

Digital drive controller for hydraulic axes with sercos interface

Type VT-HNC100...3X/S...

RE 30159-B/12.14

Replaces: 10.11

English

Operating instructions



The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

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The cover page shows a sample configuration. Thus, the delivered product may differ from the picture shown.

The original operating instructions were prepared in German.

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About these instructions

1 About this document

These instructions contain important information on the safe and appropriate assembly, transport, commissioning, operation, maintenance, disassembly and simple troubleshooting of the VT-HNC100...3X/S digital axis control.

Read these instructions completely, especially chapter 2 "General safety instructions" before working with the VT-HNC100...3X/S... digital axis control.

1.1 Issue status / version of the documentation

Table 1: Issue status / version of the documentation

Document	Issue date	Replaces	Change
RE 30159-B	10.11	10.09	--

1.2 Related documents

The VT-HNC100...3X/S... digital axis control is a system component.

Also observe the following instructions:

- Product information RE 09956
- Technical data sheet RE 30159
- Declaration of environmental compatibility RE 30139-U
- Functional description RE 30159-FK
- Parameter description RE 30159-PA

Also observe the generally applicable, legal or otherwise binding regulations of the European or national legislation and the rules for the prevention of accidents and for environmental protection applicable in your country.

2 General safety instructions

The VT-HNC100...3X/S... digital axis control has been manufactured according to the accepted rules of current technology. There is, however, still the risk of personal injury or damage to equipment if the following general safety instructions and the warnings before the steps contained in these instructions are not complied with.

- ▶ Read these instructions completely and thoroughly before working with the VT-HNC100...3X/S....
- ▶ Keep these instructions in a location where they are accessible to all users at all times.
- ▶ Always include the operating instructions when you pass the VT-HNC100...3X/S... on to third parties.
- ▶ Only operate the VT-HNC100...3X/S... in a technically unobjectionable condition and as intended, in a safety- and risk-conscious way, considering these instructions.
- ▶ In case of failures impairing the safety and changes in the operating behavior, immediately stop the VT-HNC100...3X/S... and inform the responsible personnel about the failures.

2.1 Intended use

The VT-HNC100...3X/S... is exclusively intended for being integrated in a machine or system or for being assembled with other components to form a machine or system. The product may be commissioned only if it has been integrated in the machine/system for which it is designed. Observe the operating conditions and performance limits specified in the technical data.

The VT-HNC100...3X/S... is used for the open and closed-loop control of position, pressure and velocity of electro-hydraulic axes. When using the unit, you moreover need superordinate control logics with corresponding I/O components that in connection with the VT-HNC100...3X/S... are responsible for the holistic control of the machine's motion sequence and also its monitoring as regards safety.

The VT-HNC100...3X/S... must not be used in explosive environments.

The VT-HNC100...3X/S... is a work appliance and not designed for private use.

Intended use includes having read and understood these instructions, especially the chapter 2 "General safety instructions".

2.2 Improper use

Any use of the VT-HNC100...3X/S... other than described in chapter 2.1 "Intended use" is considered as improper.

General safety instructions

2.3 Personnel qualification

Assembly, commissioning and operation, disassembly, service (including maintenance and repair) require basic mechanical, hydraulic, electrical and control knowledge as well as knowledge of the appropriate technical terms. In order to ensure operating safety, these activities may therefore only be carried out by qualified technical personnel or an instructed person under the direction and supervision of qualified personnel.

Qualified personnel are those who can recognize possible hazards and institute the appropriate safety measures due to their professional training, knowledge, and experience, as well as their understanding of the relevant conditions pertaining to the work to be done. Qualified personnel must observe the rules relevant to the subject area.

2.4 Safety instructions in this document

In these instructions, there are safety instructions before steps whenever there is a risk of personal injury or damage to the equipment. The measures described to avoid these hazards must be observed.

Warnings are structured as follows:

SIGNAL WORD!

Type of risk

- Consequences
 - ▶ Precautions
-

- Warning sign (warning triangle): Draws attention to the hazard
- Signal word: Identifies the degree of hazard
- Type of hazard: Identifies the type or source of the hazard
- Consequences: Describes the consequences in case of non-compliance
- Precautions: States how the hazard can be avoided

The signal words have the following meaning:

Signal word / warning sign	Application
DANGER! 	Indicates an imminently hazardous situation which, if not avoided, will certainly result in death or serious injury.
WARNING! 	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION! 	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or damage to equipment.
	If this information or further notes and additional information is disregarded, the operating procedure may be impaired.

2.5 Adhere to the following instructions

General instructions

- Observe the regulations for accident prevention and environmental protection applicable in the country where the product is used and at the workplace.
- Exclusively use Rexroth products in a technically unobjectionable condition.
 - ▶ Check the product for visible defects, for example loose seat of screws, loose seat of the connector plugs and connection lines, mechanical damage, etc.
- You must generally not modify or retrofit the product.
- Only use the product within the performance range provided in the technical data.
- Persons who assemble, operate, disassemble or maintain Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to respond.
- Make sure that all safety equipment belonging to the product is present, has been installed properly and is fully functional. You must not displace, bypass or disable the safety equipment.
- If it should be necessary to disable any safety equipment temporarily, for example for commissioning or maintenance work, always take the appropriate measures to ensure that no hazard to a person's life or health or to property may occur. Also observe the superordinate operating instructions of the machine or system.
- The warranty only applies to the delivered configuration.
- The warranty will not apply if the product is incorrectly assembled, not used as intended and/or handled improperly.
- Do not expose the product to any inadmissible mechanical loads under any circumstances. Never use the product as a handle or step. Do not place any objects on it.

General safety instructions

During assembly

- Make sure the relevant system component is depressurized and de-energized before assembling the product or when connecting and disconnecting plugs. Protect the system component against being switched on.
- The VT-HNC100...3X/S... should not be installed next to power electronics (e.g. frequency converters). The power pack of the VT-HNC100...3X/S... should be installed as close to the VT-HNC100...3X/S... as possible.
- Keep connections for the voltage supply as short as possible. Pass supply and return lines (+24 V/GND) together. Voltage 18-30V. Residual ripple $< 1.5 V_{pp}$, $I = 1 A - 4 A$ (depending on the VT-HNC100...3X/S... version and the co-supplied components). Ensure the largest spatial separation of signal and load lines possible and do not pass them parallelly. Do not lead signal lines through strong magnetic fields. If possible, pass signal lines without interruption. If intermediate terminals are necessary, use a terminal block with shield bus and an assembled VT-HNC100...3X/S... cable (max. length 2 m). Exception VT-HNC100-C-3X/S...: Here, intermediate clamping using a corresponding terminal block/shield bus is necessary for EMC-compliance. Load lines of two individual wires (e.g. voltage supply) are to be passed in a parallel or drilled form.
- For signal lines, only cables with a copper braid screen should be used. The cable screen is extensively connected with the metallized connector housing and usually only on the VT-HNC100...3X/S... side. This is achieved by pushing the screen back and clamping under the pull relief. Cables should only have the actually required number of wires. If this is not possible, the remaining wires should be laid to GND on both sides.
- Voltage supply of external components:
A digital position transducer with 24 V or 5 V supply can be additionally supplied via the encoder interface. When supplying a 24 V encoder, the input voltage of the VT-HNC100...3X/S... at X1S must comply with the encoder's requirements (e.g. 24 V \pm 5%, residual ripple < 500 mV). Analog components like pressure cells can be supplied via the socket X2A, X2A1. The input voltage of the VT-HNC100...3X/S... must comply with the requirements of the pressure cell.
For more information on currents etc. please refer to the technical data sheet RE 30159.
- By snapping the housing of the VT-HNC100...3X/S... on a conductive assembly rail, the earth connection to the control cabinet back wall is established. This constitutes the HF earthing of the VT-HNC100...3X/S....
- Lay the cables and lines so that they cannot be damaged and no one can trip over them.
- Before commissioning, make sure that all the seals and plugs of the plug-in connections are installed correctly and intact to ensure that they are leakproof and fluids and foreign bodies are prevented from penetrating the product.
- The environment must be free from electrically conductive contamination (acids, bases, corrosive agents, salts, metal vapors, etc.) and must not be exposed these substances.
- No silicone-containing sealing, adhesive or insulating agents must be used.
- Ensure a maintenance-friendly installation, i.e. simple access to the connection lines. Free access to the connection side must be guaranteed.
- Before installation note down the information on the nameplates. If after the installation, nameplates are not visible or readable any more, this data will be quickly available to you at any time.
- Do not use electrical signals led out of the VT-HNC100...3X/S... (e.g. the Ready for Operation signal) for switching safety-relevant machine functions! (in this connection also see the European Standard "Safety requirements for fluid power systems and their components - Hydraulics" EN 982:1996).

General safety instructions

- Troubleshoot system components as follows:
 - Switched inductivities DC: Antiparallel free-wheeling diode over actuator winding.
 - Switched inductivities AC: Type-related R/C combination over actuator winding.
 - Electric motors: R/C combination from each motor winding to earth.
 - Frequency converter: Input filter in the voltage supply of the FU.
Motor control lines shielded and laid separately from other lines and/or output filter for motor lines.
Extensive contact of the FU housing with the control cabinet back wall.

During commissioning

- Let the product acclimate itself for several hours before commissioning, as otherwise water may condense in the housing.
- Make sure that all electrical connections are either used or covered. Commission the product only if it is installed completely.

During operation

- Only authorized staff is allowed to operate the setting mechanisms of the components or parts, under the proviso that the hydraulic system is used as intended.
- Only persons who have been authorized by the operator may be granted access to the direct operating sector. This also applies during any standstill of the system.
- In case of emergency, failure or in case of other irregularities switch off the system and secure it against re-start.

Disposal

- Dispose of the product in accordance with the national regulations in your country.

3 Delivery contents

The delivery contents include:

- VT-HNC100...3X/S...
- Mating connector for X1S (type Phoenix Mini Combicon 3-pole)
- Mating connector for X2D (type Phoenix Micro Combicon 8-pole) or X2D1 (Phoenix Mini Combicon 12-pole)
- Mating connector X2A (type Phoenix Micro Combicon 8-pole) or X2A1 (HD-SUB 15-pole)
- Mating connector X8M (type Phoenix Micro Combicon 8-pole) or X8M1 (HD-SUB 15-pole)

An interface cable RS232 (length 3 m; material no. **R900776897**) as well as an USB RS232 converter (material no. **R901066684**) are **not** included in the delivery contents can, however, be ordered separately.

Software is not included in the delivery contents.

Download in the Internet for commissioning software: www.boschrexroth.com/hnc100



Check the delivery contents for completeness, for possible transport damage, for suitable and complete operating instructions. Enquire about incomplete operating instructions.

4 Product description

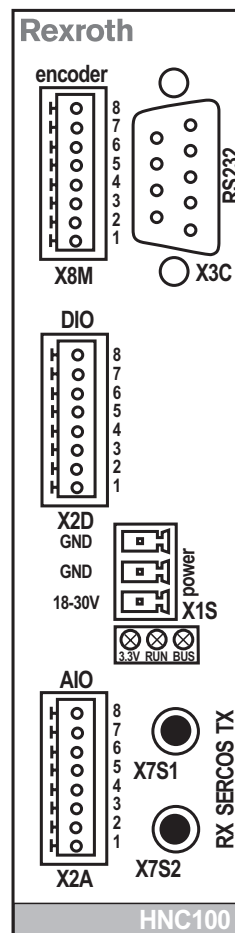
4.1 Pin assignments

VT-HNC100-C-3X/S-S-00/000, Material number R901112919
(Compact with sercos II)

X8M Encoder		
Pin	SSI	EnDat 2.2
8	Shield	Shield
7	24 Venc	
6		+5 V
5	- Clk	- Clk
4	+ Clk	+ Clk
3	- Data	- Data
2	+ Data	+ Data
1	EGND	

X2D DIO (Digital)	
Pin	
8	Shield
7	OUT2
6	OUT1
5	IN 4
4	IN 3
3	IN 2
2	IN 1
1	DGND

X2A AIO (Analog)	
Pin	
8	Shield
7	24 Vsens
6	Vout1 +
5	Vout2 +
4	Vin 1
3	Cin2 +
2	Cin1 +
1	AGND



X3C RS232	
Pin	
1	
2	TxD
3	RxD
4	reserved
5	GND
6	reserved
7	reserved
8	reserved
9	

X1S Power	
Pin	
1	GND
2	GND
3	18 - 30 V

X7 sercos II	
S1	TX
S2	RX



The pins marked with “**reserved**” are reserved and must not be connected!

Product description

VT-HNC100-1-3X/S-I-30/000, Material number R901234133
 (1-axis version with sercos III and with interface optionally for incremental, EnDat 2.2 or SSI position transducer)

VT-HNC100-1-3X/S-C-30/000, Material number R901281693
 (1-axis version with sercos III and with interface for 1 Vss position transducer)

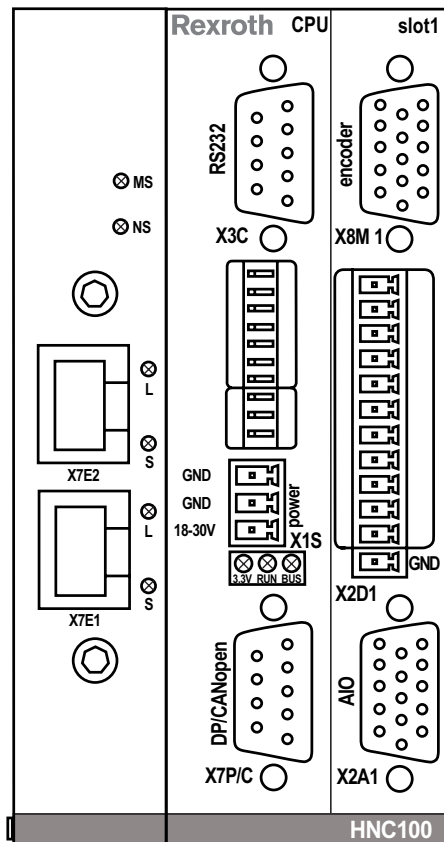
Slot 1 X8M1		Encoder				
		Incremental	1 Vpp	EnDat 2.2	SSI	Analog
Pin	1	- B (Inc)	- B (Inc)			
	2			+ CLK	+ CLK	
	3	+ R (Inc)	+ R (Inc)			
	4	- R (Inc)	- R (Inc)			
	5	+ A (Inc)	+ A (Inc)			
	6	- A (Inc)	- A (Inc)			
	7			- CLK	- CLK	
	8	+ B (Inc)	+ B (Inc)			
	9			- Data	- Data	
	10	EGND	EGND	EGND	EGND	EGND
	11			+ Data	+ Data	
	12	+5 Venc	+5 Venc	+5 Venc		
	13					+10 Vref
	14				+24 Venc	
	15					Vimp1

X3C RS232	
Pin	
1	
2	TxD
3	RxD
4	reserved
5	GND
6	reserved
7	reserved
8	reserved
9	

Slot 1 X2D1 DIO (Digital)		
Pin	1	I/O 1
	2	I/O 2
	3	I/O 3
	4	I/O 4
	5	I/O 5
	6	I/O 6
	7	I/O 7
	8	I/O 8
	9	I/O 9
	10	I/O 10
	11	I/O 11
	12	DGND

X1S Power	
Pin	
1	GND
2	GND
3	18 - 30 V

X7E1, X7E2
 sercos III connection



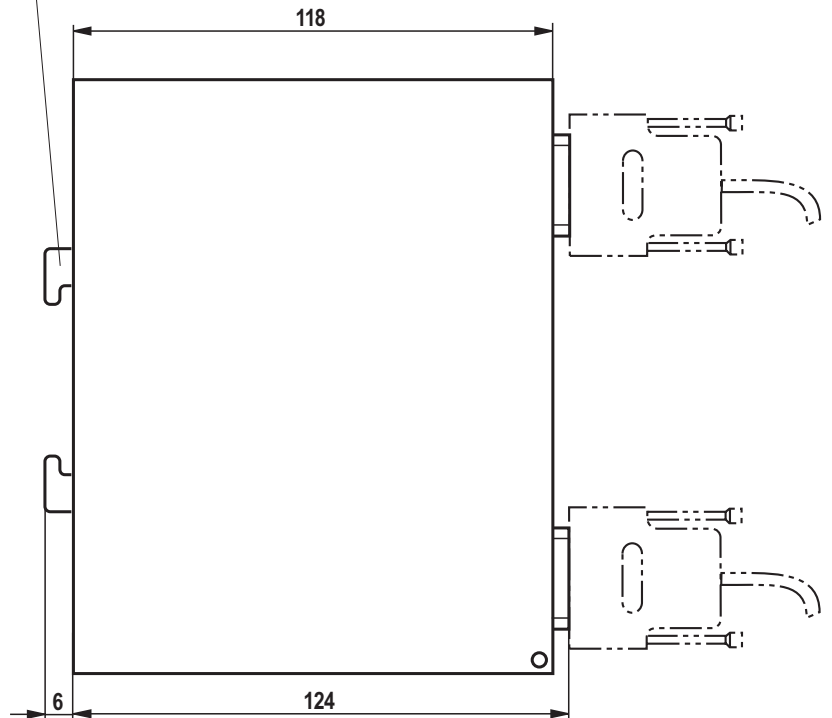
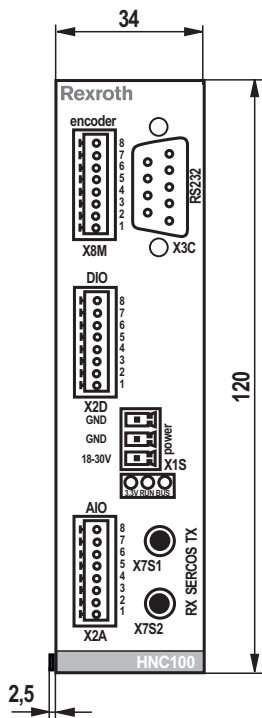
Slot 1 X2A1 AIO (Analog)		
Pin	1	Vin1 +
	2	Vin1 -
	3	Vin2 +
	4	Vin2 -
	5	Cin1 +
	6	Cin1 -
	7	Cin2 +
	8	Cin2 -
	9	reserved
	10	AGND
	11	Vout1 +
	12	Vout2 +
	13	Cout1
	14	+24 Vsens
	15	reserved



- The pins marked with “**reserved**” are reserved and must not be connected!
- PROFIBUS DP or CANopen (connection X7P/C) are not available with the sercos version.

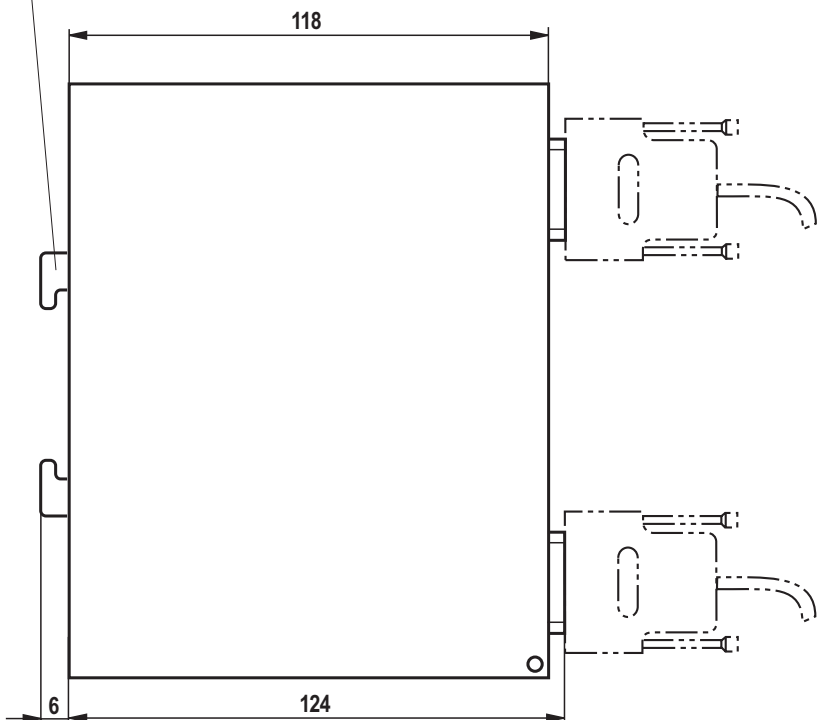
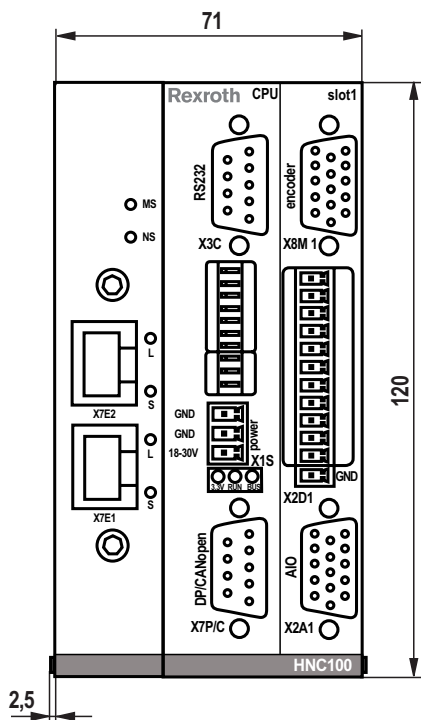
Unit dimensions VT-HNC100-C-3X/S-S-00/000 (dimensions in mm)

Assembly on top hat rail TH 35-7.5 or TH 35-15 according to EN 60715



Unit dimensions VT-HNC100-1-3X/S-...-30/000 (dimensions in mm)

Assembly on top hat rail TH 35-7.5 or TH 35-15 according to EN 60715



Product description**Description of the LEDs**

At the front side of the VT-HNC100...3X/S... unit, there are the following 3 LED displays:

- 3.3 V: Voltage supply of the VT-HNC100...3X/S... is OK.
- RUN: VT-HNC100...3X/S... has been initialized and is in "RUN". The LED flashes if the VT-HNC100...3X/S... has not been initialized.
- BUS: Field bus communication is OK.
- L: LINK active, indicates the physical connection to the communication partner.
- S: Status LED, the CI system is sending or receiving Ethernet telegrams.
- MS: Module status / host-dependent
- NS: Network status

5 Assembly

5.1 Unpacking

Dispose of the packing in accordance with the national regulations in your country.

5.2 Installation conditions

For installing the product always observe the ambient conditions specified in RE 30159.

5.3 Recommended accessories

In order to assemble the product, the need the following accessories that are not included in the delivery contents and that you can order from Bosch Rexroth:

Table 4: Recommended accessories

Component	Material number
Interface cable RS232, length 3 m	R900776897
USB RS232 converter	R901066684
Cable set VT17220-1X/HNC100-3X, length 2 m, for analog signals (connection X2A1) and digital position transducers (connection X8M1) with HD plug and open breakout cable for: VT-HNC100-1-3X	R901189300
Cable set VT17220-1X/HNC100-3X, length 2 m, for analog signals (connection X2A) and digital position transducers (connection X8M) with FK MC plug and open breakout cable for: VT-HNC100-C-3X	R901189302

5.4 Assembling the VT-HNC100...3X/S...

CAUTION!



Risk of personal injuries and material damage!

Assembly of the product requires basic electrical knowledge.

- ▶ The product may only be assembled by qualified personnel (see chapter 2.3).

Assemble the VT-HNC100...3X/S... on a top hat rail as follows:

- ▶ De-energize the relevant part of the system.
- ▶ Carefully engage the housing back side of the VT-HNC100...3X/S... on a top hat rail. The mechanical contact points on the elastic back wall of the VT-HNC100...3X/S... allow for a safe seat on the top hat rail and the connection of the housing with the control cabinet's earthing system.

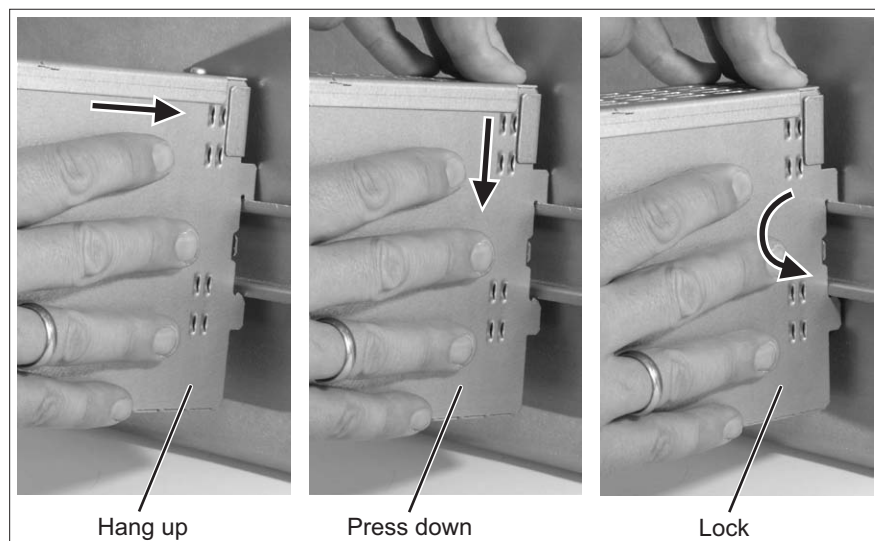


Fig. 1: Assembling the VT-HNC100...3X/S... on the top hat rail

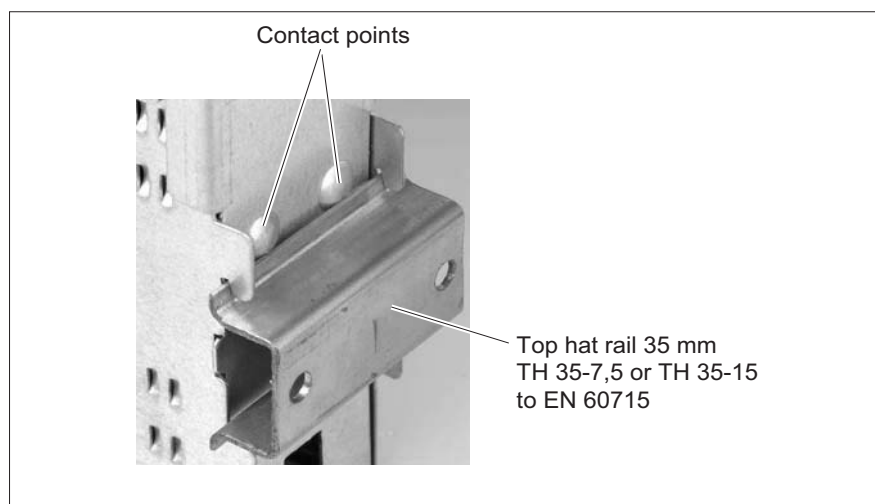


Fig. 2: Contact points of the VT-HNC100...3X/S... for assembly on top hat rail

CAUTION!**Risk of injuries when assembling under voltage!**

If you do not switch off voltage supply before assembling the product, you may get injured, destroy the product or damage system components.

- ▶ Always switch off power supply to the relevant system component before assembling the product.

CAUTION!**Risk of personal injuries and material damage!**

Incorrect energy supply may lead to uncontrolled valve positions. These could possibly result in malfunctions or failure of the VT-HNC100...3X/S... and cause injuries.

- ▶ Exclusively use a power pack with safe electrical isolation.
- ▶ Always comply with the country-specific regulations.

CAUTION!**Connecting or disconnecting plugs under voltage will destroy the unit!**

Connecting or disconnecting plugs under voltage causes high potential differences which can destroy the unit.

- ▶ Switch off power supply to the relevant system component before assembling the unit or when connecting and disconnecting plugs.

CAUTION!**Short-circuit or failures due to penetrating humidity and contamination**

The housing of the VT-HNC100...3X/S... is perforated. Contamination and liquids may easily enter and cause failures or short-circuits!

Safe functioning of the VT-HNC100...3X/S... is thus no longer ensured.

- ▶ Always provide for absolute cleanness when working on the VT-HNC100...3X/S....
- ▶ For the pin assignments of the VT-HNC100...3X/S... please refer to chapter 4.1.



In the case of VT-HNC100..3x as of series 31 with Sercos III interface (see type code VT-HNC100-1-3X/S-I-30/000) firmware versions higher than 06V26 must be used.

Further information and download:

<http://www.boschrexroth.com/hnc100>

Should you have further queries, please contact

eMail: support.nc-system@boschrexroth.de

Series			
Rexroth Made in Germany 7087	VT-HNC100-1-31/S-I-30/000		
	MNR. R901234133	14W07	SN: RR00000.1a

6 Maintenance

6.1 Cleaning and care

CAUTION!

The housing of the VT-HNC100...3X/S... is perforated. Contamination and liquids may easily enter and cause failures!

Safe functioning of the VT-HNC100...3X/S... is thus no longer ensured.

- ▶ Always provide for absolute cleanness when working on the VT-HNC100...3X/S....
 - ▶ Only use a dry and dust-free cloth for all cleaning works.
-

CAUTION!

Damage to the surface due to solvents and aggressive cleaning agents!

Aggressive detergents may damage the VT-HNC100...3X/S... and let it age faster.

- ▶ Never use solvents or aggressive detergents.
-

For cleaning and maintenance proceed as follows:

- ▶ Perform a visual inspection for checking the tight seat of all lines and screws.
- ▶ Check all plug-in and clamping connections of the VT-HNC100...3X/S... for correct seat and damage at least once per year.
- ▶ Check lines for breakage and squeezing. Have damaged or defective lines exchanged immediately!
- ▶ Clean housing parts with a dry and dust-free cloth.

6.2 Repair

The VT-HNC100...3X/S... can only be exchanged as whole unit. For safety

reasons, modifications at the VT-HNC100...3X/S... performed to one's own authority are not admissible! Repair and service works may only be performed by Bosch Rexroth AG. For repair and service works, send the unit to the service address specified in chapter 10.1.

7 Disassembly and replacement

7.1 Required tools

No tools required.

7.2 Preparing disassembly

Decommission the entire system as described in the overall system instructions. The system must in any case be brought into a safe condition, stopped, depressurized and de-energized and secured against re-start.

WARNING!**Risk of injuries when disassembling under pressure and with electrical voltage applied!**

If you do not de-pressurize and de-energize the system before disassembling the product, you may get injured and the product or system components may be damaged.

- ▶ Make sure that the relevant system components are depressurized and de-energized.

7.3 Disassembling the VT-HNC100...3X/S...

Proceed as follows to disassemble the VT-HNC100...3X/S...:

- ▶ Pull off the connection lines and plugs.
- ▶ Release the VT-HNC100...3X/S... from the top hat rail.

Disassembly and replacement / disposal

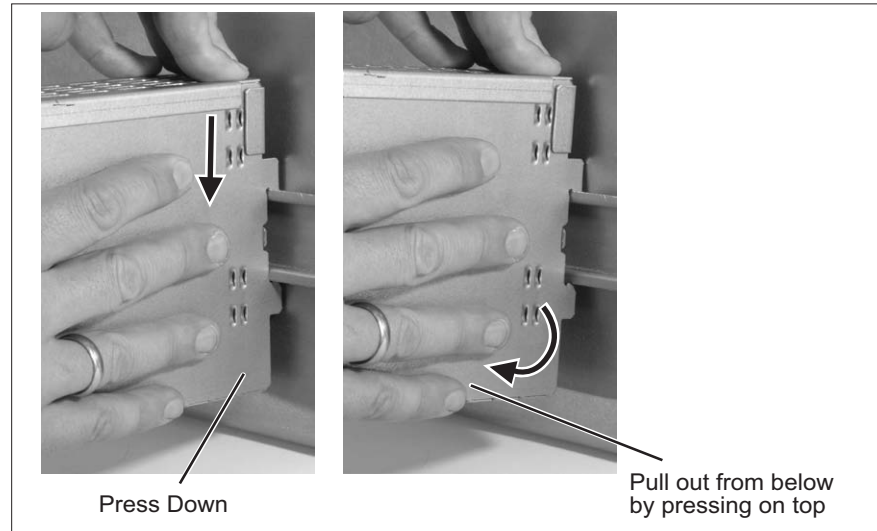


Fig. 5: VT-HNC100...3X/S... disassembly from the top hat rail

7.4 Preparing storage and further use

Proceed as follows in order to prepare the VT-HNC100...3X/S... for storage and further use:

- ▶ Only use the original packing for storage.
- ▶ Observe the admissible storage temperature range that is specified in RE 30159.
- ▶ Protect against dust and humidity.

8 Disposal

8.1 Environmental protection

Careless disposal of the VT-HNC100...3X/S... may lead to environmental contamination.

- ▶ Thus, dispose of the VT-HNC100...3X/S... in accordance with the national regulations in your country!

9 Troubleshooting

9.1 How to proceed for troubleshooting

- Always act systematically and targeted, even under pressure of time. Random and imprudent disassembly and readjustment of settings might result in the in-

Appendix

ability to restore the original error cause.

- First get a general idea of how the product works in conjunction with the entire system.
- Try to find out whether the product has worked properly in conjunction with the entire system before the troubles occurred first.
- Try to determine any changes of the entire system in which the product is integrated:
 - Were there changes to the product's operating conditions or operating range?
 - Were there any changes (e.g. retrofitting) or repair works on the entire system (machine/system, electrics, control) or on the product? If yes: Which?
 - Was the product or machine used as intended?
 - How did the malfunction appear?
 - Try to get a clear idea of the error cause. If necessary, as the direct (machine) operator.
- For troubleshooting, use the "Indraworks" diagnosis possibilities. Optionally, the diagnosis and the error messages can be read out via field bus.

If you should not be able to remedy an occurred error, please contact one of the addresses that you can find under www.boschrexroth.com or in the address directory in chapter 10.1.

10 Appendix

10.1 Address directory

Contact person for support

Bosch Rexroth AG
97816 Lohr am Main
Germany

Phone +49 (93 52) 18-11 32
Fax +49 (93 52) 18-33 63
E-mail: support.nc-system@boschrexroth.de

Contact person for service

Bosch Rexroth AG
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97816 Lohr am Main
Germany

E-mail: service@boschrexroth.de

Bosch Rexroth AG
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