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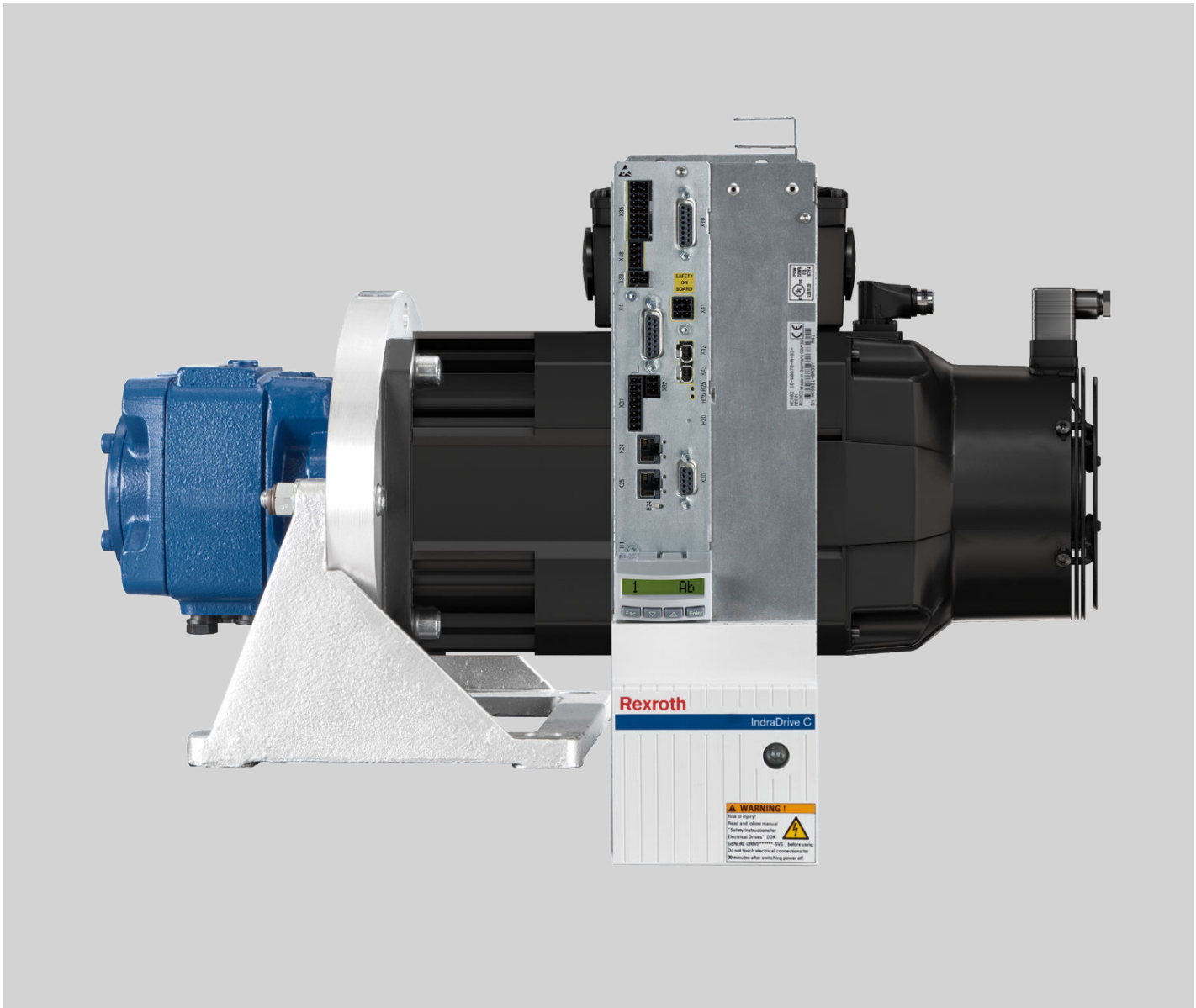
A Bosch Company

Sytronix SvP 7020 PFC 03

Variable-Speed Positioning of Hydraulic Axes

Operating instructions
RE 62314-B

Edition 01



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1 About this documentation

1.1 Validity of this documentation

This documentation applies to the variable-speed pump drives Sytronix 7020 with drive controllers of the Rexroth IndraDrive product range.

The content of the present documentation focuses on information about the electric drive system.

For general information on the Rexroth IndraDrive electric drive system. see the supplementary documentations.

Motor-pump units are described in separate operating instructions. These instruction manuals contain information on supplementary documentations (motors, pumps, hydraulic fluids, etc.).

Where required, this documentation refers to the supplementary documentations.

1.2 Supplementary documentations

1.2.1 Sytronix SvP 7020

Title	Document type	Material number de (en)
Rexroth Sytronix SvP 7020 PFC, Variable-Speed Pump Drives	Commissioning manual	R911379549 (R911379550)
Sytronix – variable-speed pump drives [1)]	Product catalog	R999000331 (R999000332)

1) This documentation contains information on supplementary documentations of the individual components (motors, pumps, hydraulic fluids, etc.).

Tab. 1-1: Documentations, motor-pump units

1.2.2 Motor-pump units

Title	Document type	Material number de (en)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA01 [1)]	Operating instructions	R911339822 (R911339824)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA02 [1)]	Operating instructions	R911387040 (R911387041)
Sytronix – variable-speed pump drives [1)]	Product catalog	R999000331 (R999000332)
Sytronix 50xx/70xx Couplings, Bellhousing	Project planning manual	R911346864 (R911346865)

1) This documentation contains information on supplementary documentations of the individual components (motors, pumps, hydraulic fluids, etc.).

Tab. 1-2: Documentations, motor-pump units

1.2.3 Pressure transducer

Title	Document type	Material number de (en)
Pressure transducer for hydraulic applications, type HM20-2X	Data sheet	RD 30272 (RE 30272)
Pressure transducer for hydraulic applications, type HM20-2X	Operating instructions	RD 30272-B (RE 30272-B)

Tab. 1-3: Documentations, pressure transducer

1.2.4 Drive controllers

Title	Document type	Material number de (en)
Drive System Rexroth IndraDrive	Product catalog	R999000018 (R999000019)
Rexroth IndraDrive Cs Drive systems with HCS01	Project planning manual	R911322209 (R911322210)
Rexroth IndraDrive Drive Systems with HMV01/02, HMS01/02, HMD01, HCS02/03	Project planning manual	R911309635 (R911309636)
Rexroth IndraDrive Supply Units, Power Sections HMV, HMS, HMD, HCS02, HCS03	Project planning manual	R911318789 (R911318790)
Rexroth IndraDrive Additional Components and Accessories	Project planning manual	R911306139 (R911306140)
Rexroth IndraDrive Drive Controllers Control Sections CSB02, CSE02, CSH02, CDB02	Project planning manual	R911338961 (R911338962)
Rexroth Connection Cables IndraDrive and IndraDyn	Selection data	R911322948 (R911322949)
Control cabinet: Air Conditioning, EMC, Design, IP Code, Electrics, IndraDrive, Rexroth EFC/Fv, Sytronix	Project planning manual	R911344987 (R911344988)

Tab. 1-4: Documentations, drive controllers

1.2.5 Firmware

Title Rexroth IndraDrive ...	Type of documentation	Material number de (en)
MPx-21 Functions	Application manual	R911385758 (R911385759)
MPx-20 Version Notes	Release notes	R911345605 (R911345606)
Power Supply Basic PSB-20 Functions	Application manual	R911345609 (R911345612)

Title Rexroth IndraDrive ...	Type of documentation	Material number de (en)
MPx-16 to MPx-21 and PSB Parameters	Reference book	R911328650 (R911328651)
MPx-16 to MPx-21 and PSB Diagnostics	Reference book	R911326539 (R911326738)
Integrated Safety Technology "Safe Torque Off" (as of MPx-16)	Application manual	R911332633 (R911332634)
Integrated Safety Technology "Safe Motion" (MPx-18 and above)	Application manual	R911338919 (R911338920)
Rexroth IndraMotion MLD Libraries as of MPx-18	Reference book	R911338915 (R911338916)
Rexroth IndraMotion MLD as of MPx-18	Application manual	R911338913 (R911338914)

Tab. 1-5: Documentations, firmware

2 Safety instructions

2.1 About this chapter

Observe the general safety instructions in this chapter and the safety instructions and instructions for action in these operating instructions. This helps to avoid personal risks, damage to property and faults.

- Read this documentation 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 product on to third parties.

2.2 Intended use

The product is an electro-hydrostatic drive system.

The Sytronix system is exclusively intended for being integrated in a machine or for being assembled with other components to form a machine or a power unit. It is only allowed to commission the Sytronix system, if it has been integrated in the machine for which it is intended.

The Sytronix system may be used as follows:

- For pressure-controlled hydraulic supply (for SvP: with alternating flow rate change, position control alternating with pressure or force control.
- By itself, the Sytronix system is not suited to execute safety-relevant functions. Safety-relevant functions can be implemented with the drive-integrated safety technology or with a higher-level Safety control.

☞ In the Sytronix system, there is no validation of the command values and actual values (pressure, force, position, speed and velocity) provided.

- Make sure that the validation is executed in the machine control.

The application-specific adjustment of the parameters during initial commissioning is allowed.

The product is intended exclusively for industrial use and not for private usage.

Operation according to the intended use also implies that you have read and understood this documentation completely, especially chapter 2 “Safety instructions“.

2.3 Improper use

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

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

The installation or use of inappropriate products in safety-relevant applications could result in unintended operating states in the application 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 ex-

ample, in explosion-protection areas or in safety-related parts of a control (functional safety).

Improper use of the product includes:

- Non-compliance with the technical data, operating conditions and performance limits according to operating instructions and order confirmation
- Incorrect installation
- Improper storage
- Improper handling and transport
- Lack of cleanliness during storage, assembly, and operation
- Non-observance of prescribed maintenance intervals
- unauthorized modification, maintenance, and repair work

2.4 Qualification of personnel

The activities described in this documentation require basic knowledge of mechanics, electrics and hydraulics as well as knowledge of the appropriate technical terms. For transporting and handling the product, additional knowledge of how to handle lifting gear and the necessary attachment devices is required. In order to ensure safe use, these activities may only be carried out by an expert in the respective field or an instructed person under the direction and supervision of an expert.

Experts are those who are able to 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 requirements pertaining to the work to be undertaken. An expert must observe the relevant specific professional rules and have the necessary expert knowledge. Expert knowledge means for example:

- Being able to read and completely understand hydraulic and electrical circuit diagrams
- Completely understanding the correlations regarding safety equipment
- Having knowledge of the function and set-up of electro-hydraulic components and converter technology
- Having basic knowledge of control technology
- Having knowledge of the IndraDrive firmware and the operation of IndraWorks Ds
- Having knowledge of parameterizing the software

Bosch Rexroth offers training courses that support your qualification in specific fields. You can find an overview of training contents on the Internet at: http://www.boschrexroth.com

2.5 General safety instructions

- Observe the valid regulations on accident prevention and environmental protection.
- Observe the safety regulations and provisions of the country in which the product is used/applied.
- Exclusively use Rexroth products in technically perfect condition.
- Observe all notices on the product.

- Persons who install, commission, operate, demount or maintain Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to respond.
- Only use original Bosch Rexroth accessories and spare parts in order to prevent any hazard to persons due to unsuitable spare parts.
- Comply with the technical data and ambient conditions specified in the product documentation.
- The installation or use of inappropriate products in safety-relevant applications could result in unintended operating states in the application which in turn could cause personal injuries and/or damage to property. Therefore, only use a product for safety-relevant applications if this use is expressly specified and permitted in the documentation of the product, e.g. in explosion protection zones or in safety-related parts of control systems (functional safety).
- Do not commission the product until you can be sure that the end product (for example a machine or system) into which the Bosch Rexroth products are installed complies with the country-specific provisions, safety regulations and standards of the application.

2.6 Product-specific safety instructions

⚠ WARNING **System parts under pressure and ejecting hydraulic fluid!**

When working on hydraulic systems with stored energy (e.g. accumulators) hydraulic components may still be under pressure even after the pressure supply was switched off. During installation and demounting, components or parts may be hurled around and cause personal injuries and/or damage to property. There is moreover the risk of serious injury caused by a powerful, ejecting hydraulic fluid jet.

- Before working on the hydraulic product ensure that the hydraulic system is depressurized and the electrical control de-energized.
- Completely depressurize machines and systems before working on hydraulic products.

⚠ WARNING **Non-compliance with functional safety!**

Hydraulic components control movements in machines or systems. In the event of mechanical and electrical faults, e.g. power supply failure due to lightning or fluctuations in the power supply, the machine can start up unexpectedly and perform uncontrolled movements and thus cause personal injuries.

- When setting up your circuit, observe functional safety, e.g. according to EN ISO 13849.
- If necessary, fit light barriers or safety guards for protection against dangerous movements.
- Observe the notes in the project planning manual and in the data sheet with regard to protection and application.
- If an accumulator is provided, install a check valve and an accumulator safety block.

⚠ WARNING **Electromagnetic interference!**

Frequency converters can be disturbed by interference emitted by the machine. This can cause malfunction, which can lead to severe injuries.

- Use only devices, connecting elements and electrical control cables that comply with the EMC Directive.
- If required, install shielding elements.
- Keep a sufficient distance to sources of radiated disturbance.
- Observe the EMC limit values and notes on EMC for the electrical components of the Sytronix system.

⚠ WARNING **Electromagnetic radiated interference!**

Electrical components of the Sytronix assemblies may emit electromagnetic interference. This can cause malfunction, which can lead to severe injuries.

- Keep a sufficient distance to sources of radiated disturbance.
- If required, install shielding elements.
- Observe the EMC limit values and notes on EMC for the electrical components of the Sytronix system.

⚠ WARNING **Improper mounting!**

Mounting of hydraulic components using mounting screws of reduced strength, improper mounting or mounting with insufficient stability may cause the hydraulic components to become loose and fall down. Consequently, hydraulic fluid may leak and lead to personal injuries and/or damage to property. Heavy hydraulic components may cause bruises or fatal injury.

- Completely mount hydraulic components according to the mounting specifications using suitable mounting aids.
- Mount the Sytronix system at places that are suitable to bear the weight of the system.
- Observe the specified mounting and installation notes and observe the given tightening torques and bolt strengths.
- Check fixing devices regularly during operation.

⚠ WARNING **Unexpected machine movements!**

Working on running systems poses a danger to life and limb. The work steps described in these operating instructions may only be performed on shut down systems. Before beginning work:

- Make sure that the drive motor cannot be switched on.
- Make sure that all force-transmitting components and connections (electrical, pneumatic, hydraulic) are switched off according to the manufacturer's instructions and are secured against restarting. If possible, remove the main fuse of the system.
- Make sure that the system is completely depressurized. Please follow the system manufacturer's instructions.
- Only qualified personnel are authorized to install the Sytronix system.

⚠ WARNING **Lines under pressure!**

Risk of injury by catapulted components or plug screws due to breakage of the weakest system component (e.g. due to missing pressure relief feature).

- Do not exceed the maximum operating pressure!
- Limit the pressure in the system by means of overpressure elements.
- Test the system at test pressure according to ISO 4413.
- Never disconnect, open or cut pressurized lines!
- Before carrying out any installation or other work, depressurize the Sytronix system.

⚠ WARNING **High electrical voltage!**

Danger to life and risk of injury caused by electric shock!

- The Sytronix system may only be connected by or under the supervision of a skilled electrician.
- Switch off the power supply before all maintenance, repair or installation work and secure it against restarting.
- Before starting installation work, plugging and unplugging connectors, and carrying out any work, switch the Sytronix system off. Secure the electrical equipment against restarting.
- Before switching the control system on, check the protective conductor on all electrical devices for proper connection according to the wiring diagram.

⚠ WARNING **Fire and explosion!**

In conjunction with heat sources, leaking hydraulic fluid can result in fire or explosion.

- Inspect the Sytronix assemblies for leakage.
- Keep sources of heat and fire away from hydraulic oil and ensure sufficient ventilation.

⚠ WARNING **Penetrating water and humidity!**

In case of use in humid or wet environments, water or humidity may penetrate at electrical plug-in connectors or hydraulic components. This case may lead to malfunction of the pump and to unexpected movements in the system which may result in personal injury and damage to property.

- Only use the Sytronix system within the intended IP protection class or lower.
- Ensure before the installation that all seals and caps of the plug-in connections are present and intact.

⚠ WARNING **Dewing!**

If the device temperature is lower than the ambient temperature, dewing may occur, which can lead to malfunction and thus to a risk of injury.

- Comply with the technical data and ambient conditions specified in the product documentation.
- Set cooling units with set temperature to the maximum shop floor temperature, not lower!
- Set cooling units with adjusting temperature setting so that the temperature inside the control cabinet is not lower than the ambient temperature. Set the temperature limitation to the maximum shop floor temperature!
- Use exclusively well sealed control cabinets to rule out dewing caused by incoming warm and humid ambient air.
- If control cabinets are operated with the doors open (commissioning, repairs, etc.), make sure that after the doors were closed, the drive controllers can at no time be cooler than the air in the control cabinet. For this reason, provide for sufficient circulation in the control cabinet.

  Observe functional safety according to EN ISO 13849.

⚠ WARNING **Health-damaging hydraulic fluid!**

Risk of intoxication and injury! Contact with hydraulic fluids causes damage to health (e.g. eye injuries, skin damage, poisoning by inhalation and swallowing).

- Always check the lines for wear and damage before any commissioning.
- Wear protective gloves, goggles and suitable work clothing.
- If nevertheless hydraulic fluid comes into contact with the eyes or penetrates the skin, consult a doctor immediately.

  When handling hydraulic fluids, strictly observe the safety notes of the hydraulic fluid manufacturer.

⚠ WARNING **Hot oil!**

Risk of burning by hot oil that may escape during servicing.

- Avoid contact with an ejecting oil jet.
- Avoid contact with an ejecting oil jet.

⚠ WARNING Electromagnetic and magnetic fields!

People with active medical implants (e.g. heart pacemakers), passive metallic implants (e.g. hip prosthesis) and pregnant women might possibly risk hazards by electromagnetic or magnetic fields in the immediate vicinity of components of the electric drive and control system and the associated current-carrying conductors.

Areas in which components of the electric drive and control system and associated current-carrying conductors are mounted, commissioned and operated may be dangerous to those people.

- Before entering these areas, the above-mentioned persons should seek advice from their physician.
- Observe the occupational safety and health regulations applicable at the site of operation, for installations equipped with components of the electric drive and control system and the associated current-carrying conductors.

⚠ CAUTION Formation of smoke!

Risk of breathing difficulties due to the formation of smoke caused by overloading of the electric drive motor during longer operation of the Sytronix system with excessively large flows and at excessive pressure!

- Provide motor protection (e.g. overload protection, circuit breaker).

⚠ CAUTION Hot surfaces!

Risk of burning. The Sytronix system heats up during operation.

- Let the Sytronix system cool down before touching it.
- Protect yourself by wearing heat-resistant protective clothing, e.g. gloves.

⚠ CAUTION Rough, slippery surface!

Hydraulic oil escaping through leaky fittings and screwed connections causes a risk of slipping.

- Check fittings and screwed connections for tightness/leakage.
- If necessary, retighten fittings/screws and remove escaped oil immediately.

⚠ CAUTION **Vibration!**

Possible generation of noise and consequently fatigue as well as interference with speech communication or disturbance of acoustic signals.

- Where appropriate, take decoupling measures such as the installation of anti-vibration dampers and use flexible hoses.

⚠ CAUTION **Missing equipotential bonding!**

Electrostatic charging of the pump due to flowing media, an incorrect earthing concept or missing equipotential bonding may lead to malfunctions or uncontrolled movements at the machine and thus cause injuries.

- Provide for correct earthing and provide for proper equipotential bonding.

⚠ CAUTION **Uncontrolled system behavior!**

Risk of injury! The failure of individual components can lead to malfunction of the assembly and therefore to unforeseeable behavior!

- Immediately have defective components exchanged.

2.7 Personal protective equipment

Personal protective equipment for users of the product consists of:

- Protective gloves and safety shoes for transporting the Sytronix system
- Hearing protection for working in the direct vicinity of the running Sytronix system

All parts of the personal protective equipment must be fully functional.

2.8 Obligations of the machine end-user

The machine end-user of products of Bosch Rexroth AG must provide their personnel with training for the following topics on a regular basis:

- Observance and use of operating instructions and the applicable legal provisions.
- Intended operation of the product.
- Observance of the instructions of the factory security offices and the machine end-user's working instructions.
- Behavior in case of an emergency.

☞ Bosch Rexroth offers training courses that support your qualification in specific fields. You can find an overview of training contents on the Internet under http://www.boschrexroth.de/didactic.

The operation of installations, systems and machines basically requires the implementation of a holistic IT security concept which is state-of-the-art in terms of technology. Accordingly, Bosch Rexroth products and their proper-

ties must be considered as components of installations, systems and machines for their holistic IT security concept.

Unless otherwise documented, Bosch Rexroth products are designed for operation in local, physically and logically secured networks with access restrictions for authorized persons, and they are not classified according to IEC 62443-4-2.

3 General information on damage to property and damage to the product

The warranty only applies to the delivered configuration.

Warranty claims will be rejected in the case of improper installation, commissioning and operation as well as in the case of use not in accordance with the intended purpose and/or improper handling.

NOTICE **Inadmissible mechanical load!**

Impact or shock forces on the Sytronix system and attached components may damage or even destroy it.

- Do not hit on the drive shaft of the unit.
- Never use the Sytronix system as a handle or step. Do not place/put any objects on top of it.

NOTICE **Foreign particles and dirt in the Sytronix system!**

Risk of damage, wear and malfunctions due to ingress of dirt and foreign particles.

- During installation, ensure utmost cleanliness in order to prevent foreign particles such as welding beads or metal chips from getting into the hydraulic lines.
- Before commissioning, make sure that all hydraulic connections are tight and that all seals and closing elements of plug-in connections are correctly installed and not damaged.
- When filling the system with hydraulic fluid, filter the fluid with a suitable filtering system to minimize contamination with solid particles and water in the system.
- Do not use cotton waste or linty cloths for cleaning.
- Take care that no cleaning agents enter the hydraulic system.

NOTICE **Wear!**

Wear may lead to malfunctions.

- Carry out the prescribed maintenance work at the time intervals specified in the operating instructions.

NOTICE **Environmentally harmful hydraulic fluid!**

Leaking hydraulic fluid leads to environmental pollution.

- Immediately remedy any leakage.
- Dispose of the hydraulic fluid in accordance with the national regulations in your country.

NOTICE **Insufficient pressure!**

If the pressure falls below the specified value, damage can occur or the product be destroyed.

- Make sure that the pressure cannot fall under the prescribed minimum value.

NOTICE **Insufficient hydraulic fluid!**

If you commission or operate the Sytronix system without or with insufficient hydraulic fluid, the control system is immediately damaged or even destroyed.

- When commissioning or re-commissioning a machine or system, make certain that the housing chamber as well as the suction and working lines of the Sytronix system are filled with hydraulic fluid and remain filled during operation.

NOTICE **Corrosion due to water and saltwater!**

Contact with salt water leads to increased corrosion. Thus, mounting screws and plug screws as well as moveable components may be chemically corroded and damaged and thus cause leakage and oil getting into the environment.

- So take suitable corrosion protection measures, e.g. by means of an anti-corrosion coating.

4 Sytronix variable-speed pump drives

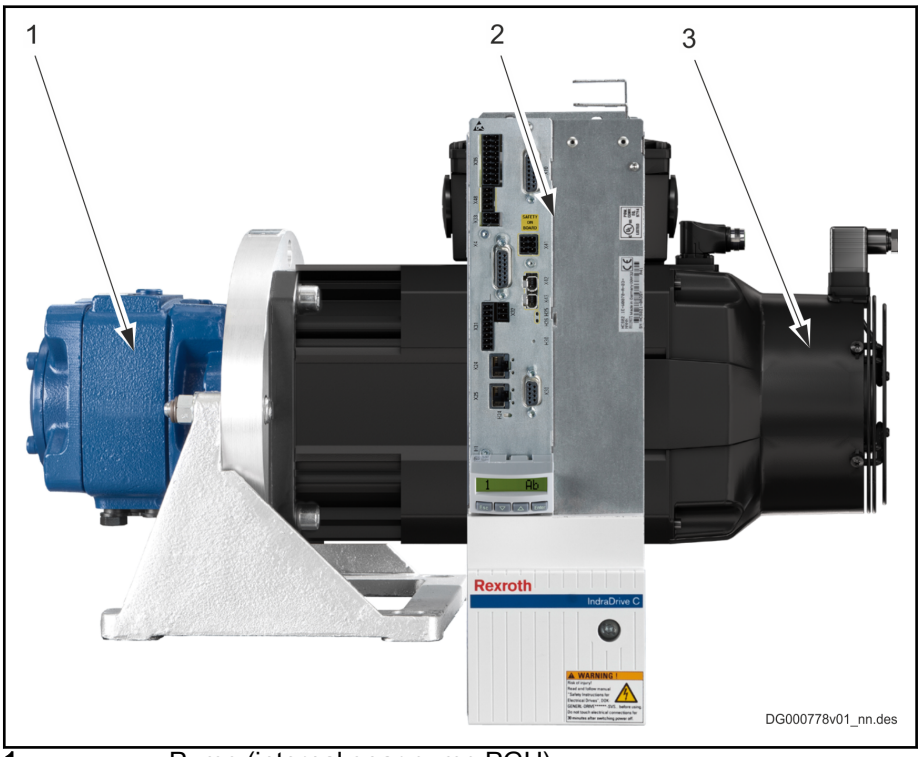
4.1 Overview

	SvP 7020
System function FWS-MLDSYX-…	PFC-02VRS (x/F control)
Drive firmware FWA-INDRV*-…	MPC-20VRS-D5-*-SYX
Control section	CSH02.1B-CC, -ET HCS01.1 … -A-CC, -ET
Power section	IndraDrive C IndraDrive M IndraDrive Cs
Motor	Synchronous motor (MSK) Synchronous motor (MS2N)
Pump	PGH
Motor-pump unit	MPA01 MPA02

Tab. 4-1: Sytronix SvP 7020

4.2 Sytronix SvP 7020

4.2.1 Overview of components



1	Pump (internal gear pump PGH)
2	Drive controller (HCS02, HCS03, HMS01 or HMS02); shown here: HCS02
3	Synchronous motor (IndraDyn MS2N or MSK with air or water cooling); shown here: MS2N
1 + 3	MPA01 or MPA02 motor-pump unit; MPA0x: motor-pump unit with direct coupling

Fig. 4-1: Sytronix SvP 7020

SvP "SvP" means "**S**ervo **v**ariable **P**ump".

SvP systems are suitable for use in open and in closed hydraulic systems for hydraulic axis control (e.g. injection molding machines).

4.2.2 System function

Drive controller	System function
HCS01	FWS-MLDSYX-**PFC**-02VRS-D0-MP**20**
HCS02	
HCS03	
HMS01	
HMS02	

PFC **P**osition **F**orce **C**ontrol

Tab. 4-2: System function

4.2.3 PFC device configuration

IndraDrive C, IndraDrive M

Equipment							Function/application					Operation mode				
Firmware	Control section						Communication	Motor encoder (motor control) [2]	Actuator encoder	Process control [3]	Process monitoring [3]	Positioning block mode	Drive-internal interpolation	Position control	Drive-controlled positioning	Velocity control
Multi-Ethernet, 2 encoders, 5 analog inputs (4 × current/voltage, 1 × voltage)																
MPC-20	CSH02.1B	ET	EC	EC	NN	DA	PROFINET® EtherNet/IP™	✓ (FOC)	✓	p_A - p_B or F_{act} [V] or [mA]	$p_{accumulator}$, T_{oil} [V] or [mA]	✓	✓	– [1]	✓	– [1]
MPC-20	CSH02.1B	ET	EC	EC	NN	DA	EtherCAT® Sercos	✓ (FOC)	✓	p_A - p_B or F_{act} [V] or [mA]	$p_{accumulator}$, T_{oil} [V] or [mA]	✓	✓	✓	✓	✓
PROFIBUS/CANopen, 2 encoders, 3 analog inputs (2 × current/voltage, 1 × voltage)																
MPC-20	CSH02.1B	ET	EC	PB	NN	EC	PROFIBUS®	✓ (FOC)	✓	p_A - p_B or F_{act} [V] or [mA]	$p_{accumulator}$ or T_{oil} [V]	✓	✓	– [1]	✓	– [1]
MPC-20	CSH02.1B	ET	EC	CN	NN	EC	CANopen	✓ (FOC)	✓	p_A -p_B or F_{act} [V] or [mA]	$p_{accumulator}$ or T_{oil} [V]	✓	✓	✓	✓	✓
PROFIBUS/CANopen, 1 encoder, 5 analog inputs (4 × current/voltage, 1 × voltage)																
MPC-20	CSH02.1B	ET	EC	PB	NN	DA	PROFIBUS®	– (FXC)	✓	p_A - p_B or F_{act} [V] or [mA]	$p_{accumulator}$, T_{oil} [V] or [mA]	✓	✓	– [1]	✓	– [1]
MPC-20	CSH02.1B	ET	EC	CN	NN	DA	CANopen	– (FXC)	✓	p_A - p_B or F_{act} [V] or [mA]	$p_{accumulator}$, T_{oil} [V] or [mA]	✓	✓	✓	✓	✓
CCD master, 2 encoders, 5 analog inputs (4 × current/voltage, 1 × voltage)																
MPC-20	CSH02.1B	CC	EC	EC	NN	DA	Self-contained from MLD application	✓ (FOC)	✓	p_A - p_B or F_{act} [V] or [mA]	$p_{accumulator}$, T_{oil} [V] or [mA]	✓	✓	✓	✓	✓
MPC-20	CSH02.1B	CC	EC	EC	NN	DA	Digital inputs	✓ (FOC)	✓	p_A - p_B or F_{act} [V] or [mA]	$p_{accumulator}$, T_{oil} [V] or [mA]	✓	–	–	–	–

1) Master communication is not real-time capable
2) **FOC**: **F**ield-**O**riented **C**ontrol (field-oriented current control of motors **with** encoder); **FXC**: **F**lu**x** **C**ontrol (flux-controlled operation of motors **without** encoder)
3) **[V]**: sensor signal as voltage; **[mA]**: sensor signal as current

Tab. 4-3: PFC device configuration (IndraDrive C, IndraDrive M)

IndraDrive Cs

Equipment						Function/application					Operation mode				
Firmware	Control section					Communication	Motor encoder (motor control) [2]	Actuator encoder	Process control [3]	Process monitoring [3]	Positioning block mode	Drive-internal interpolation	Position control	Drive-controlled positioning	Velocity control
Multi-Ethernet, 2 encoders, 1 analog input (voltage)															
MPC-20	HCS01.1E-W00xx-A-0x	A-ET	EC	EC	NN	PROFINET® EtherNet/IP™	✓ (FOC)	✓	p_A, p_B or F_{act} via master comm.	$p_{accumulator}$ via master comm.	✓	✓	– [1]	✓	– [1]
MPC-20	HCS01.1E-W00xx-A-0x	A-ET	EC	EC	NN	EtherCAT® Sercos	✓ (FOC)	✓	p_A, p_B or F_{act} via master comm.	$p_{accumulator}$ via master comm.	✓	✓	✓	✓	✓
Multi-Ethernet, 1 encoder, 3 analog inputs (2 × current/voltage, 1 × voltage)															
MPC-20	HCS01.1E-W00xx-A-0x	A-ET	EC	DA	NN	PROFINET® EtherNet/IP™	– (FXC)	✓	p_A - p_B or F_{act} [V] or [mA]	$p_{accumulator}$ [V]	✓	✓	– [1]	✓	– [1]
MPC-20	HCS01.1E-W00xx-A-0x	A-ET	EC	DA	NN	EtherCAT® Sercos	– (FXC)	✓	p_A - p_B or F_{act} [V] or [mA]	$p_{accumulator}$ [V]	✓	✓	✓	✓	✓
PROFIBUS/CANopen, 1 encoder, 1 analog input (voltage)															
MPC-20	HCS01.1E-W00xx-A-0x	A-ET	EC	EC	NN	CANopen	– (FXC)	✓	p_A - p_B or F_{act} via master comm.	$p_{accumulator}$ via master comm.	✓	✓	✓	✓	✓
MPC-20	HCS01.1E-W00xx-A-0x	A-ET	EC	PB	NN	PROFIBUS®	– (FXC)	✓	p_A - p_B or F_{act} via master comm.	$p_{accumulator}$ via master comm.	✓	✓	– [1]	✓	– [1]
CCD, 2 encoders, 1 analog input (voltage)															
MPC-20	HCS01.1E-W00xx-A-0x	A-CC	EC	EC	NN	Self-contained from MLD application	✓ (FOC)	✓	p_A - p_B or F_{act} via CCD	$p_{accumulator}$ via CCD	✓	✓	✓	✓	✓
MPC-20	HCS01.1E-W00xx-A-0x	A-CC	EC	EC	NN	Digital inputs	✓ (FOC)	✓	p_A - p_B or F_{act} via CCD	$p_{accumulator}$ via CCD	✓	–	–	–	–

[mA] Sensor signal as current

[1] Master communication is not real-time capable

[2] **FOC**: **F**ield-**O**riented **C**ontrol (field-oriented current control of motors **with** encoder); **FXC**: **F**lu**x** **C**ontrol (flux-controlled operation of motors **without** encoder)

[3] **[V]**: sensor signal as voltage; **[mA]**: Sensor signal as current

Tab. 4-4: PFC device configuration (IndraDrive Cs)

4.2.4 Documentation

Title	Document type	Material number de (en)
Sytronix – variable-speed pump drives [1)]	Product catalog	R999000331 (R999000332)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA01 [1)]	Operating instructions	R911339822 (R911339824)
Drive System Rexroth IndraDrive	Product catalog	R999000018 (R999000019)

1) This documentation contains information on supplementary documentations of the individual components (motors, pumps, hydraulic fluids, etc.).

Tab. 4-5: Documentations, motor-pump units

5 Transport and storage

5.1 Drive controllers

See documentation of the component:

Title	Document type	Material number de (en)
Rexroth IndraDrive Cs Drive Systems with HCS01	Project planning manual	R911322209 (R911322210)
Rexroth IndraDrive Supply Units, Power Sections HMV, HMS, HMD, HCS02, HCS03	Project planning manual	R911318789 (R911318790)
Rexroth IndraDrive Additional Components and Accessories	Project planning manual	R911306139 (R911306140)

Tab. 5-1: Documentations, drive controllers

5.2 Motor-pump units

See documentation of the component:

Title	Document type	Material number de (en)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA01 [1)]	Operating instructions	R911339822 (R911339824)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA02 [1)]	Operating instructions	R911387040 (R911387041)
Pressure transducer for hydraulic applications, type HM20-2X	Data sheet	RD 30272 (RE 30272)

1) This documentation contains information on supplementary documentations of the individual components (motors, pumps, hydraulic fluids, etc.).

Tab. 5-2: Documentations, motor-pump units

6 Mounting

6.1 Drive controllers

See documentation of the component:

Title	Document type	Material number de (en)
Rexroth IndraDrive Cs Drive systems with HCS01	Project planning manual	R911322209 (R911322210)
Rexroth IndraDrive Supply Units, Power Sections HMV, HMS, HMD, HCS02, HCS03	Project planning manual	R911318789 (R911318790)
Rexroth IndraDrive Additional Components and Accessories	Project planning manual	R911306139 (R911306140)
Control cabinet: Air Conditioning, EMC, Design, IP Code, Electrics, IndraDrive, Rexroth EFC/Fv, Sytronix	Project planning manual	R911344987 (R911344988)

Tab. 6-1: Documentations, drive controllers

6.2 Motor-pump units

See documentation of the component:

Title	Document type	Material number de (en)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA01 [1)]	Operating instructions	R911339822 (R911339824)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA02 [1)]	Operating instructions	R911387040 (R911387041)
Pressure transducer for hydraulic applications, type HM20-2X	Data sheet	RD 30272 (RE 30272)

1) This documentation contains information on supplementary documentations of the individual components (motors, pumps, hydraulic fluids, etc.).

Tab. 6-2: Documentations, motor-pump units

6.3 Pressure transducer HM20-2X/XXX-H-K35

- Mount the pressure transducer in **suspended position** (hydraulic connection at the top). This is the ideal position for bleeding the pressure transducer.
- **Do not install an additional valve** in the line between the pump and the pressure transducer.
- Connection the pressure transducer with a **sufficient line diameter** (no minimess connections!).

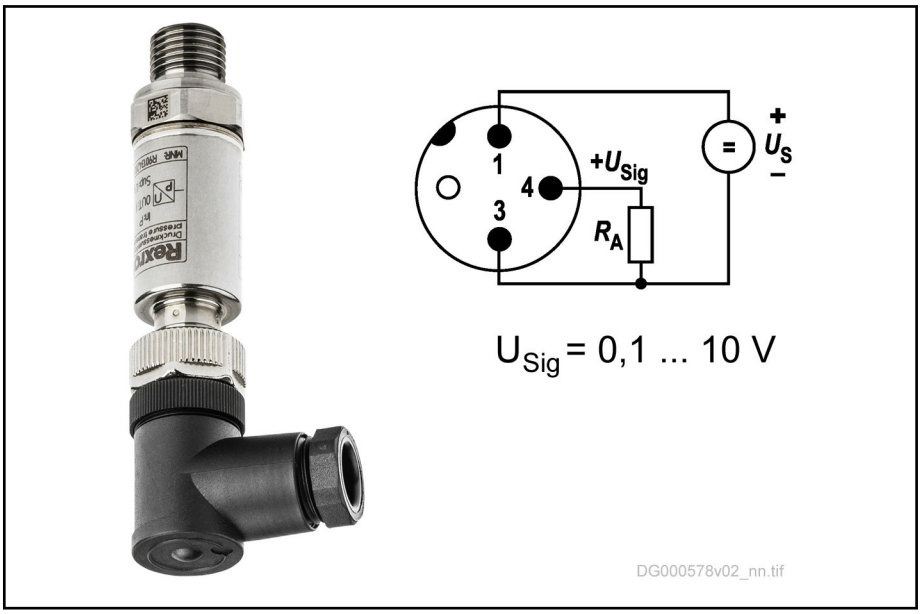


Fig. 6-1: Pressure transducer HM20-2X/XXX-H-K35 (with voltage output) and connector (angled, 4-pin, M12x1)

Connecting the pressure transducer to the control section:

See chapter 7.5 "Control section" on page 36.

See documentation of the component:

Title	Document type	Material number de (en)
Pressure transducer for hydraulic applications, type HM20-2X	Data sheet	RD 30272 (RE 30272)
Pressure transducer for hydraulic applications, type HM20-2X	Operating instructions	RD 30272-B (RE 30272-B)

Tab. 6-3: Documentation, pressure transducer

7 Installation

7.1 HCS01

7.1.1 Connection diagram of HCS01 power section

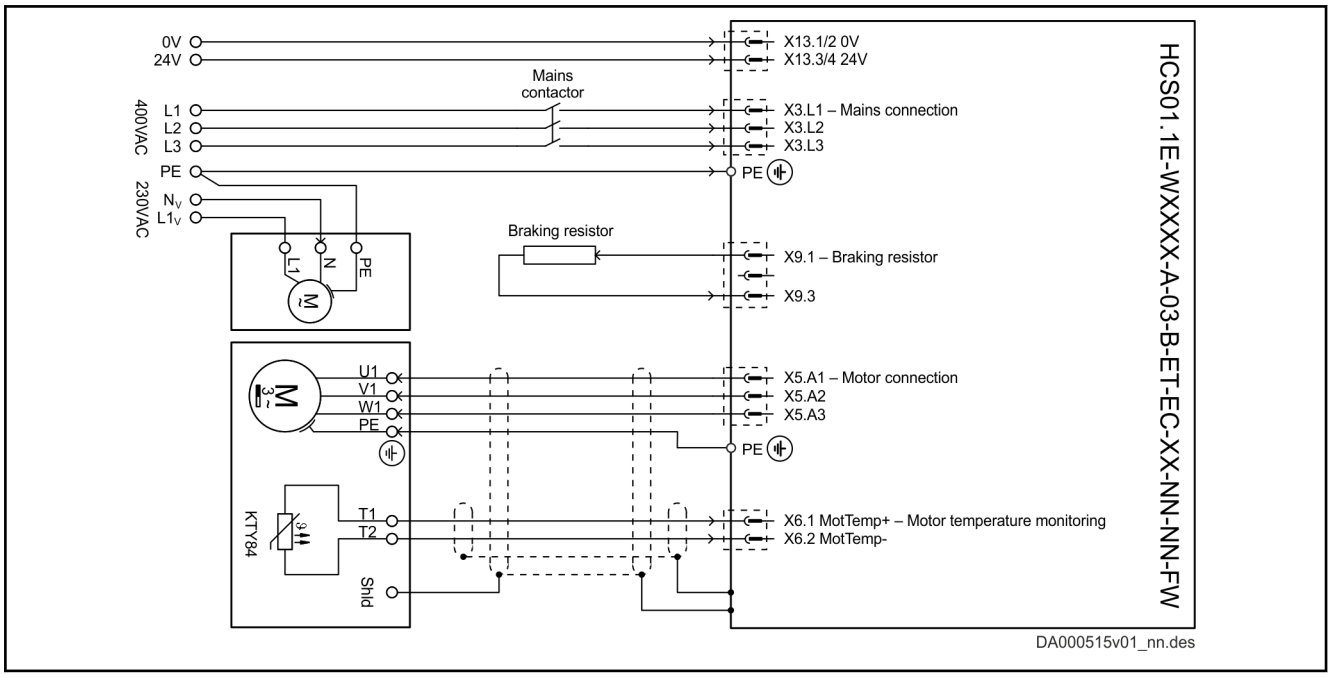


Fig. 7-1: Connection diagram of HCS01 power section

7.1.2 Connection diagram of control section

See chapter "Connection diagram of HCS01 control section" on page 36.

7.1.3 Connection points of HCS01 power section

Symbols used to describe the connection points					
Screw terminal block	Spring terminal	Thread	Max. connection cross section	Stripped length	Max. tightening torque
⊘	⇾	◘	∅	⊐━	↻

Tab. 7-1: Symbols

Connection point	HCS01	⊘ ⇾ ◘	∅ mm² (AWG)	⊐━ mm	↻ Nm
⏚	A, B, C	◘	M5	-	5
X3	A 1)	⊘	2.5 (14)	8	0.6
	B 2)	⊘	6.0 (10)	10	0.8
	C 3)	⊘	10.0 (8)	14	1.7
X5	A	⊘	2.5 (14)	8	0.6
	B	⊘	6.0 (10)	10	0.8
	C	⊘	10.0 (8)	14	1.7
X6	A, B, C	⇾	1.5 (16)	10	-
X9	A, B, C	- 5)	-	-	-
X13	A, B, C	⇾	2.5 (14)	10	-

1) A: HCS01.1E-W0003…W0013-x-02, -W0005-x-03, -W0008-x-03
2) B: HCS01.1E-W0018-x-02, -W0018-x-03, -W0028-x-03
3) C: HCS01.1E-W0054-x-03
4) D: HCS01.1E-W00xx-x-03
5) Connector available at the braking resistor

Tab. 7-2: Connection points

7.1.4 Connection points of the control section

See chapter "Connection points of HCS01 control section" on page 38.

7.1.5 Documentation

Title	Document type	Material number de (en)
Rexroth IndraDrive Cs Drive Systems with HCS01	Project Planning Manual	R911322209 (R911322210)

Tab. 7-3: Documentations, drive controllers

7.2 HCS02

7.2.1 Connection diagram of HCS02 power section

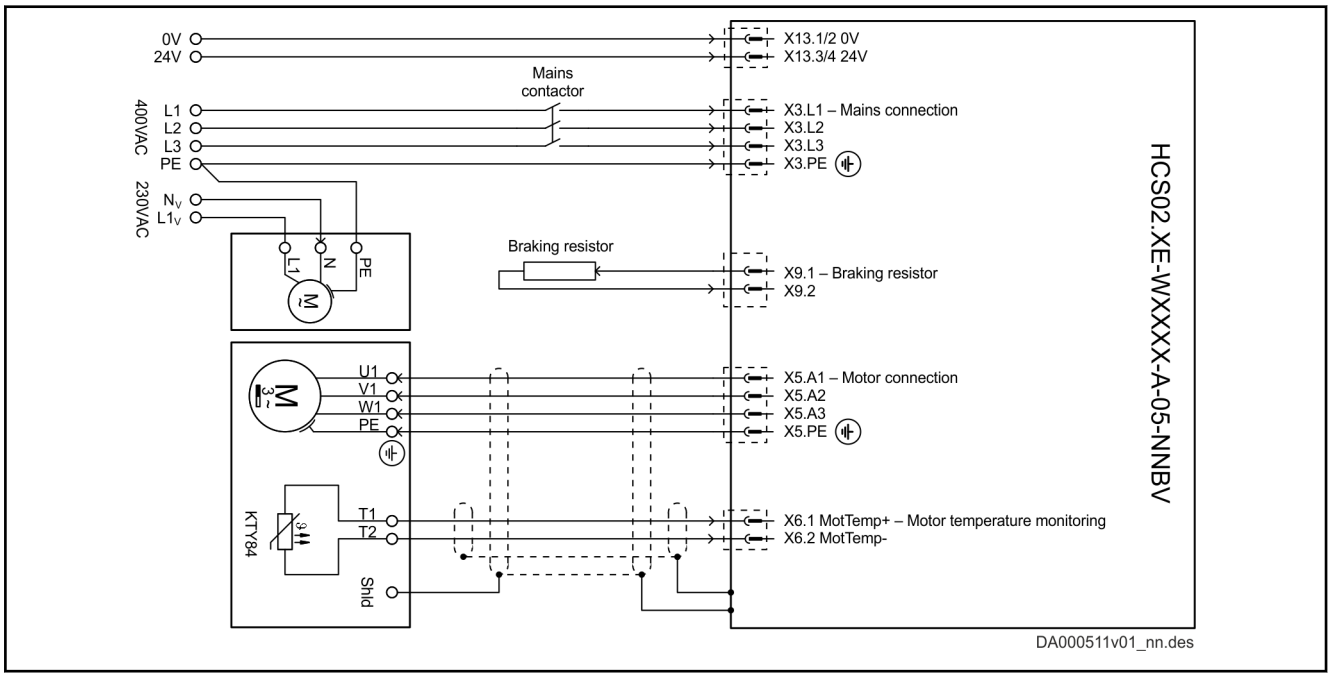


Fig. 7-2: Connection diagram of HCS02 power section

7.2.2 Connection diagram of control section

See chapter 7.5.2 "CSH02" on page 39.

7.2.3 Connection points of HCS02 power section

Symbols used to describe the connection points				
Screw terminal block	Spring terminal	Thread	Max. connection cross section	Max. tightening torque
⊘	⊸	◘	∅	↻

Tab. 7-4: Symbols

Connection point	HCS02	⊘ ⊸ ◘	∅ mm² (AWG)	↻ Nm
X3, X5, ⏚	A, B [1) 2)]	⊘	4.0 (10)	0.6
	C [3)]	⊘	16.0 (6)	1.7
X6	A, B, C	⊸	1.5 (16)	-
X9	B, C	⊘	4.0 (10)	1.7
X13	A, B, C	⊸	1.5 (16)	-
L+, L-	B, C	◘	M6	6.5

1) **A:** HCS02.1E-W0012
2) **B:** HCS02.1E-W0028
3) **C:** HCS02.1E-W0054, -W0070

Tab. 7-5: Connection points

7.2.4 Connection points of the control section

See chapter "Connection points of CSB02/CSH02 control section" on page 41.

7.2.5 Documentation

Title	Document type	Material number de (en)
Rexroth IndraDrive Supply Units, Power Sections HMV, HMS, HMD, HCS02, HCS03	Project Planning Manual	R911318789 (R911318790)
Rexroth IndraDrive Drive Controllers Control Sections CSB02, CSE02, CSH02, CDB02	Project Planning Manual	R911338961 (R911338962)

Tab. 7-6: Documentations, drive controllers

7.3 HCS03

7.3.1 Connection diagram of HCS03 power section

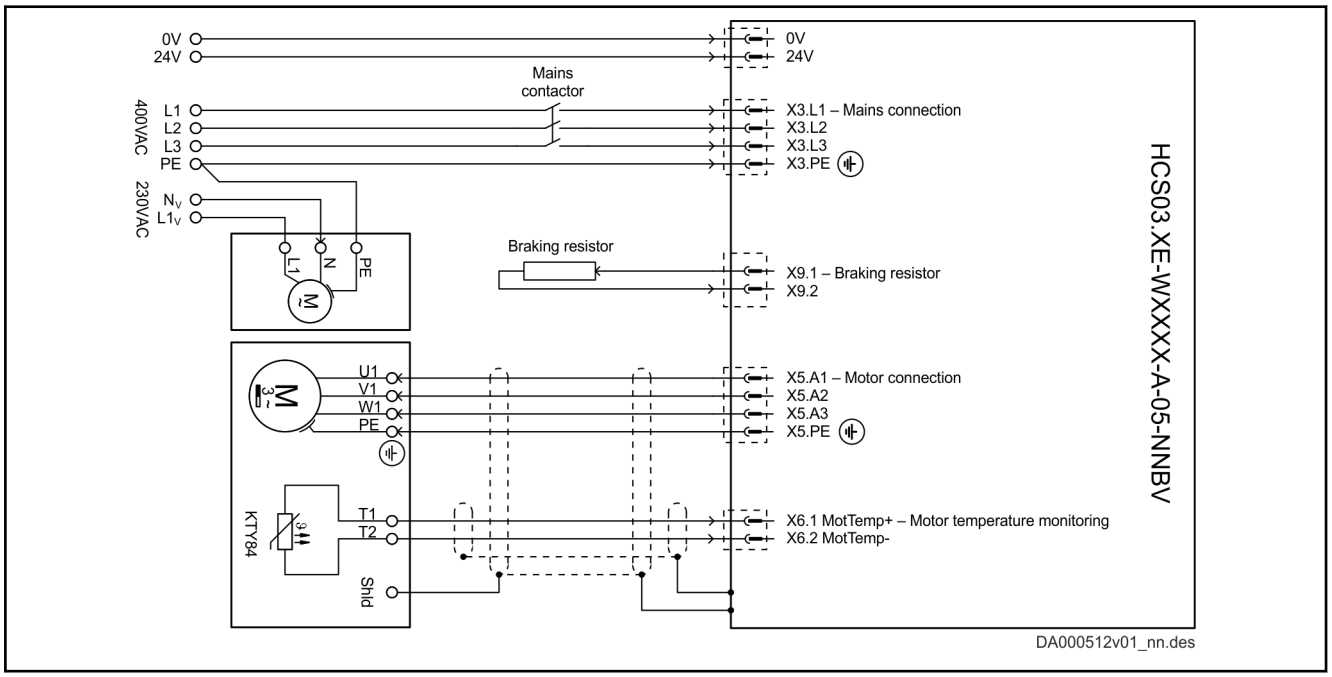


Fig. 7-3: Connection diagram of HCS03 power section

7.3.2 Connection diagram of control section

See chapter 7.5.2 "CSH02" on page 39

7.3.3 Connection points of HCS03 power section

Symbols used to describe the connection points				
Screw terminal block	Spring terminal	Thread	Max. connection cross section	Max. tightening torque
⊘	⊸	◘	∅	↻

Tab. 7-7: Symbols

Connection point	HCS03	⊘ ⊸ ◘	∅ mm² (AWG)	↻ Nm
X3 X5 ⏚	A [1)]	⊘	16.0 (6)	1.7
	B [2)]	◘	M6 1×16; 1×25; 1×35; 1×50 2×25; 2×35; 2×50 2×16 with accessories (1×6; 1×4; 1×2; 1×1 2×4; 2×2; 2×1 2×6 with accessories)	6.5
X6	A, B	⊸	1.5 (16)	-
X9	A, B	⊘	16.0 (6)	1.7
24V, 0V L+, L-	A, B	◘	M6	6.5

1) **A:** HCS03.1E-W0070
2) **B:** HCS02.1E-W0100…W0210

Tab. 7-8: Connection points

7.3.4 Connection points of the control section

See chapter "Connection points of CSB02/CSH02 control section" on page 41.

7.3.5 Documentation

Title	Document type	Material number de (en)
Rexroth IndraDrive Supply Units, Power Sections HMV, HMS, HMD, HCS02, HCS03	Project Planning Manual	R911318789 (R911318790)
Rexroth IndraDrive Drive Controllers Control Sections CSB02, CSE02, CSH02, CDB02	Project Planning Manual	R911338961 (R911338962)

Tab. 7-9: Documentations, drive controllers

7.4 HMS01

7.4.1 Connection diagram of HMS01 power section

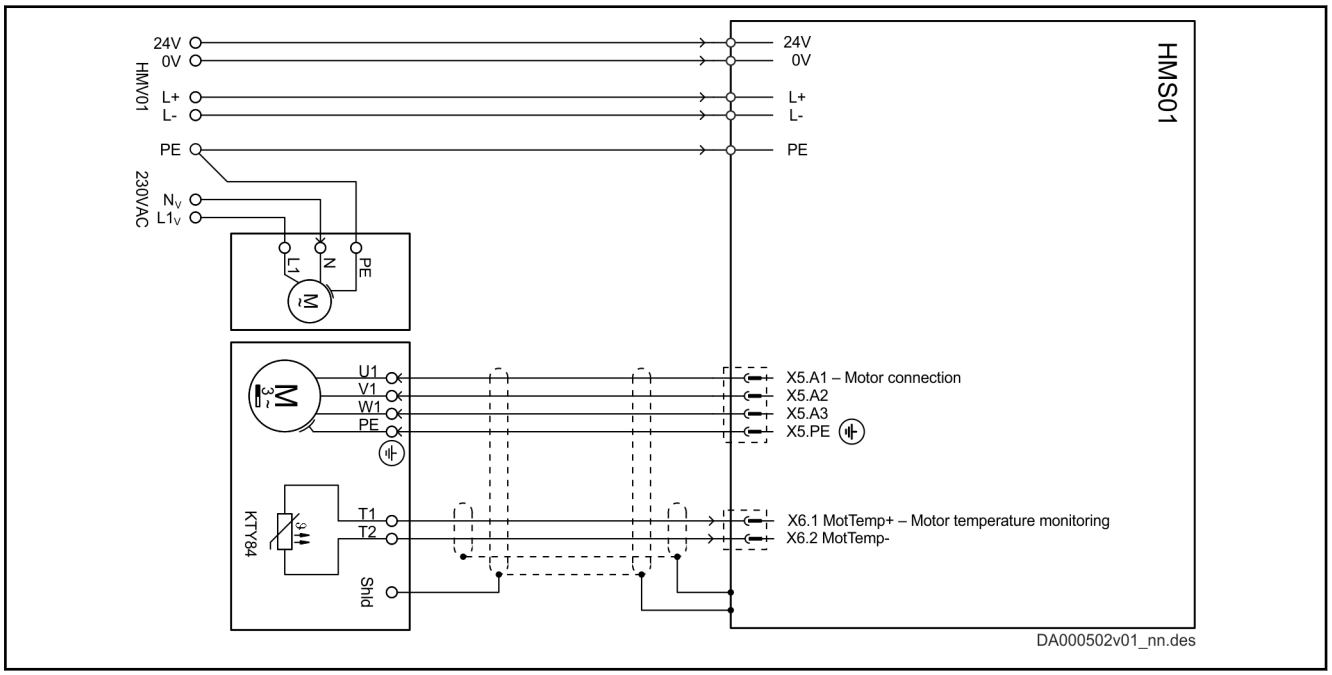


Fig. 7-4: Connection diagram of HMS01 power section

7.4.2 Connection diagram of control section

See chapter 7.5.2 "CSH02" on page 39

7.4.3 Connection points of HMS01 power section

Symbols used to describe the connection points				
Screw terminal block	Spring terminal	Thread	Max. connection cross section	Max. tightening torque
⊘	⊸	◘	∅	↻

Tab. 7-10: Symbols

Connection point	HMS01	⊘ ⊸ ◘	∅ mm² (AWG)	↻ Nm
X5	A [1]	⊘	4.0 (10)	0.6
	B [2]	⊘	16.0 (6)	1.7
	C [3]	◘	M6 1×16; 1×25; 1×35 2×16; 2×25; 2×35 (1×6; 1×4; 1×2; 1×1 2×6; 2×4; 2×2; 2×1)	6.5
	D [4]	◘	M6 1×16; 1×25; 1×35; 1×50 2×16; 2×25; 2×35; 2×50 (1×6; 1×4; 1×2; 1×1 2×6; 2×4; 2×2; 2×1)	6.5
	E [5]	◘	M10 1×16; 1×25; 1×35; 1×50; 1×70; 1×120 2×16; 2×25; 2×35; 2×50; 2×70; 2×120 (1×6; 1×4; 1×2; 1×1; 1×1/0; 1×2/0; 1×4/0 2×6; 2×4; 2×2; 2×1; 2×1/0; 2×2/0; 2×4/0)	20
X6	A, B, C, D, E	⊸	1.5 (16)	-
24V, 0V L+, L-	A, B, C, D, E	◘	M6	6.5
⏚	A, B	⊘	4.0 (10)	0.6
	C, D, E	◘	M6	6.0

1) **A:** HMS01.1N-W0020, -W0036
2) **B:** HMS01.1N-W0054, -W0070
3) **C:** HMS01.1N-W0110
4) **D:** HMS01.1N-W0150, -W0210, -W0300
5) **E:** HMS01.1N-W0350

Tab. 7-11: Connection points

7.4.4 Connection points of the control section

See chapter "Connection points of CSB02/CSH02 control section" on page 41.

7.4.5 Documentation

Title	Document type	Material number de (en)
Rexroth IndraDrive Cs Drive Systems with HCS01	Project Planning Manual	R911322209 (R911322210)
Rexroth IndraDrive Supply Units, Power Sections HMV, HMS, HMD, HCS02, HCS03	Project Planning Manual	R911318789 (R911318790)
Rexroth IndraDrive Drive Controllers Control Sections CSB02, CSE02, CSH02, CDB02	Project Planning Manual	R911338961 (R911338962)

Tab. 7-12: Documentations, drive controllers

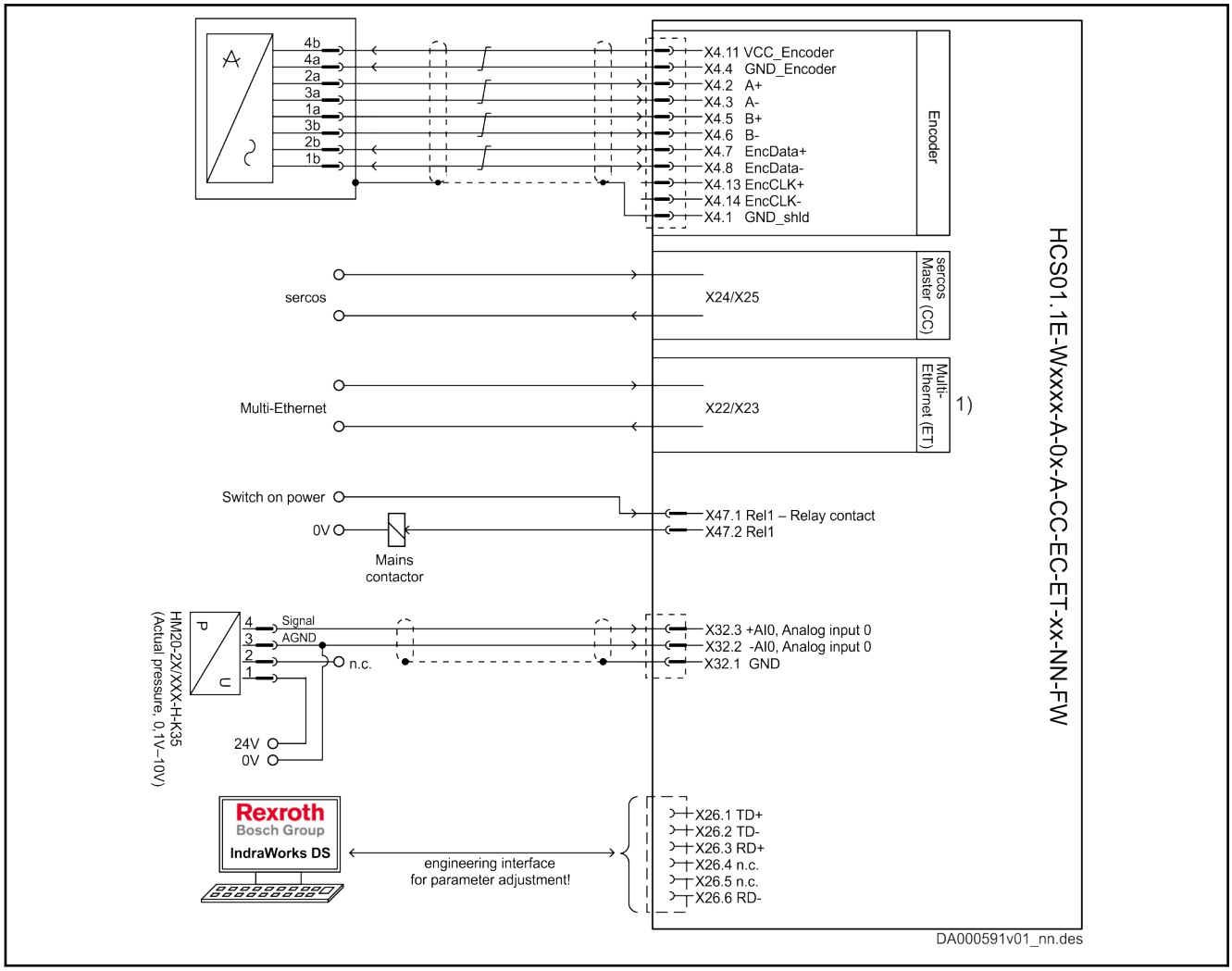
7.5 Control section

7.5.1 HCS01

Connection diagram of HCS01 control section

Position/force control (PFC system function)

HCS01 with master communication, sercos master, 1 encoder evaluation, PFC system function



1) Connecting other master communications: See chapter 7.5.3 "Connection points for master communication" on page 42

Fig. 7-5: HCS01 with master communication, sercos master, 1 encoder evaluation, PFC system function

HCS01 with master communication, 2 encoder evaluations, PFC system function

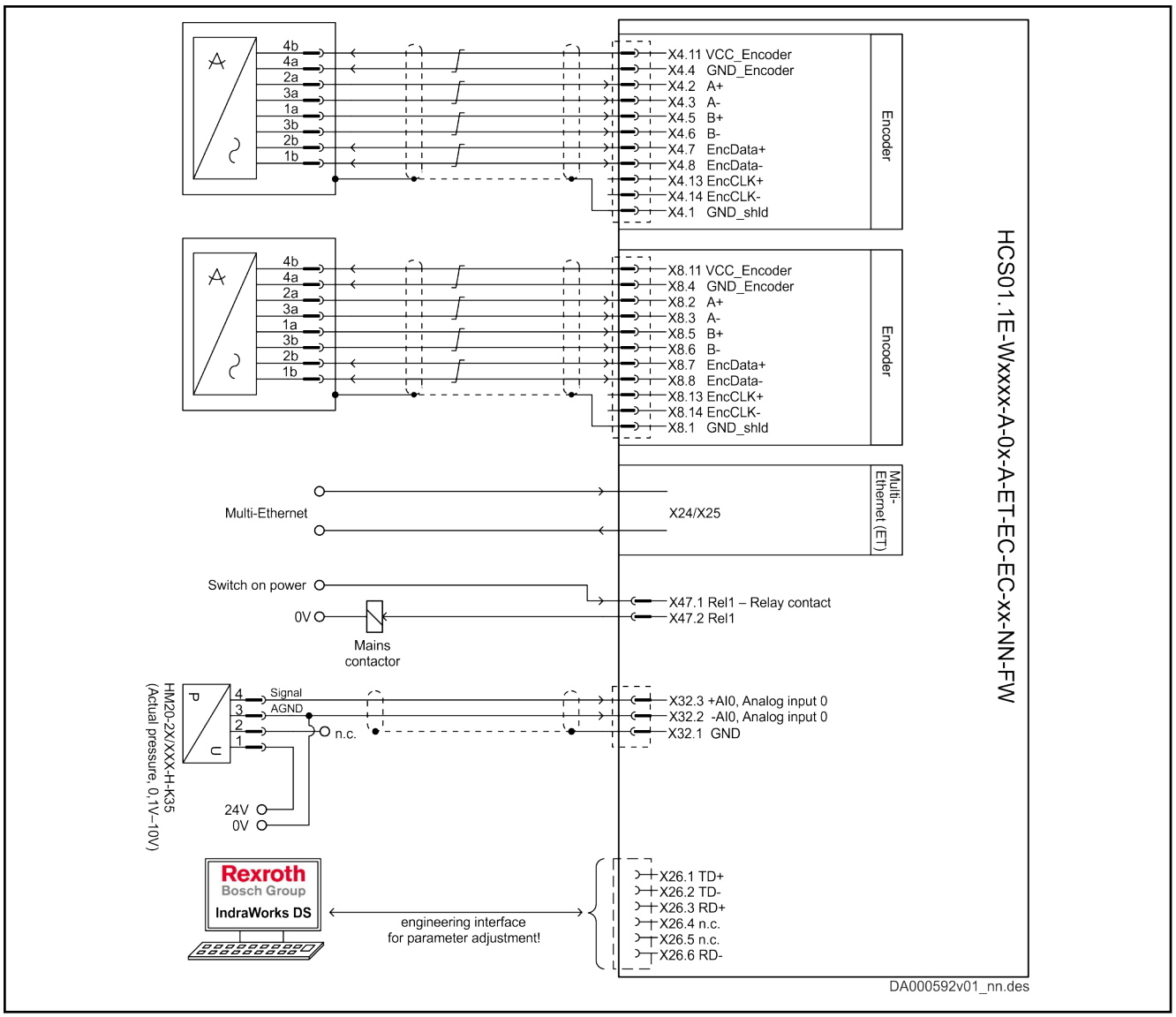


Fig. 7-6: HCS01 with master communication, 2 encoder evaluations, PFC system function

Connection points of HCS01 control section

Symbols that describe the connection points					
Spring Terminal	D-Sub	RJ-45	Max. connection cross section	Stripping length	Max. tightening torque
⊸	⌨	🖳	⌀		↻

Tab. 7-13: Symbols

Connection point	HCS01	⊸ ⌨ 🖳	⌀ mm² (AWG)	mm	↻ Nm
X4	A [1], B [1], C [1]	⌨	-	-	-
X13	A, B, C	⊸	2.5 (14)	10	-
X22 P2, X23 P1	A, B, C	🖳	-	-	-
X24 P2, X25 P1	A, B, C	🖳	-	-	-
X30	A, B, C	⌨	-	-	-
X31	A, B, C	⊸	1.5 (16)	10	-
X32	A, B, C	⊸	1.5 (16)	10	-
X47	A, B, C	⊸	1.5 (16)	10	-
X61	A, B, C	⌨	-	-	-

1) **A:** HCS01.1E-W0003…W0013-x-02, -W0005-x-03, -W0008-x-03
2) **B:** HCS01.1E-W0018-x-02, -W0018-x-03, -W0028-x-03
3) **C:** HCS01.1E-W0054-x-03

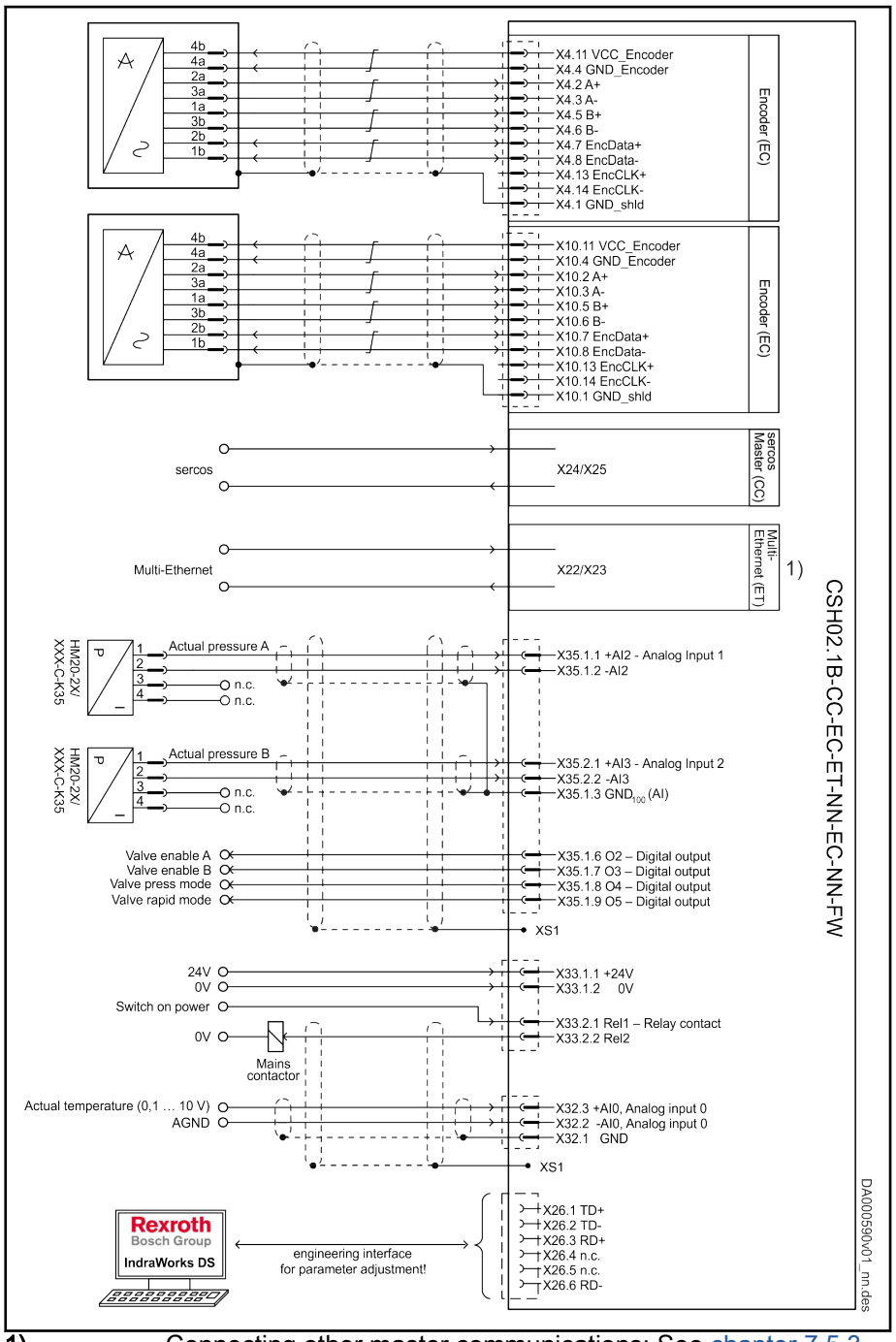
Tab. 7-14: Connection points of HCS01 control section

7.5.2 CSH02

Connection diagram of CSH02 control section

Position/force control (PFC system function)

CSH02.1B with master communication, sercos master, 2 EC encoder evaluations, 3 analog inputs (X32, X35), PFC system function



1) Connecting other master communications: See chapter 7.5.3 "Connection points for master communication" on page 42

Fig. 7-7: CSH02.1B with master communication, sercos master, 2 EC encoder evaluations, 3 analog inputs (X32, X35), PFC system function

CSH02.1B with master communication, 5 analog inputs (X32, X35, X38), 2 EC encoder evaluations, PFC system function

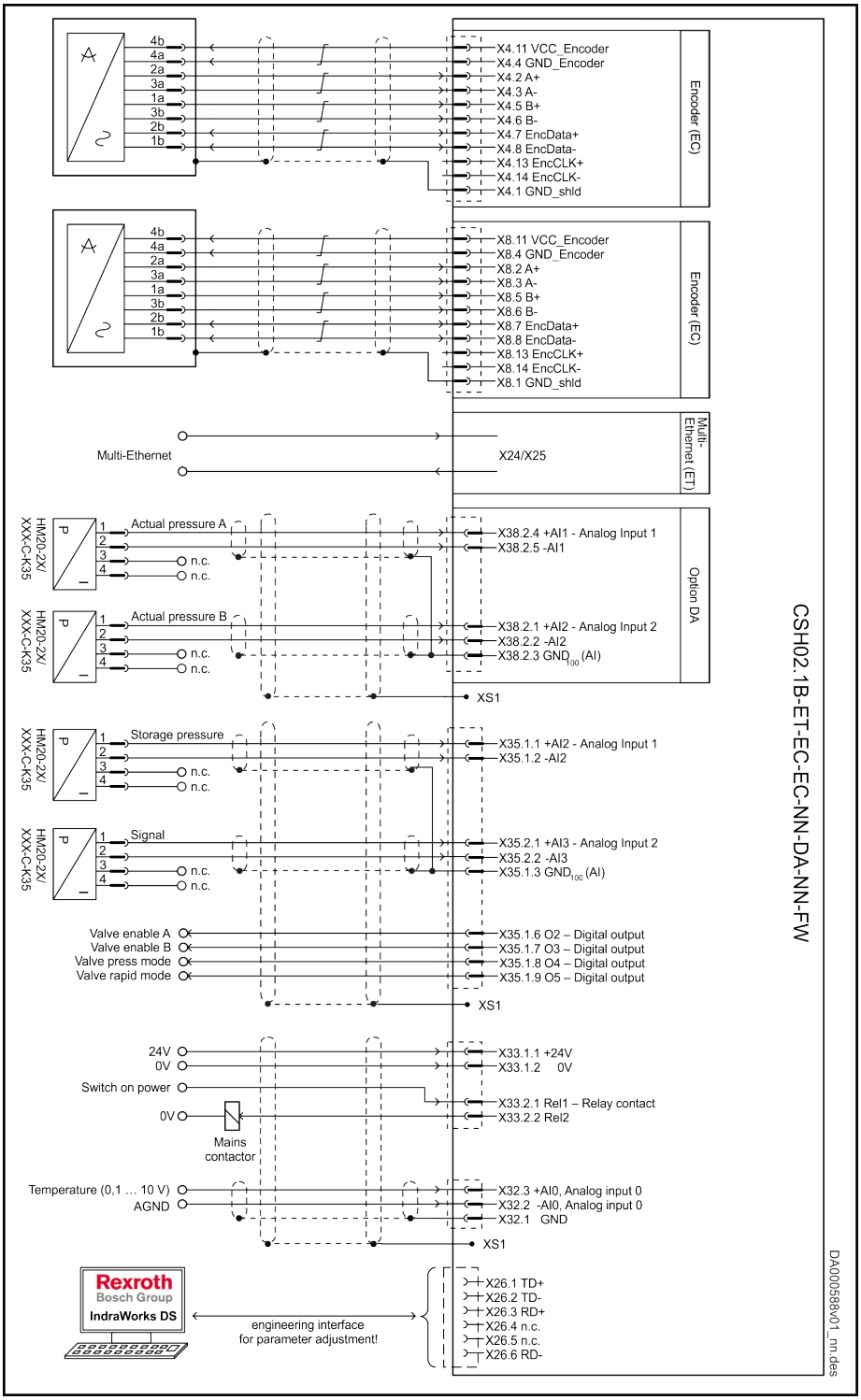


Fig. 7-8: CSH02.1B with master communication, 5 analog inputs (X32, X35, X38), 2 EC encoder evaluations, PFC system function

Connection points of CSB02/CSH02 control section

Symbols that describe the connection points			
Spring Terminal	D-Sub	RJ	Max. connection cross section
⊸			∅

Tab. 7-15: Symbols

Connection point	⊸	∅ mm² (AWG)
X4		-
X10		-
X22 P2, X23 P1		-
X24 P2, X25 P1		-
X26		-
X30		-
X31	⊸	1.5 (16)
X32	⊸	1.5 (16)
X35	⊸	1.5 (16)
X36	⊸	1.5 (16)
X37	⊸	1.5 (16)
X38	⊸	1.5 (16)
X61		-

Tab. 7-16: Connection points

Title	Document type	Material number en (de)
Rexroth IndraDrive Drive Controllers, Control Sections CSB02, CSE02, CSH02, CDB02	Project Planning Manual	R911338962 (R911338961)

Tab. 7-17: Documentation, drive controllers

7.5.3 Connection points for master communication

Overview

Master communication	Description
Multi-Ethernet	X24/X25 connection point See chapter "ET - Multi-Ethernet" on page 47
PROFIBUS	X30 connection point See chapter "PB - PROFIBUS" on page 43
CANopen	X61 connection point See chapter "CN - CANopen" on page 49

Tab. 7-18: Master communications

PB - PROFIBUS

Description

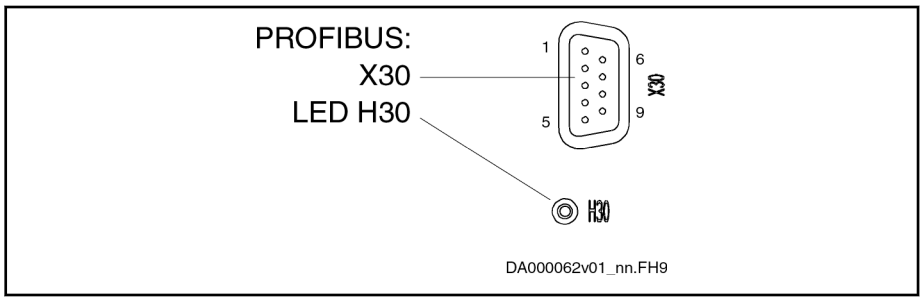
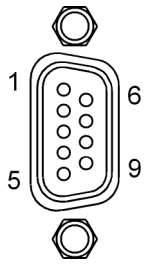


Fig. 7-9: PROFIBUS Interface

View	Identification	Function
	X30	PROFIBUS PB

D-Sub, 9-pin, female	Unit	Min.	Max.
Connection cable Stranded wire	mm^2	0.08	0.5

Tab. 7-19: Function, pin assignment, properties

Pin assignment

Pin	DIR	Signal	Function
1		-	n. c.
2		-	n. c.
3	I/O	RS485+	Receive/transmit data-positive
4	O	CNTR-P	Repeater control signal
5		0 V	0 V
6	O	+5 V	Repeater supply
7		-	n. c.
8	I/O	RS485-	Receive/transmit data-negative
9		0V	0 V

Tab. 7-20: Signal assignment

Shield connection Via D-Sub mounting screws and metallized connector housing.

Compatibility of the interface According to DIN EN 50 170

Recommended cable type According to DIN EN 50 170 - 2, cable type A

Signal specification

Signal	Specification
+5V Repeater supply	+5 V (±10%) Max. 75 mA
Repeater control signal	TTL-compatible: • 1: Transmit • 0: Receive Output resistance: 350R V_{OL} ≤ 0.8 V at I_{OL} ≤ 2 mA V_{OH} ≥ 3.5 V at I_{OH} ≤ 1 mA
Receive/transmit data	EIA-RS485 standard

Tab. 7-21: Signal specification

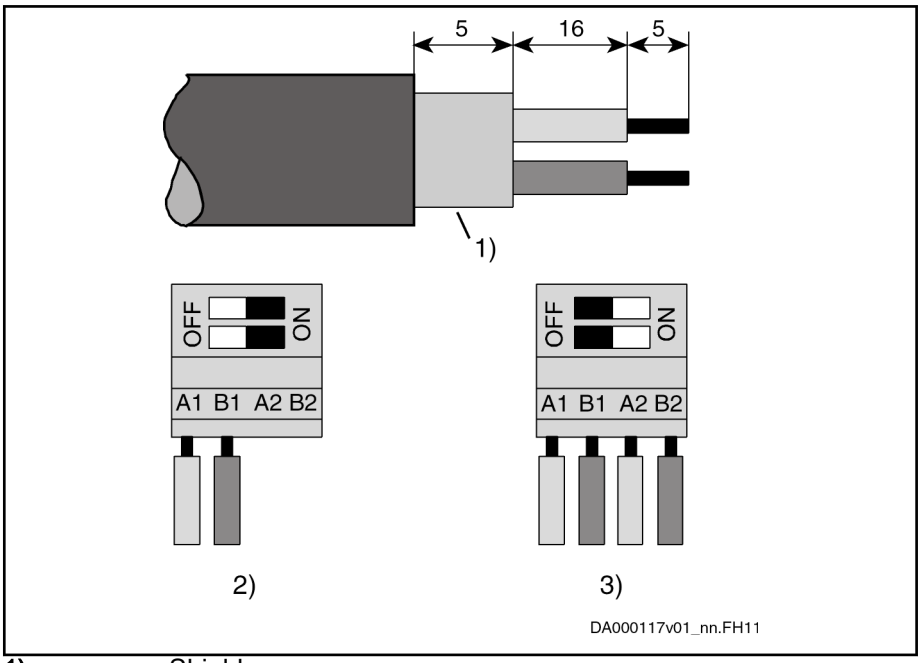
NOTICE **Danger of destroying output "+5V repeater supply" by overload!**

Do not short-circuit the output.

Do not exceed the maximum current.

Bus connectors

The PROFIBUS connectors each have a connectable terminating resistor. The terminating resistor must always be active at both the first and last bus node. Carry out the connection as shown in the figures below.



1) Shield
2) Bus connection and switch position for first node and last node
3) Bus connection and switch position for all other nodes

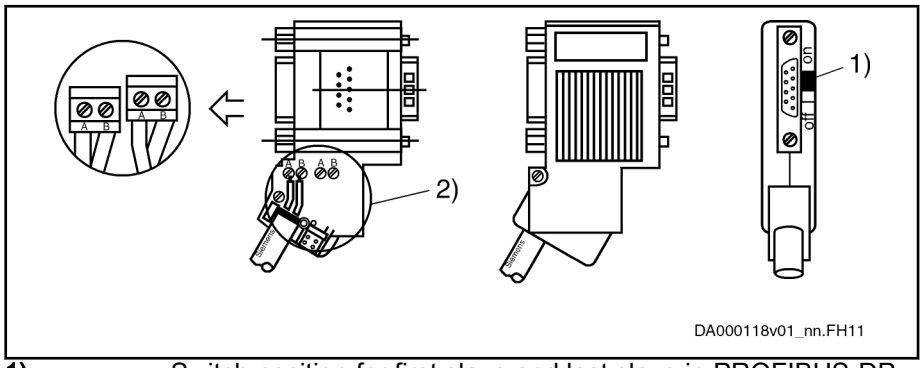
Fig. 7-10: Preparing a cable for connecting a bus connector

To assemble the bus cable, proceed as follows:

- Use cable according to DIN EN50170 / 2 edition 1996
- Strip cable (see figure above)
- Insert both cores into screw terminal block

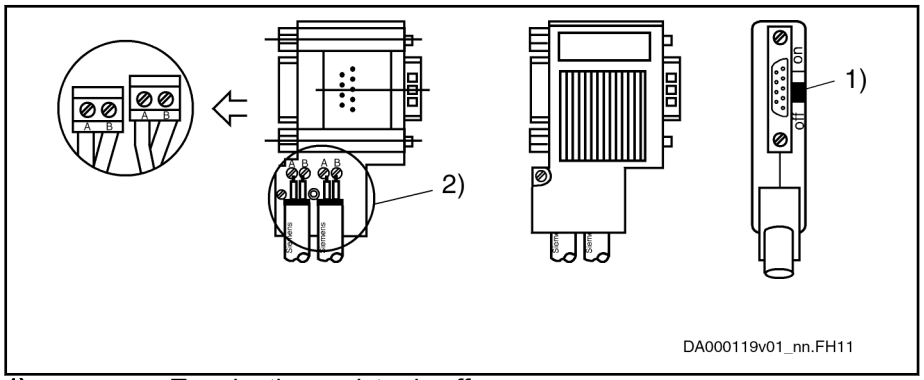
Do not interchange the cores for A and B.

- Press cable sheath between both clamps
- Screw on both cores in screw terminals



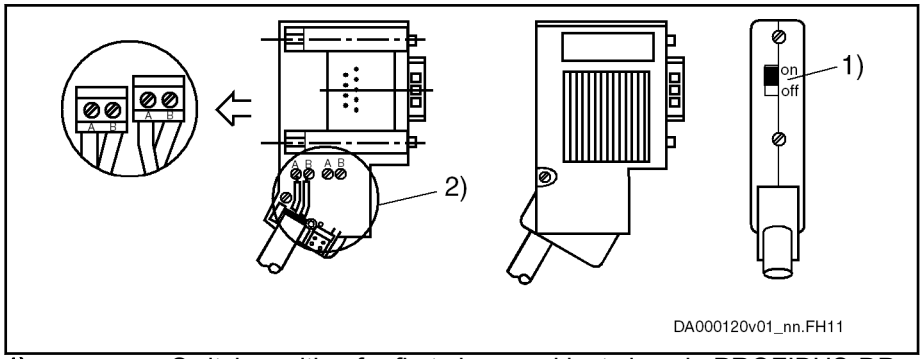
1) Switch position for first slave and last slave in PROFIBUS-DP
2) Cable shield must have direct contact to metal

Fig. 7-11: Bus connection for first and last slave, bus connector with 9-pin D-sub female connector, INS0541



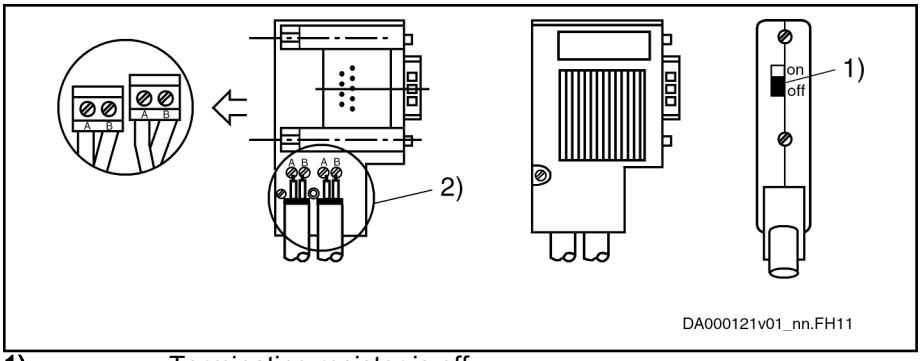
1) Terminating resistor is off
2) Cable shield must have direct contact to metal

Fig. 7-12: Bus connection for all other slaves, bus connector with 9-pin D-sub female connector, INS0541



1) Switch position for first slave and last slave in PROFIBUS-DP
2) Cable shield must have direct contact to metal

Fig. 7-13: Bus connection for first and last slave, without 9-pin D-sub female connector, INS0540



1) Terminating resistor is off
2) Cable shield must have direct contact to metal

Fig. 7-14: Bus connection for all other slaves, without 9-pin D-sub female connector, INS0540

Connect the drive controller to a control unit using a shielded two-wire line in accordance with DIN 19245/Part 1.

Diagnostic displays For the significance of the diagnostic displays, see firmware documentation.

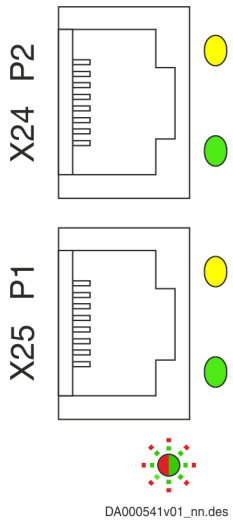
ET - Multi-Ethernet

Description

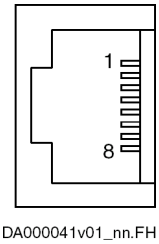
Multi-Ethernet (ET)

With the Multi-Ethernet communication module "ET", drive controllers can be integrated in different Ethernet field bus systems (e.g. sercos III, EtherCAT, EtherNet/IP or PROFINET IO).

The LED display depends on the field bus system

	X24 (port 2) X25 (port 1)

Tab. 7-22: ET, connection point

View	Connection	Signal name	Function
	1	TD+	Transmit, differential output A
	2	TD-	Transmit, differential output B
	3	RD+	Receive, differential input A
	4	n. c.	-
	5	n. c.	-
	6	RD-	Receive, differential input B
	7	n. c.	-
	8	n. c.	-
	Housing		Shield connection
Properties			
Standard	• Ethernet • Type: RJ-45, 8-pin		

Compatibility	100Base-TX according to IEEE 802.3u
Recommended cable type	• According to **CAT5e**; type of shield ITP (Industrial Twisted Pair) • Ready-made cables which can be ordered: – **RKB0011** Long cables (100 m at maximum) to connect the drive system to the higher-level control unit or remote communication nodes. Minimum bending radius: – 48.75 mm if laid flexibly – 32.50 mm if laid permanently Order code for a 30 m long cable: RKB0011/030,0 – **RKB0013** Short cables to connect devices arranged side by side in the control cabinet. 4 lengths available: 0.19 m; 0.25 m; 0.35 m; 0.55 m Order code for a 0.55 m long cable: RKB0013/00,55 Minimum bending radius: 30.75 mm

Tab. 7-23: Function, Pin Assignment, Properties

CN - CANopen

Description

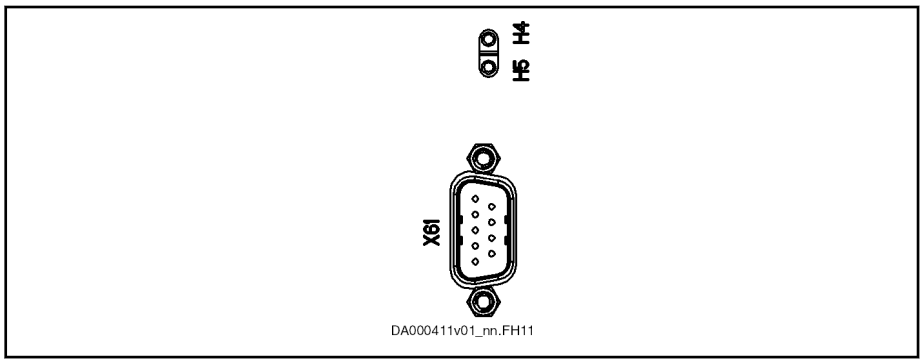
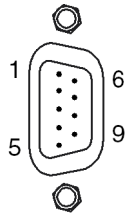


Fig. 7-15: CANopen

Connection point

Connection point	Type	Number of poles	Design	multi-wired [mm²]	Figure
X61	D-Sub	9	Pin on device	0.25–0.5	

Tab. 7-24: Connection point

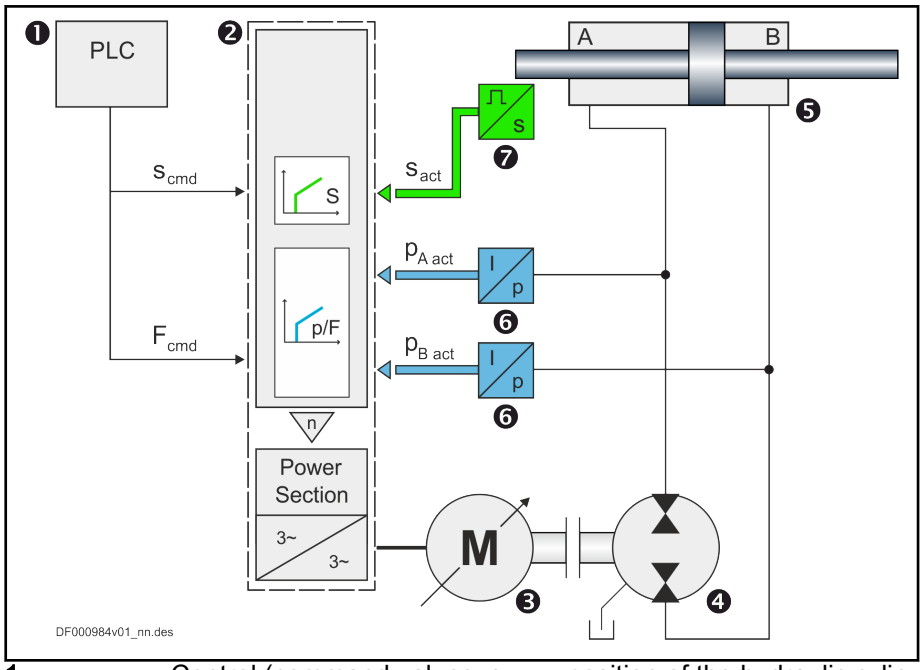
Pin Assignment

Pin	Signal	Function
1	n. c.	-
2	CAN-L	Negated CAN signal (Dominant Low)
3	CAN-GND	Reference potential of CAN signals
4	n. c.	-
5	Drain/Shield	Shield connection
6	GND	Reference potential of device
7	CAN-H	Positive CAN signal (Dominant High)
8	n. c.	-
9	n. c.	-

Tab. 7-25: Signal Assignment

8 Commissioning

8.1 System overview



1	Control (command values: s_{cmd} = position of the hydraulic cylinder, F_{cmd} = force)
2	Drive controller (Control Section, Power Section)
3	Motor
4	Pump
3 + 4	Motor-pump unit
5	Hydraulic system
6	Pressure transducer ($p_{A\ act}$ = actual pressure value chamber A, $p_{B\ act}$ = actual pressure value chamber B)
7	Position measurement (s_{act} = actual position value)

Fig. 8-1: System overview

8.2 Procedure

8.2.1 Notes

For commissioning a motor-pump group, further components are required (drive controller, control).

Commissioning is basically carried out in two steps:

1. Commissioning of the **pump drive** (motor control)
2. Commissioning of the **pump**

8.2.2 Commissioning of the pump drive (motor control)

See documentation of the component:

Title	Document type	Material number de (en)
Rexroth Sytronix SvP 7020 PFC, Variable-Speed Pump Drives	Commissioning manual	R911379549 (R911379550)

Tab. 8-1: Documentations, motor-pump units

8.2.3 Commissioning of the pump

See documentation of the component:

Title	Document type	Material number de (en)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA01 [1)]	Operating instructions	R911339822 (R911339824)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA02 [1)]	Operating instructions	R911387040 (R911387041)

1) This documentation contains information on supplementary documentations of the individual components (motors, pumps, hydraulic fluids, etc.).

Tab. 8-2: Documentations, motor-pump units

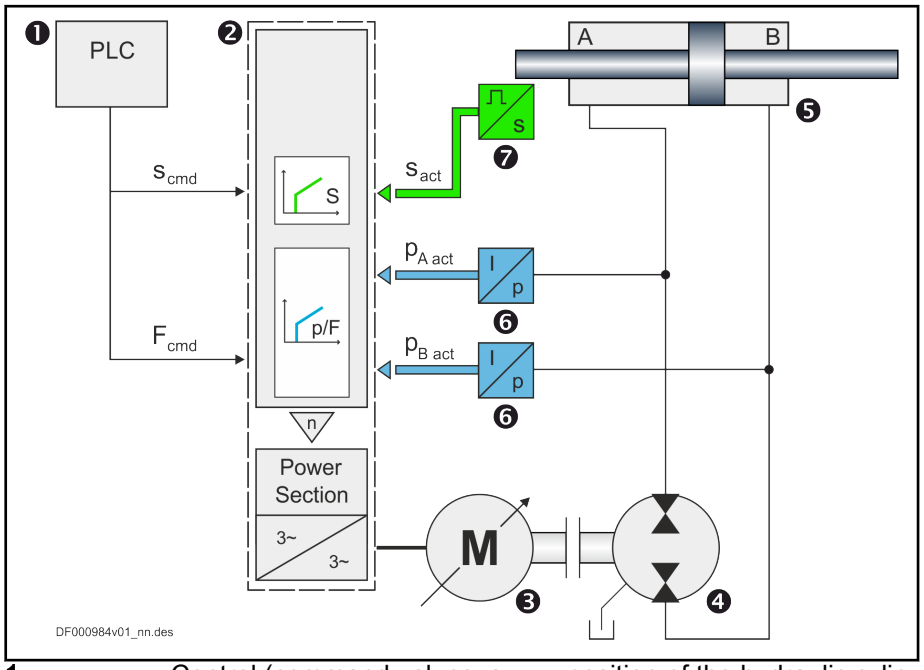
9 Operation

9.1 Position/force control PFC

The SvP system operates a PGH internal gear pump. The displaced flow rate results directly from the motor speed.

The pumps used have been especially optimized for variable-speed operation. The pumps achieve little leakage at a high overall efficiency and a low noise level. Depending on the application, sensors capture the pressure, cylinder position and motor speed and transmit the captured values to the drive controller.

The drive controller compares these values to the command values set by the control unit and controls the motor speed according to the system requirements.



1	Control (command values: s_{cmd} = position of the hydraulic cylinder, F_{cmd} = force)
2	Drive controller (Control Section, Power Section)
3	Motor
4	Pump
3 + 4	Motor-pump unit
5	Hydraulic system
6	Pressure transducer ($p_{A\ act}$ = actual pressure value chamber A, $p_{B\ act}$ = actual pressure value chamber B)
7	Position measurement (s_{act} = actual position value)

Fig. 9-1: System overview

x/F control "x/F control" means "position/force control" (x: position, F: force).

9.2 Operation modes

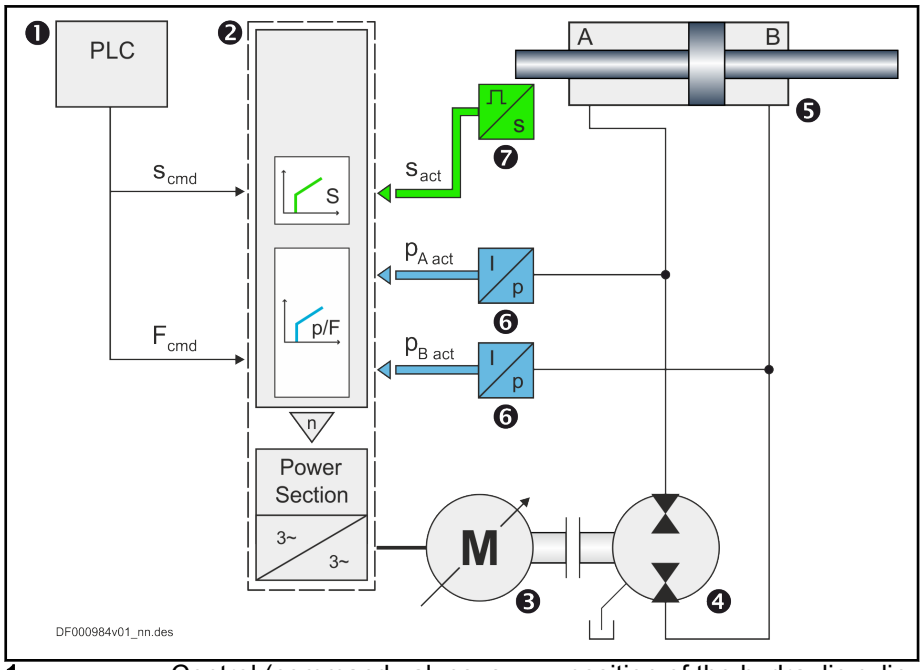
See documentation of the component (chapter "Commissioning", subchapter "Commissioning PFC", subchapter "Operation modes)":

Title	Document type	Material number de (en)
Rexroth Sytronix SvP 7020 PFC, Variable-Speed Pump Drives	Commissioning Manual	R911379549 (R911379550)

Tab. 9-1: Documentations, motor-pump units

10 Maintenance

10.1 System overview



1	Control (command values: s_{cmd} = position of the hydraulic cylinder, F_{cmd} = force)
2	Drive controller (Control Section, Power Section)
3	Motor
4	Pump
3 + 4	Motor-pump unit
5	Hydraulic system
6	Pressure transducer ($p_{A\ act}$ = actual pressure value chamber A, $p_{B\ act}$ = actual pressure value chamber B)
7	Position measurement (s_{act} = actual position value)

Fig. 10-1: System overview

10.2 Drive controllers

Regularly check the filters at the air inlets of the control cabinet. Replace or clean clogged filters.

The electrical components themselves require no maintenance.

10.3 Motor-pump units

See documentation of the component:

Title	Document type	Material number de (en)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA01 1)	Operating instructions	R911339822 (R911339824)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA02 1)	Operating instructions	R911387040 (R911387041)

1) This documentation contains information on supplementary documentations of the individual components (motors, pumps, hydraulic fluids, etc.).

Tab. 10-1: Documentations, motor-pump units

11 Decommissioning

Decommission the entire machine as described in the respective operating instructions.

To do so, complete the following steps:

- Note the instructions regarding the entire system.
- Use the machine-side control commands to bring the drive to a controlled standstill.
- Switch off the power voltage and control voltage of the controller.
- Switch off the motor circuit breaker for the fan unit.
- Depressurize the pressure side (P line).
- Switch off the main switch of the machine.
- Secure the machine against restarting.

12 Replacing components

12.1 Disassembly

12.1.1 Preparing disassembly

Decommission the complete machine as described in chapter “Decommissioning”.

- Do not work on running or unsecured machines.
- Before starting to work, secure the machine against unforeseeable movements and against unauthorized operation.
- Allow the system to cool down prior to commencing work.
- Do not work on hot surfaces.

12.1.2 Disassembly

1. Before starting work make sure that the system is depressurized.
2. Wait until the discharge time of the electrical components has expired (discharge time: refer to the warning at the components, Rexroth IndraDrive: discharge time = 30 minutes).
3. Disconnect all electrical connections.
4. Shut off the suction connection of the motor-pump unit. When doing so, observe the instructions of the manufacturer of the complete machine.
5. Before disconnecting the mechanical connections, secure the components of the system and the connection lines against falling or moving.
6. Disconnect the pipes on the pressure side.
7. Collect draining residual oil immediately in a suitable container, e.g. an oil drip pan.
8. Disassemble the components of the system as described in the documentation of the relevant component:
   - chapter 12.2 "Motor-pump unit" on page 60
   - chapter 12.3.1 "HCS01, HCS02, HCS03, HMS01" on page 60

12.2 Motor-pump unit

The operating instructions of a motor-pump unit describe both demounting and replacement of the motor and demounting and replacement of the pump.

See documentation of the component:

Title	Document type	Material number de (en)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA01 1)	Operating instructions	R911339822 (R911339824)
Rexroth Sytronix SvP 70xx Motor-Pump Unit MPA02 1)	Operating instructions	R911387040 (R911387041)

1) This documentation contains information on supplementary documentations of the individual components (motors, pumps, hydraulic fluids, etc.).

Tab. 12-1: Documentations, motor-pump units

12.3 Drive controller

12.3.1 HCS01, HCS02, HCS03, HMS01

See documentation of the component (chapter: "Handling, diagnostic and service functions", subchapter "Replacing the controller"):

Title Rexroth IndraDrive ...	Type of documentation	Material number de (en)
MPx-21 Functions	Application manual	R911385758 (R911385759)

Tab. 12-2: Documentation – firmware

13 Environmental protection and disposal

13.1 Environmental protection

Production processes

The products are manufactured in energy- and resource-optimized production processes which allow re-using and recycling the resulting waste. We regularly try to replace pollutant-loaded raw materials and supplies by more environment-friendly alternatives.

No release of hazardous substances

Our products do not contain any hazardous substances which may be released in case of appropriate use. Normally, our products will not have any negative influences on the environment.

Significant components

Significant components of our products are:

Electronic devices
- Steel
- Aluminum
- Copper
- Plastics
- Electronic components

Motors
- Steel / Stainless steel
- Aluminum
- Copper
- Brass
- Magnetic materials
- Elektronic components

13.2 Disposal

Return of products

Our products can be returned to us for disposal free of charge. However, this requires that the products be free from oil, grease or other dirt.

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

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

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

Packaging

Packaging materials consist of cardboard, wood and polystyrene They can be recycled anywhere without any problem.

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

Batteries and accumulators

Batteries and accumulators can be labeled with this symbol.

The symbol indicating "separate collection" for all batteries and accumulators is the crossed-out wheeled bin.

End users in the EU are legally bound to return used batteries and accumulators. Outside the validity of the EU Directive 2006/66/EC, the particularly applicable regulations must be followed.

Batteries and accumulators can contain hazardous substances which can harm the environment or people's health when improperly stored or disposed of.

After use, the batteries or accumulators contained in Rexroth products must be properly disposed of according to the country-specific collection systems.

Recycling

Most of the products can be recycled due to their high content of metal. In order to recycle the metal in the best possible way, the products must be disassembled into individual assemblies.

Metals contained in electric and electronic assemblies can also be recycled by means of special separation processes.

Plastic parts of the products may contain flame retardants. These plastic parts are labeled according to EN ISO 1043. They have to be recycled separately or disposed of according to the applicable legal provisions.

14 Troubleshooting

14.1 How to proceed for troubleshooting

- Always work systematically and purposefully, even when under time pressure. Randomly and imprudently disassembling and modifying settings might in the worst case result in the inability to determine 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 had worked properly in conjunction with the entire system before the error occurred.
- Try to determine any changes of the entire system in which the product has been installed:
  - Were there any changes to the product's operating conditions or operating range?
  - Were there any changes (e.g., refittings) or repairs carried out in the entire system (machine, electrics, control) or at 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 error cause. If possible, directly ask the (machine) operator.
- Document the error condition and compare it to the initial condition. If you cannot remove the error, please contact one of the contact addresses which can be found at www.boschrexroth.com.

14.2 Diagnostic concept

See documentation of the component (chapter "Parameters and diagnostic messages of Position Force Control (PFC)", subchapter "Error and warning messages for position/force control x/F control (PFC)"):

Title	Document type	Material number de (en)
Rexroth Sytronix SvP 7020 PFC, Variable-Speed Pump Drives	Commissioning Manual	R911379549 (R911379550)

Tab. 14-1: Documentation

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RE 62314-B

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