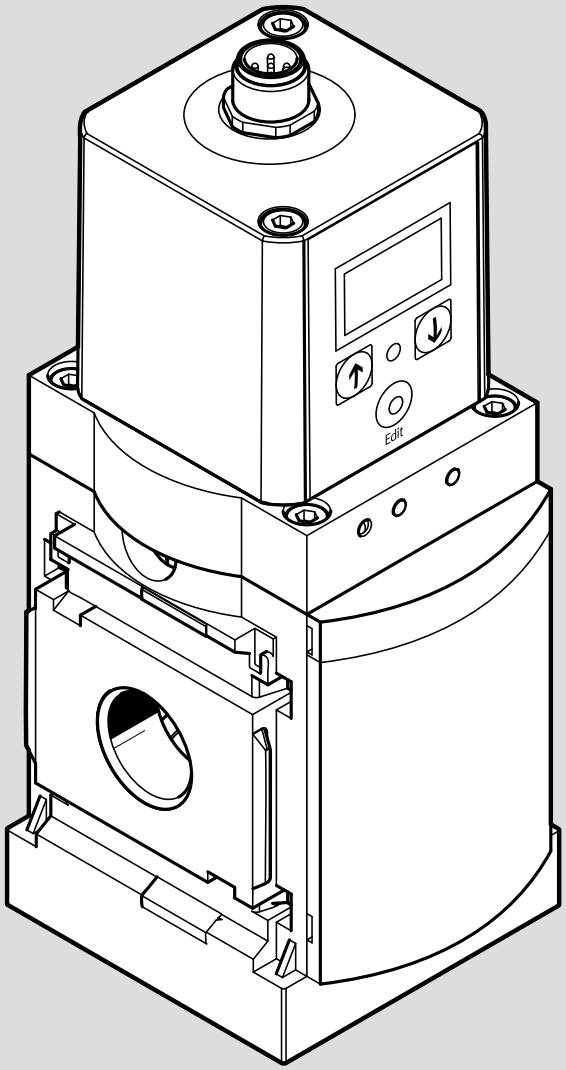
MS6-LRP(B)-...-P...10
Precision pressure regulator



FESTO

Operating instruction

8210959

8210959
2024-06
[8210961]

Original instructions

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1 Applicable documents



All available documents for the product ➔ www.festo.com/sp.

2 Safety

2.1 Safety instructions

- Only use the product in its original condition without unauthorised modifications.
- Only use the product if it is in perfect technical condition.
- Observe the identifications on the product.
- Take into account the ambient conditions at the location of use.
- Before working on the product, switch off the compressed air supply and lock it to prevent it from being switched on again.
- Before working on the product: Switch off the power supply, ensure that it is off and secure it against being switched on again.
- Use only in an industrial environment. Outside industrial environments, e.g. in commercial and residential/mixed-use areas, it may be necessary to take measures to suppress radio interference.

2.2 Intended use

The precision pressure regulator regulates the compressed air in pneumatic control loops at the set reference value regardless of the input pressure. The precision pressure regulator is intended for use in an industrial environment.

2.3 Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers. The qualified personnel have skills and experience in dealing with electropneumatic (open-loop) control technology.

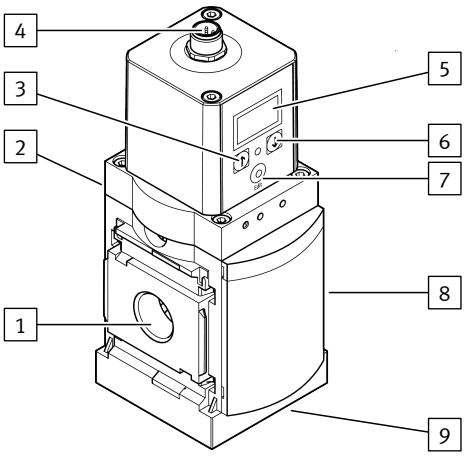
3 Additional information

- Contact the regional Festo contact if you have technical problems ➔ www.festo.com.
- Accessories and spare parts ➔ www.festo.com/catalogue.

4 Product overview

4.1 Product design

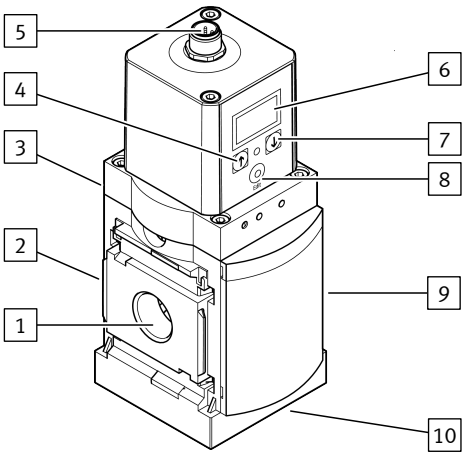
MS6-LRP-...-P...10



1 Pneumatic port 1: compressed air
2 Earth terminal
3 Button: [↑]
4 Electrical connection
5 Display
6 Button: [↓]
7 Button: [Edit]
8 Pneumatic port 2: working air
9 Pneumatic port 3: exhaust air

Fig. 1: MS6-LRP-...-P...10

MS6-LRPB-...-P...10



1 Pneumatic port 1: compressed air
2 Pneumatic port 2: working air
3 Earth terminal
4 Button: [↑]
5 Electrical connection
6 Display
7 Button: [↓]
8 Button: [Edit]
9 Pneumatic port 1: compressed air
10 Pneumatic port 3: exhaust air

Fig. 2: MS6-LRPB-...-P...10

4.2 Function

The pilot-operated, pre-pressure compensated precision pressure regulator keeps the output pressure constant, independent of the input pressure, proportional to a specified reference value in pneumatic control loops. The output pressure is set within the pressure range using the pilot head. When the operating pressure is switched off, the precision pressure regulator is exhausted via the secondary vent.

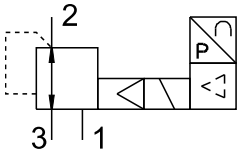


Fig. 3: Pneumatic circuit symbol

5 Mounting

5.1 Wall mounting

Requirements:
– Space requirement above the precision pressure regulator: ≥ 50 mm
– Space requirement below the precision pressure regulator: ≥ 30 mm
– Shut-off valves are installed in the compressed air supply line.

1. Align the precision pressure regulator vertically in the flow direction. The numbers on the housing are provided for orientation.
2. Mount the precision pressure regulator on the mounting surface using the mounting accessories ➔ 3 Additional information.

6 Installation

6.1 Installation, pneumatic

1. Use fittings, seals and suitable tubing from the Festo catalogue ➔ 3 Additional information.
2. Screw the fittings into the pneumatic ports 1 and 2.
3. Insert suitable tubing into the fitting to the stop.
4. Fit a silencer at the pneumatic port for exhaust air (3) or install an exhaust air duct.

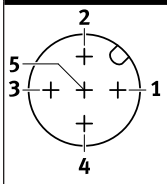
6.2 Installation, electrical

⚠ WARNING

Risk of injury due to electric shock.

- Use exclusively PELV circuits in accordance with IEC 60204-1/EN 60204-1 for the electrical power supply (Protective Extra-Low Voltage, PELV).
- Observe the general requirements of IEC 60204-1/EN 60204-1 for PELV circuits.
- Use exclusively voltage sources that guarantee reliable electrical isolation from mains power in accordance with IEC 60204-1/EN 60204-1.

1. Connect the precision pressure regulator with a shielded and twisted connecting cable ➔ www.festo.com/catalogue.
2. Lay out the connecting cable without crushing, kinking or stretching it.
3. Tighten the connecting cable at the M12×1 plug.
   Maximum tightening torque: 0.3 Nm.

M12×1 plug, 5-pin, A-coded		Allocation
	1	+ 24 V DC
	2	– Reference value
	3	GND
	4	+ Reference value
	5	+ Actual value, switching output

Earthing

For safe operation, ground the precision pressure regulator.

1. Use the earth terminal.
2. Use the following earthing accessories (included in the scope of delivery):
   – M3 screw
   – Contact washer

7 Commissioning

7.1 Connecting power supply and compressed air supply

NOTICE

- The precision pressure regulator interprets setpoint signals less than 0.1V as 0V and setpoint signals less than 4.16mA as 4mA. In this case, the output pressure is set to 0MPa by activation of the exhaust valve. As a result, a defined valve condition is assured at w = 0.
- Fail-safe position for MS6-LRP(B)-...-PE10: if the voltage variant setpoint value cable breaks, the output pressure is set to 0MPa.
- Fail-safe position for MS6-LRP(B)-...-PI10: If the setpoint value cable breaks or the power supply is lost, the output pressure remains unregulated. Leakage results in a change of pressure over the long term.

Requirements:
– The precision pressure regulator is installed.
– The pneumatic and electrical installation is complete and tested.

1. Check the operating conditions and critical limits ➔ 11 Technical data.
2. The precision pressure regulator has a differential input. The setpoint signal is applied to the contact pin 2 and pin 4, where the lower potential must be connected to the contact pin 2 and the higher potential to the contact pin 4. Contact pin 2 (– setpoint value) can be connected to contact pin 3 (GND).
3. Switch on the compressed air supply.
4. Pressurize the precision pressure regulator with an input pressure (p1)at least 0.1 MPa higher than the maximum desired output pressure.
   The following output pressure range is then allocated to the setpoint signal range:

MS6-LRP(B)-...		**-PE10**	**-PI10**
Setpoint value signal range		0 ... 10 V	4 ... 20 mA
Output pressure	[MPa]	0.01 ... 1	

7.2 Adjusting parameters

The menu items can be opened on the display and the corresponding parameters can be adjusted.
Requirement:
– The precision pressure regulator is pressurised at an input pressure (p1) at least 0.1 MPa higher than the maximum required output pressure.

1. Press the [Edit] key.
   ⇨ The first menu item *'Pr...'* is displayed.
   ⇨ If a selection is not made within 10 seconds, the display automatically returns to the initial position
2. Use the [↓] button to select the desired menu item.
3. Confirm the selected menu item with the button [Edit].
4. Use the [↑] or [↓] button to select the parameter within the menu item.
   ⇨ If a selection is not made within 80 seconds, the display automatically returns to the initial position.

5. Confirm the selected parameter with the [Edit] button.
   ⇨ The set parameter is accepted. The display shows the next menu item.
   ⇨ If a selection is not made in the main menu within 10 seconds, the display automatically returns to the initial position.
6. If necessary, select and edit additional menu items with the [↓] button.

Menu item	Name	Meaning	Selection option	Description
'Pr'	Select preset	Preset selection	*'Pr1'*	Selection of preset 1 Recommended for working volume < 0.5 l
			'Pr2'	Selection of preset 2 Recommended for working volume ~ 0.5 l
			'Pr3'	Selection of preset 3 Recommended for working volume > 0.5 l
[↓]				
'bAr'	Pressure unit	Pressure unit	*'Pa'*	Selection of the pressure unit kPa
			'bAr'	Selection of the pressure unit bar
			'PSi'	Selection of the pressure unit psi
[↓]				
'OFS'	Offset	Zero point increase	[...]	Output pressure without setpoint value
[↓]				
'rnG'	Range	Pressure range adjustment	[...]	Adjusting the pressure range
[↓]				
'Frc'	Force mode	Manual setpoint specification	MS6-LRP(B)-...-PE10: 0.00 ... 10.0V MS6-LRP(B)-...-PI10: 4.00 ... 20.0mA	Setting the manual setpoint
[↓]				
'To'	Analogue	Analogue output		Threshold value comparator
				Window comparator
			SP.O.	Setpoint value reached
			SP	Switching point
			SP.L	Lower switching point
			HY	Spread, switch difference
			SP.H	Upper switching point
			n.Lo	N/O contact
			n.Hi	N/C contact
[↓]				
'Eco'	Eco mode	Display shutdown	*'OFF'*, *'1'* ... *'999'*	The display will be switched off after the preset time, indicated by a line running through the display on the baseline.

Menu item	Name	Meaning	Selection option	Description
[↓]				
'Pin'	PIN code	Display interlock	*'OFF'*, *'1'* ... *'999'*	Entering a PIN code

Tab. 1: Menu structure

7.3 Configure output

Switching points (SP) and hysteresis (HY)

The switching point is only active when a threshold value or window comparator is selected. The value of the hysteresis specifies the tolerance for the deviation before a signal change occurs at the output (Pin 5).

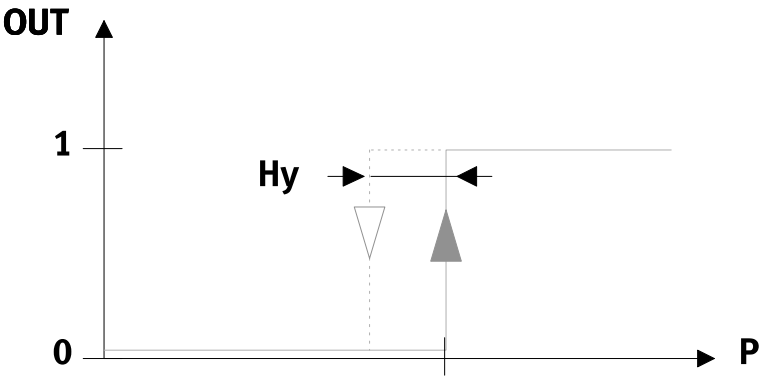


Fig. 4: Switching characteristic NO (normally open)

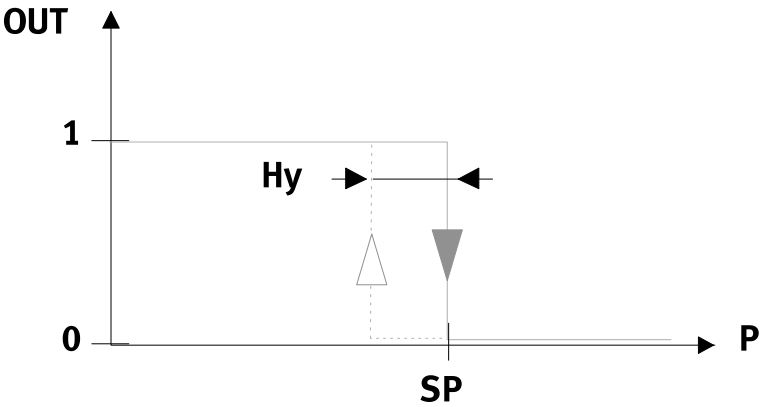


Fig. 5: Switching characteristic NC (normally closed)

Setting SP.O.

The SP.O. signal indicates that the setpoint value has been reached in the range (+/–) of the set hysteresis.

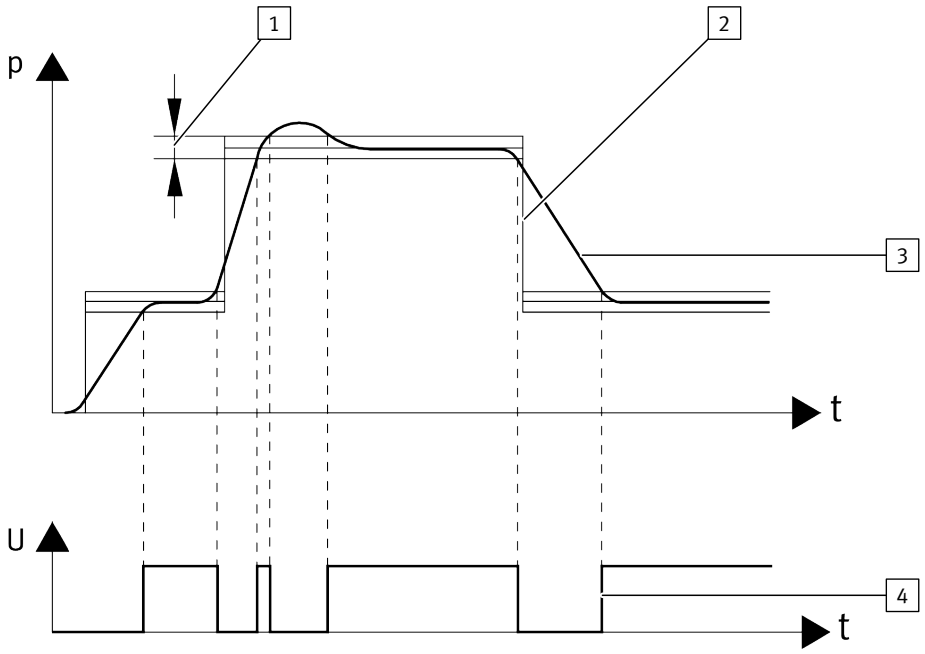


Fig. 6: Setting SP.O.

1	Hysteresis	3	Actual value
2	Reference value	4	SP.O. signal

7.4 Unlocking display

The display shows *'Loc'* after pressing the [↑], [↓] or the [Edit] button; the display is locked by a PIN code. After a short time a flashing *'0'* will be displayed and the correct PIN code must be entered. After correct entry the display will show *'unL'* and if the input is incorrect entry, the display will switch to the initial display.

1. Press the [↑], [↓] o [Edit] button.
   ⇨ The display shows *'Loc'* view. After a short time a flashing *'0'*.
2. Select the correct PIN code with the [↑] button.
3. Confirm the selected PIN code with the [Edit] button.
   ⇨ The display is unlocked.

8 Operation

NOTICE

First switch off the setpoint voltage on MS6-LRP(B)-...-PE10 or the setpoint current on MS6-LRP(B)-...-PI10. Then switch off the compressed air supply and finally the power supply.

The last point of the display and the green status LED light up when the actual value is equal to or within a range of ± 1 % (FS) of the setpoint value.

9 Cleaning

- Clean the outside of the product as required with a soft cloth.
  Permissible cleaning agents:
  – Soap solution, maximum +60 °C
  – Petroleum ether, free of aromatic compounds

10 Malfunctions

10.1 Fault clearance

Malfunction	Cause	Remedy
The precision pressure regulator does not respond.	The power supply is off, the LED does not light up.	– Check connection of the power supply 24 V DC.
	No setpoint voltage.	– Check the control unit. – Check the connection.
	The precision pressure regulator is defective.	– Send the device to the Festo repair service.
The flow rate is too low.	Flow cross section restricted by connection technology (swivel fittings)	– Use alternative connections.
The pressure rise too slow.	Large cylinder volume and long tube length	– Select another parameter set.
The pressure remains constant despite change to setpoint specification.	Supply cable breakage; the last output pressure set is maintained but not regulated. Slow pressure change is possible at output.	– Replace the supply cable.
Hard switching noise of the precision pressure regulator.	The input pressure p1 is not present.	– Increase the input pressure p1 to at least 0.1 MPa above output pressure p2. – Monitor the maximum permissible operating pressure of 0.8 MPa.

Tab. 2: Fault clearance

10.2 Reset to factory setting

NOTICE

Resetting to the factory settings will lose the current settings.
- If required, make a note of these settings before reset.

Reset [rES] restores the factory setting.

- Press and hold the buttons [↑] + [↓] + [Edit] and switch on the device.
  The following parameters are then set:

Parameters	Setting/value
x.xx	Permanent display for actual value or setpoint value
Pr2	Preset 2, (universal control behaviour)
bar	bar
OFS	000
rnG	10.0
Frc	Display shows existing pressure at pressure output P2.
To	Output: analogue
Eco	OFF
Pin	OFF

10.3 Read software version and serial number

If an unrecoverable malfunction occurs, the software version and serial number must be specified.

Displaying software version

Requirement:
– The precision pressure regulator is switched off.

- Press and hold the [↓] and [Edit] button and switch on the power supply.

Display serial number

Requirement:
– The precision pressure regulator is switched off.

- Press and hold the [↑] and [Edit] button and switch on the power supply.
  ⇨ The serial number is displayed as 6 digits, first *'xxx'* then *'xxx'* alternating approximately every 2 seconds.

11 Technical data

11.1 Technical data, general

MS6-LRP(B)-...-P...10		
Certificates, declaration of conformity		➔ www.festo.com/sp
Mounting position		Any
Valve function		3-way proportional-pressure regulator
Vibration resistance in accordance with IEC 60068-2-6		Severity level 2
Shock resistance in accordance with IEC 60068-2-27		Severity level 2
Degree of protection		IP65, in mounted status
Storage temperature	[°C]	–10 ... +60
Temperature of medium	[°C]	+10 ... +50
Ambient temperature	[°C]	0 ... +60
Pneumatic port 1		
MS6-LRP(B)-1/2-P...10		G 1/2
Pneumatic port 2		
MS6-LRP(B)-1/2-P...10		G 1/2
Pneumatic port 3		
MS6-LRP(B)-1/2-P...10		G 1/4

Tab. 3: Technical data, general

Type of severity level (SL)					
Vibration load					
Frequency range [Hz]		Acceleration [m/s²]		Deflection [mm]	
SL1	SL2	SL1	SG2	SL1	SL2
2 … 8	2 … 8	–	–	±3.5	±3.5
8 … 27	8 … 27	10	10	–	–
27 … 58	27 … 60	–	–	±0.15	±0.35
58 … 160	60 … 160	20	50	–	–
160 … 200	160 … 200	10	10	–	–
Shock load					
Acceleration [m/s²]		Duration [ms]		Shocks per direction	
SL1	SL2	SL1	SL2	SL1	SL2
±150	±300	11	11	5	5
Continuous shock load					
Acceleration [m/s²]		Duration [ms]		Shocks per direction	
±150		6		1000	

Tab. 4: Type of severity level (SL)

11.2 Technical data, pneumatic

MS6-LRP(B)-...-P...10		
Operating medium		Compressed air to ISO 8573-1:2010 [7:4:4]
		Inert gases
Information on the operating medium		Lubricated operation not possible
Operating pressure	[MPa]	0.6 ... 1.1
	[bar]	6 ... 11
	[psi]	87 ... 159
Pressure regulation range	[MPa]	0.1 ... 1.0
	[bar]	0.1 ... 10
	[psi]	1.4 ... 145
Standard nominal flow rate	[l/min]	9000
Leakage in de-energised condition $p_1 = p_{1max}$	[l/h]	≤ 10

Tab. 5: Technical data, pneumatic

11.3 Technical data, electrical

MS6-LRP(B)-...-P...10		
Nominal operating voltage	[V DC]	24
Operating voltage range	[V DC]	21.6 ... 26.4
Max. current consumption	[mA]	160
Max. electrical power consumption	[W]	4.2
Max. permissible signal line length (shielded)	[m]	30
Connection technology		M12×1 plug, 5-pin, A-coded

Tab. 6: Technical data, electrical

11.4 Characteristics of closed-loop control technology

MS6-LRP(B)-...-P...10[1)]		
Linearity		1% Full Scale (FS) at 24 V DC and 25 °C
Reproducibility		0.5% Full Scale (FS)
Temperature coefficient		0.04/K
Hysteresis pressure regulation range		
0.002 ... 0.2	[MPa]	1% Full Scale (FS)
0.006 ... 0.6	[MPa]	0.5% Full Scale (FS)
0.01 ... 1	[MPa]	0.5% Full Scale (FS)
Overall accuracy of pressure regulation range		
0.002 ... 0.2	[MPa]	1.5% Full Scale (FS)
0.006 ... 0.6	[MPa]	1.25% Full Scale (FS)
0.01 ... 1	[MPa]	1.25% Full Scale (FS)

1) Maximum deviation, characteristic values determined at room temperature in accordance with ISO 10094. The linearity refers to the ideal characteristic curve.

Tab. 7: Characteristics of closed-loop control technology

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