

# Options for AX5000 Servo Drives

## AX57xx | Encoder option cards

The AX5000 Servo Drive series supports a large number of feedback interfaces via the multi-option interface:

- resolver (2-, 4-, 6- or 8-pole)
- SinCos encoder 1 V<sub>PP</sub>
- single- and multi-turn encoder Hiperface 1 V<sub>PP</sub>
- single- and multi-turn encoder BiSS 1 V<sub>PP</sub>
- single- and multi-turn encoder 1 V<sub>PP</sub>

From hardware revision 2 onwards, OCT (One Cable Technology) is also supported by the AX5000 and with it the "second encoder" function where the encoder inside the motor is used for commutation and a second high-resolution encoder is used for position control.

### Encoder option cards

For the integration of further feedback systems the controllers can be equipped with encoder option cards from hardware revision 2 onwards. The option cards are inserted in the second option slot on top of the AX5000, offering the possibility to connect one or two further encoders, depending on the version.

### Encoder option cards for AX51xx

- AX5701: one additional encoder input 1 V<sub>PP</sub>, BiSS B, Hiperface, EnDat
- AX5721: one additional encoder input EnDat 2.2 or BiSS C
- AX5731: one additional encoder input HTL

### Encoder option cards for AX52xx

- AX5702: two additional encoder inputs 1 V<sub>PP</sub>, BiSS B, Hiperface, EnDat
- AX5722: two additional encoder inputs EnDat 2.2 or BiSS C
- AX5732: two additional encoder inputs HTL

Ordering information		Pict.
AX5701-0000	encoder option card for one additional encoder input 1 V <sub>PP</sub> , BiSS B, Hiperface, EnDat	
AX5702-0000	encoder option card for two additional encoder inputs 1 V <sub>PP</sub> , BiSS B, Hiperface, EnDat	A
AX5721-0000	encoder option card for one additional encoder input EnDat 2.2, BiSS C	
AX5722-0000	encoder option card for two additional encoder inputs EnDat 2.2, BiSS C	
AX5731-0000	encoder option card for one additional encoder input HTL	
AX5732-0000	encoder option card for two additional encoder inputs HTL	

## AX58xx | TwinSAFE drive options cards

Significant hazards to persons arise from the dynamic movements of the electrical drive equipment of machines. With the AX58xx TwinSAFE drive option cards numerous safety functions can be easily implemented by the user. No further circuits are necessary for this, such as circuit breakers or contactors in the supply lines or special external encoder systems. Optional cards that are certified according to DIN EN ISO 13849-1:2008 (Cat 4, PL e) and IEC 61508:2010 (SIL 3) are available for different safety categories:

**AX5801** | Personal protection against inadvertent restart of the drive axis (STO/SS1):

- Safe Torque Off (STO) according to IEC 61800-5-2
- control through safe 24 V DC outputs
- mains voltage and motor line remain connected

**AX5805, AX5806** | Further drive-integrated safety functions according to IEC 61800-5-2. Control is performed via EtherCAT; no further wiring is required:

- stop functions (STO, SOS, SS1, SS2)
- speed functions (SLS, SSM, SSR, SMS) with up to 8 speeds
- position functions (SLP, SCA, SLI) with reference cams
- acceleration functions (SAR, SMA)
- rotating direction functions (SDIp, SDIn)

For further information on TwinSAFE and the TwinSAFE products see page **966**

Ordering information		Pict.
AX5801-0200	TwinSAFE drive option card for AX5000 up to 40 A, HW 2.0: STO, SS1 <sup>(1)</sup>	B
AX5805-0000	TwinSAFE drive option card for AX5000 up to 40 A, HW 2.0: STO, SS1, SS2, SOS, SLS, SDI <sup>(1)</sup>	C
AX5806-0000	TwinSAFE drive option card for AX5000 from 60 A, HW 2.0: STO, SS1, SS2, SOS, SLS, SDI <sup>(2)</sup>	

<sup>(1)</sup> AX5000 up to 40 A: AX5x01-0000-0200, AX5x03-0000-0200, AX5x06-0000-0200, AX5112-0000-0200, AX5118-0000-0200, AX5125-0000-0200, AX5140-0000-0200

<sup>(2)</sup> AX5000 from 60 A up to 170 A: AX5160-0000-0200, AX5172-0000-0200, AX519x-0000-0200

## AX59xx | AX-Bridge quick connection system

For Servo Drives up to a rated current of 40 A, the AX59xx AX bridge enables the simple and fast connection of several AX5000 units to form a multi-axis system by means of plug-in supply and connection modules.

The AX590x supply module is simply snapped onto the Servo Drive. The AX591x connection module with integrated busbars is suitable for multi-axis systems and combines mains input, intermediate circuit, 24 V DC control voltage and brake voltage. In combination, the AX590x and AX591x modules enable fast installation and commissioning.

- integration of power supply, DC-Link, 24 V DC control and braking voltage

- connection module with power rail system, current carrying capacity up to 85 A
- straightforward installation and disassembly without additional wiring
- visible and safe contacting

### Active DC-Link and brake energy management

With the AX-Bridge the DC-Links are automatically through-connected: This enables an economic energy balancing between axes.

- short-circuit-proof
- intelligent utilisation of all available system ballast resistors
- elimination power loss



Ordering information		Pict.
AX5901-0000	AX-Bridge power supply module for connection of supply voltage and 24 V DC for control and brake energy (pluggable), for AX5x01...AX5125, 85 A	D
AX5902-0000	AX-Bridge power supply module for connection of supply voltage and 24 V DC for control and brake energy (pluggable), for AX5140, 85 A	
AX5911-0000	AX-Bridge power distribution module, quick connection system for power supply, DC-Link and control voltage (pluggable), for AX5x01...AX5112, 85 A	E
AX5912-0000	AX-Bridge power distribution module, quick connection system for power supply, DC-Link and control voltage (pluggable), for AX5118 and AX5125, 85 A	F



# Motor supply cables for AX5000 Servo Drives at AM8xxx

Motor cables 1 mm<sup>2</sup> with iTec plug system for AM801x, AM802x, AM803x and AM853x at AX5000 (1.5...6 A)

Ordering information	Motor cable with 1 mm <sup>2</sup> wire gauge, highly flexible for drag-chain use
ZK4500-8022-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 81 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1 mm <sup>2</sup> + (2 x 0.75 mm <sup>2</sup> ) + (2 x AWG22))
ZK4500-8022-0050	example for 5 m length
ZK4501-8022-xxxx	extension cable

For maximum cable lengths please see the current documentation ► [www.beckhoff.com/documentations](http://www.beckhoff.com/documentations)

Motor cables 1.5 mm<sup>2</sup> with M23 speedtec® plug for AM883x and AM8x4x up to AM8x6x (up to winding code P) at AX5000 (1.5...12 A)

Ordering information	Motor cable with 1.5 mm <sup>2</sup> wire gauge, fixed installation
ZK4500-8003-xxxx	cables for fixed installation min. bending radius = 61 mm (5 x OD), (4 x 1.5 mm <sup>2</sup> + (2 x 0.75 mm <sup>2</sup> ) + (2 x AWG22))
ZK4500-8003-0050	example for 5 m length
ZK4501-8003-xxxx	extension cable

For maximum cable lengths please see the current documentation ► [www.beckhoff.com/documentations](http://www.beckhoff.com/documentations)

Ordering information	Motor cable with 1.5 mm <sup>2</sup> wire gauge, highly flexible for drag-chain use
ZK4500-8023-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 89 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1.5 mm <sup>2</sup> + (2 x 0.75 mm <sup>2</sup> ) + (2 x AWG22))
ZK4500-8023-0050	example for 5 m length
ZK4501-8023-xxxx	extension cable

For maximum cable lengths please see the current documentation ► [www.beckhoff.com/documentations](http://www.beckhoff.com/documentations)

Motor cables 2.5 mm<sup>2</sup> with M23 speedtec® plug for AM8x4x up to AM8x6x (up to winding code P) at AX5000 (18...25 A)

Ordering information	Motor cable with 2.5 mm <sup>2</sup> wire gauge, fixed installation
ZK4500-8004-xxxx	cables for fixed installation min. bending radius = 69 mm (5 x OD), (4 x 2.5 mm <sup>2</sup> + (2 x 1 mm <sup>2</sup> ) + (2 x AWG22))
ZK4500-8004-0050	example for 5 m length
ZK4501-8004-xxxx	extension cable

For maximum cable lengths please see the current documentation ► [www.beckhoff.com/documentations](http://www.beckhoff.com/documentations)

Ordering information	Motor cable with 2.5 mm <sup>2</sup> wire gauge, highly flexible for drag-chain use
ZK4500-8024-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 97 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 2.5 mm <sup>2</sup> + (2 x 1 mm <sup>2</sup> ) + (2 x AWG22))
ZK4500-8024-0050	example for 5 m length
ZK4501-8024-xxxx	extension cable

For maximum cable lengths please see the current documentation ► [www.beckhoff.com/documentations](http://www.beckhoff.com/documentations)

## Motor cables 4 mm<sup>2</sup> with M40 speedtec® plug for AM8x6x (from winding code Q) and AM807x at AX5000 (12...25 A)

Ordering information	Motor cable with 4 mm <sup>2</sup> wire gauge, highly flexible for drag-chain use
ZK4500-8025-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 111 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 4 mm <sup>2</sup> + (2 x 1 mm <sup>2</sup> ) + (2 x AWG22))
ZK4500-8025-0050	example for 5 m length
ZK4501-8025-xxxx	extension cable

For maximum cable lengths please see the current documentation ► [www.beckhoff.com/documentations](http://www.beckhoff.com/documentations)

## Motor cables 10 mm<sup>2</sup> with M40 speedtec® plug for AM8x6x (from winding code Q) and AM807x at AX5000 (40 A)

Ordering information	Motor cable with 10 mm <sup>2</sup> wire gauge, highly flexible for drag-chain use
ZK4500-8027-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 225 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 10 mm <sup>2</sup> + (2 x 1.5 mm <sup>2</sup> ) + (2 x AWG22))
ZK4500-8027-0050	example for 5 m length
ZK4501-8027-xxxx	extension cable

For maximum cable lengths please see the current documentation ► [www.beckhoff.com/documentations](http://www.beckhoff.com/documentations)

## Motor cables 10 mm<sup>2</sup> with M40 speedtec® plug for AM8x6x (from winding code Q) and AM807x at AX5000 (60 A)

Ordering information	Motor cable with 10 mm <sup>2</sup> wire gauge, highly flexible for drag-chain use
ZK4504-8027-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 255 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 10 mm <sup>2</sup> + (2 x 1.5 mm <sup>2</sup> ) + (2 x AWG22))
ZK4504-8027-0050	example for 5 m length
ZK4501-8027-xxxx	extension cable

For maximum cable lengths please see the current documentation ► [www.beckhoff.com/documentations](http://www.beckhoff.com/documentations)

AX5000 (60 A) does not support OCT. With each unit, a resolver cable ZK4530-8010-xxxx must be ordered separately.

## Feedback cables for AX5000 Servo Drives at AM8xxx

### Resolver cables with iTec plug system for AM802x, AM803x, AM853x at AX5000

Ordering information	Resolver cable with 0.25 mm <sup>2</sup> wire gauge, flexible, for drag-chain use
ZK4530-8110-xxxx	flexible, drag-chain suitable cable with 5 million bending cycles, max. 120 m/min, max. 4 m/s <sup>2</sup> , min. bending radius = 75 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, 4 x 2 x 0.25 mm <sup>2</sup>
ZK4530-8110-0050	example for 5 m length
ZK4531-8110-xxxx	extension cable

## Resolver cables with M23 speedtec® plug for AM883x, AM8x4x to AM8x6x, AM807x at AX5000

Ordering information	Resolver cable with 0.25 mm <sup>2</sup> wire gauge, flexible, for drag-chain use
ZK4530-8010-xxxx	flexible, drag-chain suitable cable with 5 million bending cycles, max. 120 m/min, max. 4 m/s <sup>2</sup> , min. bending radius = 75 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, 4 x 2 x 0.25 mm <sup>2</sup>
ZK4530-8010-0050	example for 5 m length
ZK4531-8010-xxxx	extension cable

## Encoder cables with M23 speedtec® plug for AM8x6x, AM807x at AX5000

Ordering information	Encoder cable with 0.5 mm <sup>2</sup> wire gauge, highly flexible, suitable as trailing cable
ZK4510-8020-xxxx	Highly flexible, drag-chain suitable cable with 5 mio. bending cycles, max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 53 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (7 x 2 x 0.14 mm <sup>2</sup> + 2 x 0.5 mm <sup>2</sup> ). The cable is UL and CSA listed.
ZK4510-8020-0050	example for 5 m length
ZK4511-8020-xxxx	extension cable

# Accessories

## EtherCAT patch cables

Ordering information	ZK1090-9191-0xxx   EtherCAT patch cables
ZK1090-9191-0001	EtherCAT bridge AX5x01 to AX5112, length 0.17 m
ZK1090-9191-0002	EtherCAT bridge AX5118 to AX5140, length 0.26 m
ZK1090-9191-0xxx	EtherCAT patch cable, 0xxx = length in decimetres (-0020 = 2 m), available lengths 0.5 m, 1 m, 2 m, 3 m, 5 m and 10 m

## Not assembled motor cables for higher performance, from AX5000 (25 A)

Ordering information	Motor cable, flexible, drag-chain suitable with 5 million bending cycles, for Servo Drives AX5000 from 25 A
ZK4509-0016-0zzz	6 mm <sup>2</sup> , for AX5125, (4 x 6 mm <sup>2</sup> + (2 x 1 mm <sup>2</sup> + 2 x 1.5 mm <sup>2</sup> )) <sup>(1)</sup>
ZK4509-0017-0zzz	10 mm <sup>2</sup> , for AX5140, (4 x 10 mm <sup>2</sup> + (2 x 1 mm <sup>2</sup> + 2 x 1.5 mm <sup>2</sup> )) <sup>(1)</sup>
ZK4509-0018-0zzz	16 mm <sup>2</sup> , for AX5160, (4 x 16 mm <sup>2</sup> + 2 x (2 x 1.5 mm <sup>2</sup> )) <sup>(1)</sup>
ZK4509-0019-0zzz	25 mm <sup>2</sup> , for AX5172, (4 x 25 mm <sup>2</sup> + 2 x (2 x 1.5 mm <sup>2</sup> )) <sup>(1)</sup>
ZK4509-0019-1zzz	35 mm <sup>2</sup> , for AX5190, (4 x 35 mm <sup>2</sup> + 2 x (2 x 1.5 mm <sup>2</sup> )) <sup>(1)</sup>
ZK4509-0019-2zzz	50 mm <sup>2</sup> , for AX5191/AX5192, (4 x 50 mm <sup>2</sup> + 2 x (2 x 2.5 mm <sup>2</sup> )) <sup>(1)</sup>

zzz = ordering indication of the length of material in decimetres, e.g. ZK4509-0016-0100 = 10 metres, <sup>(1)</sup> not suitable for OCT

## Power supply | Mains filters for AX5000 (from 1.5 A)

Ordering information	AX2090-NF50-0xxx   Mains filters
AX2090-NF50-0014	mains filter C2 for AX5000 Servo Drives up to 14.6 A, 46.4 x 231 x 70 mm (W x H x D), 0.9 kg
AX2090-NF50-0032	mains filter C2 for AX5000 Servo Drives up to 32.8 A, 58 x 265 x 90 mm (W x H x D), 1.75 kg
AX2090-NF50-0063	mains filter C2/C3 for AX5160* Servo Drives up to 63 A, 62 x 305 x 180 mm (W x H x D), 5 kg
AX2090-NF50-0100	mains filter C2/C3 for AX5172*/AX5190 Servo Drives up to 100 A, 75 x 336 x 200 mm (W x H x D), 6 kg
AX2090-NF50-0150	mains filter C2/C3 for AX5191/AX5192 Servo Drives up to 150 A, 90 x 380 x 220 mm (W x H x D), 6.8 kg
AX2090-NF50-0180	mains filter C2/C3 for AX5193 Servo Drives up to 180 A, 200 x 410 x 120 mm (W x H x D), 7 kg

\* AX5160, AX5172: mains filter already integrated. Additional mains filter for C2 and C3 only necessary if the cable lengths exceed 10 m (C2) and 25 m (C3).

## Power supply | Mains chokes for AX5000 (from 60 A)

Ordering information	AX2090-ND50-0xxx   Mains chokes
AX2090-ND50-0060	mains choke for AX5160 Servo Drive, 60 A, 0.25 mH, U <sub>k</sub> 2 %, 190 x 200 x 120 mm (W x H x D), 7 kg
AX2090-ND50-0072	mains choke for AX5172 Servo Drive, 72 A, 0.20 mH, U <sub>k</sub> 2 %, 190 x 240 x 110 mm (W x H x D), 10 kg
AX2090-ND50-0090	mains choke for AX5190 Servo Drive, 90 A, 0.16 mH, U <sub>k</sub> 2 %, 230 x 300 x 160 mm (W x H x D), 13 kg
AX2090-ND50-0110	mains choke for AX5191 Servo Drive, 110 A, 0.13 mH, U <sub>k</sub> 2 %, 230 x 300 x 180 mm (W x H x D), 15 kg
AX2090-ND50-0143	mains choke for AX5192 Servo Drive, 143 A, 0.10 mH, U <sub>k</sub> 2 %, 240 x 330 x 200 mm (W x H x D), 25 kg
AX2090-ND50-0170	mains choke for AX5193 Servo Drive, 170 A, 0.09 mH, U <sub>k</sub> 2 %, 240 x 330 x 200 mm (W x H x D), 25 kg

## Power supply | Transient voltage suppressor for AX5000 (1.5...25 A)

Ordering information	Transient voltage suppressor for Servo Drives AX5000
AX2090-TS50-3000	transient voltage suppressor for AX5000 Servo Drives, required if CSA certification necessary

## EMC accessories | Shroud for AX5000 (from 60 A)

Ordering information	Shroud for connecting cable screens
AX2090-SB50-0001	shroud for AX5160/AX5172
AX2090-SB50-0002	shroud for AX5190/AX5191
AX2090-SB50-0003	shroud for AX5192/AX5193

## Braking energy management

Ordering information	Components for DC-Link for AX5000
AX5021-0000-0000	ballast unit with internal braking resistor (250 W) and option for connecting an external ballast resistor (up to 6 kW) as well as an additional DC link expansion capacity for storing brake energy efficiently
AX2090-BW50-0300	external ballast resistor for AX5x01 to AX5112 (stand-alone), 0.3 kW/47 Ω, 92 x 120 x 349 mm (W x H x D), 2 kg <sup>(1)</sup>
AX2090-BW50-0600	external ballast resistor for AX5x01 to AX5112 (stand-alone), 0.6 kW/47 Ω, 92 x 120 x 549 mm (W x H x D), 3 kg <sup>(1)</sup>
AX2090-BW50-1600	external ballast resistor for AX5x01 to AX5112 (stand-alone), 1.6 kW/47 Ω, 185 x 120 x 649 mm (W x H x D), 5.8 kg <sup>(1)</sup>
AX2090-BW51-1000	external ballast resistor for AX5118 to AX5140 (stand-alone) and in combination with ballast unit AX5021, 1 kW/23 Ω, 92 x 120 x 749 mm (W x H x D), 4 kg <sup>(2)</sup>
AX2090-BW51-3000	external ballast resistor for AX5118 to AX5140 (stand-alone) and in combination with ballast unit AX5021, 3 kW/23 Ω, 355 x 255 x 490 mm (W x H x D), 8 kg <sup>(2)</sup>
AX2090-BW51-6000	external ballast resistor for AX5118 to AX5140 (stand-alone) and in combination with ballast unit AX5021, 6 kW/23 Ω, 455 x 255 x 490 mm (W x H x D), 12 kg <sup>(2)</sup>
AX2090-BW52-3000	external ballast resistor for AX5160 and AX5172 (stand-alone), 3 kW/13.2 Ω, 355 x 260 x 490 mm (W x H x D), 9.5 kg <sup>(3)</sup>
AX2090-BW52-6000	external ballast resistor for AX5160 and AX5172 (stand-alone), 6 kW/13 Ω, 455 x 260 x 490 mm (W x H x D), 13 kg <sup>(3)</sup>
AX2090-BW53-3000	external ballast resistor for AX5190 and AX5191 (stand-alone), 3 kW/10.2 Ω, 355 x 255 x 490 mm (W x H x D), 9.5 kg <sup>(4)</sup>
AX2090-BW53-6000	external ballast resistor for AX5190 and AX5191 (stand-alone), 6 kW/10 Ω, 455 x 260 x 490 mm (W x H x D), 13 kg <sup>(4)</sup>
AX2090-BW54-3000	external ballast resistor for AX5192 and AX5193 (stand-alone), 3 kW/6.6 Ω, 355 x 255 x 490 mm (W x H x D), 9.5 kg <sup>(4)</sup>
AX2090-BW54-6000	external ballast resistor for AX5192 and AX5193 (stand-alone), 6 kW/6.5 Ω, 455 x 260 x 490 mm (W x H x D), 13 kg <sup>(4)</sup>

Recommended interface cables: <sup>(1)</sup> ZK4000-2101-2xxx (1.5 mm<sup>2</sup>), <sup>(2)</sup> ZK4000-2102-2xxx (2.5 mm<sup>2</sup>), <sup>(3)</sup> ZK4509-8025-xxxx (4 mm<sup>2</sup>), <sup>(4)</sup> ZK4000-2104-2xxx (6 mm<sup>2</sup>)

## AX5000 motor chokes

Ordering information	AX2090-MD50-00xx   Motor chokes
AX2090-MD50-0012	motor choke for AX5000 (1.5...12 A), up to 12 A rated current, necessary for motor cable ≥ 25 m, max. 100 m, with integrated connection cable (150 mm)
AX2090-MD50-0025	motor choke for AX5000 (18...25 A), up to 25 A rated current, necessary for motor cable ≥ 25 m, max. 50 m, with integrated connection cable (150 mm)



# Accessories for AX8000 Servo Drives at AM8xxx

Motor cables 1 mm<sup>2</sup> with iTec plug system for AM801x, AM802x, AM803x and AM853x at AX8108 and AX8206

Ordering information	Motor cable with 1 mm <sup>2</sup> wire gauge, highly flexible for drag-chain use
ZK4800-8022-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 81 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1 mm <sup>2</sup> + (2 x 0.75 mm <sup>2</sup> ) + (2 x AWG22))
ZK4800-8022-0050	example for 5 m length
ZK4501-8022-xxxx	extension cable

Motor cables 1.5 mm<sup>2</sup> with M23 speedtec<sup>®</sup> plug for AM883x and AM8x4x up to AM8x6x (up to winding code P) at AX8108 and AX8206

Ordering information	Motor cable with 1.5 mm <sup>2</sup> wire gauge, fixed installation
ZK4800-8003-xxxx	cables for fixed installation min. bending radius = 61 mm (5 x OD), (4 x 1.5 mm <sup>2</sup> + (2 x 0.75 mm <sup>2</sup> ) + (2 x AWG22))
ZK4800-8003-0050	example for 5 m length
ZK4501-8003-xxxx	extension cable

Ordering information	Motor cable with 1.5 mm <sup>2</sup> wire gauge, highly flexible for drag-chain use
ZK4800-8023-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 89 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1.5 mm <sup>2</sup> + (2 x 0.75 mm <sup>2</sup> ) + (2 x AWG22))
ZK4800-8023-0050	example for 5 m length
ZK4501-8023-xxxx	extension cable

Motor cables 2.5 mm<sup>2</sup> with M23 speedtec<sup>®</sup> plug for AM8x4x up to AM8x6x (up to winding code P) at AX8118

Ordering information	Motor cable with 2.5 mm <sup>2</sup> wire gauge, fixed installation
ZK4800-8004-xxxx	cables for fixed installation min. bending radius = 69 mm (5 x OD), (4 x 2.5 mm <sup>2</sup> + (2 x 1 mm <sup>2</sup> ) + (2 x AWG22))
ZK4800-8004-0050	example for 5 m length
ZK4501-8004-xxxx	extension cable

Ordering information	Motor cable with 2.5 mm <sup>2</sup> wire gauge, highly flexible for drag-chain use
ZK4800-8024-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 97 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 2.5 mm <sup>2</sup> + (2 x 1 mm <sup>2</sup> ) + (2 x AWG22))
ZK4800-8024-0050	example for 5 m length
ZK4501-8024-xxxx	extension cable

## Brake energy management

Ordering information	AX2090-BW80-xxxx   Ballast resistors
AX2090-BW80-1000	external ballast resistor for AX8620-1000 and AX8640-0000 supply modules, 1.0 kW, 18 Ω <sup>(1)</sup>
AX2090-BW80-1600	external ballast resistor for AX8620-0000 supply modules, 1.6 kW, 33 Ω <sup>(1)</sup>
AX2090-BW80-2000	external ballast resistor for AX8640-1000 supply modules, 2.0 kW, 8 Ω <sup>(2)</sup>
AX2090-BW80-3000	external ballast resistor for AX8640-0000 supply modules, 3.0 kW, 15 Ω <sup>(2)</sup>

Recommended interface cables: <sup>(1)</sup> ZK4000-2101-2xxx (1.5 mm<sup>2</sup>), <sup>(2)</sup> ZK4000-2102-2xxx (2.5 mm<sup>2</sup>)

# Accessories for Linear Motors ALxxxx

## MES feedback system for Linear Servomotors

The MES supplies one sine oscillation per logical motor revolution. Since no graduated rule has to be installed, the MES is an inexpensive feedback solution for linear motors.

Ordering information	AL2200-000x   Feedback system	Pict.
AL2200-000x	magnetic encoder system (MES) for AL2000, AL2400 and AL2800 Linear Servomotors	A

Option x = 0: without connector plug, x = 1: with connector plug

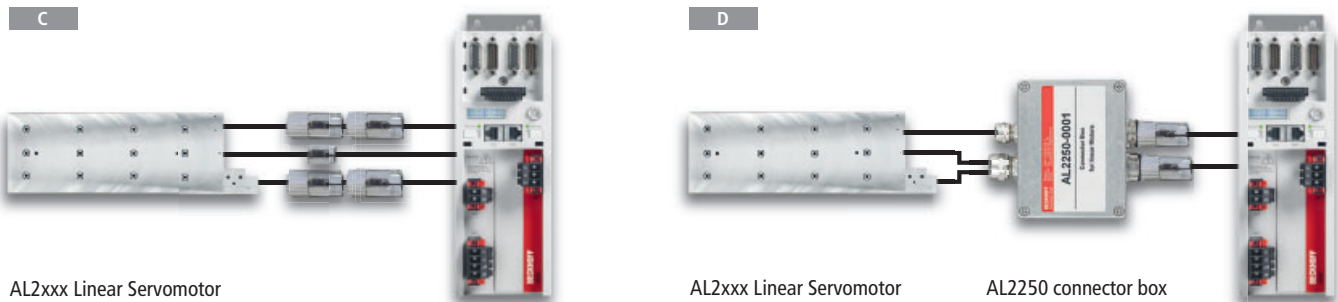
## Connector box for ALxxxx

The AL225x connector boxes facilitate wiring between linear motor and the Servo Drive. They are mounted on the linear slide and move with the motor. The motor cable, the thermal protection contact cable and the encoder cable are inserted into the box through cable glands and connected to the terminal strip. The temperature contact is linked to the motor and encoder cable, so that no thermal protection contact cable is required. The standard motor and encoder cables are connected on the other side of the boxes.

Ordering information	AL225x-0001   Connector box	Pict.
AL2250-0001	connector box for AL2003-AL2830-0001 and AL2830-1000	B
AL2255-0001	connector box for AL2830-1001 and AL2845-1000	
AL2256-0001	connector box for AL2845-1001	

## Installation options Linear Servomotors/connector box

Cable	AX5000	C	AX5000 + AL2250	D
Motor cable	ZK4500-0023			
Thermal protection contact cable	ZK4540-0020		–	
Encoder cable for MES or absolute encoder	ZK4510-0020			
Encoder cable for encoder with zero pulse	ZK4520-0020			
Coil and feedback system	with connector plugs		without connector plugs	





## Motor cable 1.5 mm<sup>2</sup> for ALxxxx at AX5000 (1.5 A...12 A)

Ordering information	Motor cable with 1.5 mm <sup>2</sup> wire gauge, highly flexible, for drag-chain use	Pict.
ZK4500-0023-xxxx	highly flexible, drag-chain useable cable (5 million bending cycles), max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 87 mm (7 x OD), max. chain length horizontal 20 m, vertical 5 m, length < 25 m, (4 x 1.5 mm <sup>2</sup> + 2 x (2 x 0.75 mm <sup>2</sup> ))	E
ZK4500-0023-0050	example for 5 m length	
ZK4502-0023-xxxx	length ≥ 25 m	
ZK4509-0023-xxxx	not assembled	
ZK4501-0023-xxxx	extension cable	F

## Motor cable 2.5 mm<sup>2</sup> for ALxxxx at AX5000 (18...25 A)

Ordering information	Motor cable with 2.5 mm <sup>2</sup> wire gauge, highly flexible, for drag-chain use	Pict.
ZK4500-0024-xxxx	highly flexible, drag-chain useable cable (5 million bending cycles), max. 240 m/min, max. 30 m/s <sup>2</sup> , bending radius = 95 mm (7 x OD), max. chain length horizontal 20 m, vertical 5 m, length < 25 m, (4 x 2.5 mm <sup>2</sup> + 2 x (2 x 1 mm <sup>2</sup> ))	E
ZK4500-0024-0050	example for 5 m length	
ZK4502-0024-xxxx	length ≥ 25 m	
ZK4509-0024-xxxx	not assembled	
ZK4501-0024-xxxx	extension cable	F



## Encoder cable (absolute encoder) for ALxxxx and AL2250 at AX5000

Ordering information	Encoder cable with 0.14 mm <sup>2</sup> wire gauge, highly flexible, for drag-chain use	Pict.
ZK4510-0020-xxxx	highly flexible, drag-chain usable cable (5 million bending cycles), max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 53 mm (7 x OD), max. chain length: horizontal = 20 m, vertical = 5 m, (7 x 2 x 0.14 mm <sup>2</sup> + 2 x 0.5 mm <sup>2</sup> )	A
ZK4510-0020-0050	example for 5 m length	
ZK4511-0020-xxxx	extension cable, highly dynamic, suitable as trailing cable	B
ZK4519-0020-xxxx	not assembled	

## Encoder cable (SinCos encoder with zero pulse) for ALxxxx and AL2250 at AX5000




Ordering information	Encoder cable with 0.14 mm <sup>2</sup> wire gauge, highly flexible, for drag-chain use
ZK4520-0020-xxxx	highly flexible, drag-chain usable cable (5 million bending cycles), max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 53 mm (7 x OD), max. chain length: horizontal = 20 m, vertical = 5 m, (7 x 2 x 0.14 mm <sup>2</sup> + 2 x 0.5 mm <sup>2</sup> )

## Thermal protection cable for ALxxxx at AX5000

Ordering information	Thermal protection cable with 0.14 mm <sup>2</sup> wire gauge, highly flexible, for drag-chain use	Pict.
ZK4540-0020-xxxx	highly flexible, drag-chain usable cable (5 million bending cycles), max. 240 m/min, max. 30 m/s <sup>2</sup> , min. bending radius = 38 mm (7 x OD), max. chain length: horizontal = 20 m, vertical = 5 m, (2 x 2 x 0.14 mm <sup>2</sup> )	C

Note: required if no connector box is used.

## Connectors for AMxxxx, ALxxxx servomotors and cables

Ordering information		Pict.
ZS4000-2030	EMC thermo-protective plug (female), D-sub, 9-pin, for AL2000, AL2400, AL2800 linear motors (counterpart to thermostat contact at AX5000 Servo Drive)	
ZS4000-2040	EMC power coupling (male), M23, 8-pin, for motor cable extension ZK4501-00x3-xxxx and ZK4501-00x4-xxx (counterpart to motor cable ZK4500-00x3-xxxx and ZK4500-00x4-xxxx)	
ZS4000-2100	metal flange for motor cable, iTec, M23 and feedback cable with iTec, to adjust the connector, including sealings	
ZS4000-2101	metal flange for feedback cable, M23, to adjust the connector, including sealings	
ZS4000-2102	EMC power connector (female), iTec, 9-pin, for motor cable ZK4704-0411-xxxx (counterpart to motor socket AM3100/AM8100)	
ZS4000-2104	EMC power connector (female), M23, 9-pin, for motor cable ZK450x-80x3-xxxx and ZK450x-80x4-xxxx (counterpart to motor socket AM8000/AM8500)	
ZS4000-2105	EMC resolver connector (female), iTec, 12-pin, for resolver cable ZK453x-8110-xxxx (counterpart to motor socket AM801x, AM802x, AM803x, AM853x)	
ZS4000-2106	EMC resolver connector (female), M23, 12-pin, for resolver cable ZK453x-8010-xxxx (counter part for motor socket AM8x4x up to AM8x7x)	
ZS4000-2107	EMC power connector (female), iTec, 9-pin, for motor cable ZK450x-8022-xxxx and ZK4704-0421-xxxx (counter part for motor socket AM80xx/AM81xx/AM85xx with iTec)	

