

1. **News IPC**
 - **Industrial PC**
 - Embedded PC
2. News I/O
3. News Motion
4. News TwinCAT





C601x-0020
Intel Atom® E39xx

C6025-0000
8th generation
Intel® Core™ i U

C603x-0070
8th/9th generation
Intel® Core™ i

Beckhoff multi-core performance index

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C6025-0000



C6027-0000

Fanless modular Intel® Core™ i U computing power for the ultra-compact Industrial PC series

- modular interface and function extensions via second circuit board
- extremely compact, very high performance
- perfect fit as an edge device with extensive data processing and numerous interfaces



Housing prepared for configuration with further options ex factory

- **option 1:** 1-second UPS
- **option 2:** 6 x RJ45, not switched
- further options in preparation

- dimensions (WxHxD): 82 x 127 x 69 mm



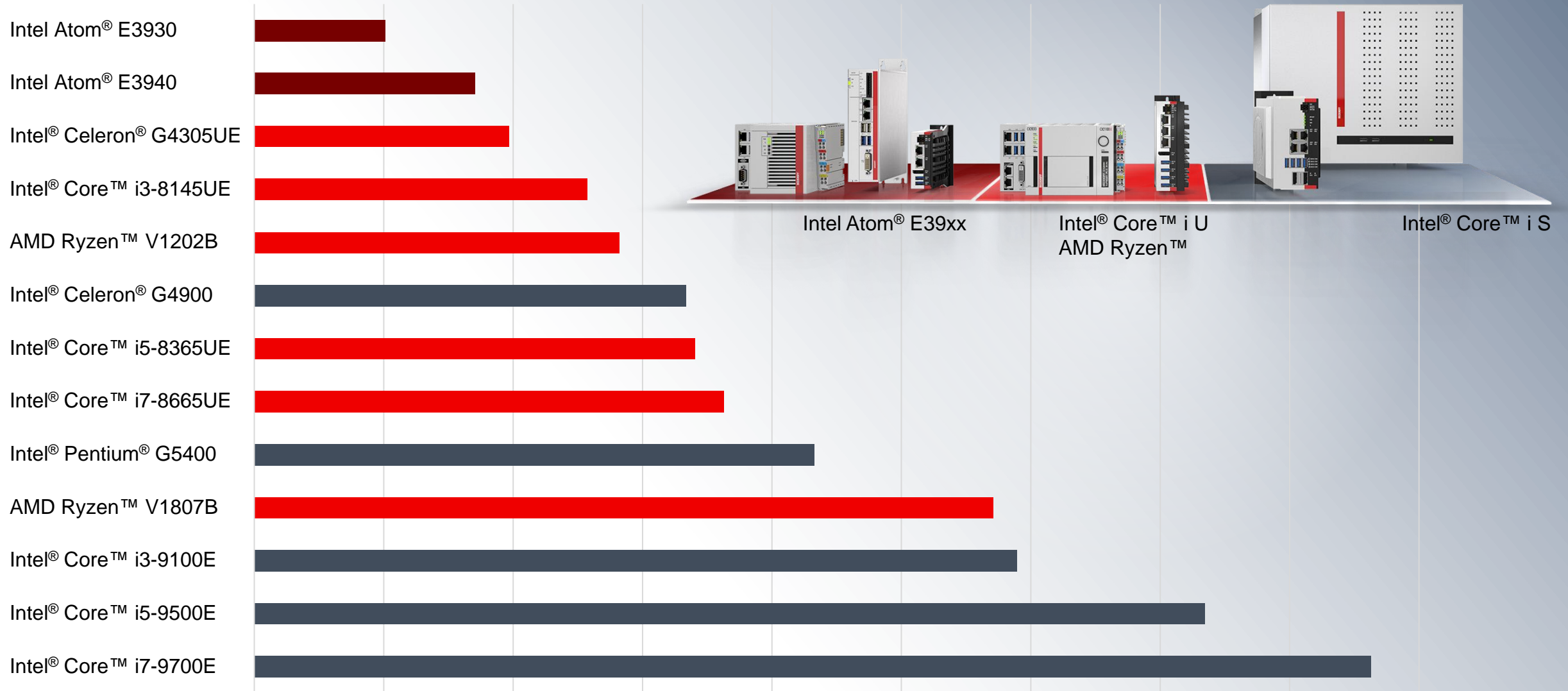
Fanless Intel® Core™ i computing power for the ultra-compact Industrial PC series

- for demanding control applications
→ Intel® Core™ i U: performance capabilities of a Core™ i, yet significantly less power consumption
- 8th generation Intel® Core™ i U processors
- small dimensions: 82 x 127 x 47 mm
- dual-core CPU with up to 2.2 GHz per core, quad-core CPU with up to 1.7 GHz per core



Beckhoff multi-core performance index

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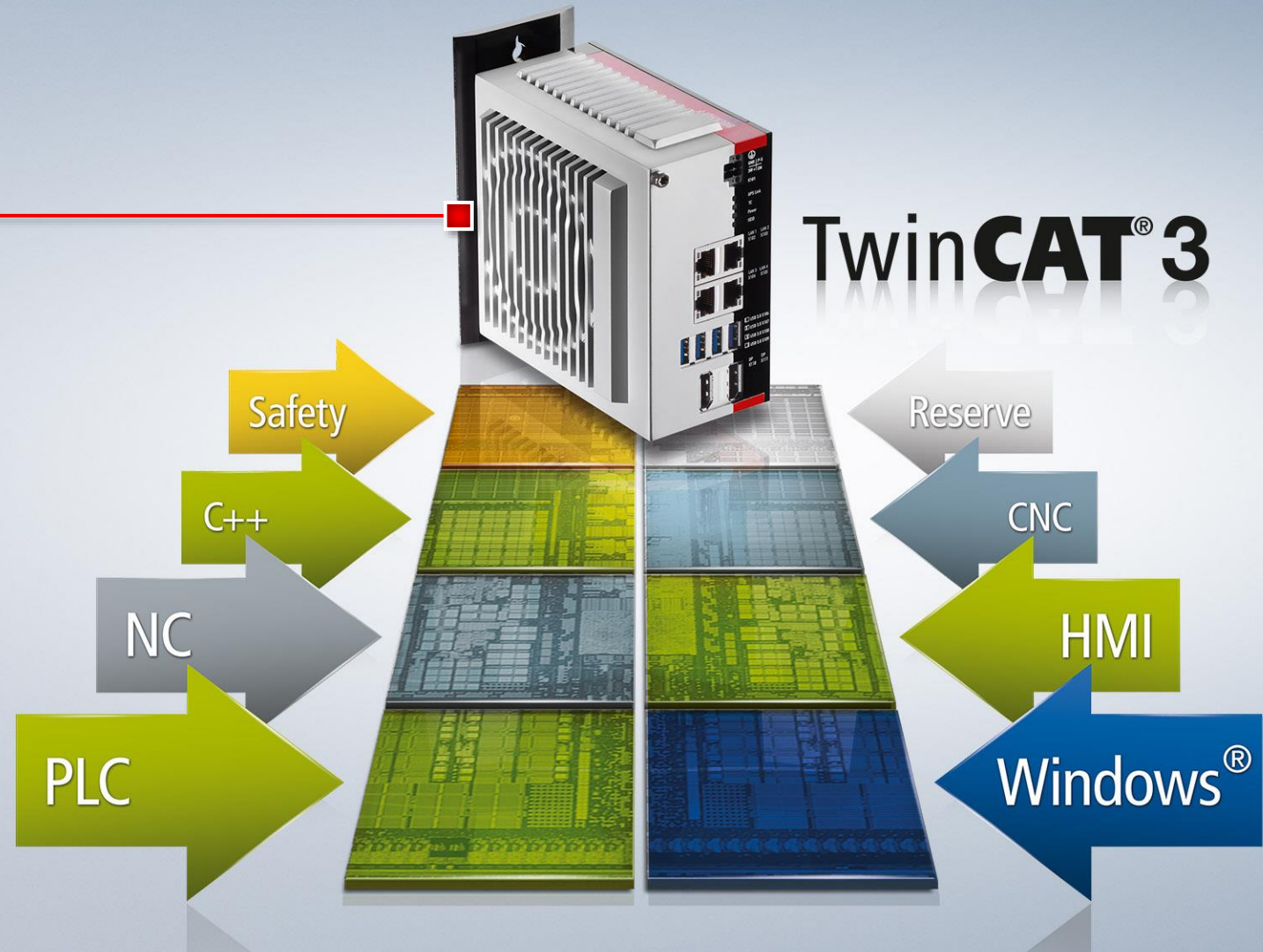


from dual- to octa-core

dual-core with 3.7 GHz,
octa-core with 2.6 GHz

up to 12 MB LLC
and 128 GB RAM

high-performance SSD,
NVM Express™



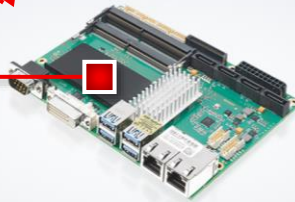
Version variety | The 9th generation for all form factors

BECKHOFF

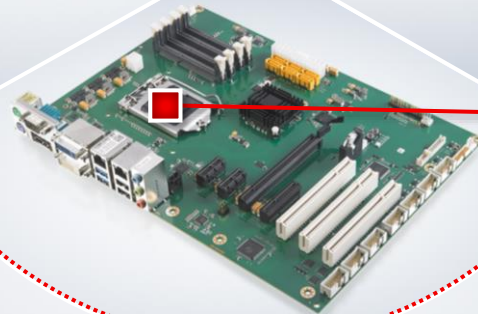


Beckhoff motherboards with
9th generation Intel[®] processors

35 W TDP



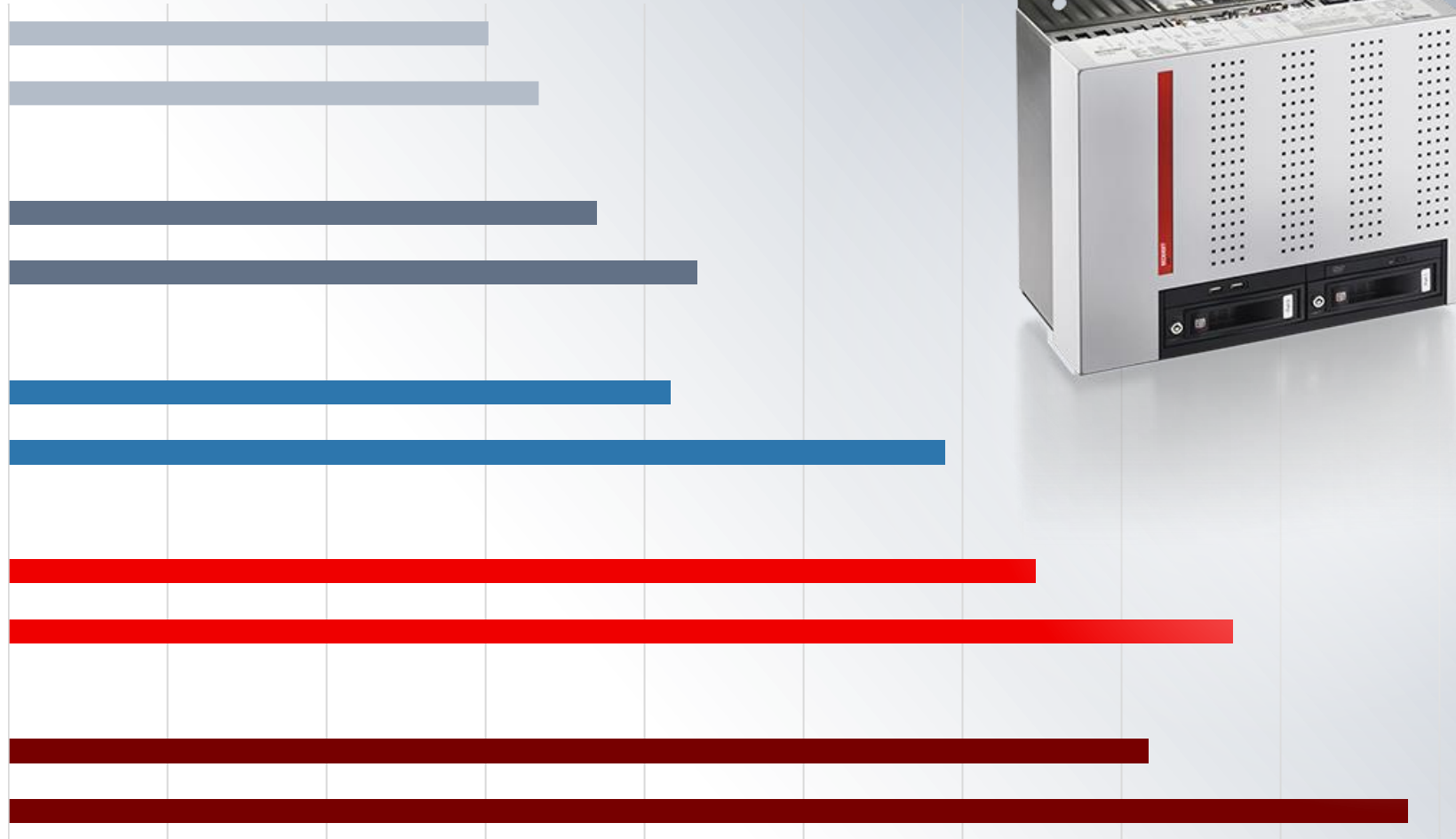
65 W TDP



Beckhoff multi-core performance index

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Intel® Celeron® G3900
Intel® Celeron® G4900
Intel® Pentium® G4400
Intel® Pentium® G5400
Intel® Core™ i3-7101E
Intel® Core™ i3-9100E
Intel® Core™ i5-7500
Intel® Core™ i5-9500E
Intel® Core™ i7-7700
Intel® Core™ i7-9700E



High performance SSDs NVMe plug-in card SSDs for ATX motherboards

BECKHOFF

- **C9900-H768, C9900-H769:** 160 GB high performance SSD, NVMe Express™, PCIe x4 plug-in card, 3D flash, extended temperature range, for ATX PCs with 8th or higher generation Intel® Celeron®, Pentium®, Core™ i3, Core™ i5 or Core™ i7, instead of 3½-inch hard disk



High performance SSDs

M.2 NVMe SSDs for C603x

BECKHOFF

- **C9900-H653, C9900-H654:** 160 GB or 320 GB high performance M.2 SSD, NVMe Express™, PCIe x4, 3D flash, extended temperature range, for C603x-0070, instead of 40 GB M.2 SSD

PCIe 3.0 in C6030 as a prerequisite for using NVMe SSDs

- **C9900-B407:** motherboard with on-board SATA RAID 1 controller and PCIe 3.0 for one high performance M.2 SSD or for two SATA M.2 SSDs in RAID configuration, instead of standard motherboard with PCIe 2.0

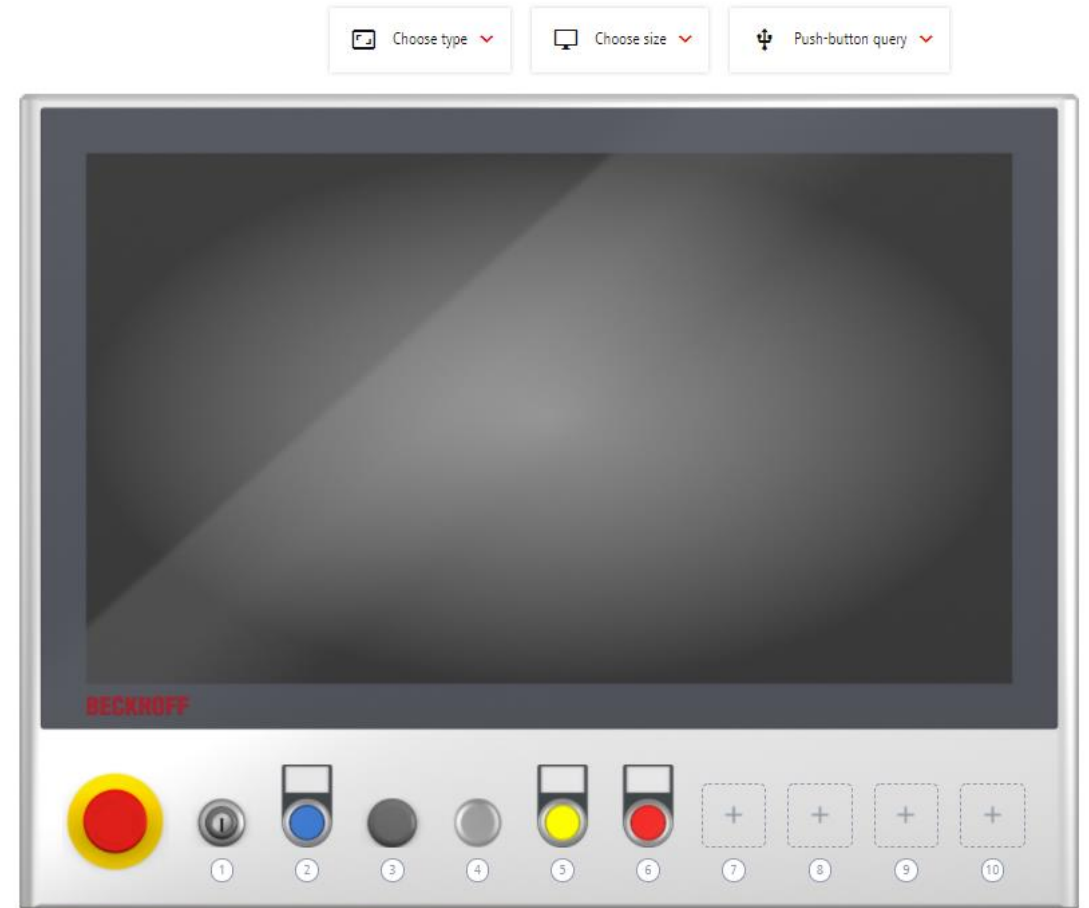


Customized push-button extension from quantity 1

BECKHOFF

Update <https://cp-configurator.beckhoff.com>

- free configuration of button types, colors, variants, ...
- no extra charge for customized variants
- no minimum order quantity



After completion of the configuration, not configured slots are provided with blind plugs.

Customized push-button extension from quantity 1

BECKHOFF

Update <https://cp-configurator.beckhoff.com>

New features:

- RFID 13.56 MHz, Mifare
- USB 2.0 port with screw-on cap
- free choice of quantities for key switches
- free choice of quantities for knob switches



- 11 steps to protect your IPC
 - Windows 10 lock functions
 - step-by-step measures
- hazards and risk assessment
 - attackers, attack types and scenarios
- measures
 - physical measures
 - administration of users and programs
 - securing the operating system, updates
 - communication (firewall, remote maintenance)

https://download.beckhoff.com/download/document/ipc/industrial-pc/IPC_Security_Guideline_EN.pdf

BECKHOFF New Automation Technology

Manual | EN

IPC

Security Guideline



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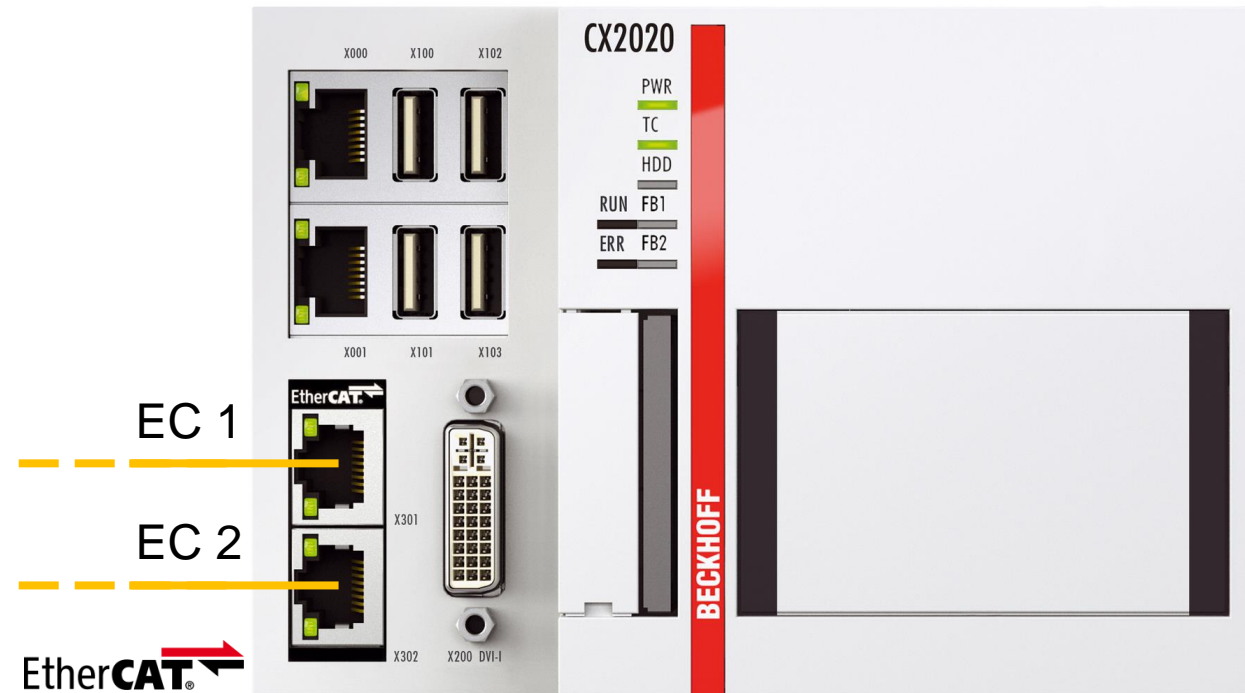


CXxxxx-M112 | 2 x EtherCAT master interface for CX51xx, CX52xx and CX20xx Embedded PCs

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New optional interfaces for all current CX devices

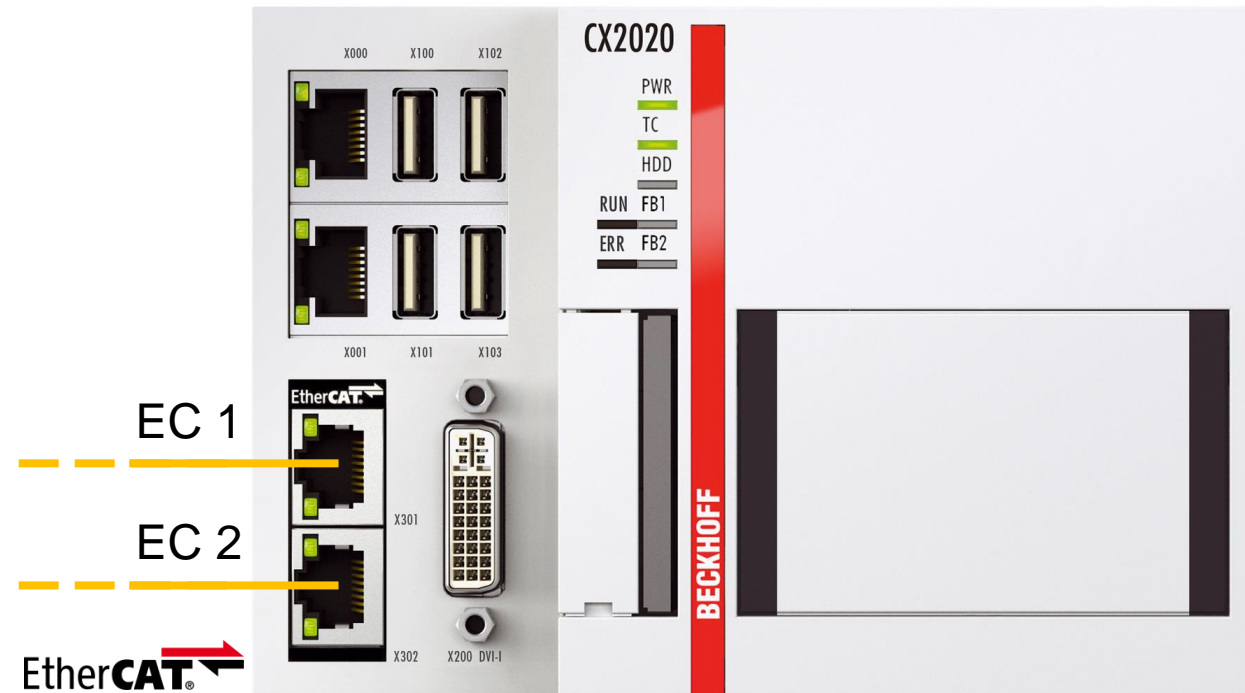
- CX51x0
- CX52x0
- CX20x0
- CX20x2
- CX20x3
- provides two additional EtherCAT master interfaces



CXxxx-M112 | 2 x EtherCAT master interface for CX51xx, CX52xx and CX20xx Embedded PCs

BECKHOFF

- 3 EtherCAT masters, fully DC-synchronized through direct FPGA integration
- no need for external synchronization of EtherCAT ring topologies with EL6692
- perfect for applications with high I/O demands such as a small XTS system
- can also be used to create EtherCAT redundancy



1. News IPC
2. **News I/O**
 - **EtherCAT Terminal**
 - Bus Terminal
 - EtherCAT Box
 - EtherCAT plug-in modules
 - power supplies
 - infrastructure components
 - I/O accessories
3. News Motion
4. News TwinCAT



EL17xx | 2-channel digital input terminals, for high voltage

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Digital input terminals

- **EL1712:** 120 V AC/DC
- **EL1702:** 230 V AC
- **EL1702-0020:** 220 V DC
- **EL1722:** 230 V AC, no power contacts

Available



EL17xx, EL27xx | Digital input and output terminals, for high voltage
EL9xxx | Potential supply terminals, 120...230 V AC/DC, with diagnostics

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Digital input terminals

- **EL1712:** 120 V AC/DC
- **EL1702:** 230 V AC
- **EL1702-0020:** 220 V DC
- **EL1722:** 230 V AC, no power contacts

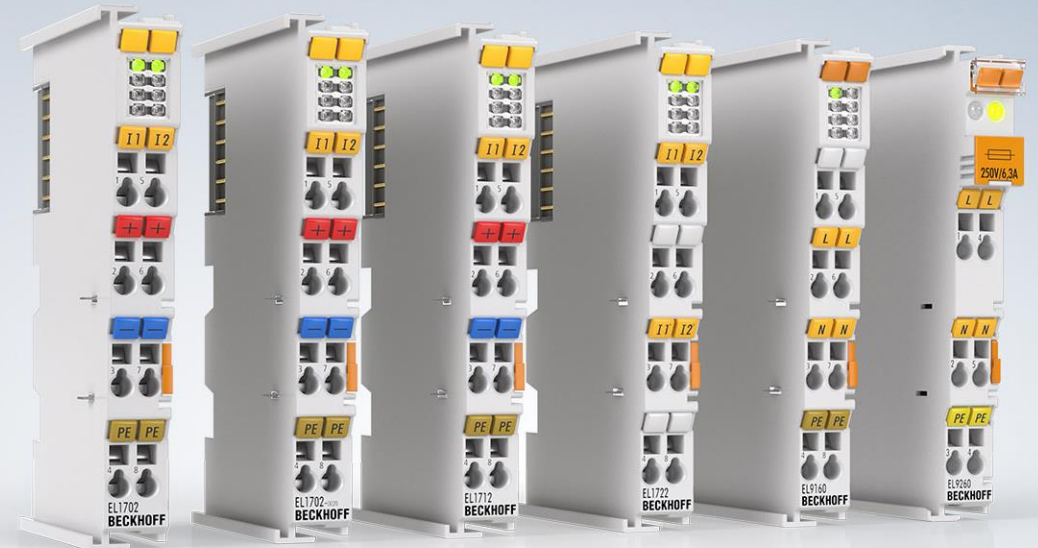
Digital output terminals

- **EL27xx:** 230 V

Potential supply terminals

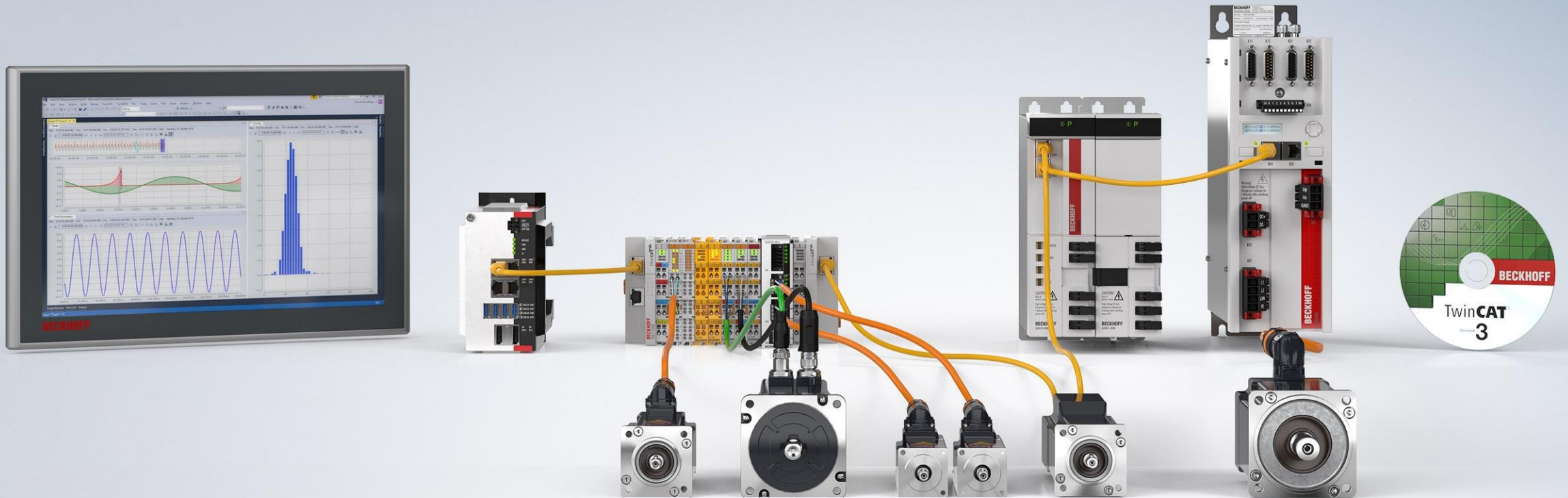
- **EL9160:** 120...230 V AC/DC, with diagnostics
- **EL9260:** 120...230 V AC/DC, without diagnostics

Available



Compact drive technology

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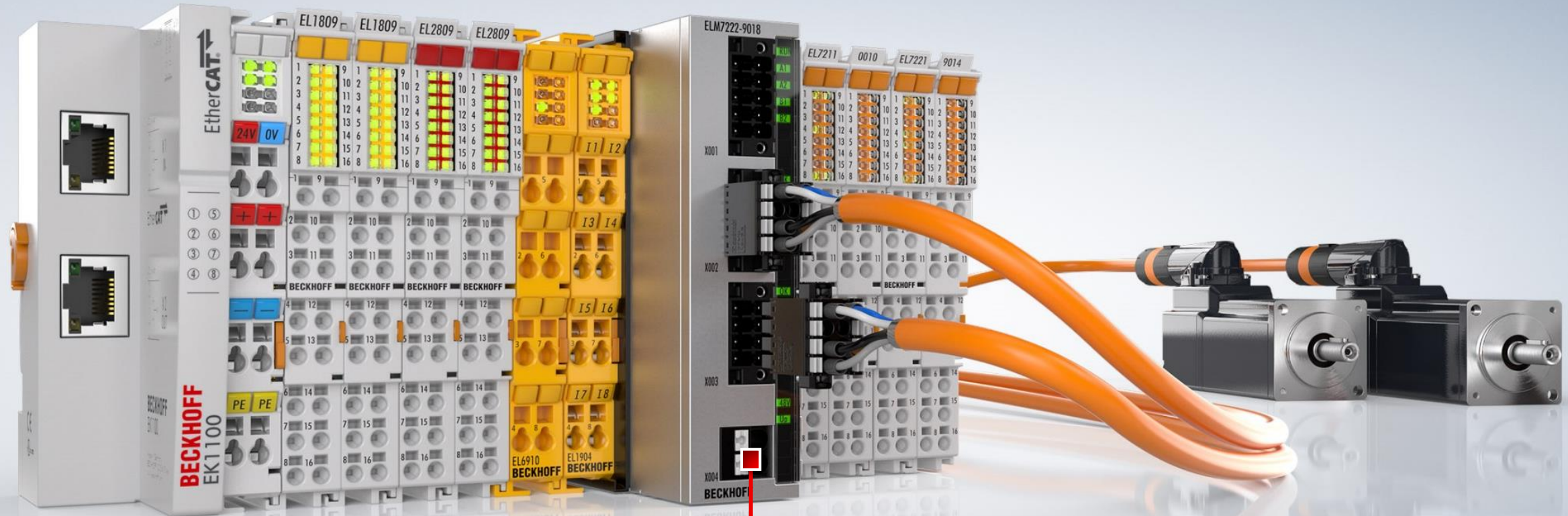


2-channel servo terminal



1-channel servo terminal





DC link connector

Technical highlights

- 1-axis module up to 16 A (I_{rms})
- 2-axis module up to 2 x 8 A (I_{rms})
- integrated chopper function, direct connection of a braking resistor (no additional EL9576 required)
- connection of motor, feedback and brake
- OCT (One Cable Technology)
- motor connection and I/O connection pluggable
- STO/SS1 via FSoE including integrated TwinSAFE Logic
- **Safe Motion** as option
 - STO, SS1, SS2, SOS, SLS, SSM, SSR, SMS, SLP, SCA, SLI, SAR, SMA, SDIp, SDIn
- reduction of the channel price for double axis modules



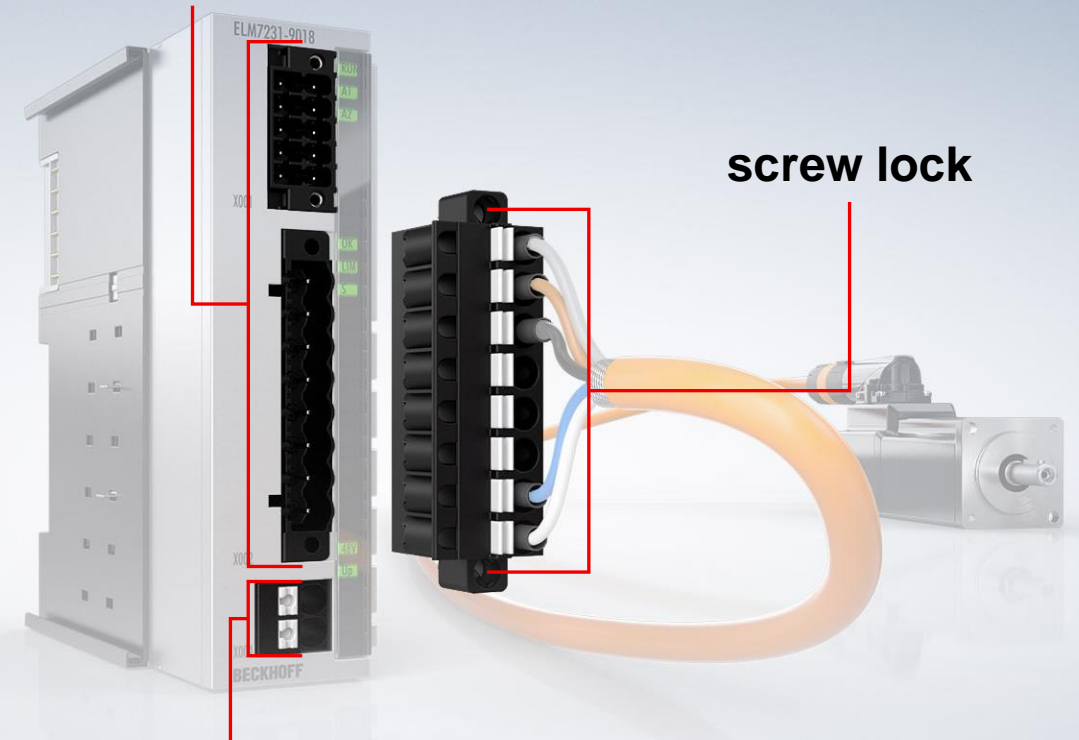
Metal housing

- optimal heat dissipation
- good shielding against electrical interference

Connector frontend

- I/O and motor connector
 - push-in spring connection and screw locking
- DC link connector
 - PCB terminal block with push-in spring connection

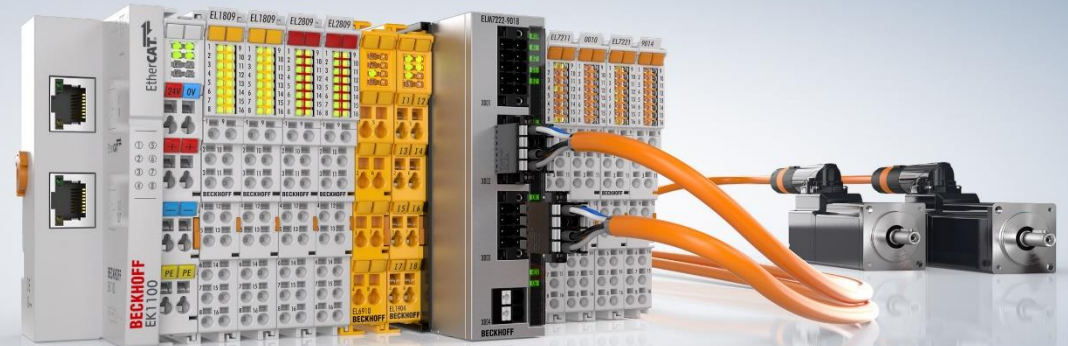
I/O and motor connector



DC link connector

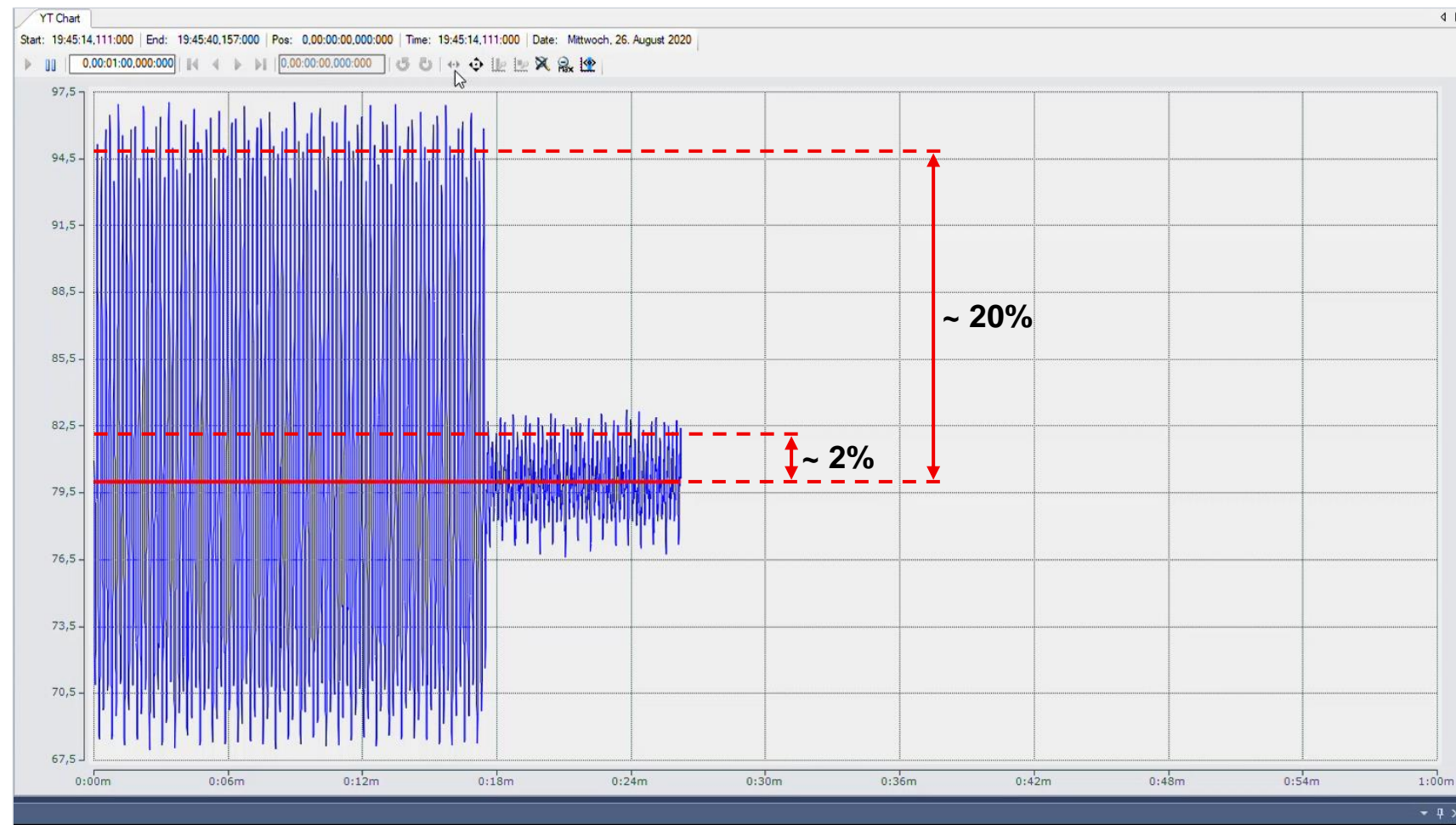
New features

- speed pre-control
- torque pre-control
- bidirectional torque limitation
- extended filter properties
 - now compatible with the functions of AX8000
- cogging compensation
 - activated by default



Cogging compensation at slow speed:

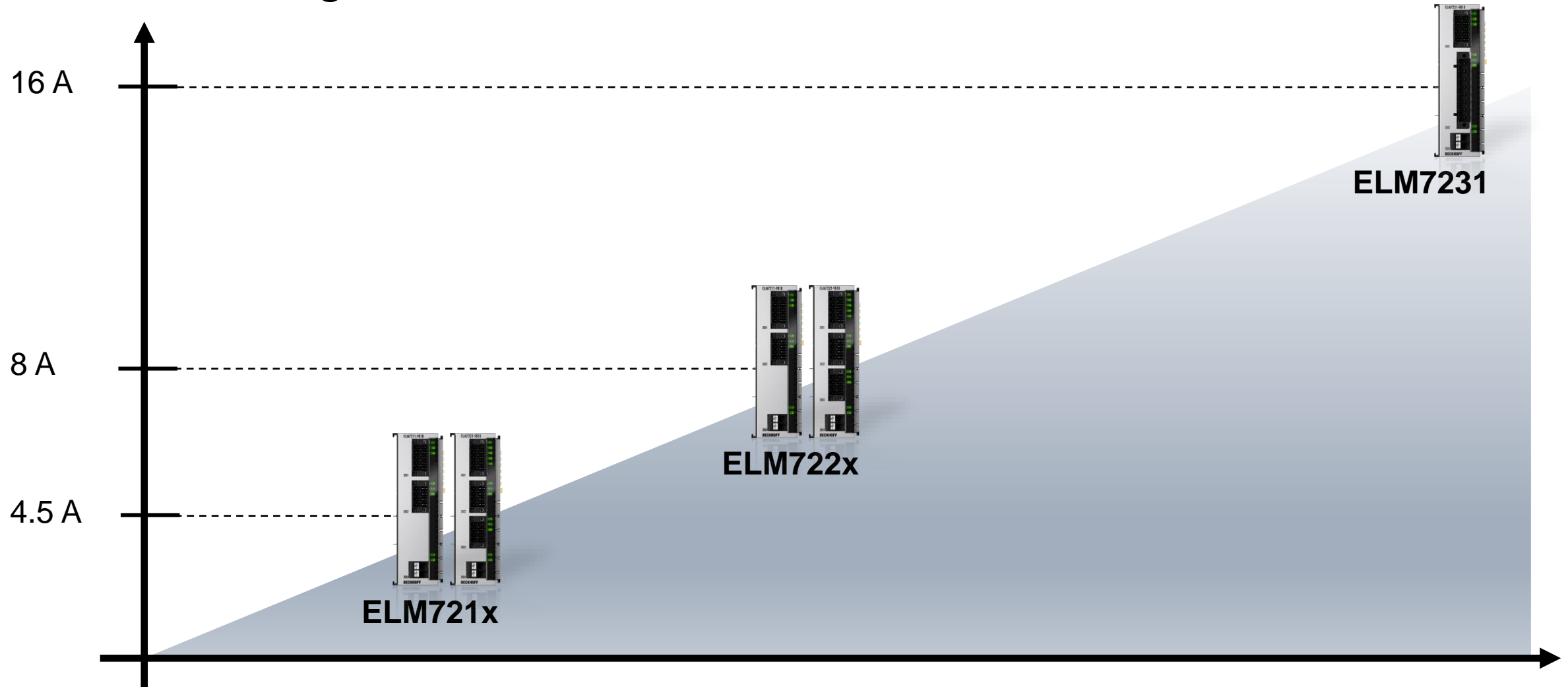
SetVelo = 80 °/s





New performance class
1 x 16 A (I_{rms})

Performance range



Compact drive technology | ELM72xx

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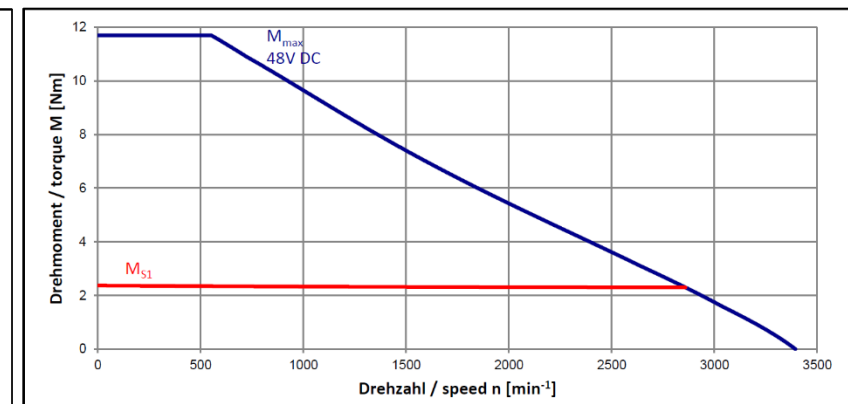
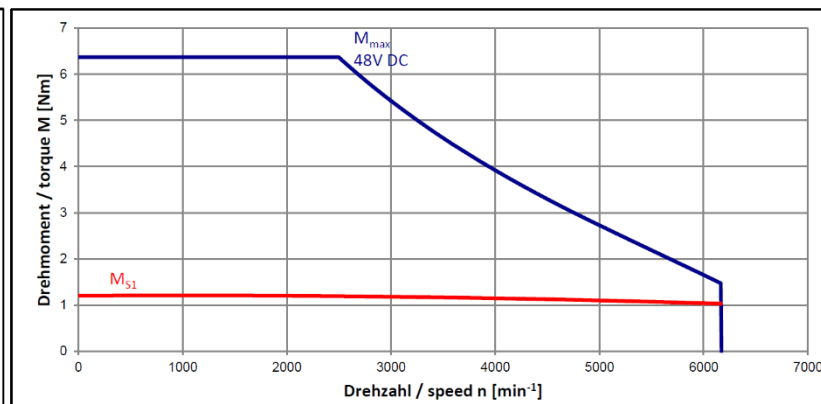
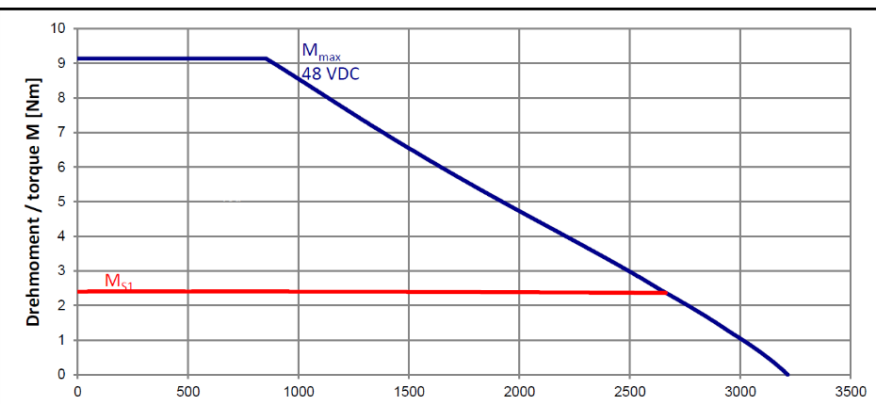
Terminal	Number of channels	Output current per channel	Peak current per channel	Safety (integrated logic)
ELM7211-9016	1	4.5 A _{rms}	9 A _{rms}	STO (FSoE)
ELM7212-9016	2	4.5 A _{rms}	9 A _{rms}	STO (FSoE)
ELM7221-9016	1	8 A _{rms}	16 A _{rms}	STO (FSoE)
ELM7222-9016	2	8 A _{rms}	16 A _{rms}	STO (FSoE)
ELM7231-9016	1	16 A _{rms}	32 A _{rms}	STO (FSoE)
ELM7211-9018	1	4.5 A _{rms}	9 A _{rms}	Safe Motion
ELM7212-9018	2	4.5 A _{rms}	9 A _{rms}	Safe Motion
ELM7221-9018	1	8 A _{rms}	16 A _{rms}	Safe Motion
ELM7222-9018	2	8 A _{rms}	16 A _{rms}	Safe Motion
ELM7231-9018	1	16 A _{rms}	32 A _{rms}	Safe Motion

→ **Safe Motion** as an option*

* STO, SS1, SS2, SOS, SLS, SSM, SSR, SMS, SLP, SCA, SLI, SAR, SMA, SDIp, SDIn

Motor for ELM7231	Rated torque	Rated speed	Rated power	Rated current
AM8122-wNyz-0000	0.7 Nm	8000 min ⁻¹	586 W	12.5 A
AM8123-wNyz-0000	1.1 Nm	5000 min ⁻¹	576 W	14.6 A
AM8142-wNyz-0000	3.9 Nm	1500 min ⁻¹	613 W	14.6 A
AM8141-wNyz-0000	2.37 Nm	2500 min ⁻¹	620 W	15.2 A
AM8133-wNyz-1001	2.96 Nm	2000 min ⁻¹	620 W	13.5 A
AM8132-wNyz-0000	2.3 Nm	2500 min ⁻¹	602 W	14.8 A
AM8131-wNyz-0000	1.28 Nm	4000 min ⁻¹	536 W	14.9 A

Characteristic curves



Motor cables for the ELM7231

- motor cable
 - for AM81xx (OCT) and ELM7231
- M23-speedtec[®] plug 9-pole (motor side), other side flying leads
- ((4 x 2.5 mm²) + (2 x 1.0 mm²) + (2 x AWG22)), shielded
- for fixed installation
 - ZK4704-0404-20x0
- or highly flexible for use with drag chains
 - ZK4704-0424-20x0
- UL/CSA approved

Description

ZK4704-0404-2010

ZK4704-0404-2030

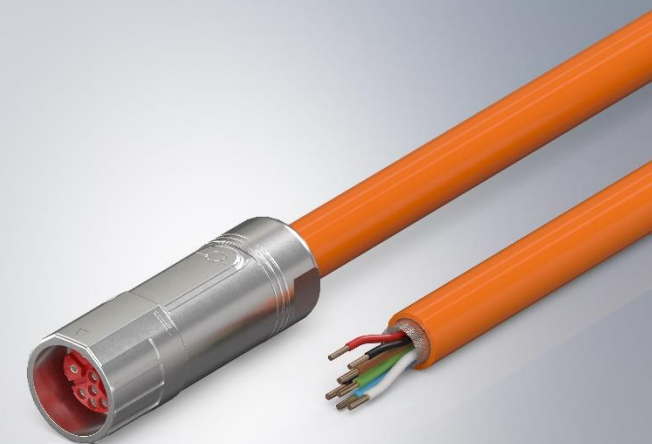
ZK4704-0404-2050

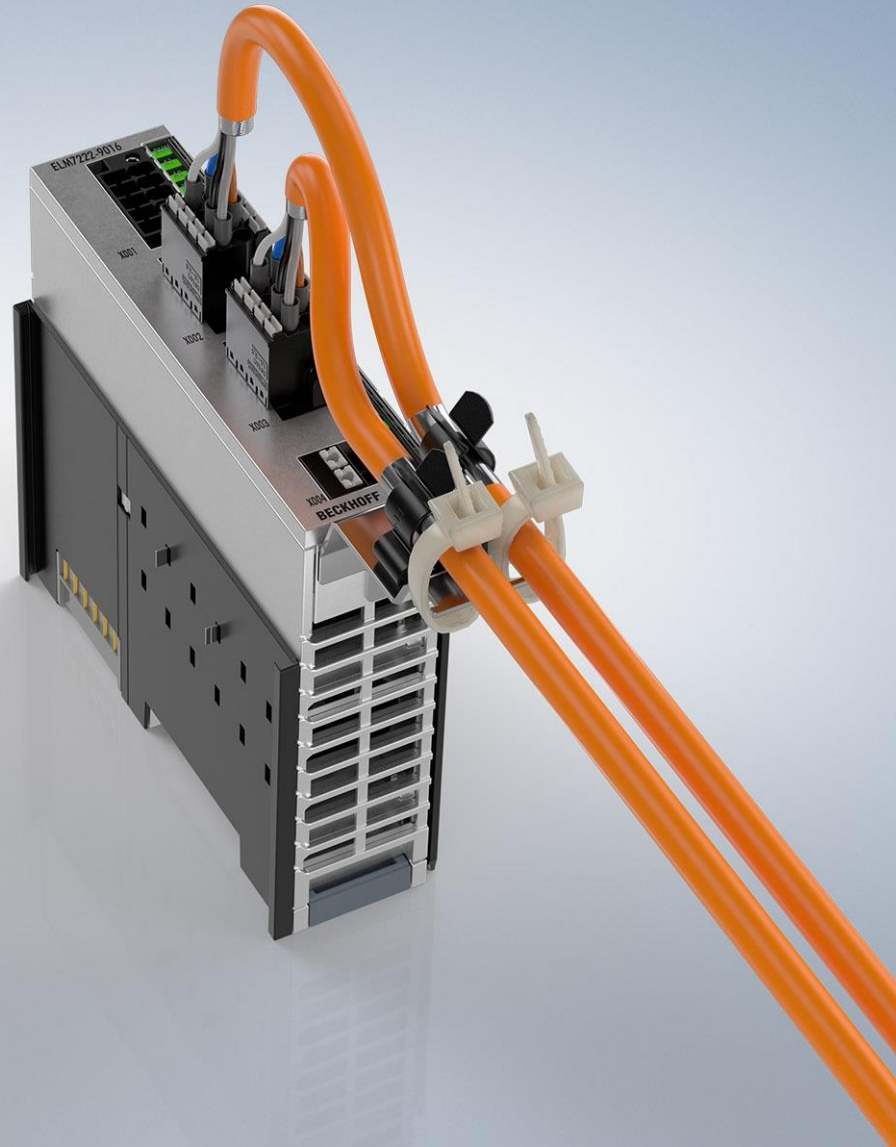
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ZK4704-0424-2010

ZK4704-0404-2010





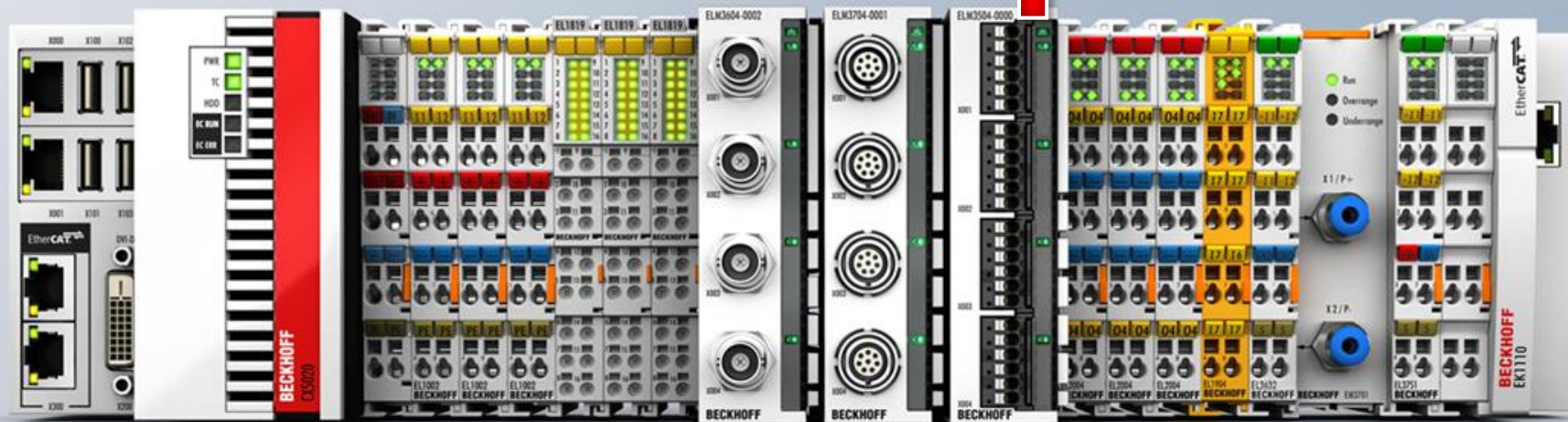
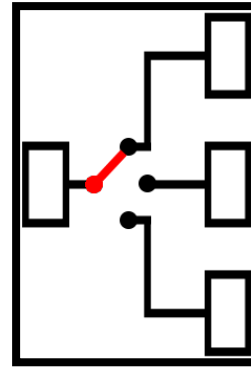
High-end measurement technology

BECKHOFF



Multiplexing

A new function in the EtherCAT Terminal system

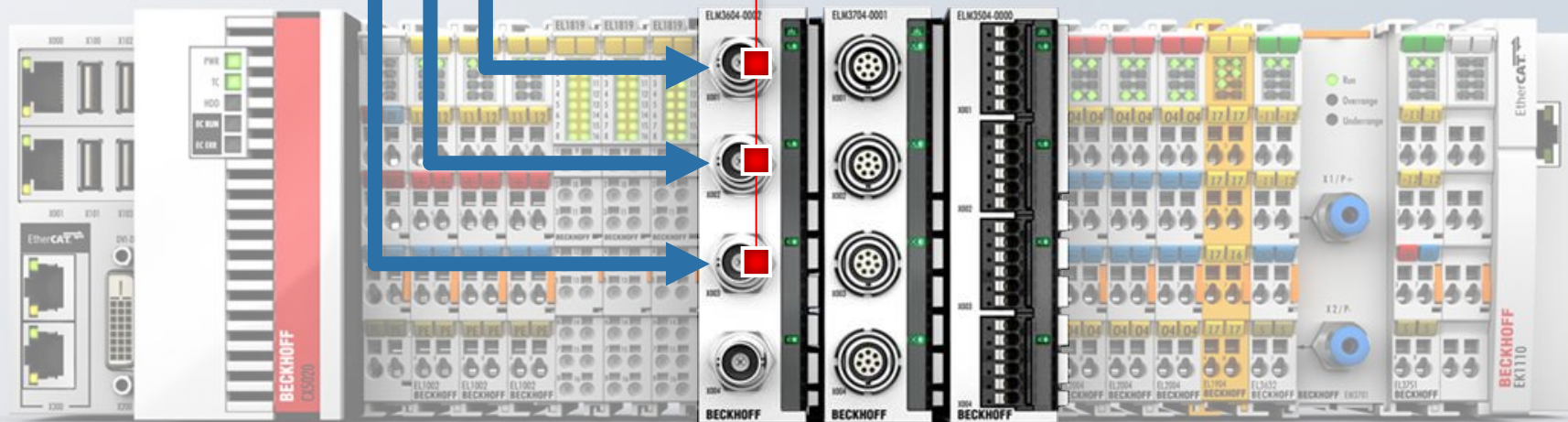




Direct sensor connection

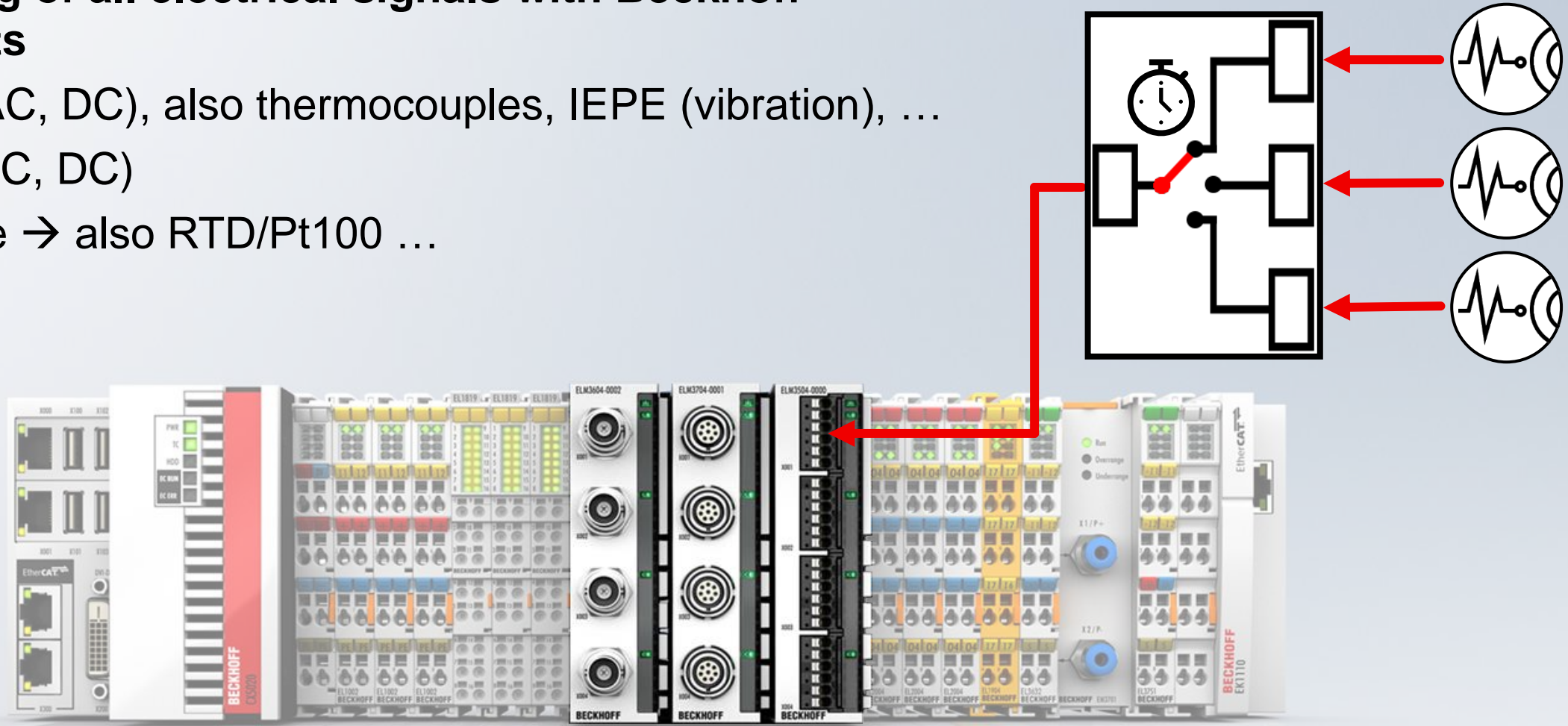
Best solution if:

- simultaneous sampling required
- continuous sampling required

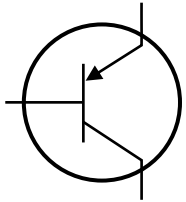


Multiplexing of all electrical signals with Beckhoff components

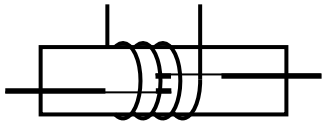
- voltage (AC, DC), also thermocouples, IEPE (vibration), ...
- current (AC, DC)
- resistance → also RTD/Pt100 ...



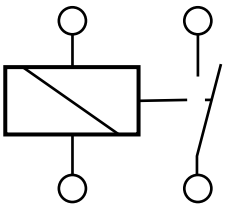
Available technologies



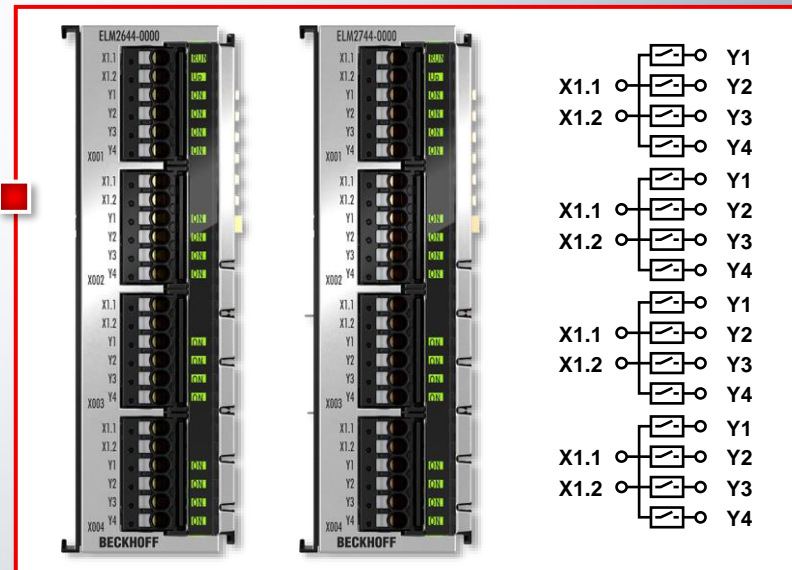
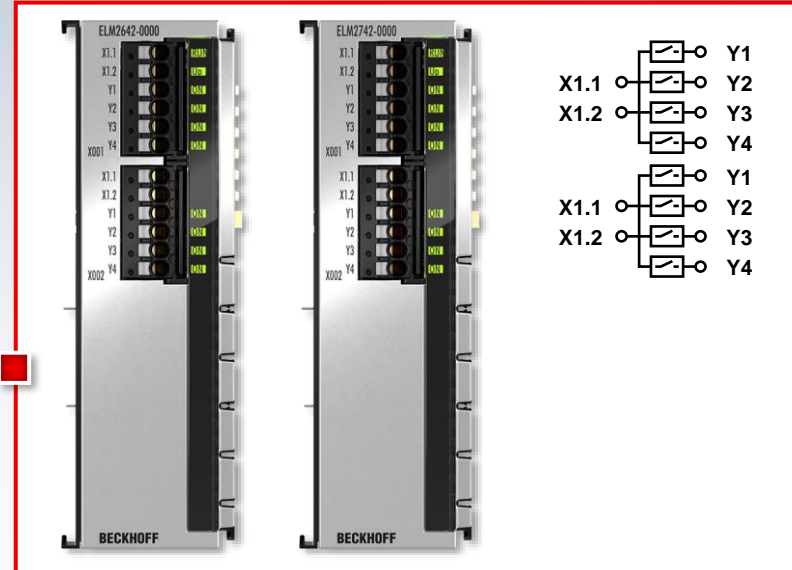
solid-state/FET/
semiconductor



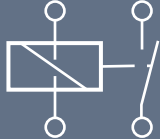


reed relay



EMR (electro-
magnetic relay)



Solid-state/FET/ semiconductor 	Reed relay 	EMR (electro-magnetic relay) 
<ul style="list-style-type: none"> ▪ high quality solid-state switches with lowest leakage current ▪ for frequent switching, but not 100% separating ▪ higher price per channel than EL27xx, approx. by factor 2 ▪ 48 V AC/DC, 1 A, potential-free <p>→ ELM2742, ELM2744</p>	<ul style="list-style-type: none"> ▪ for small analog signals: ▪ low deviation, low variability, no leakage current, high temperature stability ▪ not as overload-capable as normal relays (EMR = EL26xx) ▪ 48 V AC/DC, 0.5 A, potential-free <p>→ EL2642, ELM2642, ELM2644</p>	<p>standard for normal currents 1...20 A</p> <p>→ EL26xx</p>

High-end measurement technology | More options with multiplexing

BECKHOFF

Family	EL26xx	ELM/EL264x	ELM27xx	ELM274x
Technology	relay EMR	reed relay	solid-state/FET	
Advantage	robust	long-time stable	wear-free	wear-free, low leakage current
Disadvantage		not overloadable	temperature-sensitive, leakage current ~ μ A	temperature-sensitive
Target operation	standard switching up to 2 A, occasional switching	precision multiplex for the mV/ μ V ranges	standard switching up to 2 A, frequent switching	fast multiplex scanning
Relative price/point approx	100%	150%	75%	150%
Density*	2-channel: 0.17/mm	4-channel: 0.53/mm	2-channel: 0.17/mm	4-channel: 0.53/mm

Ideal for switching jobs with high channel counts at a low channel price.

*the higher the better

High-end measurement technology | More options with multiplexing

BECKHOFF

EMR/Reed	Details	In	Out	Channels	SP*	Rel. SP price	Pole/mm
ELM2642-0000	2 x 1*4 mux reed 48 V AC/DC, 0.5A	1	4	2	8	174%	0.27
EL2642	2 x 1*4 mux reed 48 V AC/DC, 0.5 A	1	4	2	8	110%	0.67
ELM2644-0000	4 x 1*4 mux reed 48 V AC/DC, 0.5 A	1	4	4	16	106%	0.53
EL2612	2 x relay 125 V AC/30 V DC, 2 A DC	1	1	2	2	100%	0.17
EL2624	4 x relay 125 V AC/30 V DC, 2 A DC	1	1	4	4	50%	0.33
Solid-state	Details	In	Out	Channels	SP*	Rel. SP price	Pole/mm
ELM2742-0000	2 x 1*4 mux solid-state 48 V AC/DC, 1 A	1	4	2	8	247%	0.27
ELM2744-0000	4 x 1*4 mux solid-state 48 V AC/DC, 1 A	1	4	4	16	156%	0.53
EL2794	4 x solid-state 30 V AC/DC, 2 A	1	1	4	4	100%	0.33
EL2798	8 x solid-state 30 V AC/DC, 2 A	1	1	8	8	86%	0.67
EL2808	8 x 24 V output, 0.5 A	1	1	8	8	47%	0.67

High pole density, and price per switching point on **automation level**

*Switching points



Multiplexing is to measure channels sequentially.

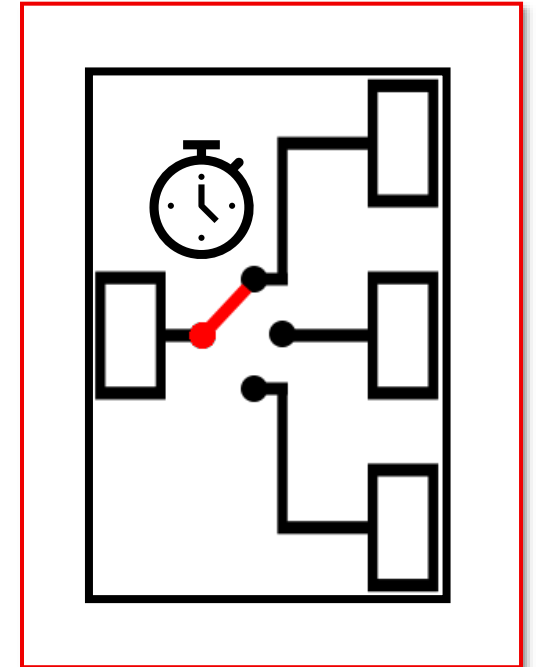


Please consider:

- Channel switching takes time [ms, sec].
- Waiting for a tuned signal may be necessary.
- Additional (minimal) contact resistances may have a negative effect.



With the new multiplexing concept, Beckhoff can now also compete in slow applications with high channel counts, such as air condition monitoring in buildings.

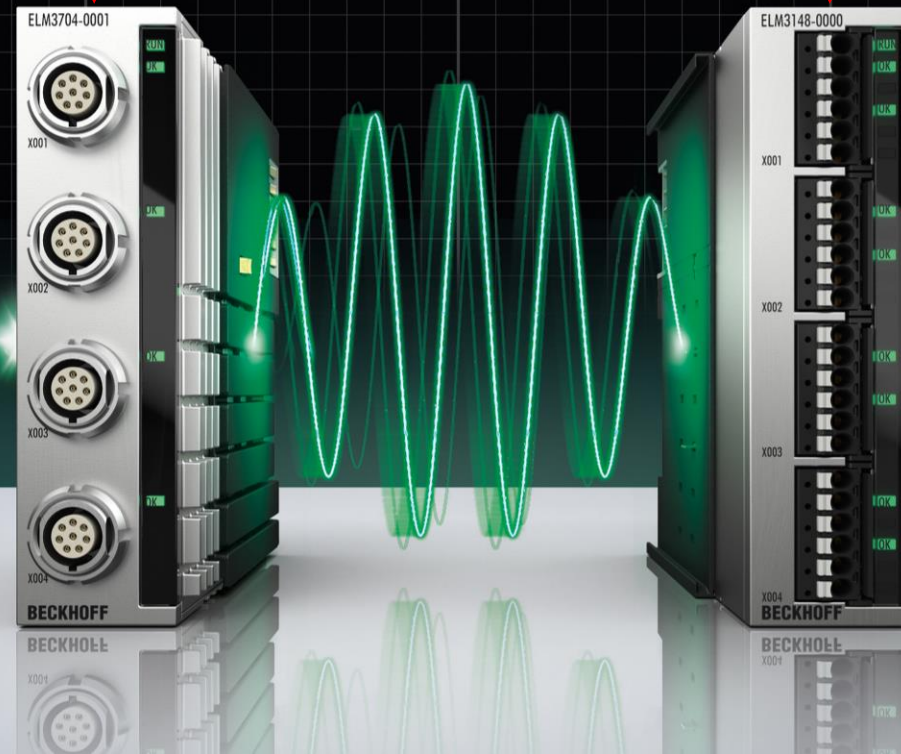


Basic Line

24 bit
10 ksp/s per channel
simultaneous
100 ppm @ 23 °C

Economy Line

24 bit
1 ksp/s per channel
multiplexed
100 ppm @ 0...50 °C



High-end measurement technology | An overview

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Analog inputs	Features	Terminal	Connector	U	IEPE	I	TC	RTD	R	DMS 1/1	DMS 1/2	DMS 1/4	Poti
Basic Line ELM3x0x	10...50 ksps per channel, simultaneous	ELM3002/4-0000	Push-in	X									
		ELM3102/4-0000	Push-in			X							
		ELM3502/4-0000	Push-in	X				X		X	X	X	X
		ELM3602/4-0000 ELM3602/4-0002	Push-in BNC	X	X								
		ELM3702/4-0000 ELM3704-0001	Push-in LEMO 8-pin	X		X	X	X	X	X	X	X	X
		ELM3702-0101 NEW ELM3704-1001 NEW	LEMO 8-pin Push-in	X	X	X	X	X	X	X	X	X	X
Economy Line ELM3x4x	1 ksps per channel, multiplexed	ELM3142/4/6/8-0000	Push-in	X		X							
		ELM3344/8-0000 ELM3344/8-0003	Push-in TC Mini	X			X						
		ELM3542/4-0000	Push-in							X	X	X	

±20 mV ... ± 60 V

± 20 mA

5 kΩ

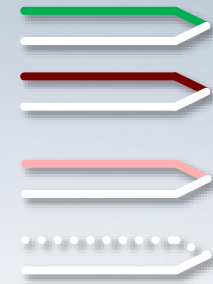
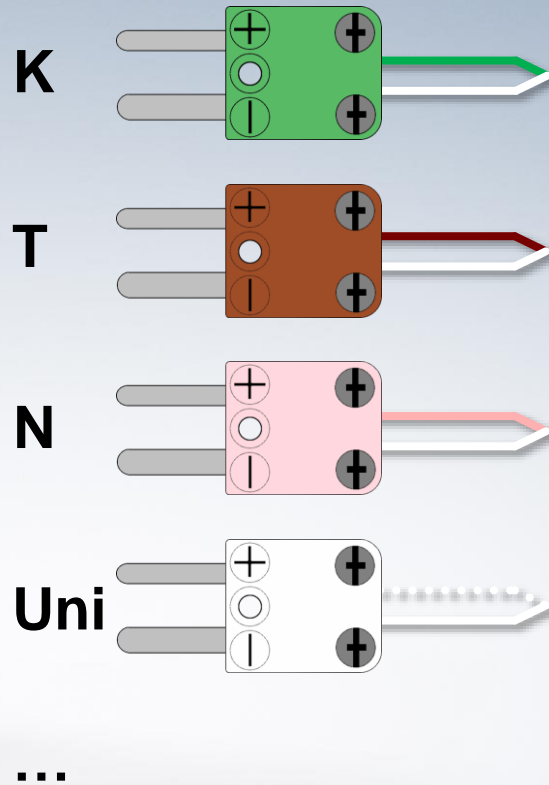
120/350 Ω

120/350 Ω, 1 kΩ

High-end measurement technology | An overview

BECKHOFF

Analog switch	Features	EMR (standard relay)	Reed (switch in vacuum)	Solid-state (FET)
EL2xxx	standard switch	EL26xx		EL27xx
ELM2xxx	designed for “small” analog signals		ELM264x	ELM274x
System	Features	EtherCAT coupler	Power supply	
	<ul style="list-style-type: none">▪ electrically isolated, filtered 24 V supply▪ ambient monitoring	EKM1101	ELM9410	

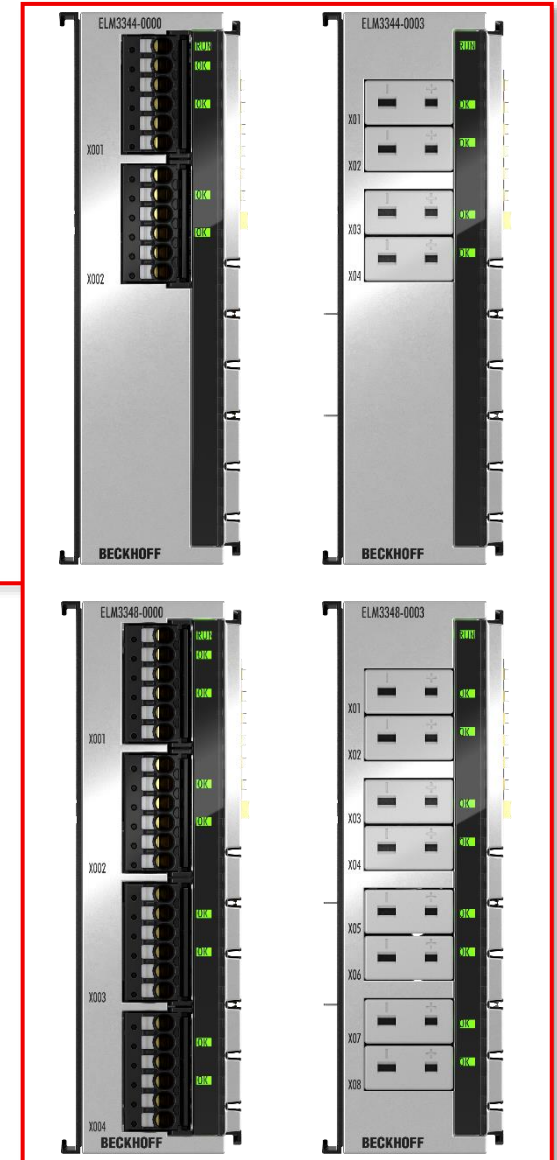


First thermocouple terminals in ELM3xxx → all types possible, with and without special plug

ELM334x | High-accuracy thermocouple measurement with ELM3xxx

BECKHOFF

- temperature measurement only with well-known ELM features: filter, diagnostics, temperature stability, ...
- 4- and 8-channel versions
- connector: push-in and Mini TC version
 - push-in: standard industrial wiring, quick installation
 - Mini TC: common use in labs and test bench, highest accuracy
- all cold-junction options possible
 - internal (easy way)
 - external by separate temp. channel
 - fixed

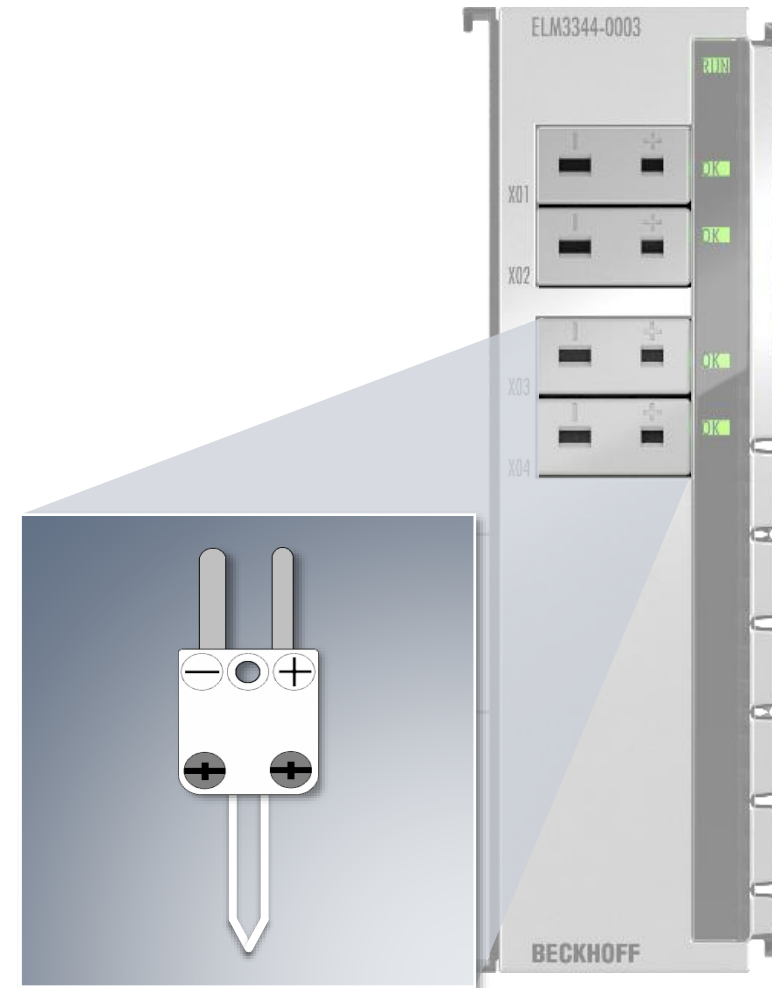


ELM334x | High-accuracy thermocouple measurement with ELM3xxx

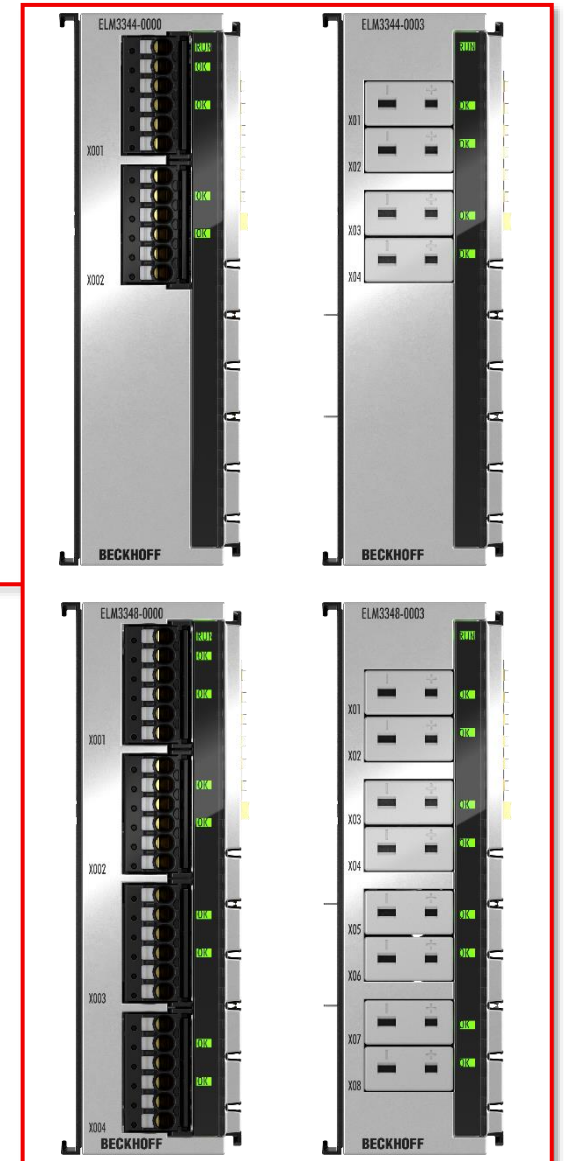
Mini thermocouple plug

BECKHOFF

- available in different material types for type B, C, ..., K, ...
- Color shows the type: green, violet, etc.
- universal “copper-based” type available
- mostly used: white/universal and green/type K
- Universal type (white) in ELM334x-0003 can be used for all types with reduced uncertainty.
- Special colored types available for bigger projects on request.



- part of the Economy line:
 - 1 ksps per channel
 - multiplexed sampling
 - outstanding temperature stability < 15 mK/K
- resolutions of up to 0.001°C
- continuous common voltage measuring to detect wiring errors
- nearly all commonly used thermocouple types supported: A1...U



ELM3704-1001 | 4-channel analog input, multi-functional with thermocouple adjustment, 24 bit, 10 ksps

BECKHOFF

- for high-accuracy thermocouple measurements: ELM370x with 10 kSps per channel
- ELM3704-1001 corresponds to ELM3704-0000
 - only adjusted with respect to the thermocouple measurement function
- all other measuring ranges from the ELM3704-0000 are available

NEW



ELM3702-0101 | 2-channel multi-functional input, 24 bit, 10 ksps, galvanic isolation, LEMO

BECKHOFF

- based on ELM3702-0000

Extension

- channel-to-channel isolation for 50 V usage (500 V by design)
- 2-wire TEDS communication for sensor data
- support of internal Pt1000 measurement for thermocouples in external cold junction mode (see webinar*)
- best choice for all high-end lab and test bench customers






NEW

* Webinar: Thermocouple measurement with Beckhoff components: precise and fast

ELM334x | High-accuracy thermocouple measurement with ELM3xxx

BECKHOFF

Accuracy range	Uncertainty	up to 100 sps 	up to 1 ksps 	up to 10 ksps 	
~ ±3...4 K	@ type K @ -100...1200 °C @ 23 °C ambient	EL3311 EL3312 EL3314 EL3318		EL310x in mV mode with external cold junction measuring	
~ ±1...2 K		EL3314-0010 EL3314-0002			
~ ±0.7 K*			ELM3344-0000 ELM3348-0000	NEW	ELM3702-0000 ELM3704-0000
~ ±0.5 K*			ELM3344-0003 ELM3348-0003	NEW	

Temperature measurement is part of nearly every machine/test bench application. The ELM series covers highest speed and accuracy requirements.

* high speed measurement: brake heat test, gear overload test, welding process monitoring (preliminary specification)

ELM334x | High-accuracy thermocouple measurement with ELM3xxx

BECKHOFF

TC overview	Terminal	Accuracy	List price	Channel price
EL, standard	EL3314	type K < ± 3.0 °C @ 23 °C and < ± 3.6 °C @ 0...55° C	100%	100%
EL, high precision	EL3314-0010	type K < ± 1.6 °C @ 23° C and < ± 2.0 °C @ 0...55 °C	122%	122%
Push-in	ELM3344-0000	type K < ± 0.7 °C @ 23 °C and < ± 1.1 °C @ 0...55 °C	172%	172%
	ELM3348-0000		269%	135%
Mini TC socket	ELM3344-0003	type K < $\pm 0,5$ °C @ 23 °C and < ± 0.9 °C @ 0...55 °C	215%	215%
	ELM3348-0003		345%	172%
Lab devices, 3rd-party devices		type K < ± 0.07 °C @ 23 °C	3200%	13,000%

- two individually parameterizable inputs
- U differential, I single-ended
- Signals can be processed in the ranges from -10/0 to +10 V DC or from -20/0/+4 to +20 mA per channel.
- input filter limit frequency 1 kHz
- measuring error $< \pm 0.3\%$ (relative to full scale value)
- U/I parameterizable, ExtendedRange, standard and compact process image, FIR/IIR filter can be activated



- four individually parameterizable inputs
- U differential, I single-ended
- Signals can be processed in the ranges from -10/0 to +10 V DC or from -20/0/+4 to +20 mA per channel.
- input filter limit frequency 1 kHz
- measuring error $< \pm 0,3\%$ (relative to full scale value)
- U/I parameterizable, ExtendedRange, standard and compact process image, FIR/IIR filter can be activated



EL3172 | 2-channel analog input, multi-function, ± 10 V, ± 20 mA, galvanically isolated, 16 bit,

BECKHOFF

NEW

- differential input, channels are galvanically isolated
- distributed clocks
- input filter limit frequency 5 kHz
- measuring error $< \pm 0.2\%$ (at $25\text{ °C} \pm 5\text{ °C}$, or else $< \pm 0.3\%$, relative to full scale value)
- U/I parameterizable, ExtendedRange, standard and compact process image, FIR/IIR filter can be activated

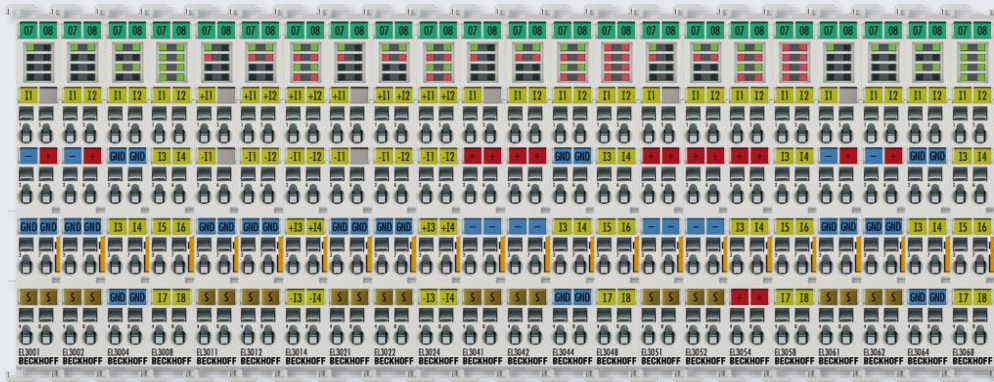


EL3072, EL3074, EL3172 | Next generation EL30xx/EL31xx terminals

BECKHOFF

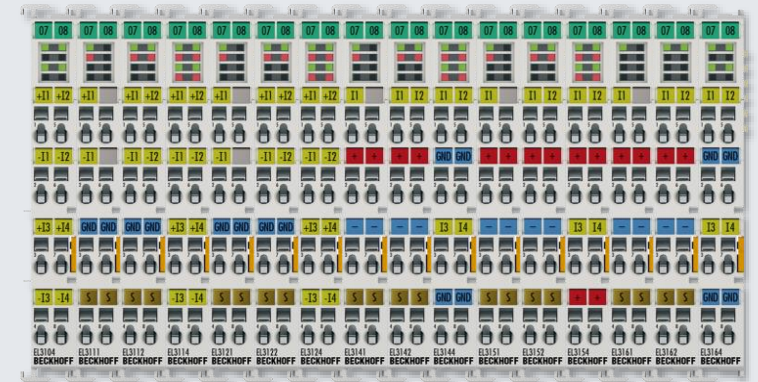
Standard analog input $\pm 10\text{ V}/\pm 20\text{ mA}/0\dots 10\text{ V}/0\dots 20\text{ mA}/4\dots 20\text{ mA}$

12-bit class: EL30xx



open hardware filter for rapidly changing signals

16-bit class: EL31xx



2nd generation: multi-functional terminals



NEW

EL3072



NEW

EL3074

- 107% ExtendedRange
- for universal use with 10 V/20 mA
- reduced list prices per channel



NEW

EL3172

Bonus:
 $\pm 25\text{ mA}$
50 V isolated channels







EL3174

EL3072, EL3074, EL3172 | Next generation EL30xx/EL31xx terminals

BECKHOFF

Standard analog input $\pm 10\text{ V}/\pm 20\text{ mA}/0\dots 10\text{ V}/0\dots 20\text{ mA}/4\dots 20\text{ mA}$

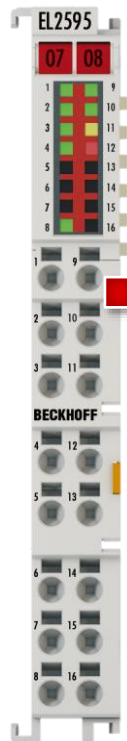
12-bit class: EL30xx			16-bit class: EL31xx		
	EL302x	EL304x	open hardware filter for rapidly changing signals	EL312x	EL314x
List price	100%  -11%	100%  -14%		100%  -8%	100%  -17%
2 nd generation: multi-functional terminals					
	EL3072	EL3074	<ul style="list-style-type: none"> 107% ExtendedRange for universal use with 10 V/20 mA reduced list prices per channel 	EL3172	EL3174
List price	89%	86%		92%	83%

EtherCAT LED strobe control terminals

BECKHOFF



1st generation



EL2595

2013



2nd generation



EL2596

2020



EL2596-0010

2021

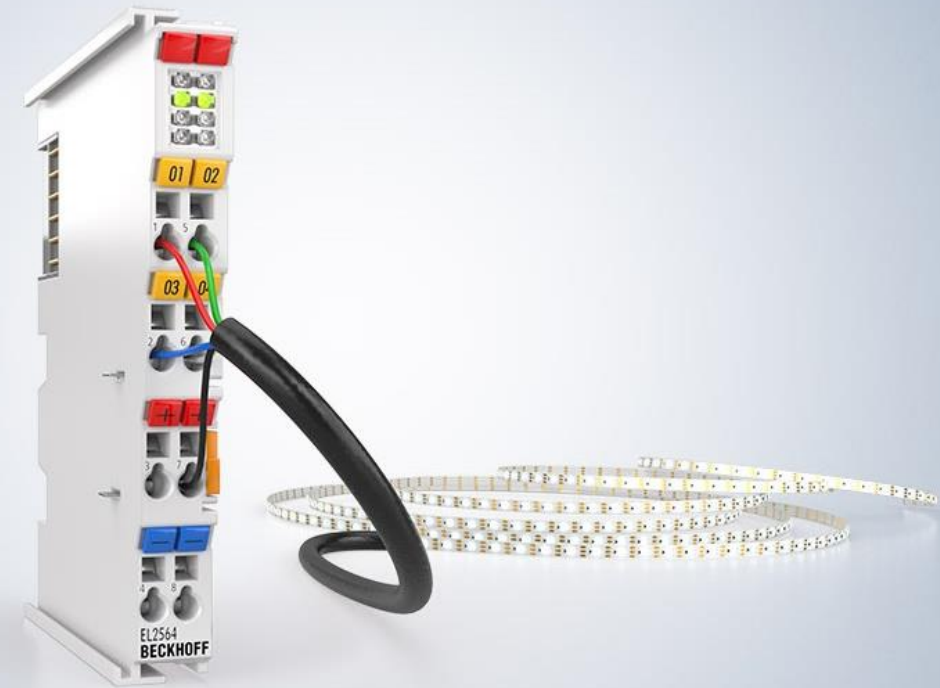


EtherCAT LED strobe control terminals Comparison

BECKHOFF

	EL2595 1 st generation	EL2596, EL2596-0010 2 nd generation
Number of channels	1	1
Supply voltage U_{in}	24 V DC (-15%/+20%)	24 V DC/48 V DC(-15%/+20%)
Supply via power contacts	yes	no
Output voltage U_{out}	2...48 V DC	0... U_{in} depending on the operating mode
Output current I_{out}	50...700 mA	0...1.2 A* 0...3 A** * permanent light, ** pulse mode
Current control accuracy	±20 mA	±3 mA
Pulse duration	200 μs...∞ s	25 μs...10 s
Trigger input	yes	yes
Trigger output	no	yes
Operation of multi-color LEDs	no	yes
Distributed clocks	yes	yes
Operating modes	–	8

- 4-channel PWM output
 - flexible voltage: 5...48 V DC
 - output current: 4 A per channel
- for general/simple lighting tasks without high demands regarding precise control
- adjustable parameters
- duty cycle per channel, total brightness over all channels, frequency, output scaling



EtherCAT LED strobe control terminals

Summary

BECKHOFF

Vision



EL2595

1-channel LED output,
48 V DC, 0.7 A
(1st generation)



EL2596

1-channel LED output,
24 V DC, 3 A
(2nd generation)



EL2596-0010

1-channel LED output,
48 V DC, 3 A
(2nd generation)

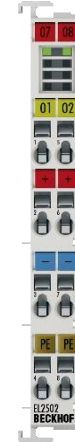


General lighting



EL2564

4-channel LED output,
5...48 V DC, 4 A, RGBW

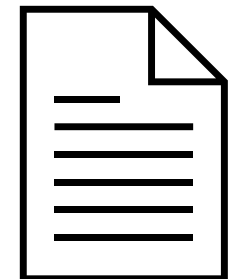


EL2xxx

digital output

EL6xxx

communication



application note

Maintenance

Power Measurement

Power Monitoring



Speed + Precision

EL3443-0020 | 3-channel analog input, power measurement, 480 V, 1 A AC/DC, 24 bit, factory calibrated

BECKHOFF

- 3-phase power measurement terminal with extended functionality
- standard version
- measured values: current, voltage; effective, reactive and apparent power; active, reactive and apparent energy, $\cos \varphi$, frequency, THD, harmonic (up to the 40th harmonic)
- factory calibration certificate



Factory calibrated



EL3453-0020 | 3-channel analog input, power measurement, 690 V, 0.1/1/5 A AC, 24 bit, electrically isolated, factory calibrated

BECKHOFF

- 3-phase power measurement terminal for up to 690 V AC with extended functionality
- high-feature version
- measured values: current, voltage; effective, reactive and apparent power; active, reactive and apparent energy, $\cos \varphi$, frequency, THD, harmonic (up to the 63rd harmonic)
- factory calibration certificate



Factory calibrated



EL3453-0100 | 3-channel analog input, power measurement, 130 V, 0.1/1/5 A AC, 24 bit, electrically isolated

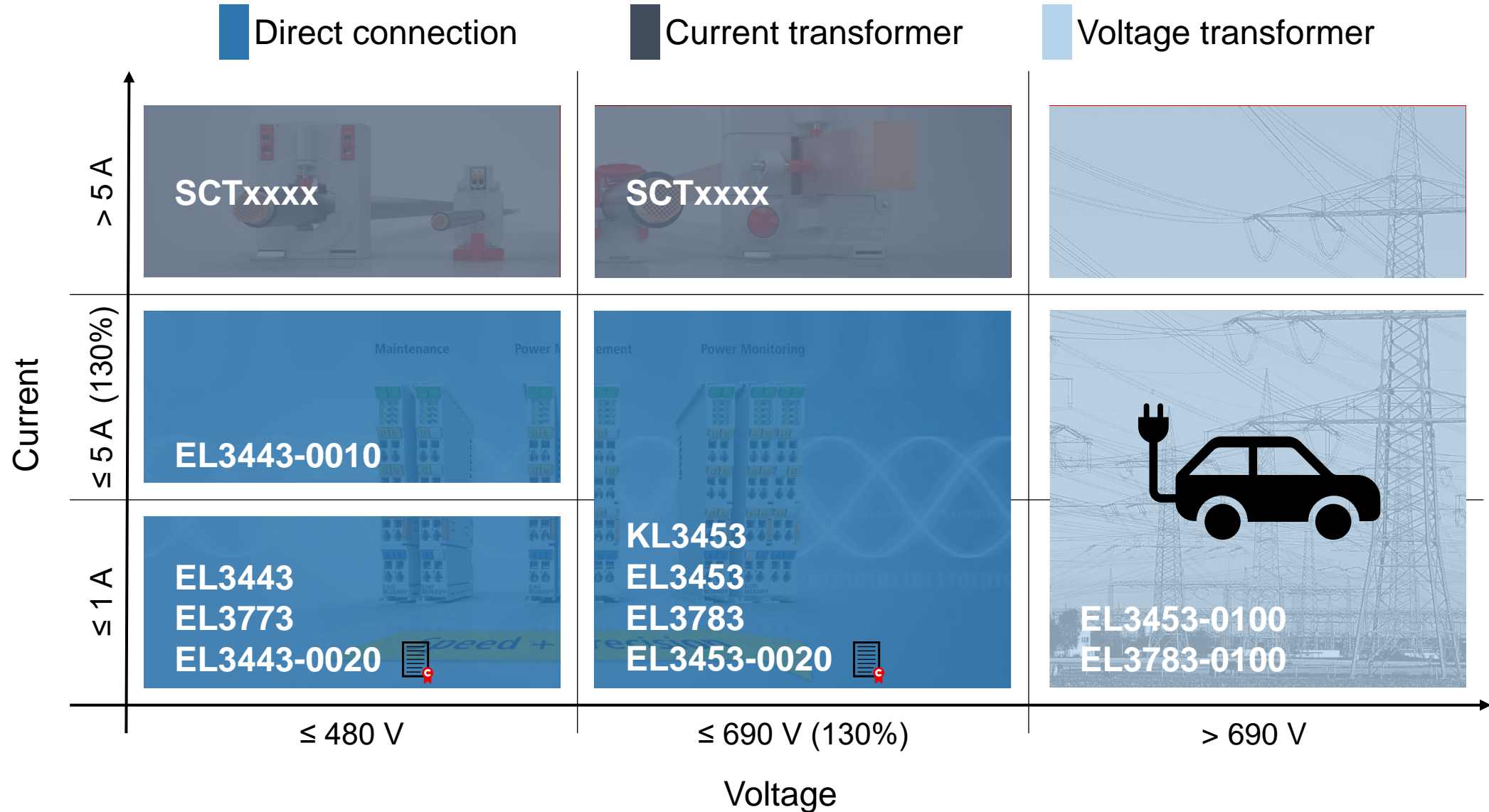
BECKHOFF

- 3-phase power measurement terminal for up to 690 V AC with extended functionality
- high-feature version
- measured values: current, voltage; effective, reactive and apparent power; active, reactive and apparent energy; $\cos \varphi$, frequency, THD, harmonic (up to the 63rd harmonic)



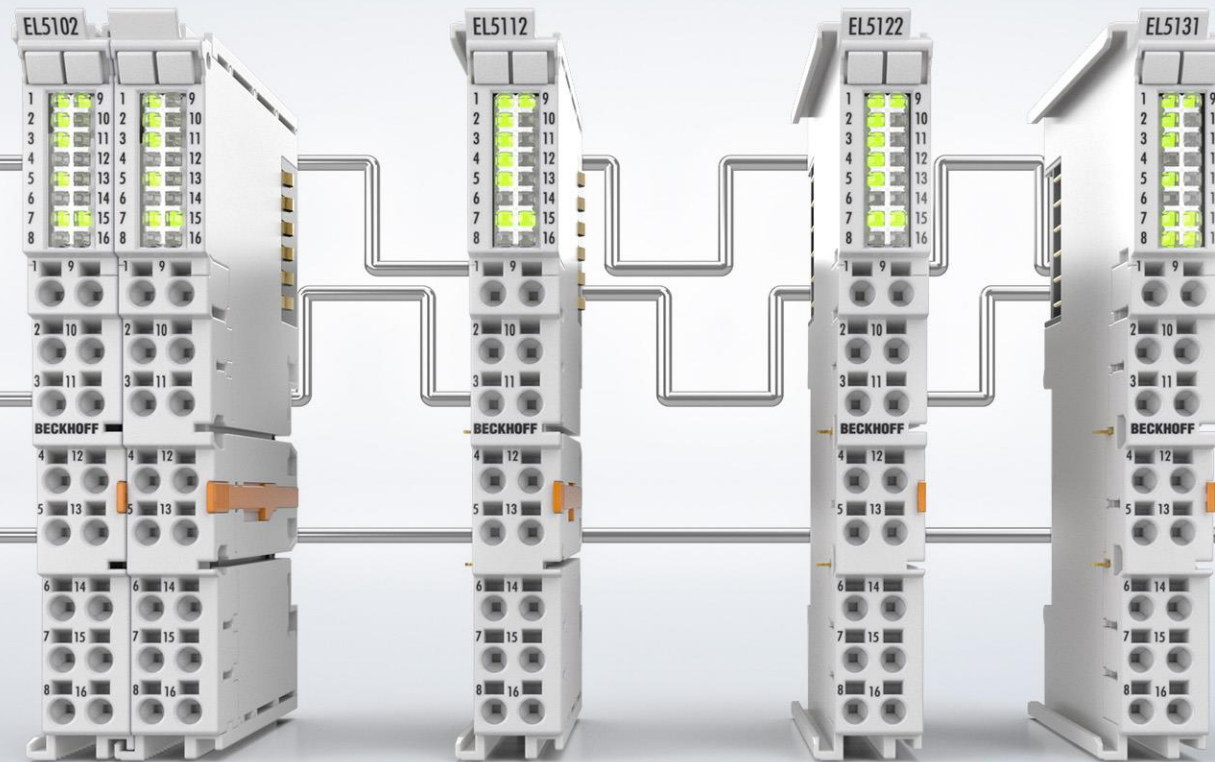
Power measurement terminal | Current and voltage range

BECKHOFF



EL51xx | 5 V incremental encoder terminals

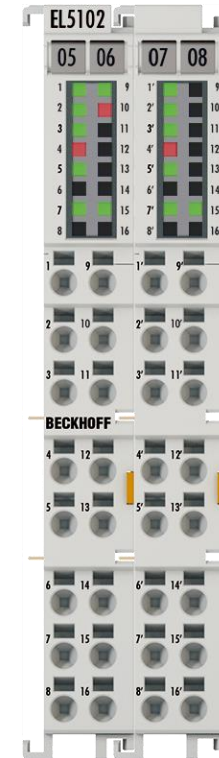
BECKHOFF



EL5102 | 2-channel incremental encoder interface, 5 V (RS422, TTL, Open Collector)

BECKHOFF

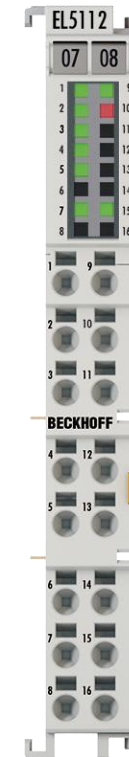
- direct connection of two incremental encoders with differential inputs (RS422) or single-ended inputs (TTL, Open Collector), parameterizable per channel
- additional inputs: latch, gate/latch (24 V DC, $T_{ON} > 1 \mu s$) per channel for counter lock/preset/store/reset
- compact form factor, 24 mm HD housing
- open-circuit recognition, measurement of period duration, frequency, speed and duty cycles, micro increments, timestamp, ...
- time measurement with 10 ns resolution
- distributed clocks



EL5112 | 2-channel incremental encoder interface, 5 V (2 x AB or 1 x ABC RS422, TTL)

BECKHOFF

- direct connection of two incremental encoders with A and B tracks or one encoder with A, B and C tracks
- differential signals (RS422) or single-ended signals (TTL, Open Collector)
- additional inputs: latch, gate/latch (24 V DC, $T_{ON} > 1 \mu s$) for counter lock/preset/store/reset
- open-circuit recognition, measurement of period duration, frequency, speed and duty cycle, microincrements, timestamp, ...
- time measurement with 10 ns resolution
- distributed clocks



EL5122 | 2-channel incremental encoder interface, 5 V single-ended (TTL, Open Collector)

BECKHOFF

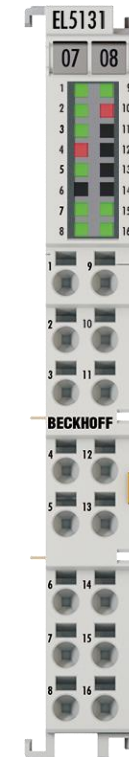
- direct connection of two incremental encoders with A and B tracks
- single-ended signals (TTL, Open Collector)
- for simple positioning and counting tasks
- additional inputs: gate/latch (24 V DC, $T_{ON} > 1 \mu s$) per channel for counter lock/preset/store/reset
- period duration, frequency and speed measurement
- distributed clocks



EL5131 | 1-channel incremental encoder interface, 5 V with two parameterizable 24 V DC outputs

BECKHOFF

- direct connection of incremental encoders with differential inputs (RS422) or single-ended inputs (TTL, Open Collector)
- Two parameterizable 24 V DC push-pull, tristate outputs are available for fast output switching ($< 10 \mu\text{s}$) at threshold values.
- open-circuit recognition, period duration, frequency, speed and duty cycle measurement, microincrements, timestamp, ...
- time measurement with 10 ns resolution
- distributed clocks



Density

- fine scaling to the required channel density and range of functions
- 50% space savings with EL5102, EL5112
- 75% space savings with EL5112, EL5122, EL5131

Cost savings

- 35% for 2 x ABC RS422 encoders with EL5102
- 58% for counting tasks with TTL/Open Collector encoders with EL5122

Function variety

- many new functions: counter limits, counter (reverse) direction detection, duty cycle measurement, filter, timestamp

Performance

- up to 5 MHz counter frequency with RS422 encoders
- 10 ns resolution for internal time measurement
- fast switching ($< 10 \mu\text{s}$) at threshold values with EL5131

EL51xx | Evaluation of incremental signals

BECKHOFF

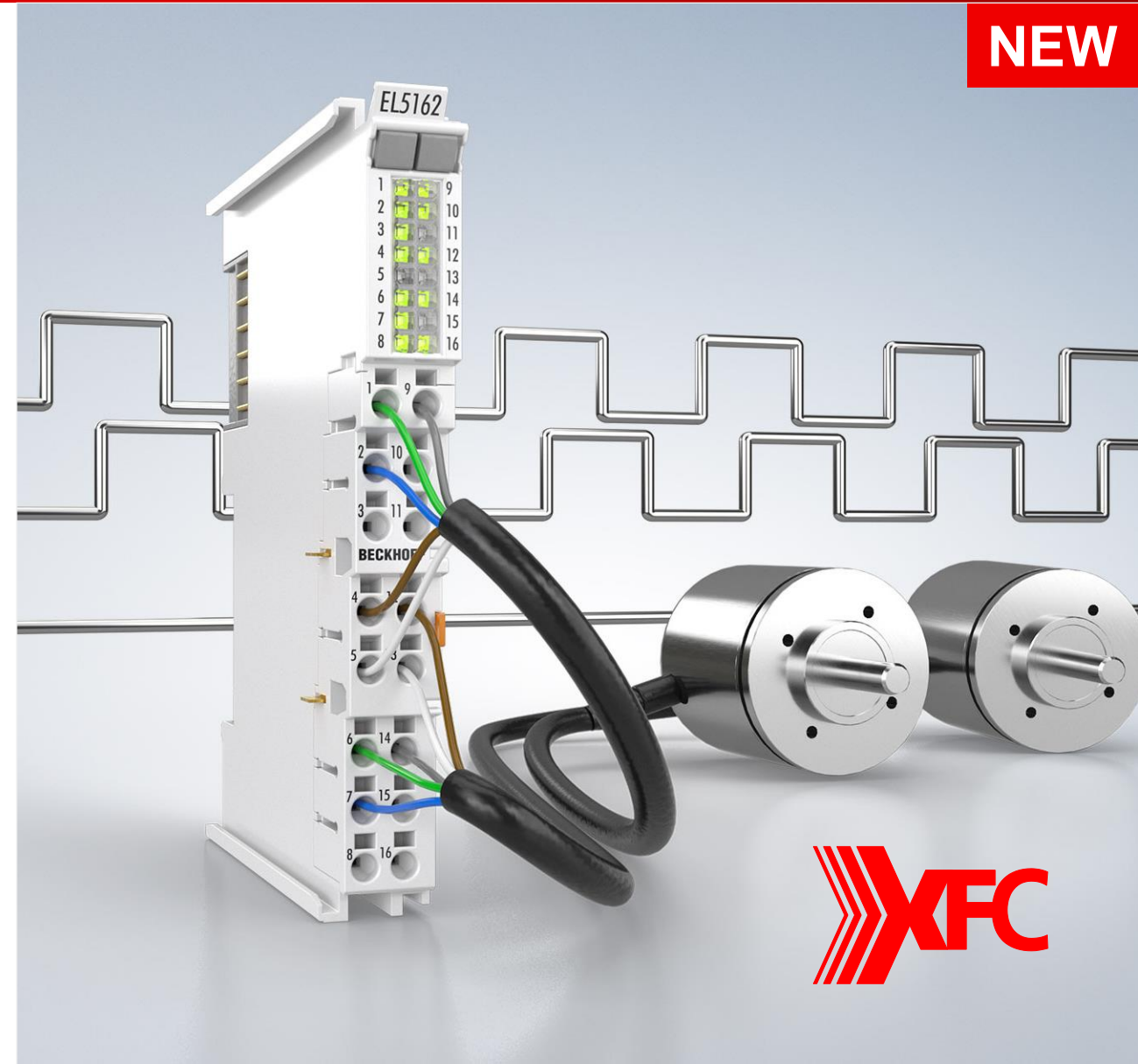
Technical data	EL5102	EL5112	EL5131	EL5122
Encoder type	RS422, TTL, Open Collector			TTL, Open Collector
Number of channels	2 x A, B, C	1 x A, B, C 2 x A, B	1 x A, B, C	2 x A, B
Outputs	–	–	2 x DO (24 V @ 0.5 A) push/pull, tristate	–
Encoder supply	5 V DC, 12 V DC, 24 V DC parameterizable			
Max. frequency	5 MHz (RS422), 1 MHz (TTL), 100 kHz (Open Collector)			
Digital inputs	latch, gate/latch, status input			gate/latch
Basic functions	save, set, reset			
Additional functions	counter limits, counter (revers) direction detection, period and frequency, velocity calculation, duty cycle, filter, microincrements,...		+ threshold values for outputs	counter limits, frequency and period calculation
Timestamp	incremental edge, latch signals		+ threshold values	–
Diagnostics	overflow/underflow, wire break, encoder supply, plausibility check, filter violation frequency			

EL5162 | 2-channel incremental encoder interface, 24 V HTL, 2 x ABC

BECKHOFF

- direct connection of two 24 V HTL incremental encoders with A, B and C track, max. 100 kHz input frequency
- additional inputs: latch, gate/latch per channel for counter lock/preset/store/reset
- measurement of period duration, frequency, speed and duty cycle, microincrements, timestamp, ...
- time measurement with 10 ns resolution
- distributed clocks

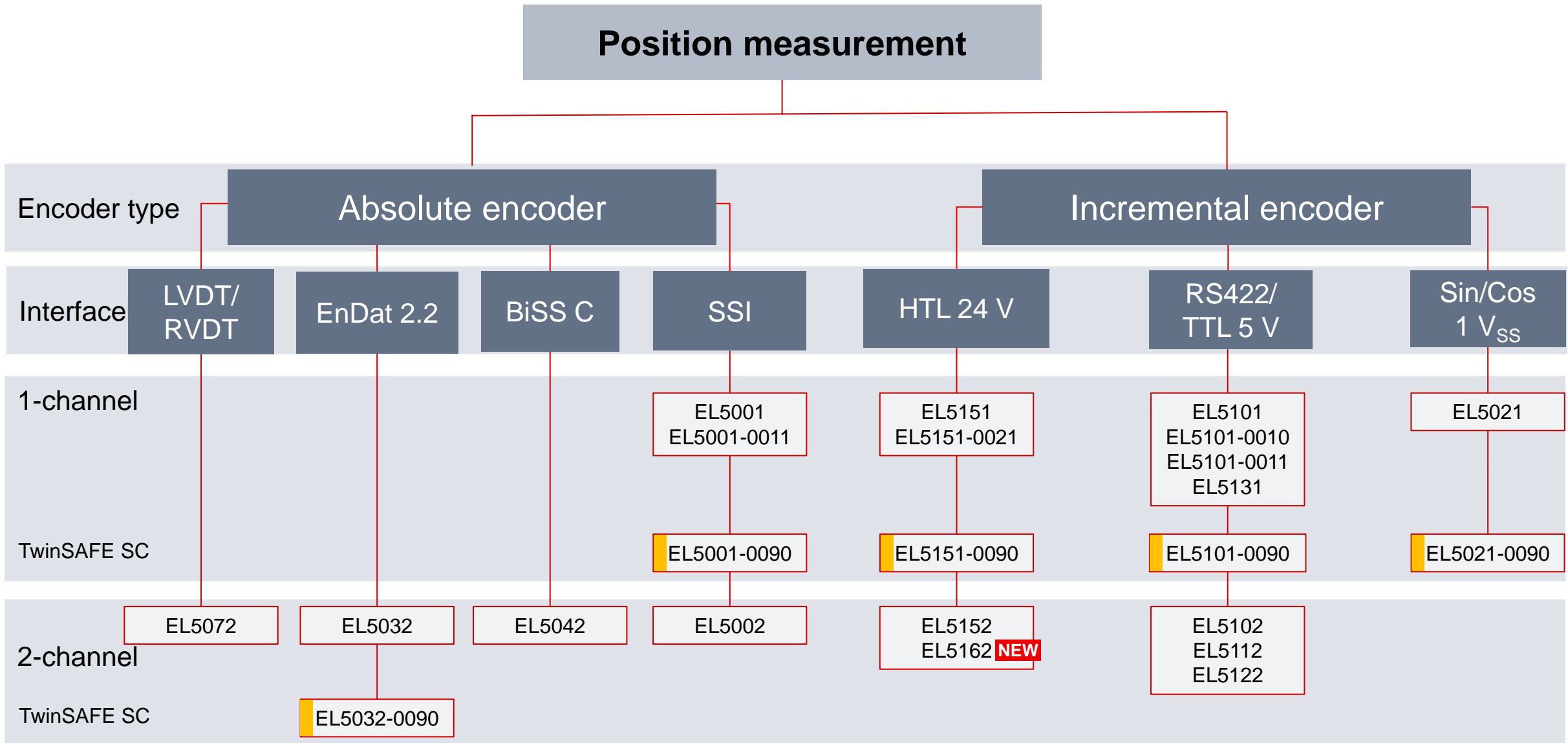
NEW



EL51xx series for 24 V HTL incremental encoders | Technical data

BECKHOFF

Technical data	EL5151	EL5152	EL5162	NEW	
Encoder type	24 V HTL (single-ended)				
Number of channels	1 x A, B, C	2 x A, B	2 x A, B, C		Density
Encoder supply	24 V DC				
Max. frequency	100 kHz				
Digital inputs	gate/latch	–	latch, gate/latch per channel		Functional and diagnostic variety
Basic functions	save, set, reset, lock	set	save, set, reset, lock		
Additional functions	period and frequency measurement, microincrements,		counter limits, counter (reverse) direction detection, period and frequency, velocity calculation, duty cycle, filter, microincrements, ...		
Time stamp	incr. edge	–	Incr. edge, latch signals		
Diagnostics			Overflow/underflow, encoder supply, plausibility check, filter violation counter		
Time measurement	100 ns		10 ns		Performance
Price level			-35% in comparison with 2 x EL5151 +5% in comparison with EL5152		Cost benefit



EL1258-0010 | EtherCAT Terminal, 8-channel digital input, 24 V DC, 1 μ s, ground switching, multi-timestamping

BECKHOFF

- 2-wire
- 8 inputs
- “0” signal voltage -3...+5 V (IEC 61131-2, type 1/3)
- “1” signal voltage 11...30 V (IEC 61131-2, type 1/3)
- input current typ. 3 mA (EN 61131-2, type 1/3)
- input filter typ. < 1 μ s
- internal sampling/execution < 10...40 μ s, corresponds to 100...25 k detectable edges/s, dependent on configuration
- distributed clocks precision \ll 1 μ s



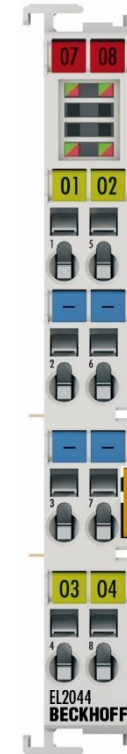
- ground switching
- low delay due to fast 10 μ s input filter
- for use with inductive or capacitive sensors, for example
- toolless connection with direct plug-in technique for solid conductors
- space-saving use in the control cabinet
- direct connection of multi-channel sensors in 1-wire connection technology in the smallest space



EL2044 | 4-channel digital output terminal 24 V DC, 2 A, with extended diagnostics

BECKHOFF

- load type: ohmic, inductive, lamp load
- max. output current: 2 A per channel
- diagnostics via process data and LEDs
 - per channel: open load/line break, overtemperature/overvoltage, short-circuit up to 24 V DC
 - device: general faults, overtemperature, undervoltage, voltage loss
- parameterizable output behavior in case of bus error



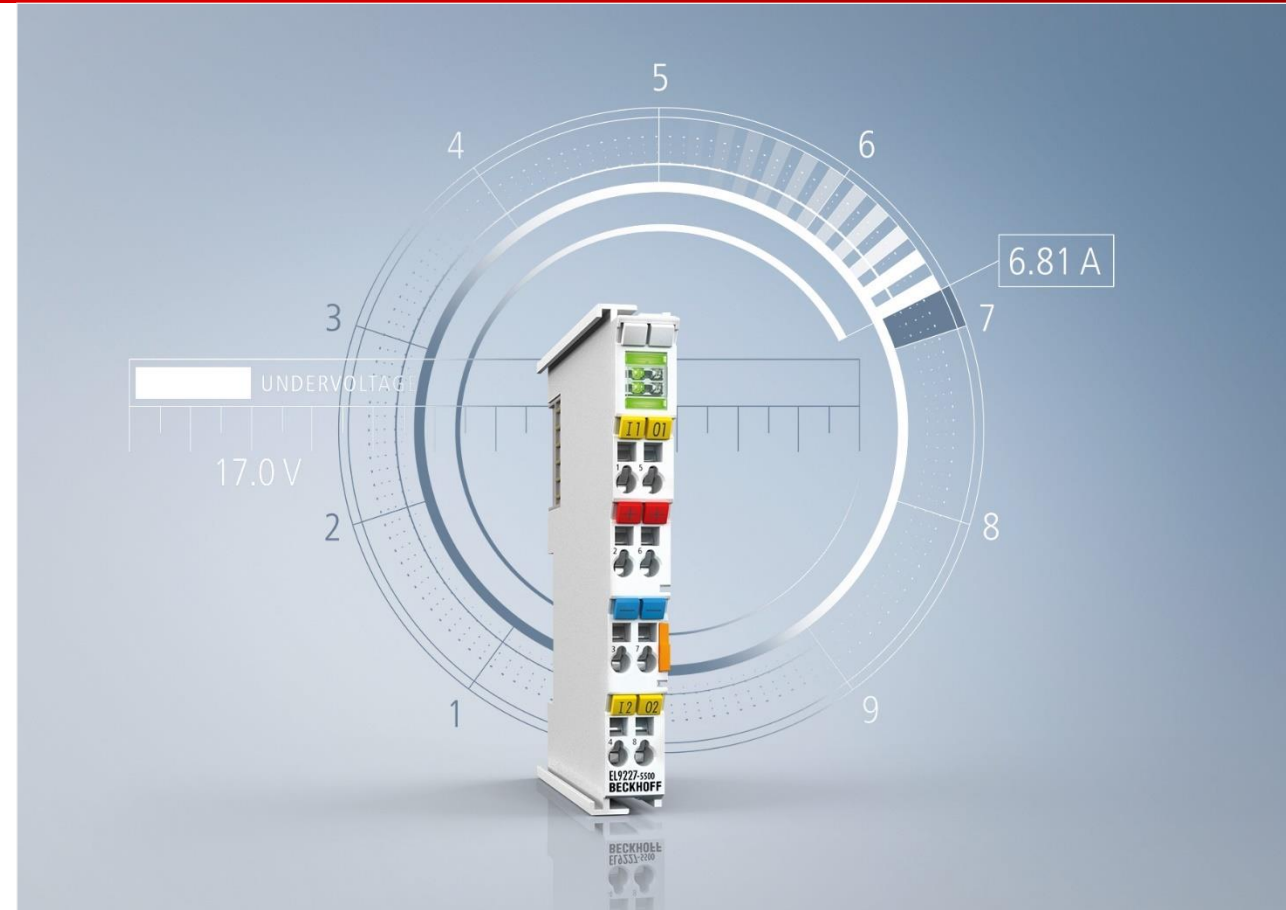
EL2642 | 2-channel reed output terminal, multiplexer, 48 V AC/DC, 0.5 A (Σ 2 A), potential-free, 1 x 4

BECKHOFF

- 2-wire reed output
- 2 x multiplexer 1 on 4
- switching on speed typ. 1 ms, max. 5 ms
- switching off speed typ. 1 ms, max. 5 ms
- max. switching frequency 6/min (at rated load)
- operating cycles mech. (min.) 5 x 10⁶
- operating cycles electr. (min.) 1 x 10⁶ (1 A/250 V AC ohmic load)
- fast reed relay, temperature measurement



- NEC Class 2
- I_N : 4 A
- adjustable up to 4 A
- monitoring functions



- overvoltage filter for the 24 V DC field supply
- protects the EtherCAT Terminal from line-bound surge voltages (due to high-energy, dynamic disturbances such as switching overvoltages at inductive consumers or indirect lightning strikes at the supply lines)
- nominal voltage 24 V (-15%/+20%)
- surge filter field supply
- rated current field supply ≤ 5 A
- PE connection



- overvoltage filter for the 24 V DC field and system supply
- protects the EtherCAT Terminal from line-bound surge voltages
- nominal voltage 24 V (-15%/+20%)
- surge filter field supply
- surge filter system supply
- rated current field supply up to 10 A, field+system \sum 10 A
- rated current system supply up to 10 A, field+system \sum 10 A
- diagnostics



Intrinsically safe I/O ELX

BECKHOFF



- 2-channel relay output for switching intrinsically safe loads up to zone 0/20
- 2 x changeover contacts
- connection of different load types (ohmic, inductive, lamp load)
- potential-free



- power supply terminal
- 24 V
- 0.65 A

New features

- improved output fuse protection by turn-off with automatic restart
- $U_O = 27.0 \text{ V}$ for ELX200x, ELX31xx, ELX41xx
 - allows connection of various field devices
 - previous $U_O = 27.7 \text{ V}$



ELX9560 | Power supply terminal, 24 V DC, electrically isolated

BECKHOFF

Verification of intrinsic safety for the ELX system BECKHOFF New Automation Technology

General information	
Project name:	Test Name
Project manager:	Test Manager
Issuer:	Test Issuer
Date of issue:	05/03/2021

Associated equipment						Classification of atmosphere <input type="checkbox"/> I <input checked="" type="checkbox"/> IIA <input type="checkbox"/> IIB/III <input type="checkbox"/> IIC				
Identification	Channel	Manufacturer	Schematic reference	Ex-marking	Notification number	Uo [V]	Io [mA]	Po [mW]	Lo [mH]	Co [nF]
ELX3181	Channel 1	Beckhoff Automation GmbH & Co. KG	-S+V61	II 3 (1) G Ex ec [Ia Ga] IIC T4 Gc	IECEx BVS 18.0005X BVS 18 ATEX E 005 X	27.70	85.00	565.00	30.00	2,200.00

Intrinsically safe electrical equipment						Classification of atmosphere <input type="checkbox"/> I <input checked="" type="checkbox"/> IIA <input type="checkbox"/> IIB/III <input type="checkbox"/> IIC				
Identification	Description	Manufacturer	Ex-marking	Notification number	Ui [V]	Ii [mA]	Pi [mW]	Li [mH]	Ci [nF]	
Sensor V61	Level Sensor	Sensor Manufacturer	Ex db ia IIC T6 ... T1 Ga/Gb, Gb	PTB 03 ATEX	27.60	131.00	983.00	0.00	0.00	

Cable inductance and capacity							
Identification	Description	Manufacturer	Cable length [m]	Cable inductance Lc [mH/km]	Cable capacity Cc [nF/km]	Resulting Lc [mH]	Resulting Cc [nF]
ÖLFLEX EB	Control Cable	LAPP	15.00	0.52	140.00	0.01	2.10

Total inductance Li + Lc [mH]	0,01
Total capacity Ci + Cc [nF]	2,10

Intrinsic safety check				
Intrinsic safety condition	Associated equipment		Intrinsically safe electrical equipment	Intrinsic safety fulfilled
$U_o \leq U_i$	27.70	\leq	27.60	NO
$I_o \leq I_i$	85.00	\leq	131.00	YES
$P_o \leq P_i$	565.00	\leq	983.00	YES
$L_o > L_i + L_c$	30.00	$>$	0.01	YES
$C_o > C_i + C_c$	2,200.00	$>$	2.10	YES

$I_o \leq I_i$	85.00	\leq	131.00	YES
$P_o \leq P_i$	565.00	\leq	983.00	YES
$L_o > L_i + L_c$	30.00	$>$	0.01	YES
$C_o > C_i + C_c$	2,200.00	$>$	2.10	YES

ELX system BECKHOFF New Automation Technology

General information	
Issuer:	Test Issuer
Date of issue:	05/03/2021

Associated equipment						Classification of atmosphere <input type="checkbox"/> I <input checked="" type="checkbox"/> IIA <input type="checkbox"/> IIB/III <input type="checkbox"/> IIC				
Schematic reference	Ex-marking	Notification number	Uo [V]	Io [mA]	Po [mW]	Lo [mH]	Co [nF]			
-S+V61	II 3 (1) G Ex ec [Ia Ga] IIC T4 Gc	IECEx BVS 18.0005X BVS 18 ATEX E 005 X	27.00	85.00	565.00	30.00	2,200.00			

Intrinsically safe electrical equipment						Classification of atmosphere <input type="checkbox"/> I <input checked="" type="checkbox"/> IIA <input type="checkbox"/> IIB/III <input type="checkbox"/> IIC				
Identification	Description	Manufacturer	Ex-marking	Notification number	Ui [V]	Ii [mA]	Pi [mW]	Li [mH]	Ci [nF]	
Sensor V61	Level Sensor	Sensor Manufacturer	Ex db ia IIC T6 ... T1 Ga/Gb, Gb	PTB 03 ATEX	27.60	131.00	983.00	0.00	0.00	

Cable inductance and capacity							
Identification	Description	Manufacturer	Cable length [m]	Cable inductance Lc [mH/km]	Cable capacity Cc [nF/km]	Resulting Lc [mH]	Resulting Cc [nF]
ÖLFLEX EB	Control Cable	LAPP	15.00	0.52	140.00	0.01	2.10

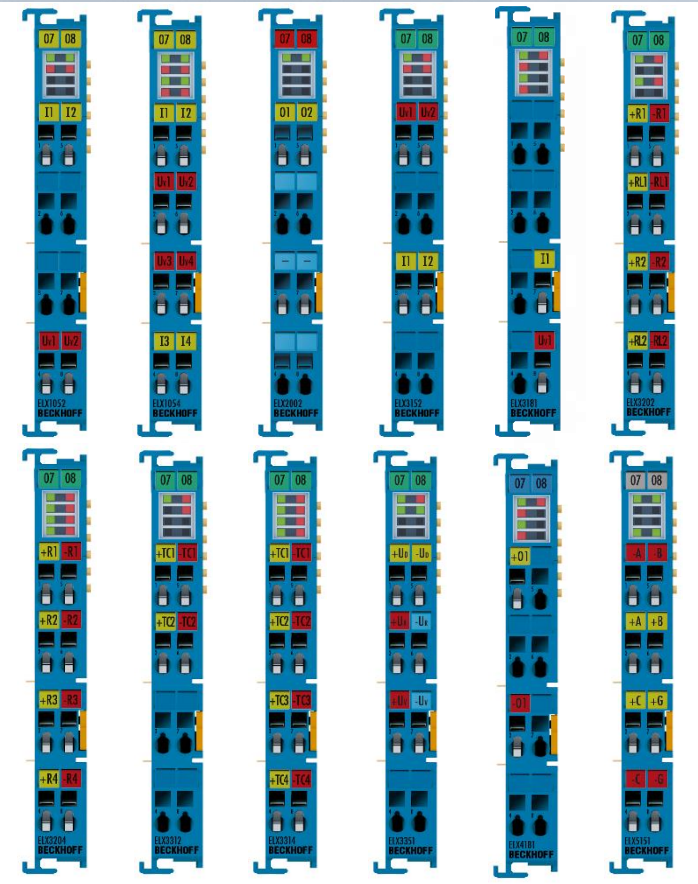
Total inductance Li + Lc [mH]	0,01
Total capacity Ci + Cc [nF]	2,10

Intrinsic safety check				
Intrinsic safety condition	Associated equipment		Intrinsically safe electrical equipment	Intrinsic safety fulfilled
$U_o \leq U_i$	27.70	\leq	27.60	NO
$I_o \leq I_i$	85.00	\leq	131.00	YES
$P_o \leq P_i$	565.00	\leq	983.00	YES
$L_o > L_i + L_c$	30.00	$>$	0.01	YES
$C_o > C_i + C_c$	2,200.00	$>$	2.10	YES

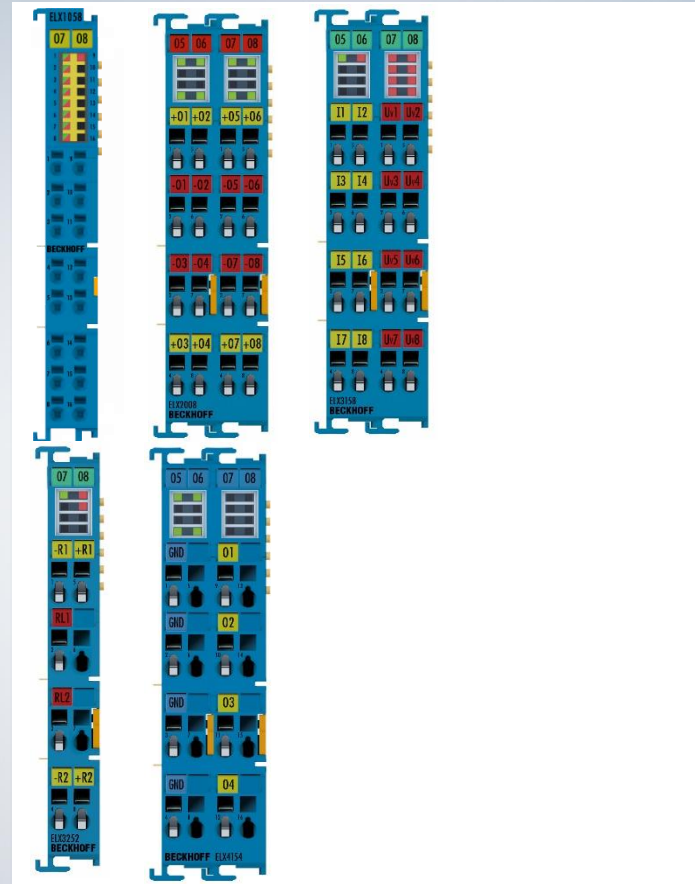
$I_o \leq I_i$	85.00	\leq	131.00	YES
$P_o \leq P_i$	565.00	\leq	983.00	YES
$L_o > L_i + L_c$	30.00	$>$	0.01	YES
$C_o > C_i + C_c$	2,200.00	$>$	2.10	YES

Intrinsically safe I/O Portfolio development

BECKHOFF



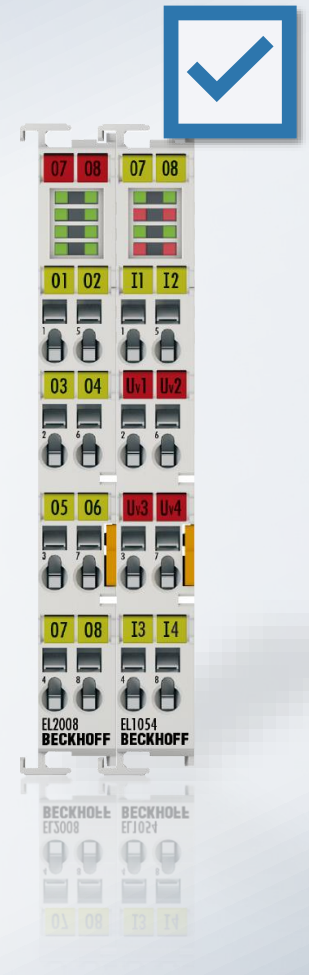
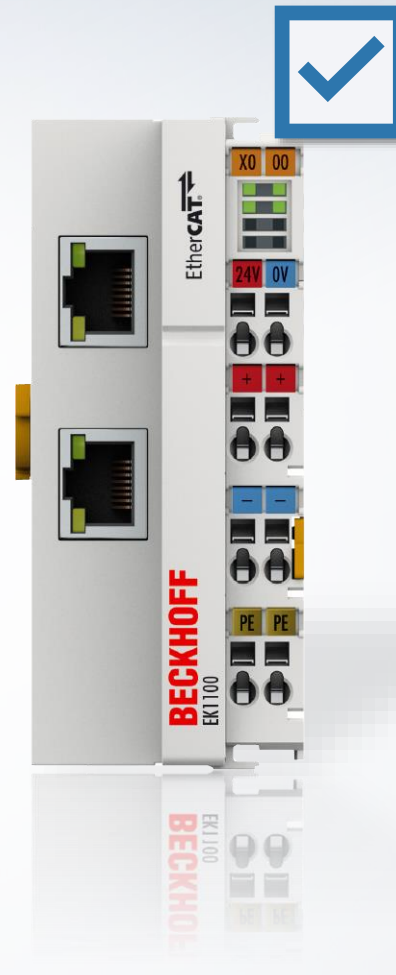
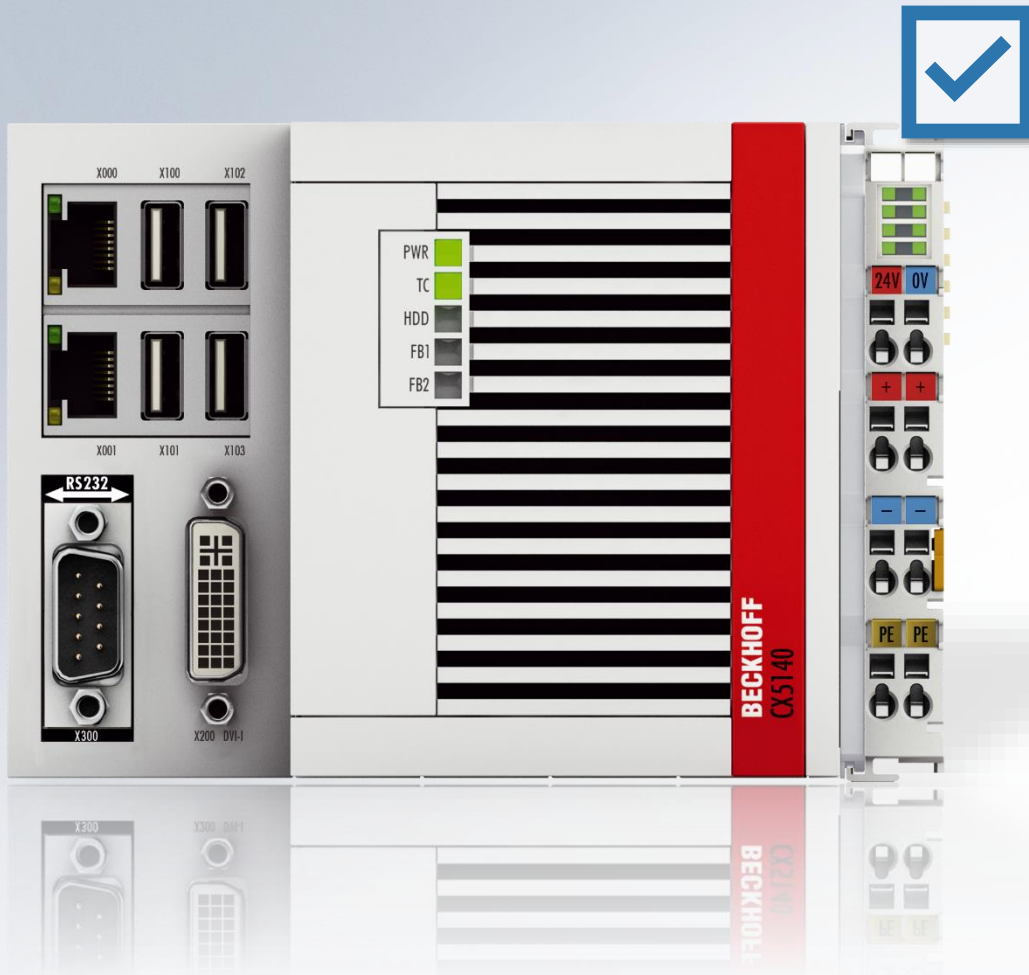
2018



2020



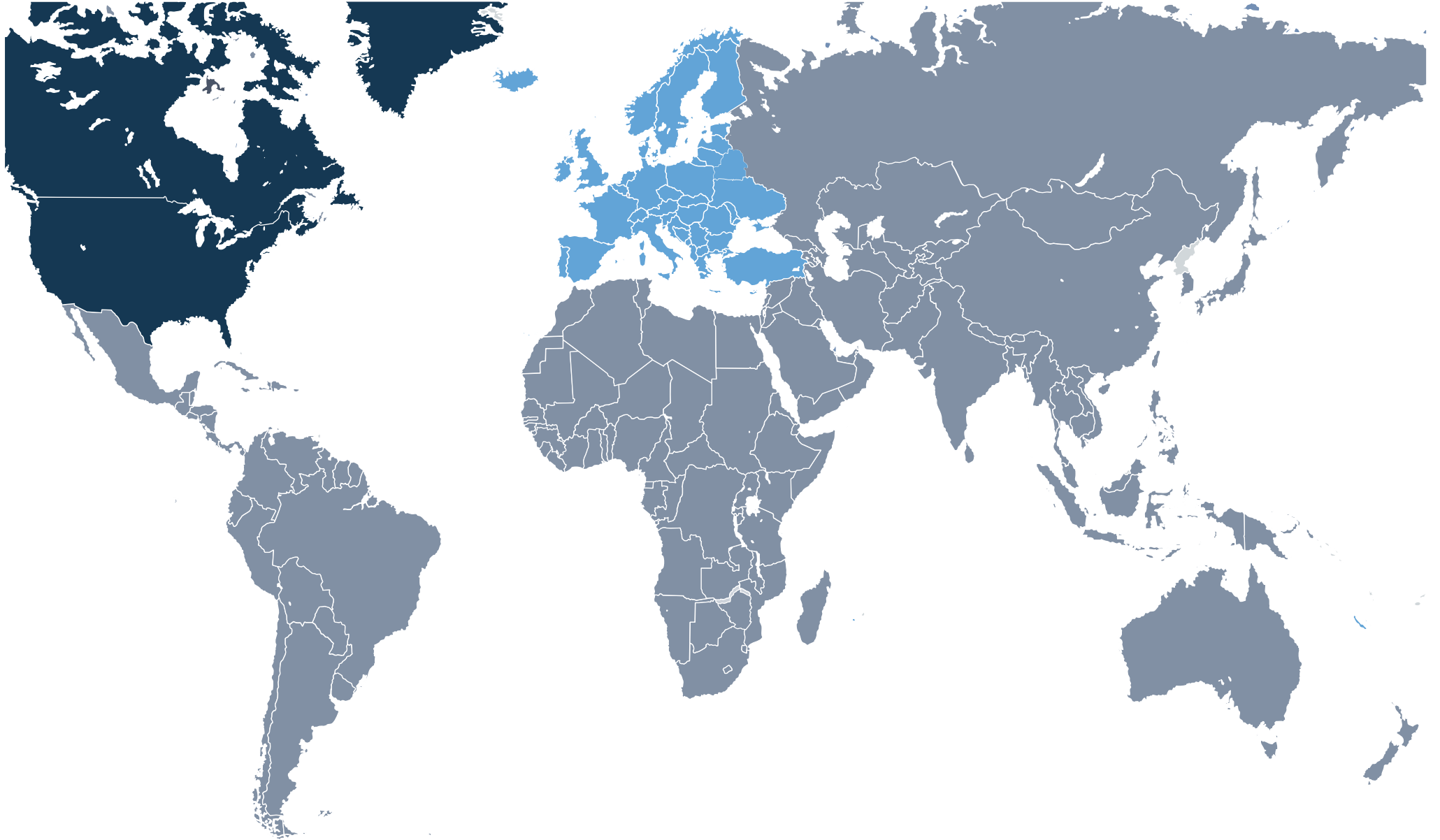
2021



ATEX

IECEX

NEC/CEC



ATEX
IECEX
NEC/CEC

ATEX	
▪ 90	BKxxxx
▪ 250	KLxxxx
▪ 20	EKxxxx
▪ 200	ELxxxx
▪ 10	CXxxxx

IECEX	
▪ 2	BKxxxx
▪ 10	KLxxxx
▪ 10	EKxxxx
▪ 50	ELxxxx
▪ 30	CXxxxx

FM	
▪ 1	BKxxxx
▪ 10	KLxxxx
▪ 5	EKxxxx
▪ 40	ELxxxx
▪ 15	CXxxxx

BZ3300 | Equipment identification labels for Bus Terminals and EtherCAT Terminals

BECKHOFF

- sticker carrier equipment identification for standard Bus and EtherCAT Terminals
- 12 x 20 mm
- unit: 100 pieces
- 5 cards, 20 pieces each

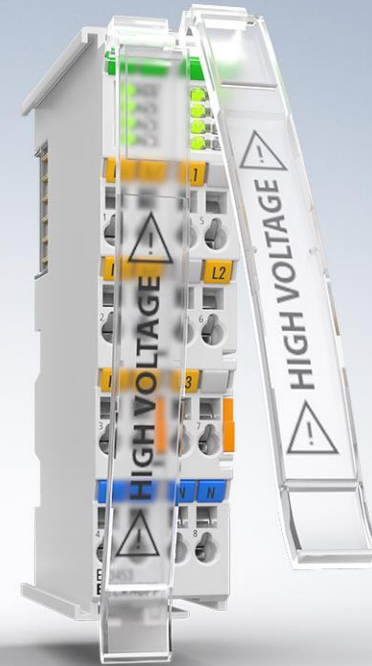
NEW



BZ3201 | Pluggable high-voltage cover

BECKHOFF

- additional safety for dangerous voltages on the field side
- current solution
 - additional coupler
 - separation terminal
- space and cost savings
- 10 pieces per package



1. News IPC
2. **News I/O**
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 - **Bus Terminals**
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 - EtherCAT plug-in modules
 - Power supplies
 - Infrastructure components
 - I/O accessories
3. News Motion
4. News TwinCAT

Communication

Analog I/O

Measurement
Technology

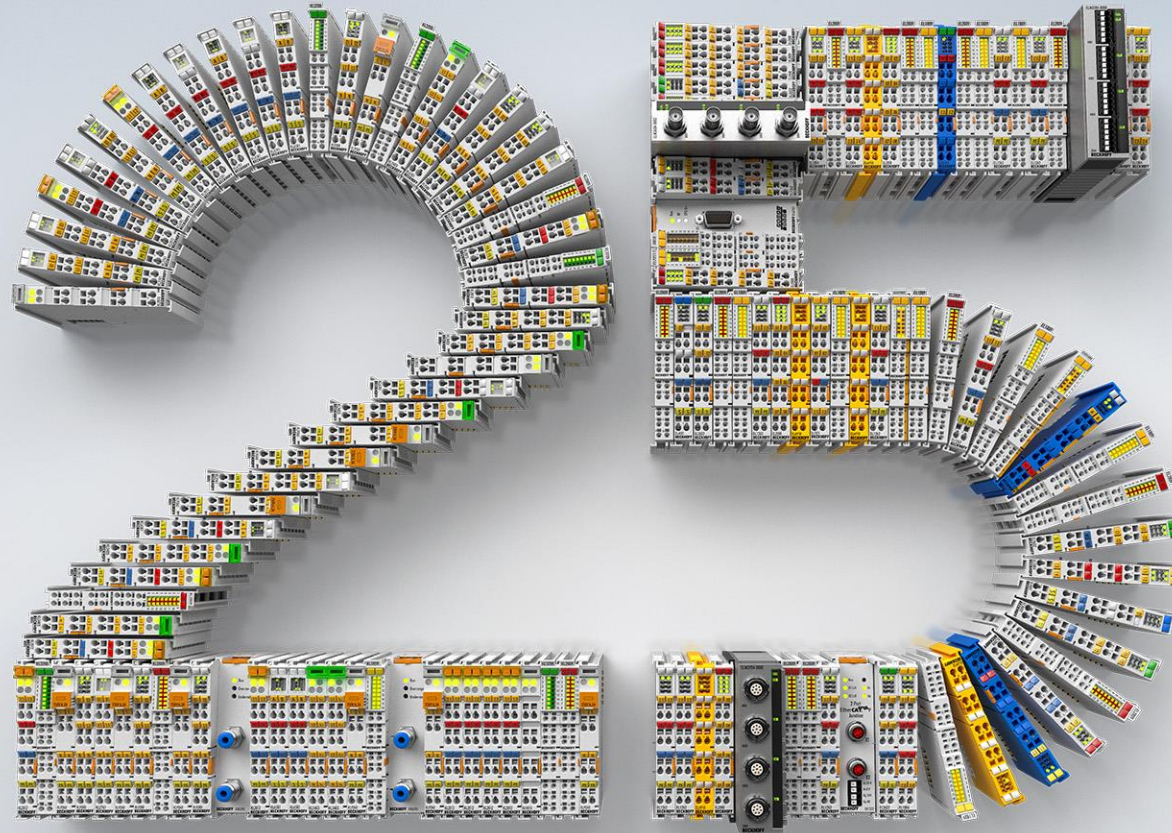
Safety

Intrinsically safe I/Os

Digital I/O

Compact Motion

EtherCAT



KL3453 | 3-channel analog input, power measurement, 690 V, 0.1/1/5 A AC, 24 bit, electrically isolated

BECKHOFF

- 3-phase power measurement terminal up to 690 V AC with extended functionality
- high-feature version
- measurement of current, voltage; effective, reactive and apparent power; active, reactive and apparent energy, $\cos \varphi$, frequency, THD, harmonic (up to 63rd harmonic)
- With up to 690 V AC, voltage inputs are optimized for the direct monitoring of high-capacity generators, as in the wind power industry, for example.



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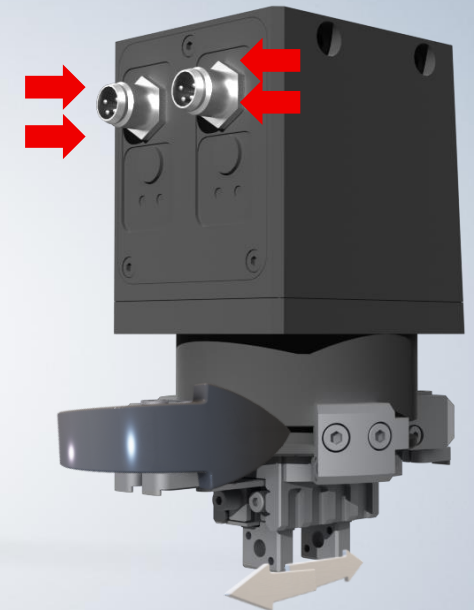


EPP2338-2002 | EtherCAT-P-Box, 8-channel digital input and output combination, 24 V DC, 10 μ s, 0,5 A, M12

BECKHOFF

- 8 x digital input/output
- 4 x M12, 5-pin
- 24 V DC U_S for sensor supply
- no current limitation to 0.5 A
- sensors stay operative without U_P
- **application:** robotic, handling

NEW



EP1839-0022/-0042 | 16-channel digital input, 24 V DC, M12, with diagnostics

BECKHOFF

- 16 x digital inputs 24 V DC, 3 ms default
- wire break detection (with sensor LED or resistor)
- filter time 0...100 ms via software
- 8 x sensor power supplies per socket
- 0.5 A per socket, switchable
- short circuit/open load detection
- undervoltage detection

NEW



EP2038-0042 | 8-channel-digital-output, 24 V DC, 2.4 A, M12, with diagnostics

BECKHOFF

- 8 x digital outputs 24 V DC, 2.4 A
- open load detection
- short circuit protection
- safe state programmable
- undervoltage detection
- EP2839-0022: EtherCAT M8, power M8
- EP2839-0042: EtherCAT M12, power 7/8"
- software controlled by CPU
- diagnostic data per channel
- **application:** machine building, automotive

NEW



EP2839-0022/-0042 | 16-channel digital output, 24 V DC, 0.5 A, M12, with diagnostics

BECKHOFF

- 16 x digital outputs 24 V DC, 0.5 A
- open load detection
- short circuit protection
- safe state programmable
- under voltage
- EP2839-0022: EtherCAT M8, power M8
- EP2839-0042: EtherCAT M12, power 7/8"
- software controlled by CPU
- diagnostic data per channel
- **application:** machine building, automotive

NEW



Overview

BECKHOFF

16-channel

16 DI

EP1809-0022/-0042



EP1839-0022/-0042



8/16-channel

16 DO 0.5 A
8 DO, 2.4 A

EP2028-0032
EP2809-0022/-0042



EP2038-0042 2.4 A
EP2839-0022/-0042 0.5 A



7/8" power

7/8" power

- license key box
 - hardware license key in IP 67
- EtherCAT interface
- very compact housing
 - 30 mm x 86 mm x 22 mm
- function similar to EL6070
- **application:**
 - modular machines in IP 67
 - IPCs in IP 67



EP6224-0002 | 4-channel communication interface and 4-channel digital input, IO-Link, master, Class A

BECKHOFF

- IO-Link master Class A
- 4 IO-Link channel
- 4 digital inputs 24 V DC
- PS 24 V DC/1.4 A per port
- Σ 4 A
- **application:** distributed IO-Link devices, small footprint

NEW



EP6601-0002 | 1-channel communication interface, Ethernet switchport box

BECKHOFF

- one fully functional and fully transparent Ethernet port
- 10BASE-T/100BASE-T with M12
- 10/100 Mbit/s, IEEE 802.3u auto-negotiation, half or full duplex at 10 and 100 Mbit/s, automatic setup
- 100 m cable length
- **application:** networked Ethernet devices in the machine



EP7041-4032 | 1-channel-motion-interface for stepper motors, 48 V DC, 5 A, BISS-C

BECKHOFF

- stepper motor controller 5 A
- BISS-C encoder interface
- note:
 - only process data
 - no travel distance control/positioning or similar
- **application:**
 - medium to slow positioning tasks
 - start without reference run



EP7402-0167 | 2-channel motion interface for BLDC motors, 48 V DC, 3.5 A, M8

BECKHOFF

NEW



EP7402-0167 | 2-channel motion interface for BLDC motors, 48 V DC, 3.5 A, M8

BECKHOFF

- 2 x MDR (BLDC) on **M8 a-coded**
- motors without integrated controller:
48 V DC, 3.5 A
- electronic fuse, current monitoring, diagnostics etc.
- IP 67 protection rating
- ambient temperature -25...+60 °C

NEW



EtherCAT Box

Power distribution

BECKHOFF

NEW



EP9208-1035 | EtherCAT distribution box, 8-channel, M12, L-coded

BECKHOFF

- passive distribution box
 - no EtherCAT
- 8 x M12, L-coded, 5-pin output ports
- one 7/8", 5-pin input port
- 24 V DC/48 V DC
- U_S , GND_S , U_P , GND_P , FE
- Σ 16 A
- LEDs per U_S/U_P
- **application:** AMI8xxx



NEW

- 4 x EtherCAT M8
- 4 x Power M8 U_S/U_P
- 2-channel in preparation
- functionality similar to EP9224-xxxx
 - M8 power on/off
 - electronic fuses
 - U/I in the process data
 - data logging
 - different fuse curves



EPI3188-0022 | 8-channel analog input, multi-function, ± 10 V, 0/4...20 mA, 16 bit, single-ended

BECKHOFF

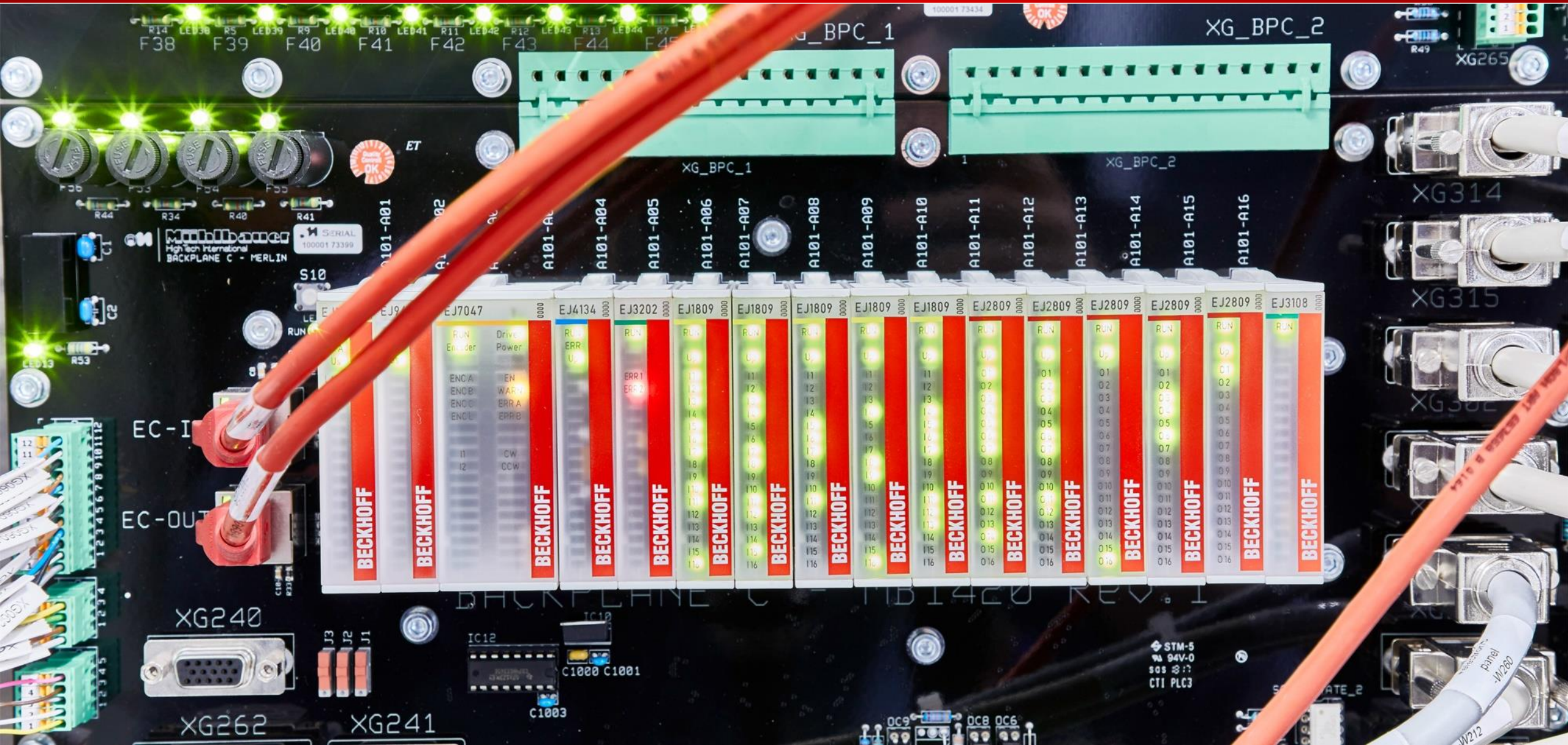
- IO-Link device
- 4 x multi-function analog input
 - ± 10 V, 0/4...20 mA
- similar to EP3184-0002
 - single-ended
- **application:**
 - distributed analog inputs
 - tool changers



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EtherCAT plug-in modules

BECKHOFF

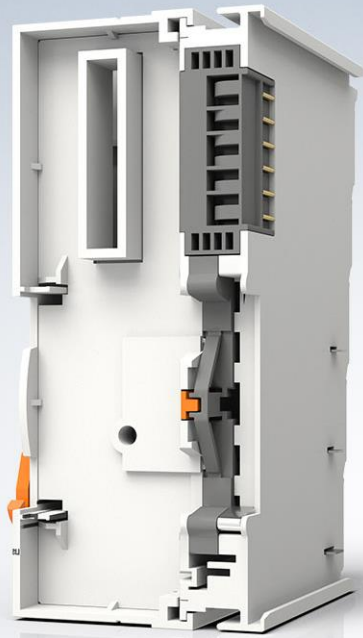


Scalable
performance level



EtherCAT plug-in modules | IPC integration

BECKHOFF





EtherNet/IP™



Ethernet

- acquires the fast binary 24 V control signals from the process level and transmits them in an electrically isolated form to the controller
- exceptionally high signal transmission through very low input delay
- synchronized operation possible with distributed clocks in XFC technology
- support of timestamping function in XFC technology

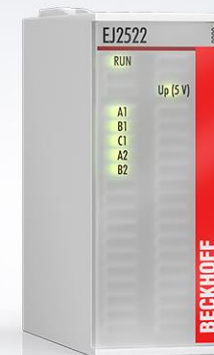


EJ2522 | 2-channel pulse train output, incremental encoder simulation, RS422, 50 mA

BECKHOFF

NEW

- outputs a frequency-modulable signal on two channels with four outputs
- for control of motor drivers or other signal receivers, which are controlled by single cycles
- selection of operating modes:
 - frequency modulation
 - pulse/direction specification
 - incremental encoder simulation (1 x ABC, 2 x AB)
- integrated path control
- synchronized operation with distributed clocks function



EJ7037 | 1-channel motion interface, stepper motor module, 24 V DC, 1.5 A, incremental encoder

BECKHOFF

- direct connection of stepper motors in low power range
- two digital inputs for limit position switches
- particularly smooth and precise motor operation through 64-fold micro stepping
- field-oriented control in connection with appropriate stepper motors
- low price and compact drive solution
- integrated encoder (1024 inc/rev)



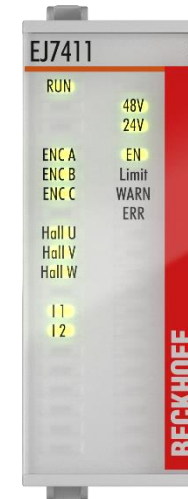
- enables direct operation of four DC motors and is electrically isolated from the E-bus
- Speed is preset by a 16-bit value from the automation unit.
- overload-proof output stage



EJ7411 | BLDC motor module with incremental encoder, 48 V DC, 4.5 A (I_{rms})

BECKHOFF

- system-integrated and compact
- supply voltage 8...48 V
- output range:
- enables connection of Hall sensors, incremental encoder (5 V/24 V; SE/Diff.)
- **hardware enable** input
- control of linear axes
- less maintenance (less wear than BDC motors)



Scenario 1

- **The EJ system:** simple integration with in-house electronics

Scenario 2

- **On request:** custom-designed complete solution

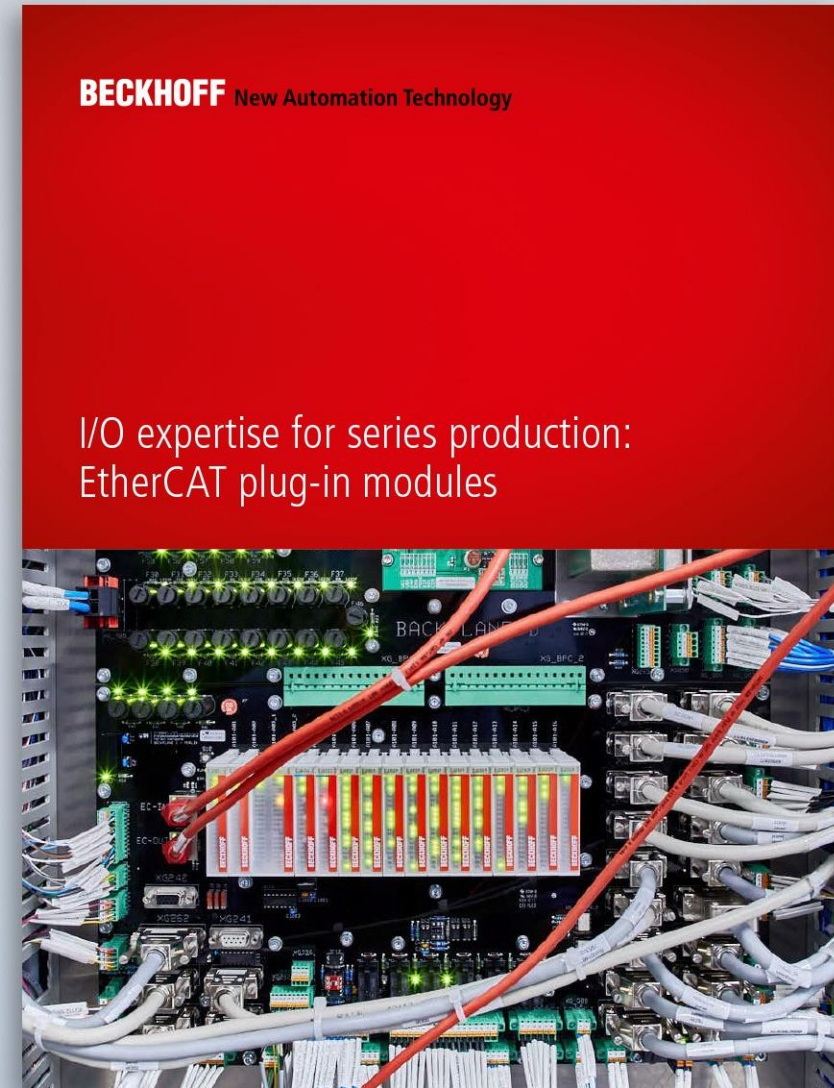
Scenario 3

- **Ready for operation:** plug & work with complete I/O box

Scenario 4

- **Full Service:** plug & work with complete control cabinet

[Download link](#)



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PSxxxx | Power supply

BECKHOFF



Power supply PS1000 portfolio update

BECKHOFF

PS1061-2405-0000

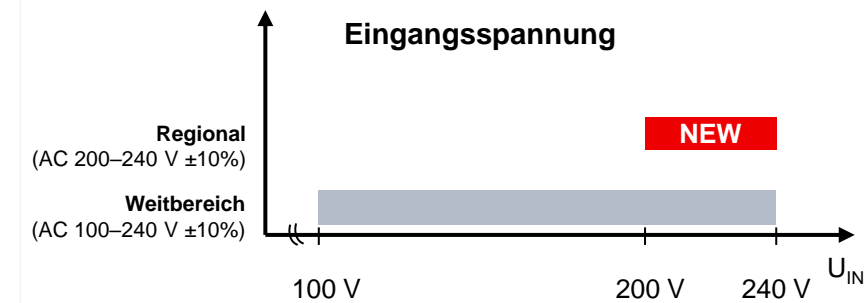
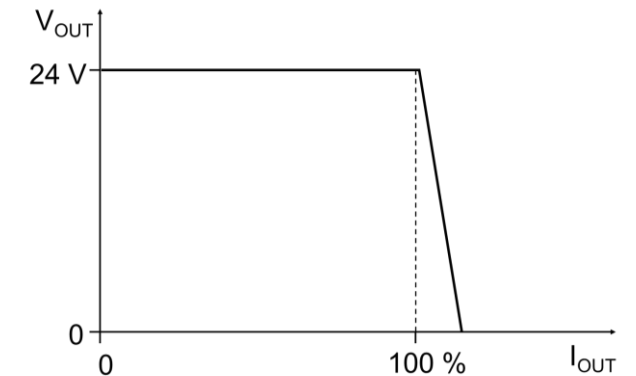
- 24 V DC, 5 A, AC 200...240 V

PS1061-2410-0000

- 24 V DC, 10 A, AC 200...240 V

PS1061-2420-0000

- 24 V DC, 20 A, AC 200...240 V



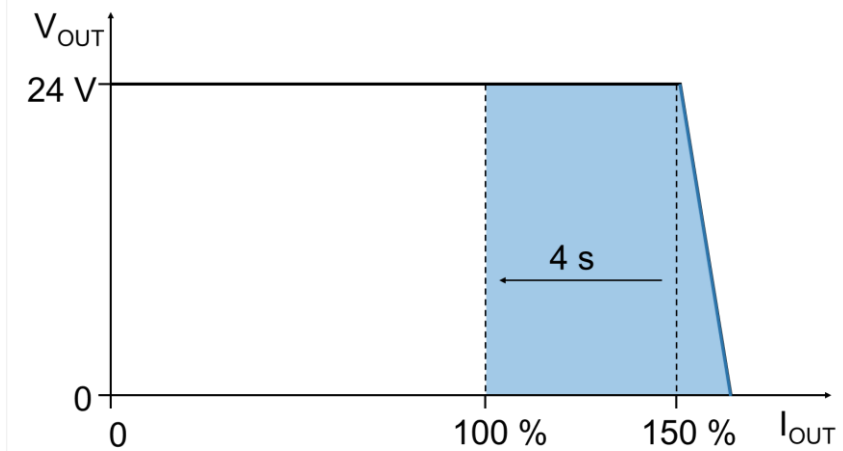
Power supply PS3000 portfolio update

BECKHOFF

PS3001-2410-0001

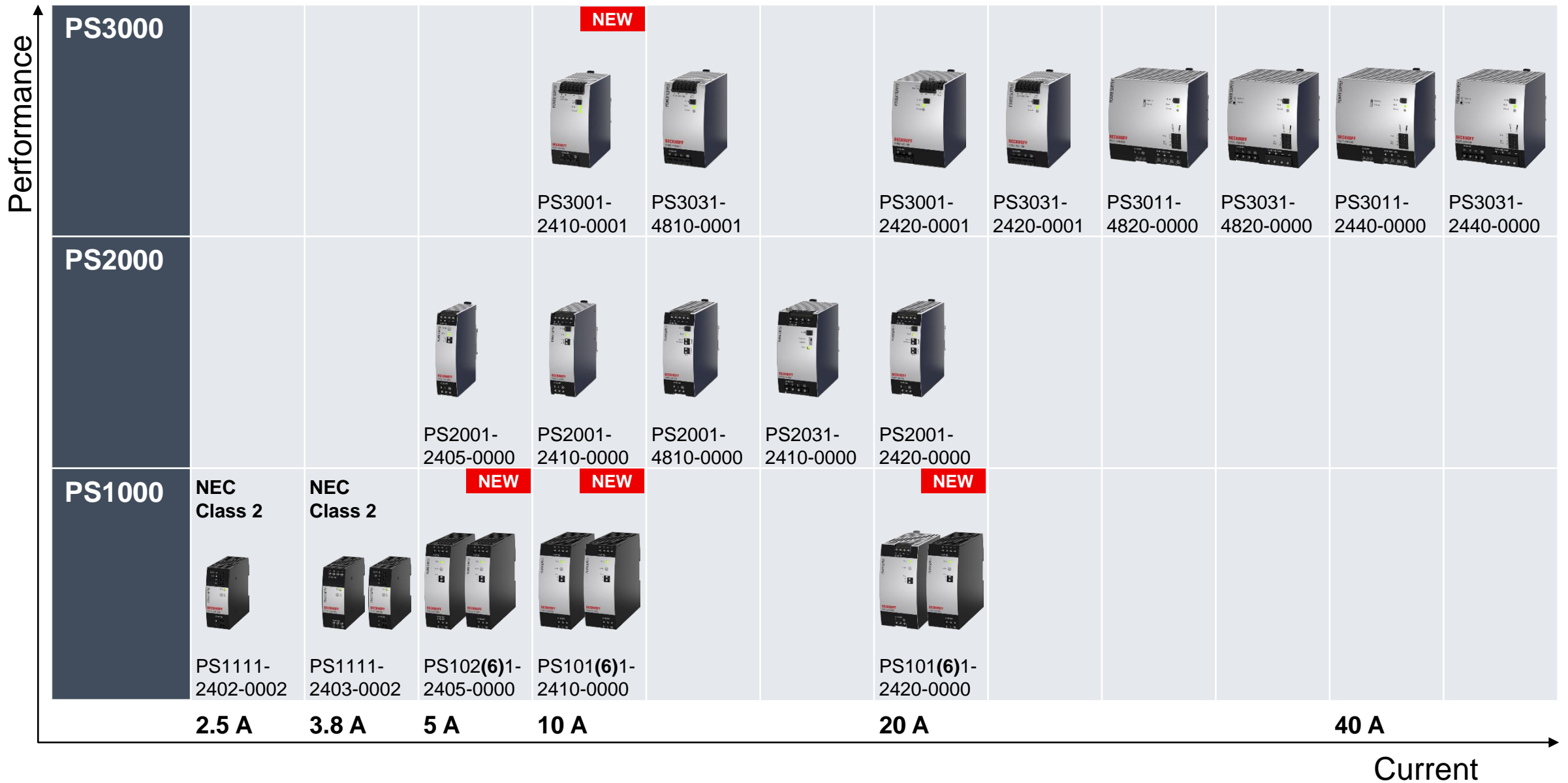
- 24 V DC, 10 A, 1-phase
- I_{out} : 150%/4 s

NEW



Power supply Portfolio

BECKHOFF



Power supply



Buffer modules

- mains voltage dips
- mains voltage fluctuations
- load peaks



UPS

- safe shutdown of plants
- emergency power supply



Redundancy modules

- double structure



Power supply



Buffer modules

- mains voltage dips
- mains voltage fluctuations
- load peaks



UPS

- safe shutdown of plants
- emergency power supply



Redundancy modules

- double structure



Power supply solutions

Buffer modules

BECKHOFF

PS9011-2420-0001

- 24 V DC, 20 A, 200 ms

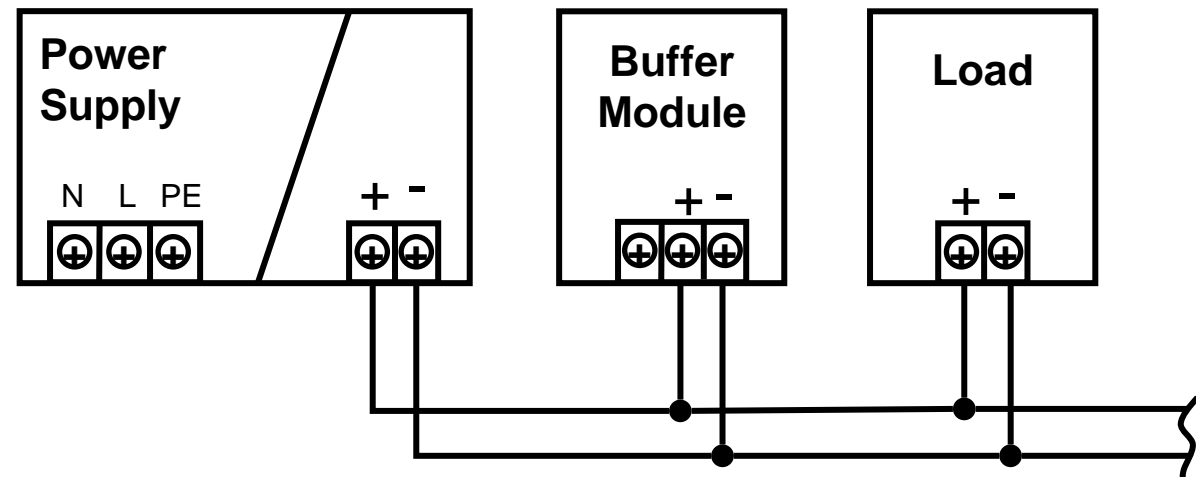
PS9011-2440-0000

- 24 V DC, 40 A, 160 ms

PS9031-4820-0001

- 48 V DC, 20 A, 100 ms

NEW



Power supply solutions

Redundancy modules

BECKHOFF

PS9401-2420-0000

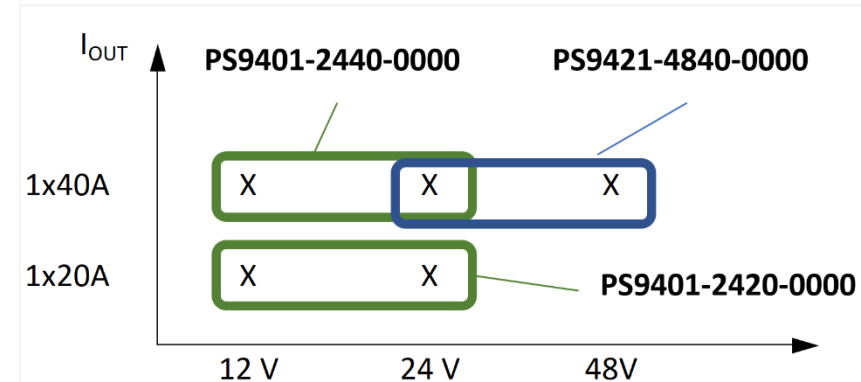
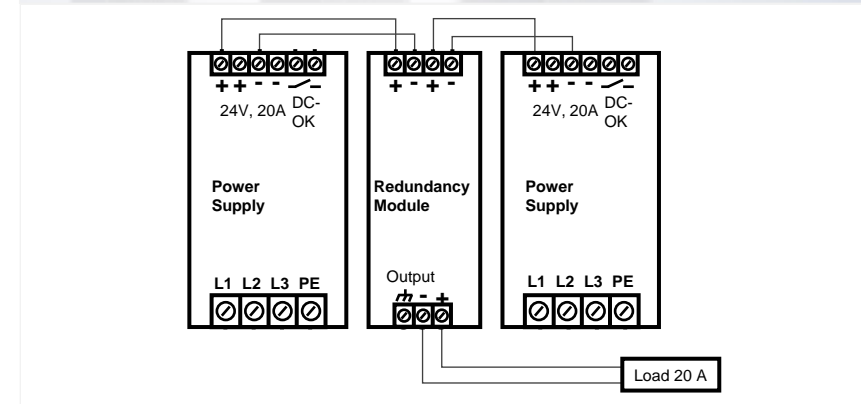
- 12...28 V DC, I_{out} : 20 A

PS9401-2440-0000

- 12...28 V DC, I_{out} : 40 A

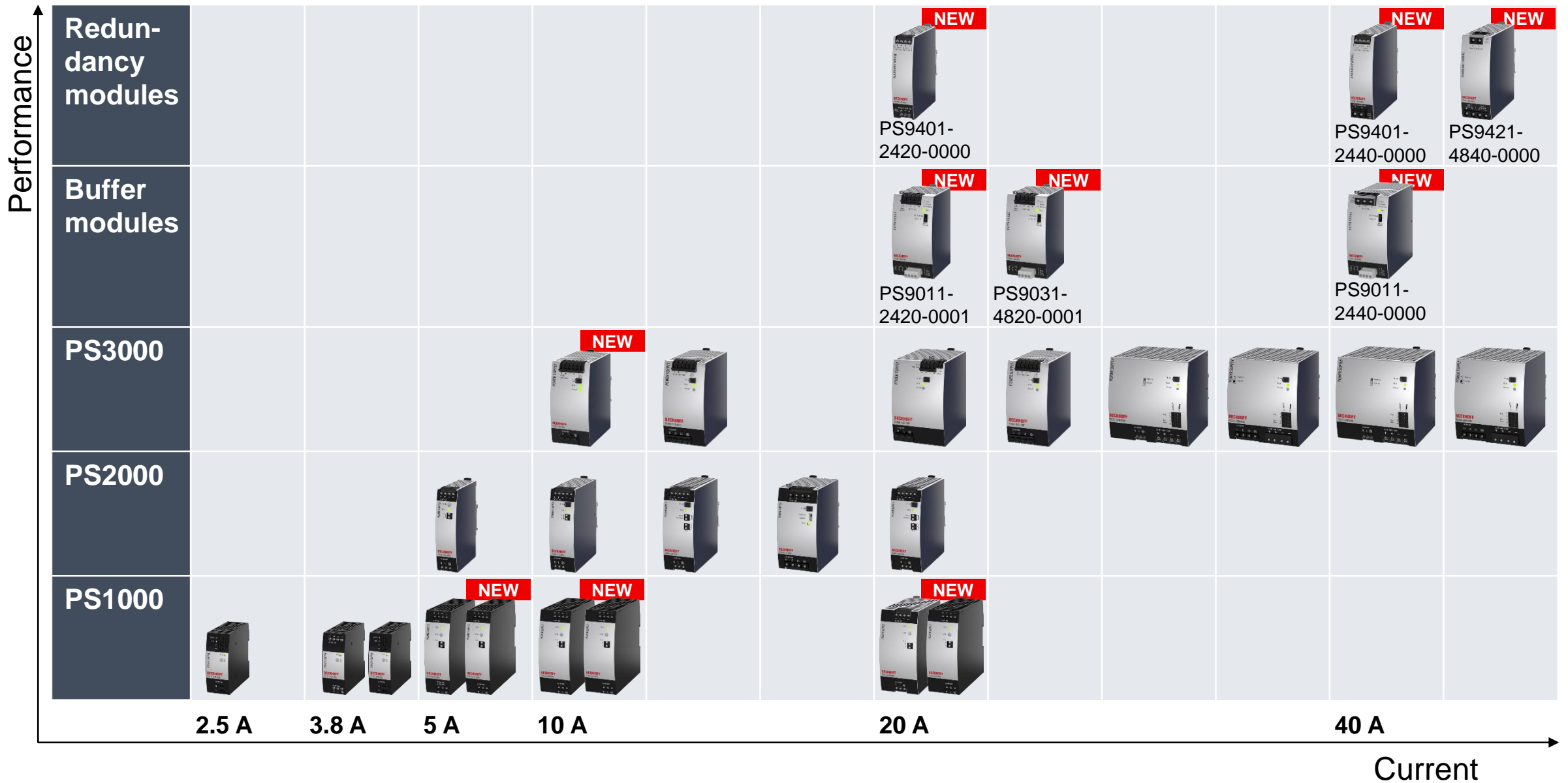
PS9421-4840-0000

- 24...56 V DC, I_{out} : 40 A



Power supply solutions Portfolio

BECKHOFF



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CU1521-0020 | Media converter, Ethernet/EtherCAT, 100 Mbit/s, 24 V DC, SFP slot

BECKHOFF

CU1561-0000

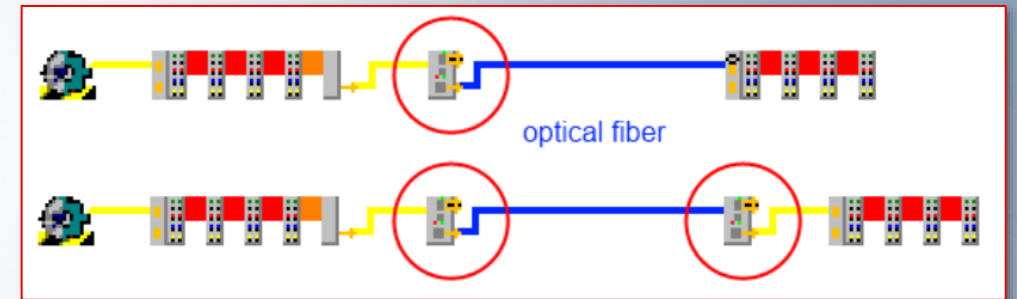
POF

CU1521-0000

Multi-mode 2 km

CU1521-0010

Single-mode 20 km



CU1521-0020 | Media converter, Ethernet/EtherCAT, 100 Mbit/s, 24 V DC, SFP slot

BECKHOFF

New SFP-capable converter for more flexibility

- supports SFP/SFP+ modules
- Only SFP modules are supported that are tested and approved by Beckhoff.

SFP

CU1521-0020

NEW



An SFP module is a plug-in device to choose individual Ethernet physics.

CU1521-0020 | Media converter, Ethernet/EtherCAT, 100 Mbit/s, 24 V DC, SFP slot

BECKHOFF

New SFP-capable converter for more flexibility

	Distanz
CU1561	50 m
CU1521-0000	2 km
CU1521-0010	20 km
CU1521-0020	0...80 km, depending on SFP

SFP
CU1521-0020

NEW



An SFP module is a plug-in device to choose individual Ethernet physics.

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EtherCAT and EtherCAT P

BECKHOFF



ZS1090-0013

- for wire cross section **AWG22**, (0.34 mm²)

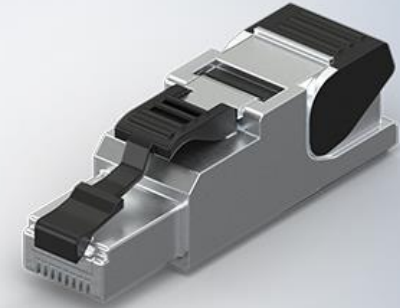
ZS1090-0015

- for wire cross section **AWG24...AWG26**, (0.25 mm²...0.14 mm²)

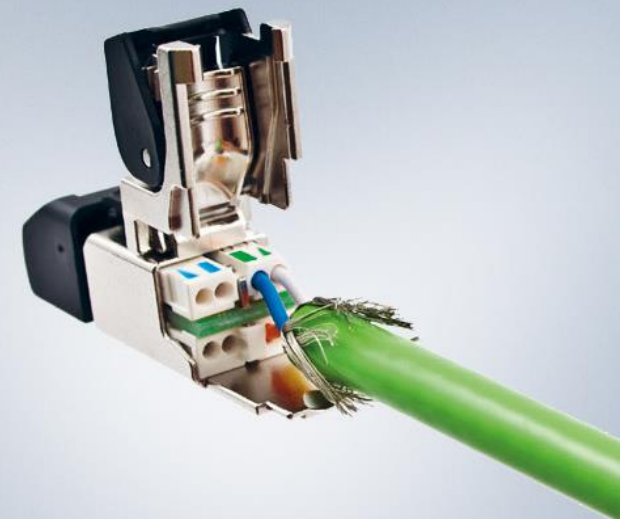
- suitable for Cat.5, Cat.6 and Cat.6a
- uniform design, fast installation
- articles available from stock

- data sheets, assembly instruction available online

NEW



Anschluss/Connection			Anwendung/Application	
Farbcode Colour code T568B	EtherCAT	RJ45 PIN Nr./No.	EtherCAT / Ind. Ethernet	EtherCAT G / G10 / Ind.Ethernet
W - O	YE	1	•	•
O	O	2	•	•
W - G	W	3	•	•
BL	-	4		•
W - BL	-	5		•
G	BL	6	•	•
W - BR	-	7		•
BR	-	8		•



EtherCAT cable for up to 10 Gbit/s

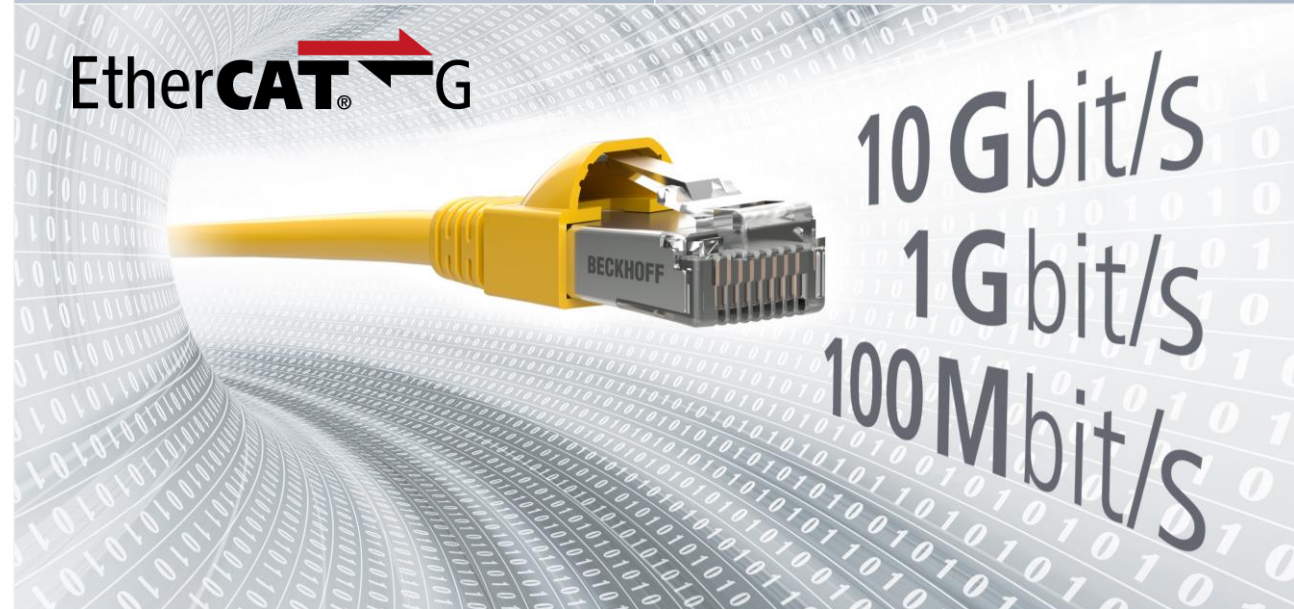
BECKHOFF

ZK1096-8181-0xxx

- plug, M12, X-coded – plug, M12, X-coded

ZK1096-8191-0xxx

- plug, M12, X-coded – RJ45
- 4 x 2 x AWG26 Cat.6a-cable for fixed installation
- data sheets available online

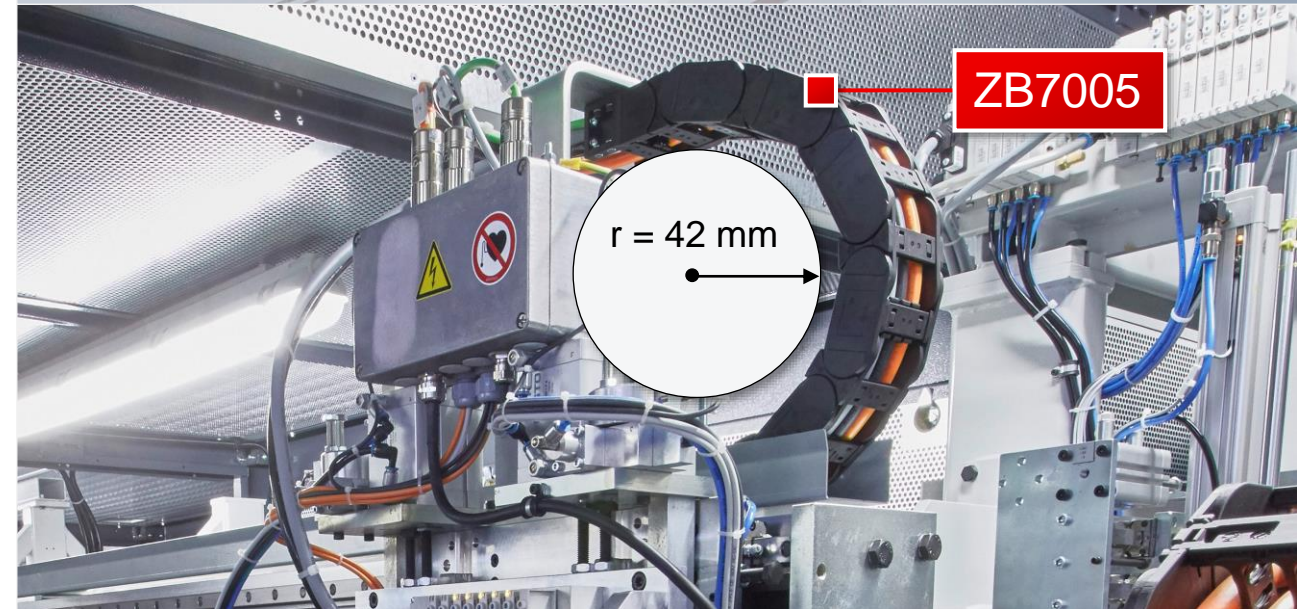
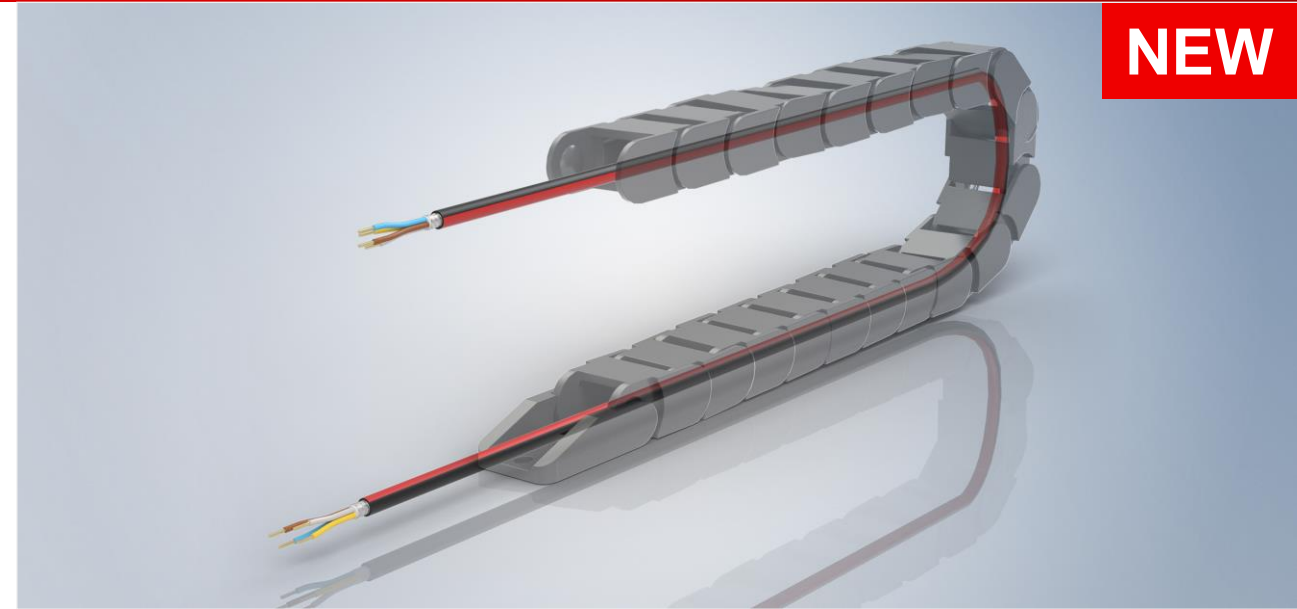


ZB7005: new raw cable

- bending radius in drag chains:
 - $r = 40 \text{ mm}$ @ 2 million cycles
 - $r = 60 \text{ mm}$ @ 5 million cycles
 - $r = 90 \text{ mm}$ @ 10 million cycles
- Bending radius of the standard cable is 100 mm @ 3 million cycles.

Advantages

- much smaller drag chains
- smaller machine footprints
- less weight



Power

BECKHOFF



L-coded M12 power cable for AMI8xxx series

BECKHOFF

ZK205x-5200-0xxx

- socket, M12, L-coded, straight

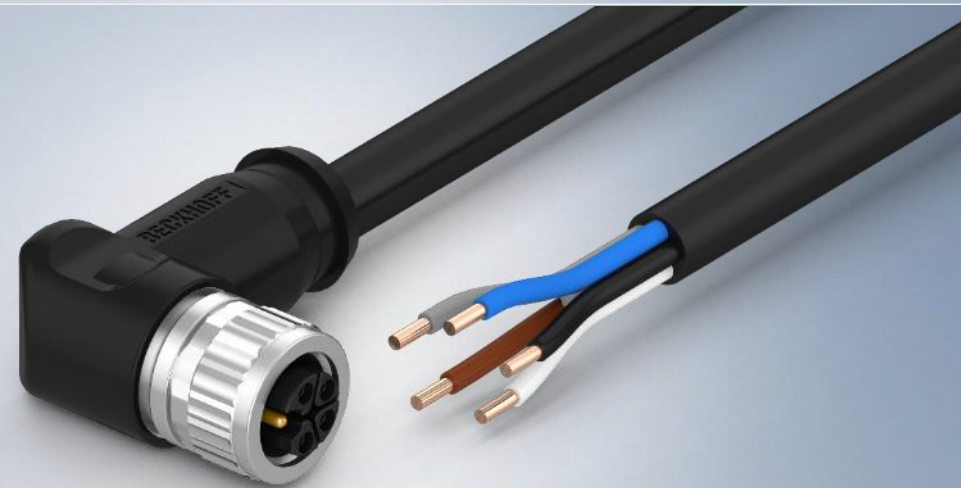
ZK205x-5400-0xxx

- socket, M12, L-coded, angled

Available with 3 different raw cables:

- 5 x 0.75 mm² for 8 A* (ZK2053-xxxx-0xxx)
- 5 x 1.5 mm² for 12 A* (ZK2050-xxxx-0xxx)
- 5 x 2.5 mm² for 16 A* (ZK2051-xxxx-0xxx)
- data sheets available online

* Maximum values are dependent on the cable and ambient temperature.



L-coded M12 power splitter for AMI8xxx series

BECKHOFF

ZS2030-4812

- T splitter, M12, L-coded
- for daisy chaining the power
 - 1 input to 2 outputs
- data sheet available online

NEW



1. News IPC
2. News I/O
3. **News Motion**
 - **Drive Technology**
 - XTS
 - XPlanar
4. News TwinCAT
5. News TwinSAFE

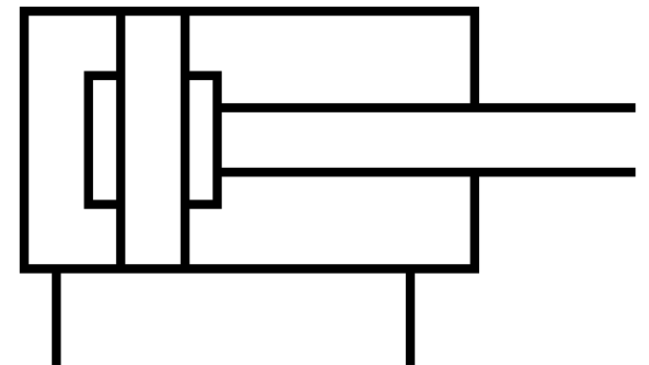
AA3000 | Electric cylinder

BECKHOFF



Key facts

- generally higher efficiency in converting electricity into motion (no detour via compressed air)
- Change-over from pneumatics to electric cylinders offers technical and economic advantages.



Example calculation of a box folding machine with 6 axes:

Quantity	Standard cylinder	Cont. force (6 bar)	Stroke (single)	Cycles per minute	Electric cylinder
2	∅ 40 mm	680 N	150 mm	60	AA3023
2	∅ 63 mm	1680 N	200 mm	30	AA3033
2	∅ 100 mm	4240 N	250 mm	15	AA3053

Comparison of annual consumption in three-shift operation (7500 hours/year):

Quantity	Standard cylinder	Consumption per year	Electric cylinder	Consumption per year
2	∅ 40 mm	167,478 m ³	AA3023	4200 kWh
2	∅ 63 mm	241,723 m ³	AA3033	10,900 kWh
2	∅ 100 mm	368,077 m ³	AA3053	18,500 kWh
	Total	777,277 m ³	Total	33,600 kWh

Example calculation of a box folding machine with 6 axes:

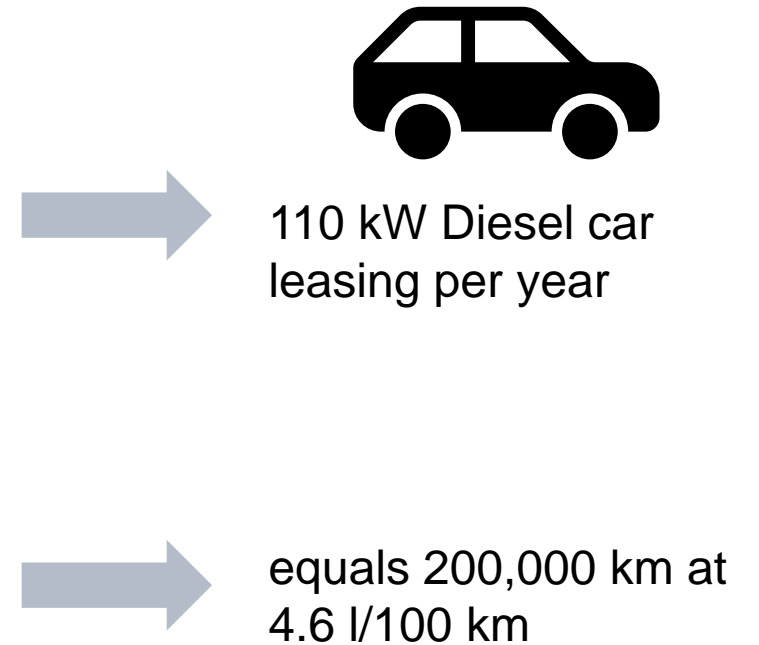
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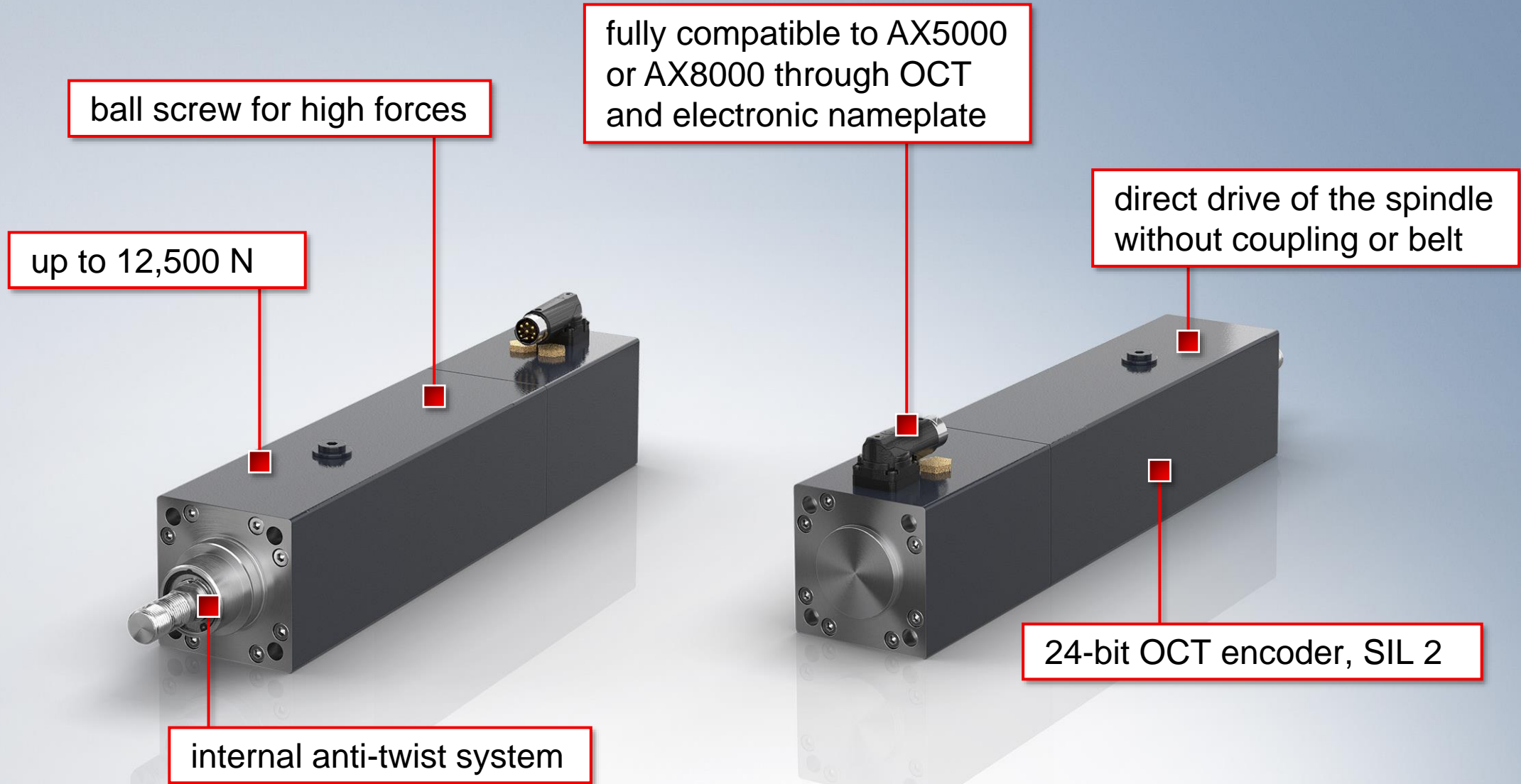
Quantity	Standard cylinder	Consumption per year	Electric cylinder	Consumption per year	
2	∅ 40 mm	20,100 kWh	AA3023	4200 kWh	-79.1%
2	∅ 63 mm	29,000 kWh	AA3033	10,900 kWh	-62.4%
2	∅ 100 mm	44,200 kWh	AA3053	18,500 kWh	-58.1%
	Total	93,300 kWh	Total	33,600 kWh	-64.0%

What do these savings mean?

Operating costs per year (for 6 axes)	
Pneumatics (0.02 €/m ³)	Electric cylinder (0.18 €/kWh)
16,800 €	6,050 €
Savings per year	10,750 €
Converted CO ₂ emissions per year (German electricity mix @ 0,4 kg/kWh)	
Pneumatics	Electric cylinder
37.32 t	13.44 t
Savings per year	23.88 t



- Sample calculation shows savings potential.
- Know-how on TCO is being further developed.



New features

- housing fully compatible to ISO 15552
- rear mounting points added
- spindle drive revised
- lubrication system revised
- 24-bit SIL 2 encoder integrated

NEW



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



- new fans in IP 65 protection rating available for AM805x/AM806x/AM807x and AM855x/AM856x
- connection via ZK4054-6400-00xx M12 standard fan cable

- order code:

AM8063-wQy**C**-0000



without holding brake

AM8063-wQy**D**-0000

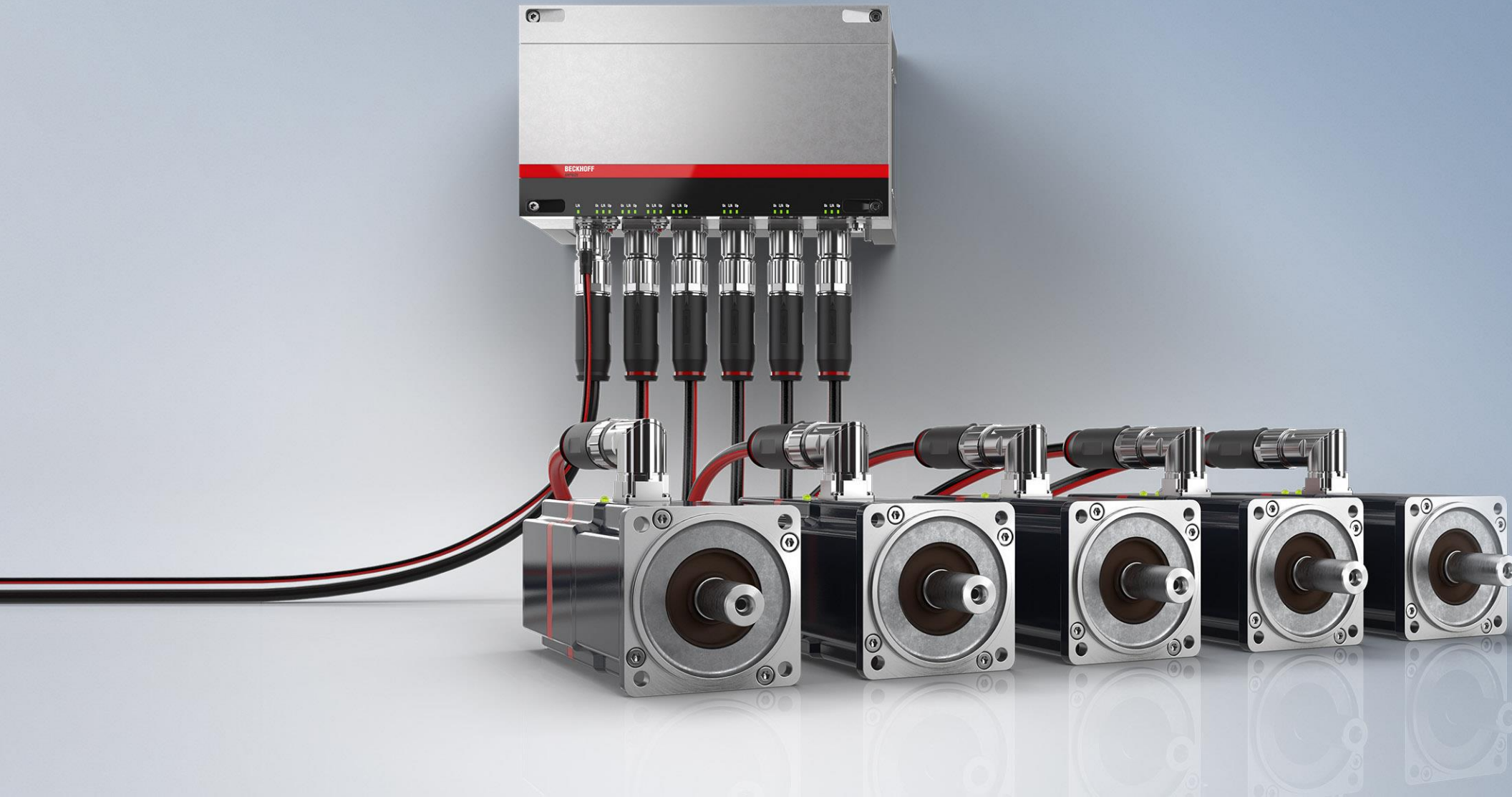


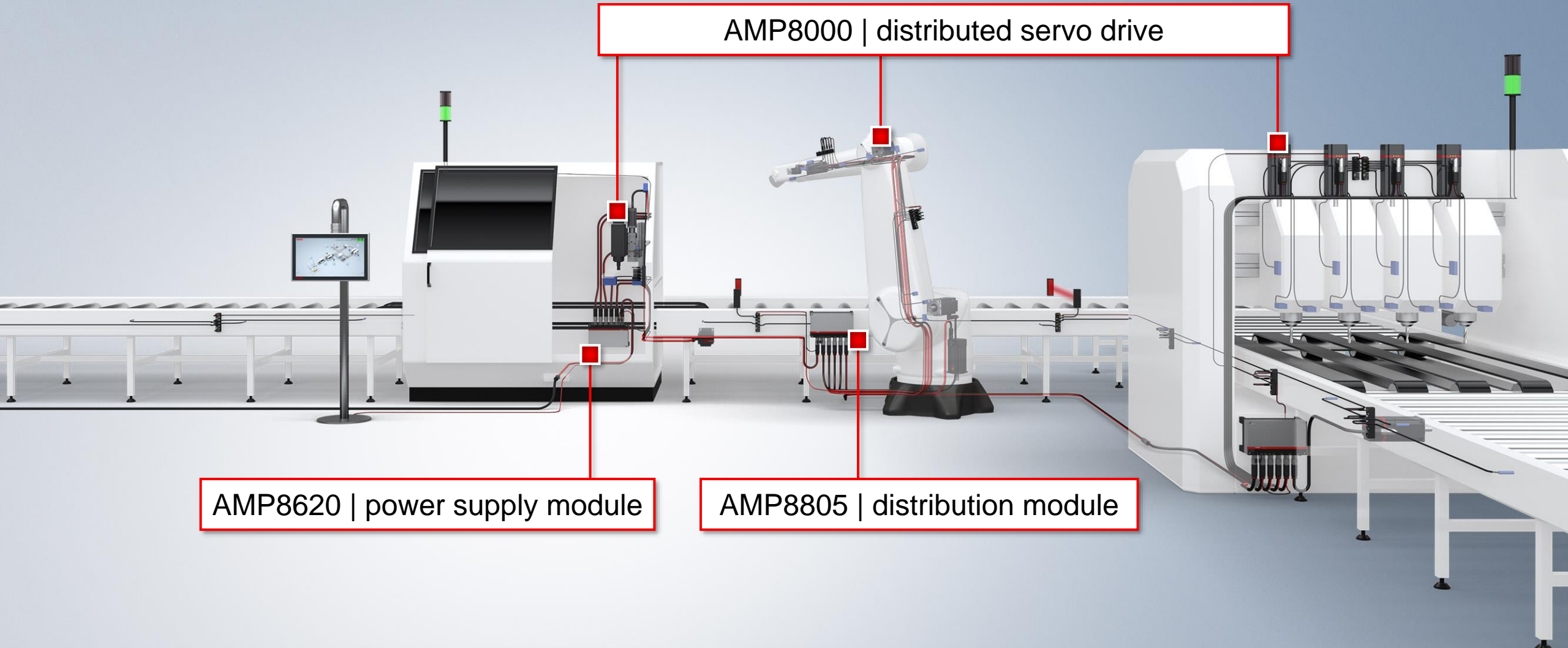
with holding brake



AMP8000 | Distributed Servo Drive system

BECKHOFF



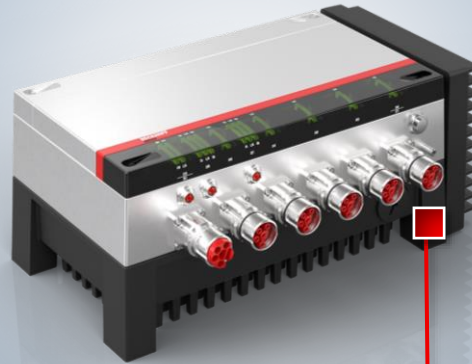


AMP8620-2005-0000



- energy storage

AMP8620-2005-0100



- energy storage
- regen resistor

AMP8620-2005-0200



- energy storage
- connector for external regen resistor

AMP8805-1000-0000



AX8831-0000-0000

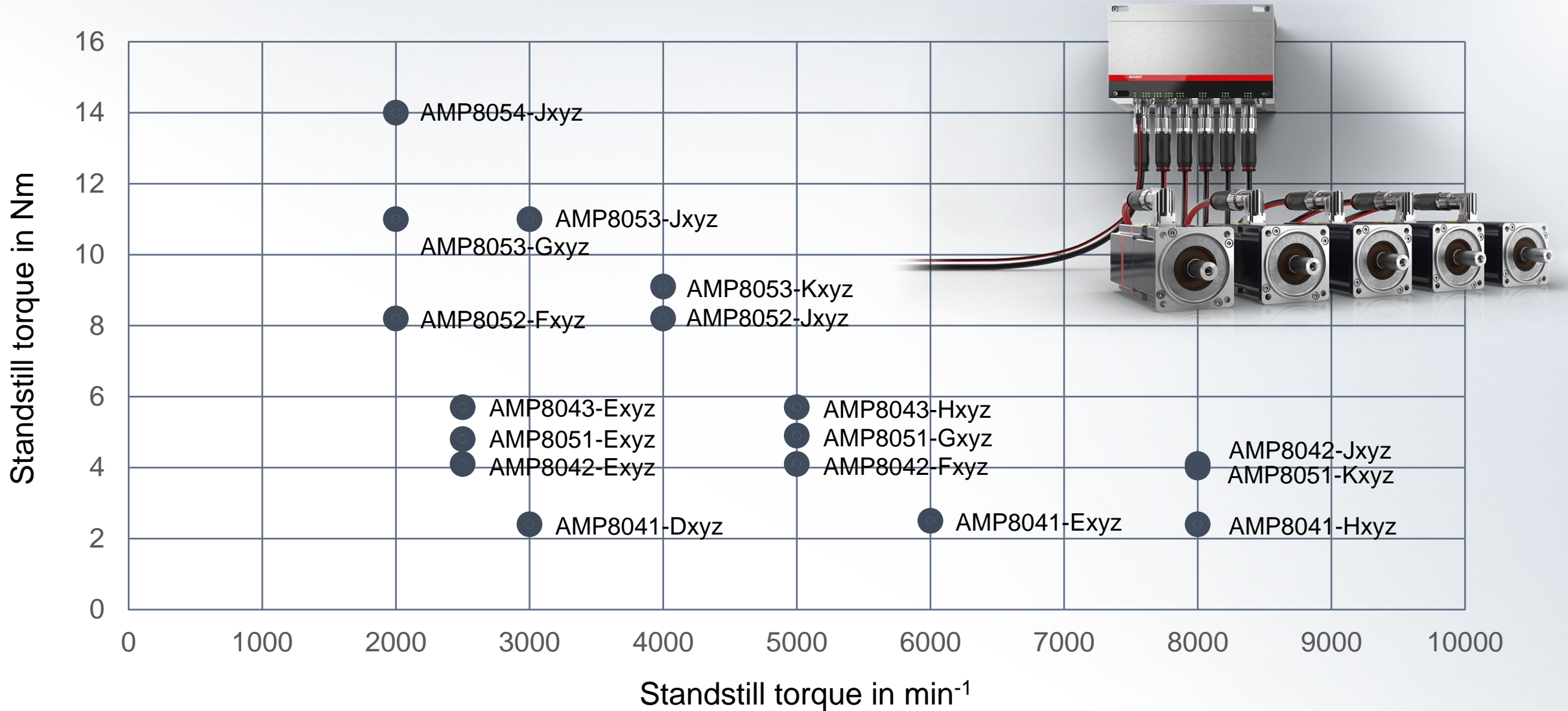


AX8832-0000-0000



AMP8000 | Available Distributed Servo Drives

BECKHOFF



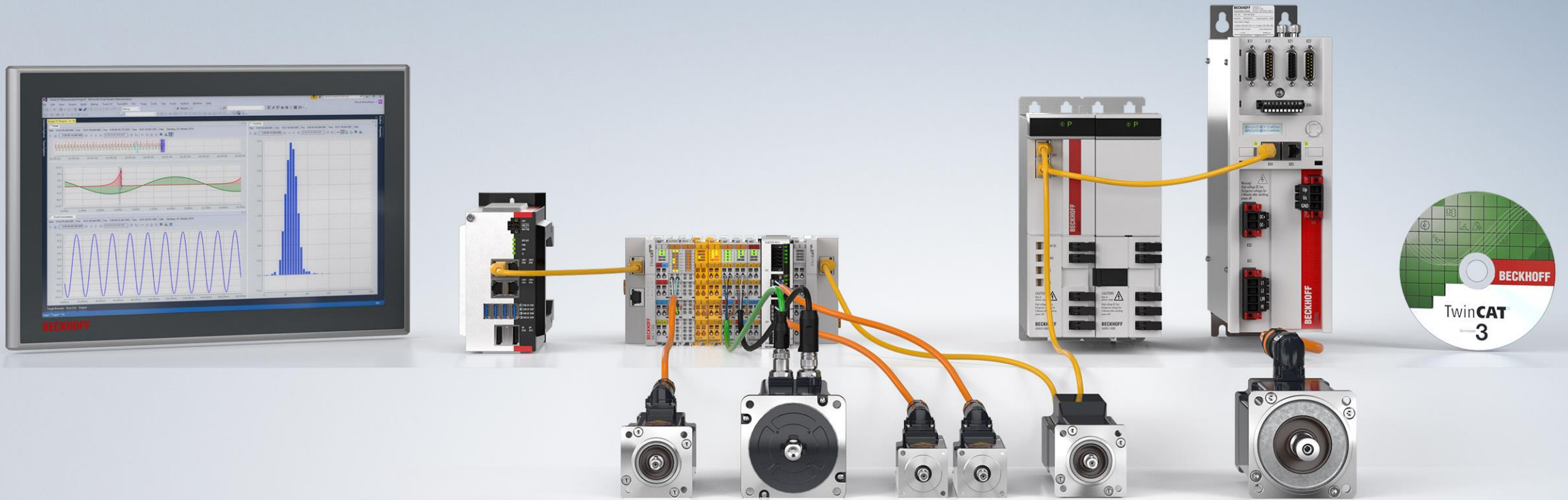
AMP8000 | New windings

BECKHOFF

	AMP8041-Hxyz	AMP8042-Fxyz	AMP8042-Jxyz	AMP8043-Hxyz	
Rated voltage	0...848 V DC	0...848 V DC	0...848 V DC	0...848 V DC	
Standstill torque	2.40 Nm	4.10 Nm	4.10 Nm	5.70 Nm	
Rated torque	2.10 Nm	3.70 Nm	3.10 Nm	4.90 Nm	
Peak torque	7.10 Nm	15.0 Nm	9.70 Nm	17.0 Nm	
Rated speed	8000 min ⁻¹	5000 min ⁻¹	8000 min ⁻¹	5000 min ⁻¹	
Rated power	1.80 kW	1.90 kW	2.60 kW	2.60 kW	
Rotor moment of inertia	1.10 kgcm ²	2.0 kgcm ²	2.0 kgcm ²	2.90 kgcm ²	
	AMP8051-Kxyz	AMP8052-Jxyz	AMP8053-Jxyz	AMP8053-Kxyz	AMP8054-Jxyz
Rated voltage	0...848 V DC	0...848 V DC	0...848 V DC	0...848 V DC	0...848 V DC
Standstill torque	4.00 Nm	8.20 Nm	11.0 Nm	9.10 Nm	14.0 Nm
Rated torque	3.9 Nm	6.9 Nm	9.0 Nm	8.4 Nm	10 Nm
Peak torque	9.20 Nm	21.0 Nm	27.0 Nm	21.0 Nm	34.0 Nm
Rated speed	8000 min ⁻¹	4000 min ⁻¹	3000 min ⁻¹	4000 min ⁻¹	2000 min ⁻¹
Rated power	3.3 kW	2.9 kW	2.8 kW	3.5 kW	2.2 kW
Rotor moment of inertia	2.3 kgcm ²	4.1 kgcm ²	5.9 kgcm ²	5.9 kgcm ²	7.9 kgcm ²

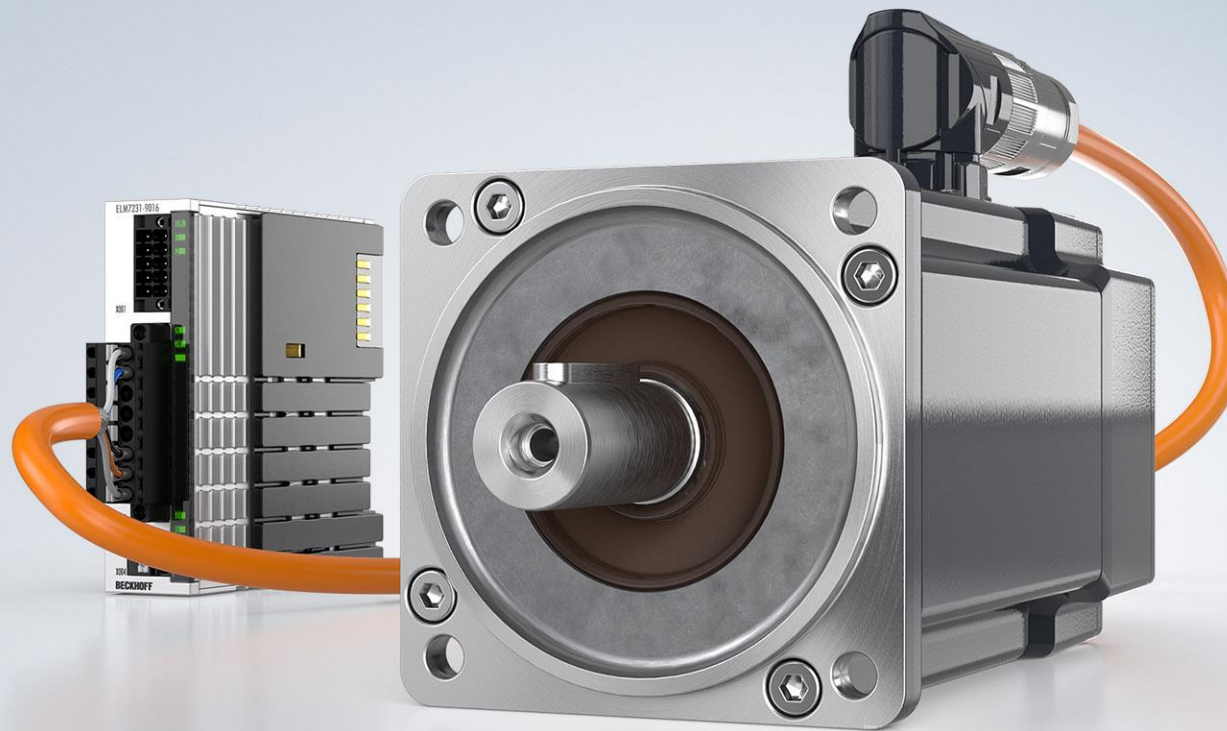
Compact drive technology

BECKHOFF



AM8100 | New motors for ELM7231

BECKHOFF



AM8100 | New motors for ELM7231

BECKHOFF

24-bit OCT encoder, SIL 2

speeds from 1500 to 8000 rpm

power range 580...620 W



AM8100 | New motors for ELM7231

BECKHOFF

- AM812x, AM813x, AM814x with winding code **N**
- nominal speed 1500 up to 8000 rpm
- standstill torque 0.8...3.9 Nm
- power range 580...620 Watt
- rotatable M23-speedtec[®] (compatible to AM8000 motor range)
- OCT 24-bit encoder, single- or multi-turn, SIL 2

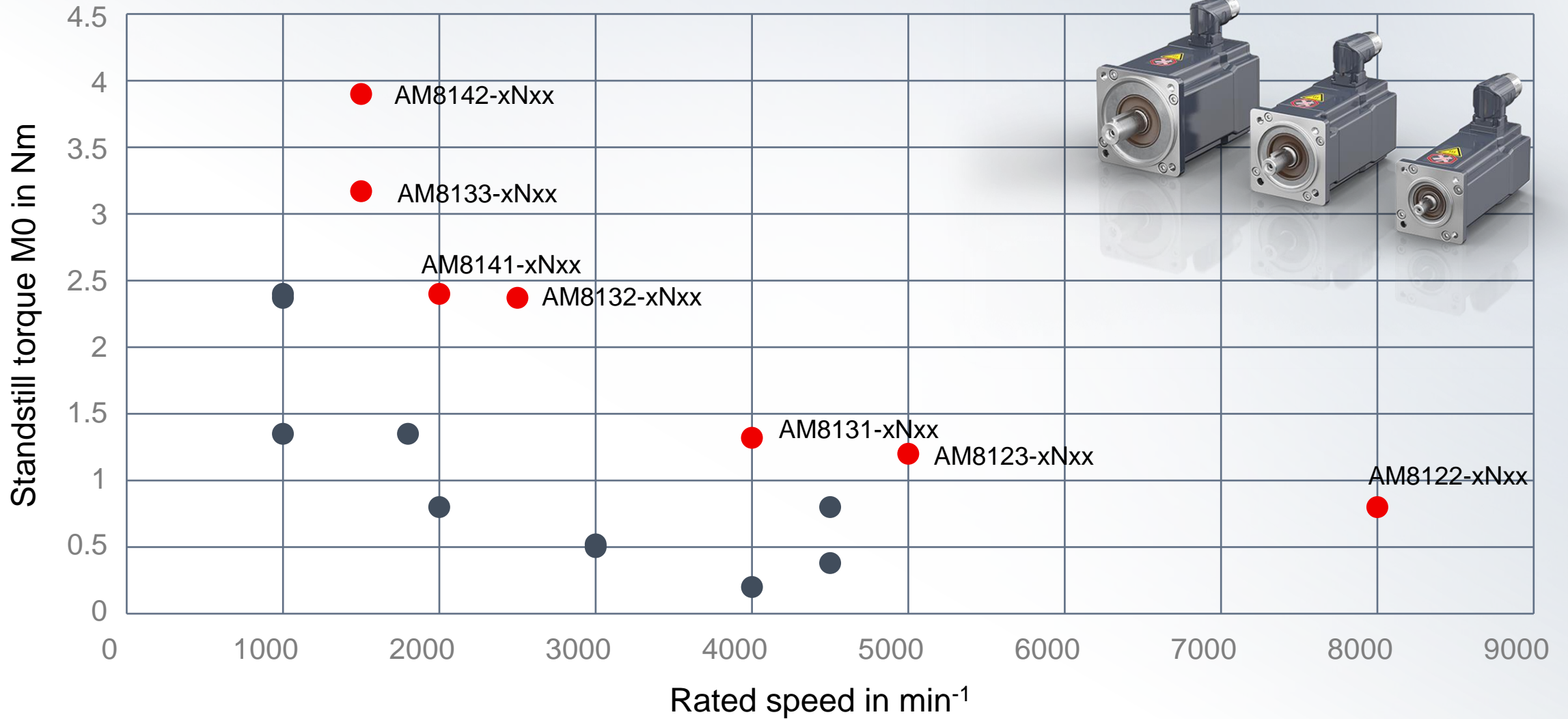
Options

- holding brake
- keyway
- shaft seal



AM8100 | New motors for ELM7231

BECKHOFF

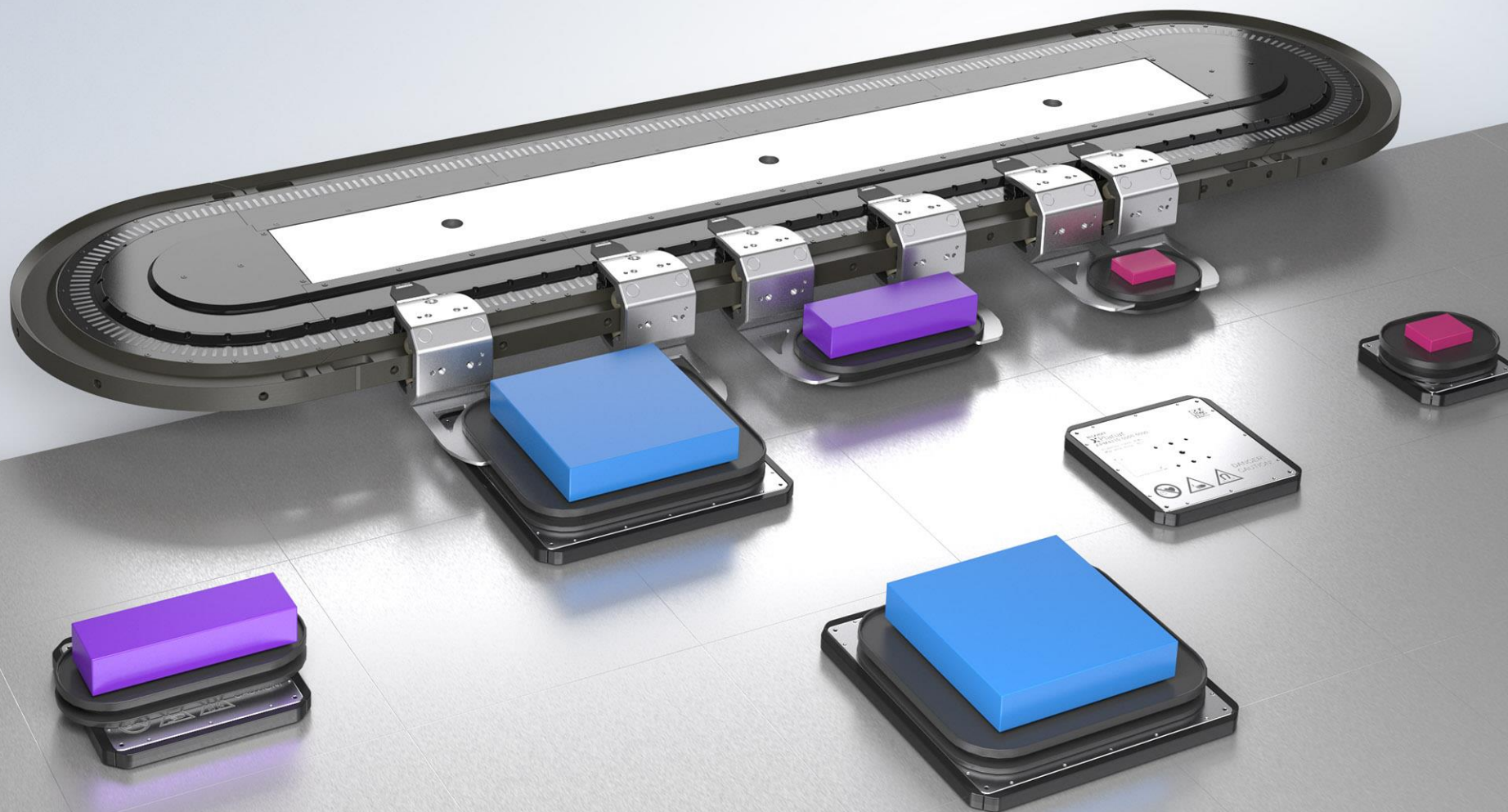


AM8100 | New motors for ELM7231

BECKHOFF

	AM8122-wNy0	AM8123-wNy0	AM8131-wNy0	AM8132-wNy0
Nominal voltage	0...48 V DC	0...48 V DC	0...48 V DC	0...48 V DC
Standstill torque	0.80 Nm	1.20 Nm	1.32 Nm	2.37 Nm
Nominal torque	0.70 Nm	1.10 Nm	1.28 Nm	2.30 Nm
Peak torque	4.18 Nm	6.37 Nm	6.07 Nm	11.70 Nm
Nominal speed	8000 min ⁻¹	5000 min ⁻¹	4000 min ⁻¹	2500 min ⁻¹
Rated power	0.586 kW	0.637 kW	0.670 kW	0.602 kW
Rotor inertia	0.253 kgcm ²	0.376 kgcm ²	0.462 kgcm ²	0.842 kgcm ²
	AM8133-wNy0	AM8141-wNy0	AM8142-wNy0	
Nominal voltage	0...48 V DC	0...48 V DC	0...48 V DC	
Standstill torque	3.17 Nm	2.40 Nm	3.90 Nm	
Nominal torque	2.96 Nm	2.37 Nm	3.90 Nm	
Peak torque	17.70 Nm	9.14 Nm	18.90 Nm	
Nominal speed	2000 min ⁻¹	2500 min ⁻¹	1500 min ⁻¹	
Rated power	0.620 kW	0.620 kW	0.613 kW	
Rotor inertia	1.22 kgcm ²	1.08 kgcm ²	1.98 kgcm ²	

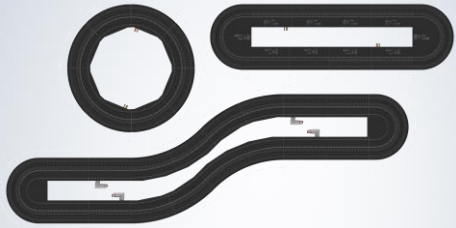
1. News IPC
2. News I/O
3. **News Motion**
 - Drive Technology
 - **XTS**
 - XPlanar
4. News TwinCAT
5. News TwinSAFE



XTS Toolbox enables customized solution concepts

BECKHOFF

Individual track layouts



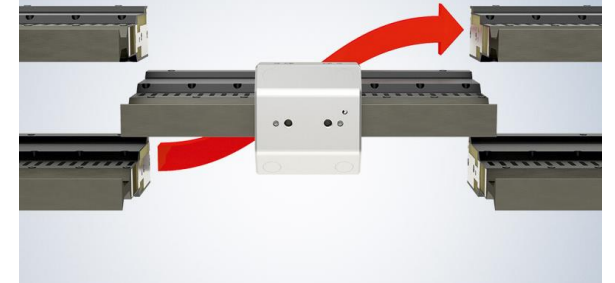
Scalable performance classes



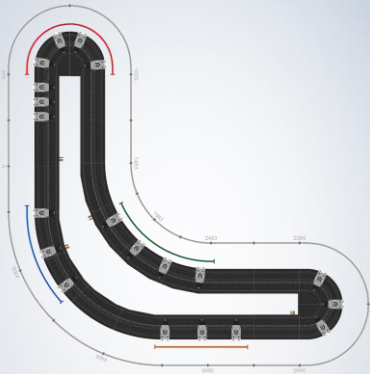
Hygienic Design



Track Management



Simulation



Support and training



Preassembled functional units

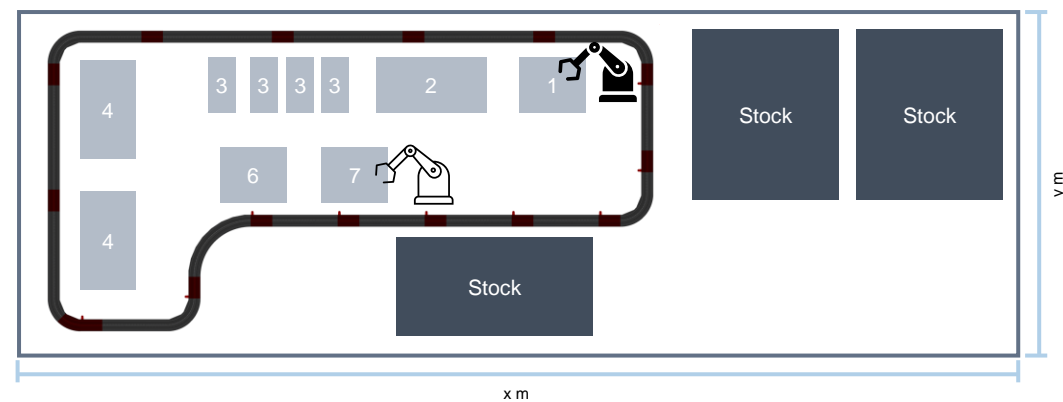
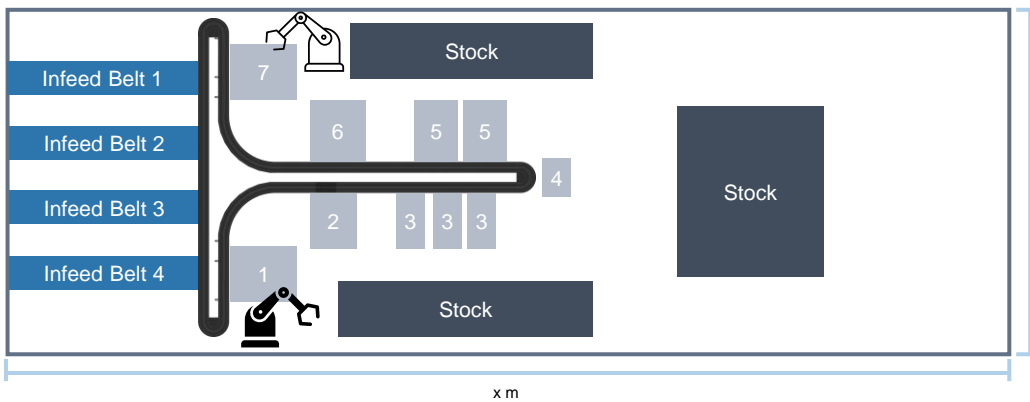
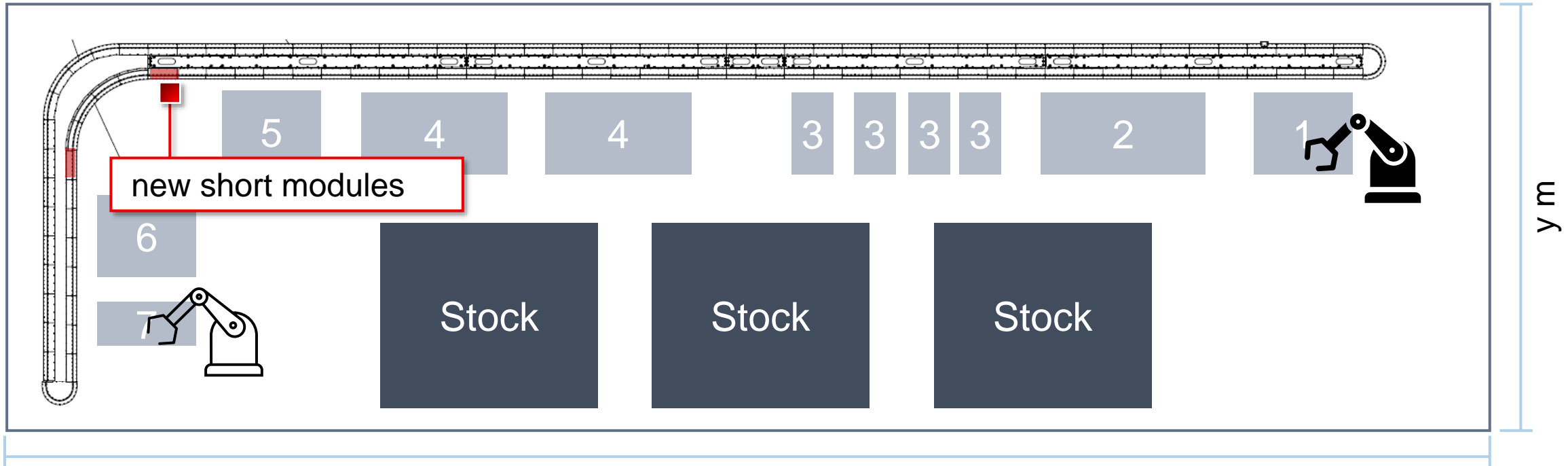


???

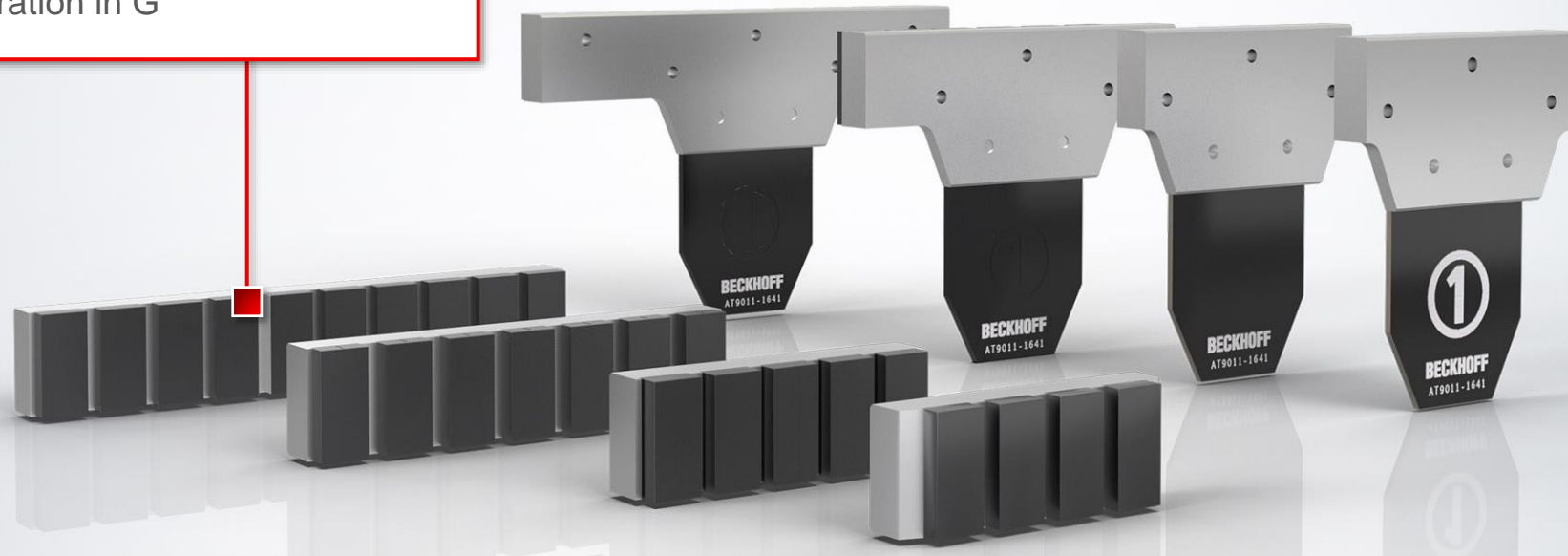
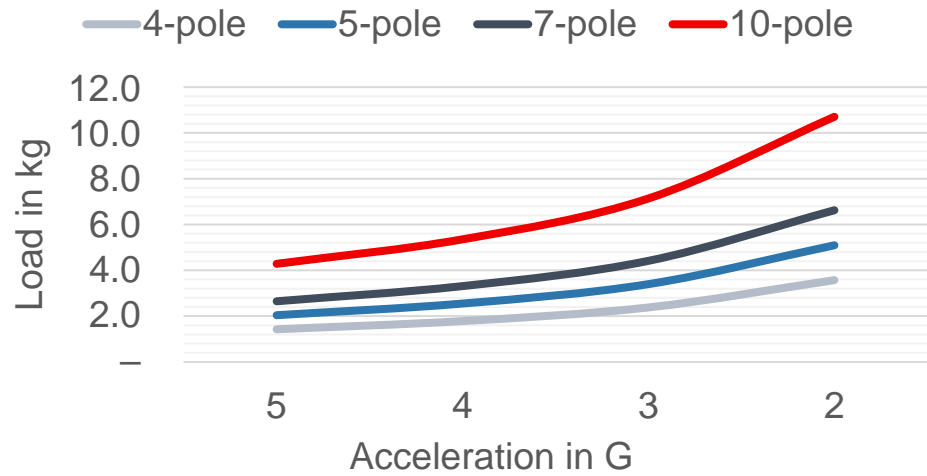


Customized conveyor tracks enable optimal use of floorspace

BECKHOFF



More magnets – more force

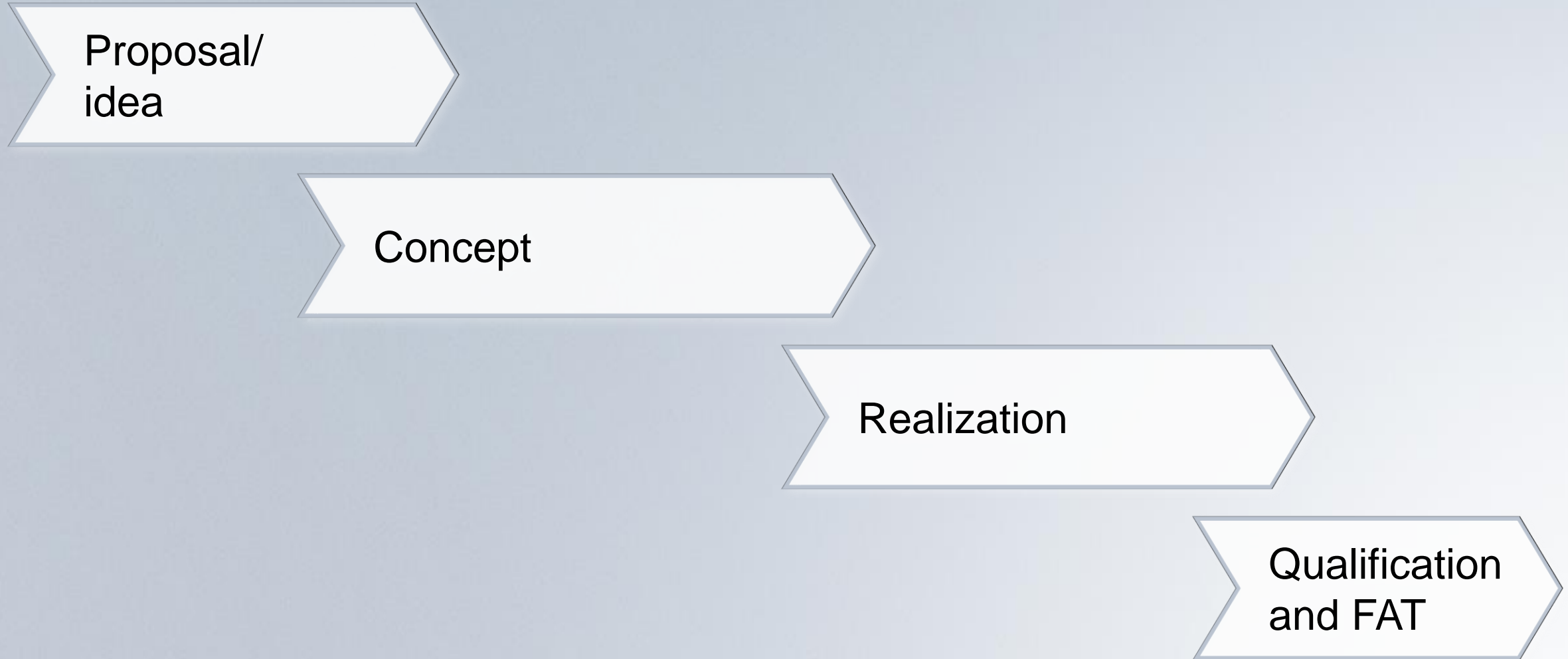


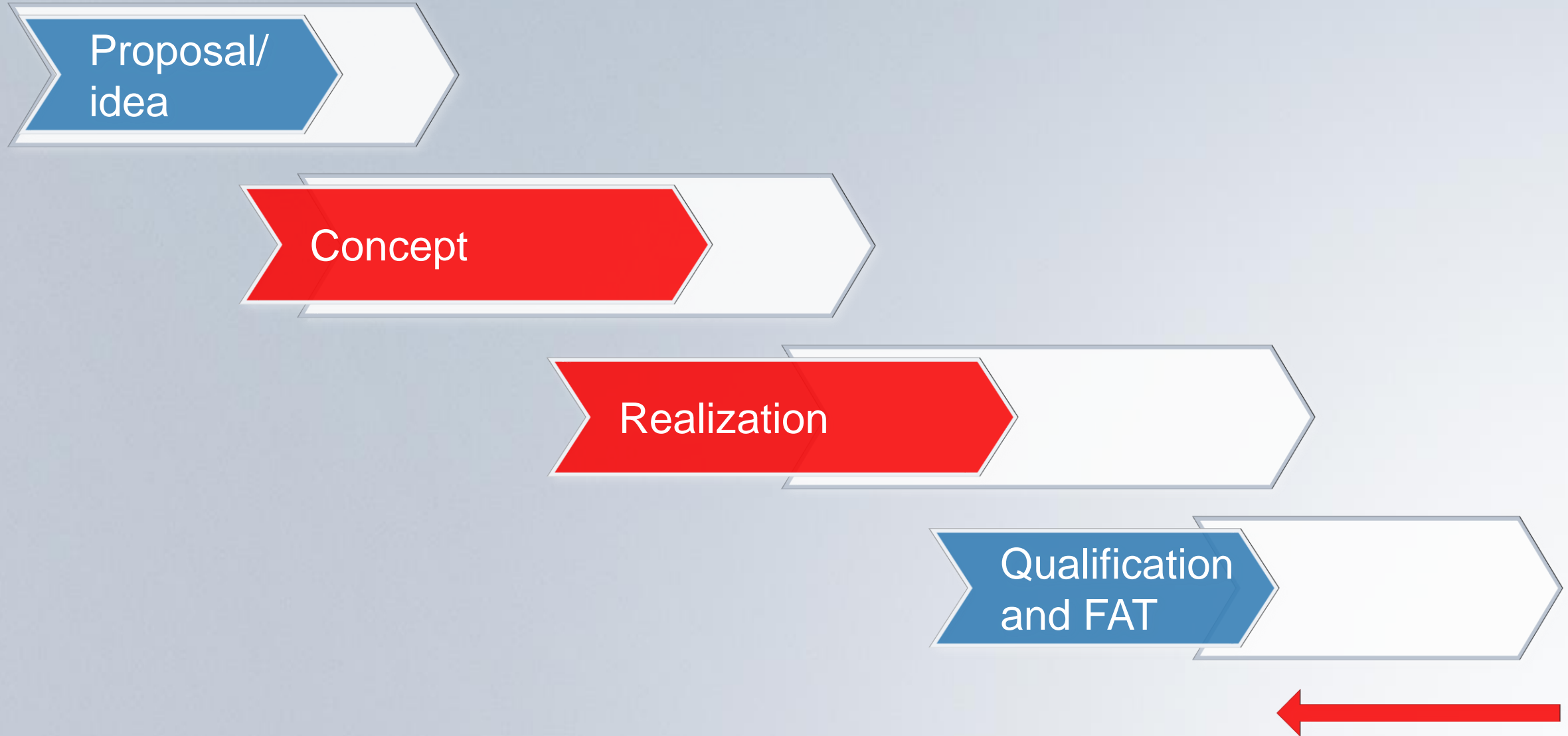
Scalable performance opens new fields of application

BECKHOFF

- Various magnetic plate configurations enable new scalability in power.
- minimal pitch of 50 mm
- Higher load capabilities offer new types of applications.
- Higher peak forces provide faster acceleration and increased product rates.
- less energy draw for the same motion (less losses and less heat)

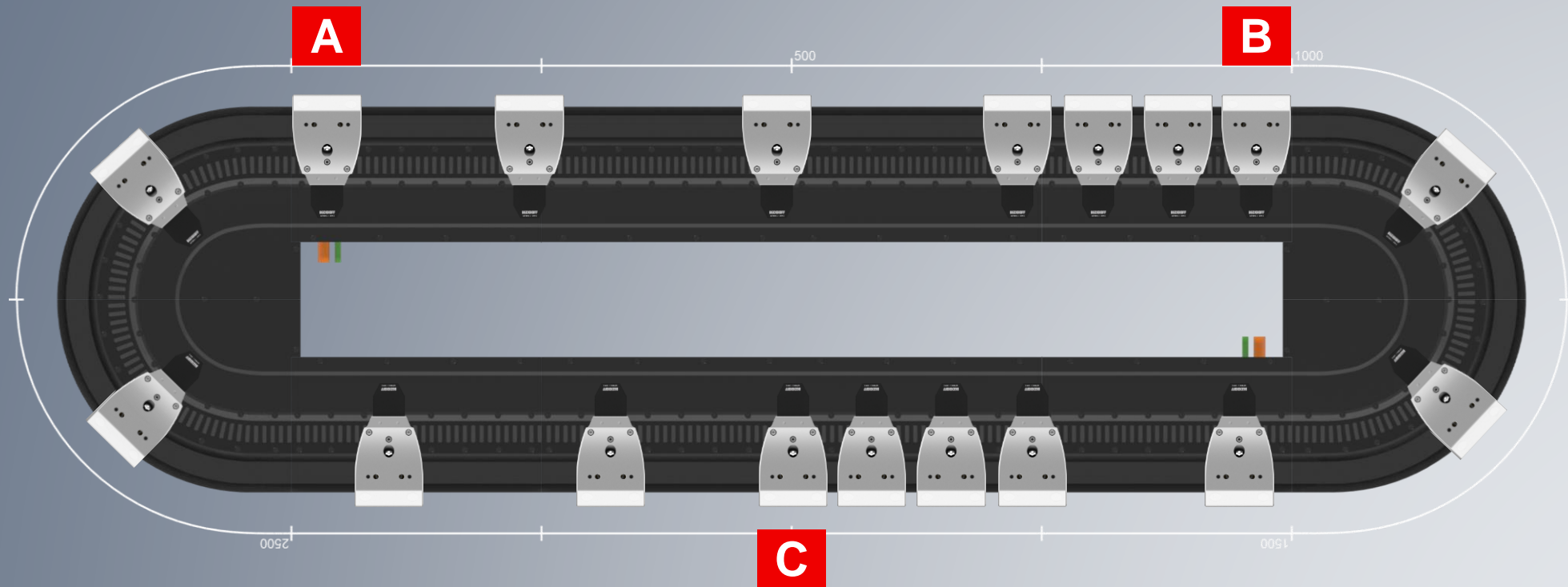






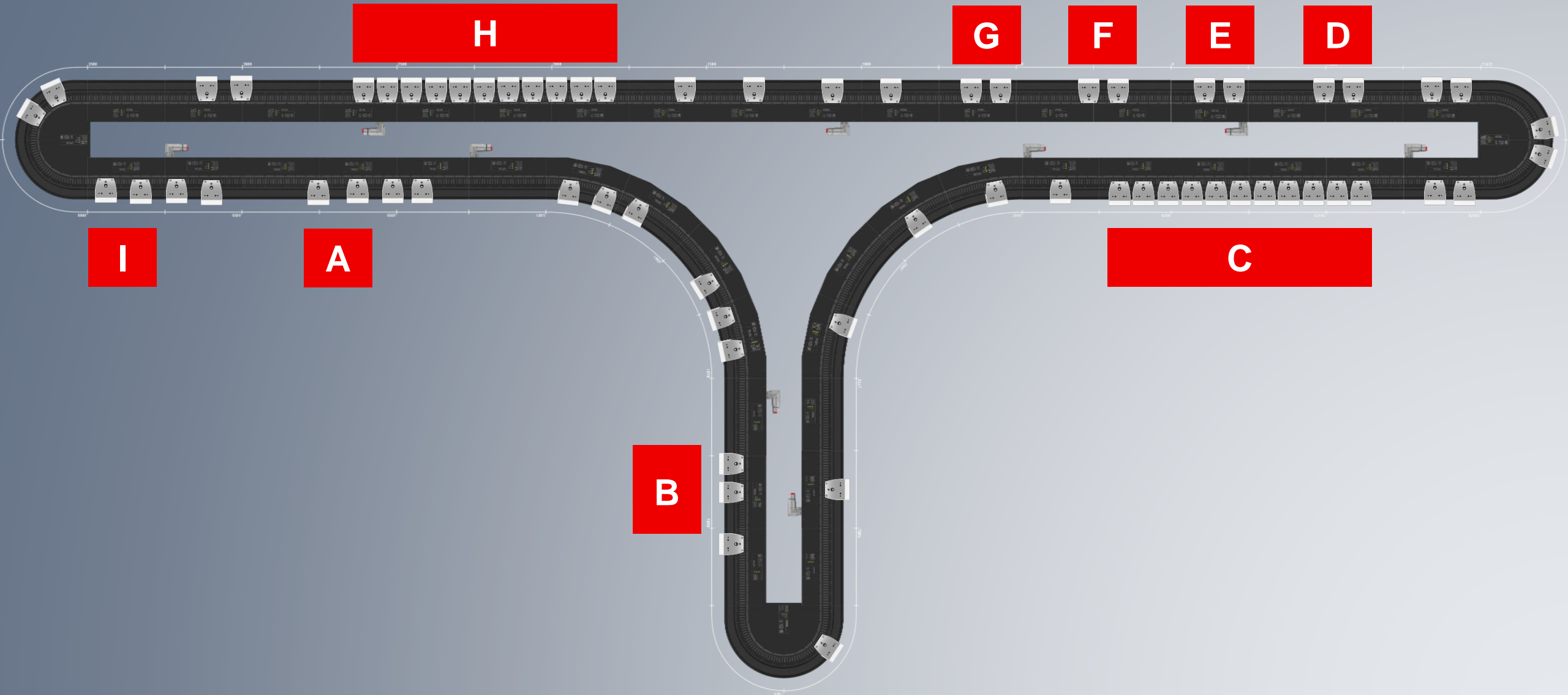
Increasing complexity in XTS system layout

BECKHOFF



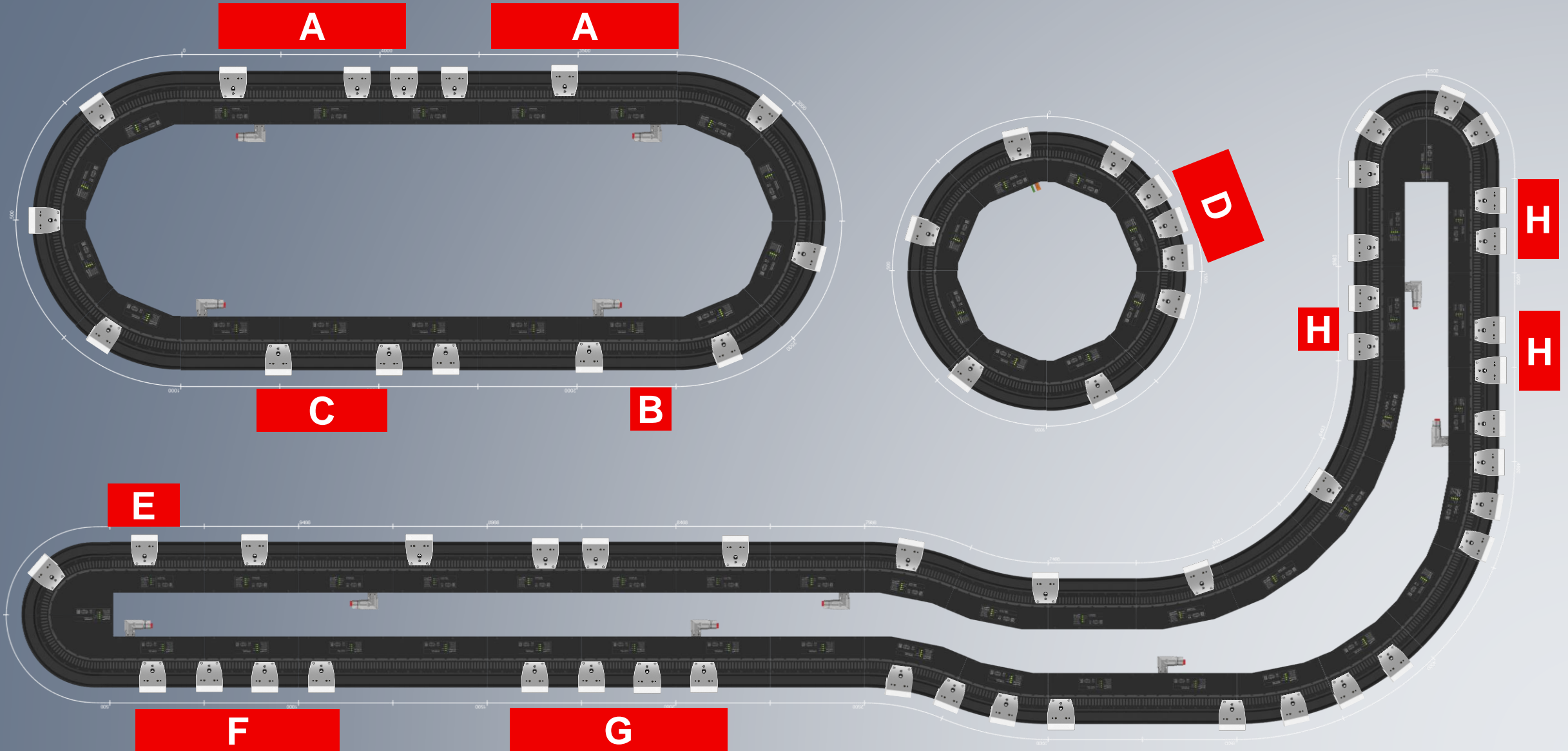
Increasing complexity in XTS system layout

BECKHOFF



Increasing complexity in XTS system layout

BECKHOFF



Visualization example with XTS HMI Control

BECKHOFF

The screenshot displays the Beckhoff XTS HMI Control interface. The main window shows a 3D visualization of a motion system, including a large motor and a curved track. The interface is titled "Motion" and includes a sidebar with navigation icons. The top right corner shows the time "13:34:38" and the Beckhoff logo. Below the visualization, there is a list of modules with their respective IDs and status indicators.

Module	ID	Status
Module 1	AT2002_0250	...
Module 2	AT2000_0233	...
Module 3	AT2000_0233	...
Module 4	AT2000_0233	...
Module 5	AT2000_0233	...
Module 6	AT2000_0233	...
Module 7	AT2000_0233	...
Module 8	AT2002_0250	...

BECKHOFF

Visualization example with XTS HMI Control

BECKHOFF

The screenshot displays the Beckhoff XTS HMI Control interface. The main window shows a 3D visualization of a robotic arm system. The interface includes a top navigation bar with the title "Motion", a clock showing "13:33:50", and the Beckhoff logo. Below the navigation bar, there are tabs for "XTS" and "AXES". A vertical sidebar on the left contains various icons for system management. The 3D model shows a robotic arm with a gripper, positioned over a work area. To the right of the 3D model is a data table listing the positions of eight mover axes. The first axis, "Mover Axis 1", is highlighted with a red exclamation mark icon, indicating an error or warning. The other axes show their current positions in millimeters.

Mover Axis	Position (mm)	Status
Mover Axis 1	63.370	Warning
Mover Axis 2	12076.006	OK
Mover Axis 3	11996.002	OK
Mover Axis 4	11915.997	OK
Mover Axis 5	11835.997	OK
Mover Axis 6	11755.999	OK
Mover Axis 7	11675.994	OK
Mover Axis 8	11596.000	OK

BECKHOFF

Visualization example with XTS HMI Control for simplified diagnostics

BECKHOFF

Mover Axis 1

63.376 mm

ACTUAL VELOCITY	2.268 mm/s	TARGET VELOCITY	0.000 mm/s
TARGET POSITION	12433.789 mm	FOLLOWING ERROR	0.460 mm
ACCELERATION	0.000 mm/s ²	ERROR ID	16992

STATUS

<input type="checkbox"/> IsEnabled	<input type="checkbox"/> InPositionArea
<input type="checkbox"/> IsReady	<input type="checkbox"/> InTargetPosition
<input type="checkbox"/> HasJob	<input checked="" type="checkbox"/> HasError
<input type="checkbox"/> IsMoving	<input type="checkbox"/> IsCoupled

Could not find any event regarding to this axis!

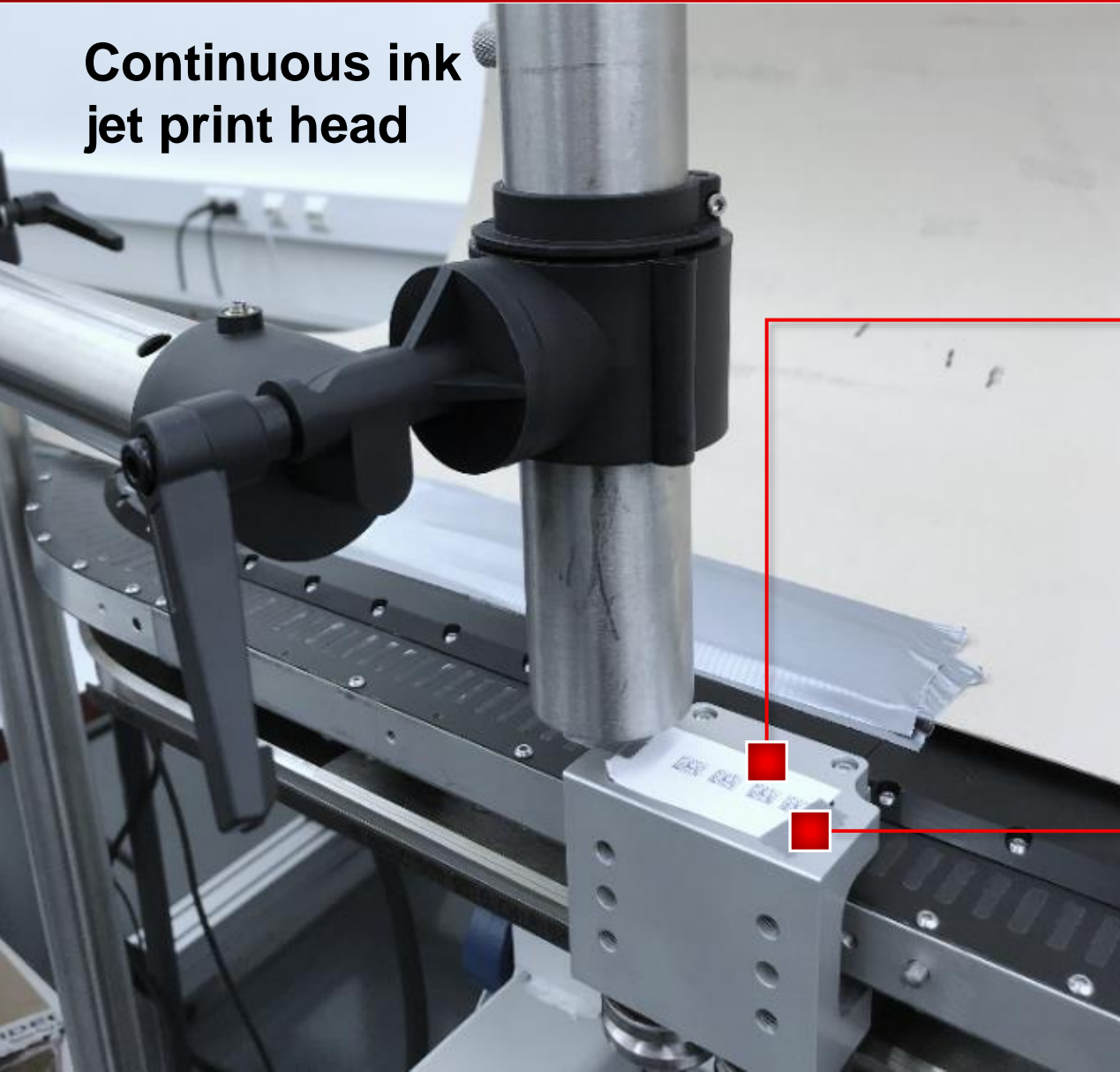
OK

BECKHOFF

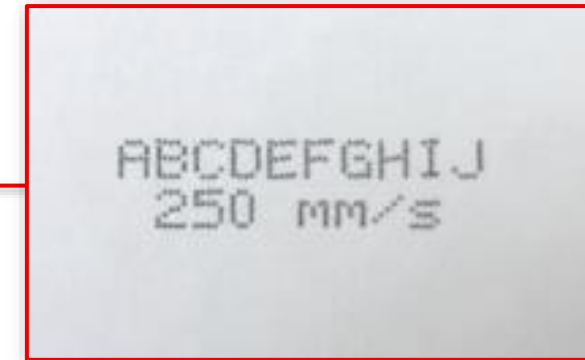
Object printing on-the-fly with XTS

BECKHOFF

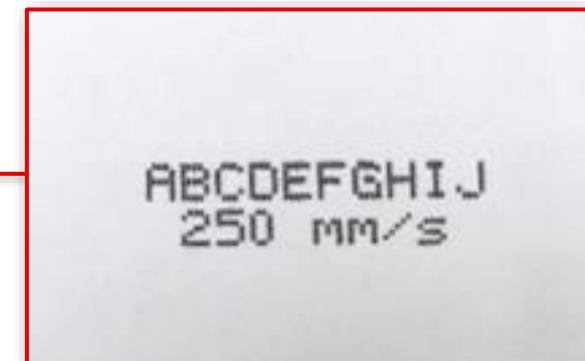
Continuous ink
jet print head



1-pass print



10-pass print



1. News IPC
2. News I/O
3. **News Motion**
 - Drive Technology
 - XTS
 - **XPlanar**
4. News TwinCAT

XPlanar: Flying Motion

BECKHOFF

XPlanar®



Release

APS4322-0000 | New connectors

BECKHOFF

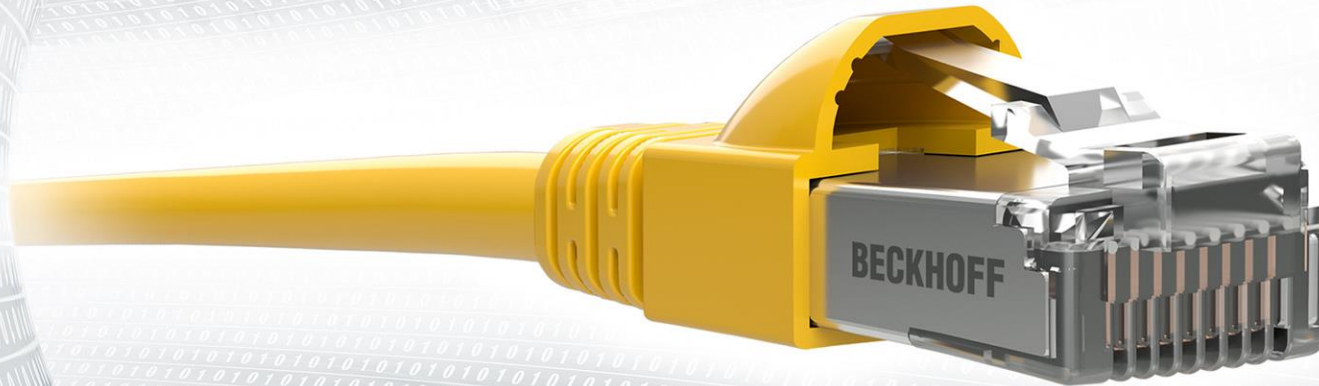


- secure mounting
- M12/M8 connectors

Release EtherCAT G update

BECKHOFF

- 12/2020: 10 tiles/master and 100 tiles/system
- further extensions under development



10 Gbit/s
1 Gbit/s
100 Mbit/s

EtherCAT[®]  G

APM4220-0000

- 115 mm x 115 mm
- 0.4 kg payload
- 2-way operation on one tile (APS4332)

APM4330-0000

- 155 mm x 155 mm
- 1.5 kg payload

APM4550-0000

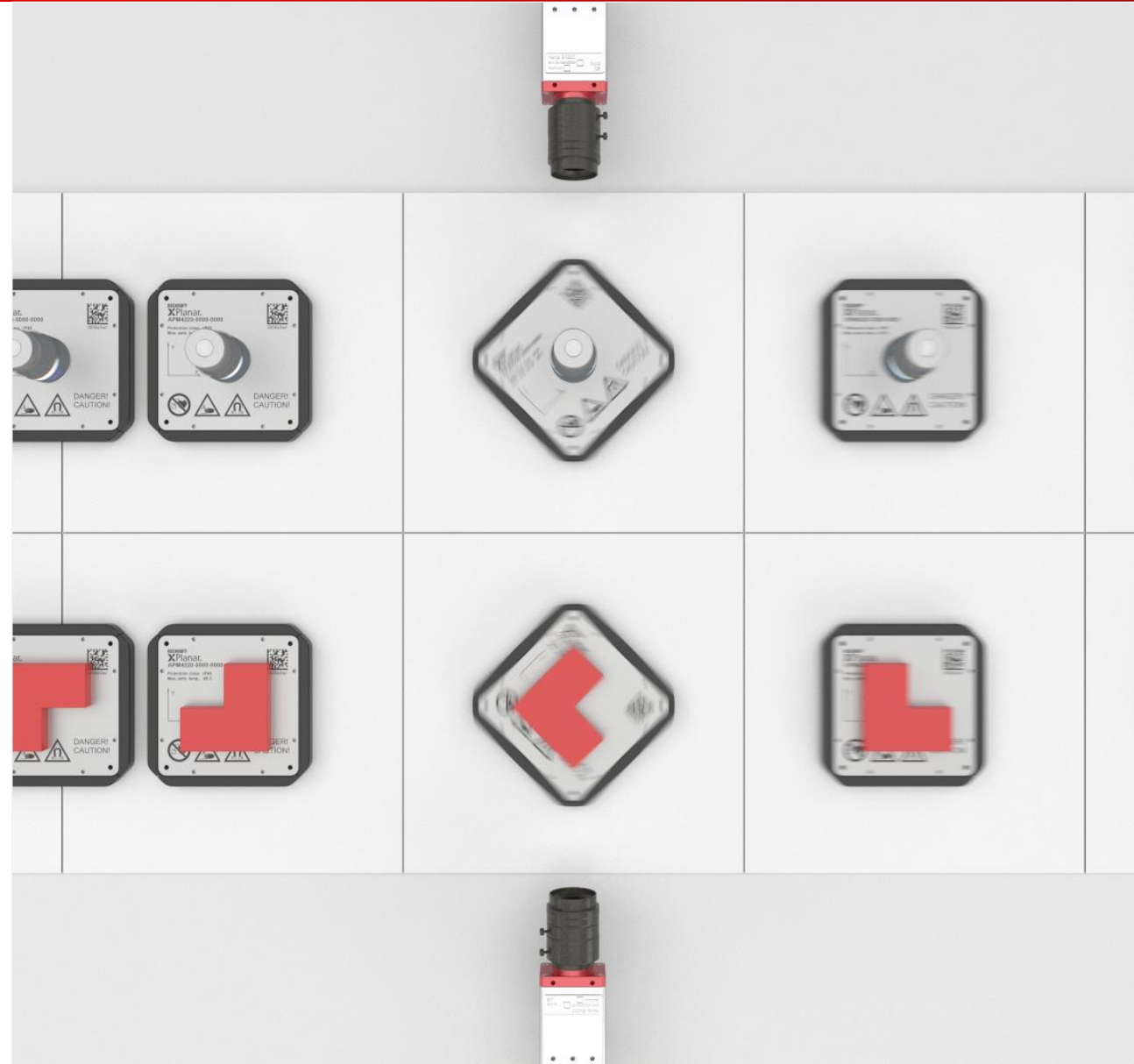
- 235 mm x 235 mm
- 4 kg payload
- 1-way operation on one tile (APS4332)



News update | 360° mover rotation

BECKHOFF

- 360° mover rotation
- up to 10 Hz
- 90° mover orientation
- available for APM4330
- possible with APS4322



- linear payload increase
- rigid coupling
- drawings available





- wireless communication between tile and mover
- unique and persistent identification of the mover
- integrated into the bumper

- encapsulated in stainless steel
- Mover ID
- 1 kg payload



1. News IPC
2. News I/O
3. News Motion
4. **News TwinCAT**
 - **TwinCAT Measurement**
 - TwinCAT 3 Motion Control
 - TwinCAT Connectivity
 - TwinCAT Industry-specific



- container in which the analytics application runs that was configured and developed in the TE3500 TC3 Analytics Workbench
- runtime can be installed locally, on remote hardware or in a virtual machine
- ideal for “headless” operation of an analysis or if a visualization of your own is already available

Features

- PLC runtime
- Analytics PLC Library
- IoT connection with MQTT and HTTPS/Rest
- storage provider connection



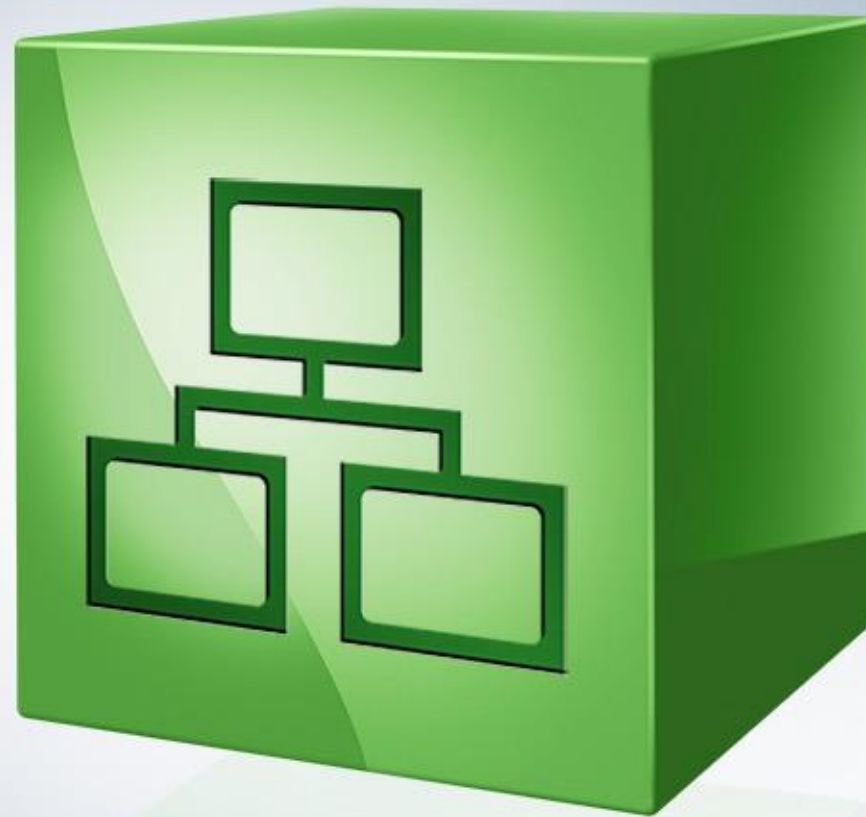
1. News IPC
2. News I/O
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4. **News TwinCAT**
 - TwinCAT Measurement
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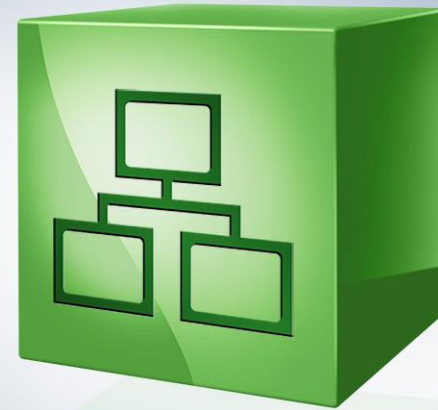
- programming interface for easy control of XPlanar movers
- definition of 2-dimensional track networks with track switching
- collision avoidance for XPlanar movers



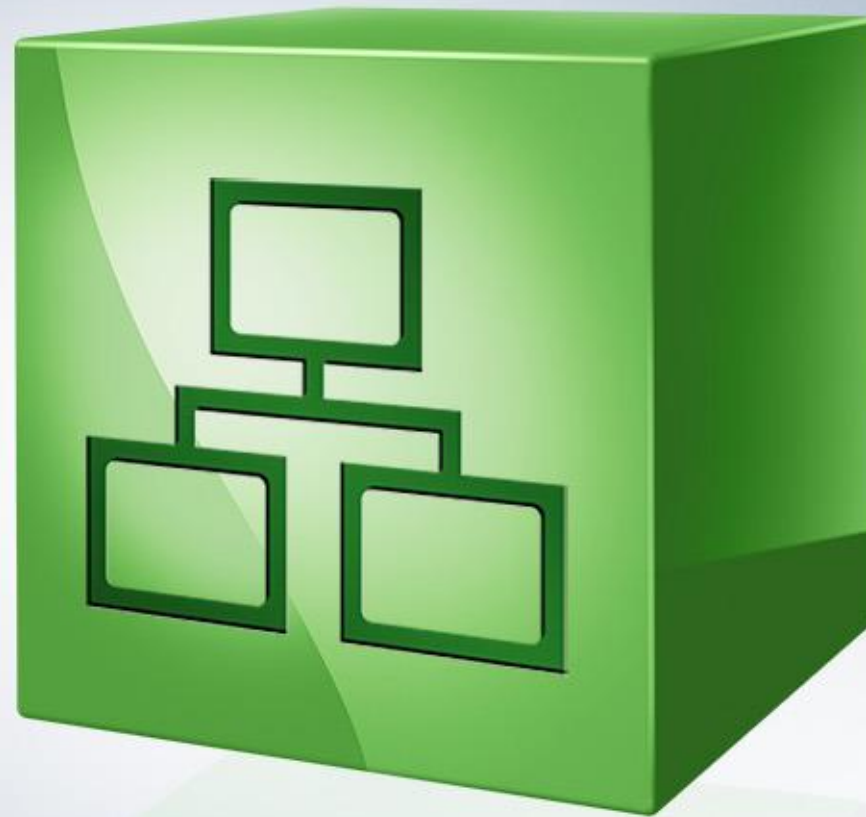
1. News IPC
2. News I/O
3. News Motion
4. **News TwinCAT**
 - TwinCAT Measurement
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 - **TwinCAT Connectivity**
 - TwinCAT Industry-specific



- The TwinCAT S7 communication function extends the wide range of communication functions further through the S7 communication protocol.
- reading and writing of S7 controller variables directly from the PLC application program, either via dynamically parameterizable PLC function blocks or via easy to configure I/O mapping
- No additional hardware is required: the local network serves as the transport medium via TCP/IP.



1. News IPC
2. News I/O
3. News Motion
4. **News TwinCAT**
 - TwinCAT Measurement
 - TwinCAT 3 Motion Control
 - TwinCAT Connectivity
 - **TwinCAT Industry-specific**



TwinCAT MTP

TwinCAT for the process industry: Module Type Package (MTP)

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TwinCAT MTP

TwinCAT for the process industry: Module Type Package (MTP)

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TwinCAT MTP

TwinCAT for the process industry: Module Type Package (MTP)

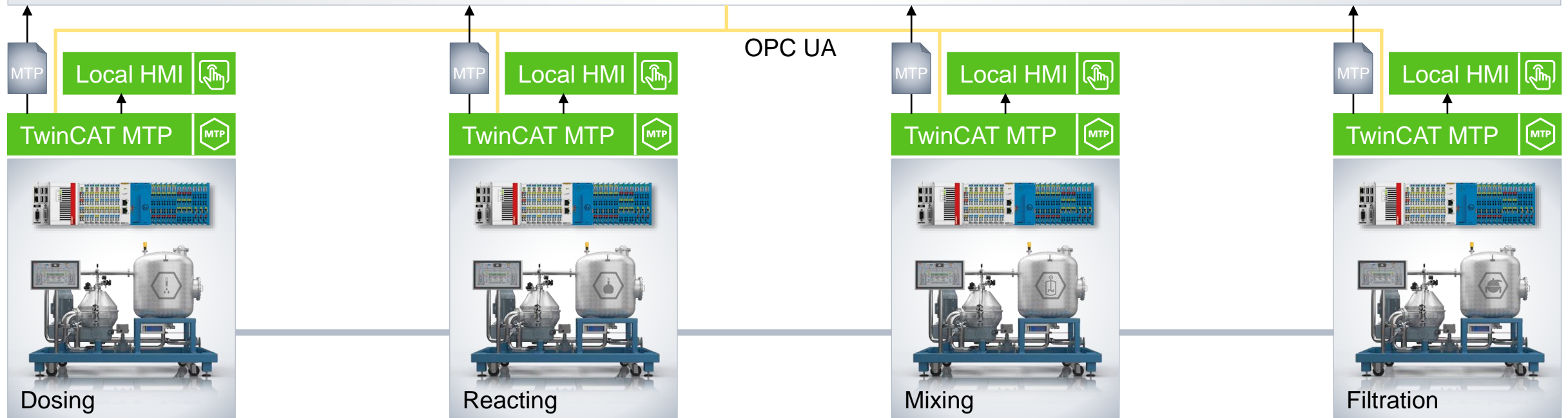
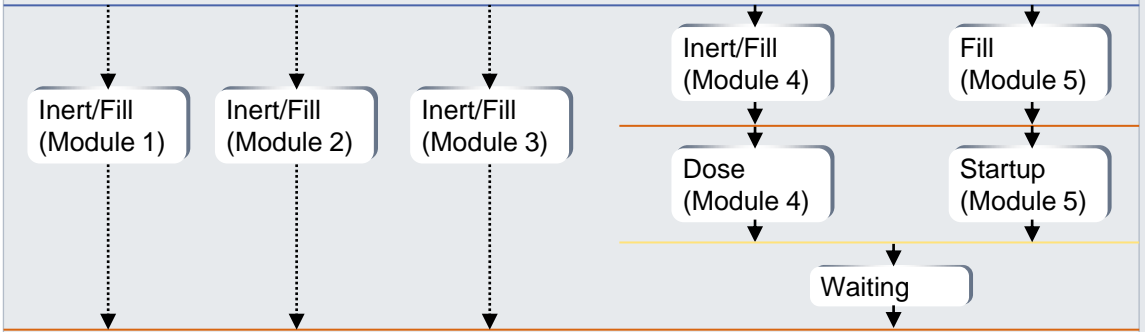
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Distributed Control System

Visualization

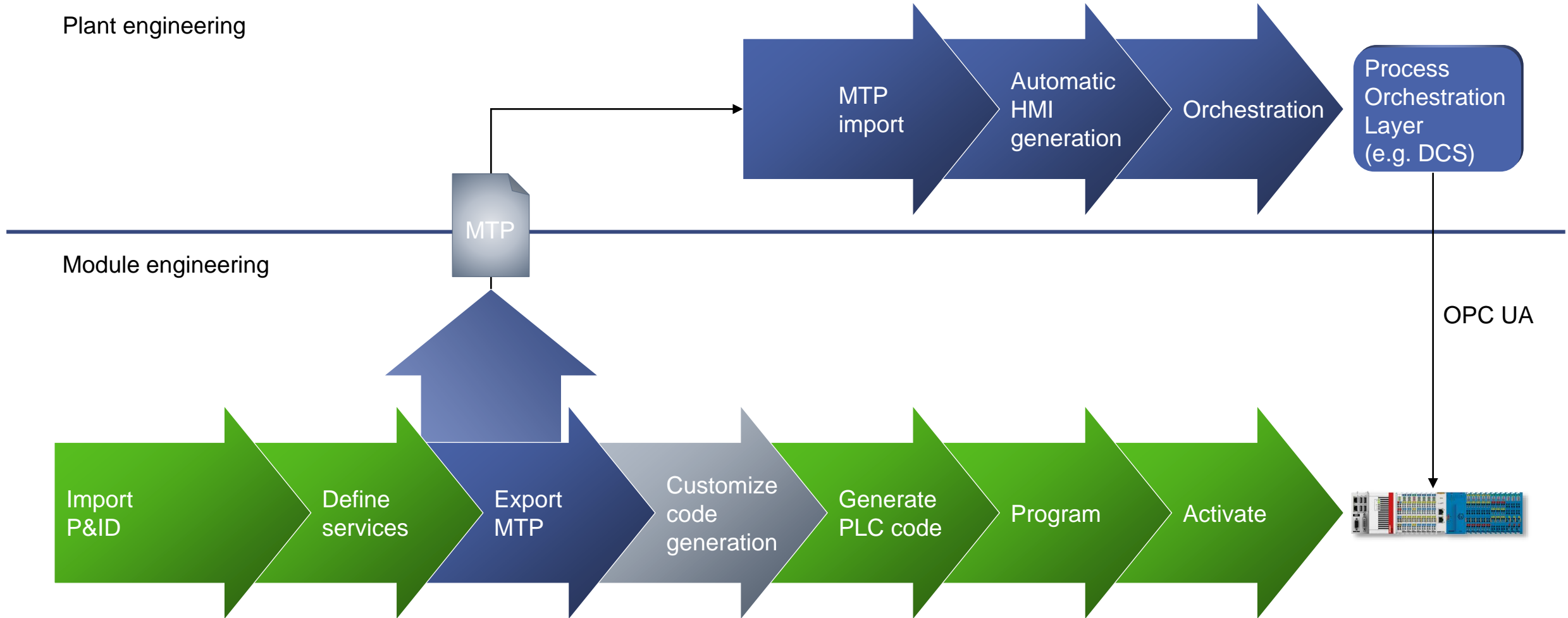


Orchestration



Module engineering with TwinCAT MTP

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TF8400 | TwinCAT MTP Runtime

- IEC 61131 library for implementing the MTP interface types

TF8401 | TwinCAT MTP Engineering

- TwinCAT project management functions for configuring the MTP



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