

# Positioner CMSX

**FESTO**



## Key features

### Function and application

The CMSX is a digital electropneumatic positioner that enables simple and efficient control of the position of process valves actuated by pneumatic actuators. This robust and compact positioner can be mounted on actuators using a mechanical interface in accordance with VDE/VDI 3845-1 (IEC 60534-6-2). There are product variants for single or double-acting actuators, different flow rates and safety settings (fail-safe, fail in place).

In addition, there are product variants for connecting external displacement/ angular sensors to remotely control the position of process valves. Commissioning is simple and robust thanks to an automated initialisation function. For setpoint specification 0/4 ... 20 mA current signals or 0 ... 10 V voltage signal are used, and for analogue position feedback a 4 ... 20 mA current signal is used. The device status is indicated by a digital

alarm output. In addition, a configurable digital input for travel to specific positions and two configurable digital outputs provide feedback on the position limit values. Several freely configurable software functions make the CMSX a flexible solution for any task.

### Innovative

- Sturdy, highly dynamic solenoid valve technology
- No internal air consumption in the controlled state
- Straightforward commissioning thanks to automated initialisation function
- Simple and self-explanatory menu navigation

### Versatile

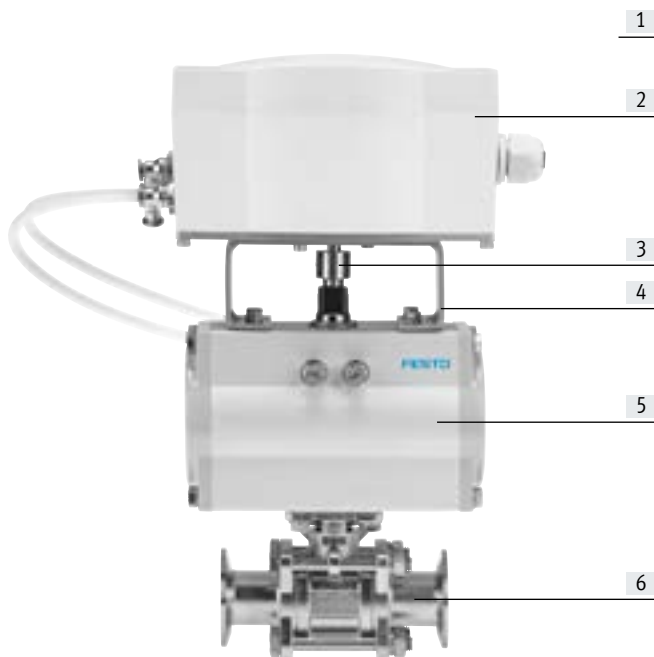
- For single- or double-acting actuators
- Fail-safe or fail-in-place safety function
- Direct connection to quarter turn actuators as per VDE/VDI 3845-1 (IEC 60534-6-2) or remote connection with external displacement encoder

### Design

- 4-conductor technology
- Operating voltage 24 V DC
- Setpoint input 0/4 ... 20 mA, 0 ... 10 V
- Position feedback 4 ... 20 mA
- 1 digital input
- 2 digital outputs
- 1 digital alarm output for feedback of the device status
- Compact polymer housing
- Standard nominal flow rate 50 l/min or 130 l/min
- Housing degree of protection IP65

## Key features

### System structure



- [1] Higher-level system (PLC/IPC or external setpoint generator)
- [2] Positioner CMSX
- [3] Mechanical coupling
- [4] Mounting adapter DARQ
- [5] Quarter turn actuator (example: DFPD)
- [6] Process valve (example: VZBD)

### Positioner/actuator combinations<sup>1)</sup>

CMSX-...	Quarter turn actuator		Linear actuator
	DFPD	DAPS	DFPI
Flow rate	Piston $\varnothing$	Piston $\varnothing$	Piston $\varnothing$
...-50-...	$\geq 160$	$\geq 180$	-
...-130-...	$\geq 240$	$\geq 240$	$\geq 100$

1) Precise selection of the positioner for the actuator is dependent on the specific application. Please consult your local Festo contact.

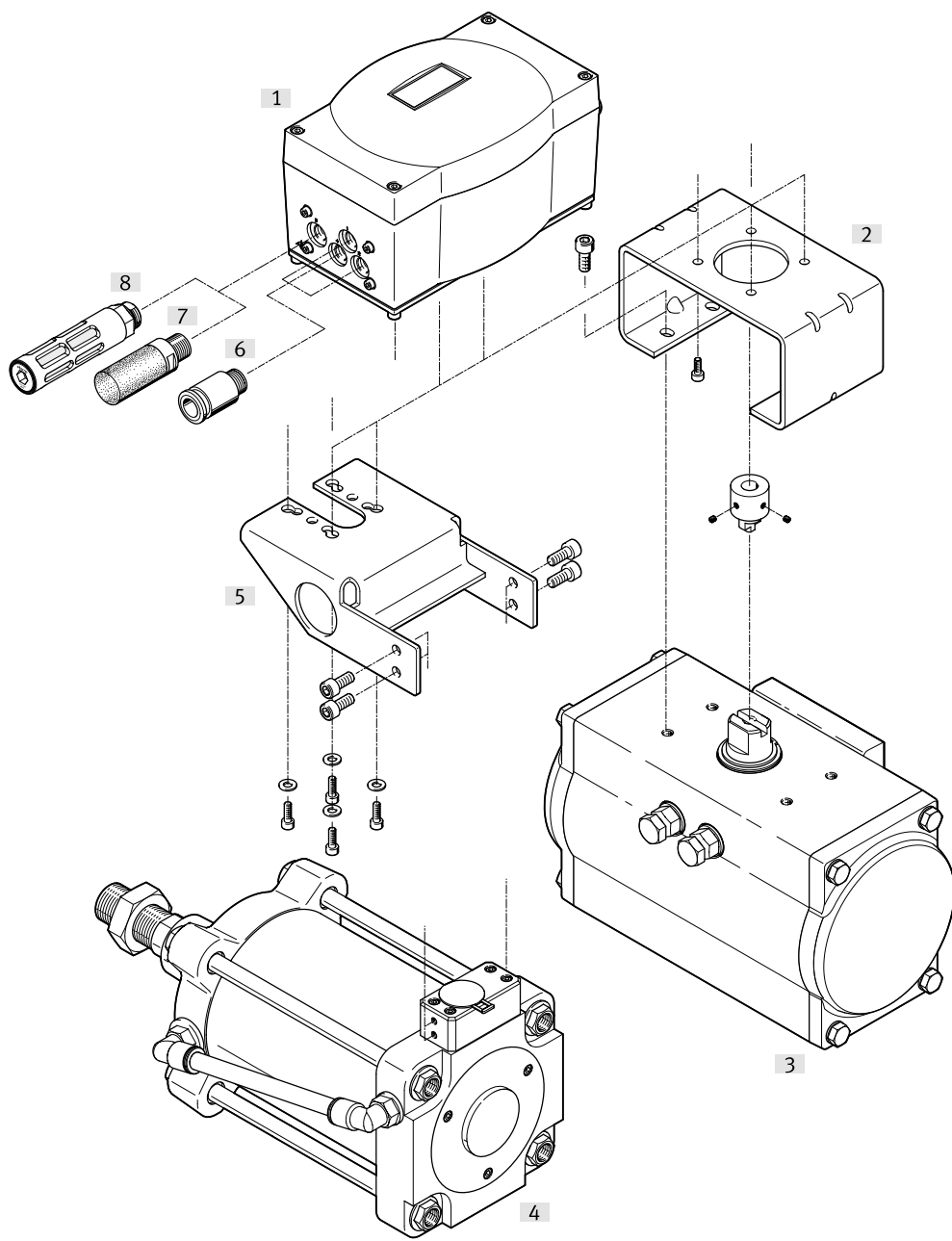
## Type codes

<b>001</b>	<b>Series</b>	
<b>CMSX</b>	Positioner for process automation	
<b>002</b>	<b>Product version</b>	
<b>P</b>	Mainly polymer	
<b>003</b>	<b>Design type</b>	
<b>S</b>	Positioner, displacement/integrated angular position detection	
<b>SE</b>	Positioner, displacement/external angular position detection	
<b>004</b>	<b>Display type</b>	
<b>C</b>	LCD, backlit	
<b>005</b>	<b>Reference value</b>	
<b>U</b>	Configurable (0...10 V/0...20 mA/4...20 mA)	
<b>006</b>	<b>Position feedback</b>	
<b>F1</b>	4...20 mA	

<b>007</b>	<b>Function</b>	
<b>D</b>	Double-acting	
<b>S</b>	Single-acting	
<b>008</b>	<b>Flow rate [l/min]</b>	
<b>50</b>	50	
<b>130</b>	130	
<b>009</b>	<b>Safety function</b>	
<b>A</b>	Opening or closing in the event of system failure <sup>1)</sup>	
<b>C</b>	Hold position in the event of a system failure <sup>1)</sup>	
<b>010</b>	<b>Generation</b>	
	2nd generation	


1) Failure of the operating voltage supply or the setpoint specification

Peripherals overview

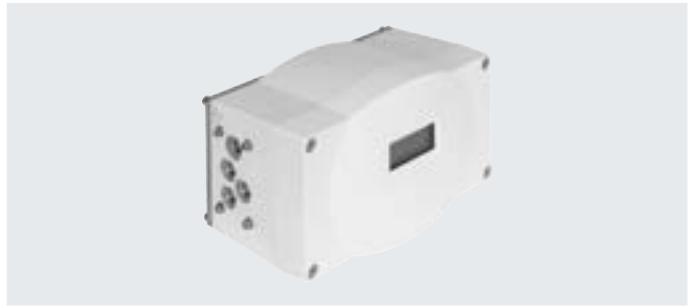


Mounting attachments and accessories		Description	→ Page/Internet
[1]	Positioner CMSX	For single- and double-acting linear or quarter turn actuators	6
[2]	Mounting adapters DARQ	For connecting positioners and actuators for process automation	14
[3]	Quarter turn actuator DFPD	Actuators for process automation	dfpd
[4]	Linear actuator DFPI	Actuators for process automation with integrated displacement encoder	dfpi
[5]	Adapter kit DADG	For direct mounting of a positioner on the actuator	15
[6]	Push-in fittings QS	A secure solution for every connection	15
[7]	Silencer UC	For reducing noise at exhaust ports	15
[8]	Silencer U	With polymer male thread	u

Data sheet

-  - Flow rate  
50 ... 130 l/min

- Product versions for fail-safe or fail-in-place safety function
- Product versions for single- or double-acting actuators



General technical data		
	Direct connection to quarter turn actuators with integrated displacement/angular detection CMSX-P-S-...	Remote connection with external displacement/angular detection CMSX-P-SE-...
Design	Digital electropneumatic positioner	
Mode of operation		
CMSX-P-S-C-U-F1-D-...	Double-acting	
CMSX-P-S-C-U-F1-S-...	Single-acting	
Design features		
With safety function A and double-acting mode of operation	Safety position – pneumatic output 4 exhausted	–
	Safety position – pneumatic output 2 exhausted	–
With safety function A and single-acting mode of operation	Safety position – pneumatic output 4 exhausted	–
With safety function C	Safety position - pneumatic output closed	–
Mounting position	Any	
Type of mounting	With accessories	
Measuring principle of displacement encoder	Potentiometer	
Sensing range	0 ... 100	–
Display	7-segment LCD display With backlighting	
Setting options	Via display and keys	
Size of dead space [%]	0.5 ... 10	
Dimensions W x L x H	190 x 105 x 130 mm	
Product weight [g]	970	
<b>Pneumatic data</b>		
Standard nominal flow rate q <sub>nN</sub>		
CMSX-P-S-C-U-F1-...-50-...	[l/min]	50
CMSX-P-S-C-U-F1-...-130-...	[l/min]	130
Pneumatic connection	G1/8	

## Data sheet

General electrical data		Direct connection to quarter turn actuators with integrated displacement/angular detection CMSX-PS-...	Remote connection with external displacement/angular detection CMSX-P-SE-...
Nominal operating voltage DC	[V]	24	
Operating voltage range DC	[V]	21.6 ... 26.4	
Max. current consumption	[mA]	600	
Reverse polarity protection		For operating voltage connections	
Connection resistance	[kOhm]	–	≤ 80
Electrical data		Direct connection to quarter turn actuators with integrated displacement/angular detection CMSX-PS-...	Remote connection with external displacement/angular detection CMSX-P-SE-...
Analogue inputs			
Signal range	[V]	0 ... 10	
	[mA]	0 ... 20	
	[mA]	4 ... 20	
Analogue inputs, max. dynamic range	[V]	0 ... 11	
	[mA]	0 ... 24	
Linearity error at 25°C	[%]	0.5	
Temperature coefficient	[%FS/K]	< 0.02	
Resolution	[bit]	16	
Overload protection		Yes	
Galvanic isolation		No	
Analogue outputs			
Signal range	[mA]	4 ... 20	
Max. load resistance	[ohm]	≤ 600	
Linearity error at 25°C	[%]	0.5	
Temperature coefficient	[%FS/K]	< 0.02	
Resolution	[bit]	12	
Reverse polarity protection		Yes	
Overload protection		Yes	
Short circuit current rating		Yes	
Galvanic isolation		No	
Digital inputs			
Input characteristics		To IEC 61131-2, type 3	
Switching input		PNP	
		NPN	
Reverse polarity protection		Yes	
Electrical isolation		Yes, via optocoupler	
Digital outputs			
Switching output		3x PNP or 3x NPN, switchable	
Output current	[mA]	100	
Reverse polarity protection		Yes	
Overload protection		Yes	
Short circuit current rating		Yes	
Electrical isolation		Yes, via optocoupler	

## Data sheet

<b>Electromechanical systems</b>		Direct connection to quarter turn actuators with integrated displacement/angular detection CMSX-P-S-...	Remote connection with external displacement/angular detection CMSX-P-SE-...
<b>Electrical connection 1</b>			
Function	Power supply		
	Power supply load		
	Analogue input		
	Analogue output		
	3x digital output		
	2x digital input		
Connection type	Terminal strip		
Connection technology	Screw terminal		
Number of pins/wires	13		
Electrical connection 1, tightening torque [Nm]	0.6		
Conductor cross section [mm <sup>2</sup> ]	< 1.5		
<b>Electrical connection 2</b>			
Function	–	External path/angle sensor	
Connection type	–	Terminal strip	
Connection technology	–	Screw terminal	
Number of pins/wires	–	3	
Electrical connection 2, tightening torque [Nm]	–	0.6	
Conductor cross section [mm <sup>2</sup> ]	–	< 1.5	
Cable connector	M20x1.5 for electrical connection 1		
	–	M12x1.5 for electrical connection 2	
Permissible cable diameter	7 ... 13 mm electr. connection 1		
	–	3 ... 6.5 mm electr. connection 2	
Max. cable length	30 m for electrical connection 1		
	–	3 m for electrical connection 2	



## Data sheet

Operating and environmental conditions		
Operating pressure	[MPa]	0.3 ... 0.8
	[bar]	3 ... 8
	[psi]	43.5 ... 116
Operating medium		Compressed air to ISO 8573-1:2010 [7:4:4]
Note on the operating/pilot medium		Lubricated operation not possible
Ambient temperature	[°C]	-5 ... +60
Storage temperature	[°C]	-20 ... +60
Relative humidity	[%]	93
Contamination level		3
Corrosion resistance class CRC <sup>1)</sup>		2 - Moderate corrosion stress
Shock resistance		Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27
		To EN 60068-2-29
Vibration resistance		Transport application test with severity level 2 to FN 942017-4 and EN 60068-2-6
		To EN 60068-2-6
CE marking (see declaration of conformity) <sup>2)</sup>		To EU EMC Directive <sup>3)</sup>
		To EU RoHS Directive
UKCA marking (see declaration of conformity) <sup>2)</sup>		To UK EMC regulations
		To UK RoHS regulations
Certification		RCM compliance mark
Degree of protection		IP65

1) Corrosion resistance class CRC 2 to Festo standard FN 940070.

Moderate corrosion stress. Indoor application where condensation is allowed to occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

2) Additional information is available at [www.festo.com/sp](http://www.festo.com/sp) → Certificates.

3) For information about the area of use, see the EC declaration of conformity at: [www.festo.com/sp](http://www.festo.com/sp) → Certificates.

If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

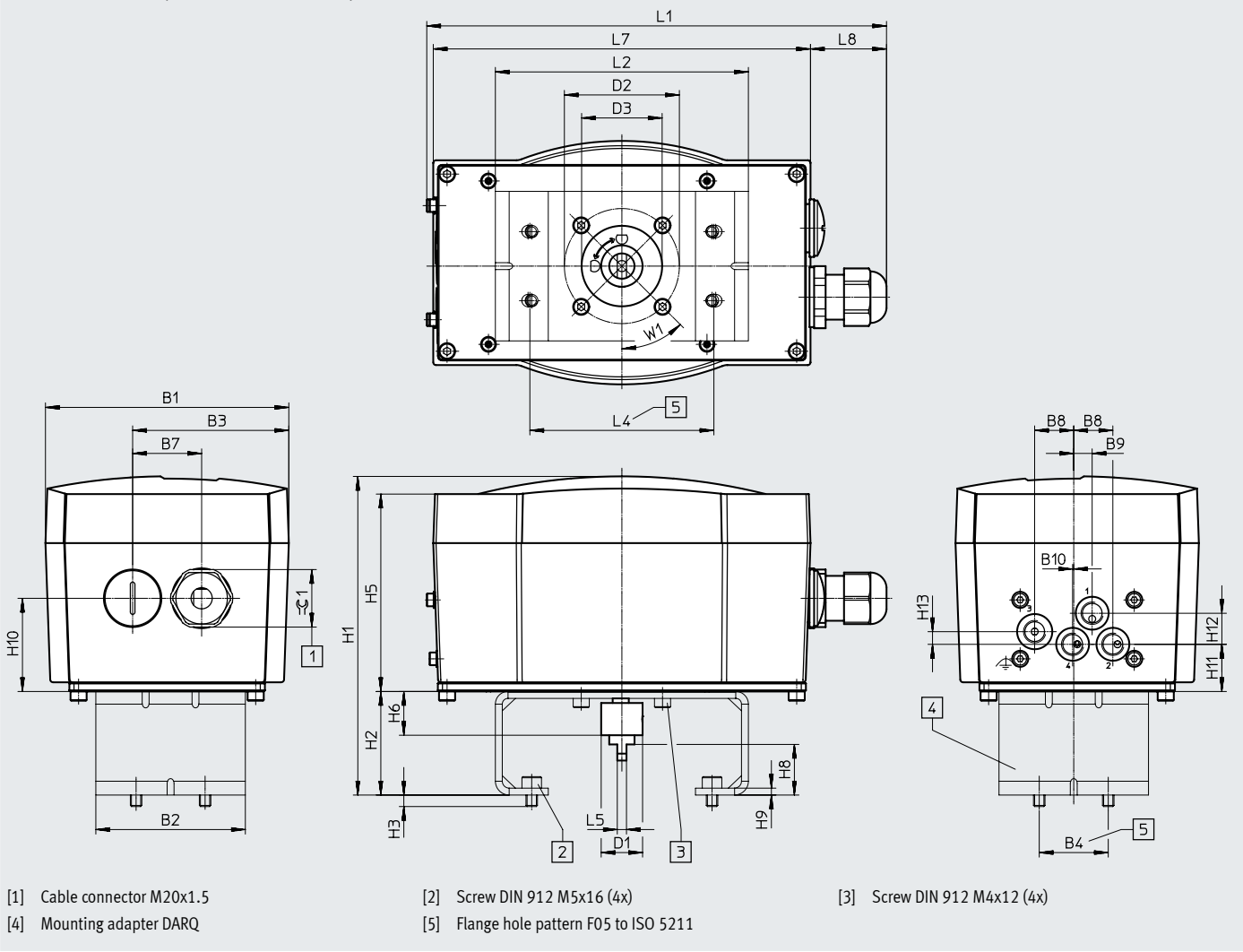
Materials	Direct connection to quarter turn actuators with integrated displacement/angular detection CMSX-P-S-...		Remote connection with external displacement/angular detection CMSX-P-SE-...	
Housing	Reinforced PC			
Inspection window	PC			
Base plate	Anodised wrought aluminium alloy			
Shaft	High-alloy stainless steel			
Coupling	High-alloy stainless steel			
Screws	High-alloy stainless steel			
Seals	NBR			
Cable connector	PA			
Blanking plug	PA		-	
PWIS conformity	VDMA24364-B2-L			
Note on materials	RoHS-compliant			

Data sheet

Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)

Direct connection to quarter turn actuators as per VDE/VDI 3845-1 (IEC 60534-6-2)



Type	B1	B2	B3	B4	B7	B8	B9	B10	D1 ∅	D2 ∅	D3 ∅	H3	H5
CMSX-P-S-C-U-F1-D-130-...	105.8	65	67.9	30	30	17	8	0.5	18	50	35	5	85.8
CMSX-P-S-C-U-F1-D-50-...													
CMSX-P-S-C-U-F1-S-50-...													
CMSX-P-S-C-U-F1-S-130-...													

Type	H6	H9	H10	H11	H12	L1	L5	L7	L8	W1	≈∅ 1
CMSX-P-S-C-U-F1-D-130-...	19	40.5	20.5	13.5	5.5	200	4	164	32.5	45°	25
CMSX-P-S-C-U-F1-D-50-...											
CMSX-P-S-C-U-F1-S-50-...											
CMSX-P-S-C-U-F1-S-130-...											

## Data sheet

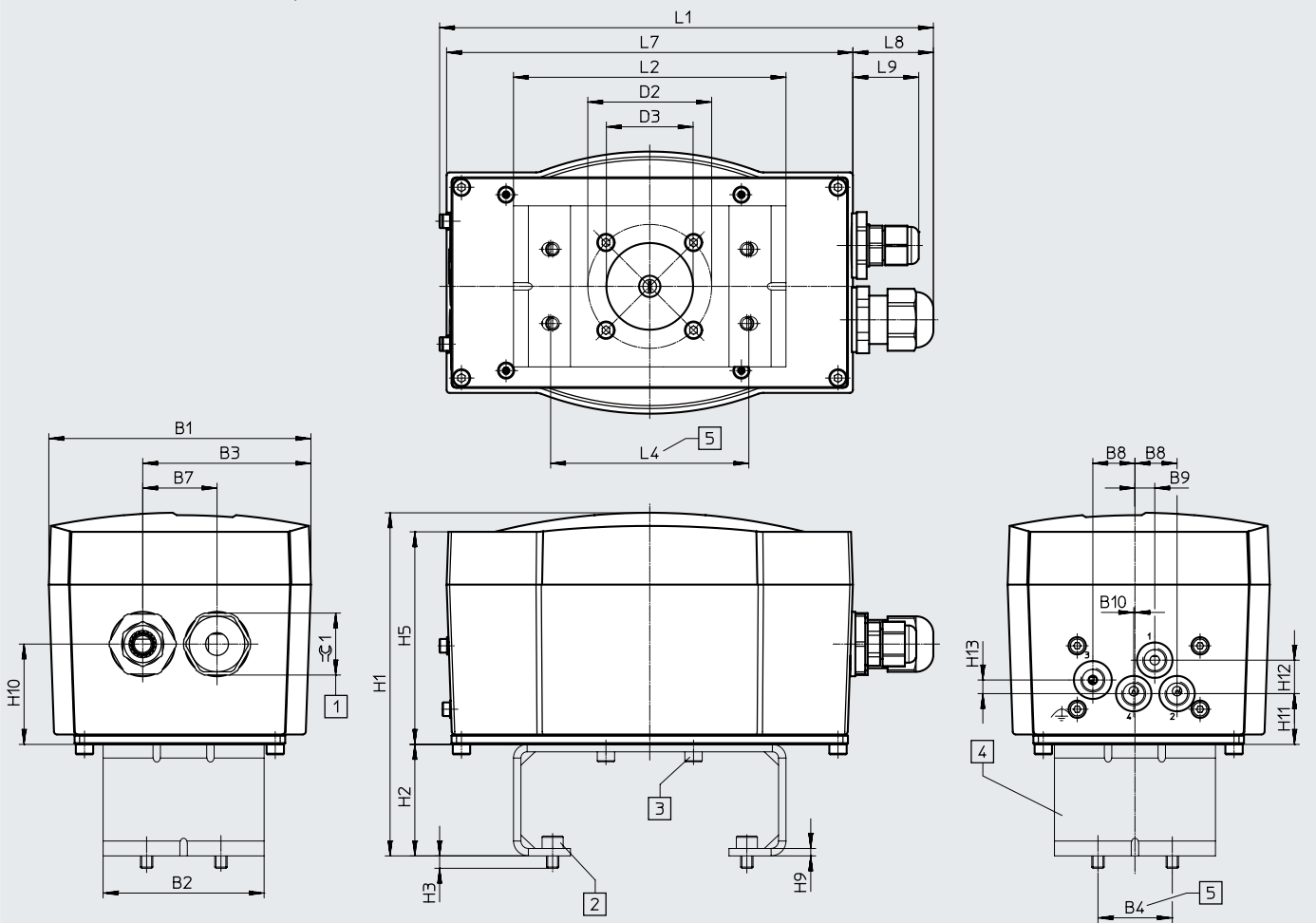
Positioner	Mounting adapters → page 14	H1	H2	H8	L2	L4 ±0.3
CMSX-PS-C-U-F1-D-130-...	DARQ-K-P-A1-F05-20-R1	138.5	45	20	110	80
	DARQ-K-P-A1-F05-30-R1	148.5	55	30	110	80
	DARQ-K-P-A2-F05-30-R1	148.5	55	30	160	130
CMSX-PS-C-U-F1-D-50-...	DARQ-K-P-A1-F05-20-R1	138.5	45	20	110	130
	DARQ-K-P-A1-F05-30-R1	148.5	55	30	110	80
	DARQ-K-P-A2-F05-30-R1	148.5	55	30	160	80
CMSX-PS-C-U-F1-S-50-...	DARQ-K-P-A1-F05-20-R1	138.5	45	20	110	130
	DARQ-K-P-A1-F05-30-R1	148.5	55	30	110	130
	DARQ-K-P-A2-F05-30-R1	148.5	55	30	160	80
CMSX-PS-C-U-F1-S-130-...	DARQ-K-P-A1-F05-20-R1	138.5	45	20	110	80
	DARQ-K-P-A1-F05-30-R1	148.5	55	30	110	130
	DARQ-K-P-A2-F05-30-R1	148.5	55	30	160	130

Data sheet

Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)

Remote connection with external displacement encoder



- [1] Cable connector M20x1.5
- [4] Mounting adapter DARQ

- [2] Screw DIN 912 M5x16 (4x)
- [5] Flange hole pattern F05 to ISO 5211

- [3] Screw DIN 912 M4x12 (4x)






Type	B1	B2	B3	B4	B7	B8	B9	B10	D2 ∅	D3 ∅	D4 ∅	H3
CMSX-P-SE-C-U-F1-D-...	105.8	65	67.9	30	30	17	8	0.5	50	35	5.4	5

Type	H5	H9	H10	H11	H12	H13	L1	L7	L8	L9	⊕ 1
CMSX-P-SE-C-U-F1-D-...	85.8	3	40.5	20.5	13.5	5.5	200	164	32.5	25.6	25

Positioner	Mounting adapters → page 14	H1	H2	L2	L4 ±0.3
CMSX-P-SE-C-U-F1-D-...	DARQ-K-P-A1-F05-20-R1	138.5	45	110	80
	DARQ-K-P-A1-F05-30-R1	148.5	55	110	80
	DARQ-K-P-A2-F05-30-R1	148.5	55	160	130

## Data sheet

## ★ Core product range

Ordering data					
	Safety position	Standard nominal flow rate [l/min]	Function	Part no.	Type
<b>Direct connection to quarter turn actuators as per VDE/VDI 3845-1 (IEC 60534-6-2)</b>					
	Can be set to open or close in the event of system failure <sup>1)</sup>	50	Double-acting	★ 3929313	CMSX-P-S-C-U-F1-D-50-A
		50	Single-acting	★ 3929370	CMSX-P-S-C-U-F1-S-50-A
<b>Remote connection with external displacement encoder</b>					
	Can be set to open or close in the event of system failure <sup>1)</sup>	130	Double-acting	★ 3929539	CMSX-P-SE-C-U-F1-D-130-A
<b>Ordering data</b>					
	Safety position	Standard nominal flow rate [l/min]	Function	Part no.	Type
<b>Direct connection to quarter turn actuators as per VDE/VDI 3845-1 (IEC 60534-6-2)</b>					
	Can be set to open or close in the event of system failure <sup>1)</sup>	130	Double-acting	3929312	CMSX-P-S-C-U-F1-D-130-A
		130	Single-acting	3929369	CMSX-P-S-C-U-F1-S-130-A
	Maintain position in the event of system failure <sup>1)</sup>	130	Double-acting	3929314	CMSX-P-S-C-U-F1-D-130-C
		50	Double-acting	3929315	CMSX-P-S-C-U-F1-D-50-C
<b>Remote connection with external displacement encoder</b>					
	Maintain position in the event of system failure <sup>1)</sup>	130	Double-acting	3929540	CMSX-P-SE-C-U-F1-D-130-C

1) Failure of the operating voltage supply or the setpoint specification

Festo core product range



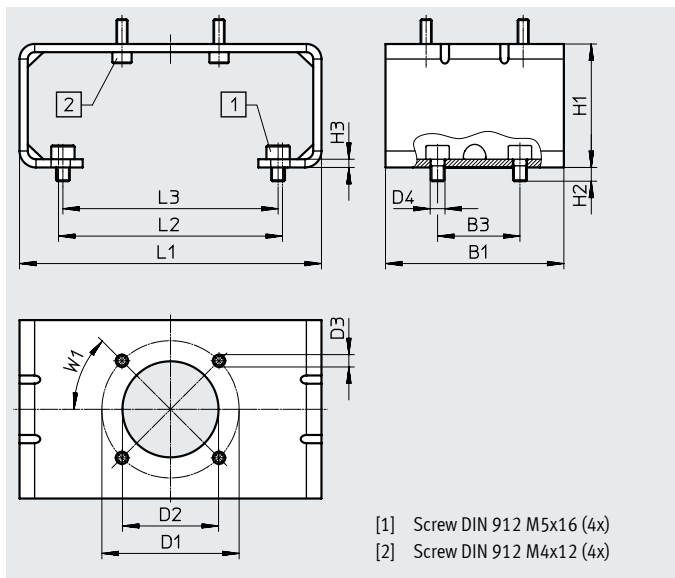
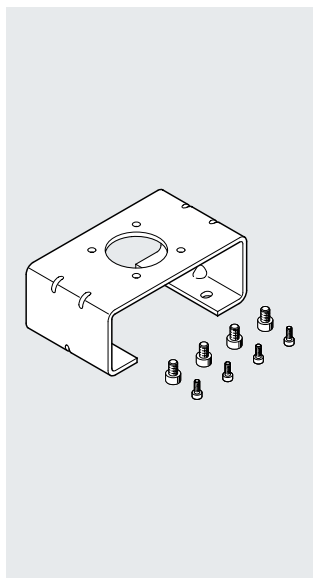
Generally ready for shipping ex works in 24 hours

Generally ready for shipping ex works in 5 days

## Accessories

### Mounting adapter DARQ-K-P...

- Mounting adapter for mounting on standard actuators to VDI/VDE 3845
- Mounting screws included in the scope of delivery
- Material:  
High-alloy stainless steel
- Contains paint-wetting impairment substances, RoHS-compliant



### Dimensions and ordering data

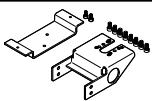
B1	B3	D1	D2	D3	D4	H1	H2	H3	L1	L2	L3	W1	CRC <sup>1)</sup>	Weight [g]	Part no.	Type		
		∅	∅	∅	∅													
65	30	50	35	4.5	5.4	45	5	3	110	81.6	78.4	45°	2	350	★ 2197135	DARQ-K-P-A1-F05-20-R1		
						55			160					131.6	128.4	380	★ 2197136	DARQ-K-P-A1-F05-30-R1
						55			460					2197137	DARQ-K-P-A2-F05-30-R1			

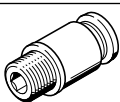
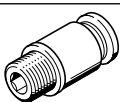
1) Corrosion resistance class CRC 2 to Festo standard FN 940070

Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

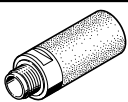


## Accessories

Ordering data – Adapter kit				Data sheets → Internet: dadg	
	Description	For ø	Part no.	Type	
	For direct mounting of an external positioner on the actuator DFPI-...-E-NB3...	100 ... 320 mm	<b>3179433</b>	<b>DADG-AK-F6-A2</b>	

Ordering data – Push-in fitting						Data sheets → Internet: qs	
	Connection	Nominal width [mm]	Tubing O.D. [mm]	PU <sup>1)</sup>	Part no.	Type	
<b>R thread</b>							
	R1/8	2.6	4	10	★ <b>153012</b>	<b>QS-1/8-4-I</b>	
				100	<b>133191</b>	<b>QS-1/8-4-I-100</b>	
		4.2	6	10	★ <b>153013</b>	<b>QS-1/8-6-I</b>	
				100	<b>133186</b>	<b>QS-1/8-6-I-100</b>	
		5.3	8	50	<b>133187</b>	<b>QS-1/8-8-I-50</b>	
<b>G thread with sealing ring</b>							
	G1/8	2.6	4	10	★ <b>186106</b>	<b>QS-G1/8-4-I</b>	
				100	<b>133008</b>	<b>QS-G1/8-4-I-100</b>	
		4.2	6	10	★ <b>186107</b>	<b>QS-G1/8-6-I</b>	
				100	<b>133009</b>	<b>QS-G1/8-6-I-100</b>	
		5.3	8	10	★ <b>186109</b>	<b>QS-G1/8-8-I</b>	

1) Packaging unit

Ordering data – Silencers				Data sheets → Internet: silencer	
	Description	PU <sup>1)</sup>	Part no.	Type	
	Version PE	1	<b>161419</b>	<b>UC-1/8</b>	
		50	<b>534219</b>	<b>UC-1/8-50</b>	

1) Packaging unit

Festo core product range



Generally ready for shipping ex works in 24 hours

Generally ready for shipping ex works in 5 days