



HDS Compact Class

HDS 5/12 C/CX, HDS 6/14 C/CX, HDS 6/14-4 C/CX,
HDS 7/16 C/CX, HDS 8/17 C/CX, HDS 8/18-4 C/CX

Service Manual



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1 Preface

Good service work requires extensive and practice-oriented training as well as well-structured training materials.

Hence we offer regular basic and advanced training programmes covering the entire product range for all service engineers.

In addition to this, we also prepare service manuals for important appliances - these can be initially used as instruction guides and later on as reference guides.

Apart from this, we also regular information about product enhancements and their servicing.

If you should require supplements, have corrections or questions regarding this document, please address these citing the following subject to: *international-service@de.kaercher.com*

Subject:	Case 111670
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The responsible product specialist will take care of your issue.

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2 Safety instructions

2.1 Hazard levels

⚠ Danger

Immediate danger that can cause severe injury or even death.

⚠ Warning

Possible hazardous situation that could lead to severe injury or even death.

Caution

Possible hazardous situation that could lead to mild injury to persons or damage to property.

2.2 General notes on safety

⚠ Warning

Prior to opening the electric box, all power to the appliance must be shut off (pull mains plug) and it must be protected from inadvertent startup.

3 Technical Features

3.1 General

Mobile hot water high pressure cleaner in different performance classes for commercial use.

- High performance burner with upright heating coil and continuous ignition
- Water supply with coarse dirt filter and filter from the pump
- Swimmer reservoir (not HDS 5/12)
- Integrated decalcification protection (not HDS 5/12)
- Steam operation (water temperatures up to 155°C) with separate steam nozzle (not HDS 5/12)
- Burner blower and fuel pump directly on the electric motor
- Hourmeter can be added later
- Flame monitoring (photo cell) can be added later
- Crane suspension can be added later

3.2 Connection performance of appliance

1-phase appliances

- HDS 5/12 C/CX: 3.2 kW
- HDS 6/14 C/CX: 3.6 kW
- HDS 6/14-4 C-CX: 3.6 kW

3-phase appliances

- HDS 7/16 C/CX: 4.7 kW
- HDS 8/17 C/CX: 5.7 kW
- HDS 8/18-4 C-CX: 6.5 kW

3.3 Electrical/electronics

- Control electronics (not HDS 5/12)
- Programme switch
- Two pressure switches (HDS 5/12: one pressure switch)
- Water temperature regulation with temperature sensor
- Temperature stop for exhaust gases
- Water shortage safeguard
- Dry run protection for pump via control electronics (not HDS 5/12)
- Level sensor for fuel, liquid softener pump oil* and detergent tank (*not HDS 5/12 and HDS 6/14)
- component testing (not HDS 5/12)
- Fault monitoring and fault display (not HDS 5/12)
- Monitoring of rotation direction (3-phase appliances only)

3.4 Drive

- 2-pin air-cooled motor or 4-pin water-cooled motor
- Motor with winding protection

3.5 High-pressure pump

- 3 piston axial pump with stainless steel or chrome piston; some models feature ceramic coating.
- Pistons without piston shoes
- Pump head made of brass
- Suction and high pressure valves made of plastic or stainless steel
- Swash plate with axial ball bearing
- Manometer
- Overflow valve with pressure and volume control (not HDS 5/12)
- Working pressure: 120-180 bar, depending on the appliance
- Water quantity: 500-800 l/h, depending on the appliance
- Safety valve
- Float tank
- Water fine filter
- Safety block with sieve, lack of water fuse and safety valve

3.6 Booster heater

- Electronic ignition transformer without ignition cable
- Conventional ignition transformer for special voltage and to start the series
- Dosing of liquid softener RM 110/111 (not HDS 5/12) without RFID system
- Upright heating coil
- Temperature increase approx. 58-62 K
- Heating oil consumption: 3.2 - 5.0 kg/h
- Temperature stop for exhaust gases: 280 °C

3.7 Cleaner

- Detergent Tank
- Detergent dosing valve on the appliance with automatic clear rinse in zero position (not HDS 5/12).

3.8 Accessories

- Rotary knob to regulate pressure and volume (not HDS 5/12)
- Stainless steel spray lance, 1,050 mm or 550 mm (HDS 5/12 only)
- Soft grip - easy press gun
- Power nozzle (stainless steel) (not HDS 5/12)
- Steam nozzle (brass) (not HDS 5/12)
- Triple nozzle (HDS 5/12 only)

4 Parts of the system

4.1 Front view



- | | |
|---|---|
| 1 Sliding handle | 7 Detergent Tank |
| 2 High pressure hose | 8 Dosage valve for detergent |
| 3 Cover | 9 Programme switch |
| 4 Chassis | 10 Indicator lamps |
| 5 Fuel tank | 11 Spray lance with high pressure nozzle and hand spray gun |
| 6 Steering roller with fixed position brake | |

The detergent and fuel tanks are integrated into the chassis and cannot be replaced separately.

Note

In order to be able to use the park brake, the appliance must be moved back. The steering roller swivels to the front and can be accessed.

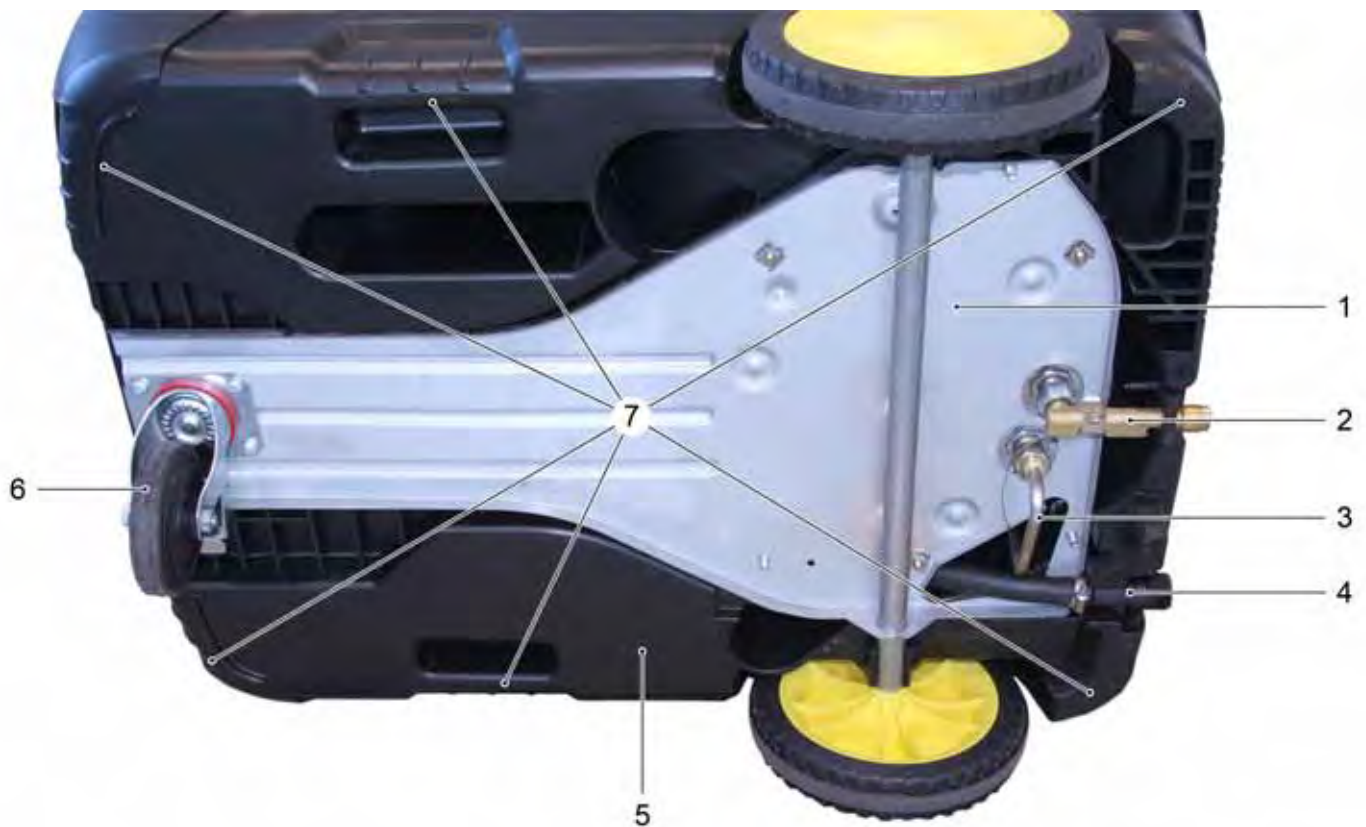
4.2 Rear view



- 1 Spray lance with high pressure nozzle and hand spray gun
- 2 Speed regulator (not HDS 5/12)
- 3 Manometer
- 4 Cover
- 5 Chassis

- 6 Water inlet
- 7 High-pressure outlet
- 8 Liquid softener (not HDS 5/12)
- 9 Power cord
- 10 Sliding handle

4.3 View from below



- 1 Floor plate
- 2 High-pressure outlet
- 3 High pressure input, on-demand heater
- 4 Water supply with coarse dirt filter
- 5 Chassis
- 6 Guiding rolls with fixed position brake
- 7 Recessed grip

Note

The floor plate is intended to reinforce the chassis and as a base plate for the on-demand heater.

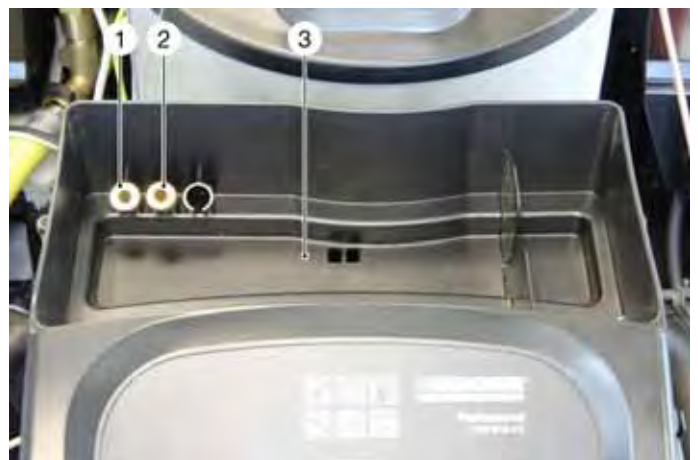
4.4 Storage compartments

4.4.1 Back



- 1 Cable hook
- 2 Storage compartment for accessories
- 3 Sliding handle

4.4.2 Inside



- 1 High-pressure nozzle (stainless steel)
- 2 Steam nozzle (brass)
- 3 Storage compartment for accessories

4.5 View of the left side, appliance hood open



- | | |
|---------------------------------|--|
| 1 Ignition transformer | 7 Fuel filter |
| 2 Exhaust temperature sensor | 8 Fuel pump |
| 3 Burner | 9 Level sensor for fuel tank |
| 4 Continuous heater | 10 Burner blower |
| 5 Fuel line | 11 Storage compartment for accessories |
| 6 Guide mandrel, appliance hood | 12 Electronics casing |

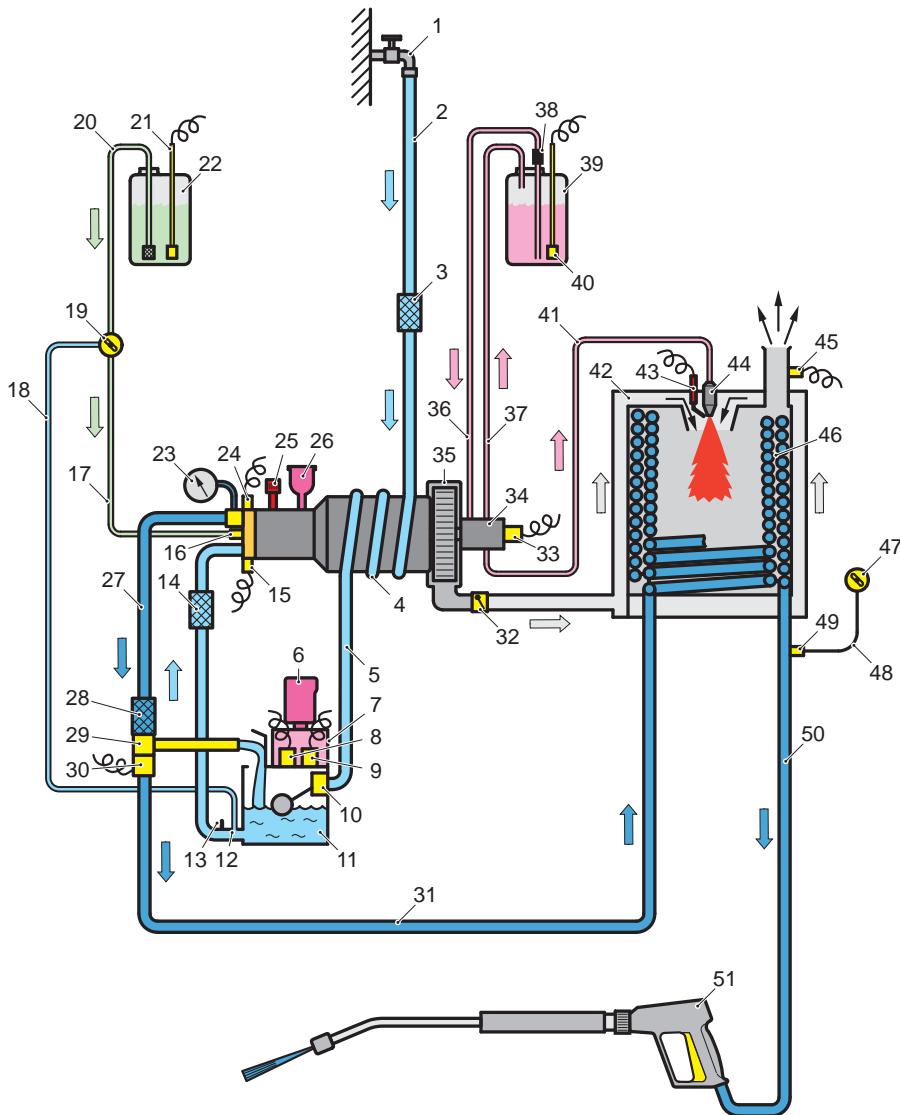
4.6 View of the right side, appliance hood open



- | | |
|---|---|
| 1 Programme switch | 11 Hose from the water cooling system for the motor to the swimmer reservoir (only for appliances with water-cooled motors) |
| 2 Electronics casing | 12 Guide mandrel, appliance hood |
| 3 Dosage valve for detergent | 13 SDS hose |
| 4 Oil tank | 14 Pick-up, liquid softener bottle |
| 5 Intake for hourmeter (option) | 15 Continuous heater |
| 6 High-pressure pump | 16 Capillary exhaust temperature monitor |
| 7 Suction hose - detergent | 17 Burner |
| 8 Detergent tank lid | 18 Fuel line |
| 9 Swimmer reservoir (integrated into the chassis) | |
| 10 Water fine filter on pump inlet | |

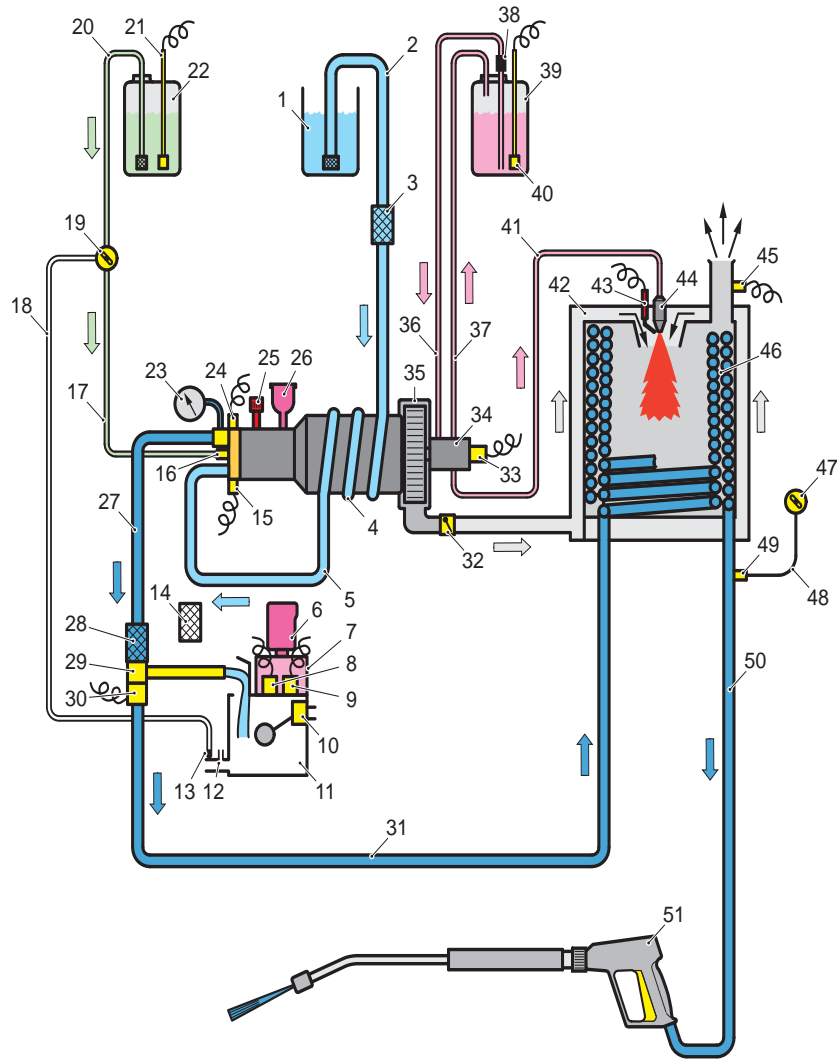
5 Function

5.1 Functional diagram of pressure water operation (water-cooled motor)



- | | | | |
|----|---|----|--|
| 1 | Water connection | 25 | Pressure and quantity regulation at the hand spray gun |
| 2 | Water supply hose | 26 | Oil tank |
| 3 | Rough dirt filter | 27 | SDS hose |
| 4 | Motor casing with cooling coil | 28 | Sieve in safety block |
| 5 | Hose to the swimmer reservoir | 29 | Safety valve |
| 6 | Liquid softener bottle | 30 | Water shortage safeguard |
| 7 | Liquid softener reservoir | 31 | Pressure pipe |
| 8 | Level sensor liquid softener | 32 | Air door, air volume adjustment |
| 9 | Solenoid valve liquid softener | 33 | Solenoid valve, fuel pump |
| 10 | Swimmer valve | 34 | Fuel pump |
| 11 | Float tank | 35 | Burner blower |
| 12 | Connection of rinse hose of the detergent dosing valve | 36 | Fuel inlet |
| 13 | Plug to block the rinse line during vacuuming operation | 37 | Fuel return line |
| 14 | Water fine filter | 38 | Fuel filter |
| 15 | Pressure switch "OFF" | 39 | Fuel tank |
| 16 | Detergent suction hose connection | 40 | Level sensor for fuel tank |
| 17 | Suction hose for detergent | 41 | Fuel pressure line |
| 18 | Rinse hose of the detergent dosing valve | 42 | Continuous heater |
| 19 | Dosage valve for detergent | 43 | Ignition electrodes |
| 20 | Detergent suction hose with filter | 44 | Fuel nozzle |
| 21 | Level sensor of detergent tank | 45 | Exhaust temperature sensor |
| 22 | Detergent Tank | 46 | Heating coil, on-demand heater |
| 23 | Manometer | 47 | Temperature controller |
| 24 | Pressure switch "ON" | 48 | Capillary exhaust temperature monitor |
| | | 49 | Temperature sensor |
| | | 50 | High pressure hose |
| | | 51 | Hand blowing gun |

5.2 Functional diagram of vacuum operation (water-cooled motor)



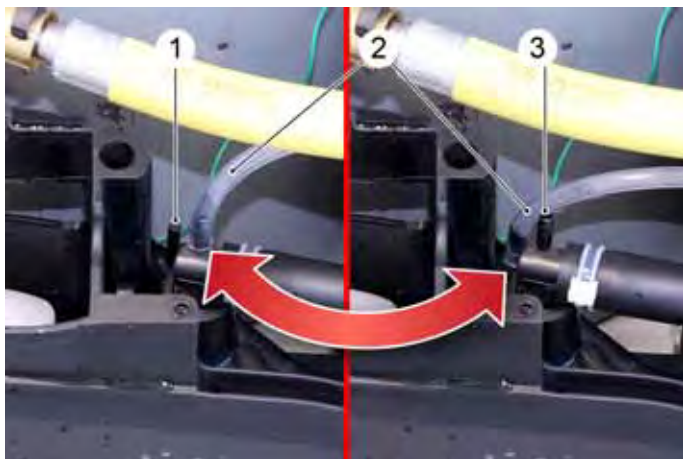
- | | | | |
|----|---|----|---------------------------------------|
| 1 | Open container | 31 | Pressure pipe |
| 2 | Water supply hose | 32 | Air door, air volume adjustment |
| 3 | Rough dirt filter | 33 | Solenoid valve, fuel pump |
| 4 | Motor casing with cooling coil | 34 | Fuel pump |
| 5 | Hose to the swimmer reservoir | 35 | Burner blower |
| 6 | Liquid softener bottle | 36 | Fuel inlet |
| 7 | Liquid softener reservoir | 37 | Fuel return line |
| 8 | Level sensor liquid softener | 38 | Fuel filter |
| 9 | Solenoid valve liquid softener | 39 | Fuel tank |
| 10 | Swimmer valve | 40 | Level sensor for fuel tank |
| 11 | Float tank | 41 | Fuel pressure line |
| 12 | Connection of rinse hose of the detergent dosing valve | 42 | Continuous heater |
| 13 | Plug to block the rinse line during vacuuming operation | 43 | Ignition electrodes |
| 14 | Water fine filter | 44 | Fuel nozzle |
| 15 | Pressure switch "OFF" | 45 | Exhaust temperature sensor |
| 16 | Detergent suction hose connection | 46 | Heating coil, on-demand heater |
| 17 | Suction hose for detergent | 47 | Temperature controller |
| 18 | Rinse hose of the detergent dosing valve | 48 | Capillary exhaust temperature monitor |
| 19 | Dosage valve for detergent | 49 | Temperature sensor |
| 20 | Detergent suction hose with filter | 50 | High pressure hose |
| 21 | Level sensor of detergent tank | 51 | Hand blowing gun |
| 22 | Detergent Tank | | |
| 23 | Manometer | | |
| 24 | Pressure switch "ON" | | |
| 25 | Pressure and quantity regulation at the hand spray gun | | |
| 26 | Oil tank | | |
| 27 | SDS hose | | |
| 28 | Sieve in safety block | | |
| 29 | Safety valve | | |
| 30 | Water shortage safeguard | | |

5.2.1 Switching to vacuum operation

Note

The switching over to vacuum mode requires rework that is described in this chapter.

- Remove the liquid softener bottle and turn it over **immediately** to avoid spills.
- Open the device hood.
- Remove the back of the appliance.
- Remove the liquid softener reservoir.
- Unscrew the water fine filter from the high pressure pump inlet.
- Unscrew the water hose from the swimmer valve and screw it onto the high pressure pump inlet.



- 1 Plug to block the rinse line during vacuuming operation
 - 2 Rinse hose of the detergent dosing valve
 - 3 Connection of rinse hose of the detergent dosing valve
- Pull the rinse hose off the connection on the swimmer reservoir output and plug it onto the stopper.

Caution

When replacing the liquid softener reservoir, make sure that the cables from the solenoid valve and level sensor are not crushed.

- Place the liquid softener tank onto the swimmer reservoir.
- Install the back of the appliance.

Until the pump has sucked in water

- Set the pressure/quantity regulation at the pump unit to maximum quantity.
- Close the dosing valve for the detergent.

Note

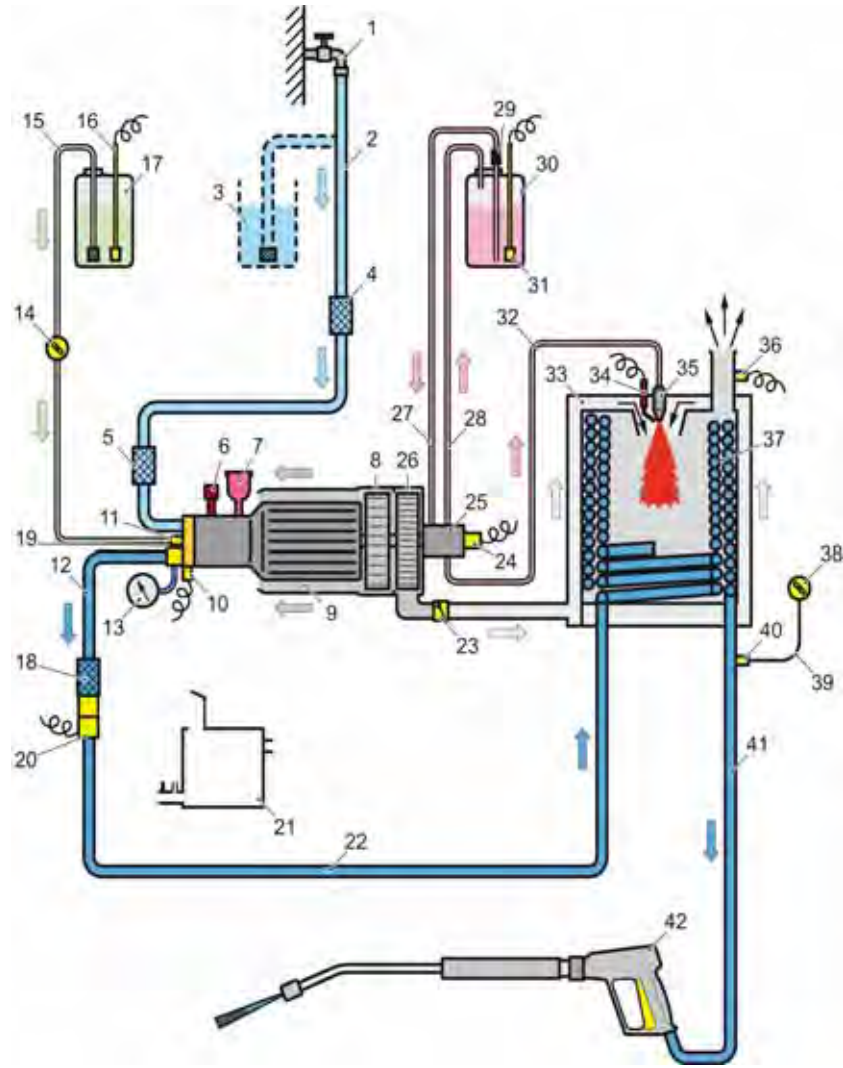
After replacing the rear panel of the appliance, reach for the intake of the liquid softener bottle and press it into the liquid softener reservoir.

Note

The suction hose with filter (accessory) must have a minimum diameter of 3/4".

The suction height is max. 0.5 m.

5.3 Functional diagram pressure water/vacuum operation (HDS 5/12)



- | | |
|---------------------------------------|--|
| 1 Water connection | 22 Pressure pipe |
| 2 Water supply hose | 23 Air door, air volume adjustment |
| 3 Open container (during vacuuming) | 24 Solenoid valve, fuel pump |
| 4 Rough dirt filter | 25 Fuel pump |
| 5 Water fine filter | 26 Burner fan |
| 6 Pressure and volume regulation | 27 Fuel inlet |
| 7 Oil tank | 28 Fuel return line |
| 8 Ventilator wheel, motor cooling | 29 Fuel filter |
| 9 Cooling air routing | 30 Fuel tank |
| 10 ON/OFF pressure switch | 31 Level sensor for fuel tank |
| 11 Detergent injector | 32 Fuel pressure line |
| 12 SDS hose | 33 Continuous heater |
| 13 Manometer | 34 Ignition electrodes |
| 14 Dosage valve for detergent | 35 Fuel nozzle |
| 15 Detergent suction hose with filter | 36 Exhaust temperature sensor |
| 16 Level sensor of detergent tank | 37 Heating coil, on-demand heater |
| 17 Detergent Tank | 38 Temperature controller |
| 18 Sieve in safety block | 39 Capillary exhaust temperature monitor |
| 19 Safety valve | 40 Temperature sensor |
| 20 Water shortage safeguard | 41 High pressure hose |
| 21 Float tank | 42 Trigger gun |

5.4 Control elements

5.4.1 Programme switch



- 1 Programme switch
- 2 Switch position "OFF"
- 3 Switch position "Cold water operation"
- 4 Switch position "Hot water operation"
- 5 Switch position "Eco mode"
- 6 Steam operation (water temperatures up to 155°C) with separate steam nozzle (not HDS 5/12)
- 7 Indicator lamps

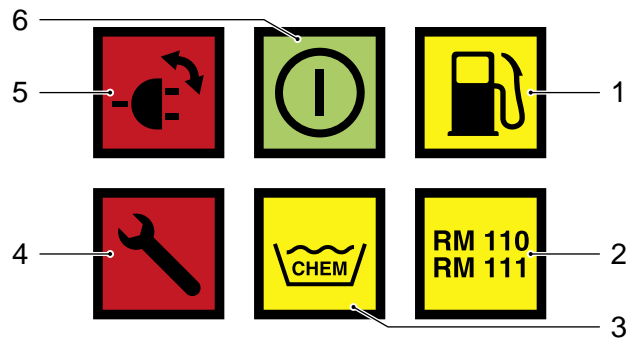
The programme switch has two switch settings and a setting range for the hot water or steam operation.

- Switch position "OFF"
The appliance is switched off.
- Switch position "Cold water operation"
High pressure cleaner function without on-demand heater
- "Hot water/steam operation":
High pressure cleaner function with on-demand heater, adjustable temperature. Steam operation from approx. 100 ?.
- "Eco mode":
Most economical water setting

Note

In "Eco mode" the water temperature is maintained at 60 °C (+/- 15 K).

5.4.2 Indicator lamps (not HDS 5/12)



- 1 Fuel control LED (yellow)
- 2 Liquid softener control LED (yellow)
- 3 Detergent control LED (yellow)
- 4 Service control LED (red)
- 5 Direction of rotation control LED (red) (3-phase appliances only)
- 6 Operation control LED (green)

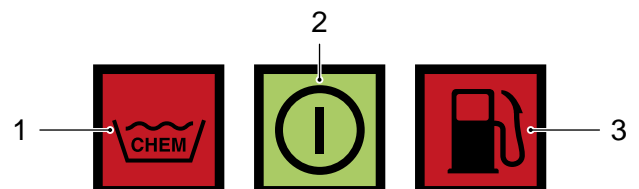
Note

A blinking Service control LED can represent a series of faults detected by the electronics:

Service LED	Meaning
Illuminated	Lack of oil
blinks 1x	Dry run or leakage
blinks 2x	Voltage supply or current pickup
blinks 3x	Winding protection contact
blinks 4x	Emission temperature
blinks 5x	Water shortage safeguard
blinks 6x	Burner fault
blinks 7x	RFID

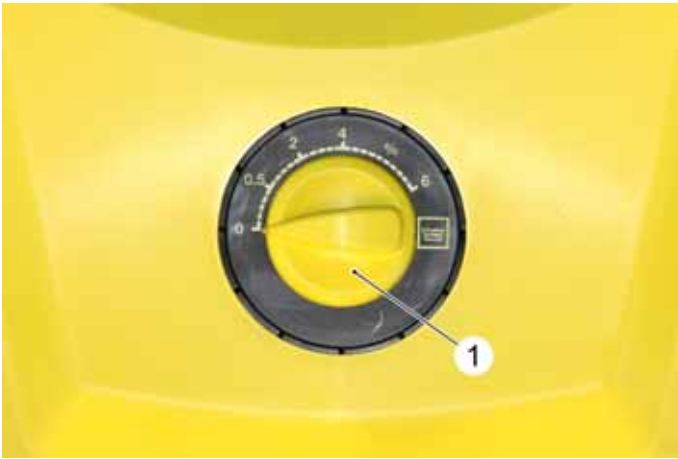
A detailed description of the faults and the solutions can be found in Chapter 7.2.

5.4.3 Indicator lamps (HDS 5/12)



- 1 Detergent indicator lamp (red)
- 2 Operation indicator lamp (green)
- 3 Fuel indicator lamp (red)

5.4.4 Dosage valve for detergent



1 Dosage valve for detergent

The dosing valve can be used to set the volume of the mixed in detergent.

Note

With the setting "0", the dosing valve is rinsed with water from the swimmer reservoir to avoid plugging/ glueing with detergent residue (not HDS-C 5/12).

5.5 Cover

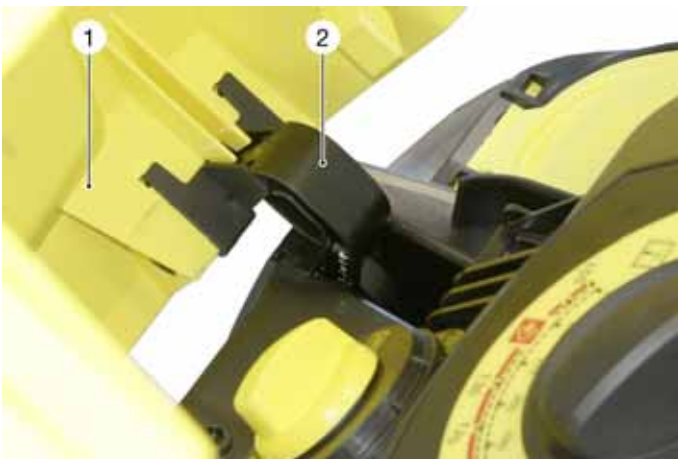
5.5.1 Open the device hood.



- 1 Cover
- 2 Locking

→ Press the latch down using a screwdriver or a coin and turn it by 90° counter-clockwise.
→ Open the device hood.

5.5.2 Double-acting hinges



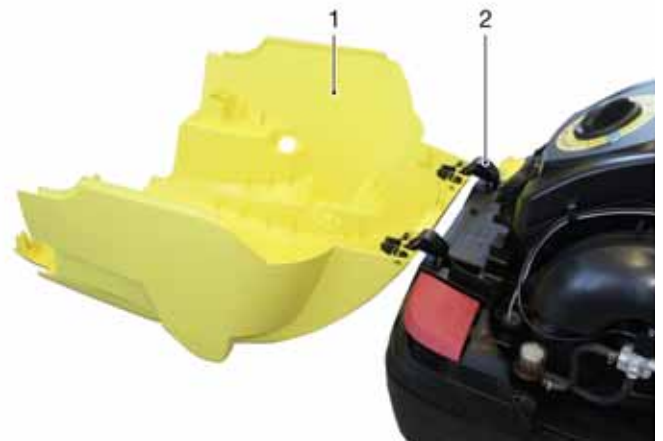
- 1 Cover
- 2 Hinge

The double-acting hinges allow the user to open the appliance hood all the way and to place it on the floor.

Note

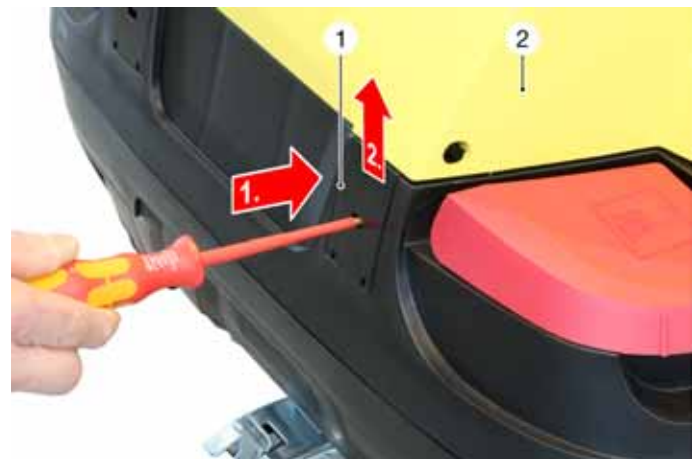
The hood does not have an arrest when it is half open.

5.5.3 Device hood open



- 1 Cover
- 2 Hinge

5.5.4 Remove the appliance hood



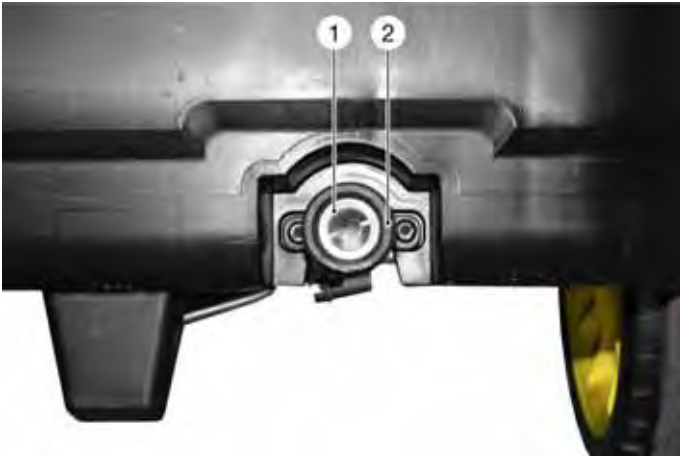
- 1 Cover
- 2 Hinge

→ Unlock the hinge by pressing into the slot with a screwdriver and slide it up.
After unlocking the hinges, the entire appliance hood can be removed.

5.6 Fresh water system

5.6.1 Coarse dirt filter

The appliance is equipped with a coarse dirt filter in the water supply connection.



- 1 Rough dirt filter
- 2 Water inlet

5.6.2 Swimmer reservoir (not HDS 5/12)

The swimmer reservoir is integrated into the appliance chassis. It is located on the right, under the liquid softener reservoir.

The swimmer reservoir supplies the pump evenly with water. It is also used to separate the water supply and the pump and prevents detergent from entering the water supply line in case of damage.

The swimmer rises with the increasing water level and closes the swimmer valve.

Note

The swimmer valve cannot be adjusted.



- 1 Connection of water supply hose
- 2 Float
- 3 Swimmer tank

5.6.3 Fine filter

The fine filter is located directly in front of the high pressure pump.



- 1 Fine filter
- 2 High-pressure pump

5.6.4 Vacuuming operations

Note

The HDS 5/12 can be operated without this refurbishing for vacuum operation, as it is not equipped with a swimmer reservoir or a rinse line for the detergent dosing valve.

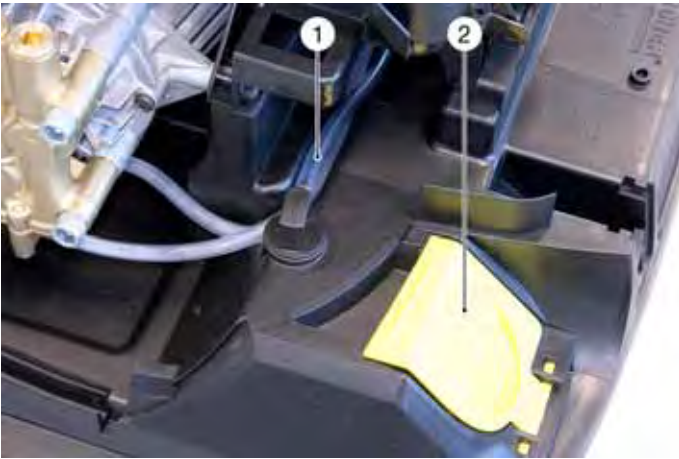
If the appliance is used for vacuuming, the rinse hose of the detergent dosing valve must be plugged onto the respective plug to prevent erroneous air suction. Furthermore, the fine filter must be uninstalled and the water supply hose must be connected directly to the high pressure pump.



- 1 Slot vacuum operation (plug)
- 2 Slot pressure water operation (connection)

5.7 Detergent

5.7.1 Detergent Tank



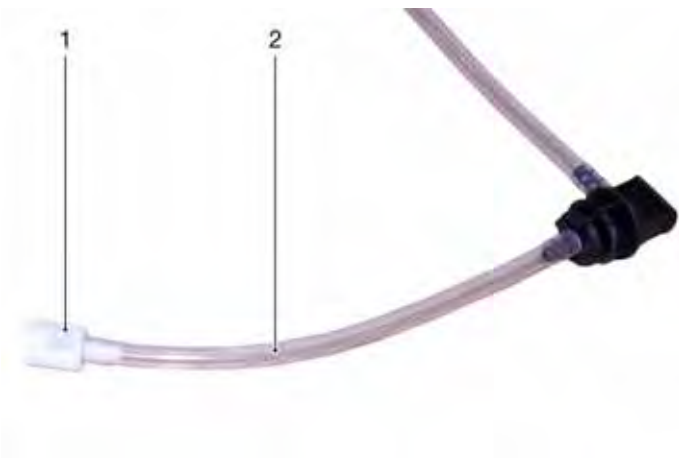
- 1 Suction hose - detergent
- 2 Detergent tank lid

5.7.2 Detergent level sensor



- 1 Level sensor of detergent tank

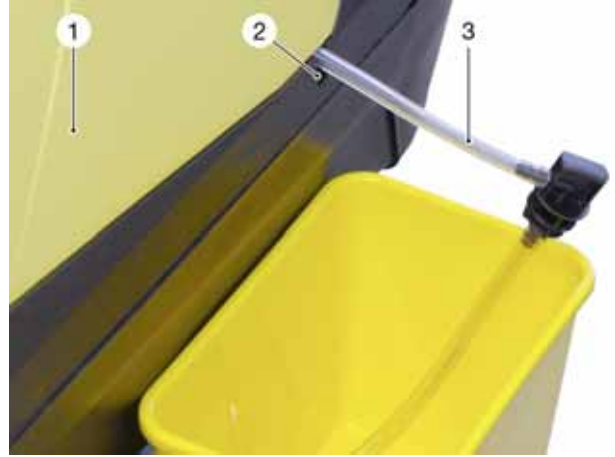
5.7.3 Filter detergent hose



- 1 Filter
- 2 Suction hose - detergent

5.7.4 External suction

The suctioning of the detergent can also be performed outside the appliance. For this, the suction hose of the detergent is routed to the outside via the recess in the chassis and then the hood is closed again.



- 1 Cover
- 2 Opening for detergent hose
- 3 Suctioning of detergent

5.7.5 Dosing valve connections



- 1 W = water for rinsing (not HDS 5/12)
- 2 P = to high pressure pump
- 3 1 = Suctioning of detergent

Note

The detergent hoses harden over time and can become loose from the connections. Erroneous air can be suctioned which means that the pump is not able to build up to full pressure. Fasten the detergent hoses to the connections using cable ties.

5.8 Electric box (not HDS 5/12)

5.8.1 Open the switchbox

⚠ Warning

Prior to opening the electric box, all power to the appliance must be shut off (pull mains plug) and it must be protected from inadvertent startup.

The electric box can be folded open toward the front after removing two screws.

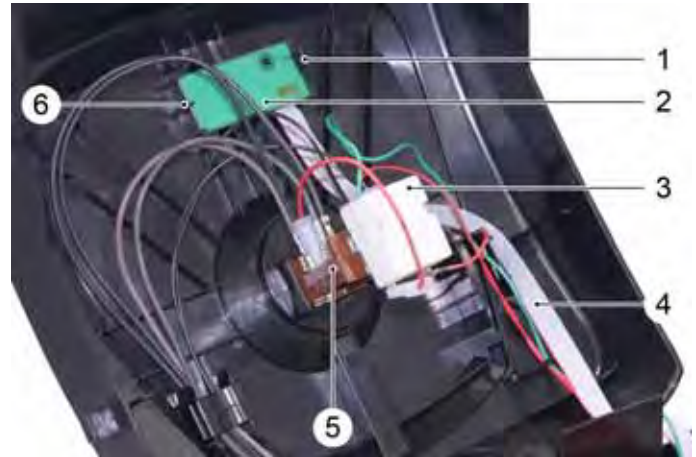


1 Top part of electric box

2 Screw

➔ Unscrew the screws and open the electric box toward the front.

5.8.2 Top part of electric box



1 locking tab of PCB control LED

2 PCB control LED

3 Temperature controller

4 Flat cable to the control PCB

5 Programme switch

6 Bracket of PCB control LED

Note

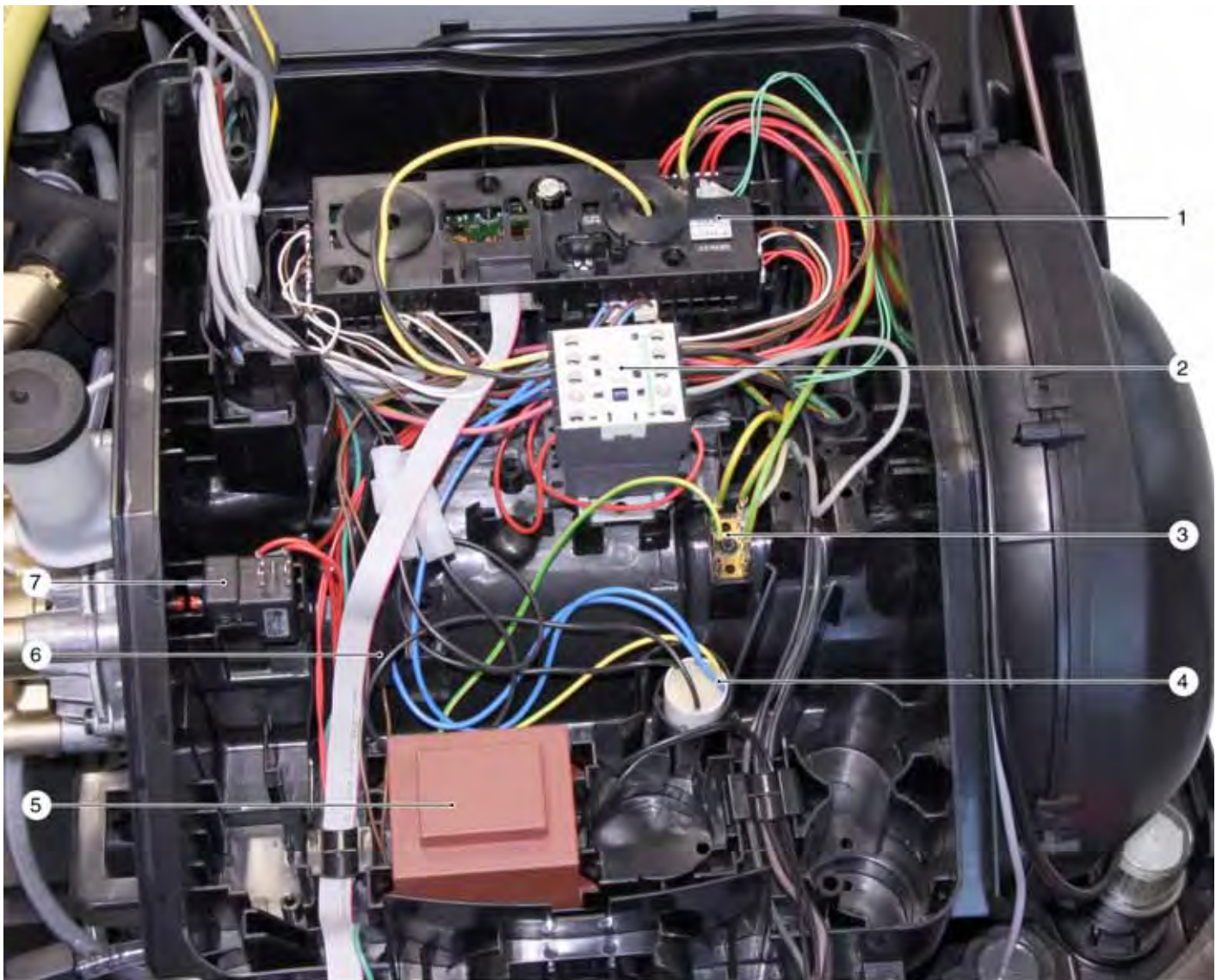
The PCB control LED is connected to the control PCB via a flat cable.

The PCB control LED cannot be delivered separately, but only paired with the control PCB as one unit.

Remove the PCB control LED

➔ Pull the locking tab out and unhook the PCB control LED from its bracket.

5.8.3 Bottom part of electric box

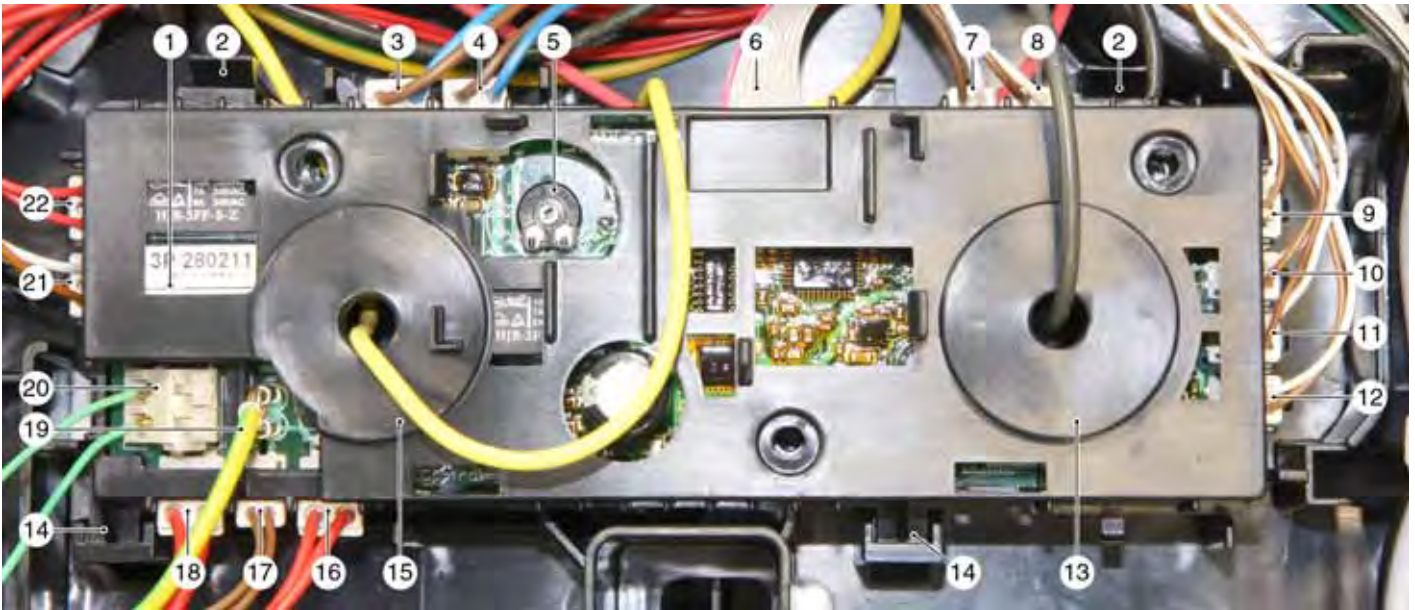


- | | |
|-----------------------------|--|
| 1 Control chip | 5 Control transformer |
| 2 Engine contactor | 6 Fuse 2.0 AT for control transformer |
| 3 Grounding point | 7 Exhaust gas temperature limiter (cannot be manually reset) |
| 4 De-interference capacitor | |

Note

The exhaust gas temperature limiter will switch itself on automatically after the cooling off period.

5.8.4 Printed circuit board (PCB)



- | | |
|---|--|
| <p>1 Plate with the version number of the hardware and software</p> <p>2 Locking nose</p> <p>3 Connection of solenoid valve for fuel</p> <p>4 Connection of solenoid valve for liquid softener</p> <p>5 Setting up water hardness/softener dosing</p> <p>6 Connection of control LEDs</p> <p>7 Connection pressure switch ON</p> <p>8 Connection pressure switch OFF</p> <p>9 Connection of level sensor for fuel tank</p> <p>10 Connection of level sensor for pump oil (please observe note)</p> <p>11 Connection of level sensor for detergent</p> <p>12 Connection of level sensor for liquid softener</p> <p>13 Current measuring coil (3-phase appliances only)</p> | <p>14 Bracket</p> <p>15 Current measuring coil</p> <p>16 Connection motor protection</p> <p>17 Connection of transformer 24 V AC</p> <p>18 Connection exhaust gas temperature limiter</p> <p>19 Grounding connection control PCB</p> <p>20 Connection of coiling protection contact</p> <p>21 Connection, lack of water fuse</p> <p>22 Connection of temperature regulator setting</p> |
|---|--|

Note

Appliances without a level sensor for the pump oil have a blind plug on the respective connection (6.650-101.0).

Current measuring coils

There are two different versions of the control PCB:

- for 1-phase appliances with a current measuring coil (4.051-171.0)
- for 3-phase appliances with two current measuring coils (4.051-148.0)

Note

The cables running through the current measuring coils must be routed in the correct direction (coming from the motor through the bottom of the PCB to the motor protection). Otherwise, the rotation direction cannot be detected (see circuit diagram).

Version numbers of software and hardware

The version numbers of the software (SW) and hardware (HW) are listed on the plate below the window on the left side of the casing.

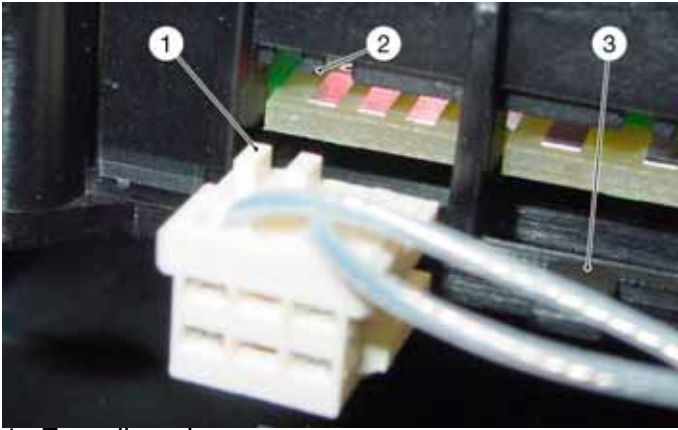
Version status at start of series:

Software: SW V1.1

Hardware: HW V1.0



- 1 Version number of the software (here: SW V1.0)
- 2 Version number of the hardware (here: HW V1.0)
- The plugs for the PCB connections are designed with encoding pins and their matching recesses in the PCB base so that only the matching plug can be attached to the respective connection.



- 1 Encoding pin
- 2 Recess for encoding pin

5.8.5 Control PCB without cover



- 1 Connection of solenoid valve for fuel
- 2 Connection of solenoid valve for liquid softener
- 3 Setting up water hardness/softener dosing
- 4 Connection of control LEDs
- 5 Connection RFID (option)
- 6 Connection pressure switch ON
- 7 Connection pressure switch OFF
- 8 Connection of level sensor for fuel tank
- 9 Connection of level sensor for pump oil
- 10 Connection of level sensor for detergent
- 11 Connection of level sensor for liquid softener
- 12 Connection photo cell ignition monitoring (option)
- 13 Current measuring coil (3-phase appliances only)
- 14 Current measuring coil
- 15 Connection motor protection
- 16 Connection of transformer 24 V AC
- 17 Grounding connection control PCB
- 18 Connection exhaust gas temperature limiter
- 19 Connection of coiling protection contact
- 20 Connection, lack of water fuse
- 21 Connection of temperature regulator

5.9 Electric box HDS 5/12

5.9.1 Open the switchbox

⚠ Warning

Prior to opening the electric box, all power to the appliance must be shut off (pull mains plug) and it must be protected from inadvertent startup.

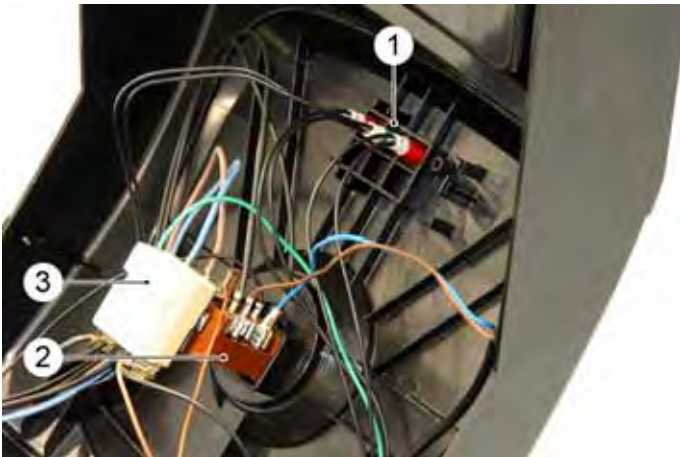
The electric box can be folded open toward the front after removing two screws.



- 1 Top part of electric box
- 2 Screw

➔ Unscrew the screws and open the electric box toward the front.

5.9.2 Top part of electric box



- 1 Indicator lamps
- 2 Programme switch
- 3 Temperature controller

Remove indicator lamps

Note

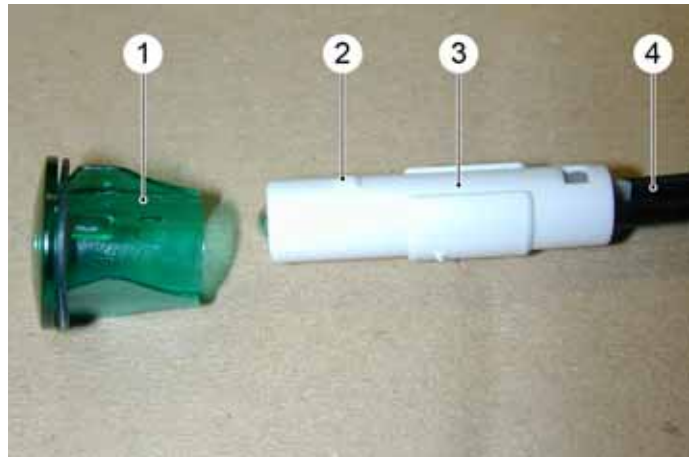
The coloured brackets for the indicator lamps are integrated in the top part of the electric box and can only be replaced by removing the panel film.

For better presentation, the indicator lamp bracket has been removed in this illustration. In repair cases, the bracket remains installed.



- 1 Indicator lamp bracket
- 2 Indicator lamp locking tab
- 3 Indicator lamp

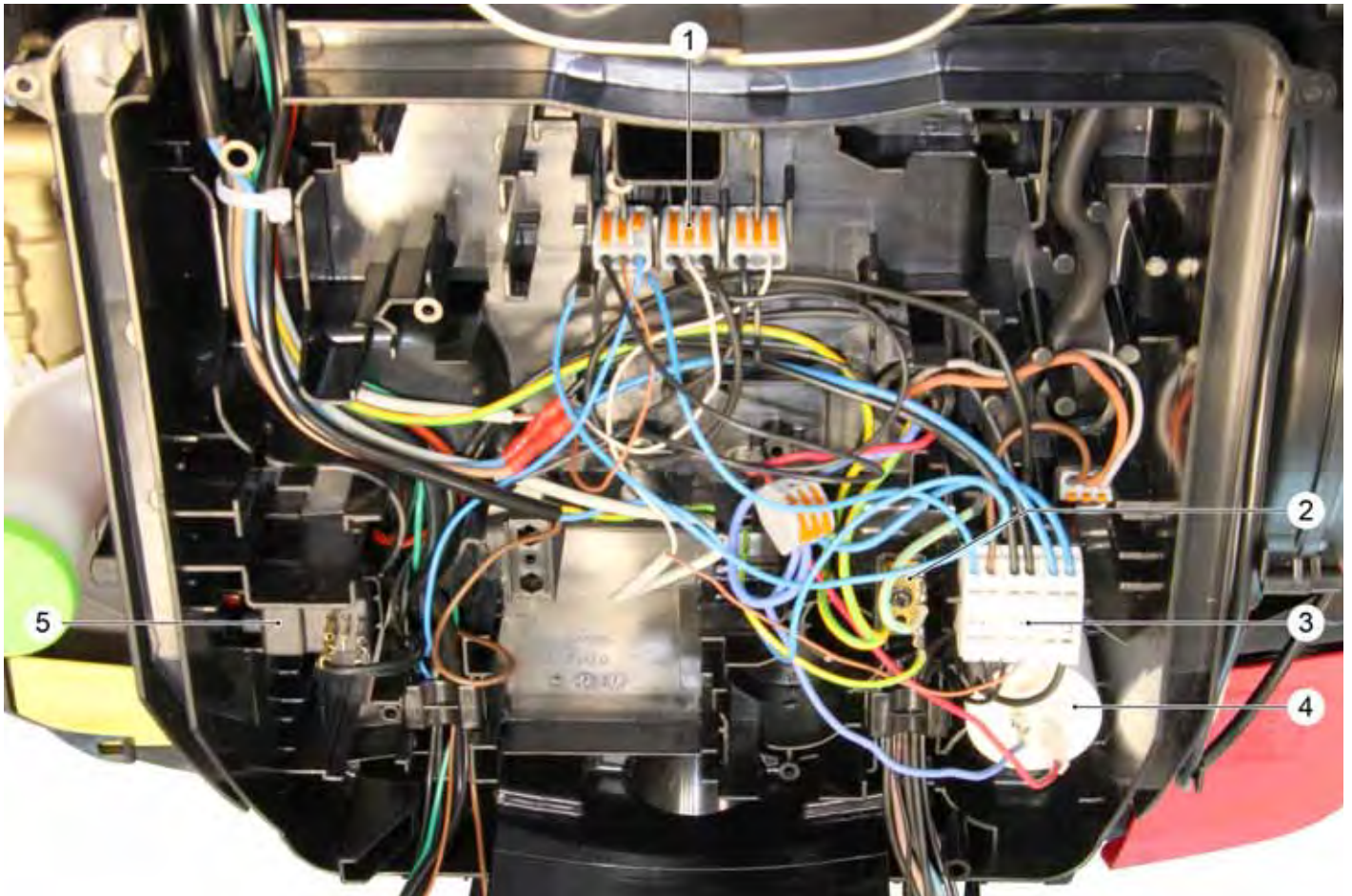
➔ Carefully twist the indicator lamp in the socket to loosen the locking tab and pull it out.



- 1 Indicator lamp bracket
- 2 Indicator lamp locking tab
- 3 Indicator lamp
- 4 Indicator lamp connecting cable

➔ Replace the indicator lamp complete with connecting cable.

5.9.3 Bottom part of electric box



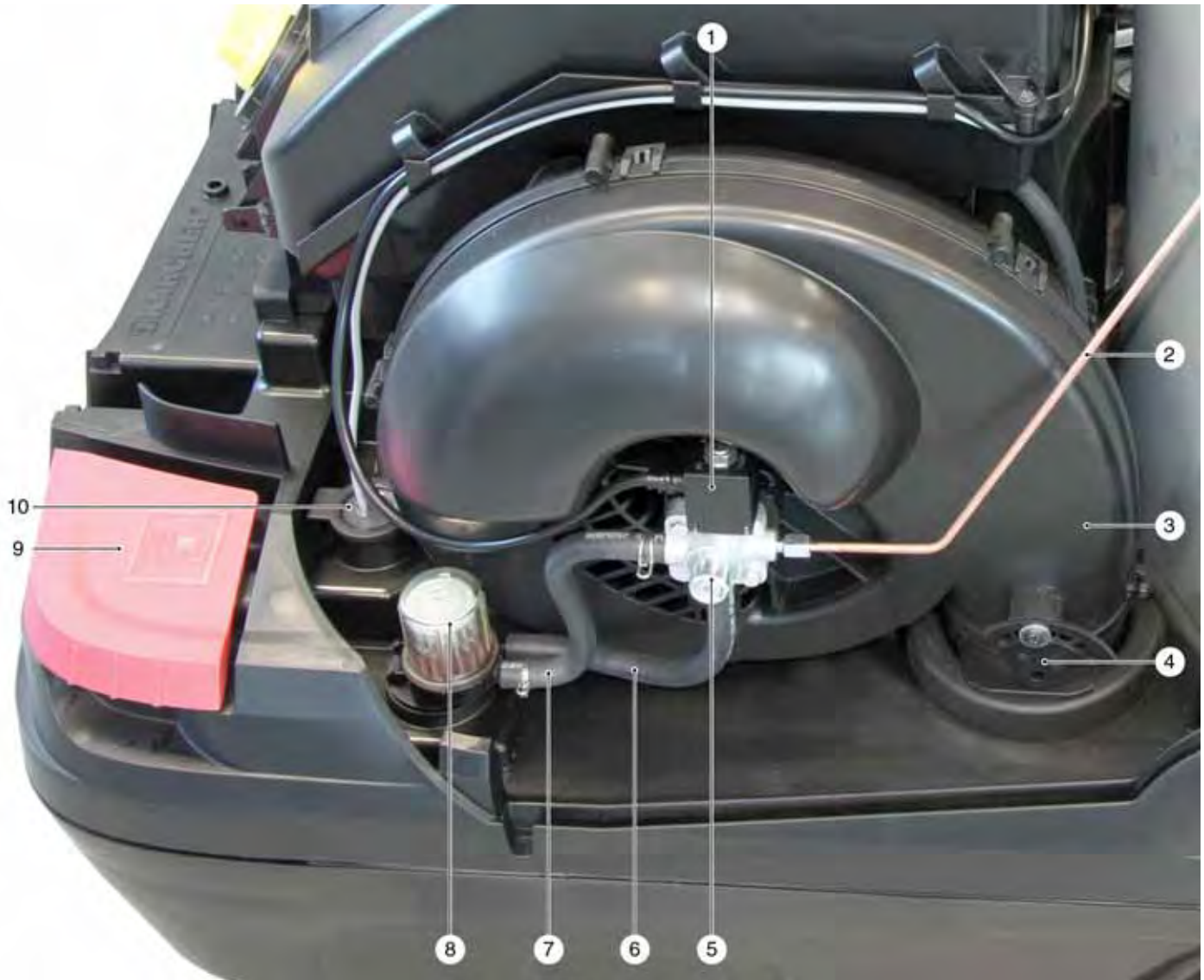
- 1 Clamp connector
- 2 Grounding point
- 3 Engine contactor
- 4 Motor capacitor
- 5 Exhaust gas temperature limiter (cannot be manually reset)

Note

The exhaust gas temperature limiter will switch itself on automatically after the cooling off period.

5.10 Burner blower with fuel pump

5.10.1 Overview



- 1 Solenoid valve, fuel pump
- 2 Fuel line from fuel pump to burner
- 3 Air guidance to the on-demand heater
- 4 Air door, air volume adjustment
- 5 Fuel pump
- 6 Return to fuel tank
- 7 Fuel hose supply to the fuel pump
- 8 Fuel filter
- 9 Fuel reservoir filler neck
- 10 Level sensor for fuel tank

Depending on the motor installed in the appliance (2 or 4 pin), there are two different blower sizes.

Device	Blower size
HDS 5/12 C/CX	Small
HDS 6/14 C/CX	Small
HDS 6/14-4 C/CX	Large
HDS 7/16 C/CX	Small
HDS 8/17 C/CX	Small
HDS 8/18-4 C/CX	Large

Note

The two blower sizes also differ regarding the attachment of the fuel pump.

In appliances with a small blower, the fuel pump is affixed with a clamp that can be removed to the left.

In appliances with a large blower, the fuel pump is affixed with a clamp that can be removed toward the bottom.

5.10.2 Fuel pump

The fuel pump is connected directly to the motor shaft via the coupling piece and the blower wheel. It also feeds fuel from the tank and back via the return during cold water operation. This lubricates the toothed wheel pump.

During warm water operation, the installed solenoid valve and part of the fuel reaches the burner through the fuel nozzle and is ignited there.

The fuel pressure is adjusted via the central setting screw.

Note

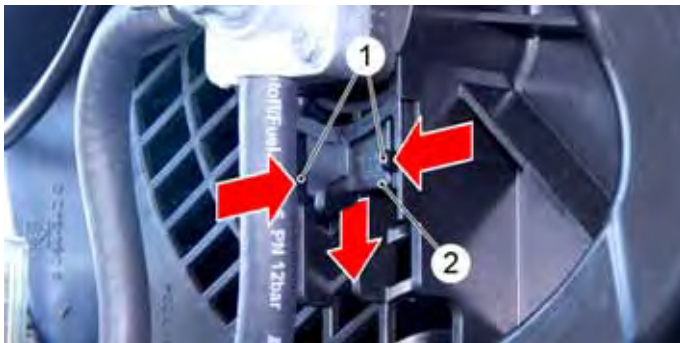
During dry runs, the fuel pump will block.

The coupling piece serves as a nominal breaking point.



- 1 Fuel pump
- 2 Fuel line to burner nozzle
- 3 Solenoid valve, fuel pump
- 4 Fuel hose supply to the fuel pump
- 5 Fuel hose return to the fuel tank
- 6 Coupling unit

The fuel pump is attached to the front blower casing by means of a clamp. Depending on the blower size, this clamp can be pulled out (see Chapter) either toward the bottom or to the left from the blower casing. The two locking tabs of the clamp must be compressed for this.



- 1 Locking nose
- 2 Clip



- 1 Clip

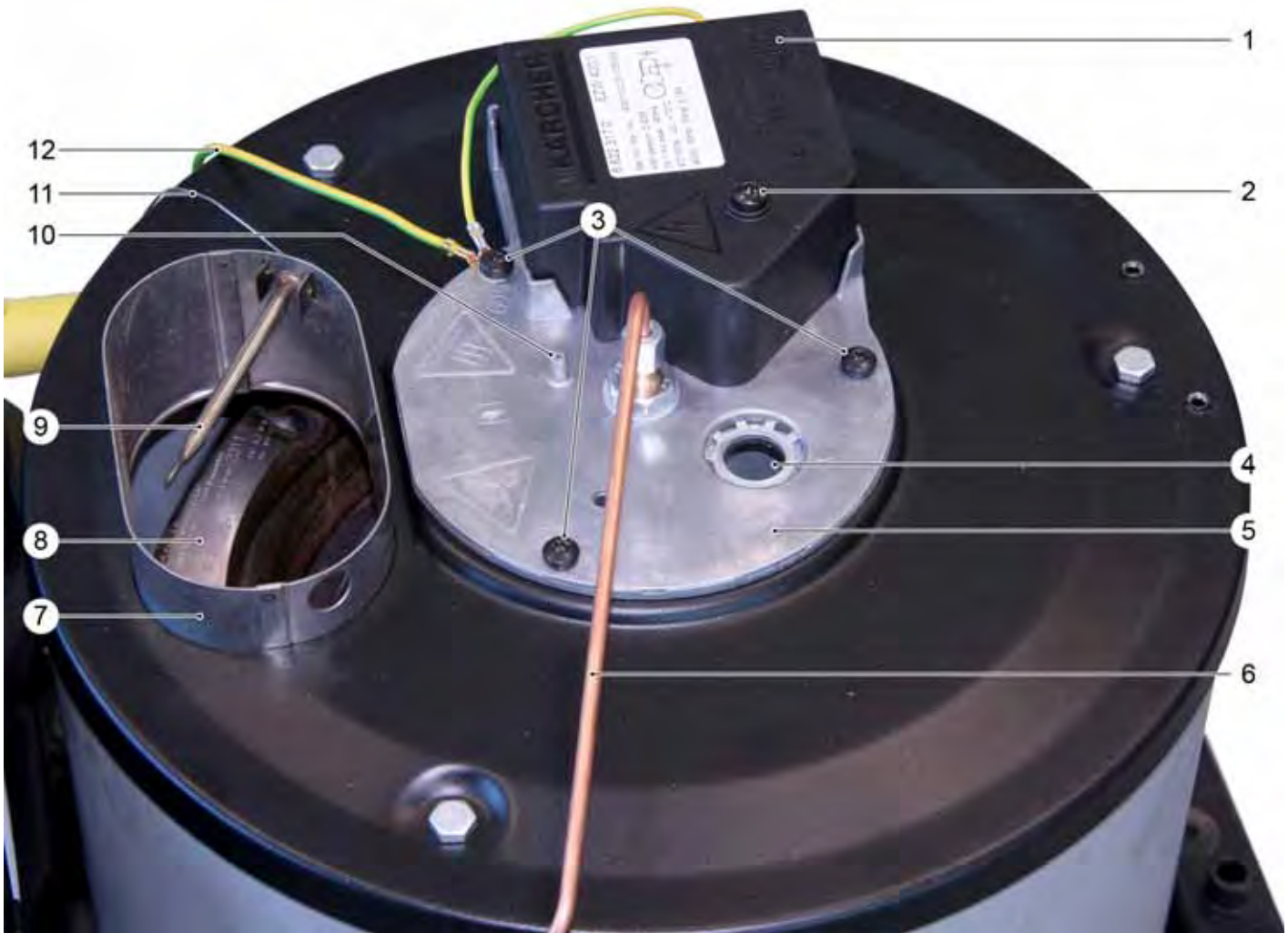
5.10.3 Burner blower

The blower supplies the burner with combustion air. The air flap is used to adjust the air value to optimised combustion values.



- 1 Stop screw
- 2 Air flap
- 3 Teeth for setting the air flap
- 4 Position of the air flap (insinuated)

5.11 Booster heater



- | | |
|---|--|
| 1 Electronic ignition transformer | 7 Exhaust nozzle, on-demand heater |
| 2 Fastening screw of ignition transformer | 8 Type plate of heating coil |
| 3 Screws for burner cover (3 x) | 9 Exhaust temperature sensor |
| 4 Sight glass, ignition monitoring (option) | 10 Connection for air pressure measurement |
| 5 Burner cover | 11 Capillary exhaust temperature monitor |
| 6 Fuel line | 12 Protective conductor |

5.11.1 Type plate of heating coil

The type plate of the heating coil can be read through the exhaust stack.



- | |
|-------------------------------|
| 1 Year of manufacture |
| 2 Specifications |
| 3 Part number of heating coil |
| 4 Pressure test passed |
| 5 Continuous plant number |

5.11.2 Ignition transformer

Different ignition transformers are used HDS compact class appliances.

Electronic ignition transformer

The integrated electronic ignition transformer (see illustration above) is used in all appliances after the drive-in phase; except for appliances with special voltages and the HDS 5/12.

The integrated electronic ignition transformer is installed directly on the burner and secured with a screw that is accessible from the top. Ignition cables are not required.

Conventional ignition transformer

The conventional ignition transformer is used for appliances with special voltages and to start series with other appliances as well. It is installed on the chassis on the left next to the on-demand heater.

The ignition electrodes are connected to the ignition transformers via ignition cables.

The mains connection cable is shielded to prevent interference.



- 1 Spacer clamp
- 2 Ignition cable
- 3 Ground screw for shield
- 4 Shield for mains connection cable.
- 5 Ignition transformer holder
- 6 Ignition transformer
- 7 Voltage supply to ignition transformer
- 8 Supply Cord

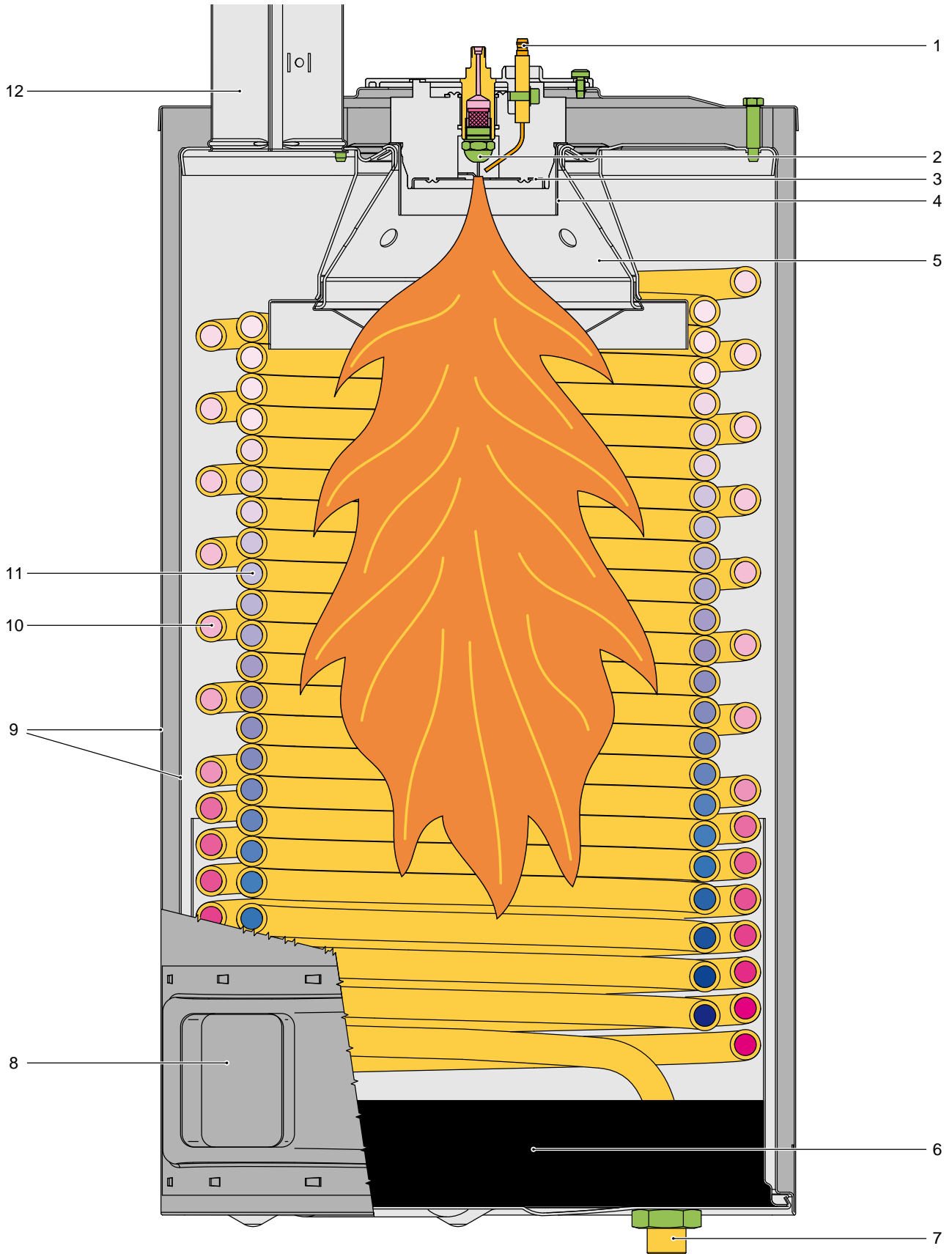
Electronic ignition transformer HDS 5/12

The ignition transformer of the HDS 5/12 is affixed to the burner lid from the bottom with 3 screws. The burner lid must be removed to replace the unit.



- 1 Screws for burner cover (3 x)
- 2 Sight glass, ignition monitoring (option)
- 3 Ignition cable
- 4 Connection for air pressure measurement
- 5 Fuel line
- 6 Protective conductor

5.11.3 Sectional illustration



- 1 Ignition electrodes
- 2 Fuel nozzle
- 3 Pressure plate
- 4 Flame ring
- 5 Burning chamber
- 6 Boiler floor

- 7 Boiler input
- 8 Air supply from burner blower
- 9 Boiler exterior, double-walled
- 10 Heating coil spiral, exterior
- 11 Heating coil spiral, interior
- 12 Exhaust nozzle, on-demand heater

Mode of operation

The water from the high pressure pump enters the interior heating coil spiral, is heated while flowing through and exits to the bottom from the heating coil spiral.

The fuel is vaporised by the fuel nozzle and ignited by the spark of the ignition electrodes.

The combustion air from the blower first flows through the double-walled boiler exterior toward the top, then it flows downward with the flame and is emitted as exhaust through the exhaust stack toward the top into the atmosphere.

The boiler floor is made of fire-resistant insulating concrete. It prevents a radiation of the heat and is used to reroute the flames.

The adjustment of the burner to good exhaust values is achieved via the air flap on the blower (air volume) and with the adjustment screw on the fuel pump (fuel pressure).

The temperature increase with the full water volume is 58-62 K depending on the appliance.

If the water volume is reduced via the pressure and volume control, the water can be heated to approx. 100 °C; if you use the steam nozzle, up to 155 °C.

An optimal burner performance is only possible if the heating coil is neither full of soot nor other deposits. Furthermore, the spark electrodes, the amount of fuel and the amount of air must be adjusted properly.

Steam operation (not HDS 5/12)

The following preparations must be made for steam operation:

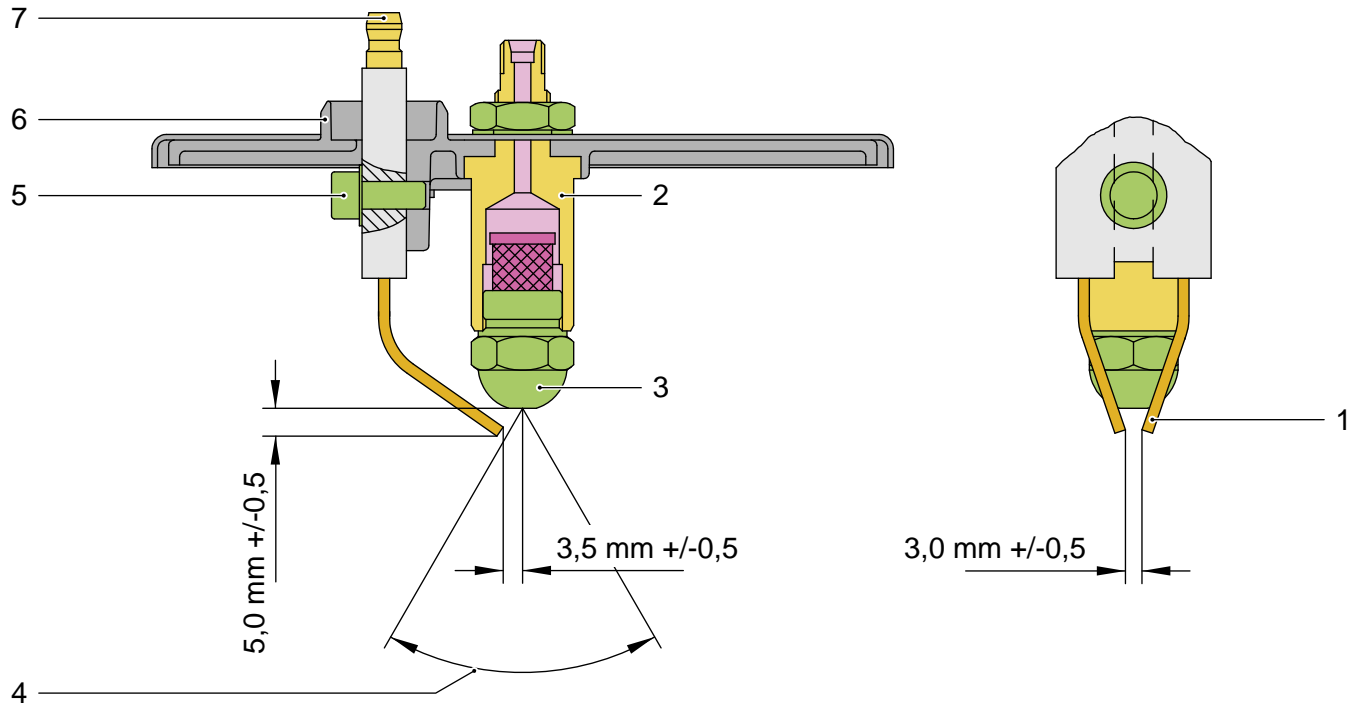
- Install steam nozzle
- Set the operating pressure on the pressure and volume control on the pump to the lowest value
- Set the desired steam temperature at the operating panel

Note

As per pressure device guidelines, the operating pressure inside the appliance must be less than 32 bars for steam operation.

This is ensured by reducing the operating pressure on the pressure and volume control and by using the supplied steam nozzle.

5.12 Burner



1 Ignition electrodes

2 Fuel nozzle holder

3 Fuel nozzle

4 Spray angle 45° or 60° , depending on the type of appliance

5 Screw

6 Burner cover

7 Contact ignition transformer

5.12.1 Function

There is a strong spark created between the two ignition electrodes to ensure that the injected fuel will ignite.

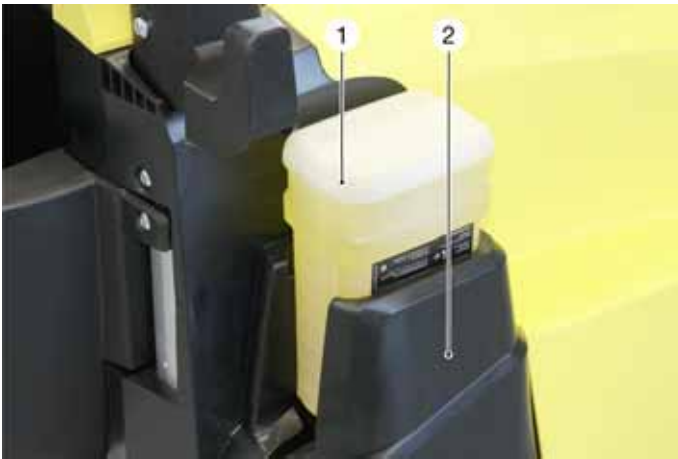
The necessary ignition voltage is generated by the ignition transformer.

The exact adherence to the adjustment dimensions is a basic requirement for the proper function of the burner, for good exhaust values and the long idle time of the ignition electrodes.

There is always a ignition spark between the two ignition electrodes, during cold and hot water operation (continuous ignition).

This is a safety measure, so that injected fuel will be ignited in any case and cannot accumulate unburned in the on-demand heater (deflagration hazard).

5.13 Liquid softener (not HDS 5/12)



- 1 Container RM 110/111 (softener liquid)
- 2 Pick-up, liquid softener bottle

The filling of the softener tank is done via the container RM 110/111; but there is no electronic detection. The container works with internal vacuum pressure. If the bottle is damaged or drilled open, it will be empty in a short time.

During burner operation with calcified water without liquid softener, you can expect faults caused by calcification residue.



- 1 Pick-up, liquid softener bottle
- 2 Container opener with coarse dirt sieve

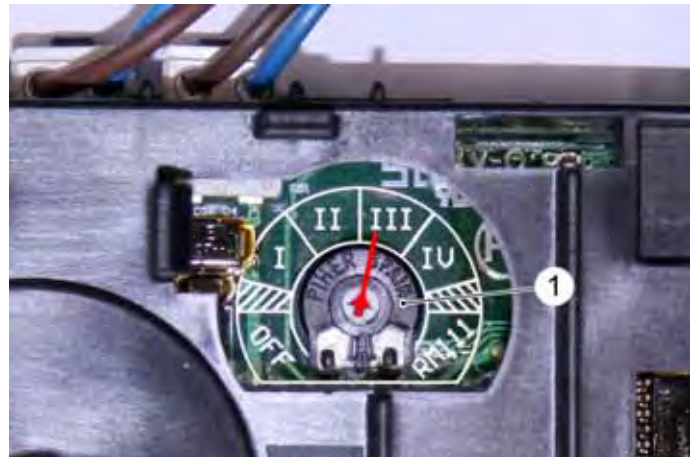
Note

The sealing of the container must not be removed; it is opened automatically when it is pressed into the intake.



- 1 Container RM 110/111 (softener liquid)
- 2 Container seal

5.13.1 Setting up water hardness



- 1 Potentiometer water hardness "RM 110"

The adjustment of the liquid softener (RM110/111) is done with the rotary regulator on the control PCB as per the local water hardness guidelines (available at the local water utility or to be measured with a hardness gauge 6.768-004).

Water hardness	adjustment	° dH
very soft	"OFF" position	up to 3,0
soft	Position "I"	3,1 - 7,0
medium	Position "II"	7,1 - 14,0
hard*	Position "III"	14,1 - 21,0
very hard	Position "IV"	> 21,0

* Factory setting

Note

When RM111 is used as a protection against black water, the position "RM 111" must be selected.

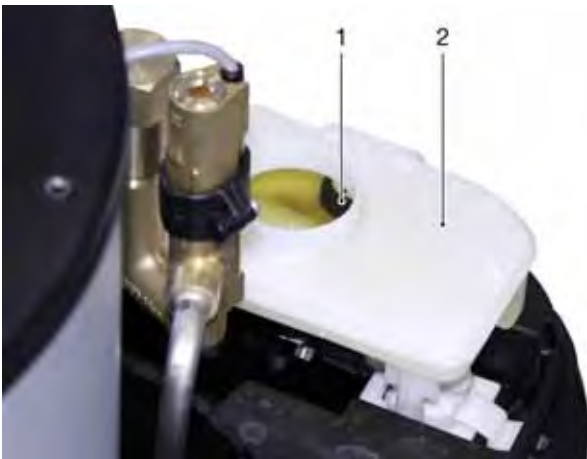
Display at startup

The setting of the liquid softener dosing is displayed by a brief illumination of the respective control LED when the appliance is turned on.



5.13.2 Liquid softener reservoir

The liquid softener tank is located below the intake for the liquid softener container.



- 1 Level sensor
- 2 Liquid softener reservoir

The empty message is emitted by the level sensor in the liquid softener tank and is displayed via the control LED.



- 1 Solenoid valve
- 2 Liquid softener reservoir

The dosing is done via the solenoid valve as per the rotary regulator setting on the control PCB. It only takes place in the programmes "ECO mode" and "Hot water/steam operation".

5.13.3 Liquid softener with RFID (option)

The RFID option for the detection of liquid softener bottles is not available at the start of the series, but might be introduced at a later time.

RFID functionality

RFID stands for Radio Frequency Identification. There is a microchip with an antenna under the label on the softener bottle, also called a tag. The write/read electronics inside the appliance can read data from the tag and also write data to the tag. The power supply is sent to the tag from the radio frequency field.

The write/read electronics query the type of detergent and saves the dosed units to the tag. When the bottle is depleted after 3,000 units or when the level switch in the softener container announces depletion, a trailing time of 5 hours is started. This trailing time is counted on the tag. Once the trailing time has elapsed or if the empty bottle is removed, the burner is switched off.

Once a bottle has been detected to be empty, it is blocked electronically and can no longer be used. Therefore, you must insert a new original softener bottle.

Activate RFID

If RFID electronics are connected to the control PCB, these two components will try to communicate with one another.

If there is successful communication for more than 3 seconds, the RFID function is permanently activated on the control PCB and cannot be switched off by the customer.

Deactivate RFID



- 1 Pin 3 connection RFID
- 2 Pin 2 connection photo cell ignition monitoring
- 3 Printed circuit board (PCB)

- On the control PCB, connect pin 3 of connection RFID to Pin 2 of the photo cell ignition monitoring connection for at least 2 seconds.
The RFID function is deactivated.
- Turn the appliance off and back on.

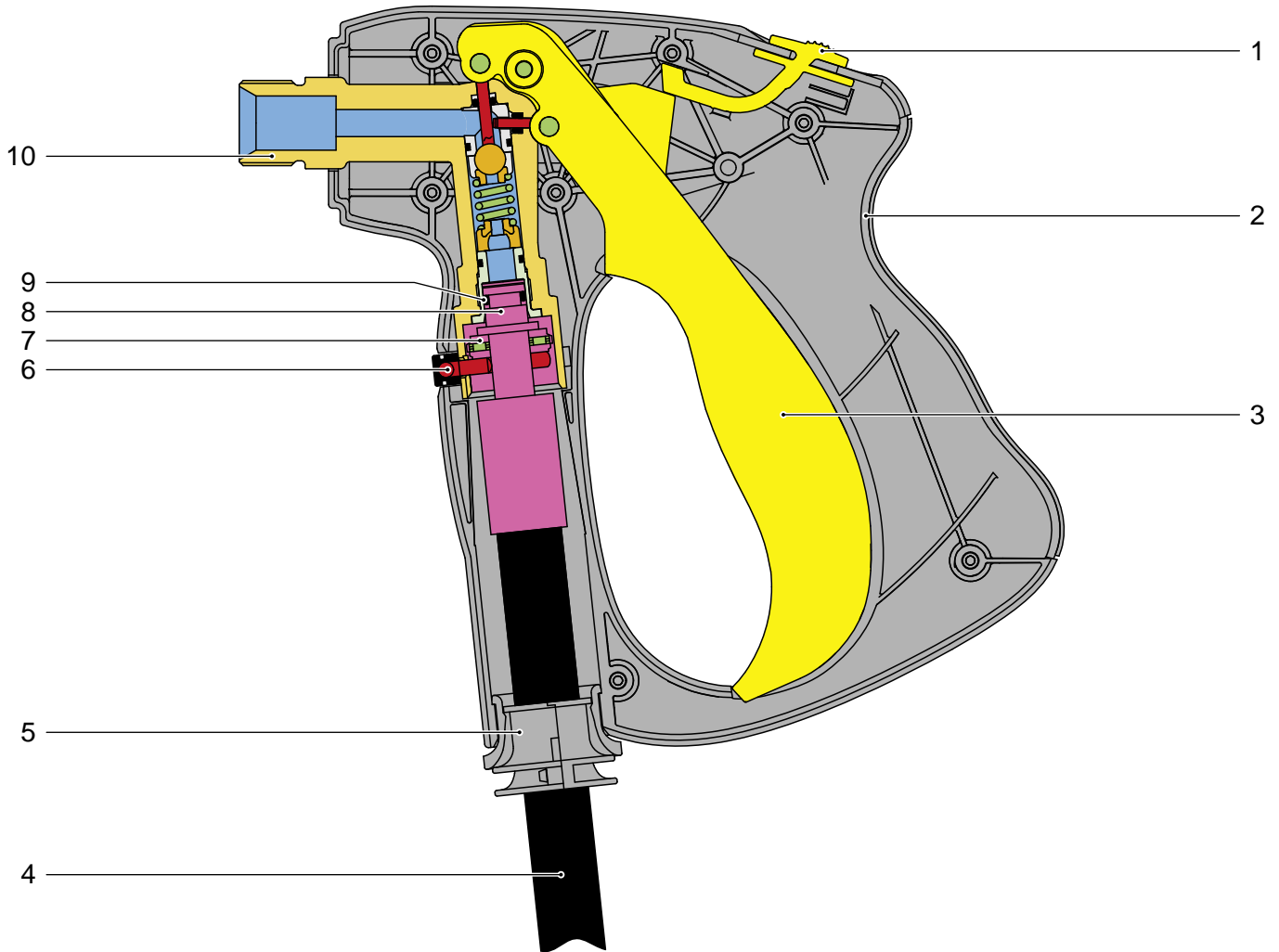
Note

The status of the RFID function can be determined via the behaviour of the control LED operation when switching the appliance on.

- *The "operation" LED is OFF during the LED test: RFID function active.*
- *The "operation" LED is ON during the LED test: RFID function inactive.*

5.14 Hand spray gun and triple nozzle

5.14.1 Hand spraygun



- 1 Safety catch
- 2 Handle bowl
- 3 Hand lever
- 4 High pressure hose
- 5 Hose guide

- 6 Safety clip
- 7 Needle bearing
- 8 Hose coupling
- 9 O ring
- 10 Node piece

Note

The node piece cannot be repaired and must be replaced as a complete unit. The date of manufacture is imprinted on the node piece. It is composed of the month (letters A to L for January through December) and year (1-digit number 1 for 2011, 2 for 2012, etc.). Example: H1 = August 2011

Function

When the manual lever is actuated, the valve in the node piece opens and the water can flow from the hose through the gun into the spray lance.

5.14.2 Triple nozzle



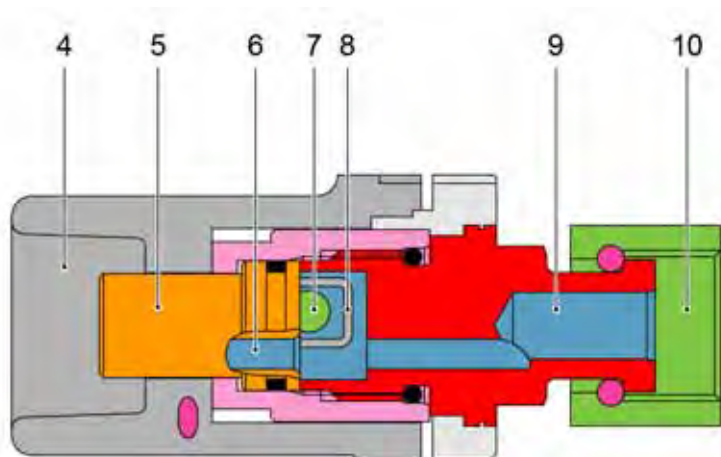
The triple nozzle can be adjusted to three different settings.
By rotating the nozzle head, you can switch between the detergent nozzle and the high pressure nozzles. The symbols on the nozzle head show which nozzle type is selected.

Setting A means high pressure point jet.
Setting B means low pressure flat jet.
This setting is used to apply the detergent.
Setting C means high pressure flat jet.

To adjust the needed type of nozzle, the gun must be closed and the nozzle head must be rotated to the settings shown above (A, B, C).



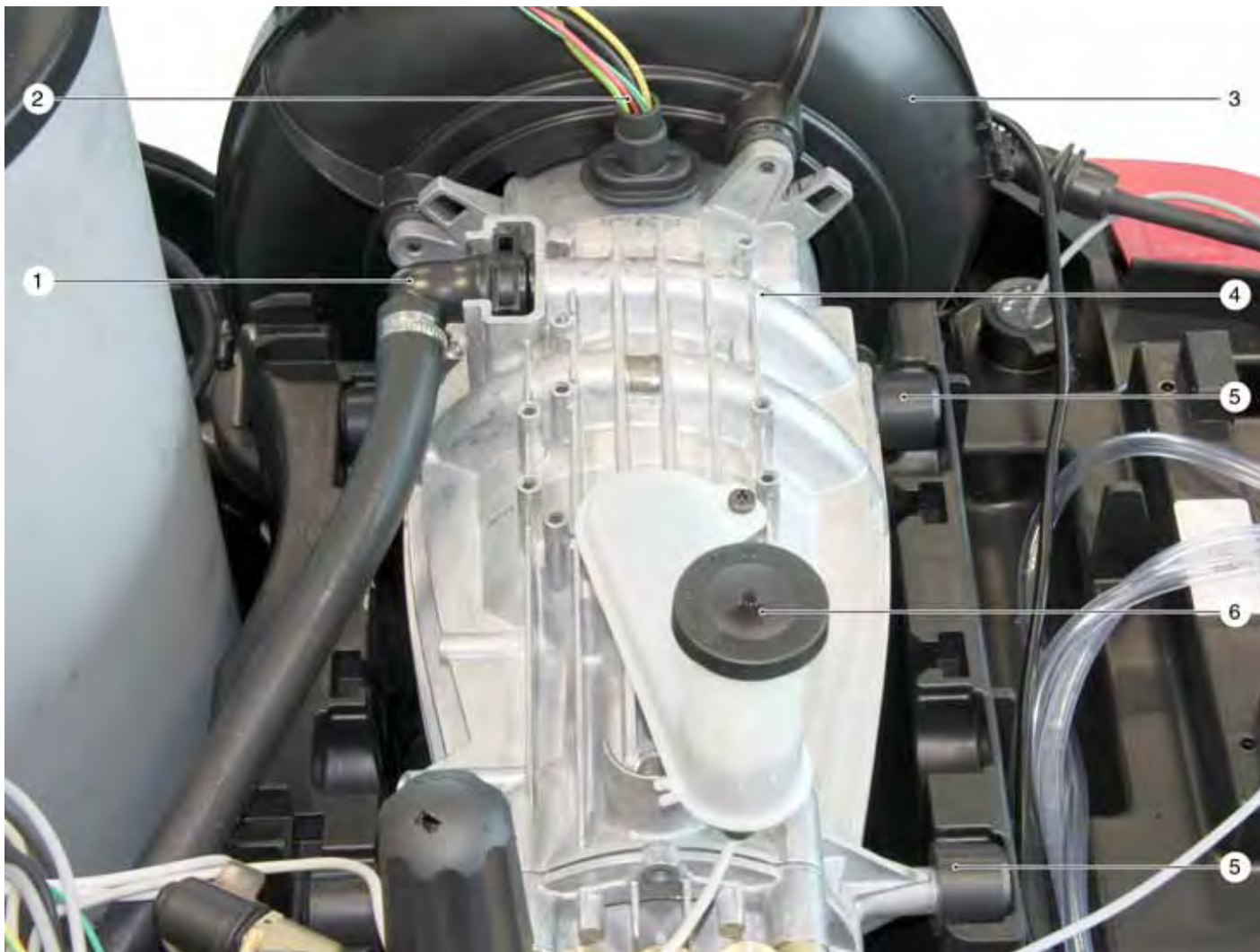
- 1 High pressure point jet (A)
- 2 High pressure flat jet (C)
- 3 Low pressure flat jet (B)
- 4 Adjustable nozzle head
- 5 Nozzle



- 6 Nozzle channel
- 7 Valve ball 2x
- 8 Valve ball cage
- 9 High pressure channel
- 10 Spray pipe connection

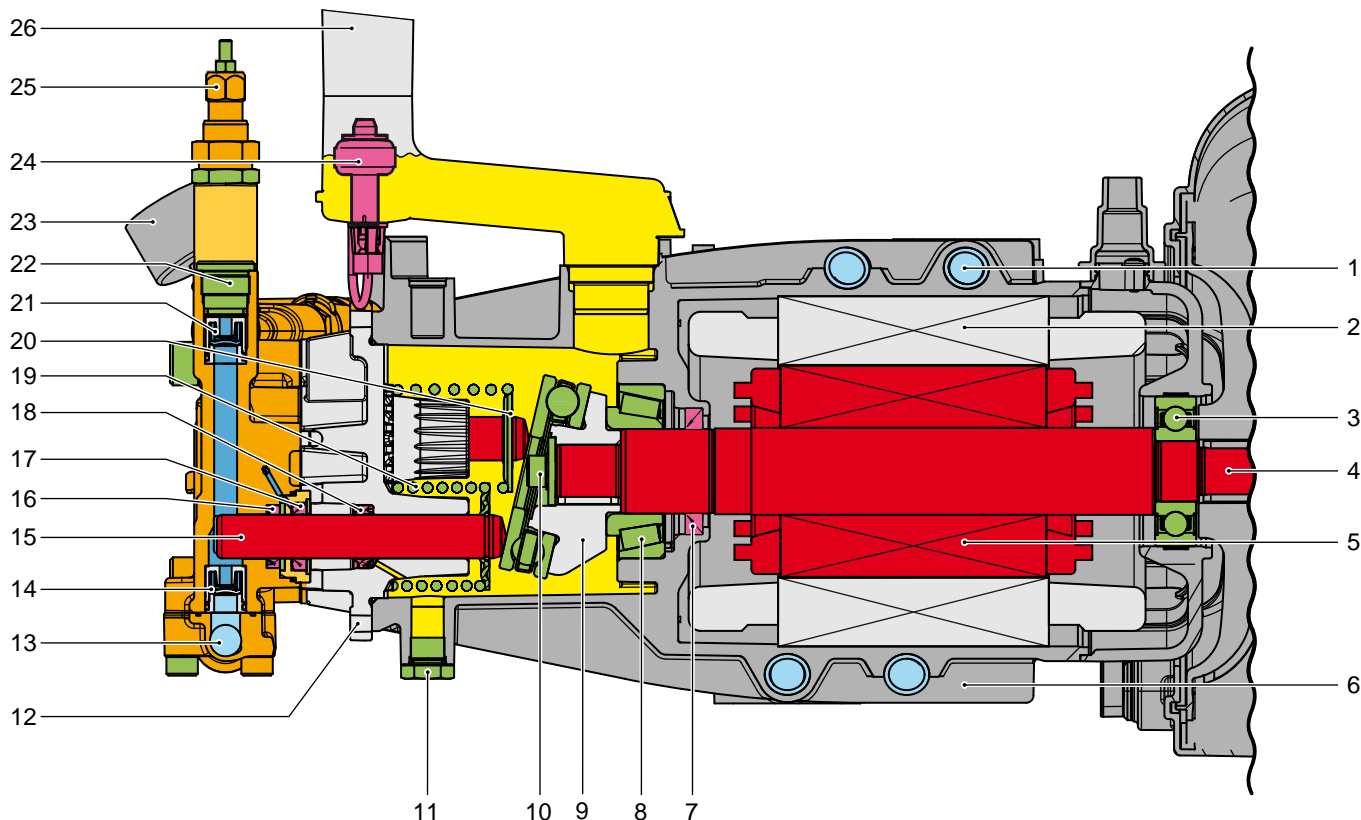
5.15 Water-cooled motor

5.15.1 View from above



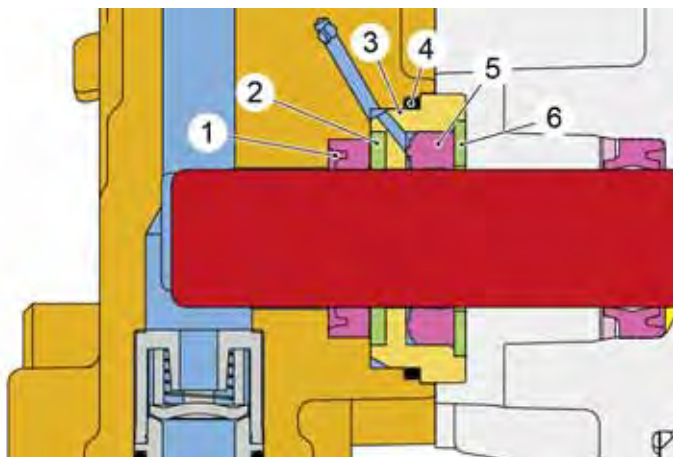
- 1 Water inlet of motor cooling
- 2 Connecting cable, motor
- 3 Burner fan
- 4 Motor
- 5 Motor intake
- 6 Oil tank

5.15.2 Sectional illustration



- | | |
|------------------------------------|-----------------------------------|
| 1 Cooling coil motor cooling | 14 Suction valve |
| 2 Stator | 15 Piston |
| 3 Motor bearing, rear (B bearing) | 16 High pressure seal |
| 4 Motor shaft | 17 Low pressure seal |
| 5 Solenoid (rotor) | 18 Oil seal |
| 6 Motor casing | 19 Piston spring |
| 7 Shaft seal ring, motor shaft | 20 Holding plate of piston spring |
| 8 Motor bearing, front (A bearing) | 21 Pressure valve |
| 9 Swash plate | 22 Valve screw |
| 10 Fastening screw, swash plate | 23 Manometer |
| 11 Oil drain screw | 24 Level sensor for pump oil |
| 12 Piston guide | 25 Pressure and volume regulation |
| 13 Suction side pump | 26 Oil tank |

5.15.3 High pressure seal / low pressure seal

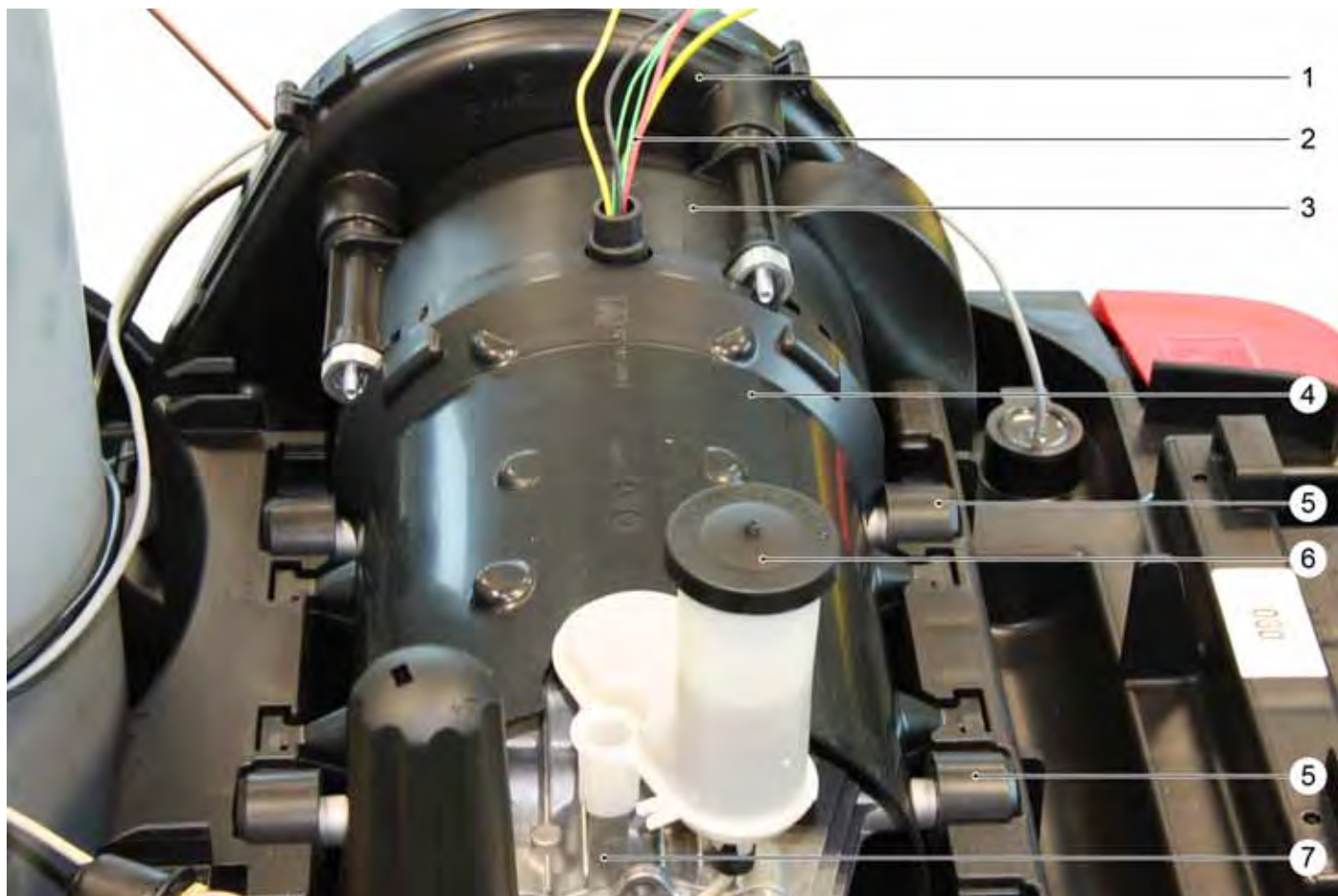


- 1 High pressure seal
- 2 Plastic washer
- 3 Bushing
- 4 O ring
- 5 Low pressure seal
- 6 Brass support disc

Note
Pay attention to installation position of the seals!

5.16 Air-cooled motor

5.16.1 View from above

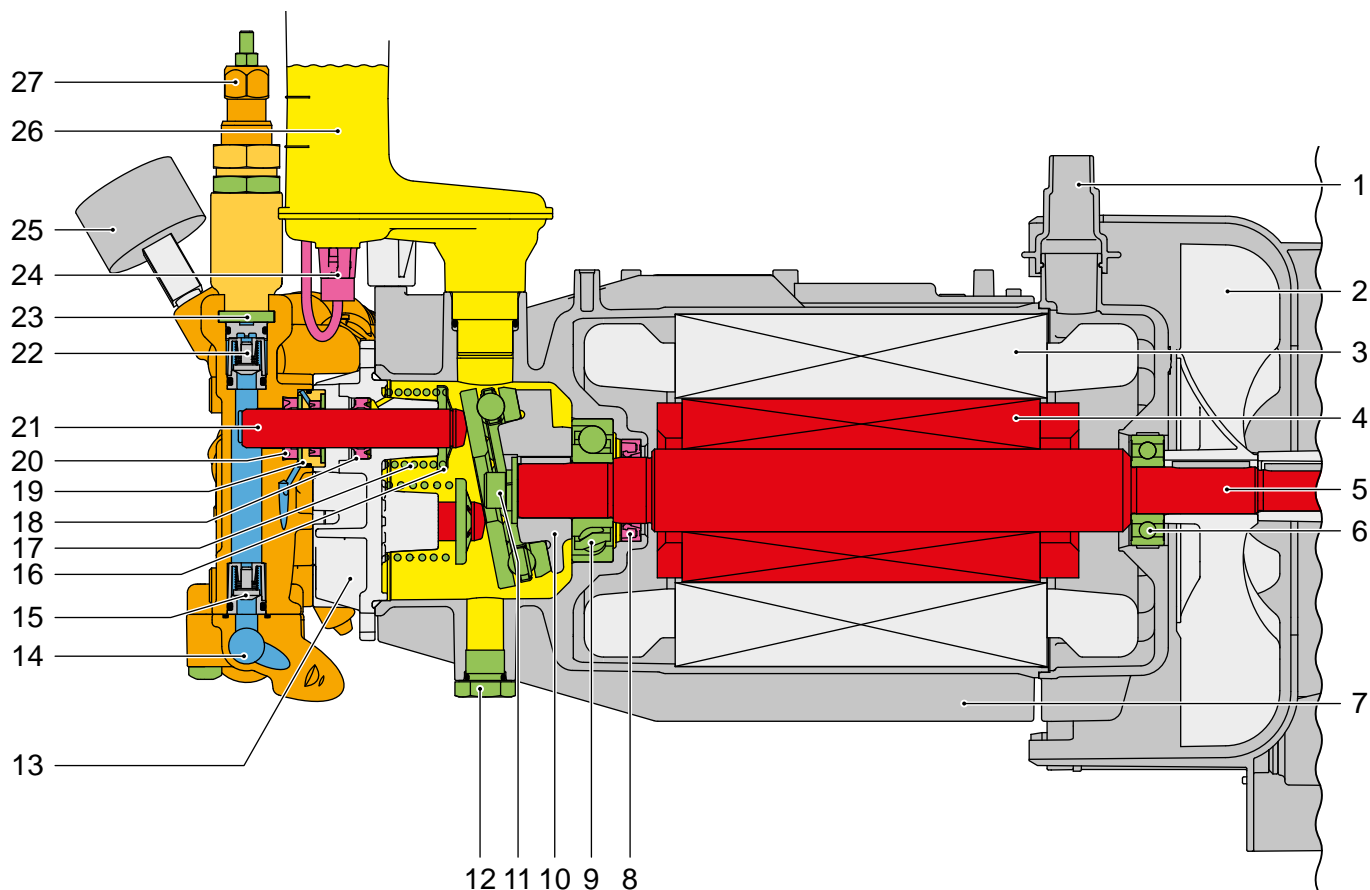


- 1 Burner fan
- 2 Connecting cable, motor
- 3 Motor cooling blower
- 4 Air guidance top part
- 5 Motor intake
- 6 Oil tank
- 7 Motor

Note

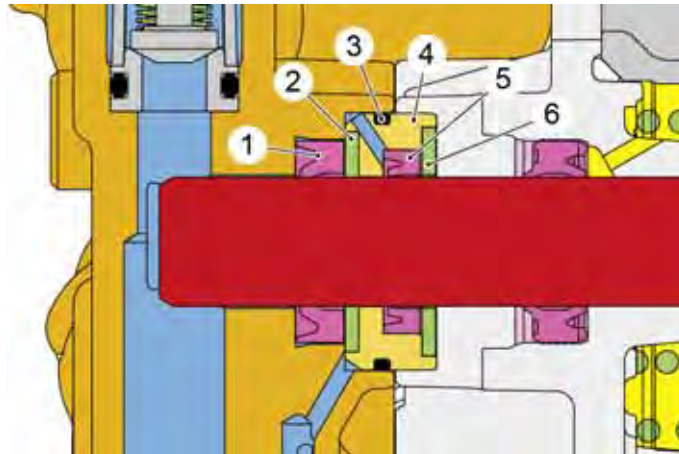
Top and bottom part of the air guidance are identical.

5.16.2 Cross section (not HDS 5/12)



- 1 Connecting cable, motor
- 2 Ventilator wheel, motor cooling
- 3 Stator
- 4 Solenoid (rotor)
- 5 Motor shaft
- 6 Motor bearing, rear (B bearing)
- 7 Motor casing
- 8 Shaft seal ring, motor shaft
- 9 Motor bearing, front (A bearing)
- 10 Swash plate
- 11 Fastening screw, swash plate
- 12 Oil drain screw
- 13 Piston guide
- 14 Suction side pump
- 15 Suction valve
- 16 Holding plate of piston spring
- 17 Piston spring
- 18 Oil seal
- 19 Low pressure seal
- 20 High pressure seal
- 21 Piston
- 22 Pressure valve
- 23 Holding plate
- 24 Level sensor for pump oil
- 25 Manometer
- 26 Oil tank
- 27 Pressure and volume regulation

5.16.3 High pressure seal / low pressure seal

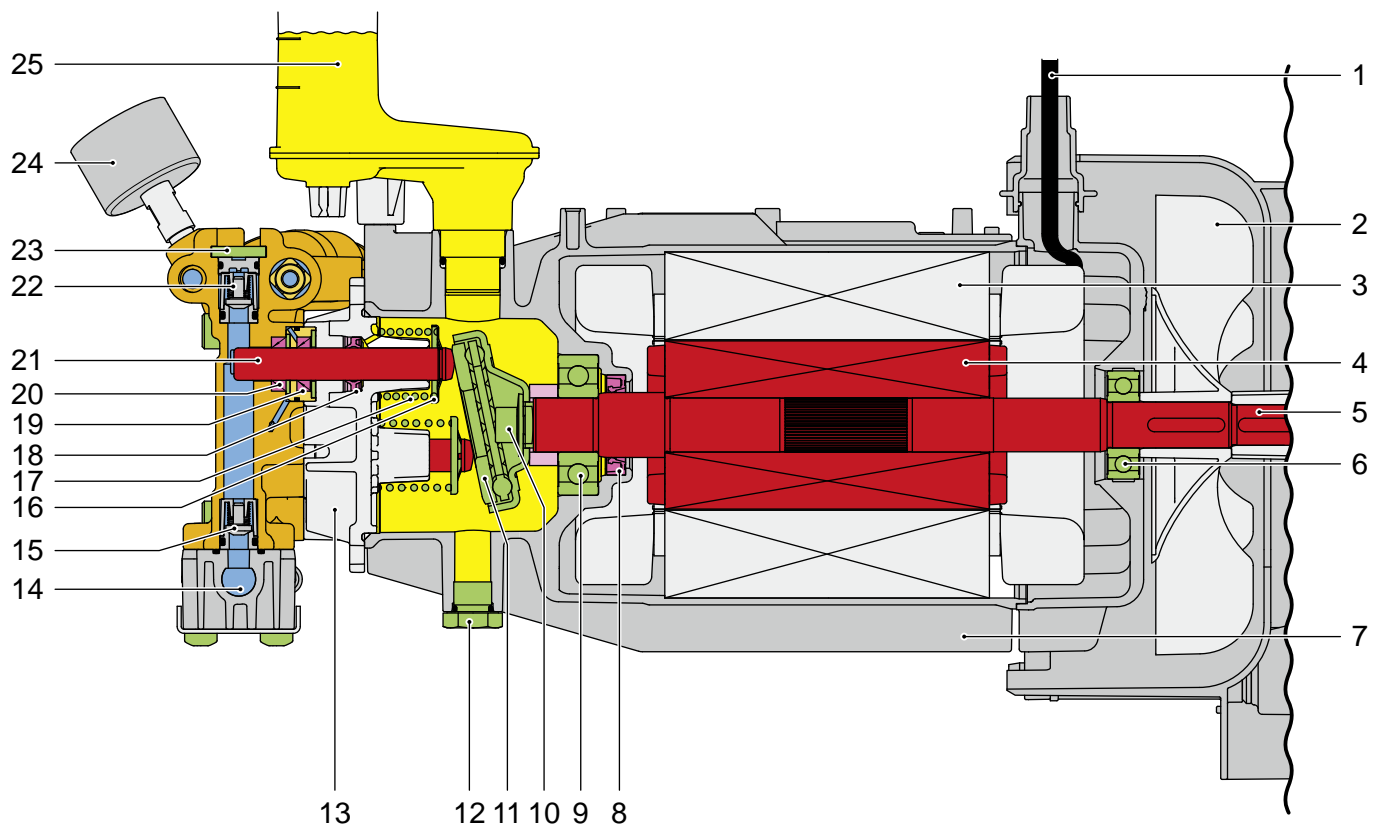


- 1 High pressure seal
- 2 Plastic washer
- 3 O ring
- 4 Bushing
- 5 Low pressure seal
- 6 Brass support disc

Note

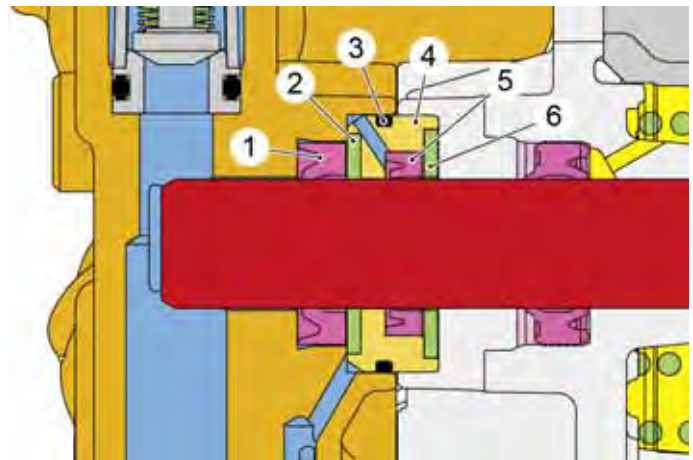
Pay attention to installation position of the seals!

5.16.4 Cross section HDS 5/12



- 1 Connecting cable, motor
- 2 Ventilator wheel, motor cooling
- 3 Stator
- 4 Solenoid (rotor)
- 5 Motor shaft
- 6 Motor bearing, rear (B bearing)
- 7 Motor casing
- 8 Shaft seal ring, motor shaft
- 9 Motor bearing, front (A bearing)
- 10 Fastening screw, swash plate
- 11 Swash plate
- 12 Oil drain screw
- 13 Piston guide
- 14 Suction side pump
- 15 Suction valve
- 16 Holding plate of piston spring
- 17 Piston spring
- 18 Oil seal
- 19 Low pressure seal
- 20 High pressure seal
- 21 Piston
- 22 Pressure valve
- 23 Holding plate
- 24 Manometer
- 25 Oil tank

5.16.5 High pressure seal / low pressure seal



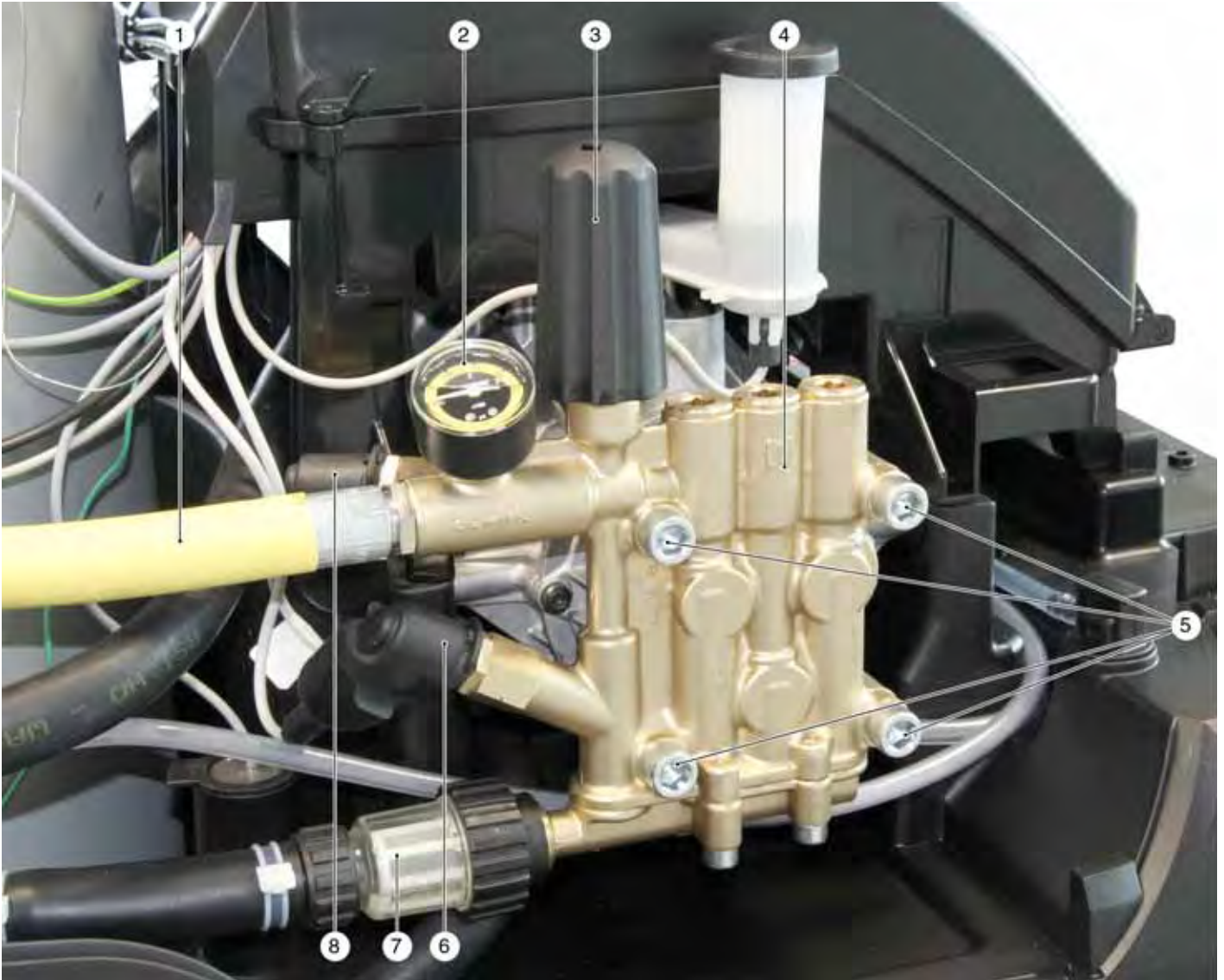
- 1 High pressure seal
- 2 Plastic washer
- 3 O ring
- 4 Bushing
- 5 Low pressure seal
- 6 Brass support disc

Note

Pay attention to installation position of the seals!

5.17 High pressure system (not HDS 5/12)

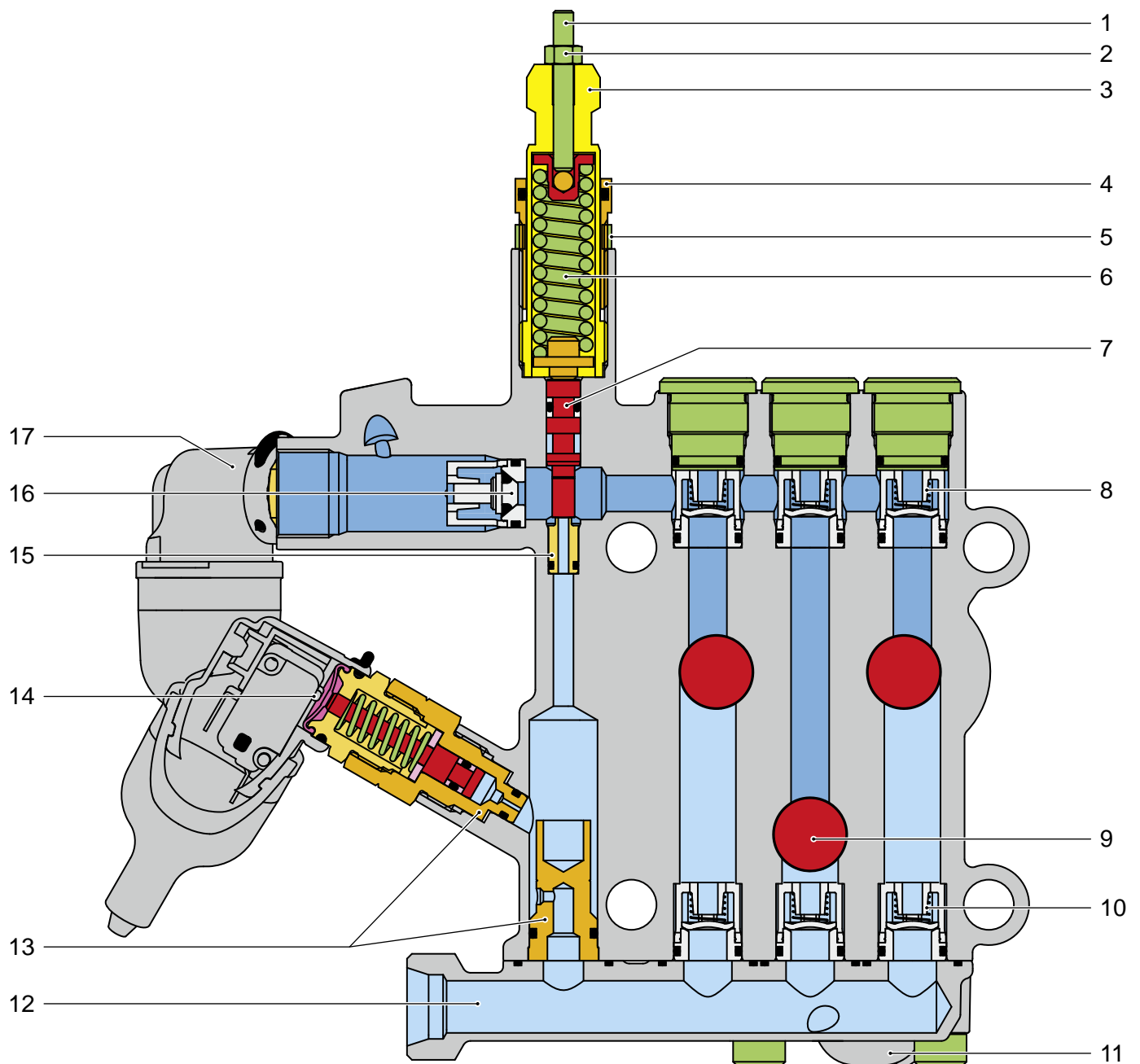
5.17.1 Overview of high pressure pump



- 1 SDS hose
- 2 Manometer
- 3 Pressure and volume regulation
- 4 Pump head
- 5 Pump head screws
- 6 Pressure switch "OFF"
- 7 Water fine filter
- 8 Pressure switch "ON"

5.17.2 Pressure and volume regulation

Cross section



- 1 Threaded pin, max. pressure setting
- 2 Locknut threaded pin
- 3 Semiload spindle
- 4 Half-load stop sleeve
- 5 Locknut of semiload stop sleeve
- 6 Pressure spring
- 7 Overflow piston
- 8 High pressure valve (3x)
- 9 Pump piston (3x)

- 10 Suction valve (3x)
- 11 Detergent infeed with backflow valve
- 12 Suction jumper with water connection
- 13 Sleeve with reduction bore
- 14 Pressure switch "OFF"
- 15 Valve seat
- 16 Pressure holding valve
- 17 Pressure switch "ON"

Manually with a pressure regulator on the high pressure pump

The pressure and volume regulation via the handle on the high pressure pump is used to relieve the motor with mostly partial load operation.

Turning the spindle anticlockwise lowers the pre-tension of the pressure spring.

This will lift the overflow piston with a lower pressure from the valve seat and part of the flowing volume runs to the suction chamber via the sleeve with the throttle bore.

The pump runs at reduced pressure.

Depending on the spindle setting, the pressure and the water volume change.

With the rotary regulator on the gun

The pressure and volume regulation via the rotary regulator on the gun should only be used during occasional partial load operation.

When the pressure is reduced via the rotary regulator, the manual pressure and volume regulation on the pump must always be opened all the way (direction "+" on the handle); otherwise, the appliance will shut off prematurely.

If the rotary regulator is partially closed, the pressure in the system will increase.

This will lift the piston off the valve seat so that a part of the flowing volume flows back to the suction chamber via the return.

The pump continues to run at high pressure.

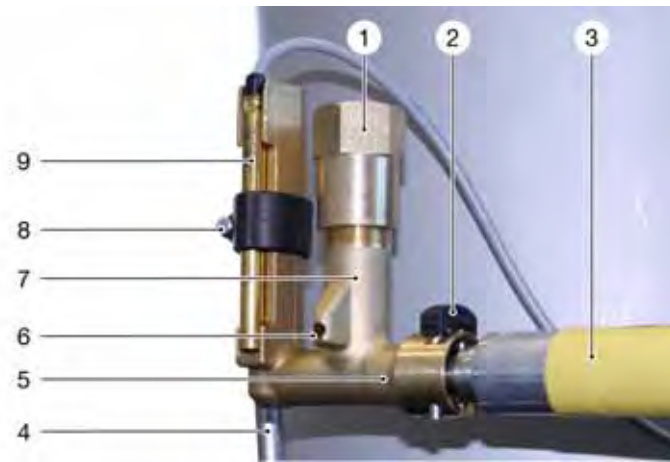
Depending on the setting of the rotary regulator on the gun, the pressure and the water volume change.

Gun closed

If the gun is closed completely, the piston will open all the way and the entire flow volume of the pump flows to the suction chamber via the throttle bore.

The dynamic pressure building up through the throttle bore of the sleeve in the return actuates the pressure switch which will in turn shut off the appliance.

5.17.3 Safety block



- 1 Adjustment screw, safety valve
- 2 Safety clip
- 3 SDS hose
- 4 High pressure pipe to the on-demand heater
- 5 Sieve (in the casing)
- 6 Output, safety valve
- 7 Safety valve
- 8 Clamping bracket, reed switch, lack of water fuse
- 9 Reed switch, lack of water fuse

Safety valve

The safety valve guides the entire flow volume of the pump to the swimmer reservoir if the pressure switch or the overflow valve is defective. It protects the appliance and accessories from excessively high over-pressure.

If the gun is open, the safety valve is closed and the entire flow volume of the pump is transferred to the gun at operating pressure.

If the pressure in the high pressure system rises by approx. 20 bar above the permissible operating pressure, the valve ball is lifted off the valve seat and part of the flow volume flows into the swimmer reservoir. The opening pressure of the safety valve is adjusted with the adjustment screw.

Rotation to the right increases the opening pressure, rotation to the left decreases the opening pressure.

The safety valve is a safety component and therefore its adjustment screw is sealed.

Note

The safety valve is adjusted via the pressure increase in the system with the burner turned on, so that it limits the pressure increase to the max. permissible value (see Specifications) with the gun closed. Then seal this setting.

Lack of water fuse and dry run safe guard

The lack of water fuse prevents the burner from switching on in case of missing or insufficient water volume and thus protects the on-demand heater from overheating.

With the gun open and sufficient water flow, the solenoid piston is pushed against the pressure spring. The solenoid piston closes the contact of the reed switch.

This opens the solenoid valve for the fuel and the burner ignites.

The sieve in the water supply of the safety block prevents the contamination of the lack of water fuse.

Note

The lack of water fuse is a safety component and therefore its locking screw is sealed.

The information regarding insufficient water volumes is sent directly to the control PCB.

There, this message is evaluated as

- lack of water fuse (shut-off of burner, see above) and as
- Dry run protection for the pump (shut off appliance) (not HDS 5/12)

The lack of water fuse functions immediately.

It switches the burner off immediately in case of insufficient water volume and back on after the water level has been replenished.

The dry run protection is initiated when the lack of water fuse signals insufficient water volume for 2 minutes.

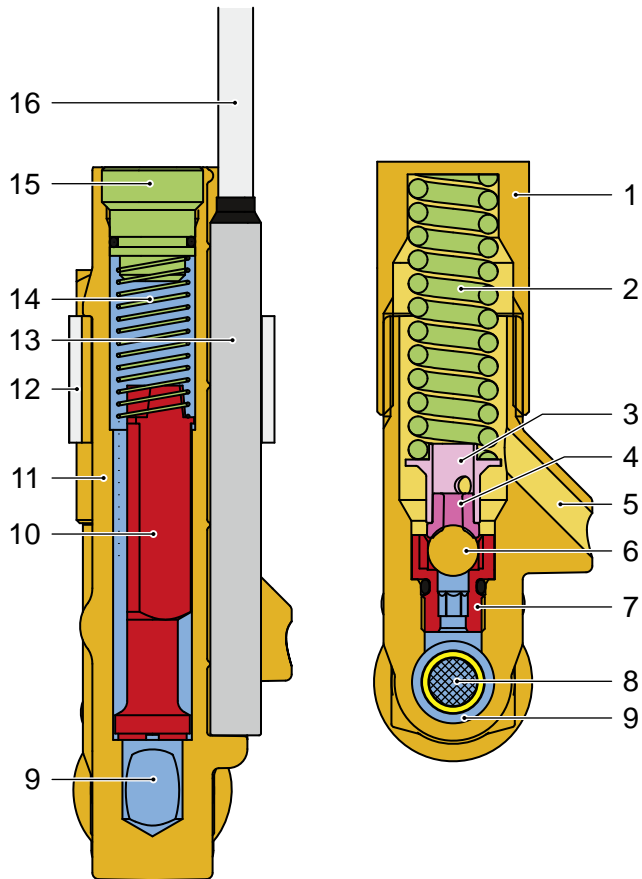
The appliance shuts off with a fault message and locks up.

The appliance can be started back up by switching it off and on via the programme switch.

Caution

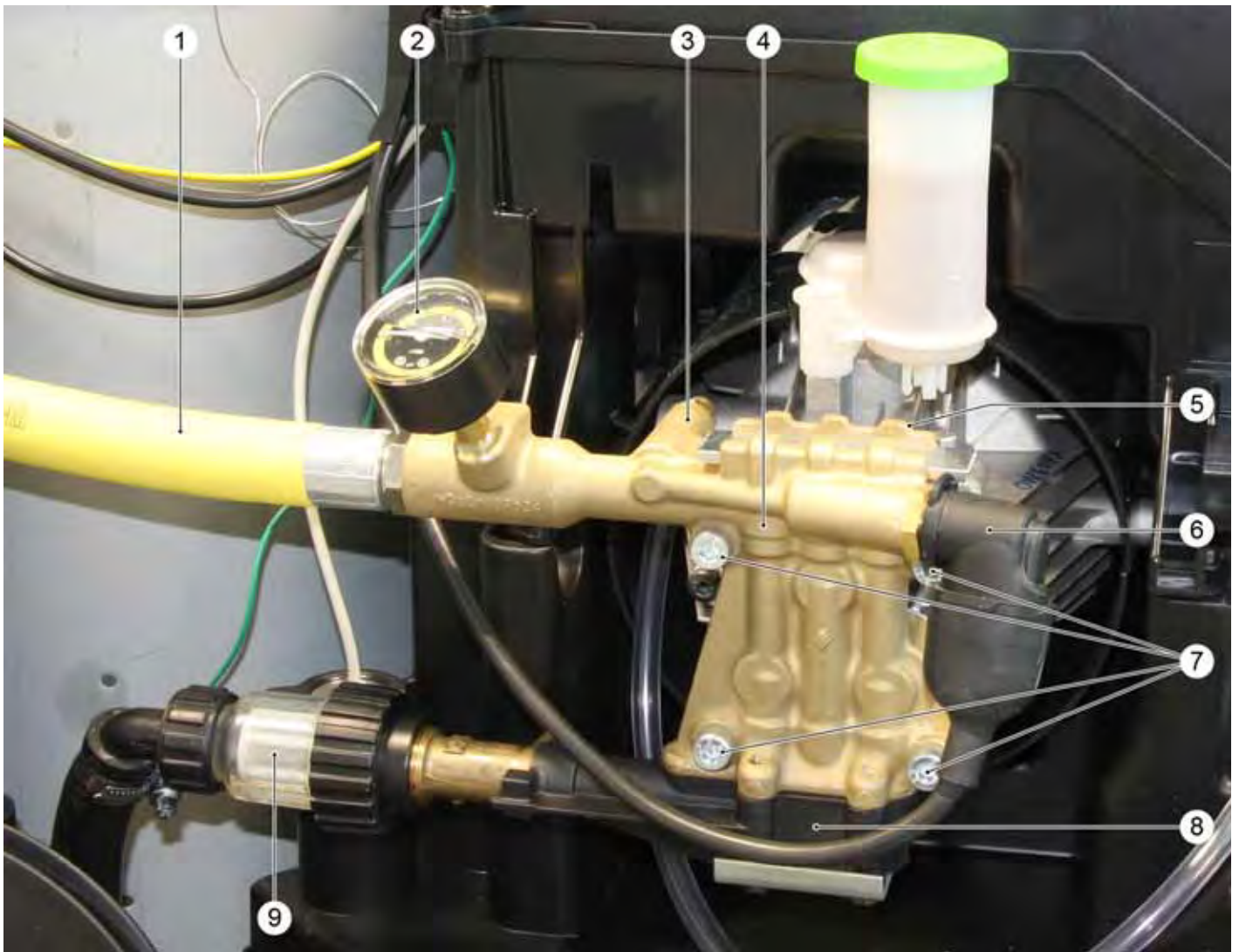
As dry runs can damage the pump with time, there must always be a sufficient water supply.

5.17.4 Safety block, cross section drawing



- 1 Adjustment screw, safety valve
- 2 Spring, safety valve
- 3 Spring plate with outlet bore
- 4 Mold part of ball guide
- 5 Water outlet safety valve
- 6 Valve ball, safety valve
- 7 Valve seat of safety valve
- 8 Sieve
- 9 Water inlet, from the high pressure pump
- 10 Solenoid piston, lack of water fuse
- 11 Casing of the lack of water fuse
- 12 Clamping bracket, reed switch
- 13 Reed switch, lack of water fuse
- 14 Spring, lack of water fuse
- 15 Locking screw, lack of water fuse
- 16 Connecting cable, reed switch

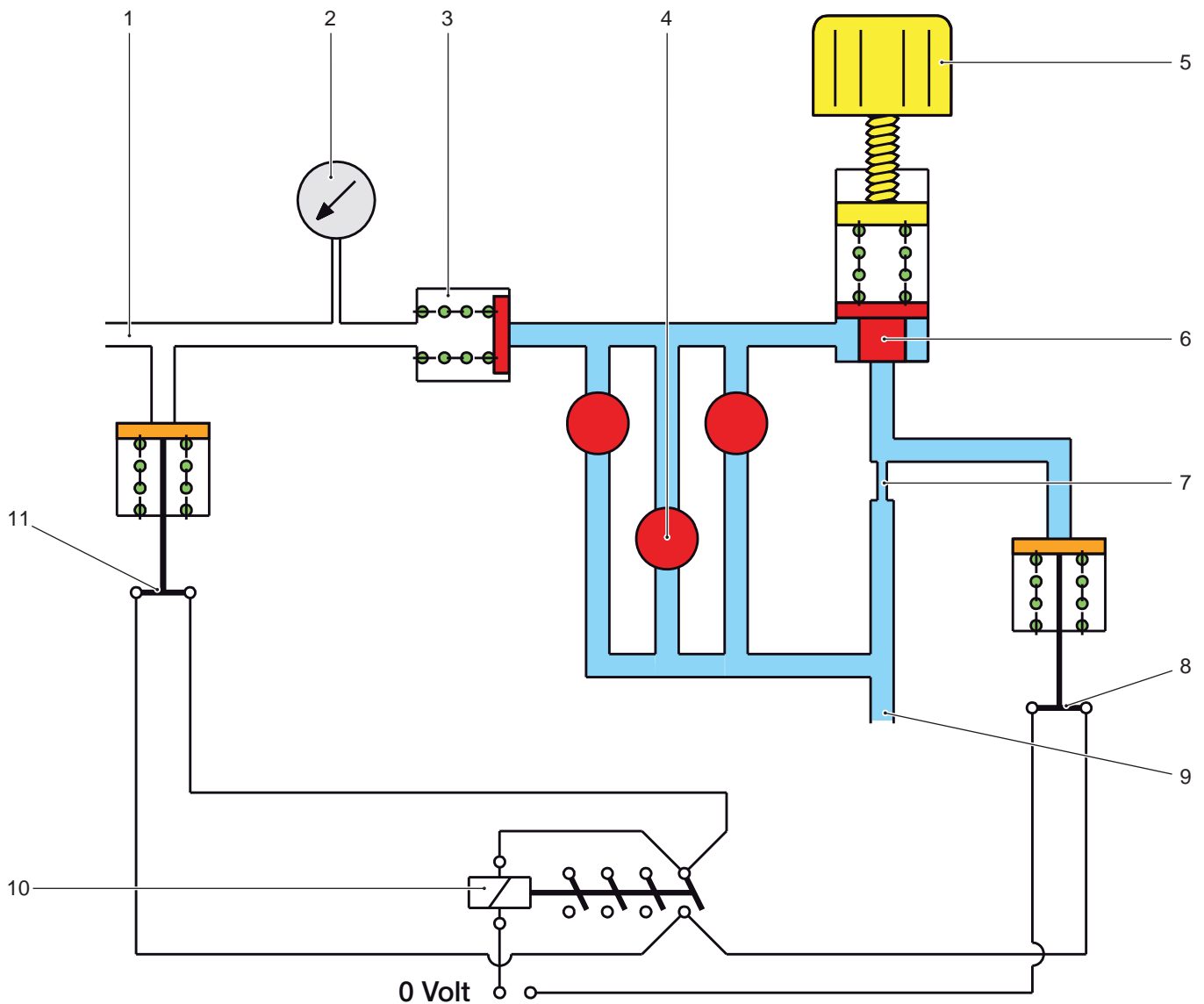
5.18 High pressure system HDS 5/12



- 1 SDS hose
- 2 Manometer
- 3 Detergent injector
- 4 Pump head
- 5 Safety valve
- 6 ON/OFF pressure switch
- 7 Pump head screws
- 8 Suction jumper with water connection
- 9 Water fine filter

5.19 Functional description of pressure switch

5.19.1 Appliance is switched off



- | | |
|---|----------------------------------|
| 1 High pressure outlet (without pressure) | 7 Reduction bore |
| 2 Manometer (without pressure) | 8 Pressure switch "OFF" (closed) |
| 3 Pressure retaining valve (closed) | 9 Water inlet |
| 4 Pump stands still | 10 Motor contactors (K1) (open) |
| 5 Rotary knob | 11 Pressure switch "ON" (closed) |
| 6 Overflow valve (closed) | |

Note

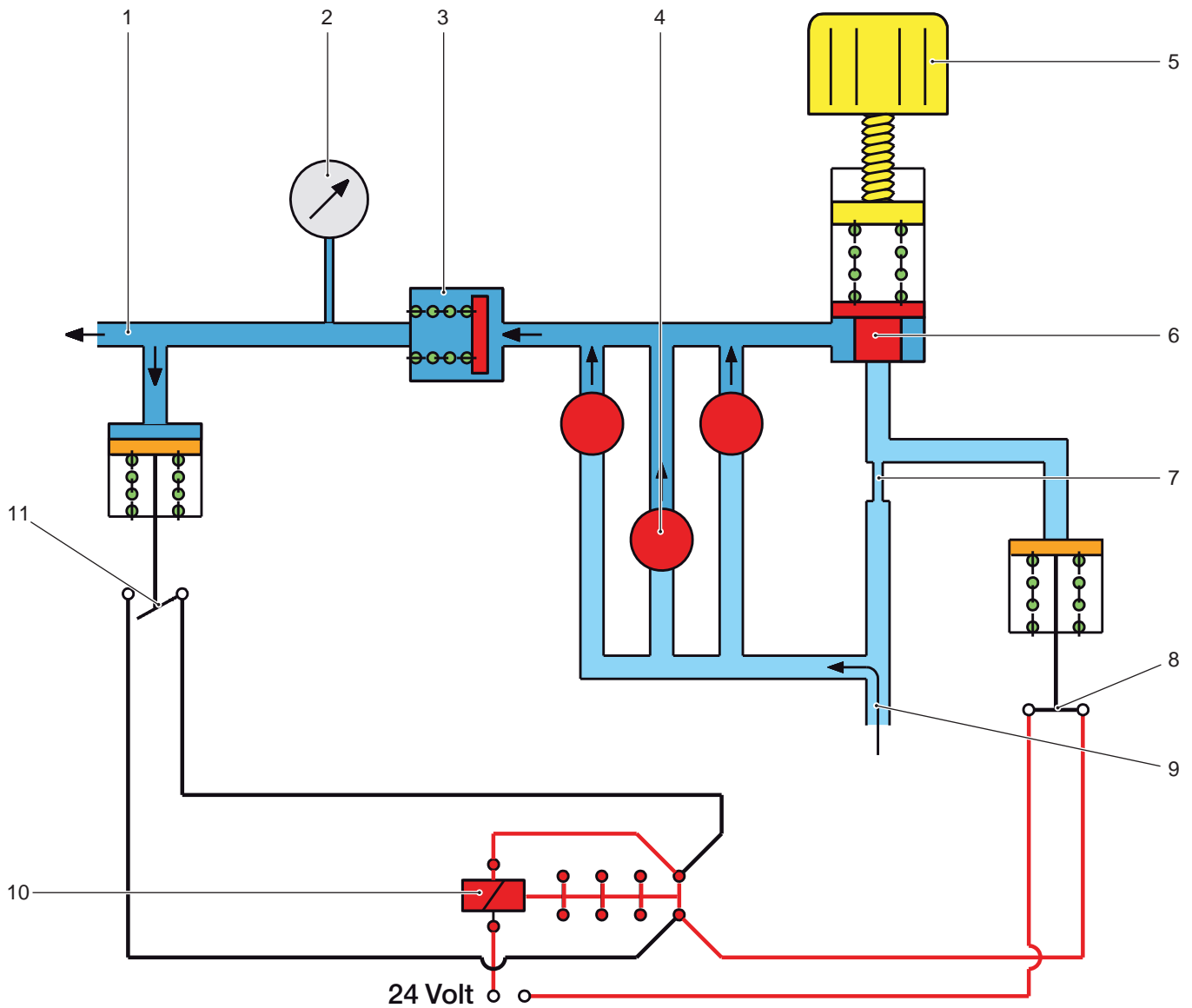
The shown functions of the prepressure switches and motor contactor are for understanding purposes only. In reality, the information from the two pressure switches is transferred directly to the control electronics, which in turn controls the motor contactor.

When the appliance is switched off and the gun is open, the pressure is taken from the system and it is without voltage.

Both pressure switches as well as the overflow valve and the pressure retaining valve closed.

The motor contactors are open.

5.19.2 The appliance is switched on and the gun is open



- 1 High pressure outlet, working pressure
- 2 Manometer, working pressure
- 3 Pressure retaining valve (open)
- 4 Pump is running
- 5 Rotary knob
- 6 Overflow valve (closed)

- 7 Reduction bore
- 8 Pressure switch "OFF" (closed)
- 9 Water inlet
- 10 Motor contactors (K1) (closed)
- 11 Pressure switch "ON" (open)

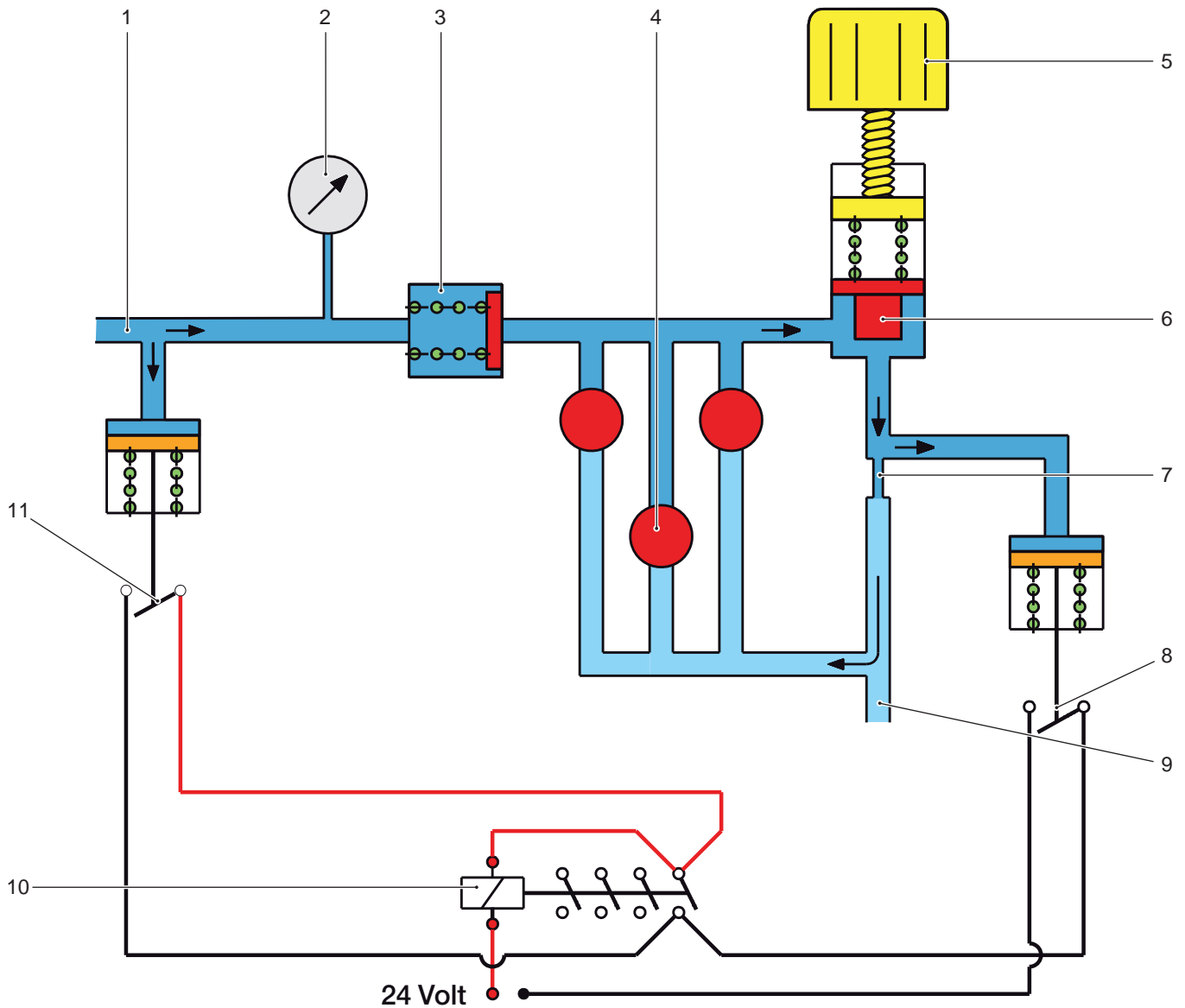
Note

The shown functions of the pressure switches and motor contactor are for understanding purposes only. In reality, the information from the two pressure switches is transferred directly to the control electronics, which in turn controls the motor contactor.

The pressure retaining valve and the pressure switch open, the overflow valve and the pressure switch remain closed. Due to the closed pressure switch, the motor contactors also remain closed.

After switching on the appliance and with the gun open, the contactor will be actuated and closes the contacts. This will start the motor and the pump will build up the working pressure.

5.19.3 Gun is closed



- 1 High pressure outlet, shut-off pressure
- 2 Manometer, shut-off pressure
- 3 Pressure retaining valve (closed)
- 4 Pump stands still
- 5 Rotary knob
- 6 Overflow valve

- 7 Reduction bore
- 8 Pressure switch "OFF" (open)
- 9 Water inlet
- 10 Motor contactors (K1) (open)
- 11 Pressure switch "ON" (open)

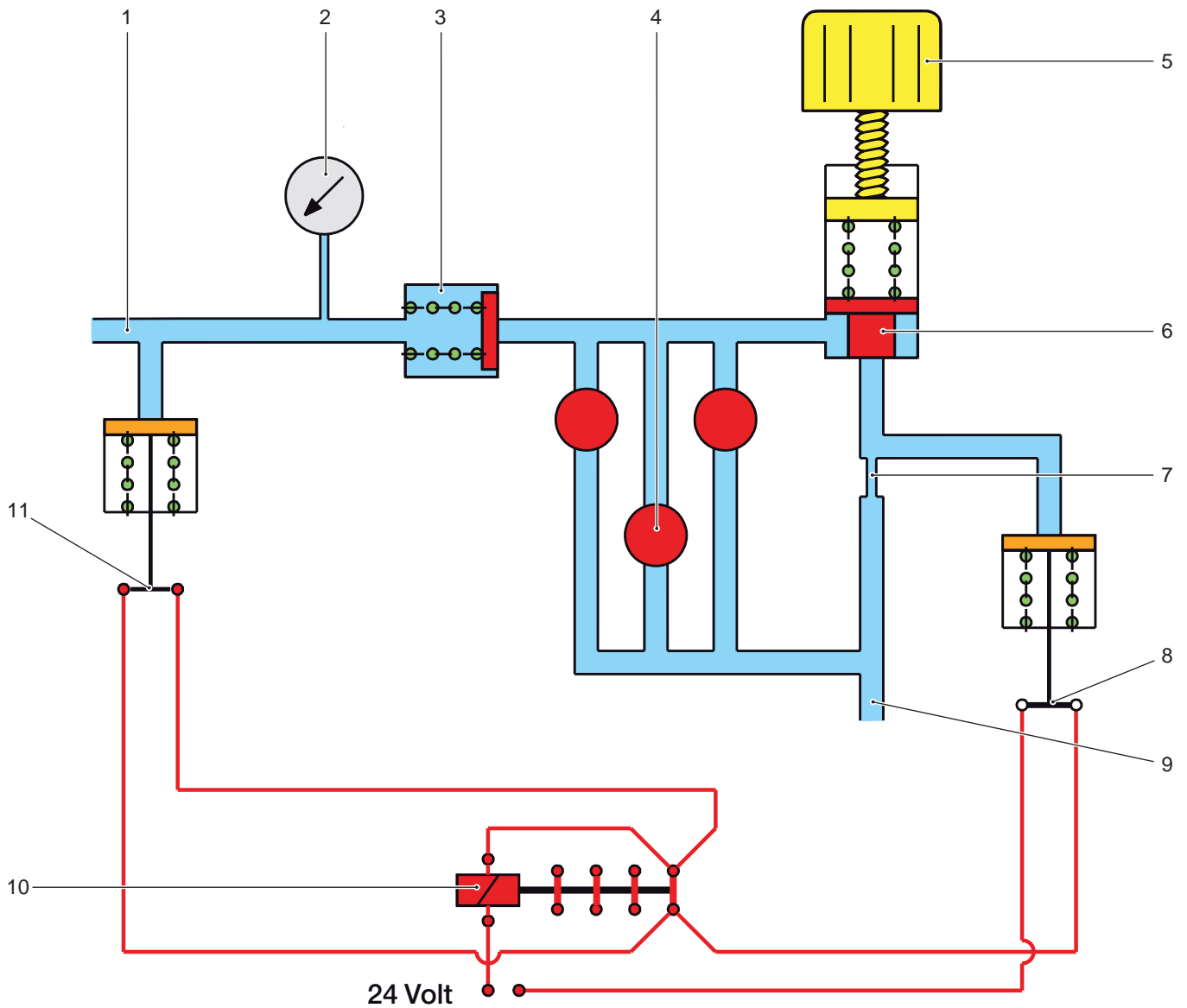
Note

The shown functions of the pressure switches and motor contactor are for understanding purposes only. In reality, the information from the two pressure switches is transferred directly to the control electronics, which in turn controls the motor contactor.

There will be brief overpressure in the system when the gun is closed. This will open the overflow valve and the entire flow volume streams into the suction chamber of the pump through the throttle bore. As soon as the overflow valve opens, the pressure retaining valve closes and the shut-off pressure is

locked between the gun and the pressure retaining valve. Due to the locked in shut-off pressure, the pressure switch remains open. There will be a pressure backup in front of the reduction bore, which opens the pressure switch at about 10 bar and thus interrupts the control circuit. The motor contactors open and the motor is shut off. As soon as the motor stops, the overflow valve will close and so will the pressure switch. However, the motor contactors will remain open as the control circuit is still interrupted by the open pressure switches.

5.19.4 The gun is reopened when the appliance is switched on



- 1 High pressure outlet (without pressure)
- 2 Manometer (without pressure)
- 3 Pressure retaining valve (closed)
- 4 Pump is running
- 5 Rotary knob
- 6 Overflow valve (closed)

- 7 Reduction bore
- 8 Pressure switch "OFF" (closed)
- 9 Water inlet
- 10 Motor contactors (K1) (closed)
- 11 Pressure switch "ON" (closed)

Note

The shown functions of the preessure switches and motor contactor are for understanding purposes only. In reality, the information from the two pressure switches is transferred directly to the control electronics, which in turn controls the motor contactor.

The motor contactor is actuated, closes the contacts, the motor starts up and the pump rebuilds the working pressure.

As soon as the gun is opened, the pressure that is locked in between the pressure retaining valve and the gun escapes. The pressure switch closes, which in turn will close the control circuit.

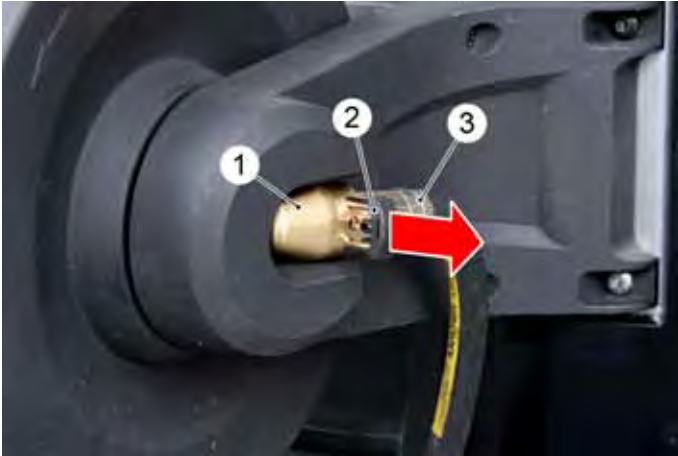
6 Basic settings and service procedures

6.1 Hose drum (CX model only)

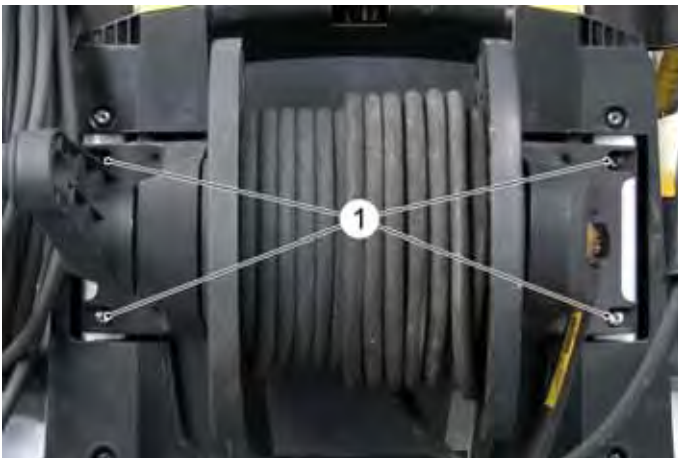
6.1.1 Remove the hose drum

Caution

Prior to removing the hose drum, shut the appliance off and release possibly existing pressure in the system by actuating the gun.

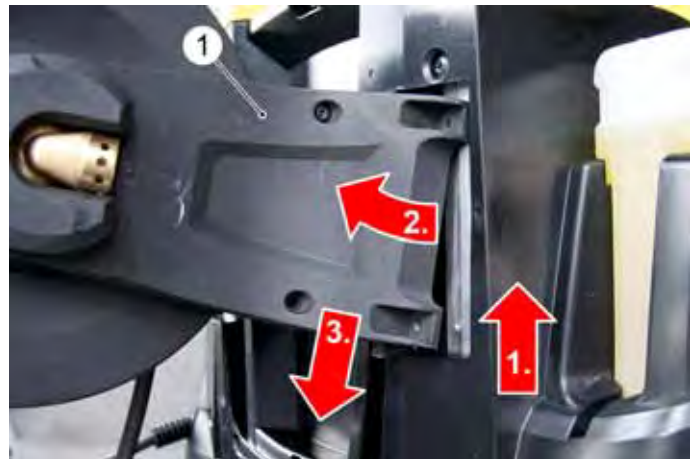


- 1 Node piece
- 2 Safety clip, high pressure line.
- 3 High pressure hose from the high pressure outlet



- 1 Screw

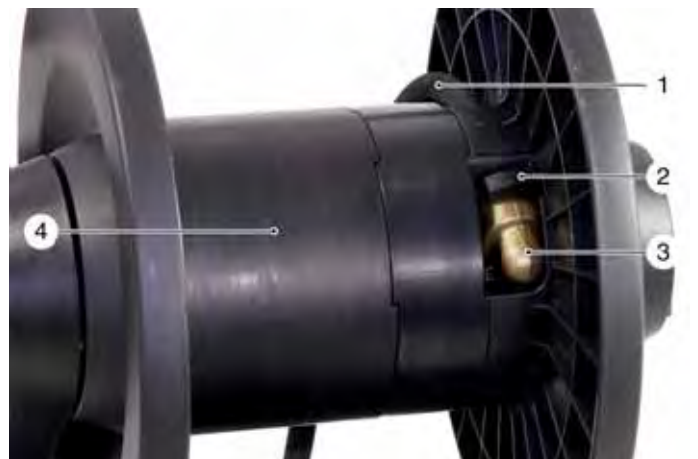
→ Remove the screws from the intakes of the hose drum.



- 1 Hose drum

→ Raise the hose drum, swivel it out and remove toward the bottom.

6.1.2 Remove the high pressure hose



- 1 High pressure hose
- 2 Safety clip
- 3 High pressure outlet, hose drum
- 4 Hose drum

→ Completely unwind the high pressure hose.
→ Pull out the safety clip.

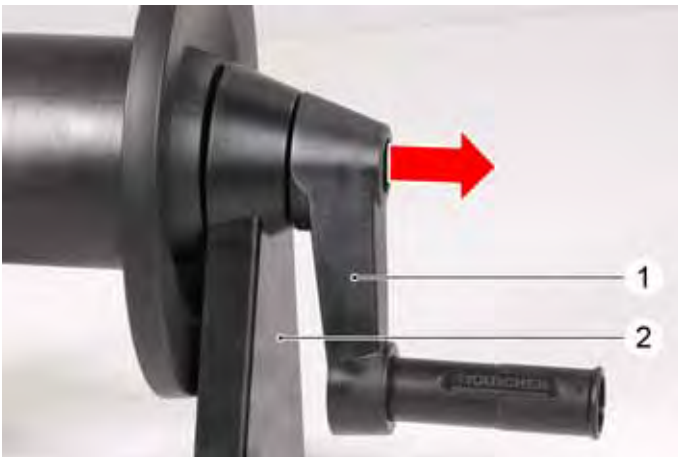


- 1 high pressure hose
- 2 Washers (3x)
- ➔ Pull the high pressure hose out of the high pressure outlet.



- 1 Node piece
- 2 Seal screw
- ➔ Remove the seal screw.
- ➔ Remove the knot and the axle.

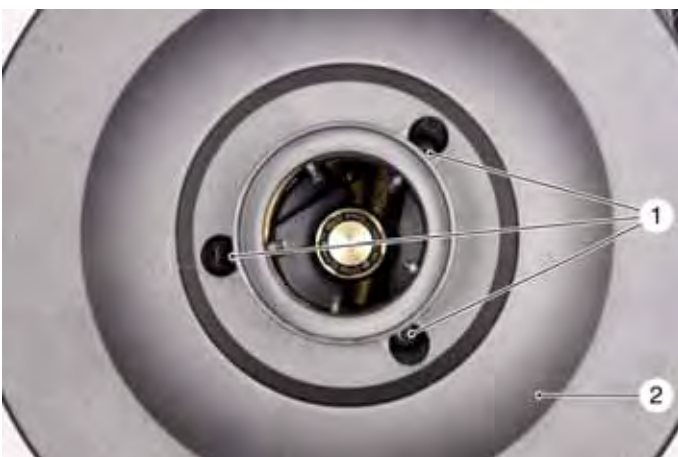
6.1.3 Replace the seal of the rotary grommet



- 1 Crank
- 2 Side part
- ➔ Pull the crank straight off of the hose drum and remove the side part.



- 1 Seal screw
- 2 Node piece
- 3 Axle
- 4 Sealings
- ➔ Replace seals and grease with PFAE grease (6.288-088).
- ➔ Check the axle and the knot for wear in the area of the seals.



- 1 Screws
- 2 Hose drum half shell
- ➔ Remove the screws underneath the side part and take out the hose drum half shell.

6.2 Remove the rear wall

Note

Prior to removing the back panel of the appliance, you must remove the liquid softener bottle from the intake. In order to prevent it from leaking, you must remove it quickly toward the top and immediately flipped upside down (opening toward the top).

➔ Open the device hood.



- 1 Fastening screws
- 2 Continuous heater

➔ Unscrew the fastening screws on the on-demand heater.



- 1 Back of appliance
- 2 Fastening screw
- 3 Guide mandrel, appliance hood

➔ Unscrew the fastening screws of the back panel of the appliance left and right by the guide mandrels of the appliance hood.



- 1 Back of appliance
- 2 Fastening screws

➔ Unscrew the fastening screws at the back panel of the appliance.

➔ Remove the rear panel of the appliance toward the top.



- 1 Back of appliance
- 2 Cross bar
- 3 Cross bar intake bottom
- 4 Top cross bar intake

Note

If the cross bar was removed from the rear panel of the appliance, the correct installation position must be adhered to during installation:

- **Appliance with large boilers (HDS 7/16, HDS 8/17, HDS 8/18-4)**

Install the cross bar into the top intake. The angle with the mounting holes must be pointing up.

- **Appliance with small boilers (HDS 5/12, HDS 6/14, HDS 6/14-4)**

Install the cross bar into the bottom intake. The angle with the mounting holes must be pointing down.

6.3 Burner

6.3.1 Test

Note

An accurate basic adjustment of the burner is only possible if the heating coil was previously thoroughly desooted and the deposits were removed. Eine exakte Grundeinstellung des Brenners ist nur möglich, wenn die Heizschlange vorher gründlich entrußt und die inneren Ablagerungen entfernt wurden.

Measure the increase in water temperature

- Install the shut-off valve with thermometer (special tool) on the appliance outlet.
- Switch on the burner and bring the appliance to working pressure with full water volume via the shut-off valve.
- Measure the increase in water temperature (water outlet temperature minus water supply flow temperature).

For target values refer to technical specifications.

Measure the air pressure

- Measure the air pressure on the burner cover (special tool) and adjust it on the air flap.

For target values refer to technical specifications.

Measure the exhaust values

- Measure the soot value, CO₂ content and the exhaust temperature (special tools, measuring gauges).

For target values refer to technical specifications.

6.3.2 Standard setting

Adjusting the fuel pressure



- 1 Fuel pump
- 2 Adjustment screw for fuel pressure

- Adjust the fuel pressure with a test gauge on the adjustment screw and repeat the measurements.

For target values refer to technical specifications.

Adjusting the soot value

- If the soot value is too high, then the air flap needs to be opened further or the fuel pressure needs to be reduced.

Adjust the CO₂ value

- Adjust the CO₂ value by moving the air flap.

- Open the air flap (rotation anti-clockwise), CO₂ content will decrease.



- 1 Stop screw
- 2 Air flap
- 3 Teeth for setting the air flap
- 4 Position of the air flap (insinuated)

Note

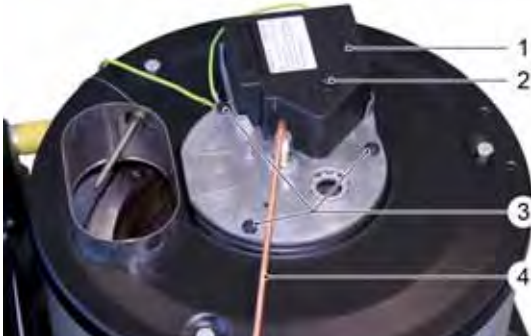
After finishing the basic adjustment, the fuel pump and the air flap must be sealed.

6.3.3 Remove burner

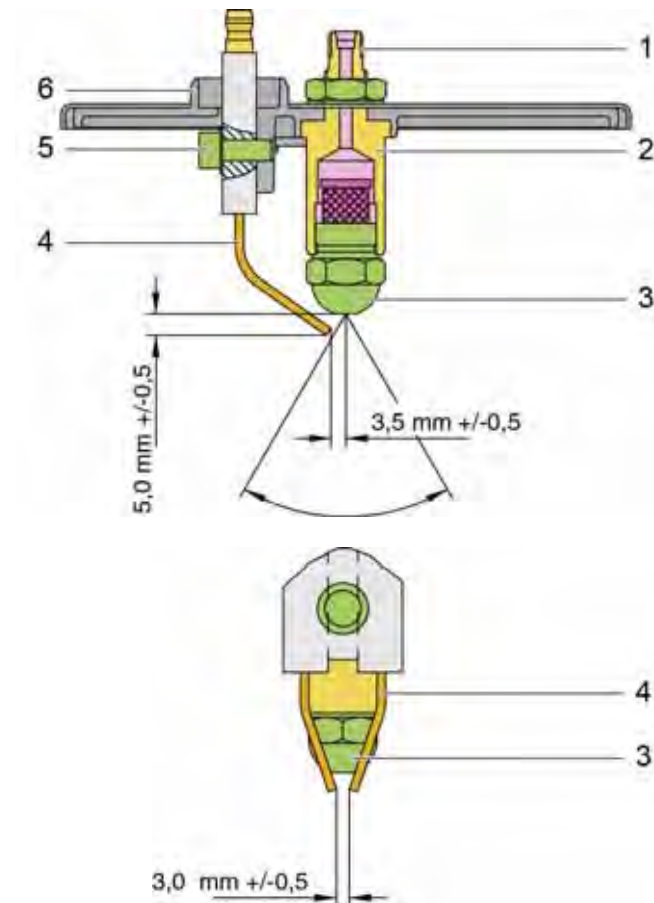
Note

For appliances with conventional ignition transformers, you must only pull the ignition cable off of the ignition electrodes.

For models where the ignition transformer is attached from the bottom (HDS 5/12), the burner must be removed before the ignition transformer can be removed.

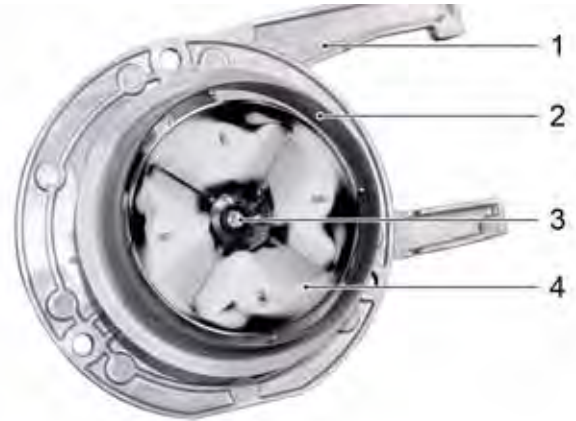


- 1 Ignition transformer
- 2 Fastening screw
- 3 Fastening screw (3x)
- 4 Fuel line



- 1 Connection fuel line
- 2 Fuel nozzle holder
- 3 Fuel nozzle, spray angle 45° or 60°, depending on the type of appliance
- 4 Ignition electrodes
- 5 Screw
- 6 Burner cover

- ➔ Unscrew the fastening screw of the ignition transformer and remove the ignition transformers (only for appliances, where the ignition transformer is installed on the top).
- ➔ Disconnect the fuel line and move it to the side.
- ➔ Remove the screws from the burner cover.
- ➔ Remove the burner toward the top.



- 1 Burner cover
- 2 Flame ring
- 3 Fuel nozzle
- 4 Pressure plate

- ➔ Pull the flame ring and pressure disc from the burner lid.

Ignition transformer HDS 5/12



- 1 Burner cover
- 2 Ignition transformer
- 3 Fastening screw (3x)

- ➔ Unscrew the fastening screw of the ignition transformer and remove the ignition transformer. The burner is installed in the reverse sequence.

6.3.4 Disassemble the burner

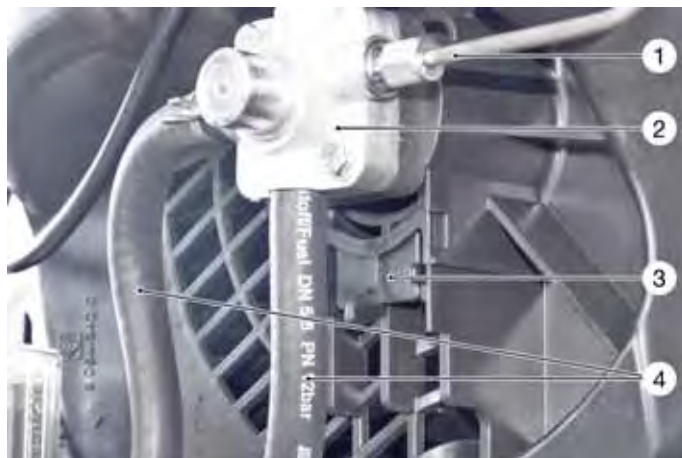


- 1 Ignition electrodes
- 2 Screw of the ignition electrodes
- 3 Burner cover
- 4 Nut
- 5 Fuel nozzle holder
- 6 Fuel nozzle

- ➔ To replace the ignition electrodes, remove the screw and take out the ignition electrodes.
- ➔ To replace the burner nozzle, remove the nut and take out holder with the fuel nozzle.

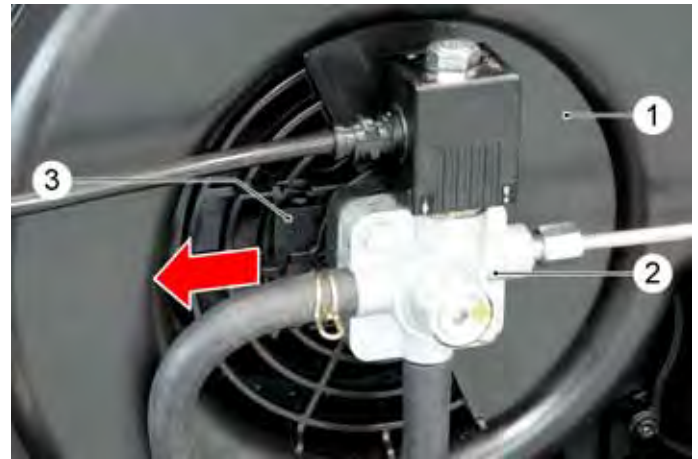
6.3.5 Remove fuel pump

Fuel pump with a lock on the bottom (large blower casing)



- 1 Fuel line
- 2 Fuel pump
- 3 Clip
- 4 Fuel hose

Fuel pump with a lock on the side (small blower casing)



- 1 Blower casing (small)
- 2 Fuel pump
- 3 Clip

- ➔ Unscrew the fuel line.
- ➔ Press the holding clamp together at the tabs and pull out toward the bottom or to the side.
- ➔ Remove the fuel pump.



- 1 Fuel pump
- 2 Solenoid valve
- 3 Fastening screw

- ➔ Remove the fuel hoses as well if needed.
- ➔ Unscrew the the fastening screw of the solenoid valve.
- ➔ Remove the solenoid valve.

6.3.6 Remove the burner casing



- 1 Fastening screw
- 2 Front side of blower casing
- 3 Stop screw
- 4 Air flap
- 5 Seal

- ➔ Unscrew the stop screw of the air flap.
- ➔ Loosen the fastening screws from the front side of the blower casing.



- 1 Fastening clip
- 2 Front side of blower casing

- ➔ Loosen the holding clips from the front side of the blower casing.
- ➔ Remove the front side of blower casing.



- 1 Screw
- 2 Ventilator wheel, burner blower

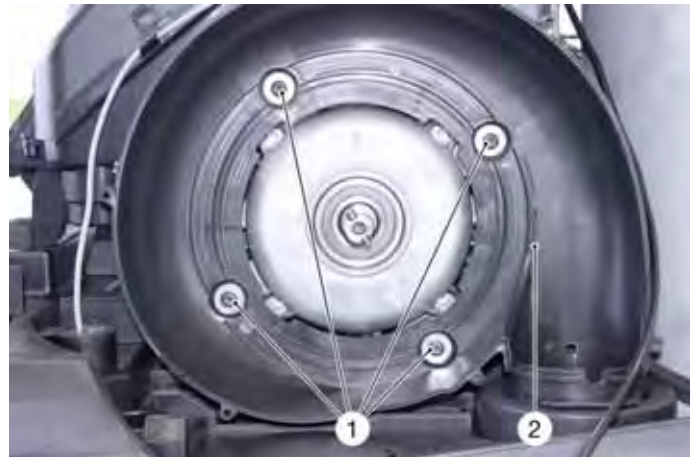
- ➔ Remove the screw and pull the ventilator wheel off.

Note

If the blower wheel cannot be removed manually, use a puller (see special tools).

The back panel of the appliance must be removed in the following cases:

- Motor replacement
- defective blower back panel



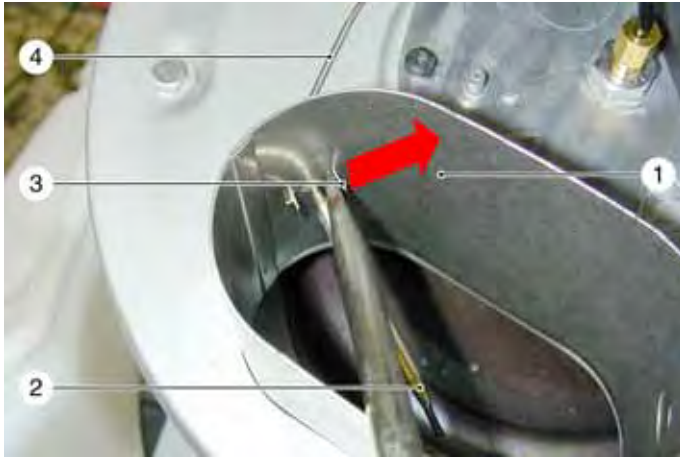
- 1 Fastening screw
- 2 Rear panel of blower casing

- ➔ Loosen the fastening screws from the rear panel of the blower casing.
- ➔ Remove the rear panel of the blower casing.

6.4 Remove the exhaust air sensor

The exhaust temperature sensor must be removed in the following cases:

- Removal of the boiler shell
- Defective exhaust temperature limiter
- Removal of the on-demand heater



- 1 Exhaust nozzle
- 2 Exhaust temperature sensor
- 3 Retaining clip
- 4 Capillary exhaust temperature sensor

- Carefully unlock the holding clamp of the exhaust temperature sensor, e.g. with a screwdriver. **The sensor must not be bent.**
- Pull out the exhaust temperature sensor.

6.5 Disassemble the high pressure pump

6.5.1 Remove the pump head

Caution

The pump head screws go through the piston guide and are screwed into the motor casing. If necessary, the piston guide must be secured with two fastening screws prior to removing the pump head as the pump oil may leak otherwise. Normally, these mounting screws are factory-installed.



- 1 Pressure switch OFF
- 2 Pump head
- 3 Threaded piece
- 4 Water fine filter
- 5 Union joint
- 6 Inlet hose

- Loosen the threaded piece from the water fine filter casing and remove the filter casing with the supply hose from the pump head.



- 1 Pressure switch ON
- 2 Retaining clip

- Lever IN/OUT the holding clamps of the connecting cables to the pressure switch.
- Pull the connecting cable of the pressure switch off.



- 1 Safety block
- 2 Retaining clip
- 3 SDS hose

- Lever out the holding clamp of the SDS hose on the safety block.
- Pull the SDS hose out of the safety block.



- 1 Pump head
- 2 Motor casing
- 3 Piston guide
- 4 Installation screw
- 5 Suction hose for detergent
- 6 Rinse line of detergent dosing valve from the swimmer reservoir
- 7 Pump head screws

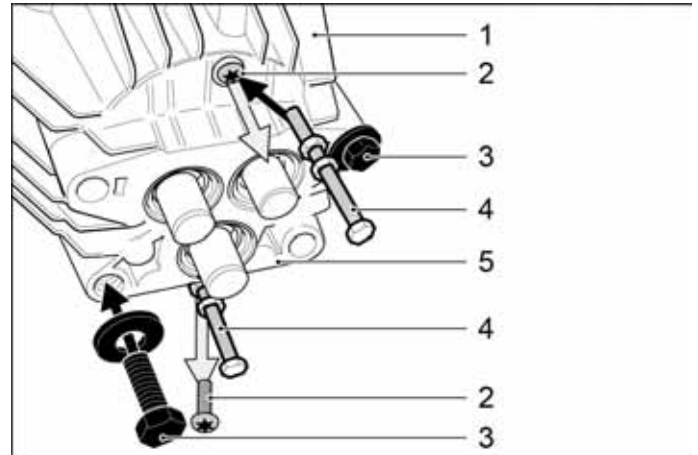
- Unscrew pump head screws.
- Pull off the pump head.
- Pull off the suction hose for the detergent from the suction jumper or the injector on the HDS 5/12.



- 1 Piston guide
- 2 Installation screw
- 3 Piston
- 4 Low pressure seal package
- 5 Oil drain screw

- Remove the low pressure seal packages from the pistons.

6.5.2 Remove the piston guide and replace the oil seals



- 1 Motor
- 2 Installation screw
- 3 Lockscrew M8x40 or M12x50
- 4 Auxiliary screw M6x110 with nuts
- 5 Piston guide

⚠ Warning

Do not let gear oil spill into the environment. Please protect the soil and dispose of waste oil in a environmentally-friendly way.

- Instead of the cylinder head screws, install two lockscrews M8x40 or M12x50 with large washers diagonal across and tighten them.
- Unscrew the oil drain screw and catch the oil. Unscrew both mounting screws and replace with auxiliary screws M6x110 (special tools).
- Remove the lockscrews M8x40 or M12x50.
- Unscrew the mounting screws M6x110 evenly against the pressure of the piston springs. Do not tilt the piston guide during this process.
- Remove the piston guide and the piston.
- Check the piston, springs and O-ring for damage; replace if necessary.



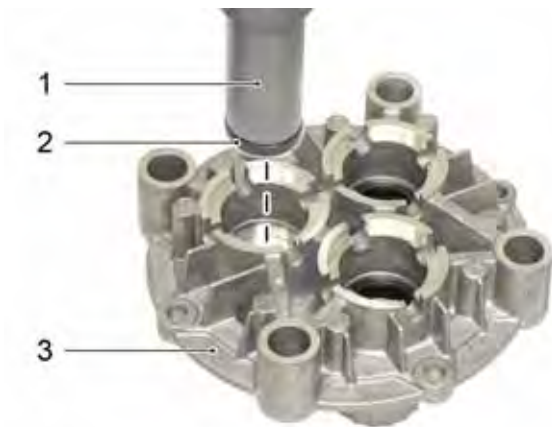
- 1 Piston guide
 - 2 Puller tool
 - 3 Oil seal
- Remove the oils seals with the puller tool.



- 1 Oil seal
- 2 Installation mandrel

Note

Place the new oil seal in water prior to installation.
 → Place the new oil seal onto the installation mandrel (single lip into the groove of the mandrel).



- 1 Installation mandrel
- 2 Oil seal
- 3 Piston guide

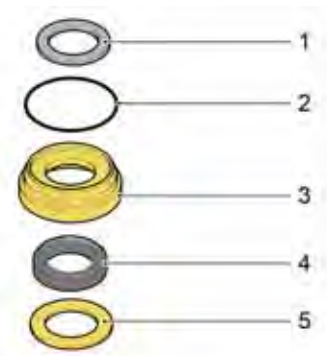
→ Install the oil seal with the installation mandrel into the piston guide.

6.5.3 Low pressure seal packages

The low pressure seal packages are similar for all appliances of the HDS compact class and only differ in colour and material of the pump head side discs and the position of the O-ring.

Note

The installation direction of the low pressure seals in the bushing (see cross section drawings) must be adhered to avoid leaks.



- 1 Plastic washer
- 2 O ring
- 3 Bushing
- 4 Low pressure seal
- 5 Brass support disc

→ Remove the low pressure seal from the bushing.



- 1 Low pressure seal
- 2 Bushing

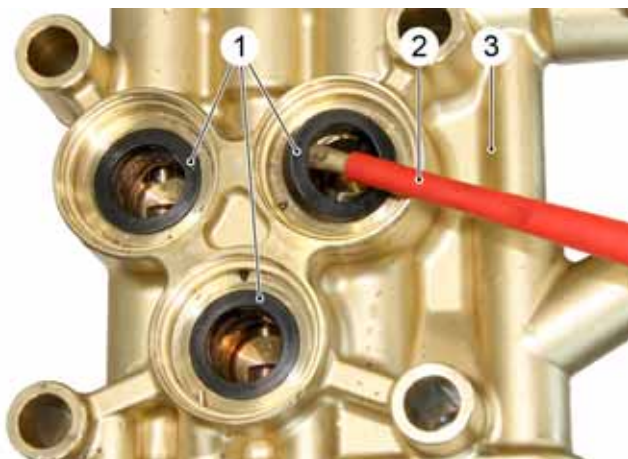
→ Grease the new low pressure seal and install it. The groove of the seal must point toward the bushing.
 → Completely assemble the low pressure seal packages.



- 1 Holes

→ Grease the low pressure seal packages and insert them into the piston guide over the pistons.
The bores at the chamfers of the bushings must point toward the centre!

6.5.4 Replace high pressure seals

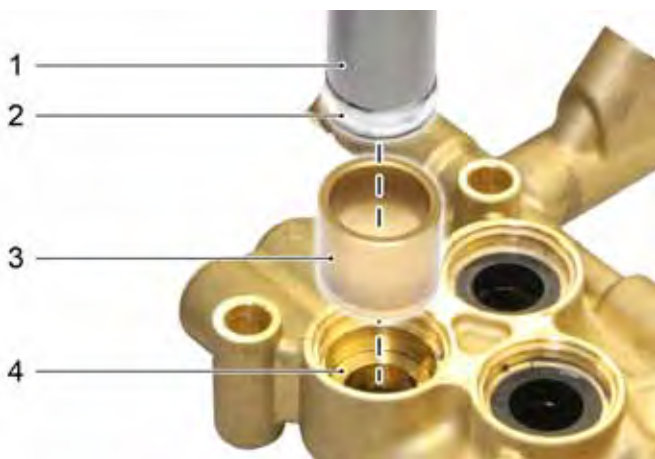


- 1 High pressure seal
- 2 Screwdriver
- 3 Pump head

➔ Remove the high pressure seals.

Note

Place the new high pressure seal in water prior to installation.



- 1 Installation mandrel
- 2 High pressure seal
- 3 Installation sleeve
- 4 Pump head

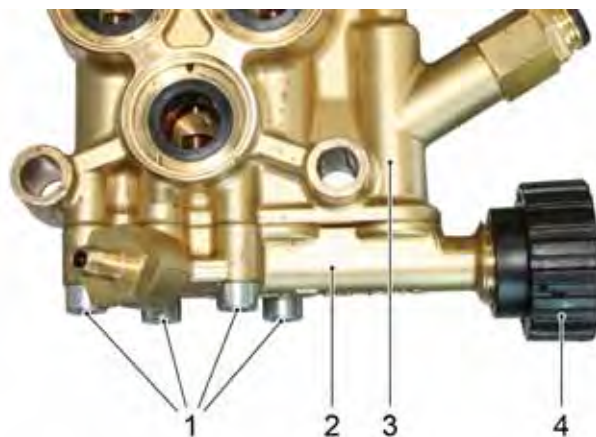
- ➔ Place the installation sleeve onto the pump head.
- ➔ Grease the high pressure seal with max. pressure grease.
- ➔ Install the high pressure seal into the piston guide using an installation mandrel into the pump head.

6.5.5 Remove the suction jumper, replace the seals and the suction valves

The suction jumper must be removed to replace the suction valves.

Note

For the HDS 5/12, the suction jumper is made of plastic and does not contain a connection for the detergent suction hose.



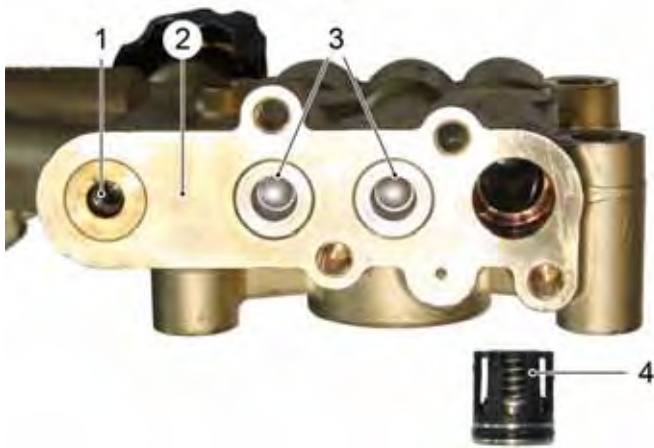
- 1 Fastening screws, suction jumper
- 2 Suction jumper
- 3 Pump head
- 4 Threaded piece

- ➔ Unscrew the threaded piece.
- ➔ Replace the threaded piece seal.
- ➔ Unscrew the fastening screws of the suction jumper.
- ➔ Remove the suction jumper.



- 1 Seal of suction jumper
- 2 Suction jumper
- 3 Detergent suction hose connection

- ➔ Remove the seals and clean the seal surfaces.
- ➔ Grease the new seals and install them.
- ➔ Unscrew the detergent hose connection, clean it and replace with a new seal.



- 1 Sleeve with reduction bore
- 2 Pump head
- 3 Suction valve
- 4 Suction valve (removed)

- ➔ Remove the suction valves using a special pliers.
- ➔ Check the suction valves for leaks.
- ➔ Insert the suction valves with greased seals.
- ➔ Install the suction jumper.

6.5.6 Remove the high pressure valves (HDS 8/18 only)

The high pressure valves are secured with valve screws.



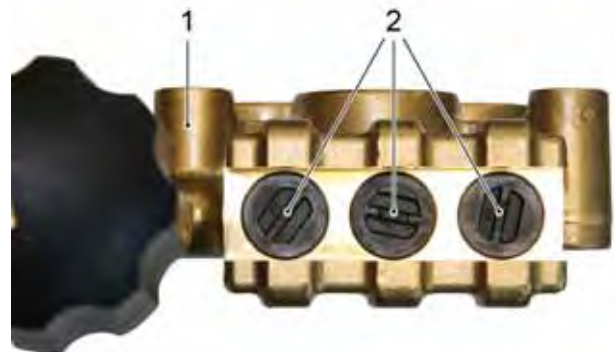
- 1 Pump head
- 2 High pressure valve
- 3 Valve screw
- 4 Valve screw

- ➔ Unscrew the valve screws.
- ➔ Remove the high pressure valves using a special pliers.
- ➔ Check the high pressure valves for leaks.
- ➔ Insert the high pressure valves with greased seals.
- ➔ Screw in the valve screws with new and greased seals.

6.5.7 Remove the high pressure valves.

The high pressure valves are secured with a support plate and one lock cap each.

- ➔ Pull the support plate out of the side of the pump head.



- 1 Pump head
- 2 Cap

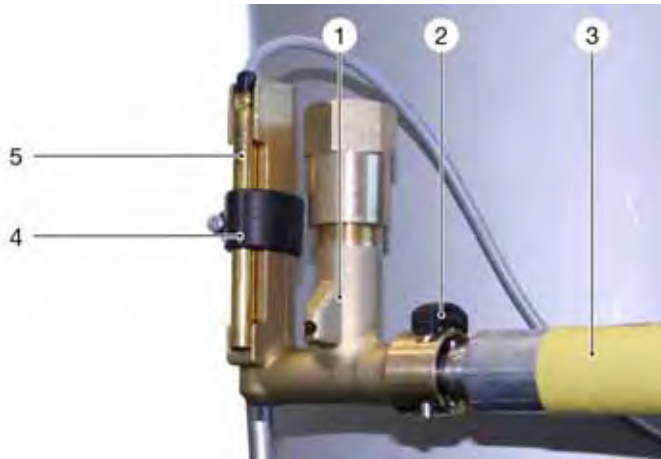
- ➔ Pull the locking caps out using flat pliers or lever them out using a small screwdriver.



- 1 Pump head
- 2 High pressure valve
- 3 Cap

- ➔ Remove the high pressure valves using a special pliers.
- ➔ Check the high pressure valves for leaks.
- ➔ Insert the high pressure valves with greased seals.
- ➔ Insert the locking caps with greased seals.
- ➔ Slide in the support plate.

6.6 Remove the safety block



- 1 Safety block
- 2 Safety clip
- 3 SDS hose
- 4 Fastener, reed switch
- 5 Reed switch

- ➔ Loosen the fastener of the reed switch.
- ➔ Remove the reed switch.
- Pull out the safety clip of the SDS hose.
- ➔ Pull out the SDS hose.



- 1 Safety block
- 2 Sieve

- ➔ Pull the sieve out of the safety block.



- 1 Sieve



- 1 Fastening nut
- 2 High pressure line

- ➔ Loosen the mounting nuts.
- ➔ Remove the safety block.

Note

Use the copper seal 5.363-360.0 to install the high pressure line to the heating coil.



- 1 Reed switch
- 2 Reference edge
- 3 Marking

Note

When installing the reed switch, make sure that the mark on the reed switch is flush with the reference edge of the safety block and that the reed switch is inserted all the way.

SDS hose function

Pumps create vibrations in the line system by means of the pressure pushes of the three pistons. The large volume textile fibre reinforced SDS hose dampens the pressure blows right after the pump. Due to the more quiet run, the pump, heating coil, high pressure hose and hand spray gun have a longer product life. The SDS hose has a longer product life than the pressure accumulator with gas filling.

6.7 Adjust the rotating regulator on the pump

Note

The pressure regulator is used to adjust the opening pressure of the overflow valve.

6.7.1 Setting the maximum working pressure



- 1 Adjustment screw, high pressure
- 2 Lock nut, adjustment screw, high pressure
- 3 Spindle, pressure and quantity regulation
- 4 Adjustment screw, low pressure
- 5 Lock nut, adjustment screw, low pressure
- 6 Pump head

- Fasten the test manometer to the high-pressure connection.
- Connect the high-pressure hose and gun to the test manometer.
- Rotate the rotating handle of the pressure regulator on the pump clockwise (direction "+") all the way to the stop.
- Rotate the rotating regulator on the gun to the position of lowest pressure (direction "-").
- Actuate the trigger on the gun and switch on the appliance.
- Pull off the rotary handle on the pressure regulator.
- Loosen the locknut of the adjustment screw for high pressure.
- Turn the adjustment screw high pressure until the opening pressure of the overflow valve is reached on the test manometer (see Specifications, full load).

Note

Turn in clock-wise direction to increase the working pressure.

Turn in counterclockwise direction to decrease the working pressure.

- Secure the adjustment screw for high pressure by tightening the locknut.
- Check the working pressure, feed volume and switch points of the pressure switches.
- Then seal this setting.

6.7.2 Setting the minimum working pressure



- 1 Adjustment screw, high pressure
- 2 Lock nut, adjustment screw, high pressure
- 3 Spindle, pressure and quantity regulation
- 4 Adjustment screw, low pressure
- 5 Lock nut, adjustment screw, low pressure
- 6 Pump head

- Fasten the test manometer to the high-pressure connection.
- Connect the high-pressure hose and gun to the test manometer.
- Install the **new** high pressure nozzle.
- Rotate the rotating regulator on the gun to the position of highest pressure (direction "+").
- Actuate the trigger on the gun and switch on the appliance.
- Rotate the rotating handle of the pressure regulator on the pump anti-clockwise (direction "-") all the way to the stop.
- Pull off the rotary handle on the pressure regulator.
- Loosen the locknut of the adjustment screw for low pressure.
- Turn the adjustment screw low pressure together with the spindle until the minimum working pressure of the overflow valve is reached on the test manometer (see Specifications, full load).

Note

Turn in clock-wise direction to increase the working pressure.

Turn in counterclockwise direction to decrease the working pressure.

- Secure the adjustment screw for low pressure by tightening the locknut.
- Check the working pressure, feed volume and switch points of the pressure switches.
- Then seal this setting.

Note

With minimum pressure and volume adjustments and when using the supplied steam nozzle, the pressure must not exceed 32 bar.

6.8 Replace the water fine filter.



- 1 Inlet hose
- 2 Water fine filter
- 3 Threaded piece

- Unscrew the supply line from the water fine filter.
- Unscrew the casing from of the water fine filter.
- Take out the filter sieve.



- 1 Filter casing
- 2 Filter sieve
- 3 Flat seal
- 4 Threaded piece
- 5 Flat seal, suction jumper

6.9 Remove the programme switch

⚠ Warning

Adhere to the electrical safety instructions when working on the electrical system of the appliance. Disconnect the appliance from power, secure against inadvertent connection and ensure that no voltage is flowing to the appliance.



- 1 Turning handle

- Pull off the rotary handle on the programme switch.



- 1 Encoding (stop)
- 2 Fastening screws

- Unscrew locking screws.
- Pull the programme switch off toward the inside.

Note

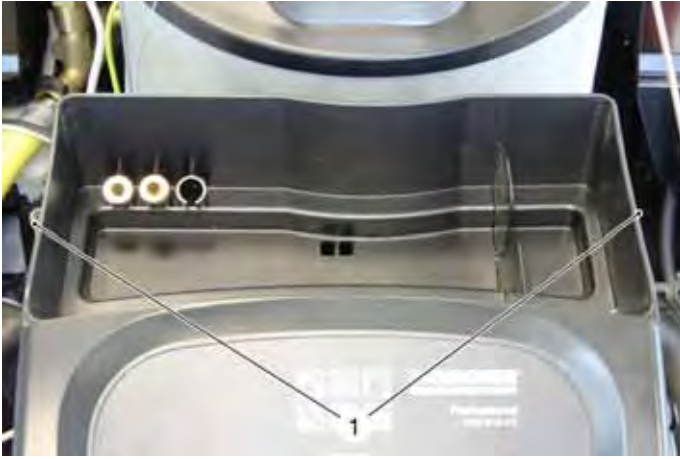
The rotation area is limited by the encoding in the rotary handle.

The temperature regulator is attached to the programme switch.

6.10 Remove the electrical box.

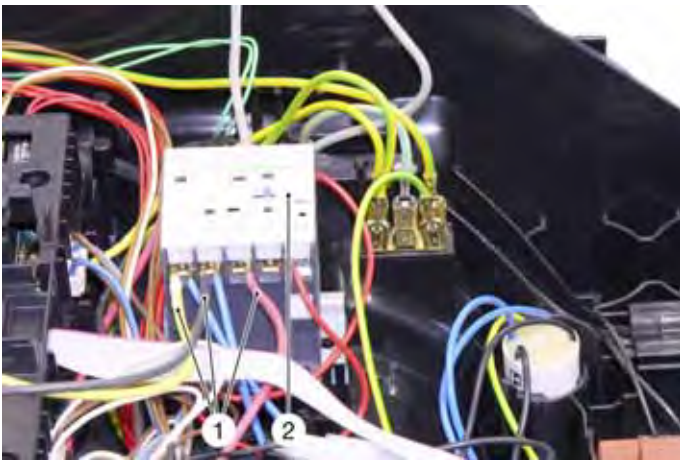
⚠ Warning

If the appliance is plugged in, there will be voltage supplied to the motor contactor even if the programme switch is turned off! Therefore, you must make sure that the appliance is disconnected from power and secured against inadvertent connection.



1 Fastening screws

- ➔ Unscrew the fastening screws on the left and right side of the top of the electrical box.
- ➔ Open the top part.

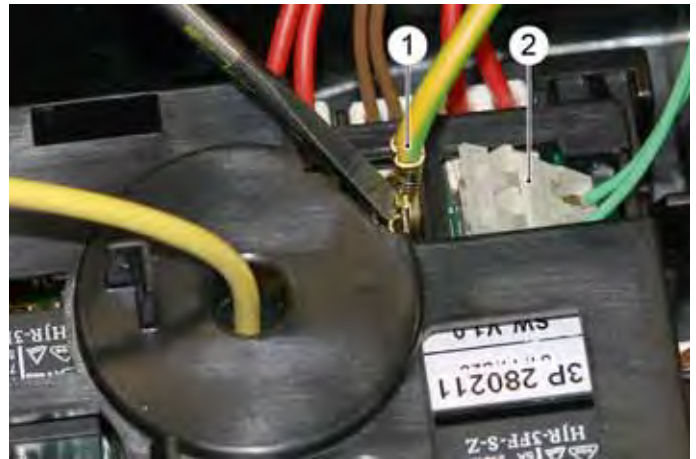


1 Connecting cable, motor
2 Engine contactor

- ➔ Unscrew the motor connection cable red, black and yellow from the motor contactor.

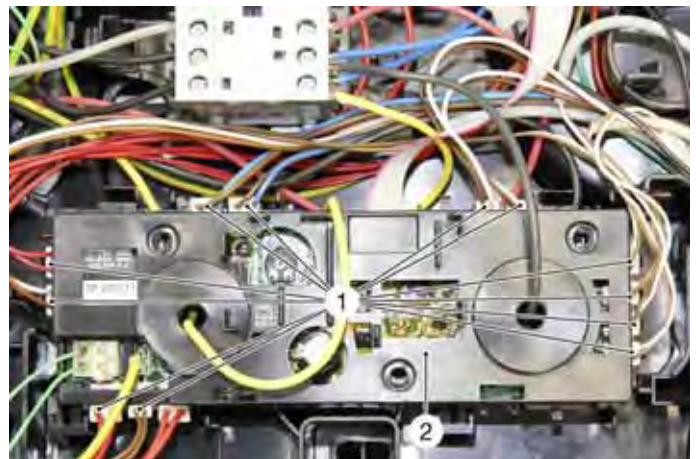
Note

The mains cable is affixed by the rear panel of the appliance. To remove the mains cable, the rear panel of the appliance must also be removed.



1 Earth cable
2 Connection of coiling protection contact

- ➔ Pull the connecting cable off the coiling protection contact off of the PCB.
- ➔ Remove all grounding cables, press the tab on the plug in with a small screwdriver.

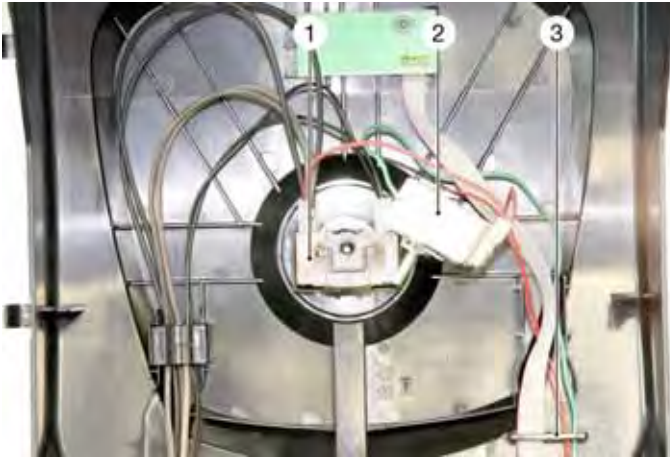


1 Connection plug
2 Printed circuit board (PCB)

Caution

Proceed carefully when removing the temperature regulator to avoid damaging the capillaries.

- ➔ Unlock all connecting plugs and pull them off the PCB.
- ➔ Pull out the exhaust temperature sensor and unhook it from the electrical box.



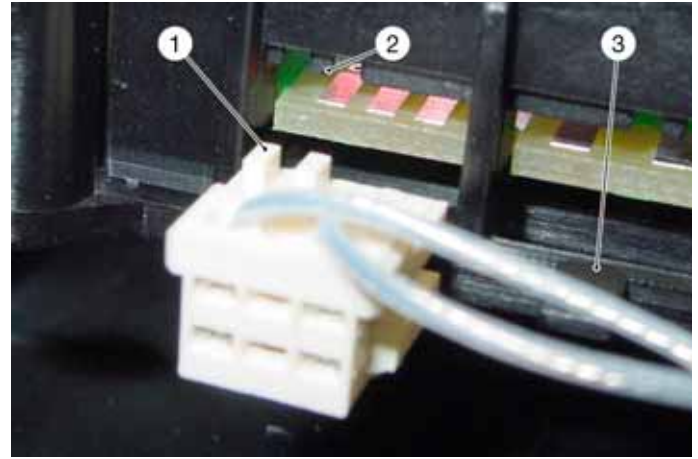
- 1 Temperature controller
- 2 Programme switch
- 3 Cable guide

→ Carefully pull the temperature switch off of the programme switch; remove the cables from the guides and completely expose them.



- 1 Fastening screws
- 2 Cable guide

→ Remove the cables on the electrics box from the outside from the cable guides.
 → Unscrew the fastening screws on the bottom part of the electrical box and remove the electrical box.



- 1 Encoding pin
- 2 Recess for encoding pin
- 3 Lock

The plugs for the PCB connections are designed with encoding pins and their matching recesses in the PCB base so that only the matching plug can be attached to the respective connection.

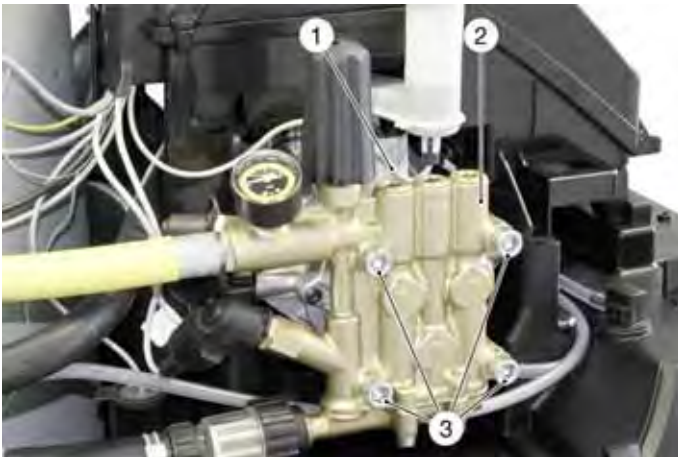
The installed plus are held in place securely by a lock. The plugs must be unlocked prior to removal.

Note

Watch for the rubber grommet of the motor cables during the reinstallation of the electrical box. If the motor cables are connected to each other before the electrical box is installed, (e.g. with insulating tape), the guidance of the cables into the electrical box is facilitated.

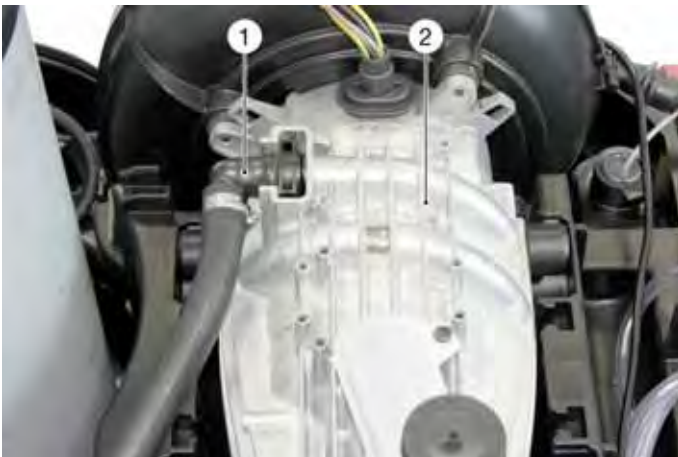
6.11 Remove the motor

- Remove the blower casing.
- Remove the electrical box



- 1 Connection line of lack of oil fuse
- 2 Pump head
- 3 Pump head screws

- Separate the connecting line of the oil level pump from the cable strand.
- Unscrew pump head screws.
- Remove the pump head.



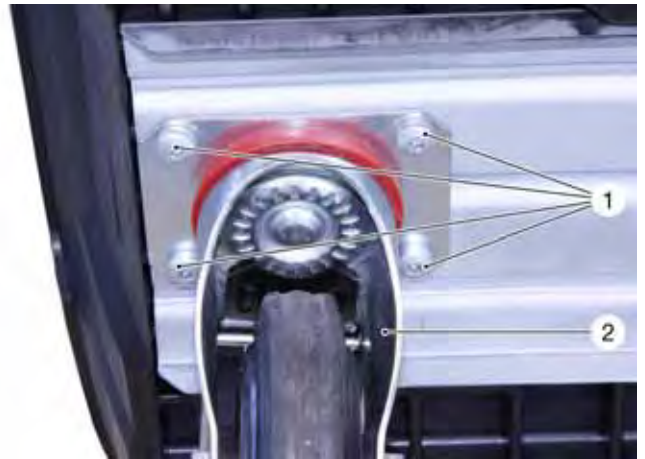
- 1 Water inlet of motor cooling
- 2 Motor

Note

For appliances with air-cooled motors, you must only remove the top air guidance as well as the rear panel of the blower casing to lift the motor out.

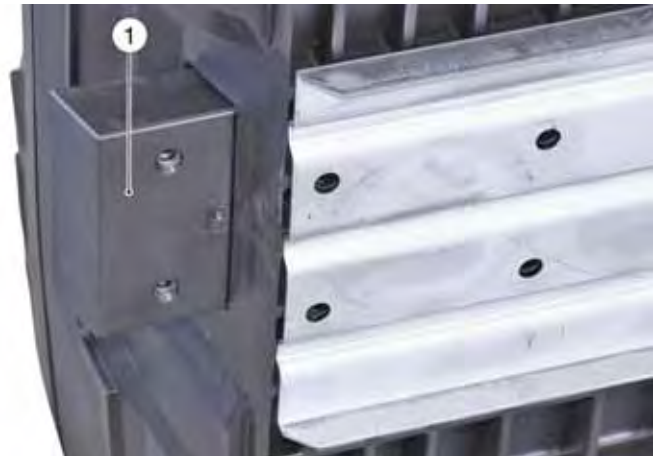
- Remove the rear panel of the blower casing.
- Rotate the top water hose of the motor cooling toward the top and pull it out.
- Tilt the motor.
- Rotate the bottom water hose of the motor cooling and pull it out.
- Replace the engine.

6.12 Replacing the steering roller



- 1 Fastening screws
- 2 Steering roller

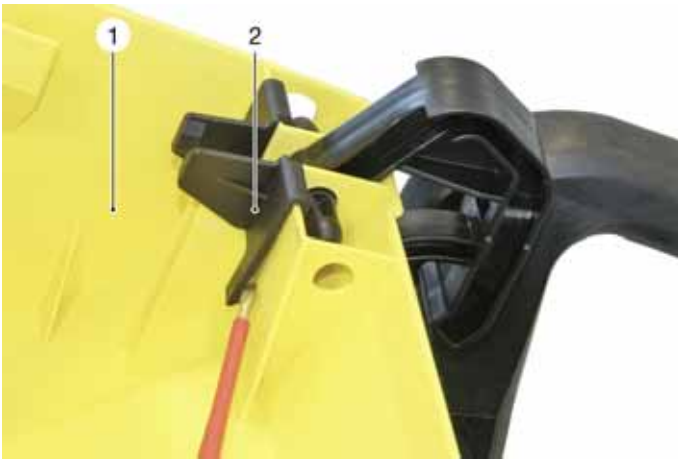
- Unscrew locking screws.
- Replace the steering roller.



- 1 Support block

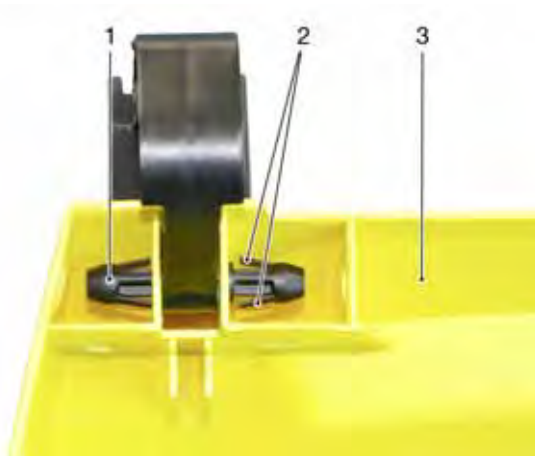
- If the fastening screws cannot be tightened anymore, pull the support block out and check them; replace if necessary.

6.13 Replace hood hinge



- 1 Cover
- 2 Hinge clamp

➔ Unclip the hinge clamp and slide it out toward the top.



- 1 Hinge bolt
- 2 Holding tabs
- 3 Cover

➔ Press the holding tabs of the hinge bolt together with pliers and slide the hinge bolt out toward the side.

6.14 Operating hour counter

For models with control transformer (not HDS 5/12), the hourmeter 6.681-108.0 can be installed later. The hourmeter is suited for 5 to 80 V AC/DC voltage. The connections are fault-proof and the counter cannot be reset.

There is no complete upgrade kit available.



- 1 Electronics system
- 2 Holder, hourmeter
- 3 Operating hour counter

- ➔ Insert the hourmeter into the intended cutout on the electronics box, above the detergent suction filter.
- ➔ Install wire end sleeves or 6.3 mm flat plugs onto both ends of the two-wire cable (approx. 800 mm, 1.5 mm²).
- ➔ Guide the wire through the suitable opening into the electrical box.
- ➔ Connect the hourmeter with cable to the contactor coil A1 and A2 (24 V AC).

7 Troubleshooting

7.1 Troubleshooting without display






Fault	Measure
Unit does not work	<ul style="list-style-type: none"> - No mains power. Check the mains connection. - No control voltage; check/replace fuse on control transformer. - Check/replace the programme switch. - Control piston/pressure screw is stuck; check, grease, replace. - Motor overloaded, overheated; switch the programme switch to "0/OFF", let the appliance cool down; switch appliance on. - The exhaust temperature limiter has been triggered, the heating coil is full of soot and exhaust temperature is too high. Allow appliance to cool down. Remove the soot from the heating coil and readjust the burner if necessary.
Device is not building up pressure	<ul style="list-style-type: none"> - HDS 5/12 only: Nozzle set to "CHEM"; set the nozzle to "High pressure". - Air within the system, ventilate pump. With open hand spray gun, turn the appliance on and off multiple times with the programme switch. Fill/replace external detergent container if empty. Check connections and conduits. - Filter in the water connection or in front of the high pressure pump is dirty, clean filter. - Water supply volume too low, check water supply volume (refer to Specifications). - Not HDS 5/12: Rinse hose of dosing valve attached incorrectly; correct. - Tap closed, open tap. - High and low pressure seals are worn; replace.
Device continuously turns on and off while hand spray gun is open	<ul style="list-style-type: none"> - High pressure nozzle plugged, clean nozzle. - Heating coil calcified, decalcify appliance.
Appliance continuously turns on and off while hand spray gun is closed	<ul style="list-style-type: none"> - Leak in the high pressure system; check the high pressure system and connections for leaks.
Appliance leaks, water drips from the bottom of the appliance.	<ul style="list-style-type: none"> - Pump leaks, safety valve not tight. Note: 3 drops/minute are allowed per piston. - High pressure seals leak; replace.
Appliance is leaking oil	<ul style="list-style-type: none"> - Appliance is losing oil between the pump head and the piston casing; replace the oil seals, check the piston.
Device is not sucking in detergent	<ul style="list-style-type: none"> - HDS 5/12 only: Nozzle set to "High pressure"; set the nozzle to "CHEM". - HDS 5/12 only: Injector dirty or worn; replace injector. - The external detergent container is empty; fill/replace external detergent container. - The filter at the detergent suction hose is dirty; clean filter. - Dosing valve closed; open dosing valve. - The backflow valve is plugged; remove the detergent hose and loosen the backflow valve using a blunt object.


Fault	Measure
Burner does not start	<ul style="list-style-type: none"> - Fuel tank empty; fill fuel. - Fuel filter dirty; change fuel filter. - Fuel solenoid valve is not opening; check, replace coil and control. - Fuel pump does not feed any fuel; check, replace the fuel pump, the rotation direction and the drive parts. - Lack of water; check water connection/supply lines. - Ignition electrodes are dirty or worn; clean or replace the ignition electrodes. - Ignition electrodes are set incorrectly; check, correct the ignition geometry of the ignition electrodes and the fuel nozzle. - Ignition transformer defective; check.

7.2 Troubleshooting with fault display (not HDS 5/12)

Different faults or system status can be displayed via control LEDs.

The LEDs "Service" and "Liquid softener" can display several faults by means of blinking signals.

LED	Activity	Meaning / measure
	LED "Rotation direction" lights up	Motor rotation direction incorrect. The appliance switches off after 3 seconds. Turn off the appliance, rotate the phase converter in the plug by 180°; turn the appliance back on.
	LED "Operation" lights up	The appliance is now ready for operation.
	LED "Fuel" lights up	Fuel tank empty. No hot water operation possible. Refill fuel.
	LED "Service" lights up	Lack of oil. Check/fill oil level of the high pressure pump; repair leaks.
	LED "Service" blinks 1x	Dry run or leak. The appliance switches off after 10 brief startups or 2 minutes of dry run. Check/ensure water supply, check high pressure system for leaks. Switch on/off the appliance again.
	LED "Service" blinks 2x	Fault in the voltage supply or current pickup of the motor too high. The appliance switches off after 1 to 3 seconds. Check the mains connection and mains fuses; check the voltage and current pickup of the motor. Replace motor if necessary.
	LED "Service" blinks 3x	Coiling protection contact open/defective. Appliance switches off. Switch off appliance and let it cool down. If the fault recurs, find the cause and fix the fault. Replace motor if necessary. Switch on/off the appliance again.
	LED "Service" blinks 4x	Exhaust temperature is too high. Appliance switches off. Switch off appliance and let it cool down. If the fault recurs, check the exhaust temperature/exhaust temperature sensor. Perform maintenance on the burner.
	LED "Service" blinks 5x	The reed switch or the solenoid piston of the lack of water fuse is stuck. Appliance switches off. Check the safety block, solenoid piston and sieve/repair the reed switch. Switch on/off the appliance again.
	LED "Service" blinks 4x	Flame sensor reports burner fault. Appliance switches off. Clean and check the burner, ignition, sight glass and fuel system. Switch on/off the appliance again.
	LED "Service" blinks 7x	Defect in RFID electronics. Burner switches off. Check/replace/remove RFID electronics.
	LED "Detergent" lights up	Detergent tank is empty. If the dosing valve is not set to "0", the high pressure pump will suck air and will lose pressure. Set detergent dosing value to "0" or refill detergent.

LED	Activity	Meaning / measure
	LED "Liquid softener" lights up	Liquid softener tank empty or RFID tag to 0. Insert new liquid softener bottle.
	LED "Liquid softener" blinks 1x	Only with RFID system: RFID tag has been on "0" for five hours. Burner shuts off. Insert new liquid softener bottle.

Note

If several faults occur and are displayed on the Service LED at the same time, only the fault that was detected first will be displayed.

After the fault is cleared and the appliance is switched on, the next fault will be displayed.

8 Technical specifications


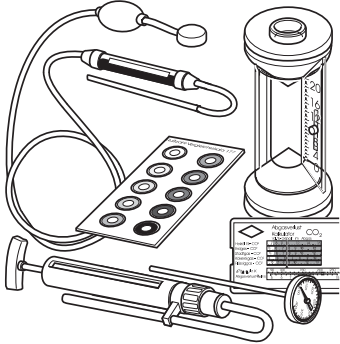
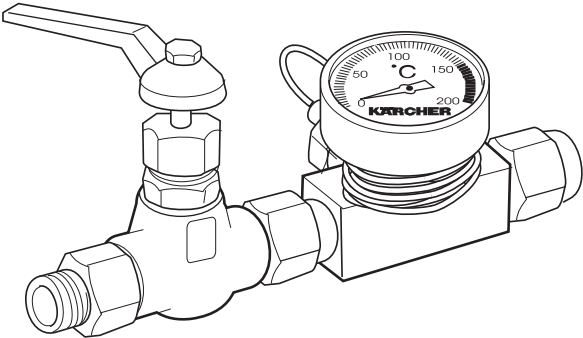
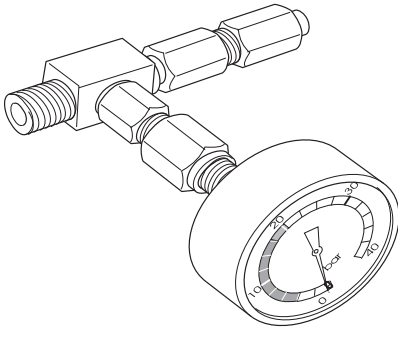
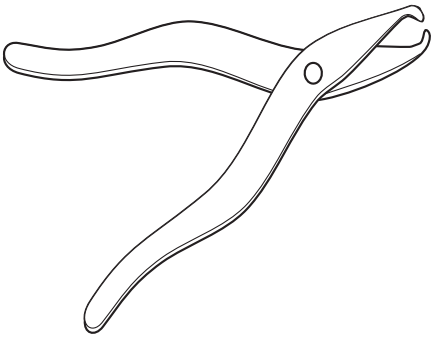
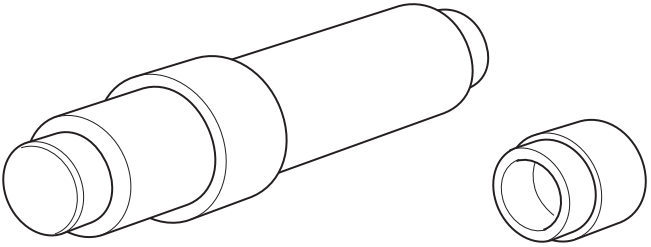
Note

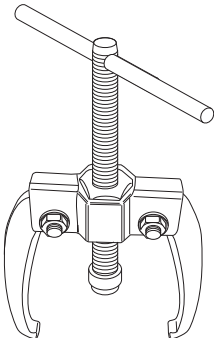
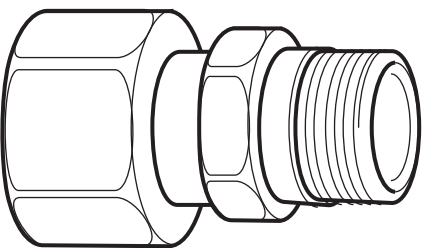

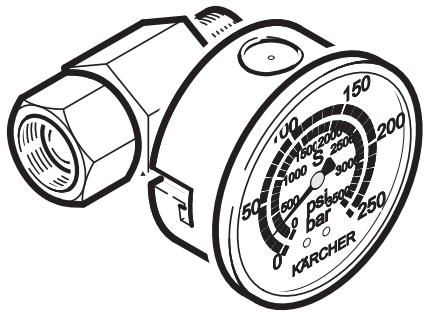
Please observe the most current technical specifications in DISIS.

		HDS 5/ 12	HDS 6/ 14	HDS 6/ 14-4	HDS 7/ 16	HDS 8/17	HDS 8/18- 4
Main Supply							
Voltage	V	230	230	230	400	400	400
Current type	Hz	1~ 50	1~ 50	1~ 50	3~ 50	3~ 50	3~ 50
Connected load	kW	2,5	3,6	3,6	4,7	5,7	6,5
Protection (slow)	A	16	16	16	16	16	16
Maximum allowed net impedance	Ohm	–	0,3710	0,3617	–	0,2638	–
Water connection							
Max. feed temperature	°C	30	30	30	30	30	30
Min. feed volume	l/h (l/min)	650 (10,8)	800 (13,3)	800 (13,3)	900 (15)	1000 (16,7)	1000 (16,7)
Suck height from open container (20 °C)	m	0,5	0,5	0,5	0,5	0,5	0,5
Max. feed pressure	MPa (bar)	1(10)	1 (10)	1 (10)	1 (10)	1 (10)	1 (10)
Performance data							
Water flow rate	l/h (l/min)	250-500 (4,2-8,3)	240-560 (4,0-9,3)	240-560 (4,0-9,3)	270-660 (4,5-11)	290-760 (4,8-12,7)	300-800 (5,0-13,3)
Operating pressure of water (using standard nozzle)	MPa (bar)	3-12 (30-120)	3-14 (30-140)	3-14 (30-140)	3-16 (30-160)	3-17 (30- 170)	3-18 (30- 180)
Max. excess operating pressure (safety valve)	MPa (bar)	?	17 (170)	17 (170)	19,5 (195)	20,5 (205)	21,5 (215)
Steam flow rate	l/h (l/min)	-	240-290 (4-4,8)	240-290 (4-4,8)	270-320 (4,5-5,3)	290-340 (4,8-5,7)	300-350 (5,0-5,8)
Max. operating pressure for working with steam (using steam nozzle)	MPa (bar)	-	3,2 (32)	3,2 (32)	3,2 (32)	3,2 (32)	3,2 (32)
Part no. of steam nozzle	--	-	5.130- 453.0	5.130- 453.0	5.130- 454.0	5.130- 449.0	5.130- 449.0
Max. operating temperature of hot water	°C	98	98	98	98	98	98
Working temperature steam operation	°C	-	155	155	155	155	155
Detergent suck in	l/h (l/min)	0-30 (0- 0,5)	0-33,6 (0-0,56)	0-33,6 (0-0,56)	0-39,6 (0-0,66)	0-45,6 (0- 0,76)	0-48 (0- 0,8)
Burner performance	kW	43	43	43	51	58	61
Maximum consumption of heating oil	kg/h	3,2	3,5	3,5	4,1	4,7	5,0

Max. recoil force of hand spray gun	N	20,1	25,6	25,6	32,4	39,8	41,4
Nozzle size	--	034	034	035	040	042	043
Values determined as per EN 60355-2-79							
Noise emission							
Sound pressure level L_{pA}	dB(A)	74	76	73	77	79	73
Uncertainty K_{pA}	dB(A)	3	3	3	3	3	3
Sound power level L_{WA} + Uncertainty K_{WA}	dB(A)	92	94	91	95	96	90
Hand-arm vibration value							
Hand spraygun	m/s ²	1,3	2,7	7,4	2,6	2,0	3,4
Spray lance	m/s ²	2,4	5,4	5,3	4,2	2,7	3,4
Uncertainty K	m/s ²	0,3	0,3	0,3	0,3	0,3	0,3
Fuel							
Fuel	--	Fuel oil EL or Diesel	Fuel oil EL or Diesel	Fuel oil EL or Diesel	Fuel oil EL or Diesel	Fuel oil EL or Diesel	Fuel oil EL or Diesel
Amount of oil	l	0,35	0,3	0,7	0,3	0,3	0,7
Oil grade	--	0W40	0W40	0W40	SAE 90	SAE 90	SAE 90
Dimensions and weights							
Length x width x height	mm	1060 x 650 x 920	1060 x 650 x 920	1060 x 650 x 920	1060 x 650 x 920	1060 x 650 x 920	1060 x 650 x 920
Weight with accessories, C	kg	100,6	108,1	118,6	118,1	121,1	126,1
Weight with accessories, CX	kg	-	111	121,5	121	124	129
Fuel tank	l	15,5	15,5	15,5	15,5	15,5	15,5
Detergent Tank	l	15,5	15,5	15,5	15,5	15,5	15,5

9 Special tools

			
<p>Electric measuring appliance</p>	<p>6.803-022</p>	<p>Exhaust measuring appliance kit</p>	<p>2.900-001</p>
			
<p>Shut-off valve with thermometer</p>	<p>2.901-030</p>	<p>Pressure gauge, fuel pressure</p>	<p>4.901-060</p>
			
<p>Removal pliers, pressure/suction valves and water sieves</p>	<p>4.901-062</p>	<p>Installation mandrel with sleeve for high pressure/oil seals HDS 5/12, HDS 6/14 (D = 12 mm) additional sleeve HDS 7/16, HDS 8/17 (D = 14 mm) HDS 6/14-4, HDS 8/18-4 (D = 18 mm)</p>	<p>2.901-036 5.901-181 2.901-034 2.901-033</p>

			
<p>Puller tool, blower wheel</p>	<p>6.816-069</p>	<p>Adapter system 2000, M22x1.5 with extended acorn nut.</p>	<p>4.401-072</p>
			
<p>Installation screws, piston guidance (2x M6x110)</p>	<p>7.304-467</p>	<p>Air pressure gauge; we recommend "Testo 510", order no. 0560 0510, hose kit, order no. 0554 0448. More information available at www.testo.com. This air pressure gauge is suitable for measurements on all HDS appliances.</p>	<p>Cannot be ordered from Kärcher. Please purchase externally.</p>
			
<p>Test manometer for working pressure</p>	<p>4.401-072</p>	<p>To remove the oil seals: Inner driver, D = 14.5 to 18.5 mm Inner driver, D = 12 to 16 mm Counter support for inner driver</p>	<p>6.815-013 6.815-023 6.815-009</p>

Information about the air pressure gauge Testo 510

- Differential pressure gauge for pressure measurements in the range between 0 and 100 hPa.
- Temperature compensation
- Air tightness compensation

- Incl. hand sling and belt pouch
- Lit up display
- Selectable units: hPa, mbar, Pa, mmH₂O, mm-Hg, inH₂O, inHg, psi, m/s, fpm
- Operates on 2 AAA batteries
- Hose kit is available as accessory

10 Torques

Tightening torques in Nm

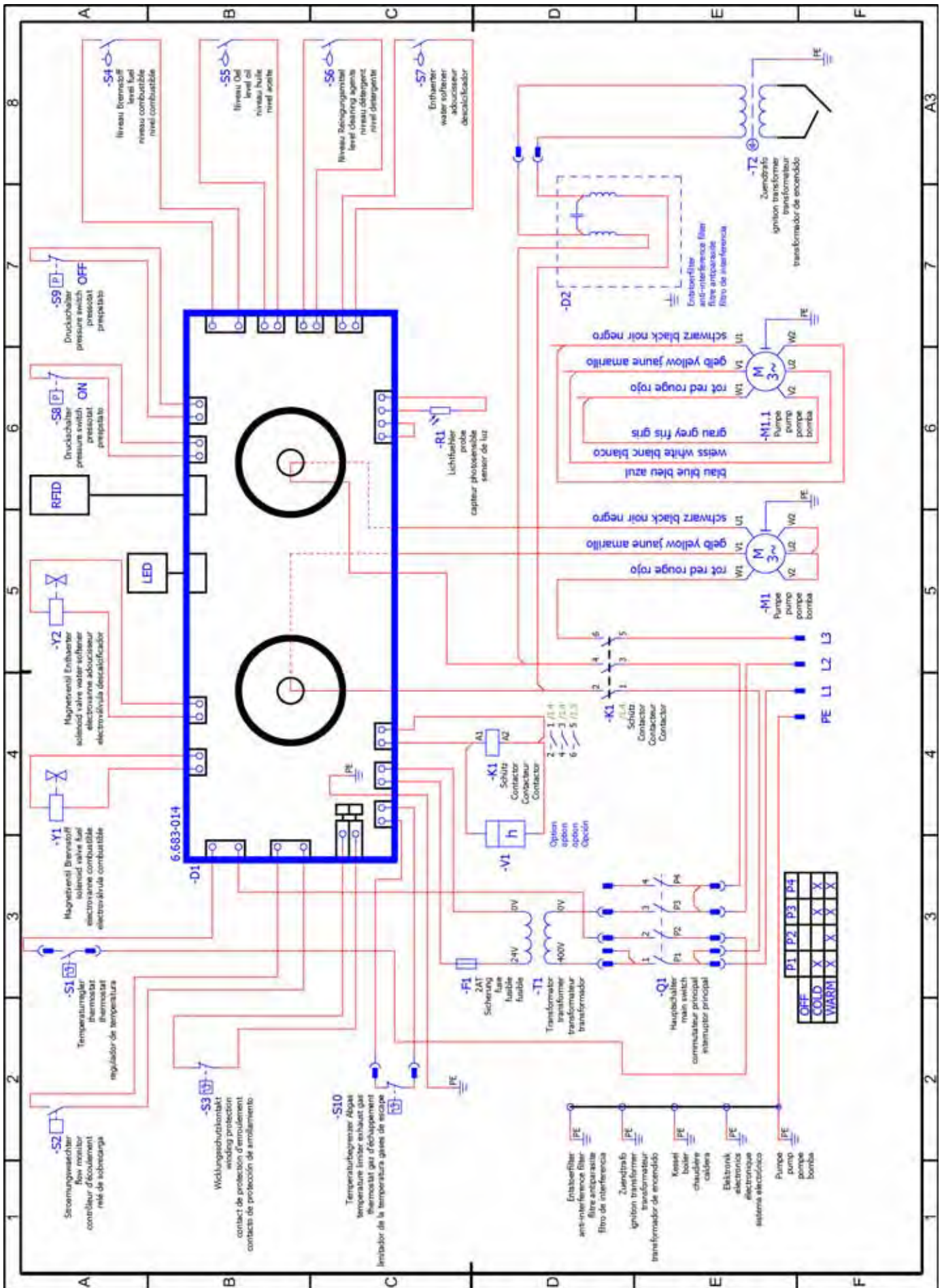
Device	HDS 5/12	HDS 6/14	HPS 6/14-4	HDS 7/16	HDS 8/17	HPS 8/18-4
Pump set						
Pump head	23-27	23-27	50-60	23-27	23-27	50-60
Piston guide	5-7	5-7	5-7	5-7	5-7	5-7
Valve screw	–	–	40-45	–	–	40-45
Suction jumper	7-9	7-9	20-22	7-9	7-9	20-22
Pressure switch	12-15	30-35	30-35	30-35	30-35	30-35
Connection of detergent hose	12-15	30-35	30-35	30-35	30-35	30-35
Valve seat of safety valve	8-10	–	–	–	–	–
Injector	1,5-2,5	–	–	–	–	–
Oil tank	3,5-4	3,5-4	3,5-4	3,5-4	3,5-4	3,5-4
Rear panel of blower casing	2-2,5	2-2,5	5,5-6	2-2,5	2-2,5	5,5-6
Blower lid	0,8-1	0,8-1	0,8-1	0,8-1	0,8-1	0,8-1
Blower wheel	7-8	7-8	7-8	7-8	7-8	7-8
Motor						
Swash plate	12-15	12-15	12-15	12-15	12-15	12-15
Oil drain screw	20-25	20-25	20-25	20-25	20-25	20-25
B bearing	5,5-7	5,5-7	9-10	5,5-7	5,5-7	9-10
Safety block						
Valve seat of safety valve	–	4	4	4	4	4
Stopper	15	15	15	15	15	15
Burner						
Burner cover	2,5-3	2,5-3	2,5-3	2,5-3	2,5-3	2,5-3
Fuel line	8	8	8	8	8	8
Nozzle holder	10-12	10-12	10-12	10-12	10-12	10-12
Burner nozzle	20-22	20-22	20-22	20-22	20-22	20-22
Ignition electrodes	2	2	2	2	2	2
Miscellaneous						
Rotating regulator/gun	40	40	40	40	40	40
Steering roller	8-9	8-9	8-9	8-9	8-9	8-9

11 Circuit diagrams

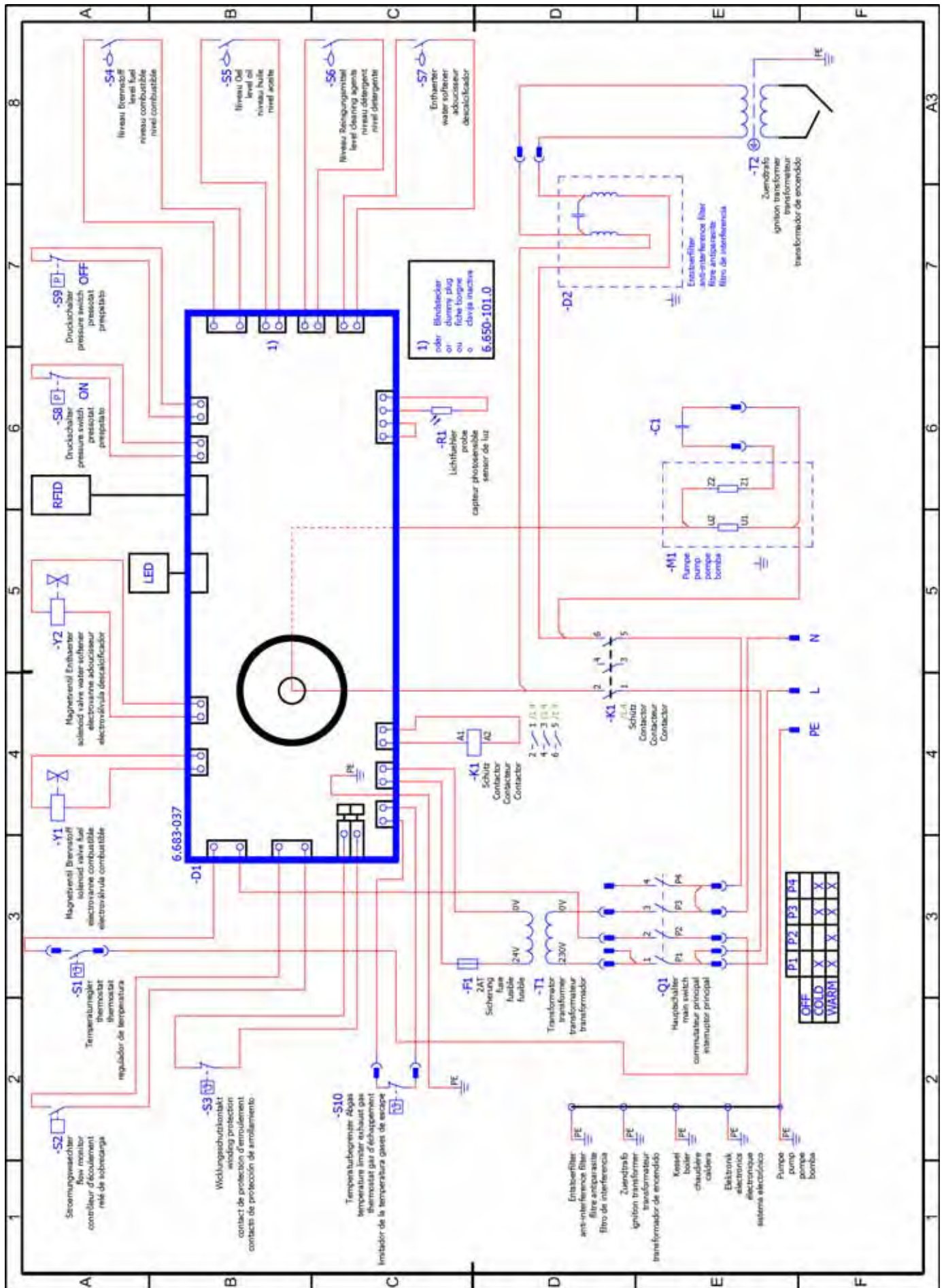
Note

Please observe the most current circuit diagrams in DISIS.

11.1 0.089-282 (3-phase appliances)



11.2 0.089-291 (1-phase appliances)



11.3 0.089-376 (HDS 5/12 - without electronics)

