



FG
Fluid Filtration

Translation of the original instructions with installation instructions

Duplex filter

Pi 23240

Pi 23280

Mat. No. of original instructions
72350697



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2 General safety instructions

2.1 Safety instructions for installation and operating personnel

This translation of the original instructions contains important safety information which must be heeded at all times during installation, normal operation and maintenance.

Non-observance can result in the following risks to persons and the environment as well as in damage to the machine or plant:

- ⇒ Failure of critical functions of the machine or plant or of its component parts.
- ⇒ Danger to persons from electrical or mechanical effects as well as from chemical reactions.
- ⇒ Danger to the environment owing to the leakage of hazardous substances.

Before installation / start-up:

- Read this translation of the original instructions carefully.
- Make sure that installation and operating personnel are adequately trained.
- Make sure the contents of the original instructions are fully understood by the responsible persons.
- Define areas of responsibility and competence.
- Prepare a maintenance schedule.

During operation of the plant:

- Keep this translation of the original instructions handy at the place of use.
- Heed the safety instructions. Always operate the machine or plant in accordance with its ratings.

If in doubt:

- Consult the manufacturer.

2.2 Warning structure

Where possible, warnings are structured according to the following system:

Signal word	
Possibly with symbol	Nature and source of the danger ⇒ Potential consequences of non-observance • Action to avert the danger.

2.3 Warning symbols used

 DANGER!
Immediate danger! ⇒ Non-observance will result in serious or fatal injury.
 WARNING!
Potentially dangerous situation! ⇒ Non-observance can result in serious or fatal injury.
 CAUTION!
Potentially dangerous situation! ⇒ Non-observance can result in minor or moderate injuries.
IMPORTANT!
Potentially dangerous situation! ⇒ Non-observance can result in property damage.

2.4 Other symbols used

	Danger: High voltage!
	Danger information about explosion protection
	Information about environmental protection
	Protective clothing must be worn!
	Eye protection must be worn!
	Respirator must be worn!
	Hand symbol: Indicates general information and recommendations
	Bullet: Indicates the order in which actions are to be carried out
	Arrow: Indicates responses to actions

3 Glossary

Initial differential pressure

Differential pressure at the start of the filtration process (when the filter element is "clean").

Differential pressure (delta p)

Pressure difference between the dirty side and the clean side.

Filter element

Cylindrical support structure with star-pleated filter material. The substance to be filtered flows from the outside to the inside. Solids are retained on the outer surface of the filter element.

Filtrate

Fluid that is filtered.

Cooling lubricant

Cooling lubricant according to DIN 51385.

4 General information

4.1 Manufacturer

Filtration Group GmbH
Schleifbachweg 45
D-74613 Öhringen
Phone +49 7941 6466-0
Fax +49 7941 6466-429
fm.de.sales@filtrationgroup.com
www.filtrationgroup.com

4.2 Information about the original instructions

FG Mat. No.:72350697
Date:06.06.17
Version:02

5 Intended use

⚠ DANGER!

Operation contrary to the intended purpose can be dangerous!

- ⇒ The manufacturer is discharged from all liability and all warranty claims are rendered invalid.
- This duplex filter is only allowed to be used in accordance with the operating conditions specified in the contract documentation and in the original instructions.
All forms of use which deviate from or exceed the limits of use described above are considered to be contrary to the intended purpose.

⚠ DANGER!

Operation contrary to the intended purpose can be dangerous!

- ⇒ The manufacturer is discharged from all liability and all warranty claims are rendered invalid.



Prohibited:

- Use for other purposes without prior consultation with the manufacturer.
- Use in hazardous areas unless explicitly mentioned in the contract documentation.
- Use with smouldering, burning or sticky particles.
- Use with highly explosive fluids or pastes.

Standard design for liquid group 2 according to pressure equipment-directive 2014/68/EU article 4 (3) and article 13.

6 Functional description

6.1 Principle of the process

Duplex filter

The parallel unit allows you to use each filter individually. Any maintenance work can thus be carried out without interrupting the filtration process.

Filtration

A star-pleated filter element is mounted on a cylindrical support structure; the filter rating is determined by the element type. The medium flows through the filter element from the outside to the inside. Solid particles are retained. The star pleat results in a larger effective filter surface.

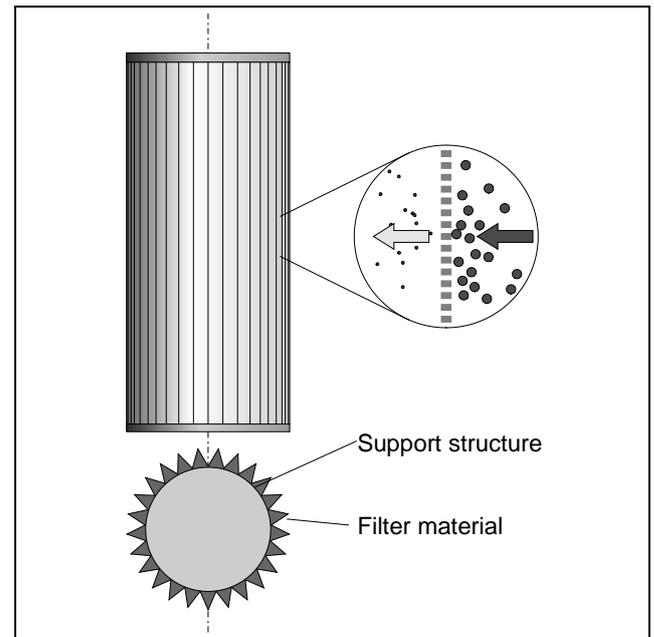


Fig. 1: Separation principle on the filter element

6.2 Main components of the duplex filter

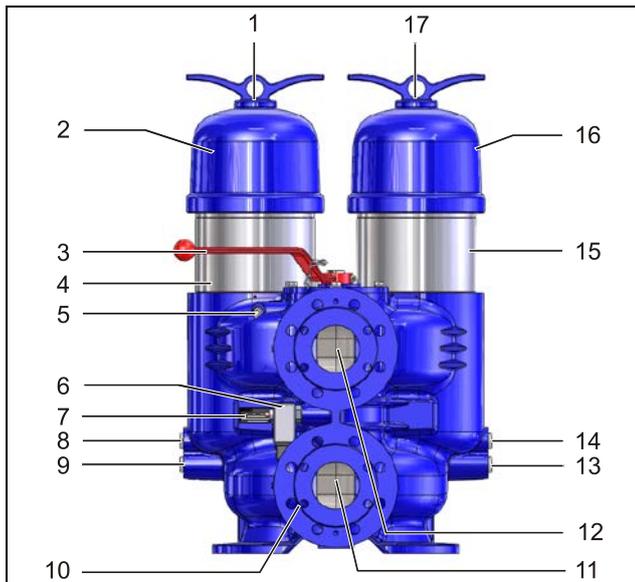


Fig. 2: Diagram of the main components

1	Vent screw (filter 1)
2	Filter cover (filter 1)
3	Switch lever
4	Filter housing (filter 1)
5	Pressure equalising screw
6	Maintenance indicator (optional)
7	Name-plate
8	Drain on dirty side (filter 1)
9	Drain on clean side (filter 1)
10	Filter head
11	Outlet
12	Inlet
13	Drain on clean side (filter 2)
14	Drain on dirty side (filter 2)
15	Filter housing (filter 2)
16	Filter cover (filter 2)
17	Vent screw (filter 2)

6.3 Operating principle of the duplex filter

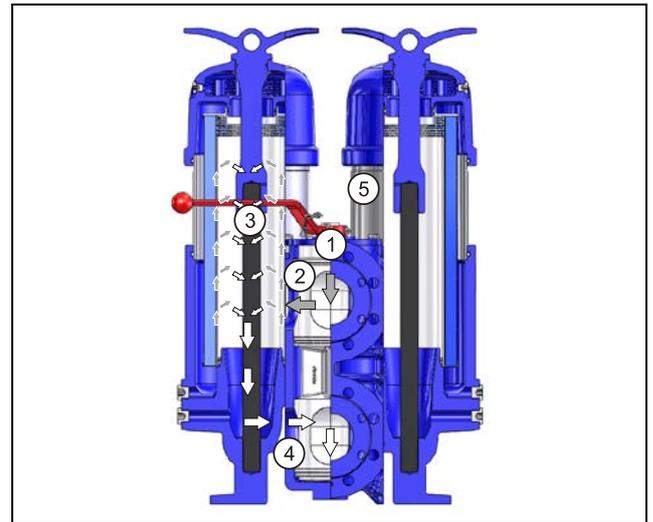


Fig. 3: Operating principle

- 1**
Dirty fluid flows in through the inlet.
- 2**
The medium is guided to the left or right filter side, depending on the position of the switch lever.
- 3**
The fluid flows through the filter element to the clean side.
- 4**
The filtered fluid exits the duplex filter via the outlet.
- 5**
When a maximum differential pressure is reached, the unit changes over to the other filter and the dirty filter element must be replaced. Wire cloth elements can be cleaned (refer to section 13.5). All other elements must be exchanged and disposed of correctly.

The filtration process does not need to be interrupted.

Optional

If a maintenance indicator is used, a signal is output when the maximum differential pressure is reached.

7 Technical data

7.1 Order-specific data



The order-specific data can be taken from the name-plate.

7.2 Technical data of the duplex filter

Nominal pressure:..... 25 bar
 Test pressure:..... 33 bar
 Temperature range: -10°C to 120°C
 Bypass opening pressure :..... Δp 3.5 bar \pm 10%
 Maint. indicator switching pressure : Δp 2.2 bar \pm 10%
 Filter housing / cover material:..... Al
 Filter head material: Cast Al
 Filter cover material: Cast Al
 Seal material:..... NBR / Al

7.3 Technical data of the standard maintenance indicator (PiS 3097)

Switch: NC / NO
with reed contact
 Protection class: IP65
 NO / NO contact load:..... Max. 70 W
 Max. 250 V AC / 200 V DC
 Max.1 A
 Delivery condition: Normally closed

8 Transport and storage

Transport

- Always transport in the original packaging.
- Avoid vibration.

Storage

- Always store in the original packaging.
- Always store in a dry, frost-free room.



9 Installation

⚠ DANGER!	
	<p>Danger if unauthorised work is carried out on the unit!</p> <p>⇒ Risk of injury to persons or damage to property.</p> <ul style="list-style-type: none"> • The unit is only allowed to be installed, accepted and tested by a suitably trained person (99/98/EC).

⚠ WARNING!	
<p>Danger if unauthorised work is carried out on the unit!</p> <p>⇒ Risk of injury to persons or damage to property.</p> <ul style="list-style-type: none"> • All installation work must be carried out by a suitably trained person. 	

9.1 Installation

	It must be possible to remove the inner assembly in order to carry out maintenance work.
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	Use only suitable, chemically resistant seals for the piping.
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- Prepare a suitable location for installing the unit.
- Be sure to allow the required clearances for dismantling and discharging (refer to section 14).
- Unpack the duplex filter.
- Mount the duplex filter on the floor (for dimensions, refer to section 14).
- Remove the protection caps from the connections.
- Connect the pipes to the duplex filter without stress. The inlet for the dirty side of the filter is located underneath the switch lever. The outlet for the clean side is located underneath the inlet for the dirty side.

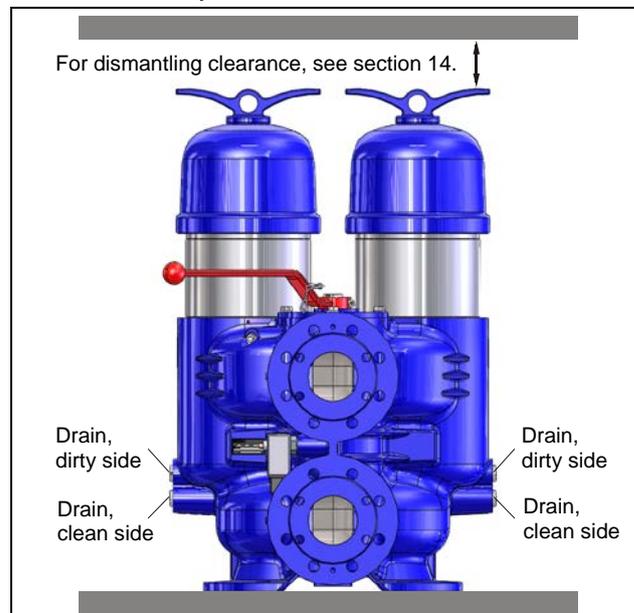


Fig. 4: Mechanical installation

* Other pressure ratings available on request if the filter deviates from the standard.

9.2 Pressure relief

Design measures must be incorporated on the clean side to prevent inadmissible excess pressure on the dirty side as well as reverse flows.

- Install pressure relief devices and / or check valves if necessary.

10 Start-up

DANGER!

This duplex filter is not allowed to be put into operation until the relevant machinery into which it is to be incorporated has been declared in conformity with the applicable EC directives, harmonised standards, European standards or equivalent national standards.

- Loosen the vent screws of the two filters two or three turns.
- Open the pressure equalising screw.
- Shift the switch lever to the middle position.
 - ⇒ Fluid flows through both filters.
- Close the vent screws as soon as medium exits from them (torque: 35 Nm).
- Recover any leaking fluids in a suitable vessel.
- Shift the switch lever to the required position so that it contacts the stop.
- Close the pressure equalising screw.
- Check that all pipe connections are tight.
 - ⇒ The duplex filter is ready for operation.

11 Normal operation



Please always ensure that you have a sufficient quantity of original FG replacement elements in stock. Disposable elements (PS / Mic) cannot be cleaned.

The following parameters must be monitored daily during normal operation:

- Differential pressure (if the optional maintenance indicator is installed)

11.1 Filters without a maintenance indicator

- Replace the filter element after the trial run or after flushing the unit.
- Comply with the instructions provided by the system manufacturer.

11.2 Filters with a maintenance indicator (optional)

During cold starts, the maintenance indicator may give a warning signal (refer to the accessories documentation for the maintenance indicator).

- Do not depress the red button of the maintenance indicator until operating temperature has been reached.
 - ⇒ If it immediately pops out again and / or the electrical signal is not switched off after reaching operating temperature, the filter element must be replaced.

12 Troubleshooting

Fault	Possible cause	Remedy
Warning signal from maintenance indicator	Cold start	Reset the signal after reaching operating temperature
	Filter dirty	Replace the filter

13 Maintenance

CAUTION!

Danger if unauthorised work is carried out on the unit!

- ⇒ Risk of injury.
- All maintenance work must be carried out by a TRAINED ENGINEERING FITTER.

13.1 Maintenance work on the parallel unit

- Shut down the duplex filter.
- Take steps to prevent the unit from being switched on again by unauthorised persons.



- Take any necessary safety precautions (protective clothing, eye protection, etc.).



- Carry out the maintenance work.
- Start up the duplex filter again.
- Observe the duplex filter. Does it operate normally?

13.2 Maintenance work on the filters

1

	The direction of fluid flow is determined by the position of the marking on the switch lever (refer to Figure 5).
---	---

- Open the pressure equalising screw as far as possible.
- Shift the switch lever (2) to the required position:
 - Switch lever in position A: filter 1 (F1) is activated while filter 2 (F2) is deactivated
 - Switch lever in position B: filter 2 (F2) is activated while filter 1 (F1) is deactivated
 - The marking on the switch lever indicates the active filter.

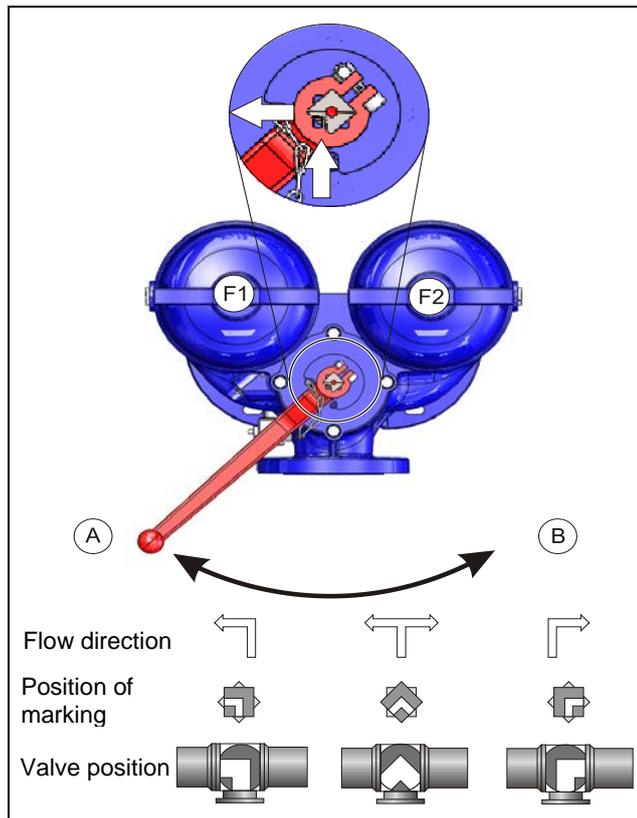


Fig. 5: Switch lever positions

- Make sure the switch lever (2) is set to the required position so that it contacts the stop.
 - ⇒ The filter side on which the element must be replaced is deactivated.
- Close the pressure equalising screw.
- Take steps to prevent the parallel unit from being operated by unauthorised persons.

Do not switch!



Work in progress

Location: _____

This plate may only be removed by: _____

⇒ Wear protective clothing and equipment appropriate to the hazard potential of the medium (e.g. eye protection, respirator, protective clothing, etc.).



2

- Place a trough or a drip pan underneath the unit.
- Open the vent screw (1) two or three turns.

3

- Open the drain plug on the dirty side (3).
- Open the drain plug on the clean side (4).
- ⇒ The deactivated filter is discharged.

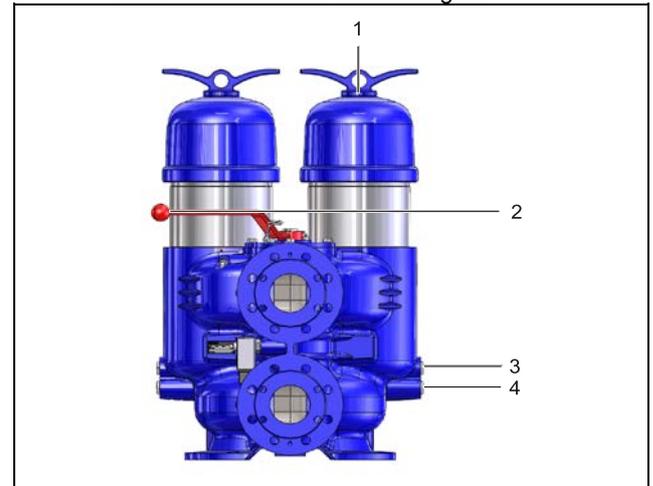


Fig. 6: Discharging the filter

5

- Carry out the maintenance work.
- Check the seals of the drain plug and the vent screw and if necessary replace.

6

- Screw in the drain plug and vent screw (torque: 35 Nm).
- Open the vent screw again two or three turns.

7

- Open the pressure equalising screw as far as possible.
- Tighten the vent screw as soon as fluid exits from the vent hole without any bubbles (torque: 35 Nm).
- Check that the filter is tight.
- Close the pressure equalising screw.

- Observe the duplex filter.
Does it operate normally?

- For the inspection and maintenance schedule, refer to the contract documentation.
It should be fixed individually by the owner.

	The necessary inspection and maintenance work is dependent on the particular application. Please consult the manufacturer of the plant in which the filter is installed if necessary.
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13.3 Replacing the inner assembly

⚠ DANGER!

The filter is pressurised!

- First relieve the pressure!
- Then open the filter!

⚠ DANGER!

Risk of injury!

- The element is only allowed to be replaced on the non-operational filter side.

⚠ CAUTION!

- Keep all impurities away from the clean side of the filter element.
- Be careful not to damage the wire cloth of the elements or the inside with sharp or pointed objects.

1

 The direction of fluid flow is determined by the position of the marking on the switch lever (refer to Figure 7).

- Open the pressure equalising screw.
- Shift the switch lever (2) to the required position:
 - Switch lever in position A: filter 1 (F1) is activated while filter 2 (F2) is deactivated
 - Switch lever in position B: filter 2 (F2) is activated while filter 1 (F1) is deactivated
 - The marking on the switch lever indicates the active filter.

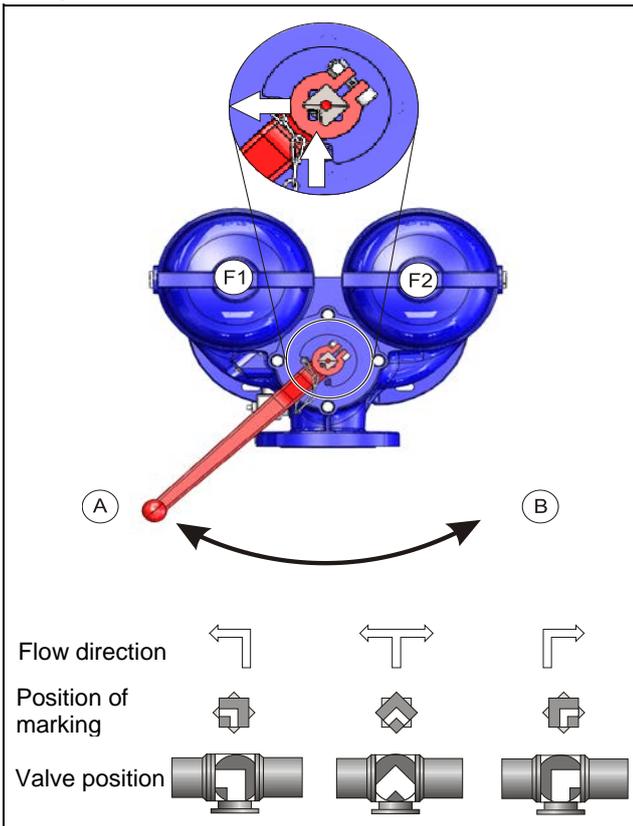


Fig. 7: Switch lever positions

- Make sure the switch lever (2) is set to the required position so that it contacts the stop.
 - ⇒ The filter side on which the element must be replaced is deactivated.
- Close the pressure equalising screw.
 - ⇒ Take steps to prevent the parallel unit from being operated by unauthorised persons.



⇒ Wear protective clothing and equipment appropriate to the hazard potential of the medium (e.g. eye protection, respirator, protective clothing, etc.).



2

- Place a trough or a drip pan underneath the unit.
- Open the vent screw (1) two or three turns.

3

- Open the drain plug on the dirty side (3).
- Open the drain plug on the clean side (4).
 - ⇒ The deactivated filter is discharged.

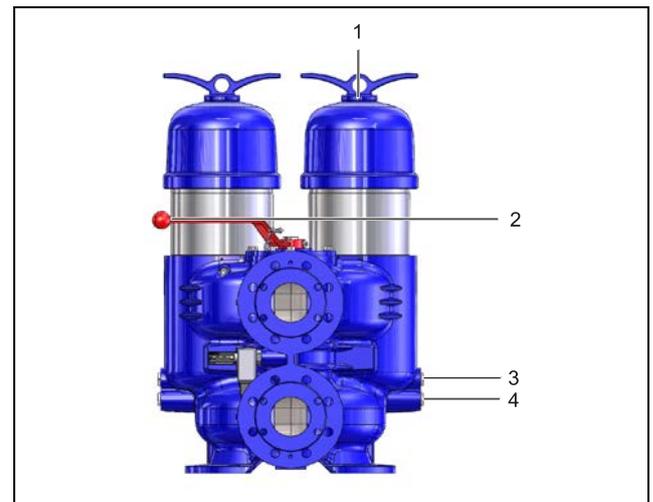


Fig. 8: Discharging the filter

4

- Unscrew the tommy nut (5) anti-clockwise.
- Remove the complete filter cover (6).

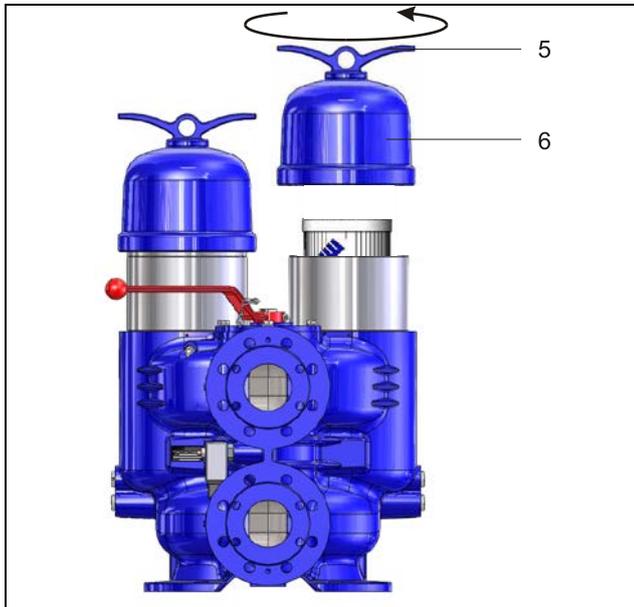


Fig. 9: Removing the filter cover

5

- Remove the filter element (7).

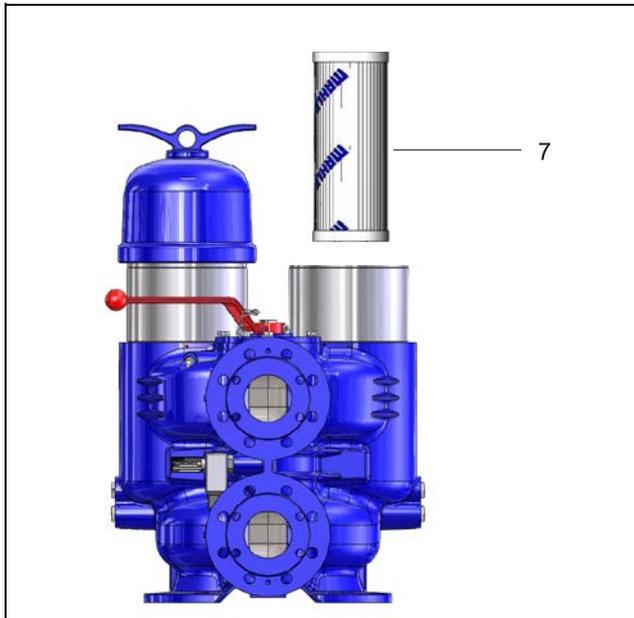


Fig. 10: Removing the filter element

- Check all sealing points and seals.
 - Replace the seals if necessary.
 - Replace dirty disposable filter elements with new FG elements (the order number on the name-plate must match the order number on the element).
 - Clean the dirty wire cloth filter element (refer to section 13.5).
- 6
- Carefully position the filter element in the filter seat.
 - Place the filter cover in position, then screw on the tommy nut clockwise as far as possible.
- 7
- Screw in the drain plugs (torque: 60 Nm).
- 8
- Open the pressure equalising screw as far as possible.
 - Tighten the vent screw as soon as fluid exits from the vent hole without any bubbles (torque: 35 Nm).
 - Check that the filter is tight.
 - Close the pressure equalising screw.

	<ul style="list-style-type: none"> • After starting up one filter side, check that all sealing points are tight.
---	---

Observe the duplex filter.
Does it operate normally?

13.4 Cleaning the filter housing



- Wear protective clothing and equipment appropriate to the hazard potential of the medium (e.g. eye protection, respirator, protective clothing, etc.).
- Open the filter housing and remove the filter element (refer to section 13.3).
- Remove any coarse impurities by mechanical means.
- Wash out the filter housing in a suitable cleaning solution.

13.5 Cleaning the wire cloth filter elements

	<ul style="list-style-type: none"> • After starting up one filter side, check that all sealing points are tight. • Defective seals must be replaced. • The system can never be cleaned one hundred percent. The service life of the filter elements is gradually shortened.
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Ultrasonic cleaning

- Immerse the dirty element upright in an ultrasonic bath for approximately 90 to 120 minutes (turn it over if necessary).
- Rinse the filter element in clean cleaning solution (e.g. naphtha).
- Carefully blow out the filter element with compressed air from the clean side to the outside.

Manual cleaning

Required for filter ratings coarser than 40 µm.

- Remove coarse, external impurities with a brush dipped in cleaning solution (e.g. naphtha).
- Leave the filter element to stand for approximately 20 minutes in clean cleaning solution.
- Then rinse it with cleaning solution from the clean side to the outside.
- Carefully blow out the filter element with compressed air from the clean side to the outside.

14 Assembly drawing

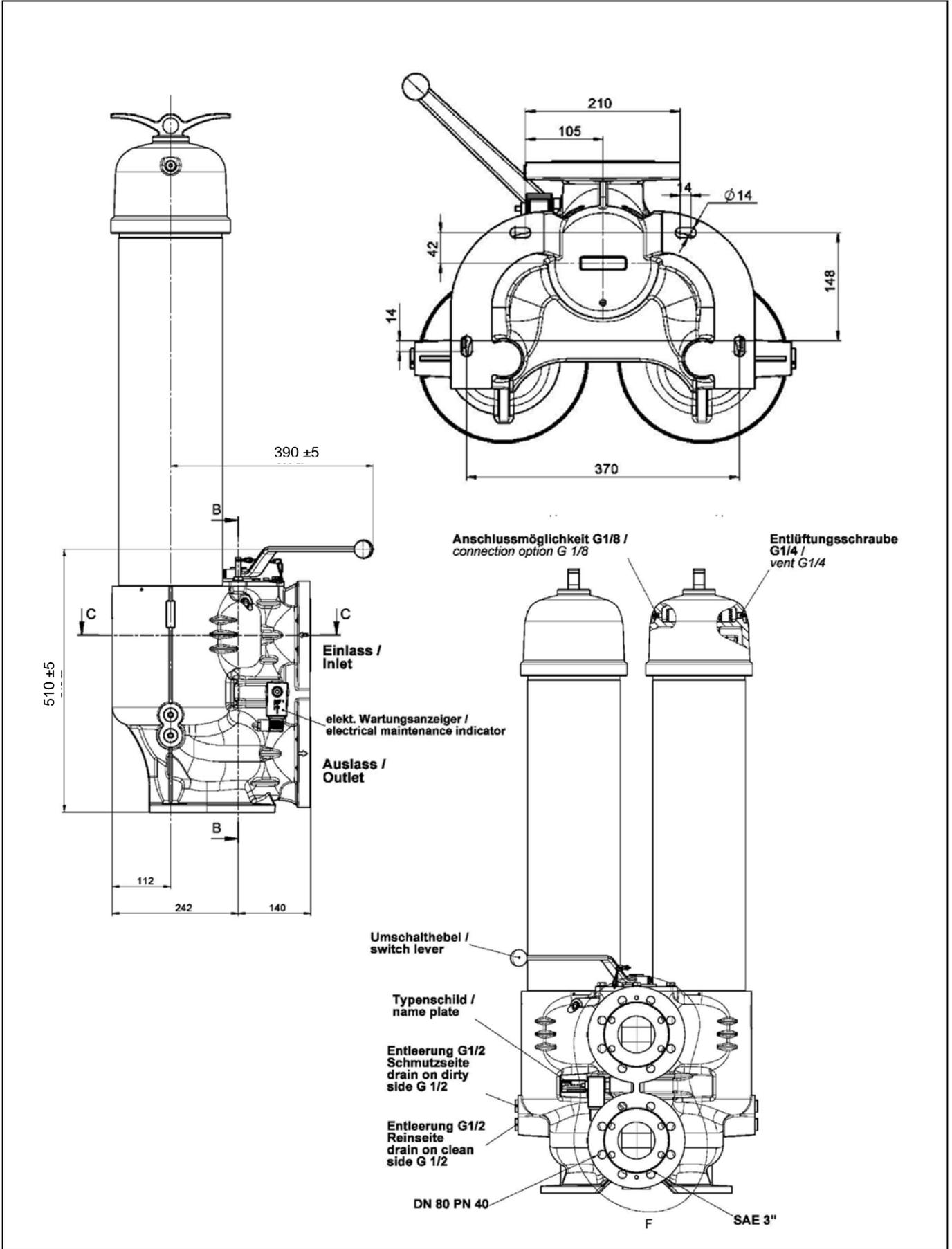


Fig. 11: Assembly drawing 1/2

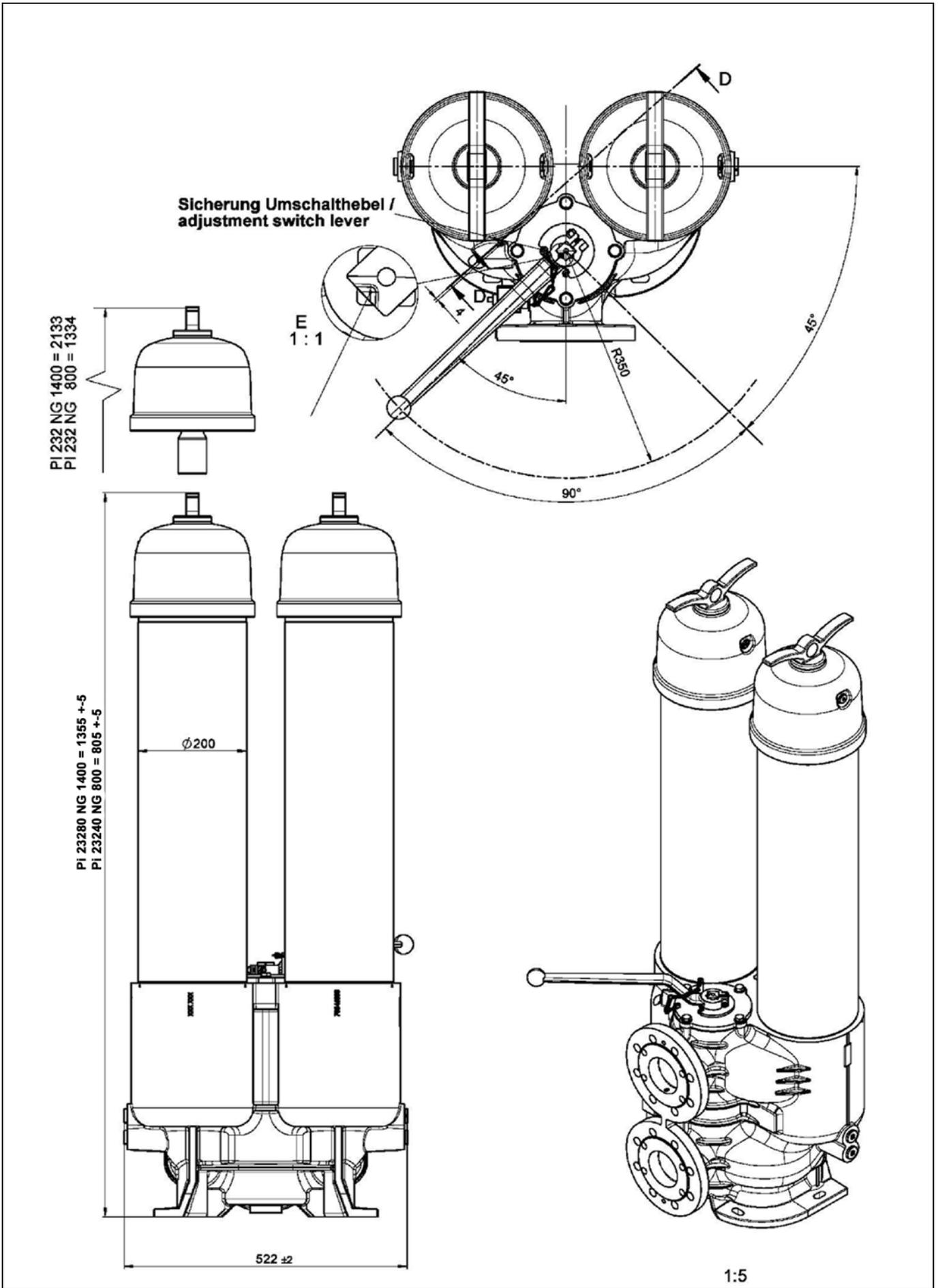


Fig. 12: Assembly drawing 2/2

15 Options table

Options table					
Model	Height [mm]	Connections	Weight w/o elements [kg]	Element dismantling clearance [mm]	Capacity per chamber (w/o element) [litres]
Pi 23240	805	DIN DN 80, PN 40	80	500	≈ 12.6
Pi 23280	1355	SAE 3", 3000 psi	90	1000	≈ 35.2

16 Spare parts drawing

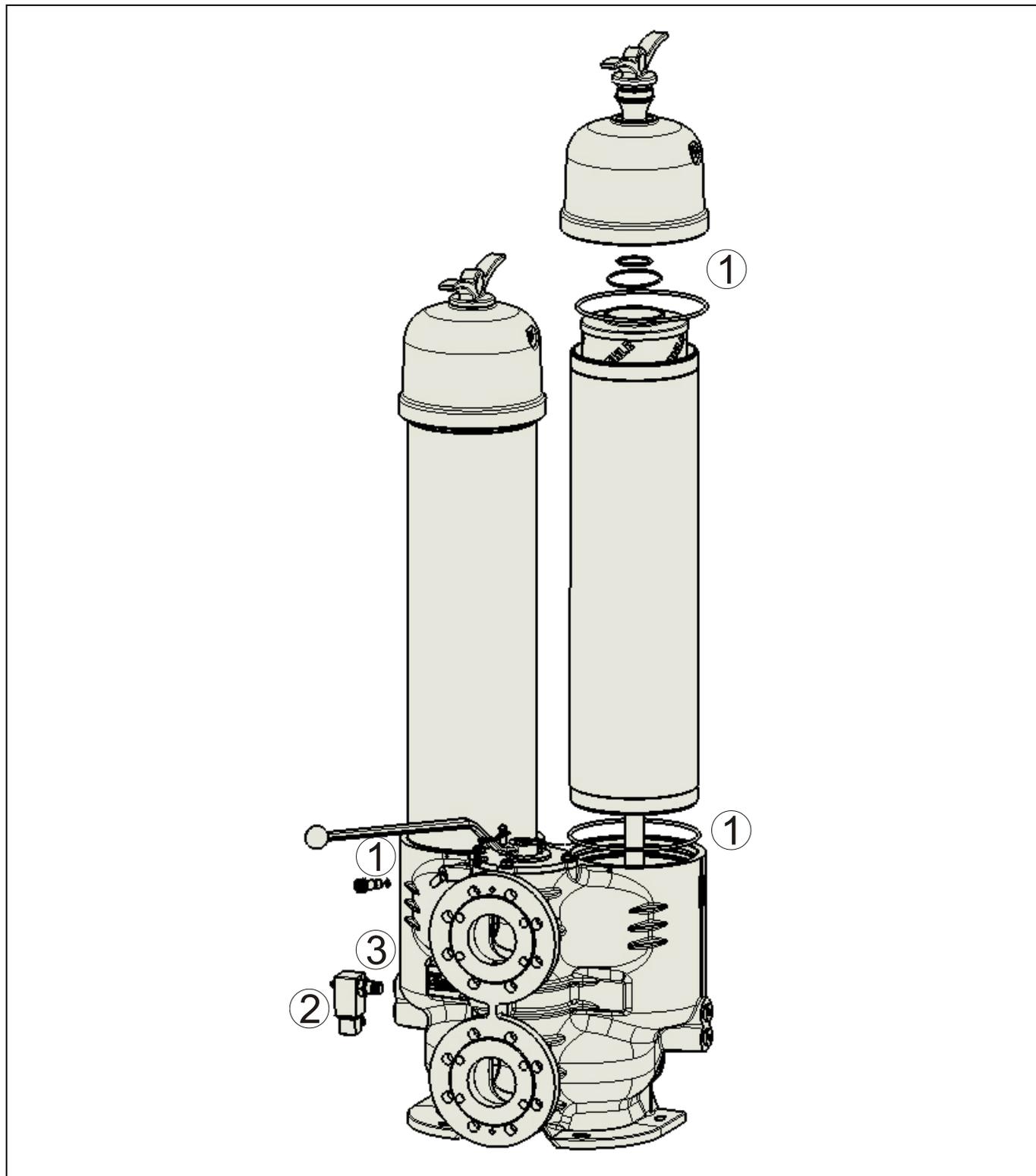


Fig. 13: Spare parts drawing

17 Recommended spare parts and accessories

No.	Benennung	Material no.	Designation
1	Dichtungssatz		Seal kit for housing
	NBR	70566903	NBR
	FPM	70566904	FPM
	EPDM	70566905	EPDM
2	Dichtungssatz für Wartungsanzeiger		Seal kit for maintenance indicator
	NBR	77760309	NBR
	FPM	77760317	FPM
	EPDM	77760325	EPDM
3	Wartungsanzeiger		Maintenance indicator
	Optisch PiS 3098/2.2	77669971	Optical PiS 3098/2.2
	Elektrisch PiS 3097/2.2	77669948	Electrical PiS 3097/2.2
	Nur elektrisches Oberteil	77536550	Only electrical cover

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