Operating Instructions

Gas Odorization System
GOE 2000

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1 Introduction

Due to the fact that natural gas by its very nature is odourless or can hardly be smelled, it is essential to odorize it in order to ensure that accidentally escaping gas is detected in time before an explosive gas-and-air mixture can form.

In accordance with Code of Practice G 280 of the German Association of Gas and Water Technology (DVGW), all gases as per DVGW Code of Practice G 260 which are used in public gas supply and have no sufficient inherent smell (warning smell) must be odorized. Odorization means adding to the gas an odorous substance what is called an odorant.
Special proportioning methods are necessary to add the odorant to the natural gas. On the one hand, a safe and constant odour intensity is desired, but on the other hand, adding too much odorant must be avoided to prevent unnecessary and unpleasant smells.

In order to achieve this purpose, the injection method has become widely accepted. With this method, precisely proportioned quantities of odorant are added to the natural gas. To do this, the volume pulses from a volumetric meter, e.g. a volume corrector, are used which are proportional to the gas quantity. This ensures an absolutely constant odorant concentration which is independent of the variations of the gas flow rate.

2 Functional Description

2.1 Odorization system

The odorization system operates in a communicative way between the reserve tank and the odorant tank, i.e. no auxiliary pressure (neither overpressure nor underpressure) is required to replenish the supply of odorant from the odorant tank into the reserve tank during operation. There is atmospheric pressure prevailing in the two tanks during operation.
Only a permanently installed hand vacuum pump is required for filling the reserve tank on starting up the system or changing the odorant tank. Using this pump, the odorant can also be delivered from the reserve tank back into the odorant tank.

The odorant level indicated by the level indicator is identical to the odorant level of the odorant tank.

The gas trap prevents the liquid column from being disrupted by possible gas bubbles being formed (e.g. by gas emissions in the odorant) in the communicating pipe system between the odorant tank and the reserve tank. In the case of the liquid column being disrupted, the automatic replenishment of odorant from the odorant tank into the reserve tank is disrupted.

Solenoid-actuated proportioning pumps (reciprocating diaphragm pumps) are used to inject the odorant into the gas flow. These pumps are controlled by volume pulses from a volumetric meter which are proportional to the gas quantity.

To protect the non-return valves of the proportioning pump and the injection nozzle, a fine filter is installed on the suction side upstream of the proportioning pump.

2.1.1 Standard equipment

2.1.1.1 17 l reserve tank (for 50 l and 100 l odorant tanks) or 35 l (for 200 l odorant tanks) with the following equipment:

- ♦ Level indicator with measuring burette and litre scale
- ♦ Gas trap in the communicating suction pipe
- ♦ Connection for level switch or level detector
- ♦ ready for connection of a flushing device

2.1.1.2 Unit flange valves for:

- ♦ Level indicators, top and bottom (2 pcs)
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2.2 Control unit

See “Publication No. 4.351 for the OSG 2000” and “Operating Instructions for the OSG 2000”.

2.3 Proportioning pumps

Explosion-protected solenoid-actuated (200 VDC) reciprocating diaphragm pumps are used as proportioning pumps. Refer to the data plate for the technical data of the solenoid actuators. A stainless steel diaphragm separates the odorant compartment from the hydraulic compartment.

The setting of the delivery rate in mm³/stroke is made through a continuous stroke adjustment feature by means of a counting mechanism or scale.

Technical data

Pump type	Pump data		Solenoid data		
NEW (OLD)	Max. pump pressure [bar,g]	Displace-ment [mm³/stroke]	Max. stroke frequency [pulses/h]	Pick-up time [s]	Release time [s]
MH–6-47	40	10 to 80	7200	0.35	0.15
MH–6-65	20	15 to 150	7200	0.35	0.15
MHO–15-300-M13 (5/12.5-solenoid 13)	80	30 to 280	4300	0.66	0.16
MHO–15-500-M13 (7/12.5-solenoid 13)	40	60 to 550	4300	0.66	0.16
MHO–15-1000-M13 (10/12.5-solenoid 13)	20	120 to 1100	4300	0.66	0.16
Refer to the “BINDER” manufacturer’s plate under “Typ” for the solenoid type used, e.g.: Type 4103E11 E11 ⇒ “Solenoid 11” (only with old equipment) Type 4103E13 E13 ⇒ “Solenoid 13”					

2.4 Gas trap

The gas trap is installed at the highest location of the communicating odorant system between the odorant tank and the reserve tank, namely at the top of the reserve tank. For the duration of a tank filling process, it prevents that the liquid column is disrupted due to minor leaks in the communicating odorant system or gas emissions in the odorant in the case of temperature or pressure variations. A drop of approx. 5 mm per week is possible under certain operating conditions. If the gas trap falls by more than 10 mm per week, it is necessary to check the leak-proofness of the suction connection between the odorant tank and the reserve tank as well as the gas trap itself.
To fill the gas trap using the hand pump, there is a measuring coupling available.
For use with mercaptans, there is a special design of a gas trap with an automatic venting device available.

2.5 Hand pump

The hand pump is used to deliver the odorant from the odorant tank into the reserve tank during start-up or tank change.
In addition, the hand pump can also be used to deliver odorant from the reserve tank back into the odorant tank.

2.6 Level indicator

The level indicator consists of a measuring burette with red scale division. The measuring burette is used to check the quantity delivered by the pump. A minor scale line corresponds to a volume of 100 mm³ (= 100 mg with tetrahydro-thiophene). The contents between two broad scale lines corresponds to a volume of 1,000 mm³.
Next to the measuring burette, there is a scale showing the odorant level (residual contents) in litres. On this scale, there are two red marks and one green mark. The two red marks identify the range for the calculation of the concentration and the green mark indicates a possibly necessary tank change.
The level indicator can be shut off using two shut-off valves.

2.7 Activated carbon filter 1000 g

The activated carbon filter prevents odorant vapours from escaping into the atmosphere.

2.8 Flow monitor, Type FS-01 for [EEx i] (option)

The flow monitor is installed vertically in the injection pipe downstream of the proportioning pump. It monitors the pulses from the control unit to the pump by means of the pulses returned by the flow monitor.

A pulse comparison is performed between the pump and the flow monitor each time after 500 pulses have been sent to the pump. In the case of a pulse difference of more than 1% (5 pulses), an alarm will be outputted (“Fault – Pulse Comparison”).

This fault message will persist until it is acknowledged by pressing the red acknowledgement button.

2.9 Level switch, Type 101-(S)-850 for [EEx i] (option)

The level switch is installed in the reserve tank. The operating point is at 800 mm from the top edge of the reserve tank. If the odorant falls below this limit, an alarm will be outputted (“Tank Level Min”).

2.10 Continuous level measurements [EEx i] for calculation of the odorant concentration and odorant level (option)

The continuous level measuring feature consists of a level detector with an attached 4-20 mA measuring transducer (with a 3-line display) and an intrinsically safe [EEx i] isolating device. The level detector is installed in the reserve tank and the isolating device in the control unit.
The calibration of the level detector and the parameterization of the measuring transducer are completely performed in the factory, so that no further settings are to be made on site.
The calculation of the concentration of odorant to be injected is made in mg/sm³ and there is a limit for it. If the odorant falls below this limit, an alarm will be outputted (“Odorant Concentration Below Min.”).
The calculated odorant concentration can be read off on the control unit and is also available as a 0/4-20 mA output signal for remote transmission.
In addition, the relevant odorant level (residual contents) in litres is displayed on the control unit and made available with a 0/4 - 20 mA output signal for remote transmission.

2.11 High-pressure flushing and venting device (option)

This device is used to flush the valves and fittings installed in the suction and injection pipes (e.g.: proportioning pump with suction and discharge valves, odorant filter, flow monitor and the complete injection nozzle) if maintenance or repair work has to be done. In addition, this device can be used to vent the odorant part of the proportioning pump (no odorant will escape). The max. backpressure is approx. 80 bar,g. All conventional flushing agents can be used.

3 Installation

3.1 Place of installation

For installation of the mechanical parts, it is essential to observe the guidelines of the relevant DVGW Codes of Practice (e.g. G 280).

Odorization systems must be installed in separate rooms with sufficient ventilation.
They must not be installed in controller rooms which are normally explosion-protected for explosion zone 2 only.

The control unit must be installed in an area free from explosion hazards.

To prevent flocculation in the odorant, a minimum temperature of +5°C should prevail in the installation room. The max. temperature must not exceed 40°C.

3.2 Mechanical installation

The mounting plate with spacers is to be fixed to the wall.
Optionally, a skid for floor installation (with lugs for additional wall-mounting) with installed odorization system and collector can be supplied.

When you fix the mounting plate, it is essential that you observe the vertical differences shown in the table below between the lower edge of the mounting plate and the upper edge of the grid (lower edge of the odorant tank) for the individual odorant tanks. Any deviation may have a negative effect on the calculation of the odorant level and the odorant concentration.

Odorant tank, 50 and 100 litres	**5 mm**
Odorant tank, 200 litres	**13 mm**

3.2.1 Piping

All connections of the odorization system are provided with *SWAGELOK* fittings. When you connect the injection pipe and the hoses, please observe the installation instructions for *SWAGELOK* fittings on the mounting plate.

3.2.1.1 The injection pipe must be installed using a 6 x 1 mm stainless steel pipe up to the injection nozzle in the gas pipe. After installation, a combined strength and leak test must be performed with the maximum proportioning pump pressure in each case.
To do this, shut the shut-off valve of the injection nozzle in the gas pipe, turn on the proportioning pump and keep it running until the solenoid actuator stops (no more strokes are performed). Then check the entire injection pipe for leaks.

3.2.1.2 To link the delivery and suction connections between the odorant tank and the reserve tank, stainless steel sheathed PTFE hoses must be used. The hoses are to be connected tightly on both sides. Make sure in particular that the suction hose is 100% leak-proof.
The suction hose (12 mm pipe dia.) must be installed with a continuous rise from the odorant tank to the reserve tank in order to ensure proper venting.

Entrapped air or leaks in the suction hose may cause a disruption of the liquid column between the two tanks and thus disrupt the automatic replenishment from the odorant tank.

3.2.1.3 The venting pipe at the output of the activated carbon filter is installed as standard with 6 x 1 mm stainless steel piping up to the lower edge of the mounting plate and terminates above the collector (it must not be led into the atmosphere).

3.2.2 Collector with grid and feet

The collector must be manufactured to WHG and tested (with test certificate).
Its capacity must be big enough to collect the odorant of the entire odorization system including the odorant tank.
Its base surface must be designed in such a way that all odorant-containing components are arranged within the collector, with the exception of the injection pipe.

3.3 Electrical installation

The standards VDE 0100, VDE 0165 (EN 60079-14) and VDE 0170/0171 (EN 50014, EN 50019, EN 50020) apply to the installation of the electrical equipment.

Tetrahydrothiophene (THT) which is mainly used as odorant is assigned to Explosion Hazard Group IIA, Temperature Class T4. Therefore, each room where odorant is present is an area subject to explosion hazards.

Electrical equipment must be designed in accordance with the requirements for zone 1 hazardous areas.

All the required connections of cables must be made to comply with the terminal diagrams.

Proposed types of cables:

Cable for proportioning pump : NYY-J 3x1.5 mm^2,
Cable for all the other devices : LIYCY 0.75 mm^2 (blue)

4 Start-up

4.1 Filling the reserve tank (Fig. 4)

4.1.1 The connecting hoses (suction and delivery hoses) between the filled odorant tank and the reserve tank are connected in a leakproof tight way.

4.1.2 Close the following shut-off valves:

- Start-up valve (3)
- Filling valve (4)
- Drain valve (9)
- Flushing valve (8), only if there is a flushing device available
- Ball valve (2) in the injection pipe downstream of the proportioning pump.

4.1.3 Open the following shut-off valves:

- Ball valve (1) in the suction pipe upstream of the reserve tank
- Reserve tank (7)
- Level indicator, top (5)
- Level indicator, bottom (6)

4.1.4 Turn on the control unit and on the operating level select “Internal Pulse Generator”, “Preselection ON” and “Pulse Generator Internal”.

4.1.5 Connect the filling hose between the hand pump (suction side; bottom) and the measuring coupling of the reserve tank.

4.1.6 Actuate the hand pump until the odorant level becomes visible on the bottom of the level indicator or until the odorant level in the gas trap rises (approx. 3 to 5 mm).

4.1.7 Open the ball valve (2) in the injection pipe downstream of the proportioning pump.

4.1.8 Open the filling valve (4). There will be a level compensation between the odorant tank and the reserve tank.

4.1.9 Afterwards, the gas trap must be filled as described in section 4.2.

4.2 Filling the gas trap (Fig. 6)

4.2.1 Connect the filling hose between the hand pump (suction side, bottom) and the measuring coupling to the gas trap.

4.2.2 Push the knob of the hand pump entirely into the pump and then pull it out very slowly with circular movements ↻ until the odorant reaches the MAX mark on the scale.
Then first remove the screw cap from the measuring coupling and after that push the knob into the pump.

4.2.3 If the odorant level falls to the MIN mark due to serious leaks in the communicating odorant system or gas emissions in the odorant, the gas trap must be filled again as described in section 4.2.2.

The filling process must be performed very slowly, otherwise the odorant may reach the hand pump.

4.3 Venting the proportioning pump (odorant part) without flushing device

4.3.1 To vent the proportioning pump, it is necessary that the odorant level of the reserve tank is always approx. 300 to 400 mm above the discharge valve of the proportioning pump.

4.3.2 If this higher level is not reached during operation, you must achieve it as follows using the hand pump:

4.3.3 Close the filling valve (4).

4.3.4 Close the ball valve (2) in the injection pipe downstream of the proportioning pump.

4.3.5 Operate the hand pump until the necessary odorant level of the reserve tank is reached.

4.3.6 Open the ball valve (2) in the injection pipe downstream of the proportioning pump.

4.3.7 Open the start-up valve (3).

4.3.8 Turn on the control unit and make the following settings on the “Internal Pulse Generator” level:

- Preselection “OFF”
- Pulse Generator “Internal”
- Internal Pulse Value “60 Pulses/min”

4.3.9 Set the proportioning pump to its maximum displacement.

4.3.10 Open the filling valve (4).

4.3.11 The odorant level falls in the reserve tank and the suction pipe of the pump and the complete pump head with suction and discharge valves are automatically vented (this applies only to proportioning pumps of Type MH - 6 - 47 / 65).
At the same time, a level compensation is performed between the odorant tank and the reserve tank.
In the case of proportioning pumps of Type MHO - 15 ... , you must loosen the injection pipe at the discharge valve and screw out the delivery valve housing approx. 2 turns so that the built-in compression spring is relieved. When the odorant comes out of the thread without any bubbles, you can retighten the valve housing and the injection pipe.

4.3.12 Close the valve (7) of the reserve tank and observe at the measuring burette whether the odorant level falls with each pump stroke in accordance with the displacement set.

Do never completely empty the measuring burette, otherwise you must repeat the venting process. Always refill the measuring burette by opening the valve (7) of the reserve tank if the minimum level is reached.

4.3.13 After you have terminated venting the proportioning pump, close the start-up valve (3) and check as described above whether the proportioning pump operates with backpressure. If necessary, open the start-up valve (3) again.

4.3.14 On the “Internal Pulse Generator” level of the control unit, select “Preselection ON”.
This will disrupt pulses from the internal pulse generator.
To prevent unintentional pulses from the internal pulse generator, you should always select “Preselection ON” during operation.

4.4 Venting the proportioning pump (odorant part) with flushing device

4.4.1 Close the valve (7) of the reserve tank.

4.4.2 Close the valve (6) at the bottom of the level indicator.

4.4.3 Open the flushing valve (8).

4.4.4 Open the screw cap of the tank containing the flushing agent 1 turn.

4.4.5 Make the flushing pump perform approx. 10 strokes.

4.4.6 Close the screw cap of the tank containing the flushing agent.

4.4.7 Close the flushing valve (8).

4.4.8 Open the valve (7) of the reserve tank.

4.4.9 Open the valve (6) at the bottom of the level indicator.

4.5 Venting the proportioning pump (hydraulic part)

4.5.1 Open the venting screw for the hydraulic compartment approx. 1 turn during operation and close it again after approx. 5 pump strokes.

4.5.2 Repeat the above venting process up to three times at intervals of approx. 5 minutes.

4.5.3 After the venting process has been terminated, check the oil level (only in the case of proportioning pumps of Type MH - 6 - 47 / 65).

4.6 Setting the displacement on the proportioning pump

4.6.1 Using the “Calculation – Pump Setting” program (see 5.8 in the “Operating Instructions for the OSG 2000”), the pulse value and the stroke setting of the proportioning pump can be calculated. Set the displacement accordingly on the proportioning pump.

4.6.2 Calculation of pump setting (without calculation program)

In order to convert working cubic metres [m³] to standard cubic metres [sm³], it is sufficient for the following calculations to use only the absolute operating pressure.

Tetrahydrothiophene (THT) has a density of about 1 kg/dm³

Therefore, 1 mg of liquid odorant (THT) corresponds to the volume of 1 mm³.

Symbols and conversions used

$Q_{b,\,max}$ = Max. gas flow – standard cubic metres [sm³/h] $\Rightarrow$ $sm^3/h = m^3/h \times p_{abs}$

$Q_{m,\,max}$ = Max. gas flow – working cubic metres [m³/h]

I1 = Input pulse value [sm³/pulse] : Take it over from “Parameterization”

P_p = Pulse value – pump [sm³/pulse] : Take it over from “Parameterization”

p_g = Gauge pressure [bar]

p_a = Absolute operating pressure [bar] $\Rightarrow$ $p_a = p_g + 1$

f_{pump} = Max. stroke frequency of the proportioning pump [pulses/h], see 2.3.1

V_{pump} = Max. output of the proportioning pump [mm³/stroke], see 2.3.1

ρ = Density of the odorant [kg/dm³]

c = Desired odorant concentration [mg/sm³]

$V_{setting}$ = Setting of the proportioning pump [mm³/stroke]

Calculation of the output (quantity to be set)

$$V_{setting} = \frac{I1 \times c \times P_p}{\rho} \text{ [mm³/stroke]}$$

Calculation of the stroke frequency

$$f_{pump} = \frac{Q_b}{I1 \times P_p} \text{ [strokes/h]}$$

When you make your calculations, make sure that

a) the maximum stroke setting (V_{pump}) and

b) the maximum stroke frequency (f_{pump})

of the proportioning pump are not exceeded (see 2.3.1).

Example 1: ⇒ Odorant – THT
Input pulses from a gas volume corrector
Proportioning pump: MHO-15-300-M11

Q_b = 10,000 [sm³/h]

I1 = 1.0 [sm³/pulse]

P_p = 5.0 [sm³/pulse]

ρ = 1 (THT) [kg/dm³]

c = 20 [mg/sm³]

$f_{pump, max}$ = 5,000 [strokes/h]

$V_{pump, max}$ = 280 [mm³/stroke]

Calculation of the output (quantity to be set)

$$V_{setting} = \frac{1 \times 20 \times 5}{1} = 100 \text{ [mm³/stroke]}$$

Calculation of the stroke frequency

$$f_{pump} = \frac{10{,}000}{1 \times 5} = 2{,}000 \text{ [strokes/h]}$$

Example 2: ⇒ Odorant – THT
Input pulses from a turbine meter
Proportioning pump: MH-6-47

Q_m = 1,600 [m³/h]

Q_b = $Q_m \times p_a$ = 1,600 × 8.5 = 13,600 [sm³/h]

$I1_m$ = 1.0 [sm³/pulse]

$I1_b$ = $I1_m \times p_a$ = 1.0 × 8.5 = 8.5 [sm³/pulse]

p_g = 7.5 bar

p_a = p_g + 1 = 8.5 bar

P_p = 3 [sm³/pulse]

ρ = 1 [kg/dm³] (THT)

c = 15 [mg/sm³]

$f_{pump, max}$ = 7,200 [strokes/min]

$V_{pump, max}$ = 80 [mm³/stroke]

Calculation of the output (quantity to be set)

$$V_{setting} = \frac{8.5 \times 15 \times 3}{1} = 45 \text{ [mm³/stroke]}$$

Calculation of the stroke frequency

$$f_{pump} = \frac{13{,}600}{8.5 \times 3} = 4{,}533 \text{ [strokes/h]}$$

Example 3: ⇒ Odorant – MERCAPTANS
Input pulses from a gas volume corrector
proportioning pump: MH-6-47

Q_b = 12,000 [sm³/h]

I1 = 10.0 [sm³/pulse]

P_p = 5.0 [sm³/pulse]

ρ = 0.82 [kg/dm³] (MERCAPTANS)

c = 6 [mg/sm³]

$f_{pump, max}$ = 7,200 [pulses/h]

$V_{pump, max}$ = 80 [mm³/stroke]

Calculation of the output (quantity to be set)

$$V_{setting} = \frac{10 \times 6 \times 5}{0.82} = 36.6 \text{ [mm³/stroke]}$$

Calculation of the stroke frequency

$$f_{pump} = \frac{12{,}000}{10 \times 5} = 2{,}400 \text{ [strokes/h]}$$

4.7 Starting up the control unit

4.7.1 The parameterization and configuration of the control unit is to be made in compliance with the “Operating Instructions for the OSG 2000”.

4.7.2 After you have selected “Operating Mode – AUTOMATIC”, “Pulse Generator – External” and “Proportioning Pump – ON” on the “Parameterization” level, the start-up process of the entire odorization system has been terminated.

4.7.3 The operating data set should be recorded in a list.

5 Operation

5.1 Service settings

5.1.1 Close the following shut-off valves:

- ♦ Start-up valve (3)
- ♦ Drain valve (9)
- ♦ Flushing valve (8), only if there is a flushing device available

5.1.2 Open the following shut-off valves:

- ♦ Reserve tank (7)
- ♦ Level indicator, top (5)
- ♦ Level indicator, bottom (6)
- ♦ Filling valve (4)
- ♦ Ball valve (2) in the injection pipe downstream of the proportioning pump
- ♦ Ball valve in the injection pipe upstream of the injection nozzle
- ♦ Ball valve (1) in the suction pipe upstream of the reserve tank

5.1.3 Make the following settings on the “Parameterization” level of the control unit:

- ♦ Operating Mode “AUTOMATIC”
- ♦ Pulse Generator “External”
- ♦ Proportioning Pump “ON”

5.2 Changing the odorant tank

When the odorant level has reached the green mark on the scale of the level indicator or when the “Change Tank” message is displayed on the control unit, the residual contents of the odorant tank can be pumped into the reserve tank in order to change the odorant tank.

5.2.1 Connect the filling hose between the hand pump (suction side; bottom) and the measuring coupling of the reserve tank.

5.2.2 Close the filling valve (4).

5.2.3 Close the ball valve (2) in the injection pipe downstream of the proportioning pump.

5.2.4 Actuate the hand pump until the odorant level in the gas trap is completely down. This means that the suction pipe has been emptied and the communicating system has been disrupted.

5.2.5 Close the ball valve (1) in the suction pipe.

5.2.6 Loosen the suction and delivery hoses on the odorant tank.

5.2.7 Change the odorant tank.

5.2.8 Connect the suction and delivery hoses to the odorant tank again.
The suction hose must be installed with a continuous rise from the odorant tank to the reserve tank in order to ensure proper venting.

5.2.9 Open the ball valve (1) in the suction pipe.

5.2.10 Actuate the hand pump until the odorant level rises in the reserve tank.
Now the communicating system is filled with odorant again.

5.2.11 Open the ball valve (2) in the injection pipe downstream of the proportioning pump.

5.2.12 Open the filling valve (4).

5.2.13 Fill the gas trap as described in 4.2. A level compensation will be performed between the odorant tank and the reserve tank.

5.3 Removing and installing the suction and discharge valves of the pump head

5.3.1 Refer to the relevant sectional drawings to remove or install the valves.

5.3.2 When you disassemble the valve inserts, make sure that the valve heads and the nozzles are not interchanged between the suction and discharge valves.

5.3.3 When you install the discharge valve, insert the individual parts centrically into the pump head and then screw in the valve housing. When you screw in the valve housing, make sure that the valve parts do not get out of place.

5.4 Checking the delivery of the proportioning pump

5.4.1 Turn on the control unit and make the following settings on the “Internal Pulse Generator” level:

- Preselection “ON”
- Pulse Generator “Internal”
- Internal Pulse Value “60 Pulses/min”

5.4.2 Close the valve (7) on the reserve tank.

5.4.3 Mark the odorant level on the level indicator (e.g. with adhesive tape or a water-soluble felt-tip pen).

5.4.4 Determine the odorant volume in mm³ available in the measuring burette. The volume between two minor scale lines is 100 mm³ and between two broad scale lines 1,000 mm³.

5.4.5 The volume determined in the measuring burette divided by the displacement in mm³ set on the proportioning pump is the number of possible pump strokes.

Example:

Volume in the measuring burette = 1,600 mm³ (16 minor scale lines)
Displacement set on the proportioning pump = 80 mm³
Number of possible pump strokes 1,600 : 80 = 20 strokes

5.4.6 On the control unit, enter the number of possible pump strokes (e.g. 20) under “Internal Pulse Generator”, “Pump Strokes No.” and initiate the start of those 20 pump strokes under “Start Pump Strokes” by pressing “Shift + F5”.

5.4.7 After the preset pump strokes have been terminated automatically, mark the new odorant level on the protective pipe of the level indicator, determine the volume delivered and divide it by the number of performed (preset) pump strokes.
The calculated value should be identical to the set displacement of the proportioning pump (permissible deviation: ± 5%).
If the deviation is larger, refer to the “Troubleshooting Table”.

5.4.8 After the delivery check has been terminated, reset the original service settings on the control unit and the shut-off valves in accordance with 5.1.

5.5 Draining the reserve tank (Fig. 5)

5.5.1 Connect the filling hose between the hand pump (delivery side; top) and the measuring coupling of the reserve tank.

5.5.2 Close the filling valve (4).

5.5.3 Actuate the hand pump until the odorant level in the gas trap is completely down. This means that the suction pipe has been emptied and the communicating system has been disrupted.

5.5.4 Put the odorant collecting vessel under the discharge pipe of the drain valve (9).

5.5.5 Open the drain valve (9).

5.5.6 The residual odorant can be drained using the hand pump.

5.5.7 After the reserve tank has been drained, reset all shut-off valves to their service positions in accordance with 5.1.

5.6 Flushing the suction and delivery pipes with all fittings

5.6.1 Close the valve (7) on the reserve tank.

5.6.2 Close the valve (6) at the bottom of the level indicator.

5.6.3 Open the flushing valve (8).

5.6.4 Open the screw cap of the tank containing the flushing agent 1 turn.

5.6.5 Operate the flushing pump (output: 6 cm³/stroke; 0.5 m 6 × 1 mm pipe, max. gas backpressure: approx. 80 bar,g).

5.6.6 After the flushing process has been terminated, close the screw cap of the tank containing the flushing agent.

5.6.7 Close the flushing valve (8).

5.6.8 Open the valve (7) of the reserve tank.

5.6.9 Open the valve (6) at the bottom of the level indicator.

5.7 Shutting down the system

5.7.1 Operate the power switch (green button) of the control unit in order to switch off the device.

5.7.2 Close the ball valve (2) in the injection pipe downstream of the proportioning pump.

6 Maintenance and Functional Checks

As to maintenance and monitoring, DIN-DVGW rules and regulations G 280 shall apply.

Due to the special importance of gas odorization, we would recommend the following measures:

6.1 Functional checks

6.1.1 Possible disturbances must be eliminated at once.

6.1.2 Check the delivery of the proportioning pump in accordance with 5.6 (on a weekly basis).

6.1.3 Check the odorant level of the gas trap (on a weekly basis).

6.1.4 Check the level of the odorant tank (on a weekly basis).

6.1.5 Check the oil level (on a monthly basis).

6.1.6 Change the activated carbon (at one-year intervals or earlier, if necessary).

6.1.7 Maintenance (at 2-year intervals by specialist staff).
(RMG Messtechnik GmbH can offer maintenance contracts at fixed prices or maintenance charged at actual cost.)

7 Troubleshooting

7.1 Troubleshooting table

Fault	Cause	Remedy
7.2 Initial output of the proportioning pump is no longer achieved.	7.2.1 Air in the odorant part of the pump head	♦ Vent the odorant part of the pump head (see 4.3 or 4.4).
	7.2.2 Air in the hydraulic part of the pump head	♦ Vent the hydraulic part of the pump head (see 4.5).
	7.2.3 Valves of the proportioning pump are leaky.	♦ Check delivery as described in 5.4: If the level does not rise in the measuring burette during the delivery stroke, the suction valve is leaky. If the stroke volume set at the proportioning pump is not sucked away during the suction stroke, the discharge valve is leaky. ♦ Remove the valves (see 5.3) and replace the parts.
	7.2.4 Odorant filter is soiled.	♦ Clean or replace the filter element.
7.3 Odorant level in the gas trap falls to "MIN".	7.3.1 Odorant tank is empty.	♦ Change or refill the odorant tank.
	7.3.2 Connection between odorant tank and reserve tank is not tight.	♦ Check external tightness of the suction connection, if necessary, replace suction pipe and/or screwed connection of the odorant tank.
	7.3.3 Gas trap is not tight.	♦ Replace all seals.
	7.3.4 Measuring coupling of the gas trap is not tight.	♦ Replace the measuring coupling.
	7.3.5 Automatic venting device is defective.	♦ Check float for leaks. ♦ Check the MIN / MAX limit switches for proper functioning. ♦ Check solenoid valve for proper functioning. ♦ Check vacuum pump for proper functioning.
7.4 Fault – Pulse Comparison	7.4.1 Flow monitor is not properly adjusted.	♦ Adjust operating point of the flow monitor.
	7.4.2 Initial output of the proportioning pump is no longer achieved.	♦ Take measures as described in 7.2.
	7.4.3 Flow monitor is soiled.	♦ Disassemble the flow monitor and clean all components.
	7.4.4 Odorant filter is soiled.	♦ Clean or replace the filter element.

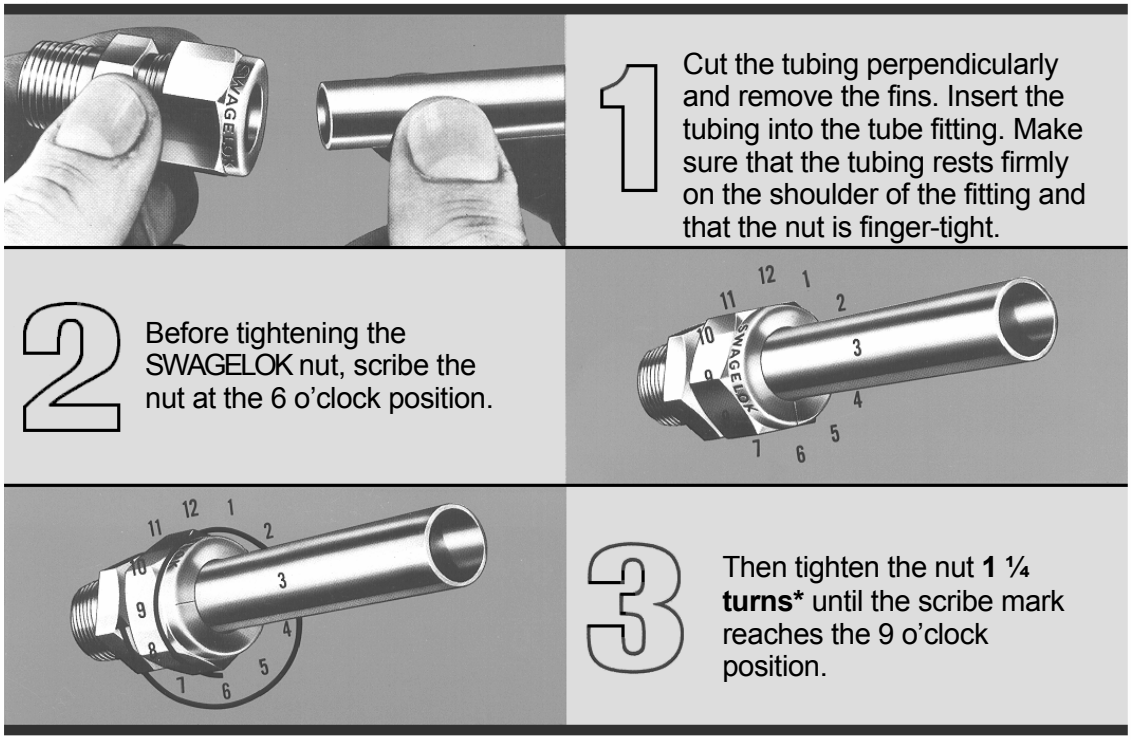
8 Annex

8.1 Installation instructions for SWAGELOK fittings

INSTALLATION INSTRUCTIONS FOR

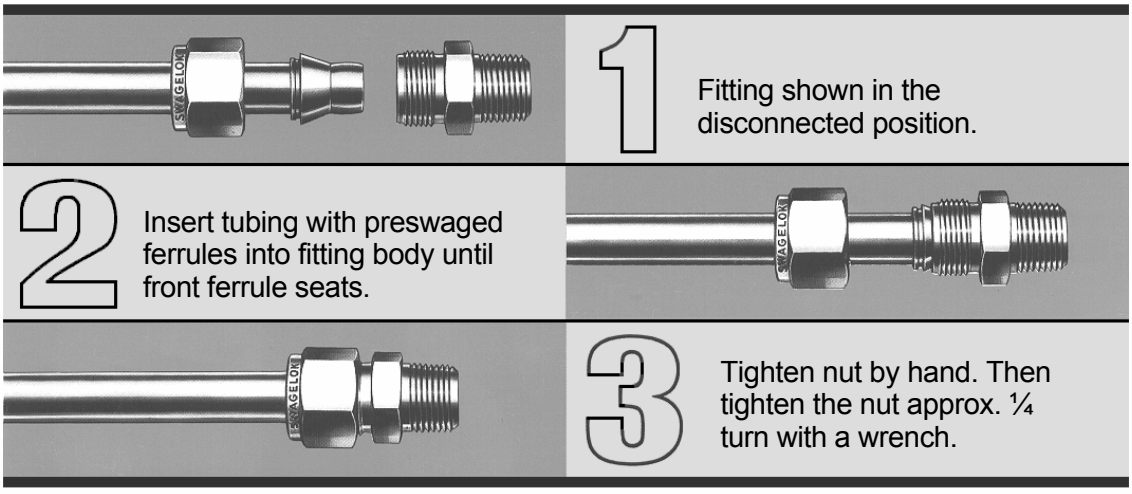
Swagelok® TUBE FITTINGS

INITIAL INSTALLATION

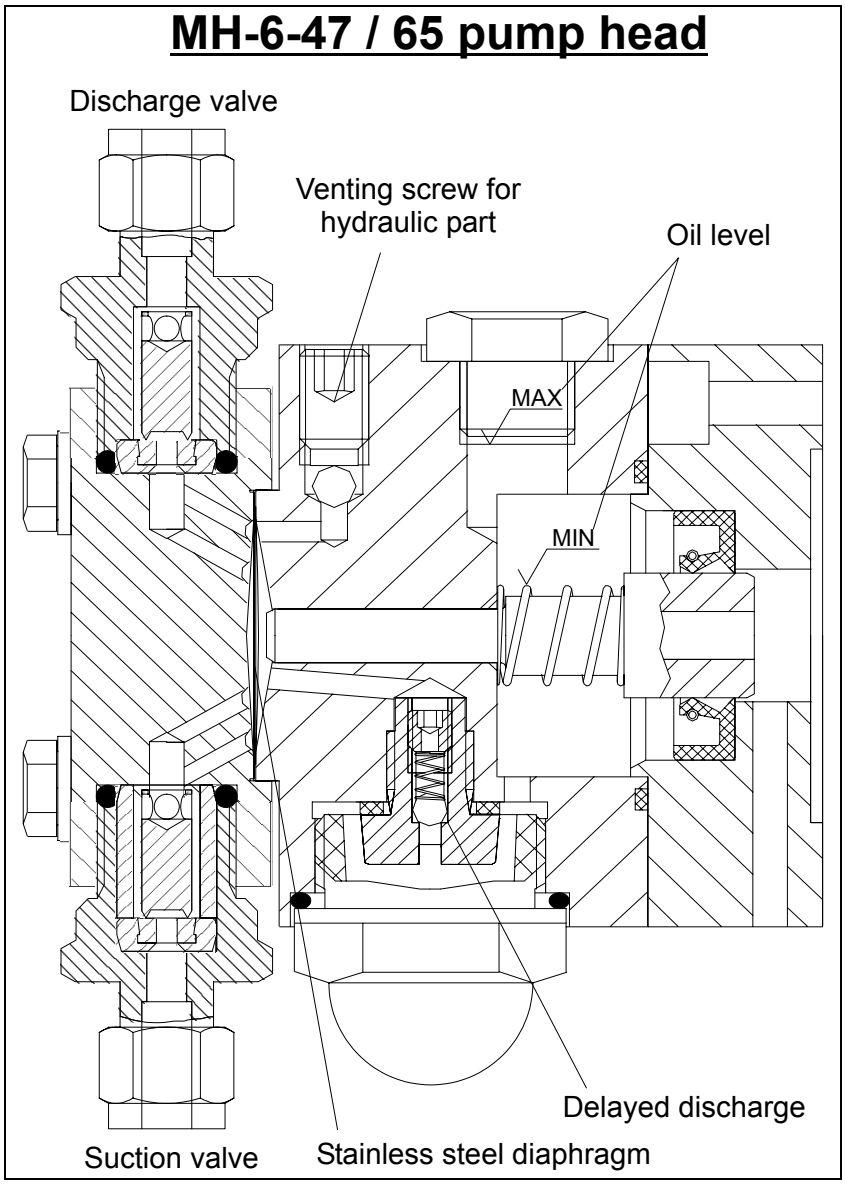


* For 2, 3, 4 mm or 1/16, 1/8, 3/16 in. size tube fittings, tighten the nut ¾ turn on initial installation.

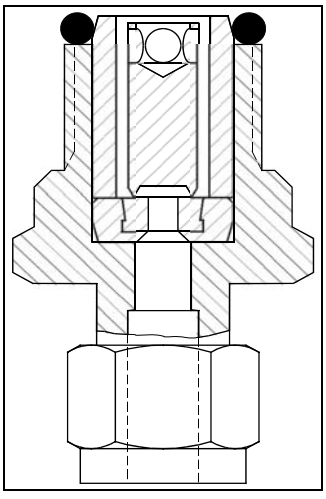
RETIGHTENING INSTRUCTIONS



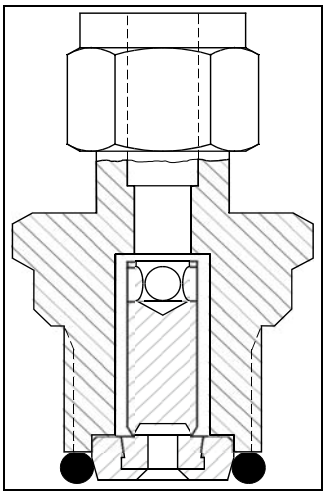
8.2 Cross-sectional diagrams – MH-6-47 / 65 proportioning pump



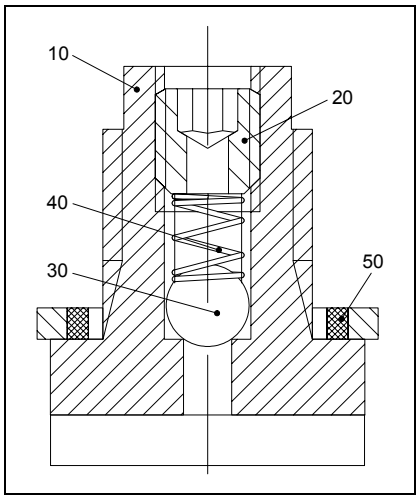
Suction valve



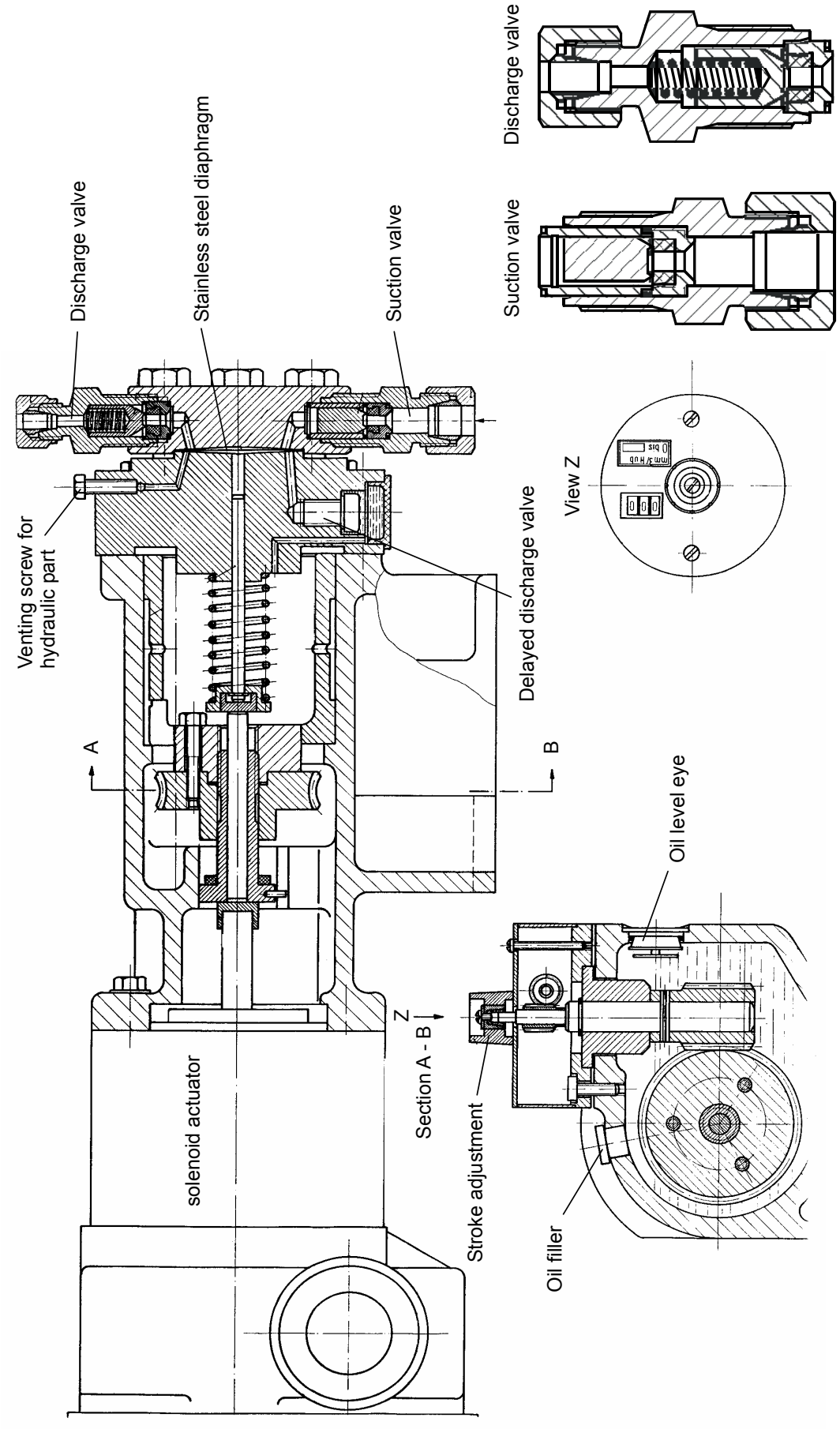
Discharge valve



Delayed discharge valve



8.3 Cross-sectional diagrams – MHO-15-300 proportioning pump



8.4 Cleaning declaration

All parts of odorization systems which were in contact with odorant must always be cleaned before they are sent to our factory for replacement or repair. (This also applies to parts which our service engineer takes with him.)

RMG Messtechnik GmbH
Attn. Mr Koch
Otto-Hahn-Straße 5

35510 Butzbach (Germany)

The fact that the cleaning was performed must be confirmed in writing (see Information Sheet overleaf) and the cleaning declaration is to be distributed as follows:

1 copy is to be sent to the address on the left
1 copy must accompany the consignment

Sender : .....

Street : .....

City : .....

Contact : .....

Tel. : .....

Fax : .....

Item(s) cleaned:

☐ Proportioning pump Type: ..... Serial No.: .....

☐ Suction/discharge valves ☐ Flow switch (FS) ☐ Level switch (LSL)

Other items: .....

☐ The item(s) was (were) cleaned using:

☐ The item(s) cleaned is (are) free from any hazardous material in conformity with the German Toxic Substances Control Act and the German Ordinance on Dangerous Substances (GefStoffV).

The item(s) cleaned was (were) in contact with the following odorant:

☐ TETRAHYDROTHIOPHENE (THT)

☐ SCENTINEL E

☐ OTHER .....

Date:	Name:	Signature:

8.5 Information sheet

Information Sheet

for repairs of

odorization systems,
odorization pumps and
parts of odorization systems

in the factory of
RMG Meßtechnik GmbH

The German Toxic Substances Control Act and the German Ordinance on Dangerous Substances (GefStofV) prohibit the release of liquid or gaseous odorants into the atmosphere.

In order to ensure this, all parts contaminated with odorant must be thoroughly cleaned before sending the device for repair.

You are requested to confirm us on the declaration overleaf that such cleaning has been performed. If we do not receive this declaration, we cannot make any repairs.

For cleaning, we would recommend using an odour covering and neutralizing agent for gas odorants

e.g.: “Penncover / ethanol 641/642 verg. M. 1 % MEK“ from Pennodorant

9 Pictures

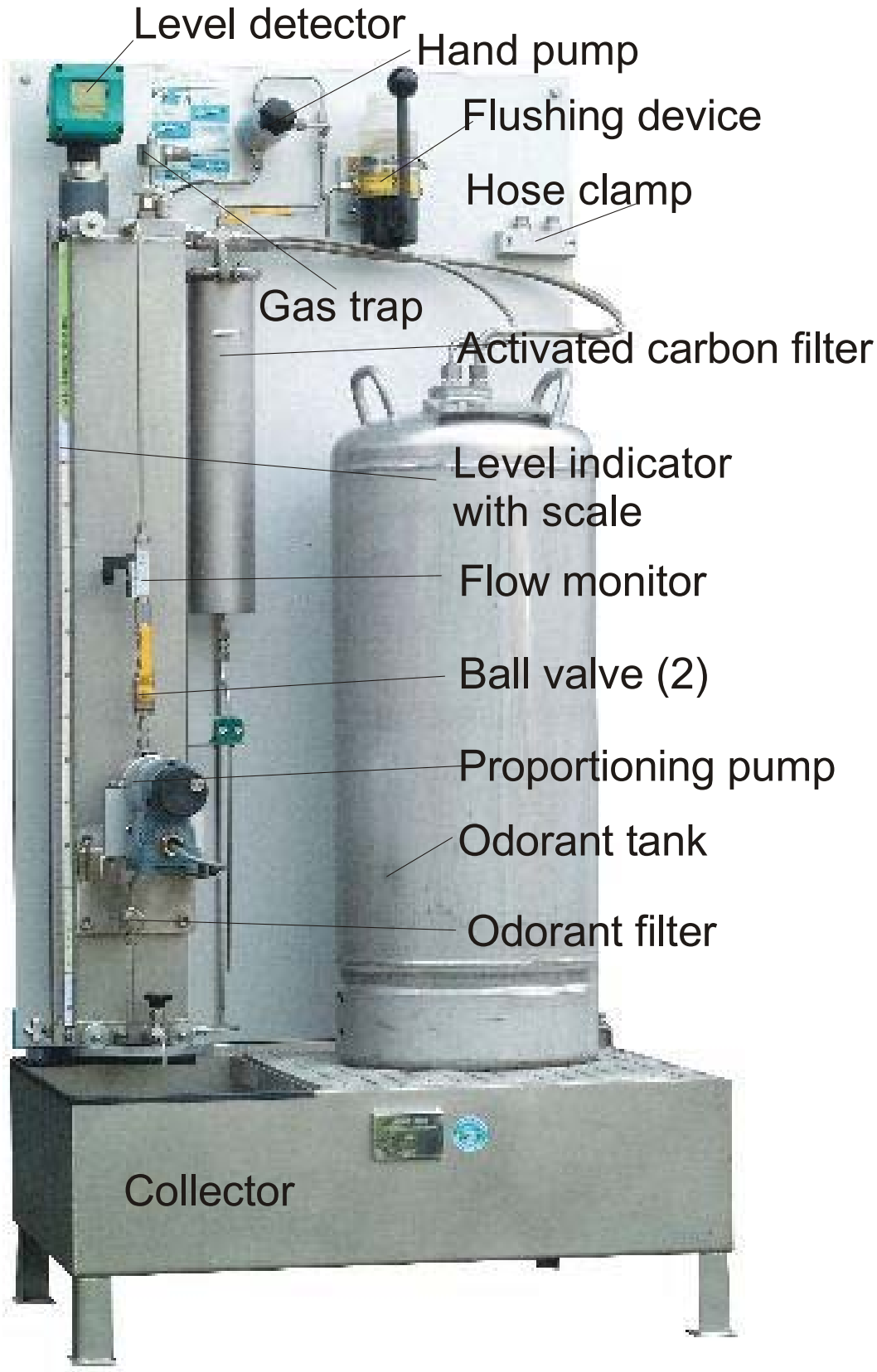


Fig. 1: GOE 2000 gas odorization system

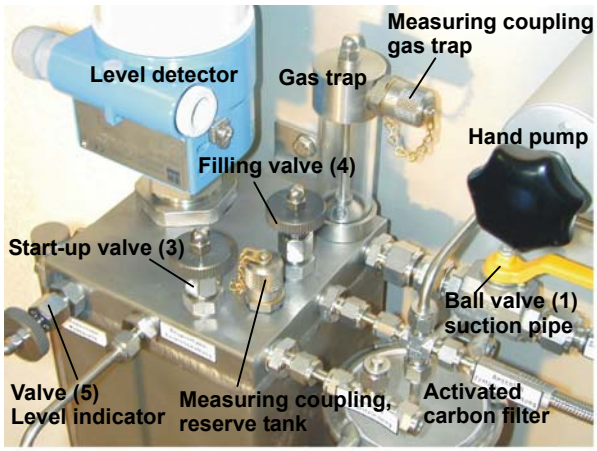


Fig 2: Reserve tank, top

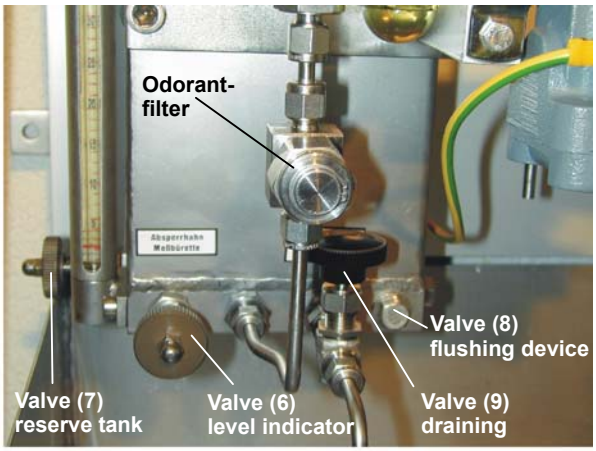


Fig 3: Reserve Tank, bottom

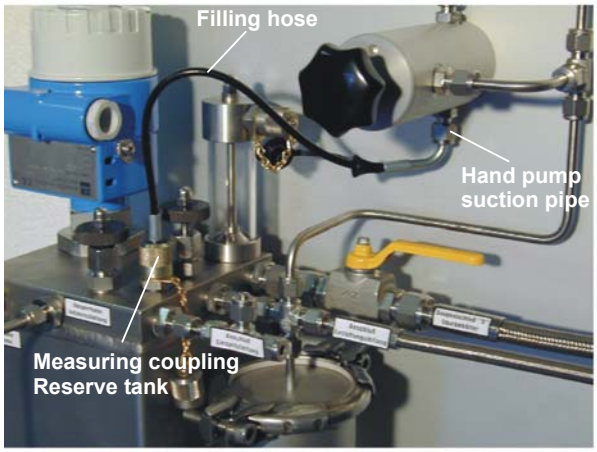


Fig 4: Filling the reserve tank

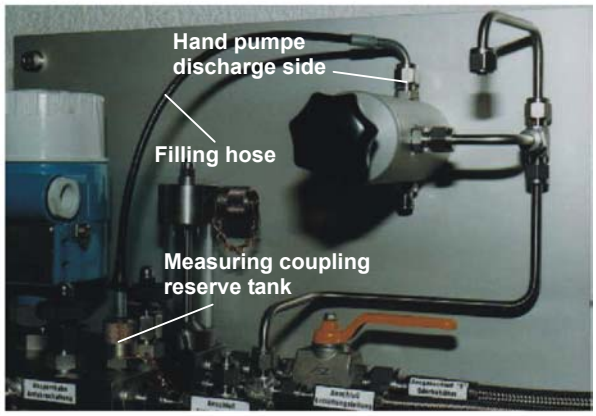


Fig 5: Draining the reserve tank

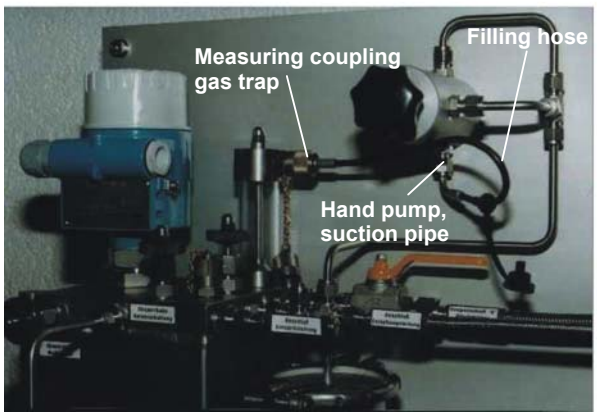


Fig 6: Filling the gas trap