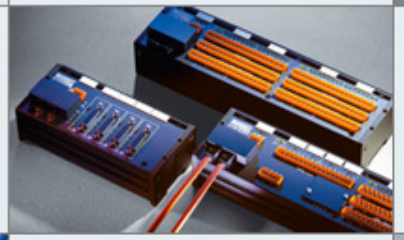
Beckhoff Drive Technology

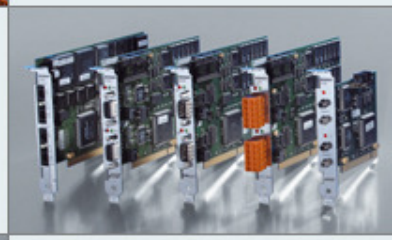
Beckhoff
Industrial PC

Beckhoff
Lightbus



Beckhoff
TwinCAT

Beckhoff
Embedded PC



Beckhoff
Bus Terminal

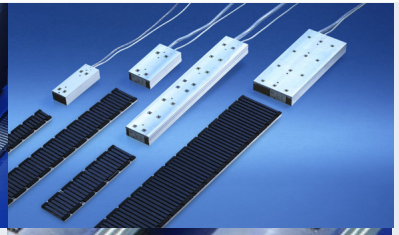
Beckhoff
Fieldbus Box

Beckhoff
PC Fieldbus
Cards, Switches

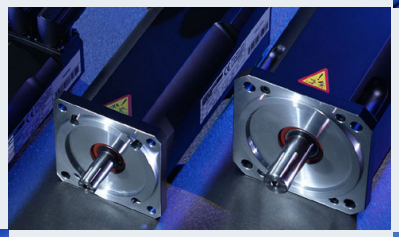
Beckhoff
EtherCAT

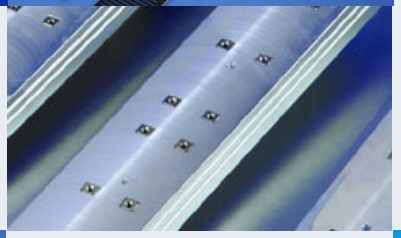
Beckhoff
Drive Technology

The drive system for high dynamic positioning tasks



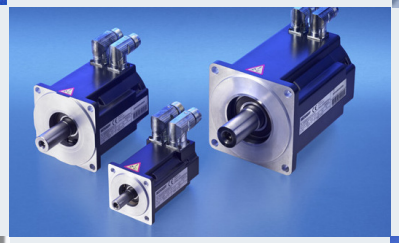
Synchronous Servomotors AM2000





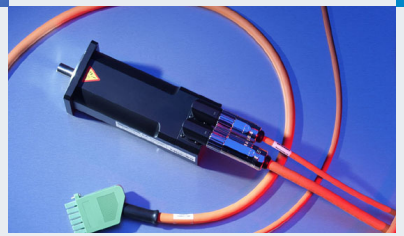
Linear Servomotors AL2xxx

Synchronous Servomotors AM3000



Hydraulic Controller AH2000

Digital Compact Servo Drive AX2000



Accessories

Digital Compact Servo Drive AX2500

Digital Compact Servo Drive AX2000

- drive for Synchronous Servomotors AM2000, AM3000 and Linear Servomotors AL2xxx
- regulation of torque, speed, or position
- wide voltage range
  230 $V^{-10\%}$...480 $V^{+10\%}$
- standard versions are available in 4 current ratings
- integrated power supply, mains filters
- compact design
- easy to wire because of pre-assembled resolver, encoder and power leads

Digital Compact Servo Drive AX2000

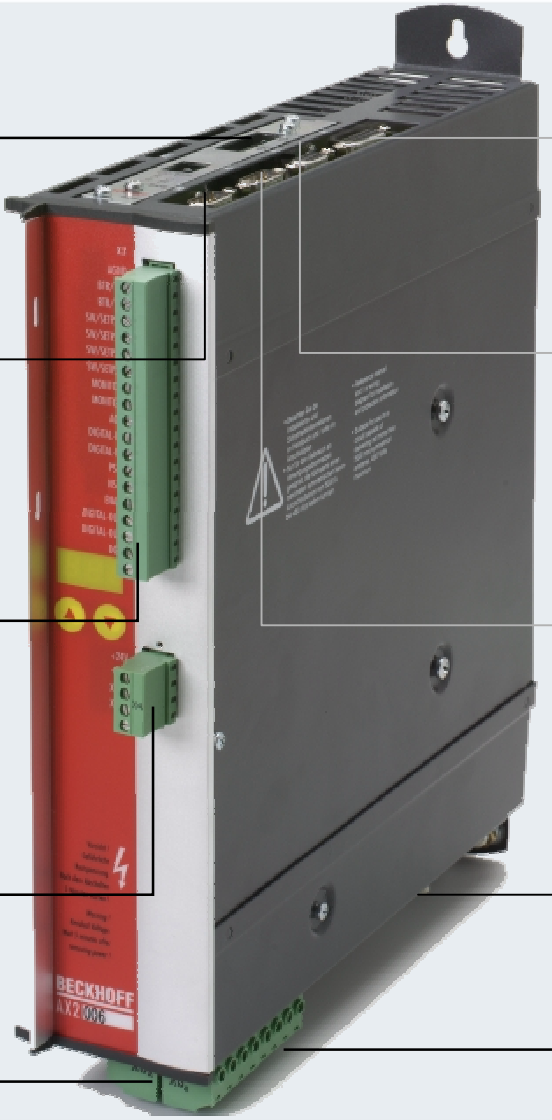
„Beckhoff Fieldbus Connect“-
variable fieldbus connection

RS 232 interface for
parameterization and
CANopen interface

Control signals
(electrically isolated) - ready
to operate, relays, set value
inputs. monitor outputs,
digital inputs/outputs,
enable input, analog/digital
signal grounds

24 V DC auxiliary supply
voltage

Mains connection,
connection for external
ballast resistor



Input for high resolution
feedback unit sine-cosine
encoder or absolute encoder

Input for feedback
unit
(resolver)

Encoder emulation,
Input for encoder control
(master-slave operation),
Pulse-direction input

Connection for motor
and brake

DC intermediate circuit

Servo Drive AX2000: Features

The most modern power electronics in a compact practical size:

- internal 32 bit microprocessor provides high quality control, with sampling times down to 62 µs
- variable fieldbus connection for easy integration into a variety of control environments
  - Lightbus
  - Profibus
  - SERCOS interface
  - CANopen
  - DeviceNet
  - ControlNet
  - Ethernet

Servo Drive AX2000: Technical data

Technical data	AX2003	AX2006	AX2010	AX2020
Rated output current	3 A	6 A	10 A	20 A
Peak output current (max. approx. 5 s 3%)	6 A_{rms}	12 A_{rms}	20 A_{rms}	40 A_{rms}
Rated supply voltage	3 x (230 .. 480) V AC ± 10%. 50 ... 60 Hz			
Rated installed load for S1 operation	2 kVA	4.2 kVA	7 kVA	14 kVA
Rated intermediate circuit DC voltage	(310-675) V DC			
Continuous power of regen circuit (RBint)	80 W	200 W	200 W	200 W

Fieldbus Connectivity	Lightbus	Profibus	Interbus	CANopen	DeviceNet	ControlNet	Sercos	RS232 RS485	Ethernet	USB
	-B200	-B310	on request	On-board	-B520	on request	-B750	on request	-B900	on request

Digital Compact Servo Drive AX2500

- AX2500 Servo Drives are fully software compatible to AX2000
- in its maximum configuration the multi-axis system comprises 8 axes (1 supply module and 7 axis modules)
- AX2500 can be used for motors with resolver or single-turn/multi-turn absolute encoder
- significantly reduced wiring and commissioning effort compared to single axes
- variable fieldbus connection: (Lightbus, Profibus DP, SERCOS interface und CANopen)
- compact, cost optimised servo system
- flexibly adaptable to the respective requirements

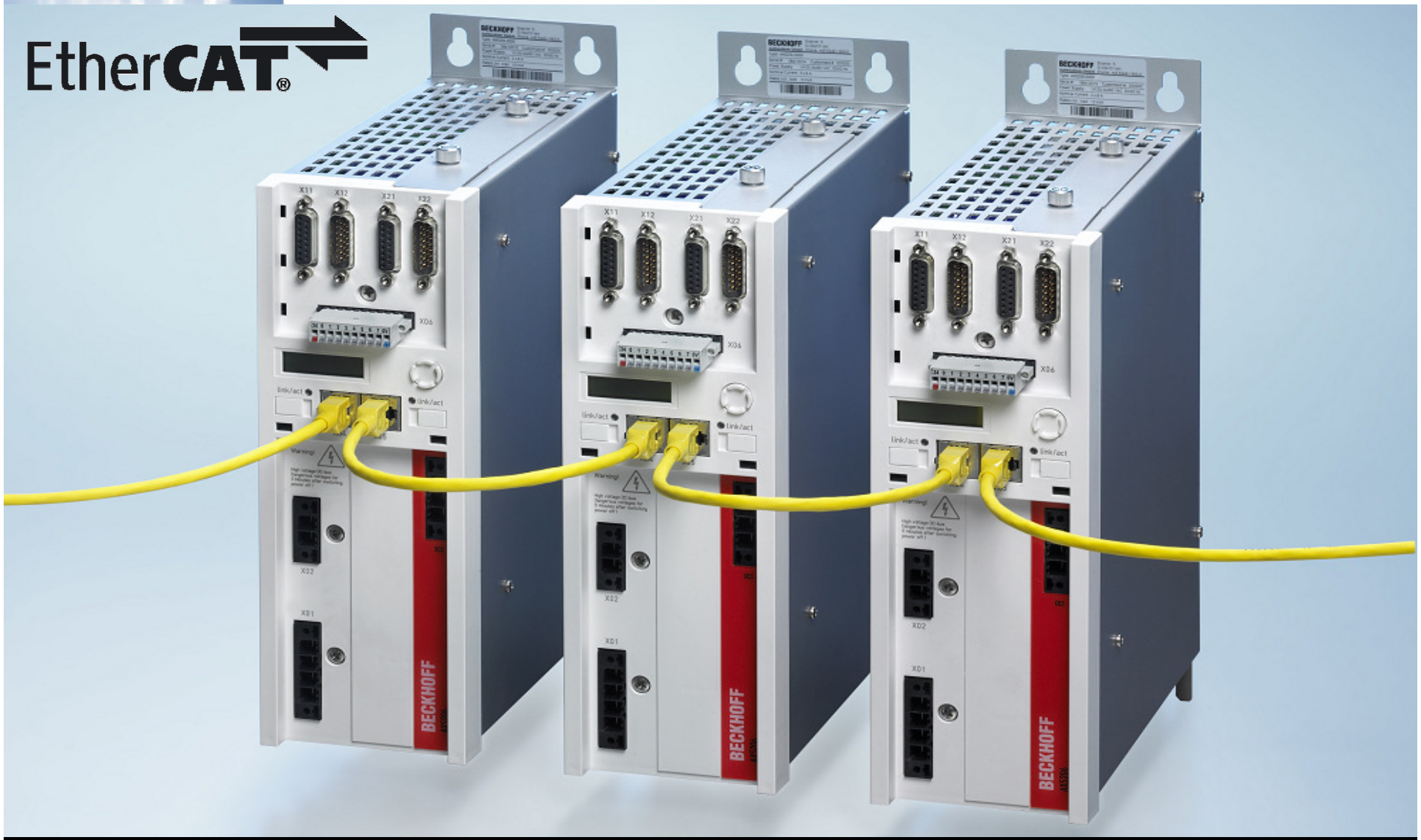
Digital Compact Servo Drive AX2500: Technical data

Technical data	AX2503	AX2506	AX2513	AX2516	AX2523	AX2526
Function	master module	master module	master module	master module	axis module	axis module
Rated supply voltage	1 x 115 … 3 x 230 VAC ± 10%. 50 … 60 Hz		3 x (230 …400) V AC ± 10% 50 … 60 Hz		-	-
Max. installed power for 51 operation multi-axis systems	7 kVA	7 kVA	12 kVA	12 kVA	-	-
Rated DC-link voltage	(160-310) V DC	(160-310) V DC	(310-560) V DC	(310-560) V DC	160-560) V DC	160-560) V DC
Rated output current (rms value 3%)	3 A_{rms}	6 A_{rms} with attached fan	3 A_{rms}	6 A_{rms} with attached fan	3 A_{rms}	6 A_{rms} with attached fan
Peak output current (max. approx. 5 s 3%)	9 A_{rms}	12 A_{rms} with attached fan	9 A_{rms}	12 A_{rms} with attached fan	9 A_{rms}	12 A_{rms} with attached fan
Continuous output ballast circuit (RBint)	40 W	40 W	40 W	40 W	-	-

Feldbus-Connectivity	Lightbus	Profibus	Interbus	CANopen	DeviceNet	ControlNet	Sercos	RS232 RS485	Ethernet	USB
	-B200	-B310	o. r.	-B510	o. r.	o. r.	-B750	o.r.	i. p.	o. r.

AX5000 – Motion control for high dynamic positioning

AX5000 | Digital Compact Servo Drive



AX5000 | Technical highlights

- high-speed capture inputs 11µs or 20µs
- wide voltage range 100 … 480 V AC
- integrated mains filter
- integration of safety functions (optional)
  - restart lock
  - TwinSAFE: intelligent safety functions for Motion Control *in prep.*
- compact design for simple control cabinet installation (for 300 mm depth)
- AX-Bridge – the quick connection system for power supply, DC link and control voltage
- variable cooling concept (fanless, forced cooling, cold plate)

AX5000 | EtherCAT optimized

EtherCAT – high performance system communication in drive control

- Short cycle time and synchrony
- EtherCAT working drives
- High precision synchrony by Distributed-Clocks
- High speed Latch with Time Stamp, e.g. “print mark control outer web”
- Ultra High speed Communication update time:
  - 100 drives in 100 µs
  - 1000 shared I/Os in 30 µs
- High speed control algorithm
  - Current controller up to 31,25 µs cycle time for high dynamic iron less linear motor control *in prep.*
  - Speed controller in 125 µs
  - Position controller in 250 µs
- Clear line topology, flexible sideline
- Easy wiring by standard cable
- Easy to scan
  - Link brake detecting and finding
  - Protocol, hardware and the Topologies make it possible to detect the individual quality of each link

AX51xx | 1-channel Servo Drive

1-axis Servo Drive for motors up to 12 A rated current

AX51xx | 1-channel Servo Drive

1-axis Servo Drive for motors up to 18/25 A rated current

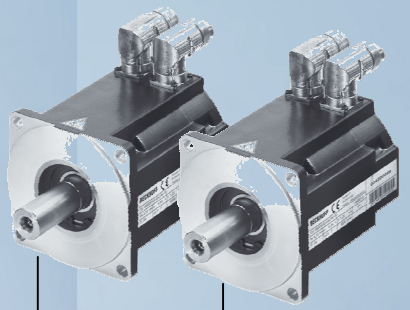
AX51xx | Technical data

Technical data	AX5101	AX5103	AX5106	AX5112	AX5118	AX5125
Rated output current	1 x 1 A	1 x 3 A	1 x 6 A	1 x 12 A	1 x 18 A	1 x 25 A
Rated supply voltage	1 x 100 … 3 x 480 VAC +/- 10 %					
DC link voltage	125… 790 VDC					
Peak output current (1)	4,5 A	7,5 A	13 A	26 A	36 A	50 A
Rated connected load for S1-operation on 480V	1,2 kVA	2,5 kVA	5 kVA	10 kVA	15 kVA	20,8 kVA
Continuous braking power (2)	50 W	50 W	150 W	50W	200W	200W
max. braking power (2)	7 kW			14 kW	28 kW	

(1) Irms for max. 7 s
(2) internal brake resistor

AX52xx | 2-channel Servo Drive

2-axis Servo Drive for two motors with a total current up to 12 A.



AX52xx | Technical data

Technical data	AX5201	AX5203	AX5206
Rated output current	2 x 1.5 A	2 x 3 A	2 x 6 A
Rated supply voltage	1 x 100 … 3 x 480 VAC +/- 10 %		
DC link voltage	125 … 790 VDC		
Peak output current (1)	7,5 A	12 A	26 A
Rated connected load for S1-operation	2,5 kVA	5 kVA	10 kVA
Continuous braking power (2)	50 W	150 W	50 W
max. braking power (2)	2,8 kW		

(1) Irms for max. 7 s
(2) Internal brake resistor

AX5000 | Cycle times and clock frequencies

Different cycle times for various application requirements

- **31.25 µs current control loop for high dynamic linear motors** ***in prep.***
- **4 kHz frequency for minimum power dissipation**

EtherCAT (minimum)	Position loop	Speed loop	Current loop	IGBT switching	Motor cable
31.25 µs	125 µs	125 µs	31.25 µs	16 kHz	32 kHz
62.5 µs	125 µs	125 µs	62.5 µs	8 kHz	16 kHz
62.5 µs	125 µs	125 µs	125 µs	4 kHz	8 kHz

AX5xxx | Features

Motor feedback:
Sin/Cos 1 Vss, TTL, single- od. multi-turn EnDat, Hiperface, BiSS

Motor feedback:
Resolver

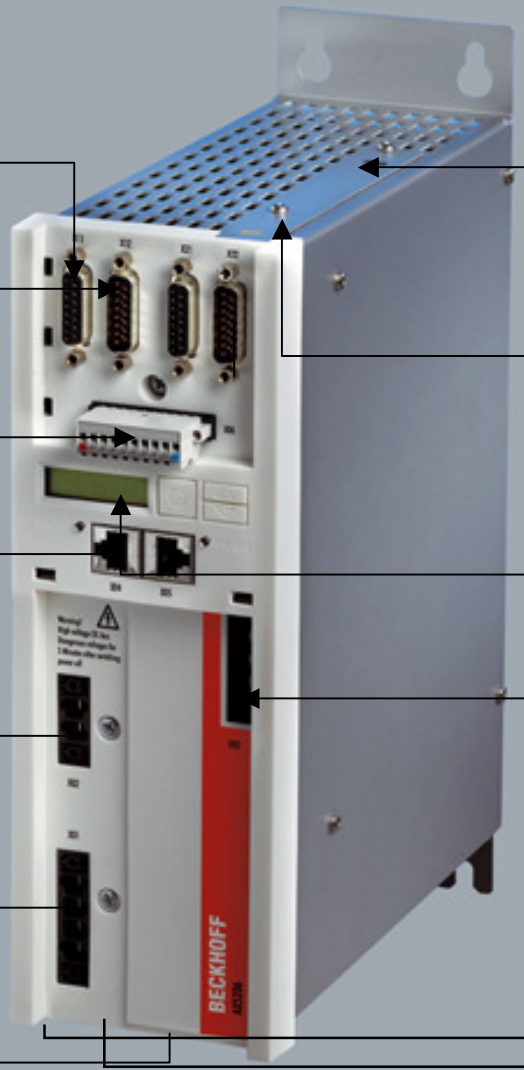
8 digital I/Os, e.g. enable, limit switch, capture input, error message

EtherCAT system bus

DC power supply/
DC link

Power supply
100 V AC .... 480 V AC

Brake control/motor temperature monitoring



Optional slot for interface boards, e. g. additional feedback

Optional slot for restart lock or optional TwinSAFE safety cards

Status display, e. g. axis identifier or error message

24 V DC control and braking voltage

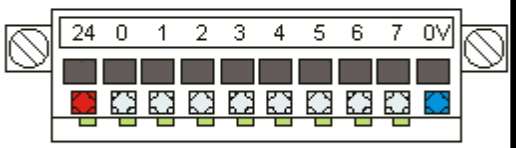
Motor circuits

X06: Digitale I/Os

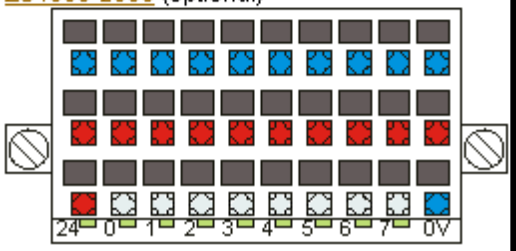
X06: Digitale I/Os

I/O-Steckverbinder ohne LEDs
ZS4500-2006

I/O-Steckverbinder mit LEDs
ZS4500-2007 (optional)



ZS4500-2008 (optional)



Terminal	Signal	Factory setting	
		AX51xx	AX52xx
24	Output 24V DC !!!		
0	Input 1	Enable	Enable Achse 1
1	Input 2	P-Stop	
2	Input 3	N-Stop	
3	Input 4		
4	Input 5		
5	Input 6	Capture	Capture Axis 1
6	Input 7	Capture	Capture Axis 2
7	Input 8 or Output	Error	
0V	Ground/DC 0V		

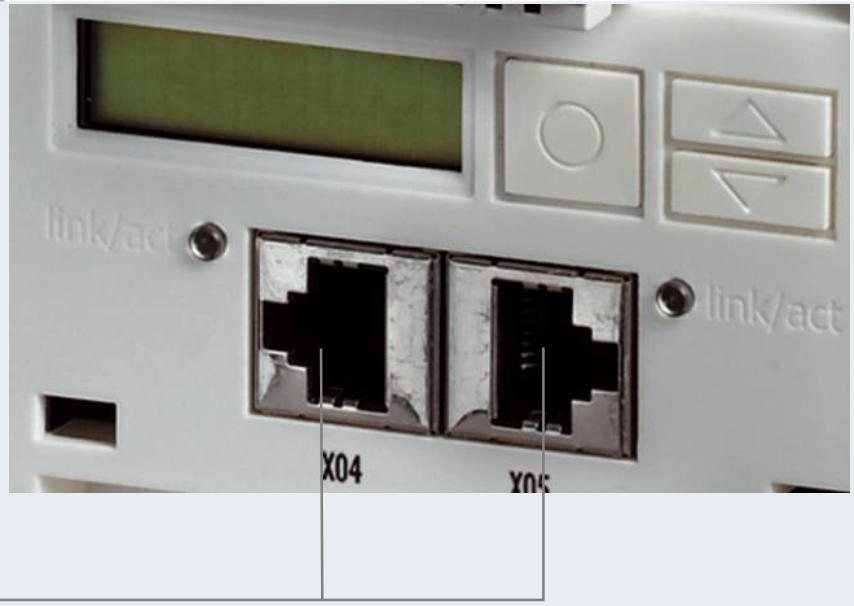
AX5000 | Digital inputs

Number:
7 inputs/
1 I/O per device

Functions:
- **limit switches pos./neg.**
- **Enable**
- **amplifier lock with stator short cut braking**
- **Capture (2x)**

Reaction time:
11 µs

AX5xxx | Communication



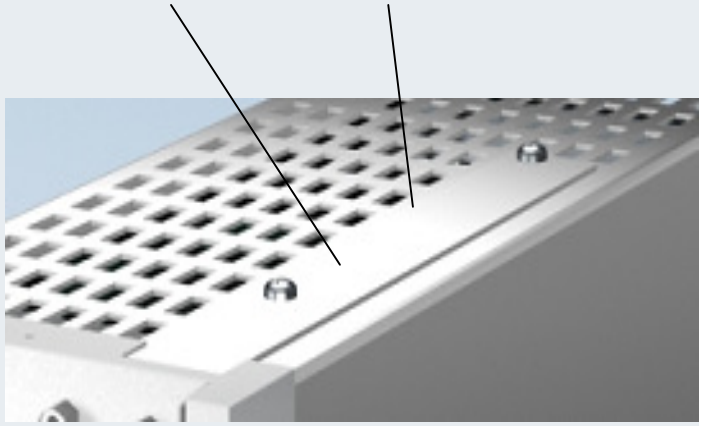
- High speed EtherCAT- as system bus
  SERCOS-Profile IEC61491 for Servo drives implemented
- Other field bus by external Gateways

AX5xxx | Options

Optional slots for interface boards:

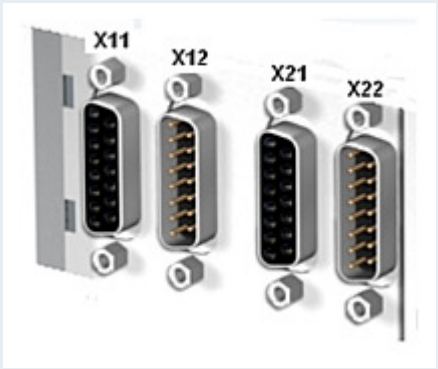
- **safety for Motion Control (Slot 1)**
- **additional feedback interface, e.g. SSI (Slot 2)**
- **I/Os (capture, etc.) (Slot 2)**
- **customer specific interface boards (Slot 2)**

Slot 1 **Slot 2**



AX5000 | Multi feedback interface

- all common feedback systems on-board – no additional interface necessary
  - Resolver
  - TTL encoder *with P160*
  - Sinus wave 1 Vpp *with P160*
  - EnDAT, single and multi turn
  - Hiperface, single und multi turn
  - BiSS, single und multi turn
- support of electronic motor name plates



Multi-Feedback-Interface

Pin	Signal: high resolution Feedback		
	EnDAT/Biss	Hiperface	Sinus/ Cosinus 1Vss
1	Cos B+	Cos B+	Cos B+
2	GND UP_5V	GND UP_9V	GND UP_5V
3	SIN A+	SIN A+	SIN A+
4	UP_5V	n.c.	UP_5V
5	DX+ (Data)	DX+ (Data)	n.c.
6	n.c.	UP_9V	n.c.
7	REF N-	UP_9V	REF N-
8	CLK+ (Clock)	n.c.	n.c.
9	REFCOS B-	REFCOS B-	REFCOS B-
10	GND_Sense	n.c.	GND_Sense
11	REFSIN A-	REFSIN A-	REFSIN A-
12	UP_5V_Sense	n.c.	UP_5V_Sense
13	DX- (Data)	DX- (Data)	n.c.
14	N+	N+	N+
15	CLK- (Clock)	n.c.	n.c.

X03: 24 VDC Supply

Control voltage supply by connector X3. The 24V supply has two lines, in this way brake and control supply can be handled separately. In case of unused Up, please connect Up-Us. By connecting motor holding brake , please pay attention to voltage tolerance.

Connector	Signal
Up	24 VDC -0 / +15% : Peripherie (for example, Motor break voltage)
Us	24 VDC +/-15% : control unit voltage
GND	GND

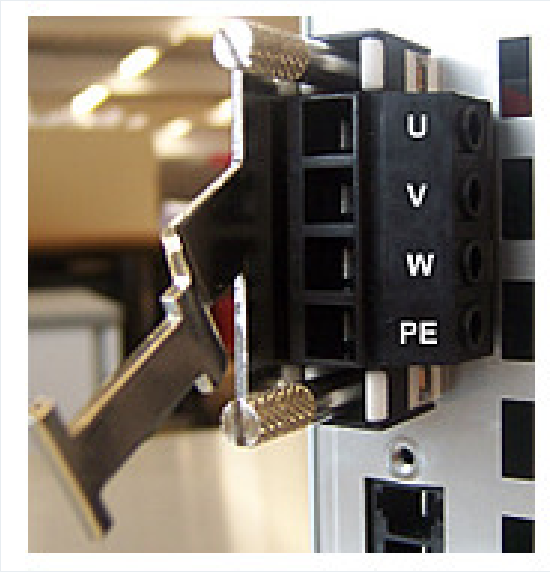
Main power

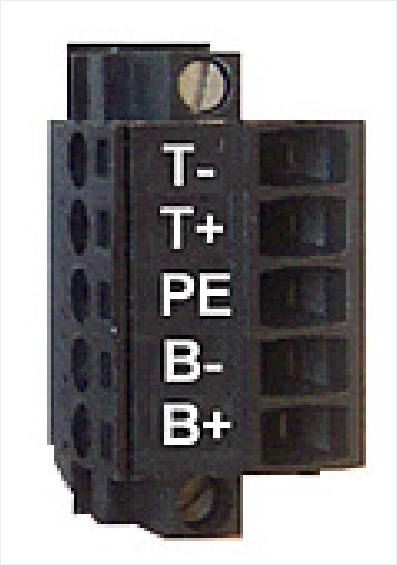
X01: Power input-

from single phase 100 VAC up to 3-phase 480 VAC. In case of single phase supply connect phase to L1 and N to L3.

Terminal	Connection	
	3-phase	1-phase
L1	Phase L1	Phase L1
L2	Phase L2	n.c.
L3/ N	Phase L3	Neutral wire
PE	Protective earth	Protective earth

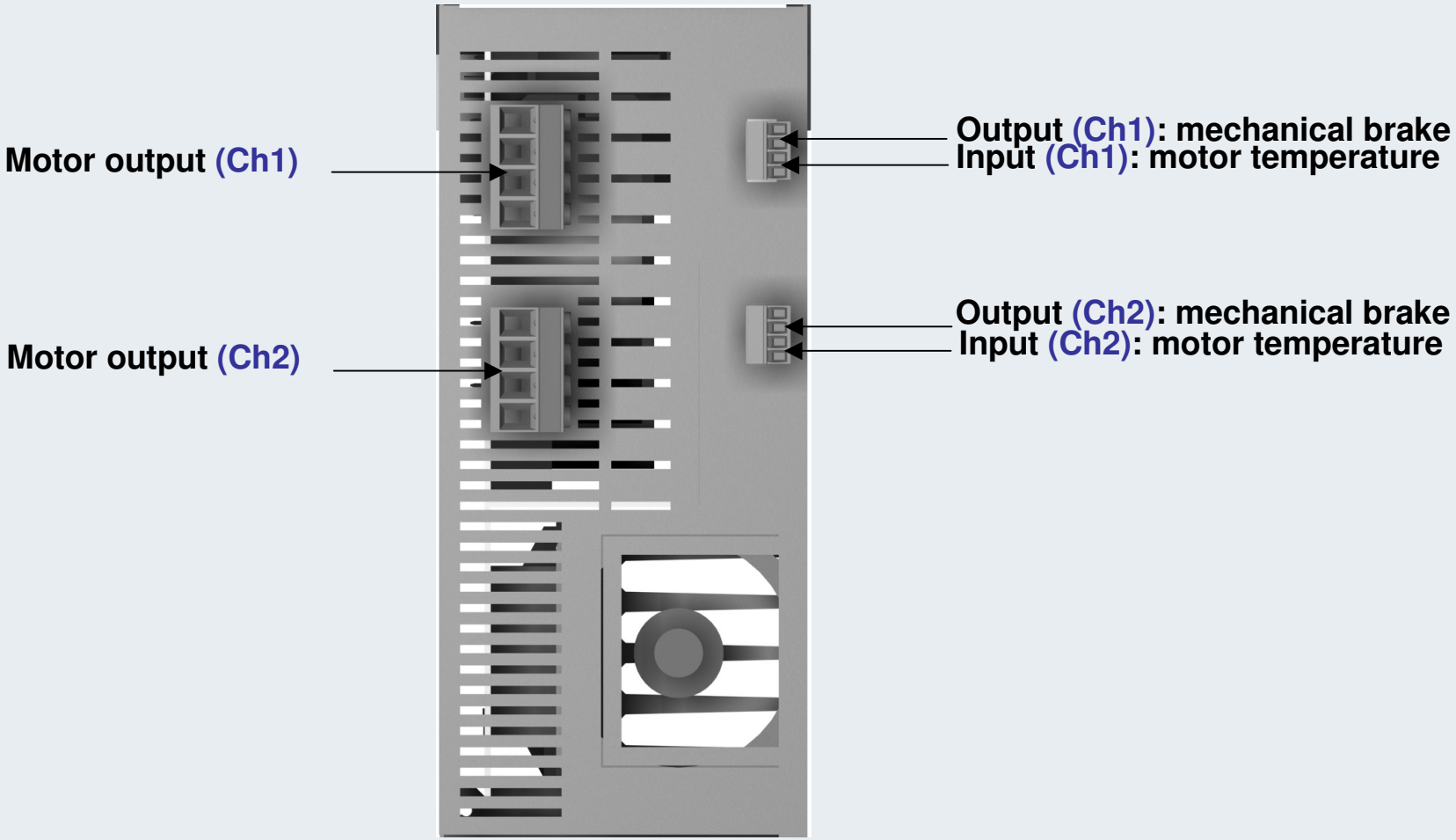
X13 (A), X23 (B): Motor terminal





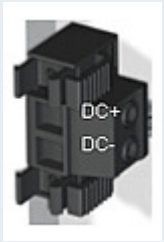
Terminal	Signal
U	Motor U
V	Motor V
W	Motor W
PE	Protect earth
Shield	Shield

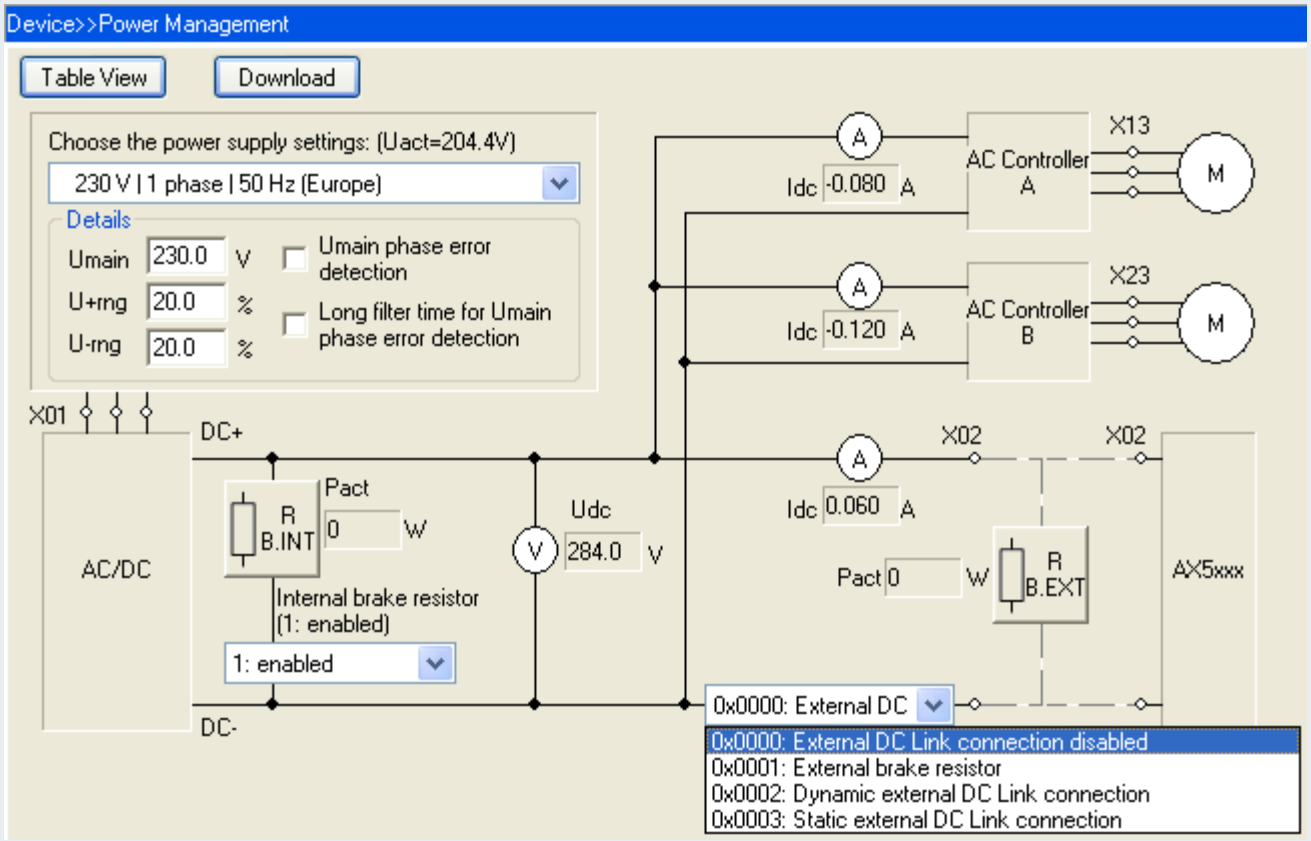
AX5000 | Motor terminal



X02: DC Link Bus

By terminal X2, DC bus coupling or direct DC power supply is possible.





AX5000 | Active DC link

- DC link automatically connected only for regenerative energy flow
- short circuit proof DC link connection
- distributed braking by using all connected braking resistors
- external chopper module for high regenerative energy *in prep.*

AX5000 | Variable cooling concept

- max. operation temperature: 50°C
- fanless operation up to 2 x 3 A or 1 x 6 A
- temperature controlled forced cooling, starting at 2 x 6 A or 1 x 12 A
- internal air flow channel separated from electronic parts, by thus no contamination
- Cold Plate *in prep.*
  - plane back plane for cold plate assembly
  - thereby realisation of protection class IP 65

AX5xxx | System modules

AX5001 | DC link expansion *in prep.*
- brake energy can be stored and reused for next acceleration process
- Short circuit proof
- can be combined with multi-axis systems through AX-Bridge
- EtherCAT interface for parameterisation and diagnosis

AX5021 | Brake module *in prep.*
- with internal 250 W braking resistor and active cooling
- integrated brake chopper for external braking resistor up to 6 kW
- EtherCAT interface for parameterisation and diagnosis

AX5041 | Energy recovery module *in prep.*
- mains inverter for feeding brake energy back into the supply network
- EtherCAT interface for parameterisation and diagnosis

AX59xx | AX-Bridge quick connection system

AX5911
- connection module with power rail system for multi-axis systems
- current carrying capacity up to 85 A according to UL/cSA
- simple, wireless connection

Connection module AX5901

AX5911
- Connection: supply or DC-link voltage and 24 V DC for control

AX5000 | Status display

2 rows x 16 characters with backlight

Advantages:

- comfortable device diagnosis and maintenance
- axis identifier for two channel devices
- display of axis status and errors, also without EtherCAT communication
- error messages as plain text

SERCOS-Profile for servo drives

To bring the motion control to an existing standard the SERCOS – Profile IEC 61491 was implemented.

This offer the user an easy and optimal setup.

<u>Sercos S- and P- Parameter:</u>

This SERCOS profile differs two main groups of parameter.

The standard parameter e.g. :
S-0-0001 ⇨ NC ⇨ Cycle time (TNcyc)

Product specific parameter e.g. :
P-0-0001 ⇨ Switching frequency of the IGBT module

The storage concept

Compared to the AX2000 the modified drive parameters are not stored inside the Drive, there is only the default setup as part of the Drive firmware.

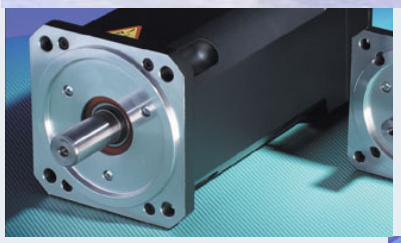
e.g. by changing the parameter „Motor“ , the new setup has to be added to the „Startup List“.

After „saving“ the „Startup List“ and “Activate configuration”, it becomes a part of the System Manager file *.tsm and will be handled from the system manager.

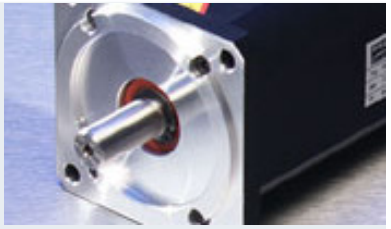
Synchronous Servomotors AM 2000

AM2000, in connection with digital servo drives, are excellent suited to positioning tasks that make high demands on dynamics and stability

- **outstanding quality**
- **highly dynamic**
- **rotors have low moments of inertia**
- **excellent rotational characteristics**
- **overload capacity**



Servomotors AM2000: Features



- high dynamic performance caused by neodymium magnets
- flange dimensions meet IEC standard
- fit j6, accuracy according DIN 42955, tolerance class R
- vibration class N according to DIN ISO 2373
- insulation material class F according to DIN 57530
- style IM B5 according to DIN 42950
- shaft end without keyway to DIN 748
- protection class IP 65
- shaft bush to IP 64, optionally with shaft sealing ring to IP 65
- long service life through brushless technology
- integrated resolver
- nominal mains voltage 400/460 V
- optional integrated holding brake
- optional integrated single-turn or multi-turn absolute encoder

Servomotors AM2000: Technical data

Technical data	AM217S	AM217M	AM227M	AM227L	AM237S
Standstill torque	0.1Nm	0.2 Nm	0.32 Nm	0.8 Nm	0.5 Nm
Standstill current	0.6 A_{rms}	0.93 A_{rms}	0.8 A_{rms}	0.82 A_{rms}	1 A_{rms}
Rated speed	6000 min^{-1}	6000 min^{-1}	4000 min^{-1}	4500 min^{-1}	6000 min^{-1}
Rotor moment	0.06 kg cm^2	0.12 kg cm^2	0.08 kg cm^2	0.14 kg cm^2	0.45 kg cm^2
Weight	0.7 kg	0.8 kg	1.1 kg	1.45 kg	1.9 kg

Technical data	AM237M	AM237L	AM247M	AM247L	AM257K
Standstill torque	1 Nm	1.5 Nm	2.5 Nm	3 Nm	2.6 Nm
Standstill current	1.6 A_{rms}	1.6 A_{rms}	1.6 A_{rms}	2.3 A_{rms}	1.9 A_{rms}
Rated speed	6000 min^{-1}	4000 min^{-1}	3000 min^{-1}	3000 min^{-1}	3000 min^{-1}
Rotor moment	0.7 kg cm^2	1 kg cm^2	1.2 kg cm^2	1.6 kg cm^2	2.1 kg cm^2
Weight	2.3 kg	2.9 kg	3.3 kg	3.5 kg	4.5 kg

Servomotors AM2000: Technical data

Technical data	AM257S	AM257M	AM257L	AM277K	AM277S
Standstill torque	4.6 Nm	8 Nm	9.5 Nm	11 Nm	17Nm
Standstill current	2.8 A_{rms}	4.3 A_{rms}	6.1 A_{rms}	6 A_{rms}	10 A_{rms}
Rated speed	3000 min^{-1}	3000 min^{-1}	3000 min^{-1}	3000 min^{-1}	3000 min^{-1}
Rotor moment	3.1 kg cm^2	4.5 kg cm^2	6.5 kg cm^2	12 kg cm^2	18 kg cm^2
Weight	5.7 kg	7.6 kg	8.7 kg	7.6 kg	14 kg

Technical data	AM277M	AM297K	AM297S	AM297M	
Standstill torque	22 Nm	26 Nm	32 Nm	40 Nm	
Standstill current	13.7 A_{rms}	16 A_{rms}	20 A_{rms}	23.4 A_{rms}	
Rated speed	3000 min^{-1}	3000 min^{-1}	3000 min^{-1}	3000 min^{-1}	
Rotor moment	13.1 kg cm^2	82 kg cm^2	104 kg cm^2	139.4 kg cm^2	
Weight	17 kg	28kg	32.5 kg	40 kg	

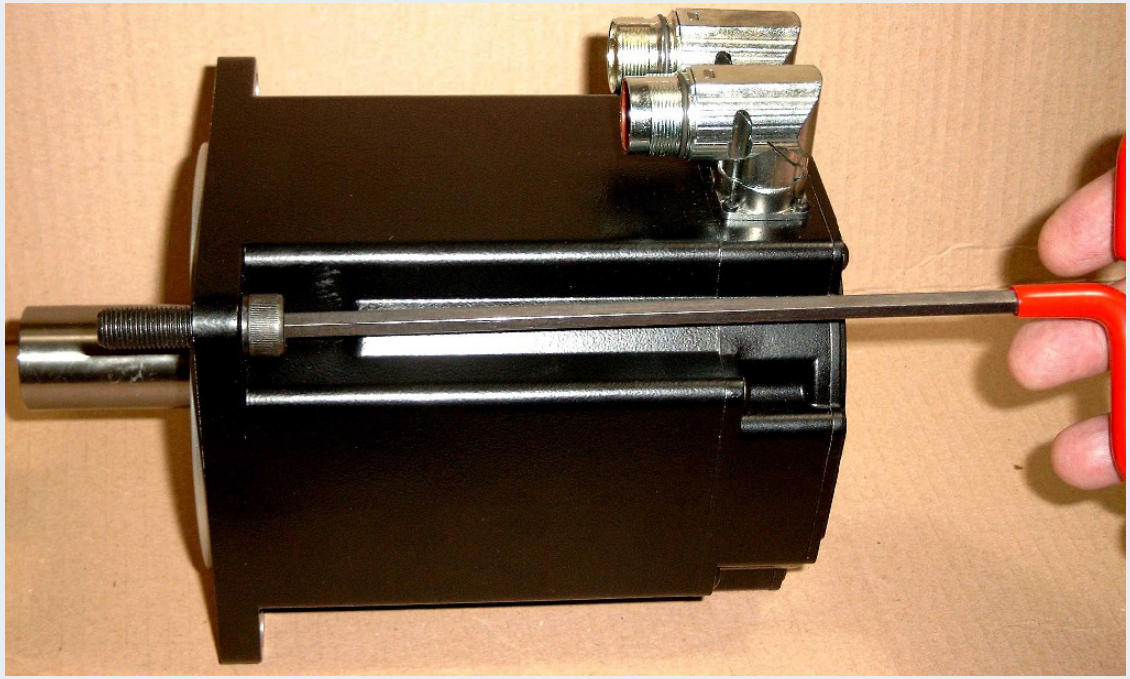
Synchronous Servomotors AM3000

Synchronous Servomotors AM3000: Features

- the stator is wound inside the housing through a needle winder
- 25-35% higher performance
- the motors are significantly shorter than conventional models
- low moment of inertia of the rotor
- robust design, high overload capacity
- increased mechanical resilience; reduction of thermal resistance through sealed winding
- single-piece motor housing reduces the heat transfer resistance
- rotating plug connectors make the wiring of the whole machine easier
- pressed bearings preventing axial motion of the shaft
- small tolerances result in highly symmetric structure inside the motor; reduction of cogging to an absolut minimum

Flexibility: Direct Access

- Assembly tools can access hardware from the rear
  - Easier to mount
  - Eliminates interference with adjacent machine parts



Quality Agency Approvals

c UL us
E61960
E103510
PS155-1

CE
EN60034-1
EN60034-5

TÜV
Rheinland
Product Safety

BAUART
GEPRÜFT

TYPE
APPROVED

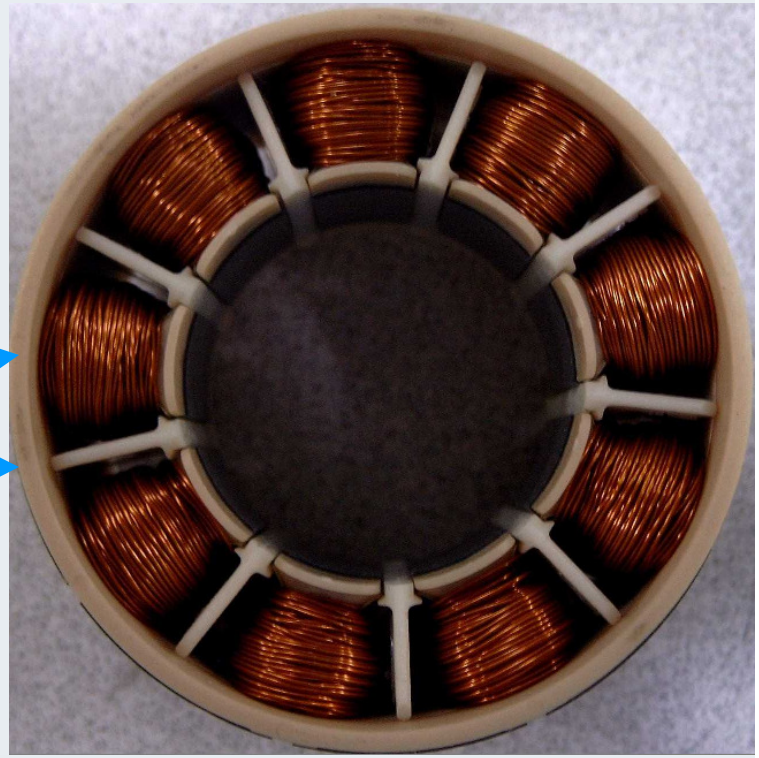
Flexible voltage range

AM302x, 3, 4, 5, 6 & 7 insulated for 480vac

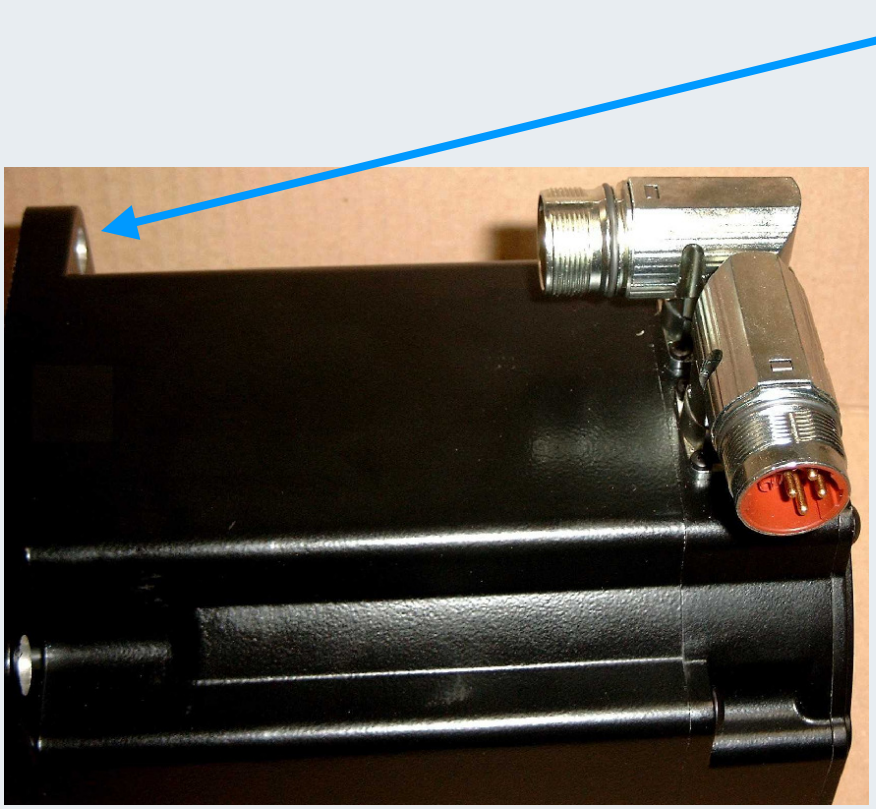
- **Windings optimized for 75Vdc, 120Vac, 240Vac, 400Vac, 480Vac**
- **AM301x 240Vac max**
- **Safe, reliable**

Single tooth winding w/ phase insulation

- **No coil overlaps**
- **No coil-to-coil shorts**



Integrated Front Endbell and Housing

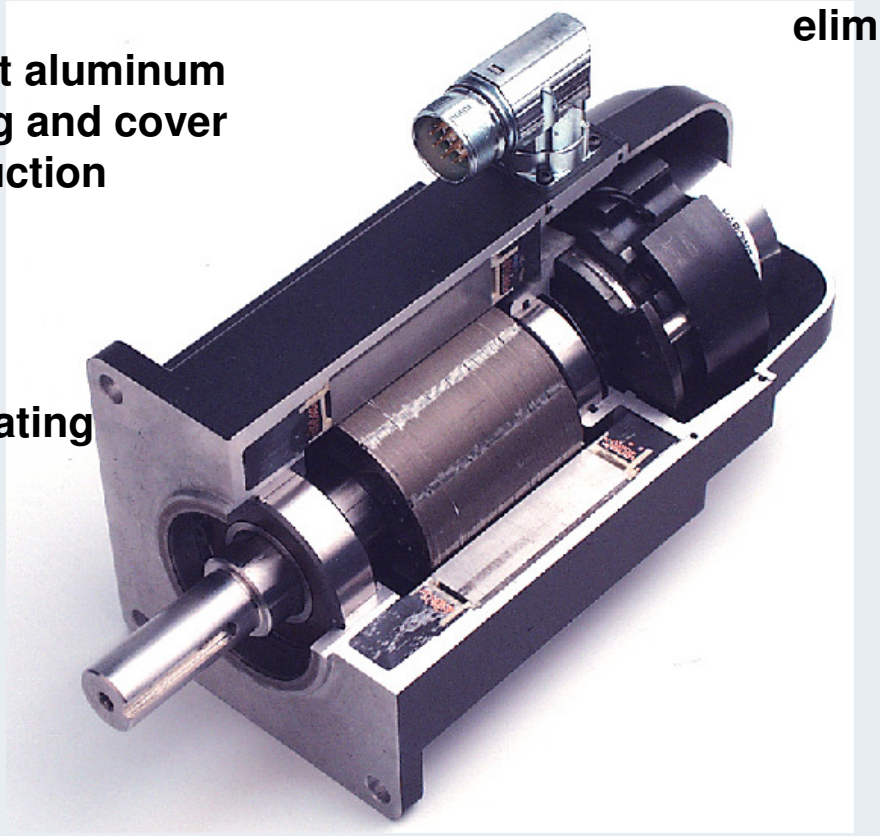


- Rigidity, strength
- No seam to leak
- Superb motor alignment, tolerances
- Low thermal resistance

Designed-In quality

Captured front bearing eliminates axial movement

Die cast aluminum housing and cover construction



Potted stators

Rugged powder coating

Neodymium-Iron-Boron magnets

High performance and low cogging

Synchronous Servomotors AM3000: Technical data

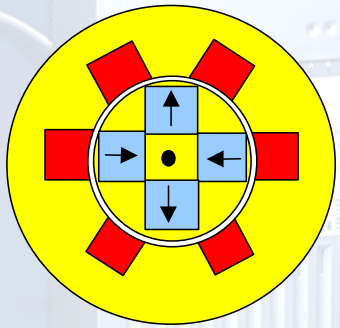
AM30uv-wxyz	Standstill torque	Standstill current	Rated speed/power supply voltage 230 V AC	400 V AC	480 V AC	Rotor moment	Weight
AM3011-xB00	0.18 Nm	1.16 A	8000 min^{-1}			0.017 kg cm^2	0.35 kg
AM3012-xC00	0.31 Nm	1.51 A	8000 min^{-1}			0.031 kg cm^2	0.49 kg
AM3013-xC00	0.41 Nm	1.48 A	8000 min^{-1}			0.045 kg cm^2	0.63 kg
AM3021-xCxz	0.48 Nm	1.58 A	8000 min^{-1}			0.107 kg cm^2	0.82 kg
AM3022-xCxz	0.84 Nm	1.39 A	3500 min^{-1}	8000 min^{-1}	8000 min^{-1}	0.161 kg cm^2	1.10 kg
AM3023-xDxz	1.16 Nm	2.19 A	5000 min^{-1}	8000 min^{-1}	8000 min^{-1}	0.216 kg cm^2	1.38 kg
AM3024-xDxz	1.41 Nm	2.21 A	4000 min^{-1}	8000 min^{-1}	8000 min^{-1}	0.270 kg cm^2	1.66 kg
AM3031-xCxz	1.15 Nm	1.37 A	2500 min^{-1}	5000 min^{-1}	6000 min^{-1}	0.330 kg cm^2	1.55 kg
AM3031-xExz	1.20 Nm	2.99 A	6000 min^{-1}			0.330 kg cm^2	1.55 kg
AM3032-xDxz	2.04 Nm	2.23 A	2500 min^{-1}	5500 min^{-1}	6000 min^{-1}	0.590 kg cm^2	2.23 kg
AM3033-xExz	2.79 Nm	2.58 A	2000 min^{-1}	4500 min^{-1}	5000 min^{-1}	0.850 kg cm^2	2.90 kg
AM3041-xCxz	1.95 Nm	1.46 A	1200 min^{-1}	3000 min^{-1}	3500 min^{-1}	0.810 kg cm^2	2.44 kg
AM3041-xExz	2.02 Nm	2.85 A	3000 min^{-1}	6000 min^{-1}	6000 min^{-1}	0.810 kg cm^2	2.44 kg
AM3042-xExz	3.42 Nm	2.74 A	1800 min^{-1}	3500 min^{-1}	4000 min^{-1}	1.450 kg cm^2	3.39 kg
AM3042-xGxz	3.53 Nm	4.80 A	3500 min^{-1}	6000 min^{-1}	6000 min^{-1}	1.450 kg cm^2	3.39 kg
AM3043-xExz	4.70 Nm	2.76 A	1500 min^{-1}	2500 min^{-1}	3000 min^{-1}	2.090 kg cm^2	4.35 kg
AM3043-xGxz	4.80 Nm	4.87 A	2500 min^{-1}	5000 min^{-1}	6000 min^{-1}	2.090 kg cm^2	4.35 kg
AM3044-xGxz	5.88 Nm	5.00 A	2000 min^{1}	4000 min^{-1}	5000 min^{-1}	2.730 kg cm^2	5.30 kg
AM3044-xJxz	6.00 Nm	8.80 A	4000 min^{1}	6000 min^{-1}	6000 min^{-1}	2.730 kg cm^2	5.30 kg
AM3051-xExz	4.70 Nm	2.75 A	1200 min^{1}	2500 min^{-1}	3000 min^{-1}	3.420kg cm^2	4.20 kg
AM3051-xGxz	4.75 Nm	4.84 A	2500 min^{1}	5000 min^{-1}	6000 min^{-1}	3.420kg cm^2	4.20 kg

Synchronous Servomotors AM3000: Technical data

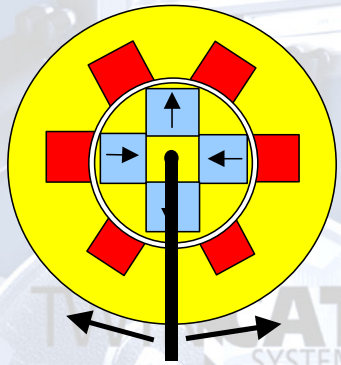
AM30uv-wxyz	Standstill torque	Standstill current	Rated speed/power supply voltage 230 V AC	400 V AC	480 V AC	Rotor moment	Weight
AM3052-xGxz	8.43 Nm	4.72 A	1500 min^{-1}	2500 min^{-1}	3000 min^{-1}	6.220 kg cm^2	5.8kg
AM3052-xKxz	8.60 Nm	9.30 A	3000 min^{-1}	5500 min^{-1}	6000 min^{-1}	6.220 kg cm^2	5.8 kg
AM3053-xGxz	11.37 Nm	4.77 A	1000 min^{-1}	2000 min^{-1}	2400 min^{-1}	9.120 kg cm^2	7.4 kg
AM3053-xKxz	11.60 Nm	9.40 A	2500 min^{-1}	4000 min^{-1}	4500 min^{-1}	9.120 kg cm^2	7.4 kg
AM3054-xKxz	14.40 Nm	9.70 A	1800 min^{-1}	3500 min^{-1}	4000 min^{-1}	11.920 kg cm^2	9.0 kg
AM3062-xKxz	12.20 Nm	9.60 A	2500 min^{-1}	3500 min^{-1}	4500 min^{-1}	16.900 kg cm^2	8.9 kg
AM3062-xMxz	12.20 Nm	13.40 A	3500 min^{-1}	6000 min^{-1}	6000 min^{-1}	16.900 kg cm^2	8.9 kg
AM3063-xKxz	16.80 Nm	9.90 A	1500 min^{-1}	3000 min^{-1}	3500 min^{-1}	24.200 kg cm^2	11.1 kg
AM3064-xLxz	21.00 Nm	12.80 A	1500 min^{-1}	3000 min^{-1}	3500 min^{-1}	31.600 kg cm^2	13.3 kg
AM3065-xNxz	24.30 Nm	17.80 A	2000 min^{-1}	3500 min^{-1}	4000 min^{-1}	40.000 kg cm^2	16.4 kg
AM3072-xPxz	29.40 Nm	18.70 A	1800 min^{-1}	3000 min^{-1}	3500 min^{-1}	64.500 kg cm^2	19.7 kg
AM3073-xPxz	41.60 Nm	19.50 A	1300 min^{-1}	2400 min^{-1}	2800 min^{-1}	92.100 kg cm^2	26.7 kg
AM3074-xPxz	52.50 Nm	18.50 A		1800 min^{-1}	2000 min^{-1}	119.700 kg cm^2	33.6 kg

What is a linear motor?

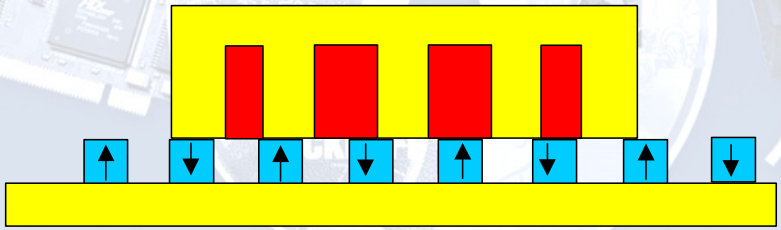
Electric motor ….



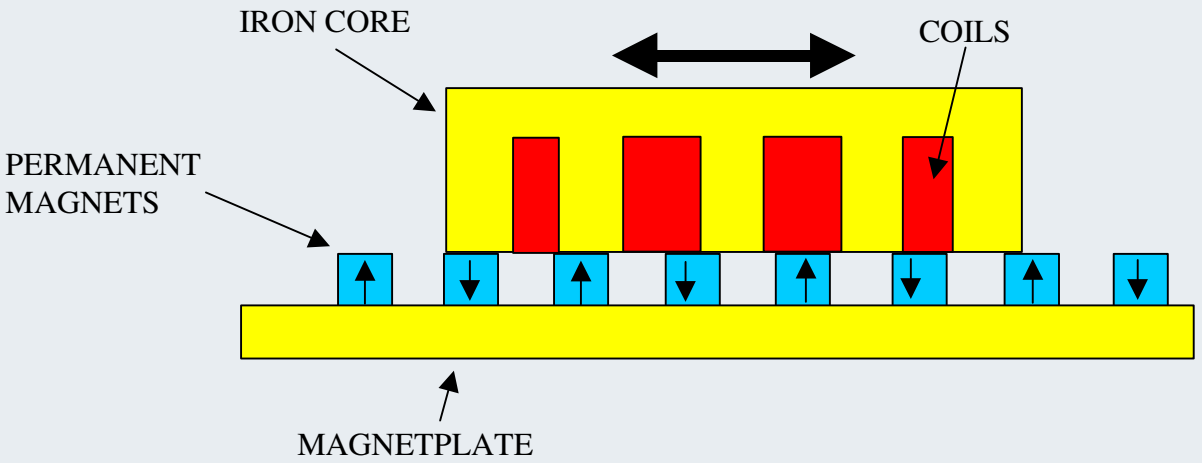
Cut …..



Roll out …



Function of a linear motor Ironcore, 3 phase synchronous



The Linear Servomotors series AL2xxx are used in applications with high demands in dynamic and stiffness. The AL2xxx motors stand out for their compact construction, light weight, low attraction force and micron operational accuracy. In combination with our Servoamplifier series AX2000 and our prepared cables we offer a complete linear drive system.

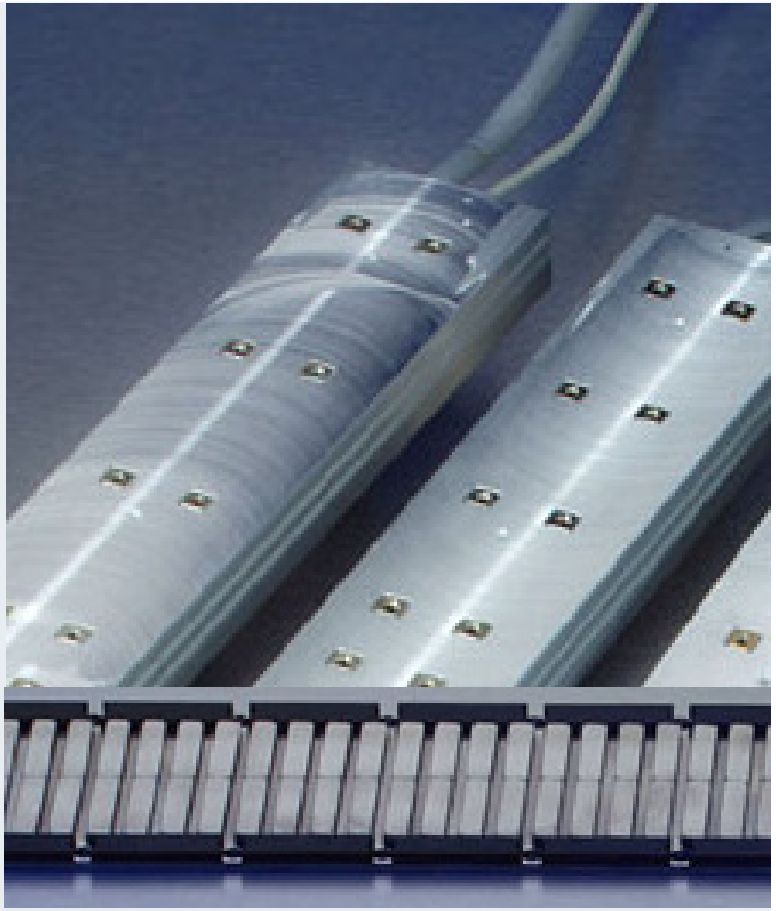
Comparison rotary – linear servomotors

Parameter	Spindle	Pinion	Belt	Linear motor
Speed	low	high	middle	very high
Stiffness	high	middle	low	very high
Acceleration	high	middle	low	very high
Precision	high	low	low	very high
Feed force	very high	high	low	low
Limit of travel	low	middle	low	very high
Wear	middle	middle	high	very low
Noise	high	high	middle	low
Costs	middle	low	low	high

Linear Servomotors AL2xxx

Arguments for using linearmotors:

- very high power – weight coefficient
- high acceleration and velocity
- extremely precise positioning, high repeatability
- easy to set up through pre-assembled cables
- no mechanical wear
- operates with AX2000, AX2500
- total fieldbus compatibility
- low cogging caused by skewed magnets
- very low thermic resistance, operating with or without water cooling possible



Linear Servomotors AL2xxx: Technical data

AL2000	Peak force 3 min. (Fpeak)	Peak current (Ipeak)	Thermal resistance (Rth)	Weight of the coil (Mp)	Motor length	Motor width
AL2003	225 N	5 A	0.96 °C/W	0.9 kg	98 mm	77 mm
AL2006	450 N	5 A	0.48 °C/W	1.5 kg	146 mm	77 mm
AL2012	900 N	10 A	0.24 °C/W	2.6 kg	244 mm	77 mm
AL2015	1125 N	10 A	0.20 °C/W	3.2 kg	290 mm	77 mm
AL2024	1800 N	20 A	0.12 °C/W	5.1 kg	468 mm	77 mm
AL2030	2250 N	20 A	0.10 °C/W	6.3 kg	562 mm	77 mm
AL2110	magnetic assembly 192 mm (magnetic path width 80 mm)					
AL2120	magnetic assembly 288 mm (magnetic path width 80 mm)					
AL2130	magnetic assembly 768 mm (magnetic path width 80 mm)					

AL2400	Peak force 3 min. (Fpeak)	Peak current (Ipeak)	Thermal resistance (Rth)	Weight of the coil (Mp)	Motor length	Motor width
AL2403	120 N	3.9 A	1.4 °C/W	0.55 kg	93 mm	51 mm
AL2406	240 N	7.9 A	0.7 °C/W	0.9 kg	143 mm	51 mm
AL2510	magnetic assembly 96 mm (magnetic path width 50 mm)					
AL2520	magnetic assembly 144 mm (magnetic path width 50 mm)					
AL2530	magnetic assembly 384 mm (magnetic path width 50 mm)					

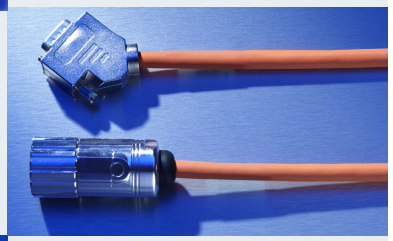
Linear Servomotors AL2xxx: Technical data

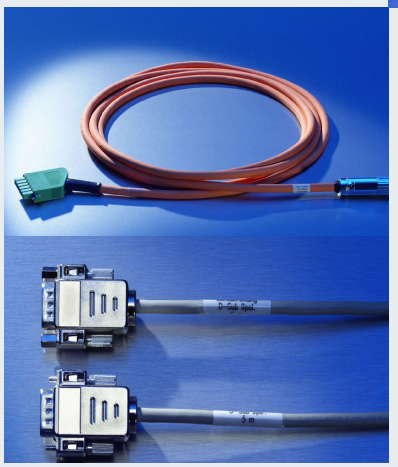
AL2800	Peak force 3 min. (Fpeak)	Peak current (Ipeak)	Thermal resistance (Rth)	Weight of the coil (Mp)	Motor length	Motor width
AL2815	2250 N	13 A	0.13 °C/W	6 kg	290 mm	125,5 mm
AL2830	4500 N	26 A	0.065 °C/W	12 kg	562 mm	125,5 mm
AL2845	6750 N	39 A	0.043 °C/W	19 kg	879 mm	125,5 mm
AL2860	9000 N	52 A	0.033 °C/W	26 kg	1169 mm	125,5 mm
AL2910	magnetic assembly 192 mm (magnetic path width 130 mm)					
AL2920	magnetic assembly 288 mm (magnetic path width 130 mm)					
AL2930	magnetic assembly 768 mm (magnetic path width 130 mm)					

Drive Technology accessories

Detailed accessories completes the product range:

- motor cables for Servo Drives AX2000, AX2500
- motor cables for Servomotors AM2000, AM3000, AL2xxx
- resolver cables for Synchronous Servomotors AM2000, AM3000
- encoder cables for Synchronous Servomotors AM2000, AM3000
- encoder cables for Linear Servomotors AL2xxx
- thermal protection cables for Linear Servomotors AL2xxx





Drive Technology Accessories

- connectors for servo drive AX2000, AX2500
- connectors for servomotors AM2000, AM3000, AL2xxx
- interface cables
- ballast-resistors
- motor-choke for AX2000-AX2020
- I/O interface cards
- operator software

The Beckhoff solution for drive technology