

Operating instructions



Automatic fuel oil de-aerator

FloCo-Top-1C

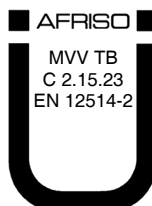
FloCo-Top-2CM



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in conjunction with a
PA hose 4 x 1 mm



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1 About these operating instructions

These operating instructions describe the automatic fuel oil de-aerators with integrated filter insert of the series "FloCo-Top-C" (also referred to as "product" in these operating instructions). These operating instructions are part of the product.

- You may only use the product if you have fully read and understood these operating instructions.
- Verify that these operating instructions are always accessible for any type of work performed on or with the product.
- Pass these operating instructions as well as all other product-related documents on to all owners of the product.
- If you feel that these operating instructions contain errors, inconsistencies, ambiguities or other issues, contact the manufacturer prior to using the product.

These operating instructions are protected by copyright and may only be used as provided for by the corresponding copyright legislation. We reserve the right to modifications.

The manufacturer shall not be liable in any form whatsoever for direct or consequential damage resulting from failure to observe these operating instructions or from failure to comply with directives, regulations and standards and any other statutory requirements applicable at the installation site of the product.

2 Information on safety

2.1 Safety messages and hazard categories

These operating instructions contain safety messages to alert you to potential hazards and risks. In addition to the instructions provided in these operating instructions, you must comply with all directives, standards and safety regulations applicable at the installation site of the product. Verify that you are familiar with all directives, standards and safety regulations and ensure compliance with them prior to using the product.

Safety messages in these operating instructions are highlighted with warning symbols and warning words. Depending on the severity of a hazard, the safety messages are classified according to different hazard categories.

NOTICE

NOTICE indicates a hazardous situation, which, if not avoided, can result in equipment damage.

2.2 Intended use

This product may only be used in single-line systems with return pipe connection for continuous de-aeration of the following fuels in fuel oil consuming systems:

- Fuel oil EL as per DIN 51603-1 and as per DIN SPEC 51603-6 with 0 - 30 % fatty acid methyl ester (FAME) as per EN 14214
- Diesel fuel as per EN 590 with up to 7 % fatty acid methyl ester (FAME) as per EN 14214
- Biofuel and biodiesel with up to 30 % fatty acid methyl ester (FAME) as per EN 14214
- Paraffinic fuels (HVO/GTL as per DIN/TS 51603-8) proportionally with 0 - 100 %

Any use other than the application explicitly permitted in these operating instructions is not permitted and causes hazards.

Verify that the product is suitable for the application planned by you prior to using the product. In doing so, take into account at least the following:

- All directives, standards and safety regulations applicable at the installation site of the product
- All conditions and data specified for the product
- The conditions of the planned application

In addition, perform a risk assessment in view of the planned application, according to an approved risk assessment method, and implement the appropriate safety measures, based on the results of the risk assessment. Take into account the consequences of installing or integrating the product into a system or a plant.

When using the product, perform all work and all other activities in conjunction with the product in compliance with the conditions specified in the operating instructions and on the nameplate, as well as with all directives, standards and safety regulations applicable at the installation site of the product.

2.3 Predictable incorrect application

The product must never be used in the following cases and for the following purposes:

- Use with undiluted additives, alcohols and acids
- Pressure operation with fuel pumping system
- Outdoor use

2.4 Qualification of personnel

This product may only be mounted, commissioned, maintained and decommissioned by a qualified, specialised company which has all required certifications and which meets the following requirements:

- Compliance with all directives, standards and safety regulations concerning handling of water-polluting substances as applicable at the installation site of the product.
- In Germany: Certification as per § 62 "Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen" (AwSV) (Ordinance on Installations for Handling Water-Polluting Substances).

Only appropriately trained persons who are familiar with and understand the contents of these operating instructions and all other pertinent product documentation are authorized to work on and with this product.

These persons must have sufficient technical training, knowledge and experience and be able to foresee and detect potential hazards that may be caused by using the product.

All persons working on and with the product must be fully familiar with all directives, standards and safety regulations that must be observed for performing such work.

2.5 Personal protective equipment

Always wear the required personal protective equipment. When performing work on and with the product, take into account that hazards may be present at the installation site which do not directly result from the product itself.

2.6 Modifications to the product

Only perform work on and with the product which is explicitly described in these operating instructions. Do not make any modifications to the product which are not described in these operating instructions.

3 Transport and storage

The product may be damaged as a result of improper transport or storage.

NOTICE

INCORRECT HANDLING

- Verify compliance with the specified ambient conditions during transport or storage of the product.
- Use the original packaging when transporting the product.
- Store the product in a clean and dry environment.
- Verify that the product is protected against shocks and impact during transport and storage.

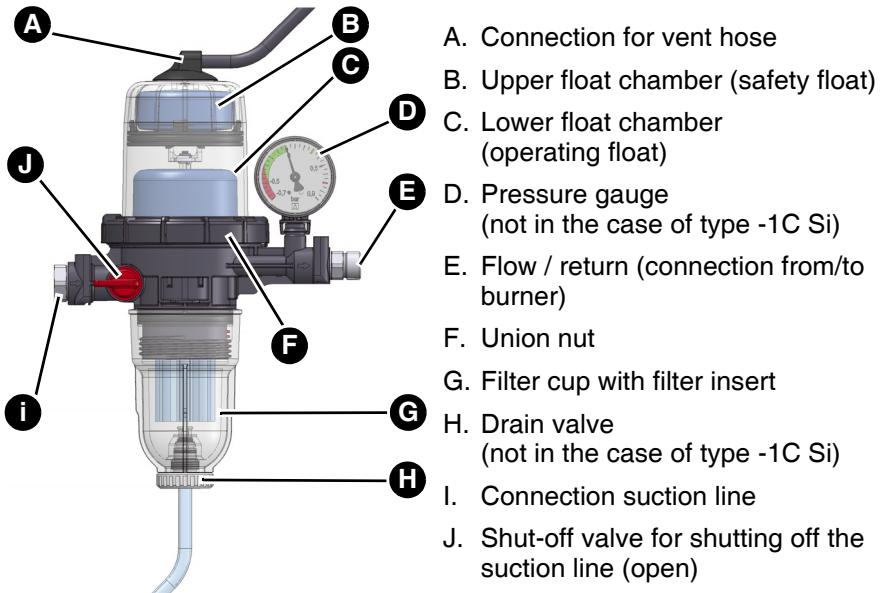
Failure to follow these instructions can result in equipment damage.

4 Product description

The product (type -2C/-2CM only) has a filter cup with an integrated drain valve so that the fuel can be drained. The drain valve allows for emergency operation (for example, from a can).

You can also connect a tester for the tightness test of the entire system.

4.1 Overview



4.2 Function

The burner pump sucks the liquid fuel from the tank via the filter insert. The fuel not burnt by the burner nozzle is returned to the vent via the return line and then resupplied to the burner via the flow line. Only the amount of fuel actually burnt is taken from the tank and added to the de-aerated fuel.

The upper float chamber keeps foam from escaping through the vent opening.

The pressure gauge indicates the operating pressure. An increased vacuum in the red area indicates a dirty filter insert. To check the suction capacity of the oil pump, the shut-off valve at both ends can be closed for a few seconds during operation. The pressure gauge indicates the suction pressure. The integrated pressure relief device in the check valve opens at 1.5 bar.

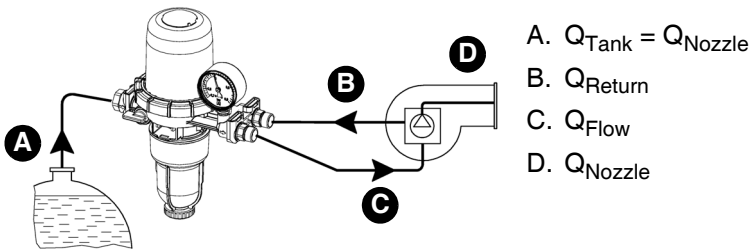
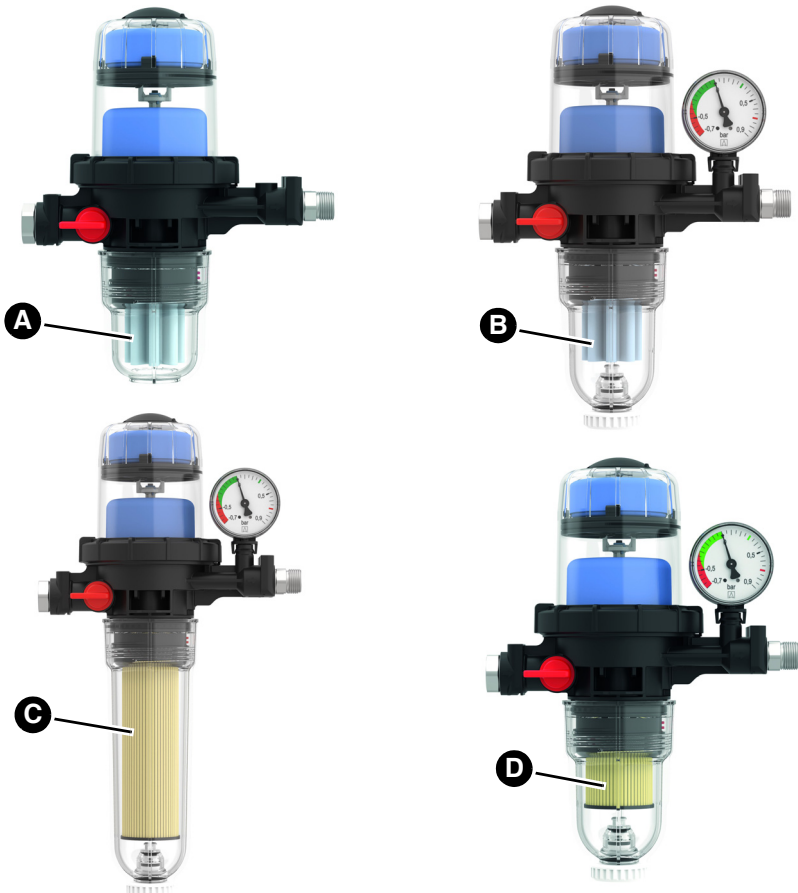


Fig. 1: Function principle of FloCo-Top

4.3 Versions



- A. Type -1C Si with sintered plastic filter insert (50 - 70 µm, 116 cm² filter surface)
- B. Type -2CM Si with sintered plastic filter insert (50 - 70 µm, 116 cm² filter surface)
- C. Type -2CM Optimum MC-18 with Opticlean ultra-fine filter insert MC-18 (5 µm, 1850 cm² filter surface), long filter cup
- D. Type -2CM MS-5 with Opticlean fine filter insert MS-5 (20 µm, filter surface > 500 cm²)

4.4 Approvals, conformities, certifications

The product is TÜV-tested (report number 968/FSP 2170.01/21).

4.5 Technical data

Parameter	Value
General specifications	
Dimensions (W x H x D)	
- Type: -1C	184 x 223 x 109 mm
- Type: -2CM	184 x 253 x 109 mm
- Type: -2CM Optimum	184 x 340 x 109 mm
Connection burner	2 x G ³ / ₈ male with 60° cone for burner hose
Connection tank	G ³ / ₈ female at shut-off valve
Nozzle throughput	Max. 100 l/h
Return flow	Max. 120 l/h
Separating capacity air/gas, depending on air content of fuel	Max. 4 l/h (de-aeration unit only) Max. 6 l/h (as per EN 12514-3)
Mounting position	Float housing vertical to the top
Operating overpressure	Max. 0.7 bar (corresponds to a static liquid column of approximately 8 m)
Response pressure pressure relief device	1.5 ±0.5 bar
Suction pressure	Max. -0.5 bar
Test pressure	6 bar
Filter insert	Sintered plastic or paper filter "Opticlean"
Housing material	plastic, glass-fibre reinforced
Ambient conditions	
Ambient temperature operation	0 ... 60 °C
Temperature of the medium	0 ... 60 °C

5 Mounting

Install the product upstream of the burner.

The product may be installed above or below the maximum tank level.

The suction line can be implemented with a steady gradient to the tank if the conditions on site permit this.

5.1 Determining the cross section of the suction line

When dual-pipe systems are converted to single-pipe operation, the flow rate of the fuel in the suction line is reduced.

⇒ Verify that the cross section of the suction line complies with DIN 4755-2 (flow rate 0.2 to 0.5 m/s) in order to help avoid air cushions in higher pipe sections and pipes with gradients (shutdowns due to error conditions).

Consider the specifications and instructions of the system manufacturer.

5.2 Determining the suction line length

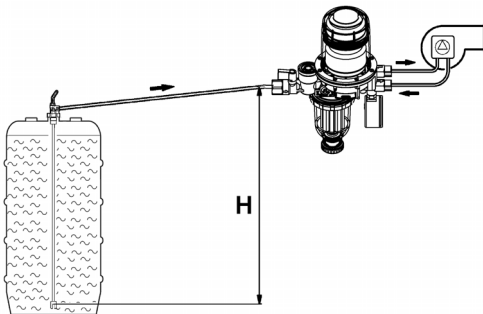
For the determination of the maximum possible suction line length, the maximum suction vacuum must not exceed -0.4 bar. An additional pressure loss of 0.05 bar is considered for the resulting filter pollution.

5.2.1 Maximum suction line length in the case of rising line

If the suction line is designed as a self-securing suction line, remove all check valves upstream of the product.

Attention

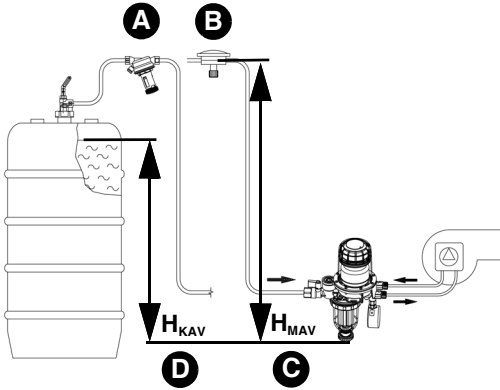
Install an external check valve upstream of the product in the case of version FloCo-Top-2CM MC-7 VI.



Nozzle throughput	Inner pipe Ø	Suction height H [m]						
		1.5	2.0	2.5	3.0	3.5	4.0	
< 2.5 kg/h (3 l/h)	Ø 4 mm	32	26	19	13	7	1	Maximum possible suction line length [m]
	Ø 6 mm	> 100	> 100	> 100	68	36	4	
	Ø 8 mm	> 100	> 100	> 100	> 100	> 100	14	
5 kg/h (6 l/h)	Ø 4 mm	10	8	6	4	2	1	
	Ø 6 mm	81	65	49	34	18	2	
	Ø 8 mm	> 100	> 100	> 100	> 100	57	7	
7.5 kg/h (9 l/h)	Ø 4 mm	10	8	6	4	2	0	
	Ø 6 mm	54	43	33	22	12	1	
	Ø 8 mm	> 100	> 100	> 100	71	38	4	
10 kg/h (12 l/h)	Ø 4 mm	8	6	4	3	1	0	
	Ø 6 mm	40	32	25	17	9	1	
	Ø 8 mm	> 100	> 100	78	53	28	3	
	Ø 10 mm	> 100	> 100	> 100	> 100	69	8	
15 kg/h (18 l/h)	Ø 6 mm	27	21	16	11	6	0	
	Ø 8 mm	86	69	52	35	19	2	
	Ø 10 mm	> 100	> 100	> 100	87	46	5	
20 kg/h (24 l/h)	Ø 6 mm	20	16	12	8	4	0	
	Ø 8 mm	64	52	39	26	14	1	
	Ø 10 mm	> 100	> 100	96	65	35	4	

5.2.2 Maximum suction line length in the case of a lower lying line

1. Install an anti-siphon valve to keep liquid fuel from escaping (siphoning) in the case of an untight suction line and a higher level in the tank.



- A. Piston type anti-siphon valve "KAV"
- B. Diaphragm type anti-siphon valve "MAV"
- C. H_{KAV} = Safe height "KAV"
- D. H_{MAV} = Safe height "MAV"

Nozzle throughput	Inner pipe Ø	Suction height H [m]						
		1.5	2.0	2.5	3.0	3.5	4.0	
< 2.5 kg/h (3 l/h)	Ø 4 mm	32	26	19	13	7	1	Maximum possible suction line length [m]
5 kg/h (6 l/h)	Ø 4 mm	10	8	6	4	2	1	
7.5 kg/h (9 l/h)	Ø 4 mm	10	8	6	4	2	0	
	Ø 6 mm	54	43	33	22	12	1	
10 kg/h (12 l/h)	Ø 4 mm	8	6	4	3	1	0	
	Ø 6 mm	40	32	25	17	9	1	
15 kg/h (18 l/h)	Ø 6 mm	27	21	16	11	6	0	
20 kg/h (24 l/h)	Ø 6 mm	20	16	12	8	4	0	
	Ø 8 mm	64	52	39	26	14	1	

5.3 Mounting the product

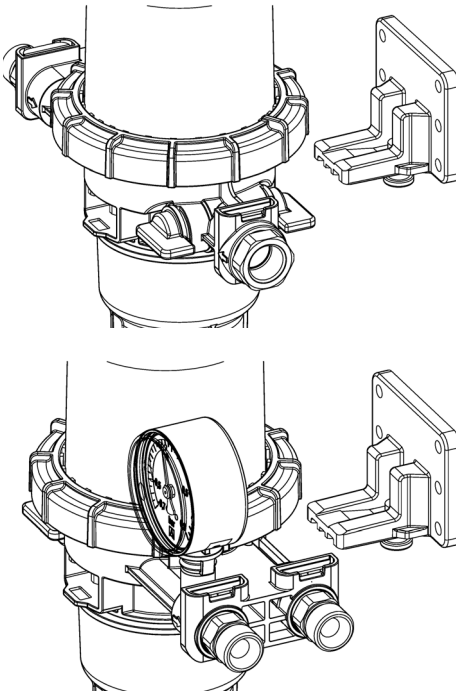
NOTICE

INOPERABLE PRODUCT

- Verify that you do not interchange the burner hoses for the flow and return lines.

Failure to follow these instructions can result in equipment damage.

- ⇒ Verify compliance with the specified ambient conditions.
- ⇒ Verify that the float housing points vertically to the top.



1. Mount the product using the enclosed bracket and four self-tapping screws.
2. Use the bracket as a template when screwing in the self-tapping screws.

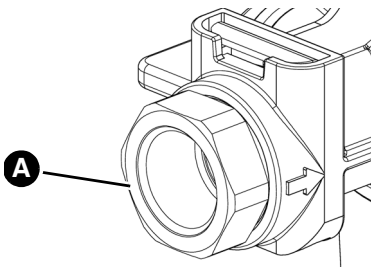
5.4 Mounting the suction line

NOTICE

LEAKING PRODUCT

- Verify that you use a screwed pipe connection as per DIN 2353 with cylindrical thread (G thread) and seal the screwed pipe connection with a flat gasket or with suitable glue. Do not use Teflon tape or hemp.

Failure to follow these instructions can result in equipment damage.



A. Connection socket $G^{3/8}$ female for suction line

FloCo-Top-1C

1. Mount the suction line into the female thread $G^{3/8}$ of the housing with a cylindrical screwed pipe connection $G^{3/8}$ as per DIN 2353. The tightening torque is 40 ± 10 Nm.
2. Use a stiffener in the case of soft or semi-soft copper pipes.
3. Lock with an open ended spanner (spanner size 22) and tighten the screwed connection at the connection piece.
4. Mount the burner hoses. Before mounting, make sure the sealing surfaces are clean and not damaged. The tightening torque is 20 ± 5 Nm.

FloCo-Top-2C

1. Mount the suction line into the female thread $G^{3/8}$ of the housing with a cylindrical screwed pipe connection $G^{3/8}$ as per DIN 2353. The tightening torque is 40 ± 10 Nm.
If you seal the suction line with the enclosed screwed pipe connection, the tightening torque for $\varnothing 6$ mm is 18 ± 3 Nm, the tightening torque for $\varnothing 8$ mm is 15 ± 5 Nm, and the tightening torque for $\varnothing 10$ mm is 20 ± 5 Nm.
2. Use a stiffener in the case of soft or semi-soft copper pipes.
3. Lock with an open ended spanner (spanner size 22) and tighten the screwed connection at the connection piece.
4. Mount the burner hoses. Before mounting, make sure the sealing surfaces are clean and not damaged. The tightening torque is 20 ± 5 Nm.

NOTICE

INOPERABLE PRODUCT

- Verify that you do not interchange the burner hoses for the flow and return lines.

Failure to follow these instructions can result in equipment damage.

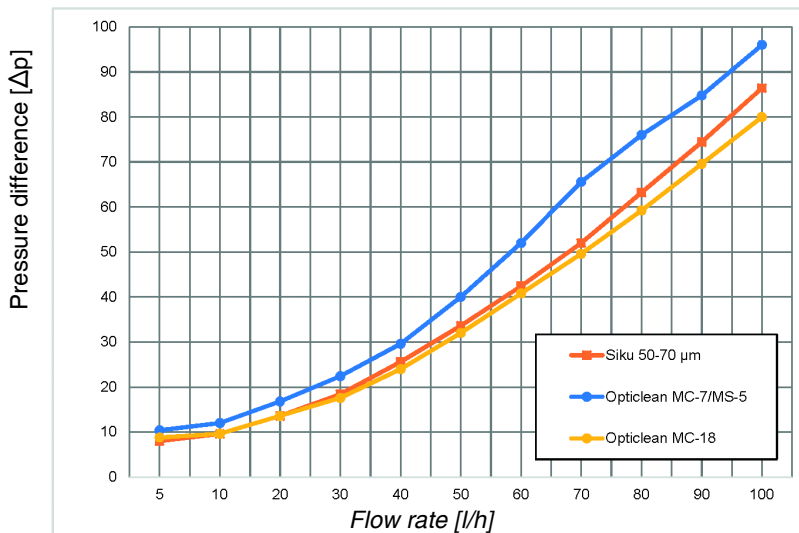
5.5 Pressure test

⇒ Verify that the product is not included in the pressure test.

5.6 Pressure loss

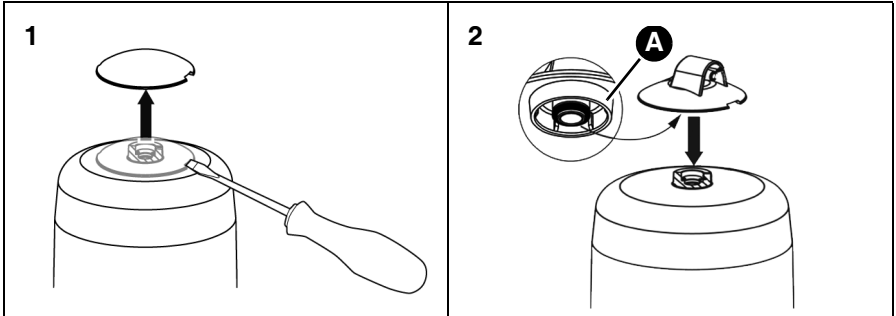
The product allows you to use a great variety of filter inserts. See the diagram for the resulting pressure losses.

5.6.1 Pressure loss with use of clean filter insert

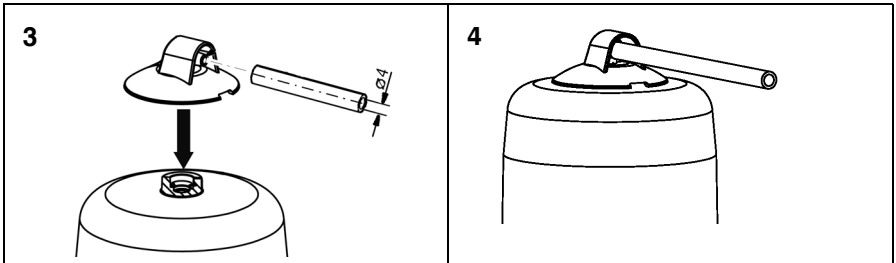


5.7 Connecting the vent hose

To avoid odours from the separated air, you can connect a vent hose.



A. Hose connection with O ring



1. Route the vent hose back to the tank next to the suction line.
2. Fixate the vent hose with cable ties.
3. Mount the other end of the vent hose to the vent line or the return connection of the withdrawal fitting at the tank.

The suction line can be connected to the withdrawal fitting with the enclosed hose connector.

6 Operation

6.1 Liquid level in the float housing

The liquid level depends on the operating conditions of the system and amounts to approximately 20-50 mm in suction mode. If the liquid level is higher, the float housing may be completely filled with fuel. When the operating conditions change, for example, decreasing liquid level in the tank, the air cushion is formed again in the float housing.

6.2 Accumulations of air in the filter cup

Depending on the filter insert and the suction vacuum of the system, an air cushion may form in the filter cup. If the filter insert is new, there may be only a little amount of fuel in the filter cup. This does not affect the operation of the system (as long as the inside of the filter insert is wetted with fuel).

With increasing pollution of the filter insert, the suction pressure increases and the filter cup gradually fills up completely with fuel.

6.3 Use in flood hazard areas

NOTICE

INOPERABLE PRODUCT

- Verify that the product (without vent hose) is replaced after a flood event.

Failure to follow these instructions can result in equipment damage.

With a connected vent hose, the product is suitable for use in flood hazard areas; it is watertight up to 10 mH₂O (1 bar pressure).

The product with vent hose continues to be operative after a flood.

- ⇒ Verify that the end of the vent hose is located at the return connection of the tank or ends above the maximum possible water level.

7 Maintenance

7.1 Maintenance intervals

NOTICE

UNSUITABLE CLEANING AGENTS

- Verify that you use only cleaning agents which do not contain solvents for cleaning the plastic parts.

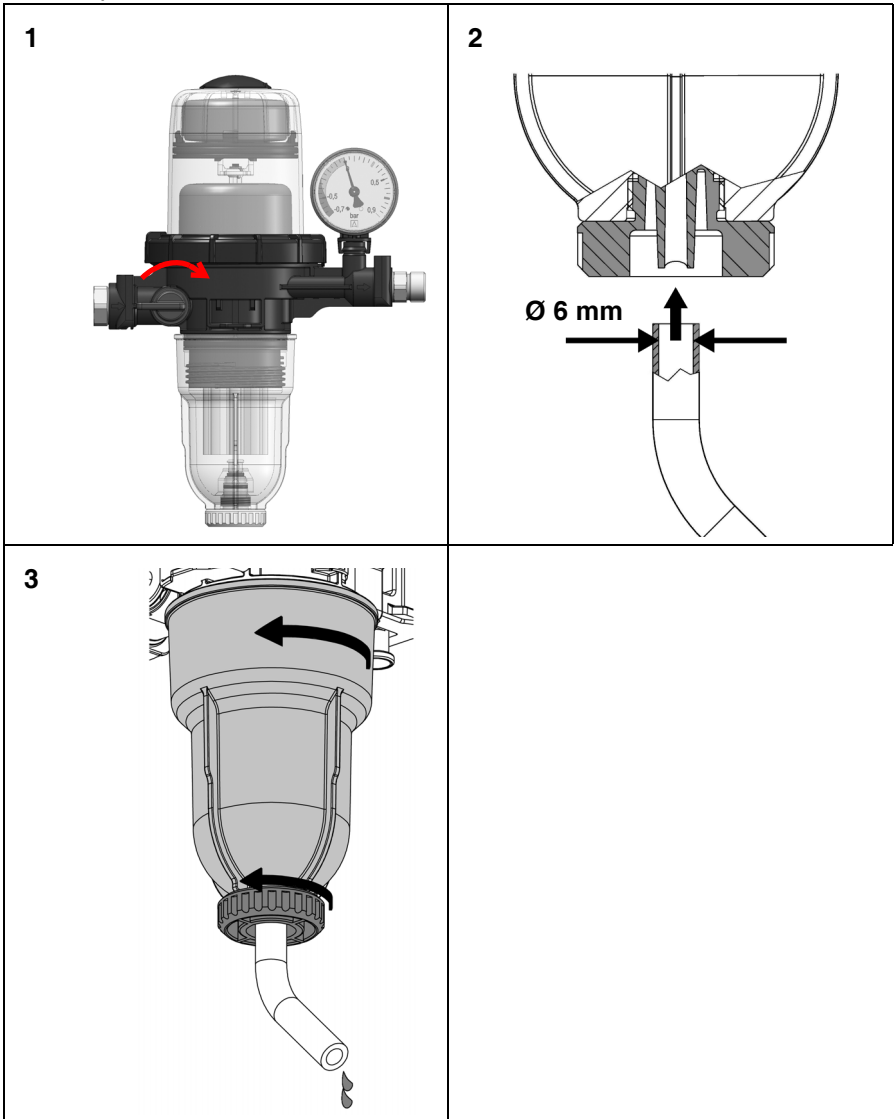
Failure to follow these instructions can result in equipment damage.

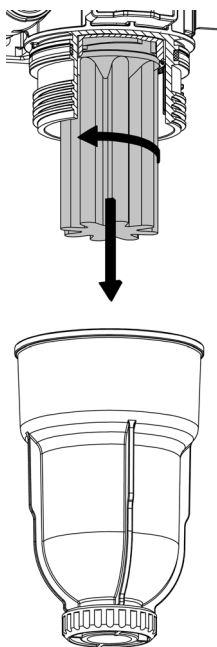
When	Activity
If required	Clean the plastic parts with soap suds
Annually or if required	Replace the filter insert, see "Replacing the filter insert"
No later than after 20 years	Replace the product
After a flood	Replace the product, if no vent hose is connected

7.2 Maintenance activities

7.2.1 Replacing the filter insert

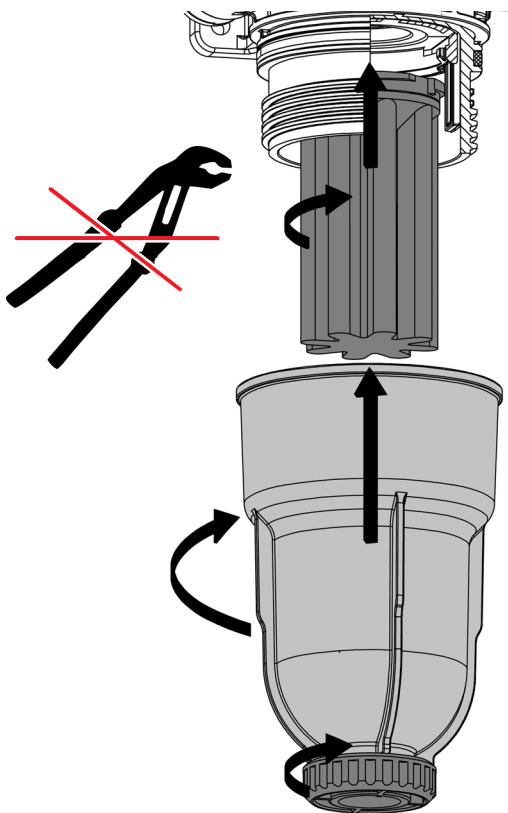
1. Place a suitable container with a capacity of at least 0.5 l below the filter cup.





2. Drain the filter cup before replacing the filter insert.

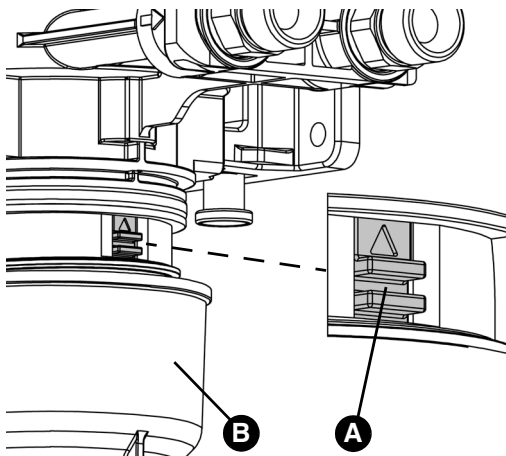
7.2.2 Mounting the filter insert



7.2.3 Replacing the burner hoses

⇒ Verify that the return line and the float chamber are completely drained prior to replacing the burner hoses.

1. Drain the filter cup (see chapter "Replacing the filter insert").



2. Press up the red slider (A) using a suitable tool (for example, screwdriver) and hold it in this position.
 - The liquid fuel is drained from the float chamber into the filter cup (B) and via the drain valve (FloCo-Top-2C only).

If you release the red slider (A), it automatically returns to its base position and the liquid fuel no longer escapes into the filter cup.

3. Replace the burner hoses.

4. Close the drain valve of the filter cup.

5. Open the shut-off valve of the suction line.

8 Troubleshooting

Any malfunctions that cannot be removed by means of the measures described in this chapter may only be repaired by the manufacturer or by qualified persons.

Problem	Possible reason	Repair
Heavy formation of foam in the float chamber due to excessive amounts of air sucked in (in excess of the possible separation capacity of > 4 l/h)	Suction line not tight	Perform a tightness test of the suction line (vacuum test or pressure test)
	Screw connection not tight	Seal the screw connections
	Initial commissioning, no fuel was sucked into the system before	Use a suction pump
	Suction line rating too great (DIN 4755)	Observe the flow rate 0.2 - 0.5 m/s (DIN 4755-2)
Burner switches off at irregular intervals due to malfunctions	Air accumulations in the suction line because pipe cross section is too great	Properly rate the suction line (see chapter "Determining the suction line length")

Problem	Possible reason	Repair
Liquid column cannot be sucked in or steady flow keeps being interrupted	Small leaks (for example, at the screw connections or the withdrawal fitting) can cause air to get into the suction line, even when the system is idle	Use a cylindrical screwed pipe connection and seal them with flat copper gaskets (air-tight) Use an additional stiffener in the case of soft or semi-soft copper pipes Check all sealing surfaces for damage Close the shut-off valve at the withdrawal fitting Perform a vacuum test (at least -0.6 bar) at the flow connection of the de-aerator
	Burner pump does not generate sufficient vacuum	Perform a suction test at the pump. The pump must generate a vacuum of at least -0.4 bar
	After a filter or burner hose replacement, the shut-off valve has not been closed	Open the shut-off valve
	After a filter or burner hose replacement, the drain valve has not been closed	Close the drain valve at the filter cup (not in the case of type-1C)
Other malfunctions	-	Contact the AFRISO service hotline

9 Decommissioning, disposal

Dispose of the product in compliance with all applicable directives, standards and safety regulations.

Filter inserts must not be disposed of together with the normal household waste.

1. Dismount the product (see chapter "Mounting", reverse sequence of steps).
2. Dispose of the product.

10 Returning the device

Get in touch with us before returning your product (service@afribo.de).

11 Warranty

See our terms and conditions at www.afribo.com or your purchase contract for information on warranty.

12 Spare parts and accessories

NOTICE

UNSUITABLE PARTS

- Only use genuine spare parts and accessories provided by the manufacturer.

Failure to follow these instructions can result in equipment damage.

Product

Product designation	Part no.	Figure
Automatic fuel oil de-aerator with integrated filter "FloCo-Top-1C Si"	70155	See chapter "Versions".
Automatic fuel oil de-aerator with integrated filter "FloCo-Top-2CM Si"	70156	
Automatic fuel oil de-aerator with integrated filter "FloCo-Top-2CM Optimum MC-18"	70158	
Automatic fuel oil de-aerator with integrated filter "FloCo-Top-2CM MS-5"	70159	

Spare parts and accessories

Product designation	Part no.	Figure
Filter cup short	20277	
Filter cup short (with drain system)	20288	
Filter cup Optimum (with drain system)	20289	
Spare vacuum gauge Range: -0.7 ... +0.9 bar	70034	-
Oil filter spanner for loose- ning the union nut of the filter cup	70061	
Screwed pipe connection as per DIN 2353 with flat copper gasket: Pipe Ø 6 mm Pipe Ø 8 mm Pipe Ø 10 mm Pipe Ø 12 mm	 20509 20508 20510 20512	-
Universal screw connec- tions for pipes Ø 6 mm, Ø 8 mm and Ø 10 mm including stiffeners	20409	-
Vent hose, PVC, Ø 4 x 1 mm, 20 m reel	20696	-

Product designation	Part no.	Figure
Angular connection piece 90°	70035	
Opticlean Fine filter short, 20 - 35 µm, MS-5	20308	
Opticlean Ultra-fine filter short, 5 - 20 µm, MC-7	20319	
Opticlean Ultra-fine filter long, 5 - 20 µm, MC-18	20318	
Sintered plastic sieve Short, 50 - 70 µm blue Long, 50 - 70 µm blue	20045 20053	