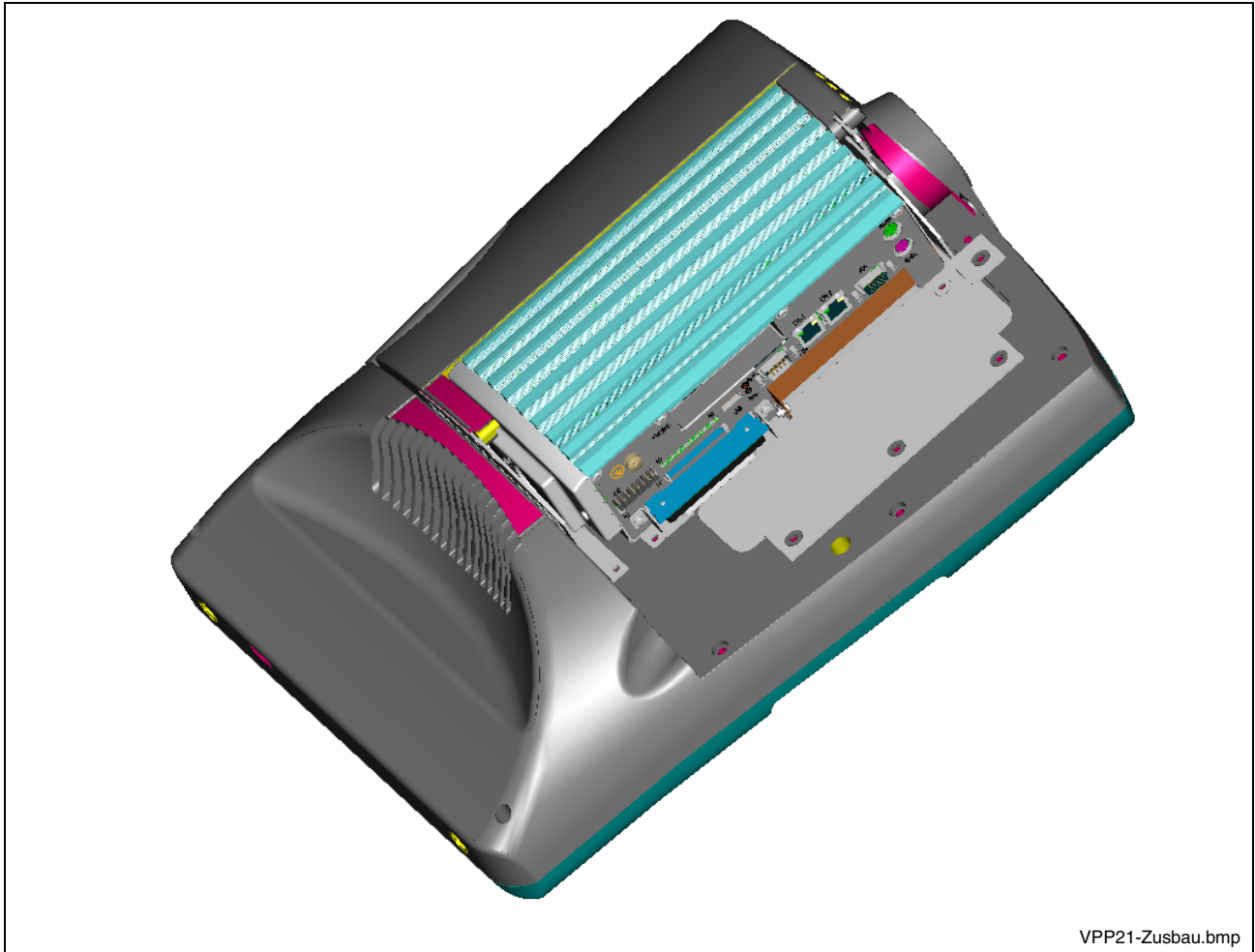


Fig. 7-1: View of the VPP 21 from the rear side with opened cover

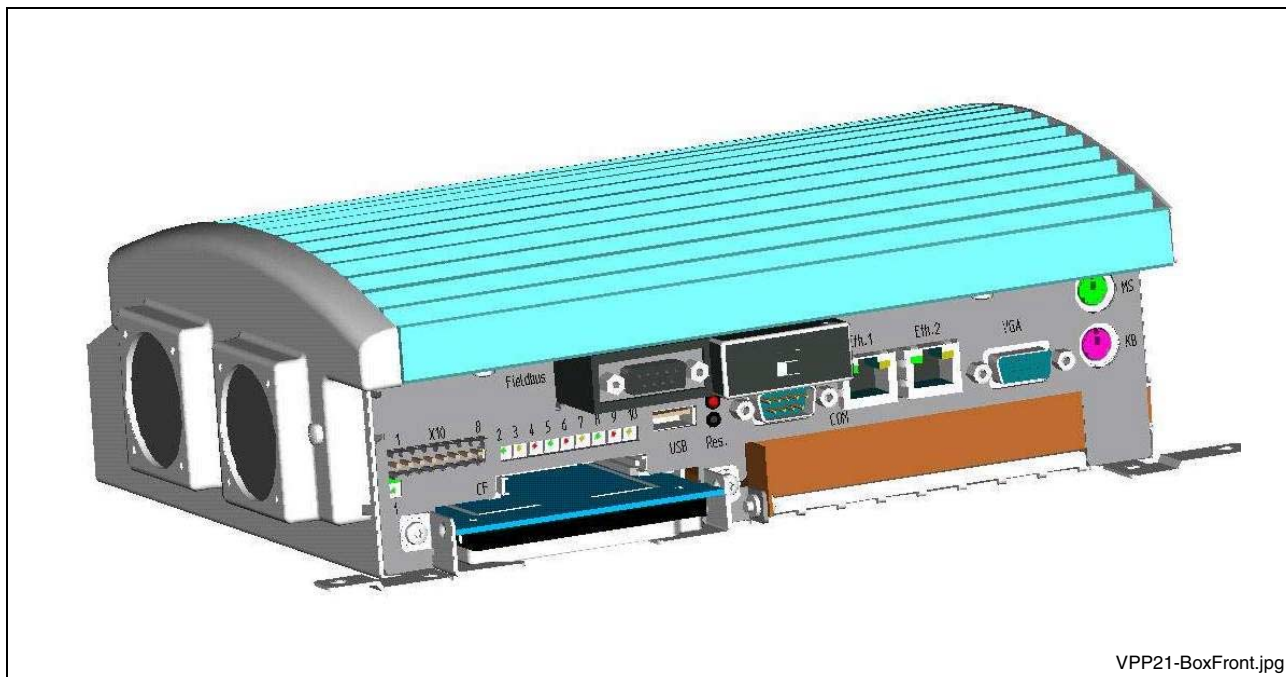


Fig. 7-2: Connector panel of the box build in the VPP 21

7.2 Operating and Error Indication

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 limit value.	Exchange battery
5	RDY_REL	LED green	READY contact closed, no error	-
6	TEMP	LED red	Temperature prewarning	-
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

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)
E	MS	PS/2 mouse	Mini-DIN PS/2 female connector, 6-pin	Mini-DIN PS/2 male connector, 6-pin
E	KB	PS/2 Keyboard/Mouse	Mini-DIN PS/2 female connector, 6-pin	Mini-DIN PS/2 male connector, 6-pin
E	VGA	VGA connection of an external CRT monitor	VGA HD female connector, 15-pin	VGA HD male connector, 15-pin
E	Eth.1, Eth.2	Network connection: Ethernet 10Base T / 100Base X	RJ45 female connector, 8-pin	RJ45 male connector (twisted pair, 8-core)
E	COM	Serial interface: RS232 (UART 16550), not assigned	D-Sub male connector, 9-pin	D-Sub female connector, 9-pin
E	USB	USB interface, type 1	USB female connector, 4-pin, type A	USB male connector, 4-pin
E	CF	Slot for Compact-Flash card as boot medium		
E		Slot for 2.5" hard disk		
E	X10	24 VDC, digital outputs, ready contact	Weidmüller male connector terminal, MSTB 1.5, 8-pin	Female connector terminal, MSTB 1.5, 8-pin
E	Field bus		D-Sub male connector, 9-pin	D-Sub female connector, 9-pin
Connection point:		VPP 21 box		

Fig. 7-4: Connector type VPP 21

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

Note: The contacts for E-STOP as well as the START and STOP pushbutton are described on page 6-10.

Serial Interface COM1

COM1 – Serial Interface

The COM1 interface is provided as serial standard interface.

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

D-Sub male connector, 9-pin	
Type:	RS232
Cable length:	Max. 15 m
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

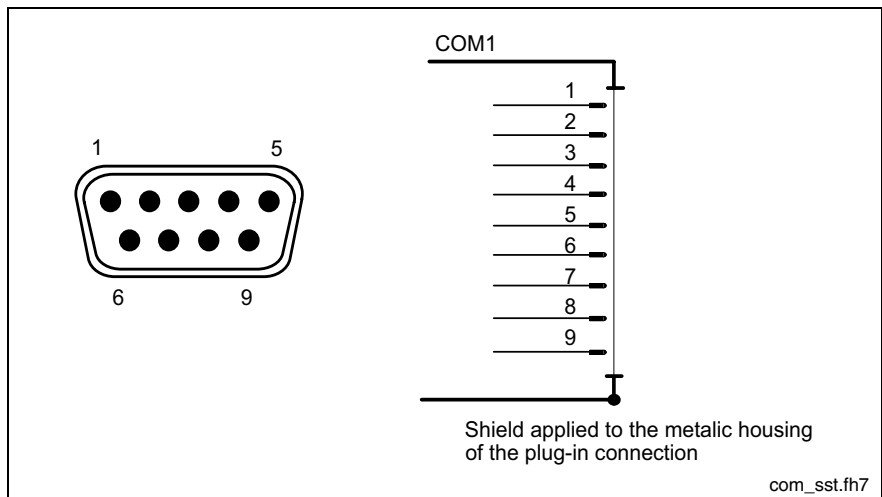


Fig. 7-5: Pin assignment COM1

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. Windows XP: select "Settings, Control 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

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

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).

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.

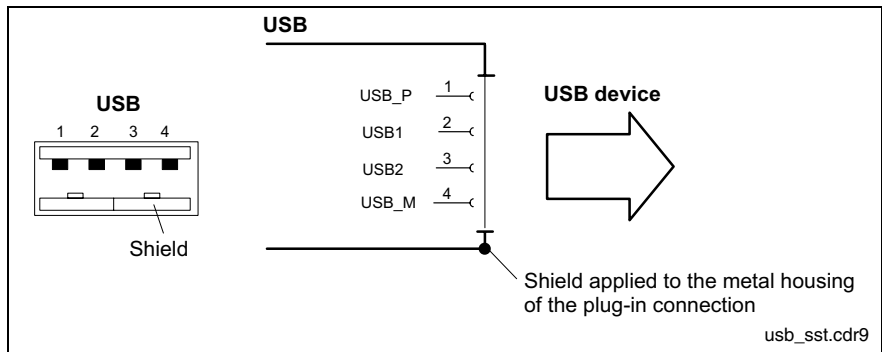


Fig. 7-6: USB interfaces

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

Ethernet Interface

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:	Max. 100 m
Cable type:	Shielded, 2-core, twisted
Transmission rate:	10 or 100 Mbits/s

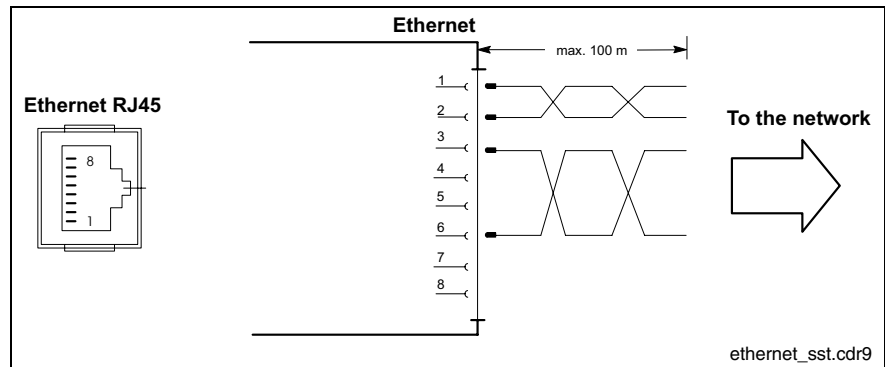


Fig. 7-7: Ethernet interface

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 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

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: Max. 4 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.

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

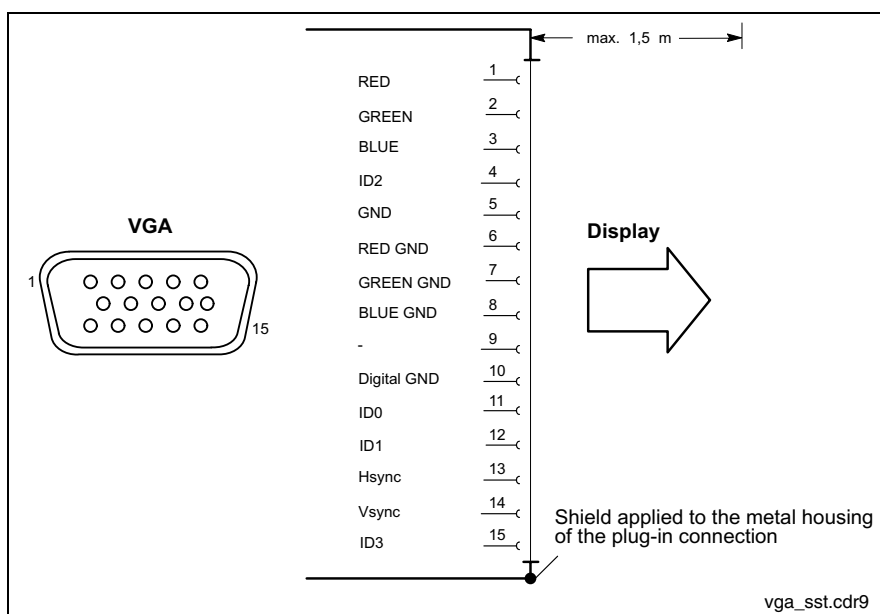


Fig. 7-8: VGA interface

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 2 bits colors
- SXGA mode: 1280 x 1024 pixels 4 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

Keyb. – 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 mm ²

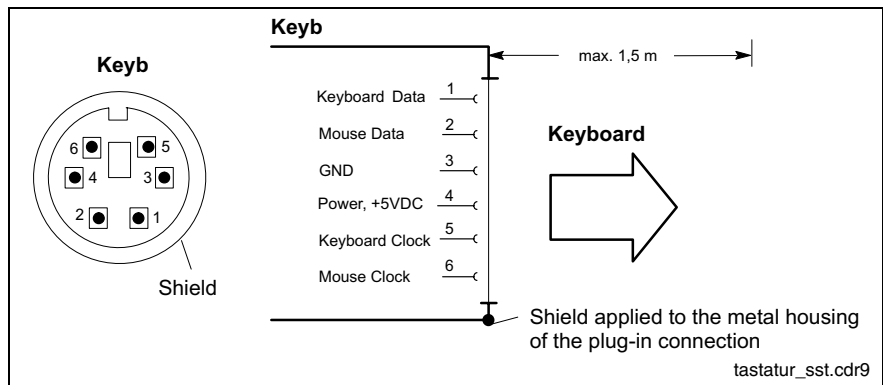


Fig. 7-9: Combined keyboard/mouse interface

Mouse Interface

Mouse – 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 mm ²
Interrupt (IRQ):	12
BIOS presettings:	PS/2 mouse support: Enabled PS/2 mouse: Auto detect

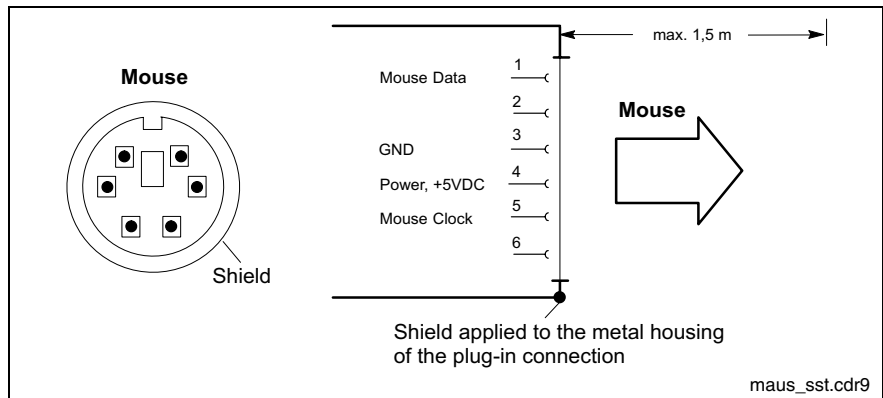


Fig. 7-10: Mouse interface

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.

Power Supply, Digital Output, Ready Contact

X10 – 24 VDC Power Supply, Digital Outputs, Ready Contact

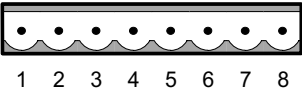
The power supply 24 VDC is applied to pin 1 and 2 of the 8-pin male connector terminal X10. All internally required voltages are generated with electrical isolation via a DC/DC converter.

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).

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 mm² can be connected.

X10		Pin	Assignment
		1	0V
		2	24V
		3	0V switched for fan
		4	24V
		5	Digital output 1
		6	Digital output 2
		7	Ready contact 1
		8	Ready contact 2

x10.fh7

Fig. 7-11: Assignment X10

Pin 1 and Pin 2: 24 VDC Supply

Parameters	Value
Rated voltage U_N	24 VDC +20 %, -15 %
Residual ripple for U_N	See figure below
Noise and surge immunity	$U_{max} = 35 \text{ V}$ (for $t < 100 \text{ ms}$)
Current consumption for U_N	Max. 4.8 A
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. 7-12: Technical data of the 24 VDC supply

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



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!

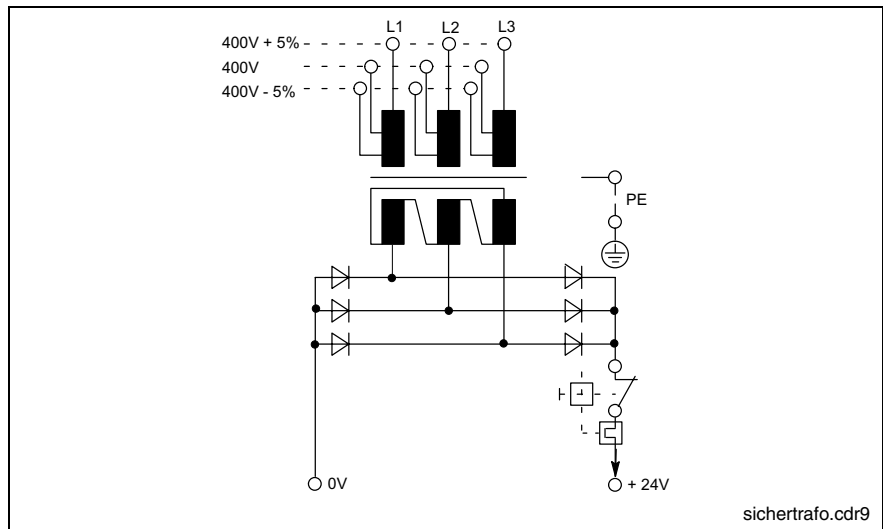


Fig. 7-13: Safety transformer according to EN 60742

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.

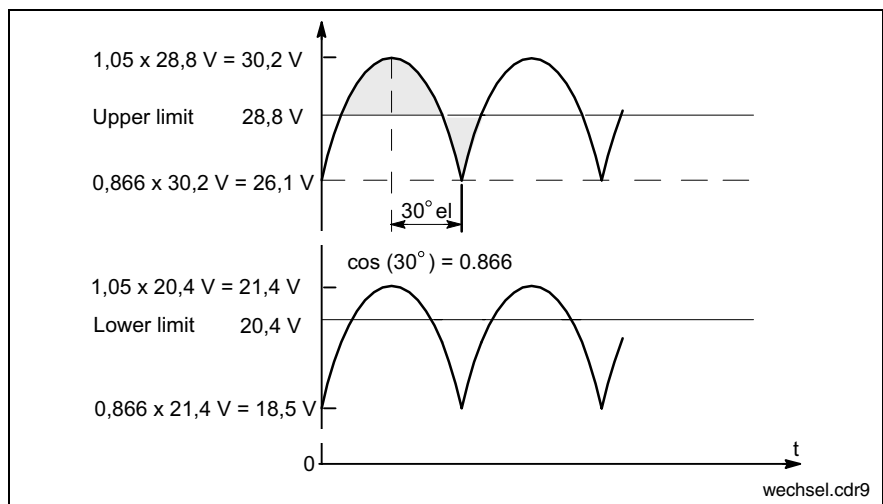


Fig. 7-14: Illustration of the limit values for the 24 VDC voltage

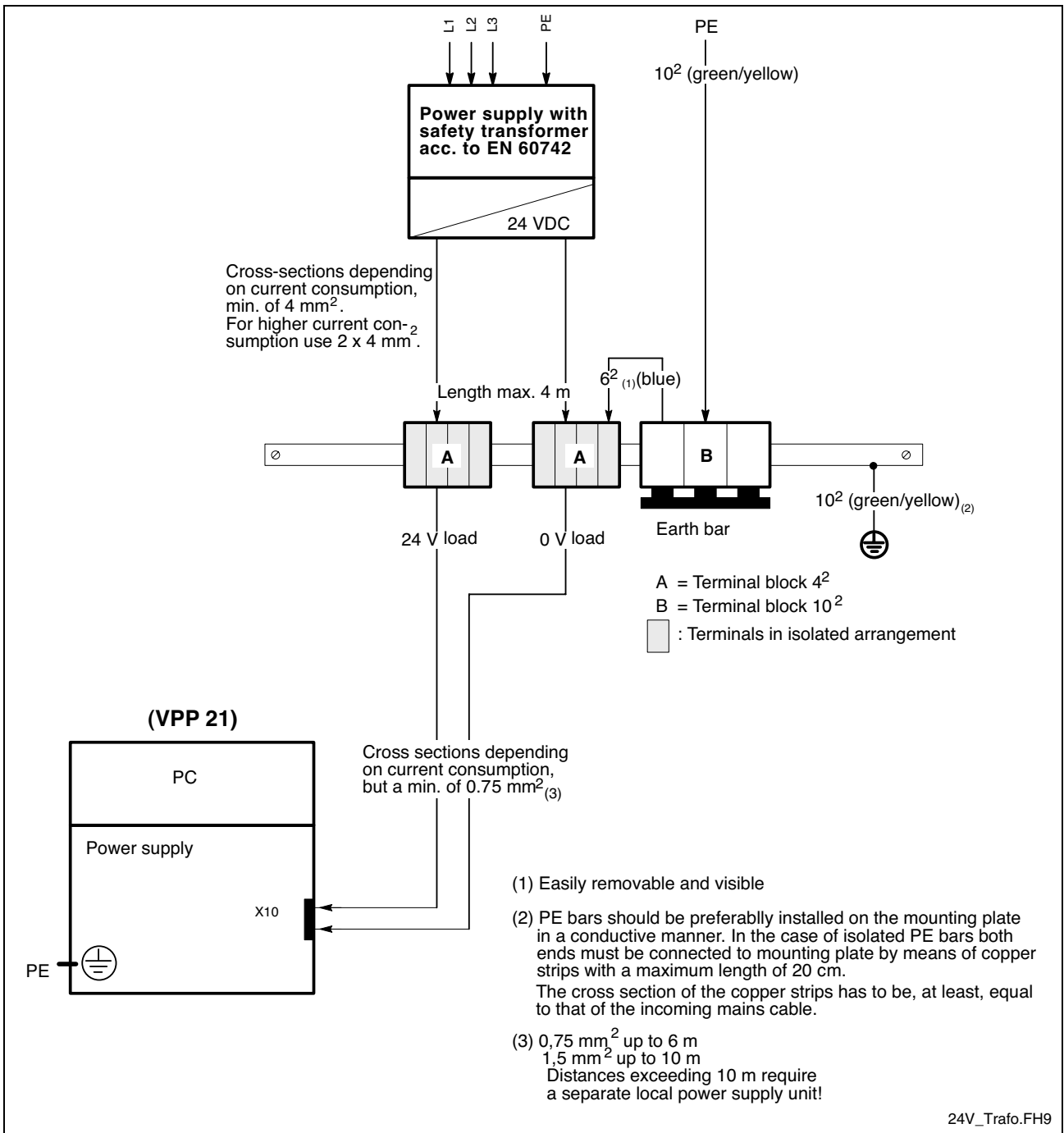


Fig. 7-15: Wiring of the power connection 24 VDC to the VPP 21

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 temperature falls under 45 °C, the fans are switched off again.

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	Signal 1: 2 mA ... 0.6 A Signal 0 (leakage current): < 0.5 mA
General Purpose	0.5 A Max. \leq 0.6 A according to EN 61131-2
Tungsten	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 μ s
Switching frequency with – ohmic load – inductive load	100 Hz 1 Hz
Contact load capacity	Max. 8 A per contact / $T_U = 55$ °C
Supply voltage	24 V, 19.2 ... 30 V /EN 61131-2

Fig. 7-16: Technical data: Digital outputs 1 and 2

Pin 7 and Pin 8: Ready Contact

The Ready contact has a single-channel setup.

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

Fig. 7-17: Characteristic data of the ready contact

If it is in the release state, 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.

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).

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 Information

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.



CAUTION!

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 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. 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.

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

8.2 Hard Disk

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



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 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 blocks 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. At present, this type is: 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.

Note: The lithium element is designed for the use under normal temperature conditions. The temperatures to be expected must not exceed values of 100 °C.

Note: 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 by 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.

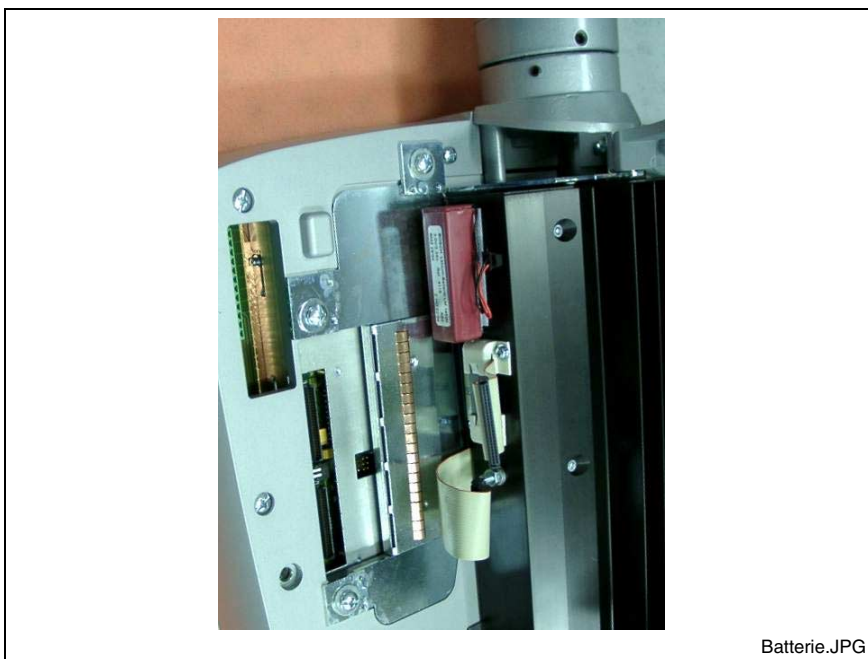


Fig. 8-1: The battery is situated behind the left door.

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. At present, this type is: 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.

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

9.2 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

Fig. 9-2: Accessories to the VPP 21

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12 Service & Support

12.1 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

12.2 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**

12.3 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.

- Verkaufsniederlassungen
- Niederlassungen mit Kundendienst

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

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

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.

- sales agencies
- offices providing service

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

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

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

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

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.

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

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.

12.5 Kundenbetreuungsstellen - Sales & Service Facilities

Deutschland – Germany

vom Ausland:

(0) nach Landeskennziffer weglassen!

from abroad:

don't dial (0) after country code!

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