Highlights 2010/2011
Partner for Success

**Added value**
Reduce costs, ensure quality – with simpler solutions

**Biomechatronics**
Future in motion

**Services**
100% system availability, implemented cost-efficiently

**Mechatronic Motion Solutions**
One platform for the whole world of automation

**Safety**
Quite simply safer – with the new machinery directive

**Didactic**
Training and consulting – first-hand industry know-how

**Electrical terminal CPX**
Integrates a large number of technologies: the new centre for the entire control sequence
Overcoming the economic crisis together – and creating added value!

As hard as the economic crisis may have hit machine construction and its related sectors, it does have one inherent benefit: it focuses the mind on what’s important and shows who the real partners of customers are.

That’s why many companies have become – and remained – our customers. Because the two things that the crisis has made blatantly obvious is that firstly, Festo is the ideal partner for its customers and secondly, we offer vital added value:

• As a family business and reliable partner today and in the future.
• Through true problem solving processes that support the client.
• With a well thought-out, rigorously pursued quality and portfolio policy: everything from a single source.
• With a range of services for maximised system availability that represents a benchmark worldwide.
• In the vanguard of technological development with biomechatronics.

You’ll find some of these benefits presented in this brochure, but can learn far more from our sales engineers during a face-to-face discussion.

Dr. Eberhard Veit
Chairman of the Management Board and
Member of the Management Board Technology
and Market Positioning of Festo AG
Focus on efficiency: intelligent automation

- Simply added value – reduce costs, ensure quality
- Mechatronic Motion Solutions – exceptionally compatible
- More economical: the integrated automation platform CPX
- Simpler, safer, more economical: your partner for safety technology
- Greater system availability – through an extensive range of services
- Technology inspired by nature: biomechatronics
- Benefit from training and consulting: Festo Didactic

Drives

**Pneumatic drives**
- Round cylinder DSNU-PPS with self-adjusting cushioning
- Stainless steel round cylinder CRDSNU
- Clean Design standard cylinder DSBF
- Guided drive DGRF
- Radial gripper HGRT
- Long-stroke gripper HGPL
- Sealed parallel gripper HGPL
- Sealed three-point gripper HGDD
- Bellows gripper HDEB
- Mini slide DGSC

**Electric drives**
- Electric mini slide EGSL
- Electric axis ELGR
- Linear motor axis ELGL-LAS with air bearing
- Electric linear motor cylinder DNCE-LAS
- Guided linear motor cylinder DFME-LAS
- Electric short-stroke cylinder ADNE-LAS with integrated linear motor drive
- Servo motor double controller CMMD-AS
- Robotic controller CMXR-C2
- Rotary lifting module EHMB
- Swivel module DSM-T-B with tandem vanes

Valves and valve terminals

**Electrical peripherals on CPX**
- CPX-CEC CoDeSys-integrated controller for CPX

**Servopneumatics**
- Positioning controller CPX-CMAX for pneumatic drives
- Soft Stop CPX-CMPX for pneumatic drives

**Valve terminals**
- Analogue input module CPX-4AE-P with four pressure sensors for CPX
- Hood CAFC-X1-GAL for CPX
- Valve terminal MPA-L
- Standard valve terminal VTSA

**Valves**
- Standard valves VSVA with M12 central plug connection
- Proportional pressure regulator VPPM
- Compact valve series VUVG
- Valve terminal VTOC
- Valve for medical applications MHA1

Product range extensions and add-ons
Compressed air preparation and connection technology

Compressed air preparation
42 MS6 service units: fine, micro filter and activated carbon cartridges MS6-LFM-...HP
42 MS service units: new size MS9
43 Pressure regulator MS12-LR-G-PE6 with integrated proportional valve VPPE

Vacuum technology
43 Vacuum generator OVEM

Pneumatic connection technology and control elements
44 Pneumatic control elements VF0F/VBQF/VBNF
44 Velcro fastener NPAW

Product range extensions and add-ons

Electronic systems

Image processing
46 Intelligent Compact Vision System SBOC-Q/SBOI-Q

Control technology
46 Graphical display and control units FED 300 ... 5000

Sensors
47 Position transmitter SMAT-8M
47 Position transmitter SMT-/SME-10M

Product range extensions and add-ons

Services

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Process automation

50 Directly actuated process valve VZWD
50 2/2-way valves for process automation VZWP
51 2/2-way valves for process automation VZXF, VZWF
51 Sensor box SRBF

Didactic

52 Electric drive seminars
52 Safety engineering seminars
53 Process automation seminars

Industries

54 Everything from a single source – automation know-how for numerous industries
Optimise your machine concepts and process sequences by means of simpler automation solutions.

Innovation can be that easy. Simpler solutions are a tried and tested way of reducing costs without compromising on productivity. To come up with a strategy for simpler solutions, we looked at machine concepts and the associated process sequences with leading users. The result is a significant improvement in the relationship between input and output in many lead users’ systems – without any losses in quality.

**Added value through innovative pneumatic components**
That combines, for example, the compact valve VUVG and the exceptional PPS cushioning for round cylinders.

**Added value through reduced overall costs (TCO)**
Reduce your overall costs (TCO) across the board with our supporting services. From engineering through procurement and commissioning to operation.
Best in class!
Compact valves VUVG

Limitless in use: for all compact, cost-effective solutions with high flow rate.
- Increase in flow rate of up to 100% for higher productivity combined with minimal space requirement
- Easy to install, e.g., electronics box is attached to the valve with just one click
- Powerful and durable thanks to the patented cartridge principle
- Multiple pressure zones possible and easily achieved

Unique in the world: cushioning system PPS
For round cylinders DSNU: self-adjusting pneumatic cushioning – PPS for short.
- Simply get started: no need for manual adjustment during installation and operation
- No stick-slip effect: optimum cushioning even with changes in load and speed
- Standard DSNU or in stainless steel

Reduce process costs: Festo Online Shop Edition II is here!
Reduce your ordering and warehousing costs and know that the quality of your processes will be right – or even improve.
Our added value for your success:
- Eliminate complicated process steps
- Complete overview of all orders
- Continuous availability (24x7)
- Project work online, without waiting times
- Error-free order processes

Easy and reliable procurement thanks to the following steps:
1. Log (re)orders in the warehouse by means of barcode scanner
2. Easy importing of the data into the online shop
3. Availability, delivery time and price can all be checked
4. Fast and free ordering and tracking
5. Fast and reliable delivery

More: www.festo.com/onlineshop

Savings potential thanks to PPS cushioning – an example
A system for sorting packages consists of 60 stations, each with one round cylinder DSNU. Assembly and setting are shortened by 5 minutes per cylinder: 300 minutes in total; saving of 5 working hours. Just install and get started.

For products related to the topics see
- Round cylinder DSNU-PPS with self-adjusting cushioning: page 22
- Compact valve series VUVG: page 38
- Service units MS9: page 42
- Pneumatic control elements VFOF/VBQF/VBNF: page 44
**Mechatronic Motion Solutions – exceptionally compatible**

Unique in the world: a platform strategy with free combination of technologies. Key advantage: the right solutions for reliable, economical automation.

Linear and rotary movement, vacuum applications, gripping and control: Mechatronic Motion Solutions combine components, modules and systems for all types of automation solutions, whether pneumatic, servopneumatic, electric or a mix of these. Software solutions are included. The integrated automation platform CPX and motion control make for an extremely compatible combination.

The simultaneous development of mechanical, electrical and electronic components as well as software decisively shortens engineering and market launch times. Rapid commissioning and increased process reliability in operation ensure a fast return on investment.
Electric drives – variety, precision and dynamics
“Different motors, controllers and axis mechanisms make the variety of electric drives almost incomprehensible. Whether highly precise in the μm range or extremely dynamic, with different load classes and mechanical dimensions, different drive technologies and specific attributes, the only way to handle the complexities of selection and design is with intelligent software and a coordinated component system.

Not only does Festo have the right knowledge needed for this, it also has the ideal software packages. The right interfaces also make the solution simple, reliable and tailored to the application – even with complete 3D systems integrated in existing control hierarchies.”

Together towards a solution: partnership in mechatronics
The system at the company MüKo inspects cast channels in an aluminium sub-base, screws in terminals and mounts electric plug connectors – all in the smallest of spaces. The complex requirements can be easily and reliably translated into a 3D structure by combining electric and pneumatic components and the coordinated interfaces in the hardware and software.

Siegmar Koblitz, Sales and Design Manager: “Everything from a single source and everything fully harmonised: drives, motors, controllers and grippers, even the vision system that checks the aluminium sub-bases … we were able to rely completely on Festo’s PositioningDrives software when it came to designing and sizing the electric axes.”

Electric linear motor cylinder DNCE-LAS
• Highly dynamic
• Pre-assembled complete system
• No strong magnetic fields

Servo motor double controller CMMD-AS
• Independent control of 2 servo motors
• Outstanding economy
• SD card slot

Electric slide EGSL
• Freely positionable
• High repetition accuracy
• Precision and resilient guide
• Flexible motor attachment

Handling system overview
More economical: the integrated automation platform CPX

Function integration sets new standards: the automation platform CPX is the new standard – and the answer to special requirements.

For you, this means more integrated and economical solutions from a single source. That’s because Festo’s integrated automation platform combines many different technologies that were previously separate and can now be integrated on one platform:

• Electric and pneumatic components – combined with motion control.
• Proportional pneumatics and servopneumatics – on one platform.
• Safety technology – with cut-off concepts up to performance level d (Cat. 3) that can be realised immediately.

With an integrated controller, diagnostics concept and web monitor and various IT services on-site a seamless integration into existing control concepts is assured. More than 10000 successful applications in factory and process automation and numerous references worldwide demonstrate: CPX stands for the future of automation.
Diverse in use
The integrated automation platform CPX is unbelievably diverse in use: directly in the field, in IP65, with control cabinet, etc.

Handling: loading and unloading, CPX controls a mix of technologies consisting of standard and servopneumatics as well as electric drive technology.

Robert Bürkle GmbH specialises in press and coating technology. The contact pressure of the gravure cylinder doctor blade has a considerable influence on the quality of the printed product — and is precisely regulated by means of proportional pressure regulators from Festo.

Festo: The introduction of new technologies is often a critical phase. What do you expect of your partners during this phase? Sascha Lämmle, design engineer at Robert Bürkle GmbH: I expect suggestions for solutions, including technical ones. The integration of proportional technology on a valve terminal is a good example of this. Later, during assembly and commissioning, Festo’s services help us to get everything installed faster and to deliver to customers on time.

B+R Maschinenbau GmbH in Königswinter-Oberpleis uses Festo’s proportional directional control valves VPPM-mpa with CPX for customer-specific solutions for heating-element welding of blow-moulded fuel containers made from plastic. The right welding force is critical for the quality of the containers.

B+R Project Manager Dipl.-Ing. Mike Botsch: “We developed this servopneumatic axis together with Festo. What were important issues for us were high speeds and the precision force control that helps when it comes to joining.”

B+R: Effective control helps us to ensure, monitor and document the quality.”

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CPX-CMPX Soft Stop on CPX ............................... 35
CPX-CMAX servopneumatic positioning system ........... 34
Standard valve terminal VTSA ............................ 37
Add-ons, valves and installation technology for MPA ....... 41
Leading manufacturers in machine construction implemented the new machinery directive and the associated EN ISO 13849-1 in pilot projects back in 2009. The first real-life solutions give grounds for optimism: a proper approach makes the new standard easier to implement.

The reasons for this are simple: the safety assessments of electric, pneumatic and mechanical components are being performed in an integrated manner for the first time. This standardisation also has an effect on the uniformity of the procedure and so makes evaluating the safety class easier.

Having Festo as a partner for safety technology makes it even easier as Festo has predefined the 10 most frequent safety functions. This helps to achieve the current safety objectives without any difficulty.

It also establishes integrated safety concepts that not only increase protection for people, but can also increase the productivity of machines.
15

Enclosures and so-called “power operated doors” provide workers with reliable protection from dangerous production processes.

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New approaches – 10 typical safety functions
Use Festo’s solution package for easy compliance with the necessary performance level to EN ISO 13849-1. The package also includes the bundled data for evaluation to EN ISO 13849-1 and certification by a trade association.

Safety from a single source
The 10 safety functions shown below can be defined and realised using the following four operating modes:
• Initial position/standstill
• Normal operation
• Set-up and service operation
• Emergency operation
Details about these functions as well as about safe circuits and components from Festo can be found in the “Safety Engineering Guidelines”.

Machine safety doors:
• Faster and safer

Enclosures and so-called “power operated doors” provide workers with reliable protection from dangerous production processes.

Machine safety doors have to open and close quickly to minimise unproductive idle periods – and at the same time meet the high safety requirements of the new machinery directive.

An example of an integrated safety solution combining mechanical and pneumatic components are the safety doors from Strasser Maschinenbau GmbH. A valve manifold, developed in close cooperation with Festo, that drives the safety devices with top speeds of up to 3 m/s and fulfils all relevant safety requirements. The design fits perfectly with the patented MecLock system from Strasser, a mechanical contact strip that blocks safety doors if there is the least contact.

Soft-start and exhaust valve
• MS6-SV
• Certified to EN 954-1 Cat. 4, ISO 13849-1, PL “e”
• AS-interface Safety@Work bus interface on request

Customer-specific complete solutions up to max. PL “d”
• Two-handed operation as a ready-to-install solution
• Safe venting
• Safe reversing
• Safe pressure reduction

Safety on the valve terminal VTSA
• Valves with special safety functions/switching position sensing
• Integrated two-channel solutions for “Safe venting/reversing” and “Protection against unexpected start-up” up to PL “d” (Cat. 3)

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Maximum system availability – through an extensive range of services

As unique as your fingerprint: services for machine operation, individually tailored to your needs.

The focus during system operation is on economy and 100% availability. Our range of services is precisely tailored to this. Our on-site technical customer service as well as our spare parts and repair service guarantee fast assistance. And our Energy Saving Services and Modernisation or Condition Monitoring Service create energy and cost-saving systems with cutting-edge technology.

The service contracts for preventative maintenance deliver maximum system performance and reliable production processes. Use the exceptional knowledge of our specialists worldwide and benefit from maximum service quality.
Energy efficiency as a service

“We use Energy Saving Services in our production plant in Berkheim. First we analysed the entire compressed air supply and checked all the systems for leaks. The result was approx. 500 leaks with a loss of about 3300 l/min in a production area of around 15000 m². With an average price of 2.5 cent/m³ for compressed air, we’re saving €42000 per annum – approx. 13 % of our overall costs for compressed air—just by getting rid of the leaks.

In a second step we’re planning to analyse and optimise non-energy-efficient applications. And we’ve integrated the Energy Saving Services into our maintenance concept to guarantee the savings achieved in the long term.”

Festo Energy Saving Services – the tailor-made service package for users of compressed air. This will help you to achieve the maximum savings potential with compressed air.

Advantages:
• Decreasing energy costs
• Increasing production capacity

The result is a cost saving of up to 60 % and increased productivity.

The modular structure enables you to tailor the service package to your needs. You’ll find further information in the “Energy Saving Services” brochure.

and in the Internet under http://www.festo.com/cms/de_de/Energy_Saving_Service.htm.


Excerpt from the commendation:
“Mechanical engineering is a vital part of the economy of Baden-Württemberg. Festo has recognised the signs of the times and through its Energy Saving Services is helping to further extend our international technological leadership to include energy efficiency. A clear gain for the environment and a worthwhile investment for individual users”, says Environment Minister Tanja Gönner, commenting on the jury’s decision.

Anton Thomaser
Head of the Global Production Centre in Berkheim

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Energy Saving Services ................................. 47
In its role as a learning company, Festo systematically researches the principles of natural movement and transfers them to biomechatronic applications in the Bionic Learning Network.

There are four stages on the path to a bionic system: identifying, evaluating and analysing the biological principles, then translating them into basic technical principles. The bionic adaptation is then applied to the technical application, often with movement patterns and drive concepts that are (r)evolutionary.

New materials and production methods such as rapid manufacturing, for example, open up new perspectives. Only minimal resources are required for construction and manufacturing, which is good for the environment, while the low weight of the moving system components significantly reduces energy consumption. And it’s fast: a wide range of workpieces can be manufactured and supplied overnight, and at costs that make them suitable for everyday use.
**The Bionic Handling Assistant**

After many years of research into combining the principles of bionics, mechatronics and robotics, Festo has succeeded for the first time in developing a naturally light, mobile and resilient tool: the prototype for a Bionic Handling Assistant.

It looks like an organic structure. It is sleek and energy-efficient, it can execute any 3D movement and can even change its linear expansion.

The astonishingly low weight of only 3 kg enables the Bionic Handling Assistant to offer a load/effective load ratio of 4:1, including the ability to change its length. And the system always remains highly mobile.

The new and unfamiliar flexibility and resilience of the entire structure impresses even when it comes into direct contact with people or fragile objects. The Bionic Handling Assistant responds flexibly to collisions so that no injuries occur and it does not have to suspend its activity.

This inherent system safety creates the prerequisites for direct and safe human/machine cooperation for the first time.

**Front End: FinGripper**

The actuating front end of the Bionic Handling Assistant forms a handling unit when combined with Fin Ray Effect®: its gripping function is both adaptive and positive-locking and it moves almost all object shapes safely, gently and auto-adaptively.

A 30-degree deflection of the integrated wrist axis offers further 3D freedom.

The Bionic Handling Assistant already has possible applications in different areas:

1. Industry and workshops
2. Agricultural technology
3. Private households and educational institutions
4. Medical technology

**Modular Lightweight Handling**

Reducing the moving load for energy-saving operation, full robotics functionality and low costs were top priorities when designing this lightweight robot. It provides an alternative to large industrial robots, whether for training purposes or for applications that do not require complex functionalities.

Its delicate structure and lightweight construction are surprising. The robot can be extended from a single-axis to a six-axis kinematic system thanks to its modular design. The robotics controller CMXR combined with minicontrollers directly at the modules also significantly reduces the moving load and the cable harness needed.

The front end is flexible and can be quickly changed: an adapter plate with bayonet lock permits many applications with a wide range of gripper types and vacuum applications as well as bit or tool holders.
Benefit from training and consulting: Festo Didactic

Benefit from the synergies afforded by Festo Didactic's proximity with industry and its training expertise.

Festo Didactic is a world leader in industrial basic and further training. As a provider of training for production and process automation, its offering includes equipment for basic and further educational institutions as well as training and consulting.

Consistently geared towards added value

40 years of experience in the area of training and 20 years in process optimisation and consulting means we have experienced trainers and consultants and the right set-up to increase your employees' and your company's success – sustainably and verifiably.

In the ideal scenario, training and consulting are combined to produce sustained process optimisation, as the example of the HUBER Packaging Group shows.
HUBER Packaging Group
The HUBER Packaging Group wanted to build a company-specific production system for process optimisation. It chose Festo Didactic because of its integrated approach to training and consulting.

The procedure in the change process
Business game – value stream analysis – employee training – auditing

The result
• Shorter throughput times
• Reduced stocks
• Lower production costs
• Improved delivery capability

The company worked with Festo to work out the approach. The plan? To combine process optimisation and employee development. From a business game, geared towards the products, the everyday production, the company culture and the subsequent value stream analysis, they developed the structure for the project “Huber Production System (HPS)”, which was used to train HPS specialists using real problems from everyday production scenarios.

From theory to practice
Working in teams on-site, the employees analyse work processes, clarify requirements, develop measures for improvement and translate these into practice. The high level of acceptance shows that it is worth involving everyone in the change process.

Great prospects
The project has now gained considerable momentum and internally trained moderators have assumed responsibility for implementing the change process. Festo Didactic is still giving advice to the HUBER Packaging Group. “We have to keep checking our progress. If we’re on new ground or we’re stuck with something, we fall back on Festo Didactic’s experience”, says Wolfgang Merkle, Factory Manager at HUBER Packaging.

Strategic objective:
ISO certification
With HPS, the HUBER Packaging Group also worked out criteria to obtain the internationally recognised quality standard ISO certification DIN EN ISO 9001:2000. Festo Didactic assisted the company during the development and application. The certification system looks at the entire process:
• Customer orientation
• Management responsibility
• Integration of the people involved
• Process-oriented approach
• System-oriented management approach
• Continuous improvement
• Fact-based decision-making approach
• Mutually beneficial supplier relationships

This certification is a strategic decision; it safeguards and creates competitive advantages through consistent customer orientation.

HUBER Packaging Group GmbH & Co. KG
Öhringen, Baden-Württemberg/Germany
Products: metal packaging for chemical/technical filling materials, dyes and paints as well as foodstuffs, drink and tobacco
www.huber-packaging.com

Additional information
Seminars on pages 50–51
Learning systems: www.festo.com/didactic
Training and consulting: www.festo-tac.com
www.festo-tac.de/maschinenrichtlinie
Unbeatable in its own performance class: round cylinder DSNU-PPS with self-adjusting pneumatic cushioning. Reduced installation time and easier assembly result in enormous time savings – and the cylinder is always perfectly adjusted. It advances dynamically, but gently, into the end-position without any manual intervention.

Benefits
• Self-adjusting for constant, ideal settings even with changing loads and/or speeds
• Unintentional adjustment is entirely excluded
• Also available as CRDSNU-PPS stainless steel cylinder

A sample calculation of the potential savings with PPS cushioning:
An installation for sorting packages consists of 60 stations, each with one DSNU round cylinder, making 60 cylinders in all. This saves up to 5 minutes in installation and set-up time per cylinder. Given that a total of 60 cylinders are installed, the total potential savings are 300 minutes or 5 working hours.

Easy-to-clean stainless steel cylinder range with numerous mounting options and a large assortment of variants. The latest generation of the CRDSNU is distinguished by innovative technological solutions, for example the completely redesigned, extremely durable, dry-running seal and self-adjusting cushioning which makes the use of flow controls entirely superfluous – and makes for exceptionally easy cleaning!

Benefits
• Modular cylinder system with many variants
• Dimensions largely to ISO 6432
• Designed out consistently in accordance with clean design criteria
• FDA approved lubrication and seals in the basic variant
• Good corrosion resistance even under aggressive ambient conditions
• Long service life with optional dry-running seal
• Quick replacement of the piston-rod scraper via split bearing cap
• Available with self-adjusting PPS end-position cushioning

Ideal for use in the food zone thanks to easy-to-clean stainless steel
Clean Design standard cylinder DSBF

Ideally suited for use in applications in the food, beverage or packaging industry: easy-to-clean cylinder DSBF in Clean Design, with standard dimensions and a comprehensive range of mounting accessories.

Benefits
• Standard cylinder to ISO 15552 with increased corrosion protection
• Resistant to commercially available cleaning agents
• FDA-approved lubrication and sealing on the basic version
• Long service life thanks to optional dry-running seal
• Available with self-adjusting cushioning PPS
• Hygienic mounting of the sensors possible
• Comprehensive range of mounting accessories for just about every type of installation

Guided drive DGRF

Guided drive in Clean Design for reliable workpiece handling, even in difficult environments. Ideal for use in the food, beverage or packaging industry

Reliable workpiece handling, even under difficult ambient conditions with the easy-to-clean guided drive DGRF in Clean Design. Ideally suited for use in applications in the food, beverage or packaging industry.

Benefits
• Systematically designed according to “Clean Design” criteria
• Long service life thanks to optional dry-running seal
• FDA-approved lubrication and sealing on the basic version
• Good corrosion resistance and smooth surfaces
• Hygienic mounting of the sensors possible
• Compact design with high guidance accuracy and load capacity
Focus on efficiency: Intelligent automation

Drives

Valves and valve terminals

Radial gripper
HGRT

Sturdy and stable: the radial gripper HGRT combines optimum torque resistance and a long service life with a robust and precise kinematic system. Even at high torque loads, it maintains its precision. Its high gripping torque holds workpieces securely, even when using long gripper jaws. Sealing air protects it against contamination, even under harsh ambient conditions.

Benefits
• Secure gripping thanks to precise, polished plain-bearing guides
• Gripping force retention via compression springs holds the gripped workpiece securely in the event of pressure failure. This also boosts the gripping force for applications involving heavier loads
• Optimum cycle times thanks to freely adjustable opening angle of up to max. 90° per gripper finger. This prevents possible collisions due to the gripper jaws opening too wide

Technical data
• 6 sizes with up to 127 Nm of total closing torque at 6 bar
• Freely adjustable opening angles of up to max. 90°/gripper finger

Long-stroke gripper
HGPL

Powerful gripping is one of the main features of the sturdy long-stroke gripper HGPL. This gripper combines outstanding performance density with a flat design. New: the additional size 63 and new stroke variants in all sizes.

Benefits
• New size 63 for even greater forces and heavier loads
• Greater flexibility thanks to new stroke variants in all existing sizes
• All stroke variants also with adjustable opening stroke
• Standard for all types: the sturdy gripper finger guide (T-slot) for maximum load and torque resistance
• Easy mounting of the position sensors, flush on the housing, for greater reliability

Technical data
• 4 sizes with strokes of up to 300 mm
• Total gripping force of up to 2,742 N
• Repetition accuracy < 0.03 mm

Sturdy and protected, powerful and precise!

Versatile gripping of, for example, balls, pipes and shafts
Sealed parallel gripper HGPD

Ideal for very harsh environments where sealing air is no longer effective: the new, completely sealed parallel gripper HGPD. Its sturdy design permits precise gripping, despite high torque loads, due to high forces or long gripper jaws and extends the existing sturdy gripper series HGDT to include a gripper with T-slot guide.

Benefits
- The complete sealing of the gripper ensures smooth operation throughout its entire service life in the harshest of environments with dust or liquids
- The special shape of the drive piston permits maximum gripping force combined with reduced weight and an outstanding space/force ratio
- Reliable gripping, even under extremely tough conditions thanks to the optional gripping force retention in the opening and closing functions
- Highly cost-effective sensing of the gripping positions by means of inductive proximity sensors that are securely mounted in integrated slots and have no interfering edges

Technical data
- 8 sizes with strokes of up to 40 mm
- Total gripping force of up to 3,900 N
- Repetition accuracy of 0.01 ... 0.05 mm

Sealed three-point gripper HGDD

Ideal for very harsh environments where sealing air is no longer effective: the new, completely sealed three-point gripper HGDD. Its sturdy design enables precise gripping with central movement, despite high torque loads, and extends the existing sturdy gripper series HGDT to include a gripper with T-slot guide.

Benefits
- The complete sealing of the gripper ensures smooth operation throughout its entire service life in the harshest of environments with dust or liquids
- Reliable gripping, even under extremely tough conditions thanks to the optional gripping force retention in the opening and closing functions
- Highly cost-effective sensing of the gripping positions by means of inductive proximity sensors that are securely mounted in integrated slots and have no interfering edges

Technical data
- 5 sizes with up to 12 mm stroke/jaw
- Total gripping force of up to 3,000 N
- Repetition accuracy of 0.03 ... 0.05 mm
Reliable and gentle internal gripping – combined with leak testing of the workpiece during transport: this special function integration makes the mechanically operated and single-acting internal gripper DHEB with bellows extremely economical, particularly with delicate workpieces.

Benefits
• Suitable for a wide range of applications thanks to the variety of options:
  – 11 sizes for gripper diameters from 8 to 85 mm
  – Upward or downward direction of bellows movement
  – Different bellows materials (EPDM or silicon)
  – Air connection on the side or centrally from above
• Optimises the process sequence, increases quality and prevents the workpieces from being scratched
• Additional reliability: optional sensing via proximity or position sensor

Just 8 mm wide, including the ball bearing cage guide. With its extremely narrow design, this unique mini slide is ideal for applications in areas that are difficult to access and require short strokes. The ease of selection, assembly and commissioning saves time; in addition, the mini slide lasts that much longer. In comparison with existing solutions, the mini slide DGSC offers an impressively long service life.

Benefits
• Smallest guided slide unit on the market
• High component density possible: thanks to its width of 8 mm it takes up minimal space in the application
• Precision ball bearing cage guide for a reliable, precise and high-quality process
• Easy mounting of devices on the yoke via threaded and centring options
• Low procurement costs, low price

Technical data
• Size: 6
• Width: 8 mm
• Max. permissible applied load: 30 g
• Repetition accuracy [mm]: linearity 0.005/parallelism 0.03/end position ± 0.1
• Stroke: 10 mm
• Stroke compensation: 2 mm
• Feed force at 6 bar: 7 N

Internal gripping and leak testing in one step!
**Electric mini slide EGSL**

**Maximum performance in tight spaces: the electric slide series EGSL.** Its precision, load carrying ability and dynamic response with strokes of up to 300 mm make positioning extremely efficient. Ideal especially for vertical applications and for short-stroke slide functions with variable positioning. EGSL – for high-precision sliding, picking and inserting, even under high mechanical loads. Linearity and parallelism in the 1/100 mm range.

**Benefits**
- Free positioning with repetition accuracy of ≤ ±0.02 mm
- Very high rating of slide loads, ideal for vertical applications such as press-fitting or joining
- Reliable: the completely closed spindle stops dirt or small parts getting into the guide area
- Flexible: motor can be attached laterally or axially, in this case turned by 4 × 90°
- Matching software tools in the FCT software package from Festo

**Electric axis ELGR**

**For simple automation tasks and, at the same time, a long service life of 5000 km.** The electric toothed belt axis with cost-optimised design is the first choice where only comparatively minimal requirements need to be fulfilled with regard to load, dynamics and precision.

**Benefits**
- Motor can be mounted at any desired position with identical mounting accessories for any installation situation
- Also suitable for use with motors from other manufacturers thanks to open motor interface
- Variants available with long slide, as well as with up to two additional slides, for high loads and better guide performance
- Complete kit for simple, space saving end-position sensing ensures reliable operation
- Quick commissioning after simple axis layout with the help of PositioningDrives software, as well as predefined parameter sets included in FCT configuration software

**Technical data**
- 3 sizes with strokes of up to 1.5 metres
- Maximum speed of up to 3 metres per second
- Repetition accuracy of all variants: ± 0.1 mm
Focus on efficiency: Intelligent automation

Drives

Valves and valve terminals

Linear motor axis with air bearing ELGL-LAS

Dynamic and reliable: air bearing as holding brake

Maximum precision and linearity: a revolutionary linear motor axis with an integrated displacement encoder and air bearing. Its magnetically preloaded air bearing acts as a holding brake. All in one: linear motor, displacement encoder and guide. The ELGL-LAS should be your axis of choice whenever horizontal and vertical positioning are required together with highly dynamic operation and maximum precision.

Benefits

• Precision and very long service life thanks to air bearing which ensures excellent positioning accuracy and linearity. Maintenance-free because none of the moving parts are in contact with each other. The system requires neither grease nor oil.
• High levels of safety even with vertical applications. The magnetically preloaded air bearing acts like an integrated holding brake
• The air bearing provides maximum protection against dirt; dry and non-adhesive particles are blown away.
• The design principle enables independent movement of several carriages on one axis.

Areas of applications

• Electronic, semiconductor and photovoltaic industry, measurement systems
• Scanner applications, medical technology, glass fibre production

Electric linear motor cylinder DNCE-LAS

Top performance with extremely short positioning times. A highly dynamic, complete system for small loads in combination with the motor controller SFC-LACI: ideal in the electronics industry and for small parts assembly

Benefits

• Festo plug and work® for clear logistics and quick assembly. All of the required components such as linear motor, displacement encoder, guide and reference switch create a ready-to-use axis
• External power electronics with the motor controller SFC-LACI with IP 54 protection: freely adjustable speed, force and position, as well as various connection options via I/O or fieldbus
• Configuration and commissioning with the Festo Configuration Tool (FCT): just enter the parameters and the position sets and you’re ready.
• Long service life and virtually maintenance-free operation: internal plain-bearing guide with integrated grease reserves reduces maintenance costs and downtime to a minimum.

Technical data

• 2 sizes with strokes of up to 400 mm
• Peak force of up to 257 N
• Repetition accuracy of all variants: ± 20 μm
Guided linear motor cylinder DFME-LAS

A complete system for small loads that is dynamic, precise and has minimal positioning times. A powerful duo: electric guide axis with linear motor DFME-LAS and motor controller SFC-LACI. Ideal in packaging technology and small parts assembly.

Benefits
- Festo plug and work® for trouble-free logistics and assembly. All the required components, such as linear motor, displacement encoder, guide and reference switch create a ready-to-use axis
- External power electronics with the motor controller SFC-LACI with IP 54 protection enables freely adjustable speed, force and position, as well as various connection options via I/O or fieldbus
- Festo Configuration Tool (FCT): just enter the parameters and the position sets and you’re ready
- Long service life and maintenance-free operation: internal plain-bearing guide with integrated grease reserves for minimal maintenance costs and reduced downtime

Technical data
- 2 sizes with strokes of up to 400 mm
- Peak forces of up to 257 N
- Repetition accuracy of all variants: ± 20 μm

Electric short-stroke cylinder ADNE-LAS with integrated linear motor drive

Highly dynamic movements at up to 40 Hz between the two end positions: the electric short-stroke cylinder with linear motor ADNE-LAS is as fast as a pneumatic cylinder, but with the customary precision of an electric cylinder. The short-stroke cylinder ADNE and the matching controller CMFL form the seamless system ADNE-LAS. Ideal for pusher applications or sorting tasks.

Benefits
- Minimal positioning times of 25 milliseconds; thanks to teach-in functions, strokes of 5 mm and upwards can be realised
- Long service life thanks to electronic end-position cushioning
- Maximum precision: impressive repetition accuracy and constant force across the entire stroke range
- Easy mounting, configuration and operation: install directly in the application thanks to protection to IP65, choose one of the four movement cycles and give the start signal – done!
- All strong magnetic fields are screened to prevent the ingress of iron parts or chips

Technical data
- Two sizes with strokes of up to 45 mm
- Peak force of up to 52 N
- Repetition accuracy of ±0.5 mm
Servo motor double controller
CMMD-AS

Ideal for standard functions: the economical double controller CMMD-AS. Guides two servo motors independently of each other. In addition to standard applications, its strengths are simple positioning tasks with I/O connection.

The combination of two controllers in one device makes the CMMD-AS extremely economical. The combined controller modules ensure reduced costs together with fully independent control of two servo motors.

Benefits
• Only one piece of controller hardware required to move two servo motors independently of each other
• The motor current of 2 x 4 A can be arbitrarily distributed between the two controllers in a ratio of up to 2 A/6 A
• Easy and user-friendly: commissioning and firmware updates via SD card slot
• Programming and parameterisation via software tools
• Jerk-free and infinite positioning by means of closed-loop operation
• Reliable restart blocking for safety-oriented uses

Robotic controller
CMXR-C2

Combines the convenience of a robotic controller with the flexibility of a PLC: CMXR-C2 offers the advantages of two worlds on one platform and makes complex applications easy. For powerful motion control functionality from synchronous point-to-point (PTP) movements to circular interpolations as well as complex handling of moving objects on several conveyor systems.

Benefits
• Individual integration in higher-order controllers or simple integration of peripheral devices, for example tracking function via vision systems, by means of integrated CoDeSys PLC
• Ideal for bonding or sealing applications: greater process reliability and quality with defined, speed-independent switching points on the path
• Increased flexibility: modular control system for digital and analogue I/O optionally expandable
• Quick and easy optimisation of the motion programs with teach pendant CDSA

Performance areas for the motor/controller combinations

Complex applications made easy
Rotary lifting module
EHMB

**One unit for linear and rotary movements.** Both axes move independently of each other. Electric rotary and linear movements are always freely positionable. Linear movements can be executed either pneumatically with the cylinder DNC or electrically with the cylinder DNCE. Size 20, which can be configured for high dynamic response or economical operation, is suitable for Cartesian systems with a Z-movement as lifting and rotary movement. Size 25 can be used as a stationary system for loading and unloading operations or in stacking systems.

**Benefits**
- Complete: a combined and configurable rotary/lifting movement
- Dynamic, flexible, economical thanks to the modular drive concept for linear motion
- Hollow axis with large internal diameter makes laying power supply lines simple, convenient and safe
- Extremely short positioning times thanks to high dynamic response during rotation, e.g. 0.25 s when swivelling a load of 1 kg by 180°

### Technical data
- **Size:** 20/25
- **Max. stroke [mm]:** 100, 200
- **Max. effective load [kg]:** 3/5
- **Max. torque [Nm]:** 3.15/8.8
- **Max. force [N]:** 280
- **Diameter of hollow axis [mm]:** 14/21

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Swivel module DSM-T-B with tandem vanes

**DSM-B – the unique semi-rotary drive.** Now with tandem vanes for twice the torque. It features an adjustable fixed stop for maximum energy absorption and precision and has a guaranteed long service life of over 10 million cycles.

**Benefits**
- Greater reliability and heavier loads due to the increased torque
- Maximum precision thanks to adjustable cushioning with fixed stop
- Optimum repetition accuracy throughout its entire service life
- Flexible and easy adaptation to the application through infinitely variable adjustment of the swivel angle up to max. 270°
- Space-saving, reliable and cost-effective: sensing via different proximity sensors
- Easy to mount

**Technical data**
- 6 sizes from 12 to 63 mm, swivel angles up to 270°
- Torque of up to 80 Nm at 6 bar
- Repetition accuracy of 0.1° swivel angle
- Mass moment of inertia unthrottled of up to 0.16 kgm²

Twice the torque thanks to tandem vanes!
Product range extensions and add-ons
Drives

**Pneumatic mini slide DGSL**
DGSL – the outstanding slide series. Unique in its precision, resilience, compactness of design and ease of installation. New: optional protective cover and additional cushioning variants.

**Twin-piston semi-rotary actuator DRQD-B**
The powerhouse with powerful and resilient twin-piston principle for swivel angels of 90°, 180° and 360° and X angle. Adjustable end-position cushioning with precision adjustment of the end positions – pneumatically or via hydraulic shock absorbers. New: flexible cushioning with metal end position.

**Parallel gripper HGPT-…-B**
Sturdy, powerful and particularly lightweight thanks to the use of light-weight housing materials: the new HGPT-…-B with gripping force retention, sealing air and four sensor slots. Its design makes it ideal for use in heavy duty applications.

**Adjustable shock absorber DYSR**
Optimum motion: brake loads quickly and smoothly with the new, adjustable shock absorber DYSR. Ideal for applications in handling technology and mechanical engineering.
Electric cylinder with piston rod DNCE
Stick-slip-free with lead screw or ball screw. Freely programmable: positions, travel distance, force control and speeds with smooth acceleration. Plug & work thanks to the modular system. New: optionally with bellows on the piston rod for greater protection.

Electric spindle axes EGSK/EGSP
For highly precise and space-saving applications with repetition accuracy of max. 10 μm. EGSK as spindle axis with recirculating ball bearings and EGSP with innovative caged recirculating ball bearings. Both stand out thanks to their compact design and high degree of mechanical rigidity.

Electric handling module HSW-AE
The handling module HSW-AE as a ready-to-install, complete pick and place solution repositions small parts by 90°. The HSW-AE has an active wait position in both end positions and is guided by means of a slotted guide plate with adjustable angle, a linear guide and a ball bearing.

Motor controller CMMx-AS for servo motor EMMS-AS
Servo motor and motor controller with standard functions or with extended function. CMMS-AS for 90% of all automation tasks with servo motors, CMMP-AS for electronic cam disk control and highly dynamic movements. Easy sizing with PositioningDrives, matching software for configuration (FCT) and operation (FHPP and fieldbus). New: can be extended to 8 I/O; CMMP-AS optionally with Ethercat interface.
Positioning controller

CPX-CMAX for pneumatic drives

The benefits of free programming and automation to IEC 61131-3: as an intelligent remote I/O terminal in IP65/IP67 mounted directly at the machine, the CPX-CEC reduces installation costs and is also ideal for decentralised control tasks. The integrated serial interface enables communication between and connection of the control panels FED as well as further serial components.

Benefits
- Full flexibility: modular I/O system, up to 512 I/Os, RS232 interface
- Diagnostics and condition monitoring: extensive CoDeSys function library
- Stand-alone open and closed-loop control: economical automation, for example of manual workstations
- Remote control on-site: preprocessing on all currently used fieldbus/Ethernet protocols
- The only fully integrated automation platform in the world in IP65: for standard pneumatics, proportional pneumatics, servopneumatics and sensors

Safety functions to ISO 13849-1
- Venting, stopping a movement, reversing a movement, reducing speed, protection against unexpected start-up are available on request for the servopneumatic systems CMAX and CMPX

Worldwide unique: the positioning controller CMAX.
The CMAX controls various pneumatic drive series – linear as well as rotary – as a module on a valve terminal. The dynamic response, force and flexibility of the pneumatic components can thus be used for a large number of positioning tasks. An economical and reliable controller thanks to auto-identification and comprehensive diagnostics.

Benefits
- Faster processes, higher productivity
- Positioning and force control in one step
- Cost-optimised positioning system for heavy-duty applications

Data and applications
- Travel speeds of up to 3 m/s
- Acceleration values of up to 30 m/s²
- Accuracy of ±0.2 mm
- Loads from 1 kg to 300 kg
- Strokes of up to 2 m (depending on the drive)
- Up to 8 axes per CPX terminal

A new dimension in performance – the CPX-CEC as an automation platform

Function and system integration – CMAX and CMPX
**CPX terminal CMPX-C-1-H1: electronic end-position controller for pneumatic drives.** Soft Stop enables pneumatic drives to brake gently and then to accelerate faster. The function of the end-position controller CMPX-C-1-H1 corresponds to the Soft Stop System SPC11.

**Benefits**
- A reduction of approx 30% in both travel times and air consumption compared with standard pneumatics
- Increased cylinder service life
- No vibrations when returning to the end positions
- Suitable for use with all fieldbuses/Ethernet and FEC available in CPX
- Easy commissioning, Festo plug and work®

**Data and areas of application**
- Time and vibration-critical applications with working loads from 1 to 300 kg
- Strokes: drive-specific, up to 2 m
- Accuracy: precise in the end positions via fixed stop, + 2 mm in the intermediate positions

**New functions**
- Digital data handling
- Reliable pressure regulation due to cascade controller
- Two recordable intermediate positions
- Brake output at the VPWP proportional valve

**Maximun function integration in the tightest of spaces with the CPX-4AE-P for all processes with pressure sensors.** This parameterisable pressure sensor module in IP65/67 offers up to four relative pressure measurements or two differential pressure measurements. Whether in process automation or production processes, the CPX-4AE-P greatly simplifies both installation in the field and engineering.

**Benefits**
- Faster installation, lower space requirement – with no external sensors
- Faster and more reliable commissioning – preassembled and tested
- Reduced channel costs – 4 channels per module
- Lower system costs – easy function integration on fieldbus/Ethernet
- Universal use – pressure range 0 ... 10 bar, vacuum -1...+1 bar
- No programming – direct transfer of the pressure valves as mbar, psi, kPa
- Direct connection – up to four tubes via 4 mm push-in connector QS
- Display of the pressure values and diagnostics – via LCD display
- Reduced downtimes – thanks to channel-oriented diagnostics

**Wide range of combination options for CMPX/CMAX**

**Analogue input module CPX-4AE-P with four pressure sensors for CPX**

**Four-fold function integration on CPX: measures pressure more easily and efficiently**
Building on existing strengths. The pro among valve terminals has now been extended to include an even more flexible system for individual sub-bases: single-increment modularity. This means that the high pneumatic performance and functionality of the MPA-L can be adapted perfectly to every application and at the same time saves space and costs.

Benefits
- A universal valve terminal for numerous industries, for example production engineering, special machine construction as well as process engineering, for example for piloting process valves
- Valves can be individually combined or extended at any time
- Conversions possible quickly and without difficulty at any time
- Durability and inexpensive technical layout
- Particularly lightweight and corrosion-resistant sub-bases made from plastic
- Resistant, durable end plates made from coated aluminium

Technical data
- Up to 32 valves/solenoid coils
- Large number of valve functions: 5/2, 5/3, 3/2, 2/2
- Protection class: IP67
- Multi-pin plug or CPX connection

ATEX without a control cabinet: easy and up to 70% more cost-effective - with the hood CAFC-X1-GAL for CPX. Quick and easy to install, it ensures that the special conditions when using CPX/MPA in an ATEX zone are met without difficulty. On request also available as a complete solution from Festo, for example as a pre-assembled mounting plate.

Benefits
- Considerable cost saving of 50 – 70% compared with a control cabinet thanks to reduced installation costs
- Without control cabinet up to ATEX zone 2/22 thanks to certified impact protection to ATEX guideline
- CPX hood can also be used as an additional safety mechanism
- Can be used close to the application
- Space-saving thanks to compact dimensions
- No additional overheads – simply order everything at the same time and the right size hood is delivered
- Neat wall through-feed for tubing and cables – with no costly and time-consuming installation
- Alternative to the “pneumatic multiple connector plate” with modular valve terminals

ATEX-certified up to zone 2/22 – with cost savings of up to 70%

Single-increment modularity
Standard valve terminal VTSA

A worldwide unique champion – now up to ISO size 2 (52 mm) and with four valve sizes on one valve terminal.
The addition of the CPX terminal in metal design opens up new perspectives for tough applications combined with function and system integration.

Standard valve terminal VTSA
- New modules for vacuum generation with integrated pressure sensor as well as voltage supply with galvanic isolation
- Unique: four valve sizes integrated on one valve terminal – without adapters!
- High flow rate: up to 3,000 l/min with ISO size 2 (52 mm) and flow rate 30% higher than is standard with VTSA-F
- Standardised: 100% ISO 15407-2 and ISO 5599-2
- Flexible: full vertical stacking range in all four sizes
- Complete installation solution
- Integrated: comprehensive diagnostic concept
- Versatile: adapts perfectly to all requirements and even to subsequently changed configurations

Safety@Festo: safety functions to ISO 13849-1
- Two-channel disconnection of electrical and pneumatic components up to performance level d (cat. 3)
- Protective functions: venting, reversing, restart blocking

Performance – to the point

Standard valves VSV with M12 central plug connection

M12 central plug connection as standard – now extended to include the fourth size (52 mm) of the sturdy standard valves VSV. User-friendly system, suitable for challenging pneumatic tasks with a high degree of standardisation and automation. Difficult conditions are no problem!

Benefits
- Standardised valve concept for ISO valves from the individual valve to Industrial Ethernet
- Flexibility: high flowrate standard valves to ISO 15407-1 in 18 and 26 mm, as well as to ISO 5599-1 in 42 mm. New: flow rate of up to 3,000 l/min for 52 mm
- All four sizes with M8, M12 or square plug type C connection
- Reading off/regulating cylinder force and pressure: manually, on-site including pressure gauge
- Variety of vertical stacking components: pressure regulators, exhaust air flow control valves, pressure supply and pressure shut-off plates
- Generous exhaust cross sections and reversible closed-loop controllers: 50% greater exhaust performance, reduced cycle times, longer service life
- Ducted pilot air optional: with heavy dust and exposure to moisture
- Safety@Festo: individual switching position sensing or with two channels interlinked, for example for pressure actuators

Standardised valve range from individual valves to valve blocks
Competitors’ valves

Impressive: greater dynamic response and an increase in flow rate of up to 100%.

The VUVG stands for an increase in flow rate of up to 100% and higher productivity combined with minimal space requirement. The integrated easy installation philosophy is as impressive as the performance and durability, which the VUVG owes to the patented cartridge principle.

Benefits
- Limitless in use: for all compact, cost-effective solutions with high flow rate
- Easy mounting: one click and you’re done! The electronics box is then mounted on the valve
- 2 x 3/2-way valves in one: one VUVG controls two single-acting cylinders
- Multiple pressure zones can be easily realised
- Pressure range of up to 10 bar possible for greater power and productivity
- LED: 360 degrees of visibility for a fast status overview and reduced downtimes
- Sturdy housing made from aluminium

Technical data
- Valve functions: 5/2, 5/3, 3x 3/2
- Flow rates: 100, 220, 380, 750 l/min
- Operating pressure: 1.5 ... 8 bar (-0.9 ... 10 for S type)
- Temperature range: -5 ... 60 ºC (-5 ... 50)
- Pneumatic connection: M3, M5, M7, G1/8

Proportional pressure regulator VPPM

High-tech and user-friendliness combined: VPPM.

Everything is included for a reliable and precise control response: three presets can be preselected at the push of a button, plus multi-sensor control. New to the modular system: the slim ¼" variant.

Benefits
- Ease of use: three presets for optimum adaptation to different volumes
- Process reliability: multi-sensor control with integrated sensors and a multi-stage control circuit guarantee the best possible control response
- Versatility: inline or flanged version, current or voltage controlled, connection to fieldbus/Ethernet via CPX terminal
- Modular system: the right valve for every application

Technical data
- Connection sizes: G1/8, G1/4, NPT or flange
- Flow rates: 380 ... 2,750 l/min
- Pressure range: 0.02 ... 2 bar, 0.06 ... 6 bar, 0.1 ... 10 bar
- Display/operation:
  VPPM-LED: controller presets can be selected via pushbuttons
  VPPM-LCD: large number of editing functions
- Electric interface: M12 plug, 8-pin

Close to the ideal curve with multi-sensor control

Best in class! The VUVG stands for an increase in flow rate of up to 100% and higher productivity combined with minimal space requirement. The integrated easy installation philosophy is as impressive as the performance and durability, which the VUVG owes to the patented cartridge principle.

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- Display/operation:
  VPPM-LED: controller presets can be selected via pushbuttons
  VPPM-LCD: large number of editing functions
- Electric interface: M12 plug, 8-pin
Valve terminal VTOC

The compact and versatile valve series VTOC is designed for use as a pilot valve. Its preferred use is as a pilot valve for process valves in the semiconductor and process industry, for example for actuating gas valves. The valve series VTOC delivers maximum compactness on a single valve manifold.

Benefits
- Very compact and space-optimised valve terminal
- Valve functionality in minimum installation space
- Wide range of electrical actuation options
- Each coil can be two-pole actuated
- Versatile thanks to configurable manifold rails, both pneumatic as well as electric
- High process reliability thanks to integrated fibre-optic cable system
- Optional: customer-specific versions and adaptations
- Wide range of functions: up to 48 3/2-way valve functions per valve terminal

Valve function 3/2 NC
Design Poppet valve
Pneumatic connection QS 3, QS 4
Electrical connection Sub-D, 25-pin or 44-pin
Flat cable 26, 40 or 50-pin
Flow rate 10 l/min
Operating pressure range 0 … 8 bar
Power consumption 0.3 W with holding current reduction
Temperature -5 … +50 °C
Protection class IP40

Valve for medical applications MHA1

Compact and flow-rate optimised: a high flow rate and extremely compact dimensions make this valve ideal for medical technology. Also available as a complete integration solution on a printed circuit board: valve, sub-base, sensors and control electronics – everything from a single source.

Areas of application
- Compact and lightweight medical devices used for metering air and oxygen flows
- Applications with requirements for mobile compressed gas supply/small compressors or small tanks

Benefits
- Flexible: suitable for extremely small fitting spaces, with variable connection design
- Safe and free from contamination: thanks to materials that are compatible with oxygen and absolutely free from grease
- Convenient: optical monitoring of the switching status by means of LED display possible from all sides
- Reliable and sturdy: for a demand-driven and precise oxygen supply, unlike conventional standard systems

MHA1: oxygen regulation on demand!
Product range extensions and add-ons
Valves and valve terminals

CoDeSys-integrated controller for CPX: CPX-CEC-C1 with CANopen master
The benefits of free programming and automation to IEC 61131-3: as an intelligent remote I/O terminal in IP65/IP67, the CPX-CEC-C1 reduces installation costs and is ideally adapted to the CPX terminal as well as motion applications with up to 31 electric drives. Improved cycle times are an additional benefit.

4-pin M8 plug connector NECU-S-M8G4-C2
Saves space and fits the compact I/O modules of the CPX or CPI range: the 4-pin M8 plug for self assembly by the user simplifies the installation of two outputs or inputs on just one M8 slot.

Connection accessories NECU-M-... M12 b-coded for Profibus
High-quality standard for fieldbus plug, socket and terminating resistor. All in all a modular complete solution for maximum flexibility and variation on the Profibus, including to IP65/67. It also offers a choice of Sub-D or 2xM12 connections with different outlet directions.

Proportional pressure regulator VPPE with display
Everything in view, under control and at an optimum cost/benefit ratio. Powerful, energy-efficient and user-friendly, the compact VPPE with display adds value to a wide range of basic applications.
Proportional technology on the fieldbus: VPPM-MPA
Unique combination of two state-of-the-art technologies: proportional technology VPPM meets CPX/MPA. The VPPM-MPA extends the innovative technology platform CPX/MPA to include a wide range of pneumatic and electrical functionalities. Individual, modular and configurable at all levels.

Add-ons, valves and installation technology for valve terminal MPA
New: additional MPA functions provide options to create an extended application environment for reliable and continuous processes in the process industry or in special engineering applications. For example a shut-off plate for hot swapping of valves under pressure in continuous processes, or a manifold block with integrated non-return valves to prevent pressure peaks at process drives and to ensure reliable and feedback-free switching of pilot valves or process drives.

Valve series VUVB
Flexibility at an attractive price: the valve series VUVB in the size VB20 and the new size VB12. Offers an excellent price/performance ratio, size and flow rate, is easy to install and assemble thanks to integrated QS fitting connections. New: ATEX certification for the VUVB and the extended pneumatic connection NPT.
Optimised performance and maximum process reliability: compressed air quality for sealing air with lasers and precision glass scales. The new fine and micro filter cartridges as well as the activated carbon cartridges are specially developed for use in applications requiring low flow rates. They are integrated in the MS6 service units.

Benefits
• Proven in use: filtration of errant particles for maximum precision and service life of lasers and precision glass scales
• Optimised performance: flow rate values are designed for sealing air applications
• Improved filter technology: greater absorbing capacity for improved service life and extremely reliable operation
• Combinable compressed air preparation modules: easily adaptable to different environmental conditions

Technical data:
• Size MS6, grid dimensions 62 mm
• Flow rate range [NL/min.]: 45 to 500
• Grades of filtration [μm]: 1 (LFM-A), 0.01 (LFM-B), activated carbon filter (LFX)

A 600% increase in flow rate? Now possible with the new size MS9 with 1” connection size. The full flow rate of the innovative MS service units can be optimised with fine filters (LFM-B), micro filters (LFM-A) and activated carbon filters (LFX) in the size MS9. New: filter (LF) and distributor modules (FRM).

High-performance combinations
Reduce costs and minimise space requirements by combining different sizes using adapters AMV/RMV. The filter size MS9 replaces the filters MS6 in the MS6 service unit; this increases the flow rate by up to 600%.

Benefits
• Maximum efficiency through a cost-effective mix of sizes
• Increased service life of the fine and micro filters through prefiltration with the new filter MS9-LF
• Economical: different compressed air qualities via distributor module FRM

Optimised performance through compressed air quality for sealing air with lasers and precision glass scales

Maximum efficiency: new size MS9 with 1” connection size
Pressure regulator MS12-LR-G-PE6 with integrated proportional valve VPPE

Precision adjustment of the pressure even in difficult-to-access areas with the integrated proportional valve VPPE in the MS12 pressure regulator.

Benefits

- Convenient remote control through transmission of electrical signals to the proportional controller
- Reliable compressed air supply for your applications thanks to maximum flow rates even with low primary pressure
- Precision pressure adjustment and reproducible results through the low hysteresis of the pilot control
- Full range of the MS series with many variants for all requirements for compressed air quality and flow rate

Technical data:
- Pressure range: 0.15 to 6 bar
- Pn. connection 1,2: 1", 1 1/4", 1 1/2" and 2"
- Actuation: electrical
- Max. pressure hysteresis: 0.04 bar
- Flow rates: 12,000 ... 21,000 l/min

Vacuum generator OVEM

Condition monitoring with OVEM increases process reliability and prevents machine downtime.

OVEM monitors the evacuation and ejection time of each cycle and provides automatic error reporting. The vacuum level can be read off numerically, as a bar graph from the LCD display or via LED and then analysed. And commissioning of the operating parameters by means of a teach-in procedure is extremely easy.

New: the low-cost alternative with one switching output 1P. As with the variants with two switching outputs, it reports whether the vacuum level has been reached.

Benefits

- Quick, precise and reliable thanks to ejector pulse
- No pressure drop due to integrated non-return valve
- Its wide range of different functions means it can be configured according to the application
- Controls on one side make it easy to use
- Space-saving: all functions integrated in one unit
- Virtually maintenance-free thanks to open silencer and filter with inspection window
- Easy to install via M12 multi-pin connector plug

Technical data

- Nominal size of Laval nozzle: 0.45/0.7/0.95/1.4 mm
- Two types, max. vacuum: 90%, high suction rate
- Switching outputs: PNP, NPN
Highly innovative: the new compact control elements from Festo for pneumatic drive solutions. Save valuable installation space through improved design and integration of several control functions in one component. And gain more time and reliability during commissioning.

Benefits
• Save up to 50% on space: VFOF/VBNF/VBQF lie flat and very close to the cylinder
• Convenient and user-friendly, 1 tool and 1 direction for setting the functions
• Fast installation and assembly, without additional mounting attachments
• Save time and costs: up to three different control functions in one component
• Reduce costs from procurement to warehousing
• Improved performance and noise emissions

The control functions
• Flow rate regulation for variable piston speeds (VFOF)
• Holding the position of the cylinder piston (VBNF)
• Combined functions (VFOF-LE-BAH)
• Manual venting (VBNF) of the appropriate cylinder chamber, reliable solution for servicing
• Significantly increased piston speeds (VBQF), optimised cycle times

Easy bundling and securing of tubing and pipes: with the Velcro fastener NPAW. Reduces the risk of injury and makes assembly more secure, even with one hand – particularly in confined surroundings such as control cabinets, for example.

Benefits
• Reusable
• Wear-free thanks to Velcro fastener
• Suitable for wall and profile mounting
• Flame-retardant and self-extinguishing Velcro fastener
• Suitable for thin and delicate fibre-optic cables

Number 1 for space savings!

Additional tubing and cables? Easily added with NPAW!
Product range extensions and add-ons
Compressed air preparation, vacuum and connection technology

Soft-start and exhaust valve MS6-SV
Maximum safety for man and machine: approval by the German institute for health and safety to DIN EN ISO 13849-1, category 4, performance level E

Polypropylene fitting NPQP
The cost-effective alternative to stainless steel: NPQP is largely resistant to all common cleaners in combination with the tubing PLN.

Polypropylene fitting NPQM
Cost-effective metal variant for a wide range of applications, whether in the body shop, the electronics industry or workshop environments. NPQM is above all suitable for media such as compressed air and vacuum.

One-way flow control valve GRLSA with fixed offset
Digital and analogue functions combined in one component – this significantly reduces the time required to set up machines and systems. Included: optimum adjustment of the required flow rate and any desired reproducibility.

Storage box for sealing rings type OK
Handy box for storing all sealing rings of the type OK
**Intelligent Compact Vision System SBOC-Q/SBOI-Q**

The **intelligent Compact Vision System SBOx-Q** redefines **flexibility in quality assurance**. For guaranteed, reliable test results in an extremely broad range of applications, particularly in the mechatronic multi-axis modular system. From detecting the position and rotary orientation of parts, reading OCR and 1D/2D codes to precision positioning axes.

**Benefits**
- Up to 256 test programs with 256 test characteristics each can be stored. New, optional functions: OCR text recognition, reading of barcodes and data matrix codes
- CoDeSys embedded: complex test sequences can be easily created using the integrated PLC with the standardised languages to IEC 61131-3. Direct actuation of servo controllers is possible via CANopen.
- SBOx-Q communicates with a large number of Festo and third-party controllers by means of standardised software interfaces via Ethernet (TCP/IP, Easy IP, Telnet, Modbus TCP) and CAN, with integrated 24 V I/O.

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**Modular kit for connecting cables NEBU**

**Find the best connecting cable** quickly with our modular cable system and its unlimited combination options for connection sockets, cable lengths and qualities as well as plugs. Perfectly matched to all devices with M8 and M12 plugs.

**Benefits**
- Significantly longer cable service life thanks to application-specific cable quality. From basic and standard to energy chains and robot technology
- Maximum flexibility through free configuration of the plug and socket sides
- Free choice of cable length from 0.1 to 30 metres
- Considerable cost savings with cable lengths that can be fabricated to any length
- Easy, uncomplicated ordering and fast delivery

**New**
- Basic cable quality for static applications
- Angled socket M12 with 3 LEDs for VW standard
- Socket M8 with 1 LED for connecting CPE valves
Position transmitter
SMAT-8M

The SMAT-8M is the first position transmitter of its kind to be manufactured as a proximity sensor. The sensing range is up to 40 mm, depending on the drive unit. It indicates piston motion via an analogue voltage signal. Ideally suited for press-fitting and clamping, location/position sensing, sorting of good and reject parts as well as workpiece replacement.

Benefits
• Direct connection to the controller via standardised, analogue interface
• Simple and secure mounting, similar to Festo proximity sensors
• Installation in the tightest of spaces thanks to its compact design
• No need for expensive special solutions via external potentiometers
• Integrated “out-of-range” detection
• Analogue measurement, for cylinders with T-slot from Festo

Technical data
• Reproducibility: typically ± 0.1 mm, on grippers: ± 0.025 mm
• Measuring range: up to 40 mm, depending on the drive
• Output: 0 – 10 V
• Connecting cable: 0.3 m long, 4-pin M8 plug
• IP 65 and IP 68 protection

Modular proximity sensor system SMT-/-SME-10M

With the new modular proximity sensor system 5M..-10M, Festo is bringing together what belongs together – by giving a variety of drives a new dimension in reliability and economic efficiency.

Benefits
• Compatibility: with all drives from Festo with C-slot and round cylinders with corresponding mounting kits
• User-friendliness: simply insert in the cylinder slot from above and conveniently adjust by means of the switching point marking on the housing
• Sturdiness: central mounting for secure fitting in the slot
• Flexibility: free configuration of cable length and connection technology
• Reliability: cables suitable for use in energy chains and on robots as standard
• Process reliability: all reed switches are equipped with internal protective circuit for longer service life

Simple position measurement in a defined area

Fully compatible with a variety of drives
Product range extensions and add-ons
Electronic systems

**Integrated controller FED-CECCAN**
The attractively priced controller for installation in display and control units FED300 ... 5000. For use wherever there is already an integrated Ethernet interface in the FED panel. Ideal, for example, for the powerful and user-friendly new graphical display and control unit FED 400 and FED 550. With integrated Ethernet interface, TFT monitor and widescreen in the case of FED 400.

**Analogue sensor boxes SRAP for quarter-turn actuators**
Complete, reliable, compatible. The analogue position sensor supplies an output signal of 4–20 mA and is used for monitoring the position of semi-rotary drives. The analogue signal output detects not just the end positions, but the entire swivel angle.

**Binary sensor boxes SRBP for quarter-turn actuators**
Flexible position sensing as standard. The binary SRBP sensor boxes not only convert the mechanical open and closed position of the actuator or process valve into electrical output signals, but also has an option to enable a mid-position to be sensed.

**Flow sensor SFAM-62**
Intelligent and compact, whether as a stand-alone device or combined with the service units from the MS series, the high flow rate sensor SFAM adapts perfectly to its application.

**Plug connector NECU-S-M8/M12**
One for all – for both valves and sensors. Quick-connection plug connector in M8 and M12 for fast, easy connection of connecting cables with open end. No tools needed.
Festo Energy Saving Services

The Festo Energy Saving Services help system operators to identify potential savings in compressed air consumption and exploit them to the full. This helps to reduce costs.

Benefits
- Energy-efficient and environmentally conscious system operation
- Reduced operating costs
- Extended component service life
- High system availability
- Reliable process sequences
- Use of up-to-date and energy-saving technologies
- Compressed air supply based on requirements
- Fast implementation and amortisation of the savings measures
- Regular inspection of the system condition
- Continuous monitoring of critical machine processes

Festo Energy Saving Services
Analysis
- Compressed air supply analysis
- Compressed air quality analysis
- Compressed air consumption measurement
- Leakage detection

Planning
- Development of a leakage management concept
- Development of a modernisation concept
- Development of a condition monitoring concept

Implementation
- Carrying out repairs
- Implementation of modernisation concept
- Implementation of a condition monitoring system

Maintenance
- Regular analysis of compressed air supply, quality and consumption
- Regular leakage detection
- Regular preventative and corrective maintenance
- Training and education

Analysis of the compressed air supply of production locations

Determine and optimally size the system’s compressed air consumption

Improve compressed air quality and minimise machine failures

Localise, classify and systematically record leakages
Made for high pressures. The directly actuated 2/2-way poppet valve VZWD supports an impressively wide range of pressures. In addition, low flow rates at high pressures are possible from 0 bar to 90 bar – ideal for metering applications and cleaning processes where pressure plays a critical role.

Benefits of VZWD
- Works without differential pressure directly from 0 bar
- Made for high pressures
- Choice of nominal sizes from 1.0 to 6.0 mm
- Normally closed (NC) function

Made for differential pressure: the pilot-controlled piston valve VZWP works with differential pressure and can be operated with up to 40 bar. Sealing materials NBR (nitrile rubber) and FKM (fluoro elastomer).

Benefits of VZWP
- Use for high pressure ranges up to 40 bar such as washing machines, water applications, etc.
- Choice of sealing materials for different applications that require a specific temperature or media compatibility
- Use of an armature tube to avoid the medium coming into direct contact with the coil
- Energy-saving thanks to pilot control: coils require less power
2/2-way valves for process automation  VZXF, VZWF

**Insensitive**
The externally controlled angle seat valve VZXF works above 0 bar and can be used with slightly contaminated media and is suitable for applications involving steam.

**Benefits of VZXF**
- Can also be used with slightly contaminated media
- Can be used for applications involving steam
- Direct pilot air supply

**Forced control**: Ideal for applications where the actual medium is not suitable for piloting valves as the forced poppet valve VZWF has a range from 0 to 16 bar. Sealing materials: NBR, FKM or EPDM (ethylene propylene diene monomer) as appropriate to the requirements.

**Benefits of VZWF**
- Suitable for closed applications such as cooling systems or filling systems
- Choice of sealing materials for different applications that require a specific temperature or media compatibility
- Use of an armature tube to avoid the medium coming into direct contact with the coil

Sensor box SRBF

**Process reliability in focus**: the sensor box SRBF senses and visualises the end positions of quarter-turn actuators. When the end position is reached, two separately adjustable cams activate micro switches so that an electrical signal can indicate via the connected cables that the end position has been reached. This is also indicated visually via a plastic hood.

**Benefits**
- Four sensor boxes with preassembled mounting adapters are available for quarter-turn actuators with interface to VDI/VDE 3845 (Namur interface)
- IP67 – can be used in harsh environments
- Quick and easy adjustment of the actuating cams in the sensor box without using an additional tool
- Extremely good value for money

Customised: choice of seals depending on the field of application

Reliability at a glance: end position reached
Electric drive technology is catching up on pneumatics. The new generation of drives is energy-efficient and can be used for a wide variety of applications. However, the interaction of mechanical components, electrical components and software gives rise to new requirements for the planning, further development and maintenance of systems.

**Fundamentals of electric drive technology**
Participants learn about the new electric drives, their function and method of operation as well as their mechanical behaviour. They can set up, program and test appropriate configurations as well as assess and check the positioning behaviour of the drives. Finally they can apply what they have learned in their day-to-day work.
4 days, order no.: 562553

**The right mechanical/electric drive combination – quickly and efficiently**
Participants from design departments learn about electric drives, their dynamic behaviour and the interaction between mechanical and electrotechnical components. They can correctly size axes with the help of the “PositioningDrives” software. They observe the relevant safety specifications and standards and can apply these in their work environment.
2 days, order no.: 570024

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**Safe circuit technology for maintenance staff**
Participants are able to troubleshoot, repair and recommission systems, taking into consideration the applicable safety regulations and safety measures. They learn about the respective control categories and their stipulations, observe the potential hazards in pneumatic circuits and choose the right spare parts. They thus acquire the knowledge they need to observe the applicable safety specifications in their working environment.
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