Rexroth Bosch Group

Rexroth IndraDrive Supply Units

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Project Planning Manual

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Supply Units

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

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Contents

1 Introduction

1.1 About this Documentation

Purpose of Documentation

This documentation basically contains the technical data of the Rexroth IndraDrive supply units.

WARNING

Personal injury and property damage caused by incorrect project planning for applications, machines and installations!

⇒ Take the content of the Project Planning Manual "Rexroth IndraDrive Drive System" (DOK-INDRV*-SYSTEM*****-PRxx-EN-P; part no. R911309636) into account.

For complete project planning of a Rexroth IndraDrive drive system you need, in any case, the Project Planning Manual "Rexroth IndraDrive Drive System" (DOK-INDRV*-SYSTEM*****-PRxx-EN-P; part no. R911309636). This Project Planning Manual, among other things, contains:

- specifications for the components of the drive system
- configuration of the drive system components
- arrangement of the components in the control cabinet
- electromagnetic compatibility (EMC)
- types of mains connection
- requirements to the mains connection
- control circuits for the mains connection
- connections of the components in the drive system
- fusing and selecting the mains contactor
- accessories in the drive system
- calculations (determining appropriate drive controller; mains connection; leakage capacitance; operating data of mains filters; selecting the 24V supply; braking behavior when using a DC bus resistor unit)

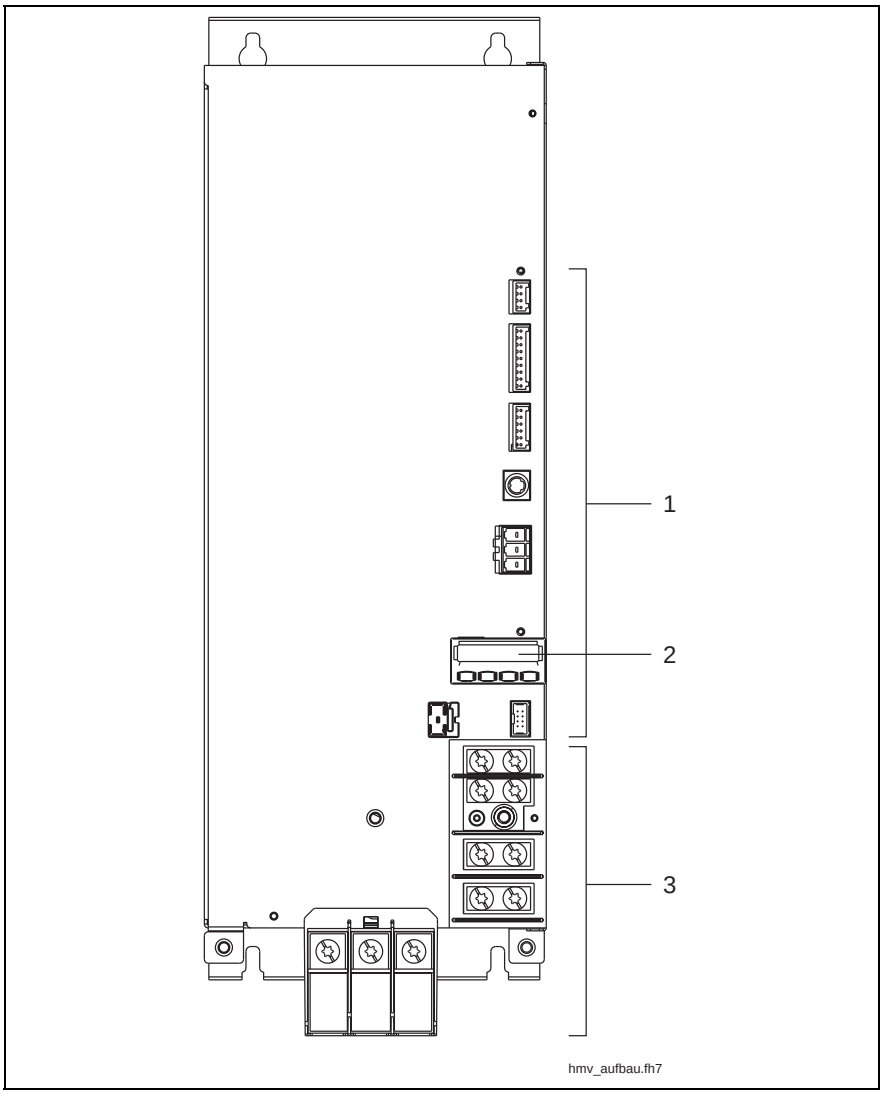
Documentations - Overview

Title	Type of Documentation	Document Typecode[1)]
Rexroth IndraDrive Drive System	Project Planning Manual	DOK-INDRV*-SYSTEM*****-PRxx-EN-P
Rexroth IndraDrive Drive Controllers Control Sections	Project Planning Manual	DOK-INDRV*-CSH********-PRxx-EN-P
Rexroth IndraDrive M Drive Controllers Power Sections	Project Planning Manual	DOK-INDRV*-HMS+HMD****-PRxx-EN-P
Rexroth IndraDrive C Drive Controllers Power Sections HCS02.1	Project Planning Manual	DOK-INDRV*-HCS02.1****-PRxx-EN-P
Rexroth IndraDrive C Drive Controllers Power Sections HCS03.1	Project Planning Manual	DOK-INDRV*-HCS03.1****-PRxx-EN-P
Rexroth IndraDrive Supply Units	Project Planning Manual	DOK-INDRV*-HMV-*******-PRxx-EN-P
Rexroth IndraDrive Integrated Safety Technology	Functional and Application Description	DOK-INDRV*-SI*-**VRS**-FKxx-EN-P
Connecting cables	Selection Data	DOK-CONNEC-CABLE*STAND-AUxx-EN-P
Safety Instructions for Electrical Drives	Safety Guidelines	DOK-GENERAL-DRIVE-******-SVSx-MS-P
Rexroth IndraDrive Additional Components	Project Planning Manual	DOK-INDRV*-ADDCOMP****-PRxx-EN-P
Rexroth IndraDrive Firmware for Drive Controllers	Functional Description	DOK-INDRV*-MP*-02VRS**-FKxx-EN-P
Rexroth IndraDrive Firmware for Drive Controllers	Functional Description	DOK-INDRV*-MP*-03VRS**-FKxx-EN-P
Rexroth IndraDrive Firmware for Drive Controllers	Functional Description	DOK-INDRV*-MP*-04VRS**-FKxx-EN-P
Rexroth IndraDrive Firmware for Drive Controllers	Parameter Description	DOK-INDRV*-GEN-**VRS**-PAxx-EN-P
Rexroth IndraDrive Firmware for Drive Controllers	Troubleshooting Guide	DOK-INDRV*-GEN-**VRS**-WAxx-EN-P
Rexroth IndraDyn S Synchronous Motors MSK	Project Planning Manual	DOK-MOTOR*-MSK********-PRxx-EN-P
Rexroth IndraDyn A Asynchronous Motors MAD/MAF	Project Planning Manual	DOK-MOTOR*-MAD/MAF****-PRxx-EN-P
Rexroth IndraDyn T Synchronous Torque Motors MBT	Project Planning Manual	DOK-MOTOR*-MBT********-PRxx-EN-P
Rexroth IndraDyn H Synchronous Kit –Spindle Motors MBS-H	Project Planning Manual	DOK-MOTOR*-MBS-H******-PRxx-EN-P
Rexroth IndraDyn L Synchronous Linear Motors MLF	Project Planning Manual	DOK-MOTOR*-MLF********-PRxx-EN-P
Third Party Motors	Project Planning Manual and Commissioning	DOK-DRIVE*-3RDPART*MOT-AWxx-EN-P

1) in the document type codes "xx" designates replacement characters for the update edition of the documentation (Example: "PR01" is the first edition of a project planning manual)

Fig. 1-1: Documentations - Overview

1.2 Basic Structure



1: Signal processing
2: Control panel (Display)
3: Power connections and control voltage connection

Fig. 1-2: Basic structure

Control Panel

The control panel is a separate part which is plugged on the supply unit. The supply unit is supplied ex works complete with control panel.

The handling of the control panel is described in chapter 8.

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 products 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 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 Bosch 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 Functional Descriptions.

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

The drive controllers have been developed for use in single- and multi-axis drive and control tasks.

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

Typical applications of the drive controllers include:

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

The drive controllers may only be operated under the assembly and installation conditions described in this documentation, in the specified position of normal use and under the ambient conditions as described (temperature, degree of protection, humidity, EMC, etc.).

2.2 Inappropriate Use

Using the drive controllers outside of the operating conditions described in this documentation and outside of the indicated technical data and specifications is defined as "inappropriate use".

Drive controllers must not be used, if

- ... they are subject to operating conditions that do not meet the specified ambient conditions. This includes, for example, operation under water, under extreme temperature fluctuations or extremely high maximum temperatures.
- Furthermore, the drive controllers must not be used in applications which have not been expressly authorized by Rexroth.
- Please carefully follow the specifications outlined in the general Safety Instructions!

3 Safety Instructions for Electric Drives and Controls

3.1 General Information

Using the Safety Instructions and Passing them on to Others

Do not attempt to install or commission this device without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with the device. If you do not have the user documentation for the device, contact your responsible Bosch Rexroth sales representative. Ask for these documents to be sent immediately to the person or persons responsible for the safe operation of the device.

If the device is resold, rented and/or passed on to others in any other form, then these safety instructions must be delivered with the device.

WARNING

Improper use of these devices, 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!

Instructions for Use

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.

- 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 device.
- Only assign trained and qualified persons to work with electrical installations:
  - Only persons who are trained and qualified for the use and operation of the device may work on this device 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 devices 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 devices have been designed for installation in industrial machinery.
- The ambient conditions given in the product documentation must be observed.
- Only use safety-relevant applications that are clearly and explicitly approved in the Project Planning Manual. If this is not the case, they are excluded.
  Safety-relevant are all such applications which can cause danger to persons and material damage.
- 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.

Explanation of Warning Symbols and Degrees of Hazard Seriousness

The safety instructions describe the following degrees of hazard seriousness. 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 Z 535
 **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 Z 535)

Hazards by Improper Use

DANGER

High electric voltage and high working current! Risk of death or severe bodily injury by electric shock!

DANGER

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

WARNING

High electric voltage because of incorrect connection! Risk of death or bodily injury by electric shock!

WARNING

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

CAUTION

Hot surfaces on device housing! Danger of injury! Danger of burns!

CAUTION

Risk of injury by improper handling! Risk of bodily injury by bruising, shearing, cutting, hitting, or improper handling of pressurized lines!

CAUTION

Risk of injury by improper handling of batteries!

3.2 Instructions with Regard to Specific Dangers

Protection Against Contact with Electrical Parts

Note: This section only concerns devices and drive components with voltages of more than 50 Volt.

Contact with parts conducting voltages above 50 Volts can cause personal danger and electric shock. When operating electrical equipment, it is unavoidable that some parts of the devices conduct dangerous voltage.

DANGER

High electrical voltage! Danger to life, electric shock and severe bodily injury!

- ⇒ Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain and repair this equipment.
- ⇒ Follow general construction and safety regulations when working on electrical power installations.
- ⇒ Before switching on the device, the equipment grounding conductor must have been non-detachably connected to all electrical equipment in accordance with the connection diagram.
- ⇒ Do not operate electrical equipment at any time, even for brief measurements or tests, if the equipment grounding conductor is not permanently connected to the mounting points of the components provided for this purpose.
- ⇒ Before working with electrical parts with voltage potentials higher than 50 V, the device must be disconnected from the mains voltage or power supply unit. Provide a safeguard to prevent reconnection.
- ⇒ With electrical drive and filter components, observe the following:

  Wait 30 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 device on. Before switching the equipment on, cover and safeguard live parts safely to prevent contact with those parts.
- ⇒ A residual-current-operated circuit-breaker or r.c.d. cannot be used for electric drives! Indirect contact must be prevented by other means, for example, by an overcurrent protective device according to the relevant standards.
- ⇒ Secure built-in devices from direct touching of electrical parts by providing an external housing, for example a control cabinet.

European countries: according to EN 50178/ 1998, section 5.3.2.3.

USA: See National Electrical Code (NEC), National Electrical Manufacturers' Association (NEMA), as well as local engineering regulations. The operator must observe all the above regulations at any time.

With electrical drive and filter components, observe the following:

DANGER

High housing voltage and large leakage current! Risk of death or bodily injury by electric shock!

⇒ Before switching on, the housings of all electrical equipment and motors must be connected or grounded with the equipment grounding conductor to the grounding points. This is also applicable before short tests.

⇒ The equipment grounding conductor of the electrical equipment and the units must be non-detachably and permanently connected to the power supply unit at all times. The leakage current is greater than 3.5 mA.

⇒ Over the total length, use copper wire of a cross section of a minimum of 10 mm^2 for this equipment grounding connection!

⇒ Before start-up, also in trial runs, always attach the equipment grounding conductor or connect with the ground wire. Otherwise, high voltages may occur at the housing causing electric shock.

Protection Against Electric Shock by Protective Low Voltage (PELV)

All connections and terminals with voltages between 5 and 50 Volt at Rexroth products are protective extra-low voltage systems which are provided with touch guard according to the product standards.

WARNING

High electric voltage by incorrect connection! Risk of death or bodily injury by electric shock!

⇒ To all connections and terminals with voltages between 0 and 50 Volt, only devices, electrical components, and conductors may be connected which are equipped with a PELV (Protective Extra-Low Voltage) system.

⇒ Connect only voltages and circuits which are safely isolated from dangerous voltages. Safe isolation is achieved for example by isolating transformers, safe optocouplers or battery operation without mains connection.

Protection Against Dangerous Movements

Dangerous movements can be caused by faulty control of 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 harm 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!

⇒ For the above reasons, ensure personal safety by means of qualified and tested higher-level monitoring devices or measures integrated in the installation.

They have to be provided for by the user according to the specific conditions within the installation and a hazard and fault analysis. The safety regulations applicable for the installation have to be taken into consideration. Unintended machine motion or other malfunction is possible if safety devices are disabled, bypassed or not activated.

To avoid accidents, bodily harm and/or material damage:

⇒ 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.

⇒ Mount the emergency stop switch in the immediate reach of the operator. Verify that the emergency stop works before startup. Don't operate the device if the emergency stop is not working.

⇒ Isolate the drive power connection by means of an emergency stop circuit or use a safety related starting lockout to prevent unintentional start.

⇒ Make sure that the drives are brought to a safe standstill before accessing or entering the danger zone.

⇒ Additionally 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 or
- 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 devices 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.

Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated by current-carrying conductors and permanent magnets in motors represent a serious personal danger to those 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 and metal implants are not permitted to enter following areas:
- Areas in which electrical equipment and parts are mounted, being operated or commissioned.
- Areas in which parts of motors with permanent magnets are being stored, repaired or mounted.

⇒ If it is necessary for somebody with a pacemaker to enter such an area, a doctor must be consulted prior to doing so. The interference immunity of present or future implanted heart pacemakers differs greatly, so that no general rules can be given.

⇒ Those with metal implants or metal pieces, as well as with hearing aids must consult a doctor before they enter the areas described above. Otherwise health hazards may occur.

Protection Against Contact with Hot Parts

CAUTION

Hot surfaces at motor housings, on drive controllers or chokes! Danger of injury! Danger of burns!

⇒ Do not touch surfaces of device housings and chokes in the proximity of heat sources! Danger of burns!

⇒ Do not touch housing surfaces of motors! Danger of burns!

⇒ According to operating conditions, temperatures can be **higher than 60 °C, 140 °F** during or after operation.

⇒ Before accessing motors after having switched them off, let them cool down for a sufficiently long time. Cooling down can require **up to 140 minutes**! Roughly estimated, the time required for cooling down is five times the thermal time constant specified in the Technical Data.

⇒ After switching drive controllers or chokes off, wait 15 minutes to allow them to cool down before touching them.

⇒ Wear safety gloves or do not work at hot surfaces.

⇒ For certain applications, the manufacturer of the end product, machine or installation, according to the respective safety regulations, has to take measures to avoid injuries caused by burns in the end application. These measures can be, for example: warnings, guards (shielding or barrier), technical documentation.

Protection During Handling and Mounting

In unfavorable conditions, handling and assembling certain parts and components in an improper way can cause injuries.

CAUTION

Risk of injury by improper handling! Bodily injury by bruising, shearing, cutting, hitting!

- ⇒ Observe the general construction and safety regulations on handling and assembly.
- ⇒ Use suitable devices for assembly and transport.
- ⇒ Avoid jamming and bruising by appropriate measures.
- ⇒ Always use suitable tools. Use special tools if specified.
- ⇒ Use lifting equipment and tools in the correct manner.
- ⇒ If necessary, use suitable protective equipment (for example safety goggles, safety shoes, safety gloves).
- ⇒ Do not stand under hanging loads.
- ⇒ Immediately clean up any spilled liquids because of the danger of skidding.

Battery Safety

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

CAUTION

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 recharge the batteries as this may cause leakage or explosion.
- ⇒ Do not throw batteries into open flames.
- ⇒ Do not dismantle batteries.
- ⇒ Do not damage electrical parts installed in the devices.

Note: Environmental protection and disposal! The batteries installed 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 separate from other waste. Observe the local regulations in the country of assembly.

Protection Against Pressurized Systems

According to the information given in the Project Planning Manuals, motors cooled with liquid and compressed air, as well as drive controllers, can be partially supplied with externally fed, pressurized media, such as compressed air, hydraulics oil, cooling liquids, and cooling lubricating agents. In these cases, improper handling of external supply systems, supply lines, or connections can cause injuries or damages.

CAUTION

Risk of injury by improper handling of pressurized lines!

⇒ Do not attempt to disconnect, open, or cut pressurized lines (risk of explosion).

⇒ Observe the respective manufacturer's operating instructions.

⇒ Before dismounting lines, relieve pressure and empty medium.

⇒ Use suitable protective equipment (for example safety goggles, safety shoes, safety gloves).

⇒ Immediately clean up any spilled liquids from the floor.

Note: Environmental protection and disposal! The agents used to operate the product might not be economically friendly. Dispose of ecologically harmful agents separate from other waste. Observe the local regulations in the country of assembly.

4 Identifying and Checking the Delivered Components

4.1 Device Types

Type Code

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

Abbrev. Column →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Example:	H	M	V	0	1	.	1	E	-	W	0	0	3	0	-	A	-	0	7	-	N	N	N	N																	

1. Product
1.1 HMV . . . . . = HMV

2. Line
2.1 1 . . . . . = 01

3. Design
3.1 1 . . . . . = 1

4. Power supply
4.1 feeded . . . . . = E
4.2 regenerative. . . . . = R

5. Cooling mode
5.1 Air, internal (through integrated blower) = W

6. Rated output

Rated output [KW]	Power supply E with choke	Power supply R	Code
18	-	X	**0018**
30	X	-	**0030**
45	-	X	**0045**
65	-	X	**0065**
75	X	-	**0075**
120	X	-	**0120**

7. Protection mode
7.1 IP 20 . . . . . = A

8. DC-bus nominal voltage
8.1 DC 700V. . . . . = 07

9. Other design
9.1 none . . . . . = NNNN

10. Standard reference

Standard	Titel	Edition
DIN EN 60529	Degrees of protection provided by enclosures (IP-Code)	2000-09

Fig. 4-1: Type code

Type Plate on the Unit

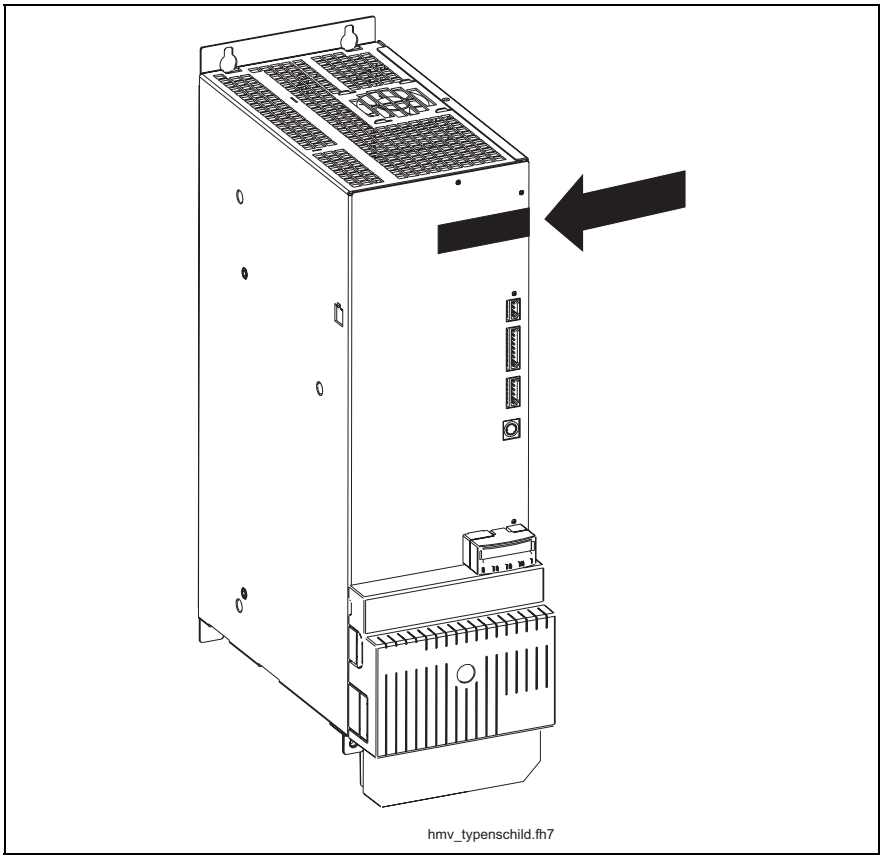


Abb. 4-2: Type plate arrangement

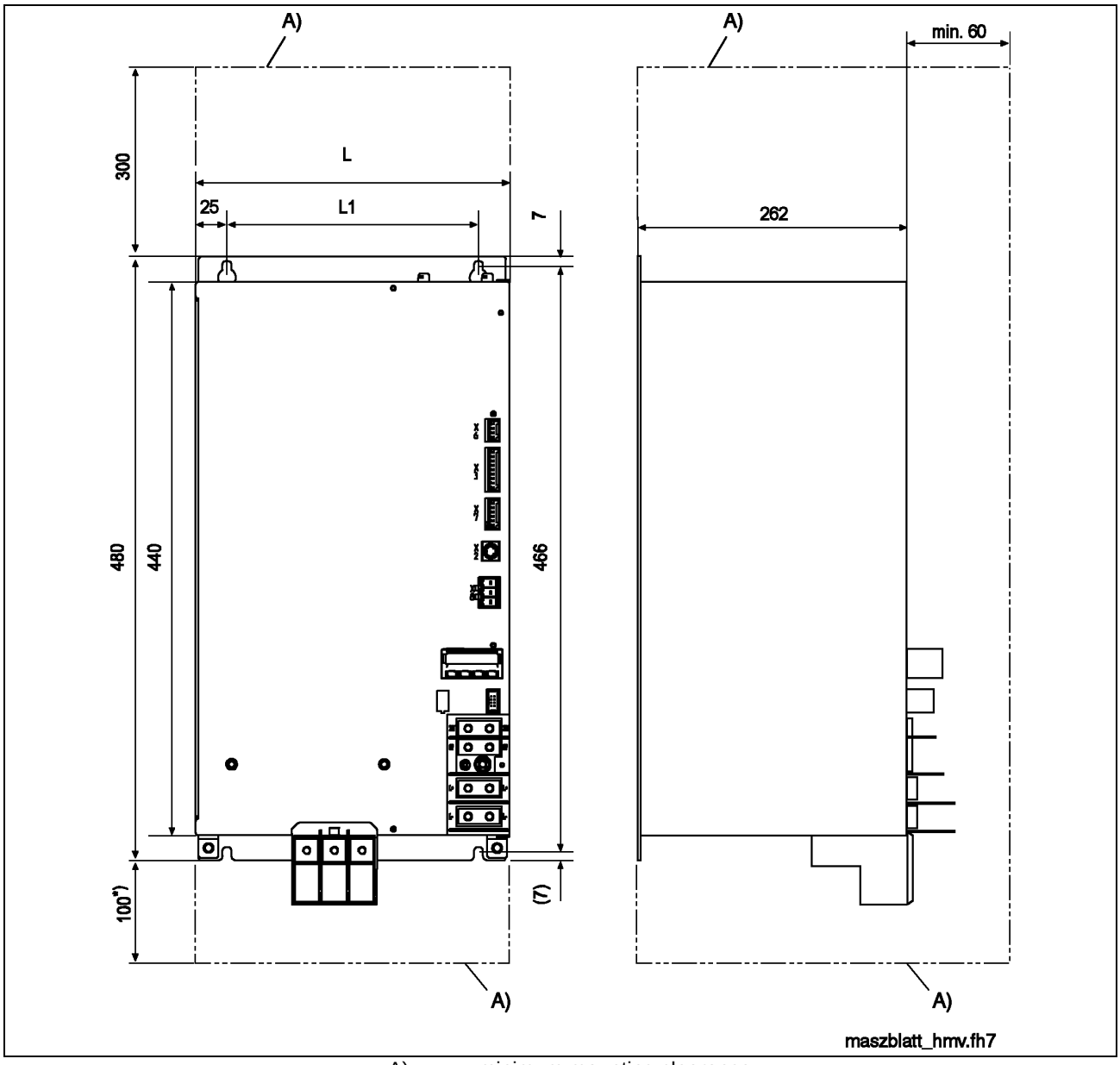
4.2 Scope of Delivery

as standard	optional
touch guard	rails for connecting the DC bus
joint bar (to connect the equipment grounding conductor to the neighboring device)	rails for connecting the control voltage
connector X31, X32, X33	
connector X14 (HMV01.1R only)	
standard display	
safety instructions (brochure; DOK-GENERAL-DRIVE******-SVSx-MS-P)	

Fig. 4-3: Scope of delivery

5 Mechanical Data

5.1 Dimensions, Weight



A) minimum mounting clearance
*) plus additional clearance for mains connection cable (The required clearance depends on the minimum bending radius of the cable.)

Fig. 5-1: Dimensional drawing for HMV01.1E-W0*** and HMV01.1R-W00**

Device	L [mm]	L1 [mm]	Weight [kg]
HMV01.1E-W0030	150	100	13,5
HMV01.1E-W0075	250	200	22,0
HMV01.1E-W0120	350	300	32,0
HMV01.1R-W0018	175	125	13,5
HMV01.1R-W0045	250	200	20,0
HMV01.1R-W0065	350	300	31,0

Fig. 5-2: L and L1 dimensions, weight

5.2 Dimensions, Mass HMV01.1R-W0120 with External Blower Unit

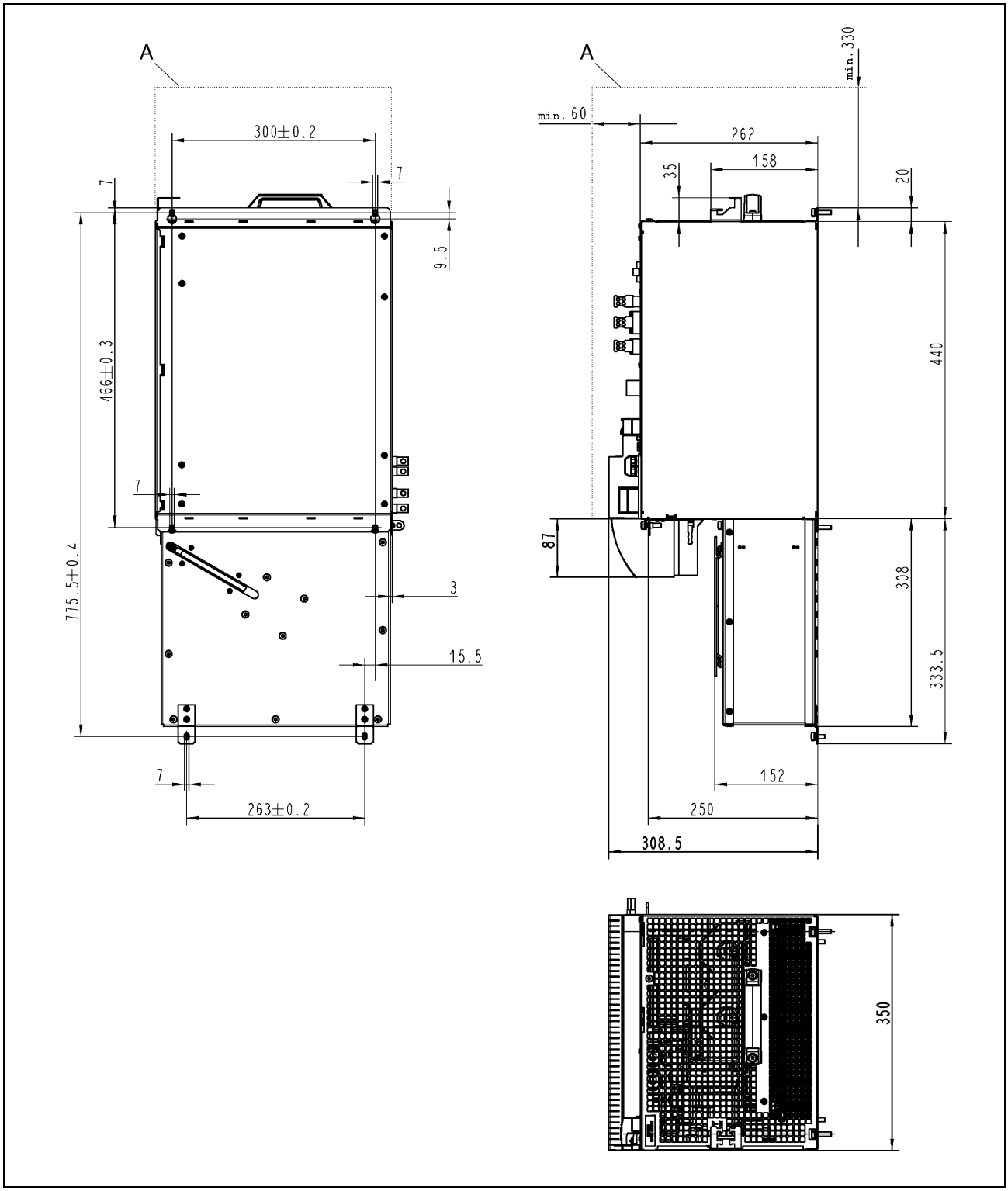


Fig. 5-3: HMV01.1R-W0120 with external blower unit HAB01

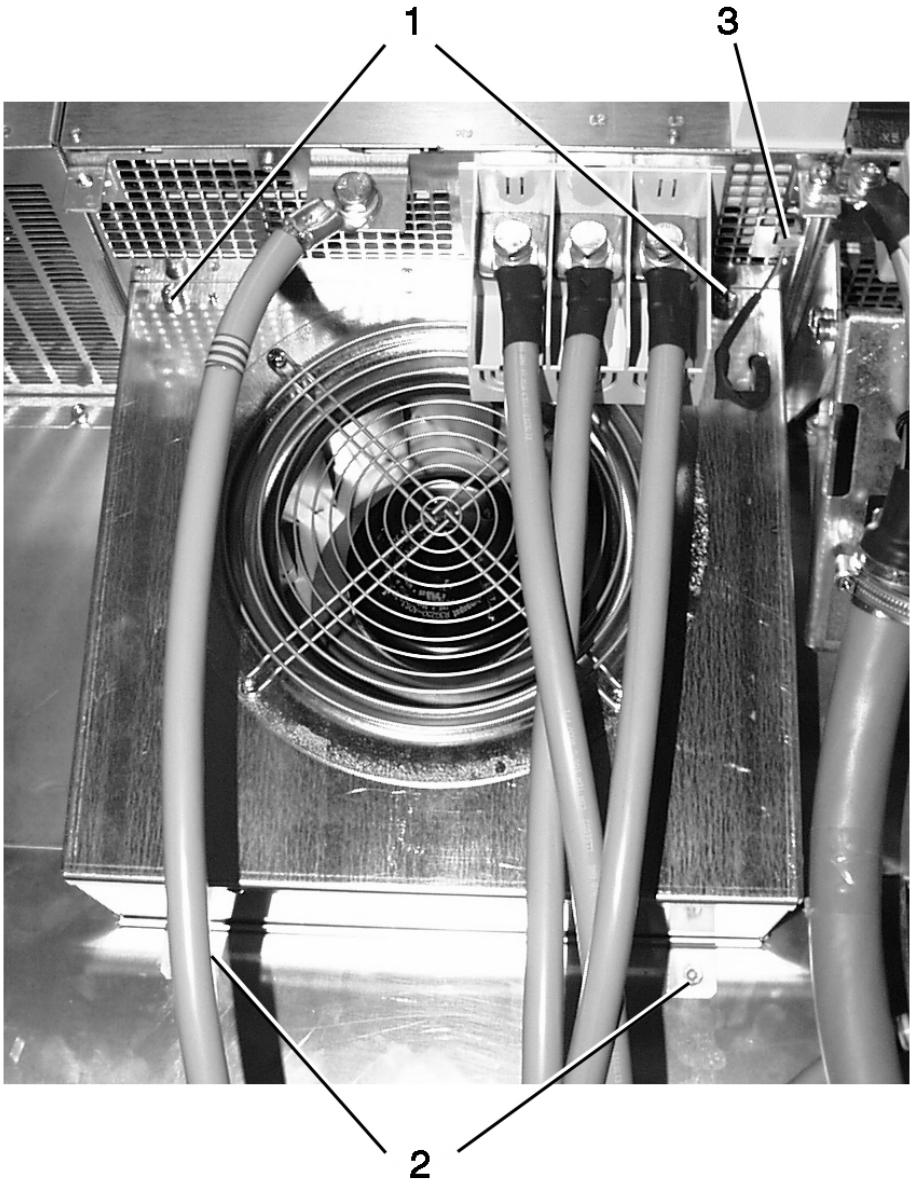
Device	Mass [kg]
HMV01.1R-W0120	34,5
HAB01.1-0350-1640-NN	7,5

Fig. 5-4: Mass

Mounting the External Blower Unit HAB01 to HMV01

Mount the blower unit HAB01 with the following steps:

- mount HMV01
- hook in HAB01
- screw HAB01 to mounting plate, observe max. tightening torque
- screw HAB01 to supply unit, observe max. tightening torque
- connect HAB01 to X13



1	screws to fix blower to supply unit
2	screws to fix blower to mounting plate
3	connection for power supply of HAB01

Fig. 5-5: HAB01 mounted

Notes

6 Electrical Data

6.1 HMV01.1E-W0030, -W0075, -W0120

Designation	Symbol	Unit	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120
kind of connection (mode of operation at the mains)	-	-	3-phase		
mains input voltage (rated voltage)	U_{LN}	V	400 -15% to 480 +10% With mains grounded via outer conductor: direct connection up to 250V; for mains voltages >250V: use isolating transformer with grounded neutral point.		
mains frequency	f_{LN}	Hz	48 to 62		
maximum mains frequency change per time unit	df_{LN}/t	Hz/s	2% * f_{LN}		
mains input continuous current (r.m.s. value; at U_{LN} = 400V)	$I_{LN\ cont}$	A	51	125	200
nominal inrush current (depending on mains input voltage)	$I_{L\ trans\ max\ (on)}$	A	< $I_{LN\ cont}$ (preload with current source)		
connected mains power without mains choke (at rated DC bus power at U_{LN} = 400V) [1]	S_{LN}	kW	31	68	108
connected mains power with mains choke (at rated DC bus power at U_{LN} = 400V)	$S_{LN\ (L\_DC)}$	kW	35	86	138
assigned mains choke type			HNL01.1E-0400-N0051	HNL01.1E-0200-N0125	HNL01.1E-0100-N0202
power factor with mains choke (at nominal DC bus power; at U_{LN} = 400V)	cosφ	-	0,97		
DC bus voltage (range)	U_{DC}	V	uncontrolled; U_{LN} * 1,41		
upper DC bus voltage limit [2]	$U_{DC\ limit\ (max)}$	V	900		
lower DC bus voltage limit [3]	$U_{DC\ limit\ (min)}$	V	0,75 * √2 * U_{LN}		
continuous DC bus power (at U_{LN} =400V) with choke [4]	$P_{DC\ cont}$	kW	30	75	120
continuous DC bus power (at U_{LN} =400V) without choke	$P_{DC\ cont}$	kW	18	45	72
continuous DC bus power depending on mains input voltage			at U_{LN} < 400 V: 1% power reduction per 4 V at U_{LN} > 400 V: 1% power increasing per 4 V		
maximum peak DC bus power (for max. 0,3 s with a preload of 0,6 x $I_{LN\ cont}$ and 40 °C ambient temperature)	$P_{DC\ peak}$	kW	45	112	180
braking resistor switch-on threshold	$U_{DC\ (R\_DC\ On)}$	V	constant 820V or variable 80V + √2 * U_{LN}		
continuous brake power (braking resistor)		kW	1,5	2	2,5
maximum brake power (braking resistor)		kW	36	90	130
brake energy absorption (braking resistor)		kWs	100	250	500
DC bus capacity	C_{DC}	µF	1410	3760	5640

Designation	Symbol	Unit	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120
maximum chargeable DC bus capacitance	C_{DCload_max}	mF	150 (charging duration: approx. 90 s)		
power dissipation at maximum continuous power (without power of braking resistor and 24 V supply; basic losses: see chapter "Control Voltage" Power consumption)	P_{Diss}	W	150	340	500
power losses per kW continuous DC bus power	$P_{W/kW}$	W/kW	4,2	4,1	3,7

1) These data refer to a supply impedance of 40 µH.
2) For behavior in case limit is exceeded: see warning "E8025 Overvoltage in power section" and error message "F2817 Overvoltage in power section"
3) For behavior in case value falls below limit: see error message "F2026 Undervoltage in power section"
4) Inductance of the choke:
HMV01.1E-W0030: 400 µH
HMV01.1E-W0075: 200 µH
HMV01.1E-W0120: 100 µH

Fig. 6-1: Electrical data

WARNING

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

⇒ If you use other DC bus capacitors than those by Rexroth, you have to make sure that the discharge time of the DC bus capacitors is less than 30 minutes. If necessary, install the appropriate discharging device.

6.2 HMV01.1R-W0018, -W0045, -W0065, -W0120

Note: The data of HMV01.1R-W0120 are preliminary. Subject to change.

Designation	Symbol	Unit	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065	HMV01.1R-W0120 [3]
kind of connection (mode of operation at the mains)	-	-	3-phase			
mains input voltage (rated voltage)	U_{LN}	V	400 -15% to 480 +10% With mains grounded via outer conductor: direct connection up to 250V; for mains voltages >250V: use isolating transformer with grounded neutral point.			
mains frequency	f_{LN}	Hz	48 to 62			
maximum mains frequency change per time unit	df_{LN}/t	Hz/s	2% * f_{LN}			
mains input continuous current (r.m.s. value; at U_{LN} = 400V)	$I_{L\ cont}$	A	26	65	94	181
nominal inrush current (depending on mains input voltage)	$I_{L\ trans\ max\ (on)}$	A	< $I_{LN\ cont}$ (preload with current source)			
connected mains power with mains choke (at rated DC bus power; at U_{LN} = 400V)	$S_{LN\ (L\_DC)}$	kW	19	47	68	tbd
assigned mains choke type			HNL01.1R-0980-C0026	HNL01.1R-0590-C0065	HNL01.1R-0540-C0094	HNL01.1R-0300-C0180
power factor	cosφ	-	0,97			
DC bus voltage (range)	U_{DC}	V	750 (controlled)			
upper DC bus voltage limit [1]	$U_{DC\ limit\ (max)}$	V	900			
lower DC bus voltage limit (shutdown threshold) [2]	$U_{DC\ limit\ (min)}$	V	0,75 * √2 * U_{LN}			
continuous DC bus power (at U_{LN} =400V; infeeding and regenerative operation)	$P_{DC\ cont}$	kW	18	45	65	120
continuous DC bus power depending on mains input voltage			at U_{LN} < 400 V: 1% power reduction per 4 V at U_{LN} > 400 V: no power increasing			
DC bus peak power (for max. 0,3 s with a preload of 0,6 x $I_{LN\ cont}$ and 40 °C ambient temperature; infeeding and regenerative operation)	$P_{DC\ peak}$	kW	45	112	162	180
braking resistor switch-on threshold	$U_{DC(R\_DC\ On)}$	V	820			
continuous brake power (braking resistor)		kW	0,4	0,4	0,4	0
maximum brake power (braking resistor)		kW	36	90	130	0
brake energy absorption (braking resistor)		kWs	80	100	150	0
DC bus capacity	C_{DC}	µF	705	1880	2820	4950
output voltage	$U_{out\ eff}$	V	750 (controlled)			
maximum chargeable DC bus capacitance	C_{DCload_max}	mF	150 (charging duration: approx. 90 s)			

Designation	Symbol	Unit	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065	HMV01.1R-W0120 [3]
power dissipation at maximum continuous power (without braking resistor power and 24V supply, basic losses: see chapter "Control Voltage" Power consumption	P_{Diss}	W	290	680	800	3200
power losses per kW continuous DC bus power	$P_{W/kW}$	W/kW	14,4	14,2	10,6	25,5

1) For behavior in case limit is exceeded: see warning "E8025 Overvoltage in power section" and error message "F2817 Overvoltage in power section"

2) For behavior in case value falls below limit: see error message "F2026 Undervoltage in power section". When DC bus voltage falls below DC600V: see warning "E2026 Undervoltage in power section"

3) preliminary data

Fig. 6-2: Electrical data

WARNING

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

⇒ If you use other DC bus capacitors than those by Rexroth, you have to make sure that the discharge time of the DC bus capacitors is less than 30 minutes. If necessary, install the appropriate discharging device.

6.1 Control Voltage

Note: The data of HMV01.1R-W0120 are preliminary. Subject to change.

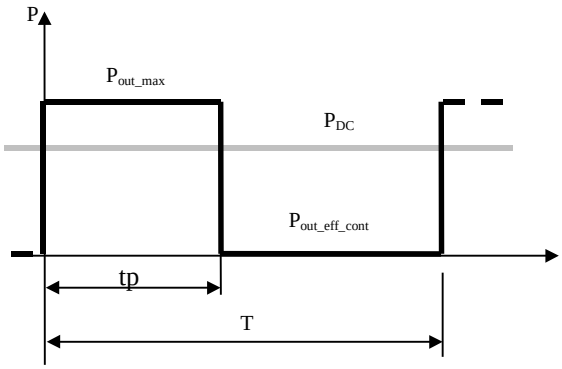
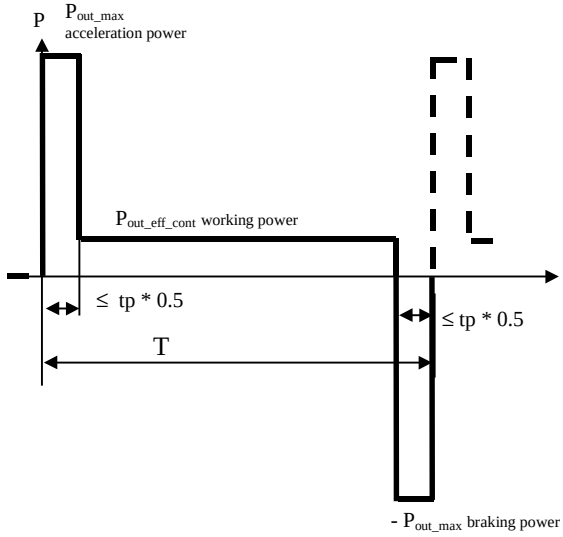
(Information at ambient temperature of 25 °C)

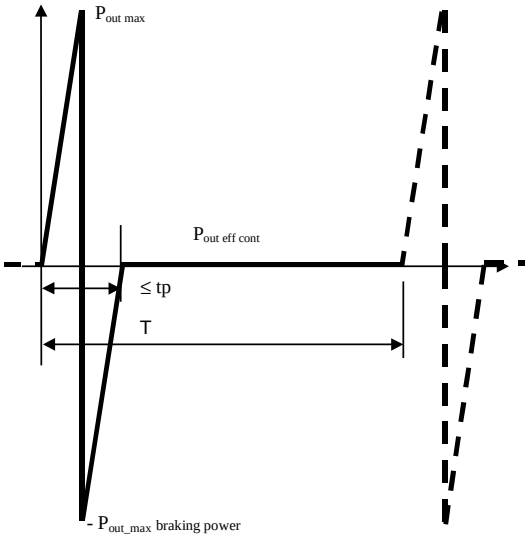
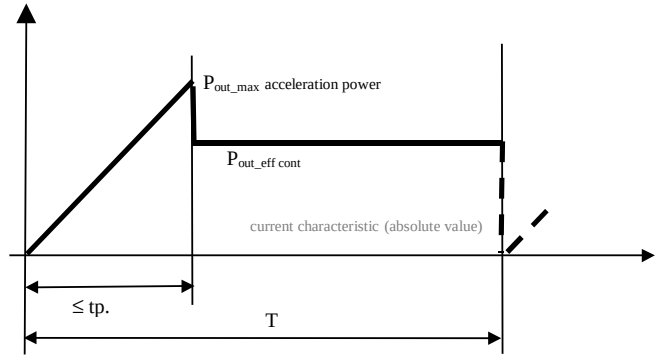
Designation		Symbol	Unit	Value
Control voltage		U_{N3}	V	24 ±5%, except HMV01.1R-W0120: 24 –20%; +15%
Max. ripple content		w	-	controlled
Max. allowed overvoltage		U_{N3max}	V	24 +20%, except HMV01.1R-W0120: 24 +15%
Max. charging current				
	HMV01.1-1E-W0030	I_{EIN3}	A	5
	HMV01.1-1E-W0075	I_{EIN3}	A	5.5
	HMV01.1-1E-W0120	I_{EIN3}	A	10
	HMV01.1-1R-W0018	I_{EIN3}	A	5.5
	HMV01.1-1R-W0045	I_{EIN3}	A	7
	HMV01.1-1R-W0065	I_{EIN3}	A	7.5
	HMV01.1-1R-W0120	I_{EIN3}	A	13 (incl. device blower)
Max. pulse duration of I_{EIN3}		$t_{EIN3Lade}$	ms	15, except • HMV01.1E-W0120: 50 • HMV01.1R-W0120: 2000
Max. input capacity		C_{N3}	mF	10, except HMV01.1R-W0120: 1
Power consumption (at +24 V):				
	HMV01.1-1E-W0030	P_{N3}	W	25
	HMV01.1-1E-W0075	P_{N3}	W	30
	HMV01.1-1E-W0120	P_{N3}	W	55
	HMV01.1-1R-W0018	P_{N3}	W	31
	HMV01.1-1R-W0045	P_{N3}	W	41
	HMV01.1-1R-W0065	P_{N3}	W	108
	HMV01.1-1R-W0120	P_{N3}	W	224 (incl. device blower)

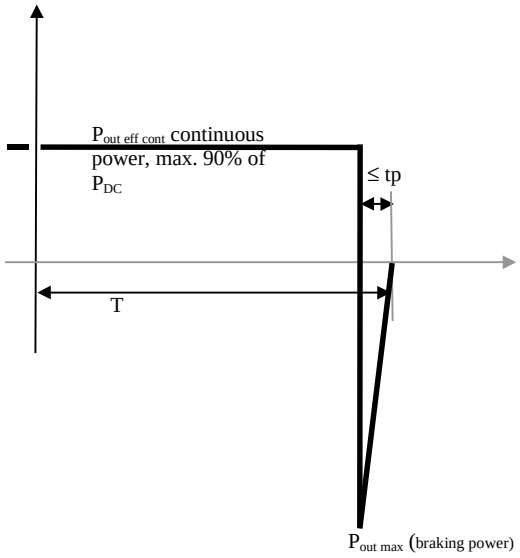
Fig. 6-3: Control voltage

6.2 Load Cycles

HMV01.1R

Designation	Symbol	Unit	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065	HMV01.1R-W0120 [1)]
Machine tool drive: main spindle short-time operation power cycle overload operation output power profile	-	-				
pulse duration	t_p	s	132	132	132	132
cycle time	T	s	300	300	300	300
maximum DC bus peak power	P_{out_max}	kW	120%	100%	105%	tbd
basic load	$P_{out\_eff\_cont}$	kW	0	0	0	0
Machine tool drive: main spindle milling spindle power cycle overload operation output power profile	-	-				
pulse duration	t_p	s	6	6	6	6
cycle time	T	s	60	60	60	60
maximum DC bus peak power	P_{out_max}	kW	250%	230%	205%	tbd
basic load	$P_{out\_eff\_cont}$	kW	20%	20%	20%	20%

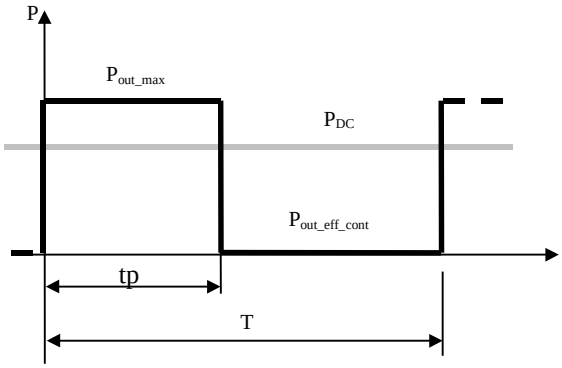
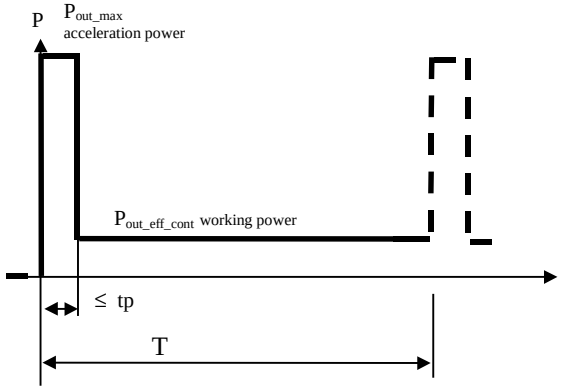
Designation	Symbol	Unit	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065	HMV01.1R-W0120 [1)]
Machine tool drive: servo drive acceleration power cycle overload operation output power profile	-	-				
pulse duration	t_p	s	0,4	0,4	0,4	0,4
cycle time	T	s	4	4	4	4
maximum DC bus peak power	P_{out_max}	kW	250%	250%	250%	tbd
basic load	$P_{out\_eff\_cont}$	kW	0	0	0	0
Printing machine drive: S1 acceleration power cycle overload operation output power profile	-	-				
pulse duration	t_p	s	60	60	60	60
cycle time	T	s	900	900	900	900
maximum DC bus peak power	P_{out_max}	kW	180%	140%	150%	tbd
basic load	$P_{out\_eff\_cont}$	kW	90%	90%	90%	90%

Designation	Symbol	Unit	HMV01.1R-W0018	HMV01.1R-W0045	HMV01.1R-W0065	HMV01.1R-W0120 [1)]
Printing machine drive: shutdown power cycle Waiting time of 60 s after shutdown not taken into account. overload operation output power profile	-	-				
pulse duration	t_p	s	10	10	10	10
cycle time	T	s	900	900	900	900
maximum DC bus peak power	P_{out_max}	kW	210%	160%	150%	tbd
basic load	$P_{out\_eff\_cont}$	kW	90%	80%	80%	tbd

1) preliminary data

Fig. 6-4: HMV01.1R – load cycles

HMV01.1E with Mains Choke

Designation	Symbol	Unit	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120
Machine tool drive: **main spindle** **short-time operation** **power cycle** overload operation output power profile	-	-			
pulse duration	t_p	s	132	132	132
cycle time	T	s	300	300	300
maximum DC bus peak power	P_{out_max}	kW	135%	130%	135%
basic load	$P_{out\_eff\_cont}$	kW	0	0	0
Machine tool drive: **main spindle** **milling spindle** **power cycle** overload operation output power profile	-	-			
pulse duration	t_p	s	3	3	3
cycle time	T	s	60	60	60
maximum DC bus peak power	P_{out_max}	kW	150%	150%	150%
basic load	$P_{out\_eff\_cont}$	kW	55%	55%	55%

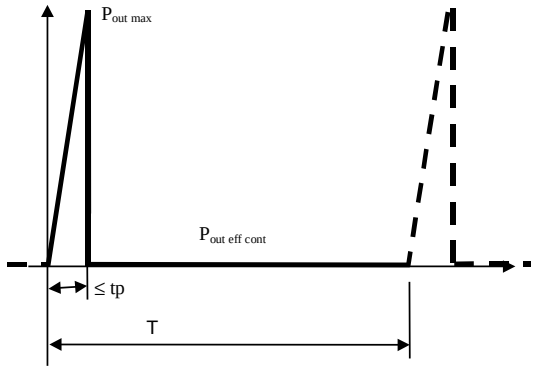
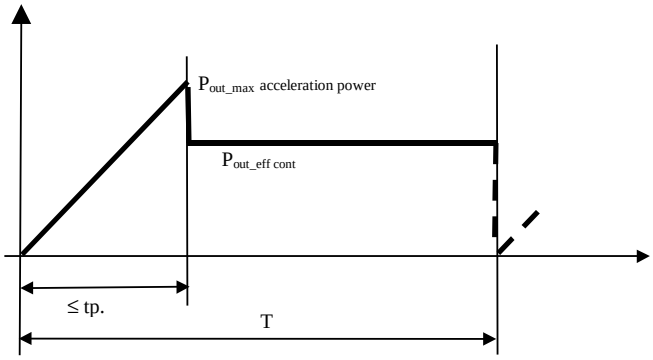
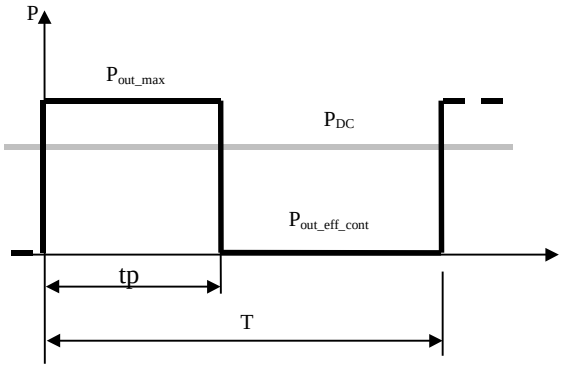
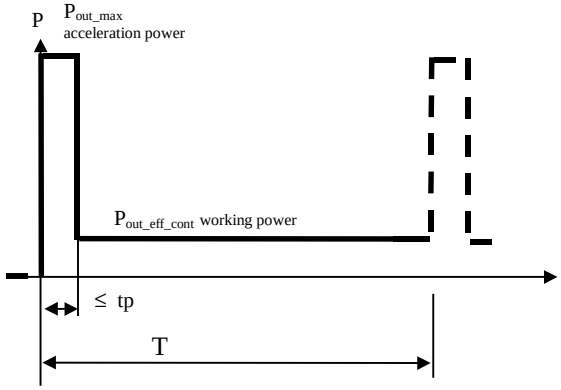
Designation	Symbol	Unit	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120
Machine tool drive: **servo drive** **acceleration** **power cycle** overload operation output power profile	-	-			
pulse duration	t_p	s	0,2	0,2	0,2
cycle time	T	s	4	4	4
maximum DC bus peak power	P_{out_max}	kW	150%	150%	150%
basic load	$P_{out\_eff\_cont}$	kW	0	0	0
Printing machine drive: S1 **acceleration** **power cycle** overload operation output power profile	-	-			
pulse duration	t_p	s	60	60	60
cycle time	T	s	900	900	900
maximum DC bus peak power	P_{out_max}	kW	150%	135%	150%
basic load	$P_{out\_eff\_cont}$	kW	90%	90%	90%

Fig. 6-5: HMV01.1E with mains choke - load cycles

HMV01.1E without Mains Choke

Designation	Symbol	Unit	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120
Machine tool drive: **main spindle** **short-time operation** **power cycle** overload operation output power profile	-	-			
pulse duration	t_p	s	132	132	132
cycle time	T	s	300	300	300
maximum DC bus peak power	P_{out_max}	kW	135%	135%	135%
basic load	$P_{out\_eff\_cont}$	kW	0	0	0
Machine tool drive: **main spindle** **milling spindle** **power cycle** overload operation output power profile	-	-			
pulse duration	t_p	s	3	3	3
cycle time	T	s	60	60	60
maximum DC bus peak power	P_{out_max}	kW	220%	210%	250%
basic load	$P_{out\_eff\_cont}$	kW	50%	50%	50%

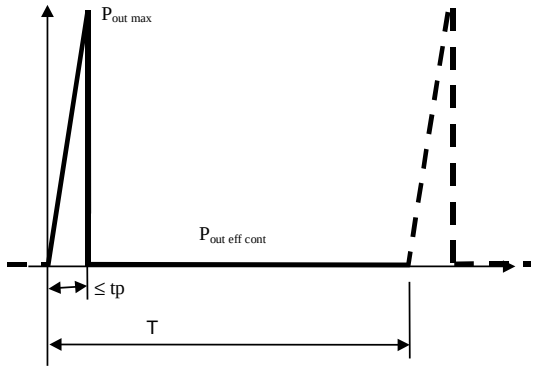
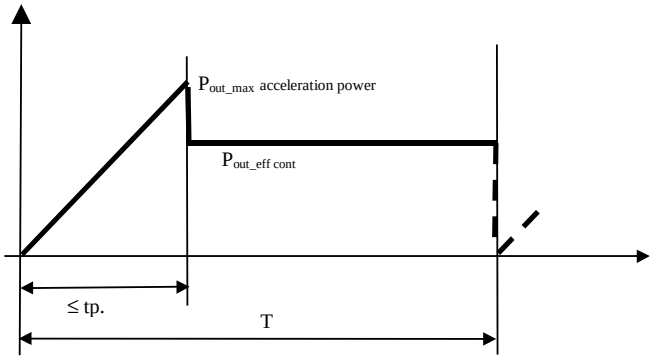
Designation	Symbol	Unit	HMV01.1E-W0030	HMV01.1E-W0075	HMV01.1E-W0120
Machine tool drive: **servo drive** **acceleration** **power cycle** overload operation output power profile	-	-			
pulse duration	t_p	s	0,2	0,2	0,2
cycle time	T	s	4	4	4
maximum DC bus peak power	P_{out_max}	kW	250%	250%	250%
basic load	$P_{out\_eff\_cont}$	kW	0	0	0
Printing machine drive: S1 **acceleration** **power cycle** overload operation output power profile	-	-			
pulse duration	t_p	s	60	60	60
cycle time	T	s	900	900	900
maximum DC bus peak power	P_{out_max}	kW	200%	160%	250%
basic load	$P_{out\_eff\_cont}$	kW	90%	90%	90%

Fig. 6-6: HMV01.1E without mains choke - load cycles

6.3 Connections

Connection Diagram

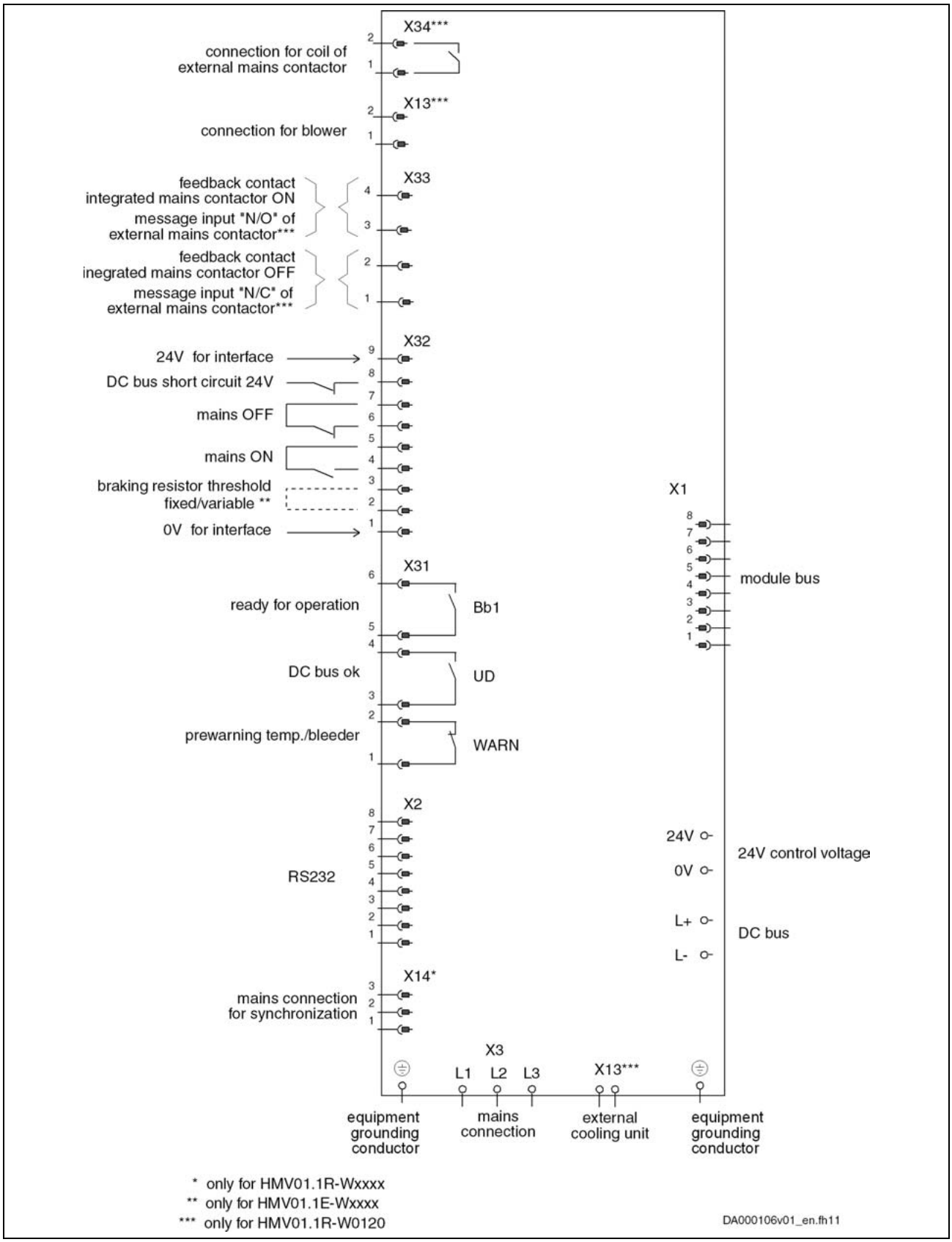


Fig. 6-7: Connection diagram

Overview

HMV01.1E-W0030 and HMV01.1E-W0075

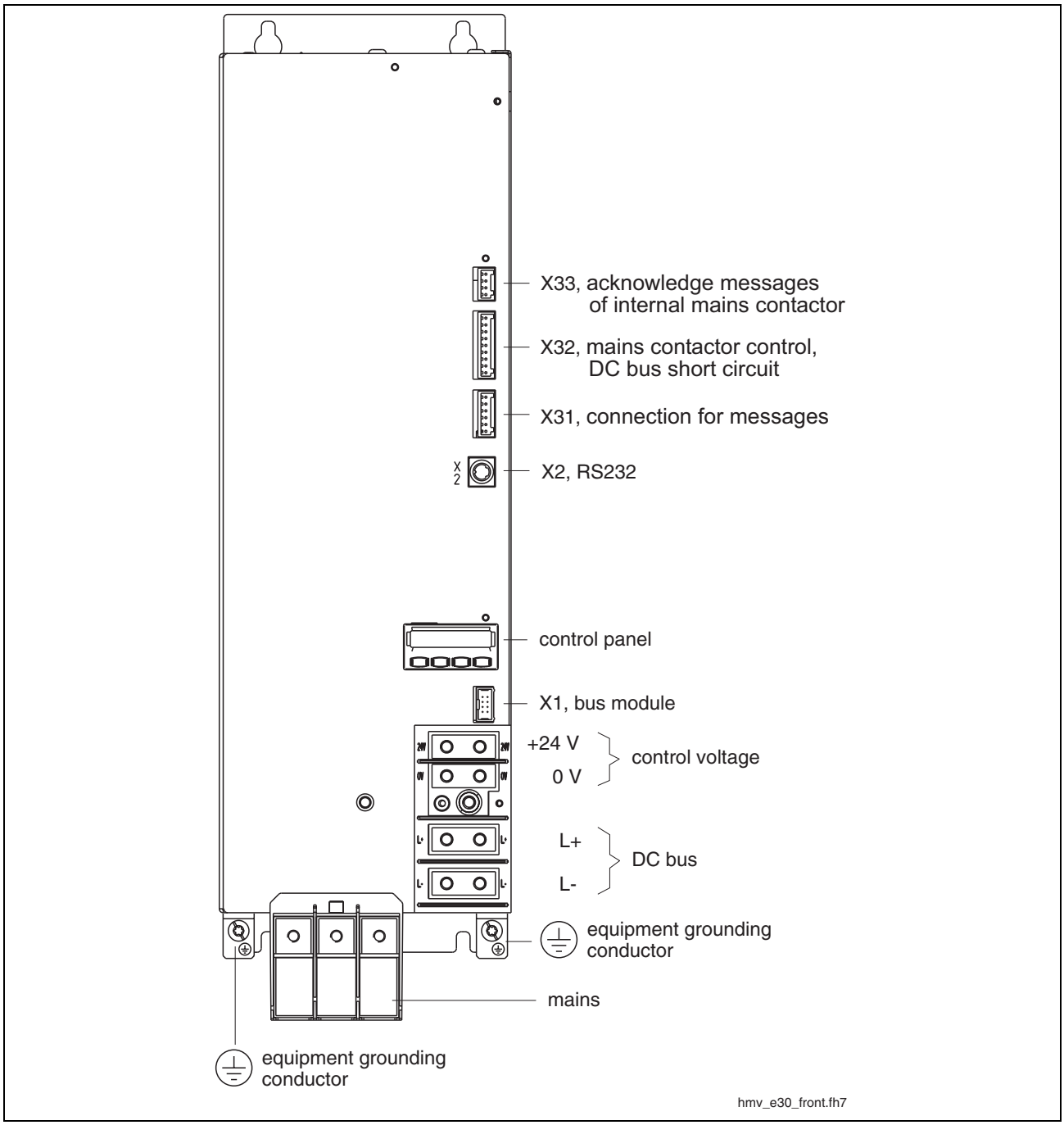


Fig. 6-8: HMV01.1E-W0030 and HMV01.1E-W0075

HMV01.1E-W0120

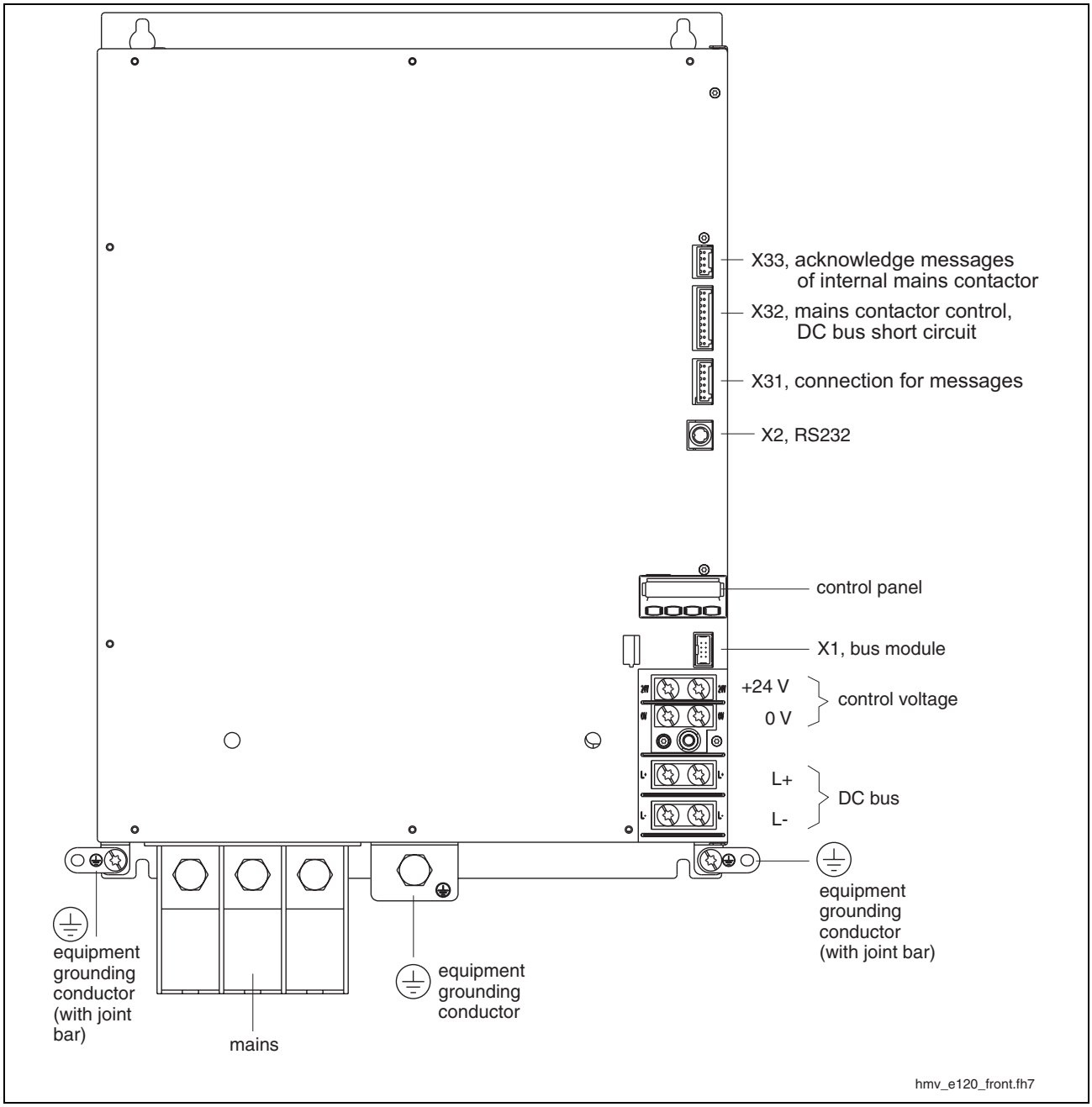


Fig. 6-9: HMV01.1E-W0120

HMV01.1R-W0018, -W0045, -W0065

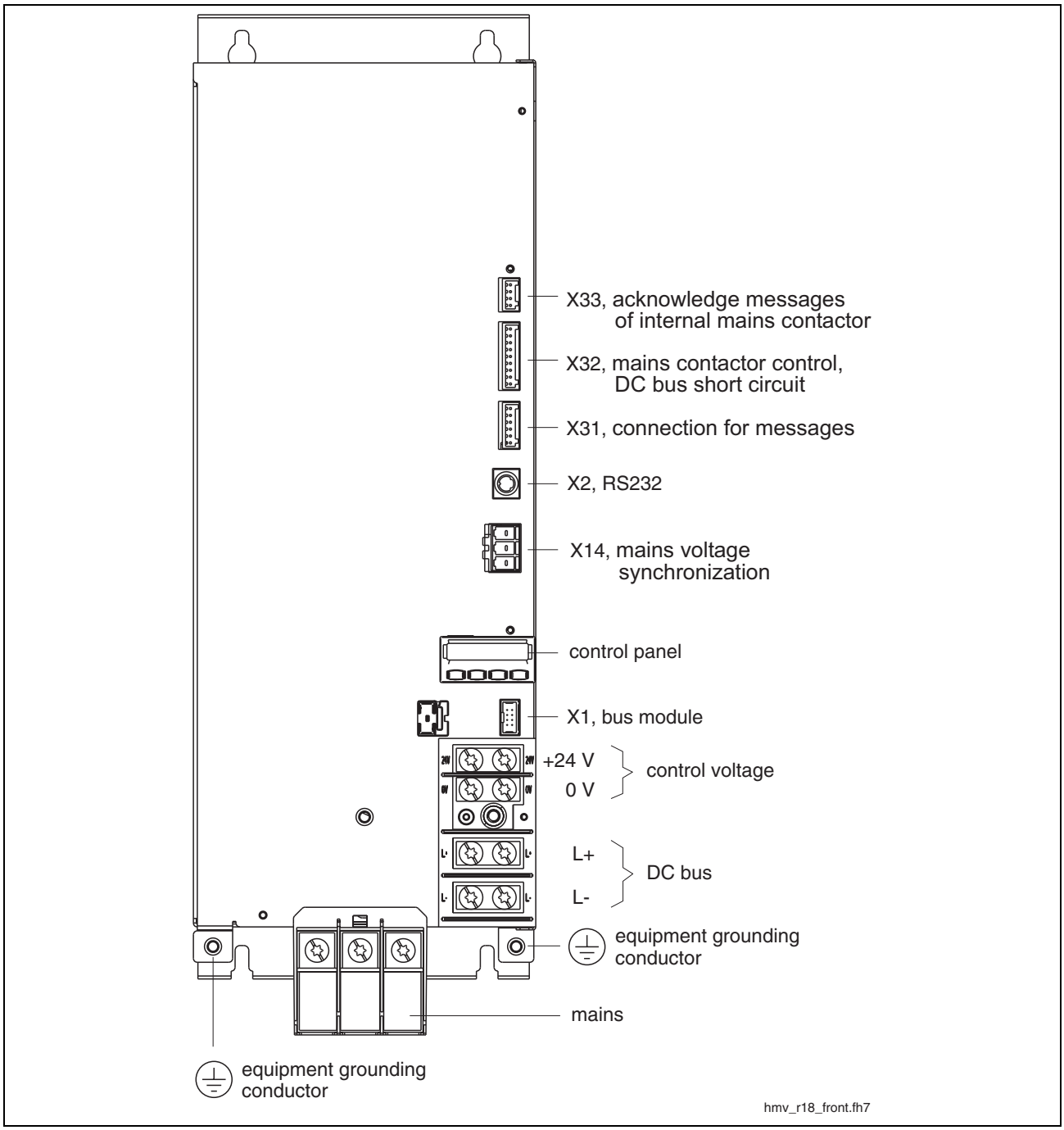


Fig. 6-10: HMV01.1R-W0018, -W0045, -W0065

HMV01.1R-W0120

Note: The data of HMV01.1R-W0120 are preliminary. Subject to change.

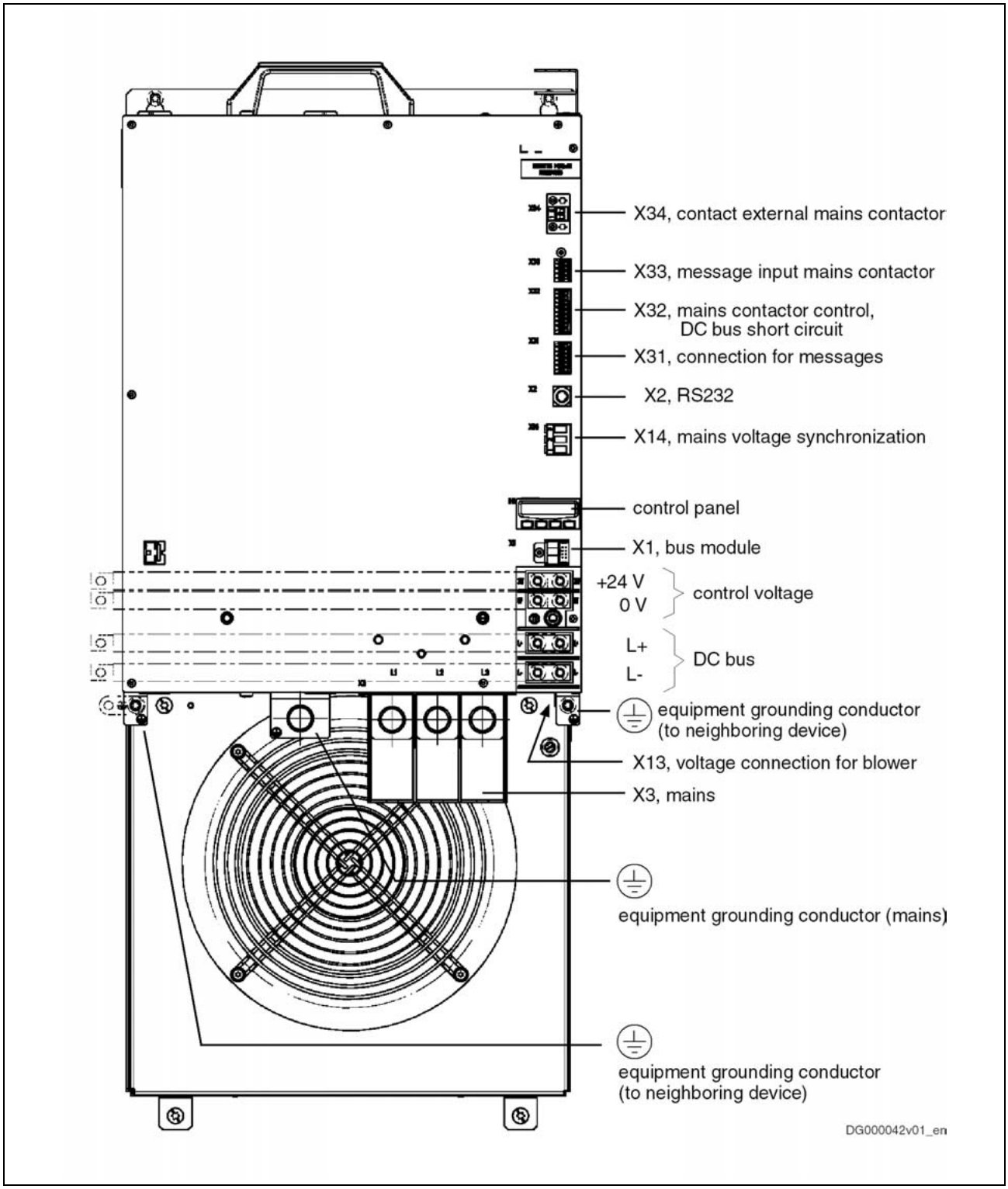


Fig. 6-11: HMV01.1R-W0120

Control Voltage (+24 V, 0 V)

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

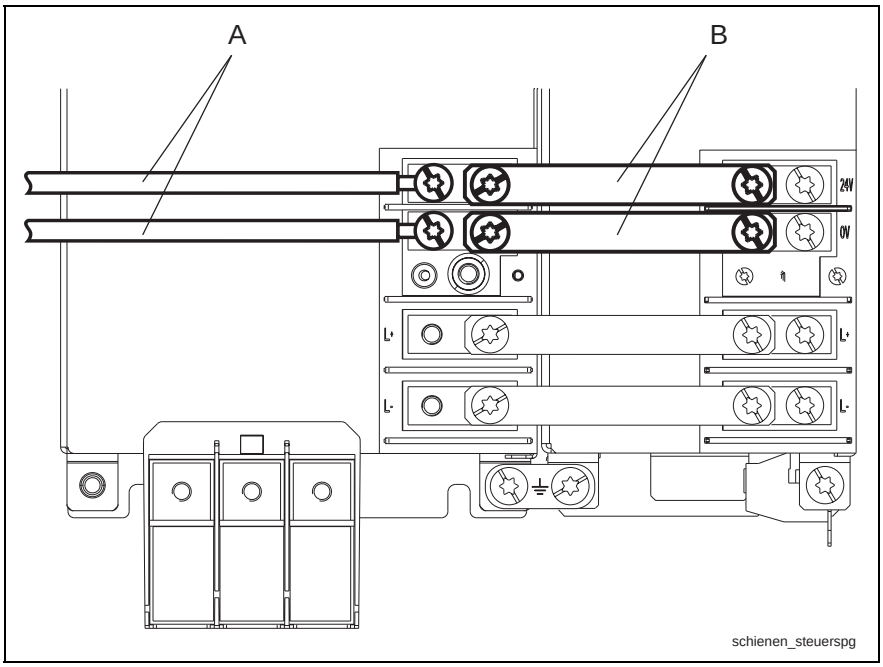
Note:
- Technical data: see page 6-5
- Falling short of the permissible control voltage leads to a corresponding error message (=> refer also to firmware functional description).
- Interruption to the control voltage when the motor is running leads to torque-free (brakeless) runout in the motor.
- If 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.



A: cables (to the source of control voltage)
B: contact rails

Fig. 6-12: Control voltage connection

Design

Connection of **external 24V power supply unit to the supply unit**:

Type	Cross section	Thread	Tightening torque
Cable	min. 1,5 mm^2	M6	6 Nm

Connection of **control voltage supply to the drive controller**:

Type	Cross section	Thread	Tightening torque
Contact rails	6 x 12 mm	M6	6 Nm

DC Bus (L+, L-)

Design

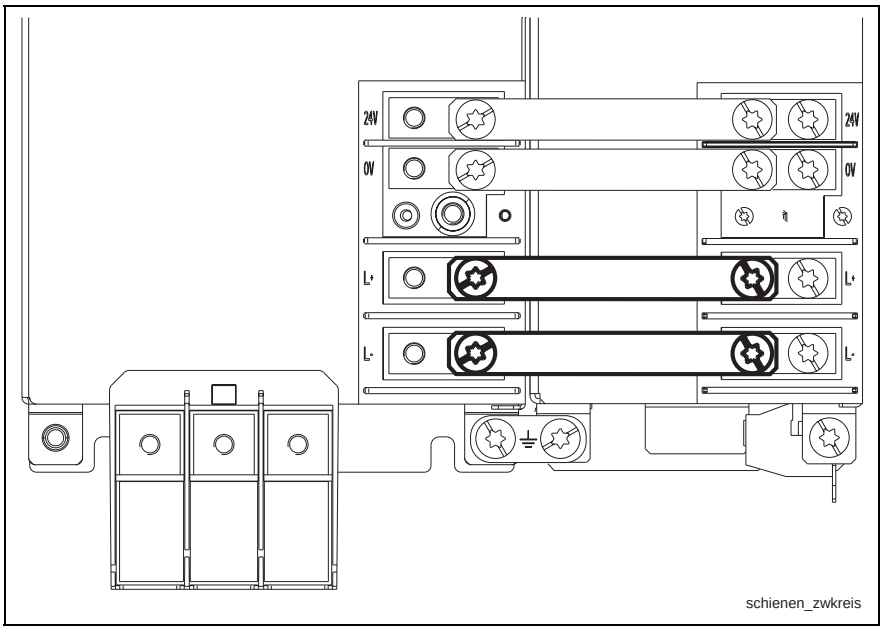


Fig. 6-13: Contact rails

Type	Cross section	Thread	Tightening torque
Contact rails	6 x 12 mm	M6	6 Nm

There are various lengths of contact rail depending on the width of the drive controllers (see Project Planning Manual "Rexroth IndraDrive Drive System" (DOK-INDRV*-SYSTEM*****-PRxx-EN-P)).

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 wires (see Project Planning Manual "Rexroth IndraDrive Drive System" (DOK-INDRV*-SYSTEM*****-PRxx-EN-P)).

Equipment Grounding Conductor

Equipment Grounding Conductor for the Mains

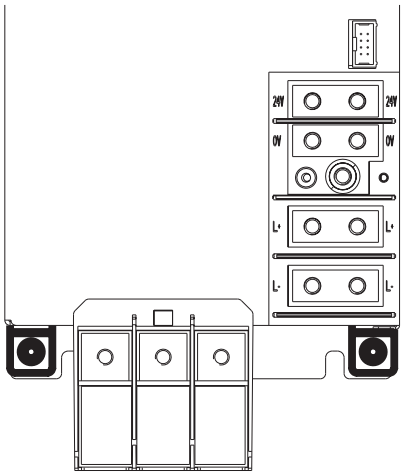
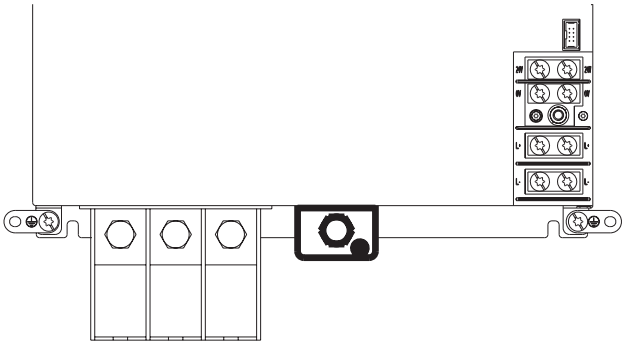
HMV01.1E-W0030, -W0075 HMV01.1R-W0018, -W0045, -W0065	HMV01.1E-W0120; HMV01.1R-W0120
	

Fig. 6-14: Equipment grounding conductor

Design The wire is fixed to the supply unit with screws:

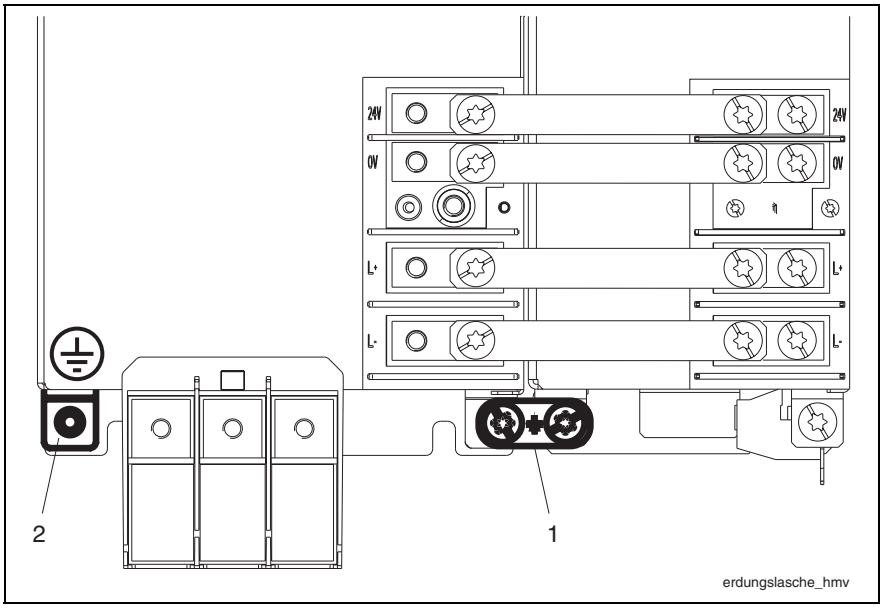
HMV01.1E-W0030, -W0075 HMV01.1R-W0018, -W0045, -W0065	HMV01.1E-W0120; HMV01.1R-W0120
M6 x 25	M10

Tightening Torque

HMV01.1E-W0030, -W0075 HMV01.1R-W0018, -W0045, -W0065	HMV01.1E-W0120; HMV01.1R-W0120
6 Nm	18 Nm

Equipment Grounding Connection to Neighboring Devices

The equipment grounding connection to a neighboring device is done via a joint bar (see figure below).



1: joint bar
2: point of connection for equipment grounding conductor

Fig. 6-15: Equipment grounding connection to neighboring devices

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

Type	Thread	Screws	Tightening torque
Joint bar	M6	M6x25	6 Nm

X1, Module Bus

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

Graphic Representation

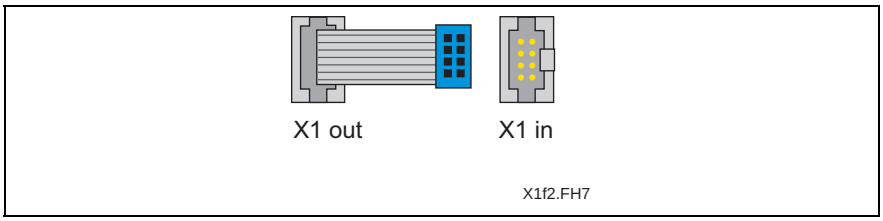


Fig. 6-16: X1

Design

Type	Number of poles	Type of design
Ribbon cable male connector	8	Male (device)
Ribbon cable female connector	8	Female (ribbon cable)

Fig. 6-17: Design

To extend the length of the module bus cable you can use our cable **RKB0001**. You can order following cable length: 0.5 … 40 m in steps of 0.5 m.

X2, RS232

RS232 Interface

The RS232 interface is required for diagnosis during commissioning and servicing.

The interface permits:

- a maximum of one node
- transmission length of up to 15 m
- baud rates of 9600/19200 baud

As diagnosis cable you can use our cable IKB041 (length: 2 m resp. 5 m)

Graphic Representation

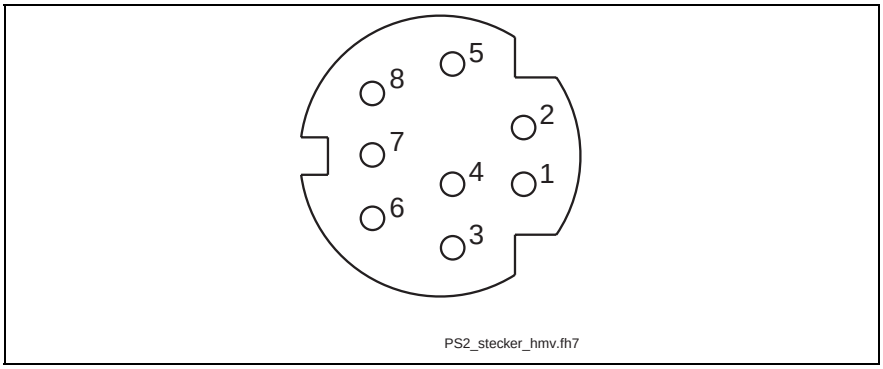


Fig. 6-18: X2

Design

Type	Number of poles	Type of design
MiniDIN	8	Male (device)

Fig. 6-19: Design

Connection Cross Section

Cross section single-wire [mm²]	Cross section multiwire [mm²]	Cross section in AWG Gauge No.
--	0.25 – 0.5	--

Fig. 6-20: Connection cross section

Connection

n.c.	1
n.c.	2
RS232_TxD	3
GND	4
RS232_RxD	5
n.c.	6
n.c.	7
n.c.	8

GND is connected to the housing. The cable shield is connected to the control section via the housing of the connector.

Note: The interface does not have an electrical isolation. The electrode voltage between control section and connected data terminal equipment must not exceed 1 V.

X3, Mains Connection

Graphic Representation

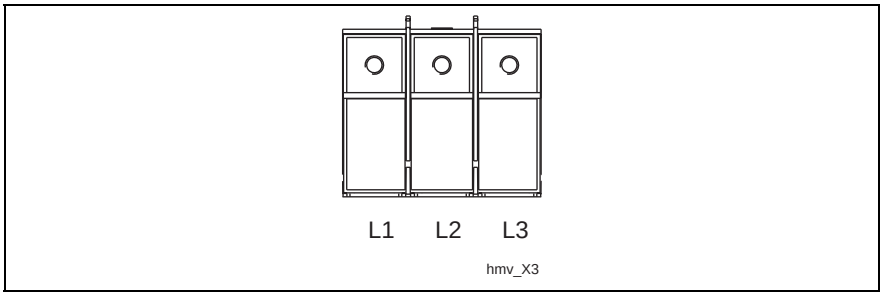


Fig. 6-21: X3

Design

HMV01.1	Type	Number of poles	Type of design
all	Terminal block	3	Threaded terminal end

Fig. 6-22: Design

Connection Cross Section

HMV01.1E-	Cross section single-wire [mm²]	Cross section multiwire [mm²]	Cross section in AWG
W0030	16	16	6
W0075	50	50	0
W0120	120	120	4/0

HMV01.1R-	Cross section single-wire [mm²]	Cross section multiwire [mm²]	Cross section in AWG
W0018	6	6	10
W0045	25	25	4
W0065	50	50	0
W0120	120	120	4/0

Fig. 6-23: Connection cross sections

Tightening Torque

HMV01.1E-	Torque [Nm]
W0030	6
W0075	6
W0120	18

HMV01.1R-	Torque [Nm]
W0018	6
W0045	6
W0065	6
W0120	18

Fig. 6-24: Tightening torques

The cables are connected via ring cable lugs:

- HMV01.1E-W210; HMV01.1R-W0120: M10
- all other devices: M6

X13, Connection for External Blower

Via this connection, the external blower unit (HAB01) of HMV01.1R-W0120 devices is supplied with voltage (24V, 0V). The connection is situated at the bottom of the device.

Note: Never operate HMV01.1R-W0120 without external blower unit. Do not operate any other loads at connection X13.

Fig. 6-25: Connection X13 at bottom of device

X14, Mains Voltage Synchronization

Description

The X14 interface is only available for regenerative supply units (HMV01.1R). It is used to connect the mains voltage synchronization.

Graphic Representation

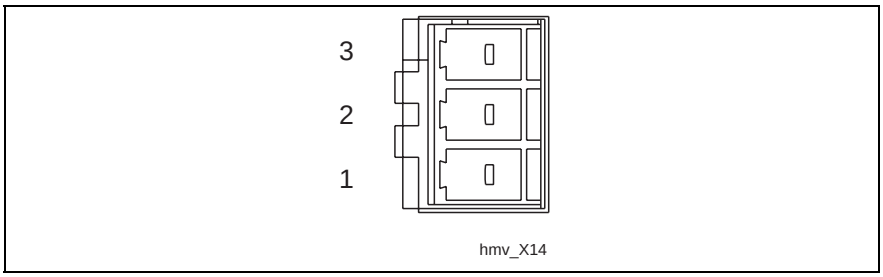


Fig. 6-26: X14

Design

Type	Number of poles	Type of design
LE 7,62 M PC 4,0 / 3G	3	Connector on device

Fig. 6-27: Design

Connection cross section

Cross section single-wire [mm²]	Cross section multiwire [mm²]	Cross section in AWG Gauge No.
1,5 - 4	1,5 – 2,5	14 - 12

Fig. 6-28: Connection cross section

Connection

Pin no.	Description	Level	Notes
3	mains connection phase L3 before choke	max. 900V	current load max. 5A
2	mains connection phase L2 before choke	max. 900V	current load max. 5A
1	mains connection phase L1 before choke	max. 900V	current load max. 5A

Fig. 6-29: Connection X14

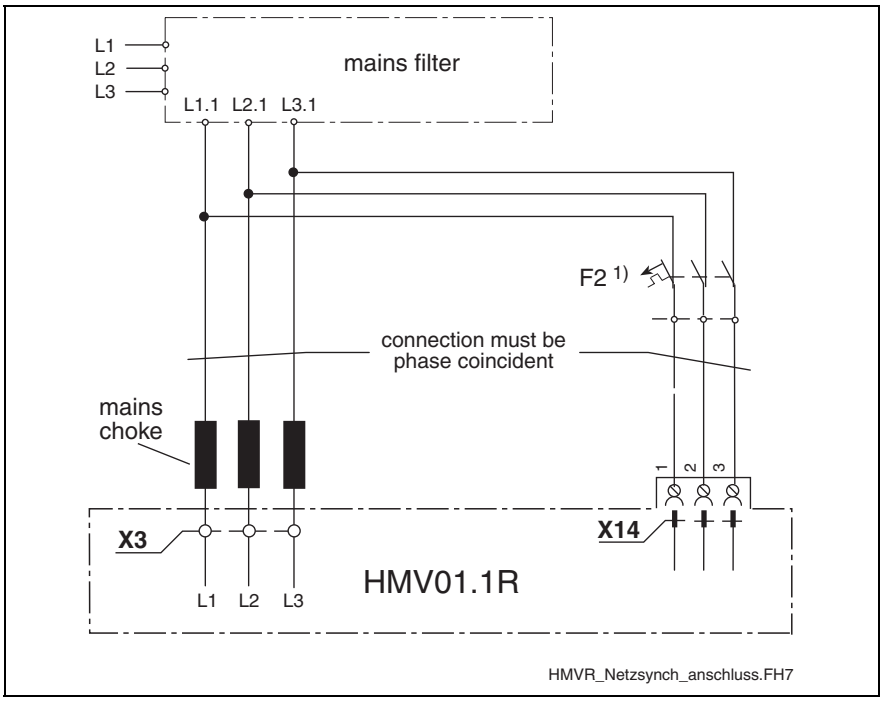
Note: Install fuses in the supply line to connection X14. Recommended fuse selection: 5A, slow.

Observe the instructions in the documentation "Rexroth IndraDrive Drive System – Project Planning Manual".

Synchronizing to the Mains

The synchronizing voltage must be tapped before the mains choke but after the mains filter. Power and synchronizing voltage connection must be in phase (see figure below).

The synchronizing voltage must be connected to the control voltage inlet (X14) of the HMV01.1R.



1) Fusing X14: See Project Planning Manual "Rexroth IndraDrive Drive System" (DOK-INDRV*-SYSTEM*****-PRxx-EN-P).

Fig. 6-30: Synchronizing voltage HMV01.1R

Note: Connect the connections X3 and X14 in phase:

X3.L1 in phase with X14.1

X3.L2 in phase with X14.2

X3.L3 in phase with X14.3

X31, Connection for Messages

Description

The X31 interface is used as a connection for messages.

Graphic Representation

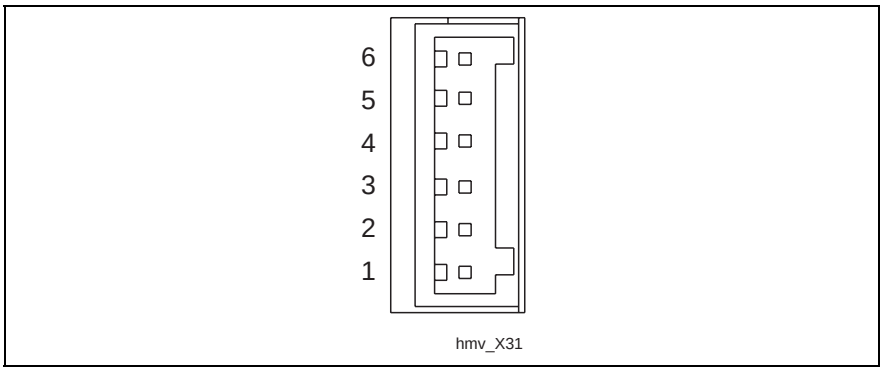


Fig. 6-31: X31

Design

Type	Number of poles	Type of design
LK06-1M WIN R3,5 series 0734	6	Female (device)

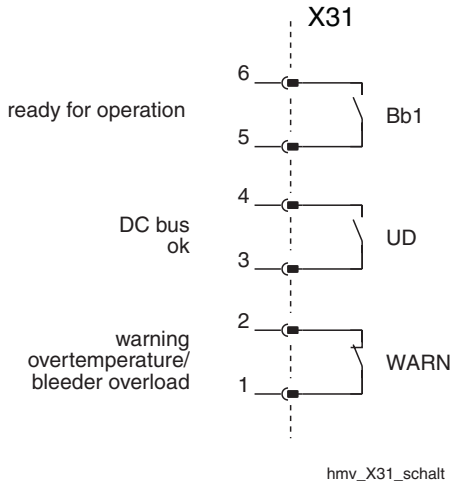
Fig. 6-32: Design

Connection Cross Section

Cross section single-wire [mm²]	Cross section multiwire [mm²]	Cross section in AWG Gauge No.
0,14 - 1,5	0,14 - 1,5	28 - 16

Fig. 6-33: Connection cross section

Connection



Name	Pin no.	Description	Level	Notes
Bb1_1	6	supply unit ready for operation (N/O contact)	contact	load DC 30V / 1A minimum load 10mA inrush current max. 5A contact closes: if no error is present contact opens: if error is present
Bb1_2	5			
UD_1	4	power supply ok (N/O contact)	contact	load DC 30V / 1A minimum load 10mA inrush current max. 5A contact closes: if DC bus voltage is within the specified range contact opens: if DC bus voltage is too low resp. in case of mains failure
UD_2	3			
WARN_1	2	warning signal for overtemperature and braking resistor overload (N/C contact)	contact	load DC 30V / 1A minimum load 10mA inrush current max. 5A contact closes: setting by default contact opens: in case of braking resistor overload resp. overtemperature
WARN_2	1			

Fig. 6-34: Connection X31

Note: In prototype versions of the supply units the WARN contact was an N/O contact. Since the following states of index the WARN contact is an N/C contact:
- HMV01.1E-W0030 since index -14,
- HMV01.1E-W0075 since index -14,
- HMV01.1E-W0120 since index -15,
- HMV01.1R-W0018 since index -17,
- HMV01.1R-W0045 since index -17,
- HMV01.1R-W0065 since index -18

Chronological Sequence When Switching ON and OFF

See chapter 11.1

X32, Mains Contactor Control, DC Bus Short Circuit, Braking Resistor Threshold

Description

The X32 interface is used to connect

- the mains contactor control
- the DC bus short circuit
- the switching signal for braking resistor threshold

Note: You find a detailed description of the mains contactor control in the Project Planning Manual "Rexroth IndraDrive Drive System" (DOK-INDRV*-SYSTEM*****-PRxx-EN-P).

Graphic Representation

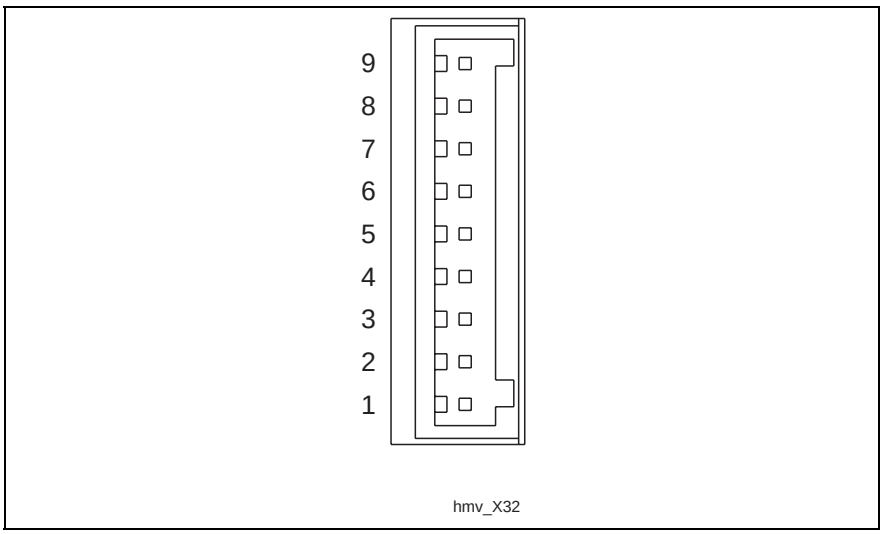


Fig. 6-35: X32

Design

Type	Number of poles	Type of design
LK09-1M WIN R3,5 series 0734	9	Female (device)

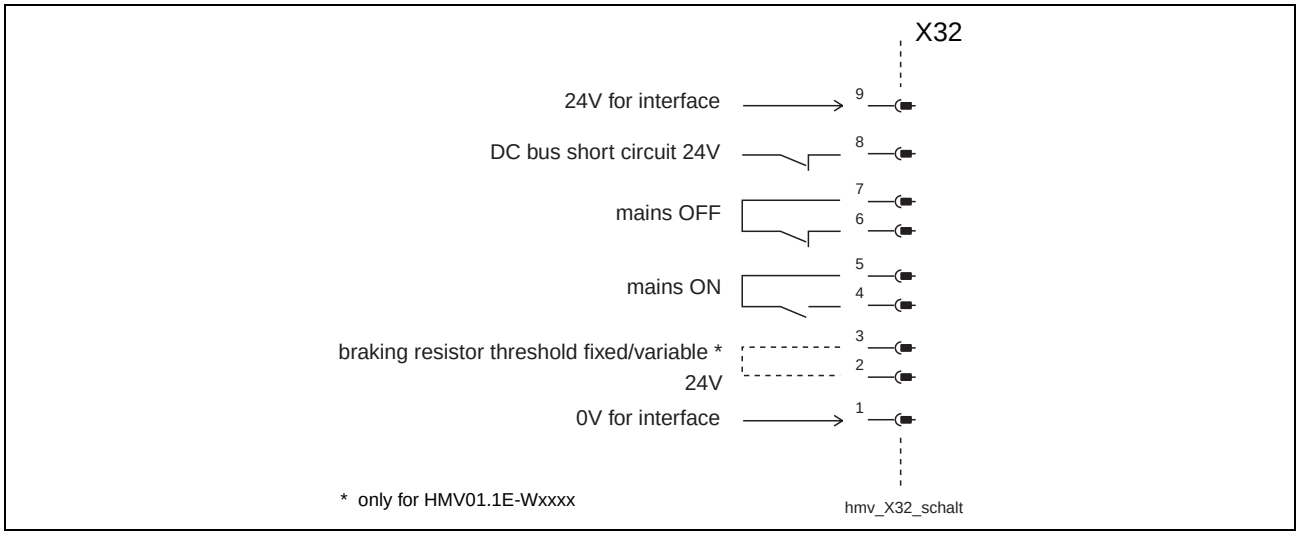
Fig. 6-36: Design

Connection Cross Section

Cross section single-wire [mm²]	Cross section multiwire [mm²]	Cross section in AWG Gauge No.
0,14 - 1,5	0,14 - 1,5	28 - 16

Fig. 6-37: Connection cross section

Connection



Name	Pin no.	Description	Level	Notes
24V_IF	9	24V supply for interface (input) for mains contactor control and DC bus short circuit function	24V ±5%	The 24V voltage can be picked off the control voltage or a separate 24V supply. Input current approx. 100 mA
DC bus s.c.	8	activating DC bus short circuit function	24V	no DC bus short circuit function => 24V via external contact
OFF1	7	switching off mains contactor	24V	for switching mains contactor on => pins 6 + 7 jumpered via N/O
OFF2	6			
ON1	5	switching on mains contactor	24V	switching mains contactor on by closing pins 4 + 5 for longer than 250 ms (pushbutton) for switching on a pulse edge is necessary
ON2	4			
braking resistor threshold	3	switching signal for braking resistor threshold	24V	for HMV01.1E only switching between braking resistor threshold • threshold **fixed**: independent from mains voltage input jumpered to Pin 2threshold **variable:** dependent from mains voltage input open; (concerning braking resistor threshold see electrical data HMV01.1E on page 6-1)
24V	2	output 24V	24V	for jumper on pin 3 for switching the braking resistor threshold
0V	1	0V reference signal	0V	0V reference potential for interface

Fig. 6-38: Connection X32

X33, Acknowledge Messages of Mains Contactor

Description

The X33 interface is used as a connection for acknowledge messages of the external resp. internal mains contactor.

Note: Observe that HMV01 with integrated mains contactor **provide** acknowledge messages, HMV01 with external mains contactor **receive** acknowledge messages.

Graphic Representation

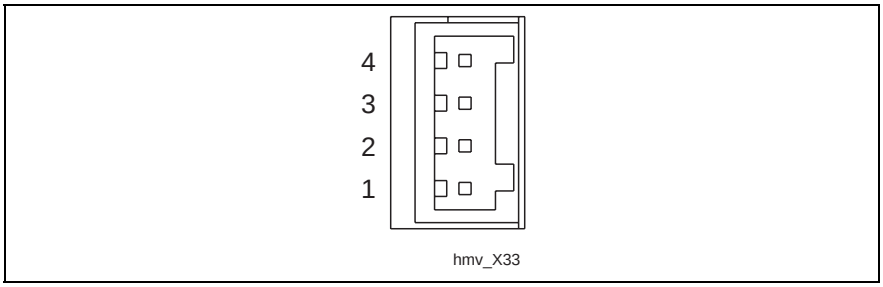


Fig. 6-39: X33

Design

Type	Number of poles	Type of design
LK04-1M WIN R3,5 series 0734	4	Female (device)

Fig. 6-40: Design

Connection Cross Section

Cross section single-wire [mm²]	Cross section multiwire [mm²]	Cross section in AWG Gauge No.
0,14 - 1,5	0,14 - 1,5	28 - 16

Fig. 6-41: Connection cross section

Connection

HMV01.1 with **integrated** mains contactor

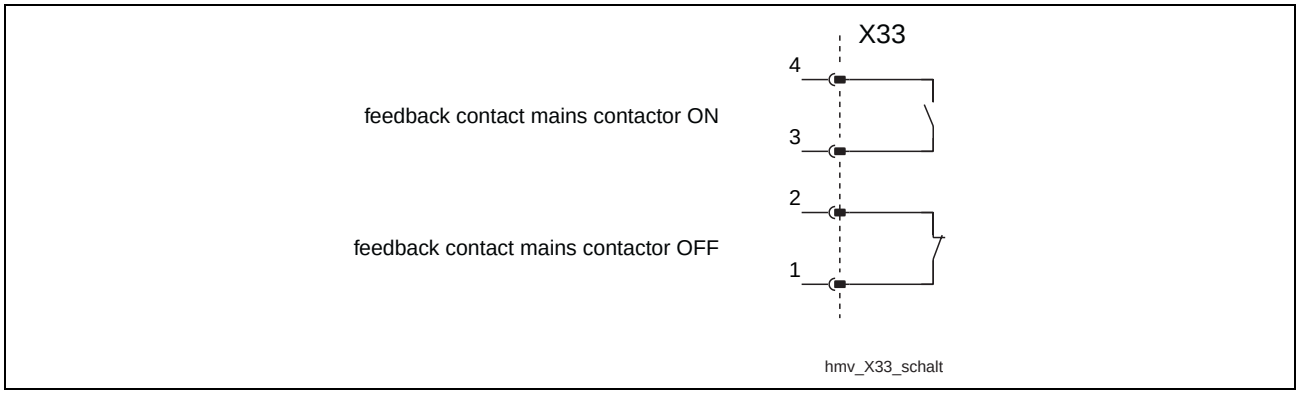


Fig. 6-42: Connection X33, HMV01 with integrated mains contactor

Connection	Function
X33.4	N/O (integrated in HMV01): feedback from integrated mains contactor (ON)
X33.3	
X33.2	N/C (integrated in HMV01): feedback from integrated mains contactor (OFF)
X33.1	

Fig. 6-43: Function X33, HMV01 with integrated mains contactor

Data	Unit	min.	typ.	max.
current load capacity	A			1
allowed peak current when switching on	A			5
voltage load capacity	V			DC 30
minimum contact load	mA	10		
contact resistance at minimum current	mOhm			1000
switching actions at max. time constant of load		100.000		
number of mechanical switching cycles			$1 * 10^6$	
time constant of load	ms			50
pick up delay	ms			10
drop out delay	ms			10

Fig. 6-44: Contactor contact X33, HMV01 with integrated mains contactor

Connection HMV01.1 with **external** mains contactor (e.g. HMV01.1R-W0120)

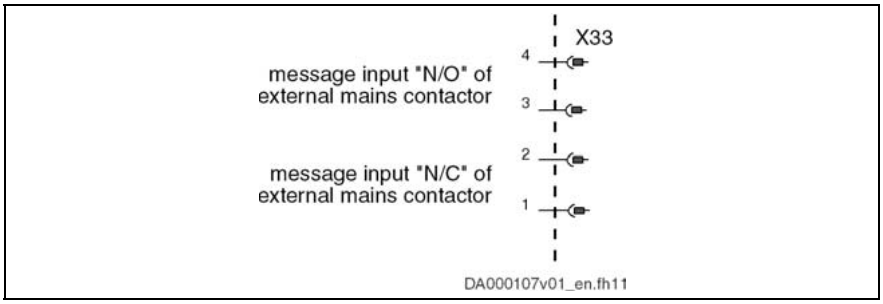


Fig. 6-45: Connection X33, HMV01 with external mains contactor

Connection	Function
X33.4	connection for an "N/O" contact of the external mains contactor; used as feedback of the status of the external mains contactor
X33.3	
X33.2	connection for an "N/C" contact of the external mains contactor; used as feedback of the status of the external mains contactor
X33.1	

Fig. 6-46: Function X33, HMV01 with external mains contactor

Data	Unit	min.	typ.	max.
allowed input voltage X33.1/2 and X33.3/4	V			30

Fig. 6-47: Acknowledge inputs X33, HMV01 with external mains contactor

X34, Contact for Controlling the External Mains Contactor

Description

The contact at X34 is used to control the external mains contactor of HMV01.1R-W0120 devices. The contact is integrated in the control circuit of the mains connection.

Note: Only use mains contactors with overvoltage limiter at the contactor coil (e.g. mains contactor 3RT1456-6AP36 with overvoltage limiter 3RT1956-1CD00 by Siemens).

Graphic Representation

Fig. 6-48: X34

Design

Type	Number of poles	Type of design
Spring terminal	2	Female (device)

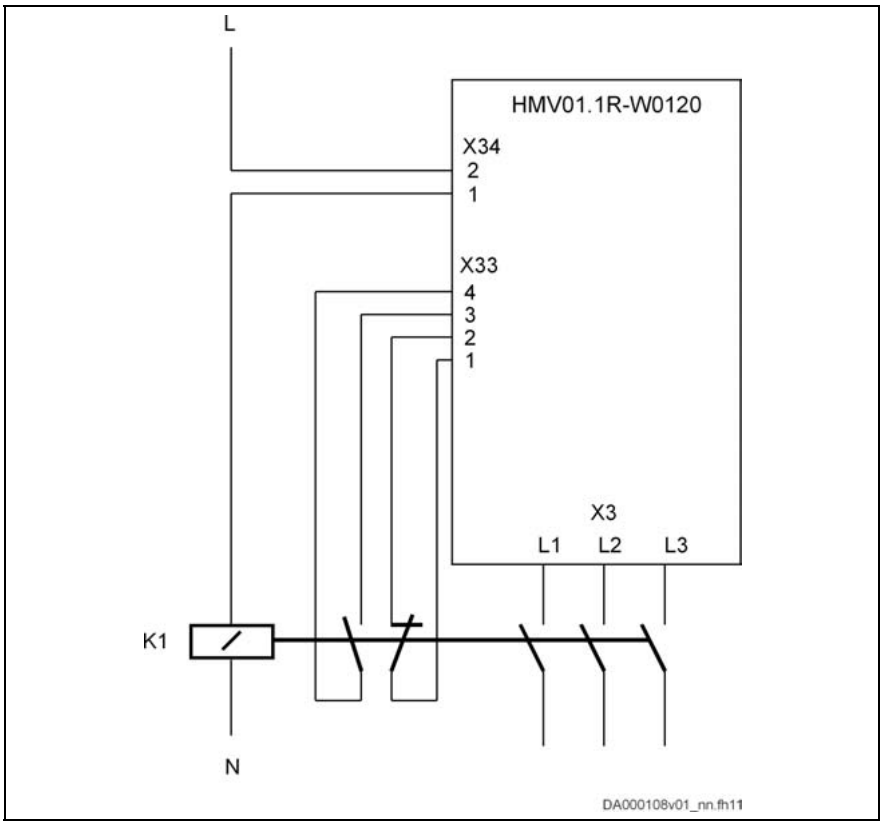
Fig. 6-49: Design

Connection Cross Section

Cross section single-wire [mm²]	Cross section multiwire [mm²]	Cross section in AWG Gauge No.
0,14 - 1,5	0,14 - 1,5	28 - 16

Fig. 6-50: Connection cross section

Connection Diagram - Block Diagram



K1: external mains contactor

Fig. 6-51: X34 Connection diagram - block diagram

Connection

Connection	Function
2	
1	DA000017v01_nn.FH9

Fig. 6-52: Connection X34

Data	Unit	min.	typ.	max.
current load capacity	A			DC 1 AC 2
voltage load capacity	V			DC 30 AC 250
contact resistance at minimum current	mOhm			1000
switching actions at max. time constant of load		100.000		
number of mechanical switching cycles				$1 * 10^6$
time constant of load	ms			50
pick up delay	ms			10
drop out delay	ms			10

Fig. 6-53: Relay contact X34

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 supply unit following connection work.

⇒ Never mount a damaged touch guard.

⇒ Immediately replace a damaged touch guard by an undamaged touch guard.

7.1 Cutouts

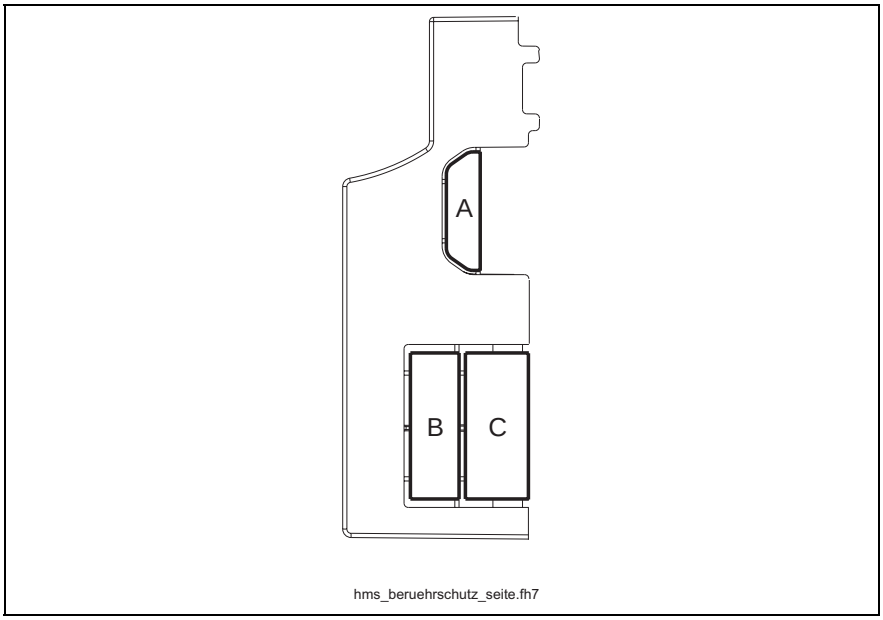


Fig. 7-1: Cutouts at the touch guard

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 devices connected to each other there **mustn't any** cutout be broken off at the outer side of the touch guard.

7.2 Mounting

The touch guard must always be mounted following connection work.

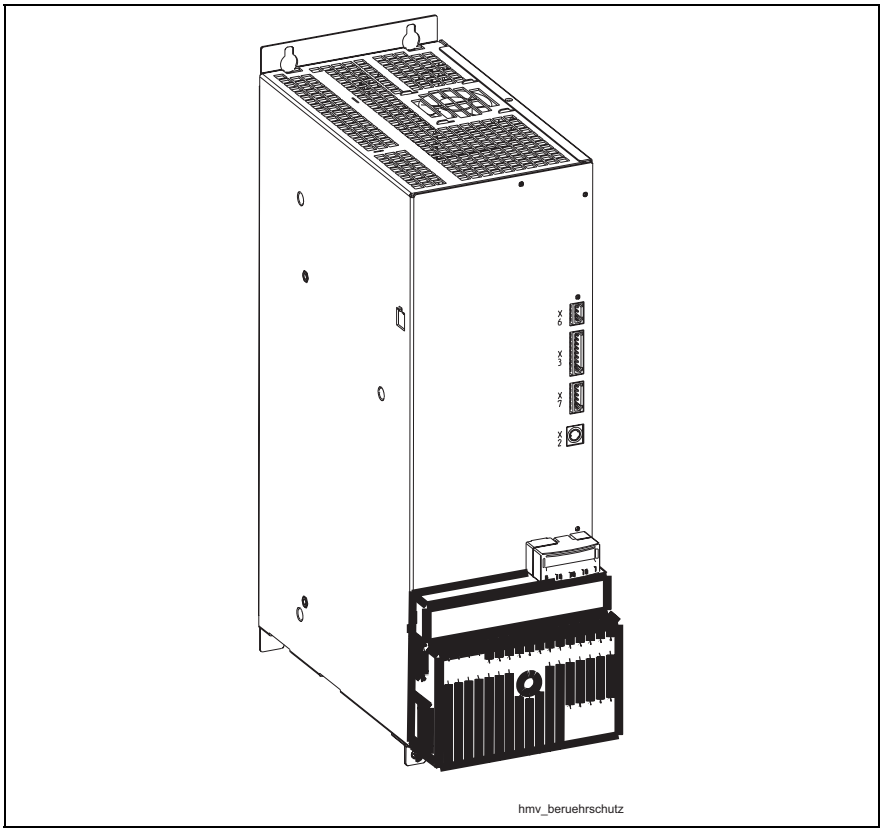


Fig. 7-2: Touch guard

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 Control Panel

8.1 Brief Description

Rexroth IndraDrive supply units have a standard control panel with an 8-digit display and four keys.

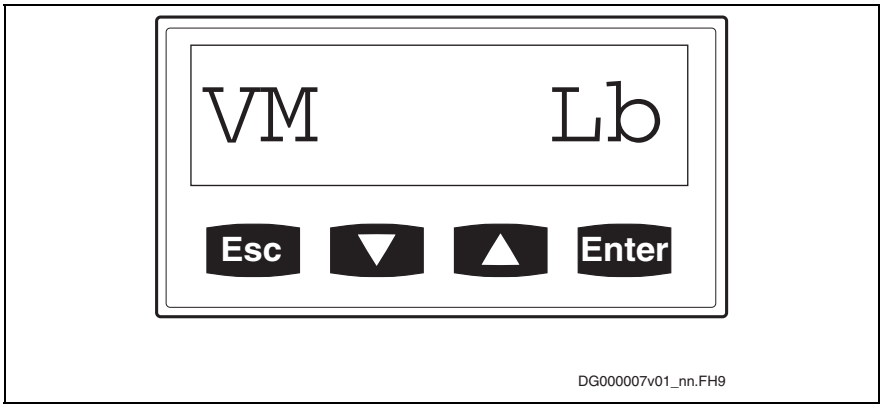


Fig. 8-1: Standard control panel

8.2 Functional Description

Displays

The display automatically shows:

- phases during device initialization
- operating states
- activated commands
- diagnostic command messages
- warnings
- diagnostic error messages

Display during Device Initialization

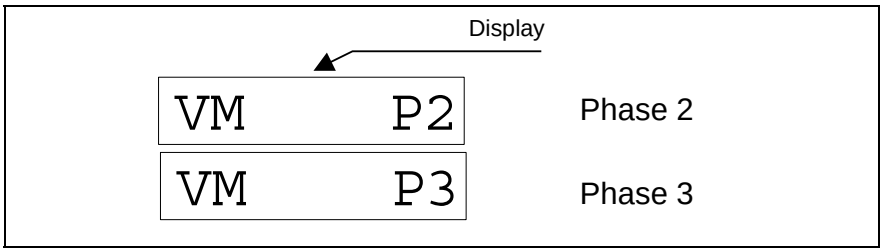


Fig. 8-2: Display during device initialization

Display of Operating States

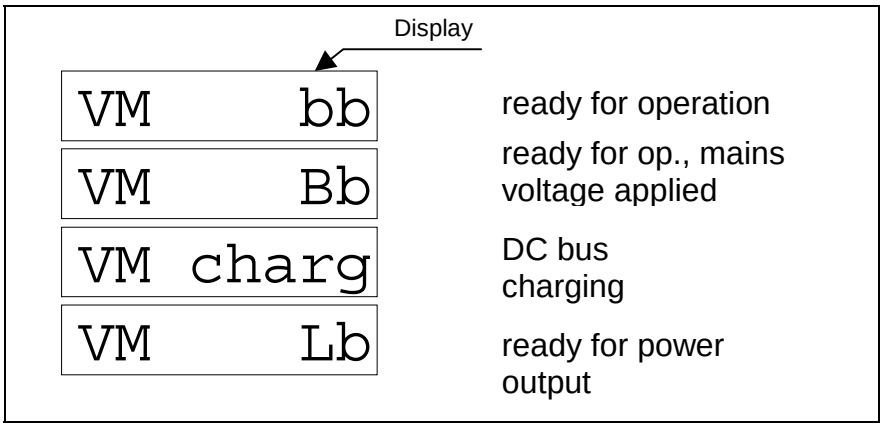


Fig. 8-3: Display of operating states

Diagnostic Command Messages

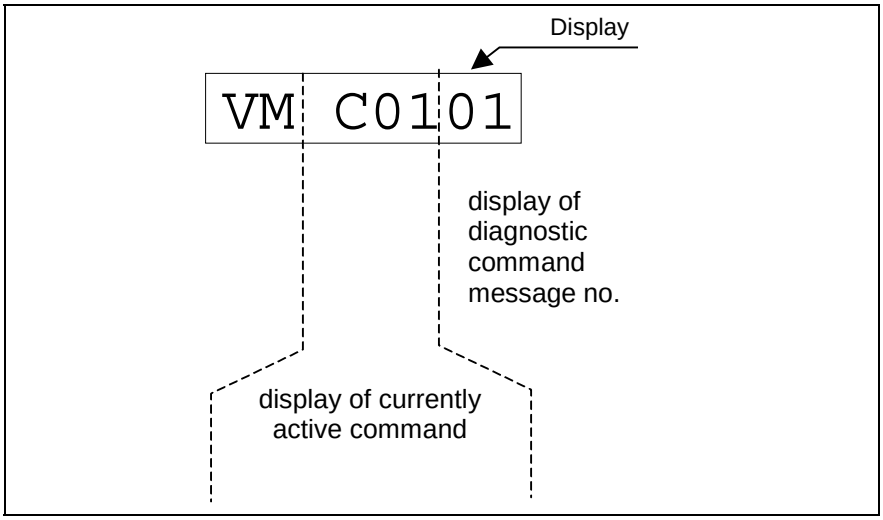


Fig. 8-4: Diagnostic command messages

Warnings and Diagnostic Error Messages

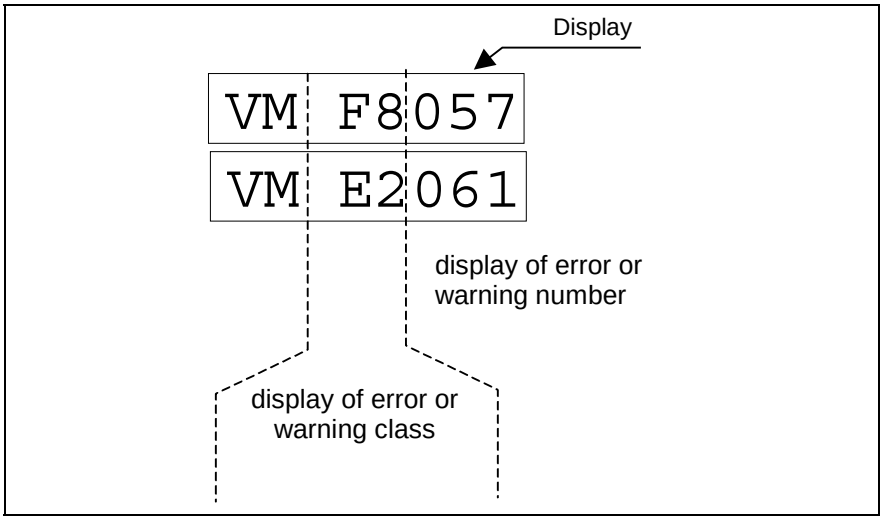


Fig. 8-5: Warnings and diagnostic error messages

Priorities of Display

The displays have different priorities because it is impossible to have various displays at the same time.

The current drive status is displayed with highest priority.

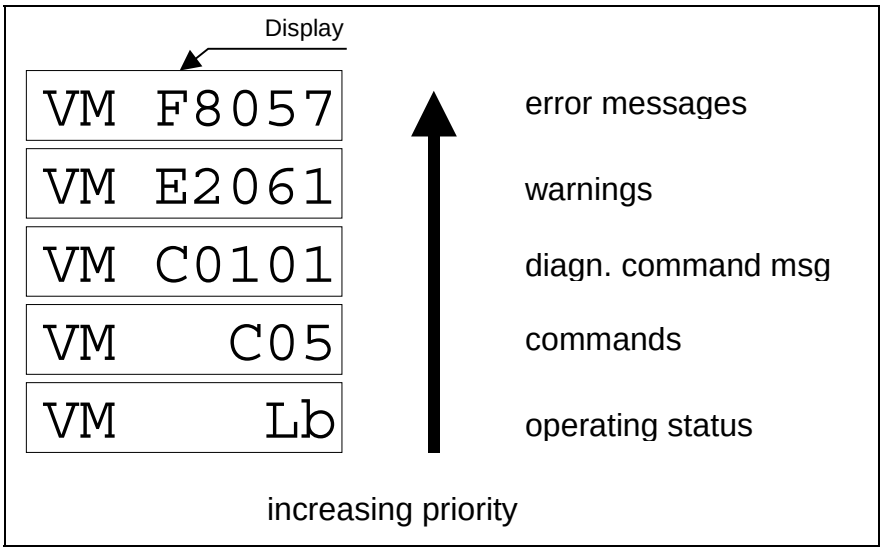


Fig. 8-6: Priority of displays with examples

Complete Diagnostic Message Text

Call complete diagnostic message text for diagnostic message currently displayed:

- initial state: standard display (e.g. "VM F8057")
- press key "v" or "^"

The diagnostic message text is displayed in the form of a marquee text. After the marquee text was completely displayed, the standard display appears again.

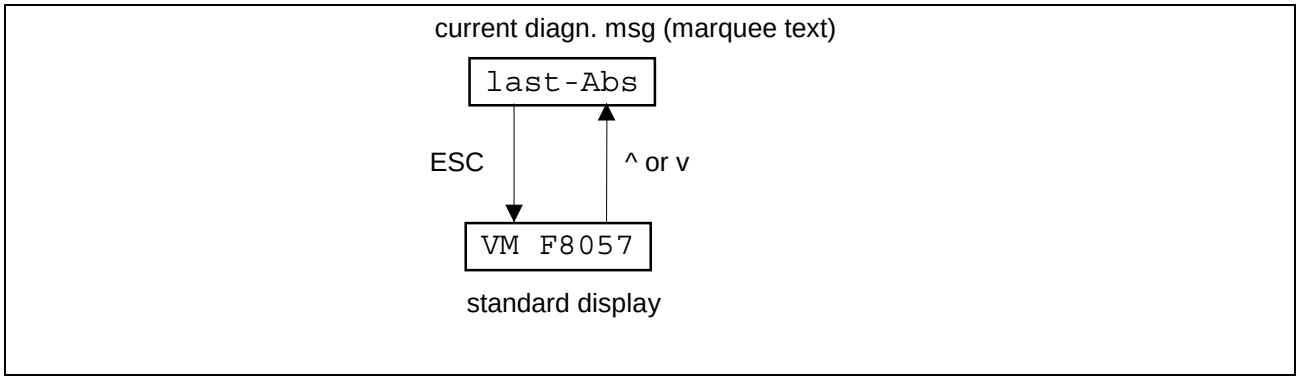


Fig. 8-7: Calling complete diagnostic message text

Extended Displays

Call extended displays (see also figure below):

- initial state: standard display (e.g. "VM Lb")
- simultaneously press "Enter" and "Esc" keys for at least 8 seconds
- press "Enter" key
- press "v" or "^" key until desired display appears
- press "Enter" key

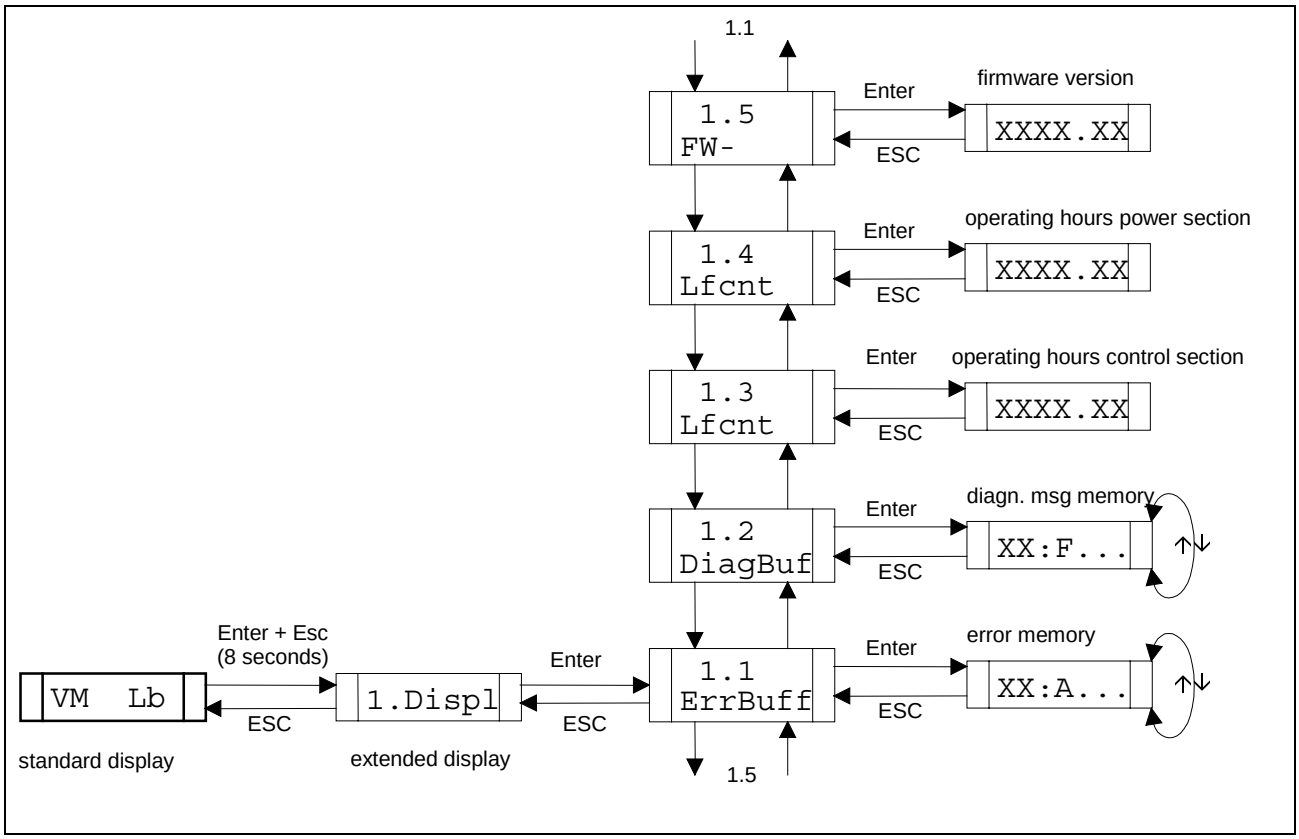


Fig. 8-8: Calling extended displays

There are the following extended displays:

- 1.1 ErrBuff: error memory;
  with the "v" or "^" key you can browse the memory
- 1.2 DiagBuf: diagnostic message memory;
  with the "v" or "^" key you can browse the memory
- 1.3 Lfcnt: operating hours counter control section
- 1.4 Lfcnt: operating hours counter power section
  (only for HMV01.1R)
- 1.5 FW-***: type designation of the firmware active in the device

Setting the Language

Set language in which diagnostic message texts are displayed (see also figure below):

- initial state: standard display (e.g. "VM Lb")
- simultaneously press "Enter" and "Esc" keys for at least 8 seconds
- press "^" key
- press "Enter" key
- press "Enter" key
- with "v" or "^" key select the desired language

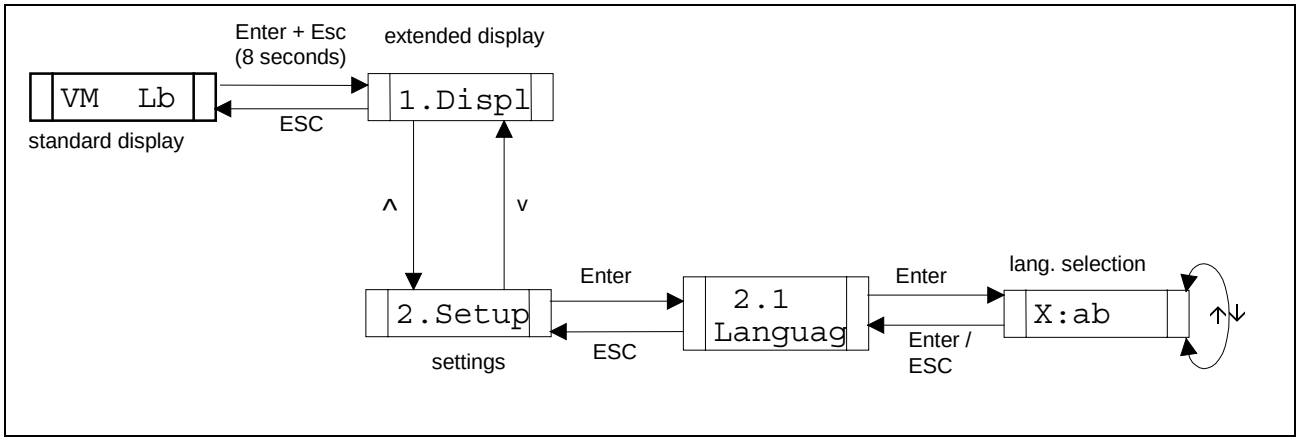


Fig. 8-9: Setting the language

Notes

9 Troubleshooting

9.1 Fault Diagnostics and Resetting Faults

Fault diagnostics

The supply unit signals operating states, warnings or faults via a display.

A prerequisite for fault diagnoses is control voltages and processors in the supply units and drive controllers that are working properly.

Resetting faults

Stored fault messages must be reset before the unit will again operate. An error can be reset by

- switching the control voltage off or
- generating the reset command of the drive controller via the bus module.
- pressing key "Esc" on the control panel (display),

CAUTION

Destruction of the power supply module, if the power is switched on to a faulty drive controller!

⇒ Upon RESET of an over current fault and after replacement of a defective supply module, the fault memories of the drive controllers must be read out prior to switching it on.

If either checks or repairs are needed, then it applies:

- Checks and repairs may only be conducted by Rexroth customer service personnel or such personnel that has been trained to do so.
- Observe the applicable safety regulations when checking the unit.
- Repairing drive components on the machine is very time consuming. Replace defective drive components completely.

WARNING

When faults are cleared, damages to the machine and injury to the personnel may occur!

⇒ Fault clearance should only be conducted by trained personnel.

⇒ Be aware of uncontrolled movements and inactive protective devices. Be sure of appropriate precautions.

⇒ Note the warnings in chapter 3.

9.2 Checking and Repairing the Unit

When contacting our service personnel we would like to ask you to provide the following information so that a quick and precise assistance can be assured:

- type designations and serial numbers of units and motors,
- the status of the fault,
- any diagnostic displays and
- software status, if necessary.

You'll find the telephone number of our service hotline in the chapter "Service & Support".

9.3 Replacing the Unit

Note: Replacing the unit requires, depending upon unit weight, a lifting device and an identical replacement unit.

DANGER

Electrical shock due to voltage-containing parts of more than 50 V!

⇒ The unit may only be replaced by qualified personnel, which have been trained to perform the work on or with electrical devices.

Note: Prior to the replacement of the unit please check according to the type plates, whether these units are of the same types. Replace only units of the same types.

Proceed as follows:

1. Switch voltage to installation off and secure it against being switched back on.
2. Using an appropriate measuring device, check whether the installation is power free. Wait the discharge time.
3. Motors must be standing still.
4. Secure vertical axes against motion.
5. Release all connections from the defective unit.
6. Release the fixing bolts and remove the unit from the control cabinet. Use the lifting device, if necessary.
7. Hang replacement unit into mounting rails. Use the lifting device, if necessary.
8. Reconnect the unit as per the terminal diagram of the machine manufacturer.
9. If vertical axes have been mechanically secured prior to replacement, then remove these devices at this point.
10. While reading out the fault memories of the connected drive controllers make sure that the device fault has not been triggered by the drive controllers (see warnings in chapter 9.1 "Fault Diagnostics and Resetting Faults").

The unit replacement is completed. The system can be put back into operation.

9.4 Diagnostic Display

Concerning error diagnoses displayed on the control panel see Troubleshooting Guide of firmware documentation.

10 Service & Support

10.1 Helpdesk

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

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

- telefonisch - by phone: **+49 (0) 9352 40 50 60**
  über Service Call Entry Center Mo-Fr 07:00-18:00
  - via Service Call Entry Center 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**

10.2 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**

10.3 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.

10.4 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.

10.5 Kundenbetreuungsstellen - Sales & Service Facilities

Deutschland – Germany

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from abroad: don't dial (0) after country code!

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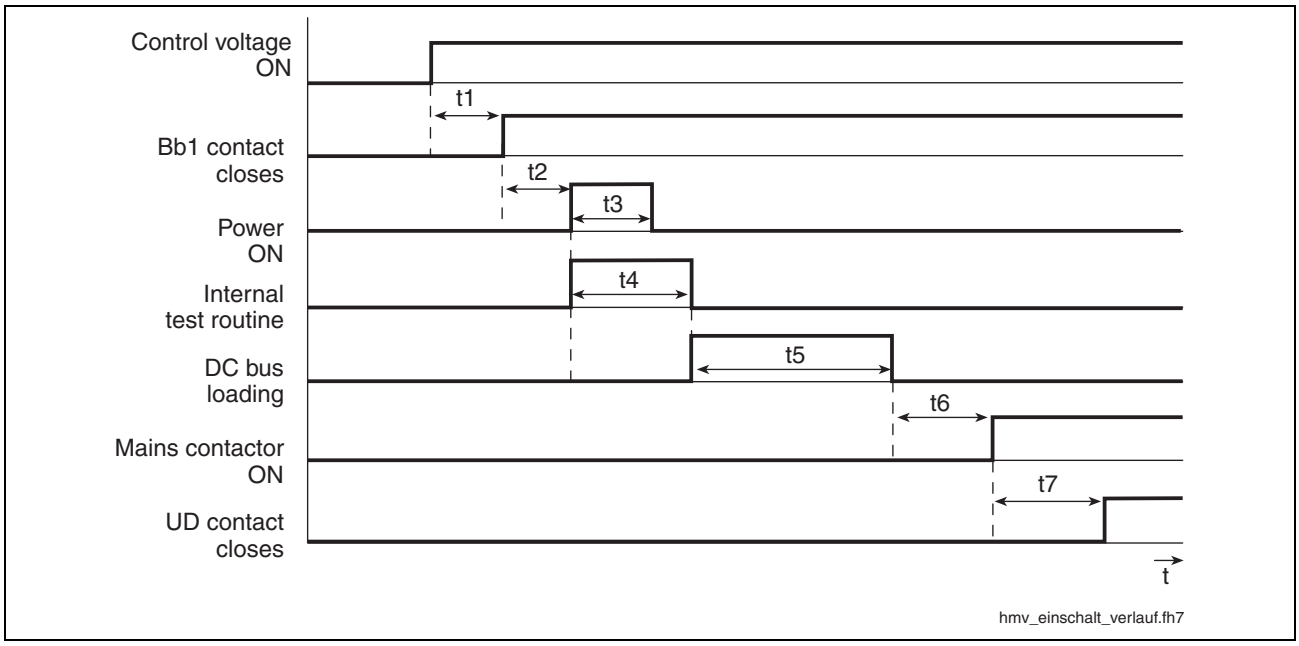
11 Appendix

11.1 Chronological Sequence when Switching ON and OFF

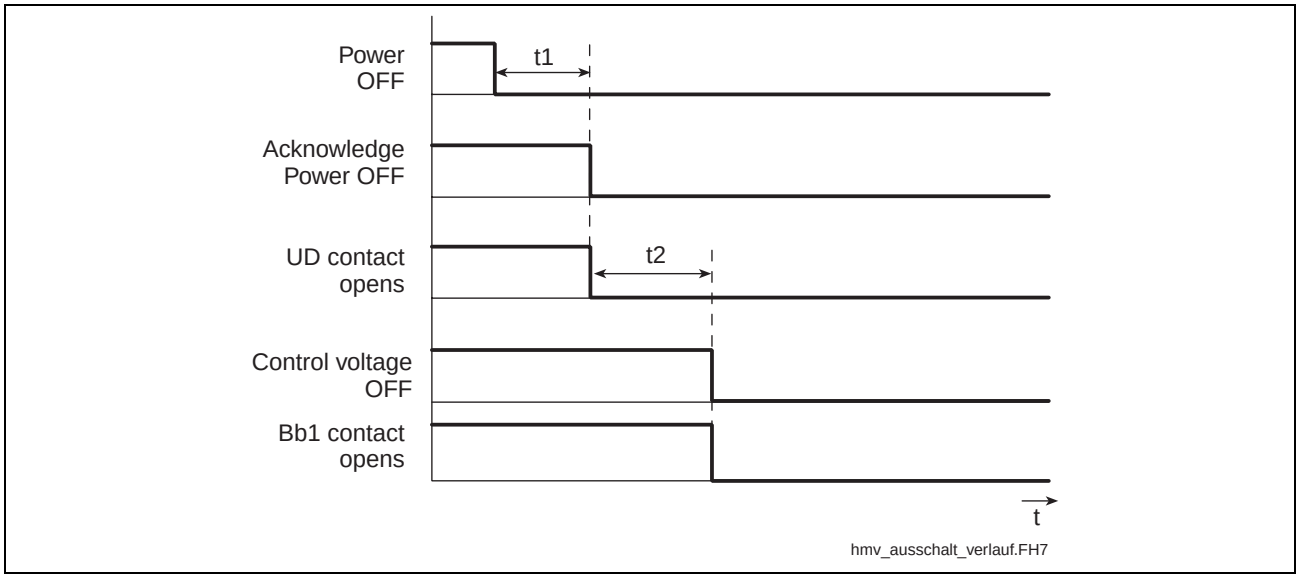
When Switching On



t1: 5,2 s;
time for internal booting until Bb1 contact closes
t2: time can be set by the user
t3: min. 250 ms; switch-on pulse
t4: 500 ms;
time for internal test routine before loading the DC bus
t5: time depends on DC bus capacitance (internal, external) and supply voltage.
t6: 500 ms;
delay time until mains contactor closes
t7: max. 200 ms;
depends on device (ON delay of mains contactor)

Fig. 11-1: Chronological sequence when powering unit up

When Switching Off



t1: max. 200 ms;
depends on device (OFF delay of mains contactor)
t2: time can be set by the user

Fig. 11-2: Chronological sequence when shutting down the unit

12 Index

G

H

I

J

K

L

M

O

P

R

S

T

U

W

X

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