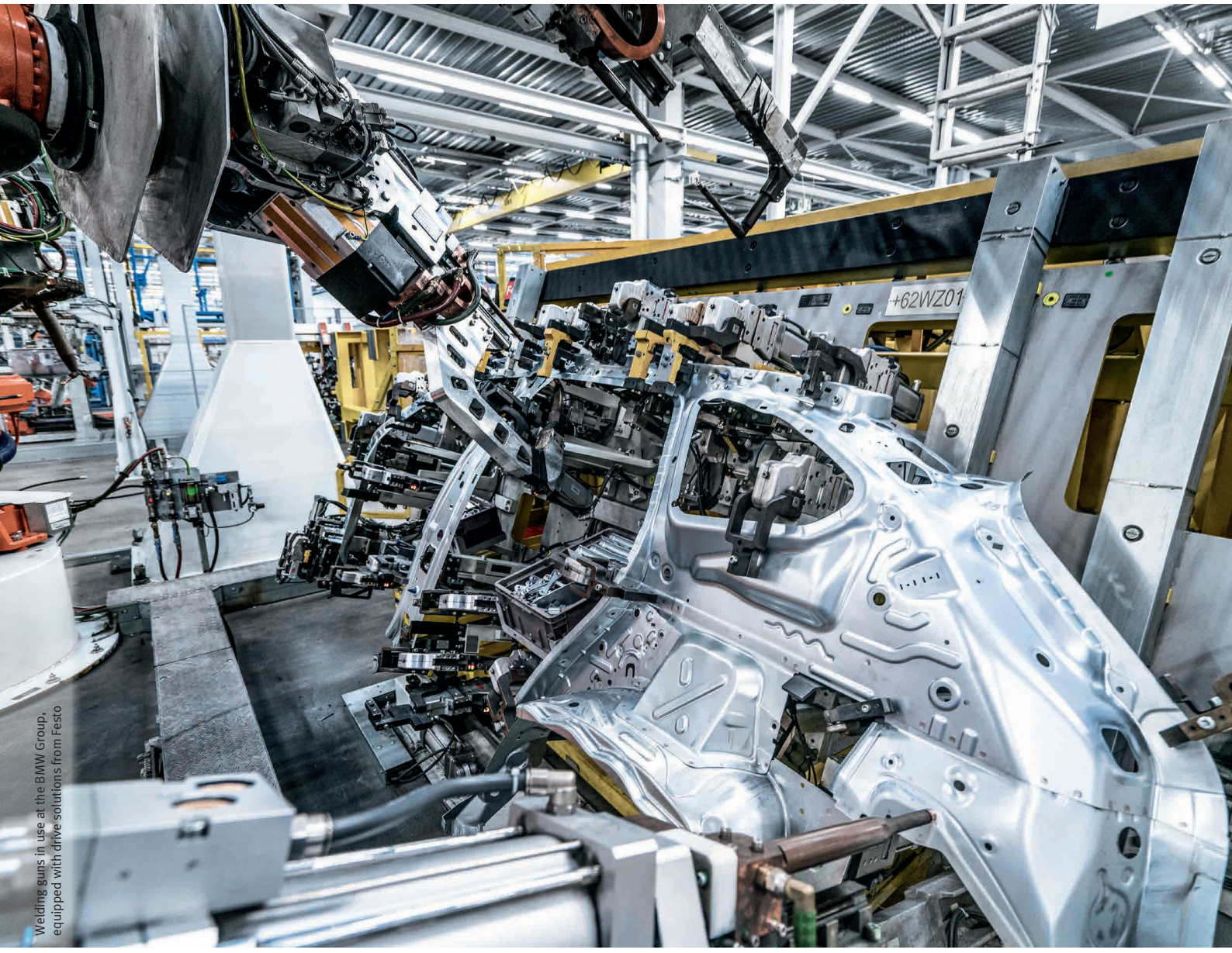
Drive solutions for welding guns



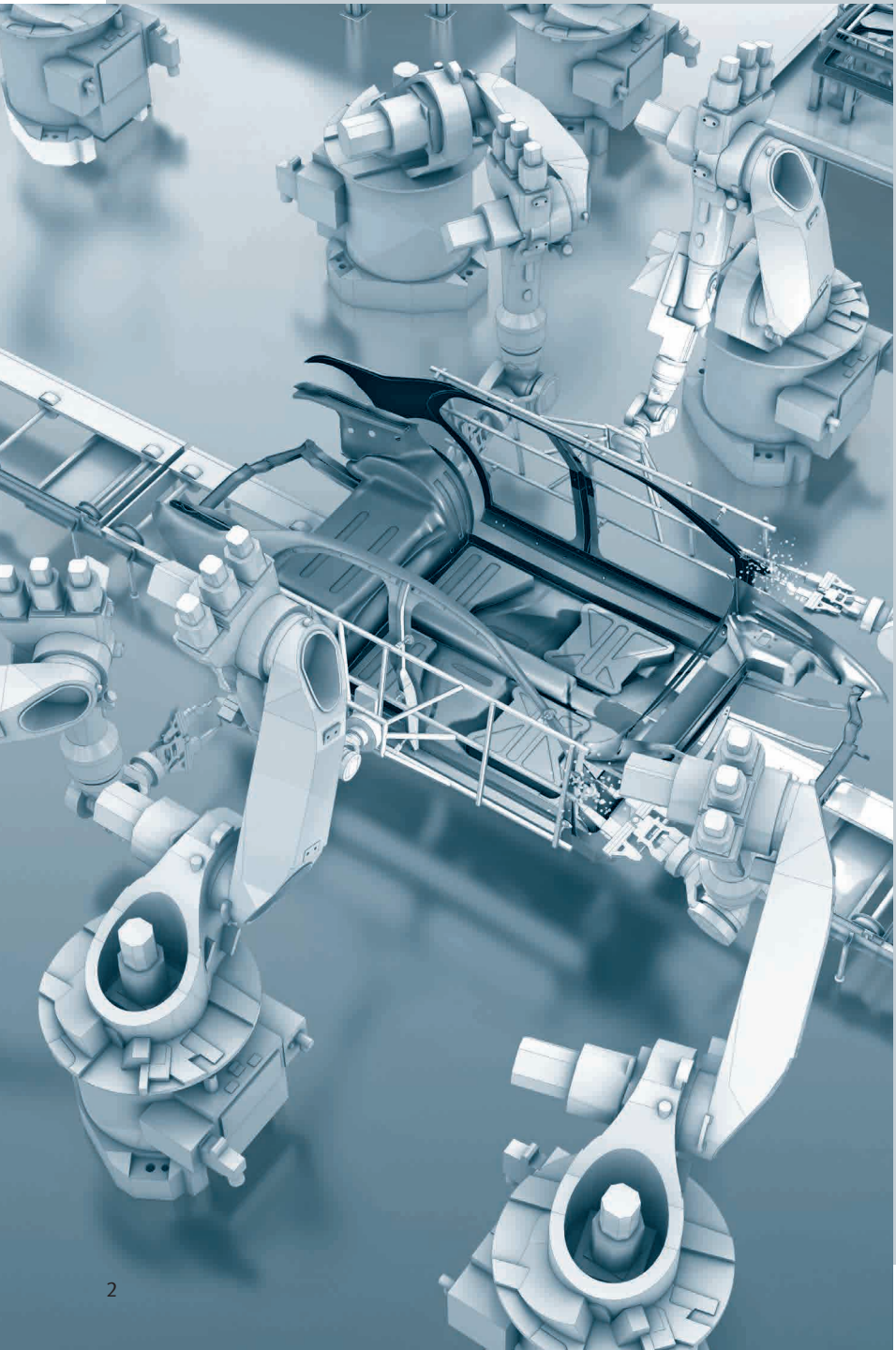
Welding guns in use at the BMW Group, equipped with drive solutions from Festo

Welding requires a high level of precision and quality, something our drive solutions for welding guns are specifically designed for. You decide which is best for you – the X gun or the C gun, servo-pneumatic or electric.

Robust and precise – top quality welding!

Our offer for the best solution

Welding guns need to be precise and reliable in operation, and also have to withstand extreme conditions. It is not just the reproducibility of the spot welds that plays an important role in the quality and efficiency of the welding process; flexibility and speed are just as important.

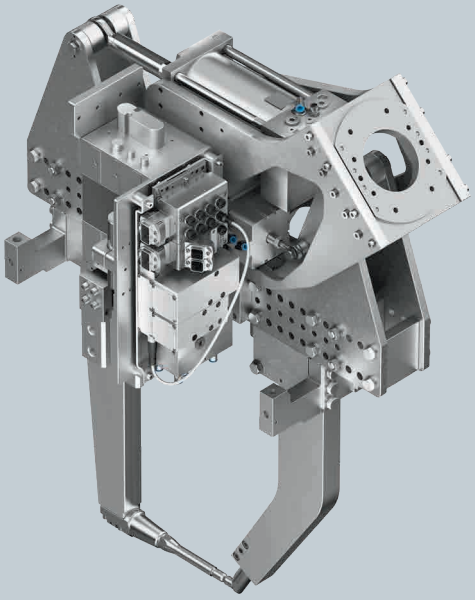


Benefit from the various technologies and achieve the solution that works best for you.

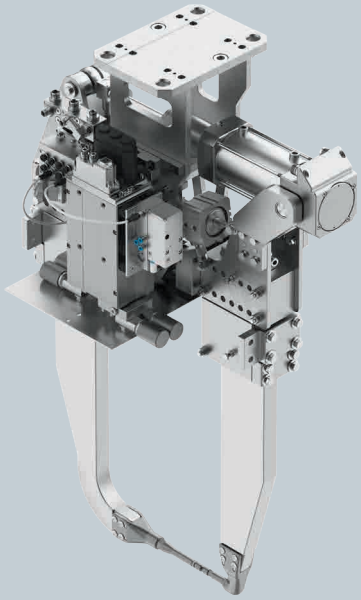
We ensure that your welding guns work properly and are commissioned in no time at all.

This generates requirements that Festo has optimally met with its servo-pneumatic and electric drive solutions for welding guns. The intelligent solutions control welding guns extremely precisely.

Servo-pneumatic drive solution
High speed and dynamic response



Electric drive solution
High energy efficiency for high forces

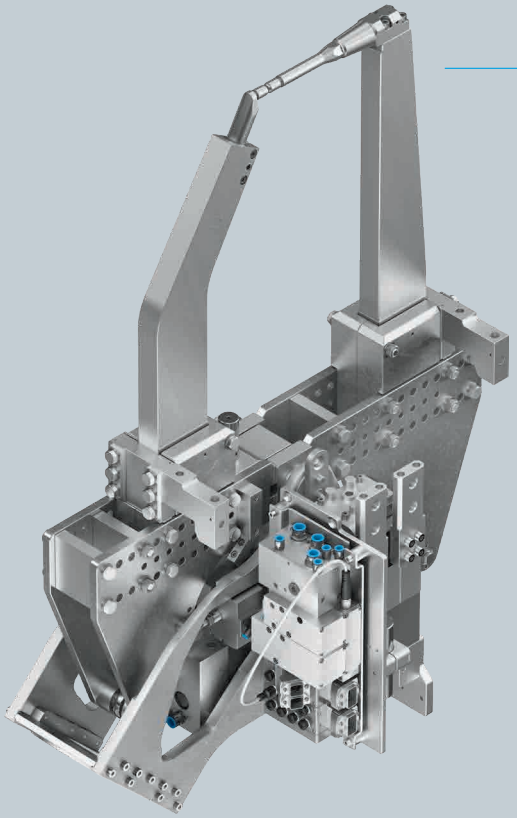


Benefits of both drive solutions

+ **Pneumatic compensation:** reduces the risk of sheet metal damage and shortens the time required for robot programming
+ **Intelligent system components:** enable data exchange with the higher-order controller, monitoring of the processes and displaying in the Industry 4.0 environment
+ **A mix of technologies:** servo-pneumatic and electric welding guns can be easily combined in one welding cell or line
+ **One operating software:** automatically detects the welding guns in a cell during commissioning and maintenance and indicates whether the welding gun in question is servo-pneumatic or electric. The use of one software program for both drive solutions reduces investment and trainingcosts.
+ **Smaller envelope:** highly integrated functions result in a reduced volume and lower weight
+ **Robot-neutral welding gun control:** operates with various robot manufacturers without the need for special software packages
+ **Shortest cycle times:** flexible path curves mean that the welding guns do not have to be fully opened when working around protruding edges.

Intelligent components for high process reliability

The intelligent system components communicate bi-directionally. The data provided enables them to monitor the processes and model them in Industry 4.0. Each component has an electronic rating plate so it can be clearly identified during commissioning and for condition monitoring during operation.



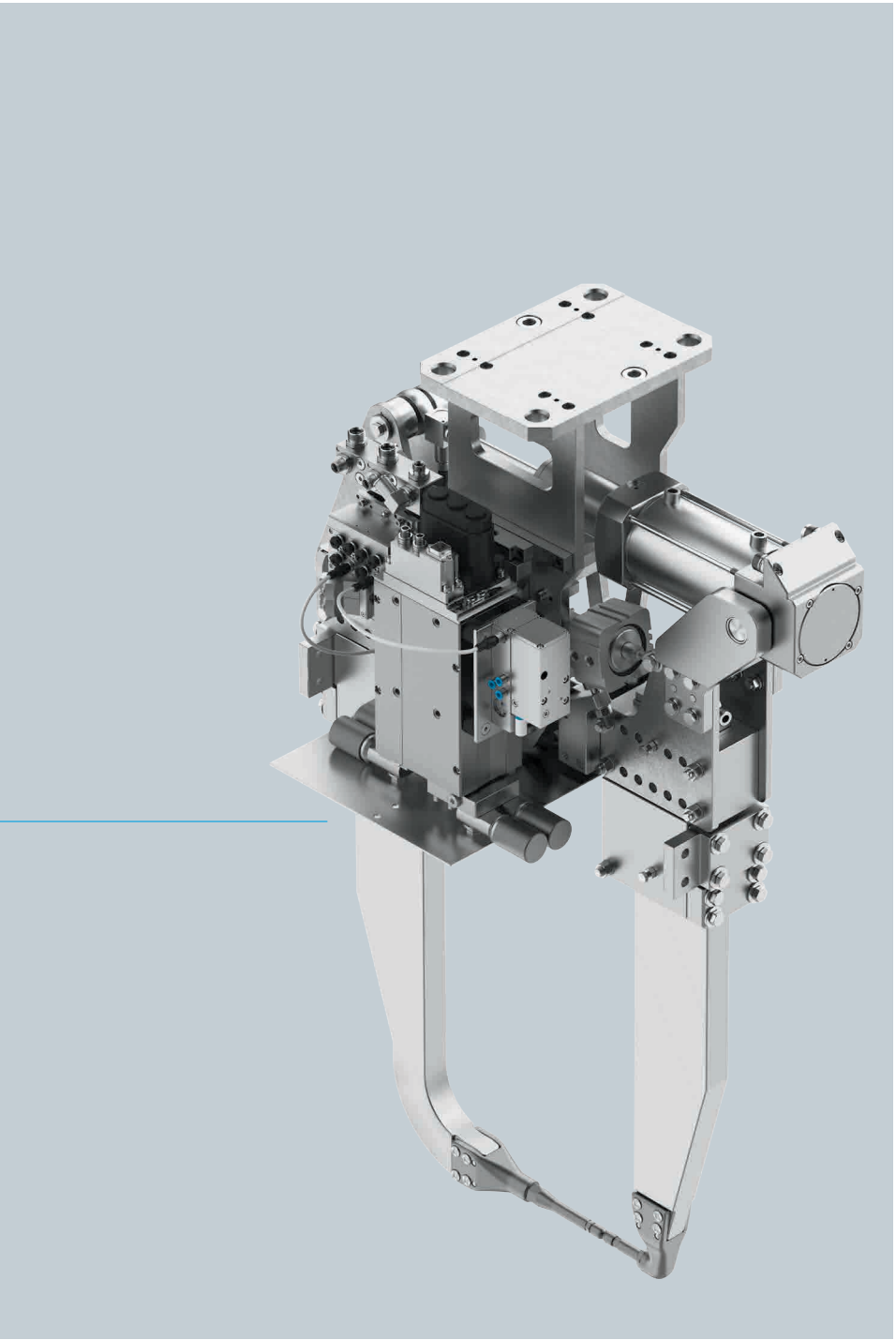
Servo-pneumatic drive solution

- Cost-efficient solution
- High speed and dynamic response
- Robust technology
- Lightweight
- Everything from a single source
- Also suitable for low-pressure networks
- When used in a mix of technologies: preferably with C guns

Electric drive solution

- Energy-efficient solution (especially with high forces)
- Compact design in low-pressure network (compared to servo-pneumatics)
- Compatible with various electric drives
- Innovative drive concept including pneumatic compensation
- When used in a mix of technologies: preferably with X guns

Bus communication between the components ensures that the controller can exchange data with the higher-order controller. During commissioning, the welding gun controller detects all connected components. This means that there is hardly any need to enter parameter data manually – commissioning doesn't get any easier!



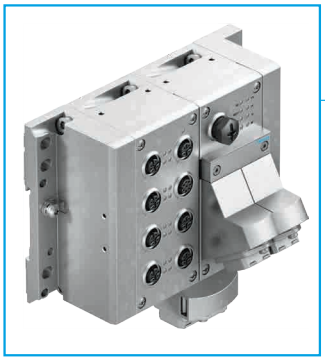
Lifelong data collection
The entire life cycle of the components is permanently saved in each component and can be evaluated if necessary. Operating data such as the distance travelled, the number of strokes, number of spot welds and date of initial commissioning are recorded and errors are stored. For example, a detailed message for an individual component can also be output in order not to lose time when detecting and eliminating faults. Customer-specific communication protocols can be implemented.

The servo-pneumatic drive solution for welding guns

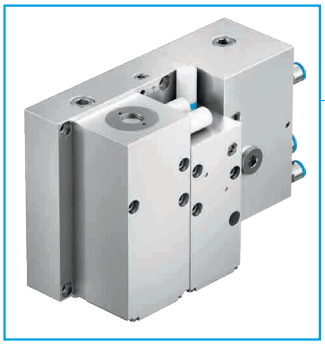
At Festo, servo-pneumatics stands for controlled pneumatic positioning technology that guarantees dynamic response, power and flexibility. With a servo-pneumatic system, a pneumatic drive can move to a preset target position using position control or generate a preset target force using force control – perfect for spot welding.

Fieldbus (e.g. PROFINET)

The robot control system specifies position and force data as setpoint values.



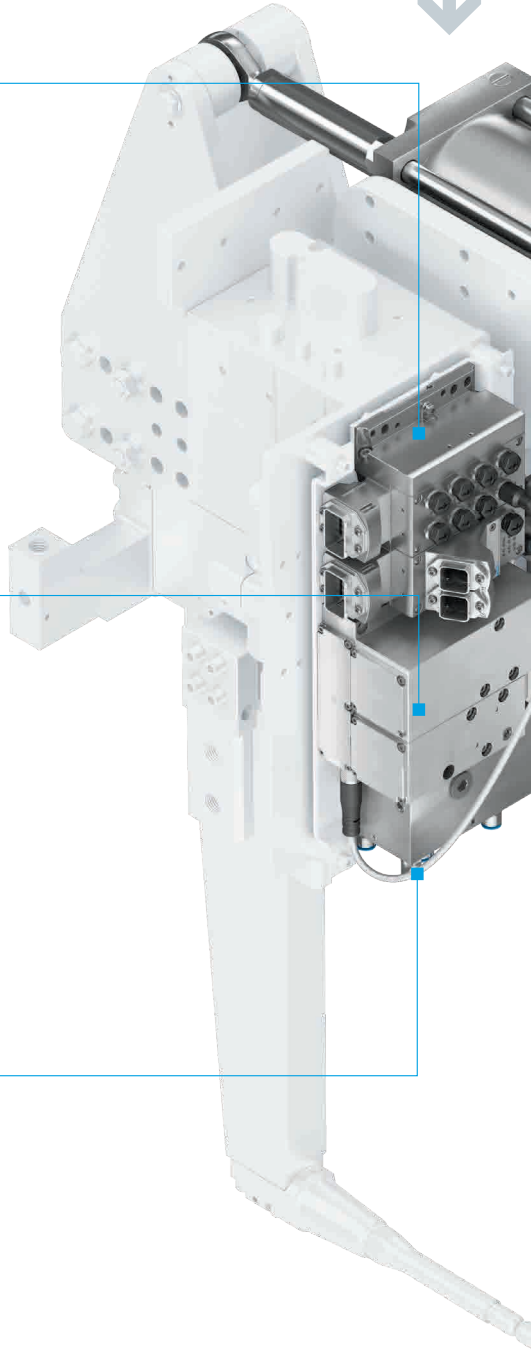
The welding gun controller
is based on a terminal CPX. It establishes a connection to the higher-order welding controller using the fieldbus. Opening widths, forces and error behaviour can be programmed using the welding gun controller. Point-to-point or 7th axis actuation is possible.



The control block
consists of a base plate, proportional valves and sub-base.

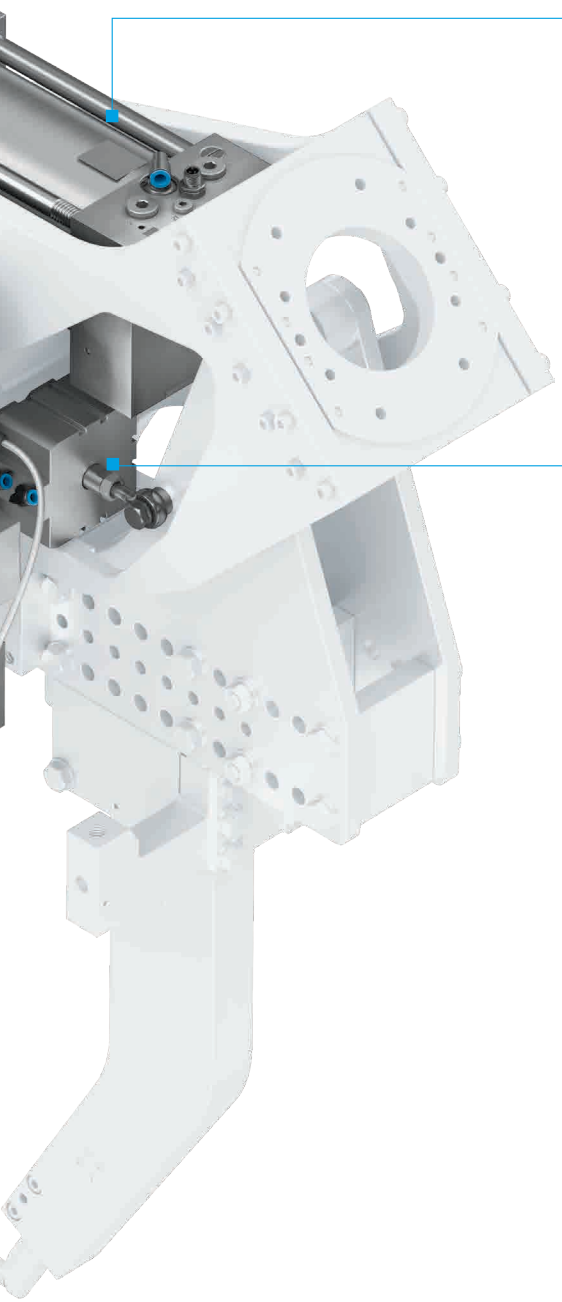
- Closed-loop position and force control for the main drive cylinder
- Closed-loop differential pressure control for the compensating cylinder
- Functions: trapping the cylinder air, air-saving system, 5 µm filter

Matching accessories
like cabling and tubing (welding-spatter resistant)

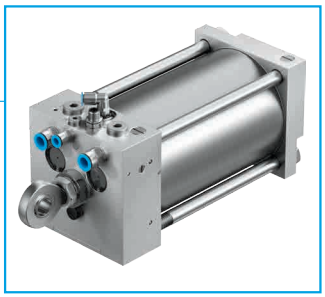


The position and force control helps to increase the quality and reproducibility of spot welds by preventing rebound impact. The spot weld can be made with a customised force. The innovative control concept guarantees forces of up to 24 kN.

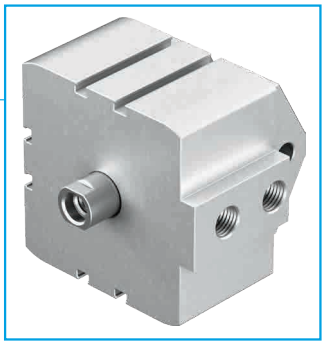
Controller reports back actual measured values for position and force



The double-acting main drive cylinder
features an integrated, contactless, wear-free position sensor for absolute measurement as well as integrated pressure sensors. Available in different sizes.



The compensating cylinder
is a double-acting, space-saving standards-based cylinder to ISO 15552. Available in different sizes.



The operating software Welding Gun Suite
makes commissioning very simple and offers more in-depth diagnostic options during operation.

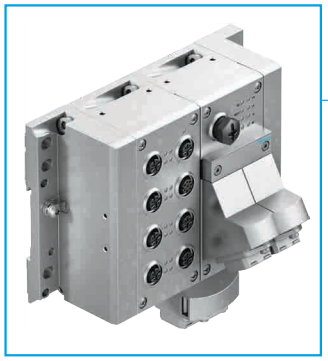
- Fast parameterisation instead of lengthy programming
- Module-orientated diagnostics
- Intuitive, modern user interface
- Overview of all welding guns in the cell/line
- Simultaneous updates of several welding guns

The electric drive solution for welding guns

New production sites and new production lines are usually equipped with a low-pressure network in order to cut energy costs and CO^2 emissions. Our specialists developed the electric drive solution for welding guns specifically for use in low-voltage networks.

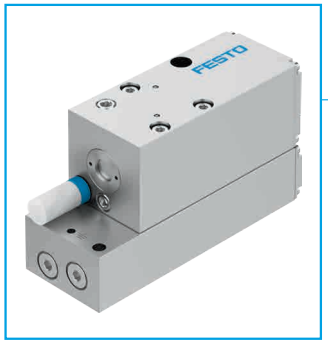
Fieldbus (e.g. PROFINET)

The robot control system specifies position and force data as setpoint values.

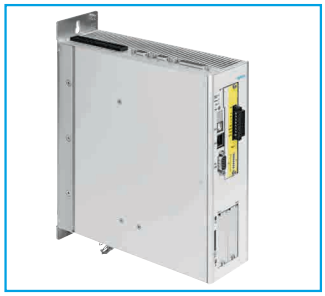


The welding gun controller
is based on a terminal CPX. It establishes a connection to the higher-order welding controller using the fieldbus. Opening widths, forces and error behaviour can be programmed using the welding gun controller. Point-to-point or 7th axis actuation is possible.

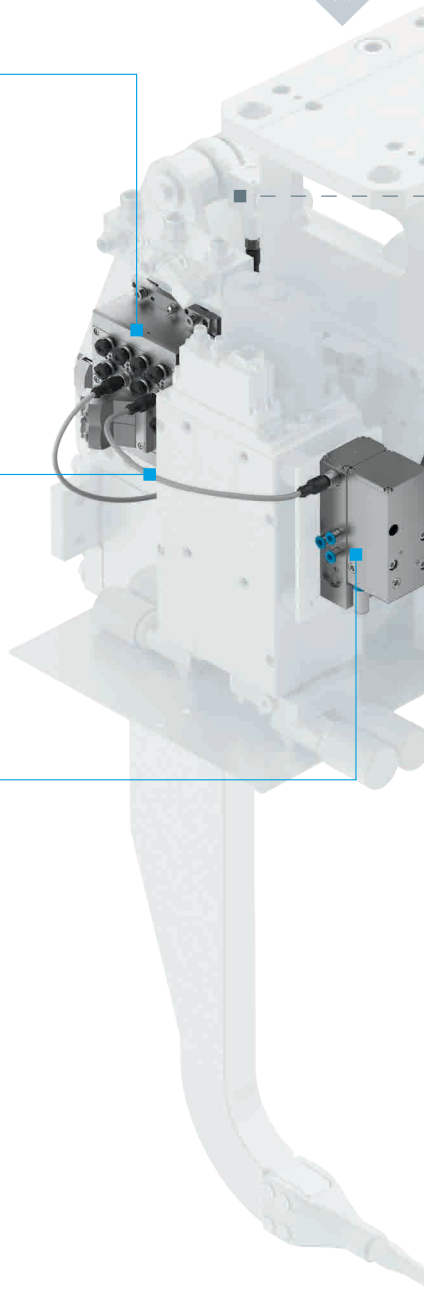
Matching accessories
like cabling and tubing (welding-spatter resistant)



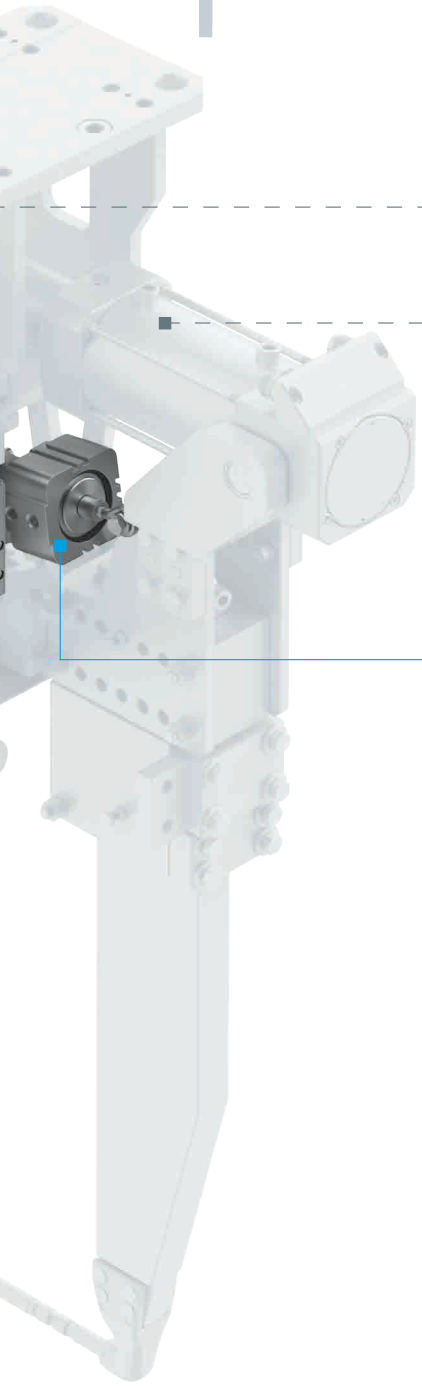
The control block
consists of a proportional valve and sub-base.
- Closed-loop differential pressure control for the compensating cylinder
- Integrated 5 µm filter



The motor controller
controls the electric drive and is thus the link between the welding gun controller and the drive.

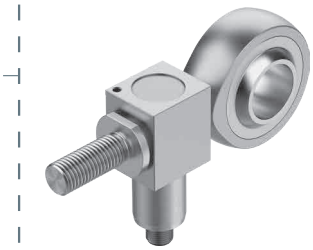


Of course the proven benefits of the servo-pneumatic drive solutions were transferred to the electric variant. Compared with servo-pneumatics, electric drive technology stands for higher energy efficiency since high forces can be achieved without a complex high-pressure network.

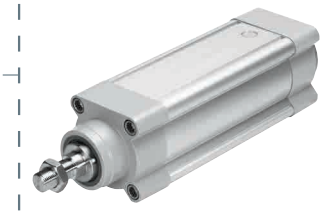


Controller reports back actual measured values for position and force

The force sensor *
ensures that the required target force is maintained.



The electric drive *
is selected in accordance with the customer's requirements.



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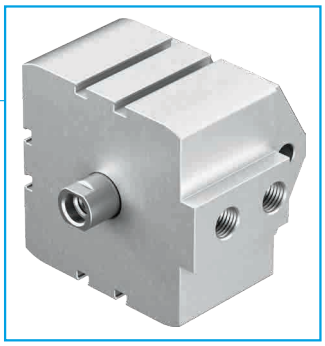

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* Third-party component

Services for welding guns

The “all-round carefree” package for the automotive industry
Looking for solutions to the rapidly rising cost pressure in your industry? With its drive solutions for welding guns and the matching services, Festo as a partner to the automotive industry offers a package that helps to mitigate this cost pressure right from commissioning, but especially during operation. We ensure that your welding guns work properly and are commissioned in no time at all. We can significantly increase the quality of the welding process and the availability of the welding guns through optimum maintenance. Our services help your employees to get to grips with the welding guns right from the beginning, thus minimising downtimes.

Commissioning services

Parameterisation and calibration
- Firmware check/update
- Parameterisation of basic parameters
- Calibration of travel
- Calibration of force
- Setting of acceleration
- Backing up of parameterisation data
- On request: checking the force build-up

Interface setup support
- Support in setting up the robot interface for the first time
- Optional: optimisation of the entire system, e.g. minimising sheet metal stress, force build-up, cycle times, etc.

Services during operation

Preventive maintenance
- Inspection of the system components
- Replacement of worn and defective parts
- Cleaning of components, degreasing of the piston rods
- Functional check of components

Want to commission and maintain your welding guns yourself?

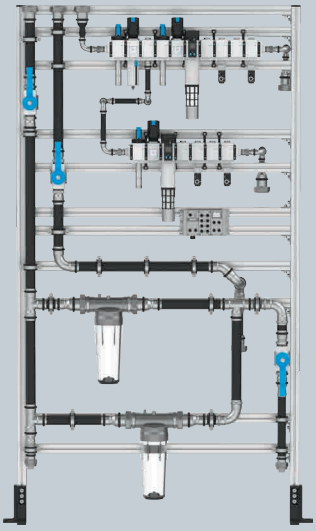
Our training courses build on many years of valuable, applied knowledge and pass on that knowledge to you and your employees. We train your operators and maintenance staff in how to professionally commission, operate and maintain the welding guns. The training content is tailored to your needs, and ranges from the fundamentals of servo-pneumatics to advanced software and diagnostic functions.

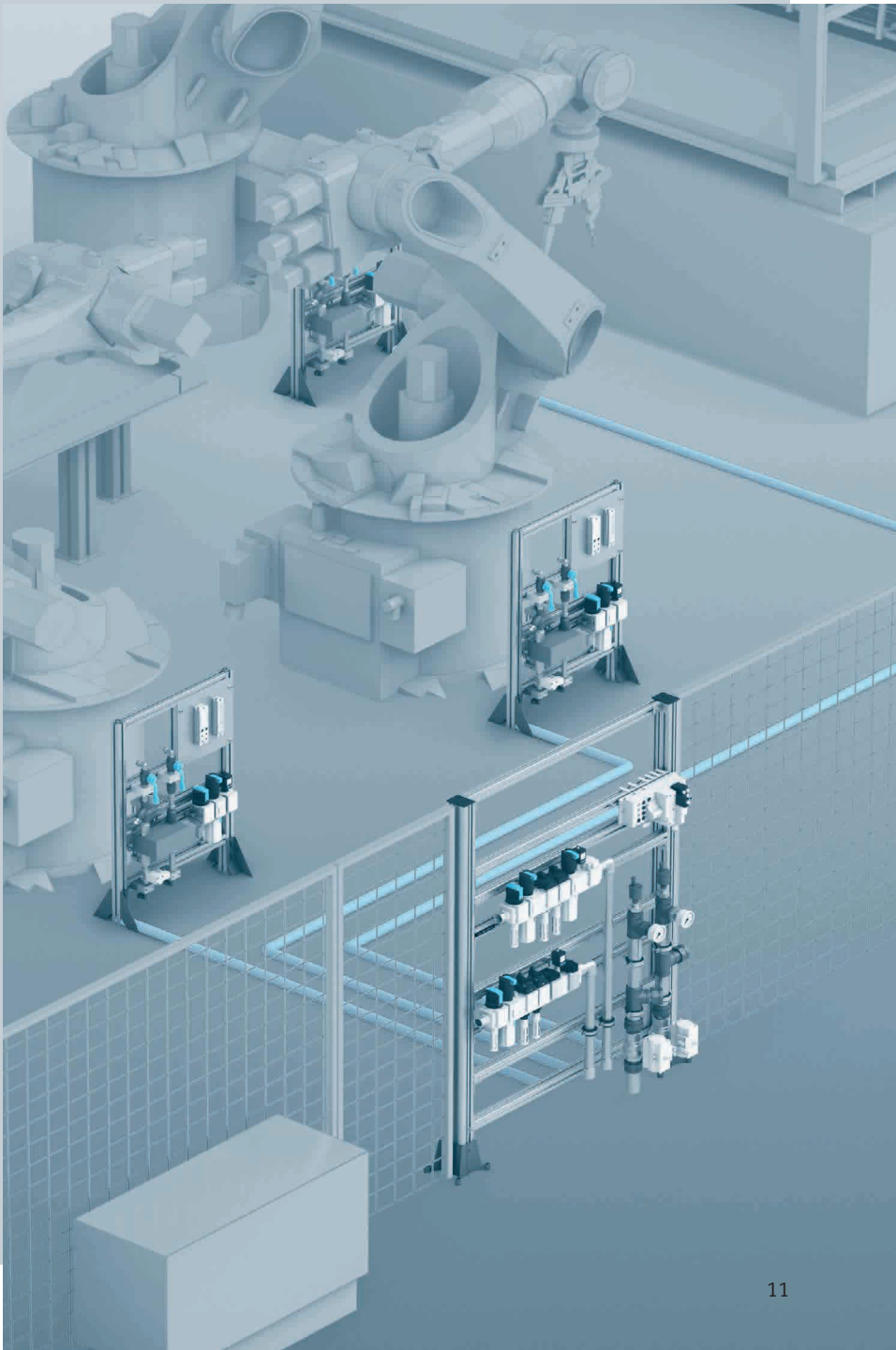
Worldwide competency
Festo national companies in over 60 countries guarantee global availability of know-how, support and spare parts.

A well-thought-out welding process from start to finish

Regulating and monitoring the compressed air and cooling water supply in the welding process
Welding with pinpoint precision is the result of a complex control process. This starts with the optimum supply of compressed air and cooling water. Using their knowledge of factory and process automation, our experts have thought through the entire process and developed further solutions. The result is ready-to-install complete solutions for reliably and efficiently regulating and monitoring the compressed air and cooling water supply of individual welding robots or entire welding lines. They can be perfectly integrated into your production environment.

And don't forget, at Festo you get everything from a single source: from configuration of the hall and robot installation plates to construction and testing to complete documentation. All as one package with just one part number. Globally manufactured, tested and delivered. This saves time and money. And it gives you a significant competitive edge right from when you place your order and start project implementation.





Johannes Berwanger
Expert Joining Technologies

“Festo has been working on the automated welding process for decades. As well as the proven servo-pneumatic drive solutions for welding guns, we also offer energy-efficient electric variants. No matter where your production is based, we will support you worldwide with our expertise. Get in touch with us!”

You rely on expertise.
You want to free up time for your core competencies.
We will help you get ahead with our ready-to-install solutions.

→ WE ARE THE ENGINEERS OF PRODUCTIVITY.

136078 de 2020/11 – Errors and omissions excepted