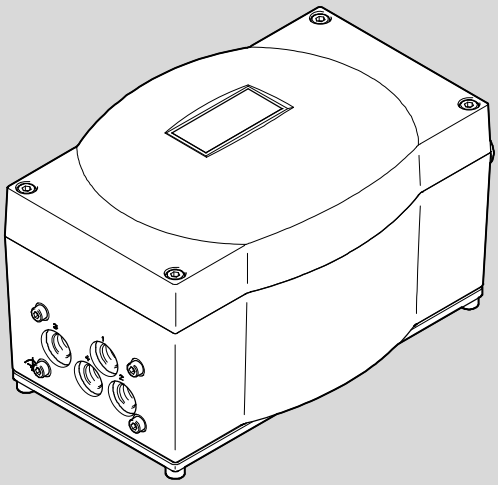
Positioner

CMSX-...-C-U-F1-...



FESTO

Description

8080774
2017-12b
[8060617]

Translation of the original instructions
CMSX-...--C-U-F1-...EN

Identification of hazards and instructions on how to prevent them:

Warning
Hazards that can cause death or serious injuries

Caution
Hazards that can cause minor injuries

Other symbols:

Note
Material damage or loss of function

Text designations:
- Activities that may be carried out in any order

1. Activities that should be carried out in the order stated

– General lists

➔ Result of an action/References to more detailed information

Table of contents

1 About this document 5

1.1 Further applicable documents 5

2 Safety 5

2.1 Intended use 5
2.2 Return to Festo 5

3 Product overview 6

3.1 Function 6
3.2 Configuration 6
3.3 Product variants and type code 8
3.4 Safety function 9
3.4.1 CMSX-P-S-...-D-...-A-G1 (rotary, double-acting) 10
3.4.2 CMSX-P-S-...-D-...-A, 2nd generation (rotary, double-acting) 10
3.4.3 CMSX-P-S-...-D-...-C-G1 (rotary, double-acting) 11
3.4.4 CMSX-P-S-...-D-...-C, 2nd generation (rotary, double-acting) 11
3.4.5 CMSX-P-S-...-S-...-A, 2nd generation (rotary, single-acting) 12
3.4.6 CMSX-P-SE-...-D-...-A, 2nd generation (linear, double-acting) 12
3.4.7 CMSX-P-SE-...-D-...-C, 2nd generation (linear, double-acting) 13

4 Further information 13

5 Service 13

6 Transport and storage 13

7 Mounting 14

7.1 CMSX-P-S-... (rotary) 14
7.2 CMSX-P-SE-... (linear) 16

8 Installation 17

8.1 Pneumatic 17
8.2 Electrical 18
8.2.1 CMSX-P-S-... (rotary) 18
8.2.2 CMSX-P-SE-... (linear) 19
8.2.3 Pin allocation 20

9 Commissioning ... 23

9.1 Menu structure – overview ... 25
9.1.1 Overview CMSX-P-S-... (rotary) ... 25
9.1.2 Overview CMSX-P-SE-... (linear) ... 26
9.2 Menu structure - basic menu level ... 27
9.2.1 Normal position ... 27
9.2.2 Operating statuses ... 29
9.2.3 Operating modes ... 29
9.3 Menu structure - main menu ... 30
9.3.1 Menu 1 SENSOR ... 31
9.3.2 Menu 2 CONFIG ... 32
9.3.3 Menu 3 PARA ... 37
9.3.4 Menu 4 CURVE ... 41
9.3.5 Menu 5 INFORM ... 43
9.3.6 Menu 6 INIT ... 44
9.4 Switch on positioner ... 45
9.5 Check sensing range of the path/angle sensor ... 45
9.6 Initialisation ... 47
9.6.1 Perform automatic initialisation (AutoInit) ... 47
9.6.2 Perform user-guided initialisation (UserInit) ... 49
9.7 Set parameters ... 50
9.8 Complete commissioning ... 50

10 Operation ... 50

11 Maintenance ... 51

12 Fault clearance ... 51

13 Dismantling ... 53

13.1 CMSX-P-S-... (rotary) ... 53
13.2 CMSX-P-SE-... (linear) ... 53

14 Disposal ... 53

15 Technical data ... 54

Index ... 56

1 About this document

This document describes the mode of operation, mounting, installation and commissioning of the product. Certain aspects of use are described in other documents and must be observed
➔ 1.1 Further applicable documents.

1.1 Further applicable documents

For all available product documentation ➔ www.festo.com/pk

2 Safety

2.1 Intended use

The positioner is intended for controlling the position of the following actuators in process automation systems:
– pneumatic quarter turn actuators (single- or double-acting)
– pneumatic drives (double-acting) with connected external path/angle sensor
Quarter turn actuators with a mechanical interface in accordance with VDI/VDE recommendation 3845 are suitable for operation of the positioner CMSX-P-S... (rotary).

- Mounting and commissioning is to be carried out only by qualified personnel, in accordance with the documentation.
- The product may only be used in its original status without unauthorized modifications.
- Only use the product if it is in perfect technical condition.
- Observe the product labelling.
- Only use compressed air in accordance with the specifications ➔ Technical data.
- The cable connector supplied only for cable throughfeed. To achieve the degree of protection IP65, seal each cable entry tight (cable fitting, blanking plug).
- Observe the handling specifications for electrostatically sensitive devices.

2.2 Return to Festo

Hazardous substances can endanger the health and safety of personnel and cause damage to the environment. To prevent hazards, the product should only be returned upon explicit request by Festo.

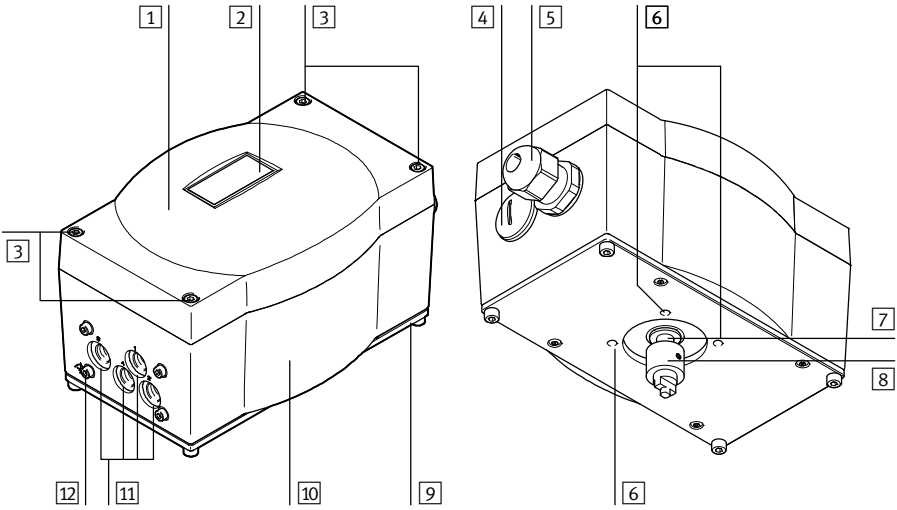
- Consult your regional Festo contact.
- Complete the declaration of contamination and attach it to the outside of the packaging.
- Comply with all legal requirements for handling hazardous substances and transporting dangerous goods.

3 Product overview

3.1 Function

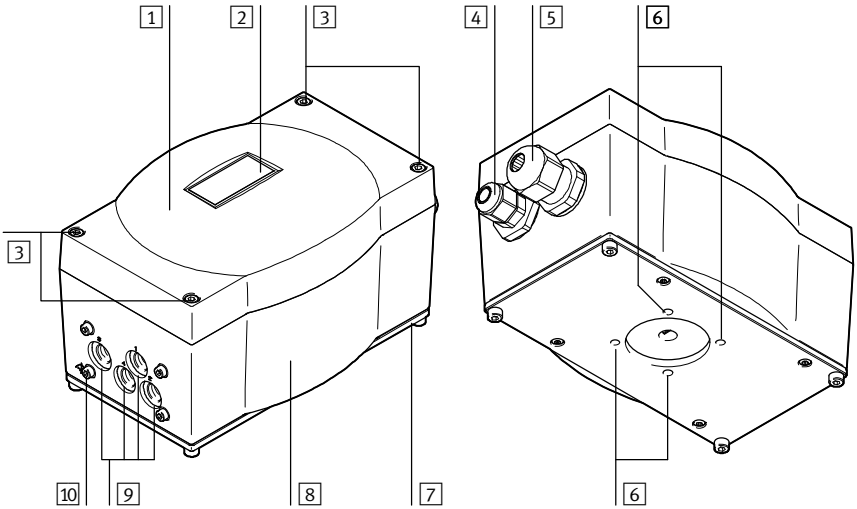
The CMSX digital electropneumatic positioner enables simple and efficient position control based on the PID control algorithm. The position specification is provided via an analogue setpoint signal.
The current position of the actuator is detected as follows:
– CMSX-P-S-... (rotary): through an integrated potentiometer
– CMSX-P-SE-... (linear): through an external path/angle sensor
The PID controller compares the measurement value with the analogue-specified setpoint value and actuates the solenoid valves.

3.2 Configuration



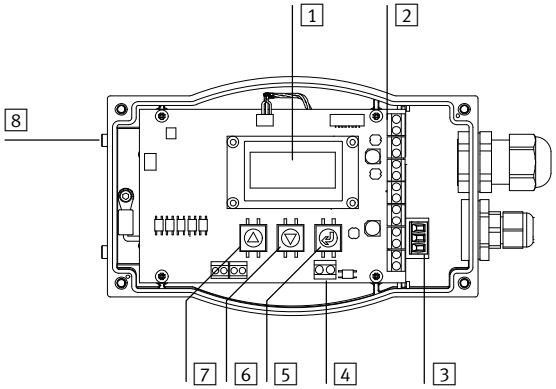
1 Housing cover
2 Inspection window for LCD display
3 Housing screws
4 Blanking plug
5 Cable entry with cable fitting for electrical connecting cable
6 Mounting thread for mounting bridge
7 Shaft
8 Mechanical coupling
9 Base plate
10 Housing
11 Pneumatic connections (G1/8)
12 Earth terminal

Fig. 1 CMSX-P-S-... operating elements and connections (rotary)



1 Housing cover
2 Inspection window for LCD display
3 Housing screws
4 Cable entry with cable fitting for external path/angle sensor
5 Cable entry with cable fitting for electrical connecting cable
6 Mounting thread
7 Base plate
8 Housing
9 Pneumatic connections (G1/8)
10 Earth terminal

Fig. 2 CMSX-P-SE-... operating elements and connections (linear)



1 LCD display
2 Terminal strip 1 (pin 1 ... 14)
3 Terminal strip 2 (pin 1 ... 3)
4 Terminal strip 3 (pin 15, 16)
5 Pushbutton Set
6 Pushbutton Sub
7 Pushbutton Add
8 Earth terminal

Fig. 3 Operating elements and connections in the device – example: CMSX-P-SE-... (linear)

Menu-driven configuration and commissioning can be carried out with the Add, Sub and Set pushbuttons. During commissioning, setpoint values can be specified using the pushbuttons.

3.3 Product variants and type code

Characteristic	Value	Description
Type	CMSX	Positioner for process automation
Product version	P	Primarily polymers
Design	S	Positioner, displacement/angle measurement integrated
	SE	Positioner, displacement/angle measurement external
Display type	C	LCD, backlit
Setpoint value	U	Configurable (0 ... 10 V, 0 ... 20 mA, 4 ... 20 mA)
Position feedback	F1	4 ... 20 mA
Function	D	Double-acting
	S	Single-acting
Nominal flow rate	50	50 l/min
	130	130 l/min
Safety function	A	Open or close in case of breakdown
	C	Block in case of breakdown
Generation	G1	1st generation
		2nd generation

Tab. 1 Type code CMSX – example: CMSX-P-S-C-U-F1-D-50-A

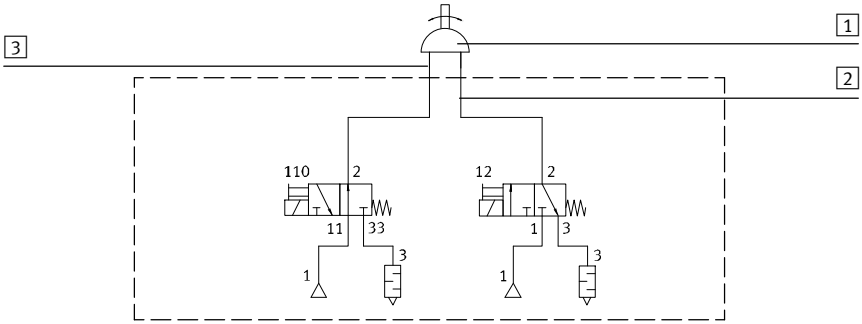
3.4 Safety function

If the electrical power supply fails, the positioner will react differently, depending on the product variants and actuator system (failure of the operating voltage supply or the setpoint specification) ➔ Tab. 2.
If the operating voltage supply is switched back on, the last operating status is immediately effective. If the PID controller is activated, the current setpoint value is immediately valid.

	Safety position in case of electrical power failure, pneumatic compressed air supply present	**Safety position in case of failure of the pneumatic compressed air supply, electric power present**	**Safety position in case of failure of both the pneumatic compressed air supply and electric power**
Single-acting drives	**CMSX-P-S-...-A** Regulating action opening/ closing, dependent on the initial position of the actuator	Undefined	**CMSX-P-S-...-A** Regulating action opening/ closing, dependent on the initial position of the actuator
Double-acting drives	**CMSX-P-S-...-D-...-A** **CMSX-P-SE-...-S-...-A** Regulating action opening/ closing, dependent on the connection of the working ports 2 and 4		**CMSX-P-S-...-D-...-A** **CMSX-P-SE-...-S-...-A** Undefined Bring actuator into the safety position as needed with a pneumatic emergency supply.
	CMSX-P-S-...-D-...-C **CMSX-P-SE-...-S-...-C** Regulating effect blocking		**CMSX-P-S-...-D-...-C** **CMSX-P-SE-...-S-...-C** Regulating effect blocking Only valid for CMSX-..., 2. Generation

Tab. 2 Overview of safety position (pneumatic initial position)

3.4.1 CMSX-P-S-...-D-...-A-G1 (rotary, double-acting)

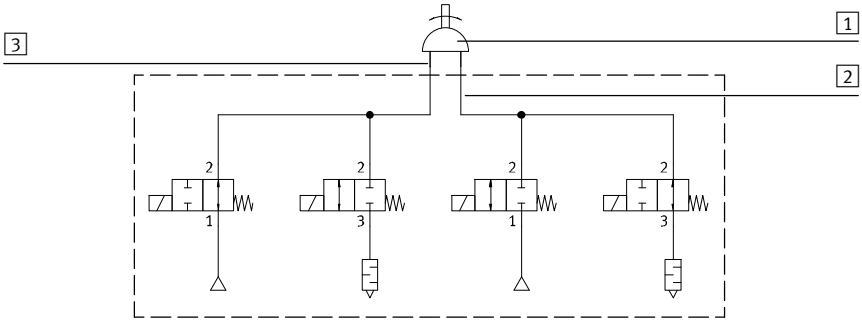


1 Drive
2 Working port (4)
3 Working port (2)

Fig. 4 Safety position (pneumatic initial position) CMSX-P-S-...-D-...-A-G1

Working port (2) is pressurised.
Working port (4) is exhausted.
The regulating effect is opening or closing.
The process valve is opened or closed, dependent on the tubing connection of the positioner to the actuator.

3.4.2 CMSX-P-S-...-D-...-A, 2nd generation (rotary, double-acting)

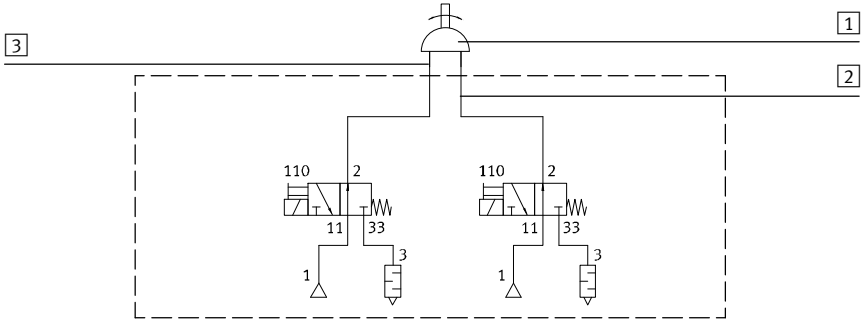


1 Drive
2 Working port (4)
3 Working port (2)

Fig. 5 Safety position (pneumatic initial position) CMSX-P-S-...-D-...-A

Working port (2) is pressurised.
Working port (4) is exhausted.
The regulating effect is opening or closing.
The process valve is opened or closed, dependent on the tubing connection of the positioner to the actuator.

3.4.3 CMSX-P-S-...-D-...-C-G1 (rotary, double-acting)

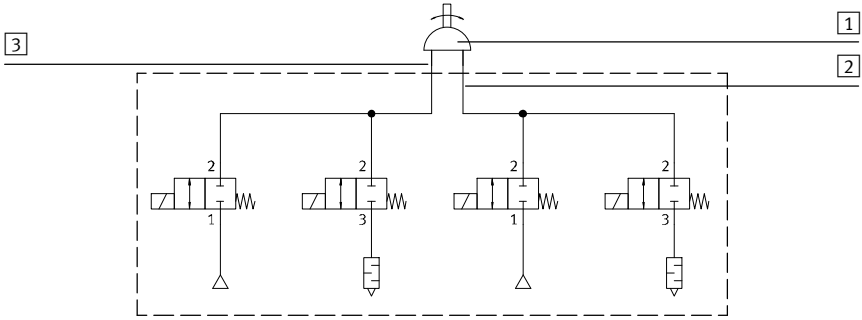


1 Drive
2 Working port (4)
3 Working port (2)

Fig. 6 Safety position (pneumatic initial position) CMSX-P-S-...-D-...-C-G1

Working port (2) is pressurised.
Working port (4) is pressurised.
The regulating effect is blocking.
The current position of the actuator is blocked.
The valves are non-reversible. Compressed air failure can result in an operating status that is not permitted.

3.4.4 CMSX-P-S-...-D-...-C, 2nd generation (rotary, double-acting)

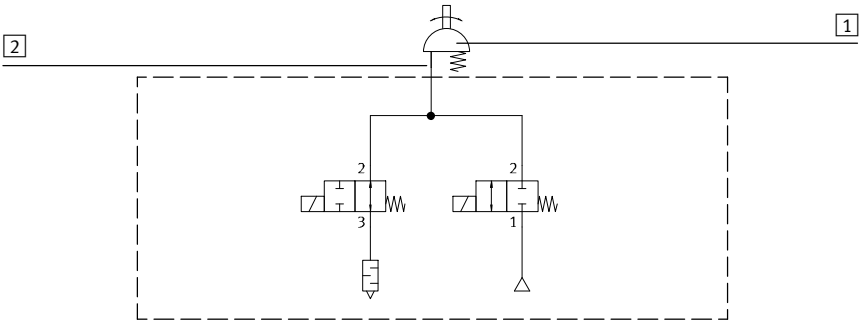


1 Drive
2 Working port (4)
3 Working port (2)

Fig. 7 Safety position (pneumatic initial position) CMSX-P-S-...-D-...-C

Working port (2) is blocked.
Working port (4) is blocked.
Compressed air is enclosed in the drive.
The regulating effect is blocking.
The current position of the actuator is blocked.

3.4.5 CMSX-P-S-...-S-...-A, 2nd generation (rotary, single-acting)

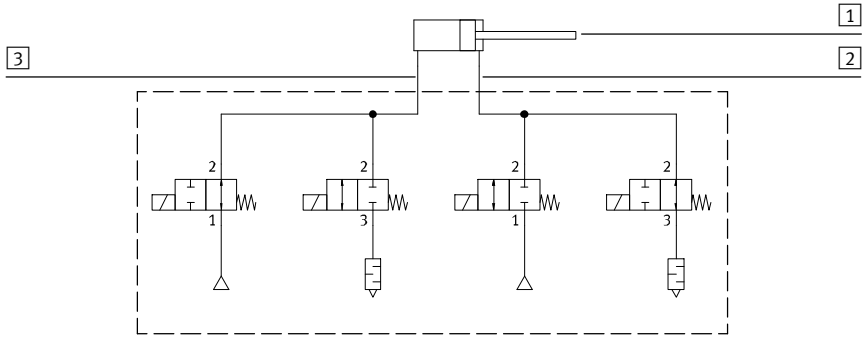


1 Drive
2 Working port (4)

Fig. 8 Safety position (pneumatic initial position) CMSX-P-S-...-S-...-A

Working port (4) is exhausted.
Dependent on the actuator, the process valve is opened or closed.

3.4.6 CMSX-P-SE-...-D-...-A, 2nd generation (linear, double-acting)

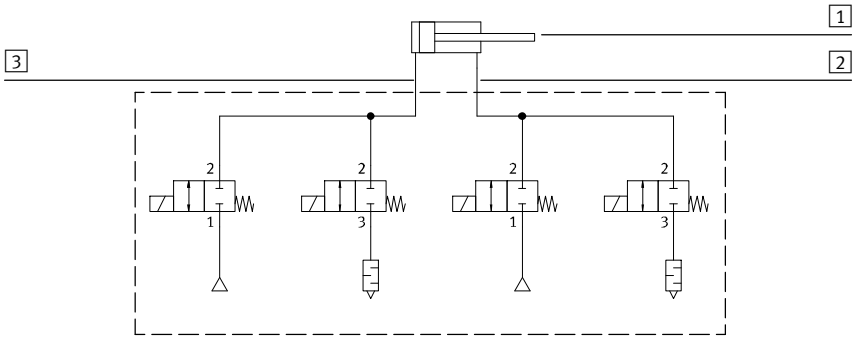


1 Drive
2 Working port (4)
3 Working port (2)

Fig. 9 Safety position (pneumatic initial position) CMSX-P-SE-...-D-...-A

Working port (2) is pressurised.
Working port (4) is exhausted.
The regulating effect is opening or closing.
The process valve is opened or closed, dependent on the tubing connection of the positioner to the actuator.

3.4.7 CMSX-P-SE-...-D-...-C, 2nd generation (linear, double-acting)



1 Drive
2 Working port (4)
3 Working port (2)

Fig. 10 Safety position (pneumatic initial position) CMSX-P-SE-...-D-...-C

Working port (2) is blocked.
Working port (4) is blocked.
Compressed air is enclosed in the drive.
The regulating effect is blocking.
The current position of the actuator is blocked.

4 Further information

– Accessories ➔ www.festo.com/catalogue.
– Documents and literature ➔ www.festo.com/sp.

5 Service

Contact your regional Festo contact person if you have technical questions ➔ www.festo.com.

6 Transport and storage

– Store the product in a cool, dry, UV-protected and corrosion-protected environment. Ensure that storage times are kept to a minimum.

7 Mounting

Note
Mounting only by qualified personnel.

Note
- Protect the underside of the device against splash water, moisture and humidity by selecting an appropriate mounting position.
- Pay attention to the actuator's direction of motion.
- Use only mounting bridges DARQ-K-P-A1-F05-... or DADG-AK-F6-A2
  ➔ www.festo.com/sp.

7.1 CMSX-P-S-... (rotary)

1. Determine the direction of rotation of the quarter turn actuator.
2. Close the process valve.
3. Switch off the compressed air and power supply.
4. Secure the mounting bridge [2] to the positioner:
   – 4 housing screws M4 [4]
   – Tightening torque 1.5 Nm ± 20 %
5. Secure the mechanical coupling [5] to the shaft of the positioner [1]:
   – 2 threaded pins [6]
   – Tightening torque 0.5 Nm ± 10 %
6. Place the positioner with the mounting bridge and the coupling on the quarter turn actuator [7] and align it. The angle of rotation of the actuator must be within the sensing range of the positioner ➔ Fig. 12.
7. Secure the positioner with mounting bridge to the quarter turn actuator:
   – 4 mounting screws M5 [3]
   – Tightening torque 3 Nm ± 20 %

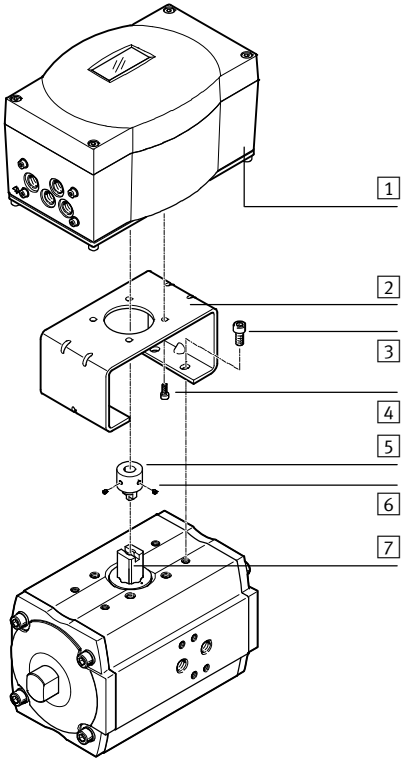
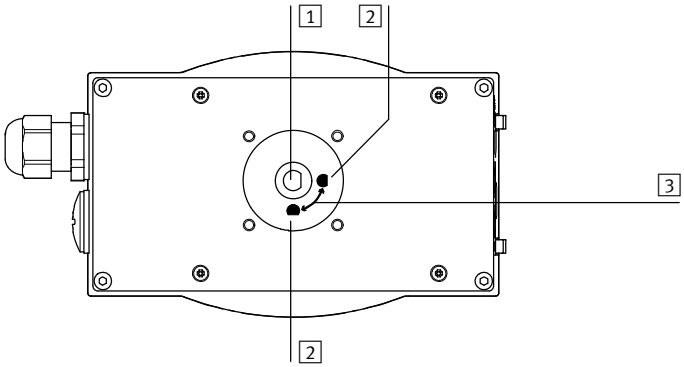


Fig. 11 Mounting CMSX-P-S-... (rotary)



1 Flat spot of the shaft
2 Identification of the alignment of the flat spot
3 Identification of the sensing range

Fig. 12 Identification of the sensing range (underside of the housing)

The angle position of the quarter turn actuator is detected by the shaft of the positioner.
The shaft of the positioner can be freely rotated and does not have a mechanical stop.
The permissible sensing range is 100°.

7.2 CMSX-P-SE-... (linear)

1. Close the process valve.
2. Switch off the compressed air and power supply.
3. Secure the mounting bridge [1] to the positioner:
   – 4 housing screws M4 [3]
   – Tightening torque 1.5 Nm ± 20 %
4. Secure the housing (flange socket) [5] to the linear actuator [6]:
   – 4 mounting screws M5 [4]
   – Tightening torque 2.7 Nm ± 10 %
5. Secure the positioner with the mounting bridge to the housing (flange socket)
   – 4 mounting screws M6 [2]
   – Tightening torque 3 Nm ± 20 %

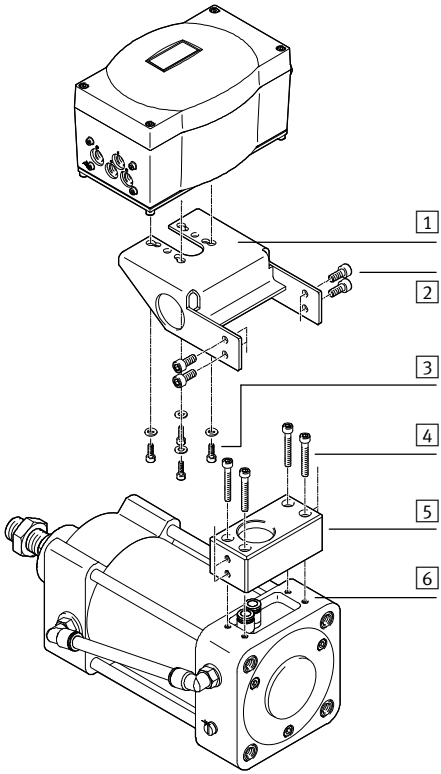
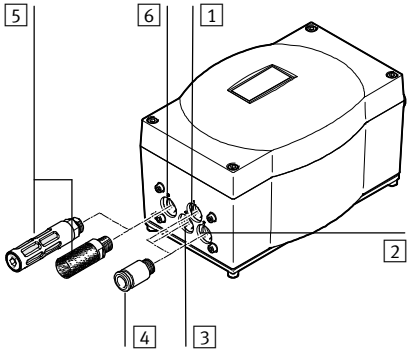


Fig. 13 Mounting CMSX-P-SE-... (linear)

8 Installation

8.1 Pneumatic



1 Supply port (1)
2 Working port (2)
3 Working port (4)
4 QS-1/8-...-I-push-in fitting (accessories)
5 Silencer (accessory)
6 Exhaust port (3)

Fig. 14 Pneumatic connections

Recommendation: Use push-in fittings of type QS-1/8-...-I and tubes of type PUN.

1. Switch off the compressed air and power supply.
2. Connect working port (2) and working port (4) with tubes to the working ports of the pneumatic actuator.
   In the case of single-acting actuators, only connect working port (4). Seal working port (2) with a blanking plug.
   – Keep the tubing short.
3. Connect the supply port (1) to the compressed air source.
4. Screw an appropriate silencer into the exhaust port (3).

8.2 Electrical

Warning
Electrical voltage.
Injury due to electric shock.
- Switch off the power supply before opening the device.

Note
The IP65 degree of protection depends on the type of electrical connection.
Inappropriate cables or an incorrect installation will reduce the degree of protection of the positioner.

8.2.1 CMSX-P-S-... (rotary)

1. Switch off the compressed air and power supply.
2. Loosen the housing screws ➔ Fig. 1, [3]. Remove the cover of the housing.
3. Guide the electric connecting cable through the cable fitting to the terminal strips ➔ Fig. 1, [5]:
   – Max. length of the signal line 30 m
   – Outside diameter of the electric connecting cable: 7 ... 13 mm
   – Conductor cross-section: max. 1.5 mm²
   – Use wire end sleeves.
4. If different reference potentials are used for the input signals and the operating voltage supply, stabilise input signals:
   – Current input signal: Set wire bridges between pin 4 and pin 6.
   – Voltage input signal: Set wire bridges between pin 2 and pin 6.
5. Wire the electrical connections ➔ Tab. 3.
   – Tightening torque: max. 0.6 Nm
6. Connect the earth terminal with low impedance (short cable with large cross section) to the earth potential ➔ Fig. 3, [8]. Leave the cable at pin 9 unchanged.
7. Tighten the union nut on the cable fitting ➔ Fig. 1, [5].
   – Tightening torque: 1.5 Nm
8. If commissioning is carried out immediately after installation, leave the cover dismounted.
9. Place the housing cover in position and tighten the 4 housing screws ➔ Fig. 1, [3].
   – Observe the correct position of the seals.
   – Tightening torque: 1.5 Nm

8.2.2 CMSX-P-SE-... (linear)

1. Switch off the compressed air and power supply.
2. Loosen the housing screws ➔ Fig. 2, [3]. Remove the cover of the housing.
3. Guide the electric connecting cable through the cable fitting to the terminal strips ➔ Fig. 2, [5]:
   – Max. length of the signal line 30 m
   – Outside diameter of the electric connecting cable: 7 ... 13 mm
   – Conductor cross-section: max. 1.5 mm²
   – Use wire end sleeves.
4. If different reference potentials are used for the input signals and the operating voltage supply, stabilise input signals:
   – Current input signal: Set wire bridges between pin 4 and pin 6.
   – Voltage input signal: Set wire bridges between pin 2 and pin 6.
5. Guide the connecting cable for external path/angle sensor through the cable fitting to the terminal strip 2 ➔ Fig. 2, [4].
   – Max. length of the signal line 15 m
   – Outside diameter of the electric connecting cable: 3 ... 6.5 mm
   – Conductor cross-section: max. 1.5 mm²
   – Do not use any wire end sleeves.
6. Wire the electrical connections ➔ Tab. 3.
   – Tightening torque: max. 0.6 Nm
7. Connect the earth terminal with low impedance (short cable with large cross section) to the earth potential ➔ Fig. 3, [8]. Leave the cable at pin 9 unchanged.
8. Tighten the union nut of the cable connector ➔ Fig. 2, [4] and Fig. 2, [5].
   – Tightening torque: 1.5 Nm
9. Do not put on the cover if commissioning is to be carried out immediately after installation dismounted.
10. Place the housing cover in position and tighten the 4 housing screws ➔ Fig. 2, [3].
    – Observe the correct position of the seals.
    – Tightening torque: 1.5 Nm

8.2.3 Pin allocation

Pin	Designation	Description	
Terminal strip 1 (pin 1 ... 14)			
1	Usp+	Voltage input signal +	Setpoint input 0 ... 10 V
2	Usp-	Voltage input signal -	
3	Isp+	Current input signal +	Setpoint input 4 ... 20 mA, 0 ... 20 mA
4	Isp-	Current input signal -	
5	+24 V DC	Operating voltage supply; 24 V DC	Supply to electronics and valves
6	0 V DC	Operating voltage supply; 0 V DC	
7	i-	Current output signal -	Actual value output 4 ... 20 mA
8	I+	Current output signal +	
9	–	Connected to the earth terminal at the factory	Leave the cable unchanged
10	ALARM	Alarm digital output	Alarm output
11	D-OUT1	Digital output Out 1	Status output
12	D-OUT2	Digital output Out 2	
13	+24 V DC	Load voltage supply for outputs; 24 V DC	Supply to digital outputs
14	0 V DC	Load voltage supply for outputs; 0 V DC	
Terminal strip 2 (pin 1 ... 3)			
1	0 V DC	Operating voltage - External path/angle sensor	External potentiometer path/angle sensor with max. 20 kΩ
2	U+	Sensor signal actual value	
3	+5 V DC	Operating voltage + External path/angle sensor	
Terminal strip 3 (pin 15, 16)			
15	D-IN-	Digital input -	Digital input[1)]
16	D-IN+	Digital input +	

1) Permits separate circuits if separate power supply units are used

Tab. 3 Pin allocation

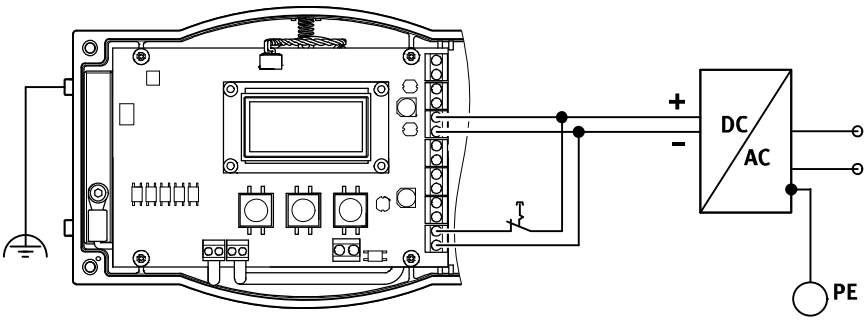


Fig. 15 Operating voltage supply and earthing – example

Setpoint inputs ➔ Pin 1 ... 4
The setpoint value can be specified as an external voltage or current signal.
With the SIGNAL parameter, the type of setpoint value can be selected ➔ Chap. 9.3.2, Tab. 15.

Actual position output ➔ Pin 7, 8
The actual position (valve position VP) is output as a current signal and can be processed in higher-level systems. The OPEN parameter influences the actual position ➔ Tab. 17.

Digital output ALARM ➔ Pin 10 and pin 14
The ALARM digital output delivers high level if the maximum positioning time is exceeded.
The maximum positioning time is determined during initialisation.

Digital outputs D-OUT1 and D-OUT2 ➔ Pin 11, 12 and pin 14
The digital outputs D-OUT1 and D-OUT2 can be connected as PNP or NPN outputs.

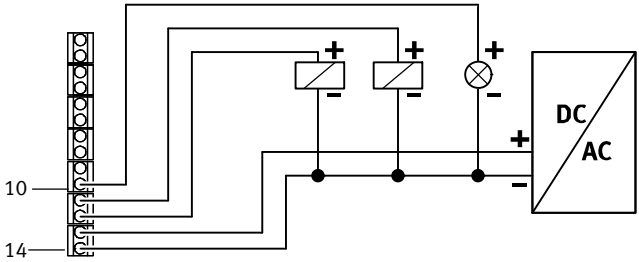


Fig. 16 Connection of digital outputs ALARM, D-OUT1 and D-OUT2 as PNP outputs – example

To connect the digital outputs ALARM, D-OUT1 and D-OUT2 as PNP outputs, connect the minus pole of the load to pin 14. The PNP outputs are positive switching, from plus to minus.

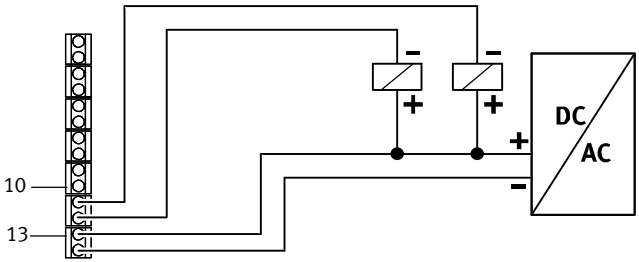
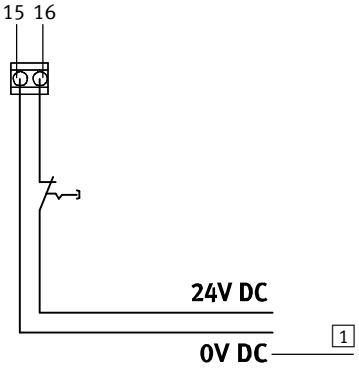


Fig. 17 Connection of digital outputs D-OUT1 and D-OUT2 as NPN outputs – example

To connect the digital outputs D-OUT1 and D-OUT2 as NPN outputs, connect the plus pole of the load to pin 13. The NPN outputs are negative switching, from minus to plus.

Digital input D-IN ➔ Pin 15, 16



1 Reference potential

Fig. 18 Connection of digital input D-IN – example

9 Commissioning

Note
Commissioning should only be carried out by qualified personnel.

Prerequisites

- The positioner is fully mounted and connected.
- Familiarize yourself with the menu system, the functions of the pushbuttons and the parameters of the positioner prior to commissioning ➔ Chap. 9.1.

Checking operating conditions

- Check operating conditions and limit values ➔ Technical data.
- Check the connection points for tightness.
- Ensure there is a stable operating voltage supply, particularly during the commissioning phase.

Factory settings

Menu	Display		Description
Basic menu level			
–	•OPERAT•	Auto	Automatic
	•ACTUAT•	Stopped	PID controller not active
Main menu			
2 CONFIG	SIGNAL	4-20mA	Current input active; 4 ... 20 mA
	OPEN[1)]	anti-clk	Active direction of the actuator clockwise
	DIRECT	increase	The setpoint position is increased with a rising setpoint value
	CHARACTE	linear	Linear setpoint characteristic
	D-OUT1 D-OUT2	power-L power-L	Low level if load voltage supply is present for outputs
	D-IN	stop-H	In the case of high level, block the actuator in position
3 PARA	DEADBAND	1.0%	Deadband of the PID controller: 1.0 %
	PID--P	1	P-proportion of the PID controller: 1
	PID--D	4	D-proportion of the PID controller: 4
	MIN	0%	Value for the lower stroke limit: 0 %
	MAX	100%	Value for the upper stroke limit: 100 %
	SPMIN	0%	Value for the lower setpoint limit or seal-closing boundary: 0 %
	SPMAX	100%	Value for the upper setpoint limit or seal-closing boundary: 100 %

1) Only CMSX-P-S-... (rotary)

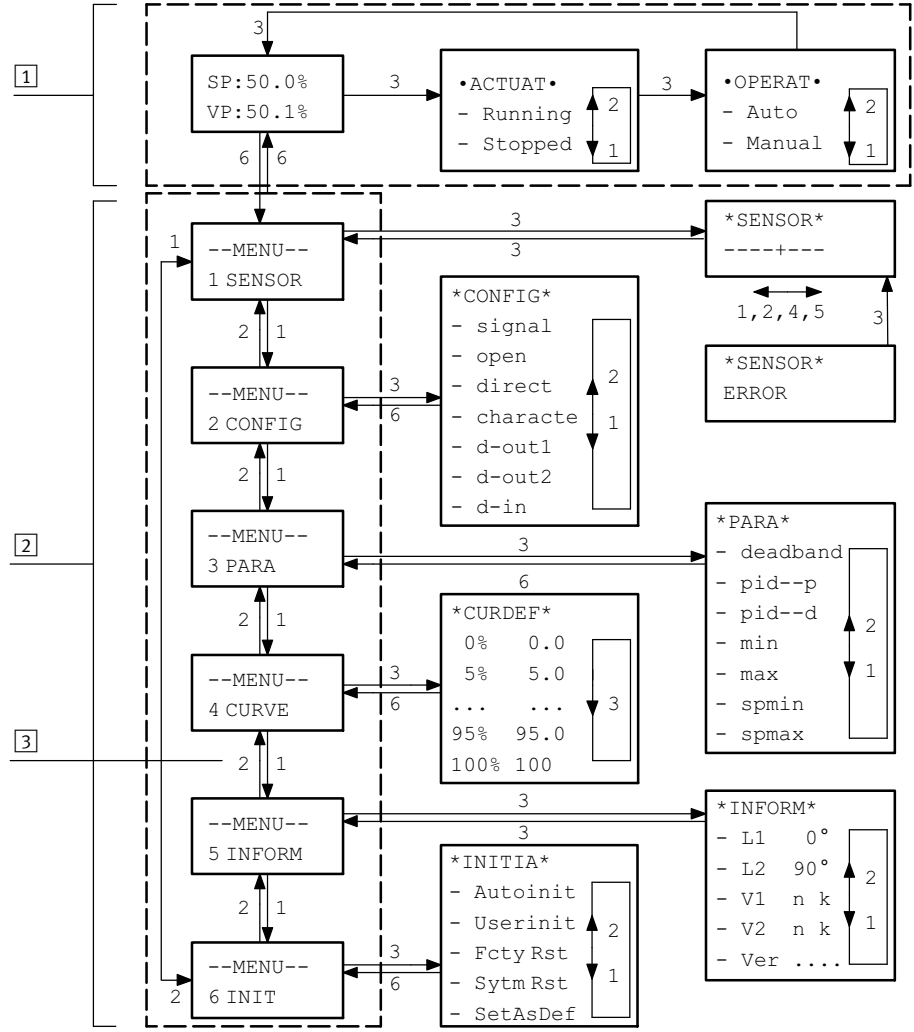
Menu	Display		Description
4 CURVE	0%	0.0	Support point at 0 % setpoint signal: 0 %
	5%	5.0	Support point at 5 % setpoint signal: 5 %
	...	...	...
	100%	100	Support point at 100 % setpoint signal: 100 %

1) Only CMSX-P-S-... (rotary)

Tab. 4 Factory settings

9.1 Menu structure – overview

9.1.1 Overview CMSX-P-S-... (rotary)

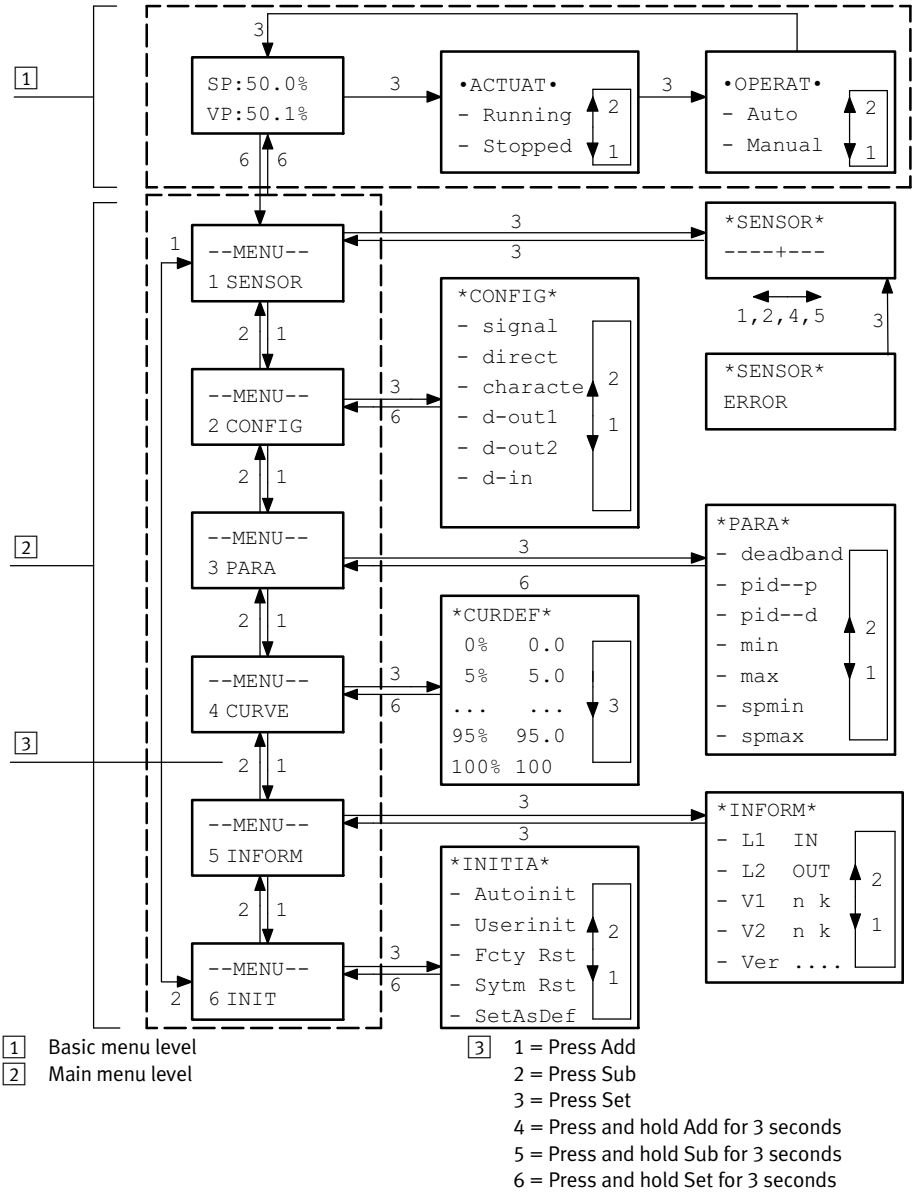


1 Basic menu level
2 Main menu level

3 1 = Press Add
2 = Press Sub
3 = Press Set
4 = Press and hold Add for 3 seconds
5 = Press and hold Sub for 3 seconds
6 = Press and hold Set for 3 seconds

Fig. 19 Menu structure – overview CMSX-P-S-... (rotary)

9.1.2 Overview CMSX-P-SE-... (linear)



1 Basic menu level
2 Main menu level

3 1 = Press Add
2 = Press Sub
3 = Press Set
4 = Press and hold Add for 3 seconds
5 = Press and hold Sub for 3 seconds
6 = Press and hold Set for 3 seconds

Fig. 20 Menu structure – overview CMSX-P-SE-... (linear)

9.2 Menu structure - basic menu level

9.2.1 Normal position

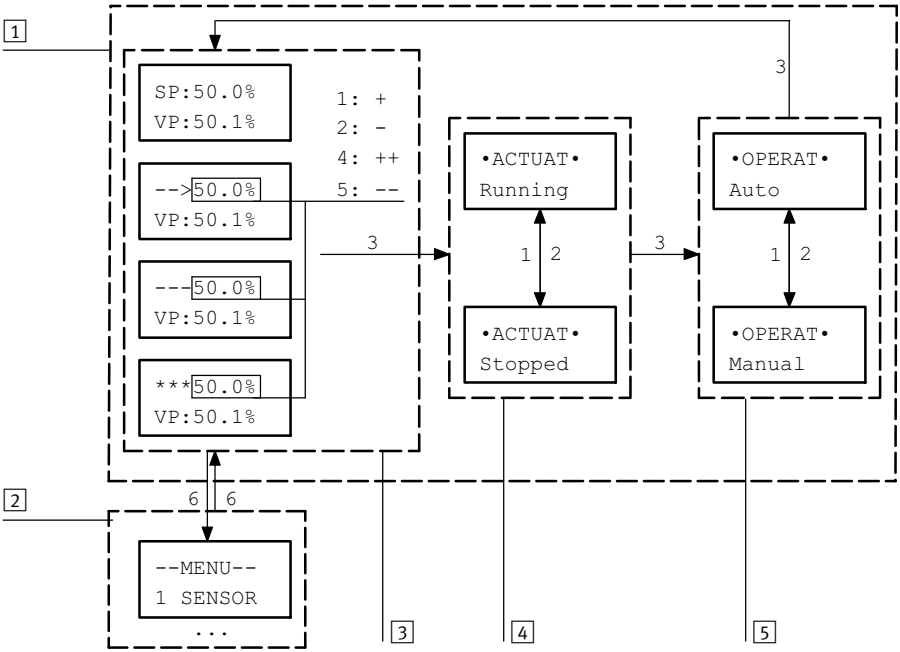
Display	Significance		
	Operating mode	Operating status	Display
SP:50.0% VP:50.1%	Automatic	PID controller active (ACTUAT Running)	The positioner shows the analogue-specified setpoint position.
-->50.0% VP:50.1%	Manual setpoint position mode	PID controller active (ACTUAT Running)	The positioner shows the pushbutton-specified setpoint position.
***50.0% VP:50.1%	Automatic or manual setpoint position mode	Signal is present at the digital input	The positioner shows the setpoint position specified at the digital input ➔ Tab. 15.
---50.0% VP:50.1%	Automatic or manual setpoint position mode	PID controller not active (ACTUAT Stopped)	The positioner shows the setpoint position.

Tab. 5 Display in the initial position

After the operating voltage supply is switched on, the positioner is automatically in the initial position. Depending on the operating mode and operating status, the positioner in the initial position shows the following values:

– Setpoint position SP of the actuator in percent
– Valve position VP of the process valve in percent (VP = valve position)

Note
If the PID controller is active and no signal is present at the digital input, the new setpoint value is immediately effective – even in manual setpoint position mode.



1 Basic menu level
2 Main menu level
3 Normal position
4 Operating statuses
5 Operating modes

Fig. 21 Movement in the basic menu level

Operation		Manual setpoint position mode	Automatic
Press Add	1	Increase setpoint position by 1 % – with overflow[1)]	Pushbuttons have no function Setpoint specification via setpoint input
Press Sub	2	Reduce setpoint position by 1 % – with overflow[1)]	
Press Set	3	Continue within the basic menu level	
Hold down Add	4	Increase setpoint position continuously in 10 % steps – with overflow[1)]	Pushbuttons have no function Setpoint specification via setpoint input
Hold down Sub	5	Reduce setpoint position continuously in 10 % steps – with overflow[1)]	
Hold down Set	6	Open main menu level	

1) If the Sub pushbutton is pressed at 0 %, the value jumps to 100 %.
If the Add pushbutton is pressed at 100 %, the value jumps to 0 %.

Tab. 6 Operation in the initial position

9.2.2 Operating statuses

Display	Significance	Description
•ACTUAT• Running	PID controller Active	**Signal at the digital input** The command configured for the digital input is executed ➔ Tab. 15. **No signal at the digital input** – Automatic operation The analogue-specified setpoint position is valid. – Manual setpoint position mode The pushbutton-specified setpoint position is valid.
•ACTUAT• Stopped	PID controller Inactive (preset)	The positioner reacts solely to signals at the digital input.

Tab. 7 Operating statuses

Operation		PID controller active	PID controller not active
Press Add	1	Stop PID controller	Start PID controller
Press Sub	2		
Press Set	3	Continue within the basic menu level	

Tab. 8 Operation when the operating status is displayed

9.2.3 Operating modes

Display	Significance
•OPERAT• Auto	Automatic (preset)
•OPERAT• Manual	Manual setpoint position mode

Tab. 9 Operating modes

Operation		Automatic	Manual setpoint position mode
Press Add	1	Activate manual setpoint position mode	Activate automatic mode
Press Sub	2		
Press Set	3	Confirm selection and continue within the basic menu level	

Tab. 10 Operation with display of the operating mode

9.3 Menu structure - main menu

Display	Description
--MENU-- 1 SENSOR	Check sensing range of the sensor
--MENU-- 2 CONFIG	Configure positioner – Type of analogue setpoint value – Active direction of the actuator - only CMSX-P-S-... (rotary) – Direction of action of the setpoint value signal – Type of setpoint characteristic curve – Function of the digital outputs – Function of the digital input
--MENU-- 3 PARA	Parameterise PID controller: – Deadband – P-proportion and D-proportion – Values of the stroke limits – Setpoint value limitation and seal-closing function
--MENU-- 4 CURVE	Define user-defined setpoint characteristic curve
--MENU-- 5 INFORM	Display information: – Smallest and largest sensor position after the last initialisation – Number of switching cycles of the valves – Firmware version
--MENU-- 6 INIT	Initialise positioner Reset positioner

Tab. 11 Main menu

Operation		Description
Press Add	1	Continue to the next menu
Press Sub	2	Back to the previous menu
Press Set	3	Open menu
Hold down Set	6	Back to the basic menu level

Tab. 12 Operation in the main menu

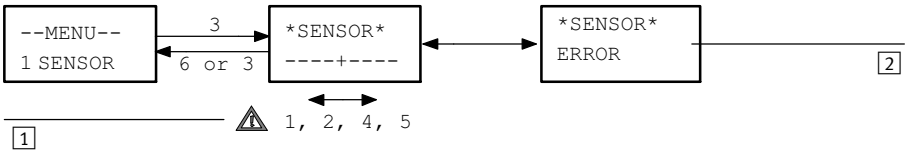
9.3.1 Menu 1 SENSOR

The function in the menu 1 SENSOR can be used as follows:

– Check sensing range of the path/angle sensor ➔ Chap. 9.5.
– Exhaust the working ports completely

Display	Description
MENU 1 SENSOR	
----+---	The sensor signal is shown in the display as a plus sign. If the actuator moves, the plus sign also moves.

Tab. 13 Menu 1 SENSOR — sensor signal



1 Only for commissioning!
Actuator is moved

2 Sensing range of the sensor
has been exceeded

Fig. 22 Movement in the menu 1 SENSOR

Note
If the working ports are pressurized or exhausted, the actuator is moved. Parameterised limit values are ineffective, since the PID controller is switched off.

Operation		Description
Press Add	1	Pressurise working port (2), exhaust (4)
Press Sub	2	Pressurise working port (4), exhaust (2)
Press Set	3	Back to the main menu
Hold down Add	4	Pressurise working port (2) and exhaust (4) as long as the pushbutton is pressed
Hold down Sub	5	Pressurise working port (4) and exhaust (2) as long as the pushbutton is pressed
Hold down Set	6	Back to the main menu

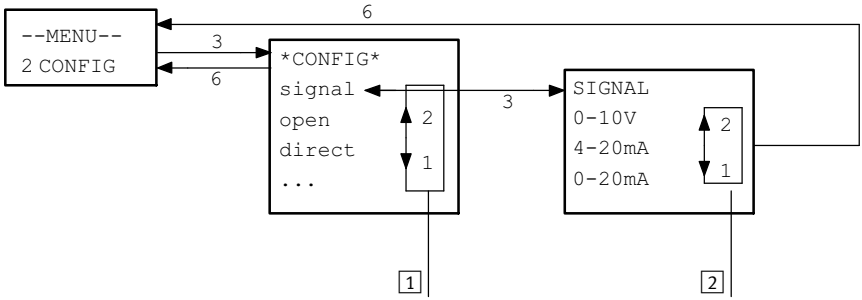
Tab. 14 Operation in the menu 1 SENSOR

9.3.2 Menu 2 CONFIG

Display	Description	
MENU 2 CONFIG		
SIGNAL	Signal type	
	0-10V	Voltage input (pin 1, 2); 0 ... 10 V
	4-20mA	Current input (pin 3, 4); 4 ... 20 mA (presetting)
	0-20mA	Current input (pin 3, 4); 0 ... 20 mA
OPEN	Active direction of the actuator - only CMSX-P-S-... (rotary)	
	clockwis	Clockwise
	anti-clk	Anti-clockwise (presetting)
DIRECT	Direction of action of the setpoint value signal ➔ Fig. 24.	
	increase	The setpoint position is increased with a rising setpoint value (presetting)
	decrease	The setpoint position is increased with a falling setpoint value
CHARACTE	Type of setpoint characteristic curve	
	linear	Linear setpoint characteristic curve (presetting) ➔ Fig. 25.
	1:25	Equal-percentage setpoint characteristic curve ➔ Fig. 25.
	1:33	
	1:50	
	user-def	User-defined setpoint characteristic curve ➔ Chap. 9.3.4.
D-OUT1 D-OUT2	Function of the digital outputs D-OUT1, D-OUT2	
	power-H	High level if load voltage supply is present for outputs
	power-L	Low level if load voltage supply is present for outputs (presetting)
	limit1-H	High level, if end position 1 is reached
	limit1-L	Low level, if end position is 1 reached
	limit2-H	High level, if end position 2 is reached
	limit2-L	Low level, if end position is 2 reached
	limits-H	High level, if end position 1 or end position 2 is reached
	limits-L	Low level, if end position 1 or end position 2 is reached
	stop-H	High level in the operating status, PID controller not active
	stop-L	Low level in the operating status, PID controller not active
D-IN	Function of the digital input (PID controller not active)	
	stop-H	In the case of high level, block actuator (presetting)
	stop-L	In the case of low level, block actuator in position
	lmt1-H	In the case of high level, travel to stop 1
	lmt1-L	In the case of low level, travel to stop 1
	lmt2-H	In the case of high level, travel to stop 2
	lmt2-L	In the case of low level, travel to stop 2

Tab. 15 Menu 2 CONFIG

Note
Parameter changes become effective immediately after the Set pushbutton is pressed.



1 Select parameter with Add (1) and Sub (2) 2 Select setting with Add (1) and Sub (2)

Fig. 23 Movement in the menu 2 CONFIG

Operation		Description	
Press Add	1	Continue to the next selection	
Press Sub	2	Back to the previous selection	
Press Set	3	Confirm selection	Confirm selection and back to the menu 2 CONFIG
Hold down Set	6	Back to the main menu	Confirm selection and back to the main menu

Tab. 16 Operation in the menu 2 CONFIG

Signal type (SIGNAL)

The setpoint value can be specified as an external voltage or current signal.

If both setpoint inputs are connected, only the signal type configured with the parameter SIGNAL is active.

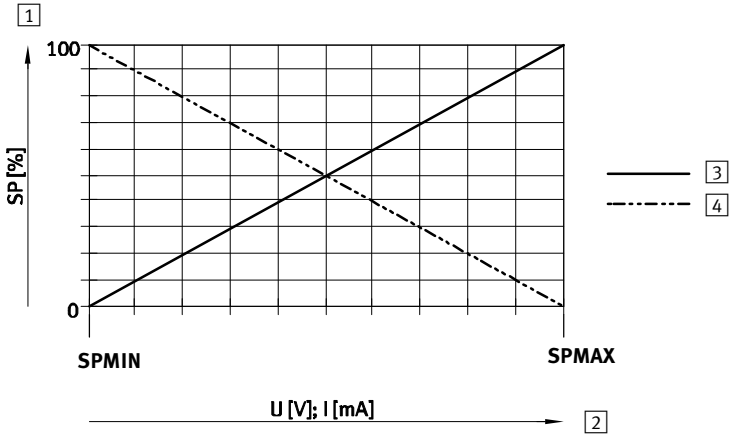
Active direction of the actuator (OPEN) - only CMSX-P-S-... (rotary)

The active direction of the actuator can be set with the parameter OPEN.

Display		Description
anti-clk		Display of the active direction of the actuator: – Anti-clockwise (presetting)
	clockwis	– Clockwise
VP 0 %	VP 0 %	Drive in pneumatic initial position: – Single-acting drives Drive completely exhausted – Double-acting drives Pneumatic output 2 of the drive completely pressurised Pneumatic output 4 of the drive completely exhausted
VP 100 %	VP 100 %	Drive completely pressurised
limit1	limit2	End position 1
limit2	limit1	End position 2
lmt1	lmt2	Stop 1
lmt2	lmt1	Stop 2

Tab. 17 Parameter OPEN

Direction of action of the setpoint value signal (DIRECT)



1 Setpoint position
2 Setpoint value signal range
3 Rising setpoint value (increase)
4 Falling setpoint value (decrease)

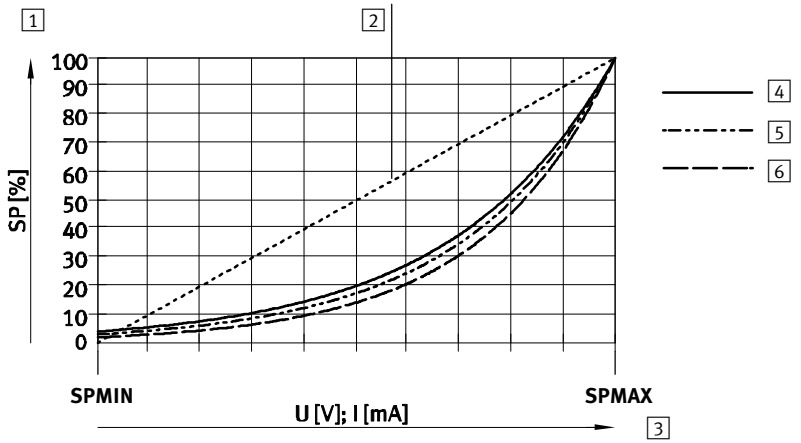
Fig. 24 Influence of the DIRECT parameter on the direction of action of the setpoint value signal – example: linear setpoint value characteristic curve

The active direction of the setpoint value signal can be set with the parameter DIRECT.
The parameter is effective independently of the setpoint characteristic curve type.

Display	Description
increase	The setpoint position is increased with a rising setpoint value (presetting)
decrease	The setpoint position is increased with a falling setpoint value

Tab. 18 Parameter DIRECT

Type of setpoint characteristic curve (CHARACTE)



1 Setpoint position
2 Linear setpoint characteristic
3 Setpoint value signal range
4 Equal-percentage setpoint characteristic curve 1:25
5 Equal-percentage setpoint characteristic curve 1:33
6 Equal-percentage setpoint characteristic curve 1:50

Fig. 25 Type of setpoint characteristic curve – example

The following types of setpoint characteristic curves can be selected with the CHARACTE parameter:
- Linear characteristic curve
- Equal-percentage characteristic curve 1:25
- Equal-percentage characteristic curve 1:33
- Equal-percentage characteristic curve 1:50
- User-defined characteristic curve

A user-defined setpoint characteristic curve can be created in the menu 4 CURVE ➔ Chap. 9.3.4.
The user-defined setpoint characteristic curve can be selected with the user-def setting.

9.3.3 Menu 3 PARA

The following parameters can be set in the menu 3 PARA:

Display	Description
MENU 3 PARA	
DEADBAND 0.5 ... 10%	Deadband of the positioner ➔ Fig. 27. Deadband in % of the actual work range, presetting = 1 %
PID--P 1 ... 20	P-proportion of the PID controller Presetting = 1
PID--D 1 ... 20	D-proportion of the PID controller Presetting = 4
MIN 0 ... 99%	Value for the lower stroke limit ➔ Fig. 28. Presetting = 0 %
MAX 1% ... 100%	Value for the upper stroke limit ➔ Fig. 28. Presetting = 100 %
SPMIN 0 ...80%	Value for the lower setpoint limit or seal-closing boundary ➔ Fig. 29. Presetting = 0 %
SPMAX 20% ... 100%	Value for the upper setpoint limit or seal-closing boundary ➔ Fig. 29. Presetting = 100 %

Tab. 19 Menu 3 PARA

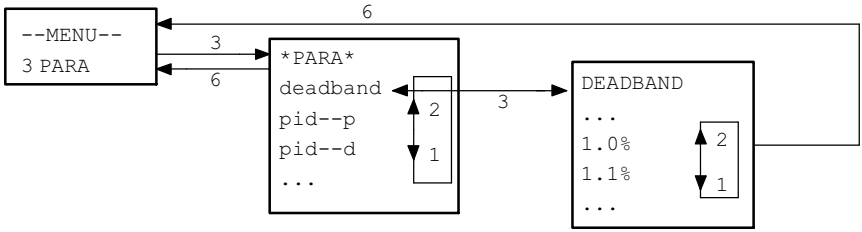


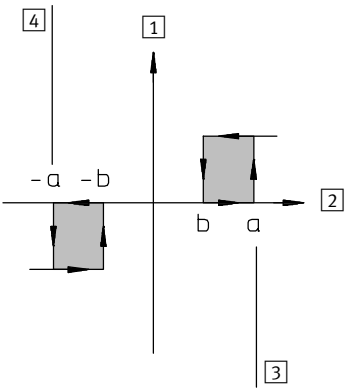
Fig. 26 Movement in the menu 3 PARA

Note
Parameter changes become effective immediately after the Set pushbutton is pressed.

Operation		Description	
Press Add	1	Continue to the next selection	Increase value
Press Sub	2	Back to the previous selection	Reduce value
Press Set	3	Confirm selection	Back to the selection
Hold down Set	6	Confirm selection and back to the main menu	

Tab. 20 Operation in the menu 3 PARA

Deadband (DEADBAND)



a = DEADBAND
b = ½ DEADBAND

1 Setpoint specification (output signal PID controller)
2 Deviation (PID controller input signal)
3 Upper limit (DEADBAND (+))
4 Lower limit (DEADBAND (-))

Fig. 27 Deadband

The deadband of the positioner can be set with the parameter DEADBAND:
– If the deviation is within the deadband, the setpoint specification remains unchanged.
– If the deviation lies outside the deadband, the setpoint specification is changed until the deviation lies within half the deadband (-b ‹ deviation ‹ b).

The size of the deadband influences the reaction of the positioner to a deviation:
– A deadband that is too small results in oscillations around the setpoint position up to permanent oscillations (instability). The process valve, actuator and solenoid valves of the positioner are subjected to unnecessary stresses.
– A deadband that is too large results in low positioning accuracy.

Controller parameters (PID--P, PID--D)

The controller parameters influence the control behaviour and positioning speed of the positioner.
The I-part of the PID controller is preset at the factory and cannot be changed.

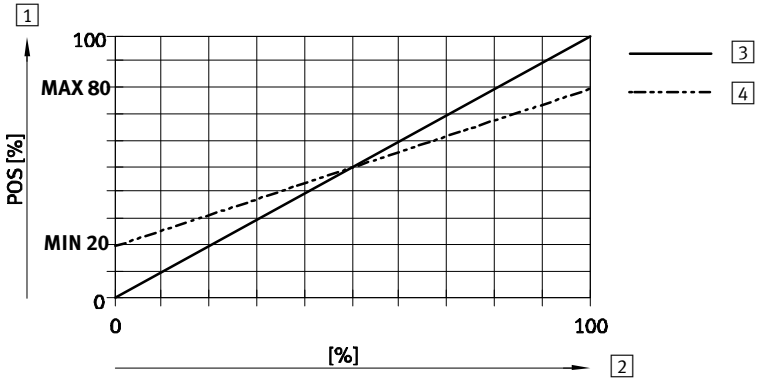
PID--P

The parameter PID--P influences the P-part of the PID-controller.
– The higher the value, the higher the setpoint specification change in the case of a deviation.
– A P-part that is too high results in overswings.
– A P-part that is too low makes control slower.

PID--D

The parameter PID--D influences the D-part of the PID-controller.
– The higher the value, the weaker the setpoint specification change with the same change in speed of the deviation.
– A D-part that is too high makes control more sluggish.
– A D-part that is too low makes control more dynamic.

Stroke limitation (MIN, MAX)



1 Physical stroke
2 Setpoint value signal range
3 Presetting: unlimited stroke
4 Adjusted setpoint characteristic curve – limited stroke

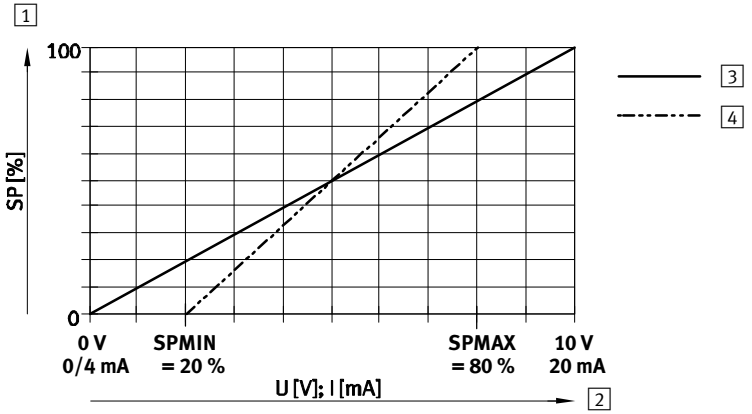
Fig. 28 Influence of the parameters MIN and MAX on the linear setpoint characteristic curve – example

The physical stroke can be limited with the parameters MIN and MAX.
The parameter is effective independently of the setpoint characteristic curve type. The setpoint characteristic curve is adjusted to the values for the lower and upper stroke limitation.

Display	Description
MIN	Value for the lower stroke limit (presetting = 0 %) MIN ‹ MAX
MAX	Value for the upper stroke limit (presetting = 100 %) MIN › MAX

Tab. 21 Parameter MIN, MAX

Setpoint value limitation and seal-closing function (SPMIN, SPMAX)



1 Setpoint position
2 Setpoint value signal range
3 Preset
4 Adjusted setpoint characteristic curve – example

Fig. 29 Influence of the parameters SPMIN, SPMAX on the setpoint value signal range – example: linear setpoint characteristic curve

The setpoint value signal range can be limited with the parameters SPMIN and SPMAX.
A seal-closing function can be implemented as a special form of setpoint value limitation.

Setpoint value limitation

Display		Description
increase	decrease	Direction of action of the setpoint value signal (DIRECT) ➔ Fig. 24.
SPMIN	SPMAX	Setpoint position 0 %
SPMAX	SPMIN	Setpoint position 100 %

Tab. 22 Allocation of the limits of the setpoint value signal range

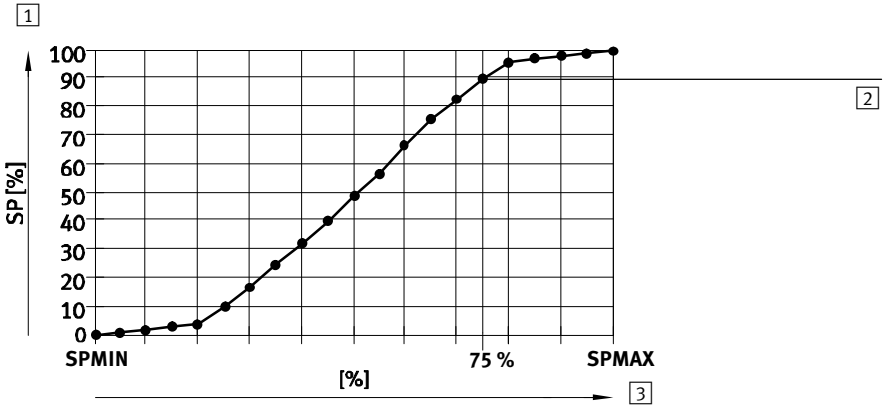
Seal closing function

If no stroke limit is set, the valve can be driven into the end positions with the maximum control force of the actuator. The seal-closing function becomes effective when the setpoint value leaves the range between the seal-closing limits.

Display	Description
SPMIN	Value for the lower seal-closing boundary If the setpoint value falls below this value, the valve can be driven into the lower end position with the maximum control force of the actuator.
SPMAX	Value for the upper seal-closing boundary If the setpoint value exceeds this value, the valve can be driven into the upper end position with the maximum control force of the actuator.

Tab. 23 Parameter SPMIN, SPMAX – seal closing function

9.3.4 Menu 4 CURVE



1 Setpoint position
2 Support point – example:
setpoint value 75 %, setpoint position 89.0 (in %)
3 Setpoint value signal range

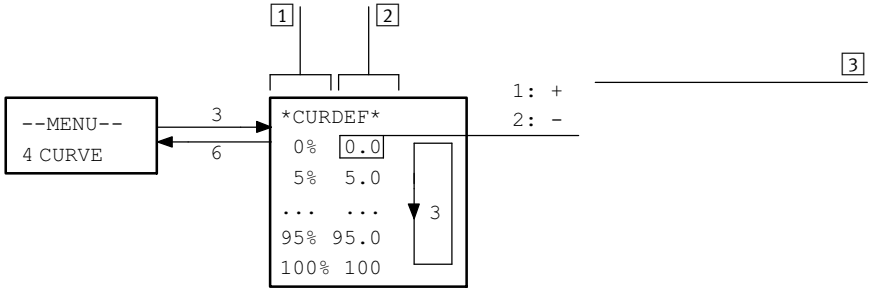
Fig. 30 User-defined setpoint characteristic curve – example

A user-defined setpoint characteristic curve can be defined through 21 support points in the menu 4 CURVE. The support points are distributed at 5 % intervals over the setpoint value signal range of 0 ... 100 %. At each support point, a setpoint position in the range of 0 ... 100 % can be assigned to the setpoint value.

– The user-defined setpoint characteristic curve must rise monotonically.
– The user-defined setpoint characteristic curve can be selected in the menu 2 CONFIG with the CHARACTE parameter ➔ Chap. 9.3.2.

Display	Description	
MENU 4 CURVE		
0%	Support point at 0 % setpoint signal	
	0.5	Setpoint position in %, presetting = 0 %
5%	Support point at 5 % setpoint signal	
	4.5	Setpoint position in %, presetting = 5 %
...	...	
100%	Support point at 100 % setpoint signal	
	99.5	Setpoint position in %, presetting = 100 %

Tab. 24 Menu 4 CURVE



1 Setpoint value
2 Setpoint position of the support point
3 Set value

Fig. 31 Movement in the menu 4 CURVE

Note
Changes become effective immediately in the Running operating status – without pressing the Set pushbutton.

Operation		Description
Press Add	1	Increase setpoint position by 0.1 % – with overflow[1)]
Press Sub	2	Reduce setpoint position by 0.1 % – with overflow[1)]
Press Set	3	Confirm current value and continue to the next support point
Hold down Set	6	Back to the main menu

1) If the Sub pushbutton is pressed at 0 %, the value jumps to 100 %.
If the Add pushbutton is pressed at 100 %, the value jumps to 0 %.

Tab. 25 Operation in the menu 4 CURVE

9.3.5 Menu 5 INFORM

Display	Description	
MENU 5 INFORM		
L1 ...°	End position 1 of the initialised opening angle (quarter turn actuators)	
	...	Numerical value [°]
L1 IN	End position 1 of the initialised path (linear actuators)	
	...	
L2 ...°	End position 2 of the initialised opening angle (quarter turn actuators)	
	...	Numerical value [°]
L2 OUT	End position 2 of the initialised path (linear actuators)	
	...	
V1 ...k	Number of switching cycles of the valve V1 since the last initialisation	
	...k	Numerical value[1] [1000]
V2 ...k	Number of switching cycles of the valve V2 since the last initialisation	
	...k	Numerical value[1] [1000]
Ver	Firmware design of the device	
	....	Version number

1) k for kilo (thousands)

Tab. 26 Menu 5 INFORM

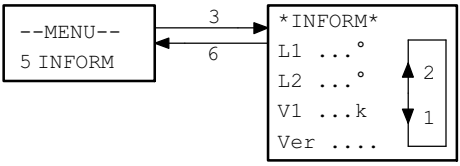


Fig. 32 Movement in the menu 5 INFORM

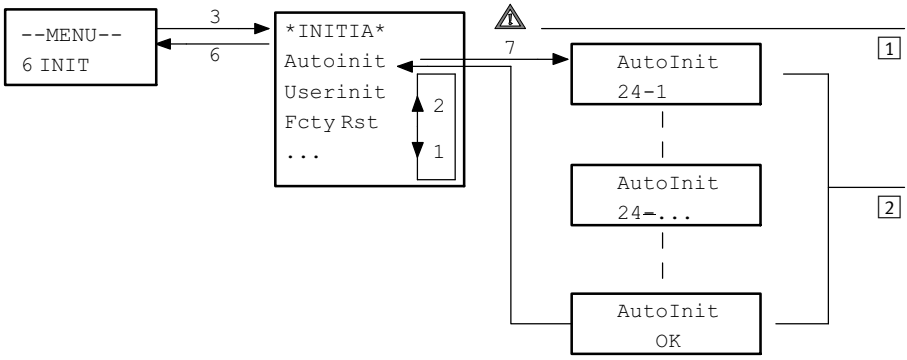
Operation		Description
Press Add	1	Continue to the next selection
Press Sub	2	Back to the previous selection
Press Set	3	Back to the main menu
Hold down Set	4	

Tab. 27 Operation in the menu 5 INFORM

9.3.6 Menu 6 INIT

Display	Description
MENU 6 INIT	
Autoinit	Start automatic initialisation ➔ Chap. 9.6.1.
Userinit	Start user-guided initialisation ➔ Chap. 9.6.2.
Fcty Rst	Reset all settings to factory settings ➔ Tab. 4.
Sytm Rst	Reset all settings to the presettings previously saved with SetAsDef
SetAsDef	Save all settings as presettings

Tab. 28 Menu 6 INIT



[1] The actuator is moved during initialisation! [2] Automatic initialisation

Fig. 33 Movement in the menu 6 INIT

Operation		Description
Press Add	1	Continue to the next selection
Press Sub	2	Back to the previous selection
Press Set	3	Confirm current selection
Hold down Set	6	Back to the main menu
Hold down Setand Add	7	Enable function

Tab. 29 Operation in the menu 6 INIT

9.4 Switch on positioner

1. Switch on the operating voltage supply.
2. Switch on the setpoint specification.
3. Switch on the compressed air.
   ➔ When the operating voltage supply is switched on for the first time, the factory settings are effective. The positioner behaves as follows:
   – Positioner is in the automatic mode.
   – PID controller is not active and does not react to setpoint specifications.
   If the operating voltage supply is switched back on, the last operating status is immediately effective. If the PID controller is activated, the current setpoint value is immediately valid.
   ➔ The initial position is displayed (example).

```
--- 0.0%
VP: 0.0%
```

9.5 Check sensing range of the path/angle sensor

The actuator can be moved with the Add and Sub pushbuttons to check if the working range of the actuator is in the sensing range of the path/angle sensor.

Prerequisites

– Power supply and compressed air are switched on.
– PID controller is not active ➔ Tab. 8.
– Digital input is deactivated ➔ Tab. 15.
– The initial position is displayed (example).

```
--- 0.0%
VP: 0.0%
```

1. Hold down the Set pushbutton for 3 seconds.

```
--MENU--
1 SENSOR
```

2. Press Set pushbutton.
   ➔ If the current position lies outside the measuring range, an error message is displayed.

```
*SENSOR*
ERROR
```

   Mount the positioner so that the sensing range of the sensor completely covers the work space of the actuator ➔ Chap. 7.

➔ If the current position lies within the measuring range, the size of the current sensor signal is shown in the display as a plus sign (example).

```
*SENSOR*
----+---
```

The actuator can be moved with the Add and Sub pushbuttons ➔ Tab. 14.
If the actuator moves, the plus sign also moves.

3. Hold down one of the pushbuttons, for example, the Add pushbutton, until the actuator reaches the end position.
   ➔ The following is displayed in the end position (example):

```
*SENSOR*
-+------
```

4. Hold down the other pushbutton, for example, the Sub pushbutton, until the actuator reaches the other end position.
   ➔ The following is displayed in the end position (example):

```
*SENSOR*
------+-
```

5. If the entire work space is traversed without an error message, continue commissioning with initialisation ➔ Chap. 9.6.
6. Press the Set pushbutton to open the main menu level again.

```
--MENU--
1 SENSOR
```

7. To display the initial position again, hold down the Set pushbutton for 3 seconds.

```
--- 0.0%
VP: 0.0%
```

9.6 Initialisation

The following values are determined during initialisation:
– Permitted stroke range
– Maximum positioning time
During initialisation, movement takes place into both end positions in succession, independently of the present setpoint value.
- Perform initialisation again in the following cases:
  – During commissioning
  – After changes in the system structure

Initialisation can be carried out in the following ways:
– Automatic initialisation: The positioner automatically carries out all steps after the start.
– User-guided initialisation: Each step is started by pressing the Add pushbutton

9.6.1 Perform automatic initialisation (AutoInit)

Note
During initialisation, the process valve is moved into the physical end positions.

Prerequisites
– Power supply and compressed air are switched on.
– Digital input is deactivated ➔ Tab. 15.
– The initial position is displayed (example).

```
--- 0.0%
VP: 0.0%
```

1. Hold down the Set pushbutton for 3 seconds.

```
--MENU--
1 SENSOR
```

2. Then briefly press the Sub pushbutton several times until the menu 6 INIT is displayed.

```
--MENU--
6 INIT
```

3. Press Set pushbutton.

```
*INITIA*
Autoinit
```

4. To start automatic initialisation, hold down the Set and Add pushbuttons simultaneously for 3 seconds.
   ➔ Automatic initialisation begins. The actuator is moved.

Initialisation takes a certain amount of time. The individual steps are displayed ➔ Fig. 33.

```
AutoInit
 24-1
```

...

```
AutoInit
 24-...
```

...

```
AutoInit
 24-22
```

➔ If an error message is displayed, restart automatic initialisation or perform user-guided initialisation ➔ Chap. 9.6.2.

➔ After successful completion of automatic initialisation, the following message is displayed:

```
AutoInit
   OK
```

5. Press Set pushbutton.

```
*INITIA*
Autoinit
```

6. Hold down the Set pushbutton for 3 seconds to open the main menu level again.

```
--MENU--
6 INIT
```

7. To display the initial position again, hold down the Set pushbutton for 3 seconds.

```
--- 0.0%
VP: 0.0%
```

9.6.2 Perform user-guided initialisation (UserInit)

Note
During initialisation, the process valve is moved into the physical end positions.

1. Switch on compressed air and the power supply.
   ➔ The PID controller is not active and the initial position is displayed (example).

```
--- 0.0%
VP: 0.0%
```

2. Hold down the Set pushbutton for 3 seconds.

```
--MENU--
1 SENSOR
```

3. Press the Sub pushbutton until the menu 6 INIT is displayed.

```
MENU
6 INIT
```

4. Press Set pushbutton.

```
*INITIA*
Autoinit
```

5. Press the Add pushbutton.

```
*INITIA*
Userinit
```

6. To start user-guided initialisation, hold down the Set and Add pushbuttons simultaneously for 3 seconds.
   ➔ The first step is displayed.

```
UserInit
11-0
```

7. To start the step, press the Add pushbutton.
   ➔ The step is executed. The drive is moved. The next step is displayed.

```
UserInit
11-2
```

8. Start each step by pressing the Add pushbutton.
   ➔ After successful completion of user-guided initialisation, the following message is displayed:

```
UserInit
   OK
```

9. Press the Set pushbutton.

```
*INITIA*
Userinit
```

10. Hold down the Set pushbutton for 3 seconds to open the main menu level again.

```
--MENU--
6 INIT
```

11. To display the initial position again, hold down the Set pushbutton for 3 seconds.

```
--- 0.0%
VP: 0.0%
```

9.7 Set parameters

Note
Parameter changes become effective immediately after the Set pushbutton is pressed.

1. Recommendation: To adjust parameters without moving the drive, perform the following steps:
   – Stop PID controller ➔ Tab. 15.
   – Deactivate digital input ➔ Tab. 8.
2. Adjust device settings and parameterisation to the application – factory settings ➔ Tab. 4.
3. Test settings.

9.8 Complete commissioning

1. Recommendation: Save settings as individual presettings in the menu 6 INIT with the command SetAsDef ➔ Tab. 28.
2. Place the housing cover in position and tighten the 4 housing screws ➔ Fig. 1, [3], Fig. 2, [3].
   – Observe the correct position of the seals.
   – Tightening torque: 1.5 Nm

10 Operation

- Observe the operating conditions.
- Observe limit values.

After the supply voltage is switched on, the positioner is in the same operating status and the same operating mode as was valid before the supply voltage was switched off.

11 Maintenance

When used as intended, the product is maintenance-free.

- Clean the outside of the product with a soft cloth and soap suds.

12 Fault clearance

Malfunction	Possible cause	Remedy
Error in positioning	Initialisation has not been executed	Perform initialisation ➔ Chap. 9.6.
	Solenoid valves of the positioner defective	Replace device.
	Mechanical connection between positioner and actuator defective	Restore mechanical connection ➔ Chap. 7; tighten coupling, if necessary; replace defective coupling.
	Failure of compressed air supply	Provide compressed air supply ➔ Chap. 8.1.
	Unstable compressed air supply	Minimise fluctuations in pressure.
Actuator tends to overswings or permanent oscillations	Controller parameter set incorrectly	Correct settings ➔ Chap. 9.3.3, Tab. 19.
	Especially for smaller actuators: Too high a flow rate in the working lines of the positioner ensures excessive positioning speed at the actuator	Install flow control valves in the working lines of the positioner.
Actuator does not move to the correct position if there is an operating voltage failure	Tubing connection between positioner and actuator defective	Correct tubing connection between positioner and actuator ➔ Chap. 3.4.
The device does not react to setpoint specifications	Compressed air supply is lacking	Provide compressed air supply.
	PID controller is not active	Start PID controller ➔ Chap. 9.2.2, Tab. 8.
	Device reacts to a signal at the digital input	Change signal at the digital input or correct parameterisation ➔ Chap. 9.3.2, Tab. 15.

Malfunction	Possible cause	Remedy
Display shows the error message *SENSOR* ERROR	Sensing range of the path/angle sensor exceeded	Correct alignment and mechanical connection between positioner and actuator ➔ Chap. 7.
		Change electrical connection of the external path/angle sensor at terminal strip 2: – Pin 1: operating voltage + – Pin 3: operating voltage -
The device does not react to analogue setpoint specification	Setpoint input is not active	Activate setpoint input ➔ Chap. 9.3.2, Tab. 15.
	Manual setpoint position mode is active	Activate automatic mode ➔ Chap. 9.2.3, Tab. 9.
	Setpoint input defective	Check setpoint value.
		Replace device.
Actuator travels to an end position, even though another setpoint value is specified	The operating voltage supply is outside the permissible range or switched off. The solenoid valves take on the neutral position ➔ Chap 3.4.	Check operating voltage supply ➔ Technical data.

Tab. 30 Fault clearance

13 Dismantling

Note
Dismantling only by qualified personnel.

Warning
Despite switched-off compressed air, the working ports of the positioner remain under pressure.
- Exhaust working ports before removal of the tubing lines.

13.1 CMSX-P-S-... (rotary)

1. Switch off compressed air.
2. Activate the manual setpoint position mode in the basic menu level (•OPERAT• Manual).
3. Move actuator until the working ports are completely exhausted.
4. Switch off power supply.
5. Loosen the housing screws ➔ Fig. 1, [3]. Remove the cover of the housing.
6. Disconnect electrical and pneumatic connection.
7. Loosen 4 mounting screws from the actuator and remove the positioner with mounting bridge ➔ Fig. 11, [3].

13.2 CMSX-P-SE-... (linear)

1. Switch off compressed air.
2. Activate the manual setpoint position mode in the basic menu level (•OPERAT• Manual).
3. Move actuator until the working ports are completely exhausted.
4. Switch off power supply.
5. Loosen the housing screws ➔ Fig. 2, [3]. Remove the cover of the housing.
6. Disconnect electrical and pneumatic connection.
7. Loosen 4 mounting screws from the housing (flange socket) and remove the positioner with mounting bridge ➔ Fig. 13, [2].

14 Disposal

- Observe the local regulations for environmentally friendly disposal.
- Dispose of the product in an environmentally friendly manner.

15 Technical data

CMSX-P-...-C-U-F1-...		
Sensing range	[°]	0 ... 100
Conforms to standard		VDI/VDE 3845 (NAMUR)
Protection against short circuit		Yes
Measured variable		
– CMSX-P-S		Rotation angle
– CMSX-P-SE		Rotation angle or stroke through external path/angle sensor
Reverse polarity protection		– For setpoint value – For operating voltage connection
Display type		Backlit LCD
Setting options		Via display and keys
Type of setpoint value characteristic curves		– Linear – Equal percentage (1:25, 1:33, 1:50) – Freely adjustable over 21 support points
Leakproof characteristics		Adjustable via SPMIN and SPMAX
Control range adaptation		Adjustable
Alarm for exceeding limit value		No
Active direction		Adjustable, rising/falling
Operating pressure	[bar]	3 ... 8
Setpoint value	[mA]	4 ... 20; 0 ... 20
	[V]	0 ... 10
Pneumatic initial position in case of breakdown		
– CMSX-...-A		Regulating effect opening/closing, adjustable through pneumatic tubing connection
– CMSX-...-C		Regulating effect blocking
Operating voltage range DC	[V DC]	21.6 ... 26.4
Max. load resistance of current output	[Ω]	500
Idle current		
– CMSX-...-G1	[mA]	100 ... 300
– CMSX-... (2. generation)	[mA]	90 ... 300
Max. current consumption	[A]	1
Max. output current	[mA]	500
Switching level	[V]	Signal 0: ≤ 5; signal 1: ≥ 10
Max. current consumption of the digital inputs at 24 V	[mA]	6
Deadband size		
– CMSX-...-G1	[%]	0.1 ... 10
– CMSX-... (2. generation)	[%]	0.5 ... 10
Operating medium		Compressed air according to ISO 8573-1:2010 [7:4:4]

1) Only in combination with a mounting bridge according to accessories ➔ www.festo.com/catalogue.

CMSX-P-...-C-U-F1-...		
Note on the operating medium		Lubricated operation not possible
CE marking, (Declaration of conformity ➔ www.festo.com/sp)		In accordance with EU EMC Directive
Protection class - in mounted state		IP65
Ambient temperature	[°C]	-5 ... 60
Storage temperature	[°C]	-20 ... 60
UV resistance		Yes
Vibration resistance according to DIN/IEC 60068, Part 2-6		0.15 mm path at 10 ... 58 Hz[1);] 2 g acceleration at 58...150 Hz[1)]
Shock resistance according to DIN/IEC 60068, part 2-29		±15 g with 11 ms duration; 5 shocks per direction[1)]
Cable connector		– M20 for device connection – M12 for connection of external path/angle sensor – only CMSX-P-SE-... (linear)
Type of mounting		With accessories, on flange according to ISO 5211
Product weight	[g]	970
Pneumatic port		G1/8
Nominal flow rate		
– CMSX-...-50	[l/min.]	50
– CMSX-...-130	[l/min.]	130
Note on materials		
– Housing		PC
– Threaded coupling (coupling)		High-alloy stainless steel
– Seals		NBR
– Adapter plate		Aluminium
– Plate (back plate)		Aluminium
– Cable connection		PA

1) Only in combination with a mounting bridge according to accessories ➔ www.festo.com/catalogue.

Tab. 31 Technical data

Index

A
Active direction 34
Actual value output 20
Alarm output 20, 21
Automatic 29

C
Configuration 32
Controller parameter 38

D
Deadband 38
Direction of action 35

E
Earthing 21

F
Factory settings 24
Firmware version 43
Functional earth 6, 7

I
Information 43
Initialization 44, 47
Input setpoint value 20

K
Key functions 31, 33, 37, 42, 43, 44

O
Operating elements 6, 7
Operating voltage supply 21

P
Physical stroke 39
Pin allocation 20
Pneumatic ports 17
Ports 6, 7, 17

S
Seal closing function 40
Setpoint characteristic curve 36, 41
Setpoint position mode, manual 29
Setpoint value limitation 40
Setpoint value signal range 40
Signal type 34
Status output 20, 21, 32
Stroke limitation 39

T
Type code 8

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