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

Rexroth Bosch Group

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

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Edition 01

Instructions

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VAC 05.1, VAC 30.2, VAC 31.1
Connection Modules

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1 About this Documentation

Overview – target groups and product phases

The activities, product phases and target groups that refer to the present documentation are marked in red color in the following figure.

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

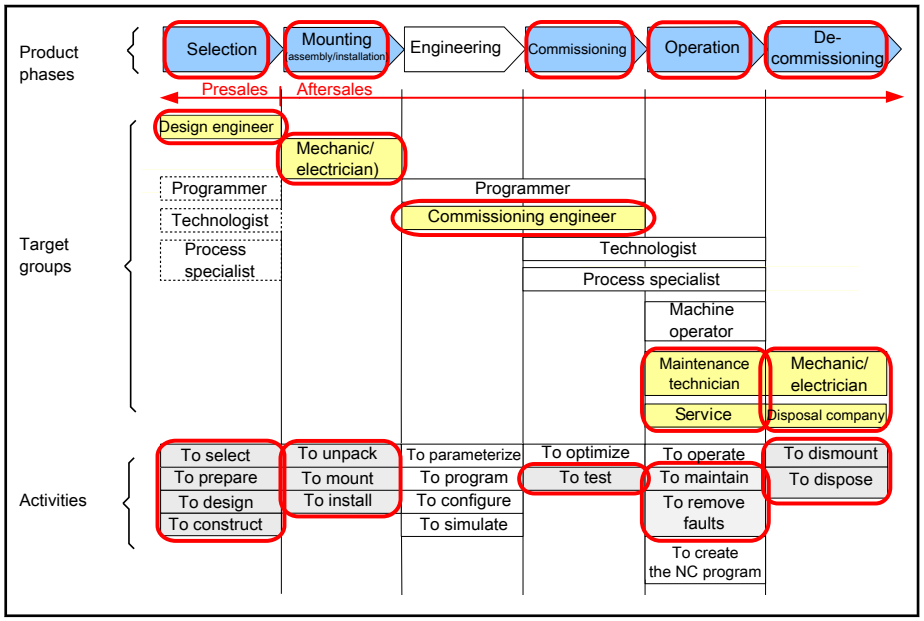


Fig. 1-1: Assigning the present documentation to the target groups, product phases and activities of the target group

Purpose

This document instructs the technical staff of the machine manufacturer on how to perform the mechanic and electrical installation in a safe way and on how to commission the Embedded Terminal.

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

Availability

This document is part of the present product delivery. The instructions have to be available to the user at any time. The product can only be passed on together with the instructions.

Scope

The instructions are valid for all variants, whose type designation code starts with "VAC3..." or "VAC05...".

The type designation code specifications are located on the type plate of the device, see also chapter 2.1 "Product Identification" on page 5.

Further documents

Title	Type of documentation	Parts number
Rexroth IndraControl VCH 05.1 Hand-Held Terminal	Instructions	R911337304
Rexroth IndraControl VCH 08.1 Hand-Held Terminal	Instructions	R911339627

About this Documentation

Title	Type of documentation	Parts number
Rexroth IndraControl VEH 30.1 Hand-Held Terminal	Project Planning Manual	R911318642
Rexroth IndraControl VEH 30.2 Hand-Held Terminal	Project Planning Manual	R911331583

Tab.1-2: Further documents

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

Customer feedback

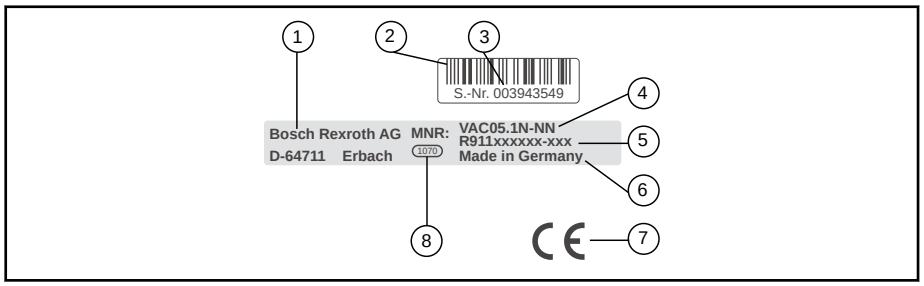
Customer requests, comments or suggestions for improvement are of great importance to us. Please email your feedback to the documentations to Feedback.Documentation@boschrexroth.de. Directly insert comments in the electronic PDF document and send the PDF file to us.

2 Product Identification and Scope of Delivery

2.1 Product Identification

2.1.1 Device Type Plate

The type plate is located on the rear panel.



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

Fig.2-1: Type plate, example

2.2 Scope of Delivery

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

3 Using the Safety Instructions

3.1 Safety Instructions – Structure

The safety instructions are structured as follows:

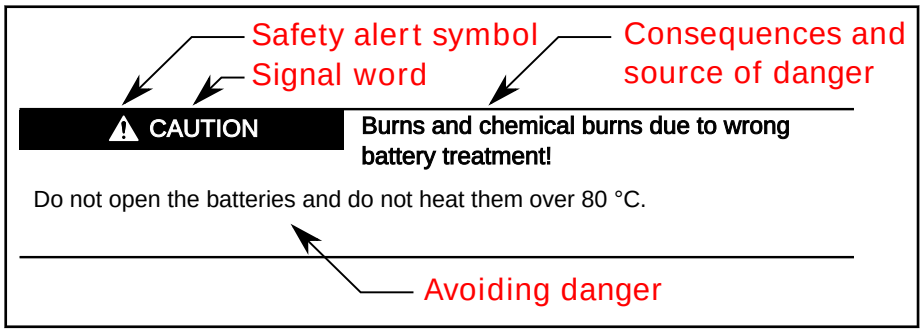


Fig.3-1: Safety instructions – structure

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 is meant to draw the reader's attention to the safety instruction and signifies the degree of danger.

The safety alert symbol (a triangle with an exclamation point), which precedes the signal words danger,warning and caution is used to alert the reader to personal injury hazards.

⚠ 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 could occur.

NOTICE

In case of non-compliance with this safety instruction, property damage could occur.

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 3000 m above sea level acc. to EN 61131-2	Up to 3000 m above sea level acc. to EN 61131-2
Mechanical strength	Max. vibration: Frequency range: 5 up to 150 Hz Excursion: 3.5 mm amplitude at 5 to 9 Hz Acceleration: 1 g for 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 VAC 30.2, VAC 31.1, VAC 05.1

7 Technical Data

	VAC 05.1	VAC 30.2	VAC 31.1
Rated supply voltage (hand-held terminal), nominal voltage U_N	DC 24 V (DC +19,2 V to DC +30 V acc. to EN 61131-2)		
Residual ripple at U_N	See project planning manual VCH 08.1		
Emitted interference and surge immunity	U_{max} = 35 V (for t < 100 ms)		
Current consumption for U_N	Maximum 0.7 A (depending on the connected hand-held terminal)		
Connections		Stop pushbutton Isolated contact "Terminal connected"	Stop pushbutton EMERGENCY STOP pushbutton Isolated contact "Terminal connected"
	1 × Ethernet connection (RJ 45, 10/100 base-T) Enabling device 17-pin fine thread flange, bayonet flange to the hand-held terminal 24 V power supply		
Jumpering the stop pushbutton circuit with unplugged hand-held terminal	Without Stop button bridging	Automatic jumpering of relay contacts	Screwable short-circuit connector
Prescribed external protection	2-A-fusible cut-out, time-lag		
Material	Front panel: Aluminum, metal cover: V2A		
Degree of protection	Front panel IP 65, Rear panel IP 30		
Degree of protection	III acc. to EN 61131-2		
Fire resistance	UL94-V0		
Weight	220 g	370 g	470 g

Tab.7-1: Technical data

8 Standards

8.1 General Information

The projects have been developed according to the German edition of the standards, available at the current stage of product development.

8.2 Used Standards

Standard	Description
DIN EN 61131-2: 2008/ B1:2009	Programmable logic controls – Part 2: Equipment requirements and tests
DIN EN 60204-1:2006/ H1:2008	Safety of machinery - Electrical equipment of machines – Part 1: General requirements
DIN EN 61000-6-4:2007 A1:2011	Electromagnetic Compatibility (EMC) Part: 6-4: Generic standards - Emission standard for industrial environments
DIN EN 61000-6-2:2006 B1:2011	Electromagnetic Compatibility (EMC) Part: 6-2: Generic standards – Immunity for industrial environments

Tab.8-1:

8.3 CE Marking – Declaration of Conformity

CE

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

- EN 60204-1:2006
- EN 61131-2:2007

☞ **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.

Contact your representative for the Declaration of Conformity.

8.4 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

Standards

However, there can be combinations or extension stages with 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.

9 Interfaces

9.1 View

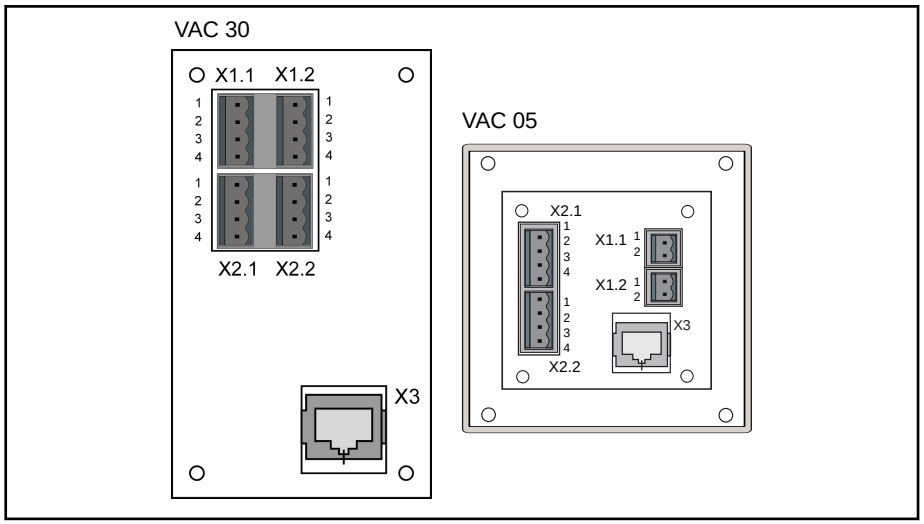


Fig.9-1: Connector panel of the VAC connection module

9.2 Overview

The connectors X1 and X2 are designed as connection strip (SL) with a pin spacing of 3.81 mm and 2 × 4-pins. The connector X3 is designed as RJ45 Ethernet.

Pin	VAC 05.1	VAC 30.2	VAC 31.1
X1.1 pin1	DC 24 V connection module		
X1.1 pin2	0 V		
X1.1 pin3	-	DC 24 V hand-held terminal	
X1.2 pin1	DC 24 V connection module		
X1.2 pin2	0 V		
X1.2 pin3	-	DC 24 V hand-held terminal	
X1.1 pin4	-	Terminal connected IN	
X1.2 pin4	-	Terminal connected OUT	
X2.1 pin1	STOP pushbutton 1 IN		EMERGENCY STOP pushbutton 1 IN
X2.1 pin2	STOP pushbutton 1 OUT		EMERGENCY STOP pushbutton 1 OUT
X2.1 pin3	STOP pushbutton 2 IN		EMERGENCY STOP pushbutton 2 IN
X2.1 pin4	STOP pushbutton 2 OUT		EMERGENCY STOP pushbutton 2 OUT
X2.2 pin1	Enabling device 1 IN		
X2.2 pin2	Enabling device 1 OUT		

Interfaces

Pin	VAC 05.1	VAC 30.2	VAC 31.1
X2.2 pin3	Enabling device 2 IN		
X2.2 pin4	Enabling device 2 OUT		
X3:	Ethernet RJ45		

Tab.9-2: Pin assignment of the VAC connection module

9.3 DC 24 V 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 connection strip (SL) with a 3.81 mm pin spacing, 2 × 4-pin, so that cables up to a maximum conductor cross-section of 1.5 mm^2 can be connected.

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

The external voltage supply must have a rated voltage of 24 V and must not exceed an output voltage of 30 V. The 24 V line to the connection module is to be protected by a 2 A time-lag fusible cut-out.

9.4 STOP Pushbutton, EMERGENCY 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	EMERGENCY STOP pushbutton 1 IN
X2.1 pin2	Stop pushbutton 1 OUT	EMERGENCY STOP pushbutton 1 OUT
X2.1 pin3	STOP pushbutton 2 IN	EMERGENCY STOP pushbutton 2 IN
X2.1 pin4	Stop pushbutton 2 OUT	EMERGENCY STOP pushbutton 2 OUT

Tab.9-3: Pin assignment, STOP, EMERGENCY STOP pushbutton X2.1

⚠ DANGER **Risk of injury due to malfunction of the stop button or emergency stop button.**

The circuit of the stop button or emergency stop pushbutton might be operated with a maximum of 30 V and must be protected with a 2-A-fusible cut-out.

9.5 Enabling Button X2.2

9.5.1 Pin Assignment

Pin	Signal name
X2.2 pin1	Enabling device 1 IN
X2.2 pin2	Enabling device 1 OUT

Pin	Signal name
X2.2 pin3	Enabling device 2 IN
X2.2 pin4	Enabling device 2 OUT

Tab.9-4: Enabling button X2.2

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

The circuit of the enabling device might be operated with a maximum of 30 V and has to be protected with a 2-A-fusible cut-out.

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

9.6 Ethernet Interface X3

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

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

Tab.9-5: Ethernet interface

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

10 Assembly, Disassembly and Electrical Installation

10.1 Housing Dimensions

10.1.1 Overview Housing Dimensions

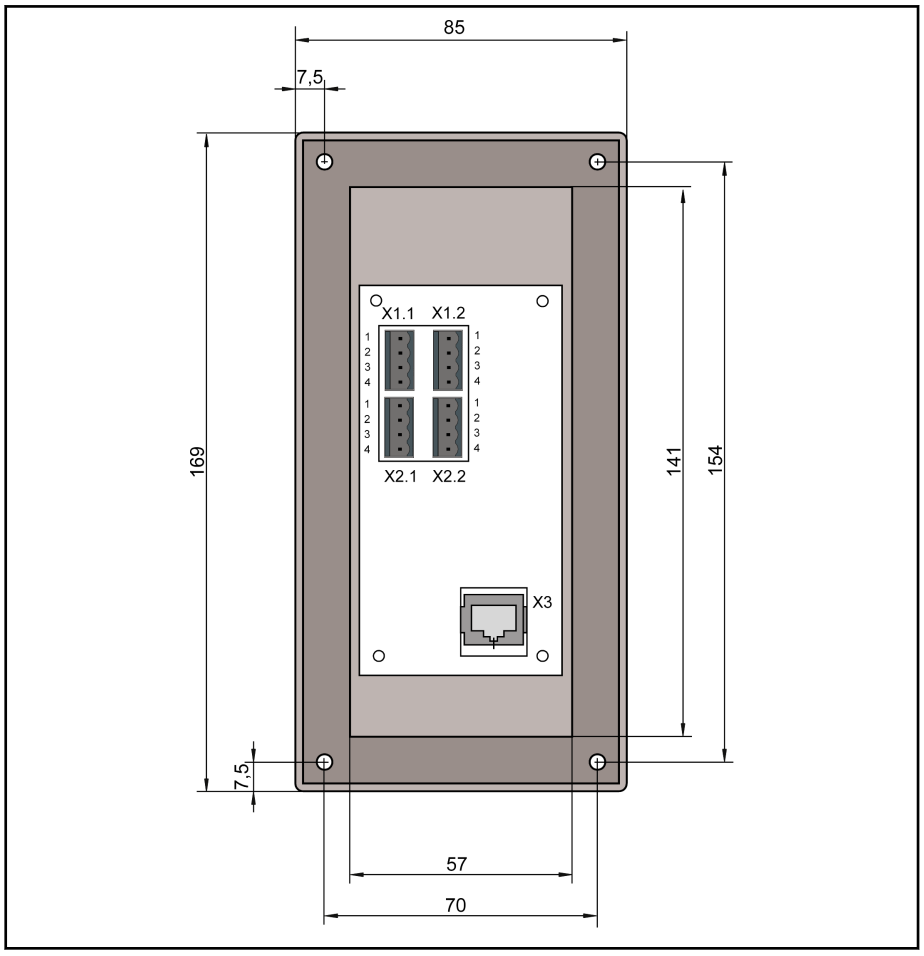


Fig.10-1: Housing and fitting dimensions, VAC 3x

Assembly, Disassembly and Electrical Installation

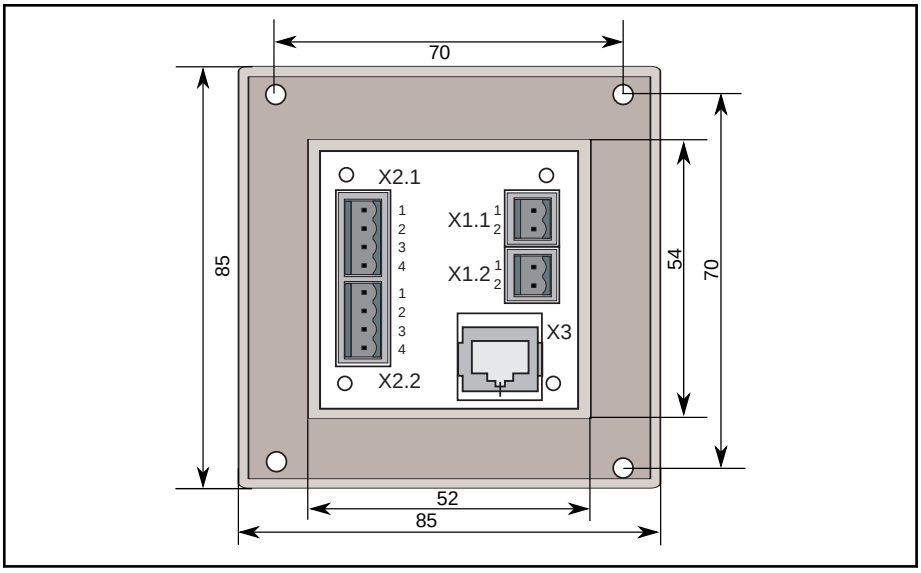


Fig. 10-2: Housing and fitting dimensions, VAC 05

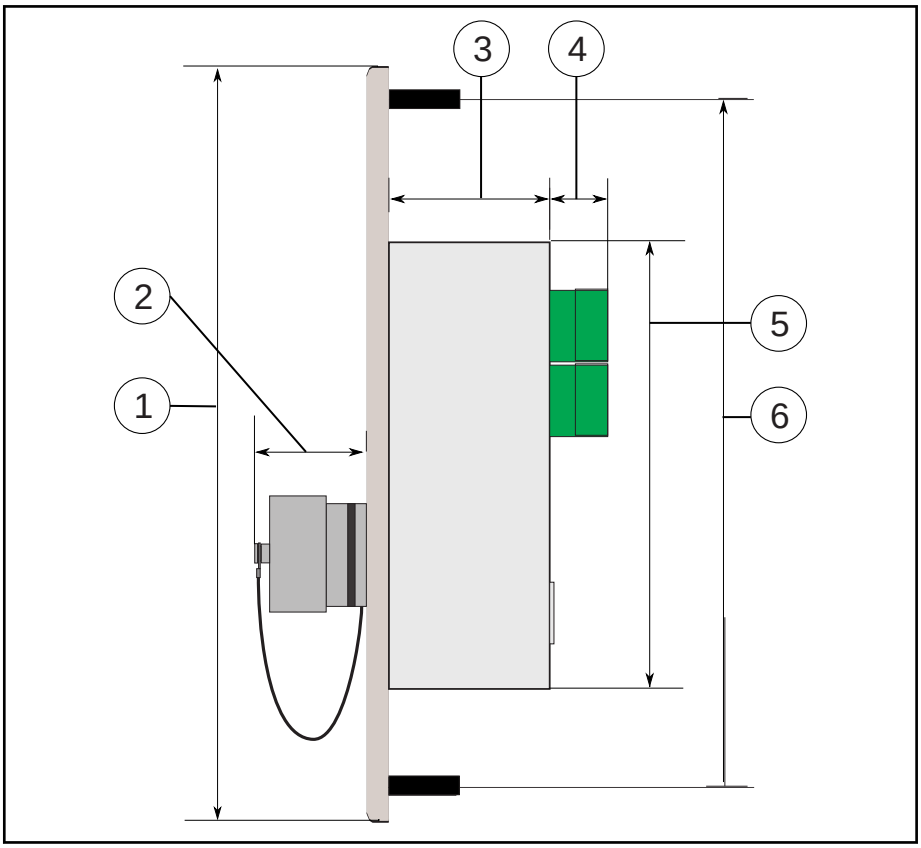


Fig. 10-3: Installation depths of connection modules VAC

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.10-4: installation depths of connection modules VAC

10.2 Electrical Wiring

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 when using VAC 30.2 caused by voltage loss and non-functioning STOP pushbutton!**

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

☞ The connection module VAC (VAC 30.2 includes an automatic STOP button bridging) 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 make the hand-held terminal engageable or disengageable when it is plugged-on, the wire jumper between X1.2 pin1 and X1.2 pin3 is to be removed and the switching voltage for the hand-held terminal is to be applied to X1.1 pin3 or X1.2 pin3.

☞ Further information about cabling and power supply can be found in the project planning manual of VCH 08.1.

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

The external voltage supply must have a rated voltage of 24 V and must not exceed an output voltage of 30 V. The 24 V line to the connection module is to be protected by a 2 A time-lag fusible cut-out.

Assembly, Disassembly and Electrical Installation

⚠ DANGER **Danger without protective separation!**

- The DC 24 V input voltage must comply with the requirements of the "Protective separation"!
- Plug and unplug the connector only if there is no voltage!

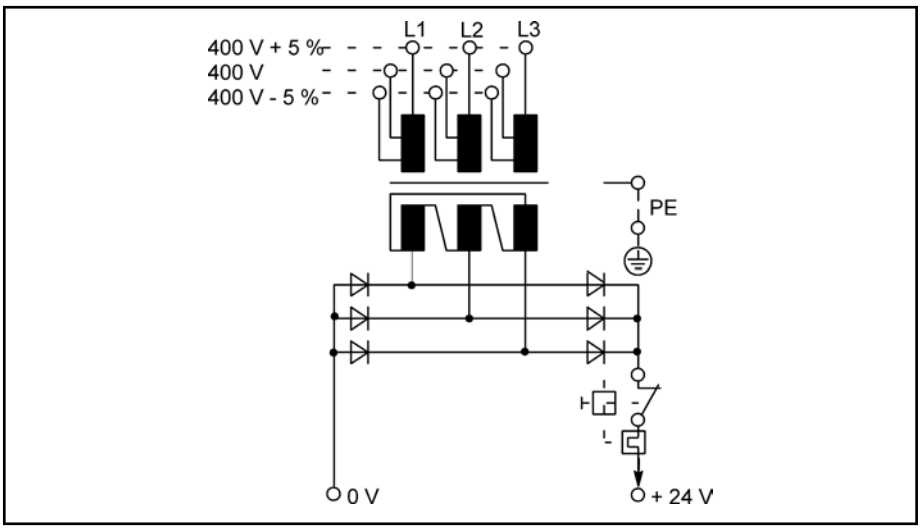


Fig.10-5: Safety transformer according to EN 60742

Interfering AC voltage components resulting from an uncontrolled three-phase bridge circuit without smoothing and with a ripple factor (see DIN 40110/10.75, section 1.2) of 5 % are permitted.

The voltage limits are:

- Upper voltage limit: 30.2 V (highest absolute value)
- Lower voltage limit: 18.5 V (lowest absolute value)

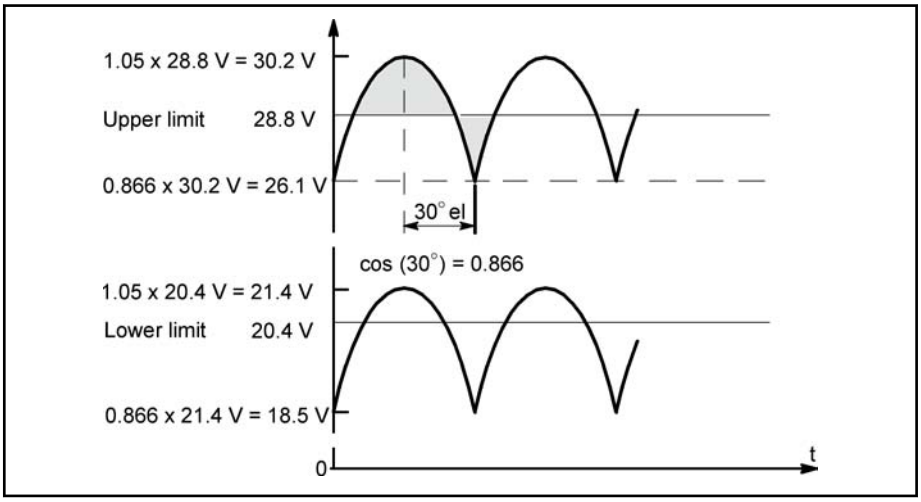
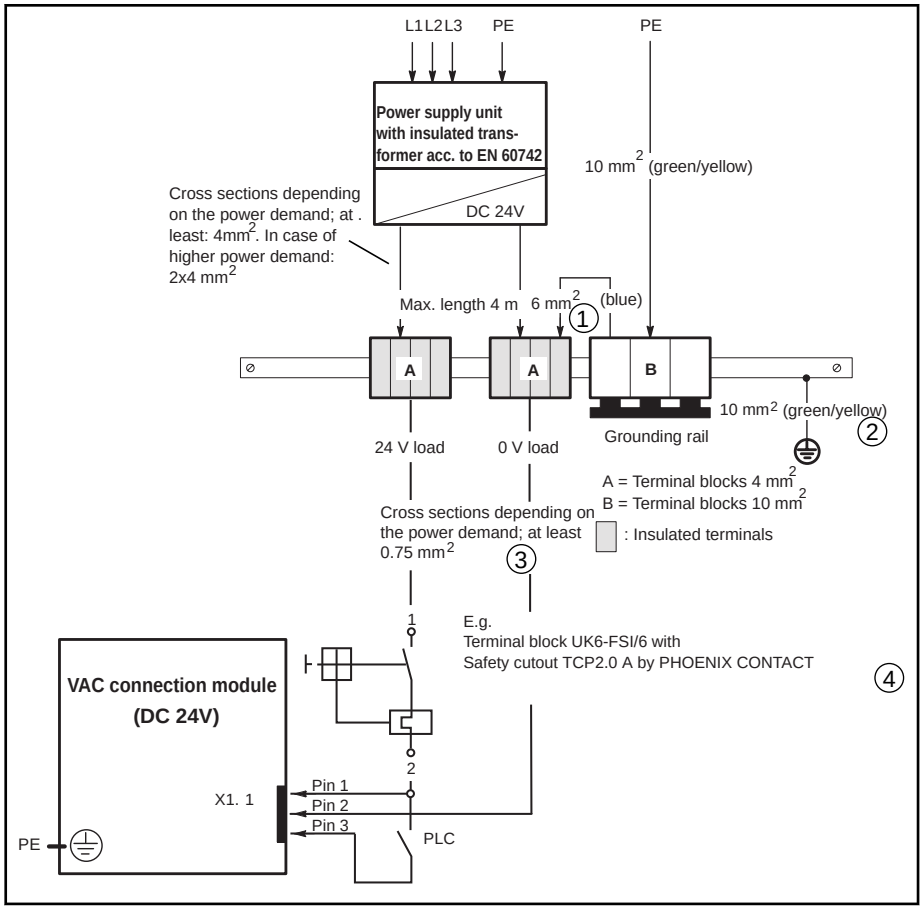


Fig.10-6: Limit values of the DC 24 V voltage



① Easily removable and visible.

② PE bars are to be installed preferably on the mounting plate. In case of isolated PE bars, both ends are to be connected to the mounting plate by means of copper strips with a maximum length of 20 cm. The cross-section of the copper strips has to be at least equal to that of the incoming mains cable.

③ 0.75 mm², up to 6 m and 1.5 mm², up to 10 m. From 10 m, a separate power supply unit is required!

④ Polarity reversal of the X1.1 connector might destroy the operator terminal, if there is no additional external protection (fire hazard). The reason for this is the grounding of the 0 V in the operator terminal and simultaneously to that the grounding of the 0 V load (PELV).

Fig. 10-7: Limit values of the DC 24 V voltage

⚠ WARNING **Danger to life due to electric shock!**

- Supply the device only with voltage sources that feature protective extra-low voltage (e.g. SELV or PELV according to EN 61131-2).
- Connect only voltages and circuits to connectors, terminals and interfaces up to 50 V nominal voltage that ensure safe isolation to dangerous voltages (e.g. by sufficient isolation and electric strength).

NOTICE **Fire hazard due to defective components!**

The DC 24 V power supply of the hand-held terminal has to be fused appropriately in the end application! The max. allowed fuse is 2 A.

Assembly, Disassembly and Electrical Installation

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

- The hand-held terminal must be projected correctly by the machine manufacturer according to the risk assessment. The following safety aspects must be taken into consideration:
  - Correct cable length for working area limitation
  - Emergency stop button and stop button are necessary and allowed
  - Adequate category and performance level for the relevant application
- The danger zone must be seen by the operator positioned in the operating zone.
- The device may be operated only in proper condition in adherence to the project planning manual.
- The operator must have the required qualifications and know the specifications given in the appropriate use according to the project planning manual.

10.2.2 Connection of Safety Engineering

Connection examples of the enabling button can be found in the project planning manual of the hand-held terminal VCH 08.1.

11 Commissioning

General Information

For commissioning the control, further parameterization or programming is necessary.

Commissioning steps

1. Before commissioning the hand-held terminal, the operator has to ensure that the plant, especially the safety devices, are in a proper condition.

   NOTICE **Stopping of the plant due to connecting a hand-held terminal with pressed stop button or EMERGENCY STOP pushbutton.**

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

2. Connect the 17-pin to the VAC connection module.
3. Set up the hand-held device and the connection module, see chapter "Software" in the project planning manual of the VCH 08.1, part number: R911320190.

☞ Find more details about commissioning in the documentation of the device or system manufacturer.

For devices with functional safety

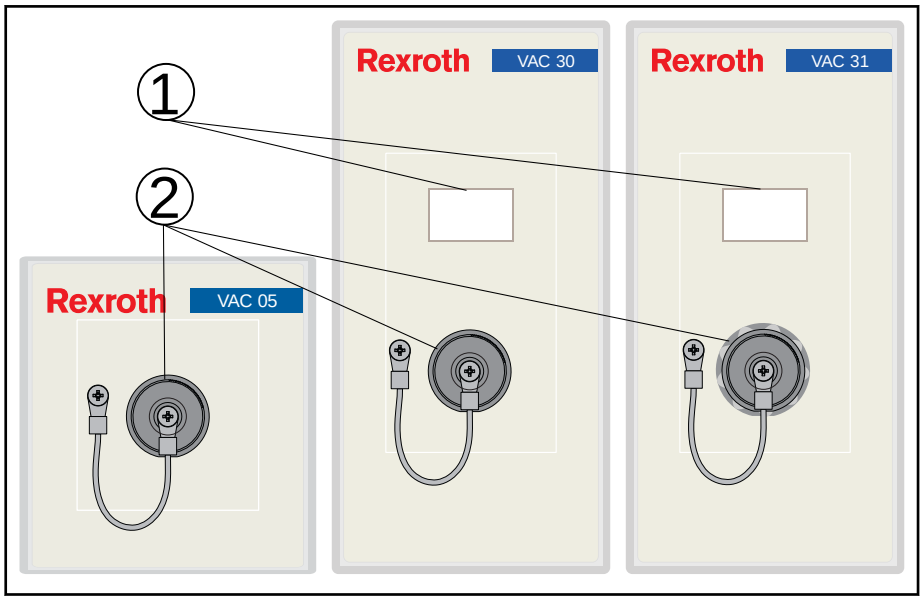
⚠ WARNING **Danger due to malfunctions of safety-relevant components such as EMERGENCY STOP pushbutton, enabling device and safety control.**

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

- Perform a risk analysis and validate the safety measures.
- Functional safety can only be guaranteed by a comprehensive implementation of the requirements (e.g. systematic measures, software requirements, etc.) according to the applied standards (DIN EN ISO 13849 and DIN EN 62061).

12 Device Description

12.1 General Information



① Window to insert labels
② 17-pin female connector (with protective cap) to connect hand-held terminals

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

12.2 Variants

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

Depending on the safety components on the hand-held terminal, the following connection modules are used:

Selecting a connection module according to safety technology applied

	VAC 05	VAC 30.2	VAC 31.1
Actuating element STOP pushbutton, EMERGENCY STOP pushbutton	For hand-held terminals with black-gray STOP pushbutton		For hand-held terminals with red-yellow button
Jumpering the safety circuit if the hand-held terminal is disconnected	-	Automatic STOP pushbutton bridging	Short-circuit connector screwed on
17-pin front connector	Fine thread	Fine thread	Bayonet
Enabling device	Lead-through isolated		

	VAC 05	VAC 30.2	VAC 31.1
Application	Compatible with hand-held terminals with STOP pushbutton: • VCH08.1EAB-064ET-A1D-064-DS-E4-PW • VCH08.1EAB-064ET-A1D-064-CS-E2-PW • VCH05... • VEH30.2...	Compatible with hand-held terminals with STOP pushbutton: • VCH08.1EAB-064ET-A1D-064-DS-E4-PW • VCH08.1EAB-064ET-A1D-064-CS-E2-PW • VCH05... • VEH30.2...	For hand-held terminals with red-yellow EMERGENCY STOP pushbuttons: • VCH08.1EAB-064ET-A1D-064-FS-B2-PW
	STOP pushbutton and enabling button are potential-free and led out directly.	The integrated "automatic STOP pushbutton bridging" allows to loop in the hand-held terminal into the safety circuits of the running machine without accidental stopping of the machine.	Hand-held terminals with red-yellow EMERGENCY STOP pushbuttons may be only looped in safety circuits if the system is in safe state or if a certified bridging mechanism is available. The hand-held terminal may be only connected if the system is in safe state. Plugging or unplugging a hand-held terminal during the operation would stop the system immediately.

Tab.12-2: Connection modules for hand-held terminals

12.3 Stop Circuit Bridging (Only for VAC 30.2, VAC 31.1)

12.3.1 Devices with Gray STOP Pushbutton

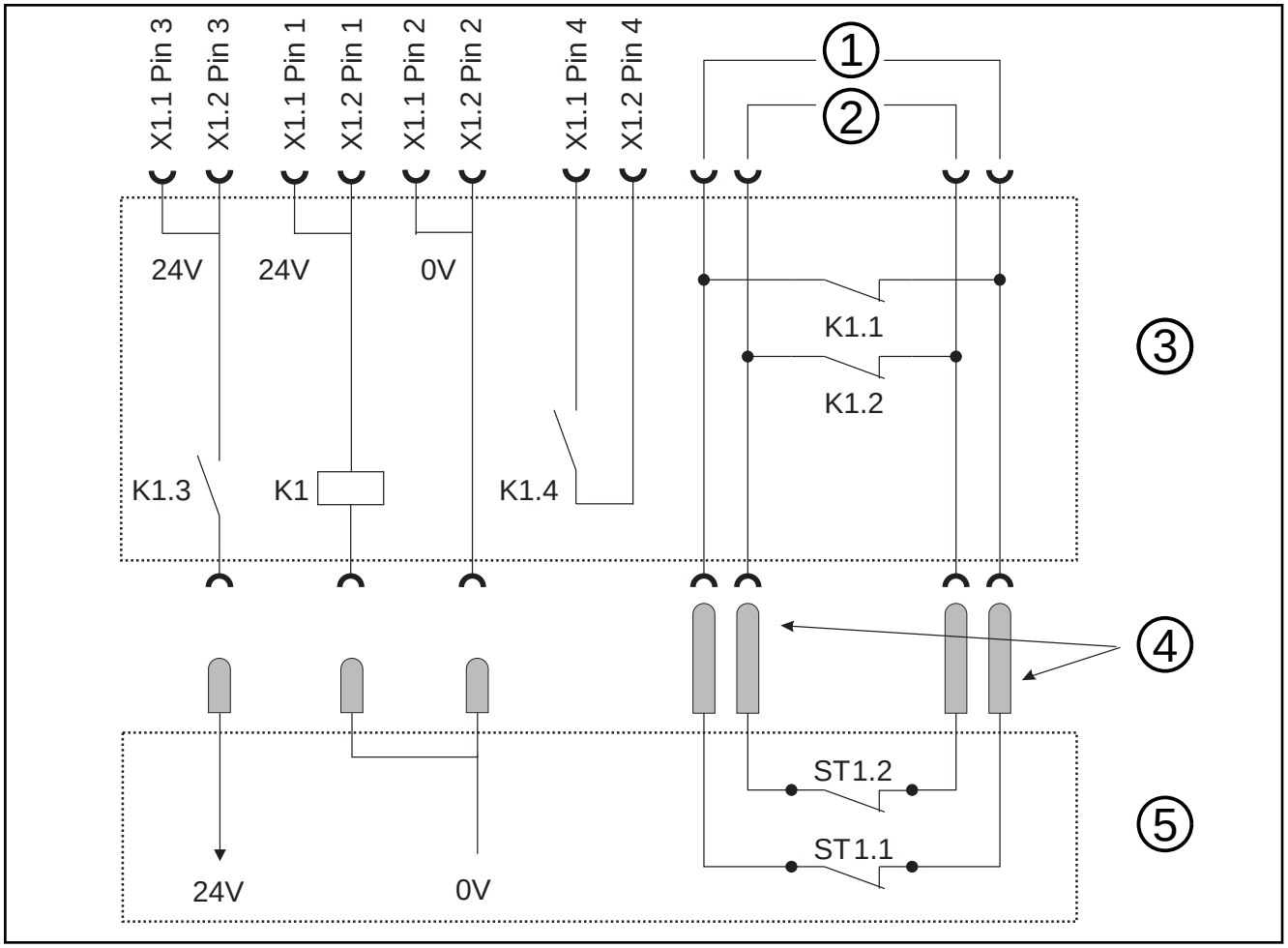
Optionally, the hand-held terminal is also available with a gray STOP pushbutton instead with a red-yellow EMERGENCY STOP pushbutton. In practical terms, the gray STOP pushbutton has the same functionality as the red-yellow EMERGENCY STOP pushbutton. By means of its coloring, the gray STOP button is to prevent the operator from using the EMERGENCY STOP pushbutton when the hand-held terminal is disconnected. The gray STOP pushbutton complies with all of the mechanical aspects of EN ISO 13850 and merely differs in color.

The VAC 30.2 connection module is equipped with an automatic STOP circuit bridging. This feature faciliates the connection or disconnection of the hand-held terminal via the VAC 30.2 connection module without causing an unintended system stop.

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

Before commissioning the hand-held terminal, make sure that the STOP pushbutton or EMERGENCY STOP PUSHBUTTON is **not** pressed.

Functionality of the STOP circuit bridging (for VAC 30.2)



① Stop circuit 1
② Stop circuit 2
③ IndraControl VAC 30.2 connection module
④ Leading contacts
⑤ Hand-held terminal

Fig. 12-3: STOP circuit bridging

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

If the 17-pin connector of the hand-held terminal is screwed on the VAC 30.2 connection module, NC contacts ST1.1 and ST1.2 are switched in the STOP circuits via leading contacts. The hand-held terminal is still not supplied with voltage and the STOP pushbutton has no effect.

If the 17-pin connector is completely screwed on the connection module, relay K1 switches and supplies the hand-held terminal with voltage via N/O contact K1.3. Simultaneously, by opening contacts K1.1 and K1.2 the STOP circuit bridging is deactivated. The STOP circuits are active, the control is ready for operation, and the STOP pushbutton is integrated in the STOP circuit.

The VAC 30.2 connection module must be permanently supplied with voltage (24 V) via pin 1 X1.1 or pin 1 X1.2. To ensure that the STOP button is integrated, a voltage monitoring has to be provided at this point. The connected hand-held terminal can be supplied via pin 3 X1.1 or pin 3 X1.2 with 24 V.

Device Description

Consequently, the hand-held terminal can be switched on and switched off as desired.

The time sequence of the connection procedure is shown in the following figure.

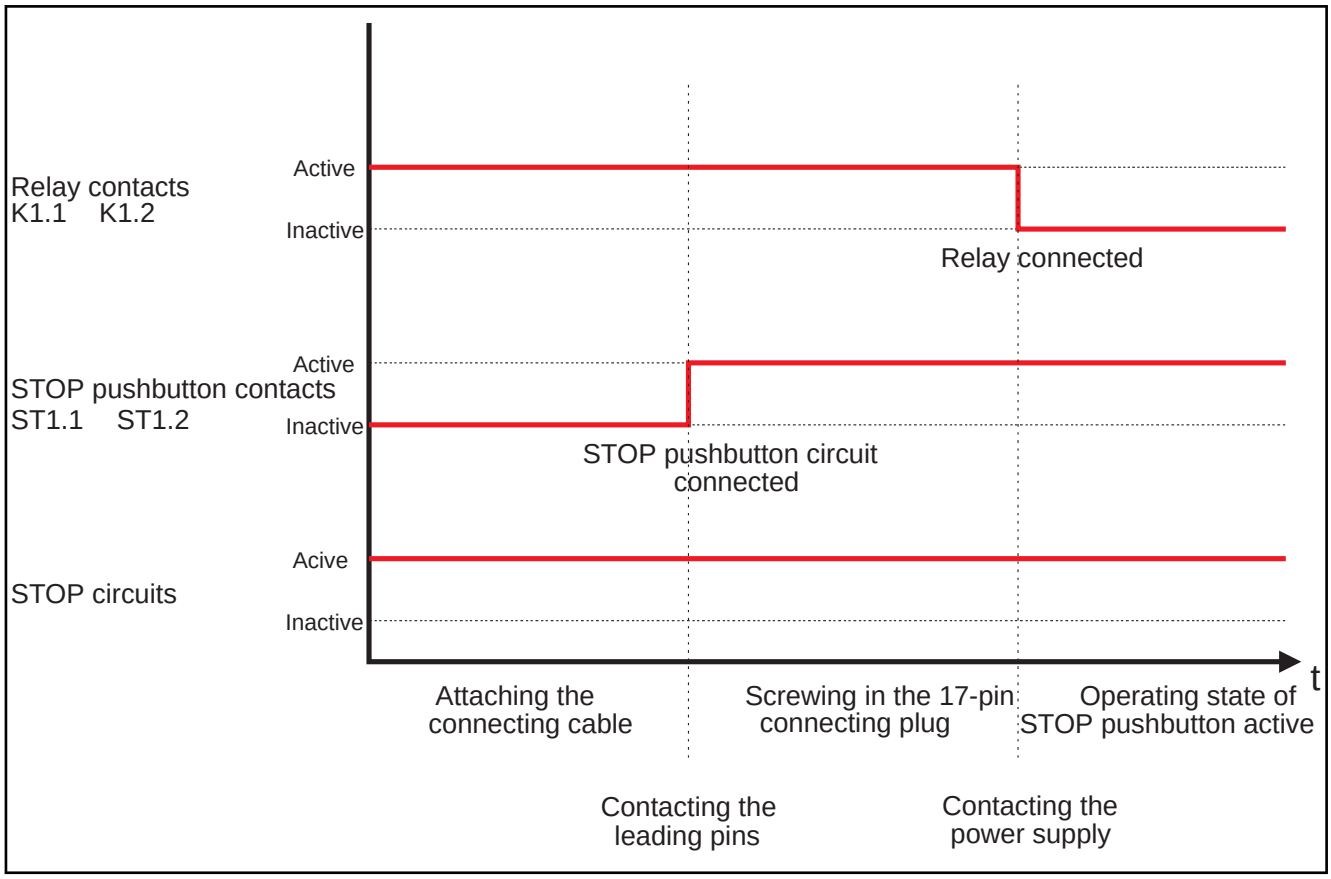


Fig. 12-4: Time sequence when connecting the VCH 08.1 STOP circuit

12.3.2 Devices with Red-Yellow EMERGENCY STOP Pushbutton

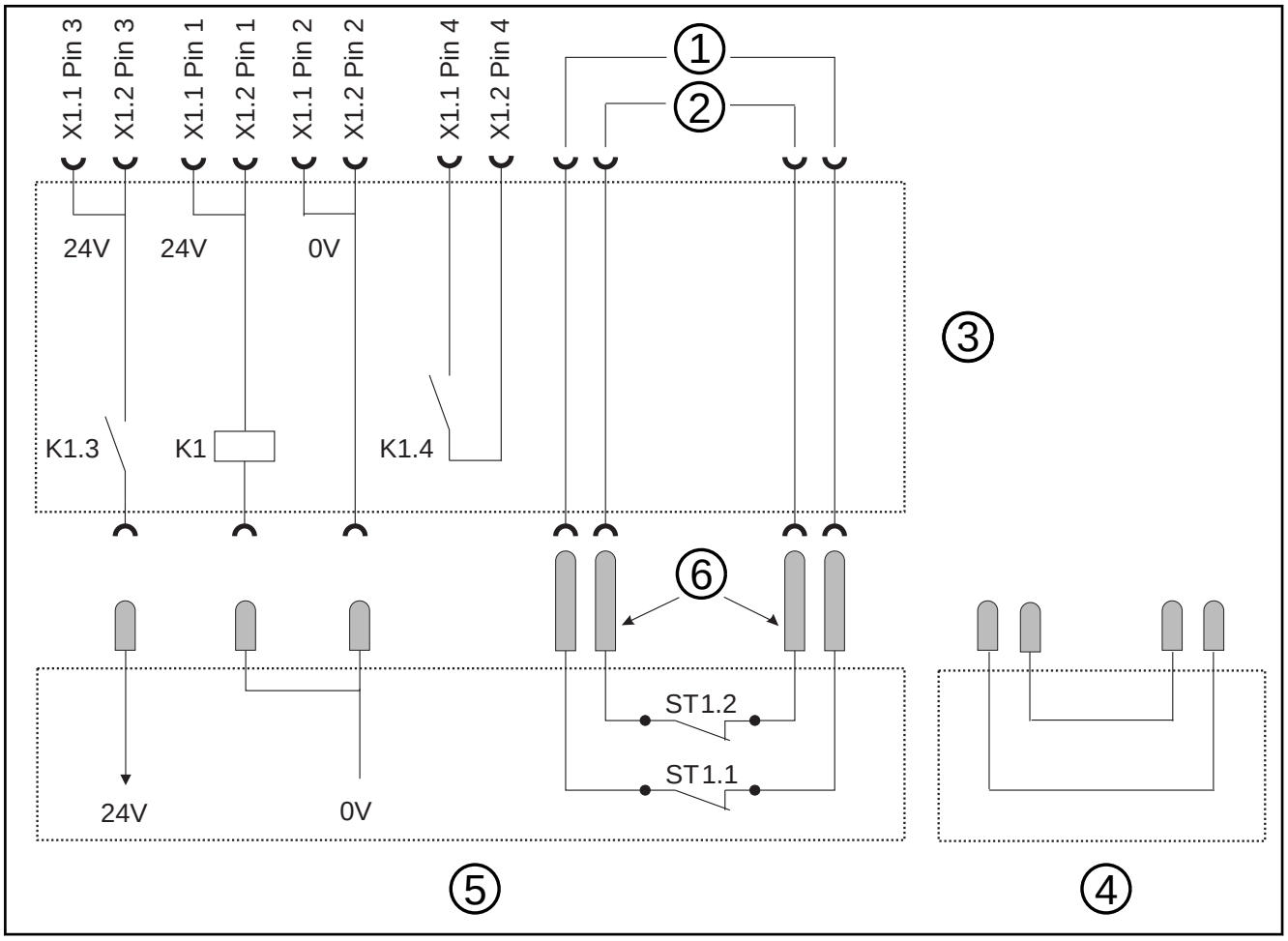
The red-yellow EMERGENCY STOP pushbutton of the hand-held terminals meet the requirement of the EN ISO 13850. The hand-held terminals have to be designed as STOP of category 0 or category 1 (see EN 60204-1 chapter 9.2.5.4.2) on the basis of the risk assessment for the machine. The connection of the positive-break contacts to an appropriate monitoring system has to comply with the category (in accordance with EN ISO 13849-1) which is defined by means of the risk assessment (in accordance with EN ISO 14121-1) of the machine.

The VAC 31.1 is designed for the connection of a hand-held terminal with red-yellow EMERGENCY STOP pushbutton. Both channels of the EMERGENCY STOP pushbutton are directly looped in the safety circuit. In order to operate the system without a connected hand-held terminal, the VAC 31.1 is equipped with a short-circuit connector. If the hand-held terminal is to be disconnected from the system, the system has to be set to a safe state. After the hand-held terminal is disconnected from the system, the short-circuit connector has to be screwed on the IndraControl VAC 31.1 connection module. Subsequently, the system can operated again. If the hand-held terminal is to be switched on again, the system has to be in a safe state, before the short-circuit connector can be removed and the hand-held terminal can be connected to the system.

NOTICE

Shutdown of the system due to connecting a hand-held terminal with pressed EMERGENCY STOP pushbutton.

Before commissioning the hand-held terminal make sure that the EMERGENCY STOP pushbutton is **not** pressed.



①	EMERGENCY STOP circuit 1
②	EMERGENCY STOP circuit 2
③	IndraControl VAC 31.1 connection module
④	Short-circuiting plug
⑤	Hand-held terminal
⑥	Leading contacts

Fig.12-5: Connection diagram, connection module VAC 31.1

⚠ WARNING **Non-functioning EMERGENCY STOP pushbuttons can have fatal consequences!**

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

Store hand-held terminals with a red-yellow EMERGENCY STOP pushbutton that are not connected so that they are not visible. In case of emergency, it is ensured that disconnected devices are not confused with functional devices.

- Unlocking an EMERGENCY STOP pushbutton must not result in uncontrolled start-up of machines or system.
- The EMERGENCY STOP pushbutton does not replace other safety devices.
- The EMERGENCY STOP pushbutton on the hand-held terminal does not replace the EMERGENCY STOP pushbutton to be mounted directly on the machine.
- Some mechanical errors in the EMERGENCY STOP pushbutton and in the STOP pushbutton can be detected only when actuated.

  Test the functionality of the EMERGENCY STOP pushbutton after the device has been exposed to mechanical shock (e.g. by dropping it on the ground).

  Additionally, the EMERGENCY STOP pushbutton has to be tested cyclically (every 6 months) by actuating the EMERGENCY STOP pushbutton.
- For further information about the EMERGENCY STOP pushbutton and the STOP pushbutton, also refer to the project planning manual of the VCH 08.1 hand-held terminal.

12.4 Display and Operating Components

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

13 Error Causes and Error Elimination

Error	Measures for error elimination
The 17-pin connector cannot be screwed on.	• Verify the neutral connector position when trying to screw on the connector. • Replace the connecting cable if the contacts are bent.
The device does not start up or the interception circuit or the release circuit are not closed.	• Screw in plugs completely. • If the contacts are bent or in case of cable break, replace the connecting cable. • If a safety component is defective, replace the device.
Communication to the hand-held terminal failed or the connection module cannot be read.	• Screw in plugs completely.

Tab.13-1: Error causes and error elimination

14 Maintenance

14.1 General Information

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

14.2 Cleaning Notes

Keep the connection module free from dew, moisture, oils and emulsions.

Clean the connection module if dirt has been collected. Use a soft, dry and lint-free rag for cleaning.

14.3 Regular Maintenance Tasks

- Before each use, check the safety device functions, such as the EMERGENCY STOP pushbutton (e.g. VCH 08.1, VEH 30.2).

15 Ordering Information

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

C Without bridging the EMERGENCY STOP pushbutton
D Automatic bridging of the EMERGENCY STOP pushbutton
N None

Tab.15-1: Type Designation 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 Helpdesk & Hotline** 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 resulting in the malfunction
- Type plate name of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your email address)

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