

HYDAC INTERNATIONAL

FAM 30/15

FluidAqua Mobil

Operating and Maintenance Instruction

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Introduction

The safety of all persons coming into contact with the FAM and the availability of the installation essentially depend on the ability to master the unit. Therefore:



Read this manual before taking the unit into operation!

The safety of the FAM largely depends on maintenance. Regular required maintenance is described in this manual. We will support you if the unit needs repair and will provide original spare parts.

Abbreviations and symbols



This symbol denotes safety precautions, the non-observance of which can endanger persons and the environment.



This symbol denotes safety precautions, the non-observance of which can endanger persons by electrical voltage.



This symbol marks an important note for the proper use of the unit / software. The non-observance of these notes can lead to damage or failures of the unit / software.



This symbol is followed by user tips and particularly useful information.

Delivery

The following items are supplied:

- 1 FluidAqua, with suction and pressure hose.
- 1 operating and maintenance instructions.
- 1 operating and maintenance instructions vacuum pump

General Safety precautions



- Operation- and maintenance work may only be carried out by technically skilled and trained personnel. Personnel entrusted with work on this system must have read these operating instructions before beginning work.
- The safe operation of this unit can only be ensured if it is used for the purpose it was intended. If there is any question about the use of this unit, please contact the manufacturer. The manufacturer will not accept responsibility for damages resulting from misuse of this equipment.
- In addition to any instructions for safe operation of our equipment, all national and provincial workplace safety and health regulations must be observed, as well as in-plant safety regulations.
- Spills of dangerous substances must be contained and disposed of in accordance with current waste disposal legislation.
- Before any maintenance or repair work is carried out on the unit, electrical power to the unit must be disconnected, and all hydraulic pressures relieved.

Suitable fluids

The dewatering unit should primarily be used for the conditioning of the following hydraulic fluids:

mineral oils	DIN 50524
gear oils	DIN 51517, 51524
synthetic ester (HEES)	DIN 51524/2



We recommend using the FluidAqua Mobil only with lubricating and mineral oils or mineral oil based fluids or biodegradable liquids – based on synthetic ester. Please contact us if you want to use other fluids.

How to behave in case of emergency

In case of emergency turn main-and emergency switch off by 90° to the left to shut down the whole installation and make it out of voltage. There will be normal pressure in the reactor after 2 or 3 minutes.

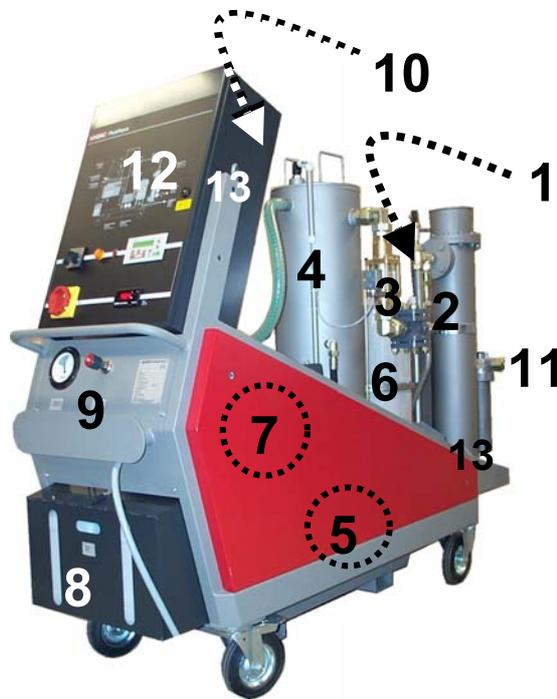


1 Description of the unit

The FluidAqua Mobil FAM was designed for the dewatering, filtration and degassing of hydraulic and lubricating oils. It removes free and emulsified water and most of the water which is in solution. Solid particles are separated efficiently by the fluid filter.

The fluid is degassed through a vacuum in the reactor.

1.1 The components of the system



1	Heater pump (charge pump)
2	heater
3	Inlet valve (2/2-directional valve)
4	reactor
5	Evacuation pump
6	Fluid filter for the separation of solid particles (OLF30)
7	Vacuum pump
8	Hinged box for the recipients collecting the condensation water
9	Vacuum gauge with regulating valve to regulate the necessary vacuum in the reactor
10	Air filter
11	Suction filter
12	The control panel consisting of <ul style="list-style-type: none"> • Main switch and emergency off • Text display (TD200) with 4 keys (Start, Stop, Fault, Reset) • HDA 5001 to regulate the temperature of the heater • Error indicator light (yellow)/light to indicate “heater on” (red) • Switch for flow rate selection: 1= 18 l/min; 2= 35 l/min
13	Ring bolts for the transport with crane

1.2 Performance

The FAM is able to reduce the water content of those fluids described in the chapter “suitable fluids” to less than 100 ppm (100 ppm = 0,01%).

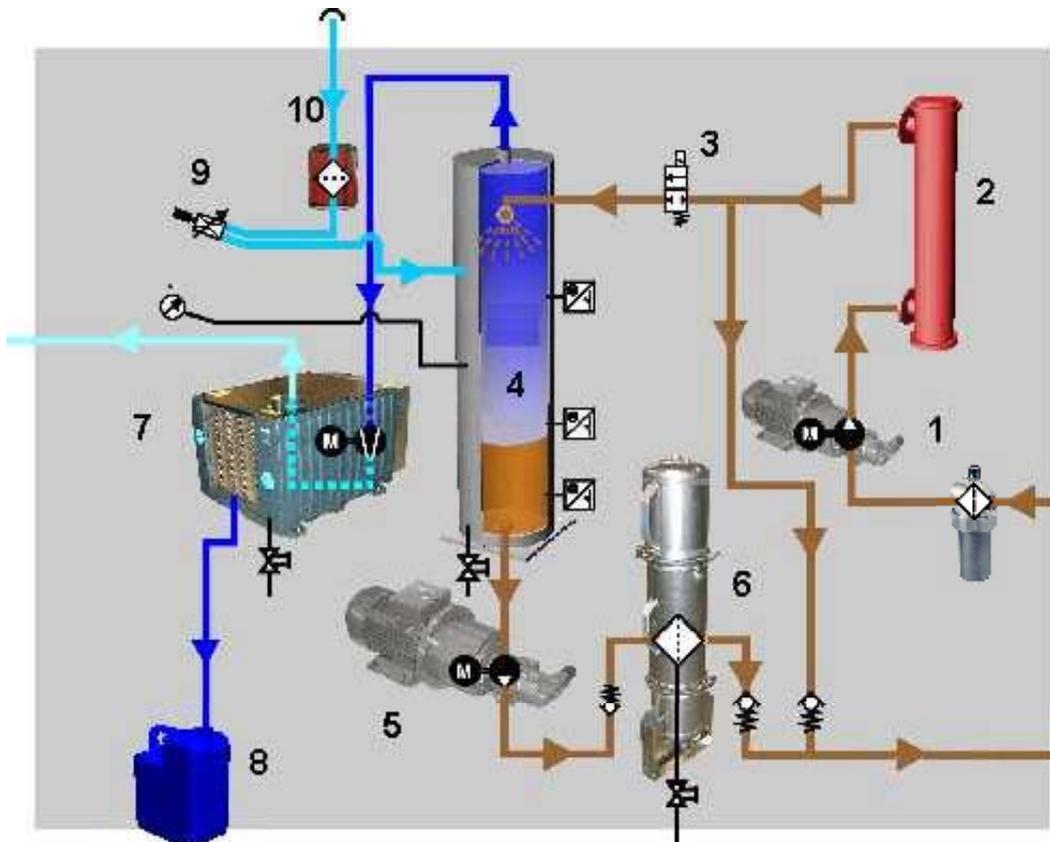


	Typical dewatering rates:
18 l/min	Approx. 1 l/h
35 l/min	Approx. 1,7 l/h

Generally, the dewatering rate depends upon the following factors:

		Dewatering rate
Water content	↑	↑
Fluid temperature	↑	↑
Detergent additives	↑	↓
Flow rate of the FAM	↑	↑

1.3 Function



After the FAM has been switched on, the fluid is pumped by means of the heater pump (1) via the heater (2) into the reactor (4). There, the fluid trickles downward over a special tower packing. With this tower packing a thin fluid film is created. The fluid is collected in the bottom part of the reactor. After reaching the level sensor 02 the evacuation pump (5) is switched on and pumps the fluid continuously to the outlet. At the same time the 2/2-directional valve (3) closes and the level in the reactor falls until it reaches the level sensor 01. Then the 2/2 directional valve opens again and the procedure is repeated. Due to the vacuum created in the reactor, air is sucked into the reactor via the air filter/dryer (10). This air is also passing through the tower packing but in opposite direction to the oil. The dry air is taking up the moisture from the oil and is evacuated by means of the watering vacuum pump (7).

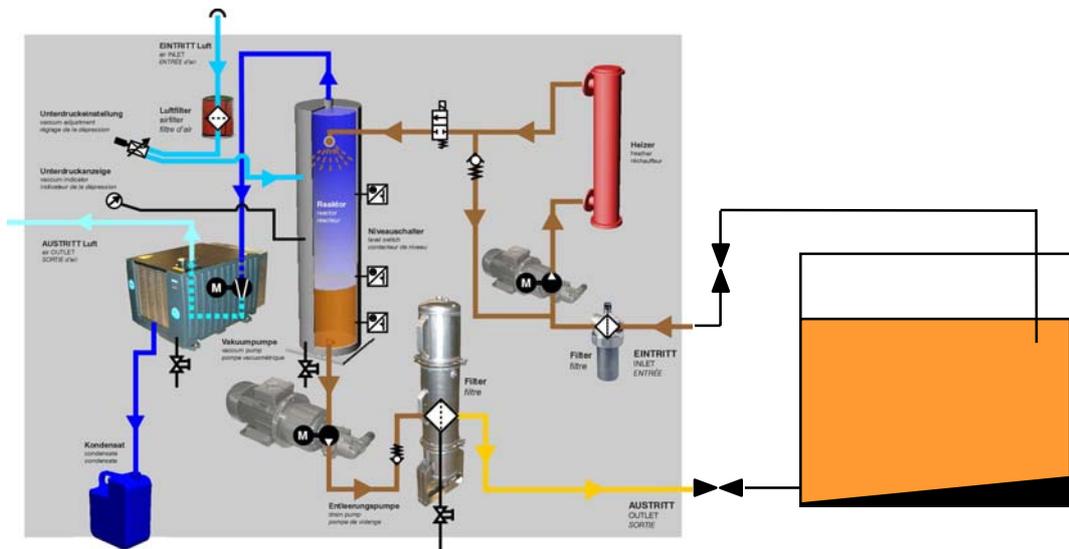
In the vacuum pump, the air is cooled before being released into the atmosphere. Due to the cooling, the moist air is condensed and the water collected in the absorber tank that is built around the actual pump and is used as operating media in the vacuum pump. If more water is removed from the oil than is being used by the vacuum pump, this excess water is collected in the water canisters (8)

The vacuum in the reactor is regulated with the regulating valve (9).

After actuating the stop switch the 2/2 directional valve closes, the heater is being switched off and the evacuation pump empties the reactor. The heater pump keeps on running until the reactor is completely drained.

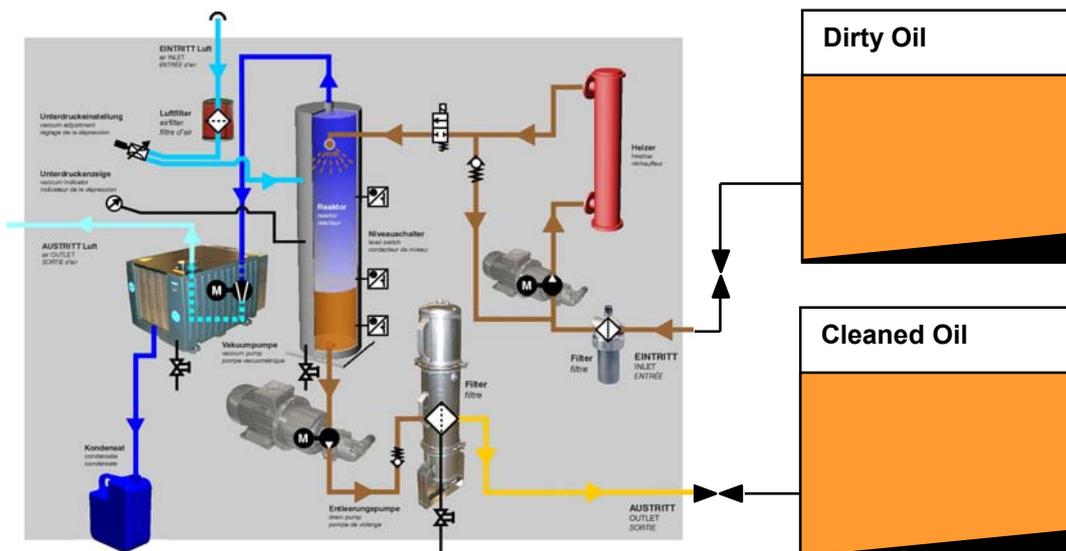
1.4 Possible applications

1.4.1 Bypass purification (dewatering, filtration and degasifying).



The FAM is connected to the tank with suction and pressure hose and purifies the fluid continuously.

1.4.2 Transfer by pumping (dewatering, filtration and degasifying).



The FAM is connected to the contaminated oil tank with the suction hose and pumps the fluid into the tank for the purified oil.



In order to avoid to overcharge the tank for the purified oil the oil level should be monitored.



In order to improve the results of the purification a bypass filtration according to point 1 should be carried out at the tank with the purified oil after the transfer by pumping.



The electric control supports several operation modes, the FAM can be switched on or off:

- a) from a control room
- b) by a level sensor in the operation mode transfer by pumping.

For more details please contact us.

2 Commissioning

2.1 Transport and packing

- All FAM units are tested at the factory for leaks and function. They are then carefully packaged for shipment.
- The fluid connections are all sealed with plugs to prevent the intrusion of contaminants during transport.
- Upon receipt of the unit, check for any damage from transportation.
- The packaging material should be re-used/re-cycled as appropriate for your area.
- These Operating and Maintenance Instructions are a component part of the FAM.
- To lift the FAM please use the ring bolts.
- If it is not necessary to lift the FAM, its wheels may be sufficient to push it to its new emplacement.
- Take care to evacuate the reactor and the fluid filter and to close the drain valve before transport.



As the FAM weighs more than 800 kg we recommend transporting with two people.

2.2 Set-up

- The unit must be mounted level and on flat surface. No special mounting is required (the brakes at the wheels must be blocked!)
- The FAM should be located near the tank (length of the hoses 5m max.), difference in high between tank and FAM 2m max.
- Sufficient room to operate and maintain the unit must be left around the FAM.

2.3 Connection

2.3.1 Suction port connection

- The suction port may be connected to a flexible hi-collapse hose, or to hard piping. The nominal size of the connected hoses/piping, must be at least as large as the inlet/outlet port sizes of the FAM in order to prevent an excessively high negative suction pressure.
- Make sure that the tank connection is always below the fluid level.
- Do not prime the fluid from the sump of the tank where high contamination may affect the operation of the unit

i Priming in the sump of the tank can lead to damage to the FAM

2.3.2 Pressure port connection

- The return line must also be installed below the fluid level in order to prevent air being introduced into the system again.

2.3.3 Water connection (optional)

- If the unit is supplied with an automatic water supply for the vacuum pump, the water supply hose must be connected according to all relevant national and provincial regulations.

Conditions for the water connection

Cold water until max. 30°C	
Working pressure:	min. 1,5 bar / 150 kPa
	max. 16 bar / 1600 kPa



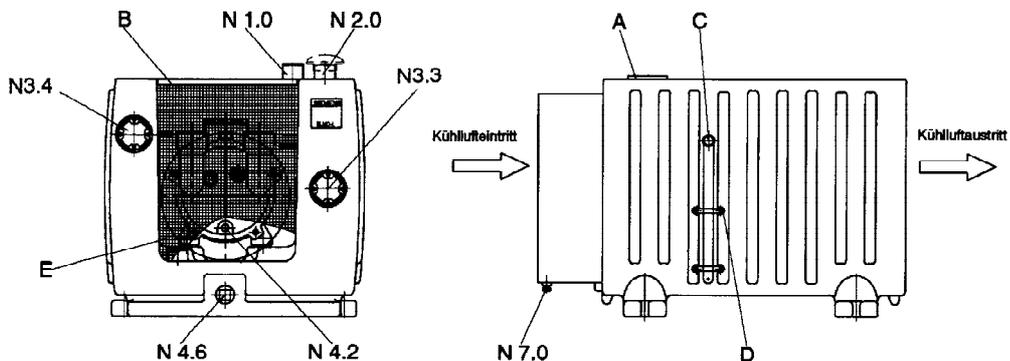
- The Unit is equipped with a filter combination.

Setting outlet pressure of the filter-combination (pressure after filter unit): To avoid turbulence in the tank of the vacuum pump, the pressure must be reduced. Set the outlet pressure according to the operating instruction FA. Honeywell:

Outlet pressure	max. 5 bar (500 kPa)
------------------------	----------------------

2.3.4 Vacuum pump

The vacuum pump and the separator is filled before distributed with a sufficient amount of water. In case of losses of water during longer transportation or storing or restarting



after prolonged shutdowns, the separator has to be filled up with normal tap water via the filler opening N3.4. The water is only filled up to the lower edge of the filler opening.

If the unit is equipped with an automatic water supply, the separator is filled automatically.

If, after switching on the unit, the vacuum pump does not create a vacuum, fill approx. 1,5 l of water into the suction hose (N1.0) of the vacuum pump, too.

During operation, the water level is monitored automatically by means of a level switch.



In order to avoid damages to the vacuum pump you should use anti-freezing compound if the ambient temperature is below 10 °C (commercial anti-freezer for cars).

2.3.5 Electrical connection

- The voltage and frequency given on the type plate, must agree with that of the power supply.
- Connection: 3 x L+ PE. conductor is not necessary.



The electrical connection must be carried out by a qualified electrician. All local and national electrical regulations and codes must be adhered to.

Now the FAM is ready to operate!

3 Operation

3.1 Switching on

- Move main switch to position “ON” and wait till the signal lamp “error” flashes once (test) and message “ready” ---> press “Start” occurs on the display.
- Press key  on the text display (TD200). During the starting period the vacuum pump starts, the inlet valve opens and the reactor is filled. When the vacuum chamber is filled to filling level 02, the evacuation pump is started and the starting period is finished. The unit runs in the automatic mode now.



After a voltage loss the FAM will not start automatically, it has to be started again!

3.2 Vacuum regulation

- Now regulate the vacuum pressure with the regulating valve on the right of the vacuum gauge depending upon the operating viscosity according to the following table.

Operating viscosity	Vacuum pressure (absolute pressure)
50 mm ² /s Hydraulic Oil	250 mbar / 25 kPa
300 mm ² /s Lube Oil	500 mbar / 50 kPa
50 mm ² /s Ester Fluids	400 mbar / 40 kPa

3.3 De-aeration of filter housing

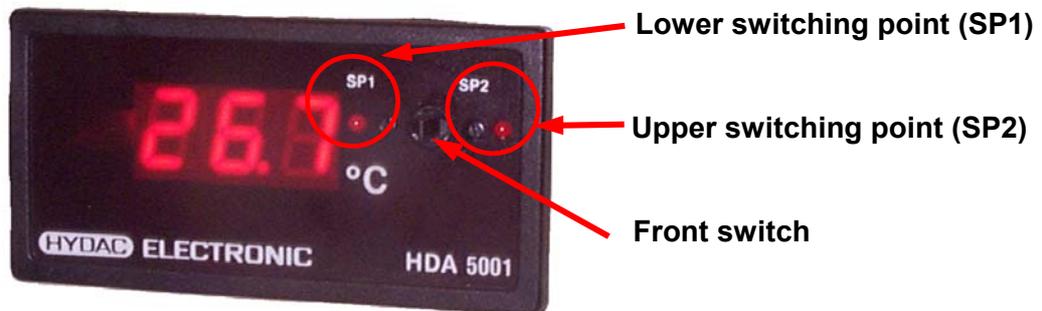
- In order to de-aerate the filter housing, open the bleed port until fluid escapes from it.



Do not unscrew the bleed port plug completely. Plug has vent groove.



3.4 Setting the fluid temperature with the HDA 5001.

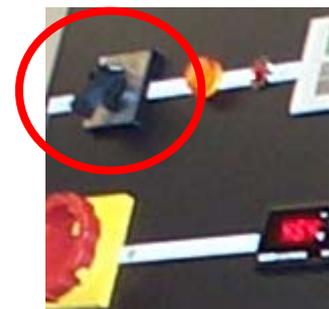


- With the HDA 5001, two switching points can be set:
 - When the fluid temperature is below the **lower switching point (SP1)**, the heater will be switched on (typical value: 55 °)
 - Reaches the temperature the **upper switching point (SP2)**, the heater will be switched off (typical value: 60°C).
- During normal operation, the HDA 5001 displays the actual measured temperature.
- With the front switch, the two switching points can be activated. They can be set via the corresponding potentiometer using a screw driver. The setting can be read while it is being carried out by activating the front switch. The switching points can also be set while the unit is in operation.
- Please use a screwdriver with a 2mm slot for setting.

3.5 Selecting the flow rate

This unit can be operated with two flow rates.

The flow rate can be selected on the flow rate selection switch located on the control panel.



Flow rate selection switch:

Position	Flow Rate
1	18 l/min
2	35 l/min



The flow rate switch can be switched while the unit is operating

3.6 Switching off

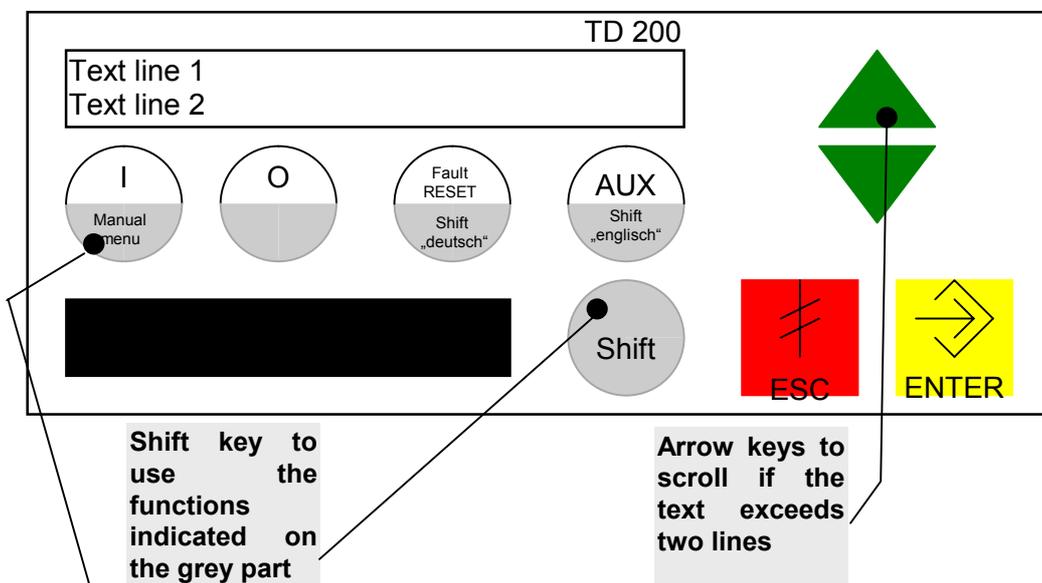
- Press key **0** on the text display (TD200). Now the unit starts with the after-running phase. The 2/2 directional valve closes, the vacuum pump and the heater is switched off and the reactor is evacuated. The charge pump keeps running until the reactor is completely drained.
- Wait till the message „ready → press Start,“ appears on the display and move main switch to position „OFF,“. Now the unit is switched off.

3.7 Language selection, fault reset and manual operation with the text display (TD200)

With the text display (TD200) you can:

- Select the language
- Acknowledge malfunction messages
- Select special functions if available
- Operate the FAM manually

Each function is assigned to a key or a key combination on the text display (TD200). The functions on the upper part of the keys (or those on the keys with only one assignment) can be triggered directly by pressing the respective key. To select the function on the lower part of the keys you have to press „Shift,“ beforehand.



Menu for manual operation

If you select the manual operation by pressing „shift“ and „I“ in succession, the message „manual menu“ appears in text line 1. To enter the second manual menu press „I“. Now the message „manual menu 2“ appears.

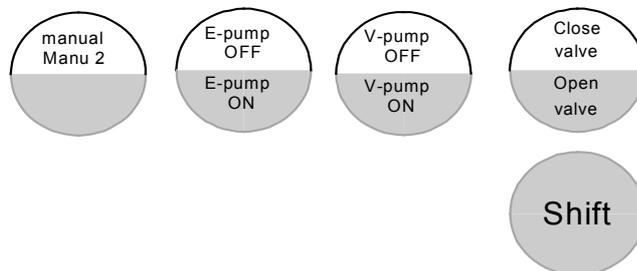
The allocation of the keys in the main and in the two manual menus are as follows:

3.7.1 Main menu

Key assignment	Function
„I“	Start purification operation
„O“	Stop FAM (after run with evacuation of the reactor)
„FAULT RESET“	acknowledge all repaired failures.
„AUX“	Operation with FCU/AS (depends upon version)
„Shift + deutsch/englisch“	Select german/english language.

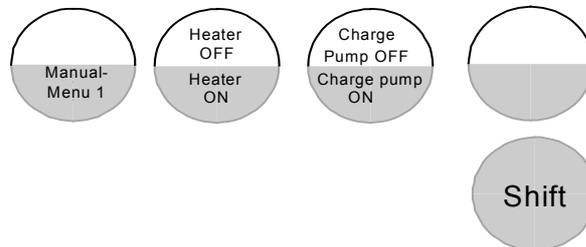
3.7.2 Menu for manual operation

In order to access the first menu for manual operation press „Shift“ and „I“ in succession. The key assignment in the **manual menu 1** is as follows:



Key assignment in Manual menu 1	Function
„manual menu 2“	To change in manual menu 2
„E-pump OFF“	Switches evacuation pump off
„E-pump ON“	Switches evacuation pump on
„V-pump OFF“	Switches vacuum pump off
„V-pump ON“	Switches vacuum pump on
„Close Valve “	Closes the inlet valve
„Open Valve “	Opens the inlet valve
„O“ and „I“	With this key combination you can exit the manual menu.

To change from the **manual menu 1** to the **manual menu 2** press „I“. Here, the key assignment is as follows:



Key assignment in Manual menu 2	Function
„manual menu 1“	To change in manual menu 1
„Heater OFF“	Switches heater off
„Heater ON“	Switches heater on *
„Heater pump OFF“	Switches charge pump off
„Heater pump ON“	Switches charge pump on
„Shift“ and „I“	With this combination you can go back into manual menu 1
„0“ and „I“	With this key combination you can exit the manual menu.

* Only possible when charge pump is switched on

4 Decommissioning, storage and disposal

4.1 Decommissioning and storage

- Drain unit completely off before storing.
- Disconnect the unit from the main and secure the electric cable on the unit.
- Secure the hoses on the unit.
- During storage, the unit must be kept in a clean and dry place. The temperature must not drop below 0°C or exceed 50°C
- The vacuum pump contains water which can freeze at temperatures at around 0°C. That is why usual anti-freeze should be filled in, as much as necessary. Please control the freezing point regularly.

4.2 Disposal

When disposing of the FAM or any of its constituent, adherence is to be maintained to local guidelines and regulations pertaining to occupational safety and environmental protection.

This applies in particular to the oil in the filter assembly and components covered with oil.

5 Maintenance

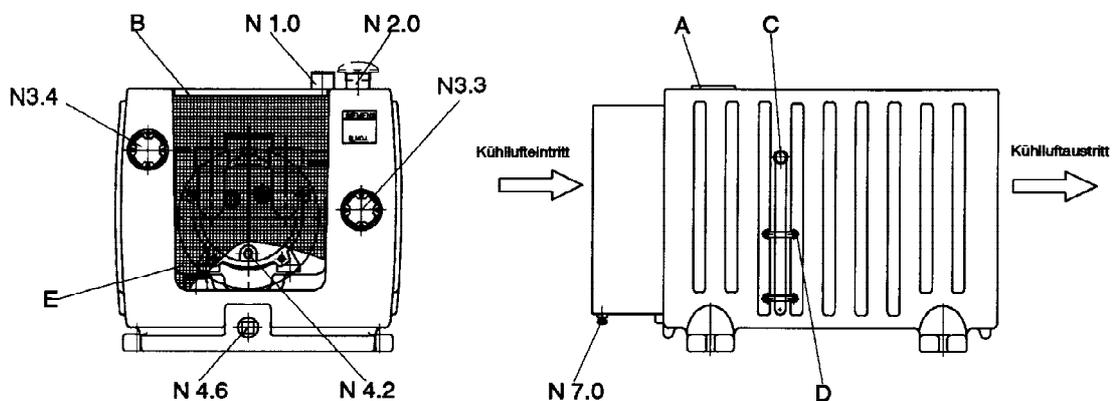
5.1 Visual checks

- Check regularly if all hoses and pipes are tight.
- Check electrical installations regularly to see if cables, plugs, sensors or connections or other parts in the switch cupboard are damaged.

5.2 Vacuum pump

See also manual for vacuum pump.

- Change water twice a year via the drainage hose connected to the drain connection (N4.6). Refill via filling connection (N3.4). If the water is heavily contaminated the system has to be drained in shorter periods and flushed thoroughly.
- Every three months the injection water pipe and condensation water pipe including filter and throttle sleeves have to be checked and cleaned or replaced if necessary (see separate manual for vacuum pump).
- The air cooler (N7.0) should be cleaned once or twice a year by blowing compressed air through the pipes. Clean also from outside.
- The whole system should be delimited if hard water is used.



The vacuum pump runs trouble-free, when the discharge air on the discharge connection (N2.0) is at or below ambient temperature.

5.3 Suction filter

The suction filter has to be cleaned regularly and when the error message „check suction strainer„ appears. To do this remove the suction filter from the housing and clean it with compressed air. Then put it back into the housing. The dirt from the suction strainer has to be collected and disposed of according to the local regulations as **hazardous waste**.



Operating the FAM without suction filter can lead to damages.

5.4 Change fluid filter

As soon as the error message "change fluid filter" appears on the display the filter should be taken out of the housing and be replaced by a new one. The contaminated filter has to be disposed of according to the local regulations as **hazardous waste**.

- Relieve the pressure in the housing by carefully opening the bleed plug on the top of the housing.
- Open the drain port, and collect the fluid (follow regulations for personal protection and environmental safety).
- When the housing is completely drained, open the housing clamp and remove the upper housing.
- Turn the locking cap 90° in a counterclockwise direction for one element package. For each additional element package turn an additional 90°.
- Remove the contaminated elements and clean the filter housing.
- Inspect the O-ring for damage, and possible replacement.
- Install new filter elements in reverse order to the removal sequence.



Warning: Install and close the last filter element with the locking cap. Without this cap installed, no filtration will take place.

- Grease and install O-ring, Re-install the upper housing and clamp. Tighten the housing clamp until the two housing halves seat against each other.
- Close the drain port.
- After re-starting the unit open the bleeding port to de-aerate the filter housing. Fill the housing completely, keeping the bleed port open until fluid escapes from it.

5.5 Waterfilter combination for automatic water supply vacuum pump (if available)

Backflush the water filter on a regular base, at the latest every 2 month. See manual for the filter combination.

5.6 Others

- The water from the water canisters for the condensate can contain drops of oil. It has to be disposed of according to the local regulations as hazardous waste.
- Once a year the fluid-filter should be completely emptied, opened and cleaned. This cleaning has to be done in a well ventilated room, so that possibly arising gases can escape.

For further information and specific instructions please refer to the suppliers documents.

6 Troubleshooting

Error message	Signal trigger	Cause	Remedy
Reactor overfilled	Reactor upper level switch 03	Maximum filling level in the reactor exceeded. Possibly foaming in the reactor.	Reduce the vacuum in the reactor e. g. from 300mbar (absolute) to 400mbar (absolute), increase the heating temperature to reduce the thickness of the oil film in the reactor. Note: If the vacuum pressure cannot be reduced any further, change the air filter.
Level switch 02/03	Float switch in the reactor	Malfunktion level switch in reactor	Check sensor and replace if necessary
Level switch 01/02	Float switch in the reactor	Malfunktion level switch in reactor	Check sensor and replace if necessary
Water level V-pump Inlet V- Pump	Float switch vacuum pump	Lack of water in the vacuum pump	Pour in the water at the side of the vacuum pump as described in the operating instruction Version with automatic water supply: Check the water supply, backflush water filter combination
Change fluid filter	Differential pressure indicator at the fluid filter	Maximum differential pressure at the filter reached	Change filter elements
Float switch	Float switch in oilpan	Oilplan of the FAM filled	Empty oilpan, check the FAM for leaks
Motor protection V/E/H-pump	Motor protection vacuum/evacuation /heater pump in the electric control box	Electric motor overloaded	Switch on engine protection in the electric control box, check viscosity.
Wrong motor rotation	Phase relay	Wrong phase sequence or supply voltage too low	Exchange two phase wire on power cord
Dry running E-pump	Level switch in the reactor	Reactor is being filled too slowly, flow into reactor is	Clean suction strainer/filter, check viscosity of the operating

Error message	Signal trigger	Cause	Remedy
		smaller than flow rate of evacuation pump	fluid and check length and height of suction line. Check vacuum pump and clean it if necessary
Check suction filter	Level switch in the reactor	This message appears together with "Dry running E-pump"	Check suction filter, check suction part, suction line could be drawn in the ground
Outlet clogged	Level switch in the reactor	No fluid is being pumped out of the FAM	Check shut-off devices in return line, check pressure restriction valve of the evacuation pump
Inlet clogged	Level switch in the reactor	Fluid cannot flow into the reactor during the start of the unit (before the evacuation pump starts to operate)	Check shut-off devices in suction line
Overflow V-pump	Float switch in the vacuum pump	Water in the vacuum pump could not run out	Check the magnetic valve at the drain of the vacuum pump, check drain pipe
Heater	Safety thermostat in the head of the heater. The safety thermostat is pre set at 80°C.	Oil too hot due to interruption of oil flow or faulty thermostat	Check shut off device in suction line Check heater pump The safety thermostat can be reset by means of the reset button in the head of the heater. Unscrew the cover of the heater and re-set the thermostat.
Fuse motor/heater	Entry fuse for motors and heaters	Fuse has released	Find and remove short-circuit

7 Technical data

For technical data see also the type plate of the unit and any separately supplied documents.

Operating pressure inlet	-0,4...0,6 bar
Operating pressure outlet	0...4,5 bar
Average Flow rate	appr. 18 / 35 l/min
Electrical power consumption	19,2 kW
Heater	13,5 kW
Weight	Appr. 600 kg
Viscosity range	15...800 mm ² /s
Safety type	IP 55
Material of seals	NBR
Fluid Temperature	10...80°C
Ambient temperature	10...40°C

7.1 Type plate

The type plate is located on the front panel of the FAM.

Please add the data from the type plate into the following copy.

HYDAC INTERNATIONAL		CE
Typ: <i>Type/ Type</i>		
Material-Nr.: <i>Material No./ code article</i>		
Fabrik-Nr.: <i>Serial No./ N° de fabrication</i>		
Volumenstrom [l/min] <i>Flow rate / Débit</i>		
Umgebungstemperatur [°C] <i>Ambiente temperature/ Température ambiante</i>		
max. Füllmenge [l] <i>Max. capacity/ Capacité de remplissage max.</i>	Leergewicht [kg] <i>Weight/ Poids</i>	
Betriebsspannung [V] <i>Operating voltage/ Tension d'alimentation</i>		
Frequenz [Hz] <i>Frequency/ Fréquence</i>		
Anschlußleistung [kW] <i>Power requirement/ Puissance nécessaire</i>		
Baujahr <i>Year of manufacturing/ Année de fabrication</i>		
Made in Germany	HYDAC Filtertechnik GmbH 66280 Sulzbach/ Saar	

8 Spares

When ordering spare parts always indicate the following:

- Type,
- Material No.,
- Serial No. and Year of manufacturing of the FAM

as indicated on the type plate.

Description	Part. No.	Qty.
Filter element N15DM002 Filter rating 2 µm	1251590	2
Filter element N15DM020 Filter rating 20 µm	349576	2
Air filter 0160 MU 003 M	1265765	1
Evacuation pump	<i>per inquiry</i>	
Feed pump	<i>per inquiry</i>	
Suction filter 0 D 200 W/HC*	1269748	1
Vacuum pump	<i>per inquiry</i>	
Vacuum gauge	639989	1
2/2-directional valve	639939	1
Pressure hose	<i>per inquiry</i>	
Suction hose	<i>per inquiry</i>	
Level switch (reactor)	1204801	1

9 Accessories

- **FluidControl Unit** to determine the purity class of the Fluids



- **AquaSensor** to measure the water content as percent of saturation



For further details please contact us.