Electric Drives
and Controls

Hydraulics

Linear Motion and
Assembly Technologies

Pneumatics

Service

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Rexroth IndraControl VEH 30.1

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Project Planning Manual

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1   System Presentation

1.1   Brief Description

The embedded terminal IndraControl VEH 30.1 is a portable, powerful, PC-based operator and visualization terminal. The 2-circuit, 3-stage enabling device as well as the 2-circuit STOP pushbutton ensure a safe operation of the controls IndraLogic and IndraMotion. It permits the comfortable configuration of machines and installations located at widely distributed connection points.

VEH 30.1	
Display	8.4" TFT
Keys	Yes
Touch screen	Yes
Enabling switch	2-circuit, 3-stage
STOP pushbutton	2-circuit
Interface	Ethernet
Connection	IndraControl VAC 30.1 with emergency stop jumpering

Fig. 1-1:   IndraControl VEH 30.1

Note: The specifications about the IndraControl VEH 30 devices made in the documentation "Rexroth IndraControl VEP/VEH", "DOK-SUPPL*-VEP/VEH*****-PR01-EN-P" are obsolete.

Keypad

The keypad consists of a chemical resistant polyester foil with embossed keys.

Touch Screen

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

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Front View of the IndraControl VEH 30.1

IndraControl VEH 30.1 with Touch Screen and Keypad

Fig. 1-2:   Front view of the IndraControl VEH 30.1

Front View of the IndraControl VAC 30.1

The hand-held terminal IndraControl VEH 30.1 is connected with the control via the connection module IndraControl VAC 30.1. At the rear side you will find all interfaces to wire the connection module firmly with the control. At the front side a 17-pin female connector with screwed plug enables the comfortable connection of an IndraControl VEH 30.1.

Fig. 1-3:   Front view of the IndraControl VAC 30.1

1.2   Operating System

For license reasons IndraControl VEH 30.1-type devices are only delivered with already installed operating system. For further information about the operating system please refer to chapter "Software".

1.3   Commissioning

Please mount the IndraControl VAC 30.1 connection module according to the specifications in chapter "Dimensions". Then, connect the connection module to the voltage supply, the STOP circuit, the enabling circuit and the network.

Before commissioning the IndraControl VEH 30.1 the operator has to assure that the installation, especially the safety devices, are in a proper status.

Note: Before commissioning the IndraControl VEH 30.1 observe that the STOP pushbutton is NOT pressed. The connection of an IndraControl VEH 30.1 with pressed STOP pushbutton would shut down the installation.

To connect the IndraControl VEH 30.1 put – as shown in Fig. 1-4 – the angled connector without effort with an angle of 45° to the horizontal on the flange of the IndraControl VAC 30.1 connection module. Only if the connector snaps in properly, the correct position is reached. Now turn the knurled nut with slight pressure on the flange.
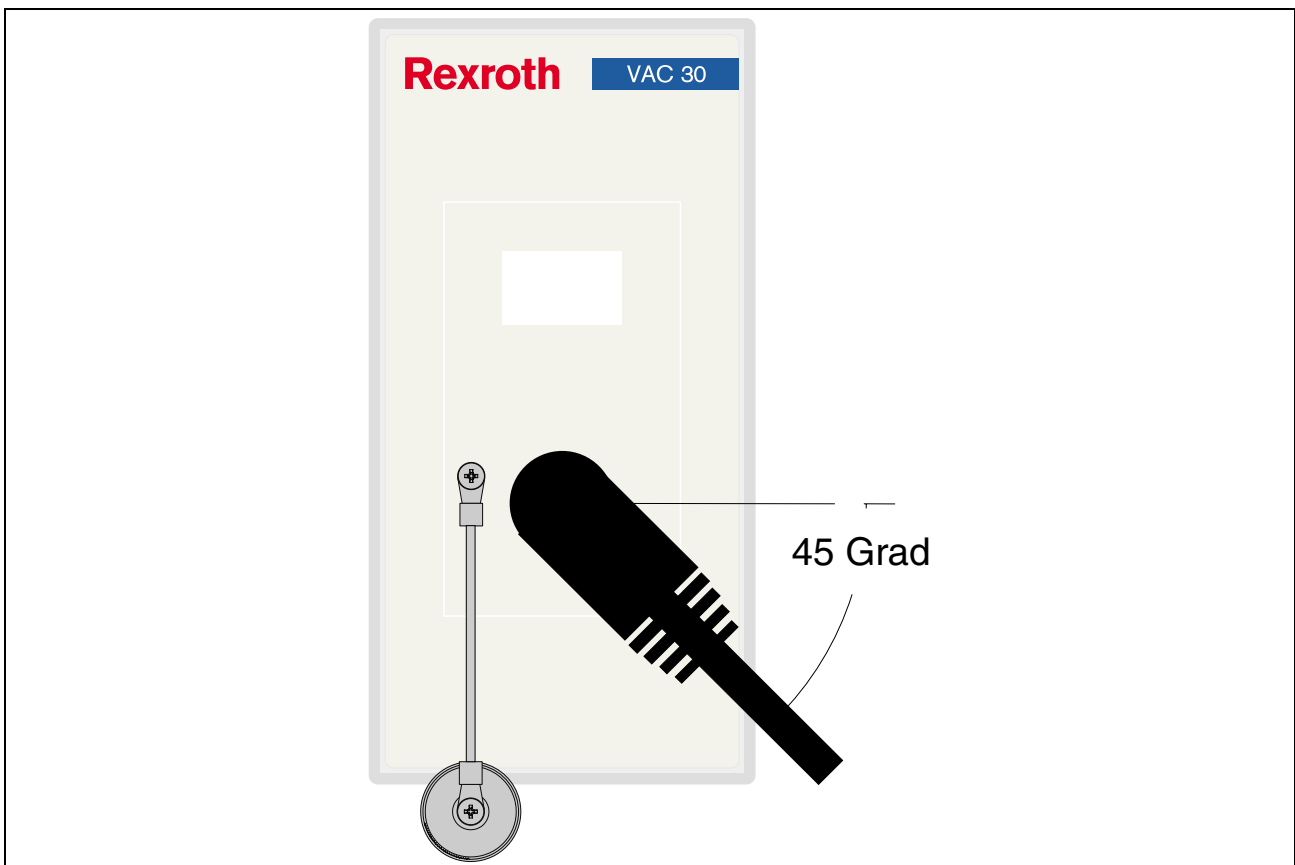
Fig. 1-4:   Plug orientation at the IndraControl VAC 30.1

Note:	While the connector is screwed on, a relay activates the STOP pushbutton. Thus, the IndraControl VEH 30.1 is supplied with voltage. Screw the knurled nut as far as the rubber seal is completely covered and the end position is reached to ensure the optimal connection of the contacts and to achieve the specified degree of protection.

During commissioning the IndraControl VEH 30.1 and regularly during the routine operation verify all three positions of the enabling device from both sides for correct function.

The device might only be commissioned and connected by qualified staff.

The device or installation manufacturer defines further details about commissioning in his documentation.

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.

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Areas of Use and Application

The embedded terminal IndraControl VEH 30.1 is a PC-based operator and visualization terminal, that can – depending on the application or configuration – also perform control functions.

Note:	The embedded terminal IndraControl VEH 30.1 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.

The embedded terminal IndraControl VEH 30.1 has been developed for use in control tasks.

Typical areas of application of the IndraControl VEH 30.1 are:

- Handling and assembly systems
- Packaging and foodstuff machine
- Printing and paper processing machines
- Machine tools.

IndraControl VEH 30.1-type devices may only be operated under the assembly, installation and ambient conditions as described here (temperature, system of protection, humidity, EMC requirements, etc.) and in the position specified.

2.2 Inappropriate Use

Using the embedded terminals IndraControl VEH 30.1 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 embedded terminal IndraControl VEH 30.1 may not be used, if

- it is subject to operating conditions that do not meet the above specified ambient conditions. This includes, for example, operation under water, in the case of extreme temperature fluctuations or extremely high maximum temperatures, or if
- Bosch Rexroth has not specifically released them for that intended purpose. Please note the specifications outlined in the general Safety Guidelines!

3   Safety Instructions for Electric Drives and Controls

3.1   Introduction

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

Do not attempt to install or start up this equipment without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation of the equipment prior to working with the equipment at any time. If you do not have the user documentation for your equipment, contact your local Bosch Rexroth representative to send this documentation immediately to the person or persons responsible for the safe operation of this equipment.

If the equipment is resold, rented or transferred or passed on to others, then these safety instructions must be delivered with the equipment.

⚠ **WARNING**	**Improper use of this equipment, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, may result in material damage, bodily harm, electric shock or even death!**

3.2   Explanations

The safety instructions describe the following degrees of hazard seriousness in compliance with ANSI Z535. The degree of hazard seriousness informs about the consequences resulting from non-compliance with the safety instructions.

Warning symbol with signal word	Degree of hazard seriousness according to ANSI
⚠ **DANGER**	Death or severe bodily harm will occur.
⚠ **WARNING**	Death or severe bodily harm may occur.
⚠ **CAUTION**	Bodily harm or material damage may occur.

Fig. 3-1:   Hazard classification (according to ANSI Z535)

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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.

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- 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.

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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.

⚠ **DANGER**

Dangerous movements! Danger to life, risk of injury, severe bodily harm or material damage!

⇒ Ensure personal safety by means of qualified and tested higher-level monitoring devices or measures integrated in the installation. 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.

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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.

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Notes

4   Technical Data

4.1   IndraControl VEH 30.1

Processor	NS-Geode 300 MHz and integrated graphic controller with 4 MB shared memory
Working memory	128 MB
Compact flash card	128 MB
Interfaces	1 x Ethernet connection (RJ 45, 10/100 Base-T)
Further connections	• STOP pushbutton • Enabling device
Housing material	Polyamid PA6 fiber
Degree of protection	IP 65, type 1 according to NEMA (UL)
Voltage supply	24 VDC
Input voltage range	24 VDC (+19 V to +30 V)
Noise and surge immunity	Umax = 35 V (for t < 100 ms)
Max. input current	0.7 A for nominal voltage 24 V
Max. inrush current	3 A for nominal voltage 24 V
Prescribed external protection	2-A-fusible cut-out, time-lag Connected before the IndraControl VAC 30.1 connection module
Max. power consumption for maximum configuration	14 W

Fig. 4-1:   Technical data of the IndraControl VEH 30.1

4.2   Operating Surface

Display	8.4" TFT, 800 x 600 pixels 262,144 colors
Operation	Touch and key operation with 34 keys
Surface – Front panel	Color: RAL 7035 light gray
Degree of protection	Front panel IP 65 according to EN 60529, IEC 60529

Fig. 4-2:   Technical data, front of the IndraControl VEH 30.1

4.3   STOP Pushbutton

Design	STOP pushbutton gray, 2-channel, electrically isolated
Nominal voltage	24-VDC-/30-VAC safety extra-low voltage
Nominal current	2 A= / 2,3 A~ current carrying capacity of the output contacts is limited by the connected cable
Prescribed external protection	2-A-fusible cut-out, time-lag

Fig. 4-3:   Technical data of the STOP pushbutton

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4.4   Enabling Device

Design	3-stage enabling switch*, 2-channel, electrically isolated
Nominal voltage	24-VDC-/30-VAC safety extra-low voltage
Nominal current*	2 A= / 2,3 A~ current carrying capacity of the output contacts is limited by the connected cable
Prescribed external protection	2-A-fusible cut-out, time-lag
Operating cycles	>200,000 for the enabling range, >100,000 for the panic position
Control category	Usable in safety-related controls up to Kat.4, DIN EN 954-1 (if required with additional monitoring modules)

Fig. 4-4:   Technical data of the enabling device

* Protect lines against short-circuits and/or cross-circuits caused by the installation!

4.5   Connection Module IndraControl VAC 30.1

Connections	• 1 x Ethernet connection (RJ 45, 10/100 Base-T) • STOP pushbutton • Enabling device • Voltage supply 24 V (see IndraControl VEH 30.1)
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 side IP 30, type 1 according to NEMA (UL)

Fig. 4-5:   Technical data of the IndraControl VAC 30.1

4.6   Ambient Conditions

	In operation	**Storage**	**Transport**
Max. surrounding air temperature	+5 °C to 40 °C according to EN 50178	-20 °C to +60 °C	-20 °C to +60 °C
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	Min. rel. humidity: 5 % Max. rel. humidity: 85 % Min. abs. humidity: 1 g/qm Max. abs. humidity: 25 g/qm Non-condensing corresponding to climatic class 3K3 according to EN 60721-3-3	Min. rel. humidity: 5 % Max. rel. humidity: 75 % Min. abs. humidity: 1 g/qm max. abs. humidity: 25 g/qm Non-condensing corresponding to climatic class 2K2 according to EN 60721-3-3	Min. rel. humidity: 5 % Max. rel. humidity: 85 % Min. abs. humidity: 1 g/qm Max. abs. humidity: 25 g/qm Non-condensing corresponding to climatic class 1K2 according to EN 60721-3-3
Air pressure	Up to 2,000 m above sea level according to EN 61131-2	Up to 3,000 m above sea level according to EN 61131-2	Up to 3,000 m above sea level according to EN 61131-2
Free fall	Free fall from 1 m height in the active status, hazardous impact	Free fall from 1 m height in the active status, hazardous impact	Free fall from 1 m height in the active status, hazardous impact
Mechanical strength	Max. vibration: Frequency range: 10...150 Hz Excursion: 0.075 mm at 10...57 Hz Acceleration: 1 g at 57...150 Hz According to EN 60068-2-6	Max. shock: 15 g 11 ms according to EN 60068-2-27 No disturbance of the function. 3 shocks in each of the three axes arranged vertically to each other, in both directions (a total of 18 shocks)	Max. shock: 15 g 11 ms according to EN 60068-2-27 No disturbance of the function. 3 shocks in each of the three axes arranged vertically to each other, in both directions (a total of 18 shocks)

Fig. 4-6:   Ambient conditions of the IndraControl VEH 30.1

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4.7   Identification

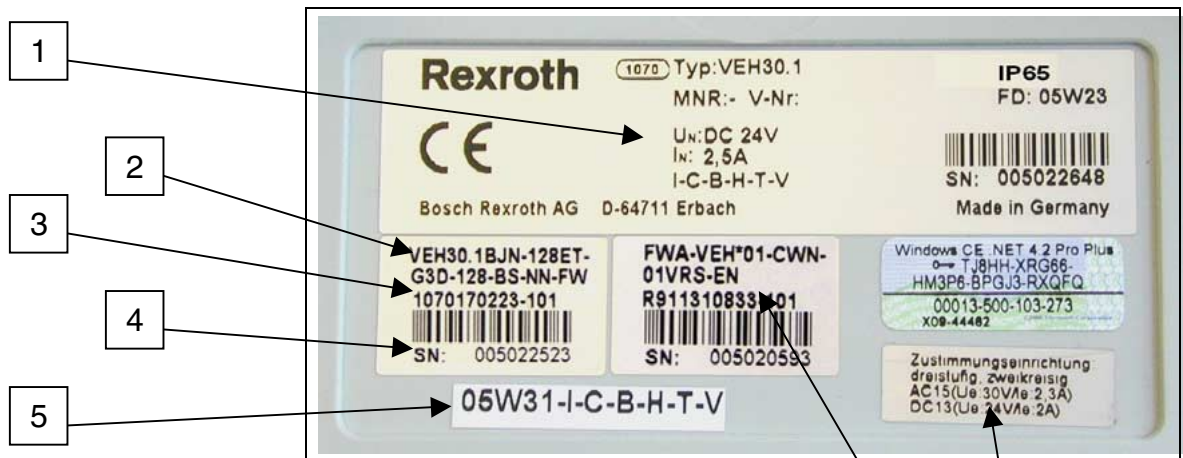Identify the device with the name plate on the rear side of the device.

Fig. 4-7:   Name plate of the IndraControl VEH 30.1

1. Company logo / Technical data
2. Ordering designation / short type
3. Part number
4. Serial number
5. Date of manufacturing
6. Ordering designation of the firmware
7. Data of the enabling device

4.8   Weight

IndraControl VEH 30.1	Approx. 2.6 kg

Fig. 4-8:   Weight of the IndraControl VEH 30.1

4.9   Used Standards

The system components of the embedded terminal IndraControl VEH 30.1 correspond to the following standards:

Standard	Meaning
EN 50178	Equipment for use in power installations
EN 60 204-1	Electrical equipment of machines
EN 50 081-2	Basic technical standard, emitted interference (industrial environment)
EN 50 082-2	Basic technical standard, noise immunity (industrial environment)
EN 60 742	Transformer for 24 V power supply unit, protective separation
EN 60 950	Overvoltage category II
EN 61 131	Requirements concerning the 24 V outputs
EN 61 131-2	Requirements concerning the 24 power supply
EN 418	Machine safety, EMERGENCY STOP devices
EN 60 529	Degrees of protection (incl. housings and installation compartments)
EN 60 068-2-6	Vibration test
EN 60 068-2-32	Free fall test
EN 60 068-2-27	Shock test

Fig. 4-9:   Used standards

UL/CSA Certification   The IndraControl VEH 30.1 device is certified according to

- **UL508** (Industrial Control Equipment) and

- **C22.2 No. 142-M1987** (CSA)

However, it is possible that there are combinations or extension stages with restricted or missing certification. Thus, verify the registration according to the UL marking on the device.

Note: To guarantee an UL/CSA-compliant operation, you have to fulfill the following conditions:

- Use 60/75 °C copper wire only.

- All connections are to be protected by a 2 A time-lag fusible cut-out.

Note: The UL/CSA marking is only valid for the device in its delivery status. After having modified the device the UL compliancy has to be verified.

4.10 Wear Parts

Wear Parts without Warranty The backlight has a limited lifetime. You speak about the end of the lifetime of a display, if its brightness decreased to half of its original brightness.

Manufacturer's specifications for the service life of the displays:

- 8,4": Typ. 20,000 hours

4.11 Compatibility Test

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

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

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

5   Dimensions

5.1   Housing Dimensions of the IndraControl VEH 30.1

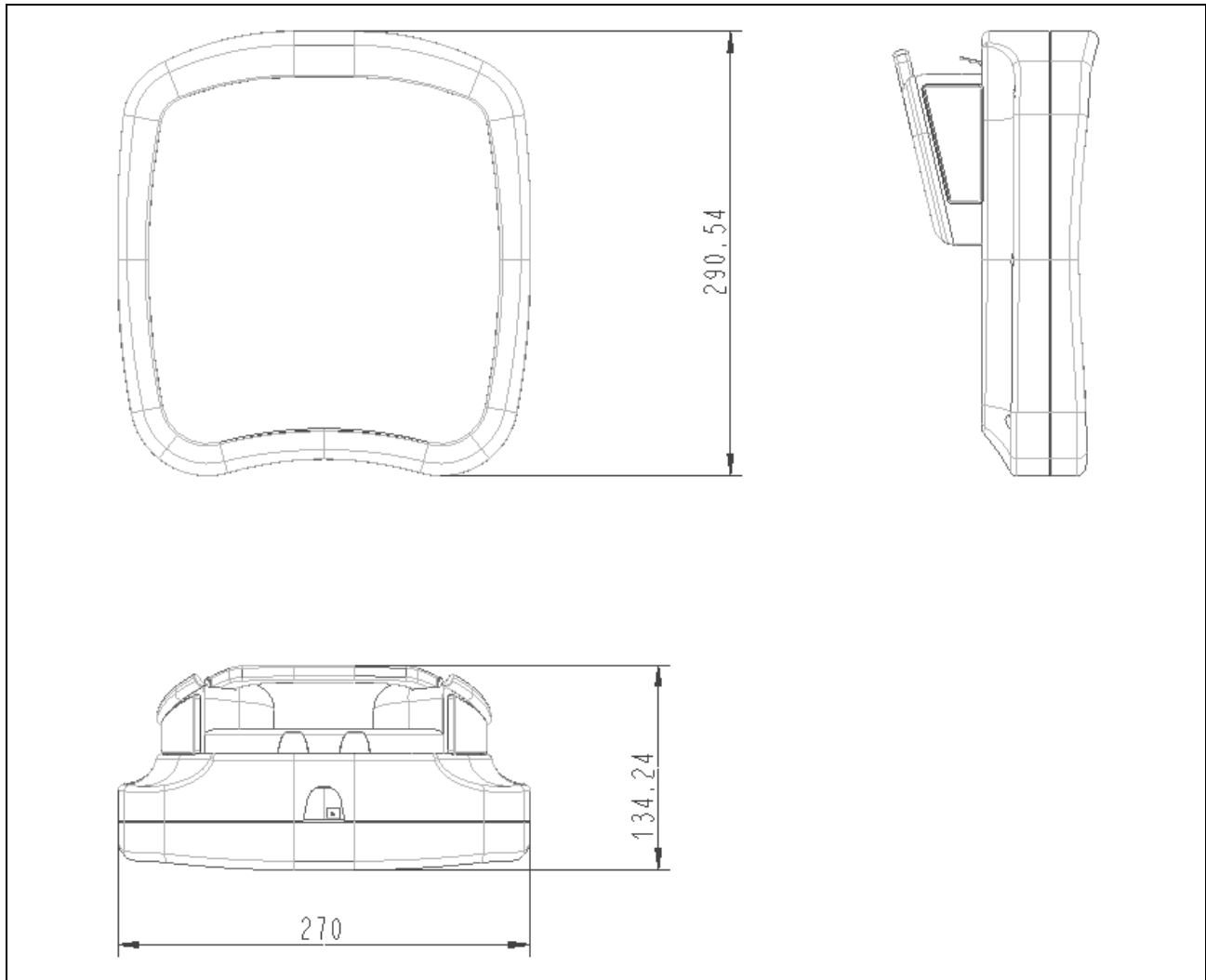The width of the IndraControl VEH 30.1 is 270 mm and the height is 290.54 mm.

Fig. 5-1:   Front view of the IndraControl VEH 30.1

5.2 Housing and Mounting Dimensions of the IndraControl VAC 30.1
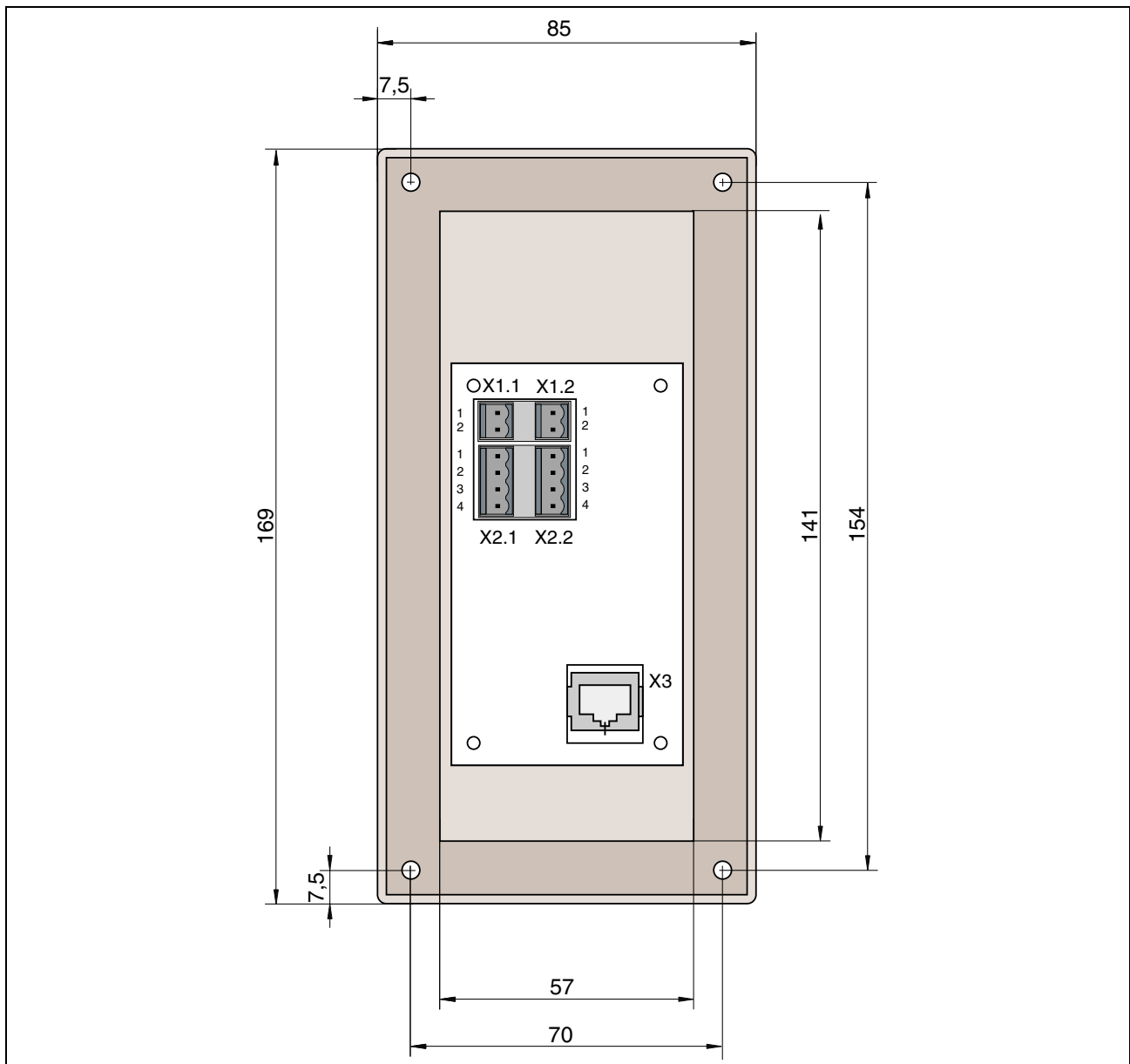

Fig. 5-2:   Housing and mounting dimensions of the IndraControl VAC 30.1

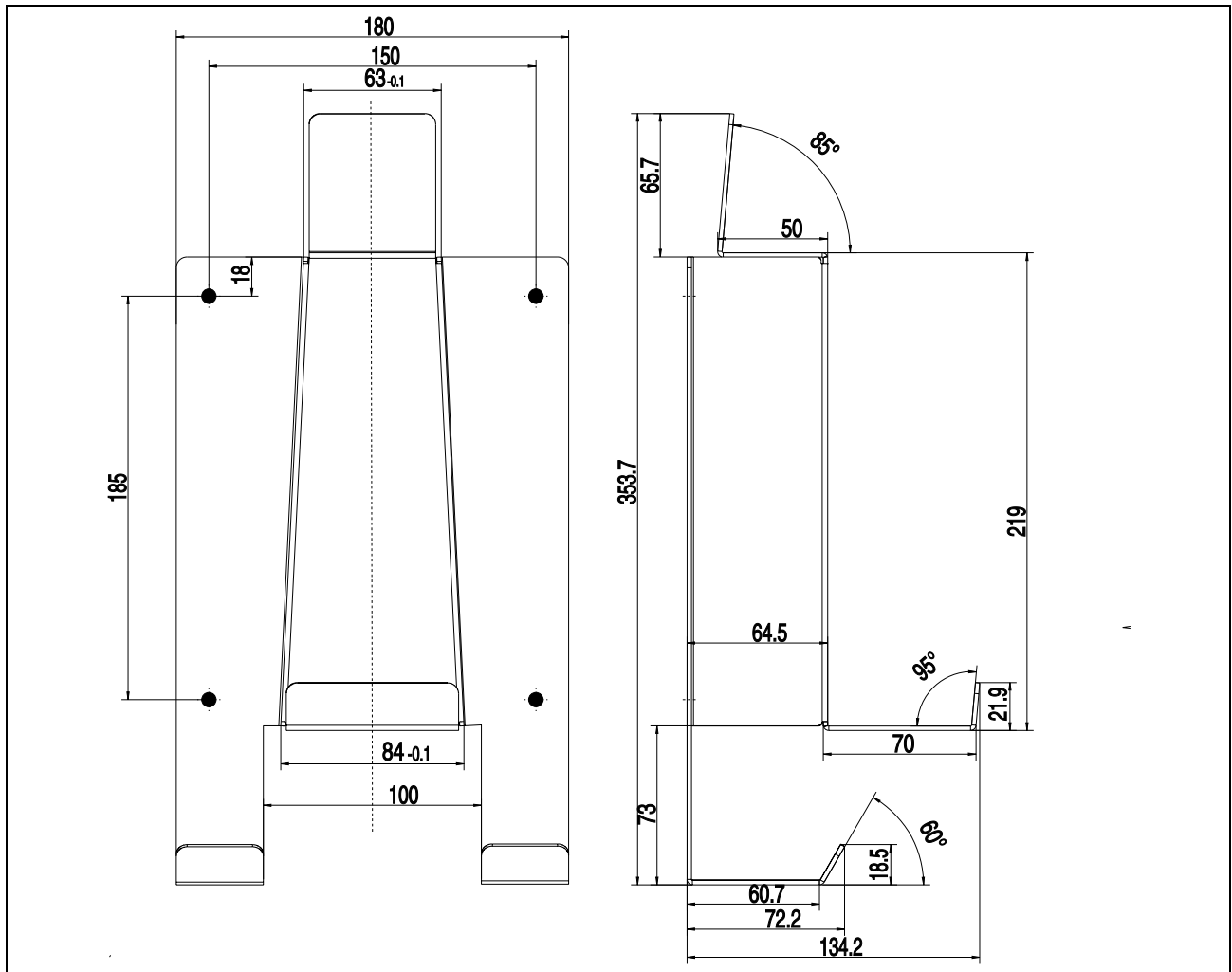## 5.3   Dimensions of the Wall Holder for the IndraControl VEH 30.1

Fig. 5-3:   Dimensions of the wall holder for the IndraControl VEH 30.1

6   Display and Operating Components

6.1   Operating Elements

Information on almost all operating elements are transmitted to the control in form of a real time protocol and are available via a function block. For further information please refer to chapter "Evaluation of Operating Element Commands" on page 9-12.

Housing of the IndraControl VEH 30.1

General Information

An enabling switch with two actuators, that can be used appropriately wired and evaluated in safety circuits up to category 4 (EN 954-1), is integrated in the IndraControl VEH 30.1.

Fig. 6-1:   Front view of the IndraControl VEH 30.1

Because of the concave shape of the housing (at the bottom) the operator can easily support the device against his body and, thus, is able to stand long fatigue-free working intervals. At the right side you can recognize one of the actuators of the enabling switch integrated in the bottom part of the housing.

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Fig. 6-2:   Rear view of the IndraControl VEH 30.1

The enabling switch as well as the two actuators are integrated in the bottom part of the housing. The housing geometry supports the carrying of the housing. Because of the housing dimensions two actuators have been integrated in the housing bottom part; only one of these actuators has to be activated to trigger the enabling function.

The molded enabling actuators have a guidance for the connection cable. That means that it is possible to change the outlet direction of the connection cable.

The clamping in the guidance is provided as kink protection and strain relief of the inlet . For this, clamp the line in an arched manner (see Fig. 6-3:   Handling of the IndraControl VEH 30.1), whereby the minimum bending radius must not be lower than 130 mm.

The upper area of the housing bottom part has a receptacle for a touch pen.

Ergonomics

During developing the housing great importance was attached to the ergonomics.

The enabling switch is intuitively operable. The status "enabled" can be fatigue-freely operated.

In case of a malfunction or if the operator is affrighted there are two possibilities of reaction: If he pushes the enabling switch completely into the panic position because he becomes cramped or if he loosens his grip (and/or even drops the IndraControl VEH 30.1), the effect is in both cases the interruption of the enabling circuits.

As of its symmetric design the IndraControl VEH 30.1 can be used in equal measure by right and left handers. If the working intervals are longer you can change the holding arm*.

* Due to the safety requirements the enabling has to be interrupted while changing the hand.

Fig. 6-3:   Handling of the IndraControl VEH 30.1

The ergonomic housing shape and the molded handles support several types of using:

Hand-held: As described above, the IndraControl VEH 30.1 lying on the forearm can be supported against the body. Thereby, the enabling can occur by the fingers of the holding hand and the operation with the free hand.

Putting It down on a Horizontal Surface: If the enabling device must not be activated, the IndraControl VEH 30.1 can also be put down on horizontal surfaces. The combined holding and depositing handle enables to put down the device easily or to work for a longer time in a sitting position. The pleasant incline of the front panel facilitates the reading of the LC display.

Hanging in holder: The IndraControl VEH 30.1 is also suitable for mounting it space-savingly at a vertical surface. For this, a wall holder is provided as accessories.

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Keypad

Position of the Keys of the IndraControl VEH 30.1

Fig. 6-4:   Position of the keys of the IndraControl VEH 30.1

Operation keys L1-L8 and R1-R8

The assignment of the operation keys is fixed. The evaluation is specified by the respective application software.

Jog keys 1+ to 6+ and 1- to 6-

Keystrokes of this keys are directly transmitted to the control via Ethernet by means of a real time protocol.

Navigation keys

The navigation keys include the cursor keys as well as the ESC and the OK key.

Touch Screen

All variants are provided with a touch screen, that allows the operation of the application software via the touch-sensitive surface of the display.

A short touch of the touch screen is taken as "left mouse click". To carry out a "right mouse click", the touch screen has to be touched at the corresponding position for approx. 2 seconds.

Safety Operating Components

Safety Concept

The IndraControl VEH 30.1 is provided with a 2-circuit, 3-stage enabling switch operated by two actuators integrated in the housing. It consists of single switching elements and can be used in safety circuits up to category 4 (EN 954-1), if the evaluation is appropriate. For this, the two circuits have been electrically isolated and designed in a redundant manner.

In operating modes with enabling switch one of the actuators of the IndraControl VEH 30.1 has to be consciously held in the central switch position. Releasing or firmly pushing through the actuator causes the stop of dangerous movements. When moving back from the pushed through position to the inactivated position, there is no enabling signal.

As second safety operating component the IndraControl VEH 30.1 has an also 2-circuit STOP pushbutton. The switching contacts are directly guided outwards via the connecting cables and can be contacted via the IndraControl VAC 30.1. It is possible to interrupt the operation of the installation in all operating modes with the STOP pushbutton (STOP category 0).

Enabling Function

The enabling switch is activated by one of the two actuators. These actuators are attached at the left and right side of the device and are mechanically coupled in a manner that it is not possible to activate them simultaneously.

The enabling switch of the IndraControl VEH 30.1 is designed according to safety technology. It has to be connected to the control in a manner that the requirements for electrical circuits for safety purposes according to EN 775, EN 60204, EN 954-1, EN 1088 and VDI 2854 are fulfilled. A succeeding control has to fulfil the monitoring of the switch according to the standards and regulations valid for the respective machine and/or installation.

Because of its proper wiring with the safety contactors of the drive control, dangerous movements can only be executed in certain operating modes (e. g. installation or test mode), if the enabling switch is hold in the central (= enabled) position. The enabling circuit on its one must not trigger dangerous movements. For this, the following commands are required:

If possible in a reasonable manner a time- or clock-dependent limitation of the enabling function should be provided.

Inactivated or in completely pushed through position (panic position) these movements are immediately stopped. Switching back from the panic position means that the device switches electrically directly to the inactivated position. A new movement is only started after entering the corresponding commands with new enabling. The position of the enabling devices is transmitted to the application software by an additional signal request.

Further specifications about the inputs and commands are described in the device documentation.

STOP Pushbutton

The IndraControl VAC 30.1 is equipped with an automatic STOP circuit jumpering. Thus, the operator can connect or disconnect the hand-held terminal IndraControl VEH 30.1 via the connection module IndraControl VAC 30.1 without causing an unintended stopping of the installation.

Note: Before commissioning the IndraControl VEH 30.1 observe that the STOP pushbutton is NOT pressed. The connection of an IndraControl VEH 30.1 with pressed STOP pushbutton would shut down the installation.

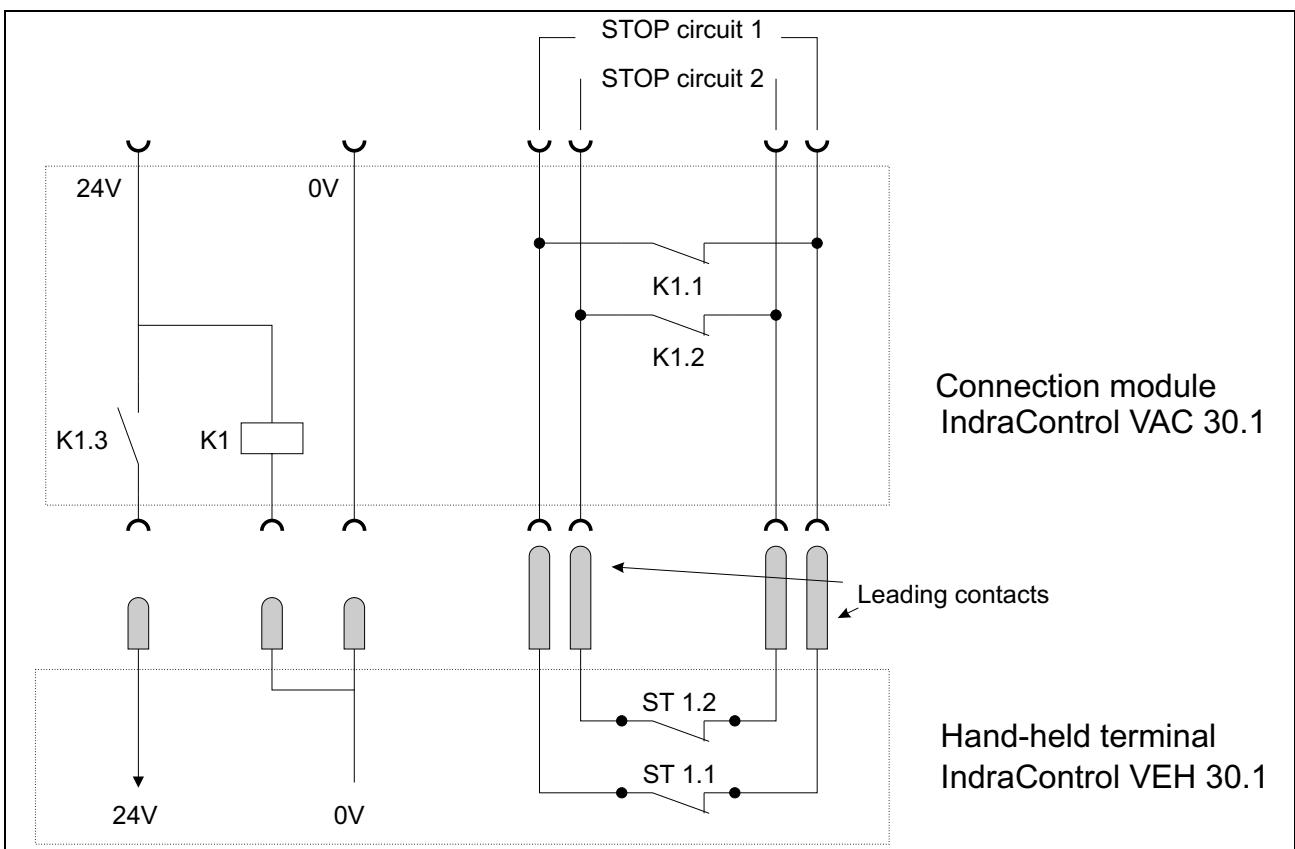## Functionality of the STOP Circuit Jumpering

Fig. 6-5:   STOP circuit jumpering

If the hand-held terminal IndraControl VEH 30.1 is not plugged in, the contacts K1.1 and K1.2 of relay K1 in the IndraControl VAC 30.1 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 you start to screw the 17-pin connector of the IndraControl VEH 30.1 on the IndraControl VAC 30.1 connection module, firstly the NC contacts ST1.1 and ST1.2 are switched in the STOP circuits via leading contacts. The IndraControl VEH 30.1 is still without voltage supply 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 IndraControl VEH 30.1 with voltage via NO contact K1.3. Simultaneously, by opening contacts K1.1 and K1.2 the STOP circuit jumpering is deactivated. The STOP circuits are active; the control is ready for operation; the IndraControl VEH 30.1 is in operation and the STOP pushbutton is integrated in the STOP circuit.

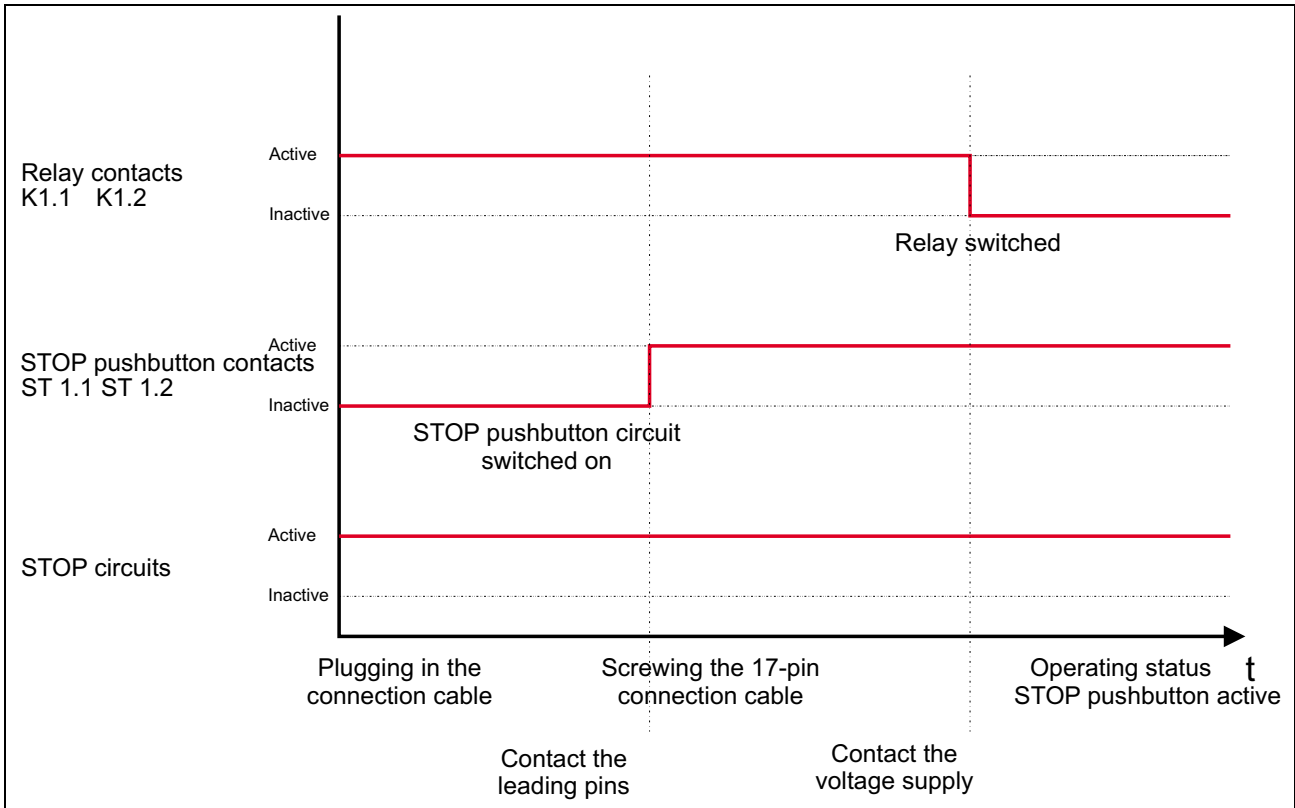The time course of the connection procedure is illustrated in Fig. 6-6.

Fig. 6-6:   Time course when connecting the IndraControl VEH 30.1 STOP circuit

Optional Operating Elements

Additional Components

The following additional elements to operate controls are available:

Left side	Right side
Override	Handwheel

Fig. 6-7:	Additional elements of the IndraControl VEH 30.1

Override

The IndraControl VEH 30.1 can optionally be ordered with an override switch. Divided up into 16 stages, the signals are transmitted as 4 bit gray code to the control via a real time protocol.

Handwheel

The IndraControl VEH 30.1 can optionally be ordered with handwheel. Position and direction of rotation are broken down into 16 bit data and are transmitted to the control via a real time protocol. The application applies the indication of the set value. The set values are reset via an operating element of the pertinent application.

6.2   Backlight Dimming

The background lighting of the display has a limited lifetime (see chapter "Wear Parts" on page 4-6).

To extend the service life of the LCD backlight, the display features a backlight dimming. This function darkens the brightness, if the IndraControl VEH 30.1 is not operated for a longer time period.

The length of the time interval can be set under Windows CE in the "Display Properties". You can call up the "Display Properties" either by right mouse click on the desktop or via **Start – Settings – Control Panel – Display**.

The default value is 5 minutes. If the application allows to dim the display early, you should reduce the set value to increase the service life of the backlight. Avoid values over 5 minutes. Otherwise, the specified service life of the display cannot be guaranteed.
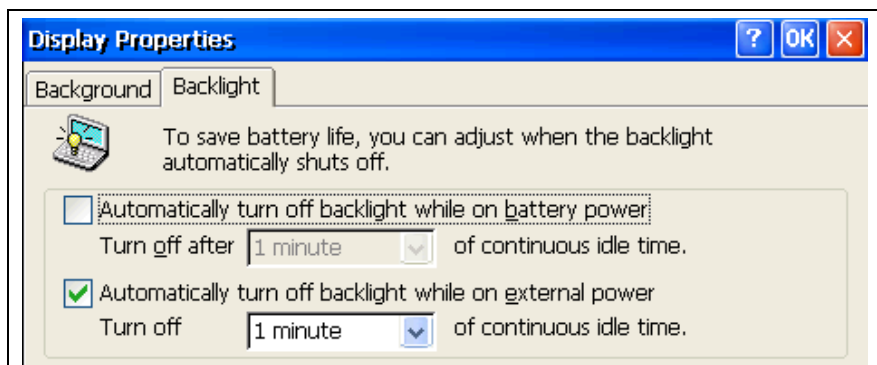

Fig. 6-8:	Display properties – Backlight dimming

7   Interfaces of the IndraControl VEH 30.1

7.1   Connection of the IndraControl VEH 30.1 via the IndraControl VAC 30.1

The IndraControl VEH 30.1 is connected via the connection module IndraControl VAC 30.1.

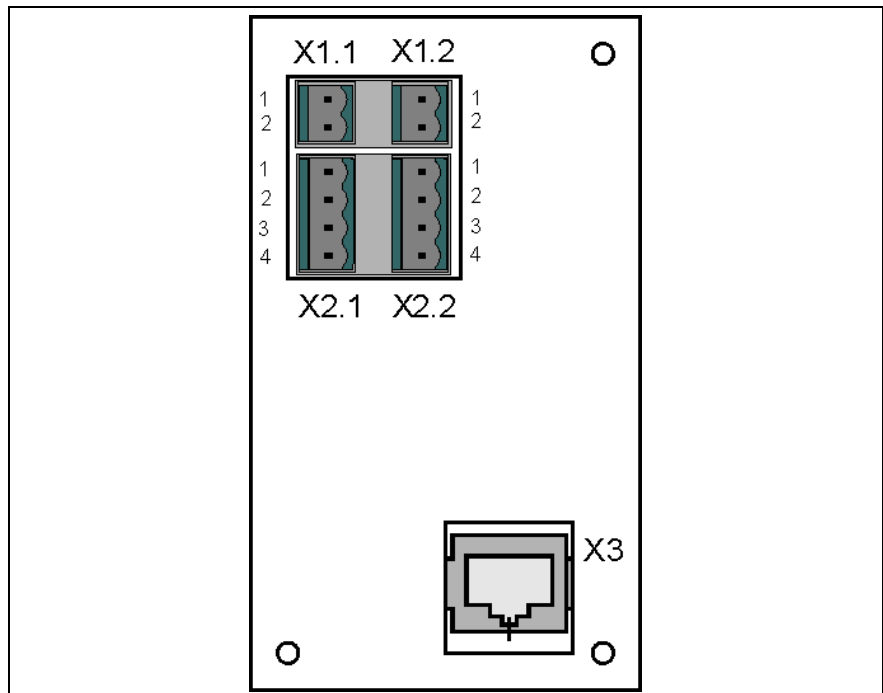### Pin Assignment of the IndraControl VAC 30.1

Fig. 7-1:   Pin assignment of the IndraControl VAC 30.1 connection module

Pin	Signal name
X1.1 Pin1	24 VDC
X1.1 Pin2	0 V
X1.2 Pin3	24 VDC
X1.2 Pin4	0 V
X2.1 Pin1	STOP pushbutton 1 IN
X2.1 Pin2	STOP pushbutton 1 OUT
X2.1 Pin3	STOP pushbutton 2 IN
X2.1 Pin4	STOP pushbutton 2 OUT
X2.2 Pin1	Enabling device 1 IN
X2.2 Pin2	Enabling device 1 OUT
X2.2 Pin3	Enabling device 2 IN
X2.2 Pin4	Enabling device 2 OUT

Fig. 7-2:   Pin assignment of the IndraControl VAC 30.1 connection module

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Note:	Use only copper wire to connect these terminals. Tighten the screws of the screw terminals with a torque of 0.22 Nm.

X1: 24 VDC Voltage Supply

All internally required voltages are generated with electrical isolation via a DC/DC converter. The connection is designed as male connector strip SL, 3.50 mm pin-spacing, 2 x 2-pin, so that cables up to a maximum line cross section of 1.5 mm^2 can be connected.

X1.1 X1.2	**Pin**	**Assignment**
1 [•] [•] 1	**X1.1** 1	24 V
	2	0 V
2 [•] [•] 2	**X1.2** 1	24 V
	2	0 V

Fig. 7-3:   Pin assignment of the 24 VDC power supply X1

Parameters	**Value**
Rated voltage U_N	24 VDC; (+19 V to +30 V)
Residual ripple for U_N	See figure below
Noise and surge immunity	U_{max}= 35 V (for t < 100 ms)
Current consumption for U_N	Max. 0.7 A
Prescribed external protection	Fusible cut-out, 2 A time-lag
Reverse voltage protection	Occurs via isolating diode; the line-side fuse is activated when polarity reversal occurs.

Fig. 7-4:   Technical data of the 24 VDC connection

Note:	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 must be protected by a 2 A time-lag fusible cut-out.

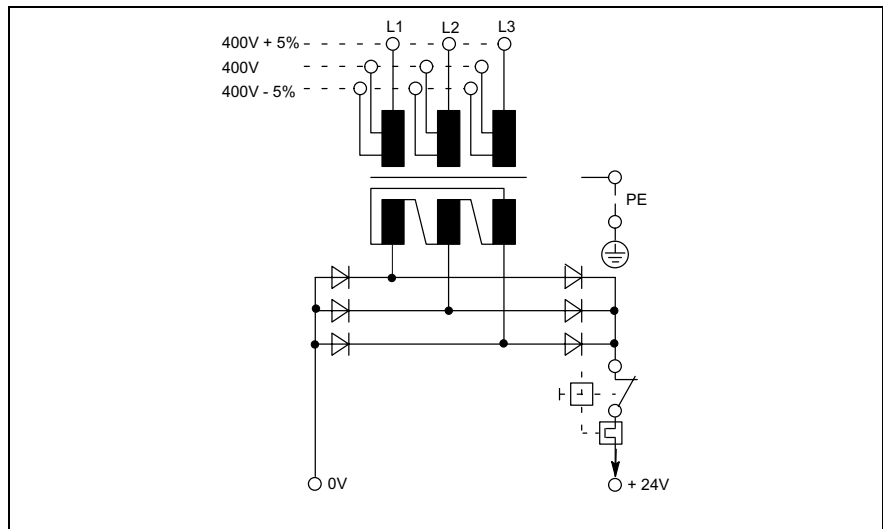| ⚠ **DANGER**	**Danger without protective separation!**
	$\Rightarrow$ The 24 VDC input voltage must comply with the requirements of the "Protective separation".
	$\Rightarrow$ Plug and unplug the connector only in no-voltage condition!

Fig. 7-5:   Safety transformer according to EN 60742

Interfering AC voltage components such as resulting from an uncontrolled 3-phase current bridge connection without smoothing with a ripple factor (see DIN 40110/10.75, section 1.2) of 5 % are permissible.

It follows from the above that as upper voltage limit the greatest absolute value is 30.2 V and as lower voltage limit the lowest absolute value is 18.5 V.
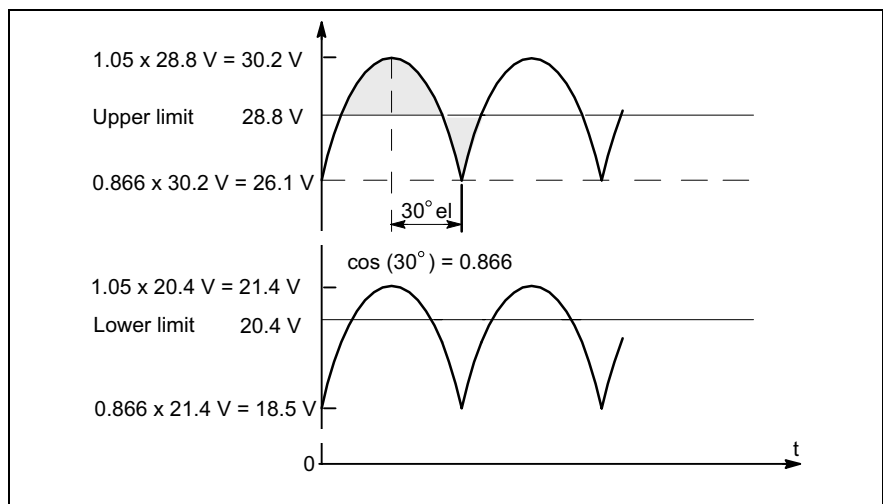

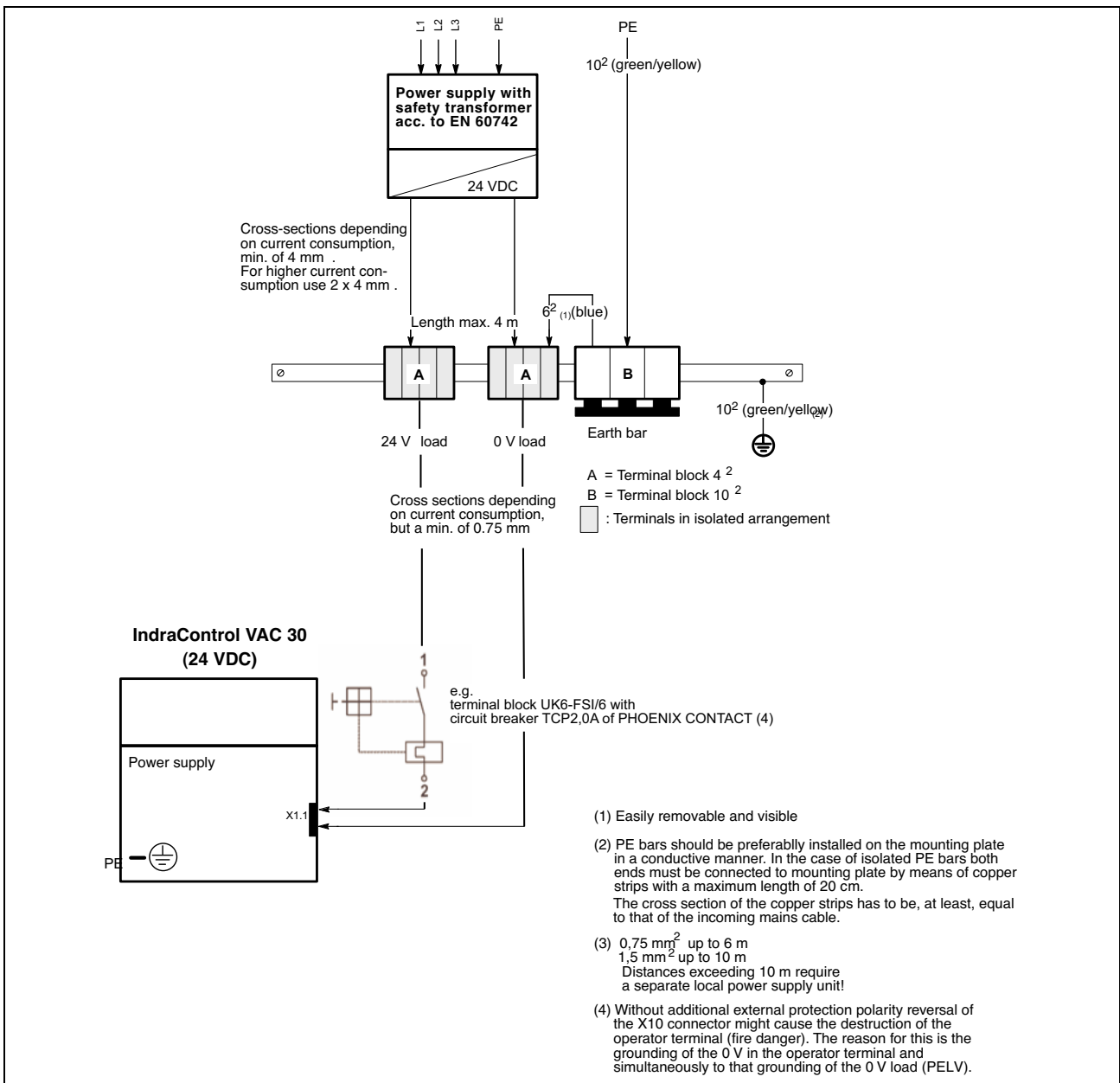Fig. 7-6:   Illustration of the limit values for the 24 VDC voltage

Fig. 7-7:   Wiring of power connection 24 VDC to the embedded terminal

X2.1: STOP Pushbutton

Pin Assignment

Pin	Signal name
X2.1 Pin1	STOP pushbutton 1 IN
X2.1 Pin2	STOP pushbutton 1 OUT
X2.1 Pin3	STOP pushbutton 2 IN
X2.1 Pin4	STOP pushbutton 2 OUT

Fig. 7-8:   Pin assignment of the STOP pushbutton X2.1

Note: The circuit of the STOP pushbutton might be operated with a maximum of 30 V and has to be protected with a 2-A-fusible cut-out.

X2.2: Enabling Device

Pin Assignment

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

Fig. 7-9:   Enabling device X2.2

Note: 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.
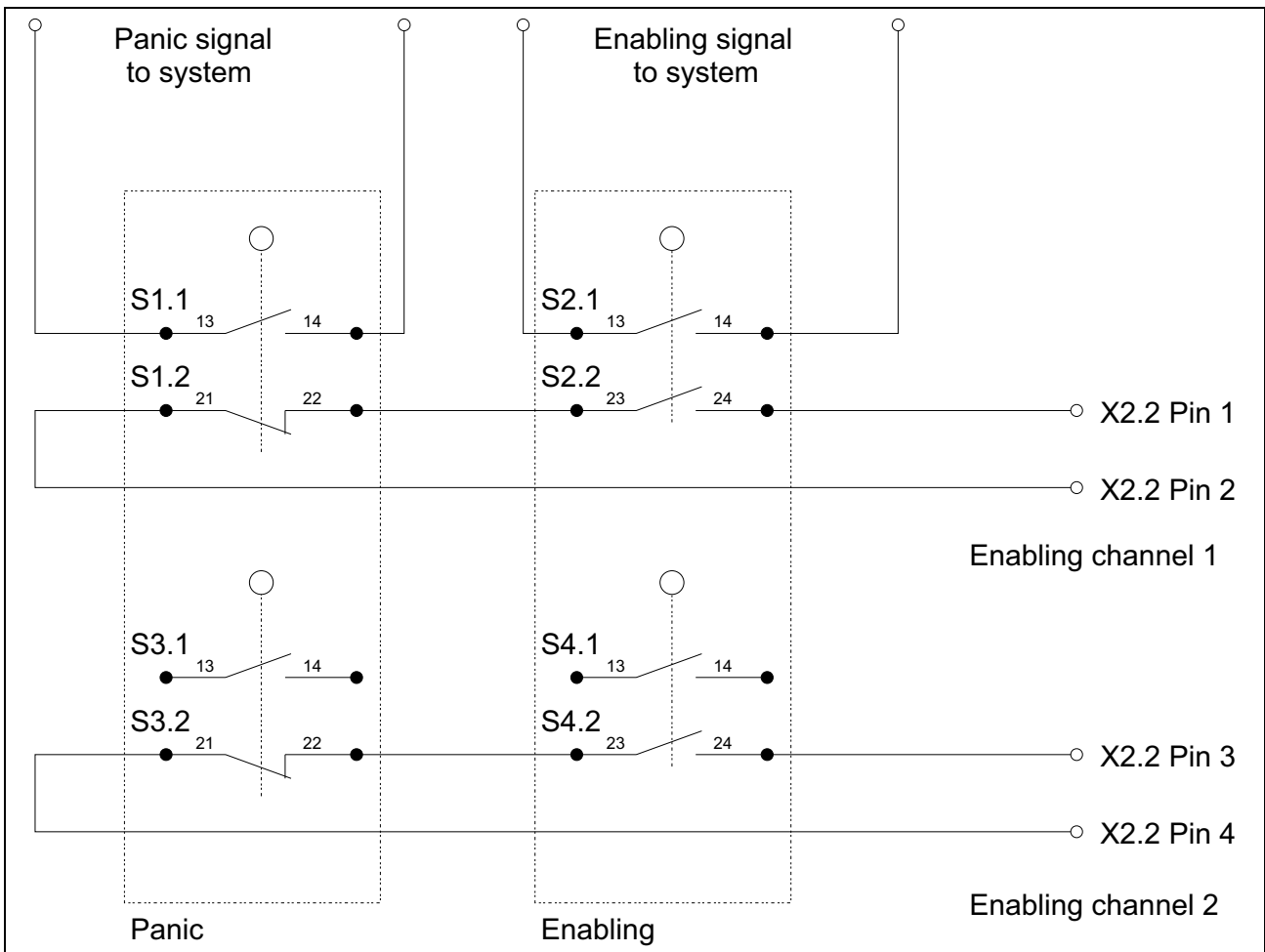
Circuit Diagram of the Enabling Device

Fig. 7-10:   Circuit diagram of the enabling device

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Contact Travel Diagram of the Enabling Switch
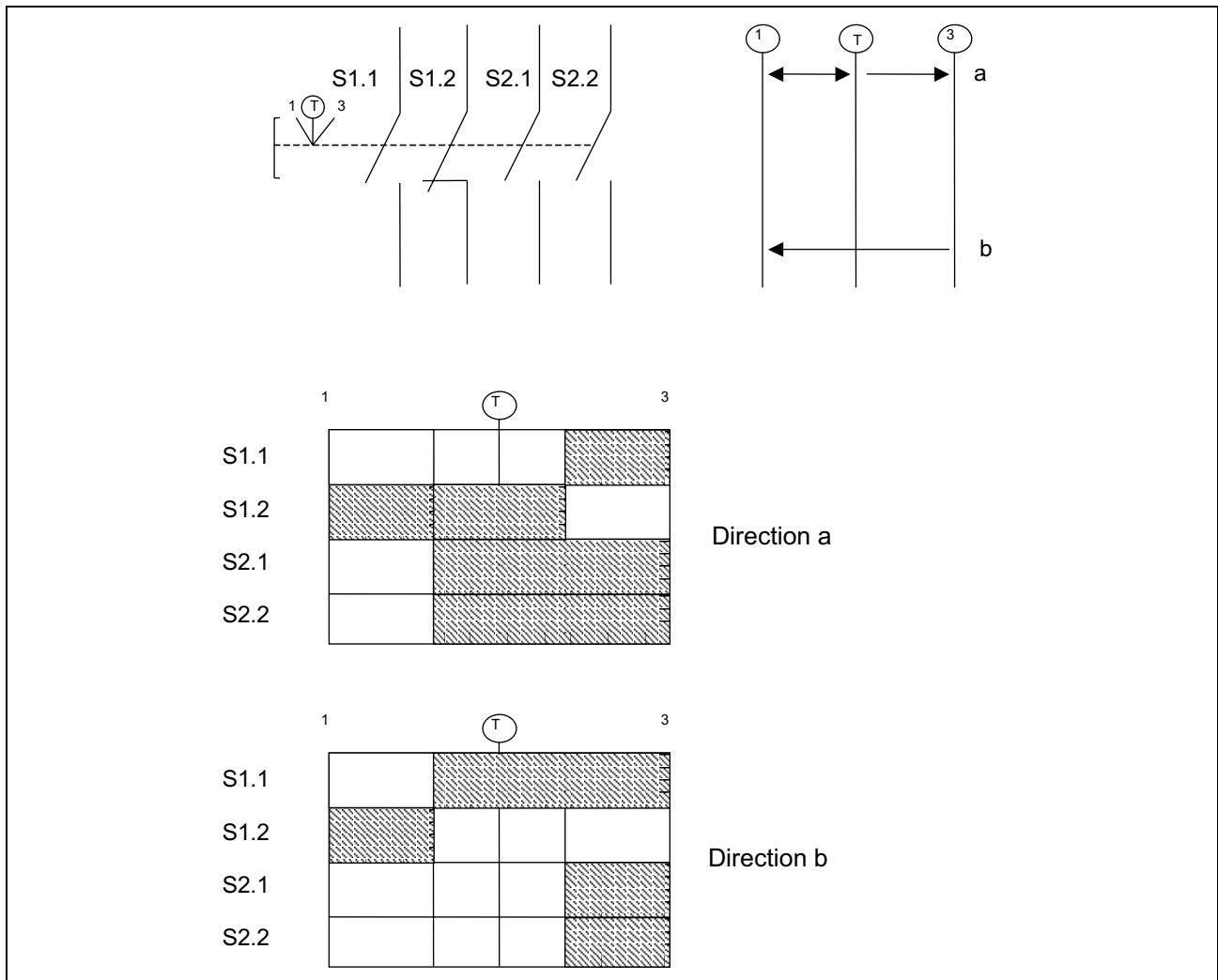

Direction a

Direction b

Fig. 7-11:   Contact travel diagram

Wiring of the Enabling Switch

The following special requirements apply for the connection between the IndraControl VEH 30.1 and the safety-related evaluation for the enabling switch: It is required that short-circuits and/or cross-circuits on the safety-related signal paths are safely detected by evaluation devices.

The following pages contain examples how to realize different control categories by means of the IndraControl VEH 30.1. If the requirements of the corresponding control categories are kept, further wiring possibilities and the use of other components is possible.

Category 1 (EN 954-1)   The 2-circuit enabling switch in the IndraControl VEH 30.1 can be used for category 1.
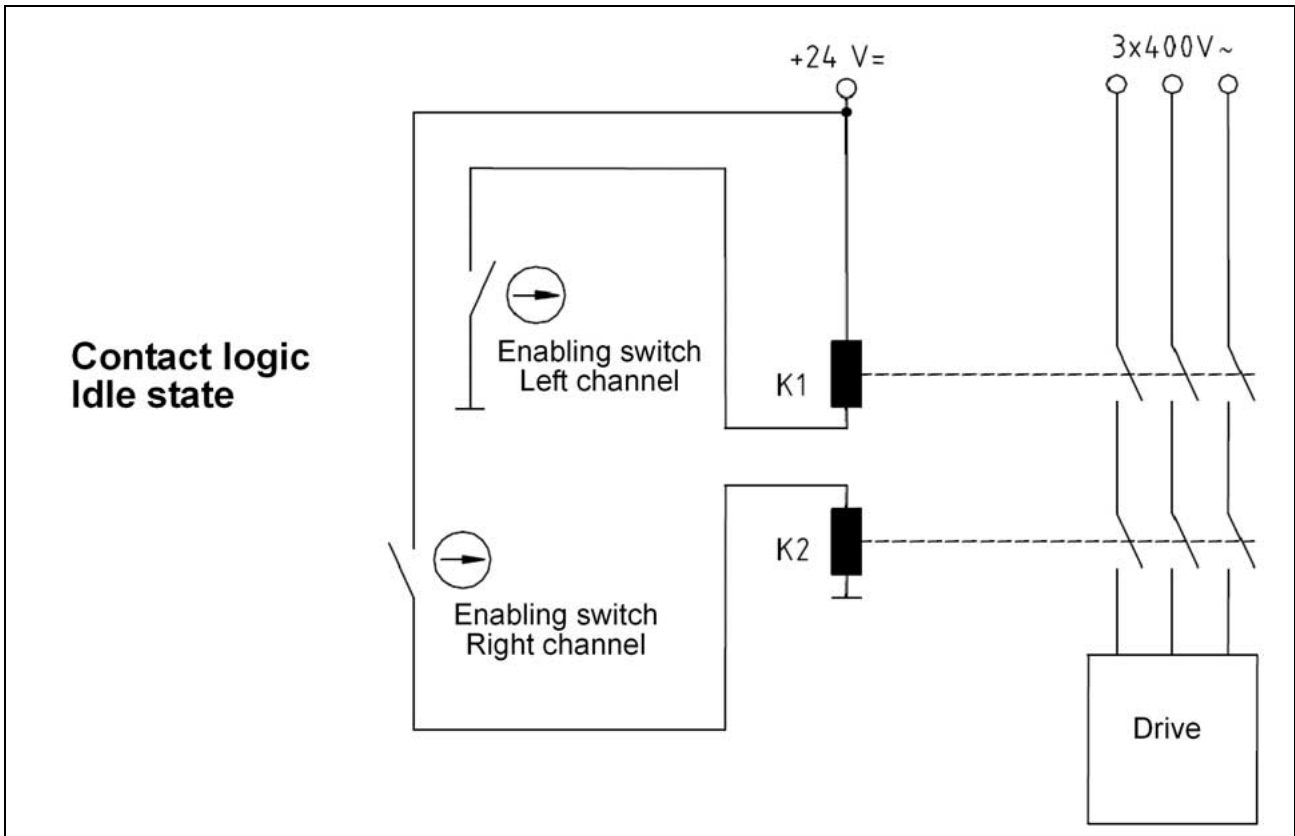

Fig. 7-12:   Internal wiring: category 1

In the example mentioned above the circuits are realized in proved and tested manner. Both have to be in the "Enabling" status to activate the power contactors.

The weak point of category 1 is its missing self-monitoring. If a circuit is faulty and remains in the enabled status, the circuit continues to work. A further error might cause a dangerous situation. Thus, it is the task of the operator to test the independent function of each individual circuit regularly (e. g. during each commissioning).

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Category 2 (EN 954-1)   If the 2-circuit enabling switch is wired in the IndraControl VEH 30.1 according to category 1 and is completed by an automatic (not necessarily safety-relevant) test, category 2 can be achieved.
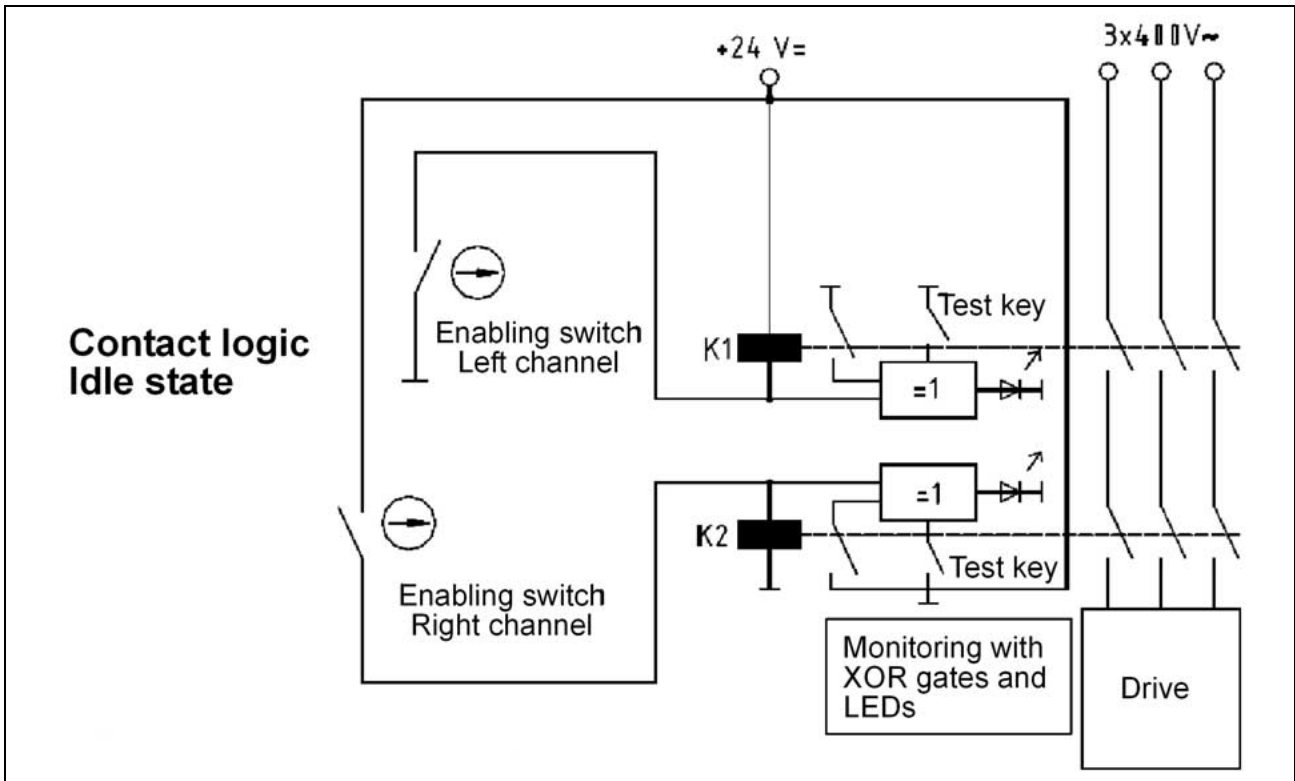
Fig. 7-13:   Internal wiring: category 2

As with category 1 the circuits are designed in proved and tested technique. The automatic monitoring of the safety function occurs by "Exclusive-Or" logic. Only if the activation of Kx matches the switching status, the output level of the gates is "low". If there are derivations, the error (high-level) is indicated by red indicator lamps.

With category 2 the monitoring is not designed in safe technique. Thus, safety function and diagnostics have to be tested regularly (e. g. during each commissioning).

Category 3/4 (EN 954-1)   If the CH-3000 shall be used in control category 3 or 4, it has to be wired with an appropriate monitoring module also recognizing short- and cross-circuits in the line. For this, the safety relay combinations SCR4-W22-3.5-D (part no. 607.5111.009) are recommended.
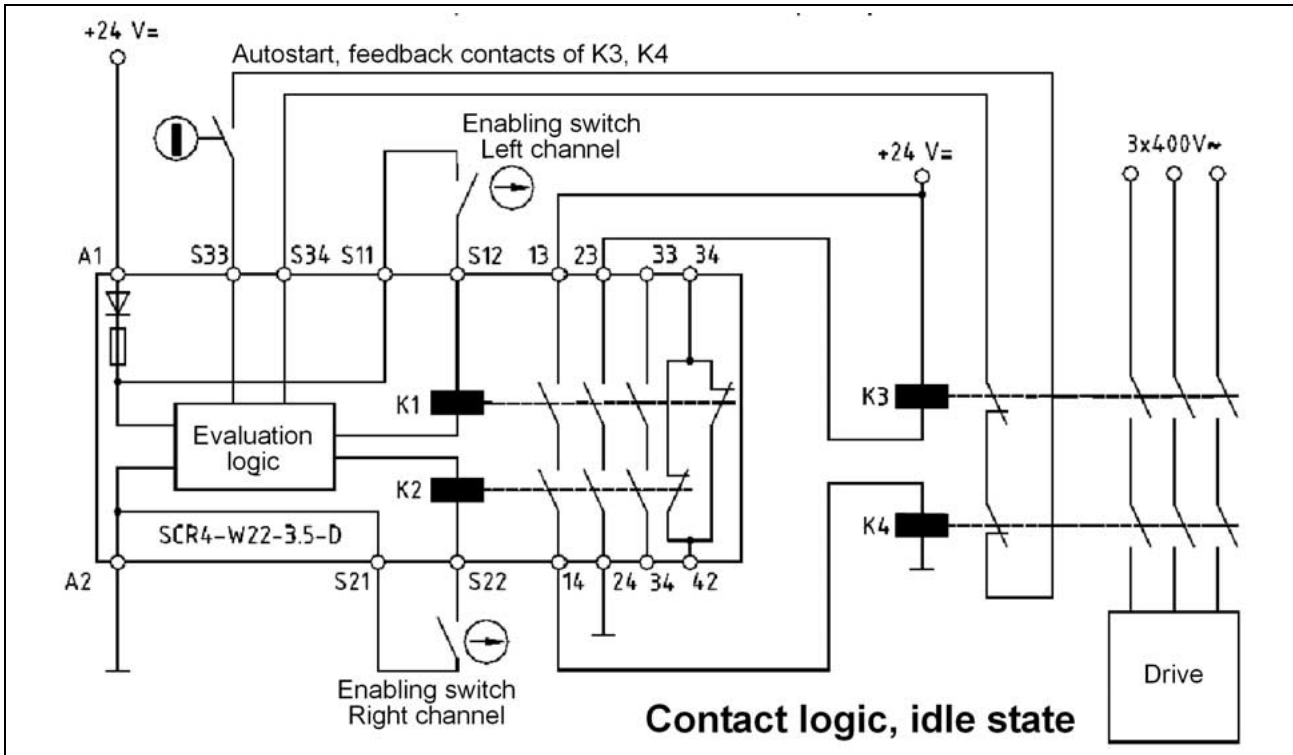

Fig. 7-14:   Internal wiring: category 3

A channel of the enabling switch is connected to the terminals S11 and S12, the second to the terminals S21 and S22. Both circuits are monitored to avoid cross-circuits.

The safety relay (SCR) compares both channels in operation. Only if the contacts of both channels are closed, also the NO contacts of the SCR (13/14, 23/24, 33/34) are closed. If one of the two input contacts should be short-circuited because of an error, the outputs are nevertheless switched off when opening the input contacts, as the undamaged input channel still introduces the switch off. When activating the enabling device next time, the outputs remain open, since the SCR has recognized the different input signals as error.

The output circuits 13/14 and 23/24 are switched in the SCR via forced-guided safety relays (33/34 and 41/42 for example can remain free). They serve to trigger the two redundant power contactors K3 and K4 .

Path S33, S34 serves for the start enabling of the SCR (here: automatic start) and is used to reread the auxiliary contacts of the power contactors. If a switched on contactor blocks, the next cycle in the SCR cannot be started anymore.

Takes the suggested installation schema as example. In any case, observe the documentation of the used components.

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X3: Ethernet Interface

The embedded terminal can be connected with an Ethernet network via an Ethernet interface.

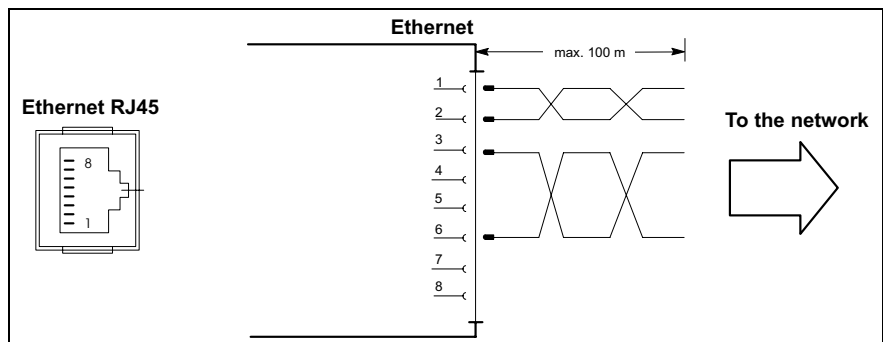| RJ45 female connector, 8-pin	
Type:	Ethernet 10Base T / 100Base X
Cable length:	Max. 100 m
Cable type:	Shielded, twisted pair
Transmission rate:	10 or 100 Mbits/s

Fig. 7-15:   Ethernet interface

Fig. 7-16:   Pin assignment of the Ethernet interface X3

The configuration of the Ethernet interfaces is described in chapter 9, "Software".

7.2   Personality Function

In the majority of cases, the system features a continuous Ethernet network. However, e. g. M-Keys, STOP pushbuttons or enabling devices are firmly assigned to one control. The IndraControl VAC 30.1 provides that an individual IP address and corresponding target addresses of the control are allocated to a hand-held terminal.

In this manner, different sections of an installation can be fully automated visualized with one IndraControl VEH 30.1 via several IndraControl VAC 30.1 connection modules. With each change of the plug-in location the IndraControl VEH 30.1 gets e. g. a new target IP address or UDP address or another application starts.

As far as IndraWorks is concerned, the intelligent connection module IndraControl VAC 30.1 serves as wild card for a firmly projected CE operator terminal, for which the application is stored on a server in the network or ideally on the control (see IndraWorks VEP/VEH configuration dialogs).

When connecting the IndraControl VEH 30.1 via the IndraControl VAC 30.1 all settings to be made under Rexroth CE Settings are archived in the IndraControl VAC 30.1. If the IndraControl VAC 30.1 does not provide any memory function, the settings are internally archived as it is the case for the IndraControl VEP devices.

If the data are successfully retrieved during switching on the IndraControl VAC 30.1, this configuration always takes priority. If no configuration data are found in the IndraControl VAC 30.1, the IndraControl VEH 30.1 starts with the internally saved settings.

8 Maintenance and Installation

8.1 General Information

The embedded terminals are maintenance-free. Some components are subject to wear and must be replaced.

Maintenance

Include the following measures in your maintenance schedule:

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

⚠️ **CAUTION!**

Dissolution of the keypad surface and the display seal through contact with solvents!

⇒ Do not use any solvents (e. g. paint thinner)!

- At least once a year, check all plug and terminal connections for proper tightness and damage. Check that cables are not broken or crushed. Replace damaged parts immediately.

8.2 LCD Display

A fading backlight causes a progressive deterioration of the LCD display's readability, so that a backlight exchange will be necessary. For further information please contact the Bosch Rexroth Service.

8.3 Maintenance of the IndraControl VEH 30.1

The IndraControl VEH 30.1 is designed for the use in the industrial environment. It does not need any special maintenance.

We recommend to keep the device away from humidity, oils and emulsions. If a particular degree of fouling is achieved - from the ergonomic point of view - the IndraControl VEH 30.1 has to be cleaned with a smooth, dry and fuzz-free cloth to restore e. g. the full grip.

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8.4 Measures in Case of Malfunctions at the IndraControl VEH 30.1

The IndraControl VEH 30.1 does not contain any components to be maintained by the operator. The housing must not be opened for maintenance purposes.

Malfunctions that are not mentioned in the following table require a check of the device at the manufacturer.

Type of malfunction	Operator terminal	Enabling pushbutton left	Enabling pushbutton right	Possible cause	Measure
No enabling possible	OK	No reaction	No reaction	Pushbutton mechanically damaged	Use new device
				Cable damaged	Use new cable and/or device
Enabling only possible on the left side	OK	OK	Defective	XOR operation, the pushbutton gets stuck	Relieve the left pushbutton, retry
				Internal mechanics damaged	Otherwise, use new device
Enabling only possible on the right side	OK	Defective	OK	XOR operation, the pushbutton gets stuck.	Relieve the right pushbutton, retry
				Internal mechanics damaged	Otherwise, use new device
Connector cannot be plugged in	-	-	-	Wrong connector orientation	Turn correctly
				Wrong cable coupling	Use appropriate cable
				Plug-pins damaged	Replace device/cable

Fig. 8-1:   Error table of the IndraControl VEH 30.1

9 Software

9.1 General Information

The IndraControl VEH 30.1 is delivered with the embedded operating system Microsoft Windows CE .NET 4.2. The operating system is contained in the FWA and has to be separately ordered besides the IndraControl VEH 30.1. Furthermore, this FWA contains the visualization software WinStudio "lite". The functional range of the visualization software WinStudio "lite" is restricted. If you want to use an extended functional range, you have to order a license.

The following tables provide an overview of the available licenses.

Ordering designation	Part number	Description
FWA-VEH*01-CWN-01VRS-EN	R911310833	IndraControl VEH 30.1: Windows CE 4.2 .NET with preinstalled WinStudio "lite".

Fig. 9-1:   Firmware type of the IndraControl VEH 30.1

Ordering designation	Part number	Description
SWS-WINSTU-RUN-06VRS-D0-WCE1K5	R911306954	WinStudio Runtime license Max. 1,500 variables, 256 array elements, 32 class elements
SWS-WINSTU-RUN-06VRS-D0-WCE4K	R911306951	WinStudio Runtime license Max. 4,000 variables, 512 array elements, 32 class elements

Fig. 9-2:   Software options

Note: All necessary settings of the IndraControl VEH 30.1, especially the network settings are made via the configuration dialog "Rexroth CE Settings". Settings directly made in the control panel of Windows CE are overwritten by the Rexroth CE Settings!

All settings made under Windows CE are saved in the Windows CE registration database. Therefore, it is necessary to save each modification via the desktop icon **Save Registry** and/or **Start – Program Files – Tools – Save Registry**.

9.2 First Commissioning

For the IndraControl VEH 30.1 default values are set and the touch screen is precalibrated ex works. After a system update the application to calibrate the touch screen is automatically started during the first commissioning. For this, see chapter 9.3, "Touch Screen Calibration". Then, the tool to set the network and application data is automatically set. For this, see chapter 9.4, "Rexroth CE Settings".

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9.3   Touch Screen Calibration

If the position of the mouse pointer does not match anymore with the touched point on the display, the touch can be recalibrated. The calibration program can be started via the desktop icon **Touch Calibration** or the start menu **Start – Program Files – Tools – Touch Calibration**. In case of a operating system update the program starts automatically.

Touch exactly the 4 calibration points one after each other with a touch pen (red point at the arrowhead). After having actuated the last calibration point, the display changes to the Windows desktop after a waiting time of approx. 5 seconds. Now, test the proper calibration of the touch screen and confirm the settings with "OK".
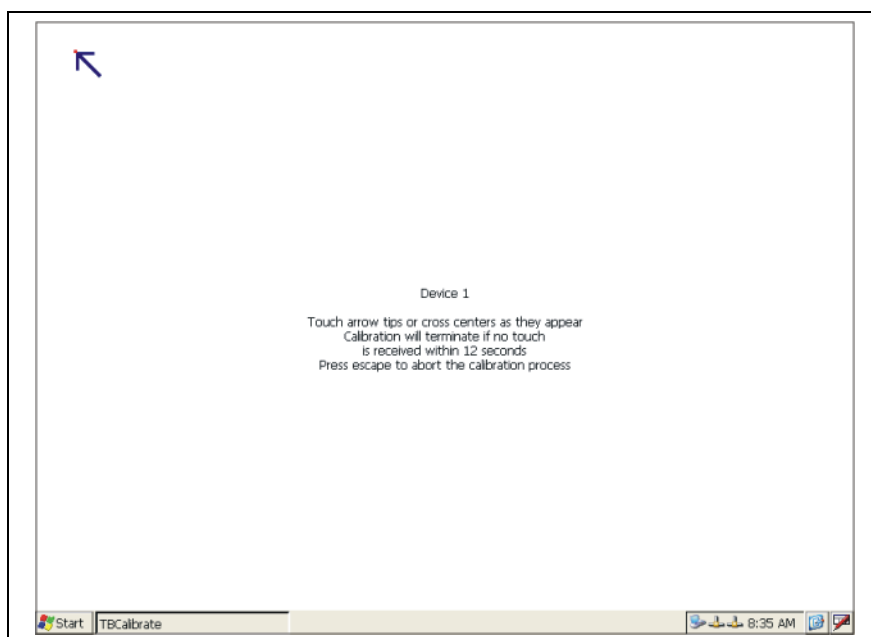

Fig. 9-3:   Touch screen calibration of the IndraControl VEH 30.1

9.4   Rexroth CE Settings

All basic settings of the IndraControl VEP 30.1 are made via the tool "Rexroth CE Settings". The tool can be started via the desktop icon **Rexroth CE Settings** or the start menu **Start – Program Files – Tools – Rexroth CE Settings**. In case of a operating system update the tool starts automatically.

The Rexroth CE Settings of the IndraControl VEH 30.1 are read from the connection module IndraControl VAC 30.1; for this see chapter "Personality Function" on page 7-11.

Note: When commissioning the IndraControl VAC 30.1 for the first time, all values are set to default.

Ethernet Adapter

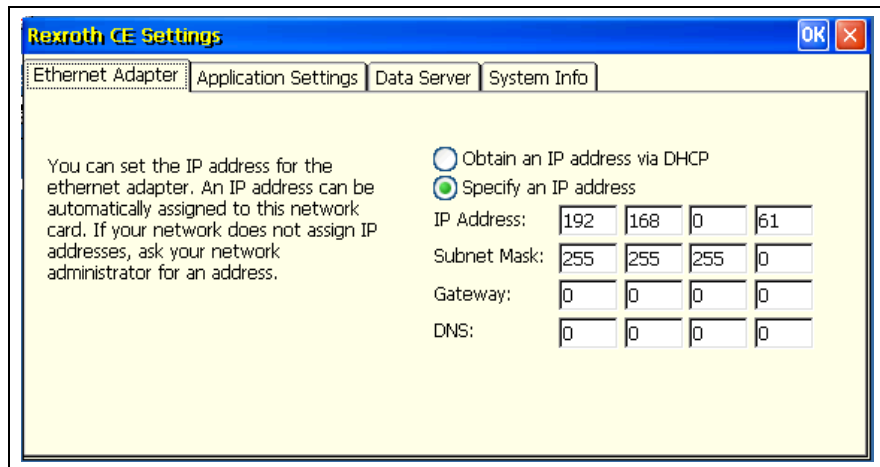The Ethernet adapter of the IndraControl VEH 30.1 is configured in this tab.

Fig. 9-4:   Rexroth CE Settings – Ethernet Adapter

Obtain an IP Address via DHCP

Automatic assignment of the network parameters via DHCP.

Specify an IP Address

Manual configuration of the network parameters.

- **IP Address:** Manual input of the device's IP address.
- **Subnet Mask:** Manual input of the Subnet Mask.
- **Gateway:** Manual input of the Gateway.
- **DNS:** Manual input of the Domain Name Server.

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Application Settings

In this tab the settings for autostart and the visualization connection to the control are configured.
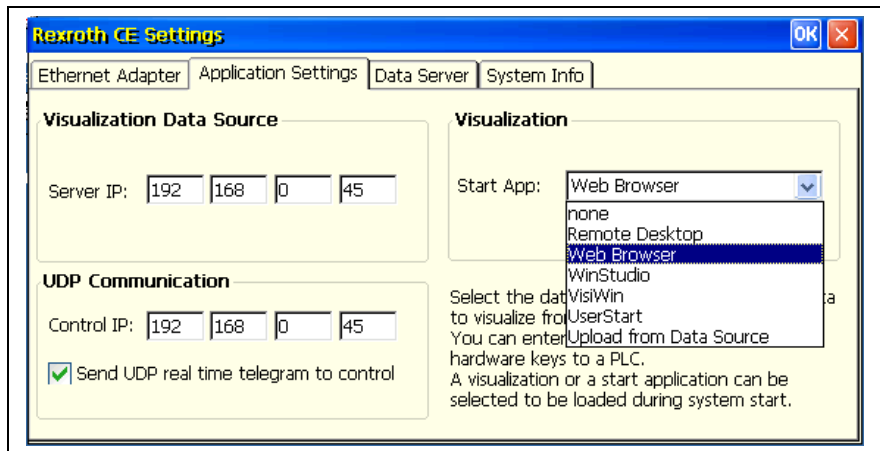

Fig. 9-5:   Rexroth CE Settings – Application Settings

Visualization Data Source

- **Ethernet:** Ethernet connection to the control.
- **Server IP:** IP address of the control connected via Ethernet.

UDP Communication

- **Control IP**: IP address of the control to which the UDP telegrams are to be sent.
- **Send UDP real time telegram to control:** Selection, if the data are to be sent to the control (control IP) via UDP telegram.

The following data are sent to the control (control IP) via UDP telegram:

- Keyboard codes for IndraControl VEH 30.1
- Data of the additional elements for IndraControl VEH 30.1. For example, handwheel, override, key switch.

Visualization

- **None:** The visualization software is not automatically started.

- **Remote Desktop:** Autostart of the Remote Desktop Client. A PC with Remote Desktop Server in the network is operated by remote control via the IndraControl VEH 30.1.

- **Web Browser:** Start of a web visualization.

- **WinStudio:** Autostart of file StorageCard\Rexroth\Winstudio\startup.cmd. The user can modify the file to adapt the start behavior. If WinStudio was selected, the OPC server is registered and the corresponding information is entered in the OPCServer.ini.

- **VisiWin:** Autostart of file StorageCard\Rexroth\Winstudio\startup.cmd. The user can modify the file to adapt the start behavior.

- **UserStart:** Autostart of file StorageCard\Rexroth\User\startup.cmd. If this option is selected, in contrast to all other selection possibilities the PLC is not automatically started. The user can define the complete start process in this file.

- **Upload from DataSource:** Downloads file startup.cmd via an FTP server from the control (Visualization Data Source) to StorageCard\Rexroth\startup.cmd. For this, an FTP server has to be activated on the control.

Data Server

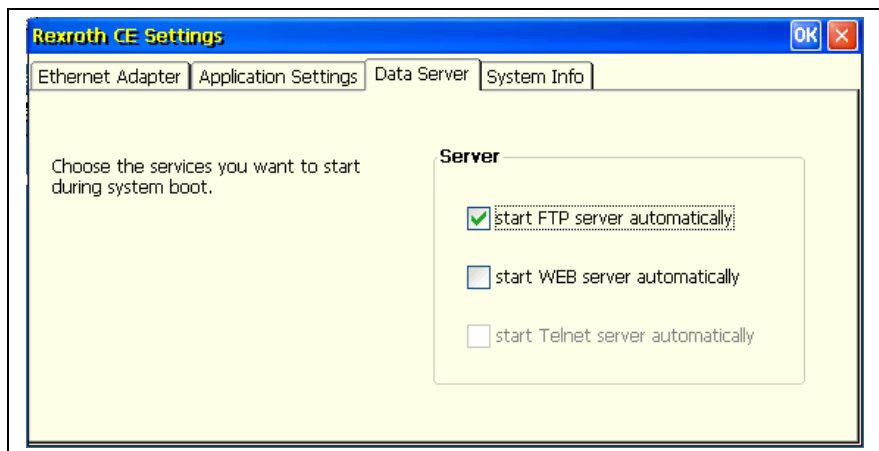In this tab the start of FTP, WEB and Telnet server can be set.

Fig. 9-6:   Rexroth CE Settings – Data Server

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start FTP server automatically

The autostart of the internal FTP server can be set here.

start WEB server automatically

The autostart of the internal web server can be set here.

start Telnet server automatically

The autostart of the internal telnet server can be set here.

System Info

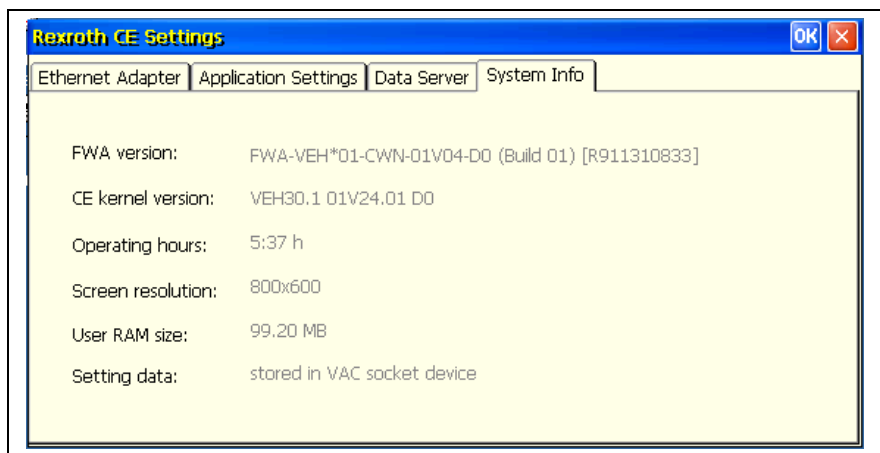This tab indicates information on the FWA and the IndraControl hardware.

Fig. 9-7:   Rexroth CE Settings IndraControl VEH 30.1 – System Info

CE image version:

Version display of the Windows CE image.

Operating hours:

Display of the IndraControl devices' runtime.

Screen resolution:

Indication of the display resolution.

User RAM size:

Display of the RAM memory available for the user.

Setting data:

Display of the device setting's memory location.

- **stored internally:** For IndraControl VEP devices.
- **stored in VAC socket device:** For IndraControl VEH 30.1 devices connected via the connection module IndraControl VAC 30.1.
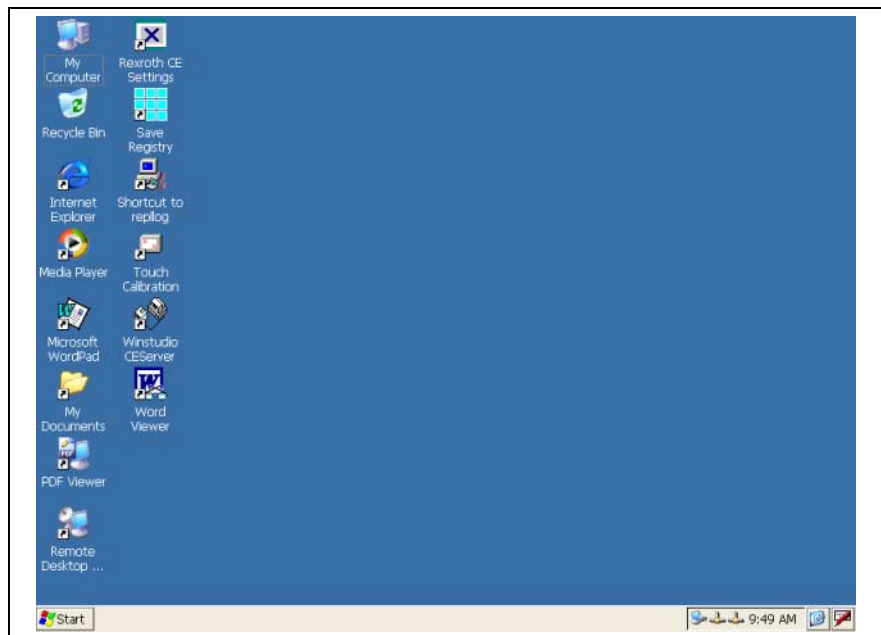
9.5 Windows CE 4.2 .NET

Fig. 9-8:   Windows CE 4.2 .NET desktop

The Windows CE 4.2 .NET operating system image provides various programs and tools.

Operation

Touch Screen Operation

The IndraControl VEH 30.1 is operated via a touch screen. For this, use your finger or better a touch pen.

The function of the "right mouse button" can be activated by touching the screen for 2 seconds. For a better appreciation of this waiting time a small circle appears around the mouse pointer.

⚠ **Danger of touch screen destruction!**

DANGER
⇒ Do not use any inappropriate and pointed objects to operate the touch screen.

Text Input via Virtual Keyboard

To enter texts into the corresponding dialogs, a virtual keyboard, that can be operated via the touch screen, is automatically opened. To call up this keyboard manually, you must activate the "Input Panel" icon in the start bar on the right bottom side of the desktop. Here, you can also modify the size of the virtual keyboard or close it.
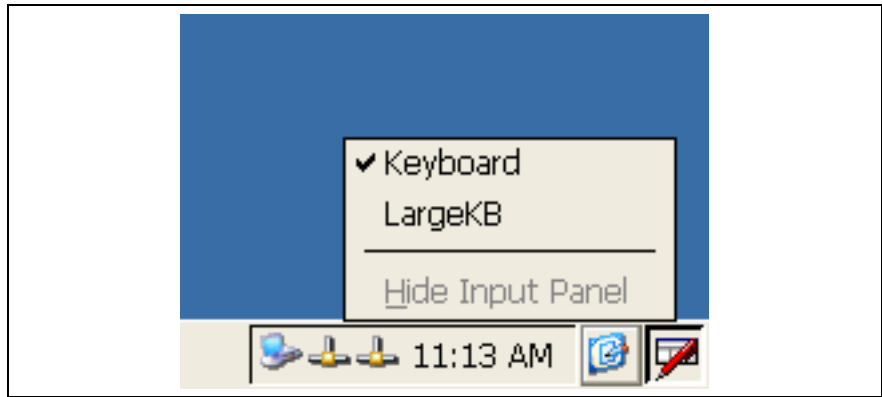
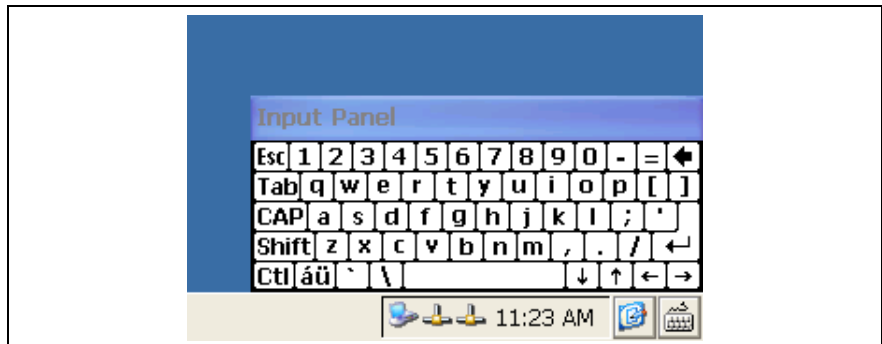Fig. 9-9:   Selecting the virtual keyboard
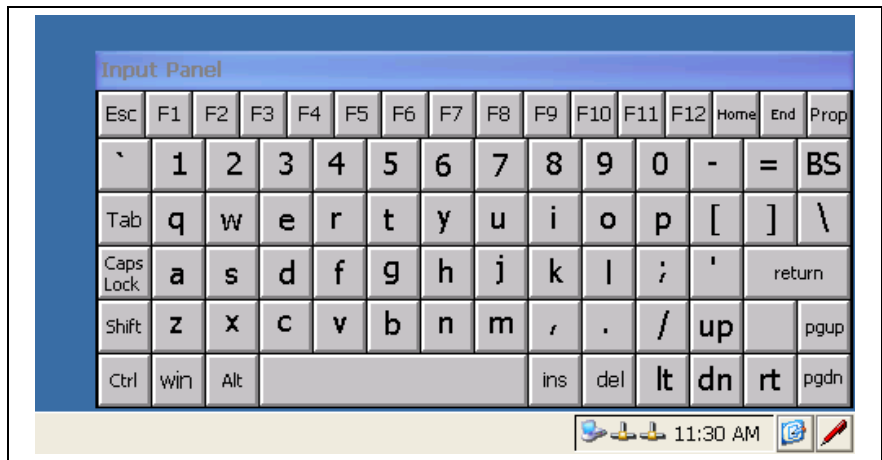

Fig. 9-10:   Virtual keyboard, small

Fig. 9-11:   Virtual keyboard, large

Microsoft Programs

The following programs can be either called up by links on the desktop or by the start menu.

Microsoft File Viewer

- **Microsoft Excel Viewer:** Program to display table files in *.XL* format.
- **Microsoft Image Viewer:** Program to display image files, slideshows and to generate slideshows.
- **Microsoft PDF Viewer:** Program to display portable document files in *.PDF format.
- **Microsoft PowerPoint Viewer:** Program to display presentation files in *.PPT and *.PPS format.
- **Microsoft Word Viewer:** Program to display text documents in *.DOC and *.RTF format.

Further Microsoft Programs

- **Command Prompt:** MS DOS prompt.
- **Internet Explorer:** Program to display web sides.
- **Media Player:** Program to display media data.
- **Microsoft WordPad:** Program to display and generate text data.
- **Remote Desktop Connection:** Remote desktop client. Permits to operate computers by remote control with the remote desktop server in the network.
- **Windows Explorer:** Program to display the file structure and to create and delete files.

Further Desktop Icons

- **My Computer:** Shows data structure and files on the IndraControl VEP.
- **Recycle Bin:** Recycle bin.
- **My Documents:** Opens the folder "My Documents".
- **Save Registry:** Saves the Windows CE 4.2 .NET registry.
- **Shortcut to repllog:** Starts the active sync server allowing connections from another computer via an active sync connection.
- **WinStudio CE Server:** Starts the WinStudio CE server. For more detailed information, please refer to chapter

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FTP Server

The FTP server can be activated or deactivated via the Rexroth CE Settings (see chapter "Rexroth CE Settings"; section "Data Server" on page 9-5). If a user logs in as "Anonymous" at the FTP server, he will get access to directory \FTP_Public on the RAM disk. This directory is automatically generated while accessing the FTP server for the first time. If a user registered on the CE device logs in, he has also access to directory \FTP_Public\Storagecard, that allows direct access to the flash disk. The users are registered via the control panel.

Note: A password must be assigned to the user via the control panel, so that he can log in as registered user on the FTP server.

Web Server

A web server, that can be activated via the Rexroth CE Settings, is integrated in the device (see chapter "Rexroth CE Settings"; section "Data Server" on page 9-5). The home directory for the web server is Windows\www\wwwpub. The web application must be configured on the flash disk under \Storagecard\CE\Profiles\Windows\www\wwwpub. During the start, the data are automatically copied to the home directory.

Telnet Server

The telnet server is deactivated.

CE User Configuration

Entries in the start menu as well as desktop links and web applications are configured on the flash disk under \Storagecard\CE\Profiles\Windows and its subdirectories. When starting the device, all files are copied to the Windows system directory and are interpreted.

9.6 WinStudio

The IndraControl VEH 30.1 devices contain the runtime of the visualization software WinStudio "lite". The functional range of the "lite" variant is restricted. If an extended functional range is required, you have to order a license (see chapter 9.1 "General Information").

Variables	200
Arrays	256
Class elements	32
Number of missing images	1
Simultaneously used drivers	1

Fig. 9-12: Functional range of WinStudio "lite"

The engineering suite IndraWorks offers the possibility to transmit comfortably applications to the IndraControl VEH 30.1. For further information please refer to the IndraWorks documentation.

A further possibility to transmit a visualization application to the IndraControl VEH 30.1 is the WinStudio CE Server. It is started via a desktop icon or **Start – Program Files – Rexroth – WinStudio – Shortcut to CE Server**.

Fig. 9-13: WinStudio CE Server – Remote Agent

- **Connection status:** Shows the status of the connection.
- **Log:** Shows log messages.
- **Setup:** Button to call up the setup dialog.
- **Start:** Button to start the visualization application.
- **Exit:** Button to finish the Remote Agent.

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Remote Agent Setup

Fig. 9-14:   Remote Agent Setup

- **Device Connection:** Configuration of the connection. The connection can only be established via TCP/IP. Infra-red and serial communication is not supported by the IndraControl VEH 30.1.

- **Run CEView on startup:** Here, you can choose, if the CEView shall be automatically started while starting the system.

- **License:** Here, you can license the product or modify the license.

- **Users:** The safety system can be started here. It allows the user management.

9.7   Evaluation of the Operating Element Commands

In addition to the operation per touch screen you can also operate the device via the keys on the front panel. Besides the navigation key block providing the used functionality of the cursor, input and escape key, the M-Keys (L1..L8, R1..R8) are arranged beside and the jog keys (1+..6-) below the display. Both are used for special tasks. With the M-Keys you can trigger operating actions, while the jog keys are provided to travel axes step by step. Depending on the design – in addition to the keys – further operating elements like override and handwheel can be provided on the front panel.

Evaluation of the Operating Status in the Control

The operating status of the M-Keys, the jog keys, the enabling device and the additional operating elements are transmitted directly into the control by a real time protocol via Ethernet communication. In the control you have the possibility to evaluate the status of the operating elements by means of a function block. The bit assignment within the function block to the operating elements is specified and cannot be modified by the user.

The keys of the navigation key block are not transmitted into the control.

See column VEH:

UDP bit	PLC-FB	VEH	VCH	Remark
0	Data[0].7	L1		M-Key
1	Data[0].6	L2		M-Key
2	Data[0].5	L3		M-Key
3	Data[0].4	L4		M-Key
4	Data[0].3	L5		M-Key
5	Data[0].2	L6		M-Key
6	Data[0].1	L7		M-Key
7	Data[0].0	L8		M-Key
8	Data[1].7	R1	//	M-Key
9	Data[1].6	R2	Hand	M-Key
10	Data[1].5	R3	->I	M-Key
11	Data[1].4	R4		M-Key
12	Data[1].3	R5		M-Key
13	Data[1].2	R6		M-Key
14	Data[1].1	R7		M-Key
15	Data[1].0	R8		M-Key
16	Data[2].7	1+		Jog key
17	Data[2].6	1-		Jog key
18	Data[2].5	2+		Jog key
19	Data[2].4	2-		Jog key
20	Data[2].3	3+		Jog key
21	Data[2].2	3-		Jog key
22	Data[2].1	4+		Jog key
23	Data[2].0	4-		Jog key
24	Data[3].7	5+		Jog key
25	Data[3].6	5-		Jog key
26	Data[3].5	6+		Jog key
27	Data[3].4	6-		Jog key
28	Data[3].3	0	0	Device identification.1
29	Data[3].2	0	1	Device identification.0
30	Data[3].1	Enable	Enable	Enabling switch

UDP bit	PLC-FB	VEH	VCH	Remark
31	Data[3].0	Panic	Panic	Enabling switch
32	Data[4].7			
33	Data[4].6			
34	Data[4].5			
35	Data[4].4			
36	Data[4].3			
37	Data[4].2			
38	Data[4].1			
39	Data[4].0			
40	Data[5].7			
41	Data[5].6			
42	Data[5].5			
43	Data[5].4			
44	Data[5].3	OvR.3	OvR.3	Override
45	Data[5].2	OvR.2	OvR.2	Override
46	Data[5].1	OvR.1	OvR.1	Override
47	Data[5].0	OvR.0	OvR.0	Override
48	Data[6].7	HW.15	HW.15	Handwheel
49	Data[6].6	HW.14	HW.14	Handwheel
50	Data[6].5	HW.13	HW.13	Handwheel
51	Data[6].4	HW.12	HW.12	Handwheel
52	Data[6].3	HW.11	HW.11	Handwheel
53	Data[6].2	HW.10	HW.10	Handwheel

Fig. 9-15:   Bit assignment with function block

Evaluation of the Keys in the Operating System

If you activate one of the foil keys, additionally to the signaling of the keystroke in the control function block a keystroke in the operating system is optionally triggered. You can define the key code that is sent to the operating system yourself by adapting file `/StorageCard/CE/UserKey.txt`. Open this file with the editor. The file is structured line by line. Each line starts with name of the key, whose key code is to be defined. Enter after the keyword `KeyLabel=` in quotations the imprint, that you want to read on the front panel. Then, after the keyword `KeyStroke=` enter the key code, that you want to assign to the key. You can enter the printable signs in inverted commas, all other key codes either as VK constants or hexadecimal code. If several keys have to be pressed in sequence to reach a sign (e. g. A as capital letter - Shift and 'A' have to be activated), the signs are entered in sequence separated by `-`.

Examples:

Small letter 'A'   KeyStroke='A'

Small letter 'A'   KeyStroke=0x41

Small letter 'A'   KeyStroke=VK_A

Capital letter 'A' KeyStroke=VK_SHIFT-'A'

Capital letter 'A' KeyStroke=VK_SHIFT-0x41

Capital letter 'A' KeyStroke=VK_SHIFT-VK_A

Ctrl-Alt-Del   KeyStroke=VK_CTRL-VK_ALT-VK_DEL

9.8   System Update

As of operating system version 01V01 of the IndraControl VEH 30.1 an update functionality is provided. Thus, you can transmit more current operating system versions to the flash memory of the IndraControl VEH 30.1.

If there are data to be saved on the IndraControl VEH 30.1, these data might be downloaded via FTP data transfer.

Note:	During the whole update process the IndraControl VEH 30.1 must not be separated from the voltage supply.
	Before downloading data and uploading the new operating system, you have to find out and write down the IP address of the IndraControl VEH 30.1.

Preparation

Start the "update" program in folder **My Computer - Windows** to initialize an update of the operating system.

The following dialog requests, if the update is to be started and indicates the user that non-stored data might get lost. Acknowledge the request with the **OK** key on the keyboard or press the **Yes** button.

After confirming with **OK** the following dialog executes a reset of the running system and starts the update system.

The now started update system can be recognized by the red background color. Here the input via touch screen is no longer possible. The dialog active now allows to execute the update or to go back to the current operating system. With the arrow keys on the left and right side you can choose **Yes** or **No** and acknowledge with **OK**.

Now, save user-specific data via FTP and acknowledge the next dialog with **OK**. If the **OK** button is pressed on the keyboard, the operating system to overwrite is deleted and the IndraControl VEH 30.1 is ready for the FTP upload of the new operating system.

Note:	Do **not yet** acknowledge the following dialog:
	Copy the new system on the device and press the OK button when finished.

Upload via FTP Server

As next step, establish an FTP connection from an upload computer containing the complete file structure of the new operating system to the IndraControl VEH 30.1. Use a graphic explorer of the upload computer as FTP client. Enter the address as follows:

ftp://xxx.yyy.zzz.aaa

Copy the complete file structure of the new operating system into the FTP directory of the IndraControl VEH 30.1. When the upload of the operating system is finished, acknowledge the dialog on the IndraControl VEH 30.1 with **OK**.

Now, the reinstalled operating system starts and behaves corresponding to a first commissioning (see chapter 9.2 "First Commissioning").

10   Ordering Information

10.1 Type Code

The embedded terminal IndraControl VEH 30.1 has the following features according to the type code illustrated below:

IndraControl VEH 30.1
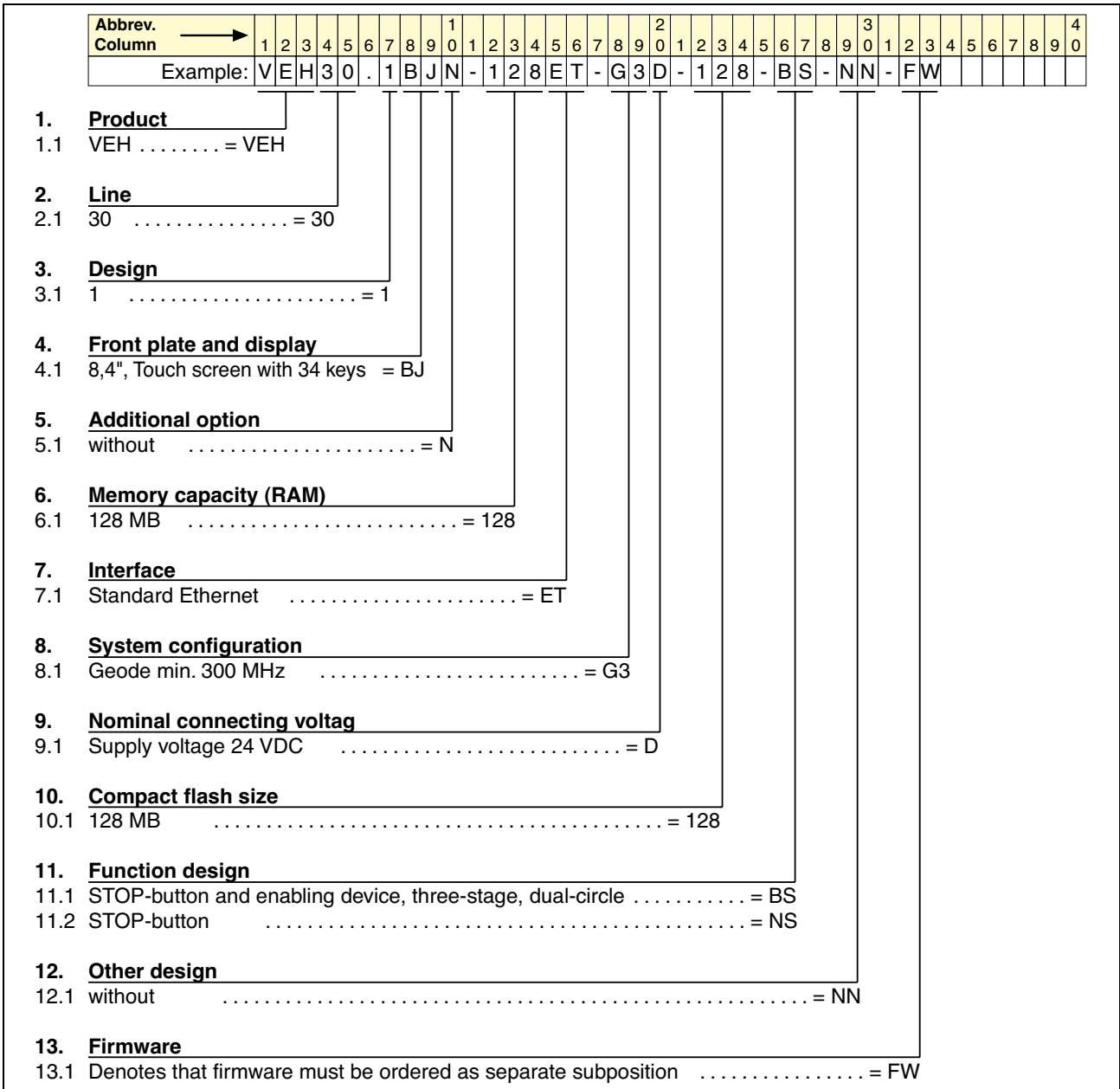
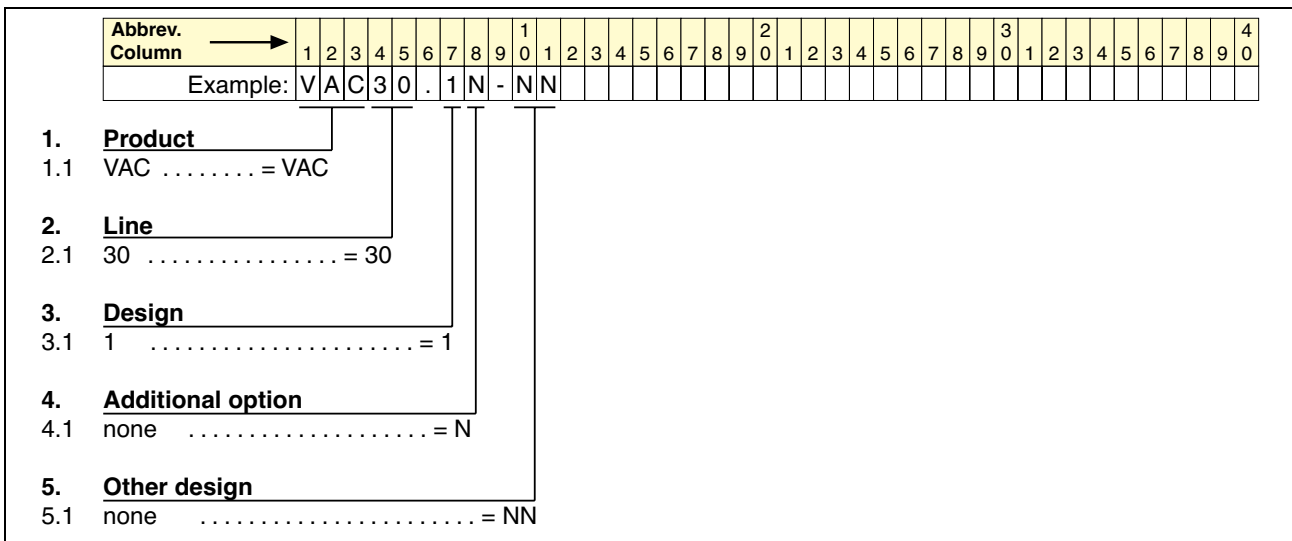Fig. 10-1:   Type code of the IndraControl VEH 30.1

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IndraControl VAC 30.1

Abbrev. Column →	1	2	3	4	5	6	7	8	9	1 0	1	2	3	4	5	6	7	8	9	2 0	1	2	3	4	5	6	7	8	9	3 0	1	2	3	4	5	6	7	8	9	4 0
Example:	V	A	C	3	0	.	1	N	-	N	N																													

1. Product
1.1 VAC . . . . = VAC

2. Line
2.1 30 . . . . = 30

3. Design
3.1 1 . . . . = 1

4. Additional option
4.1 none . . . . = N

5. Other design
5.1 none . . . . = NN

Fig. 10-2: Type code of the IndraControl VAC 30.1

10.2 Accessories

Extension Cable

Ordering designation	Part number	Description
VAS05.1-001-020-NN	R911315028	Extension cable for the IndraControl VEH 30

Fig. 10-3: Part number of the extension cable for the IndraControl VEH 30.1

Wall Holder

Ordering designation	Part number	Description
VAS01.1-001-NNN-NN	R911170076	Wall holder for the IndraControl VEH 30

Fig. 10-4: Part number of the wall holder for the IndraControl VEH 30.1

10.3 Spare Parts

Touch Pen

Ordering designation	Part number	Description
Touch pen	1070923266	Touch pen for the IndraControl VEH 30

Fig. 10-5: Part number of the touch pen for the IndraControl VEH 30.1

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13 Service & Support

13.1 Helpdesk

Unser Kundendienst-Helpdesk im Hauptwerk Lohr am Main steht Ihnen mit Rat und Tat zur Seite. Sie erreichen uns

Our service helpdesk at our headquarters in Lohr am Main, Germany can assist you in all kinds of inquiries. Contact us

- telefonisch - by phone: **+49 (0) 9352 40 50 60**
über Service Call Entry Center Mo-Fr 07:00-18:00 Central European Time
- via Service Call Entry Center   Mo-Fr 7:00 am - 6:00 pm CET

- per Fax - by fax: **+49 (0) 9352 40 49 41**

- per e-Mail - by e-mail: service.svc@boschrexroth.de

13.2 Service-Hotline

Außerhalb der Helpdesk-Zeiten ist der Service Deutschland direkt ansprechbar unter

After helpdesk hours, contact the German service experts directly at

+49 (0) 171 333 88 26

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

Hotline-Rufnummern anderer Länder entnehmen Sie bitte den Adressen in den jeweiligen Regionen.

Hotline numbers of other countries to be seen in the addresses of each region.

13.3 Internet

Unter **www.boschrexroth.com** finden Sie ergänzende Hinweise zu Service, Reparatur und Training sowie die **aktuellen** Adressen *) unserer auf den folgenden Seiten aufgeführten Vertriebs- und Servicebüros.

At **www.boschrexroth.com** you can find additional notes about service, repairs and training. The current addresses *) for our sales and service facilities locations around the world are on the following pages.

☐ Verkaufsniederlassungen
▨ Niederlassungen mit Kundendienst

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

☐ sales agencies
▨ sales agencies providing service

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

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

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

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

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

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

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.

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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13.5   Kundenbetreuungsstellen - Sales & Service Facilities

Deutschland – Germany

vom Ausland: (0) nach Landeskennziffer weglassen!
from abroad: don't dial (0) after country code!

Vertriebsgebiet Mitte Germany Centre	**SERVICE AUTOMATION**	**SERVICE AUTOMATION**	**SERVICE AUTOMATION**

Bosch Rexroth
Electrice Drives and Controls GmbH
Bgm.-Dr.-Nebel-Str. 2 / Postf. 1357
97816 Lohr am Main / 97803 Lohr
Kompetenz-Zentrum Europa
 	
Tel.:   +49 (0)9352 40-0
Fax: +49 (0)9352 40-4885
	CALL ENTRY CENTER
	H e l p d e s k
	MO – FR
	   von 07:00 - 18:00 Uhr
	   from 7 am – 6 pm
	
	Tel. +49 (0) 9352 40 50 60
	Fax +49 (0) 9352 40 49 41
	service.svc@boschrexroth.de
		HOTLINE 24 / 7 / 365
		
		außerhalb der Helpdesk-Zeit
		out of helpdesk hours
		
		Tel.: +49 (0)172 660 04 06
		oder / or
		Tel.: +49 (0)171 333 88 26
			ERSATZTEILE / SPARES
			   verlängerte Ansprechzeit
			   - extended office time -
			♦ **nur an Werktagen**
			   - only on working days -
			♦ **von 07:00 - 18:00 Uhr**
			   - from 7 am - 6 pm -
			Tel. +49 (0) 9352 40 42 22

Vertriebsgebiet Süd Germany South	Vertriebsgebiet West Germany West	Gebiet Südwest Germany South-West	
Bosch Rexroth AG Landshuter Allee 8-10 80637 München Tel.: +49 (0)89 127 14-0 Fax: +49 (0)89 127 14-490	Bosch Rexroth AG Regionalzentrum West Borsigstrasse 15 40880 Ratingen Tel.: +49 (0)2102 409-0 Fax: +49 (0)2102 409-406 +49 (0)2102 409-430	Bosch Rexroth AG Service-Regionalzentrum Süd-West Siemensstr. 1 70736 Fellbach Tel.: +49 (0)711 51046–0 Fax: +49 (0)711 51046–248	
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Bosch Rexroth AG Walsroder Str. 93 30853 Langenhagen Tel.: +49 (0) 511 72 66 57-0 Service: +49 (0) 511 72 66 57-256 Fax: +49 (0) 511 72 66 57-93 Service: +49 (0) 511 72 66 57-783	Bosch Rexroth AG Regionalzentrum Mitte Waldecker Straße 13 64546 Mörfelden-Walldorf Tel.: +49 (0) 61 05 702-3 Fax: +49 (0) 61 05 702-444	Bosch Rexroth AG Beckerstraße 31 09120 Chemnitz Tel.: +49 (0)371 35 55-0 Fax: +49 (0)371 35 55-333	Bosch Rexroth AG Regionalzentrum Ost Walter-Köhn-Str. 4d 04356 Leipzig Tel.: +49 (0)341 25 61-0 Fax: +49 (0)341 25 61-111

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