

Rexroth VAK 10.1 Rexroth VAK 40.1

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Project Planning Manual



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1 System Presentation

1.1 Brief Description VAK 10.1 and VAK 40.1

The industrial keyboards VAK 10.1 and VAK 40.1 are AT compatible PS/2 keyboards with 86 keys and an integrated mouse pointer. The two keyboards only differ in the front panel width.

Function and design have been optimized for the IndraControl V series of Bosch Rexroth.

The integrated mouse with its two mouse buttons makes it easy to navigate on graphical user interfaces.

The keyboard can be inserted as far in a drawer via guiding rails as the lock latches in.

1.2 Industrial Keyboard VAK 10.1

The industrial keyboard is used in conjunction with the BTV 16, the VPP 16 and the VDP 16. The front panel of the industrial keyboard and the operator terminals have the same size.

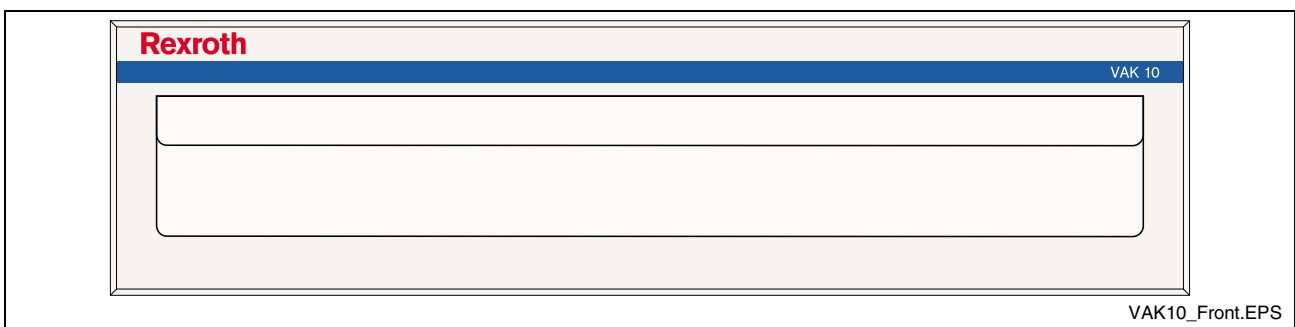


Fig. 1-1: VAK 10.1 – industrial keyboard

1.3 Industrial Keyboard VAK 40.1

The industrial keyboard is used in conjunction with the BTV 20/30, the BTV 40, the VSP 40, the VPP 40 and the VDP 40. The front panel of the industrial keyboard and the operator terminals have the same size.

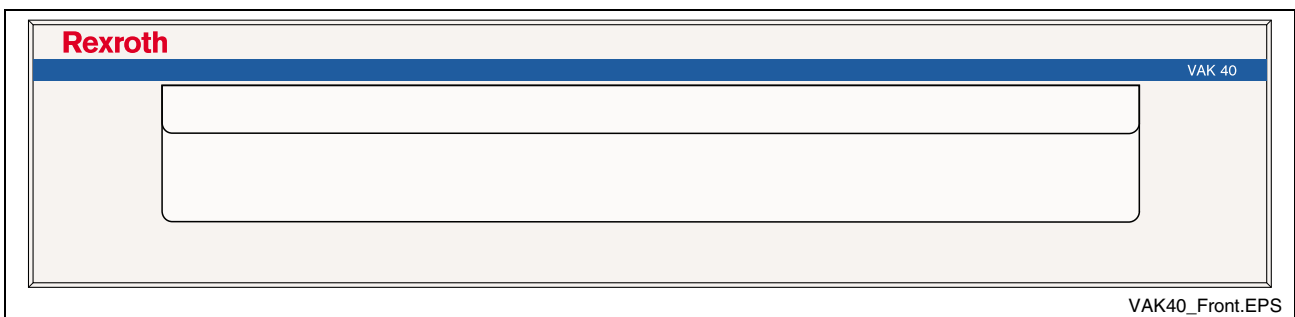


Fig. 1-2: VAK 40.1 – industrial keyboard

2 Important Directions for Use

2.1 Appropriate Use

Introduction

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

- Personnel that in any way, shape or form uses our products must first read and understand the relevant safety instructions and be familiar with appropriate use.
- If the product takes the form of hardware, then they must remain in their original state, in other words, no structural changes are permitted. It is not permitted to decompile software products or alter source codes.
- Do not mount damaged or faulty products or use them in operation.
- Make sure that the products have been installed in the manner described in the relevant documentation.

Areas of Use and Application

The VAK 10.1 and the VAK 40.1 are industrial keyboards, that are used in conjunction with the visualization units of Rexroth. The two industrial keyboards are designed for use in the following cases:

- to operate graphical user interfaces,
- to navigate within graphical user interfaces.

Note: The VAK 10.1 and the VAK 40.1 may only be used with the accessories and parts specified in this document. If a component has not been specifically named, then it may not be either mounted or connected. The same applies to cables and lines.

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

Typical areas of application of the VAK 10.1 and the VAK 40.1 are in conjunction of the Bosch Rexroth industrial PC's.

The VAK 10.1 and the VAK 40.1 may only be operated under the assembly, installation and ambient conditions as described here (temperature, system of protection, humidity, EMC requirements, etc.) and in the position specified.

2.2 Inappropriate Use

Using the industrial keyboard VAK 10.1 and the VAK 40.1 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 industrial keyboards 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 extreme maximum temperatures or if
- Bosch Rexroth has not specifically released them for that intended purpose. Please note the specifications outlined in the general Safety Instructions!

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.



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.
For example, the following areas of use are not permitted: 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 sensitive to high frequency, 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 five (5) 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 General Technical Data

Note: As the two device variants provide the same hardware except for the front panel, the following technical data apply for the VAK 10.1 as well as for the VAK 40.1:

Weight	Approx. 2,6 kg		
Maximum Ambient Temperature	Operation	+0 °C to +50 °C	
	Transport	-20 °C to +60 °C	
Air Pressure (Operation)	860 to 1060 hPa, 1500 m		
Keypad	86 keys		
Status Indicators	3 LEDs		
Plug-in Connector	Mini-DIN PS/2 connector with combined assignment of the keyboard and mouse signals; BTV compatible		
Power Supply	5 V ±5 %		
Current Consumption	30 mA		
Cable Length	1.0 m		
Front Panel Surface	Aluminum varnished		
Color	RAL 7035 light gray		

4.2 Ambient Conditions and Standards

Atmosphere	Temperature	Operation Transport	0 to +50 °C -20 to +60 °C
Mech. strength	Vibration	Operation Transport	55-500 Hz 0,25 g sine 3 axes 5-55 Hz +/- 0,0375 mm sine 3 axes 55-500 Hz 0,5 g sine 3 axes 5-55 Hz +/- 0,01875 mm sine 3 axes
	Shock	Operation Transport	5 g 11 ms half-sine all directions 15 g 11 ms half.-sine all directions
EMC	Emitted interference Electrical interference		EN 50081-2, EN 50082-2 CFR47 part 15 subpart B class A
Electr. security			According to EN 60950, UL 1950
Protection class			IP 65, also with open drawer

Fig. 4-1: Ambient conditions and standards

4.3 Compatibility Test

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

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

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

5 Keyboard and Mouse

5.1 Assignment and Function of the Key Front



Fig. 5-1: Keyboard of the VAK 10 and VAK 40

Keyboard The keyboard of the VAK 10 and the VAK 40 features all functions of a conventional PC keyboard.

Numbers and characters marked with borders, can be activated by simultaneously pressing the <FN>key. Due to the lack of space these keys replace the numeric keypad. The function keys F11 and F12 have to be also activated in this way.

Mouse The integrated mouse function at the right top side of the key front is designed to navigate on the screen. To operate the mouse proceed as follows:

The mouse pointer is situated on the right-hand side of the keyboard and serves to move the mouse. The mouse buttons are arranged above and beneath the mouse pointer. You will find the same functions on the left top side of the key front; the buttons are wired parallel. The functions are illustrated in Fig. 5-2.

LEDs If one or several of the three indicating LEDs flash, the Num, Caps-and/or Scroll functions are activated. The function assigned to the respective LED is also illustrated in Fig. 5-2.

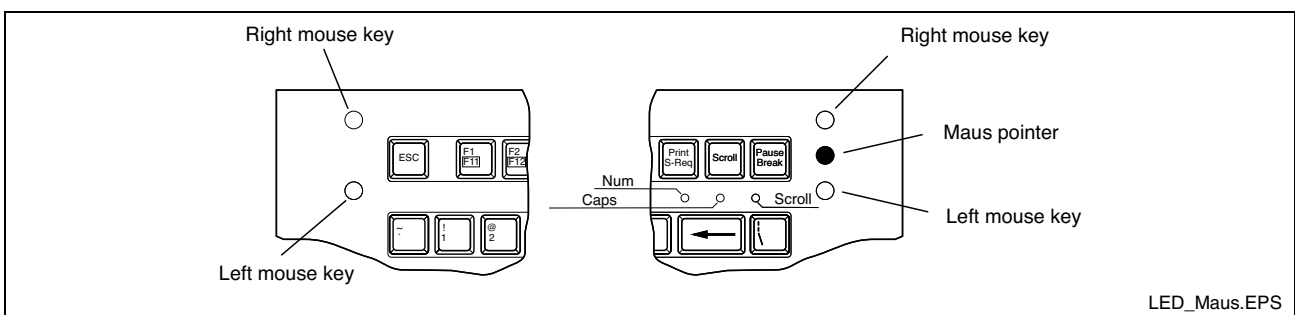


Fig. 5-2: Position of the mouse pointer with explanation of the LEDs

5.2 Installation of the Mouse Driver

The following section describes the commissioning of the VAK 40.1 at a BTV 20.3 with WINNT4.0. Generally, it is assumed that the mouse is activated in BIOS!

Note: During the starting process of Windows the mouse is not automatically recognized!

1. Login as administrator and select the register button "General" under "Start/Settings/Control Panel/Mouse and then "Change" (also if the Microsoft PS/2 mouse is already selected).

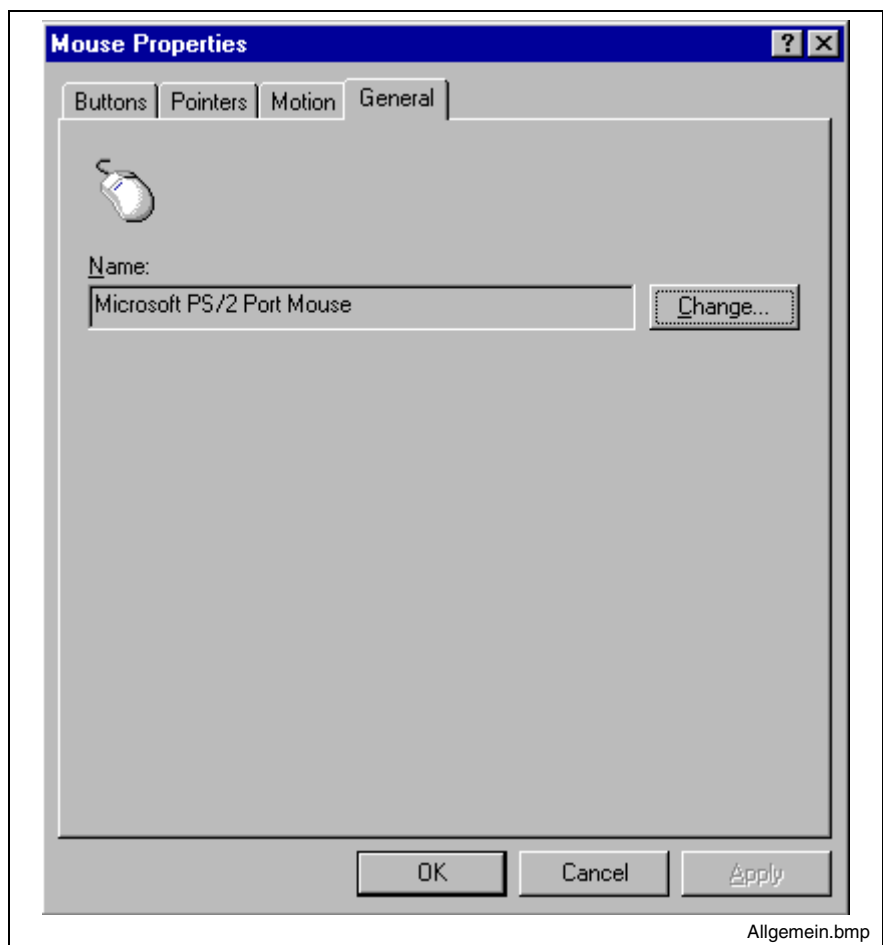


Abb. 5-3: Register button to set general mouse properties

2. After that, mark the Microsoft PS/2 mouse and confirm your selection with "OK".

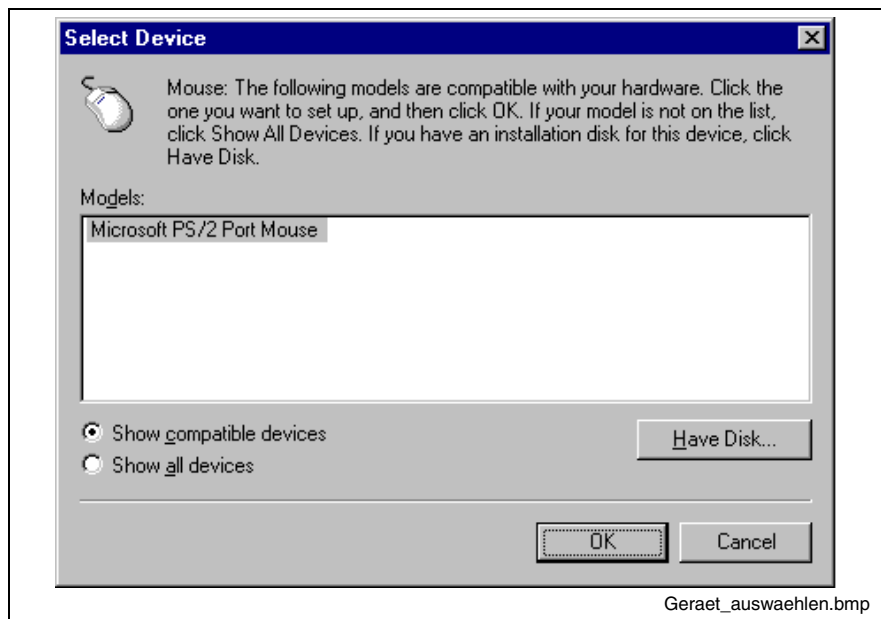


Abb. 5-4: Selection window of the Microsoft PS/2 mouse

3. Now, confirm the appearing message "Confirm Device Install" with "Yes".



Abb. 5-5: Dialog "Confirm Device Install"

4. Confirm the next appearing message "Would you like to skip file copying" also with "Yes", as the data are already available on the system.



Abb. 5-6: Dialog "Would you like to skip file copying"

5. At last, close the dialog and restart Windows.

6 Description of the Used Connections

6.1 Pin Assignment

The keyboard connector is a DIN PS/2 connector with combined assignment of the keyboard and mouse signals.

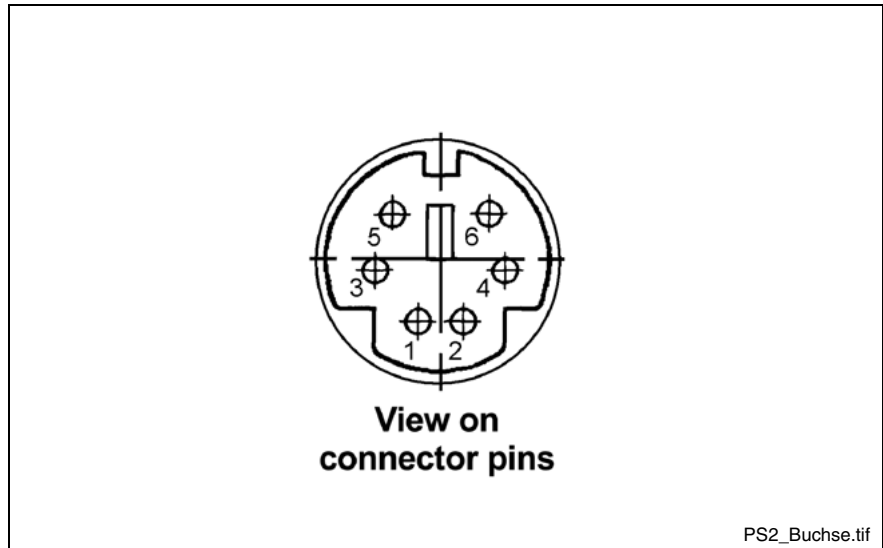


Fig. 6-1: Mini DIN PS/2 keyboard connector

The pins of the keyboard connector are assigned as follows:

Pin no.	Description
1	Keyboard data
2	Mouse data
3	GND
4	VCC + 5 V
5	Keyboard clock
6	Mouse clock

Fig. 6-2: Pin assignment of the VAK 10 / VAK 40 keyboard connector

6.2 Connection to an Operator Terminal

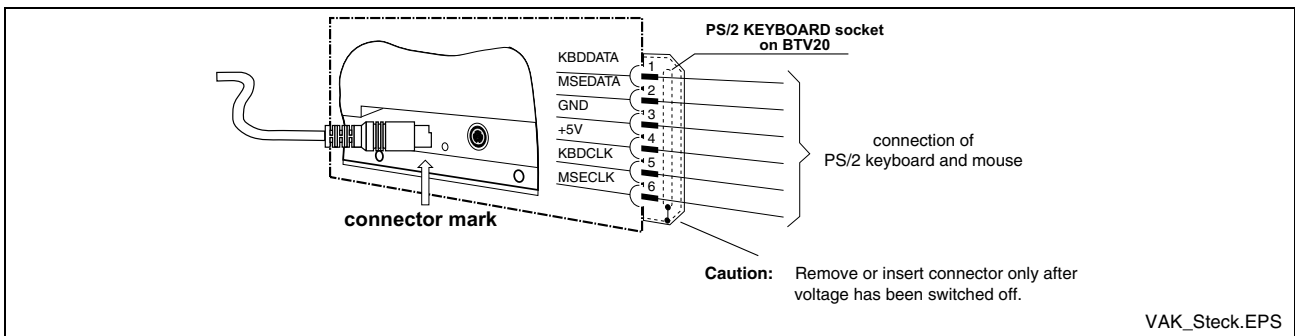


Fig. 6-3: Connection to a BTV 20 unit

To connect the industrial keyboards to a BTV 20 or BTV 16/40 unit, the 6-pin keyboard connector has to be connected with the PS/2 female connector on the rear side of the BTV unit. For a BTV 20 use the female connector with the designation "PS/2 KEYBOARD", for a BTV 16 or BTV 40 the female connector with the designation "Keyboard".

Note: During changing the keyboard, ensure that the industrial keyboard may only be connected or disconnected, when the power has been switched off.

7 Dimensions

7.1 Housing Dimensions

VAK 10.1

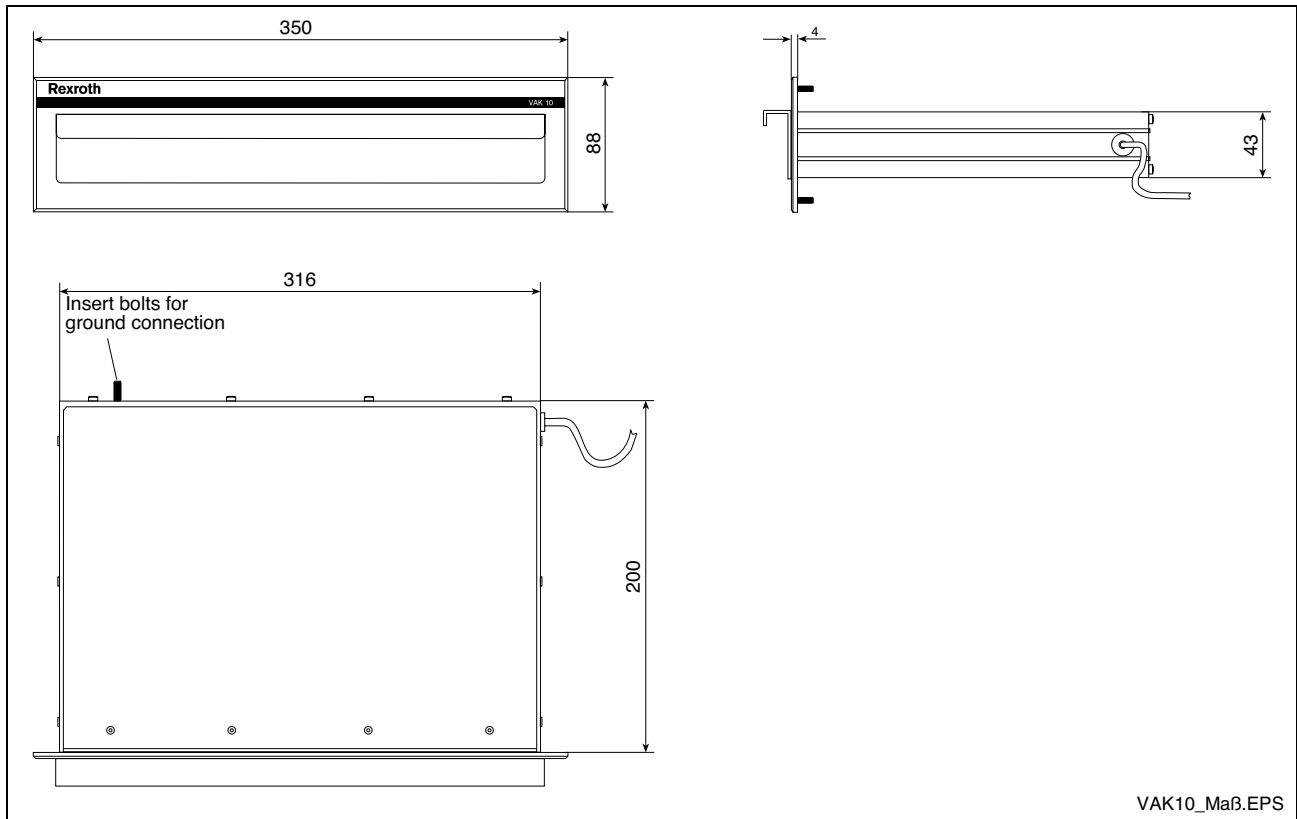


Fig. 7-1: Housing dimensions VAK 10.1

VAK 40.1

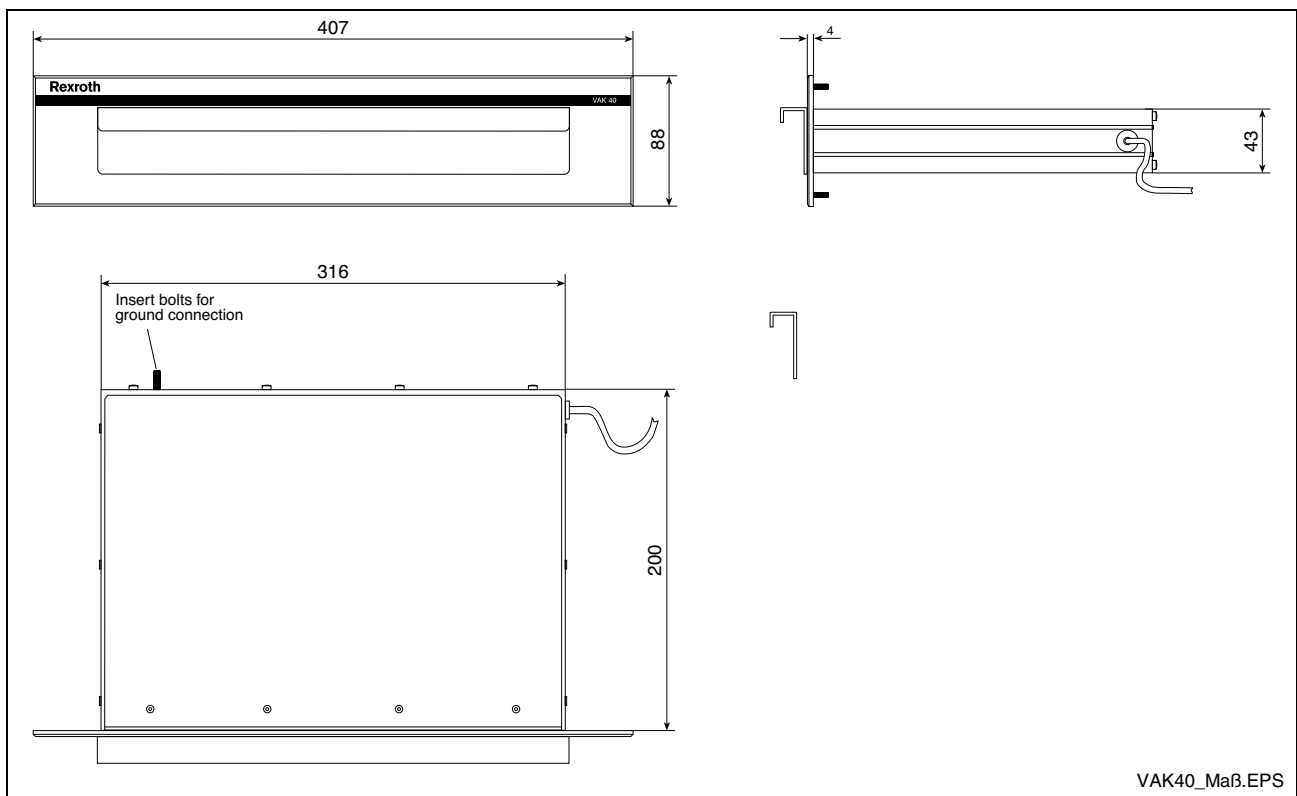


Fig. 7-2: Housing dimensions VAK 40.1

7.2 Mounting Dimensions

VAK 10.1

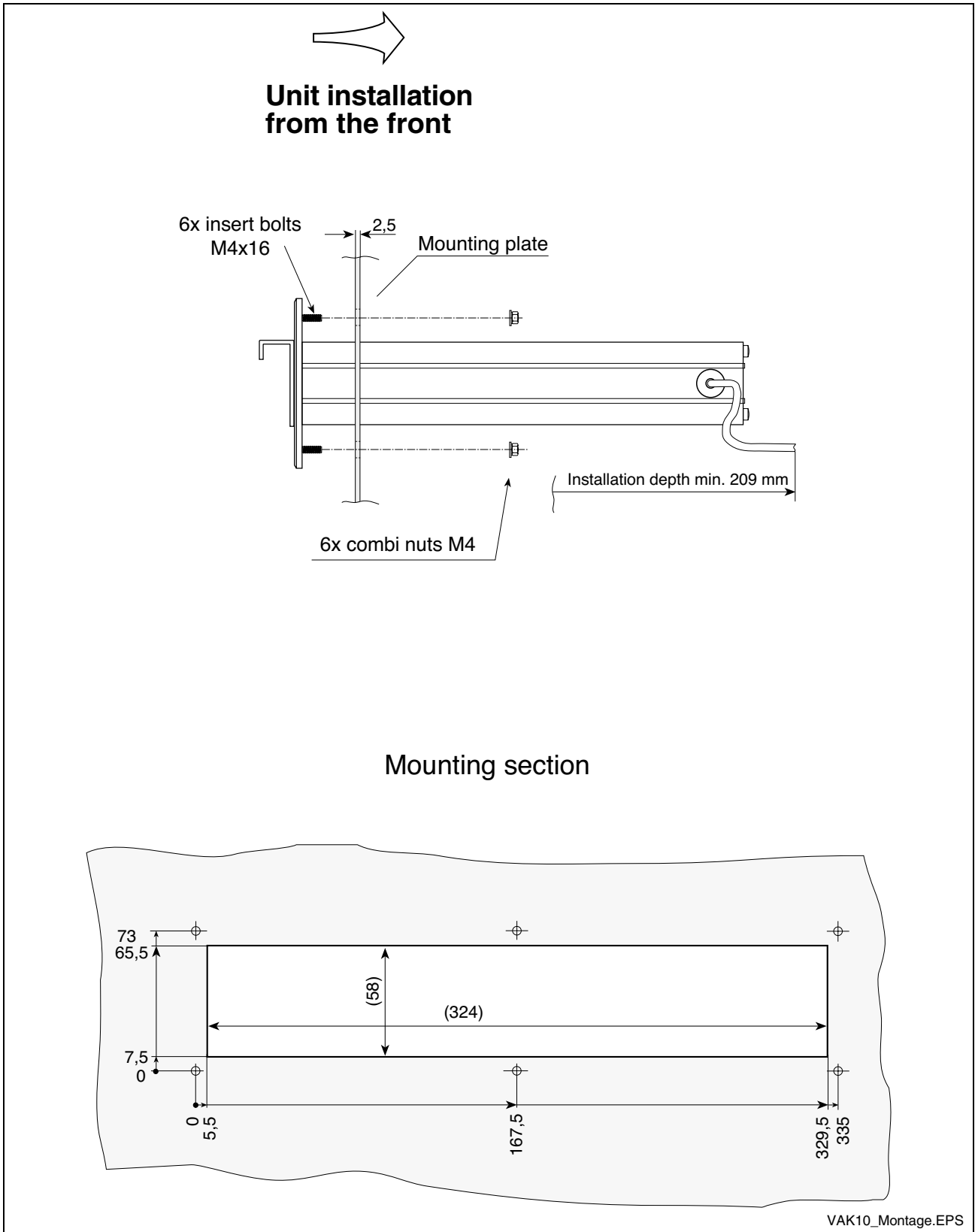


Fig. 7-3: Mounting dimensions VAK 10.1

VAK 40.1

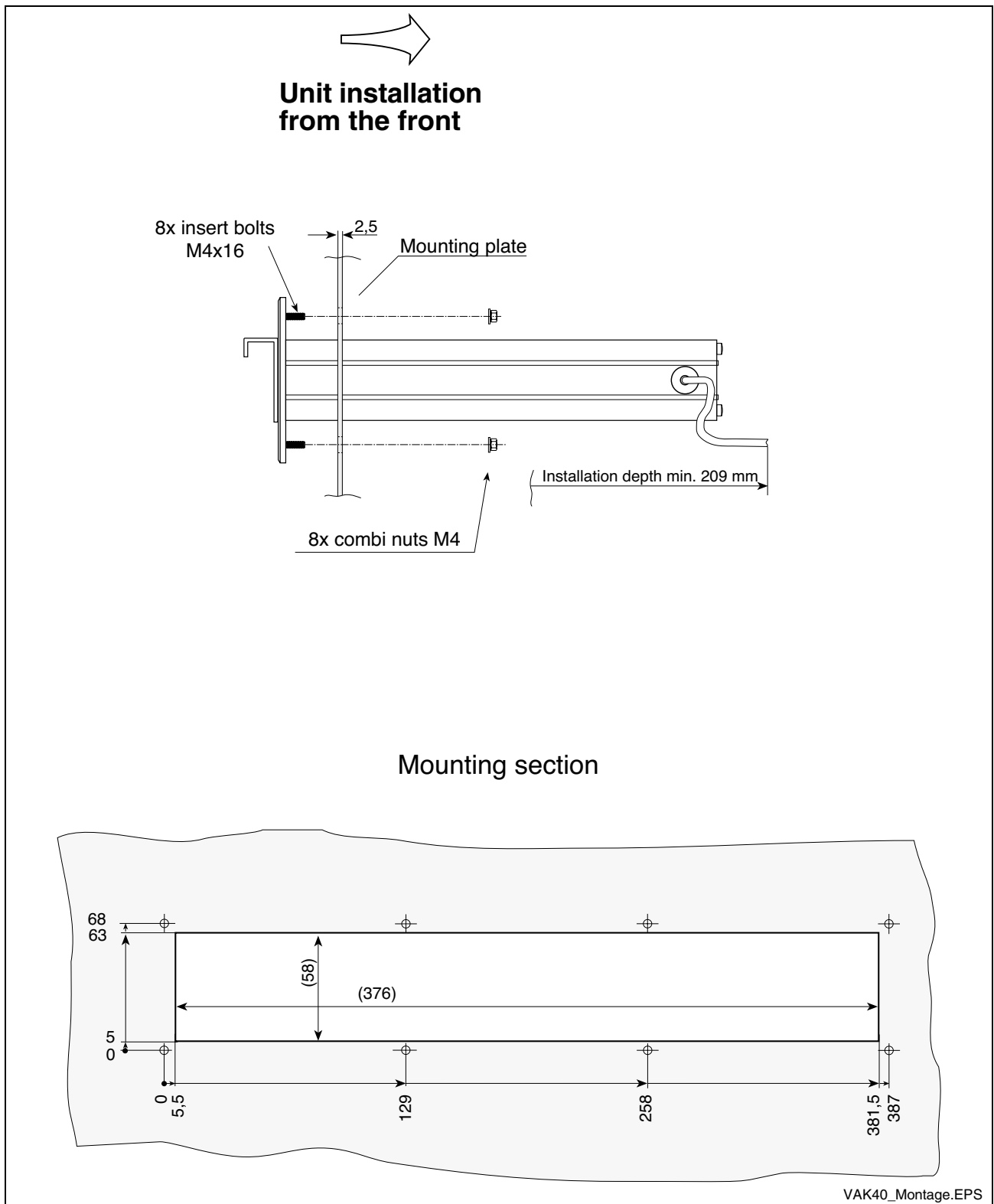


Fig. 7-4: Mounting dimensions VAK 40.1

8 Ordering Information

8.1 Type Code

VAK 10.1

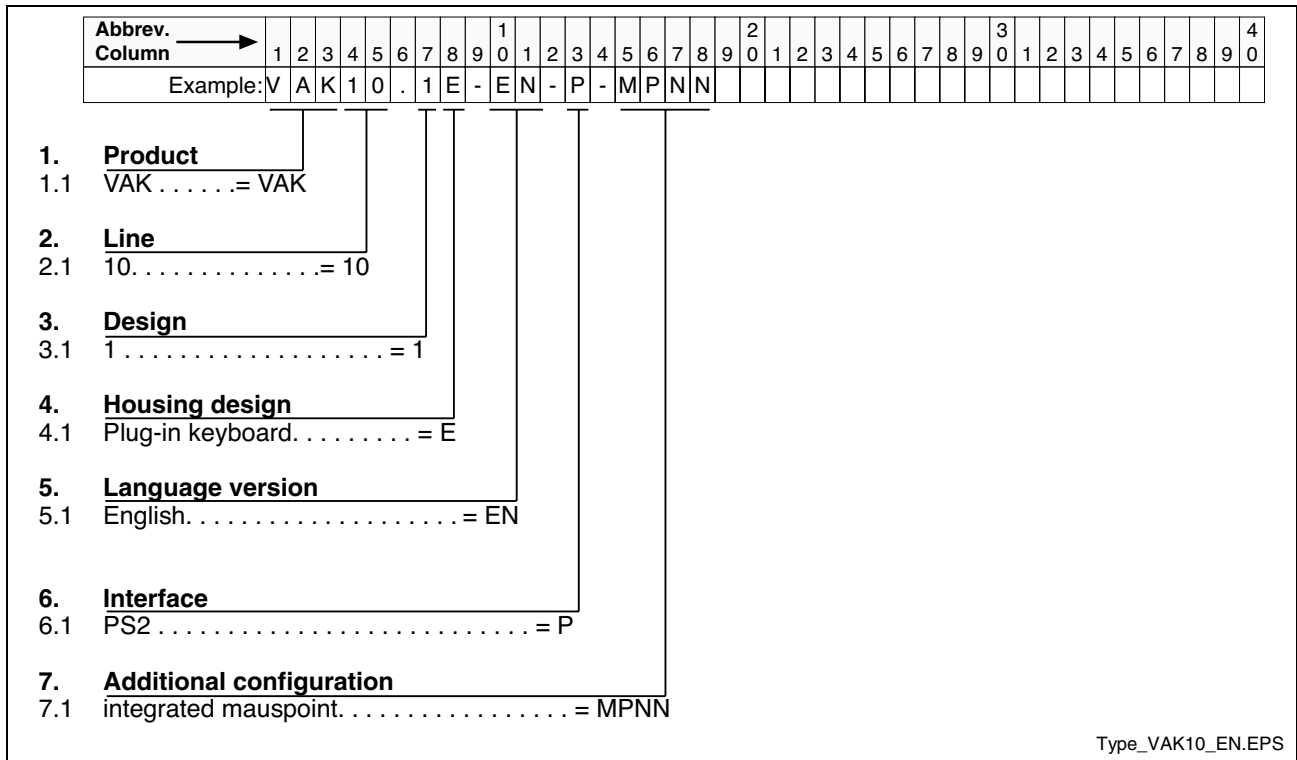


Fig. 8-1: Type code VAK 10.1

VAK 40.1

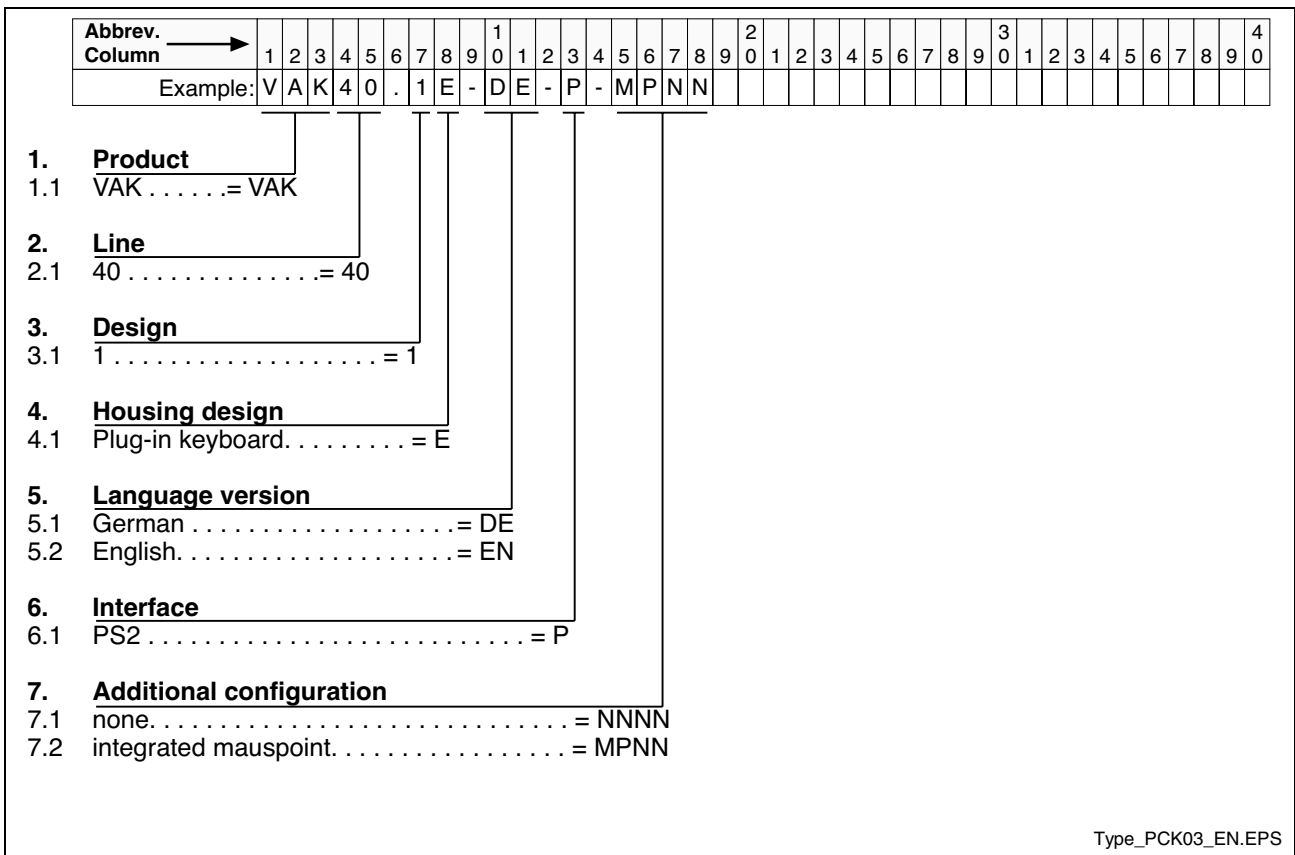


Fig. 8-2: Type code VAK 40.1

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- via Service Call Entry Center **+49 (0) 9352 40 50 60**
Mo-Fr 07:00-18:00
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Außerhalb der Helpdesk-Zeiten ist der Service direkt ansprechbar unter

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

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- offices providing service

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

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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.

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