

PC-based control technology

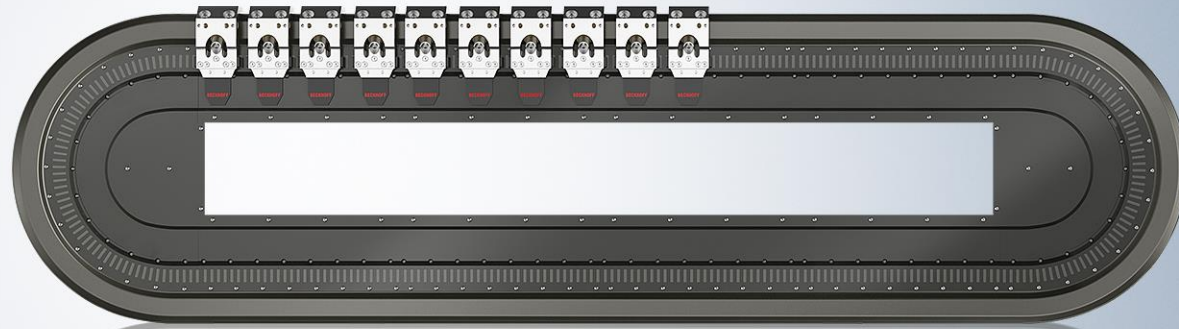
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1. **The Motion Company**
2. Servo Drives
3. Distributed Servo Drive systems
4. Servo and linear motors
5. Compact Drive Technology
6. XTS | eXtended Transport System
7. XPlanar | Planar motor system
8. Motion software
9. Accessories

Drive technology for highly dynamic positioning tasks

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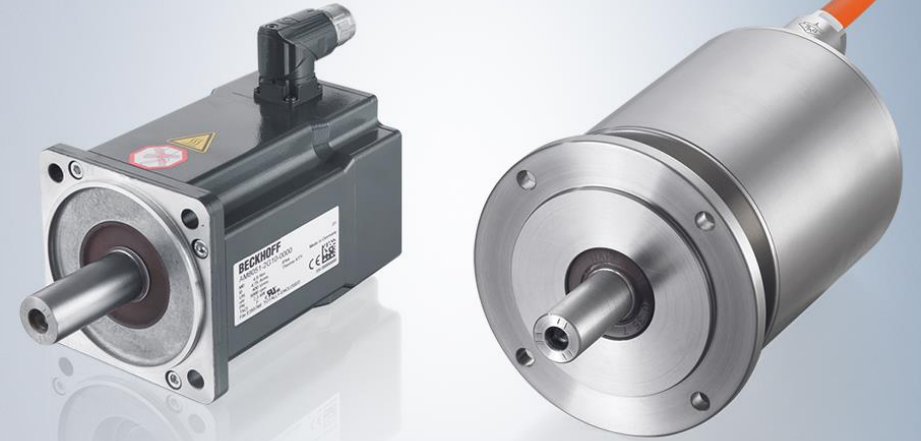
Drive technology for highly dynamic positioning tasks

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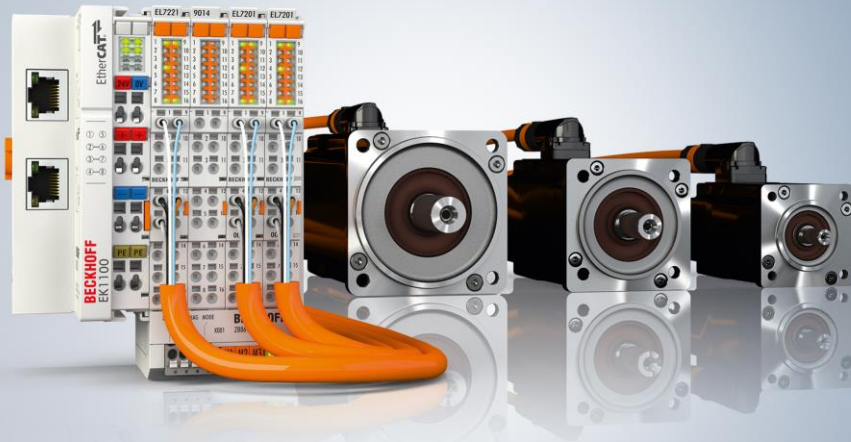
Servo drives



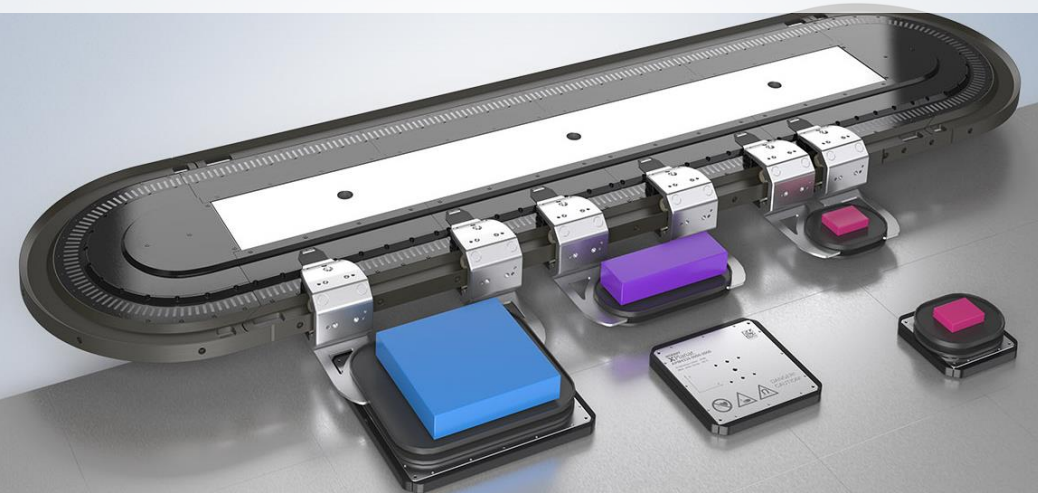
Servomotors



Compact Drive Technology



Transport systems



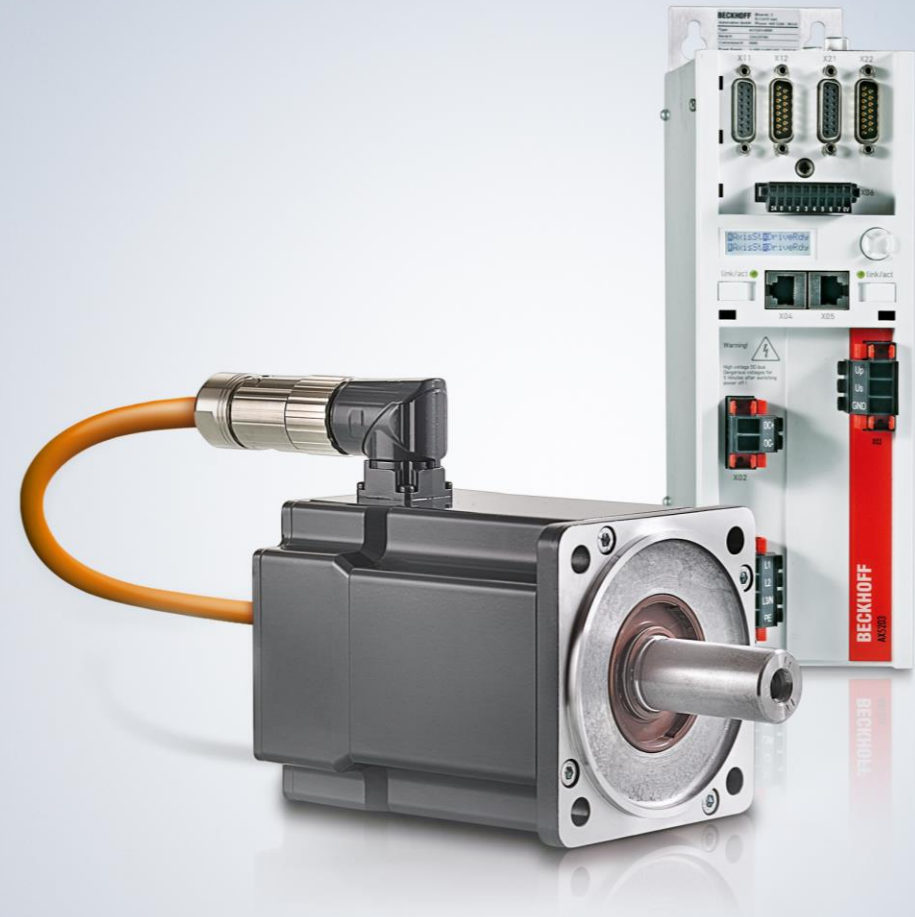


- Beckhoff offers complete motion solutions.
- hardware and software developed and produced in-house

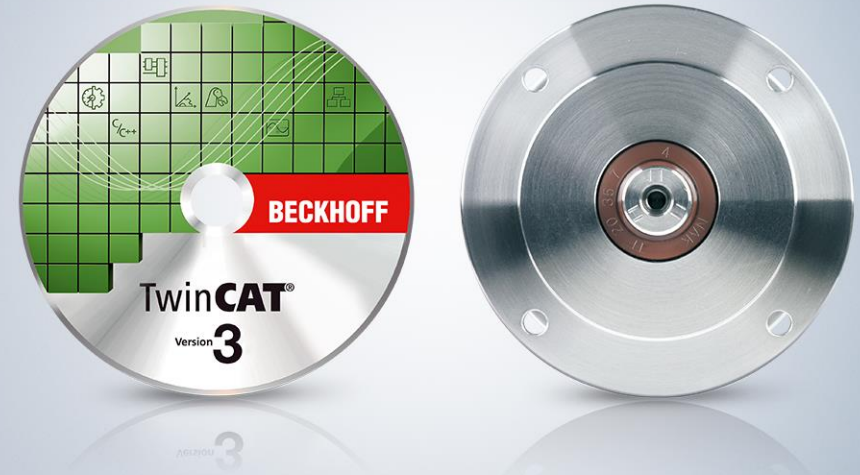
Complete motion solutions

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- scalable drive range
 - Servo Drives
 - motors
 - planetary gear units
 - accessories
- integrated support for a wide range of drive and motor technologies
 - rotary and linear servomotors
 - stepper motors
 - DC and AC motors
 - eXtended Transport System
 - XPlanar planar motor system



- base level
 - NC PTP
 - NC I
 - CNC
- functions
 - cam plates
 - flying saw
 - multi-master coupling
 - dancer control
 - winder
 - gantry axis function
 - Cartesian portals



- one partner for all motion issues
- one software tool
 - simplified commissioning and configuration
- increased flexibility for realizing applications



- competitive edge thanks to
 - lower maintenance costs
 - faster maintenance
 - more efficient inventory management
 - minimized training effort
 - high process safety
 - faster recommissioning after troubleshooting



Holistic safety integration up to PL e/SIL 3

BECKHOFF

Motion solutions from Beckhoff
support all common safety functions.



Holistic safety integration up to PL e/SIL 3

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- wide range of products
(motors and servo drives for safety functionality)
- integrated solution up to Performance Level e
 - stop (STO, SOS, SS1, SS2)
 - up to 8 speeds (SLS, SSM, SSR, SMS)
 - position (SLP, SCA, SLI)
 - acceleration (SAR, SMA)
 - rotating direction (SDIp, SDIn)
 - brake (SBC, SBT)



- reduction of components and engineering costs
- reduced effort and costs relating to compliance with safety guidelines
- simple diagnostics and expandability
- fast integration into existing concepts
- enhanced transparency (one tool)



**One Cable Technology
reduces installation and cabling costs**

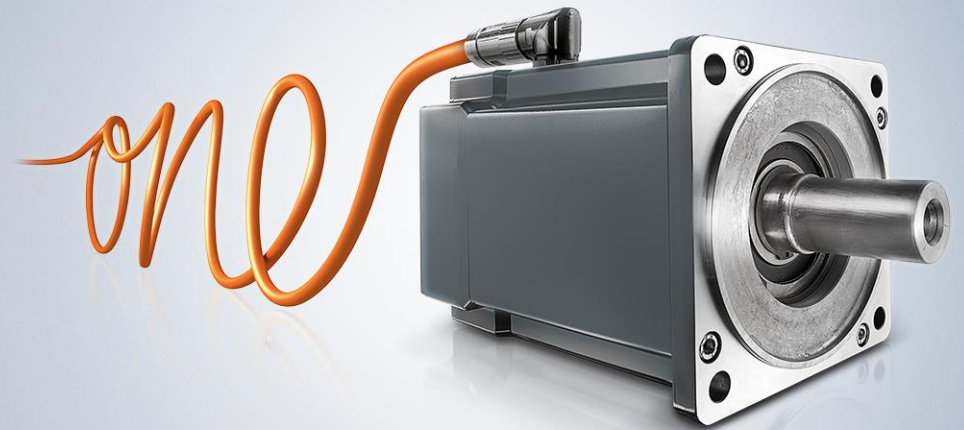
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One Cable Technology reduces installation and cabling costs

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- One Cable Technology: power and feedback system in a single standard motor cable
- reduced material costs
- reduced installation costs
- simplified commissioning
- more efficient inventory management
- reduced footprint of the machine/system



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AX8000 | High-performance multi-axis servo system

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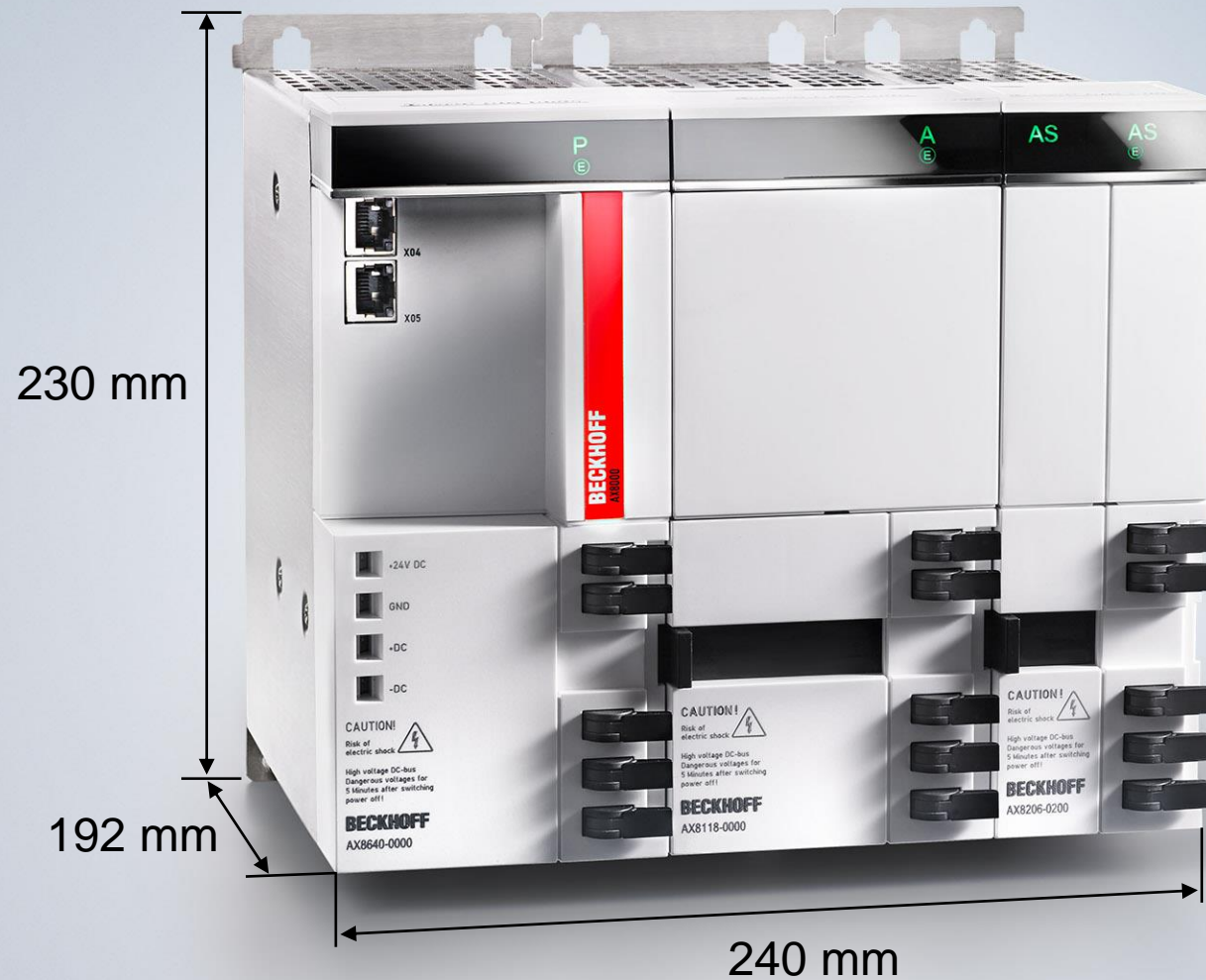
AX8000 | The new dimension

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AX8000 | The new dimension

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AX8000 | Compact for minimized space requirements

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mains filter, brake resistor
and brake chopper integrated



AX-Bridge integrated

System overview

AX86xx | Power supply modules

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AX8620

DC-Link output current

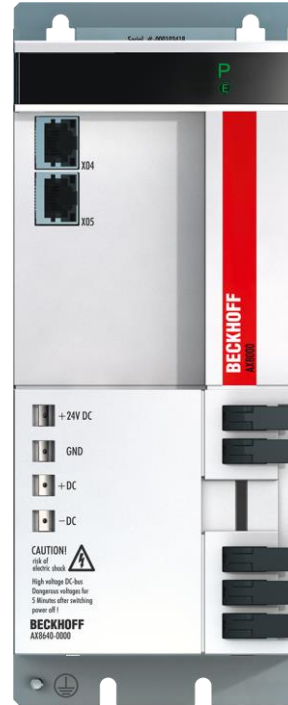
1~ 7 A DC

3~ 20 A DC

Rated supply voltage

1 x 100...240 V AC

3 x 200...480 V AC



AX8640

DC-Link output current

3~ 40 A DC

Rated supply voltage

3 x 200...480 V AC

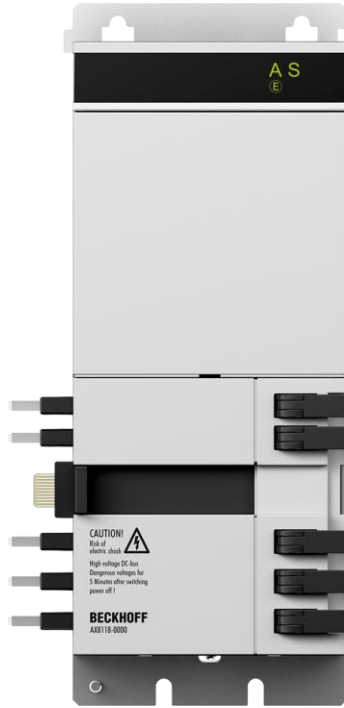
System overview

AX81xx, AX82xx | Axis modules

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AX8108
Rated output current (axis)
8 A



AX8118
Rated output current (Achse)
18 A



AX8206
Rated output current (Achse)
6 A

System overview

AX85xx | Combined power supply and axis modules

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AX8525

Rated output current (axis)
25 A

Rated supply voltage
3 x 200...480 V AC



AX8540

Rated output current (axis)
40 A

Rated supply voltage
3 x 200...480 V AC

System overview

AX8810 | Capacitor module, AX8820 | Energy recovery module

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AX8810

DC-Link capacitance
4420 μ F

DC-Link voltage
max. 875 V DC



AX8820

DC-Link voltage
max. 875 V DC

AX8000 | Quick and easy installation

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- new AX-Bridge
- toolless mounting
- One Cable Technology (OCT) integrated



- fast current and positioning control
- powerful FPGA/ARM processor technology
- FPGA-based control algorithms
- multi-channel current control technology
 - sample and response times of less than 1 μs
 - current control cycle time 32 μs
- minimum EtherCAT cycle time 62.5 μs

- 17 SafeMotion functions
- new:
 - SBC (Safe Brake Control)
 - SBT (Safe Brake Test)
- up to PL e/SIL 3 in accordance with IEC 61800-5-2 and ETG.6100 Safety Drive Profile



AX8000 | Multi-axis servo system

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	AX8620	AX8640	AX81xx	AX8206	AX85xx
Function	power supply module	power supply module	axis modules	axis modules	combined power supply and axis modules
Number of channels	side by side mounting in any order taking into account the rated output current	side by side mounting in any order taking into account the rated output current	1	2	1
Rated supply voltage	1 x 100...240 V AC 3 x 200...480 V AC	3 x 200...480 V AC			3 x 200...480 V AC
DC-Link output current	1~: 5 A DC/7 A DC* 3~: 20 A DC	3~: 40 A DC	8 A, 18 A	2 x 6 A	3~: 80 A DC, thereof max. 50 A DC for the AX-Bridge
Motor feedback			Order options OCT: AX81xx-0x00 multi-feedback interface: AX81xx-0x10	Order options OCT: AX8206-0x00 multi-feedback interface: AX8206-0x10	Order options OCT: AX85xx-0x00 multi-feedback interface: AX85xx-0x10
Drive-specific safety functions			Order options STO/SS1: AX81xx-01x0 Safe Motion: AX81xx-02x0	Order options STO/SS1: AX8206-01x0 Safe Motion: AX8206-02x0	Order options STO/SS1: AX85xx-01x0 Safe Motion: AX85xx-02x0

* 5 A without mains chokes, 7 A with mains choke

AX5000 | Digital Compact Servo Drive

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AX5000 | Digital Compact Servo Drive

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variable cooling concept

high-speed EtherCAT system
communication

fast control technology

AX-Bridge quick
connection system

large performance range
from 0.3...118 kW

wide voltage range
100...480 V AC

variable motor interface



- high flexibility in terms of
 - rated power
 - motor interface
 - voltage range
 - cooling concept
- high-performance system communication via EtherCAT
- drive-integrated safety functions in compliance with PL e/SIL 3 (optional)
 - STO Safe Torque Off
 - TwinSAFE: intelligent safety functions for Motion Control
- Bode plot option enables the detection of mechanical resonance points.

- fast control technology
 - current control: minimum 62.5 μ s
 - speed control: minimum 62.5 μ s
 - position control: minimum 62.5 μ s
- 1- or 2-channel Servo Drive
 - optimized for multi-axis applications
 - variable motor output allocation in 2-channel drives
 - active DC-Link and brake energy management

- variable motor interface
 - multi-feedback interface
 - flexible motor type selection
 - scalable wide range motor current measurement
 - OCT (One Cable Technology)
- high-speed capture inputs
- wide voltage range 100...480 V AC
- integrated mains filter
- compact design
- quick connection system AX-Bridge for power supply, DC-Link and control voltage
- variable cooling concept (fanless, forced cooling)

AX5000 | Product overview

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AX5101 – AX5112
1-channel Servo Drive,
1.5...12 A



AX5118 – AX5140
1-channel Servo Drive,
18...40 A



AX5160, AX5172
1-channel Servo
Drive, 60...72 A



AX5190, AX5191
1-channel Servo Drive,
90...110 A



AX5192, AX5193
1-channel Servo Drive,
143...170 A



AX52xx
2-channel Servo Drive,
2 x 1.5...6 A

AX5000 | Digital Compact Servo Drive

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	AX51xx	AX52xx
Function	stand-alone	stand-alone
Number of channels	1	2
Rated supply voltage	wide voltage range 1 x 100...240 V AC (1-phase operation only supported up to 6 A) 3 x 100...480 V AC 3 x 400...480 V AC (from 60 A at least 3 x 400 V AC necessary)	wide voltage range 1 x 100...240 V AC 3 x 100...480 V AC
Rated output current (axis)	1.5 A, 3 A, 6 A, 12 A, 18 A, 25 A, 40 A, 60 A, 72 A, 90 A, 110 A, 143 A, 170 A	1,5 A, 3 A, 6 A
Motor feedback	multi-feedback interface OCT supported up to 40 A	multi-feedback interface OCT
Drive-specific safety functions	supplementary products STO/SS1: AX5801 Safe Motion: AX5805, AX5806	supplementary products STO/SS1: AX5801 Safe Motion: AX5805

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400...480 V AC



AMP8620



AMP8805



AMP80xx

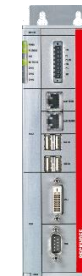
24...48 V DC



AMI812x



Panel PC



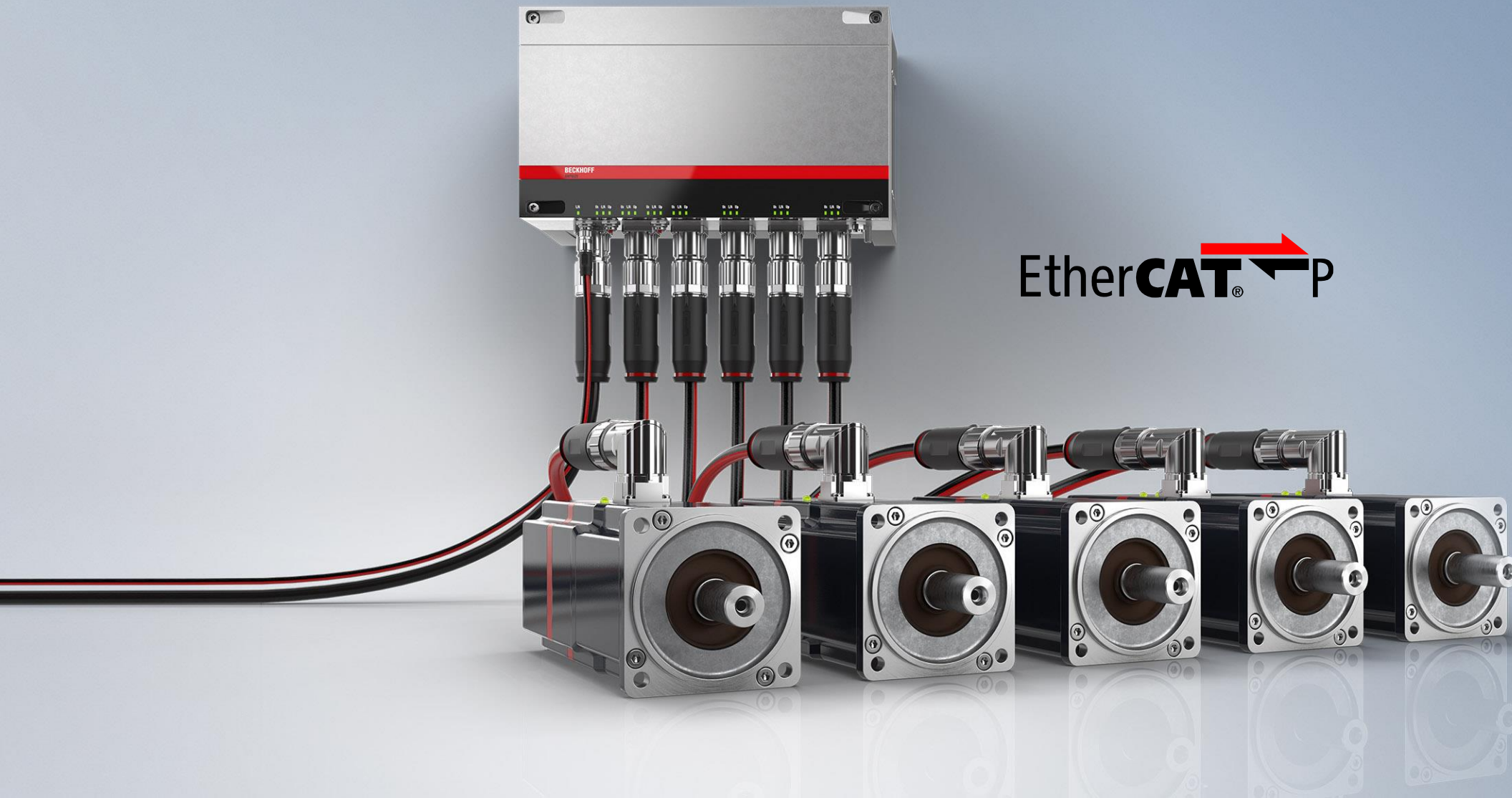
Industrial PC



Embedded PC

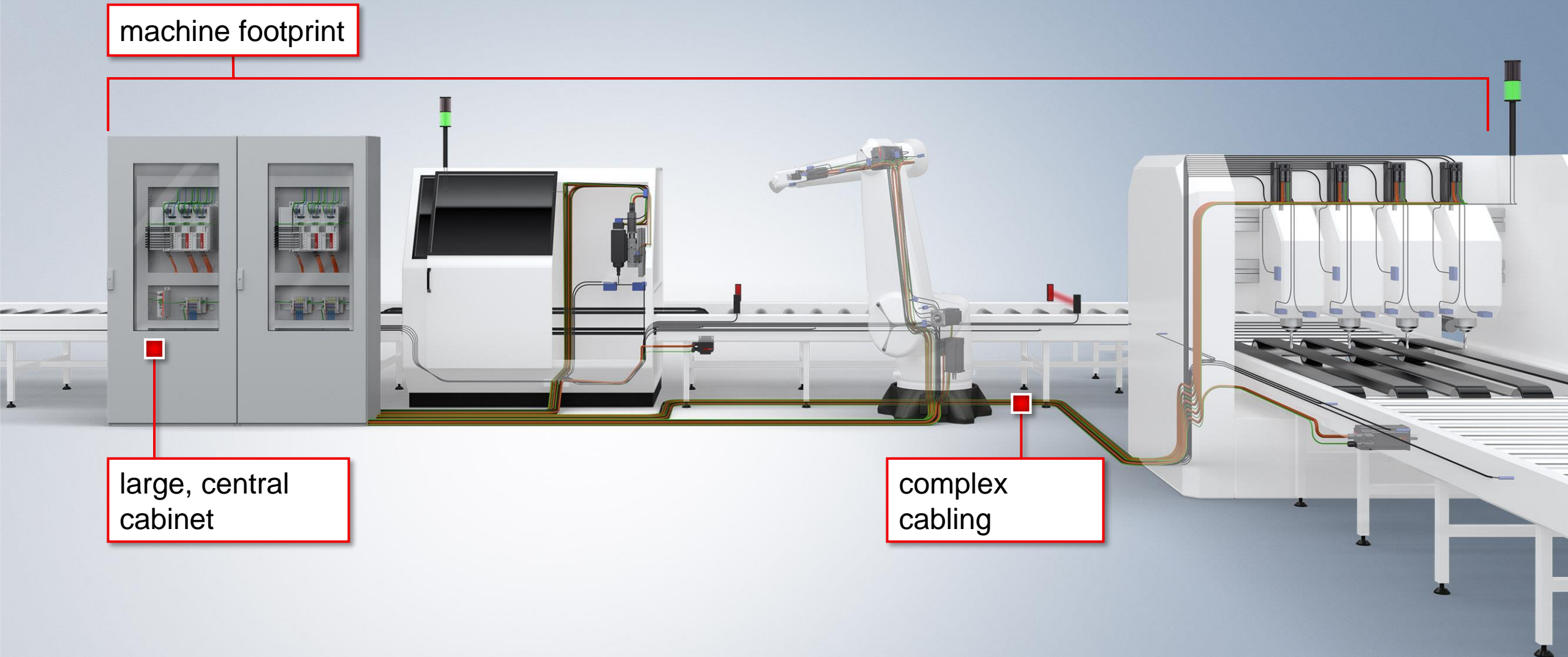
AMP8000 | Distributed Servo Drive system

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Traditional machine concept

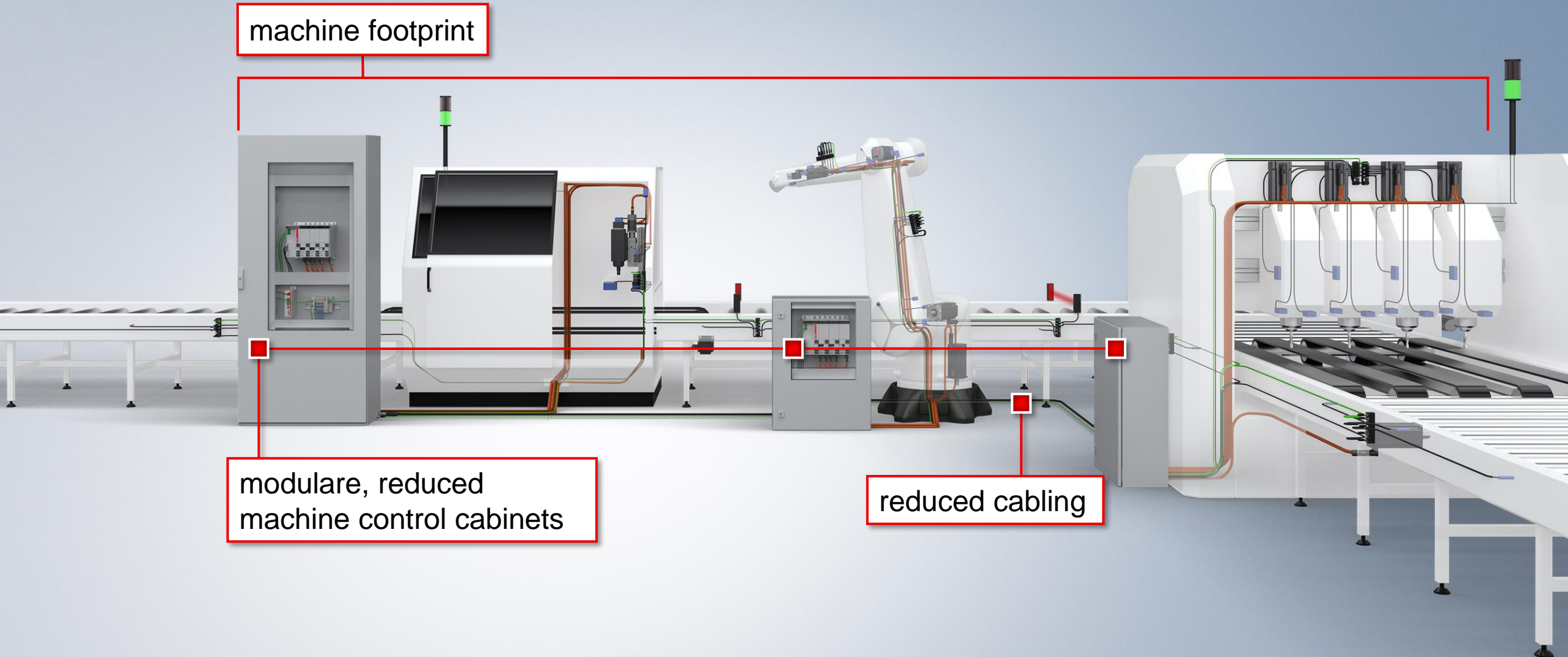
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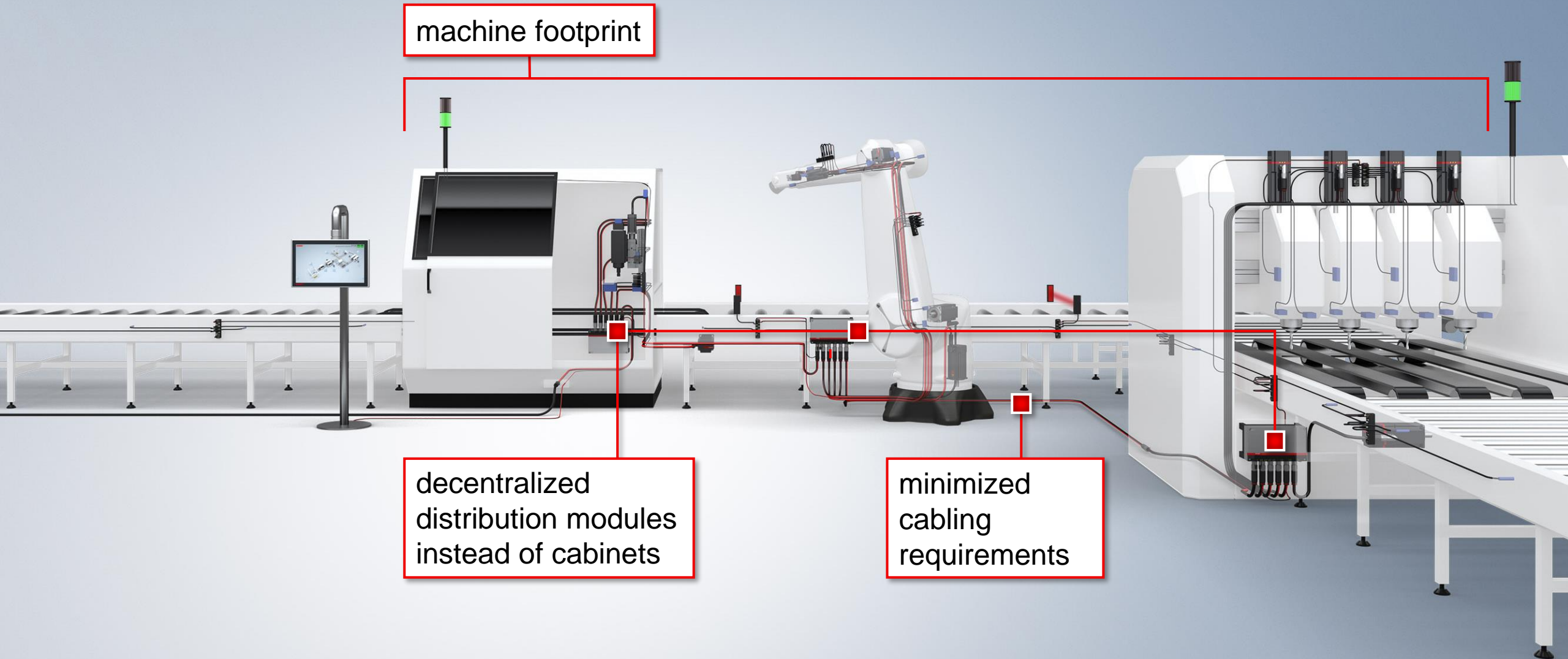


machine footprint

large, central
cabinet

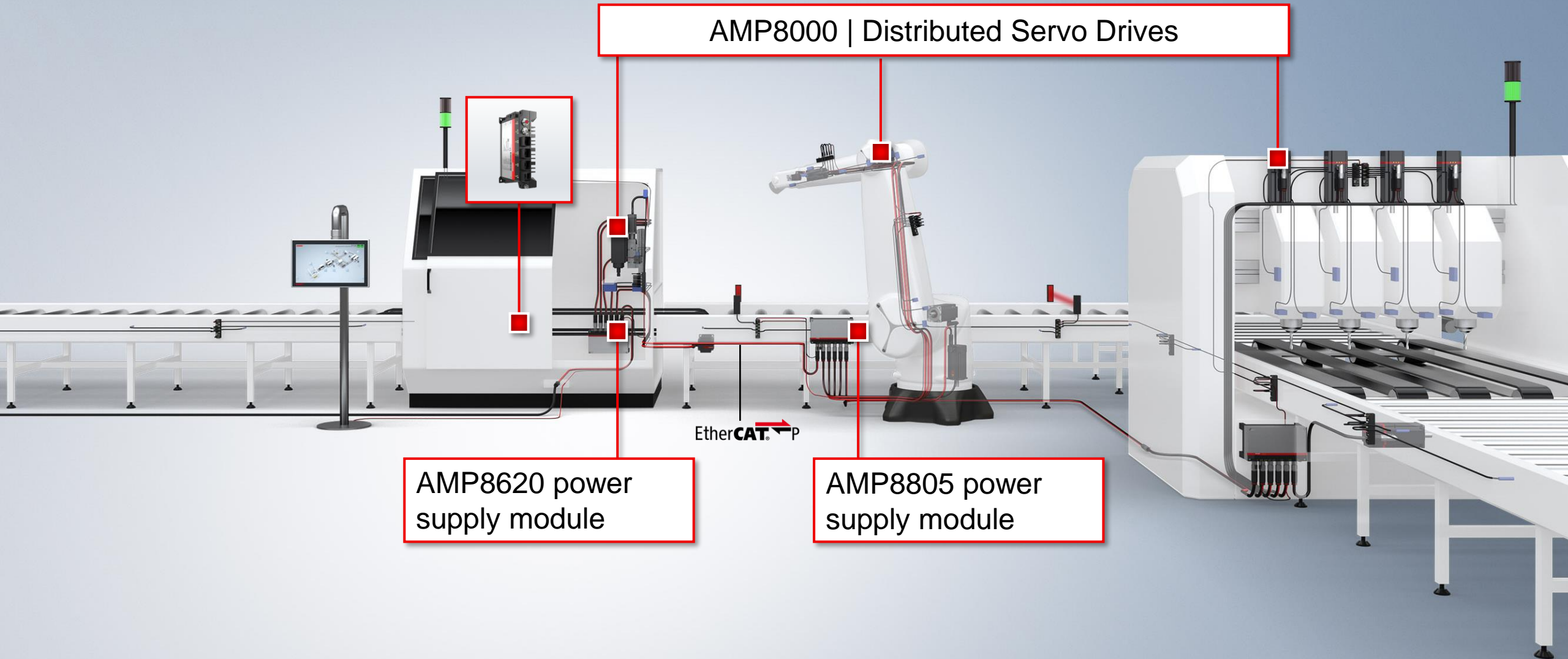
complex
cabling





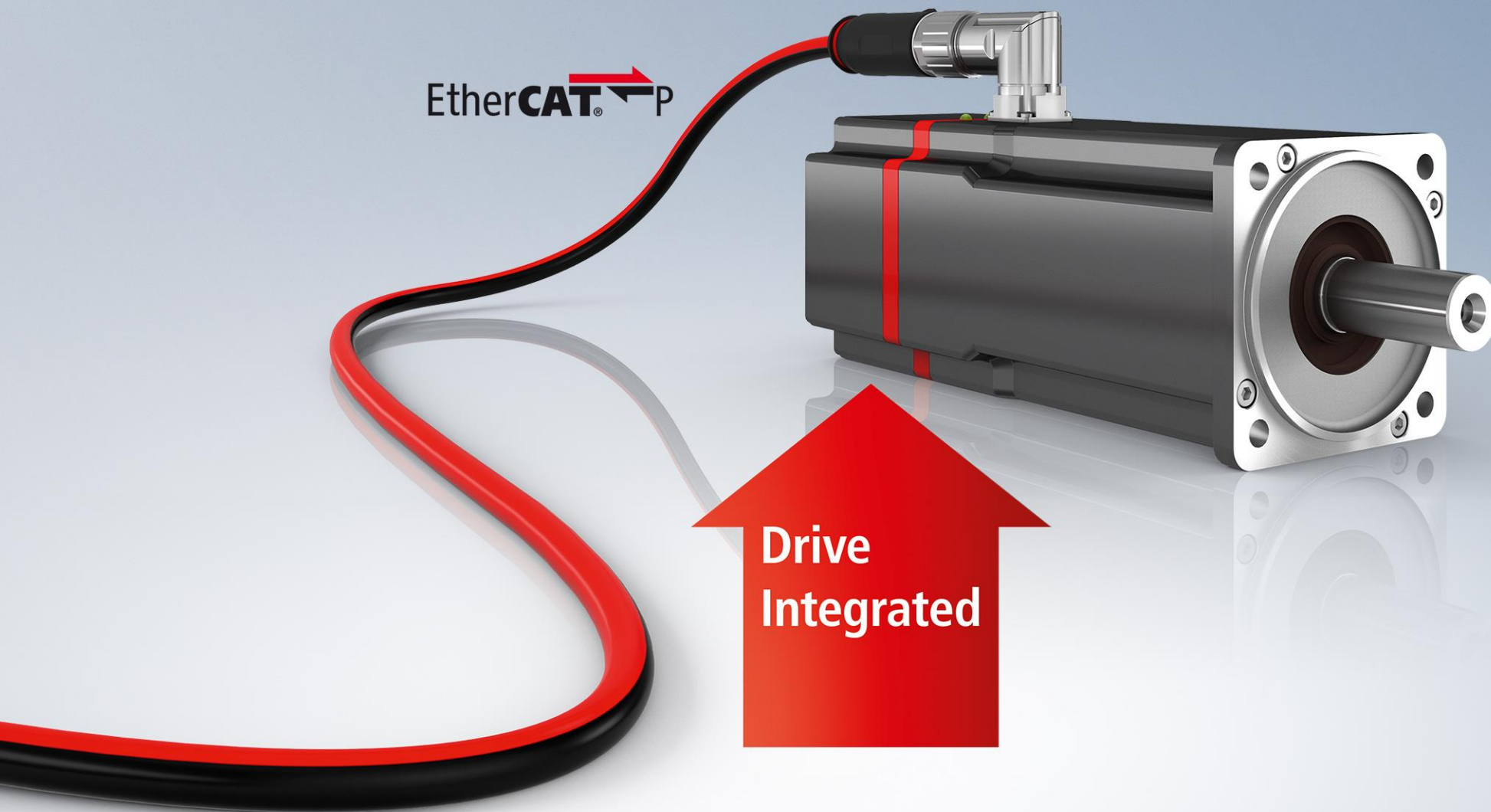
AMP8000 | Distributed Servo Drive system

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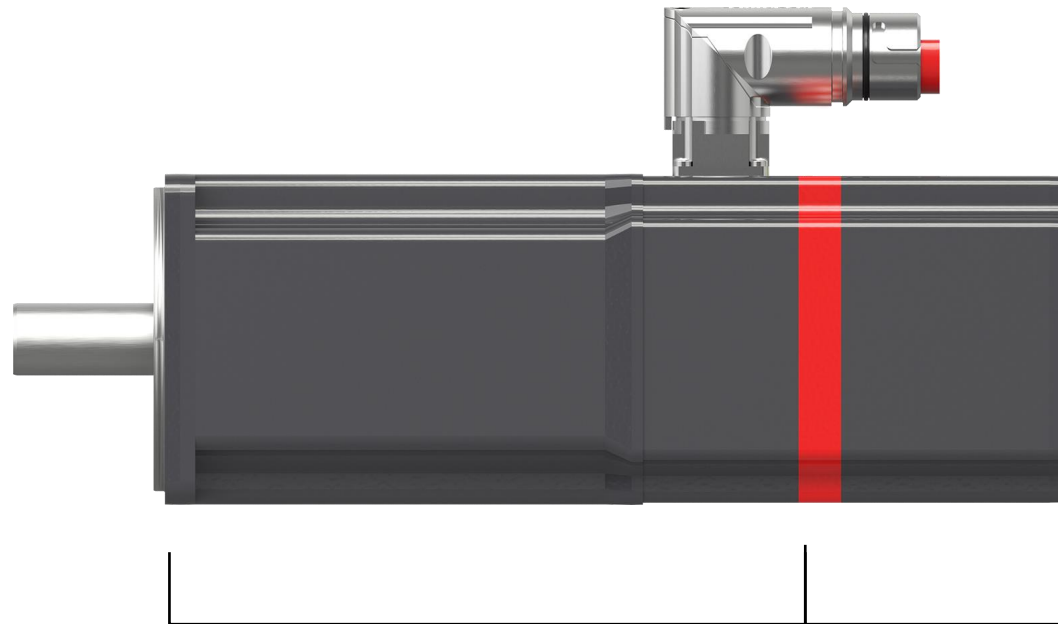
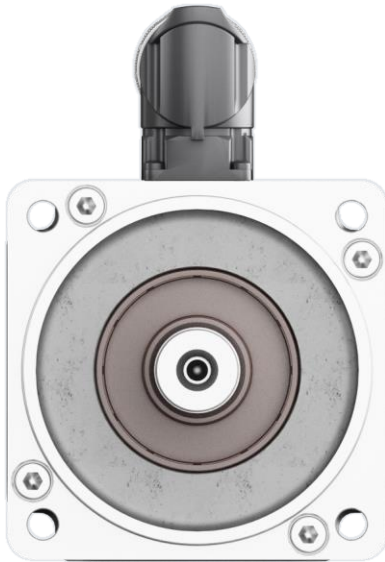


AMP80xx | Distributed Servo Drive

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Exceptionally compact and slender design

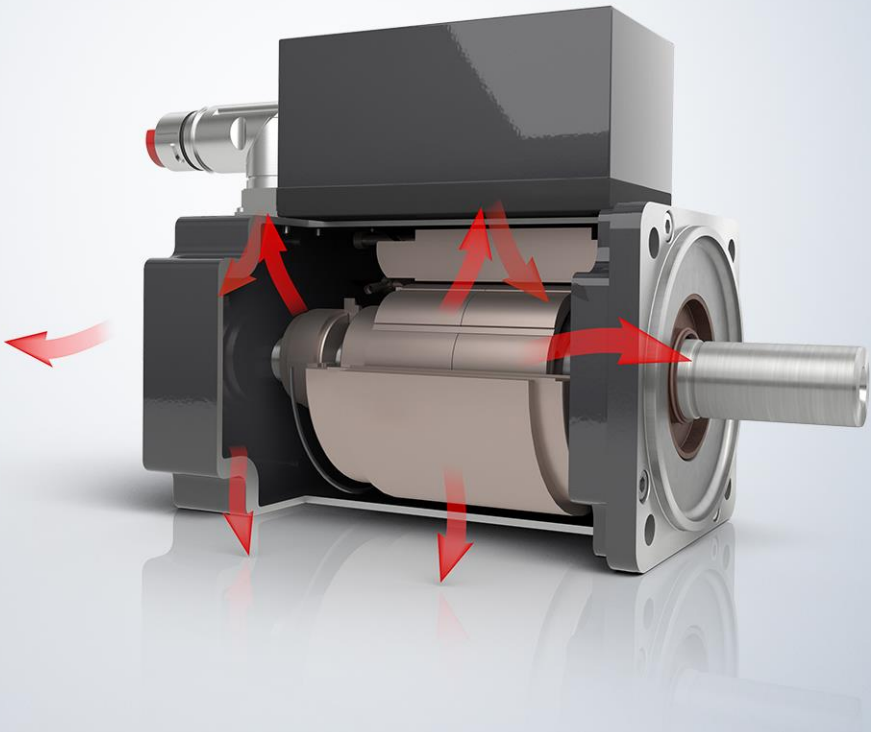


AM8000 with
modified b-side

Power Module

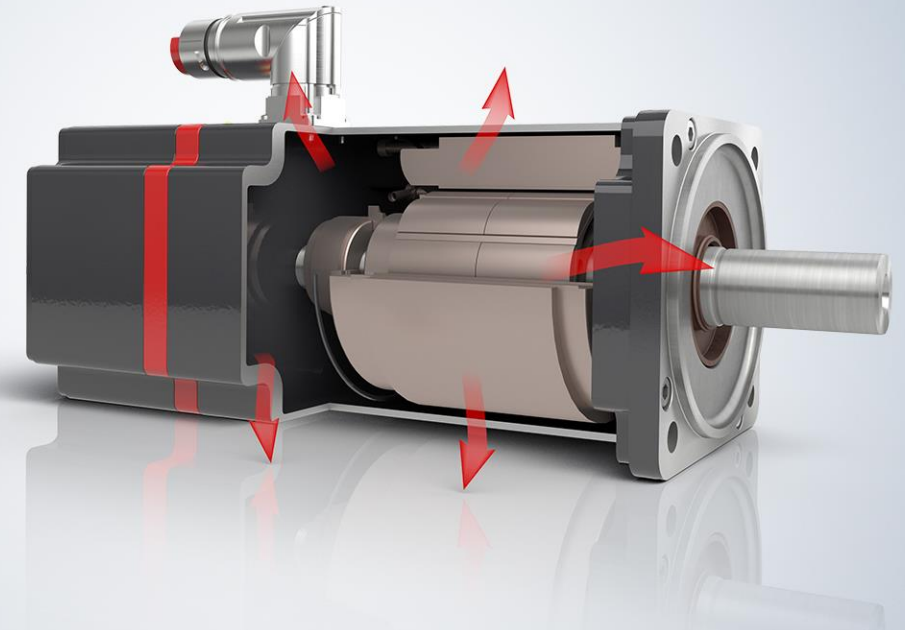
Disadvantages of top mounting

- limited heat dissipation
- derating of approx. 25 – 30 %
- change in attachment dimensions

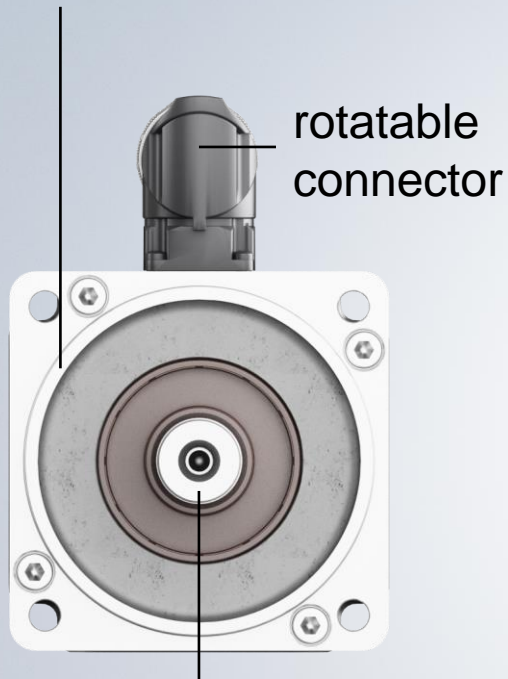


Advantages of rear mounting

- virtually unobstructed heat dissipation
- no or little derating
- no change in attachment dimensions



- single tooth winding
- potted stator
- high power density



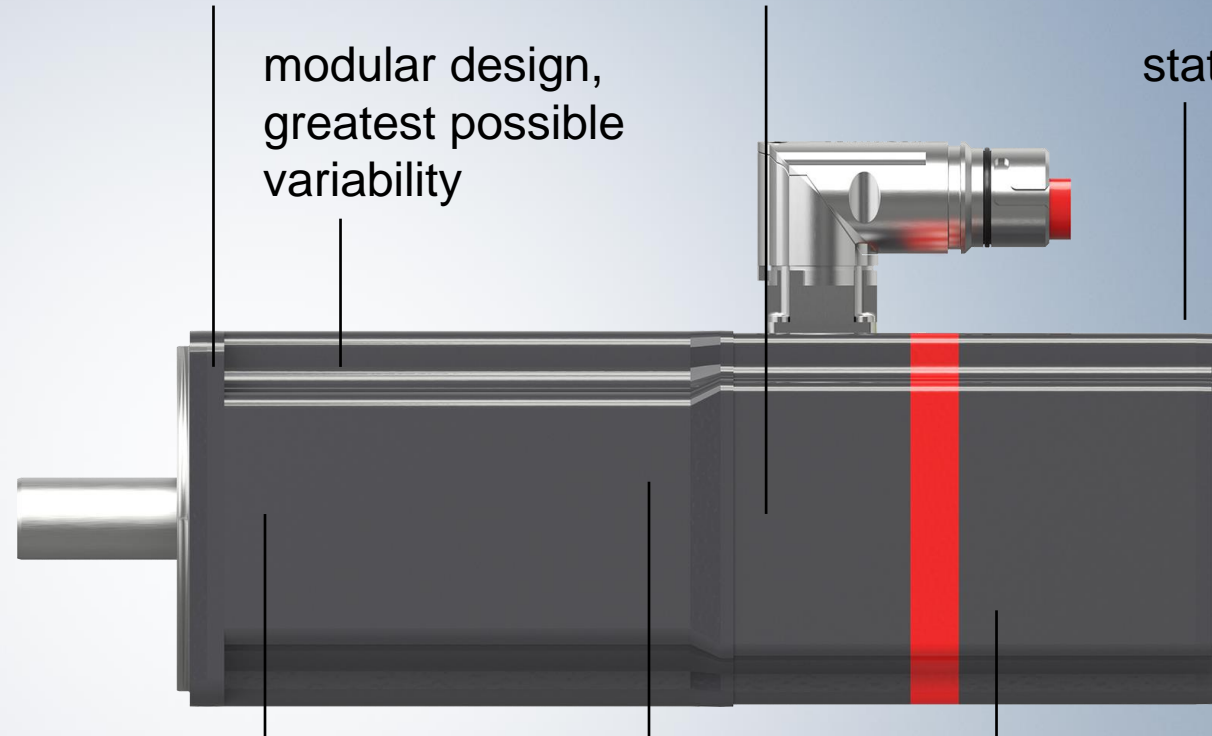
- service life 30,000 h
- highest axial and radial loadability

same mounting dimensions
as standard motor

safe single and
multiturn encoder

modular design,
greatest possible
variability

status LEDs



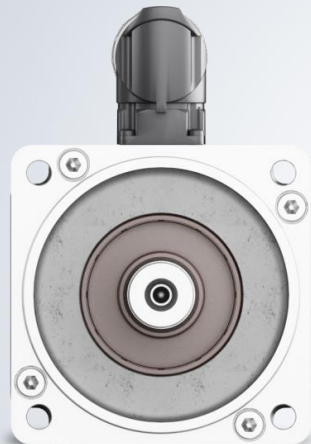
scratch-proof and durable
powder-coated

highly efficient
power stage

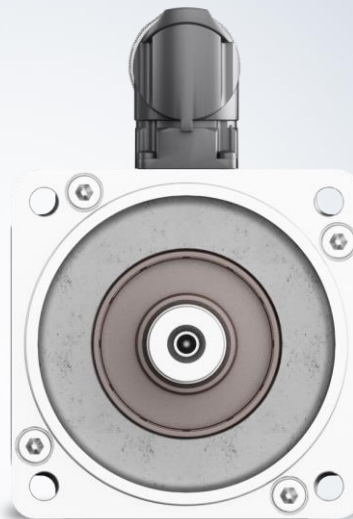
backlash-free permanent magnet
holding brake



Flange size 3



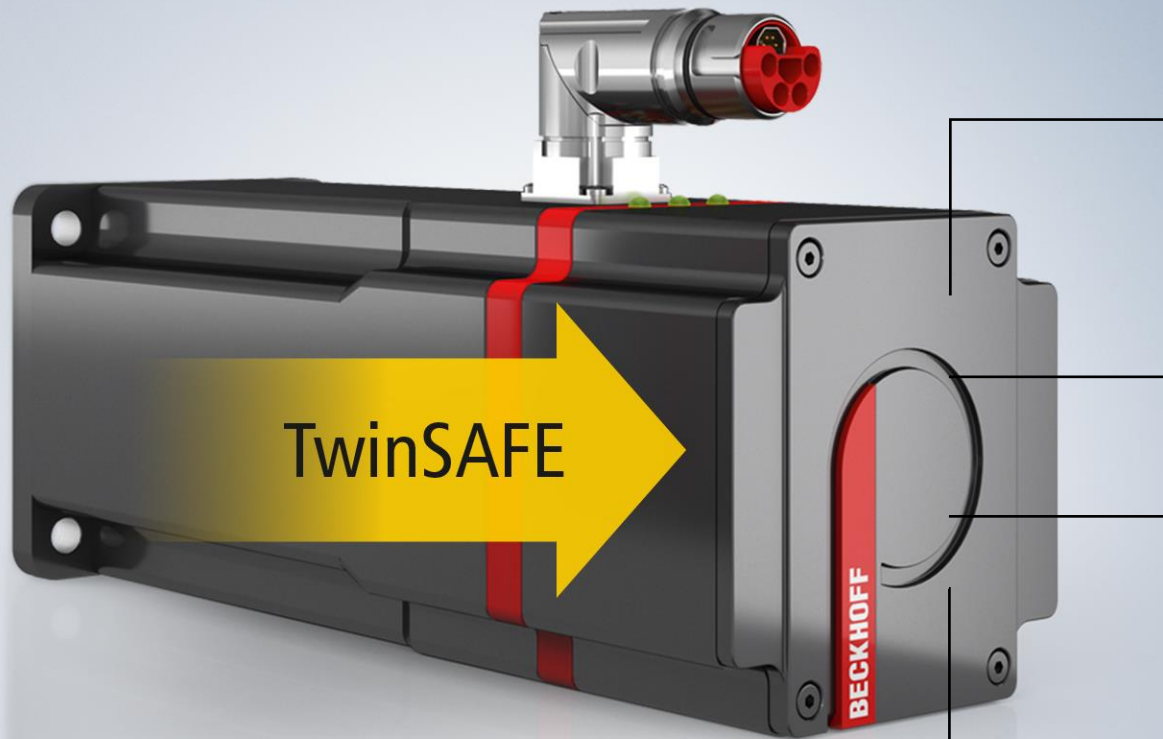
Flange size 4



Flange size 5



Flange size 6



integrated safety functions
via FSoE

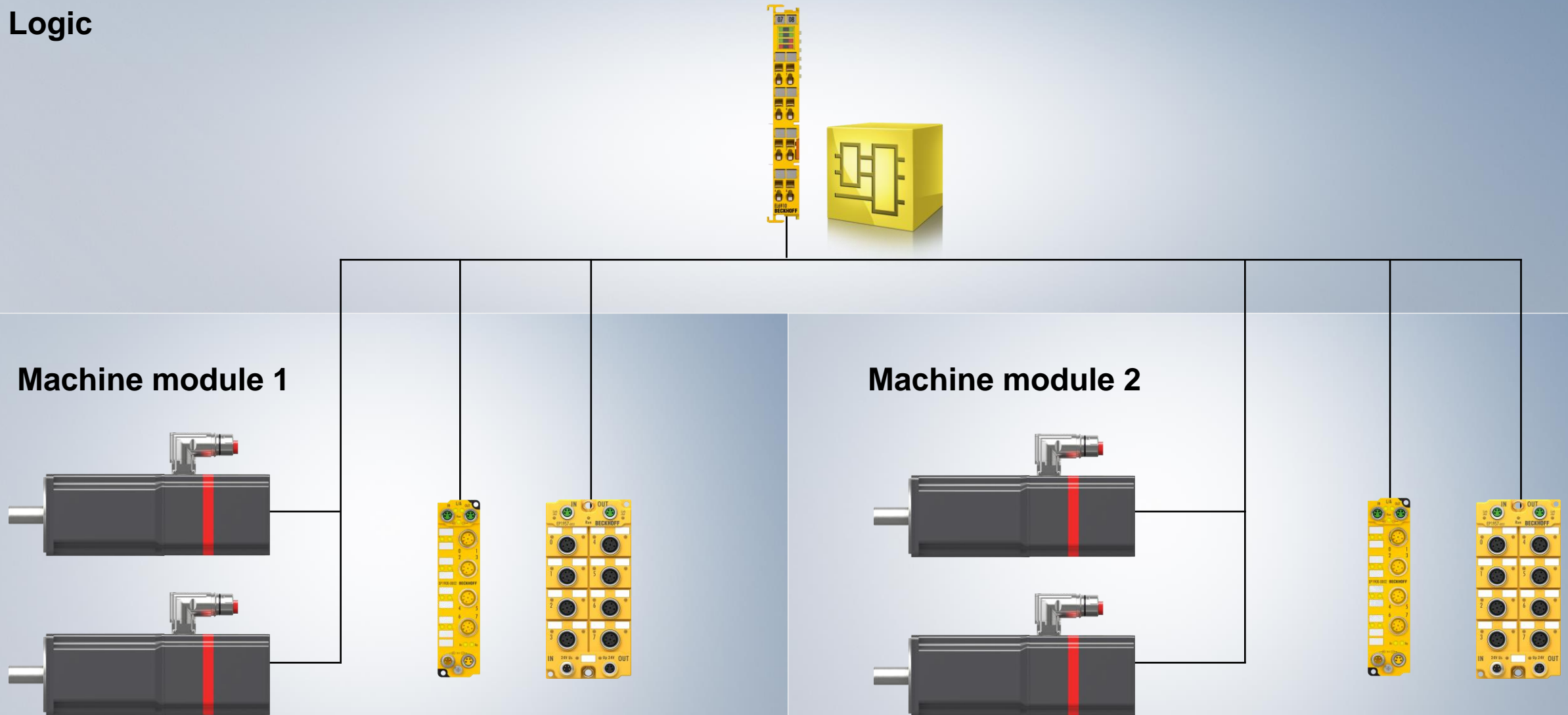
Standard: STO, SS1

Optional:

SS2, SOS, SLS, SSM, SSR, SMS, SLP,
SCA, SLI, SAR, SMA, SDIp, SDIn, SBC,
SBT

TwinSAFE-Logic

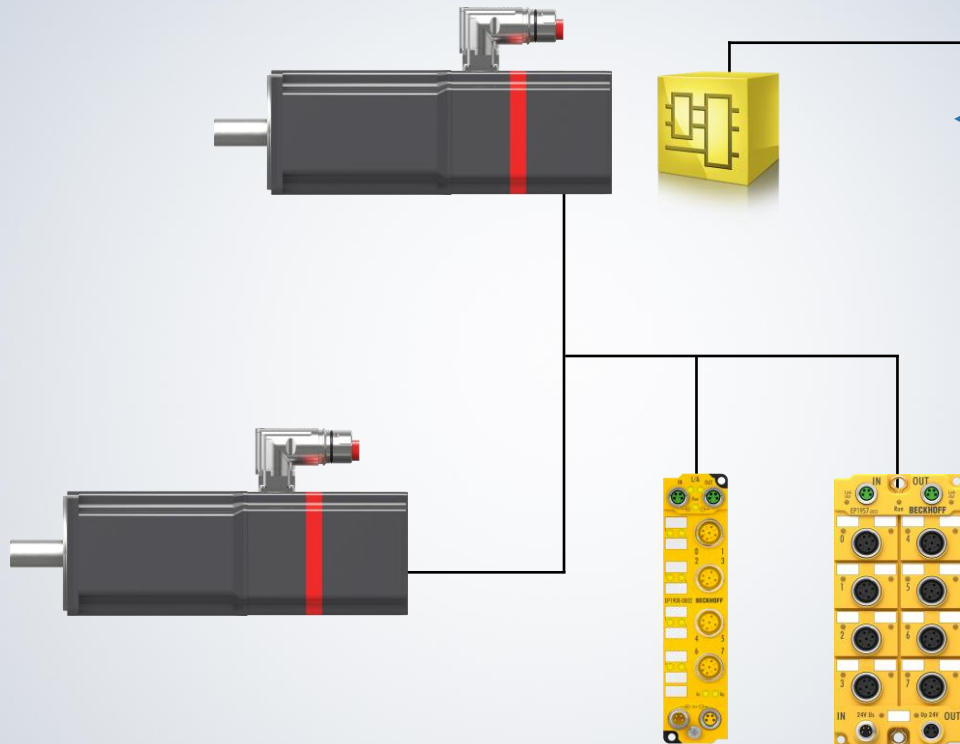
Logic



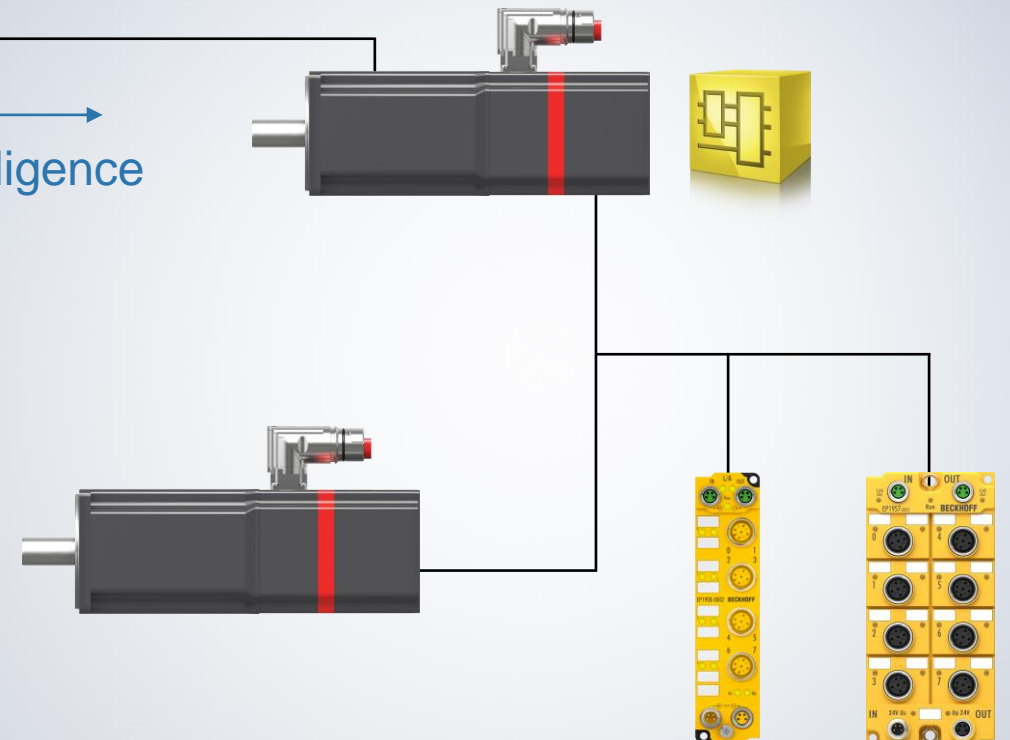
AMP80xx | TwinSAFE – Module and distributed intelligence

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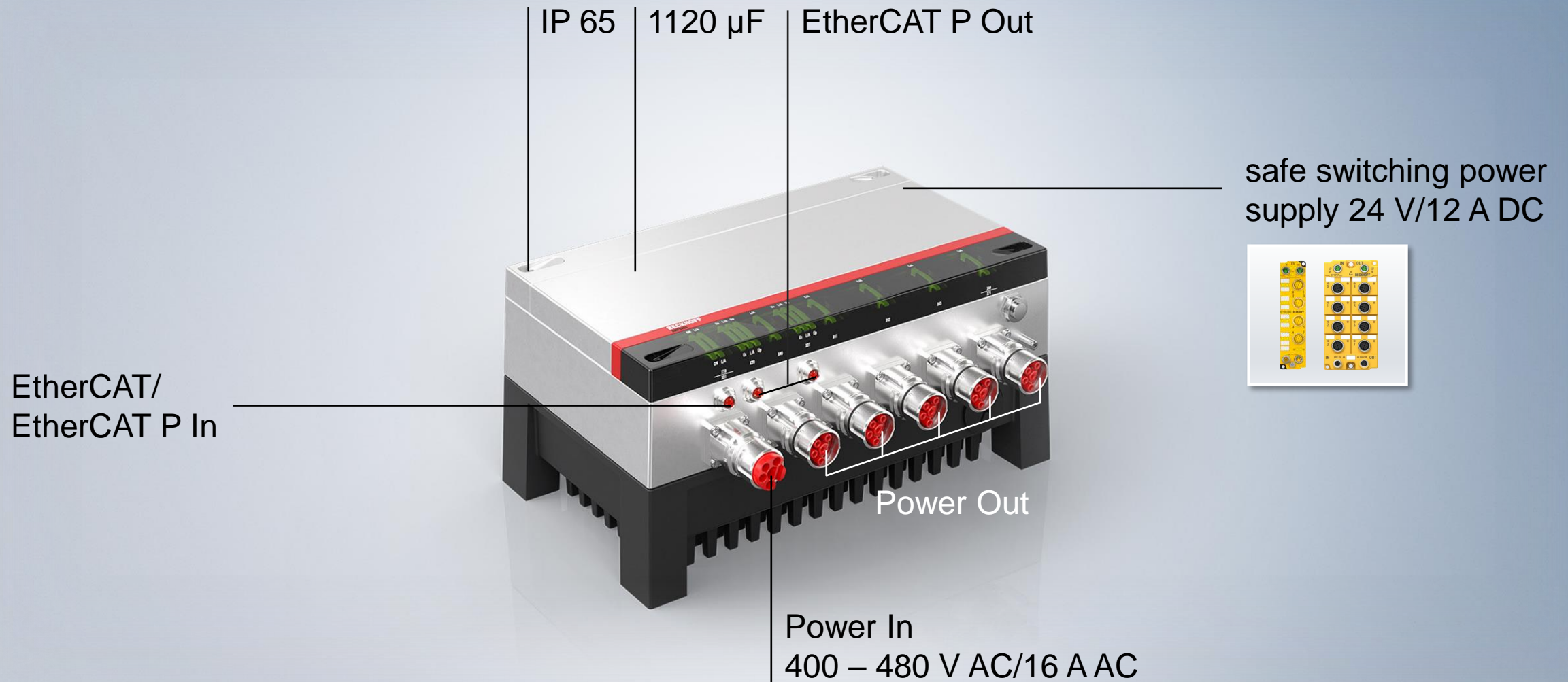
Machine module 1 Modular intelligence 1

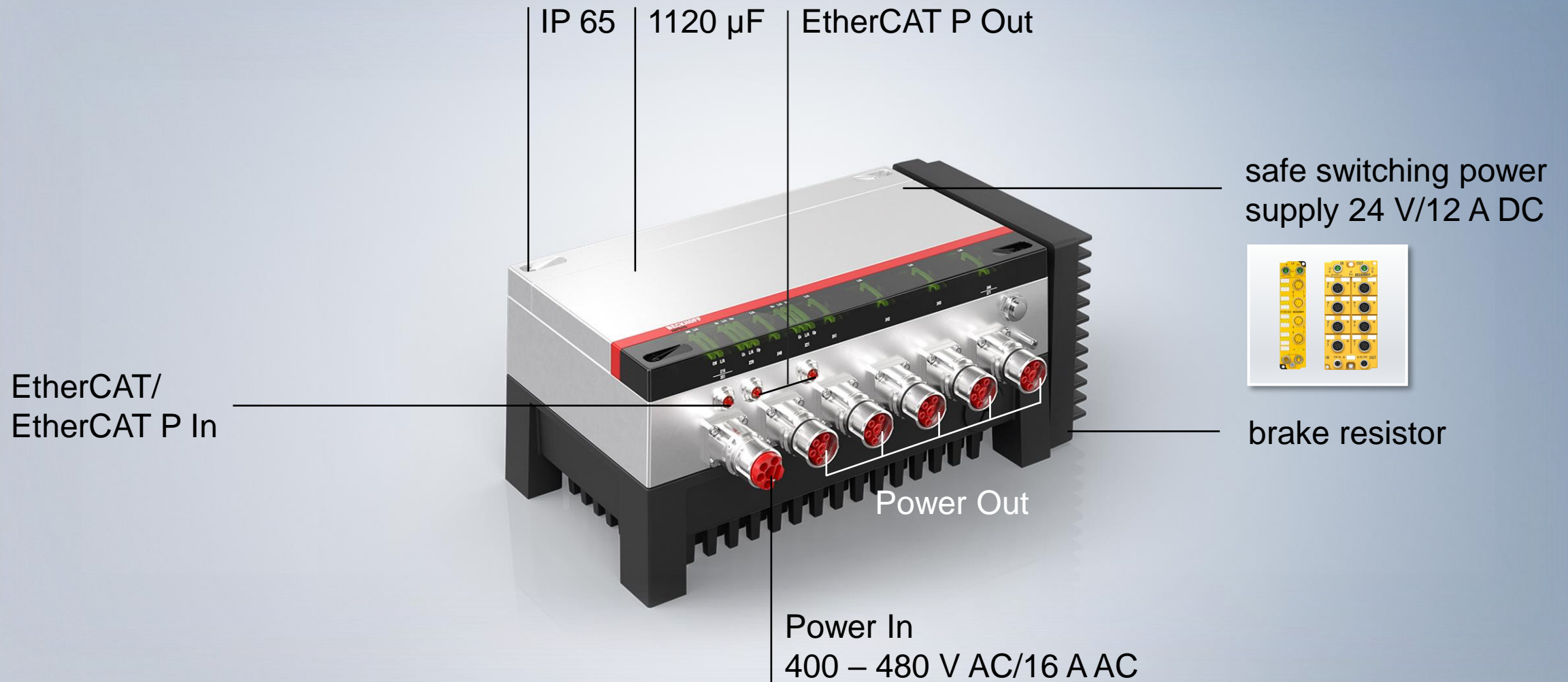


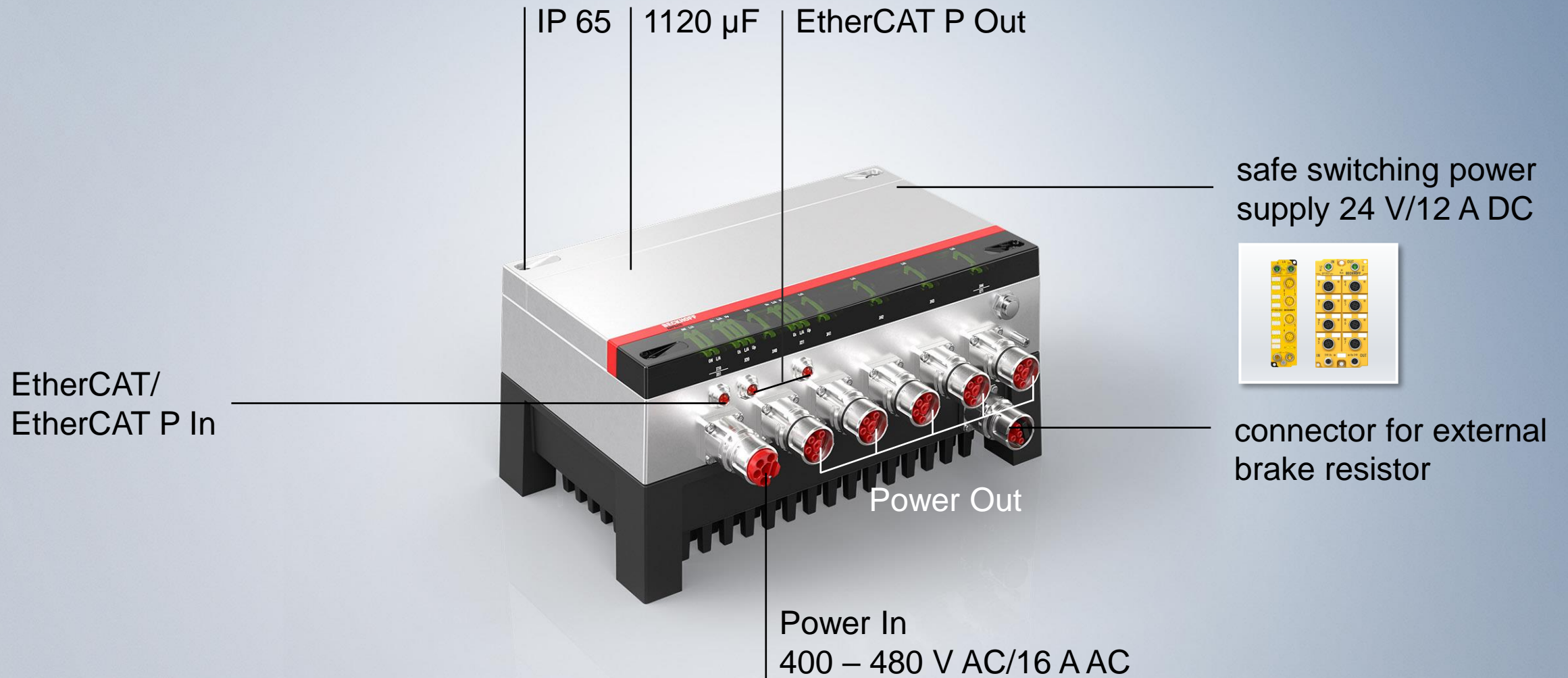
Machine module 2 Modular intelligence 2



↔
Distributed intelligence





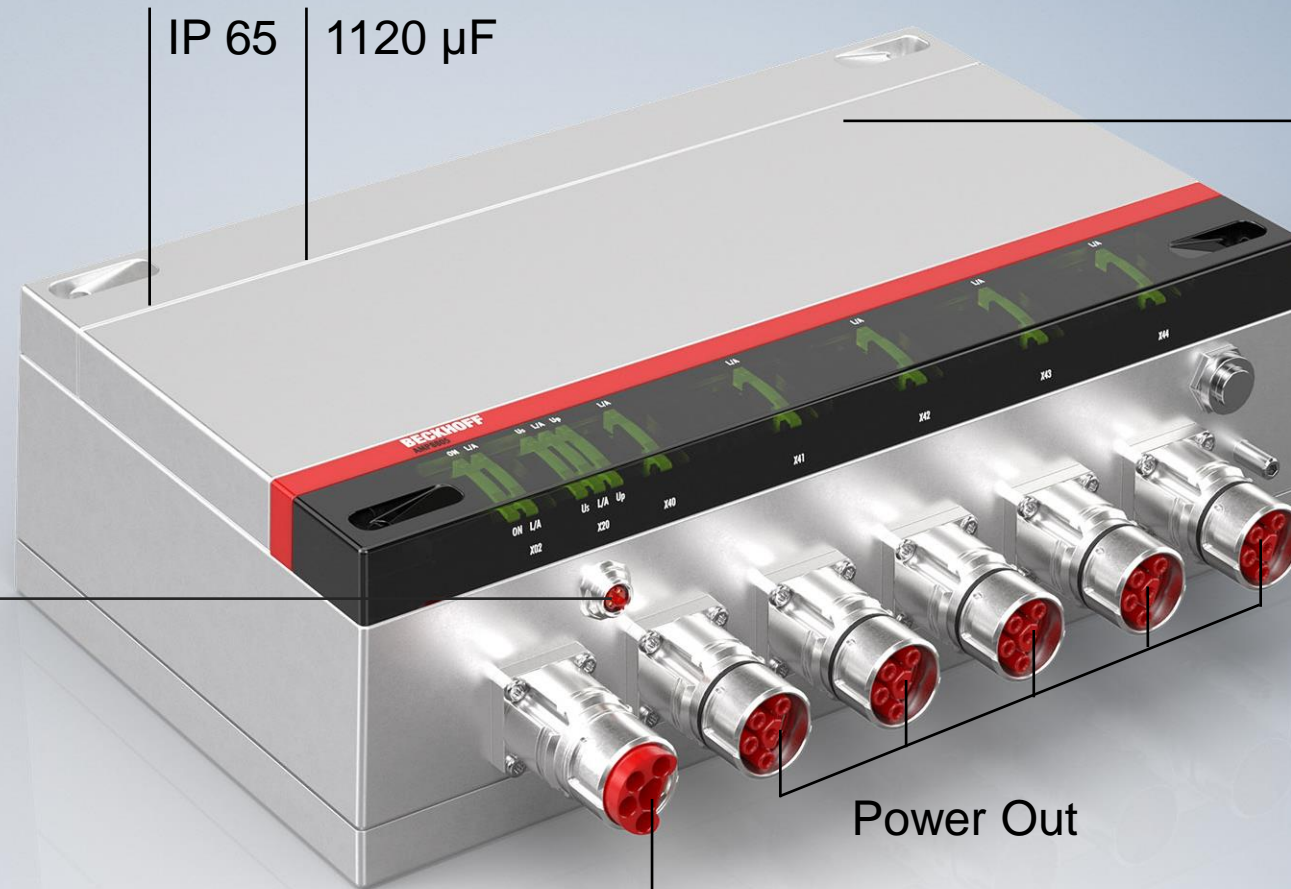


AMP8805 | Distribution module

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EtherCAT P Out



IP 65 1120 µF

safe switching power
supply 24 V/12 A DC

Power Out

Power In
565...680 V/20 A DC

AX883x | Coupling module for AX8000 system

BECKHOFF



AX8831

565...680 V DC/20 A DC
24 V DC/16 A DC

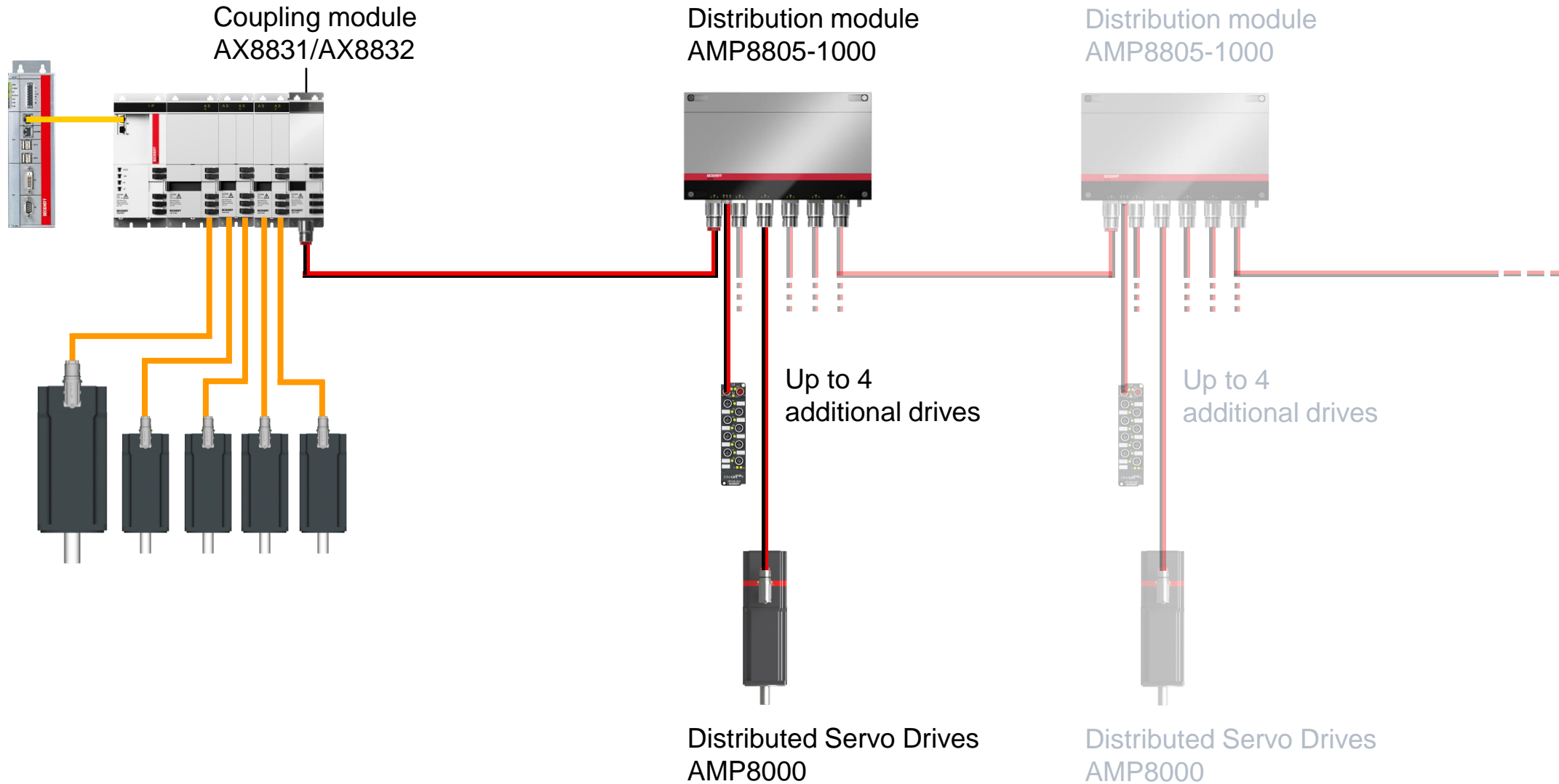


AX8832

2 x 565...680 V DC/20 A DC
24 V DC/ Σ max. 20 A DC

AMP8xxx | System expansion with small and large axes

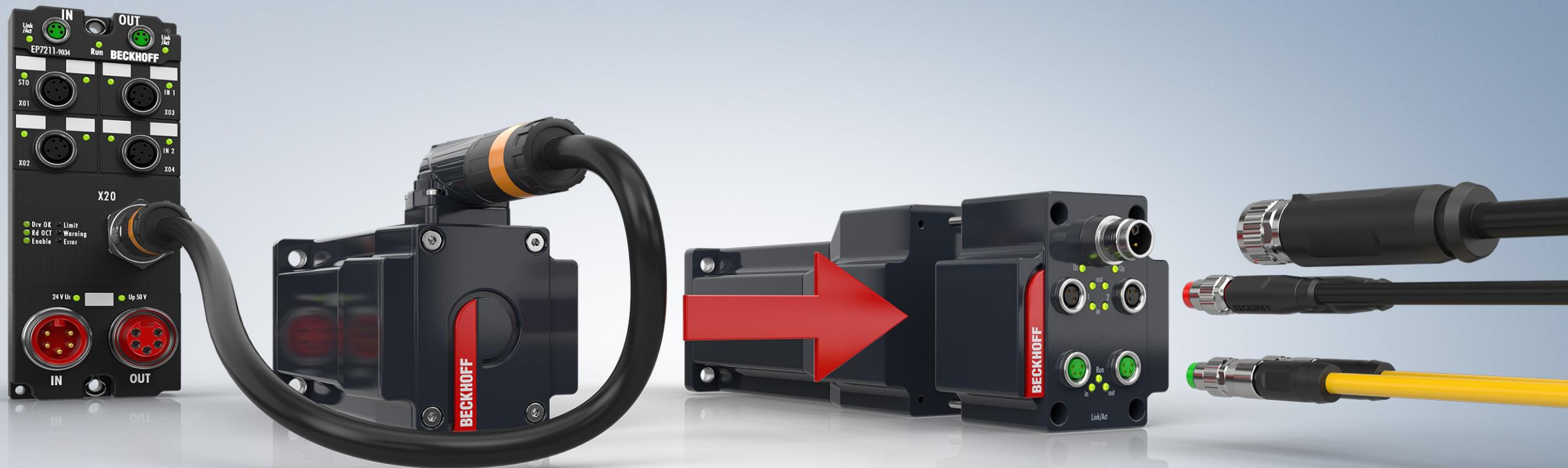
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- Flexible design supports all machine concepts.
- concept without control cabinets
- minimized footprint
- optional machine modules easily integrated
- automatic exchange of regenerative energies within the system
- integration of required I/O signals via EtherCAT P modules
- integrated safe 24 V power supply unit
- high IP 65 protection rating for use at the machine
- just one cable type for the entire AMP8000 Servo Drive system

AMI812x | Compact integrated Servo Drives

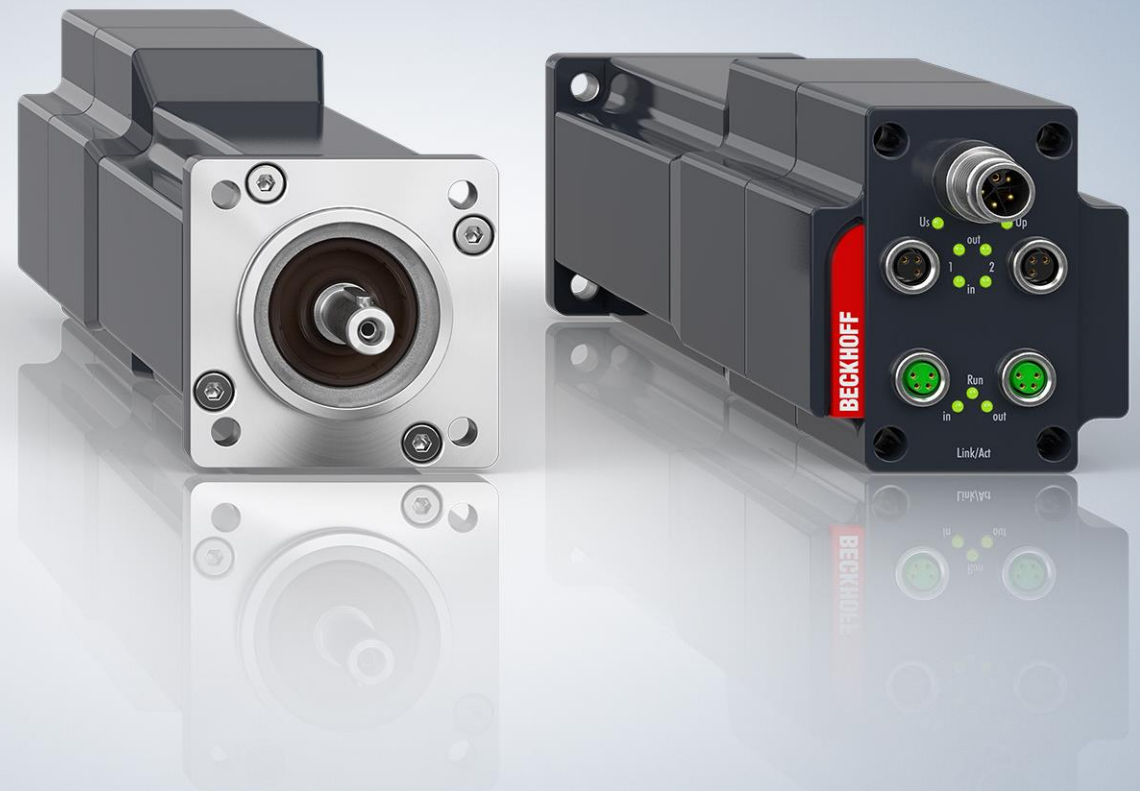
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AMI812x | Compact integrated Servo Drives

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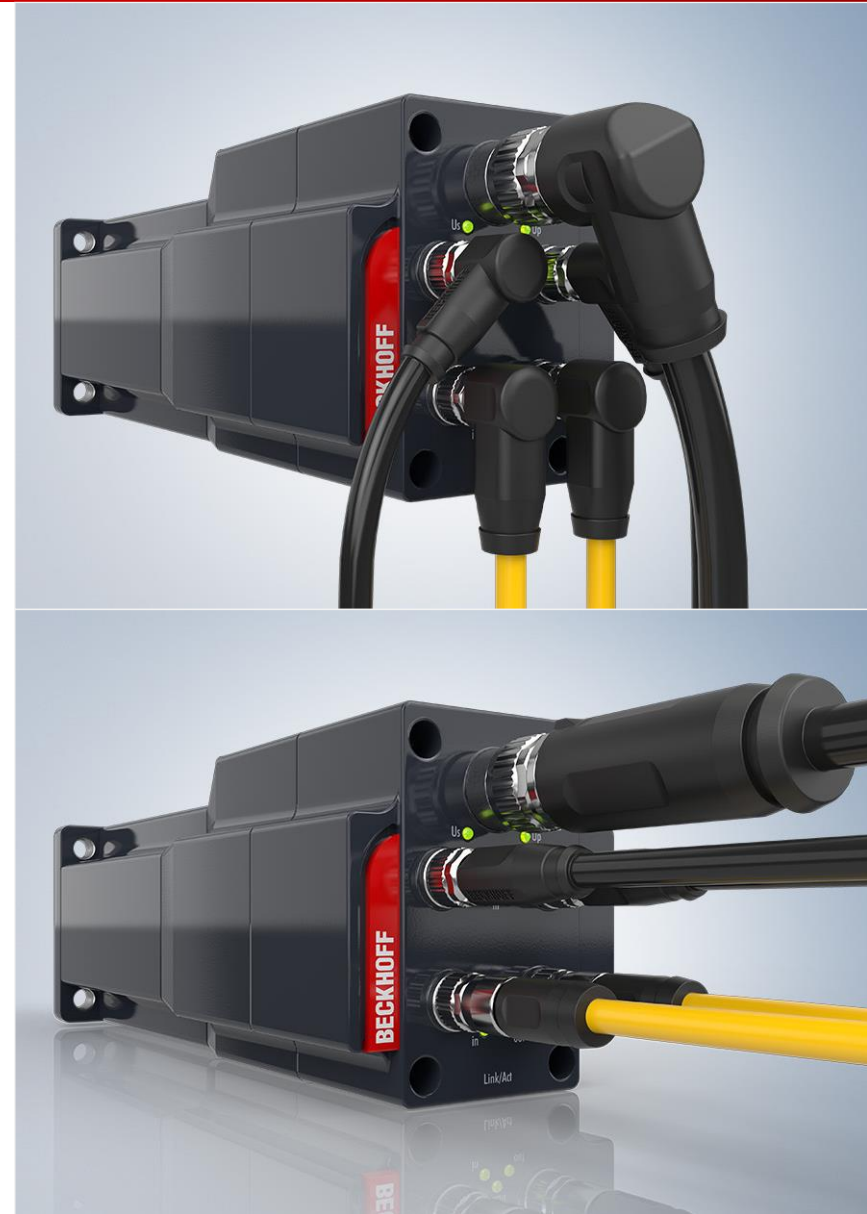
- compact servomotor with integrated output stage and fieldbus connection
- can be placed directly on the machine as an EtherCAT slave (without control cabinet or upstream I/O level)
- monitoring functions: over- and undervoltage, overcurrent, motor utilization computed by means of I²T model
- integrated into TC3 Motion Designer
- flange size F2 in three motor lengths with standstill torques from 0.5 to 1.1 Nm
- options: multi-turn absolute encoder without battery, backlash-free holding brake, shaft sealing (for IP67 rating)



AMI812x | Compact integrated Servo Drives

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- power interface: 1 x M12 connector, 5-pin, screw type, L-coded
 - supply voltage, electronics: 24 V DC
 - supply voltage, power: 8...48 V DC
- EtherCAT: 2 x M8 socket, shielded, screw type
- I/O interface: 2 x M8 socket, screw type, 3-pin
 - 2 x digital input 24 V DC/0.5 A or 2 x digital output 24 V DC/0.5 A
- PWM clock frequency 16 kHz
- current controller frequency 32 kHz
- power input from U_S : typ. 100 mA + 300 mA brake + I/Os



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Synchronous servomotors and linear servomotors

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AM8000



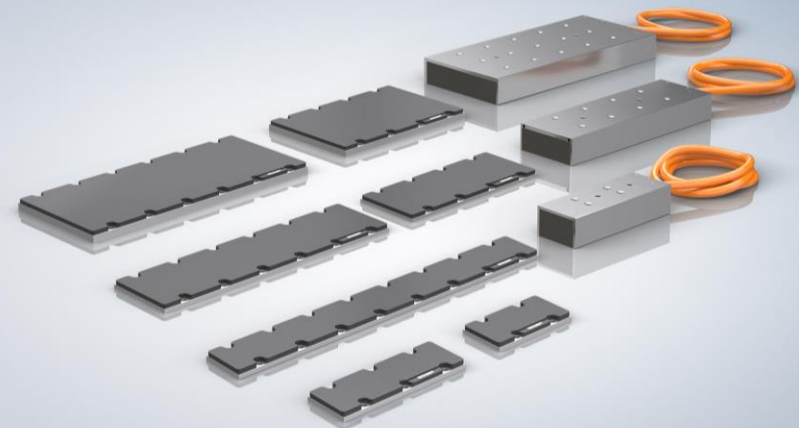
AM8500



AM8800



AL8000



Synchronous servomotors | Product overview

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AM80xx



AM80xx
forced cooling



AM85xx



AM85xx
forced cooling



AM8800



AM8700



AL8000



AA2518



AA3300



AG2300
AG2400



AG3210
AG3300
AG3400



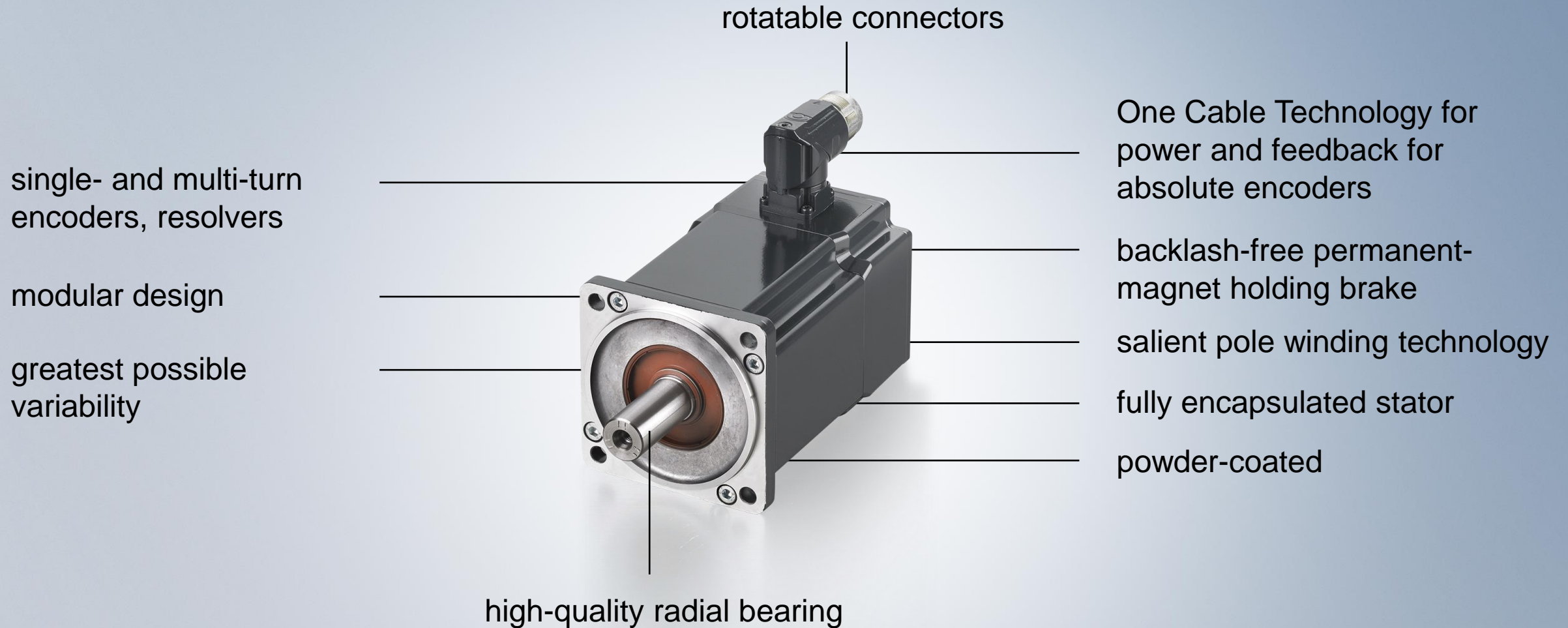
AG2800



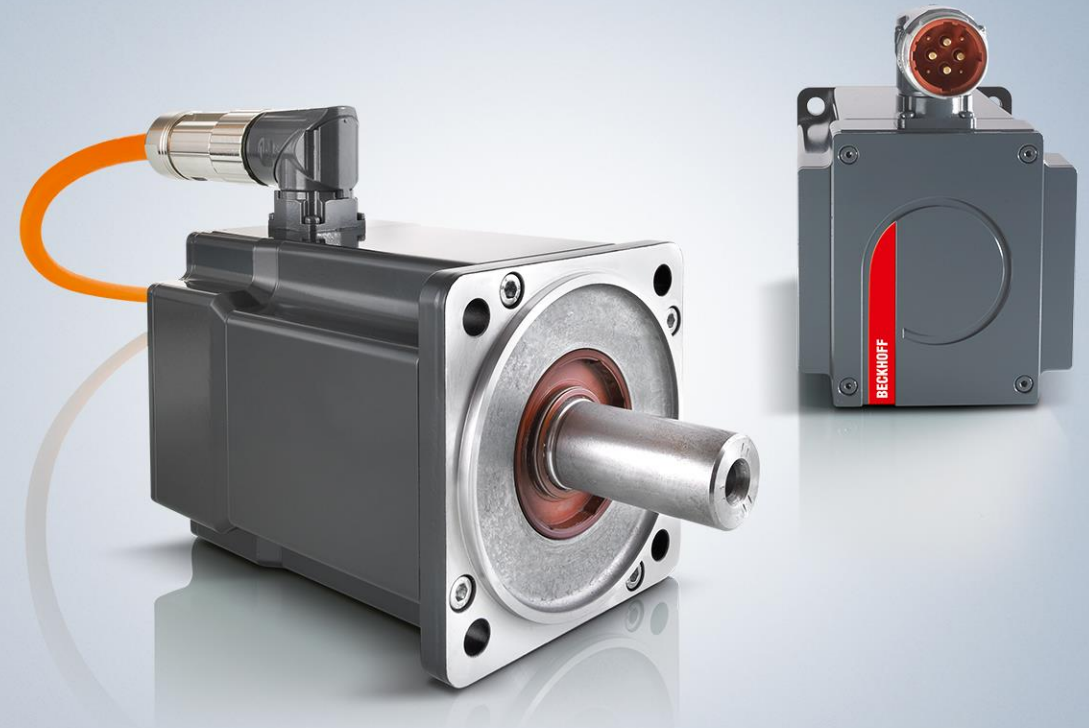
AM8000 | Synchronous servomotors

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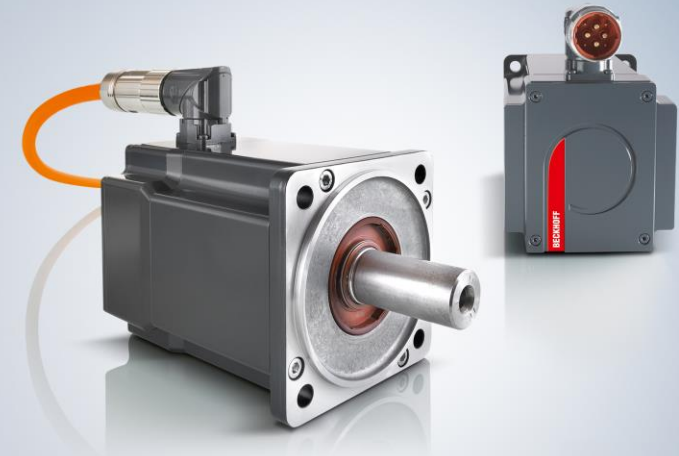
- seamlessly overlapping motor range
 - 7 flange sizes
 - each in 3 – 4 overall lengths
- torque range between 0.2...129 Nm
- safe encoder with up to 24 bit resolution
- sensorless version available
- small end turns, salient pole winding
- fully potted stator
- One Cable Technology (OCT)
- 30,000 hours service life



- Synchronous servomotors from the AM8000, AM8500, AM8700 and AM8800 series can optionally be supplied with a high-resolution two-channel safety encoder.
- SIL2 PL d safety level
- compact design, universally available for all motor sizes
- extremely high accuracy of ± 30 angular seconds \rightarrow suitable for high-precision applications
- In combination with AX8000 and TwinSAFE, all drive safety functions from EN ISO 13489-1:2008 can now be fulfilled.



- electronic identification plate
- fully digital, interference-proof interface
- No expensive and inflexible hybrid cables required!
- very significant cost and space savings
- reduction of error sources
- plug and play capability
- improved diagnostic and remote maintenance options



AM85xx | Synchronous servomotors with increased moment of inertia

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- increased moment of inertia
 - e.g. for timber processing machines, printing machines, machine tools, film winders and feed drives
- OCT (One Cable Technology) for single- and multi-turn encoders
- support for the electronic identification plate
- four different flange sizes, each in three different lengths
- external axial venting

AM8000/AM8500 | Synchronous servomotors in forced cooling design

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- high torque even at high speeds
- external fan (24 V DC)
- can be controlled with EL2022/KL2022
- increase in
 - standstill torque by up to 35%
 - rated torque at rated speed by up to 150%
- optional for the following models:
 - AM805x, AM806x, AM807x
 - AM855x, AM856x

AM8000 | Product overview

Synchronous servomotors, OCT and 2-cable standard

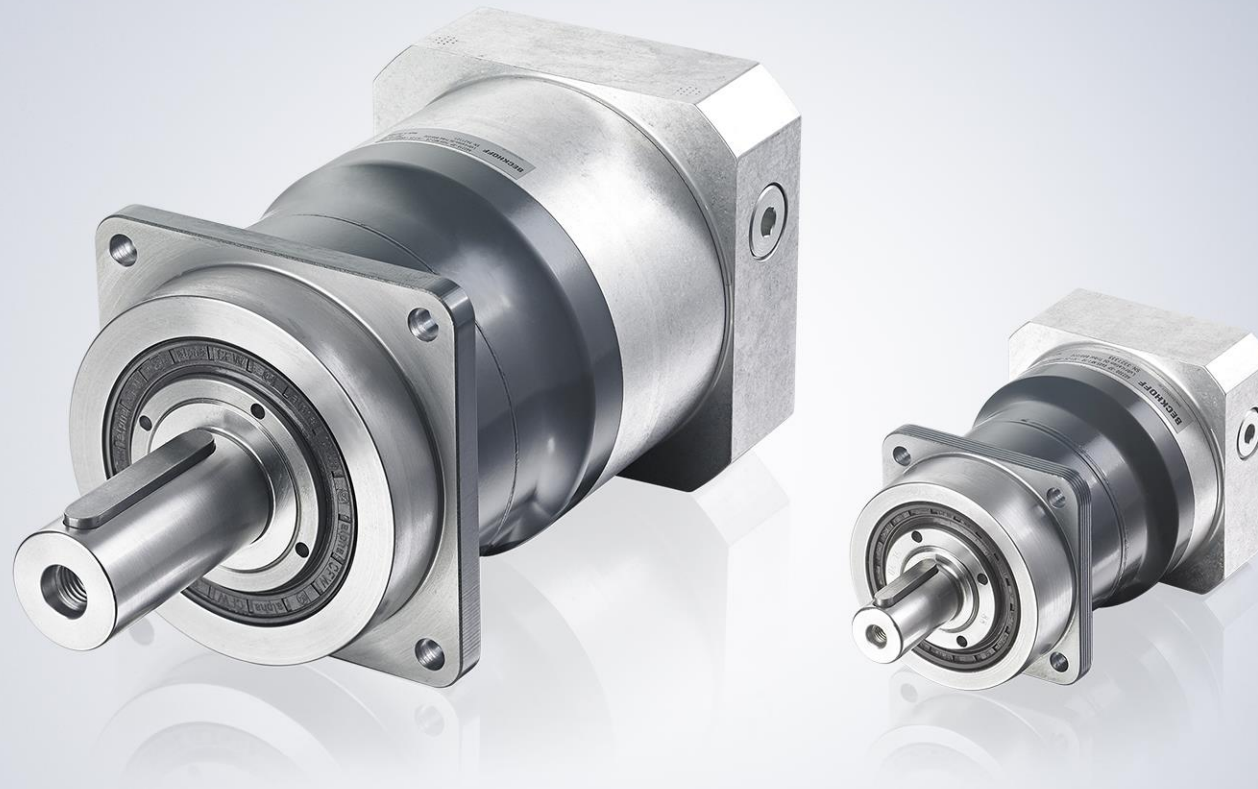
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	Flange code						
	F1 (40 mm)	F2 (58 mm)	F3 (72 mm)	F4 (87 mm)	F5 (104 mm)	F6 (142 mm)	F7 (197 mm)
Standard 400 V AC		AM802x M ₀ =0.50...1.20 Nm	AM803x M ₀ =1.37...3.22 Nm	AM804x M ₀ =2.37...5.65 Nm	AM805x M ₀ =4.80...13.8 Nm, up to 17.2 Nm with fan	AM806x M ₀ =12.8...35.0 Nm, up to 49.0 Nm with fan	AM807x M ₀ =29.0...92.0 Nm, up to 129 Nm with fan
Standard 230 V AC	AM801x M ₀ =0.20...0.52 Nm						
Standard 48 V DC	AM811x M ₀ =0.20...0,52 Nm	AM812x M ₀ =0.50...1.20 Nm	AM813x M ₀ =1.35...3.17 Nm	AM8141 M ₀ =2.40...3.90 Nm			
Increased inertia 400 V AC			AM853x M ₀ =1.37...3.22 Nm	AM854x M ₀ =2.37...5.65 Nm	AM855x M ₀ =4.80...11.4 Nm, up to 15.4 Nm with fan	AM856x M ₀ =12.8...29.0 Nm, up to 41.4 Nm with fan	
Anodized 400 V AC			AM873x* M ₀ =1.38...3.22 Nm	AM874x* M ₀ =2.45...5.65 Nm	AM875x* M ₀ =4.90...11.4 Nm	AM876x* M ₀ =12.8...29.0 Nm	
Stainless steel 400 V AC			AM883x* M ₀ =0.85...1.85 Nm	AM884x* M ₀ =1.60...3.50 Nm	AM885x* M ₀ =3.10...6.40 Nm	AM886x* M ₀ =7.75...16.7 Nm	

* Please note the different flange size.

AG2300 | High-end planetary gears with output shaft for AM8000/AM8500 servomotors

BECKHOFF

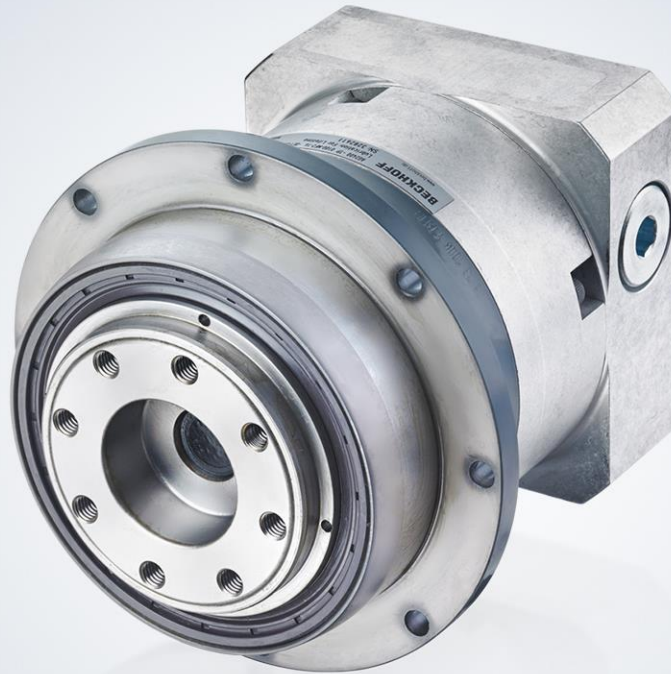


- output shaft with feather key
- high axial and radial forces
- only delivered as complete motor/gear unit
- high positioning accuracy
- for highly dynamic operating cycles (MF version)
- high nominal speeds in continuous operation (MC version)
- any installation position
- IP 65 protection rating
- 7 sizes, 14 gear ratios, single- and two-stage versions
- acceleration torques from 36...4500 Nm
- low torsional backlash (1...8 arcmin)

- maximum economic efficiency
 - excellent price-performance ratio
 - absolutely maintenance-free
 - short delivery time
 - long service life
- maximum efficiency
- maximum power density
- low running noise and smooth operation
- for highly dynamic applications
- high input speeds
- for temperature-sensitive applications
- low idle torque

AG2400 | High-end planetary gears with output flange for AM8000/AM8500 servomotors

BECKHOFF



AG2400 | High-end planetary gears with output flange for AM8000/AM8500 servomotors

BECKHOFF

- equipped with output flange
- maximum radial and axial forces
- only delivered as complete motor/gear unit
- highest positioning accuracy
- for highly dynamic cyclical operation (MF version)
- for transmission of highest torques (MA version)
- any installation position
- IP 65 protection rating
- 7 sizes, up to 20 gear ratios, single- and two-stage versions
- acceleration torques from 38...7200 Nm
- low torsional backlash (1...4 arcmin)

- maximum economic efficiency
 - excellent price/performance ratio
 - absolutely maintenance-free
 - short delivery times
 - long service life
- highest efficiency
- highest power density
- low running noise and smooth operation
- for highly dynamic applications
- high input speeds
- for temperature-sensitive applications
- low idle torque

AG3xxx | Economy planetary gear series for AM8000/AM8500 servomotors

BECKHOFF



AG3210-+NP | Economy planetary gears with output shaft as an alternative to AG2210-+LP

BECKHOFF

- output shaft with feather key
- affordable alternative to AG2210 high-end gears
- mating dimensions compatible with AG2210
- individual and flexible application options
- high torques, radial and axial forces
- 5 sizes with up to 21 gear ratios, single- and two-stage
- acceleration torques from 18...700 Nm
- high-torque variant on request
- IP 64 protection rating
- integrated into TC Motion Designer
- only available as complete motor/gear unit

AG3300-+NPS | Economy planetary gears with output shaft as an alternative to AG2300-+SP

BECKHOFF

- output shaft with feather key
- affordable alternative to AG2300
- mating dimensions compatible with AG2210
- individual and flexible application options
- lower dynamics and accuracy
- 4 sizes with up to 21 gear ratios, single- and two-stage
- acceleration torques from 51...800 Nm
- high-torque variant on request
- IP 65 protection rating
- integrated into TC Motion Designer
- only available as complete motor/gear unit

AG3400-+NPT | Economy planetary gears with output flange as an alternative to AG2400-+TP

BECKHOFF

- equipped with output flange
- affordable alternative to AG2400 high-end gears
- individual and flexible application options
- mating dimensions compatible with AG2400
- lower dynamics, torques and accuracy
- 5 sizes with up to 21 gear ratios, single- and two-stage
- acceleration torques from 18...700 Nm
- high-torque variant on request
- IP 64 protection rating
- integrated into TC Motion Designer
- only available as complete motor/gear unit



- highly dynamic servomotors in hygienic design for the packaging and food industries
- specially treated aluminum housing with ideal thermal conductivity
 - no derating of the motor power
 - very light in comparison with the stainless steel housing of the AM8800 series
- IP 69K (not including the shaft output)
- optional sealing air connection
- OCT direct cable outlet in hygienic design
- flange sizes F3 to F6 (each in 3 overall lengths)



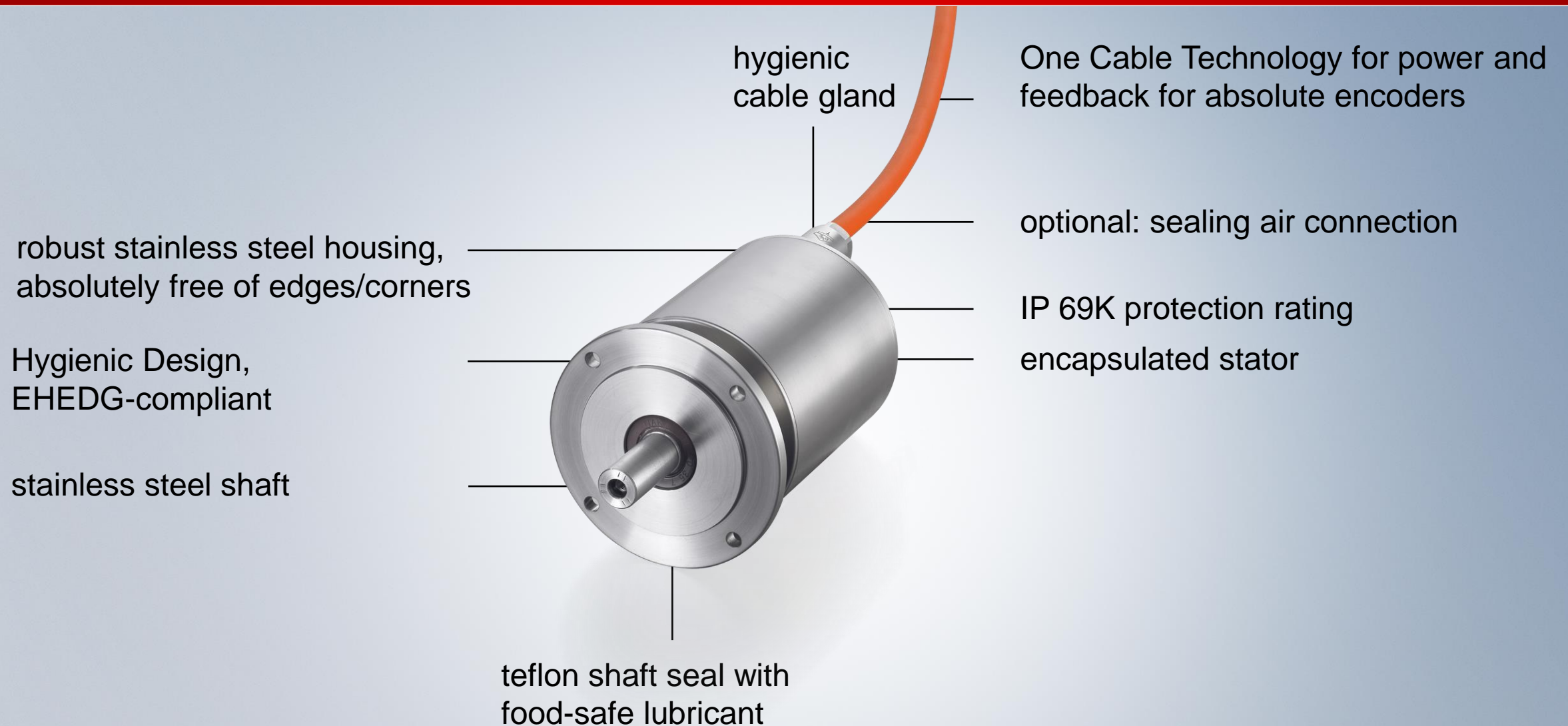
AM8800 | Stainless steel synchronous servomotors

BECKHOFF



AM8800 | Stainless steel servomotors in Hygienic Design

BECKHOFF



- stainless steel motors in AISI 316L (American Iron and Steel Institute)
- ideal for use in the food, chemical and pharmaceutical industries
- highest protection rating IP 69K
- Hygienic Design, absolutely edge-free
- maximum dynamics
- optional barrier pressure system
- One Cable Technology for power and feedback system
- food-grade grease (lubricant for shaft seal)
- standstill torque 0.85...16.7 Nm

AG2800 | Planetary gear unit for AM8800 stainless steel servomotors

BECKHOFF



BECKHOFF

AM8800-0010-0000

Made in Germany

MD 2.9 Nm Thermo KTY

n_n 2500 rpm IP67

Q_n 1.8 Arms

UN 400 Vrms

PN 0.8 kW

ThG F



SN 00002488

- planetary gear unit for adverse environmental conditions
- Hygienic Design
- highest protection rating IP 69K
- corrosion resistant implementation
- resistant to aggressive cleaning agents
- food-grade lubrication (grease)
- laser-etched name plate
- dead-space free design and smooth, electro-polished surfaces

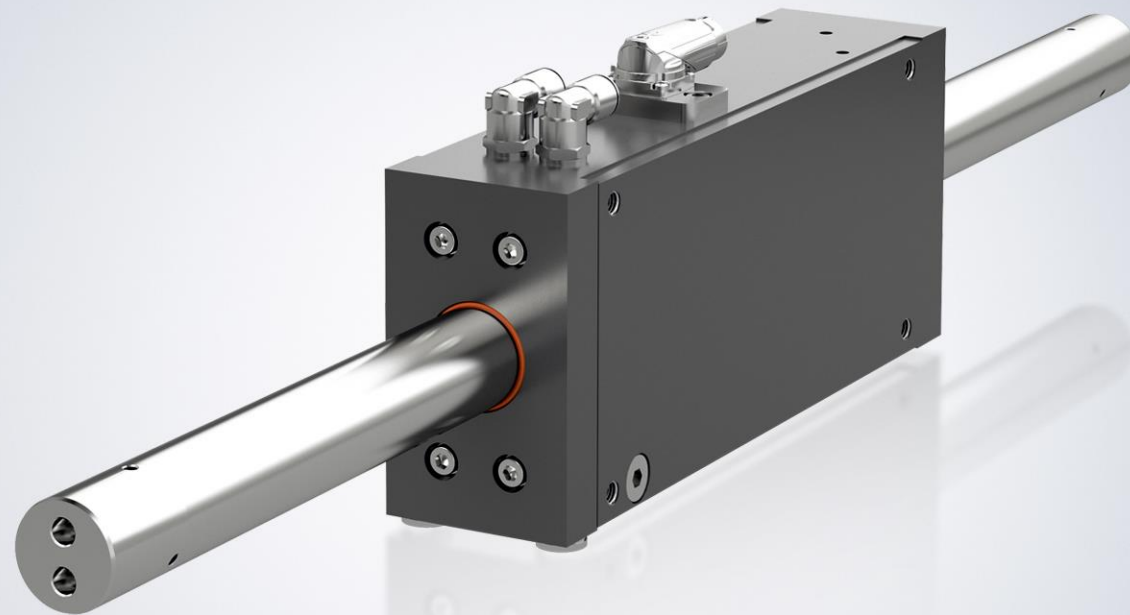
AL8000 | Highly dynamic linear servomotors

BECKHOFF



- three primary part widths with matched winding types
- matching secondary parts in different length
- modular coil concept
- A peak force of 6750 N is available in the water-cooled AL806x variant.
- The linear motors are ideally matched for use with AX8000 and AX5000.
- combined cable for power supply and temperature contact
- intuitive commissioning and optimization with TC3 Drive Manager 2





Technical highlights

- ironless tubular motor
- 400...480 V AC
- peak force 1050 N
- rated speed 8 m/s
- extremely smooth translatory movements up to 600 mm

Technical features

- ideally suited for use in the packaging industry or the machine tool sector
- no other mechanical drive components
 - backlash-free and wear-free
 - easy assembly
- secondary component: magnetic rod, available in different lengths

fully compatible to AX5000
or AX8000 through OCT and
electronic nameplate

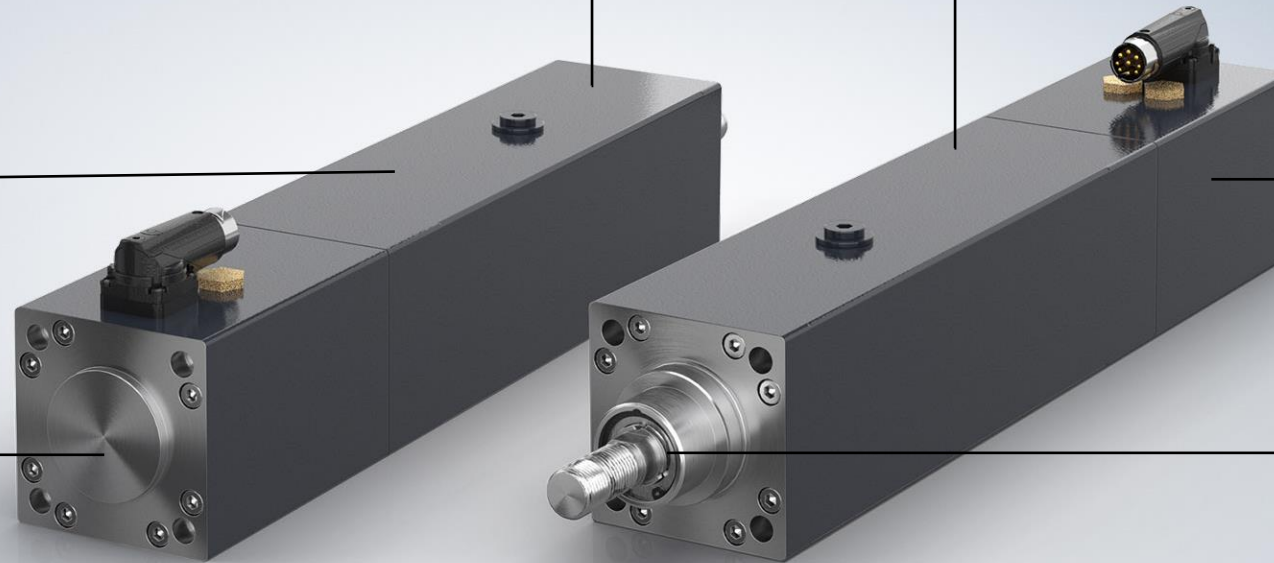
direct drive of the
spindle without
coupling or belt

OCT 24-bit
encoder, SIL 2

ball screw for high
forces

up to 12,500 N

internal anti-twist
system



AA3033-x3H0

- peak force 6250...12,500 N
- continuous force 1620...3240 N
- max. speed 0.5...1.0 m/s
- max. acceleration 10...20 m/s²
- peak current 15 A

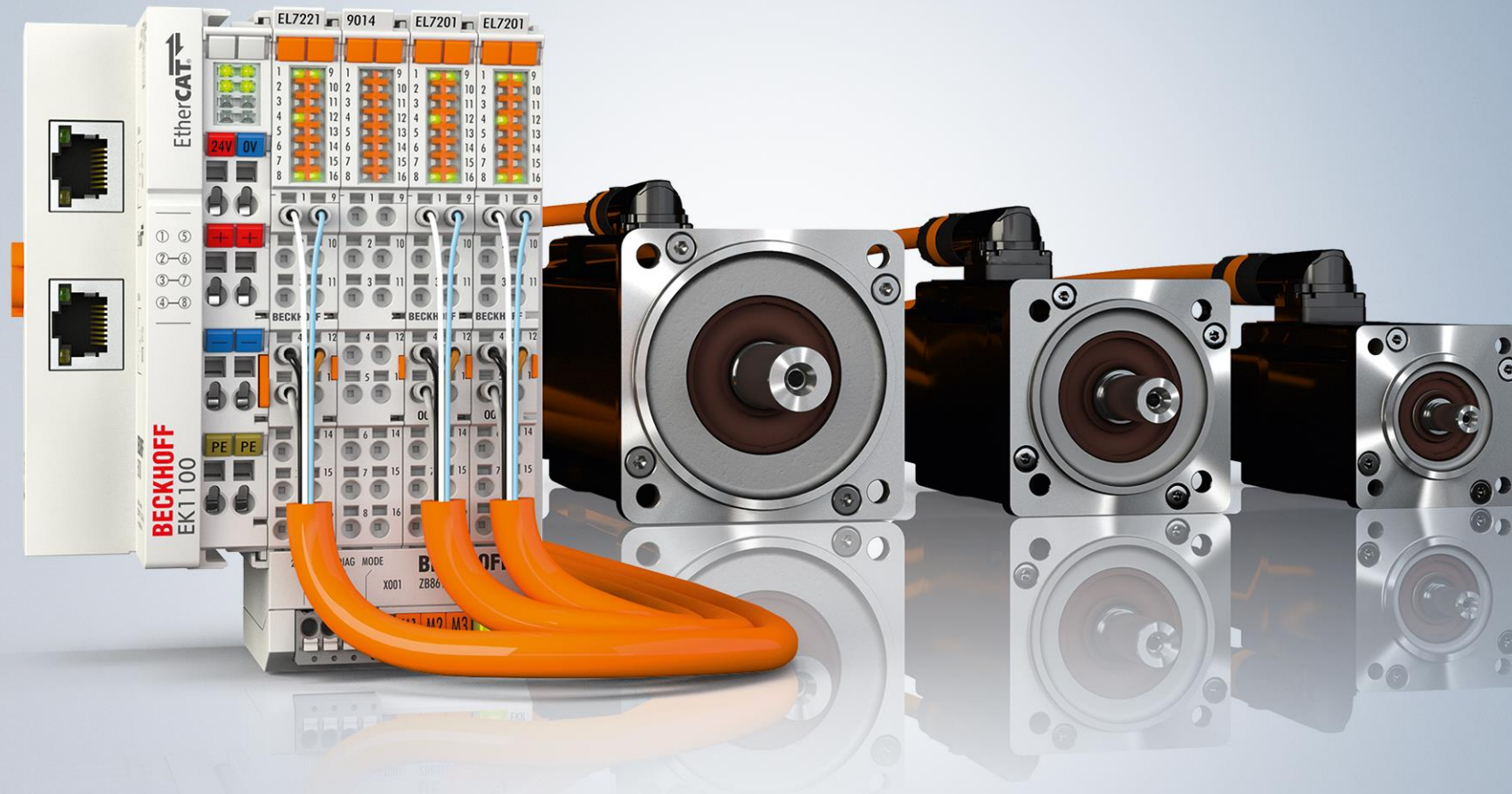
- flange 75 x 75 mm
- length 380 mm
- optional:
 - backlash-free holding brake
 - other spindle leads



1. The Motion Company
2. Servo Drives
3. Distributed Servo Drive systems
4. Servo and linear motors
- 5. Compact Drive Technology**
6. XTS | eXtended Transport System
7. XPlanar | Planar motor system
8. Motion software
9. Accessories

Compact Drive Technology

BECKHOFF



Compact Drive Technology | Product overview

BECKHOFF

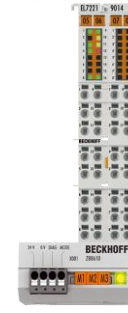
Servomotors



AM81xx



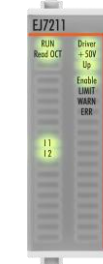
AG2250



EL72xx



EP72xx



EJ72xx



ELM72xx

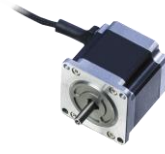
Stepper motors



AS20xx



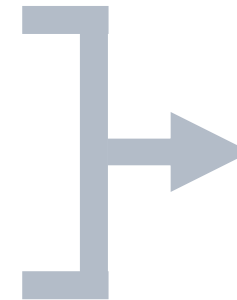
AG2250



AS10xx



AG1000



EL7031



EL704x

Linear actuators



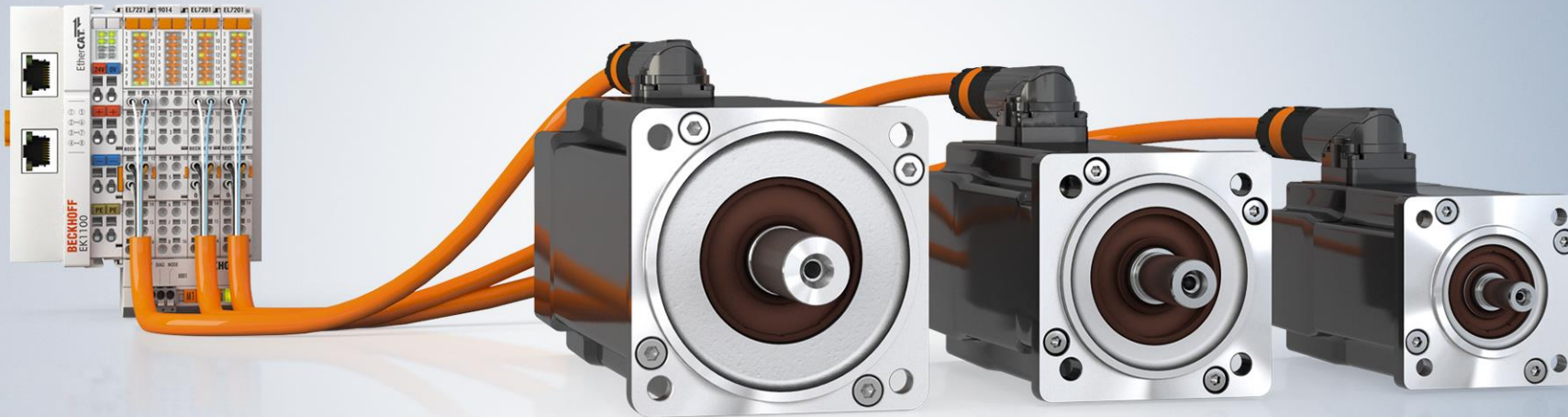
AA1121



AA1821

AM8100 | Synchronous servomotors for OCT servo terminals

BECKHOFF



- servomotors for operation with I/Os for servomotors (EL72xx, EJ72xx, EP72xx, ELM72xx)
- standstill currents from 2.85...8.0 A at 48 V DC
- One Cable Technology
- integrated absolute encoder, 24 bit, SIL 2
- backlash-free permanent magnet holding brake, feather key, shaft sealing ring (optional)



AS2000 | Industrial stepper motor
24...48 V DC, 0.8...8.0 Nm

BECKHOFF



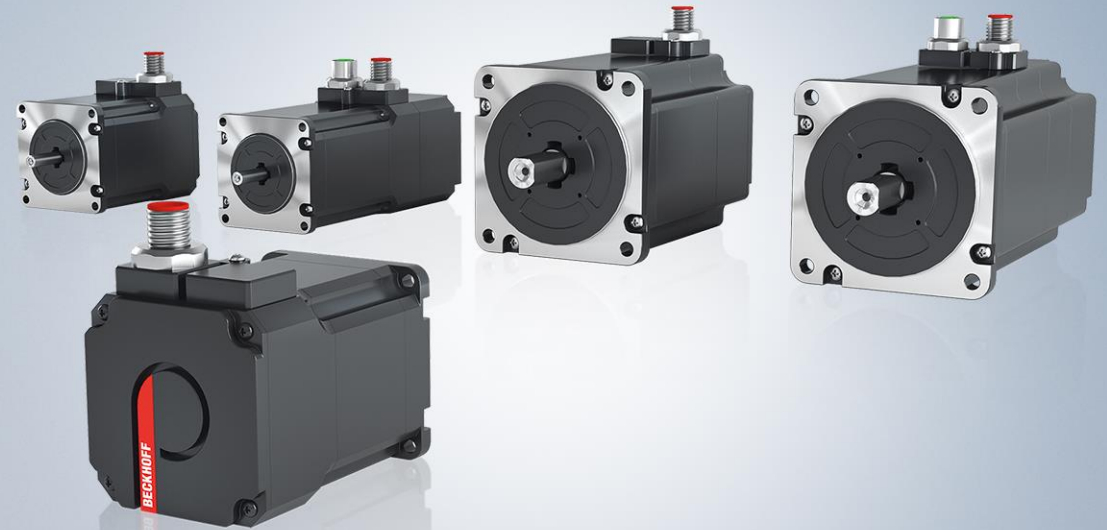
Stepper motor series with flange sizes
N2 (NEMA 23) and N3 (NEMA 34)

AS2000 | Industrial stepper motor

24...48 V DC, 0.8...8.0 Nm

BECKHOFF

- extended scalability
- extended performance range
- higher protection rating IP 54
- high-power M12 plug
- optionally integrated encoder with 1024 inc/rev
- integration in TC3 Motion Designer
- Pre-assembled connection cables, gears and couplings are available.



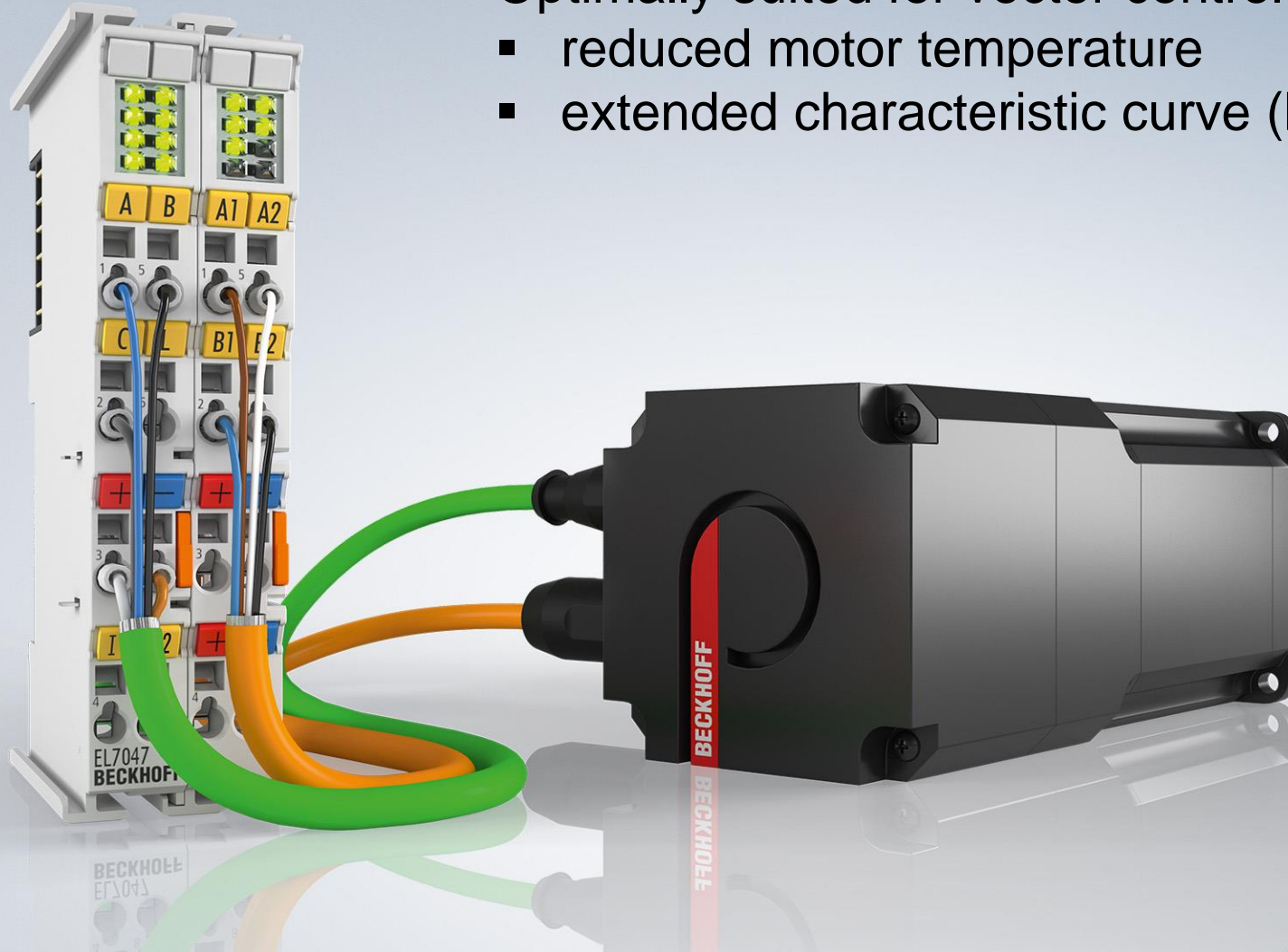
AS2000 | Industrial stepper motor

24...48 V DC, 0.8...8.0 Nm

BECKHOFF

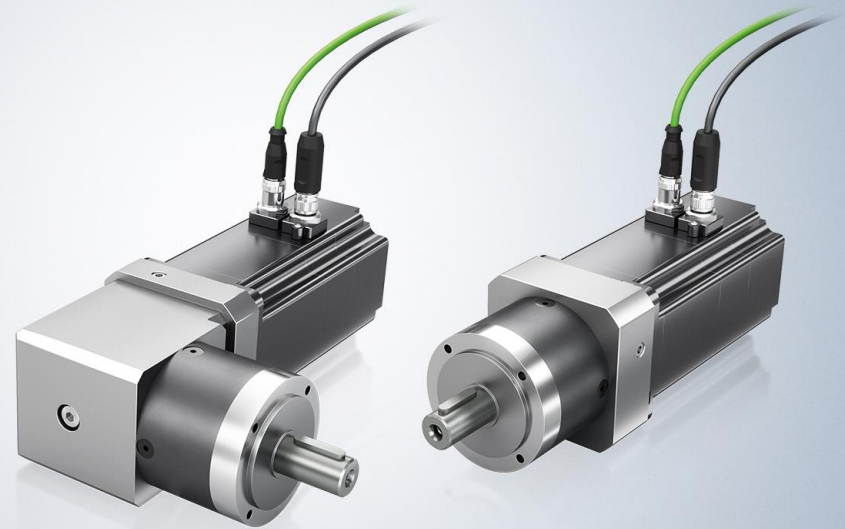
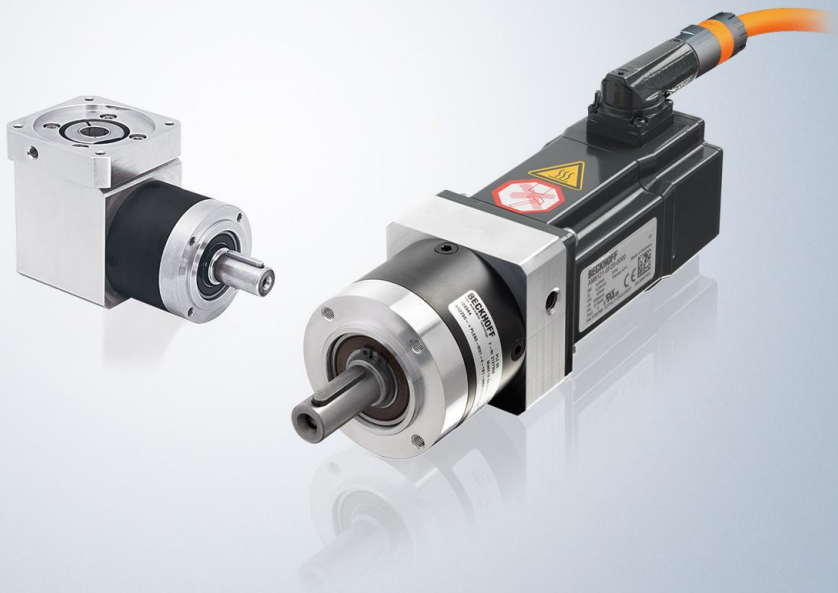
Optimally suited for vector control with EL70x7

- reduced motor temperature
- extended characteristic curve (higher speeds possible)



**AG2250 | Planetary gear unit
for AM8100 servomotors and AS2000 industrial stepper motors**

BECKHOFF



AG2250 | Planetary gear unit for AM8100 servomotors and AS2000 industrial stepper motors

BECKHOFF

- two sizes
 - normal and also as angled variant
 - 4 gear ratios, single-stage
- IP 54
- very low torsional backlash
- high output torques
- high efficiency
- flexible installation position
- lifetime lubrication

AS1000 | Stepper motors

24...48 V DC, 0.8...5.0 Nm

BECKHOFF

- flange size N1 (NEMA17), N2 (NEMA 23) and N3 (NEMA 34)
- high holding torques
- Due to the integrated micro-stepping the motors can position very well even without a feedback system.
- pre-assembled plugs for easier electrical connection



Overview | Synchronous servomotors

BECKHOFF

Flange code	< 3 A	3...5 A	> 5 A
F1 (40 mm)	AM8111-wFyz 2.85 A, 0.20 Nm	AM8112-wFyz 4.7 A, 0.38 Nm	
		AM8113-wFyz 4.8 A, 0.52 Nm	
F2 (58 mm)		AM8121-wFyz 4.0 A, 0.50 Nm AMI8121-ab00-wFyz 4.0 A, 0.50 Nm	AMI8122-ab00-wFyz 8.0 A, 0.70 Nm AMI8123-ab00-wFyz 8.0 A, 1.10 Nm
		AM8122-wFyz 4.0 A, 0.80 Nm	AM8122-wJyz 8.0 A, 0.80 Nm
F3 (72 mm)		AM8131-wFyz 5.0 A, 1.35 Nm	AM8131-wJyz 8.0 A, 1.35 Nm
			AM8132-wJyz 8.0 A, 2.35 Nm
F4 (87 mm)			AM8141-wJyz 8.0 A, 2.40 Nm

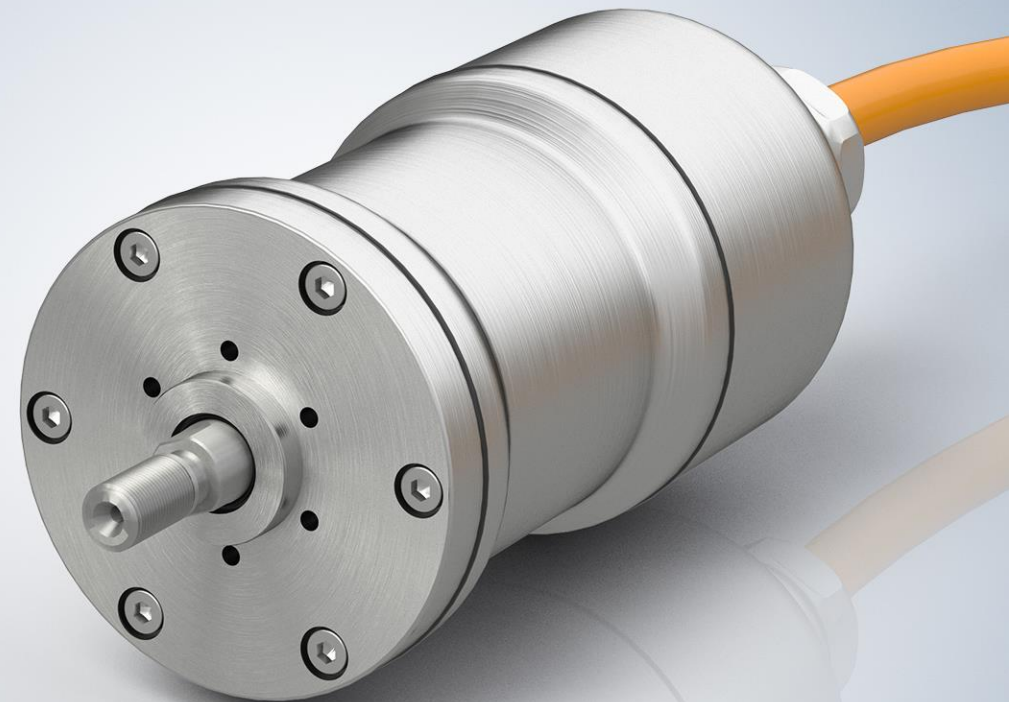
Overview | Stepper motors

BECKHOFF

Flange code	< 3 A	3...5 A	> 5 A
N1 (NEMA17)	AS1010 1.0 A, 0.38 Nm		
	AS1020 1.0 A, 0.50 Nm		
N2 (NEMA23)	AS1030 1.5 A, 0.60 Nm	AS1050 5.0 A, 1.20 Nm	AS2022-wHy0 5.6 A, 1.50 Nm
	AS2021-wDy0 2.0 A, 0.8 Nm	AS2023-wHy0 5.6 A, 1.80 Nm	AS2023-wJy0 6.4 A, 2.30 Nm
N3 (NEMA34)		AS1060 5.0 A, 5.00 Nm	AS2041-wHy0 5.6 A, 3.30 Nm
			AS2042-wHy0 5.6 A, 6.40 Nm
			AS2043-wJy0 6.5 A, 8.00 Nm

Linear actuator up to 800 N peak force

BECKHOFF



AA1121 | Linear actuator with integrated power electronics, 48 V DC, 800 N, 10 mm

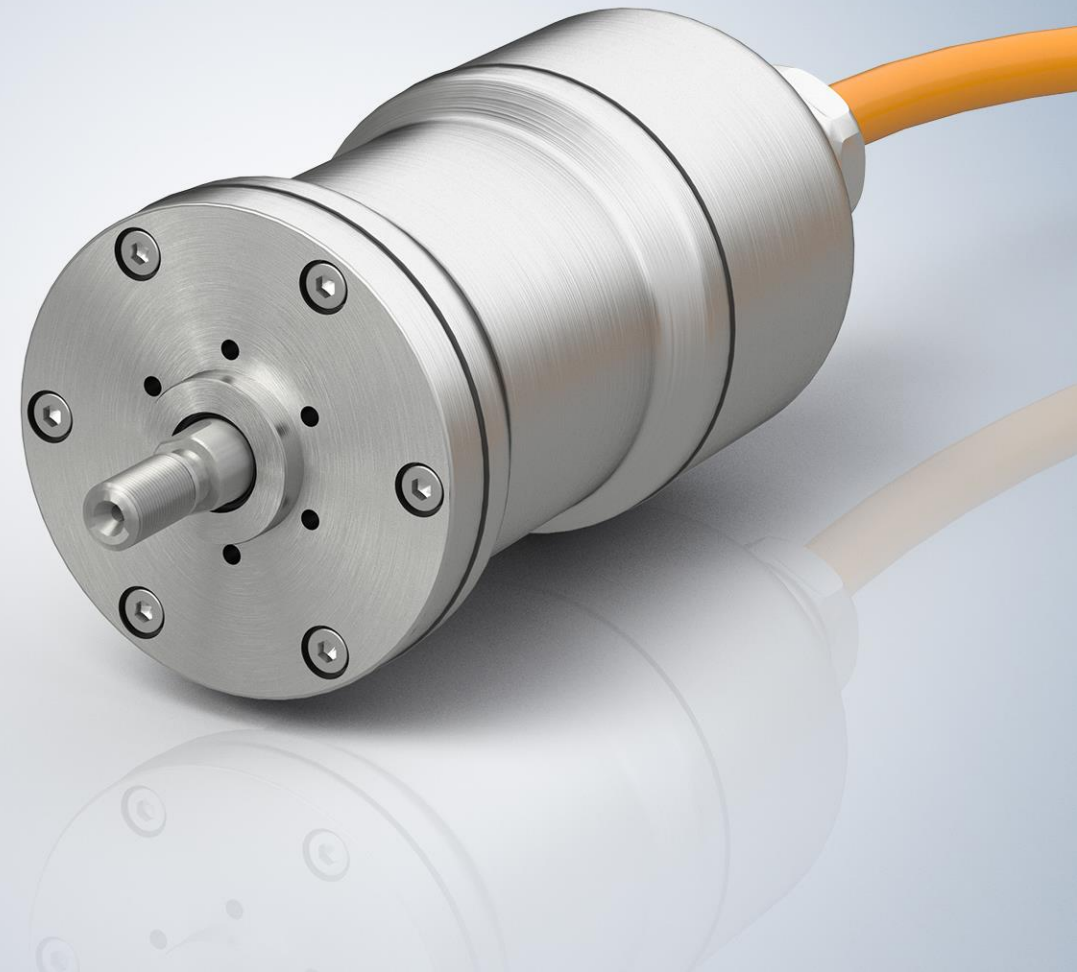
BECKHOFF

- electronic control of valves and linear adjusting units
- power: M12 plug,
fieldbus: M8 plug
- robust and extremely fast communication via EtherCAT
- easy commissioning with TwinCAT Drive Manager
- integrated absolute stroke measuring system → no limit switches necessary
- up to 75% energy savings in comparison with pneumatics



Linear actuator version in Hygienic Design

- protection rating IP 69K: ideal for use in the food, pharmaceutical and chemical industries
- small: 60 mm x 112.5 mm (flange diameter x overall length)
- shaft with M8x1 external thread
- rated supply voltage 24...48 V DC
- max. lifting height 10 mm
- peak force 800 N
- continuous stall force 110 N
- max. acceleration 7 m/s²

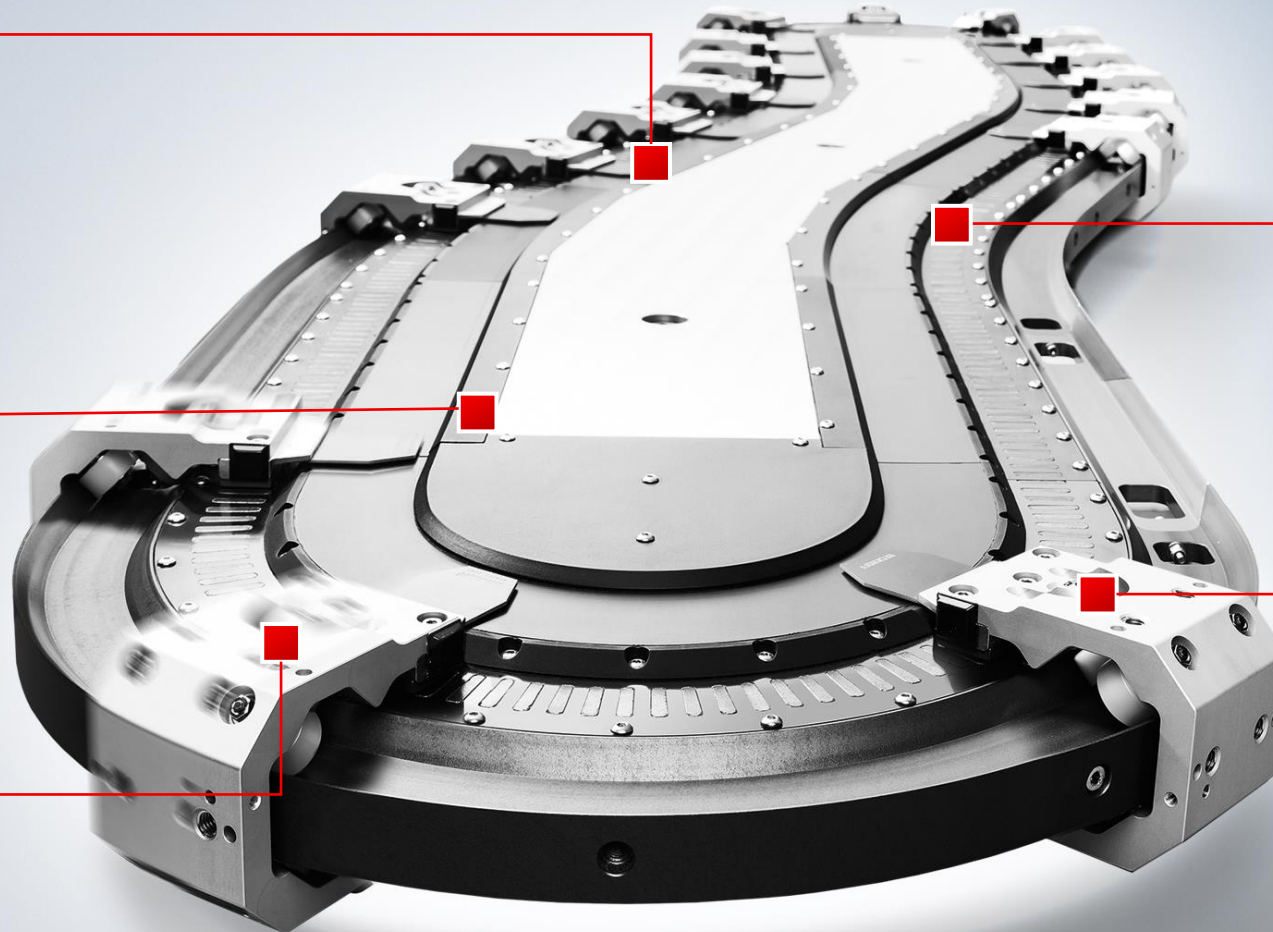


1. The Motion Company
2. Servo Drives
3. Distributed Servo Drive systems
4. Servo and linear motors
5. Compact Drive Technology
- 6. XTS | eXtended Transport System**
7. XPlanar | Planar motor system
8. Motion software
9. Accessories

Efficient
through increased
productivity

Compact system
for smaller machines

Fast engineering
short time-to-market



High availability
through low
maintenance

Flexible operation
through software-
based format changes

The modular system

BECKHOFF

straight and curved
motor module

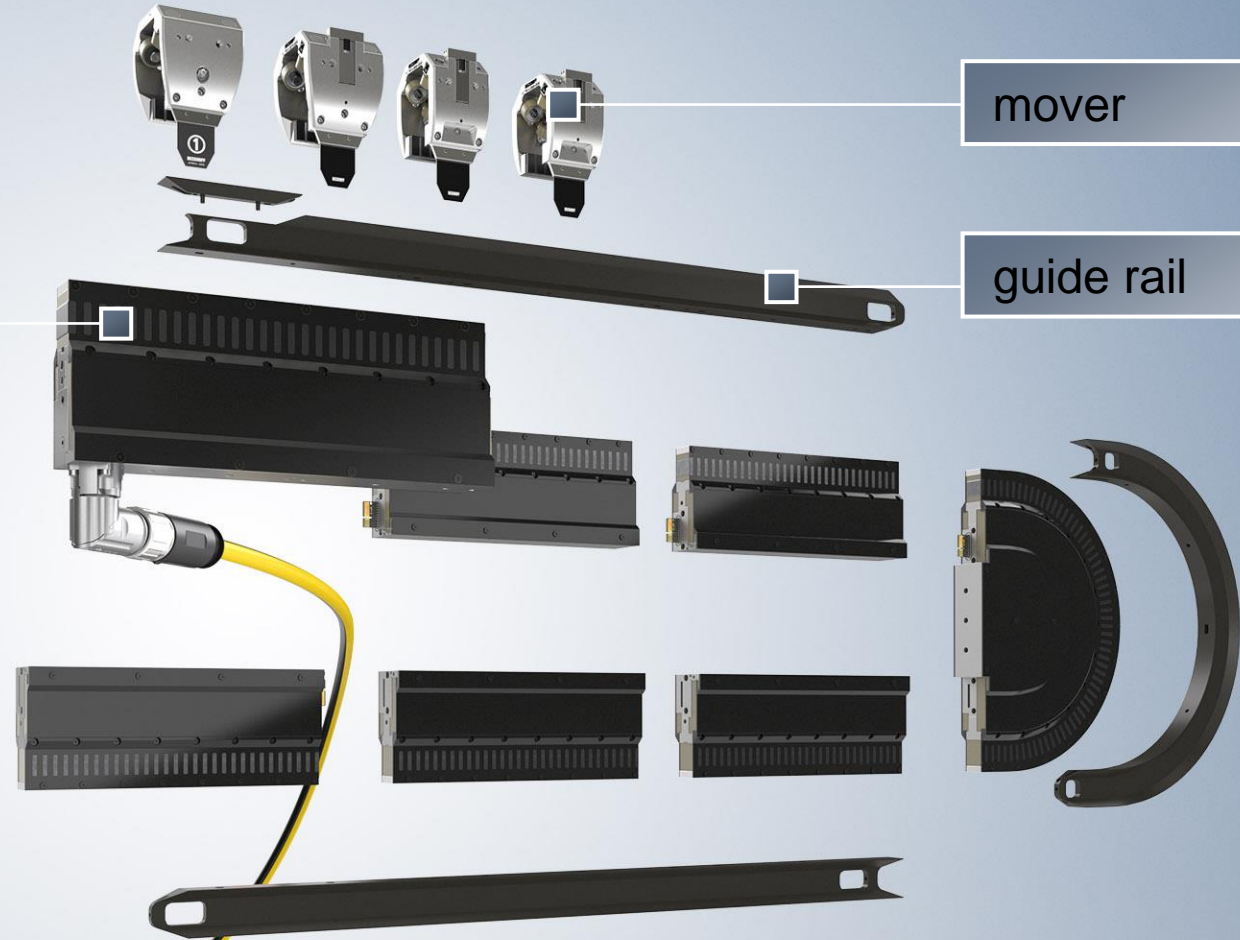
mover

guide rail

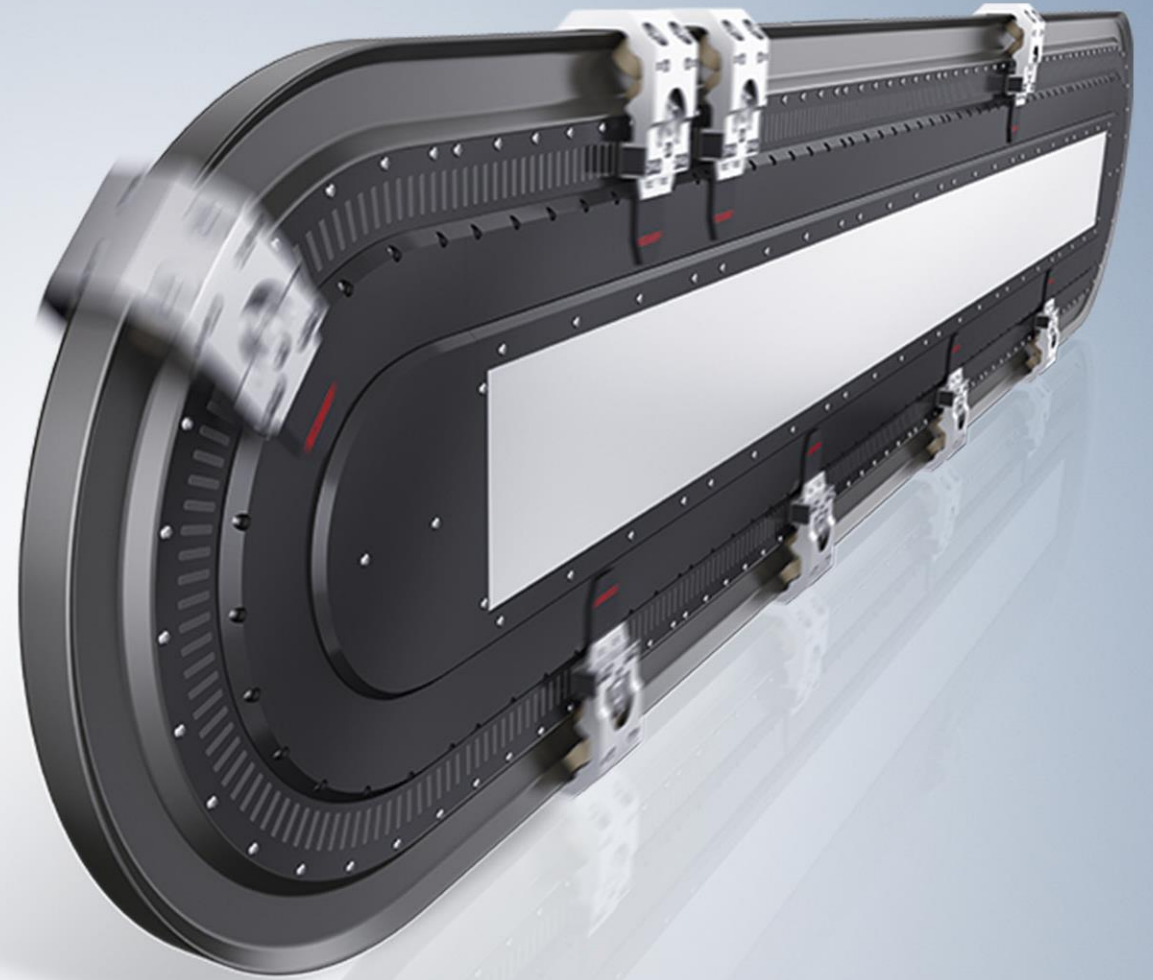
Industrial PC with
TwinCAT NC PTP,
TwinCAT XTS
Extension



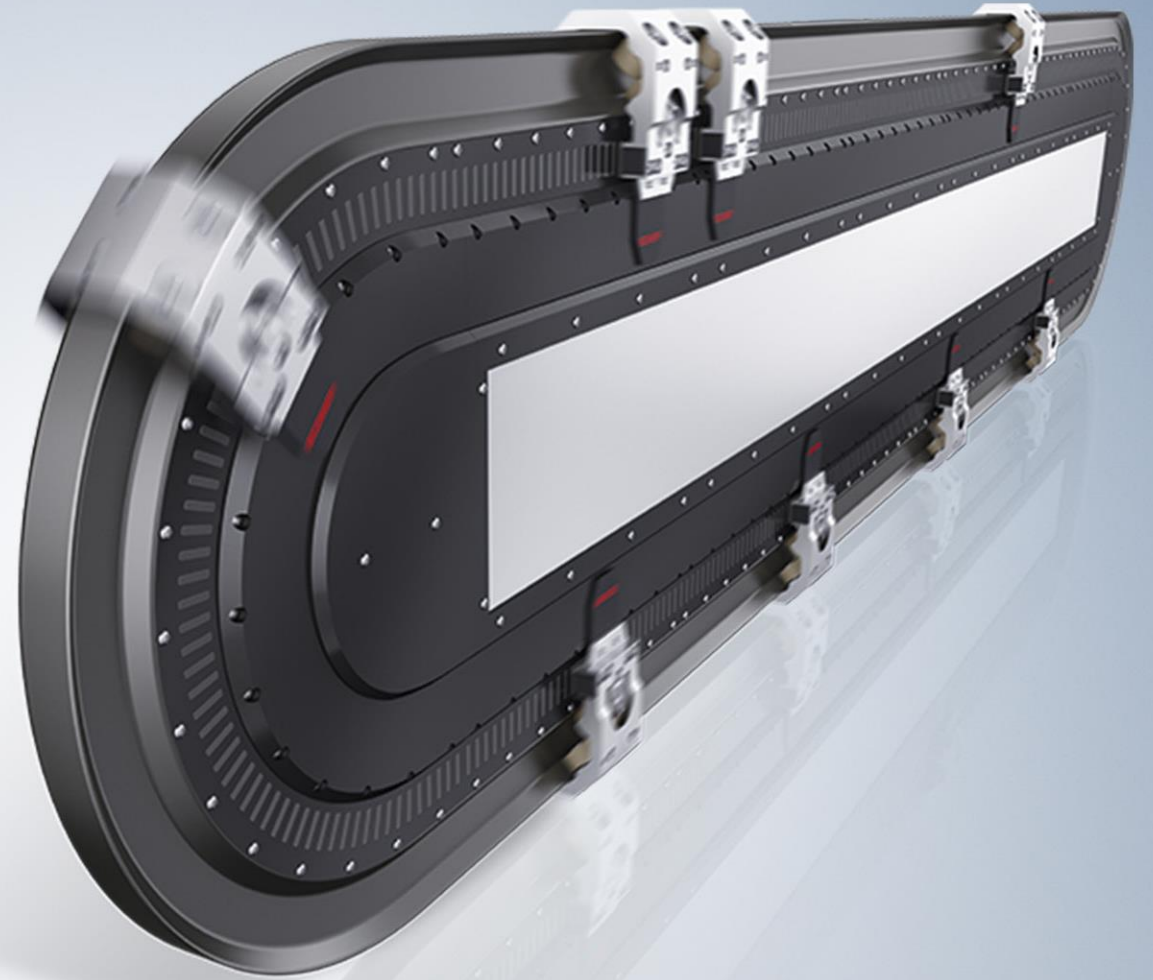
EtherCAT®



- Passive movers move along an active travel path consisting of motor modules.
- Circumferential mover travel is enabled by different motor module types.
 - Entire travel path becomes the utilizable path.
 - continuous flow of material
- Geometry and length of the travel path as well as the number of movers can be adapted to suit the application.
 - theoretically no system limitations
 - limited only by PC computing power:
> 100 m travel path, 200 movers



- Movers are freely movable on the path and can be controlled independently of one another.
 - individual product transport
 - start/stop for individual products in the running product flow
 - driving in sync with any external procedures or other movers
 - moving buffers possible
- All functions can be used without any restrictions, even in curves.



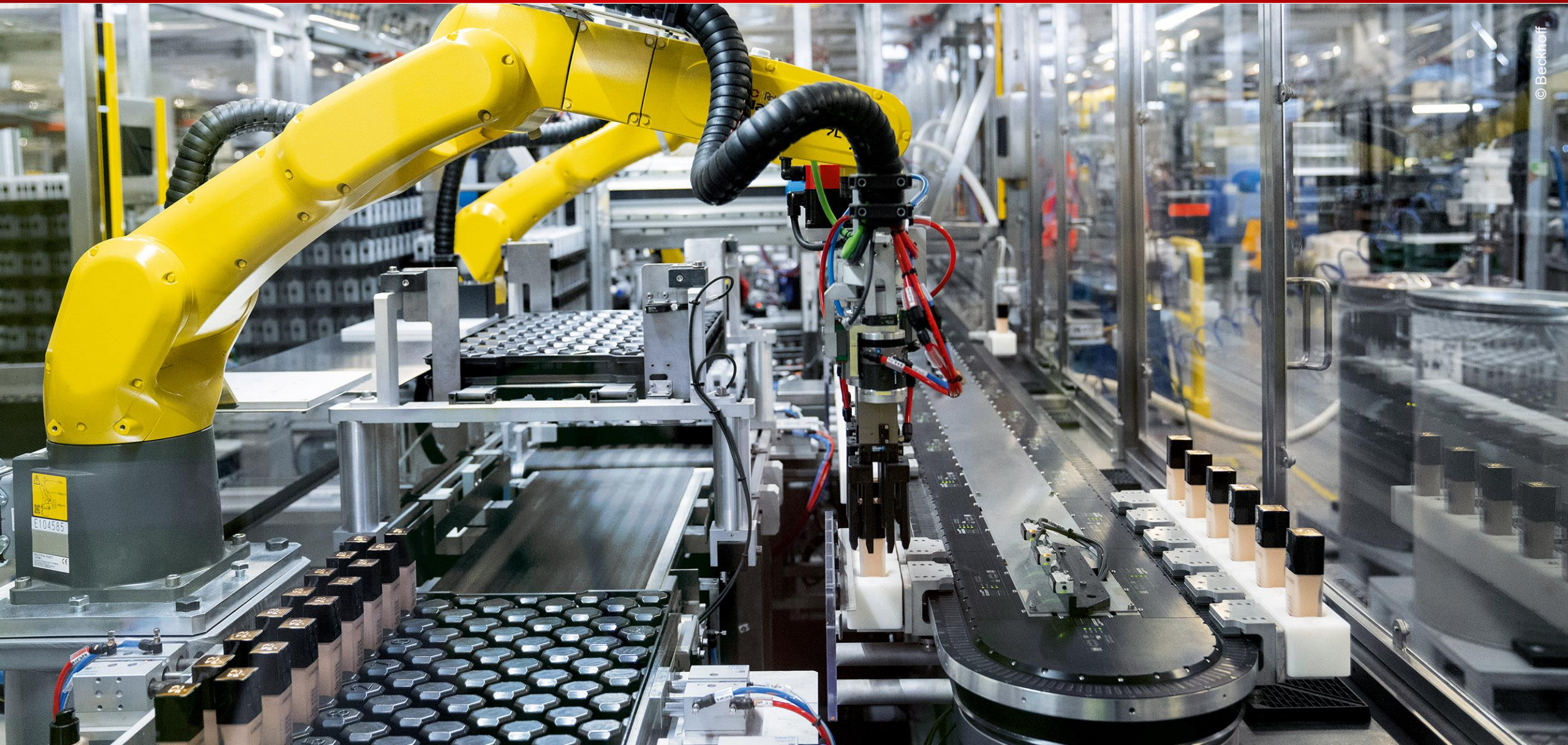
TF5850 | XTS Track Management
New flexibility in motion

BECKHOFF



**Application example:
Cosmetics filling and packaging line | L'Oréal and Secad, France**

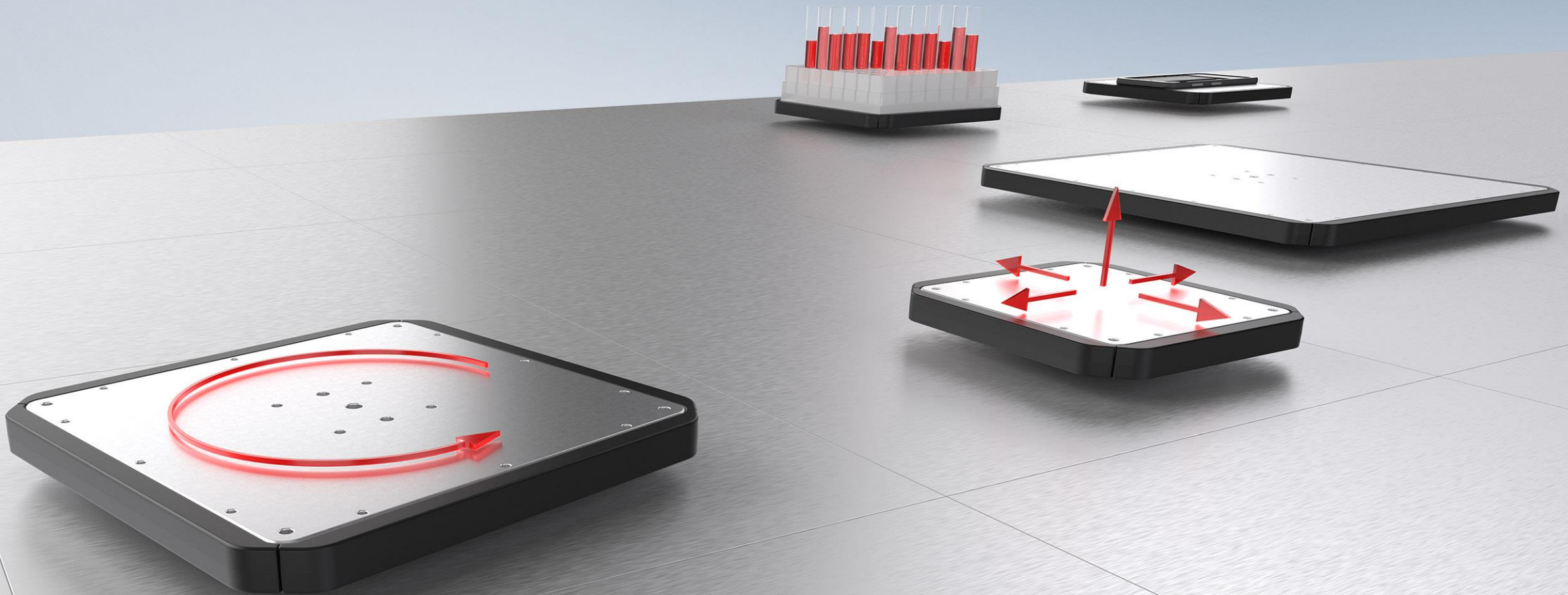
BECKHOFF



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8. Motion software
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XPlanar | Levitating, contactless, intelligent

BECKHOFF



XPlanar®



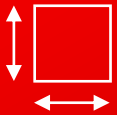
A planar mover containing permanent magnets levitates above XPlanar tiles that generate a magnetic field and detect the mover position.



speed of up to 2 m/s –
acceleration up to 10 m/s²



up to 4 kg payload,
even more in coupled
operation



Movers from 115 mm² to
235 mm² available



X/Y repeat accuracy
down to (±) 10 µm
possible



center-to-center distance
of 120 mm possible with
standard mover



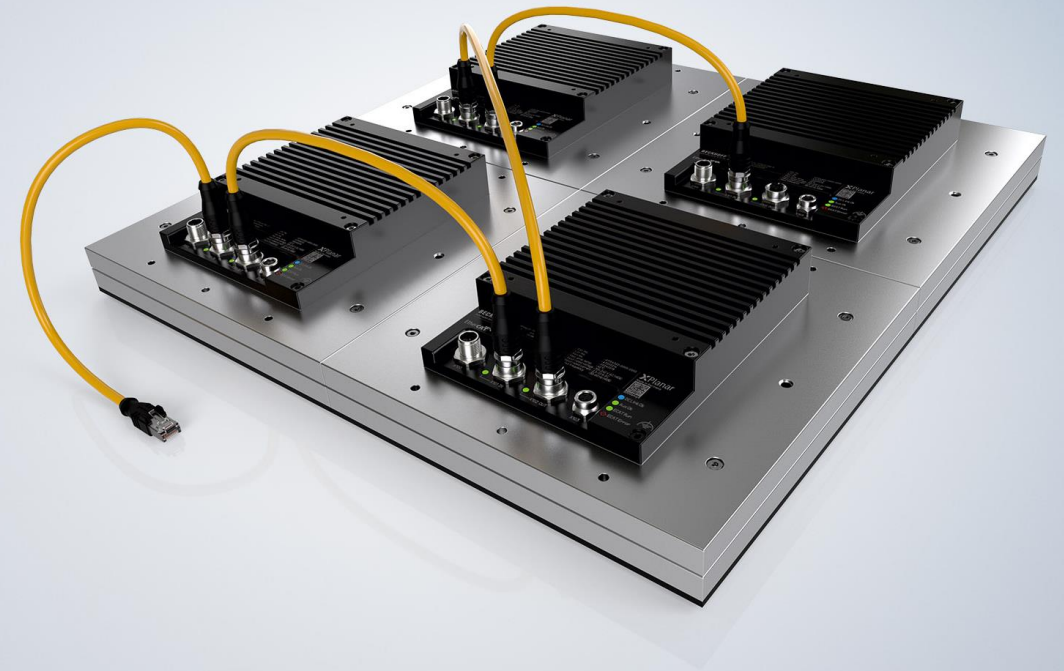
mover identification via
wireless communication



XPlanar tile: planar motor with integrated position feedback

BECKHOFF

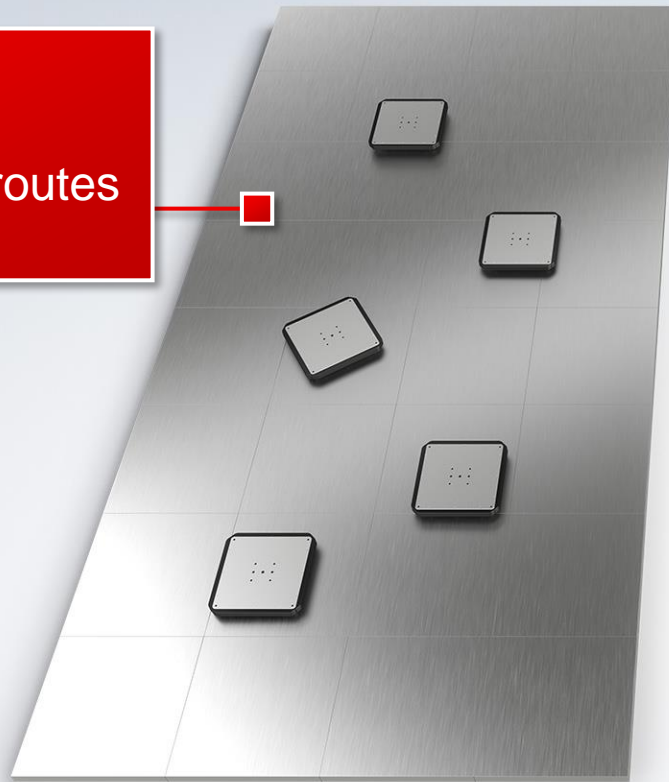
- The planar tile is highly integrated and unites all relevant functions.
- The mover positions are detected by the tiles.
- A power supply unit supplies the output stages with power.
- Super-flat coils generate the travelling magnetic field.
- EtherCAT G establishes a broadband connection to the Industrial PC.
- The tiles can be connected in series on a carrier construction on the machine side.



- free arrangement of XPlanar tiles in 240 x 240 mm format
- enables application-specific track geometries

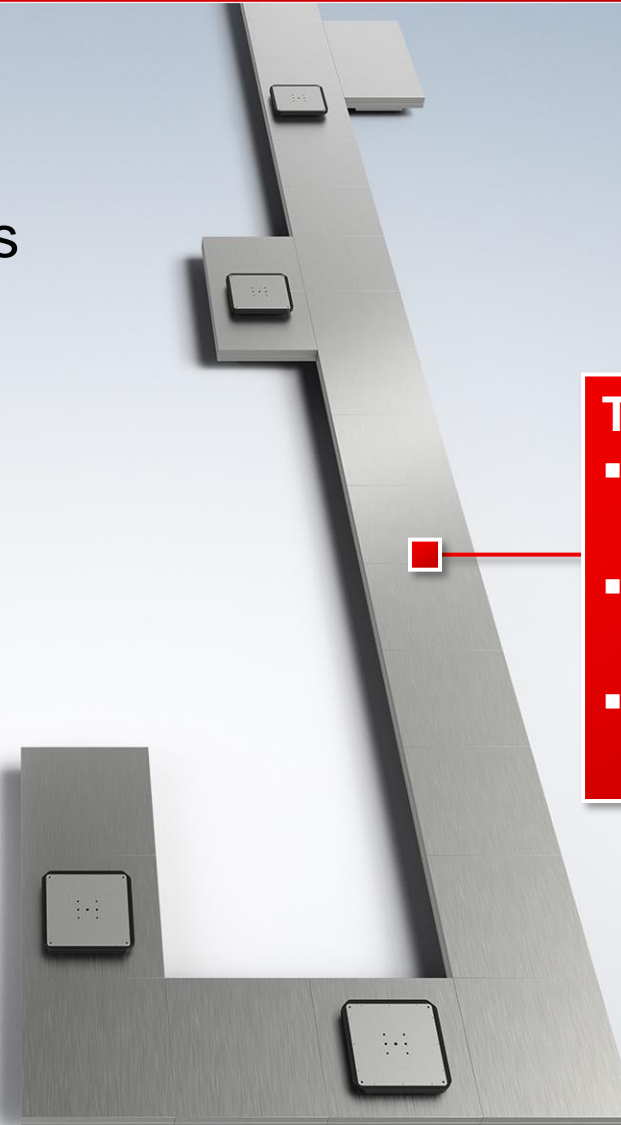
Floor layout

- compact layout
- short transport routes
- flexible use



Track layout

- connects different systems
- accommodates buffer zones
- simplifies congestion avoidance



**XPlanar software:
TF5890 | TC3 XPlanar**

BECKHOFF



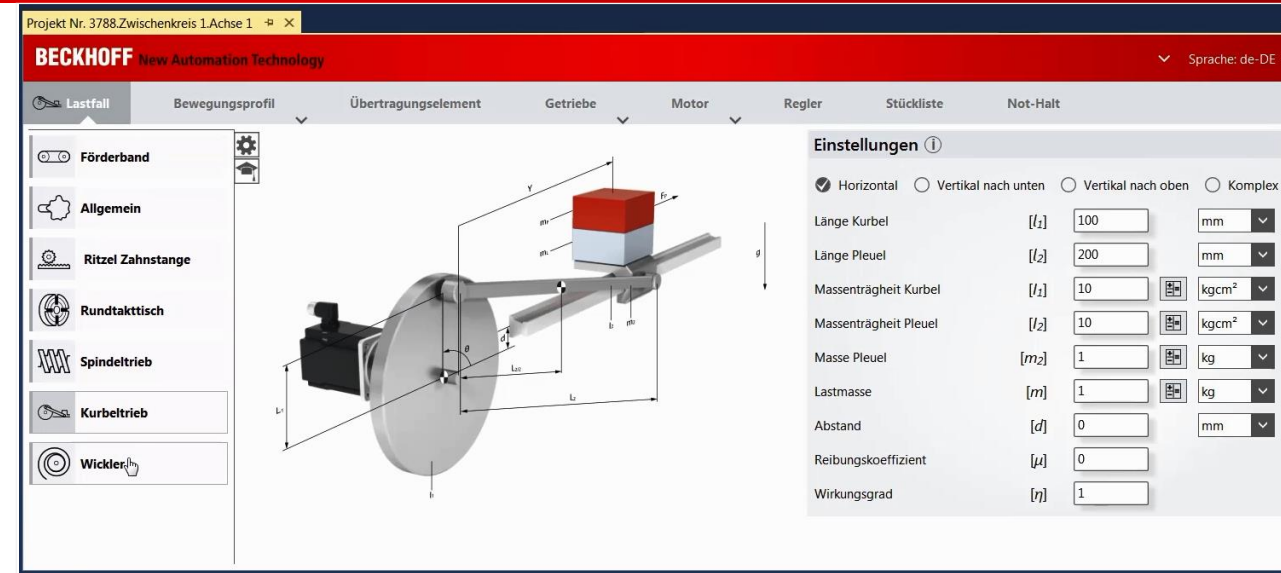
XPlanar®

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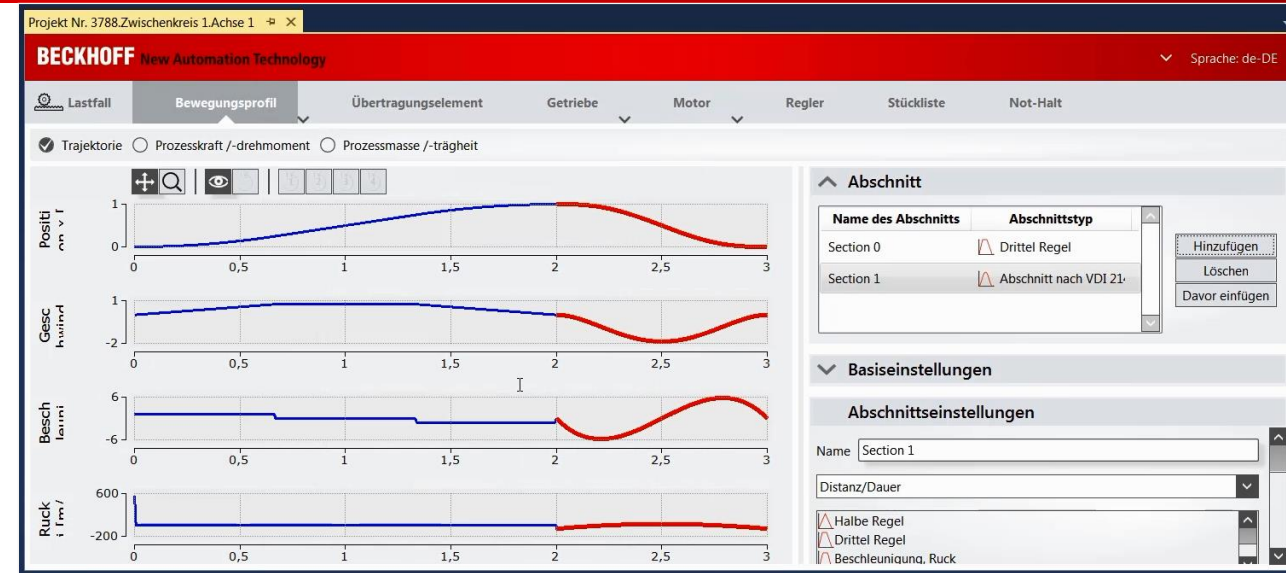


- dimensioning of drive axes in conjunction with the optimum selection of motor, gear unit, drive controllers and accessories
- optionally integrated in the TwinCAT automation platform, or used as a stand-alone project engineering tool for mechanical construction

- Mechanics
 - configuration of typical mechanical systems such as pinion rack, spindle nut, winder, crank drive, etc.



- Motion profiles
 - rough estimates for simple load cases with motion profiles
 - more complex kinematic systems in conjunction with more sophisticated motion profiles
 - cam gears according to VDI 2143
 - The export function enables the configuration to be transferred directly to the TwinCAT System Manager, without the need for repeated inputs.



- optimization function
 - selection of motor and gearbox by an optimization algorithm
 - suggestion of the optimum combination based on mechanical and cost considerations (can be filtered)
 - connected database provides access to all available gear units, motors and servo drives offered by Beckhoff
 - automatic geometry matching

The screenshot displays the 'Optimierer' (Optimizer) tab in the Beckhoff Motion Designer software. The interface is divided into several sections for configuring optimization parameters.

Sicherheitsfaktoreinstellungen (Safety Factor Settings):

- Nominelle Sicherheit: 1
- Max. Sicherheit: 1

Getriebe (Gearbox) - (aktuell verwendet) (currently used):

- Hersteller: [Alles auswählen](#) [Alles abwählen](#)
☒ Beckhoff Automation GmbH & Co. KG
- Getriebetyp: [Alles auswählen](#) [Alles abwählen](#)
☒ Planetengetriebe
☒ Winkelplanetengetriebe
- Getriebestufen / Getriebeübersetzung: [Alles auswählen](#) [Alles abwählen](#)
☒ 1
☒ 2

Motor (Motor):

- ☐ Hygienegerecht
- ☐ Lüfter erlaubt
- ☐ mit Haltebremse
- Hersteller: [Alles auswählen](#) [Alles abwählen](#)
☒ Beckhoff Automation GmbH & Co. KG
- Feedback System: [Alles auswählen](#) [Alles abwählen](#)
☐ Resolver
☐ 18 Bit Singleturn
☐ 18 Bit Multiturn
☒ 23 Bit Singleturn

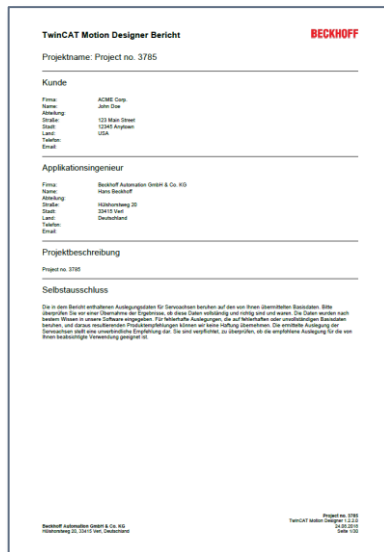
Optimiereereinstellungen (Optimization Settings):

Beschreibung	Wert	Priorität
Maximale Geschwindigkeitsausnutzung	0,7	Niedrig <input type="checkbox"/> Hoch <input checked="" type="checkbox"/>
Maximale Drehmomentausnutzung	0,7	Niedrig <input type="checkbox"/> Hoch <input checked="" type="checkbox"/>

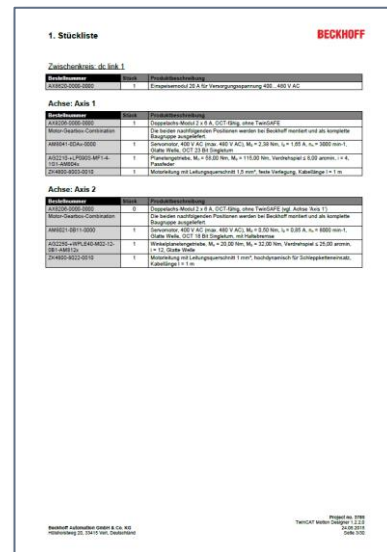
Beschreibung	Wert	Priorität
Gewünschtes Massenträgheitsverhältnis	3	Niedrig <input type="checkbox"/> Hoch <input checked="" type="checkbox"/>
Maximale Geschwindigkeitsausnutzung	0,7	Niedrig <input type="checkbox"/> Hoch <input checked="" type="checkbox"/>
Maximale Drehmomentausnutzung	0,7	Niedrig <input type="checkbox"/> Hoch <input checked="" type="checkbox"/>
Leistung		Niedrig <input type="checkbox"/> Hoch <input checked="" type="checkbox"/>
Preis		Niedrig <input type="checkbox"/> Hoch <input checked="" type="checkbox"/>

Buttons:

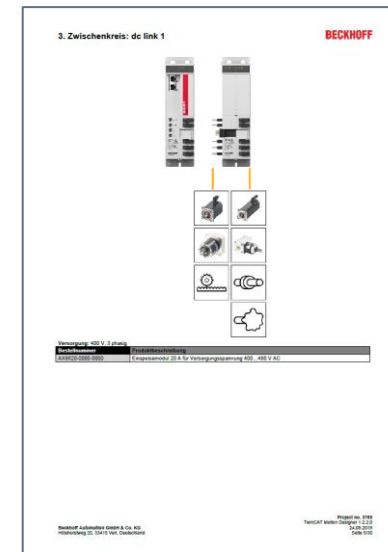
- report functions
 - axis configuration is documented in a report. A choice of short or detailed report is available.
 - technical data sheets und 3-D models are directly available from the software



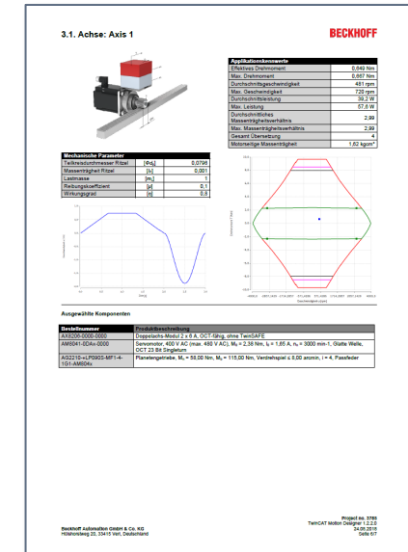
Project



Parts list



DC-Link



Axis

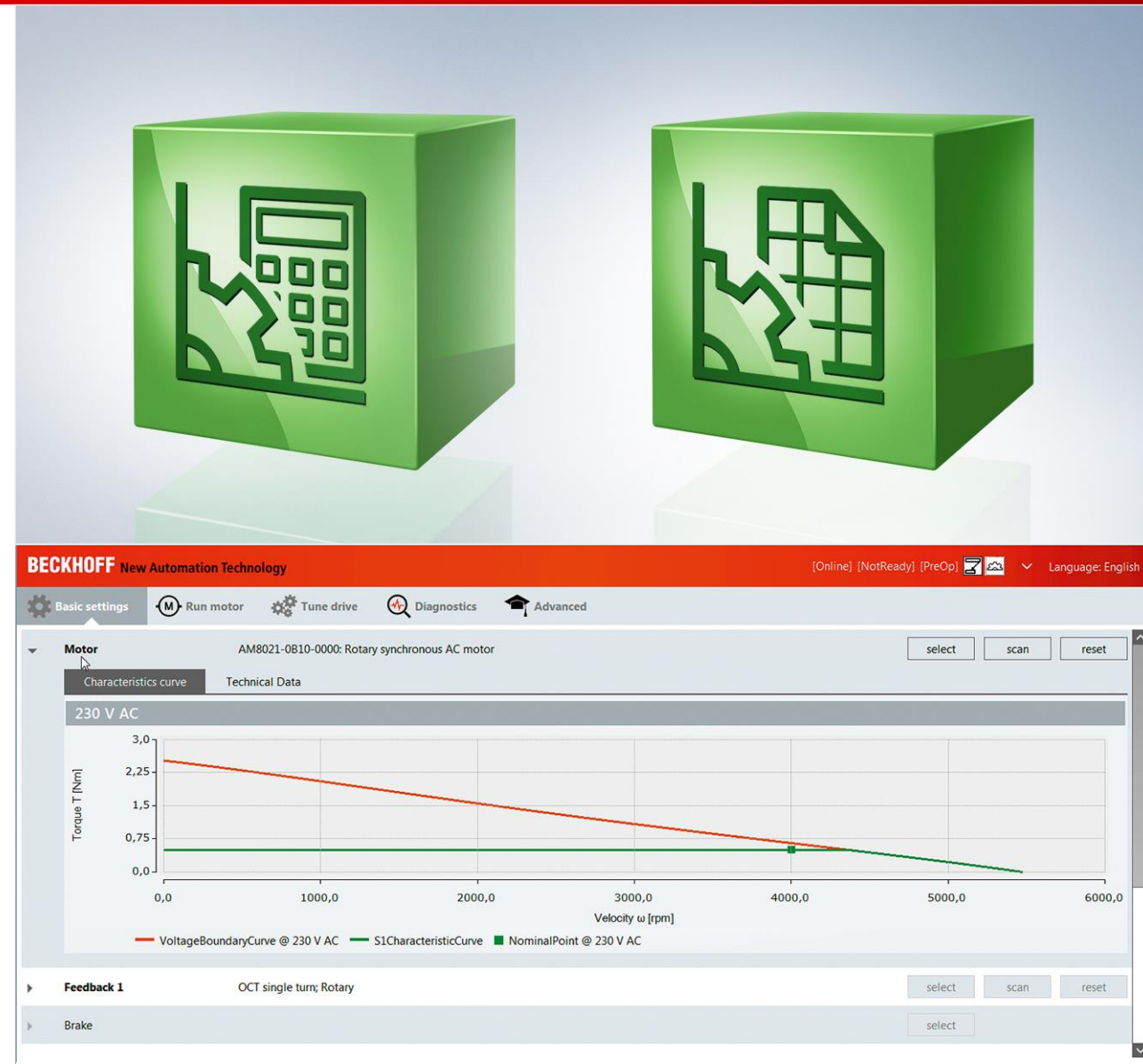
- parts list generator
 - to prepare the purchase order directly
 - accessories such as cables, chokes and installation material are also considered
- multi-axis design
 - the TC3 Motion Designer regards the machine as a holistic unit, including all drive axes
 - all load cycles, including their temporal dependence and their influence on the common DC-Link, are taken into account
 - selection of the optimum supply module or the common brake resistor is guaranteed

■ Motion Utilities

- technical library of Beckhoff products from the drive technology spectrum: motors, gears and cables
- direct access without prior axis configuration
 - technical documentation
 - product data sheets
 - 3D drawings
- cable accessories finder: automatic selection of matching cables for the chosen combination of motor and drive controller saves time.



- for commissioning of AX8000, AX5000, AMP8000, AMI8100 or EL70x7, EL72xx, EL74xx, EP72xx, EP74xx, EJ72xx, ELM72xx
- optionally available as an integrated version in TwinCAT or as an update version independently of TwinCAT
- Integration in a TwinCAT solution enables a separate assessment of supply modules, axis modules and axis channels.
- automatically generated startup list per axis with electronic identification plate
- Scope View is integrated.
- Tune Drive function: direct adjustment of parameter settings, configuration of filters



TE5950 | TC3 Drive Manager 2

BECKHOFF

BECKHOFF New Automation Technology [Online] [AxisReady] [Op] Language: English

Basic settings Run motor Tune drive Diagnostics **Advanced**

Link to TwinCAT

Slots settings Startup list Process data **Parameter list** Scaling and NC parameters

Search parameter:

Index	Name	Actual value	Set value
0x1620	Ch A AxisMain Outputs		
0x1623	Ch A Interpolator Outputs		
0x1626	Ch A PositionControl Outputs		
0x162A	Ch A VelocityControl Outputs		
0x1632	Ch A TorqueControl Outputs		
0x1A20	Ch A AxisMain Inputs		
0x1A23	Ch A Interpolator Inputs		
0x1A26	Ch A PositionControl Inputs		
0x1A2A	Ch A VelocityControl Inputs		
0x1A32	Ch A TorqueControl Inputs		
0x1A36	Ch A SyncServoMotor Inputs		
0x1A37	Ch A Primary Feedback OCT rotary (Hiperface DSL) Inp		
0x3000	Ch A AxisMain parameters		
0x3001	Ch A AxisMain actual values		

Expand all Collapse all Download Add to watch

BECKHOFF New Automation Technology [Online] [AxisOp] [Op] Language: English

Basic settings **Run motor** Tune drive Diagnostics Advanced

Drive process data

Start: 15:09:39,914:000 End: 15:09:48,940:000 Pos: 0,00:00:00,000:000 Time: 15:09:39,914:000 Date: Freitag, 10. November 2017

Position 3000,0 0,0

Velocity 1250,0 -1250,0

Lag [m] 0,75 -0,75

Torque [Nm] 6,0 E-002 0,0 -6,0 E-002

0,000s 1,000s 2,000s 3,000s 4,000s 5,000s 6,000s 7,000s 8,000s 9,000s 10,000s

ScopeView options

Drive parameters

Position control Velocity control Torque control

Kv 1 1/s

NC

Enable controller

Manual Functions Parameters

-- - + ++

Go back

BECKHOFF New Automation Technology [Online] [AxisReady] [Op] Language: English

Basic settings Run motor Tune drive **Diagnostics** Advanced

Error code and message 87 Errors; 0 Warnings; 7 Information;

Device operating time: 05:46:37 Channel power stage time: 00:08:53 Channel error counters

87 Errors 0 Warnings 7 Information Only actual messages

No filtered errors or messages are available

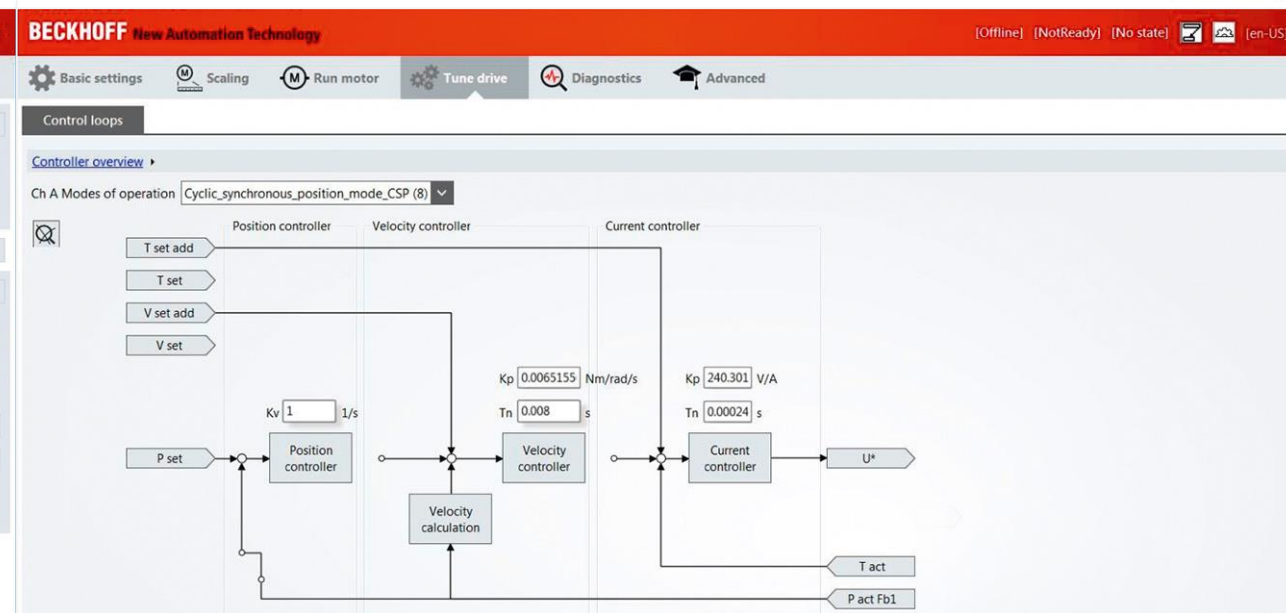
DSL error log Refresh Export

Check software configuration Refresh Export

Watch window Refresh ticks: 500 ms

Alias	Value	Parameter
Motor type	AM8021-xBx0	0x32C0:01 Ch A Motor parameters / Configured motor type
Motor temperature	19.25078 °C	0x32C1:06 Ch A SyncServoMotor actual values / Actual motor temperature
Velocity command	0 rpm	0x60FF Ch A Target velocity
Actual velocity	-0.7724 rpm	0x606C Ch A Velocity actual value
Actual position	-15599.192 °	0x6064 Ch A Position actual value

Hold to edit Reset to default Remove



1. The Motion Company
2. Servo Drives
3. Distributed Servo Drive systems
4. Servo and linear motors
5. Compact Drive Technology
6. XTS | eXtended Transport System
7. XPlanar | Planar motor system
8. Motion software
9. **Accessories**

Wide range of accessories

BECKHOFF

- motor cables
- resolver cables
- encoder cables
- thermal protection contact cables
- interface cables
- plug
- ballast resistors
- motor chokes
- mains chokes
- mains filter
- commissioning software



Beckhoff | The Motion Company
The right drive technology for any application

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Beckhoff Automation GmbH & Co. KG

Headquarters
Huelshorstweg 20
33415 Verl
Germany

Phone: +49 5246 963-0
E-mail: info@beckhoff.com
Web: www.beckhoff.com

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