

Accessories

for digital drive systems, Europe



Edition 03/2012
Translation of the original manual.
European Version (CE region)

Keep all manuals as a product component during the life span of the product.
Pass all manuals to future users / owners of the product.

Previous editions

Edition	Comments
04/2007	First edition
07/2007	System S700 updated.
11/2007	Several corrections, connectors added.
03/2008	Motor cable 1mm ² for S700 added, Symbols acc. to ANSI Z535, Y-Connector X0/X8 for S700 added, configuration of cables, 3YL20->3YL24.
04/2010	Weight 3YL-24, Product brand, 3YL20 with UL, 3YLN new, S748/772, AKD, Resolver table, S200 accessories removed.
12/2010	Order codes brake resistors, Comcoder wire colors, feedback cable color, order codes motor cables, mains filter new types, mains chokes new types, transport tool for AKM8, mounting clamps for S700, accessories S640/670 removed, 3YL20 removed, company name.
10/2011	Motor cables, cable data, EU order codes mating connectors AKD, AKD Hiperface.
03/2012	Order codes motor cables S748/772 updated, cable data, combined cables for AKD with SFD, stainless steel connectors for Washdown motors.

Technical changes to improve the performance of the equipment may be made without notice !

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1 General

1.1 About this manual

This manual describes accessories for Kollmorgen digital servo amplifiers. It contains essential technical data. The manual is only valid in conjunction with the instructions manual for the servo amplifier and servo motor you are using in your application.

You will find copies of the instructions manual for Kollmorgen servo amplifiers and servo motors on the CD ROM included in the scope of supply and on our Internet site. The documents are available in Acrobat Reader format in multiple languages (system requirements: WINDOWS, Internet browser, Acrobat Reader).

Servo amplifier product family names appear in abbreviated format:

Servo amplifier	Abbreviation	Servo amplifier	Abbreviation
SERVOSTAR™ 300	S300	S701...724	S701...724
SERVOSTAR™ 400	S400	S748/772	S748/772
SERVOSTAR™ 601...620	S601...620	AKD-xzzzy	AKD

More detail information can be found in the "Technical Product WIKI" available at www.wiki-kollmorgen.eu.

1.2 Hints for the online edition (PDF format)

Bookmark:

Table of contents and index are active bookmarks.






Table of contents and index in the text:

The lines are active cross references. Click on the desired line and the appropriate page is indicated.

Page/chapter numbers in the text:

Page/chapter numbers with cross references are active. Click at the page/chapter number to reach the indicated target.

1.3 Symbols

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

1.4 General safety instructions

⚠ CAUTION

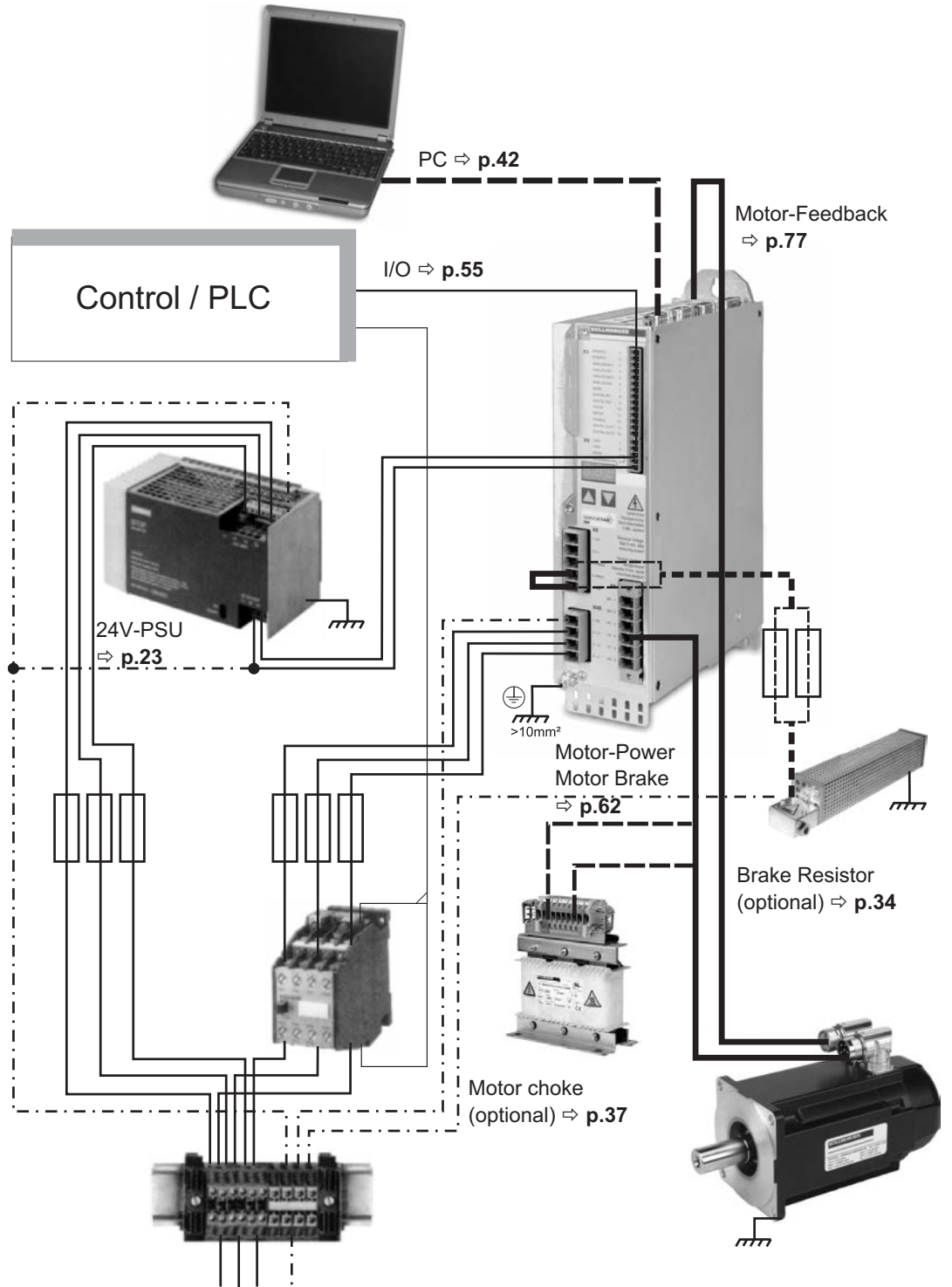
- This manual is only valid in conjunction with the instructions manual for the servo amplifier and servo motor you are using in your application.
- You must read the instructions manual for the servo amplifier and servo motor you are using in your application and observe the safety instructions they contain before commencing mounting/installation work.
- Improper or incorrect cable assembly, mounting or wiring can result in damage to property and equipment or personal injury. The following requirements of 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 correct functioning of the servo amplifier and motors is not assured.
- We do not accept any liability for faults or damage to the connected equipment caused by cables that have been configured by customers!

2 Digital Drive Systems

The systems shown are simply a possible scenario for setting up a digital drive system with relevant servo amplifier components.

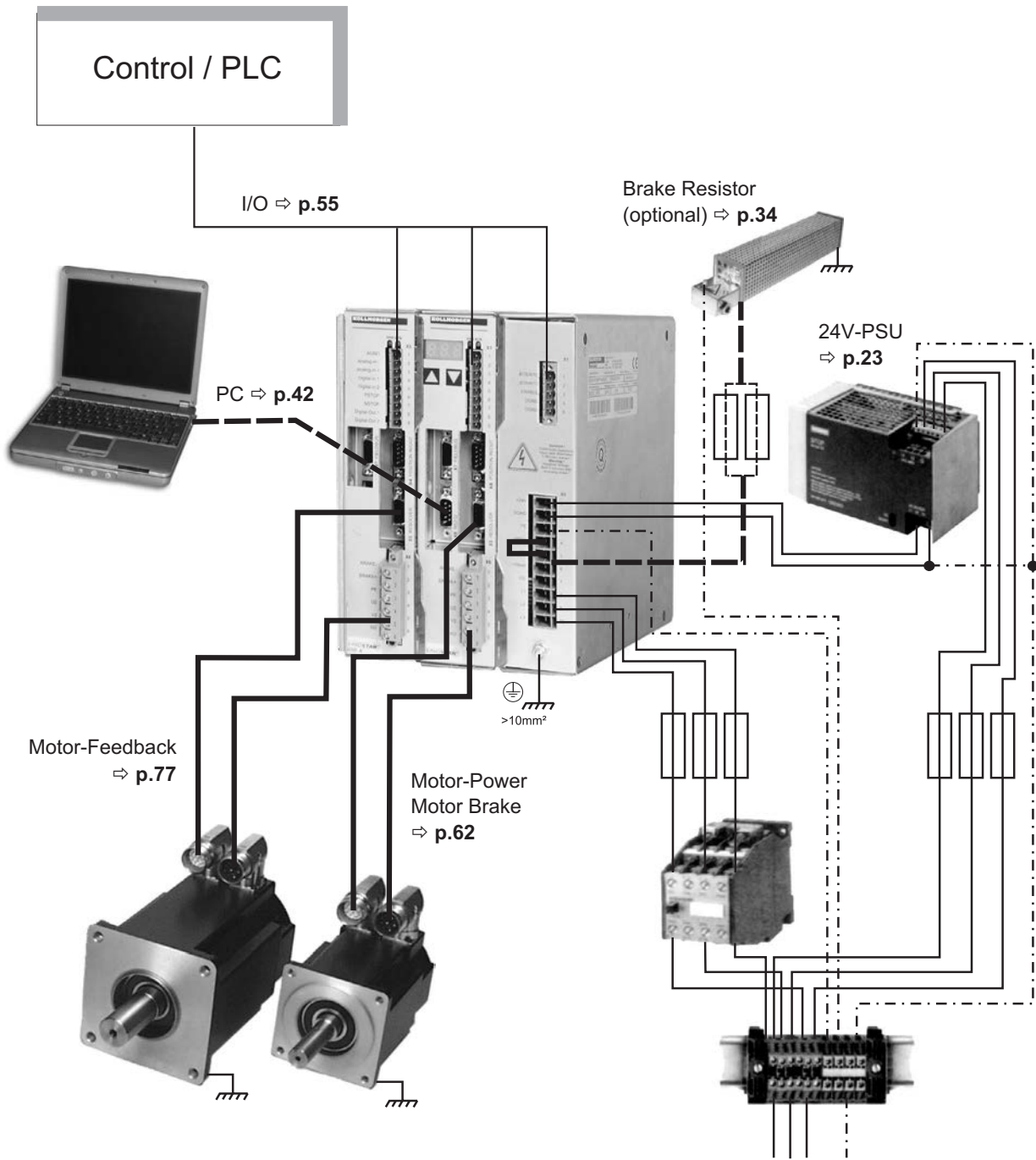
2.1 Drive System with S300



NOTE

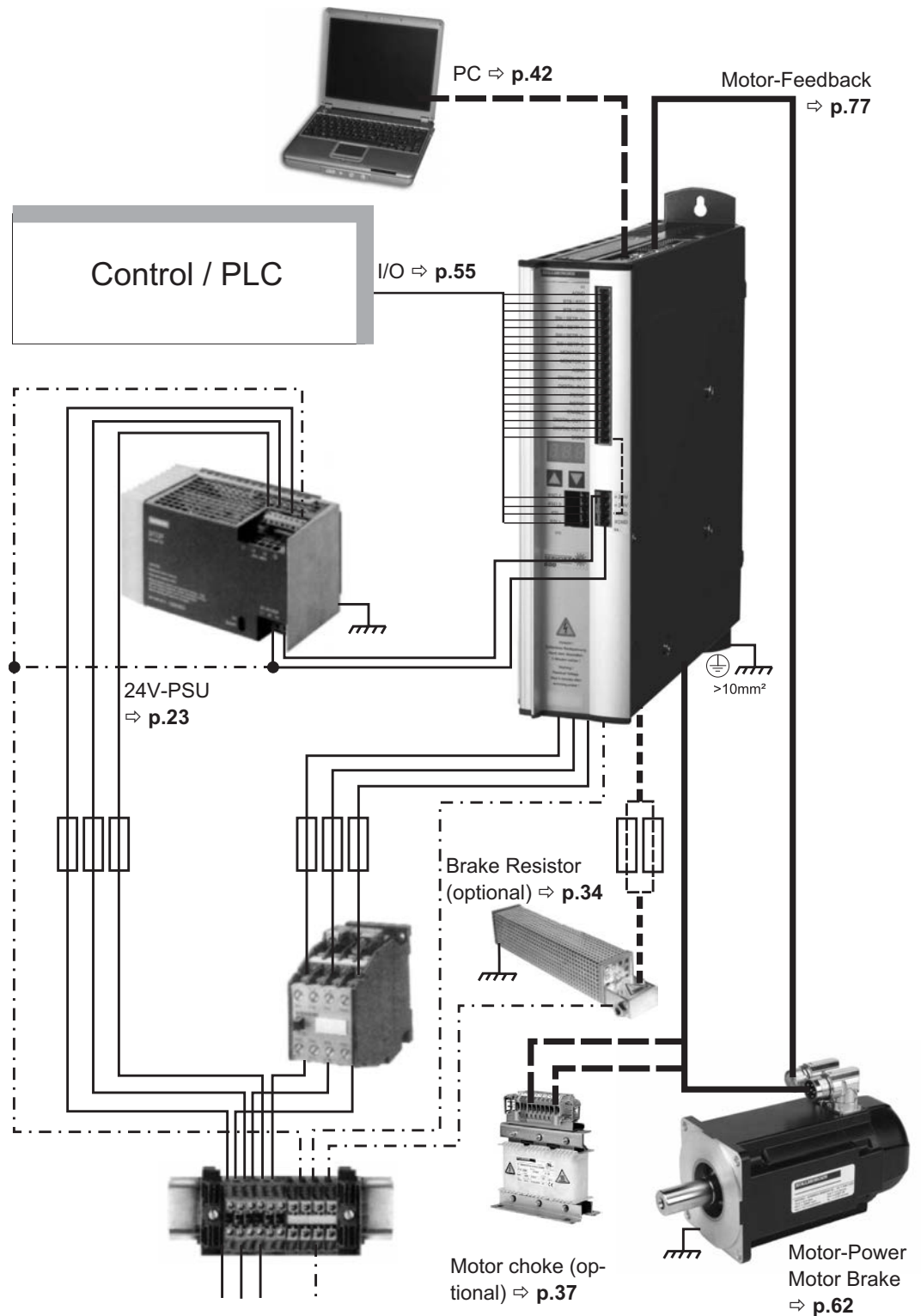
Cables drawn bold are shielded. Electrical ground is drawn with dash-dotted lines. Optional devices are connected with dashed lines to the servo amplifier.

2.2 Drive System with S400



NOTE Cables drawn bold are shielded. Electrical ground is drawn with dash-dotted lines. Optional devices are connected with dashed lines to the servo amplifier.

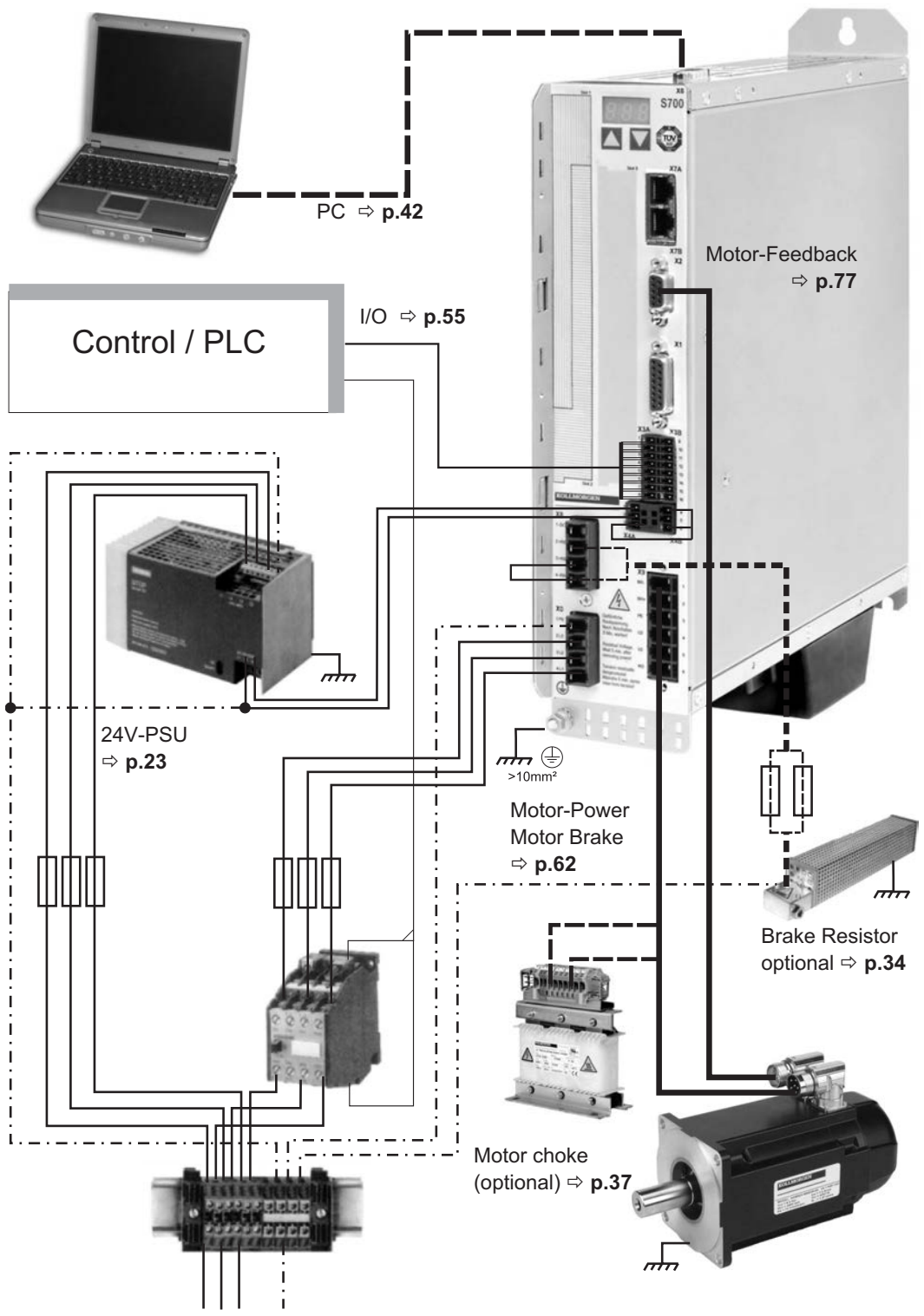
2.3 Drive System with S601...620



NOTE

Cables drawn bold are shielded. Electrical ground is drawn with dash-dotted lines. Optional devices are connected with dashed lines to the servo amplifier.

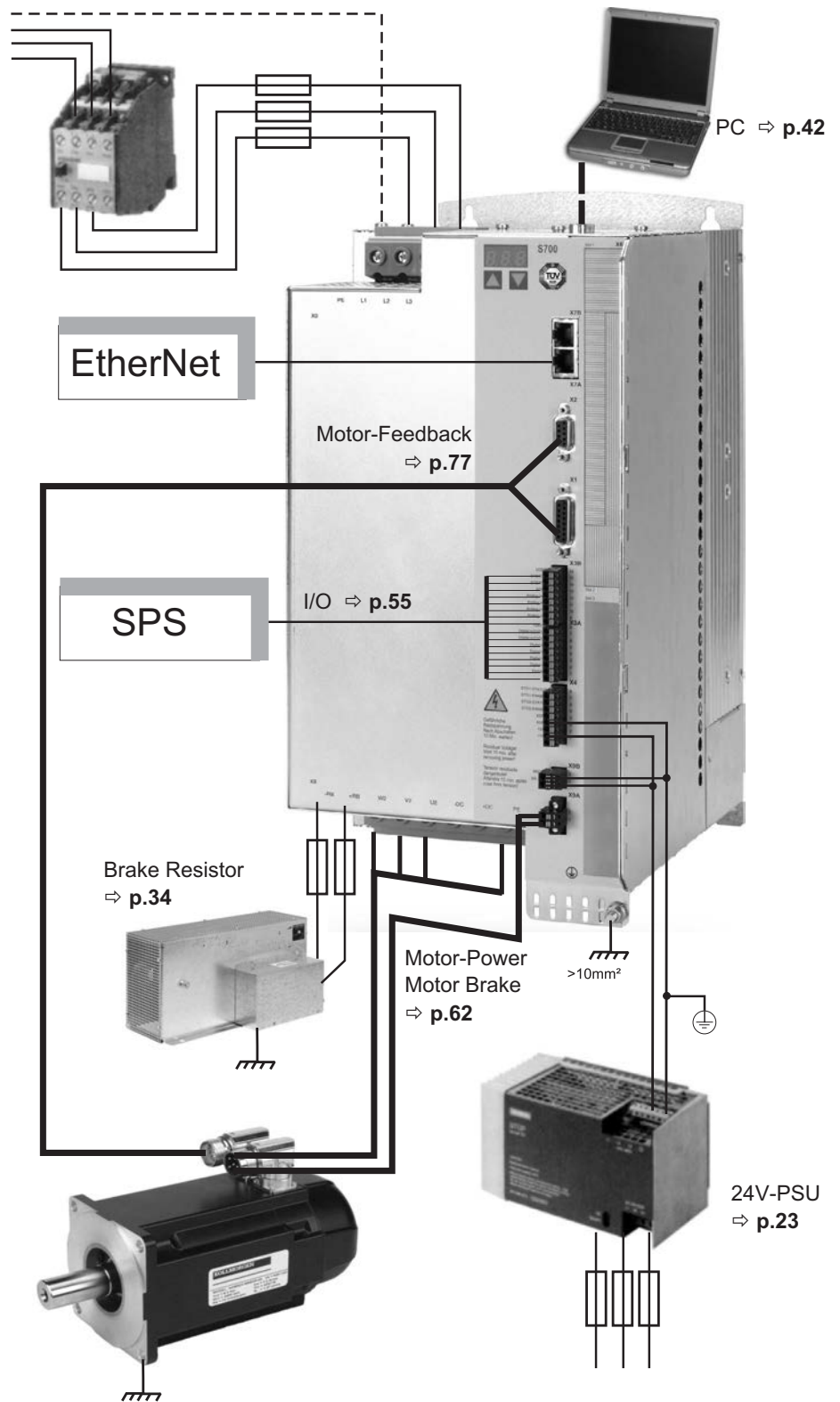
2.4 Drive System with S701...724



NOTE

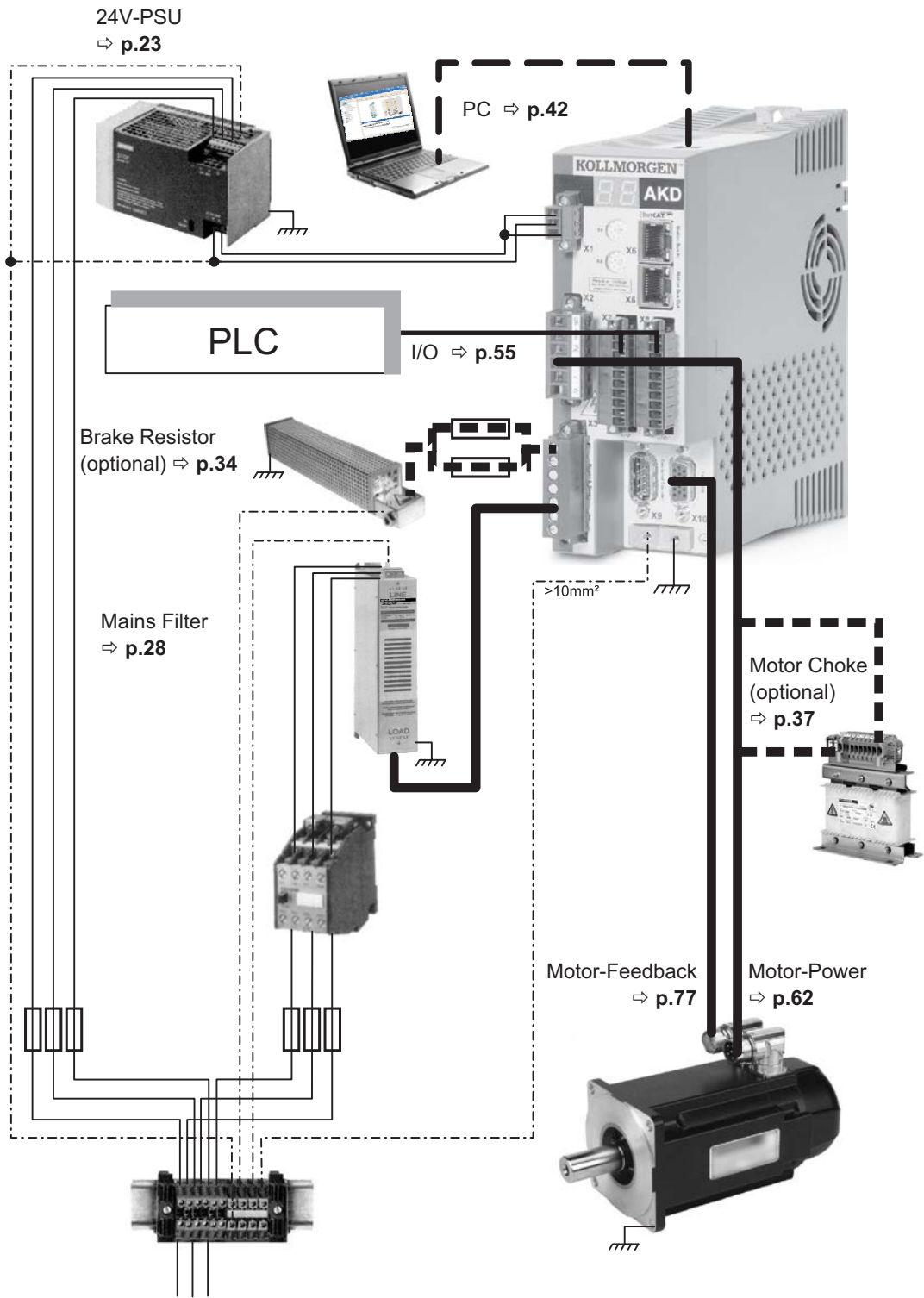
Cables drawn bold are shielded. Electrical ground is drawn with dash-dotted lines. Optional devices are connected with dashed lines to the servo amplifier.

2.5 Drive System with S748/772



NOTE Cables drawn bold are shielded.

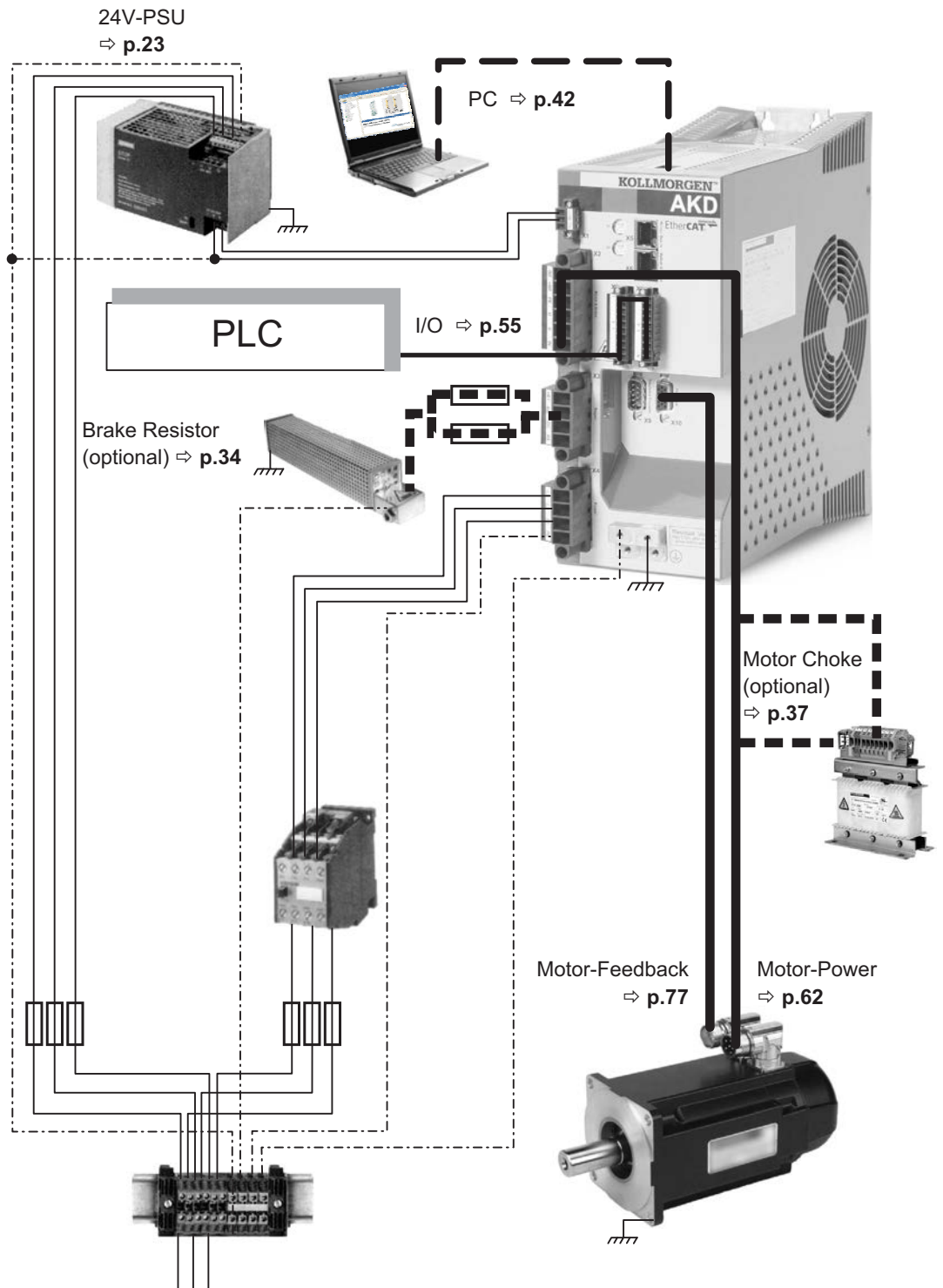
2.6 Drive System with AKD-x00306...02406



NOTE

Cables drawn bold are shielded. Electrical ground is drawn with dash-dotted lines. Optional devices are connected with dashed lines to the servo amplifier.

2.7 Drive System with AKD-x00307...02407



NOTE

Cables drawn bold are shielded. Electrical ground is drawn with dash-dotted lines. Optional devices are connected with dashed lines to the servo amplifier.

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3 Mechanical Tools

3.1 Safety instructions

⚠ CAUTION This manual is only valid in conjunction with the instructions manual for the servo amplifier and servo motor you are using in your application.

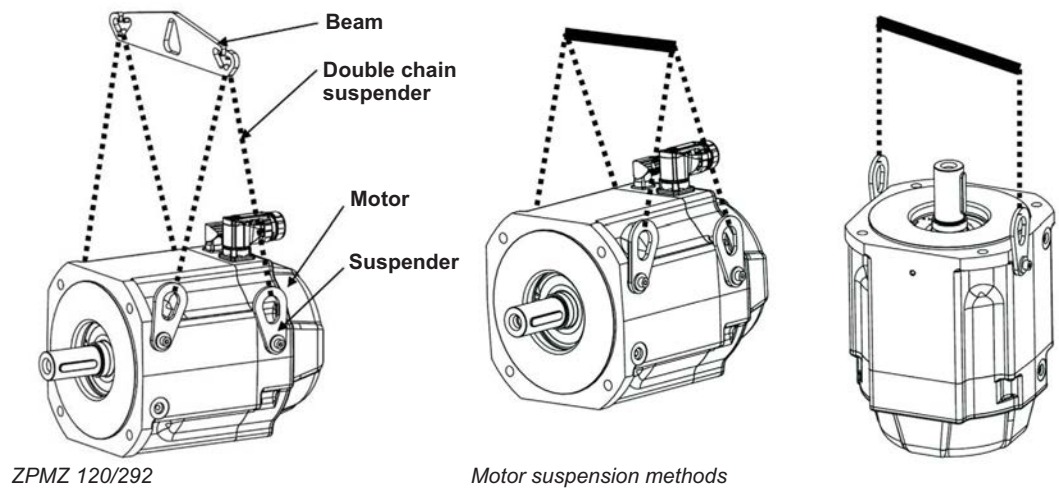
3.2 Suspension Unit for motors

⚠ CAUTION You must read the instructions manual for the suspension unit ZPMZ 120/292. Observe the "safety instructions" and "use as directed" hints before starting transportation work.

The Suspension Unit ZPMZ 120/292 is designed for suspended handling exclusively of motors (i.e., without attached units such as gearboxes, clutches, etc.) with a maximum weight of 120 kg and maximum nominal span of the extreme suspension hooks of 292 mm.

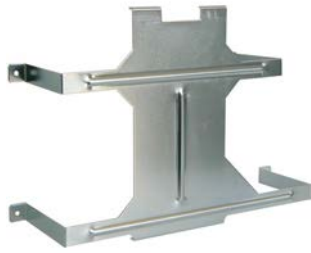
The suspended unit consists of a Beam, suspended off the crane hook and two double-run chain suspenders. The motor may be borne on two or four runs of the chain suspender.

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



Technical Data	
Lifting capacity	120 kg
Nominal span	292 mm
Lug width	44,7 mm
Lug height	51 mm
Weight	0,83 kg
Number of cycles a year	20.000
Average load	60 %
Order code	FA00092

3.3 Mounting clamps for side mounting of S701-712 and S724

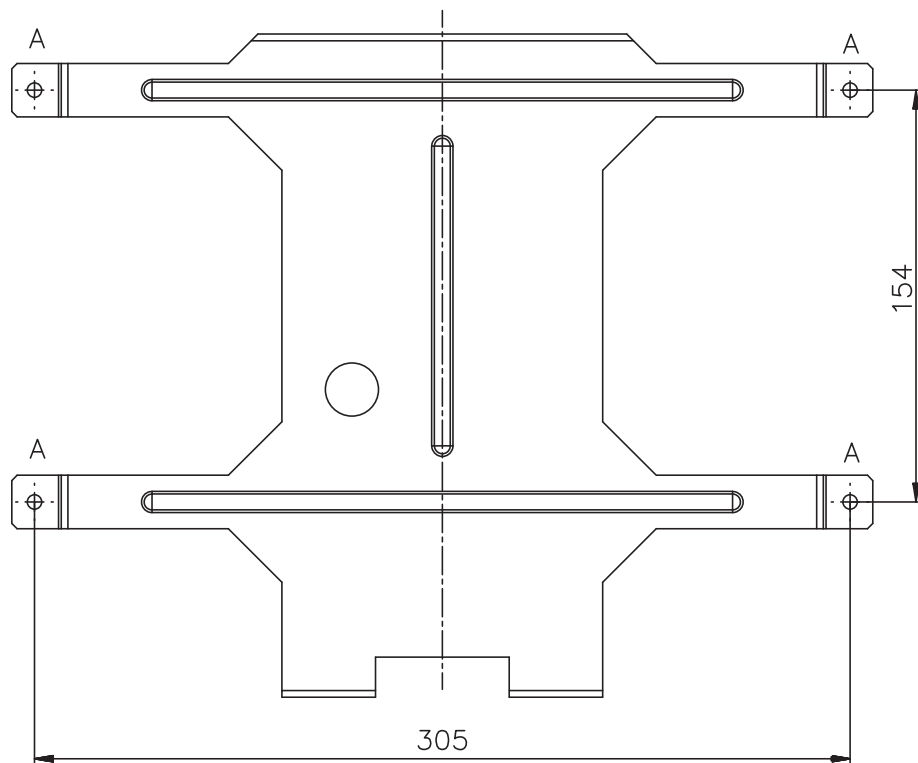
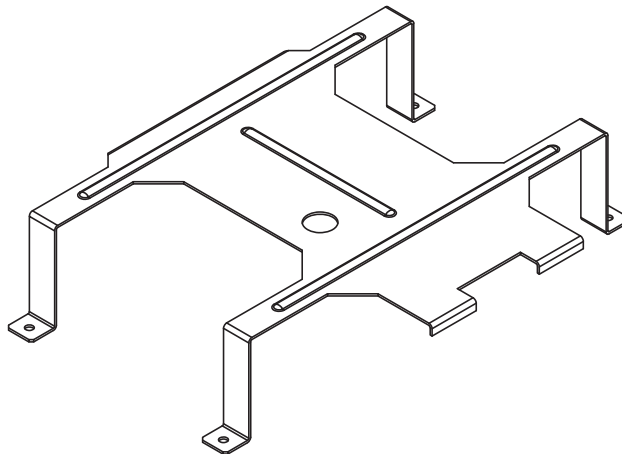


S700 mounting to side walls or doors of switchgear cabinets is possible with an additional mounting clamp.

Depending on the servo amplifier type (S701-712 with 70mm width and S724 with 100mm width) two mounting clamps are available:

3.3.1 Clamp for S701-712, 70mm

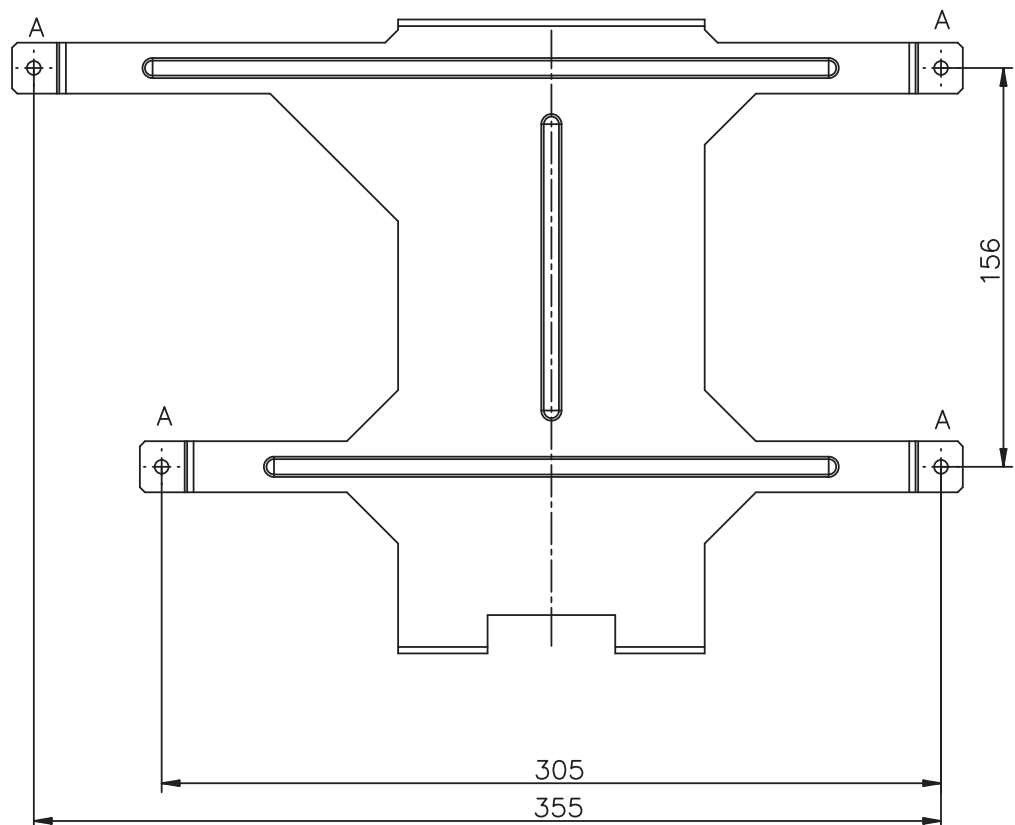
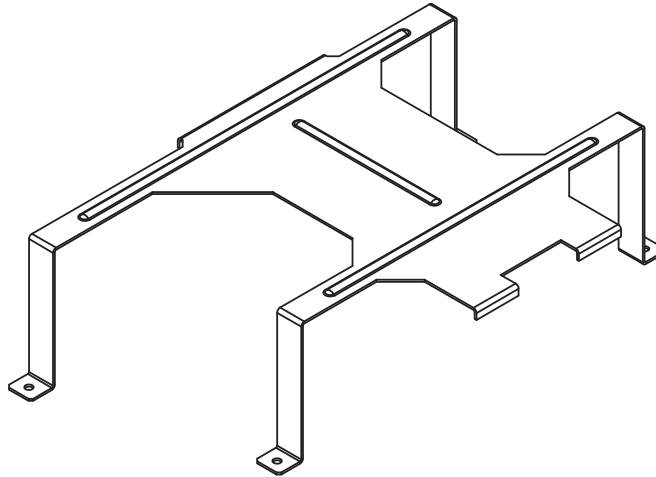
Technical Data	70mm
Mounting holes \varnothing	5,5 mm
Height	322 mm
Width	72 mm
Depth	248 mm
Weight	0.13 kg
Order code	DE-201402



3.3.2

Clamp for S724, 100mm

Technical Data	100mm
Mounting holes \varnothing	5,5 mm
Height	370 mm
Width	102 mm
Depth	248 mm
Weight	0.14 kg
Order code	DE-201403



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4 Shield clamps

4.1 Safety instructions

⚠ CAUTION You must read the instructions manual for the servo amplifier/servo 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 servo amplifier and servo motor you are using in your application.

4.2 Auxiliary terminals on the servo amplifier

S300, S701...724 and AKD



These servo amplifiers feature slots on the front panel for the connection of additional shield clamps.

We recommend using the following shield clamp:

Manufacturer	Article	Tension range
Phoenix Contact	SK14	6-13mm

S748/772



The shroud supplied with these servo amplifiers features slots for the connection of additional shield clamps.

We recommend using the following shield clamp:

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

The clamps are part of delivery of the servo amplifier.

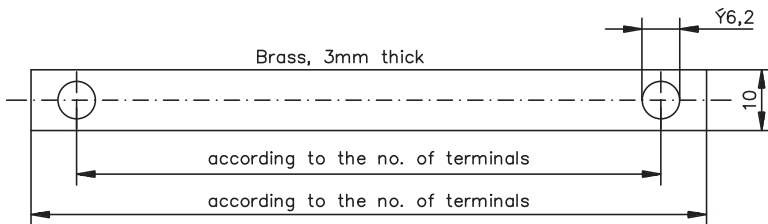
4.3 External shielding busbar



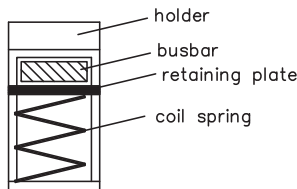
In special cases, the cable shields can be routed to an additional busbar via shield clamps. We recommend using the following shield clamp:

Manufacturer	Article
Weidmüller	KLBÜ

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

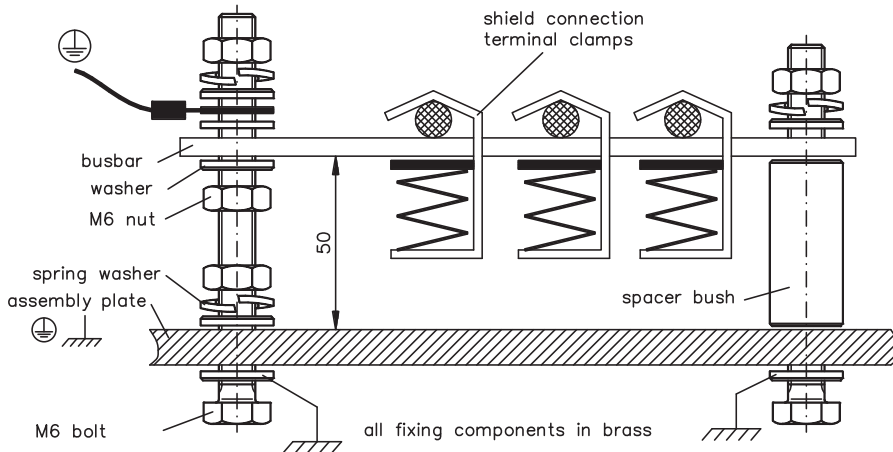


Cut a busbar of the required length from a brass rail (cross-section 10 x 3 mm) and drill holes in it as indicated. All shield clamps required must fit between the drill holes.

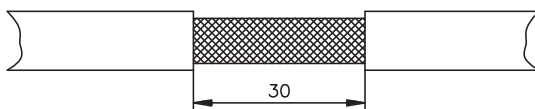


CAUTION Risk of injury due to the spring force of the coil spring. Use pin-cers.

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



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 approx. 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 there is good contact between the shield clamp and the braided shield.

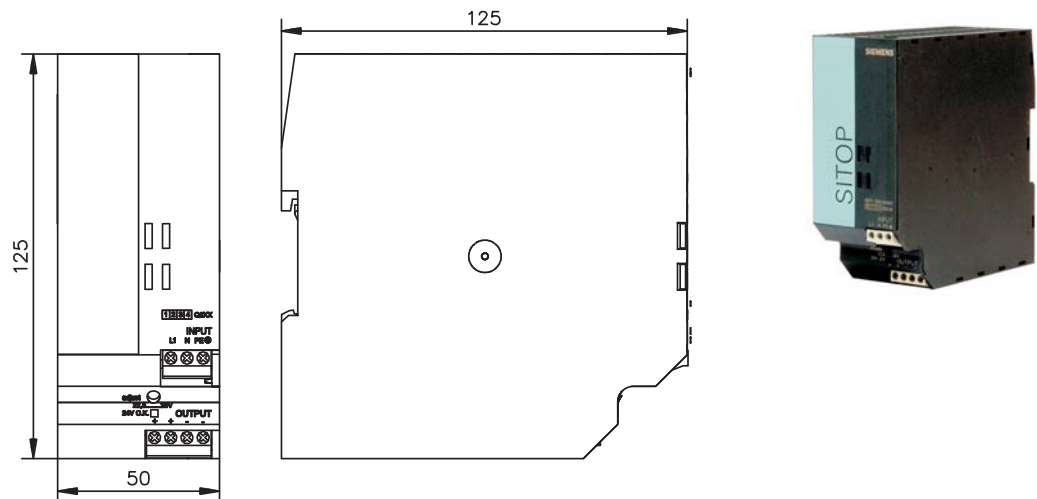
5 Power supply units (PSU)

5.1 Safety instructions

⚠ CAUTION

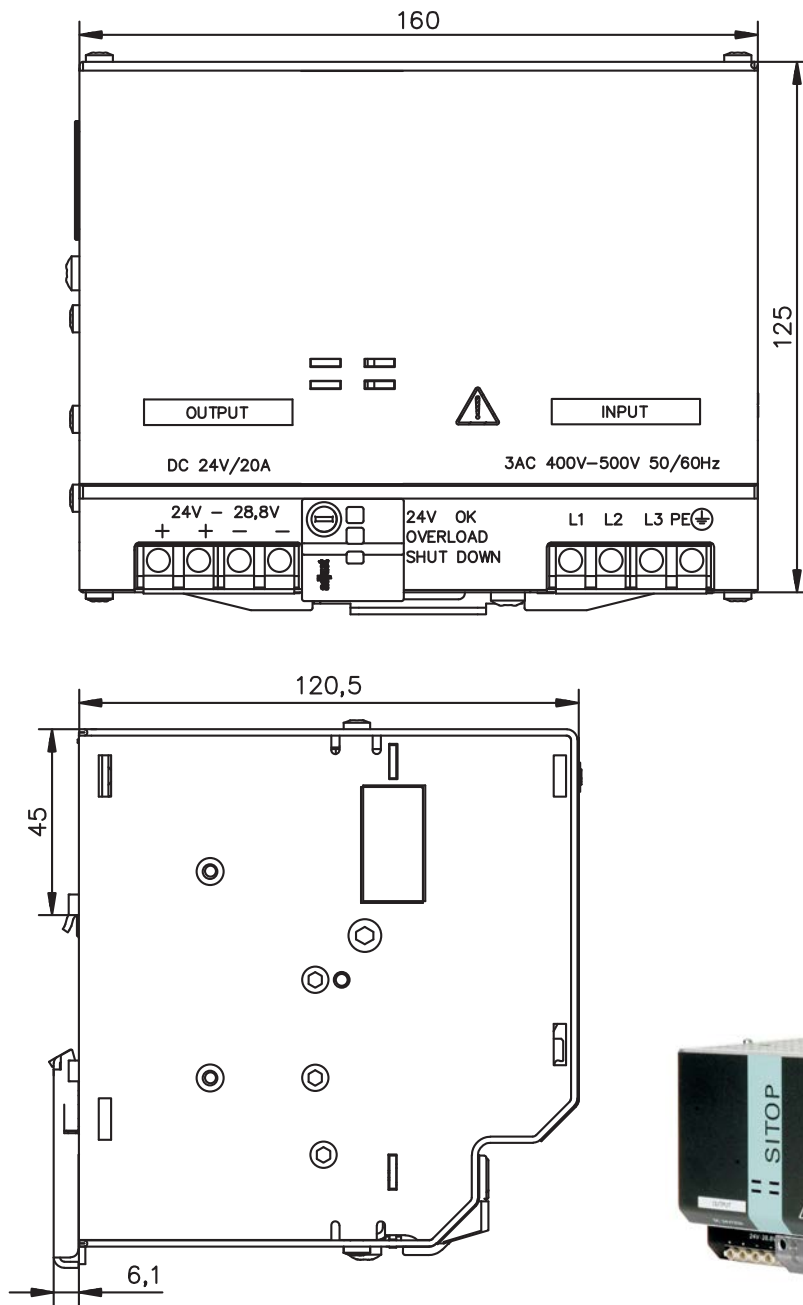
- You must read the instructions manual for the servo amplifier/servo motor you are using in your application and observe the safety instructions they contain before commencing mounting/installation work. This manual is only valid in conjunction with the instructions manual for the servo amplifier and servo motor you are using in your application.
- The wiring cross-sections indicated in the servo amplifier instructions manual must be observed.
- The voltage tolerance indicated in the servo amplifier instructions manual must be observed; note in particular the voltage loss induced by current load on the cable. Non-compliance with minimum voltage requirements can cause the motor's holding brake and the fan to malfunction.
- A connection diagram appears in the servo amplifier instructions manual.

5.2 External PSU 24V DC / 5A



Technical data	
Input voltage	120 / 230V
Input current	2.1 / 1.2A
Frequency	50/60Hz
Output voltage	24V ± 1%
Max. output current	5A
Residual ripple	<150mVss
Switching peaks	<240mVss
Output fusing	short-circuit proof
Temperature range	0 to +60°C
Mounting method	Rail DIN EN 50022-35x15/7.5, vertical mounting 50mm free space required above and below the device
Weight	0.5kg
Order Code	DE-83034

5.3 External PSU 24V DC / 20A



Technical data	
Input voltage	3 x 230/400V AC ± 10%
Input current @ 400V	approx. 1.1A
Frequency	50/60Hz
Output voltage	24V ± 1% (adjustable up to 28V)
Max. output current	20A
Residual ripple	<100mVss
Switching peaks	<200mVss
Output fusing	short-circuit proof
Temperature range	0 to +60°C
Mounting method	Rail DIN EN 50022-35x15/7.5, vertical mounting 50mm free space required above and below the device
Weight	2kg
Order Code	DE-106496

6 Mains chokes

6.1 General

In special cases, if mains voltage is more than 3% asymmetrical, then the S748/772 must be used with a mains choke. In unfavorable combination of mains impedance and DC bus capacitance the unloaded DC bus may reach voltage up to 800V without choke.

For EMC reasons the chokes should be mounted isolated to the cabinet. Single conductors can be used for wiring, shielded cables are not required.

Purpose of mains choke:

- Prevents impermissible loading of semiconductors in the event of rapid current rise during commutation.
- Prevents voltage dips in the mains voltage caused by commutation.
- Reduces current ripple in the DC link, thereby increasing the service life of the DC link capacitors.

More information can be found on the WIKI page "[Mains Choke](#)".

6.2 Safety instructions

⚠ 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-energised. 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.

⚠ CAUTION

You must read the instructions manual for the servo amplifier/servo 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 servo amplifier and servo motor you are using in your application.

NOTICE

A connection diagram appears in the servo amplifier instructions manual.

6.3 Type assignment

Servo amplifier	Mains choke
S640/S670	4% uk
S748 (with asymmetrical mains >3% only)	2% uk
S772 (with asymmetrical mains >3% only)	2% uk
AKD, S300, S400, S601...620, S701...724	not required

6.4 Order codes

Article	uk	Order codes
Mains choke 3L0,5-63-4 (0.47mH, 63A)	4%	DE-92201
Mains choke 3L0,4-80-4 (0.37mH, 80A)	4%	DE-92100
Mains choke 3L0,2-160-4 (0.19mH, 160A)	4%	DE-92099
Mains choke 3L0,24-50-2 (0.24mH, 50A)	2%	DE-201476
Mains choke 3L0,2-75-2 (0.20mH, 75A)	2%	DE-201477

6.5 Mains choke 3L

NOTICE

A number of servo amplifiers can be connected to one and 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 servo amplifiers.

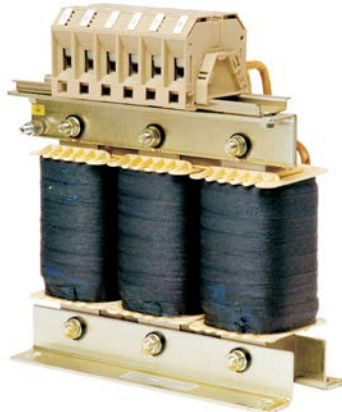
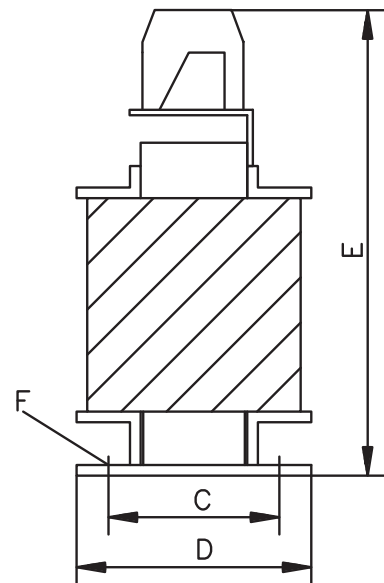
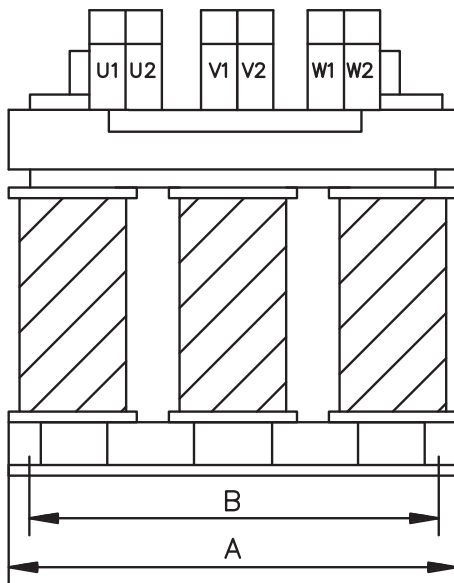
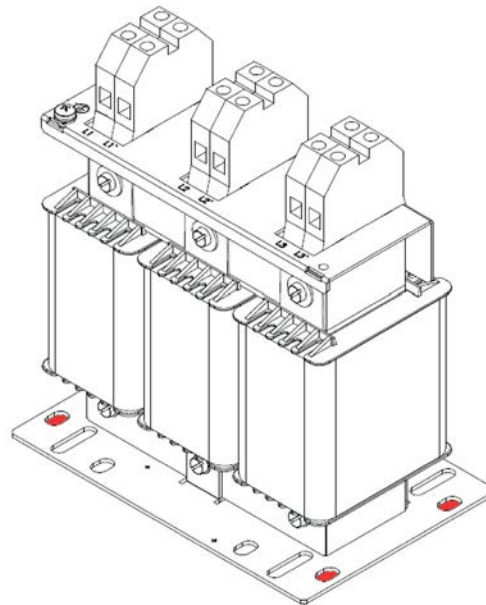


Photo: 3L 0,2-160-4, all models are similar



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]
3L 0,5-63-4	0.47	63	4	185	170	77	122	215	8x12	16	9.65
3L 0,4-80-4	0.37	80	4	210	175	85	125	240	8x12	16	12.5
3L 0,2-160-4	0.19	160	4	291	273	116.5	148.5	310	10x18	95	27
3L 0,24-50-2	0.24	50	2	152.5	114.3	88.9	101.5	163	6.5	10	5.9
3L 0,2-75-2	0.20	75	2	185	170	77	122	220	8x12	35	9.9

7 Mains filters

7.1 General

AKD-x00306...02406 servo amplifiers require an external mains filter. All other servo amplifiers feature built-in mains filters (see the relevant instructions 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 servo amplifiers with I_{peak} .

$$\begin{aligned} \text{Max. available throughput rating of the mains filter (F)} \quad P_{\max F} &= \sqrt{3} \cdot U_N \cdot I_{NF} \\ \text{Max. power consumption of the servo amplifiers (V)} \quad P_{\max V} &= g \cdot \sqrt{3} \cdot U_N \cdot \sum_i I_{peakVi} \end{aligned}$$

$$\text{Max. power consumption of the motors (M)} \quad P_{\max M} = g \cdot \sum_i k_{Ei} \cdot \frac{n_i}{1000} \cdot I_{peakVi} \cdot \sqrt{\frac{3}{2}}$$

The rated current I_{NF} of the mains filter in a system with i axes must be

$$I_{NF} \leq 2 \cdot \sum_i I_{NVi} \quad (\text{total of **twice** the rated currents of the amplifiers) and, more precisely,}$$

$$I_{NF} \leq \frac{P_{\max M}}{\sqrt{3} \cdot U_N} \quad (\text{typical max. **single** value of the amplifier peak currents})$$

In many cases it is possible to use the next smallest filter in the event of a low coincidence factor g or low load.

More information can be found on the WIKI page "[Mains Filter](#)".

7.2 Safety instructions

⚠ CAUTION

- You must read the instructions manual for the servo amplifier/servo 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 servo amplifier and servo 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-energised.

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 servo amplifier instructions manual.

7.3 Type assignment

Servo amplifier	Mains filter
S300, S400, S601...620, S700	not required
AKD-x00306...02406 (120 to 240V)	1NF, 3NF
AKD-x00307...02407 (240 to 480V)	not required

7.4 Order codes

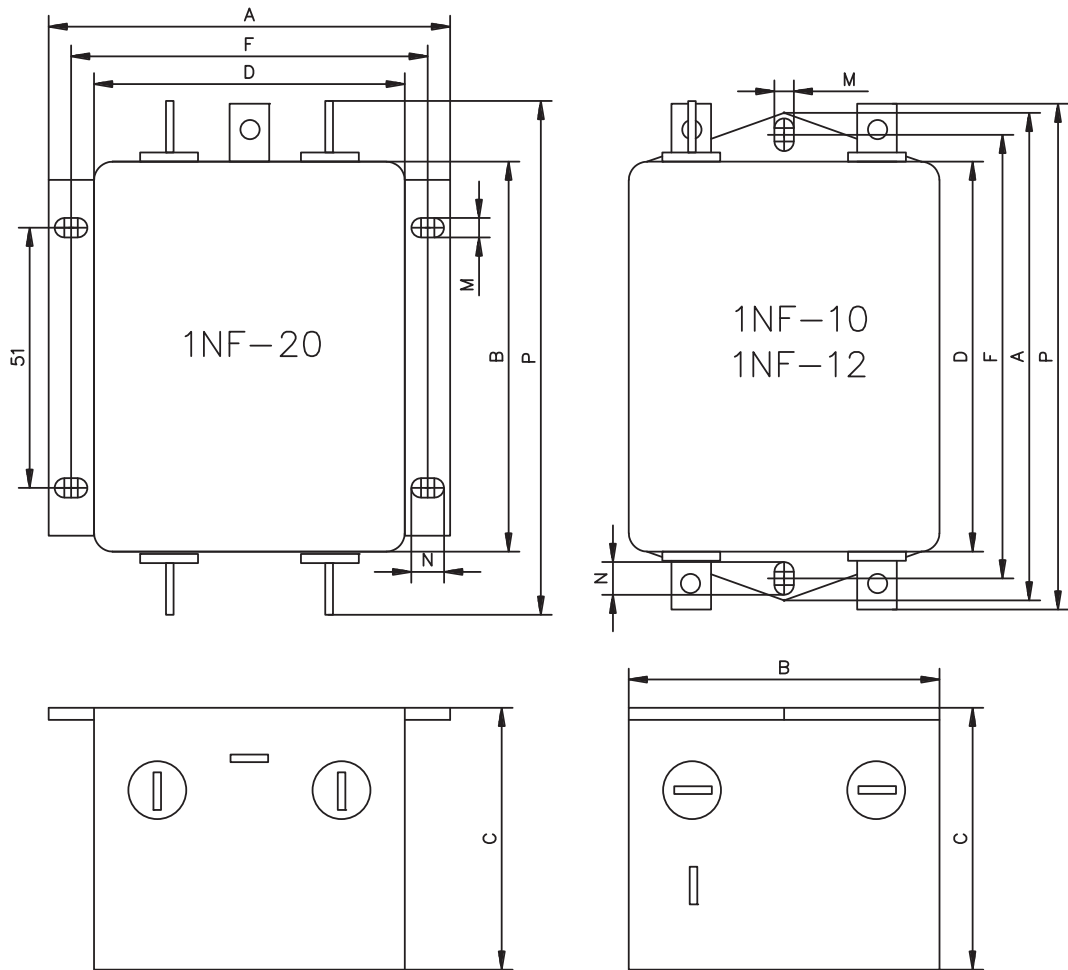
Article	Order code	Remarks
Mains filter 1NF-10 (230 VAC, 10A)	DE-201565	single phase, 230V AC, CE*, UL
Mains filter 1NF-12 (230 VAC, 12A)	DE-201566	single phase, 230V AC, CE*, UL
Mains filter 1NF-20 (230 VAC, 20A)	DE-201567	single phase, 230V AC, CE*, UL
Mains filter 1NF-25 (230 VAC, 25A)	DE-201568	single phase, 230V AC, CE*, UL
Mains filter 3NF-07 (480 VAC, 07A)	DE-201569	three phases, 480V AC, CE*, UL
Mains filter 3NF-16 (480 VAC, 16A)	DE-201570	three phases, 480V AC, CE*, UL
Mains filter 3NF-30 (480 VAC, 30A)	DE-201571	three phases, 480V AC, CE*, UL

* No EC directive matches mains filters actually. Don't hesitate to use the filters in Europe, because they are manufactured according to harmonized standards concerning creeping and voltage distances.

7.5 Mains filters 1NF-10...20

Observe the safety instructions in chapter 7.2.

For single-phase operation only.



Technical Data

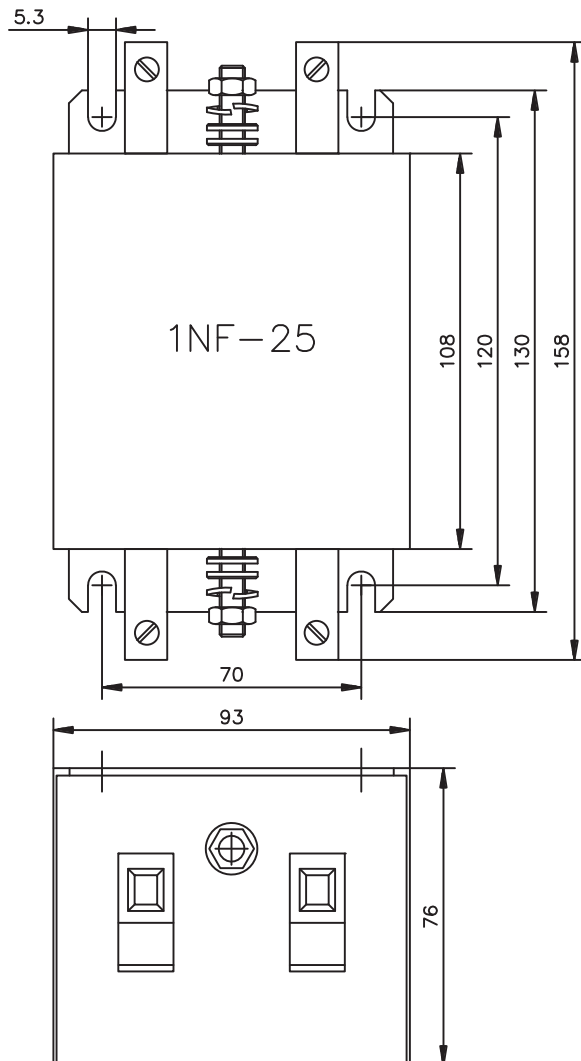
Type	Nominal Current [A]*	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	M [mm]	N [mm]	P [mm]	Weight [kg]	Connection
1NF-10	10	85	49	40.3	54	75	5.3	6.3	87	0.29	Fast-on
1NF-12	12	156	57.5	45.4	130.5	143	5.3	6	156	0.73	Fast-on
1NF-20	20	105	98.5	38.6	84.5	95	4.4	6	121.6	0.6	Fast-on

* at 40°C environment temperature

7.6 Mains filters 1NF-25

Observe the safety instructions in chapter 7.2.

For single-phase operation only.



Technical Data

Type	Nominal Current [A]*	Weight[kg]	Connection Phase	Connection PE
1NF-25	25	0.7	Terminals Wires up to 10mm ² Torque 1.5 to 1.8 Nm	Bolt M6 Torque 3.5 to 4 Nm

* at 50°C environment temperature

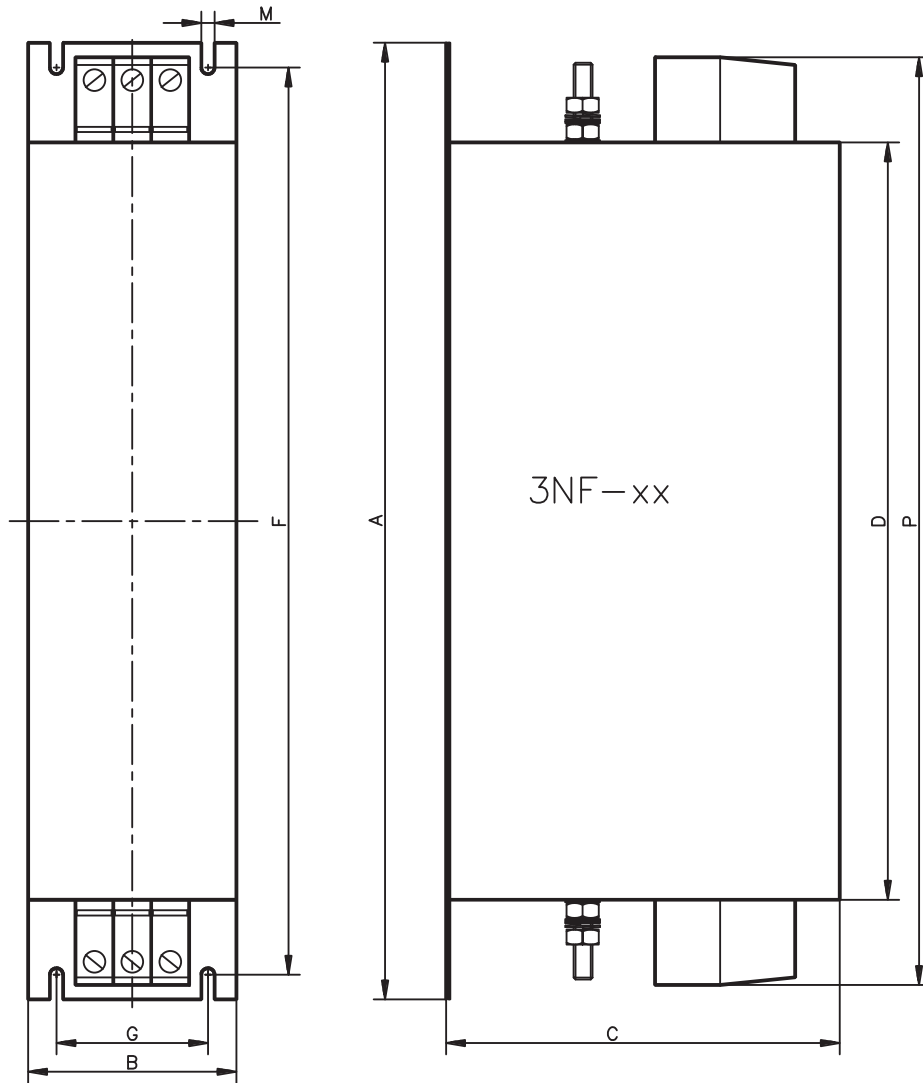
7.7

Mains filters 3NF-07...30



Observe the safety instructions in chapter 7.2.

For three-phase operation only.



Technical Data

Type	Nom. 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	4mm ² ,	M5, 2.2Nm
3NF-16	16 A	250	45	70	220	235	25	5.4	240	0.8	0.7 to 0.8Nm	
3NF-30	30 A	270	50	85	240	255	30	5.4	260	1.2	10mm ² , 1.9 to 2.2Nm	

* at 50°C environment temperature

8 Brake resistors

8.1 General

During braking with the aid of the motor, energy is fed back into the servo amplifier. This regenerative energy is dissipated as heat in the brake resistor. The brake resistor is switched on by the brake circuit. Different resistance values have to be used depending on the servo amplifier. All resistors meet the requirements of CE directives and are UL-registered.

Hints for calculation of the brake power can be found in our Product WIKI on page "[Calculation of brake power](#)", more information to the resistors are given on WIKI page "[Brake Resistors](#)".

8.2 Safety Instructions

CAUTION

- You must read the instructions manual for the servo amplifier/servo 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 servo amplifier and servo 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 brake 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 diversion 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 servo amplifier's instructions manual.

8.3 Important notes

NOTICE

To avoid any fault during operation the following conditions have to be observed:

- Unhindered access of cooling air
- Unhindered diverting of warmed up 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

8.4 Type assignment

Servo amplifier	Brake resistor	Resistance/ Ω	Remarks
S300 (S3xx61)	BAR(U)	66	optional
S300 (S3xx01)	BAR(U)	91	optional
S400	BAR(U)	33	optional
S601...620	BAR(U)	33	optional
S701-712	BAR(U)	33	optional
S724	BAR(U)/BAS(U)	23	optional
S748	BAS(U)	15	usually required
S772	BAS(U)	10	usually required
AKD-X00306	BAFP(U)/BAR(U)/BAS(U)	33	usually required
AKD-X00606	BAFP(U)/BAR(U)/BAS(U)	33	usually required
AKD-X01206	BAFP(U)/BAR(U)/BAS(U)	33	optional
AKD-X02406	BAR(U)/BAS(U)	15	optional
AKD-X00307	BAR(U)/BAS(U)	33	optional
AKD-X00607	BAR(U)/BAS(U)	33	optional
AKD-X01207	BAR(U)/BAS(U)	33	optional
AKD-X02407	BAR(U)/BAS(U)	23	optional

8.5 Order codes

Article	Amplifier	Resistance [Ω]	Rated Power [W]	Max. Power [W]	Order code
Brake resistor BAS(U) 2000-10	S772	10	2000	3200	DE-103874
Brake resistor BAS(U) 3000-10		10	3000	4800	DE-103875
Brake resistor BAS(U) 6000-10		10	6000	9600	DE-103876
Brake resistor BAR(U) 500-15	AKD-X02406, S748	15	500	800	DE-201439
Brake resistor BAR(U) 1000-15		15	1000	1600	DE-201440
Brake resistor BAS(U) 2000-15		15	2000	3200	DE-103871
Brake resistor BAS(U) 3000-15		15	3000	4800	DE-103872
Brake resistor BAS(U) 6000-15		15	6000	9600	DE-103873
Brake resistor BAR(U) 600-23	AKD-X02407, S724	23	600	960	DE-200613
Brake resistor BAR(U) 1000-23		23	1000	1600	DE-200614
Brake resistor BAS(U) 2000-23		23	2000	3200	DE-200615
Brake resistor BAS(U) 3000-23		23	3000	4800	DE-200616
Brake resistor BAS(U) 4000-23		23	4000	6400	DE-200617
Brake resistor BAFP(U) 100-33	AKD-X003 to 12, S400, S601...620, S701-712	33	100	160	DE-201437
Brake resistor BAFP(U) 200-33		33	200	320	DE-201438
Brake resistor BAR(U) 250-33		33	250	400	DE-106254
Brake resistor BAR(U) 500-33		33	500	800	DE-106255
Brake resistor BAR(U) 1500-33		33	1500	2400	DE-106258
Brake resistor BAS(U) 3000-33		33	3000	4800	DE-201407
Brake resistor BAR(U) 300-66	S300 (S3xx61)	66	300	480	DE-107161
Brake resistor BAR(U) 600-66		66	600	960	DE-107162
Brake resistor BAR(U) 1000-66		66	1000	1600	DE-107163
Brake resistor BAR(U) 300-91	S300 (S3xx01)	91	300	480	DE-107164
Brake resistor BAR(U) 600-91		91	600	960	DE-107165
Brake resistor BAR(U) 1000-91		91	1000	1600	DE-107166

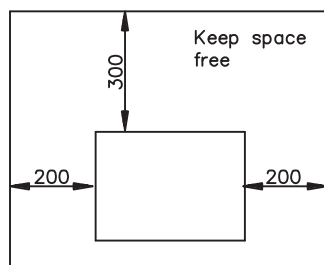
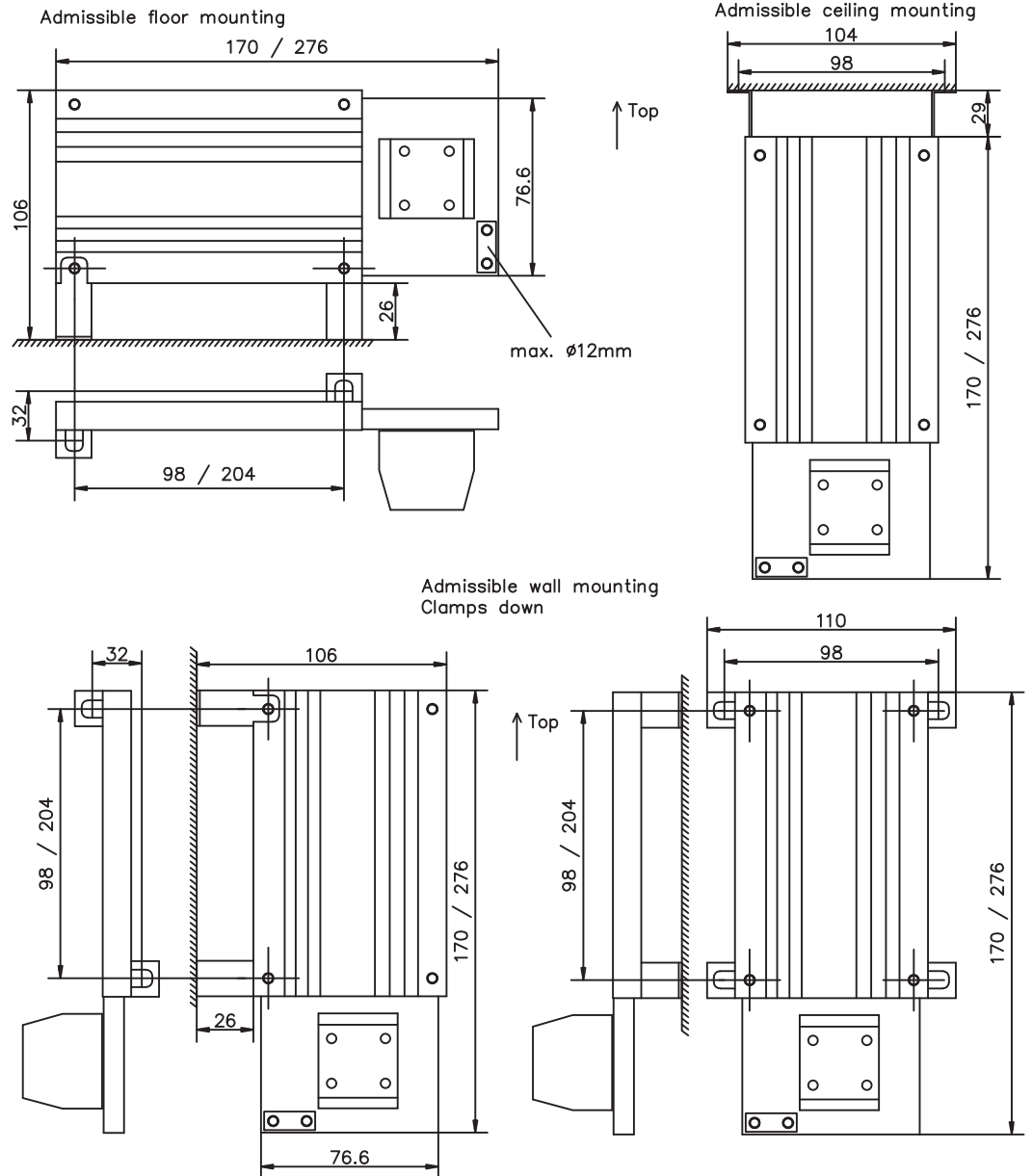
8.6 External brake resistor BAFP(U)



Protection class: IP40

⚠ WARNING

The 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
BAFP(U) 100-33	33	170	100	0,3
BAFP(U) 200-33	33	276	200	0,55

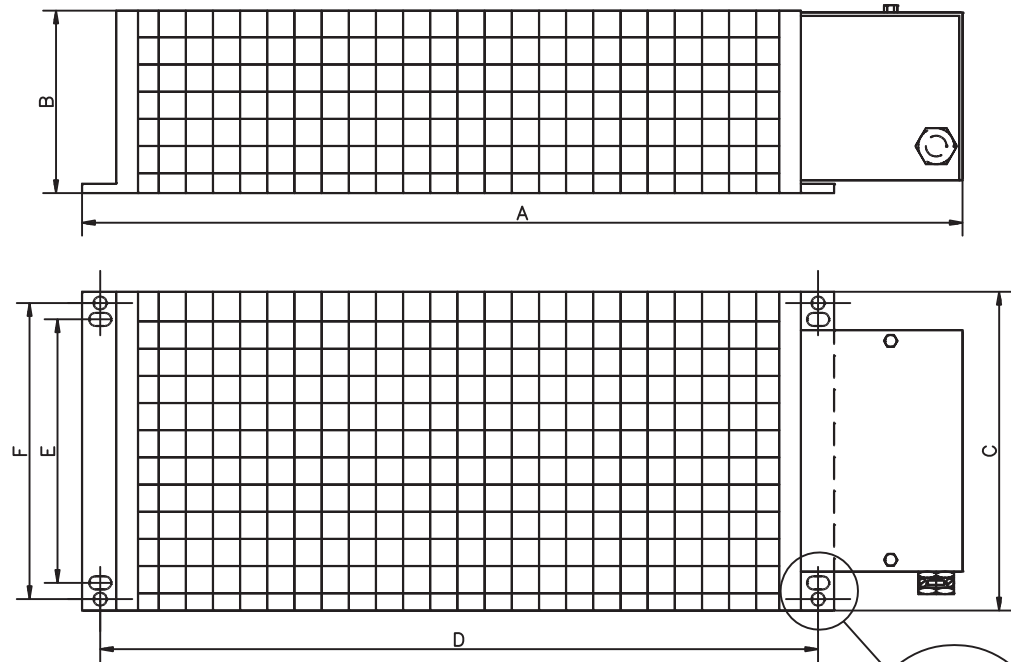
Other types of mounting are not admitted !

8.7 External brake resistor BAR(U)

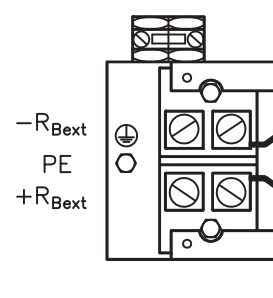
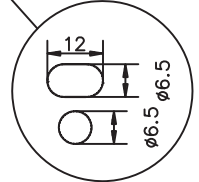
Protection class: IP20

⚠ WARNING

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

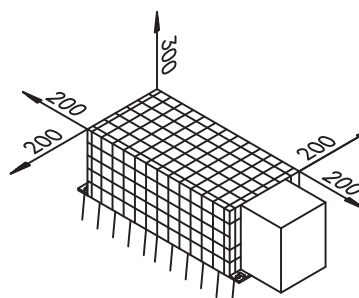


Type	R Ω	Power W	A mm	B mm	C mm	D mm	E mm	F mm	weight Kg
BAR(U) 500	15	500	549	120	92	430	64	80	3
BAR(U) 1000	15	1000	749	120	92	630	64	80	4
BAR(U) 600	23	600	549	120	92	430	64	80	3
BAR(U) 1000	23	1000	749	120	92	630	64	80	4
BAR(U) 250	33	250	349	120	92	230	64	80	2
BAR(U) 500	33	500	549	120	92	430	64	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

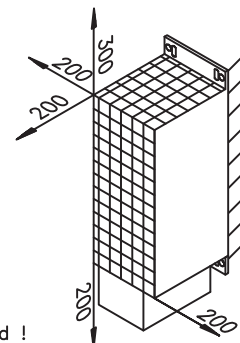


±10%, Temperaturdrift ca. 1%
Kalt ca. +8%, 320°C ca. -7%

Admissible floor mounting



Admissible wall mounting
Clamps down



Other types of mounting are not admitted !

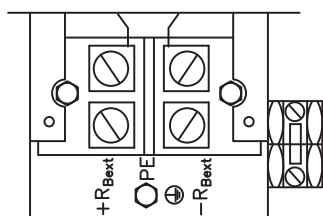
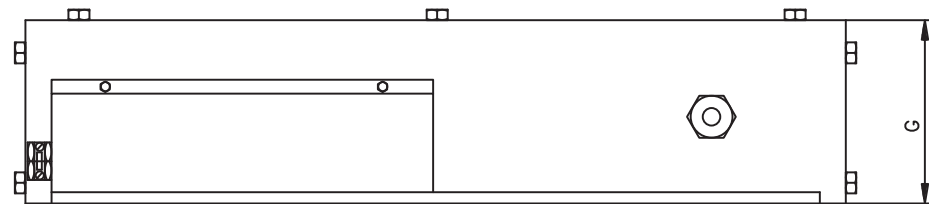
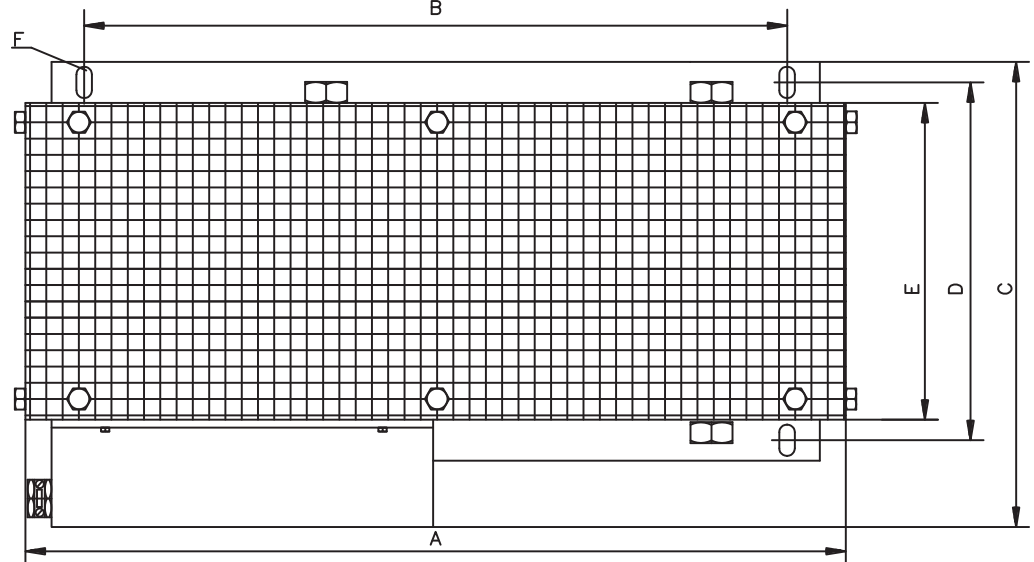
8.8 External brake resistor BAS(U)



Protection class: IP20

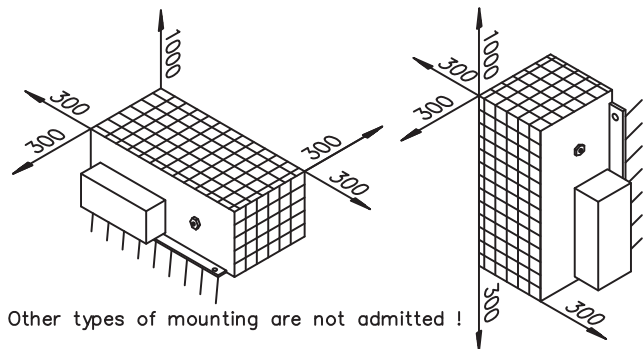
⚠ WARNING

The 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



Other types of mounting are not admitted !

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

	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

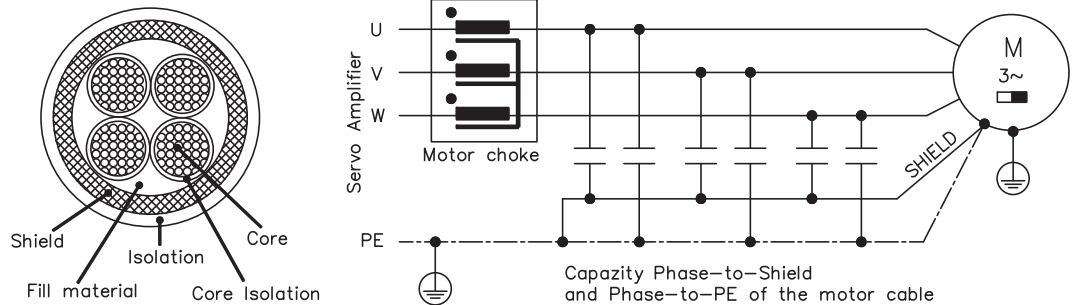
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9 Motor chokes

9.1 General

Shielded motor cables

For reasons of electromagnetic compatibility, the motor must be supplied with power via 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 high capacitive charge/discharge currents typical of shielded motor cables approx. 25 m and longer.
- To reduce current alternation noise in the motor.
- To reduce current ripple in the motor.

The digital servo amplifiers' 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 (determined by design), 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 servo amplifiers 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 amplifiers operating in parallel on the same mains filter.

The motor chokes slow down the rate of rise of the motor current (reduce edge steepness), 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 (e.g. 4 x 1.0 mm²) and therefore a higher equivalent resistance are able to reduce the oscillation tendency of the LCR oscillating circuit (amplifier/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 EN 60204.

9.2 Safety Instructions

⚠ CAUTION

- You must read the instructions manual for the servo amplifier/servo 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 servo amplifier and servo motor you are using in your application.
- Mount the motor choke on a conductive earthed assembly plate in the switchgear cabinet. The choke box 3YL-24 can be mounted to DIN rails as well.
- 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 neighbouring components.
- Provide the requisite conditions for unobstructed convection to cool the choke.
- A connection diagram appears in the servo amplifier instructions manual.
- If the motor cable is longer than 25m, 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.

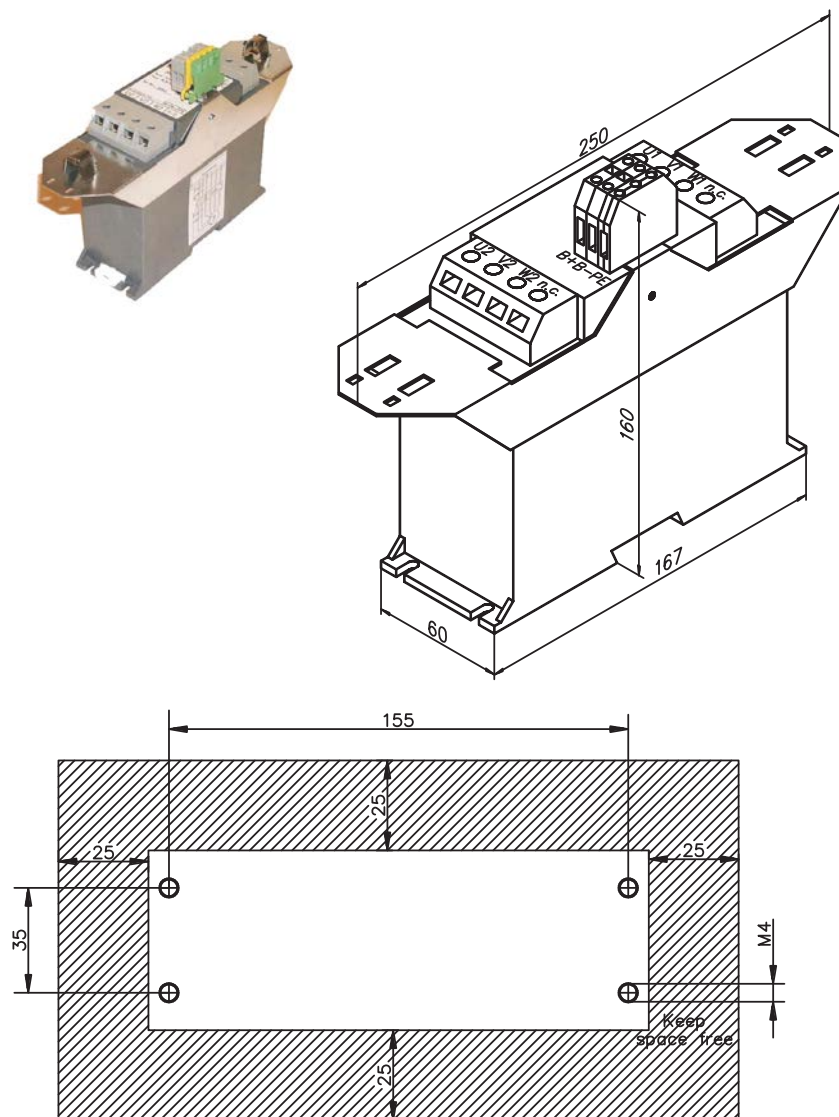
9.3 Type assignment

Servo amplifier	Motor choke	Condition
S300	3YL-24, 3YLN-xx	Motor cable \geq 25m
S400	3YL-24, 3YLN-xx	Motor cable \geq 25m
S601...620	3YL-24, 3YLN-xx	Motor cable \geq 25m
S701...724	3YL-24, 3YLN-xx	Motor cable \geq 25m
S748/772	not required	
AKD-X003x to AKD-X006x	3YLN-06	Motor cable \geq 25m
AKD-X012x	3YLN-14	Motor cable \geq 25m
AKD-X024x	3YLN-24	Motor cable \geq 25m

9.4 Order codes

Article	Nominal Current	Approvals	Order code
Motor choke box 3YL-24	24 A	CE	DE-90074
Motor choke 3YLN-06	6 A	CE, UL	DE-107929
Motor choke 3YLN-10	10 A	CE, UL	DE-107930
Motor choke 3YLN-14	14 A	CE, UL	DE-107931
Motor choke 3YLN-20	20 A	CE, UL	DE-107932
Motor choke 3YLN-24	24 A	CE, UL	DE-201447

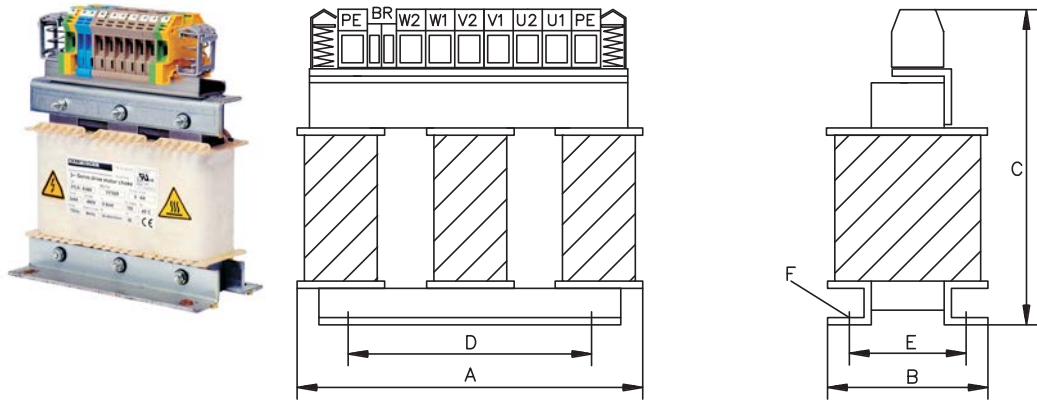
9.5 Motor choke 3YL-24



Technical data:

Rated data	Sym	Unit	3 YL-24
Rated Current	I_{rms}	A	Max. 3 x 24
Frequency	f_{max}	kHz	8.3
Inductivity	L	μH	120
Resistance	R	mOhm	2.6
Weight	G	kg	1.4
Cable diameter (Shield clamp)	-	mm	4 to 13.5
Wire cross section U-V-W max. (terminals)	-	mm^2	4
Wire cross section BR+/- max. (terminals)	-	mm^2	2.5

9.6 Motor choke 3YLN-xx



Technical Data:

Rated Data	Sym	DIM	3YLN-06	3YLN-10	3YLN-14	3YLN-20	3YLN-24
Rated current	I_{0rms}	A	6	10	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	μ H	900	900	900	450	450
Power loss	P	W	12	14.5	19.4	22.3	23.2
Protection class	-	-	IP00				
Temperature class	-	-	F				
Operation class	-	-	S1				
Weight	G	kg	4.5	5.5	10	10	10
Cable diameter (Shield clamp)	-	mm	4 to 13.5				
Wiring cross section max. (Terminals)	-	mm ²	10	10	16	16	16
Width	A	mm	155	155	190	190	190
Depth	B	mm	90	105	125	125	125
Height	C	mm	195	195	230	230	230
Mounting hole distance	D	mm	130	130	170	170	170
Mounting hole distance	E	mm	56.5	71.5	78	78	78
Mounting screws	F	-	4xM6	4xM6	4xM6	4xM6	4xM6

10 Cables

10.1 Technical data for cables

The following table lists the technical data for all cables which we supply. Further information on the chemical, mechanical and electrical characteristics of the cables can be found in our [WIKI](#).

Insulation material

Sheathing PUR (polyurethane, code 11Y)
Core insulation PETP (polyesterphthalate, code 12Y)

Capacitance (phase to shield)

Motor cable less than 180 pF/m (cross sections >6mm² have larger capacitance)
RES/encoder cable less than 120 pF/m

Technical data

- The brackets in the core definition indicate the shielding
- All cables are suitable for use as trailing cables
- The technical data refer to use as moveable cables
- Operating life : 10 million bending cycles
- All cables are UL recognized

Cores [mm ²]	Operating Temperature Range [°C]	Outside Diameter* [mm]	min. Bending Radius* static/moved [mm]
(3x0,5)	-30 / +80	6	40/60
(4x1)	-30 / +80	9	60/90
(4x1,5)	-30 / +80	10	60/100
(4x2,5)	-30 / +80	12	80/120
(4x4)	-30 / +80	13	80/130
(4x6)	-30 / +80	16	100/160
(4x10)	-30 / +80	19	120/190
(4x16)	-30 / +80	24	150/240
(4x25)	-30 / +80	27	170/270
(4x1+(2x1))	-30 / +80	10	60/100
(4x1,5+(2x1))	-30 / +80	11	70/110
(4x2,5+(2x1))	-30 / +80	14	90/140
(4x4+(2x1))	-30 / +80	15	90/150
(4x6+(2x1))	-30 / +80	17	110/170
(4x10+(2x1,5))	-30 / +80	22	140/220
(4x16+(2x1,5))	-30 / +80	26	104/195
(4x25+(2x1,5))	-30 / +80	29	117/219
(4x1+2x(2x0,75))	-30 / +80	12	48/90
(4x1,5+2x(2x0,75))	-30 / +80	13	51/95
(2x(2x0,25))	-30 / +80	6	40/60
(4x(2x0,25))	-30 / +80	8	50/80
(7x(2x0,25))	-30 / +80	9	60/90
(8x(2x0,25))	-30 / +80	10	60/100

*Tolerance +/- 5%

10.2 Tools

Only work with the special tools that are required for the used connectors. You can obtain these special tools from the manufacturer of the connectors or contacts.

10.3 PC connection

10.3.1 General

S300, S400, S600, S700

Kollmorgen digital "Sx" type servo amplifiers are equipped with a serial RS232 interface to facilitate communication with a standard personal computer (PC). Various types of interface can be used on the PC. Appropriate cables and in some cases specific accessories will be required to establish the connection between servo amplifier and PC.

AKD

The AKD is connected by a standards net cable with RJ45 connectors to the PC or to a Switch/Hub. These cables are described as Ethernet cables on page 59.

10.3.2 Order codes

Article	Order Code
Cable PC-S300/S400/S600/S700 3m, 9poles	DE-90067
Adapter SubD9-SubD25 poles	DE-90105
Setup Kit S300/S400/S600/S700 USB	DE-107666
Y-Adapter for splitting CAN/RS232 and Multilink	see p.46

10.3.3 PC connection serial USB

An interface converter is required to use the USB interface on a PC. Our "USB" setup kits contain a USB serial converter and a serial PC cable suitable for the amplifier type.

Setup Kit S300, S400, S600, S700 USB



10.3.4 PC connection serial RS232

For the purpose of parameterisation and for firmware upgrades, the servo amplifiers can be connected to the serial RS232 interface on a PC. The connecting cable must be shielded. The braided shield on the RS232 connecting cable is conductively connected to the front panel of the servo amplifier via the connector housing on the Sub-D male connector.

PC cable for S300, S400, S600, S700



10.3.5

Preparing serial PC cables for S300/S400/S600/S700

There are two possible options for the interface cables between the servo amplifier and your PC. To find out which one is correct in your case, you must check the serial interface of the PC that is going to be connected to the servo amplifier. It will be either a 25-pin or a 9-pin SubD connector. The interface cable must not be longer than 5m.

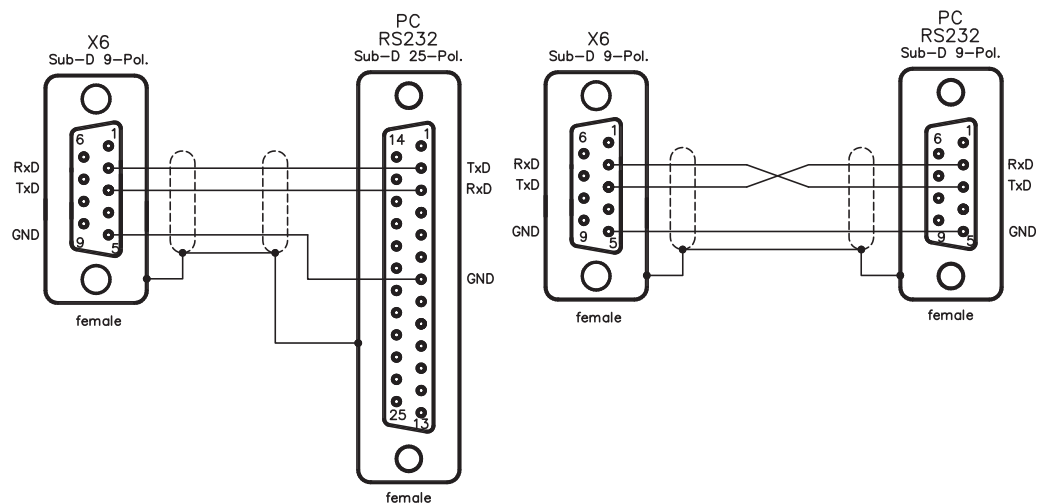
Material list

Part	Designation	Order code
Cable	LiYCY 3x0.5mm ²	DE-91838 (cut to length)
SubD socket, 9-pin	SubD socket, 9-pin with solder buckets	DE-56347
Housing, 9-pin	Housing for 9-pin SubD connector, shielded	DE-91904
SubD socket, 25-pin	SubD socket, 25-pin with solder buckets	DE-51870
Housing, 25-pin	Housing for 25-pin SubD connector, shielded	DE-82455
Screw	Fixing screw for SubD housing	DE-81906

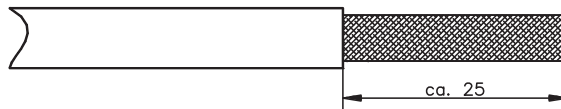
The materials listed ensure that the shielding of the cable makes an electrical connection with the housing of the SubD connectors. If you use materials that do not provide this connection, then you will have to form the shielding braid into a pigtail, insulate it, and solder it to the body of the SubD connector.

Wiring diagram (example S600)

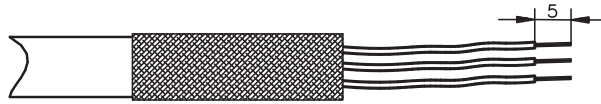
Please note that the view is that seen looking at the back of the sockets (solder side).



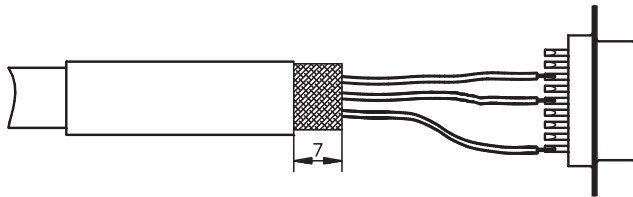
Using order code DE-90105 you can obtain an adapter plug from us, so that you can plug an interface cable that is made up for the 9-pin RS232 interface into the 25-pin interface. With this adapter, you only need one type of cable for different types of PC.

Preparing cables

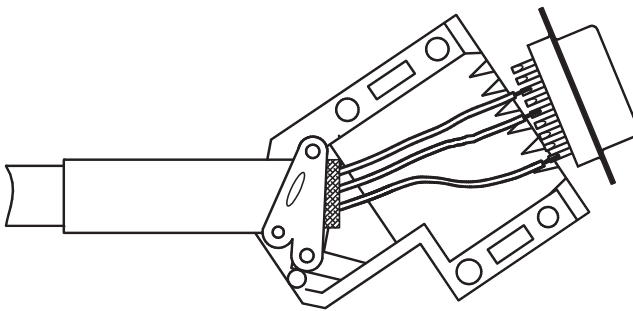
Remove the outer covering of the cable over a length of about 25mm, without damaging the shielding braid.



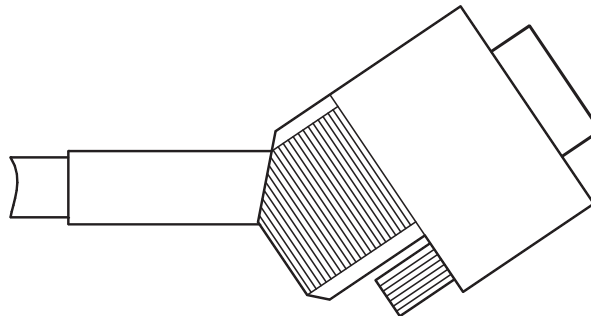
Push the shielding braid back over the outer covering of the cable, and strip off the ends of the cores over a length of about 5mm, without damaging the copper strands.



Push a suitable piece of heat-shrink tubing over the outer cover, and heat it up. Leave about 7mm free at the end. Solder the ends of the cores into the solder buckets of the SubD connector, with a link of insulated wire (see diagram) if required.



Use the strain relief to fix the cable to the bottom half of the housing. Do not overtighten the screws, or the cable will be crushed. Place the SubD connector, with the wider side below, in the bottom half of the housing.



Check the connections before closing the housing, since it cannot be opened again afterwards without damage. Place the fixing screw in position in the housing, and then press the two halves of the housing firmly together. Take care that the fixing screw and the SubD connector insert are properly located.

The 25-pin SubD connector is basically assembled in the same way as the 9-pin version, with the difference that there are two fixing screws. A separate description is therefore not necessary.

10.3.6

Y-Adapter (Splitter) for S300/S600/S700

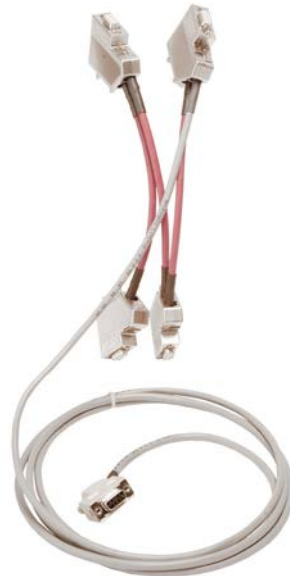
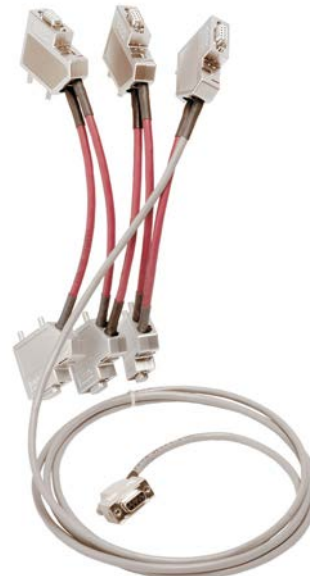
The signals for the serial link to the PC and the CAN interface are routed via the same connector on the servo amplifier (X6). Our Y adapters can be used for simultaneous access to both interfaces. In this case, the interface signals are routed via separate connectors.

Order codes

Article	Order Code
Y-Programming-Adapter 1 Axis	DE-108211
Y-Adapter -SR6Y- 4 axes (Multilink cable)	DE-90060
Y-Adapter -SR6Y6- 6 axes (Multilink cable)	DE-92042

Y programming adapter for 1 Axis

The multi-axis Y adapters support the simultaneous setup (multi-link) of a number of S300/S600/S700 in a single setup session.

Y adapter for 4 axes**Y adapter for 6 axes**

Preparing a Y-Adapter

A Y-Adapter is used to connect several servo amplifiers simultaneously to one PC. The communication between the servo amplifiers is then carried out according to the CANopen protocol, and the connection to the PC is made via the RS232 serial interface.

Cable data

Characteristic impedance	100-120 Ω
Cable capacitance	max. 60 nF/km
Conductor (loop) resistance	159.8 Ω/km

Cable length, depending on the transmission rate:

Transmission rate / kbps	1000	500	250
Max. cable length / m	20	70	115

The table refers to the total cable length between the ends of the CANopen bus. The length of cable between the PC and the first bus connector must not be more than 5m.

Longer transmission distances can be achieved with a lower cable capacitance (max. 30 nF/km) and lower loop resistance (115 Ω/km).

For EMC reasons, the SubD connector housings at the amplifier end must fulfil the following conditions:

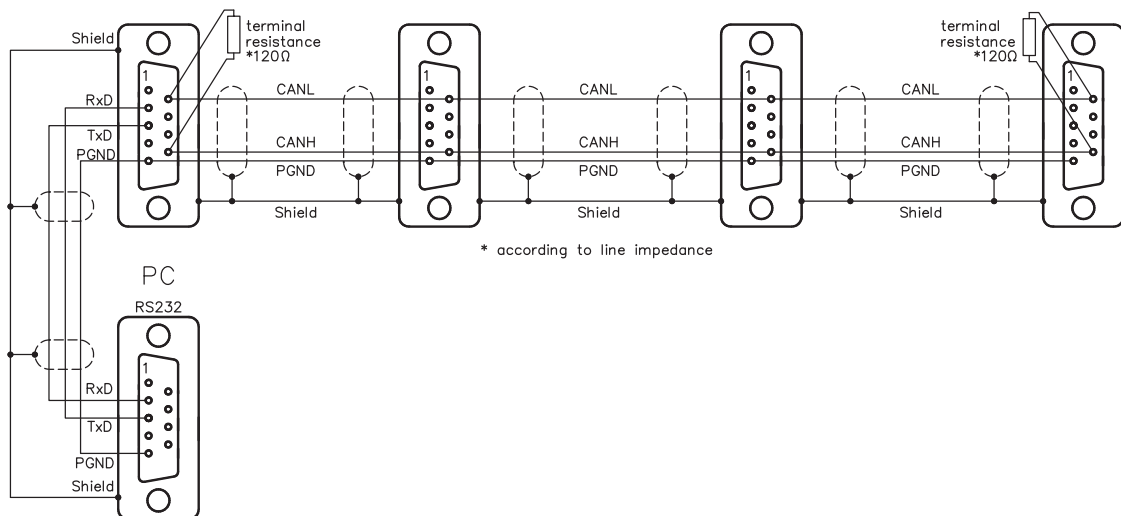
- metal or metallic-coated housing
- provision for connecting the cable shielding to the housing, large-area connection

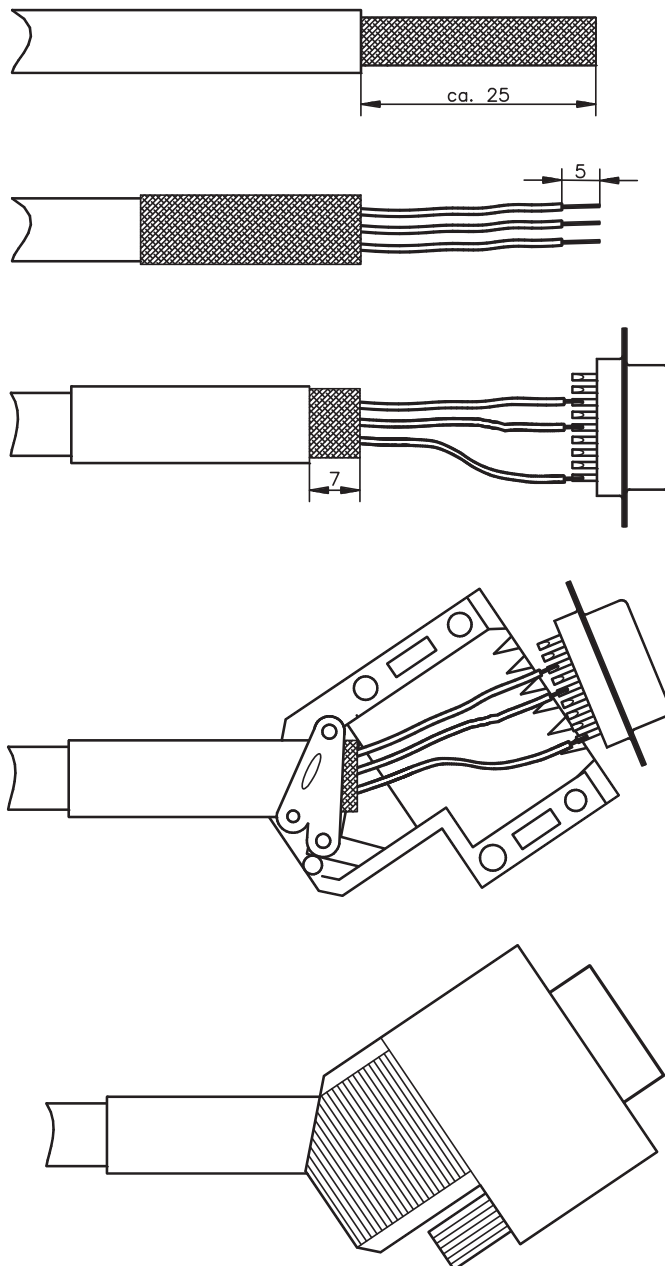
Material list

Part	Designation	Order Code
Cable, PC end	LiYCY 3x0.5mm ²	DE-91838 (to length)
Cable, controller end	Li2YCY (TP) 2x2x0.25mm ²	DE-86834 (to length)
SubD socket PC end	SubD connector 9-pin with solder buckets	DE-56347
SubD cover PC end	Housing for 9-pin SubD connector with shielding	DE-81905
Fixing screw PC end	Fixing screw for SubD housing	DE-81906
SubD kit, controller end	9-pin SubD connector (socket)	DE-90650

Wiring diagram (for S300, S600, S700)

The wiring diagram shown below is an example for the use of a Y-adapter with 4 servo amplifiers . If you need more connections, then add them in **between** Slave 1 and Slave 4. The additional connectors are wired up exactly as Slave 2/3. If your cable has more connectors than you need, any of them can be left free.



Preparing cables: PC end

Remove the outer covering of the cable over a length of about 25mm, without damaging the shielding braid.

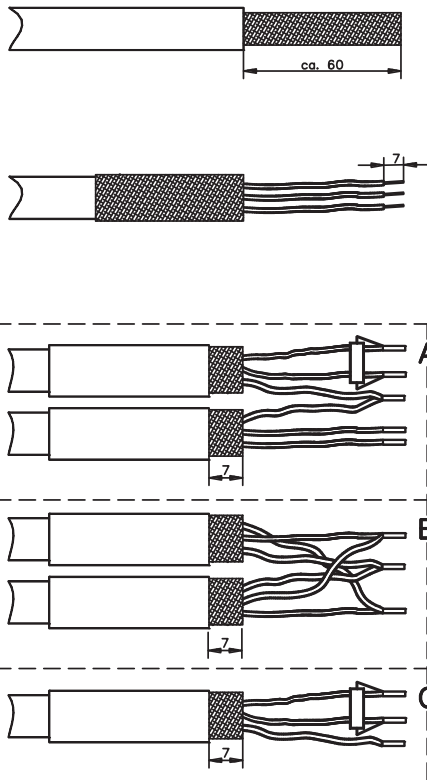
Push the shielding braid back over the outer covering of the cable, and strip off the ends of the cores over a length of about 5mm, without damaging the copper strands.

Push a suitable piece of heat-shrink tubing over the outer cover, and heat it up. Leave about 7mm free at the end. Solder the ends of the cores into the solder buckets of the SubD connector, with a link of insulated wire (see diagram).

Use the strain relief to fix the cable to the bottom half of the housing. Do not overtighten the screws, or the cable will be crushed. Place the SubD connector with the wider side below, in the bottom half of the housing.

Check the connections before closing the housing, since it cannot be opened again afterwards without damage. Place the fixing screw in position in the housing, and then press the two halves of the housing firmly together. Take care that the fixing screw and the SubD connector insert are properly located.

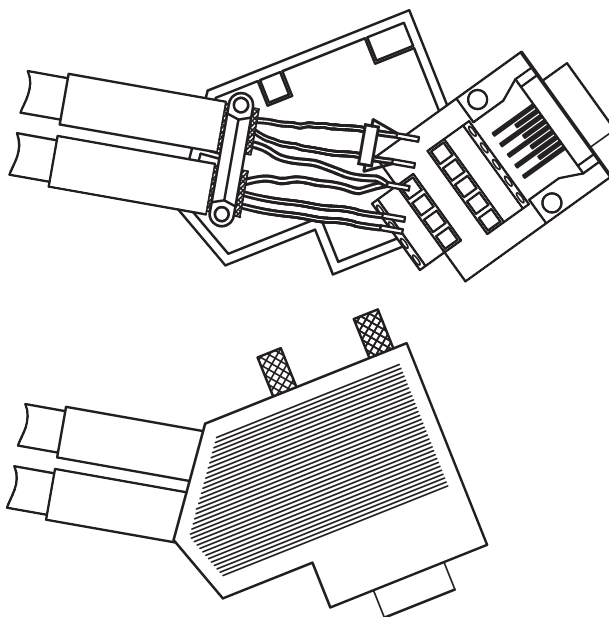
Preparing cables: amplifier end



Remove the outer covering of the cable over a length of about 60mm, without damaging the shielding braid.

Push the shielding braid back over the outer covering of the cable, and strip off the ends of the cores over a length of about 7mm, without damaging the copper strands. The length varies according to the type of bootlace ferrule that is used.

Push a suitable piece of heat-shrink tubing over the outer cover, and heat it up. Leave about 7mm free at the end. Fit appropriate bootlace ferrules to the cores. Depending on which type of connector you are preparing, use diagram A (first bus connector), B (middle bus connector) or C (last bus connector). Use ferrules for twin wires if you have to connect two cores, or one core and a termination resistor to a single connection.



Use the strain relief to fix the cable to the bottom half of the housing. Do not overtighten the screws, or the cable will be crushed. Wire up the terminals according to the wiring diagram in Chapter 10.3.6, and place the connector p.c.b. with the terminals underneath in the lower half of the housing.

Put the two knurled screws in place, and press the two halves of the housing together until the four lugs snap into position. Take care that the connector p.c.b. and the knurled screws are properly located.

10.4 Power Voltage Supply, external brake resistor, DC bus link

The connectors used (40 A and higher fixed terminals) are included in the scope of supply of the servo amplifier. If necessary, the connectors are coded and printed with the corresponding terminal designation. The table indicates the type of cable required for each intended purpose.

NOTE

We do not deliver configured cables for this interface.

NOTICE

You must always observe the specifications in respect of cable cross-sections contained in the instructions manual for the servo amplifier you are using in your application. Fit suitable wire end ferrules or plug connectors to stripped conductors. A connection diagram appears in the servo amplifier instructions manual.

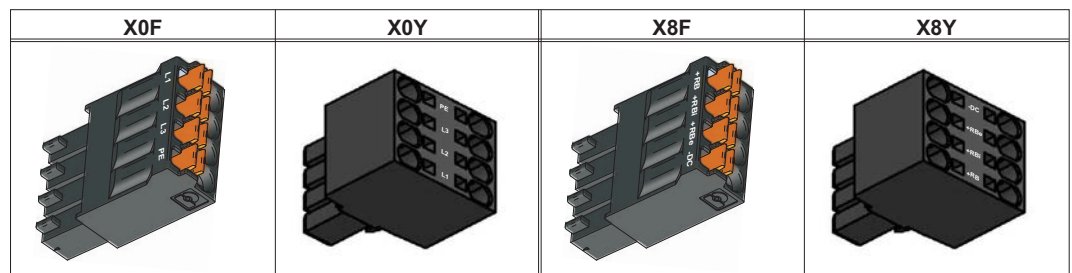
10.4.1 Mating connector (part of delivery)

Amplifier	Mains supply 1		Mains supply 2		DC-link bus		Brake resistor	
	#	Order Code	#	Order Code	#	Order Code	#	Order Code
S300-230V	X0	DE-105856	-	-	X8	DE-107556	X8	DE-107556
S300-400V	X0	DE-107557	-	-	X8	DE-107558	X8	DE-107558
S400	X0	DE-102583	-	-	X0	DE-102583	X0	DE-102583
S601...620	X0A	DE-92258	X0B	DE-92259	X7	DE-90064	X8	DE-90065
S701...724	X0	DE-200451	-	-	X8	DE-200452	X8	DE-200452
AKD-X00306/00606	X3	DE-201629	-	-	X3	DE-201629	X3	DE-201629
AKD-X01206	X3	DE-201630	-	-	X3	DE-201630	X3	DE-201630
AKD-X02406/0xx07	X4	DE-201632	-	-	X3	DE-201631	X3	DE-201631

10.4.2 Mating connector (optional)

Amplifier	Mains supply		DC-link bus / Brake resistor	
	#	Order Code	#	Order Code
S701...724	X0Y	DE-200851	X8Y	DE-200852
S701...724	X0F	DE-200955	X8F	DE-200956

With Y-connectors you can daisy-chain supply voltage or DC-bus link to several amplifiers. For details see instructions manual of the servo amplifier. The F-connectors are for fast wiring (no screws).



10.4.3 Recommended cable type

Purpose	max. length	recommended cable @ amplifier rated output current		
		In=1.5...10A	In=14...24A	In=40...70A
AC-supply*	-	H07V-K 1.5	H07V-K 4	H07VVC4-K 3G 25
DC-bus link*	20cm	H07V-K 1.5	H07V-K 4	H07V-K 25
	2m	H07VVC4-K 2X 1.5	H07VVC4-K 2X 4	H07VVC4-K 2X 25
Ext. brake resistor*	5m	H07VVC4-K 2G 1.5		H07VVC4-K 2G 25

* valid only for single-axis systems. For multi-axis systems, please consult our customer support.

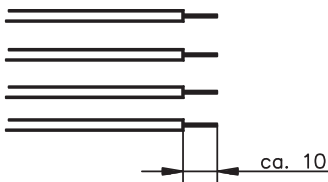
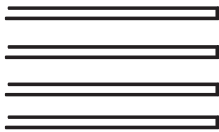
10.4.4 Preparing cables for S300/S400/S601...620/S700/AKD

The connections are on the underside or frontside of the servo amplifier. Power Combicon connectors are used, which are included in the delivery package for the servo amplifier. The connectors are coded and have the appropriate connection designation printed on them. **They must never be mixed up.**

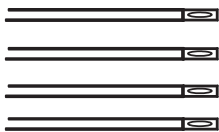
Follow the pin assignment in the instructions manual. When connecting an external brake resistor, please note that the link cable must first be removed.

Preparing unshielded cables

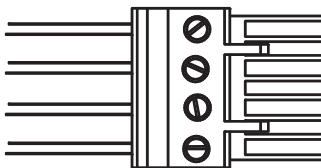
If shielding is not necessary, then we recommend using single cores for the wiring inside the switch-gear cabinet. Select them from the table above, according to your requirements.



Strip off about 10mm of the insulation at the ends of the cores. Take care to avoid damage to the copper strands while doing this. Depending on the cross-section of the core and the type of bootlace ferrule that is used, the length that has to be stripped may vary by several millimetres.

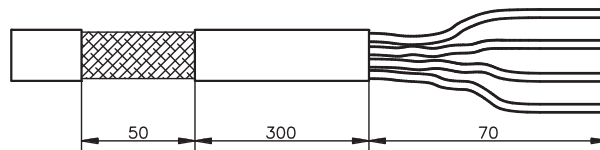


Apply bootlace ferrules to the conductors. As an alternative, you can also use terminal pins.

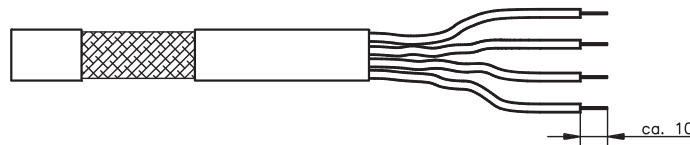


Connector example S600:

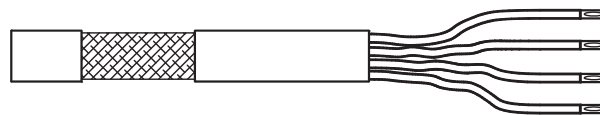
Push the ends of the conductors into the connector as far as they will go. Follow the pin assignment in the connection table above. Tighten the screws of the terminals. Take care that the insulation is not trapped in the terminals.

Preparing shielded cables

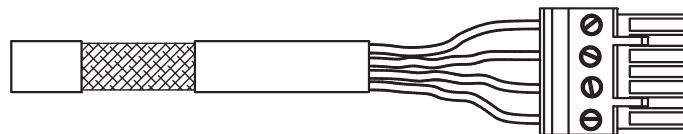
First, remove the outer covering of the cable and the shielding braid over a length of about 70mm. Then remove just the outer covering for about another 50mm, without damaging the shielding braid.



Strip off about 10mm of the insulation from the ends of the cores. Take care to avoid damage to the copper strands while doing this. Depending on the cross-section of the core and the type of bootlace ferrule that is used, the length that has to be stripped may vary by several millimetres.



Apply bootlace ferrules to the conductors. As an alternative, you can also use terminal pins instead of bootlace ferrules.

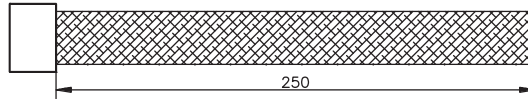


Connector example S600: Push the ends of the conductors into the connector as far as they will go. Follow the pin assignment in the instructions manual. Tighten the screws of the terminals. Take care that the insulation is not trapped in the terminals.

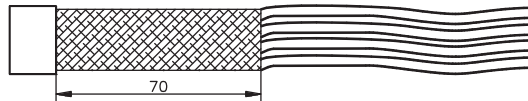
10.4.5 Preparing cables for S748/772

The connections for the power supply, the ballast resistor and the DC-link are made through terminals on the bottom of the servo amplifier. These terminals can accept core cross-sections from 10 to 50mm².

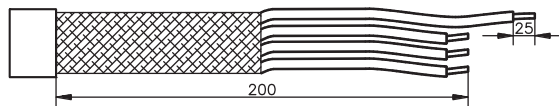
The AC supply connection is used as an example for preparing a cable.



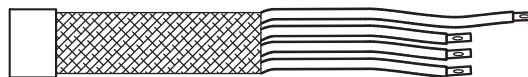
Remove the outer covering of the cable over a length of about 250mm, without damaging the shielding braid.



Shorten the shielding to a length of about 70mm.



Shorten the three cores for the supply phases to 200mm. Strip off all cores for a length of about 25mm. This length depends on the core cross-section and the bootlace ferrules that are used.



Apply bootlace ferrules to the conductors.

Connect up the cable according to the wiring diagram in the instructions manual for the servo amplifier and take care that no insulation is trapped in the terminals.

10.5 24V auxiliary voltage supply

Connectors are used, that are included in the delivery package of the servo amplifiers. If necessary, the connectors are coded and printed with the corresponding terminal designation.

NOTE

We do not deliver configured cables for this interface.

NOTICE

You must always observe the specifications in respect of cable cross-sections contained in the instructions manual for the servo amplifier you are using in your application. Fit suitable wire end ferrules or plug connectors to stripped conductors. A connection diagram appears in the servo amplifier instructions manual.

10.5.1 Mating connector (part of delivery)

Amplifier	Connector	Order Code
S300	X4	DE-107555
S400	X0	DE-102583
S601...620	X4	DE-90062
S701...724	X4A	DE-200449
S701...724	X4B	DE-200450
S748/772	X4	DE-201241
S748/772	X9B	DE-201193
AKD	X1	DE-201628

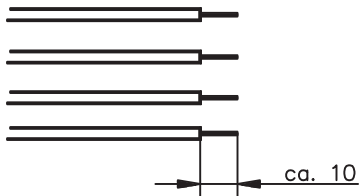
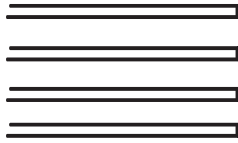
10.5.2 Recommended cable type

Purpose	recommended cable
24V Aux. Voltage Observe voltage drop!	H07V-K 1.5 oder H07V-K 2.5

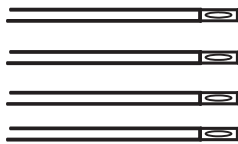
10.5.3

Preparing cables for S300/S400/S600/S700/AKD

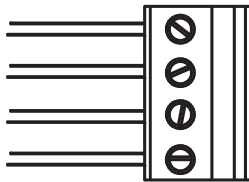
The connection is on the front panel of the servo amplifier. A Combicon connector is used, which is included in the delivery package of the servo amplifiers.



Strip off about 10mm of the insulation at the ends of the cores. Take care to avoid damage to the copper strands while doing this. Depending on the cross-section of the core and the type of bootlace ferrule that is used, the length that has to be stripped may vary by a few millimetres.



Apply bootlace ferrules to the conductors. As an alternative, you can also use terminal pins instead.



Connector example S601...620:

Push the ends of the conductors into the connector as far as they will go. Follow the pin assignment in the instructions manual. Tighten the screws of the terminals. Take care that the insulation is not trapped in the terminals.

10.6 Digital/analog Inputs/Outputs

The cables for analog signals must be twisted pairs, and shielded. The digital signals can be connected by single wires.

NOTE

We do not deliver configured cables for this interface.

10.6.1 Mating connector (part of delivery)

Amplifier	Digital / analog signals				AS/STO	
	#	Order Code	#	Order Code	#	Order Code
S300	X3	DE-107554	-	-	X4	DE-107555
S400	X3	DE-102585	X1	DE-102584	-	-
S601...620	X3	DE-90061	-	-	X10	DE-101696
S701...724	X3A	DE-200447	X3B	DE-200448	X4B	DE-200450
S748/772	X3A	DE-200447	X3B	DE-200448	X4	DE-201241
AKD	X7	DE-201633	X8	DE-201634	X1	DE-201628

10.6.2 Recommended cable type

Purpose	max. length	recommended cable
Digital I/O	10m	H07VK 0,5
BTB	10m	
Digital GND	10m	
Analog Setpoint	25m	LiYCY (TP) 4x2x0.25
Analog GND	25m	

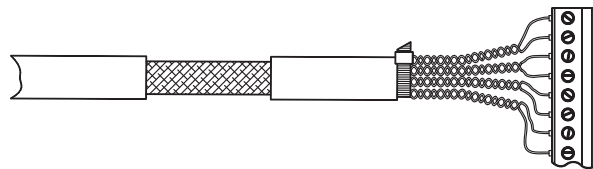
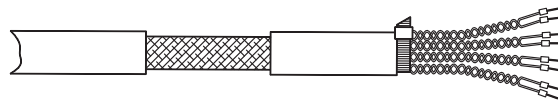
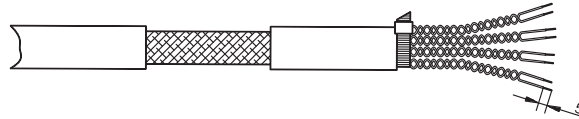
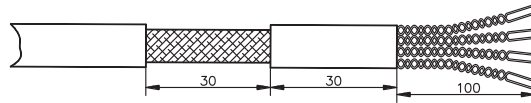
Color code

Signal	Color*	Cable
AGND	GY	LiYCY (TP) 4x2x0.25
analog in 1+	WH	
analog in 1-	BN	
analog in 2+	GN	
analog in 2-	YE	
analog out 1	PK	
analog out 2	BU	
AGND	RD	

* according to IEC 60757

10.6.3

Preparing cables



For simplicity, the instructions for preparation only show the section with the cores that have to be shielded and twisted pairs.

Remove the outer covering and the shielding braid over a length of about 100mm. Remove another section of the outer covering, about 30mm long, without damaging the shielding braid.

Secure the cores where they emerge, with a cable tie. Strip off the insulation from the cores for a length of about 5mm, without damaging the copper strands. This length can vary, according to the type of bootlace ferrule that is used.

Fit appropriate bootlace ferrules (or terminal pins) to the bared ends of the cores.

Wire up the screw terminals of the connector according to the wiring diagram (see also the instructions manual for the servo amplifier). Tighten the screws and take care that the insulation is not trapped in the terminals.

10.7 ROD/SSI, Stepper motor control, Master-Slave

10.7.1 General

This interface can be used for several applications (see the amplifiers instructions manual). The material requirements are always the same.

NOTE

We do not deliver configured cables for this interface.

10.7.2 Mating connector, cable type

Article	Description	Order Code
Cable	4x2x0.25 (per meter)	DE-92186
Sub-D connector kit	Socket 9-pol., housing and screws	DE-81784
Connector kit, amplifier end AKD, X9/X10	X10 male connector 15pin high density, X9 female connector 9pin, 2 housings, screws	AKD-X9+X10-Kit

10.7.3 Connection

The cable used must be shielded, with twisted pairs to (suggestion acc. to DIN 47100). Since it is important which signal pairs are twisted together, the following table shows the colours of the individual cores (to IEC 60757).

SubD9 S300/S400/ S600/S700	SubD9, X9 AKD	Core color @ 5x2x0.25	
		ROD	SSI, Stepper motor control, Master-Slave
1	3	WH	WH
2	7	GN	n.c.
3	8	YE	n.c.
4	1	GY	GN
5	2	PK	YE
6	4	BU	GY
7	5	RD	PK
8 n.c.	6	BK	BK
9 n.c.	9	BN	n.c.

The connector assignment is determined by the use of the interface; see the servo amplifier instructions manual.

10.7.4 Termination resistors

Depending on servo amplifier type (see instructions manual for the servo amplifier) and application, the cable must be terminated by termination resistors at the amplifier end or the control end. Since the termination resistors are only installed at the slave end in master-slave operation, the cable is not end-to-end symmetrical, although it is wired 1:1.

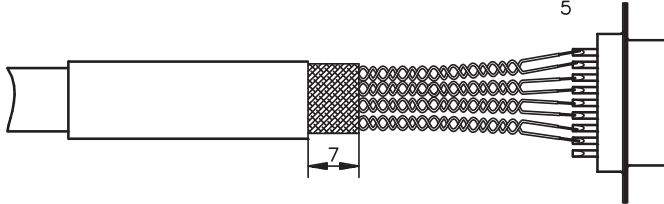
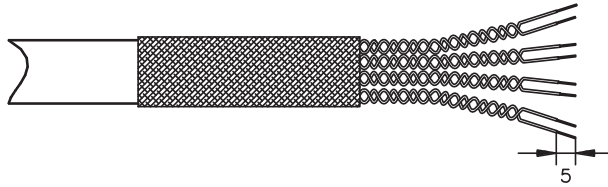
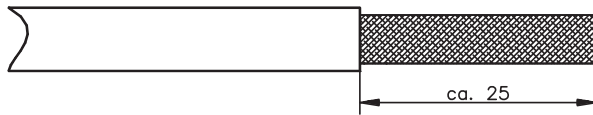
Take note of the following table (valid for S300/S400/S600/S700):

Pin	Interface function (S300/S400/S600/S700)							
	ROD		SSI		Stepper motor control		Master-Slave	
	Amplifier	Controller	Amplifier	Controller	Amplifier	Controller	Master	Slave
1	-	-	-	-	-	-	-	-
2	-	$R \approx 150\Omega$	-	-	-	-	-	-
3	-		-	-	-	-	-	-
4	-	$R \approx 150\Omega$	$R \approx 150\Omega$	-	$R \approx 150\Omega$	-	-	$R \approx 150\Omega$
5	-			-		-	-	
6	-	$R \approx 150\Omega$	-	$R \approx 150\Omega$	$R \approx 150\Omega$	-	-	$R \approx 150\Omega$
7	-		-			-	-	
8	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-

The resistance values depend on the characteristic impedance of the cable material

10.7.5

Preparing cables

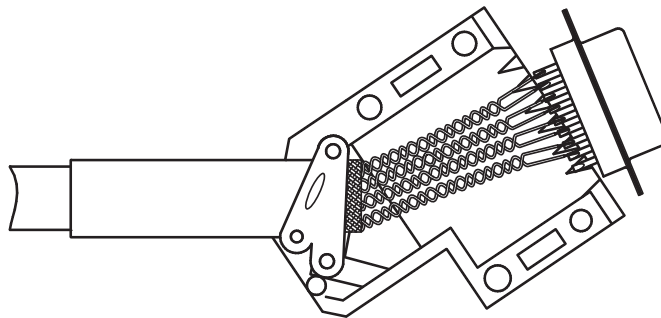


Remove the outer covering of the cable over a length of about 25mm, without damaging the shielding braid.

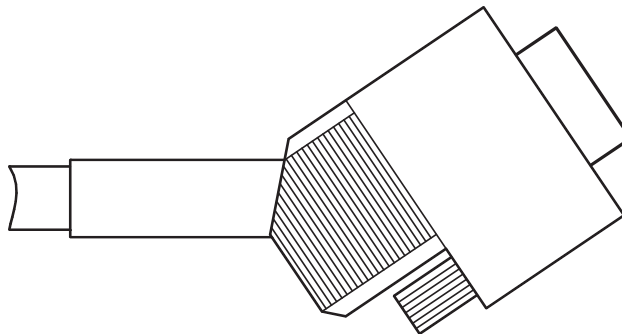
Push the shielding braid back over the outer covering of the cable, and strip off the ends of the cores over a length of about 5mm, without damaging the copper strands.

Push a suitable piece of heat-shrink tubing over the outer cover, and heat it up. Leave about 7mm free at the end.

Solder the ends of the cores (with the resistors where required) into the solder buckets of the SubD connector. Insulate the connections and the resistors so that there can be no accidental contact between them or with the connector housing.



Use the strain relief to fix the cable to the bottom half of the housing. Do not overtighten the screws, or the cable will be crushed. Place the SubD connector, with the wider side below, in the bottom half of the housing.



Check the connections before closing the housing, since it cannot be opened again afterwards without damage. Place the fixing screw in position in the housing, and then press the two halves of the housing firmly together. Take care that the fixing screw and the SubD connector insert are properly located.

10.8 Ethernet cable

10.8.1 General

Connection to an Ethernet network is possible via two RJ45 connectors in the servo amplifiers.

These cables can be used for all fieldbus connections with standard RJ45 connectors like EtherCAT, ProfiNET, SynqNet and also for the EtherNet TCP/IP Service Port connection of an AKD servo amplifier.

10.8.2 Order codes Ethernet cable, configured

Article	Length	Order code
Ethernet cable	0,10m	CBN000-002-m10-00
Ethernet cable	0,30m	CBN000-002-m30-00
Ethernet cable	0,50m	CBN000-002-m50-00
Ethernet cable	1,00m	CBN000-002-001-00
Ethernet cable	3,00m	CBN000-002-003-00
Ethernet cable	5,00m	CBN000-002-005-00
Ethernet cable	10,00m	CBN000-002-010-00

10.9 CANopen cable for AKD/S300/S400/S600/S700

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

Cable data

Characteristic impedance	100-120 Ω
Cable capacitance	max. 60 nF/km
Conductor (loop) resistance	159.8 Ω /km

Cable length, depending on the transmission rate:

Transmission rate / kbps	1000	500	250
max. cable length / m	20	70	115

The table refers to the total cable length between the ends of the bus.

Longer transmission distances can be achieved with a lower cable capacitance (max. 30 nF/km) and lower loop resistance (115 Ω /km).

10.9.1 CAN bus cable for AKD

We deliver configured CAN bus cables for AKD.

Article	Length	AKD Order code
CAN Bus cable	0,15m	CBP000-002-m15-00
CAN Bus cable	0,30m	CBP000-002-m30-00
CAN Bus cable	1,00m	CBP000-002-001-00
CAN Bus cable	3,00m	CBP000-002-003-00

The CAN Termination connector is required for bus termination of the last AKD connected to the CAN bus. For connecting an AKD to a CAN device with SubD9 connector the CAN RJ12-SubD9 Adapter can be used.

Article	Order code
CAN Termination connector	AKD-CAN-Termination
CAN RJ12->SubD9 adapter	AKD-CAN-RJ12-SubD9

10.9.2 Can bus cable for S300/S400/S600/S700

NOTE

We do not deliver configured cables for S300/S400/S600/S700.

The materials in the table below ensure that all the requirements are met for a CANopen bus cable.

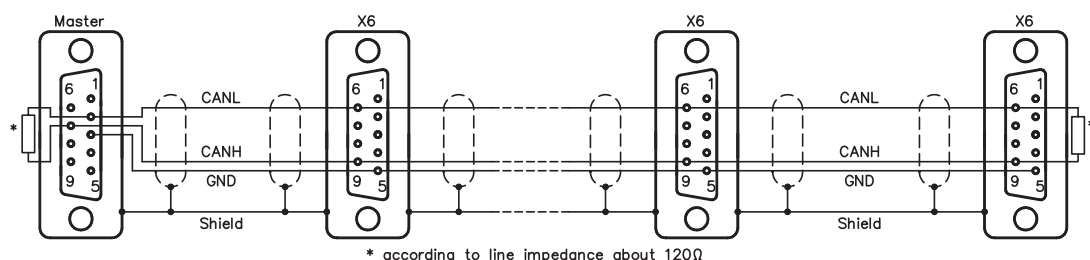
Part	Designation	Order code
Cable	Li2YCY (TP) 2x2x0.25mm ²	DE-86894 (cut to length)
SubD kit	9-pin SubD connector (socket)	DE-90650

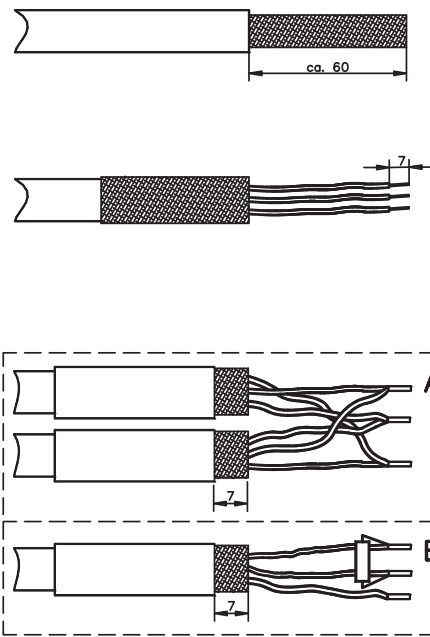
If your cable has more connectors than you need, any of them can be left free.

For EMC reasons, the SubD connector housings must fulfil the following conditions:

- metal or metallic-coated housing
- provision for connecting the cable shielding to the housing, large-area connection

Wiring diagram

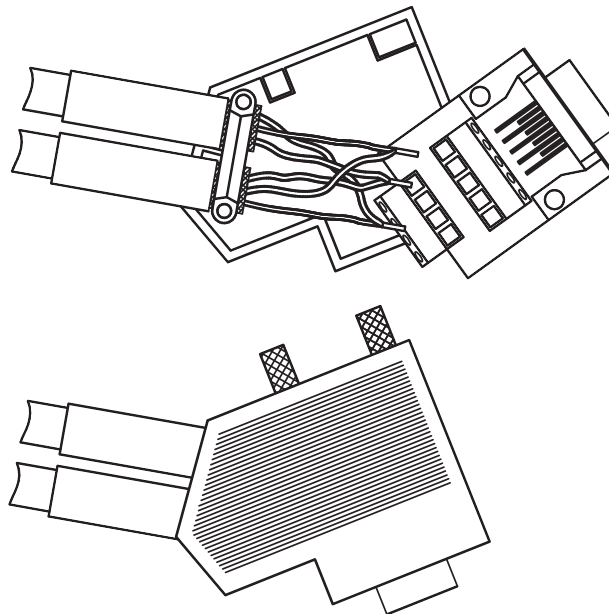


Preparing cables

Remove the outer covering of the cable over a length of about 50mm, without damaging the shielding braid.

Push the shielding braid back over the outer covering of the cable, and strip off the ends of the cores over a length of about 7mm, without damaging the copper strands. The length can vary according to the type of bootlace ferrule that is used.

Push a suitable piece of heat-shrink tubing over the outer cover, and heat it up. Leave about 7mm free at the end. Fit appropriate bootlace ferrules to the cores. Depending on which type of connector you are preparing, use diagram A (inner bus connector), or B (outer bus connector). Use ferrules for twin wires if you have to connect two cores, or one core and a termination resistor to a single connection.



Use the strain relief to fix the cable to the bottom half of the housing. Do not overtighten the screws, or the cable will be crushed. Wire up the terminals according to the wiring diagram in Chapter 10.9.2, and place the connector p.c.b. with the terminals underneath in the lower half of the housing.

Put the two knurled screws in place, and press the two halves of the housing together until the four lugs snap into position.

Take care that the connector p.c.b. and the knurled screws are properly located.

10.10 Motor cables

10.10.1 General

All Kollmorgen motors have either a connector or a terminal box for the power connection (with motor winding, protective earth and motor holding brake).

Motor series	Power Connection	Motor series	Power Connection
AKM1...8 =< 22A	Connector size 1	Cartridge DDR =< 22A	Connector size 1
AKM7...8 > 22A	Connector size 1.5	Cartridge DDR > 22A	Connector size 1.5
DBL1...6 / DBK1...4	Connector size 1	AKM8, DBL7...8	Terminal box

Depending on their power ratings, Kollmorgen servo amplifiers are equipped with connectors or fixed screw terminals. On pre-assembled cables, the motor cable shield is connected to the servo amplifier via the connector housing.

Technical data of the used cable material can be found on p.41.

10.10.2 Motor cables, configured

The cables differ in respect of how they are connected to the amplifier. There are major differences in connection method due to the varying requirements in respect of minimum code distances, different shielding concepts depending on rated voltage and current load. Our pre-assembled ready-to-use cables meet the requirements of relevant CE and UL directives.

S300 (230V)



S300 (400/480V), S700



S400



S601...620



S701...724



S748



AKD-X00306/X00606



AKD-X01206/X02406/X0xx07



10.10.2.1 Order codes motor cables for S300

230V

Article	max. current (EN60204, table 6, installation type B2)	Oder Code
Motor cable (230V) 5m (4x1)	10,1	DE-107485
Motor cable (230V) 10m (4x1)	10,1	DE-107486
Motor cable (230V) 15m (4x1)	10,1	DE-107487
Motor cable (230V) 20m (4x1)	10,1	DE-107488
Motor cable (230V) 25m (4x1)	10,1	DE-107489
Motor cable (230V) 5m (4x1+(2x0.75))	10,1 / 8,5	DE-107491
Motor cable (230V) 10m (4x1+(2x0.75))	10,1 / 8,5	DE-107492
Motor cable (230V) 15m (4x1+(2x0.75))	10,1 / 8,5	DE-107493
Motor cable (230V) 20m (4x1+(2x0.75))	10,1 / 8,5	DE-107494
Motor cable (230V) 25m (4x1+(2x0.75))	10,1 / 8,5	DE-107495

400V, with shield clamp

Article	max. current (EN60204, table 6, installation type B2)	Oder Code
Motor cable (400V) 5m (4x1)	10,1	DE-107473
Motor cable (400V) 10m (4x1)	10,1	DE-107474
Motor cable (400V) 15m (4x1)	10,1	DE-107475
Motor cable (400V) 20m (4x1)	10,1	DE-107476
Motor cable (400V) 25m (4x1)	10,1	DE-107477
Motor cable (400V) 5m (4x1+(2x0.75))	10,1 / 8,5	DE-107479
Motor cable (400V) 10m (4x1+(2x0.75))	10,1 / 8,5	DE-107480
Motor cable (400V) 15m (4x1+(2x0.75))	10,1 / 8,5	DE-107481
Motor cable (400V) 20m (4x1+(2x0.75))	10,1 / 8,5	DE-107482
Motor cable (400V) 25m (4x1+(2x0.75))	10,1 / 8,5	DE-107483

10.10.2.2 Order codes motor cables for S400

Article	max. current (EN60204, table 6, installation type B2)	Oder Code
Motor cable 5m (4x1)	10,1	DE-102575
Motor cable 10m (4x1)	10,1	DE-102576
Motor cable 15m (4x1)	10,1	DE-102806
Motor cable 20m (4x1)	10,1	DE-102807
Motor cable 25m (4x1)	10,1	DE-102808
Motor cable 5m (4x1+(2x0.75))	10,1 / 8,5	DE-102579
Motor cable 10m (4x1+(2x0.75))	10,1 / 8,5	DE-102580
Motor cable 15m (4x1+(2x0.75))	10,1 / 8,5	DE-102809
Motor cable 20m (4x1+(2x0.75))	10,1 / 8,5	DE-102810
Motor cable 25m (4x1+(2x0.75))	10,1 / 8,5	DE-102811

10.10.2.3 Order codes motor cables for S601...620

Article	max. current (EN60204, table 6, installation type B2)	Oder Code
Motor cable 5m (4x1)	10,1	DE-90083
Motor cable 10m (4x1)	10,1	DE-90084
Motor cable 15m (4x1)	10,1	DE-90085
Motor cable 20m (4x1)	10,1	DE-90086
Motor cable 25m (4x1)	10,1	DE-90087
Motor cable 5m (4x1+(2x0.75))	10,1 / 8,5	DE-90088
Motor cable 10m (4x1+(2x0.75))	10,1 / 8,5	DE-90089
Motor cable 15m (4x1+(2x0.75))	10,1 / 8,5	DE-90090
Motor cable 20m (4x1+(2x0.75))	10,1 / 8,5	DE-90091
Motor cable 25m (4x1+(2x0.75))	10,1 / 8,5	DE-90092
Motor cable 5m (4x1.5)	13,1	DE-89918
Motor cable 10m (4x1.5)	13,1	DE-89952
Motor cable 15m (4x1.5)	13,1	DE-89953
Motor cable 20m (4x1.5)	13,1	DE-89954
Motor cable 25m (4x1.5)	13,1	DE-89956
Motor cable 5m (4x1.5+(2x0.75))	13,1 / 8,5	DE-89957
Motor cable 10m (4x1.5+(2x0.75))	13,1 / 8,5	DE-89961
Motor cable 15m (4x1.5+(2x0.75))	13,1 / 8,5	DE-89963
Motor cable 20m (4x1.5+(2x0.75))	13,1 / 8,5	DE-89965
Motor cable 25m (4x1.5+(2x0.75))	13,1 / 8,5	DE-89967
Motor cable 5m (4x2.5)	17,4	DE-89959
Motor cable 10m (4x2.5)	17,4	DE-89960
Motor cable 15m (4x2.5)	17,4	DE-89962
Motor cable 20m (4x2.5)	17,4	DE-89964
Motor cable 25m (4x2.5)	17,4	DE-89966
Motor cable 5m (4x2.5+(2x1))	17,4 / 10,1	DE-89968
Motor cable 10m (4x2.5+(2x1))	17,4 / 10,1	DE-89970
Motor cable 15m (4x2.5+(2x1))	17,4 / 10,1	DE-89971
Motor cable 20m (4x2.5+(2x1))	17,4 / 10,1	DE-89972
Motor cable 25m (4x2.5+(2x1))	17,4 / 10,1	DE-89969

10.10.2.4 Order codes motor cables for S701-712

With shield clamp for amplifier's end, motor connector size 1, 6 poles, up to 22A

Article	max. current (EN60204, table 6, installation type B2)	Oder Code
Motor cable 5m (4x1)	10,1	DE-107473
Motor cable 10m (4x1)	10,1	DE-107474
Motor cable 15m (4x1)	10,1	DE-107475
Motor cable 20m (4x1)	10,1	DE-107476
Motor cable 25m (4x1)	10,1	DE-107477
Motor cable 5m (4x1+(2x0.75))	10,1 / 8,5	DE-107479
Motor cable 10m (4x1+(2x0.75))	10,1 / 8,5	DE-107480
Motor cable 15m (4x1+(2x0.75))	10,1 / 8,5	DE-107481
Motor cable 20m (4x1+(2x0.75))	10,1 / 8,5	DE-107482
Motor cable 25m (4x1+(2x0.75))	10,1 / 8,5	DE-107483

With shield plate at amplifier's end, motor connector size 1, 6 poles, up to 22A

Article	max. current (EN60204, table 6, installation type B2)	Oder Code
Motor cable 5m (4x1.5)	13,1	DE-200456
Motor cable 10m (4x1.5)	13,1	DE-200457
Motor cable 15m (4x1.5)	13,1	DE-200458
Motor cable 20m (4x1.5)	13,1	DE-200459
Motor cable 25m (4x1.5)	13,1	DE-200460
Motor cable 5m (4x1.5+(2x0.75))	13,1 / 8,5	DE-200462
Motor cable 10m (4x1.5+(2x0.75))	13,1 / 8,5	DE-200463
Motor cable 15m (4x1.5+(2x0.75))	13,1 / 8,5	DE-200464
Motor cable 20m (4x1.5+(2x0.75))	13,1 / 8,5	DE-200465
Motor cable 25m (4x1.5+(2x0.75))	13,1 / 8,5	DE-200466
Motor cable 5m (4x2.5)	17,4	DE-200468
Motor cable 10m (4x2.5)	17,4	DE-200469
Motor cable 15m (4x2.5)	17,4	DE-200470
Motor cable 20m (4x2.5)	17,4	DE-200471
Motor cable 25m (4x2.5)	17,4	DE-200472
Motor cable 5m (4x2.5+(2x1))	17,4 / 10,1	DE-200474
Motor cable 10m (4x2.5+(2x1))	17,4 / 10,1	DE-200475
Motor cable 15m (4x2.5+(2x1))	17,4 / 10,1	DE-200476
Motor cable 20m (4x2.5+(2x1))	17,4 / 10,1	DE-200477
Motor cable 25m (4x2.5+(2x1))	17,4 / 10,1	DE-200478
Motor cable 5m (4x4)	23	DE-200618
Motor cable 10m (4x4)	23	DE-200619
Motor cable 15m (4x4)	23	DE-200620
Motor cable 20m (4x4)	23	DE-200621
Motor cable 25m (4x4)	23	DE-200622
Motor cable 5m (4x4+(2x1))	23 / 10,1	DE-200623
Motor cable 10m (4x4+(2x1))	23 / 10,1	DE-200624
Motor cable 15m (4x4+(2x1))	23 / 10,1	DE-200625
Motor cable 20m (4x4+(2x1))	23 / 10,1	DE-200626
Motor cable 25m (4x4+(2x1))	23 / 10,1	DE-200627

10.10.2.5 Order codes motor cables for S724

With shield plate at amplifier's end, motor connector size 1.5, 6 poles

Article	max. current (EN60204, table 6, installation type B2)	Oder Code
Motor cable 5m (4x6)	30	DE-201678
Motor cable 10m (4x6)	30	DE-201679
Motor cable 15m (4x6)	30	DE-201680
Motor cable 20m (4x6)	30	DE-201681
Motor cable 25m (4x6)	30	DE-201682
Motor cable 5m (4x6+(2x1))	30 / 10,1	DE-201683
Motor cable 10m (4x6+(2x1))	30 / 10,1	DE-201684
Motor cable 15m (4x6+(2x1))	30 / 10,1	DE-201685
Motor cable 20m (4x6+(2x1))	30 / 10,1	DE-201686
Motor cable 25m (4x6+(2x1))	30 / 10,1	DE-201687

10.10.2.6 Order codes motor cables for S748

Wire end ferrules at amplifier's end, motor connector size 1.5, 6 poles

Article	max. current (EN60204, table 6, installation type B2)	Oder Code
Motor cable 5m (4x10)	40	DE-201589
Motor cable 10m (4x10)	40	DE-201590
Motor cable 15m (4x10)	40	DE-201591
Motor cable 20m (4x10)	40	DE-201592
Motor cable 25m (4x10)	40	DE-201593
Motor cable 5m (4x10+(2x1.5))	40 / 13,1	DE-201594
Motor cable 10m (4x10+(2x1.5))	40 / 13,1	DE-201595
Motor cable 15m (4x10+(2x1.5))	40 / 13,1	DE-201596
Motor cable 20m (4x10+(2x1.5))	40 / 13,1	DE-201597
Motor cable 25m (4x10+(2x1.5))	40 / 13,1	DE-201598
Motor cable 5m (4x16)	54	DE-201688
Motor cable 10m (4x16)	54	DE-201689
Motor cable 15m (4x16)	54	DE-201690
Motor cable 20m (4x16)	54	DE-201691
Motor cable 25m (4x16)	54	DE-201692
Motor cable 5m (4x16+(2x1.5))	54 / 13,1	DE-201693
Motor cable 10m (4x16+(2x1.5))	54 / 13,1	DE-201694
Motor cable 15m (4x16+(2x1.5))	54 / 13,1	DE-201695
Motor cable 20m (4x16+(2x1.5))	54 / 13,1	DE-201696
Motor cable 25m (4x16+(2x1.5))	54 / 13,1	DE-201697

Wire end ferrules on amplifier's end, motor end cut off for motors with terminal box

Article	max. current (EN60204, table 6, installation type B2)	Oder Code
Motor cable 5m (4x10)	40	DE-201698
Motor cable 10m (4x10)	40	DE-201699
Motor cable 15m (4x10)	40	DE-201700
Motor cable 20m (4x10)	40	DE-201701
Motor cable 25m (4x10)	40	DE-201702
Motor cable 5m (4x10+(2x1.5))	40 / 13,1	DE-201713
Motor cable 10m (4x10+(2x1.5))	40 / 13,1	DE-201714
Motor cable 15m (4x10+(2x1.5))	40 / 13,1	DE-201715
Motor cable 20m (4x10+(2x1.5))	40 / 13,1	DE-201774
Motor cable 25m (4x10+(2x1.5))	40 / 13,1	DE-201775
Motor cable 5m (4x16)	54	DE-201703
Motor cable 10m (4x16)	54	DE-201704
Motor cable 15m (4x16)	54	DE-201705
Motor cable 20m (4x16)	54	DE-201706
Motor cable 25m (4x16)	54	DE-201707
Motor cable 5m (4x16+(2x1.5))	54 / 13,1	DE-201776
Motor cable 10m (4x16+(2x1.5))	54 / 13,1	DE-201745
Motor cable 15m (4x16+(2x1.5))	54 / 13,1	DE-201746
Motor cable 20m (4x16+(2x1.5))	54 / 13,1	DE-201747
Motor cable 25m (4x16+(2x1.5))	54 / 13,1	DE-201748
Motor cable 5m (4x25)	70	DE-201708
Motor cable 10m (4x25)	70	DE-201709
Motor cable 15m (4x25)	70	DE-201710
Motor cable 20m (4x25)	70	DE-201711
Motor cable 25m (4x25)	70	DE-201712
Motor cable 5m (4x25+(2x1.5))	70 / 13,1	DE-201749
Motor cable 10m (4x25+(2x1.5))	70 / 13,1	DE-201750
Motor cable 15m (4x25+(2x1.5))	70 / 13,1	DE-201751
Motor cable 20m (4x25+(2x1.5))	70 / 13,1	DE-201752
Motor cable 25m (4x25+(2x1.5))	70 / 13,1	DE-201753

10.10.2.7 Order codes motor cables for AKD

Without shield plate, with shield clamp

Article	Usable for	Oder Code
Motor cable 1m (4x1)	AKD-X00306 & X00606	CM01A1-010-001-00
Motor cable 3m (4x1)	AKD-X00306 & X00606	CM01A1-010-003-00
Motor cable 6m (4x1)	AKD-X00306 & X00606	CM01A1-010-006-00
Motor cable 12m (4x1)	AKD-X00306 & X00606	CM01A1-010-012-00
Motor cable 24m (4x1)	AKD-X00306 & X00606	CM01A1-010-024-00
Motor cable 1m (4x1+(2x1))	AKD-X00306 & X00606	CM11A1-010-001-00
Motor cable 3m (4x1+(2x1))	AKD-X00306 & X00606	CM11A1-010-003-00
Motor cable 6m (4x1+(2x1))	AKD-X00306 & X00606	CM11A1-010-006-00
Motor cable 12m (4x1+(2x1))	AKD-X00306 & X00606	CM11A1-010-012-00
Motor cable 24m (4x1+(2x1))	AKD-X00306 & X00606	CM11A1-010-024-00
SFD combined cable 1m (4x1+2x(2x0.75))	AKD-X00306 & X00606	CCS1A1-010-001-00
SFD combined cable 3m (4x1+2x(2x0.75))	AKD-X00306 & X00606	CCS1A1-010-003-00
SFD combined cable 6m (4x1+2x(2x0.75))	AKD-X00306 & X00606	CCS1A1-010-006-00
SFD combined cable 12m (4x1+2x(2x0.75))	AKD-X00306 & X00606	CCS1A1-010-012-00
SFD combined cable 24m (4x1+2x(2x0.75))	AKD-X00306 & X00606	CCS1A1-010-024-00

With shield plate at amplifier's end, motor connector size 1 (up to 22A)

Article	Usable for	Oder Code
Motor cable 1m (4x1.5)	AKD-X01206 & X00307...X01207	CM02A1-015-001-00
Motor cable 3m (4x1.5)	AKD-X01206 & X00307...X01207	CM02A1-015-003-00
Motor cable 6m (4x1.5)	AKD-X01206 & X00307...X01207	CM02A1-015-006-00
Motor cable 12m (4x1.5)	AKD-X01206 & X00307...X01207	CM02A1-015-012-00
Motor cable 24m (4x1.5)	AKD-X01206 & X00307...X01207	CM02A1-015-024-00
Motor cable 1m (4x1.5+(2x0.75))	AKD-X01206 & X00307...X01207	CM12A1-015-001-00
Motor cable 3m (4x1.5+(2x0.75))	AKD-X01206 & X00307...X01207	CM12A1-015-003-00
Motor cable 6m (4x1.5+(2x0.75))	AKD-X01206 & X00307...X01207	CM12A1-015-006-00
Motor cable 12m (4x1.5+(2x0.75))	AKD-X01206 & X00307...X01207	CM12A1-015-012-00
Motor cable 24m (4x1.5+(2x0.75))	AKD-X01206 & X00307...X01207	CM12A1-015-024-00
SFD combined cable 1m (4x1.5+2x(2x0.75))	AKD-X01206 & X00307...X01207	CCS2A1-015-001-00
SFD combined cable 3m (4x1.5+2x(2x0.75))	AKD-X01206 & X00307...X01207	CCS2A1-015-003-00
SFD combined cable 6m (4x1.5+2x(2x0.75))	AKD-X01206 & X00307...X01207	CCS2A1-015-006-00
SFD combined cable 12m (4x1.5+2x(2x0.75))	AKD-X01206 & X00307...X01207	CCS2A1-015-012-00
SFD combined cable 24m (4x1.5+2x(2x0.75))	AKD-X01206 & X00307...X01207	CCS2A1-015-024-00
Motor cable 1m (4x4)	AKD-X02406 & X02407	CM02A1-040-001-00
Motor cable 3m (4x4)	AKD-X02406 & X02407	CM02A1-040-003-00
Motor cable 6m (4x4)	AKD-X02406 & X02407	CM02A1-040-006-00
Motor cable 12m (4x4)	AKD-X02406 & X02407	CM02A1-040-012-00
Motor cable 24m (4x4)	AKD-X02406 & X02407	CM02A1-040-024-00
Motor cable 1m (4x4+(2x1.5))	AKD-X02406 & X02407	CM12A1-040-001-00
Motor cable 3m (4x4+(2x1.5))	AKD-X02406 & X02407	CM12A1-040-003-00
Motor cable 6m (4x4+(2x1.5))	AKD-X02406 & X02407	CM12A1-040-006-00
Motor cable 12m (4x4+(2x1.5))	AKD-X02406 & X02407	CM12A1-040-012-00
Motor cable 24m (4x4+(2x1.5))	AKD-X02406 & X02407	CM12A1-040-024-00

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

Article	Usable for	Oder Code
Motor cable 1m (4x6)	AKD-X02406 & X02407	CM02A4-060-001-00
Motor cable 3m (4x6)	AKD-X02406 & X02407	CM02A4-060-003-00
Motor cable 6m (4x6)	AKD-X02406 & X02407	CM02A4-060-006-00
Motor cable 12m (4x6)	AKD-X02406 & X02407	CM02A4-060-012-00
Motor cable 24m (4x6)	AKD-X02406 & X02407	CM02A4-060-024-00
Motor cable 1m (4x6+(2x1.5))	AKD-X02406 & X02407	CM12A4-060-001-00
Motor cable 3m (4x6+(2x1.5))	AKD-X02406 & X02407	CM12A4-060-003-00
Motor cable 6m (4x6+(2x1.5))	AKD-X02406 & X02407	CM12A4-060-006-00
Motor cable 12m (4x6+(2x1.5))	AKD-X02406 & X02407	CM12A4-060-012-00
Motor cable 24m (4x6+(2x1.5))	AKD-X02406 & X02407	CM12A4-060-024-00

10.10.3 Preparing motor cables (motor end)

10.10.3.1 Motor series AKM2...8, 6SMx7, DBL2...6, DBK

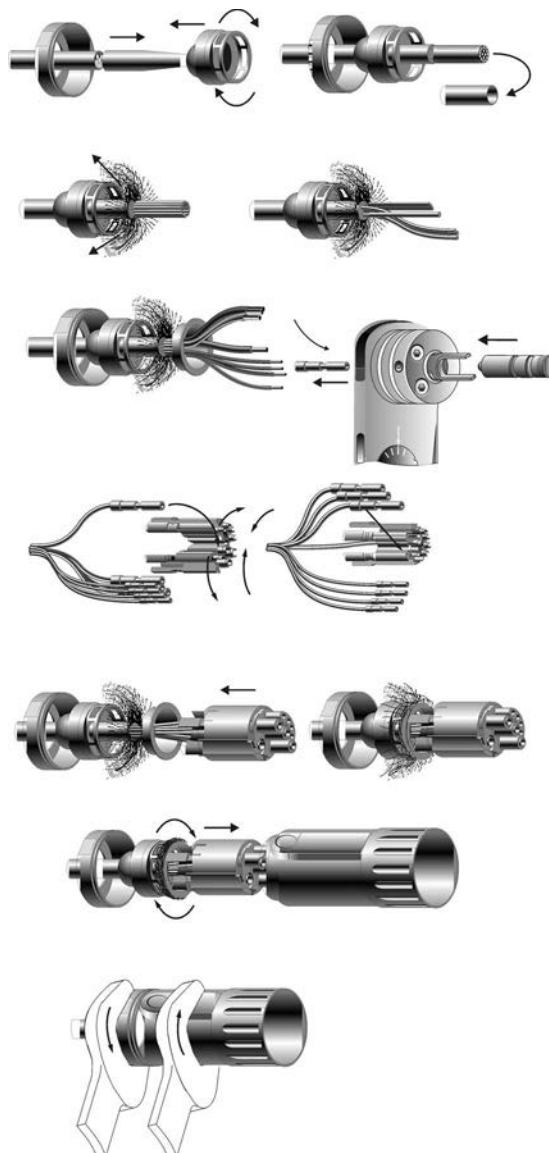
Please note that different conductor cross- sections are required for different motors, and that for motors with a holding brake the brake signals are also attached through this connector.

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

Standard (size 1), wire max 4mm ²				Option H (size 1.5), wire max. 10mm ²					
	Pin	Signal	Pin	Signal		Pin	Signal	Pin	Signal
	1	U2	A	+ Br		U	U2	+	+ Br
	4	V2	B	- Br		V	V2	-	- Br
	3	W2	C	n.c.		W	W2	1	Option J only
	⏚ (2)	PE	D	n.c.		⏚	PE	2	Option J only

Material list

Part	Designation	Order code
Cable	Overview see p. 41	
Connector kit (motor end) Size 1	EMC Connector 8 poles size 1	DE-92175
Washdown connector kit (motor end) Size 1	EMC Connector 8 poles, size 1, stainless steel	DE-201810
Connector kit (motor end) Size 1.5	EMC Connector 6 poles size 1.5	DE-201601



Preparing cables

Special tools are required for these operations. See page 41!

First push the clamping ring and the strain-relief bush onto the cable. Then remove the outer covering over a length of about 43 mm, without damaging the shielding braid.

Push the shielding back over the cable. Cut back the green-yellow core to 39mm and the power cores to 38mm.

Push the shield ring onto the cable, and strip off the power cores over a length of 7mm and the brake cores over a length of 6mm. Attach the crimp contacts to the ends of the cores with the crimp tool and the appropriate positioner. Open out the insulation body and insert contact no. 2. Press the insulation body together until you hear it snap into place. Then insert the other contacts.

Push the shield ring into the clamping ring and the insulation body into the sleeve. Take care that the components are not twisted out of alignment, and push them together as far as they will go.

Wrap the shielding round the shield ring, so that nothing sticks out, and push the connector housing over the insulation body as far as it will go.

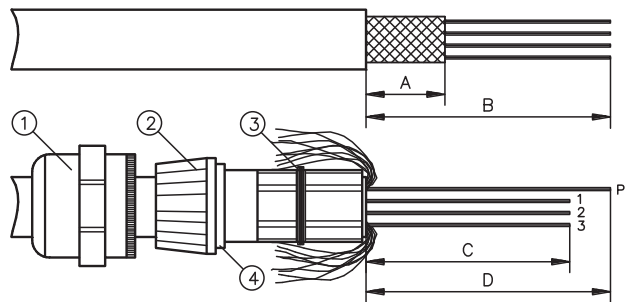
Screw the clamping ring up tight onto the connector housing. You can use ordinary wrenches to provide the opposing force.

10.10.3.2 Motor series AKM8, DBL7/8

These motors are fitted with terminal boxes, in which there are bolts or terminals for connections. The terminal boxes have 2 screw glands, so that the power and brake cables can be routed separately. If a motor cable with integral brake is used, the unused screw gland must be replaced by a blanking plug. Please refer to the instructions manual for the motor series.

10.10.3.2.1 Preparing cables for terminal box, separate cables (DBL7/8)

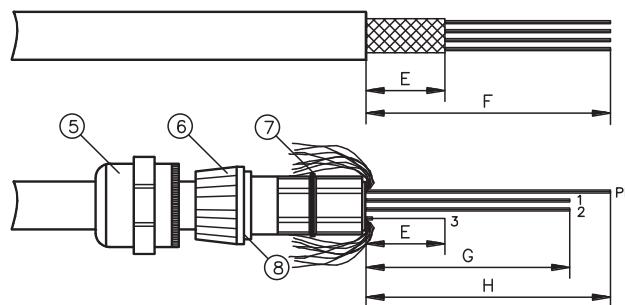
Motor cable



Remove the outer covering over length B, without damaging the shielding braid. Shorten the shielding braid to length A.

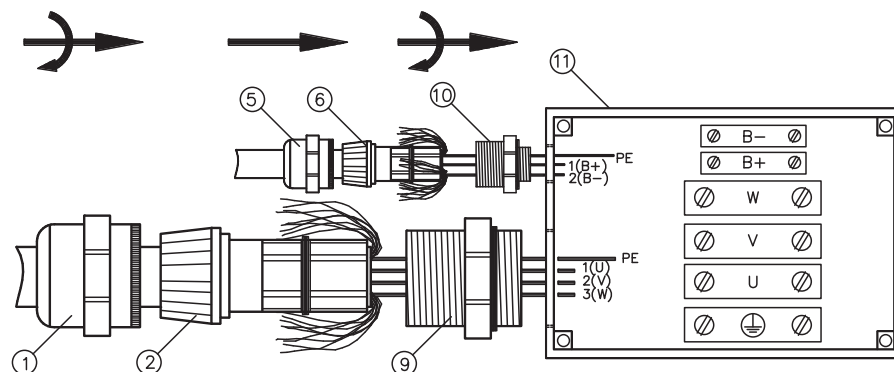
Push the union nut (1) and the clamping ring (2) onto the cable and push the shielding braid back over the clamping ring. The shielding braid must cover the sealing ring (3), but must not stick out over the sealing edge (4). Cut off the cores to lengths C and D.

Brake cable



Remove the outer covering over length F, without damaging the shielding braid. Shorten the shielding braid to length E.

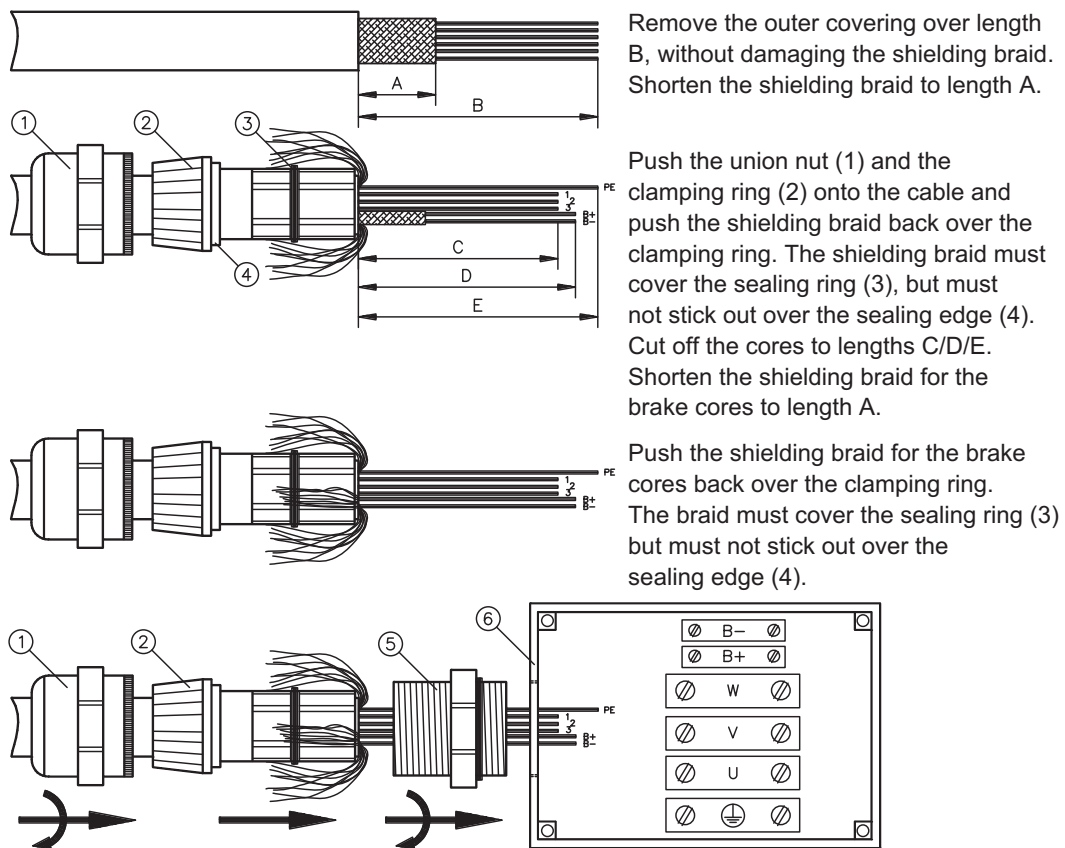
Push the union nut (5) and the clamping ring (6) onto the cable and push the shielding braid back over the clamping ring. The shielding braid must cover the sealing ring (7), but must not stick out over the sealing edge (8). Cut off the cores to lengths E/G/H. Remove the insulation from core 3 and lay it over the shielding braid.



Screw the threaded sleeve (9) or (10) into the terminal box (11). Push the cores of the cables and the clamping rings (2) or (6) through the threaded sleeve and screw the union nut (1) or (5) tightly onto the threaded sleeve. Then fit bootlace ferrules or terminal pins to the ends of the cores for the brake connections, and ring terminals to the power connections and the PE.

Motor	A	B	C	D	E	F	G	H	Connection
DBL7/8	20	140	110	140	20	140	130	140	Terminals (similar to drawing)

10.10.3.2.2 Preparing cables for terminal box, combined cables (AKM8, DBL7/8)



Screw the threaded sleeve (5) into the terminal box (6). Push the cores of the cable and the clamping ring (2) through the threaded sleeve and screw the union nut (1) tightly onto the threaded sleeve.

Then fit, depending on the motor type, bootlace ferrules or ring terminals to the ends of the cores.

Motor	A	B	C	D	E	Connection
DBL7/8	20	140	110	130	140	Terminals
AKM8	20	140	110	130	140	Terminals

10.10.4 Preparing motor cables (servo amplifier end)

Material list

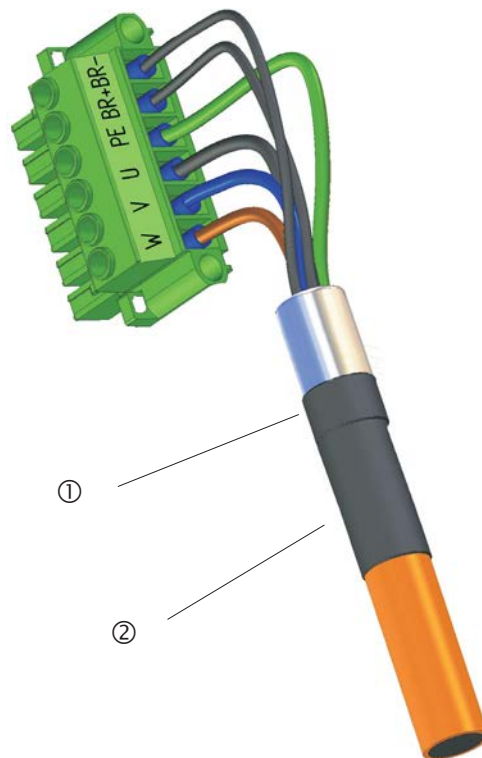
Part	Description	Order code
Cable	Overview see p. 41	
Connector kit amplifier end S300-230V	Power Combicon X9	DE-107631
Connector kit amplifier end S300-400V	Power Combicon X9	DE-107467
Connector kit amplifier end S400	Power Combicon X6	DE-107466
Connector kit amplifier end S601...620	Power Combicon X9	DE-90066
Connector kit amplifier end S701-712,S724	Power Combicon X9	DE-200453
Connector kit amplifier end AKD-X00306/X00606, SK14	Power Combicon X2	AKD-X2+SK14-Kit
Connector kit amplifier end AKD-X01206/X02406/X0xx07	Power Combicon X2	AKD-X2+Shield-Kit

Connection scheme

Pin assignment is described in the instructions manual for the servo amplifier.

10.10.4.1 Preparing cables for S300/S400

The motor is connected to the S300 or S400 by a Power Combicon connector (see p.71). Please take note that the connector can accept a maximum conductor cross-section of 4mm².



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.

Wire the connector as shown in the connection diagram in the instructions manual. Plug in the connector to the socket on the front of the servo amplifier. Screw the connector in place.

Use a shielding clamp (see p.21) to ensure an optimum shield connection to the servo amplifier.

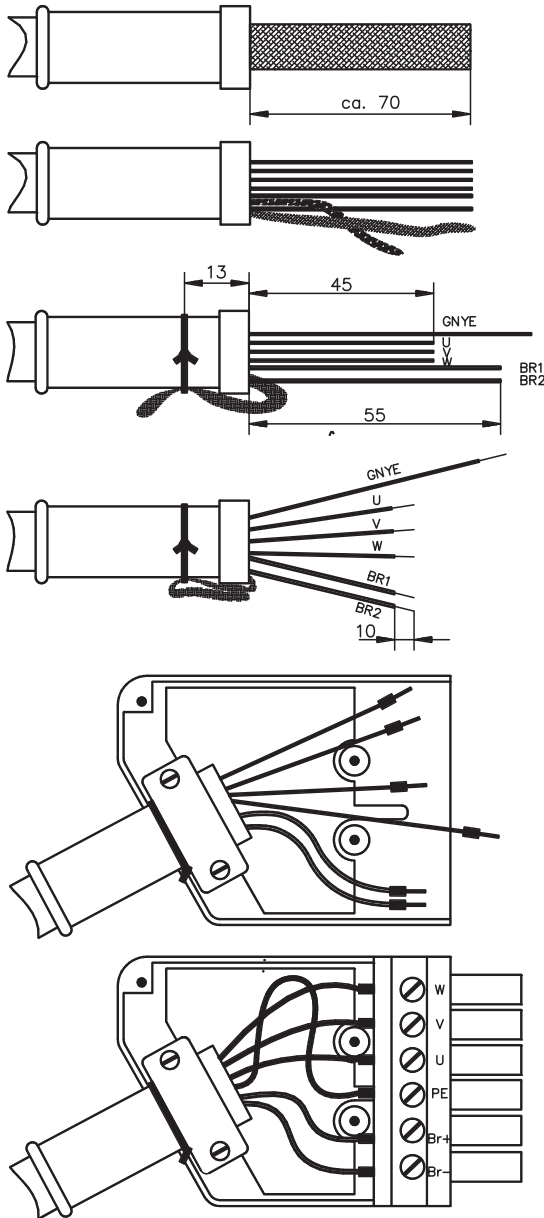
Alternatively you can use the shield shroud of the servo amplifier. Use cable ties to attach the cable to the side shroud of the amplifier, securing the braided shield of the cable to the shroud with a cable tie.

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

10.10.4.2 Preparing cables for S601...620

The motor is connected to the S601...620 by a Power Combicon connector (see p.71). You can obtain the connector kit from us (connector, housing, shield plate, rubber bushes, installation material) with the order code DE-90066.

Please take note that the connector can accept a maximum conductor cross-section of 4mm².



First push the rubber sleeve onto the cable, and then strip off about 70mm of the outer covering, without damaging the shielding.

Carefully separate the shielding braid from the cores.

Twist the shielding braid into a pigtail and tie it to the sleeve with the wire. Shorten the brake cores to 55mm and the power cores to 45mm.

Fold back the overhanging length of the shielding pigtail to face forwards. Strip off the ends of the cores for about 10mm. This length can vary, depending on the type of bootlace ferrule that is used.

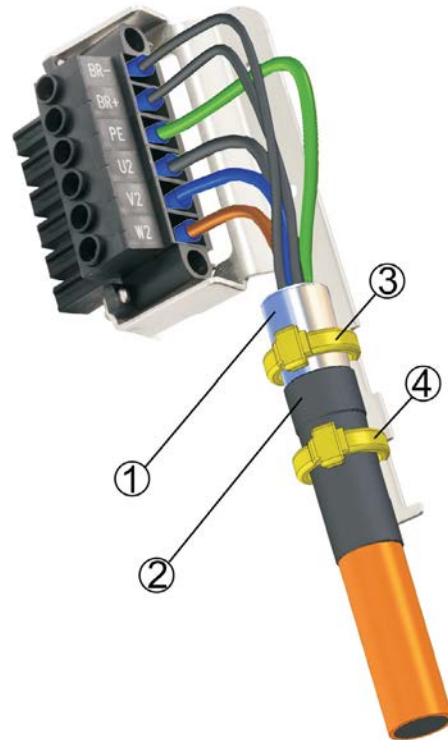
Apply bootlace ferrules to the conductors. Place the shield plate in the bottom half of the connector housing. Place the cable in the strain relief, so that the folded shielding pigtail lies on the shield plate, but the tie-wire is not clamped inside.

Tighten up the screws, without crushing the cable.

Place the connector in the housing. Take care that the tongue of the shield plate sits in the PE clamp. Wire up the connector according to the wiring diagram in the instructions manual, and tighten up the clamping screws. Take care that the insulation is not trapped underneath. Close the housing.

10.10.4.3 Preparing cables for S701...724

The motor is connected to the S701...724 by a Power Combicon connector (see p.71). You can obtain the connector kit from us (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.

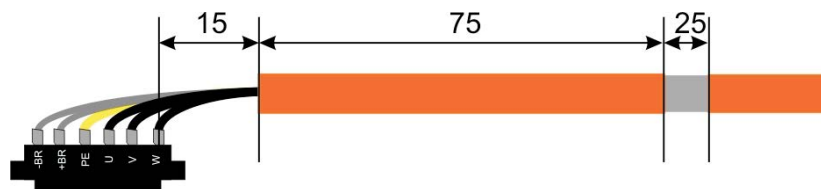
Shorten all the wires apart from the protective earth (PE) wire (green/yellow) by about 20 mm so that the PE wire is now the longest wire. Strip all wires and fit wire end ferrules.

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.

10.10.4.4 Preparing cables for AKD-X00306/X00606



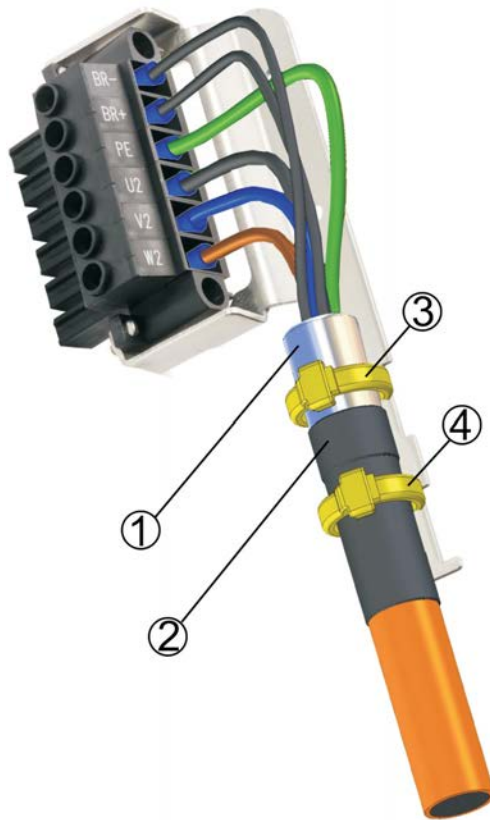
The motor is connected to the AKD-X00306/X00606 by a Power Combicon connector (see p.71). Please take note that the connector can accept a maximum conductor cross-section of 4mm².

Use a shielding clamp (see p.21) to ensure an optimum shield connection to the servo amplifier.

Wire the connector as shown in the connection diagram in the installation manual. Plug in the connector to the socket on the front of the servo amplifier. Screw the connector in place.

10.10.4.5 Preparing cables for AKD-X01206/X02406/X0xx07

The motor is connected to the AKD-X01206/X02406/X0xx07 by a Power Combicon connector(). You can obtain the connector kit from us (see p.71 with connector, housing, shield plate, rubber bushes, installation material).



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.

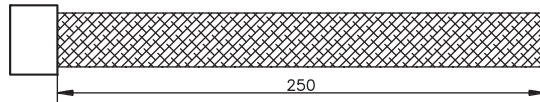
Wire the connector as shown in the connection diagram. Plug in the connector to the socket on the front of the AKD.

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.

10.10.4.6 Preparing cables for S748/772

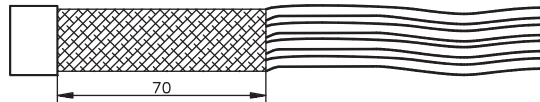
10.10.4.6.1 Motor Power Cable

The motor is connected to the S748/772 by terminals. The cable material depends on the motor that is used. Please refer to the instructions manual for the corresponding motor series.

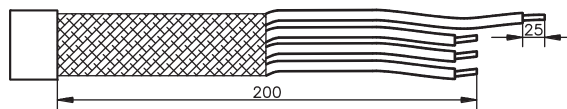


Please take note that the terminals can accept a core cross-sections of 10 to 50mm².

Remove the outer covering over a length of 250mm, without damaging the shielding braid.

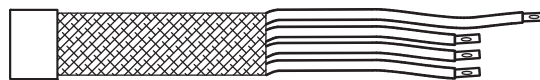


Shorten the shielding braid to a length of 70mm.



Shorten the cores for the power connections to 200mm. Strip off about 25mm of the insulation from all cores.

The length varies with the conductor cross-section and the type of bootlace ferrule that is used.

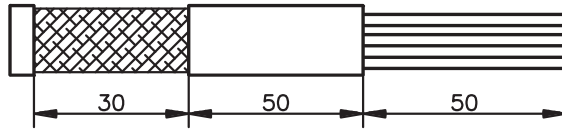


Apply bootlace ferrules to the conductors. Do not use terminal pins, because their cross-section is too small.

10.10.4.6.2 Holding Brake Cable

S748/772:

The electric holding brake of the motor is attached via connector X9A. It is therefore necessary to wire the power and brake cables separately. The 24V power supply for the holding brake is attached via connector X9B (see p.54).



Remove the outer covering of the cable and the shielding braid over a length of about 50mm. Then remove the outer covering without damaging the shielding braid.



Shorten the redundant lines of the cable as far as possible. Strip off about 10mm of the insulation from the ends of the cores. Take care to avoid damage to the copper strands while doing this. Depending on the cross-section of the core and the type of bootlace ferrule that is used, the length that has to be stripped may vary by several millimetres.

Protect the redundant lines by pushing a 30mm long heat shrink sleeve half over the outside cover and heat it up.



Apply bootlace ferrules to the conductors. As an alternative, you can also use terminal pins instead of bootlace ferrules.

Connector example S748/772:



Push the ends of the conductors into the connector as far as they will go. Follow the pin assignment in the instructions manual. Tighten the screws of the terminals. Take care that the insulation is not trapped in the terminals.

10.11 Feedback cables

10.11.1 General

All the motors in our range feature the same connector for the feedback connection. This connector is also used for the connections from the motor's thermal protection contact to the servo amplifier. The cable shield is connected to the servo amplifier via the connector housing.

Technical data of the used cable material can be found on p.41.

10.11.2 Resolver cables for S300/S400/S600/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.

10.11.2.1 Oder codes Resolver cable, configured

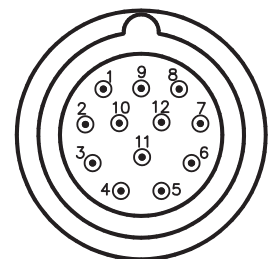
Article		S300/S400/S600/S700 Order Code		AKD order code	
Resolver cable	(4x(2x0.25))	5m	DE-84972	1m	CFR0A1-002-001-00
Resolver cable	(4x(2x0.25))	10m	DE-84973	3m	CFR0A1-002-003-00
Resolver cable	(4x(2x0.25))	50m	DE-84974	6m	CFR0A1-002-006-00
Resolver cable	(4x(2x0.25))	20m	DE-84975	12m	CFR0A1-002-012-00
Resolver cable	(4x(2x0.25))	30m	DE-87655	24m	CFR0A1-002-024-00

10.11.2.2 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.

Connections

S300/S400/ S600/S700	AKD X10 High Density	Pair No.	Core color acc. to IEC 60757	Motor end	Function
Pin	Pin			Pin	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-



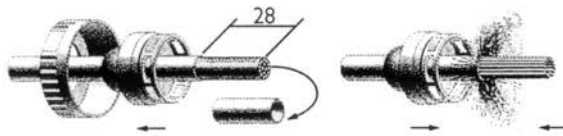
View: solder side of the motor connector

Material list

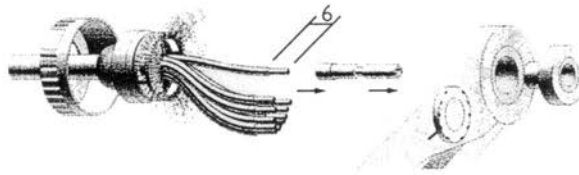
Part	Designation	Order code
Cable	LiYCY (TP) 4x2x0.25	DE-92186 (cut to length)
Connector kit, motor end	EMC Connector 12 pole	DE-90210
Washdown connector kit, motor end	EMC Connector 12 pole, stainless steel	DE-201811
Connector kit, amplifier end S300...S700	Socket 9-pol., housing and screws	DE-81784
Connector kit, amplifier end AKD, X9/X10	X10 male connector 15pin hd, X9 female connector 9pin, 2 housings, screws	AKD-X9+X10-Kit

10.11.2.2.1 Preparing motor end

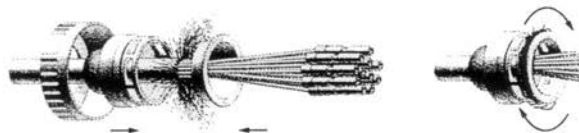
Special tools are required for these operations. Information can be requested from the manufacturer of the connector.



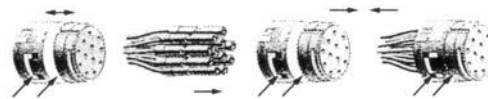
First push the clamping ring and the strain-relief bush onto the cable. Then remove the outer covering over a length of about 28mm, without damaging the shielding braid. Push the shielding back over the cable.



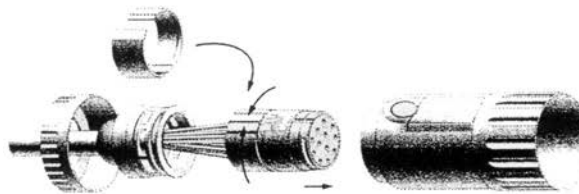
Cut back the redundant cores as far as possible. Strip off the cores over a length of about 6mm. Attach the crimp contacts to the ends of the cores with the crimp tool and the appropriate positioner.



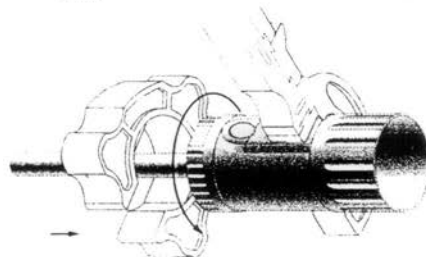
Push the shield ring over the cable, to fix the shielding in the strain-relief bush. Wrap the shielding round the shield ring, so that nothing sticks out.



Unlatch the insulation body by pulling it apart. Insert the contacts. Press the insulation body together until you hear it snap into place.

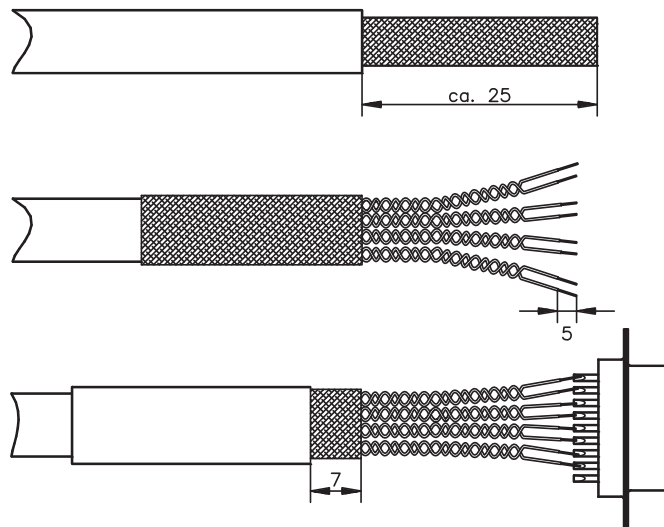


Place the distance ring around the cores, directly behind the insulation body. Click the distance ring into the slot in the insulation body and close it. Push the insulation body into the connector as far as it will go. Take care that the component parts are properly aligned.



Screw the clamping ring up tight onto the connector housing, using the special assembly wrench. Use the hook wrench to provide the opposing force.

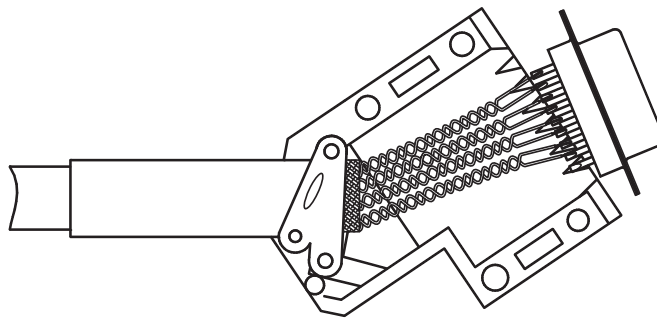
10.11.2.2.2 Preparing amplifier end



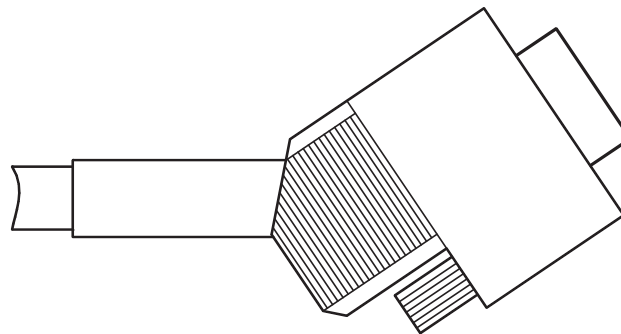
Remove the outer covering of the cable over a length of about 25mm, without damaging the shielding braid.

Push the shielding braid back over the outer covering of the cable, and cut off any surplus cores as short as possible. Strip off the ends of the cores over a length of about 5mm, without damaging the copper strands.

Push a suitable piece of heat-shrink tubing over the shielding braid, and heat it up. Leave about 7mm free at the end. Solder the ends of the cores into the solder buckets of the SubD connector according to the wiring diagram.



Use the strain relief to fix the cable to the bottom half of the housing. Do not overtighten the screws, or the cable will be crushed. Place the SubD connector with the wider side below, in the bottom half of the housing.



Check the connections before closing the housing, since it cannot be opened again afterwards without damage. Place the fixing screw in position in the housing, and then press the two halves of the housing firmly together. Take care that the fixing screw and the SubD connector insert are properly located.

10.11.3 SFD cables for AKD**10.11.3.1 General**

Motors equipped with a Kollmorgen SFD (Smart Feedback Device) are connected to the servo amplifier via a four-wire cable.

Depending on the motor's connection method, two separate cables or a single combined cable are used for power and feedback to the servo amplifier.

10.11.3.2 Order codes combined SFD & motor cable (with IP65 connectors)

See "Motor Cables" on page 67.

10.11.3.3 Order codes SFD cable (with IP65 connectors)

Article			Order Code
AKD SFD cable	1m	(2x(2x0.25))	CFS0A1-002-001-00
AKD SFD cable	3m	(2x(2x0.25))	CFS0A1-002-003-00
AKD SFD cable	6m	(2x(2x0.25))	CFS0A1-002-006-00
AKD SFD cable	12m	(2x(2x0.25))	CFS0A1-002-012-00
AKD SFD cable	24m	(2x(2x0.25))	CFS0A1-002-024-00

10.11.4 Encoder cables for S300/S400/S600/S700



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.

10.11.4.1 Order Codes Encoder cables, configured

Article	S300/S400/S600/S700		AKD	
	Order Code all encoders		Order Code EnDat, BiSS	Order Code Hiperface
Encoder cable (7x(2x0.25))	5m	DE-90287	1m CFE0A1-002-001-00	1m CFH0A1-002-001-00
Encoder cable (7x(2x0.25))	10m	DE-91019	3m CFE0A1-002-003-00	3m CFH0A1-002-003-00
Encoder cable (7x(2x0.25))	15m	DE-91811	6m CFE0A1-002-006-00	6m CFH0A1-002-006-00
Encoder cable (7x(2x0.25))	20m	DE-91807	12m CFE0A1-002-012-00	12m CFH0A1-002-012-00
Encoder cable (7x(2x0.25))	25m	DE-92205	24m CFE0A1-002-024-00	24m CFH0A1-002-024-00

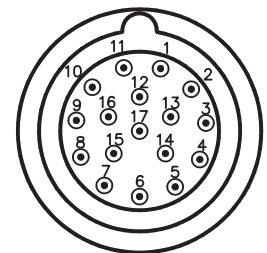
10.11.4.2 Preparing Encoder cables

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.

Connection scheme

The following table shows the correlation between the individual types of encoder and the cable connections that are required:

S300/S400/ S600/S700	Pin: amplifier end		Pair	Core color acc. to IEC 60757	Pin: motor end
	AKD				Encoder ECN/EQN/SRS/SRM
	EnDat, BiSS	Hiper- face			
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	bridge 5-4	5	VT	10
11	12	15	2	YE	11
12	4	bridge 4-5	5	BK	12
13	7	7	3	PK	13
14	8	8	7	WH/GN	14
15	3	-	4	RD	15



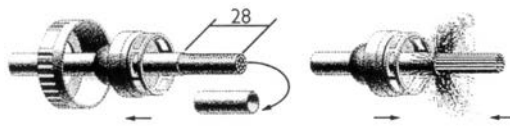
View: solder side of the motor connector

Material list

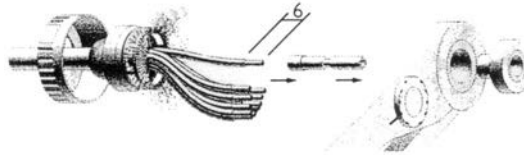
Part	Description	Order code
Cable	LiYCY (TP) 7x2x0.25mm ²	DE-100904 (cut to length)
Connector kit, motor end	EMC Connector, 17 pole	DE-85267
Washdown connector kit, motor end	EMC Connector 17 pole, stainless steel	DE-201820
Connector kit, amplifier end S300...S700	Socket 15-pol., housing and screws	DE-103440
Connector kit, amplifier end AKD, X9/X10	X10 male connector 15pin hd, X9 female connector 9pin, 2 housings, screws	AKD-X9+X10-Kit

10.11.4.2.1 Preparing motor end

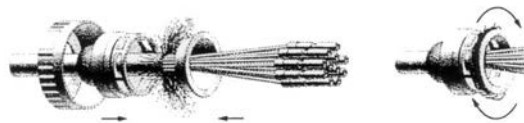
Special tools are required for these operations. Information can be requested from the manufacturer of the connector.



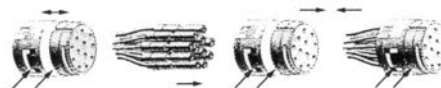
First push the clamping ring and the strain-relief bush onto the cable. Then remove the outer covering over a length of about 28 mm, without damaging the shielding braid. Push the shielding back over the cable.



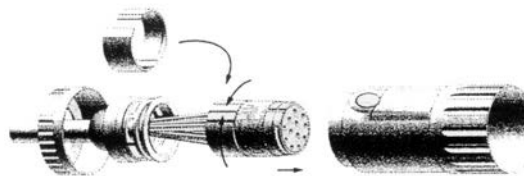
Cut back the redundant cores as far as possible. Strip off the cores over a length of about 6mm. Attach the crimp contacts to the ends of the cores with the crimp tool and the appropriate positioner.



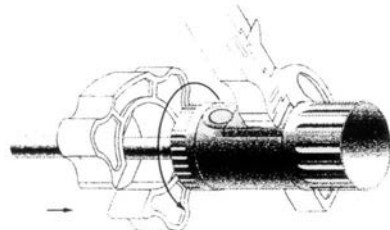
Push the shield ring over the cable, to fix the shielding in the strain-relief bush. Wrap the shielding round the shield ring, so that nothing sticks out.



Unlatch the insulation body by pulling it apart. Insert the contacts. Press the insulation body together until you hear it snap into place.

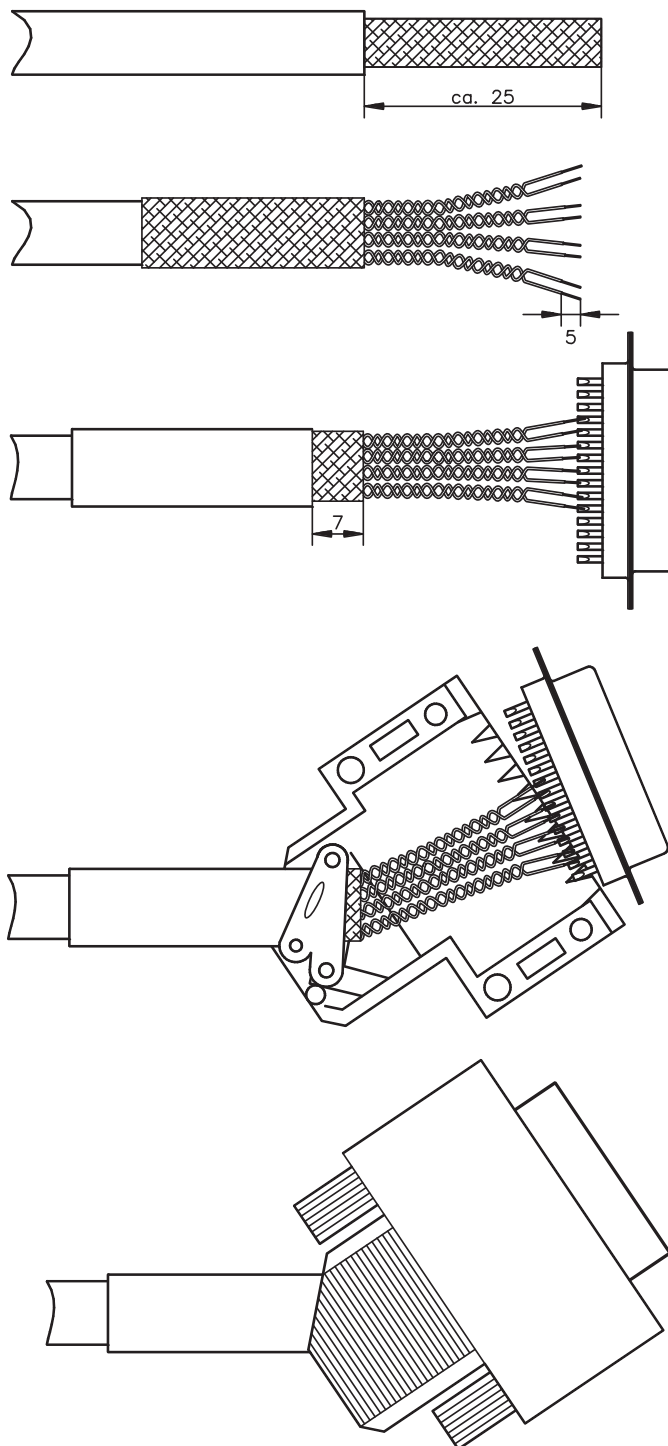


Place the distance ring around the cores, directly behind the insulation body. Click the distance ring into the slot in the insulation body and close it. Push the insulation body into the connector as far as it will go. Take care that the component parts are properly aligned.



Screw the clamping ring up tight onto the connector housing, using the special assembly wrench. Use the hook wrench to provide the opposing force.

10.11.4.2.2 Preparing amplifier end



Remove the outer covering of the cable over a length of about 25mm, without damaging the shielding braid.

Push the shielding braid back over the outer covering of the cable, and cut off any surplus cores as short as possible. Strip off the ends of the cores over a length of about 5mm, without damaging the copper strands.

Push a suitable piece of heat-shrink tubing over the shielding braid, and heat it up. Leave about 7mm free at the end. Solder the ends of the cores into the solder buckets of the SubD connector according to the wiring diagram.

Represented are exemplarily only four of the seven pairs of cores.

Use the strain relief to fix the cable to the bottom half of the housing. Do not overtighten the screws, or the cable will be crushed. Place the SubD connector with the wider side below, in the bottom half of the housing.

Check the connections before closing the housing, since it cannot be opened again afterwards without damage. Place the fixing screw in position in the housing, and then press the two halves of the housing firmly together. Take care that the fixing screw and the SubD connector insert are properly located.

10.11.5 ComCoder cables for S300/S400/S600/S700



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.

10.11.5.1 Order Codes Comcoder cables, configured

Article	Order Code S300/S400/S600/S700	Order Code/AKD
ComCodercable (8x(2x0.25))	5m DE-107915	1m CFC0A1-002-001-00
ComCodercable (8x(2x0.25))	10m DE-107916	3m CFC0A1-002-003-00
ComCodercable (8x(2x0.25))	15m DE-107917	6m CFC0A1-002-006-00
ComCodercable (8x(2x0.25))	20m DE-107918	12m CFC0A1-002-012-00
ComCodercable (8x(2x0.25))	25m DE-107919	24m CFC0A1-002-024-00

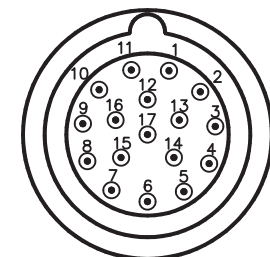
10.11.5.2 Preparing the Comcoder cable

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.

Connection scheme

Pin: amplifier end S300/S400/ S600/S700	Pin AKD X10 High Density	Pair	Core color*	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

* to IEC 60757



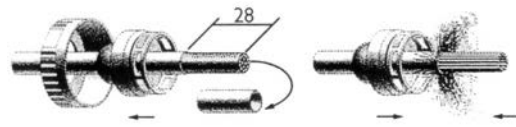
View: solder side of the motor connector

Material list

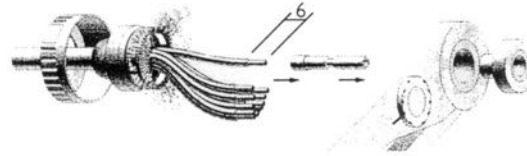
Part	Description	Order code
Cable	LiYCY (TP) 8x2x0.25mm ²	DE-108012 (cut to length)
Connector kit, motor end	EMC Connector, 17 poles	DE-85267
Washdown connector kit, motor end	EMC Connector 17 pole, stainless steel	DE-201820
Connector kit, amplifier end	Socket 15-pol., housing and screws	DE-103440
Connector kit, amplifier end AKD, X9/X10	X10 male connector 15pin high density, X9 female connector 9pin, 2 housings, screws	AKD-X9+X10-Kit

10.11.5.2.1 Preparing motor end

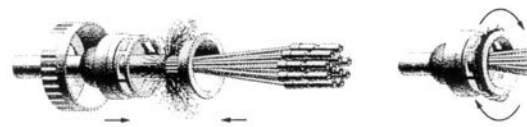
Special tools are required for these operations. Information can be requested from the manufacturer of the connector.



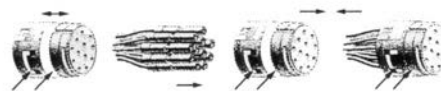
First push the clamping ring and the strain-relief bush onto the cable. Then remove the outer covering over a length of about 28 mm, without damaging the shielding braid. Push the shielding back over the cable.



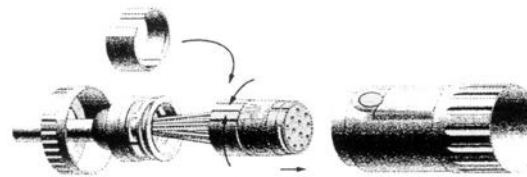
Cut back the redundant cores as far as possible. Strip off the cores over a length of about 6 mm. Attach the crimp contacts to the ends of the cores with the crimp tool and the appropriate positioner.



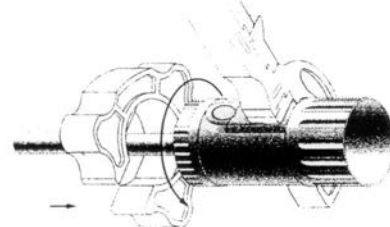
Push the shield ring over the cable, to fix the shielding in the strain-relief bush. Wrap the shielding round the shield ring, so that nothing sticks out.



Unlatch the insulation body by pulling it apart. Insert the contacts. Press the insulation body together until you hear it snap into place.

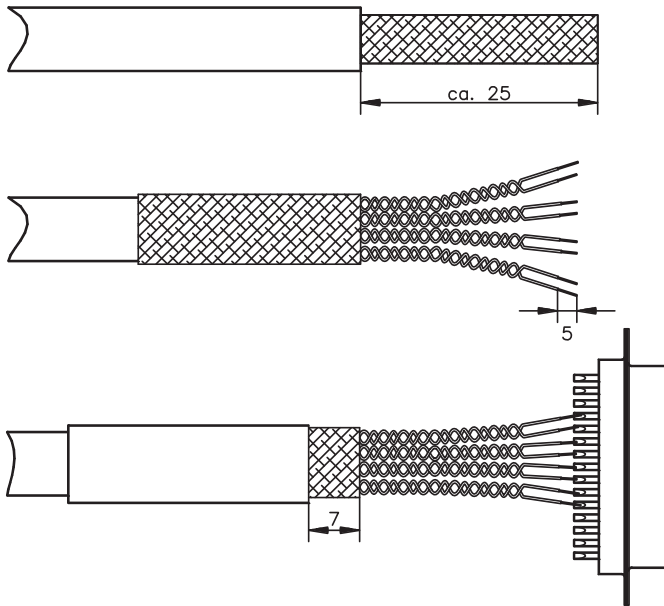


Place the distance ring around the cores, directly behind the insulation body. Click the distance ring into the slot in the insulation body and close it. Push the insulation body into the connector as far as it will go. Take care that the component parts are properly aligned.



Screw the clamping ring up tight onto the connector housing, using the special assembly wrench. Use the hook wrench to provide the opposing force.

10.11.5.2.2 Preparing amplifier end



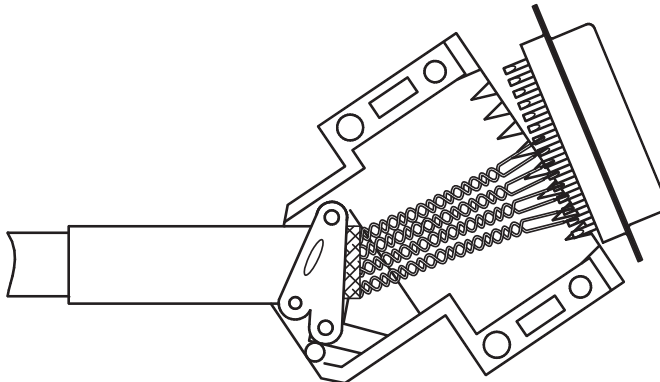
Remove the outer covering of the cable over a length of about 25mm, without damaging the shielding braid.

Push the shielding braid back over the outer covering of the cable, and cut off any surplus cores as short as possible. Strip off the ends of the cores over a length of about 5mm, without damaging the copper strands.

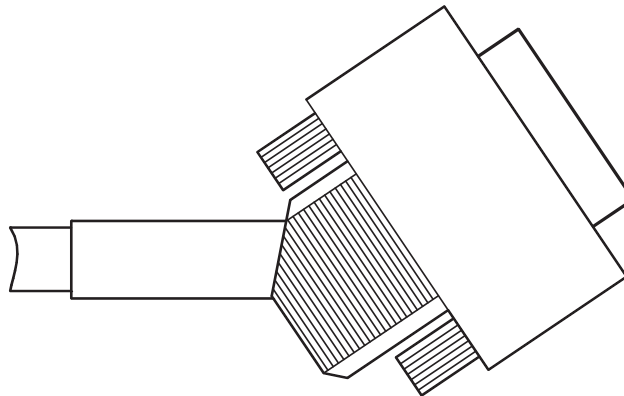
Push a suitable piece of heat-shrink tubing over the shielding braid, and heat it up. Leave about 7mm free at the end. Solder the ends of the cores into the solder buckets of the SubD connector according to the wiring diagram.

Represented are exemplarily only four of the eight pairs of cores.

Use the strain relief to fix the cable to the bottom half of the housing. Do not overtighten the screws, or the cable will be crushed. Place the SubD connector with the wider side below, in the bottom half of the housing.



Check the connections before closing the housing, since it cannot be opened again afterwards without damage. Place the fixing screw in position in the housing, and then press the two halves of the housing firmly together. Take care that the fixing screw and the SubD connector insert are properly located.



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