

AKD[®]2G / AKD[®] / S700

Accessories Guide

North American Edition



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Original Document



For safe and proper use, follow these instructions. Keep for future use.

KOLLMORGEN

Because Motion Matters™

Record of Document Revisions

Revision	Remarks
Rev A, 12/2009	Original version
Rev B, 08/2012	Updated revision
Rev C, 09/2012	Minor updates to formatting.
Rev D, 09/2012	Minor updates to formatting.
Rev E, 05/2013	Notes added on 300V and 600V Value line cable routing standards. Chapter on capacitor modules added.
Rev F, 09/2013	Pinout drawings added for linear motor adapters. Section added for Kollmorgen™ Ethernet cables.
Rev G, 12/2014	Regen resistor model support changed.
Rev H, 12/2015	Filter order information clarified.
Rev J, 11/2019	Added AKD2G accessories

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2 General

2.1 About this Manual

This manual describes accessories for the AKD2G, AKD and S700 drives and contains essential technical data. This manual is only valid in conjunction with the manuals for the AKD2G drive, AKD drive and applicable motor in your application.

The manuals for AKD2G, AKD and S700 drives are included on the disk shipped with the drives and on the Kollmorgen website (www.kollmorgen.com). These documents are available in PDF format in multiple languages (system requirements: Windows, internet browser, and Acrobat Reader). In all pdf versions, the table of contents and index entries are active bookmarks. Page/chapter numbers in the text with cross references are active links to the target material.

2.2 Symbols

Symbol	Meaning
	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	This is not a safety symbol. Indicates situations which, if not avoided, could result in property damage.
	This is not a safety symbol. This symbol indicates important notes.

2.3 General Safety Instructions

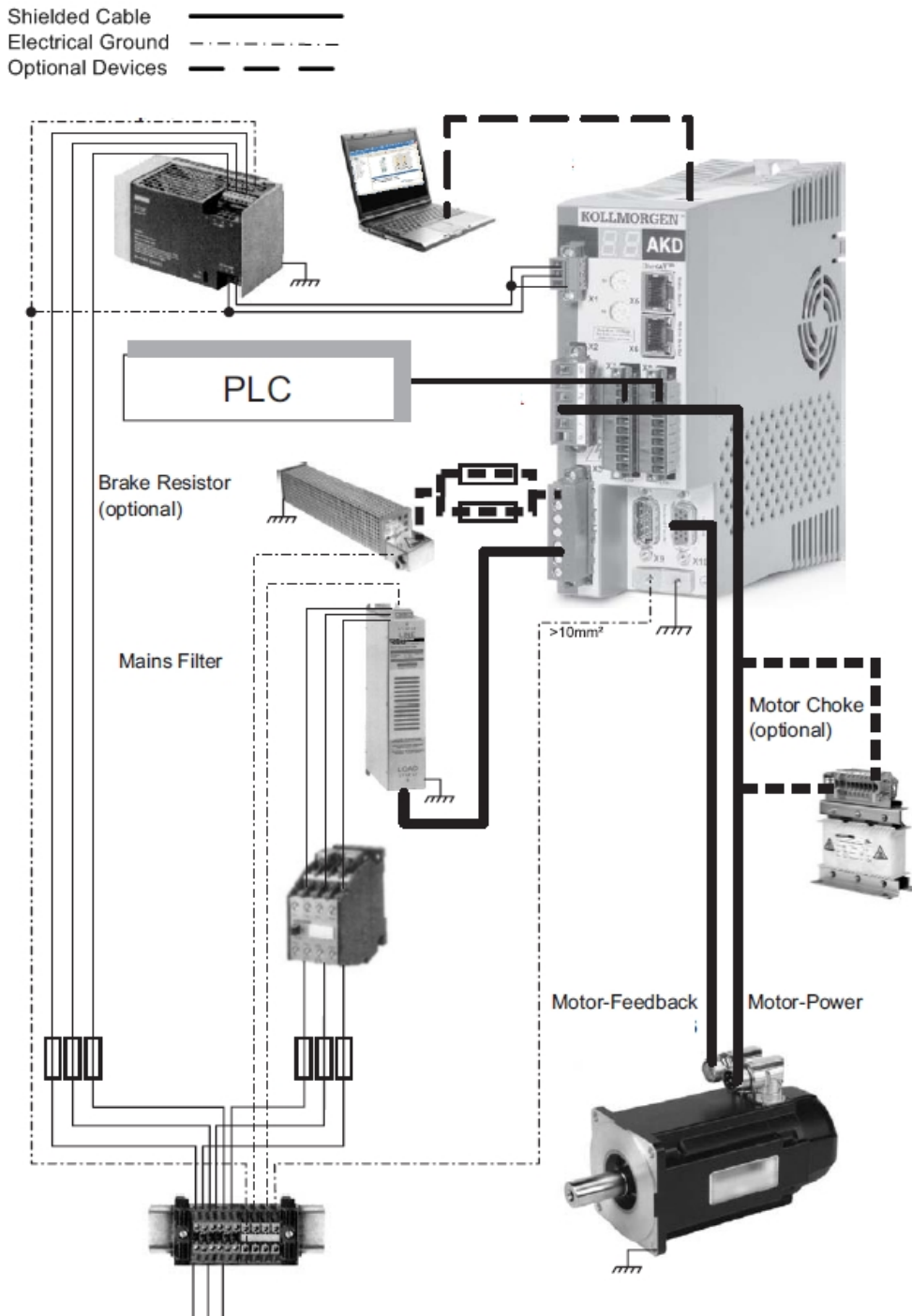
CAUTION

- This manual is only valid in conjunction with the manuals for the drive and motor in your application.
- You must read the installation manual for the drive and motor in your application and observe the safety instructions in this manual before beginning mounting/installation work.
- Improper or incorrect cable assembly, mounting, or wiring can result in damage to property and equipment or personnel injury. The following requirements for specialist personnel apply:
 - Transport: only by personnel with knowledge of handling electrostatically sensitive components.
 - Unpacking: only by electrically qualified personnel.
 - Cable assembly: only by electrically qualified personnel.
 - Installation: only by electrically qualified personnel.
 - Commissioning: only by qualified personnel with extensive knowledge of electrical engineering /drive technology.
- Observe the specific safety instructions for each product group.
- The maximum cable lengths that are given must not be exceeded, otherwise the drive and motors may not function properly.
- Kollmorgen™ is not liable for faults or damage to the connected equipment caused by cables that have been configured by customers.

3 Digital Drive Systems

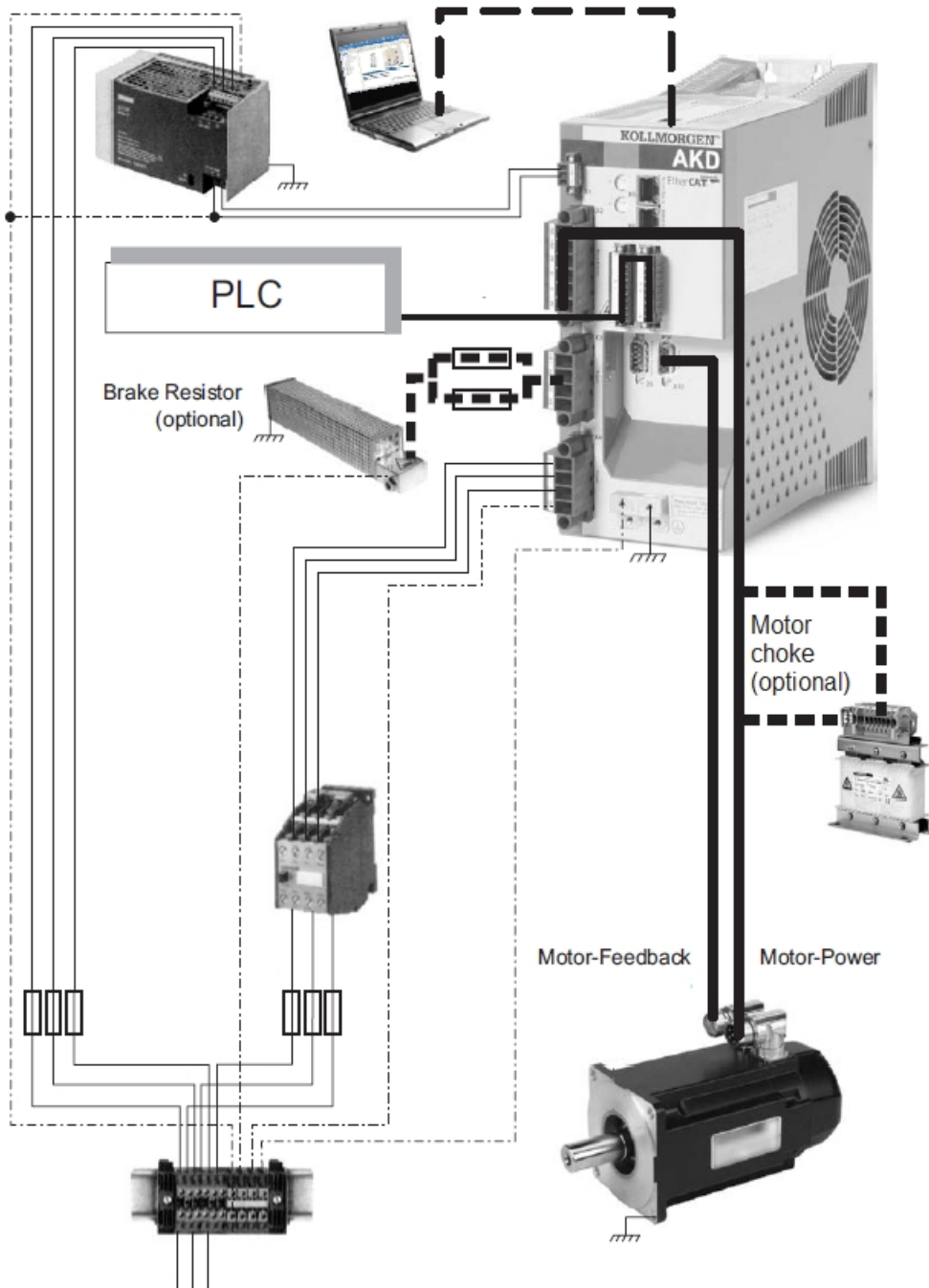
The systems shown are possible scenarios for setting up a digital drive system with relevant components.

3.1 Drive System with AKD-x00306 to 02406

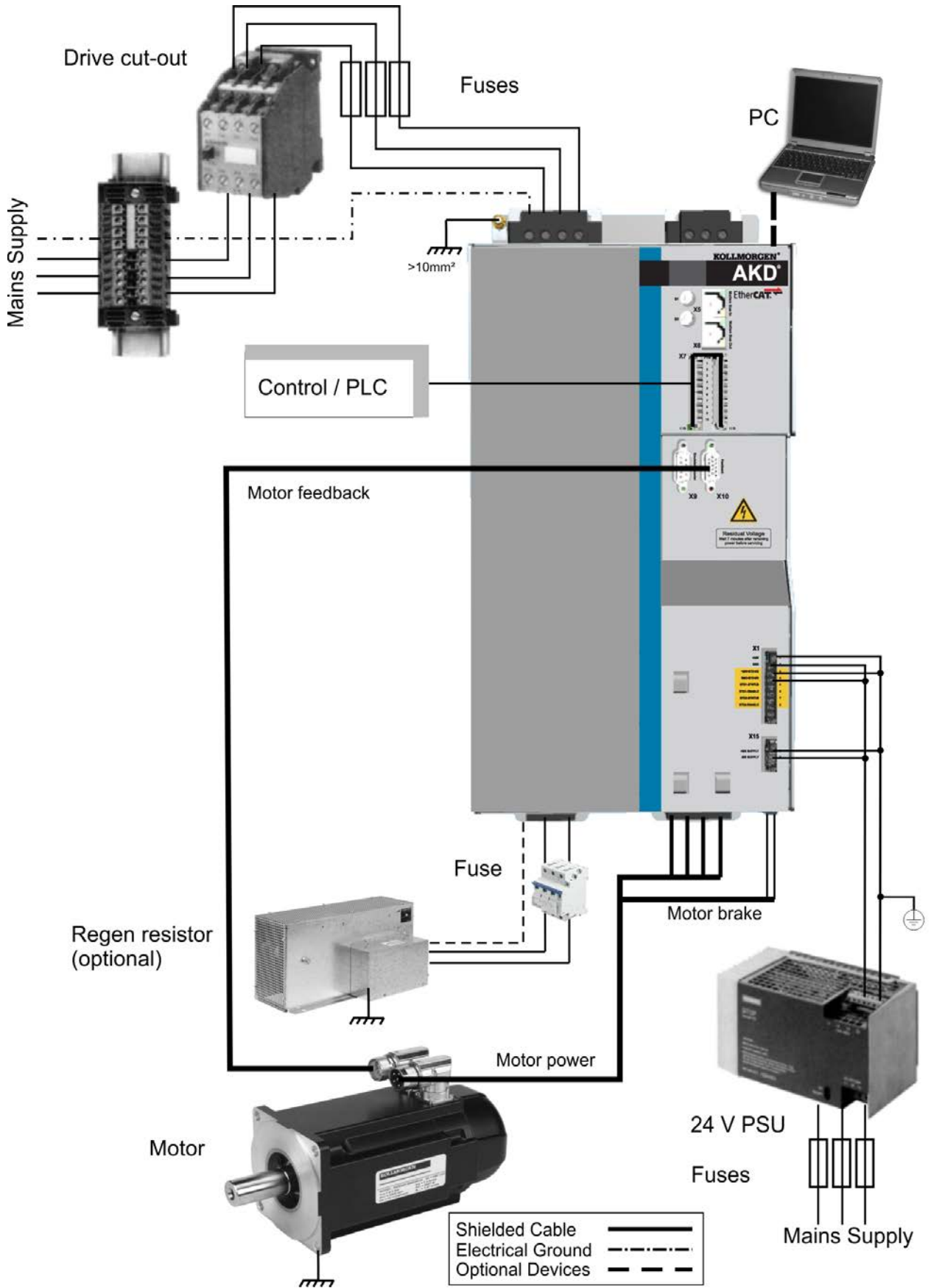


3.2 Drive System with AKD-x00307 to 02407

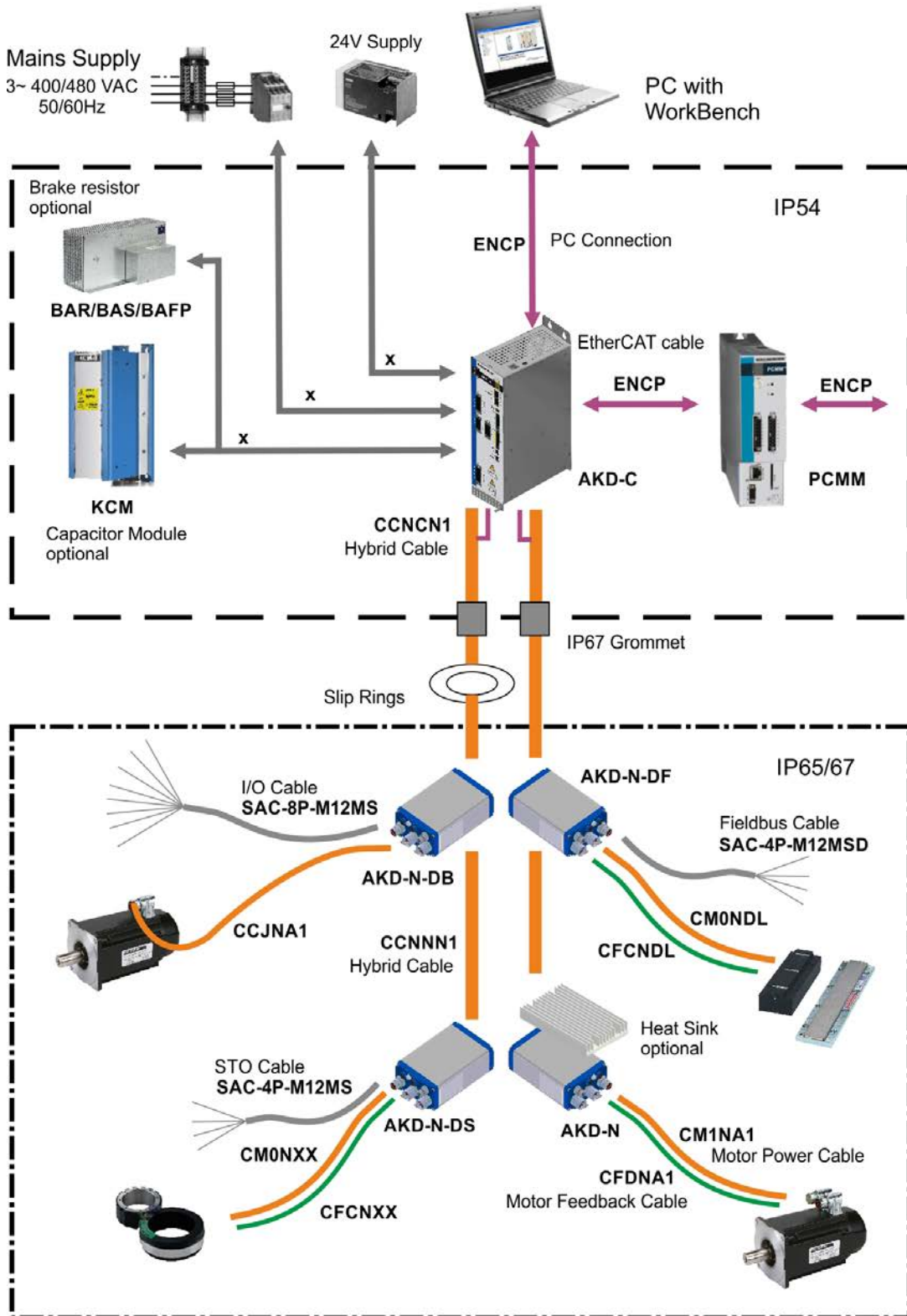
Shielded Cable ————
 Electrical Ground - - - - -
 Optional Devices - - - - -



3.3 Drive System with AKD-x04807



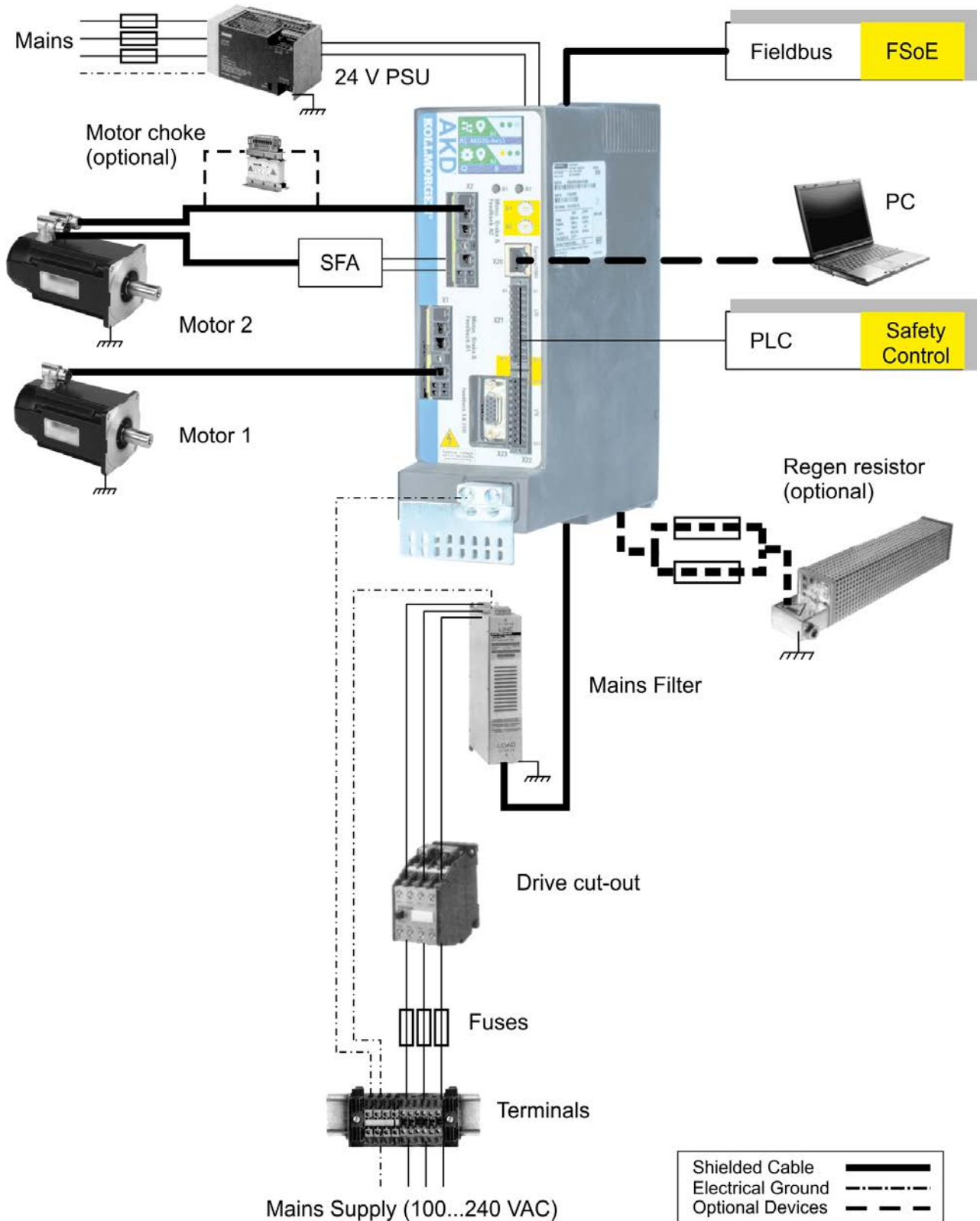
3.4 Decentralized Drive System with AKD-C and AKD-N



All components inside the borders are supplied by Kollmorgen with the exception of cables signed with "x". These cables are not supplied by Kollmorgen, you should use cables or wires according to EN 60204.

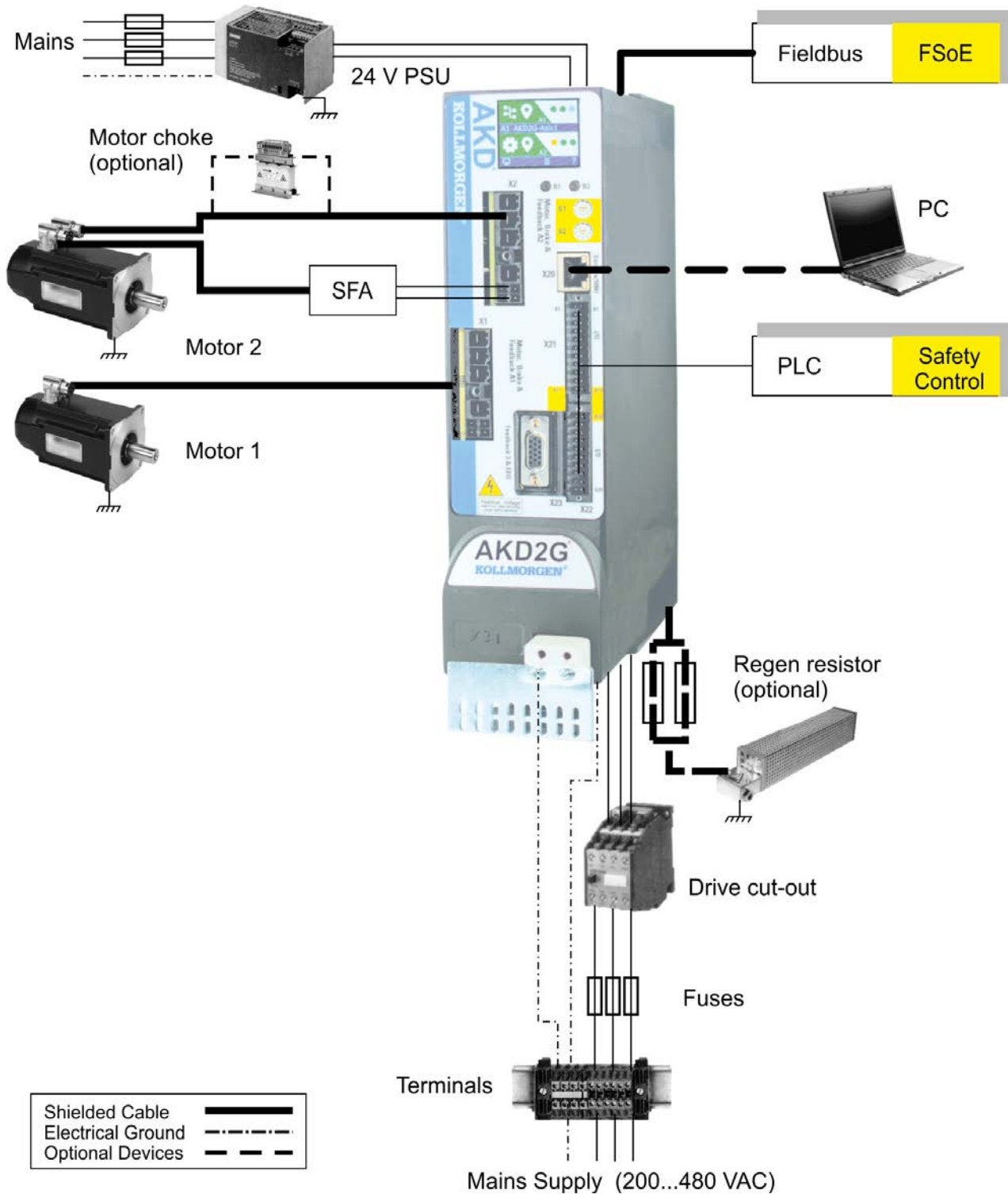
3.5 Drive System with AKD2G-Sxx-6VxxD

Example with single and dual cable motor connection on a dual axes drive. The number of available axes depend on the drive variant.



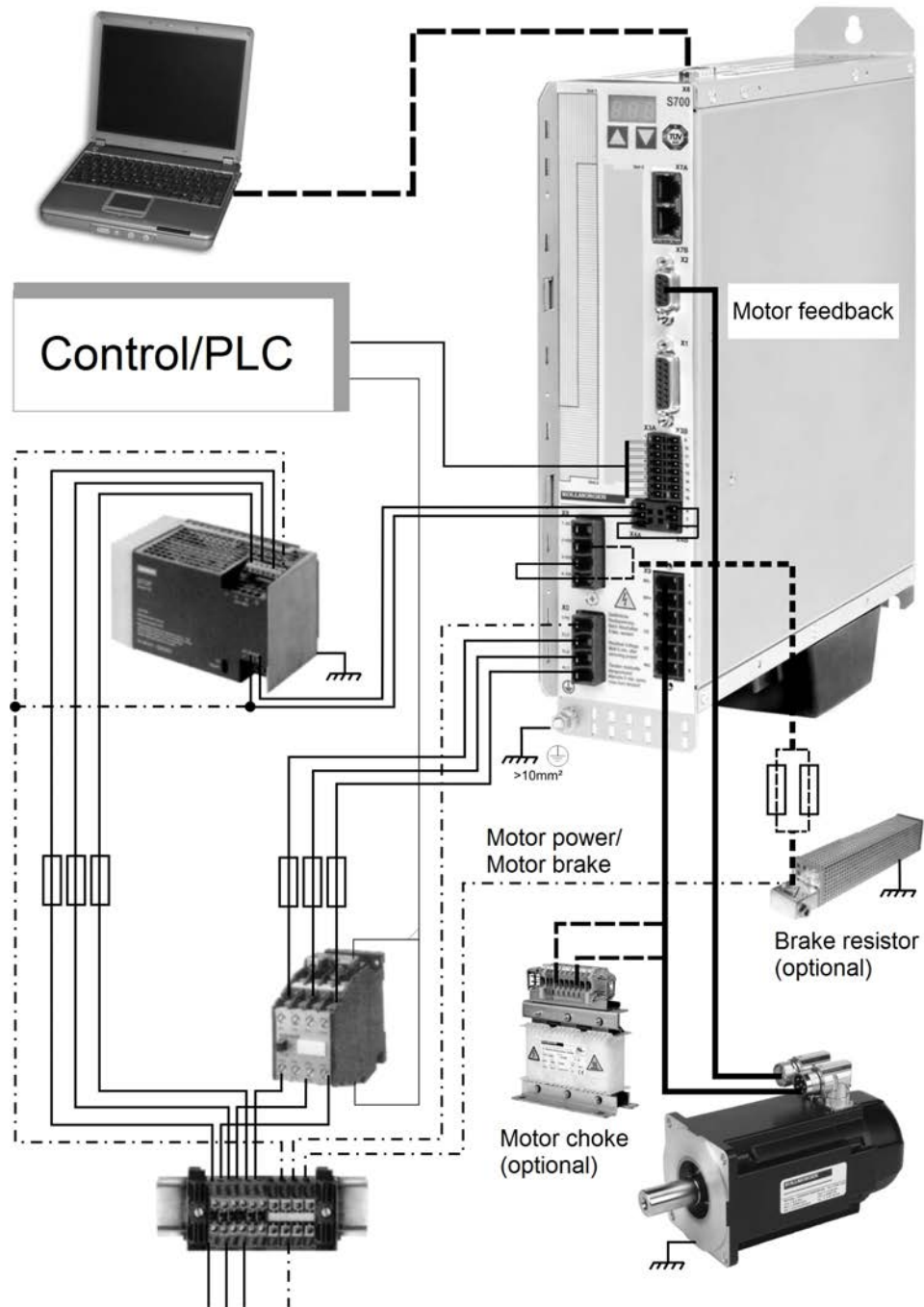
3.6 Drive System with AKD2G-Sxx-7VxxD

Example with single and dual cable motor connection on a dual axes drive. The number of available axes depend on the drive variant.



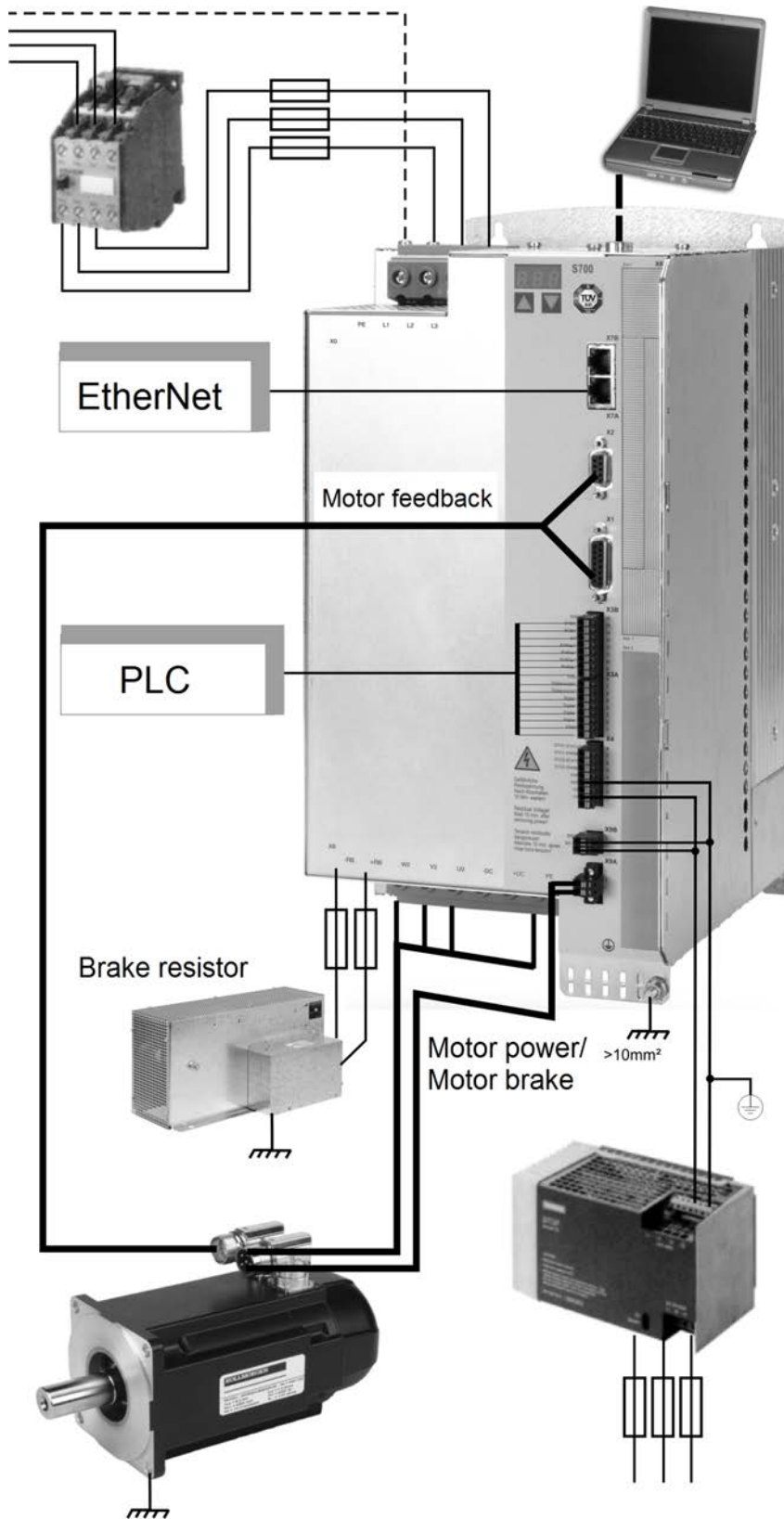
3.7 Drive System with S701 to 724

Shielded Cable ————
 Electrical Ground - - - - -
 Optional Devices - - - - -



3.8 Drive System with S748 to S772

Shielded Cable ————
 Electrical Ground - - - - -
 Optional Devices - - - - -



4 Mechanical Tools

4.1 Safety Instructions

⚠ CAUTION

This manual is only valid in conjunction with the instruction manual for the drive and motor you are using in your application.

4.2 Mounting Kit for AKMH Motors

IEC mounting kits with 1 shaft center screw and 4 flanges screws. Hygienic mounting is possible only with these screws.

Description	Order Code
Mounting Hardware AKMH2, Ax flange/Cx front mounting	MTG-KIT-AKMH2-IEC
Mounting Hardware AKMH3, Ax flange/Cx front mounting	MTG-KIT-AKMH3-IEC
Mounting Hardware AKMH4, Ax flange/Cx front mounting	MTG-KIT-AKMH4-IEC
Mounting Hardware AKMH5, Ax flange/Cx front mounting	MTG-KIT-AKMH5-IEC
Mounting Hardware AKMH6, Ax flange/Cx front mounting	MTG-KIT-AKMH6-IEC

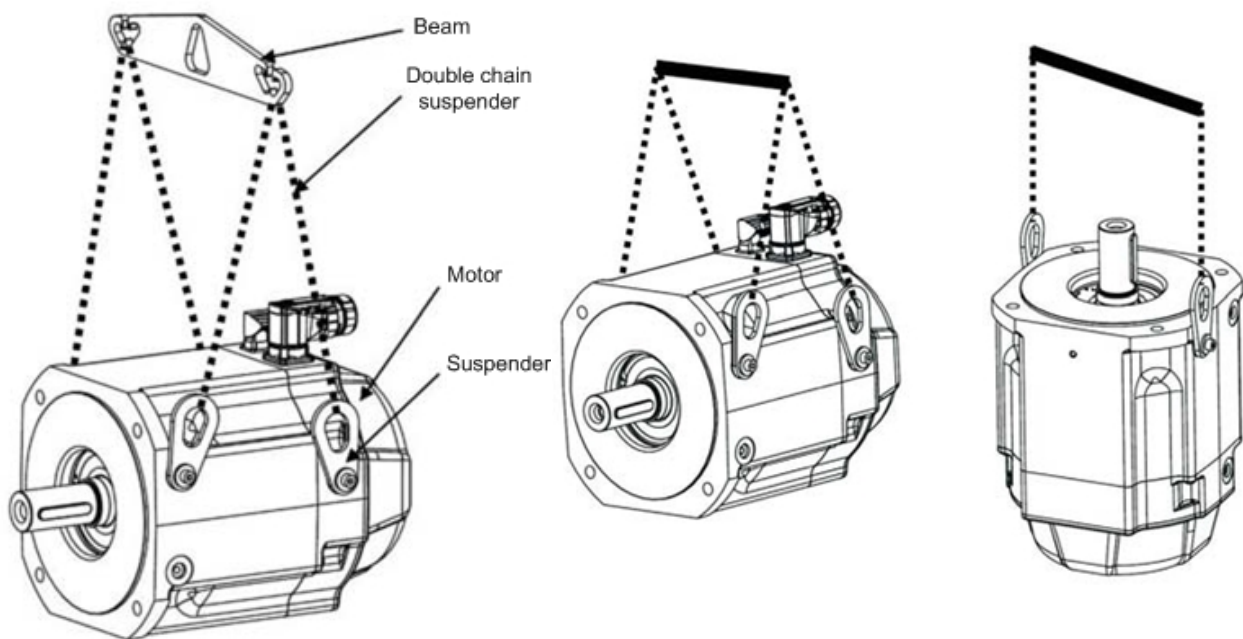
4.3 Suspension Unit for AKM8 Motors

⚠ CAUTION

You must read the instruction manual for the suspension unit ZPMZ 120/292. Observe and follow the safety instructions for this item.

The Suspension Unit ZPMZ 120/292 is designed for suspending motors only, without attached units such as gearboxes, and clutches. The suspension unit is designed for a maximum motor weight of 120 kg and maximum nominal span of the extreme suspension hooks of 292 mm.

The suspension unit consists of a beam (suspended off the crane hook) and two double-run chain suspenders. The motor may be suspended on two or four runs of the chain suspender.



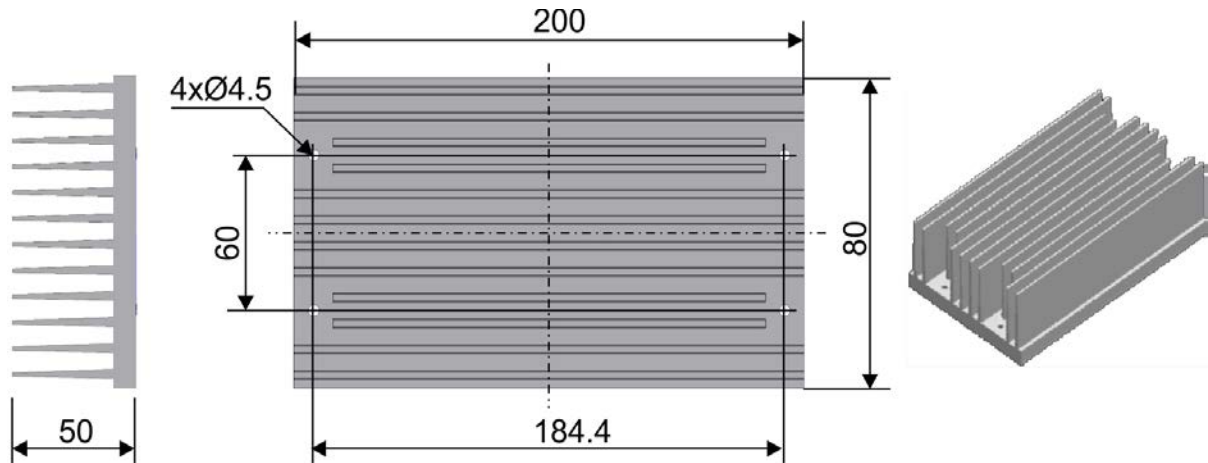
The suspenders (number depends on the motor type) are delivered with the motor.

Technical Data	Value
Lifting capacity	120 kg
Nominal span	292 mm
Lug width	44.7 mm
Lug height	51 mm
Weight	0.83 kg
Number of cycles per year	20,000
Average load	60 %
Order code	FA00092

4.4 Heat Sink for AKD-N

When mounting AKD-N to the machinery, temperature management is important to ensure maximum performance of the drive system. In case of bad cooling situation (as described in the AKD-N Installation Manual), you can mount a heat sink to the AKD-N.

Heat flow is optimized by a heat conducting film, which must be placed between heat sink and AKD-N.

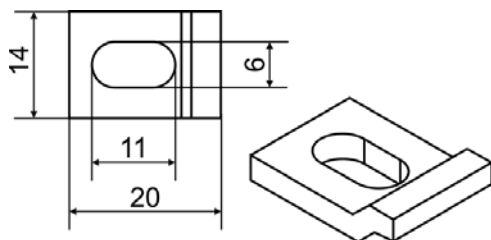


Order Codes

Description	Usable for	Order codes
Heat sink Kit 50 mm with heat conducting film and 4 screws M4x16	AKD-N003/006	AKD-N 3,6 HEATSINK KIT 50MM
Heat sink Kit 50 mm with heat conducting film and 4 screws M4x16	AKD-N012	AKD-N 12 HEATSINK KIT 50MM
Heat conducting film	AKD-N003/006	849-373001-04
Heat conducting film	AKD-N012	849-374001-04

4.5 Mounting clamps for AKD-N

The AKD-N drive is mounted to the machine with special mounting clamps. The delivery package contains 4 clamps. In case of lost or damaged clamps, you can order a set of four clamps.



Order Codes

Description	Order codes
AKD-N Mounting Clamps Set, 4 clamps	AKD-N-M/C-Set

5 Input, Output, and Feedback Accessories

5.1 X9 Screw Terminal Adapter, AKD-X9ADPT



The AKD X9 screw terminal adapter plugs into the X9 port for testing of the X9 port connection. This item is not used with S700 drives.

5.2 Linear Motor Adapter

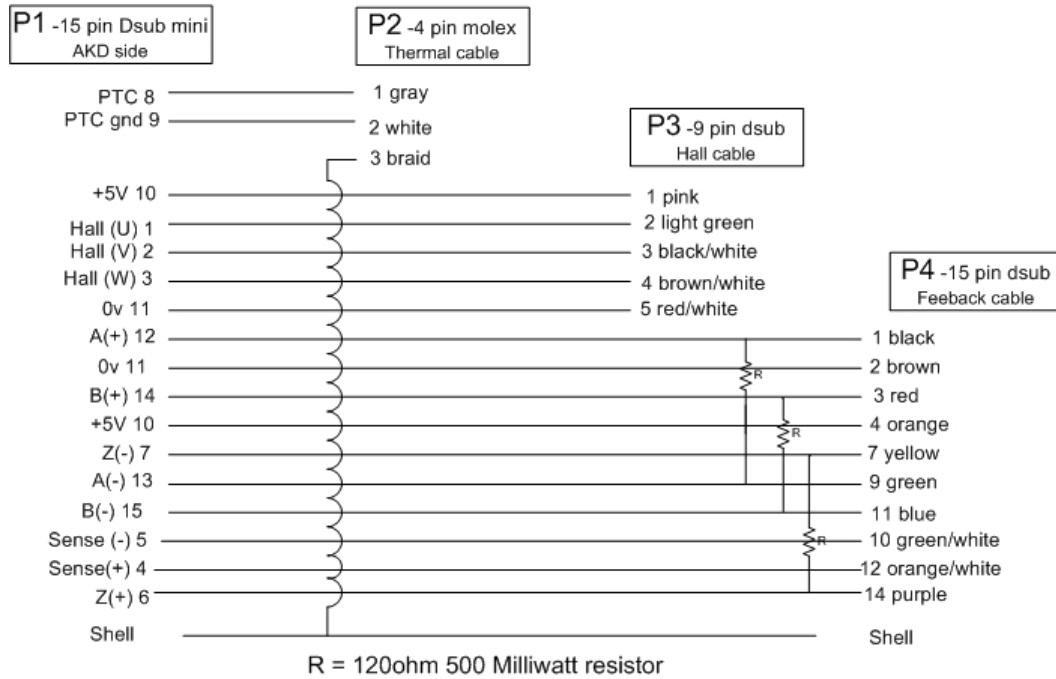


Linear motor adapters are used to combine feedback, Hall, and thermal sensors. They have connectors for standard Kollmorgen™ DDL connections. The linear feedback device is customer supplied, and two different adapter models are available for common linear feedback types. This item is not used with S700 drives.

Item	Linear Feedback Type
ACI-AKD-A	Heidenhain
ACI-AKD-B	Renishaw

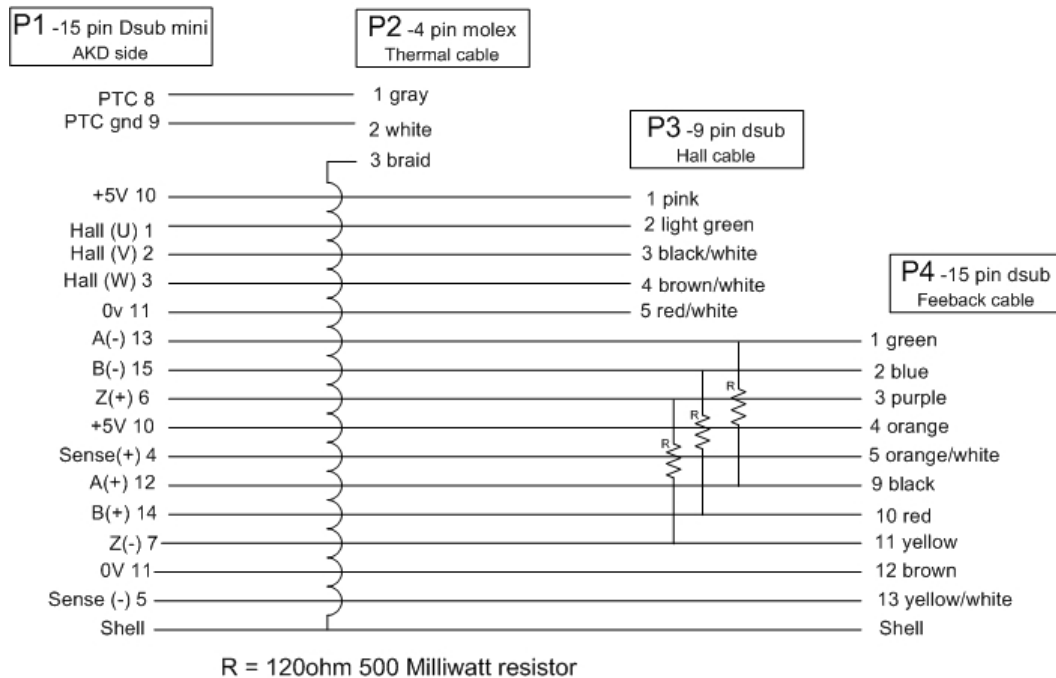
5.2.1 ACI-AKD-A Pinout Drawing

ACI-AKD-A (Heidenhain type)



5.2.2 ACI-AKD-B Pinout Drawing

ACI-AKD-B (Renishaw Sine/Cos type)



6 Shielding Accessories

6.1 Safety Instructions

⚠ CAUTION

- You must read the instructions manual for the drive/motor you are using in your application and observe the safety instructions they contain before beginning mounting/installation work.
- This manual is only valid in conjunction with the instruction manuals for the drive and motor you are using in your application.

6.2 Shield Plates

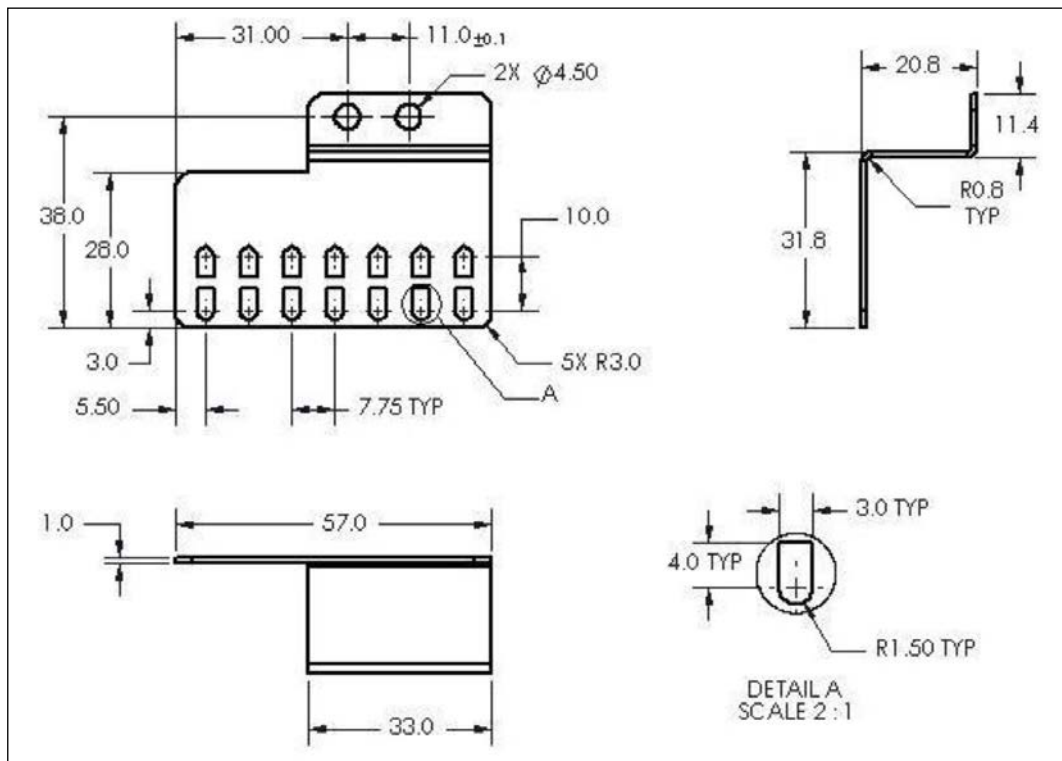
Shield plates can be attached to drives to assist in grounding and routing cabling.



6.3 AKD Shield Plates

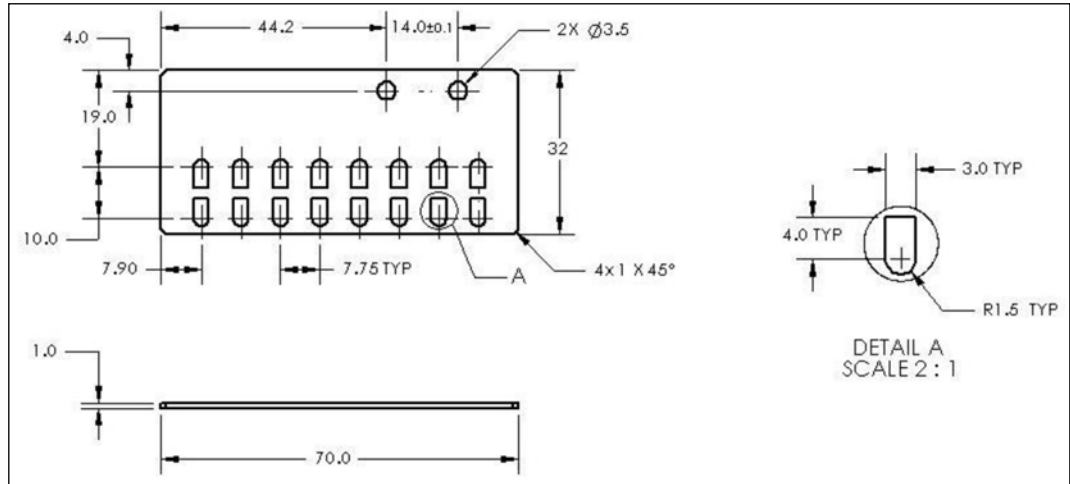
6.3.1 AKD-z-zzz06 Shield Plate

This shield plate is not included with AKD-z-zzz06, but can be ordered separately (Item 153-230000-01).



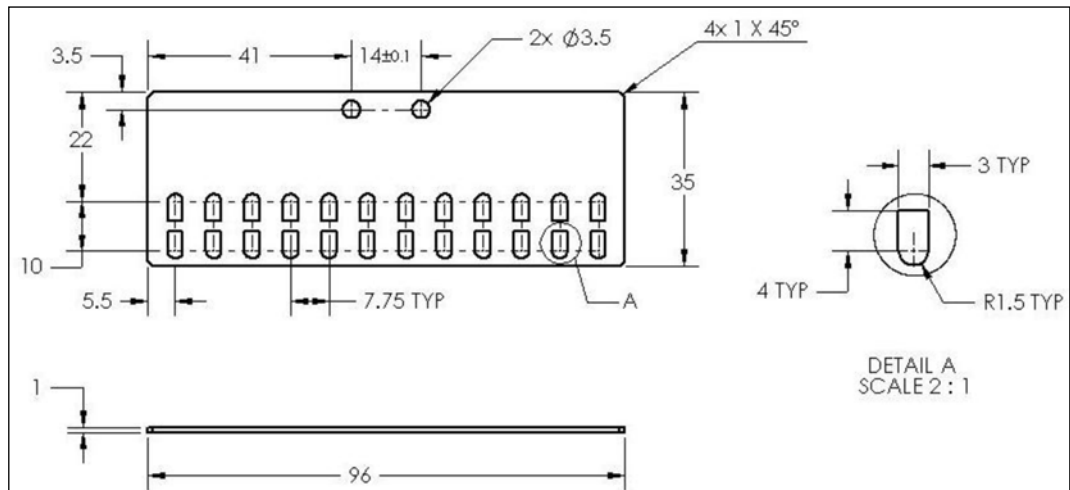
6.3.2 AKD-z-00307, AKD-z-00607, AKD-z-01207 Shield Plate

This shield plate (Item number 153-254001-00) is included for use with AKD-z-00307, AKD-z-00607, and AKD-z-01207 drives.



6.3.3 AKD-z-02407 Shield Plate

This shield plate (Item 153-255000-02) is included for use with the AKD-z-02407 drive.



6.4 Connector Tool for AKD-N

Tool for screwing the union nut of the AKD-N connections.



Order Code

Description	Order Codes
Tool for AKD-N servo drives to install connectors/cables	AKD-N-TOOL-A

6.5 Sealing plugs for AKD-N connectors

The sealing plugs in the delivery package are screwed to unused AKD-N connectors to ensure the IP class for the machine environment. In case of lost plugs, you can order a set with 3 different plug sizes.



Order Code

Description	Order Codes
AKD-N Sealing Plug Set, 4xM12, 2xM23, 2xM17	AKD-N-S/P-Set

6.6 AKD, AKD2G and S701 to S724 Shield Clamps (purchased separately)

AKD, AKD2G, S701 to 724 drives feature slots on the front panel for connecting additional shield clamps.

Recommended shield clamp:



In special cases, the cable shields can be routed to an additional busbar via shield clamps. The following shield clamp is recommended:

Order Code	Item	Tension range
DE-108248	SK14	6-13 mm

6.7 S748 to S772 Shield Clamps (purchased separately)

The shroud supplied with S748 to S772 drives features slots for the connection of additional shield clamps.

The clamps are included with the drive.

Recommend shield clamps:



Manufacturer	Item	Tension range
OBO (Bettermann)	BBS-Schelle Typ 2056	16-22 mm
OBO (Bettermann)	BBS-Schelle Typ 2056	28-34 mm

6.8 External Shielding Busbar (purchased separately)

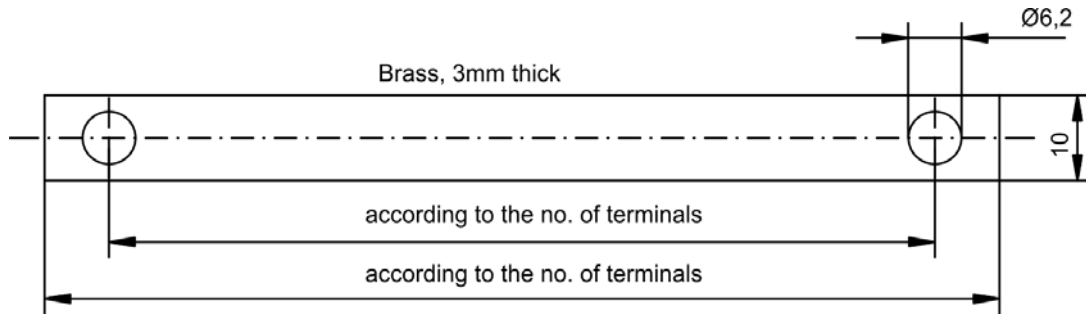


In special cases, the cable shields can be routed to an additional busbar via shield clamps. The following shield clamp is recommended:

Manufacturer	Item	Tension range
Weidmüller	KLBÜ	6-13 mm

A possible scenario for setting up a busbar for the above shield clamps is described below.

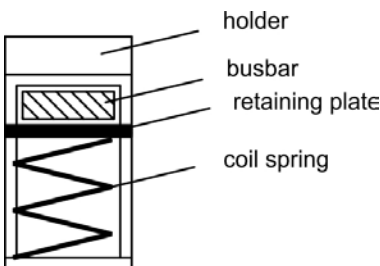
1. Cut a busbar of the required length from a brass rail (cross-section 10 x 3 mm) and drill holes in it as indicated. All shield clamps required must fit between the drill holes.



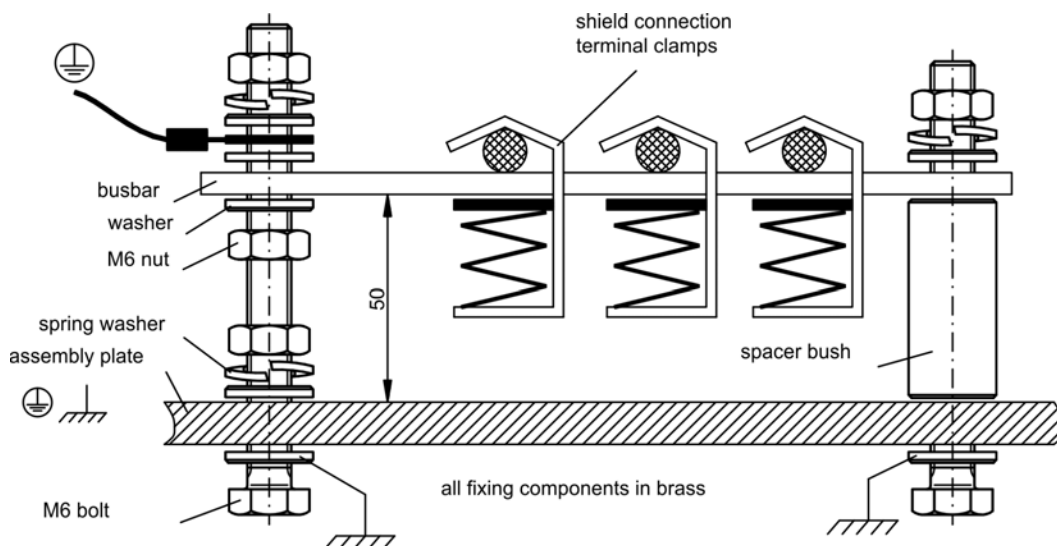
2. Squeeze together the coil spring and the supporting plate and push the busbar through the opening in the holder.

CAUTION

Risk of injury is present due to the spring force of the coil spring. Use pincers.



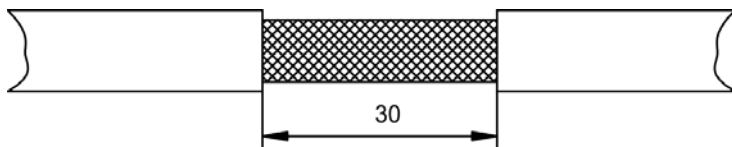
3. Mount the busbar with the shield clamps fitted on the assembly plate. Use either metal spacer bushes or screws with nuts and accessories to maintain a spacing of 50 mm. Earth the busbar using a single conductor with a cross-section of at least 2.5 mm².



- Strip the external cable sheath to a length of approximately 30 mm, taking care not to damage the braided shield. Push the shield clamp up and route the cable to it via the busbar.

NOTICE

Make sure good contact exists between the shield clamp and the braided shield.



7 Mating Connectors and Adapters

7.1 Connectors for AKD-B/P/T/M

Mating connectors are part of delivery (except SubD and RJ types). For spare parts, see tables below.

Power Connectors

Device	Description	Order Code
AKD-x00306/00606	Mating connector X2, motor, with shield clamp SK14	AKD-X2-SK14
AKD-x02406, AKD-x00307...02407	Mating connector X2, motor, with shield plate	AKD-X2+Shield-Kit
AKD-x00306/00606	Mating connector X3, mains, DC-Bus, Regen Resistor	CON- AKDX3A-SL
AKD-x01206	Mating connector X3, mains, DC-Bus, Regen Resistor	CON- AKDX3B-SL
AKD-x02406	Mating connector X4, mains	CON- AKDX3C-SL
AKD-x02406, AKD-x00307...02407	Mating connector X4, DC-Bus, Regen-R Mating connector X4 variant Y	CON- AKDX3C-S CON-AKDX3C-SL-Y
AKD-x04807	Mating connector X4, mains	CON- AKD4807X4-SL
AKD-x04807	Mating connector X14, DC-Bus Mating connector X14 variant Y	CON- AKD4807X14-SL CON-AKD4807X14-SL-Y
AKD-x04807	Mating connector X3, Regen-R	CON- AKD4807X3-SL

24 V Supply and STO Signals

Device	Description	Order Code
AKD all variants, 3A to 24A	Mating connector X1, 24V and STO	CON-AKDX1-SL
AKD all variants, 48A	Mating connector X1, 24V and STO	CON-AKD4807X1-SL

Digital I/O

Device	Description	Order Code
AKD all variants	Mating connector X7, I/O	CON-AKDX7-SL
	Mating connector X8, I/O	CON-AKDX8-SL
AKD-M	Mating connector X35, I/O	CON-AKDX35-SL
	Mating connector X36, I/O	CON-AKDX36-SL
Option IC	Mating connector X21, I/O Option	CON-AKDX21-SL
	Mating connector X22, I/O Option	CON-AKDX22-SL
	Mating connector X23, I/O Option	CON-AKDX23-SL
	Mating connector X24, I/O Option	CON-AKDX24-SL

Feedback

Device	Description	Order Code
AKD all variants	Connector kit with X10 male connector 15 pin high density, X9 female connector 9 pin, 2 housings, screws	AKD-X9+X10-Kit

CAN

Device	Description	Order Code
AKD all variants	CAN Termination connector	AKD-CAN-Termination
AKD all variants	CAN RJ12->SubD9 adapter	AKD-CAN-RJ12-SubD9

7.2 Connectors for AKD-C

Mating connectors for X12, X13, X14, X15 and X16 are part of delivery. If a mating connector is lost or damaged, you can order the AKD-C Connector Kit.

Connector Kit

Device	Description	Order Code
AKD-C	Connector Kit included mating connectors X12, X13, X14, X15 and X16	AKD-C-CONKIT
AKD-C	Connector Kit included one mating connector with shield plate for X20A or X21A	CON-AKD-CX20/21A-SLA

7.3 Connectors for AKD-N

We do not offer mating connectors for motor power, feedback, hybrid or string cables. If these connectors are damaged, a new Kollmorgen™ cable must be ordered.

Digital I/O connection

Kollmorgen™ recommends partly configured Phoenix SAC cables.

Device	Description	Order Code
AKD-N all variants	M12 mating connector for X3, 5 m cable, unconfigured wires	SAC-8P-M12MS (Phoenix Contact)

STO connection

Kollmorgen™ recommends partly configured Phoenix SAC cables.

Device	Description	Order Code
AKD-N-DS/DT	M12 mating connector for X6, 5 m cable, unconfigured wires, A coded	SAC-4P-M12MS (Phoenix Contact)

Feldbus connection

Kollmorgen™ recommends partly configured Phoenix SAC cables.

Device	Description	Order Code
AKD-N-DF/DG	M12 mating connector for X6, 5 m cable, unconfigured wires, D coded	SAC-4P-M12MSD/5,0 (Phoenix Contact)

Jump-X5 connector for AKD-N-DS/DF with single cable connection

For sufficient voltage supply of the digital feedback systems HIPERFACE DSL or SFD3 connected to AKD-N-DS/DF connector X4, a dongle must be plugged to X5.

Device	Description	Order Code
AKD-N-DS/DF, single cable	X5 mating connector with jumper 4-5	AKD-N-JUMP-X5

7.4 Connectors for AKD2G

Mating connectors are part of delivery (except SubD and RJ types). For spare parts, see tables below.

Connector Kits

Description	Order Code
X3, X10, X21 connectors	AKD2G-CONKIT
X3, X10, X21, X22 connectors	AKD2G-CONKIT+X22
X3, X10, X21, X22, X4, X5 connectors	AKD2G-CONKIT+X22+X4+X5

Connectors

Description	Order Code
X1/X2 connector - hybrid power/feedback	AKD2G-CON-X1/X2
X10 connector - 24 VDC	AKD2G-CON-X10
X10 T-connector - 24 VDC	AKD2G-CON-X10T
X21 connector - I/O	AKD2G-CON-X21
X22 connector - I/O	AKD2G-CON-X22
X3 connector - Mains/DC Link/Regen Resistor	AKD2G-CON-X3
X4 connector - second brake	AKD2G-CON-X4
X5 connector - second feedback	AKD2G-CON-X5

7.5 Smart Feedback Adapter (SFA) for AKD2G

The AKD2G servo drive is optimized for single hybrid cable technology using HIPERFACE DSL or SFD3 feedback options. For using a conventional feedback, Kollmorgen™ offers the SFA.

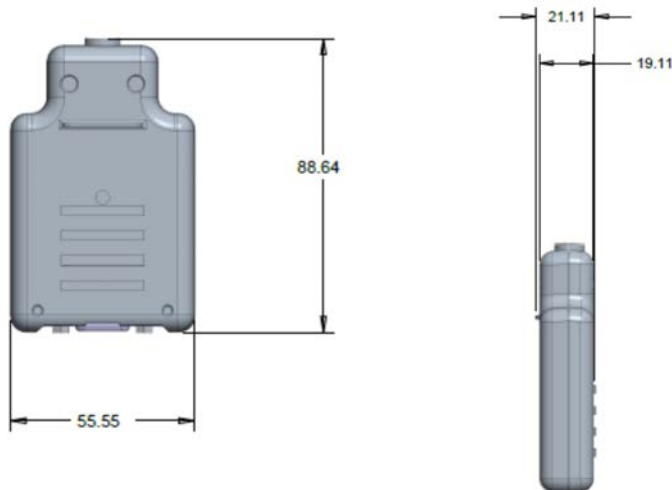
The SFA converts conventional feedbacks into 2 wire feedback allowing a customer to connect the two wires into the X1, X2 or X5 connectors (shielded).

SFA can also be used for Emulated Encoder Output (EEO) and for electronic gearing. For X41 pinout and wire color coding, refer to the AKD2G Installation Manual.



- X41 Sub-D high density 15 pin, female
- 1 m shielded cable with 3 flying leads for connection to X1 or X2 or X5
- The cable shield is connected via shield wire to X5/1 or with cable ties to the X1/X2 shield plates (cut-off the unused shield wire).
- Input for electronic gearing
- Connected feedback must be set in Workbench
- Use Kollmorgen™ feedback cables
- Output for encoder emulation (EEO3/EEO4)
- SFA dimensions (WxLxH): 55.6 x 88.7 x 21.2 mm

SFA Dimensions



SFA with din rail



Order code

Description	Order Code
SFA – 1 meter cable	AKD2G-CON-SFA-000
SFA with din rail clip – 1 meter cable	AKD2G-CON-SFA-000-D

8 Mains Chokes

In special cases, if mains voltage is more than 3% asymmetrical, then the S748/772 drives must be used with a mains choke. Without this choke, an unfavorable combination of mains impedance and DC bus capacitance can result in an unloaded DC bus voltage of up to 800 V.

To reduce EMC, the chokes should be mounted isolated from the cabinet. Single conductors can be used for wiring; shielded cables are not required.

The purpose of mains choke is as follows:

- Prevents overloading of the semiconductors in the event of a rapid current rise during commutation.
- Prevents voltage dips in the mains voltage caused by commutation.
- Reduces current ripple in the DC link, which increases the service life of the DC link capacitors.

NOTICE

Several drives can be connected to one mains choke; the rated current of the mains choke must be greater than or at least equal to the total current of the connected drives.

8.1 Safety Instructions

⚠ WARNING

Power terminals can conduct hazardous voltage up to 10 minutes after the mains voltage has been disconnected. Before starting work on power terminals, check that the phase-to-earth and phase-to-phase voltages have de-energised.

⚠ WARNING

Due to the high earth leakage currents induced by the system, you should observe the requirements of EN 61800-5-1 (which is fixed installation, $\geq 10 \text{ mm}^2$ or double protective earth) when carrying out mounting and installation work.

⚠ CAUTION

You must read the instruction manuals for the drive/motor you are using in your application and observe the safety instructions they contain before starting mounting/installation work.

⚠ CAUTION

This manual is only valid in conjunction with the instruction manuals for the drive and motor you are using in your application.

NOTICE

A connection diagram appears in the drive instruction manual.

8.2 Type Assignment

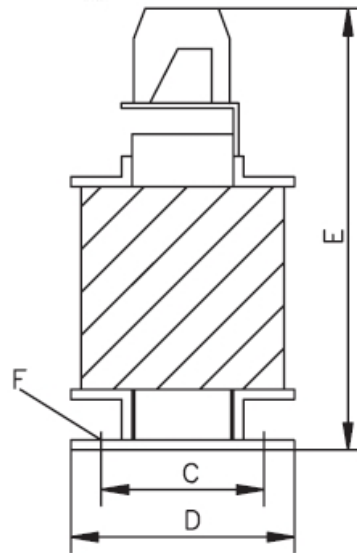
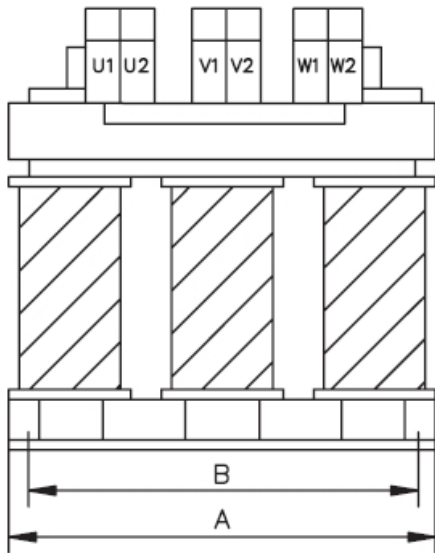
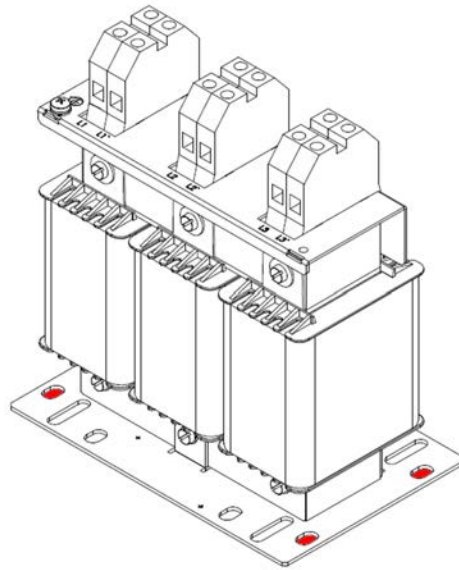
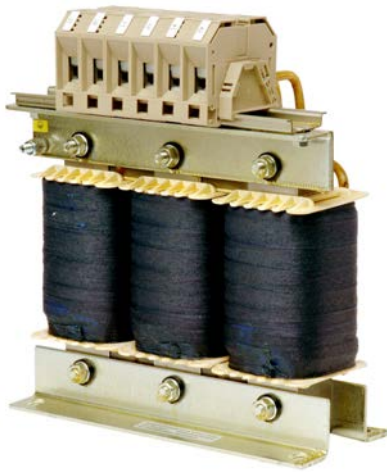
Drive	Mains Choke
AKD-x04807 (with asymmetrical mains >3% only)	2% uk
AKD2G	Not required
S748 (with asymmetrical mains >3% only)	2% uk
S772 (with asymmetrical mains >3% only)	2% uk
S701 to 724	Not required

8.3 Order Codes

Item		uk	Order Codes	Comments
Mains choke 3L0,24-50-2	(0.24 mH, 50A)	2%	DE-201476	Can be used for S748/772 in case of asymmetric mains
Mains choke 3L0,2-75-2	(0.20 mH, 75 A)	2%	DE-201477	Can be used for S748/772 in case of asymmetric mains

8.4 Mains Choke 3L

A number of drives can be connected to the same mains choke; the rated current of the mains choke must be greater than or at least equal to the total current of the connected drives.



Technical Data

Type	Inductivity [mH]	Nominal Current [A]	uk [%]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	Terminals [mm ²]	Weight [kg]
3L0,24-50-2	0.24	50	2	152.5	114.3	88.9	101.5	163	6.5	10	5.9
3L0,2-75-2	0.20	75	2	185	170	77	122	220	8x12	35	9.9

9 Mains Filters

AKD-P00306 to 02406 and AKD2G-xxx-6Vxx drives require an external mains filter. All other drives feature built-in mains filters (see the relevant instruction manual). The filtering effect of the mains filters can only be assured if the permissible throughput rating of the mains filters is not exceeded even on peak loading of the drives with I_{peak} .

The max. available throughput rating of the mains filter must be higher than the max. power consumption of the drives and higher than the maximum power consumption of the motors. More information can be found on Kollmorgen Developer Network in "[Mains Filter](#)".

9.1 Safety Instructions

⚠ CAUTION

You must read the instructions manual for the drive/motor you are using in your application and observe the safety instructions they contain before commencing mounting/installation work. This manual is only valid in conjunction with the instructions manual for the drive and motor you are using in your application.

⚠ WARNING

Power terminals are capable of conducting hazardous voltage up to 10 minutes after the mains voltage has been disconnected. Before starting work on power terminals, check that the phase-to-earth and phase-to-phase voltages have de-energized.

⚠ WARNING

Due to the high earth leakage currents induced by the system, you should observe the requirements of EN 61800-5-1 (e.g. fixed installation, $\geq 10 \text{ mm}^2$ or double protective earth) when carrying out mounting and installation work. A connection diagram appears in the drive installation manual.

9.2 Type Assignment

Drive	Mains filter
AKD-x00306 to 02406 (120 to 240V)	1NF, 3NF
AKD-x00307 to 02407 (240 to 480V)	Not required
AKD2G-xxx-6Vxx (120 to 240V)	1NF, 3NF
AKD2G-xxx-7Vxx (240 to 480V)	Not required
S700	Not required

9.3 Order Codes

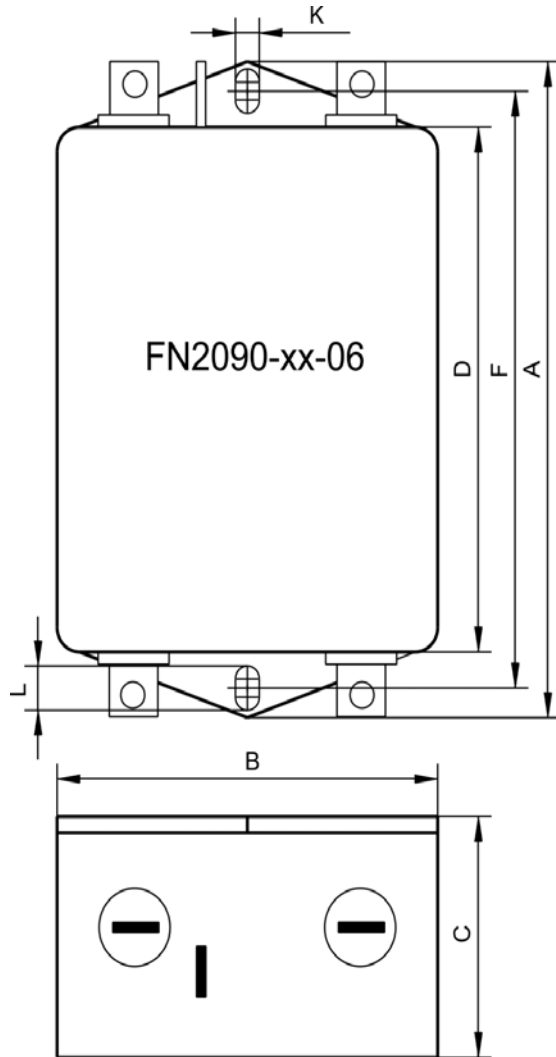
Description	Order Code	Remarks
Mains filter 1NF-10 (230 VAC, 10A)	DE-201565	1~, 230 VAC, CE, UL
Mains filter 1NF-12 (230 VAC, 12A)	DE-201566	1~, 230 VAC, CE, UL
Mains filter 1NF-20B (125V/230V, 20A)	DE-201865	1~, IEC 230 VAC, UL 125 VAC, CE
Mains filter 1NF-25 (230 VAC, 25A)	DE-201568	1~, 230 VAC, CE, UL
Mains filter 3NF-07 (480 VAC, 07A)	DE-201569	3~, 480 VAC, CE, UL
Mains filter 3NF-16 (480 VAC, 16A)	DE-201570	3~, 480 VAC, CE, UL
Mains filter 3NF-30 (480 VAC, 30A)	DE-201571	3~, 480 VAC, CE, UL
Mains filter FN2090-6	DE-202203	1~, 250 VAC, CE, UL
Mains filter FN2090-12	DE-202204	1~, 250 VAC, CE, UL
Mains filters FN-3288-10	DE-202205	3~, 530 VAC, CE, UL
Mains filters FN-3288-16	DE-202206	3~, 530 VAC, CE, UL

9.4 Mains filters FN2090



Observe the safety instructions.

For single-phase up to 240 VAC operation only.



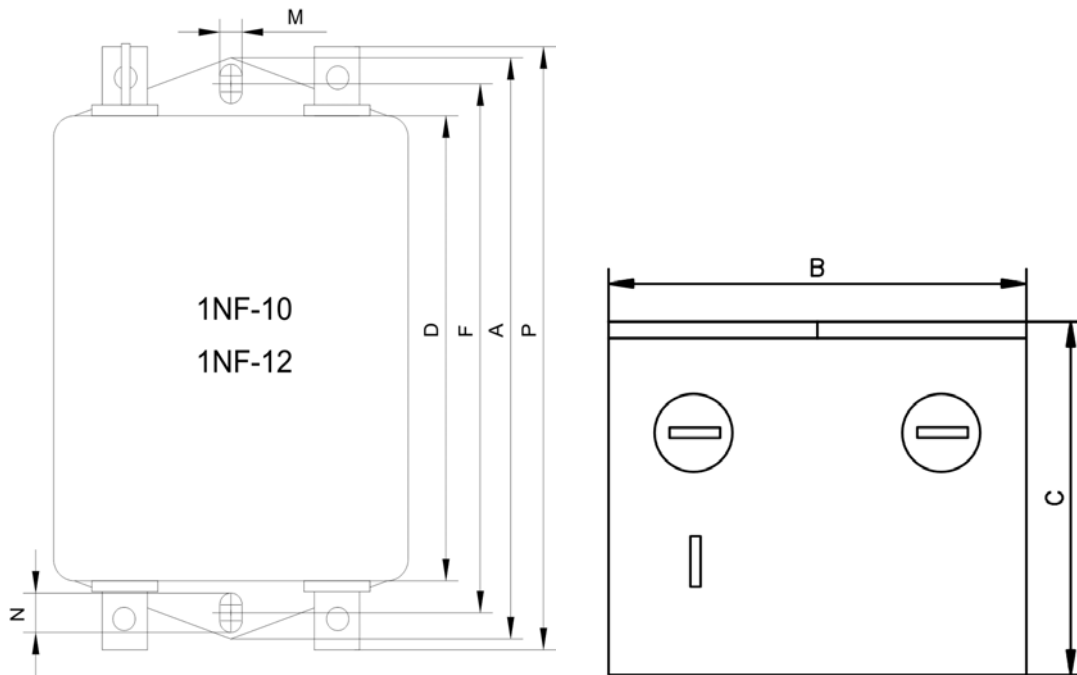
Technical Data

Type	Nominal Current [A]*	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	K [mm]	L [mm]	Weight [kg]	Faston
FN2090-6-06	6	85	54	30,5	65	75	5.3	6.3	0.2	6.3 x 0.8
FN2090-12-06	12	114	58	45.5	95	103	4.4	6	0.4	6.3 x 0.8

* at 50°C environment temperature

9.5 Mains filters 1NF-10...12

Observe the safety instructions.
For single-phase operation only.



Technical Data

Type	Nominal Current [A]*	Nominal Voltage [V]	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	M [mm]	N [mm]	P [mm]	Weight [kg]	Connection
1NF-10	10	230	85	49	40.3	54	75	5.3	6.3	87	0.29	Fast-on
1NF-12	12	230	156	57.5	45.4	130.5	143	5.3	6	156	0.73	Fast-on

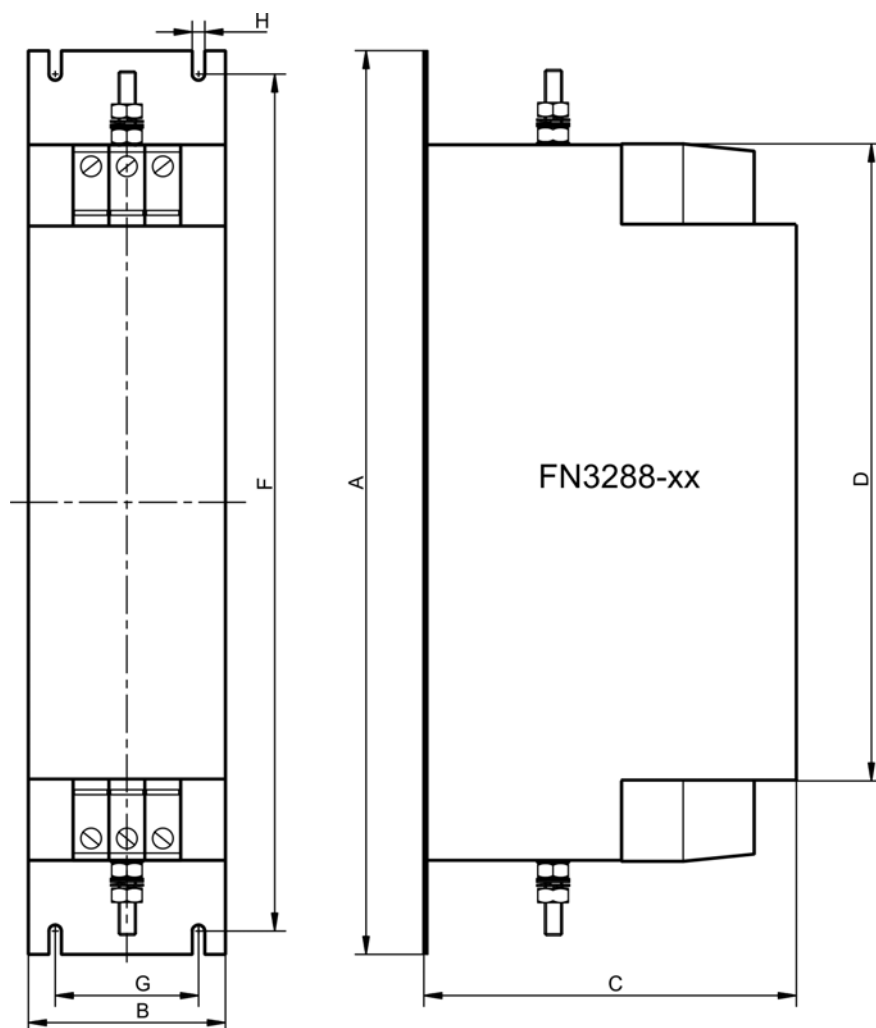
* at 40°C environment temperature

9.6 Mains filters FN3288



Observe the safety instructions.

For three-phase operation up to 480 VAC only.

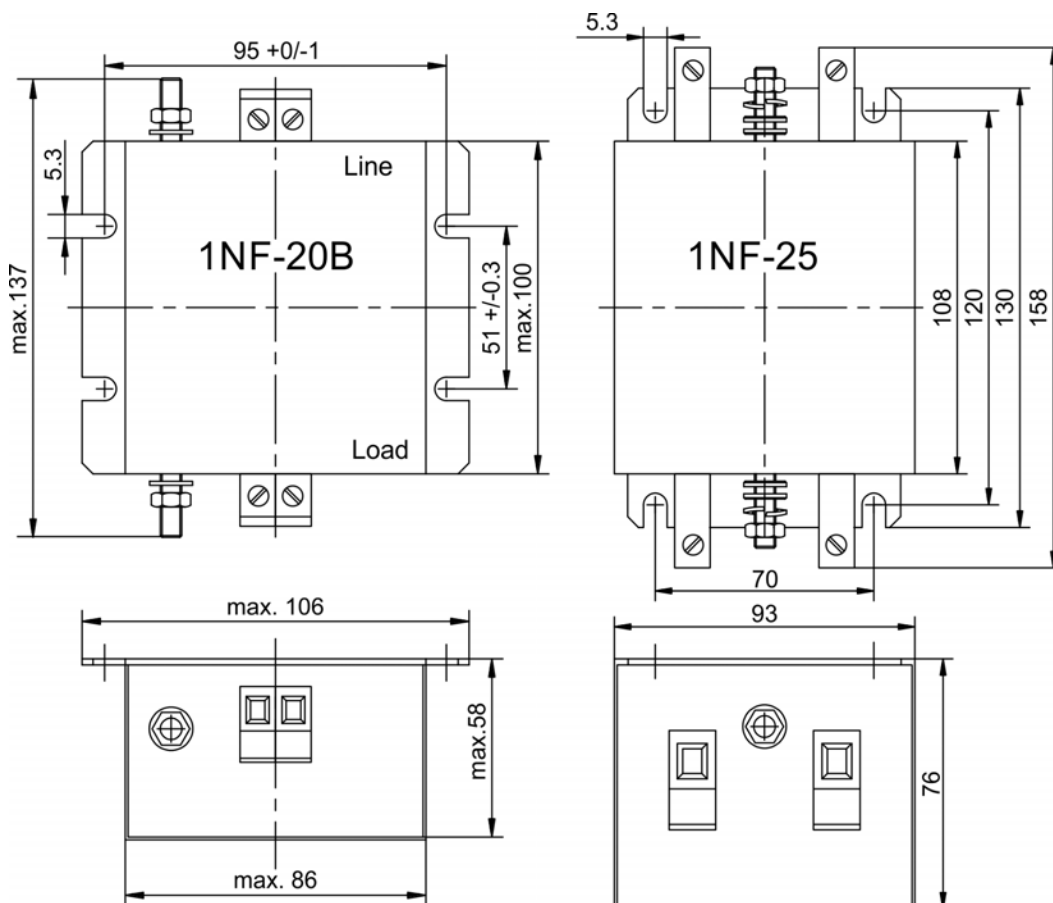


Technical Data

Type	Nom. Current [A]*	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	G [mm]	H [mm]	Weight [kg]	Terminals	PE Bolt
FN3288-10	10	185	40	120	157	175	20	4.5	0.8	0.5-6mm ² , 1.0-1.2Nm	M5, 2.2Nm
FN3288-16	16	195	45	140	164	180	25	5.4	1.0		

* at 50°C environment temperature

9.7 Mains filters 1NF-20B, 1NF-25

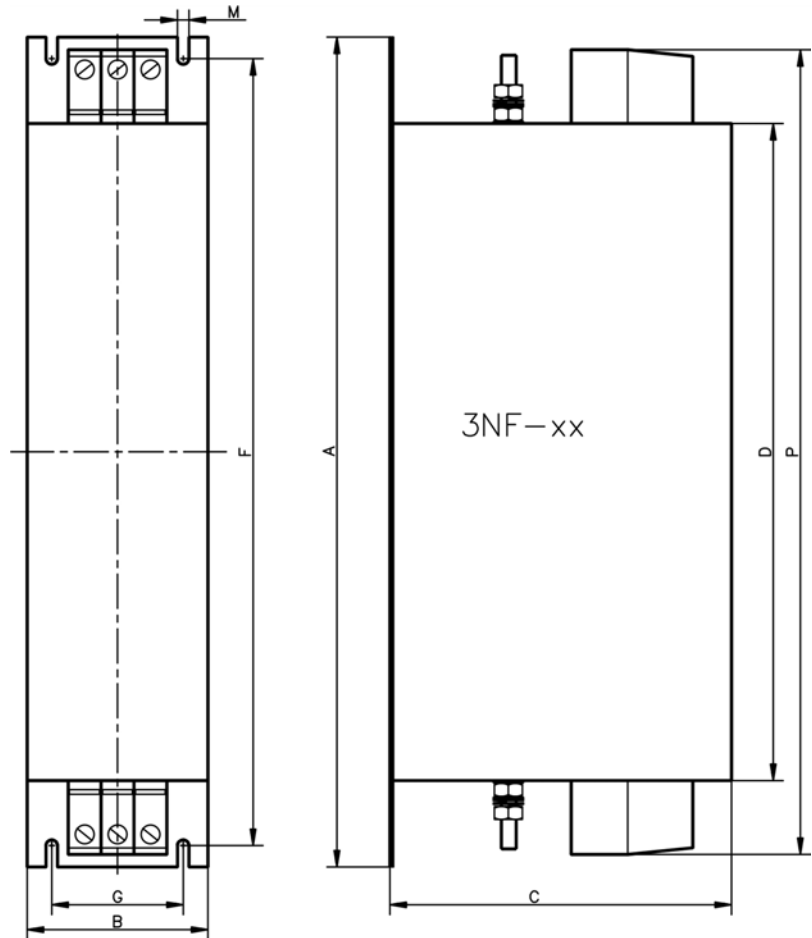


Technical Data

Type	Nominal Current [A]*	Nominal Voltage		Weight [kg]	Connection Phase Terminals	Connection PE
		IEC	UL/CSA			
1NF-20B	20	230V	125V	0.93	Wires up to 4mm ² Torque 0.6 to 0.8 Nm	Bolt M 6 Torque 3.5 to 4 Nm
1NF-25	25	230V	230V	0.7	Wires up to 10mm ² Torque 1.5 to 1.8 Nm	

* at 50°C environment temperature

9.8 Mains Filters 3NF-07...30



Technical Data

Type	Nominal Current*	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	G [mm]	M [mm]	P [mm]	Weight [kg]	Terminals	PE Bolt
3NF-07	7 A	190	40	70	160	180	20	4.5	180	0.5	4 mm ² , 0.7 to 0.8 Nm	M5, 2.2Nm
3NF-16	16 A	250	45	70	220	235	25	5.4	240	0.8		
3NF-30	30 A	270	50	85	240	255	30	5.4	260	1.2	10 mm ² , 1.9 to 2.2 Nm	

* at 50°C environment temperature

10 Capacitor Modules

KCM (Kollmorgen™ Capacitor Modules) absorb energy generated by the motor when it is operating in generator mode. Normally, this energy is dissipated as waste through brake resistors. KCM feeds the energy stored back into the DC Bus link as and when it is required.

KCM-S	Saves energy: The energy stored in the capacitor module during regenerative braking is available the next time acceleration happens. The module's inception voltage is calculated automatically during the first load cycles.
KCM-P	Power in spite of power failure: If the power supply fails, the module provides the drive with the stored energy that is required to bring the drive to a standstill in a controlled manner (this only applies to the power supply voltage; battery-back the 24 V supply separately).
KCM-E	Expansion module for both applications. Expansion modules are available in two capacitance classes.

10.1 Important Notes

DANGER

DC Bus link terminals in servo systems carry high DC voltage of up to 900 V. Touching the terminals while they are carrying voltage is extremely dangerous. Switch off (disconnect) the line voltage. You must only work on the connections when the system is disconnected.

It can take over an hour for the modules to self-discharge. Check the state of charge with a measuring device that is suitable for a DC voltage of up to 1,000 V. When measuring a voltage of over 60 V between the DC+/DC- terminals or to ground, discharge the modules as described in the KCM Instructions Manual.

NOTICE

You must read the instructions manual for the drive / servomotor you are using in your application and observe the safety instructions they contain before commencing mounting/installation work.

Wiring diagram and more important notes concerning wiring can be found in the KCM instructions manual and in the instructions manual of the used drive.

10.2 Order Codes

The KCM modules may only be connected to drives with 400/480 V rated voltage.

Type/Order Code	Remarks
KCM-S200-0000	Energy Saving Module, 1.6 kW
KCM-P200-0000	Power Module, 2 kW
KCM-E200-0000	Expansion Module 2 kW
KCM-E400-0000	Expansion Module 4 kW

Technical Data

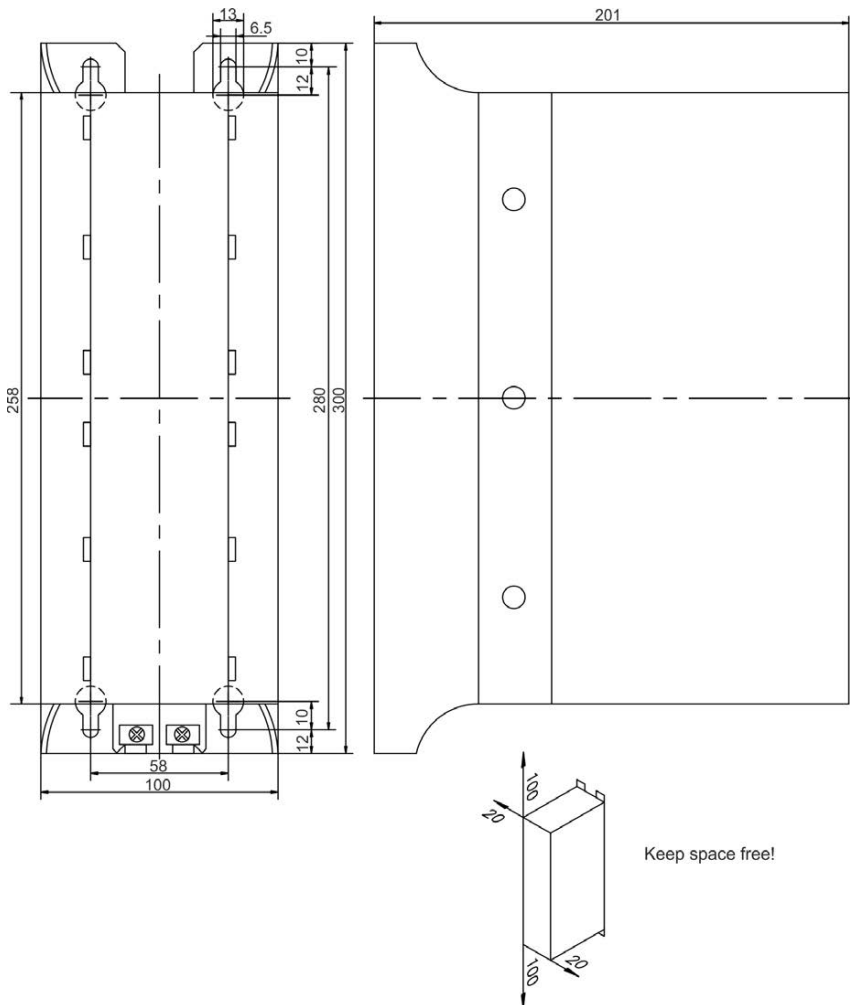
Type	Storage Capacity [Ws]	Rated supply voltage [V=]	Peak supply voltage [V=]	Power [kW]	Protection Class	Inception voltage [V=]	Weight' [kg]
KCM-S200	1600	max 850 VDC	max 950 VDC (30s in 6min)	18	IP20	calculated	6,9
KCM-P200	2000					470 VDC	6,9
KCM-E200	2000					-	4,1
KCM-E400	4000					-	6,2

10.3 KCM Module



Observe the safety instructions and in the instruction manual of the drive.

Permissible assembly type: Vertical, ground connections at the bottom. Other assembly positions are not permitted. Observe the required free space to next device. Ensure there is unobstructed convection for cooling purposes.



Technical Data

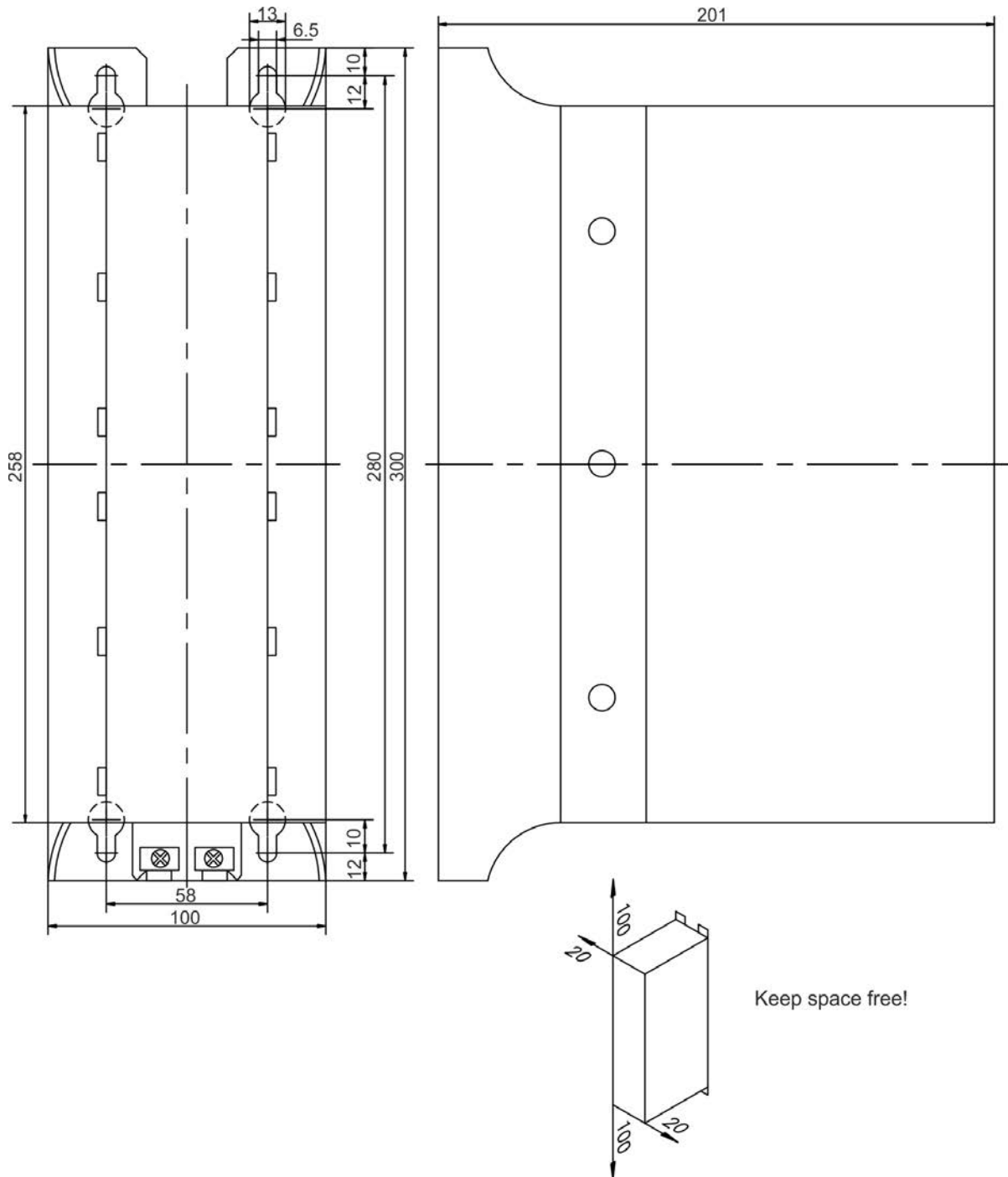
Type	Storage Capacity [Ws]	Rated supply voltage [V=]	Peak supply voltage [V=]	Power [kW]	Protection Class	Inception voltage [V=]	Weight [kg]
KCM-S200	1600	max 850 VDC	max 950VDC (30s in 6min)	18	IP20	calculated	6.9
KCM-P200	2000					470 VDC	6.9
KCM-E200	2000					-	4.1
KCM-E400	4000					-	6.2

10.4 External Regen Resistor BAFP(U)



Observe the instructions in [Important Notes](#) and in the instruction manual of the drive.

Permissible assembly type: Vertical, ground connections at the bottom. Other assembly positions are not permitted. Observe the required free space to next device. Ensure there is unobstructed convection for cooling purposes.



11 Brake/Regeneration Resistors

During braking with the aid of the motor, energy is fed back into the drive. This energy is dissipated as heat in the regeneration resistor (referred to as a brake resistor when used with an S700 drive). The regen resistor is switched on by the brake circuit. Different resistance values must be used depending on the drive. All regen resistors meet the requirements of CE directives and are UL-registered. Regen resistor requirements for Kollmorgen™ servo systems can be calculated using the [Motioneering sizing and selection tool](#).

11.1 Safety Instructions

⚠ CAUTION

- You must read the instruction manuals for the drive and motor that you are using in your application and observe the safety instructions they contain before starting mounting/installation work.
- This manual is only valid in conjunction with the instruction manuals for the drive and motor you are using in your application.
- Danger of burn. Mount only in switchgear cabinets, observe installation clearances, provide the requisite conditions for unobstructed convection for cooling. As Regen resistors can heat up to temperatures in excess of 250°C, use temperature-resistant components in the vicinity of the resistor.
- Observe allowed mounting positions (see dimension drawings). The connection terminals must never be in the vicinity area of hot air.
- In case of insufficient cooling or false mounting the resistor or the surrounding devices could be overheated or damaged.
- A connection diagram appears in the drive's instructions manual.

NOTICE

For best results, the following conditions must be provided for regen resistors:

- Unobstructed cooling air
- Unobstructed dispersion of warmed air
- Rated data with maximum ambient temperature 40°C, in case of ambient temperature higher than 40°C, power must be reduced by 4% per 10K temperature rise.

11.2 Type Assignment

Drive	Regen resistor	Resistance/Ohm
AKD-x00306	BAFP(U)/BAR(U)/BAS(U)	33
AKD-x00606	BAFP(U)/BAR(U)/BAS(U)	33
AKD-x01206	BAFP(U)/BAR(U)/BAS(U)	15
AKD-x02406	BAR(U)/BAS(U)	15
AKD-x00307	BAR(U)/BAS(U)	33
AKD-x00607	BAR(U)/BAS(U)	33
AKD-x01207	BAR(U)/BAS(U)	33
AKD-x02407	BAR(U)/BAS(U)	23
AKD-x04807	BAS(U)	10
AKD-C	BAR(U)/BAS(U)	33
AKD2G	BAFP(U)/BAR(U)/BAS(U)	33
S701 to 712	BAR(U)	33
S724	BAR(U)/BAS(U)	23
S748	BAS(U)	15
S772	BAS(U)	10

11.3 Order Codes

Description	Drive	Resistance [Ω]	Rated Power [W]	Max. Power [W]	Order code
Regen resistor BAS(U) 2000-10	S772	10	2000	3200	BAS-2000-10
Regen resistor BAS(U) 3000-10		10	3000	4800	BAS-3000-10
Regen resistor BAS(U) 6000-10		10	6000	9600	BAS-6000-10
Regen resistor BAR(U) 500-15	AKD-x01206, AKD-x02406, S748, AKD2G-SPx-6V12	15	500	800	BAR-500-15
Regen resistor BAR(U) 1000-15		15	1000	1600	BAR-1000-15
Regen resistor BAS(U) 2000-15		15	2000	3200	BAS-2000-15
Regen resistor BAS(U) 3000-15		15	3000	4800	BAS-3000-15
Regen resistor BAS(U) 6000-15		15	6000	9600	BAS-6000-15
Regen resistor BAR(U) 600-23	AKD-P02407, S724	23	600	960	BAR-600-23
Regen resistor BAR(U) 1000-23		23	1000	1600	BAR-1000-23
Regen resistor BAS(U) 2000-23		23	2000	3200	BAS-2000-23
Regen resistor BAS(U) 3000-23		23	3000	4800	BAS-3000-23
Regen resistor BAS(U) 4000-23		23	4000	6400	BAS-4000-23
Regen resistor BAFP(U) 100-33	AKD-x00306 to x00606, AKD-x00307 to x01207, S701 to S712, AKD2G-SPx-6V03, AKD2G-SPx-6V06, AKD2G-SPx-7V03 to AKD2G-SPx-7V12	33	100	160	BAFP-100-33
Regen resistor BAFP(U) 200-33		33	200	320	BAFP-200-33
Regen resistor BAR(U) 250-33		33	250	400	BAR-250-33
Regen resistor BAR(U) 500-33		33	500	800	BAR-500-33
Regen resistor BAR(U) 1500-33		33	1500	2400	BAR-1500-33
Regen resistor BAS(U) 3000-33		33	3000	4800	BAS-3000-33

11.4 External Regen Resistor BAFF(U)

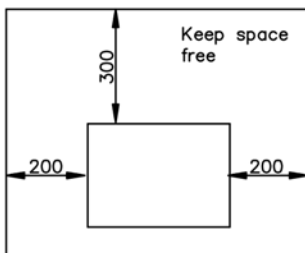
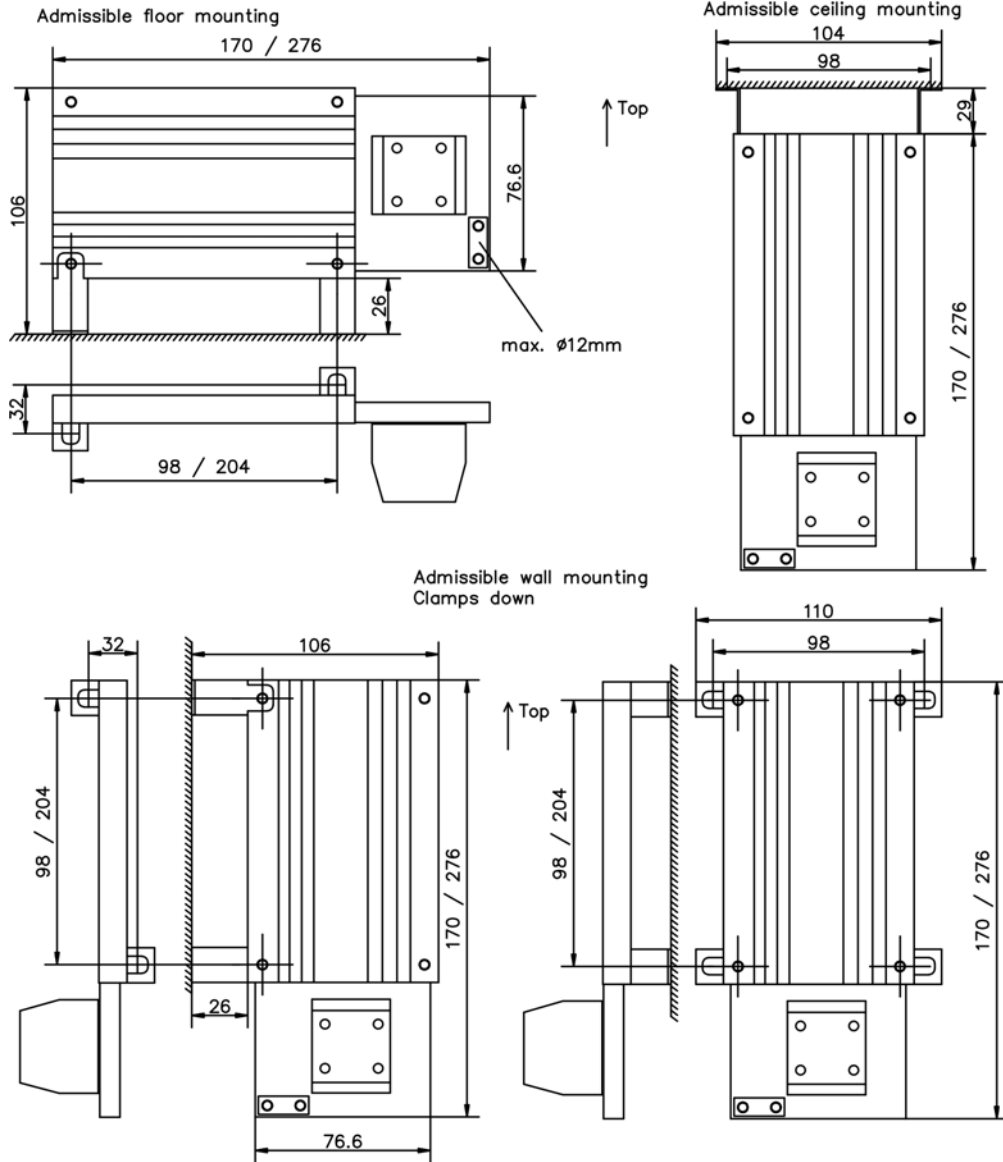


Protection class: IP40



CAUTION

- Surface temperature can exceed 250°C.
- Make sure that the necessary space is kept clear.
- Do not mount on combustible surfaces.



Typ	R	Length	Power	Weight
	Ω	mm	W	Kg
BAFF(U) 100-33	33	170	100	0,3
BAFF(U) 200-33	33	276	200	0,55

Other types of mounting are not admitted !

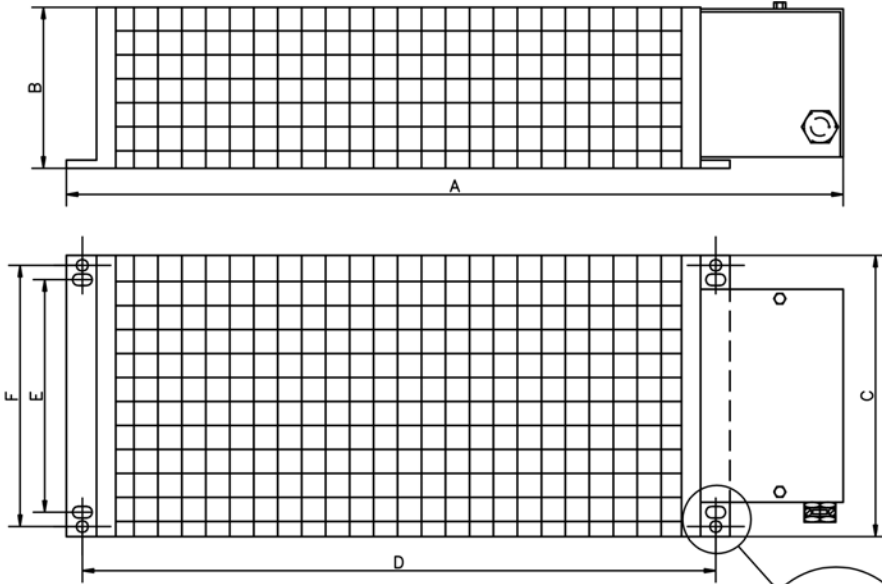
11.5 External Regen Resistor BAR(U)

Protection class: IP20

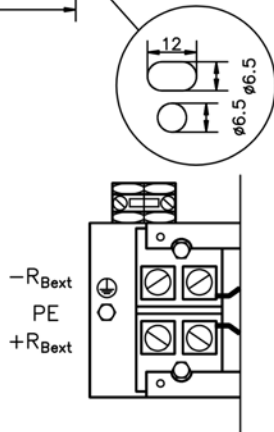


CAUTION

- Surface temperature can exceed 250°C.
- Make sure that the necessary space is kept clear.
- Do not mount on combustible surfaces.

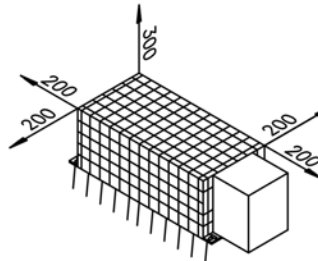


Type	R Ω	Power W	A mm	B mm	C mm	D mm	E mm	F mm	weight Kg
BAR(U) 500	15	500	549	120	92	430	64	80	3
BAR(U) 1000	15	1000	749	120	92	630	64	80	4
BAR(U) 600	23	600	549	120	92	430	64	80	3
BAR(U) 1000	23	1000	749	120	92	630	64	80	4
BAR(U) 250	33	250	349	120	92	230	64	80	2
BAR(U) 500	33	500	549	120	92	430	64	80	3
BAR(U) 1500	33	1500	649	120	185	530	-	150	5,8
BAR(U) 300	66	300	349	120	92	226	64	80	1,5
BAR(U) 600	66	600	549	120	92	426	64	80	2,3
BAR(U) 1000	66	1000	749	120	92	626	64	80	3,4
BAR(U) 300	91	300	349	120	92	226	64	80	1,5
BAR(U) 600	91	600	549	120	92	426	64	80	2,3
BAR(U) 1000	91	1000	749	120	92	626	64	80	3,4

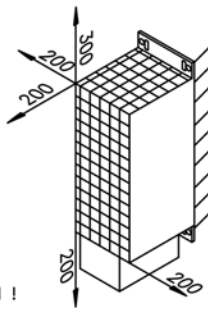


±10%, Temperaturdrift ca. 1%
Kalt ca. +8%, 320°C ca. -7%

Admissible floor mounting



Admissible wall mounting
Clamps down



Other types of mounting are not admitted !

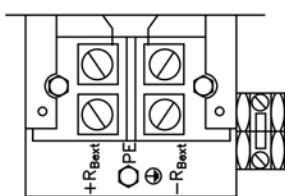
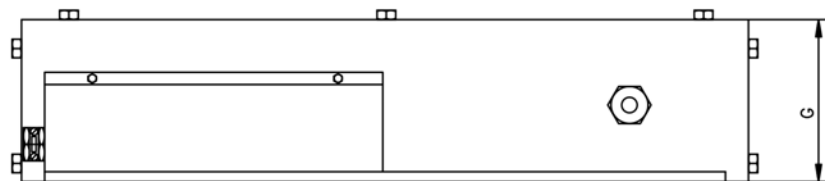
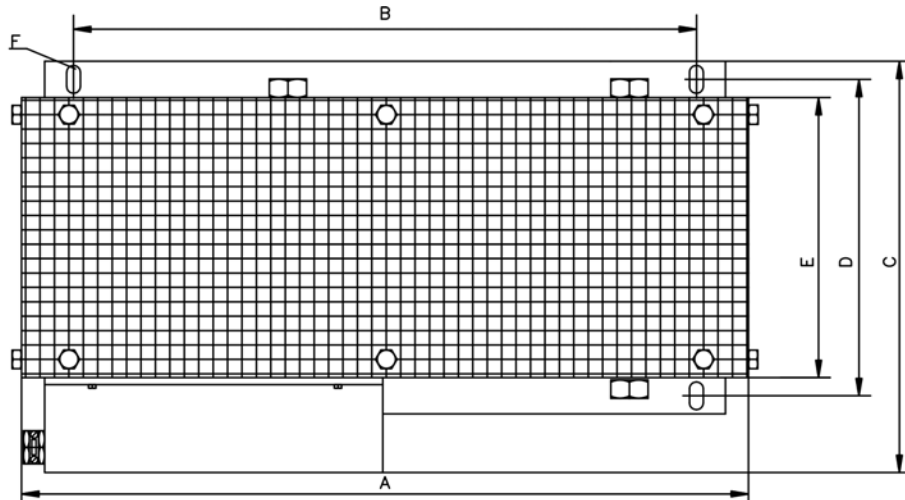
11.6 External Regen Resistor BAS(U)

Protection class: IP20



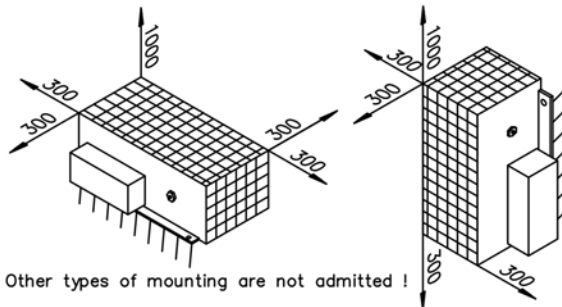
CAUTION

- Surface temperature can exceed 250°C.
- Make sure that the necessary space is kept clear.
- Do not mount on combustible surfaces.



Admissible floor mounting

Admissible wall mounting
Clamps down



±10%, Temperaturdrift ca. 1%
Kalt ca. +8%, 320°C ca. -7%

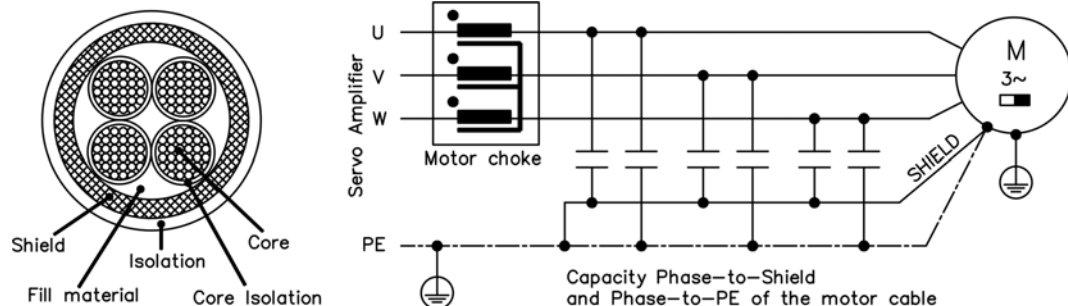
Other types of mounting are not admitted !

	R	Rated power	A	B	C	D	E	F	G	weight
	Ω	W	mm	mm	mm	mm	mm	mm	mm	Kg
BAS(U)2000-10	10	2000	490	380	255	170	150	∅10,5	260	7
BAS(U)3000-10	10	3000	490	380	355	270	250	∅10,5	260	8
BAS(U)6000-10	10	6000	490	380	455	370	350	∅10,5	260	11
BAS(U)2000-15	15	2000	490	380	255	170	150	∅10,5	260	7
BAS(U)3000-15	15	3000	490	380	355	270	250	∅10,5	260	8
BAS(U)6000-15	15	6000	490	380	455	370	350	∅10,5	260	11
BAS(U)2000-23	23	2000	490	380	255	170	150	∅10,5	260	7
BAS(U)3000-23	23	3000	490	380	355	270	250	∅10,5	260	8
BAS(U)4000-23	23	4000	490	380	355	270	250	∅10,5	260	9
BAS(U)3000-33	33	3000	490	380	355	270	250	∅10,5	260	8

12 Motor Chokes

12.1 Shielded Motor Cables

For electromagnetic compatibility, the motor must be supplied with power using a shielded cable. The structure of a cable with 100% shielding and the capacity equivalent circuit diagram (to earth) are shown below.



Why use motor chokes?

- To compensate for high capacitive charge/discharge currents typical of shielded motor cables approximately 25 m and longer.
- To reduce current alternation noise in the motor.
- To reduce current ripple in the motor.

The digital drives' high switching frequencies and steep switching edges give rise to the transfer of capacitive currents to the shield by the three phases (U, V, W). These currents flow from the shield to earth. Depending on the cable length and cable capacity, this can lead to the generation of shield currents with peak values of up to 20 A. These shield currents place a load on the drives and motor and, on large systems, lead to shifts in potential which can damage other components. This effect is evident in particular on systems with multiple drives operating in parallel on the same mains filter. The motor chokes slow down the rate of rise of the motor current, thereby reducing the current transferred to the shield.

Why is the cross-section of the motor cable important?

Motor cables longer than 50 m with a small cross-section (such as $4 \times 1.0 \text{ mm}^2$) and therefore a higher equivalent resistance are able to reduce the oscillation tendency of the LCR oscillating circuit (drive/choke/cable/motor). This cross-section can also be advantageous for cable lengths shorter than 50 m if the cable capacity and motor inductance are very high. However, the current loading of the cable must always be within the limits specified by industry standards.

12.2 Safety Instructions

⚠ CAUTION

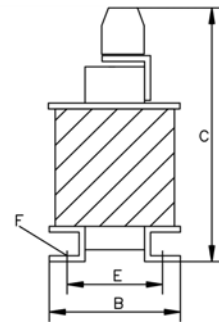
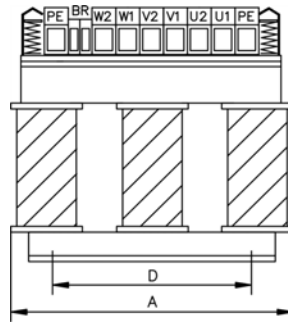
- Before starting mounting/installation work, you must read and observe the instruction manuals and the safety instructions that they contain for the drive and motor that you are using in your application.
- This manual is only valid in conjunction with the instruction manuals for the drive and motor you are using in your application.
- Mount the motor choke on a conductive earthed plate in the switchgear cabinet.
- The choke can become hot during operation (rising to temperatures in excess of 80°C). Therefore, you should make sure that the choke is mounted a sufficient distance away from neighboring components.
- Provide the requisite conditions for unobstructed convection to cool the choke.
- A connection diagram appears in the drive instructions manual.
- If the motor cable is longer than 25 m, then the motor choke is wired into the cable close to the amplifier. When laying the motor cable, allow about 400 mm for the connection to the choke.

12.3 Type Assignment

Drive*	Motor choke	Approvals	Condition
AKD-x003x to AKD-x006x	3YLN-06	CE, UL	Motor cable > 25m
AKD-x012x	3YLN-14	CE, UL	Motor cable > 25m
AKD-x024x	3YLN-24	CE, UL	Motor cable > 25m
AKD2G-xxx-xV003 to -xV006	3YLN-06	CE, UL	Motor cable > 50m
AKD2G-xxx-xV012	3YLN-14	CE, UL	Motor cable > 50m
S701 to 724	3YLN-xx	CE, UL	Motor cable > 25m
S748/772	Not required		

*AKD part numbers indicate continuous current rating (-003 is 3 A, -012 is 12 A, etc).

12.4 Motor Choke 3YLN-xx



Technical Data

Rated Data	Symbol	Units	3YLN-06	3YLN-14	3YLN-20	3YLN-24
Rated current	I _{0rms}	A	6	14	20	24
Rated voltage	U _{nom}	V	480			
Rated frequency	f _{nom}	Hz		0 to 150		
Max. frequency	f _{max}	kHz	8			
Inductivity	L	μH	900	900	450	450
Power loss	P	W	12	19.4	22.3	23.2
Protection class	-	-	IP00			
Temperature class	-	-	F			
Operation class	-	-	S1			
Weight	G	kg	4.5	10	10	10
Cable diameter (Shield clamp)	-	mm	4 to 13.5			
Wiring cross section max. (Terminals)	-	mm ²	10	16	16	16
Width	A	mm	155	190	190	190
Depth	B	mm	90	125	125	125
Height	C	mm	195	230	230	230
Mounting hole distance	D	mm	130	170	170	170
Mounting hole distance	E	mm	56.5	78	78	78
Mounting screws	F	-	4xM6	4xM6	4xM6	4xM6

13 Cables

This chapter provides cable information for AKD and S700 series servo drives. For AKD2G cable information, see [Kollmorgen 2G Cable Guide on the Kollmorgen™ website](#).

13.1 PC Connection

The AKD drive is connected to a PC or to a switch/hub by a standard net cable with RJ45 connectors.

The S700 drive series is connected to a PC using a serial RS232-SubD9 cable.

13.2 Kollmorgen™ Ethernet Cables

PUR jacketed CAT5e cables, pre-terminated with RJ45 connectors.

Description	Order code
0.17 meter pre-terminated patch cable	ENCP-0017-000
0.26 meter pre-terminated patch cable	ENCP-0026-000
0.50 meter pre-terminated patch cable	ENCP-0050-000
1 meter pre-terminated patch cable	ENCP-0100-000
2 meter pre-terminated patch cable	ENCP-0200-000
3 meter pre-terminated patch cable	ENCP-0300-000
4 meter pre-terminated patch cable	ENCP-0400-000
5 meter pre-terminated patch cable	ENCP-0500-000
10 meter pre-terminated patch cable	ENCP-1000-000
Unterminated cable per 10 meter increment (min 30 meters)	ENCU-xxxx-000
Connector kit for ENCU-xxxx-000 unterminated cable (one termination per kit)	ENCU-KIT-000

Technical Data

ENCP-xxxx-xxx (Kollmorgen™ Ethernet Cables)	
Cross-section	4 x 2 x AWG26/7 ... 4 x 2 x 0.128 mm ²
Cable sheath material	PUR
Color	Green (RAL 6018)
Line configuration	SF/UTP
Diameter	sheath: typ. 5.9 mm ± 0.2 mm
Bending radius	> 5 x diameter
Category/class	CAT5e, class D
Operating/installation temperature	-40... +75 °C/-10 ... +60 °C
Insertion cycles	min. 750

13.3 AKD Performance Cables**13.3.1 Hybrid Cables**

Hybrid cables offer a single connection point on the motor for both feedback and power. Feedback options for this connection type are:

- SFD GEN3 (Single-turn absolute, CA option)
- HIPERFACE® DSL (Single-turn absolute, GE option)
- HIPERFACE DSL (Multi-turn option, GF option)

Washdown versions of this cable are also available.

13.3.2 AKD Hybrid Cables by Motor Type

Motor	Hybrid Cable ¹ option for 240V drives (AKD-xxxx06xxxx)	Hybrid Cable ¹ option for 480V drives (AKD-xxxx07xxxx)
AKM < 12 A	CCJ1A2-015	CCJ2A2-015
12 A ≤ AKM < 20 A	CCJ2A2-025	CCJ2A2-025
Washdown AKM < 12 A	WCJ1A1-015	WCJ2A1-015
12 A ≤ Washdown AKM < 20 A	WCJ2A1-025	WCJ2A1-025

¹Hybrid cables support SFD GEN 3, Single-turn and Multi-turn HIPERFACE DSL.

13.3.3 Dual Cables

Dual cables are used to separate power and feedback. Options included in this catalog support:

- HIPERFACE (Single-turn absolute, GJ option)
- HIPERFACE (Multi-turn absolute, GK option)
- EnDat (Single-turn, LA option)
- EnDat (Multi-turn, LB option)
- BiSS (Single-turn absolute, AA option)
- BiSS (Multi-turn absolute, AB option)

Motor	Power Cable	Power Cable with Brake	SFD	EnDat 2.2, 01 & BiSS
AKM < 12 A	CP-507CCAN	CP-507CDAN	CP-507CDAN	CF-SB7374N
12 A ≤ AKM < 20 A	CP-507DCAN	CP-507DDAN	CP-507DDAN	CF-SB7374N
20 A ≤ AKM < 24 A	CP-508EDBN	CP-508EDBN	CP-508EDBN	CF-SB7374N
CDDR < 12 A	CP-507CCAN	N/A	N/A	CF-SB7374N
12 A ≤ CDDR < 20 A	CP-508DCAN	N/A	N/A	CF-SB7374N
20 A ≤ CDDR < 48 A	CM-13A4-010	N/A	N/A	CF-SB7374N
DDR < 12 A	CP-507CCAN	N/A	N/A	CF-SB7374N
12 A ≤ DDR < 20 A	CP-508DCAN	N/A	N/A	CF-SB7374N

13.3.4 AKD Value Line Cables

Value Line Cables are alternative cable options suitable for most applications. These cables separate power and feedback. Options included in this catalog support Single-turn (GJ) and Multi-turn (GK) for AKD.

Motor	Power Cable	Power Cable with Brake	SFD	EnDat 2.2, 01 & BiSS
AKM < 6 A	VP-507BEAN	VP-508CFAN	VF-DA0474N	VF-SB7374N
6 A ≤ AKM < 12 A	VP-508CEAN	VP-508CFAN	VF-DA0474N	VF-SB7374N
12 A ≤ AKM < 20 A	VP-508DEAN	VP-508DFAN	VF-DA0474N	VF-SB7374N
CDDR < 12 A	VP-507BEAN	N/A	N/A	VF-SB7374N
12 A ≤ CDDR < 20 A	VP-508CEAN	N/A	N/A	VF-SB7374N
20 A ≤ CDDR < 48 A	VP-508DEAN	N/A	N/A	VF-SB7374N
DDR < 12 A	VP-507BEAN	N/A	N/A	VF-SB7374N
12 A ≤ DDR < 20 A	VP-508CEAN	N/A	N/A	VF-SB7374N
12 A ≤ DDR < 20 A	VP-508DEAN	N/A	N/A	VF-SB7374N

13.3.5 Digital/analog Inputs/Outputs

13.3.5.1 Digital I/O cable for AKD-N



All AKD-N drives have one 8 poles M12 connector to connect digital control signals.

Drive	Order Code	Description
AKD-N (all)	SAC-8P-M12MS	5m, M12 mating connector, unconfigured wires

13.3.5.2 STO cable for AKD-N-DS



AKD-N-DS drives (devices with local STO input) have an additional 4 poles M12 connectors to connect the local STO signals.

Drive	Order Code	Description
AKD-N-S	SAC-4P-M12MS	5m, M12 mating connector, unconfigured wires, A-coded

13.3.5.3 Fieldbus cable for AKD-N-DF



AKD-N-DF drives (devices with local fieldbus input) have an additional 4 poles M12 connectors to connect the local fieldbus signals.

Amplifier	Order Code	Description
AKD-N-DF	CCNCN1-025-xxmyy-00	5m, M12 mating connector, unconfigured wires, D coded

13.3.5.4 AKD-N Performance Cables

13.3.5.5 Hybrid Cable Connecting AKD-C Power Supply to AKD-N Axis Module



Order Code	Description
CCNNN1-025-xxmyy-00	Hybrid cable connecting AKD-C to AKD-N

Length definition: xx=meters, yy=centimeters

13.3.5.6 Hybrid Cable Connecting AKD-N Axis Module to AKD-N Axis Module



Order Code	Description
SAC-4P-M12MSD/5,0	Hybrid cable connecting AKD-N to AKD-N

Length definition: xx=meters, yy=centimeters

13.3.5.7 Hybrid Cable Connecting AKD-N Axis Module to AKM Motor



Order Code	Description
CCJNA3-015-xxmyy-00	Hybrid cable connecting AKD-N to AKM (SFD GEN3, Single-turn/Multi-turn HiPerFace DSL)

Length definition: xx=meters, yy=centimeters

13.3.5.8 Performance Cables for AKD-N-DF/DS to AKM Motor



Motor	Connector	Power Cable	Power Cable with Brake	SFD
AKM < 6 A	y-tec	CM0NA3	CM1NA3	CFSNA3
	Dual Interconnect	CM0NA1	CM1NA1	CFSNA1

13.3.6 CANopen Bus Cables for AKD



Configured CANopen bus cables are available for AKD. See CANopen Bus Cable Specifications (→ p. 64) for specifications.

Item	Length	AKD Order Code
CANopen bus cable	0.15 m	P-AKD-CAN-RJ-0-15
CANopen bus cable	0.5 m	P-AKD-CAN-RJ-0-50
CANopen bus cable	3.0 m	P-AKD-CAN-RJ-3-00

The CANopen bus termination plug is required for bus termination of the last AKD drive connected to the CANopen bus. To connect an AKD drive to a CANopen device with a SubD9 connector, use the CAN RJ12-SubD9.

Item	AKD Order Code
CANopen bus termination plug	P-AKD-CAN-TERM
CAN RJ12-SubD9 adapter	P-AKD-CAN-9d-0-15

According to ISO 11898, you should use a bus cable with a characteristic impedance of 120 Ω . The usable cable length depends on the transmission rate. The values that have been measured can be taken as a guide, but they should not be interpreted as limits.

Cable length, depending on the transmission rate:

Transmission rate/kbps:	1000	500	250
Maximum cable length/m:	20	70	115

13.4 Motor Power and Feedback Cables

These cables differ in how they are connected to the drive due to the varying requirements for minimum code distances, different shielding concepts, depending on rated voltage, and current load. The following pre-assembled, ready-to-use cables meet the requirements of relevant CE and UL standards. See Motor Power Cable Specifications (→ p. 66) and Motor Feedback Cable Specifications (→ p. 72) for engineering details on all cables.



Value Line Cables



Flex Line Cables



S700 Cables

13.4.0.1 Power Cables

Cable Rating*	Value Line	OD ¹ (mm)	Value Line w/ Brake	OD ¹ (mm)	Flex Line	OD ¹ (mm)	Flex Line w/ Brake	OD ¹ (mm)
3/6 A	VP-507BEAN-XX	9.4	VP-508CFAN-XX	10.9	CP-507CCAN-XX-X	12.7	CP-507CDAN-XX-X	14.5
12 A	VP-507BEAN-XX	10.3	VP-508CFAN-XX	10.9	CP-507CCAN-XX-X	12.7	CP-507CDAN-XX-X	14.5
20 A	VP-508DEAN-XX	11.7	VP-508DFAN-XX	12.9	CP-508DCAN-XX-X	14.5	CP-508DDAN-XX-X	16.6
24A	Not Available	N/A	Not Available	N/A	CP-508EBDN-XX-X	18.3	CP-508EBDN-XX-X	18.3

*Continuous current

¹Outside diameter

13.4.0.2 Feedback Cables

Feedback Type	Value Line	OD (mm)	Flex Line	OD (mm)
SFD	VF-DA474N-XX	6.7	CF-DA0374N-XX-X	7.5
EnDat 2.1/BiSS	VF-SB4474N-XX	9.7	CF-SB7374N-XX-X	11.2
Resolver	VF-RA2474N-XX	9.7	CF-RA2574N-XX-X	9.5
Incremental/comcoder	Not available	N/A	CF-CB7374N-XX-X	11.2

13.4.1 Order Codes for S700 Motor Power Cables

13.4.1.1 S724 Order Codes

With shield plate at amplifier's end, motor connector size 1.5

Description	Order Code
Motor cable 5m (4x6)	DE-201579
Motor cable 10m (4x6)	DE-201580
Motor cable 15m (4x6)	DE-201581
Motor cable 20m (4x6)	DE-201582
Motor cable 25m (4x6)	DE-201583
Motor cable 5m (4x6+(2x1))	DE-201584
Motor cable 10m (4x6+(2x1))	DE-201585
Motor cable 15m (4x6+(2x1))	DE-201586
Motor cable 20m (4x6+(2x1))	DE-201587
Motor cable 25m (4x6+(2x1))	DE-201588

13.4.1.2 S748 Order Codes

With shield plate at amplifier's end, motor connector size 1.5

Description	Order Code
Motor cable 5m (4x10)	DE-201589
Motor cable 10m (4x10)	DE-201590
Motor cable 15m (4x10)	DE-201591
Motor cable 20m (4x10)	DE-201592
Motor cable 25m (4x10)	DE-201593
Motor cable 5m (4x10+(2x1))	DE-201594
Motor cable 10m (4x10+(2x1))	DE-201595
Motor cable 15m (4x10+(2x1))	DE-201596
Motor cable 20m (4x10+(2x1))	DE-201597
Motor cable 25m (4x10+(2x1))	DE-201598

13.5 Preparing Motor Cables (Motor End)

13.5.1 Motor Series AKM2...8, 6SMx7, DBL2...6, DBK

Please note that different conductor cross-sections are required for different motors, and for motors with a holding brake, the brake signals are also attached through this connector.

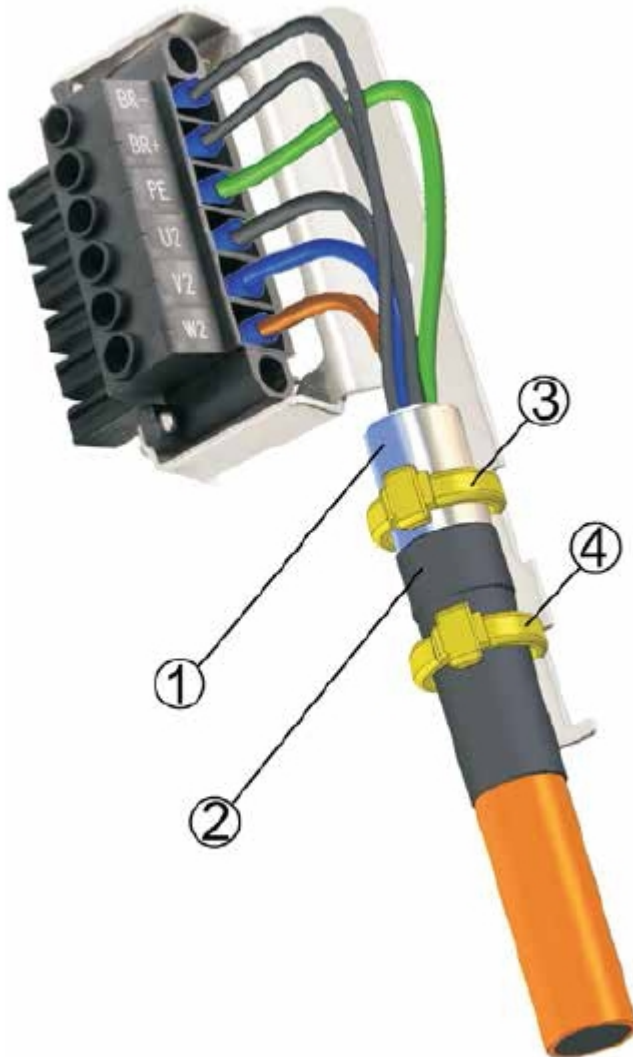
Connections: The view is as seen from the contact side of the connector:

Standard (size 1), wire max 4mm ²				
	Pin	Signal	Pin	Signal
	1	U2	A	+ Br
	4	V2	B	- Br
	3	W2	C	n.c.
	⏏ (2)	PE	D	n.c.

Option H (size 1.5), wire max. 10mm ²				
	Pin	Signal	Pin	Signal
	U	U2	+	+ Br
	V	V2	-	- Br
	W	W2	1	n.c.
	⏏	PE	2	n.c.

13.6 Preparing Cables for Drive (S701 to S724)

The motor is connected to the S701...724 by a Power Combicon connector. You can obtain the connector kit from Kollmorgen™ (connector, housing, shield plate, rubber bushes, installation material) with the order code DE-200453. Please take note that the connector can accept a maximum conductor cross-section of 6mm².



Strip the external cable sheath to a length of approx. 120 mm, **taking care not to damage the braided shield**. Push the braided shield (1) back over the cable and secure with a rubber sleeve (2) or shrink sleeve.

Shorten all the wires apart from the protective earth (PE) wire (green/yellow) by about 20 mm so that the PE wire is now the longest wire. Strip all wires and fit wire end ferrules.

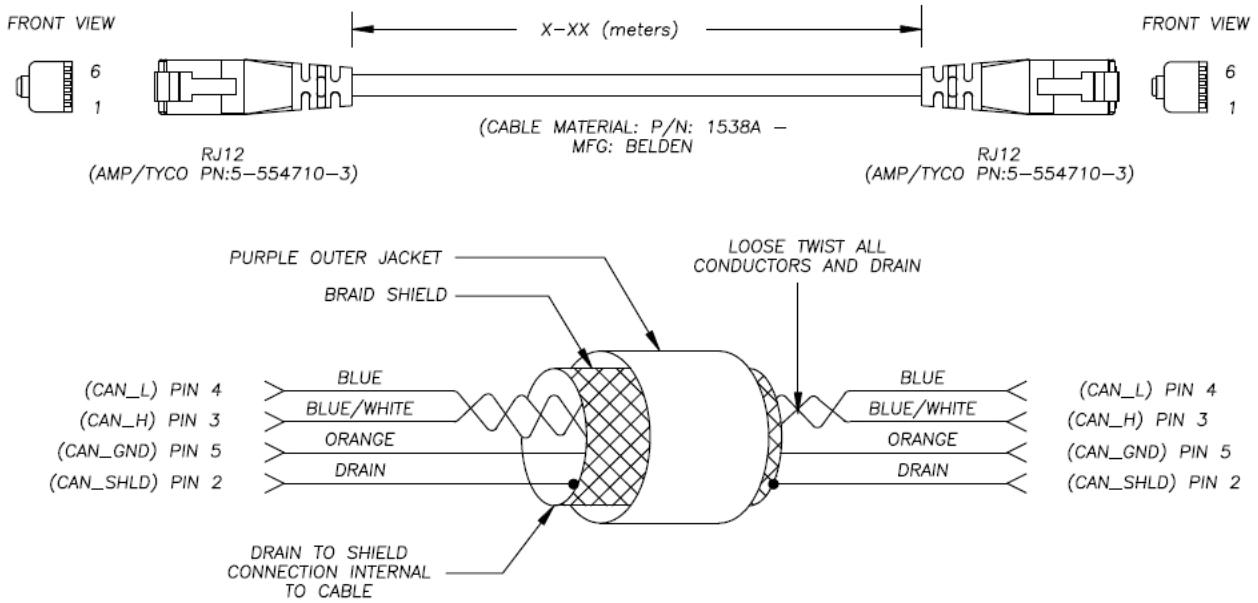
Secure the braided shield of the cable to the shroud with a cable tie or a hose clamp (3) and use a second tie (4) to fasten the cable over the rubber sleeve. Wire the connector as shown in the connection diagram. Plug in the connector to the socket on the front of the S701...724.

Screw the connector in place. This ensures that there is conductive contact over a large surface area between the braided shield and the front panel.

13.7 CANopen Bus Cable Specifications

All cables supplied with AKD and S700 drives are RoHS compliant.

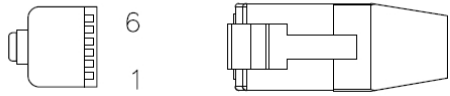
13.7.1 CANopen Cable P-AKD-CAN-RJ-z-zz



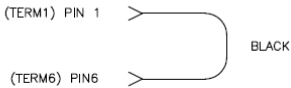
Cable Specifications	
Outside diameter	6.7 mm ± 0.2 mm
RoHS Compliant	Yes
Length:	
PAKD-CANRJ-0-15	0.15 m
PAKD-CANRJ-0-30	0.3 m
PAKD-CANRJ-1-00	1 m
PAKD-CANRJ-3-00	3 m

13.7.2 CANopen Cable P-AKD-CAN-TERM

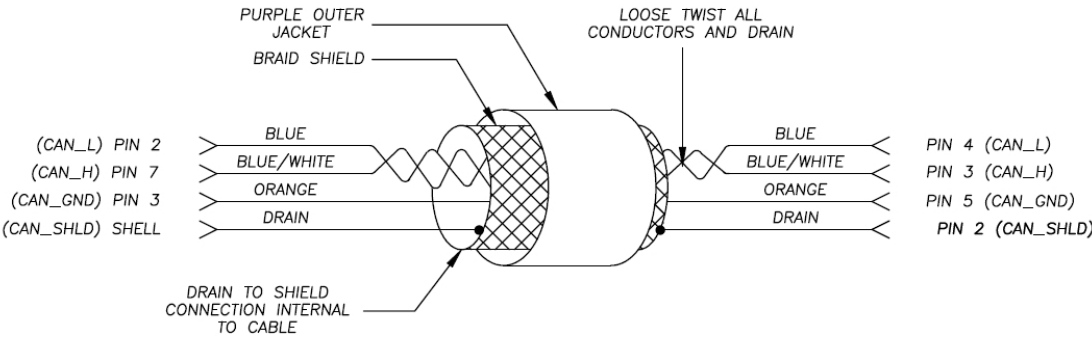
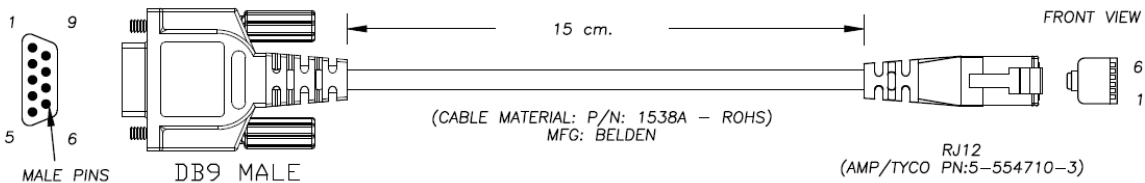
FRONT VIEW



RJ12
(AMP/TYCO PN:5-554710-3)



13.7.3 CANopen Cable PAKD-CAN-9D-0-15



13.7.4 Motor Power Cable Specifications

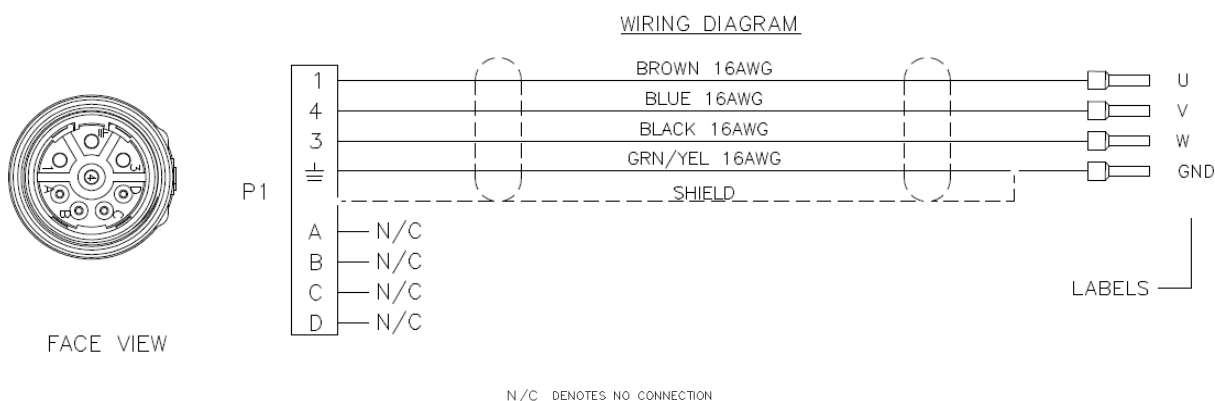
All cables supplied with AKD and S700 drives are RoHS compliant.

13.7.4.1 Cable Routing Standards

UL 508C and UL 508A indicate that wires, when routed together, shall be rated for the highest voltage involved in all of the circuits. This means that value line feedback cables which are 300V rated are not appropriate when routed directly next to motor power cables that carry more voltage than 300V. They should be physically separated. Performance line cables are recommended when this is a concern.

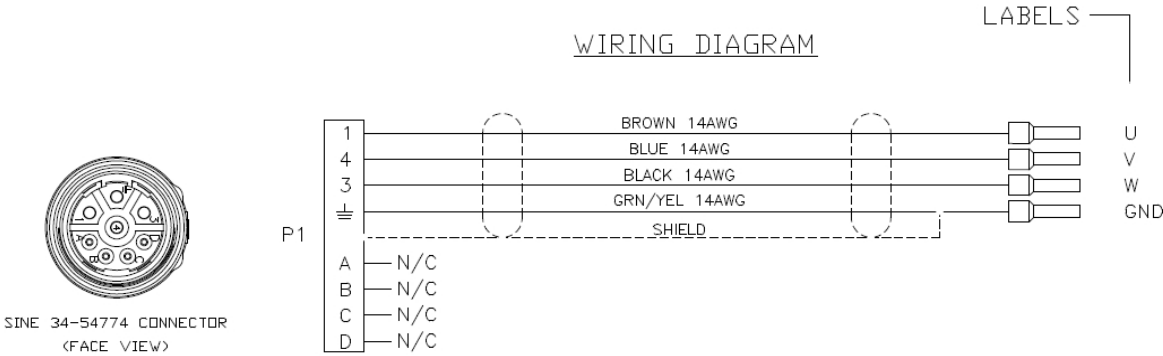
The NFPA 70 (NEC) article 300.3(C)(1) says that for circuits that are 600V or less, conductors of ac and dc circuits shall be permitted to occupy the same equipment wiring enclosure, cable, or raceway. All conductors shall have an insulation rating equal to at least the maximum circuit voltage applied to any conductor within the enclosure, cable, or raceway.

13.7.4.2 AKD 1.5 – 6 A Power Cable, VP-507BEAN-xx



Cable Specifications	
Cable jacket material	TPE
Outside diameter	9.4 mm ± 0.25 mm
Bend radius	94 mm
Static flex rating	Not rated
Dynamic flex rating	Not rated
Temperature rating	105 C
Voltage rating	600 V (see Cable Routing Standards)
RoHS Compliant	Yes
Assembly Weight:	
VP-507BEAN-01	0.258 kg
VP-507BEAN-03	0.536 kg
VP-507BEAN-06	0.955 kg
VP-507BEAN-09	1.372 kg
VP-507BEAN-12	1.789 kg

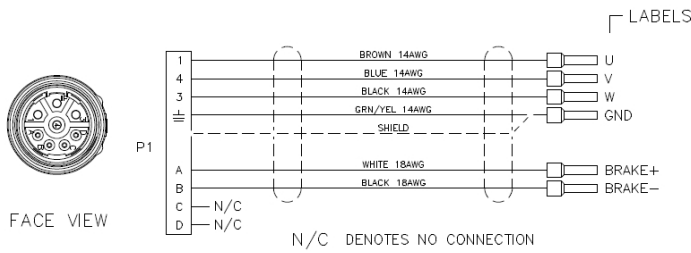
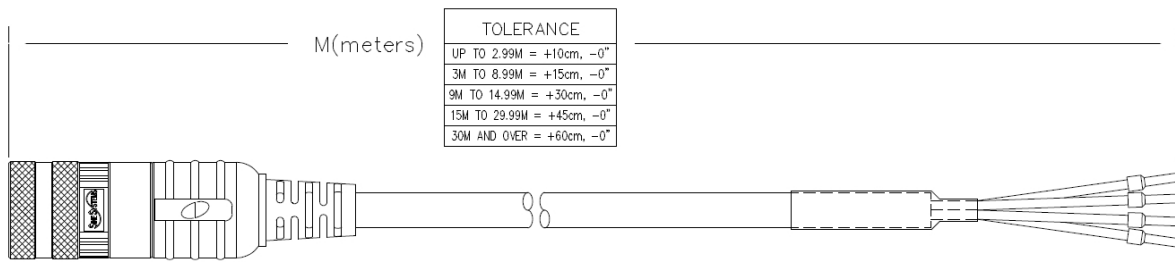
13.7.4.3 AKD 12 A Power Cable, VP-508CEAN-zz



N/C DENOTES NO CONNECTION

Cable Specifications	
Cable jacket material	TPE
Outside diameter	10.25 mm ± 0.30 mm
Bend radius	102.5 mm
Static flex rating	Not rated
Dynamic flex rating	Not rated
Temperature rating	105 C
Voltage rating	600 V (see Cable Routing Standards)
RoHS Compliant	Yes
Assembly Weight:	
VP-508CEAN-01	0.247 kg
VP-508CEAN-03	0.521 kg
VP-508CEAN-06	0.942 kg
VP-508CEAN-09	1.363 kg
VP-508CEAN-12	1.784 kg

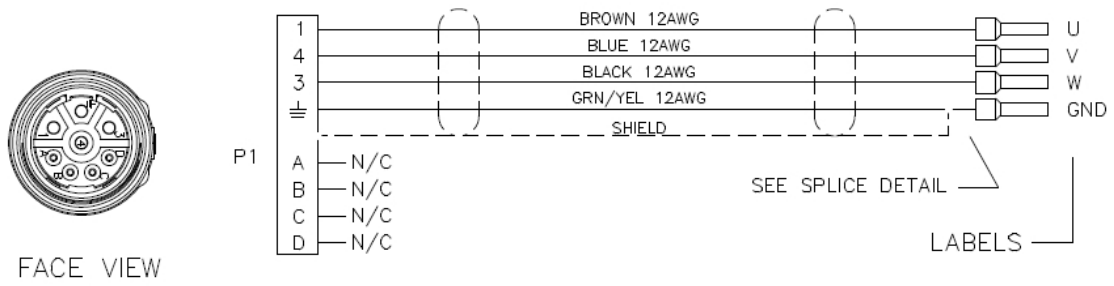
13.7.4.4 AKD 12 A Power Cable with Brake, VP-508CFAN-zz



Cable Specifications	
Cable jacket material	TPE
Outside diameter	10.90 mm ± 0.30 mm
Bend radius	109 mm
Static flex rating	Not rated
Dynamic flex rating	Not rated
Temperature rating	105 C
Voltage rating	600 V (see Cable Routing Standards)
RoHS Compliant	Yes
AWM Style	UL20328
Assembly Weight:	
VP-508CFAN-01-0	0.256 kg
VP-508CFAN-03-0	0.767 kg
VP-508CFAN-06-0	1.534 kg
VP-508CFAN-09-0	2.301 kg
VP-508CFAN-12-0	3.068 kg

13.7.4.5 AKD 24 A Power Cable with Brake, VP-508DEAN-zz

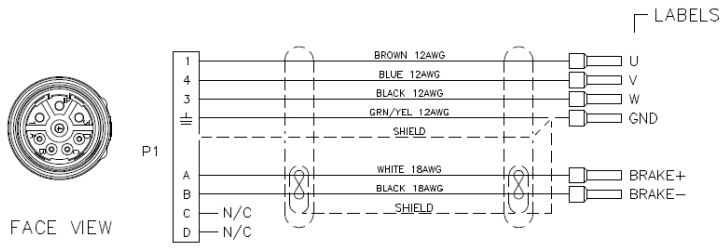
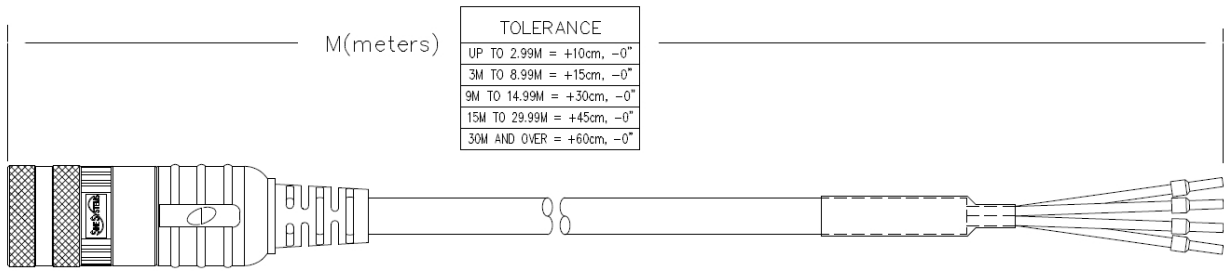
WIRING DIAGRAM



N/C DENOTES NO CONNECTION

Cable Specifications	
Cable jacket material	TPE
Outside diameter	11.70 mm ± 0.30 mm
Bend radius	117 mm
Static flex rating	Not rated
Dynamic flex rating	Not rated
Temperature rating	105 C
Voltage rating	600 V (see Cable Routing Standards)
RoHS Compliant	Yes
Assembly Weight:	
VP-508DEAN-01-0	0.292 kg
VP-508DEAN-03-0	0.874 kg
VP-508DEAN-06-0	1.750 kg
VP-508DEAN-09-0	2.622 kg
VP-508DEAN-12-0	3.496 kg

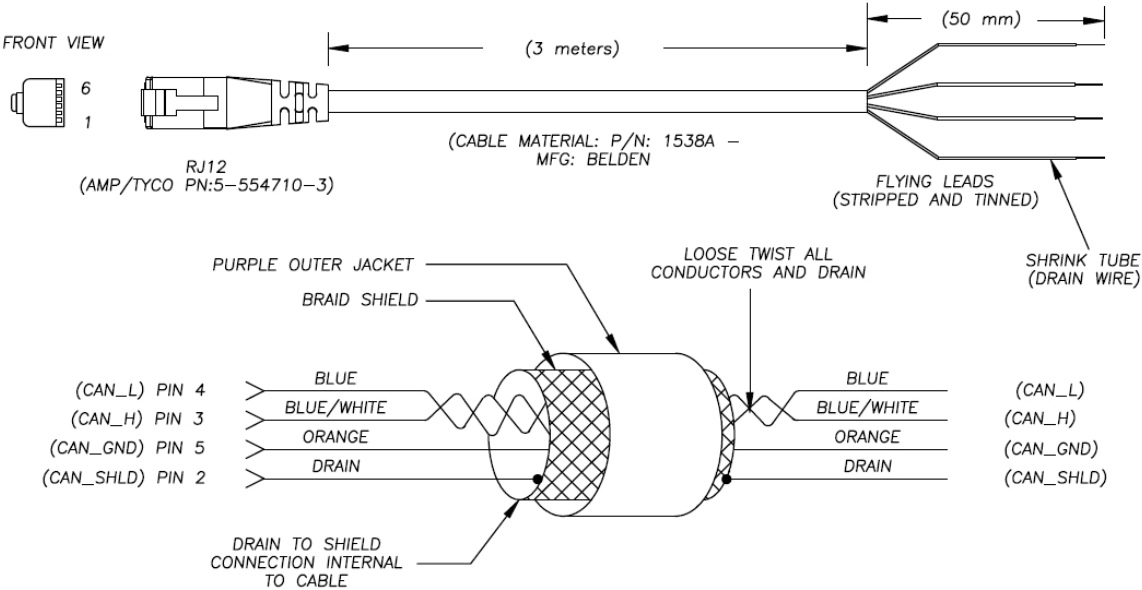
13.7.4.6 AKD 24 A Power Cable with Brake, VP-508DFAN-zz



N/C DENOTES NO CONNECTION

Cable Specifications	
Cable jacket material	TPE
Outside diameter	12.90 mm ± 0.20 mm
Bend radius	129 mm
Static flex rating	Not rated
Dynamic flex rating	Not rated
Temperature rating	105 C
Voltage rating	600 V (see Cable Routing Standards)
RoHS Compliant	Yes
AWM Style	UL20328
Assembly Weight:	
VP-508DFAN-01-0	0.328 kg
VP-508DFAN-03-0	0.983 kg
VP-508DFAN-06-0	1.966 kg
VP-508DFAN-09-0	2.949 kg
VP-508DFAN-12-0	3.932 kg

13.7.5 CANopen Cable PAKD-CAN-FL-3-00



13.8 Motor Feedback Cable Specifications

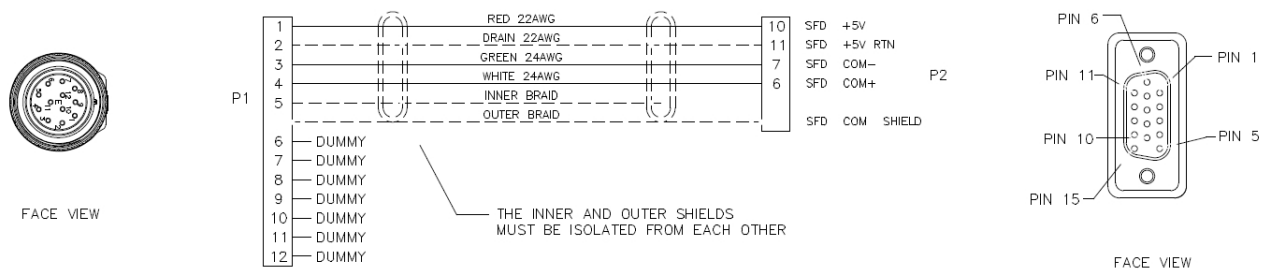
All cables supplied with AKD and S700 drives are RoHS compliant.

13.8.1 Cable Routing Standards

UL 508C and UL 508A indicate that wires, when routed together, shall be rated for the highest voltage involved in all of the circuits. This means that value line feedback cables which are 300V rated are not appropriate when routed directly next to motor power cables that carry more voltage than 300V. They should be physically separated. Performance line cables are recommended when this is a concern.

The NFPA 70 (NEC) article 300.3(C)(1) says that for circuits that are 600V or less, conductors of ac and dc circuits shall be permitted to occupy the same equipment wiring enclosure, cable, or raceway. All conductors shall have an insulation rating equal to at least the maximum circuit voltage applied to any conductor within the enclosure, cable, or raceway.

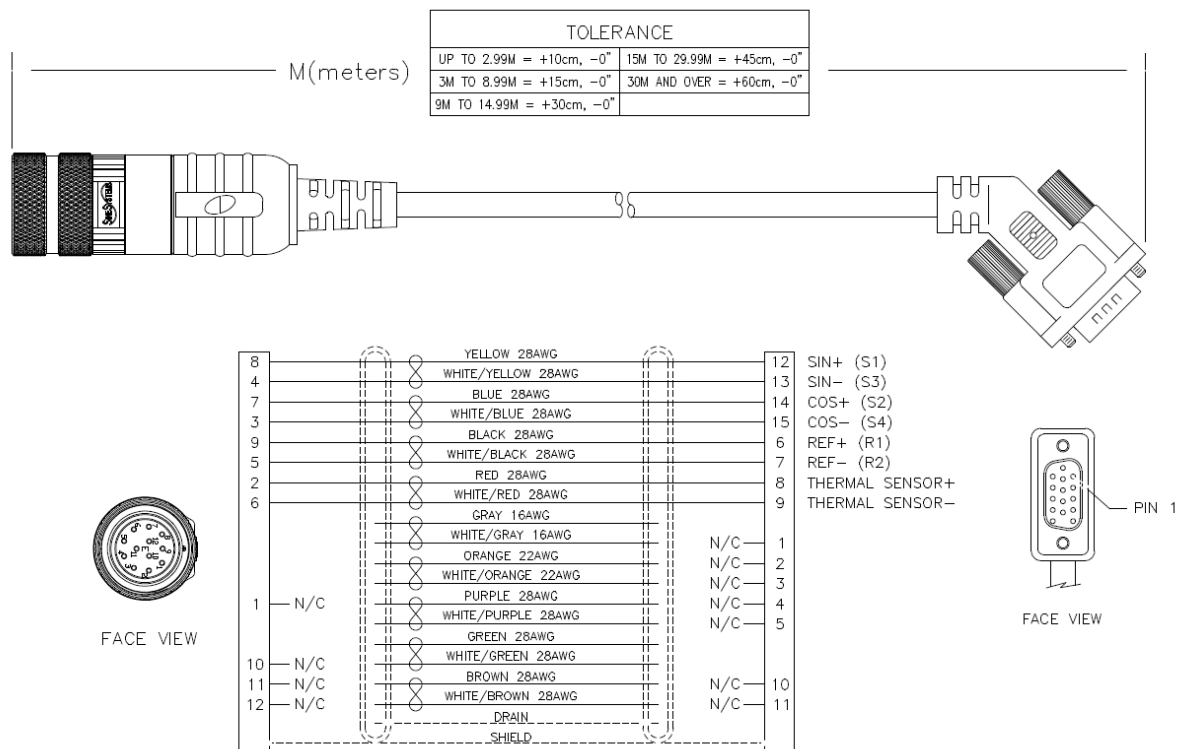
13.8.2 Motor Feedback Cable, VF-DA0-474N-zz



N/C DENOTES NO CONNECTION

Cable Specifications	
Cable jacket material	TPE
Outside diameter	6.7 mm ± 0.2 mm
Bend radius	67 mm
Static flex rating	Not rated
Dynamic flex rating	Not rated
Temperature rating	105 C
Voltage rating	300 V (see Cable Routing Standards)
RoHS Compliant	Yes
Assembly Weight:	
VF-DA0-474N-01	0.211 kg
VF-DA0-474N-03	0.357 kg
VF-DA0-474N-06	0.568 kg
VF-DA0-474N-09	0.779 kg
VF-DA0-474N-12	0.99 kg

13.8.3 Feedback Resolver Cable, VF-RA2474N-zz



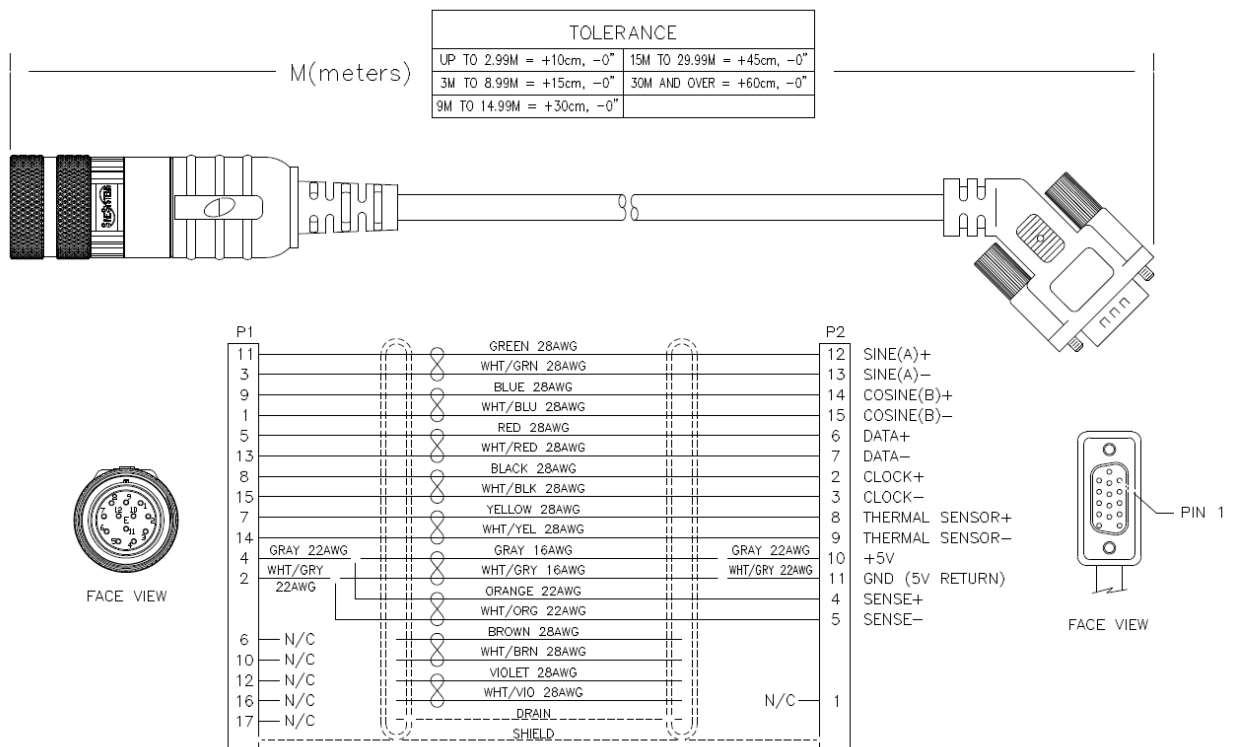
∞ = TWISTED PAIR

N/C DENOTES NO CONNECTION

CONNECTOR BACKSHELL SHIELDED 360° (BOTH ENDS)

Cable Specifications	
Cable jacket material	TPE
Outside diameter	9.65 mm ± 0.35 mm
Bend radius	96.5 mm
Static flex rating	Not rated
Dynamic flex rating	Not rated
Temperature rating	105 C
Voltage rating	300 V (see Cable Routing Standards)
AWM Style	UL20327
RoHS Compliant	Yes
Assembly Weight:	
VF-RA2474N-01-0	0.273 kg
VF-RA2474N-03-0	0.551 kg
VF-RA2474N-06-0	0.968 kg
VF-RA2474N-09-0	1.385 kg
VF-RA2474N-12-0	1.793 kg

13.8.4 Sine Encoder Feedback Cable, VF-SB4474N-zz



Cable Specifications	
Cable jacket material	TPE
Outside diameter	9.65 mm ± 0.35 mm
Bend radius	96.5 mm
Static flex rating	Not rated
Dynamic flex rating	Not rated
Temperature rating	105 C
Voltage rating	300 V (see Cable Routing Standards)
AWM Style	UL20327
RoHS Compliant	Yes
Assembly Weight:	
VF-SB4474N-01-0	0.269 kg
VF-SB4474N-03-0	0.547 kg
VF-SB4474N-06-0	0.974 kg
VF-SB4474N-09-0	1.386 kg
VF-SB4474N-12-0	1.798 kg

13.8.5 Resolver Cables for S700/AKD



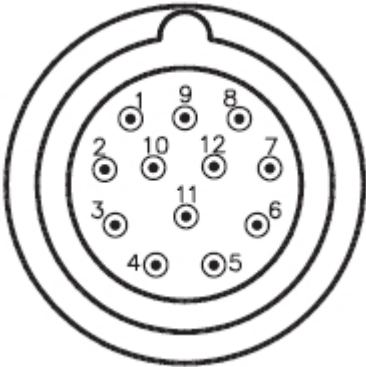
All the motors in our range feature the same 12-pin connector for the resolver connection. This connector is also used for the connections from the motor's thermal protection contact to the servo amplifier. The servo amplifiers have a Sub-D female connector for the connection of a resolver and the thermal protection contact. The cable shield is connected to the servo amplifier via the connector housing.

13.8.5.1 Resolver Cable Order Codes

Description	S700		AKD	
	Length	Order Code	Length	Order Code
Resolver Cable (4x(2x0.25))	5m	DE-84972	1m	CFR0A1-002-001-00
Resolver Cable (4x(2x0.25))	10m	DE-84973	3m	CFR0A1-002-003-00
Resolver Cable (4x(2x0.25))	50m	DE-84974	6m	CFR0A1-002-006-00
Resolver Cable (4x(2x0.25))	20m	DE-84975	12m	CFR0A1-002-012-00
Resolver Cable (4x(2x0.25))	30m	DE-87655	24m	CFR0A1-002-024-00

13.8.5.2 Preparing Resolver Cables

For cable lengths up to 100m use a shielded and sheathed cable, with cores as twisted pairs (suggestion acc. to DIN 47100). Please consult our customer support for cables longer than 100m.



View: solder side of the motor connector.

S700 Pin	AKD X10 High Density Pin	Pair No.	Core Color acc. to IEC 60757	Motor End Pin	Function 6SM, DBL/DBK, AKM
-		-	-	1	n.c.
2	8	4	BU	2	Thermal Protection
3	15	2	YE	3	S4 Cosine+
4	13	3	PK	4	S3 Sine-
5	7	1	BN	5	R2 Reference+
6	9	4	RD	6	Thermal Protection
7	14	2	GN	7	S2 Cosine-
8	12	3	GY	8	S1 Sine+
9	6	1	WH	9	R1 Reference-

13.8.6 Encoder Cables for S700/AKD



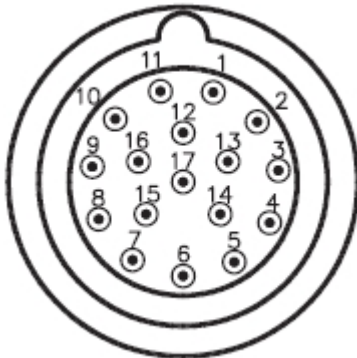
All the motors in our range feature the same 17-pin connector for the encoder connection (EnDat, HIPERFACE, BiSS etc.). This connector is also used for the connections from the motor's thermal protection contact to the servo amplifier. The servo amplifiers have a Sub-D female connector for the connection of the encoder and the thermal protection contact. The cable shield is connected to the servo amplifier via the connector housing.

13.8.6.1 Encoder Cable Order Codes

Description	S700		AKD	
	Length	Order Code	Length	Order Code
Encoder Cable (7x(2x0.25))	5m	DE-90287	1m	CFE0A1-002-001-00
Encoder Cable (7x(2x0.25))	10m	DE-91019	3m	CFE0A1-002-003-00
Encoder Cable (7x(2x0.25))	15m	DE-91811	6m	CFE0A1-002-006-00
Encoder Cable (7x(2x0.25))	20m	DE-91807	12m	CFE0A1-002-012-00
Encoder Cable (7x(2x0.25))	30m	DE-92205	24m	CFE0A1-002-024-00

13.8.6.2 Preparing Encoder Cables

Up to a cable length of 50m, use a shielded and sheathed cable with cores in twisted pairs (suggestion acc. to DIN 47100). Please consult our customer support for cables longer than 50m.



View: solder side of the motor connector.

S700	Pin: Amplifier End		Pair	Core Color acc. to IEC 60757	Pin: Motor End Encoder ECN/EQN/SRS/SRM
	AKD EnDat BiSS	Hiperface			
1	15	12	1	WH	1
2	11	11	6	RD/BU	2
3	13	14	2	GN	3
4	10	10	6	GY/PK	4
5	6	6	3	GY	5
6	-	-	-	-	-
7	9	9	7	BN/GN	7
8	2	-	4	BU	8
9	14	13	1	BN	9
10	5	5-4	5	VT	10
11	12	15	2	YE	11
12	4	4-5	5	BK	12
13	7	7	3	PK	13
14	8	8	7	WH/GN	14
15	3	-	4	RD	15

13.8.7 ComCoder Cables for S700/AKD



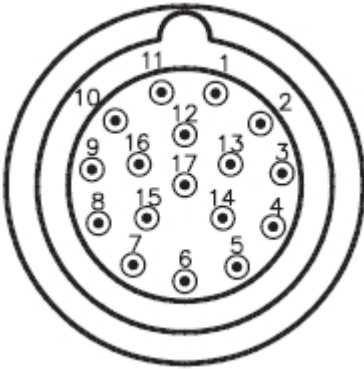
All the motors in our range feature the same 17-pin connector for the ComCoder connection. This connector is also used for the connections from the motor's thermal protection contact to the servo amplifier. The servo amplifiers have a Sub-D female connector for the connection of the ComCoder and the thermal protection contact. The cable shield is connected to the servo amplifier via the connector housing.

13.8.7.1 ComCoder Cable Order Codes

Description	S700		AKD	
	Length	Order Code	Length	Order Code
ComCoder Cable (8x(2x0.25))	5m	DE-107915	1m	CFC0A1-002-001-00
ComCoder Cable (8x(2x0.25))	10m	DE-107916	3m	CFC0A1-002-003-00
ComCoder Cable (8x(2x0.25))	15m	DE-107917	6m	CFC0A1-002-006-00
ComCoder Cable (8x(2x0.25))	20m	DE-107918	12m	CFC0A1-002-012-00
ComCoder Cable (8x(2x0.25))	30m	DE-107919	24m	CFC0A1-002-024-00

13.8.7.2 Preparing ComCoder Cable

Up to a cable length of 25m, use a shielded and sheathed cable with cores in twisted pairs (suggestion acc. to DIN 47100). Please consult our customer support for cables longer than 25m.



View: Solder side of the motor connector.

Pin Amplifier End S700	Pin AKD X10 High Density	Pair	Core color to IEC 60757	Pin: Motor End
1	14	1	WH	1
2	11	6	RD/BU	7
3	12	2	GN	3
4	10	6	GY/PK	10
5	6	3	GY	5
6	1	4	RD	15
7	9	7	BN/GN	8
8	2	4	BU	16
9	15	1	BN	2
10	5	5	VT	7
11	13	2	YE	4
12	4	5	BK	10
13	7	3	PK	6
14	8	7	WH/GN	9
15	3	8	WH/YE	17

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