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IndraDrive

Drive Controllers
Power Sections HCS03

Instruction Manual
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Edition 09

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Power Sections HCS03

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Purpose of Documentation

This documentation provides information on the installation and operation of the described products, by persons trained and qualified to work with electrical installations.

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Bosch Rexroth AG

Bgm.-Dr.-Nebel-Str. 2 ■ 97816 Lohr a. Main, Germany

Phone +49 9352 18 0 ■ Fax +49 9352 18 8400

http://www.boschrexroth.com/

DC-AE/EPI2 (CR)

Table of Contents

1 Important notes

1.1 Safety instructions

1.1.1 General information

- Do not attempt to install and operate the components of the electric drive and control system without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with these components. If you do not have the user documentation for the components, contact our Rexroth sales representative. Ask for these documents to be sent immediately to the person or persons responsible for the safe operation of the components.
- If the supplied documents contain some information you do not understand, it is absolutely necessary that you ask Rexroth for explanation before you start working at or with the components.
- If the component is resold, rented and/or passed on to others in any other form, these safety instructions must be delivered with the component in the official language of the user's country.
- Only qualified persons may work with components of the electric drive and control system or within its proximity.

  In terms of this Instruction Manual, qualified persons are those persons who are familiar with the installation, mounting, commissioning and operation of the components of the electric drive and control system, as well as with the hazards this implies, and who possess the qualifications their work requires. To comply with these qualifications, it is necessary, among other things,

  – to be trained, instructed or authorized to switch electric circuits and components safely on and off, to ground them and to mark them,
  – to be trained or instructed to maintain and use adequate safety equipment,
  – to attend a course of instruction in first aid.
- The technical data, connection and installation conditions of the components are specified in the respective application documentations and must be followed at all times.
- If the components take 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 components or alter source codes.
- Do not mount damaged or faulty components or use them in operation.
- Only use accessories and spare parts approved by Rexroth.
- Follow the safety regulations and requirements of the country in which the electric components of the electric drive and control system are operated.
- Proper and correct transport, storage, mounting and installation, as well as care in operation and maintenance, are prerequisites for optimal and safe operation of the component.

Improper use of these components, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, could result in property damage, injury, electric shock or even death.

1.1.2 Protection against contact with electrical parts and housings

☞ This section concerns components of the electric drive and control system with voltages of **more than 50 volts**.

Contact with parts conducting voltages above 50 volts can cause personal danger and electric shock. When operating components of the electric drive and control system, it is unavoidable that some parts of these components conduct dangerous voltage.

High electrical voltage! Danger to life, risk of injury by electric shock or serious injury!

- Only qualified persons are allowed to operate, maintain and/or repair the components of the electric drive and control system.
- Follow the general installation and safety regulations when working on power installations.
- Before switching on, the equipment grounding conductor must have been permanently connected to all electric components in accordance with the connection diagram.
- Even for brief measurements or tests, operation is only allowed if the equipment grounding conductor has been permanently connected to the points of the components provided for this purpose.
- Before accessing electrical parts with voltage potentials higher than 50 V, you must disconnect electric components from the mains or from the power supply unit. Secure the electric component from reconnection.
- With electric components, observe the following aspects:

  Always wait **30 minutes** after switching off power to allow live capacitors to discharge before accessing an electric component. Measure the electrical voltage of live parts before beginning to work to make sure that the equipment is safe to touch.
- Install the covers and guards provided for this purpose before switching on.
- Never touch any electrical connection points of the components while power is turned on.
- Do not remove or plug in connectors when the component has been powered.
- Under specific conditions, electric drive systems can be operated at mains protected by residual-current-operated circuit-breakers sensitive to universal current (RCDs/RCMs).
- Secure built-in devices from penetrating foreign objects and water, as well as from direct contact, by providing an external housing, for example a control cabinet.

High housing voltage and high leakage current! Danger to life, risk of injury by electric shock!

- Before switching on and before commissioning, ground or connect the components of the electric drive and control system to the equipment grounding conductor at the grounding points.

- Connect the equipment grounding conductor of the components of the electric drive and control system permanently to the main power supply at all times. The leakage current is greater than 3.5 mA.
- Establish an equipment grounding connection with a minimum cross section according to the table below. With an outer conductor cross section smaller than 10 mm^2 (8 AWG), the alternative connection of two equipment grounding conductors is allowed, each having the same cross section as the outer conductors.

Cross section outer conductor	Minimum cross section equipment grounding conductor Leakage current ≥ 3.5 mA	
	1 equipment grounding conductor	2 equipment grounding conductors
1.5 mm^2 (16 AWG)	10 mm^2 (8 AWG)	2 × 1.5 mm^2 (16 AWG)
2.5 mm^2 (14 AWG)		2 × 2.5 mm^2 (14 AWG)
4 mm^2 (12 AWG)		2 × 4 mm^2 (12 AWG)
6 mm^2 (10 AWG)		2 × 6 mm^2 (10 AWG)
10 mm^2 (8 AWG)		-
16 mm^2 (6 AWG)	16 mm^2 (6 AWG)	-
25 mm^2 (4 AWG)		-
35 mm^2 (2 AWG)		-
50 mm^2 (1/0 AWG)	25 mm^2 (4 AWG)	-
70 mm^2 (2/0 AWG)	35 mm^2 (2 AWG)	-
...	...	...

Tab. 1-1: Minimum cross section of the equipment grounding connection

1.1.3 Battery safety

Batteries consist of active chemicals in a solid housing. Therefore, improper handling can cause injury or property damage.

Risk of injury by improper handling!

- Do not attempt to reactivate low batteries by heating or other methods (risk of explosion and cauterization).
- Do not attempt to recharge the batteries as this may cause leakage or explosion.
- Do not throw batteries into open flames.
- Do not dismantle batteries.
- When replacing the battery/batteries, do not damage the electrical parts installed in the devices.
- Only use the battery types specified for the product.

☞ Environmental protection and disposal! The batteries contained in the product are considered dangerous goods during land, air, and sea transport (risk of explosion) in the sense of the legal regulations. Dispose of used batteries separately from other waste. Observe the national regulations of your country.

1.2 Intended use

This product may only be used for the mentioned applications under the specified application, ambient and operating conditions.

This product is exclusively intended for use in machines and systems in an industrial environment. This is to be understood as applications according to IEC 60204-1 "Safety of machinery, Electric equipment of machines" and NFPA 79 "Electrical Standard for Industrial Machinery".

☞ Components of the Rexroth IndraDrive system are **products of Category C3** (with restricted distribution) in accordance with IEC 61800-3. This Category comprises EMC limit values for line-based and radiated noise emission. Compliance with this Category (limit values) requires the appropriate measures of interference suppression to be used in the drive system (e.g., mains filters, shielding measures).

These components are not provided for use in a public low-voltage mains supplying residential areas. If these components are used in such a mains, high-frequency interference is to be expected. This can require additional measures of interference suppression.

2 Ratings and dimensions

2.1 HCS03

UL ratings and dimensions

Description	Symbol	Unit	HCS03.1E-W0070-_-05	HCS03.1E-W0100-_-05	HCS03.1E-W0150-_-05	HCS03.1E-W0210-_-05	HCS03.1E-W0280-_-05	HCS03.1E-W0350-_-05
Listing in accordance with UL standard			UL 508C					
Listing in accordance with CSA standard			C22.2 No. 274-13					
UL files			E134201					
Pollution degree			2					
Ambient temperature range with nominal data	T_{amax}	°C	40					
Ambient temperature range with reduced nominal data	T_{amax_red}	°C	55					
Mass	m	kg	13.00	20.00		32.50	36.50	
Device height[1)]	H	mm	490					
Device depth[2)]	T	mm	262					
Device width[3)]	B	mm	125	225		350		
Minimum distance on the top of the device[4)]	d_{top}	mm	80					
Minimum distance on the bottom of the device[5)]	d_{bot}	mm	100					
Horizontal spacing at the device[6)]	d_{hor}	mm	0					
Rated control voltage input[7)]	U_{N3}	V	24 ±20 %					
Rated power consumption control voltage input at U_{N3}[8)]	P_{N3}	W	22	25		30		
Short circuit current rating	SCCR	A rms	42000					
Rated input voltage, power[9)]	U_{LN_nom}	V	3 x AC 400...500					
Tolerance rated input voltage U_{LN}		%	+10 -15					
Mains frequency	f_{LN}	Hz	50...60					
Tolerance input frequency		Hz	±2					
Rated input current	I_{LN}	A	50.0	80.0	106.0	146.0	167.0	201.0
Branch circuit protection fuse[10)]			70	100	125	175	250	300
								Latest amendment: 2017-01-23

Description	Symbol	Unit	HCS03.1E-W0070-_-05	HCS03.1E-W0100-_-05	HCS03.1E-W0150-_-05	HCS03.1E-W0210-_-05	HCS03.1E-W0280-_-05	HCS03.1E-W0350-_-05
Required wire size in accordance with NFPA 79 and UL 508 A (internal wiring);[11)]	A_{LN}	AWG	8 AWG	4 AWG	2 AWG	1/0 AWG	2/0 AWG	3/0 AWG
Field wiring material (material; conductor temperature; class)			Cu; 60/75 °C; 1					
Output voltage	U_{out}	V	3 x AC 0...480					
Output current	I_{out}	A	45.0	73.0	95.0	145.0	165.0	200.0
Output frequency range[12)]	f_{out}	Hz	0...1600				0…800	
Power dissipation at continuous current and continuous DC bus power respectively[13)]	P_{Diss_cont}	W	800.00	950.00	1150.00	2000.00	1900.00	2300.00
								Latest amendment: 2017-01-23

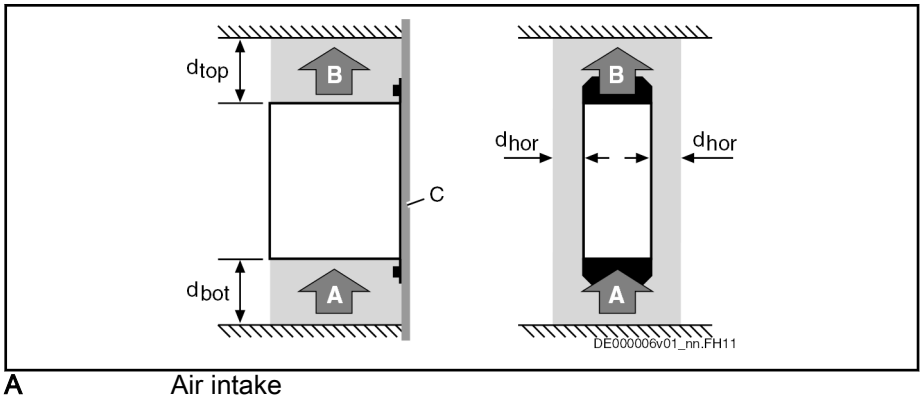
1) 2) 3) Housing dimension; see also related dimensional drawing
4) 5) 6) See fig. "Air intake and air outlet at device"
7) Observe supply voltage for motor holding brake
8) See information on "Rated power consumption control voltage input at U_{N3}"
9) Mains input L1, L2, L3 (for HMV and HCS only); For use on a solidly grounded wye source only.
10) Use listed AC input line fuses (class J; 600 V AC). Suitable for use on a circuit capable of delivering not more than 42000 A_{eff} symmetrical amperes, 500 Volts maximum (HMV, HCS02, HCS04.2 480 Volts maximum). If using inverse-time circuit breakers or type E combination motor controllers instead of recommended fuses, see UL 508C section 45.8.2.
11) Copper wire; PVC-insulation (conductor temperature 90 °C; $T_a \leq 40$ °C) in accordance with NFPA 79 chapter 12 and UL 508A chapter 28
12) Depending on switching frequency which was set in parameter P-0-0001
13) Plus dissipation of braking resistor and control section

Tab. 2-1: HCS - UL ratings and dimensions

Rated power consumption control voltage input at U_{N3}

Plus motor holding brake and control section, plus safety option

Distances



A	Air intake
B	Air outlet
C	Mounting surface in control cabinet
d_{top}	Distance top
d_{bot}	Distance bottom
d_{hor}	Distance horizontal

Fig. 2-1: Air intake and air outlet at device

Dimensional drawing HCS03.1E-W0070

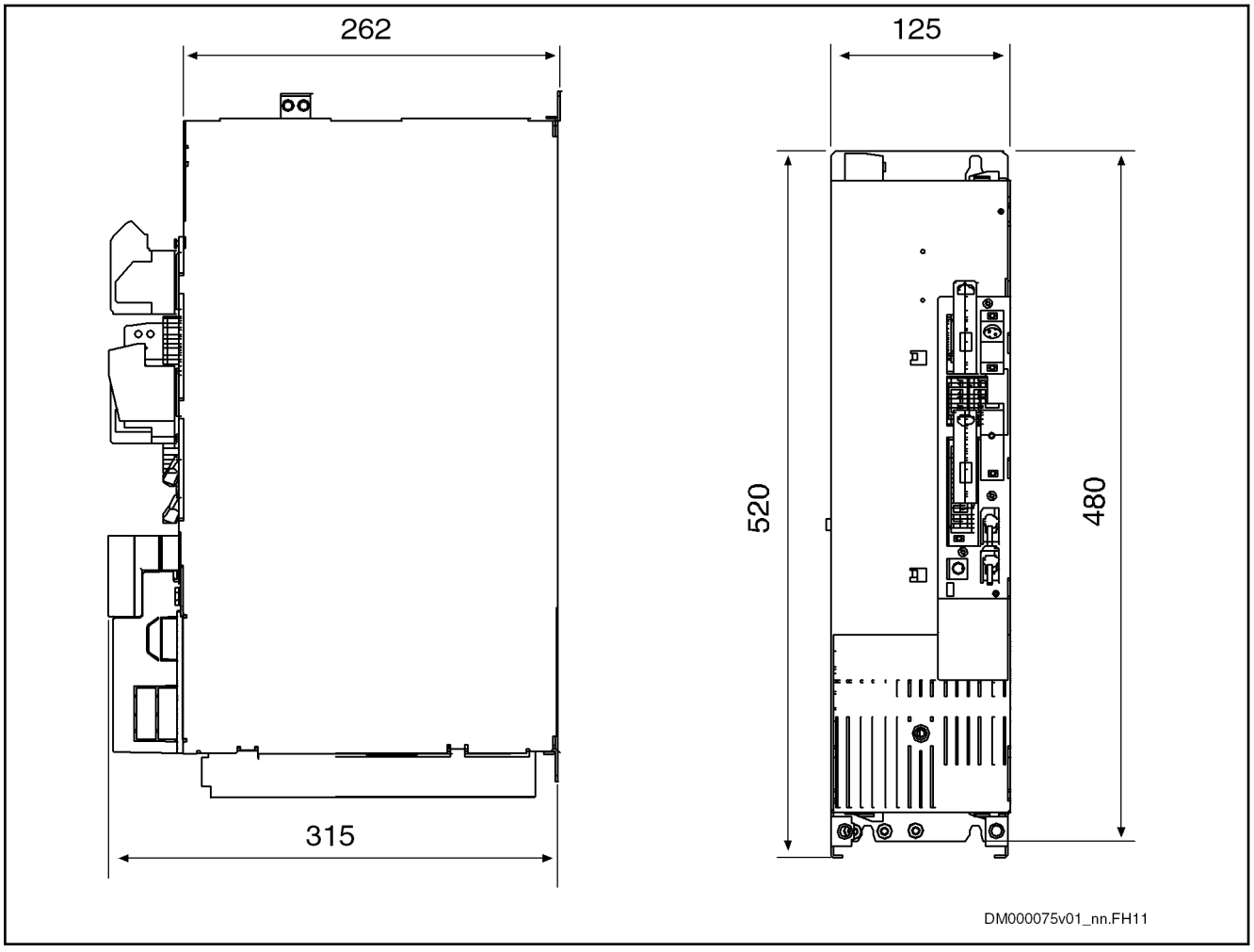


Fig. 2-2: Dimensional drawing HCS03.1E-W0070

Dimensional drawing HCS03.1E-W0070 with HAS02

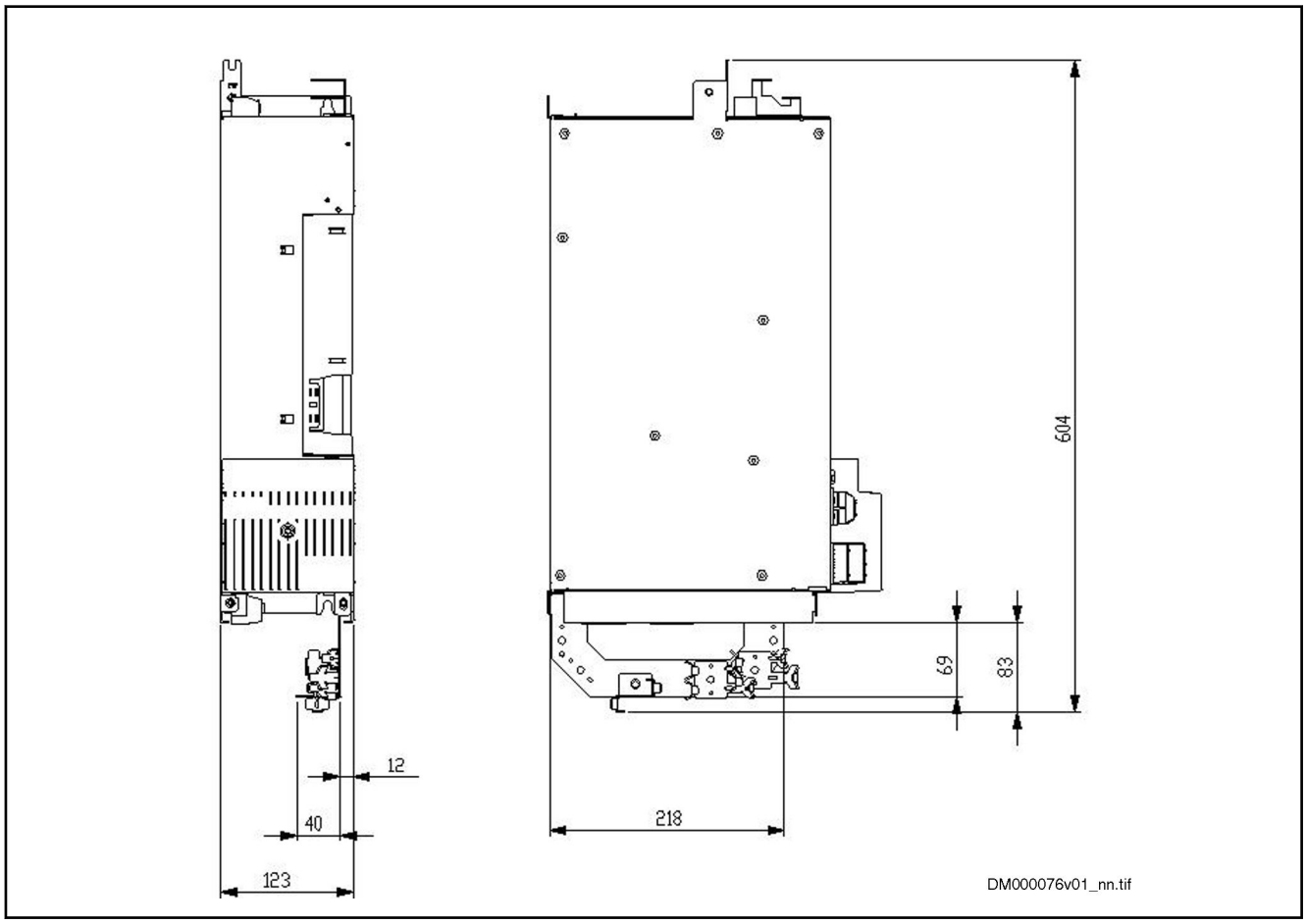


Fig. 2-3: Dimensional drawing HCS03.1E-W0070 with HAS02

Dimensional drawing HCS03.1E-W0100 and HCS03.1E-W150

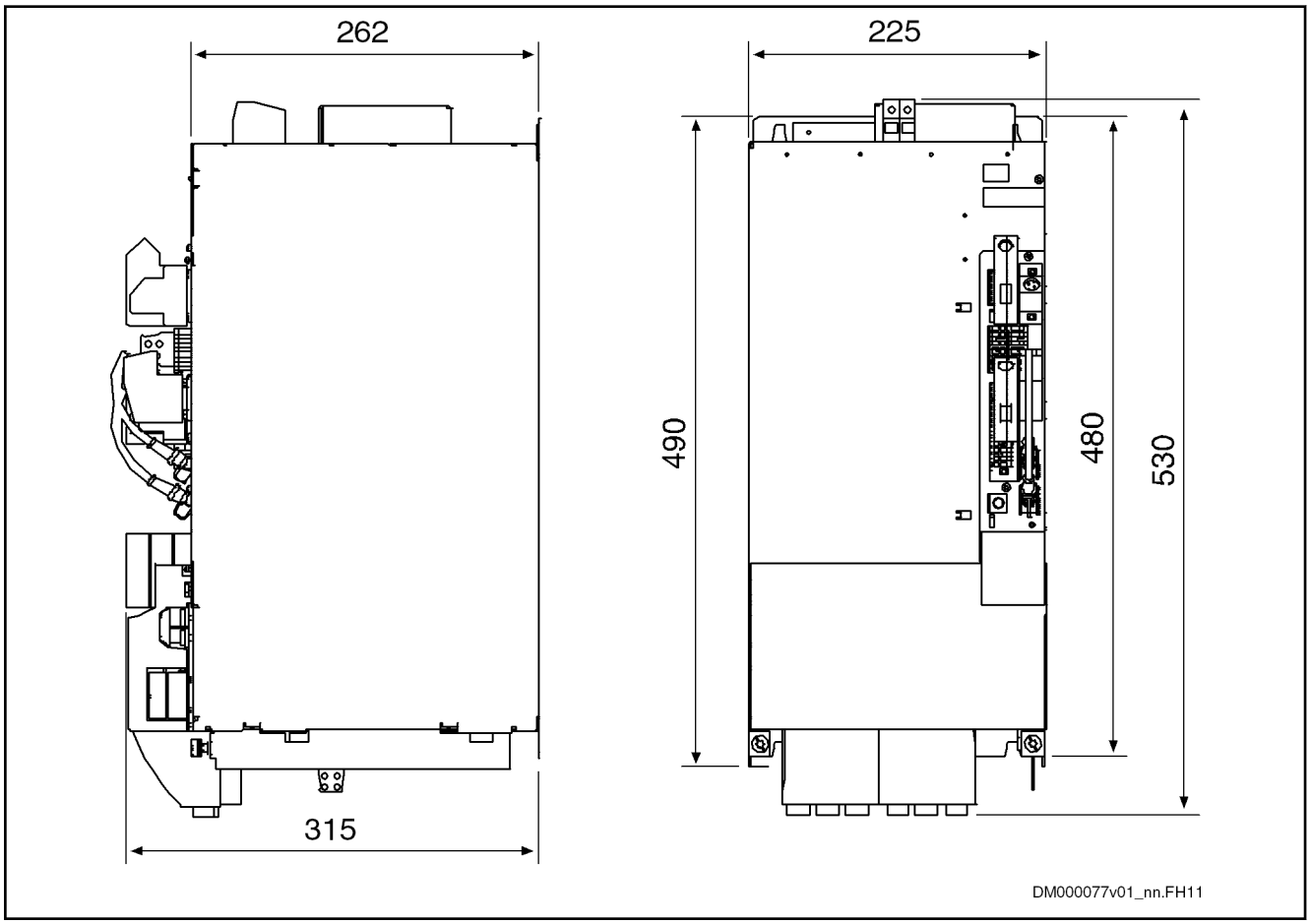


Fig. 2-4: Dimensional drawing HCS03.1E-W0100 and HCS03.1E-W150

Dimensional drawing HCS03.1E-W0100 and HCS03.1E-W150 with HAS02

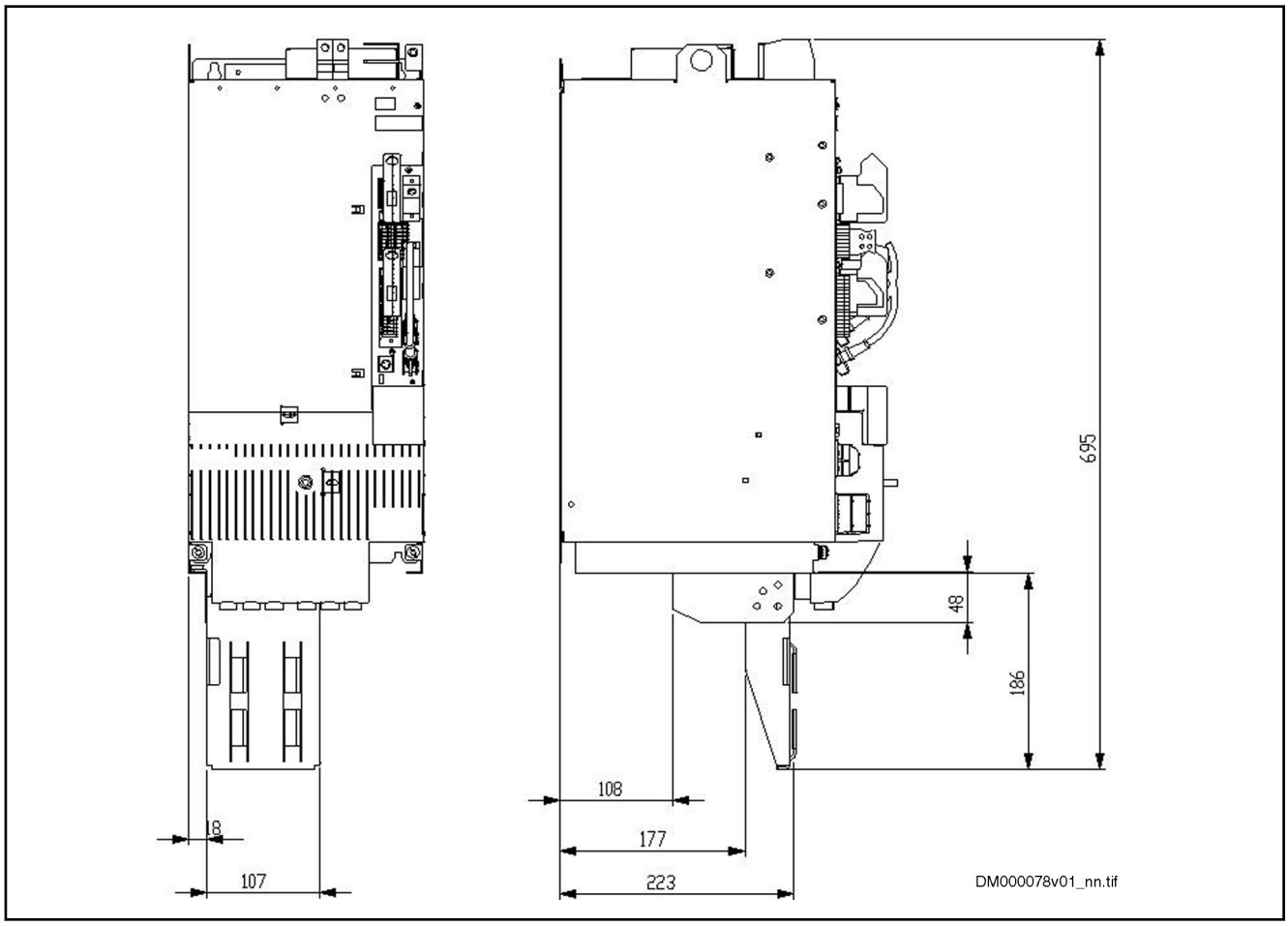


Fig. 2-5: Dimensional drawing HCS03.1E-W0100 and HCS03.1E-W150 with HAS02

Dimensional drawing HCS03.1E-W0210

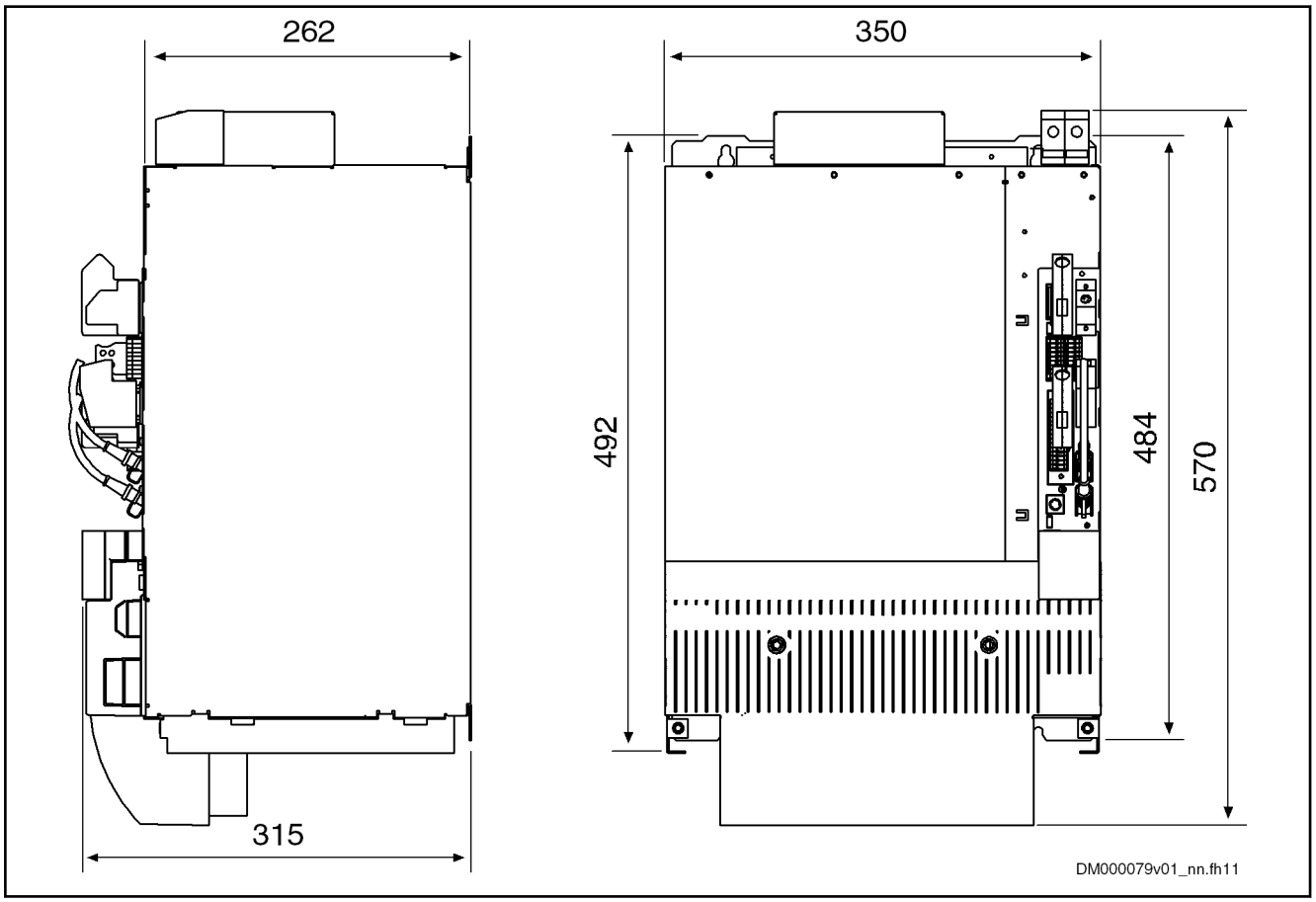


Fig. 2-6: Dimensional drawing HCS03.1E-W0210

Dimensional drawing HCS03.1E-W0210 with HAS02

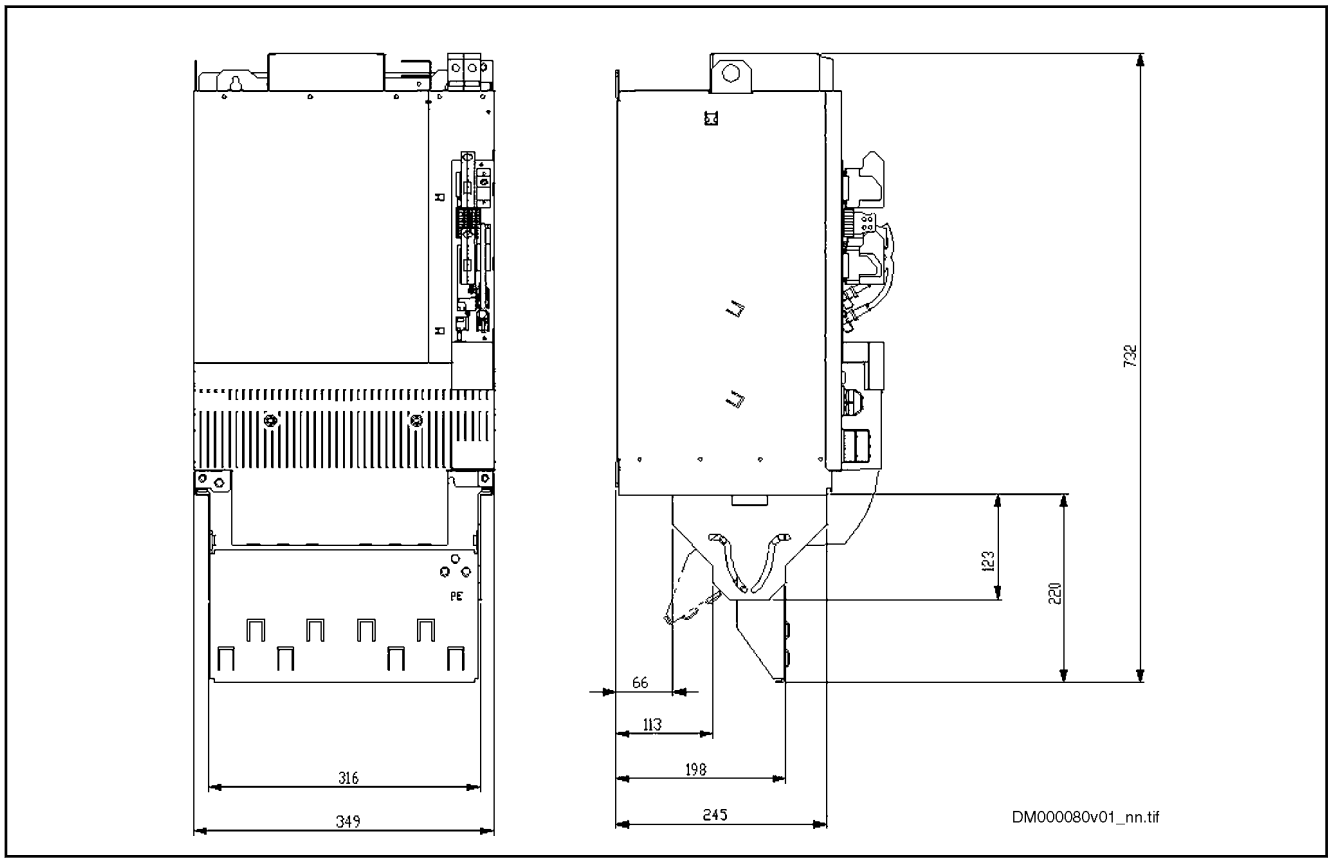
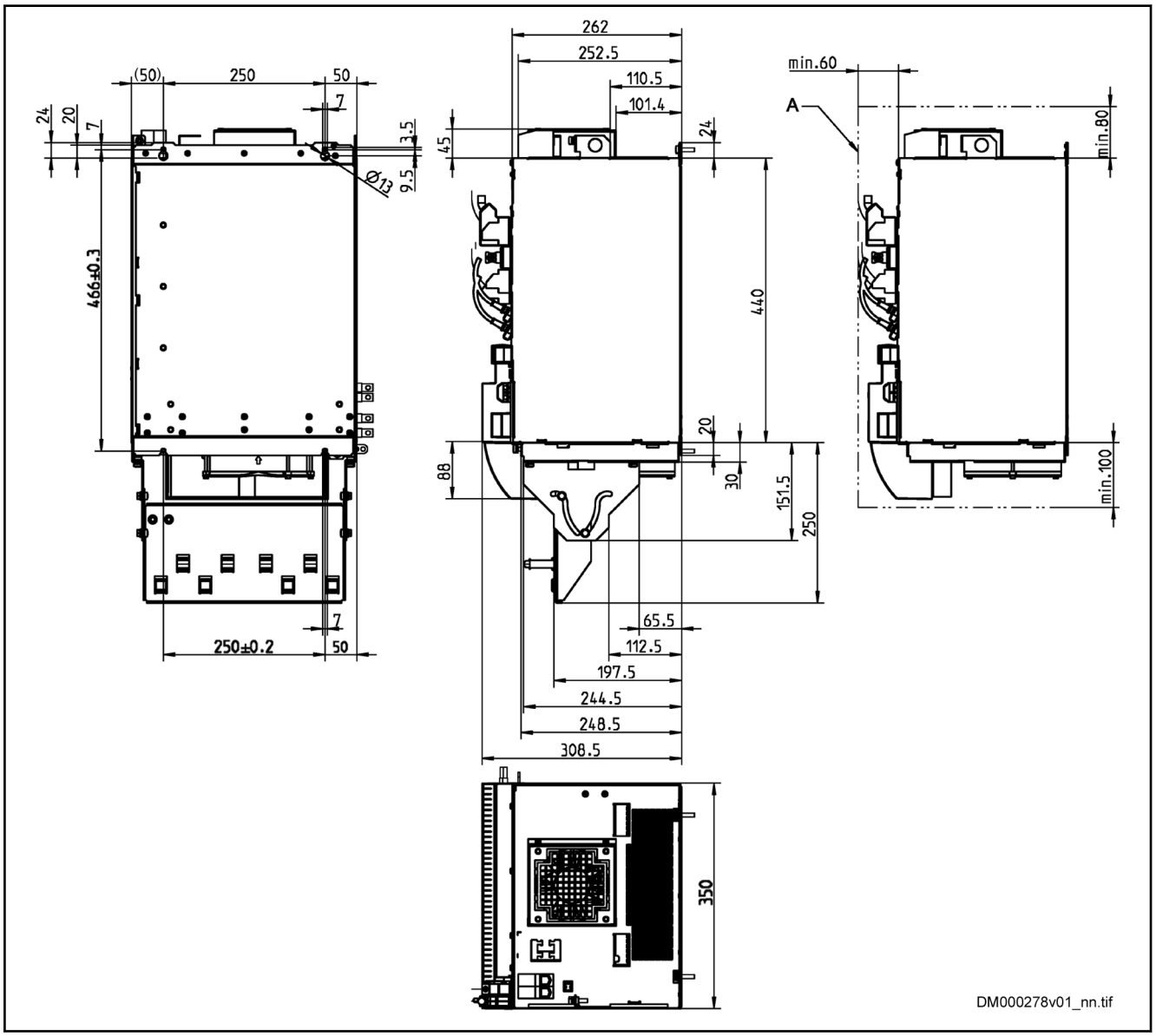


Fig. 2-7: Dimensional drawing HCS03.1E-W0210 with HAS02

Dimensional drawing HCS03.1E-W0280 and HCS03.1E-W0350



A Minimum mounting clearance

Fig. 2-8: Dimensional drawing HCS03.1E-W0280 and HCS03.1E-W0350

Boring dimensions HCS03.1E-W0070

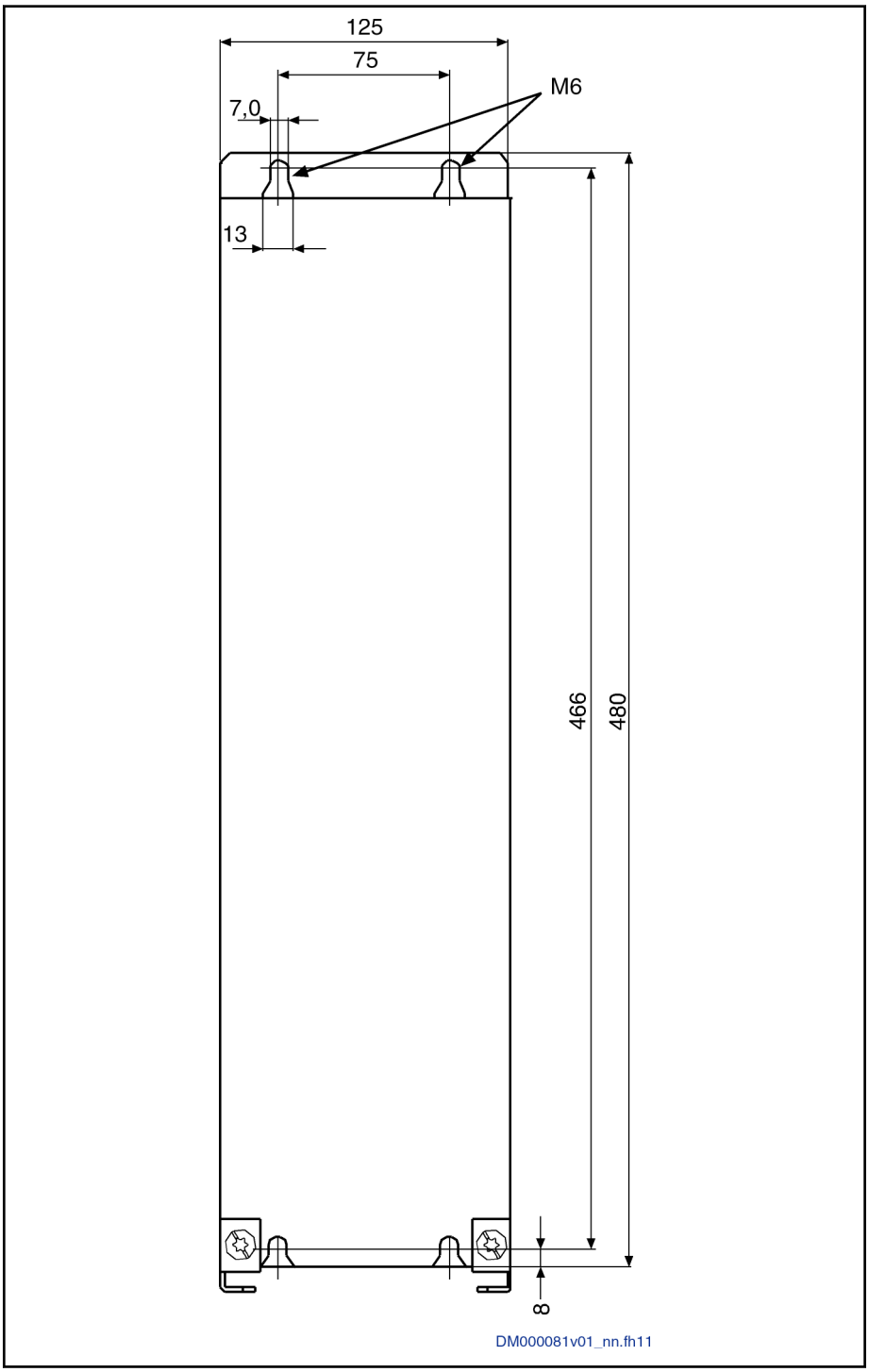


Fig. 2-9: Boring dimensions HCS03.1E-W0070

Boring dimensions HCS03.1E-W0100 and HCS03.1-W0150

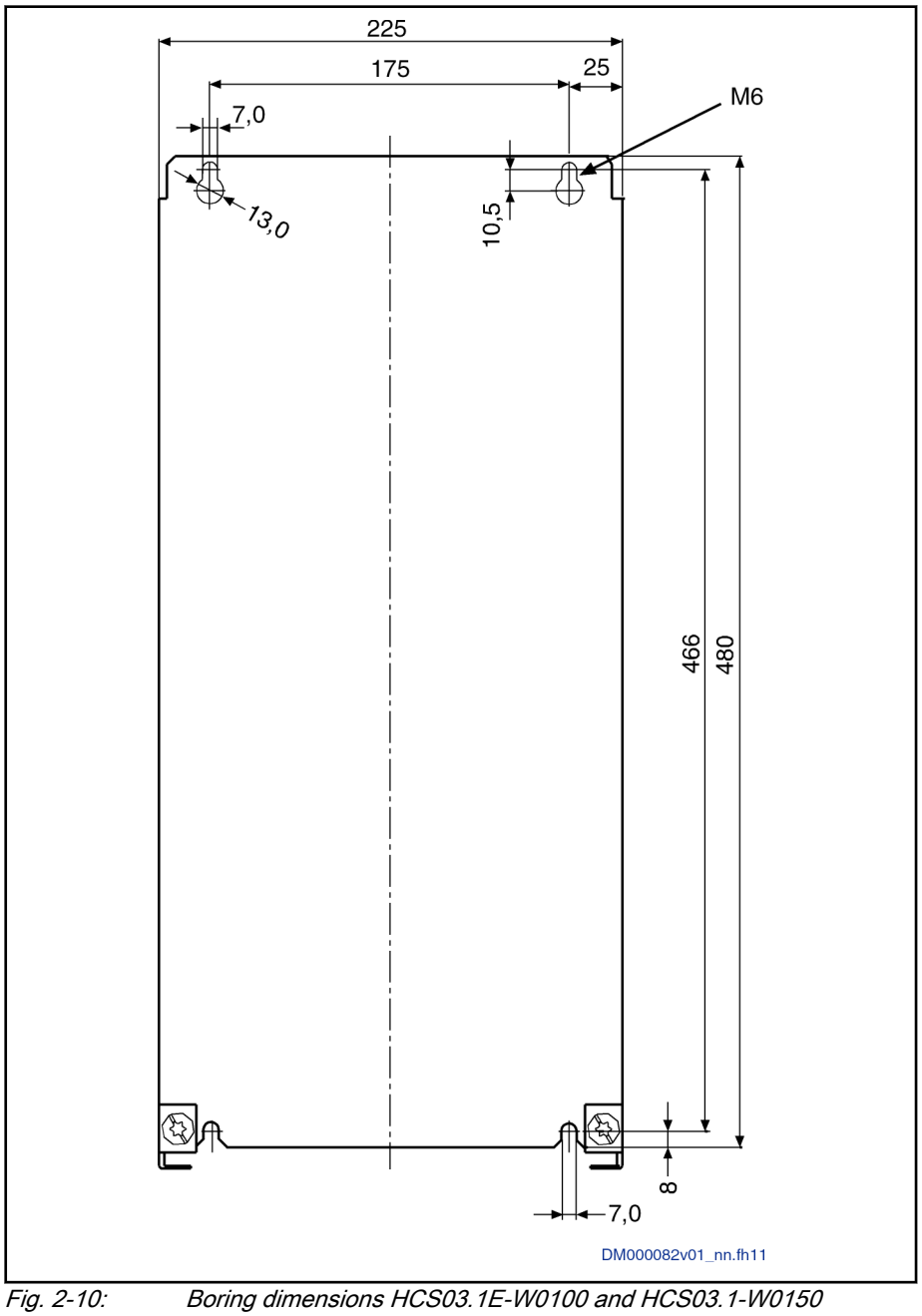


Fig. 2-10: Boring dimensions HCS03.1E-W0100 and HCS03.1-W0150

Boring dimensions HCS03.1E-W0210/280/350

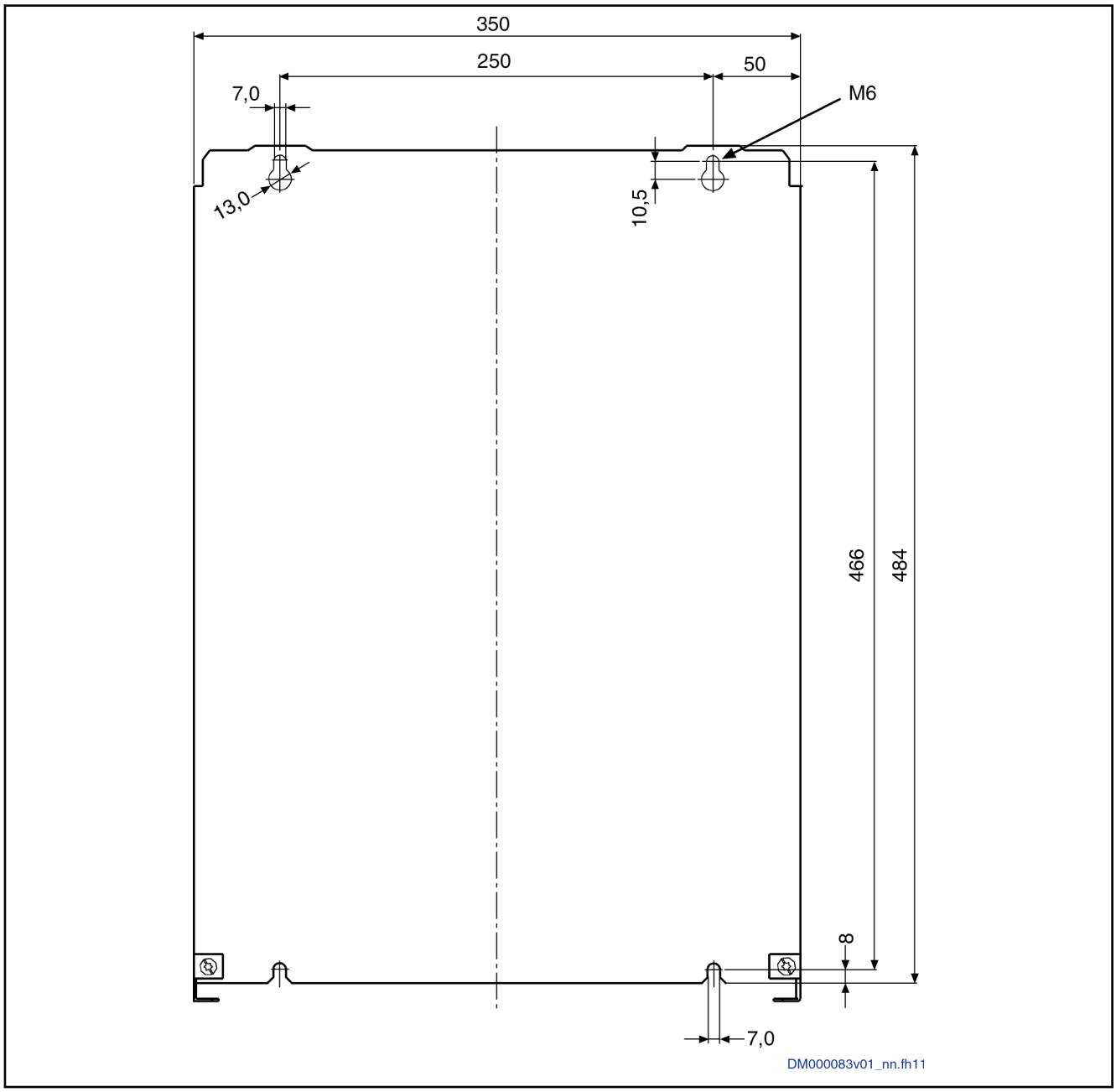


Fig. 2-11: Boring dimensions HCS03.1E-W0210/280/350

2.2 China RoHS 2

www.boschrexroth.com.cn/zh/cn/home_2/china_rohs2

3 Overview of documentations

3.1 Motors

Title	Type of documentation	Document typecode[1)] DOK-MOTOR*-…	Material number R911…
MAD / MAF Asynchronous Motors MAD / MAF	Project Planning Manual	MAD/MAF****-PRxx-EN-P	295781
MBS-H Synchronous Kit Spindle Motors	Project Planning Manual	MBS-H******-PRxx-EN-P	297895
MLF Synchronous Linear Motors	Project Planning Manual	MLF********-PRxx-EN-P	293635
MCL Ironless Linear Motors MCL	Project Planning Manual	MCL********-PRxx-EN-P	330592
MKE Synchronous Motors Synchronous Servo Motors for Potentially Explosive Areas acc. to ATEX and UL / CSA	Project Planning Manual	MKE*GEN2***-PRxx-EN-P	297663
MSK Synchronous Servo Motors	Project Planning Manual	MSK********-PRxx-EN-P	296289
MSK Synchronous Servo Motors for Potentially Explosive Areas	Project Planning Manual	MSK*EXGIIK3-PRxx-EN-P	312709
MSM Synchronous Servo Motors	Data Sheet	MSM********-DAxx-EN-P	329338
MS2E Synchronous Servo Motors acc. to ATEX Directive 2014/34/EU	Project Planning Manual	MS2E*******-PR01-EN-P	394140
MS2N Synchronous Servo Motors	Project Planning Manual	MS2N*******-PRxx-EN-P	347583
MBT Synchronous Torque Motors	Project Planning Manual	MBT********-PRxx-EN-P	298798

1) In the documentation typecodes, "xx" is a placeholder for the current edition of the documentation (e.g.: PR01 is the first edition of a Project Planning Manual)

Tab. 3-1: Documentations – motors

4 Instructions for use

4.1 Overcurrent protection

Protect the components against overcurrent:

- Branch circuit protection has to be provided externally
- Dimension the branch circuit protection according to the data "Branch circuit protection fuse" (see Ratings and dimensions)

4.2 Connection

4.2.1 Connection diagram

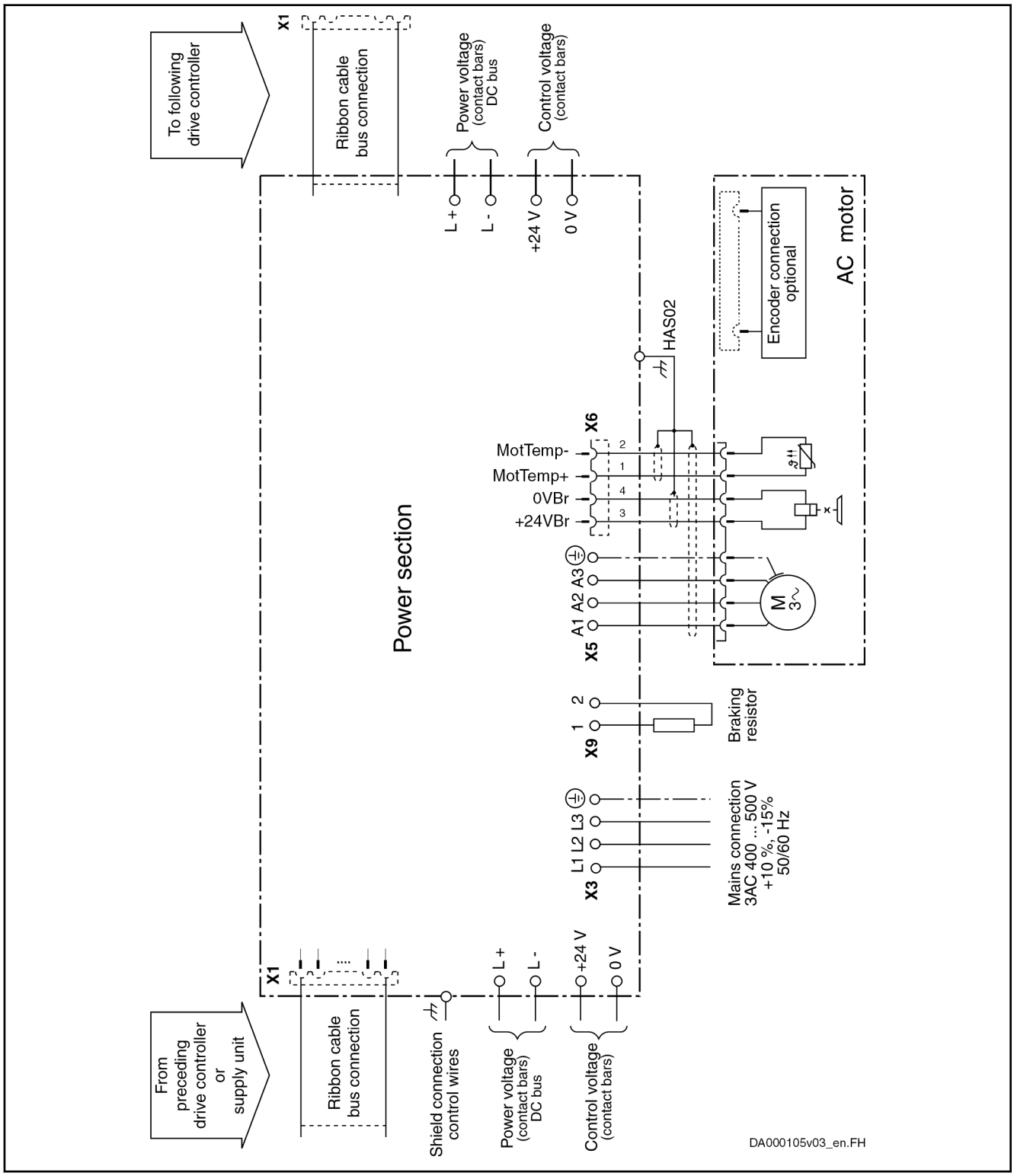


Fig. 4-1: Overall Connection Diagram

☞ Apart from the indicated connections, it is necessary to wire the **Bb contact at the control section** for signaling the readiness for operation of the drive controller (see Project Planning Manual "Rexroth IndraDrive Drive Controllers Control Sections").

For proper function of the **motor thermal management** connect the motor thermal sensor as described in the wiring diagram. Otherwise motor overtemperature sensing is not provided by the drive.

For Rexroth motors with data memory in the motor encoder, such as MSK, the motor overload protection level is set automatically while connecting the motor to the drive. There is no adjustment necessary. Otherwise refer to the Rexroth firmware documentation.

4.2.2 Connection points

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

Tab. 4-1: Symbols

Connection point	HCS03	⊘ ⊸ ◘	∅ mm² (AWG)	↻ Nm
X3 X5 ⏚	A [1]	⊘	16.0 (6)	1.7
	B [2]	◘	M6 1×16; 1×25; 1×35; 1×50 2×25; 2×35; 2×50 2×16 with accessories (1×6; 1×4; 1×2; 1×1 2×4; 2×2; 2×1 2×6 with accessories)	6.5
	C [3]	◘	M10 1×16; 1×25; 1×35; 1×50 2×25; 2×35; 2×50 2×16 with accessories (1×6; 1×4; 1×2; 1×1 2×4; 2×2; 2×1 2×6 with accessories) ⏚ (motor): M8 ⏚ (mains): M6	20 ⏚ (motor): 20 ⏚ (mains): 6.5
X6	A, B, C	⊸	1.5 (16)	-

Connection point	HCS03	⊘ → ◘	∅ mm² (AWG)	↻ Nm
X9	A	⊘	16.0 (6)	1.7
	B		25.0 (4)	2.5
	C		50.0 (0)	9.0
24V, 0V L+, L-	A, B, C	◘	M6	6.5

1) **A:** HCS03.1E-W0070
2) **B:** HCS03.1E-W0100…W0150
3) **C:** HCS03.1E-W0210…W0350

Tab. 4-2: Connection points

5 Service and support

Our worldwide service network provides an optimized and efficient support. Our experts offer you advice and assistance should you have any queries. You can contact us **24/7**.

Service Germany

Our technology-oriented Competence Center in Lohr, Germany, is responsible for all your service-related queries for electric drive and controls.

Contact the **Service Hotline** and **Service Helpdesk** under:

Phone:	**+49 9352 40 5060**
Fax:	**+49 9352 18 4941**
E-mail:	service.svc@boschrexroth.de
Internet:	http://www.boschrexroth.com

Additional information on service, repair (e.g. delivery addresses) and training can be found on our internet sites.

Service worldwide

Outside Germany, please contact your local service office first. For hotline numbers, refer to the sales office addresses on the internet.

Preparing information

To be able to help you more quickly and efficiently, please have the following information ready:

- Detailed description of malfunction and circumstances
- Type plate specifications of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your e-mail address)

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Notes

Notes

rexroth
A Bosch Company

Bosch Rexroth AG
Electric Drives and Controls
P.O. Box 13 57
97803 Lohr, Germany
Bgm.-Dr.-Nebel-Str. 2
97816 Lohr, Germany
Phone +49 9352 18 0
Fax +49 9352 18 8400
www.boschrexroth.com/electrics

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