

BOSCH REXROTH INDRADrive M PROJECT PLANNING MANUAL



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Rexroth IndraDrive M Drive Controllers Power Sections

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Project Planning Manual



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1 Introduction

1.1 About this documentation

Purpose of documentation

This documentation describes

- planning the mechanical control cabinet construction
- planning the electrical control cabinet construction
- logistical handling of the equipment

Note: Only the power section is described in this manual "Rexroth IndraDrive M, Drive Controllers: Power Sections, Project Planning Manual" (DOK-INDRV*-HMS+HMD****-PR**-EN-P; Part no.: 295014).

Note: The control section is described in a separate document: "Rexroth IndraDrive, Drive Controllers: Control Sections, Project Planning Manual" (DOK-INDRV*-CSH*****-PR**-EN-P; Part no.: 295012).

1.2 Introducing the Devices

Features and Fields of Application

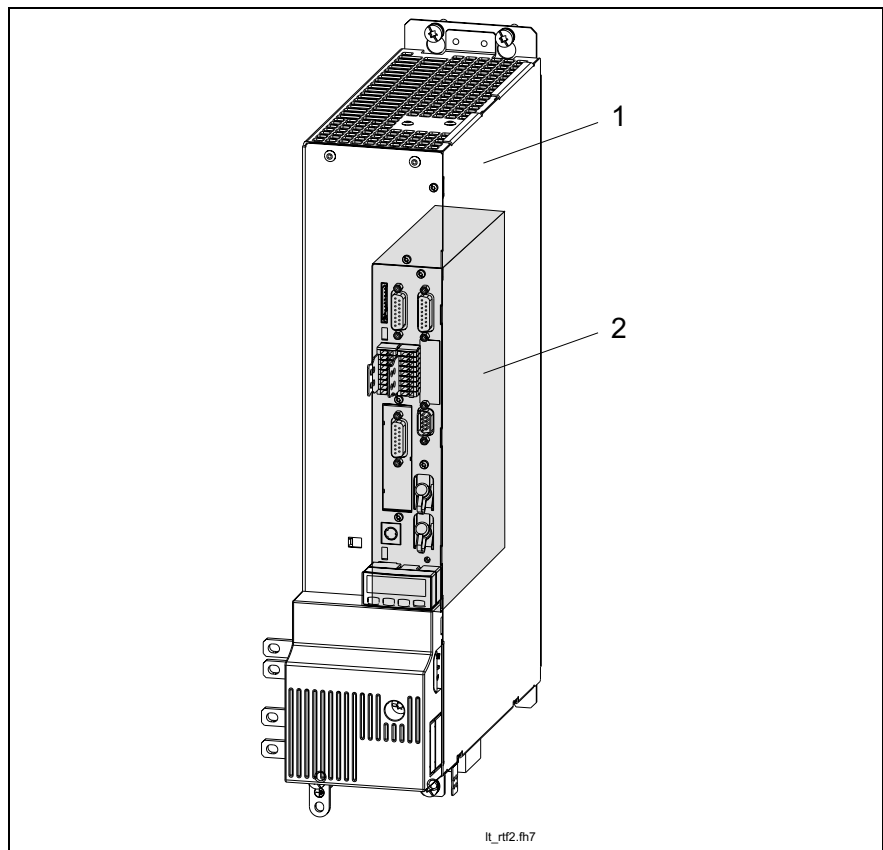
The intelligent digital drive controller is the high performance solution with high functionality for single-axis and multiple-axis drive and control tasks.

The drive controller can be used for carrying out a large number of drive tasks in the most varied applications. Various types of device are available with graduated drive performance.

Typical applications are:

- Printing presses
- Machine tools
- Handling systems
- Packaging machines
- Assembly systems

Basic Structure



- 1: Power section
2: Control section

Fig. 1-1: Basic structure

The drive controller consists of two essential parts:

- Power section
- Control section

Power Section

The following are connected to the power section:

- Power supply unit (DC bus voltage)
- 24 V power supply
- Motor
- Bus module (for cross communication with other devices connected to the DC bus)

Control Section

The control section is a separate section which is inserted into the power section. The drive controller is supplied ex works complete with control section.

Drive System

The following figure shows the components of the drive system.

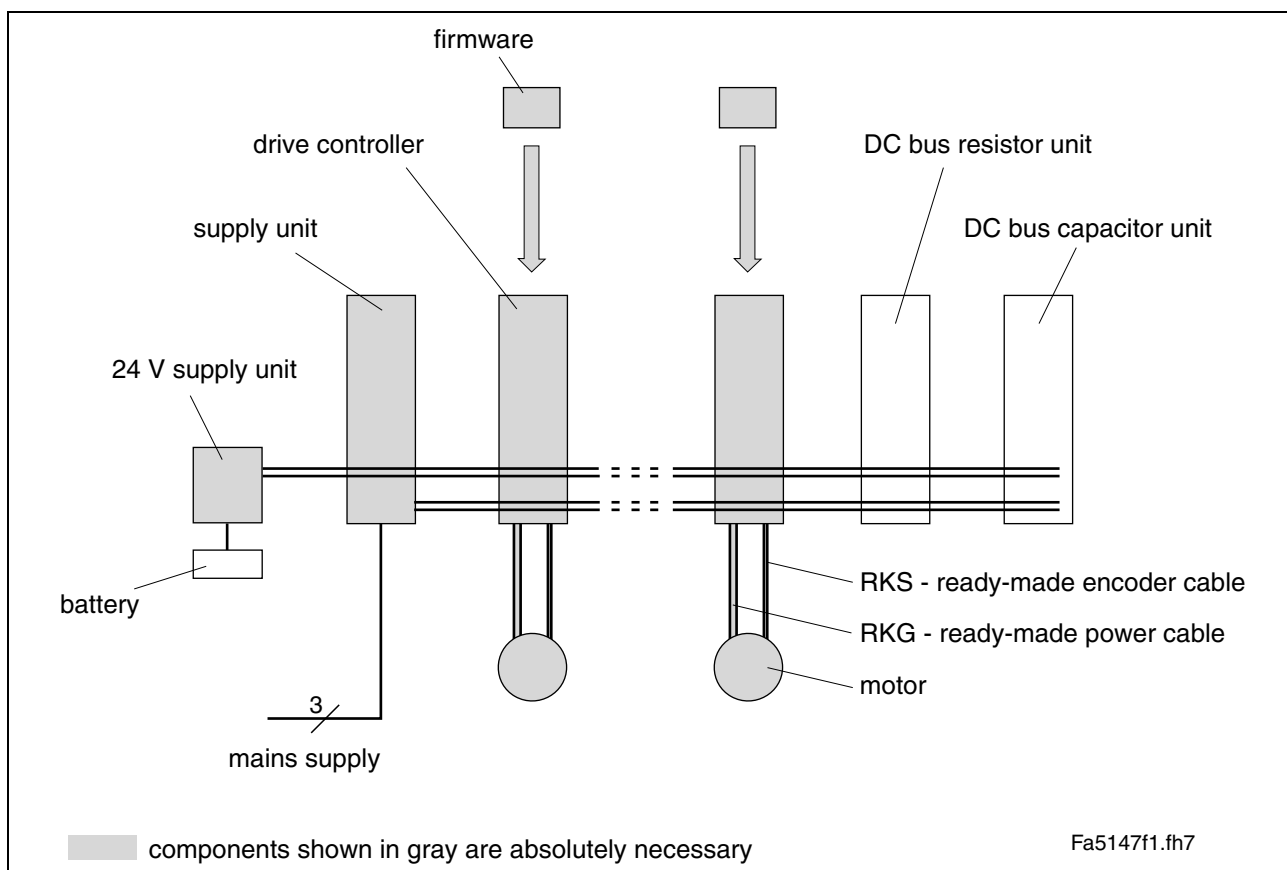


Fig. 1-2: Drive system

Tests and Certifications



Fig. 1-3: CE mark

C-UL-US Listing

In accordance with UL508 C.
The devices are C-UL-US listed under the item "Rexroth".

Tests	Insulation-high-voltage test in accordance with EN50178	Routine testing with DC 2230 V, 1 min resp. Routine testing with AC 1575 V, 1 min; Power supply with 0,1 A short-circuit current
	Separation between control and power voltage circuits	Safe separation in accordance with EN50178
	Air gaps and leakage distances	In accordance with EN50178

Fig. 1-4: Tests

Notes

2 Important Directions for Use

2.1 Appropriate Use

Introduction

Rexroth products represent state-of-the-art developments and manufacturing. They are tested prior to delivery to ensure operating safety and reliability.

The products may only be used in the manner that is defined as appropriate. If they are used in an inappropriate manner, then situations can develop that may lead to property damage or injury to personnel.

Note: Rexroth, as manufacturer, is not liable for any damages resulting from inappropriate use. In such cases, the guarantee and the right to payment of damages resulting from inappropriate use are forfeited. The user alone carries all responsibility of the risks.

Before using Rexroth products, make sure that all the pre-requisites for an appropriate use of the products are satisfied:

- Personnel that in any way, shape or form uses our products must first read and understand the relevant safety instructions and be familiar with appropriate use.
- If the product takes the form of hardware, then they must remain in their original state, in other words, no structural changes are permitted. It is not permitted to decompile software products or alter source codes.
- Do not mount damaged or faulty products or use them in operation.
- Make sure that the products have been installed in the manner described in the relevant documentation.

Areas of Use and Application

Drive controllers made by Rexroth are designed to control electrical motors and monitor their operation.

Control and monitoring of the motors may require additional sensors and actors.

Note: The drive controllers may only be used with the accessories and parts specified in this document. If a component has not been specifically named, then it may not be either mounted or connected. The same applies to cables and lines.

Operation is only permitted in the specified configurations and combinations of components using the software and firmware as specified in the relevant function descriptions.

Every drive controller has to be programmed before starting it up, making it possible for the motor to execute the specific functions of an application.

The drive controllers are designed for use in single or multiple-axis drive and control applications.

To ensure an application-specific use, the drive controllers are available with differing drive power and different interfaces.

Typical applications of drive controllers are:

- handling and mounting systems,
- packaging and foodstuff machines,
- printing and paper processing machines and
- machine tools.

The drive controllers may only be operated under the assembly, installation and ambient conditions as described here (temperature, system of protection, humidity, EMC requirements, etc.) and in the position specified.

2.2 Inappropriate Use

Using the drive controllers outside of the above-referenced areas of application or under operating conditions other than described in the document and the technical data specified is defined as "inappropriate use".

Drive controllers may not be used if

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

3 Safety Instructions for Electric Drives and Controls

3.1 Introduction

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

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

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



WARNING

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

3.2 Explanations

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

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

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

3.3 Hazards by Improper Use



DANGER

**High voltage and high discharge current!
Danger to life or severe bodily harm by electric shock!**



DANGER

Dangerous movements! Danger to life, severe bodily harm or material damage by unintentional motor movements!



WARNING

High electrical voltage due to wrong connections! Danger to life or bodily harm by electric shock!



WARNING

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!



CAUTION

Surface of machine housing could be extremely hot! Danger of injury! Danger of burns!



CAUTION

Risk of injury due to improper handling! Bodily harm caused by crushing, shearing, cutting and mechanical shock or incorrect handling of pressurized systems!



CAUTION

Risk of injury due to incorrect handling of batteries!

3.4 General Information

- Bosch Rexroth AG is not liable for damages resulting from failure to observe the warnings provided in this documentation.
- Read the operating, maintenance and safety instructions in your language before starting up the machine. If you find that you cannot completely understand the documentation for your product, please ask your supplier to clarify.
- Proper and correct transport, storage, assembly and installation as well as care in operation and maintenance are prerequisites for optimal and safe operation of this equipment.
- Only persons who are trained and qualified for the use and operation of the equipment may work on this equipment or within its proximity.
 - The persons are qualified if they have sufficient knowledge of the assembly, installation and operation of the equipment as well as an understanding of all warnings and precautionary measures noted in these instructions.
 - Furthermore, they must be trained, instructed and qualified to switch electrical circuits and equipment on and off in accordance with technical safety regulations, to ground them and to mark them according to the requirements of safe work practices. They must have adequate safety equipment and be trained in first aid.
- Only use spare parts and accessories approved by the manufacturer.
- Follow all safety regulations and requirements for the specific application as practiced in the country of use.
- The equipment is designed for installation in industrial machinery.
- The ambient conditions given in the product documentation must be observed.
- Use only safety features and applications that are clearly and explicitly approved in the Project Planning Manual.

For example, the following areas of use are not permitted: construction cranes, elevators used for people or freight, devices and vehicles to transport people, medical applications, refinery plants, transport of hazardous goods, nuclear applications, applications sensitive to high frequency, mining, food processing, control of protection equipment (also in a machine).
- The information given in the documentation of the product with regard to the use of the delivered components contains only examples of applications and suggestions.

The machine and installation manufacturer must

 - make sure that the delivered components are suited for his individual application and check the information given in this documentation with regard to the use of the components,
 - make sure that his application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.
- Startup of the delivered components is only permitted once it is sure that the machine or installation in which they are installed complies with the national regulations, safety specifications and standards of the application.

- Operation is only permitted if the national EMC regulations for the application are met.
The instructions for installation in accordance with EMC requirements can be found in the documentation "EMC in Drive and Control Systems".
The machine or installation manufacturer is responsible for compliance with the limiting values as prescribed in the national regulations.
- Technical data, connections and operational conditions are specified in the product documentation and must be followed at all times.

3.5 Protection Against Contact with Electrical Parts

Note: This section refers to equipment and drive components with voltages above 50 Volts.

Touching live parts with voltages of 50 Volts and more with bare hands or conductive tools or touching ungrounded housings can be dangerous and cause electric shock. In order to operate electrical equipment, certain parts must unavoidably have dangerous voltages applied to them.



DANGER

High electrical voltage! Danger to life, severe bodily harm by electric shock!

- ⇒ Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain or repair this equipment.
 - ⇒ Follow general construction and safety regulations when working on high voltage installations.
 - ⇒ Before switching on power the ground wire must be permanently connected to all electrical units according to the connection diagram.
 - ⇒ Do not operate electrical equipment at any time, even for brief measurements or tests, if the ground wire is not permanently connected to the points of the components provided for this purpose.
 - ⇒ Before working with electrical parts with voltage higher than 50 V, the equipment must be disconnected from the mains voltage or power supply. Make sure the equipment cannot be switched on again unintended.
 - ⇒ The following should be observed with electrical drive and filter components:
 - ⇒ Wait five (5) minutes after switching off power to allow capacitors to discharge before beginning to work. Measure the voltage on the capacitors before beginning to work to make sure that the equipment is safe to touch.
 - ⇒ Never touch the electrical connection points of a component while power is turned on.
 - ⇒ Install the covers and guards provided with the equipment properly before switching the equipment on. Prevent contact with live parts at any time.
 - ⇒ A residual-current-operated protective device (RCD) must not be used on electric drives! Indirect contact must be prevented by other means, for example, by an overcurrent protective device.
 - ⇒ Electrical components with exposed live parts and uncovered high voltage terminals must be installed in a protective housing, for example, in a control cabinet.
-

To be observed with electrical drive and filter components:



DANGER

**High electrical voltage on the housing!
High leakage current! Danger to life, danger of
injury by electric shock!**

- ⇒ Connect the electrical equipment, the housings of all electrical units and motors permanently with the safety conductor at the ground points before power is switched on. Look at the connection diagram. This is even necessary for brief tests.
- ⇒ Connect the safety conductor of the electrical equipment always permanently and firmly to the supply mains. Leakage current exceeds 3.5 mA in normal operation.
- ⇒ Use a copper conductor with at least 10 mm² cross section over its entire course for this safety conductor connection! The cross section must not be smaller than the cross section of a phase of the mains supply wire.
- ⇒ Prior to startups, even for brief tests, always connect the protective conductor or connect with ground wire. Otherwise, high voltages can occur on the housing that lead to electric shock.

3.6 Protection Against Electric Shock by Protective Low Voltage (PELV)

All connections and terminals with voltages between 0 and 50 Volts on Rexroth products are protective low voltages designed in accordance with international standards on electrical safety.



WARNING

**High electrical voltage due to wrong
connections! Danger to life, bodily harm by
electric shock!**

- ⇒ Only connect equipment, electrical components and cables of the protective low voltage type (PELV = Protective Extra Low Voltage) to all terminals and clamps with voltages of 0 to 50 Volts.
- ⇒ Only electrical circuits may be connected which are safely isolated against high voltage circuits. Safe isolation is achieved, for example, with an isolating transformer, an opto-electronic coupler or when battery-operated.

3.7 Protection Against Dangerous Movements

Dangerous movements can be caused by faulty control of the connected motors. Some common examples are:

- improper or wrong wiring of cable connections
- incorrect operation of the equipment components
- wrong input of parameters before operation
- malfunction of sensors, encoders and monitoring devices
- defective components
- software or firmware errors

Dangerous movements can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

The monitoring in the drive components will normally be sufficient to avoid faulty operation in the connected drives. Regarding personal safety, especially the danger of bodily injury and material damage, this alone cannot be relied upon to ensure complete safety. Until the integrated monitoring functions become effective, it must be assumed in any case that faulty drive movements will occur. The extent of faulty drive movements depends upon the type of control and the state of operation.

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

- ⇒ Ensure personal safety by means of qualified and tested higher-level monitoring devices or measures integrated in the installation. Unintended machine motion is possible if monitoring devices are disabled, bypassed or not activated.
- ⇒ Pay attention to unintended machine motion or other malfunction in any mode of operation.
- ⇒ Keep free and clear of the machine's range of motion and moving parts. Possible measures to prevent people from accidentally entering the machine's range of motion:
 - use safety fences
 - use safety guards
 - use protective coverings
 - install light curtains or light barriers
- ⇒ Fences and coverings must be strong enough to resist maximum possible momentum, especially if there is a possibility of loose parts flying off.
- ⇒ Mount the emergency stop switch in the immediate reach of the operator. Verify that the emergency stop works before startup. Don't operate the machine if the emergency stop is not working.
- ⇒ Isolate the drive power connection by means of an emergency stop circuit or use a starting lockout to prevent unintentional start.
- ⇒ Make sure that the drives are brought to a safe standstill before accessing or entering the danger zone. Safe standstill can be achieved by switching off the power supply contactor or by safe mechanical locking of moving parts.
- ⇒ Secure vertical axes against falling or dropping after switching off the motor power by, for example:
 - mechanically securing the vertical axes
 - adding an external braking/ arrester/ clamping mechanism
 - ensuring sufficient equilibration of the vertical axes

The standard equipment motor brake or an external brake controlled directly by the drive controller are not sufficient to guarantee personal safety!

- ⇒ Disconnect electrical power to the equipment using a master switch and secure the switch against reconnection for:
 - maintenance and repair work
 - cleaning of equipment
 - long periods of discontinued equipment use
 - ⇒ Prevent the operation of high-frequency, remote control and radio equipment near electronics circuits and supply leads. If the use of such equipment cannot be avoided, verify the system and the installation for possible malfunctions in all possible positions of normal use before initial startup. If necessary, perform a special electromagnetic compatibility (EMC) test on the installation.
-

3.8 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated near current-carrying conductors and permanent magnets in motors represent a serious health hazard to persons with heart pacemakers, metal implants and hearing aids.



WARNING

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!

- ⇒ Persons with heart pacemakers, hearing aids and metal implants are not permitted to enter the following areas:
 - Areas in which electrical equipment and parts are mounted, being operated or started up.
 - Areas in which parts of motors with permanent magnets are being stored, operated, repaired or mounted.
 - ⇒ If it is necessary for a person with a heart pacemaker to enter such an area, then a doctor must be consulted prior to doing so. Heart pacemakers that are already implanted or will be implanted in the future, have a considerable variation in their electrical noise immunity. Therefore there are no rules with general validity.
 - ⇒ Persons with hearing aids, metal implants or metal pieces must consult a doctor before they enter the areas described above. Otherwise, health hazards will occur.
-

3.9 Protection Against Contact with Hot Parts



CAUTION

**Housing surfaces could be extremely hot!
Danger of injury! Danger of burns!**

- ⇒ Do not touch housing surfaces near sources of heat! Danger of burns!
- ⇒ After switching the equipment off, wait at least ten (10) minutes to allow it to cool down before touching it.
- ⇒ Do not touch hot parts of the equipment, such as housings with integrated heat sinks and resistors. Danger of burns!

3.10 Protection During Handling and Mounting

Under certain conditions, incorrect handling and mounting of parts and components may cause injuries.



CAUTION

Risk of injury by incorrect handling! Bodily harm caused by crushing, shearing, cutting and mechanical shock!

- ⇒ Observe general installation and safety instructions with regard to handling and mounting.
- ⇒ Use appropriate mounting and transport equipment.
- ⇒ Take precautions to avoid pinching and crushing.
- ⇒ Use only appropriate tools. If specified by the product documentation, special tools must be used.
- ⇒ Use lifting devices and tools correctly and safely.
- ⇒ For safe protection wear appropriate protective clothing, e.g. safety glasses, safety shoes and safety gloves.
- ⇒ Never stand under suspended loads.
- ⇒ Clean up liquids from the floor immediately to prevent slipping.

3.11 Battery Safety

Batteries contain reactive chemicals in a solid housing. Inappropriate handling may result in injuries or material damage.



Risk of injury by incorrect handling!

- ⇒ Do not attempt to reactivate discharged batteries by heating or other methods (danger of explosion and cauterization).
- ⇒ Never charge non-chargeable batteries (danger of leakage and explosion).
- ⇒ Never throw batteries into a fire.
- ⇒ Do not dismantle batteries.
- ⇒ Do not damage electrical components installed in the equipment.

Note: Be aware of environmental protection and disposal! The batteries contained in the product should be considered as hazardous material for land, air and sea transport in the sense of the legal requirements (danger of explosion). Dispose batteries separately from other waste. Observe the legal requirements in the country of installation.

3.12 Protection Against Pressurized Systems

Certain motors and drive controllers, corresponding to the information in the respective Project Planning Manual, must be provided with pressurized media, such as compressed air, hydraulic oil, cooling fluid and cooling lubricant supplied by external systems. Incorrect handling of the supply and connections of pressurized systems can lead to injuries or accidents. In these cases, improper handling of external supply systems, supply lines or connections can cause injuries or material damage.



Danger of injury by incorrect handling of pressurized systems!

- ⇒ Do not attempt to disassemble, to open or to cut a pressurized system (danger of explosion).
- ⇒ Observe the operation instructions of the respective manufacturer.
- ⇒ Before disassembling pressurized systems, release pressure and drain off the fluid or gas.
- ⇒ Use suitable protective clothing (for example safety glasses, safety shoes and safety gloves)
- ⇒ Remove any fluid that has leaked out onto the floor immediately.

Note: Environmental protection and disposal! The media used in the operation of the pressurized system equipment may not be environmentally compatible. Media that are damaging the environment must be disposed separately from normal waste. Observe the legal requirements in the country of installation.

Notes

4 Identifying and Checking the Delivered Components

4.1 Delivery of Components

Packaging

Packaging Units The components are supplied in separate packaging units.

Packaging Labels The content of the packed components and the order number may be identified using the adhesive barcode label on the packaging.

Disposal of Packaging Material See chapter 9

Accompanying Documents

A delivery note in duplicate can be found in an envelope on one of the packages supplied. No other accompanying documents are provided.

The total number of containers supplied is recorded on the delivery note or consignment note.

4.2 Scope of Delivery

Overview

as standard	optional
Power section	Control section
Touch guard	Shielding plate for motor cable
Ground strap	DC bus rails
	Control voltage rails
	MultiMediaCard (MMC)

Fig. 4-1: Scope of delivery

Checking the Delivered Components

Please immediately check whether the delivered components are:

- complete
- correct
- intact

4.3 Component Designation

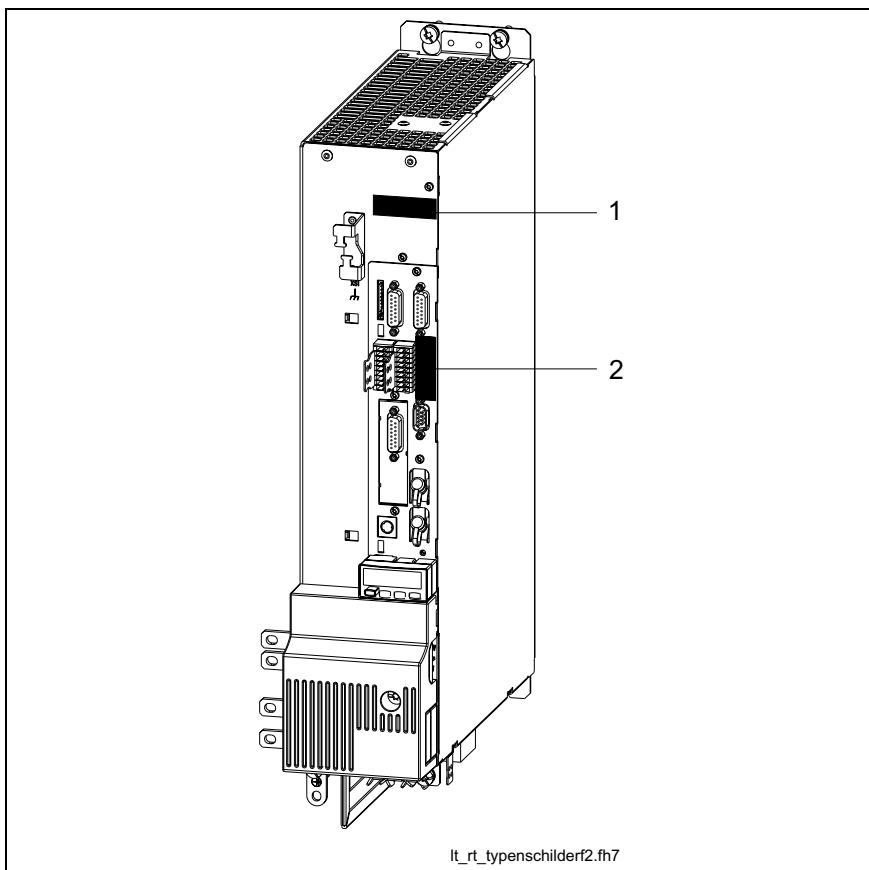
Each drive component is identified by a type designation.

A type plate is attached to all units, including the motor.

A label (cable marker) is wrapped round the ready-made cable. The type designation and length are indicated on this label. (The designation for the cable itself, without connector, is printed on the cable sheath.)

The identification of accessories packed in bags is either printed on the bag or indicated in an accompanying note.

Type Plates on the Drive Controller



1: Power section type plate

2: Control section type plate

Fig. 4-2: Type plate arrangement

4.4 Device Types

Type Code

Note: The following illustrates the basic structure of the type codes. Your sales representative will help with the current status of available versions.

Single-Axis Drive Controllers

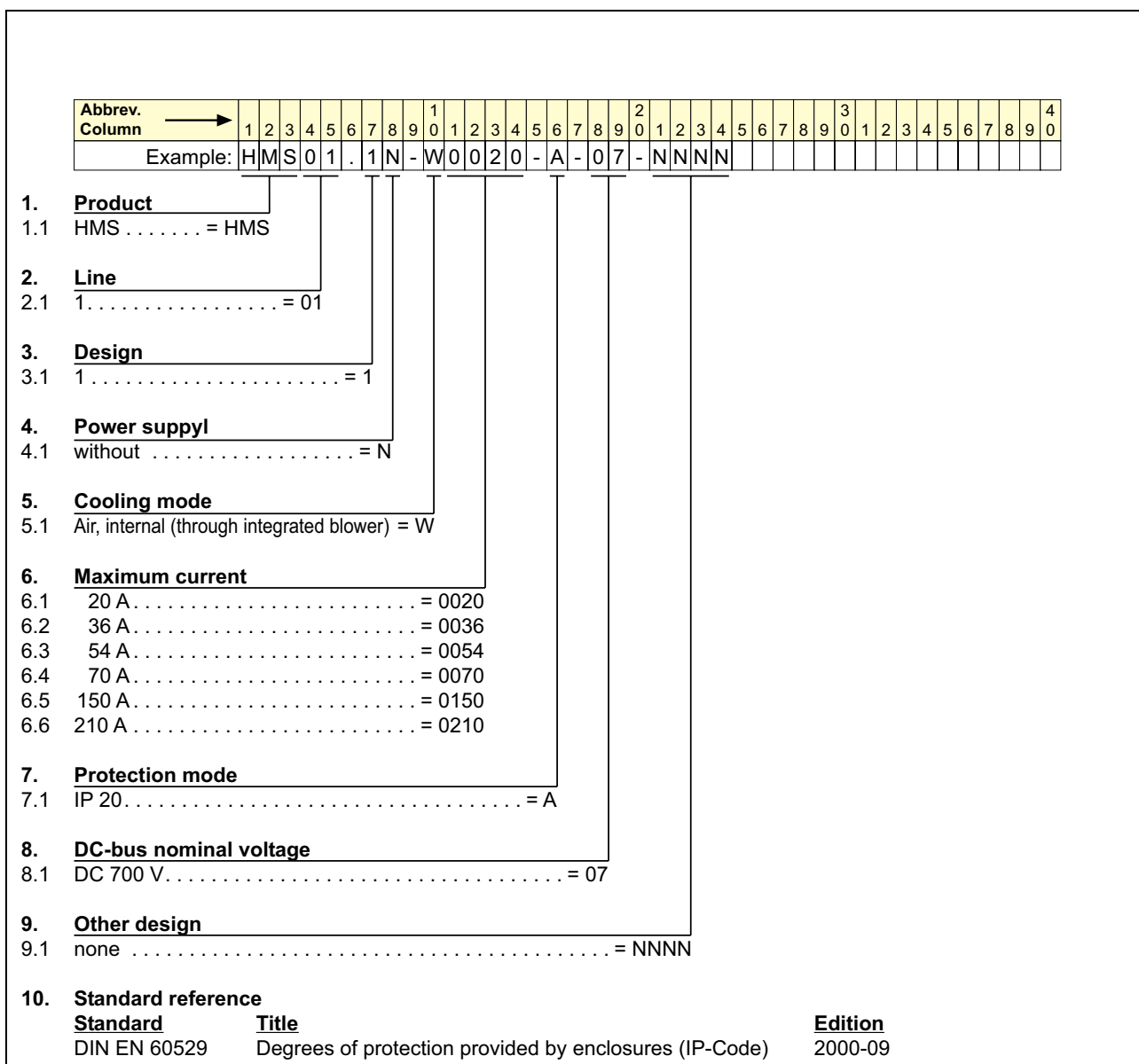


Fig. 4-3: Type code

Double-Axis Drive Controllers

Abbrev.
Column

12345678901234567890123456789012345678903012345678904

Example: HMD011N-W0020-A-07-NNNN

1. Product

1.1 HMD..... = HMD

2. Line

2.1 1..... = 01

3. Design

3.1 1..... = 1

4. Power supply

4.1 without = N

5. Cooling mode

5.1 Air, internal (through integrated blower) = W

6. eff. peak current

6.1 12 A = 0012

6.2 20 A = 0020

6.3 36 A = 0036

7. Protection mode

7.1 IP 20 = A

8. DC-bus nominal voltage

8.1 DC 700 V. = 07

9. Other design

9.1 none = NNNN

10. Standard reference

Standard

DIN EN 60529

Titel

Degrees of protection provided by enclosures (IP-Code)

Edition

2000-09

Fig. 4-4: Type code

5 Transport and Storage

5.1 Transporting the Devices

Conditions

temperature	-25 ... 70 °C
relative humidity	5 ... 95%; climatic category 2K3
absolute humidity	1 ... 60 g/m ³ climatic category 2K3
moisture condensation	slight moisture condensation allowed
icing	not allowed
Shock check not in operation according to EN 60068-2-27	Halve sine in 3 axis: 10g / 11ms

Fig. 5-1: Conditions for transport

5.2 Storing the Devices

Conditions

temperature	-25 ... 55 °C
relative humidity	5 ... 95%; climatic category 1K3
absolute humidity	1 ... 29 g/m ³ climatic category 1K3
moisture condensation	not allowed
icing	not allowed

Fig. 5-2: Conditions for storage

In Case of Long Storage Periods

The devices contain sensitive electrolytic capacitors. Therefore, in the case of long storage periods, operate the devices once a year for at least 1 hour with power on (DC bus voltage must be applied).

Notes

6 Mechanical Mounting

6.1 Mounting Conditions

Ambient and Operating Conditions

Note: The drive controllers and their additional components are designed to be built into control cabinets

Note: The user must check that the ambient conditions, and in particular the temperature of the control cabinet, are complied with by calculating the heat levels in the control cabinet.

Designation	Information
Ambient temperature	0 to +40 °C
Ambient temperature with derating	2% per °C to +55 °C
Temperature in storage	see chapter 5.2
Temperature during transportation	see chapter 5.1
Mounting altitude at rating	1000 m above sea level
Mounting altitude with derating*	Up to 2000 m 2.0% per 100 m from 1000 m From 2000 m: see characteristic in Fig. 6-3
Maximum mounting altitude*	4000 m (upper temperature limit falls to 40 °C instead of 55 °C)
Relative humidity (operation)	5% to 95% CI.3K5 with reservation, as not –5 °C
Absolute humidity	1 to 29 g/m ³
Climatic class	CI.3K5
Contamination level	Contamination level 2 in accordance with EN50178
Vibration sinus in operation according to EN 60068-2-6	Amplitude and frequency: 0.15 mm (peak-peak) at 10 ... 57 Hz Acceleration and frequency: 1 g at 57 ... 150 Hz Tolerance: ±15 %
Vibration distortion (Random) in operation according to IEC 68-2-36	Frequency: 20 ... 150 Hz Spectral acceleration density amplitude: 0.005 g ² /Hz Tolerance: ± 3 dB Virtual value (r.m.s.) of the total acceleration: 1.0 g

*

For mounting altitudes of more than 2000 m, an overvoltage limiter for transient overvoltage 1.2/50 µs must be installed in the installation or building in order to limit the voltage to 1.0 kV between the outer conductors and to 2.5 kV between conductor-ground.

Fig. 6-1: Ambient and operating conditions

Compatibility with foreign matters

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

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

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

Duty Capacity

Where conditions differ, the following performance data diminish in accordance with the diagrams (see "Fig. 6-2: Duty capacity at higher ambient temperature" and "Fig. 6-3: Duty capacity at higher mounting altitude"):

- Drive controllers:
 - Permitted DC bus continuous output
 - Continuous output of the braking resistor
 - Continuous current
- Motor:
 - Power
 - Continuous torque at standstill
 - S1 continuous torques
 - Short-time service M_{KB}

If differing ambient temperatures and higher mounting altitudes occur simultaneously, both duty factors must be multiplied. The mounting altitude must be taken into account just once. Differing ambient temperatures must be considered separately for the motor and drive controller.

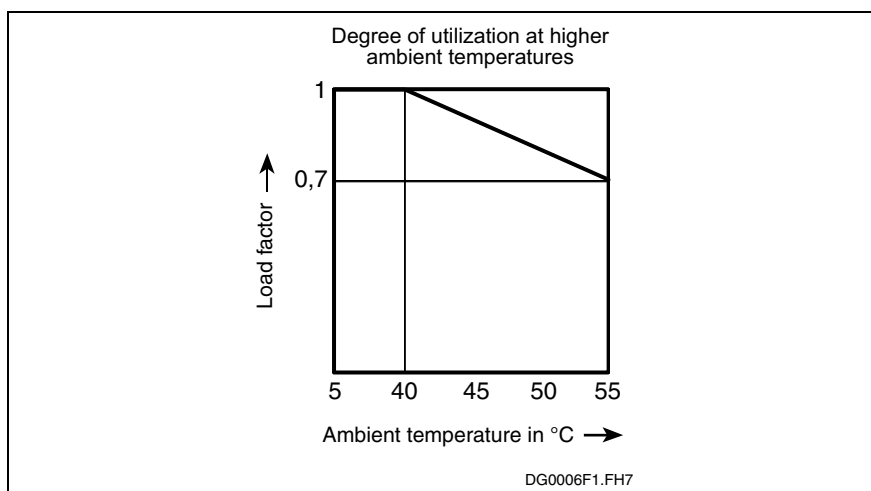


Fig. 6-2: Duty capacity at higher ambient temperature

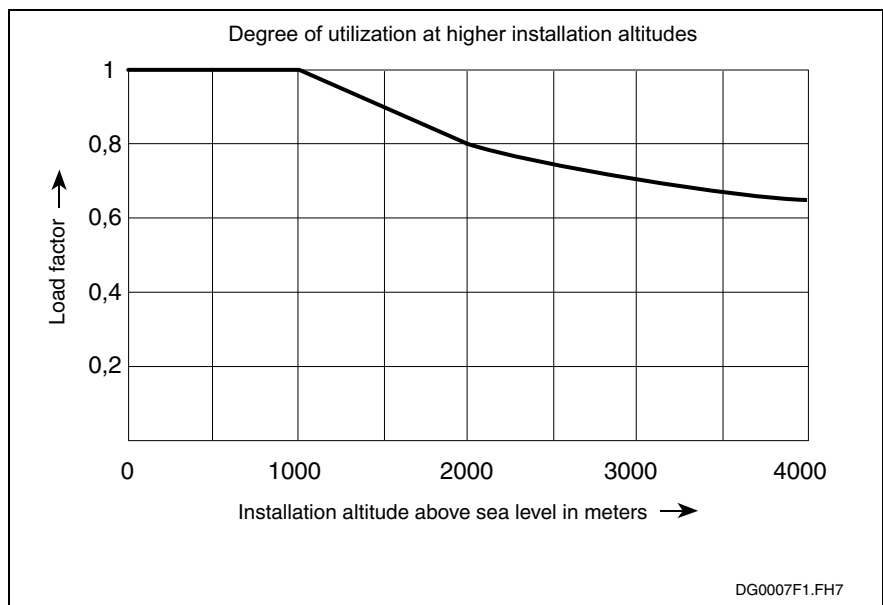
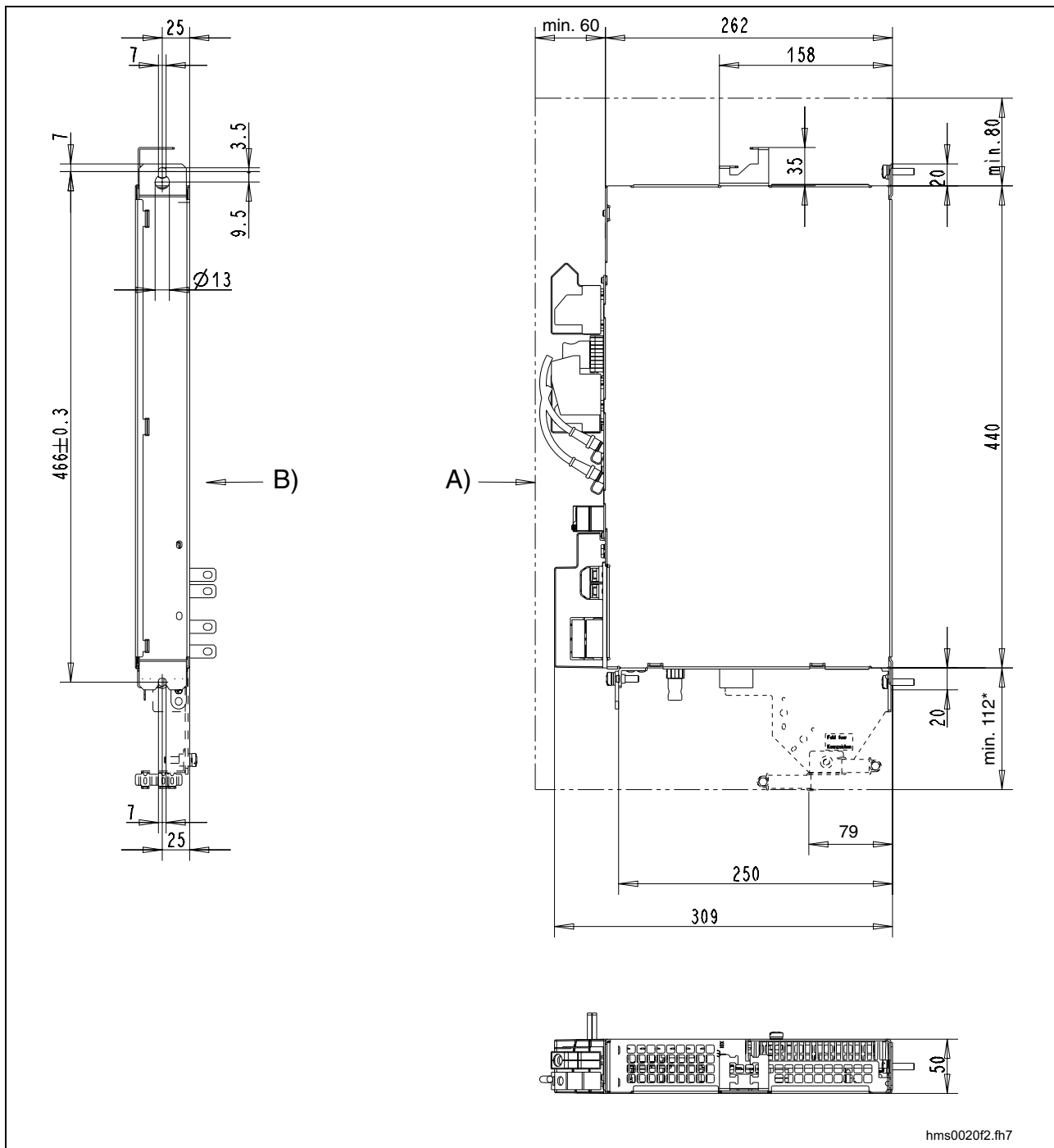


Fig. 6-3: Duty capacity at higher mounting altitude

6.2 Mechanical Technical Data

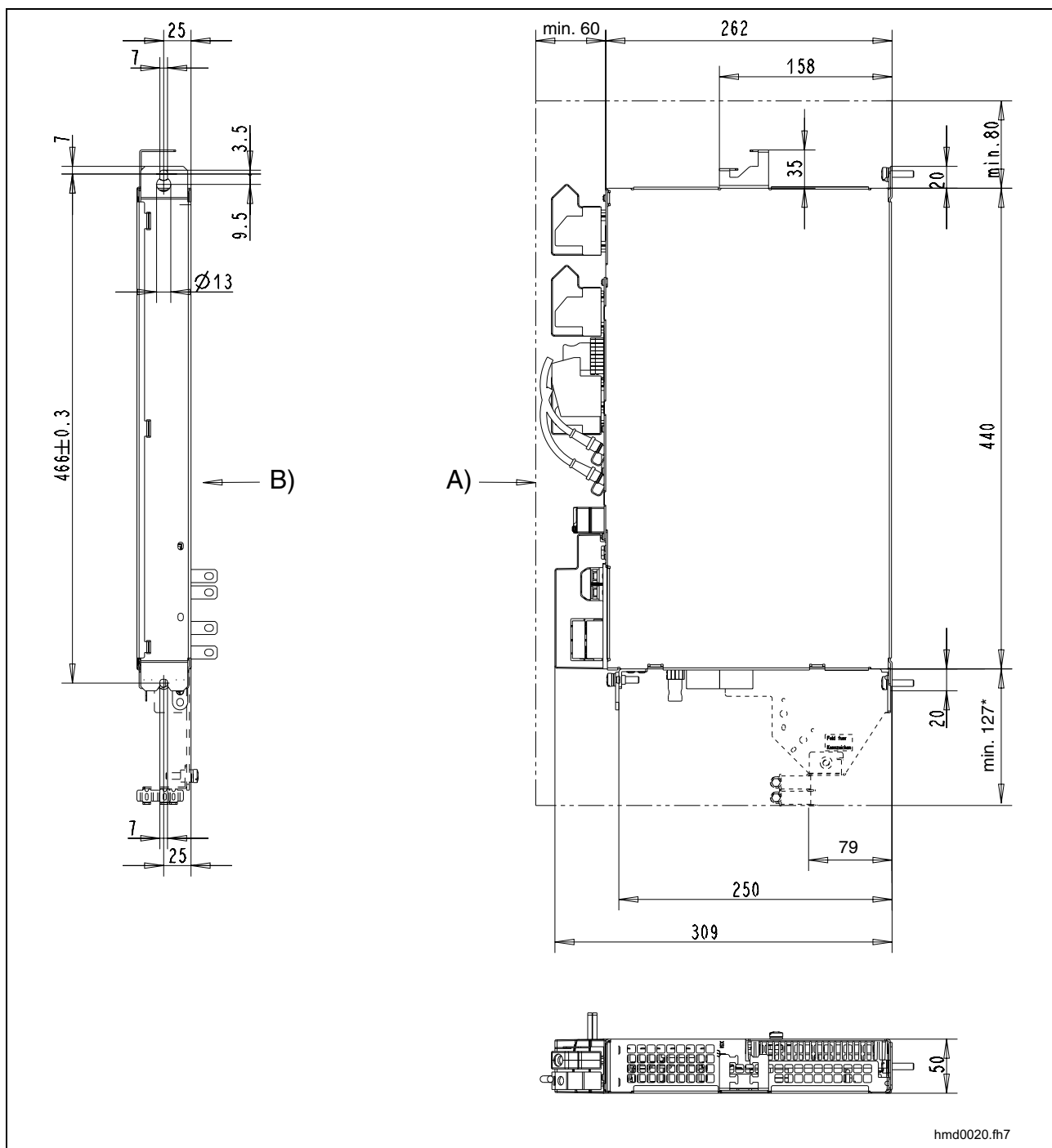
Dimensions

**Dimensional Drawing for HMS01.1N-W0020 and
HMS01.1N-W0036 Drive Controller**



A) minimum mounting clearance
 B) view from the rear!
 *): 112 mm only, if a shielding plate is used; otherwise 100 mm
 Fig. 6-4: Dimensional drawing for HMS01.1N-W0020 and HMS01.1N-W0036

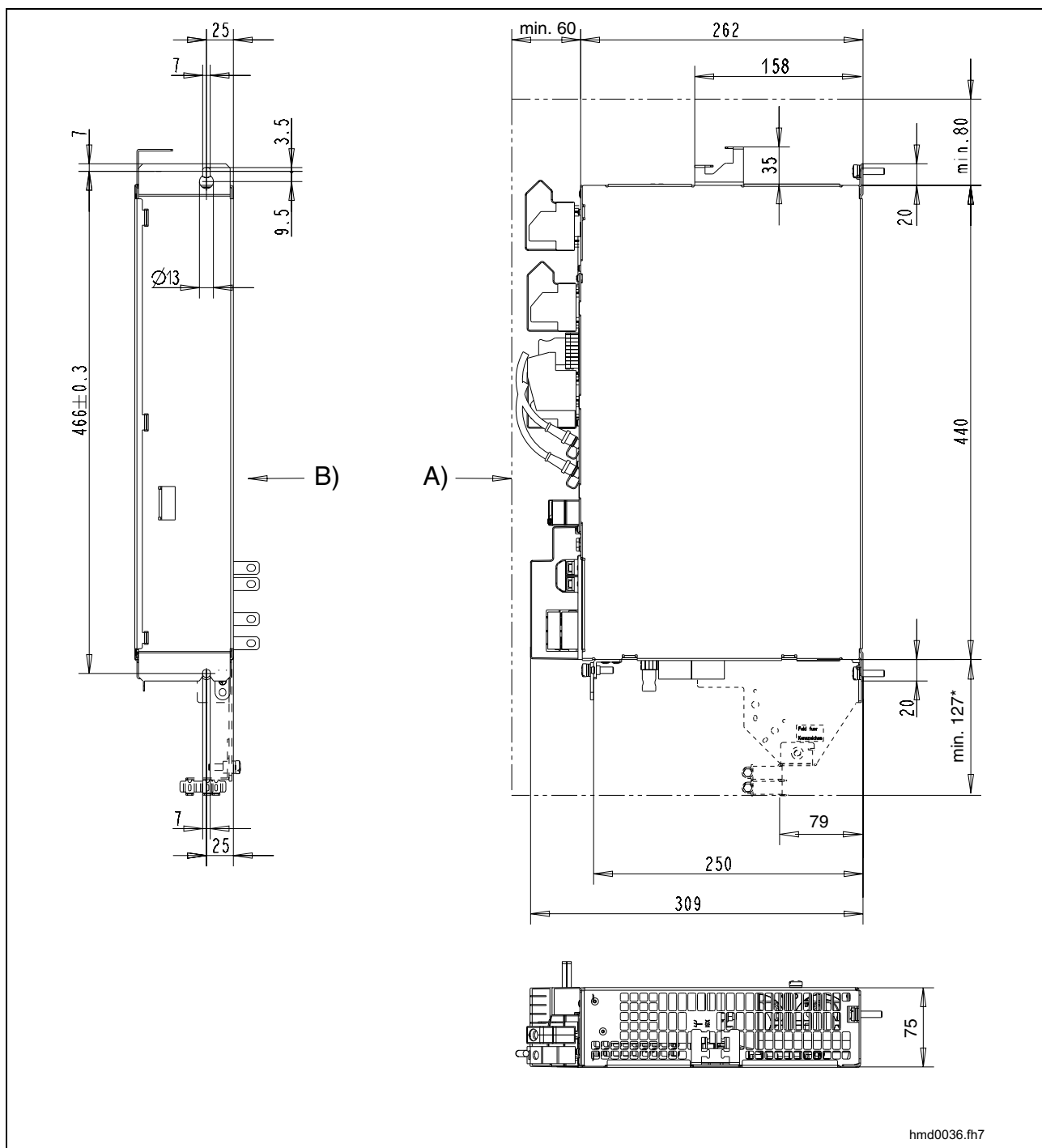
Dimensional Drawing for HMD01.1N-W0020 Drive Controller



A)	minimum mounting clearance
B)	view from the rear!
*):	127 mm only, if a shielding plate is used; otherwise 100 mm

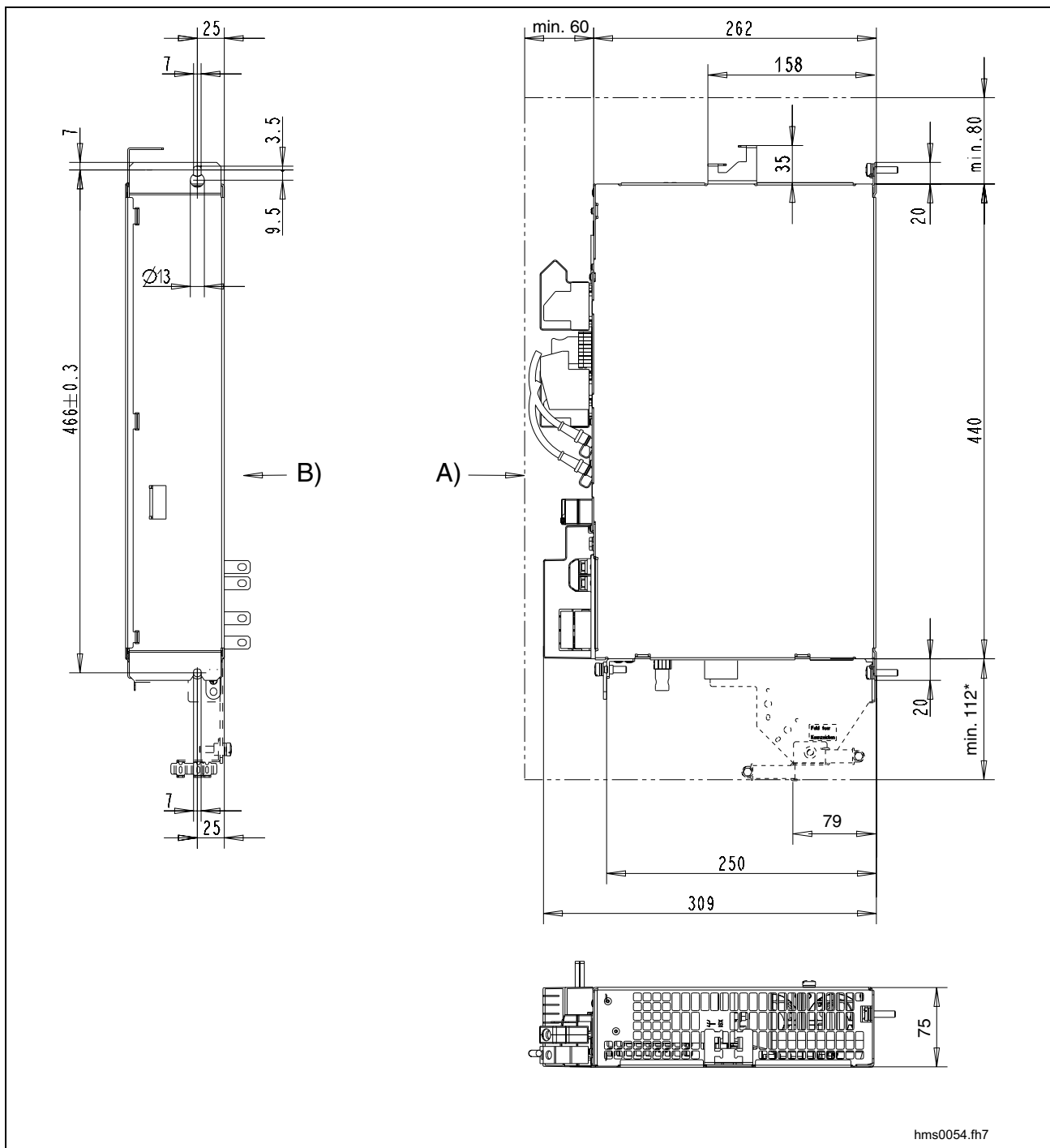
Fig. 6-5: Dimensional drawing for HMD01.1N-W0020

Dimensional Drawing for HMD01.1N-W0036 Drive Controller



A) minimum mounting clearance
 B) view from the rear!
 *): 127 mm only, if a shielding plate is used; otherwise 100 mm
 Fig. 6-6: Dimensional drawing for HMD01.1N-W0036

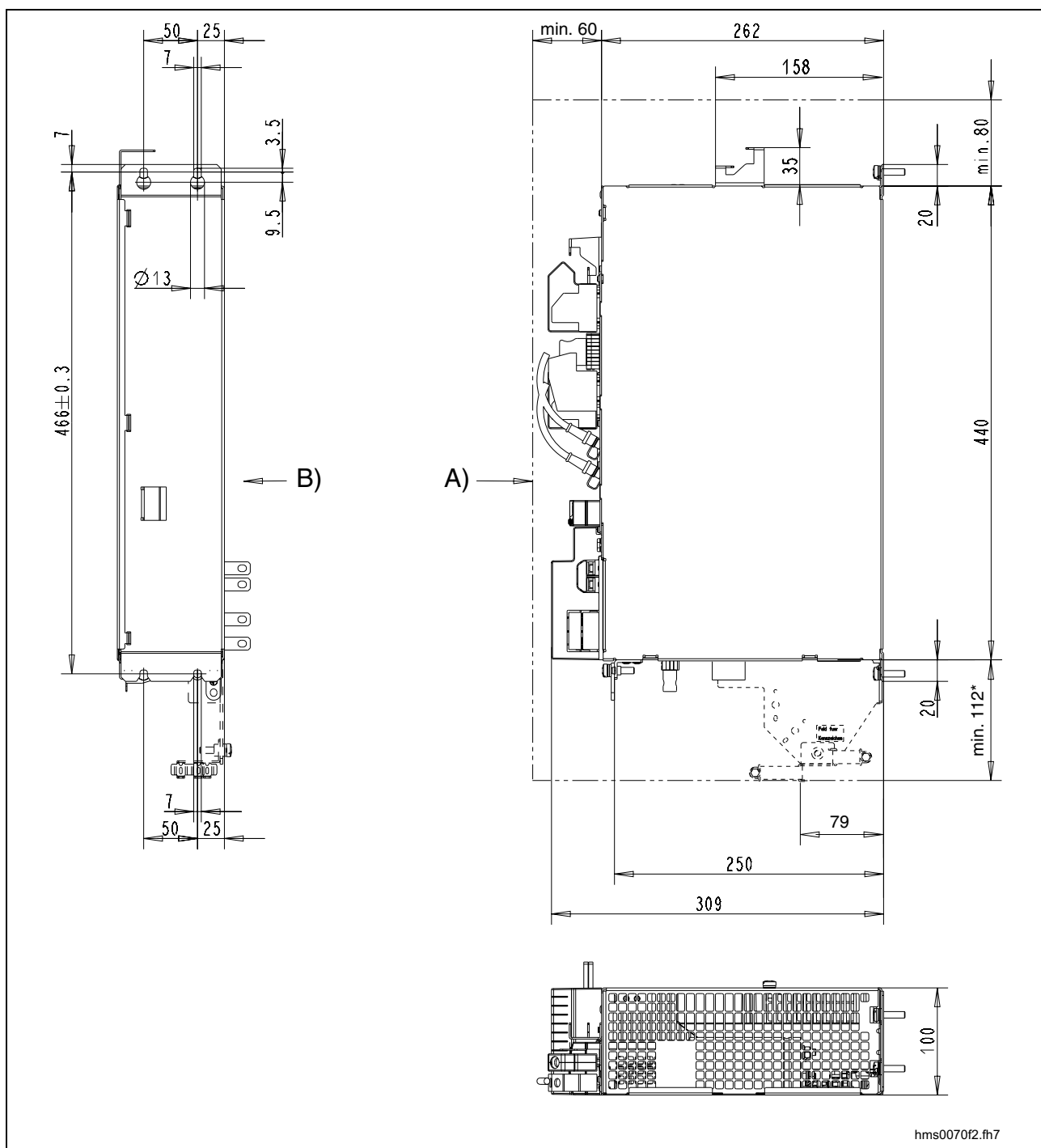
Dimensional Drawing for HMS01.1N-W0054 Drive Controller



A) minimum mounting clearance
B) view from the rear!
*): 112 mm only, if a shielding plate is used; otherwise 100 mm

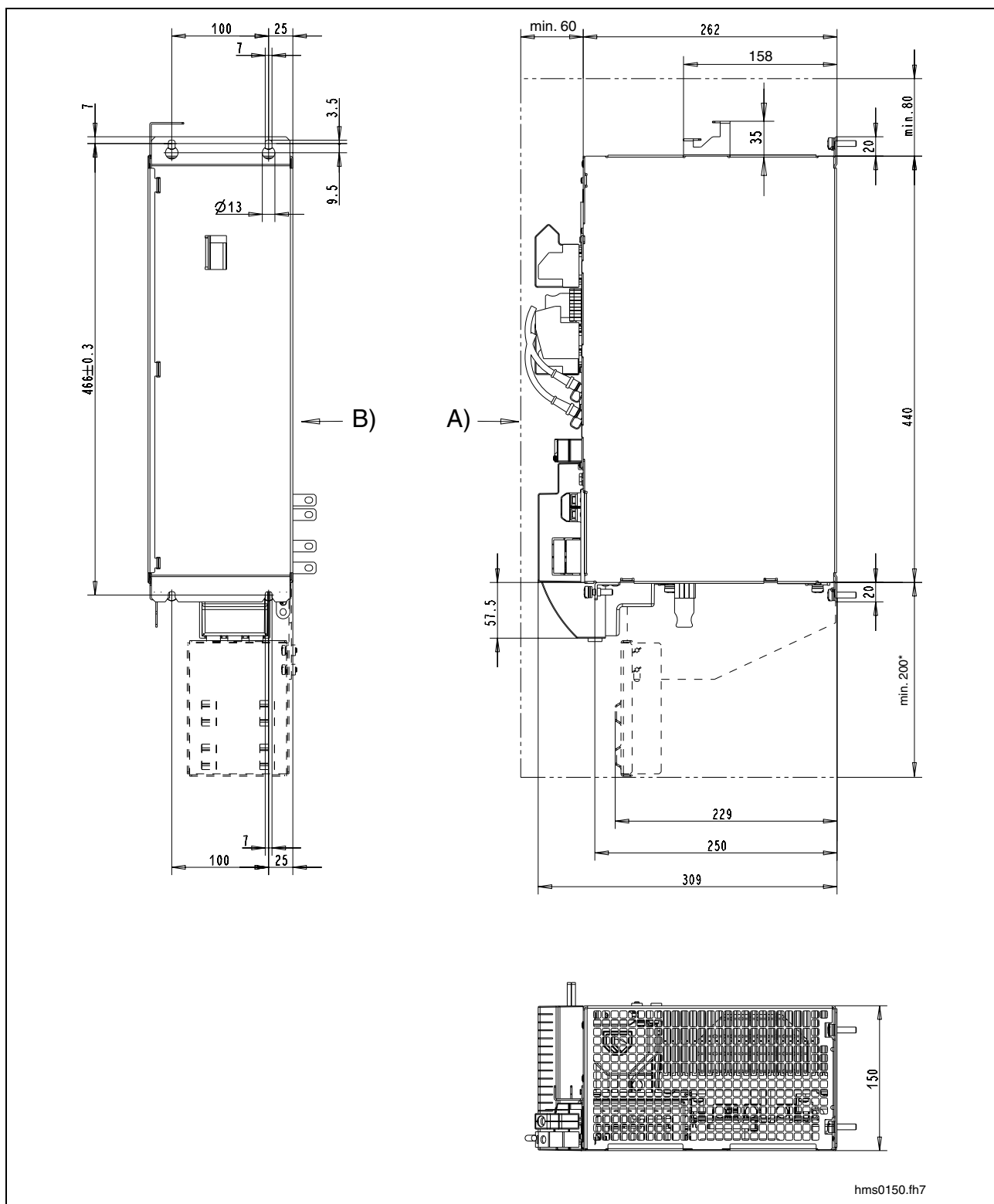
Fig. 6-7: Dimensional Drawing for HMS01.1N-W0054 Drive Controller

Dimensional Drawing for HMS01.1N-W0070 Drive Controller



A) minimum mounting clearance
 B) view from the rear!
 *): 112 mm only, if a shielding plate is used; otherwise 100 mm
 Fig. 6-8: Dimensional Drawing for HMS01.1N-W0070 Drive Controller

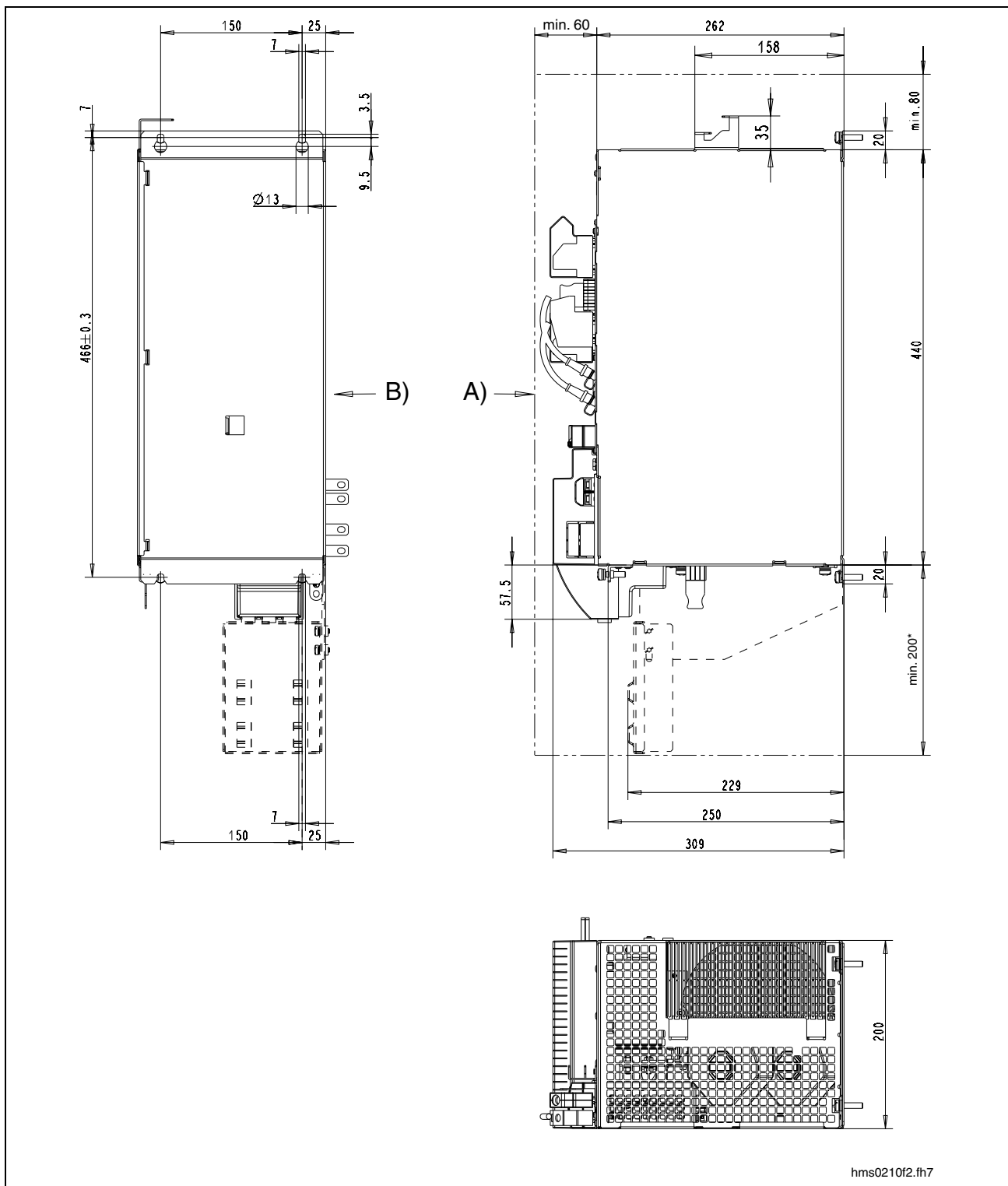
Dimensional Drawing for HMS01.1N-W0150 Drive Controller



A)	minimum mounting clearance
B)	view from the rear!
*):	200 mm only, if a shielding plate is used; otherwise 100 mm

Fig. 6-9: Dimensional Drawing for HMS01.1N-W0150 Drive Controller

Dimensional Drawing for HMS01.1N-W0210 Drive Controller



A) minimum mounting clearance
 B) view from the rear!
 *): 200 mm only, if a shielding plate is used; otherwise 100 mm
 Fig. 6-10: Dimensional Drawing for HMS01.1N-W0210 Drive Controller

Weight

Drive controller	Weight [kg]
HMD01.1N-W0012	being prepared
HMS01.1N-W0020	5.27
HMD01.1N-W0020	being prepared
HMS01.1N-W0036	5.27
HMD01.1N-W0036	being prepared
HMS01.1N-W0054	6.68
HMS01.1N-W0070	7.94
HMS01.1N-W0150	12.74
HMS01.1N-W0210	18.44

Fig. 6-11: Weight of drive controllers (without control section and accessories)

Note: Weight of control section: 0.42 kg.

Installation Orientation

Install drive controllers, DC bus resistor units and DC bus capacitor units in such a way that their longitudinal axis corresponds to the natural direction of convection (connections for motor and power downwards).

In this way the natural convection supports the forced cooling air current. This avoids the generation of pockets of heat.

Arrangement of Components in the Control Cabinet

Control Cabinet with Multiple Line Structure

Note: Particular attention should be paid to the maximum permissible air intake temperature of components when they are arranged in multiple lines in the control cabinet. Where necessary, cooling air guides are to be allowed for with ventilators specially inserted for this purpose.

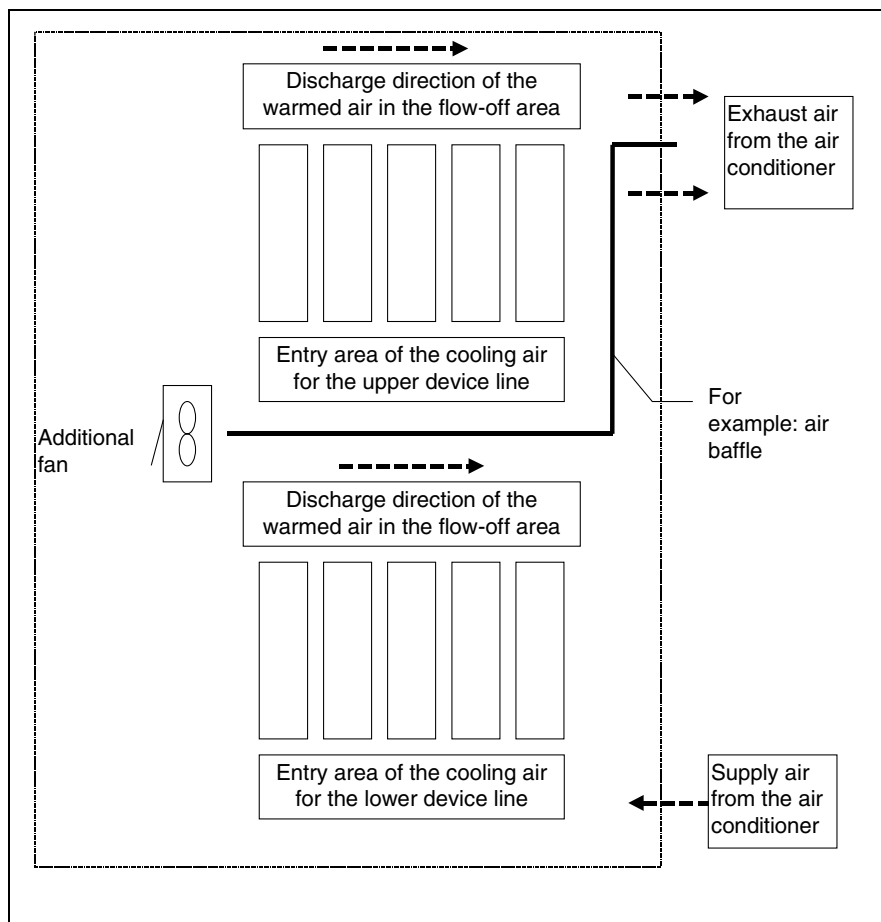


Fig. 6-12: Example of arrangement for multiple line structure with components



CAUTION

Risk of damage!

⇒ Always connect stacked drive controllers correctly (see chapter 10.3).

Power-dependent Arrangement

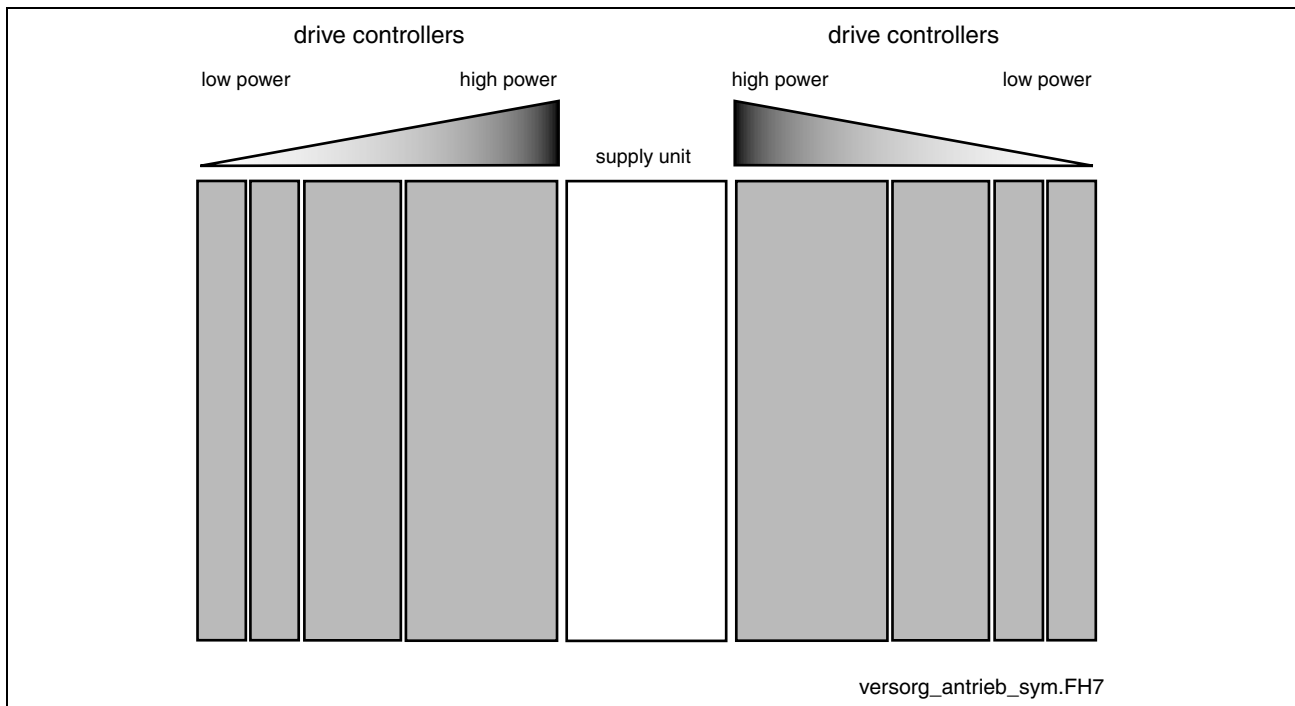


Fig. 6-13: Example of an arrangement

- Arrange the drive controllers with higher power needs and high currents as close to the supply unit as possible. Ideally the drive controllers should be distributed equally to the left and right side of the power supply.
- Position DC bus capacitor unit next to drive with the greatest DC bus continuous output.
- Position DC bus resistor unit next to drive with the greatest negative feed power.

6.3 Cooling and Cooling Units

Power Dissipation

The power dissipation of a drive system radiated to the control cabinet is calculated from the sum of the power dissipation of the supply unit, the power dissipation of the mains connecting unit, the power dissipation of each drive controller, and the power dissipation of additional units (e.g. DC bus resistor unit or DC bus capacitor unit).

To determine the power dissipation of the supply unit, the mains connecting unit, and the additional units please observe the corresponding documentation of these units.

The power dissipation of a drive controller is composed of

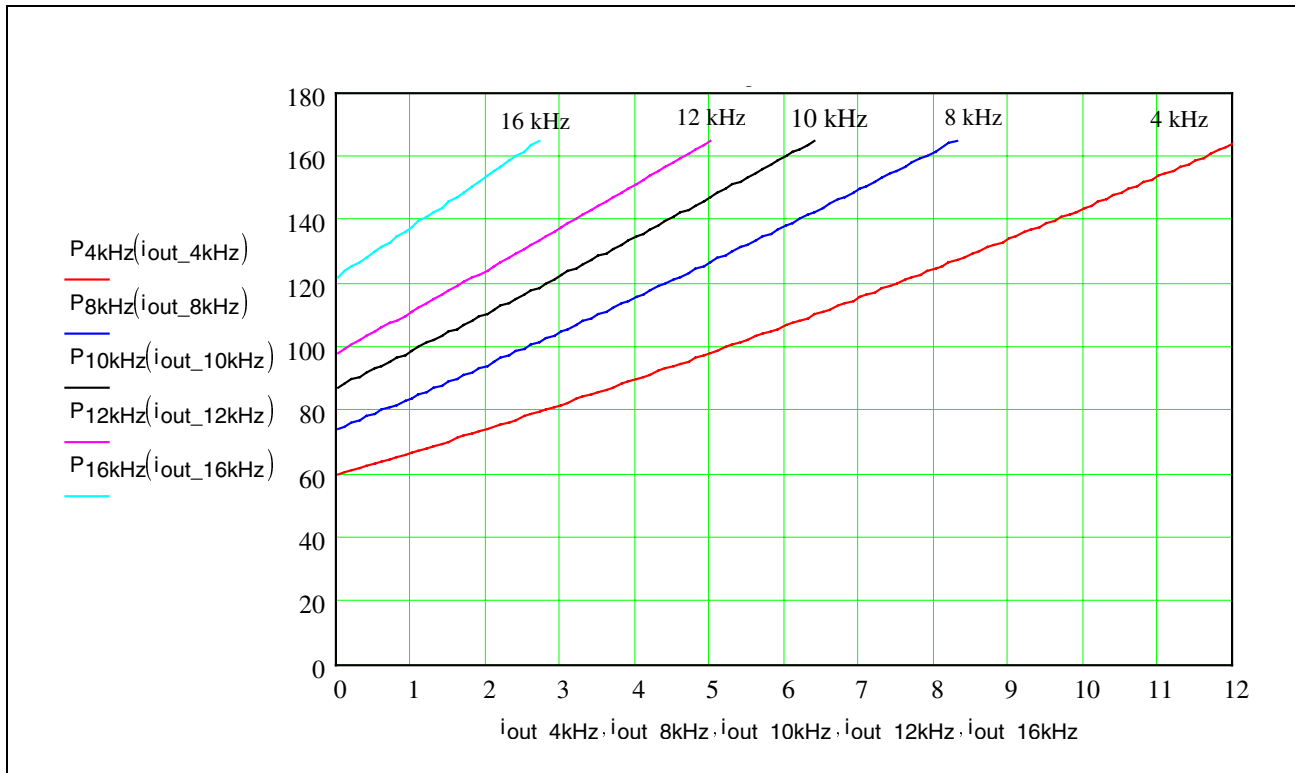
- power dissipation of optional modules
- power dissipation of control section
- basic power dissipation of power section
- current-related power dissipation of power section

Power Dissipation of Power Section

See page 7-10 for information on power consumption due to the 24 V control voltage.

The level of power dissipation occurring in power sections can be ascertained from the diagrams contained in page 6-16 onwards. In the diagrams basic and current-related power dissipation are summarized.

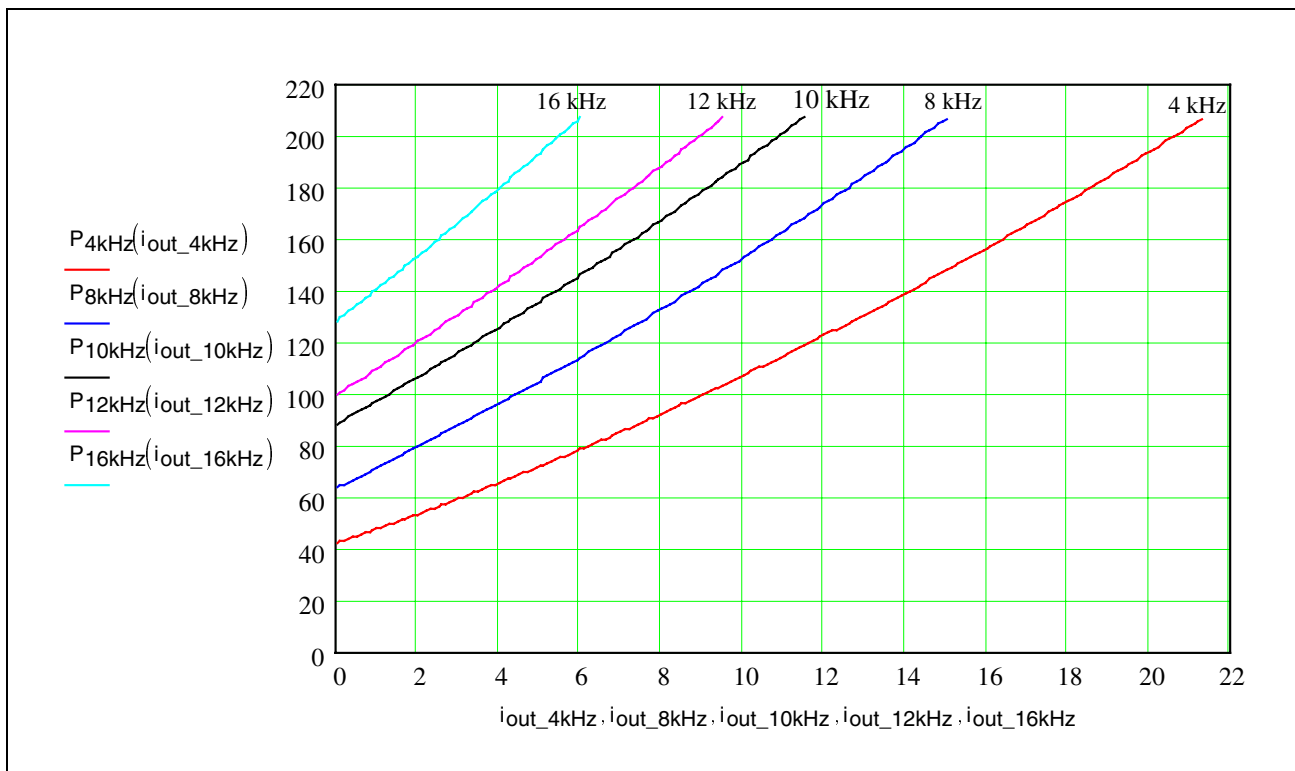
HMS01.1N-W0020



P: Power dissipation
 I: Current (r.m.s value)

Fig. 6-14: Power dissipation HMS01.1N-W0020

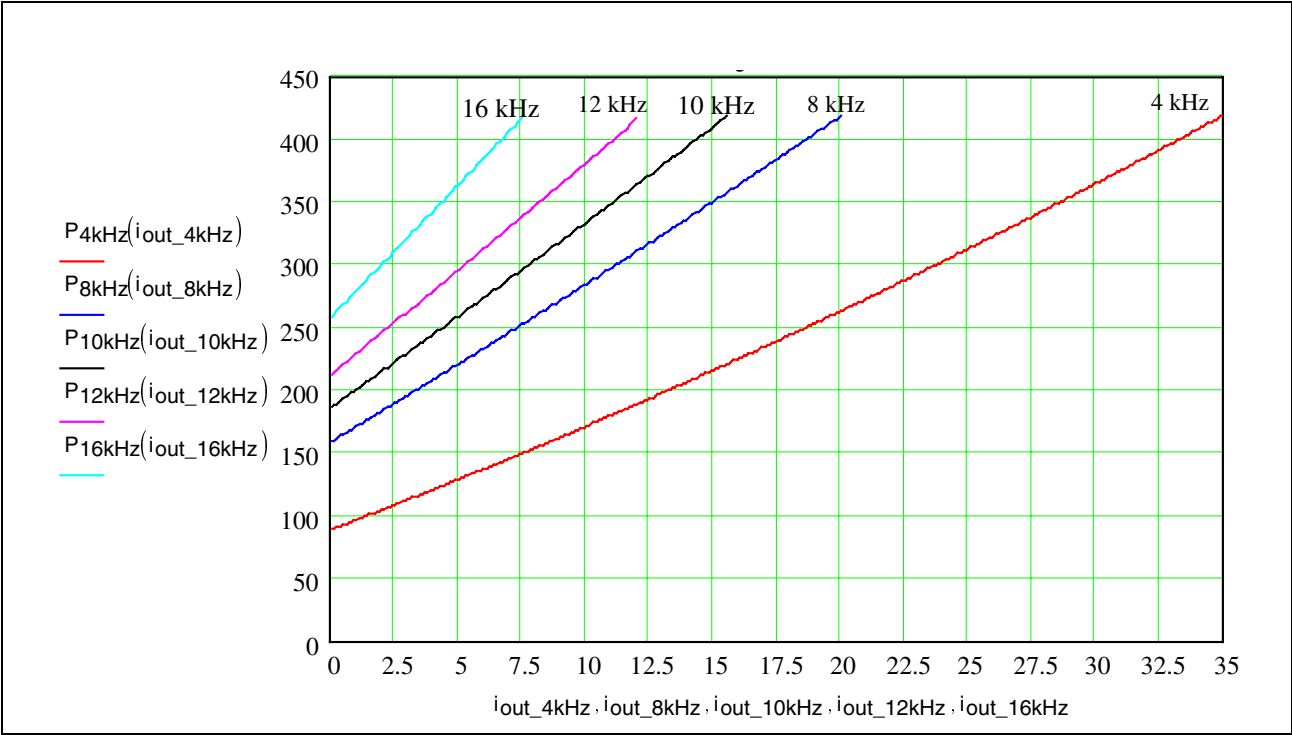
HMS01.1N-W0036



P: Power dissipation
 I: Current (r.m.s value)

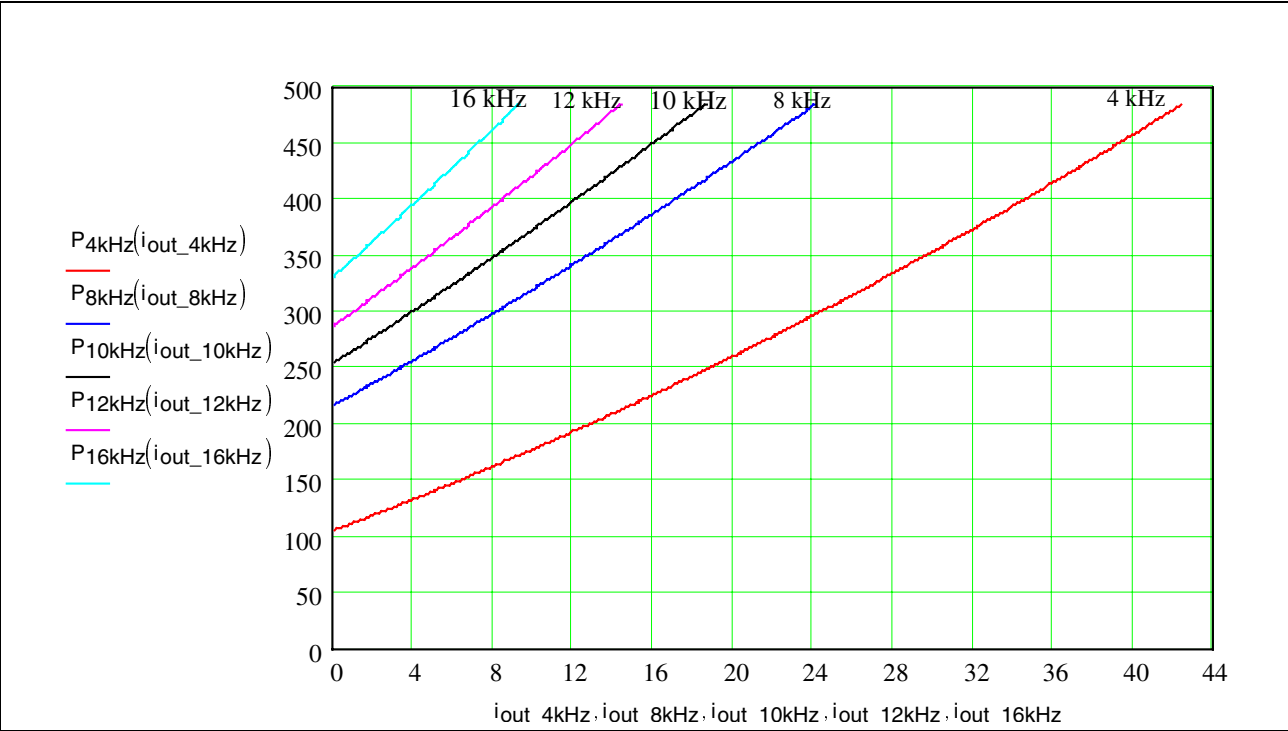
Fig. 6-15: Power dissipation HMS01.1N-W0036

HMS01.1N-W0054



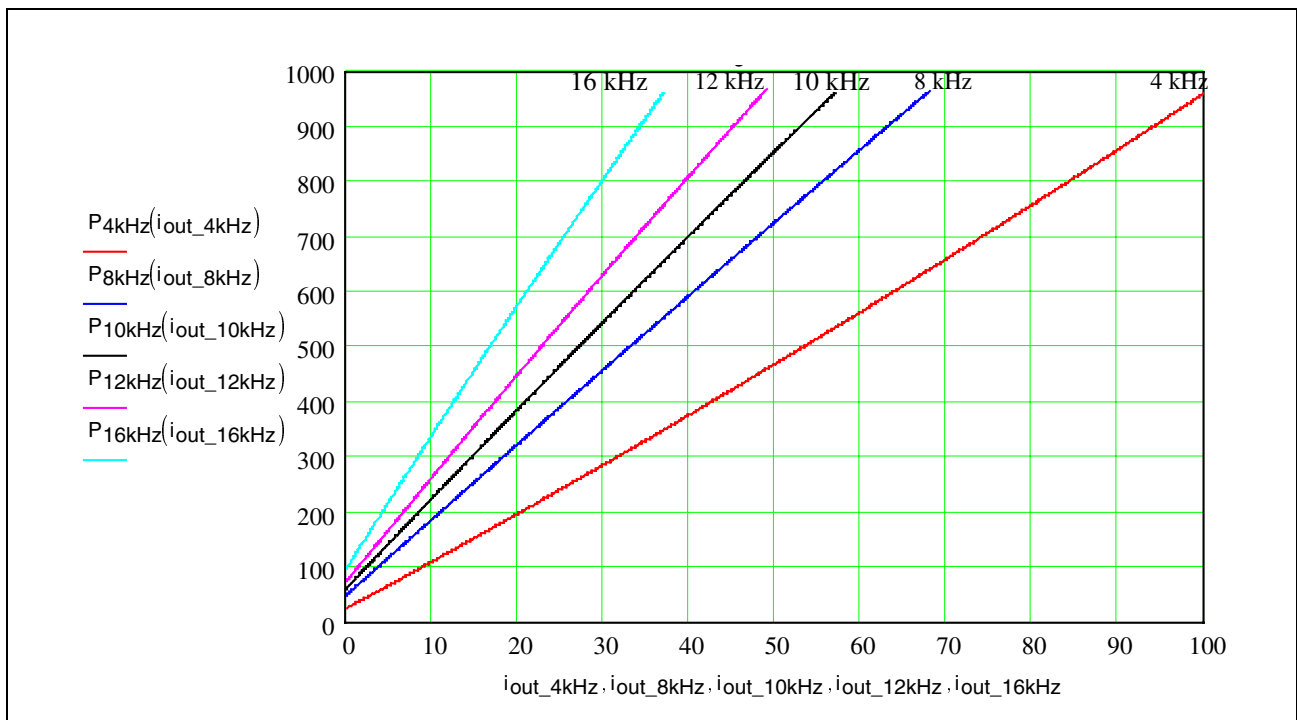
P: Power dissipation
I: Current (r.m.s value)
Fig. 6-16: Power dissipation HMS01.1N-W0054

HMS01.1N-W0070



P: Power dissipation
I: Current (r.m.s value)
Fig. 6-17: Power dissipation HMS01.1N-W0070

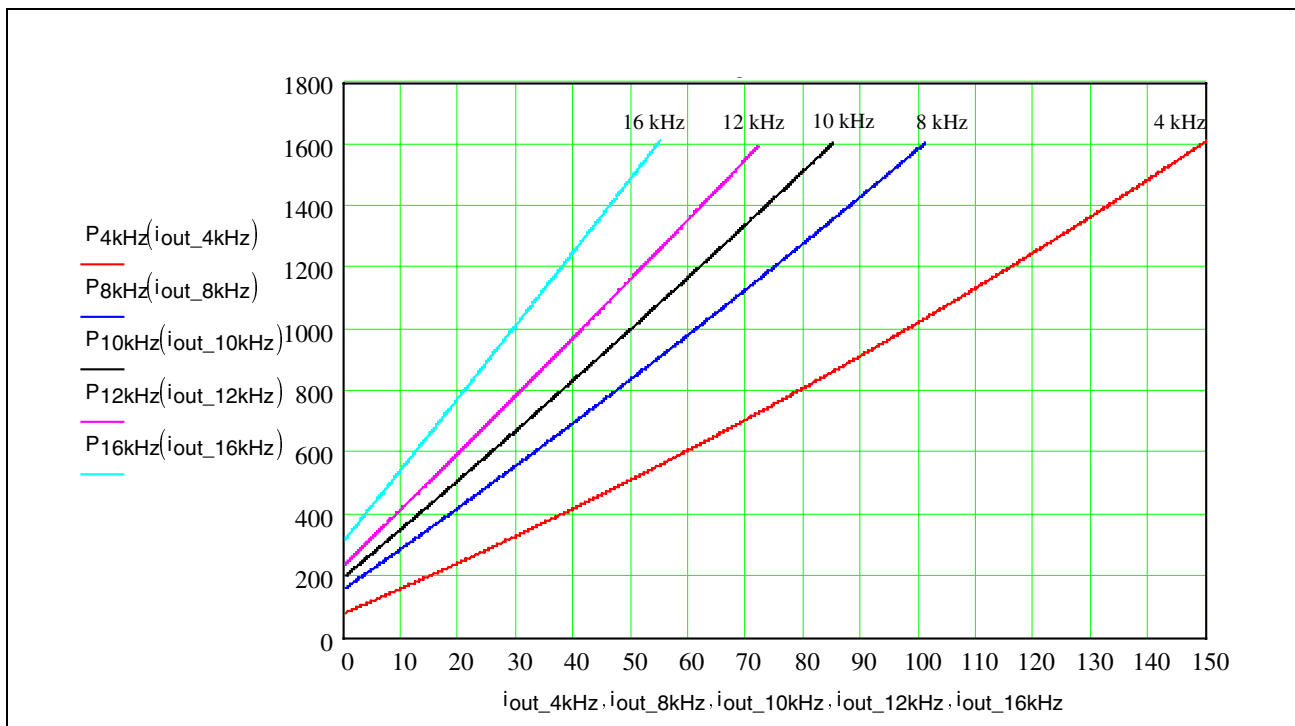
HMS01.1N-W0150



P: Power dissipation
 I: Current (r.m.s value)

Fig. 6-18: Power dissipation HMS01.1N-W0150

HMS01.1N-W0210



P: Power dissipation
 I: Current (r.m.s value)

Fig. 6-19: Power dissipation HMS01.1N-W0210

Mounting Cooling Units

Unless the ratings are reduced the drive controller may only be operated up to an specified ambient temperature (see chapter 6.1). It is therefore possible that a cooling unit will be required.



CAUTION

Possible damage to the drive controller

Operational safety of the machine endangered

⇒ Note the following instructions

Avoiding Dripping or Sprayed Water

As a matter of principle condensation water is formed when cooling units are used. For this reason, please observe the following information:

- Always position cooling units in such a way that condensation water cannot drip onto electrical equipment in the control cabinet.
- Position the cooling unit so that the ventilator for the cooling unit does not spray accumulated condensation water onto electrical equipment.

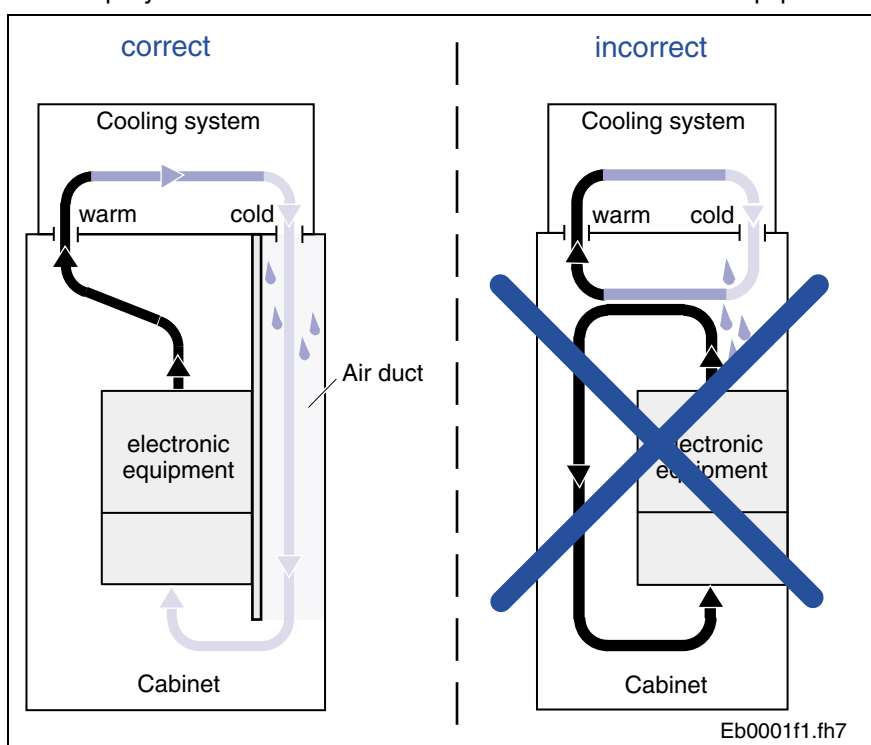


Fig. 6-20: Arrangement of the cooling unit on the control cabinet

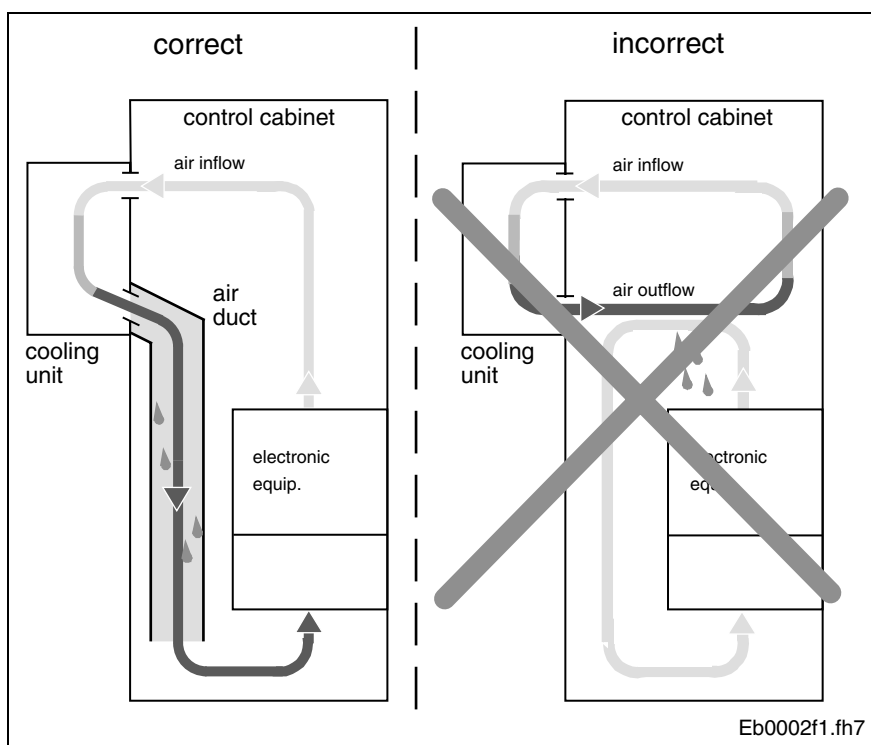


Fig. 6-21: Arrangement of the cooling unit on the front of the control cabinet

Avoiding Condensation

Condensation occurs when the temperature of the unit is lower than the ambient temperature.

- Set cooling units with temperature adjustment to the maximum surrounding temperature and no lower.
- Set cooling units with traced temperature so that the interior temperature of the control cabinet is no lower than the temperature of the surrounding air. Set the temperature delimitation to the maximum surrounding temperature.
- Only use well-sealed control cabinets so that condensation cannot arise as a result of warm and moist external air entering the cabinet.
- In the event that control cabinets are operated with the doors open (start-up, servicing etc.) it is essential to ensure that after the doors are closed the drive controllers cannot at any time be cooler than the air in the control cabinet, as otherwise condensation can occur. For this reason ample circulation must be provided inside the control cabinet to avoid pockets of heat.

7 Electrical Installation

7.1 General Information

Damage can be caused to the drive controller or circuit boards if electrostatic charging present in people and/or tools is discharged across them. Therefore, please note the following information:



CAUTION

Electrostatic charges can cause damage to electronic components and interfere with their operational safety!

⇒ Objects coming into contact with components and circuit boards must be discharged by means of grounding. Otherwise errors may occur when triggering motors and moving elements.

Such objects include:

- the copper bit when soldering
- the human body (ground connection caused by touching a conductive, grounded item)
- parts and tools (placing on a conductive support)

Endangered components may only be stored or dispatched in conductive packaging.

Note: Rexroth connection diagrams are only to be used for producing installation connection diagrams. The machine manufacturer's installation connection diagrams must be used for wiring the installation!

- Lay signal lines separately from the load resistance lines because of the occurrence of interference.
- Feed analog signals (e.g., command values, actual values) via sheathed lines.
- Do not connect mains, DC bus or power leads to low voltages or allow them to come into contact.
- When carrying out a high voltage or insulation test withstand test on the machine's electrical equipment, disconnect all connections to the units. This protects the electronic components (permitted in accordance with EN 60204-1). During their routine check test, Rexroth drive components are tested for high voltage and insulation in accordance with EN 50178.



CAUTION

Plugging and unclamping live connections can damage the controller.

⇒ Do not plug in or unclamp live connections.

7.2 10 rules for EMC-correct installation of drives

Note: Detailed information is available in the instructions in the Project Planning Manual "Electromagnetic Compatibility (EMC) in Drive and Control Systems", document typecode DOK-GENERL-EMV*****-PRxx-xx-P.

The following 10 rules are the basics for designing drive systems in compliance with EMC.

Rules 1 to 7 are generally valid. Rules 8 to 10 are especially important to limit noise emission.

- Rule 1** All metal parts of the cabinet should be connected with one another through the largest possible surface area so that the best electrical connection is established (not paint on paint!). If required, use serrated washers which cut through the paint surface. The cabinet door should be connected to the cabinet using the shortest possible grounding straps.
- Rule 2** Signal, line supply, motor and power cables should be routed away from another (this eliminates mutual interference!). The minimum clearance is: 10 cm. Barriers should be provided between power- and signal cables. These barriers should be grounded at several locations.
- Rule 3** Contactors, relays, solenoid valves, electromechanical operating hour counters etc. in the cabinet must be provided with noise suppression devices. These devices must be connected directly at the coil.
- Rule 4** Non-shielded cables belonging to the same circuit (feeder and return cables) should be twisted with the smallest possible distance between them. Cores which are not used must be grounded at both ends.
- Rule 5** Generally, interference injection can be reduced by routing cables as close as possible to grounded sheet steel panels. For this reason, cables and wires should not be routed freely in the cabinet, but as close as possible to the cabinet itself and the mounting panels. This is also true for reserve cables.
- Rule 6** Incremental encoders must be connected using shielded cables. The shield must be connected at the incremental encoder and at the drive controller through the largest possible surface area. The shield may not be interrupted, e.g. using intermediate terminals.
- Rule 7** The shields of signal cables must be connected to ground at both ends through the largest possible surface area to establish a good electrical connection (transmitter and receiver). If the potential bonding between the screen connections is poor, to reduce the shield current, an additional potential bonding conductor with a cross-section of at least 10 mm² should be connected in parallel with the shield. The shield can be connected to ground (=cabinet housing) at several locations. This is also true outside the cabinet. Foil shields are not recommended. Braided screens provide a better shielding effect (factor of 5).
- If the potential bonding is poor, analog signal cables may only be grounded at one end to the drive controller in order to prevent low-frequency noise being injected into the screen (50 Hz).
- Rule 8** Always locate a radio interference suppression filter close to the noise source. The filter should be connected through the largest possible surface area with the cabinet housing, mounting panel etc. The best solution is a bare metal mounting panel (e.g. manufactured from stainless steel, galvanized steel), as the complete mounting surface can be used to establish good electrical contact.

The incoming and outgoing cables of the radio interference suppression filter should be separated.

- Rule 9** All variable-speed motors should be connected using shielded cables, whereby the shield is connected at both ends to the housings through the largest possible surface area to minimize the inductance. The motor feeder cables should also be shielded outside the cabinet, or at least screened using barriers.

Cables with steel shield are not suitable.

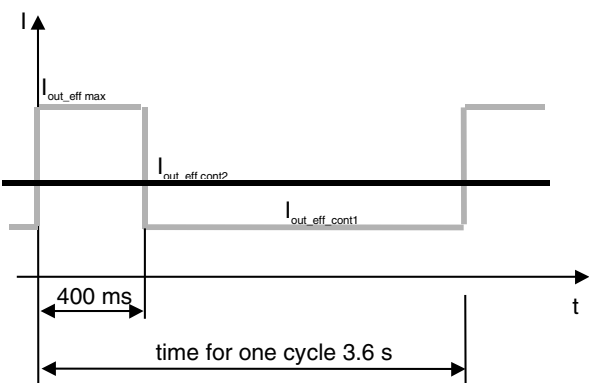
To connect the shield at the motor, a suitable PG gland with shield connection can be used (e.g. "SKINDICHT SHV/SRE/E" from the Lapp Company, Stuttgart). It should be ensured that the connection between the motor terminal box and the motor housing has a low impedance. Otherwise, use an additional grounding strap between them. Never use plastic motor terminal boxes!

- Rule 10** The shield between the motor and drive controller may not be interrupted by installing components such as output reactors, sinusoidal filters, motor filters, fuses, contactors. The components must be mounted on mounting panels which also simultaneously serve as shield connection for the incoming and outgoing motor cables. If required, metal barriers may be required to shield the components.

7.3 Electrical Data

Note: The adjustable pulse frequency (4, 8, 10, 12 resp. 16 kHz) depends on the firmware and the control section.

Power Section (HMS01.1N-W0020, HMD01.1N-W0012...W0020)

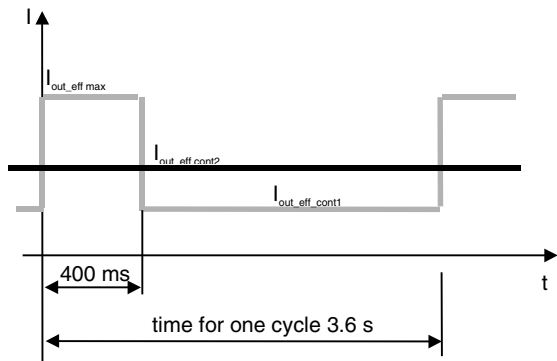
Designation	Symbol	Unit	HMD01.1N-W0012*	HMS01.1N-W0020	HMD01.1N-W0020*
DC bus voltage(range)	U_{DC}	V		254...750	
Upper DC bus voltage limit (cut-off threshold)	$U_{DC \text{ limit (max)}}$	V		$900 \pm 2.5\%$	
Output voltage	$U_{out \text{ eff}}$	V			
Fundamental voltage	$U_{DC} = 475 \text{ V}$ $U_{DC} = 750 \text{ V}$			0...336 0...530	
Continuous output current (effective value) or rated current	$I_{out \text{ eff cont2 (4 kHz)}}$ $I_{out \text{ eff cont2 (8 kHz)}}$ $I_{out \text{ eff cont2 (10 kHz)}}$ $I_{out \text{ eff cont2 (12 kHz)}}$ $I_{out \text{ eff cont2 (16 kHz)}}$	A		12.1 8.3 6.4 5.0 2.7	
Maximum output current (effective value at operation at overload)	$I_{out \text{ eff max (4 kHz, 400 ms)}}$ $I_{out \text{ eff max (8 kHz, 400 ms)}}$ $I_{out \text{ eff max (10 kHz, 400 ms)}}$ $I_{out \text{ eff max (12 kHz, 400 ms)}}$ $I_{out \text{ eff max (16 kHz, 400 ms)}}$	A		20 14 11 8.5 4.5	
Base load current available at maximum current (effective value)	$I_{out \text{ eff cont1 (4 kHz, } I_{out \text{ eff max)}}$ $I_{out \text{ eff cont1 (8 kHz, } I_{out \text{ eff max)}}$ $I_{out \text{ eff cont1 (10 kHz, } I_{out \text{ eff max)}}$ $I_{out \text{ eff cont1 (12 kHz, } I_{out \text{ eff max)}}$ $I_{out \text{ eff cont1 (16 kHz, } I_{out \text{ eff max)}}$	A		6.9 4.8 3.6 3 1.7	
Characteristic curve output current					

Designation	Symbol	Unit	HMD01.1N- W0012*	HMS01.1N- W0020	HMD01.1N- W0020*
Peak load allowance factor / duration	$I_{out_max} / I_{out_cont1}$ (4 kHz) $I_{out_max} / I_{out_cont1}$ (8 kHz) $I_{out_max} / I_{out_cont1}$ (10 kHz) $I_{out_max} / I_{out_cont1}$ (12 kHz) $I_{out_max} / I_{out_cont1}$ (16 kHz)	A		2.9 3 3.1 2.9 2.7	
Output frequency range – at $f_s = 4$ kHz – at $f_s = 8$ kHz – at $f_s = 10$ kHz – at $f_s = 12$ kHz – at $f_s = 16$ kHz	f_{out}	Hz		0...400 0...800 0...1000 0...1200 0...1600	
Power dissipation	P_{Diss}	W		165	

* being prepared

Fig. 7-1: Technical data for mains supply and power section

Power Section (HMS01.1N-W0036...0070, HMD01.1N-W0036)

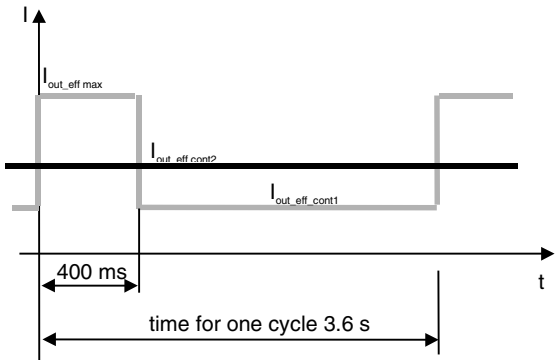
Designation	Symbol	Unit	HMS01.1N-W0036	HMD01.1N-W0036*	HMS01.1N-W0054	HMS01.1N-W0070
DC bus voltage(range)	U_{DC}	V	254...750		254...750	254...750
Upper DC bus voltage limit (cut-off threshold)	$U_{DC \text{ limit (max)}}$	V	$900 \pm 2.5\%$		$900 \pm 2.5\%$	$900 \pm 2.5\%$
Output voltage	$U_{out \text{ eff}}$	V				
Fundamental voltage	$U_{DC} = 475 \text{ V}$ $U_{DC} = 750 \text{ V}$		0...336 0...530		0...336 0...530	0...336 0...530
Continuous output current (effective value) or rated current	$I_{out \text{ eff cont2 (4 kHz)}}$ $I_{out \text{ eff cont2 (8 kHz)}}$ $I_{out \text{ eff cont2 (10 kHz)}}$ $I_{out \text{ eff cont2 (12 kHz)}}$ $I_{out \text{ eff cont2 (16 kHz)}}$	A	21.3 15 11.5 9.5 6		35 20 15.5 12 7.5	42.4 24.1 18.6 14.4 9.3
Maximum output current (effective value at operation at overload)	$I_{out \text{ eff max (4 kHz, 400 ms)}}$ $I_{out \text{ eff max (8 kHz, 400 ms)}}$ $I_{out \text{ eff max (10 kHz, 400 ms)}}$ $I_{out \text{ eff max (12 kHz, 400 ms)}}$ $I_{out \text{ eff max (16 kHz, 400 ms)}}$	A	36 25 19.5 16 10.5		54 31.5 24.5 19 12	70 41 32 25 16
Base load current available at maximum current (effective value)	$I_{out \text{ eff cont1 (4 kHz, } I_{out \text{ eff max)}}$ $I_{out \text{ eff cont1 (8 kHz, } I_{out \text{ eff max)}}$ $I_{out \text{ eff cont1 (10 kHz, } I_{out \text{ eff max)}}$ $I_{out \text{ eff cont1 (12 kHz, } I_{out \text{ eff max)}}$ $I_{out \text{ eff cont1 (16 kHz, } I_{out \text{ eff max)}}$	A	12.9 9.8 7.4 6.3 3.8		26.1 15.1 11.8 9.3 5.8	24.2 14 10.8 8.4 5.6
Characteristic curve output current	-	-				
Peak load allowance factor / duration	$I_{out \text{ max}} / I_{out \text{ cont1 (4 kHz)}}$ - at $f_s = 4 \text{ kHz}$ $I_{out \text{ max}} / I_{out \text{ cont1 (8 kHz)}}$ - at $f_s = 8 \text{ kHz}$ $I_{out \text{ max}} / I_{out \text{ cont1 (10 kHz)}}$ - at $f_s = 10 \text{ kHz}$ $I_{out \text{ max}} / I_{out \text{ cont1 (12 kHz)}}$ - at $f_s = 12 \text{ kHz}$ $I_{out \text{ max}} / I_{out \text{ cont1 (16 kHz)}}$ - at $f_s = 16 \text{ kHz}$	A	2.7 2.6 2.7 2.6 2.8		2.1 2.1 2.1 2.1 2.1	2.9 3 3 3 2.9

Designation	Symbol	Unit	HMS01.1N- W0036	HMD01.1N- W0036*	HMS01.1N- W0054	HMS01.1N- W0070
Output frequency range – at $f_s = 4$ kHz – at $f_s = 8$ kHz – at $f_s = 10$ kHz – at $f_s = 12$ kHz – at $f_s = 16$ kHz	f_{out}	Hz	0...400 0...800 0...1000 0...1200 0...1600		0...400 0...800 0...1000 0...1200 0...1600	0...400 0...800 0...1000 0...1200 0...1600
Power dissipation	P_{Diss}	W	210		420	485

* being prepared

Fig. 7-2: Technical data for mains supply and power section

Power Section (HMS01.1N-W0150...0210)

Designation	Symbol	Unit	HMS01.1N-W0150	HMD01.1N-W0210
DC bus voltage(range)	U_{DC}	V	254...750	254...750
Upper DC bus voltage limit (cut-off threshold)	$U_{DC \text{ limit (max)}}$	V	$900 \pm 2.5\%$	$900 \pm 2.5\%$
Output voltage	$U_{out \text{ eff}}$	V		
Fundamental voltage	$U_{DC} = 475 \text{ V}$ $U_{DC} = 750 \text{ V}$		0...336 0...530	0...336 0...530
Continuous output current (effective value) or rated current	$I_{out \text{ eff cont2 (4 kHz)}}$	A	100	150
	$I_{out \text{ eff cont2 (8 kHz)}}$		67	101
	$I_{out \text{ eff cont2 (10 kHz)}}$		57	85
	$I_{out \text{ eff cont2 (12 kHz)}}$		48	72
	$I_{out \text{ eff cont2 (16 kHz)}}$		37	54
Maximum output current (effective value at operation at overload)	$I_{out \text{ eff max (4 kHz, 400 ms)}}$	A	150	210
	$I_{out \text{ eff max (8 kHz, 400 ms)}}$		104	144
	$I_{out \text{ eff max (10 kHz, 400 ms)}}$		88	121
	$I_{out \text{ eff max (12 kHz, 400 ms)}}$		75	103
	$I_{out \text{ eff max (16 kHz, 400 ms)}}$		57	77
Base load current available at maximum current (effective value)	$I_{out \text{ eff cont1 (4 kHz, } I_{out \text{ eff max)}}$	A	65	105
	$I_{out \text{ eff cont1 (8 kHz, } I_{out \text{ eff max)}}$		45	72
	$I_{out \text{ eff cont1 (10 kHz, } I_{out \text{ eff max)}}$		37	60
	$I_{out \text{ eff cont1 (12 kHz, } I_{out \text{ eff max)}}$		32	51
	$I_{out \text{ eff cont1 (16 kHz, } I_{out \text{ eff max)}}$		24	39
Characteristic curve output current	-	-		
Peak load allowance factor / duration	$I_{out \text{ max}} / I_{out \text{ cont1 (4 kHz)}}$	A	2,3	2
	$I_{out \text{ max}} / I_{out \text{ cont1 (8 kHz)}}$		2,3	2
	$I_{out \text{ max}} / I_{out \text{ cont1 (10 kHz)}}$		2,4	2
	$I_{out \text{ max}} / I_{out \text{ cont1 (12 kHz)}}$		2,3	2
	$I_{out \text{ max}} / I_{out \text{ cont1 (16 kHz)}}$		2,4	2

Designation	Symbol	Unit	HMS01.1N-W0150	HMD01.1N-W0210
Output frequency range	f_{out}	Hz	0...400	0...400
– at $f_s = 4$ kHz			0...800	0...800
– at $f_s = 8$ kHz			0...1000	0...1000
– at $f_s = 10$ kHz			0...1200	0...1200
– at $f_s = 12$ kHz			0...1600	0...1600
Power dissipation	P_{Diss}	W	965	1570

* being prepared

Fig. 7-3: Technical data for mains supply and power section

Control Voltage

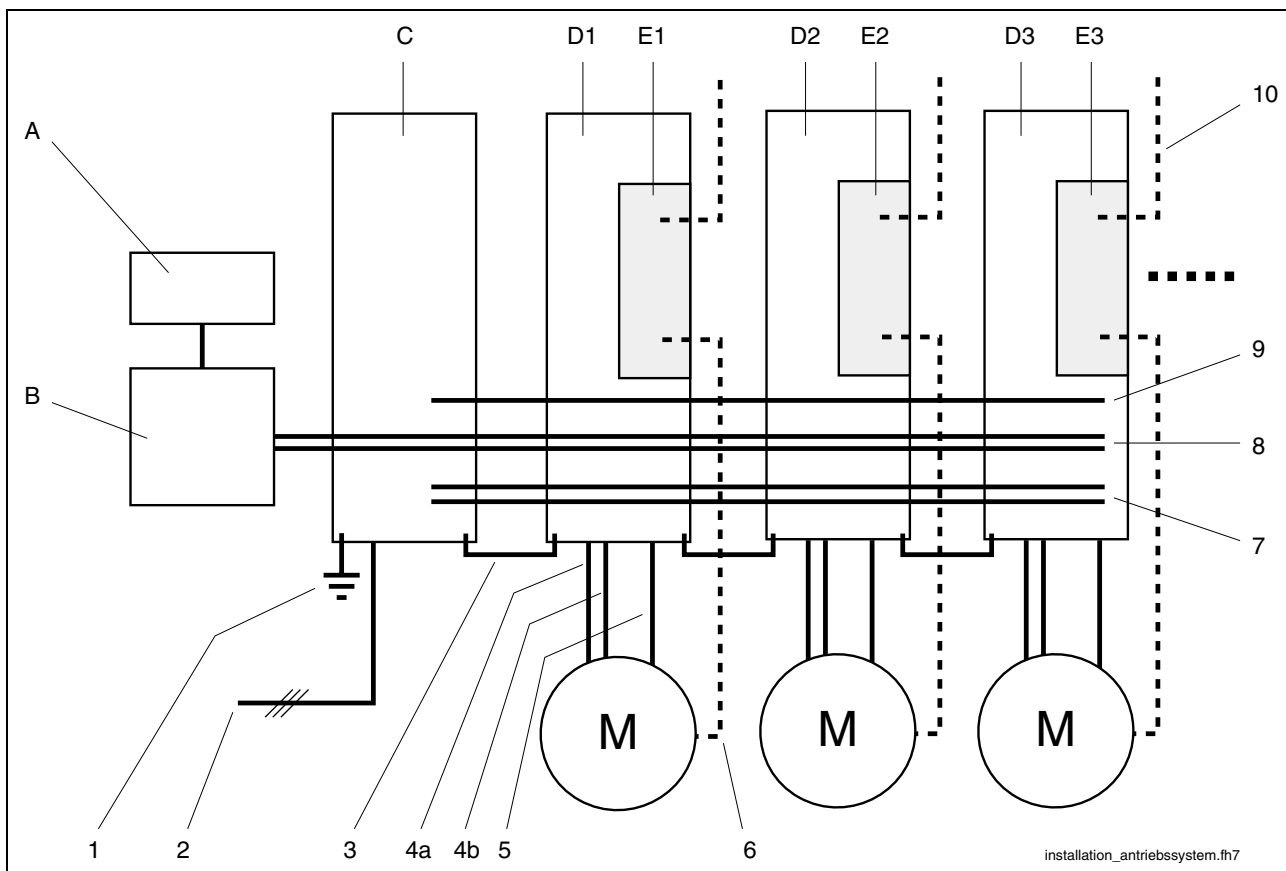
(Information at ambient temperature of 25 °C)

Designation	Symbol	Unit	Value	
Control voltage	U _{N3}	V	24 ±20% (when no motor holding brake is used) 24 ±5% (when motor holding brake is used) 26 ±5% (when motor holding brake is used and the motor cable is longer than 50 m)	
Max. ripple content	w	-	mustn't exceed the control voltage range	
Max. allowed overvoltage	U _{N3max}	V	33 (limited to a duration of 1 ms)	
Max. charging current	I _{EIN3}	A	2.5 (power section) 2.8 (control section)	
Max. pulse duration of I _{EIN3}	t _{EIN3Lade}	ms	5	
Max. input capacity	C _{N3}	mF	0.47	
Power consumption*:				
	HMD01.1-1N-W0012	P _{N3}	W	being prepared
	HMS01.1-1N-W0020	P _{N3}	W	10.1 (0.42 A at 24 V)
	HMD01.1-1N-W0020	P _{N3}	W	being prepared
	HMS01.1-1N-W0036	P _{N3}	W	15.1 (0.63 A at 24 V)
	HMD01.1-1N-W0036	P _{N3}	W	being prepared
	HMS01.1-1N-W0054	P _{N3}	W	9.6 (0.40 A at 24 V)
	HMS01.1-1N-W0070	P _{N3}	W	16.1 (0.67 A at 24 V)
	HMS01.1-1N-W0150	P _{N3}	W	22.8 (0.95 A at 24 V)
	HMS01.1-1N-W0210	P _{N3}	W	72.0 (3.00 A at 24 V)

* data without motor holding brake taken into account

Fig. 7-4: Control voltage

7.4 Drive System - Overview



No.	Designation	Obligatory?
A	UPS (uninterruptible power system)	no
B	24 V control voltage supply	yes
C	Supply unit	yes
D1, D2, D3, ...	Power sections of drive controllers	yes
E1, E2, E3, ...	Control sections of drive controllers	yes
1	Ground connection (mains)	yes
2	Mains connection	yes
3	Ground connection (drive controller)	yes
4a	Motor power cable	yes
4b	Shield of motor power cable	yes
5	Motor temperature monitor and motor holding brake	no
6	Encoder connection	yes
7	DC bus connection (L+, L-)	yes
8	Control voltage connection (+24V, 0V)	yes
9	Module bus X1	yes
10	Master communication	no

Fig. 7-5: Drive system - overview

7.5 Connecting Cables and Rails

Complete Connection Diagram

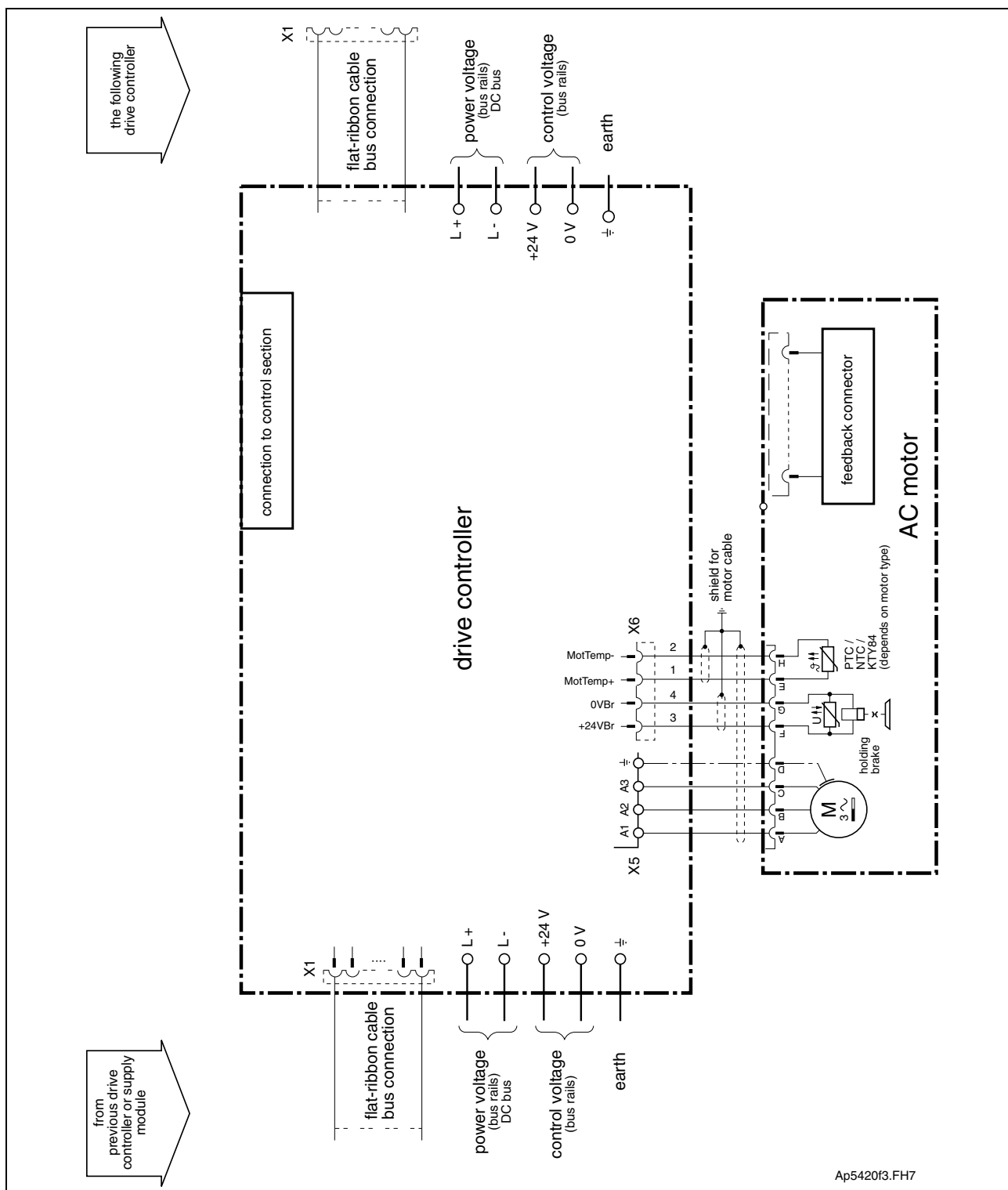


Fig. 7-6: Complete connection diagram

Connections on power section

**HMS01.1N-W0020 and HMS01.1N-W0036,
HMD01.1N-W0020 and HMD01.1N-W0036**

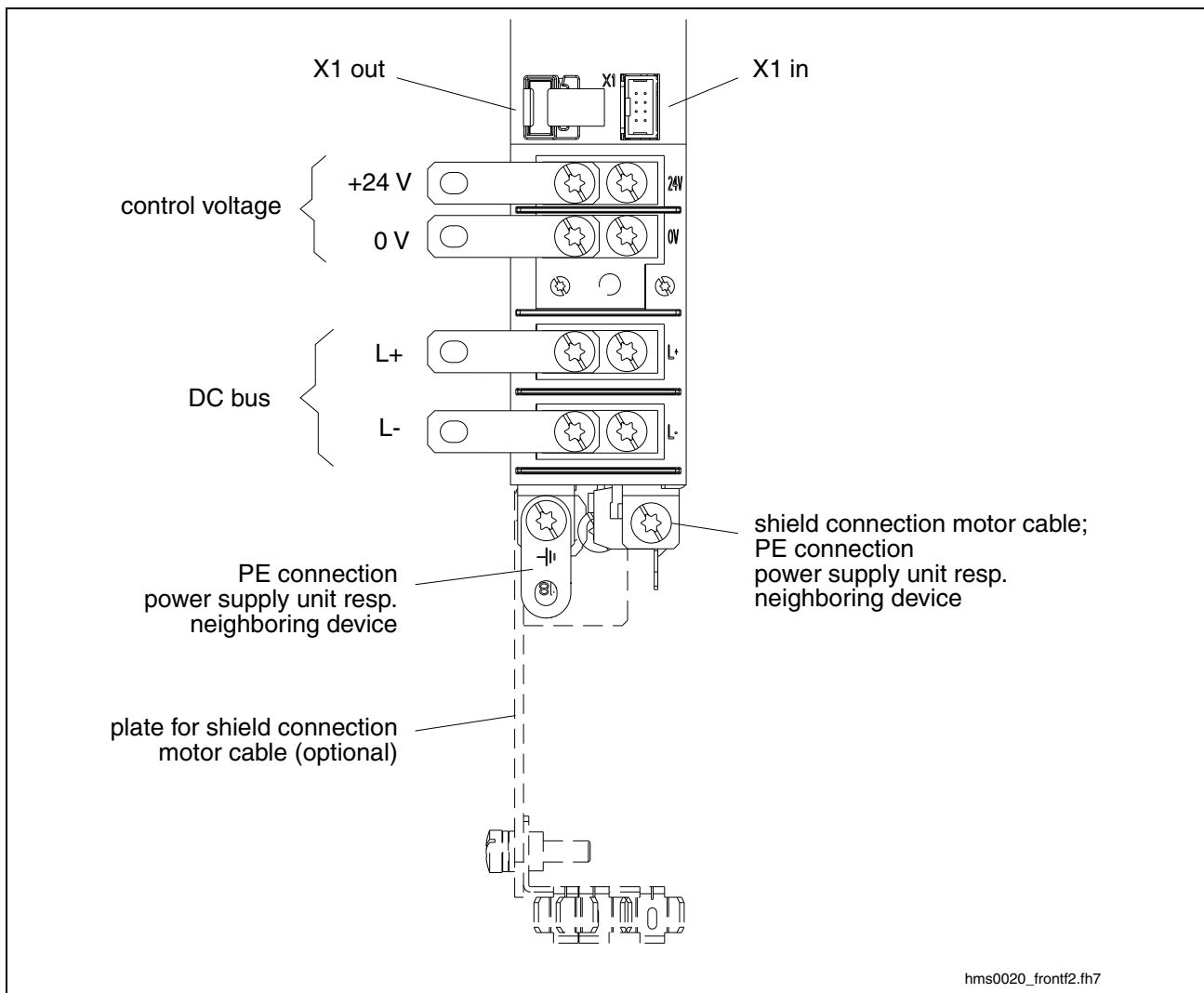
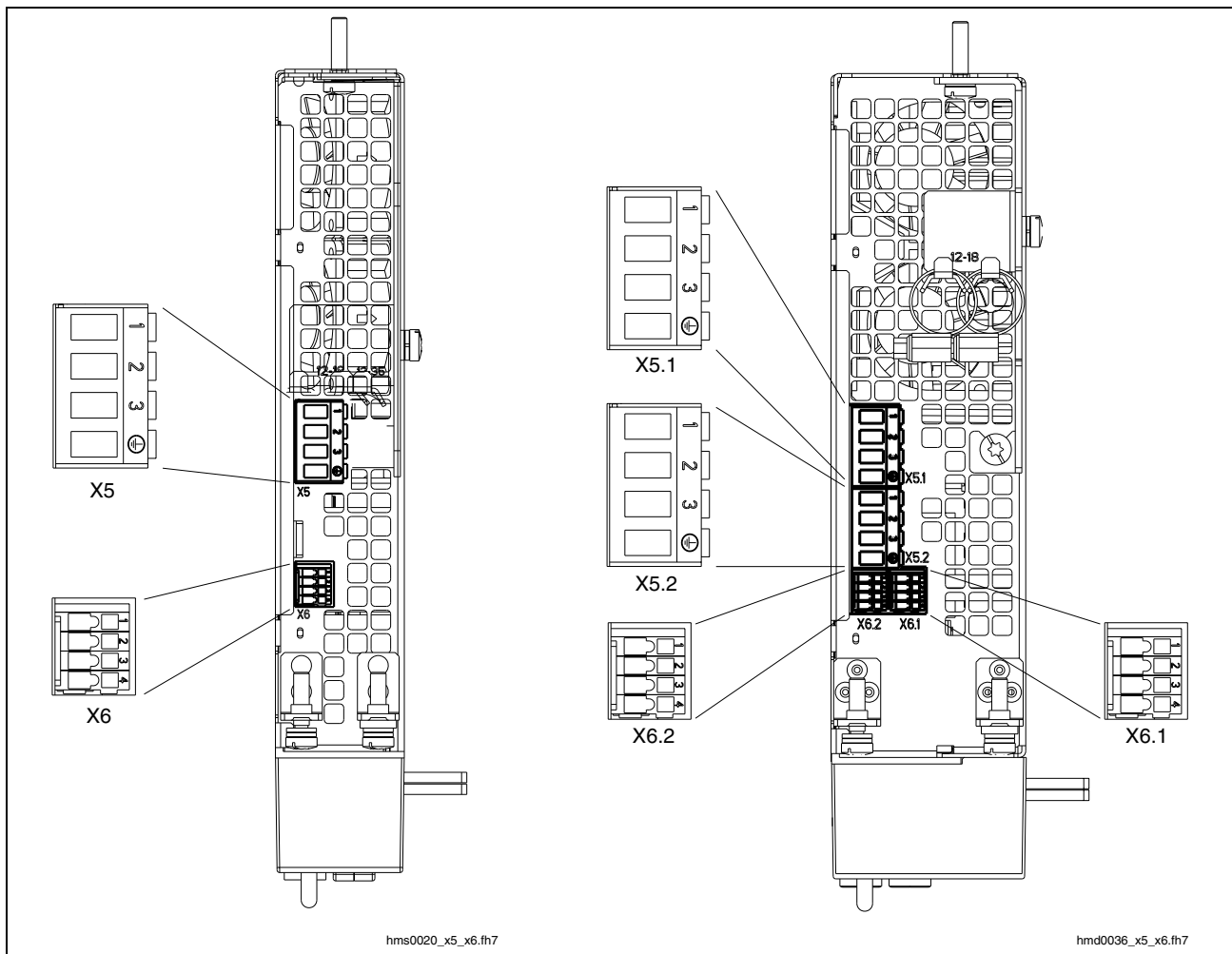


Fig. 7-7: HMS01.1N-W0020 and HMS01.1N-W0036, HMD01.1N-W0020 and HMD01.1N-W0036 power section connections (front)



X5 (HMS), X5.1 and X5.2 (HMD): Motor connection
 X6 (HMS), X6.1 and X6.2 (HMD): Motor temperature, motor holding brake
 Fig. 7-8: HMS01.1N-W0020, -W0036, HMD01.1N-W0020, -W0036 power section connections (bottom)

Description of connections:

Connection	See page
control voltage	7-19
DC bus	7-20
motor connection	7-21
ground connection power supply unit resp. neighboring device	7-25
X1	7-26
X6	7-27

HMS01.1N-W0054 and HMS01.1N-W0070

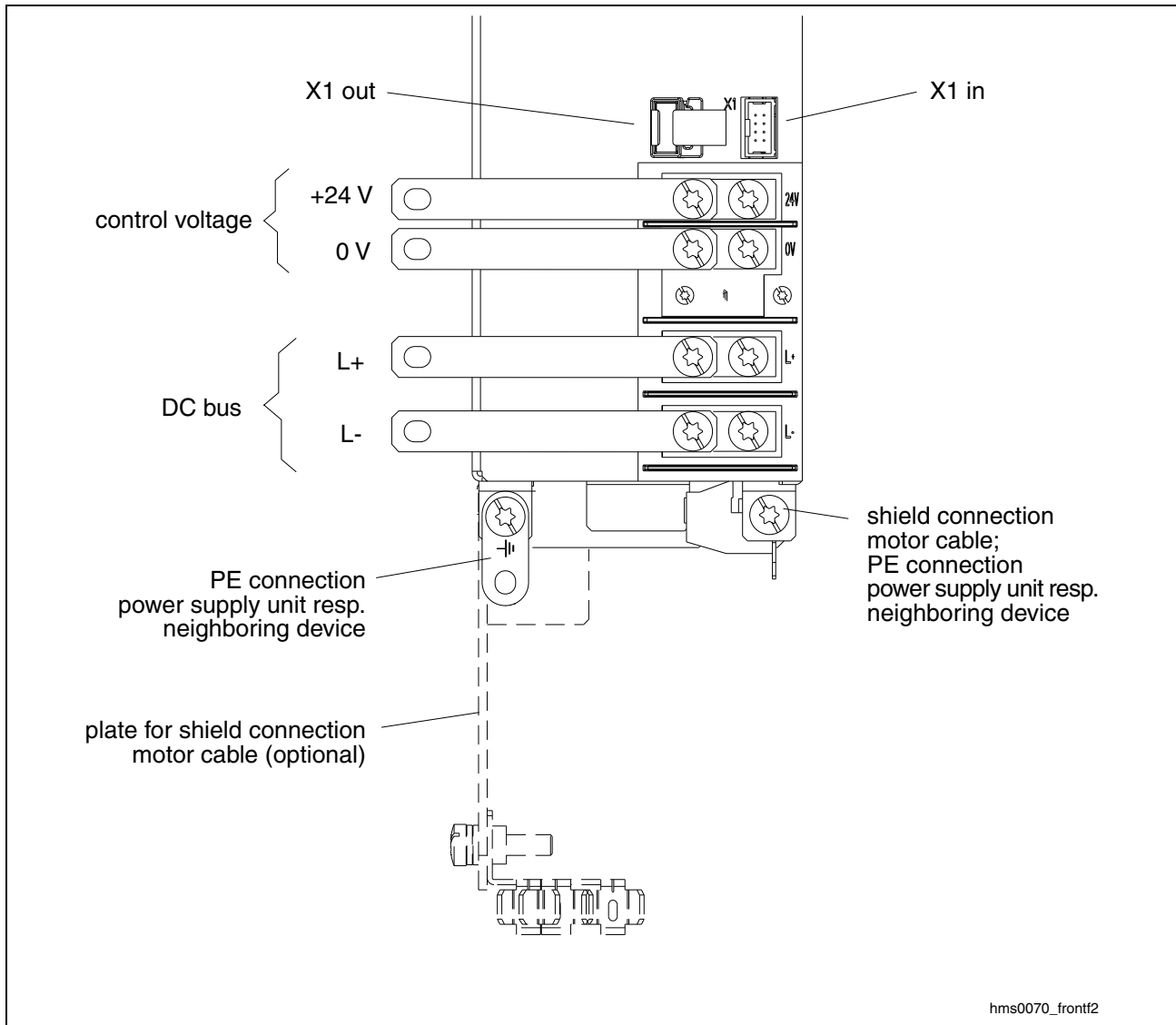
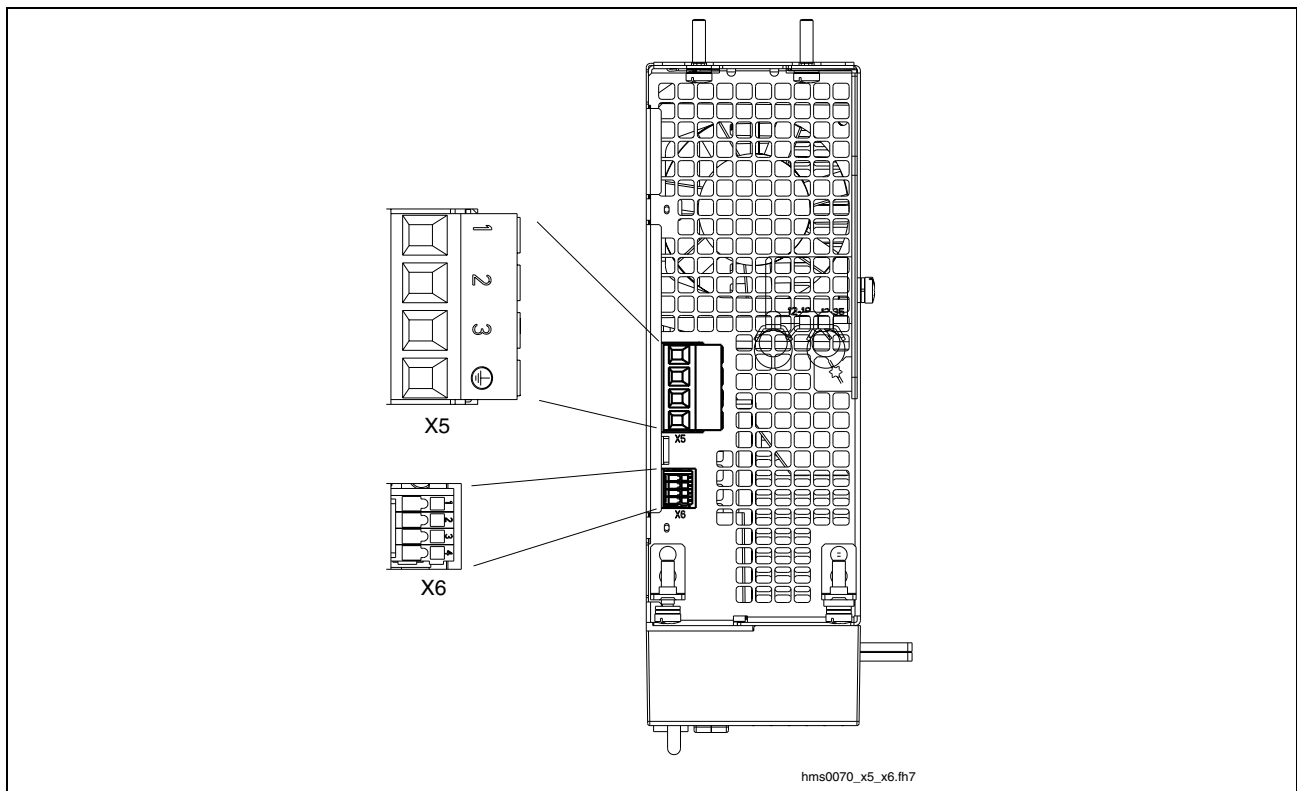


Fig. 7-9: HMS01.1N-W0054 and -W0070 power section connections (front)



X5: Motor connection

X6: Motor temperature, motor holding brake

Fig. 7-10: HMS01.1N-W0054 and -W0070 power section connections (bottom)

Description of connections:

Connection	See page
control voltage	7-19
DC bus	7-20
motor connection	7-21
ground connection power supply unit resp. neighboring device	7-25
X1	7-26
X6	7-27

HMS01.1N-W0150 and HMS01.1N-W0210

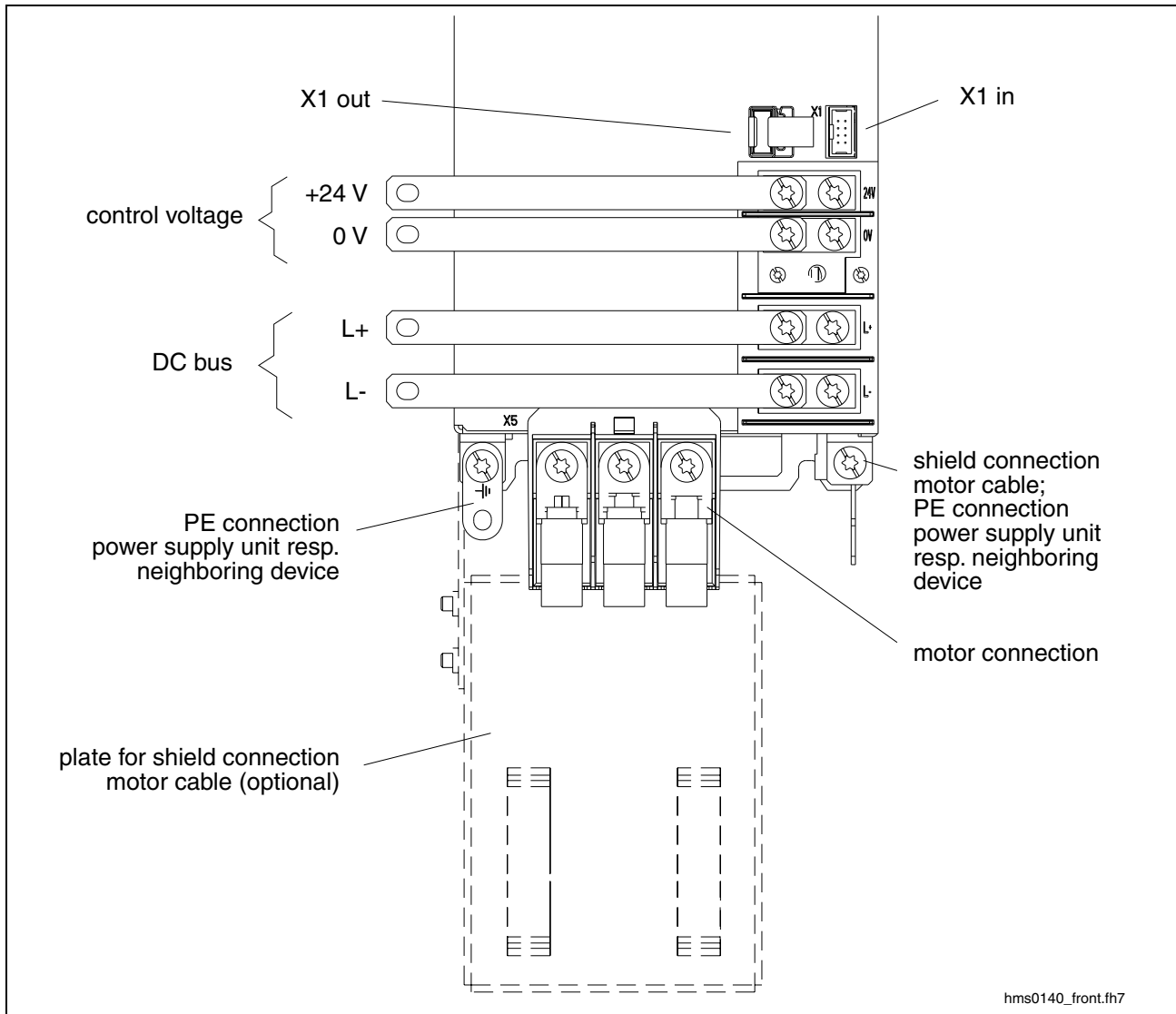
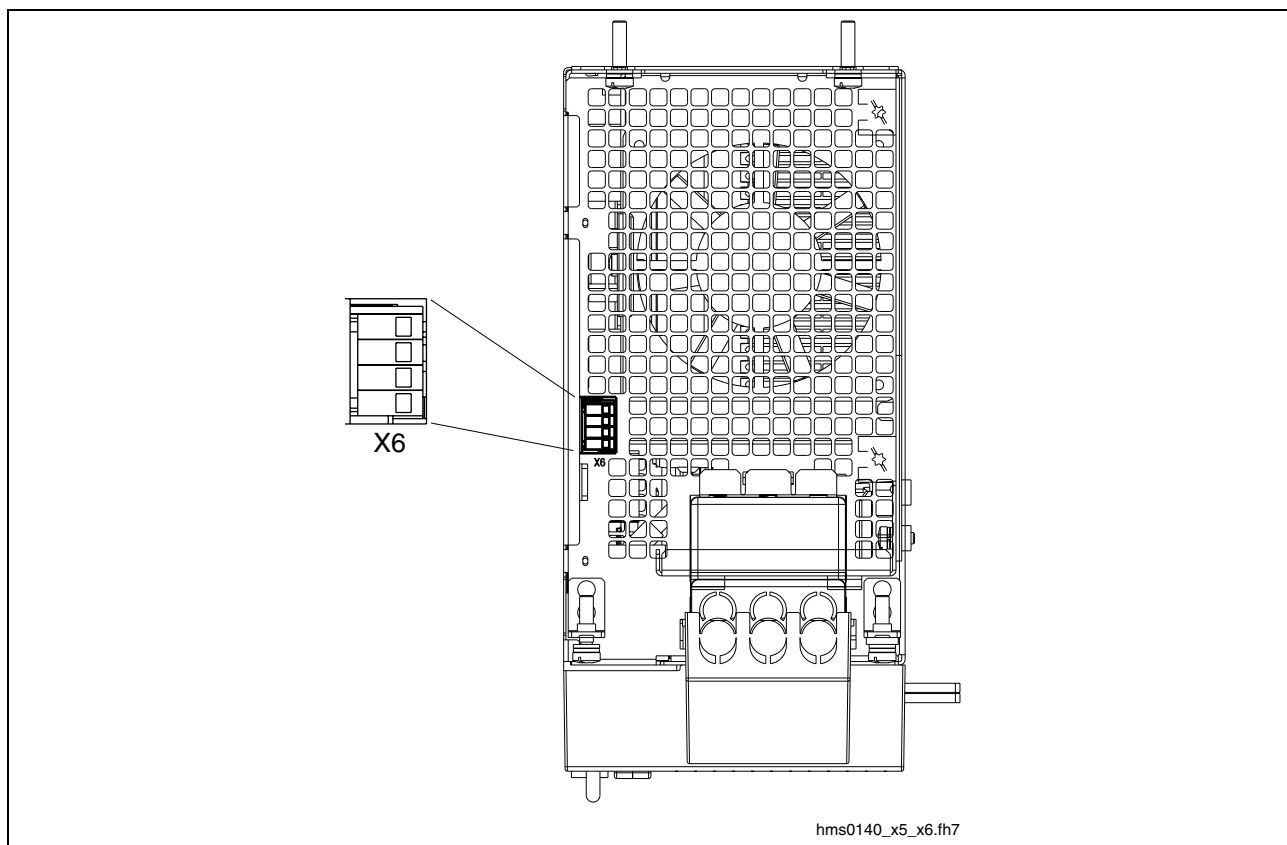


Fig. 7-11: HMS01.1N-W0150 and HMS01.1N-W0210 power section connections (front)



X6: Motor temperature, motor holding brake

Fig. 7-12: HMS01.1N-W0150 and HMS01.1N-W0210 power section connections (bottom)

Description of connections:

Connection	See page
control voltage	7-19
DC bus	7-20
motor connection	7-21
ground connection power supply unit resp. neighboring device	7-25
X1	7-26
X6	7-27

Control Voltage (+24 V, 0 V)

The control voltage is supplied by an external 24-V power supply unit.

- Note:**
- Technical data: see page 7-10
 - Falling short of the permissible control voltage leads to a corresponding error message (=> refer also to firmware function description).
 - Interruption to the control voltage when the motor is running leads to torque-free (brakeless) runout in the motor.
 - If a power supply unit is used with a DC bus dynamic braking function, an interruption to the control voltage supply causes braking to the axes through the DC bus dynamic braking.



DANGER

Dangerous movement caused by brakeless motor coasting to stop in the event of an interruption to the control voltage supply!

- ⇒ Do not stay within the motional range of the machine.
Possible measures to prevent personnel accidentally accessing the machine:
- protective fencing
 - protective grid
 - protective cover
 - light barrier.
- ⇒ Fencing and covers must be adequately secured against the maximum possible force of movement.

Design The control voltage supply is connected by contact rails and screws (M6) to the front of the drive controller (cross section of a contact rail: 4 x 12 mm). There are various lengths of contact rail depending on the width of the drive controllers.

Tightening Torque 6 Nm

DC Bus (L+, L-)

The DC bus connection connects

- the supply unit to the drive controller
- several drive controllers to one another, and
- drive controllers to additional components in order to
 - increase the stored power by means of DC bus capacitor unit
 - increase the permissible braking resistor continuous output by means of DC bus resistor unit

Design The DC bus is connected by contact rails and screws (M6) to the front of the drive controller (cross section of a contact rail: 4 x 12 mm). There are various lengths of contact rail depending on the width of the drive controllers.

Tightening Torque 6 Nm

DC Bus Wiring If in special cases it is not possible to use the DC bus rails provided to make the connection, the connection must be made using the shortest possible twisted cables.

Length of the twisted cables	• max. 2 m • when DC bus capacitor units are used: max. 40 m
Wire cross-section	min. 10 mm ² , however, no less than the cross-section of the power input line
Wire protection	by means of fuses in the mains supply
Voltage stability of a single strand against grounding	≥ 750 V (e.g., strand type - H07)



CAUTION

Risk of voltage arcing!

⇒ If wires instead of contact rails are used to connect the supply unit, the connections have to be correctly made (see page 10-11 onward).



CAUTION

Risk of voltage arcing!

⇒ If drive controllers are stacked in the control cabinet, the connections for the DC buses between the drive controllers have to be correctly made. There is otherwise a risk of voltage arcing (see page 10-13 onward).

X5, Motor Connection (1, 2, 3, Ground)

Design

HMx01.1N-	Type	Number of poles	Type of design
W0020 W0036	Terminal screw	4	Socket on device
W0054	Terminal screw	4	Socket on device
W0070	Terminal screw	4	Socket on device
W0150 W0210	Terminal block	3	Threaded terminal end for M6 ring terminal

Fig. 7-13: Design

Connection Cross Section

HMx01.1N-	Cross section single-wire [mm²]	Cross section multiwire [mm²]	Cross section in AWG
W0020 W0036	0.2-4	0.2-4	24-10
W0054	0.5-10	0.5-10	20-8
W0070	0.5-10	0.5-10	20-8
W0150	2.5-50	2.5-50	14-1
W0210	4.0-50	4.0-50	12-1

Fig. 7-14: Connection cross sections

Tightening Torque

HMx01.1N-	Tightening torque [Nm]
W0020 W0036	0.5 – 0.6
W0054	1.2 – 1.5
W0070	1.2 – 1.5
W0150	6
W0210	6

Fig. 7-15: Tightening torques

**CAUTION**

Damage to the drive controller

⇒ Strain relief cannot be provided for the motor power cable at the drive controller. Strain relief for the motor power cable must therefore be provided within the control cabinet.

Connecting the Motor Power Cable

Rexroth motor power cables must be used for connections between the drive controller and motor.

The Rexroth motor power cable consists of

- three wires for the motor power connection
- one wire for the grounded wire connection
- a separately shielded pair of wires for monitoring the motor temperature

- a separately shielded pair of wires for monitoring the motor holding brake
- a total shield to be put on the shield retainer.

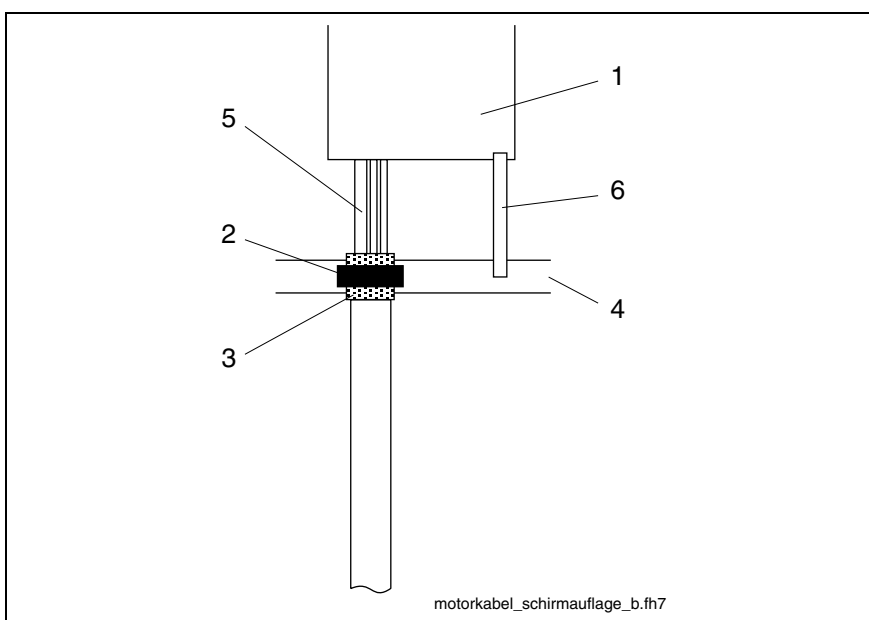
Note: For optimum shield contact of the motor power cable use our special **shielding plate**, where possible (see page 10-1).

Shield Contact of the Motor Cable without Shielding Plate

If you do not use the shielding plate you have to provide good shield contact for the motor power cable by other means.

Variant 1:

This variant provides good shield contact and strain relief for the motor cable at the same time. In this case the ground bus must be in immediate vicinity of the motor connection (X5) of the drive controller. If you use a ready-made motor cable, bear in mind the length of the litz wires at the end of the cable.

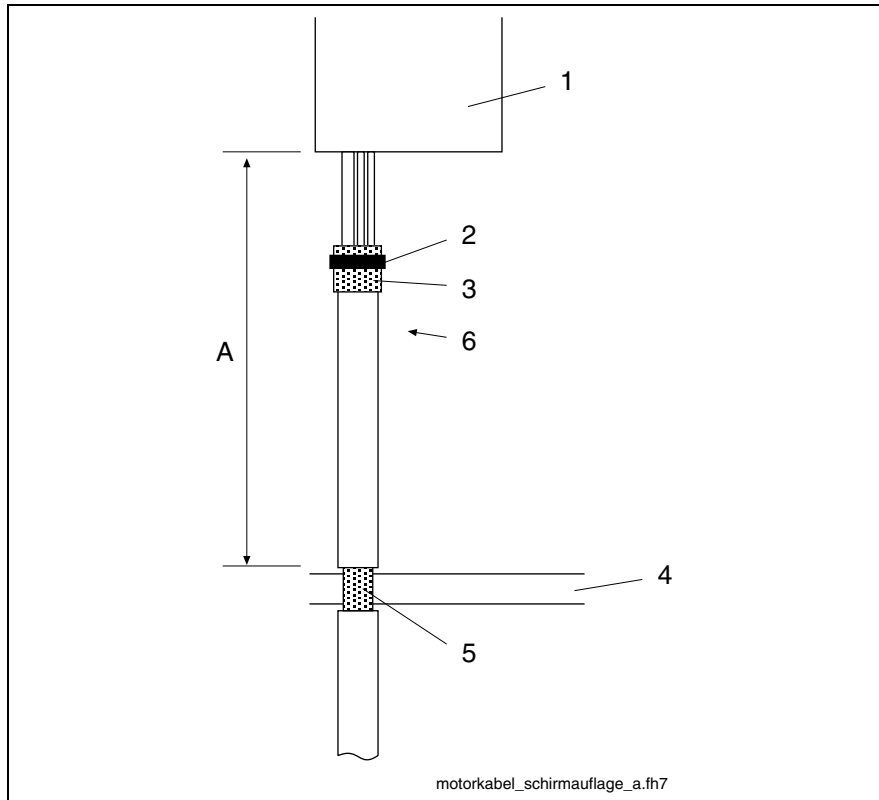


- 1: drive controller
- 2: clip for shield contact
- 3: overall shield of the motor power cable folded back
- 4: ground bus in the control cabinet
- 5: litz wires of the motor cable
- 6: cable for connecting ground bus and drive controller

Fig. 7-16: Shield contact without shielding plate (variant 1)

- By means of a clip (2) put the overall shield of the motor power cable (3) on the ground bus (4).
(If you use your own cable make sure the shields of the two inner pairs of wires are in contact with the overall shield.)
- Connect the ground bus to the drive controller by means of a cable (6) (cross section at least 10 mm²).

Variant 2:



- 1: drive controller
- 2: cable tie
- 3: overall shield of the motor power cable folded back
- 4: earth-circuit connector in the control cabinet
- 5: bare overall shield of the motor power cable
- 6: strain relief (as near to the drive-side cable end as possible)
- A: $A < 1 \text{ m}$

Fig. 7-17: Shield contact without shielding plate (variant 2)

- With a cable tie press the drive-side cable end in such a way that the shields of the two inner pairs of wires (motor temperature, holding brake) have good contact with the overall shield of the motor power cable.
(If you use your own cable make sure the shields of the two inner pairs of wires are in contact with the overall shield.)
- On the level of the earth-circuit connector in the control cabinet remove a piece of the cable sheath from the motor power cable in order to lay bare the overall shield. The distance between drive controller and bare overall shield must not be more than a maximum of 1 m. The smaller the distance, the higher the noise immunity of the drive system.
- Put the overall shield on the earth-circuit connector in the control cabinet with an appropriate connection. The connection must have a cross section of at least 10 mm^2 .
- Make sure there is sufficient strain relief for the motor power cable as near to the drive-side cable end as possible.

If you do not use a ready-made Rexroth motor power cable, the cable can alternatively be composed of four stranded single wires (3 phases, 1 ground wire) with separately guided, shielded wires for temperature monitoring and connecting the brake.

Note: Please refer to the relevant motor description for more detailed information concerning technical data, connection and cross sections.

Length of Motor Cable In order to comply with the EMC limit values, the length of the motor cable is limited at a switching frequency > 4 kHz.

The lengths given in the following table are recommended as a guide (at an ambient temperature of $\leq 40\text{ °C}$ in accordance with EN 60 204):

Drive controller switching frequency	Max. length for Class B, EN 55011	Max. length for Class A, EN 55011
4 kHz	75 m	75 m
8 kHz	38 m	38 m
10 kHz	32 m	32 m
12 kHz	25 m	25 m
16 kHz	18 m	18 m

Fig. 7-18: Guide values for maximum motor cable lengths

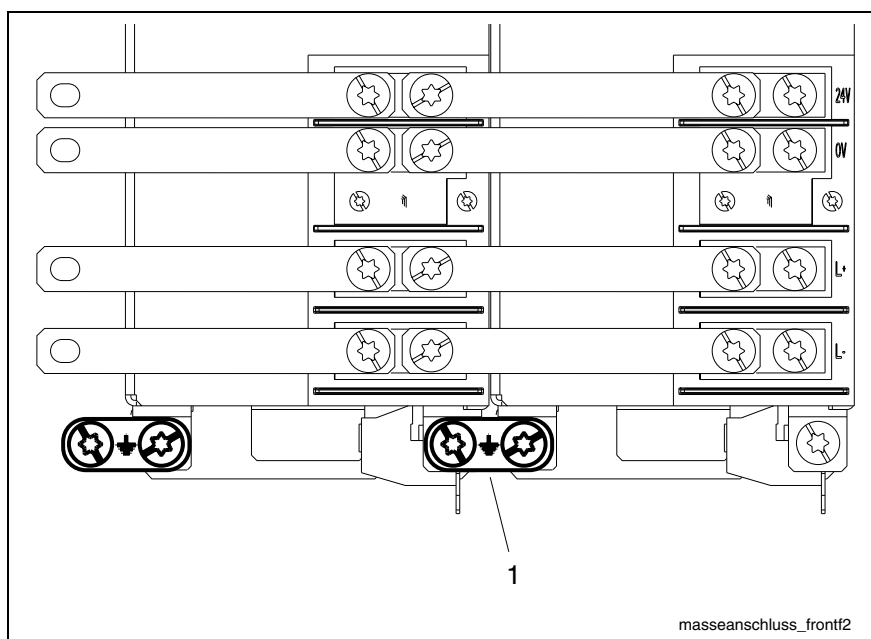
Note: When you use two parallel motor cables to connect the motor to the drive controller, the maximum motor cable length is only the half of the guide values.

Ground Connection, Power Supply Unit and Neighboring Device

The ground connection (grounding) to the supply unit or to the neighboring drive controller can be provided in duplicate in the case of the drive controllers through:

- a grounding bracket on the front (see figure below)
- the rear panel of the device if the devices are positioned against a shared, bare metal surface

Note: You must use the grounding bracket on the front for ground connection in any case. The rear panel of the device can be used in addition.



1: Grounding bracket for ground connection

Fig. 7-19: Ground connection to supply unit resp. neighboring device

Note: If cables are used for ground connection they must have a cross section of at least 10 mm^2 (but not smaller than the cross section of a phase of the mains supply wire.)

Design The grounding bracket is connected to the drive controller with screws (M6 x 25)

Tightening Torque 6 Nm

X1, Bus Module

The bus module permits data exchange between the supply unit and the drive controllers.

Graphic Representation

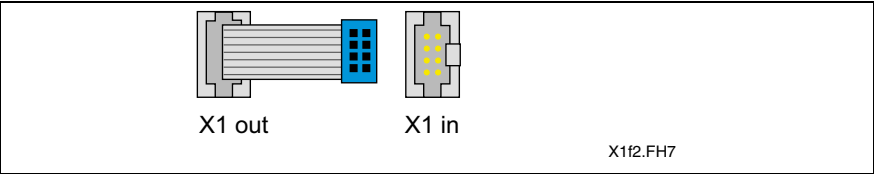


Fig. 7-20: X1

Design

Type	Number of poles	Type of design
Flat line connector	8	Connector on device
Flat line socket	8	Socket on flat line

Fig. 7-21: Design

Note: If extension leads are used the leads must be **shielded**. Their total length must not exceed a **maximum of 40 m**.

X6, Motor Temperature Monitoring and Motor Holding Brake

Graphic Representation

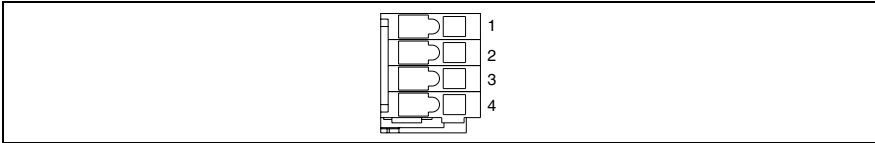


Fig. 7-22: X6 terminal connector

Design

Type	Number of poles	Type of design
Spring power	4	Bushings on connector

Fig. 7-23: Design

Connection Cross Section HMS01.1N-W0020 to -W0070 and HMD01.1N-W0012 to -W0036:

Cross section single-wire [mm²]	Cross section multiwire [mm²]	Cross section in AWG
0.14-1.5	0.14-1.5	28-16

Abb. 7-24: Connection cross section

HMS01.1N-W0150 to -W0210:

Cross section single-wire [mm²]	Cross section multiwire [mm²]	Cross section in AWG
2.5	2.5	12

Abb. 7-25: Connection cross section

Connection

1	MotTemp+	Monitoring the motor temperature
2	MotTemp-	
3	+24 VBr	Motor holding brake
4	0 VLBr	

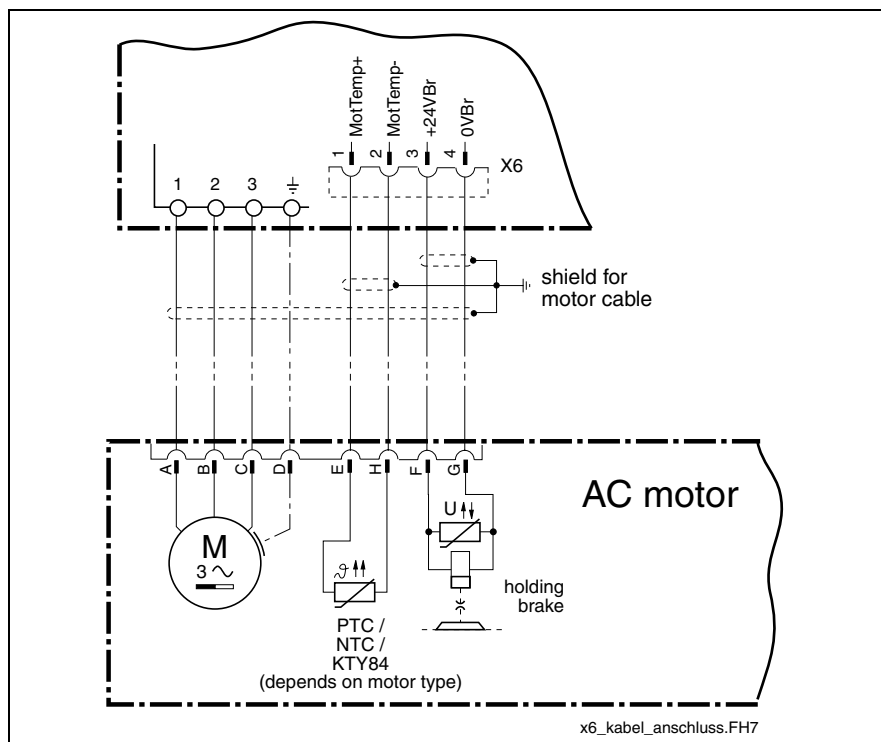


Fig. 7-26: Motor cable, temperature monitor and holding brake connection

**Maximum permitted braking current:**

- HMS01.1N-W0020: 1.6 A
- HMS01.1N-W0036: 1.6 A
- HMS01.1N-W0054: 2.0 A
- HMS01.1N-W0070: 2.0 A
- HMS01.1N-W0150: 2.5 A
- HMS01.1N-W0210: 2.5 A

Where braking currents are higher, the motor holding brake must be activated by means of an external switching mechanism.

**DANGER****Dangerous movements! Danger to personnel from falling or slipping axes!**

- ⇒ The standard motor holding brake provided or an external motor holding brake controlled directly by the drive controller are not sufficient on their own to guarantee the safety of personnel!
- ⇒ Personnel safety must be achieved using higher-ranking, fail-safe procedures:
 - Dangerous areas should be blocked off with protective fences or grids.
 - Secure vertical axes against falling or slipping after switching off the motor power by, for example:
 - mechanically locking the vertical axis
 - providing external brake/catching/clamping mechanisms
 - adequately counterbalancing the axis

Power consumption levels for the holding rate can be found in the project planning documents for AC motors.

The holding brake for AC motors is not designed as a service brake. After approximately 20,000 motor revolutions against the closed brake disc it is worn out.

Controlling the Motor Holding Brake

The drive controller assumes the control of the motor holding brake.

7.6 XS1, Shield Connection

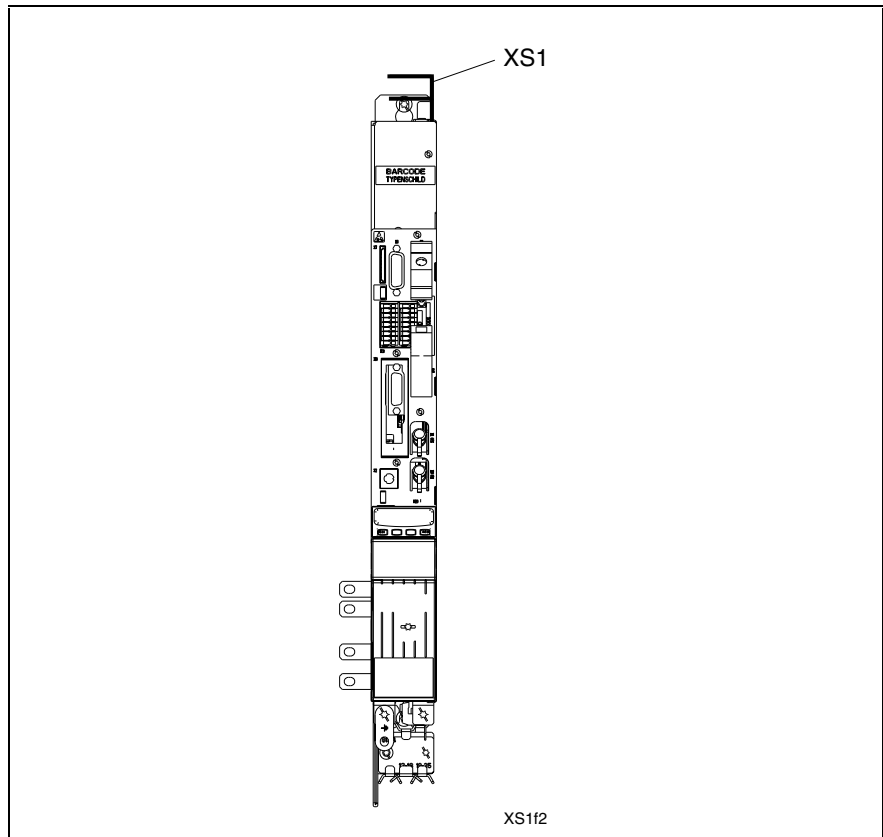


Fig. 7-27: XS1 shield connection

Connection for shields of wires connected to the control section.

Note: Always connect shield of cables with a large metal-to-metal contact surface to shield connection XS1.

7.7 Touch Guard



WARNING

Lethal electric shock caused by live parts with more than 50 V!

- ⇒ The appropriate touch guard must be mounted for each drive controller following connection work.
- ⇒ Never mount a damaged touch guard.
- ⇒ Immediately replace a damaged touch guard by an undamaged touch guard.

Cutouts

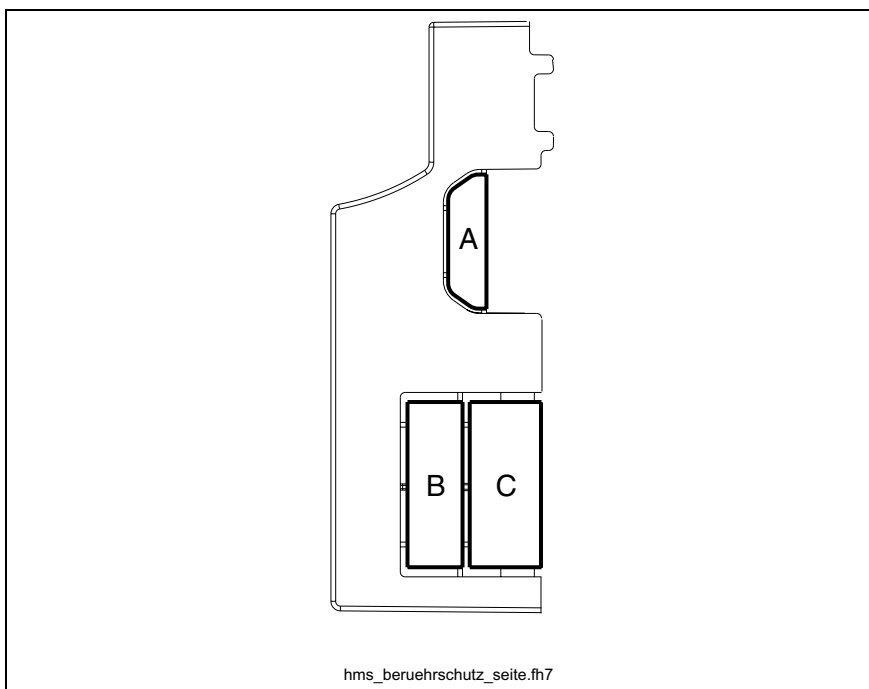


Fig. 7-28: Cutouts at the touch guard



WARNING

Lethal electric shock caused by live parts with more than 50 V!

- ⇒ You have to provide the best possible protection against contact. Therefore keep the cutouts at the touch guard as small as possible.
- ⇒ Only break off the cutouts if necessary.

- If the DC bus and the control voltage are connected by means of **contact rails**, only the **cutout C** (see picture) may be broken off the touch guard.
- If the DC bus and the control voltage are connected by means of **cables** (e.g. in the case of multiple-line arrangement of the drive controllers), the **cutouts A, B and C** (see picture) may be broken off the touch guard.

- At the first and last drive controller in a line of drive controllers connected to each other there **mustn't any** cutout be broken off at the outer side of the touch guard.

Mounting

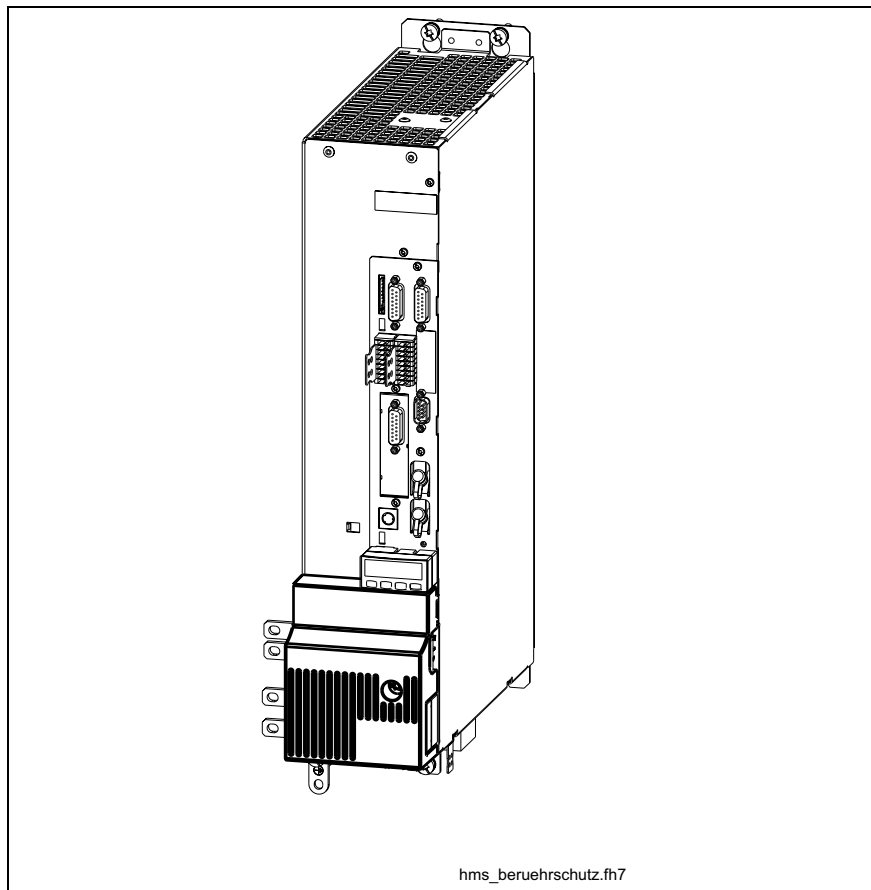


Fig. 7-29: Touch guard

The touch guard must always be mounted following connection work.

Note: **Risk of damage to the touch guard!**
The maximum tightening torque for the fixing screw for the touch guard is **2.8 Nm**.

Tightening Torque 2.8 Nm

8 Replacing Devices

8.1 General Information

The diagnostic display enables an aimed and effective problem search in order to:

- avoid production downtimes due to extensive searches in individual devices and repairs of devices on the machine
- assume operations without extensive assembly and adjustments
- quickly eliminate the problem and replace the defective component

When returning a defective device to our Customer Service, please complete the Fault Report in its entirety. The Fault Report is included in this section (see page 8-4 onward) and may be copied for your convenience.

Note: The new drive components must have the same type designations as the faulty devices. To ensure this, indicate the entire type designation when requesting replacement parts.

8.2 How to Proceed When Replacing Devices

Note: Note the safety instructions in chapter when replacing devices!

Replacing the Drive Controller

- Switch main switch off.
- Make sure main switch cannot be switched on again.
- Make sure drive controller is completely de-energized.



Lethal electric shock caused by charged capacitor!

⇒ Prior to touching uninsulated connecting cables and terminals, wait for the capacitor to discharge! Only then work on the cables!

-
- Remove touch guard and separate connecting line from drive controller.
 - Release screws on top and bottom of housing.
 - Hand new drive controller into place and tighten screws.
 - Connect drive controller as specified in the machine terminal diagrams.
 - Mount touch guard.
 - Copy firmware and parameter file to drive controller (see firmware documentation).

Replacing the Motor

- Switch main switch off.
- Make sure main switch cannot be switched on again.
- Disconnect plug-in connectors.

Note: When replacing the motor, cap open connector ends particularly if there might be the chance that they get in contact with coolant/lubricant or dirt (allowed level of contamination is V2 according to DIN VDE 0160).

- Replace motor.

Note: To mechanically replace the AC servo motor, note the instructions of the machine manufacturer.

- Connect plug-in connectors.



Danger caused by unwanted axis motion!

⇒ Servo axes with indirect path measuring system via the motor encoder will lose the reference dimension when the motor is replaced!
This reference to the machine coordinate system must therefore be reestablished after replacement.

- Servo axes with absolute motor encoder: reestablish the reference dimension.

Replacing Cables



Lethal electric shock caused by live parts with more than 50 V!

⇒ Power connectors of the cables may only be separated or connected if the installation has been de-energized!

Note: When replacing cables, note the instructions of the machine manufacturer.
If you do not use standard cables from Rexroth, then check to ensure that the cables agree with the terminal diagram of the machine manufacturer!

- Switch main switch off.
- Make sure main switch cannot be switched on again.
- Disconnect plug-in connectors.

Note: When replacing cables, cap open connector ends particularly if there might be the chance that they get in contact with coolant/lubricant or dirt (allowed level of contamination is V2 according to DIN VDE 0160).

- Replace cables.
- Connect plug-in connectors.

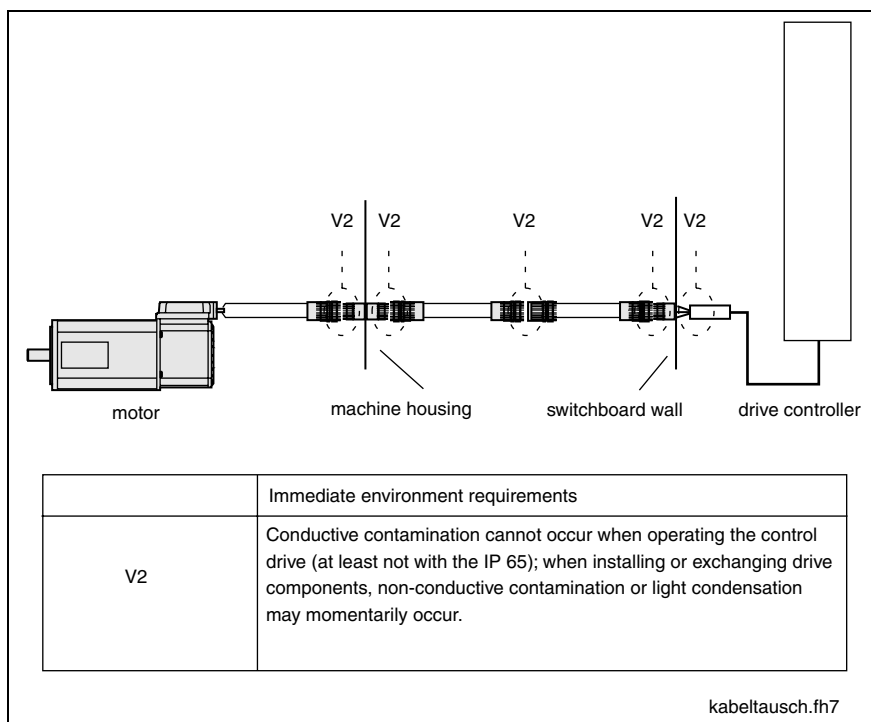


Fig. 8-1: Level of contamination according to DIN VDE 0160

ATTENTION  **Material damage caused by bad power connectors!**

⇒ Connect power connectors only when they are dry and clean.

Fault Report

Rexroth Bosch Group	Fault Report for Drive Systems	Date: Report No.:		
This fault report is intended to help eliminate problems that might possibly be related to drive systems. Please fill it out carefully and send it, together with the parameter file with which the fault occurred, to Bosch Rexroth .				
Contact person: Customer (machine manufacturer): End customer: Branch of industry:	Telephone: Fax: E-mail: @			
<table border="1"> <tr> <td data-bbox="151 636 759 1240"> System description: <u>Firmware</u> Firmware version: FWA- - - V -MS <u>Software:</u> DriveTop version: SWA-DTOP**-INB- V -MS Operating system: Service pack: Language: PC designation: Hardware configuration (system RAM, hard disk memory,...): </td> <td data-bbox="759 636 1444 1240"> <u>Drive system</u> Power section: Type code: - - - - Serial number: SN Hardware index: Control section: Type code: - - - - - - Serial number: SN Hardware index: Supply module: Type code: - - - - Serial number: </td> </tr> </table>			System description: <u>Firmware</u> Firmware version: FWA- - - V -MS <u>Software:</u> DriveTop version: SWA-DTOP**-INB- V -MS Operating system: Service pack: Language: PC designation: Hardware configuration (system RAM, hard disk memory,...):	<u>Drive system</u> Power section: Type code: - - - - Serial number: SN Hardware index: Control section: Type code: - - - - - - Serial number: SN Hardware index: Supply module: Type code: - - - - Serial number:
System description: <u>Firmware</u> Firmware version: FWA- - - V -MS <u>Software:</u> DriveTop version: SWA-DTOP**-INB- V -MS Operating system: Service pack: Language: PC designation: Hardware configuration (system RAM, hard disk memory,...):	<u>Drive system</u> Power section: Type code: - - - - Serial number: SN Hardware index: Control section: Type code: - - - - - - Serial number: SN Hardware index: Supply module: Type code: - - - - Serial number:			
<u>Motor</u> Type designation: Serial number: S.No. Motor encoder: Mounting position:	Additional components (e.g. control system involved, external encoder, filter, cooling system in control cabinet,...):			

Fault description (detailed description of situation before, during and after fault occurred):

To quickly resolve your problem we ask you to send us also the parameter set with which the fault occurred.

Name of parameter set file:

General conditions:

Mode at time fault occurred:

Operating mode ☐Parameterization mode ☐Switch phase ☐

Operating mode active at time fault occurred:

Encoder ,

7-segment display...

...after fault occurred:

...before fault occurred:

Fault status

- ☐ occurs permanently
- ☐ occurs during commissioning
- ☐ occurs sporadically
- ☐ occurs after approx. hours
- ☐ occurs with shocks
- ☐ depends on temperature

Causes

- ☐ unknown
- ☐ incorrect connection
- ☐ external cause
- ☐ mechanical damage
- ☐ loose cable connection
- ☐ moisture in unit
- ☐ foreign body in unit

Other defects

- ☐ problems in the mechanical system
- ☐ power section failure
- ☐ control system failure
- ☐ motor failure
- ☐ cable break
- ☐ defective blower
- ☐ defective feedback

Wiring / mechanical setup (e. g. length of cables, grounding, assembly,...):**Information on the machine** (e. g. operating hours, type, serial number,...):**Mains conditions** (e. g. frequency, voltage,...):**Ambient conditions** (e. g. ambient temperature, humidity,...):**In case of problems with DriveTop**

Name of dialog in which fault occurred:

Drive connection:

Note: In order to resolve your DriveTop problem quickly, we would like to ask you to send us the file "debug.log". You can find it in the DriveTop directory.

9 Disposal and Environmental Protection

9.1 Disposal

Products

Our products can be returned to us free of charge for disposal. It is a precondition, however, that the products are free of oil, grease or other dirt.

In addition, when returned the products mustn't contain any undue foreign matter or foreign component.

Please send the products free domicile to the following address:

Bosch Rexroth AG
Electric Drives and Controls
Bürgermeister-Dr.-Nebel-Straße 2
D-97816 Lohr am Main

Packaging Materials

The packaging materials consist of cardboard, wood and polystyrene. They can be easily recycled. For ecological reasons you should not return the empty packages to us.

9.2 Environmental Protection

No Release of Hazardous Substances

Our products do not contain any hazardous substances that they can release in the case of appropriate use. Normally there aren't any negative effects on the environment to be expected.

Materials Contained in the Products

Electronic Devices

Electronic devices mainly contain:

- steel
- aluminum
- copper
- synthetic materials
- electronic components and modules

Motors

Motors mainly contain:

- steel
- aluminum
- copper
- brass
- magnetic materials
- electronic components and modules

Recycling

Due to their high content of metal most of the product components can be recycled. In order to recycle the metal in the best possible way it is necessary to disassemble the products into individual modules.

The metals contained in the electric and electronic modules can also be recycled by means of specific separation processes.

The synthetic materials remaining after these processes can be thermally recycled.

10 Appendix

10.1 Accessories

Shielding Plate for Shield Connection of the Motor Cable

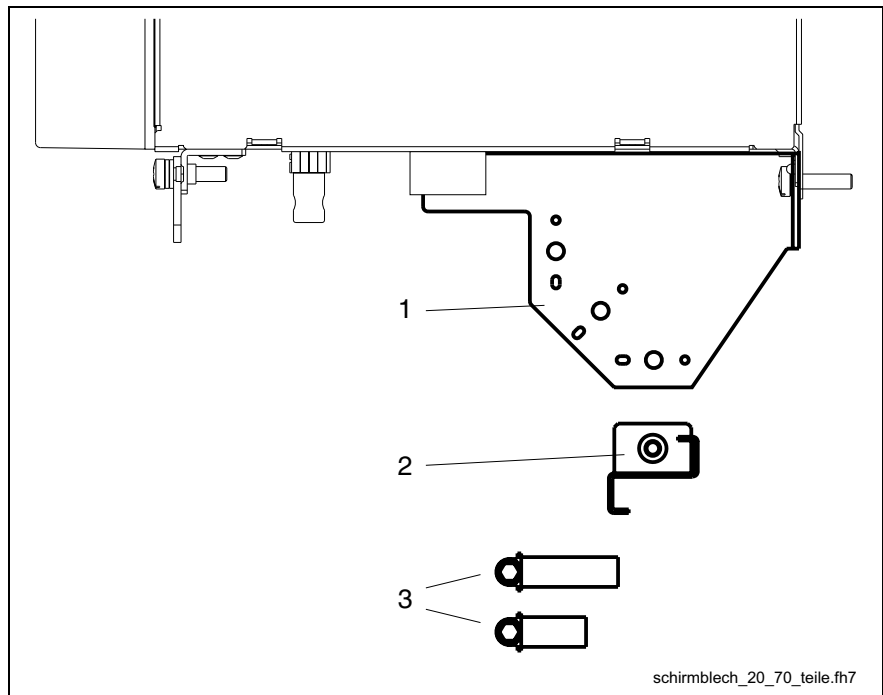
For the shield connection of the motor cable at the drive controller a special shielding plate is available:

- for HMS01.1N-W0020...70 drive controllers:
SUP-M02-HMS01.1 (part no. 294976)
- for HMS01.1N-W0150, -W0210 drive controllers:
SUP-M02-HMS01.1-W0150 (part no. 296375)
- for HMD01.1N-W0020, -W0036 drive controllers:
SUP-M02-HMD01.1 (part no. 296558)

Note:

- Using the shielding plate guarantees optimum shield contact of the motor cable. You should therefore **always** use the shielding plate, where possible.
 - The shielding plate is only available as an option.
 - If you do not use the shielding plate you have to provide good shield contact for the motor power cable by other means (see page 7-21).
-

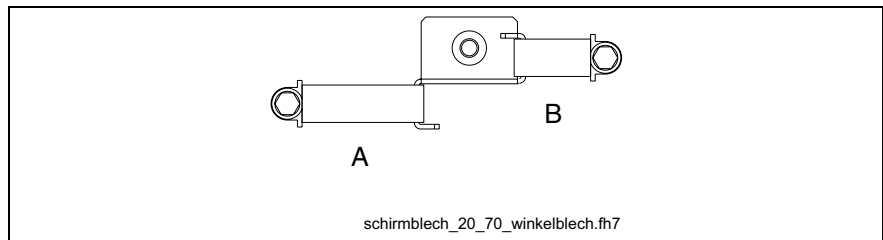
Shielding Plate for HMS01.1N-W0020...70



- 1: Shielding plate
- 2: Angle plate
- 3: Hose clips

Fig. 10-1: Shielding plate with connection accessories

The angle plate has two connections for the shield of the motor cable:



- A: for cable with greater diameter
- B: for cable with smaller diameter

Abb. 10-2: Angle plate for shield connection

How to Mount the Shielding Plate

1. Screw shielding plate to the bottom of the drive controller.

With the screw 1 (see figure) supplied together with the plate, screw the shielding plate to the bottom of the drive controller. The rear part of the shielding plate is fixed with the screw 2 that is used to mount the drive controller in the control cabinet.

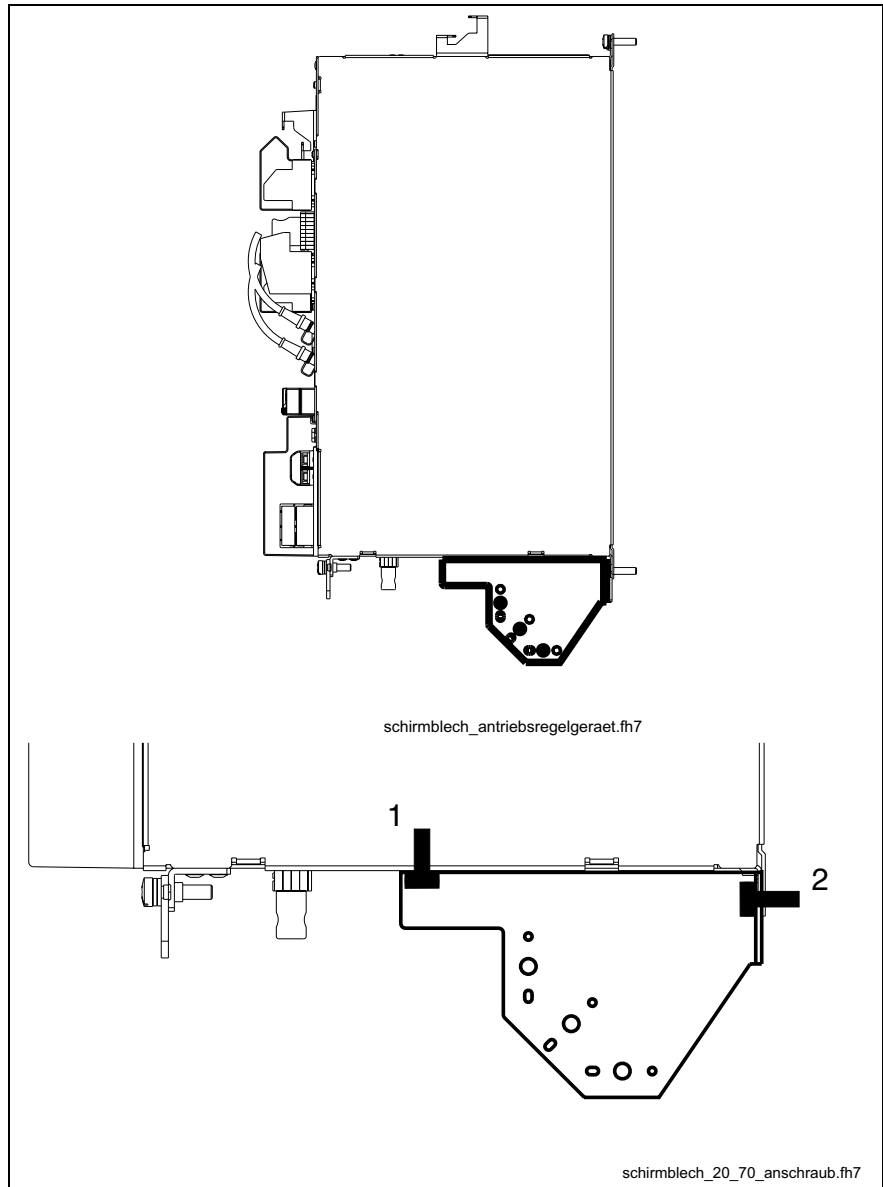


Fig. 10-3: Shielding plate on the bottom of the drive controller

2. Screw angle plate to the shielding plate.

According to the required cable routing, it is possible to mount the angle plate for the shield connection in 3 different positions:

- motor cable run **in parallel with** the bottom of the drive controller:

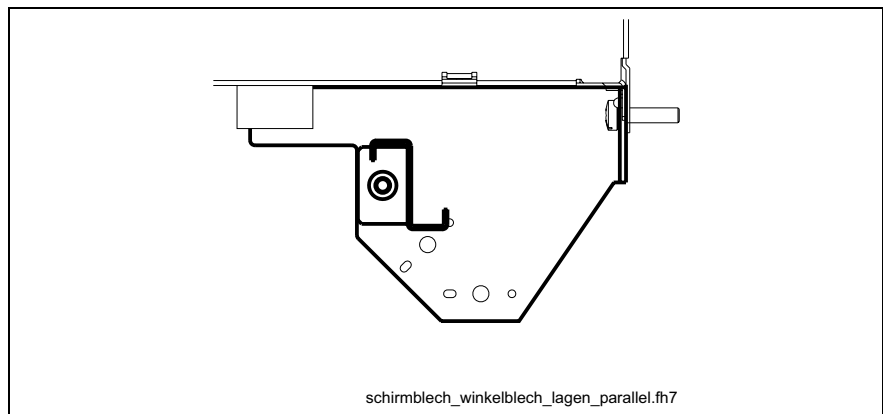


Fig. 10-4: Position of the angle plate for cable routing in parallel with bottom of drive controller

- motor cable run with **45°** to the bottom of the drive controller:

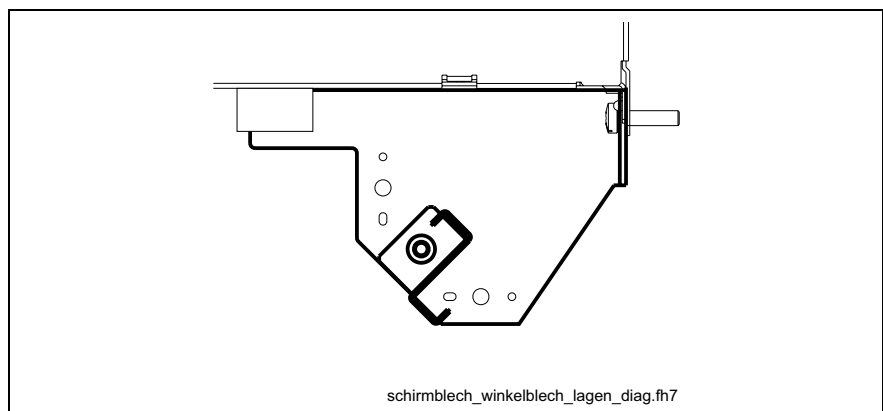


Fig. 10-5: Position of the angle plate for cable routing with 45° to bottom of drive controller

- motor cable run with **90°** to the bottom of the drive controller:

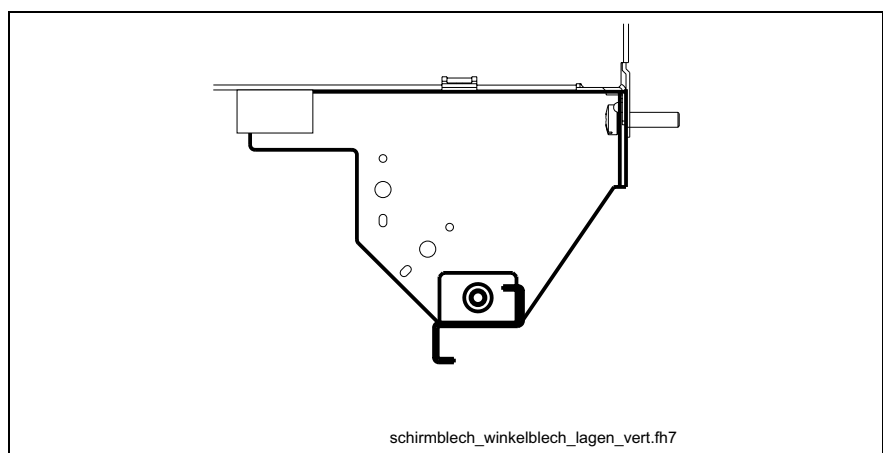


Fig. 10-6: Position of the angle plate for cable routing with 90° to bottom of drive controller

3. **Connect shield of motor cable to the angle plate by means of hose clip.**

Example for cable routing with 45° to bottom of drive controller:

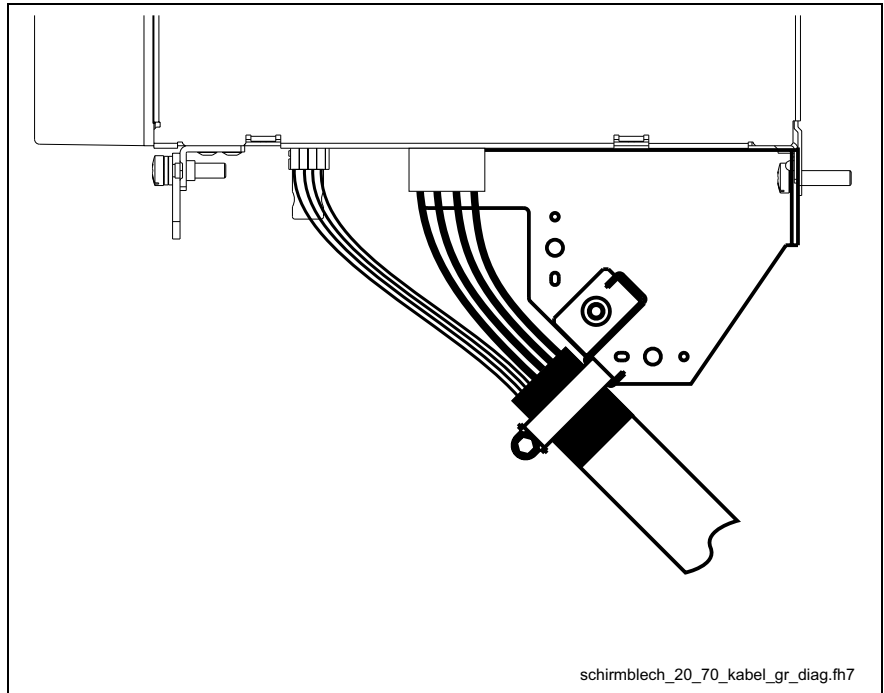


Fig. 10-7: Example for cable routing with 45° to bottom of drive controller

Shielding Plate for HMS01.1N-W0150...0210

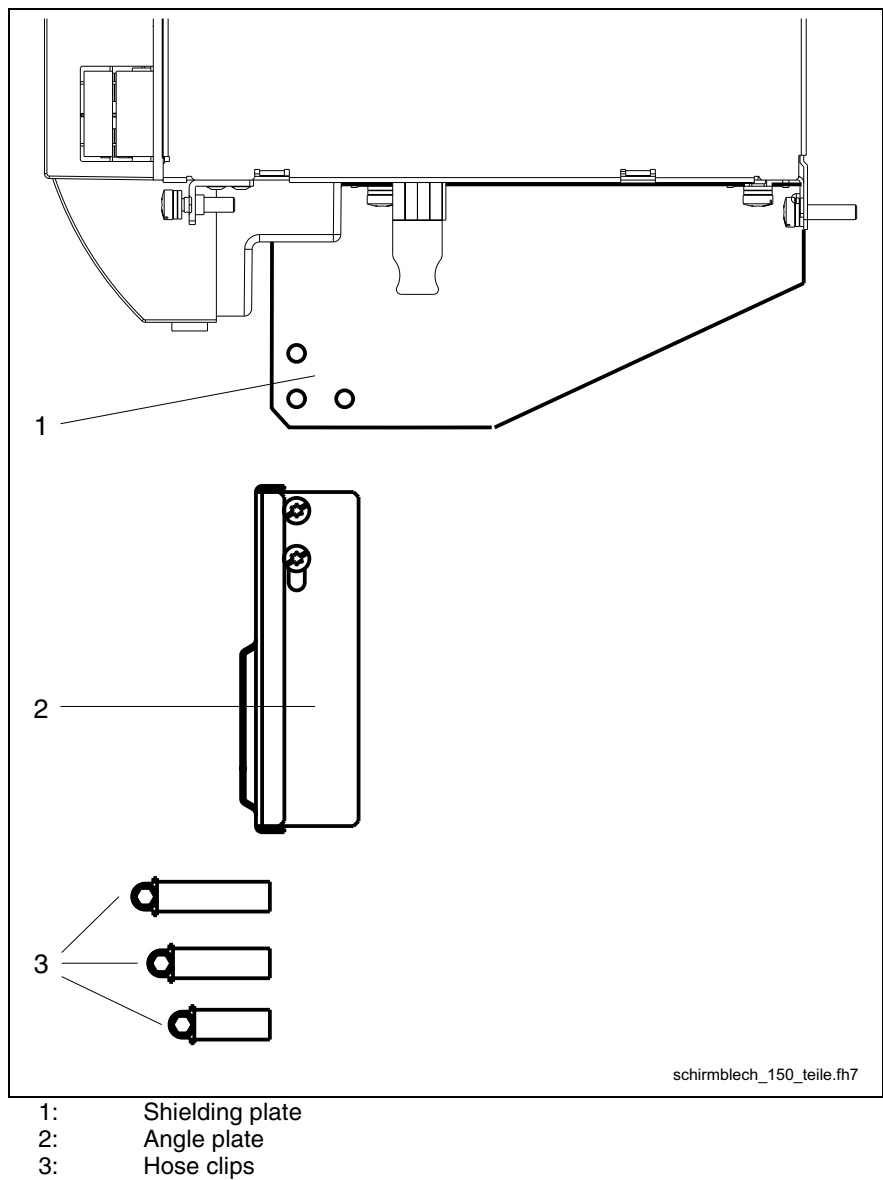


Fig. 10-8: Shielding plate with connection accessories

How to Mount the Shielding Plate

1. Screw shielding plate to the bottom of the drive controller.

With the screw 1 and screw 2 (see figure) supplied together with the plate, screw the shielding plate to the bottom of the drive controller.

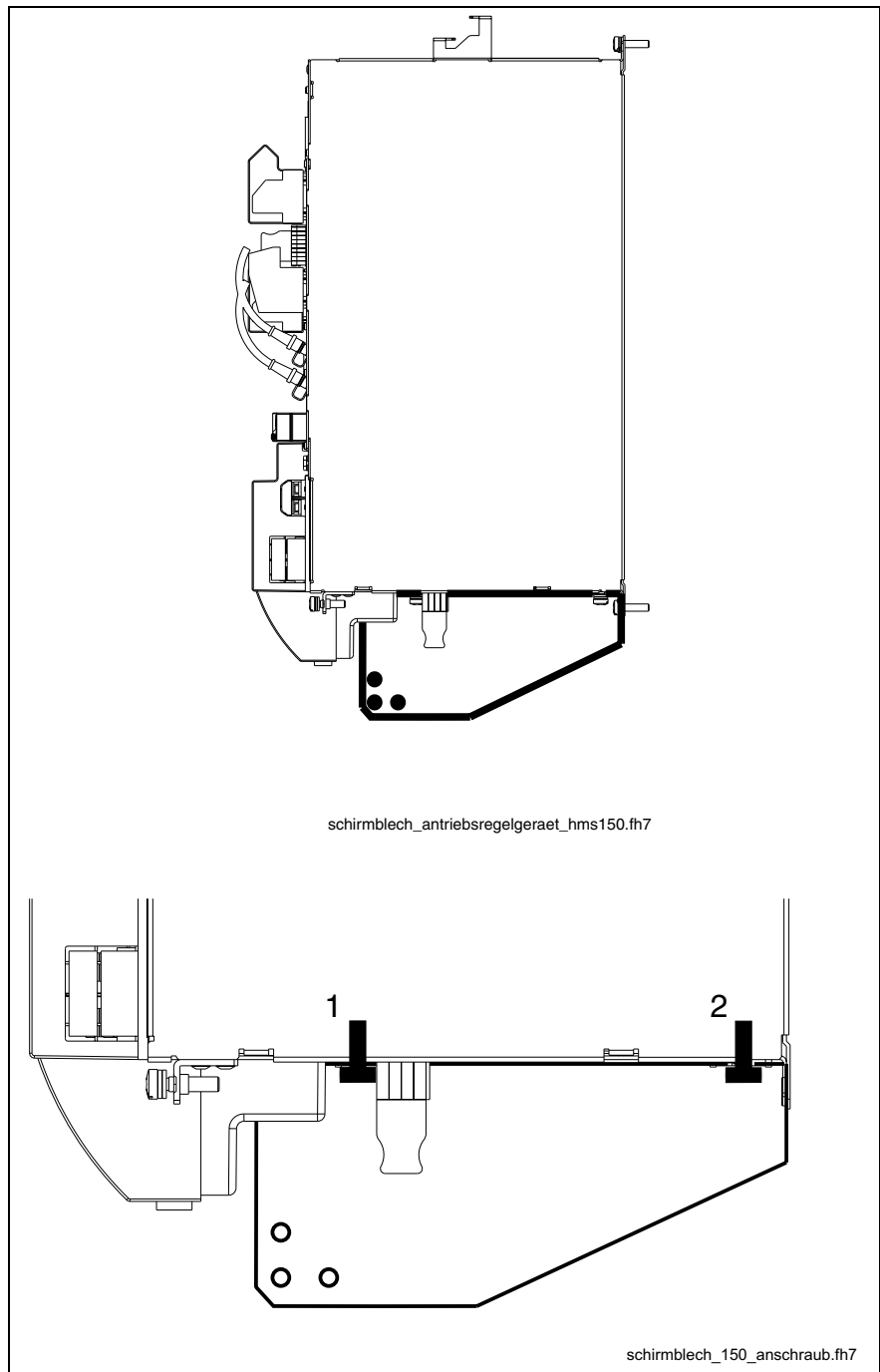


Fig. 10-9: Shielding plate on the bottom of the drive controller

2. Screw angle plate to the shielding plate.

According to the required cable routing, it is possible to mount the angle plate for the shield connection in 3 different positions:

- motor cable run **in parallel with** the bottom of the drive controller:

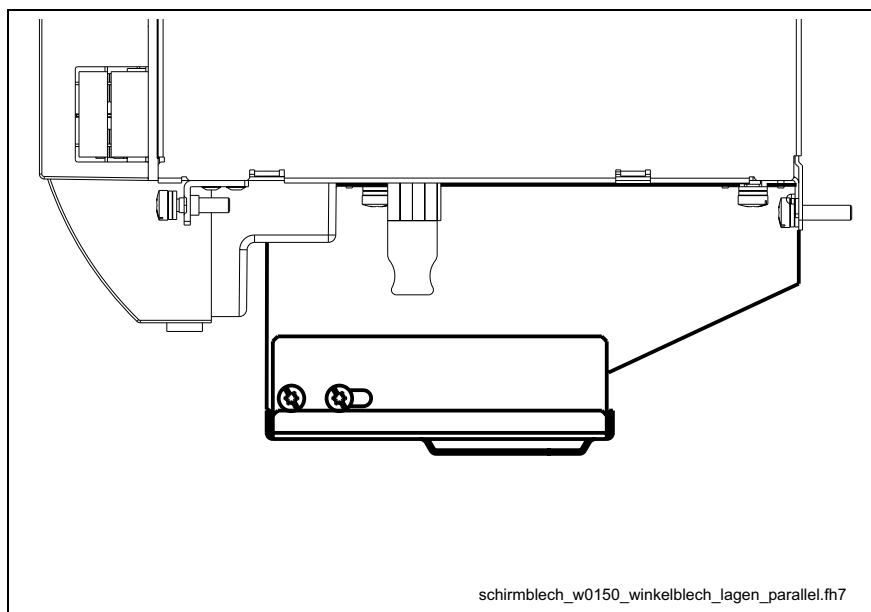


Fig. 10-10: Position of the angle plate for cable routing in parallel with bottom of drive controller

- motor cable run with **45°** to the bottom of the drive controller:

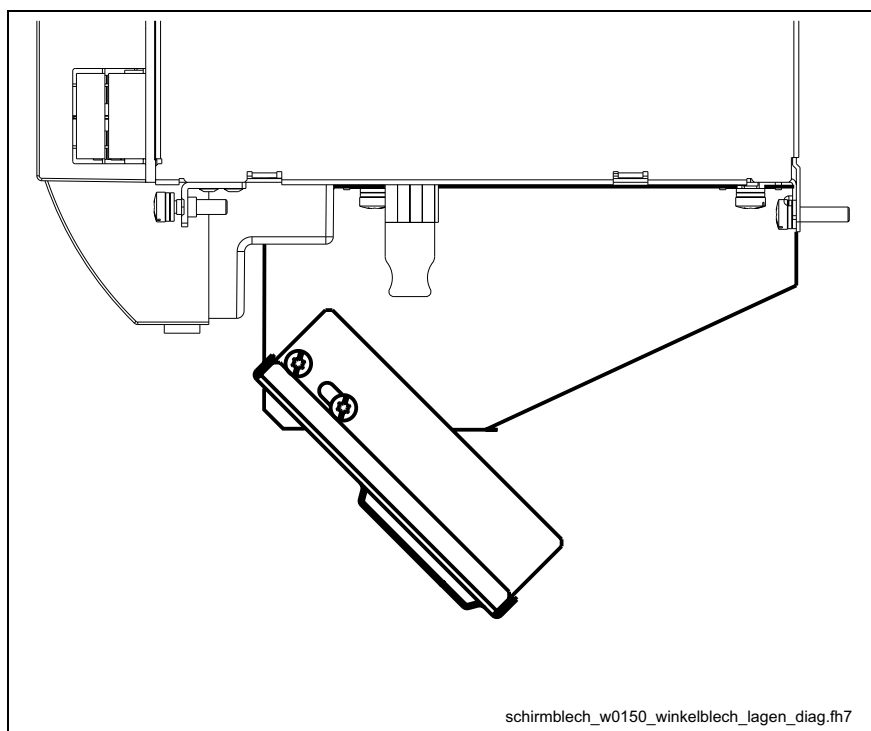


Fig. 10-11: Position of the angle plate for cable routing with 45° to bottom of drive controller

- motor cable run with **90°** to the bottom of the drive controller:

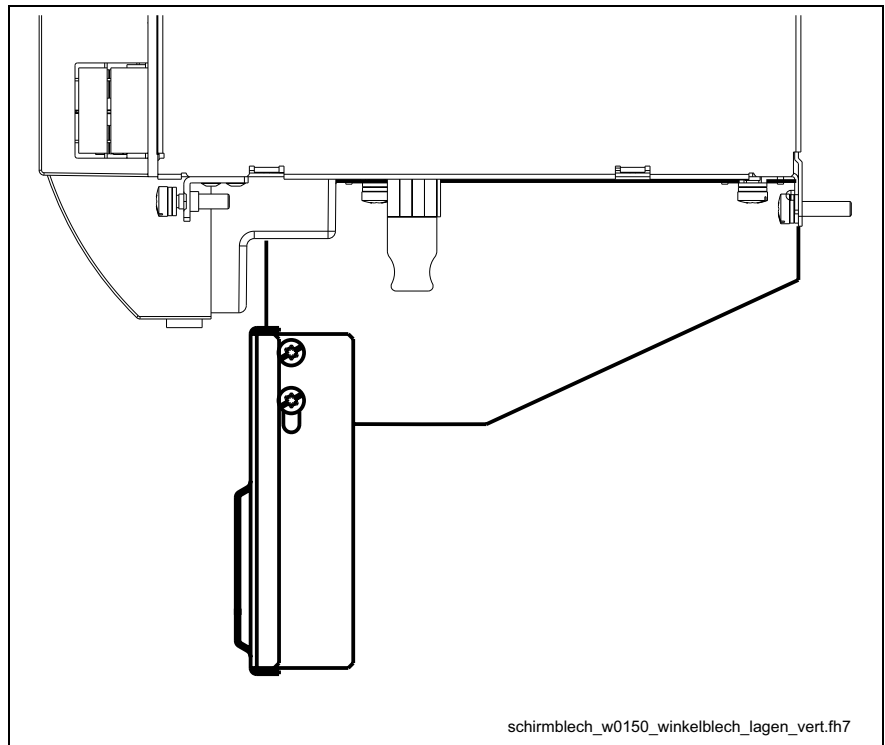


Fig. 10-12: Position of the angle plate for cable routing with 90° to bottom of drive controller

3. **Connect shield of motor cable to the angle plate by means of hose clip.**

- Example for cable routing with 90° to bottom of drive controller:

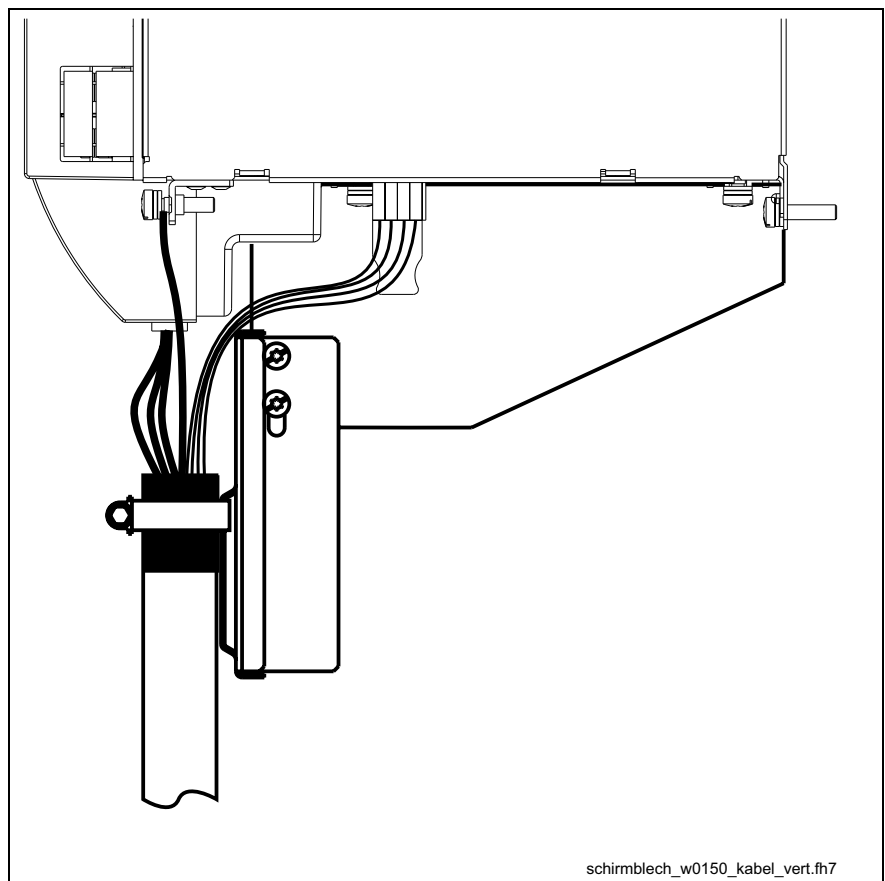


Fig. 10-13: Cable routing with 90° to bottom of drive controller

Shielding Plate for HMD01.1N-W0020 and -W0036

Mounting the shielding plate for double axis drive controllers HMD01.1N-W0020 and HMD01.1N-W0036 corresponds to mounting the shielding plate for single axis drive controllers HMS01.1N-W0020...70 (see page 10-2). The angle plate for the double axis drive controllers has two connections for the shields of two motor cables.

10.2 Connection of Supply Unit by Wires



CAUTION

Risk of voltage arcing!

⇒ If wires are used to connect the supply unit, the connections have to be correctly made.

If the contact rails supplied for connecting the supply unit cannot be used you can use wires, too. The wires used must comply with the specification (see page 7-20).

The connection depends on the cable routing (to the left or to the right of the supply unit).

The following figure shows the correct DC bus connection of the drive controller to the supply unit. The illustrated way of connection keeps bare wire sections from being situated directly vis-à-vis. This avoids voltage arcing.

Supply Unit to the Left of the Drive Controller

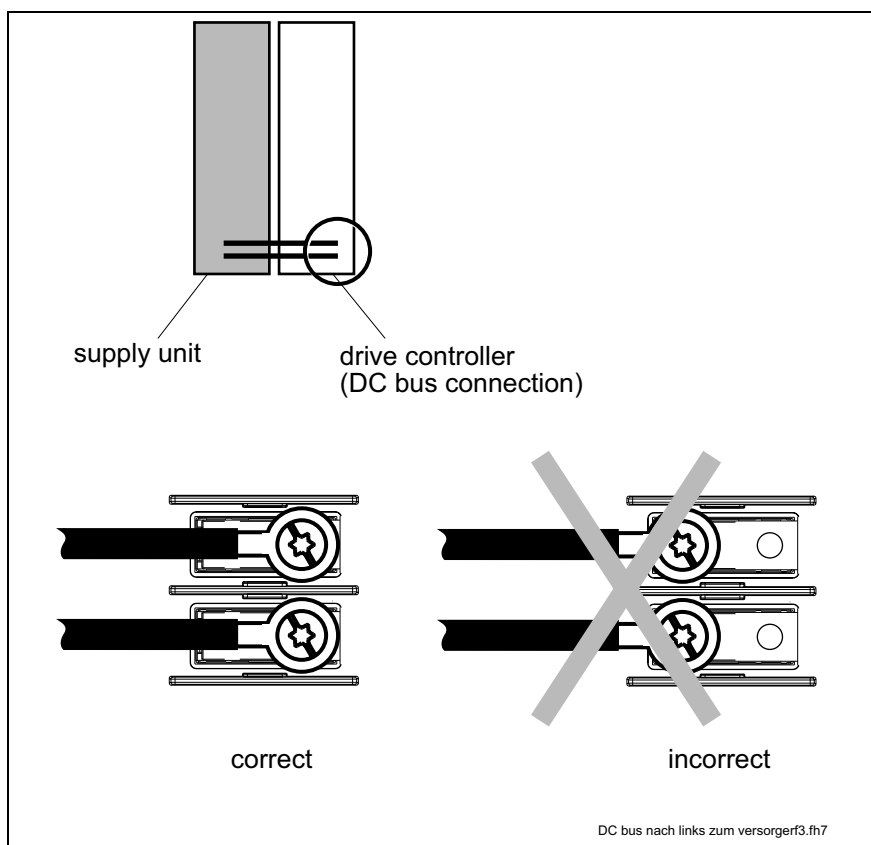


Fig. 10-14: Connection of supply unit by wires to the DC bus connection of the drive controller

Supply Unit to the Right of the Drive Controller

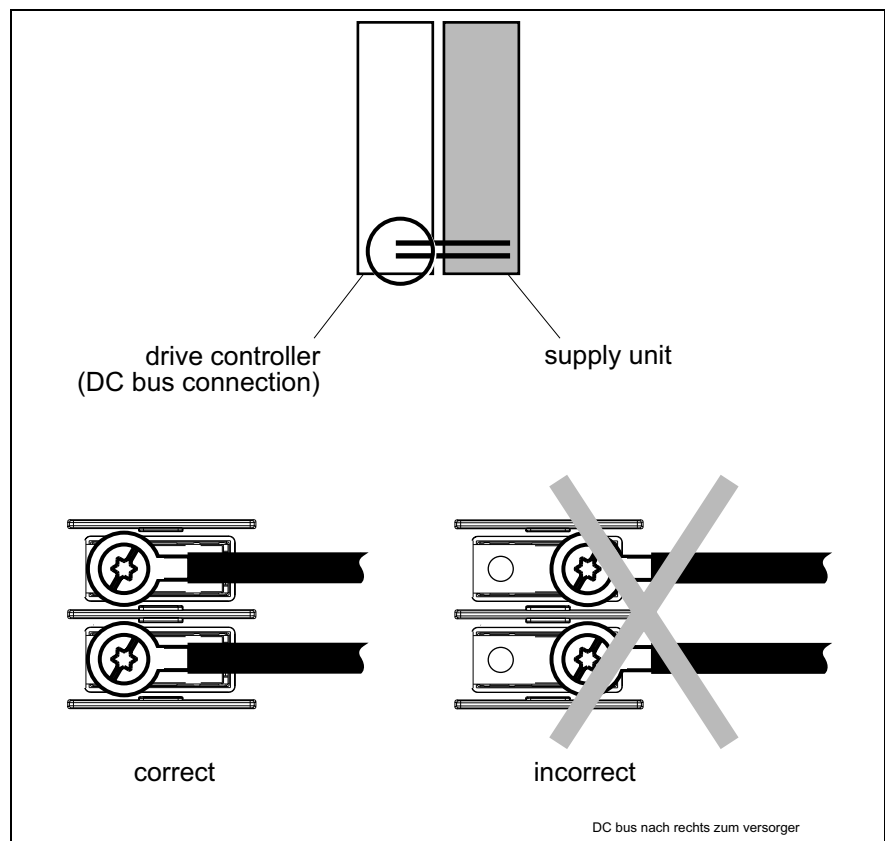


Fig. 10-15: Connection of supply unit by wires to the DC bus connection of the drive controller

10.3 Stacked Drive Controllers



CAUTION

Risk of voltage arcing!

⇒ If drive controllers are stacked in the control cabinet, the connections for the DC buses between the drive controllers have to be correctly made.

The connection depends on the cable routing (clockwise or anticlockwise).

The following figures show the correct DC bus connection for stacked drive controllers. The illustrated way of connection keeps bare wire sections from being situated directly vis-à-vis. This avoids voltage arcing.

Informations concerning the cables: see chapter DC Bus (L+, L-) on page 7-20

Anticlockwise Cable Routing

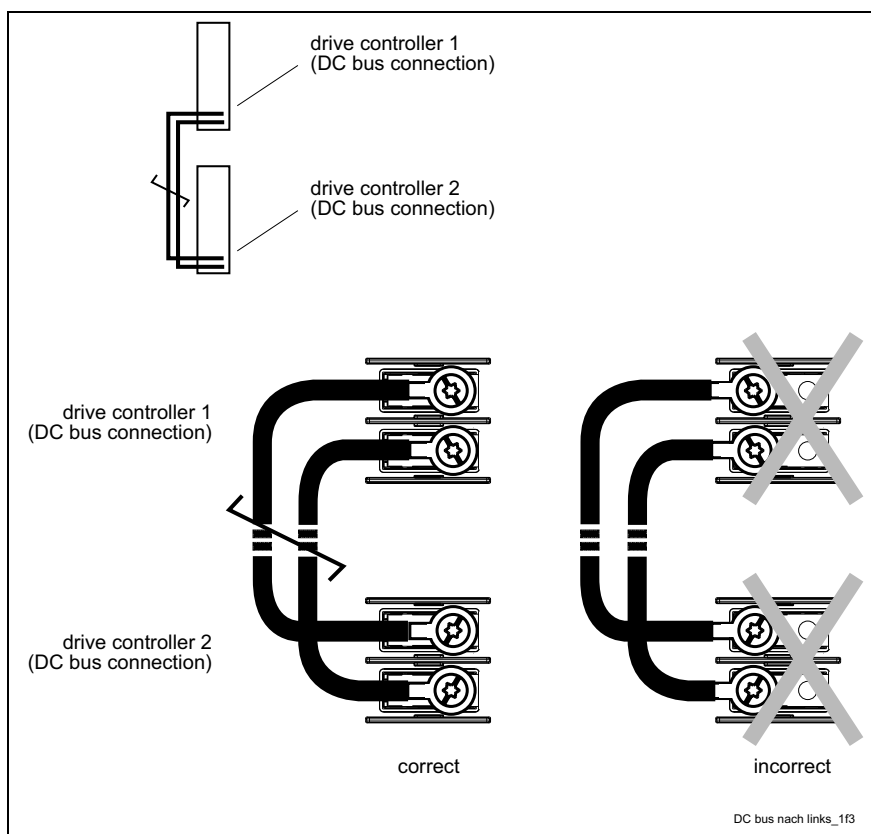


Fig. 10-16: DC bus connection for anticlockwise cable routing

Clockwise Cable Routing

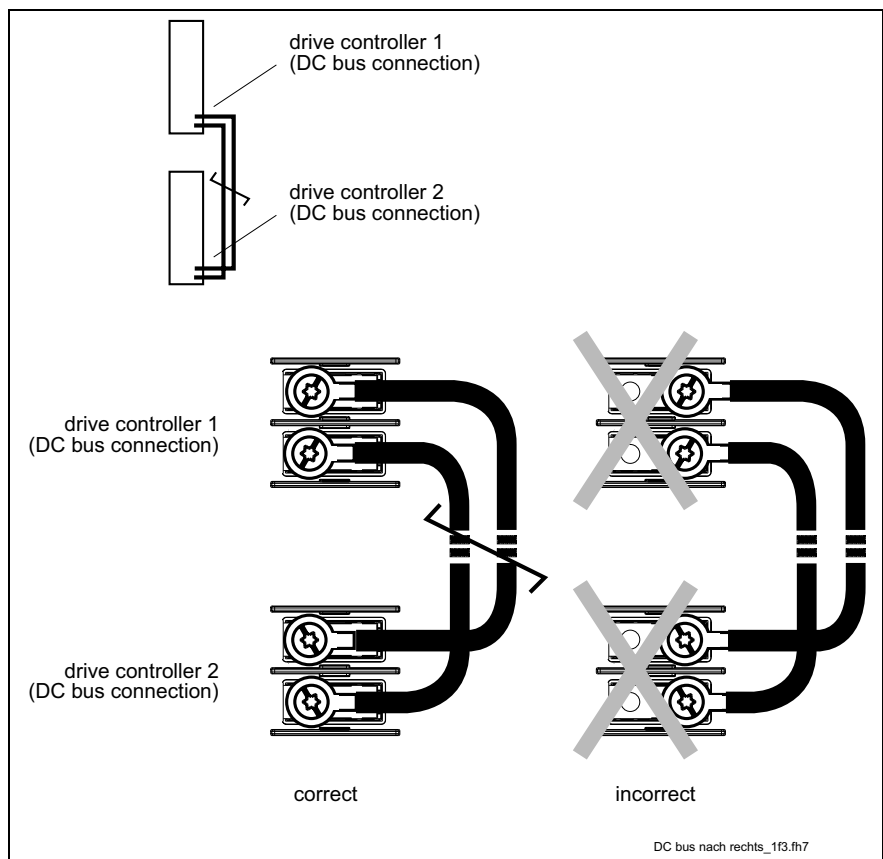


Fig. 10-17: DC bus connection for clockwise cable routing

11 Service & Support

11.1 Helpdesk

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

- telefonisch - by phone:
über Service Call Entry Center
- via Service Call Entry Center

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

49 (0) 9352 40 50 60

Mo-Fr 07:00-18:00

Mo-Fr 7:00 am - 6:00 pm

- per Fax - by fax:

+49 (0) 9352 40 49 41

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

11.2 Service-Hotline

Außerhalb der Helpdesk-Zeiten ist der Service direkt ansprechbar unter

After helpdesk hours, contact our service department directly at

+49 (0) 171 333 88 26

oder - or

+49 (0) 172 660 04 06

11.3 Internet

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



Verkaufsniederlassungen



Niederlassungen mit Kundendienst

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

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

At www.boschrexroth.com you may find additional notes about service, repairs and training in the Internet, as well as the **actual** addresses *) of our sales- and service facilities figuring on the following pages.



sales agencies



offices providing service

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

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

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

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

1. detaillierte Beschreibung der Störung und der Umstände.
2. Angaben auf dem Typenschild der betreffenden Produkte, insbesondere Typenschlüssel und Seriennummern.
3. Tel./Faxnummern und e-Mail-Adresse, unter denen Sie für Rückfragen zu erreichen sind.

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

1. Detailed description of the failure and circumstances.
2. Information on the type plate of the affected products, especially type codes and serial numbers.
3. Your phone/fax numbers and e-mail address, so we can contact you in case of questions.

11.5 Kundenbetreuungsstellen - Sales & Service Facilities

Deutschland – Germany

vom Ausland:

(0) nach Landeskennziffer weglassen!

from abroad:

don't dial (0) after country code!

Vertriebsgebiet Mitte Germany Centre	SERVICE	SERVICE	SERVICE
Rexroth Indramat GmbH Bgm.-Dr.-Nebel-Str. 2 / Postf. 1357 97816 Lohr am Main / 97803 Lohr Kompetenz-Zentrum Europa Tel.: +49 (0)9352 40-0 Fax: +49 (0)9352 40-4885	CALL ENTRY CENTER MO – FR von 07:00 - 18:00 Uhr from 7 am – 6 pm Tel. +49 (0) 9352 40 50 60 service.svc@boschrexroth.de	HOTLINE MO – FR von 17:00 - 07:00 Uhr from 5 pm - 7 am + SA / SO Tel.: +49 (0)172 660 04 06 oder / or Tel.: +49 (0)171 333 88 26	ERSATZTEILE / SPARES verlängerte Ansprechzeit - extended office time - ♦ nur an Werktagen - only on working days - ♦ von 07:00 - 18:00 Uhr - from 7 am - 6 pm - Tel. +49 (0) 9352 40 42 22
Vertriebsgebiet Süd Germany South	Vertriebsgebiet West Germany West	Gebiet Südwest Germany South-West	
Bosch Rexroth AG Landshuter Allee 8-10 80637 München Tel.: +49 (0)89 127 14-0 Fax: +49 (0)89 127 14-490	Bosch Rexroth AG Regionalzentrum West Borsigstrasse 15 40880 Ratingen Tel.: +49 (0)2102 409-0 Fax: +49 (0)2102 409-406 +49 (0)2102 409-430	Bosch Rexroth AG Service-Regionalzentrum Süd-West Siemensstr.1 70736 Fellbach Tel.: +49 (0)711 51046-0 Fax: +49 (0)711 51046-248	
Vertriebsgebiet Nord Germany North	Vertriebsgebiet Mitte Germany Centre	Vertriebsgebiet Ost Germany East	Vertriebsgebiet Ost Germany East
Bosch Rexroth AG Walsroder Str. 93 30853 Langenhagen Tel.: +49 (0) 511 72 66 57-0 Service: +49 (0) 511 72 66 57-256 Fax: +49 (0) 511 72 66 57-93 Service: +49 (0) 511 72 66 57-783	Bosch Rexroth AG Regionalzentrum Mitte Waldecker Straße 13 64546 Mörfelden-Walldorf Tel.: +49 (0) 61 05 702-3 Fax: +49 (0) 61 05 702-444	Bosch Rexroth AG Beckerstraße 31 09120 Chemnitz Tel.: +49 (0)371 35 55-0 Fax: +49 (0)371 35 55-333	Bosch Rexroth AG Regionalzentrum Ost Walter-Köhn-Str. 4d 04356 Leipzig Tel.: +49 (0)341 25 61-0 Fax: +49 (0)341 25 61-111

Europa (West) - Europe (West)

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

Italien: 0 nach Landeskennziffer mitwählen
Italy: dial 0 after country code

Austria - Österreich Bosch Rexroth GmbH Electric Drives & Controls Stachegasse 13 1120 Wien Tel.: +43 (0)1 985 25 40 Fax: +43 (0)1 985 25 40-93	Austria - Österreich Bosch Rexroth GmbH Electric Drives & Controls Industriepark 18 4061 Pasching Tel.: +43 (0)7221 605-0 Fax: +43 (0)7221 605-21	Belgium - Belgien Bosch Rexroth AG Electric Drives & Controls Industrielaan 8 1740 Ternat Tel.: +32 (0)2 5830719 - service: +32 (0)2 5830717 Fax: +32 (0)2 5830731 service@boschrexroth.be	Denmark - Dänemark BEC A/S Zinkvej 6 8900 Randers Tel.: +45 (0)87 11 90 60 Fax: +45 (0)87 11 90 61
Great Britain - Großbritannien Bosch Rexroth Ltd. Electric Drives & Controls Broadway Lane, South Cerney Cirencester, Glos GL7 5UH Tel.: +44 (0)1285 863000 Fax: +44 (0)1285 863030 sales@boschrexroth.co.uk service@boschrexroth.co.uk	Finland - Finnland Bosch Rexroth Oy Electric Drives & Controls Ansatie 6 017 40 Vantaa Tel.: +358 (0)9 84 91-11 Fax: +358 (0)9 84 91-13 60	France - Frankreich Bosch Rexroth SAS Electric Drives & Controls Avenue de la Trentaine (BP. 74) 77503 Chelles Cedex Tel.: +33 (0)164 72-70 00 Fax: +33 (0)164 72-63 00 Hotline: +33 (0)608 33 43 28	France - Frankreich Bosch Rexroth SAS Electric Drives & Controls ZI de Thibaud, 20 bd. Thibaud (BP. 1751) 31084 Toulouse Tel.: +33 (0)5 61 43 61 87 Fax: +33 (0)5 61 43 94 12
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