

Rexroth IndraDrive Mi Electronic Control System KCU

R911322419
Edition 01

Instruction Manual



Title	Rexroth IndraDrive Mi Electronic Control System KCU
Type of Documentation	Instruction Manual
Document Typecode	DOK-INDRV*-KCU01*UL ***-IB01-EN-P
Internal File Reference	RS-c1988922f97db7070a6846a0008a860a-2-en-US-3
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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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.
Published by	Bosch Rexroth AG, Bgm.-Dr.-Nebel-Str. 2, D-97816 Lohr a. Main Telephone +49 (0)93 52 / 40-0, Tx 68 94 21, Fax +49 (0)93 52 / 40-48 85 http://www.boschrexroth.de BRC/EDY4 (NN)

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1 Important Notes

1.1 Safety Instructions

1.1.1 General Information

- Do not attempt to install or commission this device without first reading all documentations 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 these documentations contain some information you do not understand, it is absolutely necessary that you ask Bosch Rexroth for explanation before you start working on or with the devices.
- 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 this documentation.
- Only trained, instructed and qualified persons are allowed 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. These persons must have adequate safety equipment and be trained in first aid.
- Technical data, connections and operational conditions are specified in the reference documentations for the product and must be followed at all times.
- 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.
- Only use spare parts and accessories approved by Bosch Rexroth.
- Follow all safety regulations and requirements for the specific application as practiced in the country of use.
- If the device is resold, rented and/or passed on to others in any other form, these safety instructions must be delivered with the device in the official language of the user's country.
- 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. Observe the data contained in the corresponding product documentations.



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!

Observe the following safety instructions!

Important Notes

1.1.2 Contact With Electrical Parts



DANGER

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

- Follow general construction and safety regulations when working on power installations.
- Before switching on the device, the equipment grounding conductor must have been non-detachably connected to all electrical equipment and motors in accordance with the connection diagram.

The equipment grounding conductor of the electrical equipment and the devices must be non-detachably and permanently connected to the supply mains 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 mm² for this equipment grounding connection!

- Before working with electrical parts with voltage potentials higher than 50 V, the device must be disconnected from the mains or voltage source. Provide a safeguard to prevent reconnection.
- Wait **30 minutes** after switching off power to allow capacitors to discharge before beginning to work. Measure the electric voltage of 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 switched 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 RCD cannot be used for electric drives! Indirect contact must be prevented by other means, for example, by an overcurrent protection device according to the relevant standards.

1.1.3 Handling and Assembly



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.

1.1.4 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

Important Notes

- wrong input of parameters before commissioning
- 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/or 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.

Important Notes

**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 commissioning. Do not 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 axis,
 - adding an external braking/ arrester/ clamping mechanism or
 - ensuring sufficient equilibration of the vertical axis.
- 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 commissioning. If necessary, perform a special electromagnetic compatibility (EMC) test on the installation.

1.1.5 Magnetic and Electromagnetic Fields



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.

1.1.6 Hot Parts



CAUTION

Hot surfaces at motor housings, on drive controllers or chokes! 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.
- 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.

1.2 Appropriate Use

This product may only be used for the applications mentioned in the reference documentations (see chapter "Reference Documentations") and under the described application, ambient and operating conditions.



For use in NFPA-79 Applications only.

2

Identification

2.1

Type Code



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

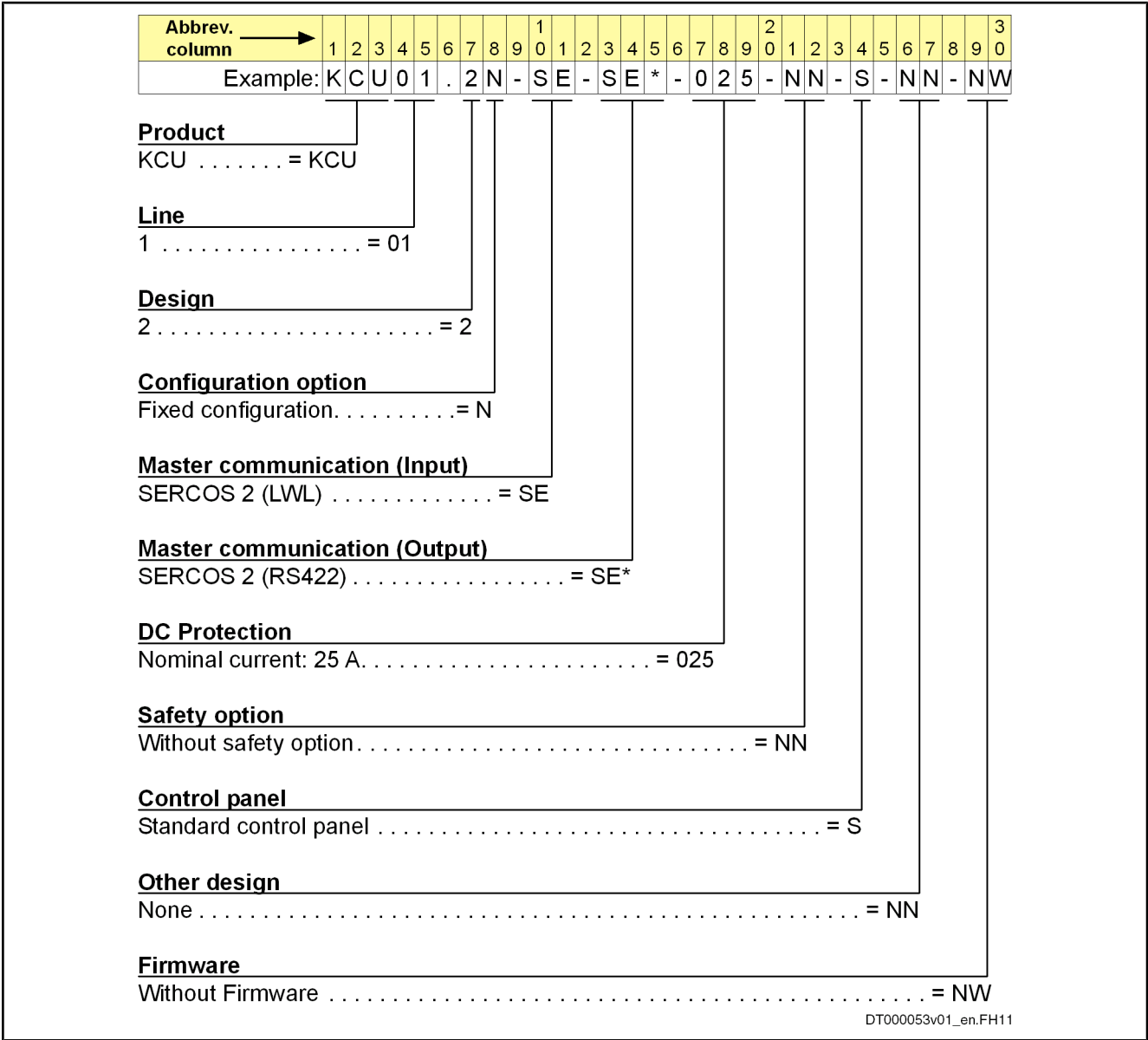
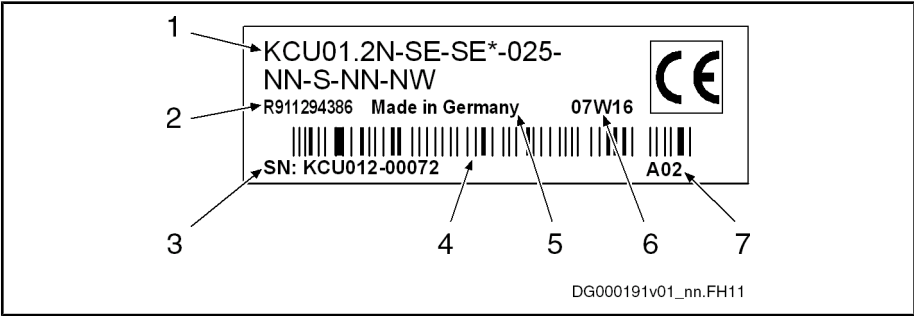


Fig.2-1: Type code

Identification

2.2 Type Plates

Type Plate (Example)



- 1
- device type
- 2
- part number
- 3
- serial number
- 4
- bar code
- 5
- country of manufacture
- 6
- production week; example 07W16: year 2007, week 16
- 7
- hardware revision index
- Fig.2-2:
- Type plate

2.3 Scope of Supply

Standard	Optional
KCU	connection accessory HAS02.1-015 for strain relief and shield connection ¹⁾
basic accessory HAS01.1-050 ¹⁾	mounting accessory HAS03

1)

for more information on HAS accessory: see Project Planning Manual "Rexroth IndraDrive Drive System"

Fig.2-3:

Scope of supply of KCU

3 Ratings and Dimensions

UL ratings and dimensions

Description	Symbol	Unit	KCU01.2N-SE-SE*-025-NN-S
listing according to UL-standard (UL)			UL 508 C
listing according to CSA-standard (UL)			Canadian National Standard(s) C22.2 No. 14-05
UL files (UL)			E 134201
pollution degree (UL)			Use in a pollution degree 2 environment
degree of protection according to IEC60529			IP20
mass (weight)	m	kg	3,80
device height (UL) ¹⁾	H	mm	352
device depth (UL) ²⁾	T	mm	206
device width (UL) ³⁾	B	mm	50
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	110
field wiring material (UL) ⁶⁾			Use 60/75 °C copper wire only, use class 1 wire only
Data Control Voltage Section - Input			
rated control voltage input (UL) ⁷⁾	U _{N3}	V	24 ± 20 %
rated power consumption control voltage input at U _{N3} (UL) ⁸⁾	P _{N3}	W	675
Data Control Voltage Section - Output			
rated control voltage output (UL)	U _{out}	V	42,0
rated control power output (UL)	P _{out}	W	588,0
Data Power Section - Input			
short circuit current rating (UL) ⁹⁾	SCCR		42000 rms symmetrical amperes, supplied by Bosch Rexroth drives / converters only
rated input voltage, power (UL) ¹⁰⁾	U _{LN_nenn}	V	540...750
rated input current (UL)	I _{L_cont}	A	25,0
Data Power Section - Output			

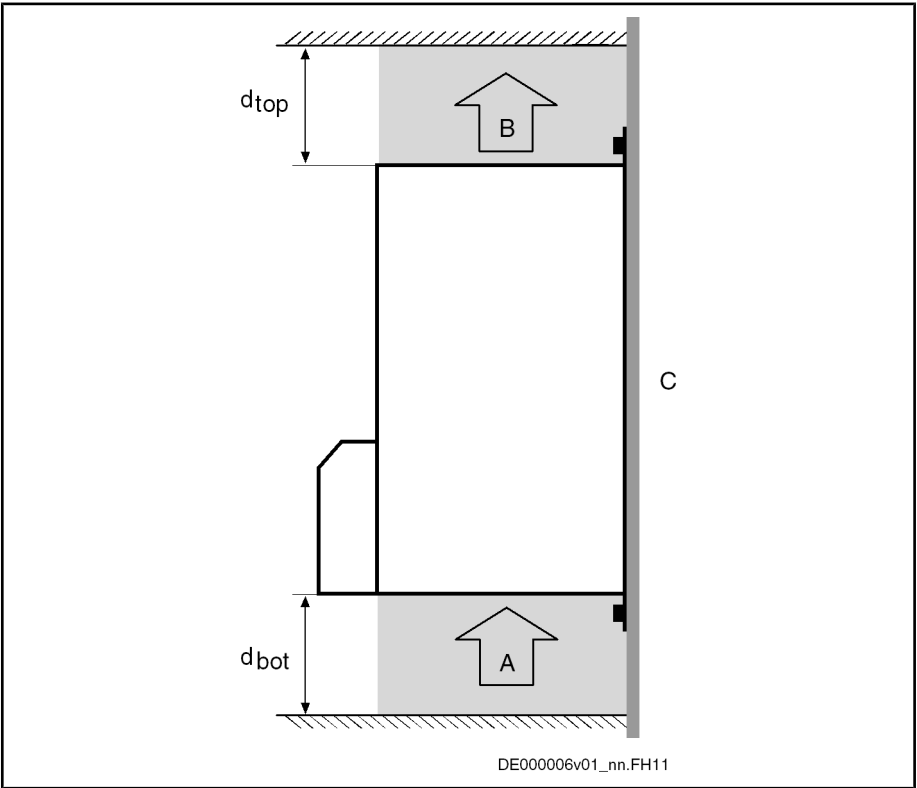
Ratings and Dimensions

Description	Symbol	Unit	KCU01.2N-SE-SE*-025-NN-S
maximum output voltage (UL)	U_{out}	V	540...750
maximum output current (UL)	I_{out_max}	A	25,0

- 1) 2) 3)
- 4) 5)
- 6)
- 7)
- 8)
- 9)
- 10)
- housing dimension; see also related dimensional drawing
see fig. "Air intake and air outlet at drive controller"
find value for tightening torque in Project Planning Manual for each de-
vice, chapter "Electrical Connection Points"
observe supply voltage for motor holding brakes
HMS, HMD, HCS: plus holding brake and control section; KCU01: at
max. number of axes
use listed AC input line fuses (600 V AC) or listed circuit breakers
(600 V AC) at the mains supply
HMS, HMD, HLB, HLC, KCU: DC bus L+, L-; HMV, HCS: mains input
L1, L2, L3

Fig.3-1: KCU - UL ratings and dimensions

Distances



- A
- B
- C
- d_{top}
- d_{bot}
- air intake
- air outlet
- mounting surface in control cabinet
- distance top
- distance bottom
- Fig.3-2: Air intake and air outlet at drive controller

4 Reference Documentations

4.1 Drive Systems, System Components

Title Rexroth IndraDrive...	Kind of documentation	Document typecode ¹⁾ DOK-INDRV*-...	Part no. R911...
Drive System	Project Planning Manual	SYSTEM*****-PRxx-EN-P	309636
Mi Drive Systems	Project Planning Manual	KCU+KSM****-PRxx-EN-P	320924
Supply Units and Power Sections	Project Planning Manual	HMV-S-D+HCS-PRxx-EN-P	318790
Drive Controllers Control Sections	Project Planning Manual	CSH*****-PRxx-EN-P	295012
Additional Components	Project Planning Manual	ADDCOMP****-PRxx-EN-P	306140

1) In the document typecodes, "xx" is a wild card for the current edition of the documentation (example: PR01 is the first edition of a Project Planning Manual)

Fig.4-1: Documentations – overview

4.2 Motors

Title Rexroth IndraDyn...	Kind of documentation	Document typecode ¹⁾ DOK-MOTOR*-...	Part no. R911...
A Series Asynchronous Motors MAD/MAF	Project Planning Manual	MAD/MAF****-PRxx-EN-P	295781
H Frameless Synchronous Spindle Motors	Project Planning Manual	MBS-H*****-PRxx-EN-P	297895
L Synchronous Linear Motors	Project Planning Manual	MLF*****-PRxx-EN-P	293635
S MSK Synchronous Motors	Project Planning Manual	MSK*****-PRxx-EN-P	296289
T Synchronous Torque Motors	Project Planning Manual	MBT*****-PRxx-EN-P	298798

1) In the document typecodes, "xx" is a wild card for the current edition of the documentation (example: PR01 is the first edition of a Project Planning Manual)

Fig.4-2: Documentations – overview

4.3 Cables

Title	Kind of documentation	Document typecode ¹⁾ DOK-...	Part no. R911...
Rexroth Connection Cables	Selection Data	CONNEC-CABLE*STAND-AUxx-EN-P	282688

1) In the document typecodes, "xx" is a wild card for the current edition of the documentation (example: AU03 is the third edition of the documentation "Selection Data")

Fig.4-3: Documentations – overview

Reference Documentations

4.4 Firmware

Title	Kind of documentation	Document typecode ¹⁾	Part no.
Rexroth IndraDrive...		DOK-INDRV*-...	R911...
Firmware for Drive Controllers	Functional Description	MP*-02VRS**-FKxx-EN-P	299223
Firmware for Drive Controllers	Functional Description	MP*-03VRS**-FKxx-EN-P	308329
Firmware for Drive Controllers	Functional Description	MP*-04VRS**-FKxx-EN-P	315485
Firmware for Drive Controllers	Parameter Description	GEN-**VRS**-PAxx-EN-P	297317
Firmware for Drive Controllers	Troubleshooting Guide	GEN-**VRS**-WAxx-EN-P	297319
Integrated Safety Technology	Functional and Application Description	SI*-**VRS**-FKxx-EN-P	297838
Rexroth IndraMotion MLD	Application Manual	MLD-**VRS**-AWxx-EN-P	306084
Rexroth IndraMotion MLD Library	Library Description	MLD-SYSLIB*-FKxx-EN-P	309224

1)

In the document typecodes, "xx" is a wild card for the current edition of the documentation (example: PA02 is the second edition of a Parameter Description)

Fig. 4-4:

Documentations – overview

5 Instructions for Use

5.1 General



The electronic control system KCU01 is for use in conjunction with HMV01, HMV02, HCS02 or HCS03 only.



Short circuit current (SCCR)

Suitable for use on a circuit capable of delivering not more than 42.000 rms symmetrical amperes.

5.2 Connections

5.2.1 Wiring Diagram

Wiring Diagram With HMV

supply unit = HMV01 or HMV02

power section = KSM



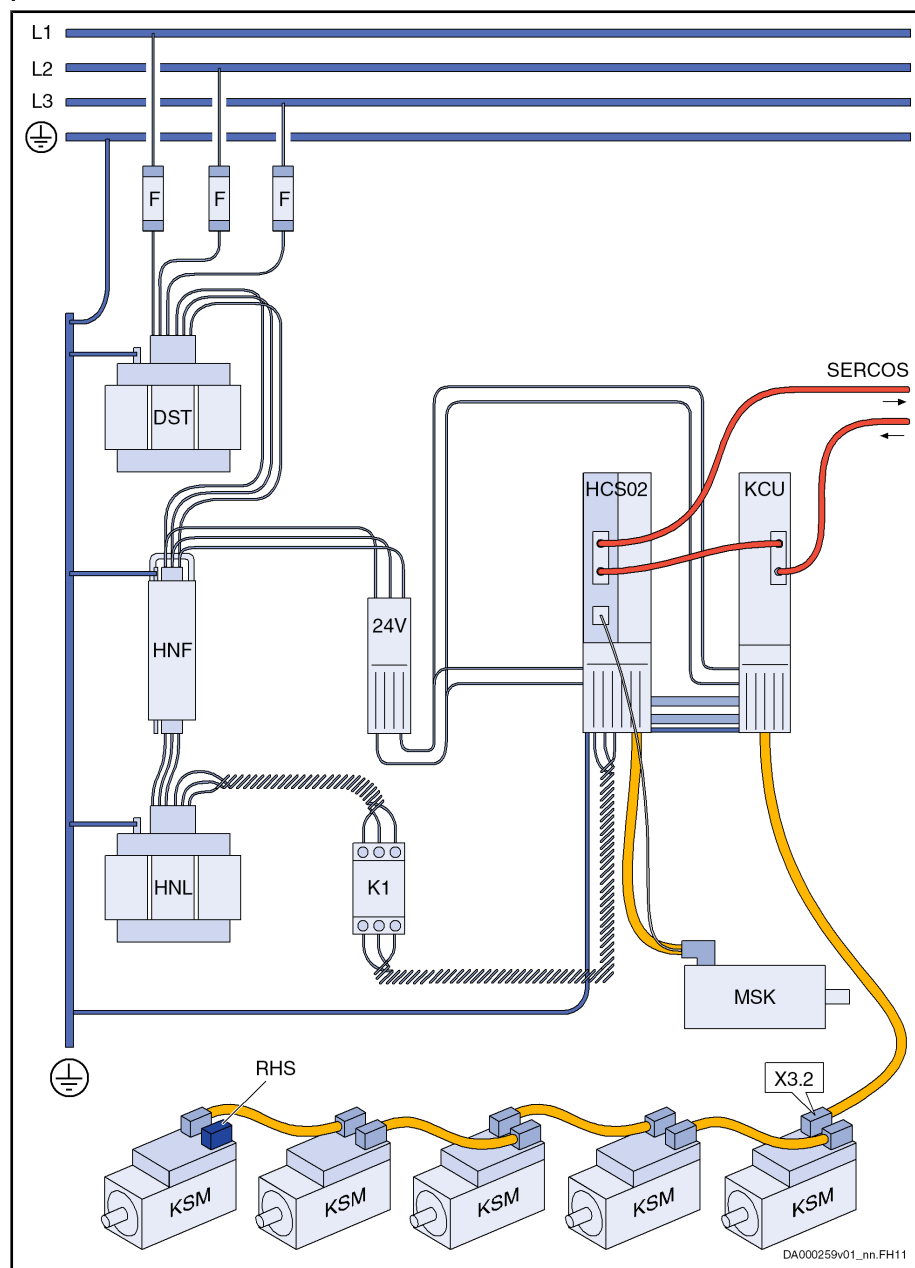
DST	transformer (optional)
F	fuses
HMD, HMS	inverters
HMV	supply unit
HNF	mains filter
HNL	mains choke
KCU	electronic control system
KSM	distributed servo drive
MSK	servo motor
24V	24V supply
1	mains contactor (for supply units without integrated mains contactor, e.g. HMV01.1R-W0120)
2	terminal connector
X3.2	connection of hybrid cable at first KSM

Fig. 5-1: System structure

Wiring Diagram With HCS02

supply unit = HCS02

power section = KSM



DST	transformer (optional)
F	fuses
HCS02	converter
HNF	mains filter
HNL	mains choke (optional)
KCU	electronic control system
KSM	distributed servo drive
MSK	servo motor
24V	24V supply
RHS	terminal connector
X3.2	connection of hybrid cable at first KSM

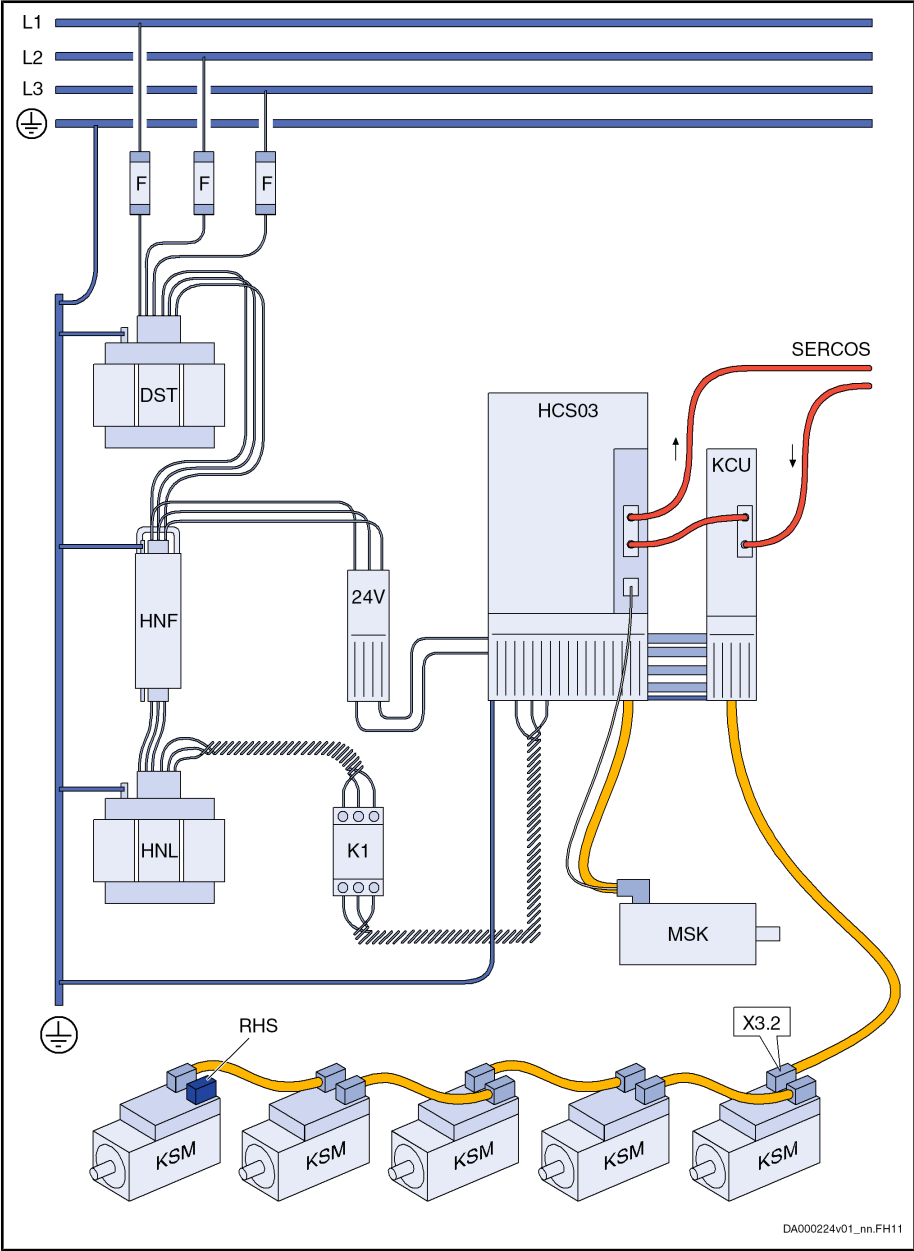
Fig. 5-2:

System structure Rexroth IndraDrive Mi with HCS02

Instructions for Use

Wiring Diagram With HCS03

supply unit = HCS03
power section = KSM



- DST transformer (optional)
- F fuses
- HCS03 converter
- HNF mains filter
- HNL mains choke (optional)
- KCU electronic control system
- KSM distributed servo drive
- MSK servo motor
- 24V 24V supply
- RHS terminal connector
- X3.2 connection of hybrid cable at first KSM

Fig. 5-3: System structure Rexroth IndraDrive Mi with HCS03

5.2.2 Connection Diagram

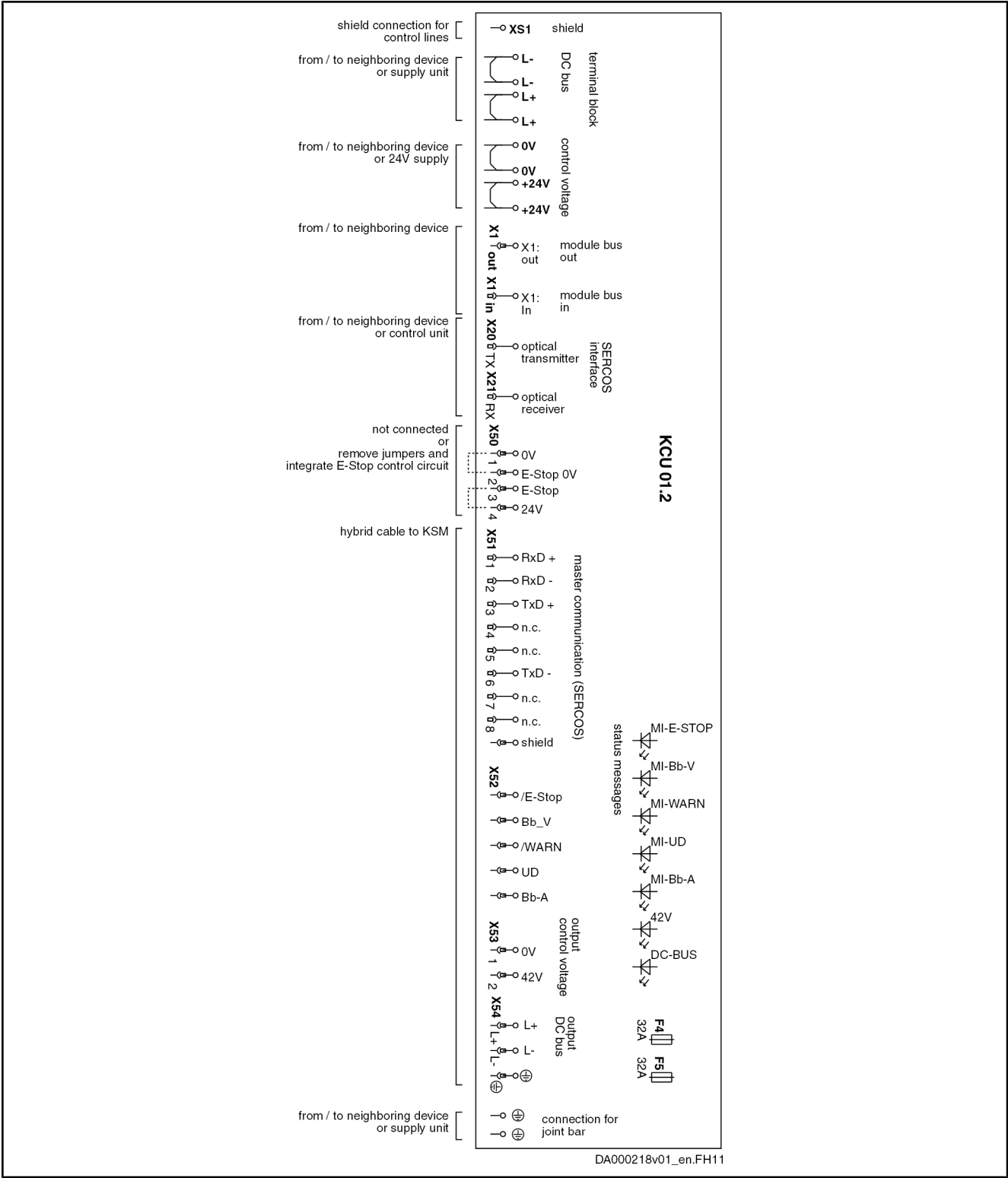
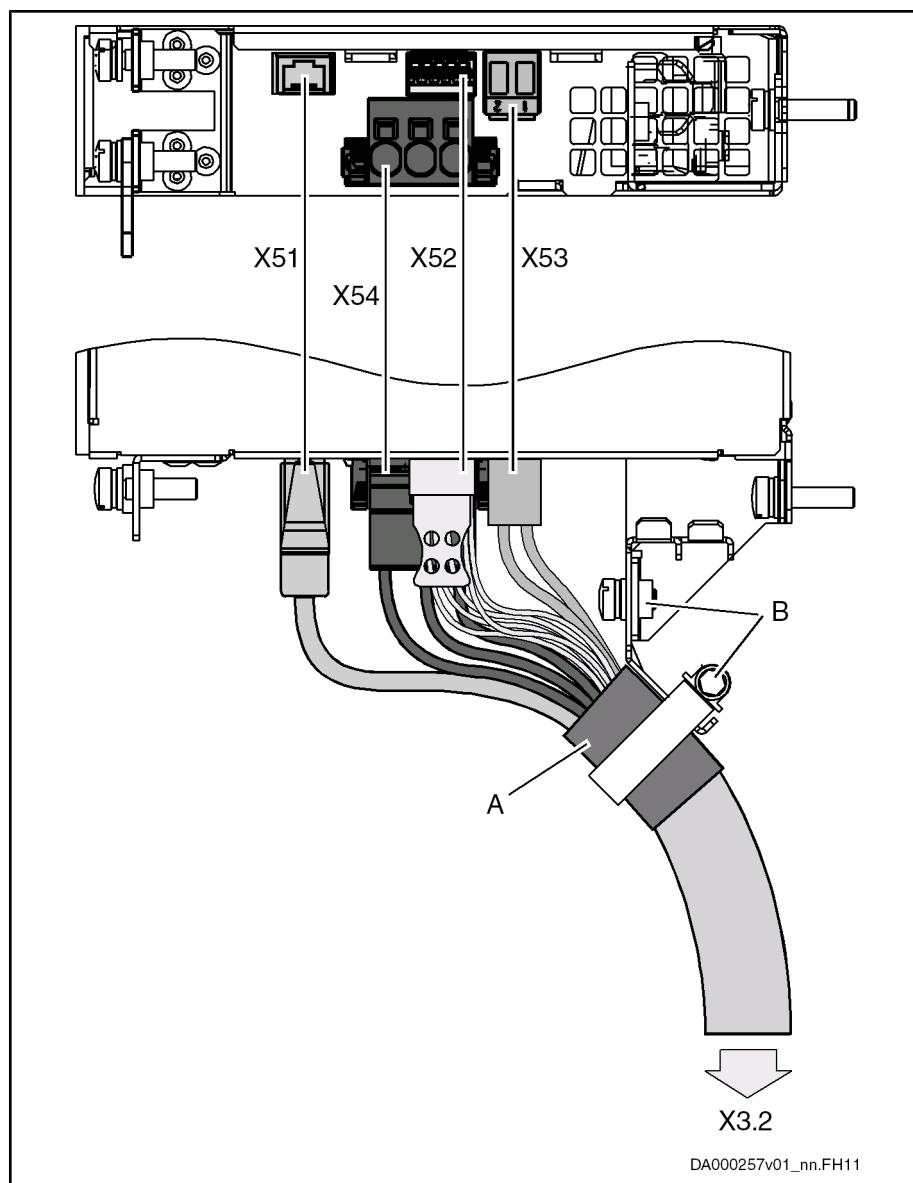


Fig.5-4: Connection diagram of KCU

Instructions for Use

5.2.3 Position of Connection Points



X51	SERCOS
X52	status messages
X53	42 V, 0 V
X54	DC bus, equipment grounding conductor
X3.2	connection of hybrid cable at first KSM
A	shield of hybrid cable
B	parts of accessory HAS02.1-015-NNN-NN for shield connection and strain relief of hybrid cable

Fig. 5-5: Connection points and hybrid cable

5.2.4 Terminal Block, 24 - 0V (24V Supply)



PELV for 24V power supply unit

For the 24V supply of the devices of the Rexroth IndraDrive range, use a power supply unit or a control-power transformer with protection by PELV ¹⁾ according to IEC 60204-1 (section 6.4).

In the scope of CSA/UL, the data of the control-power transformer are limited to:

- max. output voltage: 42.4 V_{peak} or 30 V_{ac}
- max. output power: 10000 VA

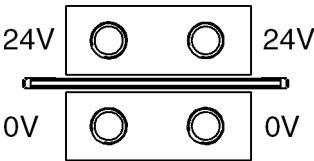
View	Identification	Function	
 DA000175v01_nn.FH11	+24V	power supply connection to neighboring devices with contact bars from accessory HAS01.1	
	0V	reference potential for power supply connection to neighboring devices with contact bars from accessory HAS01.1	
Screw connection	Unit	Min.	Max.
M6 thread at device (terminal block)			
tightening torque	Nm	5,5	6,5
power consumption	W	P _{N3} (see technical data)	
voltage load capacity	V	U _{N3} (see technical data)	
polarity reversal protection		within the allowed voltage range by internal protective diode	
Current carrying capacity "looping through" from 24V to 24V, 0V to 0V (contact bars in scope of supply of accessory HAS01)			
with contact bars -072	A	220	

Fig. 5-6: Function, pin assignment, properties

¹⁾ Protective Extra Low Voltage

Instructions for Use

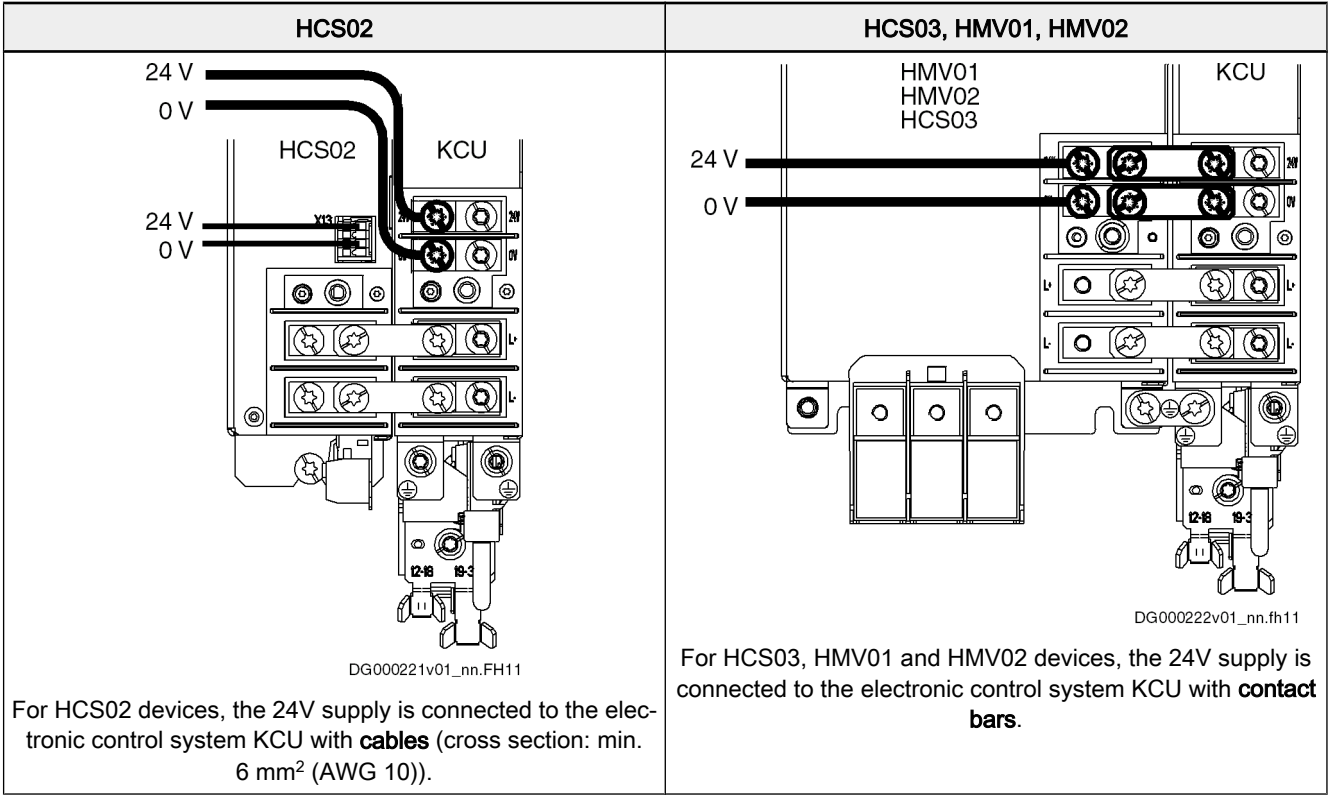


Fig.5-7: Connection of 24V supply

5.2.5 Terminal Block L+, L- (DC Bus Connection)



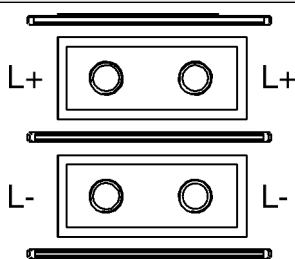
WARNING

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

Before working on live parts: De-energize the installation and secure the power switch against unintentional or unauthorized re-energization.

Wait at least **30 minutes** after switching off the supply voltages to allow discharging. To shorten the waiting time until voltage has fallen below 50 V, you can use a discharging device (see chapter "Appendix").

Check whether voltages have fallen below 50 V before touching live parts!

View	Identifica- tion	Function		
 DA000176v01_nn.FH11	L+	connection points for connecting DC bus connections		
	L-			
Screw connection M6 thread at device (terminal block)		Unit	Min.	Max.

tightening torque	Nm	5,5	6,5
short circuit protection		via fusing elements connected in the incoming circuit to the mains connection	
overload protection		via fusing elements connected in the incoming circuit to the mains connection	
Current carrying capacity "looping through" from L+ to L+, L- to L- (contact bars in scope of supply of accessory HAS01)			
with contact bars -072	A		220
additionally with contact bars -042 and end piece	A		245

Fig.5-8:
Function, pin assignment, properties

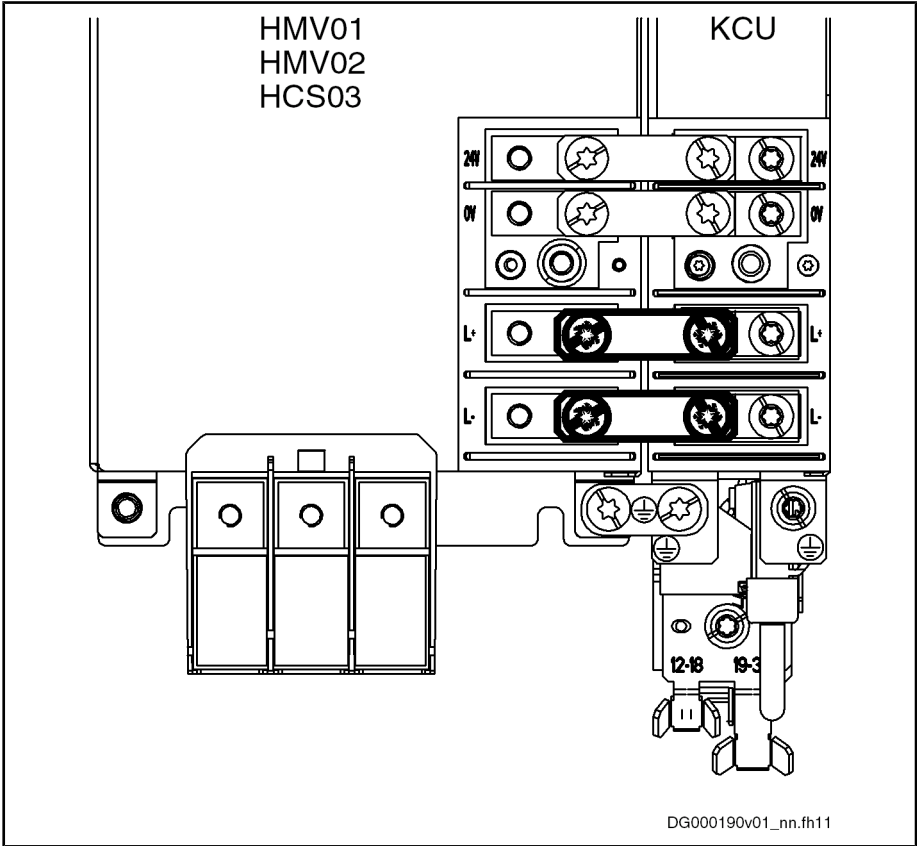


Fig.5-9:
Connection of contact bars

5.3

Installation

5.3.1

General Information on How to Install the Drive Controller



WARNING

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

Before working on live parts: De-energize the installation and secure the power switch against unintentional or unauthorized re-energization.

Wait at least **30 minutes** after switching off the supply voltages to allow discharging. To shorten the waiting time until voltage has fallen below 50 V, you can use a discharging device (see chapter "Appendix").

Check whether voltages have fallen below 50 V before touching live parts!

Instructions for Use



CAUTION

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

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

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

Such exposed conductive parts include:

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

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



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

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



CAUTION

Risk of damage to the drive controller by connecting and disconnecting live connections!

Do not connect and disconnect live connections.

5.3.2 Touch Guard at Devices

Cutouts



WARNING

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

- The appropriate touch guard must be mounted for each device following connection work.
- Never mount a damaged touch guard.
- Immediately replace a damaged touch guard by an undamaged touch guard.
- Keep the cutouts at the touch guard as small as possible. Only remove the cutouts if necessary.

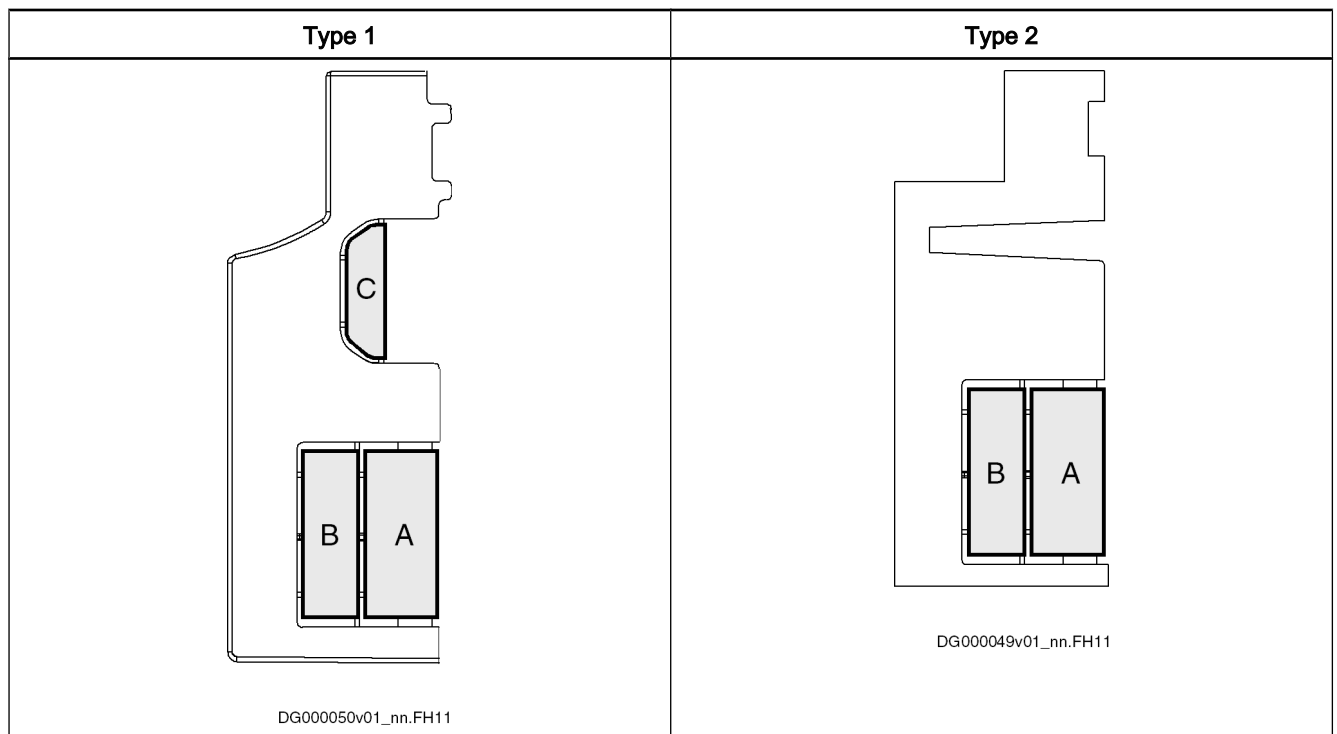


Fig. 5-10: Cutouts at the touch guard

- If the DC bus and the control voltage are connected by means of **contact bars**, only **cutout A** may be removed from 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), the **cutouts A, B and C** may be removed from the touch guard.
- At the first and last device in a line of interconnected devices, you must **not remove any** cutout at the outer side of the touch guard.

Mounting

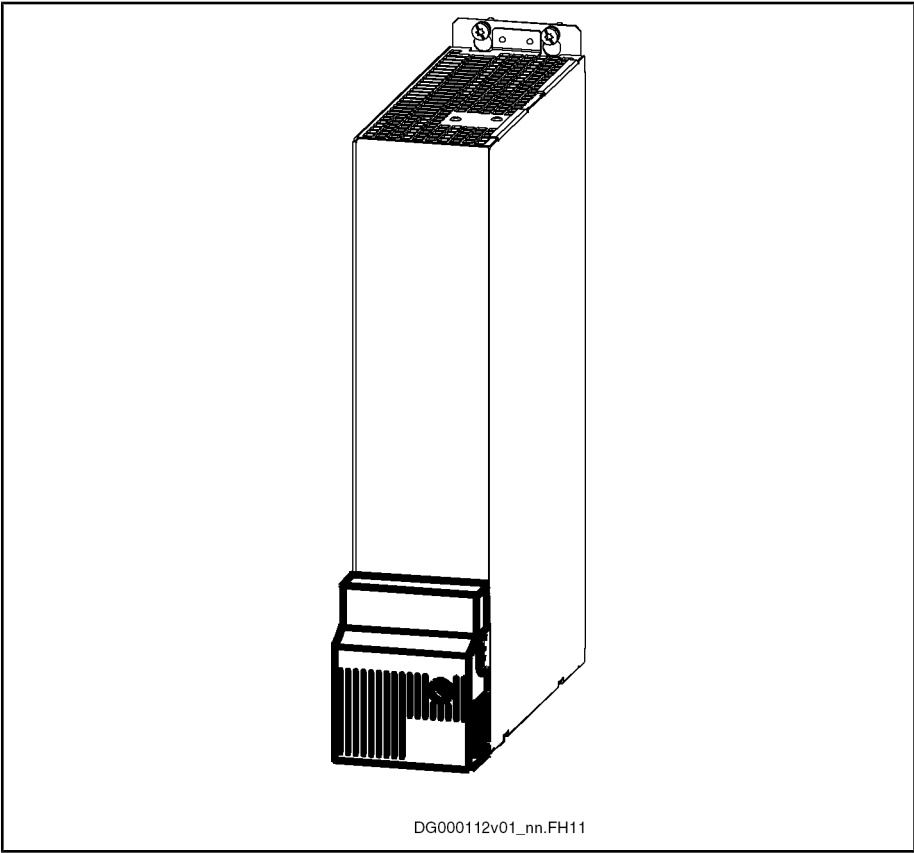


Fig.5-11: Touch guard at device
The touch guard is fixed to the device with screws.

Tightening Torque

max. 2.8 Nm

5.4 Diagnoses

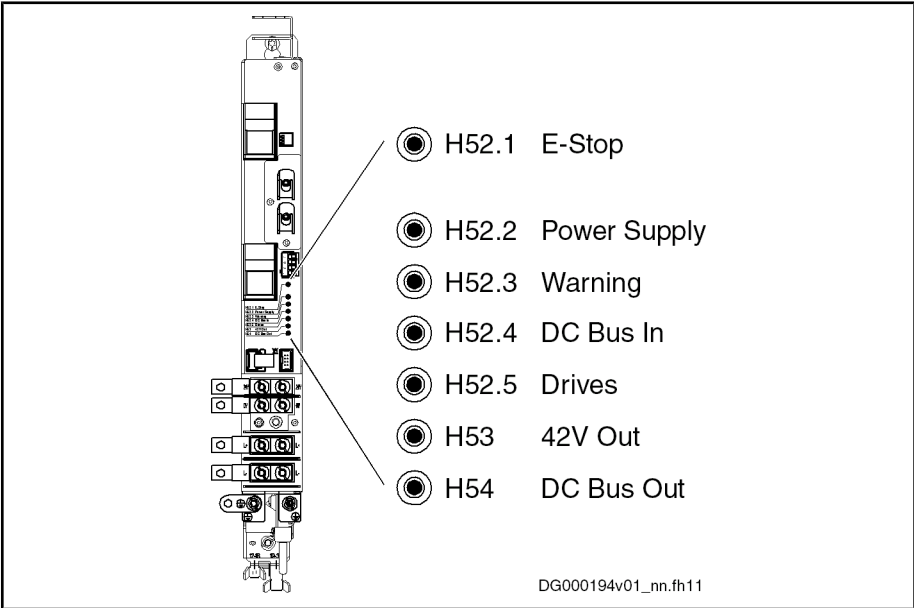


Fig.5-12: LEDs at KCU

LED	Color / status		Significance	Measures
H52.1 E-Stop	○	off	E-Stop not activated	deactivate E-Stop, if necessary
	✱	red	E-Stop active (/E_Stop)	activate E-Stop, if necessary (see connection point X50)
H52.2 Power Supply	✱	green	supply unit without error, regular status	none
	✱	red	supply unit signals error (/Bb_V)	check power supply, see also F2086
H52.3 Warning	✱	green	supply unit without warning (/Warn), regular status	none
	✱	red	supply unit signals error	check supply unit, see also E2086
H52.4 DC Bus In	○	off	DC bus voltage (L+; L-) too low	switch power on at supply unit
	✱	green	DC bus voltage (L+; L-) without error (Ud), regular status	none
H52.5 Drives	✱	green	no error at module bus, regular status	none
	✱	red	module bus error (/Bb_A)	check module bus wiring, check control voltage supply of devices; see also F2087
	✱	red/ green flashing	drive system carries out error reaction (Bb_A)	bring devices at module bus to readiness for operation; see also E2810
H53 42V Out	✱	green	control voltage for KSM at output X53 ok	none
	✱	red	control voltage for KSM at output X53 faulty	overload at output: check voltage at X53, reduce load; remove short circuit
H54 DC Bus Out	○	off	DC bus (L+, L-) not ready for power output	voltage at X54 is only monitored, when DC bus voltage at input (L+, L-) without error (see LED H52.4)
	✱	green	DC bus voltage (L+; L-) at output X54 ok (U > 50 V)	none
	✱	red	DC bus voltage (L+; L-) at output X54 not ok	check fuses F4, F5 and replace them, if necessary

Fig. 5-13: LED displays at KCU

5.5 Replacing Fuses F4 and F5


WARNING

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

Before working on live parts: De-energize the installation and secure the power switch against unintentional or unauthorized re-energization.

Wait at least **30 minutes** after switching off the supply voltages to allow discharging. To shorten the waiting time until voltage has fallen below 50 V, you can use a discharging device (see chapter "Appendix").

Check whether voltages have fallen below 50 V before touching live parts!

Instructions for Use

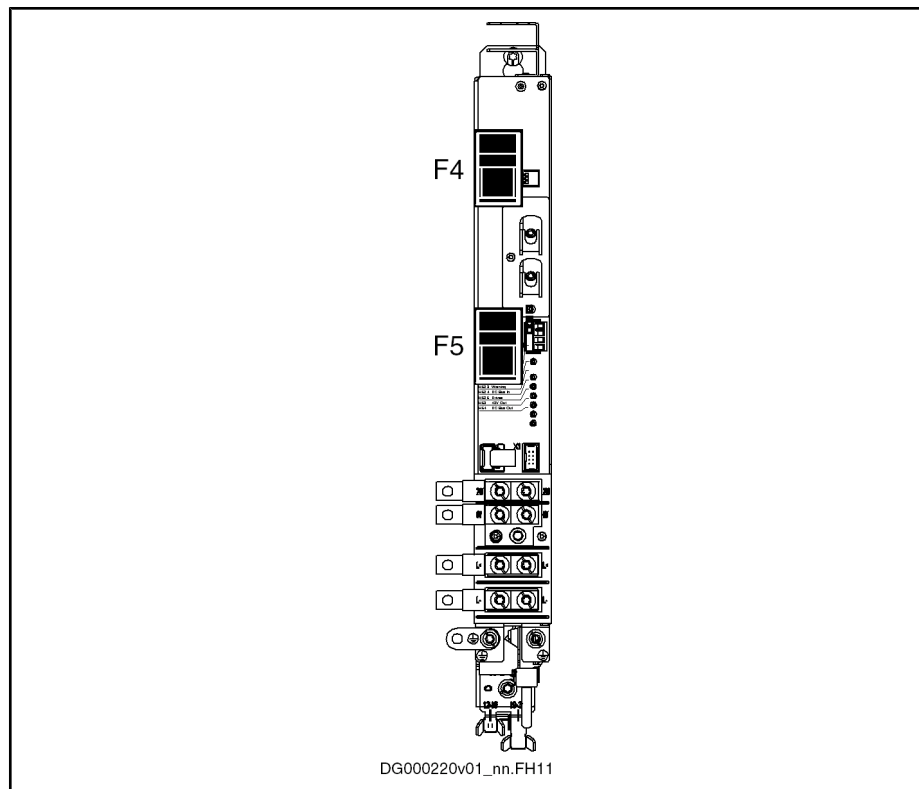


Fig.5-14: Fuses F4 and F5

Replace fuses F4 and F5

1. Switch off power voltage to drive system.
2. Wait 30 minutes to allow DC bus capacitors to discharge or use discharging device.
3. Open fuse carriers F4 and F5.
4. Remove fuses F4 and F5.

Note: Always replace both fuses, even if only one of them is defective. The intact fuse probably was already damaged.
5. Insert new **FWP-30A14Fa** fuses by BUSSMANN.
6. Close fuse carriers F4 and F5.

6 Appendix

6.1 Discharging of Capacitors

6.1.1 Discharging of DC Bus Capacitors

In the drive system Rexroth IndraDrive, capacitors are used in the DC bus as energy stores. In drive controllers and particularly in supply units, such capacitors have already been integrated.

Energy stores maintain their energy even when the supply voltage has been cut off and have to be discharged before somebody gets in contact with them.

Discharging devices have been integrated in the components of the drive system Rexroth IndraDrive; within the indicated discharging time these devices discharge the voltage below the allowed 50 V.

If additional capacitors (such as DC bus capacitor units) are connected, these capacitors, too, have to be discharged before somebody gets in contact with them.

Due to the operating principle, the discharging time is the longer

- the bigger the energy store (the capacitance value)
- the higher the voltage to which the energy store has been charged
- the greater the resistance for discharging the capacitors

Components of the drive system Rexroth IndraDrive have been dimensioned in such a way that after the supply voltage was cut off, the voltage value falls below 50 V within a discharging time of a maximum of 30 minutes.

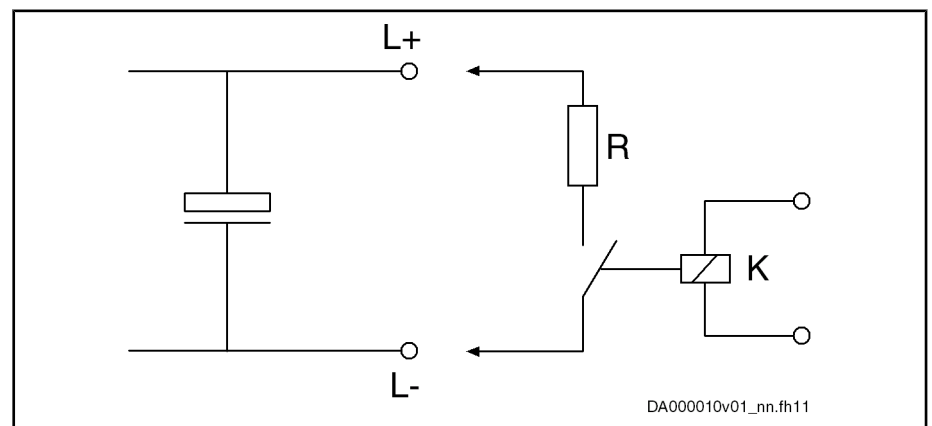
To shorten the waiting time until voltage has fallen below 50 V, you can take the following measures:

- When using HMV01 supply units: activate the function "ZKS" (DC bus short circuit)
- Use the discharging device described below.

6.1.2 Discharging Device

Operating Principle

A contactor is installed to switch a resistor to the terminals L+ and L- of the DC bus connection to discharge the capacitors. The contactor is activated via a control input which is supplied with appropriate control voltage.



R
K

discharging resistor
contactor contact

Fig. 6-1: Operating principle of discharging device

Appendix

Dimensioning

The individual components have to be sufficiently dimensioned:

- Value of the discharging resistor: 1000 ohm and at least 1000 W
- The discharging resistor and the contactor contact have to withstand the loads of practical operation (for example in the case of frequent use of the discharging device of the occurring continuous power).
- The contactor contact has to withstand the occurring direct voltage of a minimum of 1000 V.
- The contactor contact has to withstand the occurring discharge current according to the resistance value that is used, i.e. 1 A with 1000 ohm.

How to Proceed for Discharging



WARNING

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

Before working on live parts: De-energize the installation and secure the power switch against unintentional or unauthorized re-energization.

Wait at least **30 minutes** after switching off the supply voltages to allow discharging.

Check whether voltage has fallen below 50 V before touching live parts!

1. Install discharging device before switching on supply voltage for the first time.
2. Establish safe electrical connection between discharging device and object to be discharged.
3. On mains side, switch off supply voltages to drive system before activating discharging device.
4. Activate discharging device.

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