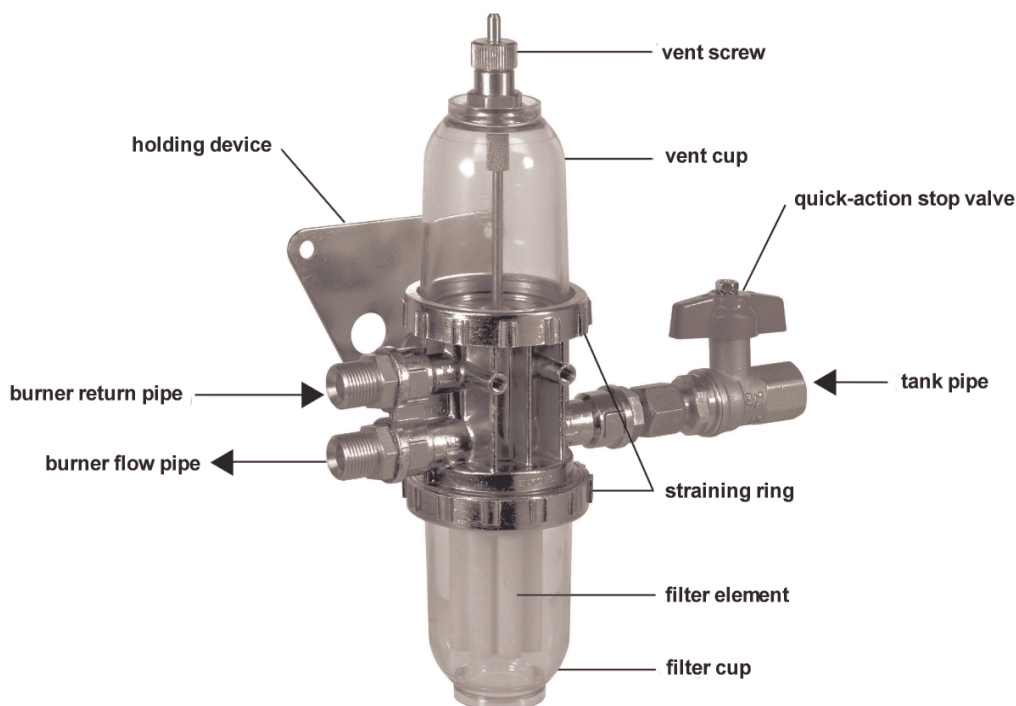


Fuel Oil Deaerator with Integrated Filter Type GS 2000

Fuel oil deaerator to DIN EN 12514-2 with filter and quick action stop valve



CONTENT

General	Page 1	Attendance	Page 7
Design	Page 1	Function control	Page 7
Operating materials	Page 2	Maintenance	Page 7
Connections	Page 2	Overhaul / Repair	Page 8
Designation	Page 2	Additional technical data	Page 8
Installation	Page 3	List of accessories	Page 8
Startup	Page 5		

GENERAL

The GOK fuel oil deaerator with integrated filter, type GS 2000, meets the requirements for a filter according to DIN EN 12514-2 (formerly DIN 4736-2) and DIN 4755-2; it combines the features of a deaerating device and a fuel oil filter. The GOK fuel oil deaerator provides for filtering and at the same time for automatic deaeration. It is intended only for installation into fuel oil heating systems which are designed in single line system with return feed for suction drain operation.

For usage to the intended purpose and ensuring the warranty, please observe these Assembly and Operating Instructions and give them to the operator.

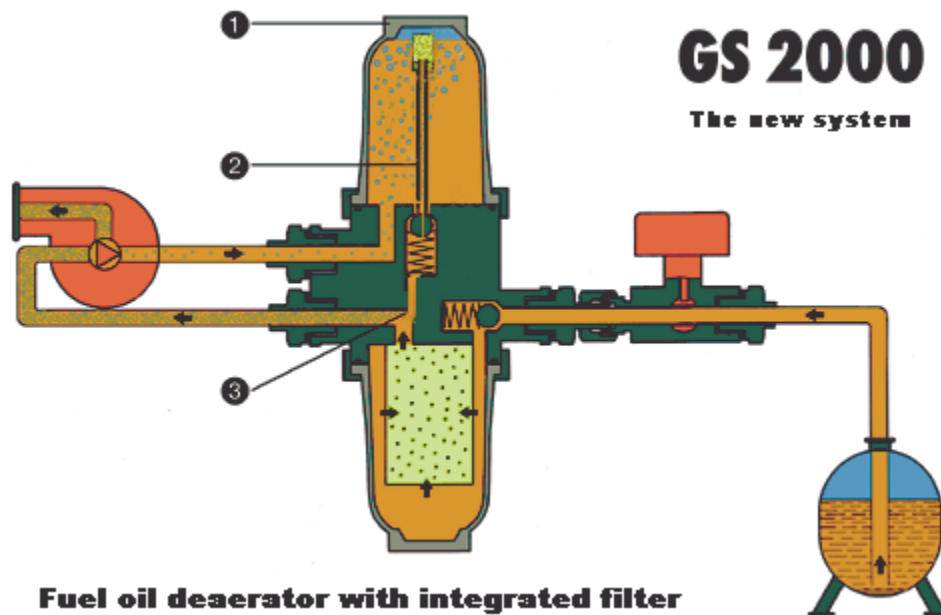
DESIGN

The GOK fuel oil deaerator with integrated filter GS 2000 comprises the following individual components:

- closed deaerating device inside the vent cup,
- vent screw in the upper part of the vent cup only for startup
- filter inside the filter cup, filter elements consisting of any of the following materials: felt, sintered plastic, high-grade steel, easy-change filter,
- check valve inside of the inlet on the tank side,
- with pre-assembled quick-action stop valve,
- mounting for wall assembly, and
- options for the connections of pipe or hose assembly.

In the ongoing operation of a fuel oil heating system, the pump constantly supplies the same volume in the burner circuit. However, this volume by far exceeds the volume required for combustion. Only that part of fuel oil consumed in the burner is replaced by the flow from the fuel storage tank. From the supply from the oil storage tank, fuel oil gets into the GOK fuel oil deaerator and is filtered during the process. An integrated check valve prevents any flowing back of fuel oil into the storage tank.

In the fuel oil deaerator GS 2000, the usual deaeration housing with the deaeration valve on top is replaced by a completely "closed system" . In this "closed system", air is collected which is deposited by the heating and relaxation of the fuel oil compressed in the burner pump, or taken in because of leakage. In the top section of this system, a thin suction pipe  leads into the vacuum section of a Venturi device  in the flow pipe of the burner circuit.



Fuel oil deaerator with integrated filter

At the start of the burner pump, fuel oil is at first only supplied via an internal valve. With increasing vacuum in the Venturi device, air is taken in from the top space of the deaeration unit and, finely dispersed, is added to the fuel oil. By this finely apportioned addition of air, any burner malfunctions are prevented, and the air collected in the air space is carried off. The "Closed System" reliably prevents any leakage of fuel oil or oil foam. Oil smell in the heating room is a matter of the past.

OPERATING MATERIALS

domestic fuel

e.g. to DIN 51603-EL-01

CONNECTIONS

connection	pipe / hose connection	dimension	to standard
TL	tank line (tank side)	female thread G 3/8 or	DIN ISO 228-1
		olive connection 10 non-soldered screwed pipe with steel olive or	DIN EN ISO 8434-1
		GOK universal connection fittings 8/10 mm screwed clamping ring connection, brass	ÜHP
VL	burner flow pipe	female thread G 3/8 or	DIN ISO 228-1
RL	burner return pipe	male thread G 3/8 with ball nipple (60° inner cone)	

DESIGNATION

The housing of each fuel oil deaerator GS 2000 bears the following designation:

Stamp	Description	Explanation
PN 6	Nominal pressure	Admissible operating pressure 6 bar maximum
→ TL	Tank line	Connection of pipe/hose line on the tank side with indication of direction of flow
→ VL	Flow burner circuit	Connection for pipe/hose line with indication of direction of flow
→ RL	Return burner circuit	Connection for pipe/hose line with indication of direction of flow

The label on the upper filter cup shows the flow diagram and the version of the fuel oil deaerator GS 2000 with the stated reference number.

INSTALLATION

Check the fuel oil deaerator GS 2000 for completeness and any transport damages before start of the installation.

The fuel oil deaerator GS 2000 must be installed by qualified craftsmen. This requirement also applies to startup, maintenance and repairs.

Notes on assembly

Expert installation under observation of the technical regulations for planning, construction and operation of the system as a whole is the precondition for faultless functioning of the fuel furnace.

Above all, make sure to observe the following:

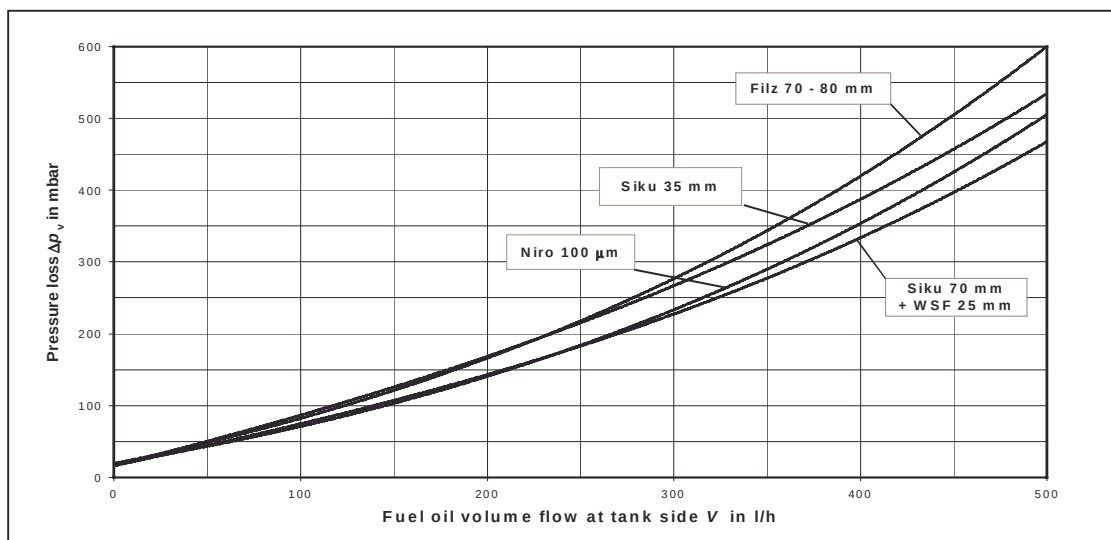
- The pipes from the tank to the fuel oil deaerator GS 2000 must be laid frost-free, if necessary plan technical heating devices when laying in domes or in the open air
- According to DIN 47552, the suction line dimensions must provide for an average fuel flow speed of 0.2 to 0.5 m/s. Too large pipe diameters with slow flow speeds can cause formation of undesirable gas bubbles.
- **Formula for calculation of the flow rate w in m/s**

$$w = 0,3537 \cdot \sqrt{V} / D^2$$

with $\dot{V}$ - fuel oil volume flow in l/h
 D - inside diameter of pipe in mm

- Inside diameters of under 4 mm are not recommended!
- Maximum total pressure drop of all stop valve in the suction line = 400 mbar

See the diagram for pressure loss of the fuel oil deaerator as a function of fuel oil volume flow and filter element used.



The installation of the fuel oil deaerator GS 2000 is admissible:

- in single-strand fuel oil burning installation with return feed (suction operation)
- above and below the oil storage tank top height
- note with reference to TRbF 231-1 no. 4.12 para 9: *"In case of tube for supply oil fuel burning installations, short flexibles between the tube and the pump are allowed, if they correspond to DIN 4798 and a protective device - e.g. an oil fuel collecting basin with signalling unit - is available. The protective device must turn off the feed pump in case of oil leaks."*
- in self-monitoring suction lines according to TRbF 231-1 no. 2 para. 5 item 3, in which the liquid column is interrupted in case of leakage.

For installation, use only open-end wrenches of corresponding width. No gas wrenches must be used.

Before installation, check the connections visually for metal chips or other matters. It is absolutely necessary to remove any such chips or other matters, e.g. by blowing through, to prevent potential malfunction.

Installation of the fuel oil deaerator GS 2000

Installation always in vertical position:

Filter cup with filter element on bottom, deaerator cup with deaerating device on top.

The fuel oil deaerator GS 2000 is supplied with enclosed holding device for wall installation. By means of the 2 enclosed hexagon bolts M 6x8, the holding device can be fixed to the front or back of the housing of the fuel oil deaerator, depending on the connection orientation of the laid pipe or tube lines.

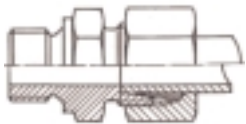
For wall installation, 2 drilled holes Ø 7 mm are provided in the holding device.

Assembly of the connections or individual components

Assignment of the connections for tank line, burner flow and return line depend on the version of your fuel oil deaerator GS 2000.

On assembly, do not change line connections - not even for a short time during startup - as this may cause damages to the GS 2000 and to the burner pump.

Assembly of the connections female thread G 3/8

Components	Connecting piece	Explanations
fuel oil deaerator	all connecting branches with sealing area	female thread G 3/8 according to DIN ISO 228-1
screwed connection		pipe thread: cylindrical male thread G 3/8 of tolerance class A according to DIN ISO 228-1 screwed plug with sealing area e.g. screwed plug form A according to DIN 3852-2
		screwed plug with profile sealing ring e.g. form E according to DIN 3852-11 or form SDSC type E according to DIN EN ISO 8434-1
seal		flat packing, e. g. according to DIN 7603 materials: aluminium or copper dimensions: inside diameter 18 mm minimum thickness 1.5 mm minimum

Place the seal flatly on the sealing area of the connecting screwing, screw in the screwed connection manually by turning to the right.

Apply and tighten the open-end wrench SW 22 at the connection branch of the fuel oil deaerator, and the open-end wrench with the corresponding wrench width SW at the screwed connection.

Recommended tightening torque with steel screwed connections: 60 Nm

Assembly of the GOK universal connection fittings with TL connection

Components	Connecting piece	Explanations
fuel oil deaerator	only TL connecting branch	female thread G 3/8 according to DIN ISO 228-1
screwed connection	universal connection fittings for cooper pipes with outside diameter 8/10 mm to DIN EN 1057 with reinforcement ring H	Consisting of pressing screw with male thread G 3/8 A and ① for outside diameter 10 mm: insert 10 mm with cutting edge ② for outside diameter 8 mm: insert 8 mm with cutting edge and pressure sleeve 8 mm.

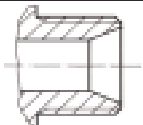
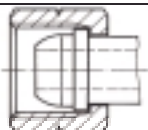
Assembly according to the Assembly Instructions for GOK universal connection fittings (on the packing)

Assembly of olive connections

Components	Connecting piece	Explanations
fuel oil deaerator	only TL connecting branch in olive connection for tube dia. 10	olive connections with steel olive according to DIN EN 8434-1
screwed connection	tube with outside diameter 10 mm	① precision steel pipe, e. g. according to DIN 2391-1 ② copper pipe according to DIN EN 1057 with reinforcement ring H according to DIN EN ISO 8434-1 and brass olive

Assembly according to the Assembly Instructions for olive connections following DIN 3859-2 (sent to you on request!)

Assembly male thread G 3/8 A with KN (60 ° inner cone)

Components	Connecting piece	Explanations
fuel oil deaerator		Pipe thread: cylindrical male thread G 3/8 of tolerance class A according to DIN ISO 228-1 with 60° inner cone
screwed connection		Union nut with female thread G 3/8 according to DIN ISO 228-1, hose nozzle with ball seal

Recommended tightening torque: 10 Nm

Re-assembly of connecting pieces mounted by the manufacturer

Non-soldered pipe connections with olive

Each time the pipe connection has been loosened, re-tighten the union nut (approx. 1 ½ turns for factory assembly results). Hold the screwed branch steady with an open-end wrench.

Change the operator position of the quick-action stop valve

Position open-end wrench SW 21 at the quick-action stop valve, and SW 19 at the union nut of the assembled olive connection of the connection branch, and loosen by turning anti-clockwise. Align the quick-action stop valve and re-tighten with the same expenditure of force.

STARTUP

If a pressure test is required before commissioning the fuel oil burning installation - e.g. according to DIN 4755 - the fuel oil deaerator GS 2000 can be subjected to a test pressure of a maximum of 6 bar. Make sure to avoid any increase of the pressure in the fuel oil deaerator to more than 6 bar following the heating of the test material. Higher pressures can damage the GS 2000.

Before startup, the fuel oil deaerator and all the connections must be checked for leaks. This test can be included in the pressure and leak test or functions test of the fuel oil burning installation. Any leaks must be sealed, e.g. re-assembly of the connections with new conical nipples, tightening of the screwed connections. Observe safety information under MAINTENANCE.

Unless defined otherwise in the startup instructions of the burner/furnace manufacturer, proceed as follows:

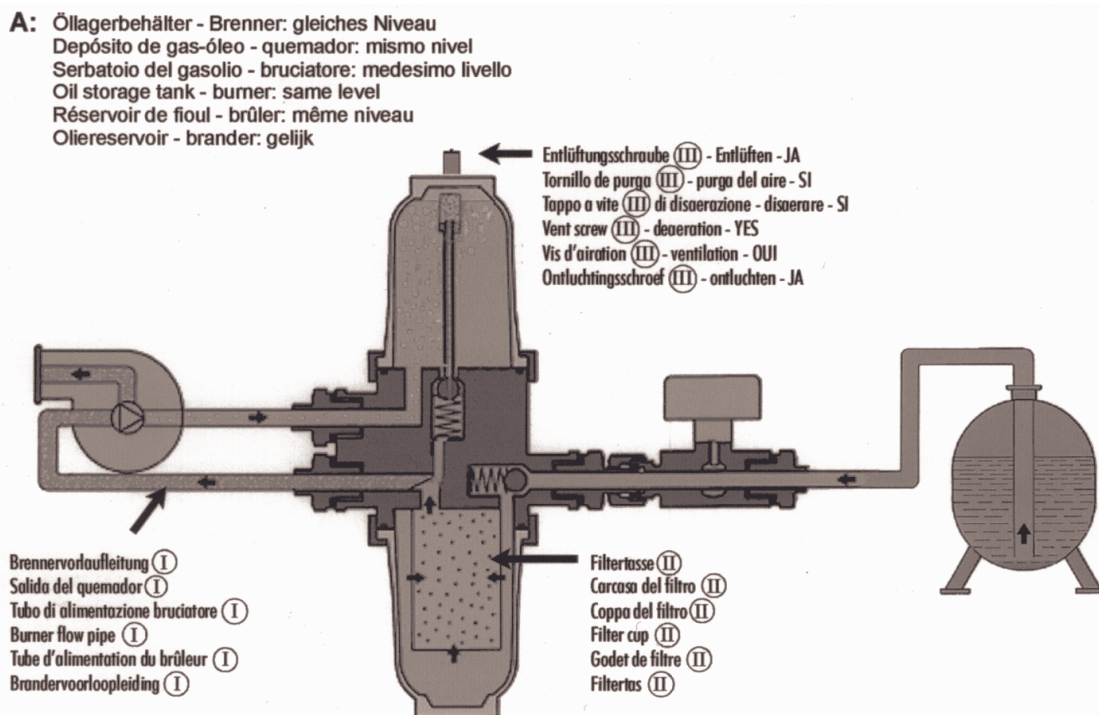
1. The lines must be deaerated with a suction pump and filled with fuel oil. The suction pump can be connected direct at the connection RL or better at the vent screw with adapter ref. 13610-60. Re-tighten the connection or close the vent screw.

2. Start burner, if necessary repeat several times.

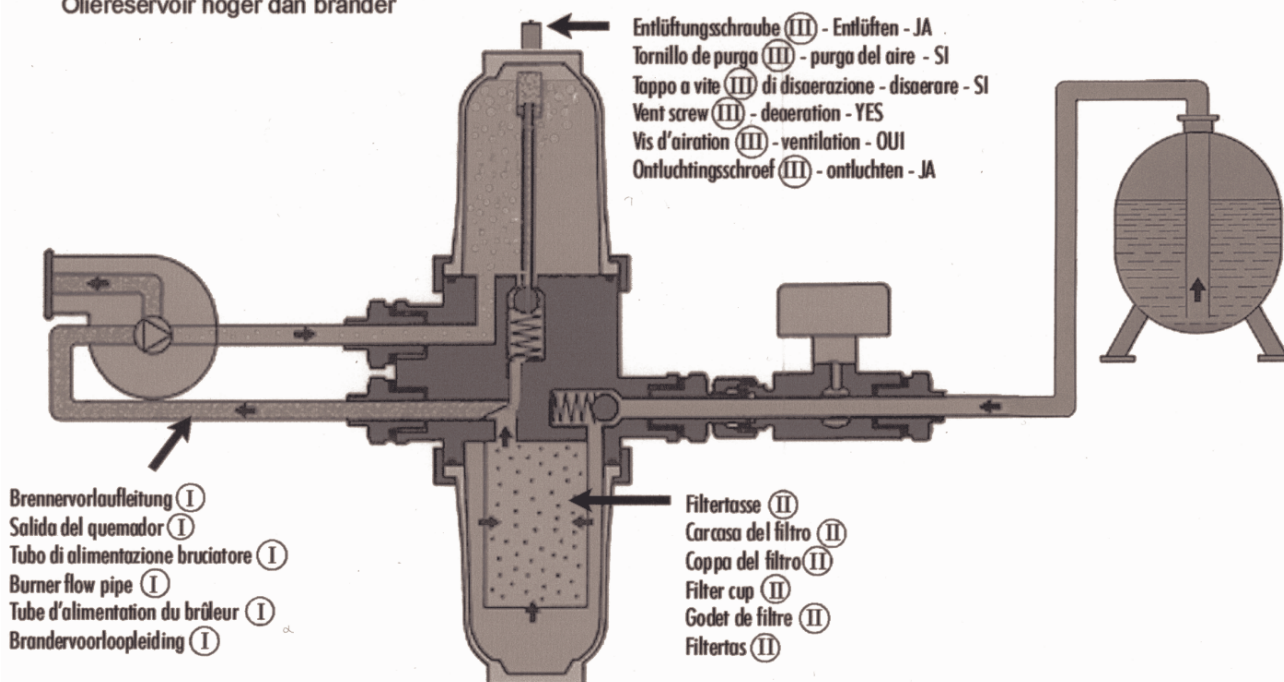
Now, the burner pump sucks fuel oil, and the deaerator cup fills with oil and oil foam.

3. Fuel oil installations with oil storage tanks situated on the same or a higher level

After the oil level in the deaerator cup has risen to approx. 50% of height, the remaining air can be let off quickly by means of the enclosed plastic hose by opening the vent screw - turn anti-clockwise. After escape of air, re-tighten the vent screw by turning it clockwise. Any air escaping from the fuel oil will be decomposed automatically at the start of the addition of air.



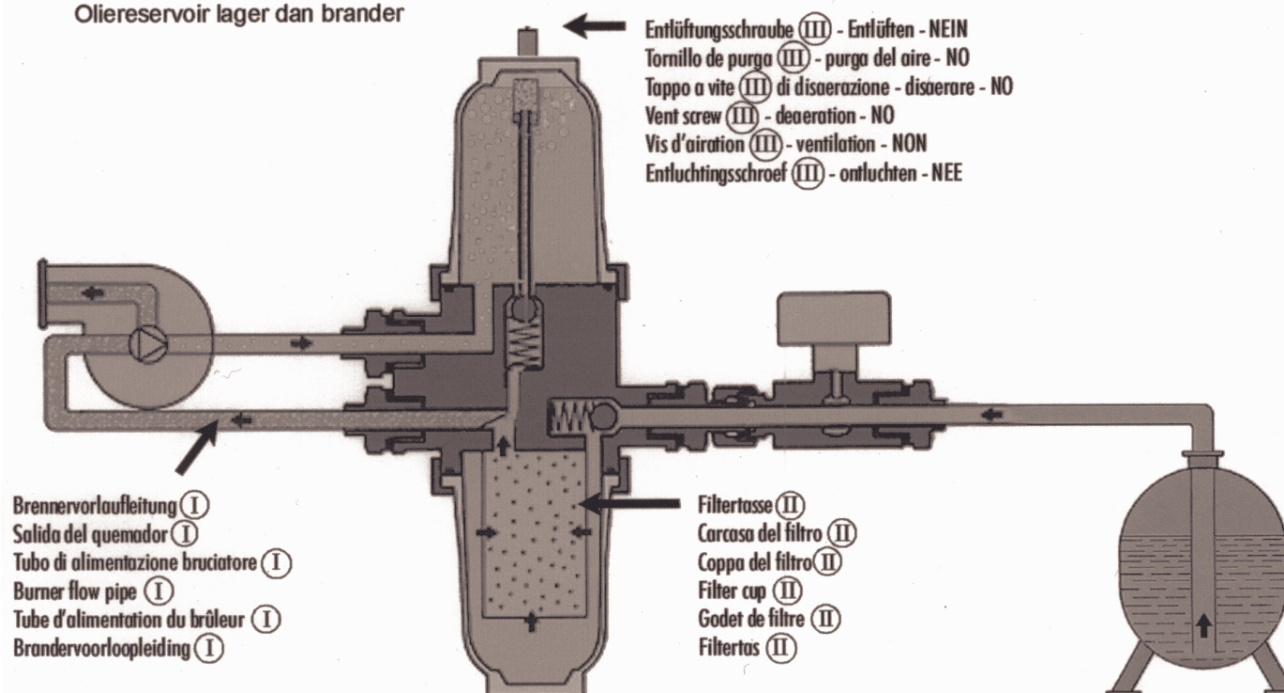
- B:** Öllagerbehälter höher als Brenner
 Depósito de gas-óleo más alto que el quemador
 Serbatoio del gasolio più in alto del bruciatore
 Oil storage tank on higher level than burner
 Réservoir de fioul sur le niveau plus haut que le brûler
 Oliereservoir hoger dan brander



4. Fuel oil burning installations with oil storage tanks at a lower height

In these systems, negative pressure can build up in the deaerator cup. Do not operate the vent screw! In this case, deaerate the system at the burner pump. Any air remaining in the deaerator cup will be decomposed automatically at the start of the addition of air. This process can take some time (approx. ½ hour).

- C:** Öllagerbehälter tiefer als Brenner
 Depósito de gas-óleo más bajo que el quemador
 Serbatoio del gasolio più in basso del bruciatore
 Oil storage tank on lower level than burner
 Réservoir de fioul sur le niveau plus bas que le brûleur
 Oliereservoir lager dan brander



ATTENDANCE

In current operation of the fuel oil burning installation, the GS 2000 does not require any attendance. Open the quick-action stop valve in the form of a quick-action ball valve. To this effect, turn the red wing handle in flow direction.

Turn the wing handle of the quick-action stop valve to the limit to 'closed' position – vertical to the flow direction – for longer standstill periods or MAINTENANCE measures.

Due to the intelligent design of the fuel oil deaerator GS 2000, the full fuel oil column will be available on burner start-up without any noticeable air particles. It does not affect the safe operation of the fuel oil deaerator if the filter cup is only partly filled with fuel oil .

SAFETY FUNCTION

In case of hose rupture in the supply (VL) and return pipe (RL), the burner signals malfunction due the air taken in. Only the remaining oil can run out.

FUNCTION CONTROL

If, after longer period of operation, the air cushion in the deaerator cup does not decompose, or if the burner signals malfunction, there is a leak in the oil line. More air is taken in than can be decomposed through addition of air to the fuel oil. The leak must be repaired to avoid any risk of fuel oil leakage.

A clearly noticeable noise from the burner pump can be a sign of a clogged-up filter element. For replacement of the filter element, see MAINTENANCE.

MAINTENANCE

SAFETY NOTE: Fuel oil pollutes the water! Any fuel oil leakage occurring during maintenance must be collected. Observe the respective legal regulations!

It is recommended to change the filter element as part of the annual maintenance. The filter element must be changed when an even deposit has formed which hides the structure of the filter surface.

- Close the shut-off devices, stop withdrawal from the oil storage tank, use collecting device.
- Loosen straining ring of the filter cup by turning left, hold the filter cup and remove it, do not damage the O ring. Clean filter cup.
- Note: Further running out of oil is avoided by an integrated shut-off device.
- Unscrew the filter element at the bayonet catch.
- Insert new filter element.
- Do not touch the filter element at the surface shell, but only the link at the lower end to avoid loosening of finest fibers.
- Clean the sealing surfaces and the O ring, hold the filter cup and O ring in position and tighten it manually by means of the straining ring. Make sure there are no leaks! Replace any damaged O ring!

For replacement of easy-change filters, see additional sheet Assembly Instructions "Adapter for Fuel Oil Easy-Change Filters".

To continue, see STARTUP and OPERATION

To replace the deaerator cup, the complete unit must be replaced. For this purpose, see the steps explained in MAINTENANCE – Exchange of Filter Element.

It is recommended to check the fuel oil deaerator and its connections for leaks in the frame of the annual system maintenance, or after any long standstill.

NOTE ON FILTER ELEMENTS:

Select a filter element according to the specification of the burner manufacturer, taking into account filter fineness and the respective operating conditions.

The IWO Institute for Economically Efficient Fuel Oil Heating Systems recommends filter elements of sintered plastic of a mesh width of 30 to 75 µm.

For fuel oil burning installation with so-called "low NO_x burners" and burners of lower thermal output, GOK fine filter elements of a mesh width of < 35 µm are recommended.

OVERHAUL / REPAIR

If the measures explained under the headings STARTUP, OPERATION and MAINTENANCE fail to achieve regular re-STARTUP, and unless the instructions have been misunderstood, the oil fuel deaerator GS 2000 must be removed and sent to the manufacturer's for a check-up. Any unauthorised handling will result in loss of the qualification approval and any warranty and guarantee claims.

ADDITIONAL TECHNICAL DATA

Temperature scopes	0 - 60 °C	(Operating material and ambience)	
Pressure grade	PN 6	Material of housing	GD-ZnAl4Cu1
Nominal capacities:		Deaeration capacity	5 l/h air
Burner circuit	maximum 120 l/h	Tank supply	maximum 80 l/h

LIST OF ACCESSORIES

ref. no.	Description	Information on application
07 444	Straight screwed connection 8 x G 3/8	Form A according to DIN 2353 with cylindrical male thread, for metal conical nipple
07 447	Straight screwed connection 10 x G 3/8	
07 952	Conical nipple DRM 3/8 aluminium	Flat packing according to DIN 7603
12 060-00	Hose pipe according to DIN 4798 G 3/8 m x olive connection 10 x 400 mm length	Connecting hose oil line - GS 2000 Tank side connection with female thread G 3/8
12 060-01	Hose pipe according to DIN 4798 outside diameter 10 x olive connection 10 x 400 mm length	Connecting hose oil line - GS 2000 Tank side connection with olive connection 10
13 512-23	Vent cup	With vent screw
13 512-37	Connecting branch G 3/8 m x G 3/8 m ball-cone connection	Transition for the connection of the hose pipe with ball-cone connection and union nut
13 610	Oil suction pump	For startup
13 610-60	Adapter GS 2000 for oil suction pump	Connecting hose between vent screw and oil suction pump
13 850-22	Filter cup 500	Material: plastic
13 850-23	Filter cup 500 long	
13 850-24	O ring 500	Seal straining ring - filter and deaerator cup
13 851-33	Siku element 70 µm standard	Siku = sintered plastics
13 851-34	Siku element 35 µm standard	
13 851-53	Siku element 70 µm long	
13 851-54	Siku element 35 µm long	
13 851-60	Easy-change filter element 25 µm	
13 851-67	Retrofit kit easy-change filter 25 µm	consisting of adapter, conical nipple for adapter, and O ring 500
15 227	Universal connecting set 8/10 mm (1 set)	For pipe outside diameters of 8 and 10 mm
15 227-03	Universal connecting set 6 mm (1 set)	For pipe outside diameter of 6 mm
15 550	Pressure compensation valve PN 10	Recommended for the installation in the tank line (TL) to compensate temperature and pressure
15 073	Leak warning device LWG 2000 complete with indicator and standard probe	Oil signalling unit to comply with TRbF 231-1

**GOK****Regler- und Armaturen-Gesellschaft mbH & Co. KG**

Obrenbreiter Straße 2-16, D-97340 Marktbreit, Tel. +49 9332 404-0, Fax +49 9332 404-43

E-mail: info@gok-online.de Internet: www.gok-online.de