

Technical perfection and top design

**kränzle**<sup>®</sup>  
HOCHDRUCKREINIGER

w w w . k r a e n z l e . c o m

# Operating manual

Hot Water High-Pressure Cleaners - electrically heated

*therm*

602 E-M 18

602 E-M 24

602 E-M 36

872 E-M 48



Read and conform safety instructions before use!

- GB -

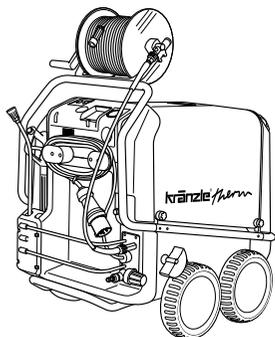


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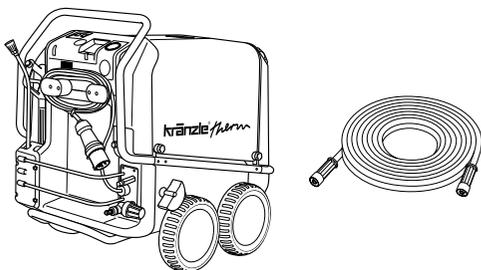
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## 4 This is what you have purchased

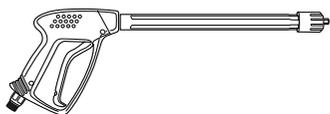


**1.** Kränzle hot water high-pressure cleaners **therm E-M**, electrically heated, with hose drum and 20 m steel-weave high-pressure hose

or



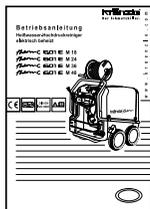
Kränzle hot water high-pressure cleaners **therm E-M**, electrically heated, without hose drum but with 10 m steel-weave high-pressure hose



**3.** Safety spray gun with insulated handle and screw connection

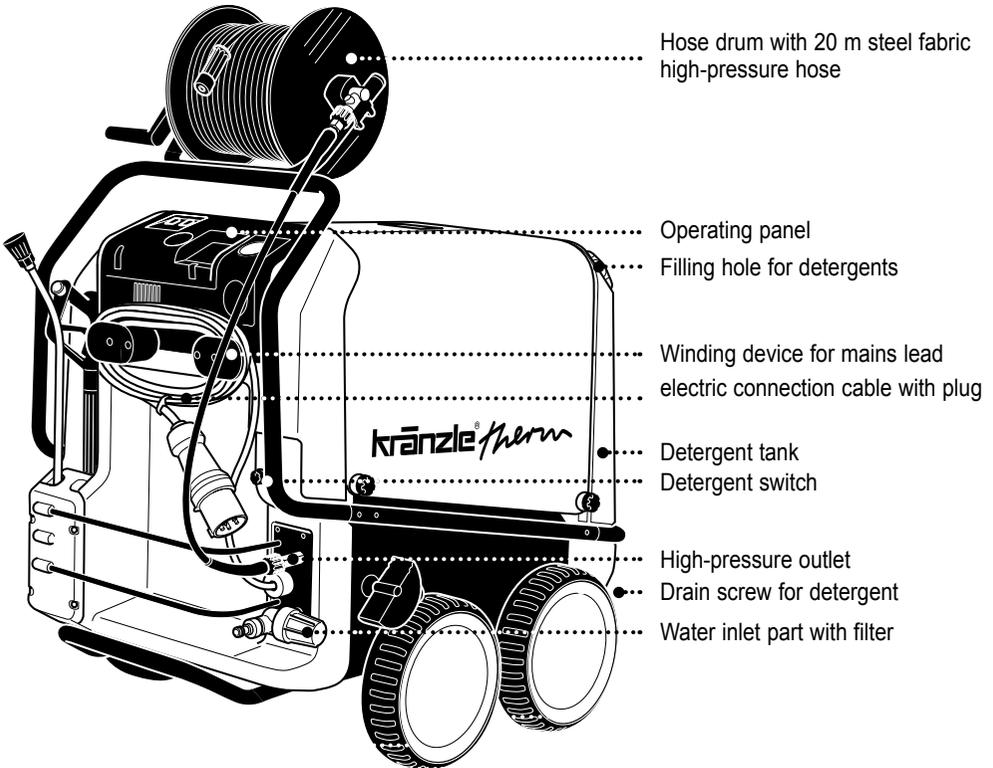


**4.** Spray lance



**5.** Operating manual

# Gerätebeschreibung Kränzle therm E-M



Hose drum with 20 m steel fabric high-pressure hose

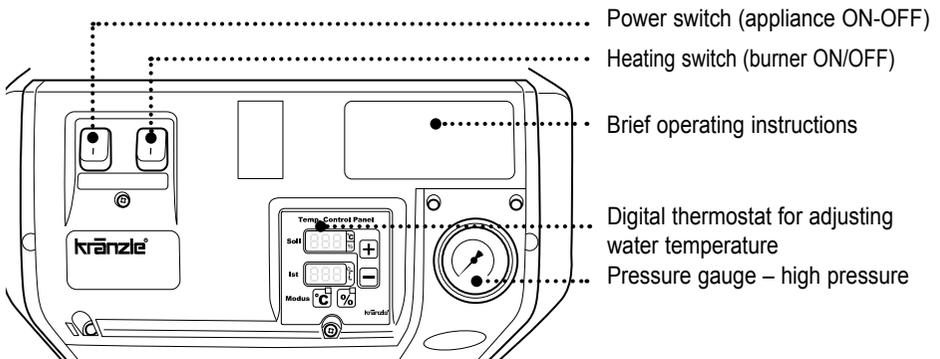
Operating panel  
Filling hole for detergents

Winding device for mains lead electric connection cable with plug

Detergent tank  
Detergent switch

High-pressure outlet  
Drain screw for detergent

Water inlet part with filter



Power switch (appliance ON-OFF)

Heating switch (burner ON/OFF)

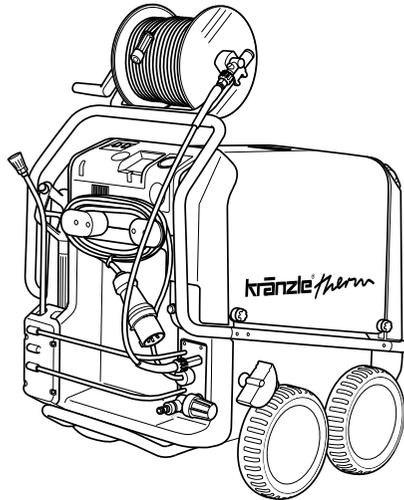
Brief operating instructions

Digital thermostat for adjusting water temperature

Pressure gauge – high pressure

**6** **Technical data****therm 602 E-M 18**

<b>Operating pressure, continuously adjustable, nozzle size 25045</b>	30 - 100 bar
<b>Operating pressure, continuously adjustable, nozzle size 2503</b>	30 - 160 bar
<b>Admissible overpressure, nozzle size 25045</b>	120 bar
<b>Admissible overpressure, nozzle size 2503</b>	170 bar
<b>Water output</b>	180 - 600 l/h
<b>Maximum hot water discharge</b>	60 °C at 32 bar
<b>Sucked in water is heated</b>	by 26 °C with 10 l/min
<b>Maximum water inlet temperature</b>	60 °C
<b>Steel fabric high-pressure hose</b>	10 m
<b>Connected load</b>	400 V, 32,6 A, 50 Hz
<b>Wattage</b>	20,6 kW
<b>Heating output</b>	18 kW
<b>Fuse</b>	50 A
<b>Protection type</b>	IP 54
<b>Weight</b>	220 kg
<b>Dimensions in mm without hose drum, L x W x H in mm</b>	1050 x 800 x 1000
<b>Order no. with 10 m HP hose</b>	<b>41.360</b>
<b>Order no. with 20 m HP hose and hose drum</b>	<b>41.360 1</b>



**therm 602 E-M 24**

**therm 602 E-M 36**

**therm 872 E-M 48**

30 - 100 bar	30 - 100 bar	30 - 170 bar
30 - 160 bar	30 - 160 bar	
120 bar	120 bar	190 bar
170 bar	170 bar	
180 - 600 l/h	180 - 600 l/h	180 - 870 l/h
72 °C bei 32 bar	80 °C at 32 bar	80 °C at 32 bar
by 34 °C with 10 l/min	by 50 °C with 10 l/min	by 46 °C with 14 l/min
60 °C	60 °C	60 °C
10 m	10 m	10 m
400 V, 41,2 A, 50 Hz	400 V, 58,6 A, 50 Hz	400 V, 80 A, 50 Hz
26,6 kW	38,6 kW	53,5 kW
24 kW	36 kW	48 kW
63 A	80 A	80 A
IP 54	IP 54	IP 54
220 kg	220 kg	220 kg
1050 x 800 x 1000	1050 x 800 x 1000	1050 x 800 x 1000
<b>41.361</b>	<b>41.362</b>	<b>41.363</b>
<b>41.361 1</b>	<b>41.362 1</b>	<b>41.363 1</b>

Permissible tolerance for figures  $\pm 5\%$  in acc. with VDMA uniform sheet 24411

## **General rules**

### **Range of application**

This machine may only be used for cleaning facades, vehicles, containers, pavement slabs, stables, machines and similar objects.

### **Inspections**

The machine must be inspected according to the “Guidelines for Liquid Spray Devices” at least once every 12 months by a qualified person, to ensure that continued safe operation is guaranteed. The results of the inspection are to be recorded in writing. This may be done in any form. For inspection reports see pages 54/57.



**High-pressure cleaners used for commercial purposes have to be checked by a qualified person at least every 12 months!**

### **Accident prevention**

The machine is designed for accidents to be impossible (if used according to these instructions). Please read safety notes included in these instructions carefully before using the machine and act correspondingly. Operating staff has to be instructed according to this manual. The “Guidelines for Liquid Spray Devices” must be complied with.

### **Setting up - Location**



**Neither set up and operate the machine in rooms where there is a risk of fire or explosion nor put it into puddles. It is prohibited to use the machine under water.**

## **Safety notes**



**Do not jam the trigger of the gun during operation!**  
**When carrying through service and maintenance tasks the machine has to be cut off the power supply system. Put main switch to "0" and pull plug out of socket.**

**Never operate the machine if cables or other safety-relevant parts (e.g. excess pressure valve, high-pressure hose, spraying devices, etc.) are defective.**

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## Safety notes



Never operate the machine without supervision. The machine may only be operated by persons who have been instructed accordingly.

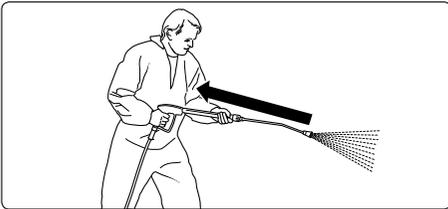
Some parts inside the machine, all water conducting components and all metal parts of gun and lance are hot during hot water operation. Keep all hoods and protective covers closed during operation and never touch any metal parts of gun or lance.

Persons operating the machine should wear the necessary protective clothing, i.e. waterproof clothing, rubber boots, safety goggles, headwear etc. It is prohibited to use the machine in close vicinity to people lacking suitable protective clothing.

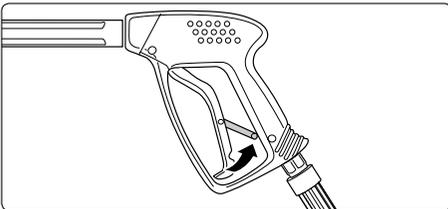
The high pressure spray can generate a high level of noise. If noise exceeds the maximum allowed levels, users and others in the vicinity must wear suitable ear protection.

Do not spray against matter containing asbestos or other hazardous substances.

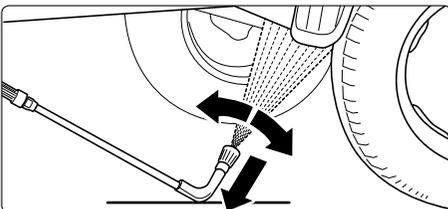
For safety reasons always switch the main switch to "0"- position after having finished the cleaning task (disconnection from power supply).



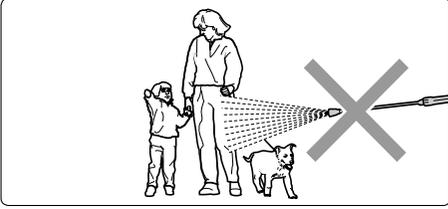
Bear in mind that during cleaning tasks with a high-pressure water jet a significant recoil at the lance arises. Additionally angled lances produce a clearly perceivable amount of torque.



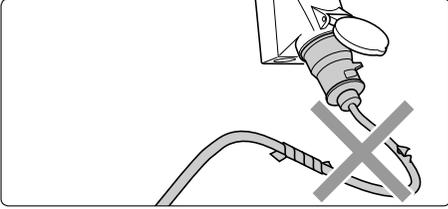
Apply the safety catch on the spray gun after each use, in order to prevent unintentional spraying!



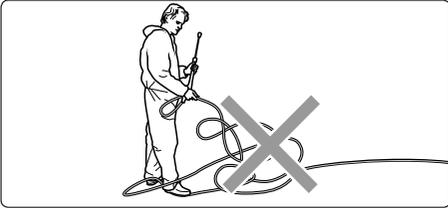
Always aim the underbody lance! Bear in mind when using a curved or angled spraying lance that there is a significant amount of torque in the recoil!

**Safety notes - This is prohibited!**

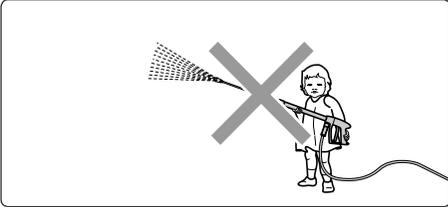
**Never direct the water jet at people or animals!**



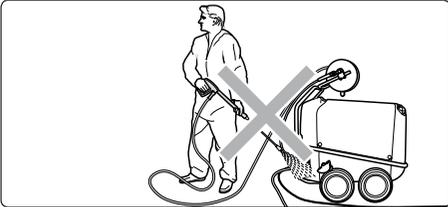
**Only use power cables which are in perfect working order! Do not damage the power cable or repair it incorrectly!**



**Never pull the high pressure hose if it has formed kinks or “nooses”!  
Never pull the hose over sharp edges!**

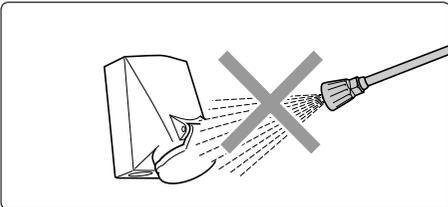


**Never allow children to use the high pressure cleaner!**



**Never direct the water jet at the machine itself!**

**The machine may not be placed within reach of the water jet spray mist!**



**Never direct the water jet at a power socket!**

## ■ Connection to water supply

Please pay attention to the regulations of your waterworks company! In accordance with DIN EN 61770, the machine may not be directly connected to the public drinking water supply lines. A brief connection however is permissible according to DVGW (German Association for Gas and Water Affairs) if a tube ventilator with check valve (Kränzle Order-No. 41.016 4) is built into the water supply. Also indirect connection to the public drinking water supply lines is permissible by way of free emission in accordance with EN 61 770; e.g. by using a reservoir with a float valve. Direct connection to a non-drinking water supply line is permissible.

## ■ Electrical connection

The voltage given on the specification plate must match the mains voltage.

**The machine is supplied with power cable without plug. The plug has to be equipped with a safety earth terminal and a 30 mA residual-current circuit breaker. The mains connection has to be fused with a time-delay fuse according to the specifications on page 6/7.**

If an extension cable is used, it must have an earth line that is properly connected to the plug connections. The conductors in the extension cable must have the following minimum cross section:

at 18 kW - 6 mm<sup>2</sup>

at 24 kW - 10 mm<sup>2</sup>

at 36 kW - 16 mm<sup>2</sup>

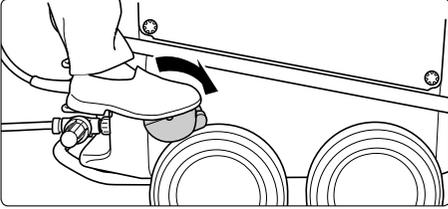
at 48 kW - 25 mm<sup>2</sup>



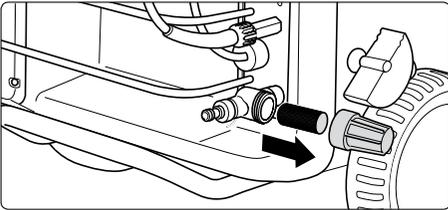
**Extension cables that are too long cause a drop in voltage and thus malfunctions. If you are using a cable drum, the cable must always be fully unwound.**

**12 Putting into operation**

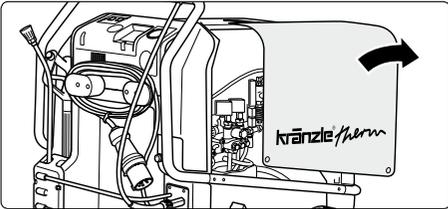
1. Steering the machine: To change direction tilt machine by pressing a foot against the footrest and pull the handle at the same time. Then turn machine into desired direction.



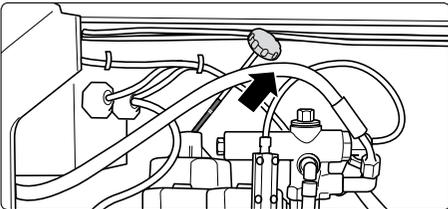
2. Always secure machine by activating the parking brake before starting work!



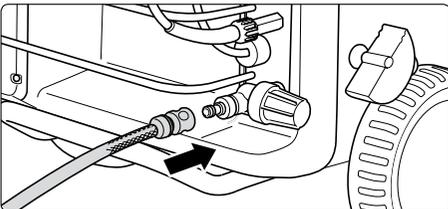
3. Check water inlet filter for cleanliness prior to putting the machine into operation! Unscrew glass body of the inlet filter and check if metal sieve is soiled.



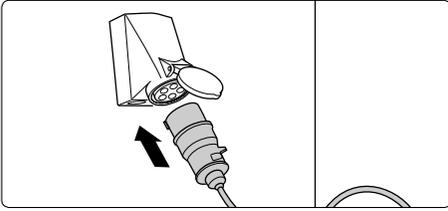
4. Always check oil level prior to operation!  
Open the right half of the protecting hood.



Do not start the machine if the oil level is not between the two markings on the oil-level glass. Refill with oil if necessary. See page 23

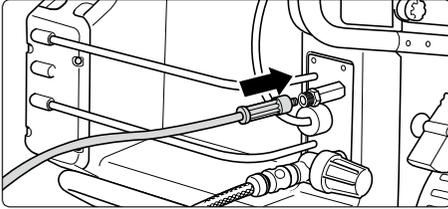


5. Connect machine to water mains (2 - 8 bar pre-pressure). Inside diameter of hose minimum 1/2 ". The water storage tank is filled with water. The float valve shuts the water intake as soon as the tank is full.

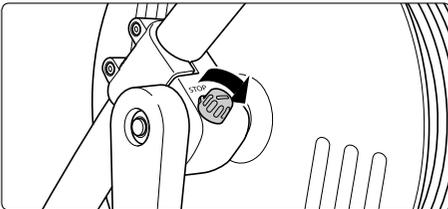


- 6.** Connect to power circuit. **Make sure that the main switch is on the "OFF" position.**

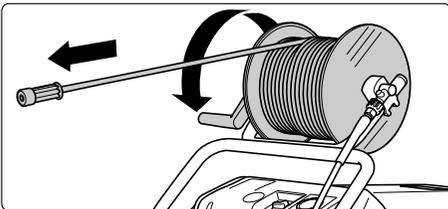
The socket must be protected by means of a time-delay fuse on the mains side (for details as to ampere values see technical data on pages 6/7).



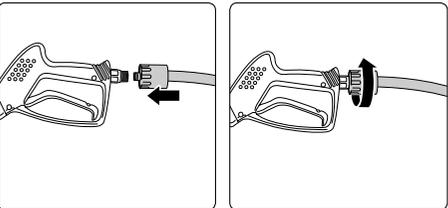
- 7.** For appliances without hose drum: Screw high-pressure hose to the high-pressure outlet pressure-tightly.



- 8.** Release fixation of hose drum.



- 9.** Unwind high-pressure hose from the hose drum without any kinks or nooses.

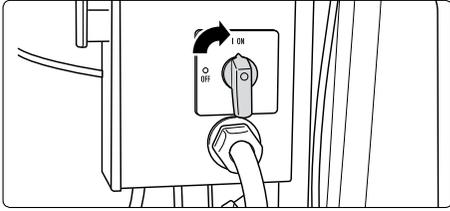


- 10.** Attach high-pressure hose to the gun and screw together pressure-tightly.

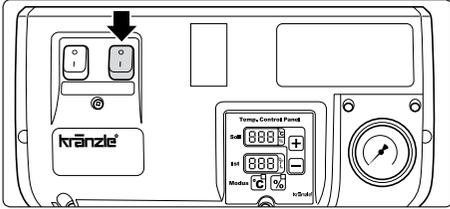


Take care that all screw connections are pressure-tight. A leakage of gun, high-pressure hose or hose drum has to be repaired at once. Leakages lead to an increased wear and to a possible malfunction of the delayed motor cut-out.

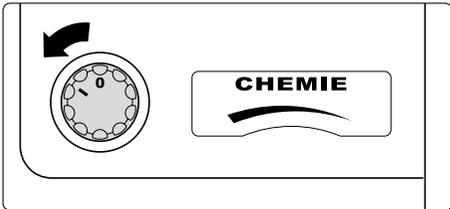
# Usage as a cold water high-pressure cleaner



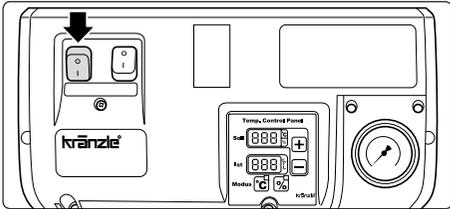
1. Switch on main switch located below the right part of the machine hood. (switch to "ON")



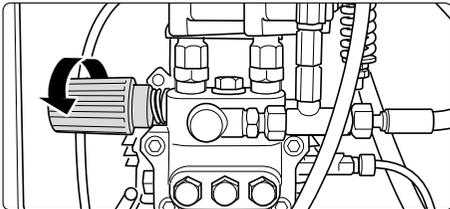
2. Ignition switch to **-OFF-** position



**Detergent valve must be closed!**  
(switch in left end position)



3. Switch on main switch with disengaged spray gun. Vent high-pressure cleaner: Pull and release trigger of spray gun repeatedly.

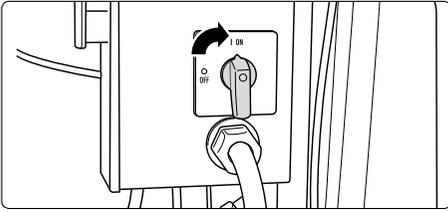


4. The operating pressure is regulated by means of the pressure regulating valve at the pump head: turn the knob to the left to decrease the operating pressure; turn it to the right to increase the operating pressure.

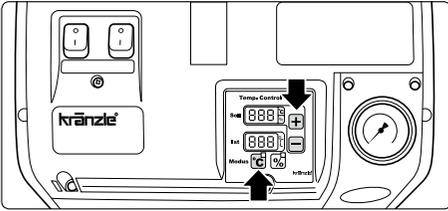


5. Start cleaning task.

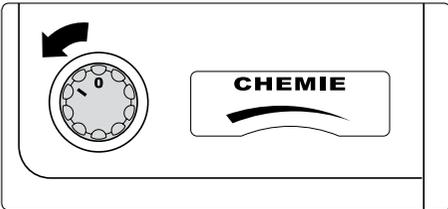
# Usage as a cold water high-pressure cleaner 15



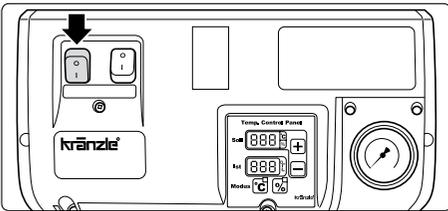
1. Switch on main switch located below the right part of the machine hood. (switch to "ON")



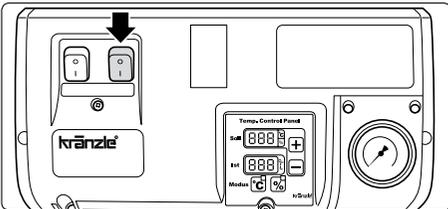
2. a) Temperature mode: Set required temperature at the thermostat. (Min. temperature 40 °C)  
b) Percentage mode: Set percentage value for heating output. (see pages 18/19)



**Detergent valve must be closed!**  
(switch in left end position)



3. Switch on main switch with disengaged spray gun. Vent high-pressure cleaner: Pull and release trigger of spray gun various times



4. Start ignition. The water is heated up and constantly kept at the set temperature.

**Start cleaning task**

During high-pressure operation (above 30 bars) the temperature may not exceed 90 °C!



During steam operation (90 - 150 °C) the pressure may not exceed 30 bar  
To reach the steam level (above 90 °C water temperature) adjust the pressure below 30 bar and choose by means of the thermostat the desired temperature of up to max. 150 °C.

In the case of machines with hose drums, the high pressure hose must always be unwound completely.

---

**16 Kränzle technology****■ Water and cleaning system**

The water is fed to the high-pressure cleaner under pressure (2-8 bar pre-pressure). A float valve regulates the water flow in the storage tank. Then the water is sucked directly from the storage tank by the high-pressure pump and forced with the adjusted pressure through the heat exchanger to the safety spray lance. The high pressure jet is formed by the nozzle at the end of the safety lance.



**Environmental, refuse disposal and water protection regulations must be observed!**

**■ Lance with trigger gun**

The machine can only be operated when the safety trigger is squeezed. When the lever is squeezed, the spray gun opens. The liquid is then pumped to the nozzle. The spray pressure increases and quickly reaches the selected operating pressure. When the trigger is released, the trigger gun closes and any further spraying of liquid from the lance is stopped. The motor stops.

When actuating the gun once more the pressure control valve - safety valve closes and the motor is started again. The pump resumes feeding water to the spraying lance with the selected operating pressure. When the gun is closed, the water hammer opens the pressure control valve - safety valve and the motor is switched off by the pressure switch.



**The trigger gun is a safety device. Repairs should only be performed by qualified persons. Should replacement parts be required, use only components authorized by the manufacturer.**

**■ Total stop system**

The machine is fitted with a Total-Stop-System. If the gun is closed for longer than approx. 20 seconds, the machine switches off automatically, after 20 minutes the machine moves to safety switch off and you must use the main switch to turn it back on. The machine restarts automatically when the gun is operated, provided that the master switch is on.

---

## ■ High pressure hose and spraying device

The high pressure hose and spraying device supplied with the machine are made of high grade material, they are also optimized for the machine and marked as required by the appropriate regulations.



If replacement parts are required, only such parts that are authorized by the manufacturer and which bear the markings required by the appropriate regulations may be used.

The high pressure hose and spray device must be connected in a pressure-tight manner.

The high pressure hose may not be driven over, pulled excessively, or twisted. The hose may under no circumstances be pulled over sharp edges, since otherwise the guarantee is automatically void.

Hoses are wearing parts. The guarantee only covers defects of fabrication no external damages whatsoever.

Defective high-pressure hoses and spraying devices may not be repaired. They always have to be replaced.

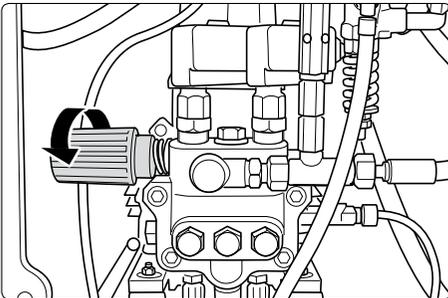
## ■ Pressure control valve-safety valve

The pressure control valve allows full adjustment of water quantity and pressure. The safety valve protects the machine from excessive pressure and cannot be adjusted beyond the admissible operating pressure. The setting nuts are sealed with lacquer.



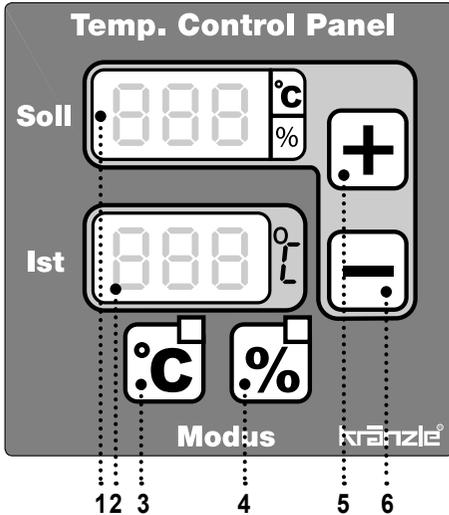
Replacements, repairs, new adjustments and sealing operations may only be performed by trained personnel.

## ■ Adjustment of pressure, quantity and temperature



The operating pressure, the water flow and correspondingly the water temperature ist controlled by the pressure control valve.

A right-hand turn increases the pressure, a left-hand turn decreases the pressure.

**18 Kränzle technology****■ Thermostat**

The thermostat controls the spray water temperature.

After you switch on the device, "888" appears in both displays for approx. 1 second as a test of the functioning of the displays.

**The thermostat has two operating modes:**

**1. Temperature mode**

This mode is always activated when the unit is switched on or can be selected using the "°C" button (Pos. 3). The red LED above the "°C" button and next to the set temperature display lights up. The desired "Set" temperature is set using the two buttons (+/-, Pos. 5+6) and can be read in the upper display (Pos. 1). If you press the button for a longer time, the set temperature is quickly adjusted in 5°C increments.

The last set value set is also stored after the unit is switched off and is available again immediately after switching back on.

The current spray temperature can be read from the bottom display (Pos. 2).

**2. Percentage mode**

This mode is activated by pressing the "%" button (Pos. 4). The yellow LED above the "%" button and next to the set temperature display flashes.

In the temperature control system in conventional high pressure cleaners, and in **temperature mode** for this unit, the water temperature is measured at the outlet of the heater, and the heater is switched on an off according to the temperature desired by the user. Due to the large amount of water in the heating coil, it takes a long time until the temperature sensor registers that the burner has switched on and the desired temperature has been reached. This means that the temperature increases far above the desired value or falls far below the desired value.

**Thermostat - Percentage mode**

The innovative new **percentage mode** now lets the user specify the switching duration of the heater in percent using the "+" and "-" buttons (Pos. 5+6) (100% being the max. temperature) rather than setting the desired temperature. Now the result of the setting must be checked by using the "Actual" temperature display. If the desired temperature has not yet been reached, the percentage must be increased.

By setting percentages of the heating duration, the temperature of the high pressure jet is kept constant in a very narrow range.

The last value set is also saved after the unit is switched off in percent mode.

**Operating hour meter**

The cleaner is equipped with an operating hour meter.

If during normal operation the momentary operating mode button ( "°C" or "%" ) is actuated for more then 2 seconds, the operating time of the pump is displayed for 5 seconds and afterwards the combustion time for 5 seconds as well. Thereafter the display shows the original values again.

As long as the operating hours are displayed no further inputs on the monitor are possible.

The operating time is displayed in hours [ h ] either in the "TARGET" or in the „ACTUAL“ window. The 1000 and 100 hours are displayed in the „TARGET“ window and the 10, 1 and 1/10 hours in the "ACTUAL" window:

Pump operating time: Target-Display: P 9 9 Actual-Display: 9 9. 9 for 9 999.9h

Combustion time: Target-Display: F 9 9 Actual-Display: 9 9. 9 for 9 999.9h

e.g.: F00 27.3 = Cumbustion time 27 hours and 18 minutes

**Displayed malfunctions**

Anzeige im Feld		Ursache	Abhilfe
SOLL	IST		
Err	OFF	Wassertemperatur am Ausgang der Heizelemente über 147 °C	Gerät ohne Heizung „Heizung AUS“ so lange betreiben, bis die Temperatur wieder unter 147°C gefallen ist. Hauptschalter „AUS“ und wieder „EIN“ schalten
AUS	E7	Gerät wurde länger als 20 Minuten nicht betrieben -> Sicherheitsabschaltung	Hauptschalter „AUS“ und wieder „EIN“ schalten.
Err	E2	Temperatursensor defekt	Temperatursensor ersetzen

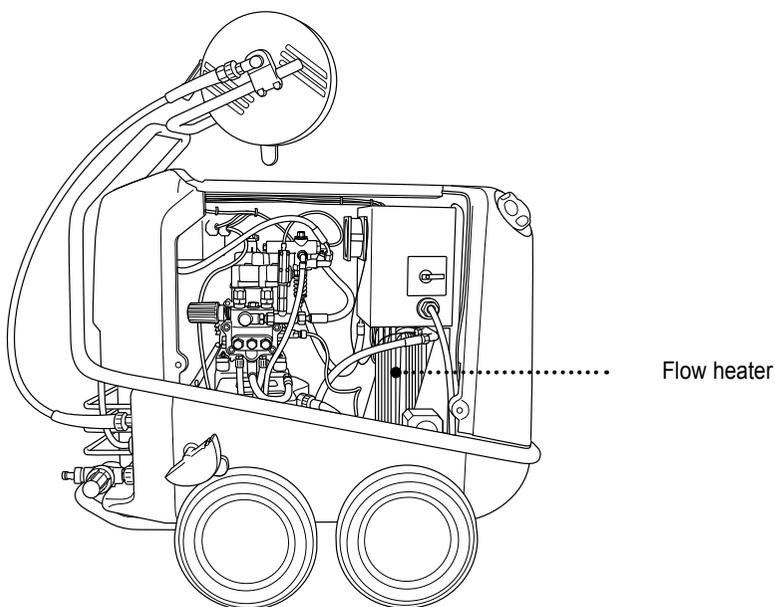
**20 Kränzle technology****■ Electric heating 18, 24, 36, 48 kW**

The flow heaters are connected in series in modular design according to machine type and kW output.

For water temperature at max. water output we refer to the table on pages 6/7, second column „Heating of sucked in water“.

To be able to reach the maximum hot water output temperature it might be necessary to reduce the operating pressure, thus reducing the water output in l/min at the same time (see page 17).

For the temperature values we refer once more to the table on page 6/7, see „max. hot water output“

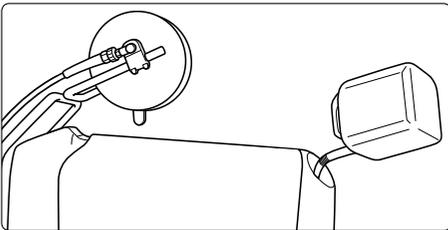


# Suction of detergents

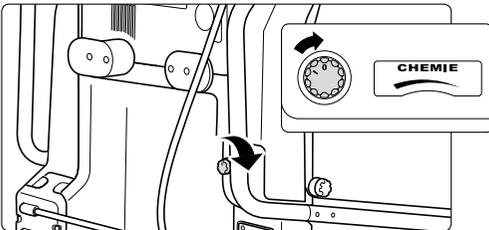
## ■ Detergent supply from the suction side:

Detergent injection on the pressur side, as you probably know it from other HP cleaners, consume approx. 30 % of the cleaning energy, no matter if they are used or not. Due to the water tank fitted to the Kränzle therm cleaners it is now possible to directly suck the detergent into the pump thus reducing output loss and increasing the efficiency considerably.

**The detergents are applied without having to reduce the working pressure.**



1. Place detergent filter into detergent container.



2. Dosing of detergent is done by turning the detergent valve.

3. By closing the detergent valve the supply of detergent is stopped.

4. After having used detergents rinse the appliance with open spray gun and clean water for at least 2 minutes.



**Only open the dosing valve, if the detergent sieve is placed in a liquid. Sucked air leads to destruction of the pump seals! No guarantee!**

**Keep detergent-ph-value neutral 7 - 9!  
Observe specifications of detergent manufacturer!  
e.g.: protective equipment, rules for waste water treatment etc.**

**Never suck in liquids containing solvents like varnish solvents, petrol, oil or similar liquid! Observe specifications of detergent manufacturers!**

**Seals inside the appliance are no resistant against solvents! The spray mist of solvents is highly inflammable, explosive and poisonous.**

## **Decommissioning - frost protection**

1. Switch off the machine - main switch to „0“- position
2. Cut off the water supply
3. Open the spray gun briefly until the pressure is released
4. Apply the safety catch on the spray gun
5. Remove the water hose and spray gun
6. Drain the pump: switch on the motor for approx. 20 seconds
7. Pull the plug from the socket
8. Clean HP hose and stow away
9. Clean water filter

### **■ Frost protection**

The machine is normally still partially filled with water after work has been completed.

#### **To protect the appliance from frost, completely empty it of water:**

Disconnect the machine from the water supply and switch off the ignition. Switch on the master switch and open the gun. The pump now presses the remaining water out of the water tank, the pump and the continuous-flow heater.

#### **Do not allow the machine to run for longer than a minute without water.**

If the machine is not in use for lengthy frosty periods of time, it is advisable to pump anti-freeze into the machine: For this purpose, fill the antifreeze agent into the water tank and switch on the machine without ignition. Wait with opened gun, until the agent comes from the nozzle.

**However, the best protection against frost is to keep the machine in a place that is safe from frost.**

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## Care and Maintenance



The machine must be disconnected from the power supply when servicing work is being carried out. The main switch should be in position "0" and the plug out of the socket.

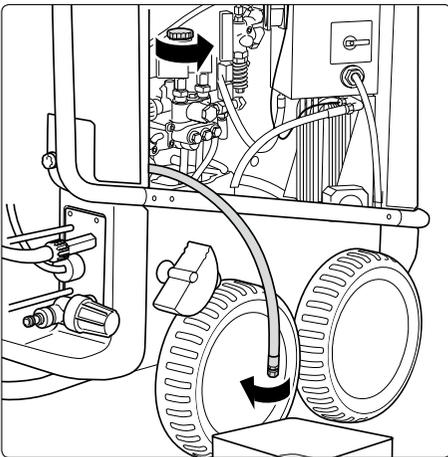
### ■ Weekly, or after approx. 40 hours of operation:

- Check the oil level of the high pressure pump. If the oil level is too low, add oil until the oil level is between the two markings on the oil measuring rod. Change the oil if it has a grey or whitish appearance. The oil should be disposed of responsibly.
- Check the water filter in front of the float valve in the water tank and the fuel filter in front of the solenoid valve. Clean the filters if necessary.

### ■ Yearly, or after approx. 500 hours of operation:

- Check and decalcify continuous flow heater, if necessary.
- Change the oil

### ■ Change the oil:



First oil change after approximately **50 operating hours**. Thereafter the oil should be changed every 500 operating hours or yearly.

Take the oil drainage hose, which is connected to the oil drainage screw from the inside of the appliance.

Open the red oil filler plug at the top side of the black oil housing.

Open the cap at the end of the hose. Drain off the oil into an oil pan and dispose of it responsibly. Close the end of the hose. Refill with new oil. Oil grade Castrol 10/W-60, approx. 0.8 l.



**Oil leakage:** If oil leaks out, go to the nearest customer service (dealer) immediately. (Environmental damages, transmission damages)

In case of increased humidity or fluctuations in temperature development of condensed water is possible; if the oil turns grey, you must change it at once.

## ■ Decalcifying the continuous-flow heater:

Calcified machines use an unnecessary amount of energy because the water can only be heated slowly and the excess pressure valve feeds a part of the water back into the pump circuit.

**Calcified machines can be recognised by increased pipeline resistance.**

Check pipeline resistance by disconnecting the high pressure lance from the gun and switching the machine on. A full jet of water emerges from the gun. The machine must be decalcified if the pressure shown on the manometer is greater than **25 bar**.

**Proceed as follows to decalcify the machine:**

1. Unscrew the high pressure hose from the machine and decalcify it separately.
2. Put the detergent suction hose into a container of decalcifying solution.
3. Set the detergent valve to the maximum concentration.
4. Switch on the machine.
5. Hold the gun in a separate container and press the trigger.
6. Wait for about a minute until the decalcifier comes out of the gun (recognisable by its whitish colour)
7. Switch off the machine and allow the solution to act for about 15-20 minutes.
8. Switch the machine back on and rinse with clear water for about 2 minutes.
9. Now check whether pipeline resistance is back to an acceptable level.

**Repeat the decalcifying process if the pressure without the high pressure lance is still above 25 bars.**



**Decalcifiers are caustic!**

**Observe the instructions for usage and accident prevention. Wear protective clothing to prevent the decalcifying agent from contacting your skin, eyes and clothing (e.g. gloves, safety mask etc.)**

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# Particular rules, directives and inspections

## ■ Inspections performed by Kränzle

- measurement of earth line resistance
- measurement of voltage and current
- inspection of tension consistency with +/- 1530 V
- pressure check of heating coil at 300 bar
- visual and functional check as per the inspection sheet provided

## ■ Guidelines for liquid sprayers

The machine conforms with the "Guidelines for liquid sprayers". These guidelines are issued by the organisation of trade associations and may be obtained from Carl Heymann-Verlag KG, Luxemburger Str. 49, 50939 Köln. These guidelines specify that this machine is to be inspected by qualified personnel whenever necessary, but no less than once every 12 months. These inspections must be recorded in the inspection log at the end of this manual.

## ■ Pressure container and steam boiler directives

Kränzle high pressure cleaning equipment conforms to the pressure container and steam boiler directive. No construction approval, notification of licence and takeover inspection are required. The water capacity is less than 5 l.

## ■ Duties of owner

The owner is to ensure that all safety-relevant components are in a serviceable condition before the sprayer is used. (e.g., safety valves, hose and electric cables, spray equipment etc).

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**26 Troubleshooting**

**Malfunction Cause of malfunction / remedy**

**Water supply**

Water tank runs over.	Float valve is dirty or defective.
Water tank does not fill completely.	Float valve is defective. Water filter is dirty. Insufficient water inlet quantity.
Pump does not suck.	Valves stick or are dirty. Suction hose leaks. Chemistry valve is open or leaks. Check hose clips (connections). High-pressure nozzle is clogged.
<b>Test:</b> check water and chemical system for tightness.	Connect water inlet directly to the pump (2-8 bar pre-pressure). Disconnect suction lines below the pump

**High-pressure pump**

Pump makes loud noises. Operating pressure is not reached.	Pump sucks air. Check suction connections. Check high-pressure nozzle. Check valves. Check O-rings under valves. Check sleeves. Manometer is defective. Unloader: check stainless steel seat and ball. Check seals on the control piston.
Water drops from the pump.	Replace sleeves in the pump. Replace O-rings.
Oil drops from the transmission.	Check oil seals (replace). Check plunger and plunger guides. Check water supply, since water deficiency or air suction can cause damage to seals and O-rings (chemistry valve leaks?)
Pressure is too low.	Worn high pressure nozzle. Stainless steel seat, ball, O-ring in unloader is dirty or defective. Manometer is defective.

**Machine does not switch off**

	Check return body and O-ring in unloader of the valve housing.
<b>Test:</b> Bridge pressure switch (red)	Check pressure switch (red). Check micro switch. Check cable connections. Board is defective.

**Appliance does not start or stops during operation**

Check electricity supply. Check main switch. Check cable connections. Check board. Check pressure switch. Switch off by overcurrent release.

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## Malfunction Cause of malfunction / remedy

### Machine does not start

Check electricity supply.  
Check main switch.  
Check cable connections.  
Board defective.  
Check pressure switch.  
Switch off by overcurrent release.

### Electrical heating elements

Insufficient water temperature.

Check electricity:  
- ON-OFF - Switch  
- Contactor  
- Flow monitoring device

### Leakage

Gun drips. High pressure hose drips.

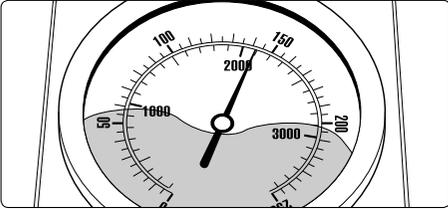
Clean nozzle. Replace seals.  
Replace O-ring below screwed connection.

Manometer indicates pressure, but no water comes out of HP-hose.

Clean nozzle.

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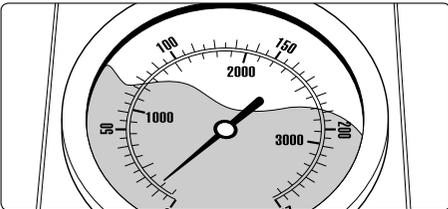
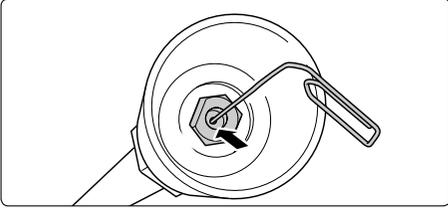
## Small repairs do it yourself



■ **No water from the nozzle but the gauge shows full pressure: Most likely the nozzle is blocked.**

(Inside the pressure gauge there is no water but a filling with glycol to damp the vibration of the pointer.)

**Proceeding:** Switch off the cleaner. Pull plug from the socket. Operate gun several times to decrease the pressure. First unscrew gun and lance, then rinse hose from any residues. Check water inlet filter for soiling. If the problem still exists, take wire (paper clip) and push cautiously through nozzle opening. If this procedure is not successful, the nozzle has to be dismantled and cleaned (from the backside) or even replaced, if necessary.

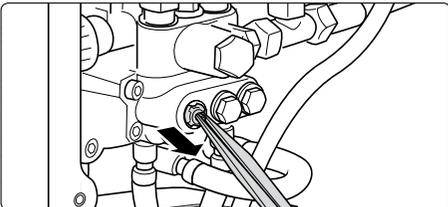
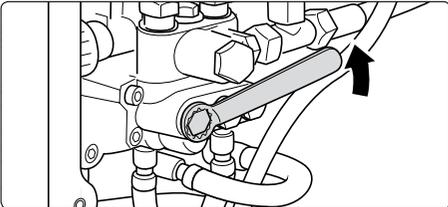


■ **Pressure gauge shows little pressure, the water from the nozzle comes in squirts, the high-pressure hose vibrates. Most likely the valves are soiled.**

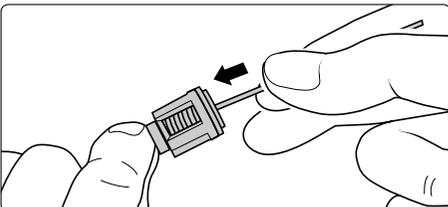
(Inside the pressure gauge there is no water but a filling with glycol to damp the vibration of the pointer.)

**Proceeding:**

Unscrew all 6 valves, one after the other (hexagonal brass screws, 3 in a row, vertically and horizontally)

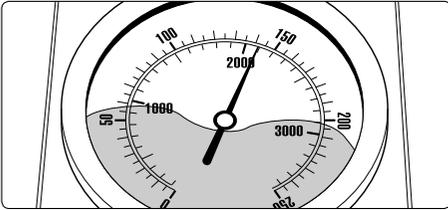


Take out valve body (with green or red plastic coating) and O-ring by means of needle nose pliers. Check O-ring for damage. In case of a damage the O-ring has to be replaced.



Take a wire (paper clip) and clean valves under running water. Also clean valve seating inside the pump.

**Do not forget the O-ring during reassembly!**



■ The pressure gauge shows full pressure although the gun has been closed. The pressure switch valve switches constantly.

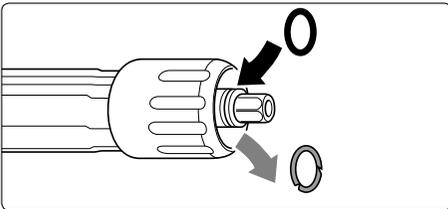
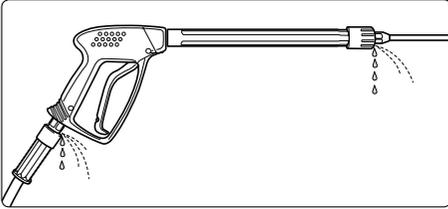
**Possible cause no.1: Leakage**

Having closed the gun, the HP cleaner must shut down and the pressure gauge must show „0“ bar. If the pressure gauge still shows full pressure and the motor constantly switches on and off, the possible reason for this can be a leakage of the pump, the HP hose or the lance.

**Proceeding:**

Check the connections from the HP cleaner to the HP hose, from the hose to the gun and also the connection between lance and gun for tightness. Switch off the cleaner. Shortly press the trigger of the gun to decrease the pressure. Unscrew HP hose, gun and lance and check the O-rings. If the O-rings are damaged they have to be replaced.

**In case of a leakage there is no guarantee for possible consequential damages.**



**Possible cause no. 2:**

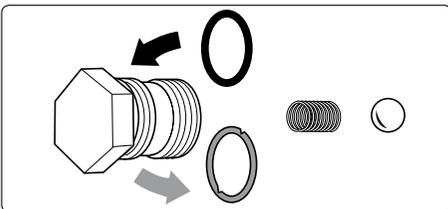
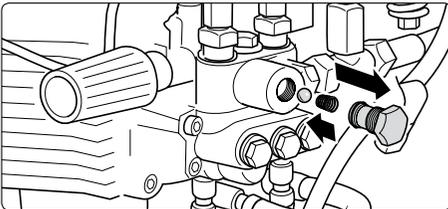
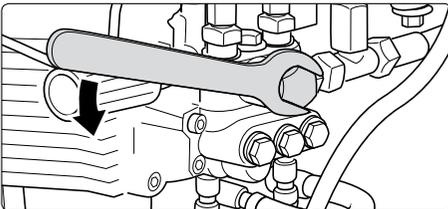
**The non-return valve is soiled or defective**

**Proceeding:**

Unscrew pump outlet.

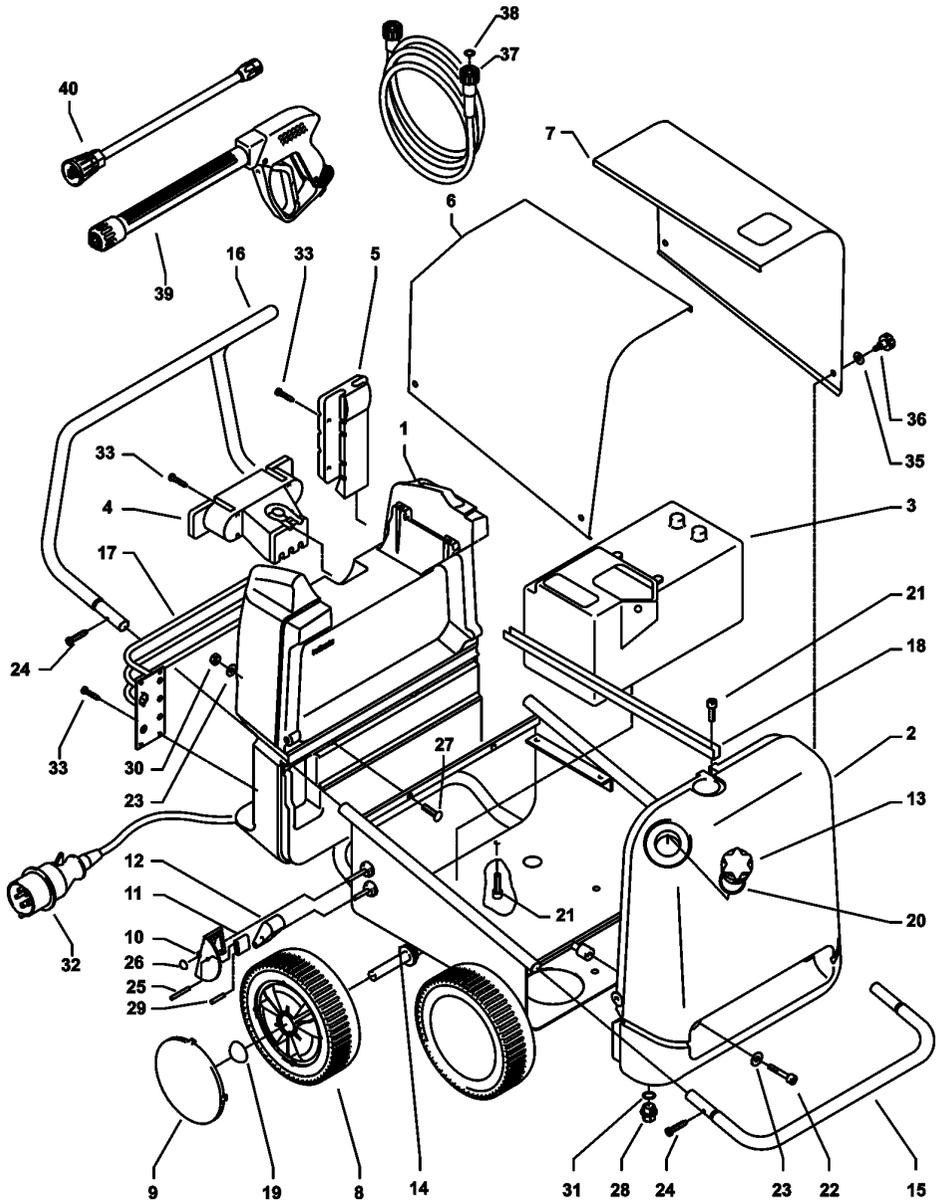
Take out non-return valve ball and check ball and stainless steel seat for soiling or damage.

Replace non-return valve if necessary.



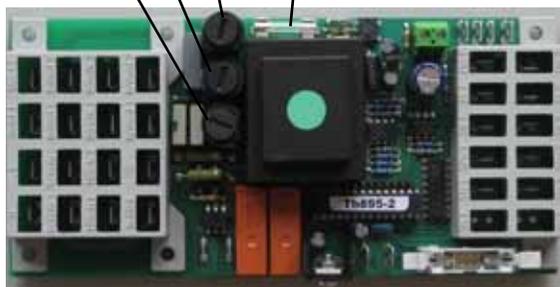
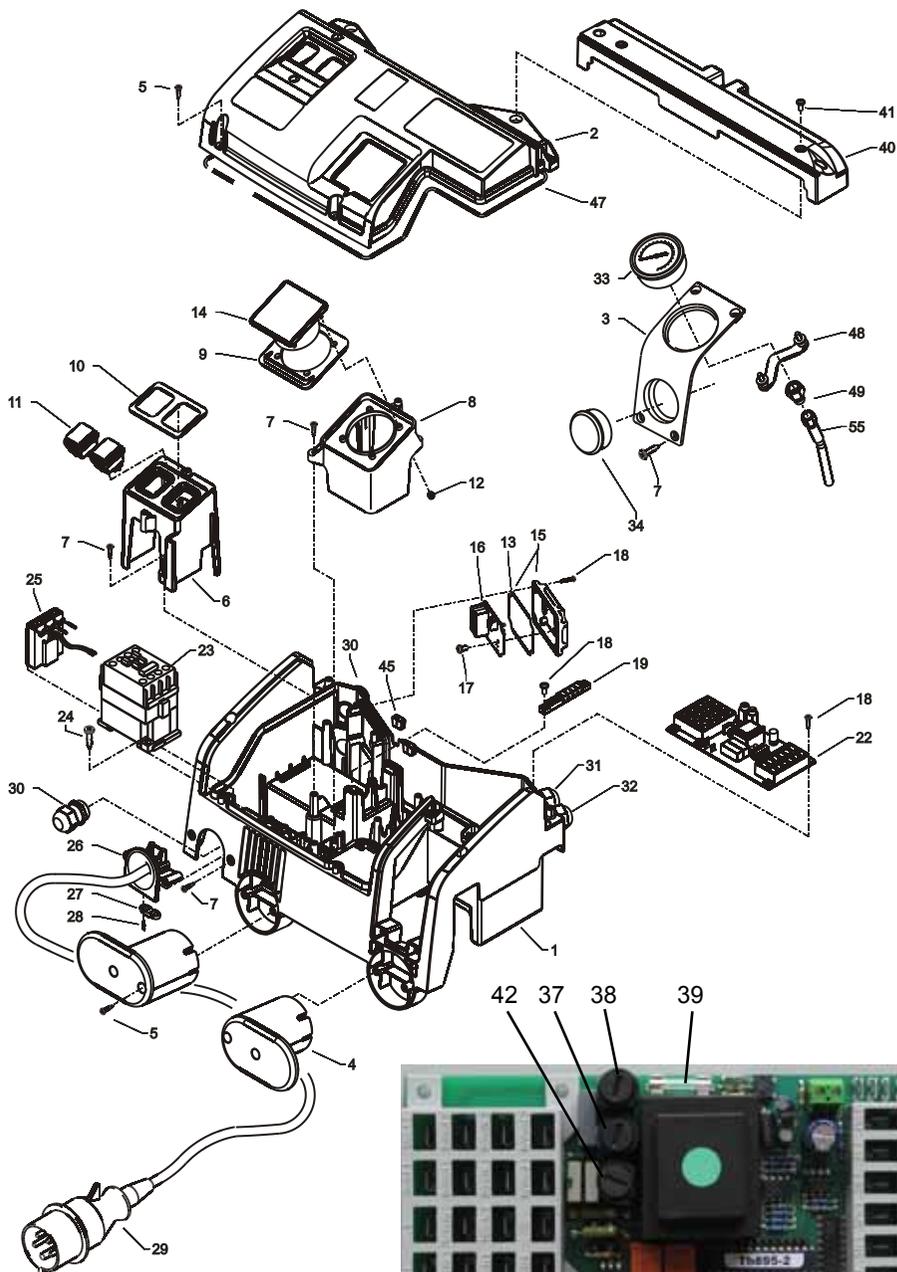
**There is no guarantee if the pump is damaged by defective O-rings due to air induction or lack of water (cavitation).**

30 Complete assembly



**Kränzle therm 602 E-M 18/24/36, therm 872 E-M 48**
**31**

No	Description	Qty.	Ord.-No
1	Cockpit	1	44.351
2	Chemietank	1	44.004
3	Wasserkasten	1	44.009
5	Lanzenköcher	1	44.008
6	Haube rechts	1	44.032
7	Haube links	1	44.031
8	Rad	4	44.017
9	Radkappe	4	44.018
10	Bremspedal	1	44.022
11	Bremshebel	1	44.023
12	Bremsklotz	1	44.024
13	Tankdeckel mit O-Ring	1	44.005
14	Fahrgestell	1	44.001
15	Frontbügel	1	44.002
16	Schubbügel	1	44.003
17	Reeling	1	44.016 1
18	Top-Strebe	1	44.019
19	Starlock-kappe 20 mm	4	40.142
20	O-Ring 70 x 5	1	44.020
21	Innensechskantschraube M 8 x 12	4	40.122
22	Innensechskantschraube M 8 x 40	2	44.033
23	Unterlegschiebe 8,4 DIN 9021	4	41.409
24	Schraube 3,9 x 16	4	12.150
25	Stift 6 x 50	1	44.035
26	Starlockkappe 8 mm	1	44.165
27	Schlossschraube M 8 x 35	2	41.408
28	Ablassschraube Brennstofftank	1	44.004 1
29	Stift 6 x 40	1	44.035 1
30	Elastic-Stop-Mutter M 8	2	41.410
31	Dichtung für Ablassschraube	1	41.047 1
32	Netzanschlussleitung mit Stecker	1	
33	Kunststoffschraube 6 x 30	8	43.423 1
35	Scheibe	4	44.034
36	Sterngriff	4	50.168 1
37	Hochdruckschlauch NW 8 10 m	1	41.081 3
37.1	Hochdruckschlauch NW 8 20 m	1	44.381 2
38	O-Ring 9,3 x 2,4 Viton	2	13.273 1
39	Pistole mit Verlängerung - Starlett II	1	41.053 1
40.1	Lanze mit Flachstrahldüse 25045 Kränzle therm 602 E-M 18/24/36, 100 bar therm 872 E-M 48	1	12.392-D25045
40.2	Lanze mit Flachstrahldüse 2503 Kränzle therm 602 E-M 18/24/36, 160 bar	1	12.392-D2503



**Kränzle therm 602 E-M 18/24/36, therm 872 E-M 48**

No	Description	Qty.	Ord.-No
1	Elektrokasten	1	44.807 1
2	Deckel für Elektrokasten therm	1	47.014 1
3	Frontplatte Manometer	1	44.375 1
4	Kabelaufwicklung	2	44.822
5	Schraube 5 x 25	10	41.414 1
6	Bock für Schalter	1	44.810
7	Schraube 5,0 x 14	10	43.426
8	Bock für Thermostat	1	47.012
9	Dichtung für Thermostat	1	47.013
10	Dichtung für Schalter	1	44.817
11	Schalter	2	44.835
12	Mutter M4	4	40.111
13	Dichtung für Deckel Übertemp.	1	44.182 1
14	Bedienteil für Steuerplatine	1	44.257
15	Deckel für Übertemperaturauslöser	1	44.361
16	Steuerplatine Übertemperaturauslöser	1	44.370
17	Schraube 3,5 x 8	3	43.430
18	Schraube 4,0 x 16	8	43.417
19	Erdungsklemme	1	44.839
22	Steuerplatine 400 V / 50/60 Hz	1	44.359
23	Schütz 400 V / 50/60 Hz	1	46.005 1
24	Schraube 4,0 x 25 mit angepr. Scheibe	2	43.425
25.1	Überstromauslöser 15A 3-pol.	1	46.040 3
26	Kabeltrompete mit Zugentlastung	1	44.819
27	Zugentlastungsschelle	1	43.431
28	Schraube 3,5 x 14	2	44.525
29	Netzanschlussleitung Drehstrom	1	
30	PG16-Verschraubung 1 Durchführung	2	41.419 1
31	PG16-Verschraubung 2 Durchführungen	3	44.132
32	PG16-Verschraubung 3 Durchführungen	1	44.133
33	Manometer	1	15.039
34	Blende	1	
37	Feinsicherung 1,25 A träge	1	44.676
38	Feinsicherung 2,0 A träge	1	44.889 1
39	Feinsicherung 630 mA träge	1	44.200 2
40	Haltebrücke	1	44.352
41	Schraube M 5 x 10	2	43.021
42	Feinsicherung 32 mA träge	1	44.200 1
45	Durchführungsstülpe für Kapillarrohr	2	44.823
47	Dichtung Elektrokasten	1	44.838
48	Klemmbügel für Manometer	1	44.049
49	Anschlussmuffe Manometer	1	44.136
51	Schlauchklemme 9 - 9	2	44.054
52	Schlauch für Waschmittelansaugung	1	44.055
53	Schlauch mit Filter und Rückschlagv.	1	44.056 1
54	Rückschlagventil für Waschmittellans.	1	44.240 1
55	Druckmessleitung	1	44.102 1

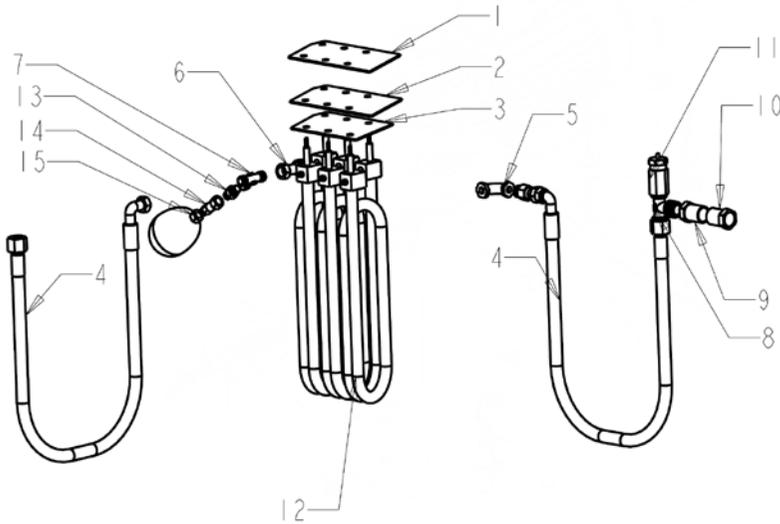


**Kränzle therm 602 E-M 18/24/36, therm 872 E-M 48****35**

<b>No</b>	<b>Description</b>	<b>Qty.</b>	<b>Ord.-No</b>
1	Wassertank	1	44.009
2	Schwimmerventil	1	46.250 5
4	Mutter R3/4"	1	46.258
5	Anschlussstück R 3/8" IG	1	41.423
7	Einströmschlauch	1	44.027
9	O-Ring 13 x 2,6	1	13.272
10	Schlauchtülle	1	44.126
11	Überwurfmutter	1	41.047
12	Schlauchschele 12 - 22	2	44.054 2
13	Wassereingangsschlauch	1	44.028
14	Schlauchtülle R3/8" x 13	1	44.029
16	HD-Schlauch Wasserausgang	1	44.840
17	Haltescheibe	1	44.841
18	Schraube DIN912 M 5 x 12	2	41.019 4
20	Wasserausgangsteil	1	44.855

### Heating element

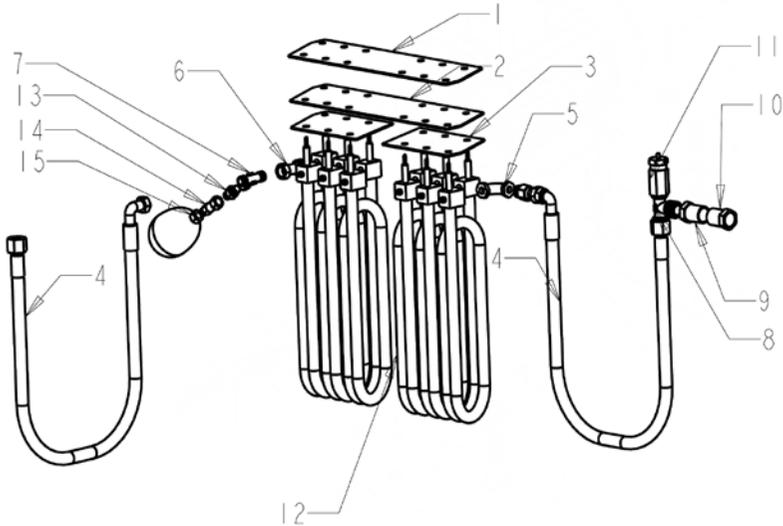
### Kränzle therm 602 E-M 18 / 24



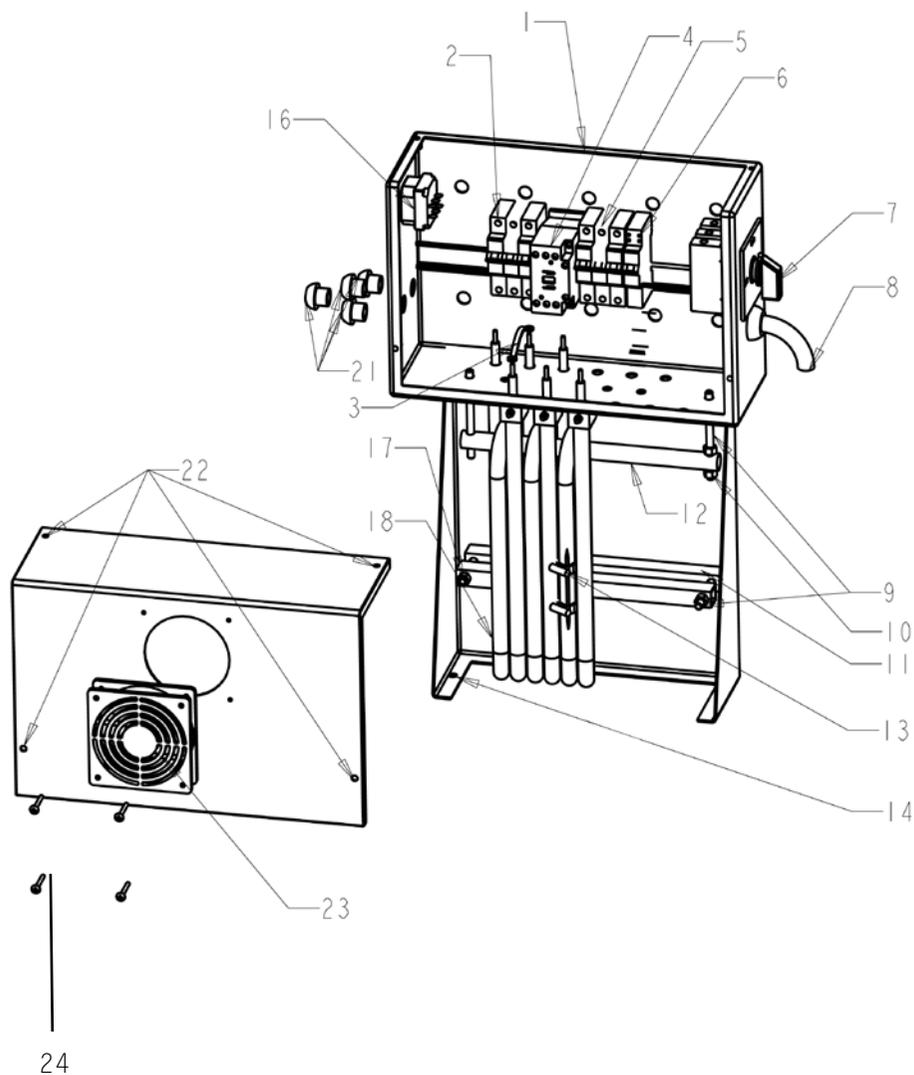
No	Description	Qty.	Ord.-No
1	Andrückblech	1	44.7541
2	Moosgummidichtung	1	44.7551
3	Zentrierblech 3 Heizstäbe	1	44.756
4	Hochdruckschlauch Eingang/Ausgang	2	44.702
5	Ermetoverschraubung Winkel gelb verzinkt	1	44.865
6	Ausgangsteil Pumpe für Kränzle therm	1	44.215
7	Ermeto T-Stück	1	44.141
8	Ermetoverschraubung T-Stück gelb verzinkt	1	44.173
9	Eingangsstück R3/8" IG für UL 250	1	13.136
10	Nippel 3/8" IG auf M22 AG	1	13.369
11	Fühleraufnahme	1	44.170
12	Elektroheizstäbe 6 KW bei 18 KW	1	44.600
12	Elektroheizstäbe 8 KW bei 24 KW	1	44.601
12	Elektroheizstäbe 24 KW bei 3 x 8 KW	3	44.603
12	Elektroheizstäbe 48 KW bei 6 x 8 KW	6	44.605
13	Ermetoverschraubung (2x18x1,5)	1	44.060
14	Anschlußmuffe	1	44.1401
15	Hydrospeicher	1	44.140

Heating element

Kränzle therm 602 E-M 36, therm 872 E-M 48



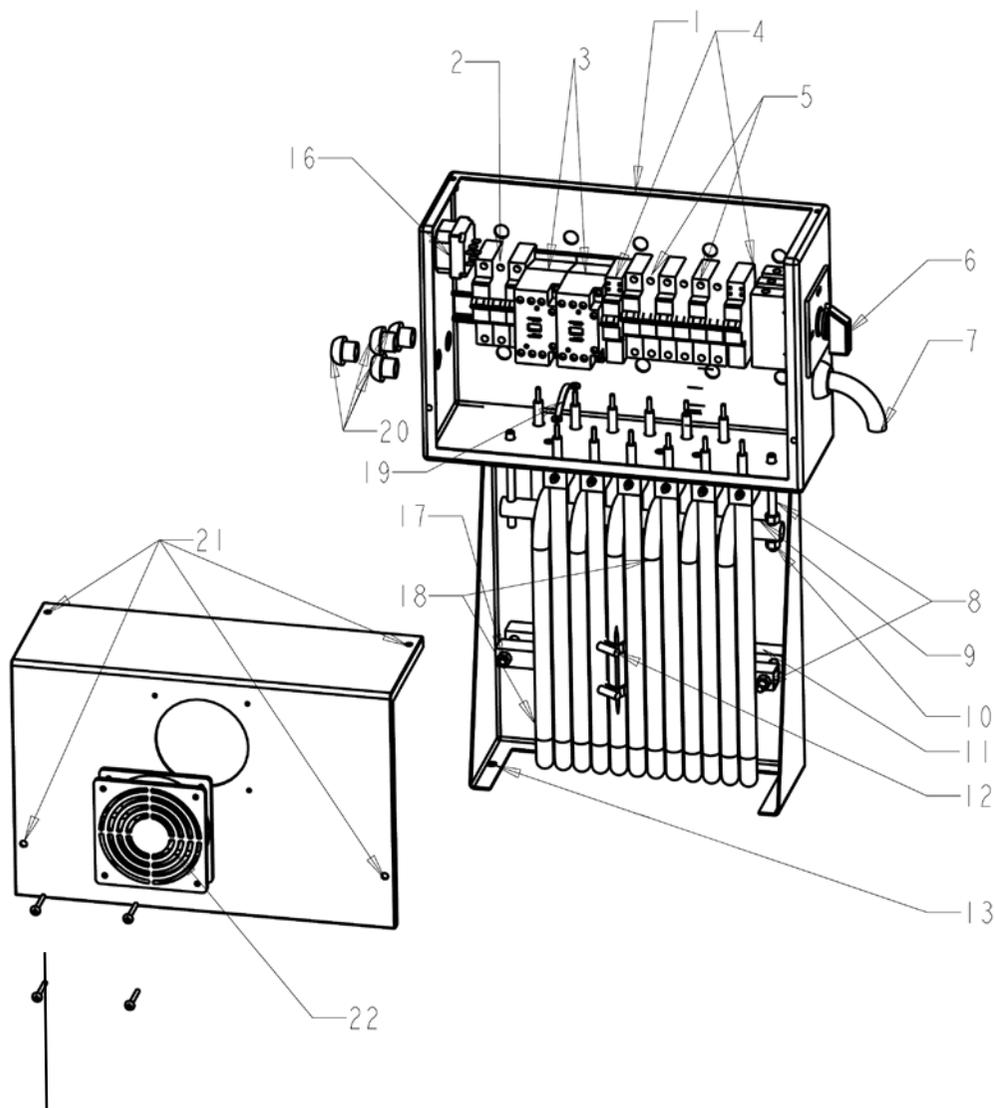
No	Description	Qty.	Ord.-No
1	Andrückblech	1	44.7541
2	Moosgummidichtung	1	44.7551
3	Zentrierblech 3 Heizstäbe	1	44.756
4	Hochdruckschlauch Eingang/Ausgang	2	44.702
5	Ermetoverschraubung Winkel gelb verzinkt	1	44.865
6	Ausgangsteil Pumpe für Kränzle therm	1	44.215
7	Ermeto T-Stück	1	44.141
8	Ermetoverschraubung T-Stück gelb verzinkt	1	44.173
9	Eingangsstück R3/8" IG für UL 250	1	13.136
10	Nippel 3/8" IG auf M22 AG	1	13.369
11	Fühleraufnahme	1	44.170
12	Elektroheizstäbe 6 KW bei 18 KW	1	44.600
12	Elektroheizstäbe 8 KW bei 24 KW	1	44.601
12	Elektroheizstäbe 24 KW bei 3 x 8 KW	3	44.603
12	Elektroheizstäbe 48 KW bei 6 x 8 KW	6	44.605
13	Ermetoverschraubung (2x18x1,5)	1	44.060
14	Anschlußmuffe	1	44.1401
15	Hydrospeicher	1	44.140

**38** Electric module 18/24 kW

## Kränzle therm 602 E-M 18/24

39

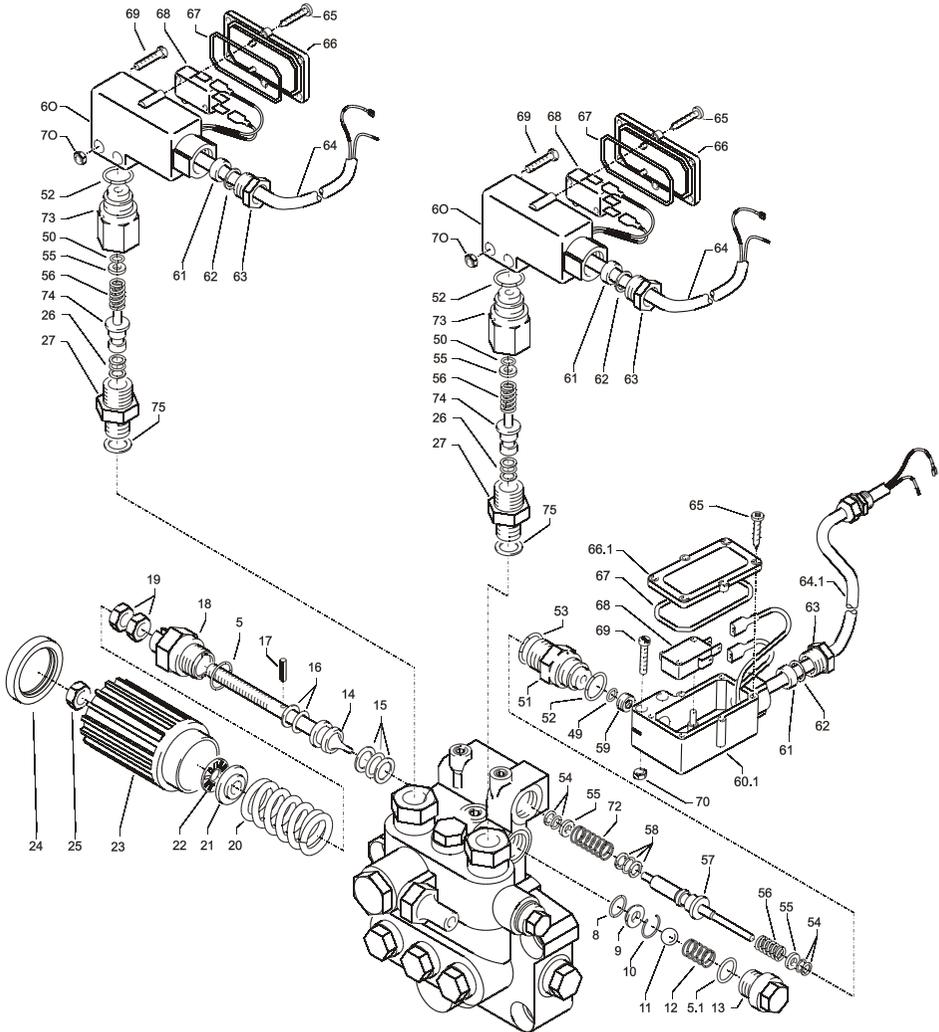
No	Description	Qty.	Ord.-No
1	Heizungsgehäuse VA	1	44.746
2	Sicherungsautomat 16 A	1	44.617
3	Zeitrelais (einschaltverzögert)	1	44.634
4	Schütz AEG 63A	1	44.6211
5	Leitungsschutzschalter AEG B32 18 KW	1	44.616
5	Leitungsschutzschalter AEG B40 24 KW	1	44.6161
6	Fernauslöser 176158	1	44.618
7	Hauptschalter 63 A	1	44.622
8	Anschlußkabel 4x6 qmm 18 KW	1	44.610
8	Anschlußkabel 4x10 qmm 24 KW	1	44.6101
9	Gewindestange Edelstahl	2	44.6241
10	Sechskantmutter M 8	10	14.1272
11	Abstandsrohr	1	44.625
12	Halterung für Heizstäbe	2	44.607
13	Schlauchschelle DIN 3017 1.4016	2	44.054
14	Sechskantschraube 8x25	2	44.137
16	Thermostat 0 - 90 Grad	1	44.619
17	Sechskantschraube 8x70 (edelstahl)	1	44.621
18	Elektroheizstab 6 Kw bei 18 Kw	3	44.600
18	Elektroheizstab 8 Kw bei 24 KWw	3	44.603
21	PG-Erweiterung PG 13,5 x PG 16	4	44.184
22	Befestigungsschrauben	4	44.664
23	Lüfter	1	44.626
24	Schraube mit Mutter	4	



**Kränzle therm 602 E-M 36, therm 872 E-M 48**

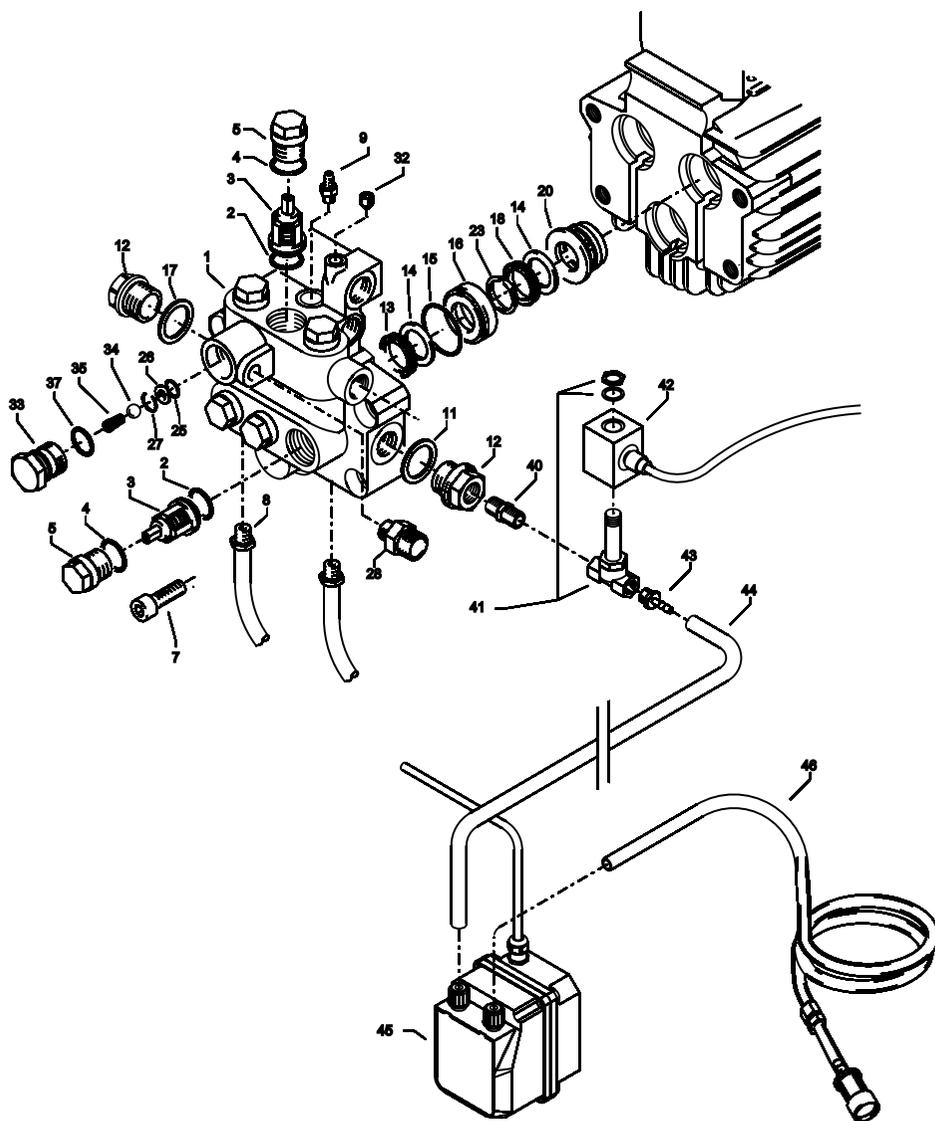
No	Description	Qty.	Ord.-No
1	Heizungsgehäuse VA	1	44.746
2	Sicherungsautomat 16 A	2	44.617
3	Schütz DIL M32 230V 50Hz	2	44.6211
4	Fernauslöser 176158	2	44.618
5	Leitungsschutzschalter AEG B32 bei 36 kW	2	44.616
6	Hauptschalter Therm elektrisch 18 – 36 kW	1	44.215
6	Hauptschalter Therm elektrisch 48 kW	1	44.6221
7	Anschlußkabel bei 36 kW	1	44.611
7	Anschlußkabel bei 48 kW	1	44.612
8	Gewindestange Edelstahl	2	44.6241
9	Sechskantmutter M 8	16	14.1272
10	Abstandsrohr	1	44.6251
11	Halterung für Heizstäbe	2	44.607
12	Schlauchschelle DIN 3017 1.4016	2	44.054
13	Sechskantschraube M 8 x 25	2	44.137
16	Thermostat 0 - 90 Grad	1	44.619
17	Sechskantschraube M 8 x 70 Edelstahl	2	44.623
18	Elektroheizstäbe 6 kW bei 18 kW	1	44.600
18	Elektroheizstäbe 8 kW bei 24 kW	3	44.602
18	Elektroheizstäbe 24 kW 3 x 8	3	44.603
18	Elektroheizstäbe 36 kW 6 x 6	6	44.604
18	Elektroheizstäbe 48 kW 6 x 8	6	44.605
19	Verdrahtungsbrücken	6	44.714
20	PG-Erweiterung PG 13,5 x PG 16	4	44.184
21	Schraube M 5 x 20	4	41.295
22	Lüfter	1	44.626
23	Schraube mit Mutter	4	

# Unloader valve and pressure switch



<b>No</b>	<b>Description</b>	<b>Qty.</b>	<b>Ord.-No</b>
5	O-Ring 16 x 2	1	13.150
5.1	O-Ring 13,94 x 2,62	1	42.167
8	O-Ring 11 x 1,44	1	12.256
9	Edelstahlsitz	1	14.118
10	Sicherungsring	1	13.147
11	Edelstahlkugel 8,5 mm	1	13.148
12	Edelstahlfeder	1	14.119
13	Verschlusschraube	1	14.113
14	Steuerkolben	1	14.134
15	Parbaks 16 mm	1	13.159
16	Parbaks 8 mm	1	14.123
17	Spannstift	1	14.148
18	Kolbenführung spezial	1	42.105
19	Mutter M 8 x 1	2	14.144
20	Ventilfeder schwarz	1	14.125
21	Federdruckscheibe	1	14.126
22	Nadellager	1	14.146
23	Handrad AM-Pumpe	1	40.457
24	Kappe Handrad AM-Pumpe	1	40.458
25	Elastic-Stop-Mutter	1	14.152
26	Parbaks 7 mm	2	15.013
27	Ausgangsteil R1/4" AG	2	15.011
49	O-Ring 3,3 x 2,4	1	12.136
50	O-Ring 5 x 1,5	2	15.014
51	Führungsteil Steuerstößel	1	15.009 1
52	O-Ring 13 x 2,6	3	15.017
53	O-Ring 14 x 2	1	43.445
54	Parbaks 4 mm	2	12.136 2
55	Stützscheibe dm 5	2	15.015
55.1	Stützscheibe dm 4	2	15.015 1
56	Edelstahlfeder	3	15.016
57	Steuerstößel lang	1	15.010 2
58	Parbaks	1	15.013
59	Stopfen M10x1 (durchgebohrt)	1	13.385 1
60	Gehäuse Elektroschalter (schwarz)	2	15.007
60.1	Gehäuse Elektroschalter (rot)	1	15.007 1
61	Gummimanschette PG 9	3	15.020
62	Scheibe PG 9	3	15.021
63	Verschraubung PG 9	3	15.022
64	Kabel 2 x 1,0 mm <sup>2</sup> 0,70 m schwarz	2	44.367
64.1	Kabel 2 x 1,0 mm <sup>2</sup> 0,70 m grau	1	44.368
65	Blechschrabe 2,9 x 16	18	15.024
66	Deckel Elektroschalter (schwarz)	2	15.008
66.1	Deckel Elektroschalter (rot)	1	15.008 1
67	O-Ring 44 x 2,5	3	15.023
68	Mikroschalter	3	44.262
69	Zylinderschraube M 4 x 20	6	15.025
70	Sechskant-Mutter M 4	6	15.026
72	Druckfeder 1 x 8,6 x 30	2	40.520
73	Grundteil Elektroschalter	2	15.009
74	Steuerkolben	2	15.010
<b>Steuerkolben kpl. mit Handrad</b>			<b>40.490</b>
<b>Rep.- Satz Druckschaltermechanik</b>			<b>15.009 3</b>
<b>Druckschalter (rt)</b>			<b>44.120 2</b>
<b>Rep.- Satz Druckschaltermechanik 1/4" AG</b>			<b>15.011 1</b>
<b>Druckschalter (sw)</b>			<b>44.120</b>

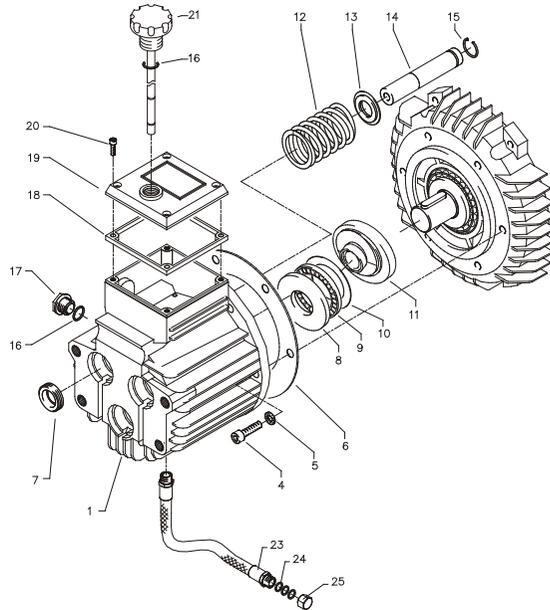
## 44 Valve housing



**Kränzle therm 602 E-M 18/24/36, therm 872 E-M 48**
**45**

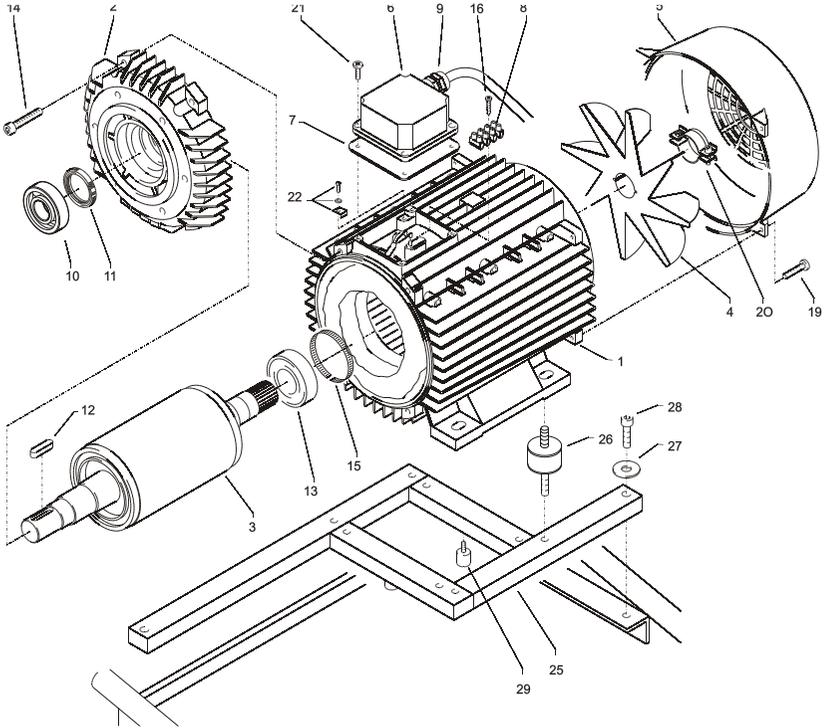
No	Description	Qty.	Ord.-No
1	Ventilgehäuse AM-Pumpe	1	40.451
2	O-Ring 15 x 2	6	41.716
3	Ventile (grün) für APG-Pumpe	6	41.715 1
4	O-Ring 16 x 2	6	13.150
5	Ventilstopfen	6	41.714
7	Innensechskantschraube M10 x 35	4	42.509 1
8	Ansaugschlauch mit Nippel R1/4"	2	44.096 4
11	Dichtring	1	40.019
12	Verschlusssschraube 3/8" mit R1/4" IG	1	
13	Manschette 18 x 26 x 4/2	3	41.013
14	Backring 18 mm	6	41.014
15	O-Ring	3	40.026
16	Leckagering 18 mm	3	41.066
18	Gewebemanschette 18 x 26 x 5,5/3	3	41.013 1
20	Zwischenring 18 mm	3	41.015 2
23	Druckring	3	41.018
25	O-Ring 11 x 1,5	1	12.256
26	Edelstahlsitz Ø 7	1	14.118
27	Sprengring	1	13.147
28	Ausgangsteil Pumpe R1/4" x 12L	1	44.394
29	Kupferring	1	42.104
30	Dichtstopfen R1/4" mit Bund	1	42.103
32	Dichtstopfen M 8 x 1	2	13.158
33	Ausgangsteil	1	40.522
34	Edelstahlkugel Ø10	1	12.122
35	Rückschlagfeder „K“	1	14.120 1
37	O-Ring 18 x 2	1	43.446
40	Doppelnippel 1/4" x 1/4"	1	44.251 2
41	Spule für Magnetventil	1	44.251 3
42	Magnetventil	1	44.251
43	Schlauchtülle 1/4" x	1	
44	Verbindungsschlauch	1	
45	Chemiepumpe	1	
46	Chemiesaugschlauch	1	
<b>Repair kit valves</b>			<b>41.748 1</b>
6x pos. 2; 6x pos. 3; 6x pos. 4			
<b>Repair kit sleeves 18 mm</b>			<b>41.049 1</b>
3x pos. 13; 6x pos. 14; 3x pos. 15; 3x pos. 23; 3x pos. 18			

## 46 Kränzle therm 602 E-M 18/24/36, therm 872 E-M 48 Pump



No	Description	Qty.	Ord.-No
1	Ölgehäuse mit Öldichtungen	1	40.452
4	Innensechskantschraube M 8 x 25	6	40.053
5	Sicherungsscheibe	6	40.054
6	Flachdichtung	1	40.511
7	Öldichtung 18 x 28 x 7	3	41.031
8	Wellenscheibe	1	40.043
9	Axial-Rollenkäfig	1	40.040
10	AS-Scheibe	1	40.041
11.1	Swash plate 7,66° (therm 602)	1	40.460-7,66
11.2	Swash plate 10,8° (therm 872)	1	40.460-10,8
12	Plungerfeder	3	40.453
13	Federdruckscheibe	3	40.454
14	Plunger 18mm (AM-Pumpe)	3	40.455
15	Sprengring	3	41.035
16	O-Ring 14 x 2	2	43.445
17	Verschlusschraube M 18 x 1,5	1	41.011
18	Flachdichtung	1	41.019 3
19	Deckel	1	40.518
20	Innensechskantschraube M 5 x 12	4	41.019 4
21	Ölmeßstab (AM-Pumpe)	1	40.461
23	Ölablassschlauch	1	44.128 1
24	Kupferring	3	14.149
25	Verschlusskappe	1	44.130
<b>Oil housing AM complete without swash plate</b>			<b>40.452 1</b>
Pos. 1, 4-7, 12-17			

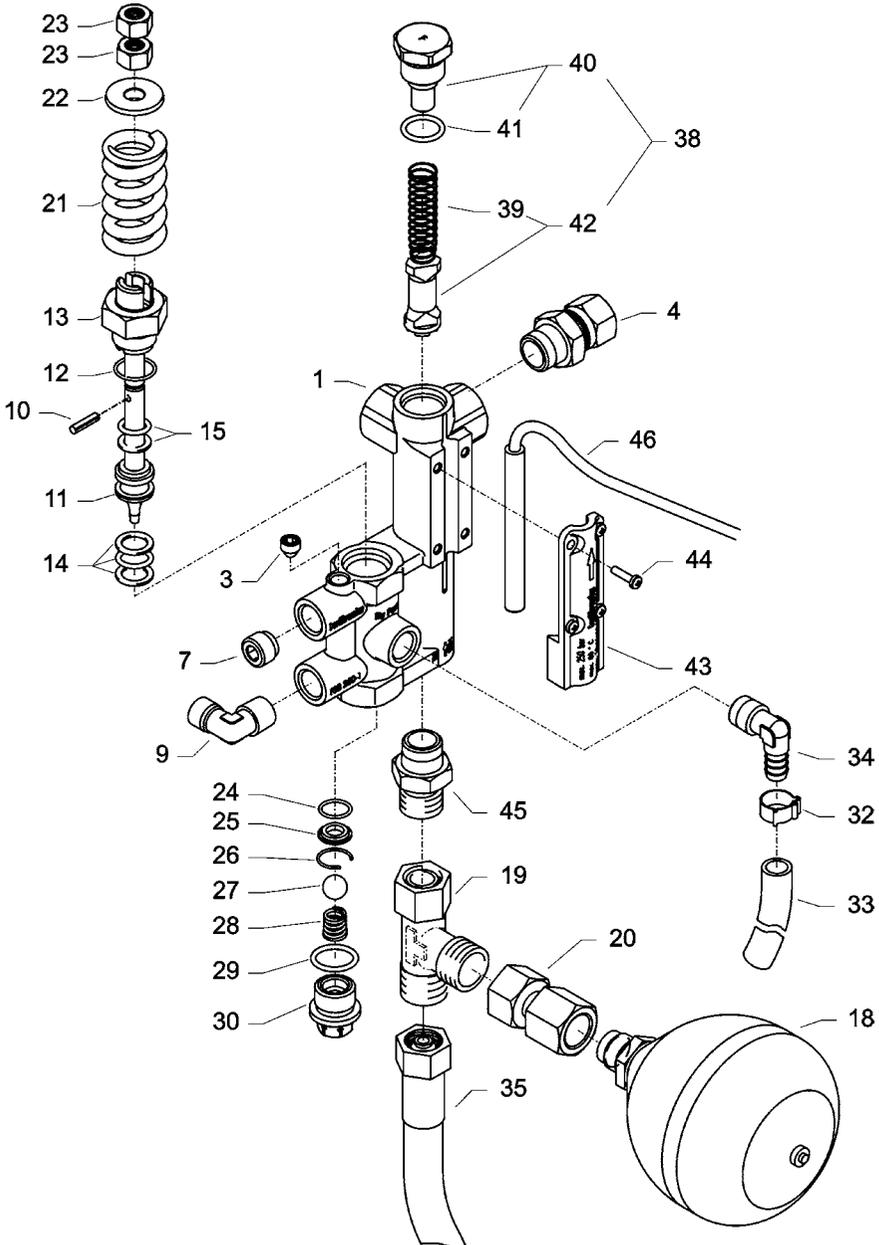
**Kränzle therm 602 E-M 18/24/36, therm 872 E-M 48  
Pump motor**



No	Description	Qty.	Ord.-No
1	Stator BG100 4,8 kW 400V / 50Hz	1	40.710
2	Lager Flansch	1	40.700
3	Rotor BG100 400V / 50Hz	1	40.703
4	Lüfterrad BG100	1	40.702
5	Lüfterhaube BG 100	1	40.701
10	Schrägkugellager 7306	1	40.704
11	Öldichtung 35 x 47 x 7	1	40.080
12	Passfeder 8 x 7 x 28	1	40.459
13	Kugellager 6206 - 2Z	1	40.538
14	Innensechskantschraube M 6 x 30	4	43.037
15	Toleranzhülse	1	40.544 1
19	Schraube M 4 x 12	4	41.489
20	Schelle für Lüfterrad BG100	2	40.535
22	Erdungsschraube kpl.	1	43.038
25	Aggregathalterung	1	44.013
26	Schwingmetall 30 x 30	4	44.227
27	Unterlegscheibe 8,4 DIN 9021	7	41.409
28	Innensechskantschraube M 8 x 40	3	43.059
29	Gummipuffer 15 x 15	2	43.419
<b>Motor compl. 4.8 kW, 3~ 400V / 50Hz</b>			<b>24.080</b>

**48 Flow-Safety-Block**

(Adjustment must be approx. 15% above the operating pressure)

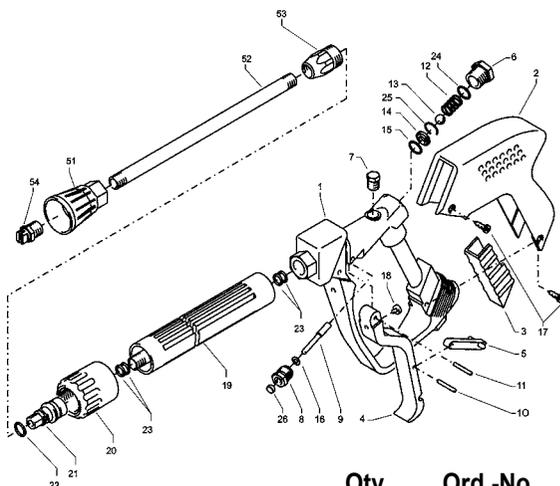


## Kränzle therm 602 E-M 18/24/36, therm 872 E-M 48

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No	Description	Qty.	Ord.-No
1	Ventilkörper FSB250-1	1	14.215
3	Dichtstopfen M 8 x 1	1	13.158
4	Ermetoverschraubung R 3/8" x 12 mm Rohrstopfen	1	44.365
7	Stopfen R1/4"	1	13.387
9	Ermetowinkel R 1/4" x 6L	1	44.062
10	Spannstift	1	14.148
11	Steuerkolben	1	14.110
12	O-Ring 16 x 2,0	1	13.150
13	Kolbenführung	1	14.130
14	Parbaks 16 mm	1	13.159
15	Parbaks 8 mm	1	14.123
18	Hydrospeicher	1	44.140
19	L-Verschraubung	1	44.869
20	Anschlussmuffe für Hydrospeicher	1	44.140 1
21	Ventilfeder	1	14.125
22	Federdruckscheibe	1	14.126
23	Sechskantmutter M 8 x 1	2	14.144
24	O-Ring 11 x 1,44	1	12.256
25	Edelstahlsitz 7,0 mm	1	14.118
26	Sprengring	1	12.258
27	Edelstahlkugel 10 mm	1	12.122
28	Edelstahlfeder	1	14.119
29	O-Ring 13,94 x 2,62	1	42.167
30	Verschlusssschraube	1	14.113
32	Schlauchselle	1	44.363
33	PVC-Schlauch DN 6	0,7m	44.403
34	Winkeltülle R 1/4" x 8	1	14.212
35	HD-Schlauch Eingang Brennkammer	1	44.384
38	Strömungskörper incl. Stopfen und Feder	1	14.218 1
39	Druckfeder Strömungswächter	1	14.217
40	Anschlagstopfen mit Zapfen Strömungswächter	1	14.219
41	O-Ring 14 x 2	1	43.445
42	Strömungskörper mit Zapfen für Feder	1	14.218
43	Abdeckung	1	12.603
44	Schraube M 4 x 8	4	44.216
45	Verschraubung M18x1,5 x 12L	1	44.364
46	Magnetschalter	1	40.594 2
<b>Steuerkolben kpl. Pos. 10-15; 21-23</b>			<b>14.110 1</b>
<b>Flow-Safety-Block kpl. Pos. 1-15; 21-45</b>			<b>14.235</b>

# Spare parts list Kränzle E-M Gun 'Starlet'



No	Description	Qty.	Ord.-No
1	Seitenschale Schlauchführung	1	40.302
1	Ventilkörper mit Handgriff	1	12.294
2	Schutzhülse	1	12.295
3	Abdeckschutz	1	12.296
4	Betätigungshebel grau	1	12.298 3
5	Sicherungshebel	1	12.149
6	Abschlusschraube M 16 x1	1	12.247
7	Stopfen	1	12.287
8	Gewindeführungshülse Ø3 R 1/4" AG	1	12.250 1
9	Aufsteuerbolzen Ø3	1	12.284 1
10	Stift	1	12.148
11	Lagernadel	1	12.253
12	Edelstahlfeder	1	12.246
13	Edelstahlkugel 8,5	1	12.245
14	Edelstahlsitz Ø7	1	14.118
15	O-Ring 11 x 1,44	1	12.256
16	O-Ring 3,3 x 2,4	1	12.136
17	Blechschräube 3,9 x 8	4	12.297
18	Druckstück	1	12.252
19	Rohr kunststoffumspritzt bds. R 1/4" AG	1	15.004 5
20	Überwurfmutter ST 30 M22 x 1,5 IG	1	13.276 1
21	Außen-Sechskant-Nippel R 1/4" IG	1	13.277 1
22	O-Ring 9,3 x 2,4	1	13.273
23	Aluminium-Dichtring	4	13.275
24	O-Ring 15 x 1,5	1	12.129 1
25	Sicherungsring	1	12.258
51	Düsenschutz	1	26.002
52	Rohr 500 mm; bds. R1/4"	1	12.385 1
53	ST 30 Nippel M 22 x 1,5 / R1/4" m. ISK	1	13.370
54.1	Flachstrahldüse 25045	1	D25045
54.2	Flachstrahldüse 2503	1	D2503

**Starlet-Pistole kpl. mit Verlängerung Pos. 1-24**

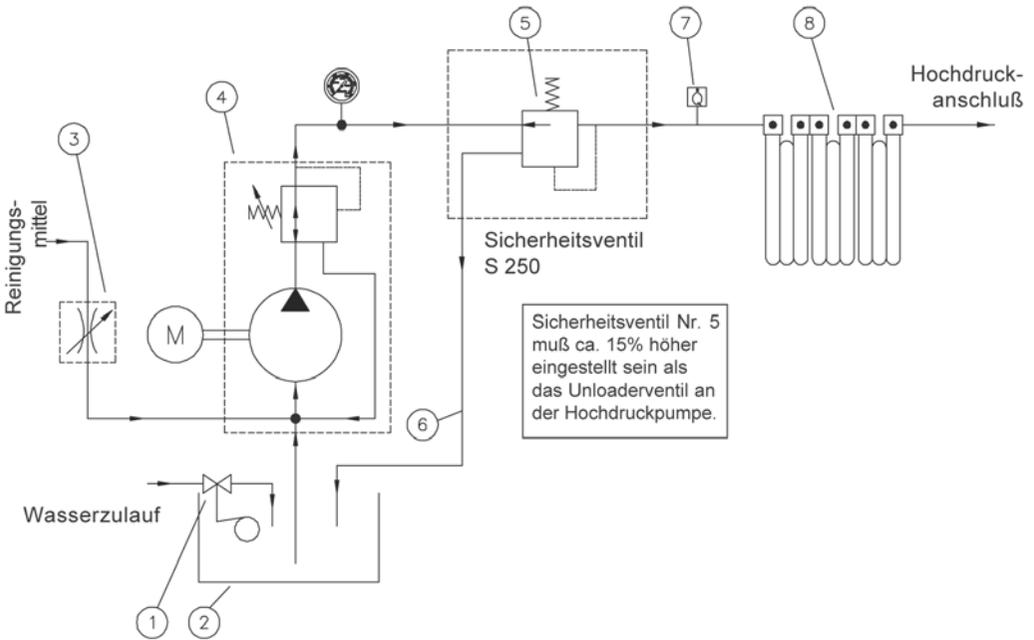
**12.320 2**

**Rep.-Satz „Starlet II“**

**12.299**

bestehend aus je 1x Position: 8, 9, 13-16, 24-26

# Pipeline plan



**Safety valve, number 5 must be set approx. 15 % higher than the unloader valve on the HP pump**

- 1 Float valve, water inlet
- 2 Water tank
- 3 Control valve detergent
- 4 High pressure pump with integrated unloader valve
- 5 Safety valve for heating coil
- 6 Safety valve excess pressure line
- 7 Flow controller
- 8 Heating elements







# Inspection report for HP cleaners

Inspection report on annually carried out Labour Safety Inspection (UVV) according to the Guidelines for Liquid Spray Equipment. (This inspection sheet serves as proof for the completion of the retest and must be kept carefully!) Kränzle-Test Stamp Mark: Order Number UVV200106

Owner: ..... Type **therm**: .....  
 Address: ..... Serial no.: .....  
 ..... Rep.-order-no.: .....

<b>Scope of inspection:</b>	<b>ok</b>	<b>yes</b>	<b>no</b>	<b>repaired</b>
Type plate (on hand)				
Operating manual (on hand)				
Protective covering, -device				
Pressure line (tightness)				
Pressure gauge (function)				
Float valve (tightness)				
Spraying device (marking)				
HP-hose/ connector (damage, marking)				
Safety valve opens at 10% / 20% excess				
Pressure reservoir				
Heating oil line (tightness)				
Solenoid valve (function)				
Thermostat (function)				
Flow controller (function)				
Power cable (damage)				
Power plug (damage)				
Protective conductor (connected)				
Emergency Off Switch (function)				
On/Off-switch				
Water quantity safety device (function)				
Used chemicals				
Allowed chemicals				

<b>Inspection data</b>	<b>determ. value</b>	<b>set value</b>
High-pressure nozzle		
Operating pressure .....bar		
Cutting-off pressure.....bar		
Efficiency rating.....%		
Conductor resist. not exceeded / value:		
Insulation		
Leakage current:		
Gun locked		

### Inspection result (tick)

- The appliance was checked by an expert according to the Guidelines for Liquid Spray Equipment, the defects found have been rectified so that the Labour Safety can be confirmed.
- The appliance was checked by an expert according to the Guidelines for Liquid Spray Equipment. The Labour Safety cannot be confirmed unless the defects found are rectified by repair or replacement of the faulty parts.

The next retest according to the Guidelines for Liquid Spray Equipment has to be carried out by: Month ..... Year .....

Place, Date ..... Signature .....

## Inspection report for HP cleaners

Inspection report on annually carried out Labour Safety Inspection (UVV) according to the Guidelines for Liquid Spray Equipment. (This inspection sheet serves as proof for the completion of the retest and must be kept carefully!) Kränzle-Test Stamp Mark: Order Number UVV200106

Owner: ..... Type **therm**: .....  
 Address: ..... Serial no.: .....  
 ..... Rep.-order-no.: .....

<b>Scope of inspection:</b>	<b>ok</b>	<b>yes</b>	<b>no</b>	<b>repaired</b>
Type plate (on hand)				
Operating manual (on hand)				
Protective covering, -device				
Pressure line (tightness)				
Pressure gauge (function)				
Float valve (tightness)				
Spraying device (marking)				
HP-hose/ connector (damage, marking)				
Safety valve opens at 10% / 20% excess				
Pressure reservoir				
Heating oil line (tightness)				
Solenoid valve (function)				
Thermostat (function)				
Flow controller (function)				
Power cable (damage)				
Power plug (damage)				
Protective conductor (connected)				
Emergency Off Switch (function)				
On/Off-switch				
Water quantity safety device (function)				
Used chemicals				
Allowed chemicals				

<b>Inspection data</b>	<b>determ. value</b>	<b>set value</b>
High-pressure nozzle		
Operating pressure .....bar		
Cutting-off pressure.....bar		
Efficiency rating.....%		
Conductor resist. not exceeded / value:		
Insulation		
Leakage current:		
Gun locked		

### Inspection result (tick)

- The appliance was checked by an expert according to the Guidelines for Liquid Spray Equipment, the defects found have been rectified so that the Labour Safety can be confirmed.
  - The appliance was checked by an expert according to the Guidelines for Liquid Spray Equipment. The Labour Safety cannot be confirmed unless the defects found are rectified by repair or replacement of the faulty parts.
- The next retest according to the Guidelines for Liquid Spray Equipment has to be carried out by: Month ..... Year .....

Place, Date ..... Signature .....

# Inspection report for HP cleaners

Inspection report on annually carried out Labour Safety Inspection (UVV) according to the Guidelines for Liquid Spray Equipment. (This inspection sheet serves as proof for the completion of the retest and must be kept carefully!) Kränzle-Test Stamp Mark: Order Number UVV200106

Owner: ..... Type **therm**: .....  
 Address: ..... Serial no.: .....  
 ..... Rep.-order-no.: .....

<b>Scope of inspection:</b>	<b>ok</b>	<b>yes</b>	<b>no</b>	<b>repaired</b>
Type plate (on hand)				
Operating manual (on hand)				
Protective covering, -device				
Pressure line (tightness)				
Pressure gauge (function)				
Float valve (tightness)				
Spraying device (marking)				
HP-hose/ connector (damage, marking)				
Safety valve opens at 10% / 20% excess				
Pressure reservoir				
Heating oil line (tightness)				
Solenoid valve (function)				
Thermostat (function)				
Flow controller (function)				
Power cable (damage)				
Power plug (damage)				
Protective conductor (connected)				
Emergency Off Switch (function)				
On/Off-switch				
Water quantity safety device (function)				
Used chemicals				
Allowed chemicals				

<b>Inspection data</b>	<b>determ. value</b>	<b>set value</b>
High-pressure nozzle		
Operating pressure .....bar		
Cutting-off pressure.....bar		
Efficiency rating.....%		
Conductor resist. not exceeded / value:		
Insulation		
Leakage current:		
Gun locked		

### Inspection result (tick)

- The appliance was checked by an expert according to the Guidelines for Liquid Spray Equipment, the defects found have been rectified so that the Labour Safety can be confirmed.
- The appliance was checked by an expert according to the Guidelines for Liquid Spray Equipment. The Labour Safety cannot be confirmed unless the defects found are rectified by repair or replacement of the faulty parts.

The next retest according to the Guidelines for Liquid Spray Equipment has to be carried out by: Month ..... Year .....

Place, Date ..... Signature .....

## EC declaration of conformity

Hereby we declare that,

**Kränzle therm 602 E-M 18, 602 E-M 24,  
602 E-M 36, 872 E-M 48**

technical specifications available from:

**Manfred Bauer, Fa. Josef Kränzle  
Rudolf-Diesel-Str. 20, 89257 Illertissen**

comply with the following guidelines  
and their amendments for high-pressure  
cleaners:

**machinery directive 2006/42/EEC,  
EMC-directive 2004/108/EEC,**

Applied specifications and standards:

**EN 60 335-2-79 :2009  
EN 55 014-1 :2006  
EN 55 014-2 / A2:2008  
EN 61 000-3-2 : 2006  
EN 61 000-3-3 : 2008**

I. Kränzle GmbH  
Elpke 97  
D - 33605 Bielefeld



Kränzle Josef

(Managing director)

Bielefeld, den 30.01.2012

## Guarantee

■ The guarantee is only valid for material and manufacturing errors. Wearing does not fall within this guarantee.

The instructions in our operating manual must be complied with.. The operating instructions form part of the guarantee. The Guarantee is void if other parts are used than genuine Kränzle accessory parts or genuine Kränzle spare parts.

For high-pressure cleaners sold to the user the guarantee period is **24 month**.  
For high-pressure cleaners sold for industrial use the guarantee period is **12 month**.

In the case of a guarantee please contact your dealer or authorized seller delivering accessories and your purchase receipt. You can find them in the internet under

**[www.kraenzle.com](http://www.kraenzle.com)**.

The guarantee is also void if the machine is used with exceeding the temperature and speed limits, a voltage below the required rating, with less than the required amount of water or with dirty water.

Pressure gauge, nozzle, valves, sleeves, high pressure hose and spray equipment are wear parts and are not covered by the warranty.

**Kränzle - world-wide:  
Technical perfection at its best.**

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As date of 30.01.2012

Subject to technical modifications. Order no. 30.248 1