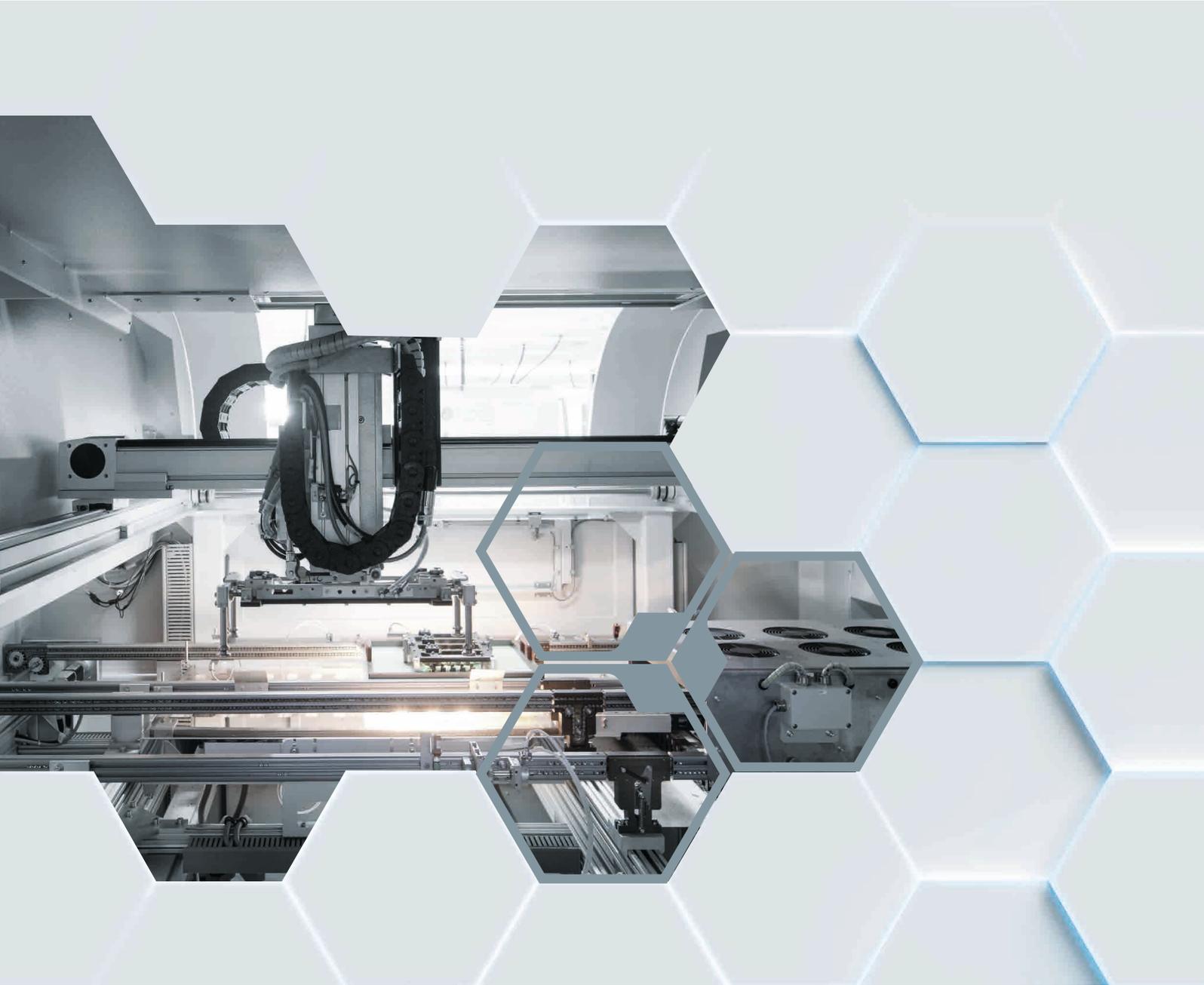


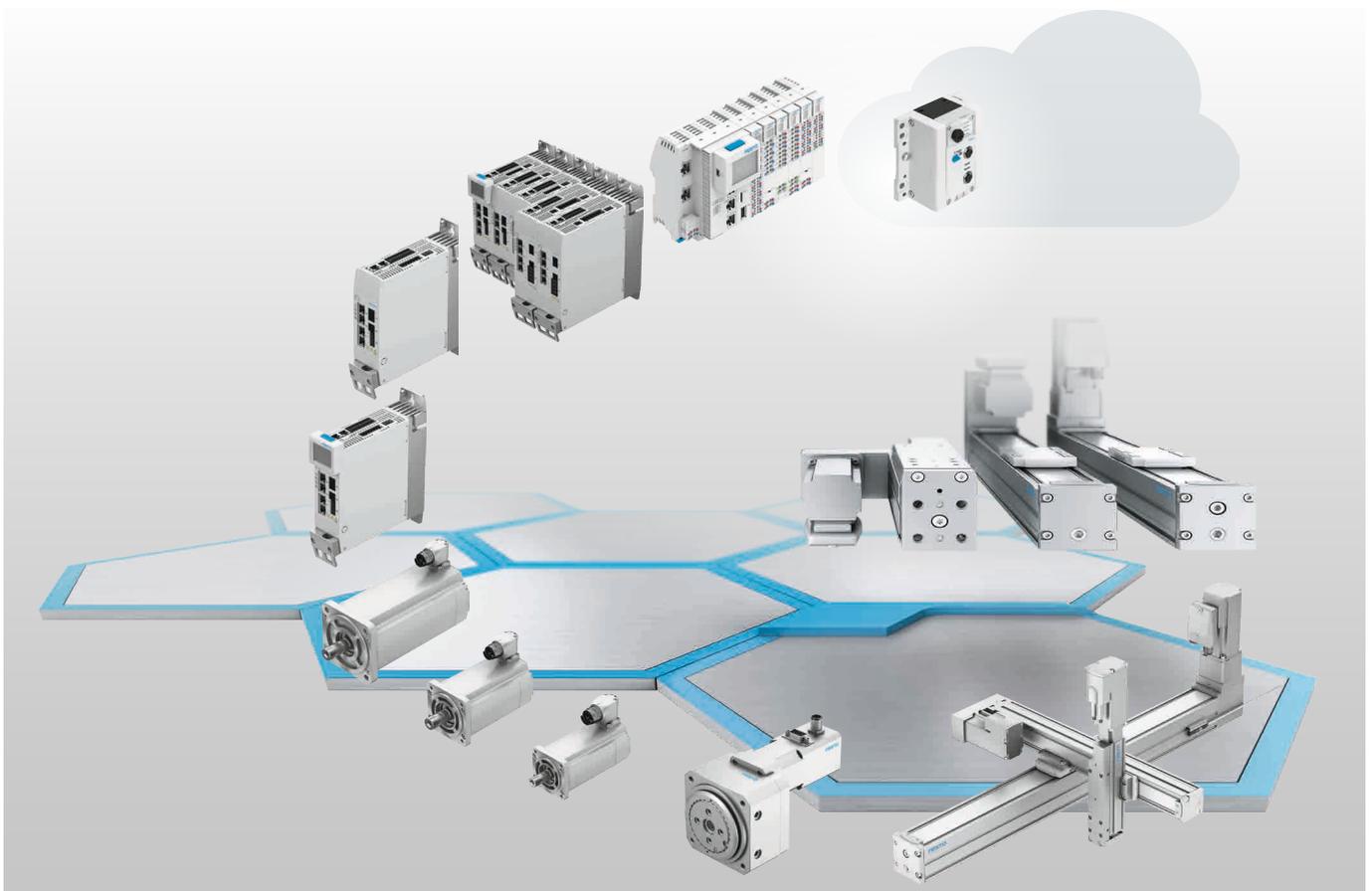
Electric automation

FESTO



You want easy and seamless connectivity?
You are looking for lasting and compatible concepts?
We connect the present to the future.

→ WE ARE THE ENGINEERS
OF PRODUCTIVITY.



Page 4

Overview and motion series

- 4 Festo Automation Platform and EtherCAT
- 6 Product overview
- 8 Optimised Motion Series
- 9 Simplified Motion Series

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Axes, cylinders and mini slides

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- 22 Mini slides

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Grippers, rotary drives and Motion Series

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- 25 Stopper cylinders
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Seamless connectivity is electric automation without any compromise

Put your trust in a partner who has been setting technological standards for decades, whether in pneumatic or electric automation. And don't expect anything less than a comprehensive offer of solutions, from mechanical systems, integrated motion control solutions and subsystems to modern cloud solutions for a variety of industries.

To pave the way for the seamless automation of machines and systems, Festo offers a unique range of solutions. We help you to connect your automation components and modules so that they interact perfectly at all times, mechanically, electrically and intelligently.

Mechanical connectivity

The extensive portfolio of mechanical linear axes and rotary modules offers you almost infinite variety for automating motion, compatible with your in-house standard and of course with our servo motors.

Electrical connectivity

Our range of servo motors and servo drives is the ideal link between your mechanical system and your control technology, always optimally coordinated and easily configured with our engineering software.

Intelligent connectivity

The decentralised control of individual process modules, the free and flexible communication with other control devices and the integrated motion control solutions from Festo enable a wide variety of solutions for industrial automation tasks. They are all supported by innovative engineering and configuration software.

Faster. Better. Connected.



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Servo drives, motors and integrated drives

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- 36 Stepper motors
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Controllers, software, handling systems

- 38 Multi-axis control systems
- 42 Functional safety
- 43 Software
- 46 Handling systems

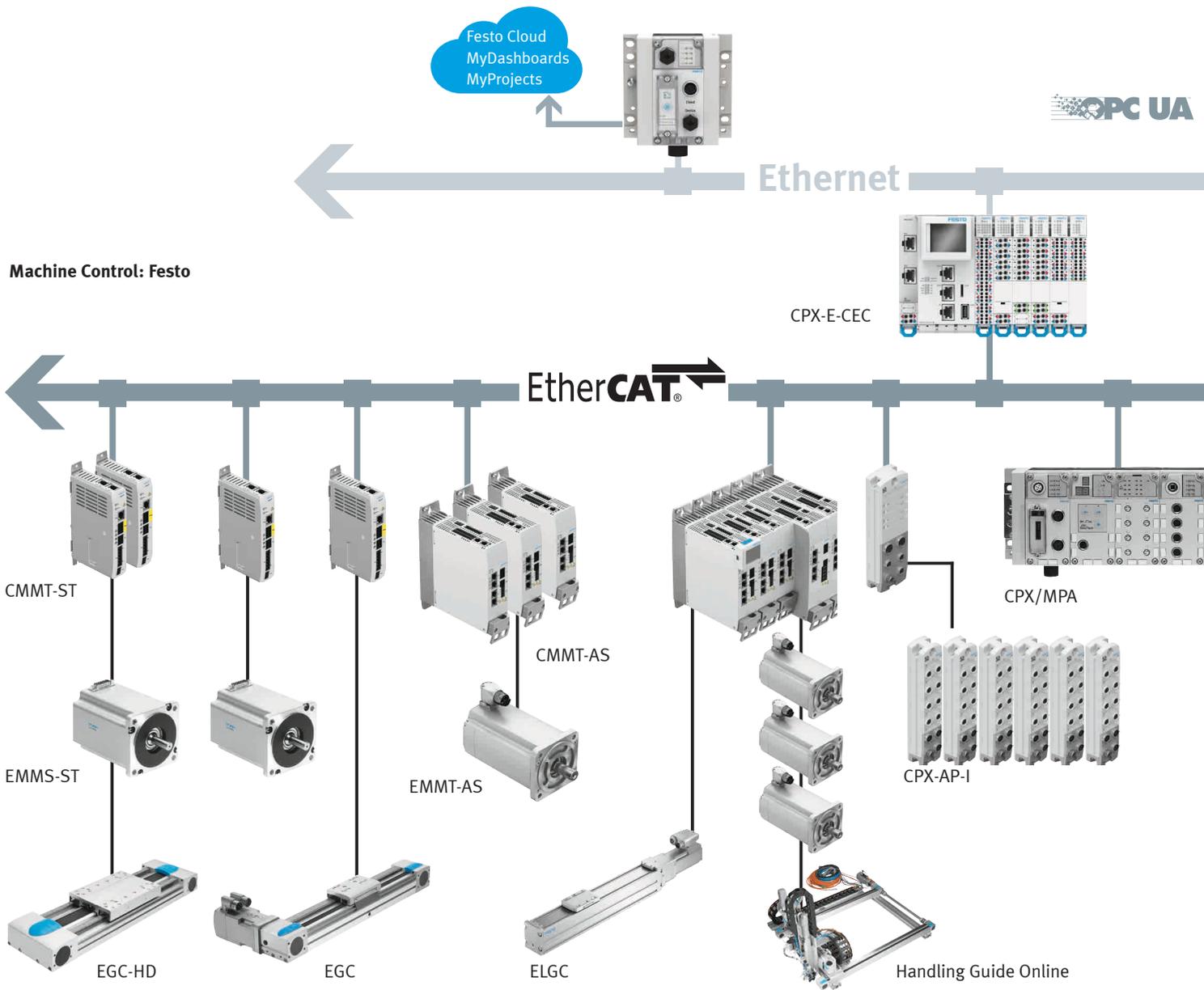
Quick design, complete control with the Festo Automation Platform and EtherCAT®

If you are looking for solutions for autonomous cells or subsystems, for example, or if you require powerful preprocessing, the new Festo EtherCAT® master controller CPX-E-CEC is perfect. You can

integrate these as subsystems into larger or diverse automation environments by using Ethernet-based protocols such as Modbus®, PROFINET and EtherNet/IP.

With the interface OPC UA, you can link CPX-E-CEC-xx into Industry 4.0 host environments and cloud concepts. By using dashboards from Festo, you can also integrate the data from

Festo components into Siemens MindSphere or Factory Talk of the IoT environment from Rockwell.



Machine Control: Festo

CMMT-ST

EMMS-ST

EGC-HD

EGC

EMMT-AS

ELGC

CMMT-AS

CPX/AP-I

CPX/MPA

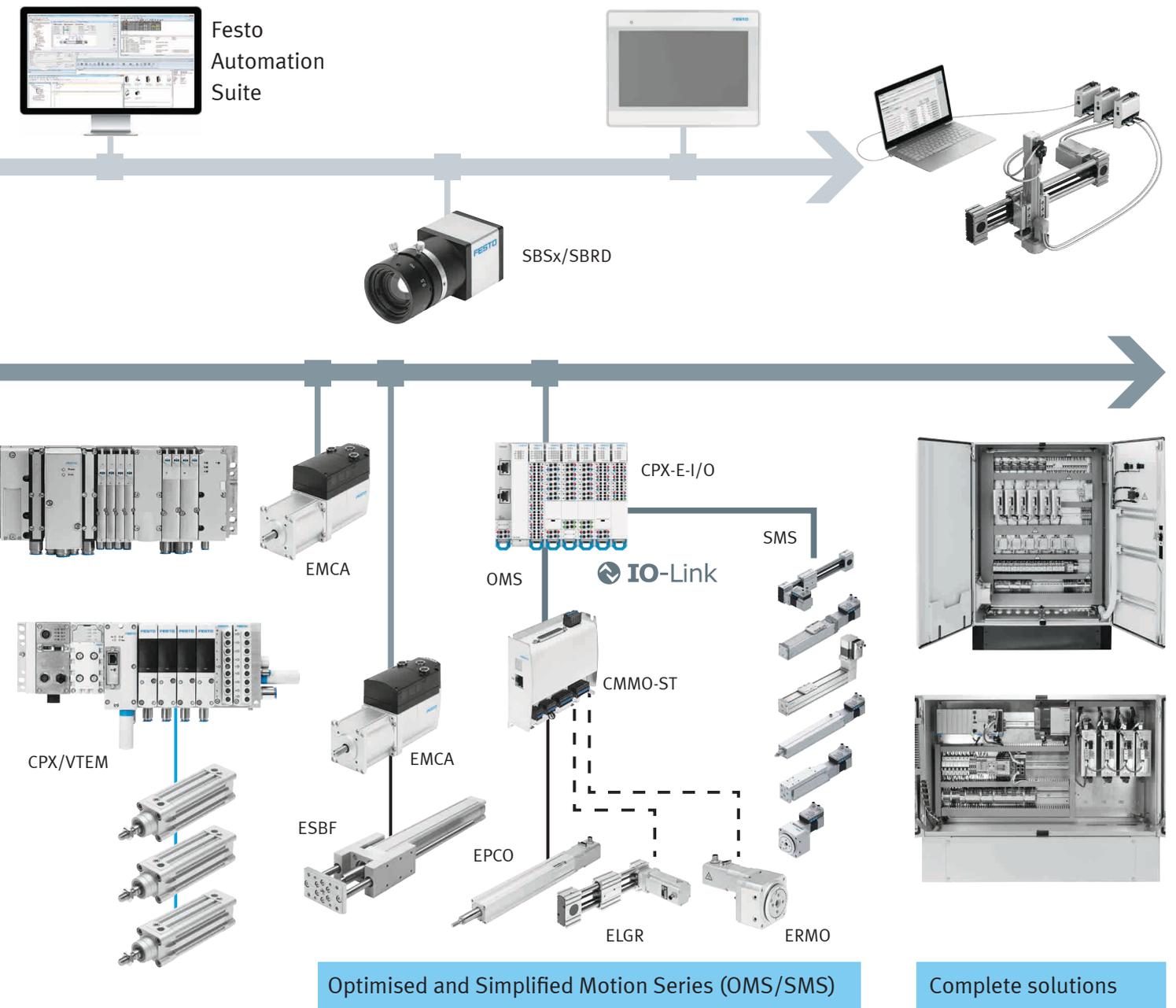
Handling Guide Online

Advanced performance: electric drives – motors – servo drives – handling systems

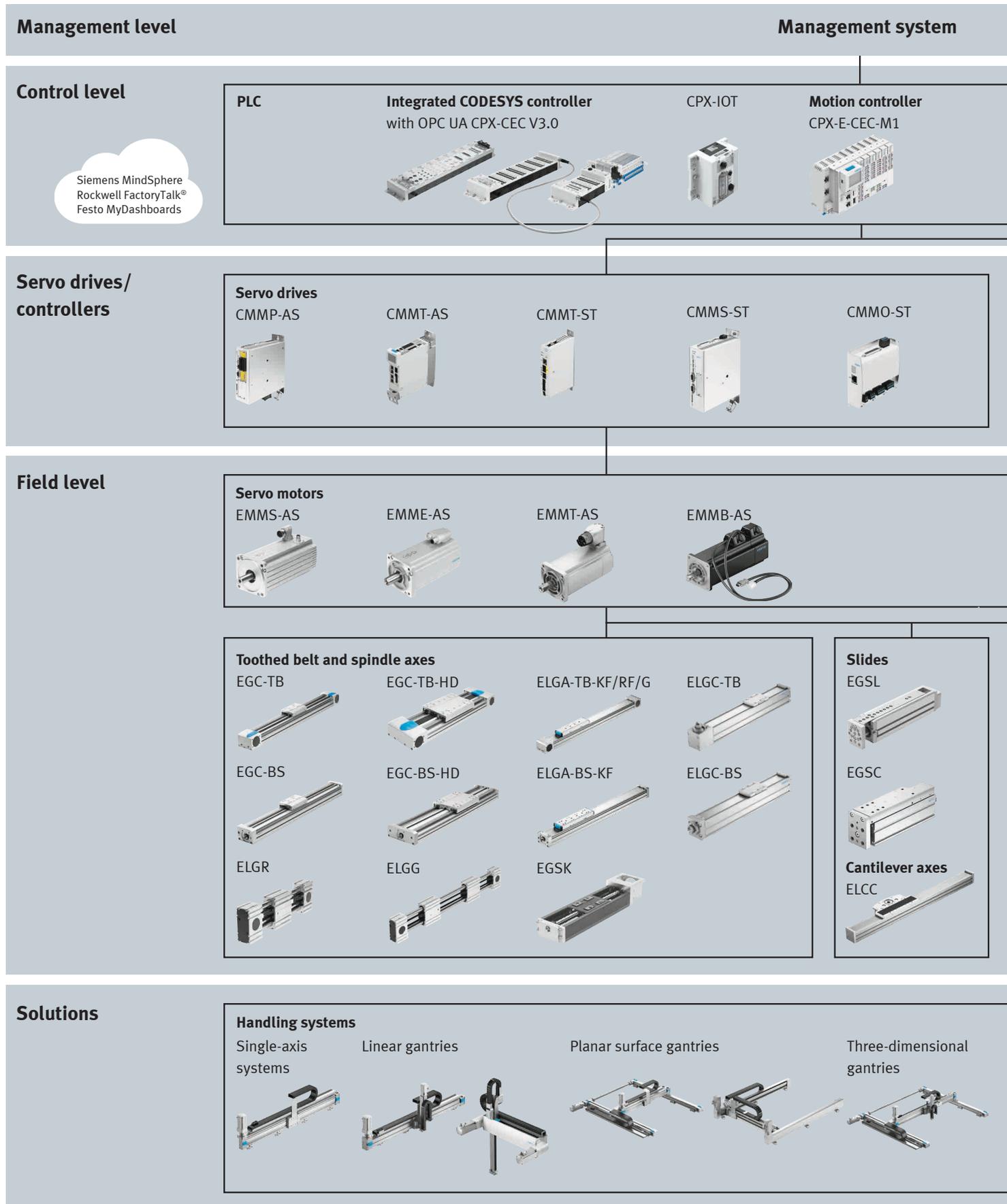
With this approach, you can realise autonomous cells and subsystems and subsequently network them; or you can fully automate the powerful preprocessing of a mechatronic solution from Festo and integrate it into the host system.

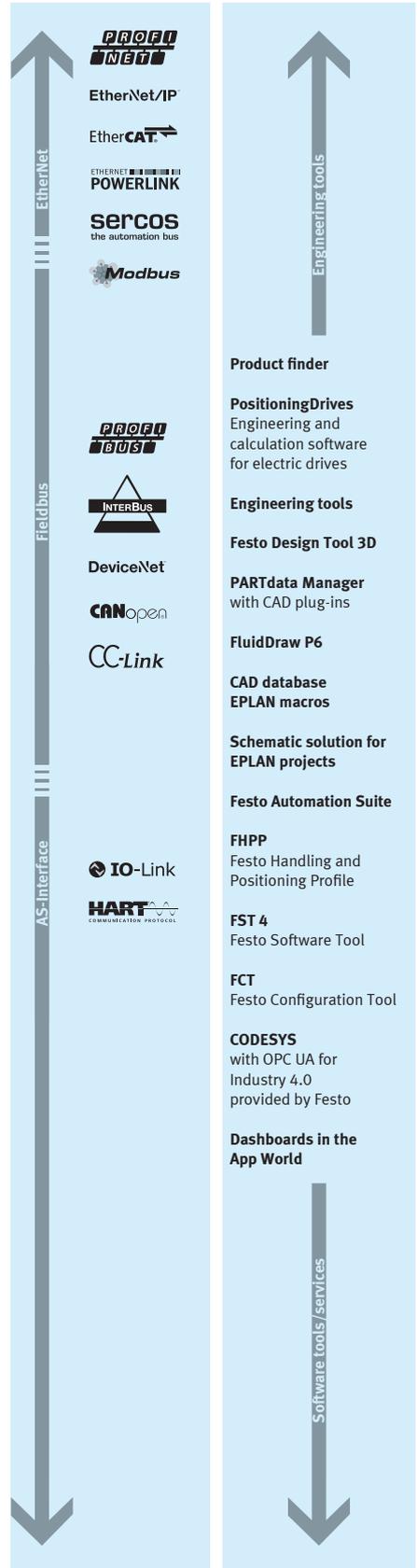
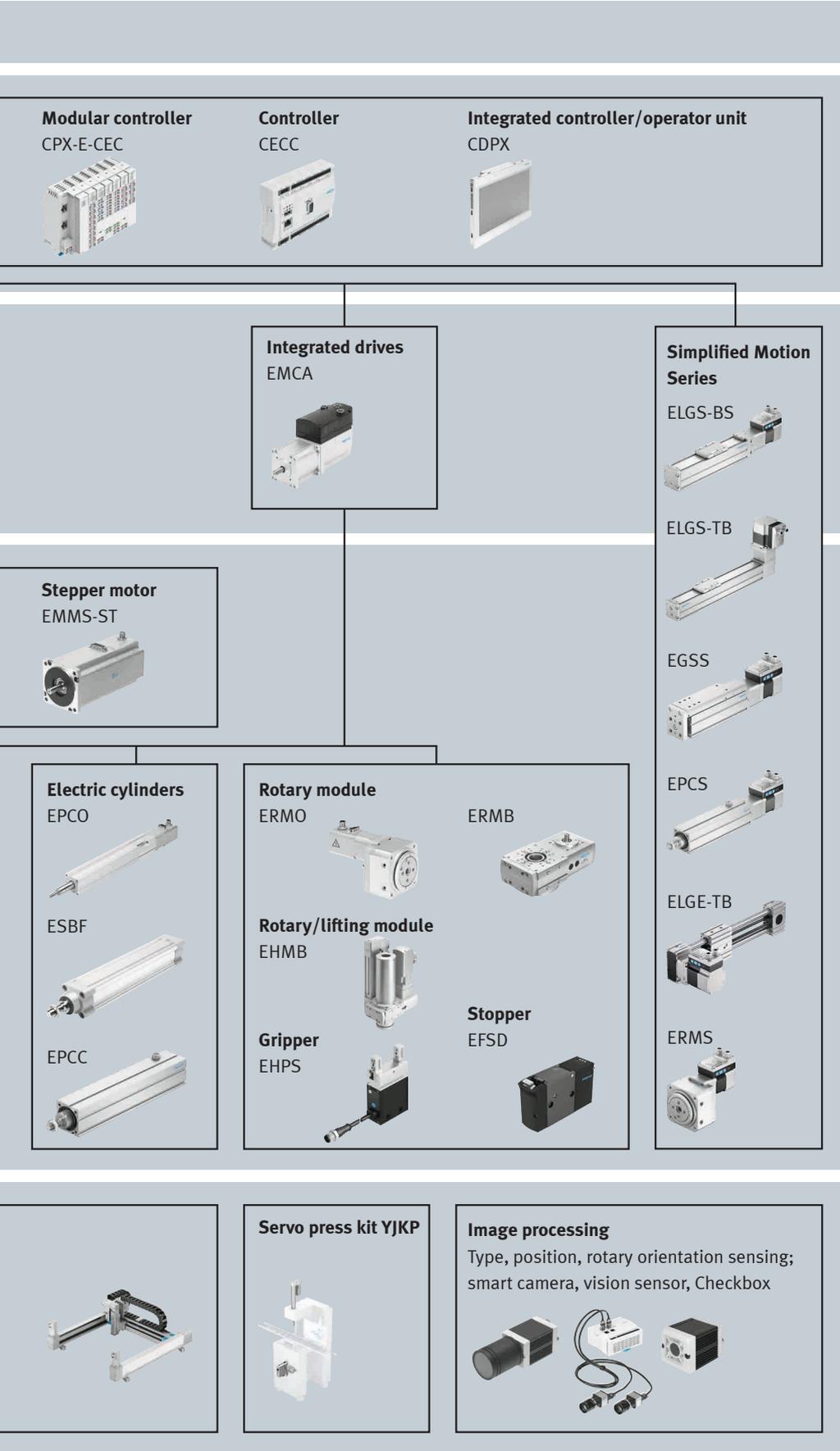
In an EtherNet/IP environment, e.g. from Rockwell, all drives can be interpolated!

And all the engineering advantages are at your disposal in subsystems, including fast mechatronic design as well as easy and clear programming within the Festo automation platform.



An overview of electric automation technology products





Optimised Motion Series



Optimised Motion Series – a low-cost system with optimised performance. It comprises a mechanical system with permanently mounted motor and servo drive (motor controller)

with integrated web browser technology and matching connecting cables. Another major plus is that you can configure, order and commission using just 1 type code.



Simple

- A single order code for product selection and configuration
- Optimised, fixed combination of drive and motor

Fast

- Configuration of motion and positioning via Web Config
- Quick and easy operation and commissioning

Flexible

- Freely selectable position, force and speed
- Freely definable motion profiles

Motor controllers CMMO-ST

Closed-loop servo controller for stepper motors with integrated web browser and IO-Link®, Modbus® TCP or I/O connection.



Electric cylinder EPCO

Electric cylinders with ball screw and non-rotating piston rod for easy positioning and movement, e.g. for stacking, stopping and separating, or switching in transfer lines.



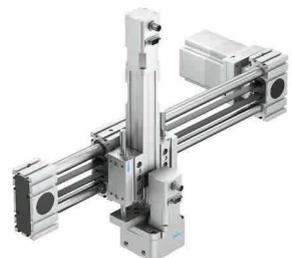
Toothed belt axis ELGR

Cost-optimised toothed belt axis for simple movements with comparatively low requirements in terms of mechanical load, dynamic response and precision.



Rotary drive ERMO

Complete solution for rotary and swivel movements such as aligning parts as well as for simple rotary indexing table applications such as semi-automated manual workstations.



Cost-effective multi-axis solutions for simple handling tasks

The 2D multi-axis solutions in the Optimised Motion Series system can be mounted without needing adapters.

Simplified Motion Series



The simplicity of pneumatics is now combined for the first time with the advantages of electric automation thanks to the **Simplified Motion Series**. These integrated drives are the perfect solution for all users who are looking for an electric alternative for very simple linear and rotary

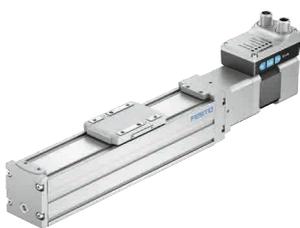
movement and positioning tasks, but don't want the commissioning process for traditional electric drive systems that can often be quite complex. There is no need for any software since operation is simply based on the "plug and work" principle. Digital I/O (DIO) and IO-Link®

are always automatically included – a product with two types of control as standard.

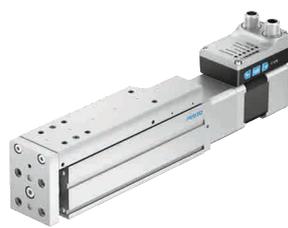
The simplified functionality makes the drives ideal for simple movements between two mechanical end positions without having to sacrifice

IO-Link

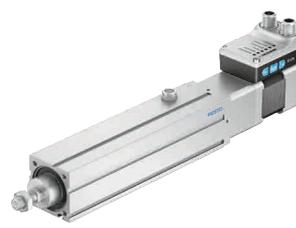
optimised motion characteristics, gently cushioned advancing and retracting into the end positions or simplified press-fitting and clamping functions. In addition, end position feedback is already integrated and no external sensors are required.



Spindle axis ELGS-BS



Mini slide EGSS

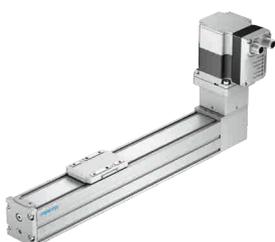


Electric cylinder EPCS

Two control options integrated in one product as standard: digital I/O and IO-Link®

For commissioning, simply adjust all relevant parameters directly on the drive:

- Speed and force
- Reference end position and cushioning
- Manual start



Toothed belt axis ELGS-TB



Toothed belt axis ELGE-TB



Rotary module ERMS

Use of extended functions via IO-Link® possible:

- Motion parameters can be adjusted remotely
- Copy and backup function for transferring parameters
- Read functions of the process parameters

See pages 28 + 29 for details

Spindle axis and toothed belt axis ELGC



The spindle and toothed belt axes ELGC stand out thanks to their internal, recirculating ball bearing guide protected by a permanent stainless steel cover strip. They both have their clean look, weight-optimised design and flexibly mounted motor in common.

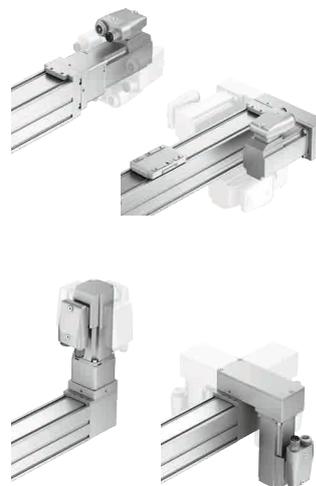
The spindle axes ELGC-BS promise precise and smooth running, whether installed horizontally or vertically. The toothed belt axes ELGC-TB are designed for higher acceleration and speed, while maintaining good rigidity and load bearing capacity.

The unique and universal "one-size down" assembly system with mounting elements for axis/axis assembly enables direct mounting without an additional adapter plate. Thanks to the matching interfaces, the axes are suitable for XY movements and vertical Z movements.



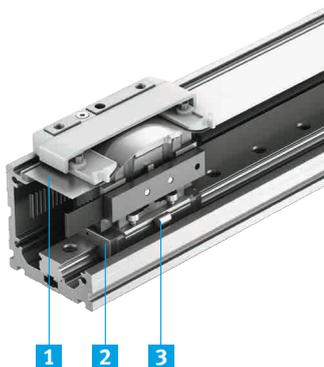
Vacuum connection

- Standard: sealed connection for leak-proof axis
- Optional: can be upgraded with vacuum connection later if required
- With vacuum connection: increased protection of the system thanks to lower particle emissions



Flexible motor mounting

- Free choice of motor positions and mounting kits, can also be changed at a later date:
- Axial kit: 4 x 90° motor position
- Parallel kit: mounting direction rotated 3 x 90° and motor position rotated 3 x 90°



1 Stainless steel cover band

- To protect the interior guide and toothed belt
- Tight seal thanks to magnetic strips
- No sagging with inverted installation

2 Recirculating ball bearing guide

- Integrated recirculating ball bearing guide with long service life
- Rigid precision guide rail to absorb high guide forces

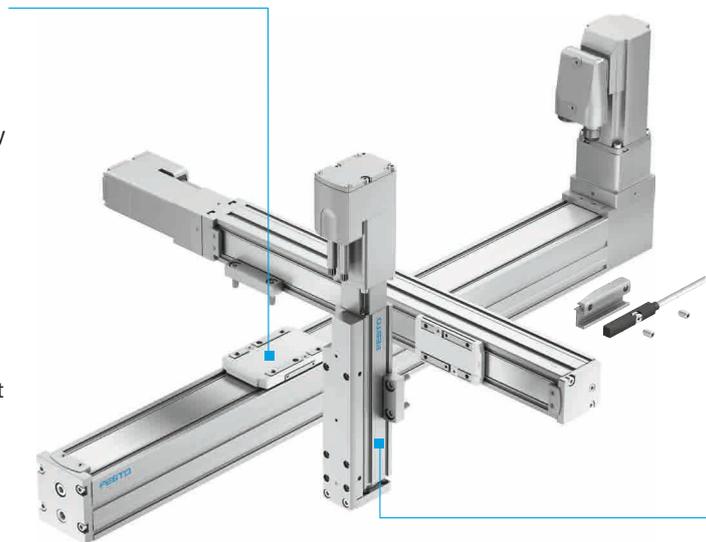
3 Magnet for position sensing

- Position magnet on both sides of the slide
- Standard with spindle and toothed belt axes
- For simple, low-cost position sensing together with proximity switch SMT-8M

Unique "one-size-down" assembly system

Linear or three-dimensional gantries, pick & place solutions or 3D cantilever systems are easy to combine and assemble without the need for any special expertise or tools.

- Adapterless connection of axes and mini slides for compact handling systems
- Base axis combined with next smallest mounting axis without any additional adapter plate using the universal profile mounting

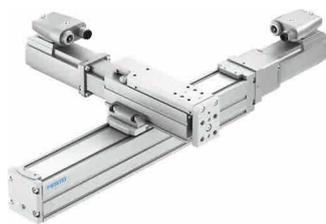


Cost-effective position sensing

- Magneto-resistive proximity sensor SMT-8M as normally open or normally closed contact with switching output PNP
- Can be fitted quickly, flexibly and securely in the profile with the sensor bracket and is easy to insert flush into the bracket from above
- Can be extended or repositioned at any time

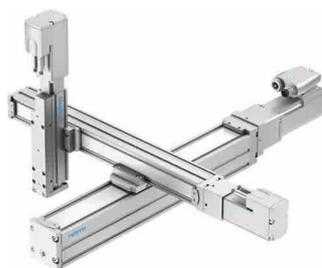
Mini slide EGSC-BS

→ See page 23



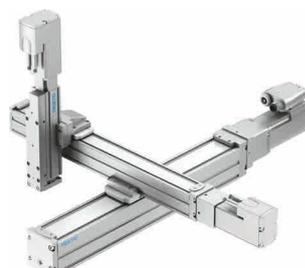
Linear gantry

Vertical 2D movements for simple handling tasks – low cost, space-optimised and easy to assemble



Cantilever system

Simple compact handling system for simple 3D movements – adapter-free, cost-optimised system design with long Z stroke



Cantilever system

Installation-space optimised, robust 3D handling unit for higher loads – additional 90° adapter for more rigidity at higher loads



Cantilever system

Compact and cost-effective 3D system with longer Y stroke; the two axes are mounted in parallel, including driveless guide axis ELFC, to absorb increased torque and provide improved guidance

Type		ELGC-BS	ELGC-TB
Size		32/45/60/80	45/60/80
Drive		Spindle drive (ball screw)	Toothed belt drive
Max. stroke	[mm]	1000	2000
Max. speed	[m/s]	1	1.5
Max. feed force	[N]	350	250
Repetition accuracy	[mm]	±0.015	±0.1

Toothed belt axis and spindle axis ELGA

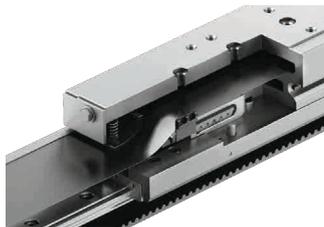


The complete ELGA family with a protected guide in different variants is available with toothed belt or spindle drives, both as an individual axis or a complete solution in standard handling systems.

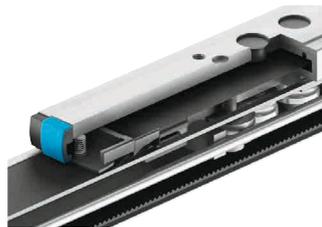
The toothed belt axes ELGA-TB have a high dynamic response and are designed for high speeds. The spindle axes ELGA-BS promise precise and smooth running. Both can cope with heavy loads and long strokes.

The internal slide guide, the stainless steel cover band, its virtually gap-free design and guide pulley in the slide provide perfect protection on the outside and inside, even in cleanrooms.

An overview of guide variants



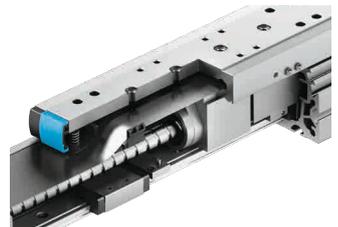
Recirculating ball bearing guide ELGA-TB-KF



Roller bearing guide ELGA-TB-RF



Plain-bearing guide ELGA-TB-G



Recirculating ball bearing guide ELGA-BS-KF

Toothed belt axis ELGA-TB-..

- Recirculating ball bearing guide -KF for absorbing high loads from slides and guides with lateral forces and torques, even during motion.
- Roller guide for highly dynamic handling, even of medium-sized and large work pieces.
- Plain-bearing guide -G for simple positioning and handling tasks or as a drive axis for applications with an external guide.

Spindle axis ELGA-BS-..

- Recirculating ball bearing guide -KF for absorbing high lateral forces and torques, even during motion.

Motor positions



Toothed belt axis ELGA-TB

- Motor position freely selectable on 4 sides
- Plug connection rotated 4 x 90°, can be modified at any time
- Position can be changed later at any time



Spindle axis ELGA-BS

- Motor position freely selectable at both ends
- Plug connection can be rotated 4 x 90°
- Can be rotated at any time

Other variants:



Guide axis ELFA

- Without its own drive
- Freely movable, passive slide
- Guide variants:
 - Roller bearing guide -RF
 - Recirculating ball bearing guide -KF



Axis for use in the food industry

- Clean look: smooth surfaces, no sensor slots
- ELGA...-F1 with FDA-compliant materials
- Guide variants:
 - Roller bearing guide -RF
 - Recirculating ball bearing guide -KF



Second slide

- For ELGA-TB-KF
- 1 driven and 1 freely movable slide
- For absorbing higher torques and loads
- Extended service life thanks to reduced, split guide loads



Vacuum or sealing air

- Greater protection thanks to an optional connection for vacuum or sealing air
- When used in cleanrooms: with vacuum, no particles from the axis can get into the environment
- When used in dusty or polluted environments: with sealing air, no dust or other environmental contaminants can get into the axis

Focus on safety



Optional sensing for greater reliability

- Inductive proximity sensor, freely positionable
- Degree of protection of the sensors: IP67
- Flush mounting in the profile slot
- Securing mounting in a clean design sensor bracket (plastic), easy to clean



Displacement encoder for monitoring the linear axis

- Suitable for safety-orientated applications (second channel)
- Linear measuring system for direct monitoring of the axis slide position
- Minimum resolution: 2.5 µm at a maximum 4 m/s

Type	ELGA-TB-KF				ELGA-TB-RF			ELGA-TB-G			ELGA-BS-KF			
	70	80	120	150	70	80	120	70	80	120	70	80	120	150
Size (= profile width in mm)	70	80	120	150	70	80	120	70	80	120	70	80	120	150
Drive system	Toothed belt										Ball screw spindle			
Guide type (slide)	Recirculating ball bearing guide				Roller bearing guide			Plain-bearing guide			Recirculating ball bearing guide			
Max. stroke [mm]	8500				7400			8500			2900			
Max. speed [m/s]	5				10			5			0.5	1	1.5	2
Repetition accuracy [µm]	±80				±80			±80			±20			
Max. feed force Fz [N]	350	800	1300	2000	350	800	1300	350	800	1300	300	600	1300	3000

Toothed belt axis and spindle axis EGC and EGC-HD



Comprehensive range with numerous variants, e.g. for high dynamic response and speed, heavy loads and high torque. All in all, this range of heavy-duty axes from the mechatronic multi-axis modular system is suitable for stand-alone as well as complete system solutions.

The generously sized profiles of the EGC with their optimised cross-sections provide the drives with maximum rigidity and load capacity. Their speed, acceleration and torque resistance set a new standard, even with the new EGC-HD with heavy-duty guide for extremely high

loads and torque resistance at high speeds and acceleration.

An additional advantage is the high performance of the axes, which often makes it possible to choose a smaller design, especially in the case of spindle axes!

The individual versions



Toothed belt axis EGC-(HD)-TB
Dynamic drive for high speeds together with heavy loads and long strokes.



Spindle axis EGC-(HD)-BS
Precision drive for accurate and smooth running together with high loads and long strokes.



Guide axis EGC-FA
Driveless linear guide unit for supporting forces and torques in multi-axis applications.

Heavy-duty variants HD



Toothed belt axis EGC-HD-TB



Spindle axis EGC-HD-BS

Flexible motor mounting for EGC-(HD)-TB



- Motor position freely selectable on 4 sides
- Position can be changed later at any time

The benefits to you:

Define an attachment variant with one part number as standard and modify the positions as and when needed.

Different slide variants



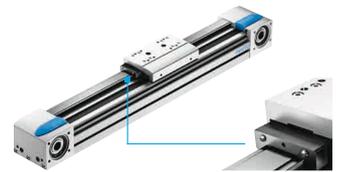
Second slide

- For greater axial and lateral torques
- Freely movable



Extended slide

- Longer guide
- For greater axial torque



Protected slide

- Scrapers on both sides of the slide remove dirt particles and liquids from the external guide

Focus on safety



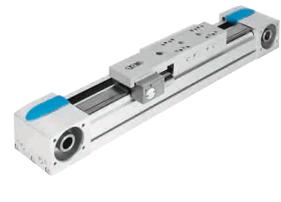
Optional sensing for greater reliability

- Inductive proximity sensor SIES-8 M
- Flush mounting of up to two sensors per profile slot



Additional inductive displacement encoder EGC...-M

- Increased absolute accuracy, minimum resolution 2.5 μm
- Suitable for safety-orientated applications (second channel)
- Inherent system inaccuracies can be easily adjusted



Clamping unit EGC...-HPN for clamping the slide

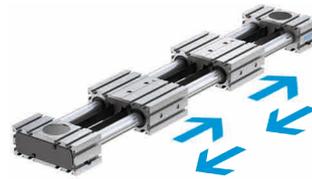
- For safety-orientated applications
- Solutions of categories 1, 2 and 3 to EN 13849-1 can be implemented with 1 and 2 channel versions

Type		EGC-TB/BS-KF	EGC-HD-TB/BS
Size		50/70/80/120/185	125/160/220
Drive		Toothed belt drive/spindle drive	Toothed belt drive/spindle drive
Max. stroke	[mm]	5000/8500 (10 000)	5000/2400
Max. speed	[m/s]	2/5	5/1.5
Repetition accuracy	[mm]	$\pm 0.08 \dots 0.02$	$\pm 0.08 \dots 0.02$
Max. force Fx	[N]	2500/3000	1500/1300
Max. torque load Mx	[Nm]	529	900
Max. torque load My/Mz	[Nm]	1820	1450
Options:		Connecting module for central lubrication	Connecting module for central lubrication

Toothed belt axis ELGR/ELGG



Ideal for applications with comparatively low requirements in terms of mechanical load, dynamic response and precision in a cost-optimised design. The flexibility of the ELGR and ELGG, their wide range of uses as well as their long service life of 5000 km make them perfect for simple applications needing cost-effective solutions.



Toothed belt axis ELGR

- One driven slide
- Optionally 1 or 2 freely moving, additional slides for an extended guide and additional mounting options

Movement in the same direction

One slide is connected to the toothed belt, whereas the second slide moves freely and provides an extended guide.



Toothed belt axis ELGG

- Two driven slides
- For long centring strokes in the packaging industry
- As a gripper with strokes of up to 300 mm per side and a payload of 10 kg
- As a drive for door motions

Movement in opposite directions

The two slides are joined to the toothed belt and move synchronously in opposing directions.



Safety thanks to optional end-position sensing:

The proximity sensor SIES-8M, together with the sensor bracket and switch lug, can be retrofitted onto the axis at any time.

- Switching output PNP or NPN
- Switching distance 1.5 mm
- Repetition accuracy $\pm 50 \mu\text{m}$ (radial)
- Output status display: 2 yellow LEDs for improved visibility, regardless of the direction of approach
- Degree of protection IP67



Guide variants for ELGR and ELGG

- Recirculating ball bearing guide for medium loads with very good running behaviour under torque load
- Plain-bearing guide (on request) for low loads or for use in humid environments and for non-abrasive dust



Flexible motor connection for ELGR and ELGG

- Motor position freely selectable on 4 sides
- Position can be changed later at any time

The benefits to you:

Create an attachment variant with one part number as standard and modify the positions as and when needed.

Spindle axis EGSK



The spindle axis EGSK stands out because of its precision, repetition accuracy, compact design and rigidity. The U-shaped steel housing of the axis also serves as a guide rail.

By combining the linear guide elements and the spindle nuts of the ball screw in one component, the sum of the production tolerances is minimised; this leads to excellent precision and repetition accuracy.

- Recirculating ball bearing guide and ball screw
- Three accuracy classes
- Optionally with additional slide
- Sizes 33 and 46 also in short slide design

Cantilever axis with toothed belt ELCC



The cantilever axis, which is available in four sizes, is extremely rigid and lightweight as well as fast and reliable. The powerful ELCC is perfect for palletising or erecting boxes in the packaging industry as well as a wide range of positioning tasks with long strokes at vertical, horizontal or other installation angles.

- Fewer vibrations and up to 50% faster settling time
- Very high acceleration and cycle times up to 30% faster
- Maximum stroke of 2 m and load of up to 100 kg
- Optional stainless steel cover band
- Optional shock absorber prevents damage during axis setup and absorbs short fall distances of a vertical installation



Flexible motor positioning

- Freely selectable mounting direction up or down
- Can be mounted in axial, parallel or diagonal position to the axis
- Motor alignment $4 \times 90^\circ$
- Can be modified later



Optional clamping unit

- Safely clamps the upright axis for a secure hold even in the event of a power failure or cable break
- Also suitable for emergency braking



Incremental displacement encoder

Contactless position sensing with $2.5 \mu\text{m}$ resolution, also suitable for safety-orientated dual-channel solutions. Mounting for size 60/70 on the outside and for 90/110 on the inside.



Inductive proximity sensor SIEN-M8

Suitable for homing or end-position sensing and can be installed alongside the displacement encoder.



Sealing air connection

Sealing air together with the cover strip minimises the number of particles that get into the guide area, e.g. in dusty environments or on machine tools.



Rack and pinion axis EHMH

- Two sizes with a payload of up to 200 kg (vertical) and a stroke of max. 2.5 m
- Optional: clamping unit, cover pinion drive, scraper package at the guide, and displacement encoder system

Size		60	70	90	110
Guide		Recirculating ball bearing guide			
Max. stroke	[mm]	1300	1500	2000	2000
Max. payload* (vertical)	[kg]	10	20	60	100
Max. speed	[m/s]	5			
Max. acceleration	[m/s ²]	50		30	
Repetition accuracy	[mm]	±0.05			
Max. feed force	[N]	300	600	1200	2500

* When designed using the engineering software PositioningDrives, higher loads can also be supported in some cases.

Electric cylinder ESBF



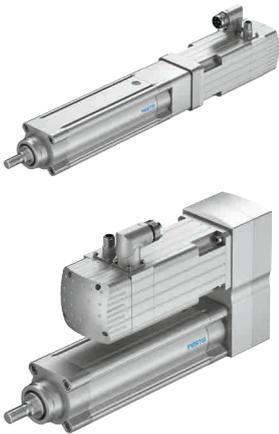
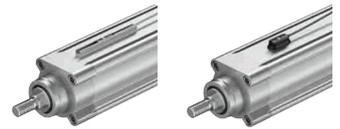
The electric cylinder ESBF enables dynamic positioning with feed forces of up to 17 kN, is available in six sizes, and has a ball screw as standard. Up to size 50, it is also available with lead screw. It is based on standard ISO 15552 and its piston rod is non-rotating with a plain bearing guide. The smooth surfaces and the clean look design make the ESBF easy to clean and thus less susceptible to contamination. All that and a service life of 10,000 km.

Cylinder options

- Guide unit
 - Recirculating ball bearing guide with high load bearing capacity
 - Absorption of lateral forces
 - Increased protection against torsion at high torque loads
- Female piston rod thread
- Extended piston rod
- Food-safe lubricant NSF-H1 for conditional use in the food sector
- Sealed motor mounting kits together with a connection for the venting hole for degree of protection IP65

Optional position sensing

- Alternative sensor bracket (to be glued)
 - Sensor rail made of aluminium
 - Polymer sensor bracket in clean design
- Proximity sensor SME/SMT-8 for homing or position sensing



Flexible motor mounting

- Axial mounting: freely selectable connection direction for motor cables: 4 x 90°
- Parallel mounting: freely selectable outlet direction for motor cables: 3 x 90°

Optional protection

- Connection of the venting hole for use in harsh or contaminated environments (IP65)
- Protected piston rod, seal and bearing with a leak-proof bellows for use in highly contaminated environments



Size		32	40	50	63	80	100
Drive system/spindle type		Ball screw (BS), lead screw (LS)			Ball screw (BS)		
Max. stroke	[mm]	800	800	1000	1200	1500	1500
Max. feed force	[N]	1000	3000	5000	7000	12000	17000
Max. speed	[mm/s]	1.1	1.2	1.2	1.35	1.34	1.34
Repetition accuracy	[mm]	±0.01					

Electric cylinder EPCO



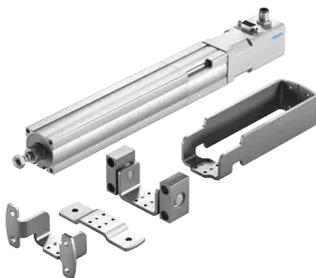
The electric cylinder with ball screw and non-rotating, plain bearing guide is available in three sizes with two pitches each. It has a permanently mounted, optimally matched motor. The smooth surfaces and clean look make the cylinder easy to clean, and thus less susceptible to contamination. The double-sided end-position cushioning reduces the impact force, stress and noise. It is powerful and compact, and has a service life of 10,000 km.

Cylinder options

- Female piston rod thread
- Extended piston rod
- Guide unit with resilient recirculating ball bearing guide
 - Absorption of lateral forces
 - To protect cylinders against rotation at high torque loads

Motor options

- Flexible motor mounting
 - Freely selectable connection direction for motor cables: 4 x 90°
 - Standard connection direction: upwards
- Encoder
 - With encoder for closed-loop operation
 - Without encoder: cost-optimised open-loop operation
- Holding brake



Mounting options

- Can be screwed on from the front or using two mounting slots underneath
- Extensive mounting accessories for many different installation situations, e.g. flange, swivel or foot mounting with numerous adapters



Optional position sensing

- Alternative sensor bracket (to be glued)
 - Sensor rail made of aluminium
 - Polymer sensor bracket in clean design
- Proximity sensor SME/SMT-8 for homing or position sensing

Size		16	25	40
Max. stroke	[mm]	200	300	400
Max. feed force	[N]	125	350	650
Max. speed	[mm/s]	300	500	460
Max. lateral force F _{y/z} (with an external guide unit)	[N]	187	335	398
Repetition accuracy	[mm]	±0.02		

Electric cylinder EPCC



The powerful yet affordable electric cylinder EPCC is suitable for simple positioning tasks. Thanks to the ball screw, it is precise and fast as well as sturdy and resilient. Its compact dimensions are ideal when installation space is limited, e.g. in assembly systems, test and inspection systems, desktop applications, small parts handling or the electronics industry. The weight-optimised design improves dynamic response and reduces cycle times.

Technical highlights of the EPCC

- High grade ball screw with low internal friction for smaller motors, i.e. less weight, installation space and electrical power required
- Space-saving integration of double bearing and coupling to absorb drive forces and torques
- Unique "one-size down" assembly ensures adapter-free mounting on the ELGC for optimised use of the installation space as well as less weight for greater dynamic response



Optional ducted air pressure compensation

- No particles or moisture are drawn from the environment into the electric cylinder
- No particles are emitted from the drive into the environment



Very flexible motor mounting

Free choice of motor positions and mounting kits, can also be changed at a later date:

- Axial kit: motor position rotated 4 x 90°
- Parallel kit: mounting direction rotated 4 x 90 and motor position rotated 3 x 90°



Cost-effective position sensing

- Simple and cost-effective sensing with magneto-resistive proximity sensor SMT-8M
- Sensor bracket for flexible, secure and rapid mounting on the profile
- Can be extended or repositioned at any time

Size		25	32	45	60
Drive system/spindle type		Ball screw drive/lead screw drive			
Stroke length	[mm]	25 ... 200	25 ... 200	25 ... 300	25 ... 500
Max. feed force	[N]	75	150	450	1000
Max. speed (low/high)	[mm/s]	133/400	188/500	180/600	250/600
Spindle pitch (low/high)	[mm/s]	2/6	3/8	3/10	5/12
Max. rotational speed	[rpm]	4000	3750	3600	3000
Max. acceleration	[mm/s ²]	15			
Repetition accuracy	[mm]	±0.02			

Mini slide EGSL



The electric slide EGSL is designed for outstanding performance when it comes to precision, high load capacity and dynamic response, even in compact spaces. This makes it a favourite for high-precision positioning and strokes of up to 300 mm. Its strengths are shown to good advantage, especially in vertical applications and short-stroke slide functions with variable positioning such as very accurate pushing, picking and insertion with linearity and parallelism in the 1/100 mm ranger, even with high mechanical loads!

Benefits

- Precise and free positioning with a repetition accuracy of max. ± 0.02 mm
- Perfect for vertical applications such as press-fitting or joining
- The guide area is protected against contamination and small parts because the spindle is fully closed; an additional cover for the guide is optional
- Simple, low-cost sensing with integrated sensor slots on the right and left
- Matching software tools for engineering (Positioning-Drives), configuration, commissioning and more with the software package Festo Configuration Tool (FCT)

Motor attachment variants

Greater flexibility thanks to lateral or axial motor mounting options. The motor can be easily adapted to the installation space: when mounted in axial direction it can be rotated 4 x 90°, and in lateral direction it can be rotated 3 x 90°.



Size		35	45	55	75
Working stroke	[mm]	50	100, 200	100, 200, 250	100, 200, 300
Max. speed	[m/s]	0.5	1.0	1.0	1.3
Feed force F _x	[N]	75	150	300	450
Torque	M _x [Nm]	6.2	18.6	33.1	67.4
	M _y [Nm]	6.0	16.3	33.3	47.1
	M _z [Nm]	6.0	16.3	33.3	47.1
Repetition accuracy	[mm]	± 0.015			
Max. horiz./vert. payload	[kg]	2	6	10	14

Mini slide EGSC



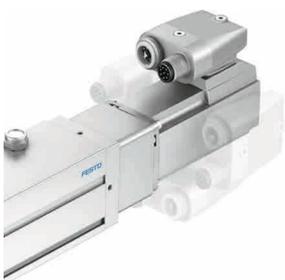
The compact mini slide EGSC offers very cost-effective yet precise positioning. The internal, protected recirculating ball bearing guide absorbs forces and torques, the compact ball screw ensures quiet spindle operation while the life-time lubrication guarantees a long service life. The mini slide is ideal in very small installation spaces or when cost efficiency is important, e.g. in the electronics industry, desktop applications, assembly systems, small parts handling or in test and inspection systems.

With the unique “one-size down” assembly system and its universal mounting profile no additional adapters are needed for direct mounting. In combination with the rotary drive ERMO and the axis series ELGC, space-optimised and very economical 2D and 3D handling systems can be easily and flexibly created.



Optional ducted air pressure compensation

- Pressure compensation air can be ducted subsequently using fittings and tubing
- No particles or moisture are drawn from the environment into the electric cylinder
- No particles are emitted from the drive into the environment



Very flexible motor mounting

Free choice of motor positions and mounting kits, can also be changed at a later date:

- Axial kit: motor position rotated 4 x 90°
- Parallel kit: mounting direction rotated 3 x 90° and motor position rotated 3 x 90°



Pick & place solution

Compact solution to precisely position and align workpieces even with high loads

- Adapterless, cost-effective direct mounting of both mini slides EGSC and the rotary drive ERMO
- Mechanically rigid and sturdy design with precision positioning

Technical data	
Design	Electric mini slide with ball screw
Sizes	25 / 32 / 45 / 60
Working stroke [mm]	25 ... 200
Max. feed force [N]	20 / 60 / 120 / 250
Max. speed [m/s]	0.6
Max. acceleration [m/s ²]	15
Repetition accuracy [µm]	± 15

Parallel gripper EHPS



The electric EHPS allows flexible and economical gripping in handling and assembly technology, as well as in the electronics industry or small parts assembly. It can also be used wherever mono-energetic, electrical power-based systems or solutions are required; and especially in clean environments where compressed air is not permitted.

It is characterised by its ease of use, minimal installation effort and safe operation

- Quick commissioning without external controller
- Easy 4-step adjustment of the gripping force all the way up from 50% to the maximum via a latched switch
- Actuation via digital I/O
- Self-locking in the event of a power failure prevents losing the product being gripped



Optional position sensing of the gripper jaw

- Easy and low-cost sensing:
 - Proximity sensor SMT-8M/-8G
 - Position transmitter SMAT
- Flush mounting in the sensor slot
- Can be extended at any time

Size		16	20	25
Max. gripping force	[N]	50	90	125
Opening angle per jaw/total	[mm]	10/20	13/26	16/32
Repetition accuracy	[µm]	30	10	10
Closing time	[s]	0.3	0.42	0.44
Max. cycle rate	[Hz]	2.2	1.7	1.3
Weight	[kg]	0.31	0.54	0.9
Degree of protection		IP40		
Connecting cable		Cable length 0.3 m, plug 5-pin M12x1		
Operating voltage	[VDC]	24		

Electric stopper cylinder EFSD

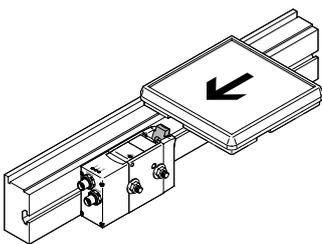


The EFSD stops workpiece carriers or packaging goods. Thanks to the direct correlation of load and conveying speed, the stopper can stop, for example, 100 kg at 6 m/min or up to 20 kg at 36 m/min. The stopper has cushioning that protects the transported goods as well as the stopper and that can be adjusted on site. The cushioning module operates using ambient air, is easy to maintain and to install.

It is actuated and controlled directly by the higher-level control system via digital I/O; no additional controller is required thanks to the internal logic. M12 plugs are used for the connection for the drive and position sensing for sensing the upper and lower position of the stop (extended or retracted). In addition, the electric stopper EFSD is designed to be energy-saving, because the motor automatically switches off in the end positions; this means that no energy is needed to hold or continuously open the line.

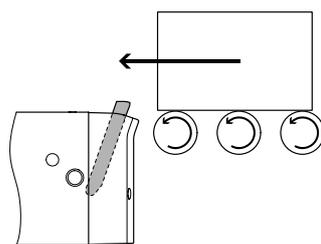
- Quick and easy set-up of transfer systems without compressed air
- Three sizes for stopping transported goods weighing between 0.25 kg and 100 kg (the size is determined by the conveying speed and the load)
- Actuation via digital I/O simplifies commissioning
- Integrated sensor technology for position sensing (stop retracted or extended)
- LED display: status and error message for visual error diagnostics
- Easy to mount onto the transfer system using two retaining screws
- Easy electrical connection for input and output signals via two cables with 5-pin M12x1 plug

Use in transfer systems



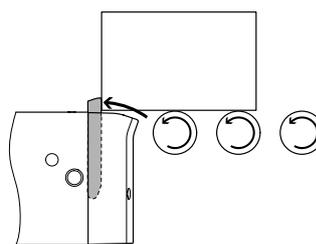
This stopper is specifically designed for use in transfer systems, where objects are transported from one processing station to the other. The EFSD can be mounted directly on the profile of the transfer system with just two screws.

Functional sequence "stop"



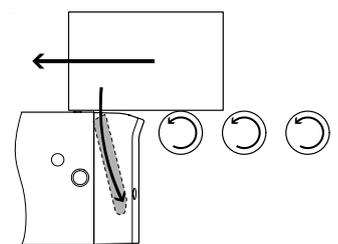
Position 1 Stopper cylinder is in the initial position

The stopper is extended and ready to stop the transported material



Position 2 Stopper cylinder is in the stop position

Transported material has been slowed down by internal cushioning and kept in position



Position 3 Stopper cylinder is in release position

Stopper is retracted and releases the transported material

Rotary drive ERMO



The rotary drive ERMO has a sturdy and backlash-free bearing to absorb high forces and torques. The stepper motor, gear unit and sealed hollow shaft are all integrated. It is an ideal electromechanical complete solution for rotating and aligning parts and workpieces or for swivelling tasks subjected to heavy loads. It is also suitable for simple rotary indexing table applications such as at manual workstations. With the optional external mounting kit, the swivel angle can be limited to max. 270°.

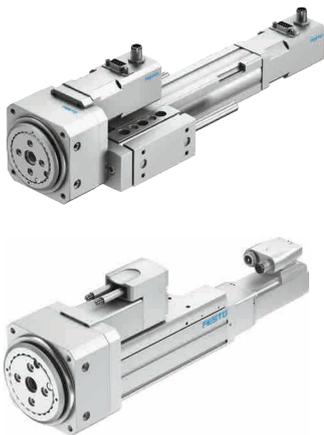


Motor and connecting cables

- The motor can be mounted and rotated 3 x 90°
- Position can be changed later at any time
- Cables in IP54 suitable for energy chains for power supply (load) and encoder, up to 10 m in length

Optional reference sensor

- Inductive proximity sensor SIEN with M8 connection integrated in the housing
- For homing or position sensing
- Ideal for multi-turn applications
- Degree of protection IP67



Mounting interfaces

- Interfaces on flange and housing, identical to the pneumatic semi-rotary drive DSM/DSM-B
- Interfaces suitable for connection to other electromechanical components, e.g.
 - Electric cylinder EPCO
 - Electric slide EGSL
 - Electric slide EGSC



Optional energy through-feed for infinite rotation

- Kit for energy through-feed including suitable connection technology
- Pneumatic, e.g. for grippers, including plug connectors for tubing
 - Electric, e.g. for sensors or the transmission of IO-Link® signals, including 8-pin M12 plug and socket

Size		12	16	25	32
Flange size	[mm]	58 x 58	68 x 68	83 x 83	105 x 105
Torque	[Nm]	0.15	0.8	2.5	5
Speed	[°/s]	600	600	400	300
Repetition accuracy	[°]	±0.05	±0.05	±0.05	±0.1
Max. axial/radial torque	[N]	500/500	600/750	700/1200	800/2000

Rotary module ERMB



Rotary drive module with motor and sensing module EAPS (optionally with additional housing)

Weights of up to 15 kg can be rotated dynamically and flexibly with the freely positionable, electric rotary module ERMB.

The module can be used as an axis of rotation with any rotation angle $>360^\circ$ or as a small, stand-alone NC rotary table.

Mounting interfaces on all sides and the large hollow shaft diameter on the high-strength rotary flange make installing the module exceptionally easy.

Matching range of motors

Using servo or stepper motors simplifies the uniform closed-loop controller concept, while the universal software platform simplifies commissioning and activation. The ERMB's performance adapts to the requirements depending on the motor technology used.

Adaptable safety

Sensing module EAPS can be used to define impermissible fields. The freely adjustable index pins in the retaining ring is sensed using two inductive sensors.

Reduced vibration

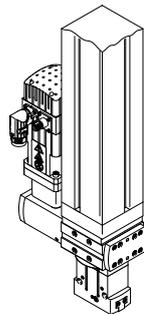
The rotary module ERMB minimises vibrations in multi-axis systems, thereby increasing their performance thanks to uniform movements and user-defined acceleration ramps. The movements into the end positions are smooth and wear-free.

Technical data

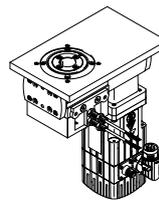
- 3 sizes: 20, 25, 32 with a max. output speed of 300 rpm
- Repetition accuracy: $\pm 0.03/0.05/0.08^\circ$

Positioning time

- Min. positioning time at swivel angle of 180° : <0.18 s



Rotary drive module with gripper on a Z axis



Rotary drive module as small NC rotary table

Highly dynamic rotary/lifting module EHMB



This extremely compact handling unit combines rotary and linear movements that can be positioned independently of each other.

The max. payload is 8 kg. Positioning for a 1 kg load time at swivel angle of 180° is 0.25 s

Simplified Motion Series



Simplified Motion Series are different electromechanical components with a simple and application-optimised combination of motor and drive controllers, the so-called integrated drive. This solution doesn't require external servo drive controllers, because all the necessary electronic components and modules are already integrated and optimised for simple movements between two mechanical end positions. Special motion characteristics can be set and adjusted, such as gently cushioned retracting into the end position, or a simplified press-fitting and clamping function.

This electrical alternative doesn't require the usual, often complex commissioning processes of traditional electric drive systems to achieve very simple linear and rotary motion and positioning tasks. Commissioning is quick and easy without the need for any software, computers or other accessories, because all parameters can be manually adjusted directly on the drive. Simplified Motion Series is directly connected to the controller, either via digital I/O (DIO) or IO-Link®, both of which are integrated as standard. A control cabinet is not required for installation, since the drives are mounted directly into the machine.



Powerful point-to-point communication is also integrated via IO-Link® for intelligent connection with the controller and all the way to the cloud.

Extended range of functions with IO-Link®:

- Motion parameters can be adjusted remotely
- Copy and backup function for transferring parameters between the drive and computer, or from the computer to another identical drive
- Read functions of the process parameters



- 1** During commissioning, all relevant parameters can be simply and intuitively adjusted directly on the integrated drive.
- Speed out: speed for the movement away from the reference end position
 - Speed in: speed for the movement to the reference end position

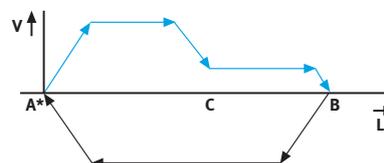
- Force: force of the drive in the "advanced" position
- Reference: setting the reference end position of the drive
- Start press: setting the position at which the power-controlled movement begins
- Demo: manual start (similar to manual override)

- 2** Simple electrical connection via M12 connector technology
- Power (4-pin): power supply for the motor
 - Logic (8-pin): control signal, sensor signal and current for the integrated electronics

Basic profile for movement between two end positions with speed-control



Extended motion profile for simplified press-fitting and clamping functions with speed and power control



- "Out" movement
- "In" movement
- A* Reference end position
- B Operating position
- C Start position "press"



Spindle axis ELGS-BS

Extremely compact and cost-effective spindle axis with precise, resilient recirculating ball bearing guide for the slide and powerful ball screw drive.

- Three sizes for a payload of up to 20 kg at a max. stroke of 800 mm

Toothed belt axis ELGS-TB

Compact and extremely cost-effective toothed belt axis with precise, resilient recirculating ball bearing guide for the slide, and durable belt.

- Two sizes for up to 1.3 m/s at a max. stroke of 2,000 mm

Common features

- Permanent stainless steel cover strip protects the internal guide and spindle or toothed belt
- Unique "one-size-down" assembly system
- Optional: vacuum connection to minimise particulate emissions from the axis into the system



Mini slide EGSS

The powerful and resilient EGSS with smooth-running spindle is the precise solution for guided linear individual movements or vertical Z movements.

- Three sizes with a max. stroke of 200 mm at a repetition accuracy of $\pm 20 \mu\text{m}$
- The internal guide absorbs transverse loads and provides very good resistance to torsion at high torques
- Direct mounting of the ERMS without the need for adapters
- Optional ducted compressed air compensation prevents particles or moisture from entering, and particles from escaping into the environment



Electric cylinder EPCS

The EPCS with smooth-running ball screw is ideal for linear individual movements. As an extremely cost-effective complete solution, the electric cylinder is perfect for

applications such as clamping, distributing, sorting and ejecting, and in handling systems as a simple Z-axis.

- Three sizes with a max. stroke of 500 mm and 0.36 m/s
- Simple and cost-effective position sensing with proximity switch
- Optional ducted compressed air compensation prevents particles or moisture from entering, and particles from escaping into the environment



Toothed belt axis ELGE-TB

The attractively priced toothed belt axis with recirculating ball

bearing guide ensures very good, smooth-running behaviour; it is ideal as an economical solution for very simple tasks with comparatively low requirements for mechanical load, dynamic response and precision, as well as for the environment.

- High running performance of 5,000 km



Rotary drive ERMS

The rotary drive for simple swivelling tasks or for increased

mechanical loads has sturdy, precise and backlash-free ball bearings for the rotary plate, thus absorbing transverse loads and torques.

- Two sizes, each with a swivel angle of 90° and 180°
- Sealed hollow shaft for the integrated through-feed of cables or tubing

Servo drive CMMT-AS



The CMMT-AS is one of the most compact servo drives on the market for low-voltage controllers. The compact servo drive for point-to-point and interpolating motion is suitable for different Ethernet-based bus systems and can be seamlessly and directly integrated in the system environments of various manufacturers. And commissioning with the Festo Automation Suite only takes a few minutes.

The well-thought-out design ensures free and convenient access to the connections and control elements. All connections and the detachable control unit CDSB are mounted at the front and on top of the closed-loop controller. Its compact design and optimised connection technology permits easy and space-saving installation in the control cabinet together with much shorter connection times.

- Direct fieldbus integration for the main controller manufacturers

- Configure standard safety functions without software: STO, SS1, SBC
- Autotuning supports easy commissioning and automatically optimises the control behaviour of rotary and linear motions for the mechanical systems of both Festo and third-party manufacturers
- Extremely low width, depth and height of the controller and unique high-density assembly thanks to good series connection of multiple controllers
- Optimally with servo motor EMMT-AS

System integration with third-party manufacturers

The servo drive CMMT-AS can also be integrated directly into the system environment of a third-party manufacturer and behaves like a controller from that controller manufacturer. The identical behaviour means that no controller-specific expertise is required for the CMMT-AS.

The prerequisite for perfect integration of an EtherNet-based protocol such as PROFINET, PROFIBUS, EtherNet/IP, EtherCAT or Modbus®. Function blocks are available for several manufacturers such as Siemens, Rockwell, Beckhoff and Omron.



Commissioning software Festo Automation Suite

The PC-based software seamlessly combines parameterisation, programming and maintenance in one program, from the mechanical system to the controller. The entire drive package can be commissioned in just five steps, and be integrated into the control system CPX-E in just two clicks.

Important technical data of the CMMT-AS	
Applications	Point-to-point and interpolating motions
Nominal power	1 phase 230 V: 0.35/0.7 kW, 3 phase 400 V: 0.8/1.2/2.5 kW
Communication	EtherCAT®, PROFINET, EtherNet/IP, Modbus®
Safety functions	STO, SS1, SBC, (SS2, SOS, SLS, SSR) *
Multi-encoder input motor Additional encoder input	ENDAT2.1/2.2 (one cable), HIPERFACE, Nikon ENDAT2.2, Nikon, A/B- and SIN/COS incremental
Mains filter	Integrated
Intermediate circuit coupling	Yes
Engineering, commissioning, programming	PositioningDrives Festo Automation Suite (including first commissioning wizard), Autotuning CODESYS

Servo motor controller CMMP-AS



CMMP-AS-M3



CMMP-AS-MO

This range of servo motor controllers (CMMP-AS) provides an extremely functional solution for dynamic movements and is perfect for the electronic control of cam discs.

CMMS-AS-MO as the basic variant with standard functions and CMMP-AS-M3 with expansion options, e.g. for an EtherCAT® connection or a safety module.

The software tools from Festo offer a universal concept from commissioning and programming right through to parameterisation

- Convenient and easy operation
- SD card for parameters and firmware

Integrated safety function

- Integrated safe stop with restart blocking for safety-orientated applications
- Safe torque off (STO) up to category 4, PLe integrated
- Further safety functions can be realised using external components
- Solution examples available

The integral software platform and Festo Configuration Tool (FCT) and the standardised data profile FHPP ensure problem-free commissioning, programming and parameterisation.

Technical data and functions

- Motor current
 - Single-phase: 2.5 and 5 A
 - Three-phase: 5 and 10 A
- 256 integrated position records
- Automatic motor brake
- Speed and position control
- Current and torque control

- Jerk-free positioning
- Infinitely variable positioning in closed-loop operation
- Flying measurement
- Electronic cam disc
- Flexible software limit switches
- External braking resistor (optional)

CANopen

PROFI
NET

PROFI
BUS

EtherCAT

DeviceNet

EtherNet/IP

Servo drive CMMT-ST



Like its big brother the CMMT-AS, the extra-low voltage closed-loop controller CMMT-ST is an integral part of the Festo Automation Platform. It offers extremely economical positioning tasks and motion solutions with low power requirements up to 300 W.

As it is part of the same platform as the CMMT-AS, it is suitable for different Ethernet-based bus systems and can also be seamlessly and directly integrated in the system environments of various manufacturers. Commissioning with the Festo Automation Suite also just takes a few minutes.

Though more compact and much cheaper than its big brother the CMMT-AS, the connection and communication concept, functional modules and standard safety features remain unchanged. The consistent control concept means that the CMMT-AS and CMMT-ST as a drive can be easily combined with both large and small axes.

EtherCAT

EtherNet/IP

PROFINET

- Max. continuous output: 300 W
- Primary voltage: 24 ... 48 V DC
- Motor current: 8 A/peak 10 A
- Point-to-point and interpolating motion as well as precise positioning
- 50% more compact than the smallest CMMT-AS
- Direct fieldbus integration for the main controller manufacturers
- Configure standard safety functions without software: STO, SS1, SBC
- Autotuning supports easy commissioning and automatically optimises the control behaviour of rotary and linear motions for the mechanical systems of both Festo and third-party manufacturers
- Optimally with proven stepper motor EMMS-ST
- Thanks to an identical platform as the CMMT-AS, it has the same connection and communication concept, functional modules and standard safety features

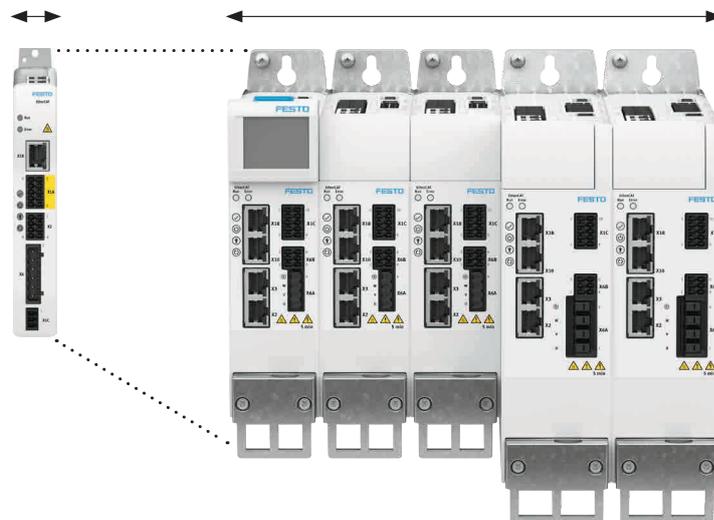


Commissioning software
Festo Automation Suite

The PC-based software seamlessly combines parameterisation, programming and maintenance in one program, from the mechanical system to the controller. The entire drive package can be commissioned in just five steps, and be integrated into the control system CPX-E with just two clicks.

CMMT-ST

CMMT-AS



Stepper motor controller CMMS-ST



Stepper motor technology in a real Festo plug & work solution package: the single-axis position controller (servo drive) CMMS-ST combined with stepper motors EMMS-ST for single and multi-axis handling applications with moving loads of up to 20 kg.

The CMMS-ST is a fully fledged closed-loop servo system for the highest degree of operational safety and fast dynamic response by using the best possible motor characteristic curve. Alternatively, the CMMS-ST can also be used as a low-cost open-loop system with stepper motors without encoders.

Integrated safety function

- Safe torque off (STO) up to category 3, PLd integrated
- Further safety functions can be realised using external components
- Solution examples available

CANopen

PROFI
BUS

DeviceNet

Technical data and functions

- Primary voltage: 24 ... 48 V DC
- Motor current: 8 A/peak 12 A
- 63 integrated position records, e.g. acceleration ramps

- Automatic motor brake
- Jerk-free positioning
- Infinitely variable positioning
- The digital inputs and outputs are protected against short circuit, overload and reverse voltages

The integral software platform and Festo Configuration Tool (FCT) and the standardised data profile FHPP ensure problem-free commissioning, programming and parameterisation.

Motor controllers CMMO-ST



The motor controller (drive system) CMMO-ST is a closed-loop servo controller for stepper motors and offers a broad connectivity such as IO-Link®, Modbus TCP or I/O interface.

As a fully fledged closed loop servo system with jerk-limited acceleration, it uses the best possible motor characteristic curve for the highest degree of operational safety and fast dynamic response.

Functions

- Monitoring of freely defined positions and torque ranges
- Monitoring of different process variables such as torque, speed, position and time
- Positioning mode with optional torque limiter
- Force mode with optional stroke limit
- Speed mode with stroke and force limitation

Key technical data

- Power supply 24 V DC for logic and load (separate)
- Maximum motor current: 5 A
- Safety: STO/cat. 3, PLd
- Degree of protection: IP40
- IO-Link® and Modbus® TCP
- I/O interface (7 freely definable positions via directly allocated I/Os)



Servo motor EMMT-AS



The AC synchronous servo motor for demanding and dynamic applications is noted for an extremely low standstill torque. This ensures good adjustability and tracking accuracy for positioning tasks. The "electronic rating plate" contains all the important motor data. It can be read by the servo drive CMMT-AS and thus the parameters for the servo motor will be automatically

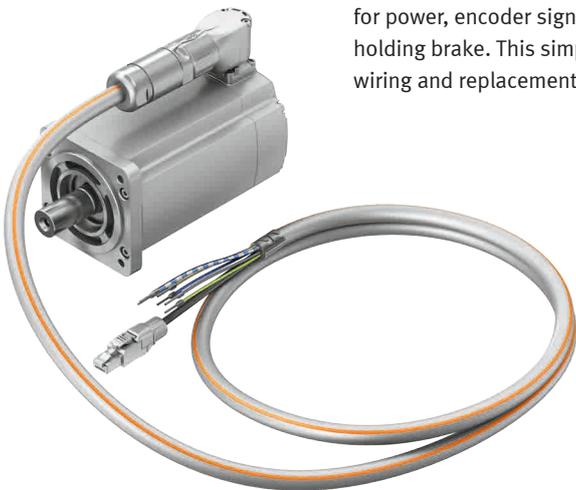
set. This makes commissioning effortless and totally reliable.

- 3 sizes 60/80/100 with up to 2.6 kW / 9.8 Nm
- Single-turn or multi-turn absolute encoder
- With or without holding brake
- Smooth, painted surface that is dirt-resistant and easy to clean
- Degree of protection IP67: complete housing and connection technology (including plug)

- Degree of protection IP40 on the shaft, optionally IP65 with sealing ring suitable for unlubricated operation
- Temperature measurement integrated in motor, interference-proof and digital transmission via the encoder protocol

Space-saving, one cable solution

The space-saving one cable plug (OCP) requires much less installation effort. The servo motor is connected with only one cable for power, encoder signals and holding brake. This simplifies wiring and replacement.



- It is suitable for transmitting higher electrical power
- Robust and durable for dynamic applications, e.g. in energy chains
- Long cables for distances over 50 m
- Cable lengths up to 100 m with improved protection against interference



Commissioning software Festo Automation Suite

The PC-based software seamlessly combines parameterisation, programming and maintenance in one program, from the mechanical system to the controller. The entire drive package from CMMT-AS and EMMT-AS can be commissioned in just five steps, and be integrated into the control system CPX-E in just two clicks.

Servo motors EMMS-AS and EMME-AS



Designed for dynamic positioning tasks: the servo motors EMMS-AS and EMME-AS with eight torque ranges.

- Single-turn encoder (standard)
- Multi-turn encoder (optional)
- Optional holding brake
- Degree of protection
 - IP65 for motor housing and power/encoder connection
 - IP54 on the motor shaft without and IP65 with shaft seal ring

Servo motor EMMB-AS



This compact and particularly economical synchronous servo motor in four power classes is perfect for simple positioning tasks, particularly in the electronics industry and small parts assembly as well as in test stations.

- Single-turn encoder, optional: multi-turn with battery adapter
- Optional holding brake

- Motor, brake and encoder cables with optimised connection technology
 - 2.5 ... 10 m
 - Optional: versions suitable for energy chains
- Degree of protection:
 - IP65 for motor housing and cable connections
 - IP50 on the motor shaft without and IP54 with shaft seal ring
- Compatible with shafts and flanges on the EMMT-AS

Stepper motor EMMS-ST



The stepper motor series EMMS-ST is designed for two-phase hybrid technology. In addition to the simple and cost-effective connection technology, the motors stand out above all thanks to the problem-free operation and the long service life.

- Four sizes with flange sizes 28, 42, 57 and 87
- Conforms to IEC 60034 standard
- Optional encoder for closed-loop function
- Optional motor brake
- Degree of protection:
 - Motor housing and plug connection in IP54
 - Motor shaft IP40

Matching range of planetary gear units

- Gear ratio $i = 3$ and 5 ; others available on request
- Life-time lubrication
- Degree of protection: IP54

Matching motor and encoder cables

- Five standard lengths from 1.5 m to 10 m; others available on request
- Shielded cables
- Suitable for energy chains
- Degree of protection IP65



Integrated drive EMCA



The complete solution EMCA for positioning electromechanical drives and for format changes consists of a maintenance- and wear-free EC motor and a motor controller (servo drive). The power electronics are also integrated. That avoids long motor cables, improves the electromagnetic compatibility and reduces the installation time and space requirements.

Integrated monitoring functions ensure reliability and availability. Absolute position sensing is included as standard via a single-turn or optionally via a multi-turn encoder. External gear units are available for optimal adaptation to different positioning tasks or format changes.

Parameterisation and commissioning are carried out with the Festo Configuration Tool FCT.

Key features

- 64 freely programmable position records
- Multi-turn encoder with buffering (resolution up to 32 bit or > 4 billion revolutions)
- One size with identical flange dimensions in 2 lengths with performance classes 120 W and 150 W
- Degree of protection IP54 is standard and IP65 is optional, for direct installation in the system
- Optional holding brake and external gear unit

Technical specifications

- Nominal power 120/150 W
- Peak power 200 W
- Nominal torque 0.34/0.46 Nm
- Maximum torque 0.78 Nm

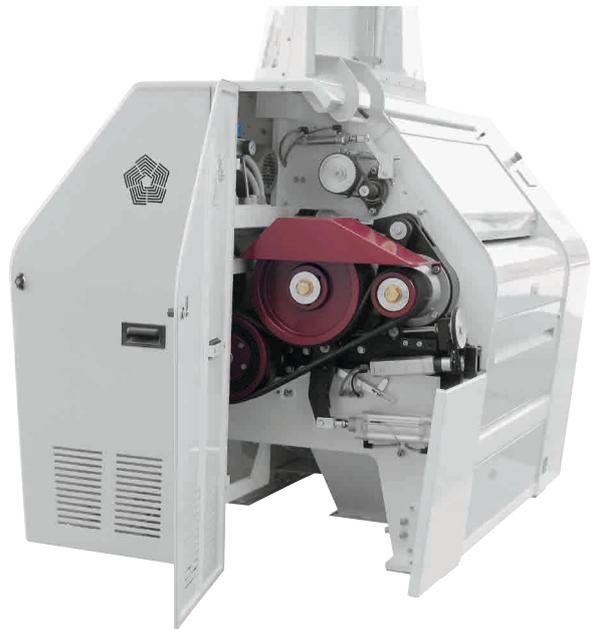
CANopen

PROFI
NET

EtherCAT

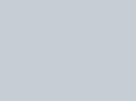
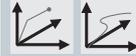
EtherNet/IP

Modbus

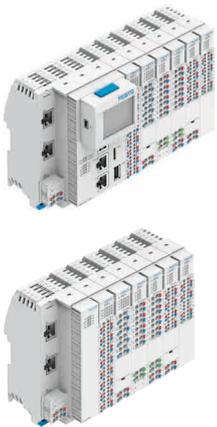


Integrated drive for format changes as a replacement for a handwheel

Overview of multi-axis control systems

Module	Compact controller	Integrated controller	CPX Terminal		CPX-E automation system in the control cabinet		
	 <p>Controller CECC-D CECC-LK</p>	 <p>CODESYS V3 controller CDPX</p>	 <p>CODESYS V3 controller CPX-CEC-C1-V3</p>	 <p>Motion controller CPX-CEC-M1-V3</p>	 <p>Modular controller CPX- E-CEC-C1-PN</p>	 <p>Modular motion controller CPX-E-CEC-M1-PN</p>	
Functionality	 <p>Single axis (PTP asynchronous)</p>	 <p>Single axis (PTP asynchronous)</p>	 <p>C1: Single axis</p>	 <p>M1: Interpolation (3D)</p>	 <p>C1: Single axis</p>	 <p>Robotics (3D)</p>	
Maximum permissible axes	4 axes	8 axes	128 axes	31 axes	Open acc. to EtherCAT® specification	16 axes interpolated	
Motion	<ul style="list-style-type: none"> • PTP asynchronous 	<ul style="list-style-type: none"> • PTP asynchronous • Each axis moves with its own predefined parameter • The axes do not reach their end positions at the same time and the path is not defined • M1 variants: 3D interpolation with -M1 variants for up to 31 axes 			<ul style="list-style-type: none"> • C1 versions: PTP asynchronous • M1 versions: 3D path interpolation 		
Special features	<ul style="list-style-type: none"> • Stand-alone controller • Integration of two fast inputs (200 kHz) • 4 IO-Link® masters for CECC-LK • CODESYS V3 • OPC UA server 	<ul style="list-style-type: none"> • Integrated controller in one display • CODESYS V3 • OPC-UA client 	<ul style="list-style-type: none"> • Function integration on the CPX terminal • CODESYS V3 • 32 bit/800 MHz processor • OPC UA server 		<ul style="list-style-type: none"> • CODESYS V3-SPS SP10 • Encoder interface • Interrupt function • High-speed clock pulse inputs • Digital and analogue I/O modules • IO-Link® master module • Two EtherCAT® interfaces, one EtherCAT® master • Integrated full CPU • Host integration via fieldbus interface as slave to: <ul style="list-style-type: none"> – PROFINET (version PN) – EtherNet/IP (version EP, on request) • USB Interface • SD card interface 		
				<ul style="list-style-type: none"> • SoftMotion: • PLC open • CNC editor • DXF import • Cam disc editor 	<ul style="list-style-type: none"> • PLC open Part 1, 2, 4*** • CNC editor • DXF import *** • Cam disc editor <p>*** Robotics library</p>		
Application example	<ul style="list-style-type: none"> • 2D/3D handling systems • Pick & place • Palletising 	<ul style="list-style-type: none"> • 2D/3D handling systems • Pick & place • Palletising 			<ul style="list-style-type: none"> • Path control • Bonding • Cutting • Handling • Flying saw • Cam disc 	<ul style="list-style-type: none"> • 2D/3D handling systems • Pick & place • Palletising 	<ul style="list-style-type: none"> • 2D/3D handling systems • Palletising • Bonding • Dispensing • Painting • Cutting • Flying saw • Cam disc

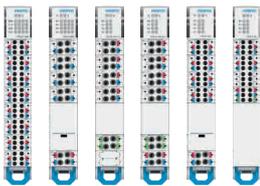
Modular control system CPX-E



CPX-E is a powerful automation system and, as an EtherCAT® master controller and motion controller to IP20, is the central control system for handling applications. The version without control unit is a compact and affordable remote I/O including different bus modules.

Thanks to comprehensive PLC functions and multi-axis applications with interpolation, the CPX-E can be easily integrated into existing host systems. The OPC UA client and server functions ensure easy integration and interoperability in Industry 4.0 host environments with cloud and digitalisation concepts.

- Fast EtherCAT® master interface
- Bus slave interfaces: PROFINET, Ethernet/IP
- High performance (dual core processor with 766 MHz and 512 MB RAM)
- USB interface and SD card interface
- Display CDSB optional
- CODESYS V3 as of SP10
- Motion functions such as SoftMotion
- UL/CSA, C-Tick, IEC Ex certifications



Remote I/O modules

- Digital input modules (16 DI)
- Digital output modules (8 DO/0.5 A)
- Analogue input module (4 AI current/voltage)

- Analogue output module (4 AO current/voltage)
- IO-Link® master modules (4 channels)*
- Counter module

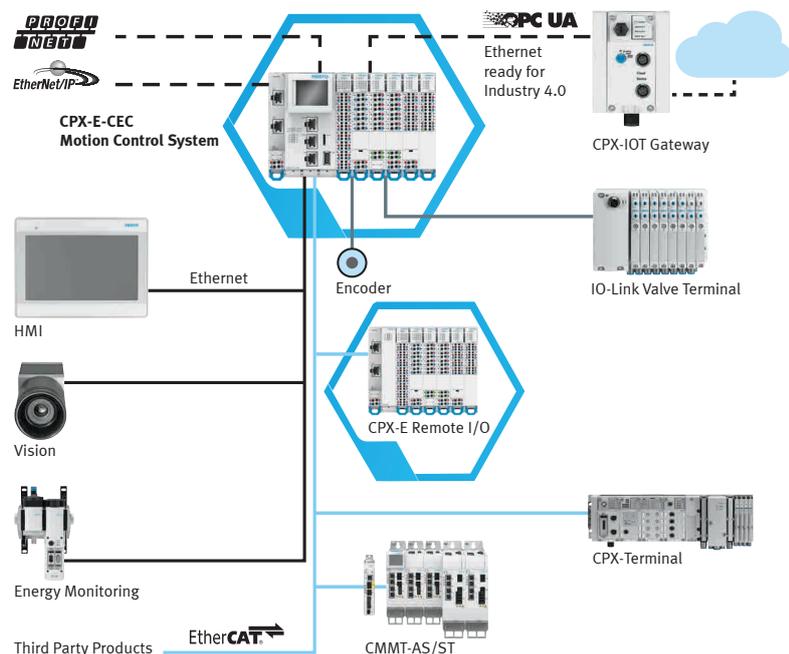
The control options of the CPX-E

- CPX-E-CEC-C1: powerful CODESYS V3 control unit with comprehensive PLC functions, but without any motion control functions
- CPX-E-CEC-M1-EP: motion controller with CODESYS V3 and SoftMotion

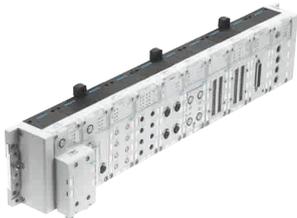


The PC-based software seamlessly combines parameterisation, programming and maintenance in one program, from the mechanical system to the controller. The entire drive package can be commissioned in just five steps, and be integrated into the control system CPX-E with just two clicks.

Architecture of the automation system CPX-E



Terminal CPX



The CPX terminal is used as a modular and flexible automation platform, including embedded CODESYS controller, or as a versatile remote I/O in IP65. With CPX, you can integrate pneumatic and electrical control chains easily, quickly, flexibly and, above all, seamlessly into all automation concepts and company-specific standards. This makes CPX the perfect platform for electrical peripherals of a machine with decentralised and networked intelligence. It is a forward-looking technology that can now be connected to host environments for Industry 4.0 as well as to the Festo Cloud and others via the IoT gateway.

Perfect networking thanks to:

- Universal communication via fieldbus/Ethernet
- A choice of pneumatic platforms (valve terminals)
- Subordinate, decentralised installation systems CPI, IO-Link® or I-Port
- Maximum range of modules for almost any automation requirement

Extensive function integration

- Front-end control
- A choice of scalable installation concepts
- Comprehensive diagnostics and condition monitoring, also via an IoT gateway and the Festo Cloud
- Motion control for electric and servo-pneumatic drives



DeviceNet

CANopen

EtherNet/IP

EtherCAT

SERCOS
the automation bus

Festo Cloud via CPX-IOT Gateway
OPC-UA/AMQP/MQTT



CODESYS controller with CANopen master for multiple asynchronous axes



Motion control with CPX-CEC-C1-V3

An intelligent remote directly I/O terminal in IP65/IP67 mounted directly on the machine for decentralised control tasks in the machine.

- Extensive CODESYS function library
- Integrated CANopen master for several thousand I/Os
- Motion control with up to 127 asynchronous electric drives



Additional CODESYS SoftMotion library for 3-dimensional interpolation



Motion control with CPX-CEC-M1-V3

As the CPX-CEC-C1, with additional CODESYS SoftMotion library. This allows the controller to perform three-dimensional interpolation for up to 31 synchronous, electric axes. With flexible electronic camming functions and CNC editor included.

New: predefined profiles are available as function blocks and visualisation components for highly dynamic handling systems (→ page 46/47) ("Festo Robot Lib").

Compact controller CECC



The CECC is a versatile controller with CODESYS V3 provided by Festo and offers a huge number of functions on a compact device. With the CECC, electric or pneumatic drives are easy to control, especially for small tasks. The innovative, object-oriented programming and function library for motion control for interpolating up to 3 axes make operation and programming very easy.

CECC-D with basic functions:

- CANopen master for connecting with servo drives
- Ethernet, Modbus® TCP client/server, EasyIP, TCP/IP, OPC server are available
- 12 digital inputs, 8 digital outputs, 2 high-speed counters of up to 180 kHz

CECC-S with additional interfaces:

- IO-Link® master and device
- RS232, RS422, RS485 for free programming or as a direct encoder interface

CECC-LK with IO-Link®:

- Four IO-Link® masters and one IO-Link® device interface
- Easy to connect with sensors and valve terminals
- Direct connection with the Simplified Motion series

OPC UA client server is available on request, making CECC ready for Industry 4.0.

Operator unit CDPX



CDPX as a front end display with a touchscreen simplifies the communication with machines and systems. Simple intuitive project planning and programming is carried out with the Designer Studio. The operator unit with perfect graphic display visualises data, and operates as a worldwide server for external clients.

With the addition of a CODESYS controller, CANopen master and digital and analogue I/O modules, a Programmable Automation Controller (PAC) is created, thus simplifying the control of automation tasks at field level. Festo valve terminals, servo drives and other products can now be connected directly via CANopen.

- Four display sizes up to 13.3" and 1280 x 800 pixels
- Additional functions such as:
 - Data presentation in numerical, textual and graphic form
 - Data collection and trend display
 - IP camera image display
- Analogue and digital inputs and outputs optional

Smart camera SBRD



The smart camera SBRD opens up new opportunities for automation and robotics! The powerful remote head controller is specially designed for multi-camera tasks. The lightweight and ultra-compact USB cameras

SBPB provide monochrome or colour images. With a resolution of up to 5 megapixels, they are the optimal solution for many standard applications, yet are also extremely cost-effective.

The matching image processing software Camera Configuration Studio (CCS) is easy and intuitive to operate.

Functional safety

The Machinery Directive 2006/42/EC permits numerous safety functions as protective measures for appropriate risk

reduction to DIN EN 61800-5-2 and EN 60204-1. Implementing these safety functions in a practical manner requires

different components that can easily be integrated into an overall concept.



PROFIsafe I/O modules to CPX
The scalable PROFIsafe input and output modules of the automation platform CPX cover the entire local safety chain thanks to IP65/67. Multiple PROFIsafe modules per CPX are possible.

The compact and sturdy 8-channel input module enables clear and simple connection of safety-orientated switching devices, such as emergency stop switches or light barriers.

The output module switches the internal supply voltage of the valve terminal off, and offers 2 independent, secure outputs for other voltage zones of the valve terminal or for individual valves.



Motor controller CMM...
The safety function STO is integrated as standard into all motor controllers (drive systems)

in the CMM ... range. This allows easy implementation of the emergency stop requirements with safe stop SS1 up to category 3, PLd.

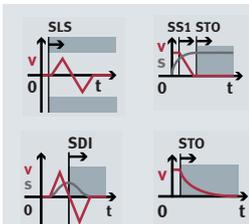
For stricter requirements, the series CMMP-AS-M3 provides optional safety modules for safety functions up to category 4, PLe.



Intelligent solutions for monitoring linear axes
The drive mechanisms cannot be monitored by using encoders in servo motors, and by integrating safety-related functions in motor

controllers (drive systems), or via external monitoring systems. However, with a linear displacement encoder mounted directly on the drive, as well as the safety-oriented mounting of a

linear scale and measuring head, the axis position can be monitored directly for safety functions up to category 4, PLe.

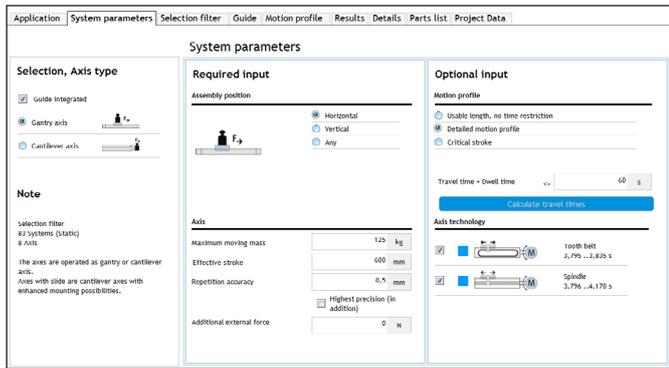


Sample solutions
How do I implement safety functions with electric drive components?

Festo provides a number of solutions. Descriptions, bills of materials, circuit diagrams, application programs and

Sistema projects allow fast integration into your safety concept – with the appropriate documentation.

PositioningDrives – Software tool for designing axis systems

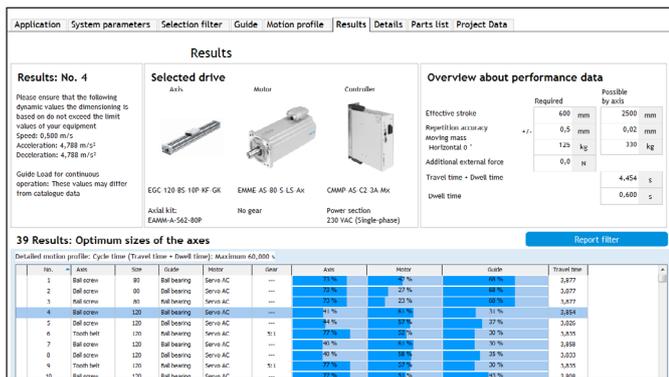


PositioningDrives prevents design errors and improves energy efficiency by helping you to choose the right components. Designing drive mechanisms, gear units and motors separately can increase the safety factors and result in oversized electric drive systems.

Application parameters such as mounting position, load, stroke and precision need to be entered. There is also an option to limit the travel time. Preselected drive and motor technology as well as guide variants limit the number of variations and quickly generates a list of results.

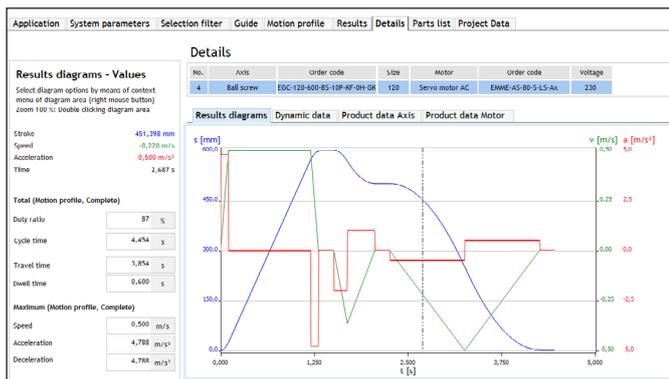
Toothed belt drives or spindle drives, servo motors, stepper motors or DC motors, ball bearing guides or plain-bearing guides – the plethora of options to choose from presents the user with a major challenge: calculating the correct drive package.

The preferred solution package There are different sorting options to make the selection process easier. The combination of axis, motor/gear unit and drive system (controller) is displayed graphically, and the degree of utilisation is shown as a bar graph. By clicking once on the component illustration, the appropriate documentation is opened in the selected language.



Once a few application details have been entered, the PositioningDrives software calculates various combinations from the extensive, coordinated range of linear axes, motors, gear units and drive systems (controllers). The ideal drive package for the respective requirements can then be selected from the list of results.

Detailed results The program then provides detailed information such as the motion profile, dynamic load data, product characteristics and a bill of materials. Complete project documentation and data back-up round off the range of functions of PositioningDrives.



Commissioning software Festo Automation Suite



The PC-based software Festo Automation Suite combines the parameterisation, programming and maintenance of Festo components in one program. The entire drive package, from the mechanical system to the controller, can be commissioned. The commissioning software that is available free of charge already contains the basic functionalities of all Festo components.

Plug-ins or add-ons can be installed directly via the program. Furthermore, device information,

manuals and application descriptions, can also be downloaded from the software without having to open a web browser.

Intelligent connectivity

Using the integrated commissioning wizard, it only takes five steps to safely configure and parameterise a fully operational drive system. And with just two clicks, the servo drive CMMT-AS is integrated into the controller program of CPX-E. Optionally, the CODESYS extension additionally

enables the motion control and robotics functions of CPX-E to be programmed.



Free download of the software at www.festo.com/automationsuite

Highlights

- Only five steps to get a drive system up and running
- Customisable thanks to device-specific plug-ins and add-ons
- Integrated controller programming
- Access to device information and instructions directly from the software



The user interface has a uniform look across all functions, whether diagnostic information for valve terminals is requested, or a servo drive is parameterised or programmed in CODESYS.

1 Display of component links

List of all components used and hierarchical display of the communication relationships.

2 User-orientated design

Add the Festo components by dragging and dropping, then establish the communication connections by intuitively drawing the required lines. The software automatically calculates the basic parameters of the stations in the background.

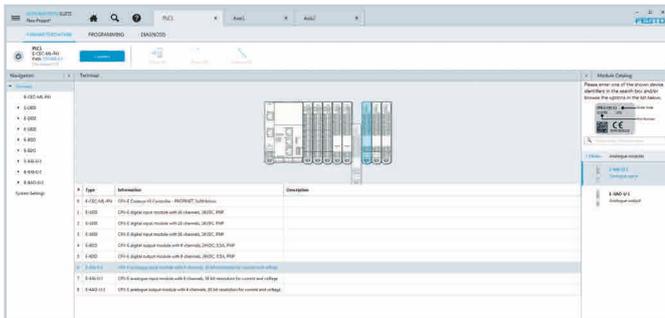
3 Navigation similar to a web browser

Device-specific content is shown on tabs, so that you can conveniently move between the different contents.

4 Installing plug-ins

Search for device-specific add-ons of the components using part number or order code, and the Festo Automation Suite will automatically find the right plug-in and immediately install it either from the program, or by online download.

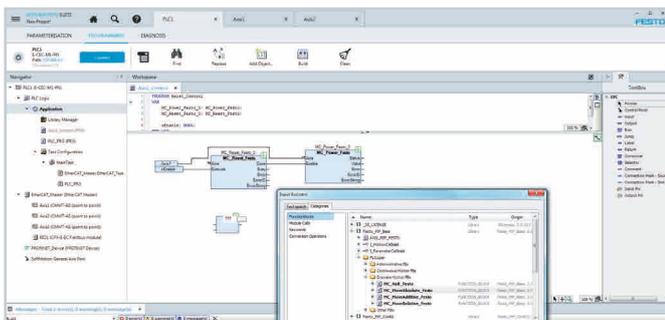
Examples of plug-in features



Flexible configuration of the CPX-E terminal

The individual modules of the CPX-E terminal can be configured and parameterised using a graphical user interface, so

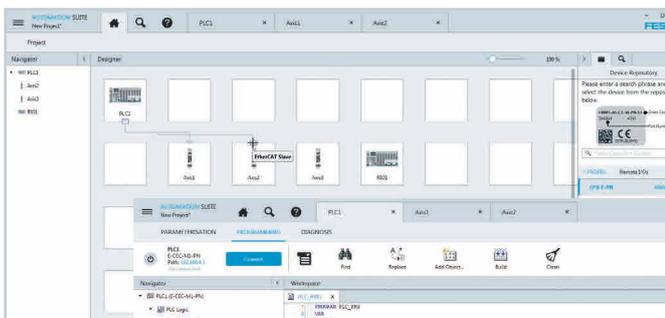
they can be changed, replaced, added or deleted by dragging and dropping them. Module and channel parameters can also be easily set.



Controller programming with CODESYS

You can download CODESYS as a system add-on. It integrates seamlessly into the user interface of the plug-in and makes the established editors for controller programming

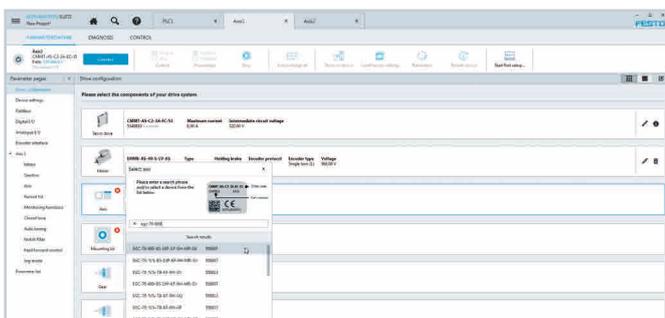
according to IEC 61131-3 available: from simple point-to-point motion and SoftMotion applications with cam disc and CNC functions to robotics applications according to PLCopen Part 4.



Extremely easy integration of the drive system

Where 100 mouse and keyboard operations were once required, two now suffice. After CMMT-AS has been connected to the controller CPX-E by dragging a line, everything else, from integrating the necessary libraries and linking the process

data to transferring important axis parameters, is performed automatically. The drive system is immediately ready for use in the controller program. The result is fewer errors and more time for your main task: creating and commissioning the machine process.



Simple and secure parameterisation

The parameterisation, diagnostic and control functions can be displayed in the tool bar. The clear parameterisation interface allows you to easily select the required Festo mechanical system using the order information, such as the part number. The program takes care of the correct settings as all the

technical data – from the servo drive to the axis – is saved and used to automatically calculate the controller settings. There no longer is a need for complex, manual calculation of the suitable parameter values, which considerably minimises time, effort and sources of error!

Handling systems and Cartesian robots

The ready-to-install systems provide you with fast and reliable solutions for standard applications that are fully assembled, tested and perfectly coordinated, and include energy chain, connection technology and matching drive package.

Handling Guide Online: the quickest way ever to the right handling system

Configure single-axis systems, linear, planar surface and three-dimensional gantries as well as highly dynamic and compact handling systems quickly and easily with the Handling Guide Online.

- The right handling system, including CAD model and commissioning file, in 20 minutes.
- The engineering effort and the design of the handling system are reduced to just a few minutes
- Very easy and intuitive to use and features structured data prompts
- Shorter time-to-market, because it takes only around 3 weeks from configuration and ordering to delivery and installation.

1D handling systems



Single-axis systems for linear movement

The single-axis system with its high mechanical rigidity and sturdy design is ideal for long, one-dimensional strokes and large loads. It always includes

an energy chain for reliable operation. A matching servo drive package from Festo, as well as many other options, round off the ready-to-install complete system.

2D handling systems



Linear gantry for vertical movements in 2D

High mechanical rigidity makes this linear gantry precise, even with very long strokes of up to 3000 mm in the Y direction. The tubing and cables are routed through energy chains, ensuring outstanding operational and process reliability.



Highly dynamic linear gantry for maximum dynamic response in limited space

The Cartesian high-speed place robot based on the EXCT offers excellent dynamic response with max. 95 picks/minute, high flexibility and a compact design. It is a slim design with a very compact Z-axis, ideal for flexible handling tasks with free movement in the vertical plane even when installation space is limited.



Planar surface gantry for horizontal movements in 2D

With its high mechanical rigidity and sturdy design, this planar surface gantry can be used anywhere, whether with heavy workpieces or high payloads. At the same time, it is extremely precise, even with long strokes.



Highly dynamic planar surface gantry for maximum dynamic response throughout the installation space

Thanks to its extremely low moving mass, the gantry with robotic functionality allows up to 100 picks/min and covers the working space of two SCARA robots. It is very compact and flat, and moves almost vibration-free. The working space of the XY planar surface gantry makes handling highly flexible with free planar movement.



Compact planar surface gantry for maximum working space coverage

The compact planar surface gantry based on the EXCM shows its advantage, especially when every millimetre counts. It combines outstanding functionality with an extremely compact, flat design and maximum working space coverage.

3D handling systems



Three-dimensional gantry for three-dimensional movements in a space

The Cartesian robot is ideal for very long strokes of up to 3000 mm in the X direction, even with high loads. The combination of different axis modules means it can be used anywhere, for light to heavy workpieces or a variety of dimensions.



Highly dynamic three-dimensional gantry for maximum performance in 3D

With up to 100 picks/min, and being scalable in both X and Y directions, the three-dimensional gantry based on the EXCH is very dynamic as well as extremely compact and flat. The low moving mass allows up to 30% more power and the low centre of gravity ensures low overshoot and better positioning accuracy.



Compact three-dimensional gantry for high payloads in the smallest of spaces

The extremely space-saving, compact and flat 3D system is excellent at absorbing high forces and torques, and its length and width are configurable. The solution stands out thanks to its smooth-running characteristics and high positioning precision.



Productivity

Maximum productivity is a question of ambition

Do you share this attitude? We will be glad to help you achieve this goal – through our four outstanding qualities:

- Security • Efficiency • Simplicity • Competency

We are the engineers of productivity.

Discover new dimensions for your company:

→ www.festo.com/whfesto