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Instruction Manual

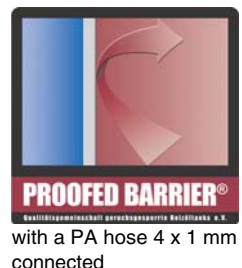
Automatic fuel oil de-aerator Flow-Control

Flow-Control 3/K-1	# 69930
Flow-Control 3/K-1 (G¼)	# 69978
Flow-Control 3/M	# 69929
Flow-Control 3/M (G¼)	# 70014



-  Read manual before use!
-  Observe all safety information!
-  Keep manual for future use!

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1 About this instruction manual

This instruction manual is part of the product.

- ▶ Read this manual before using the product.
- ▶ Keep this manual during the entire service life of the product and always have it readily available for reference.
- ▶ Always hand this manual over to future owners or users of the product.

1.1 Structure of warning

WARNING TERM The type and source of danger is shown here.



- ▶ Precautions to take in order to avoid the danger are shown here.

There are three different levels of warning:

Warning term	Meaning
DANGER	Imminent danger! Failure to observe the information will result in death or serious injuries.
WARNING	Possible imminent danger! Failure to observe the information may result in death or serious injuries.
CAUTION	Dangerous situation! Failure to observe the information may result in minor or serious injuries as well as damage to property.

1.2 Explanation of symbols and typeface

Symbol	Meaning
<input checked="" type="checkbox"/>	Prerequisite for an activity
▶	Activity consisting of a single step
1.	Activity consisting of several steps
↪	Result of an activity
•	Bulleted list
Text	Indication on a display
Highlighting	Highlighting



2 Safety

2.1 Intended use

The automatic fuel oil de-aerator Flow-Control may only be used in single-line systems with return pipe connection for continuous de-aeration of the following liquids in oil-fired systems:

- Light fuel oil EL according to DIN 51603-1
- Diesel as per EN 590
- Fuel oil with max. 20 % fatty acid methyl ester (FAME) according to EN 14213
- Flow-Control 3/M only: Biodiesel and vegetable oils (rape oil)

Any use other than the use explicitly permitted in this instruction manual is not permitted.

2.2 Predictable incorrect application

The automatic fuel oil de-aerator Flow-Control must never be used in the following cases:

- Use with undissolved additives, alcohols and acids

2.3 Safe handling

This product represents state-of-the-art technology and complies with the pertinent safety regulations. Each device is subjected to a function and safety test prior to shipping.

- ▶ Operate this product only when it is in perfect condition. Always observe the operating instructions, all pertinent local and national directives and guidelines as well as the applicable safety regulations and directives concerning the prevention of accidents.

2.4 Staff qualification

The product may only be mounted, commissioned, operated, maintained, shut down and disposed of by qualified, specially trained staff.

2.5 Modifications to the product

Changes or modifications made to the product by unauthorised persons may lead to malfunctions and are prohibited for safety reasons.

2.6 Usage of spare parts and accessories

Usage of unsuitable spare parts and accessories may cause damage to the product.

- ▶ Use only genuine spare parts and accessories of the manufacturer (refer to chapter 7, page 14).

2.7 Liability information

The manufacturer shall not be liable for direct or consequential damage resulting from failure to observe the technical instructions, guidelines and recommendations.

The manufacturer and the sales company shall not be liable for costs or damages incurred by the user or by third parties in the usage or application of this device, in particular in case of improper use of the device, misuse or malfunction of the connection, malfunction of the device or of connected devices. The manufacturer or the sales company shall not be liable for damages resulting from any use other than the use explicitly permitted in this instruction manual.

The manufacturer shall not be liable for misprints.

3 Product description

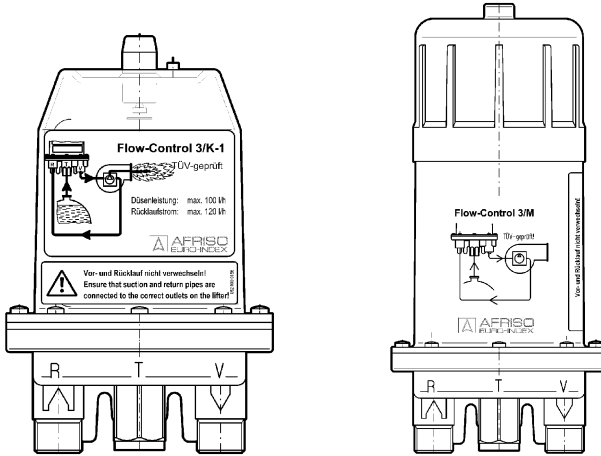


Fig. 1: Flow-Control 3/K-1

Flow-Control 3/M

Flow-Control 3/K-1 consists of a diecast zinc housing with female G $\frac{1}{4}$ i connection thread at the tank side and male G3/8 connection threads with 60° cone for connection of the burner hoses. The float chamber is made of transparent plastic.

Flow-Control 3/M is equipped with two separate float chambers. The first float chamber consists of a metal de-aerator hood with operating and de-aerating float. The second one is a transparent plastic safety float chamber. It prevents the oil foam from escaping via the de-aerator opening (e.g. during commissioning/filter exchange) and indicates malfunctions of the de-aerator valve.

3.1 Function

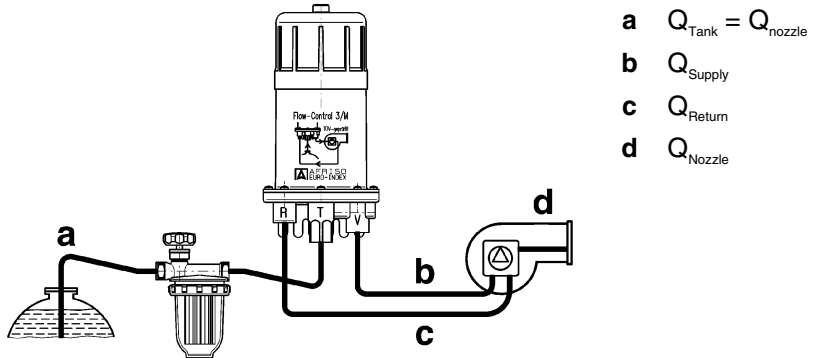


Fig. 2: Flow-Control 3/M with filter

The burner pump draws the fuel oil from the tank via the filter and the non-return valve installed in Flow-Control and delivers it to the nozzle. The excess oil (i.e. the oil exceeding the nozzle capacity) is pumped into the float chamber via the return pipe. While the oil level gradually increases in the float chamber, the oil is de-aerated by the de-aeration valve.

When the oil reaches a level of approx. 20-30 mm above the bottom, the floats begin to operate and actuate the bypass valve, thus delivering the de-aerated return oil to the suction pipe.

This way, the system only withdraws the amount of oil from the tank via the filter which is actually needed for combustion. This considerably prolongs the filter service life. The maximum possible service life can be obtained with the long filter insert made of sintered plastic (Optimum).

The oil that now flows to the pump primarily consists of de-aerated fuel oil plus oil from the tank that still contains air.



3.2 Application examples

a Max. 4.50 m

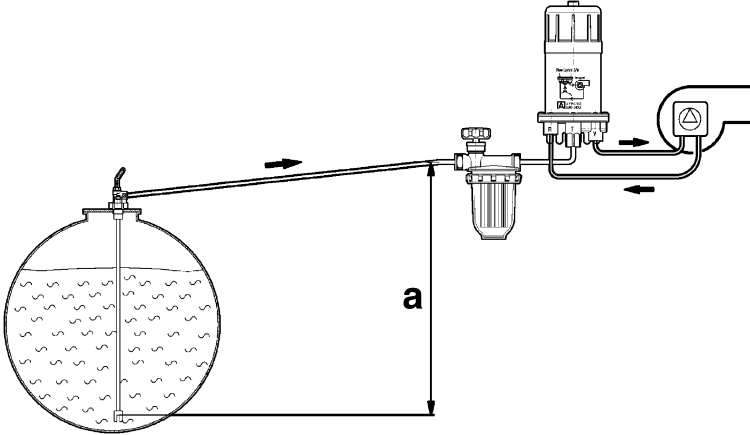
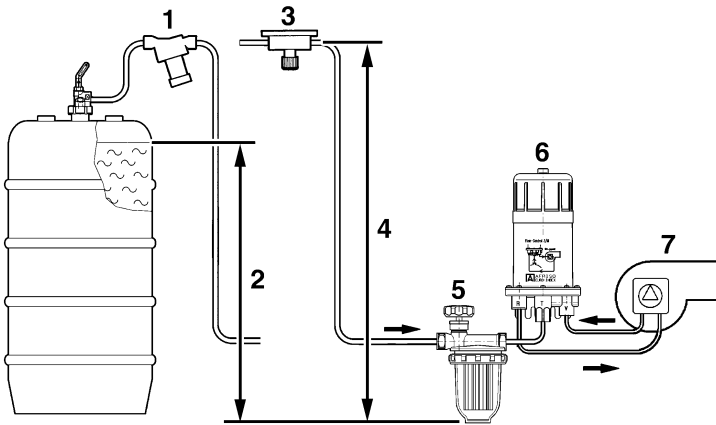


Fig. 3: Installation of Flow-Control 3/M above the tank level with self-securing suction pipe (steady gradient to the tank). The non-return valves in the withdrawal fitting or at the end of the suction hose must be removed.



- 1 Piston-type anti-siphon valve KAV
- 2 Static pre-pressure for sizing the KAV
- 3 Diaphragm type anti-siphon valve MAV
- 4 Static pre-pressure for sizing the MAV
- 5 Filter
- 6 Flow-Control
- 7 Burner

Fig. 4: Installation of Flow-Control below the tank level. We recommend to install an anti-siphon valve to prevent fuel oil from escaping in the case of a defective suction line with a higher oil level in the tank.



4 Specifications

Table 1: Specifications

Parameter	Value
General specifications	
Dimensions: (W x H x D)	
Flow-Control 3/K-1	95 x 150 x 95 mm
Flow-Control 3/M	95 x 200 x 95 mm
Burner connection	Male G3/8 with 60° cone for burner hose or female G¼
Tank connection	G¼ female
Nozzle capacity	Max. 100 l/h
Return flow	Max. 120 l/h
Separation capacity air/gas	Approx. 4 l/h
Mounting position	Float housing vertical to the top
Operating overpressure	Max. 0.7 bar (corresponds to a static oil column of 8 m)
Suction vacuum	Max. 0.5 bar
Test pressure	6 bar
Operating temperature range	
Ambient	Max. 60 °C
Operation	Max. 60 °C

4.1 Approvals, tests and conformities

Flow-Control is TÜV-tested, report no. V132 2007 V1.

5 Mounting and commissioning

- ▶ Mount Flow-Control to the sheet metal boiler wall using the enclosed tapping screws.

For drilling the holes with a Ø 3 mm drill, you can use the mounting bracket with the holes as a template. The float housing must point vertically to the top.

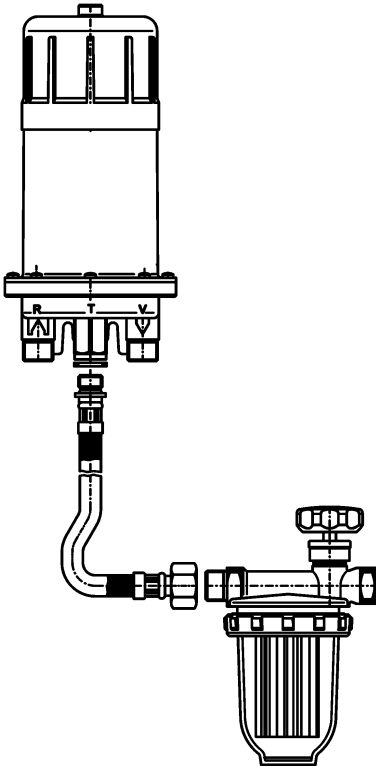
Make sure to select an installation site where the ambient temperature cannot exceed 60 °C. This means that you must not mount the device on top of or next to an uninsulated boiler part, above opening

dampers at furnaces or to the flue gas pipe. Use suitable oil hoses as per DIN 4798-1 for connection to the oil pump. An oil filter must be installed in the supply line upstream of Flow-Control.

The burner hoses are mounted to the two male threaded connections R and V.

Use the G $\frac{1}{4}$ (outside) hose shipped with the unit and the G $\frac{3}{8}$ female union nut to connect the unit to the filter.

The filter can be connected (connection T) with the optionally enclosed hose G $\frac{1}{4}$ outside diameter and a G $\frac{3}{8}$ female union nut.

**CAUTION**

Damage to the pump or Flow-Control due to incorrect connection of supply and return connections.

- ▶ Do not confuse the supply and return connections (not even during commissioning for a short period of time).

5.1 Installation notes

Install Flow-Control upstream of the burner. The unit may be installed above or below the tank level. The suction line can be designed as a self-securing suction line with a steady gradient to the tank if the conditions on site permit this (according to the German Technical Rules for Flammable Liquids TRbF 231 no. 2 section 5, point 3; check for regulations applying at your installation site). In this case, all non-return valves upstream of Flow-Control must be removed.

When dual-pipe systems are converted to single-pipe operation, the flow speed of the oil in the suction line is reduced. In order to avoid air cushions (shutdowns due to fault conditions), it is recommended to check/size the cross section of the suction line according to DIN 4755-2 (flow speed 0.2 to 0.5 m/s).

5.2 Nomogram

Nomogram for determining the internal pipe diameter (NW) of the heating oil suction pipe in order to prevent gas from accumulating in higher pipe sections and sections with downward gradients, or gas formation resulting from excessively high flow speeds.

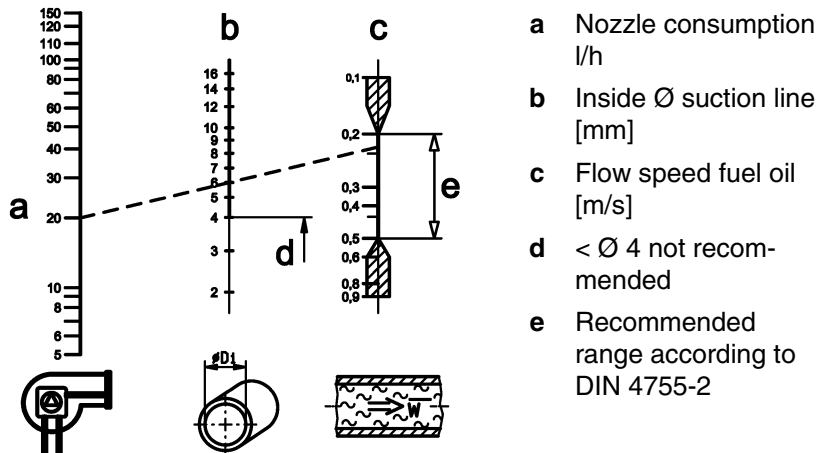


Fig. 5: Nomogram

Example: A pipe with $\text{Ø } 8 \times 1$ mm (NW 6) is required for a volume of 20 l/h and an average flow speed of approx. 0.23 m/s.

5.3 Pressure test

When subjecting the suction pipe to a pressure test, the pressure connection must not be made at the Flow-Control unit since the non-return valve integrated in the device does not allow the pressure to be applied to the suction pipe. Therefore, the device is not to be included in the pressure test.

5.4 Parallel connection

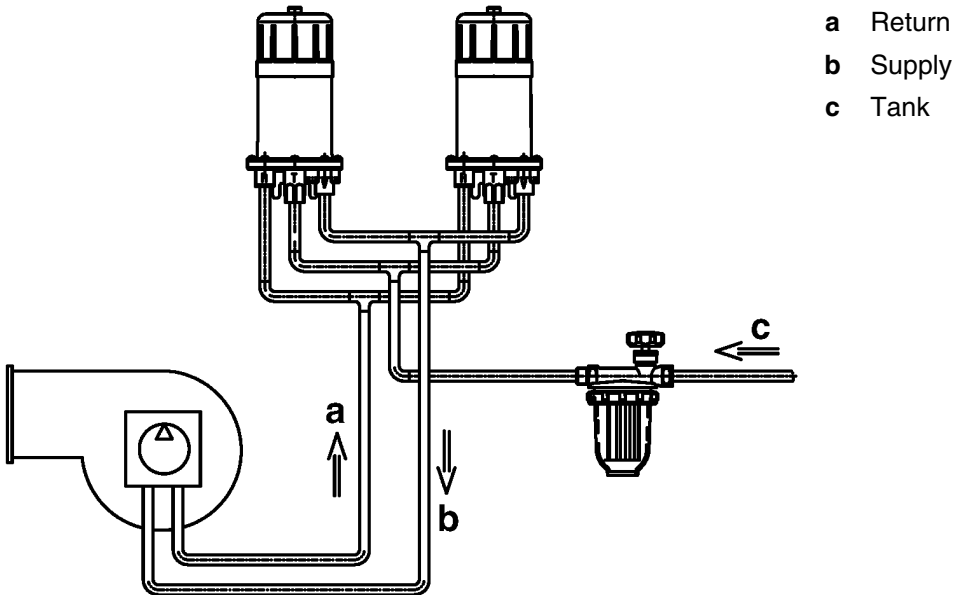


Fig. 6: Parallel operation of two Flow-Control 3/M units

6 Operation

6.1 Oil foam

Oil foam may build up if the amount of air sucked into the de-aerator exceeds the separating capacity of the device (4 l/h). Possible reasons:

- Leak in the suction pipe
- Leaks in the screw connections at the suction side
- Initial commissioning (without separate suction pump)
- Suction pipe dimensions too great (observe DIN 4755-2, flow speed 0.2-0.5 m/s)

6.2 Air bubbles

Depending on the filter insert and the suction vacuum of the facility, the air separated from the oil may be retained by the filter insert to a major or minor degree.

An air cushion may form upstream of the "filter sieve". This air cushion is visible in the filter bowl. The size of the air cushion depends on the flow speed and the suction pressure in the filter, i.e. more air particles may be pulled through the sieve at a great throughput compared to a slow flow speed (lower oil consumption by burner). When a vacuum is generated during operation of the burner, this causes the oil level to decrease in the filter bowl outside of the filter sieve.

The inside of the filter sieve is completely filled with filtered oil so that malfunctions cannot occur. The irregular pore structure of the sintered plastic filter insert with a spatial effect assures excellent permeability of the air. Therefore, the filter upstream of Flow-Control should be equipped with such a filter insert.

6.3 Oil level in the float housing

The oil level depends on the operating conditions of the facility and amounts to approx. 20-50 mm in suction mode.

If the oil level is higher, the float housing may be completely filled with oil if the suction pipe is tight. This is caused by the absorption of the air through the fuel oil. Over time, this results in a reduction of the air cushion.

When the operating conditions change (e.g. decreasing oil level in the tank), the air cushion is formed again in the float housing.

6.4 Pressure mode

Since in pressure mode with an oil pump there is no gas formation caused by suction, it is not meaningful to use an oil de-aerator in this mode.

In pressure mode, it is recommended to use a single-line filter with return pipe connection. If, the increased return pressure (\Rightarrow 0.7 bar pre-pressure + Δp of the bypass valve results, for instance, in a return pressure of 1.2-1.5 bar) caused by the increased Δp (0.5-0.8 bar in the case of a single-line filter with return pipe connection) should result in problems with the burner pump, it is possible to use a Flow-Control 3/M unit.

In the case of such applications, take appropriate measures to prevent the maximum permissible pre-pressure of 0.7 bar to be exceeded even in the case of error conditions (defective pressure reducer, etc.), e.g. by means of a bypass valve, a pressure switch, etc.

An oil drip pan has to be placed below the burner hoses and the oil de-aerator.

6.5 Flood risk areas

Flow-Control can be used in flood risk areas if a de-aeration hose is used (refer to chapter 7, page 14). The de-aerator hose must be connected to the return connection of the tank or end above the maximum possible water level.

7 Spare parts and accessories

Part	Part no.
Piston-type anti-siphon valve KAV	20240
Diaphragm type anti-siphon valve MAV	20139
Vent hose (a), PA, 4 x 1 mm, roll of 50 m	820 030 0410
Flow-Control 3/K-1 only: Vent nipple (b) with O ring Ø 12 x 2.5 mm (c) and hose connection G 3/8 x 4 mm	69940

To prevent odours from the separated air (e.g. if the unit is installed in kitchens), a vent hose can be connected to the Flow-Control hood.

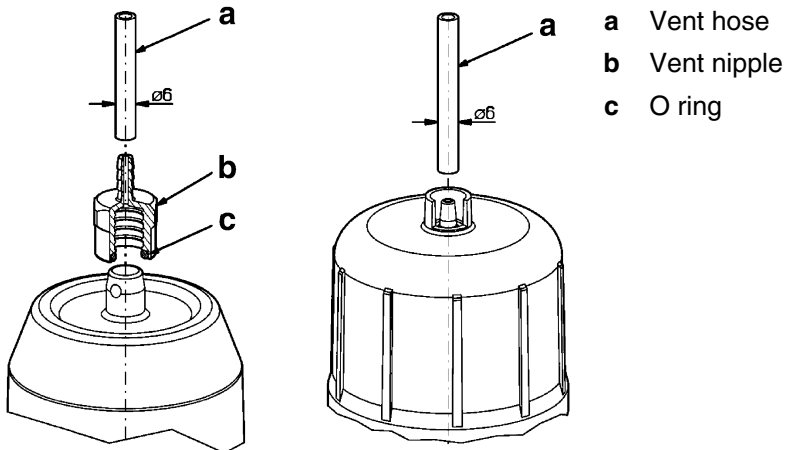


Fig. 7: Flow-Control 3/K-1 Flow-Control 3/M



1. Flow-Control 3/K-1 only: Screw in the vent connection with a spanner size 19 until the O ring presses against the flat surface of the hood.
2. Push the vent hose onto the vent nipple and route it to the tank next to the suction pipe.
3. Fixate the vent hose with cable straps.
4. Mount the other end of the vent hose to the de-aeration pipe or the return connection of the withdrawal fitting at the tank to prevent clogging.
5. Use the enclosed hose connection for connection to the return connection of the withdrawal fitting.

8 Warranty

The warranty of the manufacturer for this product is 24 months after the date of purchase. This warranty shall be good in all countries in which this device is sold by the manufacturer or its authorised dealers.

9 Copyright

The manufacturer retains the copyright to this manual. This manual may only be reprinted, translated, copied in part or in whole with the prior written consent of the manufacturer. We reserve the right to technical modifications with reference to the specifications and illustrations in this manual.

10 Customer satisfaction

Customer satisfaction is our prime objective. Please get in touch with us if you have any questions, suggestions or problems concerning your product.

11 Addresses

The addresses of our worldwide representations can be found on the Internet at www.afriso.de.