

New Unit Information



HDS 9/16 ST-GAS
HDS 9/16 ST-GAS LPG
HDS 12/14 ST-GAS NG+LPG

1.251-...

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1 Technical features

High-pressure supply unit with gas-driven hotwater generator, suitable for closed fresh air and exhaust airflow, for central supply of highpressure cleaning systems.

ORIGINAL HDS 9/16 ST GAS NG up to 12/2005 (1.251-101.0)

REVISED HDS 9/16 ST GAS NG from 01/2006 and LPG and HDS 12/14 ST-GAS NG+LPG (1.251-103.0, 1.251-104.0)

Design:

- Pump and motor as HDS 895
- Stainless steel piston with ceramic sleeve
- Stainless steel valves
- Carbon fibre reinforced valve cages
- Brass cylinder head
- Stainless steel continuous-flow heater
- Stainless steel heating coil
- Water cooled boiler jacket
- Gas-fired forced draught burner with surface burner technology
- Adjustable pressure/flow control
- Steplessly variable cleaning agent suction

Electrics:

- Automatic switching on during the availability time (2 - 8 minutes)
- Shutdown during stoppage
- Hot water temperature infinitely adjustable
- Pressure switch for switching on/off the pump unit
- Control unit for gas burner with hot electrode
- Motor monitoring by:
 - Motor thermal (winding shield) contact
 - Motor protective relay
- Fault display for:
 - Exhaust thermostat
 - Burner fault
 - Stand-by
 - Motor overheating

- Scale inhibitor level
- Safety features:
 - Flame monitoring system
 - Water shortage safety device
 - Exhaust temperature limiter
 - Safety valve

Important:

Note:

Prerequisite for service works on parts carrying gas in a National Licence for Gas Installations as well as special training for the unit.

Only a specialist firm approved by the national gas and water authorities may install the gas pipe and connect the unit to this pipe.

The gas installation must be carried out by an approved or licensed skilled person.

- The national and regional regulations for the installation and operation of the unit must be observed. The chimney system must be suitable for overpressure.

Note:

The unit must be set to the gas type available during the commissioning on-site. The regional gas suppliers can be contacted for this information.

- The HDS 9/16 ST-GAS (NG) and HDS 12/14 ST-GAS (NG) units are set in the factory to gas type G 20.
- The HDS 9/16 ST-GAS LPG and HDS 12/14 ST-GAS (LPG) units are set in the factory to gas type G 31.
- Adequate ventilation of the room in which the unit is installed must be guaranteed.
- An outlet with siphon is to be provided for connecting the unit. Quantity of condensate arising 3-4 l/h.
- Only trained Kärcher customer service fitters are permitted to make adjustments and repairs to the gas burner.

2.1 View from the front

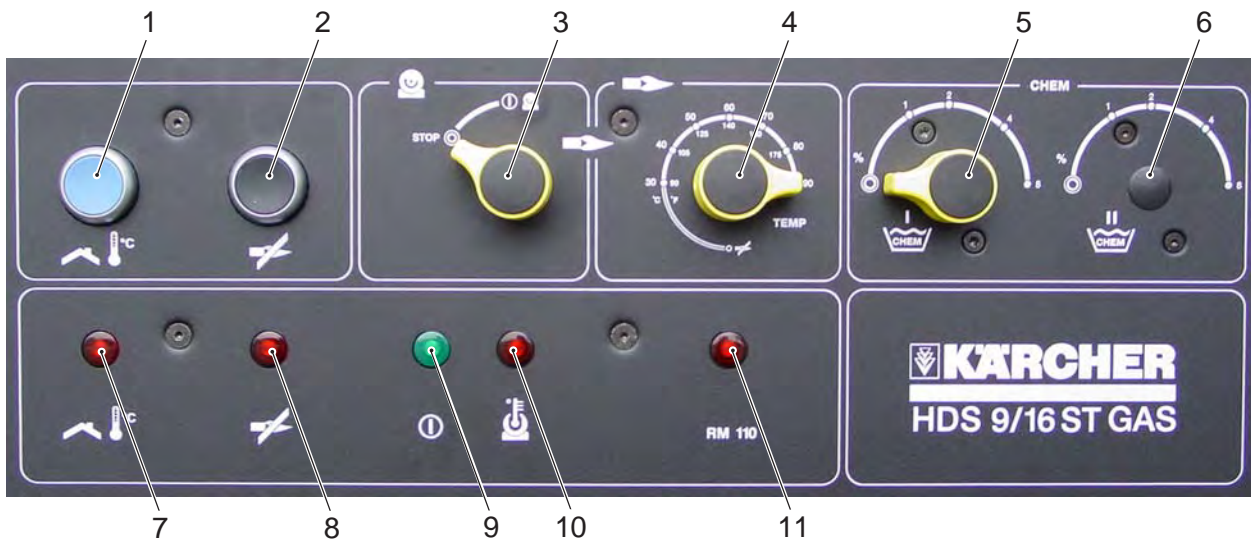


HDS 9/16 ST-GAS

- | | |
|--|---------------------------|
| 1 Cover, float tank | 7 Water connection |
| 2 Pressure gauge | 8 Front cover |
| 3 Opening to the pressure and flow control | 9 Control panel |
| 4 Mains connection cable | 10 Continuous flow heater |
| 5 Addresses field | 11 Gas burner housing |
| 6 Intake hose, cleaning agent | |

2.2 Control panel

Control panel of the HDS 9/16 ST GAS (NG up to 12/2005), black **ORIGINAL**

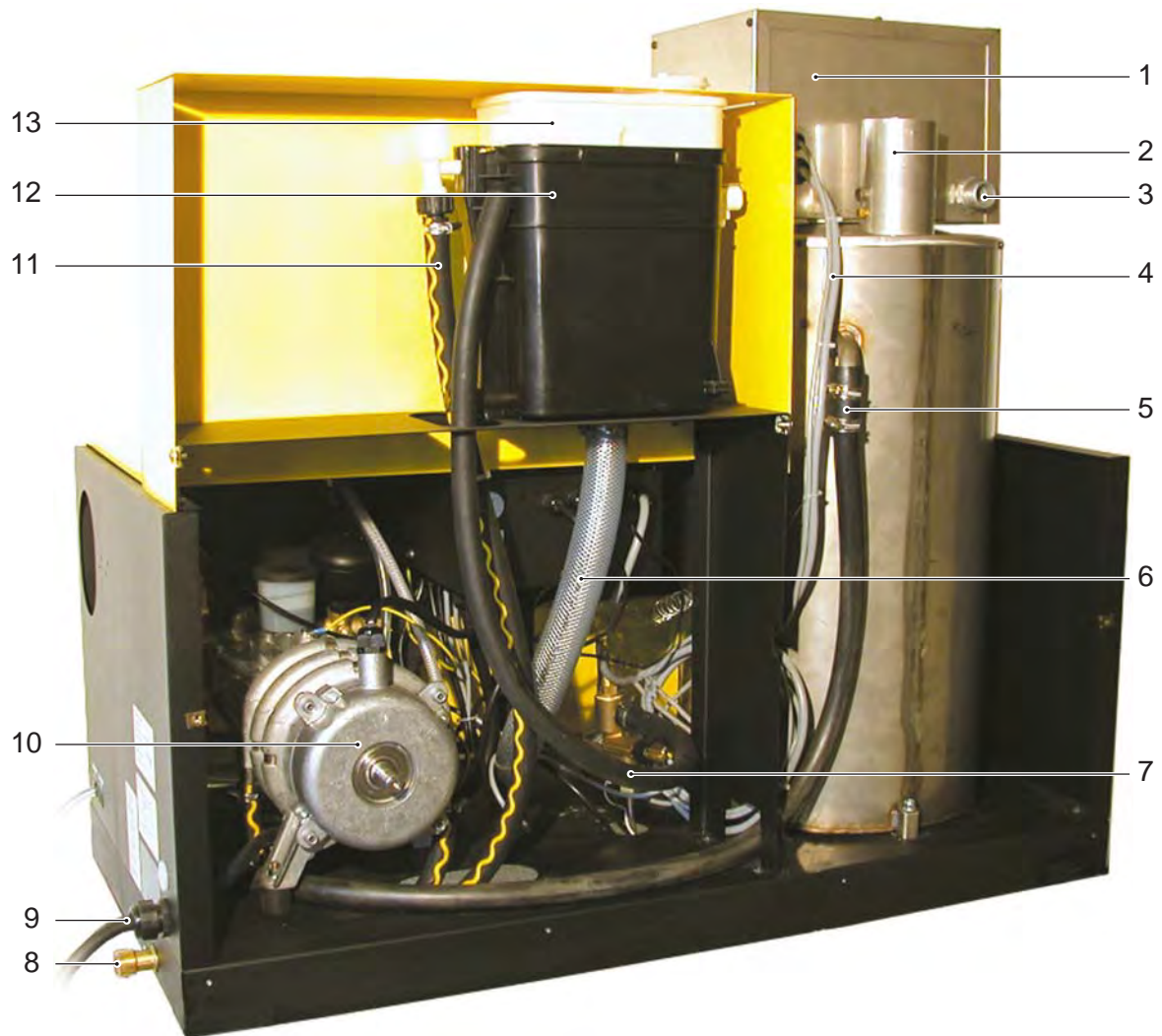


Control panel of the HDS 9/16 ST GAS, (NG from 01/2006 and LPG) **REVISED**
and HDS 12/14 ST-GAS NG+LPG, stainless steel



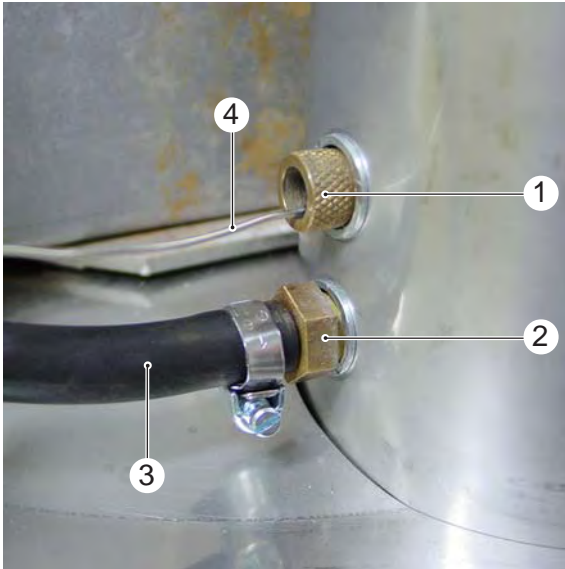
- | | |
|---|---|
| 1 Exhaust thermostat release button (B2) | 7 Exhaust thermostat indicator lamp (red) (H4) |
| 2 Control unit for gas burner release button (S2) | 8 Burner fault indicator lamp (red) (H5) |
| 3 Unit switch (Q1) | 9 Standby indicator lamp (green) (H1) |
| 4 Temperature regulator (B1) | 10 Motor overheating indicator lamp (red) (H2) |
| 5 Cleaning agent - metering valve I | 11 Scale inhibitor level indicator lamp (red) (H3) |
| 6 Cleaning agent - metering valve II (option) | 12 Control panel (NG from 01/2006 and LPG and HDS 12/14 ST-GAS NG and LPG), the arrangement and function of the controls are identical with the ORIGINAL -version. |
- () see circuit diagram

2.3 View from the rear (without rear wall)



- | | |
|--|--|
| 1 Gas burner housing | 8 Water connection |
| 2 Exhaust connecting sleeve | 9 Mains connection cable |
| 3 Gas connection | 10 Motor |
| 4 Connection cable for gas-fired forced draught burner | 11 Water hose, motor cooling to the float tank |
| 5 Water hose, boiler cooling - outlet to the pump inlet | 12 Float tank |
| 6 Water hose, float tank- outlet to the boiler cooling inlet | 13 Container for scale inhibitor |
| 7 Water hose, safety valve to the float tank | |

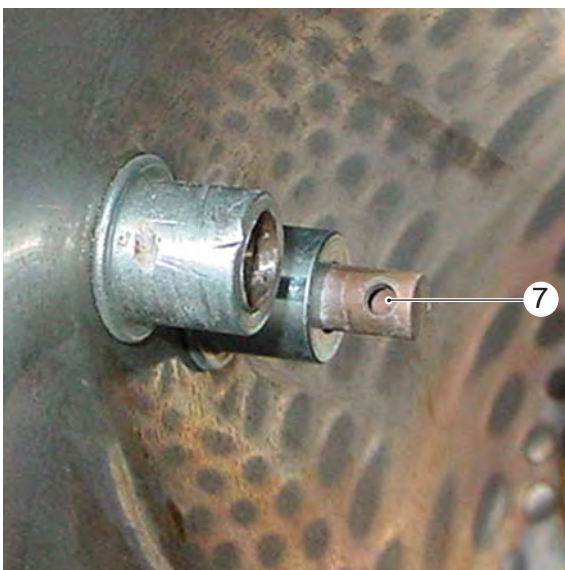
2.3.1 View from the rear / exhaust connecting sleeve



Connections at the exhaust connecting sleeve



Measuring points in the exhaust connecting sleeve



Measuring point for exhaust gas pressure switch in the exhaust connecting sleeve

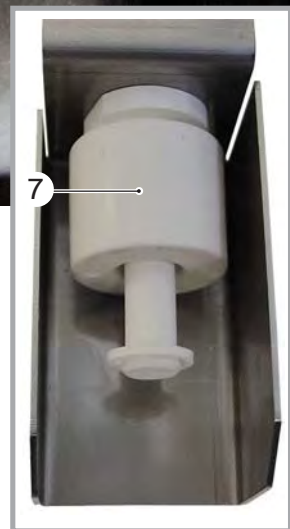
At the connection points (1, 2) at the exhaust connecting sleeve, the exhaust temperature is measured using the exhaust temperature sensor (5) and the exhaust pressure is measured using the exhaust pressure sensor (6). The pressure hose (3) is connected to the exhaust pressure switches in the gas burner housing.

Note:

The opening in the exhaust pressure sensor (7) must be fitted in the exhaust gas direction of flow in order to obtain a precise exhaust pressure measurement.

- 1 Connection point, exhaust temperature sensor
- 2 Connection point, exhaust pressure measurement
- 3 Pressure hose
- 4 Capillary tube
- 5 Exhaust temperature sensor
- 6 Exhaust pressure sensor
- 7 Opening in exhaust pressure sensor

2.4 Float tank (NG from 01/2006 and LPG) **REVISED** and HDS 12/14 ST-GAS NG+LPG



- 1 Cover, float tank
- 2 Float tank
- 3 Control cable, float switch
- 4 Float switch housing
- 5 Float
- 6 Bottom float switch (insufficient water)
- 7 Top float switch

The float switch switches the unit off via the time relay (K5) if there is insufficient water (6) in the float tank.

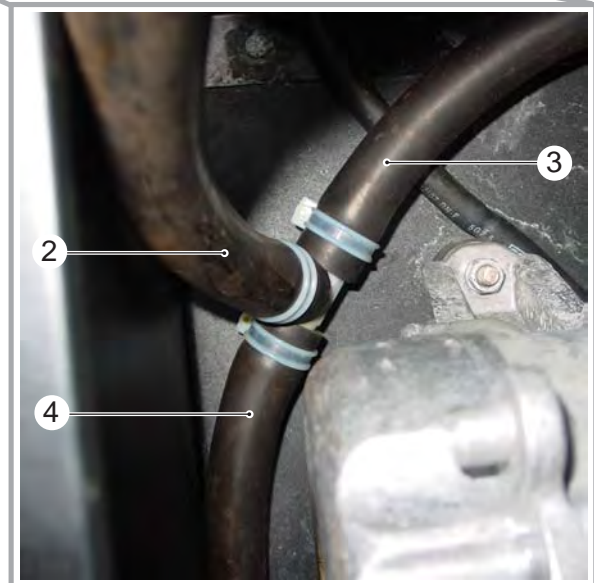
2.4.1 Float tank, bypass



The bypass connection (2) warrants an adequate water supply to the pump input.

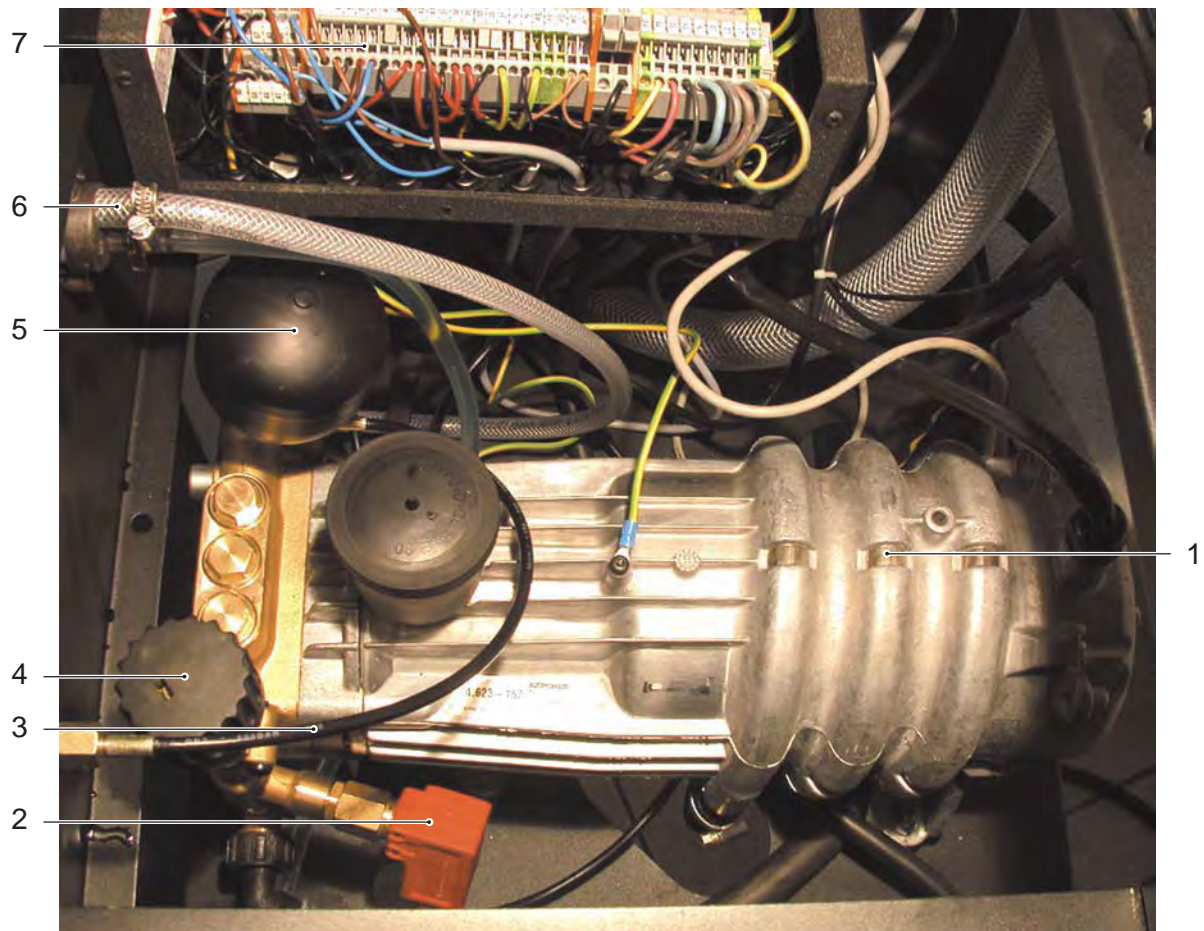
Note:

The bypass connection (2) has been fitted in HDS 12/14 ST-Gas (NG+LPG) since the start of the series, and has been fitted in HDS 9/16 ST-GAS (NG) from serial number 10220 and in HDS 9/16 ST-GAS (LPG) from serial number 10030.



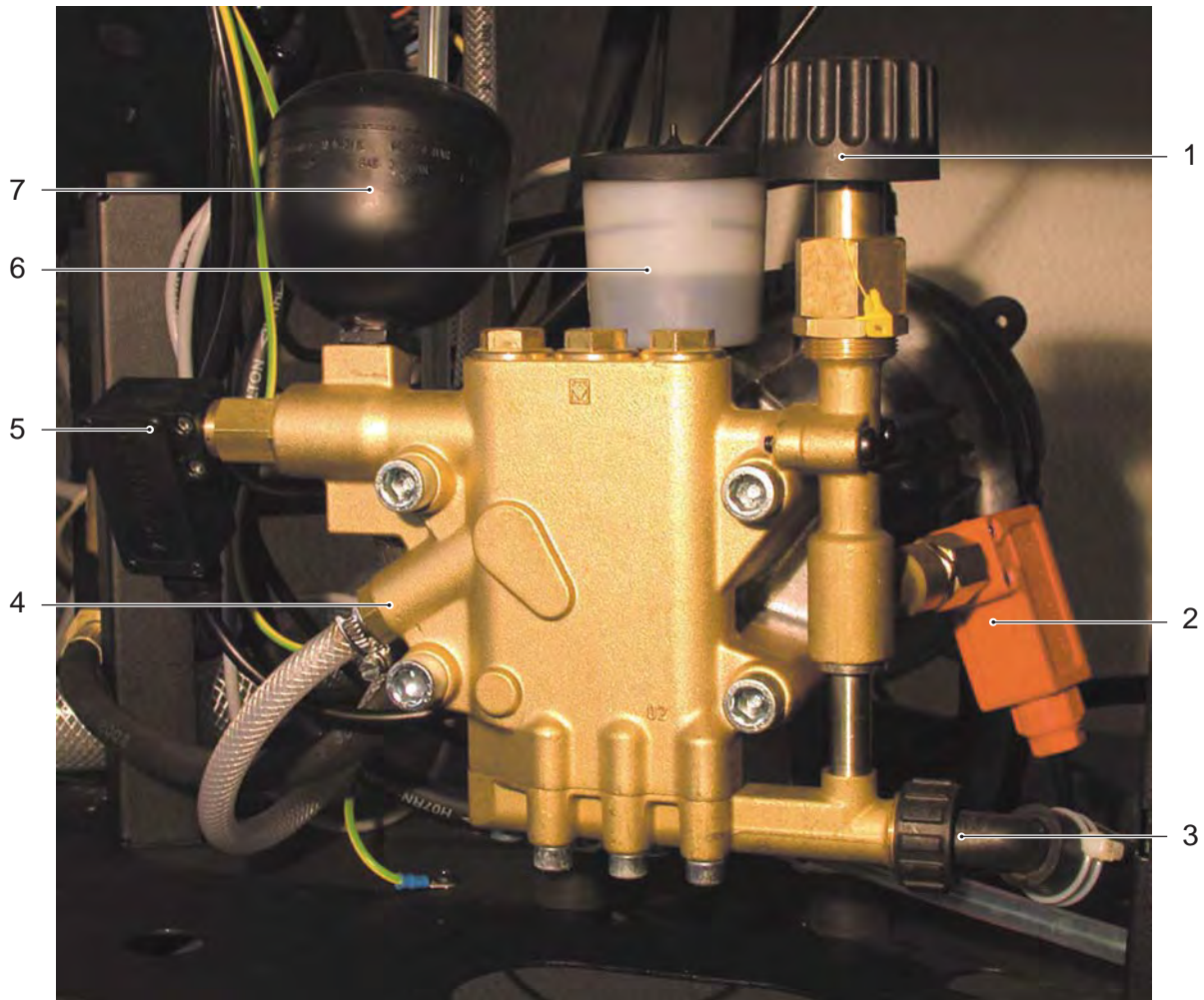
- 1 Float tank
- 2 Water hose from float tank (bypass connection)
- 3 Water hose to pump input
- 4 Water hose from boiler cooling output

2.5 Motor / pump unit

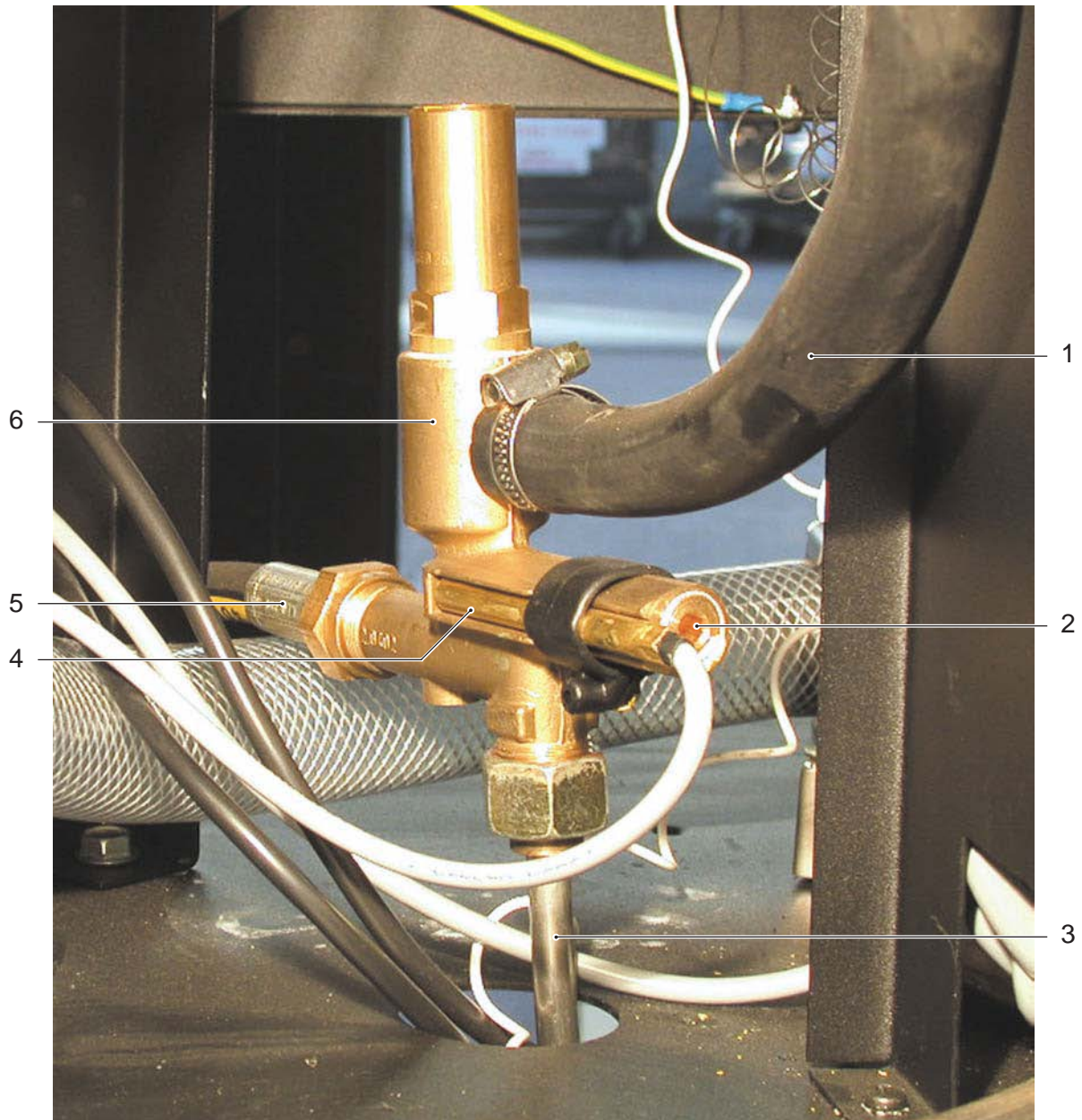


- 1 Water cooling, electric motor
- 2 Pressure switch, unit OFF
- 3 Pressure gauge supply line
- 4 Pressure and flow control
- 5 Vibration damper
- 6 Cleaning agent metering valve
- 7 Electrical cabinet

2.6 Pump head

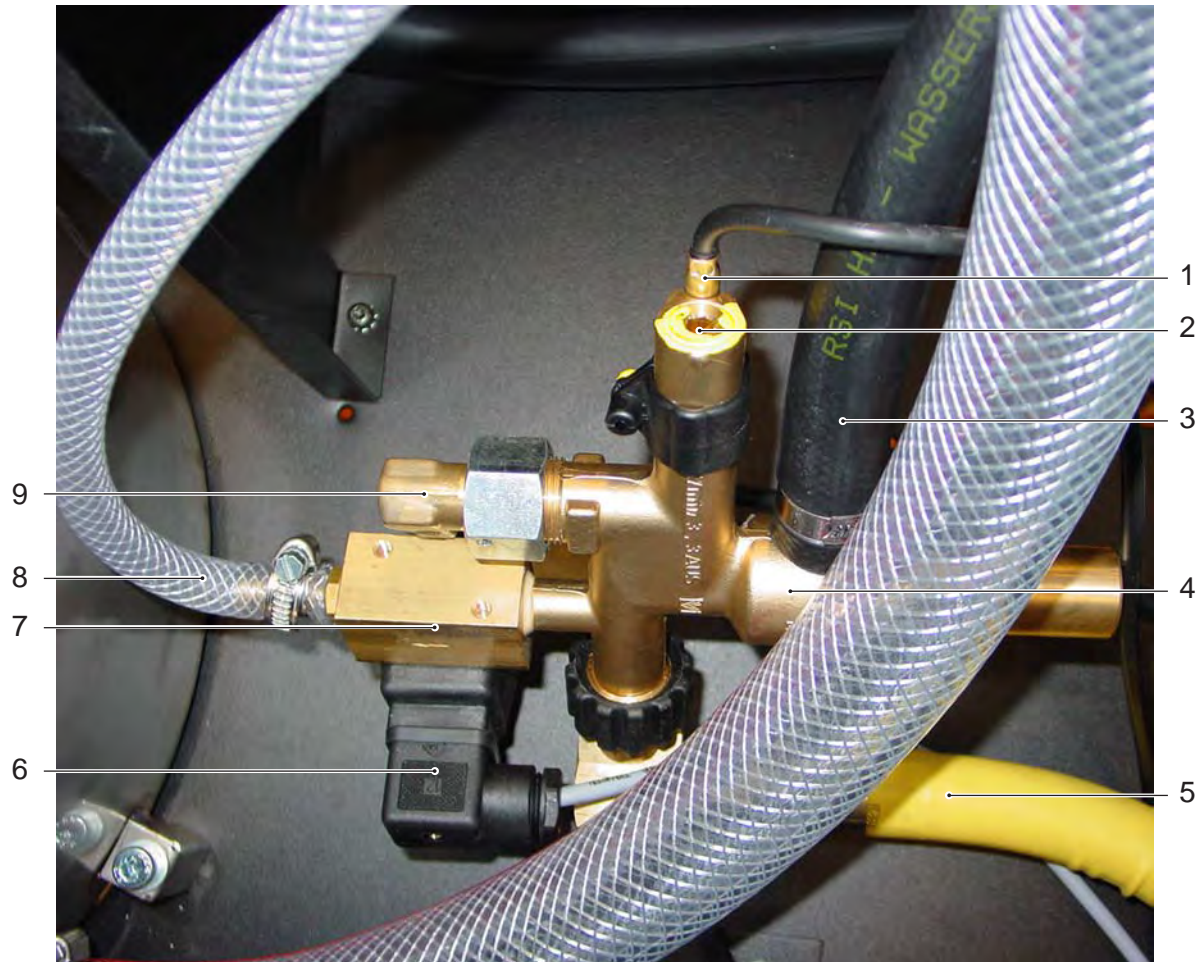


- 1 Pressure and flow control
- 2 Pressure switch, unit OFF, red
(8 bar / 116 psi)
- 3 Pump inlet
- 4 Connection for cleaning agent suction
- 5 Pressure switch, unit ON, black
(32 bar / 464 psi)
- 6 Oil tank
- 7 Vibration damper

2.7 HDS 9/16 ST GAS safety block (NG up to 12/2005) ORIGINAL

- 1 Return to float tank
- 2 Screw plug
- 3 Pipe to the continuous flow heater
- 4 Reed switch/water shortage safety device (B3)
- 5 Supply line from the high-pressure pump
- 6 Safety valve

2.8 HDS 9/16 ST GAS safety block (NG from 01/2006 and LPG) **REVISED** und HDS 12/14 ST-GAS NG+LPG

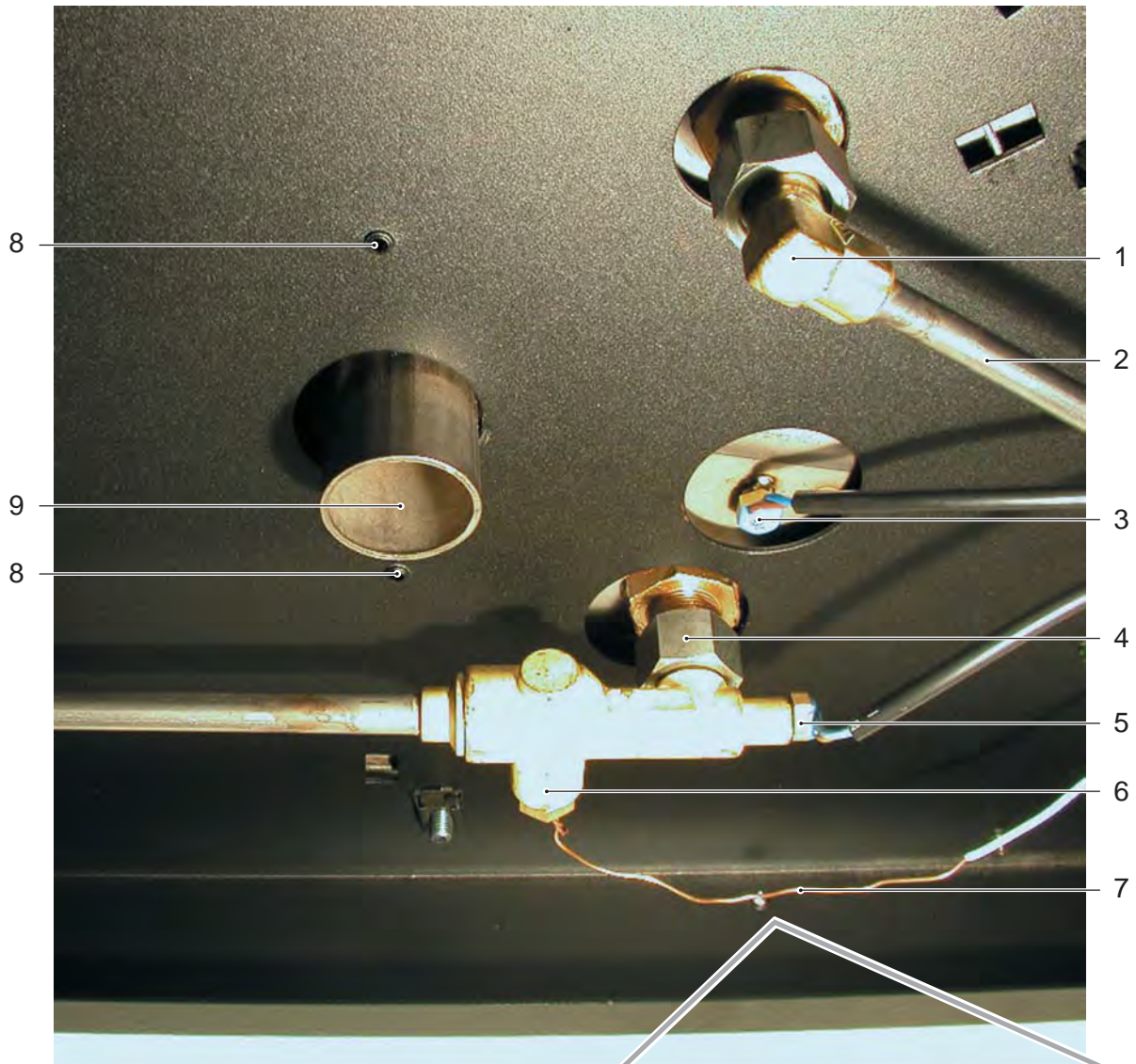


- 1 Reed switch/water shortage safety device (B3)
- 2 Screw plug
- 3 Return to float tank
- 4 Safety valve
- 5 Supply line from the high-pressure pump
- 6 Coil for solenoid valve (Y1), pressure relief
- 7 Solenoid valve (Y1), pressure relief
- 8 Return to float tank
- 9 Pipe to the continuous flow heater

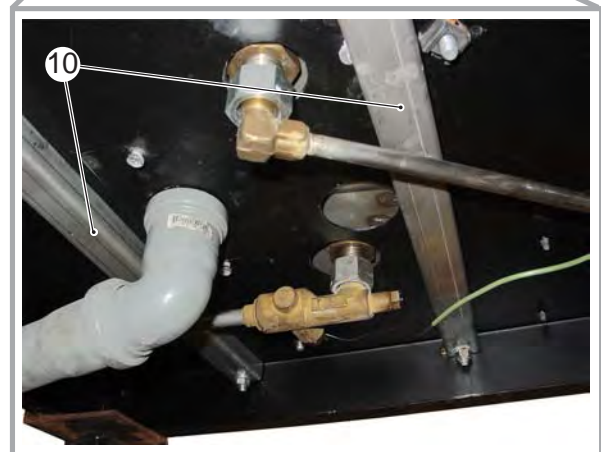
2.8.1 Pressure relief

After closing the gun and switching off the unit via the pressure switch, the solenoid valve (Y1) is briefly opened with a time delay by the timer module (A1) in order to release the pressure in the system into the float tank.

2.9 Continuous flow heater, view from below



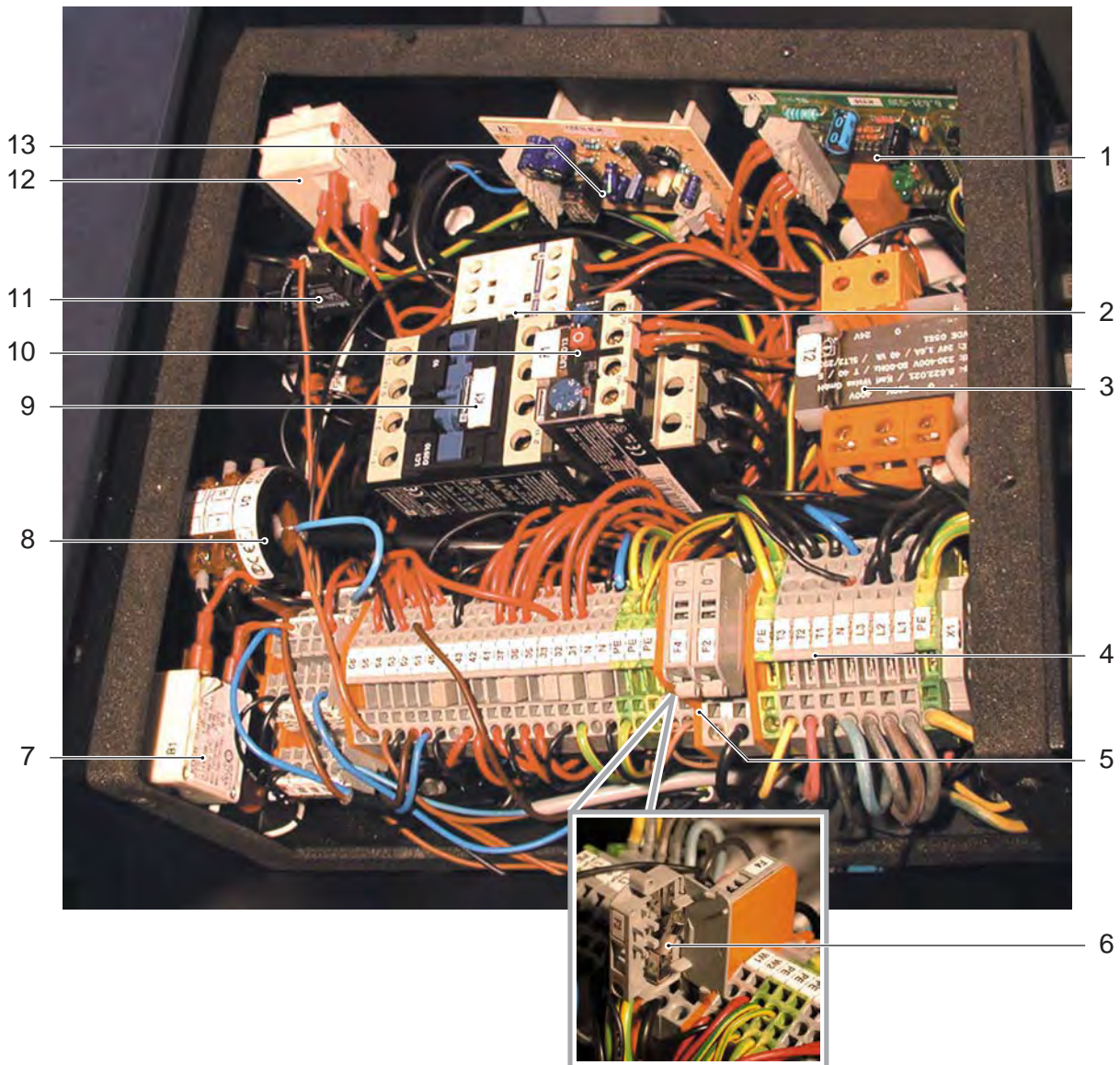
- 1 Boiler inlet connection
- 2 Pipe from safety block
- 3 Temperature limiter (B4) boiler base (75 °C / 167 °F)
- 4 Boiler outlet connection
- 5 Temperature limiter (B5) boiler outlet (110 °C / 230 °F)
- 6 Temperature regulator (B1) (30 - 98 °C / 86 - 208 °F)
- 7 Capillaries, temperature regulator
- 8 Fixing drill holes for siphon accessory kit
- 9 Condensate outlet
- 10 Frame reinforcement on HDS 12/14 ST-GAS (NG+LPG) for HDS 9/16 ST-GAS (NG-LPG) (option)



View from below with frame reinforcements on HDS 12/14 ST-GAS NG+LPG

The frame reinforcements (10) are used in HDS 12/14 ST-GAS (NG-LPG) to increase the stability of the frame construction, because the boiler is heavier than in HDS 9/16 ST-GAS (NG+LPG).

2.10 HDS 9/16 ST GAS electrical cabinet (NG up to 12/2005) ORIGINAL



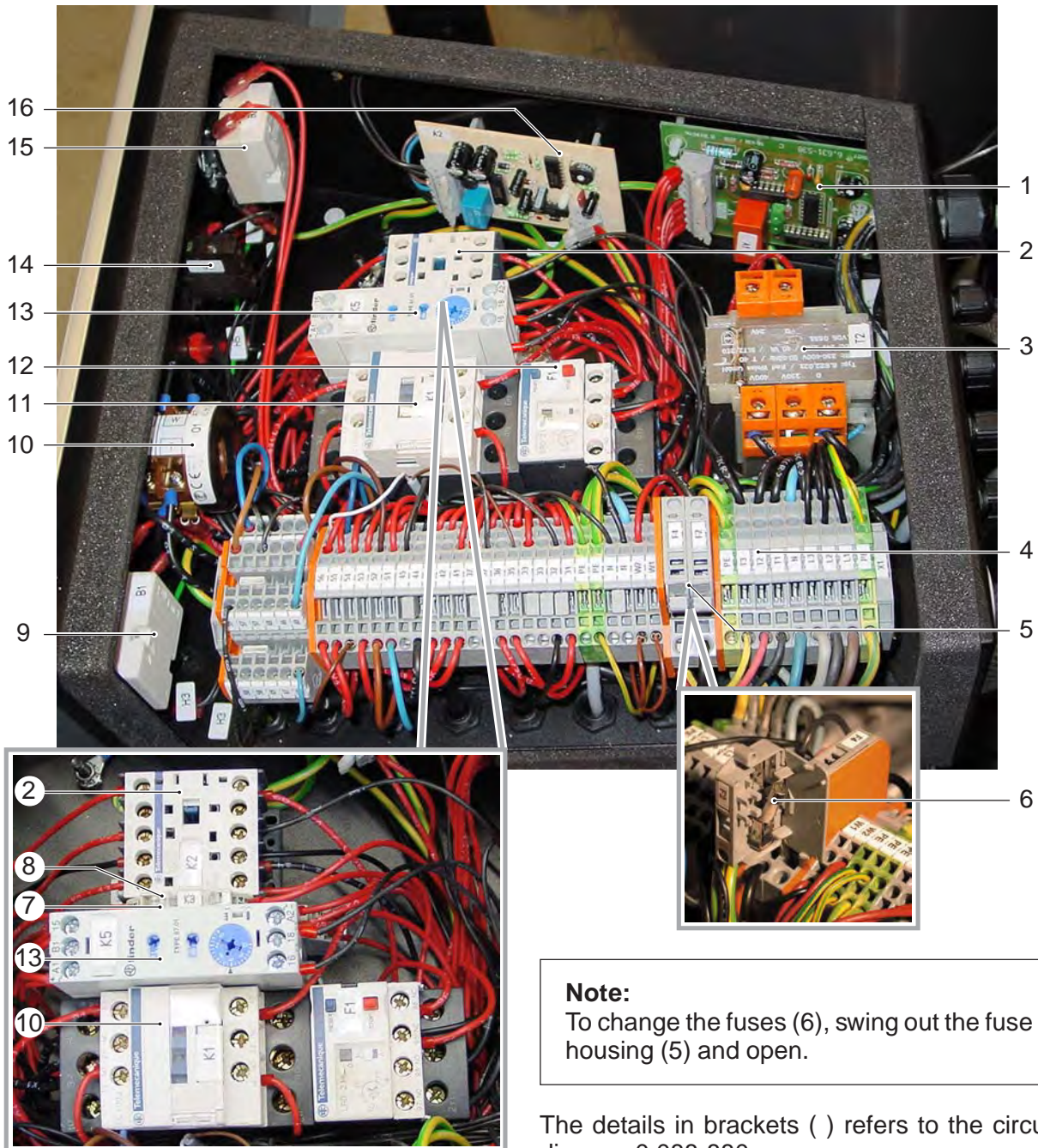
- 1 Timer module (A1)
- 2 Contactor release for burner (K2)
- 3 Control circuit transformer (T2)
- 4 Terminal strip (X1)
- 5 Fuse housing
- 6 Fuses (F2, F4)
- 7 Temperature regulator (B1)
- 8 Unit switch (Q1)
- 9 Motor contactor (K1)
- 10 Fuse (F1)
- 11 Control unit for gas burner unlocking button (S2)
- 12 Exhaust thermostat unlocking button (B2)
- 13 Printed circuit board pulse generator, scale inhibitor (A2)

Note:

To change the fuses (6), swing out the fuse housing (5) and open.

The details in brackets () refers to the circuit diagram 0.088-399

2.11 HDS 9/16 ST GAS LPG electrical cabinet (NG from 01/2006 and LPG) **REVISED and HDS 12/14 ST-GAS NG+LPG**



Note:
To change the fuses (6), swing out the fuse housing (5) and open.

The details in brackets () refers to the circuit diagram 0.088-880

- 1 Timer module (A1)
- 2 Contactor release for burner (K2)
- 3 Control circuit transformer (T2)
- 4 Terminal strip (X1)
- 5 Fuse housing
- 6 Fuses (F2, F4)
- 7 Contactor (K4)
- 8 Contactor (K3)

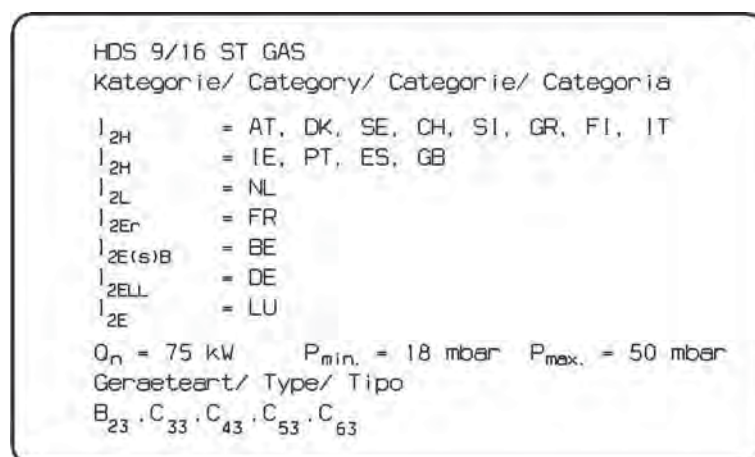
- 9 Temperature regulator (B1)
- 10 Unit switch (Q1)
- 11 Motor contactor (K1)
- 12 Fuse (F1), bimetal
- 13 Time relay (K5)
- 14 Control unit for gas burner release (S2)
- 15 Exhaust thermostat (B2)
- 16 Printed circuit board pulse generator, scale inhibitor (A2)

2.12 Rating plates HDS 9/16 ST-GAS (NG)



2.12.1 Rating plate - unit

- 1 Manufacturing No. (serial number)
- 2 Year of manufacture
- 3 Gas type
I₂ ELL = gas band E, H, L, LL
G20 = natural gas Germany
G25 = natural gas Holland
- 4 Gas pressure
P_{min} = 1800 Pa
P_{max} = 5000 Pa
- 5 Barcode



2.12.2 Rating plate - gas category

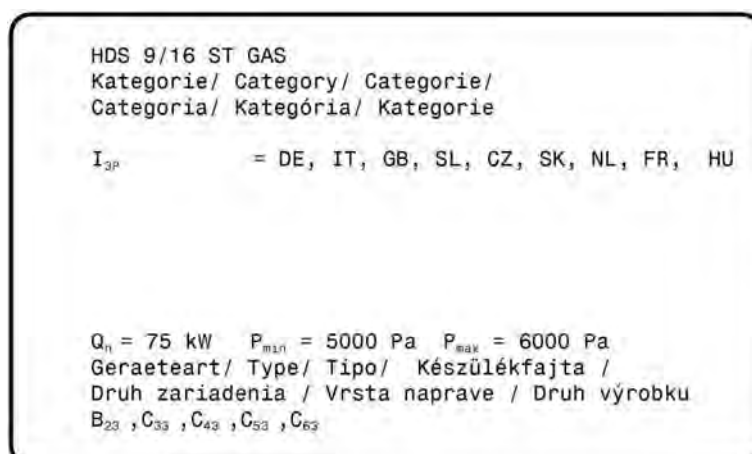
- I₂ = National approval
B, C = installation regulations (see page 61 + 62)

2.13 Rating plates HDS 9/16 ST-GAS LPG



2.13.1 Rating plate - unit

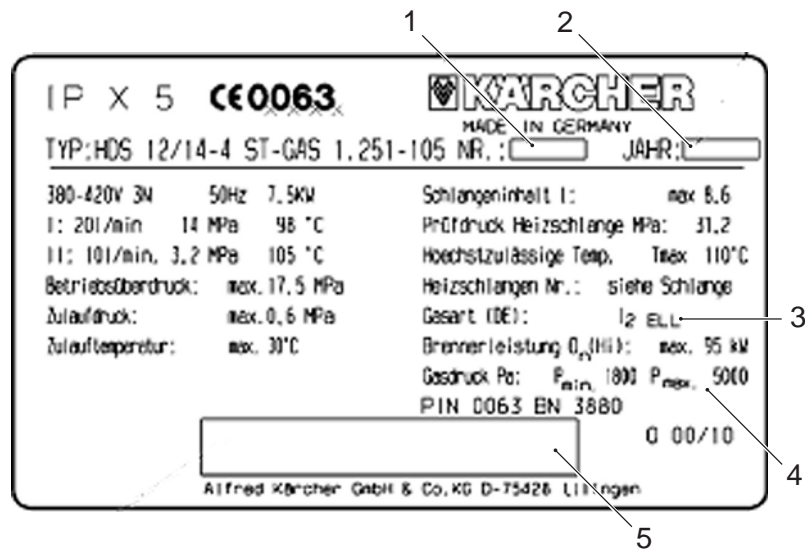
- 1 Manufacturing No. (serial number)
- 2 Year of manufacture
- 3 Gas type
I3 B/P = butane/propane
G31 = liquid gas
- 4 Gas pressure
 P_{min} = 5000 Pa
 P_{max} = 6000 Pa
- 5 Barcode



2.13.2 Rating plate - gas category

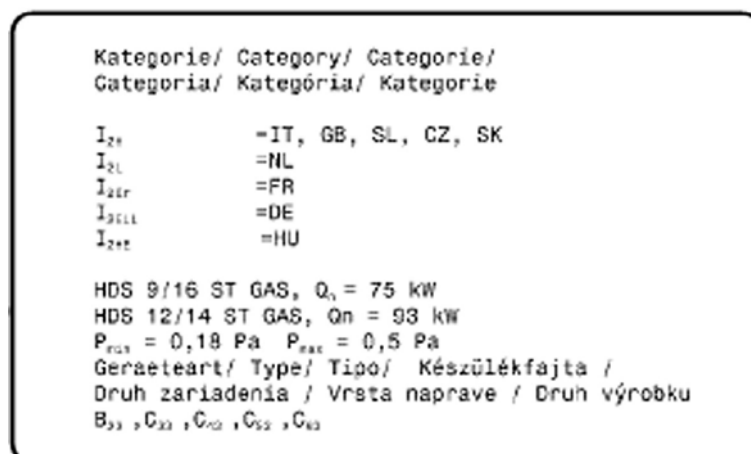
- I3 = National approval
 B, C = installation regulations (see page 61 + 62)

2.14 Rating plates HDS 12/14 ST-GAS NG



2.14.1 Rating plate - unit

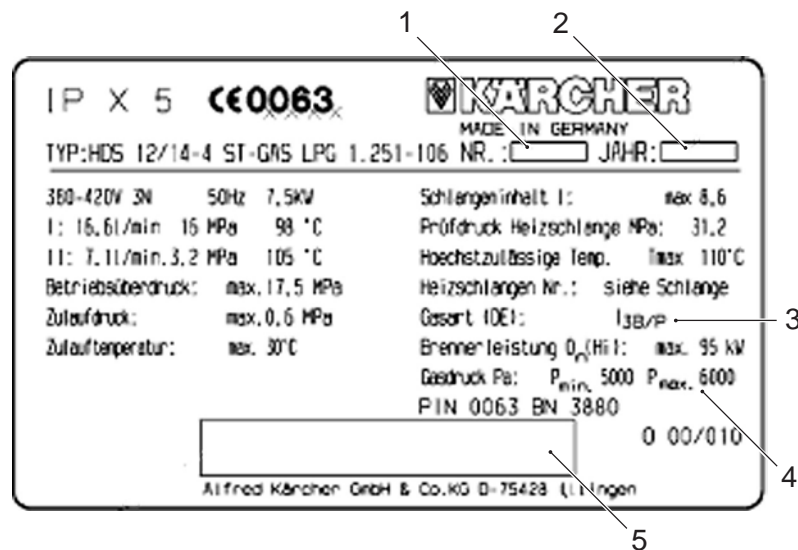
- 1 Manufacturing No. (serial number)
- 2 Year of manufacture
- 3 Gas type
I₂ ELL = gas band E, H, L, LL
G20 = natural gas Germany
G25 = natural gas Holland
- 4 Gas pressure
P_{min} = 1800 Pa
P_{max} = 5000 Pa
- 5 Barcode



2.14.2 Rating plate - gas category

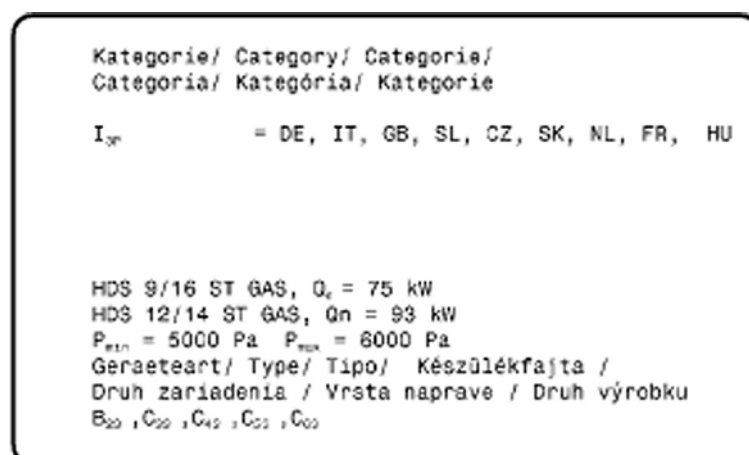
- I₂ = National approval
B, C = installation regulations (see page 61 + 62)

2.15 Rating plates HDS 12/14 ST-GAS LPG



2.15.1 Rating plate - unit

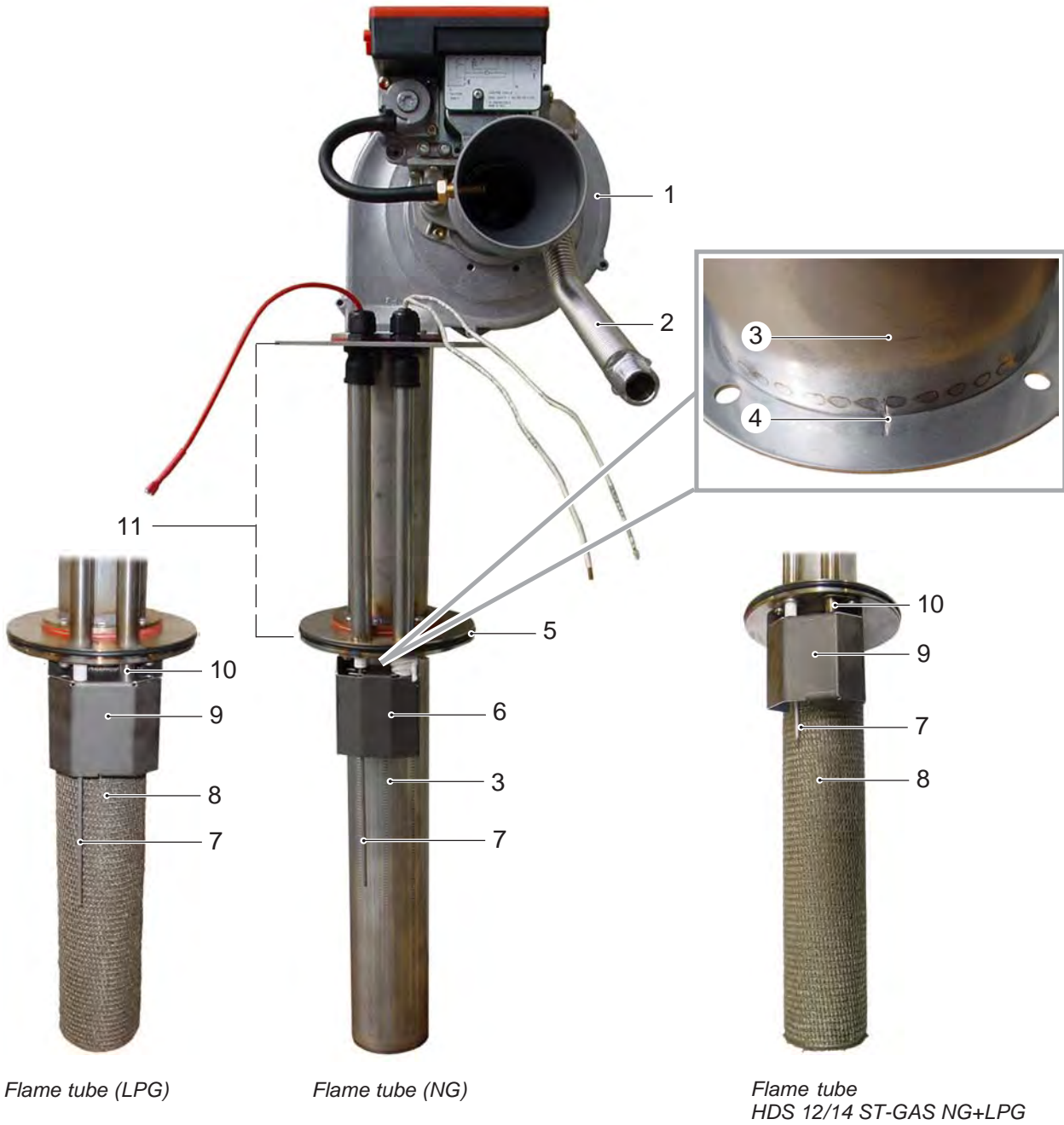
- 1 Manufacturing No. (serial number)
- 2 Year of manufacture
- 3 Gas type
I3 B/P = butane/propane
G31 = liquid gas
- 4 Gas pressure
P_{min} = 5000 Pa
P_{max} = 6000 Pa
- 5 Barcode



2.15.2 Rating plate - gas category

- I3 = National approval
B, C = installation regulations (see page 61 + 62)

2.16 Gas burner



Flame tube (LPG)

Flame tube (NG)

Flame tube
HDS 12/14 ST-GAS NG+LPG

- 1 Blower fan
- 2 Gas connection hose
- 3 Flame tube (NG)
- 4 Notch, flame tube
- 5 Sealing ring
- 6 Ignition plate (NG)
- 7 Ionisation electrode
- 8 Flame tube with metal fabric (LPG)
- 9 Ignition plate (LPG)
- 10 Hot electrode
- 11 Water-cooled area

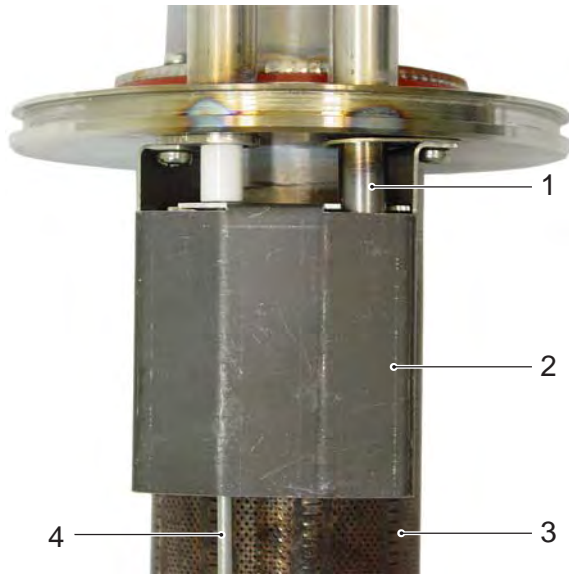
The HDS 9/16 ST-GAS has a surface burner, which does not operate with a large flame, but, compared to a gas cooker, with a large number of small flames.

These small flames are generated by a dense network of close spaced holes on the fire tube. In HDS 9/16 ST-GAS LPG and HDS 12/14 ST-GAS NG and LPG, the flame tube is also covered with a metal mesh. This achieves a better distribution of the gas.

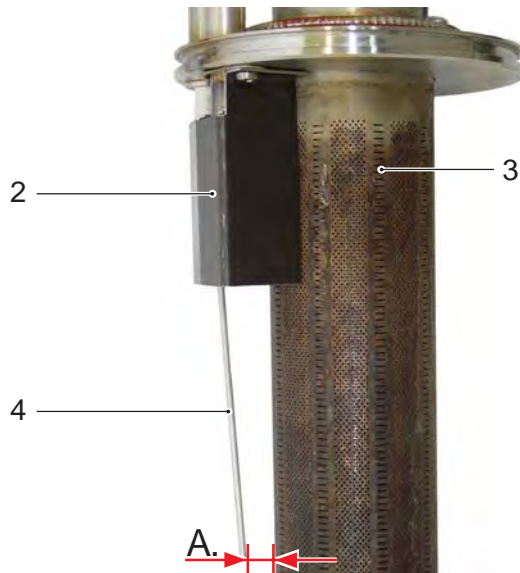
Note:

The notch (4) must be located in the middle between the ionization electrode (4) and hot electrode (10).

2.16.1 Gas burner / flame tube (NG)



Ignition plate

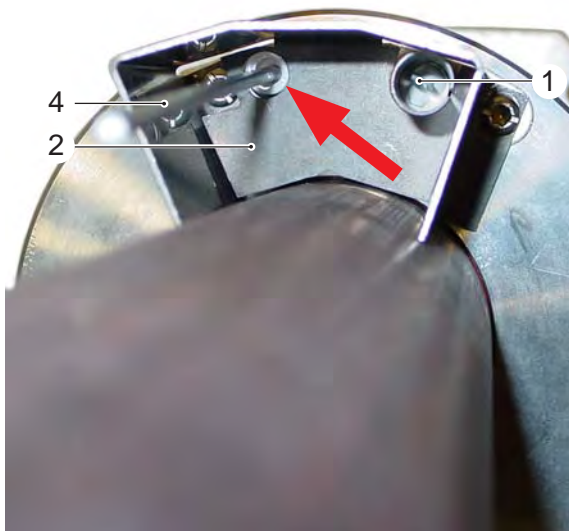


Ionisation electrode

Note:

The ionisation electrode (4) must be fitted at a distance ($A = 10 \text{ mm} / 0.394 \text{ in}$) from the flame tube and centrally aligned with the ignition plate hole (see arrow).

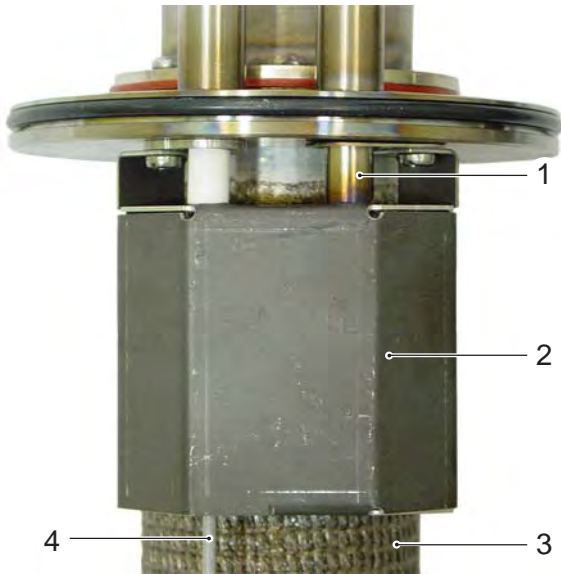
The electrical resistance between the ionization electrode (4) and the flame tube (3) changes when the gas flame is burning or extinguished. This value is used to monitor the flame.



Annular gap at the ionisation electrode

- 1 Hot electrode
- 2 Ignition plate
- 3 Flame tube
- 4 Ionisation electrode
- A Distance 10 mm / 0.394 in

2.16.2 Gas burner / flame tube (LPG)



Ignition plate



Ionisation electrode

Note:

The ionisation electrode (4) must be fitted at a distance (A = 10 mm / 0.394 in) from the flame tube and centrally aligned with the ignition plate hole (see arrow).

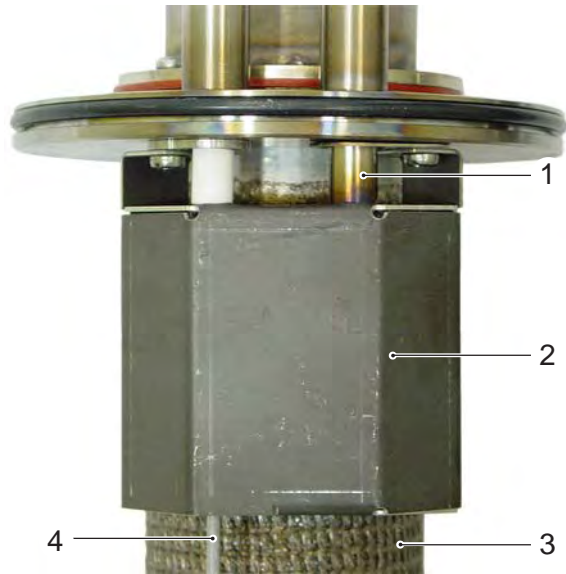
The electrical resistance between the ionization electrode (4) and the flame tube (3) changes when the gas flame is burning or extinguished. This value is used to monitor the flame.



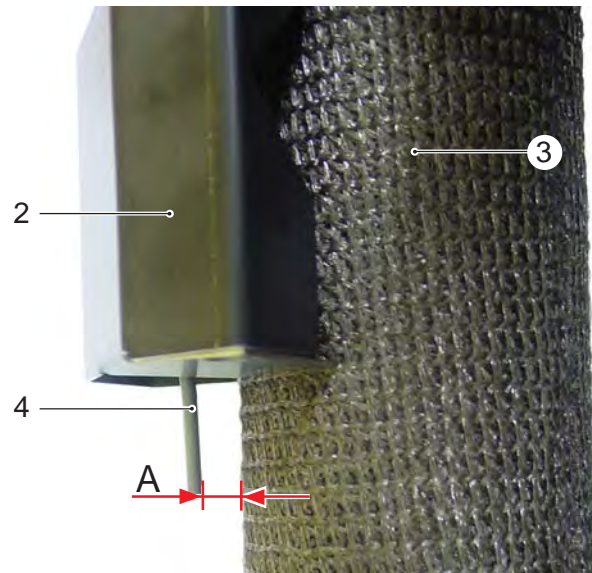
Annular gap at the ionisation electrode

- 1 Hot electrode
- 2 Ignition plate
- 3 Flame tube with metal fabric
- 4 Ionisation electrode
- A Distance 10 mm / 0.394 in

2.16.3 Gas burner / flame tube HDS 12/14 ST-GAS NG+LPG



Ignition plate

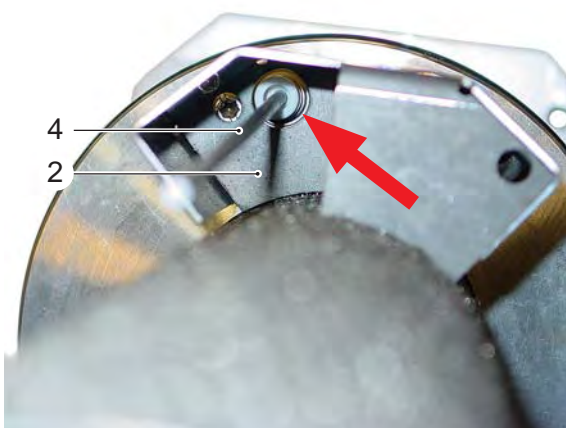


Ionisation electrode

Note:

The ionisation electrode (4) must be fitted at a distance ($A = 10 \text{ mm} / 0.394 \text{ in}$) from the flame tube and centrally aligned with the ignition plate hole (see arrow).

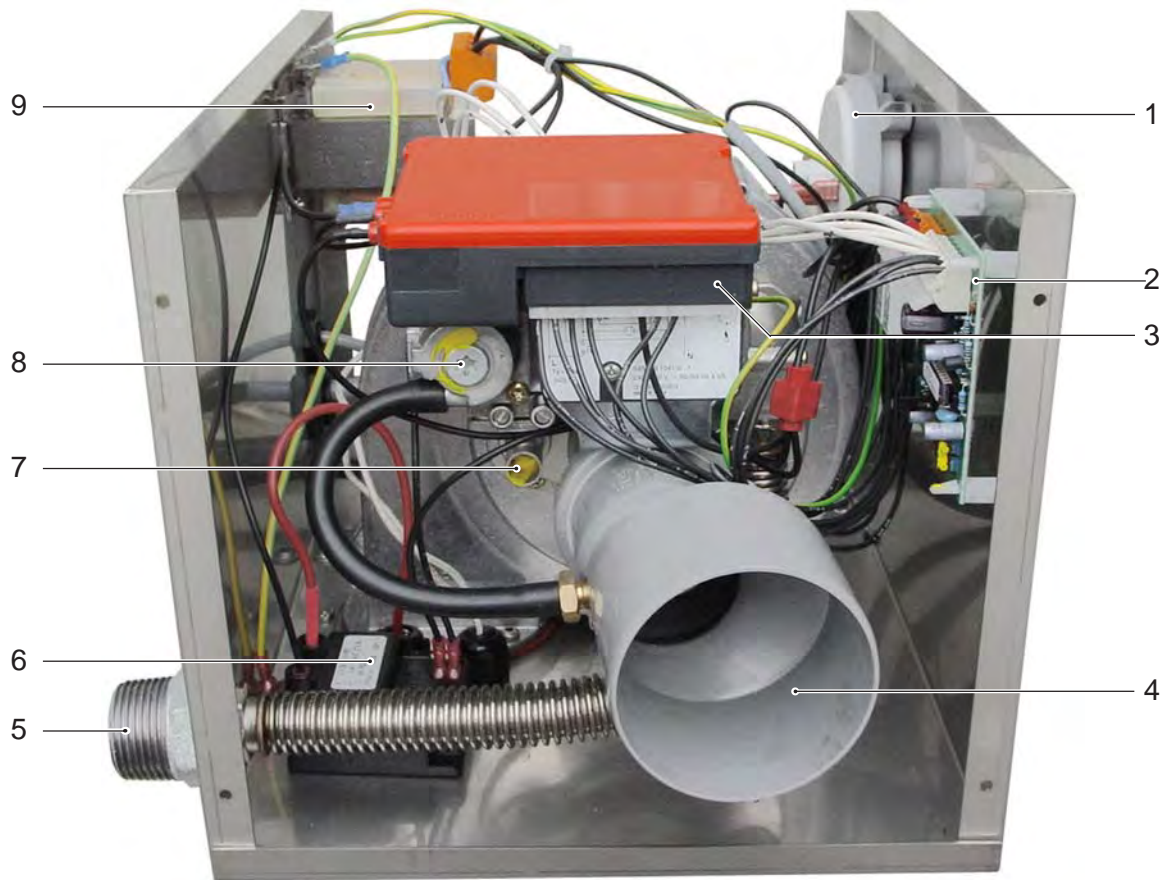
The electrical resistance between the ionization electrode (4) and the flame tube (3) changes when the gas flame is burning or extinguished. This value is used to monitor the flame.



Annular gap at the ionisation electrode

- 1 Hot electrode
- 2 Ignition plate
- 3 Flame tube with metal fabric
- 4 Ionisation electrode
- A Distance 10 mm / 0.394 in

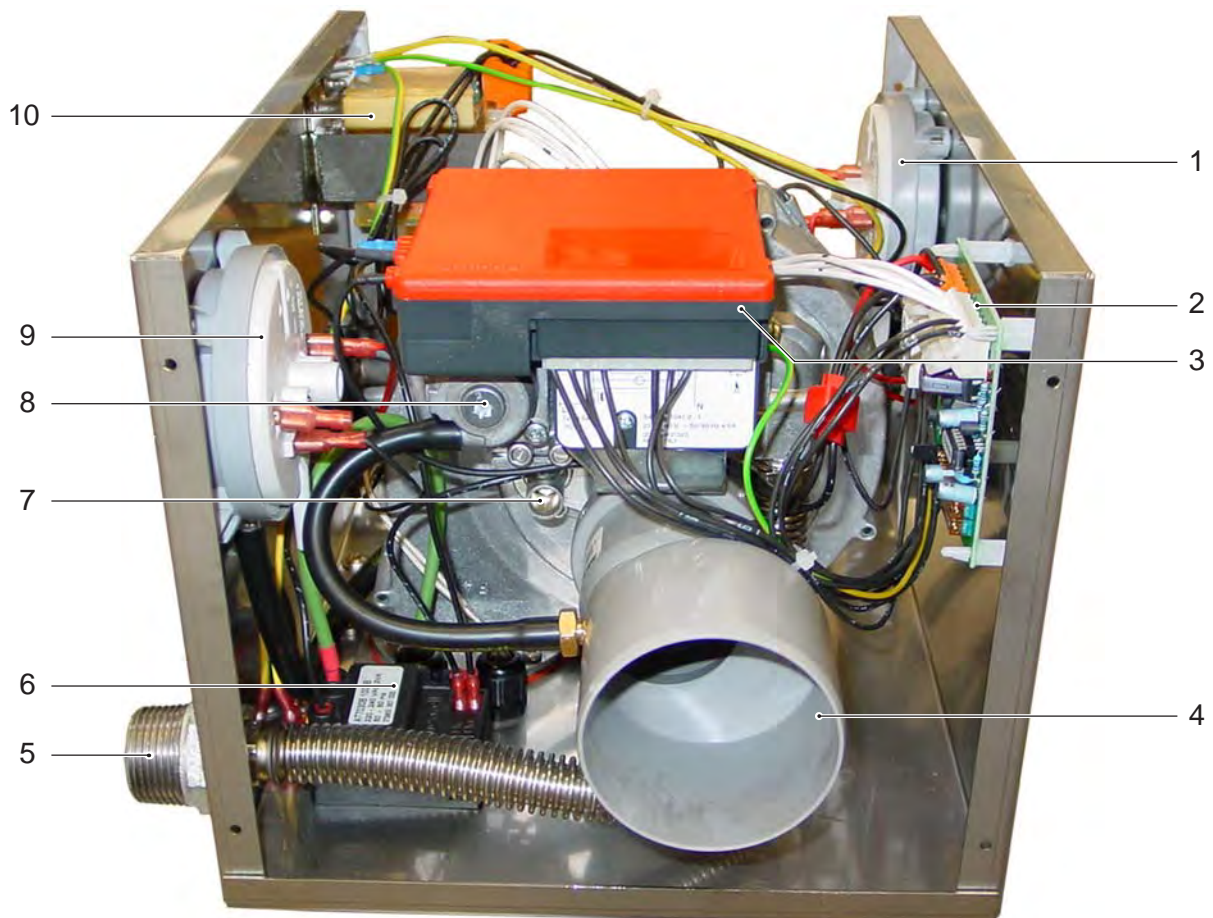
2.16.4 Gas burner, housing open (NG up to 12/2005) **ORIGINAL**



- 1 Exhaust gas pressure switch
- 2 PWM printed circuit board*
- 3 Control unit for gas burner
- 4 Combustion air supply
- 5 Gas connection
- 6 Transformer, ionisation electrode
- 7 CO₂ adjusting screw
- 8 Screw plug for pressure governor
- 9 Transformer, hot electrode

* PWM = pulse-width modulation, impeller fan speed setting

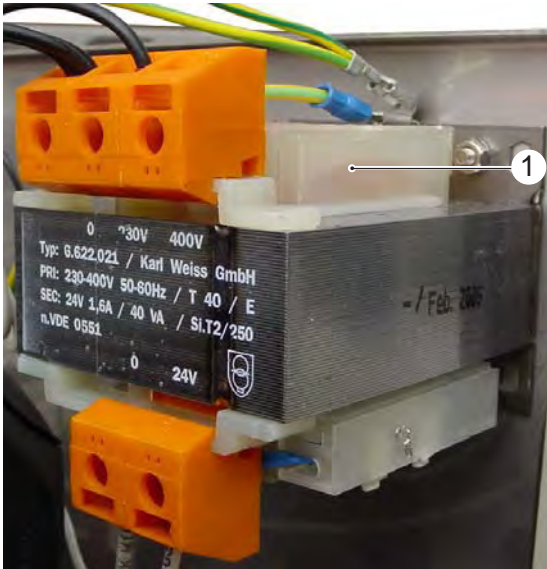
2.16.5 Gas burner, housing open (NG from 01/2006 and LPG and HDS 12/14 ST-GAS NG+LPG) **REVISED**



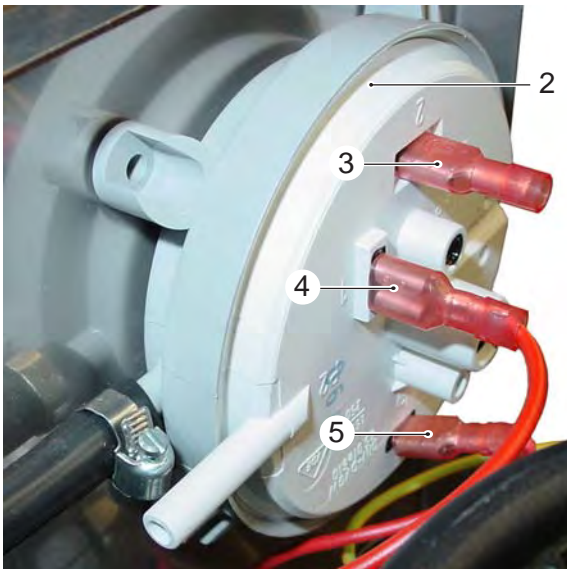
- 1 Exhaust gas pressure switch
- 2 PWM printed circuit board*
- 3 Control unit for gas burner
- 4 Combustion air supply
- 5 Gas connection
- 6 Transformer, ionisation electrode
- 7 CO₂ adjusting screw
- 8 Screw plug for pressure governor
- 9 Exhaust gas pressure switch (additional)
- 10 Transformer, hot electrode

* PWM = pulse-width modulation, impeller fan speed setting

2.16.6 Gas burner, housing open



Transformer, hot electrode



Pressure switch



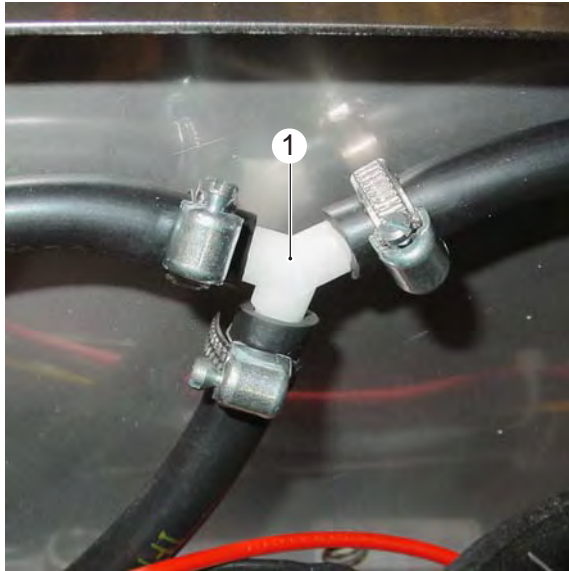
Transformer, ionisation electrode

Note:

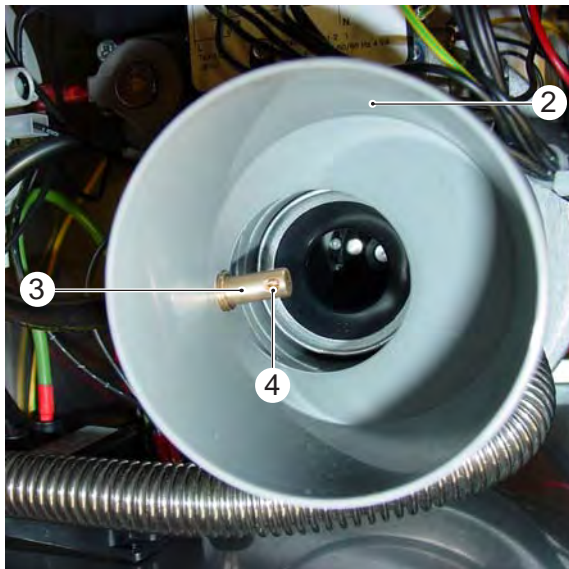
An insulated shock protection plug is attached at jumper slot 2, as in operation 230 Volt is permanently applied to the bare Steckkontakt plug terminal.

- 1 Transformer, hot electrode
- 2 Exhaust gas pressure switch
- 3 Jumper slot 2 with insulated shock protection plug
- 4 Jumper slot 1
- 5 Jumper slot 3
- 6 Connecting plug to the transformer hot electrode
- 7 Connecting plug to the PWM printed circuit board
- 8 Connection cable from the control unit for gas burner
- 9 Transformer, ionisation electrode
- 10 Connection cable of the ionisation electrode

2.16.6 Gas burner, housing open



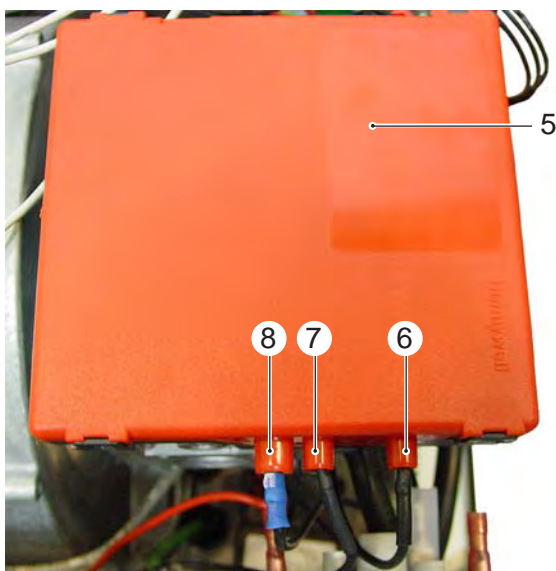
T-piece, pressure distribution to the pressure switches



Combustion air supply

Note:

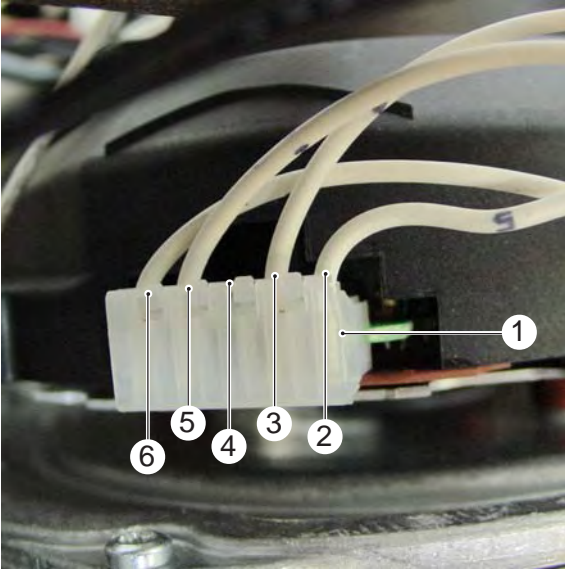
In order to achieve precise function of the control unit for gas burner the opening in the pressure sensor air supply (4) must be fitted against the direction of flow.



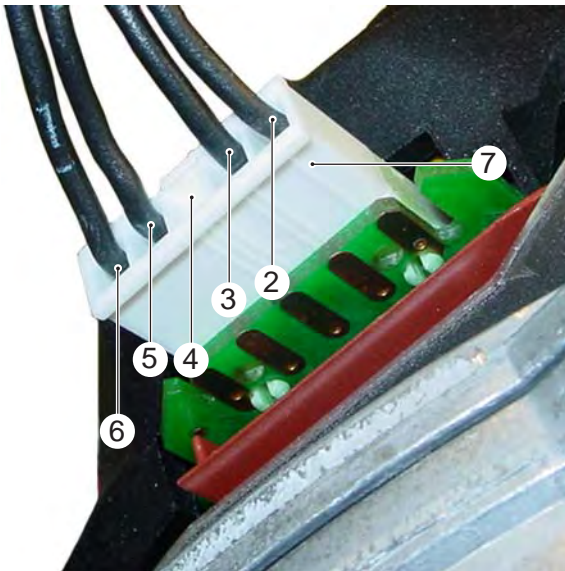
Control unit for gas burner

- 1 T-piece, pressure distribution to the pressure switches
- 2 Combustion air supply connecting sleeve
- 3 Pressure sensor, air supply
- 4 Opening in the pressure sensor, air supply
- 5 Control unit for gas burner
- 6 Connection cable to the PWM printed circuit board
- 7 Connection cable to the transformer, hot electrode
- 8 Connection cable to the transformer, ionisation electrode

2.16.6 Gas burner, housing open



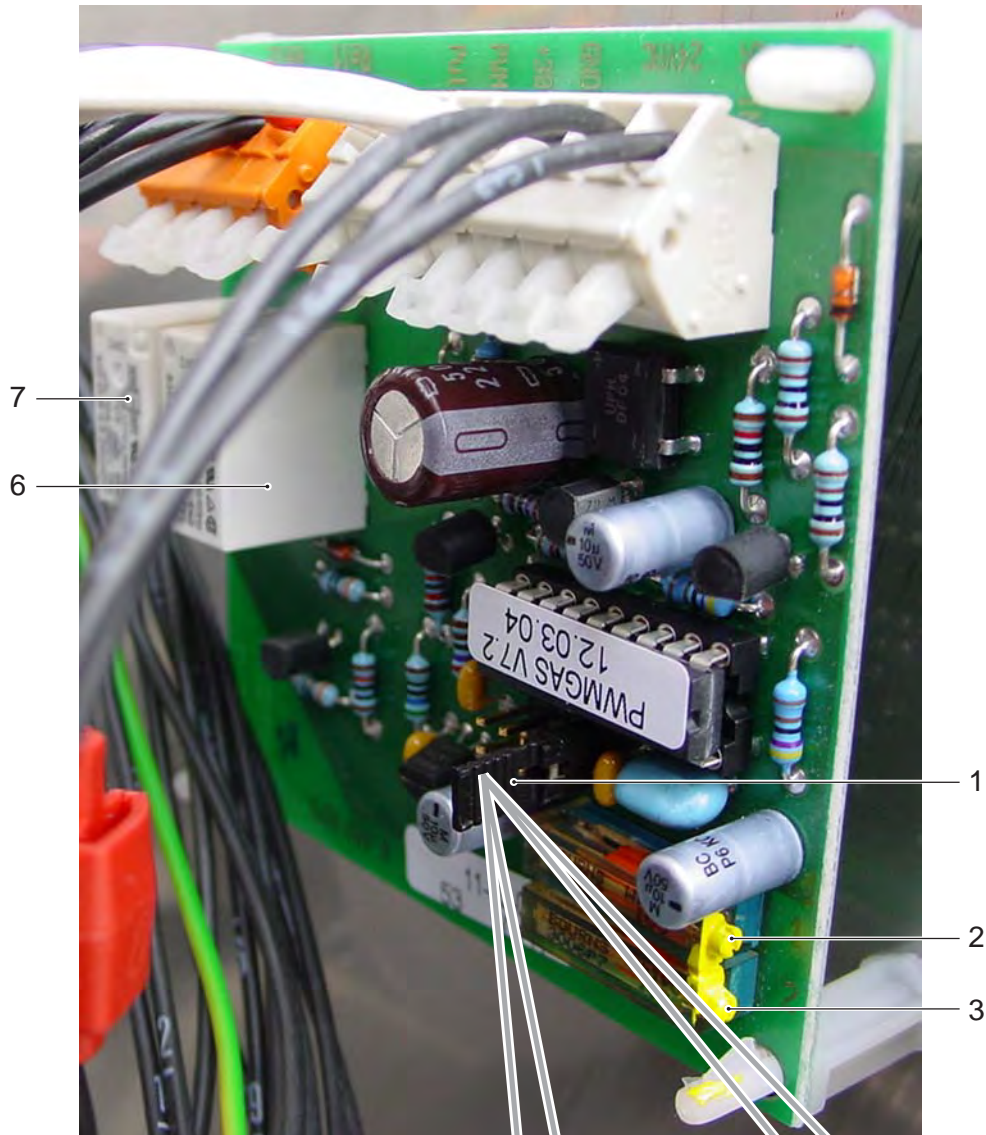
Connecting plug of the PWM printed circuit board,
HDS 9/16 ST GAS



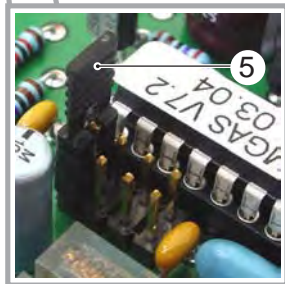
Connecting plug of the PWM printed circuit board,
HDS 12/14 ST GAS

- 1 Connecting plug, HDS 9/16 ST-GAS
- 2 Connection point for cable No. 5
- 3 Connection point for cable No. 4
- 4 Connection point for cable No. 3, unused
- 5 Connection point for cable No. 2
- 6 Connection point for cable No. 1
- 7 Connecting plug, HDS 12/14 ST-GAS

2.17 PWM printed circuit board



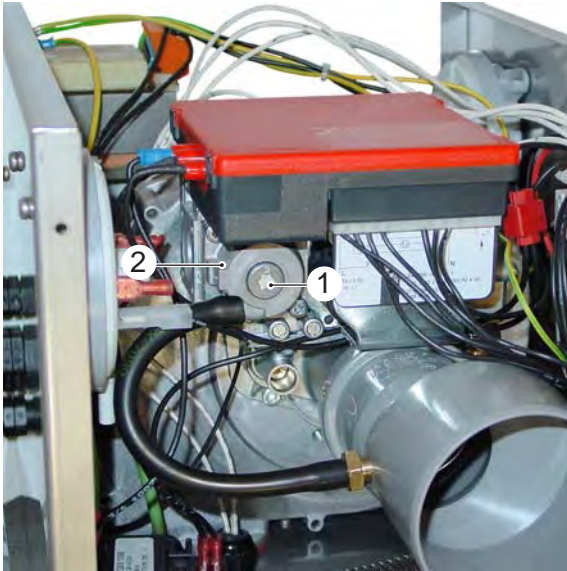
- 1 Jumper
- 2 Adjusting screw 1, fan speed (starting speed)
- 3 Adjusting screw 2, fan speed (operating speed)
- 4 Jumper in slot 4 (operating speed adjustment)
- 5 Jumper in slot 1 (starting speed adjustment)
- 6 PWM K2
- 7 PWM K1



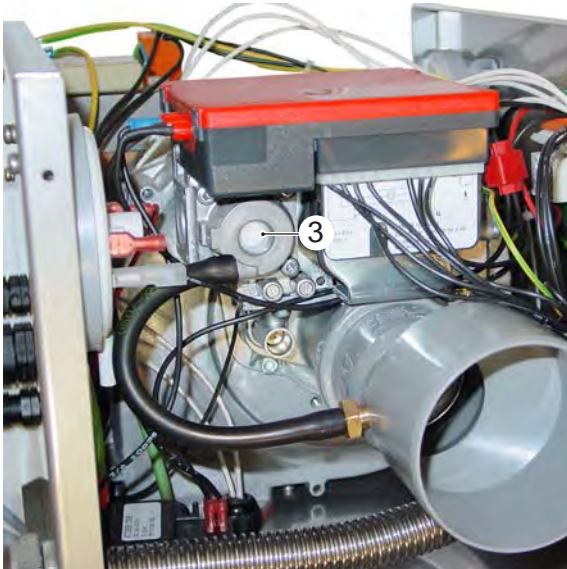
Note:

During operation the jumper must always be inserted in slot 4 (4). Slot 1 (5) is only required for checking the starting speed.

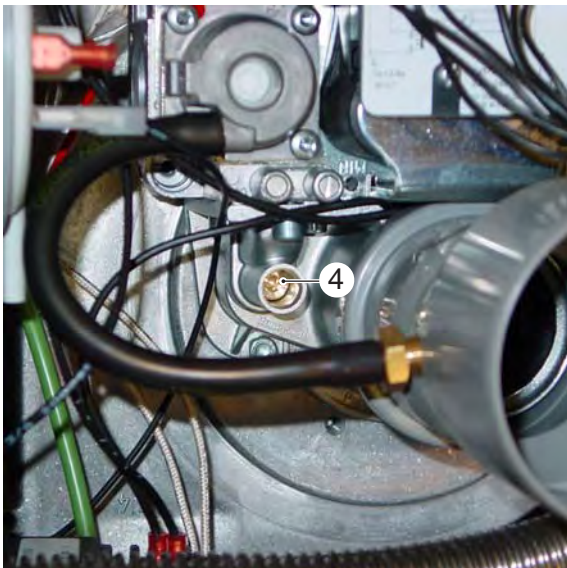
2.18 Presetting the gas burner



Screw out the screw plug (1)



Adjust the depth of the adjusting screw (3)



Adjust CO₂ adjusting screw (4)

Note:

The gas burner must only be preset if the pressure governor has been replaced or the supply has been changed to another type of gas.

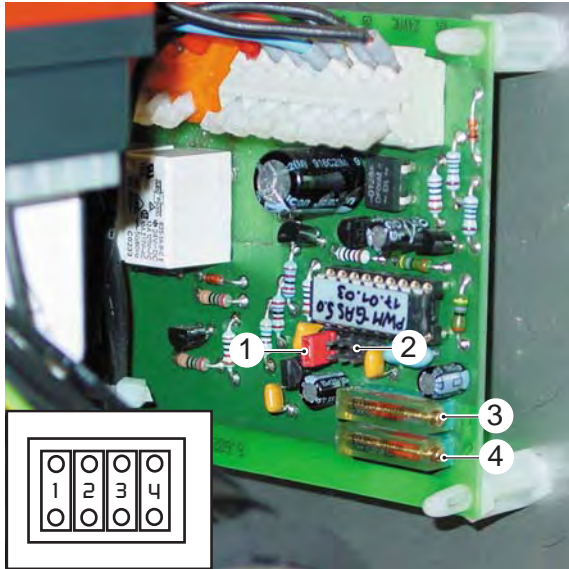
The unit is set in the factory as an NG unit with gas type G 20 and as an LPG unit with G 31. When switching the NG unit over to G 25 or other (see rating plate) natural gases or the LPG unit to G 30 or other (see rating plate) LPGs, the NG exhaust values of the NG unit and the LPG gas values of the LPG unit must be adjusted in accordance with the new unit information.

The empty plate included is lettered with the new gas type set and attached in the addresses field (see page 5, item 5) on the right-hand side of the unit. At the same time the sign attached in the factory with G20 (NG unit) or G31 (LPG unit) must be removed.

1. Screw out the screw plug (1) (Torx 40).
2. Adjust the adjusting screw (3) using a depth gauge as follows:
 - HDS 9/16 ST-GAS NG+LPG: 6,5 mm (0.25 in) deep
 - HDS 12/14 ST-GAS NG+LPG: 5,2 mm (0.20 in) deep
 (measured at the outer edge of the screw).
3. Adjust the adjusting screw (4) as follows:
 - HDS 9/16 ST-GAS NG+LPG:
 - for natural gas: 12,8 mm (0.5 in) deep
 - for liquid gas: 14,6 mm (0.57 in) deep
 - HDS 12/14 ST-GAS NG+LPG:
 - for natural gas: 9,4 mm (0.37 in) deep
 - for liquid gas: 12,6 mm (0.49 in) deep

- 1 Screw plug for (3)
- 2 Pressure governor
- 3 Adjusting screw of the gas pressure governor
- 4 CO₂ adjusting screw

2.19 Basic setting for the gas burner



PWM printed circuit board and board slot numbering

Note:

It is only necessary to adjust the basic setting for the gas burner if the PWM printed circuit board has been replaced or the supply has been changed to another type of gas.

1. Change over bridge (jumper)

Remove the bridge (jumper) ((1) on the PWM printed circuit board from jumper slot 4 (2) and plug into jumper slot 1.

(Photo shows the jumper (1) at jumper slot 1.)

2. Connect the unit

Fully connect the unit (electricity, water supply and wastewater, exhaust, gas), however, the gas tap remains closed.

3. Switch on unit

Set unit switch to the „burner“ setting and the temperature regulator to the maximum temperature.

4. Connect measuring instrument

Connect the multimeter (6.681-037) to the PWM printed circuit board (red on „PULSE“ (5), black on „GND“ (6)).

5. Set the basic speed

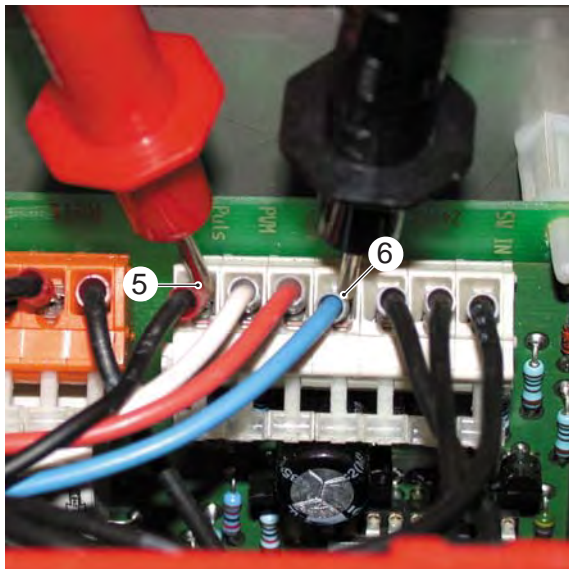
Use the adjusting screw (3) to set the gas burner to 89.33 ± 2 Hz (2680 rpm).

Note:

The frequency displayed at the multimeter must be converted into speed (rpm). The formula is:

$$\frac{\text{Frequency}}{2} \times 60 = \text{Speed (rpm)}$$

89.33 Hz equates to a speed of 2680 rpm.



Connect measuring instrument



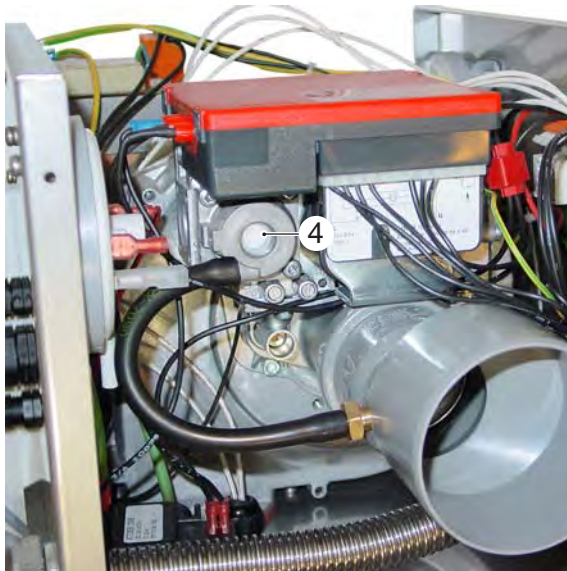
Frequency measurement with multimeter

- 1 Bridge (jumper) at jumper slot 1
- 2 Jumper slot 4
- 3 Basic setting adjusting screw
- 4 Adjusting screw, operating speed
- 5 Red test prod on „PULSE“
- 6 Black test prod on „GND“

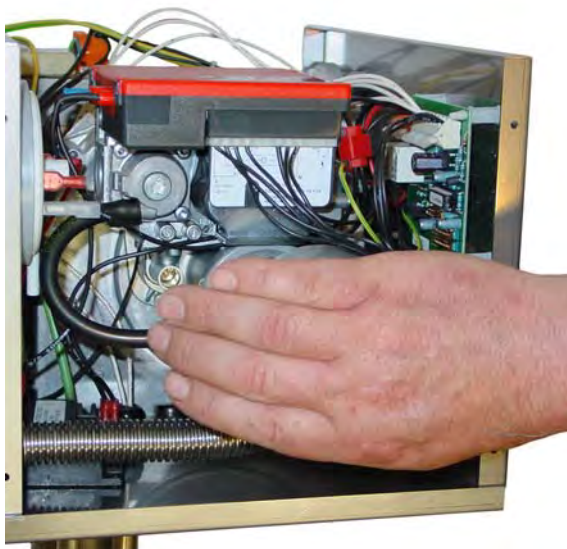
2.19 Basic setting for the gas burner



Connect the measuring sensor



Adjust CO₂ value



Interrupt the air intake

6. Switch on the burner

- Remove jumper from jumper slot 1 (see page 29, item 1) and keep in safe place.
- Open gas tap and actuate release button - burner is burning.
- Plug the jumper back into jumper slot 1.

7. Connect the measuring sensor

To take the CO₂ measurement, remove the threaded plug from the measurement opening of the chimney connection (1) and insert the measuring sensor (3).

8. Adjust CO₂ value

Set the CO₂ value using the adjusting screw of the gas pressure governor (4) and check using the exhaust measuring device (2).

CO₂ value for natural gas: 9,0 %

CO₂ value for liquid gas: 11 %

9. Interrupt the air intake

After the measured value has stabilised, completely interrupt the air intake briefly (1/2 sec) with your hand and then remeasure. This checks the function of the gas pressure governor.

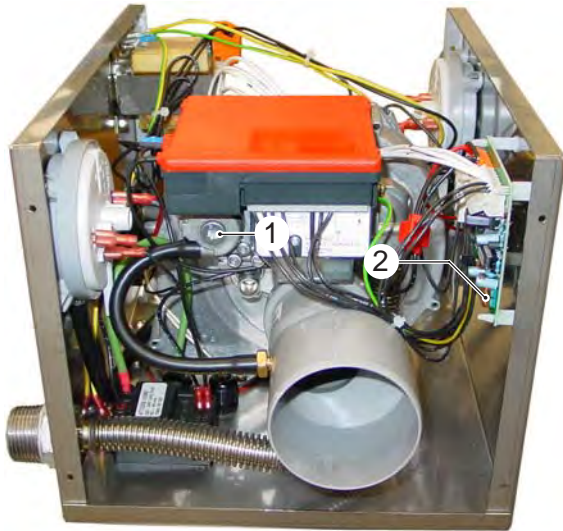
Note:

The exhaust measuring device is not available as a special tool. It must be purchased locally and must be able to record the following values:

- Exhaust gas temperature
- Room temperature
- CO₂
- O₂
- NO_x
- CO
- Exhaust loss in %

- 1 Measurement opening of the chimney connection
- 2 Exhaust measuring device (sample)
- 3 Measuring sensor
- 4 Adjusting screw, gas pressure governor

2.19 Basic setting for the gas burner



Set starting speed

10. Insert the screw plug

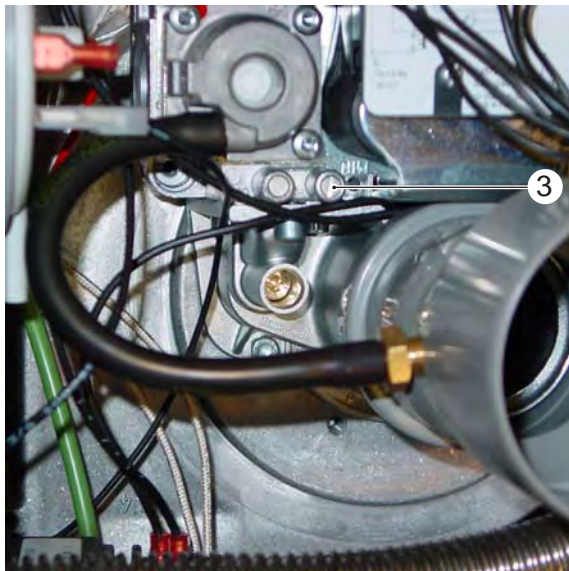
Insert screw plug (1) and screw tight.

11. Set starting speed

Use the adjusting screw (2) to set the speed of the gas burner to 167 ± 3 Hz (5000 rpm).

12. Switch off unit

Switch off the unit and close the gas tap.



Gasdruck am Gasbrenner messen

Measuring gas pressure when the burner is running

To warrant troublefree operation of the gas burner, the gas pressure must be min. 16 mbar (0.0016 MPa) and max. 100 mbar (0.01 MPa) while the gas burner is running.

- Unscrew the screw cap (3) through one turn.
- Push the gas pressure gauge with PVC hose (\varnothing approx. 7-8 mm, 0.276-0.315 in) immediately onto the screw neck.

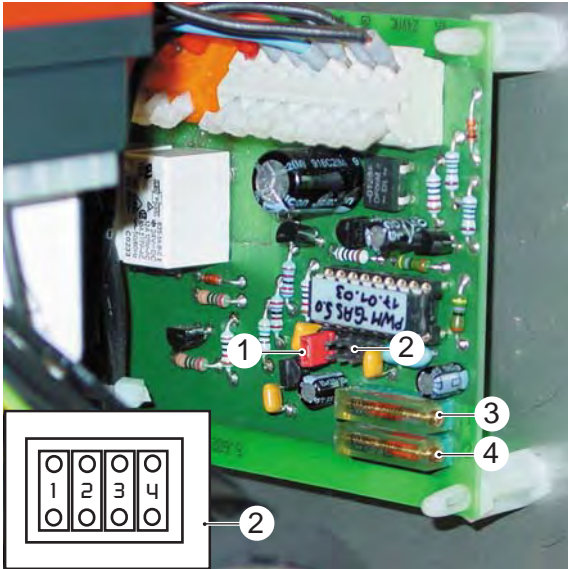
Note:

The PVC hose of the gas pressure gauge must be pushed onto the screw neck immediately after opening the screw plug (3) because gas flows out of the screw neck as soon as the screw plug (3) has been opened.

- 1 Screw plug for pressure governor
- 2 Basic setting adjusting screw
- 3 Screw plug, gas pressure measurement on gas burner

- After measuring the gas pressure, pull the PVC hose off the screw neck and close the screw plug (3) immediately.

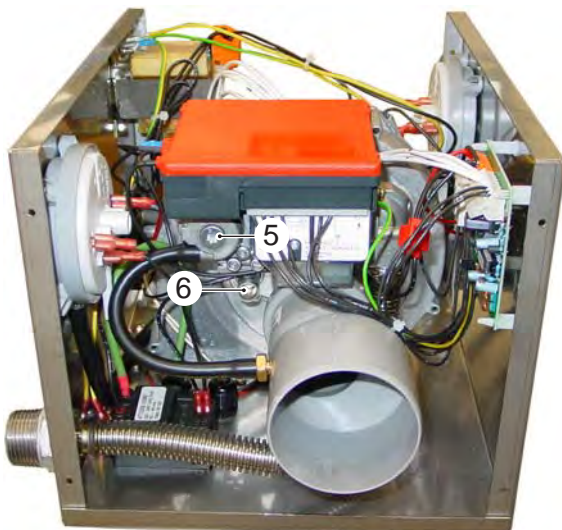
2.20 Set the operating data for the gas burner



PWM printed circuit board and board slot numbering



Frequency measurement with multimeter



Seal the adjusting screws

1. Change over jumper

To measure the operating speed, move the jumper (1) on the PWM printed circuit board from slot 1 to slot 4.

2. Set operating speed

Connect the multimeter to the PWM printed circuit board, switch on the unit and use the adjusting screw (3) to set the operating speed.:

- HDS 9/16 ST-GAS NG+LPG:
for natural gas to 6300 rpm (210 ± 4 Hz)
for liquid gas to 5970 rpm (199 ± 4 Hz)
- HDS 12/14 ST-GAS NG+LPG:
for natural gas to 6900 rpm (230 ± 4 Hz)
for liquid gas to 6330 rpm (211 ± 4 Hz)

Then press the resetting button for the automatic gas firing and immediately switch off the unit.

3. Switch on unit

Open the gas tap, set unit switch to the burner setting and temperature regulator to the maximum temperature.

4. Adjust CO₂ value

Use the adjusting screw (6) to set the CO₂ value and check with the exhaust measuring device:

- for natural gas: 9 %
- for liquid gas: 12 %

5. Measure / set temperature increase

Use the thermometer to measure the temperature increase (water outlet minus water inlet = 63 °C / 145 °F).

In necessary use the adjusting screw (3) to correct the temperature increase and check/adjust the CO₂ value again.

6. Interrupt the air intake

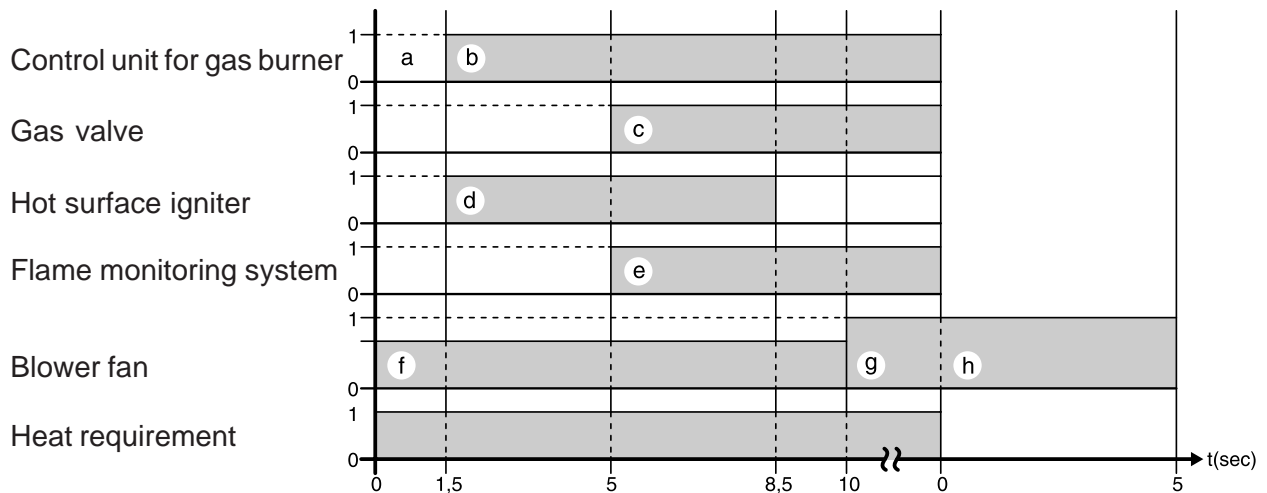
After the measured value has stabilised, completely interrupt the air intake briefly (1/2 sec) and then remeasure. This checks the function of the gas pressure governor.

7. Seal the adjusting screws

After completing the setting works all the adjusting screws must be sealed.

- 1 Jumper
- 2 Jumper slots
- 3 Basic setting adjusting screw
- 4 Adjusting screw, operating speed
- 5 Adjusting screw, gas pressure governor
- 6 CO₂ adjusting screw

2.21 Flow diagram of burner operation

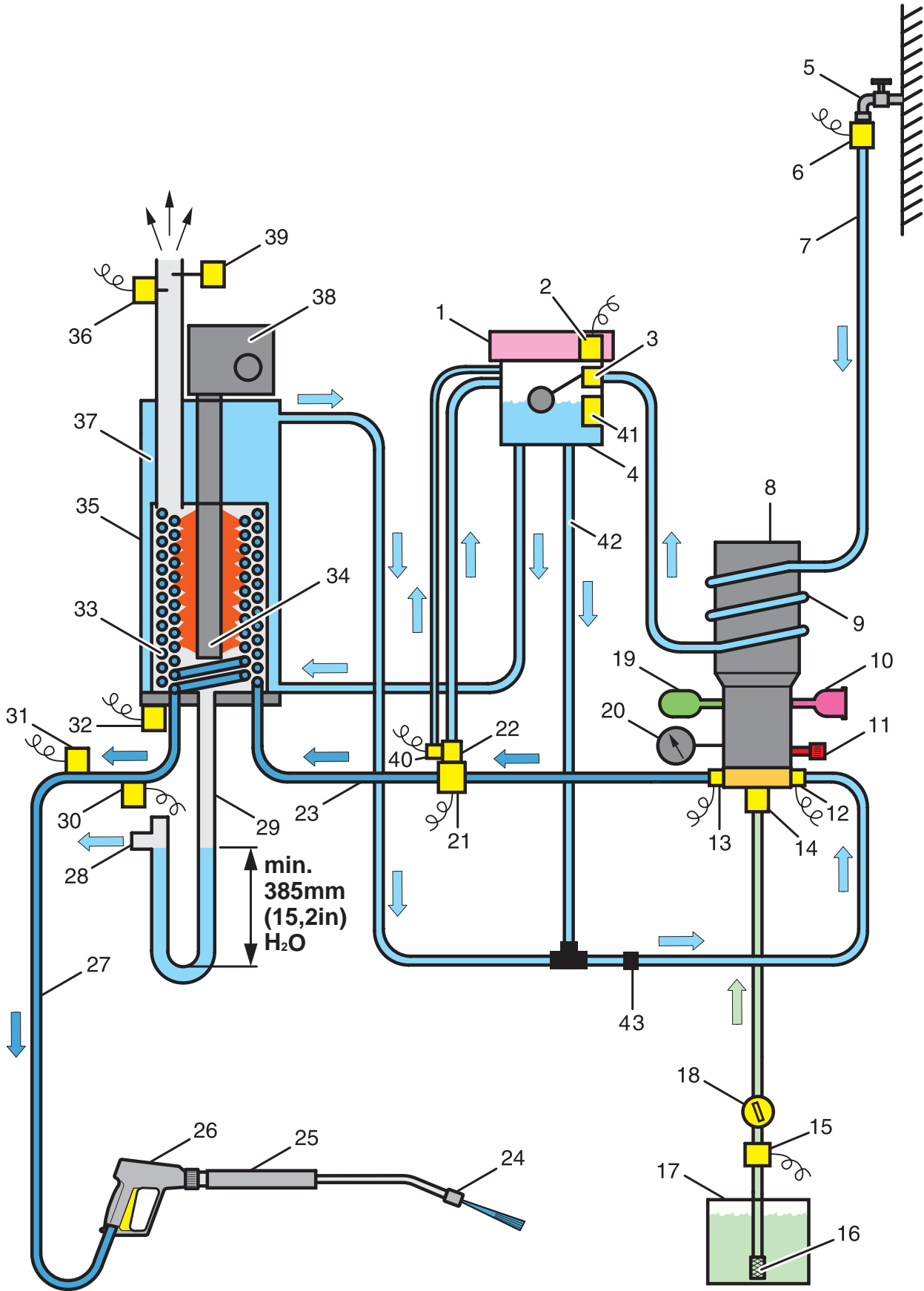


- a Initialisation
- b Full control function
- c Gas valve open
- d Glow time
- e Flame monitoring through ionisation current measurement
- f Pre-flushing time with start speed
- g Operating speed
- h After-flushing time 5 sec.

Fault if:

- The start speed is exceeded during the pre-flushing time (f);
- the blower fan speed falls below 2000 rpm during burner operation;
- no ionisation current is measured after 8.5 sec or it is too weak;
- zero speed monitoring when blower fan stopped. Nominal speed <100 rpm.

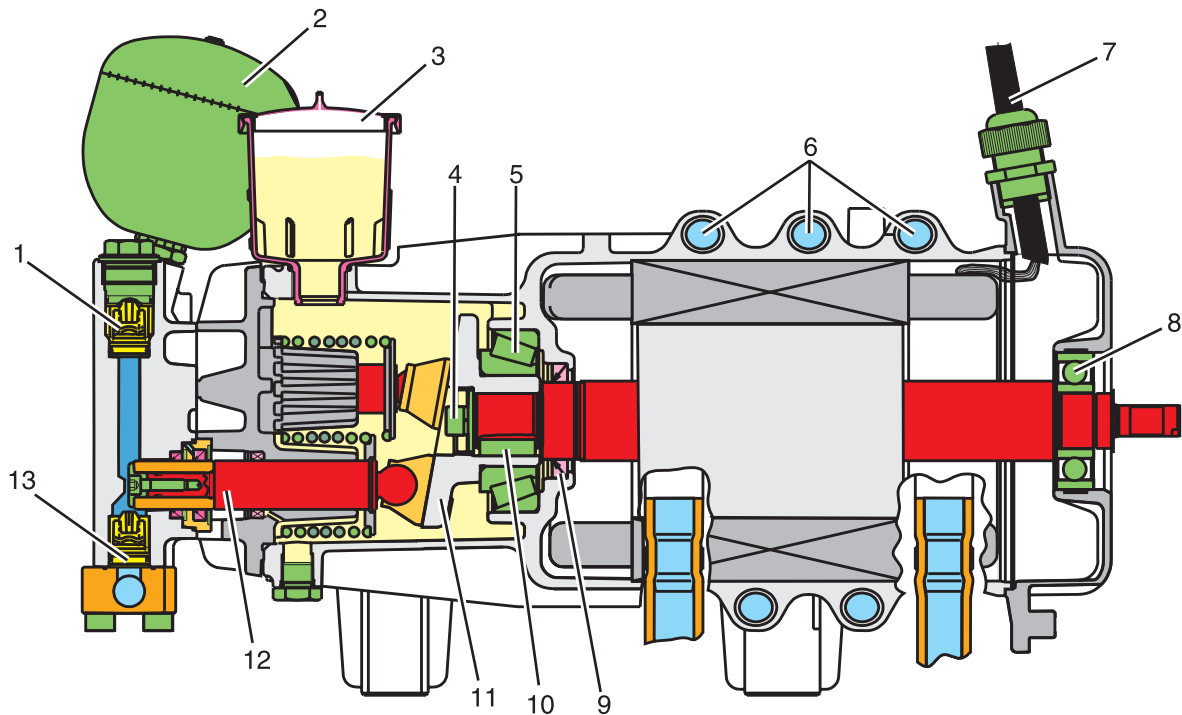
2.22 Functional diagram, unit



2.20 Functional diagram, unit

- | | | | |
|----|---|----|---|
| 1 | Container for scale inhibitor liquid | 29 | Condensate discharge |
| 2 | Scale inhibitor liquid metering valve | 30 | Temperature regulator, water outlet
(30 - 98 °C / 86 - 208.4 °F) |
| 3 | Float valve | 31 | Temperature limiter, water outlet
(110 °C / 230 °F) |
| 4 | Float tank | 32 | Temperature limiter boiler base
(75 °C / 167 °F) |
| 5 | Water connection | 33 | Heating coil |
| 6 | Solenoid valve for water inlet (option) | 34 | Surface burner |
| 7 | Water inlet hose | 35 | Continuous flow heater |
| 8 | Water-cooled electric motor | 36 | Temperature limiter, exhaust
(258 °C / 490 °F or 320 °C / 608 °F) |
| 9 | Motor housing with cooling coils | 37 | Water-cooled area |
| 10 | Oil tank | 38 | Gas burner |
| 11 | Pressure and flow control | 39 | Exhaust pressure switch (1x) ORIGINAL
(NG up to 12/2005) |
| 12 | Pressure switch, unit OFF | | Exhaust pressure switch (2x) REVISED
(NG from 01/2006 and LPG) |
| 13 | Pressure switch, unit ON | 40 | Solenoid valve, pressure relief REVISED
(NG from 01/2006 and LPG) |
| 14 | Cleaning agent non-return valve | 41 | Float switch, insufficient water REVISED
(NG from 01/2006 and LPG) |
| 15 | Cleaning agent solenoid valve (option) | 42 | Bypass
HDS 12/14 ST-GAS (NG+LPB)
on HDS 9/16 ST-GAS (NG) from serial
number 10220 and
HDS 9/16 ST-GAS (LPG) from serial
number 10030 |
| 16 | Cleaning agent filter | 43 | Suction throttle |
| 17 | Cleaning agent container 1 | | |
| 18 | Cleaning agent metering valve 1 | | |
| 19 | Pulsation damper | | |
| 20 | Pressure gauge | | |
| 21 | Water shortage safety device | | |
| 22 | Safety valve (175 bar / 2537.5 psi) | | |
| 23 | High-pressure pipe | | |
| 24 | High-pressure nozzle | | |
| 25 | Spray lance | | |
| 26 | Servopress handgun | | |
| 27 | High-pressure hose | | |
| 28 | Siphon, condensate discharge | | |

2.23 Function of the motor and pump



- 1 Pressure valve
- 2 Pulsation damper
- 3 Oil tank
- 4 Retaining screw, swash plate
- 5 Front motor bearing
- 6 Motor housing with cooling coils
- 7 Electrical connection, motor
- 8 Rear motor bearing
- 9 Shaft seal
- 10 Key
- 11 Swash plate
- 12 Piston with ceramic sleeve
- 13 Suction valve

Note:

Motor and pump correspond to unit HDS 895. For more detailed information with respect to the function, setting and troubleshooting, please refer to the service manual HDS 1295 (5.905-221).

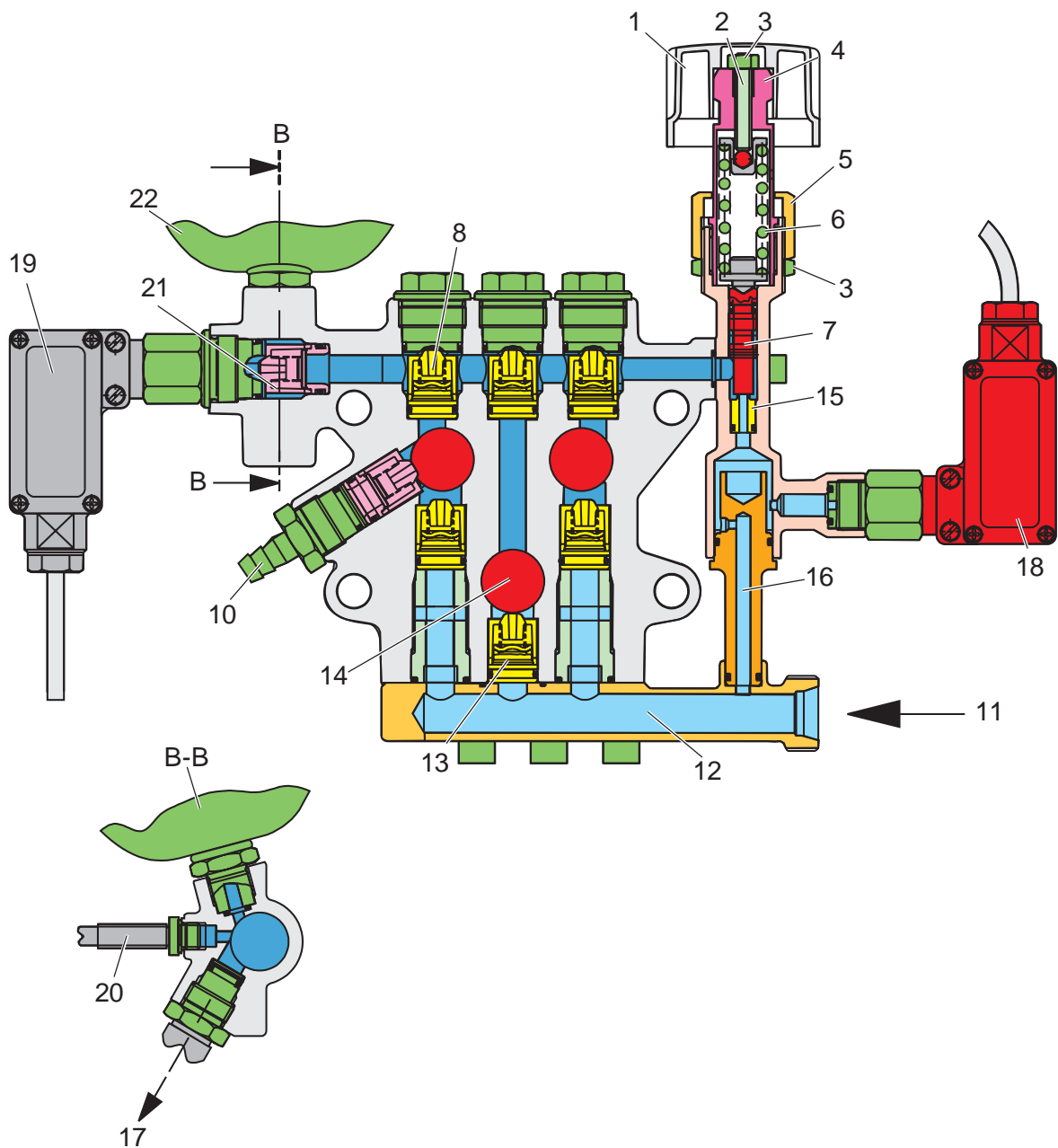
2.23.1 Motor

The Motor is water-cooled by the cooling coils in the motor housing (6). The motor shaft sits on a tapered-roller bearing (5) at the front and a ball bearing (8) at the rear. The motor has a motor (winding shield) thermal contact against thermal overload.

2.23.2 Pump

The swash plate (11) is fastened to the motor shaft by a key (10) and a retaining screw (4). The 3 pistons with ceramic sleeves (12) and glide shoes are pressed against the swash plate (11) by strong springs. The suction (13) and pressure valves (1) are of the same type. The conical valve seat and plate of the suction and pressure valves reduces the noise level.

2.24 Function of pressure and flow control



- | | |
|---|-----------------------------------|
| 1 Rotary knob | 12 Suction chamber |
| 2 Threaded stud | 13 Suction valve |
| 3 Lock nuts | 14 Pump piston |
| 4 Spindle | 15 Valve seat |
| 5 Stop sleeve | 16 Sleeve with throttle bore |
| 6 Spring | 17 High-pressure connection |
| 7 Overflow piston | 18 Pressure switch, unit OFF |
| 8 High-pressure valve | 19 Pressure switch, unit ON |
| 10 Cleaning agent connection with nonreturn valve | 20 Pressure gauge connection |
| 11 Water connection | 21 High-pressure non-return valve |
| | 22 Pulsation damper |

2.24 Function of pressure and flow control

2.24.1 Manual pressure and flow control using rotary knob

Pressure and flow control using the rotary knob (1) is used to relieve the motor during primarily part-load operation.

If the spindle (4) is turned in a clockwise direction, the prestress in the spring (6) is reduced. This raises the overflow piston (7) even if the valve seat (15) is at a low pressure and part of the flow rate flows via the sleeve with throttle bore (16) to the suction chamber.

The pump continues to run with reduced pressure. The pressure and quantity of water changes depending on the spindle setting,.

2.24.2 Pressure and flow control using the servopress gun

Pressure and flow control using the servopress gun should only be used for occasional part-load operation.

In servopress mode the manual pressure and flow control should always be turned to MAX. Otherwise the unit switches off prematurely.

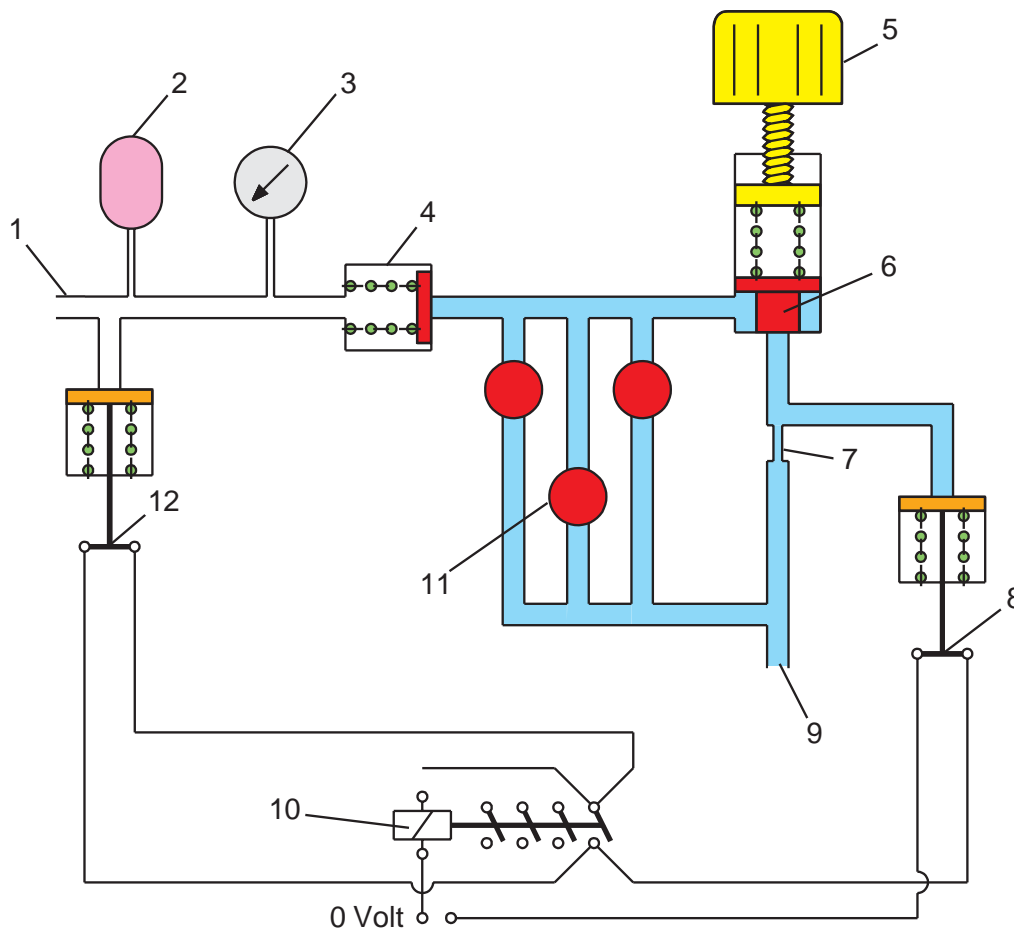
If the servopress gun is partly closed the pressure in the system increases. This causes the piston (7) to be lifted from the valve seat (15), so that part of the flow rate flows via the return to the suction chamber.

The pump continues to run with a high pressure. The pressure and quantity of water changes depending on the gun setting.

2.24.3 Gun closed

If the gun is now completely closed, the piston (7) opens fully and the whole flow rate of the pump flows via the throttle bore (16) to the suction chamber. The dynamic pressure, which forms by the throttle bore of the sleeve in the return, activates the pressure switch (18), which then switches off the unit.

2.25 Function of the pressure switch

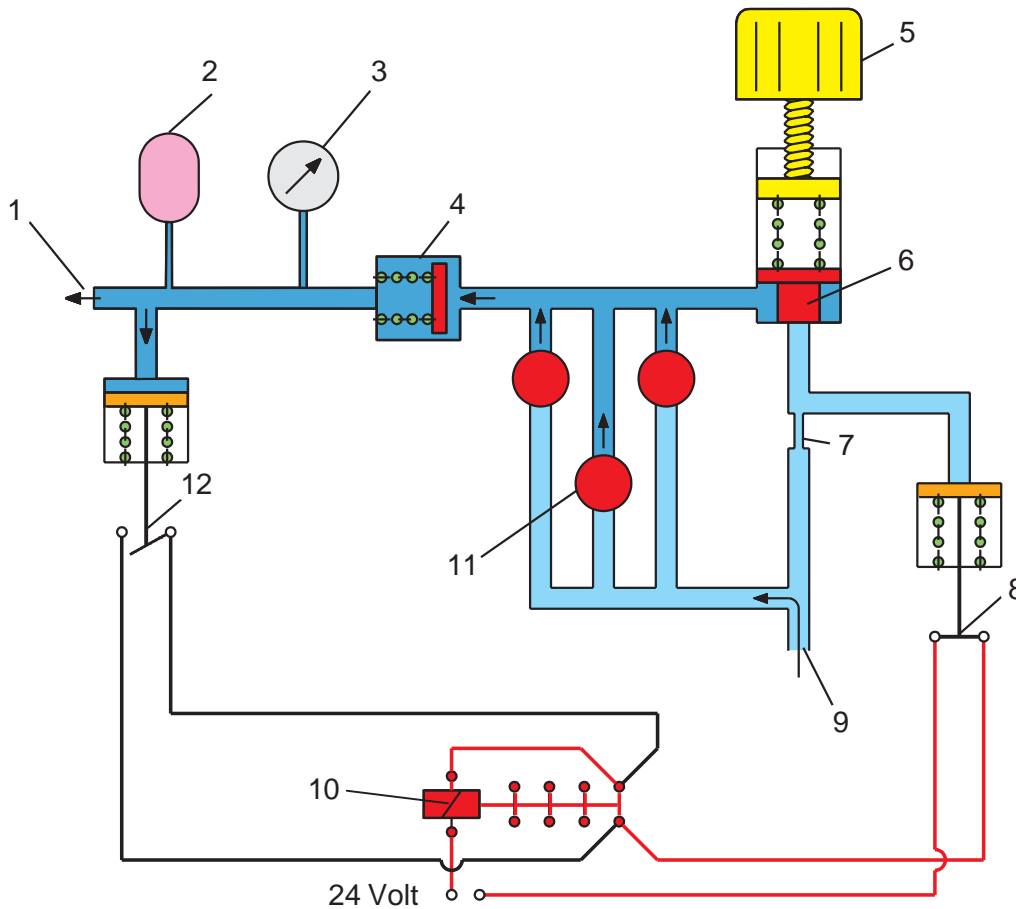


- 1 High-pressure outlet (unpressurised)
- 2 Pulsation damper
- 3 Pressure gauge (unpressurised)
- 4 Non-return valve (closed)
- 5 Rotary knob
- 6 Overflow valve (closed)
- 7 Throttle bore
- 8 Pressure switch (B7) (closed)
- 9 Water inlet
- 10 Motor protection contacts (K1) (open)
- 11 Pump is at a standstill
- 12 Pressure switch (B1) (closed)

2.25.1 Unit is switched off

When the unit is switched off and the gun open, the system is unpressurised and off-load. Both the pressure switches (8) and (12) and the overflow valve (6) and the non-return valve (4) are closed. The motor protection contacts (10) are open (see circuit diagram).

2.25 Function of the pressure switch



- 1 High-pressure outlet, operating pressure
- 2 Pulsation damper
- 3 Pressure gauge, operating pressure
- 4 Non-return valve (open)
- 5 Rotary knob
- 6 Overflow valve (closed)
- 7 Throttle bore
- 8 Pressure switch (B7) (closed)
- 9 Water inlet
- 10 Motor protection contacts (K1) (closed)
- 11 Pump is running
- 12 Pressure switch (B1) (open)

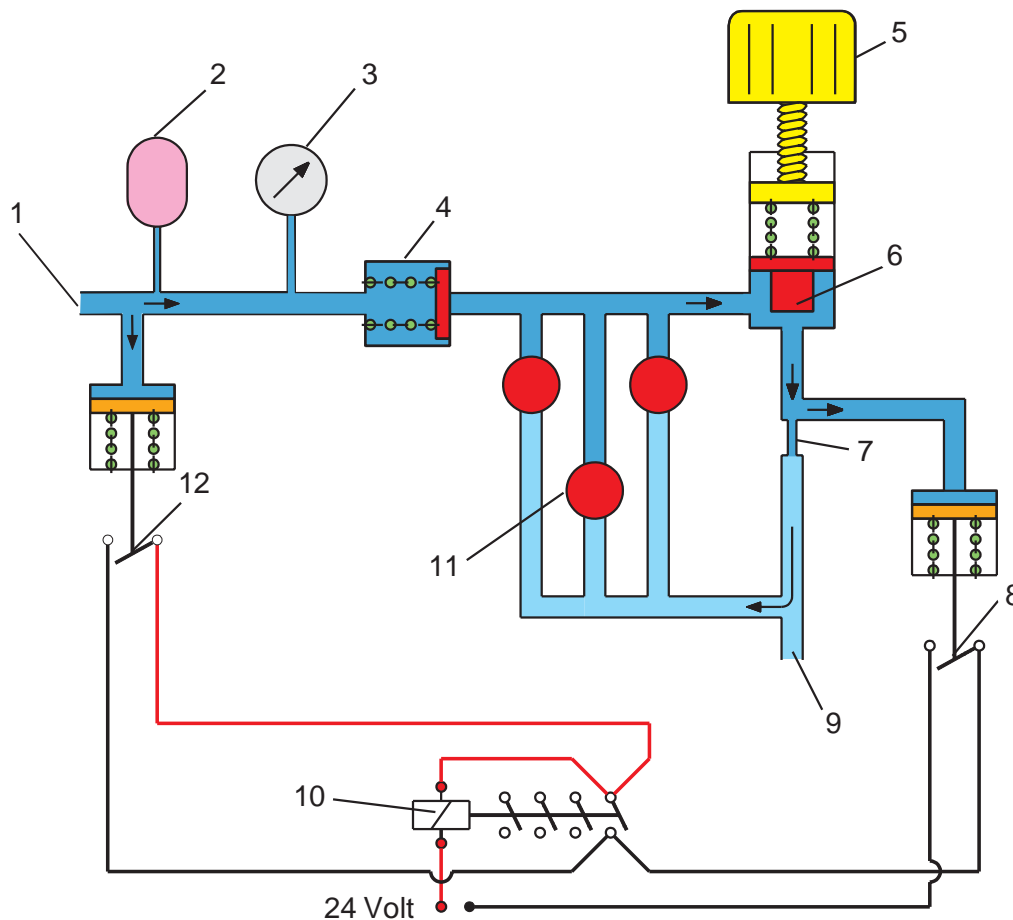
2.25.2 The unit is switched on and the gun opened

After switching on the unit with the gun open the motor contactor tightens and closes the contacts (10). This causes the motor to start and the pump (11) builds up the operating pressure.

The non-return valve (4) and pressure switch (12) open, the overflow valve (6) and pressure switch (8) remain closed.

The closed pressure switch (8) causes the motor protection contacts (10) to remain closed too (see circuit diagram).

2.25 Function of the pressure switch



- 1 High-pressure outlet, switch-off pressure
- 2 Pulsation damper
- 3 Pressure gauge, switch-off pressure
- 4 Non-return valve (closed)
- 5 Rotary knob
- 6 Overflow valve (open)
- 7 Throttle bore
- 8 Pressure switch (B7) (open)
- 9 Water inlet
- 10 Motor protection contacts (K1) (open)
- 11 Pump is at a standstill
- 12 Pressure switch (B1) (open)

As soon as the overflow valve (6) opens, the non-return valve (4) closes and the switch-off pressure is enclosed between the gun and non-return valve (4). The enclosed switch-off pressure causes the pressure switch (12) to remain open.

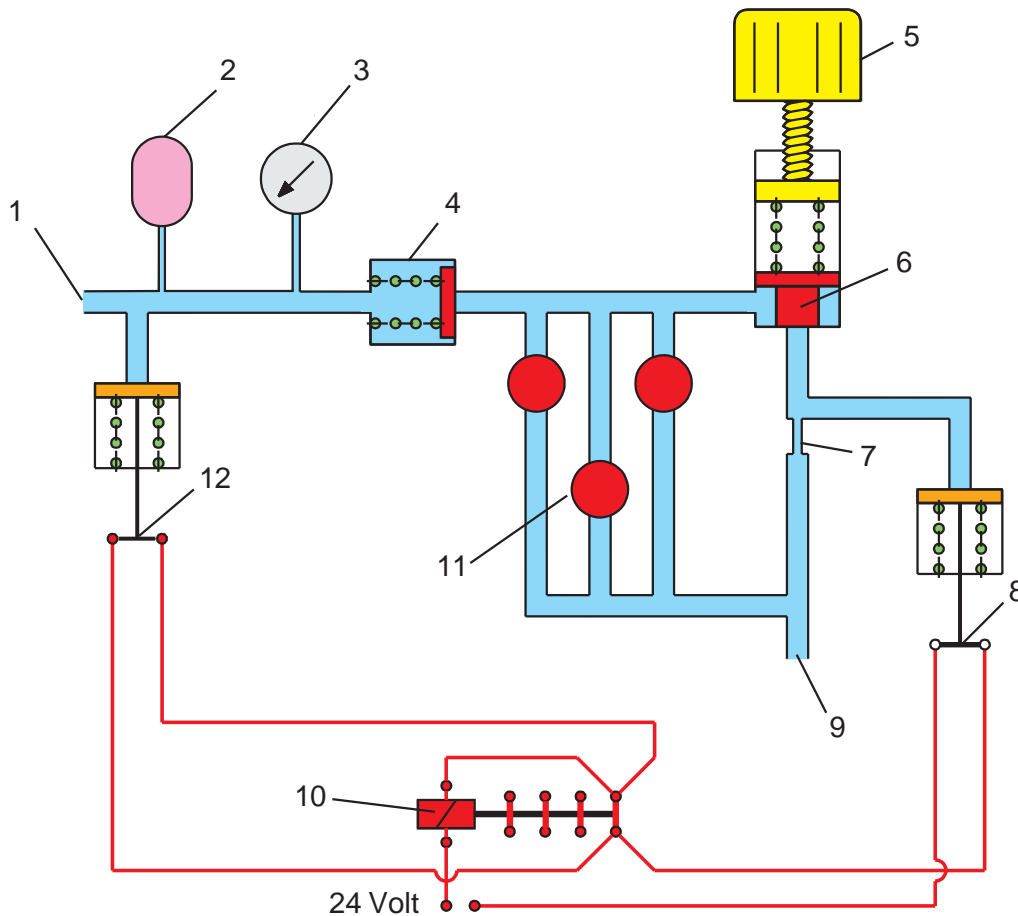
At the same time, a back-pressure results in the throttle bore (7), which opens the pressure switch (8) at approx. 10 bar and this interrupts the control circuit. The motor protection contacts (10) open and the motor are switched off.

As soon as the motor is at a standstill, the overflow valve (6) and the pressure switch (8) closes. The motor protection contacts (10) continue to remain open however, as the control circuit is only interrupted by the opened pressure switch (12) (see circuit diagram).

2.25.3 Gun is closed

When the gun is closed a short-term overpressure occurs in the system. This causes the overflow valve (6) to open and the whole flow rate flows through the throttle bore (7) into the suction chamber of the pump.

2.25 Function of the pressure switch



- 1 High-pressure outlet (unpressurised)
- 2 Pulsation damper
- 3 Pressure gauge (unpressurised)
- 4 Non-return valve (closed)
- 5 Rotary knob
- 6 Overflow valve (closed)
- 7 Throttle bore
- 8 Pressure switch (B7) (closed)
- 9 Water inlet
- 10 Motor protection contacts (K1) (closed)
- 11 Pump starts up
- 12 Pressure switch (B1) (closed)

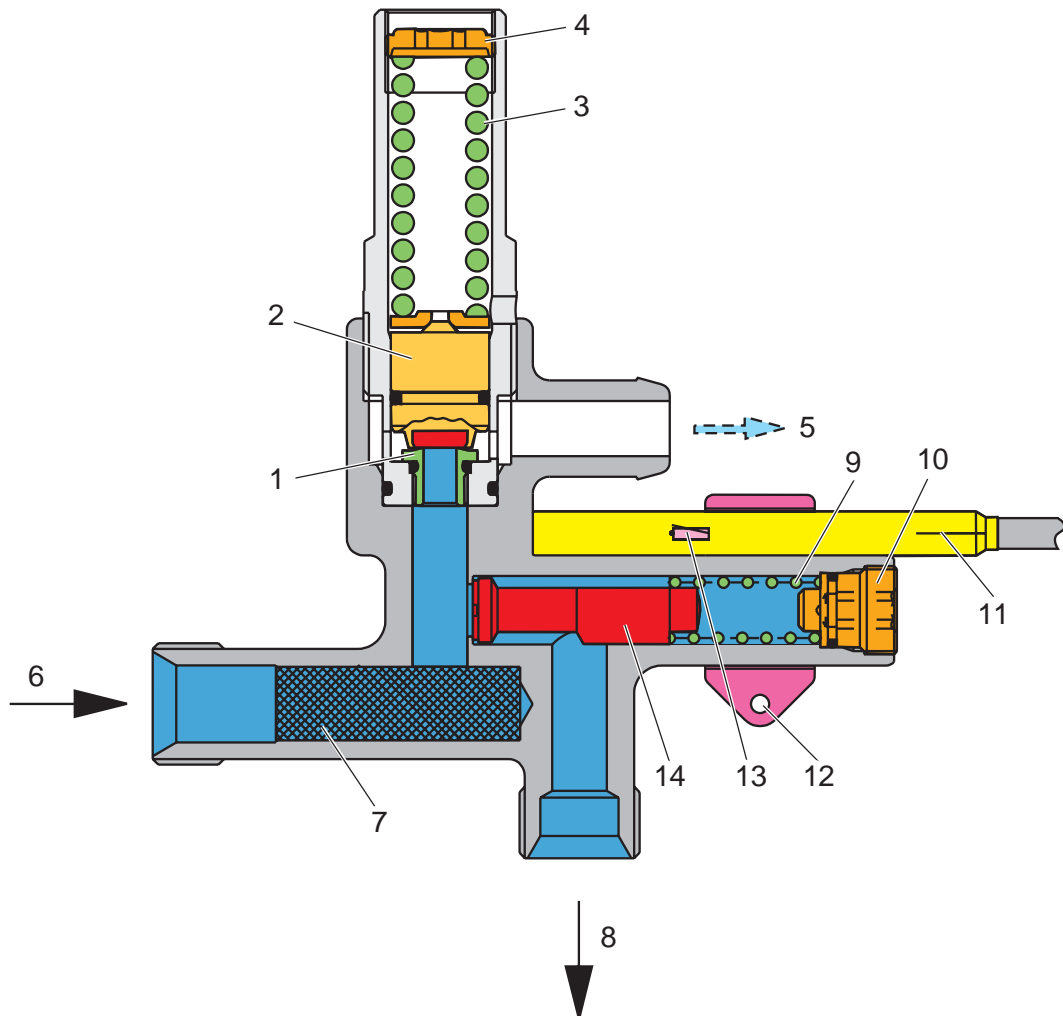
2.25.4 Gun is reopened with unit switched on

As soon as the gun is opened, the pressure is enclosed between the non-return valve (4) and the gun. The pressure switch (12) closes.

This means the control circuit is closed again, the motor contactor (10) tightens, closes the contacts, the motor starts up and the pump builds up the operating pressure again (see circuit diagram).

2.26 Function of the safety valve and water shortage safety device **ORIGINAL**

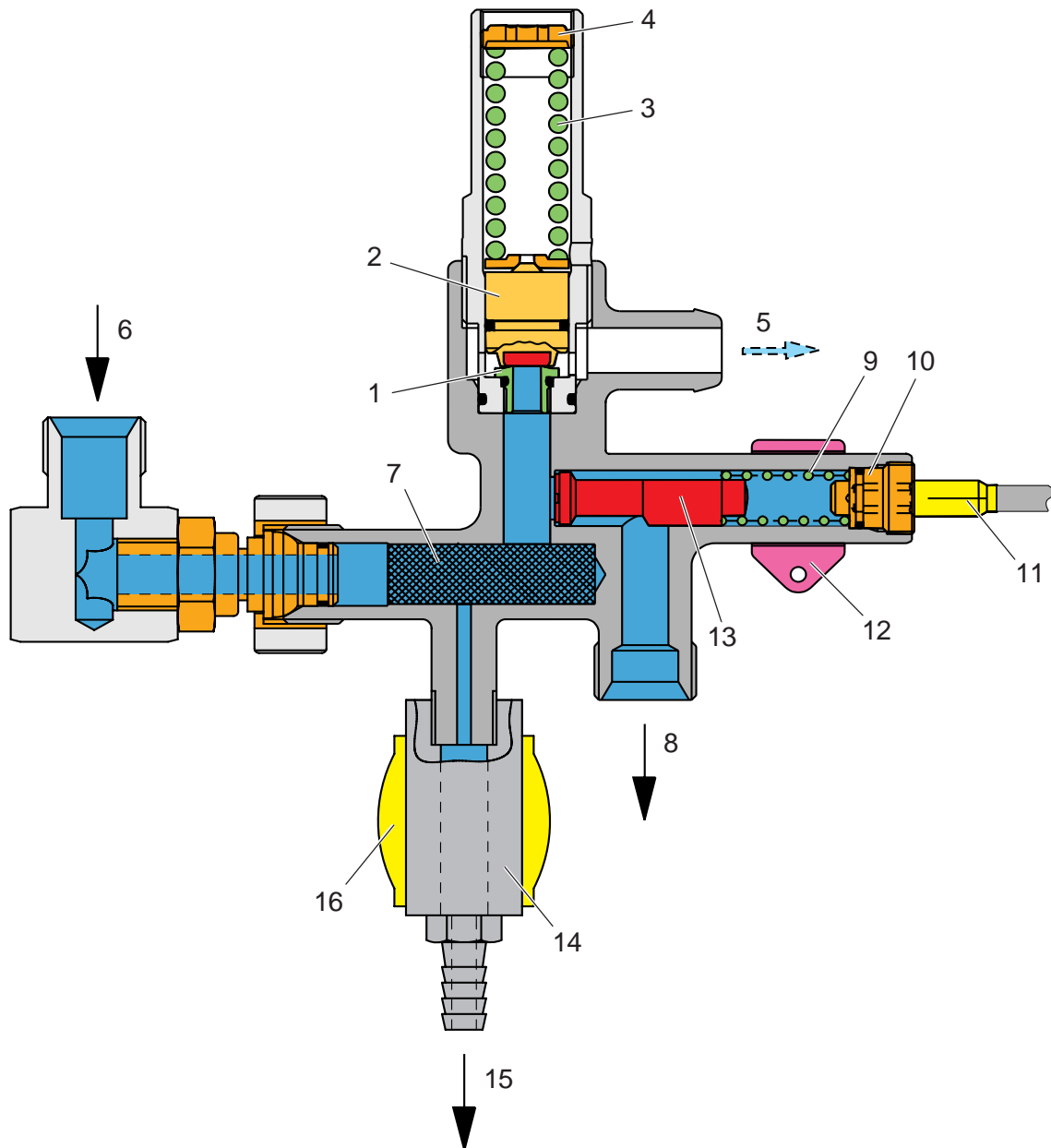
2.26.1 HDS 9/16 ST GAS (NG up to 12/2005)



- | | |
|----------------------------|--|
| 1 Valve seat | 8 Outlet to the continuous flow heater |
| 2 Piston | 9 Spring |
| 3 Spring | 10 Screw plug |
| 4 Adjusting screw | 11 Marking |
| 5 Outlet to the float tank | 12 Clamp holder |
| 6 Inlet from the pump | 13 Reed switch |
| 7 Strainer | 14 Magnetic piston |

2.26 Function of the safety valve and water shortage safety device **REVISED**

2.26.2 HDS 9/16 ST GAS (NG from 01/2006 and LPG) und HDS 12/14 ST-GAS NG+LPG



- | | |
|--|---|
| 1 Valve seat | 9 Spring |
| 2 Piston | 10 Screw plug |
| 3 Spring | 11 Reed switch with marking |
| 4 Adjusting screw | 12 Clamp holder |
| 5 Outlet to the float tank | 13 Magnetic piston |
| 6 Inlet from the pump | 14 Solenoid valve, pressure relief |
| 7 Strainer | 15 Outlet to the float tank |
| 8 Outlet to the continuous flow heater | 16 Coil for solenoid valve, pressure relief |

2.26 Function of the safety valve and water shortage safety device

2.26.3 Safety valve

If the pressure switch or overflow valve are defective, the safety valve feeds the whole flow rate of the pump to the float tank and therefore protects the unit and accessories against overpressure.

When the gun is open the safety valve is usually closed and the whole flow rate of the pump is pumped to the gun at operating pressure.

If the pressure in the high-pressure system rises to approx. 20 bar above the operating pressure, the piston (2) is lifted from the valve seat (1) and part of the flow rate flows to the float tank (5). The opening pressure of the safety valve is set using the adjusting screw (4).

The safety valve of the LPG version also has a solenoid valve (see page 43, item 14), which to relieve the pressure after closing the gun and switching off the unit via the pressure switch, is briefly opened by the timer module (A1) in order to discharge the pressure in the system into the float tank.

The safety valve is a safety component and therefore sealed at the adjusting screw (4).

2.26.4 Water shortage safety device

The low-water protection prevents the burner from burning if there is no or insufficient water and therefore protects the boiler against overheating.

If the gun is open and there is sufficient water flow the magnetic piston (see page 42, item 14 and page 43, item 13) is pushed against the spring (9). The magnetic piston (14) causes the contact of the reed switch to close (see page 42, item 13 and page 43, item 11). This opens the fuel solenoid valve and the burner ignites.

The strainer (7) prevents the water shortage safety device from becoming soiled.

The water shortage safety device is a safety component and is therefore sealed at the screw plug (10) and at the clamp holder (12).

2.27 Accessories for exhaust connection (option)



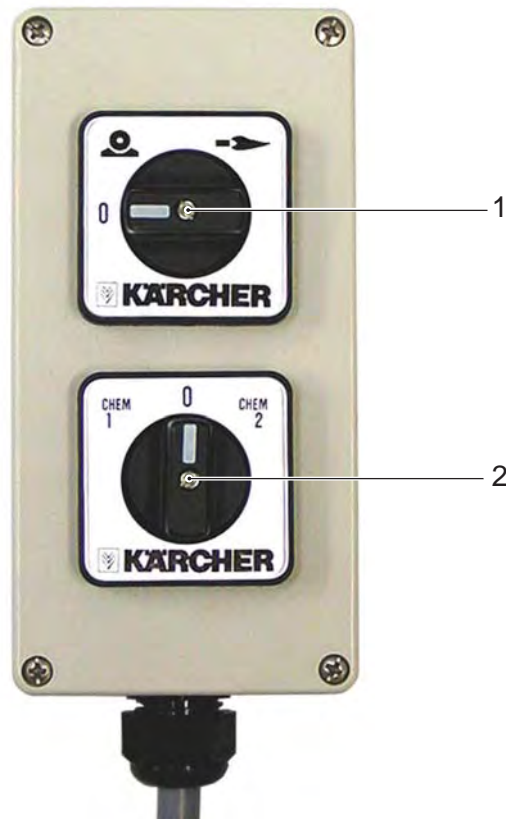
HDS 9/16 ST-GAS

- 1 Exhaust connector (2.640-425)
- 2 Measurement opening for CO₂
- 3 Exhaust connector (2.640-424)

The „exhaust“ accessories (2.640-425 (1) and 2.640-424 (3)) enable the unit to be connected to a conventional chimney and to be operated dependent on the ambient air. Prerequisite is that the chimney is suitable for the connection of condensing units, e.g. in that the chimney has been rehabilitated by pulling through a stainless steel pipe.

An opening is available to measure the CO₂ values (2).

2.28 Remote control accessories (option)



- 1 Device and operating modes switch
- 2 Selector switch for cleaning agent suction

The HDS 9/16 ST-GAS is prepared for the connection of remote controls.

The most frequently used versions have a unit and operating modes switch (1) and a selector switch for the cleaning agent suction (2). The unit and operating modes switch (1) can be used to switch the unit on and off and to choose between hot and cold water operation.

The selector switch for the cleaning agent suction (2) enables the cleaning agent to be switched on and over if the relevant solenoid valves are installed.

Extended remote control variants are described in detail in the planning manual (5.959-253).

3 Troubleshooting

Fault	Solution
Unit wont start, standby indicator doesn't light up	<ul style="list-style-type: none"> - Check the power supply and fuse. - Deactivate the safety time switch by switching the unit switch off and back on again. - Check/replace the pressure switch. - Check/replace timer module (A1).
Motor overheating indicator lamp is lit	<ul style="list-style-type: none"> - The temperature detector (WS) in the motor or the bimetal relay (F1) has triggered; remove the cause of the overload.
Burner won't ignite or flame goes out during operation	<ul style="list-style-type: none"> - Adjust the temperature regulator to a higher setting. - Switch on the burner. - Ensure an adequate supply of water when the low-water protection is switched off (see technical specifications). - Open gas tap. - The maximum temperature at the water outlet (110 °C / 230 °F) or boiler base (75 °C / 167 °F) has been exceeded. Leave the boiler to cool and restart the burner/check the temperature regulator. - Check/replace burner fault indicator lamp. - Exhaust gas pipe or chimney blocked - check/clean. - Check/replace exhaust gas pressure switch.
Burner fault indicator lamp flame is lit	<ul style="list-style-type: none"> - Switch the unit off and then back on again in order to unlock the PWM printed circuit board. - Check the gas supply. - Check the ventilation and exhaust gas system. - Check/top up condensation water in the boiler base (at least 5 litres). - Check/unlock control unit for gas burner. - No glowing element available/check/correct control unit for gas burner and glow transformer fuse or replace defective parts and if necessary clean. Press release button in order to unlock the flame monitoring system. - Check/replace the blower fan and PWM printed circuit board. Press release button in order to unlock the flame monitoring system. - The maximum temperature at the water outlet (110 °C / 230 °F) or boiler base (75 °C / 167 °F) has been exceeded. Leave the boiler to cool and restart the burner/check the temperature regulator. - Exhaust gas pipe or chimney blocked - check/clean. - Check/replace exhaust gas pressure switch.
indicator lamp of exhaust thermostat is lit	<ul style="list-style-type: none"> - Set temperature regulator to zero and open handgun until the system has cooled. Press the resetting button, to unlock the temperature limiter.

3 Troubleshooting

Fault	Solution
indicator lamp of scale inhibitor is lit	<ul style="list-style-type: none"> – Top up scale inhibitor. – Check scale inhibitor printed circuit board (A2).
Insufficient or no cleaning agent function	<ul style="list-style-type: none"> – Check/correct metering valve position. – Clean the cleaning agent filter. – Top up the tank. – Check/clean the cleaning agent hoses, metering valve or solenoid valve. – When operating with remote control, check or replace the electronics or solenoid valve.
Unit doesn't reach full pressure	<ul style="list-style-type: none"> – Check/replace high-pressure nozzle. – Check cleaning agent system for leaks. – Check/adjust water supply. – Check/clean strainer at the water inlet. – Check/adjust safety valve. – Check/adjust the pressure and flow control valve.
High-pressure pump knocks, pressure gauge indicator vibrates severely	<ul style="list-style-type: none"> – Check/replace vibration damper. – Check suction system for leaks/remove leak. – Check cleaning agent system for leaks/remove leak.
Unit continuously switches off/on when handgun open	<ul style="list-style-type: none"> – Check/clean high-pressure nozzle in the spray lance. – Unit is calcified; see HDS 1295 service manual (5.905-221). – Check/adjust the pressure and flow control valve. – Clean the strainer at the low-water protection.
Unit won't switch off when the handgun is closed	<ul style="list-style-type: none"> – Vent the pump. – Check/adjust safety valve. – Check/set the pressure and flow regulating valve.

4 Technical specifications

Unit type	Unit No.	Circuit diagram	Operating instructions	Spare parts list
HDS 9/16 ST-GAS EU I	1.251-101	0.088-399 ORIGINAL 0.088-880 REVISED	5.959-254	5.958-465
HDS 9/16 4ST-GAS EU	1.251-103	0.088-880	5.959-809	5.970-557
HDS 9/16 ST-GAS LPG	1.251-104	0.088-880	5.959-809	5.970-557
HDS 12/14 4ST-GAS NG	1.251-105	0.088-880	5.961-809	5.970-696
HDS 9/16 4ST-GAS LPG	1.251-106	0.088-880	5.961-809	5.970-696

The technical data sheet and the circuit diagram will be included in the next issue of the spare parts CD-ROM (DISIS) and are also available in kaercher-inside (<https://kaercher-inside.com>).

If required, the operating instructions and the spare parts lists can be ordered as a paper copy from the spare parts service by quoting the relevant part number.

5 Special tool

Multimeter (standard)	6.803-022
Multimeter with frequency measurement function	6.681-037
Shut-off valve with thermometer	2.901-030
Pressure measuring unit for switch-off pressure switch	
– Pressure gauge	6.421-103
– Hose	6.389-635
– Connection nipple	5.901-137
Adapter system 2000	4.401-072
Dismantling pliers for pressure and suction valves and water strainers	4.901-062
Assembly mandrel for high-pressure and oil seal	5.901-064
Sleeve for assembly of high-pressure seal	5.901-136
Assembly mandrel for O-ring / support ring, overflow piston	5.901-127
Dismantling tool for cables in the central plug	5.901-134
Striking tool for overflow valve seat	5.901-126
Deflection tool for overflow valve seat	5.901-125
Extraction tool for swash plate	4.901-038
Testing pressure gauge for operating pressure	4.742-025
Assembly screws for piston guide (2x)	7.304-403
Sliding capiper	(no part number)
Exhaust measuring device, digital	(no part number)

6 Tightening torque

Suction valves, cover screws	20 Nm
Pressure valve, screw plugs	50 Nm
Safety valve, seat	8-10 Nm
Cylinder head screws	50-60 Nm
Swash plate, retaining screw	20 Nm
Oil drain plug	20-25 Nm
Piston housing	1-3 Nm
Pressure switch connections	50 Nm
Cleaning agent connection	35 Nm

Operator/Owner: _____

Location: _____

Order No: _____

Factory No: _____

Instructor: _____

Place: _____

Gas type: _____

Date: _____



- The operating instructions have been read independent of this checklist. The technical data and the operating, safety, warning and installation instructions contained in the operating instructions have been and will be observed.*
- Water hose and high-pressure hose are properly connected.*
- A siphon has been connected to the condensate discharge of the boiler (water column at least 350 mm).*
- 5 litres of water have been filled into the continuous flow heater via the exhaust connecting sleeve.*
- Function of the siphon and the water outlet has been checked. (Fill an additional 2 litres of water via the exhaust connecting sleeve.)*
- The water inlets for the unit, continuous flow heater and floater tank are open.*
- The exhaust airflow has been visually inspected for connection and functionality.*
- Air intake opening at the burner has been checked for blockages, free suction of the combustion air is possible.*
- The scale inhibitor container has adequate scale inhibitor liquid.*
- The electrical connection has been checked.*
- The hydraulic system has been vented. (Unit mains switch set to cold-water operation position. Press spraying device 2-3 times for approx. 5 minutes.)*
- The unit has been run for approx. 15 minutes continuously in cold-water mode, without a water shortage or knocking sounds occurring in the pump. (If water shortage and/or knocking sounds occur in the pump, adjust the float ball in the float tank.)*
- The gas supply has been checked with the gas tap open. (Static gas pressure min. 18 mbar / 0.261 psi, max. 50 mbar / 0.725 psi)*
- The combustion values have been checked in installed condition. (unit mains switch set to hot water operation position. Turn temperature regulator to maximum. Continuously activate spraying device.)*

Signature
of the instructor: _____Signature
of the operator/owner: _____

8.1 Regulations, guidelines and rules

Before installing the unit the gas supply company and district master chimney sweep should be consulted.

The building legislation, commercial law and emissions control regulations must be observed for the installation. Please note the following regulations, guidelines and standards listed in the following:

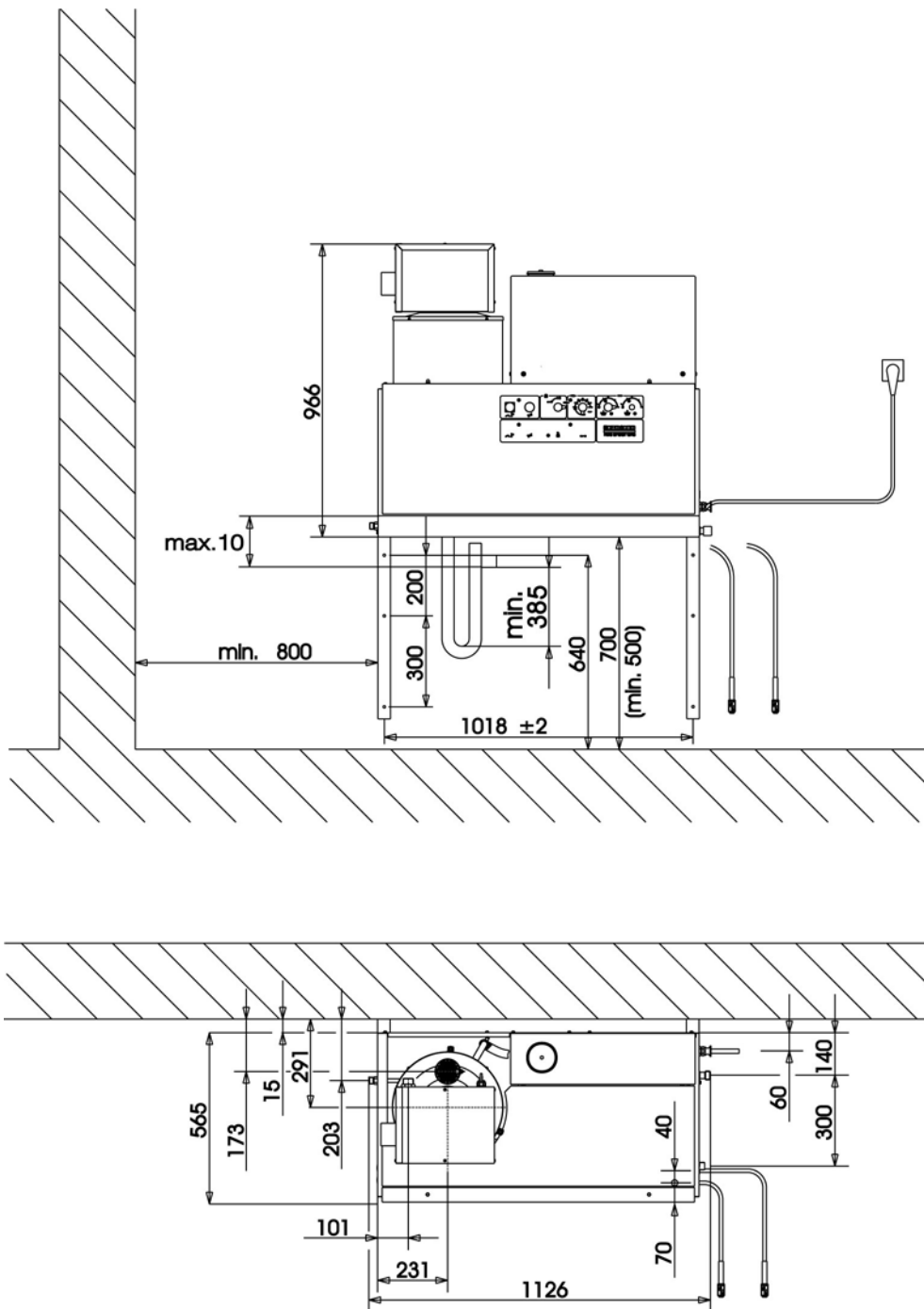
- The respective national regulations of the legislator must be observed for the electrical installations.
- The respective national regulations of the legislator must be observed for the gas installations.

Important!

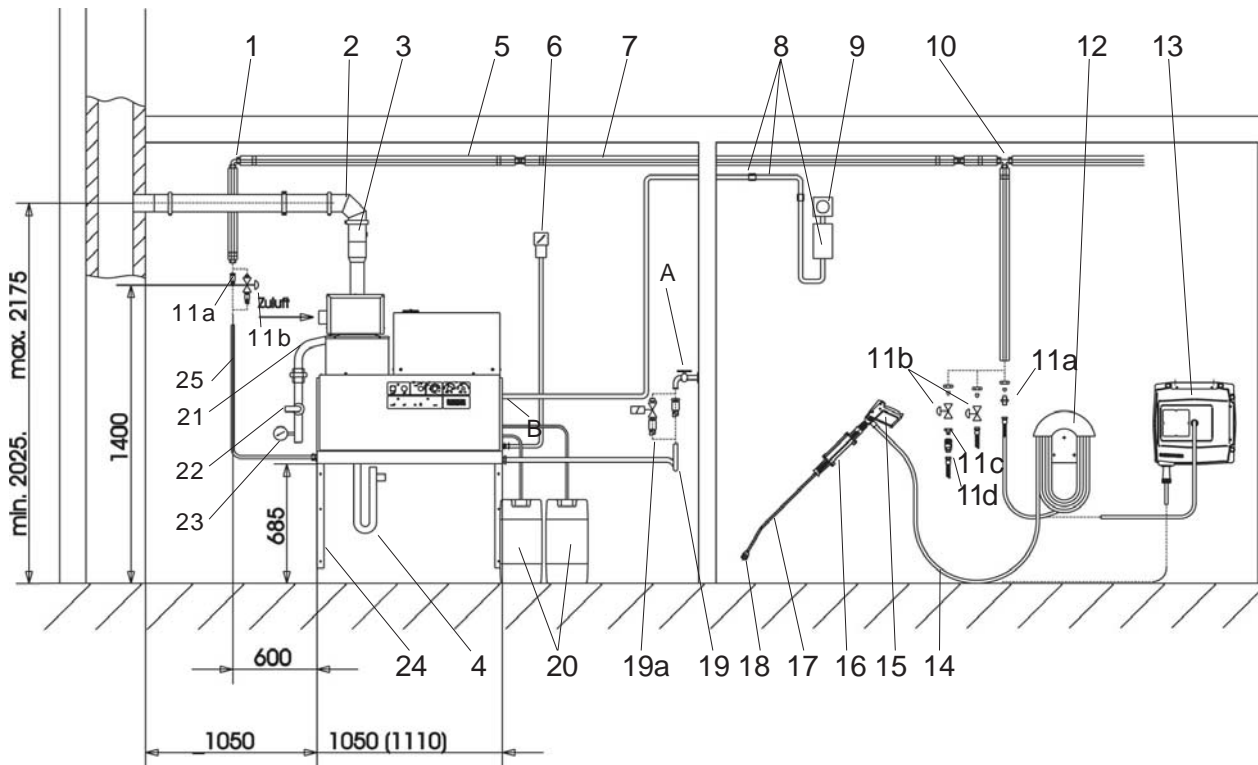
When designing a chimney and fireplace the locally valid regulations must always be observed.

- DVGW-TRGI '86, issued 1996: Technische Regeln für die Gasinstallation/Technical rules for gas installation
- DVGW-TRF '96: Technische Regeln Flüssig-gas/Technical rules for liquid gas
- DVGW leaflets: G260, G600, G670
- DIN 1988: Technische Regeln für Trinkwasserinstallation (TRWI - technical rules for drinking water installation)
- BImSchV: Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes - Regulations for implementation of the federal emissions control law
- FeuVo: Feuerungsverordnung der Bundesländer - firing regulations of the federal states
- Only a specialist firm approved by the gas and water authorities may install the gas pipes and connect the unit to this pipe.
- DIN 13384-1: Berechnungen von Schornsteinabmessungen / Calculation of chimney dimensions
- DIN EN 1443, DIN 18160 T1: Abgasanlagen / exhaust systems

8.2 Dimensions (mm)



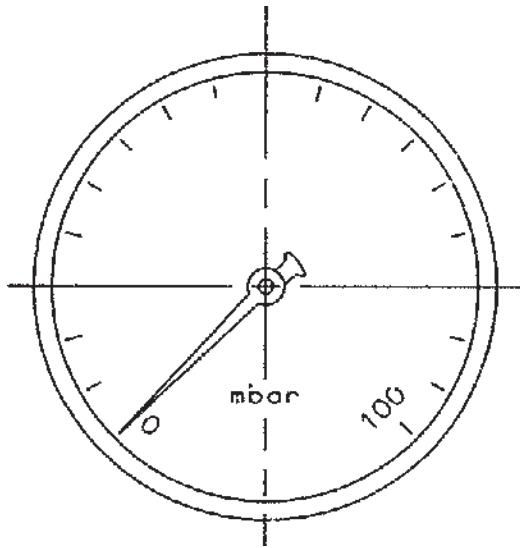
8.3 Installation materials



Item	Installation materials	Order No.
1	Angle screw fitting	6.386-356
2	Parts set connection parts for „exhaust“	2.640-425
3	Parts set boiler connection „exhaust“	2.640-424
4	Parts set for siphon	2.640-422
5	Thermal insulation	6.286-147
6	Mains switch	6.631-455
7	Pipe set, steel zincod	2.420-004
	Pipe set, stainless steel	2.420-006
8	Parts set for remote controls	2.744-008
9	Parts set for EMERGENCY STOP switch	2.744-002
10	T-screw fitting	6.386-269
11a	Connection sockets, brass	2.638-180
	Connection sockets, stainless steel	2.638-181
11b	Shut off tap NW 8, steel zincod	4.580-144
	Shut off tap NW 8, stainless steel	4.580-163
11c	Fixed quick coupling part	6.463-025
11d	Loose quick coupling part	6.463-023

Item	Installation materials	Order No.
12	Hose holder	2.042-001
13	Hose drum	2.637-238
14	High-pressure hose 10 m	6.388-083
15	Handgun	4.775-012
	Handgun system 2000	4.775-282
16	Spray lance holder	2.042-002
17	Spray lance	4.760-101
	Spray lance system 2000	4.760-355
18	Nozzle mouthpiece HDS 9/16 ST-GAS HDS 12/14 ST-GAS	2.883-402 2.883-406
19	Water hose 3/4“, 1.5 m	4.440-282
19a	Magnetic valve water inlet	4.743-011
20	Cleaning agent tank, 60 litre	5.070-078
21	Gas hose R1“	6.388-228
22	Gas shut off tap R1“	6.412-389
23	Manometer „Gas“ Attention! Shut off valve to be provided on site	6.412-059
24	Parts set for base frame	2.210-008
25	High-pressure hose 1.5 m, M22x1.5	2.210-008

8.3 Installation materials

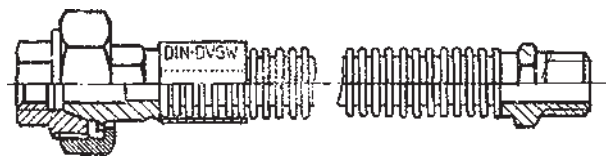


Order No.: 6.421-059

8.3.1 Gas manometer

Manometer Ø 63 mm, connection on rear 1/4".

A non-return valve must be fitted on site in front of the manometer.

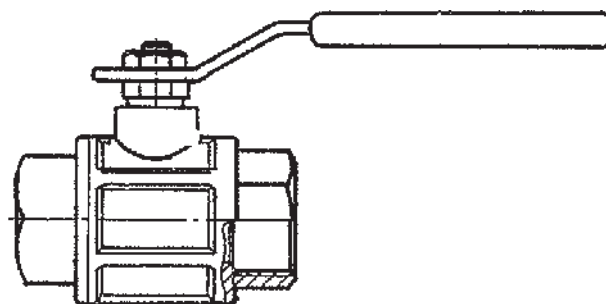


Order No.: 6.388-228

8.3.2 Corrugated gas hose

Gas connection hose for high-pressure cleaner, DVGW tested, registration number 82.05.e156.

- Length 320 mm
- Nominal size DN 25
- Connection 1"
- Stainless steel



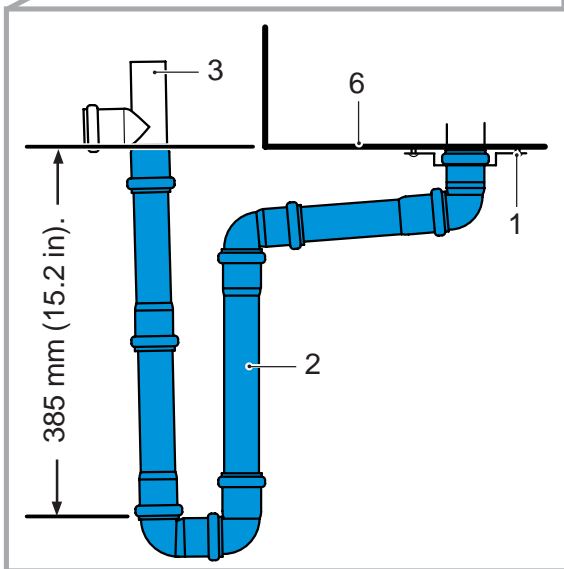
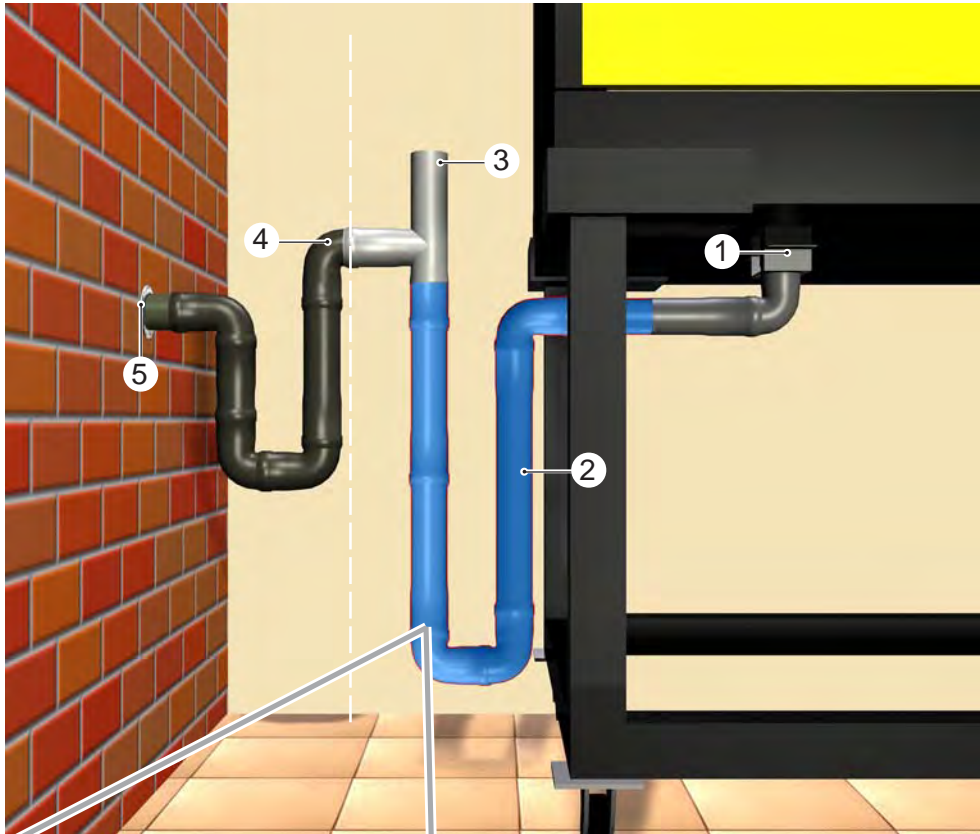
Order No.: 6.412-389

8.3.3 Gas shut-off tap

Through ball valve, DVGW tested, registration number 79.09e.154

- connection 1"
- Nominal pressure PN 4 corrugated gas hose

8.4 Siphon accessory kit



The siphon kit (2.640-422, shown in gray and cut open) is connected with the fixing plate (1) to the boiler condensate drain pipe and connected with the wastewater siphon (4) of the wastewater connection (5).

The system is vented (3) above the connection to the wastewater siphon (4).

Note:

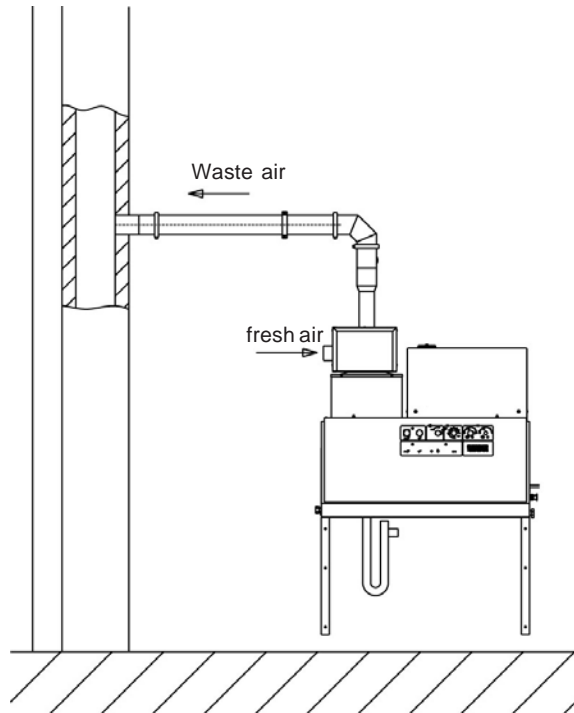
The siphon kit (2.640-422) contains all the parts between item 1 and 3 (see figure above).

Note:

The discharge edge of the siphon must certainly not be fitted below the lower edge of the unit (see diagram). If the discharge edge is lower than the lower edge of the unit, then there will not be enough condensate in the siphon and the pipe can melt because of the extreme heat produced when operating the unit. The water column (2) in the condensate siphon must be at least 385 mm (15.2 in.).

- 1 Condensate siphon fixing plate
- 2 Water column in the siphon
- 3 Ventilation stub
- 4 Wastewater siphon
- 5 Wastewater connection
- 6 Unit base

8.5 Installation variants for fresh air and exhaust airflow



Note:

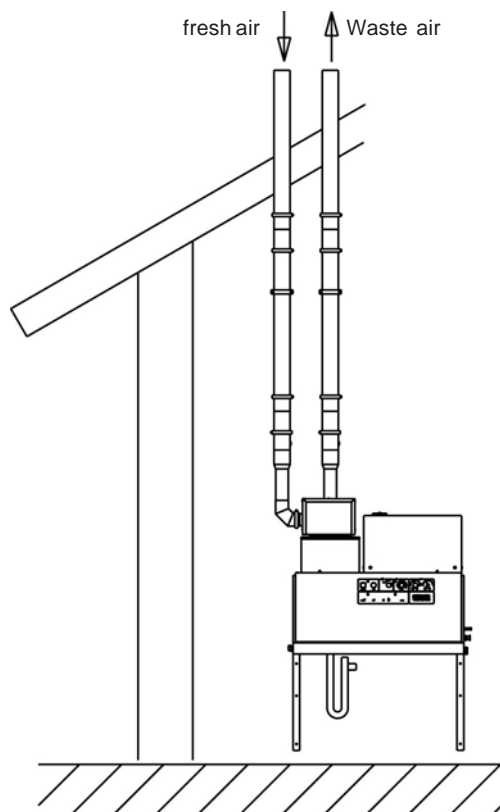
The designations B23, C33, C43, C53 and C63 represent the rating plate gas category (see chapter 2.12.2, 2.13.2, 2.14.2 and 2.15.2)

Gas category B23

Connect the gas unit to a conventional single flue chimney to DIN 18160 and operate dependent on ambient air. Prerequisite is that the chimney is suitable for the connection of condensing units, e.g. in that the chimney has been rehabilitated by pulling through a stainless steel pipe.

Note:

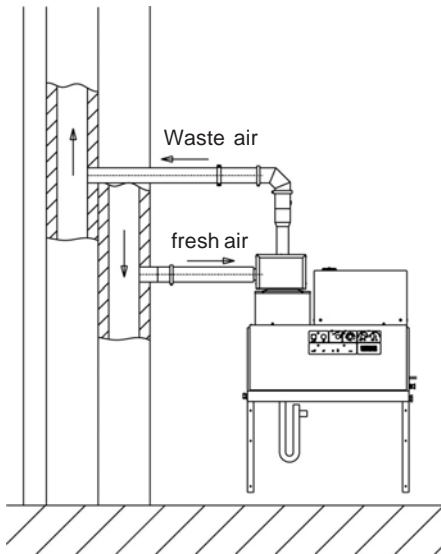
A separate chimney is to be installed for each HDS 9/16 ST-GAS and HDS 12/14 ST-GAS.



Gas category C33

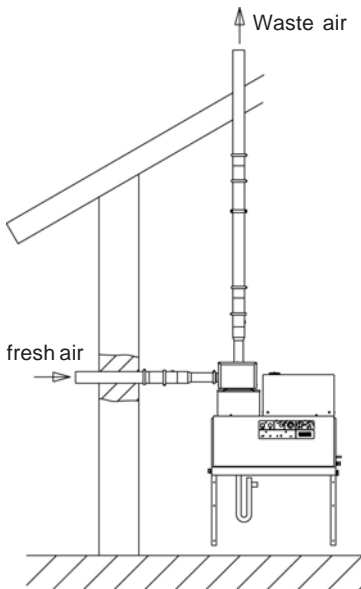
Operation of the gas unit independent of ambient air with combustion air intake and exhaust air flow vertical above the roof. The openings are located close to each other in the same pressure range.

8.5 Installation variants for fresh air and exhaust airflow



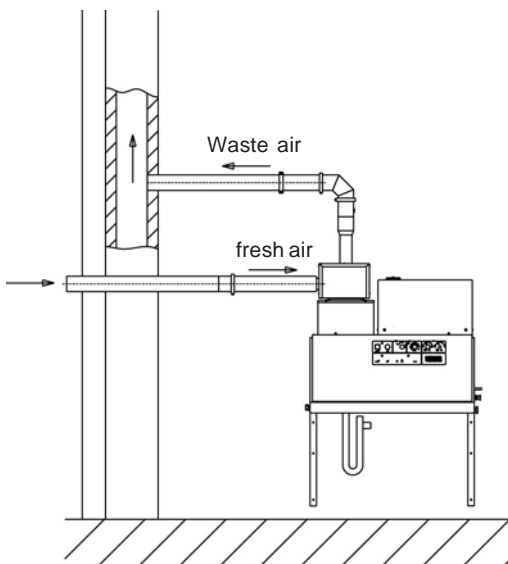
Gas category C43

Gas unit with combustion air intake and exhaust fed to the connection at an air exhaust system (LAS). (Independent of ambient air).



Gas category C53

Gas unit with separate combustion air intake and exhaust airflow. The openings are located in different pressure ranges. (Independent of ambient air).



Gas category C63

The combustion air is removed from the external air via a closed system. The exhaust is to be passed through a chimney. (Independent of ambient air).

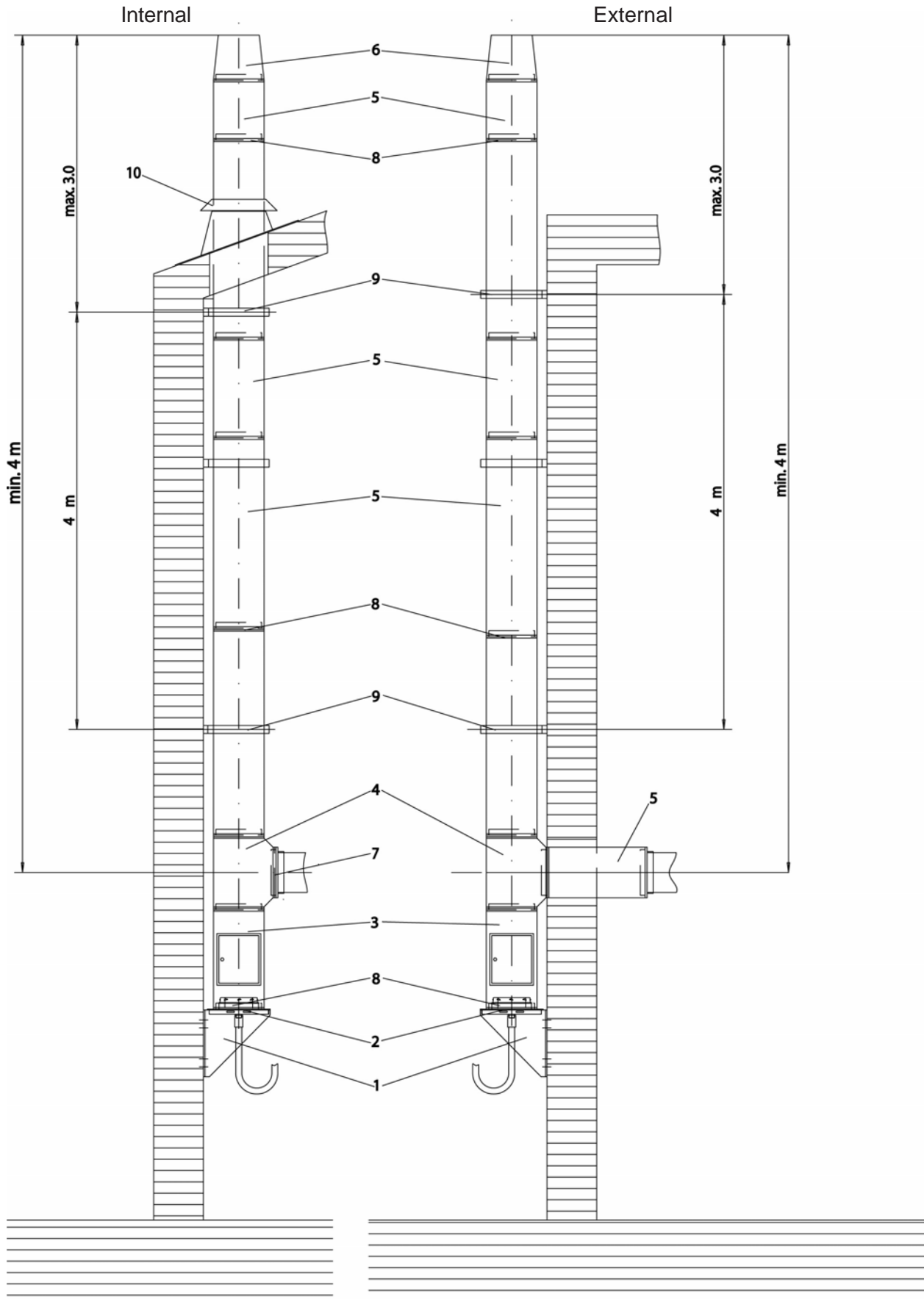
Prerequisite is that the chimney is suitable for the connection of condensing units, e.g. in that the chimney has been rehabilitated by pulling through a stainless steel pipe.

The chimney must be suitable for overpressure.

Note!

In order to reach the prescribed combustion values the chimney draught given in the technical data must be observed.

8.6 Exhaust system, double-walled



8.6 Exhaust system, double-walled

Chimney, double-walled

Double-walled prefabricated chimney made from stainless steel with 25 mm special mineral wool insulation.

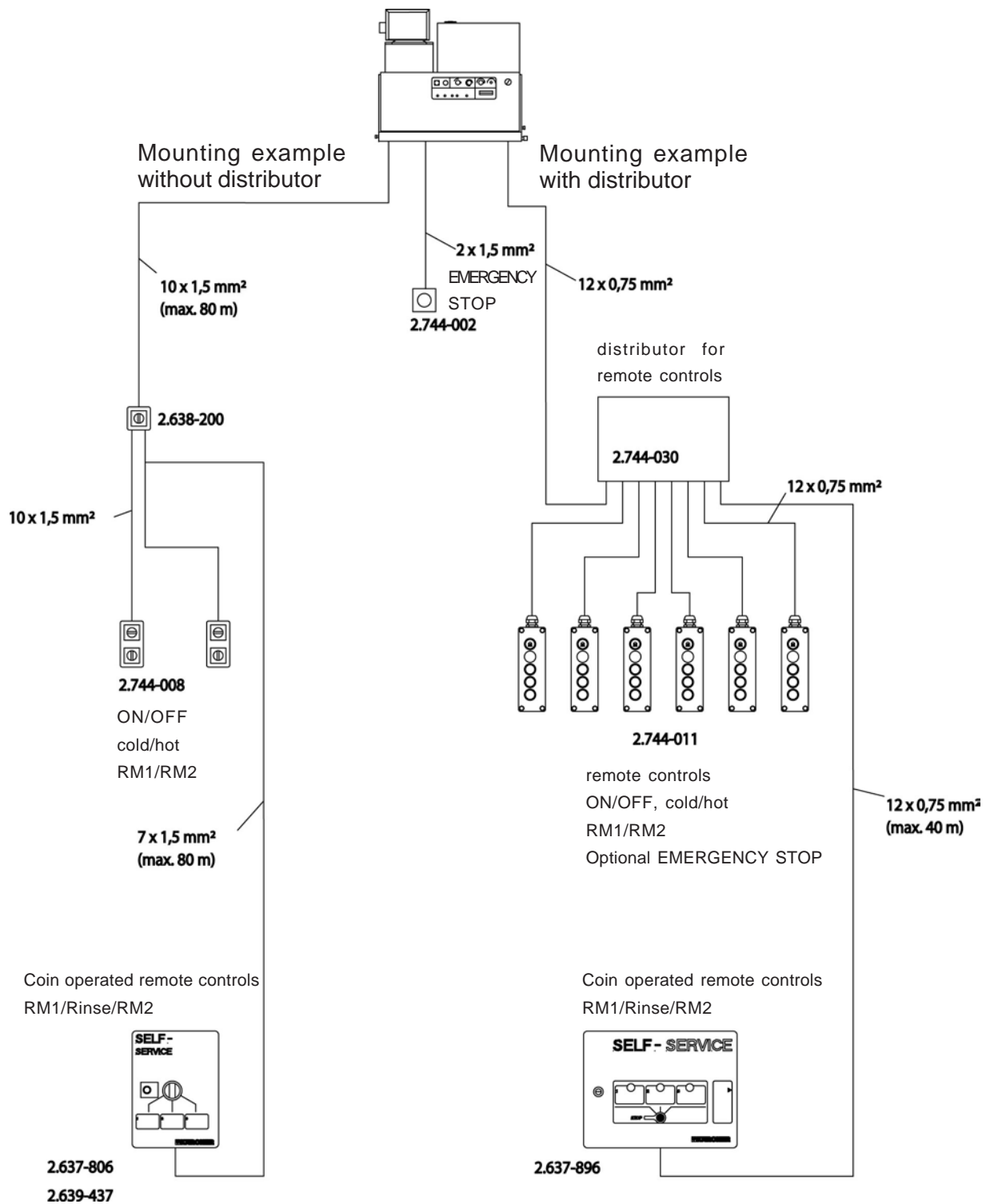
- With building authority approval for oil and gas heated units, approval number 7.1.141 (FRG)
- External diameter 251 mm
- Internal diameter 203 mm
- Prefabricated segments connected by a coupling system with additional clamping tape

Important!

When designing a chimney and fireplace the locally valid regulations must always be observed.

Item	Designation	Order No.	Price	No.	Total
1	Wall bracket	6.526-187			
2	Anchoring plate	6.526-188			
3	Cleaning piece	6.526-189			
4	T-piece 90°	6.526-190			
5	Extension element 300 mm	6.526-193			
	Extension element 500 mm	6.526-192			
	Extension element 1000 mm	6.526-191			
6	Opening end piece	6.526-197			
7	Connection coupling	7.999-999			
8	Clamping tape	6.526-133			
9	Wall fixing tape	6.526-199			
10	Roof cover 5°-32°	6.526-194			
	Roof cover 32°-45°	6.526-195			
	Flat roof cover	6.526-196			

8.7 Remote control diagram (Example with and without distributor)



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