

# Electronics, assembly and testing Solutions and products

**FESTO**



Handling, assembling and testing small parts are at the heart of the electronics industry. Festo has a wide variety of solutions and products for these applications, whether pneumatic, electric or a combination of both. And all that at a fair price.

You live speed and innovation.  
You think efficiency and miniaturisation.  
We are your solution for electrics and pneumatics.

→ **WE ARE THE ENGINEERS  
OF PRODUCTIVITY.**



## Applications

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## Your partner for greater productivity

### The focus is always on you and your requirements

The innovation cycles in the electronics industry are becoming ever shorter; most companies have less than six months when building a new production line. Fast, precise, reliable and cost effective – these are the key requirements for automation solutions in small parts assembly and testing. We are the experts in industrial automation – and our products and solutions are designed precisely with your requirements in mind.

#### The benefits at a glance

- + Extensive core product range: delivered quickly and attractively priced
- + Pneumatic, electric and a combination of both
- + Functional modules and ready-to-install solutions
- + Seamless connectivity: mechanical systems, motors and controllers
- + Wide range of cleanroom products
- + Time-saving engineering tools for project engineering and design
- + Global presence that guarantees support and service all around the world

Our  
expertise

Your  
advantage

#### Product highlights

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#### Product portfolio

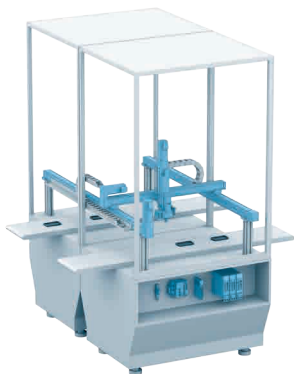
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# Automating electronics manufacturing processes

Festo technologies open up an enormous potential for companies that wish to replace manual process steps with automatic ones in the production of electronic devices. Machine builders, too, benefit from our extensive automation expertise. Using smartphone assembly as an example, we will show what opportunities and advantages are on offer here.

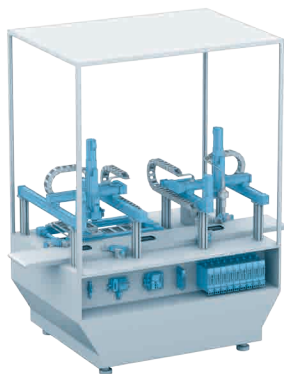
These days, smartphones are usually transported through the assembly line on a central belt, with manual workstations arranged on the left and right. In our example, we show how one or more of these manual assembly steps can be automated. The benefit to you is maximum productivity and flexibility in the manufacturing process. Get off to a good start with Festo.

## Pick & place



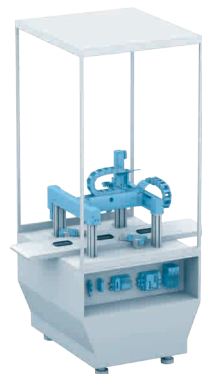
Pick up the smartphone housing from the manual assembly line and transport to the automatic assembly line.

## Screw driving



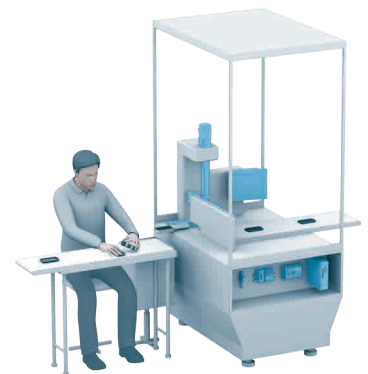
Insert the printed circuit board into the smartphone housing and fix it in place using an automatic screwdriver.

## Dispensing



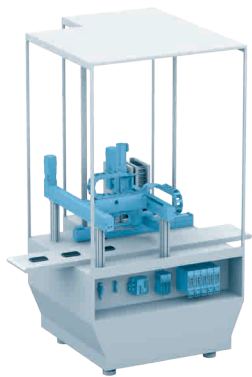
Apply adhesive beading to the smartphone housing.

## Pressing



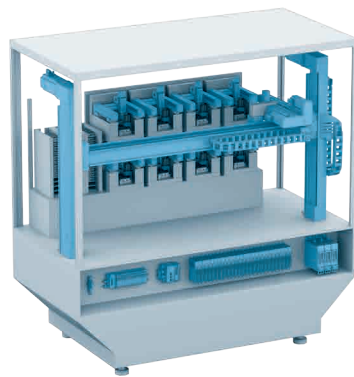
Press the display automatically into the smartphone housing after it has been carefully placed by hand.

## Stacking and packing



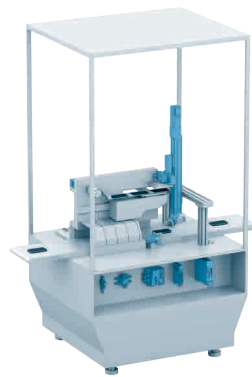
Remove smartphones from the assembly line and place them in a workpiece carrier.

## Testing



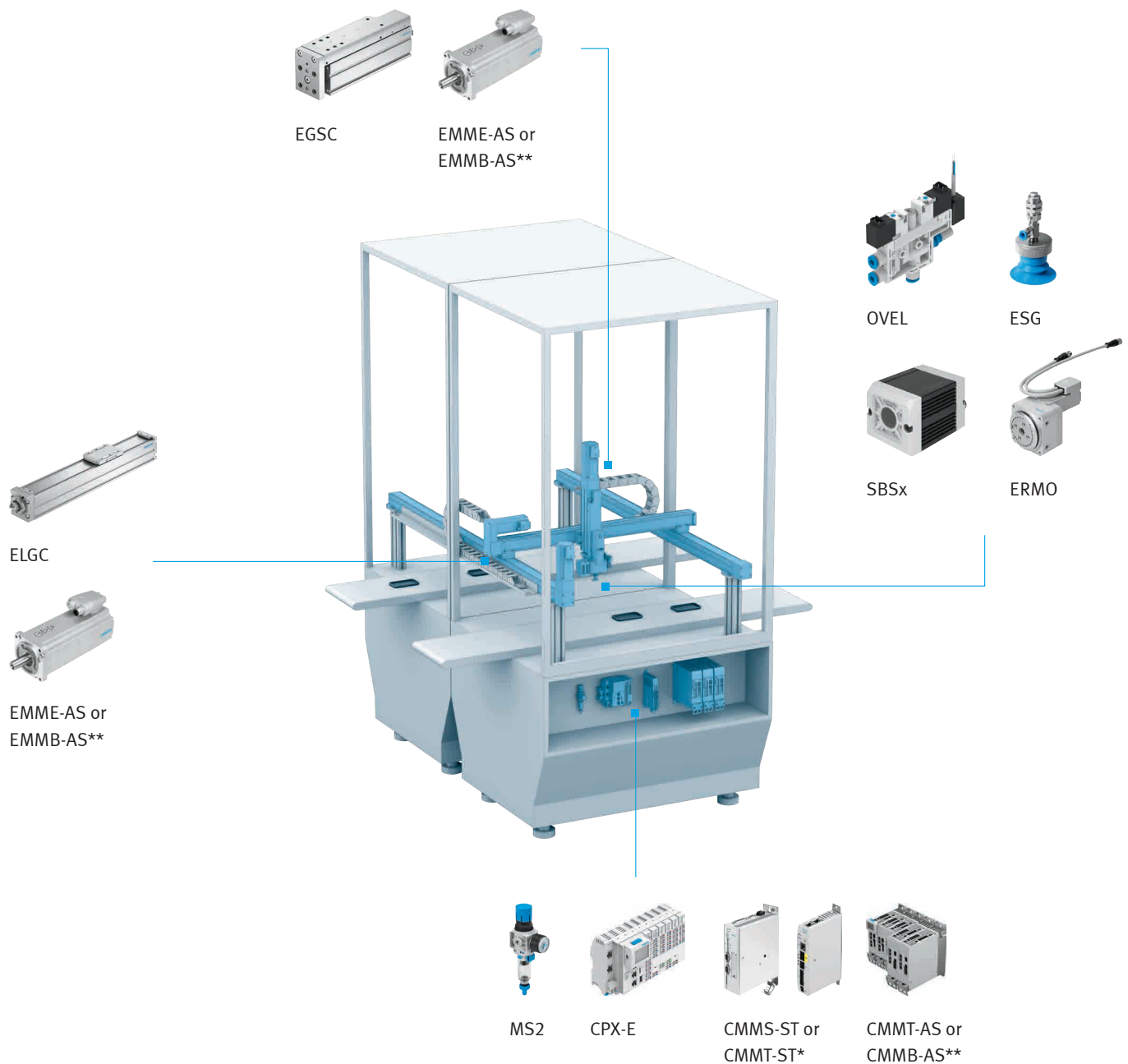
Remove smartphones from the workpiece carrier to check them on the testing device.

## Labelling



Apply a label on a product.  
E.g. attach a protective film to the smartphone display.

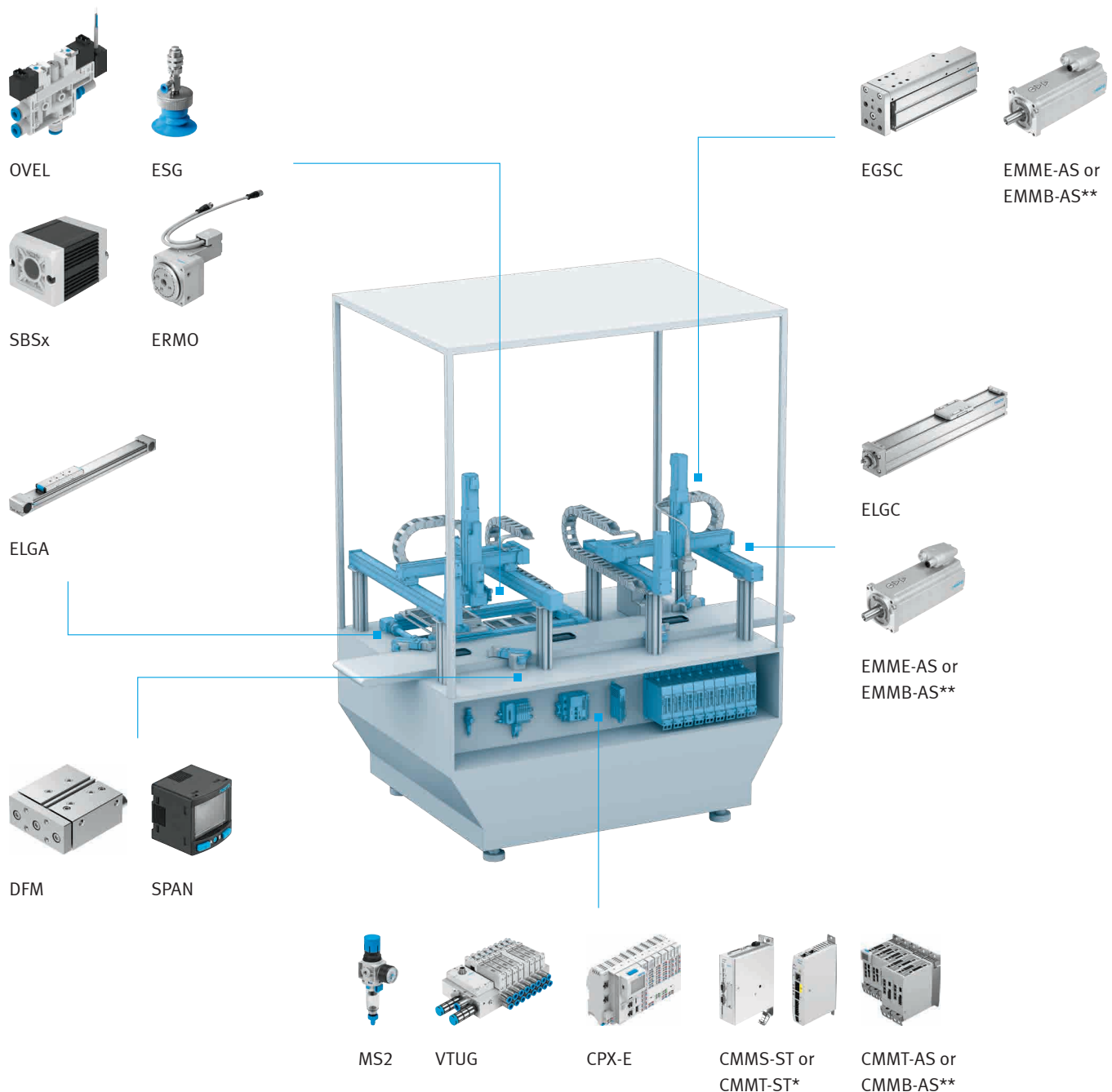
## Pick & place: reduce costs and save space



In pick & place applications, the smartphone housing is reliably removed from the conveyor or placed back down again. An ideal basis for such applications is a cost- and space-saving handling system from Festo, consisting of proven mechanical components: the affordable linear axes ELGC, the mini slide EGSC and the rotary actuator ERMO. You can also use this kinematic system for almost all handling tasks in the manufacturing process. When selecting suitable motors and drives, you have many options to choose from, ranging from solutions with basic functions to high-performance

designs. Especially for manufacturers who produce in Asia, we have developed the servo motor EMMB-AS and servo drive CMMB-AS, including connection options using pulse train technology and plugs in protection class IP20. The front unit consists of the mini slide EGSC as the Z-axis, rotary drive ERMO, the compact, light-weight vacuum generator OVEL, suction gripper ESG and vision sensor SBSx for workpiece detection.

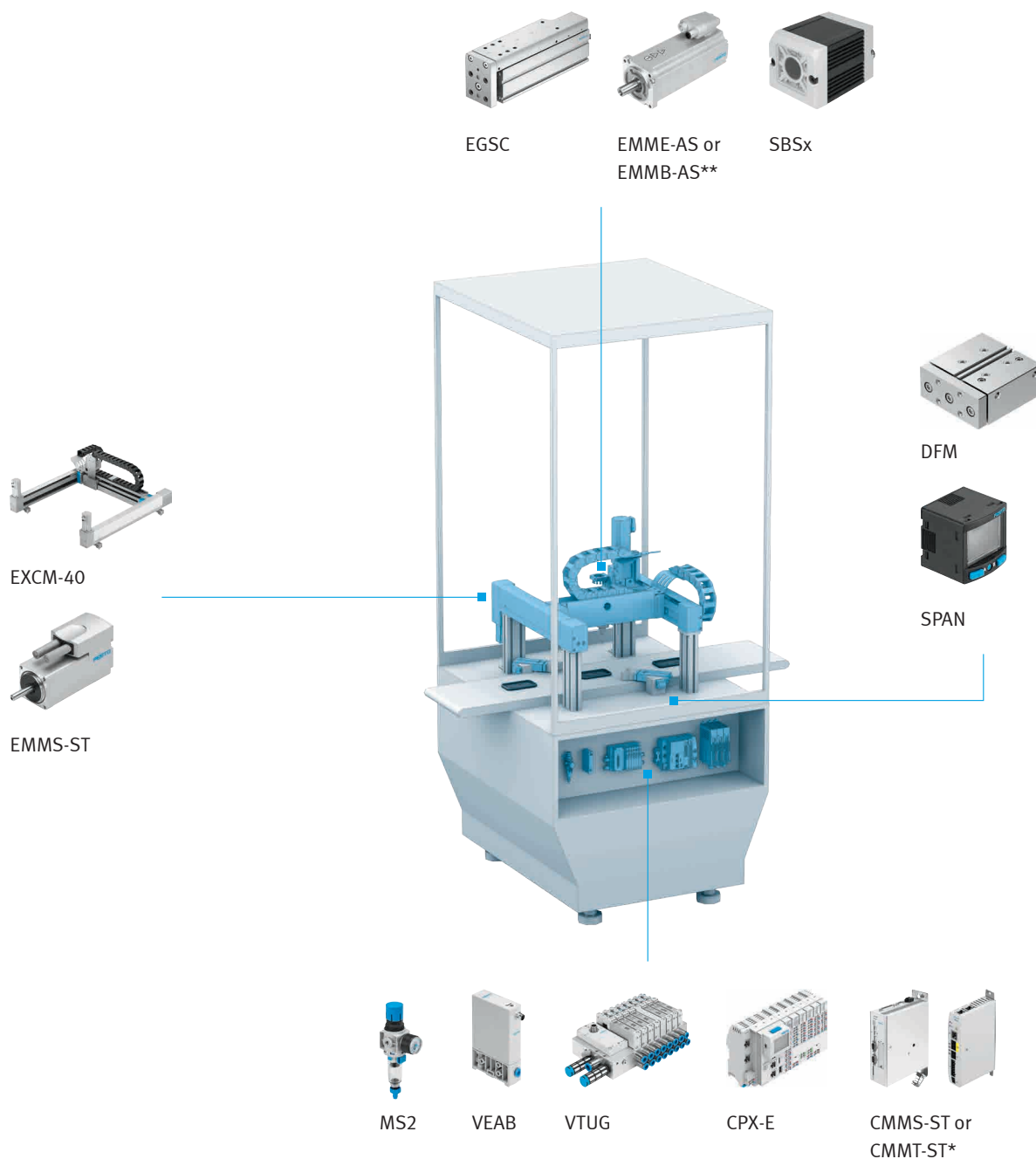
## Screw driving: everything precisely placed and fastened



To assemble the printed circuit board in the smartphone housing, it must first be removed from the workpiece carrier. To do this, the workpiece carrier is lifted and moved using electric axis ELGA. The printed circuit board (PCB) is then placed precisely in the housing and attached with an automatic screwdriver, all while being monitored by our image processing system. Instead of the incoming housings being laboriously aligned and fixed in place by hand, these tasks are performed by guided drives DFM. The pressure sensors SPAN display the pressure level of the clamping cylinder.

The pneumatic system is controlled by the new modular control system CPX-E together with the attractively priced valve terminal VTUG from the Festo core product range. In line with our modular automation concept, the electric handling system at this station also consists of linear axes ELGC and mini slides EGSC. Special feature: all axes are directly connected to each other without adapter plates.

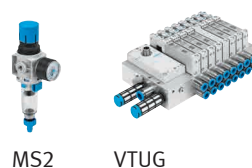
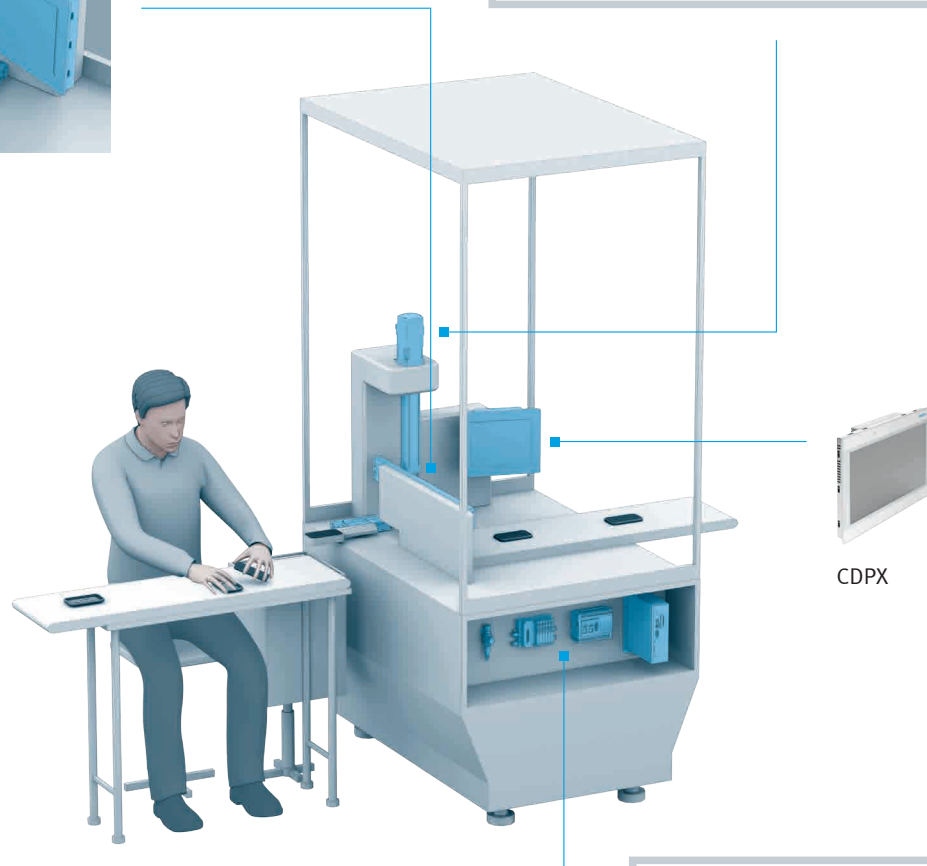
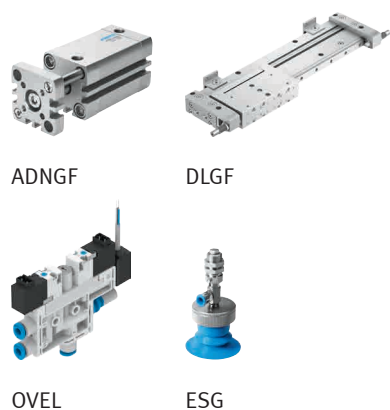
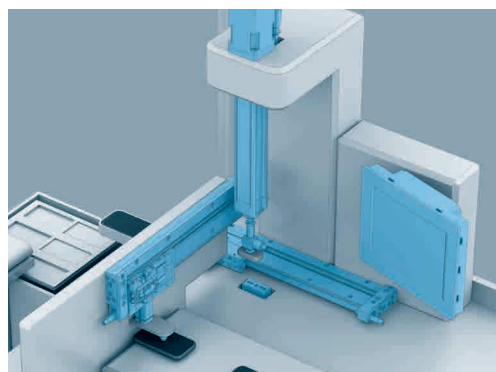
## Dispensing: simply faster and to the point



To apply adhesive to the smartphone housing automatically, quickly and precisely, Festo offers the extremely compact planar surface gantry EXCM-40 with stepper motor EMMS-ST and controller CPX-E as a solution. For higher performance requirements, a planar surface gantry EXCM-40 with servo motor EMMS-AS and servo drive CMMT-AS is an excellent option. In both cases, guided cylinders DFM align the incoming workpieces and then clamp them, while pressure sensors SPAN display the pressure level of the clamping

cylinders. Finally, the proportional pressure regulator VEAB precisely controls the amount of adhesive to be applied. The additional advantages of automation are: no protruding adhesive, no reworking and lower adhesive consumption.

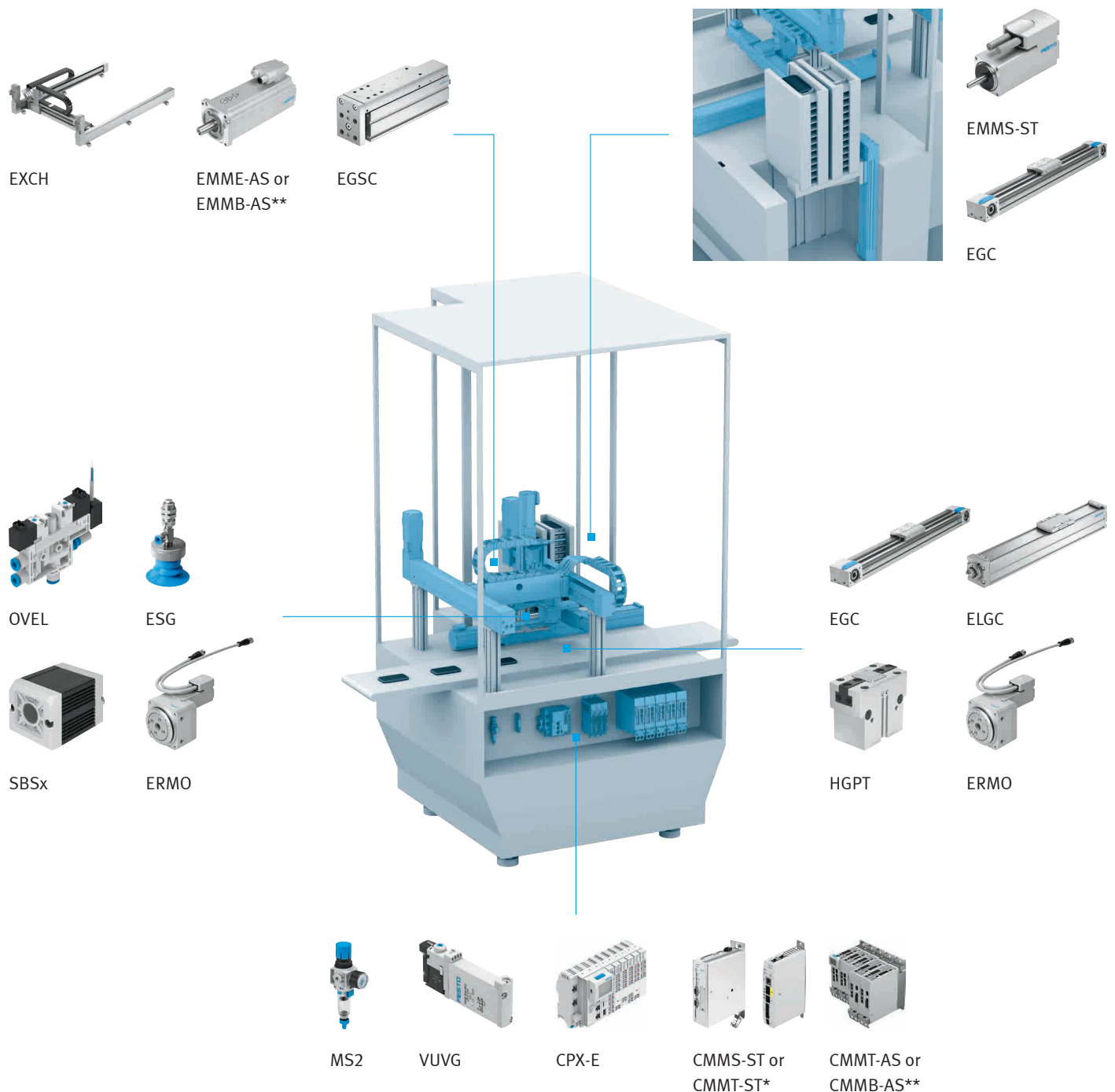
## Pressing: evenly and controlled



After the display has been manually placed in the smartphone housing with great care, a fully automatic press station continues with further processing. In this step, both parts are pressed together using a defined and controlled force. This is exactly the right task for the servo press kit YJKP. The servo press kit comprises modular operating software and carefully coordinated standard Festo components: an electric spindle drive, a motor, a motor controller, a force sensor and an open-loop controller – everything you need for elec-

tric press applications up to 17 kN. The workpiece is moved pneumatically by a system consisting of a rodless cylinder DLGF, guided compact cylinder ADNGF, vacuum generator OVEL and vacuum gripper ESG. The servo press kit YJKP is considerably less expensive than conventional press systems – this enables you to gain a significant competitive edge in productivity.

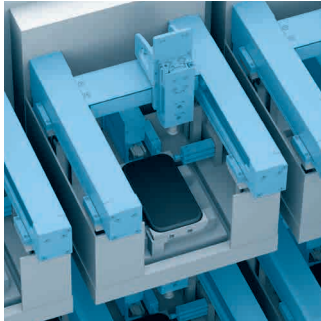
## Stacking and packing: at high speed right from the start



In this station of the production process, the smartphones are taken from the assembly line, placed in workpiece carriers and arranged so that they can then be fed to the next processing steps. The main function is taken on by a high-speed pick & place system consisting of the planar surface gantry EXCH and the mini slide EGSC. The image processing system of Festo guarantees the precision needed

for detecting and aligning the smartphones. The smartphones are then loaded in the magazines using a cantilever system consisting of electric standard linear axes EGC and ELGC with rotary actuator ERM0 and gripper HGPT. The magazines are also moved up and down by the standard linear axes EGC.

## Testing: safe, secure and fully automated



ERMO



HGPT



EGSC



ELGC



EXCM-30



EGSC



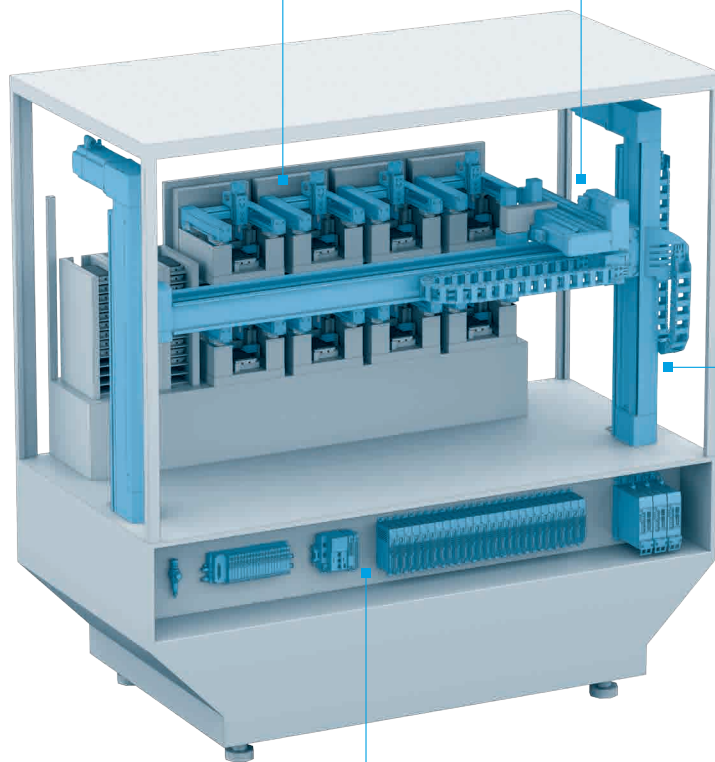
EMMS-ST



DGST



DPDM



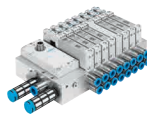
EXCH



EMME-AS or  
EMMB-AS\*\*



MS2



VTUG



CPX-E



CMMS-ST or  
CMMT-ST\*

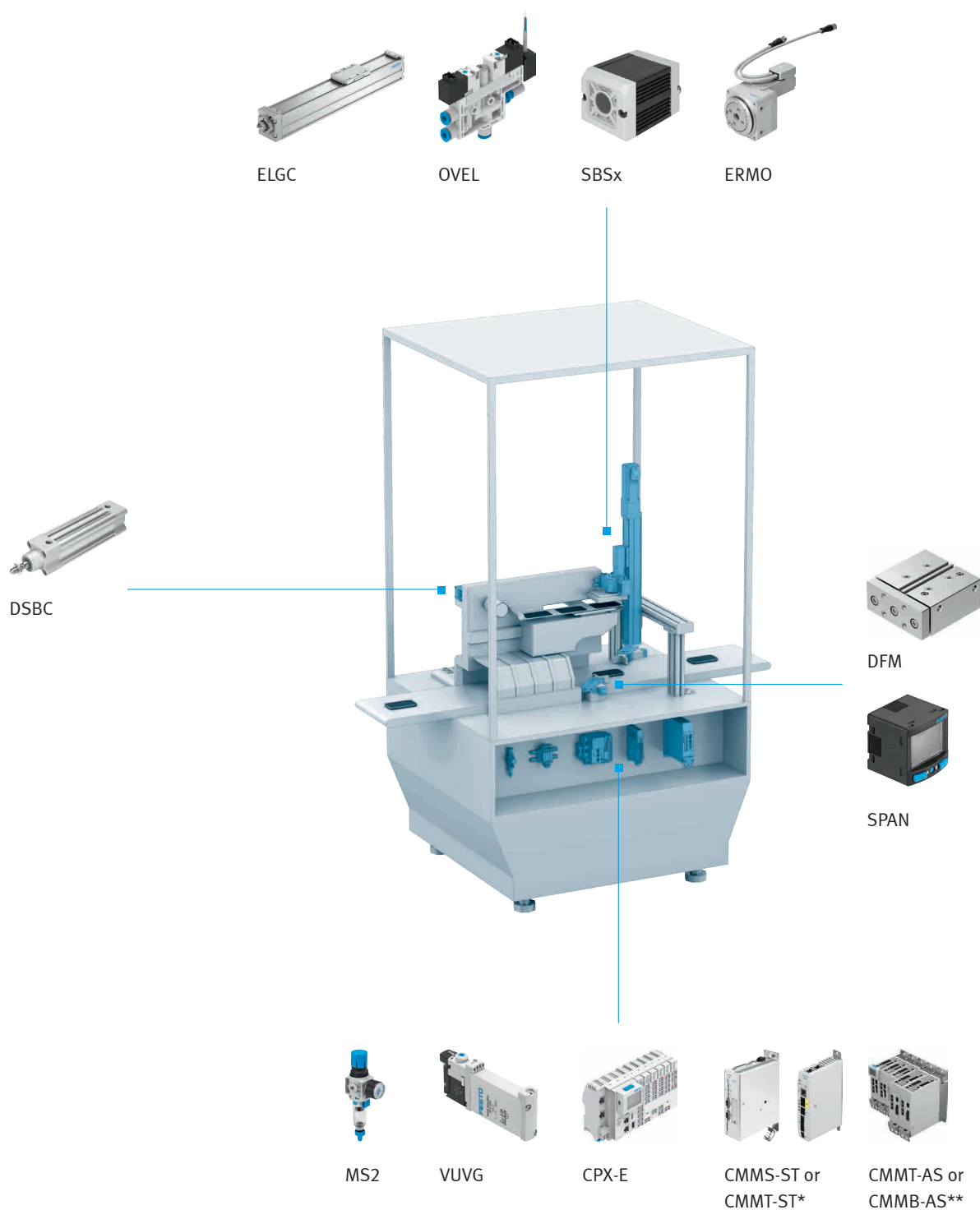


CMMT-AS or  
CMMB-AS\*\*

The smartphones arrive at the test station stacked in magazines. They are reliably transported from the stacking magazine to the testing device by the high-speed pick & place solution EXCH in combination with the space- and cost-saving handling system consisting of ELGC, EGSC, ERM and HGPT. The individual work-piece carriers are fixed into place in the testing device using several

multimount cylinders DPDM. Our compact handling system EXCM and the new and very short mini slide DGST support the testing of the touch display while the electric mini slide EGSC precisely connects the plug for the electric function test with the smartphone.

## Labelling: precise and reliable



The last production steps in smartphone assembly include attaching a protective film to the display. Automation guarantees a safe and reliable processing during this step. In this system, the roller with the protective films (labels) is moved and tensioned using a standard ISO cylinder DSBC. The protective film is suctioned using

vacuum and then precisely applied to the smartphone. As in previous stations, the vacuum is generated by the vacuum generator OVEL and the film is applied by a pick & place solution with linear axis ELGC and directly mounted rotary drive ERMO.

## Flexible thanks to standardised applications

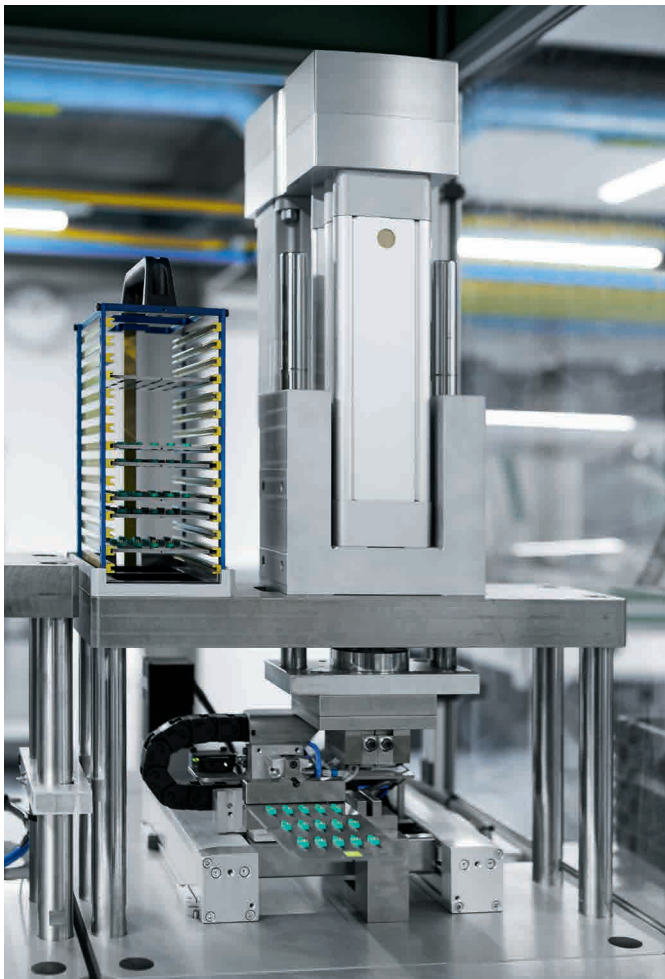
Success in the electronics industry depends to a large extent on engineering effort and the components used. Companies that concentrate on standardised products and solutions can increase their profits by 20 to 30%.

A good example is the British family-owned company Harwin Plc – manufacturer of electrical plug connectors for over 60 years. This

market has increasing demanding requirements, while miniaturisation is advancing at the same time. To ensure quality and flexibility, Harwin relies on a modular, scalable and customised automation concept from Festo. The advantages of this strategy include faster production lines, simplified commissioning and easy maintenance.

**“The modular concept that we developed with Festo makes our assembly lines future-proof.”**

Paul McGuinness, Operations Director at Harwin



### Think ahead, act successfully

The new assembly lines for electrical plug connectors are setting high technical standards at Harwin. The three main stations of the automation concept - “Inserting the pin contacts into the connector housings”, “press-fitting the pins” and “bending the pins” - are based on Festo modules with as many standard parts as possible:























- All three stations have a common base plate.
- The connector bodies are moved using the compact handling system YXMx.
- All the electric and pneumatic actuators are controlled by a controller CECC-X in combination with a valve terminal CPX/MPA.
- The press-fitting and bending stations use the servo press kit YJKP.

Everything for the servo press kit YJKP is available from a single source: application software, drive package and controller.


















# Application-specific product portfolio from Festo

No two production environments are the same. However, even the most individual requirements can still be combined into a common denominator, as long as the right industry expertise, such as from Festo, is available. With our solutions and products, you can automate

most functions in small parts assembly and testing. We have provided you with an overview of which components are particularly well suited for which functions.

			Pick & place	Moving	Sorting/ separating	Stopping	Holding/fixing into place	Gripping	Pressing in	Air preparation	Vacuum generation	Image processing	Operator units
<b>Pneumatic drives</b>													
	ADN			■	■	■	■						
	DSBC			■	■								
	DPDM		■	■	■		■		■				
	DFM			■	■	■	■		■				
	DLGF		■	■									
	DGST		■	■	■		■						
<b>Electromechanical drives</b>													
	ESBF		■	■					■				
	EGC		■	■									
	ELGA		■	■									
	ELGC		■	■									
	EGSC		■	■									
	ERMO		■	■									
<b>Motors and controllers</b>													
	EMME-AS		■	■									
	EMMS-ST		■	■									
	EMMT-AS		■	■									
	EMMB-AS		■	■									
	CMMT-ST		■	■									
	CMMT-AS		■	■									
	CMMB-AS		■	■									

**CMMT-ST**  
Available from  
the middle of  
2019

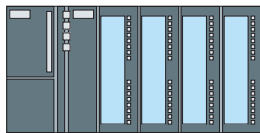
		Pick & place	Moving	Sorting/ separating	Stopping	Holding/fixing into place	Gripping	Pressing in	Air preparation	Vacuum generation	Image processing	Operator units
<b>Grippers</b>												
	HGPT	■					■					
<b>Handling systems</b>												
	EXCM	■	■									
	EXCH	■	■									
<b>Vacuum technology</b>												
	OVEL	■					■			■		
	ESG	■					■					
	ESS/ESV											
<b>Valves/valve terminals</b>												
	VUVG	■	■	■	■	■	■	■	■			
	VTUG											
	VEEA/ VEAB	■	■				■	■				
<b>Sensors</b>												
	SMT- 8M/10M	■	■	■	■	■	■	■				
	SPAN	■				■	■			■		
<b>Image processing systems</b>												
	SBSx	■	■	■			■				■	
<b>Air preparation</b>												
	MS02	■	■	■	■	■	■	■	■			
<b>Control technology</b>												
	CPX-E	■	■	■	■	■	■	■				
	CPX/MPA	■	■	■	■	■	■	■	■			
	CDPX											■
<b>Function-specific systems</b>												
	YJKP							■				

# The Festo automation concept

Our automation concept enables all components to be seamlessly connected, from the workpiece to the control level and even to the cloud. This also makes it possible to directly integrate a third-party controller into electromechanical servo control systems. In addition, when using Festo controllers, decentralised automation systems can

also be created: controllers for pneumatic solutions with remote I/O, pneumatic valves and drives, and motion controllers for electrical solutions with servo drive, motors and mechanical actuators.

## Host PLC



Pulse train

## HMI



**PROFI**  
**NET**

EtherNet/IP

Ethernet

PLC CPX-E



EtherCAT

## Servo

### Servo drive



CMMB-AS



CMMT-AS



EMCA

### Motors



EMMB-AS



EMMT-AS



EMMB-AS

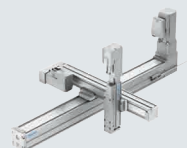


EMME-AS

### Drives



EXCx



ELGC/EGSC



EGC



EGSC



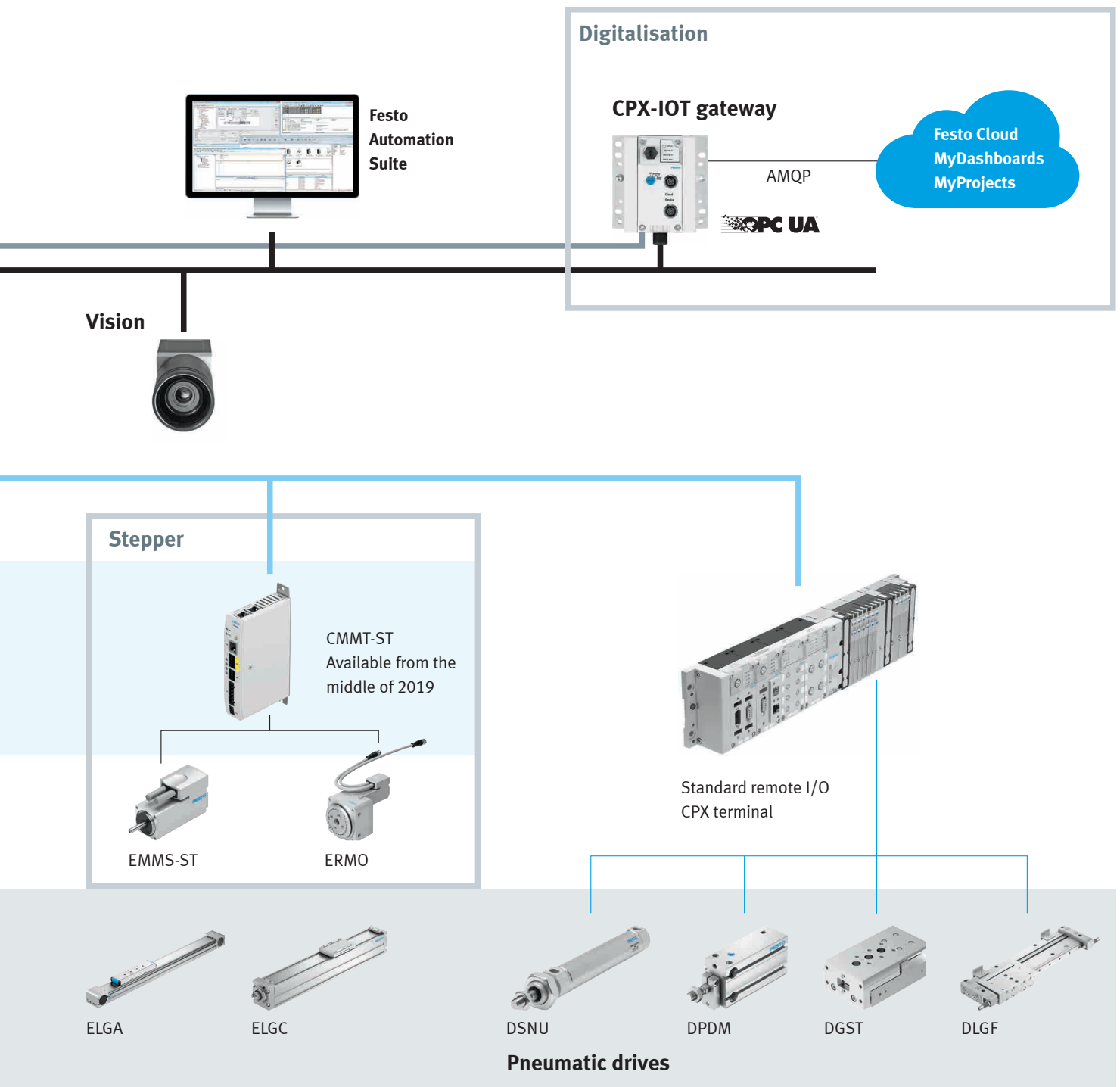
ESBF

Pick & place solutions

Electric drives

**The benefits of the automation concept from Festo are entirely convincing:**

- + Communication within the decentralised system via EtherCAT®
- + Connection to the higher-order Siemens controller via PROFINET and to the Rockwell controller via EtherNet/IP
- + Connection to the Festo Cloud and other cloud systems via OPC UA and AMQP, as well as the IoT gateway of Festo
- + Connection to vision systems and the Festo Automation Suite via Ethernet – an engineering software for parameterisation, programming, commissioning and maintenance



# Decentralised automation for a wide variety of requirements

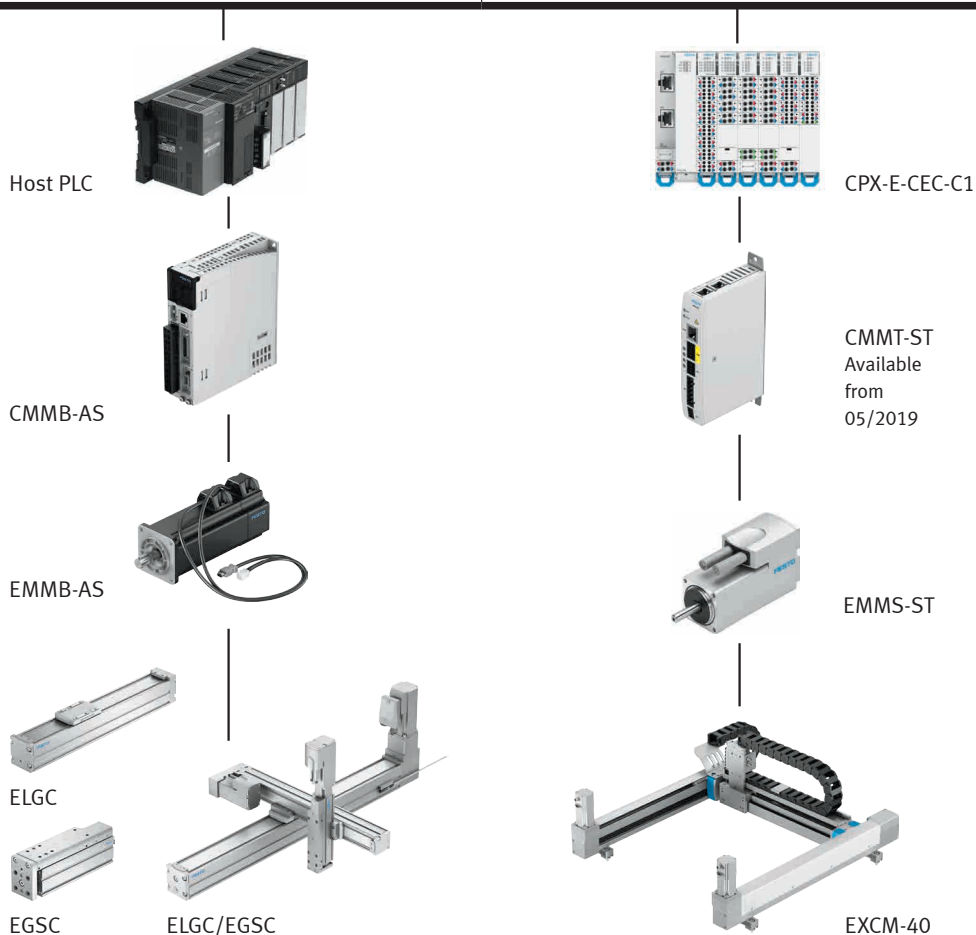
Regardless of the requirements that the application and therefore the connected automation and control concept place on you, Festo offers the appropriate solution:

- Either cost-optimised solutions with basic functionality or high-end solutions for high-performance demands
- For point-to-point and interpolated movements
- With or without integrated fieldbus interfaces for communication
- In IP20 or IP54

Below are descriptions of four possible concepts that can form the basis for technical discussions with our experts. They all have one thing in common: complete connectivity from the mechanical system to the controller.

## Cost-optimised

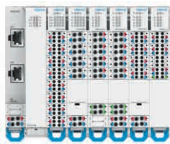
Application	Especially for requirements in Asia, e.g. simple pick & place tasks	For automatic motion sequences in which performance plays a subordinate role, e.g. for simple dispensing tasks
<b>Motor technology</b>	Servo	Baseline servo
<b>Type of motion</b>	Point-to-point/interpolation (through host PLC)	Point-to-point
<b>Power</b>	700 W	400 W
<b>Degree of protection (motor)</b>	IP20	IP54
<b>Max. number of axes</b>	Depending on the host PLC	Up to 8 axes
<b>Control technology</b>	Pulse train, digital IO	EtherCAT®
<b>Communication interface</b>	RS232	OPC UA, Modbus TCP, TCP/IP



## Performance

	Standard system for electric automation with high precision and flexibility	Ideal for situations in which high performance, speed and communication are required, e.g. for fast and demanding pick & place tasks
	Servo	Servo
	Point-to-point/interpolation	Point-to-point/interpolation
	2500 W	2500 W
	IP54	IP54
	Up to 8 axes	Up to 16 axes
	EtherCAT®	EtherCAT®
	OPC UA, Modbus TCP, TCP/IP	PROFINET or EtherNet/IP, OPC UA, Modbus TPC, TCP/IP

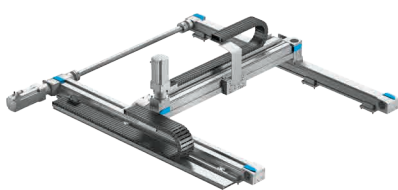
CPX-E-CEC-M1



CMMT-AS



EMME-AS



EGC

CPX-E-CEC-M1-PN/EP



CMMT-AS



EMMS-AS



EXCH-40

## Product highlights for assembly systems

Assembly technology is characterised by highly complex sequences involving many different work steps and processes. Solutions for quickly and accurately assembling small parts in extremely narrow spaces are in demand. Our products have been developed for precisely these industrial challenges and master them with great skill.

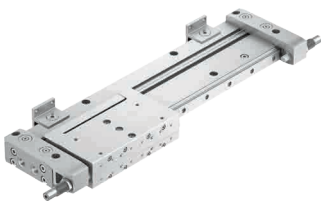


### Slide drive DGST

The DGST is the most compact twin piston slide drive on the market. The slide and yoke plate are manufactured from a single piece, making it particularly torsion-resistant without any misalignment. Together with the extremely precise recirculating ball bearing guide, this ensures maximum precision and thus high quality and process reliability.

#### Highlights:

- Shortest slide drive on the market
- Powerful, space-saving, highly precise
- All interfaces have a symmetrical design
- Maintenance-free twin piston drive
- End position accuracy up to  $\pm 0.01$  mm
- Seven sizes (from DGST-6 to DGST-25) can be directly combinable



### Linear drive DLGF

The rodless DLGF is a genuine space-saving miracle. It is extremely flat, making it ideal not only for the electronics industry and small parts assembly, but wherever installation space is very limited. The sophisticated technology (e.g. the self-adjusting pneumatic cushioning PPS) is equally impressive – as is the very low price.

#### Highlights:

- Extremely flat
- Self-adjusting pneumatic end-position cushioning PPS
- Three pneumatic connection variants as standard
- Alternative air connections underneath the cover
- Option of coupling two cylinders DLGF

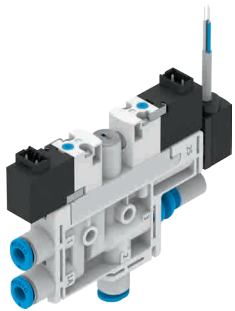


### Multimount cylinder DPDM

This product offers all kinds of mounting options – bolt it on, bolt through it, horizontal or upright. Perfect for all applications with linear movements and short strokes: pushing, clamping or holding. There are different versions: with guide, with through piston rod, solid or hollow, capable of withstanding high temperatures – a true multi-talent.

#### Highlights:

- Wide variety of mounting options
- Free of copper
- Sturdy and resilient
- Suitable for manifold assembly



#### **Vacuum generator OVEL**

Small, weight-optimised and designed specifically for the electronics industry, the OVEL is the perfect product for direct integration into the front unit. This reduces the evacuation time and increases the operating cycles. The integrated filter and open silencer make the OVEL extremely easy to maintain.

#### **Highlights:**

- Ideal for highly dynamic, decentralised handling applications
- Precisely adjustable ejector pulse thanks to separate compressed air supply
- Choice of analogue or digital switching output
- Easy commissioning and parameterisation thanks to IO-Link®
- Mounting directly onto the front unit

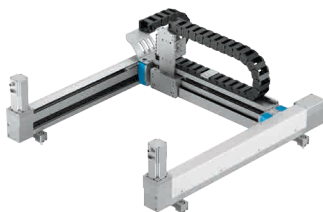


#### **Compressed air and filter regulator series MS2**

The compressed air and filter regulators MS2 are very compact and extremely light, yet have flow rates of up to 350 l/min. They are best suited for installation directly in the machine for use close to the process and for end-of-arm applications. Advanced polymer materials make the MS2 series up to 50% lighter than competitive products, but extremely sturdy at the same time.

#### **Highlights:**

- For mounting directly in the machine
- The lightest on the market: from 28 g (LR) to max. 38 g (LFR)
- Sturdy thanks to high-quality polymer
- Fitting space reduced by up to 40%
- Inexpensive
- Condensate level always visible (LFR)



#### **Compact planar surface gantry EXCM**

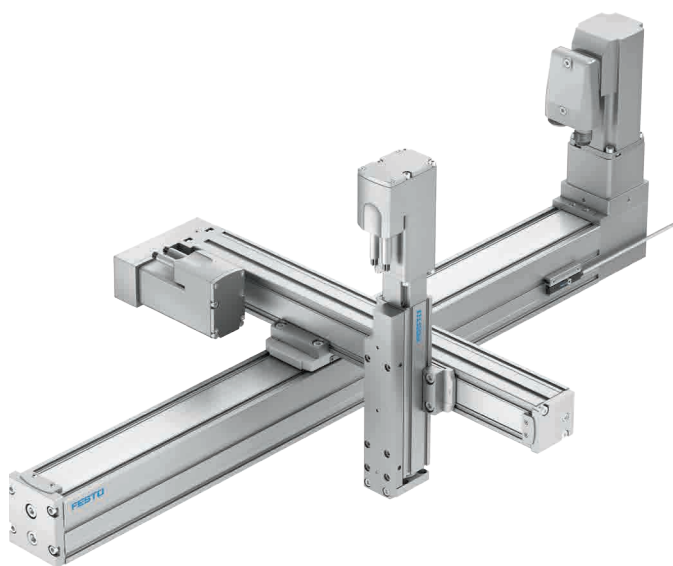
Especially in desktop applications, the planar surface gantry EXCM guarantees a compact machine design and maximum working space at the same time. The dynamic response is excellent thanks to extremely small moving masses. The integrated drive and controller package is preparameterised to allow fast commissioning.

#### **Highlights:**

- Ideal for desktop applications
- Flat and compact for optimised use of space
- Integrated motor and controller
- Easy commissioning and operation
- Maintenance-free

## Spindle and toothed belt axes ELGC and mini slides EGSC

For applications where compact dimensions are essential, our handling system is extremely space-saving and fits seamlessly into assembly and testing systems, in small parts handling, the electronics industry or desktop applications. The affordable linear axes ELGC and mini slides EGSC offer an optimal ratio between installation space and working space. They feature a common system approach, platform architecture and, last but not least, adapterless connections.



### Spindle and toothed belt axes ELGC

The interior, protected recirculating ball bearing guide is perfect for XY-movements and vertical Z-movements.

### Mini slide EGSC

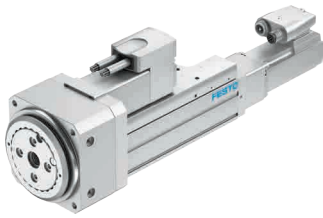
The powerful and resilient mini slide has a smooth-running spindle and is ideal for vertical Z-movements or individual, guided linear movements in every mounting position.

### Highlights

- Very compact and cost-effective
- Optimal installation space to working space ratio
- Unique "one-size-down" assembly system
- Scalable modular system kit comprising linear axes and mini slides
- Standardised accessories for faster design and reduced warehousing

Technical data	Spindle axis ELGC-BS-KF	Toothed belt axis ELGC-TB-KF	Guide axis ELFC-KF	Mini slide EGSC-BS
Design	Electromechanical axis with ball screw drive	Electromechanical axis with toothed belt	Guide without drive	Electric mini slide with ball screw drive
Sizes	32, 45, 60, 80	45, 60, 80	32, 45, 60, 80	25, 32, 45, 60
Working stroke [mm]	100 ... 1,000	200 ... 2,000	100 ... 2,000	25 ... 200
Max. feed force [N]	40, 100, 200, 350	75, 120, 250	-	20, 60, 120, 250
Max. speed [m/s]	1	1.5	1.5	0.6
Max. acceleration [m/s <sup>2</sup> ]	15	15	15	15

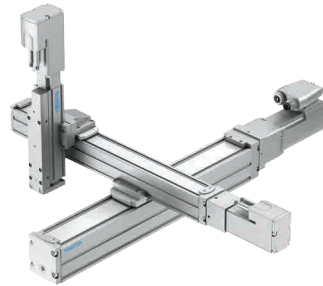
## Start off with an affordable, compact solution – from individual axes to complete handling systems



### Single-axis system

Precision positioning and alignment of workpieces even with high loads

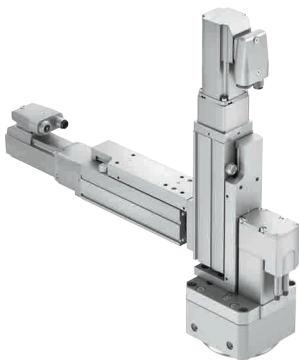
- Adapterless direct mounting of mini slides and rotary drives
- Also available as linear-rotary Z-axis in 2D and 3D systems



### Cantilever system

Installation-space optimised, robust 3D handling unit for higher loads:

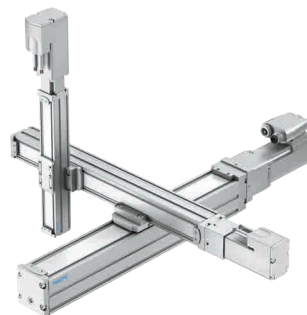
- Spindle or toothed belt axes combined with mini slides for the Z-axis
- Additional 90° adapter for added rigidity during higher loads



### Pick & place solution

Compact answer to simple requirements:

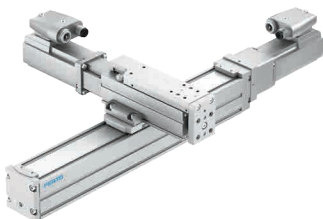
- Adapterless, cost-effective direct mounting of mini slides and rotary drives
- Mechanically rigid and sturdy design with precision positioning



### Cantilever system

Simple handling unit in a compact format for simple tasks:

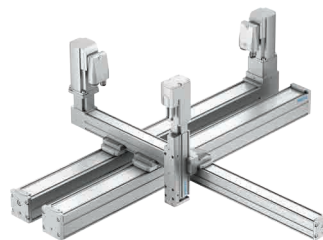
- Combined spindle or toothed belt axes for 3D movements
- Adapterless, cost-optimised system structure with long Z-stroke



### Linear gantry

Vertical 2D movements for simple handling tasks can be realised at low cost:

- Spindle or toothed belt axes combined with mini slides for vertical 2D working space
- Space-optimised and easy to assemble



### Cantilever system

Compact, affordable system with increased guidance:

- Combined spindle or toothed belt axes for 3D motion with longer Y stroke
- Two axes installed in parallel, including driveless guide axis
- ELFC to absorb increased torque and provide improved guidance of the cantilever axis



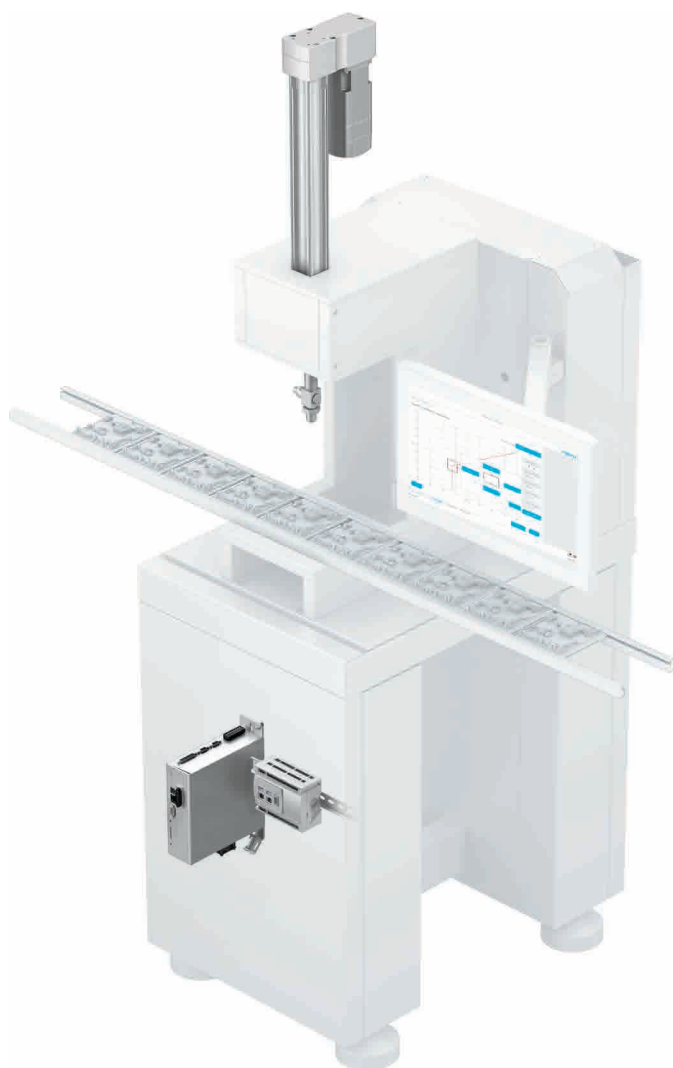
### 3D gantry

Extremely compact 3D system with attractive price/performance ratio:

- Maximum workspace coverage by combining the small-scale gantry EXCM and the mini-slide for the Z-axis
- Configurable length and width and with different Z strokes

## Servo press kit YJKP

The modular servo press kit YJKP gives you just the software functions you need for your application. Simple, affordable and easy to install, it optimises the price/performance ratio of your extremely precise and repeat-accurate press-fitting system.



### Pre-assembled system kit

The size of the YJKP makes it the right choice for every application. It consists of modular operating software and carefully coordinated standard Festo components: an electric spindle drive, a motor, a motor controller, a force sensor and an open-loop controller – everything you need for electric press applications up to 17 kN. All you have to do is integrate it into your application!

### Pre-installed software

The pre-installed operating software is ready to use straight away, and is easy and intuitive to parameterise, even without programming knowledge. The modular software featuring application-specific functions can be used on a PC, iPad or other human-machine interfaces and is compatible with all types of platforms. And the press controller with OPC UA interface makes the system ready for Industry 4.0.

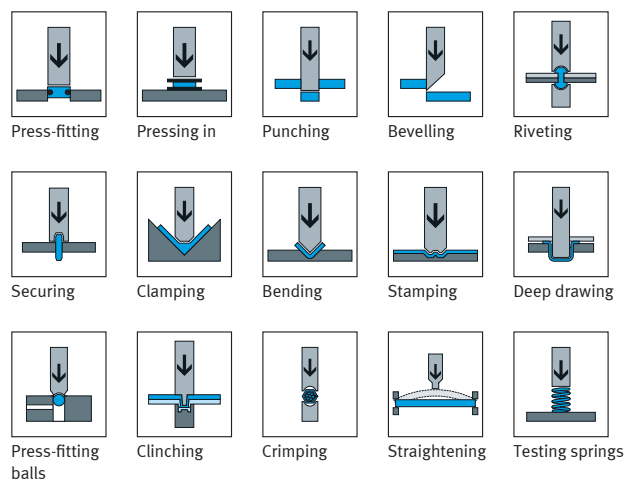
### Technical data

Storage temperature [°C]	–10 ... +60
Operating temperature [°C]	0 ... +40
Stroke length [mm]	100, 200, 300, 400
Force ranges [kN]	0.1 – 0.8; 1.5; 4; 7; 12; 17
Max. feed speed [mm/s]	250
Repetition accuracy [mm]	≤ ± 0.01
Interface	EtherNet, 24 V I/O
Bus systems	Modbus TCP, EtherNet/IP, PROFINET
Configuration via visualisation system	Force/displacement diagrams Specification for good/defective parts Visualisation
FS accuracy of force measurement <sup>1)</sup> [%]	± 0.25
Measuring speed for force sensor	1,000 measurements/s
Evaluation methods	Window technique Threshold value Envelope

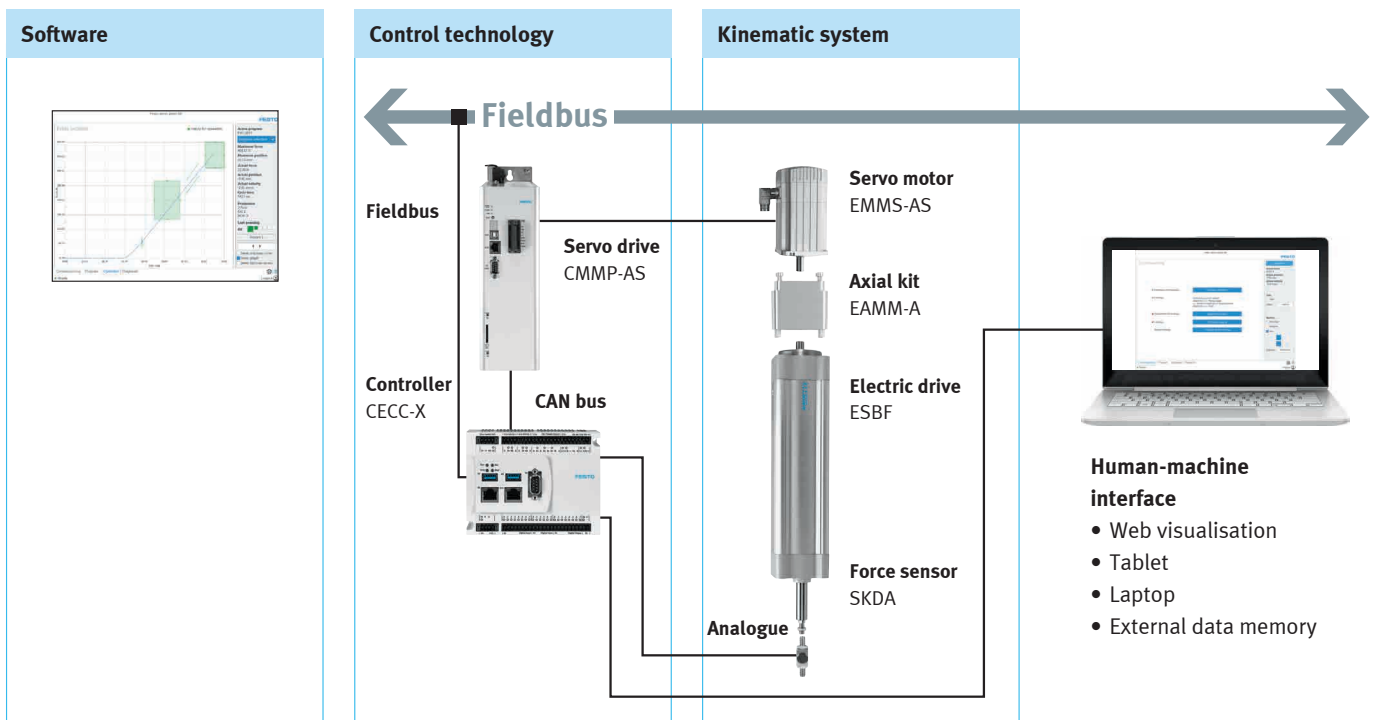
### Highlights

- Less expensive than conventional press-fitting systems
- Software and hardware from a single source
- Pre-installed modular software
- Pre-assembled kit
- Press forces up to 17 kN
- Easy to integrate into your own system concept
- Compatible with Industry 4.0

### Areas of application






### Individual and flexible design: the pre-assembled system kit





## Pneumatic and electric components for the electrical industry

To make it easier for you to choose from among the 33,000 products in the Festo catalogue, we have selected the components that are relevant for your industry. On the following 14 pages you will find a clear overview and description of these components. If you have any questions, just contact one of our experts!

### Pneumatic drives

		★		
	<b>Compact cylinders ADN</b>		<b>Compact cylinders ADNGF</b>	<b>Compact cylinders AEN-S/ADN-S</b>
<b>Mode of operation</b>	Double-acting		Double-acting	Double-acting, single-acting
<b>Piston diameter [mm]</b>	12, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125		12, 16, 20, 25, 32, 40, 50, 63, 80, 100, Guide rod with yoke	6,10
<b>Theoretical force at 6 bar, advancing [N]</b>	51 ... 7363		68 ... 4712	13 ... 47
<b>Stroke [mm]</b>	1 ... 500		1 ... 400	5 ... 10
<b>Cushioning</b>	Elastic cushioning rings/pads at both ends, self-adjusting pneumatic end-position cushioning		Elastic cushioning rings/pads at both ends, self-adjusting pneumatic end-position cushioning	
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Compact and affordable with a long service life</li> <li>• ISO 21287</li> <li>• Up to 50% less installation space than comparable standards-based cylinders to ISO 15552</li> <li>• Piston rod with female or male thread</li> </ul>		<ul style="list-style-type: none"> <li>• Mounting hole pattern to ISO 21287</li> <li>• Plain-bearing guide</li> <li>• Optionally with through piston rod</li> <li>• For higher loads with a piston rod secured against rotation by a guide rod and yoke plate</li> </ul>	<ul style="list-style-type: none"> <li>• Short and slim</li> <li>• Lightweight and versatile</li> <li>• Free of copper</li> <li>• Fast and reliable delivery, even in large quantities</li> </ul>

		★		★
	<b>Standards-based cylinders DSBC</b>		<b>Round cylinders DSNU</b>	
<b>Mode of operation</b>	Double-acting		Double-acting	
<b>Piston diameter [mm]</b>	32, 40, 50, 63, 80, 100, 125		8, 10, 12, 16, 20, 25	
<b>Theoretical force at 6 bar, advancing [N]</b>	415 ... 7363		23 ... 295	
<b>Stroke [mm]</b>	1 ... 2800		1 ... 500	
<b>Cushioning</b>	Elastic cushioning rings/pads at both ends, self-adjusting pneumatic end-position cushioning, pneumatic cushioning, adjustable at both ends cushioning, adjustable at both ends		Elastic cushioning rings/pads at both ends, self-adjusting pneumatic end-position cushioning, pneumatic cushioning, adjustable at both ends	
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• ISO 15552 (ISO 6431, VDMA 24562)</li> <li>• Self-adjusting pneumatic end-position cushioning which adapts optimally to changes in load and speed</li> <li>• Standard profile with two sensor slots</li> <li>• Comprehensive range of mounting accessories for just about every type of installation</li> </ul>		<ul style="list-style-type: none"> <li>• ISO 6432</li> <li>• Good running performance and long service life</li> <li>• Self-adjusting pneumatic end-position cushioning which adapts optimally to changes in load and speed</li> <li>• Piston rod with female or male thread</li> </ul>	

★ **Festo core product range**  
covers 80% of your  
automation tasks

**Worldwide:** Always in stock

**Superb:** Festo quality at an attractive price

**Easy:** Just a few clicks to place an order online

**Fast:** Generally ready for dispatch from the Festo factory in 24 hours



**Compact cylinders, multimount  
DPDM**



**Guided drives  
DFM**



	Compact cylinders, multimount DPDM	Guided drives DFM
<b>Mode of operation</b>	Double-acting, single-acting, pushing, pulling	
<b>Piston diameter [mm]</b>	6, 10, 16, 20, 25, 32, guide rod with yoke	6, 10, 12, 16, 20, 25, 32, 40, 50, 63, 80, 100
<b>Theoretical force at 6 bar, advancing [N]</b>	9 ... 483	17 ... 4712
<b>Stroke [mm]</b>	5 ... 50	5 ... 400
<b>Cushioning</b>	Elastic cushioning rings/plates at both ends	Elastic cushioning rings/pads at both ends, pneumatic cushioning, adjustable at both ends; shock absorber, soft characteristic curve
<b>Position sensing</b>		Via proximity sensor
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Compact design</li> <li>• Piston rod variants</li> <li>• For position sensing</li> <li>• Simple to mount thanks to a range of mounting interfaces</li> <li>• Optional: heat-resistant design up to 120°C</li> </ul>	<ul style="list-style-type: none"> <li>• Resilient: 100% increase in payload</li> <li>• Precision guidance</li> <li>• Optimal price/performance ratio</li> <li>• Drive and guide in a single housing</li> <li>• High resistance to torques and lateral forces</li> <li>• Plain or recirculating ball bearing guides</li> <li>• Wide variety of mounting and attachment options</li> <li>• Wide range of variants for customised applications</li> </ul>






**Linear drives  
DLGF**


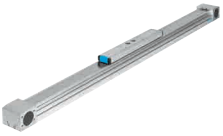

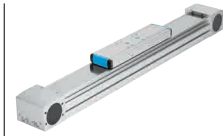





**Slide drives  
DGST**


	Linear drives DLGF		Slide drives DGST
<b>Nominal diameter [mm]</b>	20, 25, 32, 40	<b>Size</b>	06, 08, 10, 12, 16, 20, 25
<b>Operating pressure [bar]</b>	6	<b>Strokes [mm]</b>	10 ... 200
<b>Max. speed [m/s]</b>	1.5	<b>Feed force (at 6 bar) [N]</b>	34 ... 590
<b>Perm. ambient temperature [°C]</b>	0 ... +60	<b>End-position adjustment</b>	Reduce at least to the next smaller standard stroke
<b>Classification</b>	Free of copper, free of PWIS, RoHS-compliant	<b>Air connection</b>	On the side
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Extremely flat</li> <li>• Self-adjusting pneumatic end-position cushioning PPS</li> <li>• Three pneumatic connection versions as standard</li> <li>• Alternative air connections underneath the cover</li> <li>• Option of coupling two cylinders DLGF</li> </ul>	<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Highly precise</li> <li>• Powerful</li> </ul>

## Electromechanical drives




	 <b>Electric drives ESBF</b>	 <b>Spindle axes EGC-BS-KF</b>	 <b>Toothed belt axes EGC-TB-KF</b>
<b>Size</b>	32, 40, 50, 63, 80, 100	70, 80, 120, 185	50, 70, 80, 120, 185
<b>Max. feed force F<sub>x</sub> [N]</b>	1000 ... 17000	400 ... 3000	50 ... 2500
<b>Repetition accuracy</b>	+/-0.01, +/-0.015, +/-0.05	+/-0.02	+/-0.08, +/-0.1
<b>Stroke [mm]</b>	30 ... 1500	50 ... 3000	50 ... 8500
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Available with ball screw drive (size 32 ... 100) or lead screw (size 32 ... 50)</li> <li>• Ball screw drive: with three spindle pitches for selecting the optimal force-speed ratio</li> <li>• Axial or parallel motor mounting</li> <li>• 68 types in stock with short delivery times and modular products for individual specifications</li> </ul>	<ul style="list-style-type: none"> <li>• Recirculating ball bearing guide for high loads and torques</li> <li>• Optionally with clamping unit, at one or both ends</li> <li>• Profile with optimised rigidity</li> <li>• Various spindle pitches</li> <li>• The spindle support enables maximum travel speed</li> <li>• Axial or parallel motor mounting</li> </ul>	<ul style="list-style-type: none"> <li>• Recirculating ball bearing guide for high loads and torques</li> <li>• Optionally with clamping unit, at one or both ends</li> <li>• Profile with optimised rigidity</li> <li>• 22 types in stock with short delivery time and modular products for individual specifications</li> </ul>


	 <b>Toothed belt axes ELGA-TB-KF</b>	 <b>Toothed belt axes ELGA-TB-RF</b>	 <b>Spindle axes ELGA-BS-KF</b>	 <b>Toothed belt axes ELGA-TB-G</b>
<b>Size</b>	70, 80, 120, 150	70, 80, 120	70, 80, 120, 150	70, 80, 120
<b>Max. feed force F<sub>x</sub> [N]</b>	260 ... 2000	260 ... 1000	650 ... 6400	350 ... 1300
<b>Repetition accuracy</b>	+/-0.08	+/-0.08	+/-0.02	+/-0.08
<b>Stroke [mm]</b>	50 ... 8500	50 ... 7400	50 ... 3000	50 ... 8500
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Recirculating ball bearing guide for high loads and torques</li> <li>• High feed forces</li> <li>• Precise and resilient guide</li> <li>• Speeds up to 5 m/s with high acceleration up to 50 m/s<sup>2</sup></li> <li>• Flexible motor mounting</li> <li>• Guide and toothed belt protected by cover strip</li> <li>• 22 types in stock with short delivery time and modular products for custom variants</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated roller bearing guide</li> <li>• High speeds up to 10 m/s with high acceleration up to 50 m/s<sup>2</sup></li> <li>• Guide backlash = 0 mm</li> <li>• Very good operating behaviour under torque load</li> <li>• Sturdy alternative to the recirculating ball bearing guide</li> <li>• As a drive for external guides, especially for high speeds</li> <li>• Motor can be mounted on 4 sides</li> </ul>	<ul style="list-style-type: none"> <li>• Internal, precision recirculating ball bearing guide with high load capacity for high torque loads</li> <li>• Guide and ball screw protected by cover strip</li> <li>• For the highest requirements in terms of feed force and accuracy</li> <li>• Speeds up to 2 m/s with high acceleration up to 15 m/s<sup>2</sup></li> <li>• Space-saving position sensing</li> <li>• Flexible motor mounting</li> <li>• 34 preconfigured types and modular product system for custom variants</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated plain-bearing guide</li> <li>• For small and medium loads</li> <li>• Low guide backlash</li> <li>• Drive component for external guides</li> <li>• Speeds up to 5 m/s with high acceleration up to 50 m/s<sup>2</sup></li> <li>• Flexible motor mounting</li> <li>• Motor can be mounted on 4 sides</li> </ul>




			
	<b>Spindle axes ELGC-BS-KF</b>	<b>Toothed belt axes ELGC-TB-KF</b>	<b>Mini slides EGSC-BS-KF</b>
<b>Size</b>	32, 45, 60, 80	45, 60, 80	25, 32, 45, 60
<b>Max. feed force F<sub>x</sub> [N]</b>	40 ... 350	75 ... 250	70 ... 345
<b>Repetition accuracy</b>	+/-0.01, +/-0.015	+/-0.1	+/-0.015
<b>Stroke [mm]</b>	100 ... 1000	200 ... 2000	25 ... 200
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Internal guide and ball screw drive</li> <li>• Space-saving position sensing</li> <li>• Flexible motor mounting</li> <li>• Optimal installation space to working space ratio</li> <li>• The toothed belt axes, spindle axes ELGC and mini slides EGSC form a scalable modular system for compact automation</li> </ul>	<ul style="list-style-type: none"> <li>• Precise and resilient guide rail</li> <li>• Internal guide and toothed belt</li> <li>• Flexible motor mounting</li> <li>• Optimal installation space to working space ratio</li> <li>• The toothed belt axes, spindle axes ELGC and mini slides EGSC form a scalable modular system for compact automation</li> </ul>	<ul style="list-style-type: none"> <li>• Precise guide and ball screw drive</li> <li>• Compact dimensions</li> <li>• Flexible motor mounting</li> <li>• The toothed belt axes, spindle axes ELGC and mini slides EGSC form a scalable modular system for compact automation</li> </ul>

	
	<b>Rotary drives ERMO</b>
<b>Size</b>	12, 16, 25, 32
<b>Max. driving torque [Nm]</b>	0.15 ... 5
<b>Max. input speed [1/min]</b>	50 ... 100
<b>Rotation angle</b>	Infinite
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Electric rotary drive with stepper motor and integrated gear unit</li> <li>• ServoLite – closed-loop operation with encoder</li> <li>• Heavy-duty bearing for high forces and torques</li> <li>• Backlash-free pre-stressed rotating plate with very good axial eccentricity and concentricity properties</li> <li>• Quick and accurate installation</li> <li>• For simple rotary indexing table applications and as a rotary axis in multi-axis applications</li> <li>• Quick and simple operation and commissioning</li> <li>• Best price/performance ratio</li> </ul>


## Motors and controllers

			
	<b>Servo motors EMMT-AS</b>	<b>Servo motors EMMB-AS</b> (only available in Asia)	<b>Servo motors EMME-AS</b>
<b>Nominal torque [Nm]</b>	0.6 ... 9.8	0.32 ... 2.39	0.12 ... 6.4
<b>Nominal rotary speed [rpm]</b>	3000	3000	3000 ... 9000
<b>Peak torque [Nm]</b>	1.8 ... 30	0.96 ... 7.17	0.7 ... 30
<b>Max. rotational speed [rpm]</b>	4700 ... 12500	5000 ... 6500	3910 ... 10000
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Extremely low detent torque</li> <li>• OCP – one cable plug</li> <li>• Highly energetic, corrosion-resistant and high temperature-resistant NdFeB magnets for high torques and degrees of efficiency</li> <li>• Digital absolute displacement encoder, single turn or multi-turn</li> <li>• Motor-integrated temperature monitoring</li> <li>• Digital rating plate</li> </ul>	<ul style="list-style-type: none"> <li>• Easy and sturdy connection technology</li> <li>• Digital single-turn absolute displacement encoder (standard)</li> <li>• Attractively priced</li> </ul>	<ul style="list-style-type: none"> <li>• Reliable, dynamic, precise</li> <li>• Brushless, permanently excited synchronous servo motor</li> <li>• Digital absolute displacement encoder, single turn or multi-turn</li> <li>• Optimised connection technology</li> <li>• Over 40 types in stock</li> <li>• Optionally with holding brake</li> <li>• Optional: multi-turn encoder with SIL2</li> </ul>

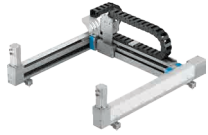

	
	<b>Stepper motors EMMS-ST</b>
<b>Size [mm]</b>	28, 42, 57, 87
<b>Holding torque [Nm]</b>	0.09 ... 9.3
<b>Nominal current [A]</b>	1.4 ... 9.5
<b>Max. rotational speed [rpm]</b>	430 ... 6000
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Small increments and high driving torques thanks to 2-phase hybrid technology</li> <li>• Optimised connection technology</li> <li>• 28 types in stock</li> <li>• With incremental encoder for closed-loop operation</li> <li>• Optionally with holding brake</li> </ul>

			
	<b>Servo drives CMMT-AS</b>	<b>Servo drives CMMT-ST</b>	<b>Servo drives CMMB-AS (only available in Asia)</b>
<b>Nominal current</b>	2 A (6 A) ... 4 A (12 A)	8 A (10 A)	1.5 A (7 A) ... 7 A (15)
<b>Nominal operating voltage</b>	230 V AC	24-48 V DC	230 V AC
<b>Nominal operating voltage phases</b>	Single-phase	DC supply	Single-phase
<b>Nominal power of the controller [W]</b>	350 ... 700	150 ... 300	100 ... 750
<b>Fieldbus coupling</b>	PROFINET, EtherNet/IP and Modbus TCP, EtherCAT	PROFINET, EtherNet/IP and Modbus TCP, EtherCAT	Pulse direction and I/O
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Single-phase servo drive</li> <li>• Can be used universally</li> <li>• Precise force, speed and position control</li> <li>• Comprehensively integrated protective functions for the servo drive, motor and axis with automatic motor shut-down/quick stop</li> <li>• Integrated safety functions</li> <li>• Supports the motor series EMMT-AS, EMME-AS and EMMS-AS as well as third-party motors</li> </ul>	<ul style="list-style-type: none"> <li>• Extra-low voltage servo and stepper drive</li> <li>• Up to 300 W in an ultra-compact space</li> <li>• Can be used universally</li> <li>• Precise force, speed and position control</li> <li>• Comprehensively integrated protective functions for the servo drive, motor and axis with automatic motor shut-down/quick stop</li> <li>• Integrated safety functions</li> <li>• Supports the motor series EMMT-AS, EMME-AS and EMMS-AS, as well as third-party ED and stepper motors</li> </ul>	<ul style="list-style-type: none"> <li>• Very compact</li> <li>• All connections and control components on the front</li> <li>• Easy positioning thanks to pulse train technology</li> </ul>

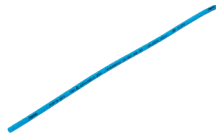
## Grippers

	
	<b>Parallel grippers HGPT</b>
<b>Total gripping force at 6 bar, closing [N]</b>	106 ... 6300
<b>Stroke per gripper jaw [mm]</b>	1.5 ... 25
<b>Position sensing</b>	Via proximity sensor
<b>Gripping force backup</b>	During opening, during closing
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Sturdy and powerful up to 825 N</li> <li>• With T-slot guide</li> <li>• Suitable for external and internal gripping</li> <li>• Gripper jaw guide protected by sealing air against dust</li> <li>• High-force variant available</li> </ul>


## Handling systems


	 <p><b>2D planar surface gantries EXCM</b></p>	 <p><b>2D planar surface gantries EXCH</b></p>
<b>X-axis stroke [mm]</b>	Max. 2000	Max. 2500
<b>Y-axis stroke [mm]</b>	Max. 1000	Max. 1500
<b>Rated load [kg]</b>	0 ... 4	0 ... 6
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Perfectly matched drive and controller packages</li> <li>• Excellent functionality in small installation spaces</li> <li>• Low moving dead weight</li> <li>• Actuation via two stepper motors with integrated optical encoder and two-axis controller</li> <li>• With recirculating ball bearing guide</li> </ul>	<ul style="list-style-type: none"> <li>• Perfectly matched drive and controller packages</li> <li>• Optimal dynamic response when compared with other Cartesian gantry systems</li> <li>• Drive concept with low moving dead weight</li> <li>• Flat system design</li> <li>• High acceleration in both axial directions</li> <li>• Large working space</li> </ul>

## Pneumatic connection technology



	 <p><b>Plastic tubing PUN-H, PUN-H-DUO</b></p>	★
<b>Outer diameter [mm]</b>	2 ... 16	
<b>Inner diameter [mm]</b>	1.2 ... 11	
<b>Temperature-dependent operating pressure [bar]</b>	-0.95 ... 10	
<b>Ambient temperature [°C]</b>	-35 ... 60	
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Polyurethane</li> <li>• High resistance to microbes and hydrolysis</li> <li>• Suitable for energy chains</li> <li>• Also available as DUO tubing</li> <li>• Operating medium: compressed air, vacuum, water</li> <li>• Available in a variety of colours</li> </ul>	



## Vacuum technology


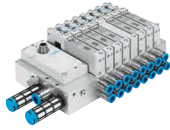
	 <p><b>Vacuum generator OVEL</b></p>
<b>Nominal width of Laval nozzle [mm]</b>	0.45 ... 0.95
<b>Ejector characteristics</b>	High suction rate, high vacuum, standard
<b>Integrated function</b>	Electric ejector pulse, flow control valve, pressure sensor, pressure transmitter, electric on/off valve, filter, open silencer
<b>Max. vacuum [%]</b>	89 ... 92
<b>Max. suction rate [l/min] with respect to atmosphere</b>	4 ... 21
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Affordable and compact</li> <li>• Powerful vacuum or high suction rate</li> <li>• Lightweight</li> <li>• Various output stages and vacuum types</li> <li>• Short switching times thanks to integrated solenoid valves</li> <li>• Quick, precise and safe placement of the workpiece via the ejector pulse</li> <li>• Simple installation</li> </ul>



	 <p><b>Suction grippers ESG</b></p>	 <p><b>Vacuum suction cup ESS</b></p>
<b>Suction cup size [mm]</b>	4x20, 6x10, 6x20, 8x20, 8x30, 4x10, 10x30, 15x45, 20x60, 25x75, 30x90	4x20, 6x10, 6x20, 8x20, 8x30, 4x10, 10x30, 15x45, 20x60, 25x75, 30x90
<b>Suction cup diameter [mm]</b>	2 ... 200	2 ... 200
<b>Holding force at nominal operating pressure [N]</b>	0.1 ... 1610	0.1 ... 1610
<b>Design</b>	Vacuum port on top, vacuum port on the side, with height compensator, with long height compensator	Round, bell-shaped
<b>Information on materials - suction cup</b>	BR, FPM, NBR, PUR, VMQ (silicone), Vulkollan®	BR, FPM, NBR, PUR, VMQ (silicone), Vulkollan®
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Modular system of suction cup holders and suction cups with over 5000 variants</li> <li>• For almost every workpiece in almost every shape</li> <li>• Optionally with angle compensator, height compensator, filter</li> <li>• 15 suction cup diameters</li> <li>• 6 suction cup shapes</li> <li>• Suction cup volume: 0.002 ... 245 cm<sup>3</sup></li> <li>• Min. workpiece radius: 10 ... 680 mm</li> <li>• Vacuum connection: push-in connector or barbed fitting</li> <li>• For plastic tubing, threaded connection</li> </ul>	<ul style="list-style-type: none"> <li>• For universal handling systems with very fast cycle times</li> <li>• Complete unit consisting of suction cup and support plate with mounting</li> <li>• Suction cup volume: 0.002 ... 245 cm<sup>3</sup></li> <li>• Min. workpiece radius: 10 ... 680 mm</li> <li>• Mounting for suction cup holder: female thread, male thread, push-in connector</li> <li>• Suction cup with mounting thread</li> <li>• Long service life</li> </ul>

## Valves/valve terminals



	 <p><b>Solenoid valves for individual connection VUVG</b></p>	 <p><b>Solenoid valves, plug-in VUVG</b></p>
<b>Actuation type</b>	Electrical	Electrical
<b>Pneumatic supply</b>	G1/4, G1/8, M3, M5, M7	
<b>Pneumatic working port</b>	G1/4, G1/8, M3, M5, M7, QS-1/4, QS-1/8, QS-10, QS-3, QS-3/16, QS-3/8, QS-4, QS-5/16, QS-5/32, QS-6, QS-8, flange	G1/4, G1/8, M5, M7, flange
<b>Standard nominal flow rate [l/min]</b>	80 ... 1380	130 ... 1200
<b>Valve function</b>	2x3/2-way, single solenoid, closed, 2x3/2-way, single solenoid, open, 2x3/2-way, single solenoid, open/closed, 5/2-way, double solenoid, 5/2-way, single solenoid, 5/3-way, pressurised, 5/3-way, exhausted, 5/3-way, closed	2x3/2-way, single solenoid, closed, 2x3/2-way, single solenoid, open, 2x3/2-way, single solenoid, open/closed, 3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, double solenoid, 5/2-way, single solenoid, 5/3-way, pressurised, 5/3-way, exhausted, 5/3-way, closed
<b>Electrical connection</b>	Plug, via E-box, connection pattern H, horizontal connection, M8x1 A-coded to EN 61076-2-104, 2-pin, 3-pin	Via sub-base
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Compact with high flow rate</li> <li>• Can be expanded into a valve terminal with an individual connection</li> <li>• 2x 3/2 – one valve, two functions</li> <li>• Simple installation</li> <li>• Electrically and pneumatically actuated valves</li> <li>• In-line valves can be used as individual valves or manifold valves</li> </ul>	<ul style="list-style-type: none"> <li>• Sub-base valve</li> <li>• For valve terminal VTUG with plug-in</li> </ul>


	 <p><b>Proportional pressure regulators VEAA</b></p>	 <p><b>Proportional pressure regulators VEAB</b></p>
<b>Valve function</b>	3-way proportional pressure regulator	3-way proportional pressure regulator
<b>Pneumatic supply</b>	QS-4, flange	QS-4, flange
<b>Pressure regulation range [bar]</b>	0 ... 2, 0 ... 6, 0 ... 10	-1 ... -0.005, 0.001 ... 0.2, 0.005 ... 1, 0.01 ... 2, 0.03 ... 6
<b>Standard nominal flow rate [l/min]</b>	≥7	≥4.5
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Silent operation</li> <li>• Very low power consumption</li> <li>• No heat generation</li> <li>• Highly precise</li> <li>• Integrated piezo technology</li> <li>• Long service life</li> <li>• Very short switching times</li> </ul>	<ul style="list-style-type: none"> <li>• Silent operation</li> <li>• Very low power consumption</li> <li>• No heat generation</li> <li>• Highly precise</li> <li>• Integrated piezo technology</li> <li>• Long service life</li> <li>• Very short switching times</li> </ul>

	 <p><b>Valve manifolds VTUG-S</b></p>	 <p><b>Valve terminals with multi-pin plug/fieldbus connection VTUG</b></p>
<b>Width [mm]</b>	10, 14, 18	10, 14, 18
<b>Standard nominal flow rate</b>	380 l/min at 10 mm, 780 l/min at 14 mm, 1380 l/min at 18 mm	330 l/min at 10 mm, 630 l/min at 14 mm, 1200 l/min at 18 mm
<b>Max. no. of valve positions</b>	16	24
<b>Electric actuation</b>	Individual connection	Individual connection, fieldbus, multi-pin plug, IO-Link®, I-Port
<b>Valve terminal design</b>	Fixed grid	Fixed grid
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Compact due to valves VUVG</li> <li>• Connection technology easy to change via the E-box</li> <li>• Wide range of valve functions</li> <li>• Also with semi in-line valves</li> </ul>	<ul style="list-style-type: none"> <li>• Low-cost fixed grid</li> <li>• Extremely easy assembly</li> <li>• Exchangeable electrical actuation</li> <li>• IO-Link® capable</li> <li>• Valves VUVG with individual electrical connection can be integrated</li> <li>• Also available with pneumatic multiple connector plate</li> <li>• Part of the VG series</li> <li>• Energy-efficient thanks to reverse operation and targeted pressure reduction</li> </ul>

	 <p><b>Valve terminals MPA-L</b></p>	 <p><b>Valve terminals MPA-S</b></p>
<b>Width [mm]</b>	10, 14, 20	10, 14, 20
<b>Standard nominal flow rate</b>	360 l/min at 10 mm, 670 l/min at 14 mm, 870 l/min at 20 mm	360 l/min at 10 mm, 550 l/min at 14 mm, 700 l/min at 20 mm
<b>Max. no. of valve positions</b>	32	24, 32, 64, 8
<b>Electric actuation</b>	Fieldbus, multi-pin plug, IO-Link®, I-Port	AS-Interface, fieldbus, multi-pin plug
<b>Valve terminal design</b>	Valve sizes can be mixed	Modular, valve sizes can be mixed
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Maximum modularity</li> <li>• Single granular</li> <li>• Polymer sub-base</li> <li>• 3 valve sizes</li> <li>• Tamper-proof fixed flow restrictor</li> <li>• Fieldbus interface via CPX</li> <li>• IO-Link® capable</li> </ul>	<ul style="list-style-type: none"> <li>• Valve terminals for universal applications</li> <li>• High-performance valves in a sturdy metal housing</li> <li>• Metal linking</li> <li>• Two valve sizes can be combined</li> <li>• Excellent communication thanks to serial linking</li> <li>• Fieldbus interface via CPX</li> <li>• Max. 128 valves</li> </ul>

## Sensors

	 <p><b>Proximity sensors SMT-8M-A</b></p>	 <p><b>Proximity sensors SMT-10M, SMT-10G</b></p>
<b>Electrical connection</b>	2-wire, 3-wire, 2-pin, 3-pin, cable, cable with plug, M8x1, M12x1, rotatable thread	2, 3, cable, cable with plug, M8x1 A-coded to EN 61076-2-104, M12x1 A-coded to EN 61076-2-101, open end
<b>Operating voltage range DC [V]</b>	5 ... 30	5 ... 30
<b>Switching element function</b>	N/C contact, N/C contact or N/O contact switchable, N/O contact	N/O contact
<b>Switching output</b>	NPN, PNP, PNP/NPN switchable, contactless, 2-wire	NPN, PNP, contactless, 2-wire
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Measuring principle: magneto-resistive</li> <li>• Short design</li> <li>• Variant EX2 for use in potentially explosive areas</li> <li>• Insertable in the slot from above, flush with the cylinder profile</li> <li>• LED switching status indication</li> <li>• LED function reserve indication</li> <li>• Cable length 0.1 ... 30 m</li> </ul>	<ul style="list-style-type: none"> <li>• Measuring principle: magneto-resistive</li> <li>• Clamped in C-slot, insertable in the slot from above or lengthwise</li> <li>• LED switching status indication</li> <li>• Cable length 0.3, 2.5 m</li> </ul>

	 <p><b>Pressure sensors SPAN</b></p>	
<b>Pressure measuring range [bar]</b>	1 ... 16	
<b>Switching element function</b>	N/C or N/O contact, switchable	
<b>Pneumatic connection</b>	Male thread G1/8, NPT1/8-27, R1/8, female thread G1/8, M5, QS-4	
<b>Electrical connection</b>	Plug, square design, 4-pin	
<b>Display type</b>	Illuminated LCD	
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Compact design 30 x 30 mm</li> <li>• For monitoring compressed air and non-corrosive gases</li> <li>• For network monitoring, regulator monitoring, leak testing, object detection</li> <li>• Relative measurement method based on a piezo-resistive measuring cell</li> <li>• Serial communication integrated using IO-Link® 1.1</li> <li>• High-contrast, blue backlit display</li> <li>• Electrically compatible with all controllers</li> <li>• Attractive price and great performance</li> </ul>	

## Air preparation



**Service units**  
**MS2**

<b>Pneumatic connection</b>	M5 or QS6
<b>Pressure gauge connection</b>	G1/8
<b>Pressure regulation range [bar]</b>	0.5 ... 7
<b>Max. operating pressure [bar]</b>	10 (M5), 8 (QS6)
<b>Pressure gauge variants</b>	Bar/psi, MPA
<b>Standard nominal flow rate</b>	LR: M5: 170 l/min; QS6: 350 l/min LFR: M5: 140 l/min; QS6: 310 l/min
<b>Weight [g]</b>	LR: 28 – 31 LFR: 35 – 38
<b>Temperature range [°C]</b>	-5 ... +50
<b>Grid dimension [mm]</b>	25
<b>Grade of filtration (LFR) [µm]</b>	5
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Inexpensive</li> <li>• The lightest on the market: from 28 g (LR) to max. 38 g (LFR)</li> <li>• Compact: fitting space reduced by up to 40%</li> <li>• Optimum control response</li> <li>• High flow rate</li> <li>• Sturdy thanks to high-quality polymer</li> <li>• Condensate level always visible (LFR)</li> <li>• Directly in the machine</li> <li>• Ideal for end-of-arm applications</li> </ul>



## Function-specific systems




**Servo press kits**  
**YJKP**

<b>Working stroke [mm]</b>	100 ... 400
<b>Press force [kN]</b>	0 ... 17
<b>Feed speed [mm/s]</b>	0 ... 250
<b>Accuracy in ± % FS</b>	0.25
<b>Protocol</b>	Modbus® TCP, EtherNet/IP, TCP/IP
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Everything from a single source: modular system kit comprising operating software GSAY, electric cylinder with spindle drive ESBF, motor EMMS-AS, motor controller</li> <li>• CMMP-AS, force sensor and controller CECC-X together with the required accessories</li> <li>• Less expensive than conventional press-fitting systems</li> <li>• Pre-installed operating software for precisely the required application-specific functions you required</li> <li>• Commissioning made easy: parameterisation instead of programming</li> <li>• For top quality: real-time monitoring of the press-fitting operation and clear visualisation of the force/displacement curves</li> <li>• Fit for Industry 4.0 thanks to the OPC UA interface at the controller</li> </ul>

## Control technology

		
	<b>Terminals CPX</b>	<b>Automation systems CPX-E</b>
<b>Protocol</b>	INTERBUS®, DeviceNet®, PROFIBUS, CANopen, CC-LINK®, Ether-Net/IP, PROFINET, EtherCAT, ModbusTCP	
<b>Module positions</b>	Max. 9 electric input/output modules	10
<b>Max. address capacity Inputs [byte]</b>	64	64
<b>Max. address capacity Outputs [byte]</b>	64	64
<b>Parameterisation</b>	Diagnostic behaviour, failsafe response, forcing of channels, signal setup	
<b>Degree of protection</b>	IP65, IP67	IP20
<b>Nominal operating voltage DC [V]</b>	24	24
<b>Operating voltage range DC [V]</b>	18 ... 30	
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Automation platform</li> <li>• Open to all common fieldbus protocols and Ethernet</li> <li>• Integrated diagnostic and maintenance functions</li> <li>• Can be used as stand-alone remote I/O or with valve terminals MPA-S, MPA-L, VTSA/VTSA-F</li> <li>• Choice of polymer or metal housing with individual linking</li> <li>• Analogue inputs and outputs, 2-way/4-way, optionally with HART protocol</li> </ul>	<ul style="list-style-type: none"> <li>• Modern control system with high performance: <ul style="list-style-type: none"> <li>– EtherCAT master</li> <li>– Slave interfaces: PROFINET, EtherNet/IP</li> </ul> </li> <li>• Digital input modules (16 DI), digital output modules (8 DO/0.5 A)</li> <li>• Analogue input modules (current, voltage), analogue output modules (current, voltage)</li> <li>• Modern programming with CODESYS V3 to IEC 61131-3</li> <li>• Integration of SoftMotion functions (PLCopen)</li> <li>• High I/O component density</li> <li>• Easy mounting of the control system</li> </ul>

	
	<b>Operator units CDPX</b>
<b>Display</b>	2 ... 16
<b>Display size [“]</b>	13.3, 7, 4.3, 10.4
<b>Recipe memory [byte]</b>	32000
<b>Display resolution</b>	480x272 pixel, WVGA, 800x480 pixel, SVGA, 800x600 pixel, WXGA, 1280x800 pixel
<b>Ethernet interface</b>	RJ45 10/100 MBd
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• Powerful processors combined with wide-screen technology</li> <li>• Remote access, remote control</li> <li>• FTP and HTTP servers</li> <li>• Open for web and multimedia applications</li> <li>• With touch screen</li> <li>• Project planning and programming with Designer Studio</li> </ul>

## Image processing systems



**Vision sensors  
SBSx**

<b>Sensor resolution</b>	1280 x 1024 pixel (SXGA), 736 x 480 pixel WideVGA
<b>Frame rate</b>	50 frames/sec.
<b>Lighting</b>	<ul style="list-style-type: none"> <li>• Integrated, powerful LED lighting</li> <li>• Colours: red, infrared, white (depending on the model)</li> <li>• External lighting can be simply plugged in; triggered by the SBSI</li> </ul>
<b>Interfaces</b>	<ul style="list-style-type: none"> <li>• Ethernet protocols: TCP/IP, FTP, SMB</li> <li>• PROFINET, Ethernet/IP</li> <li>• RS232/RS422 (code reader models only)</li> <li>• I/O: 2 inputs, 4 outputs, 2 selectable inputs/outputs (all switchable PNP/NPN)</li> </ul>
<b>Dimensions [mm]</b>	45 x 45 x 76.7 (W x L x H)
<b>Ambient temperature [°C]</b>	0 ... 50
<b>Nominal operating voltage DC [V]</b>	24
<b>Highlights</b>	<ul style="list-style-type: none"> <li>• All-in-one device with optical system, lighting, evaluation and communication</li> <li>• Simple and intuitive: just 3 steps to the perfect solution</li> <li>• Powerful and fast software tools</li> <li>• External light SBAL can be connected directly – Festo plug &amp; work</li> <li>• Affordable vision solution</li> </ul>



# Productivity

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