



Service Manual



WMF 1000 / WMF 1000 Pro

coffee machine

Service Manual for the WMF 1000 / WMF 1000 Pro

1 GENERAL NOTES

1.1 Copyright

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2 SAFETY REGULATIONS

2.1 General

2.1.1 Identification of hazards



Hazard instructions are identified in this manual with the following hazard symbol. Depending on the type of hazard, this may warn of:

- **RISK OF FATAL INJURY** (e.g. from pressure containers or electric shock)
- **RISK OF INJURY** (from scalding, cutting or other mechanical injuries)
- **PROPERTY DAMAGE** (from escaping products, machine parts falling out or falling over, etc.)

These dangers can also result in machine faults, loss of warranty or third-party liability claims. Functional safety flaws of individual components can cause severe accidents.

2.1.2 Training of service technicians

Maintenance personnel

- Persons who are assigned maintenance tasks on the machine must be able to prove that they have been properly trained by the machine manufacturer or its designated and authorised representatives.
- Specifically, they must be familiar with the safety regulations for all maintenance tasks.
- They must have the necessary tools and original spare parts available.

Maintenance regulations

- All maintenance tasks must be carried out according to the manufacturer's current maintenance regulations.
- Everyone that is assigned to maintenance tasks is personally responsible for staying up to date with the current version of these maintenance regulations.

2.1.3 Intended use

The intended use of the device and associated options are subject to the contractually agreed intended use and any existing supplementary agreements, the "General terms and conditions" of WMF Aktiengesellschaft and this Owner's Manual. In legal terms, any other use is not an intended use. The manufacturer accepts no liability for damage resulting from unintended use.

2.1.4 Safety devices

The coffee machine is equipped with all necessary safety devices required for operation according to its intended use.

2.1.5 General safety regulations



The safety regulations are to be applied according to the specific procedure or maintenance task being carried out. Always apply the safety regulations that offer maximum protection from injury and property damage. This is particularly true when it is necessary to carry out tests or measurements on the uncovered machine while it is operating. Only instructed persons may carry out any work on the electrical components while these are live, or on hydraulic systems while these are under pressure.

Do not begin the maintenance tasks until all safety precautions have been taken.

Scalding and burns

Hydraulic water systems in automatic beverage dispensers can contain hot liquids (water, milk, etc.). Some of the components and dispensed products are also hot. If these systems come apart spontaneously or these components or beverages are touched, severe injuries from scalding or burns or property damage can result.

- Therefore, do not separate pipes and vessels unless you have first depressurised and/or deaerated the system. Wear suitable safety gear (glasses/gloves, etc.) when carrying out this kind of work.
- When carrying out maintenance tasks on the device or the interior of the device, make sure not to burn or scald yourself.
- Allow the machine to cool off before you begin the maintenance tasks.

Pressure containers

Hydraulic systems in automatic beverage dispensers can be pressurised. If these systems come apart spontaneously, severe injuries or property damage from explosively escaping fluids or flying parts can result.

Observe the following whenever you work on pressure vessels (including pipes and threaded connections):

- Never open pressurised containers.
- Use appropriate measures (relieving pressure, dispensing products, etc.) to ensure that these systems are depressurised before the maintenance tasks.

- Therefore, do not separate pipes and vessels unless you have first depressurised and/or deaerated the system. Wear suitable safety gear (glasses/gloves, etc.) when carrying out this kind of work.

Spare parts

- For all maintenance tasks, use only original spare parts from the machine manufacturer.
- Do not make any unauthorised modifications (improvisations) to the machine, especially not to the safety-related parts. Modifications to safety-related parts can cause accidents with a risk of fatal or severe injury.
- Using unsuitable spare parts can result in loss of warranty.

Cutting injuries

- The sharp edges of the sheet metal frame parts can cause injuries. Wear suitable clothing and work gloves.
- Never reach into the bean hopper or the grinder disks of the grinder. The sharpened grinder disks can cause severe injuries.

Screw connections

- Many screw connections can fulfil their function reliably only if the screws are tightened to the prescribed torques. Therefore, always observe the specified torques.
- Use suitable, tested torque tools and have them tested at the prescribed intervals.

Sealing materials

- The sealing materials of the threaded connections can contact beverages or beverage ingredients. Unsuitable sealing materials can harm foodstuffs or can be destroyed by beverage contents or raw materials.
- Therefore, use only sealing materials approved for use in the food processing industry. Follow the recommendations in the product documentation from the corresponding manufacturer.

Corrosion resistance of materials

- When different metals contact each other, they can electrochemically decompose from the effects of the ingredients of certain liquids. This corrosion is usually invisible and can cause unexpected holes or leaks or cause pressure vessels to burst. This, in turn, can cause severe injury or property damage.
- Therefore, for all maintenance tasks, use only materials that are suitable for the specific systems. Follow the corresponding installation regulations when using different types of metals.

2.2 Electrical engineering regulations

2.2.1 General



RISK OF FATAL INJURY

Whenever work is carried out on electrical equipment, a risk of fatal injury from electric shock exists if live electrical parts are touched. Contact with live parts can be hazardous, even at low voltages. Only authorised technicians may carry out this work.

2.2.2 Testing electrical circuits

Follow these rules whenever you carry out any maintenance tasks:

Testing circuits when de-energised

Whenever possible, test the circuits while they are de-energised. De-energise the machine by following these steps:

1. Unplug the power plug.
2. Secure the machine from being switched on again (lockout/tagout).
3. Verify that the machine is de-energised (check at all poles; consider any linked systems that may be outside energy sources).

Testing while energised (in exceptional cases only!)

If it is necessary to test the machine while it is energised, follow these rules:

1. Use tools with insulated and voltage-tested handles only.
2. Use covers, panels or other suitable means to eliminate the possibility of accidentally touching live parts.
3. Ensure that the location is insulated and always wear voltage-tested gloves.
4. Do not carry out these tests by yourself; rather, ensure that another person is present who is skilled in first aid for electrical accidents and can take action quickly in the event of an emergency.

- Do not bypass any safety elements (device fuses, safety thermostats, etc.)
- Fuses protect the connected devices from excessive voltage in case of overload or short circuit. If the fuse ratings are too high, malfunctions can cause property damage to the machine or cause fire. Therefore, replace fuses with fuses of the same rating only.
- When testing electrical circuits, take the circuit engineering of the respective components into account. In particular, transistorised consumers must be tested according to the semiconductor components. Incorrect measurements can cause defects of the semiconductors.

2.3 Sanitary regulations

Internationally, food safety guidelines are defined in the HACCPs (HACCP= Hazard Analysis and Critical Control Point). Many countries observe national sanitary regulations in addition to the HACCPs.

The coffee machine must always be operated in accordance with the HACCPs and the national and industry-specific sanitary regulations.

2.3.1 Food regulations (milk)

- Do not use unpasteurised or raw milk. Only use pasteurised milk or UHT milk! In all cases, the milk must be homogenised!
- The milk must not be used if it has already been warmed or its shelf life has expired.
- When using cartoned milk, we recommend using the milk directly from the original package for sanitary reasons.
- The milk must have a temperature of approx. 3°C to 5°C. If this temperature cannot be kept, an optimal product cannot be dispensed.

2.3.2 Using cleaning agents

In certain quantities, cleaning agents are hazardous to health. When the machine is cleaned, these cleaning agents come into contact with many components of the beverage preparation system. Residues from these cleaning agents can diminish product quality and cause injuries. Whenever you carry out cleaning tasks, ensure that no subsequent contamination of foodstuffs is possible.

- Use only the cleaning and descaling agents recommended by the manufacturer.
- Follow the prescribed cleaning processes exactly (refer to the Owner's Manual and brief cleaning manual).
- Thoroughly rinse all areas to ensure that no cleaning agent residues are left in the systems.
- Have organisational measures in place to ensure that cleaning agents and foodstuffs are stored separately. Ensure that the containers are labelled in a clear, unmistakable manner, including the prescribed warnings.

2.3.3 Using lubricants

- Machine lubricants can contain substances that are hazardous to humans and animals and can cause symptoms of poisoning or paralysis or otherwise harm health.
- Therefore, use of these substances in coffee machines is permitted only where they do not come into direct contact with foodstuffs or drinking water.
- Always consult the currently valid maintenance regulations to find out which types of lubricants may be used where.
- Label lubricant containers in order to prevent mixups.
- Work neatly in order to ensure that lubricants cannot undetectedly contact foodstuffs, either directly or indirectly.

2.4 Regulations for components

2.4.1 Vibration pump

- The vibration pump contains parts that are sensitive to impact and pressure and can be damaged by improper handling.
- Therefore, you have to cushion the vibration pump during transport. It must not be exposed to any shock or impact or be dropped or tensioned in any way (vise, clamps, etc.). Take care never to expose the vibration pump to below-freezing temperatures, as this will cause irreparable damage to the pump.

2.4.2 Brew unit

If damaged, cylinder walls and pistons no longer function reliably. Therefore, work very carefully during assembly/disassembly, making sure not to leave any scratch marks on these parts.

2.4.3 Grinder

- Adjust the grinding degree only while the grinder is running.

2.4.4 Valves

- The valves have a defined direction of flow. If they are installed incorrectly, malfunctions of the water system or accidents with a risk of severe or fatal injury will result. The flow direction is indicated by arrows or by the numbering of the connections.



Safety valves can fulfil their safety function only if they are installed in the correct direction of flow. Incorrectly installed valves can cause an unacceptable pressure rise, which in turn can cause the hot water boiler or steam boiler to burst. This can cause potentially fatal injuries and/or property damage. When installing a safety valve, make sure to install it in the correct direction. It is not permitted to disassemble, descale and reassemble safety valves. Non-return valves have only one flow direction. Installing them counter to the flow direction will result in malfunctions in the water system. When installing a valve, make sure to install it in the correct direction.

- Therefore, always observe the correct installation direction for all valves.

2.4.5 PC board

- The PC board functions properly only if the yellow/green earthing cable (PE conductor) is connected correctly. Therefore, when replacing the PC board, make sure to connect the yellow/green earthing cable (PE conductor) to the plug-in strip on the cover plate.
- Static discharges can destroy printed circuit boards (PCBs). Therefore, when handling PCBs, make sure that you do not acquire a static charge, and store sensitive components only in ESD (= antistatic) packaging (refer to section [4.3.26.1 ESD \(electrostatic discharge\) protection](#) on page 4-28)
- Replacing the EEPROM module: ensure that the connecting legs are in a row and that the notches of the housing match those of the socket.

2.4.6 Safety thermostats



The safety thermostats can fulfil their purpose only if they are installed correctly and the connectors are not deformed. If the safety thermostats are installed incorrectly or have bent connectors, they will function incorrectly or not at all and thus cannot shut off the electrical circuits. This results in a risk of bursting of the hot water boiler or the steam boiler. Observe the following points during installation:

- Heat must be conducted properly from the hot water boiler / steam boiler to the safety thermostat. All contact surfaces between the flow water heater / steam boiler, contact sleeve and safety thermostat, as well as the stud bolts of the safety thermostat, must be coated with sufficient thermally conductive paste.
- The flat pin connectors must not be bent during or after installation or subjected to any kind of mechanical stress.

- After a safety thermostat is activated, the temperature sensor must be checked.

2.4.7 Level probe

- Level probes exist with different lengths. A level probe with the wrong length can cause malfunction of the steam boiler.
- Use only level probes with the correct length for the steam boiler.

2.4.8 Hot water boiler / steam boiler

- The hot water boiler and the steam boiler are pressure containers and are tested as a complete unit after manufacture.

3 MAINTENANCE REGULATIONS

3.1 Service intervals of the WMF 1000 and WMF 1000 Pro coffee machine

The definitions of the service tasks are based on an annual output of 10,000 cups (maximum 50 cups/day)

2.1 – 2.17 =
Inspection

R1 = Replace (time)
R2 = Replace (cycles)

R1 = Replace after this amount of time

R2 = Replace after this number of brew cycles

(A) = Safety-related parts

(see item 3.1)

No. 2.1 - 2.17 = Checklist numbers

(see item 2.1)

Part designation	WMF article No.	10,000 12 months	20,000 24 months	30,000 36 months	40,000 48 months	50,000 60 months	60'000 72 months
Hot water boiler 230V (A) For additional voltages, see spare parts catalogue	33.7006.2300	2.1	2.1	2.1	2.1	2.1	R1
Safety valve 16 bar (A)	33.7006.2126	2.2	R1	2.2	R1	2.2	R1
Solenoid valve, brass 2/ 2.5 24VDC	33.7006.2101	2.3	2.3	R2	2.3	2.3	R2
Steam boiler 230V (A) For additional voltages, see spare parts catalogue	33.7006.2350	2.1	2.1	2.1	2.1	2.1	R1
Safety valve 16 bar (A)	33.7006.2126	2.2	R1	2.2	R1	2.2	R1
Solenoid valve, brass 2/ 2.5 24VDC	33.7006.2101	2.3	2.3	R2	2.3	2.3	R2
Steam boiler level probe	33.7006.2360	2.4	2.4	2.4	2.4	2.4	R1
Brew unit	33.7006.2675	2.5	2.5	2.5	2.5	2.5	R2
Inlet piston	33.7006.2316	2.5	2.5	R2	2.5	2.5	
Outlet plunger	33.7006.2310	2.5	2.5	R2	2.5	2.5	
Brew unit tube connection	33.7006.2606	R2	R2	R2	R2	R2	
O-ring set for brew unit	33.7006.2169	R2	R2	R2	R2	R2	R2
Drive motor	33.7006.2609	2.6	2.6	2.6	2.6	2.6	R2
Flow meter (machine with water tank) Flow meter (machine with fixed water connection)	33.7006.2155 33.7006.2788	2.7	2.7	2.7	2.7	2.7	R1
Solenoid valve, stainless steel 2/ 2.5 24VDC	33.7006.2125	2.3	2.3	R2	2.3	2.3	R2
Vibration pump	33.7006.2160	2.8	R2	2.8	R2	2.8	R2
Solenoid valve, brass 2/ 2.5 24VDC	33.7006.2765	2.3	R2	2.3	R2	2.3	R2
Solenoid valve, brass 2/ 2.5 24VDC	33.7006.2765	2.3	R2	2.3	R2	2.3	R2
Grinder motor	33.7006.2400	2.9	2.9	2.9	2.9	2.9	R2
Grinder disk set, 2 holes Grinder disk set, 3 holes	33.7006.5007 33.7007.1344	2.10	2.10	2.10	2.10	2.10	R2
Water tank filter	33.7006.2608	2.11	2.11	R1	2.11	2.11	R1
O-ring tank stamp	33.7006.2764	R1	R1	R1	R1	R1	R1
All-in-one spout	33.7007.1272	2.12	R1	2.12	R1	2.12	R1
O-ring, All-in-one spout	33.7006.2395	R1		R1		R1	
All-in-one Pro spout	33.2810.0000	2.12	R1	2.12	R1	2.12	R1
O-ring, All-in-one Pro spout	33.1580.3000	R1		R1		R1	
Hose, pump/ hot water boiler	33.7006.2144	2.13					R1
Hose, hot water boiler / T-piece	33.7006.2138						
Hose, T-piece/T-piece	33.7006.2141						
Hose, T-piece/brew valve	33.7006.2135						
Hose, T-piece/brew unit	33.7006.2142						
Hose, brew unit - coffee spout	33.7006.2145						
Hose, T-piece - drain valve	33.7006.2143						
hose, drain valve - drip tray	33.7006.2137						
Hose, steam boiler feeding valve – steam boiler	33.7006.2139						
Hose, hot water boiler - safety valve	33.7006.2135						
Hose, T-piece - hot water valve	33.7006.2136						
Hose, steam boiler – safety valve	33.7006.2136						
Hose, T-piece - steam valve	33.7007.1154						
Hose, hot water valve – hot water drain	33.7006.2135						

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3.2 Supplement to maintenance regulations 2.1 – 2.17

- 2.1 Check the interior and exterior of the hot water boiler and the steam boiler for limescale. Check the threaded connections and seals for leaks; the threaded connection is tightened with a torque of **2.2 Nm**.
- 2.2 Visually check for leaks, scale build-up and opening pressure.
- 2.3 Visually check for leaks, soiling, limescale and the condition of the seals.
- 2.4 Visually check for leaks and the function of the level probe.
- 2.5 Clean the brew unit, replace the piston O-rings and apply a light coat of food-grade grease ~~33.7006.7399~~; check the inlet and outlet pistons. Check the rotating connection unit for leaks, replace the O-rings and apply a light coat of food-grade grease ~~33.7006.7399~~. Check the brew unit for freedom of movement, proper function and leaks.
- 2.6 Check the function of the motor and its secure fit in the slide.
- 2.7 Clean the flow meter and check the nozzle and impeller.
- 2.8 Check the pump for proper function, leaks, noise and its position in the mounting. The pump must build up a pressure of 8-12 bars.
- 2.9 Check the motor for proper function and the empty message (see service manual).
- 2.10 Check the grinding degree and grind quantity (see service manual). Check block inhibiting wire in the powder outlet and the powder outlet position.
- 2.11 Clean or replace the water tank filter. Descale the water tank if necessary. Check the function of the float switch and reed contact.
- 2.12 Clean the all-in-one spout, replace the O-rings and check its function.
- 2.13 After removing one Teflon line, check the hose at the plug connection for damage and shorten it by 10mm or replace it if necessary.
- 2.14 During each service, any components not listed in chapter 1, "Maintenance regulations" must be checked and replaced if necessary.
- 2.15 If the parts are extremely calcified, it is mandatory to check the lime content of the water and take the appropriate measures.
- 2.16 You can modify the parameters on the machine and view them on the display. Programming can be carried out using the PC.
- 2.17 The exact time for descaling is determined by the water hardness, water throughput and whether or not a water filter is used. The WMF 1000 calculates this time and displays the corresponding prompt. (We recommend using a water filter if the water hardness is equal to or greater than 5°KH.)
You can change the descaling request in the PC programming.

After the service, the following parameters must be checked and readjusted if necessary:

Pump pressure	8 - 12 bars
Coffee discharge temperature	82 - 84°C
Milk beverage temperature	65°C
Grind quality	Grain size
Grind quantity for one cup of coffee	8 - 9 g.
The cup volume in the cup	Water and milk

The machine should be **thoroughly cleaned** and in optimum condition when handed over to the customer.

If the job can only be carried out at a later date, the customer must be informed and this must be noted on the service report.

3.3 Safety-related parts A

- 3.1 The hot water and steam elements have to be replaced every 72 months.
- 3.2 For safety reasons, the safety valve 33.7006.2126 has to be replaced every 24 months.
- 3.3 If a part is defective and can no longer be repaired, this part must be replaced.
Components relevant to safety such as the hot water boiler, the steam boiler and the safety valve must not be repaired (always replaced).

3.4 Prerequisite

WMF Aktiengesellschaft certifies that the **WMF 1000 / WMF 1000 Pro** compact coffee machine is suitable for use in small foodservice operations and, if the following prerequisites are met, can dispense a maximum of **50 coffee** beverages per day over a period of **72 months** after initial commissioning.

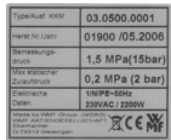
- 4.1 The coffee machine must be operated with drinking water. The exact time for descaling is determined by the water hardness, water throughput and whether or not a water filter is used. (We recommend using a water filter if the water hardness is equal to or greater than 5°KH.)
- 4.2 The water must be free of dirt and the chlorine content must not exceed 100mg/l.
- 4.3 The voltage may not exceed the tolerance of +/- 5%. The machines are to be used according to country-specific voltages.
- 4.4 The unit must be cleaned in accordance with the operating instructions or the quick reference card which are supplied. When cleaning, make sure that the cleaning products recommended by the manufacturer are used. The operating personnel have to be trained accordingly.
- 4.5 Maintenance must be carried out after a maximum of 10,000 dispensed coffee beverages or every 12 months. All necessary repairs and part exchanges must be carried out.
- 4.6 The local after-sales service must be fully trained and has to have the necessary spare parts and tools to carry out repairs.

3.5 Failure to comply with the maintenance regulations

- 5.1 WMF Aktiengesellschaft shall not be liable for any damages or losses, either for its contractual partner or for any third party, resulting from non-compliance with these maintenance regulations.
- 5.2 The most current version of the maintenance regulations is valid. The contractual partner of WMF Aktiengesellschaft shall follow them immediately after receipt of a new version and impose them on all employees, representatives, partners, purchasers, etc. The contractual partner accepts full responsibility for observing the regulations. The contractual partner shall hold WMF Aktiengesellschaft free and harmless from all claims of loss or liability, for direct or indirect damages (including costs for representatives) resulting out of the violation of these terms.

4 FUNCTION DESCRIPTION

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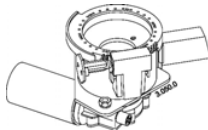
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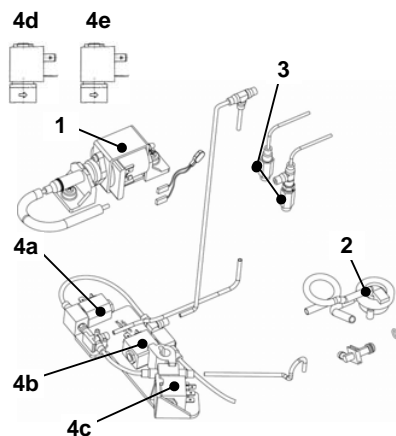
Control panel	4.3.6	4-7
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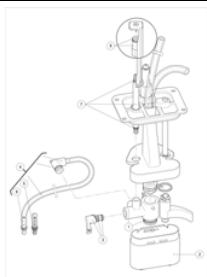
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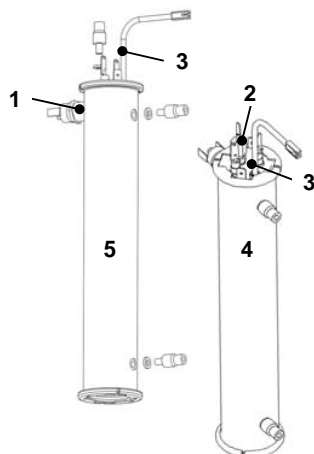
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4b	Steam boiler feeding valve		
4c	Flush valve		
4d	Steam valve		
4e	Hot water valve		



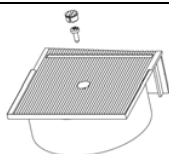
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4.2 Connections

4.2.1 General

The connections to the supply and drainage systems vary according to the machine configuration and the options that are in place. However, they must always be carried out according to applicable local regulations for the respective supply and drainage systems.


4.2.2 Serial number

The serial number appears on the serial plate.

4.2.3 Serial plate

Each machine has a serial plate that is attached to the left side of the centre console, close to the ground coffee hopper.

The serial plate contains important data that are necessary for connecting and maintaining the machine (service, repairs, and spare parts).

Type/Ausf. KKM	03.0500.0001
Herst.Nr./Jahr	01900 /05.2006
Bemessungsdruck	1,5 MPa(15bar)
Max statischer Zulaufdruck	0,2 MPa (2 bar)
Elektrische Daten	1N/PE-50Hz 230VAC / 2200W
<small>Made by WMF GmbH (MERZ) WMF AKTIENGESELLSCHAFT Edmundstr. 6279312 Weilheim</small> 	

Example

The main circuit breaker is the interface between the machine and the customer's on-site installation. This can take the form of a gang switch, power switch, residual current operated device or plug-in device. They must ensure shutoff at all poles and must be installed by authorised technicians in accordance with local regulations.

Connection values

Voltage + 6% - 10% Frequency	Connection value	Pre-fuse	Cable
230 VAC 50 Hz	2.2 kW	10 A	3x1.5 mm ²
Length of the connecting cable: 1.0m			
Other specifications available on request.			

4.2.4 Water specifications

If the data do not meet these specifications, measures must be put in place (water softener, dechlorination device etc.) to ensure that they are met. Refer the instructions in the user manual. Follow local codes and regulations.

For proper operation of the coffee machine and optimum coffee quality, the drinking water should have a water hardness between 0 and 4° carbonate hardness (kH). If the water hardness is 5° kH or above, a water filter should be used.

You can use a carbonate hardness test to determine the water hardness.

For more information about filters and the carbonate hardness test, refer to the user manual.

4.2.5 Power supply connection



RISK OF FATAL INJURY

Whenever work is carried out on electrical equipment, a risk of fatal injury from electric shock exists if live electrical parts are touched. Contact with live parts can be hazardous, even at low voltages. Only authorised technicians may carry out this work.

4.2.6 Limescale

In addition to trace amounts of minerals, tap water often contains a substantial proportion of bicarbonates. According to this proportion, the water is called either "soft" or "hard". When the water is heated, these bicarbonates form limescale deposits—particularly in the hot water boiler, in the steam boiler, and in the pipes and valves. The limescale deposits lead to poor energy transmission and thus cause increased energy consumption, hardening of seals and decreased service life of components. Often, in addition to the fixed deposits, there are also free or broken-off limescale particles in the water. These loose limescale particles in particular can cause a wide variety of problems (reduced pipe cross-sections, clogged valve seats, restrictors and filters, etc.)

Brewing high-quality coffee requires a certain calcium content in the water. If the calcium content is insufficient, the aroma of the coffee cannot fully develop, the brewing time becomes longer and the milk clouds in the coffee; the crema is flat and unstable.

However, the limescale problem cannot be solved by removing all limescale from the water using water softener systems. It is equally undesirable if water treatment systems give the water a pH value that is too high (alkaline) or too low (acidic). These properties cause increased corrosion of pipes and thus a higher risk of leaks.

Therefore, a service technician must always be aware of the latent hazards and problems caused by limescale deposits and limescale damage.

During maintenance tasks, components with limescale build-up can be dealt with in either of two ways:

1. Replace them. It is mandatory to replace certain components when they develop excessive limescale build-up. For others, the effort required to descale them is not worthwhile, or their function after being descaled is doubtful.
2. Descaling. The system as a whole is descaled; the table applies for individual parts.

Part reference	Part number	Clean	Replace
Level probe	33.7006.2360	x	
Flow meter	33.7007.1086	x	x *
* Replace if the part has excessive limescale build-up			

Descaling must be carried out using the descaling agent recommended by WMF. Follow the instructions on the containers. After descaling, rinse the treated components thoroughly.

If you find exceptionally large limescale deposits in the components, you will need to conduct a water hardness test and, depending on the results and in consultation with the customer, take action to minimise these deposits.

4.3 Components

4.3.1 General

This section describes all components that are used for multiple systems or are used in a similar form in various systems for dispensing products. These descriptions provide the basis for understanding the system descriptions. Only by understanding how individual components function and many components work together are you able to adjust and maintain a machine so that it dispenses the highest quality products.

4.3.2 Programming

The PC board monitors the operating performance of many components.

Information about the operating status is gathered using sensors (e.g. limit switches). In addition, typical parameters (e.g. currents/times) are measured and evaluated by the PC board.

The switching thresholds of these electrical parameters can be changed via the machine programming.

Time	in seconds
Temperature	in °C
Volume	converted into ml (can vary slightly)
Current	in numbers (between 0 and 255)
	Value 255 = 9.27 A
	Value 50 = 1.81 A (example: default current setting "no beans")

4.3.3 ESD (electrostatic discharge) protection

Electronic components can be damaged by static discharge. Therefore, all components of this type must be protected from static charges using suitable means. Therefore, observe all regulations for preventing and dissipating static charges. (Refer to section [2.4.5 PC board](#) on page [2-4](#) and [4.3.26.1 ESD \(electrostatic discharge\) protection](#) on page [4-28](#)).

4.3.4 Lubricants

Some components must be lubricated during maintenance work. Various lubricants are available for this purpose. They must be used according to the maintenance regulations and the maintenance instructions, both in terms of quality (type of grease) and quantity (volume).



RISK OF INJURY

Machine lubricants can contain substances that are hazardous to humans and animals and can cause symptoms of poisoning or paralysis or otherwise harm health. Therefore, use of these substances in coffee machines is permitted only where they do not come into direct contact with foodstuffs or drinking water.

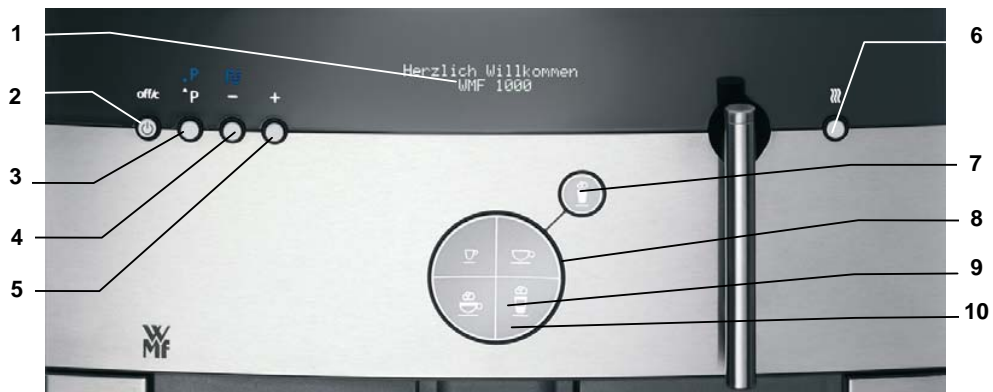
- Always consult the currently valid maintenance regulations to find out which types of lubricants may be used where.
- Label lubricant containers in order to prevent mixups.
- Work neatly in order to ensure that lubricants cannot undetectedly contact foodstuffs, either directly or indirectly.
- Food-grade greases have a limited storage life; observe the expiration date on the packages and containers.

4.3.5 Overview of machine



- | | | | |
|---|---|----|---------------------------------------|
| 1 | Bean hopper | 10 | Drip tray with level-indicator |
| 2 | Manual insert | 11 | Brew unit cover |
| 3 | Display | 12 | Heated cup storage |
| 4 | Off / c button / timer | 13 | Hot water button |
| 5 | Grinding degree setting | 14 | Hot water spout |
| 6 | Beverage buttons | 15 | Milk button / milk foam button |
| 7 | Coffee grounds container | 16 | Adjustment lever for all-in-one spout |
| 8 | Milk lever (toggles between milk / milk foam) | 17 | Water tank |
| 9 | Drip tray grid | 18 | All-in-one spout |

4.3.6 Control panel



- | | | | |
|---|---|----|--------------------------------------|
| 1 | Display | 6 | Hot water button |
| 2 | Off / c button / timer | 7 | Milk button / milk foam button |
| 3 | P button / confirmation | 8 | Readiness display |
| 4 | Minus button / care button / aroma button | 9 | Display of selected beverage buttons |
| 5 | Plus button / aroma button | 10 | Beverage buttons |

4.3.7 Grinder

In the grinder, the coffee beans are ground into coffee powder by a three-stage grinder. The process of grinding the coffee beans converts a great deal of mechanical energy into heat (friction). The components of the grinder heat up and, during "continuous operation," this heat is transferred to the coffee powder. Excessive heating can have a negative effect on the quality of the coffee. Therefore, it is very important that the grinder disks are in very good condition at all times and that, as a result, the beans break efficiently rather than being abraded into small pieces.

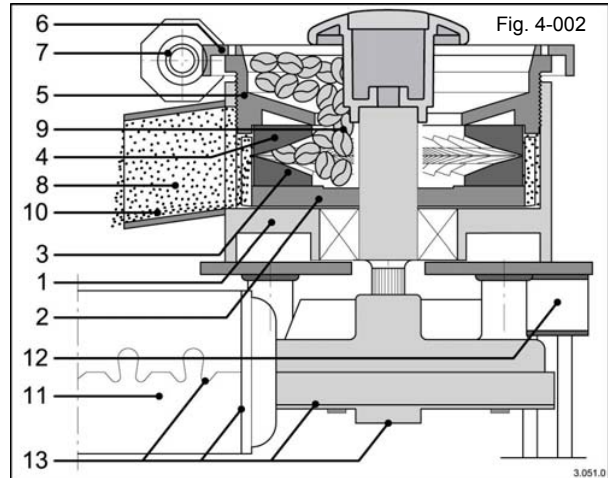
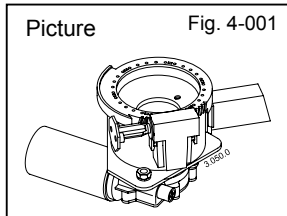
Function description

The two grinder disks are installed horizontally. The lower grinder disk is seated on a star shaft on the base of the grinder housing and is driven by the motor via a worm gear. The upper grinder disk is mounted so that it is axially adjustable using a threaded bushing and does not rotate.

The gap between the two grinder disks can be adjusted with great precision via the axial adjustment of the two grinder disks. This gap determines the grain size of the coffee powder, known as the grinding degree.

The grinding degree (grinder disk distance) can be adjusted manually using a worm shaft that engages at every quarter turn and thus is protected from loosening (moving) on its own. The powder is discharged into the powder outlet through four cams that are installed equidistant along the circumference of the star shaft. A wire at the end of the powder outlet ensures that the coffee powder falls into the powder inlet of the brew unit.

The operating status of the grinder is controlled by the PC board via the motor current. Grinder empty, bean hopper empty (= low grinding resistance) or foreign objects in the grinder (very high grinding resistance) etc. affect the current consumption of the motor, are detected and the grinder is switched off. A corresponding error message appears in the display.



Grinder

1. Grinder housing
2. Star shaft
3. Lower grinder disk
4. Upper grinder disk
5. Adjusting ring
6. Grinding degree disc (adjustment scale)
7. Worm shaft
8. Powder outlet
9. Coffee beans
10. Coffee powder
11. Motor / gearbox
12. Rubber/metal buffer
13. Visual check during service

Technical data

Supply voltage rating:	24 V DC
Operating voltage:	30-36 V DC
Operating current:	5-6 A
No-load current:	1-1.5 A
Current when "Bean hopper empty":	< 1.5 A (corresponds to value 3 in the programming)
Current when "Grinder blocked":	> 5.56 A over 750 ms > 7.20 A over 150 ms

4.3.7.1 Grinding degree setting

The grinder is factory-set to an optimal value (medium grind) that is suitable for most varieties of coffee beans. However, you can adjust the grinding degree according to your individual preference.

Caution:

The grinding degree may be adjusted only while the grinder is operating.

Use the multi-tool setting knob. The opening for setting the grinding degree is in the left side wall of the device. Initiate coffee dispensing and wait until the grinder starts up. Set the desired grinding degree during the grinding process. Do not move adjust it by than one complete turn per grinding operation.

Finer grinding degree = Rotate clockwise
Coarser grinding degree = Rotate anticlockwise

The coarser the grinding degree, the shorter the brewing time.

The finer the grinding degree, the longer the brewing time.

Adjustments after changing the grinder disks:

- Rotate the grinder disks towards one another until the star shaft cannot be turned any more.
- Set the grinding degree disk and the shaft bearing, along with the worm shaft, into place.
- Screw in the worm shaft with nine 360° rotations.
- Install the finger protection device.
- Check the grind quality visually (based on the reference grind).

4.3.7.2 Helpful coffee tips and tricks

The quality of the brewed coffee depends not only on the device, but to an equal extent on the water, coffee variety, grind, temperature, etc. Following are some particularly important tips:

- Always use fresh coffee and darker roasts.
- Coffee beans and grounds are best stored in a cool place, in a closed container.
- If the brewed coffee flows too quickly or too slowly, the reason is usually that the grinding degree is incorrect.

Coffee flows too quickly:

Set the grinding degree finer = rotate clockwise = coffee flows more slowly.

Coffee flows too slowly:

Set the grinding degree coarser = rotate anticlockwise = coffee flows more quickly.

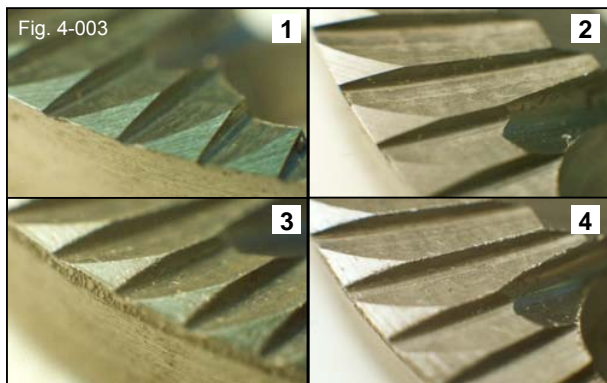
Caution:

The grinding degree may be adjusted only while the grinder is operating.

Maintenance

Frequently encountered problems (symptoms)

grinder disks worn out; the discs suffer the most wear in the fine grinding area. If these edges are dull, the resistance of the grinder increases and blocking of the grinder is possible. The following illustration shows new (figures 1 and 2) and completely worn (figures 3 and 4) grinder disks. The signs of wear are readily visible even along the outside edge.



Check

- Check the counter status in the service program, then:
- Empty the bean hopper and grinder.
- Check the "Bean hopper empty" message.
- Check the coffee powder for uniform grind, grain size and grinding degree
- Visually check the grinder disks for wear
- Check: wire at powder outlet

Check the "Bean hopper empty" message

- The current values must correspond that of the installed grinder.
- The grinders are measured during manufacturing and labelled with a sticker with the current value (according to the table below).
- During installation, for each machine, the current value of the grinder must be entered according to the table below.
- When a grinder is replaced during a service call, the new current value must be configured.
→ Service program, System configuration window, Parameters tab, value: *Current (empty bean hopper)*.
- If there are problems detecting the "Bean hopper empty" status, this is most likely because the current value is set incorrectly.

Default values:

Grinder no-load current	Value on grinder sticker	Service program Value: <i>Current (empty bean hopper)</i>
1.0 - 1.5 A	3	55
1.6 - 1.7 A	4	60
1.8 - 2.0 A	5	65

Service intervals

Check according to maintenance regulations, section 3.1 on page 3-1.

- Check the condition of the grinder motor / gearbox with regard to: Fastening
Housing/bearing plate defects
Gaps or grease escaping around the gearbox.
- Traces of overheating around the flat plug-in connectors
- Check the "No beans" message.
- Grinding degree: visually check the grain size of the coffee powder. Reset the grinding degree or replace the grinder disks in pairs.

Replace according to maintenance regulations, section 3.1 on page 3-1.

- grinder disks in pairs.
- Check according to maintenance regulations, section 3.1 on page 3-1.

After the grinder disks are replaced, the counter must be set to zero using the Service Program.

4.3.8 Brew unit

(For removing the brew unit, see sec. 7.4 on page 7-12)

The brew unit is the heart of the coffee machine. Its condition, cleanliness and proper function are critical factors for the coffee quality. The brew unit is also the component that is subjected to the greatest mechanical, thermal and chemical stress. Therefore, cleaning and maintenance are very important.

Function description

The brew unit consists of a highly compact cylinder (chamber) and piston system in which the coffee powder is pressed. The overall brewing process is divided into individual process steps: filling with coffee powder, tamping according to the programmed tamping pressure,

pre-infusion, brewing, re-pressing and ejecting the coffee grounds. The brewing cylinder/brewing piston system is mounted on a carriage that moves back and forth between two fixed pistons. The carriage is moved by a spindle. The outlet piston, together with the lower moving piston and the brewing cylinder, forms the brewing chamber. The lower piston engages on the friction piston and pushes the grounds upwards through the brewing cylinder, where the scraper conveys it into the coffee grounds container. The

spindle is driven by an electric motor (lifting motor). This lifting motor is controlled by the program. Depending on the brewing process, it is controlled sometimes by time and sometimes by current. The home position (filling) is defined by driving to a limit switch.

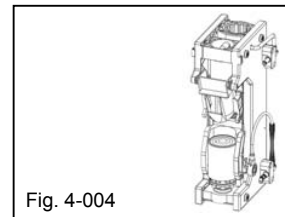


Fig. 4-004

Brew unit

1. Lifting motor
2. Spindle
3. Friction piston
4. Lower piston (brewing water inlet into the cylinder)
5. Position switch (not installed on the brew unit)
6. Brewing cylinder
7. Outlet piston with restrictor (0.6 mm opening)
8. Brewer slide
9. scraper
10. Brewing line
11. Restrictor
12. Corner piece
13. Side parts, left + right

Technical data

Supply voltage rating:	24 V DC
Operating voltage:	30-36 V DC
No-load current:	approx. 1.3 A
Block circuit:	≥ 8.5 A

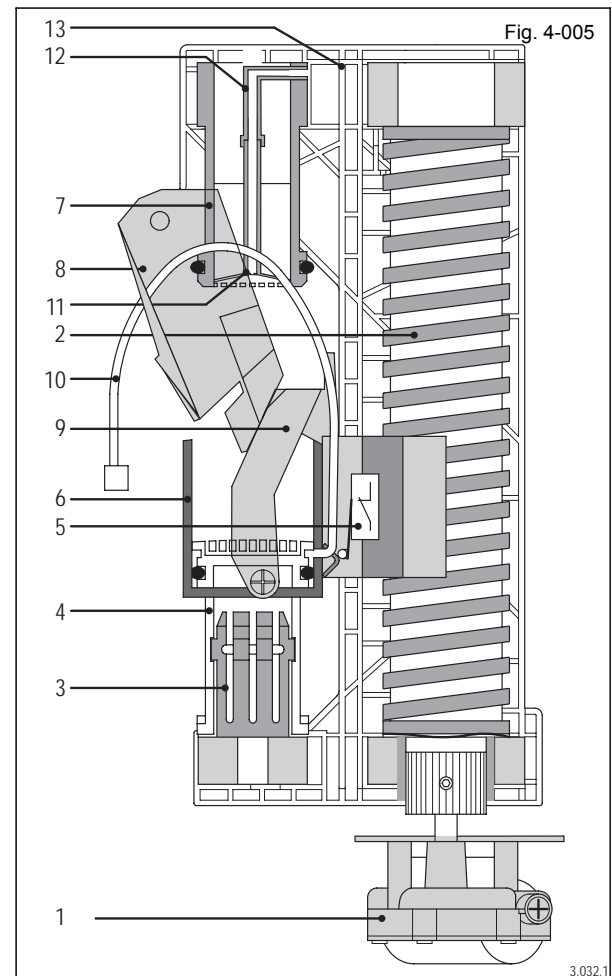
Maintenance

Frequently encountered problems:

- O-rings defective (insufficient brewing pressure; water leaking in the machine)
- Outlet piston/lower piston (water inlet) or brewing cylinder clogged

Check

- Move the brewing cylinder up and down using the multi-tool; while doing so, check the movement of the brewing cylinder in the outlet piston and the lower piston on the friction piston.
- Check the condition of the O-rings.
- Check for noise.
- Check clearance between spindle and carriage.
- External: Visually check for defects (e.g., broken-out sections on the spindles, etc.)
- Soiling (spindle bearings, pistons)



3.032.1

Service intervals

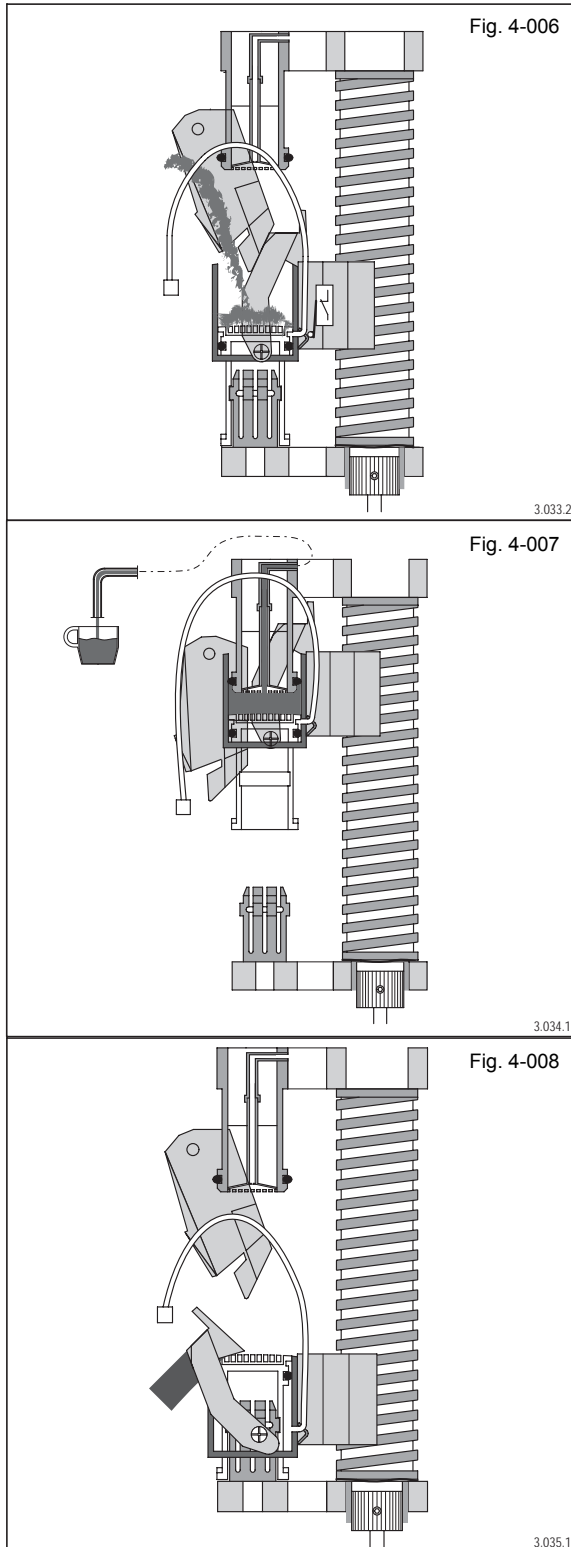
Check according to maintenance regulations, section 3.1 on page 3-1.

- Cleaning
- Check for proper function and leaks
- Replace parts: Lower piston incl. O-ring
- Outlet piston incl. O-ring

- Motor/gearbox firmly mounted on slide without any slack.
- Lifting motor: Check play of drive shaft for the motor/gearbox housing connection.
- Replace the brew unit with friction piston and O-rings (do not lubricate!).

Replace according to maintenance regulations, section 3.1 on page 3-1.

The three most important piston/cylinder positions are described below:



Home position / filling

The brewing cylinder is slightly below the middle of the entire lifting range. The lower piston is at the lower end of the brewing cylinder. Therefore, the maximum cylinder volume is available for filling with coffee powder. The coffee powder is filled from the grinder via the inlet and the funnel.

Brewing

The brewing cylinder and lower piston are at the top end of the lifting range; the funnel is swung away. The outlet piston closes the brewing cylinder above, and the coffee powder is pressed on it. The brewing water is pressed into the brewing cylinder from below, and the coffee moves upwards through the outlet piston and the angle to the outlet.

The "Open brewing cylinder" and "Re-pressing" positions differ only very slightly from this position. For "Open brewing cylinder", the brewing cylinder moves a few millimetres downwards after the coffee powder is tamped and pre-infused. For post-pressing, the brewing cylinder moves minimally upwards and stops in this position for a short time to press the water remaining in the grounds out through the supply line and the flush valve (booster).

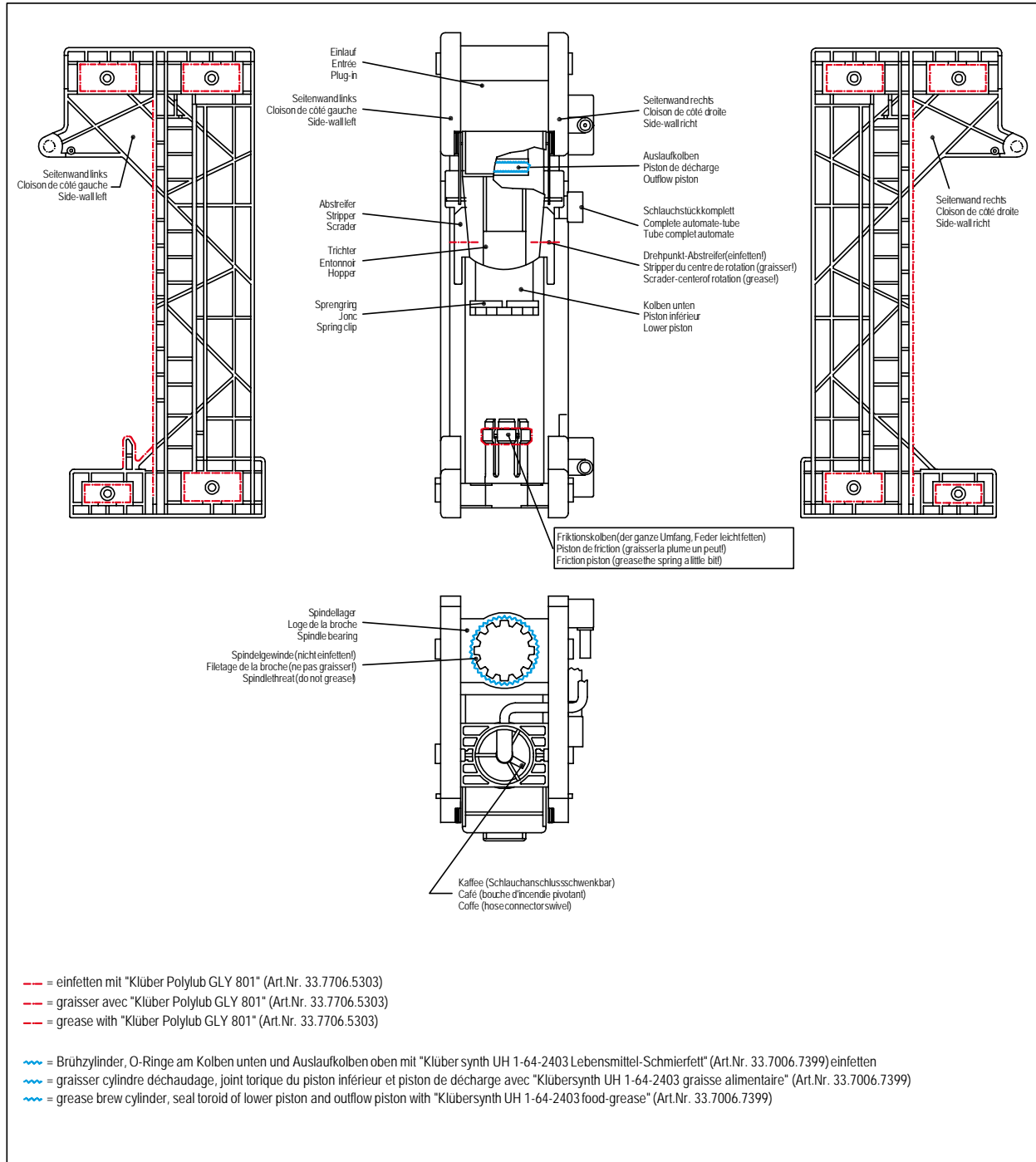
Grounds ejection

The brewing cylinder and lower piston are at the bottom end of the lifting range. The friction piston pushes the lower piston through the brewing cylinder until it reaches the top edge of the brewing cylinder. The scraper ejects the pressed coffee grounds with a pivoting motion.

After the grounds are ejected, the brewing cylinder and lower piston return to the home position.

4.3.8.1 Lubrication schedule for the brew unit

After disassembly, cleaning and repair of spare or defective components, the following marked surfaces (bearing and guide surfaces) must be lubricated with a light coat of grease (note the WMF Aktiengesellschaft article numbers). In doing so, note the parts that may not be lubricated and observe the safety regulations and instructions for using food-grade greases.



4.3.9 Vibration pump

The pump generates the pressure for all systems in the machine. It increases the pressure of the connected water line (household pipes or fresh water tank) to the brewing pressure for the coffee (8-12 bars). Thus the pump is in operation whenever products (except steam) are dispensed.

Property damage

- The vibration pump contains parts that are sensitive to impact and pressure and can be damaged by improper handling.
- Therefore, you have to cushion the vibration pump during transport. It must not be exposed to any shock or impact or be dropped or tensioned in any way (vise, clamps, etc.). Take care never to expose the vibration pump to below-freezing temperatures, as this will cause irreparable damage to the pump.

Technical data

Flow: 0.4 l/min. (0.9 l/min. max.)
 Pump pressure: 8 - 12 bars (16 bar max.)
 Voltage: 24VAC 50/ 60Hz
 Power: 48W

Service intervals

Check according to maintenance regulations, section 3.1 on page 3-1.

- Check for leaks and noise.

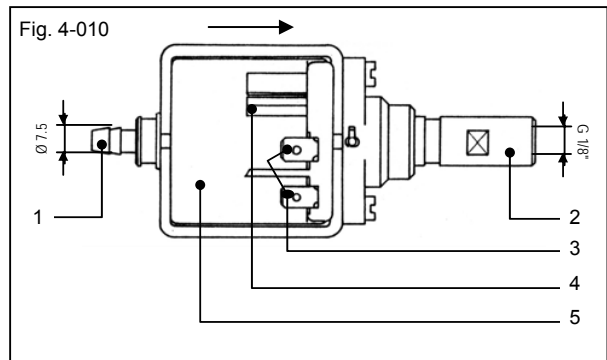


Fig. 4-010

- Vibration pump**
1. Hose nipple
 2. Non-return valve
 3. Electrical connector tabs
 4. Circuit breaker holder
 5. Coil with housing

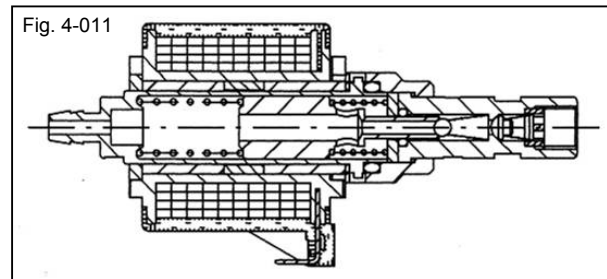


Fig. 4-011

4.3.10 Flow meter

The flow meter measures the water volume when dispensing coffee. This measurement controls various functions of the machine such as metering or (indirectly) the heating of the hot water boiler.

Functional description

The flow meter is built into the supply line of the hot water boiler. In principle, it is a small turbine that, with each rotation, generates two electrical impulses that are counted by the PC board. The restrictor in the area of the water inflow to the turbine chamber ensures that the water hits the turbine vanes at high speed, thus providing reliable power to the turbine wheel.

Flow meter

1. Output: Intake side of vibration pump
2. Input: Water tank
3. Hose: 240 mm
4. Hose: 80 mm
5. Nozzle: Ø 1.2 mm
6. Connecting cable: 620 mm
7. Month / year
8. GND
9. Signal
10. + 5 V

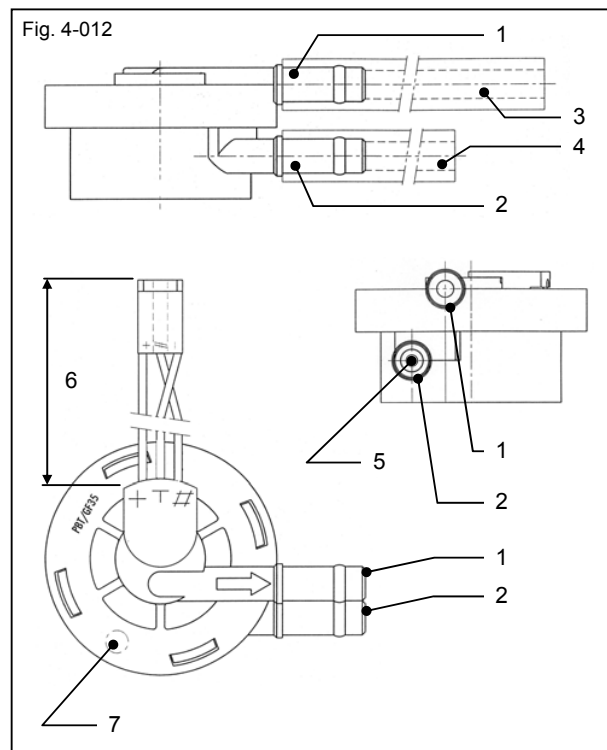


Fig. 4-012

Technical data:

Max. flow rate, approx.: 0.92 l/min.
(with the Ø 1.2 mm nozzle)
Pressure: 0 bar, suction function only
Operating voltage: 5V DC

Metering

Through counting the impulses and based on the flow per impulse, volumes can be measured and controlled using the program.

Maintenance

Frequently encountered problems:

- Calcification: results in different cup volumes

- Soiling from particles: turbine wheel locked
- Electrical plug connections (flow meter PC board)
- Defective PC board
- Defective flow meter

Note: if the flow meter does not function or if no pulses reach the control system, the PC board reverts to the last measured outlet time, thus controlling the cup volumes.

Service intervals

Check according to maintenance regulations, section 3.1 on page 3-1.

- Check for calcification, soiling and mechanical damage. Replace O-ring after opening.

Replace according to maintenance regulations, section 3.1 on page 3-1.

- Complete flow meter

4.3.11 Air pump WMF 1000 Pro

The air pump (a) feeds air to the all-in-one professional spout. The air is necessary for foaming the milk.

Functional description

The milk is drawn in and warmed by the steam (steam valve (b)). For creating milk foam, the air pump (a) is used to mix air with the steam.

Technical data:

Flow volume:	170 ml/min
Pump pressure:	750 - 1150 mbar
Module voltage:	24VDC
Air pump voltage:	18 VDC

Maintenance

Check for calcification, soiling and mechanical damage.

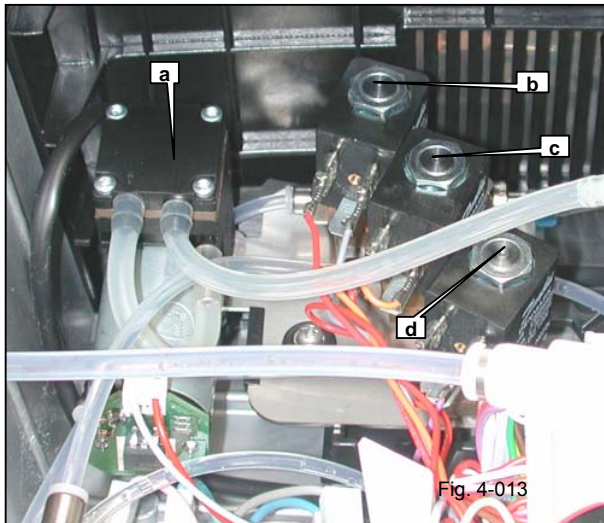


Fig. 4-013

4.3.12 Steam Jet WMF 1000 Pro

The cup warmer can be used to preheat cups.

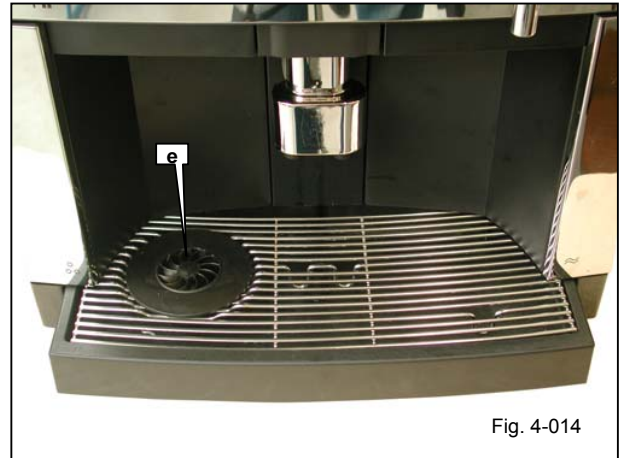


Fig. 4-014

Functional description

The cup is placed onto the steam plate (e) upside down. The steam released by the cup warmer valve (d) heats the cup.

Maintenance

The steam plate can be unlatched (f) and unhooked (g) for cleaning purposes. The steam plate can be rinsed under hot water.

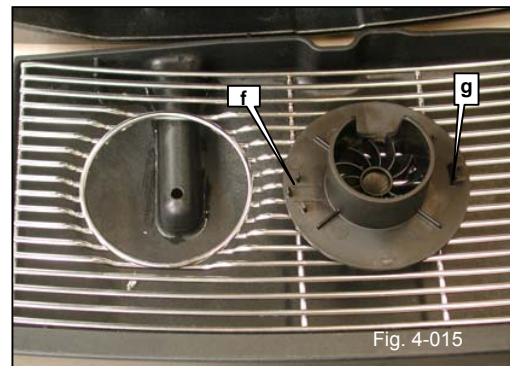


Fig. 4-015

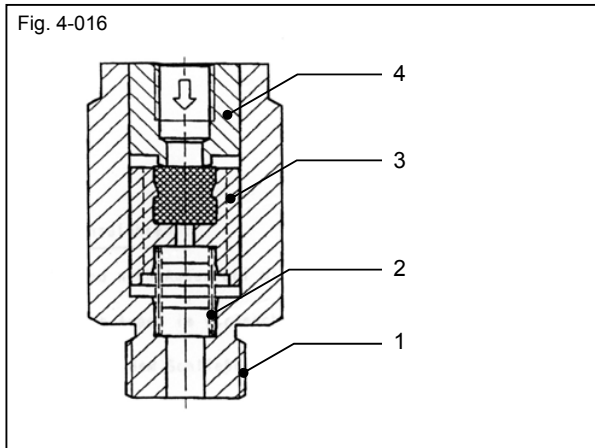
4.3.13 Safety valve

The safety valve is a check valve that is pressurised on the inlet side and depressurised on the outlet side. Safety valves are part of a multilevel safety concept intended to protect the the hot water boiler and the steam boiler from overheating and bursting due to overpressure. The safety valves are installed in either the supply line or the hot water/steam line of the hot water boiler/steam boiler. The overpressure resulting from expansion of the water is diverted to the grounds container. This type of valve can be installed in any position, as the spring of the closing element always presses on the valve seat.

Functional description

The closing element is pressed on the valve seat by spring pressure. If the water pressure on the inlet side exceeds the closing pressure of the spring, the valve opens and the water flows through. Because an overpressure can never be generated on the outlet side, the opening pressure depends only on the spring pressure. Safety valves must never be disassembled, and their springs must never be replaced.

Fig. 4-016



Special feature: note installation direction

Safety valve

1. M10x1 thread
2. Pressure spring
3. Valve insert
4. Press-in bushing



RISK OF FATAL INJURY/PROPERTY DAMAGE

Safety valves can fulfil their safety function only if they are installed in the correct direction of flow. Incorrectly installed valves can cause an unacceptable pressure rise, which in turn can cause the hot water boiler or steam boiler to burst. This can cause potentially fatal injuries and/or property damage. When installing a safety valve, make sure to install it in the correct direction. It is not permitted to disassemble, descale and reassemble safety valves.

Technical data

Opening pressure: Nominal: 13.5 bars
Maximum: 14-16 bars

Maintenance

Frequently encountered problems:

- Calcification or soiling: continuous water flow as a result of limescale or dirt particles on the ball seal or valve seat.
- Fatigue of pressure springs: opening pressure falls below the brewing pressure of 7.5 bar and leads to incorrect metering quantities (insufficient cup volumes)

Check

Safety valves must not be opened by safety technicians. They must be replaced if malfunction is suspected (traces of limescale etc.) or a safety thermostat is triggered.

Service intervals

Carry out a check according to the maintenance regulations, section 3.1 on page 3-1. After a safety thermostat is triggered:

- Replace the complete safety valve.

4.3.14 Solenoid valves

Solenoid valves with one pressure connection and one or more working connections are called directional valves. They control not only the start and stop of the flow of medium, but also its path between the connections. The solenoid valves are designed as disk seat valves and function according to the lifting armature principle. The closing element (valve piston, plunger) is pressed against the valve seat by spring pressure and the pressure of the contacting medium. This allows these valves to be installed in any position.

Functional description

2/2-way valve

This valve has two positions: locked and open. Depending on the intended use in the machine, the valve can be open or closed when de-energised. The following description applies to a 2/2-way valve that is closed when de-energised. The closing element (plunger) is pivoted in the valve body so that it can move axially and is enveloped by the flow of medium. A spring presses the closing element onto the valve seat. If current coil flows through the coil, the coil builds up a magnetic field that pulls the closing element into the valve body, counter to the spring pressure and the inlet pressure of the water. The valve opens.

Installation direction

When connecting or replacing solenoid valves, make sure to install them in the correct direction (arrow on the housing).

Maintenance

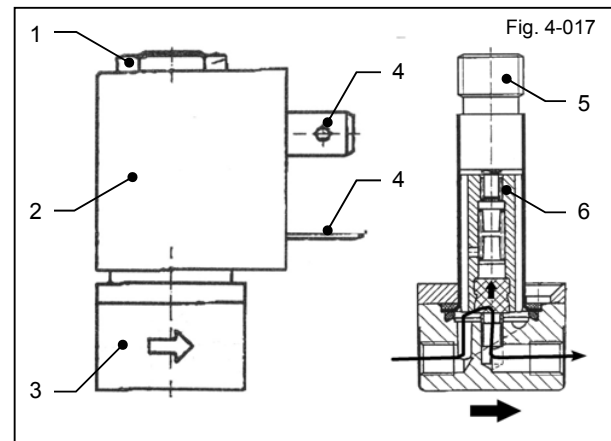
Frequently encountered problems:

- Calcified: Valve does not close; insufficient flow.
- Soiled: Valve does not close; insufficient flow.
- Defective coil: Valve does not open/close at supply voltage rating

Service intervals

Check according to the maintenance regulations, section 3.1 on page 3-1, for calcification and wear of the seal in the closing element and check the valve seats.

Replace according to maintenance regulations, section 3.1 on page 3-1.



Solenoid valve

1. Valve body - solenoid terminal nut
2. Solenoid
3. Housing
4. Electrical connector tabs
5. Valve body (core guide tube)
6. Plunger

4.3.15 All-in-one spout

For dispensing hot milk and milk foam.

Functional description

If a milk product is selected, the steam valve opens and draws milk in from the milk container. Depending on the setting of the rotary valve, either hot milk (without being mixed with air) or milk foam (mixed with air) is dispensed.

M setting = hot milk

❖ setting = milk foam

Maintenance

Frequently encountered problems:

- Dirty
- O-ring defective
- Restrictor missing

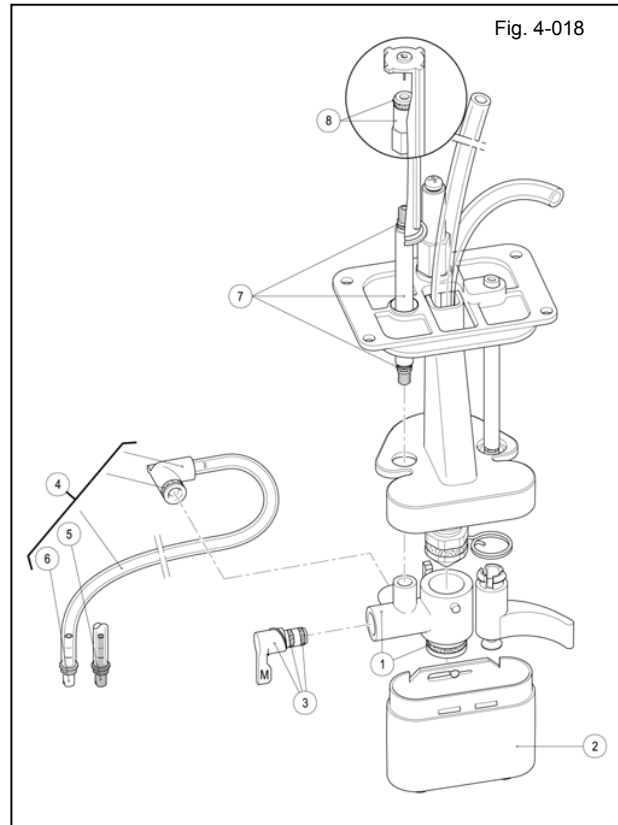
Check

- Thoroughly clean the all-in-one spout.
- Check the O-rings for damage.
- Check that the correct milk nozzle is installed.

Service intervals

Check according to the maintenance regulations, section 3.1 on page 3-1, for calcification and wear of the seal in the closing element and check the valve seats.

Replace according to maintenance regulations, section 3.1 on page 3-1.



All-in-one spout

1. Foam chamber
2. Spill-over cup
3. Rotary valve
4. Milk tube
5. Milk nozzle
6. Milk nozzle
7. Air intake pipe
8. Air intake cap

4.3.16 All-in-one Pro spout

For dispensing hot milk and milk foam.

Functional description

If a milk product is selected, the steam valve opens and draws milk in from the milk container. The milk is mixed with steam in the spout to create hot milk.

For dispensing milk foam, the steam valve is opened and the air pump switched on.

Maintenance

Frequently encountered problems

- Dirty
- O-ring defective
- Restrictor missing

Check

- Thoroughly clean the spout.
- Check the O-rings for damage.
- Check that the correct milk nozzle is installed.

Service intervals

Check according to the maintenance regulations, section 3.1

on page 3-1, for calcification and wear of the seal in the closing element and check the valve seats.

Replace according to maintenance regulations, section 3.1 on page 3-1.

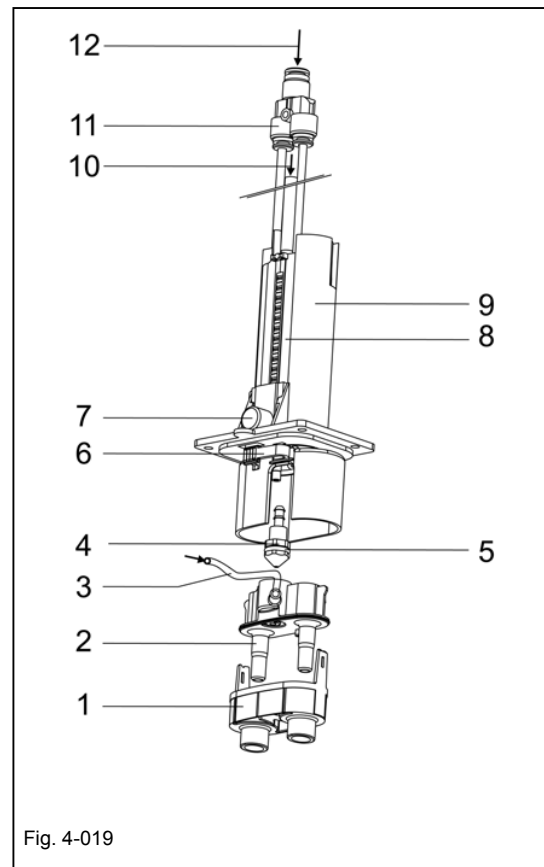


Fig. 4-019

All-in-one Pro spout

1. Foamer - bottom section
2. Foamer - upper section
3. Milk tube
4. Steam nozzle
5. O-ring
6. Ejector
7. Clip
8. Guide
9. Flange
10. Steam
11. Y-connector plug-in connection
12. Coffee

4.3.17 Safety thermostat

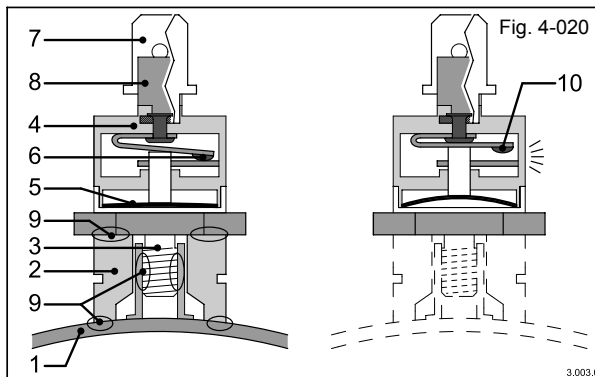
The safety thermostat is one of three safety levels that prevent overheating and thus prevent a hot water boiler or steam boiler from bursting in an "emergency". If the heater is not shut off by the PC board in the regular way, the safety thermostat interrupts the electrical circuit at a temperature of 155°C. Overheating can have a variety of causes (see the chapter on "Fault diagnostics").

Functional description

The safety thermostat is, in principle, an electrical contact (normally closed contact) that is opened by a bimetallic disc when the switching temperature is reached. It is designed such that the contact is opened suddenly (snap contact), thus preventing contact erosion. The contact remains open even after the hot water boiler or steam element cools off. No automatic restart takes place.

It must be reset after cooling off, but this may not take place until any faults are corrected.

Reset: Press the red button.



Safety thermostat

1. Hot water boiler
2. Circuit breaker fastener (contact sleeve)
3. Threaded bolt
4. Thermostat housing
5. Bimetallic disc
6. Opening contact
7. Flat plug-in connector
8. Reset button
9. Thermally conductive paste
10. Contact open

The following conditions are critical for reliable function:



RISK OF FATAL INJURY/PROPERTY DAMAGE

The safety thermostats can fulfil their purpose only if they are technically installed correctly and the connectors are not deformed. If the safety thermostats are installed incorrectly or have bent connectors, they will function incorrectly or not at all and thus cannot shut off the electrical circuits. This results in a risk of bursting of the hot water boilers or steam boilers in case of malfunction. Observe the following points during installation.

- Heat must be conducted properly from the hot water boiler / steam boiler to the safety thermostat. All contact surfaces between the hot water boiler / steam boiler, contact sleeve and safety thermostat, as well as the stud bolts of the safety thermostat, must be coated with sufficient thermally conductive paste.
- The flat pin connectors must not be bent during or after installation or subjected to any kind of mechanical stress.

Technical data

Response temperature:	155°
Max. supply voltage rating:	250 VAC
Max. current:	16 A
Max. tightening torque:	1 Nm
Thermally conductive paste:	Art.No. 33.7006.7391

Check

We do not recommend carrying out a direct thermal test (by heating up). Check for proper installation:

- Has thermally conductive paste been applied to all contacts?
- Are signs of overheating (scorch marks) or cracks in the housing visible?
- Check the contact resistance using an ohmmeter (approx. 0 Ω!)
- Check the flat plug-in connectors for oxidation damage.

No other maintenance tasks exist for the safety thermostat.

4.3.18 Level probe

The level probe controls the water level in the steam boiler. To ensure that sufficient steam is available at all times, the water in the steam boiler must not exceed a certain level.

Conductivity

Because it contains minerals and metals, water is capable of conducting electricity. These very small admixtures of elements give the water electrolytic properties (ion movement under the influence of an electrical field). This electrolytic conductivity is measurable in a way that is similar to the conductivity of a metallic conductor.

This property of the water can be used to check the level in the hot water boiler / steam boiler. The level of an electrically conductive medium in a metal vessel is signalled by an electrode (level probe) and a conductivity amplifier (part of the PC board).

If the water does not touch the electrode, the resistance between the wall of the vessel and the electrode is very high; if the water touches the electrode, the resistance becomes smaller. These changes in resistance are evaluated by the conductivity amplifier, and the steam boiler feeding valve is activated correspondingly.

Functional description

The level probe is built into the hot water boiler / steam boiler. It is electrically insulated by an insulating hose, except for a few millimetres at the tip and on the flat pin connector. The negative potential (GND) is present at the hot water boiler / steam boiler, and a positive voltage from the PC board is present at the PC board. If the water level reaches the tip of the level probe, current flows through the water. The PC board evaluates the signal and closes the feeding valve to the hot water boiler / steam boiler at the steam boiler. As soon as the water level falls, the current flow is interrupted by the probe. The signal remains off and the PC board opens the steam boiler feeding valve. For this type of circuit to function, the water must have a minimum conductivity of 100 μS .



PROPERTY DAMAGE

Use only level probes with the suitable length for each hot water boiler / steam boiler.

Dimensioned drawings

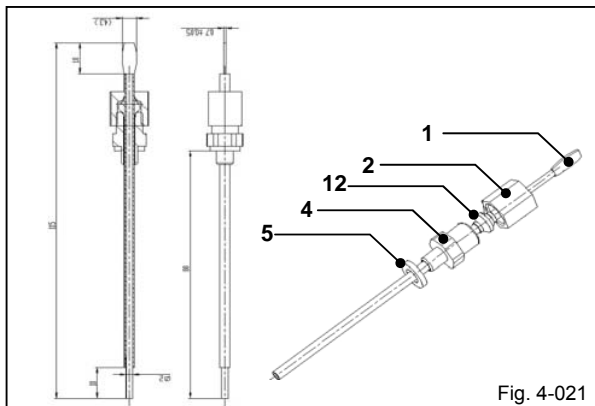


Fig. 4-021

Installation instructions

Tighten the terminal nut on the Legris nipple with a torque of 12 Nm; this also presses the clamping ring in place.



Caution! Do not confuse the torques: when the level probe is screwed into the steam boiler, the fastening torque is 2.2 Nm.

Maintenance

Frequently encountered problems:

- Limescale deposits on the probe tip: there is no signal; hot water boiler / steam boiler is overfilled.

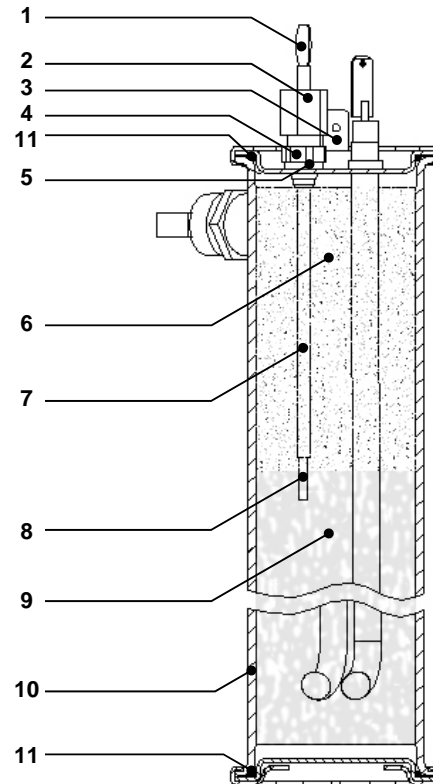
Service intervals

Check according to maintenance regulations, section 3.1 on page 3-1.

- Limescale deposits on the probe tip and leaks on the terminal nuts.

Cross-section

Fig. 4-022



Level probe

1. Level probe
2. Terminal nut
3. GND connection
4. Nipple
5. UCAR seal
6. Steam
7. Insulation (level probe)
8. Level probe tip
9. Water
10. Hot water boiler / steam boiler pipe
11. O-ring (cannot be replaced)
12. Clamping ring

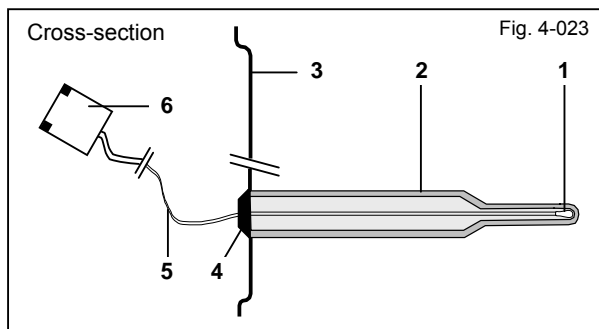
4.3.19 Temperature sensor

The temperature sensor is an active measuring system for temperature control of the hot water boiler and steam boiler. It measures the temperature of these elements at nearly their highest point.

Functional description

The temperature sensor is based on the principle of the change in resistance of a conductor through which current is flowing when the temperature changes. This is an active measuring circuit. The resistance of the measuring loop decreases when the temperature increases—it is what is known as an NTC resistor (NTC = negative temperature coefficient).

The PC board constantly monitors this resistance change and converts it, according to the limit values of the heater control system, into the switch-on and switch-off commands for the heaters (relay). The NTC probe is embedded in an insulated stainless steel tube cast into a terminal nut at the end. The 2-wire measuring line has a plug that is connected to the control board.



Temperature sensor

1. NTC resistance wire
2. Sensor tube (stainless steel)
3. Pressure vessel cover
4. Sealing compound (epoxy resin)
5. Connecting cable
6. Connection plug

Technical data

Temperature [°C]	Resistance [kΩ]
20	12.565
25	10.000
80	1.242
84	1.095
90	0.910

Maintenance

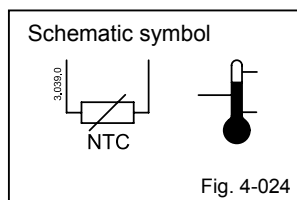
Frequently encountered problems:

- Malfunction due to high outer contact resistance of plugs, etc.
- Scale build-up: prevents thermal conductance and causes overheating of the system and possible triggering of a safety thermostat.

Check

Service technicians cannot check the temperature sensor with sufficient accuracy. If you suspect malfunction:

- Descale the machine.
 - With water tank, refer to the owner's manual.
- Replace the hot water boiler / steam boiler



4.3.20 Fan

The fan takes in cooler air. It removes the steam, which enters the machine when a cappuccino beverage is dispensed, from the interior of the machine. The temperature and humidity in the machine are reduced, thus also reducing wear on the components.

Technical data

Supply voltage rating:	24 VDC
Current:	0.08 A
Power:	1.9W
Dimensions:	60 x 60 x 15 mm
Noise level (max.)	31 dB (A)
Direction of rotation:	Pictured on housing

Check

The fan switches on when a product is dispensed. After the programmed after-run time, the fan shuts off again. The after time is set in the Service Program under "System configuration"/"Fan after-run" (refer to the programming manual).



4.3.21 Hot water boiler

The coffee water is heated in the hot water boiler. The high heat output allows very short heating times. Therefore, a certain quantity of hot water is always available for dispensing products, and more can be added very quickly.

Overheating protection

The hot water boiler and the steam boiler are equipped with three-level protection from overheating and bursting.

- The first level is the temperature sensor. It switches the heater on and off based on the water temperature.
- The second level is the safety thermostat. If the surface temperature of the hot water boiler / steam boiler exceeds 155°C, the safety thermostat interrupts the heating circuit.
- The third safety level is the safety valve. It releases the overpressure that is built up.

Functional description

The hot water boiler is manufactured of stainless steel. The heater and temperature sensor are soldered in at the top. Each hot water boiler undergoes a comprehensive quality inspection after being manufactured.

The heater is connected to the power relay via a safety thermostat.

Technical data

Volume:	0.35 l
Operating pressure:	12 bar / max. 14 bar
Test overpressure:	14 bar
Heat output:	1000 W
Voltage/current:	230 V AC, 4.34 A
Maximum operating temperature:	192 °C
Minimum operating temperature:	10 °C
Operating temperature:	86 °C - 102 °C
Heating time:	10°-->86° approx.: < 2 min.



FUNCTIONAL SAFETY

The hot water boiler is a pressure container and is tested as a complete unit after manufacture.

Descale them using the descaling agent recommended by the manufacturer and the descaling program of the machine.

Maintenance

Frequently encountered problems:

- Calcification: long heating time

Check

- Visually check for leaks.
- The heating water is overheated.
Calcification of the temperature sensor:
Coffee: The dispensed coffee begins to bubble (boil)
Hot water: The hot water bubbles, splashes and boils (refer to section 4.2.6 Limescale on page 4-4)
- Protracted heating time:
Calcification of the heater
- Read the descaling counter display on the laptop:
Depending on the water composition, or if a tank filter is installed, more frequent descaling may be recommended (refer to the operating instructions).

Service intervals

Check according to maintenance regulations, section 3.1 on page 3-1.

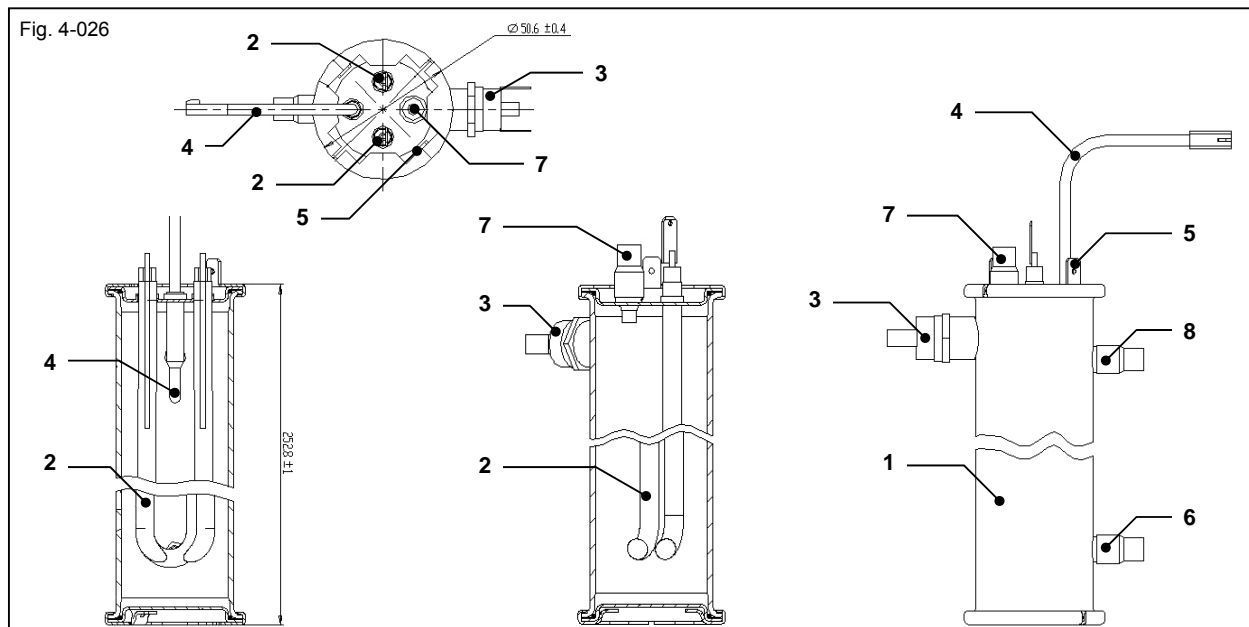
Replace according to maintenance regulations, section 3.1 on page 3-1.

Complete hot water boiler

Hot water boiler

1. Hot water boiler pipe
2. Heater
3. Safety thermostat
4. Temperature sensor
5. GND connection
6. Supply inlet (torque 2.2 Nm)
7. Safety valve outlet (torque 2.2 Nm)
8. Hot brewing water line outlet (torque 2.2 Nm)

Fig. 4-026



4.3.22 Steam boiler

The steam boiler produces steam. The relatively small volume and high heat output ensure a short heating time, while also providing enough steam to allow products that require steam to be prepared at any time.

Overheating protection

The hot water boiler and the steam boiler are equipped with three-level protection from overheating and bursting.

- The first level is the temperature sensor. It switches the heater on and off based on the water temperature.
- The second level is the safety thermostat. If the surface temperature of a hot water boiler / steam boiler exceeds 155°C, the safety thermostat interrupts the heating circuit.
- The third safety level is the safety valve. It releases the overpressure that is built up.

Functional description

The steam boiler is manufactured of stainless steel. The heater and temperature sensor are soldered in at the top. Each steam boiler undergoes a comprehensive quality inspection after being manufactured.

The steam boiler is filled only about two-thirds full with water. If the water level reaches the level probe, the steam boiler feeding valve is closed. This ensures that enough room is available for steam to form above the water level. The heater is connected to the power relay via a safety thermostat.

Technical data

Volume:	0.35 l
Operating pressure:	12 bar / max. 14 bar
Test overpressure:	14 bar
Heat output:	1000 W
Voltage/current:	230 V AC, 4.34 A

Maximum operating temperature:	192 °C
Minimum operating temperature:	10 °C
Operating temperature:	116 °C - 130 °C
Heating time:	10°-->130° approx.: < 2 min.



FUNCTIONAL SAFETY

Steam boilers are pressure containers and are tested as a complete unit after manufacture.

Descale them using the descaling agent recommended by the manufacturer and the descaling program of the machine.

Maintenance

Frequently encountered problems:

- Calcification: long heating time

Check

- Visually check for leaks.
- Calcification of the temperature sensor causes the overtemperature to overshoot; this can only be checked with the laptop (refer to section 4.2.6 Limescale on page 4-4).
- Protracted heating time:
Calcification of the heater

Service intervals

Check according to maintenance regulations, section 3.1 on page 3-1.

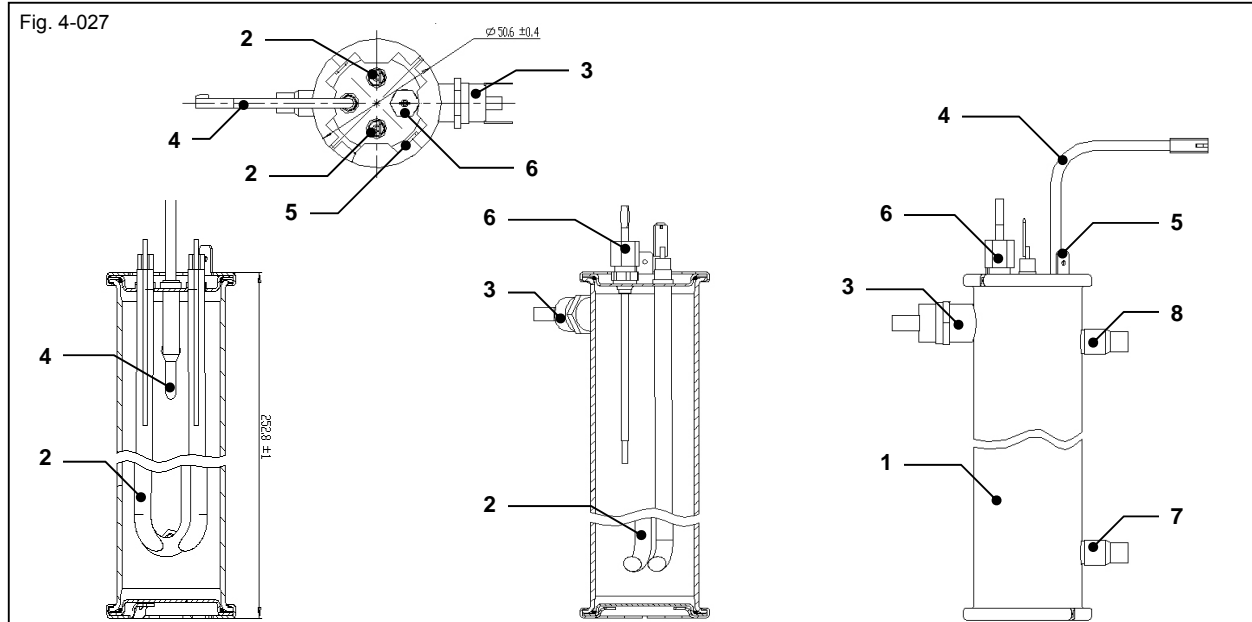
Replace according to maintenance regulations, section 3.1 on page 3-1.

Complete steam boiler

Steam Boiler

1. Steam boiler pipe
2. Heater
3. Safety thermostat
4. Temperature sensor
5. GND connection
6. Level probe
7. Supply inlet (torque 2.2 Nm)
8. Safety valve/steam line outlet (torque 2.2 Nm)

Fig. 4-027



4.3.23 Threaded connections/pipes/hoses

All water metering, heating and control components are associated with a wide variety of pipes, hoses and connectors. Though the assortment used may seem relatively complex, each threaded connection and pipe segment has been carefully selected for the specific intended use. This complex connection system includes a number of possible fault sources that can cause leaks and impair product quality. Therefore, a number of rules must be observed while working.

The following list includes only the most fundamental rules to be followed during maintenance work.

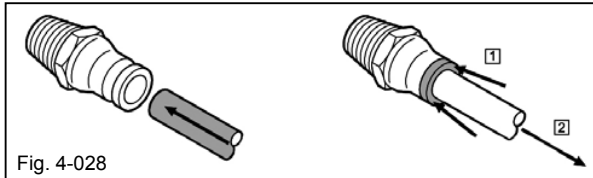


Fig. 4-028

Material properties

- Replace defective line materials with components that have identical material properties. In particular,
- line materials for coffee must be made of acid-resistant materials.
- Hot water and steam lines must be approved for the corresponding temperatures.
- Therefore, only food-grade silicon hoses may be used for milk products.
- Note that when different metals contact each other, they can electrochemically corrode or decompose from the effects of the ingredients of certain liquids. Therefore, use only the original material pairings.
- Follow the installation instructions for different types of materials.

Design properties

- The various thread shapes and nominal sizes must not be replaced with components that have different specifications. (Interchangeability /compatibility!)

- The line materials must not be replaced with ones that have different nominal sizes (the thermal stability of the systems, time-dependent processes, and the functional safety of the devices could be impaired).
- Observe the bending radii of hoses and pipes. Teflon lines tend to kink and break if the bending radii are too small.
- Depending on the system, hoses with a smooth inner surface may have to be used for waste water and drainage lines.

Lubricating the threaded connections

If it is necessary to lubricate threaded connections, you must do so very carefully. Ensure that the grease does not get into the lines, giving the water a greasy taste.

Maintenance

All line sections require periodic inspection and must be replaced as their condition dictates or according to the maintenance regulations (refer to section 3.1 on page 3-1 and its table below).

Service intervals

Check according to maintenance regulations, section 3.1 on page 3-1.

- Visually check all lines (incl. threaded connections) for calcification, damage, soiling and leaks.

Replace according to maintenance regulations, section 3.1 on page 3-1.

- The maintenance regulations identify the pipes that require special checks at defined intervals.

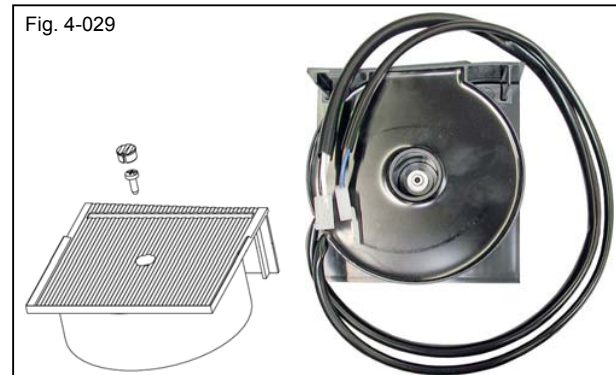
4.3.24 Transformer

The transformer transforms the primary voltage (mains voltage) into secondary voltage (consumer voltage).

Technical data

Primary voltage: 230 VAC \pm 10 %

Transformer secondary voltage: 12 V / 24 V AC
Transformer power: 120 VA



4.3.25 Keyboard printed circuit board (PCB)



RISK OF FATAL INJURY/PROPERTY DAMAGE

Whenever work is carried out on electrical equipment, a risk of fatal injury from electric shock exists if live electrical parts are touched. Contact with live parts can be hazardous, even at low voltages. Only authorised technicians may carry out this work.

The keyboard PCB is the "human-machine-human" interface.

Functional description

The keyboard PCB forwards the values that the user enters by pressing keys to the PC board, which, in turn, sends signals back to the keyboard PCB. The keyboard PCB passes on the signals to the user via the LED and/or display.



PROPERTY DAMAGE

Static charges that occur when working with printed circuit boards can destroy them. Therefore, when handling PCBs, make sure that you do not acquire an electrical charge, and store sensitive components only in ESD (= antistatic) packaging

For more information on ESD (electrostatic discharge) protection, see section [4.3.26.1 ESD \(electrostatic discharge\) protection](#) on page 4-28)

Technical data

PCB supply voltage: 5 V
Main switch supply voltage: 230 V

Check

Service technicians in the field cannot carry out a complete function check of the PCB with the tools at their disposal. If the keyboard PCB is defective, replace the entire component, including the keys and cover.

4.3.26 PC board

The PC board is the "brain" of the coffee machine and controls all machine functions. It contains the programs, monitors all sensors and controls the consumers. The most important elements of the PC board are the microcontroller with integrated memory, which contains the program (Flash ROM) (1) and a special memory chip (EEPROM) (2) for all system counters and settings (parameters).

Functional description

The PC board processes the signals of the various sensors according to the programs and the variable settings and controls the consumers accordingly. All sensors are directly wired to this PCB. For instructions specific to the PC board, refer to the function descriptions of the individual components. Refer to the programming manual for the basic instructions about the program.

- The PC board functions properly only if the PE conductor is connected correctly. Therefore, when replacing the PC board, ensure that the PE conductor is properly connected to the PCB.
- Static charges that occur when working with printed circuit boards can destroy them. Therefore, when handling PCBs, make sure that you do not acquire an electrical charge, and store sensitive components only in ESD (= antistatic) packaging
- Replacing the EEPROM module: ensure that the connecting legs are in a row and that the notches of the housing match those of the socket.

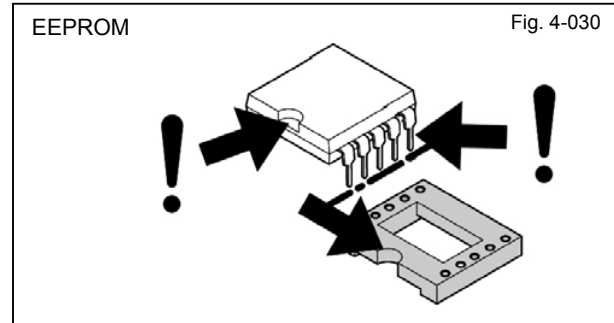


Fig. 4-030

EEPROM modules: the connecting legs must be straight and the notches on the IC housing and socket must match.

Technical data

PC board supply voltage 12V/24V
EEPROM 16 Kbit

Check

Service technicians in the field cannot carry out a complete function check of the PCB with the tools at their disposal. The functions of the PC board can be checked using the system check, querying specific settings and querying counters. If defects are found, replace the entire PC board. A clean connection of the PE conductor is critical for proper function of the PC board.

Maintenance

If it is necessary to replace the PC board, the EEPROM must be transferred to the newly installed PC board (data back-up). All counter readings are stored on the EEPROM and must be transferred to the new PC board.

4.3.26.1 ESD (electrostatic discharge) protection

Electronic components can be damaged by electrostatic discharge. This damage is usually not visible until after a component or entire circuit board has been installed.

Both persons and materials can acquire static charges from friction. In case of contact with sensitive electrical or electronic components, these charges can be discharged to earth. This can either punch holes in the semiconductors due to the high voltages or the transient high leakage currents can destroy certain semiconductor structures. Electrostatic discharges do not pose an immediate hazard to humans; however, fear or hesitation regarding electric shocks can increase the risk of accident.

The extent of the static charges depends on various factors, such as humidity, type of flooring and furniture or packaging, the clothes people are wearing, the speed at which machines, materials or air are moving, earthing conditions of the rooms, etc.

In worst-case scenarios, voltages of more than approx. 30 kV can build up. However, even significantly lower voltages can destroy components.

Therefore, effective ESD protection must be used by everyone who handles sensitive components. Measures to prevent electrostatic charges can include:

- Instruction about the hazard (including visitors, etc.)
- Labelling endangered components/rooms
- Personal antistatic measures: earthing wristbands, conductive footwear, and clothing made of natural fibres.
- ESD-compliant packages and containers
- ESD workstations (ESD mats, humidifiers, etc.)



The symbol to the left appears on all components that require protection from ESD, as well as on their packaging.

In addition to suitable materials and equipment (tools, ESD mat, etc.), an important part of effective ESD protection—particularly for maintenance work in the field—is applying the safety regulations.

4.3.26.2 PC board layout

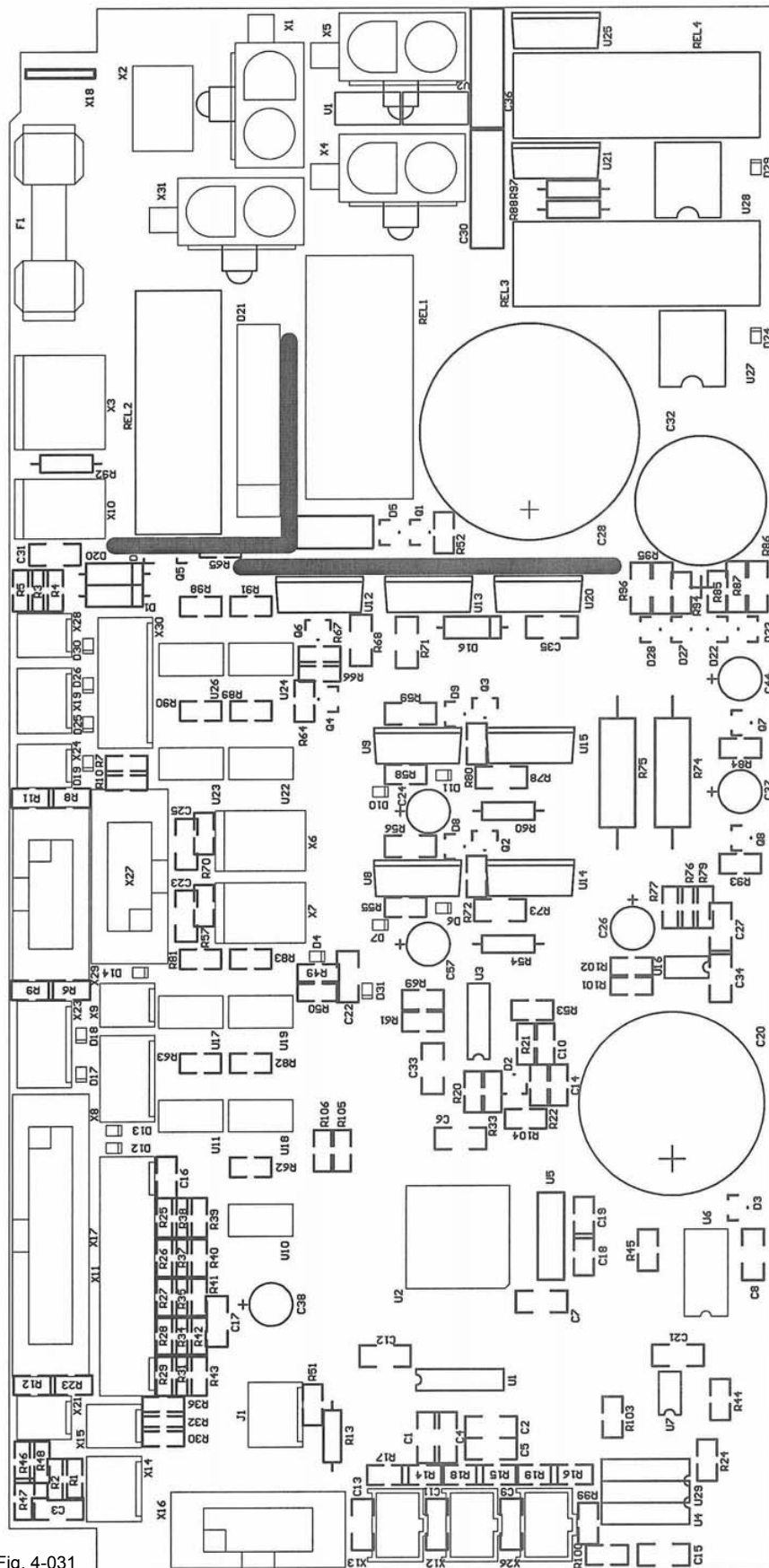




Fig. 4-031

Connector	Colour	Designation	Connection
X1.1	Blue	Neutral	Mains supply
X1.2	Brown	Phase	Mains supply
X2.1	Brown	Phase	Primary connection on transformer
X2.2	Blue	Neutral	Primary connection on transformer
X3.1	White	12VAC	Secondary connection on transformer
X3.2	Black	0V	Secondary connection on transformer
X3.3	White	12VAC	Secondary connection on transformer
X4.1	Blue	Neutral	Connection on water heater
X4.2	Green	Phase	Connection on water heater
X5.1	Blue	Neutral	Connection on steam heater
X5.2	Grey	Phase	Connection on steam heater
X6.1	Purple	0V	Grinder motor
X6.2	Red	+24VDC	Grinder motor
X7.1	Green	24VDC (+/-)	Drive motor
X7.2	Yellow	24VDC (+/-)	Drive motor
X8.1	Red	+24VDC	Brewing valve
X8.2	Green	0V (switched)	Brewing valve
X8.3	Red	+24VDC	Steam boiler feeding valve
X8.4	Grey	0V (switched)	Steam boiler feeding valve
X9.1	Red	+24VDC	Fixed water valve
X8.2	Black	0V (switched)	Fixed water valve
X10.1	Black	24V 	Vibration pump
X10.2	Black	24V 	Vibration pump
X11.1	Red	+12VDC	Reserve
X11.2	Orange	Signal	Reserve
X11.3	Red	+12VDC	Brew unit door micro switch
X11.4	White	Signal	Brew unit door micro switch
X11.5	Red	+12VDC	Brew unit position micro switch
X11.6	Green	Signal	Brew unit position micro switch
X11.7	Red	+12VDC	Coffee grounds container micro switch
X11.8	Purple	Signal	Coffee grounds container micro switch
X11.9	Red	+12VDC	DECAF container lid micro switch
X11.10	Brown	Signal	DECAF container lid micro switch
X11.11	Yellow	Signal	Level probe
X12.1	Blue	NTC	Steam temperature sensor
X12.2	Blue	NTC	Steam temperature sensor
X13.1	Blue	NTC	Hot water temperature sensor
X13.2	Blue	NTC	Hot water temperature sensor
X14.1	Brown	+5VDC	Flow meter
X14.2	Yellow	Signal	Flow meter
X14.3	Green	0V	Flow meter
X15.1	White	+12VDC	Water tank sensor
X15.2	White	Signal	Water tank sensor
X16		RS232	Service plug
X17			Operator PCB
X18	Yellow/green	GND	Earthing terminal
X19.1		0V	
X19.2		+12VDC	
X19.3		+24VDC	
X21.1		+12VDC	Drip tray micro switch
X21.2		Signal	Drip tray micro switch
X23.1		+24VDC	Hot water valve
X23.2		0V (switched)	Hot water valve
X23.3		+24VDC	Steam valve
X23.4		0V (switched)	Steam valve
X24.1	Red	+24VDC	Fan
X24.2	Black	0V (switched)	Fan

Connector	Colour	Designation	Connection
X26.1	Blue	NTC	Reserve temperature sensor
X26.2	Blue	NTC	Reserve temperature sensor
X27		Option	Coin checker
X28.1		+12VDC	All-in-one spout micro switch
X28.2		Signal	All-in-one spout micro switch
X29			Operator PCB
X30.1	Red	+24VDC	Switched brewing valve
X30.2	Black	0V (switched)	Switched brewing valve
X30.3			Reserve valve output
X30.4			Reserve valve output
X30.5			Reserve valve output
X30.6			Reserve valve output
X31.1	Brown	Relay contact	Self-holding
X31.2	Brown	Relay contact	Self-holding

4.3.27 Brewing system

Product dispensed: Cafe Latte

Prerequisite: Unit is heated

Note: Unit with all-in-one spout

In the following description, some processes are illustrated in simplified form.

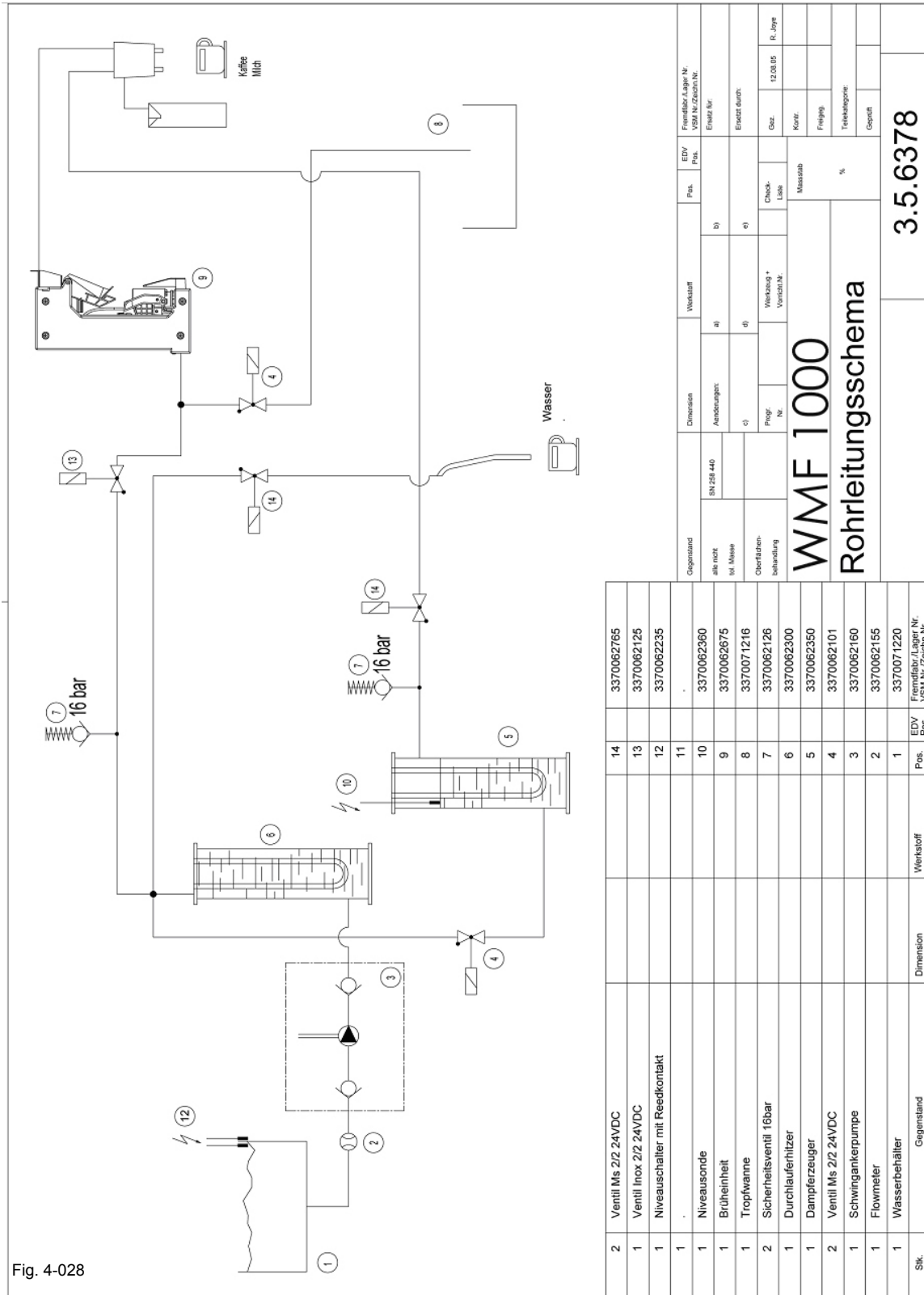


Fig. 4-028

Step	PC board (electronics / electrical system)	Hydraulic system	Mechanical processes
Product selection			
1	Beverage button is pressed. Signal from keyboard reaches the PC board; program analyses the control command and starts the product preparation cycle		
Display			
2 ¹⁾	"1x Cafe Latte" "Milk lever downwards"		Turn the left milk lever on the all-in-one spout downwards.
3	Confirm by pressing the illuminated beverage button.		
Grind coffee			
4	Switch on the grinder motor: Power transistor switches through; grinder motor runs for the configured time in seconds.		
5			Grinder in operation; coffee powder falls through the powder chute into the brewing cylinder of the brew unit.
Close the brew unit, brewing process.			
6	Open the flush valve.	Flush valve opens.	
7	Switch on the lifting motor: Power transistor switches through.		The brewing cylinder drives up and presses the coffee powder.
	As soon as the contact pressure has been reached, the current increase in the lifting motor during a certain time signals "Piston closed" and the lifting motor (9) is shut off.		
8	Switch on the vibration pump.	Vibration pump generates the pressure in the water system.	
9 ¹⁾ 9 ²⁾	Close the flush valve; power transistor switches through.	Flush valve closes, the programmed volume of hot water now flows from the hot water boiler into the brewing cylinder.	
10 ¹⁾	Open steam valve for all-in-one spout.	Steam valve for all-in-one spout opens, the programmed time in the PC board runs, the steam flows into the all-in-one spout and pulls the milk out of the milk container.	
Water metering			
11	Water metering for coffee is activated.	The flow meter sends the pulses for metering according to the water flow. The coffee flows from the brewing cylinder through the coffee spout into the cup.	
12	After the programmed water volume, the brewing process is ended. Shut off the vibration pump, open the flush valve.	Vibration pump is shut off; flush valve opens. The hot water feed to the brew unit stops. The pressure in the system drops.	
Heating of the hot water boiler			
13 ¹⁾	Heater of the hot water boiler is switched on and off according to the conditions programmed on the PC board.	Water in the hot water boiler is heated up	
Water refill			
14 ¹⁾	Water level falls below the minimum; the level probe initiates water refilling.		
15	Switch on the vibration pump; open the steam boiler feeding valve.	Vibration pump generates the pressure in the water system; steam boiler feeding valve opens.	
16	Water refill ended: switch off the vibration pump, close the steam boiler feeding valve.	Vibration pump is shut off; close the steam boiler feeding valve.	
Re-pressing			
17	Switch on the lifting motor to re-press the grounds. The lifting motor remains switched on for approx. 0.2 seconds.		The brewing cylinder moves slightly upwards and presses the grounds.
		The remaining water in the grounds flows through the opened brewing line into the drip tray.	
Grounds ejected, brew unit moves to home position.			
18	End re-pressing; reverse the direction of rotation of the lifting motor to open the brewing cylinder.		
19			Brewing cylinder now moves downwards; the lower piston slides onto the friction piston and pushes the grounds out of the brewing cylinder. The scraper ejects the grounds into the grounds drawer.
	When the piston cannot move downwards any further, its direction of rotation is again reversed via the current measurement of the lifting motor.		The brewing cylinder moves back upwards, but the friction piston holds the lower piston back until it is pulled away from the friction piston by the brewing cylinder.
Home position of the brew unit			
20	Micro switch on the brew unit signals "Piston home position reached"; lifting motor is shut off.		Brew unit is in home position.
21 ¹⁾	Close steam valve for all-in-one spout.	Steam valve for all-in-one spout closes.	

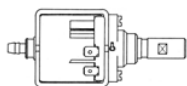
- 2¹⁾ To dispense milk, the left milk lever on the all-in-one spout must be pulled downwards. For milk foam, it must be in the top position.
- 9¹⁾ If no product is dispensed for longer than one minute, the pipes are preheated. This is done by leaving the steam boiler feeding valve open for a few pulses at the beginning of the brewing cycle. Hot water then flows from the hot water boiler into the drip tray, heating up the pipe all the way to the brew unit connection.
- Coffee: 20 pulses (guide value)
Espresso: 50 pulses (guide value)
- 9²⁾ Pre-infusion: If pre-infusion is programmed, a programmed volume of hot water is allowed into the brewing chamber; then, the vibration pump is stopped for a programmed time (pause). Afterwards, the brewing process is resumed.
- 10¹⁾ Depending on the programming, the steam valve for the all-in-one spout is opened or closed at different times:
- Coffee+milk: The flush valve for hot water (coffee) and the steam valve for the all-in-one spout are triggered simultaneously. When the time elapses, the steam valve closes, and the flush valve opens after the brewing process ends.
- Coffee-->milk: When the flush valve opens (brewing process ended), the steam valve is activated (opened).
- Milk-->coffee: When the steam valve closes (steam dispensing ended), the flush valve is activated (opened).
- 13¹⁾ The flush valve is opened during the heating time of the hot water boiler.
- 14¹⁾ Water refill: If the water level in the hot water boiler/steam boiler falls below the minimum, the level probe is no longer covered by water. This means that the signal at the level probe is no longer discharged to earth (pulsing DC voltage: cannot be measured using a multimeter). The voltage at the level probe increases and initiates water refill via the PC board. If the water level again reaches the level probe, water is refilled for the programmed time before the refilling ends. To prevent water overflow, a default value is set that ends water refilling after a certain time (timeout).
- 21¹⁾ The default setting of the steam flow time is 20 seconds (guide value). When the programmed time expires, the steam valve closes independently of the current brewing process.

5 DISASSEMBLING THE MACHINE

Preparing for maintenance	5.1	5-2
Removing the housing.....	5.2	5-3



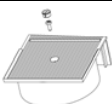
Removing the hot water boiler / steam boiler	5.3	5-6
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Removing the vibration pump.....	5.4	5-8
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Removing the flow meter.....	5.5	5-9
Removing the flow meter and cables	5.6	5-11



Removing the transformer.....	5.7	5-12
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Removing the complete front panel.....	5.8	5-13
Replacing the panel cover.....	5.9	5-13
Removing the All-in-one spout	5.10	5-13
Removing the All-in-one Pro spout.....	5.11	5-14

5.1 Preparing for maintenance

5.1.1 Safety regulations



The safety regulations are to be applied according to the specific procedure or maintenance task being carried out. Always apply the safety regulations that offer maximum protection from injury and property damage. This is particularly true when it is necessary to carry out tests or measurements on the uncovered machine while it is operating. Only instructed persons may carry out any work on the electrical components while these are live, or on hydraulic systems while these are under pressure.

Read chapter 2, "Safety regulations," on page 2-1.



RISK OF FATAL INJURY/PROPERTY DAMAGE

Whenever maintenance tasks are carried out, accidents with severe injury or property damage are possible as a result of the following:

- Touching live devices and components.
- Accidental startup.
- Touching hot devices or components (scalding).
- Accidental opening of pressurised containers or pipes.
- Reaching into rotating blades or being crushed between moving machine parts.

Protect yourself from these hazards by taking the following steps:

- Switch off the main switch and secure it from being switched on again.
- For machines with accounting systems: disconnect any telecommunications connections or IT network connections.
- Lock or disconnect the water supply connection.
- Depressurise pressurised systems.
- Allow the machine to cool off.

Do not begin the maintenance tasks until all safety precautions have been taken.

5.1.2 Notes about the maintenance instructions



- The disassembly instructions are identified with the "Uninstallation, disassembly" pictogram.
- Generally, a great deal of detailed information can be obtained from the spare parts catalogue.

5.1.3 Assembly/installation of the components



- Usually, components are assembled or reinstalled in the machine in the reverse order of steps in which they are uninstalled or disassembled. This pictogram identifies important details for assembly in the disassembly instructions.
- Many parts are not subject to specific maintenance regulations. However, whenever parts are assembled/installed, they should be visually inspected for cleanliness and the condition of their materials. These instructions pertain to particularly important inspections of this kind. The machine check should be carried out before each maintenance task. To do so, the machine must still be connected to the power and water supply. However, it is usually necessary to disconnect the machine from these networks before proceeding with further tasks.

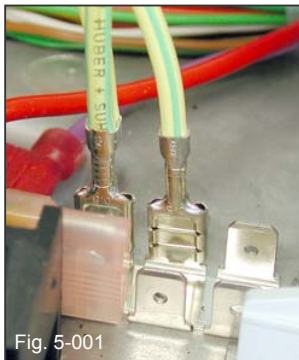


Fig. 5-001

During installation, ensure that cables are correctly routed.



Check that all earthing cables are plugged in properly!

5.2

Removing the housing

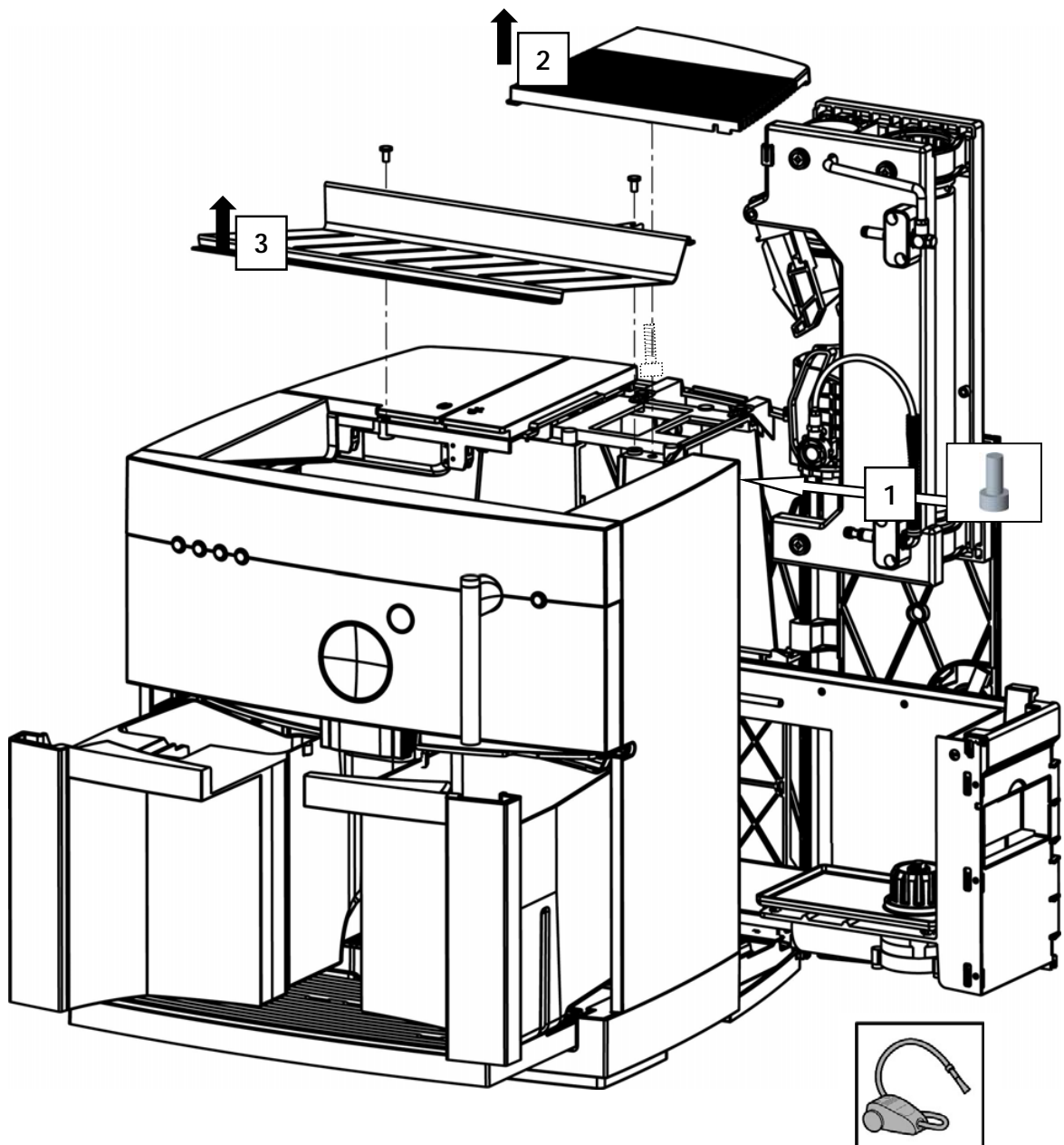


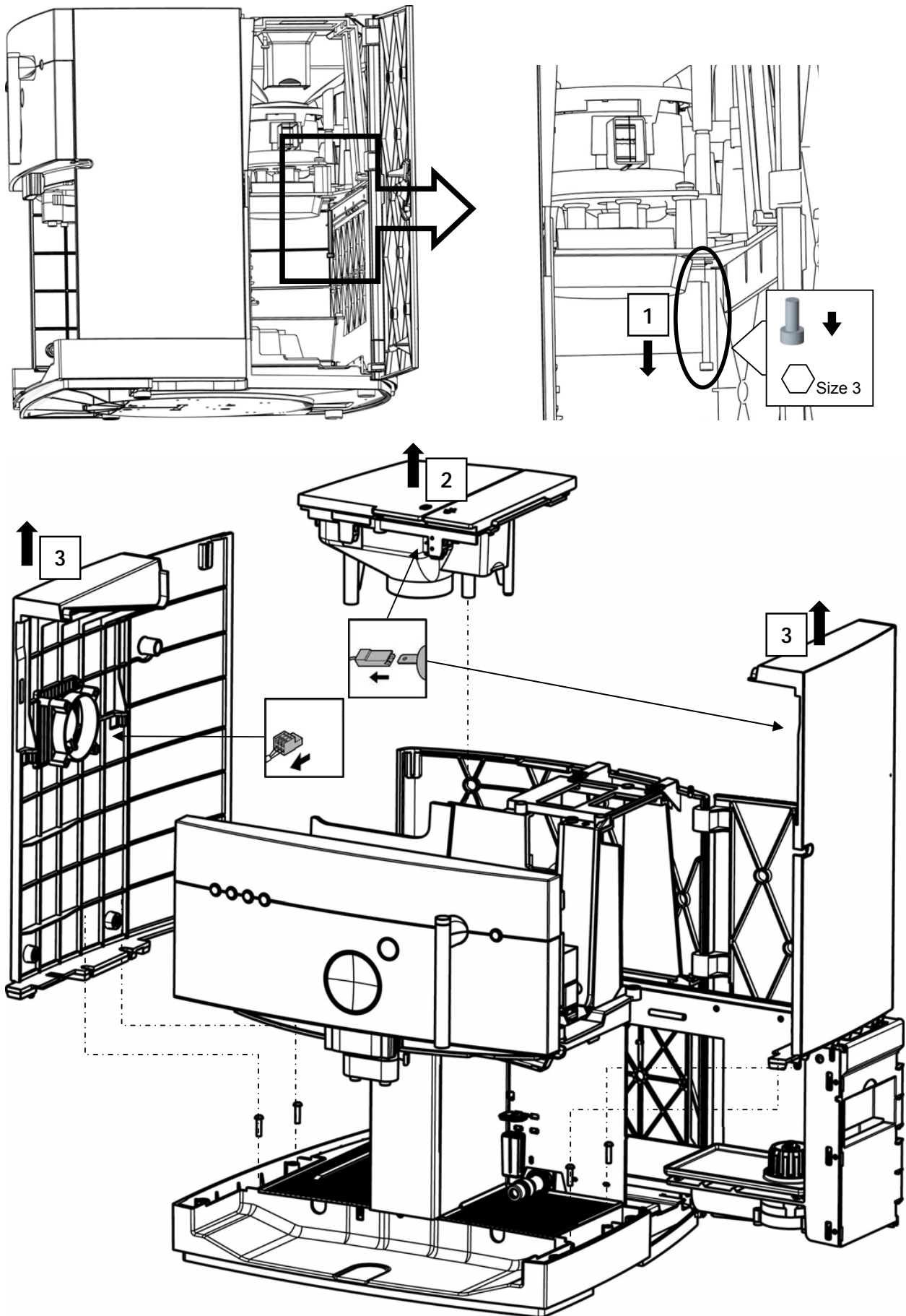
For safety notes, refer to chapter 2 on page 2-1.

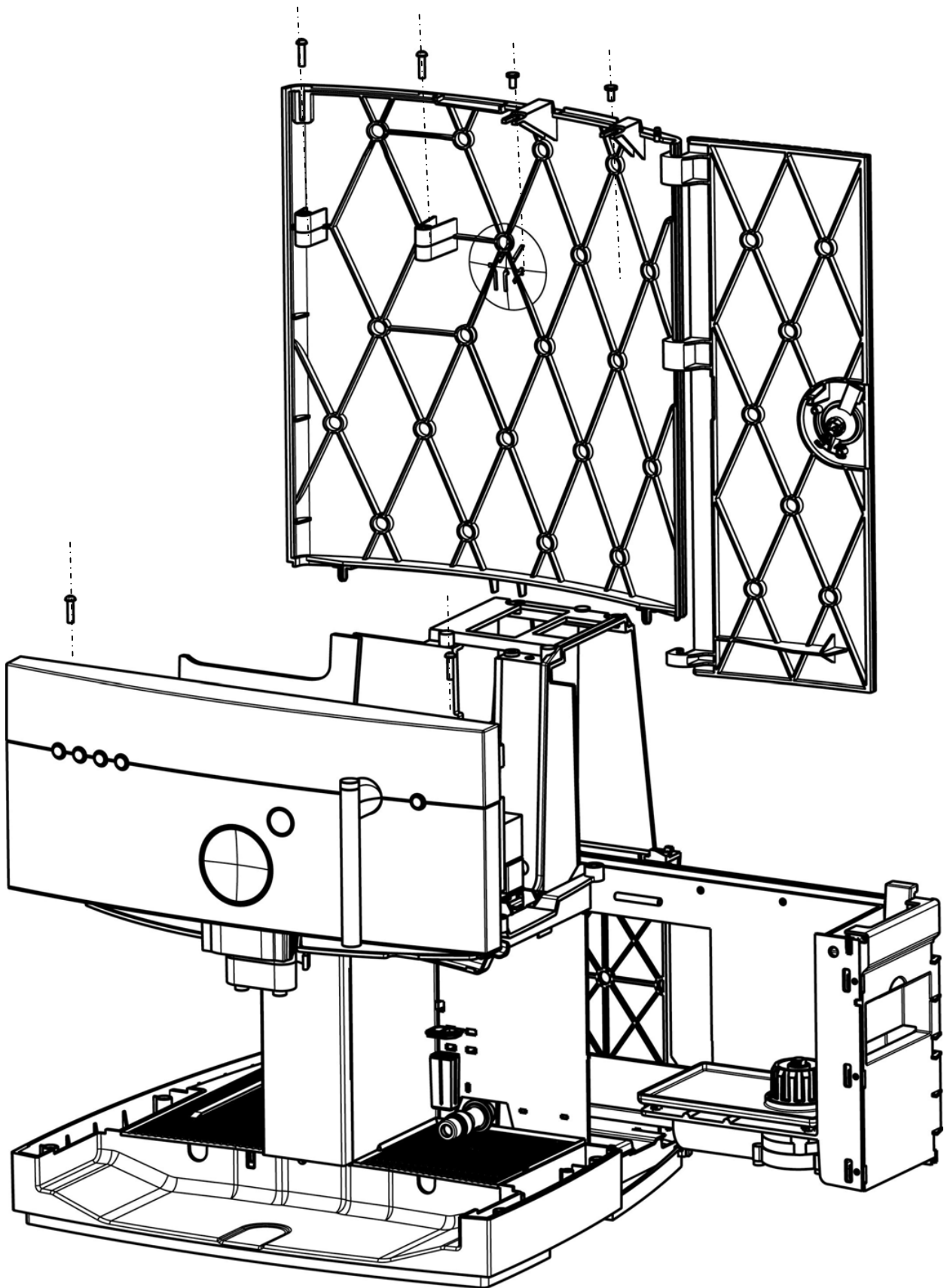
"Removing the housing"—either partially or completely—is necessary in order to maintain certain components as outlined in chapter 5.3.



Disconnect the machine from the mains power supply.

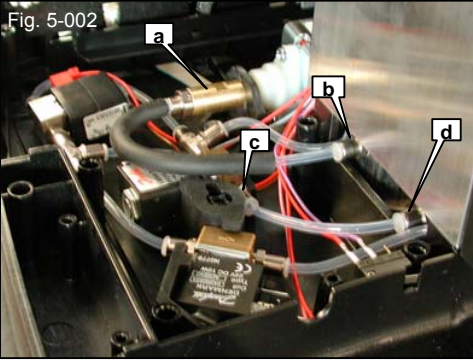






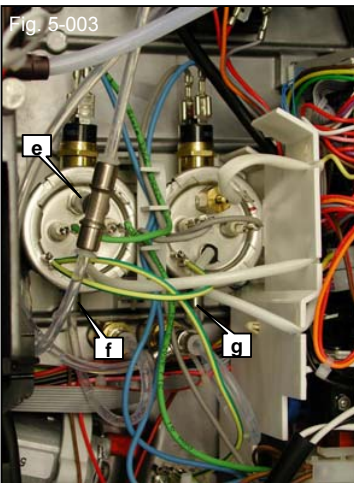


5.3 Removing the hot water boiler / steam boiler



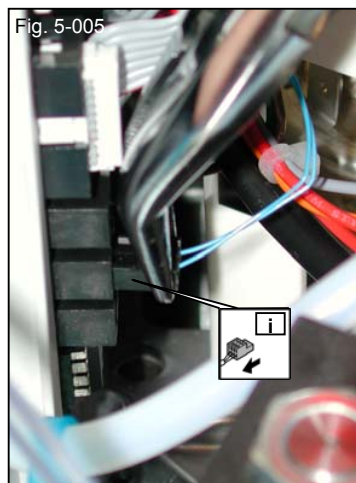
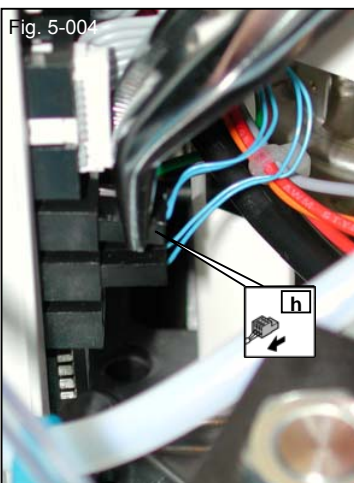
1a Hot water boiler
Disconnect the formed hose from the Legris nipple (a) and drain the water from the hose into a container. Then, disconnect the formed hose from the Legris nipple (b).

1b Steam boiler
Disconnect the formed hose from the Legris nipple (c) and drain the water from the hose into a container. Then, disconnect the formed hose from the Legris nipple (d).



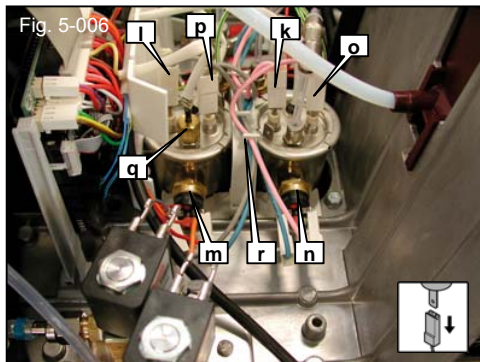
2a Hot water boiler
Then, disconnect the formed hose from the Legris nipples (e) and (f).

2b Steam boiler
Disconnect the formed hose from the Legris nipple (g).



3a Hot water boiler
Using bent nose pliers, carefully disconnect the electrical plug connector (h) of the HWB temperature sensor from the PC board.

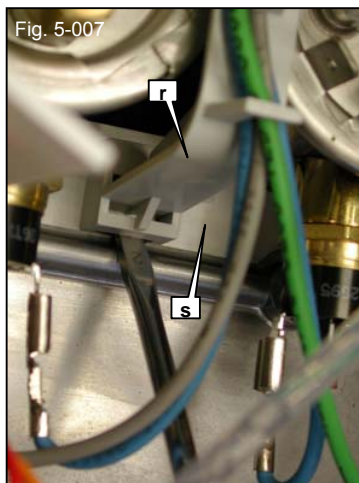
3b Steam boiler
Using bent nose pliers, carefully disconnect the electrical plug connector (i) of the SB temperature sensor from the PC board.



- 4 Disconnect the electrical plug connectors of the following elements:

- (k) Steam boiler heater (to the PC board)
- (l) Hot water boiler heater (to the PC board)
- (m) Steam boiler safety thermostat (blue)
- (n) Hot water boiler safety thermostat (blue)
- (o) Steam boiler earthing cable
- (p) Hot water boiler earthing cable
- (q) Steam boiler level probe

- 5 Then, unhook the cables from the holding bracket (r).



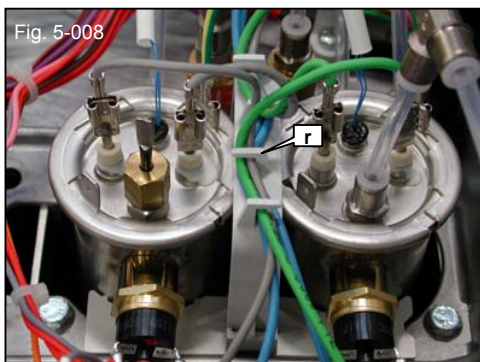
- 6 Using a screwdriver, carefully push the mounting of the holding bracket (r) backwards and lift the holding bracket upwards, unhook it on the opposite side and pull it upwards and out.

- 7 Remove the spacer (s) and the opposite spacer (not pictured), preferably using a needle nose pliers.
(The spacers (s) are not fastened and, without the holding bracket (r), quickly fall into the shaft).

- 8 Rotate the hot water boiler anticlockwise, then pull it upwards and out.

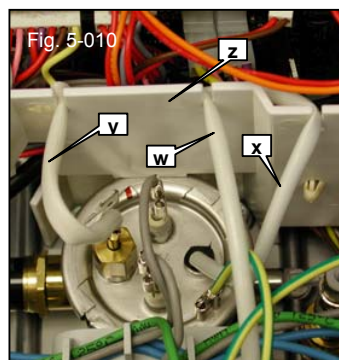
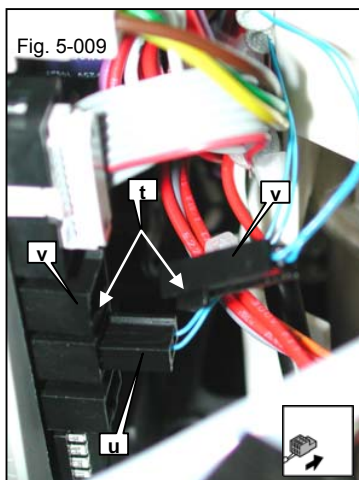
- 9 Rotate the steam boiler anticlockwise, then pull it upwards and out.

Installation



If possible, insert the steam boiler first.

After successful connection, hook the cables of the safety thermostats and heaters neatly into the holding bracket (r).



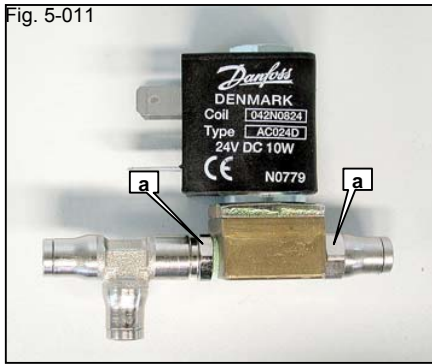
- (t) The plugs of the temperature sensors are equipped with an "anti-twist device."

- (u) Connect the temperature sensor of the steam boiler to the PC board.

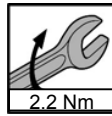
- (v) Connect the temperature sensor of the hot water boiler to the PC board.

Insert the cables of the hot water boiler temperature probe (w), the steam boiler temperature probe (x) and the steam boiler level probe (y) into the cut-outs of the "PC board insulation" (z).

Fig. 5-011



Tighten the Legris connections (a) with a torque of 2.2 Nm!

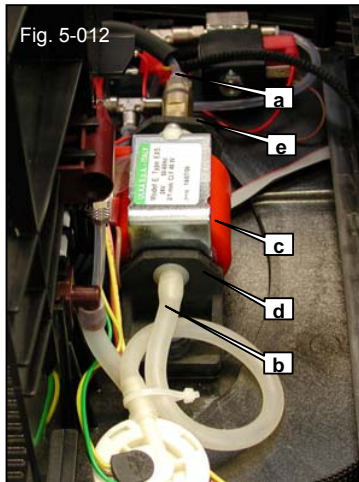


5.4 Removing the vibration pump



Disconnect the machine from the mains power supply.

Fig. 5-012



- 1 Disconnect the formed hose from the Legris connection (a).
- 2 Pull off the silicon hose (b) from the connection nipple and push the vibration pump (c) out of the rubber mount (d) on one side.
- 3 Pull the vibration pump (e) out of the rubber mount on the other side
- 4 Rotate the vibration pump 90° clockwise and disconnect the cable connections (a) + (b).

Fig. 5-013

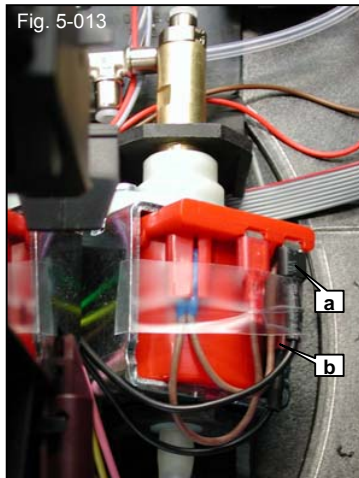
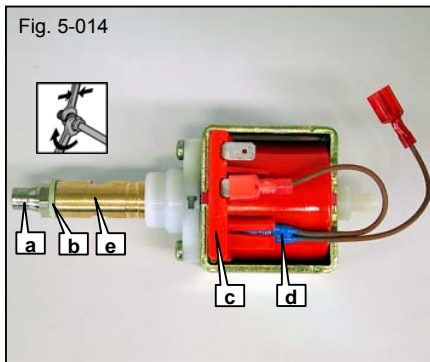


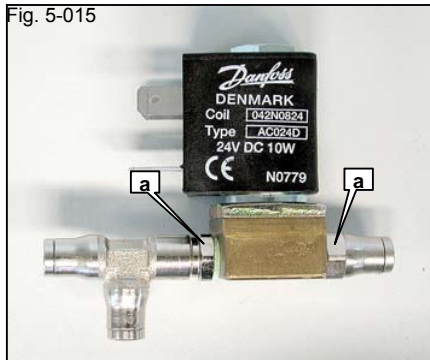
Fig. 5-014



- 5 Unscrew the Legris connection from the non-return valve of the vibration pump.

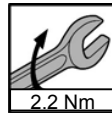
- (a) Legris connection
- (b) Flat seal (after removing the Legris connection, check for damage and replace if necessary)
- (c) Vibration pump
- (d) Thermal switch (temperature monitoring of the vibration pump)
- (e) Non-return valve (... of the vibration pump cannot be replaced)

Fig. 5-015



During installation, ensure that the silicon hose is not kinked.

Tighten the Legris connections (a) with a torque of 2.2 Nm!

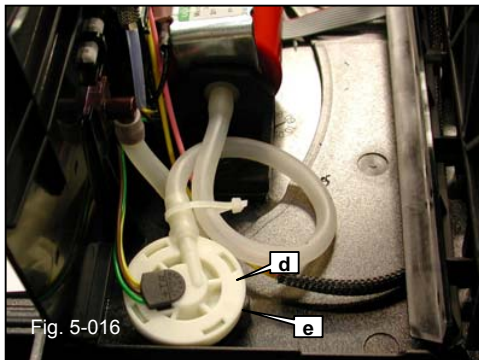


5.5 Removing the flow meter

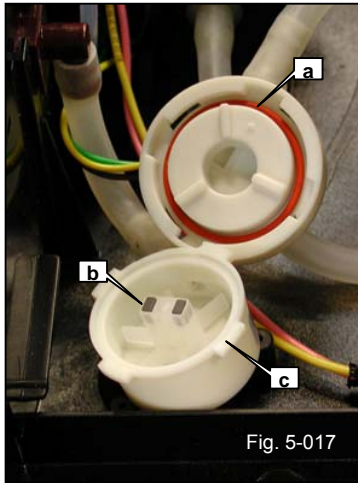


Disconnect the machine from the mains power supply.

If the O-ring (a), blade impeller (b) or flow meter cup (c) (bottom section with restrictor) are defective, they can be replaced if necessary (Fig. 5-017):



- 2 Lift the flow meter (d) upwards and out of the mount (e).
- 3 Hold the flow meter lid and rotate the flow meter cup clockwise (bayonet catch)



- (a) O-ring
- (b) Blade impeller
- (c) Flow meter cup (bottom section with restrictor)

Fig. 5-017

Installation

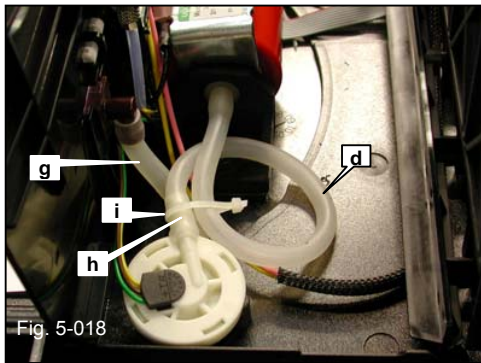


Fig. 5-018

During installation, ensure that the silicon hoses (f) + (g) are not kinked.



The water inlet (h) and outlet (i) of the flow meter must lie on top of each other.

Correct: Fig. 5-018

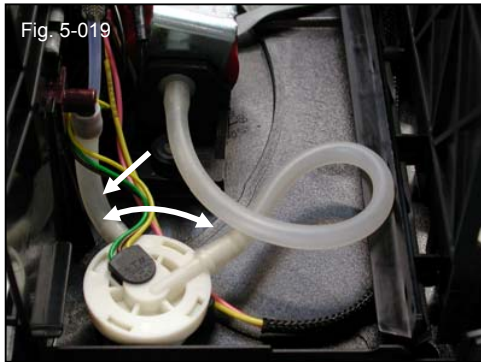


Fig. 5-019

Wrong Fig. 5-019

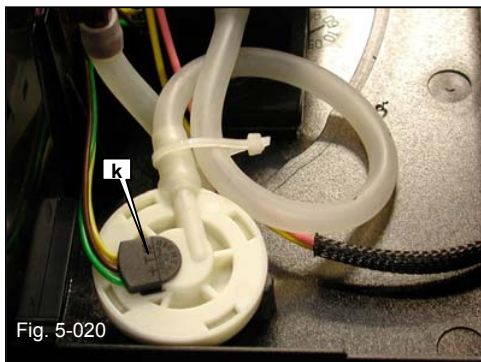


Fig. 5-020

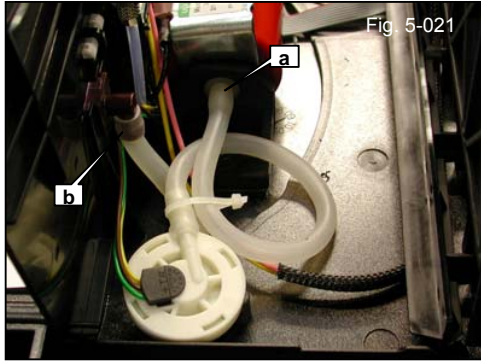
The Hall sensor (k) must not be removed, as otherwise an accurate count of the water volume cannot be guaranteed. If the flow meter lid, Hall sensor or cable strands flow meter are defective, the entire flow meter must be replaced.



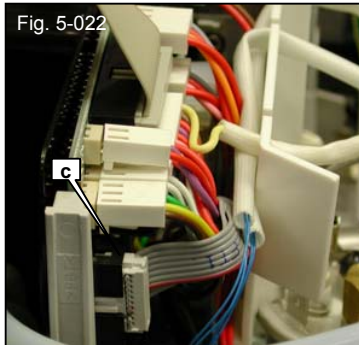
Refer to section [Removing the 5.6](#) on page 5-11



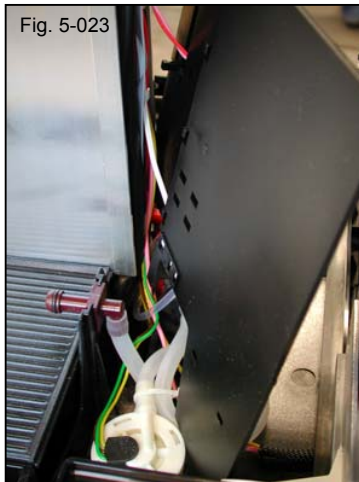
5.6 Removing the flow meter and cables



- 1 Disconnect the silicon hoses (a) + (b).

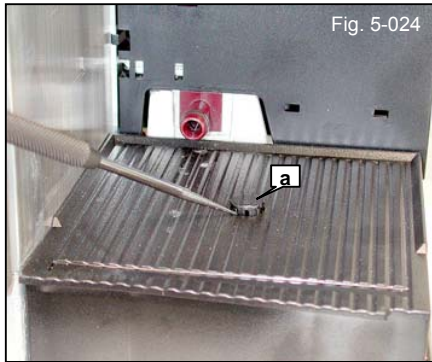


- 2 Carefully disconnect the electrical plug connector (c) of the flow meter from the PC board.
- 3 Hold the middle panel with the left hand. With the other hand, carefully push the middle panel towards the back.



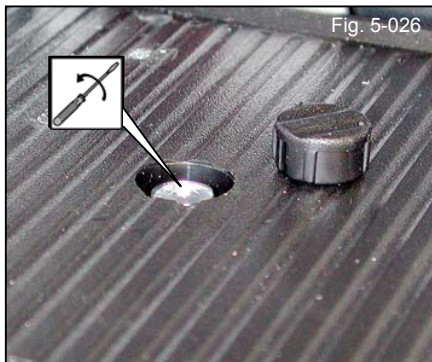
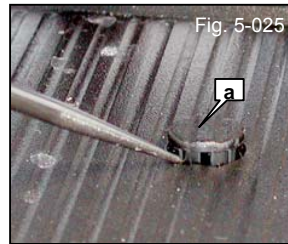
- 4 Remove the cables from the machine.
- 5 Install the new flow meter and insert the cables.
- 6 Carefully install the middle panel by following the above steps in reverse order and while ensuring that no cables are pinched in the process.

5.7 Removing the transformer

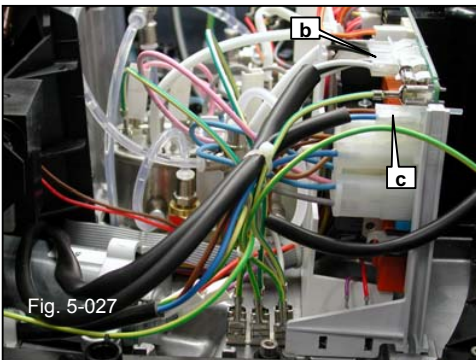


- 1 Using a sharp-pointed object (such as the scriber) ...

a ... remove the "platform lid".
(Figs. 5-024 + 5-025).



- 2 Unscrew the screw using a size 2 Philips screwdriver, unscrew the screw and pull the transformer forwards and out.



- 3 Carefully disconnect the electrical plug connectors (b) + (c) of the transformer from the PC board.

- 4 "Remove" the cables from the machine.



5.8 Removing the complete front panel

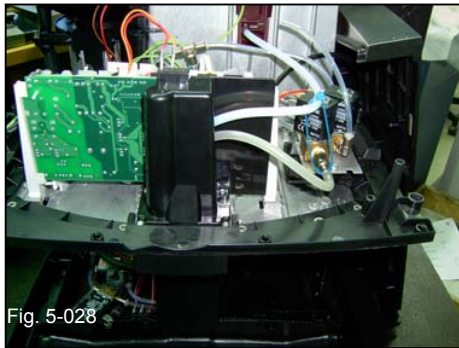


Fig. 5-028

1. Remove both side walls (see p. 5-37 and the following).
2. Remove both screws (a).
3. Disconnect the 3 connection cables (b+d).
4. Remove the hose to the hot water spout (c).
5. The front panel can now be removed towards the front.

Caution: It is critical that, when installing the front panel, the earth wire (d) is installed properly and tightly.

5.9 Replacing the panel cover:

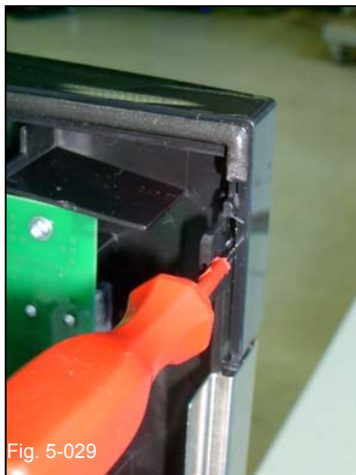


Fig. 5-029

1. With a small screwdriver, brace the cover at the location marked (d) (left and right) and pry the cover up and out.

5.10 Removing the All-in-one spout

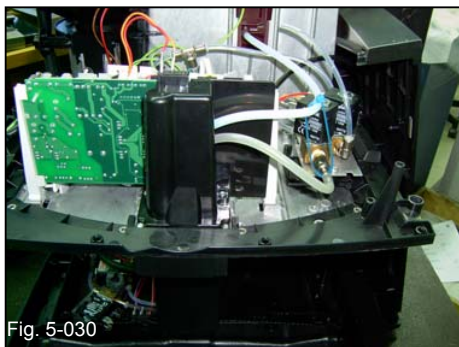


Fig. 5-030

1. Remove both side walls and the front panel (see p. 5-37 and the following).



2. Disconnect both hoses (a).

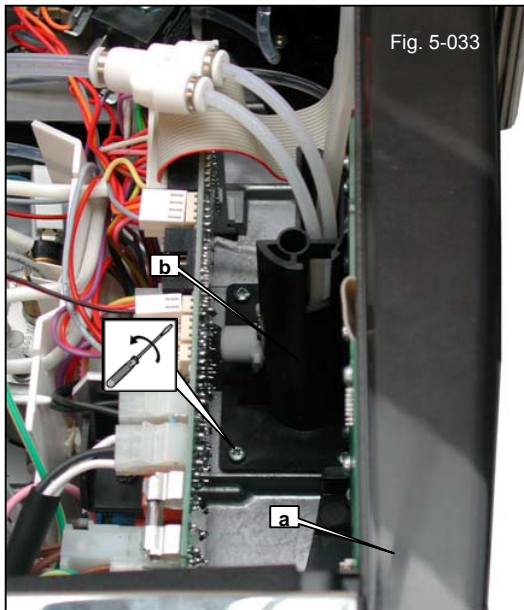
3. Remove 4 screws (b) on the cover (c). Lift and remove the cover.



4. Pull the foamer (spout) downwards a little. The complete foamer can then be lifted out.

5. Install the new foamer by following these instructions in reverse order. In doing so, ensure that the hoses are layed correctly (a).

5.11 Removing the All-in-one Pro spout



Before the spout can be completely removed, the following steps must be carried out:

Remove the side covers (see section 5.2, "Removing the housing").

Remove the complete front panel (a) (see section 5.8).

The spout (b) can now be removed.

6 SPECIAL NOTES

Drainage	6.1	6-2
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6.1 Drainage

Drain the coffee machine in order to prevent consequential damage due to freezing of water remaining in the machine.

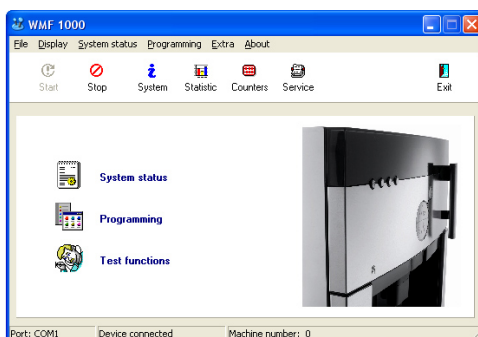
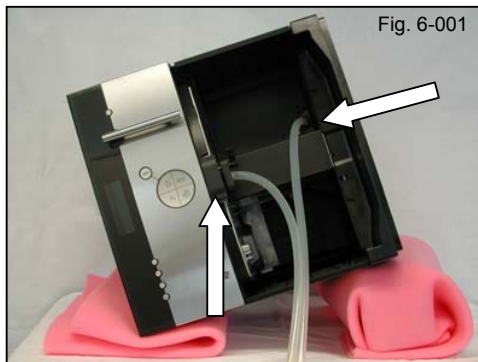


Fig. 6-004

1. Remove and clean the brew unit.
2. Clean the brewing chamber using a vacuum cleaner.
3. Insert the brew unit into the coffee machine and close the service door.
4. Empty the coffee bean hopper and clean the vacuum cleaner.
5. Remove the water tank and grounds container.
6. Remove the spill-over cup.
7. Lay the machine on its left side (coffee bean hopper side), put it on an incline (Fig. 6-001) and stabilise it. Use a soft pad.
8. Attach a hose to the steam nozzle (Fig. 6-001)
9. Plug the power cord into the socket and start the machine.
10. Attach a compressed air line with 1 bar of line pressure to the water inlet (Fig. 6-002).

Caution: We recommend installing a compressed air monitor (air pressure reducer with display).

11. Connect the connection cable (Fig. 6-003) from the computer (laptop) to the PC board.
12. In the Service Program, select "Test functions", then right-click. Click on "System drain" (Fig. 6-004/5) and confirm with YES.
The steam boiler feeding valve is opened and the system is drained using the compressed air.
13. Once the water stops draining, remove the compressed air connection and water connection.
14. Return the machine to an upright position.
15. Insert the filled water tank and wait for the pump to refill with water.
16. Remove and empty the water tank.
17. The machine indicates that it is in standby. You can now exit the Service Program and unplug the cable connection to the computer.
18. Unplug the power cord from the socket.
19. Assemble the machine.

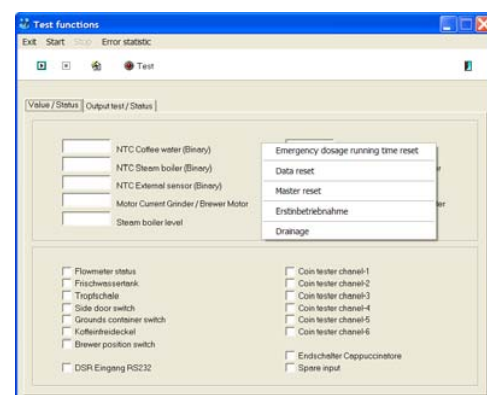


Fig. 6-005