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FRANK GmbH · Hochdruckreinigungs- und Umwelttechnik ·Bochumer Straße 15 · 57234 Wilnsdorf

HOCHDRUCKREINIGER
HIGH PRESSURE CLEANER

FEM 718 MSE-Z

BETRIEBSANLEITUNG
OPERATING INSTRUCTIONS
Mode D` EMPLOI

Vor Inbetriebnahme die Betriebsanleitung und Sicherheitshinweise lesen und beachten!

Read the instruction sheet and the safety instructions before putting into operation and observe them!

Avant mise en route de l`appareil, lire et respecter les instructions de Service et consignes de sécurité !

Contents **Page**

1. Application

The wall-mounted FRANK hot water high-pressure cleaner module is used for cleaning, degreasing, phosphatizing, preserving and desinfecting vehicles, machines, machine components, containers, etc.

2. Technical data

High-pressure stage HD:	Working pressure max.:	180 bar
	Flow rate:	11,5 l/min
	Operating temperature max.:	70 °C
Heating capacity:	18 kW/30 kW	
Water temperature after heating period:	max. 70 °C about 17 minutes/10 minutes	
Constant temperature:	40 °C/55 °C	
Supply voltage:	400 V 3N AC 50 Hz	230 V 3 AC 50 Hz
Rated load:		
at a heat capacity of 18 kW:	23 kW 35 A	23 kW 60 A
at a heat capacity of 30 kW:	35 kW 52,5 A	
Noise emission, sound level:	max. 72 dB (A)*	

Dimensions:
Module:

Length:	1000 mm
Height:	825 mm
Width:	580 mm

Master control cabinet:

Length:	600 mm
Height:	600 mm
Width:	210 mm

*measured outside, at a distance of 1 m from the machine surface and 1.6 m above the ground.

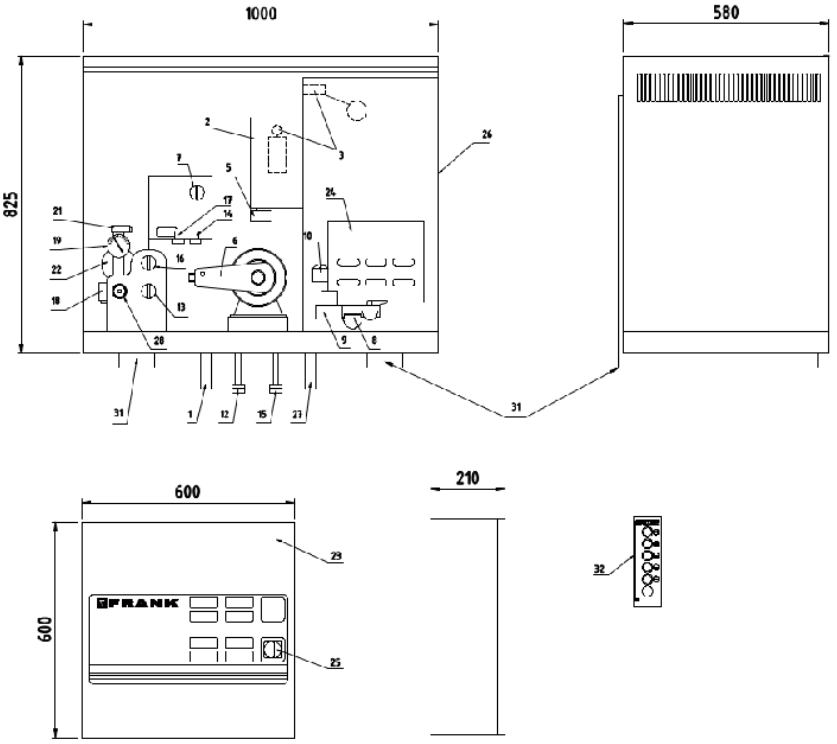
3. Description

3.1 Construction

The wall-mounted FRANK hot water high-pressure module is a stationary, electrically-heated machine. The machine consists of an enamelled chassis with wall consoles, hot water tank made of stainless steel with electrical gilled pipes, high-pressure pump with electric motor, cold water tank and a separate master control cabinet.

On the pressure side the machine is equipped with a glycerine-dampered pressure gauge, an overflow safety valve, a flow monitor switch, a pressure switch and a pressure accumulator.

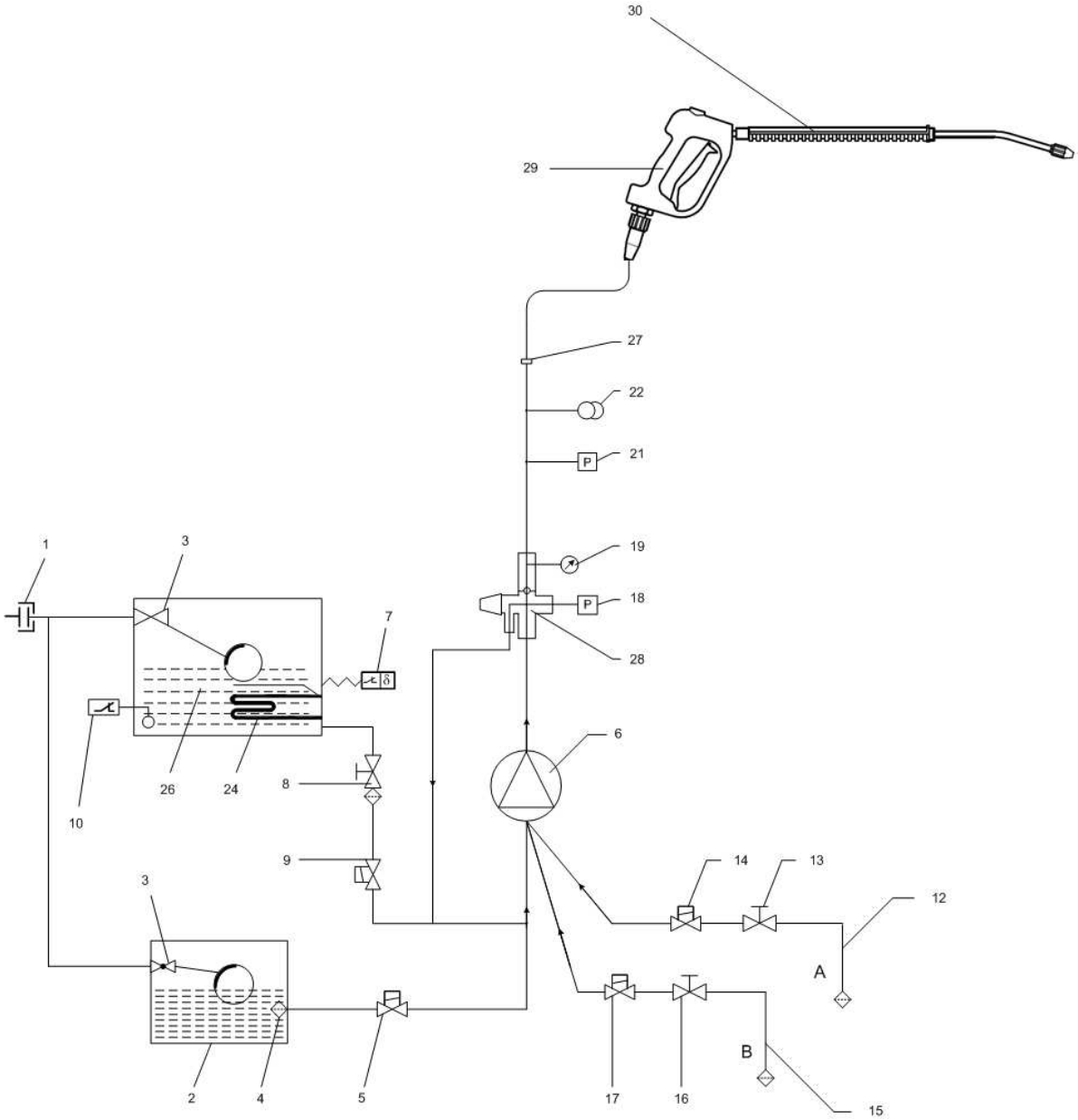
The construction and dimensions are shown in the basic circuit diagram.



1	Water connection
2	Cold water tank
3	Float valve
4	Suction filter
5	Solenoid valve - cold water
6	High-pressure pump
7	Regulating thermostat
8	Ball valve with dirt trap
9	Solenoid valve – hot water
10	Level switch
11	Solenoid valve – water inlet with filter
12	Suction pipe with suction filter for cleaning agent A
13	Dosing valve for cleaning agent A
14	Solenoid valve for cleaning agent A
15	Suction pipe with suction filter for cleaning agent B
16	Dosing valve for cleaning agent B
17	Solenoid valve for cleaning agent B
18	Pressure switch "OFF"
19	Pressure gauge
20	Flow monitor
21	Pressure switch "ON"
22	Pressure accumulator
23	Main switch cabinet
24	Tabular radiator
25	Main and emergency switch
26	Hot water tank
27	High-pressure connection
28	Overflow safety valve
29	Spray gun (Accessories "Washing bay equipment")
30	Spray lance with nozzle (Accessories "Washing bay equipment)
31	Wall bracket
32	Control box for remote control

3.2 Function

3.2.1 Functional diagram



3.2.2 Water and cleansing agent/Preserving agent system

The incoming water from the mains flows past the float valve into the water inlet tank. The high-pressure pump collects the water and conveys it under pressure to the safety spray lance.
Cleaning agent A or B can be added to the water through dosing valves via 2 solenoid valves. For this purpose, the suction tubes for the cleaning agents are placed in the tanks filled with cleaning agents.

The solenoid valves in the cleaning agent suction hoses shut off or open the intake of cleaning agents in accordance with the programme selected on the control cabinet.

3.2.3 Safety spray lance with mechanical spray gun

The mechanical spray gun permits operation of the machine only when the safety control lever has been activated. The spray gun is opened by activating the lever. When the lever is released, the gun is closed, preventing any further release of fluid from the spray lance.

When the gun is closed during operations, a pressure surge in the system is released, as a result of which the machine is switched off by means of a pressure switch. After the pressure has fallen to approx. 20 bar, the machine is switched on again by a second pressure switch, when the lever of the gun is activated once again.

The spray gun is a safety device. Repair works are to be carried out by experts only.

3.2.4 Overflow safety valve

The overflow safety valve with integrated electric pressure switch protects the machine against excessive pressure and is designed in such a manner that it cannot be set above the maximum admissible operating pressure. The check nut of the handwheel is sealed with lacquer.

Replacement, repair works, and settings are to be carried out by experts only.

3.2.5 Level switch

The tabular radiators in the hot water tank are monitored by the level switch. In case of lack of water the tabular radiators are switched off automatically. At hot water operation – programme “HOT” – the level switch protects also the high pressure pump, which is also automatically switched off in case of lack of water.

3.2.6 Regulating thermostat/heating switch

The thermostat has a regulating function.
Thermostat and heating switch form a unit. Both of them are actuated by a thermostat spindle and the turning button.
By setting the desired temperature, the heating is switched on.
By turning back the turning button anticlockwise until the limit has been reached, the heating is switched off.

3.2.7 Pressure switch

The machine is equipped with two identical pressure switches. One of them has the safety function of a pressure switch. It switches off the machine in the event of the spray gun being closed.

The second pressure switch starts the machine when the spray gun has been opened, after the pressure has fallen to approx. 20 bar. The pressure cannot be regulated on the pressure switches.

Pressure switches are safety devices. Replacement and repair works may be done by experts only.

3.2.8 Pressure accumulator (pulsation damper)

The pressure accumulator dampens the pulsation of the high-pressure pump and delays the restarting of the machine in the event of a leakage in the pressure system.

The filling pressure of the accumulator is 20 bar and must not fall below. Faulty accumulators are to be replaced immediately.

3.2.9 Control cabinet

All electrical components are centrally installed in the control cabinet. A main and emergency switch is installed in the front door and can be operated from outside the cabinet.

Maintenance and repair works may only be carried out by experts with the main and emergency switch being switched off and being protected against unintentional starting.

3.2.9.1 Fuses

The fuses protect the electrical components of the control circuit in the event of faults.

3.2.9.2 Motor protection

The motor is protected against overloading by an overload release device. In the event of overloading the release device switches off the motor and restarts it again automatically after it has cooled down. If the motor is repeatedly switched off by the release device, the cause of the fault is to be eliminated.

3.2.9.3 Automatic cutoff system

By closing the spray gun the machine is switched off by means of a pressure switch, the time sequence of the automatic cutoff system starts. During the time sequence the machine remains in operating condition. By opening the spray gun during the time sequence the time gone is deleted, which means, when closing the spray gun again, the time sequence starts from zero.
After the time to be set on a time relay has gone by, the operating condition is deleted.
For restarting the machine, the start button on the control box at the washing site must be switched on.
At works the time of the automatic cutoff device is set to approx. 5 minutes.
In case the time for the operating condition has to be changed, the setting has to be carried out by an expert on the corresponding time relay in the main switch cabinet.

4. Installation

4.1 Location

The machine must not be installed and operated in fire and explosion hazard areas.

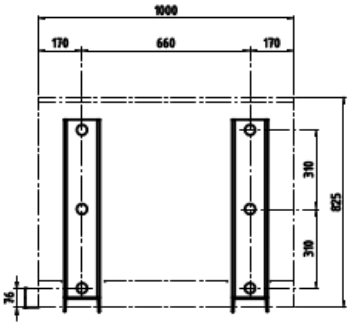
Frost protection
The machine, the long-distance pipings and the washing bays have to be installed in such a manner to protect them from frost.

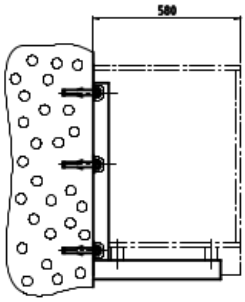
The machine is designed for stationary installation on a solid wall.

The satisfactory solidity of the wall must be checked and approved by an expert on site. If there is no sufficient solidity of the wall for wall installation, the machine is to be mounted on a scaffolding.

4.2 Assembly dimensions

Assembly dimensions

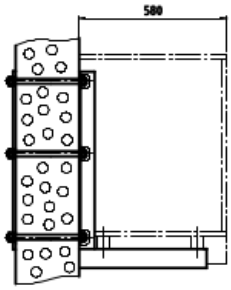




A
wall type:
concrete. for example B15-B 35;
brick
lime sand-full stone;
pumice stone

Fixing kit A
Nr. 2.08.02.00.000

wall bores:
Ø 12 x 110 mm for
wall module:
Ø 10 x 90 mm for
main control cabinet



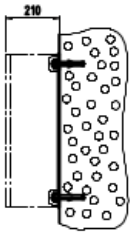
B
wall type:
high hole briks;
lime sand-hole stone
light high-hole bricks
for example poroton
gas concrete

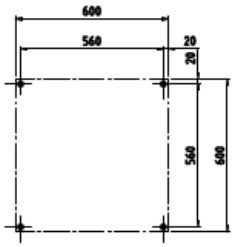
Fixing kit B
Nr. 2.08.02.10.000

wall bores:
Ø 12 for wall module;
Ø 10 x 90 mm for
main control cabinet

Wall Module

control cabinet





4.3 Connecting the machine

4.3.1 Electrical connection

The machine must be connected to the mains in accordance with the appropriate regulations by a locally authorized senior electrician.
63 A slow blow fuses must be installed in the building for the 30 kW version, 40 A slow fuses for the 18 kW version.

4.3.2 Water connection

The machine is to be connected to a tap of the pressure water pipe with a ½ "DN 12 hose, suitable for pipe pressure.

With a flow pressure of minimum 2 bar up to maximum 10 bar the water supply must be guaranteed according to the maximum volume flow of the corresponding machine type.

4.3.3 Long-distance piping

The long-distance piping is to be carried out by a skilled fitter for oil and water systems. Only components of the FRANK long-distance piping range are to be used as the thermal and chemical constancy can be guaranteed for these parts only.

For the installation and maintenance of the long-distance piping special instructions have to be followed.

4.3.4 High-pressure hose and spraying device

Only components which are approved by the manufacturer and marked in accordance with regulations are to be used.
High-pressure hose and spraying device are to be connected pressure-sealed to the machine. The high-pressure hose must not be driven over, pulled excessively or twisted.

5. Operation

5.1 Cleaning agents

Only the following FRANK chemicals and possibly certain other additional agents authhorized by the manufacturer may be used, since material compatibility can only be guaranteed for these cleaning agents.

FRANK Cleaning agents

FRANKOCLEAN NER 0800	FRANKOCLEAN LMI 0480
FRANKOCLEAN FZG 1070	FRANKOCLEAN WAX 0710
FRANKOCLEAN FZG 1170	FRANKOCLEAN DEF 1040
FRANKOCLEAN ALU 1020	FRANKOCLEAN AKO 1000
FRANKOCLEAN LWB 1140	FRANKOCLEAN HRB 1150

Observe the instructions for use of these cleaning and preserving agents. If necessary, wear protective glasses and safety clothing.

5.2 Nozzles and recoiling forces

The approved nozzle is adapted to the maximum flow rate, the admissible pump pressure and to the direct connection of a high-pressure hose pipe DN 8 x 10 m. The appropriate nozzle size is to be taken from the table below.

For long-distance pipings and/or longer hose pipes larger nozzles are to be used. The nozzle size is to be chosen and laid down in such a manner that the working pressure of the high-pressure stage (HD), indicated in section 2, is not exceeded.

When handling safety spray lance, the recoil should be taken into account, and the fact that torque is produced by the recoil when angled spray lances are in operation. This torque increases with the length of the lance.

Admissible nozzles; code number	Jet shape	Spray angle	Flow rate l/min.	Pump pressure bar	Recoil N
0004	Full jet	-	11,5	180	32 N
1504	Flat jet	15°			
2504*	Flat jet	25°			
4004	Flat jet	40°			
5004	Flat jet	50°			
6504	Flat jet	65°			

*Supplied nozzle for direct connection to a high-pressure hose DN 8 10 m without remote piping.

5.3 Working pressures and spray flow rates, infinitely variable

Working pressure bar	Flow rate l/min
180	11,5
150	10,5
120	9,5
90	8,0
60	6,5

5.4 Operating temperatures

The operating temperature can be adjusted infinitely on the thermostat. It can be set to maximum 70 °C.

5..5 Selection of the cleaning program

... .to be done on the control box of the washing bay:

Start button, programe "COLD"

Button for programe "HOT"

A

Button for cleaning agent A or B for program "COLD" or "HOT"

B

STOP button for deleting the program. The button must be actuated in order to change the program from HOT to COLD or from operation with detergent to operation without detergent.
Actuate start button and select the program desired.

5.6 Works setting

The machine has been set and tested according to the technical data under section 2.

The works setting and testing has been done under the following conditions:
Ambient temperature (Air temperature): 18 °C
Medium air pressure: 986 hPa

5.7 Commissioning

5.7.1 Initial commissioning

Compare the technical data on the machine plate to the technical data of this operating instructions.
Check oil level of the high-pressure pump.
Fill up cold water tank and hot water tank. For this purpose open tap of the water supply pipe and set main and emergency switch to "1".
Operate and deaerate the machine with cold water, without the adding of cleaning agents for about 1 minute, at zero pressure. For this purpose:

- set turning button of the regulating thermostat right back to the stop.
- set dosing valve button to "0"
- set main and emergency switch to "1"
- actuate button switch on the control cabinet at the washing site.

Thereupon:

- set main and emergency switch to "O".
- connect spray lance and spray gun to the high-pressure hose in a pressure-sealed manner.

5.7.2 Rated value settings

Set operating temperature on the turning button of the regulating thermostat.

Set the dosing of the cleaning and preserving agents on the dosing valve button according to the table below:

Formulation concentration 1:10 (1 part cleaning agent, 10 parts water)

Dosing valve position	Percentage of final concentration of the cleaning agent in the water jet
1	
2	0,09
3	0,39
4	0,51
5	0,52
6	0,55
7	0,58
8	0,63
9	0,66
10	0,67

If higher concentrations are required, the formulation of the cleaning agent has to be increased.

The maximum suction height for the cleaning agent is 1 m. The suction baskets must be located below the cleaning agent level in the tank.

The desired cleaning agent A or B can be selected on the button of the control box at the washing site.

A T T E N T I O N!

When the cleaning agent tank is empty, shut the corresponding dosing valve. Do not select the program with the empty tank, as air will be sucted which can damage the pump.

5.7.3 Starting the machine, program selection

Set main and emergency switch to "1".
Start machine by actuating the START button switch on the control cabinet at the washing site.

A T T E N T I O N !
Machine starts with spray gun closed and switches off immediately.

Select program – see section 5.5

5.7.4 Operating the safety spray lance

Direct high-pressure safety spray lance at the object to be cleaned.
Release and actuate safety lever on the spray gun. The water is now conveyed to the nozzle.
Spray pressure builds up and quickly attains the selected operating pressure.
Avoid an opening and closing of the spray gun in quick succession.

Securely hold the spray lance with both hands.
Avoid opening and releasing the spray gun in rapid succession.
Do not direct high-pressure jet at persons, live parts or machine.
The high-pressure hose has to be handled carefully in order to prevent to be driven over or to be pulled excessively.
Buckling of the hose should be avoided.

6.1 Taking the machine out of operation

Keep the machine running for at least 1 minute with cold water but without the addition of cleaning agents to flush out all chemical residues.

Release safety lever of the spray gun, close spray gun. The machine is switched off by means of a pressure switch.
The time sequence of the automatic cutoff system starts – see section 3.2.9.3.
After the time sequence of the automatic cutoff system has finished, open spray gun for pressure release for a short period and secure safety lever of the spray gun using the locking device to prevent any unintentional opening of the spray gun

The machine can only be restarted by pressing the START button again.

For longer periods of non-use and/or maintenance and servicing purposes, set. main and emergency switch to "0". Open gun until machine is depressurized. Turn off water supply.
In case of danger - e.g. leakage on spray appliance or on high-pressure hose pipe -press STOP button on the control cabinet at the washing site.

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5.9. Restarting of the machine

When restarting the machine, make sure the machine and particularly the power supply cord, the high-pressure hose and the safety spray lance are in perfectly good condition.

6. Maintenance

Maintenance and repair works may only be done by qualified personnel. Set main and emergency switch to "0" and protect against switching on.
Keep off hot parts - danger of burning.

Maintenance and repair works may only be carried out by qualified staff.

6.1 High-pressure pump

Change the pump lubrication oil at intervals of approx. 200 operating hours, but at the latest, after 3 months of operation. For lubrication use branded oils of SAE 90 quality only. When changing the oil, remove the draining screw, drain the oil and dispose it properly. Then put the oil draining screw back into place and refill new oil through the funnel until the upper mark on the dipstick is reached. Between oil changes check the oil level regularly; the oil level must always be between the two marks on the dipstick. If necessary, refill oil.

6.2. Water filter, Cleaning agent filter

Regularly check the filter in the water inlet solenoid valve of the hot water tank, in the dirt trap of the ball valve of the hot water suction pipe, in the cold water tank and on the cleaning agent suction hoses for contamination and clean them, if necessary.

11. Troubles, causes and troubleshooting

Trouble	Possible cause	What to do about it
Machine is not running or switches off during operation	No current; low voltage Interruptance in power supply	Have an expert: check the fuse of local installation and control fuses in the circuit box of the machine, replace if necessary; check supply cable, wall socket and voltage
	Fuse(s) in main switch cabinet blown out	Have an expert check the cause and have the fuses replaced.
	Low or excessive voltage, overcurrent release switches off	Provide required voltage
	Excessive pump pressure, overcurrent release switches off.	See under "Trouble" "Excessive pump pressure"
	Threephase current motor runs on 2 phases, overcurrent release switches off	See under "Cause" Disturbances in the electric power supply"
Pump fails to reach required pressure	Leakage in pump or in chemical suction hose	Check and retighten screw connections, replace sealings if necessary, tighten hose clips; check dosing valve for leaks, replace, if necessary
	Leakage in pressure system	Have an expert check pipes, hoses, fittings for leakage, have leaking parts sealed or replaced, if necessary

Trouble	Possible Cause	What to do about it
Pump fails to reach the required pressure	Defective pump sleeves	Have sleeves replaced
	Defective pump valves	Have valves replaced
	Worn out spray nozzle	Have nozzle replaced
	Wrong spray nozzle	Mount correct nozzle
	Water filter contaminated	Have filter cleaned
	Lack of water	Provide required supply flow pressure
Excessive pump pressure	Nozzle blocked	Remove and clean nozzle, flush spray lance without nozzle
	Wrong spray nozzle	Mount correct nozzle
No flow of cleansing agents	Cleansing agent filter on suction hose empty or suction filter on suction hose is not below the liquid level	Fill up cleansing agent or dip suction filter deeper in cleansing agent tank.
	Suction filter on cleansing agent hose contaminated	Clean filter
Rated temperature can not be reached	Regulating thermostat has been adjusted too low	Increase temperature
	Tabular radiator defective	Localize defective tabular radiator and have it replaced by an expert

8. Checking

The machine must be checked by an expert in accordance with the " regulations for liquid spray appliances" if necessary, but at least every 12 months in order to guarantee a safe operation. The results of these tests must be recorded in writing.

9. Prevention of accidents

The machine has been designed as to exclude accidents if operated properly. The operators must be warned of the danger of injury by hot machine parts and by the high-pressure jet. The regulations "working with liquid spray appliances" must be followed.

The machine must only be operated with mounted cover

The machine must not be operated when further persons are in the operating area.

Do not direct the high-pressure jet to persons, current-carrying parts or to the machine.

Do not operate the machine with defective high-pressure hose or defective electrical wires.

The machine must not be operated by children or untrained persons.

10. Safety instructions

For reasons of safety only those spare parts and accessories which are approved by the manufacturer and specified in the appropriatespare parts list are to be used. The manufacturer is responsible for the effects on the safety, reliability and performance of the machine only when the following conditions are fulfilled:

- servicing, extensions, adjustments, modifications and repair works are carried out by persons authorized by the manufacturer and recorded.

- connection to the electric power supply is carried out in accordance with national regulations considering the local operational area.

- machine is used in accordance with the Operating Instructions.

This operating manual has to be handed over to the operator.

OPERATING INSTRUCTIONS
FEM 813 - 18 kW

Supplements, corrections

2 Technical Data

Maximum volume flow:	13 l/min	
Operating pressure:	130 bar	
Operating temperature:	70 °C	
Heat capacity:	18 kW	
Water temperature	70 °C	
after heating period:	13 min. (approx.)	
Constant temperature:	35 °C (approx.)	
Mains supply:	400 V 3N AC 50Hz	230 V 3 AC 50 Hz
Nominal consumption:	23 kW, 35 A	23 kW, 61 A

Noise emissions: 80 dB (A), measured outside, at a distance of 1 m from the machine surface and 1 m above ground.

5.2 Recoil force 32 N

5.3 Working pressures and spray flow rates

130 bar - 13 l/min
93 bar - 11 l/min
62 bar - 9 l/min

The other technical data and instructions are the same as for model FEM 718

OPERATING INSTRUCTIONS
FEM 813 - 30 kW

Supplements, corrections

2 Technical Data

Maximum volume flow:	13 l/min
Operating pressure:	130 bar
Operating temperature:	70 °C
Heat capacity:	30 kW
Water temperature	70 °C
after heating period:	8 min. (approx.)
Constant temperature:	48 °C (approx.)
Mains supply:	400 V 3N AC 50Hz
Nominal consumption:	35 kW, 53 A
Noise emissions:	80 dB (A), measured outside, at a distance of 1 m from the machine surface and 1 m above ground.

5.2 Recoil force 32 N

5.4 Working pressures and spray flow rates

130 bar - 13 l/min
93 bar - 11 l/min
62 bar - 9 l/min

The other technical data and instructions are the same as for model FEM 718