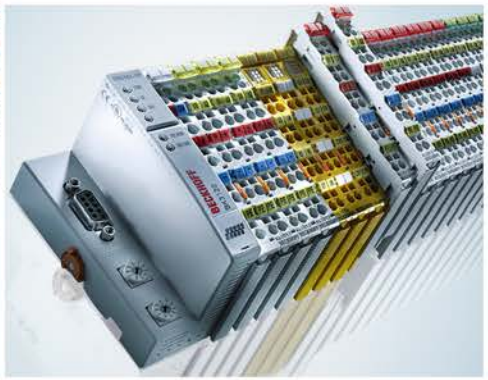
New Automation Technology

Drive Technology

I/O



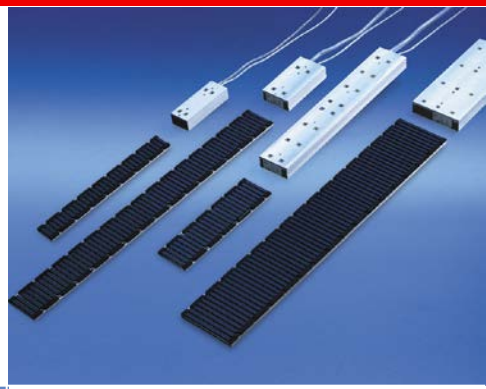
Automation

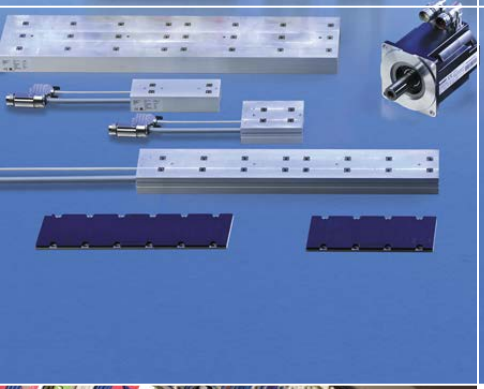
Motion

IPC

The drive system for high dynamic positioning tasks

Linear
Servomotors
ALxxxx





Synchronous
Servomotors
AM2000/AM3xxx

Digital Compact
Servo Drive
AX5xxx

Digital Compact
Servo Drive
AX20xx

Digital Compact
Servo Drive
AX25xx

AX5000 | Digital Compact Servo Drive

Technical highlights

- fast control technology
  - current control: min. 31.25 µs
  - speed control: min. 125 µs
  - position control: min. 125 µs
- high-speed EtherCAT system communication
- 1- or 2-channel Servo Drive
  - optimised for multi-axis applications
  - variable motor output allocation in 2-channel drives
- active DC-Link and brake energy management
- variable motor interface with
  - multi-feedback interface
  - flexible motor type selection
  - scalable, wide range motor current measurement

Technical highlights

- high-speed capture inputs
- wide range voltage 100…480 V AC (up to 25 A)
- integrated mains filter
- integration of safety functions (optional)
  - restart lock
  - TwinSAFE: intelligent safety functions for Motion Control
- compact design for simple control cabinet installation
  (for 300 mm depth) (up to 25 A)
- AX-Bridge – the quick connection system for power supply, DC-Link (up to 25 A)
- variable cooling concept
  (fanless, forced cooling, cold plate)

Features

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

Motor feedback: Resolver, TTL

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

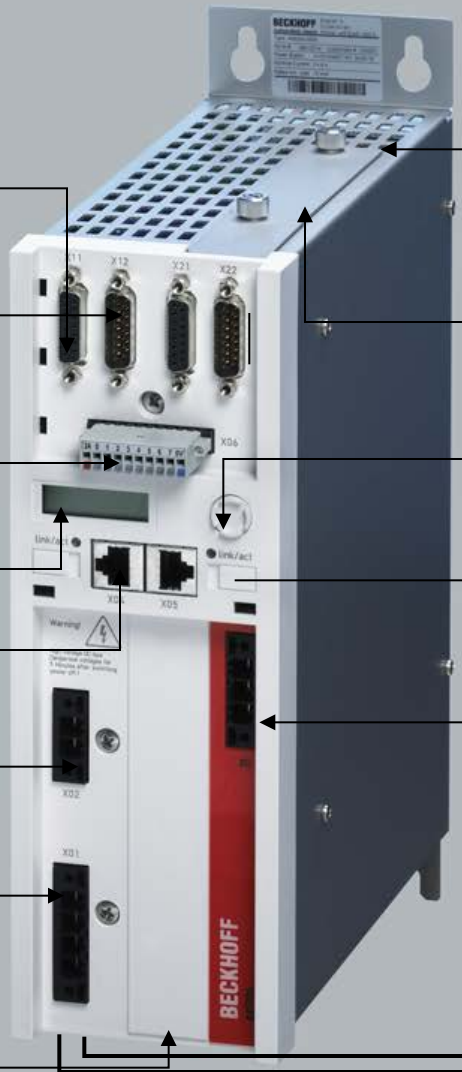
Status display, e.g. axis identifier or error message

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

Navigation buttons (Enter, Up/Down)

Operating material identification

24 V DC control and braking voltage

Motor circuits

AX51xx | 1-channel Servo Drive

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

AX5118, AX5125 | Rated output current of 18 A and 25 A

Technical data at 50 °C ambient temperature

Technical data	AX5101	AX5103	AX5106	AX5112	AX5118	AX5125
Rated output current (3 phases)	1 x 1.5 A	1 x 3 A	1 x 6 A	1 x 12 A	1 x 18 A	1 x 25 A
Rated supply voltage	3 x 100 V AC –10% ... 3 x 480 V AC +10 % 1 x 100 V AC –10% ... 1 x 240 V AC +10 %			3 x 100 V AC – 10%... 3 x 480 V AC + 10 %		
DC-Link voltage	max. 890 V DC					
Peak output current (1)	4.5 A	7.5 A	13 A	26 A	36 A	50 A
Rated connected load for S1-operation	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	90 W	200 W	200 W
Max. braking power (2)	14 kW			27 kW		

(1) I_{eff} for max. 7 seconds
(2) internal brake resistor

AX51xx | Rated current up to 170 A

NEW

AX51xx | Rated current up to 170 A

NEW

- Enlargement of the Servo drive product line AX5000 with Servo Drives from 60 A up to 170 A.
- three sizes with rated currents of 60 A, 72 A, 90 A, 110 A, 143 A, 170 A

- Features
  - Highspeed EtherCAT system communication
  - Connection voltage: 400…480 V AC +-10%
  - Multi feedback interface
  - flexible selection of motor type
  - Highspeed capture inputs
  - Diagnosis and parameter display
  - Integrated mains filter up to 72 A rated current acc. to Cat. C3, acc. to EN61800-3
  - optional safety functions:
    - restart lock
    - intelligent TwinSAFE safety function

Technical data at 50 °C ambient temperature

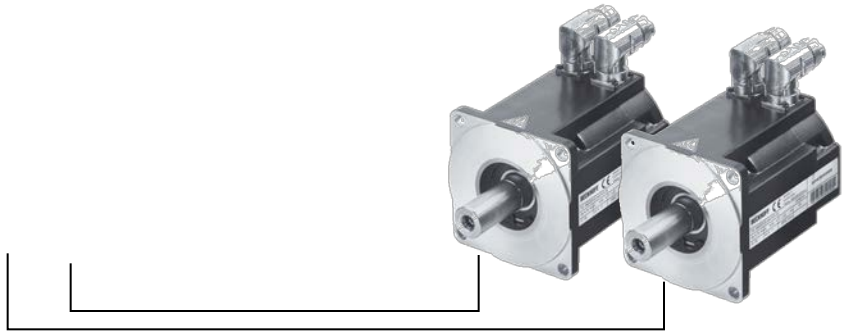
NEW

Technische Daten	AX5160	AX5172	AX5190	AX5191	AX5192	AX5193
Rated output current	1 x 60 A	1 x 72 A	1 x 90 A	1 x 110 A	1 x 143 A	1 x 170 A
Rated supply voltage	3 x 400 V AC – 10%... 3 x 480 V AC + 10 %					
DC-Link voltage	max. 890 V DC					
Peak output current (1)	120 A	142 A	180 A	220 A	286 A	50 A
Rated connected load for 480 V AC	42 kVA	50 kVA	62kVA	76 kVA	99 kVA	118 kVA
Continuous braking power	external					
Max. braking power	external					

(1) I_{eff} für max. 7 s

AX52xx | 2-channel Servo Drive

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



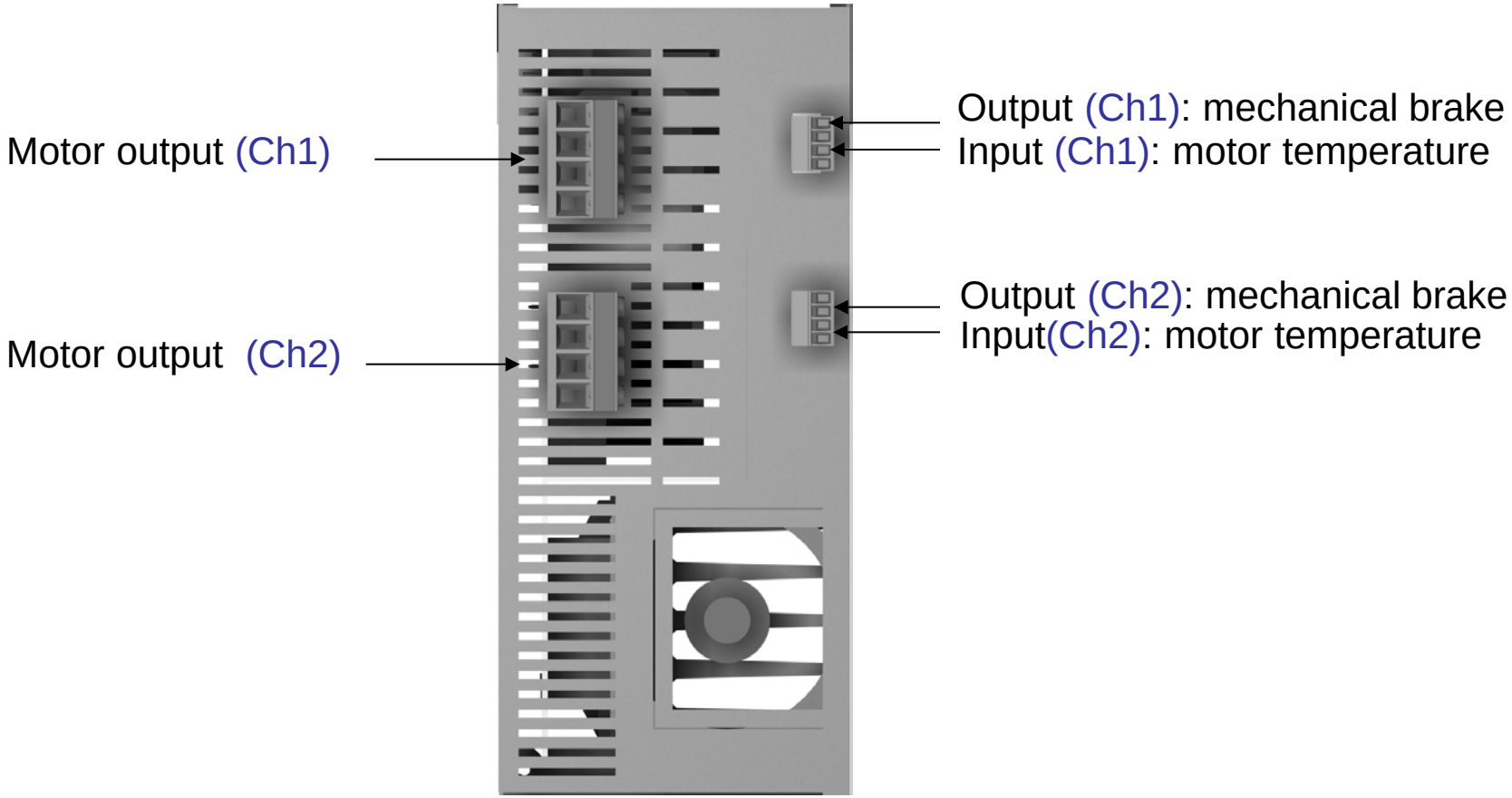
Technical data at 50 °C ambient temperature

Technical data	AX5201	AX5203	AX5206
Rated output current	2 x 1.5 A	2 x 3 A	2 x 6 A (*)
Rated supply voltage	3 x 100 V AC – 10 %... 3 x 480 V AC + 10% 1 x 100 V AC – 10 %... 1 x 240 V AC + 10 %		
DC-Link voltage	max. 890 VDC		
Peak output current (1)	10 A	20 A	26 A
Rated connected load for S1-operation (2)	2.5 kVA	5 kVA	10 kVA
Continuous braking power (2)	50 W	150 W	90 W
Max. braking power (2)	14 kW		

(1) I_{eff} for max. 7 seconds
(2) internal brake resistor
(*) With a 1-phase mains, the total current is limited to 9 A.

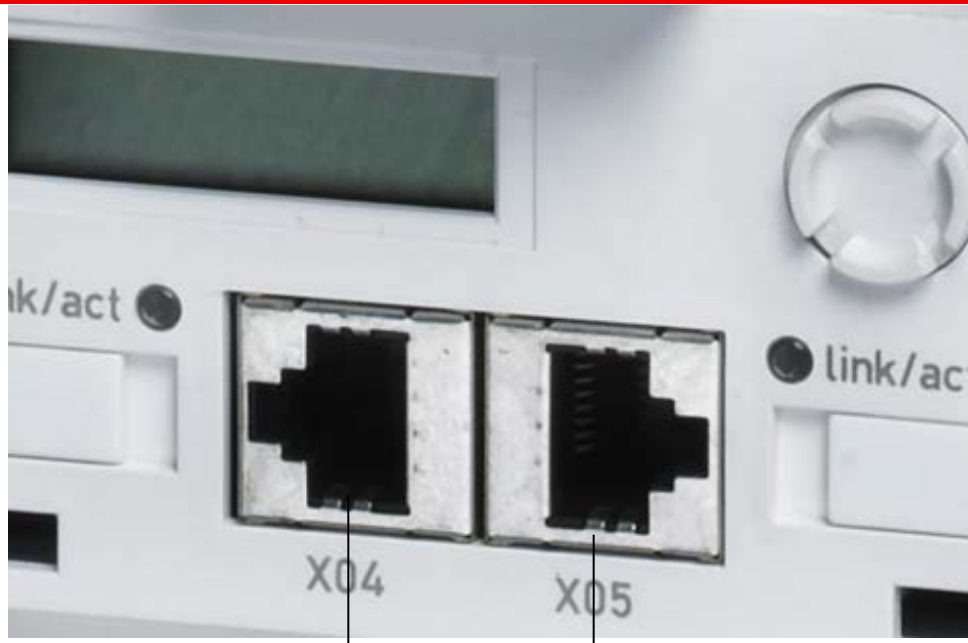
AX5000 | The features in detail

Bottom


Motor output (Ch1)
Motor output (Ch2)
Output (Ch1): mechanical brake
Input (Ch1): motor temperature
Output (Ch2): mechanical brake
Input(Ch2): motor temperature

Communication

- high-speed EtherCAT system bus
- SERCOS profile for drive technology as implemented per IEC 61491
- other fieldbus systems over external gateways



Cycle times and clock frequencies

- different cycle times for various application requirements
  - 62,5 µs current control loop
  - 4 kHz frequency for minimum power dissipation

- example configurations:

EtherCAT (minimum)	Position loop	Speed loop	Current loop	IGBT switching	Motor cable
62,5 µs	NC/PLC	NC/PLC	31,25 µs	16 kHz	32 kHz
62,5 µs	NC/PLC	NC/PLC	62,5 µs	8 kHz	16 kHz
125 µs	125 µs	125 µs	31,25 µs	16 kHz	32 kHz
125 µs	125 µs	125 µs	62,5 µs	8 kHz	16 kHz
125 µs	125 µs	125 µs	125 µs	4 kHz	8 kHz

Wide voltage range

- same drive for all common power supply systems – no options, no variants, e.g.
  - 1 x 100 V AC for Asia
  - 1 x 115 V AC for North America
  - 3 x 200 V AC for Asia
  - 1 x 230 V AC for Europe
  - 3 x 230 V AC for North America
  - 3 x 400 V AC for Europe
  - 3 x 480 V AC for North America

Multi feedback interface

- all common feedback systems on-board – no additional interface necessary
  - resolver
  - TTL encoder
  - Sinus/Cosinus 1 Vss
  - EnDAT, single- and multi-turn
  - Hiperface, single- and multi-turn
  - BiSS, single- and multi-turn

Variable motor interface

- brushless synchronous servomotors
- asynchronous servomotors
- asynchronous AC motors in servo operation with sensor feedback up to 6,000 rpm
- standard motors (DASM) in frequency mode up to 60,000 rpm
- linear motors (iron core and ironless)
- torque motors

Scalable output current

- high resolution measuring range spread at full current resolution
- advantages
  - A 6 A drive can run a 1 A motor.
  - flexible power balancing within a 2-channel module by utilising total device current:
    12 A = 2 x 6 A or 1 x 3 A + 1 x 9 A
  - minimum type variation, minimum inventory
  - device-specific factory setting, afterwards automatic application scaling via motor parameters

Active DC-Link

- short-circuit-proof DC-Link connection
- distributed braking by using all connected braking resistors
- external chopper module for high regenerative energy

Digital inputs

- Number
  - 7 inputs per device
- Functions
  - limit switches pos./neg. enable
  - amplifier lock with stator short cut braking
  - capture (2 x)

Digital output (programmable functions)

- Number
  - 1 output per channel + 1 device output

- Functions
  - control of the mechanical brake
  - error messages regarding external dynamic emergency stop functionalities
  - ready for operation

Status display

- Advantages
  - comfortable device diagnosis with output of the axis identifier
  - display of axis status and errors, also without EtherCAT communication
  - error messages as plain text

Cooling concept

- max. operation temperature: 50 °C
- fanless operation up to 2 x 3 A or 1 x 6 A
- forced air cooling with regulated fan from 2 x 6 A/1 x 12 A
- internal air flow channel separated from electronic parts, thus no contamination
- cold plate
  - plane back plane for cold plate assembly

AX5000 | System modules and accessories

System modules

- AX5001 | DC-Link expansion
  - for buffering of regenerated energy (brake energy)
  - short-circuit-proof
  - generation of 24 V auxiliary supply from intermediate circuit including power management
  - can be combined with multi-axis systems through AX-Bridge
  - EtherCAT interface for parameterisation and diagnosis
- AX5021 | Brake module
  - 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
  - mains inverter for feeding brake energy back into the supply network
  - EtherCAT interface for parameterisation and diagnosis

AX59xx | AX-Bridge quick connection system

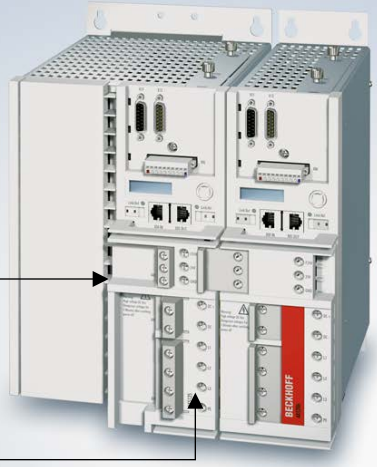
- Connection module with power rail system for multi-axis systems, current carrying capacity up to 85 A

Supply module AX5901 with snap-on connection for the Servo Drive

Power distribution module AX5911 with snap-on connection for power supply, DC-Link and control voltage

AX59xx | AX-Bridge quick connection system

Power supply module AX5901 with snap-on connection for Servo Drive

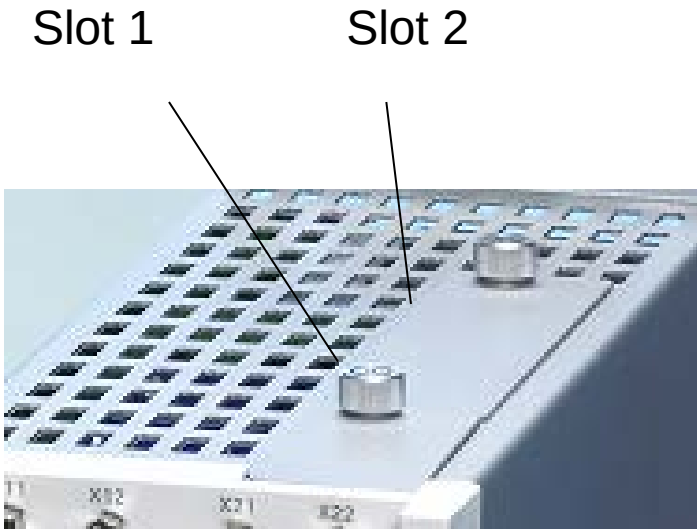


Power distribution module AX5911 with snap-on connection for power supply, DC-Link and control voltage

Power distribution module AX5912 for AX5118, AX5125 with snap-on connection

Accessories

- optional slots
  - safety for Motion Control (slot 1)
  - additional encoder interface, e.g. SSI (slot 2)
  - I/Os (capture, etc.) (slot 2)
  - customer-specific cards (slot 2)



Optimised for EtherCAT

- EtherCAT – the optimum drive bus
  - short cycle time
  - synchronicity
  - simultaneity
- Ethernet right down to the drives
- high-precision system synchronising through distributed clocks
- high-speed capture with time stamp, e.g. for print mark control
- ultra high-speed communication with update times of:
  - 100 axes in 100 µs
  - 1,000 distributed I/Os in 30 µs

Optimised for EtherCAT

- high-speed control algorithms
  - current controller with cycle times down to 31.25 µs for highly dynamic regulation of ironless linear motors
  - speed controller 125 µs
  - position controller 125 µs
- transparent line topology with flexible branches
- simple system wiring using standard patch cable
- simple diagnosis
  - breaking point detection and localisation
  - Protocol, physical characteristics and topology enable individual quality monitoring of all transmission links.

Safety integrated with TwinSAFE

Option cards for various safety categories

- AX5801 | Restart lock
  - personal protection against inadvertent restart of the drive axis
    - meets EN 954-1
    - STO Safe Torque Off (IEC 61800-5-2)
    - SS1 Safe Stop 1 (IEC 61800-5-2)
    - control through digital input
    - Mains voltage and motor line remain connected.

Safety integrated with TwinSAFE

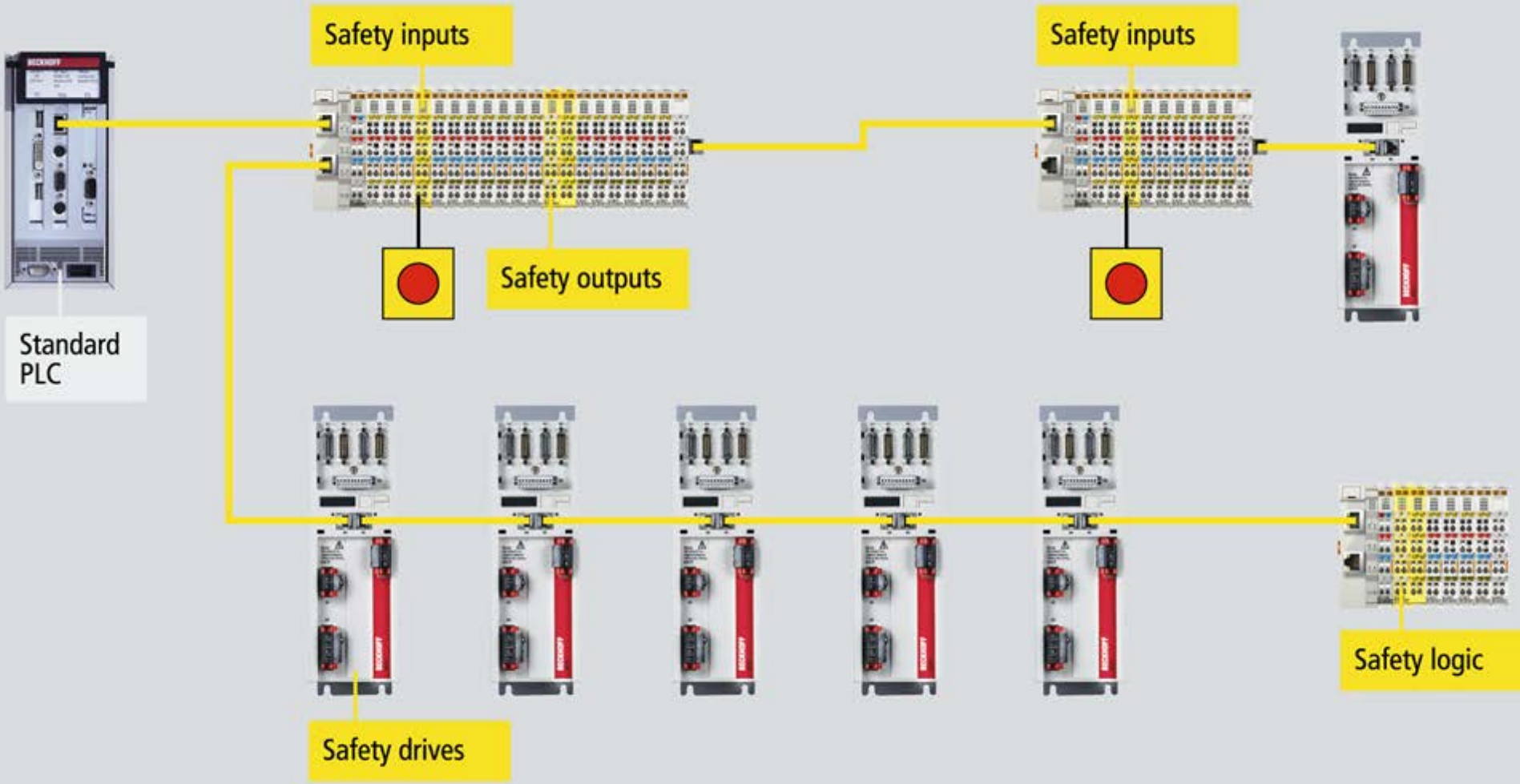
Option cards for various safety categories

- AX5805 | TwinSAFE drive option cards
  - meets safety category 3 (EN 954)
  - realisation of the following functions, acc. to IEC 61800-5-2
    - STO Safe Torque Off
    - SS1 Safe Stop 1
    - SS2 Safe Stop 2
    - SOS Safe Operating Stop
    - SLA Safely Limited Accel.
    - SLS Safely Limited Speed
    - SSR Safe Speed Range
    - SLT Safely Limited Torque
    - STR Safe Torque Range
    - SLP Safely Limited Position
    - SLI Safely Limited Increment
    - SDI Safe Direction
    - SCA Safe CAM

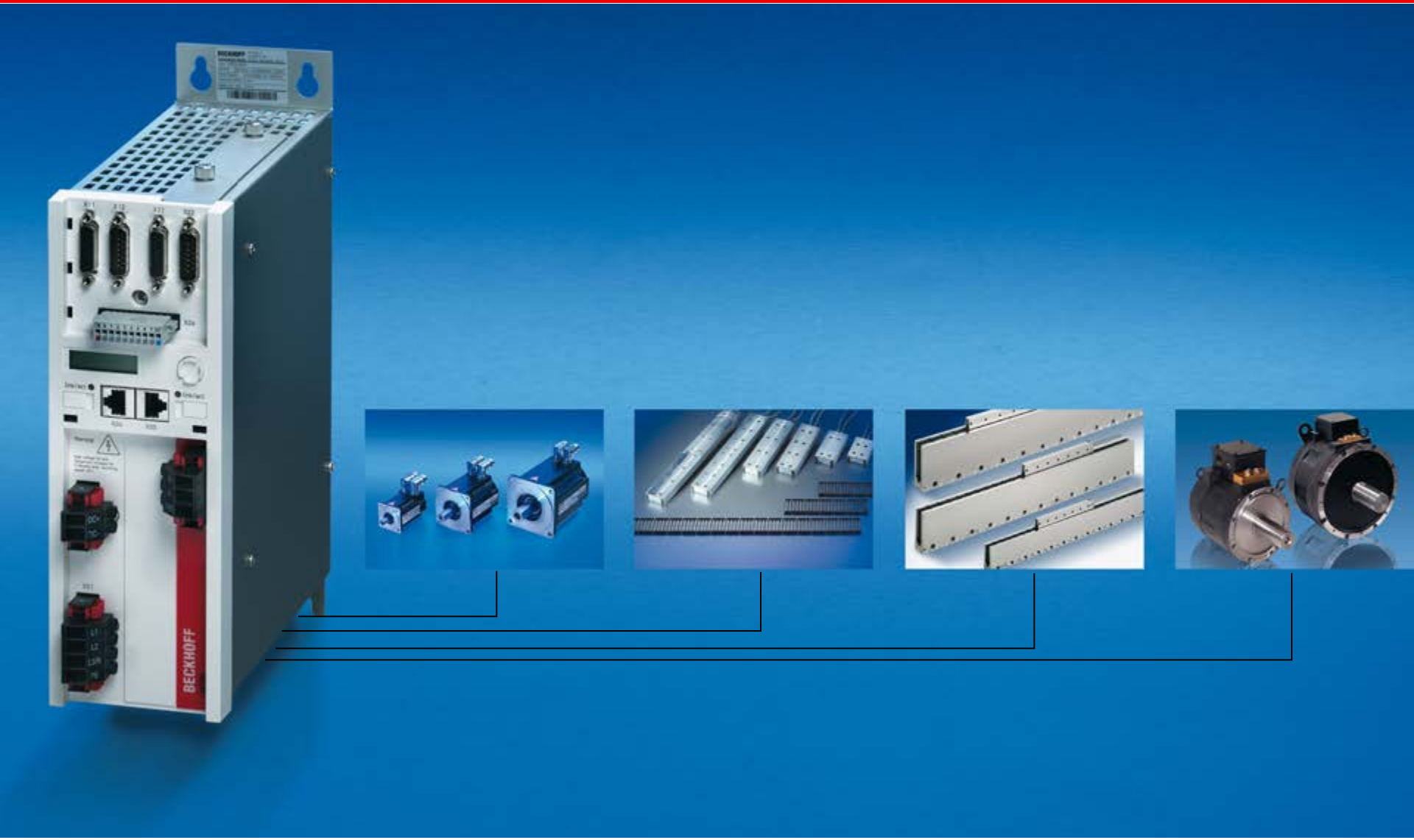
Safety integrated with TwinSAFE

- Safety over EtherCAT
  - The protocol developed according to IEC 61508 can be transferred via EtherCAT.
  - Fieldbus gateways enable the drives to be integrated into traditional fieldbus systems: PROFIBUS, DeviceNet, CANopen, SERCOS interface or Ethernet.
  - The integration into the TwinSAFE product family allows the realisation of safety technology without sophisticated safety control.

Emergency stop wiring via TwinSAFE and EtherCAT

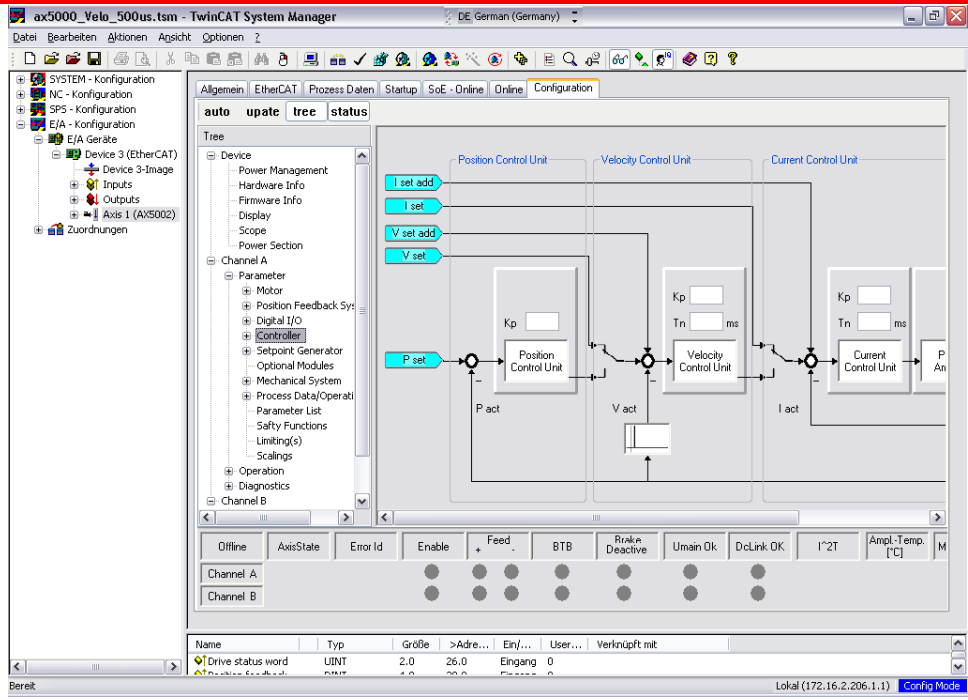


Variable motor interface



Startup

- complete integration into TwinCAT System Manager
- advantage of using all TwinCAT tools like scope, etc.



Support/service

- The parameters are only stored in TwinCAT.
- During a system restart the AX5000 is checked for type identity, followed by downloading of the parameter set.
- The AX5000 checks the electronic name plate of the connected motor.
- If all preconditions are valid, TwinCAT will download and configure the AX5000 automatically. No highly qualified service staff is necessary.

AX20xx | Digital Compact Servo Drive

Technical highlights

- drive for Synchronous Servomotors AM2000, AM3000 and Linear Servomotors AL2xxx
- regulation of torque, speed, or position
- wide voltage range
  3 x 230 $V_{-10\ \%}$…480 V^{+10} %
- 3…80 A rated output current
- integrated power supply, mains filters
- compact design
- easy to wire because of pre-assembled resolver, encoder and power leads

Features

“Beckhoff Fieldbus Connect” – variable fieldbus connection for the easy integration into a variety of control environments

RS232 interface for para-meterisation 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

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:
  - EtherCAT
  - PROFIBUS
  - SERCOS interface
  - CANopen
  - DeviceNet
  - real-time Ethernet
  - Lightbus

Technical data

Technical data	AX2003	AX2006	AX2010	AX2020	AX2040	AX2070
Rated output current	3 A	6 A	10 A	20 A	40 A	70 A/80 A
Peak output current (max. ca. 5 sec. 3%)	6 A_{RMS}	12 A_{RMS}	20 A_{RMS}	40 A_{RMS}	80 A_{RMS}	140/160 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	33 kVA	66 kVA
Rated intermediate circuit DC voltage	(310...675) V DC					
Continuous power of regen circuit (RBint)	80 W	200 W	200 W	200 W	external	external

Fieldbus connectivity	EtherCAT	PROFIBUS	CANopen	DeviceNet	SERCOS interface	RS 232 / RS 485	Ethernet	LIGHTBUS
Interface	- B110	- B310	on-board	- B520	- B750	on-board	- B900	- B200

AX25xx | Digital Compact Servo Drive

Features

- AX2500 Servo Drives are fully software compatible to the AX2000.
- In its maximum configuration the multi-axis system comprises 8 axes (1 supply module and 7 axis modules).
- The 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, CANopen or real-time Ethernet)
- compact, cost-optimised servo system; flexibly adaptable to the respective requirements

Technical data

Technical data	AX2503	AX2506	AX2513	AX2516	AX2523	AX2526
Function	master module	master module	master module	master module	axis module	axis module
Rated output current	3 A	6 A with attached fan	3 A	6 A with attached fan	3 A	6 A with attached fan
Rated supply voltage	1 x 115…3 x 230 V AC ±10 %, 50…60 Hz		3 x (230…400) V AC ±10 %, 50…60 Hz		–	
Max. installed power for S1 operation, multi-axis systems	7 kVA	7 kVA	12 kVA	12 kVA	–	
Rated intermediate circuit DC voltage	(160…310) V DC		(310…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 power of regen circuit (RBint)	40 W	40 W	40 W	40 W	–	

Feldbus-Connectivity	PROFIBUS	CANopen	DeviceNet	SERCOS interface	RS 232 / RS 485	Ethernet	LIGHTBUS
Interface	- B310	-B510	on request	- B750	on-board	- B900	- B200

AM30xx | Synchronous Servomotors

Technical highlights

- low moment of inertia of the rotor
- robust design, high overload capacity
- increased mechanical resilience; reduction of thermal resistance through sealed winding
- reduction of the heat transfer resistance on the flange and increased stability
- Small tolerances result in highly symmetric structure inside the motor; reduction of cogging to an absolute minimum.

Features

- The stator is wound inside the housing through a needle winder.
- 25…35 % higher performance with same overall size
- The motors are significantly shorter than conventional models.
- Rotating plug connectors make the wiring of the whole machine easier.

Technical data

AM30uv-wxyz-000a	Standstill torque	Standstill current	Rated speed at rated supply voltage			Rotor moment of inertia	Weight
			230 V AC	400 V AC	480 V AC		
AM3011-wB00	0.18 Nm	1.16 A	8000 min^{-1}	–	–	0.017 kg cm^2	0.35 kg
AM3012-wC00	0.31 Nm	1.51 A	8000 min^{-1}	–	–	0.031 kg cm^2	0.49 kg
AM3013-wC00	0.41 Nm	1.48 A	8000 min^{-1}	–	–	0.045 kg cm^2	0.63 kg
AM3021-wCyz-000a	0.48 Nm	1.58 A	8000 min^{-1}	8000 min^{-1}	8000 min^{-1}	0.107 kg cm^2	0.82 kg
AM3022-wCyz-000a	0.84 Nm	1.39 A	3500 min^{-1}	8000 min^{-1}	8000 min^{-1}	0.161 kg cm^2	1.10 kg
AM3023-wCyz-000a	1.13 Nm	1.41 A	2500 min^{-1}	5500 min^{-1}	7000 min^{-1}	0.216 kg cm^2	1.38 kg
AM3023-wDyz-000a	1.16 Nm	2.19 A	5000 min^{-1}	8000 min^{-1}	8000 min^{-1}	0.216 kg cm^2	1.38 kg
AM3024-wCyz-000a	1.38 Nm	1.42 A	2000 min^{-1}	4500 min^{-1}	5500 min^{-1}	0.270 kg cm^2	1.66 kg
AM3024-wDyz-000a	1.41 Nm	2.21 A	4000 min^{-1}	8000 min^{-1}	8000 min^{-1}	0.270 kg cm^2	1.66 kg
AM3031-wCyz	1.15 Nm	1.37 A	2500 min^{-1}	5000 min^{-1}	6000 min^{-1}	0.330 kg cm^2	1.55 kg
AM3031-wEyz	1.20 Nm	2.99 A	6000 min^{-1}	6000 min^{-1}	6000 min^{-1}	0.330 kg cm^2	1.55 kg
AM3032-wCyz	2.00 Nm	1.44 A	1500 min^{-1}	3000 min^{-1}	3500 min^{-1}	0.590 kg cm^2	2.23 kg
AM3032-wDyz	2.04 Nm	2.23 A	2500 min^{-1}	5500 min^{-1}	6000 min^{-1}	0.590 kg cm^2	2.23 kg
AM3033-wCyz	2.71 Nm	1.47 A	1000 min^{-1}	2000 min^{-1}	2500 min^{-1}	0.850 kg cm^2	2.90 kg
AM3033-wEyz	2.79 Nm	2.58 A	2000 min^{-1}	4500 min^{-1}	5000 min^{-1}	0.850 kg cm^2	2.90 kg
AM3041-wCyz	1.95 Nm	1.46 A	1200 min^{-1}	3000 min^{-1}	3500 min^{-1}	0.810 kg cm^2	2.44 kg
AM3041-wEyz	2.02 Nm	2.85 A	3000 min^{-1}	6000 min^{-1}	6000 min^{-1}	0.810 kg cm^2	2.44 kg
AM3042-wEyz	3.42 Nm	2.74 A	1800 min^{-1}	3500 min^{-1}	4000 min^{-1}	1.450 kg cm^2	3.39 kg
AM3042-wGyz	3.53 Nm	4.80 A	3500 min^{-1}	6000 min^{-1}	6000 min^{-1}	1.450 kg cm^2	3.39 kg
AM3043-wEyz	4.70 Nm	2.76 A	1500 min^{-1}	2500 min^{-1}	3000 min^{-1}	2.090 kg cm^2	4.35 kg
AM3043-wGyz	4.80 Nm	4.87 A	2500 min^{-1}	5000 min^{-1}	6000 min^{-1}	2.090 kg cm^2	4.35 kg
AM3044-wEyz	5.76 Nm	2.90 A	1200 min^{1}	2000 min^{-1}	2500 min^{-1}	2.730 kg cm^2	5.30 kg

Technical data

AM30uv-wxyz-000	Standstill torque	Standstill current	Rated speed at rated supply voltage			Rotor moment of inertia	Weight
			230 V AC	400 V AC	480 V AC		
AM3044-wGyz	5.88 Nm	5.00 A	2000 min^{1}	4000 min^{-1}	5000 min^{-1}	2.730 kg cm^2	5.30 kg
AM3044-wJyz	6.00 Nm	8.80 A	4000 min^{1}	6000 min^{-1}	6000 min^{-1}	2.730 kg cm^2	5.30 kg
AM3051-wEyz	4.70 Nm	2.75 A	1200 min^{1}	2500 min^{-1}	3000 min^{-1}	3.420 kg cm^2	4.20 kg
AM3051-wGyz	4.75 Nm	4.84 A	2500 min^{1}	5000 min^{-1}	6000 min^{-1}	3.420 kg cm^2	4.20 kg
AM3052-wGyz	8.43 Nm	4.72 A	1500 min^{-1}	2500 min^{-1}	3000 min^{-1}	6.220 kg cm^2	5.8kg
AM3052-wKyz	8.60 Nm	9.30 A	3000 min^{-1}	5500 min^{-1}	6000 min^{-1}	6.220 kg cm^2	5.8 kg
AM3053-wGyz	11.37 Nm	4.77 A	1000 min^{-1}	2000 min^{-1}	2400 min^{-1}	9.120 kg cm^2	7.4 kg
AM3053-wKyz	11.60 Nm	9.40 A	2000 min^{-1}	4000 min^{-1}	4500 min^{-1}	9.120 kg cm^2	7.4 kg
AM3054-wKyz	14.40 Nm	9.70 A	1800 min^{-1}	3500 min^{-1}	4000 min^{-1}	11.92 kg cm^2	9.0 kg
AM3062-wKyz	12.20 Nm	9.60 A	2000 min^{-1}	3500 min^{-1}	4500 min^{-1}	16.90 kg cm^2	8.9 kg
AM3062-wMyz	12.20 Nm	13.40 A	3000 min^{-1}	6000 min^{-1}	6000 min^{-1}	16.90 kg cm^2	8.9 kg
AM3063-wKyz	16.80 Nm	9.90 A	1500 min^{-1}	3000 min^{-1}	3500 min^{-1}	24.20 kg cm^2	11.1 kg
AM3063-wMyz	17.00 Nm	13.80 A	2000 min^{-1}	4000 min^{-1}	4500 min^{-1}	24.20 kg cm^2	11.1 kg
AM3063-wNyz	17.00 Nm	17.40 A	3000 min^{-1}	5000 min^{-1}	6000 min^{-1}	24.20 kg cm^2	11.1 kg
AM3064-wKyz	20.80 Nm	9.20 A	1200 min^{-1}	2000 min^{-1}	2500 min^{-1}	31.60 kg cm^2	13.3 kg
AM3064-wLyz	21.00 Nm	12.80 A	1500 min^{-1}	3000 min^{-1}	3500 min^{-1}	31.60 kg cm^2	13.3 kg
AM3064-wPyz	20.40 Nm	18.60 A	2500 min^{-1}	4500 min^{-1}	5500 min^{-1}	31.60 kg cm^2	13.3 kg
AM3065-wKyz	24.80 Nm	9.80 A	1000 min^{-1}	2000 min^{-1}	2200 min^{-1}	40.00 kg cm^2	15.4 kg
AM3065-wMyz	25.00 Nm	13.60 A	1500 min^{-1}	3000 min^{-1}	4000 min^{-1}	40.00 kg cm^2	15.4 kg
AM3065-wNyz	24.30 Nm	17.80 A	2000 min^{-1}	3500 min^{-1}	4000 min^{-1}	40.00 kg cm^2	15.4 kg
AM3072-wKyz	29.70 Nm	9.30 A	–	1500 min^{-1}	1800 min^{-1}	64.50 kg cm^2	19.7 kg
AM3072-wMyz	30.00 Nm	13.00 A	–	2000 min^{-1}	2500 min^{-1}	64.50 kg cm^2	19.7 kg

Technical data

AM30uv-wxyz-000	Standstill torque	Standstill current	Rated speed at rated supply voltage			Rotor moment of inertia	Weight
			230 V AC	400 V AC	480 V AC		
AM3072-wPyz	29.40 Nm	18.70 A	1800 min^{-1}	3000 min^{-1}	3500 min^{-1}	64.50 kg cm^2	19.7 kg
AM3073-wMyz	42.00 Nm	13.60 A	–	1500 min^{-1}	1800 min^{-1}	92.10 kg cm^2	26.7 kg
AM3073-wPyz	41.60 Nm	19.50 A	1300 min^{-1}	2400 min^{-1}	2800 min^{-1}	92.10 kg cm^2	26.7 kg
AM3074-wLyz	53.00 Nm	12.90 A	–	1200 min^{-1}	1400 min^{-1}	119.70 kg cm^2	33.6 kg
AM3074-wPyz	52.50 Nm	18.50 A	–	1800 min^{-1}	2000 min^{-1}	119.70 kg cm^2	33.6 kg

u: flange code, v: motor length

Option w = 0: smooth shaft (standard),
w = 1: shaft with groove and feather key according to DIN 6885,
w = 2: shaft with IP 65 sealing ring and smooth shaft,
w = 3: shaft with IP 65 sealing ring and shaft with groove and feather key

Option x = winding code A…P

Option y = 0: resolver, 2-pole, y = 1: single-turn absolute encoder, EnDat,
y = 2: multi-turn absolute encoder EnDat, y = 3: single-turn absolute encoder BiSS,
y = 4: multi-turn absolute encoder, BiSS

Option z = 0: without stopping brake, z = 1: with stopping brake

Option a = 0: connection boxes for motor and feedback cable, a = 1: connection cable 0.5 m

Special flange, special shaft and other accessories on request

Winding code “Q” for AM307x:

NEW

AM30uv-wxyz-000	Standstill torque	Standstill current	Rated speed at rated supply voltage			Rotor moment of inertia	Weight
			230 V AC	400 V AC	480 V AC		
AM3072-wQyz	29,7 Nm	20,9 A	–	3500 min^{-1}	4000 min^{-1}	64,50 kg cm^2	19,7 kg
AM3073-wQyz	41,6 Nm	24,6 A	–	3000 min^{-1}	3500 min^{-1}	92,10 kg cm^2	26,7 kg
AM3074-wQyz	51,9 Nm	26,2 A	–	2500 min^{-1}	3000 min^{-1}	119,7 kg cm^2	33,6 kg

- Enlargement of AM307x motors up to 25 A
- Optimized for AX5125
- Enables higher speed
- No modification of the demensions necessary (in comparison to other winding types)

AM308x | motors up to 150Nm

NEW

Technical data

NEW

AM30uv-wxyz-000	Standstill torque	Standstill current	Peak torque	Peak current	Rated speed at rated supply voltage 400 V AC
AM3082	80 Nm	50 A	220 Nm	120 A	2500 min^{-1}
AM3083	110 Nm	72 A	300Nm	170 A	2200 min^{-1}
AM3084	150 Nm	90 A	400 Nm	240 A	2000 min^{-1}

- Features
  - feedback: resolver, singleturn and multiturn absolute encoder
  - smooth shaft or shaft with groove and feather key
  - protection class IP65, shaft feedthrough IP54, optional IP67 with shaft seal
  - UL/CSA

AM35xx | Synchronous Servomotors

Technical highlights

- high overload capacity
- maximum power density through stator pole winding
- increased moment of inertia for highly dynamic applications at higher loads
- very low torque ripple

Features

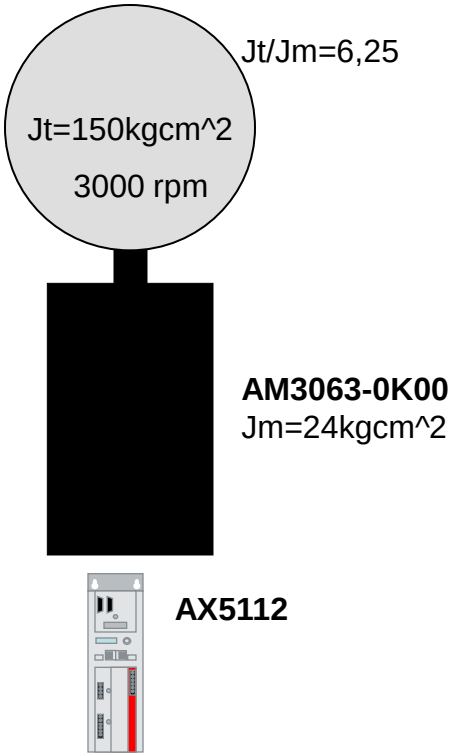
- compact design
- flexible feedback systems such as resolver or absolute encoder
- rotatable plug connectors facilitate assembly
- simple commissioning
- protection class IP 64, optionally IP 65/67
- UL and CSA approval

Technical data

AM35uv-wxyz	Standstill torque	Standstill current	Rated torque	Rated current	Rotor moment of inertia
AM3541-wxyz	1.9 Nm	1.7 A	1.6 Nm	1.5 A	2.0 kg cm²
AM3542-wxyz	3.3 Nm	2.4 A	2.9 Nm	2.3 A	4.0 kg cm²
AM3543-wxyz	4.2 Nm	4.8 A	3.0 Nm	3.7 A	8.0 kg cm²
AM3551-wxyz	4.1 Nm	3.4 A	3.2 Nm	3.4 A	15.0 kg cm²
AM3552-wxyz	6.3 Nm	4.8 A	4.6 Nm	4.8 A	19.0 kg cm²
AM3553-wxyz	8.6 Nm	6.4 A	6.1 Nm	6.4 A	20.0 kg cm²
AM3562-wxyz	11.6 Nm	10.3 A	8.4 Nm	10.3 A	40.0 kg cm²
AM3563-wxyz	14.9 Nm	12.5 A	10.9 Nm	12.5 A	60.0 kg cm²

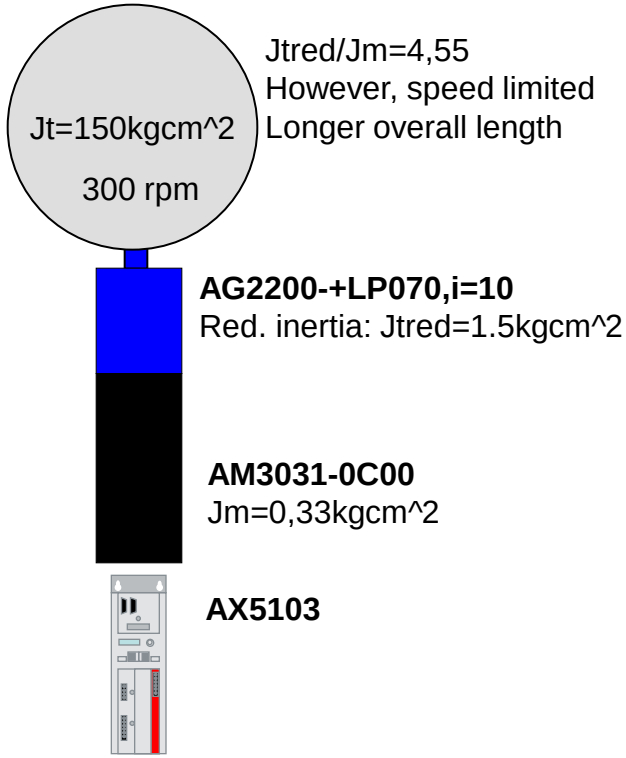
Example: rotary table drive

Direct drive



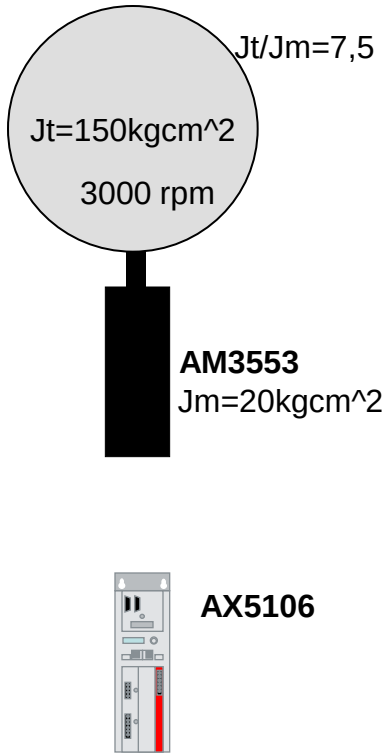
+ Inertia ratio
+ Rotary speed
+ Direct drive
- Required space
- Costs
- Controller only 1 channel

Drive via gearbox



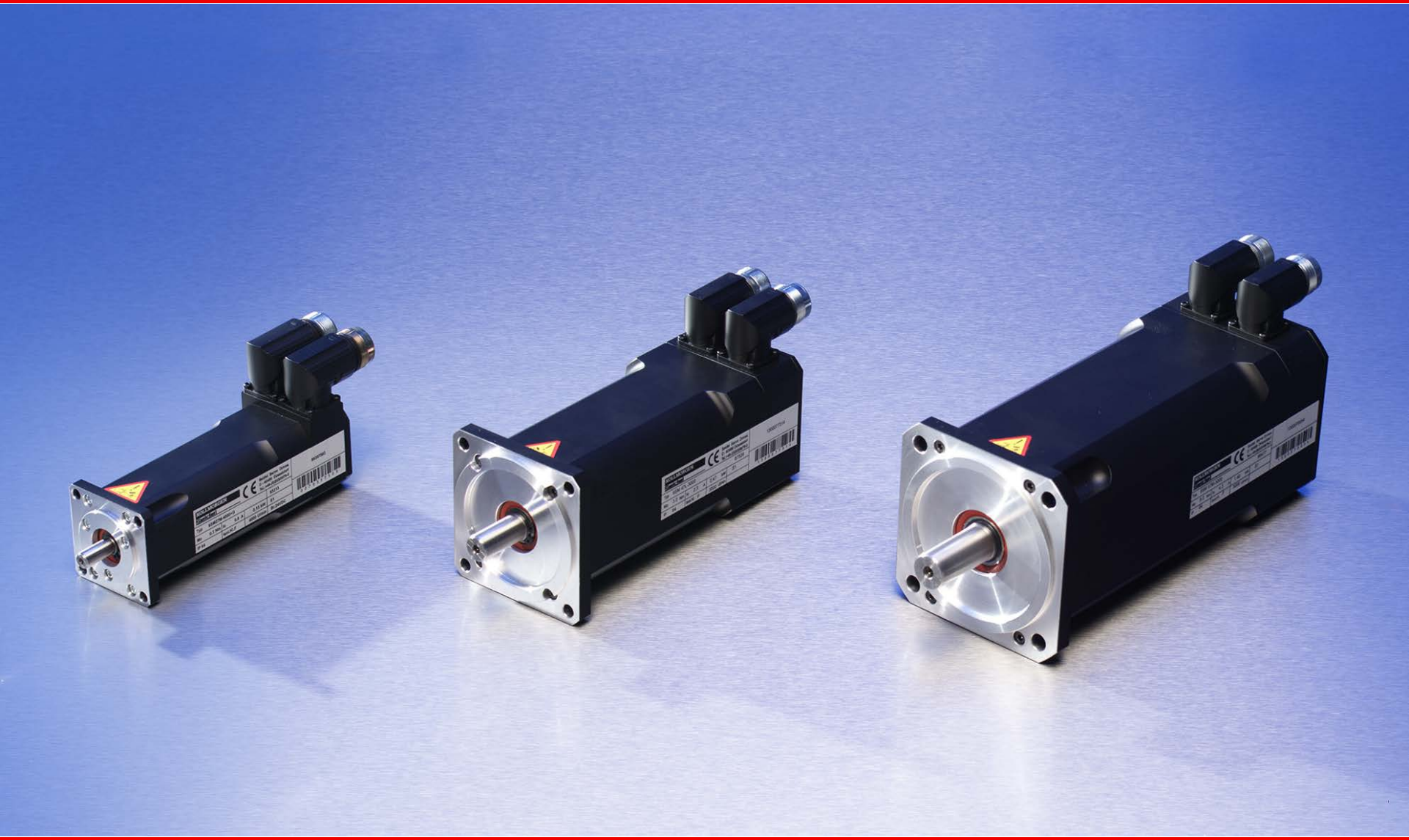
+ Inertia ratio
+ Cossts
+ Controller also 2-channel
- Rotary speed
- no direct drive
(backlash afflicted)

Direct drive



+ Inertia ratio
+ Direct drive
+ Costs
+ Rotary speed
+ Required space
+ Controller also 2-channel

AM2xxx | Synchronous Servomotors



Technical highlights

- in connection with digital servo drives outstandingly suited to positioning tasks that make high demands on dynamics and stability
- excellent quality
- highly dynamic
- Rotors have low moments of inertia.
- excellent rotational characteristics
- high overload capacity

Features

- high dynamic performance through neodymium magnets
- flange dimensions meet IEC standard fit j6, accuracy according to 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 feather key groove
- 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
- optional single-turn or multi-turn absolute encoder
- optionally special winding

Technical data

AM2000-wxyz	Standstill torque	Standstill current	Rated speed at rated supply voltage		Rotor moment of inertia	Weight
			230 V AC	400 ... 480 V AC		
AM217S-0000	0.1 Nm	0.6 A	6000 min^{-1}	–	0.06 kg cm^2	0.7 kg
AM2217M-0000	0.2 Nm	0.93 A	6000 min^{-1}	–	0.12 kg cm^2	0.8 kg
AM217S-2000	0.1 Nm	0.6 A	6000 min^{-1}	–	0.06 kg cm^2	0.7 kg
AM217M-2000	0.2 Nm	0.93 A	6000 min^{-1}	–	0.12 kg cm^2	0.8 kg
AM227M-0000	0.32 Nm	0.8 A	–	4000 min^{-1}	0.08 kg cm^2	1.1 kg
AM227M-0001	0.32 Nm	0.8 A	–	4000 min^{-1}	0.15 kg cm^2	1.4 kg
AM227L-0000	0.8 Nm	0.83 A	–	4500 min^{-1}	0.13 kg cm^2	1.5 kg
AM227L-0001	0.8 Nm	0.83 A	–	4500 min^{-1}	0.2 kg cm^2	1.8 kg
AM237S-0000	0.5 Nm	1 A	–	6000 min^{-1}	0.45 kg cm^2	1.9 kg
AM237S-0001	0.5 Nm	1 A	–	6000 min^{-1}	0.83 kg cm^2	2.3 kg
AM237M-0000	1 Nm	1.6 A	–	6000 min^{-1}	0.7 kg cm^2	2.3 kg
AM237M-0001	1 Nm	1.6 A	–	6000 min^{-1}	1.08 kg cm^2	2.7 kg
AM237L-0000	1.5 Nm	1.6 A	–	4000 min^{-1}	1 kg cm^2	2.9 kg
AM237L-0001	1.5 Nm	1.6 A	–	4000 min^{-1}	1.38 kg cm^2	3.3 kg
AM247M-0000	2.5 Nm	1.78 A	–	3000 min^{-1}	1.4 kg cm^2	3.3 kg
AM247M-0001	2.5 Nm	1.78 A	–	3000 min^{-1}	1.78 kg cm^2	3.7 kg
AM247L-0000	3 Nm	2.3 A	–	3000 min^{-1}	1.6 kg cm^2	3.5 kg
AM247L-0001	3 Nm	2.3 A	–	3000 min^{-1}	1.98 kg cm^2	3.9 kg
AM257K-0000	2.6 Nm	1.9 A	–	3000 min^{-1}	2.1 kg cm^2	4.5 kg
AM257K-0001	2.6 Nm	1.9 A	–	3000 min^{-1}	3.16 kg cm^2	5.25 kg
AM257S-0000	4.6 Nm	2.8 A	–	3000 min^{-1}	3.1 kg cm^2	5.7 kg
AM257S-0001	4.6 Nm	2.8 A	–	3000 min^{-1}	4.16 kg cm^2	6.3 kg

Technical data

AM2000-wxyz	Standstill torque	Standstill current	Rated speed at rated supply voltage		Rotor moment of inertia	Weight
			230 V AC	400 ... 480 V AC		
AM257M-0000	8 Nm	4.3 A	–	3000 min^{-1}	4.5 kg cm^2	7.6 kg
AM257M-0001						
AM257L-0000	9.5 Nm	6.1 A	–	3000 min^{-1}	6.5 kg cm^2	8.7 kg
AM257L-0001	9.5 Nm	6.1 A	–	3000 min^{-1}	7.56 kg cm^2	9.45 kg
AM277K-0000	11 Nm	6 A	–	3000 min^{-1}	12 kg cm^2	9.8 kg
AM277K-0001	11 Nm	6 A	–	3000 min^{-1}	15.6 kg cm^2	11.3 kg
AM277S-0000	17 Nm	10 A	–	3000 min^{-1}	18 kg cm^2	14 kg
AM277S-0001	17 Nm	10 A	–	3000 min^{-1}	21.6 kg cm^2	15.5 kg
AM277M-0000	22 Nm	13.7 A	–	3000 min^{-1}	13.1 kg cm^2	17 kg
AM277M-0001	22 Nm	13.7 A	–	3000 min^{-1}	16.7 kg cm^2	18.5 kg
AM297K-0000	26 Nm	16 A	–	3000 min^{-1}	82 kg cm^2	28 kg
AM297K-0001	26 Nm	16 A	–	3000 min^{-1}	91.5 kg cm^2	31.3 kg
AM297S-0000	32 Nm	20 A	–	3000 min^{-1}	104 kg cm^2	32.5 kg
AM2297S-0001	32 Nm	20 A	–	3000 min^{-1}	113.5 kg cm^2	35.8 kg
AM297M-0000	40 Nm	23.4 A	–	3000 min^{-1}	139.4 kg cm^2	40 kg
AM297M-0001	40 Nm	23.4 A	–	3000 min^{-1}	148.9 kg cm^2	43.3 kg

Option w = 0: smooth shaft, w = 1: shaft with groove and feather key according to DIN 6885

Option x = 0: standard winding, x = 1: special winding

Option y = 0: feedback: resolver, y = 1: feedback: single-turn absolut encoder,
y = 2: feedback: multi-turn absolut encoder

Option z = 0: without stopping brake, z = 1: with stopping brake

Special flange, special shaft and other accessories on request

AG2200 | Planetary gear units for Servomotors

- Usage in applications where large mass inertia has to be overcome

Technical highlights

- maximum economic efficiency (low price, absolutely maintenance-free, short delivery time, long service life)
- maximum efficiency at > 95 % at full load
- maximum power density
- low running noise

Features

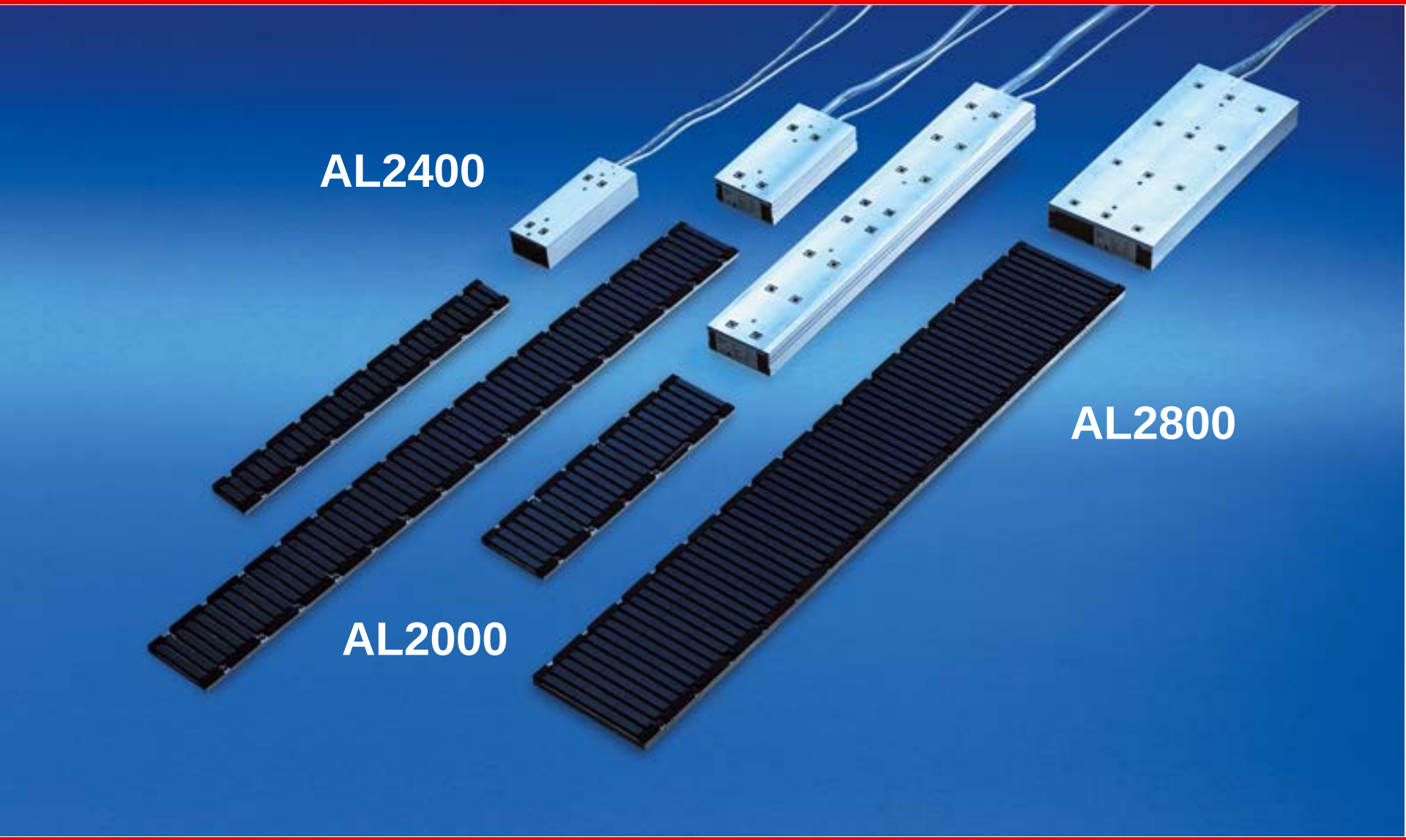
- only deliverable as a complete motor/gear unit
- suitable for cyclic or continuous operation
- flexible mounting position
- protection class IP 64
- output shaft with feather key
- 5 sizes
- 9 gear ratios
- acceleration torque between 11 and 450 Nm
- maximum speed up to 8,000 rpm
- low torsional backlash

Technical data

	Rated torque	Acceleration torque	Torsional back-lash standard/ reduced	Typ. combination with AM2000	Typ. combination with AM3000
AG2200-+LP050-M01-x-11y	≥ 5 Nm	≥ 11 Nm	≤12/10 arcmin	AM227x/AM237x	AM301x/AM302x
AG2200-+LP050-M02-x-11y	≥ 5 Nm	≥ 11 Nm	≤15/13 arcmin	AM227x/AM237x	AM301x/AM302x
AG2200-+LP070-M01-x-11y	≥ 16 Nm	≥ 32 Nm	≤12/ 8 arcmin	AM237x/AM247x	AM302x/AM303x
AG2200-+LP070-M02-x-11y	≥ 16 Nm	≥ 32 Nm	≤15/10 arcmin	AM237x/AM247x	AM302x/AM303x
AG2200-+LP090-M01-x-11y	≥ 40 Nm	≥ 80 Nm	≤12/ 8 arcmin	AM247x/AM257x	AM304x/AM305x
AG2200-+LP090-M02-x-11y	≥ 40 Nm	≥ 80 Nm	≤15/10 arcmin	AM247x/AM257x	AM304x/AM305x
AG2200-+LP120-M01-x-11y	≥ 100 Nm	≥ 200 Nm	≤12/ 8 arcmin	AM257x/AM277x	AM305x/AM306x
AG2200-+LP120-M02-x-11y	≥ 100 Nm	≥ 200 Nm	≤15/10 arcmin	AM257x/AM277x	AM305x/AM306x
AG2200-+LP155-M01-x-11y	≥ 190 Nm	≥ 350 Nm	≤12/ 8 arcmin	AM277x/AM297x	AM306x/AM307x
AG2200-+LP155-M02-x-11y	≥ 190 Nm	≥ 350 Nm	≤15/10 arcmin	AM277x/AM297x	AM306x

M01: single-stage
M02: two-stage
x = gear ratio 3*, 4*, 5, 7* or 10 (* LP70/90/120 only)
x = gear ratio 15*, 16*, 25, 30*, 50, 70* or 100 (* LP70/90/120 only)
y = 0: reduced torsional backlash
y = 1: standard torsional backlash

AL2x00 | Linear Servomotors



Technical highlights

- 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/AX5000
- complete fieldbus compatibility
- low cogging caused by skewed magnets
- very low thermic resistance, operating with or without water cooling possible
- MES, scaleless feedback system for cost-effective positioning (achievable positing range of 0.1 mm)

Features

- six different motors, all with the same width
- All motors can be operated using the same magnetic plates.

Primary part

- protection class IP 64
- quickly connected to the AX2000 via plugged connections

Secondary part

- three different lengths of magnetic plates
- can be combined in any desired way

Technical data

AL2000	Peak force 3 sec. (F_{peak})	Peak current (I_{peak})	Thermal resistance (R_{th})	Weight of the coil (M_p)	Motor length	Motor width
AL2003	225 N	5 A	0.96 °C/W	0.9 kg	98 mm	77 mm
AL2006	450 N	6,5 A/13 A	0.48 °C/W	1.5 kg	146 mm	77 mm
AL2009	675 N	8 A/15 A	0,32 °C/W	2,0 kg	195 mm	77 mm
AL2012	900 N	13 A/26 A	0.24 °C/W	2.6 kg	244 mm	77 mm
AL2015	1125 N	13 A/33 A	0.20 °C/W	3.2 kg	290 mm	77 mm
AL2018	1350 N	20 A/41 A	0,16 °C/W	3,8 kg	336 mm	77 mm
AL2024	1800 N	26 A/52 A	0.12 °C/W	5.1 kg	468 mm	77 mm
AL2030	2250 N	20 A/50 A	0.10 °C/W	6.3 kg	562 mm	77 mm
AL2110	magnetic assembly 192 mm					
AL2120	magnetic assembly 288 mm					

Technical data

AL2400	Peak force 3 sec. (F_{peak})	Peak current (I_{peak})	Thermal resistance (R_{th})	Weight of the coil (M_p)	Motor length	Motor width
AL2403	120 N	3.9 A	1.4 °C/W	0.55 kg	93 mm	50 mm
AL2406	240 N	7.9 A	0.7 °C/W	0.9 kg	143 mm	50 mm

AL2510	magnetic assembly 96 mm
AL2520	magnetic assembly 144 mm
AL2530	magnetic assembly 384 mm

AL2800	Peak force 3 sec. (F_{peak})	Peak current (I_{peak})	Thermal resistance (R_{th})	Weight of the coil (M_p)	Motor length	Motor width
AL2812	1800 N	13 A/26 A	0,16 °C/W	5 kg	244 mm	130 mm
AL2815	2250 N	13 A/33 A	0.13 °C/W	6 kg	290 mm	130 mm
AL2830	4500 N	26 A/66 A	0.065 °C/W	12 kg	562 mm	130 mm
AL2845	6750 N	39 A/99 A	0.043 °C/W	18 kg	834 mm	130 mm

AL2910	magnetic assembly 192 mm
AL2920	magnetic assembly 288 mm

AL38xx | Linear Servomotors

Technical highlights

- absolutely stiff, backlash-free coupling of load and motor
- no cogging, highly synchronous operation
- high dynamics through lower weight of the coil part
- high force density
- direct, fast force generation, thereby no position overshoot
- significantly higher positioning accuracy through high control loop gain possible

Features

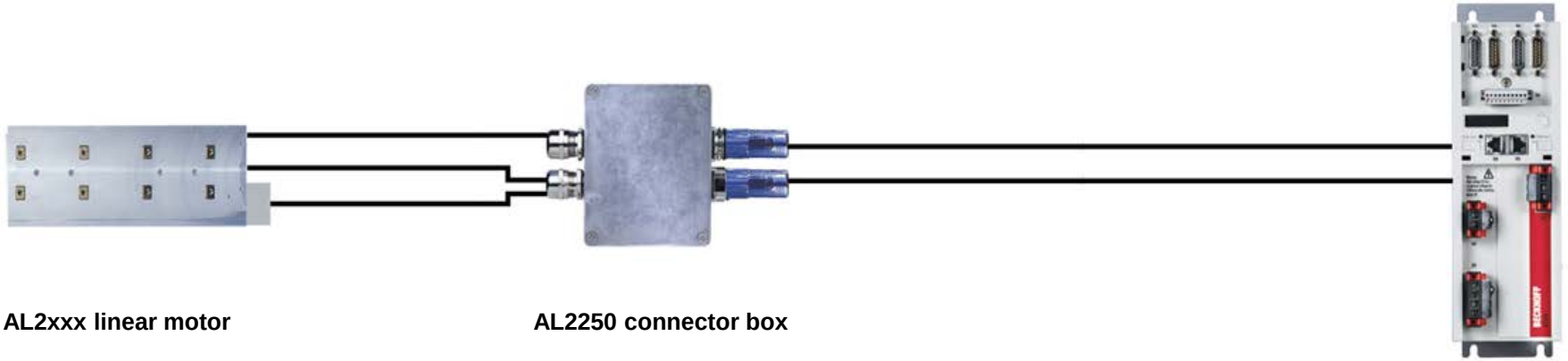
- ironless servomotor
- maintenance-free drive, no abrasion, no wear
- ideal for cleanroom applications
- maximum velocity 2.7 m/s (N type) or 6.6 m/s (S type)

Technical data

AL38xx	AL3803	AL3806	AL3809	AL3812	AL3818
Winding type	N | S	N | S	N | S	N | S	N
Peak force 3 sec. (F_{peak})	700 N	1400 N	2100 N	2800 N	4200 N
Peak current (I_{peak})	5.6 A | 13.9 A	11.3 A | 28 A	16.9 A | 42 A	22.6 A | 56 A	34 A
Cont. force with air cooling (F_{ca})	104 N	208 N	312 N	416 N	624 N
Cont. current (I_c)	1.14 A | 2.8 A	2.27 A | 5.6 A	3.4 A | 8.4 A	4.5 A | 11.2 A	6.8 A
Cont. power loss (P_c)	82 W	165 W	247 W	330 W	494 W
Force constant (K_f)	124 N/A | 50.3 N/A	124 N/A | 50.3 N/A	124 N/A | 50.3 N/A	124 N/A | 50.3 N/A	124 N/A
Motor constant (K_m)	323 N^2/W	647 N^2/W	970 N^2/W	1293 N^2/W	1940 N^2/W
Wind. resistance per phase (R_f)	15.8 Ω | 2.6 Ω	7.9 Ω | 1.29 Ω	5.3 Ω | 0.86 Ω	4 Ω | 0.65 Ω	2.6 Ω
Wind. inductance per phase (L_f)	28 mH | 4.6 mH	14 mH | 2.3 mH	9 mH | 1.5 mH	7 mH | 1.2 mH	4.7 mH
Thermal resistance (R_{th})	1.04 °C/W	0.52 °C/W	0.35 °C/W	0.26 °C/W	0.17 °C/W
Weight of the coil (M_p)	0.55 kg	0.95 kg	1.35 kg	1.75 kg	2.55 kg

AL2250 | Connector Box

- For simple wiring between linear motor and the Servo Drive



AL2xxx linear motor

AL2250 connector box

- mounting on the linear slide
- Motor, thermal protection contact and encoder cable are introduced into the box through cable glands and connected to the terminal strip.
- No thermal protection contact cable is required.

AS1xxx | Stepper Motors

Technical highlights

- synchronous motors with a high number of poles (direct drives)
- high holding torque
- very good positioning capability
- makes a holding brake unnecessary in many applications

Features

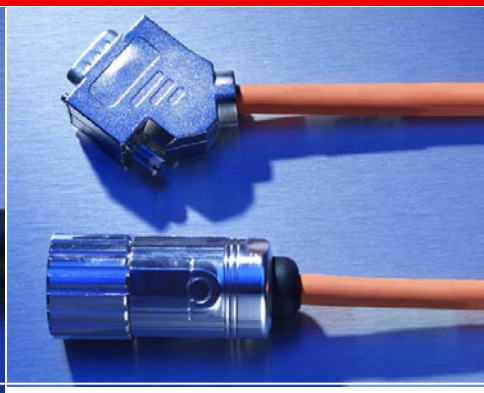
- individual steps or partial steps can be approached directly (i.e. without return system)
- equipped with pre-assembled plug connectors to simplify the electrical connection
- can be used as actuators or auxiliary axes in machine construction and automation

Technical data

AS1xxx	AS1010-0000	AS1020-0xyz	AS1030-0000	AS1050-0xyz	AS1060-wxyz
Rated supply voltage	24…50 V DC				
Rated current (per phase)	1.0 A	1.0 A	1.5 A	5.0 A	5.0 A
Standstill torque Mo	0.38 Nm	0.5 Nm	0.6 Nm	1.2 Nm	5.0 Nm
Winding resistance (per phase)	4.10 Ω	4.80 Ω	0.80 Ω	0.28 Ω	0.36 Ω
Winding induc-tance (per phase)	9.50 mH	9.50 mH	3.80 mH	0.86 mH	2.80 mH
Rotor moment of inertia	0.056 kg cm²	0.074 kg cm²	0.21 kg cm²	0.36 kg cm²	4.40 kg cm²
Resolution	1.8°/200 full steps				
Dimensions (r x lenght)	42 mm x 39 mm	42 mm x 48 mm	56 mm x 53 mm	56 mm x 75 mm	86 mm x 97 mm
Weight	0.31 kg	0.39 kg	0.68 kg	1.00 kg	2.85 kg
Bus Terminal	KL2531	KL2531/KL2541	KL2531	KL2541	KL2541

Drive Technology accessories

- Detailed accessories complete
- the product range:
- motor cables AL2000/AM2000/ AM3000/AM3500 to AX2000/AX2500/ AX5000
- resolver cables AM2000/AM3000/ AM3500 to AX2000/AX2500/AX5000
- encoder cables AM2000, ALxxxx to AX2000/AX2500/AX5000
- encoder cables for Linear Servomotors ALxxxx
- thermal protection cables ALxxxx to AX2000/AX2500/AX5000
- interface cables



Drive Technology accessories

- connectors for Servo Drives AX2000/AX2500/AX5000
- connectors for servomotors AMxxxx, ALxxxx and cables
- ballast resistors
- motor chokes
- I/O interface cards
- operator software

For all branches and industries