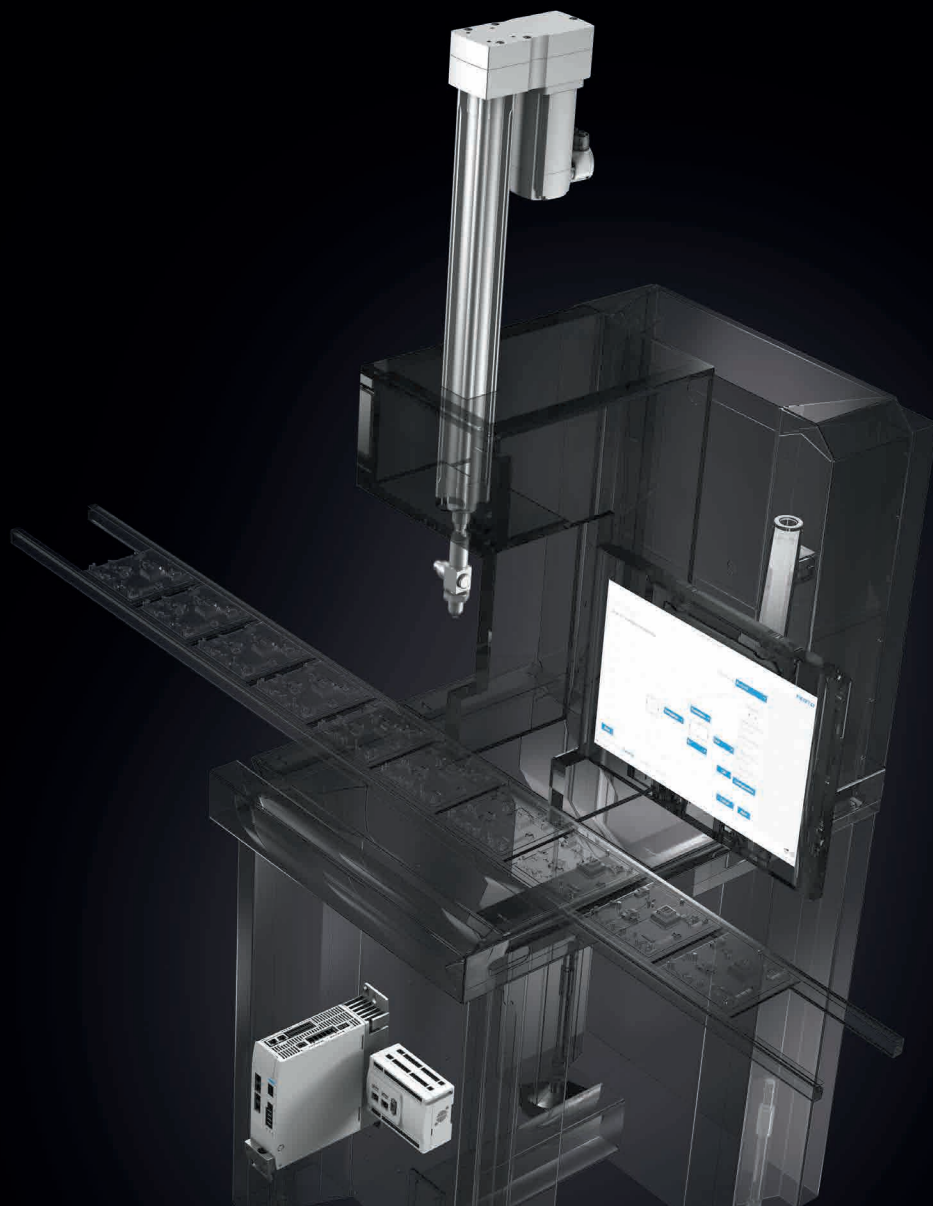


Joining and press-fitting solutions

FESTO



You need complete systems.
You want reduced complexity.
We are your dependable solutions partner.

→ WE ARE THE ENGINEERS
OF PRODUCTIVITY.



Page 4

Overview of technologies

- 4 Overview of technologies
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Pneumatic joining and press-fitting solutions

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Electric joining and press-fitting solutions

- 16 Electric joining and press-fitting solutions up to 5.5 kN
- 20 Servo-electric joining and press-fitting solutions up to 17 kN

Smart and intuitive: automation solutions for joining and press-fitting processes from the driving force in industrial automation.

Successful machine building no longer depends entirely on constructing systems using components, but increasingly also on process expertise and reliable subsystems.

Joining and press-fitting are key processes in the production of goods, and an important area in factory automation. That is why we are now also offering self-contained systems in this field. We have many years of experience as a partner in the design and production of handling systems and drive solutions as well as expertise in processes. This enables us to offer exactly the right solution for your joining and press-fitting application – from low-cost components all the way up to a complete "servo press kit YJKP" package including software.

This means that oversized and therefore overpriced joining and press-fitting systems are a thing of the past. You get exactly the solution that meets your needs.

See our solution expertise for joining and press-fitting applications for yourself on the following pages. You will find your solution quickly and easily in our overview of all possible combinations and packages offered by Festo.

Page 24

Electric servo press
kit YJKP



Perfect
solutions

for
joining and
press-fitting

Joining and press-fitting processes – from simple pneumatics to intelligent control technology

The process of joining and press-fitting is much older than automated production technology. Automated processes with calculated parameters offer significant advantages: the reproducibility of force and speed during the joining and press-fitting process is much better, while the result ensures consistent quality.

Tailored performance and price

The optimum price/performance ratio in an automated joining and press-fitting solution is determined by a number of key parameters: What forces do I need? What cycle time do I need to achieve for efficient production? What process data do I need to gather for this?

Whether simple pneumatics or solutions featuring intelligent control technology are required, Festo has the right solution for every application. The electric servo press kit YJKP is a complete solution including software. Read more about the YJKP on pages 24–27.

Safety during joining and press-fitting

The measures required to implement functional safety are often as individual as your application. We offer a range of application notes to simplify the integration of the joining and press-fitting solutions into your safety concept. They describe and explain how to integrate the solution into fully automatic processes.

Depending on your risk assessment, safe stop functions up to Performance Level e in Cat. 4 can be implemented.

Note:

The explanations and examples in this brochure are just examples. The operator is responsible for the actual implementation and safety considerations.

Foreseeable misuse

Construction of presses with manual loading or manual unloading in accordance with EC Machinery Directive 2006/42/EC Appendix IV, Point 9 without any additional protective measures.

Overview of joining and press-fitting solutions at Festo

The table below will help you to preselect the right components for your joining and press-fitting solution. It shows the possible force ranges and the corresponding function ranges side by side.

	Function range ↑	Pneumatic drives		Electric drives			Technology →
		Up to 48 kN	Up to 43 kN	Up to 5,5 kN	Up to 17 kN	Up to 17 kN ^{*)}	
• STO Safe Torque Off		■	■	■	■	■	
• SS1 Safe Stop 1		□	□	■	■	■	
• Application software		□	□	□	□	■	
• Force control		□	■	□	□	■	
• Speed control		□	■	■	■	■	
• Position control		□	■	■	■	■	
• Force monitoring		□	■	■	■	■	
• Speed monitoring		□	■	■	■	■	
• Position monitoring		□	■	■	■	■	
• Fixed speed setting		■	■	■	■	■	
• Fixed force setting		■	■	■	■	■	
• End positions monitored		■	■	■	■	■	
• Positioning at a fixed stop		■	■	■	■	■	
		Pneumatic joining and press-fitting solutions Page 8-11	Servo-pneumatic joining and press-fitting solutions Page 12-15	Electric joining and press-fitting solutions Page 16-19	Servo-electric joining and press-fitting solutions Page 20-23	Electric servo press kit YJKP Page 24-27	

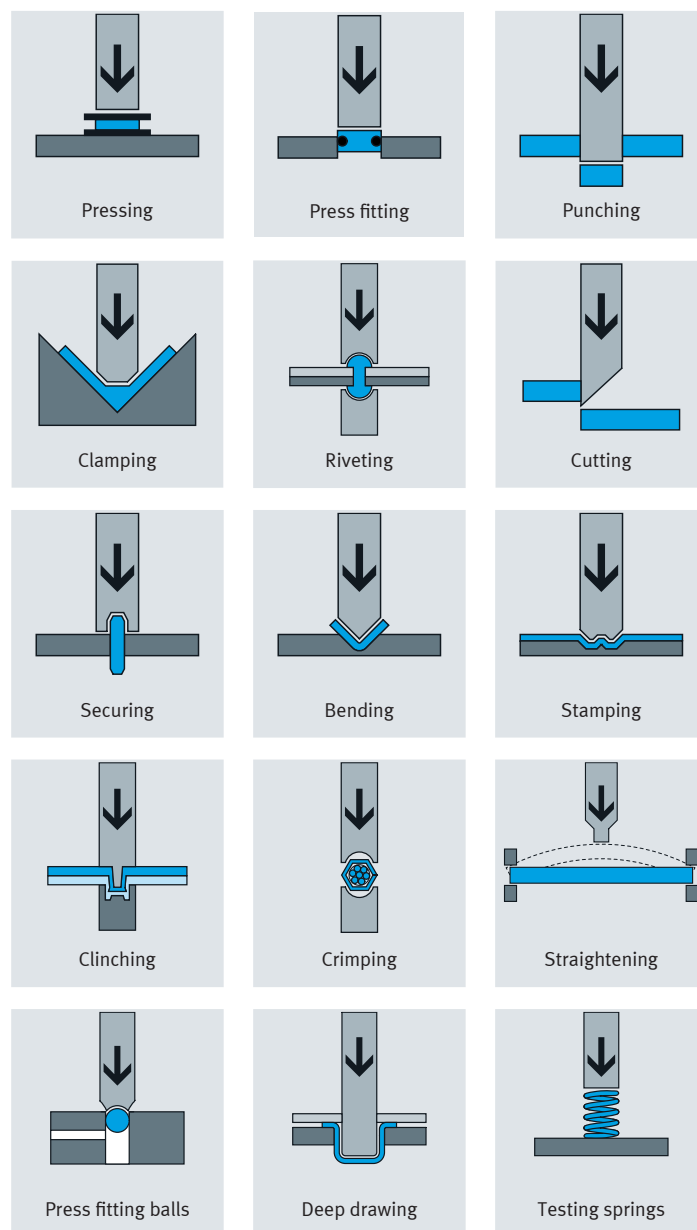
■ Available
□ Not available

^{*)} Variants up to 100 kN in preparation

Joining and press-fitting: two terms for numerous applications

Joining and press-fitting refer to processes in which a workpiece is changed using a tool and the application of force. The increasing complexity of production processes means that supposedly simple tasks like clamping workpieces now fall under this heading.

Possible application areas/ application examples



15 typical joining and press-fitting applications can be realised using Festo systems. These symbols will guide you on the following pages and lead you directly to the technology best suited to your application.

The right technology for every task

Pneumatics

Pneumatics offers a high level of force in a relatively small space because of its high performance density. Pneumatic solutions are particularly suitable for those press-fitting tasks where force needs to be built up and maintained for a

period of time. Servo-pneumatic systems are also positional in order to build up a controlled force. This makes them ideal for tasks that require the workpiece to be approached at high speed followed by the application of a defined force.

Typical areas of application of pneumatics

Pneumatics is an energy-efficient solution for press-fitting, clamping or testing springs, and generate very little heat. One characteristic of pneumatics is the use of compressed air as its medium. When a force is applied, it "follows" even a soft, deformable workpiece.

Electrics

Electric drive technology is always based on a mechanical drive, a motor with position evaluation and a servo drive. This combination permits reproducible positioning

irrespective of the load and parameters like dynamic response and intermediate positions. Different cycles can be freely configured.

Case-by-case basis: the right solution for your needs

The options for implementing joining and press-fitting tasks are varied, and very much depend on the general conditions

and requirements. This brochure shows possible solutions based on the range of functions required and the application.

Proven and simple: pneumatic joining and press-fitting solutions up to 48 kN

Conventional pneumatics is suitable for simple joining and press-fitting tasks with forces up to 48 kN. This proven technology does not require a lot of training to be used.

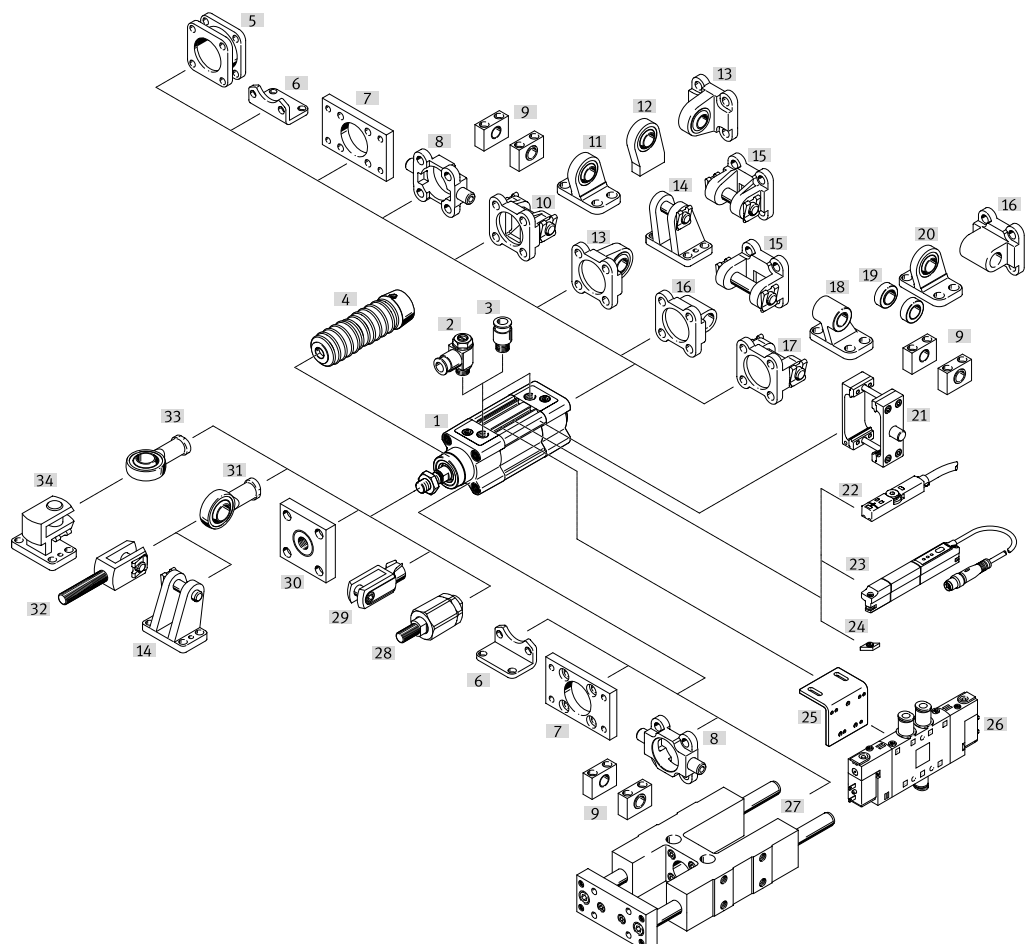
Expandable technology

Pneumatics can be kept low-cost by a clever combination of individual components in a standard basic package. It can become an almost infinitely expandable system with which, for example, advanced path monitoring as well as advanced safety functions (e.g. STO or SS1) can be realised.

Focus on process reliability

Proven pneumatic drive technology makes joining and press-fitting processes extremely reliable. However, nowadays the requirements for pneumatic automation go far beyond traditional joining and press-fitting where an actuator moves from one end to another.

Process reliability, reduction of scrap, tamper-proof systems, reduction of downtimes and fast adaptation to changing requirements are key parameters, and intelligent combinations are the effective and attractively priced answer.

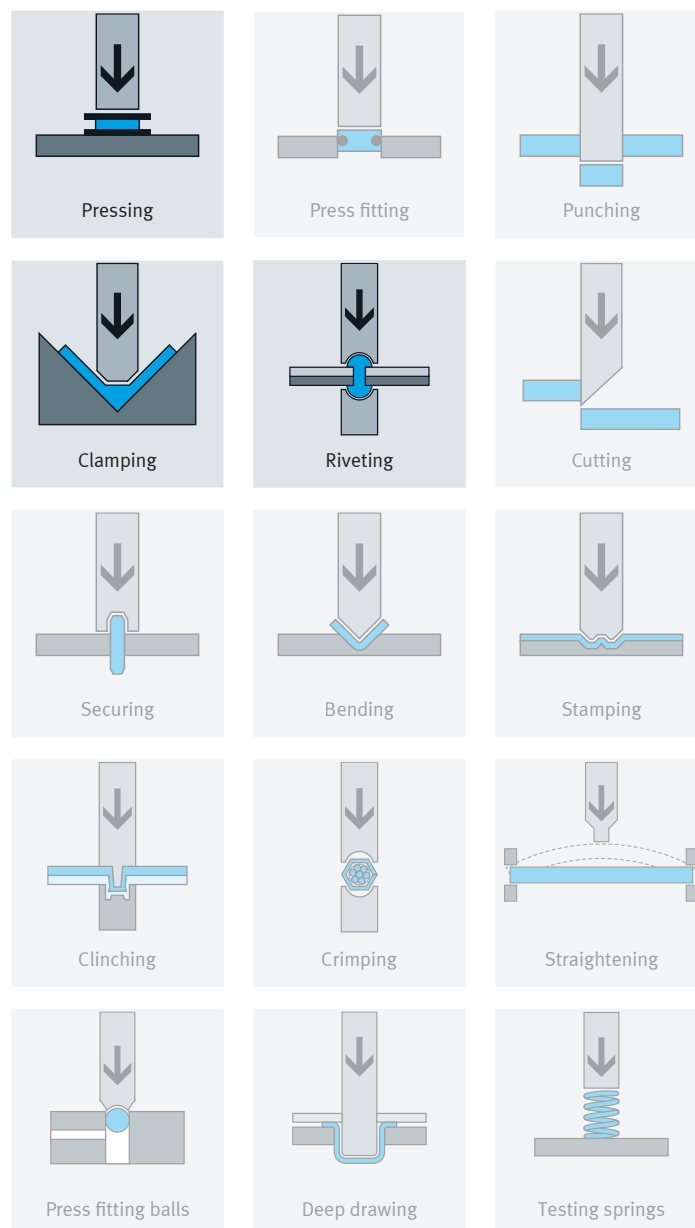


Overview of typical joining and press-fitting tasks

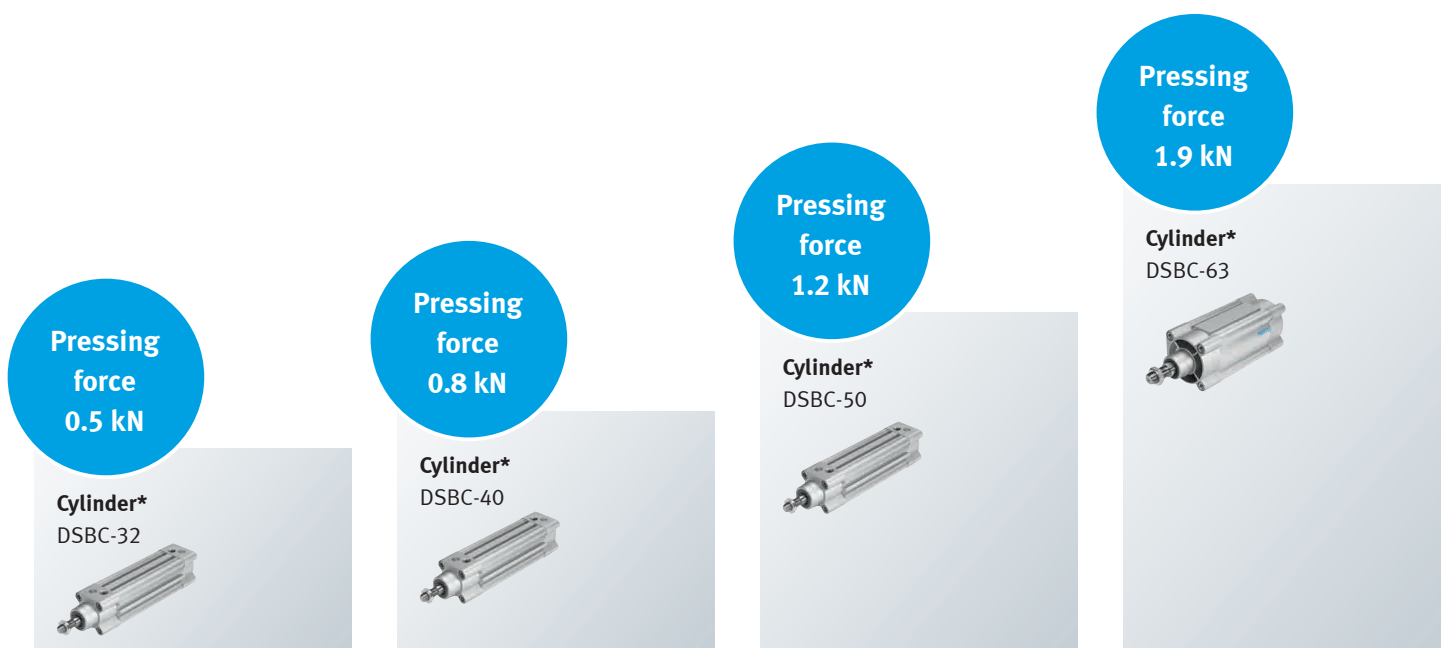
Pneumatically controlled drives for simple joining and press-fitting tasks allow you to adjust the force and speed and monitor whether the required position is reached.

Function range

- STO
- SS1
- Application software
- Force control
- Speed control
- Position control
- Force monitoring
- Speed monitoring
- Position monitoring
- Fixed speed setting
- Fixed force setting
- End positions monitored
- Positioning at a fixed stop



Selection of drive systems at a glance



*Theoretical force at 6 bar
→ www.festo.com/catalogue...

**Pressing
force
3 kN**

Cylinder*
DSBC-80



**Pressing
force
7.4 kN**

Cylinder*
DSBC-125



**Pressing
force up to
approx.
18 kN**

Tandem cylinder*
DNCT



High-force cylinder*
ADNH



**Pressing
force up to
approx.
48 kN**

Large cylinder*
DSBG-320



Size

For most joining and press-fitting tasks: servo-pneumatic solutions up to 43 kN

Servo-pneumatics, in other words joining and press-fitting combined in a closed loop, permit a variety of functions that could otherwise only be achieved with purely electric systems. It is the perfect solution for customers who need or want to avoid electrical processes. This can be achieved with open- and closed-loop control technology in combination with distance and force sensors. The energy for these solutions is still provided by the existing compressed air network.

Many tasks – one solution

Joining and press-fitting tasks increasingly consist of several substeps and include both the actual joining process as well as other tasks like feeding parts and clamping workpieces. Servo-pneumatic systems offer almost limitless possibilities for realising joining and press-fitting processes. They can be designed as centralised, standalone systems (remote controller) or as decentralised systems.

Characteristics of servo-pneumatic systems from Festo

- Force and position system with an accuracy of ± 0.5 mm up to 43 kN
- The system can be used with any cylinder in combination with the displacement encoder MLO
- Safety requirements for pneumatic presses are described in EN 13763.
- With the sub-base VABP in relation with corresponding valves, safety functions are

possible up to Performance Level d in accordance to EN ISO 13849-1.

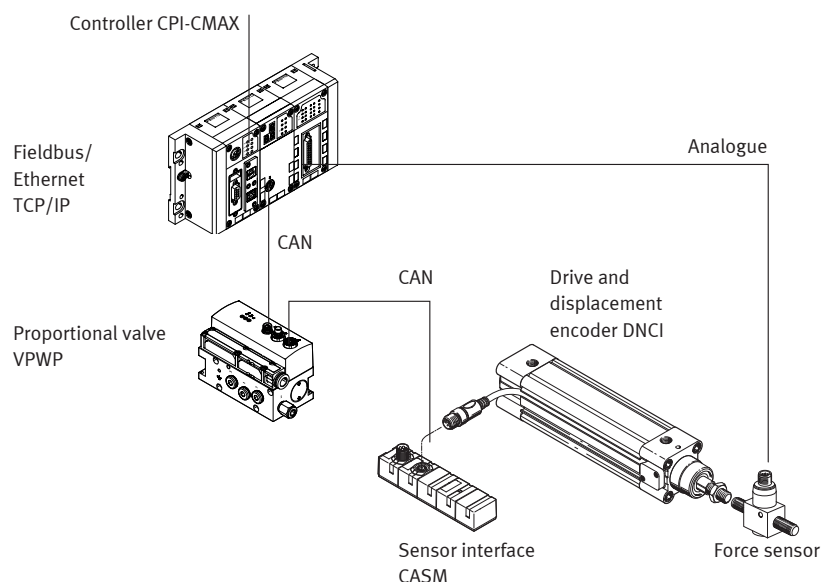
- Each position can be freely selected and parameterised
- Protected against overload and sturdy, even under very harsh operating conditions
- High force and positioning reproducibility for high process reliability
- The entire system conforms to IP65

All-rounder for a full range of functions: controller CPX-CMAX

The third generation of servo-pneumatics offers greater functionality and ease of operation. The new controller

CPX-CMAX offers everything that industrial communication can provide: open-loop control and communication, servo-pneumatic

motion, measurement, closed-loop control, decentralisation. And it is suitable for force control too.

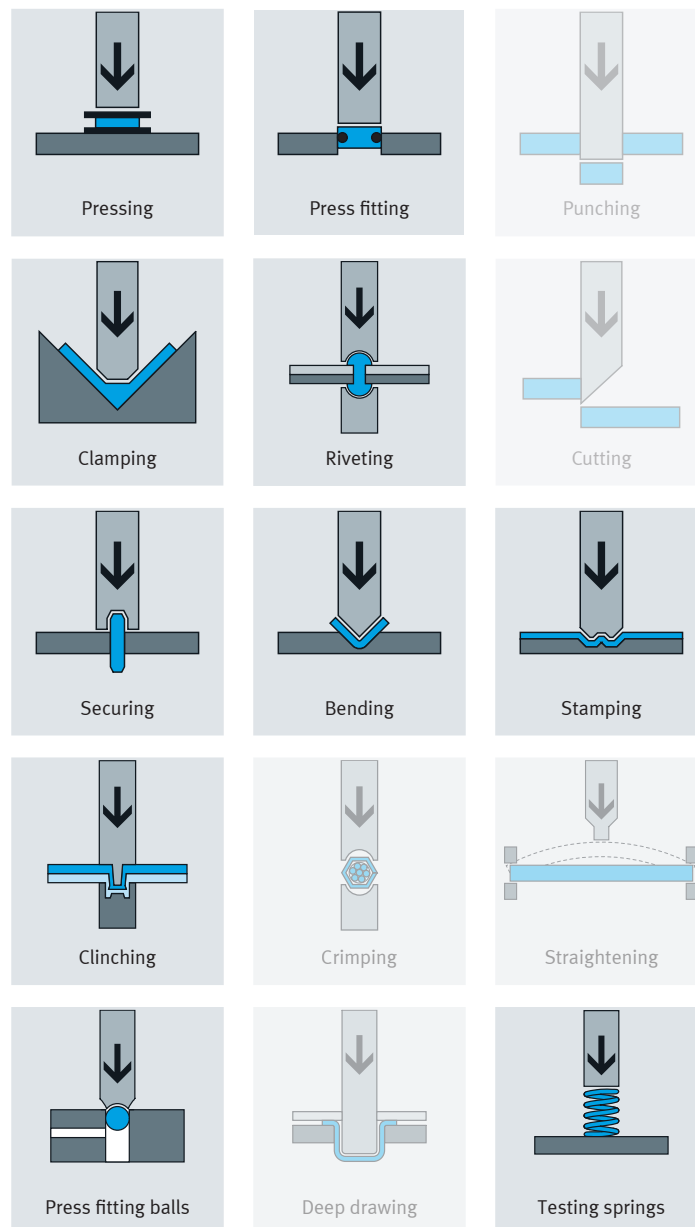


Overview of typical joining and press-fitting tasks

Servo-pneumatics is suitable for almost all joining and press-fitting processes. They are ideal for customers who want to avoid electric systems or need to fall back on them (e.g. for force or safety reasons).

Function range

- STO
- SS1
- Application software
- Force control
- Speed control
- Position control
- Force monitoring
- Speed monitoring
- Position monitoring
- Fixed speed setting
- Fixed force setting
- End positions monitored
- Positioning at a fixed stop



Selection of drive systems at a glance

**Pressing
force
0.4 kN**

**Cylinder with
displacement encoder***
DNCI-32



**Valve
VPWP-4**



**Pressing
force
1 kN**

**Cylinder with
displacement encoder***
DNCI-40



**Valve
VPWP-4**



**Pressing
force
2.6 kN**

**Cylinder with
displacement encoder***
DNCI-50 to 63



**Valve
VPWP-6
VPWP-8**



**Pressing
force
6.4 kN**

**Cylinder with
displacement encoder***
DDPC-80 and 100



**Valve
VPWP-8
VPWP-10**



**Controller
CPX-CMAX**

*Theoretical force at 6 bar
→ www.festo.com/catalogue...

**Pressing
force
12 kN**

**Cylinder with
displacement encoder***
DFPI-160 or
DSBG-160 +
potentiometer MLO



**Pressing
force
17 kN**

**Cylinder with
displacement encoder***
DFPI-200 or
DSBG-200 +
potentiometer MLO



**Pressing
force up to
48 kN**

**Cylinder with
displacement encoder***
DFPI-320 or
DSBG-320 +
potentiometer MLO



**Valve
VPWP-10**



**Valve
VPWP-10**



**Valve
VPWP-10**



Size

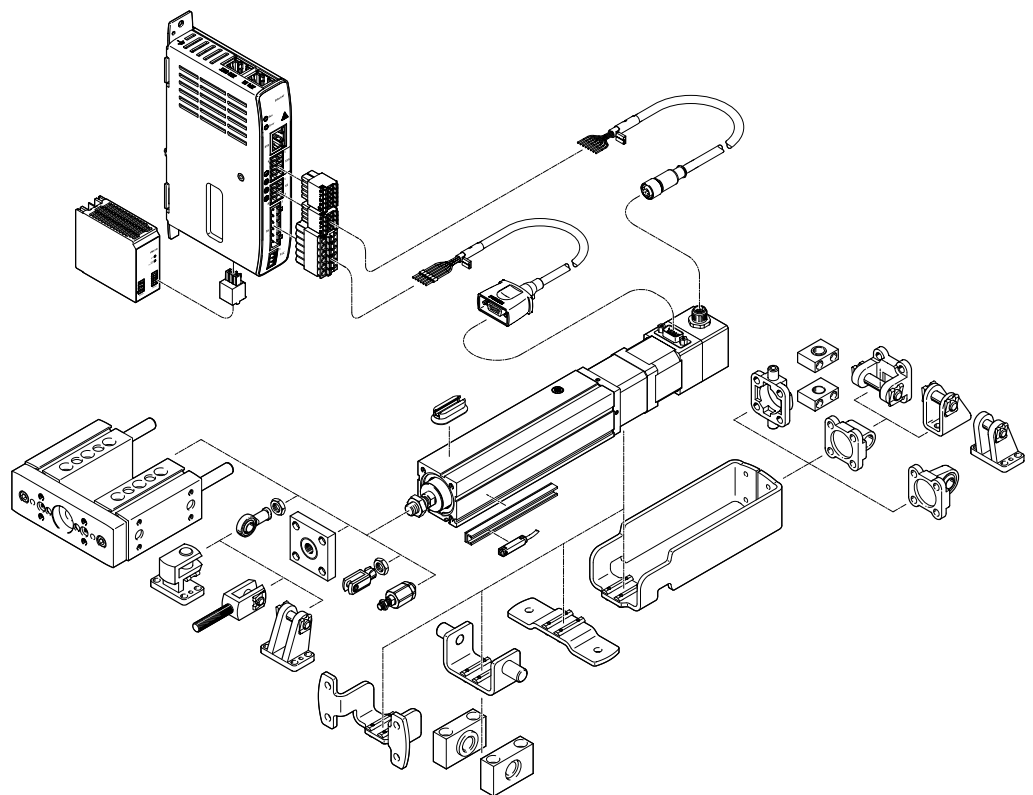
Cost-optimised with force limitation as standard: joining and press-fitting with electric drive technology up to 5.5 kN

This Festo portfolio offers an intelligent as well as a cost-optimised solution for all positioning tasks in automation technology. Everything is possible, from infinite rotary applications and gantry designs to complex joining and press-fitting tasks with position- and force-dependent process steps.

Outstanding price/performance ratio

The drive series EPCC and ESBF are perfect for joining and press-fitting tasks for forces up to 5.5 kN thanks to their technical data, and they also offer an outstanding price/performance ratio.

Commissioning and maintenance of the controlled drives can be carried out using the Festo Automation Suite software. All drives offer the option of STO/SS1 to Performance Level e, Cat. 4, in accordance with DIN EN 13849.

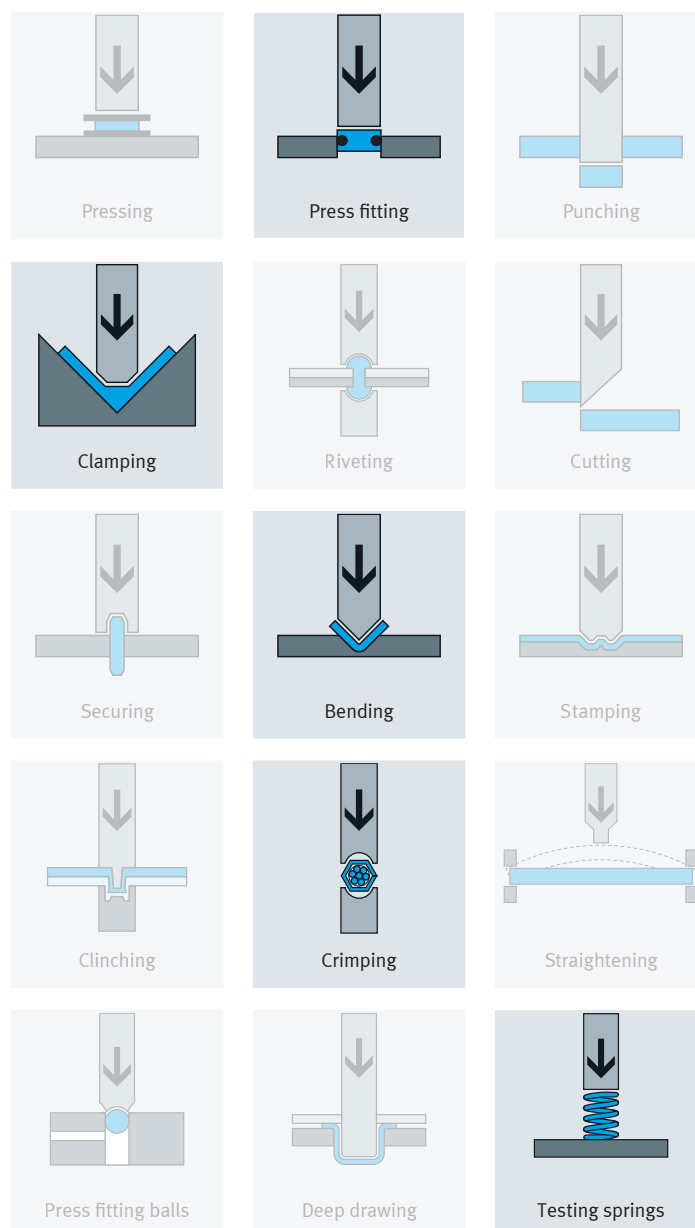


Overview of typical joining and press-fitting tasks

For a reliable process the drives can be used with position and speed control, as well as with force limitation. This means that all those applications where storing process data plays a less important role can be easily implemented.

Function range

- STO
- SS1
- Application software
- Force control
- Speed control
- Position control
- Force monitoring
- Speed monitoring
- Position monitoring
- Fixed speed setting
- Fixed force setting
- End positions monitored
- Positioning at a fixed stop



Selection of drive systems at a glance

Pressing
force
0,1 kN

Servo motor
EMME-AS-40



Drive
Electric cylinder
EPCC-32



Pressing
force
0,4 kN

Servo motor
EMMT-AS-60



Drive
Electric cylinder
EPCC-45

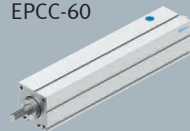


Pressing
force
1 kN

Servo motor
EMMT-AS-60



Drive
Electric cylinder
EPCC-60



Pressing
force
1 kN

Servo motor
EMMT-AS-60



Drive
Electric cylinder
ESBF-32



Servo drive
CMMT-AS

Pressing
force
3 kN

Servo motor
EMMT-AS-80



Drive
Electric cylinder
ESBF-40



Pressing
force
5 kN

Servo motor
EMMT-AS-100



Drive
Electric cylinder
ESBF-50



Pressing
force
5.5 kN

Servo motor
EMMT-AS-100



Drive
Electric cylinder
ESBF-63



Size

Maximum flexibility: servo-electric solution for challenging joining and press-fitting tasks up to 17 kN

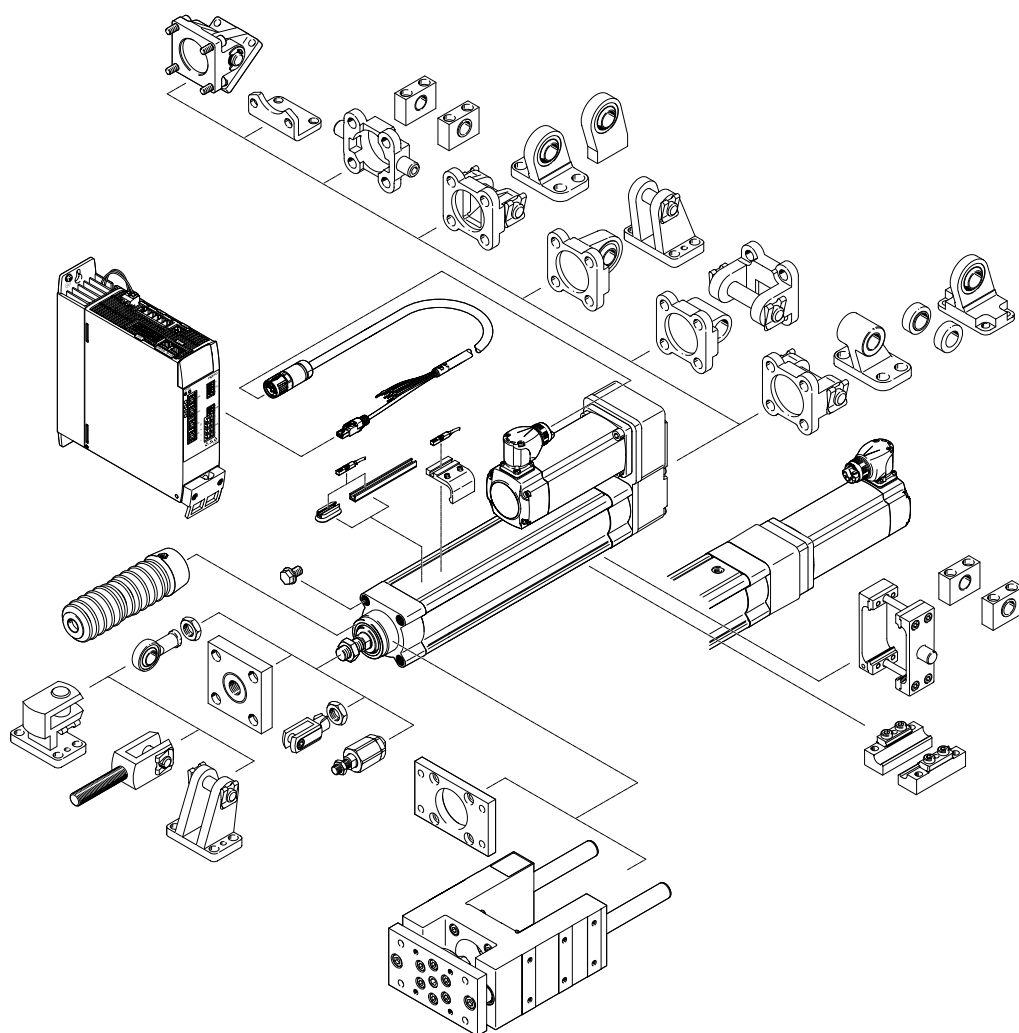
These solutions have maximum flexibility built in: 6 output stages, digital I/O as well as ready-made modules for common PLC controllers make all manner of joining and press-fitting applications possible. Numerous add-on options further increase the variety of applications.

One for all: CMMT-AS

The centrepiece of this automation system is the extremely compact servo drive CMMT-AS equipped with an impressive range of functions that leaves nothing to be desired, from the bus system interface through to safety functions STO and SS1 to Cat. 4, PLe.

It has 6 output stages in which digital I/Os as well as ready-made modules for common PLC controllers can be used for control.

One of the other main features is the spindle drive designed as a standards-based cylinder. With numerous add-on options and motor series up to a force of 17 kN (up to 100 kN on request), the CMMT-AS offers the right solutions whether the goal is reproducible positioning or a process with a defined force profile.



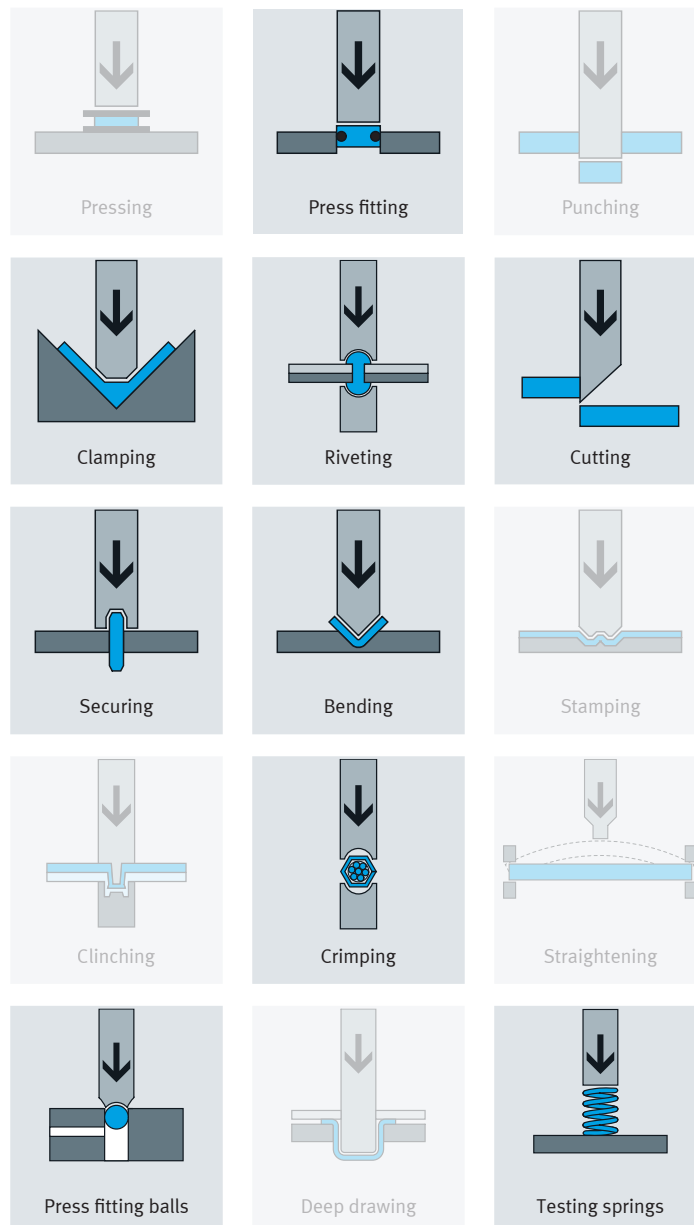
Overview of typical joining and press-fitting tasks

Function range

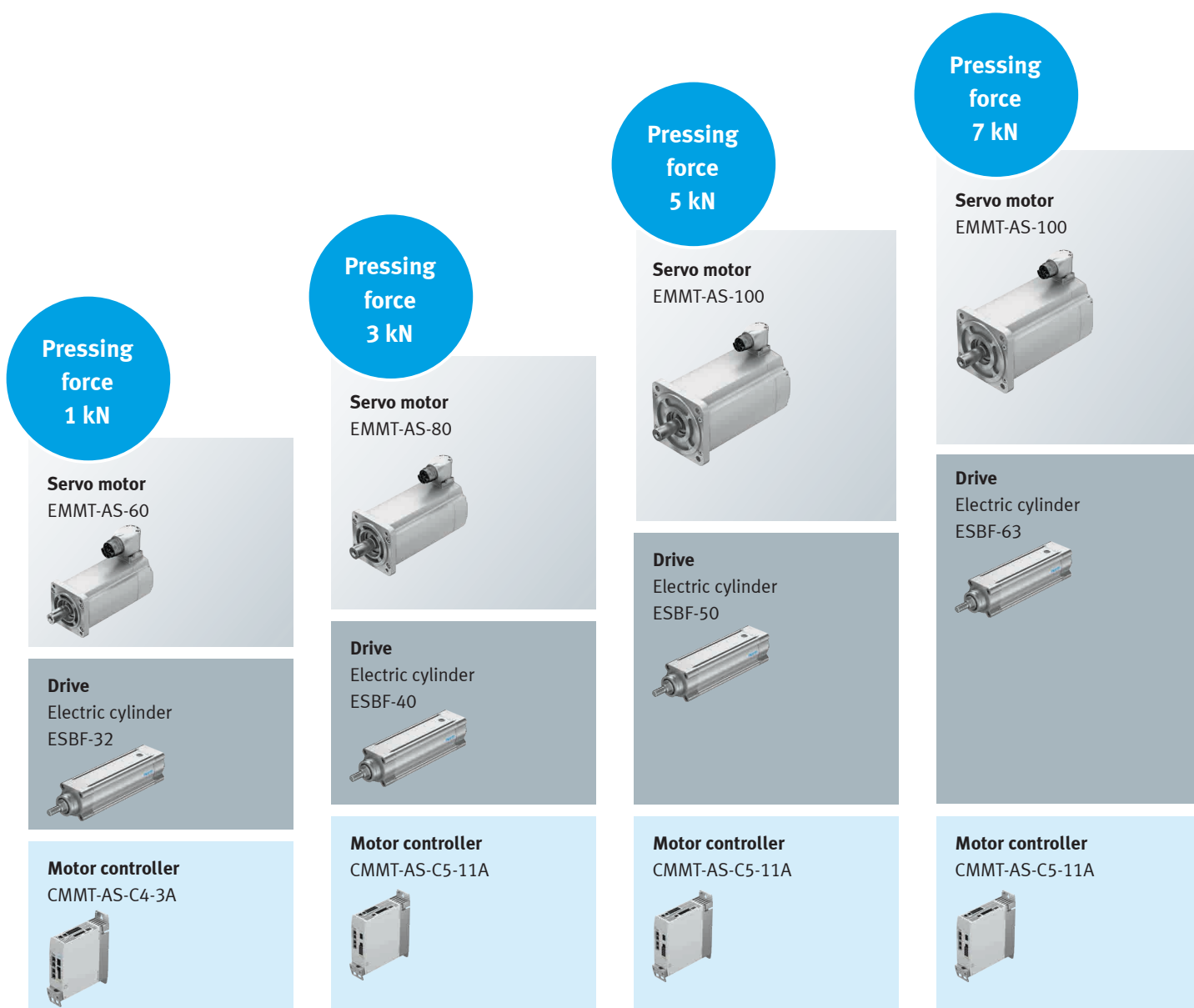
- STO
- SS1
- Application software
- Force control
- Speed control
- Position control
- Force monitoring
- Speed monitoring
- Position monitoring
- Fixed speed setting
- Fixed force setting
- End positions monitored
- Positioning at a fixed stop

Also available:

Custom safety devices



Selection of drive systems at a glance



Pressing
force
12 kN

Servo motor
EMMT-AS-150



Pressing
force
17 kN

Servo motor
EMMT-AS-150



Drive
Electric cylinder
ESBF-100



Drive
Electric cylinder
ESBF-80



Motor controller
CMMT-AS-C12-11A



Motor controller
CMMT-AS-C12-11A



Size

Software included: servo press kit YJKP for electric press-fitting applications

The modular servo press kit YJKP gives you just the software functions you need for your application. You get an extremely precise press-fitting system with a high level of repetition accuracy and an excellent price/performance ratio. Simple, cost-effective and quick to install.



Pre-assembled system kit

The right size for every application: the YJKP consists of modular operating software and harmonised standard Festo components. With electric spindle drive, motor, motor controller, force sensor and control system, you have everything you need for electric press-fitting applications up to 17 kN. All you have to do is integrate it!

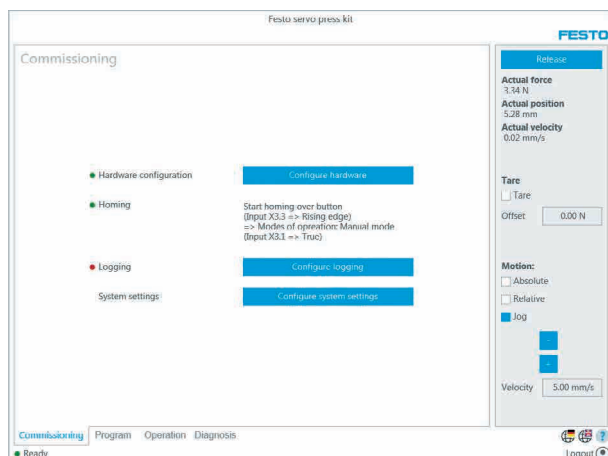
functions can be used on a PC, iPad or other types of human-machine interface and is compatible with all types of platforms.

Thanks to the function elements in the software's integrated library, joining and press-fitting processes are quick to configure and easy to implement.

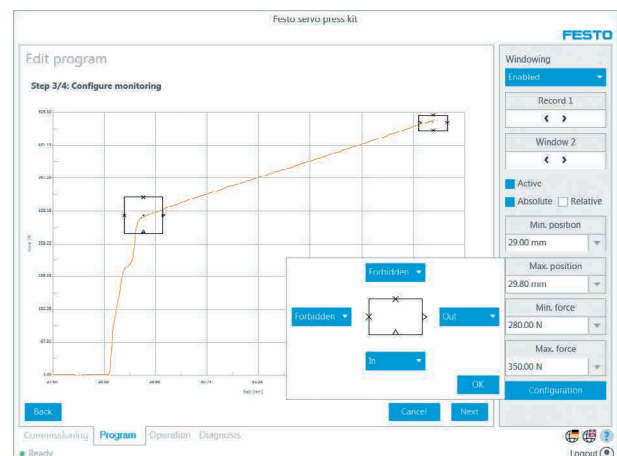
Pre-installed, platform-neutral software

The pre-installed operating software GSAY is ready to use straight away and you don't need to be a programming expert to parameterise it, it's that easy and intuitive. The modular software featuring application-specific

- Recording process data for quality assurance
- Recorded force/displacement graph exported as csv file
- Analysis functions for the force/displacement graph
- Definition of windows
- Space envelopes
- Through points
- Software is customisable



Application software GSAY: commissioning

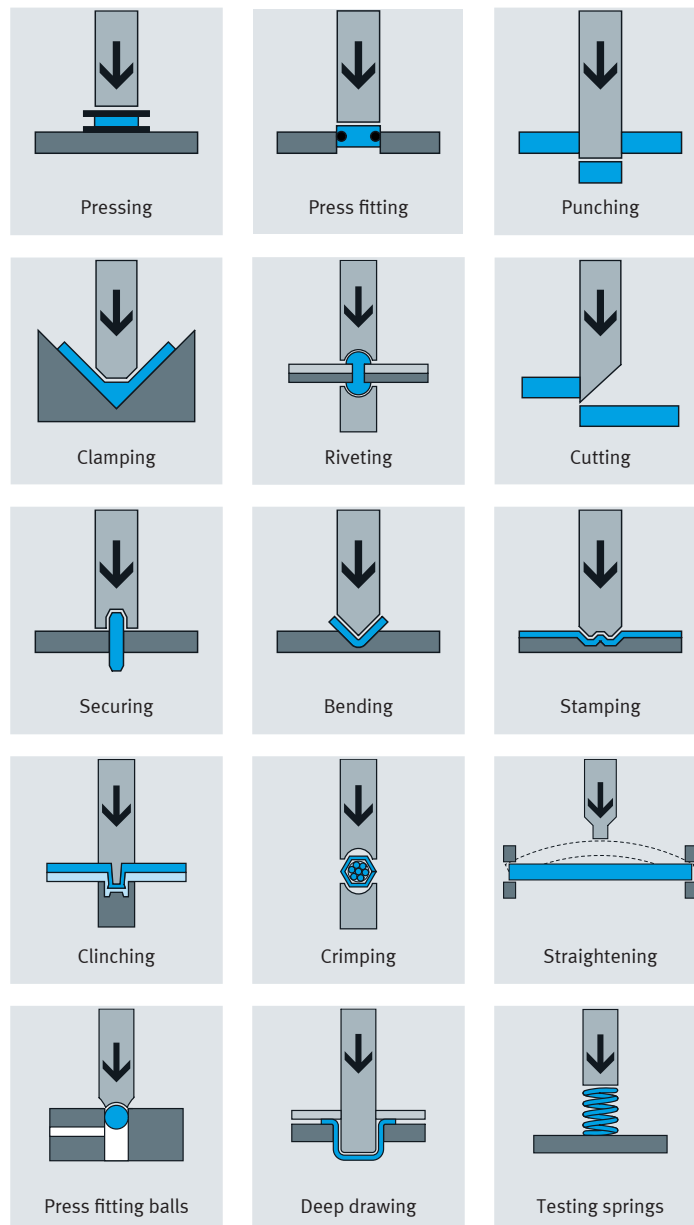


Application software GSAY: creating a reference curve incl. windowing

Overview of typical joining and press-fitting tasks

Function range

- STO
- SS1
- Application software
- Force control
- Speed control
- Position control
- Force monitoring
- Speed monitoring
- Position monitoring
- Fixed speed setting
- Fixed force setting
- End positions monitored
- Positioning at a fixed stop



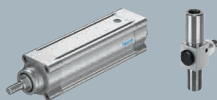
Selection of drive systems at a glance

Pressing
force
0.8 kN

Servo motor
EMMT-AS-60



Drive and force sensor
Electric cylinder ESBF-32
+ force sensor SKDA-0.8



Motor controller
CMMT-AS-C4-3A

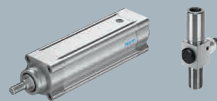


Pressing
force
1.5 kN

Servo motor
EMMT-AS-60



Drive and force sensor
Electric cylinder ESBF-40
+ force sensor SKDA-1.5



Motor controller
CMMT-AS-C4-3A

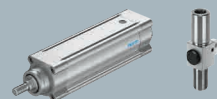


Pressing
force
4 kN

Servo motor
EMMT-AS-80



Drive and force sensor
Electric cylinder ESBF-50
+ force sensor SKDA-4



Motor controller
CMMT-AS-C5-11A

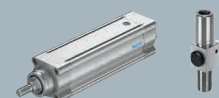


Pressing
force
7 kN

Servo motor
EMMT-AS-100



Drive and force sensor
Electric cylinder ESBF-63
+ force sensor SKDA-7



Motor controller
CMMT-AS-C5-11A



Controller
CECC-X

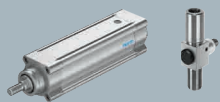


Pressing
force
12 kN

Servo motor
EMMT-AS-150



Drive and force sensor
Electric cylinder ESBF-80
+ force sensor SKDA-12



Motor controller
CMMT-AS-C12-11A

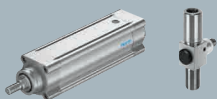


Pressing
force
17 kN

Servo motor
EMMT-AS-150



Drive and force sensor
Electric cylinder ESBF-100
+ force sensor SKDA-17



Motor controller
CMMT-AS-C12-11A



Size



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/whyfesto