

LasGAR Basic

Laser gas control valve with Piezo activation and upstream gas valves

LGRB type series analog and digital (EtherCAT/Profinet)

Brief operating instructions

Version 00



For complete up-to-date operating instructions, visit <http://www.hoerbiger.com/>

ID no.: PS31016A



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1 Note for using the brief operating instructions

The brief operating instructions describe the pneumatic and electrical connection of the device, as well as its start-up. They include notes about electrical and pneumatic characteristics.

The brief operating instructions do not include any basic safety instructions and warnings. Therefore, they may only be used by qualified personnel who have read and understood the **up-to-date** operating instructions belonging to the product. These operating instructions can be downloaded from the HOERBIGER company website <http://www.hoerbiger.com>.

For additional information, contact the manufacturer at the following address:

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86972 Altenstadt
Germany

Information on the Internet: www.hoerbiger.com

2 Product description

2.1 Description

Devices in the LasGAR type series are used for efficient gas control in laser cutting machines and are typically composed of the following components:

1. Gas control valve for regulation of the cutting pressure
2. Digital or analog communication interface
3. Upstream valve unit with switching valves for gas selection
4. Input filter unit to protect against coarse dirt particles from the supply line

The structure is modular and can vary depending on the installation situation.

The following are available type series:

- LasGAR Basic: The entry-level device offers optimized pressure and flow for all machines with low and medium laser power up to approx. 10 kW.
- LasGAR Plus: The high-performance device offers increased pressure and flow for all machines with high laser power up to 30 kW.

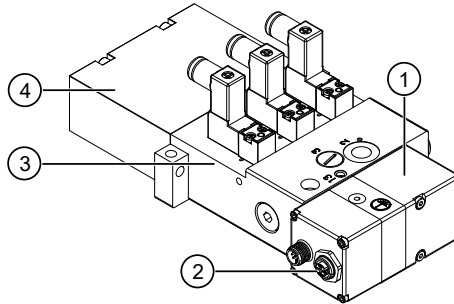


Fig. 1: Example: Gas control valve (for variants, see technical data sheet)

1	Gas control valve basic or plus	3	Upstream valve unit (option)
2	Communication interface	4	Input filter unit (option)

The compact, ready-to-use unit can be installed in laser cutting machines and connected using gas and electric connections.

2.2 Technical data

Technical data, see technical data sheet.

3 Assembly and installation

3.1 Assembly



CAUTION

Personal injury or property damage due to covered ventilation openings!

Covered ventilation openings can cause severe injuries and damage to the valve.

- Make sure that the distance between the ventilation openings and the surrounding parts is at least equal to the opening diameter.

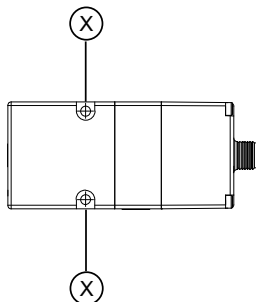


Fig. 2: Fastening single controller without connection plate, through bore d 4.2

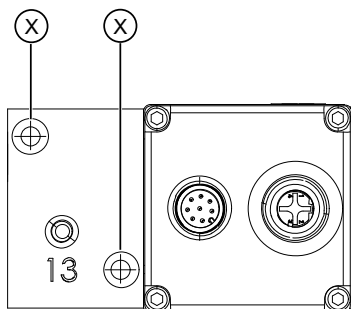


Fig. 3: Fastening single controller with connection plate, through bore d 4.2

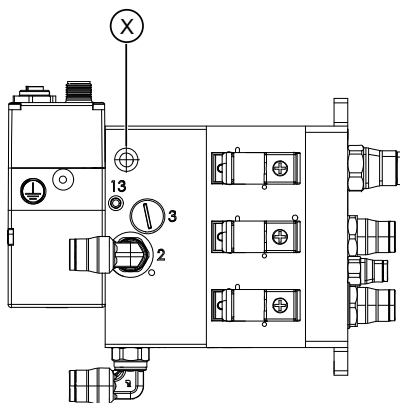


Fig. 4: 2- and 3-gas special model, fastening from above, through bore d 6.5

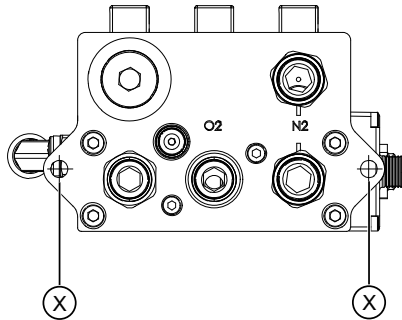


Fig. 5: 2- and 3-gas special model, fastening from front, through bore d 6.5

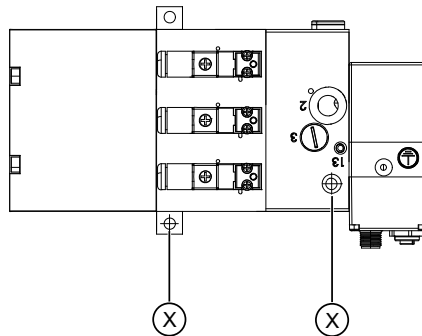


Fig. 6: 2- and 3-gas standard model with filter block, fastening from above, through bore d 6.5

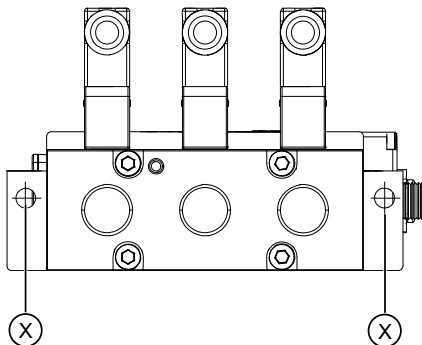


Fig. 7: 2- and 3-gas standard model with filter block, fastening from front, through bore d 6.5

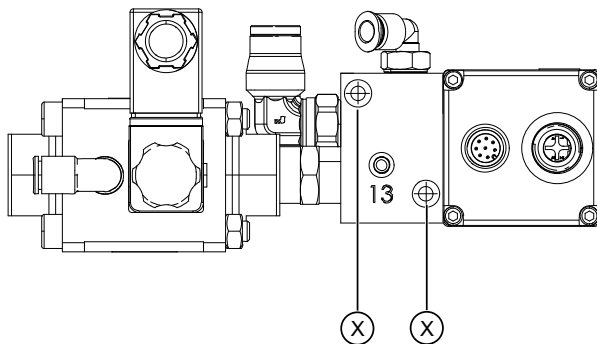


Fig. 8: 1-gas model, fastening from above, through bore d 4.2

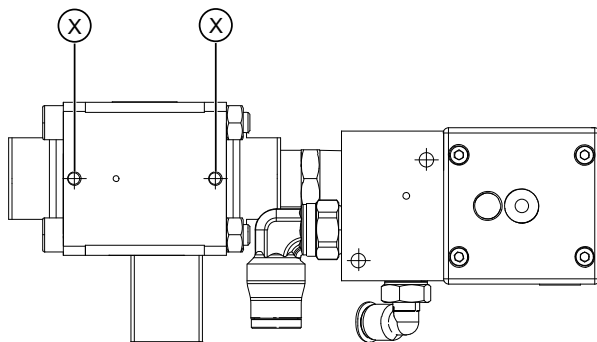


Fig. 9: 1-gas model, fastening switching valve (optional), M4 thread

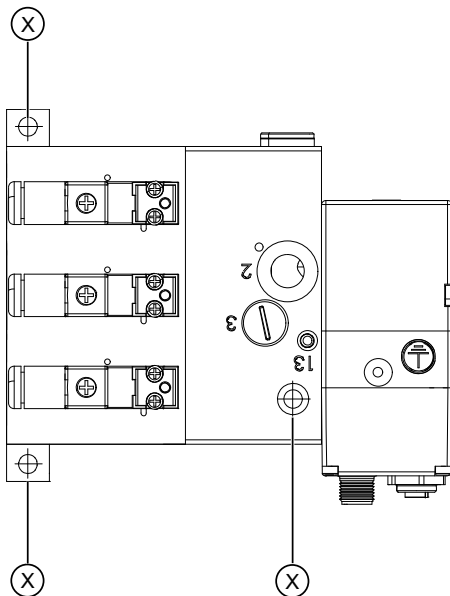


Fig. 10: 2- and 3-gas standard model, fastening from above, through bore d 6.5

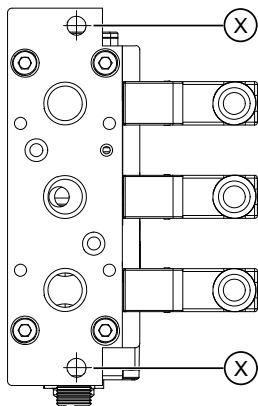


Fig. 11: 2- and 3-gas standard model, fastening from front, through bore d 6.5

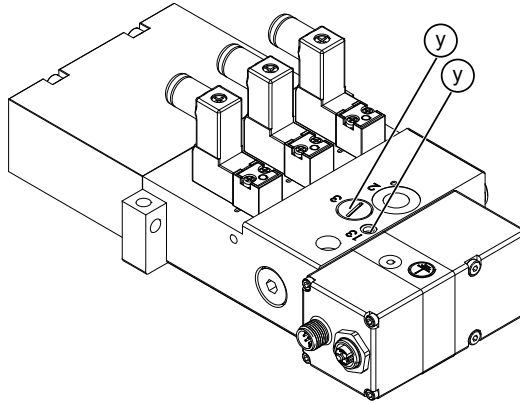


Fig. 12: Ventilation openings

1. Fasten devices via the fastening bores securely and vibration-free.
2. For the single controller with and without connection plate, use M4 screws, tightening torque 2.8 ± 0.5 Nm.
3. Fasten all other models with M6 screws, tightening torque 9.5 ± 0.5 Nm.
4. Use screw locks.
5. Make sure that the ventilation openings are always free and not partially or completely covered. Only then is correct operation guaranteed.

3.2 Gas installation

3.2.1 Gas connections

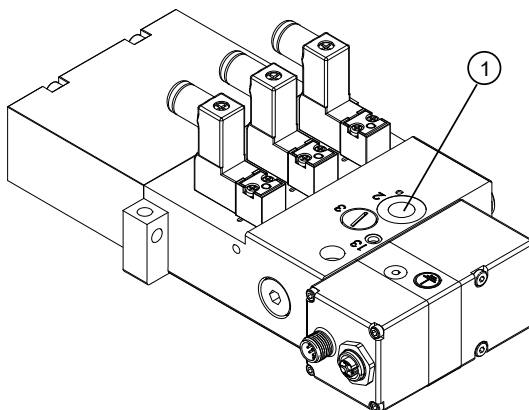


Fig. 13: Gas connection

1	Cutting gas output G $\frac{1}{4}$		
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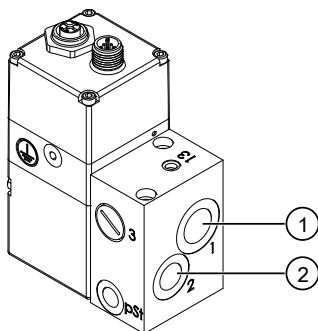


Fig. 14: Gas connection single controller

1	Cutting gas input 1 G $\frac{3}{8}$	2	Cutting gas output 1 G $\frac{1}{4}$
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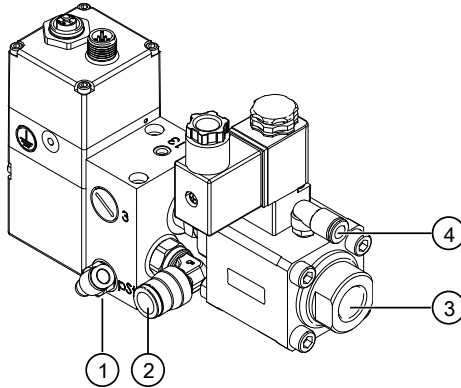


Fig. 15: Gas connection 1-gas variant

1	Proportional valve input G $\frac{1}{8}$ (PST)	3	Cutting gas input G $\frac{3}{8}$
2	Cutting gas output G $\frac{1}{4}$	4	Switching valve input M5

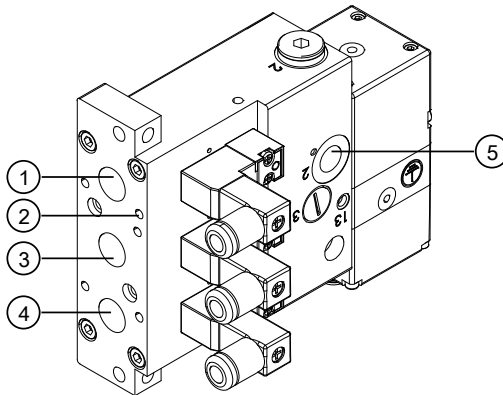


Fig. 16: Gas connection 2- and 3-gas variant with or without filter

1	Cutting gas input G $\frac{3}{8}$	4	Cutting gas input G $\frac{3}{8}$
2	Control air input M5	5	Cutting gas output G $\frac{1}{4}$
3	Cutting gas input G $\frac{3}{8}$		

3.2.2 Connecting gases



⚠ DANGER

Mortal danger due to improperly connected pressure lines!

The pressure lines are under high pressure. Improperly connected lines can loosen under pressure, whip around, and cause life-threatening injuries.

- Only have the device started up by trained personnel.
- Only have faults on the device eliminated by trained personnel.
- Before start-up and troubleshooting, check the connections.
- Only have compressed air supply and cutting gases connected by trained personnel.
- Before installation, depressurize all lines and lock them against switching on again.
- Only operate the device within the prescribed power limits, see technical data sheet.
- Do not use any grease when mounting the lines (e.g. threaded connections).



⚠ DANGER

Mortal danger with use of oxygen as cutting gas!

Using oxygen as a cutting gas can cause life-threatening injuries and damage to the device.

- Heed maximum operating pressure; see technical data sheet.
- When changing filter cartridges in the input filter unit, only use greases that are suitable for oxygen.



⚠ WARNING

Personal injury and property damage due to undefined machine states!

Undefined machine states can cause severe injuries and damage to the valve.

- Wear prescribed protective equipment.



⚠ CAUTION

Personal injuries and property damage due to contaminated compressed air or gas lines!

Contaminated compressed air or gas lines can cause injuries and damage to the valve.

- Only use dry, clean compressed air and gases. Adhere to the media quality; see technical data sheet.
- Before each gas connection, place a filter with max. 10 µm mesh size upstream. Do not use filters based on sintering material.
- Only supply compressed air and gases through clean lines free of particles and dust.
- Flush compressed air and gas lines before connection to the valve or clean them with a brush (cleaning scraper) in order to remove particles and deposits (see Fig. *Cleaning the gas line with cleaning scraper*, page 13 below).
- Only use O-ring seals for compressed air and gas connections (see Fig. *Screwing with O-ring seal*, page 13 below); do not use PTFE sealing tape, pastes, adhesive threaded seals, or hemp.

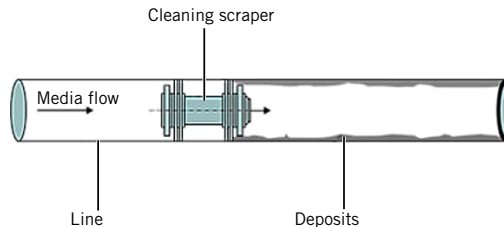


Fig. 17: *Cleaning the gas line with cleaning scraper*



Fig. 18: *Screwing with O-ring seal*

1. Remove protective films from the connections.
2. Connect gas lines according to drawings in chapter Gas connections.
3. Connect control air supply to the control air connection.
4. Connect argon, compressed air, oxygen, or nitrogen supply to the connections Gas 1, Gas 2, or Gas 3.
5. Check connections for tight fit and leaks.

3.3 Electrical installation

For the electrical installation, 2 device variants are distinguished:

- LasGAR Basic analog (0 – 10 V or 4 – 20 mA)
- LasGAR Basic digital (EtherCAT or Profinet)

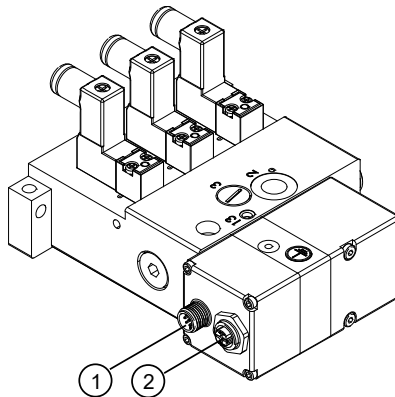


Fig. 19: Electrical connections

1	Analog input/power supply X1	2	Digital input/communication interface
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3.3.1 Analog device variant

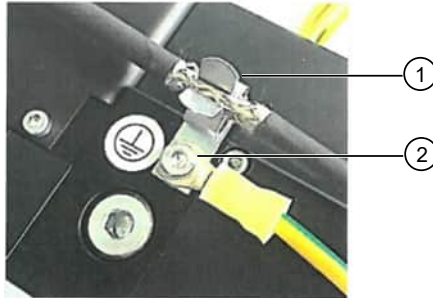


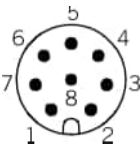
Fig. 20: Connection of cable screen

1	Screen line to connection X1	2	Connection to machine body
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If necessary, the screening clamps can be moved to the opposite housing side.

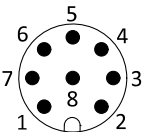
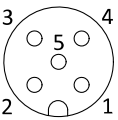
1. Connect the 24 V power supply to X1.
2. Check plug connection for correct fit.
3. Connect the screen of the connection line to the machine body.
4. To improve the immunity to EMC interference, strip the cable to plug connection X1 approx. 150 mm away from the plug to approx. 20 mm and fasten it in the screen clamp (1).
5. To improve the immunity to EMC interference, connect the valve via one of the two grounding connections on the housing to the machine body (2) using a line with as large a cross section as possible.

Plug connection	Connection	Pin assignment
X1	Control signals M12x1 A-coded 8-pin plug 	1: 24 V 2: Target value 3: GND 4: Input pressure P1 5: Output pressure P2 6: Ready/pressure reached 7: UART RxD 8: UART TxD

Tab. 1: Analog connection

3.3.2 Digital device variant

1. Connect 24 V power supply to X1. **NOTICE! Do not connect pin 2!**
2. Connect input cable to X2 EtherCAT or Profinet.
3. Check plug connection for correct fit.
4. Connect the screen of the connection lines X1 and X2 to the machine body.
5. In order to improve the immunity to EMC interference, strip the insulation from the cable on the plug side and fasten the cable screen to the machine body with a grounding clip.

Plug connection	Connection	Pin assignment
X1	Power supply M12x1 A-coded 8-pin plug 	1: 24 V 2: Do not connect! 3: GND 4: Gas output 1 5: Gas output 2 6: Gas output 3 7: UART RxD 8: UART TxD
X2	EtherCAT/Profinet input M12x1 D-coded 4-pin socket 	1: TD+ 2: RD+ 3: TD- 4: RD-

Tab. 2: EtherCAT and Profinet connections

3.3.3 Connection of upstream valves (gas selection)

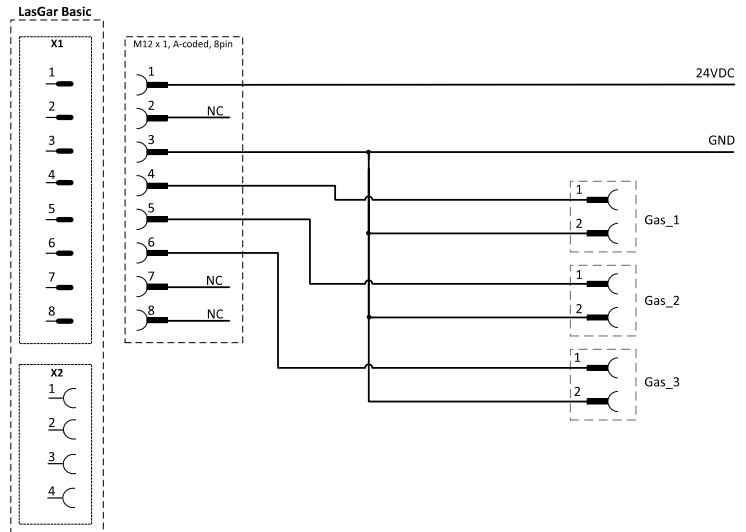


Fig. 21: Electrical connection schema LasGAR Basic digital with activation of upstream valves via Y-cable

4 Start-up

4.1 Start-up



DANGER

Mortal danger due to improperly connected pressure lines!

The pressure lines are under high pressure. Improperly connected lines can loosen under pressure, whip around, and cause life-threatening injuries.

- Only have the device started up by trained personnel.
- Only have faults on the device eliminated by trained personnel.
- Before start-up and troubleshooting, check the connections.
- Only have compressed air supply and cutting gases connected by trained personnel.
- Before installation, depressurize all lines and lock them against switching on again.
- Only operate the device within the prescribed power limits, see technical data sheet.
- Do not use any grease when mounting the lines (e.g. threaded connections).



WARNING

Personal injury and property damage due to undefined machine states!

Undefined machine states can cause severe injuries and damage to the valve.

- Wear prescribed protective equipment.
1. Check whether electrical cables and gas lines are connected correctly as described in the chapters *Gas installation, page 10* and *Electrical installation, page 14*.
 2. Connect compressed air supply, control air, and cutting gases to superior air and gas supply.
 3. Switch on 24 V power supply.

5 Service



⚠ WARNING

Personal injury and property damage due to improper servicing

Malfunctions can result.

- In case of fault, do NOT service the device.
- In case of fault, shut the device down immediately.
- Remove the complete valve and send it to the manufacturer's local agent for servicing.

5.1 Inspection and maintenance plan

Work to be performed	ir	d	w	¼ y	y	oh
<ul style="list-style-type: none"> ■ Check compressed air and gas connections for leaks. 				X		
<ul style="list-style-type: none"> ■ Check electrical cable for cracks, kinks, and damage to the cable insulation. ■ Replace damaged cables. 				X		
<ul style="list-style-type: none"> ■ Check electrical plug connection and union nuts to ensure they are tight. ■ If necessary, tighten union nuts. 				X		
<ul style="list-style-type: none"> ■ Check fixed clamping of the screen on the screening clamp. ■ If necessary, fix or replace clamp. 				X		
<ul style="list-style-type: none"> ■ Check body connection between LGR and machine body. ■ If necessary, tighten screws. 				X		
<ul style="list-style-type: none"> ■ Check screws to ensure they are tight, tighten if necessary. 				X		
<ul style="list-style-type: none"> ■ Check type plates to ensure they are present, visible, legible, and complete; replace if necessary. 					1	
<ul style="list-style-type: none"> ■ Check filter cartridges in input filter unit for soiling and replace if necessary. (Only for LGRPF model) 	ir				1	
Legend: ir= if required, d = daily, w = weekly, ¼ = quarterly, y = annually, oh = operating hours						

5.2 Filter change in the input filter unit



⚠ DANGER

Mortal danger due to unsuitable components!

The use of unsuitable components can cause life-threatening injuries.

- Use only the manufacturer's filter sets since these are suitable for oxygen use.



⚠ DANGER

Mortal danger due to incorrect greases!

The O-rings of the filter elements are pre-greased with oxygen-suitable grease. The use of other greases can cause life-threatening injuries.

- Never re-grease O-rings.



A filter change can only be done in the models LGRPF (LasGAR Plus), LGRBF (LasGAR Basic), and for the LASFIL Compact.

The input filter unit is equipped with one filter per gas input and one filter for the control air connection. Soiled filter elements can be changed out.

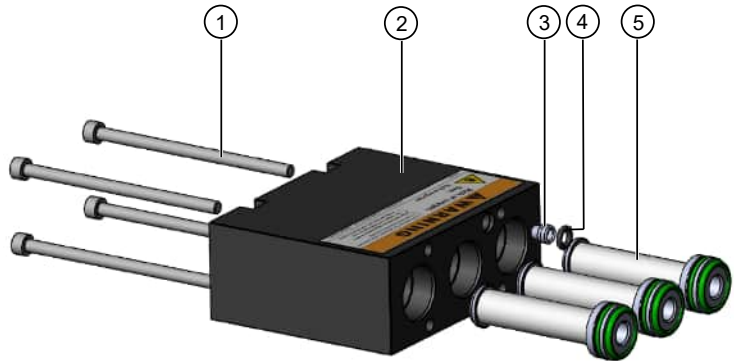


Fig. 22: Filter unit with replacement filters

1	Fastening screws	4	O-ring
2	Filter housing	5	Filter cartridge cutting gases
3	Filter use control air		

Replacement filters can be ordered using the following item numbers:

Filter	Item number	Scope of delivery
Filter set for cutting gas inputs	PS12739A	1 filter cartridge with O-rings mounted and pre-greased with oxygen grease
Filter set for control lift input	PS12740A	1 filter element 1 O-ring

Tab. 3: Replacement filter

5.2.1 Taking device out of service



DANGER

Mortal danger due to residual energies!

After switching off, there are residual electrical and pneumatic energies on the device that have to be reduced slowly and can cause life-threatening injuries if the device is touched.

- Disconnect the device from electrical and pneumatic power supplies before dismantling.
- Wait 10 seconds until residual energies in the system have been reduced completely.



WARNING

Risk of injury due to pressure

- Do not perform any work on the valve when it is pressurized.
1. De-energize and depressurize the device.
 2. Lock and ventilate the gas and compressed air supply.
 3. Wait 10 seconds until residual energies in the device have been reduced completely.
 4. Check whether the gas and pressure supplies are depressurized.

5.2.2 Changing the gas filter

1. Loosen the 4 fastening screws (1) in order to loosen the filter unit from the LasGAR or the connection plate.
2. Pull the filter cartridge (5) out of the filter housing (2) using an M8 screw.
3. In the filter housing (2), check the installation space of the filter cartridge (5) for soiling and clean if necessary.
4. Push the new filter cartridge into the filter housing (2) and press it in by hand up to the stop. In the process, heed the correct position of the two pre-mounted O-rings.
5. Screw the filter unit with 4 fastening screws (1) to the LasGAR or the connection plate, tightening torque $6 \text{ Nm} \pm 0.5 \text{ Nm}$.

5.2.3 Changing the control air filter

1. Loosen the 4 fastening screws (1) in order to loosen the filter unit from the LasGAR or the connection plate.
2. Remove O-ring (4) from the control air connection.
3. Remove the filter insert (3) from the filter housing (2).
4. In the filter housing (2), check the installation space of the filter insert (3) for soiling and clean if necessary.
5. Insert the new filter insert (3) into the filter housing (2).
6. Insert the O-ring (4).
7. Screw the filter unit with 4 fastening screws (1) to the LasGAR or the connection plate, tightening torque $6 \text{ Nm} \pm 0.5 \text{ Nm}$.

6 Repair and maintenance

1. Only have repair work on the device performed by the manufacturer since only the manufacturer has the equipment for optimal adjustment after repair and can therefore guarantee perfect functionality.
2. Do NOT perform maintenance on the inner parts of the device.
3. Send the complete valve to the manufacturer for maintenance and service.