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

Rexroth Bosch Group

Digital controller assembly for the secondary control of axial piston units

Type SYHNC100-SEK...3X

RE 30162-B/04.11
Replaces: 06.10

English

Operating Instructions



Hyquip Limited New Brunswick Street Horwich Bolton Lancashire BL6 7JB UK
Company Registered in England No: 4167649 VAT Registration No: 732 5692 25 BS EN ISO 9001:2008 No: LRQ 0964389

The data specified below only serve to describe the product. Any information with regard to use only refers to application examples and recommendations. Data available in catalogs are no guaranteed characteristics. The information given does not exempt the user from making own evaluations and tests. Our products are subject to a natural process of wear and aging.

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The cover shows a sample configuration. The product supplied may therefore differ from the photo shown.

The original operating instructions were prepared in German.

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1 About this document

1.1 Validity of the documentation

This documentation applies to the SYHNC100-SEK...3X digital controller assembly of the VT-HNC100 product family.

For the precise identification of the products see chapter 4.3 "Identification of the product" on page 12.

This documentation is intended for assembly fitters, operators and service technicians and plant operators.

This documentation contains important information on the safe and appropriate assembly, transport, electrical connection, commissioning, operation, use, maintenance, disassembly and simple troubleshooting of the product.

- You should read this documentation thoroughly, and in particular the chapter “Safety instructions”, page 7, before working with the product.

1.2 Additional documentation

Documentations marked with the book symbol 🕮 must be available to you before handling the product and must be complied with:

Table 1:

	Title	Document number	Document type
🕮	Digital controller assembly SYHNC100-SEK...3X	RE 30162	Technical data sheet Available on the Internet under www.boschrexroth.com
	Declaration on the environmental compatibility for EMC, climate and mechanical load	RE 30162-U	Environmental statement Available on the Internet under www.boschrexroth.com
	General product information on hydraulic products	RE 07008	Available on the Internet under www.boschrexroth.com

1.3 Illustration of information

Consistent safety instructions, symbols, terms and abbreviations are used so that you can quickly and safely work with your product using this documentation. For a better understanding, they are explained in the following sections.

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1.3.1 Safety instructions

In this documentation, safety instructions are indicated whenever sequences of operations are explained which bear the risk of personal injury or damage to property. The measures described for preventing these hazards must be observed.

Safety instructions are set out as follows:

> **⚠ SIGNAL WORD**
>
> **Type of risk**
>
> Consequences in case of non-compilance
>
> ▶ Precausion

- **Warning signs:** Draws attention to the hazard
- **Signal word:** Identifies the degree of hazard
- **Type of risk:** Specifies the type or source of the hazard
- **Consequences:** Describes the consequences of non-compilance
- **Precautions:** Specifies how the hazard can be prevented

Table 2: Risk classes according to ANSI Z535.6-2006

Warning sign, signal word	Meaning
⚠ DANGER	indicates a dangerous situation which may cause death or severe personal injuries if not avoided
⚠ WARNING	indicates a dangerous situation which may cause death or severe personal injuries if not avoided
⚠ CAUTION	indicates a dangerous situation which may cause minor or medium personal injuries if not avoided
NOTE	Damage to property: The product or the environment could be damaged.

1.3.2 Symbols

The following symbols indicate notes which are not safety-relevant but increase the understanding of the documentation.

Table 3: Meaning of the symbols

Symbols	Meaning
	If this information is not observed, the product cannot be used and/ or operated optimally.
▶	individual, self-dependent step

1.3.3 Denominations

The following denominations are used in this documentation:

Table 4: Denominations

Denomination	Meaning
SYHNC100-SEK...3X	Digital controller assembly
WIN-PED®	Operating software WIN-PED® 6.6 for the SYHNC100-SEK...3X
RE xxxx	Rexroth document in English language

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1.3.4 Abbreviations

The following abbreviations are used in this documentation:

Table 5: Abbreviations

Abbreviation	Meaning
CAN	Controller AREA Network
CPU	Central Processing Unit
I/O	Input/Output
EMC	Electromagnetic Compatibility
HMI	Human Machine Interface
HNC	Hydraulic Numerical Control
OK	HNC ready for operation
PC	Personal Computer
USB	Universal Serial Bus
PELV	Protective Extra Low Voltage

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2 Safety instructions

2.1 General information on this chapter

The SYHNC100-SEK controller assembly has been manufactured according to the accepted rules of current technology. However, there is still the risk of injury and damage to property if you do not observe this chapter and the safety instructions in this documentation.

- Read these instructions completely and thoroughly before working with the product.
- Keep this documentation in a location where it is accessible to all users at all times.
- Always include the required documentation when you pass the SYHNC100-SEK...3X on to third parties.
- Only operate the SYHNC100-SEK...3X in a technically immaculate condition and as intended, in a safety- and risk-conscious manner, considering these instructions.
- In case of failures impairing the safety and modifications to the operating behavior, shut down the SYHNC100-SEK...3X immediately and report the failures to the responsible personnel.

2.2 Intended use

The SYHNC100-SEK...3X is an electric assembly.

You may use the product as follows:

The SYHNC100-SEK...3X is intended exclusively for integration into a machine or system or to be assembled with other components to form a machine or system. The product may be commissioned only if it is integrated in the machine/system for which it is designed. Observe the operating conditions and performance limits specified in the technical data.

The SYHNC100-SEK...3X is used for the closed-loop control of speed and torque and for the open-loop control of the torque of up to four mechanically coupled secondary controlled drives. When using the unit, you moreover need superordinate control logics with corresponding I/O components that in connection with the SYHNC100-SEK...3X are responsible for the holistic control of the machine's motion sequence and also its monitoring as regards safety.

The SYHNC100-SEK...3X must not be used in explosive environments.

The SYHNC100-SEK...3X is designed for professional and not for private use.

Intended use includes having read and understood this documentation, especially the chapter 2 “Safety instructions”.

2.3 Improper use

Any use deviating from the intended use is not intended and thus not admissible.

The installation or use of inappropriate products in safety-relevant applications could result in unintended operating conditions when being used which in turn could cause personal injuries and/or damage to property. Therefore please only use a product for safety-relevant applications if this use is expressly specified and permitted in the documentation of the product. For example in explosion-protected areas or in safety-related control components (functional safety).

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Bosch Rexroth AG does not assume any liability for damages caused by not intended use. The user assumes all risks involved with not intended use.

Not intended use of the product includes:

- Using the digital controller assembly outside the specified performance limits and operating conditions and in particular the specified environmental conditions;
- Using the digital controller assembly as safety-related part of controls in the sense of DIN EN ISO 13849. Functional safety must be implemented using appropriate additional components.

2.4 Qualification of personnel

The activities described in this documentation require basic knowledge of the electric installation, control technology, programming and hydraulics, especially secondary controlled drives, as well as knowledge of the appropriate technical terms. In order to ensure safe use, these activities may only be carried out by qualified technical personnel or an instructed person under the direction and supervision of a qualified person.

Qualified personnel are those who can recognize potential hazards and apply 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 undertaken. Qualified personnel must observe the rules/laws relevant to the specific subject area.

Qualified personnel are those who can recognize potential hazards and apply the appropriate safety measures due to their professional training, knowledge and experience, as well as their understanding of the relevant conditions on secondary controlled drives pertaining to the work to be undertaken. Qualified personnel must observe the rules/laws relevant to the specific subject area applying to secondary controlled drives.

The operation of the SYHNC100-SEK...3X digital controller assembly requires the safe handling with the PC program WIN-PED® version 6.6.

2.5 General safety instructions

- Observe the applied provisions for the prevention of accidents and for environmental protection.
- Observe the safety regulations and provisions of the country where the product is implemented/used.
- Exclusively use Rexroth products in good technical order and condition.
- Observe all notes on the product.
- Persons who assemble, operate, disassemble or maintain Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to respond.
- Only use accessories and spare parts authorized by the manufacturer.
- Comply with the technical data and ambient conditions indicated in the product documentation.
- The installation or use of inappropriate products in safety-relevant applications could result in uncontrolled operating conditions when being used which in turn could cause injuries and/or damages to property. Therefore please only use a product for safety-relevant applications if this use is expressly specified and permitted in the documentation of the product.
- Do not commission the product until you can be sure that the end product (for example a machine or system) where the Rexroth product is installed complies with the country-specific provisions, safety regulations and application standards.

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- Please observe the safety-relevant information and risk specifications in the operating instructions of the manufacturer of the connected hydraulic system before commissioning the control with a hydraulic system.
- Please observe the general installation and safety instructions when working on electric systems.
- The information given in the product documentation with regard to the use of the supplied components are only application samples and recommendations. The machine manufacturer and system installer must check the suitability of the supplied components and the information given in this documentation with regard to their use self-dependently for his individual application and adjust it to the safety instructions and standards valid for his application, and carry out the required measures, changes and amendments.
- Technical data as well as connection and installation conditions are available in the product documentation and must be imperatively observed.
- Personal protection is to be ensured by monitoring or measures which are superior to the system. The SYHNC100-SEK..3x itself is no safety-relevant component.
- You must generally not modify or retrofit the product.

2.6 Product- and technology-related safety instructions

- **Dangerous motions**
  It is not allowed for persons to stay within the range of motion of machines and machine parts. The following are examples of possible measures against unintended access of persons:
  - Protective fences
  - Protective grids
  - Protective covers
  - Light barrier

- If persons must access the danger zone during active control, monitoring or measures must be provided for personal safety which are superior to the system. These measures must be provided according to the specific data of the system and on the basis of the risk and failure analysis of the system manufacturer/user. In this connection, the safety requirements applied for the system must be taken into account.
- The SYHNC100-SEK...3X itself does not include any safety functions for personal safety and is no safety-relevant component. The SYHNC100-SEK...3X is solely used for closed-loop speed control, closed-loop torque control as well as open-loop torque control of secondary controlled axes.
- In case of failures impairing the safety and modifications to the operating behavior, shut down the SYHNC100-SEK...3X immediately and report the failures to the responsible personnel.

- **High electrical voltage as a result of incorrect connection!**
  Danger of life, risk of injuries caused by electric shock!
  - Only use power packs with protective extra-low voltage (PELV) and/or if they are safely separated from the mains circuits. For further information please see IEC 60204-1.
  - All connections and clamps with voltages between 0 and 50 Volt may only be connected with devices, electric components and lines with a protective extra-low voltage (PELV).
  - Only connect voltages and electric circuits provided with a safe isolation from dangerous voltages. Safe electrical isolation can be achieved for example with isolating transformers, safe optocouplers or mains-free battery operation.

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2.7 Personal safety equipment

Check specified personal protection for completeness and protective effect and have it available. (Please observer customer requirements and personal protection list!)

3 Scope of delivery

The scope of delivery includes:

- Mating connector for X1S (Type Phoenix Mini Combicon 3-pole),
- Mating connector for X2D (Type Phoenix Mini Combicon 12-pole),
- Mating connector for X2A (Type HD-SUB 15-pole),
- Mating connector for X8M (Type HD-SUB 15-pole)

Accessories such as interface cables and cable sets are not included in the scope of delivery and must be ordered separately. See chapter 6.2 "Recommended accessories" on page 23.

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4 Information on this product

4.1 Performance description

The SYHNC100-SEK..3X digital controller assembly is an NC control for closed-loop speed control, closed-loop torque control as well as open-loop torque control of 1 to 4 mechanically coupled control axes with 4 subordinate swivel angle controllers for axial piston units of type A4VS..DS1(E). The SYHNC100-SEK..3X is connected to a superior control via a bus system (PROFIBUS DP or CANopen) and parameterized using a PC and the software program WIN-PED® version 6.6.

4.2 Product description

The SYHNC100-SEK..3X is designed for being used in rough industrial environments as regards to interference resistance, mechanical vibration and shock resistance, and climate resistance.

The SYHNC100-SEK..3X includes freely configurable controller variants:

- Closed-loop speed control
- Closed-loop torque control
- Open-loop torque control

For parameterization and diagnosis, the PC software WIN-PED® 6.6 is used.

For process connection, the SYHNC100-SEK...3X digital axis control is provided with digital and analog transducer interfaces and digital inputs/outputs. A bus system or switching and analog signals are available for the communication with the superior control.

For the use of the unit, you moreover need superordinate control logics with corresponding I/O components that in connection with the SYHNC100-SEK...3X are responsible for the holistic control of the machine's motion sequence and also its monitoring as regards safety.

The preparation of user-specific data sets forms the basis for the function of the SYHNC100-SEK...3X. These data sets are generated on the PC and sent to the SYHNC100-SEK...3X using a serial interface. The connection between user program and data sets is referred to as project.

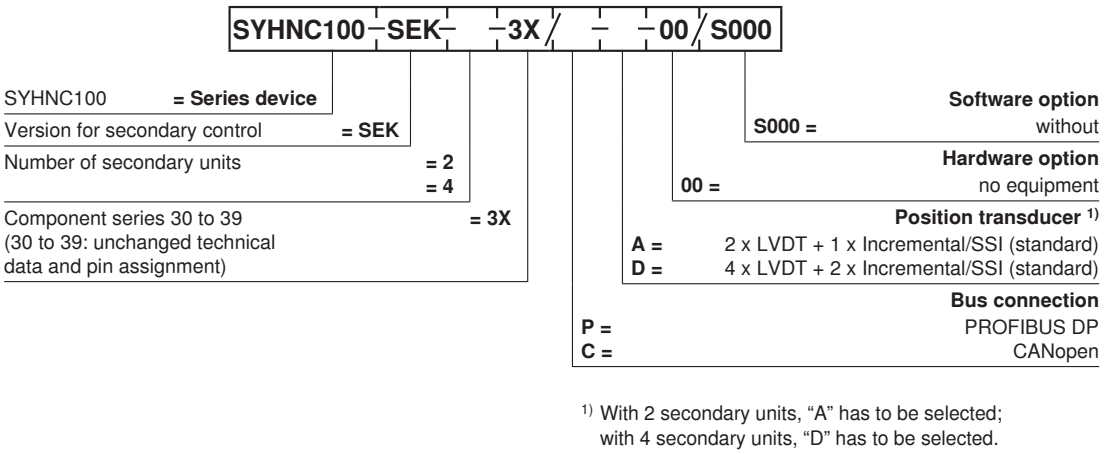
The SYHNC100-SEK...3X includes different controller functions which are described in the data sheet.

Technical data, operating conditions and the limitation of use of the SYHNC100-SEK...3X controller assembly are available in the data sheet RE 30162.

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4.3 Product identification



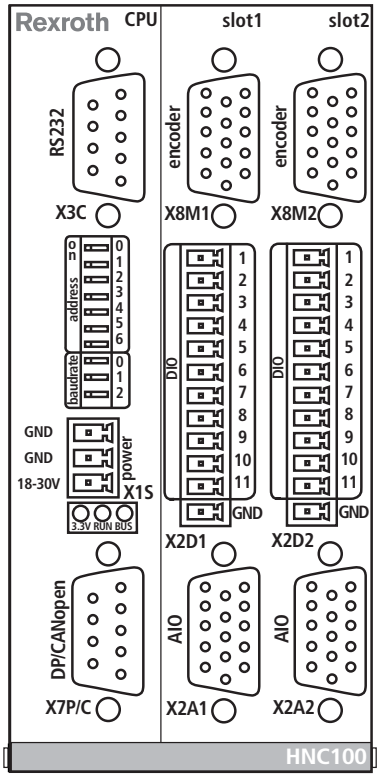
1) With 2 secondary units, “A” has to be selected; with 4 secondary units, “D” has to be selected.

Fig. 1: Order code

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4.4 Pin assignment (2-LVDT version)



X7C Pin	CANopen
1	reserved
2	CAN_L
3	CAN_GND
4	reserved
5	reserved
6	reserved
7	CAN_H
8	reserved
9	reserved

X7P Pin	PROFIBUS DP
1	reserved
2	reserved
3	RxD/TxD-P
4	CNTR-P
5	DGND
6	VP
7	reserved
8	RxD/TxD-N
9	reserved

X1S Pin	Power
1	GND
2	GND
3	18 – 30 V

Note for all ports:
The pins marked with "**reserved**" are reserved and must not be connected!

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Information on this product

Pin assignment (SLOT 1)

SLOT 1 X8M1 - ENCODER | LVDT / port IW9 / AWX			
Signal	**Pin**	**Description of IW9**	**Description of AWX**
LVDT1	1	IW9-1 GND	AWX1 Pin 1
LVDT1	2	IW9-1 Pin 2	AWX1 Pin 2
LVDT1	3	IW9-1 Pin 1	AWX1 Pin 3
LVDT1	4	Bridge to Pin 5 IW9-1	reserved
LVDT1	5	Bridge to Pin 4 IW9-1	AWX1 Pin 4
	6	reserved	reserved
LVDT2	7	IW9-2 Pin 1	AWX2 Pin 3
LVDT2	8	Bridge to Pin 9 IW9-2	reserved
LVDT2	9	Bridge to Pin 8 IW9-2	AWX2 Pin 4
	10	reserved	reserved
LVDT2	11	IW9-2 GND	AWX2 Pin 1
	12	reserved	reserved
	13	reserved	reserved
	14	reserved	reserved
LVDT2	15	IW9-2 Pin 2	AWX2 Pin 2

SLOT 1 X2D1 - digital I/O		
Signal	**Pin**	**Description**
OUT 1	1	Ready for operation / axis 1 sum error
OUT 2	2	Ready for operation / axis 2 sum error
OUT 3	3	Axis 1 isolator valve control
OUT 4	4	Axis 2 isolator valve control
OUT 5	5	Open brake
OUT 6	6	Controller active
OUT 7	7	Speed = 0
OUT 8	8	Torque = 0
OUT 9	9	reserved
OUT 10	10	Operating mode "0" = n control "1" = MD open-loop/closed-loop control
OUT 11	11	Swivel angle control active

SLOT 1 X2A1 - analog I/O		
Signal	**Pin**	**Description**
Vin 1+	1	Torque command value +/–10 V
Vin 1–	2	Torque command value voltage reference
Vin 2+	3	Actual torque value +/–10 V
Vin 2–	4	Actual torque value voltage. Reference
Cin 1+	5	reserved
Cin 1–	6	reserved
Cin 2+	7	Actual torque value 4 to 20 mA / load cell
Cin 2–	8	Actual torque value current reference
nc	9	reserved
AGND	10	Analog GND
Vout 1	11	Analog OUT1 +/–10 V / actuating variable 1 -> module amplifier
Vout 2	12	Analog OUT2 +/–10 V / actuating variable 2 -> module amplifier
Cout1	13	Analog OUT1 +/–20 mA
+24V	14	24 V output voltage
nc	15	reserved

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Pin assignment (SLOT 2)

SLOT 2 X8M2 - ENCODER | INK1			
Signal	**Pin**	**INK description**	**SSI description**
–B	1	–Ua2 / GEL293 Pin G	
+ Clk	2		+ CLK
+ R	3	reserved	reserved
- R	4	reserved	reserved
+ A	5	+Ua1 / GEL293 Pin C	
- A	6	–Ua1 / GEL293 Pin H	
-Clk	7		– CLK
+ B	8	+Ua2 / GEL293 Pin B	
-DATA	9		– Data
GND	10	0 V / GEL293 Pin A	Ground
+DATA	11		+ Data
+5Venc	12	+5 V / GEL293 Pin F	
+10Vref	13	reserved	reserved
+24V enc	14		+24V
	15	reserved	reserved

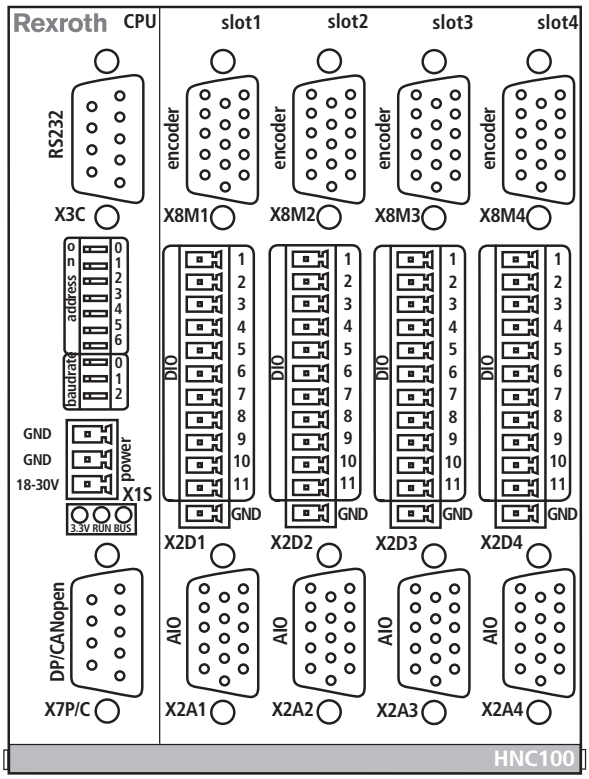
SLOT 2 X2D2 - digital I/O		
Signal	**Pin**	**Description**
IN 1	1	Enable
IN 2	2	Start
IN 3	3	Error reset
IN 4	4	Open-loop torque control
IN 5	5	Closed-loop torque control
IN 6	6	Pressure OK
IN 7	7	Open brake
IN 8	8	reserved
IN 9	9	reserved
IN 10	10	reserved
IN 11	11	reserved

SLOT 2 X2A2 - analog I/O		
Signal	**Pin**	**Description**
Vin 1+	1	Speed command value signal +/–10 V
Vin 1–	2	Speed command value reference
Vin 2+	3	Actual pressure value signal 0 to 10 V / pressure tapping point
Vin 2–	4	Actual pressure value reference
Cin 1+	5	reserved
Cin 1–	6	reserved
Cin 2+	7	Actual pressure value current signal 0 to 20 mA / pressure tapping point
Cin 2–	8	Actual pressure value current reference
n.c.	9	reserved
AGND	10	AGND
Vout 1	11	Diagnosis 1
Vout 2	12	reserved
Cout1	13	reserved
+24V	14	24 V output voltage
n.c.	15	reserved

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4.5 Pin assignment (4-LVDT version)



X7C Pin	CANopen
1	reserved
2	CAN_L
3	CAN_GND
4	reserved
5	reserved
6	reserved
7	CAN_H
8	reserved
9	reserved

X7P Pin	PROFIBUS DP
1	reserved
2	reserved
3	RxD/TxD-P
4	CNTR-P
5	DGND
6	VP
7	reserved
8	RxD/TxD-N
9	reserved

X1S Pin	Power
1	GND
2	GND
3	18 – 30 V

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

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Pin assignment (SLOT 1)

SLOT 1 X8M1 - ENCODER | LVDT / port IW9 / AWX			
Signal	**Pin**	**Description of IW9**	**Description of AWX**
LVDT1	1	IW9-1 GND	AWX1 Pin 1
LVDT1	2	IW9-1 Pin 2	AWX1 Pin 2
LVDT1	3	IW9-1 Pin 1	AWX1 Pin 3
LVDT1	4	Bridge to Pin 5 IW9-1	reserved
LVDT1	5	Bridge to Pin 4 IW9-1	AWX1 Pin 4
	6	reserved	reserved
LVDT2	7	IW9-2 Pin 1	AWX2 Pin 3
LVDT2	8	Bridge to Pin 9 IW9-2	reserved
LVDT2	9	Bridge to Pin 8 IW9-2	AWX2 Pin 4
	10	reserved	reserved
LVDT2	11	IW9-2 GND	AWX2 Pin 1
	12	reserved	reserved
	13	reserved	reserved
	14	reserved	reserved
LVDT2	15	IW9-2 Pin 2	AWX2 Pin 2

SLOT 1 X2D1 - digital I/O		
Signal	**Pin**	**Description**
OUT 1	1	Ready for operation / axis 1 sum error
OUT 2	2	Ready for operation / axis 2 sum error
OUT 3	3	Axis 1 isolator valve control
OUT 4	4	Axis 2 isolator valve control
OUT 5	5	Open brake
OUT 6	6	Controller active
OUT 7	7	Speed = 0
OUT 8	8	Torque = 0
OUT 9	9	reserved
OUT 10	10	Operating mode "0" = n control "1" = MD open-loop/closed-loop control
OUT 11	11	Swivel angle control active

SLOT 1 X2A1 - analog I/O		
Signal	**Pin**	**Description**
Vin 1+	1	Torque command value +/–10 V
Vin 1–	2	Torque command value voltage reference
Vin 2+	3	Actual torque value +/–10 V
Vin 2–	4	Actual torque value voltage. Reference
Cin 1+	5	reserved
Cin 1–	6	reserved
Cin 2+	7	Actual torque value 4 to 20 mA / load cell
Cin 2–	8	Actual torque value current reference
n.c.	9	reserved
AGND	10	Analog GND
Vout 1	11	Analog OUT1 +/–10 V / actuating variable 1 -> module amplifier
Vout 2	12	Analog OUT2 +/–10 V / actuating variable 2 -> module amplifier
Cout1	13	Analog OUT1 +/–20 mA
+24V	14	24 V output voltage
n.c.	15	reserved

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Pin assignment (SLOT 2)

SLOT 2 X8M2 - ENCODER | LVDT / port IW9 / AWX			
Signal	**Pin**	**Description of IW9**	**Description of AWX**
LVDT3	1	IW9-3 GND	AWX3 Pin 1
LVDT3	2	IW9-3 Pin 2	AWX3 Pin 2
LVDT3	3	IW9-3 Pin 1	AWX3 Pin 3
LVDT3	4	Bridge to Pin 5 IW9-3	reserved
LVDT3	5	Bridge to Pin 4 IW9-3	AWX3 Pin 4
	6	reserved	reserved
LVDT4	7	IW9-4 Pin 1	AWX4 Pin 3
LVDT4	8	Bridge to Pin 9 IW9-4	reserved
LVDT4	9	Bridge to Pin 8 IW9-4	AWX4 Pin 4
	10	reserved	reserved
LVDT4	11	IW9-4 GND	AWX4 Pin 1
	12	reserved	reserved
	13	reserved	reserved
	14	reserved	reserved
LVDT4	15	IW9-4 Pin 2	AWX4 Pin 2

SLOT 2 X2D2 - digital I/O		
Signal	**Pin**	**Description**
OUT 1	**1**	Ready for operation / axis 3 sum error
OUT 2	**2**	Ready for operation / axis 4 sum error
OUT 3	**3**	Axis 3 isolator valve control
OUT 4	**4**	Axis 4 isolator valve control
OUT 5	**5**	reserved
OUT 6	**6**	reserved
OUT 7	**7**	reserved
OUT 8	**8**	reserved
OUT 9	**9**	reserved
OUT 10	**10**	reserved
OUT 11	**11**	reserved

SLOT 1 X2A2 - analog I/O		
Signal	**Pin**	**Description**
Vin 1+	1	reserved
Vin 1–	2	reserved
Vin 2+	3	reserved
Vin 2–	4	reserved
Cin 1+	5	reserved
Cin 1–	6	reserved
Cin 2+	7	reserved
Cin 2–	8	reserved
n.c.	9	reserved
AGND	10	AGND
Vout 1	11	Analog OUT3 +/–10 V / actuating variable 3 -> module amplifier
Vout 2	12	Analog OUT4 +/–10 V / actuating variable 4 -> module amplifier
Cout1	13	reserved
+24V	14	24 V output voltage
n.c.	15	reserved

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Pin assignment (SLOT 3)

SLOT 3 X8M3 - ENCODER | INK1			
Signal	**Pin**	**INK description**	**SSI description**
–B	1	–Ua2 / GEL293 Pin G	
+ Clk	2		+ CLK
+ R	3	reserved	reserved
- R	4	reserved	reserved
+ A	5	+Ua1 / GEL293 Pin C	
- A	6	–Ua1 / GEL293 Pin H	
-Clk	7		– CLK
+ B	8	+Ua2 / GEL293 Pin B	
-DATA	9		– Data
GND	10	0 V / GEL293 Pin A	Ground
+DATA	11		+ Data
+5Venc	12	+5 V / GEL293 Pin F	
+10Vref	13	reserved	reserved
+24V enc	14		+24V
	15	reserved	reserved

SLOT 3 X2D3 - digital I/O		
Signal	**Pin**	**Description**
IN 1	1	Enable
IN 2	2	Start
IN 3	3	Error reset
IN 4	4	Open-loop torque control
IN 5	5	Closed-loop torque control
IN 6	6	Pressure OK
IN 7	7	Open brake
IN 8	8	reserved
IN 9	9	reserved
IN 10	10	reserved
IN 11	11	reserved

SLOT 3 X2A3 - analog I/O		
Signal	**Pin**	**Description**
Vin 1+	1	Speed command value signal +/–10 V
Vin 1–	2	Speed command value reference
Vin 2+	3	Actual pressure value signal 0 to 10 V / pressure tapping point
Vin 2–	4	Actual pressure value reference
Cin 1+	5	reserved
Cin 1–	6	reserved
Cin 2+	7	Actual pressure value current signal 0 to 20 mA / pressure tapping point
Cin 2–	8	Actual pressure value current reference
n.c.	9	reserved
AGND	10	AGND
Vout 1	11	Diagnosis 1
Vout 2	12	reserved
Cout1	13	reserved
+24V	14	24 V output voltage
n.c.	15	reserved

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Pin assignment (SLOT 4)

SLOT 4 X8M4 - ENCODER | INK2			
Signal	**Pin**	**INK description**	**SSI description**
–B	1	–Ua2 / GEL293 Pin G	
+ Clk	2		+ CLK
+ R	3	reserved	reserved
- R	4	reserved	reserved
+ A	5	+Ua1 / GEL293 Pin C	
- A	6	–Ua1 / GEL293 Pin H	
-Clk	7		– CLK
+ B	8	+Ua2 / GEL293 Pin B	
-DATA	9		– Data
GND	10	0 V / GEL293 Pin A	Ground
+DATA	11		+ Data
+5Venc	12	+5 V / GEL293 Pin F	
+10Vref	13	reserved	reserved
+24V enc	14		+24V
	15	reserved	reserved

SLOT 4 X2D4 - digital I/O		
Signal	**Pin**	**Description**
IN 1	**1**	reserved
IN 2	**2**	reserved
IN 3	**3**	reserved
IN 4	**4**	reserved
IN 5	**5**	reserved
IN 6	**6**	reserved
IN 7	**7**	reserved
IN 8	**8**	reserved
IN 9	**9**	reserved
IN 10	**10**	reserved
IN 11	**11**	reserved

SLOT 4 X2A4 - analog I/O		
Signal	**Pin**	**Description**
Vin 1+	1	reserved
Vin 1–	2	reserved
Vin 2+	3	reserved
Vin 2–	4	reserved
Cin 1+	5	reserved
Cin 1–	6	reserved
Cin 2+	7	reserved
Cin 2–	8	reserved
n.c.	9	reserved
AGND	10	AGND
Vout 1	11	Diagnosis 2
Vout 2	12	reserved
Cout1	13	reserved
+24V	14	24 V output voltage
n.c.	15	reserved

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5 Transport and storage

There are no special transport instructions for this product. You must, however, observe the notes in chapter 2 "General safety instructions" and comply with the environmental conditions for storage and transport which are detailed in the technical data of data sheet 30162.

5.1 SYHNC100-SEK...3X storage

Proceed as follows in order to prepare the SYHNC100-SEK...3X for storage and further use:

- Only use the geniune packaging for storage.
- Comply with the admissible storage temperature range of –20 °C to +70 °C.
- Protect the SYHNC100-SEK...3X from dust and humidity.

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6 Assembly

NOTE

Risk of short circuit!

Water may condense within the housing!

- Let the SYHNC100-SEK...3X acclimate itself for several hours, as otherwise water may condense in the housing.

The housing of the SYHNC100-SEK...3X is perforated. According to the existing protection class, dirt and fluids may easily enter and cause failures and a short circuit! Safe functioning of the SYHNC100-SEK...3X is thus no longer ensured.

- When working on the SYHNC100-SEK...3X you must make sure that everything is clean and that no fluids will enter the housing.

Major potential differences!

Danger of destroying the SYHNC100-SEK...3X by connecting or disconnecting plug-in connectors under voltage.

- Switch off power supply to the relevant system component before assembling the unit or when connecting and disconnecting plug-in connectors.

6.1 Installation conditions

- For installing the product always observe the environmental conditions specified in the data sheet RE 30162.

NOTE: The environment must be free from electrically conductive contamination (acids, bases, corrosive agents, salts, metal vapors, etc.) and the device must not be exposed to these substances. Rule out any deposits according to protection class IP 20.

The SYHNC100-SEK...3X is intended for top hat rail assembly in the control cabinet. The dimensions of each version are listed in the data sheet RE 30162.

- Before commissioning, make sure that all the seals and plugs of the plug-in connections are installed correctly and undamaged to ensure that fluids and contamination parts are prevented from penetrating the product.

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6.2 Recommended accessories

The following accessories are recommended for the connection of the SYHNC100-SEK...3X controller assembly. These accessories are not included in the scope of delivery, and can be ordered separately from Bosch Rexroth.

Table 6: Accessories

Component	Material number
RS232 interface cable, 1:1, length: 3 m	**R900776897**
USB RS232 converter	**R901066684**
Cable set VT17220-1X/HNC100...3X, length 2 m,for analog signals (connection X2A) and digital position measurement systems (connection X8M) with HD plug-in connector and open breakout cable for SYHNC100-SEK...3X	**R901189300**
Plug-in connector type 6ES7972-0BA41-0XA0 for PROFIBUS DP	**R90050152**

6.3 SYHNC100-SEK...3X assembly

- Lay the cables and lines so that they cannot be damaged and no one can trip over them.
- By snapping the housing of the SYHNC100-SEK...3X on a conductive assembly rail, the earth connection to the control cabinet rear wall is established. This constitutes the HF earthing of the SYHNC100-SEK...3X.
- 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 no longer visible or legible, these data will be quickly available to you at any time.

6.3.1 Place of installation

Do not install the HNC next to power electronics (e.g. frequency converters, etc.) The power pack of the SYHNC100-SEK...3X should be installed as close to the SYHNC100-SEK...3X as possible.

6.3.2 Voltage supply

- The connection should be as short as possible. Pass supply and return lines (+24 V/GND) together. Voltage 18 - 30 V.
- Load lines of two individual wires (voltage supply) are to be passed in a parallel or drilled form.

6.3.3 Supply of external components

When supplying a 24 V encoder, the input voltage of the SYHNC100-SEK...3X at X1S must comply with the encoder's requirements (e.g. 24 V +/-5 %, residual ripple <500 mV).

Analog components like pressure cells can be supplied via the sockets X2A1...4.

Prerequisite: The supply of the SYHNC100-SEK...3X corresponds to the requirements of the pressure tapping point. Further notes with regard to currents, etc. are available in the data sheet RE 30162.

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6.3.4 Screening

For signal lines, only cables with a copper braid shield should be used. The cable shield is extensively connected with the metallized connector housing and only on the SYHNC100-SEK...3X side. This is achieved by pushing the shield back and clamping under the pull relief.

6.3.5 General notes with regard to wiring

- Observe the highest possible separation of signal and load lines and do not lay the same parallel.
- Do not pass the signal lines through strong magnetic fields.
- Lay signal lines as continuously as possible. If intermediate terminals are required, please use terminal block with shield strip and assembled SYHNC100-SEK...3X cable (max. length 2m).
- Cables should have the actually required number of wires only. If this is not possible, you must connect the wires and connect them to the earth on one side in the control cabinet.

6.3.6 Troubleshooting the system

In case of faults with the VT-HNC100 signals, you must check the troubleshooting of other electric components, e.g. as follows:

Switched inductivities:	DC: Antiparallel free-wheeling diode over actuator winding
	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 frequency converter.
	Motor control line shielded and laid separately from other lines, and/or output filter for motor lines.
	Extensive contact of the frequency converter housing with the rear wall of the control cabinet

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6.4 SYHNC100-SEK...3X mechanical assembly

Assemble the SYHNC100-SEK...3X on a top hat rail as follows:

- Carefully engage the rear wall of the SYHNC100-SEK...3X housing on a top hat rail and check for safe seat. The mechanical contact points on the elastic rear wall of the SYHNC100-SEK...3X allow for a safe seat on the top hat rail and the connection of the housing with the control cabinet's earthing system.

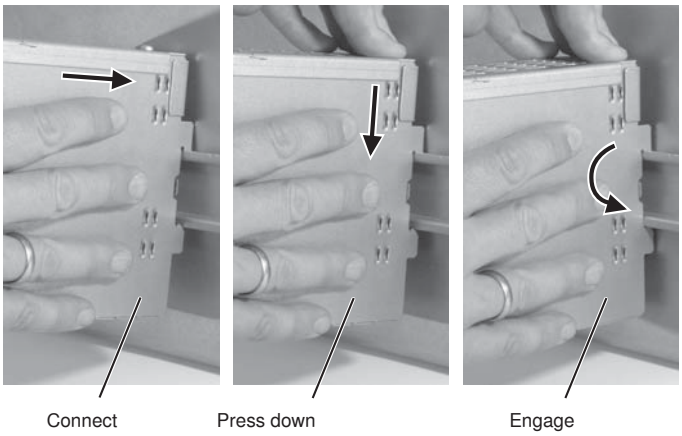


Fig. 2: SYHNC100-SEK...3X assembly on the top hat rail

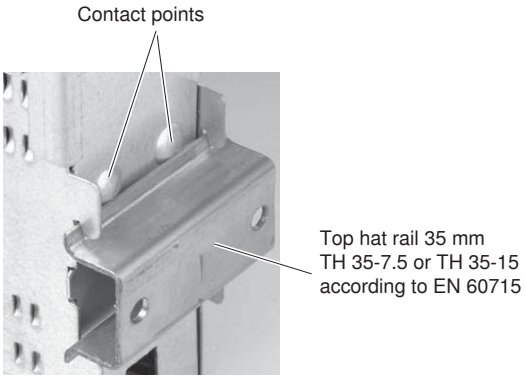


Fig. 3: Contact points of the SYHNC100-SEK...3X for assembly on top hat rail

By snapping the housing of the SYHNC100-SEK...3X on a conductive assembly rail, the earth connection to the control cabinet rear wall is established. This constitutes the HF earthing of the SYHNC100-SEK...3X.

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6.4.1 Wiring example for the SYHNC100-SEK...3X

Use of pre-assembled breakout cables at the X8M encoder connector interface and the analog I/O X2A

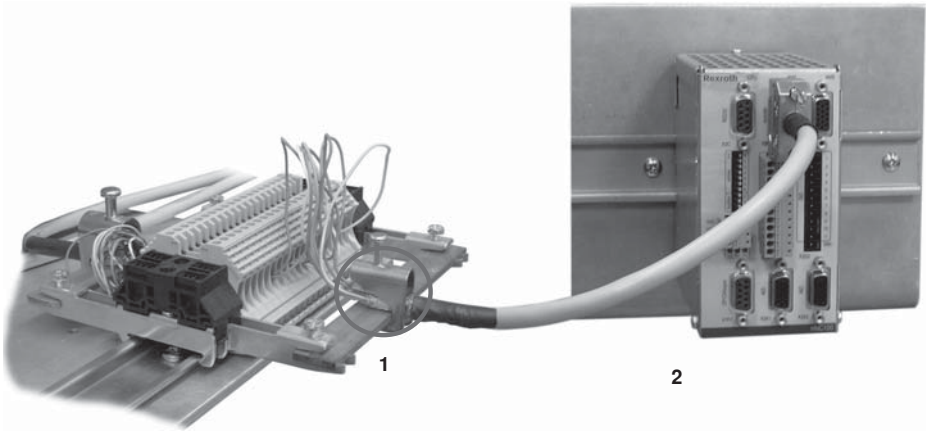


Fig. 4: Breakout cable with HD-SUB, 15-pole

1 Shield clamp:
the open end of the assembled breakout cable is connected with the terminal block. Using a shield clamp which is adjusted to the shield strip, the pushed back cable shield is pulled extensively to the potential of the control cabinet rear wall, i.e the earth. The low-impedance connection of the conductively coated DIN rail to the control cabinet rear wall is important.

2 SYHNC100-SEK...3X shield system
The cable shields are connected with the VT-HNC100 housing via the HD-SUB plug-in connector. The connection with the control cabinet rear wall is established via the housing and the DIN rail. Metalized D-sub connector housings are used. The cable shield must be pushed back and clamped under the pull relief. See illustration below.

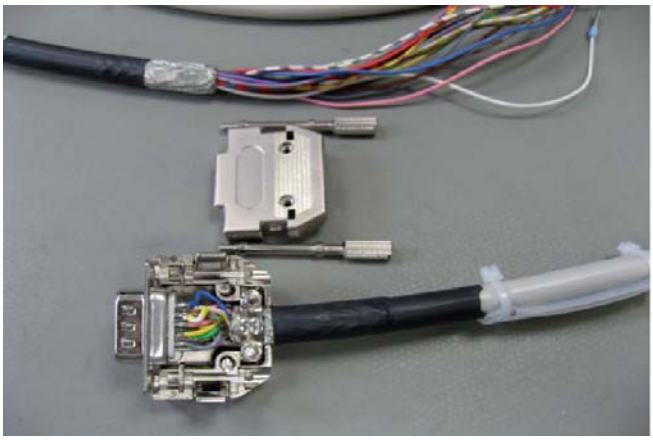


Fig. 5: Breakout cable with 15-pole HD-SUB connector and open cable end

Max. length of the cable: 2 m

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NOTE: On the side of the breakout cable, all wires must be connected to the terminal strip. Otherwise there is a risk of short circuit!

The earthing of the control cabinet must be considered accordingly.

Wiring diagram for analog (X2A) or digital interface (X8M)
VT17220-1X/HNC100...3X & material number: R901189300

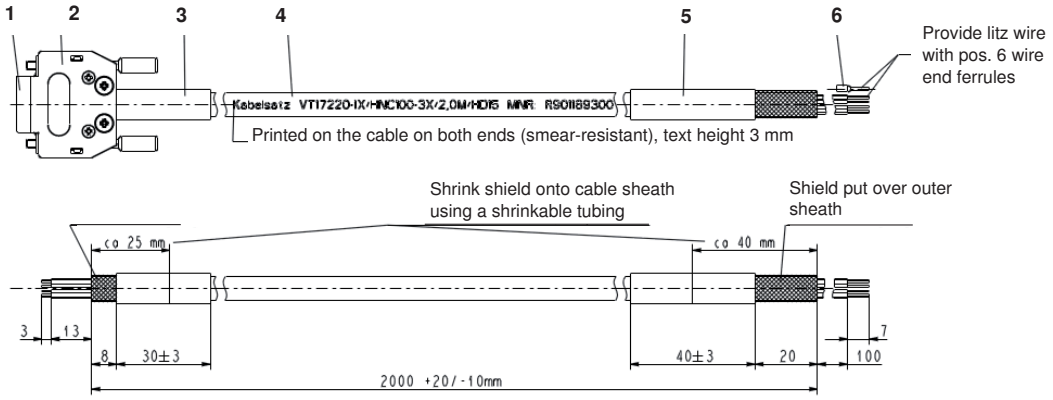


Fig. 6: Wiring diagram for analog or digital interface

1 HD Sub connector high density 15-pole with solder bucket
2 D-SUB housing, 9-pole, metal/UNC (mat. no. R900016918)
3 Shrinkable tubing 30 mm
4 Cable Unitronic LiYCY 8 x 2 x 0.14 mm^2, approx. 2.2 m
5 Shrinkable tubing 40 mm
6 Wire end ferrules

NOTE: Type and manufacturer of item 2 are binding (housing dimensions)

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Assembly

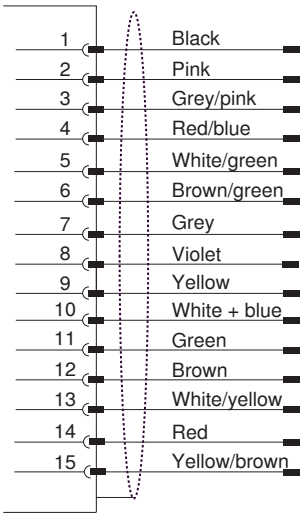


Table 7: Pin assignment

Slot X2A1	AIO (analog)
Pin 1	Vin 1 +
Pin 2	Vin 1 -
Pin 3	Vin 2 -
Pin 4	Vin 2 -
Pin 5	Cin 1 +
Pin 6	Cin 1 -
Pin 7	Cin 2 +
Pin 8	Cin 2 -
Pin 9	reserved
Pin 10	AGND
Pin 11	Vout 1
Pin 12	Vout 2
Pin 13	Cout 1
Pin 14	24 Vsens
Pin 15	reserved

Slot 1 X8M3/4	Encoder	
	Incremental	SSI
Pin 1	–Ua2 / GEL293 Pin G	
Pin 2		+ CLK
Pin 3	reserved	
Pin 4	reserved	
Pin 5	+Ua1 / GEL293 Pin C	
Pin 6	–Ua1 / GEL293 Pin H	
Pin 7		– CLK
Pin 8	+Ua2 / GEL293 Pin B	
Pin 9		– Data
Pin 10	0 V / GEL293 Pin A	Ground
Pin 11		+ Data
Pin 12	+5 V / GEL293 Pin F	
Pin 13	reserved	
Pin 14		+24V
Pin 15	reserved	

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6.4.2 Wiring instructions for pressure transducers

The figure shows a wiring example. Screening is not taken into account. See chapter 6.4.1 "SYHNC100-SEK...3X wiring".

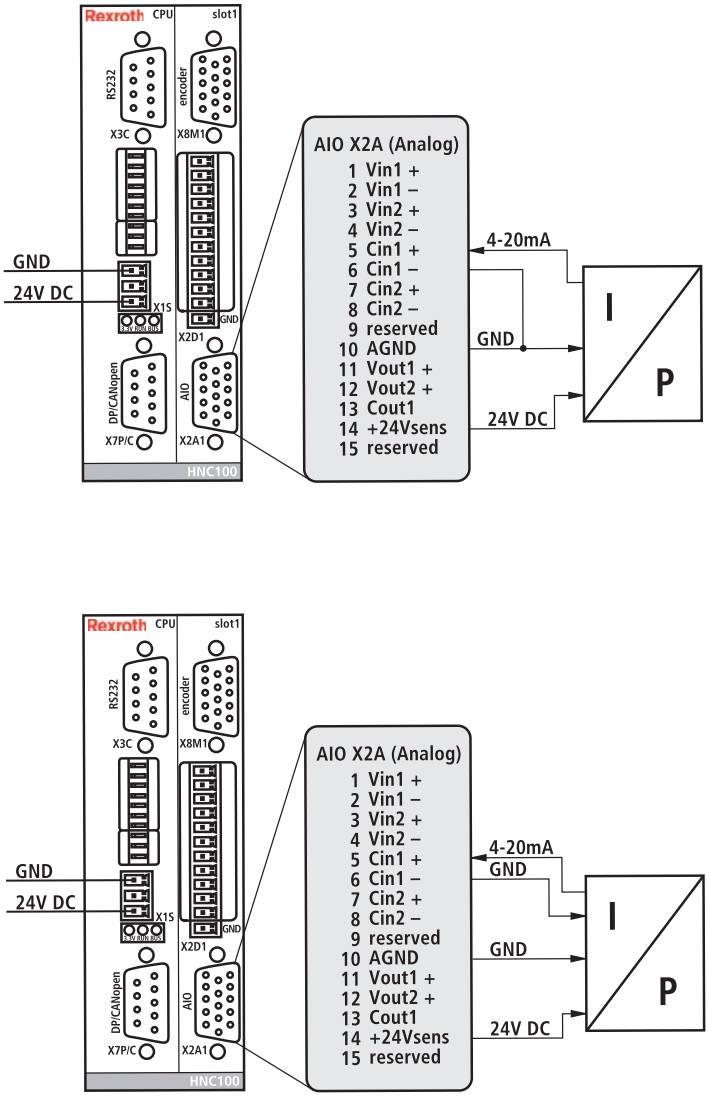


Fig. 7: Wiring for pressure transducers

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Assembly

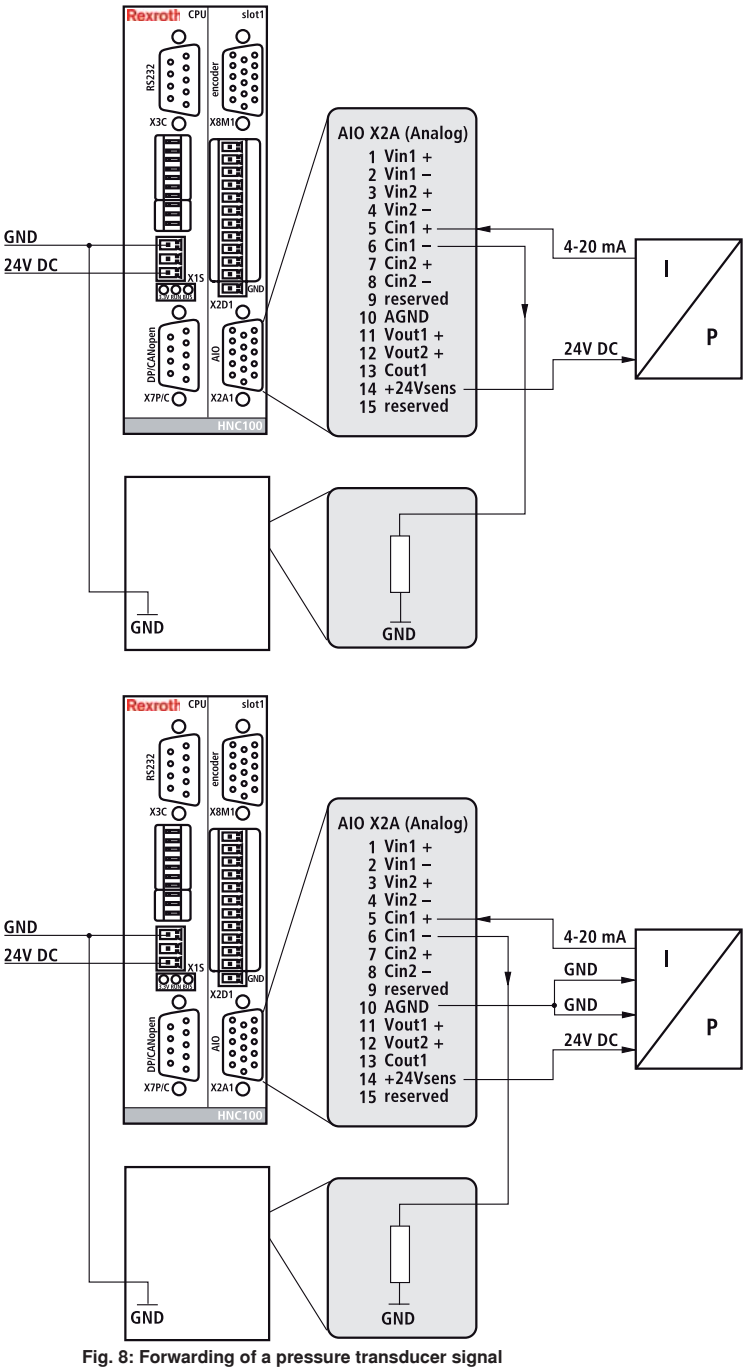


Fig. 8: Forwarding of a pressure transducer signal

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6.4.3 Description of the LEDs

At the front side of the SYHNC100-SEK...3X unit, there are the following 3 LED displays:

- 3.3 V: Voltage supply of the SYHNC100-SEK...3X is OK.
- RUN: SYHNC100-SEK...3X has been initialized and is in “RUN”. The LED flashes if the SYHNC100-SEK...3X has not been initialized or is defective.
- BUS: Field bus communication is OK.

6.4.4 CANopen

The CANopen interface as well as the operation of the SYHNC100-SEK...3X via CANopen is described in detail in the online help.

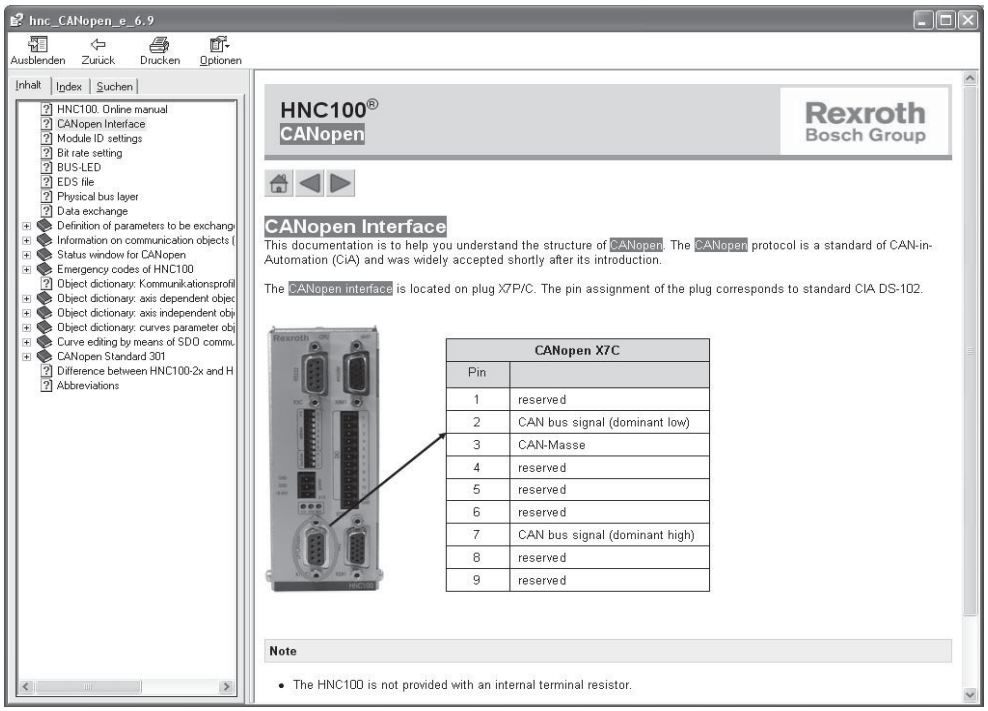


Fig. 9: CANopen interface

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Assembly

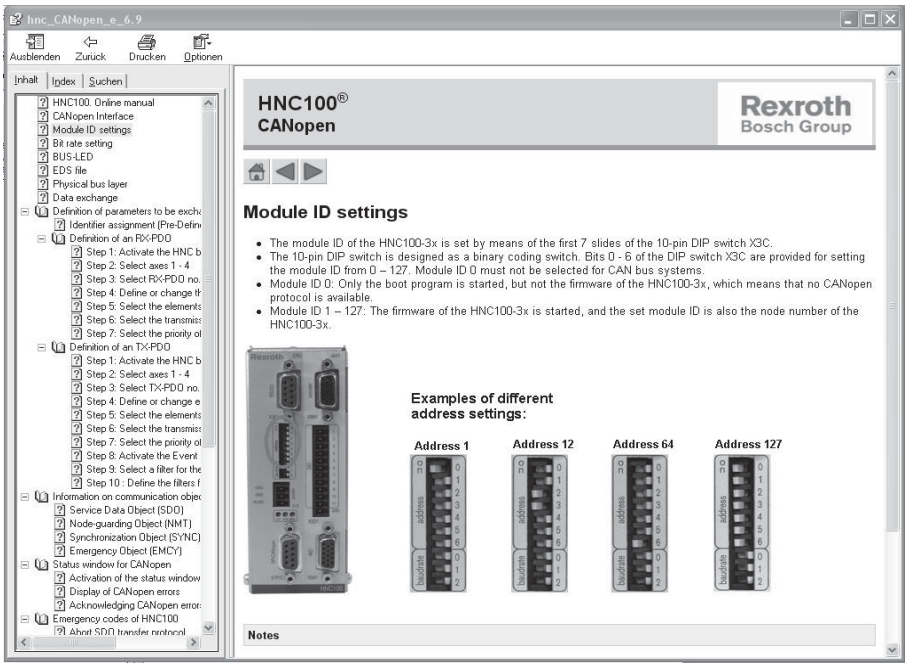


Fig. 10: VT-HNC100 address with CANopen

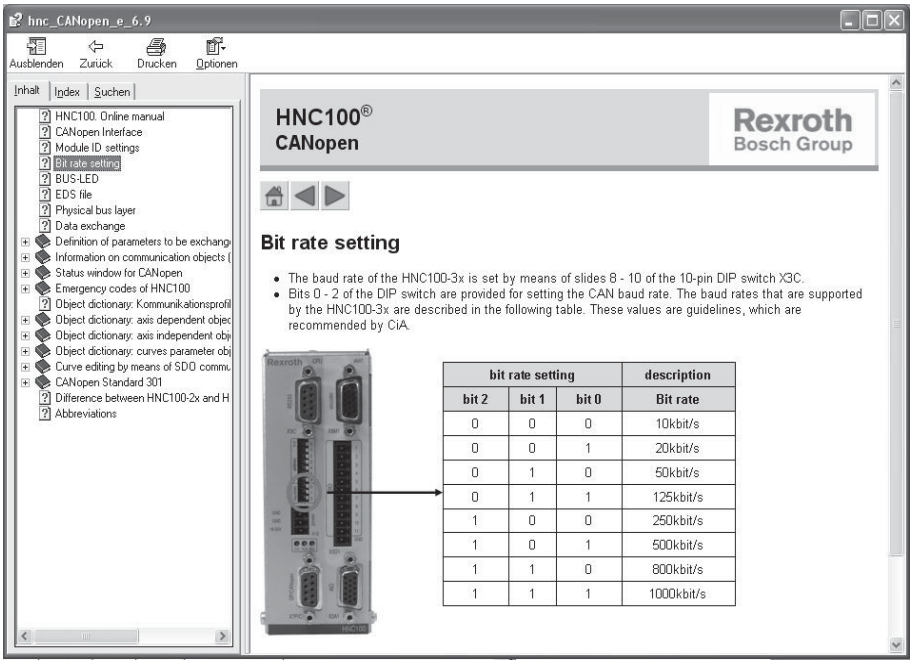


Fig. 11: Baud rate for CANopen

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6.4.5 PROFIBUS DP

The PROFIBUS DP interface as well as the operation of the SYHNC100-SEK...3X via CANopen is described in detail in the online help.

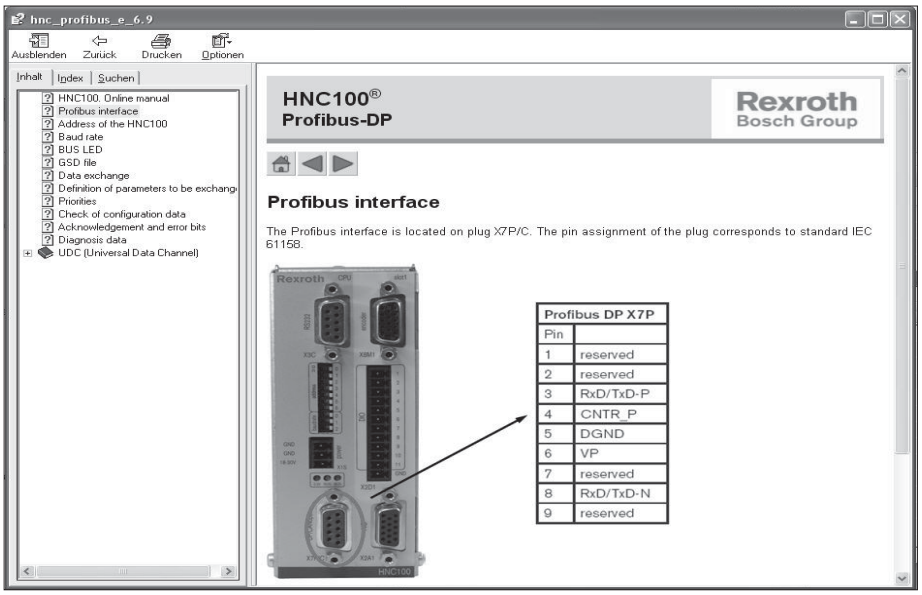


Fig. 12: RROFIBUS DP interface

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6.4.6 Setting the address switch

The address switch is located at the front side of the housing of the SYHNC100-SEK...3X.

A binary setting of 1 to 127 addresses is possible.

In switch position 0 = boot mode, all data can be transferred.

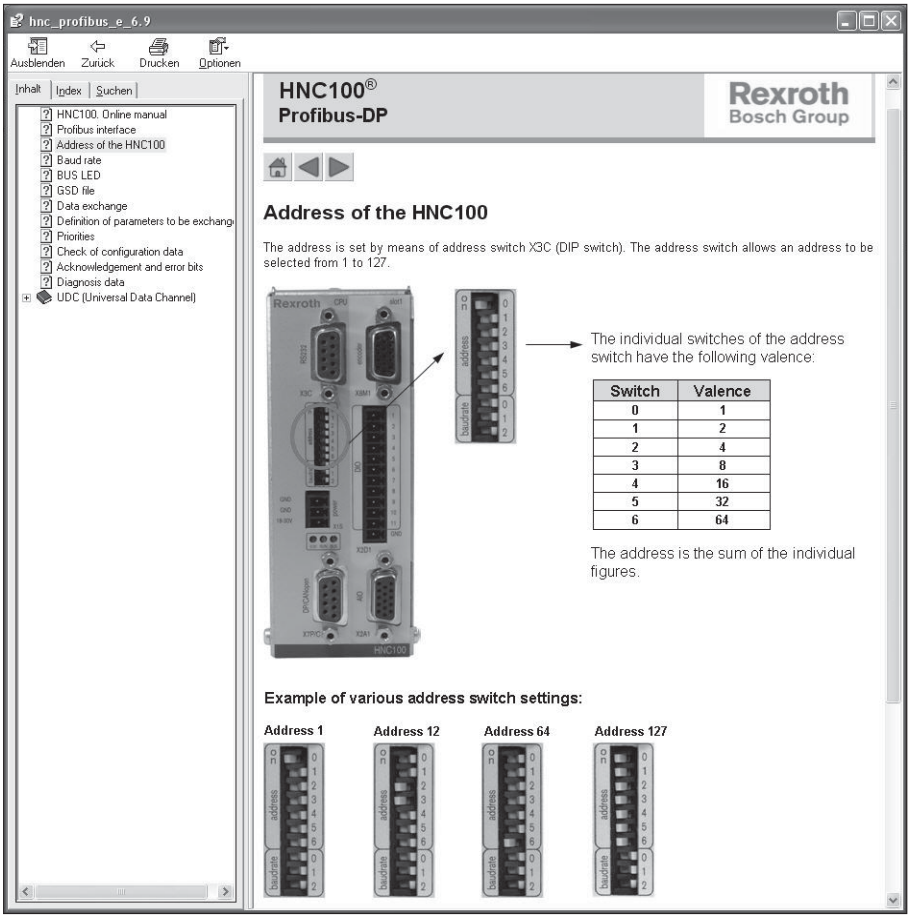


Fig. 13: Address setting for PROFIBUS DP

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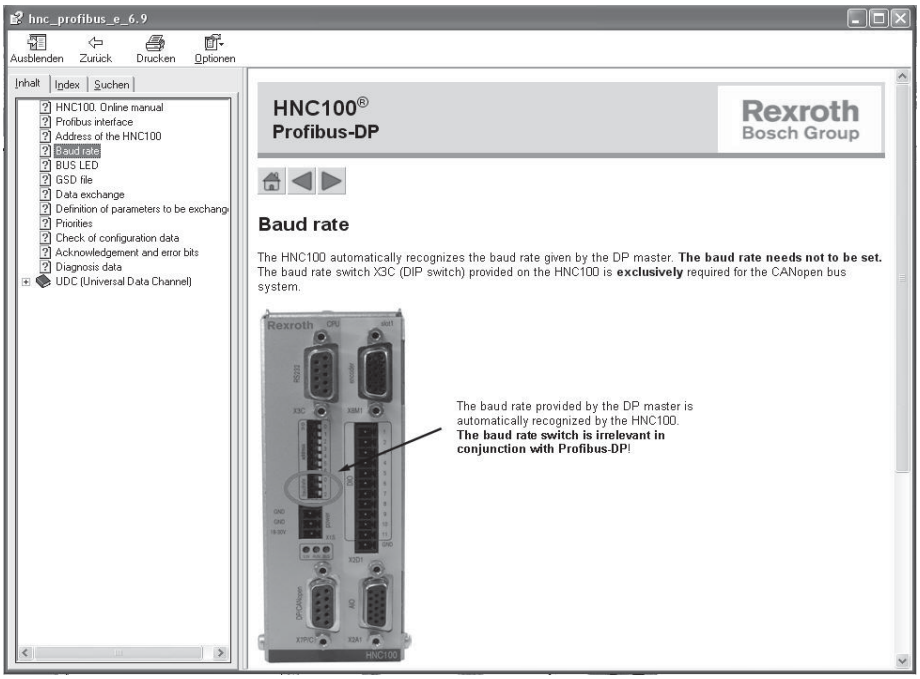


Fig. 14: PROFIBUS DP baud rate

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7 Commissioning

7.1 First commissioning

NOTE

Uncontrolled connection or disconnection of plug-in connectors!

The device might be destroyed.

- Before installation works, and before connecting or disconnecting plug-in connectors to or from the device, the device must be disconnected from the voltage supply or reliably de-energized.
  Devices damaged due to incorrect installation are not covered by the warranty.
- Observe protection class, voltage supply and environmental conditions according to data sheet RE 30139.

There are the following prerequisites for the functioning of the SYHNC100-SEK...3X:

- The WINPED® 6.6 operating software has to be used.
- There must be an application project on the SYHNC100-SEK...3X. If no application project is available, please contact `support.ncsystems@boschrexroth.de`.
- The application project must also be available on the PC so that the SYHNC100-SEK...3X can be initialised and/or the parameterization and diagnosis can be completed.

Further information on operation, project planning, programming and diagnosis of the control system with WIN-PED® 6.6 is available in the help menus of the program.

7.2 Commissioning software WIN-PED® 6.6

For commissioning and for later operation, the user can apply the PC program WIN-PED®. It can be used for the programming, setting and diagnosis of the SYHNC100-SEK...3X. Functionality, menus and program windows are adjusted to the variants of the SYHNC100-SEK...3X.

WIN-PED® **offers the following functions:**

- Convenient dialog functions for the online or offline settings of the machine data
- Dialog window for the online setting of the parameter values
- Various options for the display of the process parameters, the digital inputs, outputs
- Recording and graphic illustrations of up to 16 process parameters with a great choice of trigger options

The PC program WIN-PED® 6.6 is not included in the scope of delivery of the VT-HNC100...3X. Download on the Internet:
`www.boschrexroth.com/hnc100`

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7.3 Installation requirements

The following system specifications are required for the PC program WIN-PED®:

- IBM PC or compatible system
- Windows XP
- Main memory (recommendation: 512 MB)
- 100 MB of available hard disk capacity

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 scope of delivery, can, however, be ordered separately. See chapter 6.2 "Recommended accessories" on page 23.

7.3.1 HNC - PC connection via serial interface

Establish the connection between the SYHNC100-SEK...3X and your PC as follows:

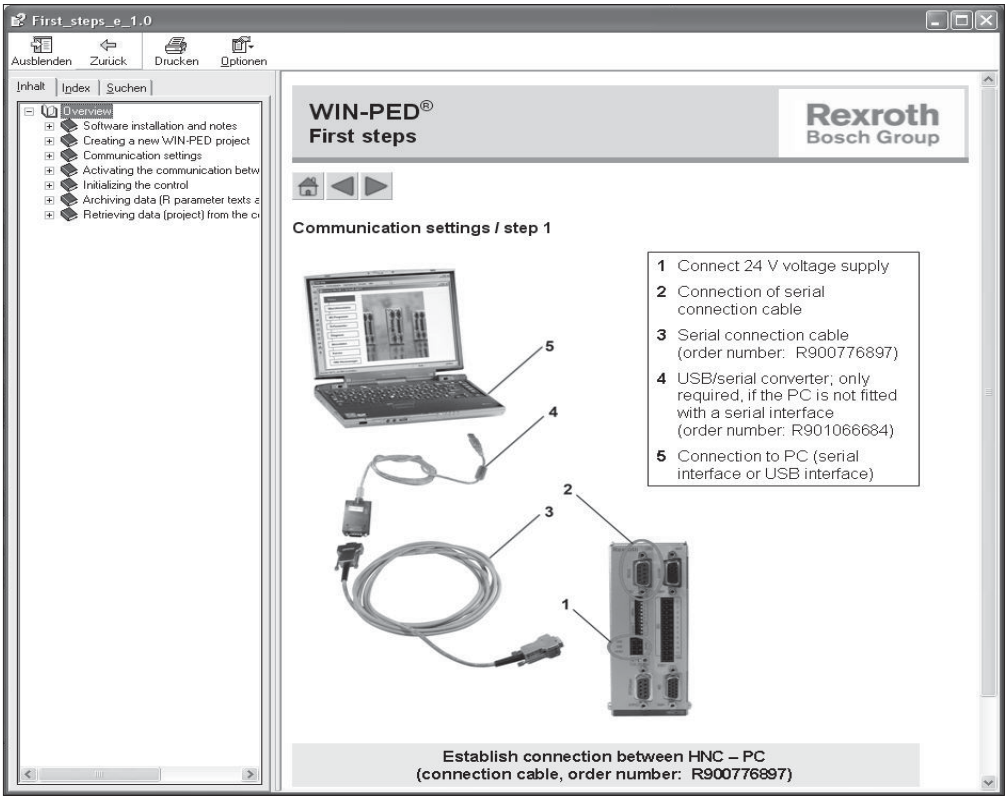


Fig. 15: Connection and required accessories

Make the SYHNC100-SEK...3X ready for operation:

- ▶ Carefully check the wiring.
- ▶ Apply operating voltage to the SYHNC100-SEK...3X.

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Please observe the instructions for the installation program when installing WIN-PED®.

- After having installed the program, you can start it by clicking on it.

8 Operation

During normal operation, the user does not need to intervene.

In case of mains failure during operation, the SYHNC100-SEK...3X can be switched on again without any further measures and is then ready for operation.

8.1 Software description

The WIN-PED® software is described in the previous chapter 7 "Commissioning".

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9 Maintenance and repair

9.1 Cleaning and care

NOTE

Failures!

Loss of functionality due to penetrating dirt and humidity!

- Always provide for absolute cleanness when working on the SYHNC100-SEK...3X..
- Only use a dry and dust-free cloth for all cleaning works.



Aggressive detergents may damage the SYHNC100-SEK...3X 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 SYHNC100-SEK...3X 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.

9.2 Maintenance

The maintenance of the SYHNC100-SEK...3X is limited to the cleaning of the surface in order to prevent dirt and humidity from entering the housing. Regularly check the SYHNC100-SEK...3X for dirt and correct connections taking into account the environmental conditions.

9.3 Repair

The SYHNC100-SEK...3X can only be exchanged as whole unit. For safety reasons, modifications at the SYHNC100-SEK...3X performed to one's own authority are not admissible! Repair and maintenance works may only be performed by Bosch Rexroth AG. For repair and maintenance works, send the unit to the service address specified in chapter 15.

Devices returned to Bosch Rexroth for repair must be sent in geniune packaging.

Repaired devices are returned with default settings.

User-specific settings are not accepted. The user must transfer all appropriate user parameters and programs again.

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10 Disassembly and replacement

10.1 Preparing disassembly

NOTE

The device might be destroyed!

- Decommission the entire system as described in the overall system manual.
- De-energize the device and all connected components.

10.2 Disassembling the digital controller assembly

Proceed as follows to disassemble the SYHNC100-SEK...3X:

- Pull off the connection lines and plugs.
- Release the SYHNC100-SEK...3X from the top hat rail.

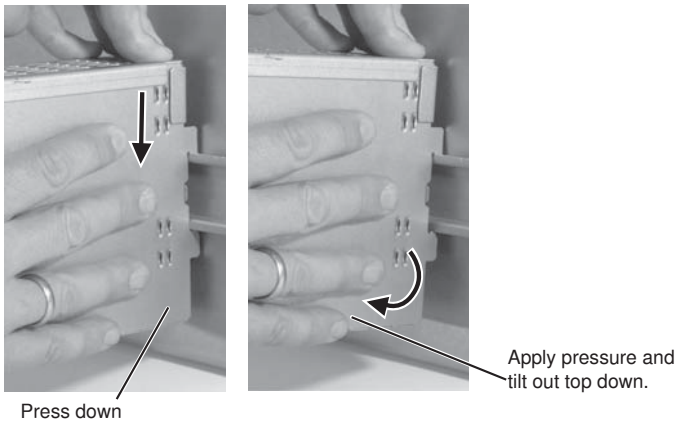


Fig. 16: Disassembly of the SYHNC100-SEK...3X from the top hat rail

10.3 Preparing the components for storage/further use

Proceed as follows in order to prepare the SYHNC100-SEK...3X for storage and further use:

- Only use the geniune packaging for storage.
- Observe the admissible storage temperature range that is specified in RE 30162.
- Protect against dust and humidity.

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11 Disposal

11.1 Environmental protection

Careless disposal of the SYHNC100-SEK...3X and the packaging material could lead to pollution of the environment.

- Thus, dispose of the SYHNC100-SEK...3X and the packaging material in accordance with the currently applicable national regulations in your country.

11.2 Return to Bosch Rexroth

The products manufactured by us can be returned to us for disposal purposes at no costs. However, the precondition is that there are no spurious adherences or any other contamination. Furthermore, there must be no inappropriate foreign matter or third party components when products are returned.

The products have to be sent free to the door to the following address:

Bosch Rexroth AG

Service Industriehydraulik [Industrial hydraulics]

Bürgermeister-Dr.-Nebel-Straße 8

97816 Lohr am Main

Germany

11.3 Packagings

Upon request, reusable systems can be used for regular deliveries. The materials for one-way packagings are mostly cardboard, wood, and styrofoam. These can be disposed of without any problems. Due to ecological reasons, one-way packagings should not be used for returning products to us.

11.4 Materials used

Our products do not contain any hazardous materials that could be released during intended use. Normally, no adverse effects on human beings and on the environment have to be expected.

The products essentially consist of:

• Electronic components and assemblies

11.5 Recycling

Due to the high share of metals the products can mostly be recycled. In order to achieve an ideal metal recovery, disassembly into individual assemblies is required. The metals contained in electric and electronic assemblies can be recovered by means of special separation procedures as well. If the products contain batteries or accumulators, these have to be removed before recycling and furnished to the battery recycling, if possible.

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12 Extension and conversion

The SYHNC100-SEK...3X must neither be extended nor converted. If you convert the SYHNC100-SEK...3X, warranty will expire.

13 Troubleshooting

13.1 How to proceed for troubleshooting

- Always work systematically and focused, even when under time pressure. Random and imprudent disassembly and readjustment of settings might, in the worst-case scenario, result in the inability to restore the original error cause. By readjusting parameters, the drive units operate in an uncontrolled or vibrating manner or do not operate at all due to changed command values, or that they react in any other unexpected way.
- First get a general idea of how your 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 error occurred first.
- Try to determine any changes of the entire system in which the product is integrated:
  - Were there any changes to the product's operating conditions or operating range?
  - Were there any changes or repair works on the entire system (machine/system, electrics, control) or on the product?
    If yes: What were they?
  - Was the product or machine used as intended?
  - How did the malfunction become apparent?
  - Try to get a clear idea of the cause of the fault. Directly ask the (machine) operator.
- For troubleshooting, use the WIN-PED 6® diagnosis possibilities. Optionally, the diagnosis and the error messages can be read out via field bus.

If you could not remedy the occurred fault, please contact one of the addresses you find at http://www.boschrexroth.com or in the list of addresses in the annex. In case of WIN-PED® software failures, you can visit the website `www.boschrexroth.com/hnc`. Here, software updates or occurred faults and their remedy are explained.

14 Technical data

Technical data vary according to the version of the SYHNC100-SEK...3X. A detailed description of your controller assembly is available in the data sheet RE 30162.

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15 Appendix

15.1 Address directory

15.1.1 Contact person for repair

Bosch Rexroth AG
Service Industriehydraulik [Industrial hydraulics]
Bgm.-Dr. Nebel-Str. 8
97816 Lohr am Main
Germany

`http://www.boschrexroth.com/service`
Email: service@boschrexroth.de

15.1.2 Contact person for support

Bosch Rexroth AG
Zum Eisengießer 1
97816 Lohr am Main
Germany

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

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