



## **Product overview**

FESTO'S PRODUCTS ARE PROUDLY SOLD AND  
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### It's so easy:

1. Select the product group you require from the Table of contents → 3.  
Eg.: Electromechanical drives 32
2. Find the products you want on the product pages using the technical features and descriptions.
3. The blue arrow directs you to the search term with which you can find all product information and process your order on the Internet. Simply append the search term or type to the Internet address.  
Example: using search term:  
→ **Internet:**  
**[www.festo.com/catalogueSpindleaxis](http://www.festo.com/catalogueSpindleaxis)**  
Example: using type:  
→ **Internet:**  
**[www.festo.com/catalogueegc-bs](http://www.festo.com/catalogueegc-bs)**

Are you already in the product catalogue?

Enter the search term in the search field next to the magnifying glass.



You can also search offline. The electronic product catalogue can be found on the DVD inside the cover. Follow the installation instructions next to the DVD.

The electronic product catalogue offers additional productivity-boosting applications. See page 6 for more information.

4. Should you require individually tailored advice, you can find contact details on the next page.



## Quick start – from product family to product

There are three options available:

1. Click on a product group **1** or a product photo. This brings you to a selection of products with a list **2** of technical features and the buttons **3**
  - "Engineering" starts the selection and calculation software
  - "Documentation" provides detailed information in PDF format
  - "Feature search" lets you further narrow down the product selection further
2. Full text search: Enter your search term in the search field **5**. This can be made up of complete or partial keywords, part numbers, type codes or

names of favourites. Depending on your input, a selection of products as described under 1. will be displayed or you will be taken directly to the product you searched for. The search field **5** saves your search terms.

3. Quick link: Use the quick link to bring you directly **4** to the desired product family.



## Retrieving information on the product

Explanation of the fields in the configuration window:

1. Tab navigation **1**:
  - "Select features": Select the appropriate features here
  - "Product list": Lists all products in the product group
2. Input field for order code **2**: Enter the exact order code here.
3. Other actions **3**, which are available following a correct configuration:
  - "Add to basket": Adds your product to the basket, see also section "Export basket" and "Basket management"
  - "2D/3D view": Creates a CAD model, see section "Viewing CAD models"

- "Accessories": Lists suitable accessories
- "Data Sheet": Contains all relevant technical data
- "Display Overview": Displays an overview of all selected models.

4. Details **4**: Here you will find information such as part number, price, delivery time, product graphic, product illustration and circuit symbol.



## Product configuration for complex products

1. Select the product characteristics:
  - Navigate using the structure **1** or the tabs **4**.
  - Using the tabs **4** from left to right, configure your product by selecting the desired features **3**.
  - The structure **1** or the tabs **4** give you a quick overview of all selected features. Missing features are marked with an exclamation mark **2** and incorrect features are marked in red. Clicking on the feature

takes you directly to it, so that you can then change it.

2. Graphical representation **5**: A dynamic graphic is constructed based on your current configuration.
3. Add the product to the basket: Once configuration is complete, you can add products to the basket by clicking on "Add to basket". A message is displayed to confirm that the product has been added successfully. To find out how to initiate an order, see section "Basket management"

## Online or offline – get the ideal solution fast



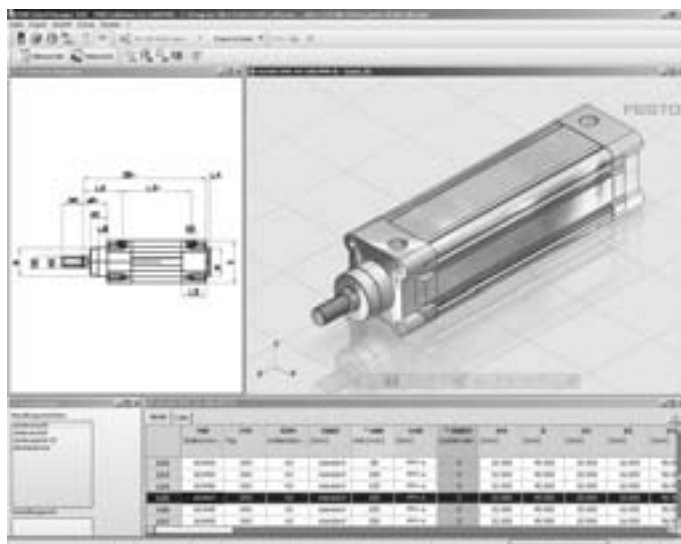
### New function: My favourites

You can now save as many product configurations as you want as favourites.

To display the list of all saved favourites [1]:

- Click on the "My favourites" tab [2]. A table containing your saved favourites is displayed. The delivery time, name of favourite, part number, type code and the button [4] for deleting the favourite are also displayed.

- Double-clicking on a configuration row or marking a row and clicking on the "Select features" tab brings you to the corresponding configuration window [3].
- You can sort your favourites by clicking on the table header [5].
- You can select multiple favourites and compare them by clicking "Product compare" [6].



### Viewing CAD models

Clicking on the "2D/3D view" button opens a window containing a CAD preview of the product. The "Export" function lets you export the files to your CAD system in the desired format.



### Exporting the basket contents ...

1. ... as a csv file:  
To do this, click "Export" [1], select "Save as" in the window that opens and specify where you want to save it to. This file can then be opened in Excel, for example, and edited.
2. ... to your choice of format:  
To do this, click "Settings" [3] and specify which information is to be exported.

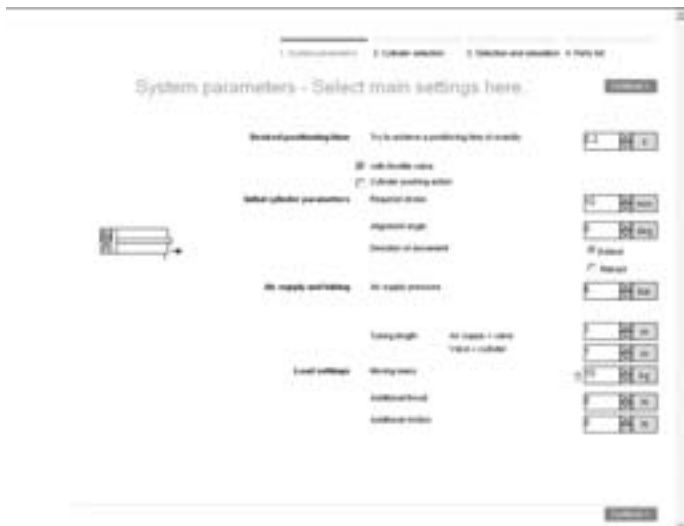
- directly to the online shop, simply click on "Export to online basket" [2]. An Internet connection is established and the products are transferred to the online basket. After logging in via "Login", your net prices and delivery times are displayed. Now just place your order and you're done!
2. Initiate order: Simply print out your basket and send it to Festo by fax or export it as an e-mail.

### Basket management

1. Upload basket directly to the online shop and place your order: To upload a basket

The detailed instructions "info\_en.pdf" can be found on the DVD.

## Software tool






## Pneumatic dimensioning

Perfect simulations replace expensive actual tests.





The tool is an expert system that supports you in the selection and configuration of the entire pneumatic control chain. If one parameter is changed, the program automatically adapts all the others. This tool can be found in the electronic catalogue for the product group, on the website under Support in the Engineering software area or on the DVD under Selection and sizing.

## Standards-based cylinders

Type	Mode of operation	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Description
Standard cylinder, round cylinder DSNU, ESNU, DSN, ESN 	Double-acting, Pushing, Single-acting	8 mm, 10 mm, 12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm	19 ... 1,870.3 N	1 ... 500 mm	P: elastic cushioning rings/pads at both ends, PPS: self-adjusting pneumatic end-position cushioning, PPV: adjustable pneumatic cushioning at both ends	<ul style="list-style-type: none"> <li>Standard cylinder DSNU, ESNU, DSN, ESN, piston diameter 8 ... 25 mm, conforms to ISO 6432</li> <li>Low-cost round cylinder DSNU, ESNU, piston diameter 32 ... 63 mm</li> <li>For position sensing: DSNU, ESNU</li> <li>Without position sensing: DSN, ESN</li> <li>Wide range of variants</li> <li>Good running performance and long service life</li> <li>Piston rod with male or female thread</li> </ul> <p>➔ Internet: <a href="#">.../dsnu</a></p>
Standard cylinder DSNUP 	Double-acting	16 mm, 20 mm, 25 mm	121 ... 295 N	25 ... 100 mm	P: elastic cushioning rings/pads at both ends	<ul style="list-style-type: none"> <li>ISO 6432</li> <li>Cost-optimised round cylinder</li> <li>Wrought aluminium alloy cylinder barrel</li> <li>Polyamide bearing and end caps</li> <li>For position sensing</li> </ul> <p>➔ Internet: <a href="#">.../dsnup</a></p>
Standard cylinder DNCB 	Double-acting	32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm	483 ... 4,712 N	2 ... 2,000 mm	PPV: adjustable pneumatic cushioning at both ends	<ul style="list-style-type: none"> <li>ISO 15552 (ISO 6431, VDMA 24562)</li> <li>For position sensing</li> <li>Saves up to 11% fitting space compared with ordinary standard cylinders</li> <li>Profile slot for proximity sensors and air connections on one side</li> <li>Proximity sensors fit flush in the profile slot</li> <li>Male piston rod thread</li> </ul> <p>➔ Internet: <a href="#">.../dncb</a></p>





## Standards-based cylinders

Type	Mode of operation	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Description
Standard cylinder DNC 	Double-acting	32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm, 125 mm	415 ... 7,363 N	2 ... 2,000 mm	P: elastic cushioning rings/pads at both ends, PPV: adjustable pneumatic cushioning at both ends	<ul style="list-style-type: none"> <li>• ISO 15552 (ISO 6431, VDMA 24562)</li> <li>• For position sensing</li> <li>• Saves up to 11% fitting space compared with ordinary standard cylinders</li> <li>• Wide range of variants</li> <li>• Profile slot for proximity sensors on three sides</li> <li>• No protruding proximity sensors</li> <li>• Male piston rod thread</li> </ul> <p>→ Internet: .../dnc</p>
Standard cylinder DNG 	Double-acting	32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm, 125 mm, 160 mm, 200 mm, 250 mm, 320 mm	415 ... 48,250 N	1 ... 2,000 mm	PPV: adjustable pneumatic cushioning at both ends	<ul style="list-style-type: none"> <li>• ISO 15552 (ISO 6431, VDMA 24562)</li> <li>• Sturdy tie rod design</li> <li>• Proximity sensors mounted using kit</li> <li>• Wide range of accessories</li> </ul> <p>→ Internet: .../dng</p>
Standard cylinder DSBF 	Double-acting	32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm	415 ... 4,712 N	1 ... 2,800 mm	PPS: self-adjusting pneumatic end-position cushioning, PPV: adjustable pneumatic cushioning at both ends	<ul style="list-style-type: none"> <li>• ISO 15552 with increased corrosion protection</li> <li>• Resistant to standard cleaning agents</li> <li>• FDA-approved lubrication and sealing on the basic version</li> <li>• Long service life thanks to optional seal for unlubricated operation</li> <li>• Hygienic mounting of the sensors possible</li> <li>• Comprehensive range of mounting accessories for just about every type of installation</li> </ul> <p>→ Internet: .../dsbf</p>
Compact cylinder CDC 	Double-acting	20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm, 80 mm	141 ... 3,016 N	1 ... 500 mm	P: elastic cushioning rings/pads at both ends	<ul style="list-style-type: none"> <li>• ISO 21287</li> <li>• Up to 50% less installation space than comparable standard cylinder to ISO 15552</li> <li>• Easy-to-clean design</li> <li>• Increased corrosion protection</li> <li>• For position sensing</li> <li>• Wide range of variants</li> <li>• Piston rod with male or female thread</li> </ul> <p>→ Internet: .../cdc</p>






## Round cylinders



1

Type	Mode of operation	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Description
Round cylinder EG 	Pushing, Single-acting	6 mm, 12 mm, 16 mm, 25 mm	17 ... 295 N	1 ... 80 mm	None	<ul style="list-style-type: none"> <li>Miniature cylinder</li> <li>Good running performance</li> <li>Male piston rod thread</li> </ul> → Internet: <a href="#">.../eg</a>
Round cylinder EG-PK 	Pushing, Single-acting	2.5 mm, 4 mm, 6 mm	1.7 ... 14 N	5... 25 mm	None	<ul style="list-style-type: none"> <li>Miniature cylinder with air connection</li> <li>Barbed fitting connection for plastic tubing with standard I.D.</li> </ul> → Internet: <a href="#">.../eg-pk</a>



## Stainless steel cylinders

Type	Mode of operation	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Description
Standard cylinder, round cylinder CRDSNU 	Double-acting	12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm	51 ... 1,870 N	1 ... 500 mm	P: elastic cushioning rings/pads at both ends, PPS: self-adjusting pneumatic end-position cushioning, PPV: adjustable pneumatic cushioning at both ends	<ul style="list-style-type: none"> <li>Piston diameter 12 ... 25 mm, conforms to ISO 6432</li> <li>Corrosion-resistant in harsh ambient conditions</li> <li>Easy-to-clean design</li> <li>Long service life thanks to optional unlubricated operation seal</li> <li>For position sensing</li> <li>Wide range of variants</li> <li>Wide range of accessories</li> </ul> → Internet: <a href="#">.../crdsnu</a>
Standard cylinder CRDNG, CRDNGS 	Double-acting	32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm, 125 mm	483 ... 7,363 N	10 ... 2,000 mm	PPV: adjustable pneumatic cushioning at both ends	<ul style="list-style-type: none"> <li>ISO 15552 (ISO 6431, VDMA 24562)</li> <li>Corrosion-resistant in harsh ambient conditions</li> <li>Easy-to-clean design</li> <li>Threaded mounting, mounting via accessories</li> <li>For position sensing</li> <li>Variants: through piston rod, heat-resistant design</li> </ul> → Internet: <a href="#">.../crdng</a>
Round cylinder CRDSW 	Double-acting	32 mm, 40 mm, 50 mm, 63 mm	483 ... 1,870 N	10 ... 500 mm	P: elastic cushioning rings/pads at both ends	<ul style="list-style-type: none"> <li>Corrosion-resistant in harsh ambient conditions</li> <li>Easy-to-clean design</li> <li>For position sensing</li> <li>Male piston rod thread</li> </ul> → Internet: <a href="#">.../crdsw</a>

## Stainless steel cylinders






Type	Mode of operation	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Description
Round cylinder CRHD 	Double-acting	32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm	483 ... 4,712 N	10 ... 500 mm	PPV: adjustable pneumatic cushioning at both ends	<ul style="list-style-type: none"> <li>Corrosion-resistant in harsh ambient conditions</li> <li>Easy-to-clean design, optimised for intensive demands</li> <li>Greater flexibility thanks to different end caps</li> <li>For position sensing</li> <li>Male piston rod thread</li> </ul> <a href="#">→ Internet: .../crhd</a>
Round cylinder CRDG 	Double-acting	12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm	68 ... 1,870 N	10 ... 500 mm	P: elastic cushioning rings/pads at both ends	<ul style="list-style-type: none"> <li>Corrosion-resistant in harsh ambient conditions</li> <li>Easy-to-clean design</li> <li>Threaded mounting, mounting via slotted nut or hex nut</li> <li>For position sensing</li> <li>Male piston rod thread</li> </ul> <a href="#">→ Internet: .../crdg</a>

## Short-stroke cylinders and compact cylinders




Type	Mode of operation	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Description
Compact cylinder ADN, AEN 	Double-acting, Pushing, Single-acting, Pulling	12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm, 125 mm	51 ... 7,363 N	1 ... 500 mm	P: elastic cushioning rings/pads at both ends	<ul style="list-style-type: none"> <li>ISO 21287</li> <li>Up to 50% less installation space than comparable standard cylinder to ISO 15552</li> <li>For position sensing</li> <li>Piston rod with male or female thread</li> <li>Wide range of variants</li> </ul> <a href="#">→ Internet: .../adn</a>
Compact cylinder ADNP 	Double-acting	20 mm, 25 mm, 32 mm, 40 mm, 50 mm	188 ... 1,178 N	5 ... 80 mm	P: elastic cushioning rings/pads at both ends	<ul style="list-style-type: none"> <li>ISO 21287</li> <li>Up to 50% less installation space than comparable standard cylinder to ISO 15552</li> <li>With polymer end cap and piston rod made from aluminium</li> <li>Low-cost cylinder for standard applications</li> <li>For position sensing</li> <li>Piston rod with male or female thread</li> </ul> <a href="#">→ Internet: .../adnp</a>

## Short-stroke cylinders and compact cylinders



1

Type	Mode of operation	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Description
Short-stroke cylinder ADVC, AEVC 	Double-acting, Pushing, Single-acting	4 mm, 6 mm, 10 mm, 12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm	4.9 ... 4,712 N	2.5 ... 25 mm	P: elastic cushioning rings/pads at both ends	<ul style="list-style-type: none"> <li>Short-stroke cylinder with standard port pattern to VDMA 24562 from dia. 32 mm</li> <li>Low space requirement</li> <li>High clamping forces in a compact size</li> <li>For position sensing with proximity sensor for T-slot and for C-slot</li> <li>Piston rod with male or female thread</li> </ul> → Internet: <a href="#">.../advc</a>
Compact cylinder ADVU, AEVU, AEVUZ 	Double-acting, Pushing, Single-acting, Pulling	12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm, 125 mm	42 ... 7,363 N	0 ... 400 mm	P: elastic cushioning rings/pads at both ends	<ul style="list-style-type: none"> <li>50% less installation space than comparable standard cylinder to ISO 15552</li> <li>For position sensing</li> <li>Wide range of variants</li> <li>Piston rod with male or female thread</li> </ul> → Internet: <a href="#">.../advu</a>
Flat cylinder DZF 	Double-acting	Equivalent diameter, 12 mm, 18 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm	51 ... 1,870 N	1 ... 320 mm	P: elastic cushioning rings/pads at both ends	<ul style="list-style-type: none"> <li>Extremely flat design</li> <li>Protected against torsion thanks to special piston shape</li> <li>Ideal for block mounting</li> <li>Wide range of installation options</li> <li>For position sensing</li> <li>Piston rod with male or female thread</li> </ul> → Internet: <a href="#">.../dzf</a>
Flat cylinder DZH 	Double-acting	Equivalent diameter, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm	104 ... 1,870 N	1 ... 1,000 mm	PPV: adjustable pneumatic cushioning at both ends	<ul style="list-style-type: none"> <li>Flat design</li> <li>Protected against torsion thanks to special piston shape</li> <li>Ideal for block mounting</li> <li>Wide range of installation options</li> <li>For position sensing</li> <li>Male piston rod thread</li> </ul> → Internet: <a href="#">.../dzh</a>
Flat cylinder EZH 	Pushing, Single-acting	Equivalent diameter, 1.5 mm, 10 mm, 2.5 mm, 5 mm	3 ... 180 N	10 ... 50 mm	None	<ul style="list-style-type: none"> <li>Extremely flat design</li> <li>Protected against torsion thanks to special piston shape</li> <li>Wide range of installation options</li> <li>For position sensing</li> </ul> → Internet: <a href="#">.../ezh</a>

## Cartridge cylinders and multimount cylinders



Type	Mode of operation	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Description
Multimount cylinder DMM, EMM, DMML, EMMML 	Double-acting, Pushing, Single-acting	10 mm, 16 mm, 20 mm, 25 mm, 32 mm	37 ... 483 N	1 ... 50 mm	P: elastic cushioning rings/pads at both ends	<ul style="list-style-type: none"> <li>Wide range of mounting options</li> <li>Wide selection of piston rod variants</li> <li>For position sensing</li> <li>Male piston rod thread</li> </ul> → <b>Internet: .../dmm</b>
Cartridge cylinder EGZ 	Pushing, Single-acting	6 mm, 10 mm, 16 mm	13.9 ... 109 N	5 ... 15 mm	None	<ul style="list-style-type: none"> <li>Minimal fitting space</li> <li>Installation with or without mounting attachments</li> <li>Male piston rod thread</li> </ul> → <b>Internet: .../egz</b>
Flanged cylinder DFK, EFK 	Double-acting, single-acting, pushing	8 mm, 10 mm, 12 mm, 16 mm, 20 mm, 25 mm	30 ... 295 N	10 ... 80 mm	P: elastic cushioning rings/pads at both ends	<ul style="list-style-type: none"> <li>Polymer design</li> <li>Integrated mounting flange and connection</li> <li>Male piston rod thread</li> </ul> → <b>Internet: .../dfk</b>

## Cylinders with clamping unit

Type	Mode of operation	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Description
Standard cylinder DSNU-KP 	Double-acting	8 mm, 10 mm, 12 mm, 16 mm, 20 mm, 25 mm	30... 295 N	1 ... 500 mm	P: elastic cushioning rings/pads at both ends, PPS: self-adjusting pneumatic end-position cushioning, PPV: adjustable pneumatic cushioning at both ends	<ul style="list-style-type: none"> <li>Piston rod can be held or clamped in any position</li> <li>Piston rod can be held in position for long periods even with alternating loads, fluctuating operating pressure or leaks in the system</li> <li>Mounting hole pattern to ISO 6432</li> <li>For position sensing</li> </ul> → <b>Internet: .../dsnu-kp</b>
Standard cylinder DNC-KP 	Double-acting	32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm, 125 mm	415 ... 7,363 N	2 ... 2,000 mm	P: elastic cushioning rings/pads at both ends, PPV: adjustable pneumatic cushioning at both ends	<ul style="list-style-type: none"> <li>Piston rod can be held or clamped in any position</li> <li>Piston rod can be held in position for long periods even with alternating loads, fluctuating operating pressure or leaks in the system</li> <li>Mounting hole pattern to ISO 15552</li> <li>For position sensing</li> <li>Wide range of variants</li> <li>Piston rod with male or female thread</li> </ul> → <b>Internet: .../dnc-kp</b>

## Cylinders with clamping unit

1

Type	Mode of operation	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Description
Cylinder with clamping unit DNCKE, DNCKE-S 	Double-acting	40 mm, 63 mm, 100 mm	754 ... 4,712 N	10 ... 2,000 mm	PPV: adjustable pneumatic cushioning at both ends	<ul style="list-style-type: none"> <li>Cylinder for holding, clamping and cushioning</li> <li>Mounting hole pattern to ISO 15552</li> <li>Variant DNCKE-...-S approved for braking tasks in safety-relevant control systems of category 1</li> <li>Piston rod can be clamped in any position</li> <li>For position sensing</li> <li>Male piston rod thread</li> </ul> → Internet: .../dncke
Compact cylinder with clamping unit ADN-KP 	Double-acting	20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm	188 ... 4,712 N	10 ... 500 mm	P: elastic cushioning rings/pads at both ends	<ul style="list-style-type: none"> <li>Mounting hole pattern to ISO 21287</li> <li>Piston rod can be held or clamped in any position during clamping, processing or handling operations</li> <li>For position sensing</li> <li>Piston rod with male or female thread</li> </ul> → Internet: .../adn-kp




## Software tool

Calculation guide for  
pneumatic linear drives

Festo's linear drives are known for delivering maximum force in minimum space. By specifying the project parameters such as mass or force, mounting position and travel, the software tool determines the optimum drive configuration for you.



The calculation software can be found on our website under Support in the Engineering software area or on the DVD under Selection and sizing.

## Rodless cylinders

Type	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Position sensing	Description
Linear drive DGC 	8 mm, 12 mm, 18 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm	30 ... 1,870 N	1 ... 8,500 mm	P: elastic cushioning rings/pads at both ends, PPV: adjustable pneumatic cushioning at both ends, YSR: shock absorber, hard characteristic curve, YSRW: shock absorber, soft characteristic curve	Via proximity sensor	<ul style="list-style-type: none"> <li>Basic design, plain or recirculating ball bearing guides</li> <li>Optimised mounting options</li> <li>High-precision guide</li> <li>Optimised sealing system</li> <li>All settings accessible from one side</li> <li>Available with variable end stops and intermediate position module</li> <li>Exchangeable with DGPL thanks to foot mountings</li> <li>Software tool available for bearing calculation</li> </ul> <p>→ Internet: <a href="#">.../dgc</a></p>
Linear drive DGP, DGPL 	18 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm, 80 mm	153 ... 3,016 N	10 ... 3,000 mm	PPV: adjustable pneumatic cushioning at both ends, YSR: shock absorber, hard characteristic curve	Via proximity sensor	<ul style="list-style-type: none"> <li>Low space requirement</li> <li>High precision and load capacity</li> <li>Basic design, plain, recirculating ball bearing or heavy-duty guides</li> <li>Wide range of variants</li> </ul> <p>→ Internet: <a href="#">.../dgp</a></p>
Linear drive SLG 	8 mm, 12 mm, 18 mm	30 ... 153 N	100 ... 900 mm	P: elastic cushioning rings/pads at both ends, YSR: shock absorber, hard characteristic curve	Via proximity sensor	<ul style="list-style-type: none"> <li>Extremely flat design</li> <li>Integrated precision guide</li> <li>Adjustable end stops</li> <li>Choice of supply ports</li> <li>Available with intermediate position module</li> </ul> <p>→ Internet: <a href="#">.../slg</a></p>

## Rodless cylinders

1

Type	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Position sensing	Description
Linear drive DGO 	12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm	68 ... 754 N	10 ... 4,000 mm	P: elastic cushioning rings/pads at both ends, PPV: adjustable pneumatic cushioning at both ends	Via proximity sensor	<ul style="list-style-type: none"> <li>Magnetic force transmission</li> <li>Pressure-tight and zero leakage</li> <li>Dirt-proof and dust-proof</li> </ul> <b>→ Internet: .../dgo</b>
Linear drive SLM 	12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm	68 ... 754 N	10 ... 1,500 mm	P: elastic cushioning rings/pads at both ends, YSR: shock absorber, hard characteristic curve	Via proximity sensor, For inductive sensors	<ul style="list-style-type: none"> <li>Recirculating ball bearing guide</li> <li>Magnetic force transmission</li> <li>Individual choice of end-position cushioning and sensing</li> </ul> <b>→ Internet: .../slm</b>


## Software tool



## Mass moment of inertia





Juggling pencils and pocket calculators is now a thing of the past. No matter whether you have discs, blocks, push-on flanges, grippers, etc., this tool does the job of calculating all the mass moments of inertia. Just save, send or print and you're finished. This tool can be found on the website under Support in the Engineering software area as a download or on the DVD under Selection and sizing.

## Semi-rotary drives



Type	Size	Torque at 6 bar	Swivel angle	Permissible mass moment of inertia	Position sensing	Description
Semi-rotary drive DRQD, DRQD-B 	6, 8, 12, 16, 20, 25, 32, 40, 50	0.16 ... 78.6 Nm	0 ... 360°	0.075 ... 11,000 kgcm <sup>2</sup>	Via proximity sensor	<ul style="list-style-type: none"> <li>With twin pistons based on the rack and pinion principle</li> <li>High accuracy</li> <li>Extremely good rigidity</li> <li>Wide range of variants</li> <li>With spigot or flanged shafts</li> </ul> <b>→ Internet: .../drqd</b>



## Semi-rotary drives


Type	Size	Torque at 6 bar	Swivel angle	Permissible mass moment of inertia	Position sensing	Description
Swivel module DSM, DSM-B 	6, 8, 10, 12, 16, 25, 32, 40, 63	0.15 ... 80 Nm	0 ... 270°	6.5 ... 5,000 kgcm <sup>2</sup>	Via proximity sensor, None	<ul style="list-style-type: none"> <li>Force transmitted directly to the drive shaft via a rotary vane</li> <li>With spigot or hollow flanged shafts</li> </ul> → Internet: <a href="#">.../dsm</a>
Semi-rotary drive DSR, DSRL 	10, 12, 16, 25, 32, 40	0.5 ... 20 Nm	0 ... 180°	0 ... 150 kgcm <sup>2</sup>	Via proximity sensor	<ul style="list-style-type: none"> <li>Force transmitted directly to the drive shaft via a rotary vane</li> <li>With spigot or hollow flanged shafts</li> </ul> → Internet: <a href="#">.../dsr</a>
Semi-rotary drive DRQ 	16, 20, 25, 32, 40, 50, 63, 80, 100	0.5 ... 150 Nm	0 ... 360°	2 ... 2,000 kgcm <sup>2</sup>	Via proximity sensor	<ul style="list-style-type: none"> <li>Conversion of linear motion into rotation via a play-compensating gear unit</li> <li>High precision thanks to backlash-free transmission of force from the gear rack to the pinion</li> </ul> → Internet: <a href="#">.../drq</a>
Swivel/linear drive unit DSL-B 	16, 20, 25, 32, 40	1.25 ... 20 Nm	0 ... 270°	0.35 ... 40 kgcm <sup>2</sup>	Via proximity sensor	<ul style="list-style-type: none"> <li>Rotation and linear motion can be controlled individually or simultaneously</li> <li>High repetition accuracy</li> <li>With plain or recirculating ball bearing guide</li> <li>Through piston rod</li> </ul> → Internet: <a href="#">.../dsl</a>

## Tandem/high-force cylinders





Type	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Description
Tandem cylinder DNCT 	32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm, 125 mm	898 ... 14,244 N	2 ... 500 mm	<ul style="list-style-type: none"> <li>Mounting hole pattern to ISO 15552</li> <li>Max. 2 cylinders can be combined</li> <li>Thrust and return force increase</li> <li>For position sensing</li> <li>Male piston rod thread</li> </ul> → Internet: <a href="#">.../dnct</a>
High-force cylinder ADNH 	25 mm, 40 mm, 63 mm, 100 mm	1036 ... 18,281 N	1 ... 150 mm	<ul style="list-style-type: none"> <li>Mounting hole pattern to ISO 21287</li> <li>Max. 4 cylinders can be combined</li> <li>Thrust increase</li> <li>Only 2 connections are required to pressurise all cylinders</li> <li>For position sensing</li> <li>Piston rod with male or female thread</li> </ul> → Internet: <a href="#">.../adnh</a>

## Multi-position cylinders


1

Type	Piston diameter	Theoretical force at 6 bar, advance stroke	Max. total of all individual strokes	Description
Multi-position cylinder ADNM 	25 mm, 40 mm, 63 mm, 100 mm	295 ... 4,712 N	1000 ... 2,000 mm	<ul style="list-style-type: none"> <li>Mounting hole pattern to ISO 21287</li> <li>Piston rod with male or female thread</li> <li>2 ... 5 cylinders can be combined</li> <li>Max. 5 positions can be approached</li> <li>Piston rod with male or female thread</li> <li>For position sensing</li> </ul> → Internet: .../adnm





## Drives with slides

Type	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Position sensing	Description
Mini slide DGSL 	6 mm, 8 mm, 10 mm, 12 mm, 16 mm, 20 mm, 25 mm, 32 mm	17 ... 483 N	10 ... 200 mm	E: short elastic cushioning rings/pads at both ends, P1: elastic cushioning rings/pads at both ends with fixed stop, P: elastic cushioning rings/pads at both ends, Y3: progressive shock absorber at both ends	Via proximity sensor	<ul style="list-style-type: none"> <li>High load capacity and positioning accuracy</li> <li>Maximum movement precision thanks to ground-in ball bearing cage guide</li> <li>Maximum flexibility thanks to 8 sizes</li> <li>Reliable in the event of pressure drop thanks to clamping cartridge or end-position locking</li> <li>Versatile mounting options thanks to piggy-back</li> <li>Compact</li> </ul> → Internet: .../dgsl
Mini slide SLT 	6 mm, 10 mm, 16 mm, 20 mm, 25 mm	34 ... 590 N	10 ... 200 mm	CC: shock absorber at both ends, P: elastic cushioning rings/pads at both ends	Via proximity sensor	<ul style="list-style-type: none"> <li>Powerful twin piston drive</li> <li>Ball bearing guide</li> <li>Versatile mounting options</li> <li>Easy adjustment of end positions</li> </ul> → Internet: .../slt
Mini slide SLS 	6 mm, 10 mm, 16 mm	17 ... 121 N	5 ... 30 mm	P: elastic cushioning rings/pads at both ends	Via proximity sensor	<ul style="list-style-type: none"> <li>Slim design</li> <li>Ball bearing guide</li> <li>Versatile mounting options</li> </ul> → Internet: .../sls
Mini slide SLF 	6 mm, 10 mm, 16 mm	17 ... 121 N	10 ... 80 mm	P: elastic cushioning rings/pads at both ends	Via proximity sensor	<ul style="list-style-type: none"> <li>Flat design</li> <li>Ball bearing guide</li> <li>Versatile mounting options</li> <li>Easy adjustment of end positions</li> </ul> → Internet: .../slf

## Drives with slides





Type	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Position sensing	Description
Mini slide SPZ 	10 mm, 16 mm, 20 mm, 25 mm, 32 mm	60 ... 724 N	10 ... 100 mm	P: elastic cushioning rings/pads at both ends	Via proximity sensor	<ul style="list-style-type: none"> <li>• Twin piston</li> <li>• High force with excellent protection against torsion</li> <li>• Widely spaced piston rods for high load capacity</li> <li>• Plain or recirculating ball bearing guides</li> </ul> → Internet: .../spz

## Drives with guide rods


Type	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Position sensing	Description
Guided drive DFP 	10 mm, 16 mm, 25 mm, 32 mm, 50 mm, 80 mm	31 ... 3,016 N	25 ... 500 mm	P: elastic cushioning rings/pads at both ends, PPV: adjustable pneumatic cushioning at both ends	Via proximity sensor	<ul style="list-style-type: none"> <li>• High-precision guiding thanks to recirculating ball bearing guide on piston rod</li> <li>• Able to absorb high torques</li> <li>• Saves space in comparison with standard cylinders</li> </ul> → Internet: .../dfp
Compact cylinder ADNGF 	12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm	68 ... 4,712 N	1 ... 400 mm	P: elastic cushioning rings/pads at both ends	Via proximity sensor	<ul style="list-style-type: none"> <li>• Mounting hole pattern to ISO 21287</li> <li>• Piston rod secured against rotation by means of guide rod and yoke plate</li> <li>• Plain-bearing guide</li> <li>• Available with through piston rod</li> </ul> → Internet: .../adngf
Compact cylinder ADVUL 	12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm	51 ... 4,712 N	1 ... 400 mm	P: elastic cushioning rings/pads at both ends	Via proximity sensor	<ul style="list-style-type: none"> <li>• Piston rod secured against rotation by means of guide rod and yoke plate</li> <li>• For position sensing</li> <li>• Plain-bearing guide</li> <li>• Available with through piston rod</li> </ul> → Internet: .../advul
Mini guided drive DFC 	4 mm, 6 mm, 10 mm	7.5 ... 47 N	5 ... 30 mm	P: elastic cushioning rings/pads at both ends	Via proximity sensor, None	<ul style="list-style-type: none"> <li>• Smallest guided drive</li> <li>• High precision and load capacity</li> <li>• Minimal space requirement</li> <li>• Drive and guide unit in a single housing</li> <li>• Plain or recirculating ball bearing guides</li> </ul> → Internet: .../dfc

## Drives with guide rods



1

Type	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Cushioning	Position sensing	Description
Guided drive DFM, DFM-B 	12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm, 80 mm, 100 mm	51 ... 4,712 N	10 ... 400 mm	P: elastic cushioning rings/pads at both ends, PPV: adjustable pneumatic cushioning at both ends, YSRW: shock absorber, soft characteristic curve	Via proximity sensor	<ul style="list-style-type: none"> <li>• Drive and guide unit in a single housing</li> <li>• Plain or recirculating ball bearing guides</li> <li>• High resistance to torques and lateral forces</li> <li>• Wide range of mounting options</li> <li>• Wide range of variants</li> </ul> <a href="#">→ Internet: .../dfm</a>
Guided drive DGRF 	20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm	189 ... 1,870 N	10 ... 400 mm	P: elastic cushioning rings/pads at both ends, PPV: adjustable pneumatic cushioning at both ends	Via proximity sensor	<ul style="list-style-type: none"> <li>• Designed completely according to Clean Design criteria</li> <li>• Long service life thanks to optional seal for unlubricated operation</li> <li>• FDA-approved lubrication and sealing on the basic version</li> <li>• Good corrosion resistance and smooth surfaces for easy cleaning</li> <li>• Hygienic mounting of the sensors possible</li> <li>• Compact design with high guidance accuracy and load capacity</li> </ul> <a href="#">→ Internet: .../dgrf</a>
Twin-piston cylinder DPZ, DPZJ 	10 mm, 16 mm, 20 mm, 25 mm, 32 mm	60 ... 966 N	10 ... 100 mm	P: elastic cushioning rings/pads at both ends	Via proximity sensor	<ul style="list-style-type: none"> <li>• Twin pistons provide twice the force in half the space</li> <li>• Plain or recirculating ball bearing guides</li> <li>• Precision stroke adjustment in the end position</li> </ul> <a href="#">→ Internet: .../dpz</a>
Linear drive unit SLE 	10 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, 50 mm	47 ... 1,178 N	10 ... 500 mm	YSR: shock absorber, hard characteristic curve	Via proximity sensor, For inductive sensors	<ul style="list-style-type: none"> <li>• Combination of guide unit and standard cylinder</li> <li>• Multi-axis and drive combinations</li> <li>• Recirculating ball bearing guide</li> </ul> <a href="#">→ Internet: .../sle</a>


## Linear modules

Type	Mode of operation	Piston diameter	Stroke	Theoretical force at 6 bar, advance stroke	Position sensing	Description
Linear module HMP 	Double-acting	16 mm, 20 mm, 25 mm, 32 mm	50 ... 400 mm	121 ... 483 N	Via proximity sensor	<ul style="list-style-type: none"> <li>• Precision, backlash-free guidance</li> <li>• High rigidity with a long stroke</li> <li>• Infinitely adjustable end stops</li> <li>• Flexible thanks to intermediate position</li> <li>• Adjustable end-position cushioning</li> </ul> <a href="#">→ Internet: .../hmp</a>


## Stopper cylinders

Type	Piston diameter	Permissible impact force on the advanced piston rod	Stroke	Position sensing	Toggle lever position sensing	Description
Stopper cylinder DFST 	50 mm, 63 mm, 80 mm	3000 ... 6,000 N	30 ... 40 mm	Via proximity sensor	For inductive sensors	<ul style="list-style-type: none"> <li>• Toggle lever design</li> <li>• Integrated adjustable shock absorber for smooth and adapted stopping</li> <li>• Up to 800 kg impact load</li> <li>• For position sensing on the piston</li> <li>• For position sensing on the toggle lever by inductive sensor</li> <li>• Lever locking mechanism</li> <li>• Toggle lever deactivator</li> </ul> → Internet: .../dfst
Stopper cylinder STA, STAF 	20 mm, 32 mm, 50 mm, 80 mm	170 ... 14,600 N	15 ... 40 mm	Via proximity sensor		<ul style="list-style-type: none"> <li>• Trunnion and roller version</li> <li>• Absorption of high lateral forces</li> <li>• Direct mounting of solenoid valves on flange plate</li> </ul> → Internet: .../sta


## Clamping modules

Type	Clamping area	Stroke	Description
Clamping module EV 	10x30, 15x40, 15x63, 20x75, 20x120, 20x180, Dia. 12, Dia. 16, Dia. 20, Dia. 25, Dia. 32, Dia. 40, Dia. 50, Dia. 63	3 ... 5 mm	<ul style="list-style-type: none"> <li>• Single-acting, with reset function</li> <li>• Clamping force 55 ... 1,690 N</li> <li>• Compact cylinders without piston rod with diaphragm</li> <li>• Flat, space-saving design</li> <li>• Hermetically sealed</li> <li>• Pressure plates and foot mounting as accessories</li> </ul> → Internet: .../ev


## Linear/swivel clamps

Type	Piston diameter	Theoretical clamping force at 6 bar	Clamping stroke	Swivel angle	Description
Linear/swivel clamp CLR 	12 mm, 16 mm, 20 mm, 25 mm, 32 mm, 40 mm, 50 mm, 63 mm	51 ... 1,682 N	10 ... 50 mm	90° +/- 2°, 90° +/- 3°, 90° +/- 4°	<ul style="list-style-type: none"> <li>• Double-acting</li> <li>• Swivelling and clamping in one step</li> <li>• Swivel direction adjustable</li> <li>• Compact</li> <li>• Clamping fingers as accessories</li> <li>• Available with dust and welding spatter protection</li> <li>• For position sensing</li> </ul> → Internet: .../clr

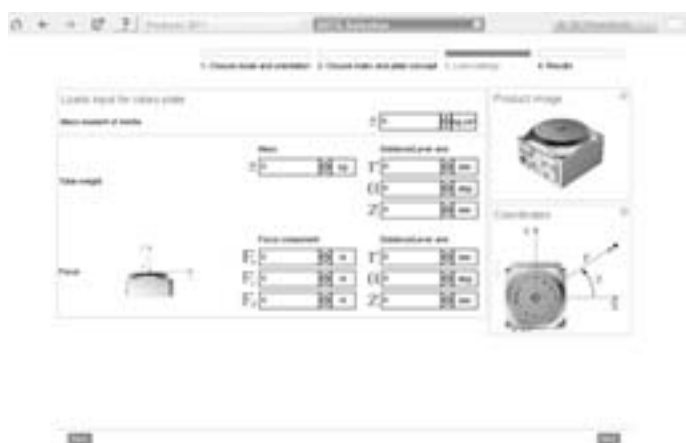
## Bellows cylinders

Type	Size	Stroke	Description
Bellows cylinder EB 	145, 165, 215, 250, 325, 385	60 ... 230 mm	<ul style="list-style-type: none"> <li>• Use as a spring element or for reducing oscillations</li> <li>• Single-bellows or double-bellows cylinder</li> <li>• High forces with a short stroke</li> <li>• Uniform movement: no stick-slip effect</li> <li>• Application: in dusty environments or in water</li> <li>• Maintenance-free</li> </ul> → Internet: .../eb

## Fluidic muscle

Type	Size	Theoretical force at 6 bar	Nominal length	Max. contraction	Description
Fluidic muscle DMSP, MAS 	10, 20, 40	480 ... 6,000 N	40 ... 9,000 mm	25% of nominal length	<ul style="list-style-type: none"> <li>• Single-acting, pulling</li> <li>• With press-fitted (DMSP) or screwed (MAS) connection</li> <li>• Three integrated adapter variants</li> <li>• Ten times the initial force of a comparable pneumatic cylinder</li> <li>• Judder-free movements</li> <li>• Hermetically sealed design offers protection against dust, dirt and moisture</li> </ul> → Internet: .../dmisp

## Software tool




## Rotary indexing table selection




This tool helps you to select the right rotary indexing table of the type DHTG from Festo for your application. Let yourself be guided by the program and enter your general parameters and you will receive at least one suggestion for the product best suited to your application.

Use expert mode to set more parameters. This tool can be found in the electronic catalogue for the product group under Engineering or on the DVD under Selection and sizing.

## Rotary indexing tables

Type	Size	Torque at 6 bar	Pitch	Description
Rotary indexing table DHTG 	65, 90, 140, 220	2.1 ... 58.9 Nm	2 ... 24	<ul style="list-style-type: none"> <li>• Sturdy mechanical system</li> <li>• Simple planning and commissioning</li> <li>• Rotary table diameters: 65, 90, 140, 220 mm</li> <li>• Free direction of rotation controller</li> </ul> → Internet: .../dhtg



## Semi-rotary drives for process automation

Type	Torque at rated operating pressure and 0° swivel angle	Torque at 6 bar	Swivel angle	Description
Semi-rotary drive DAPS 	8 ... 8,000 Nm		90°	<ul style="list-style-type: none"> <li>• High break-away torques</li> <li>• Approved in accordance with Directive 94/9/EC (ATEX)</li> <li>• Mounting flange to ISO 5211</li> <li>• Mounting hole pattern to VDI/VDE 3845</li> <li>• Port pattern as per NAMUR for solenoid valves/sensor boxes to VDI/VDE 3845</li> </ul> <p>→ Internet: <a href="#">.../daps</a></p>
Semi-rotary drive DFPB 	7 ... 945 Nm		90°	<ul style="list-style-type: none"> <li>• Identical torque characteristic across the entire rotation angle range of 90°</li> <li>• Process valve connection to ISO 5211 on both sides</li> <li>• Can be mounted on all process valves using pressure relief slot</li> <li>• Mounting hole pattern to VDI/VDE 3845</li> <li>• Sturdy, non-slip and easy-to-clean aluminium housing</li> <li>• Long service life, low wear</li> <li>• Increased corrosion protection</li> </ul> <p>→ Internet: <a href="#">.../dfpb</a></p>
Semi-rotary drive DRD, DRE 		7.44 ... 8,814 Nm	90°	<ul style="list-style-type: none"> <li>• For automating swivel valves in the process industry</li> <li>• Sturdy and precise</li> <li>• For highly accurate advancing to various positions</li> <li>• Mounting flange to ISO 5211</li> <li>• Mounting hole pattern to VDI/VDE 3845</li> <li>• Port pattern as per NAMUR for solenoid valves/sensor boxes to VDI/VDE 3845</li> </ul> <p>→ Internet: <a href="#">.../drd</a></p>





## Linear drives for process automation

1

Type	Piston diameter	Theoretical force at 6 bar, advance stroke	Stroke	Description
Linear drive DFPI 	100 mm, 125 mm, 160 mm, 200 mm, 250 mm, 320 mm	4,712 ... 48,255 N	40 ... 990 mm	<ul style="list-style-type: none"> <li>Actuation of linear process valves in process engineering systems</li> <li>With integrated displacement encoder (potentiometer)</li> <li>Available with integrated positioning controller and valve manifold</li> <li>Sturdy and compact housing with high degree of protection</li> <li>Ideal for outdoor use thanks to high degree of corrosion protection</li> <li>Suitable for use in water, industrial process water and sewage technology, as well as the silage and bulk goods industry</li> <li>Easy to integrate into an existing control architecture</li> </ul> → Internet: .../dfpi
Linear drive DLP 	80 mm, 100 mm, 125 mm, 160 mm, 200 mm, 250 mm, 320 mm	3,016 ... 48,255 N	40 ... 600 mm	<ul style="list-style-type: none"> <li>Approved in accordance with Directive 94/9/EC (ATEX)</li> <li>Port pattern as per NAMUR for solenoid valves to VDI/VDE 3845</li> <li>Mounting hole pattern to ISO 5210</li> <li>Male piston rod thread</li> <li>For position sensing</li> </ul> → Internet: .../dlp

## Accessories for drives for process automation

Type	Description
Measuring unit ASDLP 	<ul style="list-style-type: none"> <li>For linear drives DLP for the mechanical, infinitely fine sensing of movement</li> <li>For the closed-loop and open-loop control of gate slides, flat slide valves and weirs particularly in the area of water and sewage technology and the bulk goods industry</li> <li>Interface to the positioning controllers to VDI/VDE 3845 (Namur)</li> </ul> → Internet: .../asdlp
Local controller DLP-VSE 	<ul style="list-style-type: none"> <li>Convenient manual control unit for actuating process drives</li> <li>Pneumatic drive with the functionality of an electric drive</li> <li>Controller mounting options on and separately from the drive (wall mounting)</li> <li>Operated on site or remote-controlled</li> <li>High corrosion protection</li> </ul> → Internet: .../dlp-vse

## Software tool








## Shock absorber selection

Whether diagonal or vertical, curved or straight, lever or disc, all types of cushioned movements are taken into account. The software tool always recommends the best shock absorber.



This tool can be found on the website under Support in the Engineering software area as a download or on the DVD under Selection and sizing.

## Shock absorbers




Type	Stroke	Max. energy absorption per stroke	Cushioning	Description
Shock absorber YSR-C 	4 ... 60 mm	0.6 ... 380 J	Self-adjusting	<ul style="list-style-type: none"> <li>Hydraulic shock absorber with path-controlled flow control function</li> <li>Rapidly increasing cushioning force curve</li> <li>Short cushioning stroke</li> <li>Suitable for rotary drives</li> </ul> <a href="#">Internet: .../ysr-c</a>
Shock absorber YSRW 	8 ... 34 mm	1.3 ... 70 J	Self-adjusting, Soft characteristic curve	<ul style="list-style-type: none"> <li>Hydraulic shock absorber with path-controlled flow control function</li> <li>Gently increasing cushioning force curve</li> <li>Long cushioning stroke</li> <li>Suitable for low-vibration operation</li> <li>Short cycle times possible</li> </ul> <a href="#">Internet: .../ysrw</a>
Shock absorber DYSR 	8 ... 60 mm	4 ... 384 J	Adjustable	<ul style="list-style-type: none"> <li>Adjustable cushioning characteristics</li> <li>Easy adjustment</li> </ul> <a href="#">Internet: .../dysr</a>
Shock absorber YSRWJ 	8 ... 14 mm	1 ... 3 J	Self-adjusting, Soft characteristic curve	<ul style="list-style-type: none"> <li>Cushioning with self-adjusting, progressive hydraulic shock absorber</li> <li>Gently increasing cushioning force curve</li> <li>Adjustable cushioning stroke</li> <li>End-position sensing with proximity sensor SME/SMT-8</li> <li>Precision end-position adjustment</li> </ul> <a href="#">Internet: .../ysrwj</a>
Shock absorber DYEF 	0.9 ... 7 mm	0.005 ... 1.2 J	Elastic cushioning element with metal fixed stop, P cushioning without metal fixed stop	<ul style="list-style-type: none"> <li>Mechanical shock absorber with flexible rubber buffer</li> <li>Flexible rubber buffer allows a defined metal end position</li> <li>Adjustable cushioning hardness</li> <li>Ideal for cushioning low energy</li> <li>With precise metal end position</li> </ul> <a href="#">Internet: .../dyef</a>

## Shock absorbers

1

Type	Stroke	Max. energy absorption per stroke	Cushioning	Description
Shock absorber DYSC 	5 ... 18 mm	1 ... 25 J	Self-adjusting	<ul style="list-style-type: none"> <li>Hydraulic shock absorber with path-controlled flow control function</li> <li>Rapidly increasing cushioning force curve</li> <li>Short cushioning stroke</li> <li>Suitable for rotary drives</li> <li>With metal fixed stop</li> </ul> <b>→ Internet: .../dysc</b>
Shock absorber DYSW 	6 ... 20 mm	0.8 ... 12 J	Self-adjusting, Soft characteristic curve	<ul style="list-style-type: none"> <li>Hydraulic shock absorber with path-controlled flow control function</li> <li>Gently increasing cushioning force curve</li> <li>Long cushioning stroke</li> <li>Suitable for low-vibration operation</li> <li>Short cycle times possible</li> <li>With metal fixed stop</li> </ul> <b>→ Internet: .../dysw</b>

## Accessories for pneumatic drives

Type	Size	Stroke	Round material to be clamped	Static holding force	Description
Guide unit FEN, FENG 	8 / 10, 12 / 16, 20, 25, 32, 40, 50, 63, 80, 100	1 ... 500 mm			<ul style="list-style-type: none"> <li>For protecting standard cylinders against rotation at high torque loads</li> <li>High guide precision for workpiece handling</li> <li>Plain or recirculating ball bearing guides</li> </ul> <b>→ Internet: .../fen</b>
Clamping cartridge KP 			4 ... 32 mm	80 ... 7,500 N	<ul style="list-style-type: none"> <li>For installation of clamping units</li> <li>Not certified for use in safety-relevant control systems</li> </ul> <b>→ Internet: .../kp</b>
Clamping unit KPE, KEC, KEC-S 			4 ... 32 mm	80 ... 8,000 N	<ul style="list-style-type: none"> <li>KPE: Ready-to-install combination of clamping cartridge KP and housing</li> <li>KEC: For use as holding device (static application)</li> <li>KEC-S: For security-related applications</li> </ul> <b>→ Internet: .../kpe</b>

## Customised components – for your specific requirements



### Drives with customised designs

Can't find the pneumatic drive you need in our catalogue?

We can offer you customised components that are tailored to your specific requirements – from minor product modifications to complete new product developments.






Common product modifications:

- Materials for special ambient conditions
- Customised dimensions
- Special strokes
- Customised mounting options
- Implementation of special cylinder functions (cylinder/valve combinations, single-acting principle etc.)

Many additional variants are possible. Ask your Festo sales engineer, who will be happy to help.

Further information on customised components can be found on your local website at [www.festo.com](http://www.festo.com)

## Axis controllers

Type	No. of axis strings	Axes per string	Description
Axis controller CPX-CMAX 	1	1	<ul style="list-style-type: none"> <li>Axis controller as CPX module, supports pneumatic piston rod, rodless and semi-rotary drives</li> <li>Force and position control</li> <li>Use with all fieldbus/Ethernet and CEC controllers available in CPX</li> <li>Simple commissioning thanks to auto identification function</li> <li>Rapid commissioning and comprehensive diagnostics with the parameterisation software FCT</li> </ul> <p>→ Internet: <a href="#">.../cpx-cmax</a></p>
End-position controller CPX-CMPX 	1	1	<ul style="list-style-type: none"> <li>Electronic end-position control for pneumatic drives</li> <li>Soft Stop for smooth braking and quick acceleration</li> <li>Use with all fieldbus/Ethernet available in CPX</li> <li>Simple commissioning, Festo plug and work®</li> <li>Approx. 30% shorter travel times and 30% less air consumption than with comparable standard pneumatics</li> </ul> <p>→ Internet: <a href="#">.../cpx-cmpx</a></p>
Axis controller SPC200 	2	2	<ul style="list-style-type: none"> <li>Positioning controller in modular design with I/O or fieldbus interface</li> <li>Supports pneumatic piston rod, rodless and rotary drives as well as stepper motor drives</li> <li>Commissioning software: WinPISA</li> <li>For dynamic positioning applications</li> <li>Programming language to DIN 66025</li> </ul> <p>→ Internet: <a href="#">.../spc200</a></p>
End-position controller SPC11 	1	1	<ul style="list-style-type: none"> <li>Quickly and smoothly into the end position with two additional intermediate positions</li> <li>Electronic end-position cushioning</li> <li>Quick and easy commissioning: configure, teach, done</li> <li>Supports pneumatic piston rod, rodless and rotary drives</li> </ul> <p>→ Internet: <a href="#">.../spc11</a></p>
Measuring module CPX-CMIX 	1	1	<ul style="list-style-type: none"> <li>Movement and measurement with measuring module CPX-CMIX</li> <li>Records the position and speed of a drive with displacement encoder</li> <li>Standardised digital signal processing</li> <li>Use with all fieldbus/Ethernet and CEC controllers available in CPX</li> <li>Measurement accuracy ±0.01 ... 0.02 mm</li> <li>Quick and easy commissioning</li> </ul> <p>→ Internet: <a href="#">.../cpx-cmix</a></p>

## Software tool

FESTO






### Soft Stop


Soft Stop virtually makes the impossible possible. Travel times are reduced by as much as 30% for pneumatic drives and vibration is also greatly reduced. The selection program performs all of the necessary calculations.

This tool can be found on the website under Support in the Engineering software area as a download or on the DVD under Selection and sizing.


## Linear drives with displacement encoder

Type	Piston diameter	Theoretical force at 6 bar, advance stroke	Max. load, horizontal	Max. load, vertical	Stroke	Description
Standard cylinder DNCI 	32 mm, 40 mm, 50 mm, 63 mm	415 ... 1,870 N	45 ... 180 kg	15 ... 60 kg	10 ... 2,000 mm	<ul style="list-style-type: none"> <li>Standards-based cylinder to ISO 15552</li> <li>With integrated, non-contacting and relative analogue displacement measuring encoder</li> <li>Suitable for servopneumatic applications with CPX-CMAX, -CMPX, -CMIX, SPC200 and SPC11</li> <li>Piston rod variants</li> <li>Male piston rod thread</li> </ul> <p>➔ Internet: <a href="#">.../dncl</a></p>
Standard cylinder DNCM 	32 mm, 50 mm	483 ... 1,178 N	45 ... 120 kg	15 ... 40 kg	100 ... 500 mm	<ul style="list-style-type: none"> <li>Standards-based cylinder to ISO 15552</li> <li>With analogue, external displacement encoder</li> <li>Suitable for servopneumatic applications with CPX-CMAX, -CMPX, -CMIX, SPC200 and SPC11</li> <li>With attached potentiometer</li> <li>Piston rod variants</li> <li>Male piston rod thread</li> </ul> <p>➔ Internet: <a href="#">.../dncm</a></p>
Linear drive DGCI 	18 mm, 25 mm, 32 mm, 40 mm, 63 mm	153 ... 1,870 N			100 ... 2,000 mm	<ul style="list-style-type: none"> <li>With non-contacting absolute displacement measuring encoder</li> <li>Suitable for servopneumatic applications with CPX-CMAX, -CMPX, -CMIX, SPC200 and SPC11</li> <li>With guide</li> <li>Supply ports optionally on end face or front</li> </ul> <p>➔ Internet: <a href="#">.../dgci</a></p>



## Linear drives with displacement encoder

Type	Piston diameter	Theoretical force at 6 bar, advance stroke	Max. load, horizontal	Max. load, vertical	Stroke	Description
Linear drive DGPI, DGPI-L 	25 mm, 32 mm, 40 mm, 50 mm, 63 mm	295 ... 1,870 N				<ul style="list-style-type: none"> <li>With integrated non-contacting absolute displacement measuring encoder</li> <li>Suitable for servopneumatic applications with CPX-CMAX, -CMPX, -CMIX, SPC200 and SPC11</li> <li>With or without guide</li> </ul> → Internet: .../dgpi

## Semi-rotary drives with displacement encoder




Type	Piston diameter	Torque at 6 bar	Max. mass moment of inertia, horizontal	Max. mass moment of inertia, vertical	Swivel angle	Description
Swivel module DSMI 	25 mm, 40 mm, 63 mm	5 ... 40 Nm	0.03 ... 0.6 kgm <sup>2</sup>	0.03 ... 0.6 kgm <sup>2</sup>	0 ... 272°	<ul style="list-style-type: none"> <li>Rotary encoder integrated</li> <li>Suitable for servopneumatic applications with CPX-CMAX, -CMPX, -CMIX, SPC200 and SPC11</li> <li>With rotary vane</li> <li>Compact design</li> </ul> → Internet: .../dsmi

## Displacement encoders


Type	Stroke	Measuring principle of displacement encoder	Output signal	Displacement resolution	Description
Displacement encoder MLO 	100 ... 2,000 mm	Analogue	Analogue	0.01 mm	<ul style="list-style-type: none"> <li>Absolute measurement with high resolution</li> <li>System product for servopneumatic positioning technology and Smart Soft Stop</li> <li>Version: profile or connecting rod</li> </ul> → Internet: .../mlo
Displacement encoder MME 	225 ... 2,000 mm	Digital	CAN protocol type SPC-AIF	0 ... 0.01 mm	<ul style="list-style-type: none"> <li>Method of measurement: magnetostrictive</li> <li>Non-contacting with absolute measurements</li> <li>High speeds of travel</li> <li>System product for servopneumatic positioning technology and Smart Soft Stop</li> </ul> → Internet: .../mme



## Sensor interfaces

Type	Diagnostic function	Electrical connection, displacement encoder	Electrical connection, control interface	Control interface	Description
Sensor interface CASM 	Display via LED	5-pin, 8-pin, Socket, M12	5-pin, M9, Plug	CAN bus with Festo protocol, Digital, Without terminating resistor	<ul style="list-style-type: none"> <li>For the actuation of pneumatic positioning drives with the latest servopneumatic systems such as CPX-CMAX, -CMPX and -CMIX</li> <li>Short lines for analogue signals, secure digitised bus transmission</li> <li>Convenient plug and work@ concept with auto identification and comprehensive diagnostics</li> <li>High degree of protection IP67</li> </ul> <p>→ Internet: <a href="#">.../casm</a></p>
Measured-value transducer DADE 	Display via LED	8-pin, Socket, M12			<ul style="list-style-type: none"> <li>For standard cylinder DNCI</li> <li>Converts sensor signals into voltage or current signals</li> <li>Mounting via through-holes</li> <li>Diagnostic display via LED</li> </ul> <p>→ Internet: <a href="#">.../dade</a></p>
Axis interface SPC-AIF 	Display via LED	Cable with plug, 8-pin socket, M12, 5-pin socket, M9	5-pin, 7-pin, M9, Plug and socket	CAN bus with Festo protocol, Digital, Without terminating resistor	<ul style="list-style-type: none"> <li>Interface for signal distribution of the control signal from the SPC200 to the drive/displacement encoder and proportional valve MPYE</li> <li>Transmission of control signals to a second axis interface for a second positioning axis</li> <li>High protection class IP65</li> <li>Short lines for analogue signals</li> <li>Pre-assembled cables</li> </ul> <p>→ Internet: <a href="#">.../spc-aif</a></p>

## Proportional valves

Type	Valve function	Pneumatic connection 1	Pressure regulation range	Standard nominal flow rate	Description
Proportional directional control valve VPWP 	5/3-way proportional directional control valve, closed	G1/4, G1/8		350 ... 1,400 l/min	<ul style="list-style-type: none"> <li>Regulated piston spool valve</li> <li>Digital actuation</li> <li>Integrated pressure sensors for monitoring function and force control</li> <li>With auto identification</li> <li>Diagnostic function</li> <li>Integrated digital output, e.g. for a clamping/brake unit</li> <li>Suitable for servopneumatic applications with CPX-CMAX and CPX-CMPX</li> </ul> <p>→ Internet: <a href="#">.../vpwp</a></p>

## Software tool

FESTO






## PositioningDrives






Which electromechanical linear drive best meets your needs? Enter the data for your application, such as position values, effective loads and mounting position, and the software suggests a number of solutions.

This tool can be found on the website under Support in the Engineering software area as a download or on the DVD under Selection and sizing.






## Linear drives and slides

Type	Size	Max. feed force F <sub>x</sub>	Repetition accuracy	Working stroke	Description
Electric cylinder DNCE 	32, 40, 63	300 ... 2,500 N	+/-0.02 - +/-0.03 mm, +/-0.02 mm, +/-0.07 mm	100 ... 800 mm	<ul style="list-style-type: none"> <li>Lead screw or ball screw</li> <li>Standard port pattern to ISO 15552</li> <li>Axial or parallel motor interface</li> <li>Integrated reference switch</li> <li>Freely positionable</li> <li>Non-rotating piston rod</li> <li>Larger strokes available on request</li> </ul> <p>➔ Internet: <a href="#">.../dnce</a></p>
Toothed belt axis EGC-TB 	50, 70, 80, 120, 185	50 ... 2,500 N	+/-0.08 mm, +/-0.1 mm	50 ... 8,500 mm	<ul style="list-style-type: none"> <li>Recirculating ball bearing guide for high forces and torques</li> <li>Profile with optimised rigidity</li> <li>Highly dynamic response and minimum vibration</li> <li>Small toothed disc diameter</li> <li>Reference switch optional</li> <li>Freely positionable</li> </ul> <p>➔ Internet: <a href="#">.../egc-tb</a></p>
Spindle axis EGC-BS 	70, 80, 120, 185	300 ... 3,000 N	+/-0.02 mm	50 ... 3,000 mm	<ul style="list-style-type: none"> <li>Recirculating ball bearing guide for high forces and torques</li> <li>Profile with optimised rigidity</li> <li>Highly dynamic response and minimum vibration</li> <li>Various spindle pitches</li> <li>Reference switch optional</li> <li>Freely positionable</li> </ul> <p>➔ Internet: <a href="#">.../egc-bs</a></p>



## Linear drives and slides

Type	Size	Max. feed force F <sub>x</sub>	Repetition accuracy	Working stroke	Description
Toothed belt axis ELGR 	35, 45, 55	50 ... 350 N	+/-0.1 mm	50 ... 1,500 mm	<ul style="list-style-type: none"> <li>• Optimum price/performance ratio</li> <li>• Ready-to-install unit for quick and easy design</li> <li>• High reliability thanks to tested service life of 5,000 km</li> <li>• Motor can be mounted on any one of 4 sides</li> <li>• With plain or recirculating ball bearing guide</li> <li>• Kit for easy and space-saving end-position sensing</li> <li>• Quick commissioning following simple design using the PositioningDrives software as well as predefined parameter sets in the parameterisation software FCT</li> </ul> <p>→ Internet: .../elgr</p>
Toothed belt axis ELGG 	35, 45, 55	50 ... 350 N	+/-0.1 mm	50 ... 1,200 mm	<ul style="list-style-type: none"> <li>• For universal use with opposing movement</li> <li>• The different guide variants, the optional long slide and the central support enable solutions that are technically appropriate, reliable and at the same time economical</li> <li>• Long service life of over 2,500 km per slide</li> <li>• Simple and reliable design with PositioningDrives</li> <li>• Fast and user-friendly commissioning with the Festo Configuration Tool FCT</li> </ul> <p>→ Internet: .../elgg</p>
Toothed belt axis DGE-ZR 	8, 12, 18, 25, 40, 63	15 ... 1,500 N	+/-0.08 mm, +/-0.1 mm	1 ... 4,500 mm	<ul style="list-style-type: none"> <li>• Without guide, recirculating ball bearing guide, roller guide or heavy-duty guide</li> <li>• Optional protected version</li> <li>• Compact dimensions</li> <li>• Reference switch optional</li> <li>• Freely positionable</li> </ul> <p>→ Internet: .../dge-zr</p>
Spindle axis DGE-SP 	18, 25, 40, 63	140... 1,600 N	+/-0.02 mm	100 ... 2,000 mm	<ul style="list-style-type: none"> <li>• Without guide, recirculating ball bearing guide or heavy-duty guide</li> <li>• Optional protected version</li> <li>• Compact dimensions</li> <li>• Reference switch optional</li> <li>• Freely positionable</li> </ul> <p>→ Internet: .../dge-sp</p>
Cantilever axis DGEA-ZR 	18, 25, 40	230 ... 1,000 N	+/-0.05 mm	1 ... 1,000 mm	<ul style="list-style-type: none"> <li>• Toothed belt drive with recirculating ball bearing guide</li> <li>• Dynamic cantilever operation</li> <li>• Stationary drive head</li> <li>• Reference switch optional</li> <li>• Freely positionable</li> </ul> <p>→ Internet: .../dgea</p>



## Linear drives and slides

Type	Size	Max. feed force F <sub>x</sub>	Repetition accuracy	Working stroke	Description
Positioning axis DMES 	18, 25, 40, 63	240 ... 3,000 N	+/-0.05 mm, +/-0.07 mm	50 ... 1,800 mm	<ul style="list-style-type: none"> <li>• Mechanical linear drive</li> <li>• Without guide, plain or recirculating ball bearing guide</li> <li>• High mechanical torques</li> <li>• High feed forces of up to 3,000 N</li> <li>• Compact dimensions</li> <li>• Reference switch optional</li> <li>• Freely positionable</li> </ul> <b>→ Internet: .../dmes</b>
Cantilever axis EGSA 	50, 60	100 ... 200 N	+/-0.01 mm	100 ... 300 mm	<ul style="list-style-type: none"> <li>• Electromechanical cantilever axis with recirculating ball bearing spindle</li> <li>• High rigidity</li> <li>• Maximum precision</li> <li>• Highly dynamic response</li> <li>• Freely positionable</li> <li>• Integrated reference switch</li> </ul> <b>→ Internet: .../egsa</b>
Cantilever axis EGSL 	35, 45, 55, 75	75 ... 450 N	+/-0.015 mm	50 ... 300 mm	<ul style="list-style-type: none"> <li>• Very high rated slide loads, ideal for vertical applications such as press-fitting or joining</li> <li>• Safe: The completely closed spindle stops dirt or stray small parts getting into the guide area</li> <li>• Flexibility: Motor can be attached laterally or axially, in this case turned by 4 x 90°</li> <li>• Suitable software tools in the software package FCT from Festo</li> </ul> <b>→ Internet: .../egsl</b>
Mini slide SLTE 	10, 16		+/-100,000 µm	50 ... 150 mm	<ul style="list-style-type: none"> <li>• Electromechanical linear axis with plain bearing spindle</li> <li>• With DC servo motor</li> <li>• Easy actuation via I/O interface, Profibus, CANopen, DeviceNet</li> <li>• Precise and rigid guide</li> <li>• Freely positionable</li> <li>• Fast positioning times</li> </ul> <b>→ Internet: .../slte</b>
Electric slide EGSK, EGSP 	15, 20, 26, 33, 46	19 ... 466 N	+/-0.003 - +/-0.004 mm, +/-0.003 - +/-0.01 mm, +/-0.01 mm	25 ... 840 mm	<ul style="list-style-type: none"> <li>• Electromechanical linear axis with recirculating ball bearing spindle</li> <li>• Recirculating ball bearing guide with and without ball bearing chain</li> <li>• Standardised mounting interfaces</li> <li>• Compact design</li> <li>• High rigidity</li> <li>• Long service life</li> </ul> <b>→ Internet: .../egsk</b>

## Semi-rotary drives



Type	Max. driving torque	Max. input speed	Rotation angle	Description
Rotary module ERMB 	0.7 ... 8.5 Nm	900 ... 1,350 rpm	Endless	<ul style="list-style-type: none"> <li>Electromechanical rotary module with toothed belt</li> <li>Compact design</li> <li>Multi-directional mounting interfaces</li> <li>Stable arrangement of the output shaft bearings</li> <li>Unlimited and flexible rotation angle</li> </ul> <b>→ Internet: .../ermb</b>
Rotary lifting module EHMB 	0.7 ... 6.7 Nm	900 ... 1,350 rpm	Endless	<ul style="list-style-type: none"> <li>Complete: Combined and configurable rotary lifting movement</li> <li>Dynamic, flexible, efficient thanks to the modular drive concept for linear movement</li> <li>Simple, convenient and safe thanks to hollow shaft with large internal diameter for installing electric cables</li> <li>Fastest positioning times thanks to high dynamic response during rotation, e.g. 0.25 s when swivelling a 1 kg load by 180°</li> </ul> <b>→ Internet: .../ehmb</b>

## Direct drives

Type	Size	Max. feed force Fx	Repetition accuracy	Working stroke	Description
Linear drive ELGL 	30, 64, 120	56 ... 475 N	+/-0.01 mm	1 ... 5,750 mm	<ul style="list-style-type: none"> <li>Electric linear drive with linear motor, air cushion bearing and displacement encoder</li> <li>Ready-to-install system offering greater flexibility, precision and dynamic response</li> <li>Air cushion bearing provides high precision, high linearity and wear-free characteristics</li> <li>Actuation via motor controller CMMP-AS</li> </ul> <b>→ Internet: .../elgl</b>
Electric cylinder DNCE-LAS 	32, 40	93.7 ... 202 N	+/-0.02 mm	100 ... 400 mm	<ul style="list-style-type: none"> <li>Linear motor axis with piston rod</li> <li>Consisting of freely positionable linear motor, integrated displacement encoder, reference switch and plain bearings</li> <li>Positioning with very high dynamic response for small loads</li> <li>Easy actuation via I/O interface, Profibus, CANopen including interpolated position mode, DeviceNet</li> <li>Festo plug and work® for clear logistics and rapid assembly</li> <li>Configuration and commissioning with the parameterisation software FCT</li> <li>Optionally with clamping unit</li> </ul> <b>→ Internet: .../dnce*las</b>

Direct drives



Type	Size	Max. feed force Fx	Repetition accuracy	Working stroke	Description
Guided drive DFME-LAS 	32, 40	94 ... 202 N	+/-0.015 mm	100 ... 400 mm	<ul style="list-style-type: none"><li>• Recirculating ball bearing guide</li><li>• Consisting of freely positionable linear motor, integrated displacement encoder and reference switch</li><li>• Positioning with very high dynamic response for small loads</li><li>• Long service life and maintenance-free operation</li><li>• Easy actuation via I/O interface, Profibus, CANopen including interpolated position mode, DeviceNet</li><li>• Configuration and commissioning with the parameterisation software FCT</li><li>• Festo plug and work® for smooth logistics and assembly</li></ul> <b>➔ Internet: .../dfme*las</b>
Short-stroke cylinder ADNE-LAS 	32, 40	8 ... 55 N	+/-0.1 mm	15 ... 45 mm	<ul style="list-style-type: none"><li>• Electric short-stroke cylinder with integrated linear motor</li><li>• Highly dynamic movement between two end positions</li><li>• Electronic end-position cushioning</li><li>• Simple commissioning, Festo plug and work®</li><li>• Also for harsh ambient conditions</li></ul> <b>➔ Internet: .../adne*las</b>

Customised components – for your specific requirements



Drives with customised designs

Can't find the electromechanical drive you need in our catalogue? We can offer you customised components that are tailored to your specific requirements – from minor product modifications to complete new product developments.

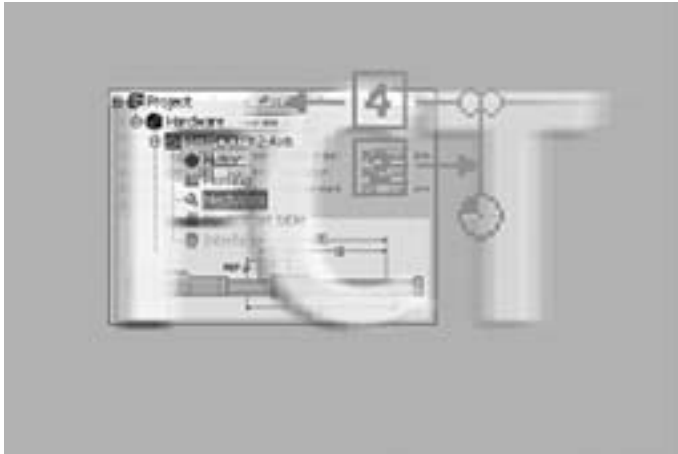
Common product modifications:

- Special strokes
- Design for special ambient conditions
- Design optimised for the fitting space
- Design with opposing carriages
- Design with absolute encoder

Many additional variants are possible. Ask your Festo sales engineer, who will be happy to help.

Further information on customised components can be found on your local website at [www.festo.com](http://www.festo.com)

## Software tool

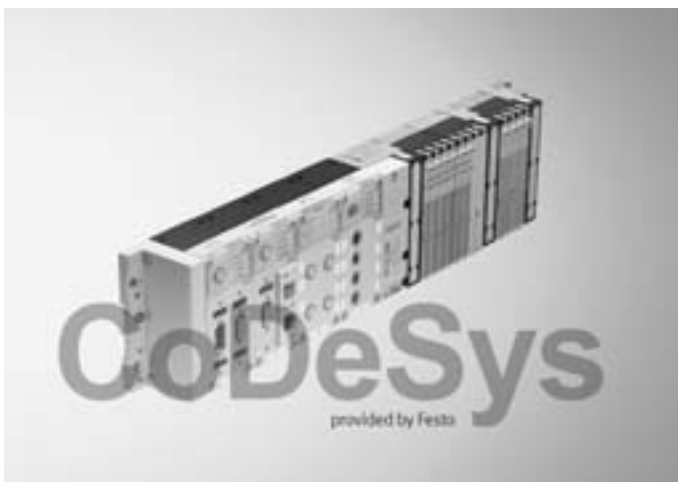


### Festo Configuration Tool (FCT)

FCT is a configuration and parameterisation software program, which supports all Festo devices, in particular motor controllers.

It is extremely flexible, provides full support for the device properties and is simple and intuitive to operate. The user is guided step-by-step through the commissioning process while each individual step is checked.

The FCT parameterisation software can be found on the website under Support in the Support and Downloads area. Enter FCT as a search term here to retrieve it.



### CoDeSys


CoDeSys makes your life easier with simple commissioning, fast programming and parameterisation – standardised programming of embedded devices to IEC 61131-3

#### Advantages

- Hardware-neutral software platform for quick and easy configuration, programming and commissioning of pneumatic and electric automation solutions
- Extensive module libraries for single or multi-axis positioning motions
- The IEC 61131-3 standard means that CoDeSys is flexible and open for all types of control tasks
- Modular: offline and online functions, as well as components for hardware configuration and visualisation
- User-friendly IEC functional module extension
- Re-use of existing application parts


The CoDeSys parameterisation software can be found on the website under Support in the Support and Downloads area. Enter CoDeSys as a search term here to retrieve it.

## Servo motors


Type	Nominal torque	Nominal speed	Peak torque	Max. rotational speed	Description
Servo motor EMMS-AS 	0.2 ... 20.05 Nm	2,000 ... 10,300 rpm	1 ... 48.8 Nm	2,210 ... 11,180 rpm	<ul style="list-style-type: none"> <li>• Permanently excited, electrodynamic, brushless servo motor</li> <li>• Digital absolute displacement encoder, single turn or multi-turn</li> <li>• Available with holding brake</li> <li>• Optimised connection technology</li> </ul> <p>➔ Internet: <a href="#">.../emms-as</a></p>





## Servo motors

Type	Nominal torque	Nominal speed	Peak torque	Max. rotational speed	Description
Motor unit MTR-DCI 		3,000 ... 3,400 rpm		3,000 ... 3,400 rpm	<ul style="list-style-type: none"> <li>• DC motor with encoder</li> <li>• Gear unit, controller, power electronics integrated</li> <li>• Parameterisation interface RS232</li> <li>• I/O, Profibus, CANopen, Profibus DP, DeviceNet interface</li> <li>• Control panel with display, optional</li> <li>• Gear unit ratio: 7:1, 14:1, 22:1</li> </ul> → Internet: <a href="#">.../mtr-dci</a>


## Stepper motors

Type	Max. rotational speed	Motor holding torque	Description
Stepper motor EMMS-ST 	430 ... 2,720 rpm	0.5 ... 9.3 Nm	<ul style="list-style-type: none"> <li>• 2-phase hybrid technology</li> <li>• Step angle 1.8°</li> <li>• Standard industrial connection technology</li> <li>• Optional: encoder, brake</li> </ul> → Internet: <a href="#">.../emms-st</a>




## Controllers for AC servo motors

Type	Nominal current	Nominal operating voltage AC	Phases of nominal operating voltage	Controller rated output	Fieldbus link	Description
Motor controller CMMS-AS 	4 ... 5 A	230 V	1-phase	600 VA	CANopen, DeviceNet, Profibus DP	<ul style="list-style-type: none"> <li>• For servo motor</li> <li>• Digital absolute shaft encoder in single-turn and multi-turn versions</li> <li>• Can be operated as a torque, speed or position controller</li> <li>• Position controller, integrated brake chopper</li> <li>• I/O interface</li> <li>• Electronic gear unit</li> </ul> → Internet: <a href="#">.../cmms-as</a>
Motor controller CMMD-AS 	8 ... 10 A	230 V	1-phase	1,200 VA	CANopen, DeviceNet, Profibus DP	<ul style="list-style-type: none"> <li>• Only one piece of controller hardware required to move two servo motors independently of each other</li> <li>• The motor current of 2x 4 A can be distributed between both controllers with a ratio of 2 A:6 A</li> <li>• Simple and user-friendly: commissioning and firmware updates via SD card slot</li> <li>• Programming and parameterisation via software tools</li> <li>• Jerk-free and infinite positioning by means of closed-loop operation</li> <li>• Reliable restart blocking for safety-relevant applications</li> </ul> → Internet: <a href="#">.../cmmd-as</a>



## Controllers for AC servo motors

Type	Nominal current	Nominal operating voltage AC	Phases of nominal operating voltage	Controller rated output	Fieldbus link	Description
Motor controller CMMP-AS 	2 ... 20 A	230 ... 400 V	1-phase, 3-phase	500 ... 12,000 VA	CANopen, DeviceNet, Ethernet, Profibus DP, Sercos	<ul style="list-style-type: none"> <li>• For servo motor</li> <li>• Flying saw</li> <li>• For cam disk controllers and highly dynamic movements</li> <li>• Standardised interfaces allow seamless integration in mechatronic multi-axis modular systems</li> <li>• Reliable and convenient commissioning, programming and parameterisation via software tools</li> </ul> <p>→ Internet: <a href="#">.../cmmp-as</a></p>




## Controllers for DC servo motors

Type	Nominal current, load supply	Nominal voltage, load supply DC	Controller rated output	Fieldbus link	Description
Motor controller SFC-DC 	3 A	24 V	75 VA	CANopen, DeviceNet, Profibus DP	<ul style="list-style-type: none"> <li>• High degree of protection IP54</li> <li>• Easy actuation via I/O interface, Profibus, CANopen, DeviceNet</li> <li>• With or without control panel</li> <li>• Parameterisation via control panel or parameterisation software FCT</li> <li>• For actuation of mini slide SLTE, parallel gripper HGPLE</li> </ul> <p>→ Internet: <a href="#">.../sfc-dc</a></p>
Motor controller SFC-LACI 	10 A	48 V	480 VA	CANopen, Profibus DP	<ul style="list-style-type: none"> <li>• High degree of protection IP54</li> <li>• Open-loop and closed-loop position controller</li> <li>• Easy actuation via I/O interface, Profibus, CANopen including interpolated position mode</li> <li>• With or without control panel</li> <li>• Parameterisation via control panel or parameterisation software FCT</li> <li>• For controlling electric cylinder DNCE-LAS and guided drive DFME-LAS</li> </ul> <p>→ Internet: <a href="#">.../sfc-laci</a></p>
End-position controller CMFL 	3 A	24 V either, 48 V			<ul style="list-style-type: none"> <li>• For force-controlled positioning of short-stroke cylinder ADNE-LAS</li> <li>• Realisation of dynamic movement with continuous monitoring, including "Motion Complete"</li> <li>• Highly dynamic response</li> </ul> <p>→ Internet: <a href="#">.../cmfl</a></p>


## Controllers for stepper motors

Type	Nominal current	Nominal current, load supply	Max. step frequency	Controller operating mode	Fieldbus link	Description
Motor controller CMMS-ST 		8 A	4 kHz	PWM MOSFET power end stage	CANopen, Profibus DP	<ul style="list-style-type: none"> <li>For stepper motor</li> <li>Can be operated as a torque, speed or position controller</li> <li>Position controller, integrated brake chopper</li> <li>I/O interface</li> <li>Electronic gear unit</li> </ul> <b>→ Internet: .../cmms-st</b>
Motor controller SEC-ST 	1.25 ... 6 A		40 kHz	Bipolar chopper driver		<ul style="list-style-type: none"> <li>For stepper motor</li> <li>Compact unit, ready for installation</li> <li>Current reduction</li> <li>Pre-assembled electrical connection accessories</li> </ul> <b>→ Internet: .../sec-st</b>


## Multi-axis controllers

Type	Operating voltage	Operating voltage range DC	Control interface	Fieldbus link	Supported kinematic systems	Description
Controller CMXR-C1 	24 VDC +20%/-15%, 24 VDC +25%/-20%			2 x CANopen masters	2-axis gantries X-Z/Y-Z/X-Y, 3-axis gantries X-Y-Z, Any interpolation, Tripod	<ul style="list-style-type: none"> <li>Multi-axis control for linear and three-dimensional gantries, tripod kinematic systems</li> <li>Optional handheld terminal CDSA</li> <li>Point to point and complex path control</li> <li>Ethernet and CANbus interface</li> </ul> <b>→ Internet: .../cmxr-c1</b>
Controller CMXR-C2 	24 VDC +20%/-15%, 24 VDC +25%/-20%			2 x CANopen masters	2-axis gantries X-Z/Y-Z/X-Y, 3-axis gantries X-Y-Z, Any interpolation, Tripod	<ul style="list-style-type: none"> <li>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</li> <li>Ideal for bonding or sealing applications: greater process reliability and quality with defined, speed-independent switching points on the path</li> <li>Increased flexibility: modular control system for digital and analogue I/O optionally expandable</li> </ul> <b>→ Internet: .../cmxr-c2</b>
Control block CPX-CMXX 		18 ... 30 V	CAN bus		2-axis gantries X-Z/Y-Z/X-Y, 3-axis gantries X-Y-Z	<ul style="list-style-type: none"> <li>Intelligent module in the CPX terminal for the actuation of electric drive units</li> <li>Coordination of the entire motion sequence</li> <li>Actuation of 2 axis groups with max. 4 axes per group</li> <li>Ethernet and CANbus interface</li> </ul> <b>→ Internet: .../cmxx</b>

## Multi-axis controllers

Type	Operating voltage	Operating voltage range DC	Control interface	Fieldbus link	Supported kinematic systems	Description
Control block CPX-CEC-M1 	24 V DC		CAN bus			<ul style="list-style-type: none"> <li>Comprehensive CoDeSys function library plus CoDeSys SoftMotion library</li> <li>Motion Control with up to 8 synchronous electric drives and 2.5D interpolation</li> <li>Efficient open and closed-loop control, e.g. with manual workstations</li> <li>The only fully integrated automation platform in the world in IP65: for standard pneumatics, proportional pneumatics, servopneumatics, electric drives and sensors</li> </ul> <p>→ Internet: <a href="#">.../cpx-cec-m1</a></p>

## Power supply units

Type	Nominal output voltage DC	Nominal output current	Input voltage range AC	Input current	Power failure bridging	Description
Power supply unit SVG 	24 ... 48 V	4.8 ... 20 A	100 ... 500 V	1.9 – 0.8 A, 2.1 – 1.0 A, 2.2 – 1.2 A, 2.3 – 1.9 A, 2.8 – 1.2 A, 5.1 – 2.3 A	20 ... 50 ms	<ul style="list-style-type: none"> <li>H-rail mounting</li> <li>Mounting position: Free convection</li> </ul> <p>→ Internet: <a href="#">.../svg</a></p>

Software tool







Gripper selection




A secure grip is a question of the right calculation. In this case, calculation of weight, direction of movement, distances, etc. The software tool immediately determines which of the parallel, three-point, angle or swivel/gripper units best matches your requirements, and in which size.

This tool can be found in the electronic catalogue for the product group, on the website under Support in the Engineering software area or on the DVD under Selection and sizing.



Parallel grippers

Type	Total gripping force at 6 bar, closing	Stroke per gripper jaw	Position sensing	Gripping force backup	Description
<div>Parallel gripper HGPT</div> 	106 ... 6,300 N	1.5 ... 25 mm	Via proximity sensor	During closing, During opening	<ul style="list-style-type: none"><li>Sturdy and powerful</li><li>With T-slot guide</li><li>Suitable for external and internal gripping</li><li>Protection against dust in gripper jaw guide via sealing air</li><li>Gripping force backup</li><li>High-force variant (F) available</li></ul> <a href="#">Internet: .../hgpt</a>
<div>Parallel gripper HGPL</div> 	158 ... 2,742 N	20 ... 150 mm	Via proximity sensor		<ul style="list-style-type: none"><li>Space-saving, high forces and torques</li><li>Controlled, precise and centred gripping</li><li>Long stroke: long guide length for the gripper jaws</li><li>Suitable for external and internal gripping</li><li>Opening stroke can be adjusted to optimise time</li></ul> <a href="#">Internet: .../hgpl</a>
<div>Parallel gripper HGPP</div> 	80 ... 830 N	2 ... 12.5 mm	For Hall sensor, For inductive sensors	During closing, G2, During opening, G1	<ul style="list-style-type: none"><li>High-precision gripper jaw guide</li><li>Suitable for external and internal gripping</li><li>Highly flexible thanks to versatile attachment, mounting and application options</li><li>Gripping force backup</li></ul> <a href="#">Internet: .../hgpp</a>
<div>Parallel gripper HGPC</div> 	44 ... 126 N	3 ... 7 mm	Via proximity sensor	During closing, G2	<ul style="list-style-type: none"><li>Compact, low cost, reliable operation, long service life</li><li>High force with minimal volume</li><li>Suitable for external and internal gripping</li><li>Gripping force backup</li></ul> <a href="#">Internet: .../hgpc</a>




## Parallel grippers

Type	Total gripping force at 6 bar, closing	Stroke per gripper jaw	Position sensing	Gripping force backup	Description
Parallel gripper HGP 	20 ... 700 N	2 ... 12.5 mm	For Hall sensor, Via proximity sensor	During closing, G2, During opening, G1	<ul style="list-style-type: none"> <li>Self-centring</li> <li>Suitable for external and internal gripping</li> <li>Versatile thanks to externally adaptable gripper fingers</li> <li>High gripping force and compact size</li> <li>Max. repetition accuracy</li> </ul> <a href="#">Internet: .../hgp</a>
Parallel gripper HGPM 	16 ... 35 N	2 ... 3 mm	None		<ul style="list-style-type: none"> <li>Micro gripper: compact, handy design</li> <li>Versatile thanks to externally adaptable gripper fingers</li> <li>Mounting options with clamping spigot, with flange mounting, with Z stroke compensation</li> </ul> <a href="#">Internet: .../hgpm</a>
Parallel gripper HGPLE 		40 mm	Via integrated angular displacement encoder		<ul style="list-style-type: none"> <li>Electrically driven gripper with long stroke</li> <li>Free, speed-controlled selection of gripping positions</li> <li>Long stroke allows use with workpieces of different sizes</li> <li>Adjustable gripping force for highly sensitive and large, heavy workpieces</li> <li>Very high torque resistance, very high accuracy</li> <li>Short opening and closing times</li> <li>Minimal installation costs</li> <li>See product documentation on our website for gripping force</li> </ul> <a href="#">Internet: .../hgple</a>

## Three-point grippers



Type	Total gripping force at 6 bar, closing	Stroke per gripper jaw	Position sensing	Gripping force backup	Description
Three-point gripper HGDT 	207 ... 2,592 N	1.5 ... 10 mm	Via proximity sensor	During closing, During opening	<ul style="list-style-type: none"> <li>Synchronous movement of gripper jaws</li> <li>With T-slot guide</li> <li>Gripping force backup</li> <li>Suitable for external and internal gripping</li> <li>Dust-proof via sealing air</li> <li>High-force variant (F) available</li> </ul> <a href="#">Internet: .../hgdt</a>
Three-point gripper HGD 	90 ... 880 N	2.5 ... 6 mm	For Hall sensor, Via proximity sensor		<ul style="list-style-type: none"> <li>Self-centring</li> <li>Suitable for external and internal gripping</li> <li>Versatile thanks to externally adaptable gripper fingers</li> <li>High precision and high holding forces</li> </ul> <a href="#">Internet: .../hgd</a>

## Angle grippers


Type	Total gripping torque at 6 bar, closing	Max. opening angle	Position sensing	Description
Angle gripper HGWM 	22 ... 64 Ncm	14 ... 18.5°	None	<ul style="list-style-type: none"> <li>• Micro angle gripper: compact, handy design</li> <li>• Mounting options with clamping spigot, with flange mounting, with Z stroke compensation</li> <li>• Versatile thanks to externally adaptable gripper fingers</li> </ul> → Internet: .../hgwm
Angle gripper HGW 	22 ... 880 Ncm	40°	Via proximity sensor	<ul style="list-style-type: none"> <li>• Self-centring</li> <li>• Suitable for external and internal gripping</li> <li>• Versatile thanks to externally adaptable gripper fingers</li> <li>• Constant gripping torque over the entire angle range</li> </ul> → Internet: .../hgw
Angle gripper HGWC 	22 ... 144 Ncm	30 ... 80°	Via proximity sensor	<ul style="list-style-type: none"> <li>• Internal fixed flow control, does away with the need for external flow control in 90% of applications</li> <li>• High force with minimal volume</li> <li>• Suitable for external and internal gripping</li> <li>• Repetition accuracy 0.05 mm</li> <li>• Compact and cost-effective</li> </ul> → Internet: .../hgwc

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## Radial grippers

Type	Total gripping torque at 6 bar, closing	Max. opening angle	Position sensing	Description
Radial gripper HGRT 	158 ... 7,754 Ncm	180°	Via proximity sensor, For inductive sensors	<ul style="list-style-type: none"> <li>• Secure gripping thanks to precise, polished plain-bearing guides</li> <li>• Gripping force backup via compression springs holds the gripped workpiece securely in the event of pressure failure</li> <li>• Compression spring also boosts the gripping force for applications involving heavier loads</li> <li>• 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</li> </ul> → Internet: .../hgtr
Radial gripper HGR 	13 ... 500 Ncm	180°	Via proximity sensor	<ul style="list-style-type: none"> <li>• Self-centring</li> <li>• Suitable for internal and external gripping</li> <li>• Constant gripping torque over the entire angle range</li> <li>• Versatile thanks to externally adaptable gripper fingers</li> </ul> → Internet: .../hgr


## Radial grippers

Type	Total gripping torque at 6 bar, closing	Max. opening angle	Position sensing	Description
Radial gripper HGRC 	22 ... 144 Ncm	180°	Via proximity sensor	<ul style="list-style-type: none"> <li>Internal fixed flow control, does away with the need for external flow control in 90% of applications</li> <li>High force with minimal volume</li> <li>Suitable for external and internal gripping</li> <li>Repetition accuracy 0.05 mm</li> <li>Compact and cost-effective</li> </ul> <a href="#">→ Internet: .../hgrc</a>

## Swivel/gripper units



Type	Total gripping force at 6 bar, closing	Stroke per gripper jaw	Swivel angle	Position sensing, gripper	Description
Swivel/gripper unit HGDS 	52 ... 130 N	2.5 ... 7 mm	210°	Via proximity sensor	<ul style="list-style-type: none"> <li>Combination of parallel gripper and swivel module</li> <li>Swivel angle infinitely adjustable</li> <li>Precise end stop with flexible cushioning or integrated shock absorber</li> </ul> <a href="#">→ Internet: .../hgds</a>

## Internal grippers

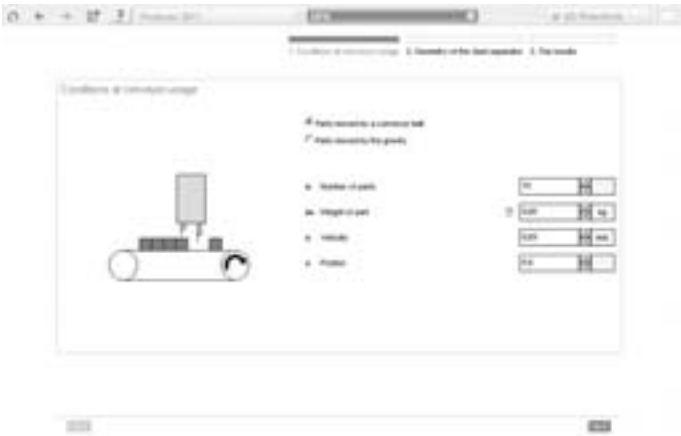
Type	Stroke of bellows	Min. diameter to be gripped	Min. diameter to be gripped	Max. operating frequency of gripper	Description
Bellows gripper DHEB 	3.5 ... 25 mm	8 ... 66 mm	11 ... 85 mm	0 ... 4 Hz	<ul style="list-style-type: none"> <li>11 sizes for 8 to 85 mm gripping diameter</li> <li>Upwards or downwards direction of movement of bellows</li> <li>Different bellows materials EPDM or silicone</li> <li>Air connection at side including centre hole or central from above</li> <li>Optimised process sequence with increased quality and prevents the workpieces from being scratched</li> <li>Additional safety with optional sensing via proximity switch or sensor</li> </ul> <a href="#">→ Internet: .../dgeb</a>



## Sealed grippers

Type	Total gripping force at 6 bar, closing	Stroke per gripper jaw	Position sensing	Gripping force backup	Description
Parallel gripper HGPD 	94 ... 3,716 N	3 ... 20 mm	Via proximity sensor	During closing, During opening	<ul style="list-style-type: none"> <li>The complete sealing of the gripper ensures smooth operation throughout its entire service life in the harshest of environments with dust or liquids</li> <li>The special shape of the drive piston permits maximum gripping force combined with reduced weight and an outstanding space/force ratio</li> <li>Reliable gripping, even under extremely tough conditions thanks to the optimal gripping force backup in the opening and closing functions</li> <li>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</li> </ul> <p>→ Internet: .../hgpd</p>
Three-point gripper HGDD 	336 ... 2,745 N	4 ... 12 mm	Via proximity sensor	During closing, During opening	<ul style="list-style-type: none"> <li>The complete sealing of the gripper ensures smooth operation throughout its entire service life in the harshest of environments with dust or liquids</li> <li>Reliable gripping, even under extremely tough conditions thanks to the optional gripping force backup in the opening and closing functions</li> <li>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</li> </ul> <p>→ Internet: .../hgdd</p>

Software tool




Feed separators

This tool helps you to select the right separator of the type HPV from Festo for your application. Let yourself be guided by the program and enter your general parameters and you will receive at least one suggestion for the product best suited to your application.

This tool can be found in the electronic catalogue for the product group, on the website under Support in the Engineering software area or on the DVD under Selection and sizing.

Feed separators

Type	Mode of operation	Piston diameter	Stroke	Theoretical force at 6 bar, advance stroke	Description
Feed separator HPV 	Double-acting	10 mm, 14 mm, 22 mm	10 ... 60 mm	45 ... 225 N	<ul style="list-style-type: none"><li>• For separating workpieces in the supply process</li><li>• Low-cost and reliable</li><li>• Just one valve required for actuation</li><li>• For position sensing</li></ul> <a href="#">➔ Internet: .../hvp</a>



Software tool




Configurator

Compile a product with numerous features reliably and quickly with the help of the configurator. Select all the required product features step-by-step. The use of logic checks ensures that only correct configurations are available for selection. The configurator is part of the electronic catalogue and is not available as a separate software program.




Handling modules

Type	Size	Theoretical force at 6 bar	Minimum cycle time	Y stroke	Z stroke	Repetition accuracy	Description
Handling module HSP 	12, 16, 25	40 ... 65 N	0.6 ... 1 s	52 ... 170 mm	20 ... 70 mm	+/-0.01 mm, +/-0.02 mm	<ul style="list-style-type: none"><li>• Function module for the automatic transfer, feed and removal of small parts in extremely confined spaces</li><li>• Guided vertical and horizontal motion sequence</li><li>• High precision and good rigidity</li><li>• Compact design</li><li>• Extremely short cycle times</li><li>• Cost-optimised</li><li>• Stroke adjustment along Y and Z-axes</li></ul> <a href="#">➔ Internet: .../hsp</a>
Handling module, pneumatic HSW-AP, HSW-AS 	10, 12, 16	30 ... 55 N	0.6 ... 1 s		80 ... 100 mm		<ul style="list-style-type: none"><li>• Function module for the automatic transfer, feed and removal of small parts in extremely confined spaces</li><li>• Guided swivel and linear motion</li><li>• High precision and good rigidity</li><li>• HSW-AP: pneumatic, with swivel module DSM; HSW-AS: without drive, with drive shaft</li><li>• Fast and compact</li><li>• Low-cost and ideal for universal use</li></ul> <a href="#">➔ Internet: .../hsw</a>





## Handling modules

Type	Size	Theoretical force at 6 bar	Minimum cycle time	Y stroke	Z stroke	Repetition accuracy	Description
Handling module, electric HSW-AE 	10, 12, 16		0.8 ... 1.2 s		80 ... 100 mm		<ul style="list-style-type: none"> <li>Function module for the automatic transfer, feed and removal of small parts in extremely confined spaces</li> <li>Guided swivel and linear motion</li> <li>High precision and good rigidity</li> <li>Electric, with motor unit MTR-DCI</li> <li>Freely positionable, freely selectable speed</li> <li>Smooth motion sequence</li> <li>Simple commissioning using teach-in procedure</li> </ul> → Internet: <a href="#">.../hsw</a>





## Pick &amp; Place

Type	Effective load	Description
Pick & Place 1.0 DGSL, SLT, SLTE 	0 ... 4 kg	<ul style="list-style-type: none"> <li>Compact design</li> <li>Lightweight components</li> <li>High load carrying capacity and precision</li> <li>Range of stroke lengths</li> <li>Very short cycle times</li> <li>Various cushioning variants</li> <li>High functionality thanks to the optimal clamping unit and end-position locking</li> <li>Freely positionable</li> </ul> → Internet: <a href="#">.../pick</a>
Pick & Place 2.0 HMP, DGSL, SLT, SLTE, EGSA 	0 ... 6 kg	<ul style="list-style-type: none"> <li>Very rigid and precise even with long strokes</li> <li>Intermediate position along Y and Z-axes</li> <li>Clamping unit along Y and Z-axes</li> <li>Freely positionable along Y and Z-axes</li> <li>Narrow front end area</li> <li>Highly dynamic response</li> </ul> → Internet: <a href="#">.../pick</a>
Pick & Place 3.0 HMP 	0 ... 10 kg	<ul style="list-style-type: none"> <li>Very rigid and precise even with long strokes</li> <li>Very high load carrying capacity thanks to high-quality guides</li> <li>Intermediate position</li> <li>Clamping unit and electrical interface along both axes</li> <li>Highly dynamic response with effective loads up to 6 kg</li> </ul> → Internet: <a href="#">.../pick</a>



## Linear gantries

Type	Effective load	Description
Linear gantry 1.0 SLG, DGSL, SLT, SLTE 	0 ... 2 kg	<ul style="list-style-type: none"> <li>• Very compact design thanks to the flat drive along the Y-axis and mini slide along the Z-axis</li> <li>• Multiple intermediate positions along the Y-axis</li> <li>• Positionable anywhere along the Z-axis</li> <li>• High precision in end and intermediate positions thanks to metal stops</li> </ul> → Internet: <a href="#">.../portal</a>
Linear gantry 2.0 DGPL, DGC, DGE 	0 ... 4 kg	<ul style="list-style-type: none"> <li>• Choice of pneumatic or electric (toothed belt or spindle) drive for horizontal axis</li> <li>• Any number of intermediate positions along the Y-axis with servopneumatic or electric axis</li> <li>• Additional functions such as intermediate positions and clamping unit along the Z-axis</li> <li>• DUO system structure for particularly high loads</li> </ul> → Internet: <a href="#">.../portal</a>
Linear gantry 3.0 DGPL, DGC, DGE, DGSL, SLT, SLTE 	0 ... 6 kg	<ul style="list-style-type: none"> <li>• Choice of pneumatic or electric (toothed belt or spindle) drive for horizontal axis</li> <li>• Very high dynamic response thanks to small moving load along the Y and Z-axes</li> <li>• Any number of intermediate positions along the Y-axis with servopneumatic or electric axis</li> <li>• DUO system structure for particularly high loads</li> </ul> → Internet: <a href="#">.../portal</a>
Linear gantry 4.0 DGPL, DGC, DGE, HMP, DGEA 	0 ... 10 kg	<ul style="list-style-type: none"> <li>• Choice of pneumatic or electric (toothed belt or spindle) drive for horizontal axis</li> <li>• Any number of intermediate positions along the Y and Z-axes</li> <li>• Extremely rigid Z-axis with additional functions such as intermediate positions and clamping unit</li> <li>• Highly dynamic response along the Z-axis due to the low moving load of the drive</li> <li>• DUO system structure for particularly high loads</li> </ul> → Internet: <a href="#">.../portal</a>

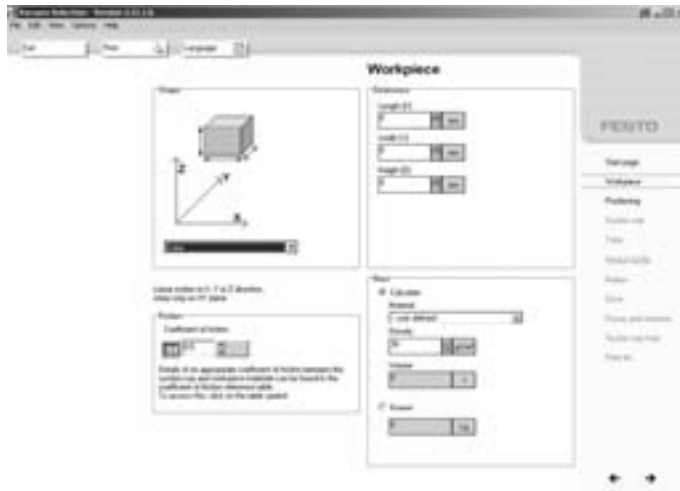
## Three-dimensional gantries

Type	Effective load	Description
Three-dimensional gantry 1.0 DGE, DGPL, DGC 	0 ... 4 kg	<ul style="list-style-type: none"> <li>Choice of pneumatic or electric drive for horizontal X and Y-axes</li> <li>Any number of intermediate positions along the X and Y-axes with servopneumatic or electric axes</li> <li>Additional functions such as intermediate positions (with through-travel capability) and clamping cartridge along the Z-axis</li> <li>DUO system type for particularly high loads</li> </ul> <p>→ Internet: <a href="#">.../portal</a></p>
Three-dimensional gantry 2.0 DGE, DGPL, DGC, DGSL, SLT, SLTE 	0 ... 6 kg	<ul style="list-style-type: none"> <li>Choice of pneumatic or electrical drive for horizontal X and Y-axes</li> <li>Any number of intermediate positions along the X and Y-axes with servopneumatic or electric axes</li> <li>Very high dynamic response thanks to double slide along the X-axis</li> <li>Pneumatic or electric drive on the Z-axis</li> <li>DUO system type for particularly high loads</li> </ul> <p>→ Internet: <a href="#">.../portal</a></p>
Three-dimensional gantry 3.0 DGE, DGPL, DGC, DGEA 	0 ... 10 kg	<ul style="list-style-type: none"> <li>Choice of pneumatic or electric drive for all axes</li> <li>Any number of intermediate positions along the X and Y-axes with servopneumatic or electric axes</li> <li>Choice of guide characteristics and drive concepts</li> <li>DUO system type for particularly high loads</li> </ul> <p>→ Internet: <a href="#">.../portal</a></p>
Three-dimensional gantry 4.0 DGE, DGPL, DGC, HMP 	0 ... 10 kg	<ul style="list-style-type: none"> <li>Choice of pneumatic or electric drive for horizontal X and Y-axes</li> <li>Any number of intermediate positions along the X and Y-axes with servopneumatic or electric axes</li> <li>Additional functions such as intermediate positions and clamping unit along the Z-axis</li> <li>DUO system type for particularly high loads</li> </ul> <p>→ Internet: <a href="#">.../portal</a></p>

## Planar surface gantries

Type	Effective load	Description
Planar surface gantry 1.0 – 3.0 DGE, DGP 	0 ... 6 kg	<ul style="list-style-type: none"> <li>• Repetition-accurate, centralised direct connection of axes</li> <li>• High level of process reliability thanks to integration of cables in energy chains</li> <li>• Defined handling system mounting interfaces for a mounting frame</li> <li>• Electric with toothed belt or spindle drive, pneumatic or servopneumatic</li> <li>• Any number of intermediate positions along the X and Y-axes</li> </ul> → Internet: <a href="#">.../portal</a>
Planar surface gantry 4.0 – 5.0 DGE, FDG 	0 ... 50 kg	<ul style="list-style-type: none"> <li>• Repetition-accurate, centralised direct connection of axes</li> <li>• High level of process reliability thanks to integration of cables in energy chains</li> <li>• Defined handling system mounting interfaces for a mounting frame</li> <li>• Electric with toothed belt or spindle drive, pneumatic or servopneumatic</li> <li>• Any number of intermediate positions along the X and Y-axes</li> </ul> → Internet: <a href="#">.../portal</a>

## Software tool






## Vacuum selection

Which suction cup for which surface and which movement? Don't experiment – calculate! This software tool even enables a differentiation between linear and rotary movements.

This tool can be found on the website under Support in the Engineering software area as a download or on the DVD under Selection and sizing.





## Vacuum generators

Type	Nominal size of laval nozzle	Ejector features	Integrated function	Max. vacuum	Max. suction rate with respect to atmosphere	Description
Vacuum generator OVEM 	0.45 ... 1.4 mm	Standard, High suction rate, High vacuum	Ejector pulse valve, electrical, Flow control valve, On-off valve, electrical, Filter, Air-saving circuit, electrical, Non-return valve, Silencer, open, Vacuum switch	93%	6 ... 50.5 l/min	<ul style="list-style-type: none"> <li>• Compact design</li> <li>• Monitoring and visualisation of the vacuum by means of vacuum sensor with LCD display</li> <li>• Central electrical connection via M12 plug</li> <li>• Maintenance-free operation and reduced noise level through integrated, open silencer</li> <li>• Integrated filter with inspection window for maintenance display</li> <li>• Adjustable ejector pulse</li> </ul> <p>→ Internet: <a href="#">.../ovem</a></p>
Vacuum generator VN 	0.45 ... 3 mm	In-line, Standard, High suction rate, High vacuum	Pneumatic ejector pulse, Silencer, open, Vacuum switch	86 ... 93%	6.1 ... 339 l/min	<ul style="list-style-type: none"> <li>• Can be used directly in the work space</li> <li>• Available as straight or T-shaped housing</li> <li>• No wearing parts</li> <li>• With or without vacuum switch</li> <li>• Integrated ejector pulse, electrical actuation for vacuum ON/OFF, combination of ejector pulse and actuation optional</li> </ul> <p>→ Internet: <a href="#">.../vn</a></p>
Vacuum generator cartridge VN 	0.45 ... 2 mm	Standard, High suction rate, High vacuum		92 ... 93%	7.2 ... 184 l/min	<ul style="list-style-type: none"> <li>• For fitting into customised housing for decentralised vacuum generation</li> </ul> <p>→ Internet: <a href="#">.../vn</a></p>







## Vacuum generators


FESTO

Type	Nominal size of laval nozzle	Ejector features	Integrated function	Max. vacuum	Max. suction rate with respect to atmosphere	Description
Vacuum generator VAD 	0.5 ... 1.5 mm	High vacuum		80%		<ul style="list-style-type: none"> <li>Sturdy aluminium housing</li> <li>Connection for additional external reservoir</li> <li>Maintenance-free</li> <li>See product documentation on our website for max. suction rate</li> </ul> <a href="#">Internet: .../vad</a>
Vacuum generator VAK 	1 mm	High vacuum	Pneumatic ejector pulse	80%		<ul style="list-style-type: none"> <li>Sturdy aluminium housing</li> <li>Connection for additional external reservoir</li> <li>Built-in reservoir</li> <li>Reliable setting down of workpieces</li> <li>See product documentation on our website for max. suction rate</li> </ul> <a href="#">Internet: .../vak</a>
Vacuum generator VADM, VADMI 	0.45 ... 3 mm	High vacuum	Ejector pulse valve, electrical, Flow control valve, On-off valve, electrical, Filter, Air-saving circuit, electrical, Non-return valve, Vacuum switch	85%		<ul style="list-style-type: none"> <li>Compact and sturdy design</li> <li>Built-in solenoid valve (on/off)</li> <li>Filter with contamination indicator</li> <li>Available with air-saving circuit, vacuum switch</li> <li>Reliable setting down of workpieces</li> <li>See product documentation on our website for max. suction rate</li> </ul> <a href="#">Internet: .../vadm</a>
Vacuum generator VAD-M, VAD-M-I 	0.7 ... 2 mm	High vacuum	Ejector pulse valve, electrical, On-off valve, electrical	85 ... 90%		<ul style="list-style-type: none"> <li>Compact and sturdy design</li> <li>Built-in solenoid valve (on/off)</li> <li>Reliable setting down of workpieces</li> <li>Maintenance-free because there are no moving parts</li> </ul> <a href="#">Internet: .../vad-m</a>



## Suction cups

Type	Suction cup size	Suction cup diameter	Breakaway force at 70% vacuum	Design	Information on suction cup materials	Description
Suction gripper ESG 	10x30 mm, 15x45 mm, 20x60 mm, 25x75 mm, 30x90 mm, 4x10 mm, 4x20 mm, 6x10 mm, 6x20 mm, 8x20 mm, 8x30 mm	2 ... 200 mm	0.1 ... 1,610 N	Oval, standard, Round, bellows, 1.5 convolutions, Round, bellows, 3.5 convolutions, Round, bell- shaped, Round, standard, Round, extra deep	FPM, NBR, Polyurethane, TPE-U (PU), VMQ (silicone)	<ul style="list-style-type: none"> <li>• Modular product of suction cup holder and suction cup with over 2,000 variants</li> <li>• Available with angle compensator, height compensator, filter</li> <li>• 15 suction cup diameters</li> <li>• 5 suction cup shapes</li> <li>• Suction cup volume: 0.002 ... 245 cm<sup>3</sup></li> <li>• Min. workpiece radius: 10 ... 680 mm</li> <li>• Vacuum port: push-in connector or barbed fitting connection for plastic tubing, threaded connection</li> </ul> <p>➔ <b>Internet: .../esg</b></p>
Suction cup holder ESH 				Vacuum port on top, Vacuum port at side, With height compensator		<ul style="list-style-type: none"> <li>• With or without height compensator</li> <li>• 6 holder sizes</li> <li>• 8 holder types</li> <li>• 3 tubing connections</li> </ul> <p>➔ <b>Internet: .../ESH</b></p>
Suction cup ESS 	10x30 mm, 15x45 mm, 20x60 mm, 25x75 mm, 30x90 mm, 4x10 mm, 4x20 mm, 6x10 mm, 6x20 mm, 8x20 mm, 8x30 mm	2 ... 200 mm	0.1 ... 1,610 N	Bellows, Oval, standard, Round, bellows, 1.5 convolutions, Round, bellows, 3.5 convolutions, Round, bell- shaped, Round, standard, Round, extra deep	FPM, NBR, Polyurethane, TPE-U (PU), VMQ (silicone)	<ul style="list-style-type: none"> <li>• Suction cup consisting of the suction cup itself, plus the support plate with mounting</li> <li>• Suction cup volume: 0.002 ... 245 cm<sup>3</sup></li> <li>• Min. workpiece radius: 10 ... 680 mm</li> <li>• Mounting for suction cup holder: female thread, male thread, push-in connector</li> </ul> <p>➔ <b>Internet: .../ess</b></p>
Suction cup ESV 		20 ... 200 mm	9.8 ... 1,610 N	Bellows, Round, bellows, 1.5 convolutions, Round, bellows, 3.5 convolutions, Round, bell- shaped, Round, standard, Round, extra deep	FPM, NBR, Polyurethane, TPE-U (PU), VMQ (silicone)	<ul style="list-style-type: none"> <li>• Suction cup wearing part</li> <li>• Easily interchangeable</li> <li>• Suction cup volume: 0.318 ... 245 cm<sup>3</sup></li> <li>• Min. workpiece radius: 10 ... 680 mm</li> </ul> <p>➔ <b>Internet: .../esv</b></p>



## Suction cups

Type	Suction cup size	Suction cup diameter	Breakaway force at 70% vacuum	Design	Information on suction cup materials	Description
Suction cup, bellows suction cup VAS, VASB 		1 ... 125 mm	0.035 ... 606 N	Vacuum port on top, Vacuum port at side, Round, bellows, 1.5 convolutions, Round, standard	NBR, TPE-U (PU), VMQ (silicone)	<ul style="list-style-type: none"> <li>• Sturdy and reliable</li> <li>• Suction cups with fixed connecting thread</li> <li>• 12 suction cup diameters</li> <li>• Round suction cup shape, bellows</li> <li>• Vacuum connection on top, at side</li> <li>• Free of copper, PTFE and silicone</li> <li>• Screw-in thread</li> </ul> ➔ <b>Internet: .../vas</b>


## Standards-based directional control valves

Type	Actuation type	Pneumatic connection 1	Standard nominal flow rate	Valve function	Electrical connection	Description
Solenoid valve, pneumatic valve VSVA, VSPA 	Electric, pneumatic	Sub-base size 1 to ISO 5599-1, Sub-base size 1 to ISO 5599-2, Sub-base size 18 mm to ISO 15407-1, Sub-base size 18 mm to ISO 15407-2, Sub-base size 2 to ISO 5599-1, Sub-base size 2 to ISO 5599-2, Sub-base size 26 mm to ISO 15407-1, Sub-base size 26 mm to ISO 15407-2	400 ... 2,900 l/min	2x3/2-way, single solenoid, closed, 2x3/2-way, single solenoid, open, 2x3/2-way, single solenoid, open/closed, 3/2-way, single solenoid, open/closed, 5/2-way, double solenoid, 5/2-way, double solenoid, dominant, 5/2-way, single solenoid, 5/3-way, pressurised, 5/3-way, exhausted, 5/3-way, closed, 5/3-way, connection 2 pressurised, 4 exhausted	2-pin, 3-pin, 4-pin, Type C, M12x1, M8x1, Plug, Central plug, With protective earth conductor, To DIN EN 175301-803, to ISO 15407-2, to ISO 5599-2, Without protective earth conductor, Round design	<ul style="list-style-type: none"> <li>Sturdy metal design</li> <li>Broad range of functions</li> <li>Highly flexible, modular valve range</li> <li>Vertical stacking with pressure regulator etc.</li> </ul> <p>➔ <b>Internet: .../vsva</b></p>
Solenoid valve, pneumatic valve MN1H, MFH, MDH, MEBH, JMN1H, JMFH, JMDH, JMEBH, VL, J, JD 	Electric, pneumatic	Connecting plate, Sub-base size 1 to ISO 5599-1, Sub-base size 2 to ISO 5599-1, Sub-base size 3 to ISO 5599-1, Sub-base size 4 to ISO 5599-1	1200 ... 6,000 l/min	5/2-way, double solenoid, 5/2-way, double solenoid, dominant, 5/2-way, single solenoid, 5/3-way, pressurised, 5/3-way, exhausted, 5/3-way, closed	Type A, M12x1, Plug, Central plug, To DIN 43650, Round design, Square design	<ul style="list-style-type: none"> <li>Sturdy metal design</li> <li>Extensive range of electrical connection options</li> <li>Port pattern to ISO 5599-1</li> </ul> <p>➔ <b>Internet: .../iso 5599-1</b></p>



## Standards-based directional control valves

Type	Actuation type	Pneumatic connection 1	Standard nominal flow rate	Valve function	Electrical connection	Description
Solenoid valve NVF3 	Electric	G1/4, NPT1/4-18	900 l/min	5/2-way, single solenoid, closed, 5/2-way, single solenoid		<ul style="list-style-type: none"> <li>Port pattern to Namur</li> <li>Direct mounting on drives</li> <li>Optional variants for use in Ex Zone I</li> <li>Flat</li> </ul> <b>→ Internet: .../namur</b>
Solenoid valve VSNB 	Electric	G1/4	950 l/min	5/2-way, double solenoid, 5/2-way, single solenoid, 5/2-way and 3/2-way, single solenoid	Type A, To DIN EN 175301-803	<ul style="list-style-type: none"> <li>Port pattern to Namur</li> <li>Direct mounting on drives</li> <li>Optional variants for use in Ex Zone I</li> <li>Short</li> </ul> <b>→ Internet: .../namur</b>


## Universal directional control valves, individual valves

Type	Actuation type	Pneumatic connection 1	Standard nominal flow rate	Valve function	Electrical connection	Description
Solenoid valve VUVG 	Electric	G1/8, M3, M5, M7	90 ... 780 l/min	2x3/2-way, single solenoid, closed, 2x3/2-way, single solenoid, open, 2x3/2-way, single solenoid, open/closed, 5/2-way, double solenoid, 5/2-way, single solenoid, 5/3-way, pressurised, 5/3-way, exhausted, 5/3-way, closed	Via E-box	<ul style="list-style-type: none"> <li>Compact</li> <li>Easy mounting</li> <li>Wide choice of variants</li> <li>High flow rate relative to its size</li> </ul> <b>→ Internet: .../vuvg</b>




## Universal directional control valves, individual valves

Type	Actuation type	Pneumatic connection 1	Standard nominal flow rate	Valve function	Electrical connection	Description
Solenoid valve VUVB 	Electric	Connecting plate, QS-6, QS-8	200 ... 1,000 l/min	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 4/2-way, double solenoid, 4/2-way, single solenoid, 5/2-way, double solenoid, 5/2-way, single solenoid	Type C, Plug, to EN 175301-803, Via sub-base	<ul style="list-style-type: none"> <li>In-line valve</li> <li>Semi in-line valve</li> <li>Sub-bases for individual valves</li> <li>Manifold rail for valve manifold with individual electrical connection or for valve terminal with electrical multi-pin connection</li> <li>Electrical connection via plug, square design to EN 175301-803, type C</li> </ul> → <b>Internet: .../vuvb</b>
Solenoid valve CPE10, CPE14, CPE18, CPE24 	Electric, Pneumatic	G1/4, G1/8, G3/8, M5, M7, QS-10, QS-12, QS-4, QS-6, QS-8	180 ... 3,200 l/min	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, double solenoid, 5/2-way, single solenoid, 5/3-way, pressurised, 5/3-way, exhausted, 5/3-way, closed	2-pin, 4-pin, Type C, M8x1	<ul style="list-style-type: none"> <li>High flow rate relative to its size</li> <li>Broad range of functions</li> <li>Comprehensive valve range</li> </ul> → <b>Internet: .../cpe</b>

## Universal directional control valves, individual valves


Type	Actuation type	Pneumatic connection 1	Standard nominal flow rate	Valve function	Electrical connection	Description
Solenoid valve VMPA1 	Electric	M7	230 ... 360 l/min	2x2/2-way, single solenoid, closed, 2x3/2-way, single solenoid, closed, 2x3/2-way, single solenoid, open, 2x3/2-way, single solenoid, open/closed, 3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, double solenoid, 5/2-way, single solenoid, 5/3-way, pressurised, 5/3-way, exhausted, 5/3-way, closed	4-pin, M8x1, Plug, To EN 60947-5-2	<ul style="list-style-type: none"> <li>• Supplements the valve terminals MPA</li> <li>• Mounted on individual sub-base</li> <li>• Comprehensive valve range</li> </ul> → Internet: .../vmpa1

## Universal directional control valves, individual valves




Type	Actuation type	Pneumatic connection 1	Standard nominal flow rate	Valve function	Electrical connection	Description
Solenoid valve CPASC1, CPPSC1 	Electric	Connecting plate	150 ... 220 l/min	2x2/2-way, single solenoid, closed, 2x3/2-way, single solenoid, closed, 2x3/2-way, single solenoid, open, 3/2-way, single solenoid, closed, 5/2-way, double solenoid, 5/2-way, single solenoid, 5/3-way, pressurised, 5/3-way, exhausted, 5/3-way, closed	3-pin, Plug	<ul style="list-style-type: none"> <li>• Wide choice of variants</li> <li>• Comprehensive valve range</li> </ul> → Internet: .../cpasc1
Solenoid valve, pneumatic valve, Tiger 2000 MFH, MVH, JMFH, JMVH, VL, J 	Electric, pneumatic	G1/8, G1/4, G3/8	750 ... 2,600 l/min	5/2-way, double solenoid, 5/2-way, single solenoid, 5/3-way, pressurised, 5/3-way, exhausted, 5/3-way, closed	Type B, To DIN EN 175301-803, Via F coil, to be ordered separately	<ul style="list-style-type: none"> <li>• Sturdy and reliable</li> <li>• Wide range of voltages</li> </ul> → Internet: .../tiger 2000
Solenoid valve, pneumatic valve, Tiger Classic MFH, MOFH, JMFH, JMFDH, VL/O, VL, JH, JDH 	Electric, pneumatic	G1/8, G1/4, G1/2, G3/4	500 ... 7,500 l/min	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, double solenoid, 5/2-way, double solenoid, dominant, 5/2-way, single solenoid, closed, 5/2-way, single solenoid	Via F coil, to be ordered separately	<ul style="list-style-type: none"> <li>• Sturdy and reliable</li> <li>• Wide range of voltages</li> <li>• All-metal valve</li> </ul> → Internet: .../tiger classic






## Universal directional control valves, individual valves

Type	Actuation type	Pneumatic connection 1	Standard nominal flow rate	Valve function	Electrical connection	Description
Solenoid valve, pneumatic valve, midi pneumatic MEBH, MOEBH, MEH, MOEH, JMEBH, JMEH, VL, J 	Electric, pneumatic	Connecting plate, G1/8	200 ... 700 l/min	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, double solenoid, 5/2-way, single solenoid, 5/3-way, pressurised, 5/3-way, exhausted, 5/3-way, closed	Plug, square design to EN 175 301-803, type C	<ul style="list-style-type: none"> <li>Semi in-line valve</li> <li>Sub-base valve</li> <li>Midi pneumatic: 18 mm width</li> <li>Manifold assembly for 2 ... 10 valves or individual mounting</li> <li>Electrical connection via plug, square design to EN 175301-803, type C</li> <li>Operating voltage 24 V DC, 110/230 V AC (50 ... 60 Hz)</li> </ul> <b>→ Internet: .../midi</b>



## Application-specific directional control valves

Type	Actuation type	Pneumatic connection 1	Standard nominal flow rate	Valve function	Electrical connection	Description
Solenoid valve MHA1, MHP1 	Electric	Connecting plate, QS-3, QS-4, Prepared for QSP10	10 ... 30 l/min	2/2-way, single solenoid, closed, 2x2/2-way, single solenoid, closed, 3/2-way, single solenoid, closed, 3/2-way, single solenoid, open	Plug, Plug KMH	<ul style="list-style-type: none"> <li>Semi in-line valve</li> <li>Sub-base valve</li> <li>Miniature valve: Grid dimension 10 mm</li> <li>Connecting plates</li> <li>Manifold block for 2 ... 10 valves</li> <li>Switching times down to 4 ms</li> <li>Operating voltage 5, 12 or 24 V DC</li> </ul> <b>→ Internet: .../mh1</b>
Solenoid valve MHE2, MHP2, MHA2, MHE3, MHP3, MHA3, MHE4, MHP4, MHA4 	Electric	Connecting plate, G1/4, G1/8, M7, QS-4, QS-6, QS-8	90 ... 400 l/min	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, single solenoid	2-pin, Cable, Plug	<ul style="list-style-type: none"> <li>In-line valve</li> <li>Semi in-line valve</li> <li>Sub-base valve</li> <li>Fast-switching valve: switching times down to 2 ms</li> <li>Direct mounting, individual sub-base, manifold assembly</li> <li>Manifold block for 2 ... 10 valves</li> <li>Grid dimension 14, 19, 24 mm</li> <li>Operating voltage 24 V DC</li> </ul> <b>→ Internet: .../mh2</b>
Solenoid valve MHJ9, MHJ10 	Electric	Connecting plate, QS-4, QS-6	50 ... 160 l/min	2/2-way, single solenoid, closed	2-pin, 3-wire, Cable, Plug KMH	<ul style="list-style-type: none"> <li>Sub-base valve</li> <li>Individual valve with integrated QS fitting</li> <li>For very fast sorting applications with up to 1,000 Hz</li> <li>Very long service life &gt; 2 billion switching cycles</li> <li>Outstanding reproducibility</li> </ul> <b>→ Internet: .../mhj9</b>





## Application-specific directional control valves

Type	Actuation type	Pneumatic connection 1	Standard nominal flow rate	Valve function	Electrical connection	Description
Solenoid valve VOVG 	Electric	Connecting plate, M5, M7	180 ... 200 l/min	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, single solenoid	2-pin, Plug	<ul style="list-style-type: none"> <li>In-line valve</li> <li>Semi in-line valve</li> <li>Sub-base valve</li> <li>Direct mounting, manifold assembly</li> <li>Manifold rail for 2 ... 10 valves</li> <li>Width 10, 12, 25 mm</li> <li>Operating voltage 5, 12 or 24 V DC</li> </ul> <b>→ Internet: .../vovg</b>
Solenoid valve VOFC, VOFD 	Electric	G1/2, G1/4, NPT1/4-18, Namur port pattern	450 ... 3,000 l/min	3/2-way, single solenoid, closed, 5/2-way, double solenoid, 5/2-way, single solenoid	Terminal box, cable entry thread M20x1.5	<ul style="list-style-type: none"> <li>For outdoor use under harsh ambient conditions, e.g. in refining thanks to sturdy design and high corrosion resistance</li> <li>Piloted piston spool and piston poppet valves</li> <li>In-line valve</li> <li>Variants with TÜV approval up to SIL4 to IEC 61508</li> <li>Shuttle valve can switch between internal and external pilot air</li> </ul> <b>→ Internet: .../vofc</b>
Solenoid valve CDVI5.0 	Electric	Connecting plate	300 ... 650 l/min	2/2-way, single solenoid, closed, 2/2-way, single solenoid, open, 2x3/2-way, single solenoid, closed, 2x3/2-way, single solenoid, open, 3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, double solenoid, 5/2-way, single solenoid, 5/3-way, pressurised, 5/3-way, exhausted, 5/3-way, closed	Multi-pin plug, cable 10 m	<ul style="list-style-type: none"> <li>Sub-base valve</li> <li>Corrosion-resistant</li> <li>Easy-to-clean design</li> <li>Also available as valve terminal type 15 CDVI</li> <li>Operating voltage 24 V DC</li> </ul> <b>→ Internet: .../cdvi5.0</b>




## Manually actuated directional control valves: Swivel lever valves

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Hand lever valve VHER 	4/3-way, exhausted, 4/3-way, closed	Direct	170 ... 4,300 l/min	G1/2, G1/4, G1/8, M5	-0.95 ... 10 bar	<ul style="list-style-type: none"> <li>With lever and detent</li> <li>Lever in metal or polymer design</li> <li>Front panel mounting, through or mounting holes</li> <li>Can also be used as 3/3-way valve by sealing port 2</li> </ul> <b>→ Internet: .../vher</b>
Hand lever valve H-3-1/4-B, H-5-1/4-B 	3/2-way, double solenoid, 5/2-way, double solenoid	Direct, Piloted	550 ... 600 l/min	G1/4	-0.95 ... 10 bar	<ul style="list-style-type: none"> <li>With hand lever</li> <li>Suitable for vacuum operation</li> <li>Die-cast aluminium design</li> </ul> <b>→ Internet: .../h-3-1/4</b>


## Manually actuated directional control valves: Pushbutton valves

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Pushbutton valve F-3-M5 	3/2-way, single solenoid, closed	Direct	80 l/min	M5	-0.95 ... 8 bar	<ul style="list-style-type: none"> <li>With pedal</li> <li>Suitable for vacuum operation</li> <li>Directly actuated</li> <li>Sturdy die-cast zinc design</li> </ul> <b>→ Internet: .../f-3-m5</b>
Pushbutton valve K/O-3-PK 	3/2-way, single solenoid, open/closed	Direct	80 l/min	PK-3	0 ... 8 bar	<ul style="list-style-type: none"> <li>With button switch</li> <li>Polymer design</li> <li>Ducted exhaust air</li> </ul> <b>→ Internet: .../k/o-3-pk</b>
Pushbutton valve K-3-M5 	3/2-way, single solenoid, closed	Direct	80 l/min	M5	-0.95 ... 8 bar	<ul style="list-style-type: none"> <li>With button switch</li> <li>Suitable for vacuum operation</li> <li>Sturdy die-cast zinc design</li> </ul> <b>→ Internet: .../k-3</b>
Pushbutton valve T-5/3-1/4	5/3-way, closed	Piloted	680 l/min	G1/4	2 ... 10 bar	<ul style="list-style-type: none"> <li>With pushbutton</li> <li>For positioning, for stopping in the event of an EMERGENCY-STOP and for holding a double-acting cylinder in any position</li> <li>Aluminium design</li> </ul> <b>→ Internet: .../t-5/3-1/4</b>
Robust palm operated valve PV-3-1/8 	3/2-way, single solenoid, closed	Direct	80 l/min	G1/8	-0.95 ... 8 bar	<ul style="list-style-type: none"> <li>With large actuating surface</li> <li>For heavy duty actuation</li> <li>Suitable for vacuum operation</li> </ul> <b>→ Internet: .../pv-3</b>



## Manually actuated directional control valves: Finger lever valves

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Finger lever valve TH/O-3-PK-3 	3/2-way, single solenoid, closed	Direct	80 l/min	PK-3	0 ... 8 bar	<ul style="list-style-type: none"> <li>With finger lever</li> <li>Polymer design</li> <li>Ducted exhaust air</li> </ul> <a href="#">Internet: .../th*</a>
Finger lever valve TH-3-M5, TH-3-1/4-B, TH-5-1/4-B, THO-3-1/4-B 	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, single solenoid	Direct	80 ... 600 l/min	G1/4, M5	-0.95 ... 10 bar	<ul style="list-style-type: none"> <li>With finger lever</li> <li>Suitable for vacuum operation</li> <li>Die-cast zinc or die-cast aluminium design</li> </ul> <a href="#">Internet: .../th-3-m5</a>
Finger lever valve H-4/3 	4/3-way, exhausted	Piloted	125 l/min	M5	0... 8 bar	<ul style="list-style-type: none"> <li>With detenting finger lever</li> <li>Front panel mounting or mounting on sub-base</li> <li>Aluminium design</li> </ul> <a href="#">Internet: .../h-4/3</a>


## Manually actuated directional control valves: Toggle lever valves

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Toggle lever valve KH/O-3-PK-3 	3/2-way, single solenoid, open/closed	Direct	80 l/min	PK-3	0 ... 8 bar	<ul style="list-style-type: none"> <li>With toggle lever</li> <li>Directly actuated</li> <li>Polymer design</li> <li>Ducted exhaust air</li> </ul> <a href="#">Internet: .../kh*</a>
Toggle lever valve H-5/3-1/4	5/3-way, closed	Piloted	680 l/min	G1/4	2 ... 10 bar	<ul style="list-style-type: none"> <li>With toggle lever</li> <li>For positioning, for stopping in the event of an EMERGENCY-STOP and for holding a double-acting cylinder in any position</li> <li>Aluminium design</li> </ul> <a href="#">Internet: .../h-5/3-1/4</a>



## Manually actuated directional control valves: Foot valves

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Foot valve with detent F-3-1/4-B, FO-3-1/4-B, F-5-1/4-B 	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, single solenoid	Direct	550 ... 600 l/min	G1/4	-0.95 ... 10 bar	<ul style="list-style-type: none"> <li>With foot pedal</li> <li>Suitable for vacuum operation</li> <li>Sturdy die-cast zinc design</li> </ul> <b>→ Internet: .../fo-3</b>
Foot valve with detent FP-3-1/4-B, FPB-3-1/4, FP-5-1/4-B 	3/2-way, single solenoid, closed, 5/2-way, single solenoid	Direct	550 ... 600 l/min	G1/4	-0.95 ... 10 bar	<ul style="list-style-type: none"> <li>With foot pedal with detent</li> <li>Suitable for vacuum operation</li> <li>Sturdy die-cast zinc design</li> </ul> <b>→ Internet: .../fpb-3</b>


## Manually actuated directional control valves: Selector switches

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Selector switch HW-6-38 	3/6	Direct	180 l/min	M5	0 ... 8 bar	<ul style="list-style-type: none"> <li>With rotary knob and arrow</li> <li>Front panel mounting or mounting on sub-base</li> <li>With six switching positions</li> </ul> <b>→ Internet: .../hw-6</b>





## Manually actuated directional control valves: Front panel valves

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Front panel valve SV/O-3-PK-3x2 	2x3/2-way, single solenoid, closed	Direct	70 l/min	PK-3	0 ... 8 bar	<ul style="list-style-type: none"> <li>Basic valve for actuator attachments such as toggle levers, selector switches</li> <li>Polymer design</li> <li>Reliable coupling system for rapid assembly and dismantling</li> </ul> <b>→ Internet: .../sv/o</b>
Front panel valve SVS-3-1/8, SVS, SVSO-3-1/8 	3/2-way, single solenoid, closed, 4/2-way, single solenoid	Direct	120 l/min	G1/8	3.5 ... 8 bar	<ul style="list-style-type: none"> <li>Basic valve for actuator attachments such as pushbutton actuators, mushroom pushbuttons, mushroom actuators, selector switches, toggle levers, key actuators</li> <li>Reliable coupling system enables rapid assembly and dismantling</li> <li>Front panel mounting</li> </ul> <b>→ Internet: .../svos</b>



## Manually actuated directional control valves: Front panel valves

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Front panel valve SV-3-M5, SV-5-M5-B 	3/2-way, single solenoid, closed, 5/2-way, single solenoid	Direct	65 ... 95 l/min		-0.95 ... 8 bar	<ul style="list-style-type: none"> <li>• Basic valve for actuator attachments such as pushbutton actuators, mushroom pushbuttons, mushroom pushbuttons with detent, selector switches, toggle levers</li> <li>• Front panel mounting</li> <li>• Suitable for vacuum operation</li> <li>• Plastic design</li> <li>• Reliable coupling system for rapid assembly and dismantling</li> </ul> → Internet: .../sv-3




## Mechanically actuated directional control valves: Stem actuated valves

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Stem actuated valve V/O-3-PK-3, V/O-3-1/8 	3/2-way, single solenoid, open/closed	Direct	80 ... 140 l/min	G1/8, PK-3	-0.95 ... 8 bar	<ul style="list-style-type: none"> <li>• With plunger or actuator attachments as required</li> <li>• Through-holes in housing</li> <li>• Polymer or aluminium design</li> </ul> → Internet: .../v/o-3
Stem actuated micro valve S-3-PK-3-B, SO-3-PK-3-B 	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open	Direct	60 l/min	PK-3	-0.95 ... 8 bar	<ul style="list-style-type: none"> <li>• With plunger for actuator attachments such as pushbutton actuators, toggle levers</li> <li>• Dimensions to DIN 41635, type A</li> <li>• Polymer design</li> </ul> → Internet: .../s-3-pk
Stem actuated valve VS-3-1/8, VS-4-1/8, VOS-3-1/8 	3/2-way, single solenoid, closed, 4/2-way, single solenoid	Piloted	120 l/min	G1/8	3.5 ... 8 bar	<ul style="list-style-type: none"> <li>• With plunger</li> <li>• Aluminium design</li> <li>• Minimal actuating force with pilot control</li> <li>• Can also be used as 2/2-way valve by plugging the exhaust</li> </ul> → Internet: .../vos
Stem actuated valve V-3-1/4-B, V-5-1/4-B, VO-3-1/4-B 	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, single solenoid	Direct	550 ... 600 l/min	G1/4	-0.95 ... 10 bar	<ul style="list-style-type: none"> <li>• With plunger</li> <li>• Suitable for vacuum operation</li> <li>• Directly actuated</li> <li>• Die-cast aluminium design</li> </ul> → Internet: .../vo-3




## Mechanically actuated directional control valves: Stem actuated valves

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Limit valve SDK-3-PK-3, SDK-4-PK-3 	3/2-way, single solenoid, closed	Direct	16 l/min	PK-3	0 ... 8 bar	<ul style="list-style-type: none"> <li>Can be used for stroke-dependent signal generation as a limit switch and fixed stop</li> <li>For end-position sensing and position control</li> <li>High accuracy</li> <li>Stainless steel design</li> </ul> → Internet: .../sdk
Limit stop signal generator SDV-2-B, SDV-3 	3/2-way, closed, single solenoid	Direct	16 l/min	PK-3	0 ... 8 bar	<ul style="list-style-type: none"> <li>Can be used for stroke-dependent signal generation as a limit switch and fixed stop</li> <li>For end-position sensing and position control</li> <li>High precision and low actuating forces</li> <li>Compact dimensions</li> <li>Use in contaminated environments</li> </ul> → Internet: .../sdv



## Mechanically actuated directional control valves: Roller lever valves

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Roller lever valve R/O-3-PK-3 	3/2-way, single solenoid, open/closed	Direct	80 l/min	PK-3	0 ... 8 bar	<ul style="list-style-type: none"> <li>With roller lever</li> <li>Directly actuated</li> <li>Polymer design</li> <li>Ducted exhaust air</li> </ul> → Internet: .../r/o-3-pk
Roller lever valve RS-3-1/8, RS-4-1/8, ROS-3-1/8 	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 4/2-way, single solenoid	Piloted	120 l/min	G1/8	3.5 ... 8 bar	<ul style="list-style-type: none"> <li>With roller lever</li> <li>Indirectly actuated</li> <li>Aluminium design</li> <li>Minimal actuating force with pilot control</li> <li>Can also be used as 2/2-way valve by plugging the exhaust</li> </ul> → Internet: .../ros-3
Roller lever valve R-3-M5, R-3-1/4-B, R-5-1/4-B, RO-3-1/4-B 	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, single solenoid	Direct	80 ... 600 l/min	G1/4, M5	-0.95 ... 10 bar	<ul style="list-style-type: none"> <li>With roller lever</li> <li>Suitable for vacuum operation</li> <li>Directly actuated</li> <li>Die-cast aluminium design</li> </ul> → Internet: .../ro-3

## Mechanically actuated directional control valves: Roller lever valves with idle return


Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Roller lever valve with idle return L/O, L/O-3-PK-3 	3/2-way, single solenoid, open/closed	Direct	80 l/min	PK-3	0 ... 8 bar	<ul style="list-style-type: none"> <li>• With roller lever with idle return</li> <li>• Directly actuated</li> <li>• Polymer design</li> <li>• Ducted exhaust air</li> </ul> → Internet: .../l/o-3
Toggle lever valve LS-3-1/8, LS-4-1/8, LOS-3-1/8 	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 4/2-way, single solenoid	Piloted	120 l/min	G1/8	3.5 ... 8 bar	<ul style="list-style-type: none"> <li>• With toggle lever</li> <li>• Indirectly actuated</li> <li>• Aluminium design</li> <li>• Minimal actuating force with pilot control</li> <li>• Can also be used as 2/2-way valve by plugging the exhaust</li> </ul> → Internet: .../los-3
Roller lever valve with idle return L-3-M5, L-3-1/4-B, L-4-1/4-B, LO-3-1/4-B 	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open, 5/2-way, single solenoid	Direct	80 ... 600 l/min	G1/4, M5	-0.95 ... 10 bar	<ul style="list-style-type: none"> <li>• With roller lever</li> <li>• Suitable for vacuum operation</li> <li>• Directly actuated</li> <li>• Die-cast aluminium design</li> </ul> → Internet: .../lo-3

## Mechanically actuated directional control valves: Swivel lever valves


Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Swivel lever valve RW/O-3-1/8 	3/2-way, single solenoid, open/closed	Direct	140 l/min	G1/8	-0.95 ... 8 bar	<ul style="list-style-type: none"> <li>• Basic valve for actuator attachments such as swivel lever short, long, swivel lever rod</li> <li>• Suitable for vacuum operation</li> <li>• Directly actuated</li> <li>• Aluminium design</li> </ul> → Internet: .../rw/o-3
Pneumatic limit valve RWN/O-3-1/8-B 	3/2-way, single solenoid, open/closed	Direct	120 l/min	G1/8	-0.95 ... 8 bar	<ul style="list-style-type: none"> <li>• Directly actuated in one direction</li> <li>• Suitable for vacuum operation</li> <li>• Aluminium design</li> </ul> → Internet: .../rw/o-3




## Mechanically actuated directional control valves: Swivel lever valves

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Swivel lever valve RW-3-M5 	3/2-way, single solenoid, closed	Direct	80 l/min	M5	-0.95 ... 8 bar	<ul style="list-style-type: none"> <li>• With swivel lever</li> <li>• Additional actuator attachments such as swivel lever short, long, swivel lever rod</li> <li>• Suitable for vacuum operation</li> <li>• Directly actuated</li> <li>• Sturdy die-cast zinc design</li> </ul> <p>➔ Internet: .../rw-3</p>





## Mechanically actuated directional control valves: Whisker valves

Type	Valve function	Type of control	Standard nominal flow rate	Pneumatic working line	Operating pressure	Description
Whisker valve FVS-3-1/8, FVSO-3-1/8 	3/2-way, single solenoid, closed, 3/2-way, single solenoid, open	Piloted	120 l/min	G1/8	3.5 ... 8 bar	<ul style="list-style-type: none"> <li>• With whisker</li> <li>• Especially suitable for sensing of dissimilar workpieces or workpieces not precisely in position</li> <li>• Indirectly actuated</li> <li>• Aluminium design</li> <li>• Minimal actuating force with pilot control</li> <li>• Can also be used as 2/2-way valve by plugging the exhaust</li> </ul> <p>➔ Internet: .../fvs-3</p>



## Non-return valves and quick exhaust valves

Type	Pneumatic connection 1	Standard nominal flow rate	Standard flow rate exhaust 6→0 bar	Standard nominal flow rate pressurisation 6→5 bar	Standard nominal flow rate 1→2 (6-5)	Operating pressure	Description
Non-return valve H, HA, HB 	G1/8, G1/4, G3/8, G1/2, G3/4, M5, QS-4, QS-6, QS-8, QS-10, QS-12, R1/8, R1/4, R3/8, R1/2	115 ... 2,230 l/min			1,000 ... 5,900 l/min	-1 ... 12 bar	<ul style="list-style-type: none"> <li>• Valve function: Non-return function</li> <li>• Screw-in or in-line installation</li> <li>• With connecting thread at both ends, push-in connector at both ends, thread/push-in connector</li> </ul> <p>➔ Internet: .../h-qs</p>


## Non-return valves and quick exhaust valves

Type	Pneumatic connection 1	Standard nominal flow rate	Standard flow rate exhaust 6->0 bar	Standard nominal flow rate pressurisation 6->5 bar	Standard nominal flow rate 1->2 (6-5)	Operating pressure	Description
Non-return valve HGL 	G1/8, G1/4, G3/8, G1/2, M5, QS-4, QS-6, QS-8, QS-10, QS-12				130 ... 1,600 l/min	0.5 ... 10 bar	<ul style="list-style-type: none"> <li>Valve function: piloted non-return function</li> <li>Pneumatically piloted</li> <li>Screw-in with male thread</li> <li>Pilot air connection: M5, G1/8, G1/4, G3/8, QS-4</li> </ul> → Internet: .../hgl
Manual override HAB 	G1/8, G1/4, G3/8, G1/2						<ul style="list-style-type: none"> <li>Valve function: exhaust component</li> <li>For non-return valve HGL</li> <li>For manual exhausting of air trapped in a cylinder</li> </ul> → Internet: .../hab
Quick exhaust valve VBQF 	G1/8, QS-6		1,300 l/min	350 l/min		0.5 ... 10 bar	<ul style="list-style-type: none"> <li>Minimal height</li> <li>High flow rate</li> <li>Improved noise emissions</li> <li>Rotatable (but continuous rotatability of the connection should be avoided)</li> </ul> → Internet: .../vbqf
Quick exhaust valve SE, SEU 	G1/8, G1/4, G3/8, G1/2, G3/4		1,000 ... 6,500 l/min	300 ... 4,560 l/min		0.2 ... 10 bar	<ul style="list-style-type: none"> <li>Valve function: Quick exhaust</li> <li>Non-return valve, piloted</li> <li>Screw-in</li> <li>With or without silencer</li> </ul> → Internet: .../se



## Ball valves and on-off valves

Type	Valve function	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Description
On-off valve HE 	2/2-way, double solenoid, 3/2-way, double solenoid	QS-6, QS-8, QS-10, QS-12, R1/8, R1/4, R3/8, R1/2	270 ... 840 l/min	-0.95 ... 10 bar	<ul style="list-style-type: none"> <li>Non-return valve, piloted</li> <li>Connection: thread at both ends, push-in connector at both ends, thread/push-in connector</li> </ul> → Internet: .../he
Hand slide valve W 	3/2-way, double solenoid	G1/8, G1/4, G3/8, G1/2, G3/4, M5	120 ... 6,800 l/min	-0.95 ... 10 bar	<ul style="list-style-type: none"> <li>Shut-off valve, manually actuated</li> <li>In-line installation</li> <li>Suitable for vacuum operation</li> <li>Metal design</li> </ul> → Internet: .../w-3




## Ball valves and on-off valves

Type	Valve function	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Description
Ball valve QH, QHS 	2/2-way, double solenoid	G1/4, G3/8, G1/2, G3/4, G1, G1 1/2, QS-4, QS-6, R1/8	148 ... 84,000 l/min	-1 ... 10 bar	<ul style="list-style-type: none"> <li>Shut-off valve, manually actuated</li> <li>In-line installation, can be screwed in, bulkhead fitting</li> <li>Variants: thread at both ends, push-in connector at both ends, thread/push-in connector</li> </ul> → Internet: .../qh


## Pressure regulators

Type	Pressure regulation range	Standard nominal flow rate	Nominal flow rate, closed	Nominal flow rate, open	Pneumatic connection 1	Pneumatic connection 2	Description
Pressure regulator LR-QS, LRMA-QS 	1 ... 8 bar	22 ... 150 l/min			G1/8, G1/4, M5, QS-4, QS-6, QS-8	QS-4, QS-6, QS-8	<ul style="list-style-type: none"> <li>Piston regulator with through pressure supply</li> <li>Available with pressure gauge</li> <li>Directly actuated</li> <li>Connections: push-in connector at both ends, thread/push-in connector</li> <li>Push-in connector, can be rotated 360°</li> </ul> → Internet: .../lrma
Differential pressure regulator LRL, LRLL 	2 ... 6 bar		30 ... 730 l/min	30 ... 760 l/min	G1/8, G1/4, G3/8, G1/2, M5	QS-4, QS-6, QS-8, QS-10, QS-12	<ul style="list-style-type: none"> <li>Piston regulator with through pressure supply</li> <li>Without pressure gauge</li> <li>Connections: thread/push-in connector on top or at side</li> <li>Push-in connector, can be rotated 360°</li> </ul> → Internet: .../lrl






## One-way flow control valves

Type	Valve function	Pneumatic connection 1	Standard nominal flow rate in flow control direction	Adjustment component	Description
One-way flow control valve GRLA, GRLZ, GRLSA, GRGA, GRGZ, GR, GRA, GRE, GRU, GRF, GRP 	Exhaust air one-way flow control function, One-way flow control function, Supply air one-way flow control function	G1/8, G1/4, G3/8, G1/2, G3/4, M3, M5, PK-3, PK-3 with union nut, PK-4, PK-4 with union nut, PK-6 with union nut, QS-3, QS-4, QS-6, QS-8, QS-10, QS-12	0 ... 4,320 l/min	Rotary knob with scale, Internal hex, Knurled screw, Slotted head screw	<ul style="list-style-type: none"> <li>Flow control valve, flow control at one end</li> <li>Exhaust air or supply air flow control</li> <li>Standard, mini, in-line variants with different flow rates</li> <li>Functional combination with one-way flow control valve and piloted non-return valve</li> <li>Flow control/silencer</li> <li>Polymer, metal, stainless steel design</li> <li>Connections: thread at both ends, push-in connector at both ends, thread/push-in connector</li> </ul> <p>→ Internet: .../grla</p>
One-way flow control valve GRXA-HG 	One-way flow control function for exhaust air and piloted non-return valve	QS-4, QS-6, QS-8	130 ... 280 l/min	Slotted head screw	<ul style="list-style-type: none"> <li>Functional combination with one-way flow control valve and piloted non-return valve</li> <li>Holding function and speed setting in one housing</li> <li>Additional supply port for holding crossover interlinking</li> </ul> <p>→ Internet: .../grxa-hg</p>
One-way flow control valve VFOC 	Supply air one-way flow control function	QS-4, QS-6	0 ... 270 l/min	Slotted head screw	<ul style="list-style-type: none"> <li>Shut-off valve, flow control at one end</li> <li>Polymer, metal design</li> <li>Precision adjustment for low and medium speeds</li> <li>Thread/push-in connector, push-in connector/push-in sleeve</li> </ul> <p>→ Internet: .../vfov</p>




## Flow control valves

Type	Valve function	Pneumatic connection 1	Standard nominal flow rate in flow control direction	Adjustment component	Description
Flow control valve GRLO, GRGO, GRO, GRPO 	Flow control function	G1/8, G1/4, M3, M5, PK-3, PK-4, QS-3, QS-4, QS-6	1.65 ... 350 l/min	Rotary knob with scale, Knurled screw, Slotted head screw	<ul style="list-style-type: none"> <li>Flow control valve, flow control at both ends</li> <li>Standard, mini, in-line flow control valve</li> <li>Polymer, metal design</li> <li>Precision adjustment for low and medium speeds</li> <li>Connections: thread at both ends, push-in connector at both ends, thread/push-in connector</li> </ul> <p>→ Internet: .../grlo</p>



## Proportional valves

Type	Valve function	Pneumatic connection 1	Pressure regulation range	Standard nominal flow rate	Description
Proportional pressure regulator VPPM 	3-way proportional pressure regulator	Connecting plate, G1/4, G1/8, NPT1/4-18	0.02 ... 10 bar	380 ... 2,750 l/min	<ul style="list-style-type: none"> <li>In-line valve</li> <li>Sub-base valve, flanged valve</li> <li>Piloted diaphragm regulator</li> <li>Integration in valve terminal MPA via fieldbus</li> <li>Multi-sensor control</li> <li>High repetition accuracy</li> <li>User interface with LED displays, LCD display, adjustment/selection buttons</li> <li>Setpoint value input as analogue voltage or current signal</li> <li>Integrated pressure sensor</li> <li>Electrical connection via plug, round design, 8-pin, M12 or terminal linking</li> </ul> → Internet: .../vppm
Proportional pressure regulator VPPE 	3-way proportional pressure regulator, 3-way proportional pressure regulator, closed	G1/8	0.02 ... 10 bar	310 ... 1,250 l/min	<ul style="list-style-type: none"> <li>Piloted diaphragm regulator</li> <li>Setpoint input as analogue voltage signal</li> <li>Electrical connection via M12x1 plug, 4-pin</li> <li>Available with setpoint module</li> </ul> → Internet: .../vppe
Proportional pressure regulator MPPE 	3-way proportional pressure regulator, closed	G1/8, G1/4, G1/2	0 ... 10 bar		<ul style="list-style-type: none"> <li>Piloted diaphragm regulator</li> <li>Setpoint value input as analogue voltage or current signal</li> <li>Pressure regulation ranges can be selected</li> <li>Electrical connection via plug, round design to DIN 45326, M16 x 0.75, 8-pin</li> <li>Available with setpoint module</li> <li>See product documentation on our website for standard nominal flow rate</li> </ul> → Internet: .../mppe
Proportional pressure regulator MPPEs 	3-way proportional pressure regulator, closed	G1/8, G1/4, G1/2	0 ... 10 bar		<ul style="list-style-type: none"> <li>Piloted diaphragm regulator</li> <li>Setpoint value input as analogue voltage or current signal</li> <li>Pressure regulation ranges can be selected, individual pressure regulation ranges on request</li> <li>Electrical connection via plug, round design to DIN 45326, M16 x 0.75, 8-pin</li> <li>Available with setpoint module</li> <li>See product documentation on our website for standard nominal flow rate</li> </ul> → Internet: .../mppes
Proportional directional control valve MPYE 	5/3, Closed	G1/8, G1/4, G3/8, M5		100 ... 2,000 l/min	<ul style="list-style-type: none"> <li>Regulated piston spool valve</li> <li>Analogue actuation</li> <li>Setpoint input as voltage signal (0 ... 10 V)</li> <li>Suitable for servopneumatic applications with SPC200 and SPC11</li> </ul> → Internet: .../mpye


## Process/media valves

Type	Design	Valve function	Standard nominal flow rate	Flow rate Kv	Process valve connection	Actuation type	Description
Ball valve VAPB 	2-way ball valve			5.9 ... 1,414 m <sup>3</sup> /h	NPT1/4, NPT3/8, NPT1/2, NPT3/4, NPT1, NPT1 1/4, NPT1 1/2, NPT2, NPT2 1/2, NPT3, NPT4, Rp1/4, Rp3/8, Rp1, Rp1 1/4, Rp1 1/2, Rp1/2, Rp3/4, Rp2, Rp2 1/2, Rp3, Rp4	Mechanical	<ul style="list-style-type: none"> <li>2-way on-off valve</li> <li>Brass design</li> <li>Mechanically actuated</li> <li>Manual actuation via accessories</li> <li>Connecting thread to DIN 2999</li> <li>Mounting flange to ISO 5211</li> <li>Centring attachment for simple automation</li> </ul> → Internet: .../vapb
Ball valve VZBA 	3-way ball valve, L-hole, T-hole			4.5 ... 100 m <sup>3</sup> /h	Rp1/4, Rp3/8, Rp1/2, Rp3/4, Rp1, Rp1 1/2, Rp1 1/4, Rp2	Mechanical	<ul style="list-style-type: none"> <li>3-way on-off valve</li> <li>Stainless steel design</li> <li>Mechanically actuated</li> <li>Manual actuation via accessories</li> <li>Connecting thread to DIN 2999</li> <li>Mounting flange to ISO 5211</li> <li>Centring attachment for simple automation</li> </ul> → Internet: .../vzba
Ball valve VZPR 	2-way ball valve, Semi-rotary drive	2/2			Rp1/4, Rp3/8, Rp1/2, Rp3/4, Rp1, Rp1 1/4, Rp1 1/2, Rp2, Rp2 1/2, Rp3, Rp4	Electric, Pneumatic	<ul style="list-style-type: none"> <li>Pneumatic semi-rotary drive, double-acting and 2-way on-off valve</li> <li>Flow is fully opened or closed in both directions</li> <li>Brass or stainless steel design</li> <li>Port pattern as per NAMUR to VDE/VDI 3845</li> </ul> → Internet: .../vzpr


## Electrical directional control valves

Type	Design	Valve function	Standard nominal flow rate	Flow rate Kv	Process valve connection	Actuation type	Description
Solenoid valve MN1H-2 	Diaphragm valve	2/2, Single solenoid	2,000 ... 30,500 l/min		G1/4, G3/8, G1/2, G3/4, G1, G1 1/2	Electric	<ul style="list-style-type: none"> <li>Poppet valve</li> <li>Brass design</li> <li>Adjustable closing cushioning</li> <li>In-line mounting or via through-holes</li> <li>Operating voltage 24 V DC, 110/230 V AC (50 ... 60 Hz)</li> <li>Electrical connection via plug, square design to EN 175301-803, type A</li> </ul> <b>➔ Internet: .../mn1h-2</b>
Solenoid valve VZWM 	Poppet valve with diaphragm seal	2/2-way, single solenoid, closed	1,400 ... 31,000 l/min	1.6 ... 39 m3/h	G1/4, G3/8, G1/2, G3/4, G1, G1 1/4, G1 1/2, G2	Electric	<ul style="list-style-type: none"> <li>Diaphragm valve</li> <li>Indirectly actuated</li> <li>Brass or special steel casting design</li> <li>Wide range of coils</li> <li>Electrical connection via solenoid armature tube system 8 or 13</li> <li>Voltage 24 V DC, 110, 230 V AC</li> </ul> <b>➔ Internet: .../vzwm-l</b>







## Angle seat valves

Type	Design	Valve function	Standard nominal flow rate	Flow rate Kv	Process valve connection	Actuation type	Description
Angle seat valve VZXF 	Poppet valve with spring return	2/2-way, single solenoid, closed	3,000 ... 50,700 l/min	2.8 ... 47.5 m3/h	G1/2, G3/4, G1, G1 1/4, G1 1/2, G2, NPT1/2, NPT3/4, NPT1, NPT1 1/4, NPT1 1/2, NPT2	Pneumatic	<ul style="list-style-type: none"> <li>Insensitive to steam or slightly contaminated media</li> <li>No pressure differential required between the inlet and outlet</li> <li>Low flow resistance</li> <li>No dead space</li> <li>Long service life</li> <li>Low-maintenance</li> </ul> <b>➔ Internet: .../vzxf</b>

## Pneumatic directional control valves

Type	Design	Valve function	Standard nominal flow rate	Flow rate Kv	Process valve connection	Actuation type	Description
Pneumatic valve VLX 	Diaphragm valve	2/2, Single solenoid	2,400 ... 14,000 l/min		G1/4, G3/8, G1/2, G3/4, G2	Pneumatic	<ul style="list-style-type: none"> <li>Poppet valve</li> <li>Indirectly actuated</li> <li>Brass design</li> <li>In-line mounting or via through-holes</li> </ul> <b>➔ Internet: .../vlx</b>



## M5 Compact System

Type		Description
M5 Compact System MUFH, MFH, JMFH, VL/O, J, VL, JD, VZ, VZO, OS, ZK, GRF, PE, VPE, PEN, PZA, PZV, PZVT 		<ul style="list-style-type: none"> <li>• Complete system offering control components with all the functions required for pneumatic sequence controls</li> <li>• Solenoid and pneumatic valves</li> <li>• Time delay valves</li> <li>• Logic components</li> <li>• One-way flow control valves</li> <li>• Pressure switches</li> <li>• Pneumatic counters</li> <li>• Pneumatic timers</li> <li>• For control cabinet installation</li> <li>• Fast replacement of components</li> </ul> <p>➔ <b>Internet: .../m5-compact</b></p>
Quickstepper and Commander FSS, FSSC 		<ul style="list-style-type: none"> <li>• Quickstepper: pneumatic-mechanical sequencer with 12 steps and start logic circuits; ready-to-install sequence controller; acknowledgement-controlled motion sequences</li> <li>• Commander: command module for use with Quickstepper, including the most important functions for pneumatic sequencers</li> </ul> <p>➔ <b>Internet: .../fss</b></p>
Control block for two-hand start ZSB 		<ul style="list-style-type: none"> <li>• Standard nominal flow rate &gt;50 l/min</li> <li>• Nominal size: 4 mm</li> <li>• Pneumatic connection: G1/8</li> <li>• Safety component in accordance with EU Machinery Directive</li> <li>• Poppet valve</li> <li>• Mounting thread or through-holes in housing</li> </ul> <p>➔ <b>Internet: .../zsb</b></p>
Counter PZA, PZV 		<ul style="list-style-type: none"> <li>• Mechanical counter with pneumatic drive</li> <li>• Through-holes in housing or front panel mounting</li> <li>• Reset via pushbutton or pneumatic signal</li> <li>• Available with protective cap</li> </ul> <p>➔ <b>Internet: .../pza</b></p>
Timer PZVT 		<ul style="list-style-type: none"> <li>• Mechanical sequence counter with pneumatic drive</li> <li>• Adjustable delay time</li> <li>• Front panel mounting</li> <li>• Mounting on G or H rails</li> <li>• Available with protective cap</li> </ul> <p>➔ <b>Internet: .../pzvt</b></p>
OR gate OS 		<ul style="list-style-type: none"> <li>• Valve function: OR function</li> <li>• Logic valve</li> <li>• Pneumatic control system</li> <li>• Mounting via through-holes</li> </ul> <p>➔ <b>Internet: .../os</b></p>

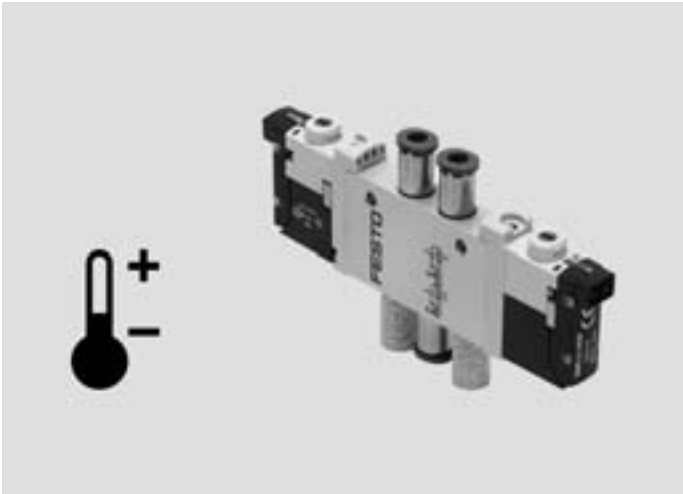


M5 Compact System



Type		Description
Logic component ZK 		<ul style="list-style-type: none"><li>Valve function: AND function</li><li>Dual-pressure valve</li><li>Connects two input signals in the AND operation</li><li>Mounting via through-holes</li></ul> <a href="#">→ Internet: .../zk</a>
Time delay valve VZA, VZOA, VZB, VZOB 		<ul style="list-style-type: none"><li>Time delay infinitely adjustable</li><li>Max. 30 s time delay</li><li>Mounting via through-hole or front panel mounting</li></ul> <a href="#">→ Internet: .../vza</a>

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## Software tool





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## Standards-based valve terminals

Type	Width	Standard nominal flow rate	Max. no. of valve positions	Electrical control	Valve terminal design	Description
Valve terminal type 16 VTIA 	18 mm, 26 mm	400 ... 1,000 l/min	16	Individual connection	Modular and expandable	<ul style="list-style-type: none"> <li>Robust and flexible valve terminal to ISO 15407-1</li> <li>Two valve sizes can be combined</li> <li>Wide range of individual electrical connections</li> </ul> <p>→ Internet: <a href="#">.../vtia</a></p>
Valve terminal type 44, type 45 VTSA, VTSA-F 	18 mm, 26 mm, 42 mm, 52 mm, 65 mm	400 ... 4,000 l/min	32	Ethernet, Fieldbus, Multi-pin plug, Integrated controller	Modular and expandable	<ul style="list-style-type: none"> <li>Robust and flexible valve terminal to ISO 15407-2/ISO 5599-2</li> <li>Four valve sizes can be combined</li> <li>Integrated safety functions</li> </ul> <p>→ Internet: <a href="#">.../vtisa</a></p>




## Universal valve terminals

Type	Width	Standard nominal flow rate	Max. no. of valve positions	Electrical control	Valve terminal design	Description
Valve terminal type 32 MPA-S 	10 mm, 20 mm	0 ... 700 l/min	64	Fieldbus	Modular and expandable	<ul style="list-style-type: none"> <li>Compact dimensions</li> <li>Two valve sizes can be combined</li> <li>Strong communication options thanks to serial linking</li> </ul> <p>→ Internet: <a href="#">.../mpa</a></p>
Valve terminal type 34 MPAL 	10 mm, 20 mm	0 ... 700 l/min	64	Fieldbus	Modular and expandable	<ul style="list-style-type: none"> <li>Highly modular and versatile</li> <li>Easily expandable in increments of one</li> <li>Plastic sub-bases</li> </ul> <p>→ Internet: <a href="#">.../mpal</a></p>



## Universal valve terminals

Type	Width	Standard nominal flow rate	Max. no. of valve positions	Electrical control	Valve terminal design	Description
Valve terminal type 33 MPAF 	10 mm, 20 mm	0 ... 700 l/min	64	Fieldbus	Modular and expandable	<ul style="list-style-type: none"> <li>Optimised for high flow rates</li> <li>Two valve sizes can be combined</li> <li>Strong communication options thanks to serial linking</li> </ul> <b>→ Internet: .../mpaf</b>
Valve terminal type 10 CPV 	10 mm, 14 mm, 18 mm	0 ... 1,600 l/min	8	AS-interface, CP installation system, Individual connection, Fieldbus, Multi-pin plug	Fixed grid	<ul style="list-style-type: none"> <li>Cubic design: Maximum performance in the minimum of space</li> <li>Three sizes</li> <li>Wide range of connection and mounting options</li> </ul> <b>→ Internet: .../cpv</b>
Valve terminal type 12 CPA 	10 mm, 14 mm	300 ... 600 l/min	22	AS-interface, Individual connection, Fieldbus, Multi-pin plug	Modular and expandable	<ul style="list-style-type: none"> <li>Compact Performance: compact valves in sturdy metal housing</li> <li>Patented electrical linking system for flexible expansion options</li> <li>Electrical connection technology: individual, multi-pin plug, AS-interface, fieldbus, CPX terminal connection</li> <li>High pressure range</li> <li>Wide range of valve functions</li> <li>Multiple pressure zones</li> </ul> <b>→ Internet: .../cpa</b>
Valve terminal type 80, Smart Cubic CPV-SC 	10 mm	170 l/min	16	Individual connection, Fieldbus, Multi-pin plug	Fixed grid	<ul style="list-style-type: none"> <li>Compact format</li> <li>Optimised flow rates</li> <li>Clear design</li> </ul> <b>→ Internet: .../cpv-sc</b>
Valve terminal type 82, Smart Cubic CPA-SC 	10 mm	120 ... 180 l/min	20, 24	Individual connection, Fieldbus, Multi-pin plug	Fixed grid	<ul style="list-style-type: none"> <li>Compact dimensions</li> <li>Wide range of individual electrical connections</li> <li>Various pneumatic connection directions</li> </ul> <b>→ Internet: .../cpa-sc</b>
Valve terminal type 24 VTUB 	20 mm	200 ... 1,000 l/min	16	Individual connection, Multi-pin plug	Fixed grid	<ul style="list-style-type: none"> <li>Outstanding economy</li> <li>Simple handling</li> <li>Optimised for basic applications</li> </ul> <b>→ Internet: .../vtub</b>
Valve terminal type 23 VTUB-12 	12 mm	400 l/min	35	Fieldbus, Multi-pin plug	Fixed grid	<ul style="list-style-type: none"> <li>Compact dimensions</li> <li>Sturdy poppet valve</li> <li>Flexible and low-cost fieldbus modules</li> </ul> <b>→ Internet: .../vtub-12</b>


## Application-specific valve terminals

Type	Width	Standard nominal flow rate	Max. no. of valve positions	Electrical control	Valve terminal design	Description
Valve terminal MH1 	10 mm	10 l/min	24	Individual connection, Multi-pin plug	Fixed grid	<ul style="list-style-type: none"> <li>Extremely small valves</li> <li>Low switching noise</li> <li>Versatile pneumatic connections</li> </ul> → Internet: .../mh1
Valve terminal type 15, Clean Design CDVI 	24 mm	300 ... 650 l/min	16	Fieldbus, Multi-pin plug	Modular and expandable	<ul style="list-style-type: none"> <li>Hygienic</li> <li>Corrosion-resistant</li> <li>Easy to clean (Clean Design)</li> </ul> → Internet: .../cdvi
Valve terminal type 84 VTOC 	10 mm	10 l/min	24	Multi-pin plug	Fixed grid	<ul style="list-style-type: none"> <li>Compact pilot valves for process valves</li> <li>Various electrical and pneumatic interfaces</li> <li>Basis for customised adaptations</li> </ul> → Internet: .../vtoc




## Electrical peripherals

Type	Max. number of inputs	Max. number of outputs	Number of module positions	Electrical control	Description
Electrical terminal CPX 	Digital 512, analogue 32	Digital 512, analogue 18	Max. 9 electric input/output modules	Fieldbus, Integrated controller	<ul style="list-style-type: none"> <li>Centralised, decentralised, hybrid installation system with maximum modularity and flexibility</li> <li>IP65 and IP67 or IP20</li> <li>Choice of plastic or metal housing with individual linking</li> <li>Open to common fieldbus protocols and Ethernet</li> <li>Integrated diagnostic and service function</li> <li>Operating modes: stand-alone as remote I/O or with valve terminals type 12 CPA, type 32 MPA, type 44/45 VTSA/VTSA-F</li> </ul> → Internet: .../cpx
Installation system CPI 	128	128	Max. 4 installation strings, Max. 4 CP modules per string	Fieldbus, Integrated controller	<ul style="list-style-type: none"> <li>Complete concept for decentralised machine and system structure</li> <li>Combination of centralised and decentralised installation possible with electrical terminal CPX</li> <li>Decentralised pneumatic components and sensors for fast processes</li> <li>Centralised electrical components for fieldbus and common power supply</li> <li>With valve terminal type 10 CPV, type 12 CPA, type 32 MPA, type 80 CPV-SC</li> </ul> → Internet: .../ctec

## Electrical peripherals

Type	Max. number of inputs	Max. number of outputs	Number of module positions	Electrical control	Description
AS-interface® components ASI 	496	496		AS-interface	<ul style="list-style-type: none"> <li>Accessories for AS-interface installation system</li> <li>Modules for actuation of individual valves ASI-EVA</li> <li>Cable distributor ASI-KVT</li> <li>Addressing device ASI-PRG-ADR</li> <li>Compact I/O modules (IP65, IP67)</li> <li>AS-interface power supply unit SVG..</li> </ul> → Internet: .../as-interface

## Control blocks

Type				Description
Control block CPX-FEC 				<ul style="list-style-type: none"> <li>Modular I/O system, up to 512 I/Os – full flexibility via CPX</li> <li>Comprehensive solutions for diagnostics and condition monitoring</li> <li>Stand-alone open and closed-loop control</li> <li>Pre-processing with all common fieldbus/Ethernet protocols (remote control) – fast, stand-alone processes on site</li> </ul> → Internet: .../cpx-fec
Control block CPX-CEC-C1 				<ul style="list-style-type: none"> <li>Modular I/O system, up to 512 I/Os, CAN master functionality – full flexibility via CPX</li> <li>Comprehensive solutions for diagnostics and condition monitoring – thanks to special CoDeSys function library</li> <li>Stand-alone open and closed-loop control</li> <li>Pre-processing with all common fieldbus/Ethernet protocols (remote control) – fast, stand-alone processes on site</li> </ul> → Internet: .../cpx-cec-c1
Bus node CTEU 				<ul style="list-style-type: none"> <li>For valve terminals type 23 VTUB-12 and type 24 VTUB</li> <li>Available for CANopen, Profibus, DeviceNet</li> <li>Fieldbus-typical LEDs, interfaces and switch elements available</li> <li>Isolated power supply for electronics and valves</li> <li>Optional basic diagnosis: undervoltage, short circuit</li> <li>Optionally expandable for low-cost, decentralised installation of two additional valve terminals with I-Port</li> </ul> → Internet: .../cteu

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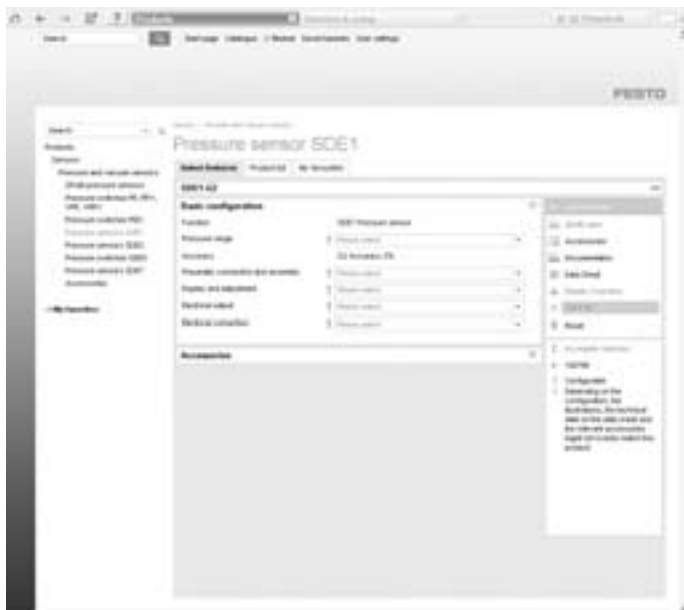
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## Proximity sensors, for T-slot

Type	Electrical connection	Operating voltage range DC	Switching element function	Switching output	Description
Proximity sensor SME-8, SME-8M, SME-8-SL, SME-8-FM 	2-wire, 2-pin, 3-wire, 3-pin, Cable, Cable with plug, M12, M5x0.5, M8x1, Snap-on flange, Plug, Rotatable thread, Open end	0 ... 230 V	N/O contact, N/C contact	Contacting, Contacting, bipolar, Without LED function	<ul style="list-style-type: none"> <li>Method of measurement: magnetic reed</li> <li>Screw-clamped or clamped in slot, insertable from above or lengthwise from end</li> <li>Electrical connection via open cable end, plug M5, M8, M12</li> <li>Cable length 0.3, 2.5, 5, 7.5, 0.2 ... 10 m</li> <li>Two-wire and three-wire design</li> <li>Suitable for use with energy chains and robots</li> <li>SME-8-...-S6: Heat-resistant design</li> </ul> <p>→ Internet: <a href="#">.../sme-8</a></p>
Proximity sensor SMT-8, SMT-8G, SMT-8M, SMT-8-SL, CRSMT-8 	2-wire, 2-pin, 3-wire, 3-pin, Cable, Cable with plug, M12, M12x1, M5x0.5, M8x1, Snap-on flange, Plug, Rotatable thread, Open end	5 ... 30 V	Namur, N/O contact, N/C contact	NPN, Namur, PNP, PNP/NPN, Non-contacting, 2-wire	<ul style="list-style-type: none"> <li>Method of measurement: magneto-resistive</li> <li>Secured with screw or clamped, insertable in the slot from above or lengthwise</li> <li>Electrical connection via open cable end, plug M5, M8, M12</li> <li>Cable length 0.3, 2.5, 5, 7.5, 0.2 ... 30 m</li> <li>Two-wire and three-wire design</li> <li>Selected types acc. to ATEX Directive for explosive atmospheres</li> <li>CRSMT-8: Corrosion and acid-resistant design</li> <li>Suitable for use with energy chains and robots</li> </ul> <p>→ Internet: <a href="#">.../smt-8</a></p>

## Proximity sensors, for T-slot



Type	Electrical connection	Operating voltage range DC	Switching element function	Switching output	Description
Proximity sensor SMEO-8E 	2-wire, 3-wire, 3-pin, Cable, M12x1, M8x1, Plug	0 ... 250 V	N/O contact	Contacting, Contacting, bipolar, Without LED function	<ul style="list-style-type: none"> <li>Sturdy sensor in block design</li> <li>Method of measurement: magnetic reed</li> <li>Electrical connection via open cable end, plug M8, M12</li> <li>Cable length 2.5 m</li> <li>Plug integrated in housing</li> <li>LED switching status display</li> </ul> <b>→ Internet: .../smeo-8</b>
Proximity sensor SMT0-8E, SMTSO-8E 	3-wire, 3-pin, Cable, M12x1, M8x1, Plug	10 ... 30 V	N/O contact	NPN, PNP	<ul style="list-style-type: none"> <li>Sturdy sensor in block design</li> <li>Method of measurement: magneto-resistive</li> <li>Electrical connection via plug M8, M12</li> <li>Plug integrated in housing</li> <li>LED switching status display</li> <li>SMTSO-8: Welding field immune design</li> </ul> <b>→ Internet: .../smt0-8</b>
Proximity sensor SMPO-8E 					<ul style="list-style-type: none"> <li>Pneumatic proximity sensor</li> <li>Method of measurement: magnetic</li> <li>Pneumatic connection via female thread M5</li> <li>Optical switching status display</li> </ul> <b>→ Internet: .../smpo</b>

## Proximity sensors, for C-slot




Type	Electrical connection	Operating voltage range DC	Switching element function	Switching output	Description
Proximity sensor SME-10, SME-10M, SME-10F 	2-wire, 2-pin, 3-wire, 3-pin, Cable, Cable with plug, M12, M5x0.5, M8x1, Snap-on flange, Plug, Rotatable thread, Open end	0 ... 230 V	N/O contact, N/C contact	Contacting, Contacting, bipolar, Without LED function	<ul style="list-style-type: none"> <li>Method of measurement: magnetic reed</li> <li>Clamped in C-slot, insertable from above or from end</li> <li>Electrical connection via open cable end, plug M5, M8</li> <li>Cable length 0.3, 2.5 m</li> <li>Two-wire and three-wire design</li> </ul> <b>→ Internet: .../sme-10</b>
Proximity sensor SMT-10, SMT-10M, SMT-10F, SMT-10G 	2-wire, 2-pin, 3-wire, 3-pin, Cable, Cable with plug, M12, M12x1, M5x0.5, M8x1, Snap-on flange, Plug, Rotatable thread, Open end	5 ... 30 V	Namur, N/O contact, N/C contact	NPN, Namur, PNP, PNP/NPN, Non-contacting, 2-wire	<ul style="list-style-type: none"> <li>Method of measurement: magneto-resistive</li> <li>Clamped in C-slot, insertable from above or from end</li> <li>Cable length 0.3, 2.5 m</li> <li>Electrical connection via open cable end, plug M5, M8</li> <li>Two-wire and three-wire design</li> </ul> <b>→ Internet: .../smt-10</b>





## Proximity sensors, round design

Type	Electrical connection	Operating voltage range DC	Switching element function	Switching output	Description
Proximity sensor SMEO-4U, CRSMEO-4 	2-wire, 3-wire, 3-pin, Cable, M12x1, M8x1, Plug	0 ... 250 V	N/O contact	Contacting, Contacting, bipolar, Without LED function	<ul style="list-style-type: none"> <li>Method of measurement: magnetic reed</li> <li>Electrical connection via open cable end, plug M8</li> <li>Cable length 2.5, 5 m</li> <li>Two-wire and three-wire design</li> <li>CRSMEO-4: Corrosion-resistant design</li> </ul> <b>→ Internet: .../smeo-4</b>
Proximity sensor SMT0-4U 	3-wire, 3-pin, Cable, M12x1, M8x1, Plug	10 ... 30 V	N/O contact	NPN, PNP	<ul style="list-style-type: none"> <li>Method of measurement: magneto-inductive</li> <li>Electrical connection via open cable end, plug M8</li> <li>Cable length 2.5 m</li> <li>Three-wire design</li> </ul> <b>→ Internet: .../smt0-4</b>



## Proximity sensors, block design

Type	Electrical connection	Operating voltage range DC	Switching element function	Switching output	Description
Proximity sensor SMEO-1 	2-wire, 3-wire, 3-pin, Cable, M12x1, M8x1, Plug	0 ... 250 V	N/O contact	Contacting, Contacting, bipolar, Without LED function	<ul style="list-style-type: none"> <li>Method of measurement: magnetic reed</li> <li>Electrical connection via open cable end, plug M8</li> <li>Cable length 2.5, 5 m</li> <li>Two-wire and three-wire design</li> <li>SMEO-1-S6: Heat-resistant design</li> <li>LED switching status display</li> </ul> <b>→ Internet: .../smeo-1</b>
Proximity sensor SMT0-1, SMTSO-1 	3-wire, 3-pin, Cable, M12x1, M8x1, Plug	10 ... 30 V	N/O contact	NPN, PNP	<ul style="list-style-type: none"> <li>Method of measurement: magneto-resistive</li> <li>Cable length 2.5 m</li> <li>Electrical connection via open cable end, plug M8, M12</li> <li>Three-wire design</li> <li>SMTSO-1: Welding field immune design</li> <li>LED switching status display</li> </ul> <b>→ Internet: .../smt0-1</b>
Proximity sensor SMT0-6 	3-pin, M8x1, Plug	10 ... 30 V	N/O contact	PNP	<ul style="list-style-type: none"> <li>Method of measurement: magneto-inductive</li> <li>Electrical connection via plug M12</li> <li>LED switching status display</li> </ul> <b>→ Internet: .../smt0-6</b>


## Proximity sensors, block design

Type	Electrical connection	Operating voltage range DC	Switching element function	Switching output	Description
Proximity sensor SMPO-1 					<ul style="list-style-type: none"> <li>3/2-way valve, normally closed</li> <li>Pneumatic proximity sensor</li> <li>Method of measurement: magnetic</li> <li>Pneumatic connection via barbed fitting for tubing I.D. 3 mm</li> <li>Optical switching status display</li> </ul> <a href="#">Internet: .../sm-po</a>
Proximity sensor SMT-C1 	3-wire, 3-pin, Cable, Cable with plug, M12x1, M8x1, Rotatable thread	10... 30 V	N/O contact	PNP	<ul style="list-style-type: none"> <li>Method of measurement: inductive</li> <li>Electrical connection via open cable end</li> <li>Three-wire design</li> <li>LED switching status display</li> </ul> <a href="#">Internet: .../smt-c1</a>


## Position sensors

Type	Design	Position measuring range	Analogue output	Electrical connection	Description
Position transmitter SMAT-8E, SMAT-8M 	For T-slot	0 ... 52 mm	0 – 10 V, 0 – 20 mA	4-pin, Cable with plug, M8x1, Plug, Rotatable thread	<ul style="list-style-type: none"> <li>Method of measurement: magnetic</li> <li>Screw-clamped or clamped in slot, insertable from above or lengthwise from end</li> <li>Integrated out-of-range sensor</li> <li>LED status display</li> </ul> <a href="#">Internet: .../sm-at</a>
Position sensor SMH-S1 	For gripper			4-pin, Cable with plug, M8x1	<ul style="list-style-type: none"> <li>Method of measurement: magnetic Hall</li> <li>For grippers</li> <li>Freely selectable switching points</li> <li>Three gripper positions can be detected using an evaluation unit</li> </ul> <a href="#">Internet: .../sm-h</a>




## Signal converters

Type	Signal range	Switching output	Switching function	Electrical connection, output	Electrical connection, input	Description
Signal converter SVE4 	0 – 10 V +/- 0.3 V, 0 – 20 mA +/- 0.6 mA, Adapted for position sensors SMH-S1-HG	2xNPN, 2xPNP	Freely programmable	4-pin, M8x1, Plug, To EN 60947-5-2	4-pin, Socket, M8x1, To EN 60947-5-2	<ul style="list-style-type: none"> <li>Converts analogue signals into switching points</li> <li>Switching function freely programmable with teach-in</li> <li>Threshold value, hysteresis or window comparator</li> <li>Mounting directly on H-rail or via adapter plate</li> <li>LED switching status display</li> <li>Certification: cULus listed (OL), C-Tick</li> </ul> <a href="#">Internet: .../sve4</a>





## Signal converters

Type	Signal range	Switching output	Switching function	Electrical connection, output	Electrical connection, input	Description
Evaluation unit SMH-AE 		NPN, PNP		5-pin,, Plug, M12x1	4-pin, Socket, M8x1, to EN 60947-5-2	<ul style="list-style-type: none"> <li>Electronic evaluation unit for Hall sensor SMH-S1</li> <li>Amplifies the signal from the sensor</li> <li>With 3 potentiometers for setting 3 switching points</li> <li>LED operating and switching status display</li> </ul> → Internet: .../smh-ae





## Pressure and vacuum sensors

Type	Pressure measuring range	Switching element function	Pneumatic connection	Electrical connection	Display type	Description
Pressure and vacuum switch PEV, VPEV 	-1 ... 10 bar	Changeover switch	G1/4, G1/8, M5	4-pin, Type A, M12x1, M8x1, Screw terminal, Plug, To DIN 43650, To EN 60947-5-2, Round design, Square design		<ul style="list-style-type: none"> <li>Mechanical pressure and vacuum switch</li> <li>Adjustable switching point</li> <li>Screw-in, via through-holes or via H-rail</li> <li>Visual scale for pressure adjustment</li> <li>Certification: CCC</li> </ul> → Internet: .../pev
PE converter PEN, PE, VPE 	-1 ... 8 bar	N/O contact, Changeover switch	G1/8, M5, PK-3, PK-4	3 connecting wires, 3-wire, 4-wire, Cable, Screw terminal		<ul style="list-style-type: none"> <li>Pneumatic/electric differential pressure switch</li> <li>Pneumatic/electric pressure transducer</li> <li>Design for vacuum</li> <li>Mounting on mounting frame 2N</li> <li>Splash-proof design</li> <li>Certification: CCC</li> </ul> → Internet: .../pen
Pressure sensor SDE5 	-1 ... 10 bar	N/O contact, Switchable, N/C contact	QS-1/4, QS-4, QS-5/32, QS-6	3-wire, 3-pin, Cable, M8x1, Plug, To EN 60947-5-2, Round design		<ul style="list-style-type: none"> <li>Programmable and configurable pressure switch for simple pressure sensing tasks</li> <li>Trigger/window comparator</li> <li>Teach-in function for programming</li> <li>Integrated microprocessor</li> <li>Switching status indicated by an LED visible from all sides</li> <li>Certification: cULus listed (OL), C-Tick</li> </ul> → Internet: .../sde5







## Pressure and vacuum sensors

Type	Pressure measuring range	Switching element function	Pneumatic connection	Electrical connection	Display type	Description
Pressure sensor SDE3 	-1 ... 10 bar	Switchable	QS-4, QS-5/32	4-pin, 5-pin, Cable, Cable with plug, M12x1, M8x1, Plug, To EN 60947-5-2, Round design	Illuminated LCD	<ul style="list-style-type: none"> <li>Five pressure measuring ranges</li> <li>Measurement of relative or differential pressure or 2 independent pressure inputs</li> <li>Switching output 2x PNP or 2x NPN</li> <li>Numerical and graphical pressure display</li> <li>Via H-rail, via wall/surface bracket, front panel mounting, via through-holes</li> <li>Certification: C-Tick, Atex, c UL us - Listed (OL)</li> </ul> <b>→ Internet: .../sde3</b>
Pressure sensor SDE1 	-1 ... 10 bar	Switchable	G1/8, QS-4, R1/4, R1/8	3-pin, 4-pin, 5-pin, Cable with plug, M12x1, M8x1, Plug, To EN 60947-5-2, Round design	Illuminated LCD, Back illuminated LCD	<ul style="list-style-type: none"> <li>Five pressure measuring ranges</li> <li>Measurement of relative or differential pressure</li> <li>Switching outputs PNP, NPN and with analogue current or voltage output</li> <li>LCD or illuminated LCD display</li> <li>Via H-rail, via wall/surface bracket, mounting on service unit, front panel mounting</li> <li>Certification: cULus listed (OL), C-Tick</li> </ul> <b>→ Internet: .../sde1</b>
Pressure sensor SPAB 	-1 ... 10 bar	Switchable	Male thread G1/8, Male thread NPT1/8-27, Male thread R1/8, Female thread M5	4-wire, 4-pin, Cable, M8x1, Plug, To EN 60947-5-2, Round design	Illuminated LCD, multi-colour	<ul style="list-style-type: none"> <li>Relative pressure measurement</li> <li>Switching output PNP, NPN and analogue output</li> <li>Two-part, multi-coloured display</li> <li>Simple commissioning thanks to intuitive operation</li> <li>Compact design 30x30 mm</li> <li>Certification: cULus listed (OL), C-Tick</li> </ul> <b>→ Internet: .../spab</b>
Pressure sensor SDET 	-1 ... 100 bar		G1/4	4-pin, M12x1, Plug, To EN 60947-5-2, Round design		<ul style="list-style-type: none"> <li>Eight pressure measuring ranges</li> <li>Analogue output 0.1 ... 10 V or 4 ... 20 mA</li> <li>Relative pressure measurement</li> <li>Resistant to water and oils</li> <li>Pressure monitoring of gaseous and liquid media</li> <li>Pipe clamp included in scope of delivery</li> </ul> <b>→ Internet: .../sdet</b>


## Flow sensors

Type	Flow measuring range	Operating medium	Operating pressure	Pneumatic connection	Electrical connection	Description
Flow sensor SFE3 	0.05 ... 50 l/min	G5: Nitrogen, L83: air quality class 3:6:2 to DIN ISO 8573-1	-0.7 ... 7 bar	Female thread G1/8, QS-6	Cable	<ul style="list-style-type: none"> <li>Flow sensor with integrated digital display</li> <li>With unidirectional flow input</li> <li>Mounting: via through-holes or mounting bracket</li> <li>Electrical connection via open cable end</li> <li>Cable length 1 m</li> <li>Certification: C-Tick</li> </ul> <b>→ Internet: .../sfe3</b>
Flow sensor SFET 	-10 ... 50 l/min	G5: Nitrogen, L83: air quality class 3:6:2 to DIN ISO 8573-1	-0.9 ... 7 bar	Female thread G1/8, QS-4, QS-6	Cable	<ul style="list-style-type: none"> <li>With unidirectional (SFET-F) or bidirectional (SFET-R) flow input</li> <li>Mounting: via through-holes or mounting bracket</li> <li>Electrical connection via open cable end</li> <li>Cable length 1, 3 m</li> <li>Certification: C-Tick</li> </ul> <b>→ Internet: .../sfet</b>
Flow sensor SFAB 	0.1 ... 1,000 l/min	G5: Nitrogen, L78: air quality class 3:4:1 to DIN ISO 8573-1, L81: air quality class 5:4:3 to DIN ISO 8573-1	0 ... 10 bar	QS-1/4, QS-10, QS-12, QS-3/8, QS-5/16, QS-6, QS-8	5-pin, M12x1, Straight plug	<ul style="list-style-type: none"> <li>Flow sensor with integrated digital display</li> <li>With unidirectional flow input</li> <li>Mounting: H-rail mounting, wall or surface mounting</li> <li>Certification: C-Tick</li> </ul> <b>→ Internet: .../sfab</b>
Flow sensor SFAM 	10 ... 15,000 l/min	G5: Nitrogen, L81: air quality class 5:4:3 to DIN ISO 8573-1	0 ... 16 bar	Manifold module, G1, G1 1/2, G1/2, NPT1 1/2-11 1/2, NPT1-11 1/2, NPT1/2-14	5-pin, M12x1, Straight plug	<ul style="list-style-type: none"> <li>Stand-alone device or combined with MS series service units</li> <li>Supplies absolute flow information and accumulated air consumption measurement</li> <li>Covers large measuring range with specified precision thanks to highly dynamic response</li> <li>Large, illuminated LCD display</li> </ul> <b>→ Internet: .../sfam</b>




## Inductive sensors

Type	Size	Switching output	Switching element function	Electrical connection	Operating voltage range DC	Description
Proximity sensor SIEN 	4 mm, 6.5 mm, M12, M12x1, M18, M18x1, M30, M30x1.5, M5x 0.5, M8x1	NPN, PNP	N/O contact, N/C contact	3-wire, 3-pin, Cable, M12x1, M8x1, Plug	10 ... 30 V	<ul style="list-style-type: none"> <li>• With standard switching distance</li> <li>• For DC voltage</li> <li>• Round design</li> <li>• Metric thread</li> <li>• Flush or non-flush mounting</li> <li>• With switching status display</li> <li>• Design with metal housing</li> <li>• Design with polyamide housing</li> </ul> <b>→ Internet: .../sien</b>
Proximity sensor SIED 	M12, M18, M30	Non- contacting, 2-wire	N/O contact, N/C contact	2-wire, 2-pin, Cable, M12x1, Plug	10 ... 320 V	<ul style="list-style-type: none"> <li>• With standard switching distance</li> <li>• For DC and AC voltage</li> <li>• Metric thread</li> <li>• Flush or non-flush mounting</li> <li>• With switching status display</li> <li>• Design with metal or polyamide housing</li> </ul> <b>→ Internet: .../sied</b>
Proximity sensor SIES 	12x26x40 mm, 15x20x30 mm, 40x40x120 mm, 5x5x25 mm, 8x8x40 mm	NPN, PNP	Antivalent, N/O contact, N/C contact	3-wire, 3-pin, Cable, Cable with plug, M8x1, Screw terminal, Plug, Rotatable thread	10 ... 30 V	<ul style="list-style-type: none"> <li>• Block design</li> <li>• Flush mounting</li> <li>• With switching status display</li> </ul> <b>→ Internet: .../sies</b>
Proximity sensor SIEH 	3 mm, M12, M18	NPN, PNP	N/O contact, N/C contact	3-wire, 3-pin, Cable, Cable with plug, M12x1, M8x1, Plug	10 ... 30 V	<ul style="list-style-type: none"> <li>• With increased switching distance</li> <li>• Flush mounting</li> <li>• Metric thread</li> <li>• With switching status display</li> <li>• Design with stainless steel housing</li> </ul> <b>→ Internet: .../sieh</b>
Proximity sensor SIEA 	M8, M12, M18, M30			3-pin, 4-pin, M12x1, M8x1, Plug	15 ... 30 V	<ul style="list-style-type: none"> <li>• With analogue output</li> <li>• Flush mounting</li> <li>• Metric thread</li> </ul> <b>→ Internet: .../siea</b>
Proximity sensor SIEF 	40x40x65 mm, M8, M12, M18, M30	NPN, PNP	Antivalent, N/O contact	3-wire, 3-pin, 4-pin, Fixcon, Cable, M12x1, M8x1, Plug	10 ... 30 V	<ul style="list-style-type: none"> <li>• Reduction factor 1 for all metals</li> <li>• Welding field immune</li> <li>• Flush, partially flush or non-flush mounting</li> <li>• With switching status display</li> <li>• Design with housing resistant to welding spatter</li> </ul> <b>→ Internet: .../sief</b>



## Inductive sensors

Type	Size	Switching output	Switching element function	Electrical connection	Operating voltage range DC	Description
Proximity sensor SIES-8M 	T-slot	NPN, PNP	N/O contact, N/C contact	3-wire, 3-pin, Cable, Cable with plug, M8x1, Rotatable thread	10 ... 30 V	<ul style="list-style-type: none"> <li>Suitable for position sensing for electric axes EGC and grippers with T-slot</li> <li>With 2 LEDs for better visibility</li> <li>Flush mounting</li> <li>→ <b>Internet: .../sies-8m</b></li> </ul>


## Opto-electrical sensors

Type	Method of measurement	Range	Size	Type of light	Switching output	Description
Opto-electronic sensor SOEG 	Distance sensor, Through-beam sensor, Receiver, Fibre-optic unit, Retro-reflective sensor, Diffuse sensor, Background suppression sensor, Transmitter, For transparent objects	0 ... 20,000 mm	20x32x12 mm, 30x30x15 mm, 4 mm, 50x50x17 mm, M12, M12x1, M18, M18x1, M5x0.5	Infrared, Red, Red polarised	NPN, PNP	<ul style="list-style-type: none"> <li>Variants: diffuse sensor standard, with cylindrical light beam or with background suppression, laser retro-reflective sensor also for transparent objects, through-beam sensor, fibre-optic unit, distance sensor</li> <li>Round design, block design</li> <li>Setting option: potentiometer, teach-in</li> <li>Electrical connection via open cable end or plug</li> <li>→ <b>Internet: .../soeg</b></li> </ul>
Opto-electronic sensor SOEL 	Distance sensor, Retro-reflective sensor, Diffuse sensor, Background suppression sensor	0 ... 20,000 mm	20x32x12 mm, 50x50x17 mm	Laser, Red, Red polarised	NPN, PNP	<ul style="list-style-type: none"> <li>Laser sensor</li> <li>Variants: diffuse sensor as contrast sensor also with background suppression, retro-reflective sensor, distance sensor</li> <li>Setting option: teach-in, potentiometer</li> <li>Electrical connection via open cable end or plug</li> <li>→ <b>Internet: .../soel</b></li> </ul>
Colour sensor SOEC 	Colour sensor	12 ... 32 mm	50x50x17 mm	White	PNP	<ul style="list-style-type: none"> <li>Diffuse sensor</li> <li>Block design</li> <li>Setting option: teach-in</li> <li>Electrical connection via M12x1 plug, 8-pin</li> <li>Display via 7 LEDs</li> <li>→ <b>Internet: .../soec</b></li> </ul>


## Opto-electrical sensors

Type	Method of measurement	Range	Size	Type of light	Switching output	Description
Fibre-optic cable SOE4, SOOC 	Through-beam sensor, Fixed focus, Fork light barrier, Fibre-optic unit, Diffuse sensor	2 ... 650 mm		Red	NPN, PNP	<ul style="list-style-type: none"> <li>Use for precise and space-saving position sensing in electronics and light assembly</li> <li>Operational with accessory fibre-optic cable SOOC</li> <li>Variants: LED display, switching and analogue output</li> <li>Setting option: teach-in</li> <li>Four operating modes: standard, fine mode, fast mode, long-distance mode</li> <li>H-rail mounting or via through-holes</li> <li>With protection against mutual interference</li> </ul> → Internet: <a href="#">.../soe4</a>
Fork light barrier SOOF 	Fork light barrier		Fork 120x60 mm, Fork 30x35 mm, Fork 50x55 mm, Fork 80x55 mm	Red	NPN, PNP	<ul style="list-style-type: none"> <li>Through-beam sensor with minimal installation effort</li> <li>Version: polymer or metal</li> <li>Sturdy housing: high shock and vibration resistance</li> <li>Protection class IP67</li> <li>Electrical connection via M8x1 plug, 3-pin</li> <li>Setting option: potentiometer or teach-in</li> <li>LED displays</li> </ul> → Internet: <a href="#">.../soof</a>

## Air gap sensors




Type	Sensing range	Operating pressure	Display type	Operating medium	Description
Air gap sensor SOPA 	20 ... 200 µm	4 ... 7 bar	Illuminated LCD, multi-colour	LX3: filtered compressed air, grade of filtration 40 µm, lubricated or unlubricated	<ul style="list-style-type: none"> <li>Convenient solution for high-precision contact and distance monitoring</li> <li>Setting option: teach-in or numerical setting using three buttons</li> <li>Integrated air jet function</li> <li>Multi-coloured LCD display</li> <li>H-rail, wall mounting, via through-holes</li> <li>Certification: C-Tick</li> </ul> → Internet: <a href="#">.../sopa</a>

## Sensor boxes



Type	Measured variable	Operating voltage range AC	Operating voltage range DC	Electrical connection	Type of mounting	Description
Sensor box SRBP 	Rotation angle	19.2 ... 28.8 V	7.8 ... 28.8 V	9-pin, Screw terminal, Plug-in		<ul style="list-style-type: none"> <li>Based on VDI/VDE 3845 (NAMUR)</li> <li>Binary</li> <li>Position sensor for semi-rotary actuators</li> <li>Sensors based on reed technology</li> </ul> → Internet: <a href="#">.../srbp</a>





## Sensor boxes

Type	Measured variable	Operating voltage range AC	Operating voltage range DC	Electrical connection	Type of mounting	Description
Sensor box SRAP 	Rotation angle		15 ... 30 V	9-pin, Screw terminal, Plug-in		<ul style="list-style-type: none"> <li>Based on standard VDI/VDE 3845 (NAMUR)</li> <li>Analogue</li> <li>For monitoring the position of semi-rotary actuators</li> <li>Sensors based on 2D Hall technology</li> </ul> → Internet: <a href="#">.../srp</a>
Limit switch attachment SRBF 		0 ... 250 V	0 ... 24 V		On flange to ISO 5211, Via accessories	<ul style="list-style-type: none"> <li>Based on ISO 5211, DIN EN 60947-5-1</li> <li>With two mechanical switches</li> <li>For mechanical, electric proximity sensor</li> </ul> → Internet: <a href="#">.../srbf</a>
Limit switch attachment DAPZ 		0 ... 250 V	0 ... 250 V	Screw terminal, Plug-in		<ul style="list-style-type: none"> <li>Square or round design</li> <li>Drive interface to Namur VDI/VDE 3845</li> <li>With pneumatic, electric or inductive sensing</li> </ul> → Internet: <a href="#">.../dapz</a>



## Function monitoring

Type	Sensor resolution	Working distance	Field of vision	Exposure time	Description
Compact Vision System SBOC-M 	1,280 x 1,024 pixels (SXGA), 640 x 480 pixels (VGA), 752 x 480 pixels (WideVGA)	Depends on the lens chosen	Depends on the lens chosen	8 ... 1,000,000 µs	<ul style="list-style-type: none"> <li>High-speed camera for diagnostics and commissioning as well as for function monitoring of fast motion sequences</li> <li>Recording and storage electronics integrated in the camera</li> <li>For standard lens with C mount connection</li> <li>Can be networked via Ethernet</li> <li>Compact dimensions, low weight</li> </ul> → Internet: .../sboc-m
Compact Vision System SBOI-M 	640 x 480 pixels (VGA), 752 x 480 pixels (WideVGA)	20 ... 1,000 mm	14 x 10 mm - 520 x 390 mm, 7.9 x 5.5 mm - 195 x 125 mm	18 ... 1,000,000 µs	<ul style="list-style-type: none"> <li>High-speed camera for diagnostics and commissioning as well as for function monitoring of fast motion sequences</li> <li>Recording and storage electronics integrated in the camera</li> <li>With integrated lens</li> <li>Can be networked via Ethernet</li> <li>Compact dimensions, low weight</li> </ul> → Internet: .../sboi-m

## Orientation and quality inspection

Type	Sensor resolution	Max. no. of inspection programs	Frame rate (full image)	Lens mounting	Min. part length	Min. part diameter	Description
Compact Vision System SBOC-Q 	1,280 x 1,024 pixels (SXGA), 640 x 480 pixels (VGA), 752 x 480 pixels (WideVGA)	256	27 ... 185 fps	CS mount (C mount with lens protection tube)			<ul style="list-style-type: none"> <li>Intelligent field-based camera</li> <li>For 2D quality inspection, position and rotary orientation sensing, reading of 1D and 2D codes, reading of optical characters (OCR)</li> <li>Integrated full PLC (CoDeSys)</li> <li>Ethernet and CAN for communicating with master controllers</li> </ul> → Internet: .../sboc-q
Compact Vision System SBOI-Q 	640 x 480 pixels (VGA), 752 x 480 pixels (WideVGA)	256	60 ... 185 fps	Integrated lens			<ul style="list-style-type: none"> <li>Intelligent field-based camera</li> <li>For 2D quality inspection, position and rotary orientation sensing, reading of 1D and 2D codes, reading of optical characters (OCR)</li> <li>Integrated full PLC (CoDeSys)</li> <li>Ethernet and CAN for communicating with master controllers</li> </ul> → Internet: .../sboi-q

## Orientation and quality inspection

Type	Sensor resolution	Max. no. of inspection programs	Frame rate (full image)	Lens mounting	Min. part length	Min. part diameter	Description
Checkbox CHB 	1,024 pixels/line, 512 pixels/line	48			3 mm	0.5 mm	<ul style="list-style-type: none"> <li>Intelligent, line-scan camera-based vision system</li> <li>For orientation recognition and quality inspection of small moving parts</li> <li>Available with conveyor unit and air ejector positions</li> <li>Available with encoder connection</li> <li>Teach-in function</li> </ul> → Internet: .../chb
Checkbox Compact CHB-C 	1,024 pixels/line, 512 pixels/line	48			3 mm	0.5 mm	<ul style="list-style-type: none"> <li>Intelligent line-scan camera</li> <li>For orientation recognition and quality inspection of small moving parts</li> <li>Encoder connection</li> <li>Teach-in function</li> </ul> → Internet: .../chb-c

## Software tool



## Air consumption

Calculate your system's air consumption quickly and conveniently. Simply enter all the drives and tubing, set the cycle times and working pressure and the air consumption per minute and per day will be calculated for you. It includes a feature for exporting the input table together with the result directly to Excel.

This tool can be found on the website under Support in the Engineering software area as a download or on the DVD under Selection and sizing.



## Configurator


Compile a product with numerous features reliably and quickly with the help of the configurator.

Select all the required product features step-by-step. The use of logic checks ensures that only correct configurations are available for selection.



A dynamic graphic generated on the basis of the configuration provides visual assistance in selecting the correct product features.

The configurator is part of the electronic catalogue and is not available as a separate software program.


## Service units: D series, metal

Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Grade of filtration	Description
Service unit FRC, FRCS 	G1/8, G1/4, G3/8, G1/2, G3/4, G1, M5, M7, QS-4, QS-6	80 ... 8,700 l/min	0.5 ... 12 bar		5 ... 40 µm	<ul style="list-style-type: none"> <li>Filter, regulator and lubricator functions in a single unit</li> <li>High flow rate and highly efficient removal of contaminants</li> <li>Good regulation characteristics with minimal pressure hysteresis</li> <li>Setting values are secured by locking the rotary knob</li> <li>Sizes: Micro, Mini, Midi, Maxi</li> <li>Grid dimensions: 25, 40, 55, 66 mm</li> </ul> <p>➔ Internet: .../frc</p>


## Service units: D series, metal

Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Grade of filtration	Description
Service unit combination FRC-K 	G1/8, G1/4, G3/8, G1/2, G3/4	530 ... 8,200 l/min	0.5 ... 12 bar		40 µm	<ul style="list-style-type: none"> <li>Combination of filter regulator LFR, branching module FRM, lubricator LOE, on-off valve HE, HEE, soft-start valve HEL, mounting accessories</li> <li>Sizes: Micro, Mini, Midi, Maxi</li> <li>➔ Internet: <a href="#">.../frc-*ka</a></li> </ul>
Service unit combination LFR-K, LFRS-K 	G1/8, G1/4, G3/8, G1/2, G3/4	575 ... 9,400 l/min	0.5 ... 12 bar		40 µm	<ul style="list-style-type: none"> <li>Combination of filter regulator LFR, LFRS, branching module FRM, on-off valve HE, HEE, soft-start valve HEL, mounting accessories</li> <li>Sizes: Micro, Mini, Midi, Maxi</li> <li>➔ Internet: <a href="#">.../lfr-*ka</a></li> </ul>


## Service units: D series, polymer

Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Grade of filtration	Description
Service unit FRC-DB 	G1/8, G1/4	400 ... 650 l/min	0.5 ... 7 bar		5 ... 40 µm	<ul style="list-style-type: none"> <li>Filter, regulator and lubricator functions in a single unit</li> <li>High flow rate and highly efficient removal of contaminants</li> <li>Good regulation characteristics with minimal pressure hysteresis</li> <li>Setting values are secured by means of the rotary knob with detent</li> <li>With manual or semi-automatic condensate drain</li> <li>Size: Mini</li> <li>➔ Internet: <a href="#">.../frc</a></li> </ul>

## Service units: MS series


Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Grade of filtration	Description
Service unit MSB4-FRC, MSB6-FRC 	G1/8, G1/4, G3/8, G1/2	800 ... 4,800 l/min	0.3 ... 12 bar		5 ... 40 µm	<ul style="list-style-type: none"> <li>Sizes: 4, 6</li> <li>Filter, regulator and lubricator functions in a single unit</li> <li>High flow rate and highly efficient removal of contaminants</li> <li>Good regulation characteristics with minimal pressure hysteresis</li> <li>Setting values are secured by locking the rotary knob</li> <li>➔ Internet: <a href="#">.../msb</a></li> </ul>

## Service units: MS series


Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Grade of filtration	Description
Service unit combination MSB4, MSB6, MSB9 	G1/8, G1/4, G1/2, G3/4, G1, G1 1/4, G1 1/2, NPT1/2-14, NPT3/4-14, NPT1-11 1/2, NPT1 1/4-11 1/2, NPT1 1/2-11 1/2	550 ... 18,000 l/min	0.5 ... 16 bar		0.01 ... 40 µm	<ul style="list-style-type: none"> <li>Sizes: 4, 6, 9</li> <li>Combination of filter regulator MS-LFR, filter MS-LF, fine and micro filter MS-LFM, activated carbon filter MS-LFX, pressure regulator MS-LR, MS-LRB, precision pressure regulator MS-LRP, MS-LRPB, electrical pressure regulator MS-LRE, lubricator MS-LOE, on-off valve MS-EM, MS-EE, soft-start valve MS-DL, MS-DE, soft-start/quick exhaust valve MS-SV, membrane air dryer MS-LDM1</li> </ul> <p>➔ Internet: <a href="#">.../msb*</a></p>

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## Filter regulators: D series, metal

Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Grade of filtration	Description
Filter regulator LFR, LFRS 	G1/8, G1/4, G3/8, G1/2, G3/4, G1, M5, M7, QS-4, QS-6	110 ... 11,000 l/min	0.5 ... 12 bar	1 ... 16 bar	5 ... 40 µm	<ul style="list-style-type: none"> <li>Space-saving design with filter and regulator in a single unit</li> <li>Good particle separation and high flow rate</li> <li>Good regulation characteristics with minimal hysteresis</li> <li>Two pressure gauge connections for flexible installation</li> <li>Setting values are secured by locking the rotary knob</li> <li>With manual, semi-automatic or fully automatic condensate drain</li> <li>Lockable rotary knob</li> </ul> <p>➔ Internet: <a href="#">.../lfr</a></p>




## Filter regulators: D series, polymer

Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Grade of filtration	Description
Filter regulator LFR-DB 	G1/8, G1/4	500 ... 1,200 l/min	0.5 ... 12 bar	1 ... 16 bar	5 ... 40 µm	<ul style="list-style-type: none"> <li>Space-saving design with filter and regulator in a single unit</li> <li>Good particle separation and high flow rate</li> <li>Good regulation characteristics with minimal hysteresis</li> <li>With manual or semi-automatic condensate drain</li> <li>Setting values are secured by locking the rotary knob</li> </ul> <p>➔ Internet: <a href="#">.../lfr</a></p>



## Filter regulators: MS series

Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Grade of filtration	Description
Filter regulator MS4-LFR, MS6-LFR, MS9-LFR, MS12-LFR 	G1/8, G1/4, G3/8, G1/2, Internal	850 ... 21,500 l/min	0.3 ... 16 bar	0.8 ... 20 bar	5 ... 40 µm	<ul style="list-style-type: none"> <li>• Good regulation characteristics with low hysteresis and primary pressure compensation</li> <li>• Good particle and condensate separation</li> <li>• Available with or without secondary venting</li> <li>• High flow rate</li> <li>• MS4-LFR, MS6-LFR: directly actuated diaphragm regulator, MS9-LFR: piloted or directly actuated filter-diaphragm regulator, MS12-LFR: Piloted diaphragm regulator without intrinsic air consumption</li> <li>• Lockable rotary knob</li> <li>• Return flow option for exhausting from outlet port 2 to outlet port 1 already integrated</li> </ul> <p>→ Internet: <a href="#">.../ms*-lfr</a></p>




## Filters: D series, metal

Type	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Grade of filtration	Description
Filter LF 	Connecting plate, G1/8, G1/4, G3/8, G1/2, G3/4, G1, M5, M7, QS-4, QS-6	170 ... 5,300 l/min	0 ... 16 bar	5 ... 40 µm	<ul style="list-style-type: none"> <li>• Good particle and condensate separation</li> <li>• High flow rate with minimal pressure drop</li> <li>• With manual or fully automatic condensate drain</li> </ul> <p>→ Internet: <a href="#">.../lf</a></p>
Fine filter LFMB 	Connecting plate, G1/8, G1/4, G3/8, G1/2, G3/4, G1	250 ... 1,250 l/min	1 ... 16 bar	1 µm	<ul style="list-style-type: none"> <li>• High efficiency filter for special requirements</li> <li>• Air quality to DIN ISO 8573-1</li> <li>• Version with differential pressure indicator for optical indication of filter contamination</li> </ul> <p>→ Internet: <a href="#">.../lfmb</a></p>
Micro filter LFMA 	Connecting plate, G1/8, G1/4, G3/8, G1/2, G3/4, G1	130 ... 950 l/min	1 ... 16 bar	0.01 µm	<ul style="list-style-type: none"> <li>• High efficiency filter for special requirements</li> <li>• Air quality to DIN ISO 8573-1</li> <li>• Version with differential pressure indicator for optical indication of filter contamination</li> </ul> <p>→ Internet: <a href="#">.../lfma</a></p>

## Filters: D series, metal


Type	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Grade of filtration	Description
Activated carbon filter LFX 	Connecting plate, Manifold module, G1/8, G1/4, G3/8, G1/2, G3/4, G1	300 ... 1,430 l/min	0 ... 16 bar		<ul style="list-style-type: none"> <li>Removal of liquid and gaseous oil particles from compressed air using activated carbon</li> <li>Activated carbon filter cartridges provide odour and oil-free air to food industry standard</li> <li>Residual oil content ≤0.003 mg/m<sup>3</sup></li> <li>Air quality class at the output 1.7.1 to DIN ISO 8573-1</li> </ul> <p>→ Internet: .../lfx</p>
Fine filter combination LFMBA 	G1/8, G1/4, G3/8, G1/2, G3/4, G1	125 ... 600 l/min	1 ... 16 bar	0.01 µm	<ul style="list-style-type: none"> <li>High efficiency filter for special requirements</li> <li>Air quality to DIN ISO 8573-1</li> <li>Available as pre-assembled filter combination</li> <li>Version with differential pressure indicator for optical indication of filter contamination</li> </ul> <p>→ Internet: .../lfmba</p>

## Filters: MS series




Type	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Grade of filtration	Description
Filter MS4-LF, MS6-LF, MS9-LF, MS12-LF 	G1/8, G1/4, G3/8, G1/2, Internal	1,000 ... 16,000 l/min	0 ... 20 bar	5 ... 40 µm	<ul style="list-style-type: none"> <li>Good particle and condensate separation</li> <li>High flow rate with minimal pressure drop</li> <li>Available with manual, semi-automatic, fully automatic or fully automatic, electrically actuated condensate drain</li> </ul> <p>→ Internet: .../ms*-lf</p>
Fine filter MS4-LFM, MS6-LFM, MS9-LFM, MS12-LFM 	Manifold module, G1/8, G1/4, G3/8, G1/2, G3/4, G1	120 ... 7,600 l/min		0.01 ... 1 µm	<ul style="list-style-type: none"> <li>High-performance filter for exceptionally clean compressed air</li> <li>Air quality to DIN ISO 8573-1</li> <li>Available with differential pressure indicator for indication of contamination</li> <li>Available with electronic filter pollution indicator</li> </ul> <p>→ Internet: .../ms*-lfm</p>
Activated carbon filter MS4-LFX, MS6-LFX, MS9-LFX, MS12-LFX 	Manifold module, G1/8, G1/4, G3/8, G1/2, G3/4, G1	250 ... 6,000 l/min		0.01 ... 1 µm	<ul style="list-style-type: none"> <li>Removal of liquid and gaseous oil particles from compressed air using activated carbon</li> <li>Eliminates odours and vapours</li> </ul> <p>→ Internet: .../ms*-lfx</p>





## Filters: Individual devices

Type	Size	Grade of filtration	Operating pressure	Flow rate with respect to atmosphere	Noise reduction	Description
Filter silencer LFU 	G1/4, G3/8, G1/2, G1	1 µm		4,000 ... 12,500 l/min	Reduction by 40 dB	<ul style="list-style-type: none"> <li>Removes up to 99.99% of oil and other contaminants from exhaust air</li> <li>Manual rotary condensate drain</li> <li>Exhaust noise reduced regardless of frequency</li> </ul> → Internet: .../lfu



## Regulators: D series, metal

Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Max. pressure hysteresis	Description
Pressure regulator LR, LRS 	G1/8, G1/4, G3/8, G1/2, G3/4, G1, M5, M7, QS-4, QS-6	120 ... 12,500 l/min	0.5 ... 12 bar	0 ... 16 bar	0.2 ... 0.5 bar	<ul style="list-style-type: none"> <li>Suitable for front panel mounting</li> <li>Lockable design</li> <li>Two pressure gauge connections for different fitting options</li> <li>Mini and Midi sizes: directly actuated diaphragm regulator</li> <li>Maxi size: piloted piston regulator, diaphragm regulator LRS-DI</li> <li>Good regulation characteristics with minimal pressure hysteresis</li> <li>High flow rate</li> <li>Return flow option for venting from outlet port 2 to inlet port 1</li> <li>Available with pressure gauge</li> <li>Sizes: Micro, Mini, Midi, Maxi</li> </ul> → Internet: .../lr-1*8
Pressure regulator LRB, LRBS 	Connecting plate	1,600 ... 3,800 l/min	0.5 ... 12 bar	1 ... 16 bar	0.2 bar	<ul style="list-style-type: none"> <li>Manifold assembly with through air supply</li> <li>Lockable design</li> <li>Good regulation characteristics with low hysteresis and primary pressure compensation</li> <li>For configuring a regulator manifold with independent pressure ranges</li> <li>Settings secured via detent on rotary knob and push-in adjustment lock</li> <li>Directly actuated diaphragm regulator</li> <li>Without pressure gauge</li> <li>Sizes: Mini, Midi</li> </ul> → Internet: .../lrb-d
Pressure regulator combination LRB-K 	G1/4, G3/8, G1/2	1,600 ... 3,800 l/min	0.5 ... 12 bar		0.2 ... 0.5 bar	<ul style="list-style-type: none"> <li>With through air supply</li> <li>Regulator manifold with independent pressure ranges</li> <li>Good regulation characteristics with low hysteresis and primary pressure compensation</li> <li>Settings secured via detent on rotary knob and push-in adjustment lock</li> <li>Directly actuated diaphragm regulator</li> <li>Without pressure gauge</li> <li>Sizes: Mini, Midi</li> </ul> → Internet: .../lrb-1*4




## Regulators: D series, polymer

Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Max. pressure hysteresis	Description
Pressure regulator LR-DB 	Connecting plate, G1/8, G1/4	≥1,300 l/min	0.5 ... 7 bar	0 ... 16 bar	0.5 bar	<ul style="list-style-type: none"> <li>• High flow rate</li> <li>• Good regulation characteristics with minimal pressure hysteresis</li> <li>• Setting values are secured by locking the rotary knob</li> <li>• Available with pressure gauge</li> <li>• Size: Mini</li> </ul> <b>→ Internet: .../lr-db</b>
Pressure regulator combination LRB-DB 	G1/2	≥1,000 l/min	0.5 ... 7 bar		0.5 bar	<ul style="list-style-type: none"> <li>• With through air supply</li> <li>• Good regulation characteristics with low hysteresis and primary pressure compensation</li> <li>• Regulator manifold with independent pressure ranges</li> <li>• Setting values are secured by locking the rotary knob</li> <li>• Without pressure gauge</li> <li>• Size: Mini</li> </ul> <b>→ Internet: .../lrb-db</b>



## Regulators: MS series

Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Max. pressure hysteresis	Description
Pressure regulator MS4-LR, MS6-LR, MS9-LR 	G1/8, G1/4, G3/8, G1/2	1,000 ... 26,500 l/min	0.3 ... 16 bar	0 ... 20 bar	0.25 ... 0.3 bar	<ul style="list-style-type: none"> <li>• Good regulation characteristics with low hysteresis and primary pressure compensation</li> <li>• High flow rate with minimal pressure drop</li> <li>• Available with secondary venting</li> <li>• Lockable rotary knob</li> <li>• With pressure sensor with display and rotary knob pressure gauge</li> <li>• Sizes 4, 6, 9</li> <li>• Grid dimension 40, 62, 90 mm</li> </ul> <b>→ Internet: .../ms*-lr</b>
Pressure regulator MS4-LRB, MS6-LRB 	G1/2, G1/4	300 ... 7,300 l/min	0.3 ... 16 bar		0.25 bar	<ul style="list-style-type: none"> <li>• For manifold assembly with through air supply</li> <li>• For configuring a regulator manifold with independent pressure regulation ranges</li> <li>• Good regulation characteristics with low hysteresis and primary pressure compensation</li> <li>• Actuator lock to protect set values against adjustment</li> <li>• With and without secondary venting</li> <li>• Integrated return flow option for exhausting from output 2 to output 1</li> <li>• Optional pressure sensor</li> <li>• Optional rotary knob pressure gauge</li> </ul> <b>→ Internet: .../ms*-lrb</b>

## Regulators: MS series


Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Max. pressure hysteresis	Description
Pressure regulator MS12-LR 	Manifold module	12,000 ... 22,000 l/min	0.15 ... 16 bar		0.04 ... 0.4 bar	<ul style="list-style-type: none"> <li>• Good regulation characteristics with low hysteresis and primary pressure compensation</li> <li>• High flow rate with minimal pressure drop</li> <li>• Actuator lock to protect set values against adjustment</li> <li>• With secondary venting</li> <li>• Pressure gauge connection for different fitting options</li> <li>• Size: 12</li> <li>• Grid dimension 124 mm</li> <li>• MS12-LR-...-PO: pneumatically actuated (pressure range determined by means of pilot regulator)</li> <li>• MS12-LR-...-PE6: electrically actuated (pilot control by proportional pressure regulator)</li> </ul> <p>➔ <b>Internet: .../ms12-lr</b></p>
Precision pressure regulator MS6-LRP, MS6-LRPB 	G1/4, G3/8, G1/2	800 ... 5,000 l/min	0.05 ... 12 bar		0.02 bar	<ul style="list-style-type: none"> <li>• As individual device and for manifold assembly</li> <li>• Manifold assembly with through air supply</li> <li>• Good regulation characteristics with low hysteresis and primary pressure compensation</li> <li>• Actuator lock to protect set values against adjustment</li> <li>• Available with pressure sensor with display</li> <li>• Size 6</li> <li>• Grid dimension 62 mm</li> </ul> <p>➔ <b>Internet: .../ms*-lrp</b></p>
Electrical pressure regulator MS6-LRE 	G1/4, G3/8, G1/2	2,200 ... 7,500 l/min	0.3 ... 16 bar		0.25 bar	<ul style="list-style-type: none"> <li>• With integrated electric drive unit for indirectly setting the output pressure</li> <li>• Constant output pressure even in the event of a power failure thanks to the fail-safe function</li> <li>• Available with control unit with display</li> <li>• Available with integrated pressure sensor with electrical output</li> <li>• With or without secondary venting</li> <li>• Size 6</li> <li>• Grid dimension 62 mm</li> </ul> <p>➔ <b>Internet: .../ms*-lre</b></p>

## Regulators: Individual devices


Type	Pneumatic connection 1	Standard nominal flow rate	Pressure regulation range	Operating pressure	Max. pressure hysteresis	Description
Pressure regulator LR-G, LRS-G 	G1/8	600 ... 700 l/min	0.5 ... 12 bar	0 ... 16 bar	0.2 bar	<ul style="list-style-type: none"> <li>Lockable design</li> <li>Sturdy design</li> <li>For front panel mounting</li> <li>Excellent flow rates</li> <li>Precision diaphragm regulator</li> </ul> → Internet: .../lr-1*8-g
Precision pressure regulator LRP, LRPS 	G1/4	800 ... 2,300 l/min	0.05 ... 10 bar	1 ... 12 bar	0.02 bar	<ul style="list-style-type: none"> <li>Lockable design</li> <li>Precision pressure adjustment possible both in static and dynamic applications</li> <li>Good response characteristics during rapid modification of supply pressure and flow rate</li> <li>Supply pressure fluctuations are almost entirely compensated</li> </ul> → Internet: .../lrp

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## Lubricators: D series

Type	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Min. flow rate for lubricator operation	Description
Lubricator LOE 	G1/8, G1/4, G3/8, G1/2, G3/4, G1, M5, M7, QS-4, QS-6	160 ... 9,000 l/min	0 ... 16 bar	3 ... 10 l/min	<ul style="list-style-type: none"> <li>Proportional lubricator with precision oil metering</li> <li>Quick and easy top-up even under pressure</li> <li>High flow rate</li> <li>Sturdy metal housing and transparent lubricator bowl with metal bowl guard</li> <li>Oil capacity 6.5 ... 190 cm<sup>3</sup></li> <li>Sizes: Micro, Mini, Midi, Maxi</li> <li>Grid dimension 25, 40, 55, 66 mm</li> </ul> → Internet: .../loe






## Lubricators: MS series

Type	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Min. flow rate for lubricator operation	Description
Lubricator MS4-LOE, MS6-LOE, MS9-LOE, MS12-LOE 	G1/8, G1/4, G3/8, G1/2, Internal	1,100 ... 27,000 l/min	1 ... 16 bar	40 ... 400 l/min	<ul style="list-style-type: none"> <li>Configurable proportional lubricator with precision oil metering</li> <li>Quick and easy oil top-up even under pressure</li> <li>Flow direction can be selected: left/right, right/left</li> <li>Oil capacity 30 ... 1,500 cm<sup>3</sup></li> <li>Sizes: 4, 6, 9, 12</li> <li>Grid dimension 40, 60, 90, 124 mm</li> </ul> → Internet: .../ms*-loe



## On-off and soft-start valves: D series

Type	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Actuation type	Description
On-off valve HE 	G1/8, G1/4, G3/8, G1/2, G3/4, G1	1,000 ... 10,000 l/min	0 ... 16 bar	Manual	<ul style="list-style-type: none"> <li>3/2-way valve</li> <li>Ducted exhaust possible via a threaded connection</li> <li>The switching position is immediately recognisable</li> <li>Size: Mini, Midi, Maxi</li> <li>Grid dimension 40, 55, 66 mm</li> </ul> → Internet: .../he-d
On-off valve HEE 	G1/8, G1/4, G3/8, G1/2, G3/4, G1	1,000 ... 6,500 l/min	2.5 ... 16 bar	Electric	<ul style="list-style-type: none"> <li>For pressurising and venting pneumatic installations</li> <li>With solenoid coil, without plug socket</li> <li>Solenoid head can be repositioned by 4 x 90°</li> <li>Detenting and non-detenting manual override</li> <li>Supply voltage 24 V DC, 110, 230 V AC</li> <li>Sizes: Mini, Midi, Maxi</li> <li>Grid dimension 40, 55, 66 mm</li> </ul> → Internet: .../hee-d
On-off valve HEP 	G1/8, G1/4, G3/8, G1/2, G3/4, G1	1,000 ... 6,500 l/min	2 ... 16 bar	Pneumatic	<ul style="list-style-type: none"> <li>On-off valve for pressurising and venting pneumatic installations</li> <li>As an individual device or in combination with other D series modules</li> <li>Especially suitable for applications requiring explosion protection</li> <li>Size: Mini, Midi, Maxi</li> <li>Grid dimension 40, 55, 66 mm</li> </ul> → Internet: .../hep
Soft-start valve HEL 	G1/8, G1/4, G3/8, G1/2, G3/4, G1	1,000 ... 6,500 l/min	3 ... 16 bar	Pneumatic	<ul style="list-style-type: none"> <li>For gradual pressure build-up (for use with on-off valves HE and HEE)</li> <li>For advancing drives slowly and reliably into the initial position</li> <li>For avoiding sudden and unexpected movements</li> <li>Adjustable switching time delay</li> <li>Sizes: Mini, Midi, Maxi</li> <li>Grid dimension 40, 55, 66 mm</li> </ul> → Internet: .../hel


## On-off and soft-start valves: MS series

Type	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Actuation type	Description
On-off valve MS4-EM1, MS6-EM1, MS9-EM, MS12-EM 	Manifold module, G1/8, G1/4, G3/8, G1/2	1,200 ... 32,000 l/min	0 ... 21 bar	Manual	<ul style="list-style-type: none"> <li>For slowly pressurising and venting pneumatic installations</li> <li>At port 3 a silencer can be attached or the exhaust air can be ducted</li> <li>Available with pressure gauge and pressure sensor with display</li> <li>Size: 4, 6, 9, 12</li> <li>Grid dimension 40, 62, 90, 124 mm</li> </ul> <b>➔ Internet: .../ms*-em</b>
On-off valve MS4-EE, MS6-EE, MS9-EE, MS12-EE 	Manifold module, G1/8, G1/4, G3/8, G1/2	1,000 ... 32,000 l/min	3 ... 18 bar	Electric	<ul style="list-style-type: none"> <li>Supply voltage 24 V DC, 110, 230 V AC</li> <li>For slowly pressurising and venting pneumatic installations</li> <li>Available with pressure sensor with display</li> <li>With solenoid coil, without plug socket</li> <li>Sizes: 4, 6, 9, 12</li> <li>Grid dimension 40, 62, 90, 124 mm</li> </ul> <b>➔ Internet: .../ms*-ee</b>
Soft-start valve MS4-DL, MS6-DL, MS12-DL 	Manifold module, G1/8, G1/4, G3/8, G1/2	1,000 ... 42,000 l/min	2 ... 21 bar	Pneumatic	<ul style="list-style-type: none"> <li>For slowly pressurising and venting pneumatic installations (for use with on-off valves EM1 and EE)</li> <li>For advancing the drives slowly and reliably into the initial position</li> <li>For avoiding sudden and unexpected movements</li> <li>Adjustable switching time delay</li> <li>Sizes: 4, 6, 12</li> <li>Grid dimension 40, 62, 124 mm</li> </ul> <b>➔ Internet: .../ms*-dl</b>
Soft-start valve MS4-DE, MS6-DE, MS12-DE 	Manifold module, G1/8, G1/4, G3/8, G1/2	1,000 ... 42,000 l/min	3 ... 18 bar	Electric	<ul style="list-style-type: none"> <li>Supply voltage 24 V DC, 110, 230 V AC</li> <li>For slowly pressurising and venting pneumatic installations</li> <li>For advancing the drives slowly and reliably into the initial position</li> <li>For avoiding sudden and unexpected movements</li> <li>Adjustable switching time delay</li> <li>Size 4, 6, 12</li> <li>Grid dimension 40, 62, 124 mm</li> </ul> <b>➔ Internet: .../ms*-de</b>
Soft-start and exhaust valve MS6-SV 	G1/2	4,300 l/min	3.5 ... 10 bar	Electric	<ul style="list-style-type: none"> <li>Complies with standard DIN EN ISO 13849-1</li> <li>For reducing pressure quickly and reliably and for building up pressure gradually</li> <li>A switching time delay adjusted via a flow control valve for gradual pressure build-up</li> <li>Available with silencer</li> <li>Supply voltage 24 V DC</li> <li>Size 6</li> <li>Grid dimension 62 mm</li> </ul> <b>➔ Internet: .../ms6-sv</b>


## On-off and soft-start valves: Individual devices

Type	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Actuation type	Description
On-off valve HE-LO 	G1/8, G1/4, G3/8, G1/2, G3/4, G1	1,000 ... 10,000 l/min	0 ... 16 bar	Manual	<ul style="list-style-type: none"> <li>To safety standard</li> <li>For shutting off the compressed air supply whilst simultaneously exhausting systems powered by compressed air</li> <li>Can be locked in the closed position</li> <li>Screwed into piping, through-holes for wall mounting</li> </ul> <b>➔ Internet: .../he*lo</b>
Solenoid valve, pneumatic valve MFHE, VLHE 	G1/4, G3/8, G1/2	1,200 ... 2,900 l/min	2 ... 12 bar	Electric, pneumatic	<ul style="list-style-type: none"> <li>For F solenoid coils</li> <li>Piloted</li> <li>On-off valve in combination with service units</li> <li>Soft-start valve</li> <li>Manual override, detenting</li> </ul> <b>➔ Internet: .../mfhe</b>


## Air dryers: D series

Type	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Pressure dew point	Pressure dew point reduction	Description
Membrane air dryer LDM1 	G1/2, G3/4, G1	300 ... 1,000 l/min	3 ... 12.5 bar		17 ... 20 K	<ul style="list-style-type: none"> <li>Final dryer with excellent operational reliability</li> <li>Flow rate-dependent dew point reduction</li> <li>Wear-free function requiring no external energy</li> <li>Size: Maxi</li> <li>Grid dimension 66 mm</li> <li>Individual device with or without sub-bases, for service unit combination</li> </ul> <b>➔ Internet: .../ldm1</b>

## Air dryers: MS series



Type	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Pressure dew point	Pressure dew point reduction	Description
Membrane air dryer MS4-LDM1, MS6-LDM1 	G1/8, G1/4, G3/8, G1/2	50 ... 400 l/min			20 K	<ul style="list-style-type: none"> <li>Final dryer with excellent operational reliability</li> <li>Suitable for use as an individual device or for integration into existing service unit combinations</li> <li>Flow rate-dependent dew point reduction</li> <li>Wear-free function requiring no external energy</li> <li>Sizes: 4, 6</li> <li>Grid dimension 40, 62 mm</li> </ul> <b>➔ Internet: .../ms*-ldm1</b>

## Air dryers: Individual devices


Type	Pneumatic connection 1	Standard nominal flow rate	Operating pressure	Pressure dew point	Pressure dew point reduction	Description
Adsorption dryer PDAD 	G3/8, G1/2	10 ... 1,000 l/min		-40 °C		<ul style="list-style-type: none"> <li>Produced for decentralised compressed air drying</li> <li>Greater service life of pneumatic components</li> <li>Additional filtering of oil and particulates</li> <li>Defined pressure dew point</li> <li>High flow rate</li> <li>Low purge air consumption and noise levels</li> </ul> → Internet: .../pdad

## Compressed air distribution units: D series

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Type	Pneumatic connection 1	Standard nominal flow rate in main flow direction 1→2	Operating pressure	Description
Branching module FRM 	G1/8, G1/4, G3/8, G1/2, G3/4, G1	1,100 ... 20,000 l/min	0 ... 16 bar	<ul style="list-style-type: none"> <li>Designs with integrated non-return function, with pressure switch</li> <li>Several additional air connections for greater flexibility</li> <li>Can be used as an intermediate distributor for varying air qualities</li> <li>Sizes: Mini, Midi, Maxi</li> <li>Grid dimension 40, 55, 66 mm</li> </ul> → Internet: .../frm
Distributor block FRZ 	Manifold module			<ul style="list-style-type: none"> <li>Sizes: Micro, Mini, Midi, Maxi</li> <li>Grid dimension 25, 40, 55, 66 mm</li> <li>Several additional air connections for greater flexibility</li> </ul> → Internet: .../frz

## Compressed air distribution units: MS series

Type	Pneumatic connection 1	Standard nominal flow rate in main flow direction 1→2	Operating pressure	Description
Distributor block MS4-FRM, MS6-FRM, MS9-FRM, MS12-FRM 	Manifold module, G1/8, G1/4, G3/8, G1/2, G3/4, G1, G1 1/4, G1 1/2, NPT1/2-14, NPT3/4-14, NPT1-11 1/2, NPT1 1/4-11 1/2, NPT1 1/2-11 1/2	1,200 ... 50,000 l/min	0 ... 21 bar	<ul style="list-style-type: none"> <li>Designs with integrated non-return function, with pressure switch</li> <li>Pneumatic manifold with 4 connections</li> <li>Can be used as an intermediate distributor for varying air qualities</li> <li>Outlet at top and bottom</li> <li>Available with pressure sensor with display</li> <li>Sizes 4, 6, 9, 12</li> <li>Grid dimension 40, 62, 90, 124 mm</li> </ul> → Internet: .../ms*-frm





## Compressed air distribution units: MS series


Type	Pneumatic connection 1	Standard nominal flow rate in main flow direction 1->2	Operating pressure	Description
Distributor block MS4-FRM-FRZ, MS6-FRM-FRZ 	G1/4, G1/2	4,050 ... 14,600 l/min	0 ... 20 bar	<ul style="list-style-type: none"> <li>Pneumatic manifold with 4 connections</li> <li>Outlet at top and bottom</li> <li>Can be used as an intermediate distributor for varying air qualities</li> <li>Can be used as an intermediate distributor between two pressure regulators with large rotary knob with pressure gauge on size MS4</li> <li>Sizes: 4, 6</li> <li>Grid dimension 40, 62 mm</li> </ul> → Internet: <a href="#">.../ms*-frm-frz</a>

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## Condensate drains

Type	Pneumatic connection	Operating pressure	Description
Condensate drain WA 	M9	0 ... 16 bar	<ul style="list-style-type: none"> <li>For attachment to service units and compressed air networks/systems</li> <li>Automatic emptying after the max. fill level has been reached</li> <li>Automatic emptying after the operating pressure <math>p &lt; 0.5</math> bar is switched off</li> <li>Manual actuation during operation is possible</li> </ul> → Internet: <a href="#">.../wa</a>
Condensate drain PWEA 	G1/2	0.8 ... 16 bar	<ul style="list-style-type: none"> <li>Fully automatic condensate drain with integrated electrical controller</li> <li>Interface for communicating with master control device</li> <li>Reliable thanks to non-contacting capacitive sensor</li> <li>Can be used with service units or simply in piping systems</li> <li>Ready status and switching status indicated via LEDs and electrical interface</li> </ul> → Internet: <a href="#">.../pwea</a>

## Pressure amplifiers

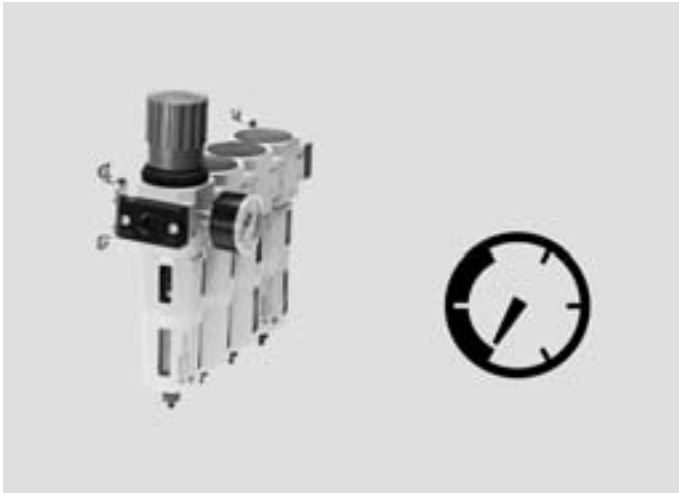
Type	Pneumatic connection 1	Output pressure 2	Supply pressure 1	Description
Pressure booster DPA 	G1/4, G3/8, G1/2	4 ... 16 bar	2 ... 10 bar	<ul style="list-style-type: none"> <li>Minimal loss of volume due to valve activation</li> <li>Designed as a pressure booster/air reservoir combination</li> <li>Any mounting position</li> <li>Short filling times</li> <li>Long service life</li> <li>Compact design</li> <li>Available with sensing option</li> </ul> → Internet: <a href="#">.../dpa</a>

## Pressure indicators

Type	Type of mounting	Display range	Pneumatic connection	Operating pressure	Measurement accuracy class	Description
Pressure gauge MA, MAP 	In-line installation	0 ... 25 bar	G1/8, G1/4, M5, QS-4, QS-6, QS-8, R1/8, R1/4	0 ... 25 bar	1.6, 2.5, 4, 5	<ul style="list-style-type: none"> <li>• Designs based on DIN EN 837-1, available with red-green range</li> <li>• Precision pressure gauge</li> <li>• Accuracy of measurement class MA: 2.5, MAP: 1.6</li> <li>• Pneumatic connection via R, metric or G thread, push-in connector</li> <li>• Display units bar, psi, MPa</li> <li>➔ <b>Internet:</b> <a href="#">.../ma</a></li> </ul>
Flanged pressure gauge FMA 	Front panel mounting	0 ... 16 bar	G1/4	0 ... 16 bar	1.6, 2.5	<ul style="list-style-type: none"> <li>• Design to DIN ISO 837-1</li> <li>• Pneumatic connection via G thread</li> <li>• Front panel mounting</li> <li>• Display units bar, psi</li> <li>➔ <b>Internet:</b> <a href="#">.../fma</a></li> </ul>
Flanged precision pressure gauge FMAP 	Front panel mounting	0 ... 16 bar	G1/4	0 ... 16 bar	1	<ul style="list-style-type: none"> <li>• Complies with standard DIN EN 837-1</li> <li>• Pneumatic connection via G thread</li> <li>• Display units bar, psi</li> <li>• Front panel mounting</li> <li>➔ <b>Internet:</b> <a href="#">.../fmap</a></li> </ul>
Pressure gauge kit DPA-MA-SET 	Via male thread		G1/8, G1/4, R1/8	10 ... 16 bar	2.5, 4	<ul style="list-style-type: none"> <li>• For pressure booster DPA</li> <li>• For monitoring the supply and output pressure</li> <li>• Pneumatic connection via R, G thread</li> <li>➔ <b>Internet:</b> <a href="#">.../dpa*set</a></li> </ul>
Vacuum gauge VAM, FVAM 	Front panel mounting, Screw-in	-1 bar, -1 ... 9 bar	G1/8, G1/4, R1/8, R1/4	-1 bar, -1 ... 9 bar	2.5	<ul style="list-style-type: none"> <li>• Designs based on standard DIN EN 837-1, available with red-green range</li> <li>• Pneumatic connection via R, G thread</li> <li>• Screw-in or front panel mounting</li> <li>• Double or single scale</li> <li>• Display units bar, inHg, psi</li> <li>➔ <b>Internet:</b> <a href="#">.../vam</a></li> </ul>
Pressure gauge PAGN 	In-line installation	0 ... 16 bar	M5, QS-1/4, QS-3/8, QS-4, QS-6, QS-8, QSP-10	0 ... 16 bar	2.5, 4	<ul style="list-style-type: none"> <li>• Display units bar, psi</li> <li>• Pneumatic connection via QSP-10</li> <li>• Mounting via retaining clamp</li> <li>➔ <b>Internet:</b> <a href="#">.../pagn</a></li> </ul>

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## Tubing selection







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## Standard O.D. tubing

Type	O.D.	I.D.	Temperature-dependent operating pressure	Ambient temperature	Description
Plastic tubing, DUO tubing PUN, PUN-DUO 	3 ... 16 mm	2.1 ... 11 mm	-0.95 ... 10 bar	-35 ... 60 °C	<ul style="list-style-type: none"> <li>Highly flexible plastic tubing</li> <li>Polyurethane</li> <li>RoHS-compliant</li> <li>Operating media compressed air, vacuum</li> <li>Suitable for use with energy chains</li> <li>High resistance to stress cracks</li> <li>Designed as DUO tubing</li> </ul> <p>→ Internet: <a href="#">.../pun</a></p>
Plastic tubing, DUO tubing PUN-H, PUN-H-DUO 	3 ... 16 mm	2.1 ... 11 mm	-0.95 ... 10 bar	-35 ... 60 °C	<ul style="list-style-type: none"> <li>Polyurethane</li> <li>Designed as DUO tubing</li> <li>Operating media compressed air, vacuum, water</li> <li>Approved for use in the food industry</li> <li>High resistance to microbes and hydrolysis</li> <li>Suitable for use with energy chains</li> </ul> <p>→ Internet: <a href="#">.../pun-h</a></p>
Plastic tubing PUN-CM 	4 ... 12 mm	2.5 ... 8 mm	-0.95 ... 10 bar	-35 ... 60 °C	<ul style="list-style-type: none"> <li>Highly flexible plastic tubing, antistatic, electrically conductive</li> <li>Polyurethane</li> <li>Operating media compressed air, vacuum</li> <li>High resistance to UV radiation</li> <li>Suitable for use with energy chains</li> </ul> <p>→ Internet: <a href="#">.../pun-cm</a></p>





## Standard O.D. tubing

Type	O.D.	I.D.	Temperature-dependent operating pressure	Ambient temperature	Description
Plastic tubing PUN-V0 	3 ... 16 mm	2 ... 11.8 mm	-0.95 ... 30 bar	-35 ... 60 °C	<ul style="list-style-type: none"> <li>Highly flexible single-sheath plastic tubing</li> <li>Flame retardant to UL 94 V0 ... V2</li> <li>For use in the immediate vicinity of welding applications</li> <li>Polyurethane</li> <li>Operating media compressed air, vacuum</li> <li>High resistance to microbes and hydrolysis</li> </ul> <p>→ Internet: <a href="#">.../pun-v0</a></p>
Plastic tubing PEN 	4 ... 16 mm	2.7 ... 10.8 mm	-0.95 ... 10 bar	-30 ... 60 °C	<ul style="list-style-type: none"> <li>Polyethylene</li> <li>RoHS-compliant</li> <li>Operating media compressed air, vacuum</li> <li>Good resistance to chemicals and very good hydrolysis resistance</li> <li>Resistant to most cleaning agents and lubricants</li> </ul> <p>→ Internet: <a href="#">.../pen</a></p>
Plastic tubing PAN 	4 ... 16 mm	2.9 ... 12 mm	-0.95 ... 19 bar	-30 ... 80 °C	<ul style="list-style-type: none"> <li>High thermal and mechanical load capacities</li> <li>High resistance to microbes</li> <li>Polyamide</li> <li>Operating media compressed air, vacuum</li> </ul> <p>→ Internet: <a href="#">.../pan</a></p>
Plastic tubing PAN-R 	4 ... 16 mm	2.5 ... 10 mm	-0.95 ... 35 bar	-30 ... 80 °C	<ul style="list-style-type: none"> <li>For applications with a high pressure range</li> <li>High resistance to microbes</li> <li>Polyamide</li> <li>Operating media compressed air, vacuum</li> </ul> <p>→ Internet: <a href="#">.../pan-r</a></p>
Plastic tubing PAN-V0 	6 ... 14 mm		-0.95 ... 12 bar	-30 ... 90 °C	<ul style="list-style-type: none"> <li>Double-sheath tubing</li> <li>PVC, polyamide</li> <li>Flame retardant to UL 94 V0</li> <li>Operating media compressed air, vacuum, water, mineral oil</li> <li>High resistance to microbes, UV radiation</li> <li>Suitable for use with energy chains</li> </ul> <p>→ Internet: <a href="#">.../pan-v0</a></p>
Plastic tubing PLN 	4 ... 16 mm	2.9 ... 12 mm	-0.95 ... 14 bar	-30 ... 80 °C	<ul style="list-style-type: none"> <li>High resistance to chemicals, microbes, hydrolysis</li> <li>Approved for foodstuffs</li> <li>Resistant to most cleaning agents and lubricants</li> <li>Operating media compressed air, vacuum, water</li> <li>Polyethylene</li> <li>RoHS-compliant</li> </ul> <p>→ Internet: <a href="#">.../pln</a></p>




## Standard O.D. tubing

Type	O.D.	I.D.	Temperature-dependent operating pressure	Ambient temperature	Description
Plastic tubing PFAN 	4 ... 12 mm	2.9 ... 8.4 mm	-0.95 ... 16 bar	-20 ... 150 °C	<ul style="list-style-type: none"> <li>• Pneumatic tubing with resistance to high temperatures and chemicals</li> <li>• Approved for foodstuffs</li> <li>• High resistance to chemicals, microbes, UV radiation, hydrolysis, stress cracks</li> <li>• Perfluoroalkoxy alkane</li> <li>• RoHS-compliant</li> <li>• Operating media compressed air, vacuum</li> </ul> → Internet: <a href="#">.../pfan</a>





## Standard I.D. tubing

Type	O.D.	I.D.	Temperature-dependent operating pressure	Ambient temperature	Description
Plastic tubing, DUO tubing PU, PU-DUO 	3.2 ... 17.6 mm	2.3 ... 13 mm	-0.95 ... 10 bar	-35 ... 60 °C	<ul style="list-style-type: none"> <li>• Highly flexible plastic tubing</li> <li>• High resistance to abrasion and kinks</li> <li>• Polyurethane, PU-9 and PU-13: polyurethane with reinforcing fabric</li> <li>• Operating media compressed air, vacuum</li> <li>• Suitable for use with energy chains</li> <li>• Designed as DUO tubing</li> </ul> → Internet: <a href="#">.../pu</a>
Plastic tubing PL 	4.3 ... 17.6 mm	3 ... 13 mm	-0.95 ... 9 bar	-30 ... 60 °C	<ul style="list-style-type: none"> <li>• High resistance to microbes</li> <li>• Operating medium compressed air</li> <li>• PL-3, PL-4, PL-6: food industry approval in accordance with Directive 2002/72/EC and FDA</li> <li>• Polyurethane, PL-9 and PL-13: PVC with reinforcing fabric</li> <li>• RoHS-compliant</li> </ul> → Internet: <a href="#">.../pl</a>
Plastic tubing PCN 	6.5 mm	4 mm	-0.5 ... 0.25 bar	-10 ... 60 °C	<ul style="list-style-type: none"> <li>• For use with condensate drains on D series service units</li> <li>• PVC with reinforcing fabric</li> <li>• Operating media compressed air, water</li> </ul> → Internet: <a href="#">.../pcn</a>
Rubber hose P 	13 ... 31 mm	6 ... 19 mm	-0.95 ... 16 bar	-20 ... 80 °C	<ul style="list-style-type: none"> <li>• P-6 and P-9: Nitrile rubber</li> <li>• P-13 and P-19: ethylene propylene rubber, styrene butadiene rubber</li> <li>• With tubing for barbed hose fitting N</li> <li>• Operating media compressed air, vacuum, water</li> </ul> → Internet: <a href="#">.../p</a>

## Spiral tubing




Type	O.D.	I.D.	Working length	Temperature-dependent operating pressure	Ambient temperature	Description
Spiral plastic tubing, DUO spiral plastic tubing PUN-S, PUN-S-DUO 	4 ... 12 mm	2.6 ... 8 mm	0.5 ... 6 m	-0.95 ... 10 bar	-35 ... 60 °C	<ul style="list-style-type: none"> <li>Highly flexible plastic tubing</li> <li>Suitable for use with energy chains</li> <li>Polyurethane</li> <li>High resistance to UV radiation, stress cracks</li> <li>Operating media compressed air, vacuum</li> <li>Designed as DUO tubing</li> </ul> → Internet: .../spiral
Spiral plastic tubing PUN-SG 	9.5 ... 11.7 mm	6.4 ... 7.9 mm	2.4 ... 6 m	-0.95 ... 15 bar	-40 ... 60 °C	<ul style="list-style-type: none"> <li>Pre-assembled with captive rotatable fittings</li> <li>Polyurethane, nickel-plated brass, polyacetal</li> <li>High resistance to microbes, hydrolysis</li> <li>Operating media compressed air, vacuum</li> </ul> → Internet: .../spiral
Spiral plastic tubing PPS 	6.3 ... 7.8 mm	4.7 ... 6.2 mm	7.5 ... 15 m	-0.95 ... 21.2 bar	-30 ... 80 °C	<ul style="list-style-type: none"> <li>Pre-assembled with 2 rotatable fittings and captive OL sealing rings</li> <li>Polyamide, brass, galvanised steel</li> <li>Operating media compressed air, vacuum, water</li> <li>Suitable for use with energy chains</li> <li>High resistance to microbes</li> <li>RoHS-compliant</li> </ul> → Internet: .../pps

## Push-in fittings




Type	Pneumatic connection	Pneumatic connection, outlet	Operating pressure	Temperature-dependent operating pressure	Ambient temperature	Description
Push-in fitting QSM, QSM-I, QSMF, QSMP, QSMS, QSMC, QSM-H, QSMC-H, QSML, QSMLL, QSMLV-I, QSMLLV-I, QSML-H, QSMT, QSMTL, QSMX, QSMY 	Male thread G1/8, M3, M5, M6, M6x0.75, M7, M8x0.75, R1/8, Female thread M3, M5, Push-in sleeve QS-3, QS-4, QS-6, For tubing O.D. 3, 4, 6 mm	For tubing O.D. 3, 4, 6 mm		-0.95 ... 14 bar	-10 ... 80 °C	<ul style="list-style-type: none"> <li>• Quick Star, Mini</li> <li>• Compact for maximum component density in confined spaces</li> <li>• Male or female thread with external or internal hex</li> <li>• Push-in fitting</li> <li>• Push-in connector</li> <li>• Push-in bulkhead connector</li> <li>• Push-in cap</li> <li>• Push-in connector with push-in sleeve</li> <li>• Blanking plug</li> </ul> → Internet: .../qsm
Push-in fitting QSM-B, QSM-B-I, QSML-B, QSMT-B 	Male thread M3, M5, M6, M7, R1/8, For tubing O.D. 3, 4, 6 mm	For tubing O.D. 3, 4, 6 mm		-0.95 ... 10 bar	-10 ... 60 °C	<ul style="list-style-type: none"> <li>• Quick Star, Mini</li> <li>• Compact for maximum component density in confined spaces</li> <li>• Male thread with external or internal hex</li> </ul> → Internet: .../qsm-b
Push-in fitting QS, QS-I, QSF, QSS, QSS-F, QSSF, QSC, QS-H, QSH, QSC-H, QSL, QSLL, QSLF, QSLV-I, QSLV, QSL-H, QSL-HL, QST, QSTF, QSTL, QSW, QSW-HL, QSY, QSY-H, QSYL, QSYLV, QSYTF 	Male thread G1/2, G1/4, G1/8, G3/8, M5, R1/2, R1/4, R1/8, R3/8, Female thread G1/8, G1/4, G3/8, G1/2, Push-in sleeve QS-4, QS-6, QS-8, QS-10, QS-12, QS-16, For tubing O.D. 4, 6, 8, 10, 12, 16 mm	Female thread G1/8, G1/4, G3/8, G1/2, For tubing O.D. 4, 6, 8, 10, 12, 16 mm		-0.95 ... 14 bar	-10 ... 80 °C	<ul style="list-style-type: none"> <li>• Quick Star, standard</li> <li>• Male or female thread with external or internal hex</li> <li>• Push-in fitting</li> <li>• Push-in connector</li> <li>• Push-in bulkhead connector</li> <li>• Push-in bulkhead connector with fixed collar</li> <li>• Push-in cap</li> <li>• Push-in connector with push-in sleeve</li> <li>• Push-in sleeve</li> <li>• Blanking plug</li> </ul> → Internet: .../qs
Push-in fitting QS-B, QS-B-I, QSL-B, QSLL-B, QST-B, QSTL-B, QSY-B 	Male thread R1/8, R1/4, R3/8, R1/2, For tubing O.D. 4, 6, 8, 10, 12, 16 mm	For tubing O.D. 4, 6, 8, 10, 12, 16 mm		-0.95 ... 10 bar	-10 ... 60 °C	<ul style="list-style-type: none"> <li>• Quick Star, standard</li> <li>• Male thread with external or internal hex</li> <li>• Push-in fitting</li> <li>• Push-in connector</li> </ul> → Internet: .../qs-b




## Push-in fittings

Type	Pneumatic connection	Pneumatic connection, outlet	Operating pressure	Temperature-dependent operating pressure	Ambient temperature	Description
Push-in fitting QS-F, QS-F-I, QSF-F, QSSF-F, QS-F-H, QSS-F, QSH-F, QSC-F-H, QSC-F-I, QSL-F, QSL-F, QST-F, QSY-F 	G1/8, G1/4, G3/8, G1/2, M5, M7, Push-in sleeve QS-4, QS-6, QS-8, QS-10, QS-12, For tubing O.D. 4, 6, 8, 10, 12 mm	For tubing O.D. 4, 6, 8, 10, 12 mm	-0.95 ... 16 bar		0 ... 150 °C	<ul style="list-style-type: none"> <li>Quick Star, metal</li> <li>Solid-metal push-in fitting with chrome plated surface coating.</li> <li>High corrosion resistance (corrosion resistance class 3 according to Festo standard 940070) and chemical resistance</li> <li>Approved for use in the food and packaging industry</li> <li>Male or female thread with external or internal hex</li> <li>Push-in fitting</li> <li>Push-in bulkhead connector</li> <li>Push-in fitting with push-in sleeve</li> <li>Push-in connector</li> <li>Push-in bulkhead connector</li> <li>Push-in connector with push-in sleeve</li> <li>Push-in sleeve</li> <li>Blanking plug</li> <li>Blanking screw</li> </ul> <p>➔ Internet: <a href="#">.../qs-f</a></p>
Push-in fitting NPQM 	G1/8, G1/4, G3/8, G1/2, M5, M7, Push-in sleeve QS-4, QS-6, QS-8, QS-10, QS-12, For tubing O.D. 4, 6, 8, 10, 12 mm	For tubing O.D. 3, 4, 6, 8, 10, 12 mm	-0.95 ... 16 bar		-20 ... 70 °C	<ul style="list-style-type: none"> <li>Low-cost metal variant</li> <li>Push-in connector with push-in sleeve</li> <li>Male or female thread with external or internal hex</li> <li>Push-in bulkhead connector</li> <li>Housing made from nickel-plated brass</li> <li>Push-in L-fitting</li> <li>Multiple distributor</li> <li>Push-in T-fitting</li> <li>Push-in T-connector</li> <li>Push-in Y-connector</li> </ul> <p>➔ Internet: <a href="#">.../npqm</a></p>
Push-in fitting CRQS, CRQSS, CRQSL, CRQST, CRQSY 	Male thread M5, R1/8, R1/4, R3/8, R1/2, For tubing O.D. 4, 6, 8, 10, 12, 16 mm	For tubing O.D. 4, 6, 8, 10, 12, 16 mm	-0.95 ... 10 bar		-15 ... 120 °C	<ul style="list-style-type: none"> <li>Quick Star, stainless steel</li> <li>Maximum corrosion resistance (corrosion resistance class 4 according to Festo standard 940 070) and chemical resistance</li> <li>Approval for use in the food processing and packaging industry</li> <li>Male thread with internal and external hex</li> <li>Push-in fitting</li> <li>Push-in connector</li> <li>Push-in bulkhead connector</li> </ul> <p>➔ Internet: <a href="#">.../crqs</a></p>



## Push-in fittings

Type	Pneumatic connection	Pneumatic connection, outlet	Operating pressure	Temperature-dependent operating pressure	Ambient temperature	Description
Push-in fitting NPQP 	Male thread R1/8, R1/4, R3/8, R1/2, Push-in sleeve QS-4, QS-6, QS-8, QS-10, QS-12, For tubing O.D. 4, 6, 8, 10, 12 mm		-0.95 ... 10 bar		-20 ... 60 °C	<ul style="list-style-type: none"> <li>• Low-cost alternative to stainless steel: in combination with tubing PLN resistant to most cleaning agents</li> <li>• Housing made from polypropylene</li> <li>• Male thread with external hex</li> <li>• Push-in bulkhead connector</li> <li>• Blanking plug</li> <li>• Push-in L-fitting</li> <li>• Push-in L-connector</li> <li>• Push-in T-fitting</li> <li>• Push-in T-connector</li> <li>• Push-in Y-fitting</li> </ul> → Internet: <a href="#">.../npqp</a>
Push-in fitting QS-V0, QSL-V0, QST-V0 	G1/8, G1/4, G3/8, G1/2, R1/8, R1/4, R3/8, R1/2, For tubing O.D. 4, 6, 8, 10, 12 mm	For tubing O.D. 4, 6, 8, 10, 12 mm	-0.95 ... 10 bar		0 ... 60 °C	<ul style="list-style-type: none"> <li>• Quick Star, flame-retardant</li> <li>• For use in all areas where there is a risk of fire</li> <li>• Male thread with external hex</li> <li>• Push-in fitting</li> <li>• Push-in connector</li> </ul> → Internet: <a href="#">.../qs-v0</a>
Self-sealing/rotary push-in fitting QSK, QSSK, QSKL, QSR, QSRL 	Male thread G1/8, G1/4, G3/8, G1/2, M5, R1/8, R1/4, R3/8, R1/2, For tubing O.D. 4, 6, 8, 10, 12 mm	For tubing O.D. 4, 6, 8, 10, 12 mm		-0.95 ... 14 bar	-10 ... 80 °C	<ul style="list-style-type: none"> <li>• Quick Star, standard</li> <li>• Male thread with external hex</li> <li>• Self-sealing push-in fitting</li> <li>• Self-sealing push-in connector</li> <li>• Push-in bulkhead connector</li> <li>• Rotary push-in fitting</li> </ul> → Internet: <a href="#">.../qsk</a>



## Barbed fittings

Type	Nominal size	Pneumatic connection	Operating pressure	Temperature-dependent operating pressure	Ambient temperature	Description
Barbed fitting N, CN, SCN, RTU, LCN, LCNH, L-PK, TCN, T-PK, V-PK, Y-PK, FCN, CRCN 	1.3 ... 16.5 mm	G1/8, G1/4, G3/8, G1/2, G3/4, M3, M3x0.5, M4, M5, M6x0.75, M10x1, M12x1, NPT1-11 1/2, PK-2, PK-3, PK-4, PK-6, PK-9, PK-13, PK-19, R1			0 ... 60 °C	<ul style="list-style-type: none"> <li>• Barbed fitting</li> <li>• Barbed bulkhead fitting</li> <li>• Barbed tubing connector</li> <li>• Barbed T-connector</li> <li>• With male thread or with male thread and external hex</li> <li>• Stainless steel design</li> </ul> → Internet: <a href="#">.../cn</a>




## Barbed fittings

Type	Nominal size	Pneumatic connection	Operating pressure	Temperature-dependent operating pressure	Ambient temperature	Description
Female hose connector C-P, N-P, N-MS, SK 	2.5 ... 16.5 mm	G1/8, G1/4, G3/8, G1/2, G3/4, M5, NPT1-11 1/2, PK-3, PK-4, PK-6, PK-9, PK-13, PK-19, R1				<ul style="list-style-type: none"> <li>For hose clip</li> <li>Barbed hose fitting with or without sealing ring</li> <li>Hose clip to DIN 3017</li> <li>Brass, aluminium design</li> <li>➔ <b>Internet: .../c-1</b></li> </ul>
Quick connector ACK, CK, CK-KU, QCK, SCK, SCK-KU, CV-PK, GCK-KU, LCK, LCK-KU, LCKN, TCK, KCK-KU, FCK-KU, MCK, MCK-KU, LK, LK-KU, TK, TK-KU, VT-2, VT-3 	1.7 ... 12 mm	G1/8, G1/4, G3/8, G1/2, M5, M6x0.75, M10x1, M12x1, M16x1, PK-13 with union nut, PK-3 with union nut, PK-4 with union nut, PK-6 with union nut, PK-9 with union nut, R1/8, R1/4, R3/8	-0.9 ... 16 bar			<ul style="list-style-type: none"> <li>Quick connector</li> <li>Bulkhead quick connector</li> <li>Sealing cap for plastic tube fittings and barbed fittings</li> <li>T-distributor</li> <li>Union nut for CK tube fitting</li> <li>Multiple distributor</li> <li>Female or male thread with sealing ring</li> <li>Aluminium or polymer design</li> <li>➔ <b>Internet: .../ck</b></li> </ul>


## Threaded fittings

Type	Pneumatic connection 1	Pneumatic connection 2	Operating pressure	Ambient temperature	Description
Threaded fitting NPFB-S, QM, NPFB-R, QMR, NPFB-E, NPFB-D, NPFB-R, SCM, NPFB-L, NPFB-T, NPFB-Y, NPFB-X 	G1/8, G1/4, G3/8, G1/2, G3/4, G1, M5, M7, R1/8, R1/4, R3/8, R1/2, R3/4, R1	G1/8, G1/4, G3/8, G1/2, G3/4, G1, M5, R1/8, R1/4, R3/8, R1/2, R3/4, R1	-0.95 ... 40 bar	-20 ... 150 °C	<ul style="list-style-type: none"> <li>Sleeve</li> <li>Reducing sleeve</li> <li>Extension</li> <li>Double nipple</li> <li>Reducing nipple</li> <li>Female bulkhead connector</li> <li>Fitting</li> <li>With male and female thread</li> <li>➔ <b>Internet: .../npfb</b></li> </ul>
Blanking plug, double nipple B, D, E, ESK, SCM, QM, QMR 	G1/8, G1/4, G3/8, G1/2, G3/4, G1, M3, M5, M7, R1/8, R1/4, R3/8, R1/2	G1/8, G1/4, G3/8, G1/2, G3/4, G1, M3, M5, M7, R1/8, R1/4, R3/8, R1/2			<ul style="list-style-type: none"> <li>Blanking plug</li> <li>Reducing nipple</li> <li>Double nipple</li> <li>Bulkhead fitting</li> <li>Sleeve</li> <li>Reducing sleeve</li> <li>With male and female thread</li> <li>➔ <b>Internet: .../esk</b></li> </ul>

## Piping



Type	O.D.	Information on tubing materials	Operating pressure	Temperature-dependent operating pressure	Ambient temperature	Description
Plastic pipe PQ-PA 	12 ... 28 mm	PA	-0.95 ... 7 bar		-25 ... 75 °C	<ul style="list-style-type: none"> <li>• Rigid pipe made from high-quality polyamide</li> <li>• Operating medium: compressed air, vacuum, fluids</li> <li>• Flexible, maintenance-free</li> <li>• Smooth inside wall ensures optimum flow conditions</li> </ul> <a href="#">Internet: .../pq</a>
Pipe PQ-AL 	12 ... 28 mm	Wrought aluminium alloy	-0.95 ... 7 bar		-30 ... 75 °C	<ul style="list-style-type: none"> <li>• Rigid aluminium pipe</li> <li>• Operating medium: compressed air, vacuum, fluids</li> <li>• Corrosion-resistant</li> <li>• Smooth inside wall ensures optimum flow conditions</li> </ul> <a href="#">Internet: .../pq</a>
Plastic-coated metal tube PM 	6 ... 8 mm	Wrought aluminium alloy, PE		-0.95 ... 30 bar	-29 ... 65 °C	<ul style="list-style-type: none"> <li>• Operating media compressed air, vacuum</li> <li>• Resistant to deformation</li> <li>• Can be bent straight and reshaped several times without a pipe-bending device and without being damaged</li> <li>• Polyethylene, wrought aluminium alloy</li> <li>• RoHS-compliant</li> </ul> <a href="#">Internet: .../pm</a>

## Push-in fittings for piping PQ




Type	Pneumatic connection	Nominal size	Operating pressure	Temperature-dependent operating pressure	Ambient temperature	Description
Push-in fitting CQ, CQ-H, CQH-QS, CQC-H, CQL, CQT, CQD, CQA, CQSR, CQO 	Male thread G3/8, G1/2, G3/4, G1, Push-in sleeve CQ-12, CQ-15, CQ-18, CQ-22, CQ-28, Push-in sleeve QS-12, QS-16, For pipe/tubing O.D. 12, 15, 18, 22, 28 mm	8 ... 24.9 mm	-0.95 ... 15 bar		-25 ... 75 °C	<ul style="list-style-type: none"> <li>• For pipes PQ-PA, PQ-AL and tubing PAN and PUN</li> <li>• Operating medium: compressed air, vacuum, fluids</li> <li>• Push-in fitting</li> <li>• Push-in connector</li> <li>• Push-in connector with push-in sleeve</li> <li>• Push-in sleeve</li> <li>• Blanking plug</li> <li>• Distributor</li> <li>• Fluid separator</li> <li>• Retaining ring</li> <li>• Releasing tool</li> <li>• Male thread</li> </ul> <a href="#">Internet: .../cq</a>

## Couplings

FESTO

Type	Pneumatic connection	Standard nominal flow rate	Operating pressure	Ambient temperature	Description
Quick coupling socket, quick coupling plug KD1, KD2, KD3, KD4, KD5, KD3-A-R, KD4-A-R, KS1, KS2, KS3, KS4, KS5, KS3-A-R, KS4-A-R 	Male thread G1/8, G1/4, G1/2, M5, G1/8, G1/4, G3/8, G1/2, Female thread G1/8, G1/4, G3/8, G1/2, M5, M3, M5, PK-2, P-13, Via union nut: PK-3, PK-4, PK-6, PK-9, PK-13, Barbed fitting PK-6, PK-9	44 ... 1,120 l/min	-0.95 ... 15 bar	-10 ... 80 °C	<ul style="list-style-type: none"> <li>Quick connection coupling for standard applications without safety function</li> <li>With male or female thread or with barbed fitting or quick connector</li> <li>Shut-off at one or both ends</li> </ul> <b>→ Internet: .../kd1</b>
Quick coupling socket, quick coupling plug KDMS, KDS, KSS 	Male thread G1/4, G3/8, G1/2, G1/8, G1/4, G3/8, G1/2, Female thread G1/4, G3/8, G1/2, Via union nut: PK-9, PK-13, Barbed fitting PK-9	1,240 ... 1,818 l/min	-0.95 ... 12 bar	-10 ... 60 °C	<ul style="list-style-type: none"> <li>Safety coupling</li> <li>Shut-off on one side</li> <li>With male or female thread</li> <li>Coupling variants: plastic and metal</li> </ul> <b>→ Internet: .../kdms</b>

## Distributors

Type	Pneumatic connection, supply line	Pneumatic connection	Pneumatic connection, outlet	Number of supply lines	Number of outlets	Max. rotational speed	Description
Multiple distributor QSLV, QSQ, QST3 	Male thread G1/4, G1/8, G3/8, G1/2, Male thread R1/8, R1/4, R3/8, R1/2, For tubing O.D. 6, 8, 10 mm		For tubing O.D. 4, 6, 8, 10, 12 mm	1	2 ... 6		<ul style="list-style-type: none"> <li>Quick Star, standard</li> <li>Temperature range up to 80 °C</li> <li>L-shape, T-shape</li> <li>Rotatable 360°</li> <li>Connection via threaded connection or push-in connector</li> <li>Reducing design</li> </ul> <b>→ Internet: .../qslv</b>
Distributor block FR 	G1/8, G3/8, G1/2, G3/4, R1/8, R1/4, R3/8, R1/2		G1/8, G1/4, G1/2, M3, M5, PK-3, PK-4, R1/8, R1/4, R3/8, R1/2	1	3 ... 12		<ul style="list-style-type: none"> <li>Die-cast aluminium or anodised aluminium</li> <li>Operating pressure 0 ... 16 bar</li> <li>4, 8, 9 or 12 connections</li> </ul> <b>→ Internet: .../fr-4</b>
Rotary distributor GF 		Male thread G1/4, G3/8, G1/8, G1/4, G1/2, Female thread G1/4, G3/8, Female thread	G1/8, G1/4, G1/2, M5			300 ... 3,000 rpm	<ul style="list-style-type: none"> <li>4 outlets or 2 axial and radial outlets</li> <li>Single or multiple rotary distributor</li> <li>Design with air through-feeds</li> <li>Operating pressure -0.95 ... +10 bar</li> </ul> <b>→ Internet: .../gf</b>

Software tool




Configurator

Compile a product with numerous features reliably and quickly with the help of the configurator.  
Select all the required product features step-by-step. The use of logic checks ensures that only correct configurations are available for selection.  
The configurator is part of the electronic catalogue and is not available as a separate software program.







Universal connecting cables

Type	Electrical connection	Cable length	Description
<div>Connecting cable</div> <div>NEBU</div> <div></div>	4-pin/3-wire, 4-pin/3-pin, 4-pin/4-wire, 4-pin/5-pin, 5-pin/4-pin, 8-pin, A-coded/A-coded, Straight socket/cable, Straight socket/straight plug, Angled socket, M12x1, M12x1/M12x1, M5x0.5/M12x1, M5x0.5/M8x1, M5x0.5/open end, Straight plug/straight socket, Square design/open end	0.1 ... 30 m	<ul style="list-style-type: none"><li>• Designs for static, standard, energy chain and robot applications</li><li>• Design with switching status display</li><li>• Designs for connecting sensors and actuators</li></ul> <p>➔ Internet: .../nebu</p>
<div>Plug socket with cable</div> <div>SIM</div> <div></div>	3-pin, 4-pin, 8-pin, Straight socket, Angled socket, M12x1, Clip-on	2 ... 10 m	<ul style="list-style-type: none"><li>• Easy-to-clean design approved for use in the food industry</li><li>• Welding field-resistant design</li><li>• Design with clip-on socket</li></ul> <p>➔ Internet: .../sim</p>






## Universal connecting cables

Type	Electrical connection	Cable length	Description
Connecting cable KM8, KM12 	3-pin/3-pin, 4-wire, 4-pin/3-pin, 4-pin/4-pin, 8-pin/8-pin, Cable, M12x1/M12x1, M12x1/M8, M12x1/M8x1, M8x1/M8x1, Straight plug/straight socket, Straight plug/angled socket, Straight plug/straight socket, Straight plug/angled socket	0.5 ... 5 m	<ul style="list-style-type: none"> <li>For connecting inputs and outputs or for connecting individual valves or sensors</li> <li>Pre-assembled at both ends: straight plug with straight or angled socket</li> <li>Type of mounting: union nut, threaded connector</li> </ul> <p>→ Internet: <a href="#">.../km8</a></p>



## Connecting cables for control systems

Type	Electrical connection	Cable length	Description
Connecting cable SBOA-K 	Straight plug/straight socket/straight socket, Angled plug/straight socket	2 m	<ul style="list-style-type: none"> <li>For Compact Vision System SBOC-Q, SBOI-Q</li> <li>Ethernet diagnostic cable, for integration in a CPI system or for I/O expansion</li> </ul> <p>→ Internet: <a href="#">.../sboa-k</a></p>
Connecting cable KSPC-SECST, KSPC-AIF 	15-pin, Plug, Straight socket/angled socket, 5-pin/5-pin	1.5 m, 5 m, 8 m	<ul style="list-style-type: none"> <li>For connecting motor controller SEC-ST to axis controller SPC200</li> <li>For connecting motor controller SPC200 to axis controller SPC-AIF</li> </ul> <p>→ Internet: <a href="#">.../kspc</a></p>
Connecting cable NEBC 	15-pin, 15-pin/9-pin, 5-pin, 5-pin/3-wire, 9-pin, Socket, Straight socket/straight socket, M12x1, M9/open end, Angled plug/cable, Straight plug, Sub-D, Sub-D/Sub-D, Square design/angled	0.3 ... 5 m	<ul style="list-style-type: none"> <li>For I/O interface</li> <li>For connecting motor controller CMMS-ST to any controller</li> </ul> <p>→ Internet: <a href="#">.../nebc</a></p>
Connecting cable FEC-KBG 	RJ11 plug/Sub-D, socket, 15-pin, RJ12 plug/Sub-D, socket, 15-pin	1.2 m, 1.8 m	<ul style="list-style-type: none"> <li>For connecting electrical terminal CPX to operator unit FED</li> </ul> <p>→ Internet: <a href="#">.../fec-kbg</a></p>
Control cable KES 		2.5 ... 10 m	<ul style="list-style-type: none"> <li>For I/O interface for connecting motor controller SFC-DC to any controller</li> <li>For I/O interface for connecting motor controller MTR-DCI to any controller</li> </ul> <p>→ Internet: <a href="#">.../kes</a></p>
Programming cable PS1-ZK11 		1.5 m	<ul style="list-style-type: none"> <li>Connecting cable for motor controller CMMS-ST</li> </ul> <p>→ Internet: <a href="#">.../cmms-st</a></p>

## Connecting cables for fieldbuses



Type	Electrical connection	Cable length	Description
Flat cable KASI 		100 m	<ul style="list-style-type: none"> <li>For AS-interface</li> <li>2-wire</li> <li>Reverse polarity protected</li> <li>Contact using insulation displacement technology</li> <li>No need to strip cable and wire insulation</li> <li>2 different colours: yellow (preferred for the AS-interface network) and black (for auxiliary power supply)</li> </ul> <b>→ Internet: .../kasi</b>
Addressing cable KASI-ADR 	4-pin/4-pin/2-pin, Straight socket/angled plug/straight socket		<ul style="list-style-type: none"> <li>For AS-interface</li> <li>For any slaves such as individual valve interface, Midi/Maxi valve terminal with AS-interface connection, CP valve terminal</li> <li>Reverse polarity protected</li> </ul> <b>→ Internet: .../kasi-adr</b>
Programming cable KDI 	4-pin/9-pin, 5-pin/25-pin, 9-pin/9-pin, Straight socket/straight socket, Straight socket/straight plug, M12x1/Sub-D, M8x1/Sub-D, Straight plug/straight socket, Sub-D/Sub-D	2.5 ... 5 m	<ul style="list-style-type: none"> <li>Pre-assembled at both ends</li> <li>For diagnostic interface</li> <li>For servo motor MTR-DCI</li> </ul> <b>→ Internet: .../kdi</b>
Connecting cable KVI 	Straight plug/straight socket, Angled plug/angled socket	0.25 ... 8 m	<ul style="list-style-type: none"> <li>For fieldbus connection (CP bus valve terminal type 10 CPV and CPI installation system)</li> <li>5-pin round connector</li> <li>Pre-assembled at both ends</li> <li>Suitable for use with energy chains</li> </ul> <b>→ Internet: .../kvi</b>
Connecting cable KV-M12 	Angled plug/angled socket	1.5 ... 3.5 m	<ul style="list-style-type: none"> <li>Plug socket with cable for diagnostic interface (to electric terminal CPX)</li> <li>Pre-assembled at both ends</li> <li>5-pin/4-wire</li> <li>Round plug</li> <li>Mounting via union nut M12</li> </ul> <b>→ Internet: .../kv-m12</b>

## Connecting cables for motors



Type	Electrical connection	Cable length	Description
Encoder cable NEBM 		5 ... 15 m	<ul style="list-style-type: none"> <li>For servo motors EMMS-AS and stepper motors EMMS-ST</li> <li>Suitable for use with energy chains</li> </ul> <b>→ Internet: .../nebm</b>
Motor cable KMTR 		2.5 ... 10 m	<ul style="list-style-type: none"> <li>For motor controllers SFC-DC</li> </ul> <b>→ Internet: .../kmtr</b>





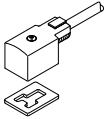
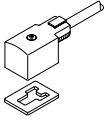
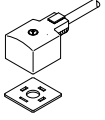



## Connecting cables for motors

Type	Electrical connection	Cable length	Description
Motor cable KMTRE 		5 ... 10 m	<ul style="list-style-type: none"> <li>Screened cable</li> <li>Can be used at -40 ... +125 °C</li> <li>Suitable for use with energy chains</li> <li>Protection class IP67</li> <li>For stepper motors MTRE-ST</li> </ul> → Internet: <a href="#">.../kmtre</a>
Power supply cable KPWR 		2.5 ... 10 m	<ul style="list-style-type: none"> <li>For motor units MTR-DCI</li> <li>For motor controllers SFC-DC for connecting load and logic supply</li> </ul> → Internet: <a href="#">.../kpwr</a>



## Connecting cables for valves

Type	Electrical connection	Cable length	Description
Connecting cable NEBV-C1, NEBV-B2, NEBV-Z2, NEBV-H1, NEBV-M8 	-/M12x1, 15-pin, 2-pin, 2-pin/5-pin, 25-pin, 3-pin/5-pin, 37-pin, 4-pin/2-wire, 4-pin/3-pin, 4-pin/5-pin, 44-pin, 8-pin/4-pin, 8-pin/4-pin/4-pin, Socket, Socket/plug/plug, Straight socket/straight plug, Angled socket/cable, Angled socket/straight plug, Type BI/A-coded, Type C/A-coded, Cable with plug, M12x1/M12x1, M12x1/M12x1/M12x1, M8x1, M8x1/M8x1, Sub-D, To DIN EN 175301-803/M12x1, Square design MSZC/A-coded	0.5 ... 10 m	<ul style="list-style-type: none"> <li>Connecting cable for AS-interface, for valves with solenoid coils ZC (CPE10, CPE14), for valves VUVG,</li> <li>Pre-assembled</li> <li>NEBV-C1, B2, -Z2: Based on standard EN 175301-803, EN 61076-2-101</li> </ul> → Internet: <a href="#">.../nebv</a>
Plug socket with cable KMYZ-2, KMYZ-3, KMYZ-4, KMYZ-9 	2-pin/2-wire, 2-pin/2-pin, 2-pin/3-pin, Angled socket, Angled socket/cable, Angled socket/straight plug, Angled socket/angled plug, Cable, Square design/M8x1, Square design/open end, Square design/square design, Square design MSZB, Square design MSZC	0.2 ... 10 m	<ul style="list-style-type: none"> <li>For valve with ZB solenoid coil: MZBH, MOZBH</li> <li>For valve with ZC solenoid coil: CPE10-M1BH, CPE14-M1BH, MH2, MH3</li> <li>RoHS-compliant</li> <li>Mounting via central screw</li> </ul> → Internet: <a href="#">.../kmyz-2</a>



## Connecting cables for valves

Type	Electrical connection	Cable length	Description
Plug socket with cable KMEB-1, KMEB-2, KMEB-3 	2-pin, 3-pin, 4-pin, 5-pin, Angled socket, Type C, To DIN EN 175301-803	0.5 ... 10 m	<ul style="list-style-type: none"> <li>For valve with EB solenoid coil: CPE18, CPE24, MEBH, MOEBH, JMEBH, JMEBDH, JMN2DH</li> <li>With PVC or polyurethane cable</li> <li>Mounting via central screw</li> </ul> <p>→ Internet: <a href="#">.../kmeb-1</a></p>
Plug socket with cable KME 	3-pin, Angled socket, Type C, To DIN EN 175301-803	2.5 ... 10 m	<ul style="list-style-type: none"> <li>For valve with E solenoid coil: MEH, MOEH, JMEH</li> <li>Mounting via central screw</li> <li>With PVC cable</li> <li>Temperature range -20 to +80 °C</li> </ul> <p>→ Internet: <a href="#">.../kme</a></p>
Plug socket with cable KMF 	Socket	2.5 ... 10 m	<ul style="list-style-type: none"> <li>For valve with F solenoid coil: MFH, MOFH, JMFH, JMFHDH, NVF3, MUFH</li> <li>Mounting via central screw</li> <li>PVC cable</li> <li>Temperature range -20 to +80 °C</li> </ul> <p>→ Internet: <a href="#">.../kmf</a></p>
Plug socket with cable KMV 	Socket, Type B	2.5 ... 10 m	<ul style="list-style-type: none"> <li>For valves with V solenoid coils</li> <li>Mounting via central screw M3</li> <li>With PVC cable</li> <li>Temperature range -20 to +80 °C</li> </ul> <p>→ Internet: <a href="#">.../kmv</a></p>
Plug socket with cable KMC 	Socket, Type A	2.5 ... 10 m	<ul style="list-style-type: none"> <li>For valve with D solenoid coil: MDH, MODH, JMDH</li> <li>For valve with N1 solenoid coil: MN1H, JMN1H, JMN1DH</li> <li>PVC cable</li> <li>Mounting via central screw</li> <li>Temperature range -20 to +80 °C</li> </ul> <p>→ Internet: <a href="#">.../kmc</a></p>
Plug socket with cable KMH 	2-pin, 3-pin, Socket	0.5 ... 5 m	<ul style="list-style-type: none"> <li>For miniature valve MHA1 and MHP1</li> <li>For fast-switching valve MHA2 and MHP2</li> <li>Mounting via clip</li> <li>Temperature range -40 to +80 °C</li> <li>PVC cable</li> </ul> <p>→ Internet: <a href="#">.../kmh</a></p>
Connecting cable MHJ9-KMH 	2-pin/2-pin/4-wire, Straight socket/straight socket/cable	0.5 ... 2.5 m	<ul style="list-style-type: none"> <li>For MHJ9 valves</li> <li>With plug sockets KMH</li> </ul> <p>→ Internet: <a href="#">.../mhj9-kmh</a></p>
Electrical plug base MHAP-PI 	2-pin, 3-pin, Socket	0.5 ... 1 m	<ul style="list-style-type: none"> <li>Plug base with cable for connecting individual valve</li> <li>Pre-assembled</li> <li>2-pin or 3-pin plug socket</li> <li>Mounting via clip</li> </ul> <p>→ Internet: <a href="#">.../mhap</a></p>





## Connecting cables for valves

Type	Electrical connection	Cable length	Description
Connecting cable KMPYE-AIF, KMPYE-5, KMPYE-... 		0.3 ... 10 m	<ul style="list-style-type: none"> <li>Connecting cable for connecting proportional directional control valves MPYE to the axis interface of axis controller SPC200</li> <li>Plug socket with cable, screened, for proportional directional control valves MPYE with 5 m cable</li> <li>Connecting cable, screened, for proportional directional control valves MPYE with max. 10 m cable</li> </ul> <p>→ Internet: <a href="#">.../kmpye</a></p>
Plug socket with cable KMPPE 		2.5 m, 5 m	<ul style="list-style-type: none"> <li>For proportional pressure regulators MPPE and MPPEs</li> <li>Temperature range -30 to +80 °C</li> <li>Mounting via union nut M16x0.75</li> <li>With PVC cable</li> </ul> <p>→ Internet: <a href="#">.../kmppe</a></p>


## Connecting cables for valve terminals

Type	Electrical connection	Cable length	Description
Connecting cable NEBV-S1 	-/M12x1, 15-pin, 2-pin, 2-pin/5-pin, 25-pin, 3-pin/5-pin, 37-pin, 4-pin/2-wire, 4-pin/3-pin, 4-pin/5-pin, 44-pin, 8-pin/4-pin, 8-pin/4-pin/4-pin, Socket, Socket/plug/plug, Straight socket/straight plug, Angled socket/cable, Angled socket/straight plug, Type BI/A-coded, Type C/A-coded, Cable with plug, M12x1/M12x1, M12x1/M12x1/M12x1, M8x1, M8x1/M8x1, Sub-D, To DIN EN 175301-803/M12x1, Square design MSZC/A-coded	0.5 ... 10 m	<ul style="list-style-type: none"> <li>Connecting cable for multi-pin plug connection</li> <li>Pre-assembled</li> <li>Sub-D</li> </ul> <p>→ Internet: <a href="#">.../nebv-s1</a></p>
Connecting cable KVIA 	Straight plug, Straight plug/straight socket, Straight plug/angled socket	5 ... 10 m	<ul style="list-style-type: none"> <li>For inputs/outputs (analogue connections)</li> <li>Pre-assembled at both ends</li> <li>4-pin/5-pin round plug</li> <li>Suitable for use with energy chains</li> </ul> <p>→ Internet: <a href="#">.../kvia</a></p>





## Connecting cables for valve terminals

Type	Electrical connection	Cable length	Description
Connecting cable VMPA-KMS1, VMPA-KMS2 	Cable with plug	2.5 ... 10 m	<ul style="list-style-type: none"> <li>• Plug socket with cable for multi-pin plug connection (to valve terminal type 32 MPA)</li> <li>• Pre-assembled at one end</li> <li>• Mounting via 3 screws</li> <li>• PVC or polyurethane cable</li> </ul> <b>→ Internet: .../vmpa-kms</b>
Connecting cable KEA 	25-pin, Socket, Sub-D	5 ... 10 m	<ul style="list-style-type: none"> <li>• For multi-pin plug connection</li> <li>• Type of mounting: 2x M3x16 screws</li> <li>• Operating voltage range 250 V AC/DC</li> </ul> <b>→ Internet: .../kea</b>
Connecting cable KMP2, KMP3, KMP4, KMP6 	15-pin, 25-pin, 26-pin, 9-pin, Socket, Sub-D	2.5 ... 10 m	<ul style="list-style-type: none"> <li>• Plug socket with cable for multi-pin plug connection</li> <li>• Pre-assembled</li> <li>• Mounting via union nut, with 2 screws</li> </ul> <b>→ Internet: .../kmp</b>
Connecting cable KRP 	2-pin, Angled socket	2.5 ... 5 m	<ul style="list-style-type: none"> <li>• Plug socket with cable for connecting relay plates, (valve terminal type 10 CPV10 and CPV14)</li> <li>• Pre-assembled</li> <li>• Mounting via self-tapping central screw</li> </ul> <b>→ Internet: .../krp</b>





## Connecting cables for sensors

Type	Electrical connection	Cable length	Description
Connecting cable NEBS 		2.5 ... 5 m	<ul style="list-style-type: none"> <li>• Connections: Plug socket with square design, open end</li> </ul> <b>→ Internet: .../nebs</b>



## Universal plug connectors

Type	Electrical connection	Connection cross section	Protection class	Description
Plug NECU, NECU-HX 	2x20-pin, 3-pin, 4-pin, 5-pin, 7/8" round plug connector, A-coded, AIDA push-pull, Socket, Socket/spring-loaded terminal, Straight socket, Straight socket/screw terminal, M12x1, M12x1 round plug connector, M8x1, R=2.54, Screw terminal, Straight plug/insulation displacement connector, Straight plug, Straight plug/screw terminal, Pre-assembled, Screenable, Square design	0.13 ... 2.5 mm <sup>2</sup>	IP40, IP65, IP67, IP68	<ul style="list-style-type: none"> <li>Power supply socket for fieldbus connection</li> <li>Plug and socket for power supply</li> <li>Can be assembled with any cable lengths</li> <li>NECU-HX: reconnectable M8 and M12 round plug connectors with Harax® quick connection technology for low-voltage applications</li> </ul> <p>➔ Internet: <a href="http://www.festo.com/catalogue/.../necu">.../necu</a></p>
Push-in T-connector NEDU 	4-pin/3-pin, 4-pin/4-pin, A-coded/A-coded, M12x1/M12x1, M12x1/M8x1, M8x1/M8x1, Plugs/sockets, To EN 60947-5-2		IP65, IP67	<ul style="list-style-type: none"> <li>For fieldbus connection</li> <li>Branch line for connecting and disconnecting fieldbus components</li> </ul> <p>➔ Internet: <a href="http://www.festo.com/catalogue/.../nedu">.../nedu</a></p>
Plug SEA 	3-pin, 4-pin, 5-pin, Angled socket/screw terminal, Type A, M12x1, M12x1 round plug connector, M8x1, Straight plug/solder connection, Straight plug/insulation displacement connector, Straight plug/screw terminal	0.08 ... 0.75 mm <sup>2</sup>	IP65, IP67	<ul style="list-style-type: none"> <li>Sensor plug/socket for inputs/outputs</li> <li>Can be assembled with any cable lengths</li> </ul> <p>➔ Internet: <a href="http://www.festo.com/catalogue/.../sea">.../sea</a></p>
Sensor socket SIE-GD, SIE-WD 	4-pin, Straight socket, Angled socket, M12x1	0.25 ... 0.75 mm <sup>2</sup>	IP67	<ul style="list-style-type: none"> <li>For customised fabrication of cables</li> <li>Pin adapter for fieldbus connection</li> <li>With screw terminals</li> <li>Straight or angled design</li> </ul> <p>➔ Internet: <a href="http://www.festo.com/catalogue/.../sie-gd">.../sie-gd</a></p>






## Plug connectors for control systems

Type	Electrical connection	Connection cross section	Protection class	Description
Plug NECC 	11-pin, Spring-loaded terminal, Plug	0.2 ... 2.5 mm <sup>2</sup>		<ul style="list-style-type: none"> <li>Encoder plug for motor controllers CMMS-ST, CMMS-AS</li> <li>Plug for multi-axis control systems CMXR for interface housing CAMI-C, 11-pin</li> <li>Plug for multi-axis control systems CMXR and for modular controllers CECX for peripheral modules</li> <li>2-pin, 4-pin, 6-pin, 8-pin, 11-pin, 18-pin</li> </ul> → Internet: <a href="#">.../necc</a>
Plug PS1-SAC, PS1-ZC 	10-pin/10-pin, 10-pin/30-pin, Socket/terminal strip	0.08 ... 0.75 mm <sup>2</sup>		<ul style="list-style-type: none"> <li>For power supply</li> <li>Cable connection using clamping technology</li> <li>Individually or as a set</li> </ul> → Internet: <a href="#">.../ps1</a>
Plug assortment NEKM 				<ul style="list-style-type: none"> <li>For motor controllers CMMP-AS, CMMS-ST</li> <li>Comprising plug for power supply and plug for motor connection</li> </ul> → Internet: <a href="#">.../nekm</a>
Plug FBS-RJ45 	5-pin, Type A, M12x1, Straight plug/screw terminal	0.75 mm <sup>2</sup>	IP40, IP65, IP67, In assembled condition, To IEC 60529	<ul style="list-style-type: none"> <li>Ethernet plug with 8-pin RJ45 connection</li> <li>Permissible cable diameter: 4 ... 8 mm</li> <li>Reverse polarity protected</li> <li>High transmission quality</li> <li>Detachable connection</li> </ul> → Internet: <a href="#">.../fbs-rj</a>






## Plug connectors for fieldbuses

Type	Electrical connection	Connection cross section	Protection class	Description
T-adapter FB-TA 	5-pin, 5-pin/5-pin, M12x1/M12x1, M12x1/M8x1, Plug/socket, Plugs/sockets		IP67	<ul style="list-style-type: none"> <li>For fieldbus connection (for valve terminal type 10 CPV and CP installation system)</li> <li>Branch line for connecting and disconnecting fieldbus components</li> <li>With open cable end or with 5-pin push-in connector</li> </ul> → Internet: <a href="#">.../fb-ta</a>
Plug, plug socket FBS, FBSD 	4-pin, 5-pin, 5-pin/5-pin, Straight socket/screw terminal, Angled socket/screw terminal, Type A, M12x1, Straight plug/screw terminal	0.75 mm <sup>2</sup> , 0.2 ... 2.5 mm <sup>2</sup>	IP20, IP40, IP65, IP67, In assembled condition, To IEC 60529	<ul style="list-style-type: none"> <li>For fieldbus connection</li> <li>Straight and angled design</li> <li>Can be assembled with any cable lengths</li> </ul> → Internet: <a href="#">.../fbs</a>

## Plug connectors for fieldbuses







Type	Electrical connection	Connection cross section	Protection class	Description
Bus connection FBSD-KL 	5-pin/5-pin, Angled socket/screw terminal	0.2 ... 2.5 mm <sup>2</sup>	IP20	<ul style="list-style-type: none"> <li>Angled socket, 5-pin; screw terminal, 5-pin</li> </ul> → Internet: .../fbsd-kl
Plug FBS-SUB-9-WS 	5-pin, Type A, M12x1, Straight plug/screw terminal	0.75 mm <sup>2</sup>	IP40, In assembled condition, To IEC 60529	<ul style="list-style-type: none"> <li>Plug connector for bus connection CAN bus and Profibus</li> <li>Cable connection 2x horizontal or 2x vertical</li> <li>Printed circuit terminal block with screw connector</li> </ul> → Internet: .../fbs-sub-9-ws
Plug FBS-SUB 			IP65, IP67, In assembled condition, To IEC 60529	<ul style="list-style-type: none"> <li>Fieldbus plug with 9-pin Sub-D connection</li> <li>Variants for Profibus DP, Interbus nodes CPX and CPV, CC-Link CPX and CPV, CPX-FEC</li> <li>Position of DIL switches can be read externally</li> <li>Easy mounting</li> </ul> → Internet: .../fbs-sub
Cable distributor ASI-KVT 		1.5 mm <sup>2</sup>	IP65, In assembled condition, To IEC 60529	<ul style="list-style-type: none"> <li>Flat cable distributor for branching or for reconnecting AS-interface flat cables</li> <li>Reverse polarity protected</li> </ul> → Internet: .../asi-kvt
Cable socket ASI-SD 	2-pin, 4-pin, 5-pin, Straight socket, Straight socket/insulation piercing connector, Screw terminal	0.75 ... 1.5 mm <sup>2</sup>	IP65, IP67	<ul style="list-style-type: none"> <li>For AS-interface</li> <li>Flat cable socket for connecting AS-interface stations to the AS-interface bus system</li> <li>M12 connection</li> <li>Reverse polarity protected</li> <li>Detachable connection</li> </ul> → Internet: .../asi-sd

## Plug connectors for valves



Type	Electrical connection	Connection cross section	Protection class	Description
Plug socket MSSD 	3-pin, 4-pin, Socket, Angled socket, Type A, Type B, Type C, To DIN EN 175301-803, to DIN EN 61984, Round design, Square design, Square design MSC, Square design MSE, Square design MSEB, Square design MSF, Square design MSN1, Square design MSN2, Square design MSV	0.75 ... 1.5 mm <sup>2</sup>	IP40, IP65, IP67, In assembled condition, To IEC 60529	<ul style="list-style-type: none"> <li>For valves with F, D, N1, V, E, EB, N2, Y, Z, ZB, ZC, MD-2, MH-2 solenoid coils</li> <li>For connecting individual valves (for valve terminal type 14)</li> <li>Cable connection using clamping screws, insulation displacement technology or push-in connector</li> <li>With or without LED</li> </ul> <p>→ Internet: <a href="#">.../mssd</a></p>
Soldering base PCBC 	2-pin, 3-pin		IP40	<ul style="list-style-type: none"> <li>For mounting miniature valves MHA1 and MHP1 on a PCB with plug connection underneath (-PI)</li> <li>For valve terminal type 82 CPA-SC for plug-in connection</li> </ul> <p>→ Internet: <a href="#">.../pcbc</a></p>
Multi-pin plug socket NECA 	9-pin/9-pin, Sub-D/screw terminal	0.34 ... 1 mm <sup>2</sup>	IP65, To IEC 60529	<ul style="list-style-type: none"> <li>For soft-start and exhaust valves MS6-SV, MS series</li> <li>Electrical connection via Sub-D 9-pin, screw terminal 9-pin</li> </ul> <p>→ Internet: <a href="#">.../ms6-sv</a></p>
Angled plug socket MPPE-3-B 	8-pin, Angled socket, Solderable	0.75 mm <sup>2</sup>	IP67	<ul style="list-style-type: none"> <li>For proportional pressure regulators MPPE and MPPES</li> <li>Mounting via union nut</li> </ul> <p>→ Internet: <a href="#">.../mppe-3-b</a></p>
Illuminating seal MF-LD, MC-LD, MV-LD, ME-LD, MEB-LD 	Type A, Type B, Type C, To DIN EN 175301-803, Square design MSC, Square design MSE, Square design MSEB, Square design MSF, Square design MSV		IP65	<ul style="list-style-type: none"> <li>For mounting between the plug socket and solenoid coil</li> <li>The seal is illuminated yellow when the power is switched on</li> <li>For F, D, N1, V, E, EB solenoid coils</li> </ul> <p>→ Internet: <a href="#">.../mc-ld</a></p>



## Plug connectors for valve terminals

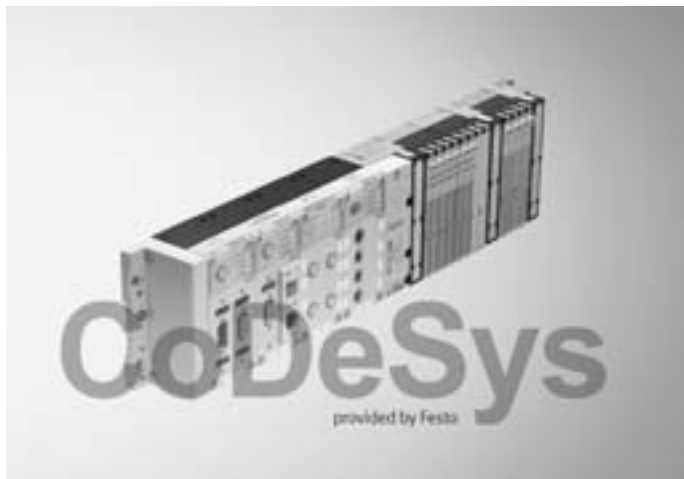
Type	Electrical connection	Connection cross section	Protection class	Description
Power supply socket NTSD 	4-pin, 5-pin, Straight socket, Angled socket, Screw terminal, Straight plug/screw terminal	0.75 ... 2.5 mm <sup>2</sup>	IP67	<ul style="list-style-type: none"> <li>Straight and angled design</li> <li>For power supply</li> <li>Can be assembled with any cable lengths</li> </ul> → Internet: <a href="#">.../ntsd</a>
Fieldbus adapter FBA-CO, FBA-PB 	9-pin/5-pin, Straight socket/straight plug, Straight socket/plug and socket, Sub-D/-, Sub-D/M12x1		IP67	<ul style="list-style-type: none"> <li>9-pin Sub-D plug to 5-pin round plug/M12 socket</li> </ul> → Internet: <a href="#">.../fba</a>
Bus connection FBA-1, FBA-2 	9-pin/5-pin, Straight socket/straight plug, Straight socket/plug and socket, Sub-D/-, Sub-D/M12x1		IP40, IP65, IP67, To IEC 60529	<ul style="list-style-type: none"> <li>Can be assembled with any cable lengths</li> </ul> → Internet: <a href="#">.../fba-1</a>
Cover cap ISK 				<ul style="list-style-type: none"> <li>For sealing unused ports/openings</li> <li>Thread M8, M12</li> </ul> → Internet: <a href="#">.../isk</a>
Plug socket, plug SD-SUB 	25-pin, Plug, Sub-D		IP65	<ul style="list-style-type: none"> <li>Plug socket for multi-pin plug connection</li> <li>Plug for inputs/outputs</li> <li>Can be assembled with any cable lengths</li> </ul> → Internet: <a href="#">.../sd-sub</a>
Multi-pin plug socket IMP1 	25-pin, 40-pin, 72-pin, Socket	0.75 ... 1.75 mm <sup>2</sup>	IP65	<ul style="list-style-type: none"> <li>For multi-pin cable connection</li> <li>Can be assembled with any cable lengths</li> </ul> → Internet: <a href="#">.../imp1</a>

## Plug connectors for sensors

Type	Electrical connection	Connection cross section	Protection class	Description
Angled plug socket PEV-WD 	4-pin, Angled socket		IP65	<ul style="list-style-type: none"> <li>For pressure switch PEV</li> <li>15 ... 30, 180 V DC, 230 V AC</li> <li>Angled design</li> <li>Available with LED display</li> </ul> → Internet: .../ <a href="#">pev*wd</a>
Angled plug socket SD-4-WD 	25-pin, Plug, Sub-D		IP65, To IEC 60529	<ul style="list-style-type: none"> <li>For swivel module DSMI</li> <li>Angled design</li> </ul> → Internet: .../ <a href="#">sd-4-wd</a>

## Software tool

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**CoDeSys**




CoDeSys makes your life easier with simple commissioning, fast programming and parametrisation – standardised programming of embedded devices to IEC 61131-3

**Advantages**


- Hardware-neutral software platform for quick and easy configuration, programming and commissioning of pneumatic and electric automation solutions
- Extensive module libraries for single or multi-axis positioning motions
- The IEC 61131-3 standard means that CoDeSys is flexible and open for all types of control tasks
- Modular: offline and online functions, as well as components for hardware configuration and visualisation
- User-friendly IEC functional module extension
- Re-use of existing application parts

The CoDeSys parametrisation software can be found on the website under Support in the Support and Downloads area. Enter CoDeSys as a search term here to retrieve it.


## Controllers

Type	Operating voltage	CPU data	Type of fieldbus interface	Ethernet, connector plug	Description
Controller CECX-M1 	19.2 - 30 VDC, 24 VDC +25%/-15%	64 MB DRAM, Processor 400 MHz	CAN bus, Profibus master DP-V1, Profibus slave DP-V0, Profibus slave DP-V1	8-pin, Socket, RJ45	<ul style="list-style-type: none"> <li>• Motion controller with CoDeSys and SoftMotion</li> <li>• Programming to standard IEC 61131-3</li> <li>• Three plug-in slots for optional modules</li> </ul> → Internet: <a href="#">.../cecx</a>
Controller CECX-C1 	19.2 - 30 VDC, 24 VDC +25%/-15%	64 MB DRAM, Processor 400 MHz	CAN bus, Profibus master DP-V1, Profibus slave DP-V0, Profibus slave DP-V1	8-pin, Socket, RJ45	<ul style="list-style-type: none"> <li>• Modular master controller with CoDeSys</li> <li>• Programming to standard IEC 61131-3</li> <li>• Three plug-in slots for optional modules</li> </ul> → Internet: <a href="#">.../cecx</a>
Controller FED-CEC 		32-bit RISC processor, 24 MHz, Watchdog	CAN	RJ45	<ul style="list-style-type: none"> <li>• Plug-in card with processor module</li> <li>• For fitting into operator units FD</li> <li>• Fieldbus interfaces CANopen</li> <li>• CoDeSys programming software provided by Festo</li> </ul> → Internet: <a href="#">.../fed-cec</a>

## Operator units, text-based

Type	Display	Display size	Recipe memory	Ethernet interface	Number of user LEDs	Number of function keys	Description
Operator unit FED-40, FED-50, FED-60, FED-90 	Mono-chrome LCD, with back-lighting	4 x 20 characters	16 KB	Optional, 10 MBd	5... 13	4 ... 12	<ul style="list-style-type: none"> <li>• Straightforward designing of human-machine dialogues</li> <li>• Semi-graphical display of process values makes them easier to read</li> <li>• 4-line text display and operating buttons</li> <li>• Serial interface</li> <li>• Recipe handling</li> <li>• Password protection</li> </ul> <p>→ Internet: .../fed</p>

## Operator units, with touchscreen

Type	Display	Display size	Display resolution	Ethernet interface	Description
Operator unit FED-301, FED-400, FED-501, FED-550, FED-700, FED-1000, FED-2000, FED-5000 	Monochrome LCD, Colour TFT	10.4", 12.1", 15", 3.8", 4.3", 5.6", 5.7", 7.5"	1/4 VGA, 320x240 pixels, SVGA, 800x600 pixels, VGA, 640x480 pixels, XGA, 1024x768 pixels	100 MBd, 2nd Ethernet interface, optional, 10 MBd, RJ45 10/100 MBd, Optional, 10 MBd	<ul style="list-style-type: none"> <li>• Graphics-capable for maximum flexibility when displaying processes and data</li> <li>• No programming effort in the PLC program</li> <li>• Convenient FED Designer WYSIWYG design tool</li> <li>• Shorter project planning thanks to re-usable objects</li> <li>• Trend display</li> <li>• Program sequences display</li> <li>• Can be connected to all FEC® units</li> <li>• Extremely sturdy thanks to metal housing</li> </ul> <p>→ Internet: .../fed</p>

## Software



Type	Description
Diagnostic module GFDM	<ul style="list-style-type: none"> <li>• Diagnostic system for the continuous monitoring of the pressure, flow and cycle consumption of a pneumatic system</li> <li>• The system includes sensors (a flow sensor and a pressure sensor) for recording the measured values, a controller for evaluation and one of two visualisation options</li> <li>• Limit monitoring and information concerning trends</li> <li>• Automatic reference data acquisition (teach-in)</li> <li>• Monitoring of up to 16 different process sequences on one system</li> </ul> <p>→ Internet: .../gfdm</p>

Software






Type		Description
Software (FluidDraw) GSWF		<ul style="list-style-type: none"><li>• Quick and easy creation of pneumatic circuit diagrams</li><li>• Comprehensive pneumatics symbol library</li><li>• Easy, user-friendly operator guidance</li><li>• Interface to Festo products (catalogue, online shop)</li></ul> <a href="#">➔ Internet: .../gswf</a>
Software GSWC		<ul style="list-style-type: none"><li>• Circuit diagram templates for modular electrical terminal CPX</li><li>• CPX macros for circuit diagram design in EPLAN</li></ul> <a href="#">➔ Internet: .../gswc</a>



## Reservoirs

Type	Volume	Information on air reservoir materials	Conforms to	Condensate drain connection	Description
Air reservoir VZS 	20 l	Steel, Painted	DIN EN 286-1	G3/8	<ul style="list-style-type: none"> <li>• Compensation of pressure fluctuations</li> <li>• Provision of large quantities of compressed air for supplying fast pulsing drives</li> <li>• Volume up to 20 l</li> <li>• With condensate drain</li> </ul> → Internet: .../vzs
Air reservoir CRVZS 	0.1 l, 0.4 l, 0.75 l, 10 l, 2 l, 20 l, 5 l	High-alloy stainless steel	AD 2000	G3/8	<ul style="list-style-type: none"> <li>• Corrosion-resistant</li> <li>• Volume up to 20 l</li> <li>• Available with condensate drain</li> <li>• The reservoirs can be used to compensate pressure fluctuations, and act as accumulators in the event of sudden air consumption</li> <li>• Provision of large quantities of compressed air for supplying fast pulsing drives</li> <li>• Designs in accordance with EU Pressure Equipment Directive</li> </ul> → Internet: .../crvzs


## Silencers

Type	Information on silencer insert materials	Pneumatic connection	Noise level	Description
Silencer U 	Bronze, PE	G1, G1/2, G1/4, G1/8, G3/4, G3/8, M3, M5, PK-3, PK-4	65 ... 84 dB(A)	<ul style="list-style-type: none"> <li>• Compact design, plastic or die-cast zinc</li> <li>• Barbed fitting or threaded connection</li> <li>• RoHS-compliant designs</li> </ul> → Internet: .../u
Silencer UC 	PE	G1/4, G1/8, M5, M7, QS-10, QS-3, QS-4, QS-6, QS-8	58 ... 68 dB(A)	<ul style="list-style-type: none"> <li>• Design with push-in sleeve for push-in fitting QS or threaded connection for solenoid valves CPE</li> <li>• Plastic design</li> </ul> → Internet: .../uc
Silencer UO 	PE	G1/4, G1/8, M7		<ul style="list-style-type: none"> <li>• Special minimal resistance silencer</li> <li>• For vacuum generator VN</li> <li>• Facilitates trouble-free operation</li> </ul> → Internet: .../uo

## Silencers

Type	Information on silencer insert materials	Pneumatic connection	Noise level	Description
Silencer UOS-1 	PE	G1		<ul style="list-style-type: none"> <li>For soft-start and exhaust valves MS6-SV, MS series</li> <li>Mounted using male threads</li> </ul> → Internet: .../uos-1
Silencer UOM, UOMS 	PU foam	G1/4, G3/8		<ul style="list-style-type: none"> <li>Silencer and silencer extension</li> <li>For vacuum generators</li> <li>Special minimal resistance silencer</li> <li>Facilitates trouble-free operation of the vacuum generator</li> <li>Silencer extension for extending the silencer for further noise reduction</li> </ul> → Internet: .../uom

## Air guns

Type	Exhaust function	Pneumatic connection	Housing materials	Description
Low consumption air gun LSP 	Metered blowing	Female thread G1/4	Wrought aluminium alloy, PA6 reinforced	<ul style="list-style-type: none"> <li>Precise, infinitely variable, lever operated flow metering</li> <li>Interchangeable nozzles</li> <li>Pneumatic connection via female thread</li> </ul> → Internet: .../lsp

## Control cabinets



### Factory automation

- Control cabinets made to measure
- Individually configured
- Adapted to requirements in industrial automation
- Design and sizing included

### Technical data

- Simple to complex control cabinet designs
  - Pneumatic
  - Electric
  - Combined
- Application-specific combination of components
- Use of the latest innovations and technologies
- 100% tested, with test certificate
- Ready-to-install
- Complete documentation
- Design conforms to:
  - EN 60204-1
  - ATEX zone 1 and 21 (pneumatic only), ATEX zone 2 and 22 (electric and electro-pneumatic)
  - UL-508A
- Implementation of safety functions
- Different bus technologies, including:
  - PROFIBUS
  - CANopen
  - DeviceNet



## Control cabinets

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### Process automation

- Control cabinets made to measure
- Individually configured
- Adapted to requirements in process automation
- Design and sizing included

### Technical data

- Simple to complex control cabinet designs
  - Pneumatic
  - Electric
  - Combined
- Application-specific combination of components
- Different operating voltages possible
- Use of the latest innovations and technologies
- 100% tested, with test certificate
- Ready-to-install
- Complete documentation
- Design conforms to:
  - EN 60204-1
  - ATEX zone 1 and 21 (pneumatic only), ATEX zone 2 and 22 (electric and electro-pneumatic)
  - UL-508A
- Implementation of safety functions
- Wide range of bus technologies
- Compliance with special cleanliness and hygiene requirements
- Special materials, e.g. stainless steel, for use in virtually all ambient conditions
- Protected against the entry of liquids and foreign matter, e.g. dust
- Installation of heating or cooling elements possible in areas of application with extreme temperature fluctuations
- Intrinsically safe valve terminal technology
- Replacement of individual terminal valves during operation (hot-swap)
- Inspections without opening the cabinet using inspection window
- Control elements on the outside
- Safe thanks to key lock system on the service unit: to switch off, all employees responsible must remove their lock

## Control cabinets



### Control cabinets for controllers

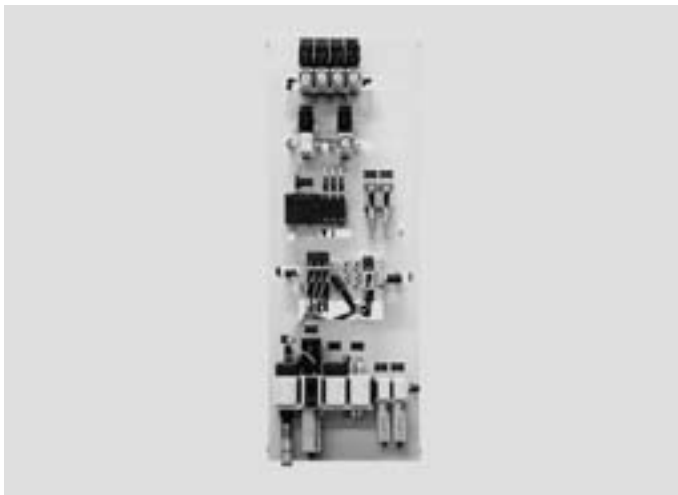
- Made-to-measure control cabinets for controlling handling systems
- Software package for third-party devices included
- Individually configurable
- Adapted to requirements for handling solutions

➔  
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### Technical data

- Simple to complex control cabinet designs
  - Pneumatic
  - Electric
  - Combined
- 1 ... 31 axes
- Application-specific combination of components
- Use of the latest innovations and technologies
- 100% tested, with test certificate
- Ready-to-install
- Complete documentation
- Design conforms to:
  - EN 60204-1
  - ATEX zone 1 and 21 (pneumatic only), ATEX zone 2 and 22 (electric and electro-pneumatic)
  - UL-508A
- Implementation of safety functions
- Wide range of bus technologies

## Mounting plates and assemblies



### Mounting plates

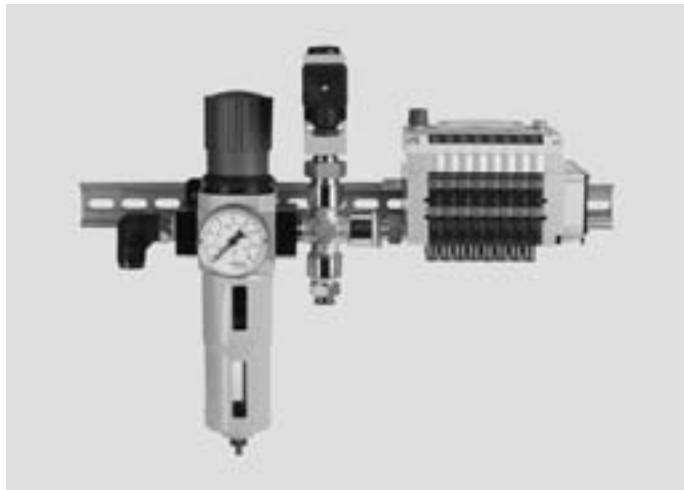
- Machine-specific preassembly of pneumatic and electrical components on support plate
- Tubing and wiring included
- Defined interfaces for simple installation directly in the system

### Technical data

- Customised support plate shape
- For a wide range of industrial applications
- Support plate available in different materials, e.g. sheet steel, stainless steel etc.
- Application-specific combination of components
- Fully assembled, connected and wired
- Defined interfaces
- Use of the latest innovations and technologies
- Ready-to-install: All steps from engineering through to assembly and right up to quality inspection are performed by Festo specialists.
- 100% tested, with test certificate
- Complete documentation
- Design conforms to:
  - EN 60204-1
  - ATEX zone 1 and 21 (pneumatic only), ATEX zone 2 and 22 (electric and electro-pneumatic)
  - UL-508A
- Implementation of safety functions

## Mounting plates and assemblies

FESTO



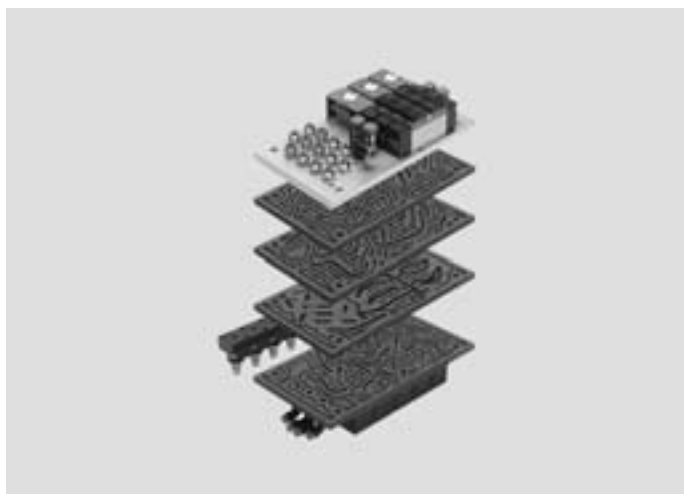
### Sub-assemblies

- Pneumatic and electrical components preassembled to create a function unit
- Can be combined from around 30,000 catalogue components
- Connections included
- For integration in machines

### Technical data

- Combination of various pneumatic and/or electrical components to create a single unit
- For a wide range of industrial applications
- Application-specific combination of components
- Optional accessories mounted on sub-assembly
- Use of the latest innovations and technologies
- Ready-to-install: all steps from engineering through to assembly and right up to quality inspection are performed by Festo specialists.
- 100% tested, with test certificate
- Complete documentation
- Design conforms to:
  - EN 60204-1
  - ATEX zone 1 and 21 (pneumatic only), ATEX zone 2 and 22 (electric and electro-pneumatic)
  - UL-508A
- Implementation of safety functions

## Integrated solutions



### Manifold duct plates

- Ideal for a large number of pneumatic connections in an extremely compact space
- No tubing
- Compact
- Easy to service
- Not subject to malfunction

### Technical data

- Shape of manifold duct plate freely selectable
- Combination of over 30,000 catalogue components, e.g. valves, regulators, filters, sensors etc.
- High connection density of components
- No waste
- Variable positioning of mechanical, pneumatic and electrical interfaces
- Integration of customised components
- Compact
- Sturdy and not subject to malfunction
- Sealed and protected unit
- Easy to service
- Available with protective cover
- 100% tested
- Ready-to-install
- Complete documentation
- Implementation of safety functions

## Integrated solutions

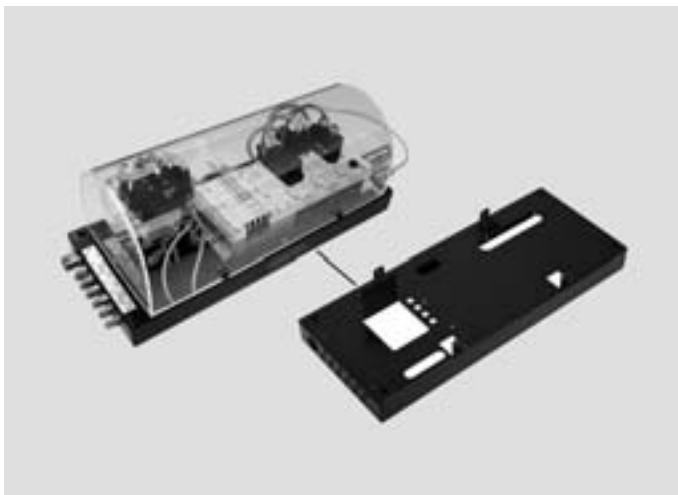


### Cartridge solutions

- Integration of various pneumatic functions in one component
- No need for single housings
- Ideal for applications that require a highly compact design

### Technical data

- Space-saving thanks to extremely compact design
- Pneumatic functions integrated in a single compact housing, e.g.:
  - Directional control valves
  - Flow control valves
  - Non-return valves
  - Vacuum generators
  - Pressure regulators
  - Pneumatic logic functions
- Housing available in different materials
- No tubing required
- Minimal cabling required
- Significant design freedom
- Variable integration options on and within the machine
- Sturdy design thanks to protected installed parts and smooth surfaces
- 100% tested
- Ready-to-install
- Complete documentation

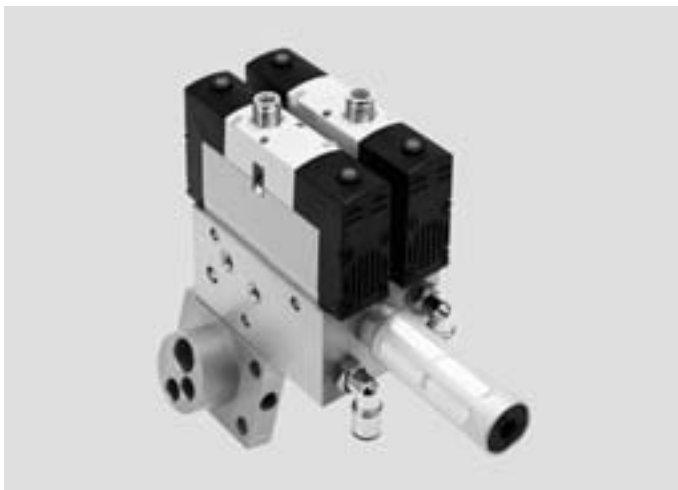


### Sheet-metal constructions and special housings

- Reduced weight thanks to optimal material utilisation with sheet-metal construction
- Protection against environmental influences and unauthorised access
- Ideally combined as a control cabinet directly in the system

### Technical data

- Sheet-metal constructions
  - Customised shape and size
  - Reduced weight and number of assembly parts
- Special housing
  - Customised shape (flat, curved, rectangular etc.)
  - Customised dimensions
  - Different materials (metal, aluminium, plastic etc.)
  - Compact, space-saving format
  - Protection against environmental influences and unauthorised access
- In combination
  - Alternative to conventional control cabinets
  - Variable integration options on and within the machine
  - Short tubing and cable lengths
  - Attractive design



### Functional blocks

- Compressed air supply for pneumatic components via drilled ducts
- Ideal for small number of pneumatic components and variable connection options
- Compact and easy to service

### Technical data

- No tubing required thanks to drilled ducts
- Housing available in different materials:
  - Aluminium
  - Brass
  - Steel
  - POM
  - PEEK
  - PA
  - etc.
- Customised design of the pneumatic interfaces for the system
- Ideal for a small number of components and variable connection options
- Extremely economical, even for small quantities

## Integrated solutions



### Profile solutions

- Extruded profiles in combination with valves as a valve terminal
- For the distribution of compressed air in the machine concept
- Customised profile cross sections available

### Technical data

- Profiles in customised cross sections and lengths
- Integrated ducts for straight-line routing of the compressed air
- Common air supply for multiple valves or valve terminals via a single duct
- Combination of exhaust air and supply air without tubing, even over long distances
- Supply of compressed air at different locations
- No tubing required
- Significantly reduced cabling
- Modular structure easy to achieve
- Optional: profile as mechanical mounting for other components or as a supporting part of the machine frame

## Operating phase



### Maintenance

- Preventive and corrective maintenance
- Directly on your system
- For high machine availability and rapid assistance should the worst happen

### Services

Implementation of the following preventive maintenance measures to DIN 31051:

#### Inspections

- Checking for damage and wear characteristics
- Checking of mechanical, pneumatic and electrical connections and connectors
- Checking of lubrication
- Checking of compressed air preparation
- Carrying out of component-specific inspections

#### Maintenance

- Lubrication/relubrication of guides
- Tightening of connectors
- Replacement of air filters
- Replacement of silencers
- Carrying out of component-specific preventive maintenance tasks

#### Repair

- Troubleshooting
- Solution finding
- Error elimination
- Rectification of leakages
- Replacement or repair of components

### Services

- Inspection
- Profitability analysis
- Repair or replacement of faulty components or wearing parts
- Leakage testing
- Function check

Please send the faulty component and a detailed error description to your Festo national company.

Detailed spare parts lists can be found on the Festo Internet site.

### Repair service

- Send high-quality components and assemblies to Festo for repair
- Extended service life
- Reduced costs



## Energy Saving Services

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### Compressed air production energy analysis

- Energy Saving Services – the service package for energy efficiency.
- Identification and optimum utilisation of potential savings for compressed air
- Save up to 60% on compressed air costs
- Energy saving begins with the compressor

### Services

- Measurement of compressor operating times as well as load/idling times
- Current consumption measurement
- Flow measurement/consumption measurement
- Pressure measurement (level and bandwidth)
- Estimation of leakage volume
- Comparison of energy consumption and supplied compressed air volume



### Compressed air consumption analysis

- Determination of exact compressed air consumption
- Optimal configuration of compressed air supply
- No pressure drop due to undersupply
- No unnecessary energy costs due to oversupply

### Services

- Installation and removal of the measuring equipment with standard components (fittings, tubing etc.)
- Measurement of flow rate, consumption and pressure with machine running and when idle
- Determination and analysis of different characteristics
  - Consumption per machine cycle
  - Average consumption per minute
  - Average pressure
  - Max./min. pressure
  - Max./min. rate of air flow
- Documentation of measurement results including graphical representation of measurement results, optionally available as PDF file or colour printout
- 3 hours on-site service (additional effort on a time and material basis)



### Compressed air quality analysis

- Optimisation of compressed air quality
- Increased service life of components
- Reduced maintenance costs

### Services

- Inspection of decentralised air preparation at point of usage
- Measurement of residual oil content
- Measurement of pressure dew point
- Analysis of measurement results and recommendation of improvement measures (if applicable)
- Documentation of all measurement results
- 3 hours on-site service (max. 3 measurements; additional effort on a time and material basis)



## Energy Saving Services



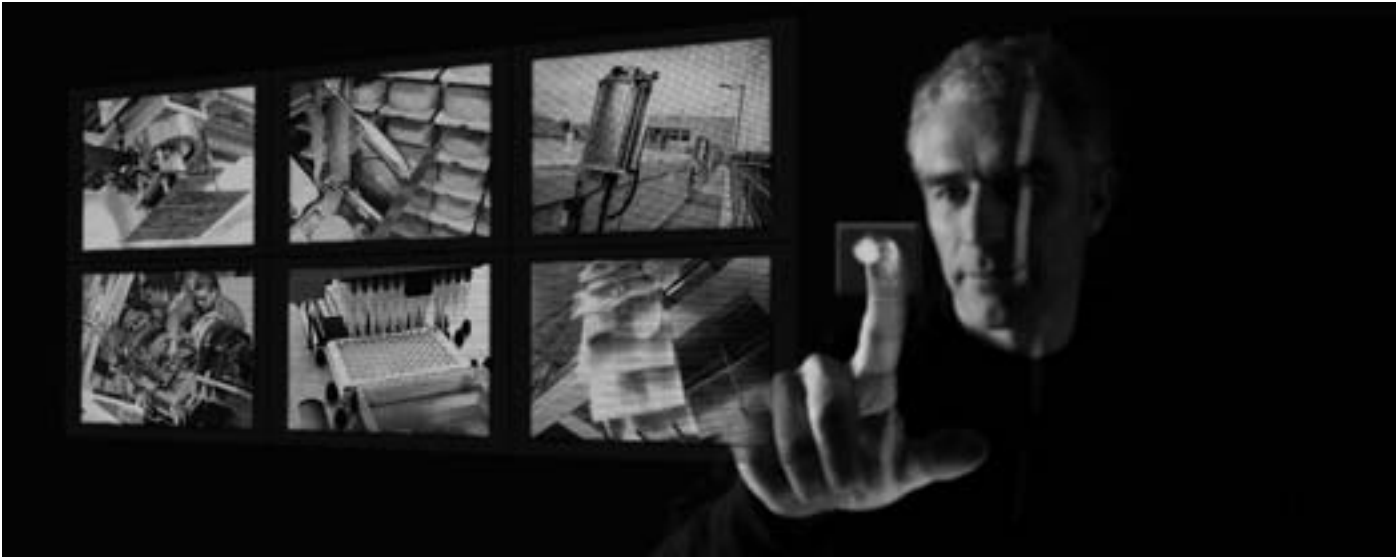
### Leakage detection

- Detection and rectification of leakages in production plants
- Immediate energy and operating cost savings

### Services

- Detection of compressed air leakages using highly sensitive ultrasound detectors during operation
- Checking of the complete compressed air system from the compressor to the pneumatic application
- Classification of the leakages according to size and cost
- Documentation of faulty components as well as of the type and cause of fault
- Leakage report
  - Recommended measures
  - Spare parts required
  - Estimation of repair time
  - Prioritisation of measures
  - Assessment as to whether repair can be carried out while machine is in operation
- Information on optimisation options
- Documentation of measures carried out





**Innovative solutions for factory and process automation**

When it comes to automation, Festo is right at home – whether it's factory automation involving discontinuous processes or the various fields of

application in process automation involving batch and continuous processes. Industry-specific and industry-wide expertise guarantees the right

products and services for our mutual success. From improving energy efficiency to increasing machine availability – Festo has its finger on the pulse

and will support you in meeting any challenges you face

**Your goal: Optimising process costs, ensuring productivity**

**Our solution: Partner throughout the entire production process**

**Your goal: Productivity and economy**

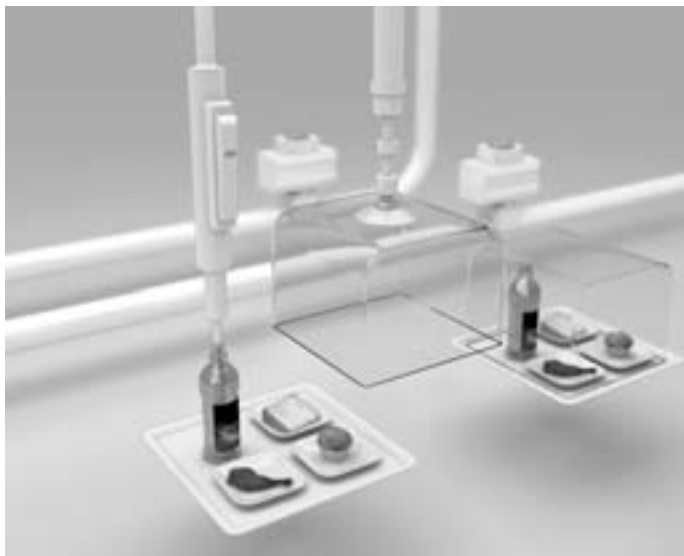
**Our solution: Understanding the challenges in your segment**

**Your goal: Optimum solutions in the shortest possible time**

**Our solution: Combining knowledge of applications and technologies**

**Your goal: Competitive edge thanks to innovation and differentiation**

**Our solution: Meeting challenges with technology and innovation**



### Festo – partner throughout the entire production process:

- From continuous processes through food and splash zones right up to end-of-line packaging
- Collaborative engineering
- Creating synergies – everything from a single source

### Solutions for applications with demanding requirements

- Preventing biological contamination: Resistant materials and easy-to-clean design
- Safe for use in the food sector: Declarations of conformity with FDA, NSF-H1, design approval (1935/2004)
- Preventing physical hazards: Corrosion-resistant materials
- Operability after cleaning: Unlubricated operation

### Clean Design drives and sensors for safe food production

- Easy-to-clean and resistant design, seals and grease suitable for foodstuffs (FDA, NSF-H1)
- Self-adjusting end-position cushioning system PPS
  - Minimal vibrations thanks to optimum cushioning
  - Minimal installation times thanks to self-adjustment
  - Easy to clean: No adjusting screw
- Modular sealing system for every requirement

### Valve solutions: Standard or customised

- Maximum safety thanks to our components:
  - Clean Design
  - Protection to IP65 and IP67
  - Corrosion-resistant
- Cost-effectiveness in assembly and operation:
  - Reduced installation costs
  - Reduced energy consumption thanks to decentralised installation concept
  - Reduced cleaning time
- Condition monitoring and diagnostics:
  - Downtime prevention increased by up to 35% and downtime is shorter
  - Faster identification of faults

### Tubing/threaded fitting combinations for every application:

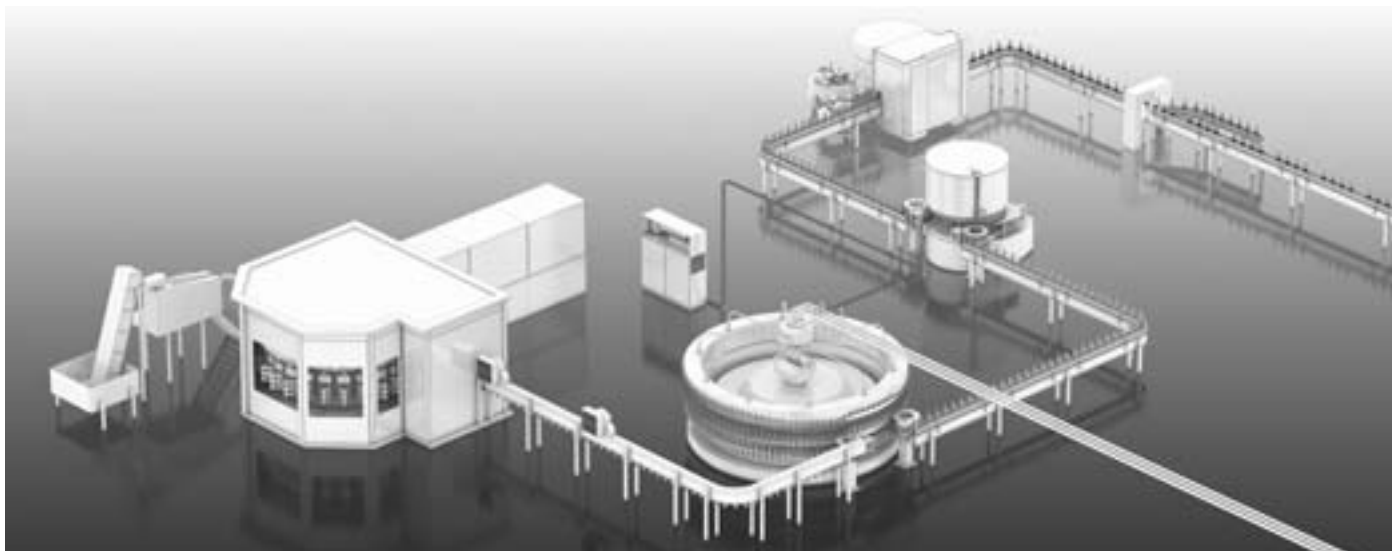
- Resistant to heat
- Resistant to cleaning agents and media

### Meeting challenges with technology and innovation

- Optimised to your requirements – our innovative products
- Complete solution from a single source – application-specific systems
- Added value for your processes – continuous improvement of services from engineering to operation

Which of our innovations can give you that competitive edge?

Talk to our specialists.





### Festo – your partner in water technology

Added value in process automation for plant operators, engineering firms and system integrators

**Your goal:** Optimising process costs, reducing complexity and increasing process reliability.

**Our solution:** Partner throughout the entire project and value creation phases of water and sewage treatment plants

Festo offers tailored automation solutions. Our solutions are economical, reliable and robust. What's more, you get everything from a single source – from the drive technology right up to field level.

Working together to develop intelligent automation – from conceptual design to smooth operation.

### Understanding the challenges in water technology

Special challenges demand special solutions. We work with our customers to develop efficient and reliable applications that are designed to meet the specific requirements of each of the individual processes involved in water treatment, including:

- Complete, decentralised automation systems for filtration, ultrafiltration and reverse osmosis.
- Explosion-proof, ideal for fermentation tanks.

### Solution competence:

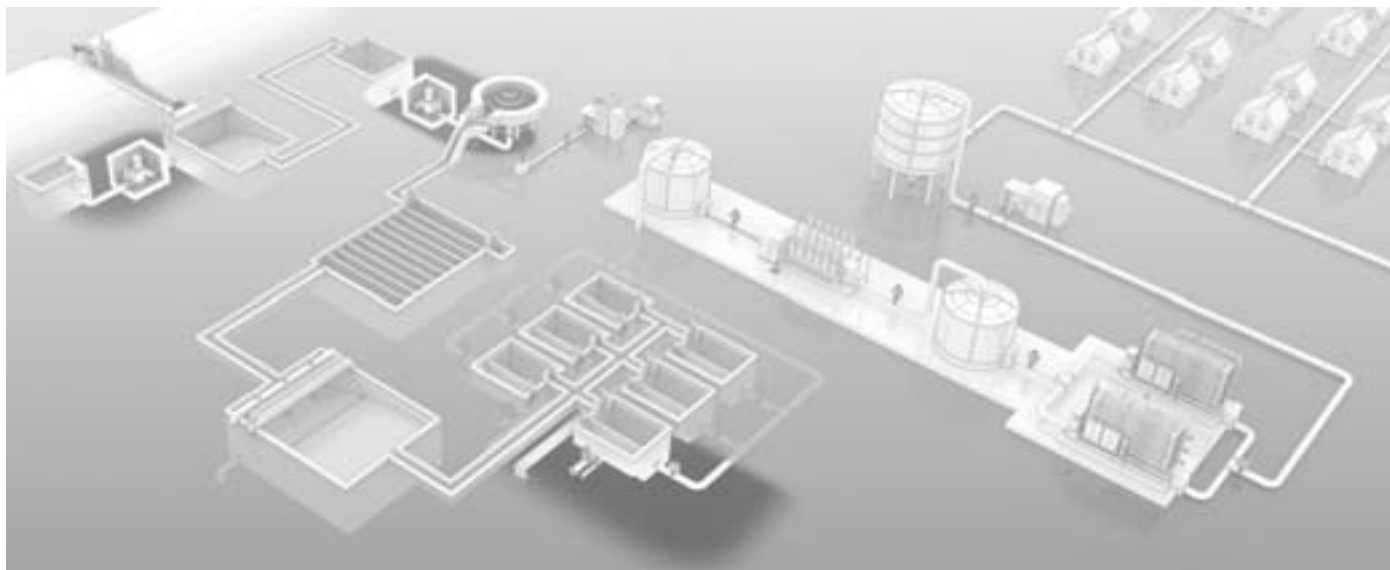
Very close coordination with the plant operator and the planning office with regard to automated processes in the conceptual design and planning phase.

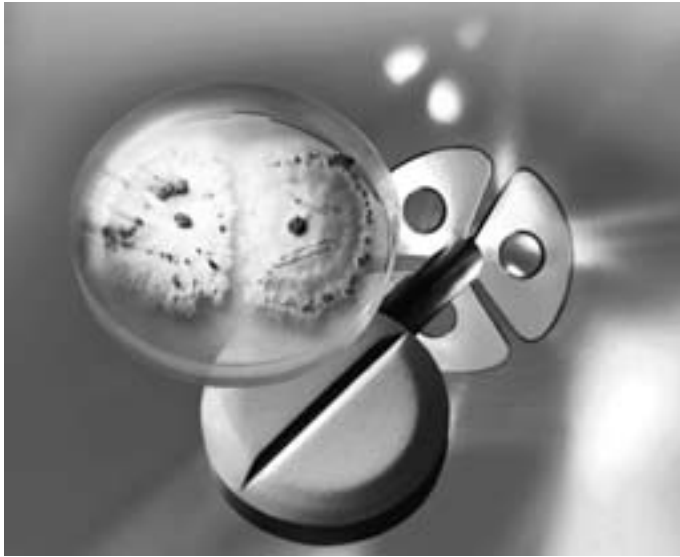
Design of the compressed air network as well as of the consumption metering Definition of plant standards for the pneumatic actuator and valve technology

Whether your project involves renovation, modernisation, expansion, integration into an existing system or new development, reliable technology and economy lie at the heart of every decision. The Festo automation concept

takes these factors into account by optimising process costs, reducing complexity and increasing reliability.

**Talk to our specialists.**





**Festo – your partner in the biotechnology/pharmaceuticals industries for the entire automation process chain**

Whether your production process is focussed on

- Production of APIs
- Precision chemistry
- R&D
- Highly sterile filling processes

**Your goal: Optimising process costs, increasing productivity and flexibility.**

**Our solution: Reduction of total costs**

The best guarantee for safe, reliable and risk-free production are proven technologies combined with effective control concepts.

Regardless of whether you require highly sterile filling processes in secondary production or the production of APIs or precision chemistry in primary production,

Festo products and services will increase your productivity.

**Understanding the challenges in the biotechnology/pharmaceuticals industries**

We work with our customers to develop customised solutions that are designed to meet the specific requirements of the industry, including:

- Consistently reducing the period of time from the system concept to the start of production

Saving time saves money and extends productive use of the patent period.

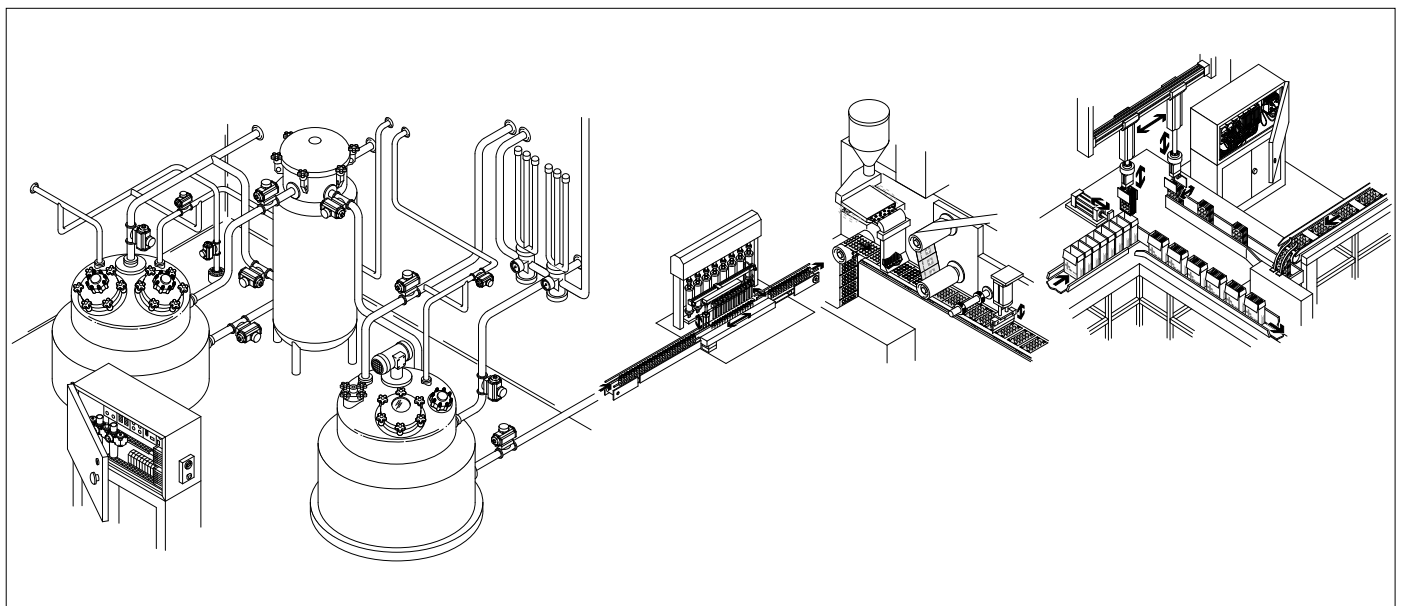
**Solution competence:**

Festo has the answer with products, modules and systems for the implementation of modular and scalable system concepts.

Our industry specialists will support you in handling large projects, with the development of design proposals, for example.

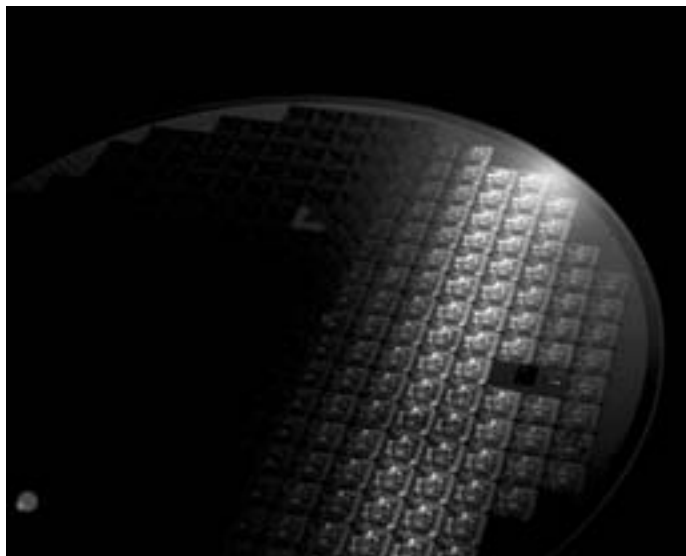
Whether your project involves modernisation, expansion of an existing system or new development, reliable technology and economy lie at the heart of every decision.

**Talk to our specialists.**



## Partner to the electronics and light assembly industries

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### **Festo will guide you through the entire process chain for the electronics and light assembly industries**

- from wafer production at the front end to finished chips at the back end
- with quality testing and assembly of the finished products
- in the area of small parts assembly, in both the electronic and non-electronic sector

In summary: Festo will support you in all areas where space is tight and miniaturised automation solutions are needed.

**Your goal: Competitive edge thanks to innovation and increased productivity**

**Our solution: Automation partner throughout the entire production process.**

We will guide you through your entire production process from the front end to final assembly. Whether you produce electronic or purely mechanical products – Festo can offer automation solutions that are tailored to your requirements.

### **Understanding the challenges**

The electronics and light assembly industries are characterised by high cycle rates, extreme cost pressure, fast format change and increasingly smaller and more efficient machines. In summary: Making miniaturisation and performance a big priority.

### **Solutions optimised to your requirements.**

Festo responds to these specific challenges with an optimised product and solution portfolio:

- With weight-optimised, compact design
- For fast cycle times
- For precise movements
- For clean room applications
- Miniaturised with
- function integration included

We will work with you to find the ideal solution for your application, for example:

- Valves for the control of gas boxes
- Grippers and handling systems for holding electronic chips
- Miniaturised handling systems for assembly
- Testing and quality checking systems for final assembly

**Our specialists will be happy to assist you. Talk to us.**





## Partner to the solar and flat-screen industries

FESTO



### Festo – your partner in photovoltaics for the entire automation process chain

Whether your production is focussed on

- Producing wafers or thin-film cells
- Manufacturing cells or modules
- "Inline" or "batch" production

#### Your goal: Optimising process costs, ensuring productivity

##### Our solution: Partner throughout the entire production process

Festo optimises the automation solutions to your requirements so that they integrate into your production as seamlessly as possible. Tell us what you need. And we'll develop an individual solution for you.

#### Understanding the challenges in the photovoltaics industry

Special challenges demand special solutions. We work with our customers to develop customised solutions that are designed to meet the specific requirements of the industry, including:

- Low-contact grippers based on the Bernoulli principle
- Air bearings for gentle substrate transport
- Or intelligent pilot valves for gas box control.

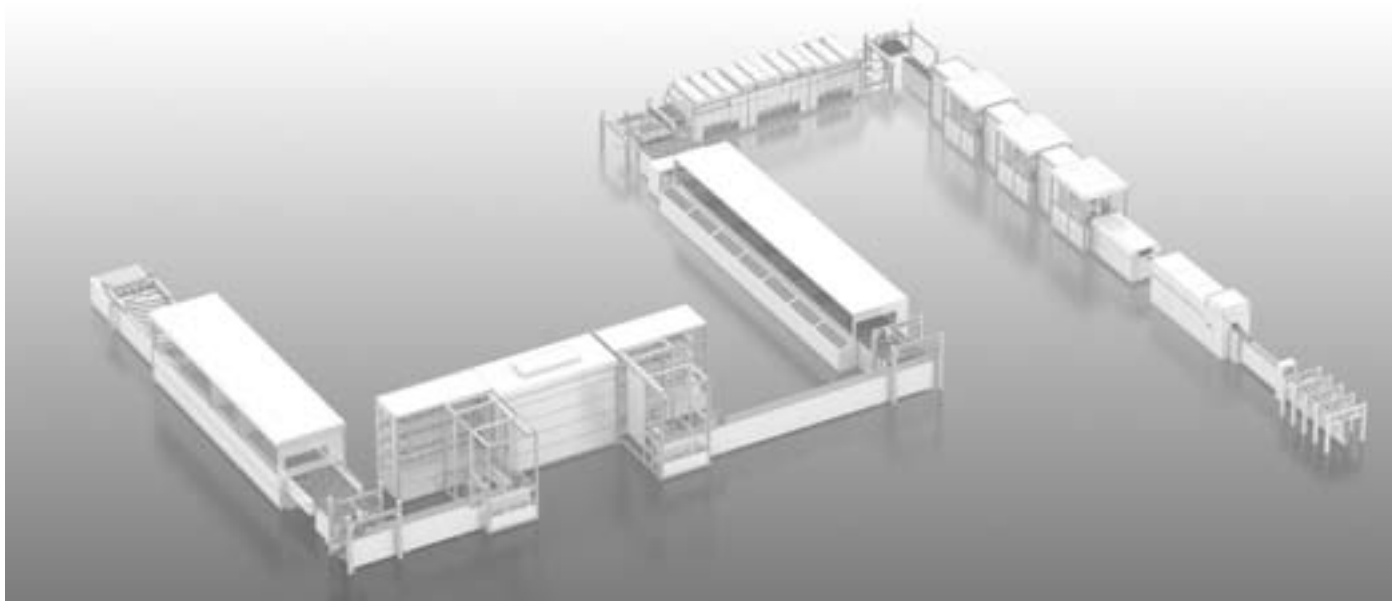
#### Solution competence: More than just products

Festo offers services for the entire life cycle of complete system solutions. These range from consulting and engineering complete handling solutions through commissioning the ready-to-install systems to an extensive after sales service. These go hand-in-hand with a fast return on investment, maximum productivity and increased process reliability – a package of benefits that pay off. The right hardware is available from

the multi-axis modular system with no restrictions and also with no interface problems, even with very complex handling solutions:

- Simple pick and place handling solutions
- Linear gantries
- Three-dimensional gantries
- The cream of the crop: Optimised high-speed handling systems

**Talk to our specialists.**





## Festo – partner throughout the entire production process:

- Understanding the processes – from the press shop through to engine and transmission production
- Developing solutions – collaborative engineering
- Creating synergies – everything from a single source

## Your goal: Optimising process costs, ensuring productivity

### Our solution: Partner throughout the entire production process

Your requirements define the solution. We will provide support not just in relation to components and pneumatic and electrical subsystems, but for all phases of the value added chain from planning right through to production – and beyond, with our After Sales Services, for example.

## Understanding the challenges

With over 50 years of experience in standard components and application-optimised automation technology, vehicle manufacturers and suppliers can rely on Festo. No matter where in the world you are planning to base your production, Festo will be there for you with short communication channels, rapid availability of components and prompt assistance when you urgently need it.

- Competent – sales and applications experts (Key Account Management)
- Fast – worldwide networking of applications knowledge
- Tailor-made – customer integration in R&D (innovative products based on ISO standards)

## Competitive edge thanks to innovation and differentiation

- Optimised to your requirements – our innovative products (e.g. CPX terminal in metal design)
- Complete solution from a single source – application-specific systems (e.g. drive concepts for welding tongs)
- Added value for your processes – continuous improvement of services from engineering to operation (e.g. Energy Saving)

## Catalogues and release lists:

For the convenience of suppliers and manufacturers in the automotive industry, Festo produces manufacturer-specific catalogues and factory and project-specific release lists.

## Talk to our specialists.





Festo – your partner in the automotive, commercial vehicle and rail vehicle industries

**One strong partner. Our team:**

Around 14,600 employees worldwide.

**Our mission:**

Sustainable management and long-term creation of value for our customers, our company, our employees and our partners.

**Our motto:**

Install it and forget it.

**We create solutions.**

**Our advantages – your competitive edge:**

- Price-sensitive, functional components and systems
- High production, product and service quality
- Extended temperature ranges
- Enhanced vibration and shock resistance

- High level of reliability with respect to service life and switching cycle rate
- High resistance to contamination and corrosion
- Structures aligned with the automotive process to VDA 6.4, ISO 9001, ISO 14001, ISO TS 16949

**Long life built in: Automation in commercial vehicles.**

**Everything from a single source.**

Innovative, flexible and reliable solutions. From individual components to ready-to-install systems. New products developed specifically for use in vehicles – sturdy, flexible and precise.

Decades of experience in the development and implementation of customised systems in commercial

vehicles, buses and coaches, rail vehicles and agricultural machinery.

For maximum safety, reliability and convenience. Always the optimum functionality at the best price. Combined with service packages for even greater economy.

**Talk to our specialists.**

