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Rexroth IndraControl VAC 05.1, VAC 30.2, VAC 31.1

Connection Modules

Operating Instructions
R911338408

Edition 02

Title

Rexroth IndraControl
VAC 05.1, VAC 30.2, VAC 31.1
Connection Modules

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Note

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

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1 About this documentation

1.1 Overview on target groups and product phases

In the following illustration, the framed activities, product phases and target groups refer to the present documentation.

Example: In the product phase "Mounting (assembly/installation)", the target group "mechanic/electrician" can execute the activity "install" using this documentation.

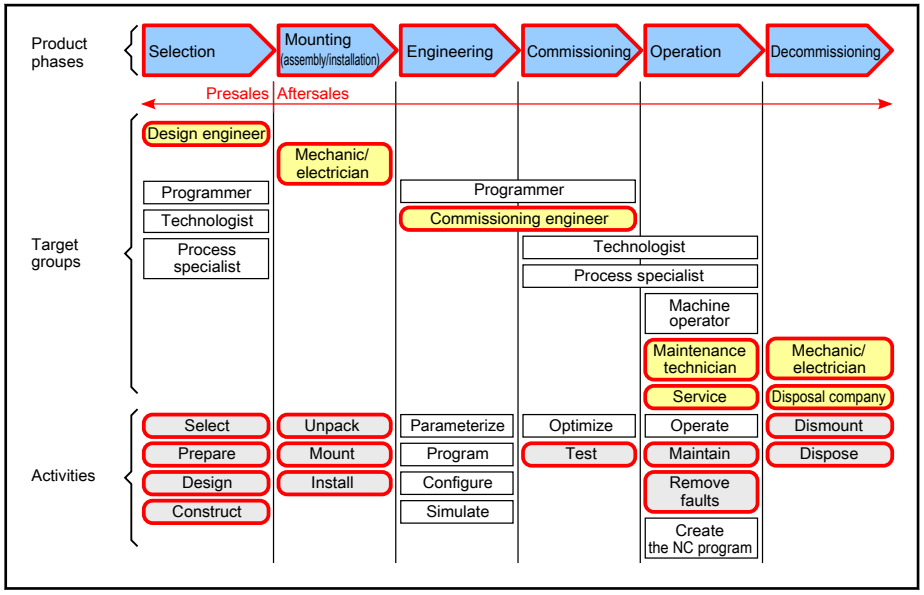


Fig. 1-1: Assigning the present documentation to the target groups, product phases and activities of the target group

1.2 Purpose

This document instructs the technical staff of the machine manufacturer on how to perform the mechanical and electrical installation safely and on how to commission the Embedded Terminal.

Required qualification: Individual who is able to assess the tasks assigned and to identify possible risks owing to qualification in the subject, knowledge and experience. The individual should also be familiar with the standards and regulations.

1.3 Scope

This operating instructions applies to all variants whose type code starts with "VAC3..." or "VAC05..."

The type code specifications are located on the type plate of the device, also refer to chapter 2.1 "Product identification" on page 3.

1.4 Related documents

Title	Type of documentation	Material number
IndraControl VCH 08.1 Hand-Held Terminal	Operating Instructions	R911339628
IndraControl VEH 30.1 Hand-Held Terminal	Project Planning Manual	R911318643
IndraControl VEH 30.2 Hand-Held Terminal	Project Planning Manual	R911331585
IndraControl VH 2110.01 Hand-Held Terminal	Operating Instructions	R911346750
IndraControl V-Devices	Project Planning Manual	R911343901

Tab. 1-1: Related documents

For further documents, please enter the specified material number under "Documentation and Downloads" in the "Rexroth Media Directory" at http://www.boschrexroth.com.

1.5 Customer feedback

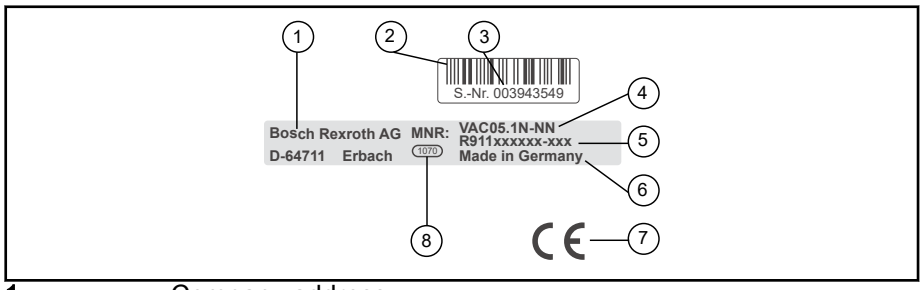
Customer requests, comments or suggestions for improvement are of great importance to us. Please email your feedback on the documentations to Feedback.Documentation@boschrexroth.de. Directly insert comments in the electronic PDF document and send the PDF file to Bosch Rexroth.

2 Product identification and scope of delivery

2.1 Product identification

2.1.1 Type plate on the device

The type plate is located on the rear panel.



1 Company address
2 Serial number as barcode
3 Serial number
4 Type name (type code)
5 Material number
6 Name of origin
7 CE mark
8 Division or plant number

Fig. 2-1: Exemplary type plate

2.2 Scope of delivery

- Connection module VAC 05.1, VAC 30.2 or VAC 31.1
- Safety instructions

3 Using safety instructions

3.1 Structure of the safety instructions

The safety instructions are structured as follows:

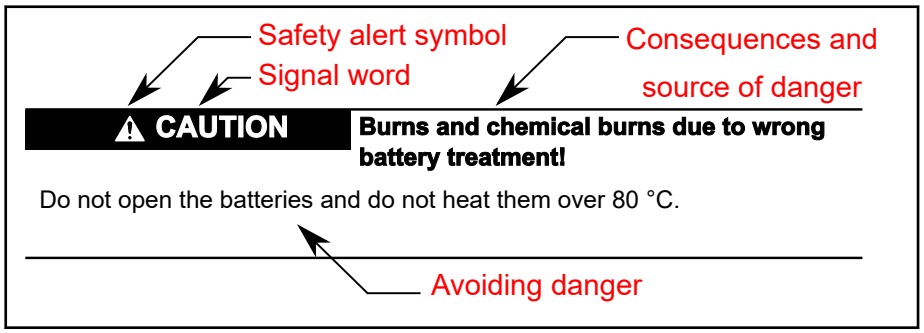


Fig. 3-1: Structure of the safety instructions

3.2 Explaining signal words and safety alert symbol

The safety instructions in this documentation contain specific signal words (danger, warning, caution, notice) and, if necessary, a safety alert symbol (according to ANSI Z535.6-2006).

The signal word draws attention to the safety instruction and indicates the risk potential.

The safety alert symbol (triangular safety reflector with exclamation marks), preceding the signal words Danger, Warning, Caution indicates hazards for persons.

⚠ DANGER

In case of non-compliance with this safety instruction, death or serious injury **will** occur.

⚠ WARNING

In case of non-compliance with this safety instruction, death or serious injury **can** occur.

⚠ CAUTION

In case of non-compliance with this safety instruction, minor or moderate injury can occur.

NOTICE

In case of non-compliance with this safety instruction, material damage can occur.

3.3 Symbols used

Pointers are displayed as follows:

This is a note.

Tips are displayed as follows:

This is a tip.

3.4 Explaining the signal alert symbol on the device

If this symbol is on your device, you have to observe the documentation on the device. The respective documentation informs on the type of hazard as well as the steps required to avoid this hazard.

4 Intended Use

The connection modules are designed by Bosch Rexroth for use in industrial environments.

NOTICE	Danger of destruction of the device if not expressly stated accessories, mounting parts and other components, cables, lines, software and firmware are used.

The connection modules may be used only as intended and with the accessories, mounting parts and other components specified in this documentation. Components that are not expressly mentioned must neither be attached nor connected. The same is valid for cables and lines.

Operation must only be carried out with the hardware component configurations and combinations that are expressly specified and with the software and firmware indicated and specified in the respective documentation and functional descriptions.

Fields of use of the connection modules:

- Handling systems and assembly systems
- Packaging and food processing machines
- Printing machines and paper converting machines
- Machine tools
- Wood processing machines

The connection modules may only be operated under the mounting and installation conditions, the position, and the ambient conditions (temperature, degree of protection, humidity, EMC etc.) specified in this documentation.

5 Spare Parts, Accessories and Wear Parts

No spare, accessory or wear parts are available for the connection modules.

6 Ambient conditions

	In operation	Storage	Transport
Max. ambient temperature	+5 °C to 40 °C according to EN 50178, class 3K3	-20 °C to +70 °C according to EN 50178, class 3K3	-20 °C to +70 °C according to EN 50178, class 3K3
Max. temperature gradient	Temporal temperature changes up to 3 K per minute	Temporal temperature changes up to 3 K per minute	Temporal temperature changes up to 3 K per minute
Relative humidity	5% to 95%	5% to 95%	5% to 95%
Air pressure	Up to 2,000 m above sea level acc. to EN 61131-2	Up to 3,000 m above sea level acc. to EN 61131-2	Up to 3,000 m above sea level acc. to EN 61131-2
Mechanical strength	Max. vibration: Frequency range: 5 to 150 Hz Excursion: 3.5 mm amplitude between 5 and 9 Hz Acceleration: 1 g at 9 to 150 Hz Acc. to EN 60068-2-6	Max. shock: 15 g 11 ms acc. to EN 60068-2-27	Max. shock: 15 g 11 ms acc. to EN 60068-2-27

Tab. 6-1: Ambient conditions of the VAC 05.1, VAC 30.2 and VAC 31.1,

NOTICE **Defective product due to gases jeopardizing functions**

Due to the risk of corrosion, avoid sulphurous gases (e.g. sulphur dioxide (SO_2) and hydrogen suphide (H_2S)). The product is not resistant against these gases.

NOTICE **Failure of the product due to contaminated air**

- The ambient air must not contain acids, alkaline solutions, corrosive agents, salts, metal vapors and other electrically conductive contaminants in high concentrations
- The devices to be installed into the housings and installation compartments must at least comply with the degree of protection IP 54 according to EN 60529.
- The device shall be provided in a suitable fire enclosure in the end-use application.

☞ This is a product that corresponds to the limit values of the emitted interference of class A (industrial environments). This is a product that does *not* correspond to the limit values of the emitted interference of class B (residential area and small enterprises)

When using the product in residential areas or small enterprises, the operator has to take actions to prevent radio interferences (also refer to EN 55022).

7 Technical data

	VAC 05.1	VAC 30.2	VAC 31.1
Rated supply voltage (hand-held terminal), rated voltage U_N	24 V DC (+19.2 V DC to +30 V DC acc. to EN 61131-2)		
Emitted interference and surge immunity	U_{max} = 35 V (for t < 100 ms)		
Current consumption at U_N	Maximum 0.7 A (depending on the connected hand-held terminal)		
STOP pushbutton E-STOP pushbutton	-	STOP pushbutton Potential-free contact "Terminal connected"	E-STOP pushbutton Potential-free contact "Terminal connected"
Connections	1 × Ethernet connection (RJ 45, 10/100 base-T) Enabling button 17-pin fine thread, bayonet flange to the hand-held terminal Voltage supply 24 V		
Bypassing the STOP pushbutton circuit when the hand-held terminal is removed	Without Stop pushbutton bypassing	Automatic bypassing using relay contacts	Screwable short-circuit connector
Specified external fuse protection	2 A protective fuse, slow		
Material	Front panel: Aluminum, cover sheet: V2A		
Degree of protection	Front panel IP 65, Rear side IP 30		
Protection class	III according to EN 61131-2		
Flame retardance	UL94-V0		
Weight	220 g	370 g	470 g

Tab. 7-1: Technical data

8 Standards

8.1 Standards used

Standard	Meaning
EN 61131-2	Programmable logic controllers – Part 2: Equipment requirements and tests
EN 60204-1	Safety of machinery – Electrical equipment of machines - Part 1: General requirements
EN 61000-6-4	Electromagnetic compatibility (EMC) Part 6-4: Generic standards – Emission standard for industrial environments
EN 61000-6-2	Electromagnetic compatibility (EMC) Part 6-2: Generic standards – Immunity for industrial environments

Tab. 8-1: Standards used

For the current editions refer to the EU declaration of conformity.

8.2 EU marking - Declaration of conformity

CE

The electronic products described in the present operating instructions comply with the requirements and the target of the following EU directive and with the following harmonized European standards:

- EN 60204-1
- EN 61131-2

Non-compliance with CE conformity due to modifications to the device.

The CE marking is only valid for the device in its delivery status. After having modified the device, the CE conformity is to be verified.

For the last published version of the EU declaration of conformity, go to the Bosch Rexroth Download Center: www.boschrexroth.com/MediaDirectory: DCTC-30440-001. For further versions (e.g. older products), please contact your Bosch Rexroth partner.

8.3 UL/CSA certified

c UL US LISTED

The devices are certified according to

- **UL508** (Industrial Control Equipment) and
- **C22.2 no. 142-M1987** (CSA)

UL file no. E210730

However, there can be combinations or extension stages with a limited or missing certification. Thus, verify the registration according to the UL marking on the device.

Loss of UL/CSA conformity due to modifications to the device.

The UL- and CSA- marking is only valid for the device in its delivery status. After having modified the device the UL and CSA compliance is to be verified.

8.4 UK declaration of conformity

The products comply with the UK directive acc. to S.I. 2016/1091 (electromagnetic compatibility).

For the UK declaration of conformity, go to the Bosch Rexroth media directory: www.boschrexroth.com/MediaDirectory, search term: DCTC-30440-031

9 Interfaces

9.1 View

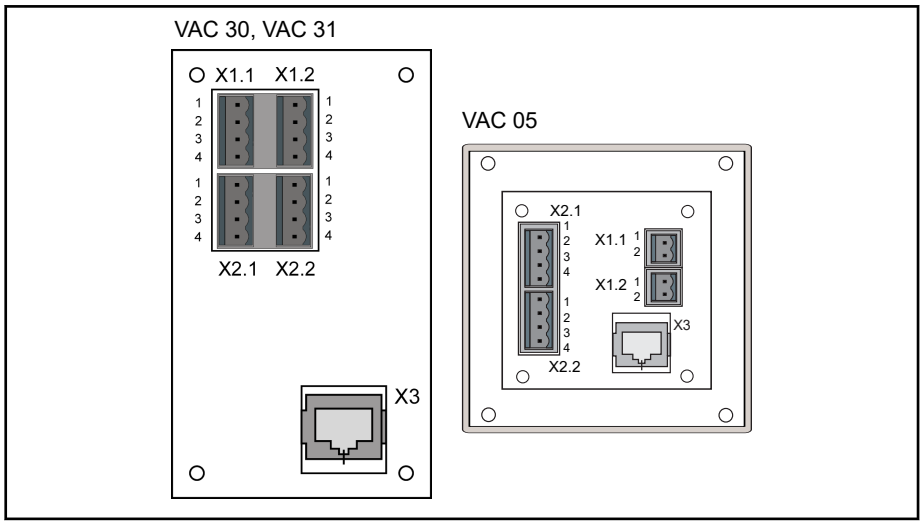


Fig. 9-1: Connector panel of the VAC connection module

9.2 Overview

The connectors X1 and X2 are designed as pin headers (SL), 3.81 mm grid, 2 × 4-pin and connector X3 as RJ45 Ethernet.

Pin	VAC 05.1	VAC 30.2	VAC 31.1
X1.1 Pin1	24 V DC connection module		
X1.1 Pin2	0 V		
X1.1 Pin3	-	24 V DC hand-held terminal	
X1.2 Pin1	24 V DC connection module		
X1.2 Pin2	0 V		
X1.2 Pin3	-	24 V DC hand-held terminal	
X1.1 Pin4	-	Terminal connected IN	
X1.2 Pin4	-	Terminal connected OUT	
X2.1 Pin1	Stop pushbutton 1 IN		E-STOP pushbutton 1 IN
X2.1 Pin2	Stop pushbutton 1 OUT		E-STOP pushbutton 1 OUT
X2.1 Pin3	Stop pushbutton 2 IN		E-STOP pushbutton 2 IN
X2.1 Pin4	Stop pushbutton 2 OUT		E-STOP pushbutton 2 OUT
X2.2 Pin1	Enabling button 1 IN		
X2.2 Pin2	Enabling button 1 OUT		
X2.2 Pin3	Enabling button 2 IN		

Pin	VAC 05.1	VAC 30.2	VAC 31.1
X2.2 Pin4	Enabling button 2 OUT		
X3	Ethernet RJ45		

Tab. 9-1: Pin assignment of the connection module VAC

9.3 24 V DC voltage supply X1

All voltages required in the hand-held terminal are generated with electrical isolation via a DC/DC converter. The connection is designed as pin strip S, grid of 3.81 mm, 2 x 4 pin to ensure that cables up to a maximum conductor cross-section of 1.5 mm^2 can be connected.

NOTICE **Possible damages due to missing protection at the 24 V lead.**

The external voltage supply has to have a rated voltage of 24 V and must not exceed an output voltage of 30 V. The 24 V supply line to the connection module has to be protected with a slow 2 A safety fuse.

9.4 STOP pushbutton, E-STOP pushbutton X2.1

9.4.1 Pin assignment

Pin	Signal name VAC 30.2, VAC 05.1	Signal name VAC 31.1
X2.1 Pin1	STOP pushbutton 1 IN	E-STOP pushbutton 1 IN
X2.1 Pin2	STOP pushbutton 1 OUT	E-STOP pushbutton 1 OUT
X2.1 Pin3	STOP pushbutton 2 IN	E-STOP pushbutton 2 IN
X2.1 Pin4	STOP pushbutton 2 OUT	E-STOP pushbutton 2 OUT

Tab. 9-2: Pin assignment, STOP, E-STOP pushbutton X2.1

⚠ DANGER **Risk of injury due to malfunction of the STOP button or E-STOP pushbutton.**

The circuit of the STOP or E-STOP pushbutton may be operated with up to 30 V and has to be protected with a slow 2 A safety fuse.

9.5 Enabling button X2.2

9.5.1 Pin assignment

Pin	Signal name
X2.2 Pin1	Enabling button 1 IN
X2.2 Pin2	Enabling button 1 OUT
X2.2 Pin3	Enabling button 2 IN
X2.2 Pin4	Enabling button 2 OUT

Tab. 9-3: Enabling button X2.2

⚠ DANGER **Risk of injury due to malfunction of the enabling control.**

The circuit of the enabling button may be operated with up to 30 V and has to be protected with a slow 2 A safety fuse.

For connection examples, refer to the project planning manual of VCH 08.1 hand-held terminal.

9.6 Ethernet interface X3

The hand-held terminal can be connected to an Ethernet network via the Ethernet interfaces.

RJ45, socket, 8-pin	
Type:	Ethernet 10Base T / 100Base X
Cable length:	Maximum 65 m; category 6 patch cable (according to specifications) from the VAC connection module
Cable type:	Shielded, twisted pair
Transmission rate:	10 or 100 Mbits/s; class D

Tab. 9-4: Ethernet interface

The configuration of the Ethernet interfaces is described in more detail in the project planning manual for the respective hand-held terminal.

10 Mounting and dismounting and elec. installation

10.1 Housing dimensions

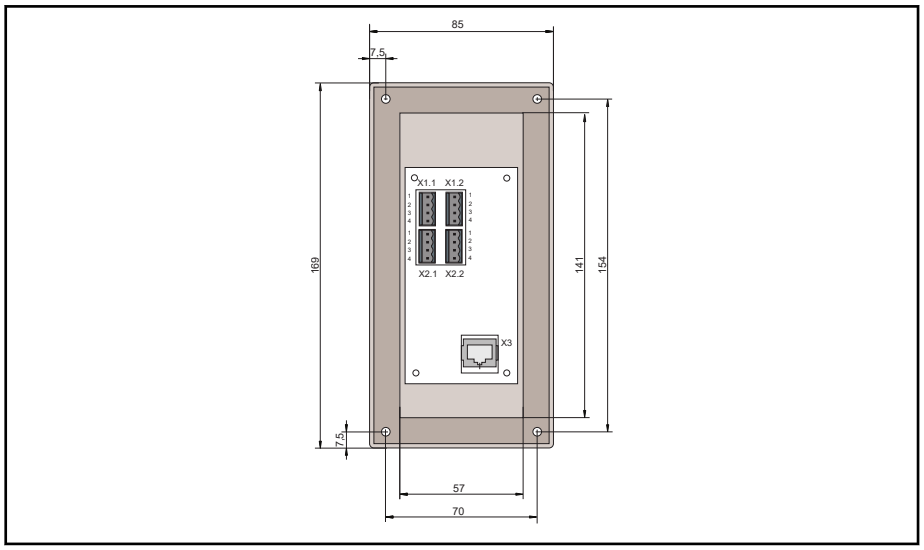


Fig. 10-1: Housing and mounting dimensions, VAC 3x

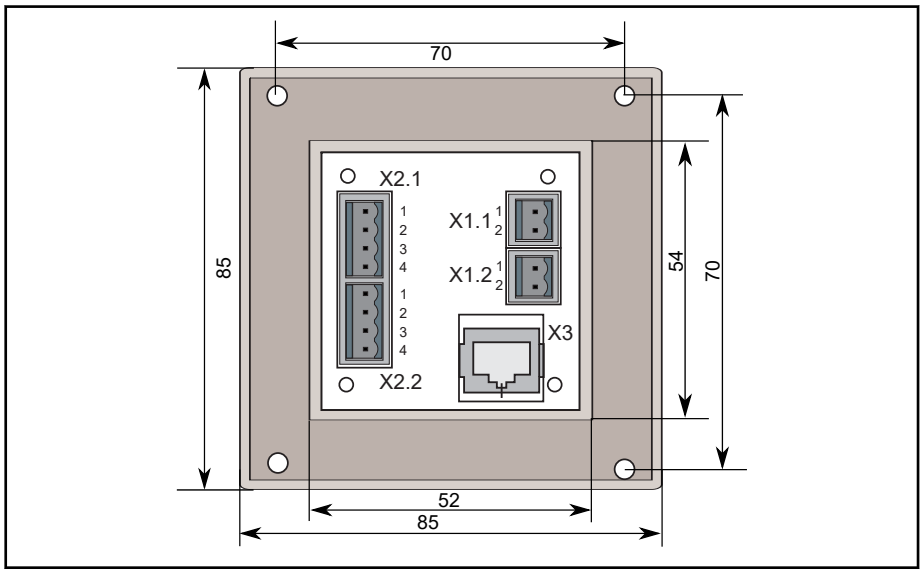


Fig. 10-2: Housing and mounting dimensions, VAC 05

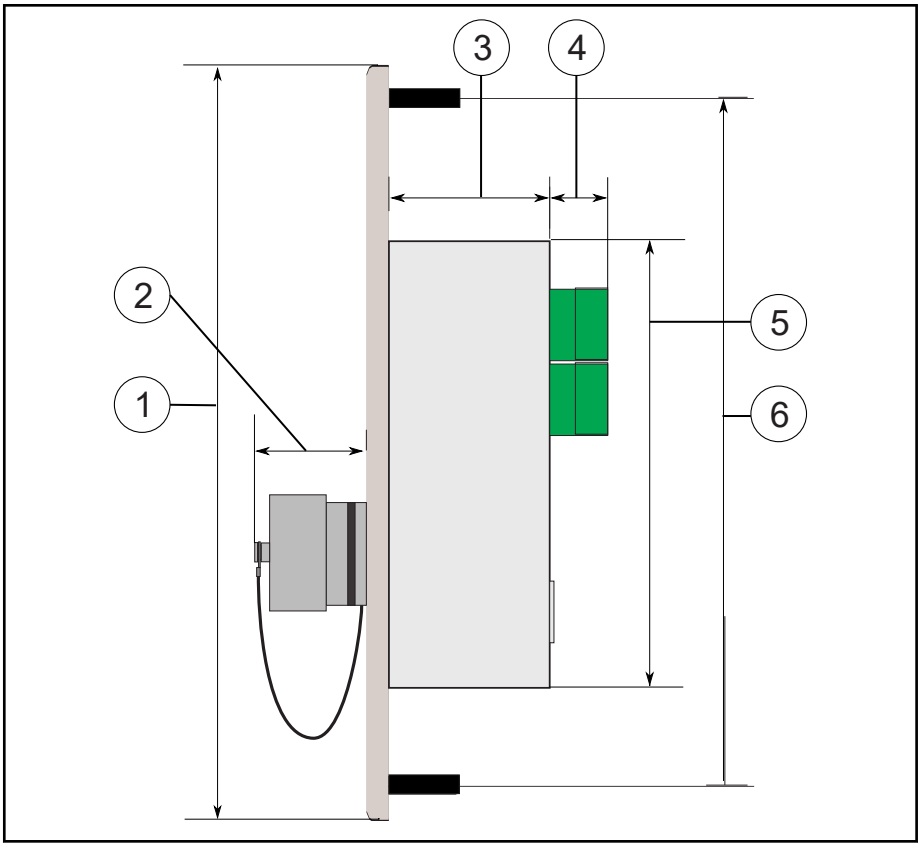


Fig. 10-3: Mounting depths, connection modules VAC

Connection module	①	②	③	④	⑤	⑥
VAC 05	85 mm	25 mm	20 mm	11 mm	70 mm	54 mm
VAC 30.2	169 mm	25 mm	36 mm	13 mm	100 mm	154 mm
VAC 31.1	169 mm	70 mm	33 mm	13 mm	100 mm	154 mm

Tab. 10-1: Mounting depths, connection modules VAC

10.2 Electric connection

10.2.1 General information

NOTICE

Destruction of screw terminals, insufficient contact and loss of UL certificiation if inadquate wire is used and/or wrong tightening torque.

Use only copper wire for wiring the connection terminals. Tighten the screws of the screw terminals with a torque of 2.25 lb in (0.22 Nm).

⚠ DANGER **Risk of injury at the VAC 30.2 caused by power failure and a non-functioning STOP pushbutton!**

For safety reasons, the voltage supply for the connection module (X1.1 pin1, X1.2 pin1) has to be monitored. If the voltage fails, the STOP pushbutton at the device is inoperative.

☞ The VAC connection module (for VAC 30.2 including automatic STOP pushbutton bypassing) is supplied with voltage via X1.1 pin1 or X1.2 pin1.

The connected hand-held terminal is supplied with voltage via X1.1 pin3 or X1.2 pin3. To switch on and off the hand-held terminal when it is plugged on, the wire link between X1.2 pin1 and X1.2 pin3 has to be removed and the switching voltage for the hand-held terminal has to be applied to X1.1 pin3 or X1.2 pin3.

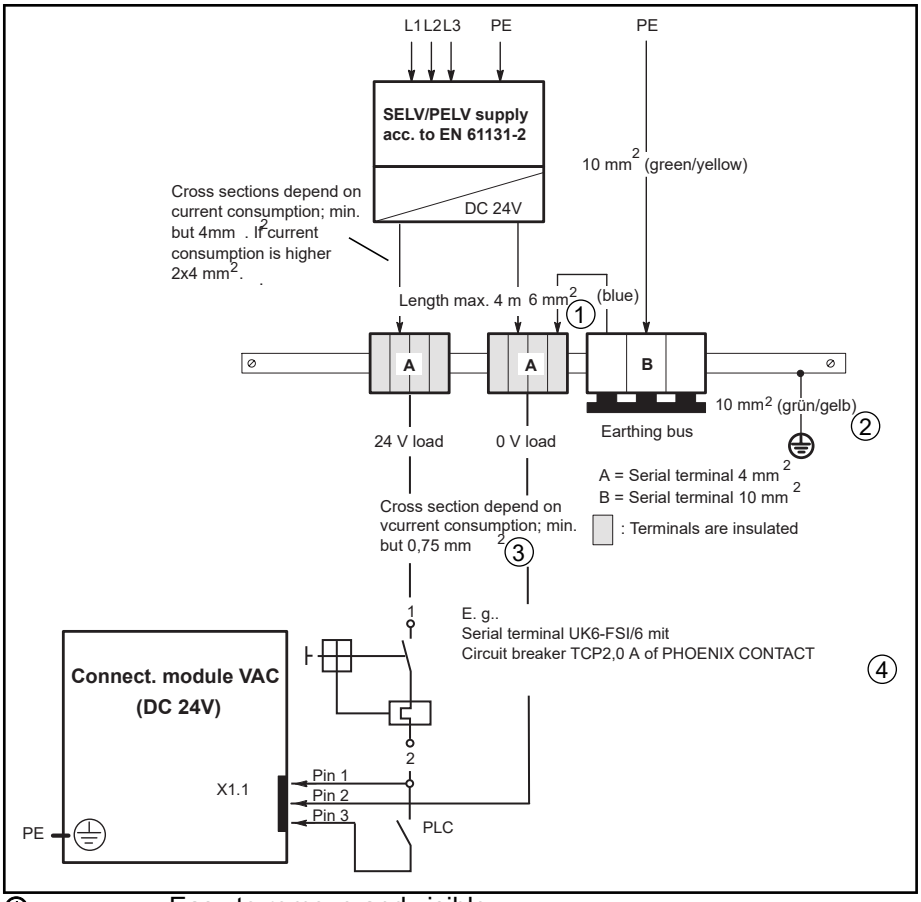
☞ For cabling and further information on the voltage supply, refer to the project planning manual or operating instructions for the hand-held terminal being used, refer to chapter 1.4 "Related documents" on page 2.

NOTICE **Possible damages due to missing protection at the 24 V lead.**

The external voltage supply has to have a rated voltage of 24 V and must not exceed an output voltage of 30 V. The 24 V supply line to the connection module has to be protected with a slow 2 A safety fuse.

⚠ DANGER **Danger without safe separation!**

- The 24 V DC input voltage must comply with the requirements of the "safe separation"!
- Plug and remove the plug-in connection only if no voltage is applied!



① Easy to remove and visible.

② PE bars are to be installed preferably on the mounting plate. Insulated PE bars have to be connected to the mounting plate on both sides with copper strips no longer than 20 cm. The cross-section of the copper strips has to be at least equal to that of the incoming mains cable.

③ 0.75 mm², up to 6 m and 1.5 mm², up to 10 m. If the cable length exceeds 10 m, a separate power supply unit is required!

④ Polarity reversal of the X1.1 plug can destroy the operator terminal if there is no additional external protection (fire hazard). This is caused by grounding the 0 V in the operator terminal and simultaneously by grounding the 0 V load (PELV).

Fig. 10-4: Connection example for 24 V DC voltage supply

⚠ WARNING **Personal injury due to electric shock!**

- Only supply the device from voltage sources with safety extra-low voltage (e.g. SELV or PELV acc. to EN 61131-2).
- Only connect connections, terminals or interfaces up to 50 V nominal voltage to voltages and circuits with a safe separation from dangerous voltages (e.g. through sufficient insulation and electric strength).

NOTICE **Fire hazard in the event of component failure!**

Ensure that the 24 V DC current supply of the hand-held terminal is adequately protected in the final application! The maximum fuse allowed is 2 A.

⚠ WARNING **Personal injury due to wrong project planning!**

- The hand-held terminal has to be projected correctly by the machine manufacturer according to the risk assessment. The following safety aspects have to be considered:
  - Correct cable length for working area limitation
  - E-STOP or STOP pushbutton required and allowed
  - Adequate category and performance level for the relevant application
- The danger zone has to be visible by the operator positioned in the operating zone.
- The device may be operated only in proper condition in adherence to the operating instructions.
- The operator must have the required qualifications and know the details of the intended use given in the project planning manual.

10.2.2 Connecting the safety technology

For connection examples of the enabling button, refer to the project planning manual of the hand-held terminal VCH 08.1.

11 Commissioning

11.1 General information

To commission the control, further parameterization or programming is required.

11.2 Commissioning steps

1. Before commissioning the hand-held terminal, the operator has to ensure that the system, especially the safety devices, is appropriate.

   NOTICE **Shutdown of the system by connecting a hand-held terminal with pressed Stop or E-STOP pushbutton.**

   Before commissioning the hand-held terminal, ensure that the Stop or E-STOP pushbutton is **not** pressed.

2. Connect the 17-pin connector to the VAC connection module.
3. Set up the hand-held terminal and the connection module (refer to the project planning manual "IndraControl V-Devices, Operating Systems", chapter 1.4 "Related documents" on page 2).

☞ For more details on the commissioning, refer to the documentation of the device or the system manufacturer.

11.3 For devices with functional safety

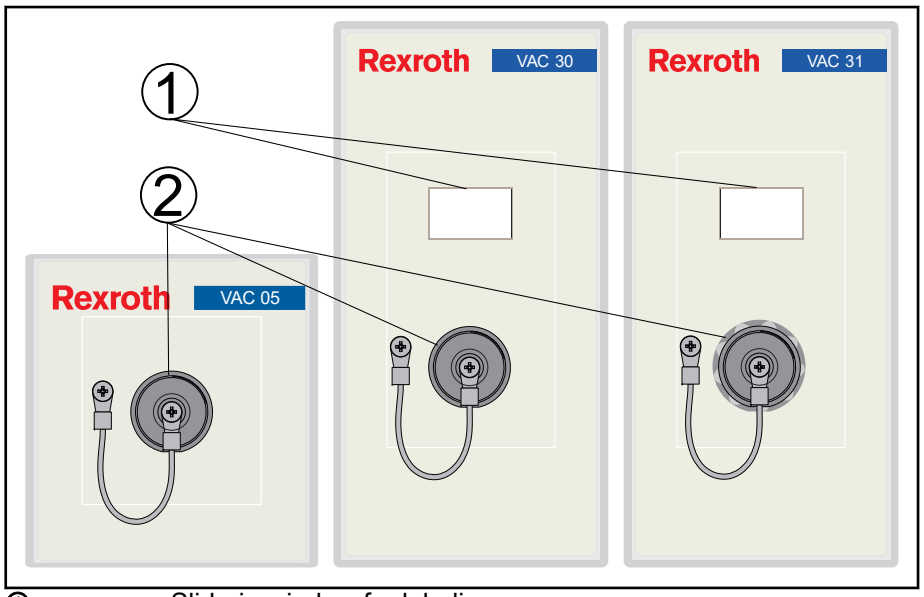
⚠ WARNING **Danger due to malfunctions of safety-related components such as E-STOP pushbutton, enabling button and safety control.**

The use of functional safety components does not automatically result in a functionally safe machine.

- Perform a risk analysis and validate the relevant protective measures.
- The functional safety can only be ensured by comprehensively implementing the requirements (e.g. systematic measures, software requirements, etc.) according to the applicable standards (DIN EN ISO 13849 and DIN EN 62061).

12 Device description

The connection modules VAC 05.1, VAC 30.2 and VAC 31.1 are used to connect Bosch Rexroth hand-held terminals to the system.



① Slide-in window for labeling
② 17-pin socket (with protective cap) to connect hand-held terminals

Fig. 12-1: Front views of the connection modules

12.1 Variants

The hand-held terminal is connected via a connection module.

The following connection modules are used depending on the selection of safety components on the hand-held terminal:

Selection of the connection module according to the applied safety technology

	VAC 05	VAC 30.2	VAC 31.1
Actuating element STOP pushbutton, E-STOP pushbutton	For hand-held terminals with black-gray STOP pushbutton		For hand-held terminals with red-yellow E-STOP pushbutton
Bypassing the safety circuit if the hand-held terminal is disconnected	-	Automatic STOP button bypassing	Short-circuit connector screwed on
17-pin front connector	Fine thread	Fine thread	Bayonet
Enabling button	Led out potential-free		

	VAC 05	VAC 30.2	VAC 31.1
Use	Suitable for hand-held terminals with STOP pushbuttons: • VCH08.1EAB-064ET-A1D-064-DS-E4-PW • VCH08.1EAB-064ET-A1D-064-CS-E2-PW • VCH05... • VEH30.2...	Suitable for hand-held terminals with STOP pushbuttons: • VCH08.1EAB-064ET-A1D-064-DS-E4-PW • VCH08.1EAB-064ET-A1D-064-CS-E2-PW • VCH05... • VEH30.2...	Suitable for hand-held terminals with red-yellow E-STOP pushbutton: • VCH08.1EAB-064ET-A1D-064-FS-B2-PW • VH2110.01-00-02-N3-111-CA
	Stop pushbutton and enabling control button potential-free and wired out directly.	The integrated "automatic STOP pushbutton bypassing" allows the hand-held terminal to be looped into the safety circuit of the running machine without unintentionally stopping the machine.	Hand-held terminals with red-yellow E-STOP pushbutton may be only looped in safety circuits if the system is in safe state or if a certified bypassing mechanism is available. Connect a hand-held terminal only if the system is in the safe state. Plugging or removing a hand-held terminal during the operation immediately sets this system to standstill.

Tab. 12-1: Connection modules for the hand-held terminals

12.2 Stop circuit bypassing (only for VAC 30.2)

12.2.1 Devices with gray STOP pushbutton

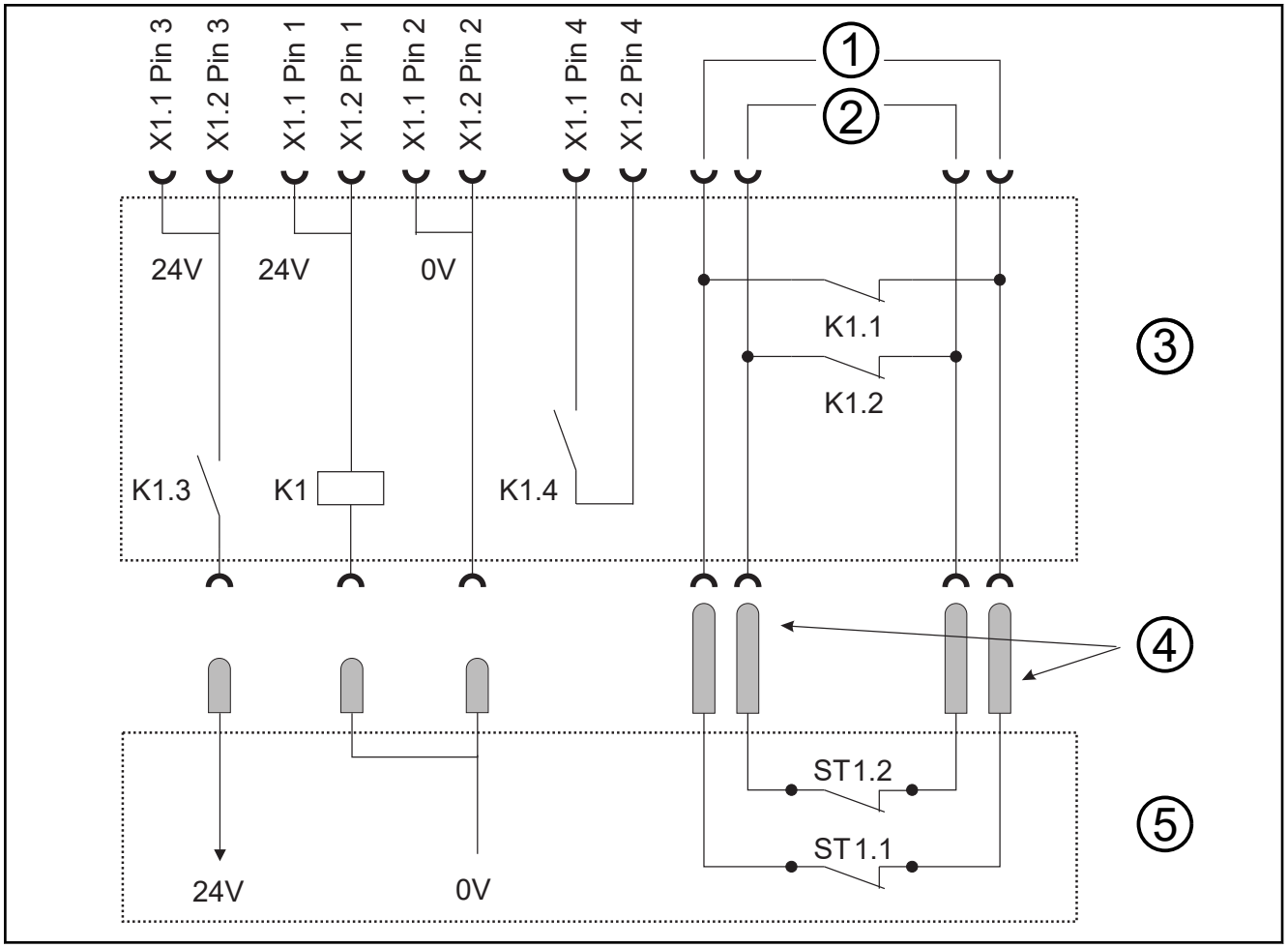
The hand-held terminal is also available with a gray STOP pushbutton instead of a red/yellow E-STOP pushbutton. The gray STOP pushbutton has the same functionality as the red/yellow E-STOP pushbutton. Its coloring is intended to prevent the E-STOP pushbutton, which is therefore ineffective from being used in the event of danger when the hand-held terminal is disconnected. The grey STOP pushbutton also complies with all mechanical aspects of EN ISO 13850 and differs only in its coloring.

The VAC 30.2 connection module is equipped with an automatic STOP circuit bypassing. Due to this bypassing, the operator can connect or disconnect the hand-held terminal via the connection module VAC 30.2 without causing an unintended system stop.

NOTICE **Shutdown of the system due to the connection of a hand-held terminal with pressed STOP pushbutton.**

Before commissioning the hand-held terminal, ensure that the STOP pushbutton is **not** pressed.

Functionality of the STOP circuit bypassing (for VAC 30.2)



① Stop circuit 1
② Stop circuit 2
③ Connection module IndraControl VAC 30.2
④ Early-make contacts
⑤ Hand-held terminal

Fig. 12-2: STOP circuit bypassing

When the hand-held terminal is not plugged in, the contacts K1.1 and K1.2 of relay K1 in the connection module VAC 30.2 keep the STOP circuits 1 and 2 of the control closed. The STOP circuits are active and the control is ready for operation.

When the 17-pin connector of the hand-held terminal is screwed onto the VAC 30.2 connection module, early-make contacts switch the N/C contacts ST1.1 and ST1.2 to the STOP circuits. The hand-held terminal is still without power supply and the STOP pushbutton has no effect.

When the 17-pin connector is fully screwed onto the connection module, the relay K1 switches and supplies the hand-held terminal with voltage via the NC contact K1.3. At the same time, opening contacts K1.1 and K1.2 deactivates the STOP circuit bypassing. The STOP circuits are active, the control is ready for operation and the STOP pushbutton in is integrated into the STOP circuits.

The VAC 30.2 connection module has to be supplied permanently with voltage (24 V) via pin 1 X1.1 or pin 1 X1.2. To ensure that the STOP pushbutton can be safely integrated, voltage monitoring has to be provided at this point.

The connected hand-held terminal can be supplied with 24 V via pin 3 X1.1 or pin 3 X1.2 and can therefore be switched on and off as required.

The time sequence of the connection process is shown in the following illustration.

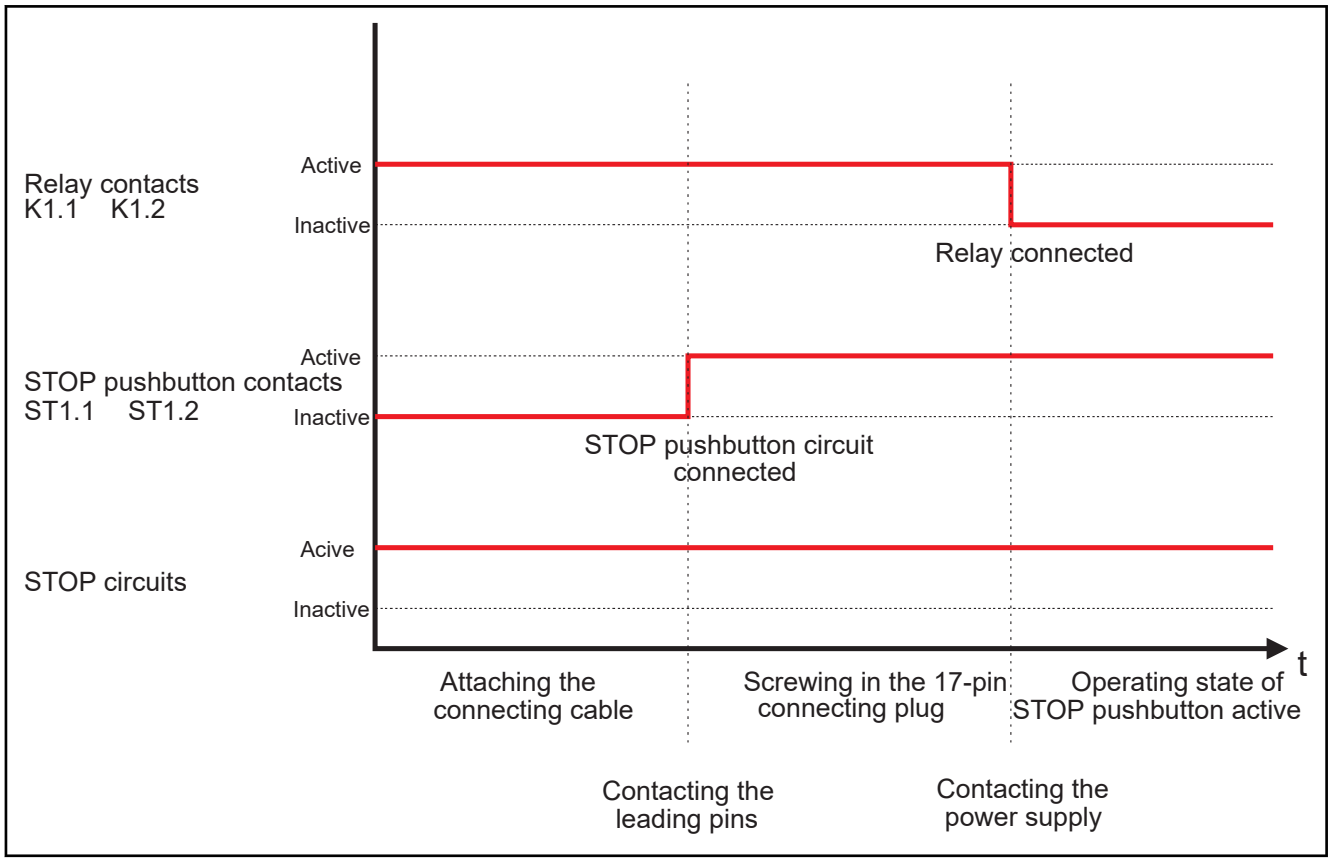


Fig. 12-3: Time sequence for switching on the VCH 08.1 STOP circuit

12.2.2 Devices with red-yellow E-STOP pushbutton

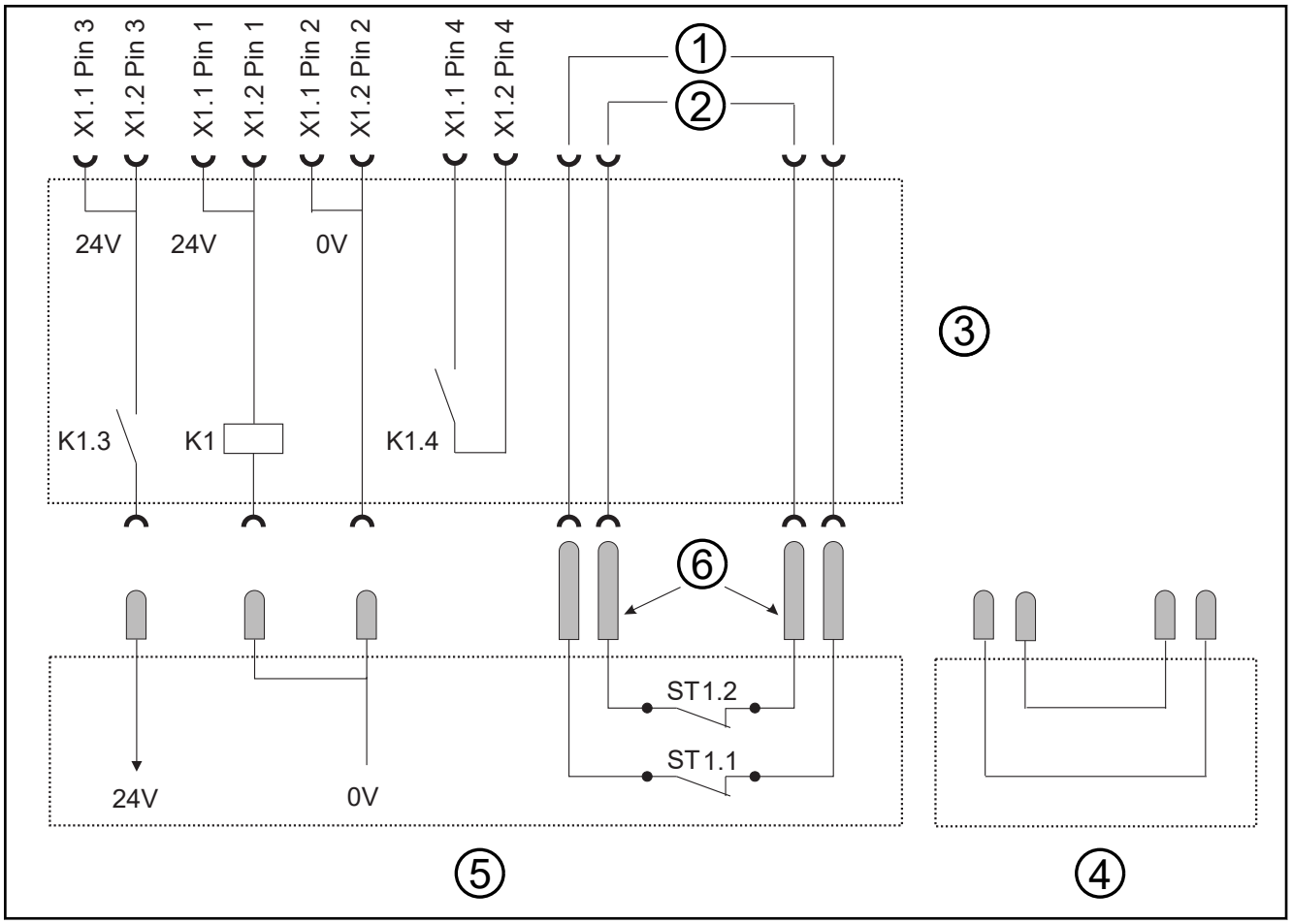
The red-yellow E-STOP pushbutton at the hand-held terminals comply with the requirements of the EN ISO 13850. It has to be designed as a STOP of either category 0 or 1 (see EN 60204-1) based on the risk assessment of the machine. The connection of the positive break contacts to an appropriate monitoring system must meet the category (acc. to EN ISO 13849-1) defined based on the risk assessment of the machine.

The VAC 31.1 is designed for the connection of a hand-held terminal with a red/yellow E-STOP pushbutton. The two channels of the E-STOP pushbutton are looped directly into the safety circuit. The VAC 31.1 is equipped with a short-circuit plug so that the system can be operated without a connected hand-held terminal. If the hand-held terminal is to be removed from the system, this system has to be brought into a safe state and the short-circuit plug must be screwed onto the VAC 31.1 connection module after disconnecting the hand-held terminal from the system. Only then can the system can be operated again. If the hand-held terminal is to be connected again, the system has to be brought into a safe state as well before the short-circuit plug can be removed and the hand-held terminal can be connected to the system.

NOTICE

Shutdown of the system by connecting a hand-held terminal with pressed E-STOP pushbutton

Before commissioning the hand-held terminal, ensure that the E-STOP pushbutton is **not** pressed.



① E-STOP circuit 1
② E-STOP circuit 2
③ Connection module IndraControl VAC 31.1
④ Short-circuit connector
⑤ Hand-held terminal
⑥ Early-make contacts

Fig. 12-4: Functional diagram of the VAC 31.1 connection module

⚠ WARNING **Non-functioning E-STOP devices can have fatal consequences!**

Red-yellow E-STOP pushbuttons have to be effective in all operation modes of a machine or a system at any time.

Do store the unconnected hand-held terminals with the red-yellow E-STOP pushbutton not being visible. In case of emergency, the unconnected devices are thus not mixed up with the operative devices.

- Unlocking an E-STOP facility must not result in uncontrolled startup of machines or plant.
- The E-STOP pushbutton does not replace other safety devices.
- The E-STOP pushbutton at the hand-held terminal is not a replacement for the E-STOP pushbuttons to be fitted directly on the machine.
- Some mechanical errors in the E-STOP pushbutton and in the STOP button can only de detected while actuating.

  Test the function of the E-STOP pushbutton after the device had been exposed to mechanical shock (e.g. fallen on the ground).

  Additionally, the E-STOP has to be tested cyclically by pressing the E-STOP pushbutton.
- For further information on the E-STOP and STOP pushbutton, please also refer to the project planning manual for the hand-held terminal, see chapter 1.4 "Related documents" on page 2.

12.3 Display and operating components

As the VAC connection module is operated together with a hand-held terminal (e.g. VEH 30.2, VCH 08.1, VH2110...) or a machine control panel (e.g. VAM 10.2, VAM 11.41, ...), the display and operating components of the respective connected hand-held terminal device or machine control panel apply, refer to the respective documentation of the connected device.

13 Error causes and troubleshooting

Error	Troubleshooting actions
The 17-pin connector cannot be unscrewed.	• Note the zero position of the connector when screwing it on. • If the contacts are bent, replace the connecting cable or replace the device.
The device does not start or the E-STOP circuit or the enabling circuit are not closed.	• Completely screw in the connector. • If the contacts are bent or there is an interruption in the cable, replace the connecting cable or replace the device. • If a safety component is defective, replace the device.
Communication to the hand-held terminal fails or the connection module cannot be read out.	• Completely screw in the connector.

Tab. 13-1: Error causes and troubleshooting

☞ Repairs at the device by the customer are not permitted. Exceptions are maintenance works listed in the chapter "Maintenance".

For further information in the event of repair, please contact the Bosch Rexroth Service.

14 Maintenance

The connection module is designed for the industrial environment. No special maintenance is required.

☞ Only the maintenance works at the device listed in this chapter are permitted.

For further information in the event of repair, please contact the Bosch Rexroth Service.

14.1 Cleaning notes

Keep the connection module free from humidity, oils and emulsions.

The connection module should be cleaned after soiling. Use a soft, dry and lint-free rag for cleaning.

14.2 Scheduled maintenance tasks

- Before each use, check the function of the safety devices such as the E-STOP pushbutton at the hand-held terminal (e.g. VH2110, VCH 08.1, VEH 30.2).

15 Ordering information

Column	1-3	4-5	6	7	8	9	10-11
Product features	Product	Series	.	Design	Extension option	-	Other model
Type code	VAC	05	.	1	N	-	NN
	VAC	30	.	2	N	-	NN
	VAC	31	.	1	C	-	NN

C Without bypassing the E-STOP pushbutton
N None

Tab. 15-1: Type code

16 Disposal

16.1 General Information

Dispose of the products according to the respective national standard.

16.2 Take-Back

Our products can be returned to our premises free of charge for disposal. However, the products must be free of impurities like oil, grease or other impurities.

Furthermore, the products returned for disposal must not contain any undue foreign material or foreign components.

Send the products "free domicile" to the following address:

Bosch Rexroth AG
Electric Drives and Controls
Bürgermeister-Dr.-Nebel-Straße 2
D-97816 Lohr am Main, Germany

16.3 Packaging

The packaging materials consist of cardboard, plastic material, wood or expanded polystyrene (EPS). The packaging materials can be recycled without any problem.

For ecological reasons, please refrain from returning the empty packages to us.

17 Service and support

Our worldwide service network provides an optimized and efficient support. Our experts offer you advice and assistance should you have any queries. You can contact us **24/7**.

Service Germany

Our technology-oriented Competence Center in Lohr, Germany, is responsible for all your service-related queries for electric drive and controls.

Contact the **Service Hotline** and **Service Helpdesk** under:

Phone:	**+49 9352 40 5060**
Fax:	**+49 9352 18 4941**
E-mail:	service.svc@boschrexroth.de
Internet:	http://www.boschrexroth.com

Additional information on service, repair (e.g. delivery addresses) and training can be found on our internet sites.

Service worldwide

Outside Germany, please contact your local service office first. For hotline numbers, refer to the sales office addresses on the internet.

Preparing information

To be able to help you more quickly and efficiently, please have the following information ready:

- Detailed description of malfunction and circumstances
- Type plate specifications of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your e-mail address)

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Notes

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