HYDAC INTERNATIONAL

FAM 15/30/50/70

FluidAqua Mobil

Operation Instructions

English (translation of original instructions)

Document No.: 3132155e

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All details are subject to technical modifications.

Technical specifications are subject to change without notice.

HYDAC Filtertechnik GmbH

Service Technology Division / Filter Systems

Postfach 12 51

D-66273 Sulzbach / Saar

Germany

Phone: ++49 (0) 6897 / 509 – 01

Fax: ++49 (0) 6897 / 509 – 846

Content

Preface

We have compiled the most important instructions for the **operation** and **maintenance** of our product for you, its user, in this documentation**.**

It will acquaint you with the product and assist you in using it as intended in an optimal manner.

Keep it in the vicinity of the product so it is always available.

Sometimes the information contained in the documentation cannot always keep up with changes made to the product as we attach considerable importance to keeping our products cutting-edge. Consequently, there might be deviations in technical details, illustrations and dimensions.

If you discover errors while reading the documentation or have suggestions or other useful information, please don't hesitate to contact us:

HYDAC Filtertechnik GmbH

Division Service technology / Filter systems
Technical Documentation Department
Postfach 12 51
66273 Sulzbach/Saar - Germany

Fax: ++49 (0) 6897 509 846
Email: filtersysteme@hydac.com

The editorial board would welcome your contributions.

"Putting experience into practice"

Customer service

Contact our technical sales department if you have any questions on our product. When contacting us, always include the model/type designation, serial no. and part-no. of the product:

Fax: ++49 (0) 6897 509 846
Email: filtersysteme@hydac.com

Product modification

We would like to point out that changes to the product (e.g. purchasing additional options, etc.) may mean that the information in the operating instructions is no longer applicable or adequate.

After modification or repair work that affects the safety of the product has been carried out on components, the product may not be returned to operation until it has been checked and released by a HYDAC technician.

Report any modifications carried out on the product by you or a third party immediately.

Warranty

Our warranty applies in accordance with the general terms and conditions of sale and delivery of HYDAC Filtertechnik GmbH.

They are available at: www.hydac.com ⇨ Legal information.

Using the documentation

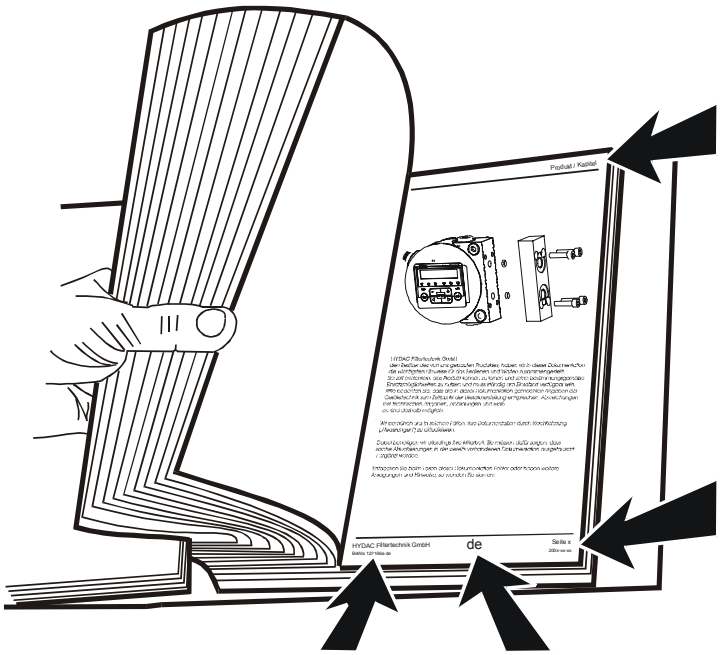
Note that the method described for locating specific information does not release you from your responsibility of carefully reading these instructions prior to starting the unit up for the first time and at regular intervals in the future.

WHAT do I want to know?

I determine which topic I am looking for.

WHERE can I find the information I'm looking for?

The documentation has a table of contents at the beginning. There, I select the chapter I'm looking for and the corresponding page number.



The documentation number with its index enables you to order another copy of the operating and maintenance instructions.
The index is incremented every time the manual is revised or changed.

Safety Information and Instructions

These operating instructions contain the most important notes for operating the FluidAqua Mobil FAM safely.

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.

Obligations and Liability

The basic prerequisite for the safe and proper handling and operation of the FAM is knowledge of the safety instructions and warnings.

These operating instructions in general, and the safety precautions in particular, are to be adhered by all those who work with the FluidAqua Mobil.

Adherence is to be maintained to pertinent accident prevention regulations applicable at the site where the product is used.

The safety guidelines listed here are restricted to use of the FluidAqua Mobil.

The FluidAqua Mobil has been designed and constructed in accordance with the current state of the art and recognized safety regulations. Nevertheless, hazard may be posed to the life and limb of the individual using the product or to third parties.

The FluidAqua Mobil is to be used:

- solely for its designated use
- only in accordance with the designated equipment group, equipment category and zone indicated above
- only when in a safe, perfect condition
- Any faults or malfunctions which might impair safety are to be properly repaired or remedied immediately.

Our General Terms and Conditions apply. They are made available to the owner upon concluding purchase of the unit at the latest. Any and all warranty and liability claims for personal injuries and damage to property shall be excluded in the event they are attributable to one or more of the following causes:

- Improper use of the FluidAqua Mobil or use deviating from its intended use
- Improper start up, operation and maintenance of the FluidAqua Mobil
- Operating the FluidAqua Mobil when the safety systems are defective
- Modifications to the FluidAqua Mobil made by the user or purchaser
- Improper monitoring of unit components that are subject to wear and tear
- improperly performed repair work

Explanation of Symbols and Warnings, etc.

Basic Symbols

DANGER denotes situations which can lead to death if safety precautions are not observed.

WARNING denotes situations which can lead to death if safety precautions are not observed.

CAUTION denotes situations which can lead to severe injuries if safety precautions are not observed.

NOTICE denotes situations which can lead to property damage if safety precautions are not observed.

General Safety Precautions

Operation, adjustment and calibration work may only be carried out by technically skilled and trained personnel.

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, please contact the manufacturer. The manufacturer will not accept responsibility for damages resulting from misuse of this equipment.

The following applies to all work performed using the unit: adherence to pertinent national regulations pertaining to accident prevention and safety at the workplace in addition to any applicable internal rules and regulations of the owner/operator, even though they are not specifically cited herein.

Leaks of dangerous materials must be properly collected and disposed of so as not to harm any persons or the environment. The corresponding statutory regulations are to be followed.

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.

Proper/Designated Use

The FAM was developed for the dewatering, filtration and degassing of hydraulic and lubricating oils. It removes free water, emulsified water and a large percentage of the water to be found in solution.

Any other use shall be deemed to be improper and not in keeping with the product's designated use.

Proper or designated use of the product extends to the following:

- Observing all the notes contained in these operating instructions.
- Performing requisite inspection and maintenance work.

Improper Use

Any use deviating from the proper/designated use described above is prohibited.

Improper use may result in hazard to life and limb.

Example of improper use:

- Operation with non-approved fluids.

Safety Devices

Prior to starting up the FAM unit each time, make sure that all the protective safety devices are properly installed and are in proper working order.

Safety devices may not be removed until the product has been shut down and secured against being restarted (e.g. warning sign or padlock on the main switch).

When the product is supplied in partial consignments, the safety devices are to be applied by the operator as specified by law/pertinent regulations.

Informal Safety Precautions

Make sure to always keep the operating instructions in the vicinity of the FluidAqua Mobil unit.

Apart from the operating instructions, any and all general and local regulations pertaining to accident prevention and environmental protection are to be made available and observance to be maintained to them.

Make sure to keep the safety and hazard symbols and warnings on the FluidAqua Mobil in a legible condition.

FluidAqua Mobil components may not be opened except in normal, non-contaminated environments. The mains cable must be pulled out before the FluidAqua Mobil is opened. Tests conducted with the housing open may only be performed by properly trained, certified electricians. This also applies to all repair work or to any modifications to electrical components approved by HYDAC.

The hoses and connection fittings are to be checked daily for leakage (visual check). The electrical components of the FluidAqua Mobil are to also be regularly checked (visual check once a month). Any loose connections or damaged cables are to be replaced immediately.

Safety Measures to Be Followed during Normal Operation

Do not operate the FAM unless all the safety devices function properly.

The product is to be checked once a day for external damage and the proper functioning of the safety devices.

Electrical Hazards

Any work involving the power supply may only be done by a properly trained, certified electrician.

Make sure to check the electrical equipment of the product on a regular basis. Any loose connections or damaged cables are to be remedied/replaced immediately.

If work on live components is required, a second individual should be present to switch off the unit if necessary.

Training and Instruction of Personnel

The FluidAqua Mobil may only be operated by properly trained and instructed personnel.

The areas of responsibility of your staff must be established in a clear-cut manner.

Staff undergoing training may not use the FluidAqua Mobil unless supervised by an experienced staff member.

Individuals / Activity	Individuals undergoing training	Individuals with technical training/ engineering background	Electrician	Supervisor with the appropriate authority
Packing Transportation	X	X		X
Commissioning		X	X	X
Operation	X	X	X	X
Troubleshooting/ locating the source of malfunction		X	X	X
Remedying mechanical problem		X		X
Troubleshooting, electrical problem			X	X
Maintenance	X	X	X	X
Servicing				X
Decommissioning / storage	X	X	X	X

Maintenance, Servicing and Troubleshooting

The prescribed adjustment, maintenance/servicing and inspection work is to be conducted in a timely fashion.

All operating media are to be protected in case the product is accidentally started up.

The FluidAqua Mobil is to be disconnected from the power supply and protected against being inadvertently switched back on when performing any maintenance, servicing, inspection or repair work.

Check any screwed fittings which have been removed to see that they have been properly secured.

Always check the product to see that it functions properly when performing maintenance and servicing work.

Modifications to the FluidAqua Mobil

Do not make any modifications (design modifications, extensions) to the FluidAqua Mobil without the prior consent of the manufacturer.

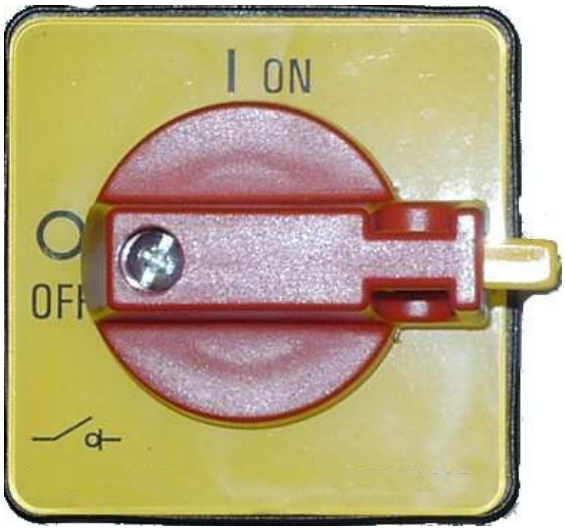
Any design modifications or extensions may not be made without HYDAC Filtertechnik GmbH's express prior written approval.

Immediately replace any machine components which are not in perfect condition.

Only use original (OEM) spare parts and consumables. When using non-OEM components it cannot be ensured that they have been designed and manufactured so as to comply with loading and safety requirements.

What to Do in Case of Emergency

In the event of an emergency, rotate the main and E-STOP switch 90° to the left in order to shut down the entire system. The entire system is then voltage-free downstream from this switch. Normal pressure is restored to the vacuum chamber after about 1 minute.



Checking the scope of delivery

Upon receiving the FAM check it for any damage in transit. The FAM may not be set up and installed unless it is in perfect order. Any damage in transit is to be reported to the forwarding agent or the department in charge immediately; the unit may not be commissioned until this damage is properly remedied.

The following items are supplied:

Item	Qty.	Description
1	1	FluidAqua Mobil - FAM
-	1	Four-sided hollow socket key, 6 mm
-	1	Technical documentation: - Operating instructions FAM - Service and maintenance instructions FAM - Electrical wiring diagram - Operating and maintenance instructions for vacuum pump Supplementary operating instructions (depending on FAM design)

Description of the System

The FAM was developed to dewater, filter and degas hydraulic and lubricating oils. It removes free water, emulsified water and a large proportion of the water in solution. The integrated fluid filter ensures efficient particulate separation.

A degassing of the medium is also achieved by the vacuum set up in the vacuum container.

Performance

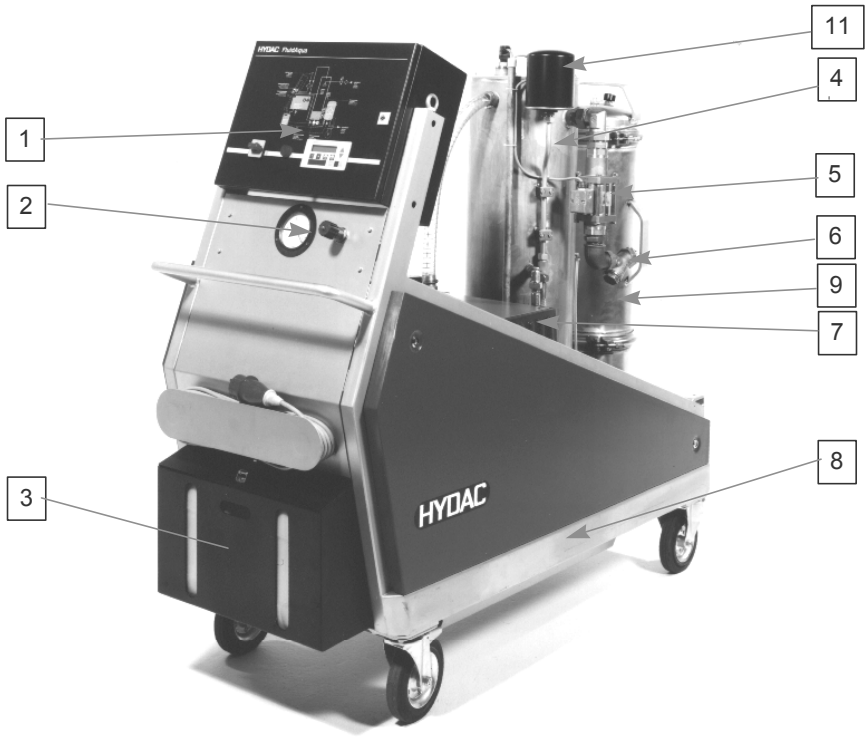
The FAM is able to dewater the fluids described in the "Suitable fluids" section to a water content of less than 100 PPM.

	Typical dewatering rates:
FAM-15	≈ 1.0 l/h
FAM-30	≈ 1.7 l/h
FAM-50	≈ 2.2 l/h
FAM-70	≈ 2.6 l/h

The dewatering speed is dependent on:

		Dewatering rate
Water content	⇧	⇧
Fluid temperature	⇧	⇧
Detergent additives	⇧	⇩
Volumetric flow of the FAM	⇧	⇧

System components



Item	Description
1	Operation panel, consisting of: - Main switch and emergency-off switch - Fault indicator light - Text display (TD 200) - Component diagram
2	Vacuum gauge with throttle valve to set the required vacuum
3	Hinged box for storing condensate collection containers
4	Vacuum chamber
5	Inlet valve (2/2 directional valve)
6	Suction strainer (FAM 15/30/50, only)
7	Vacuum pump
8	Evacuation pump
9	Fluid filter for separating solid particles
11	Air filter and dryer

Suitable Fluids

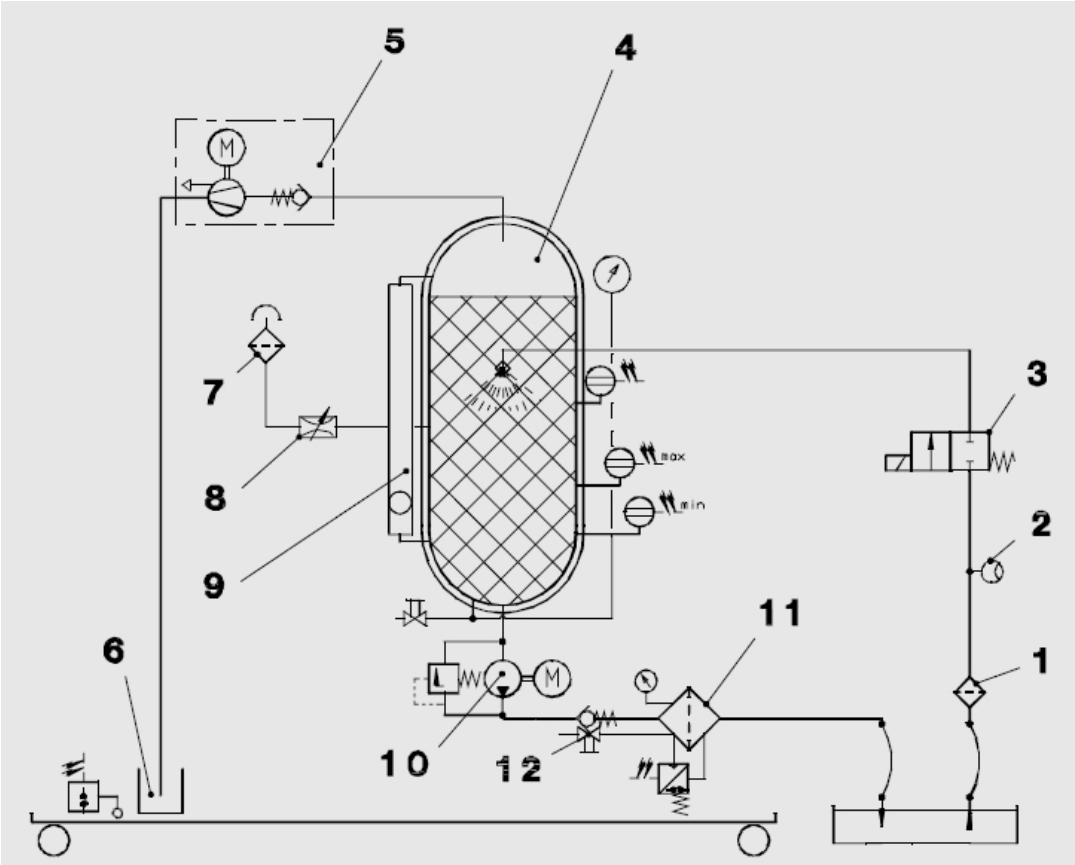
Depending on the version, only use the FAM for the following fluids (see model code):

FAM-xx-**M**-x-x/xxxx-xxx-xx-x-x-x	• mineral oils acc. DIN 50524 • gear oils acc. DIN 51517 and DIN 51524 • Other hydraulic and lubrication oils which require or are compatible with NBR seals
FAM-xx-**B**-x-x/xxxx-xxx-xx-x-x-x	• synthetic ester (HEES) DIN 51524/2 • Vegetable oils (HETG, HTG) • Hydraulic and lubrication oils which require or are compatible with Viton seals
FAM-xx-**X**-x-x/xxxx-xxx-xx-**D**-x-x	HFD fluids (not for pure phosphate esters which require EPDM seals).

TIP

If other media / fluids are used, the FAM can be damaged.

Hydraulic schematic



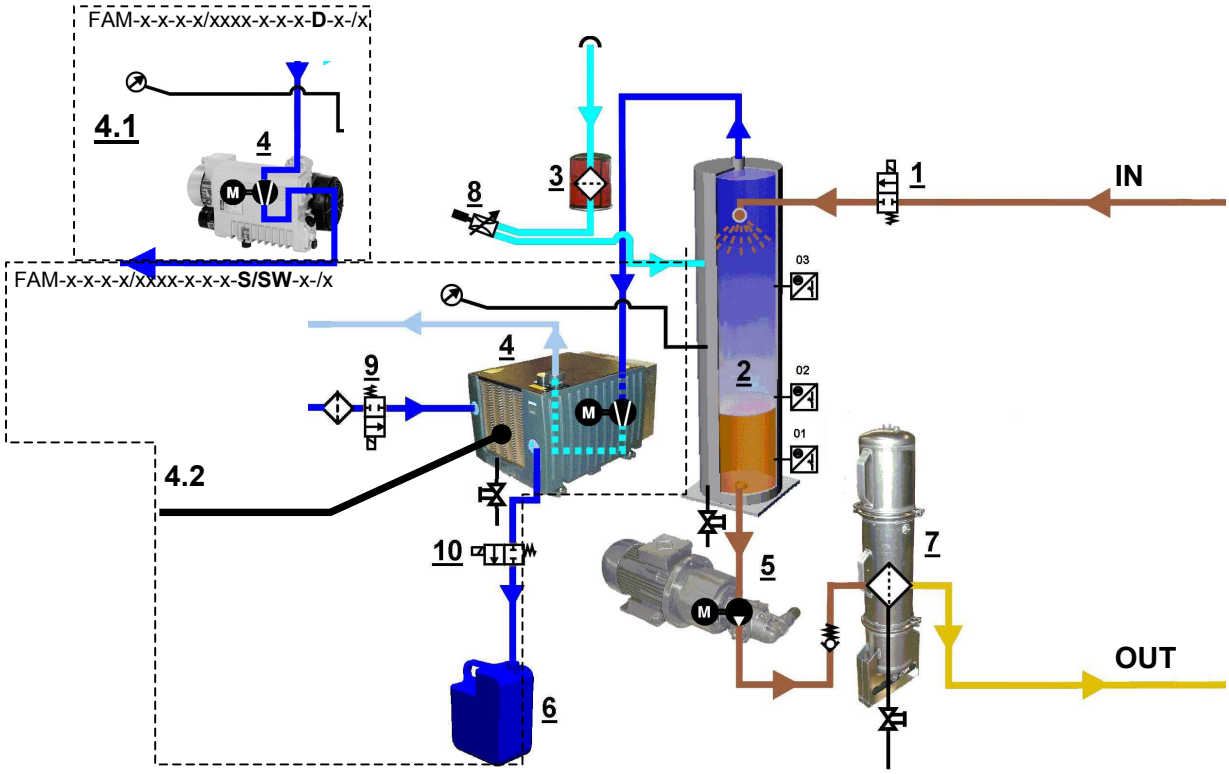
Item	Description
1	Suction strainer (FAM 15/30/50, only)
2	Inspections glass
3	Solenoid valve inlet
4	Vacuum chamber
5	Vacuum pump
6	Cannister
7	Air filter
8	Underpressure control
9	Vacuum chamber filling level
10	Evacuation pump
11	Oil filter
12	Draining

Function

After the FAM is switched on, the inlet valve **(1)** opens and the vacuum pump **(4)** builds up the necessary vacuum. Because of this vacuum, the fluid which is to be purified is sucked into the vacuum chamber (2). The fluid percolates downwards over a special tower packing and collects in the lower part of the reactor. After reaching the level sensor **02** the evacuation pump **(5)** is switched on and pumps the fluid out via the fluid filter **(7)** towards the outlet. At the same time, the inlet value (1) closes and the level of the reactor drops to the level sensor 01. When this is reached, the inlet valve (1) opens and fluid passes from the inlet into the reactor until the level sensor is reached 02. The inlet valve closes and the procedure repeats itself.

The vacuum in the vacuum chamber (2) sucks air out through the air filter (3). This air absorbs the moisture of the fluid and is then sucked out by the vacuum pump **(4)**.

Der Füllstand wird dabei automatisch über einen Schwimmerschalter überwachtA special cooling system [1] within the water ring vacuum pump cools the air and dries part of it. The vacuum pump directs this condensed water to the process water circuit. If more water is harvested than is consumed by the pump (evaporates), it is drained through the overflow valve **(10)** into the condensate canister **(6)**[1]. If less water is extracted than can be used by the pump, it is manually refilled by the automatic water connection[2] **(9)**. The fill level is monitored automatically by a level



switch.

The vacuum in the reactor is regulated with the regulating valve **(8)**.

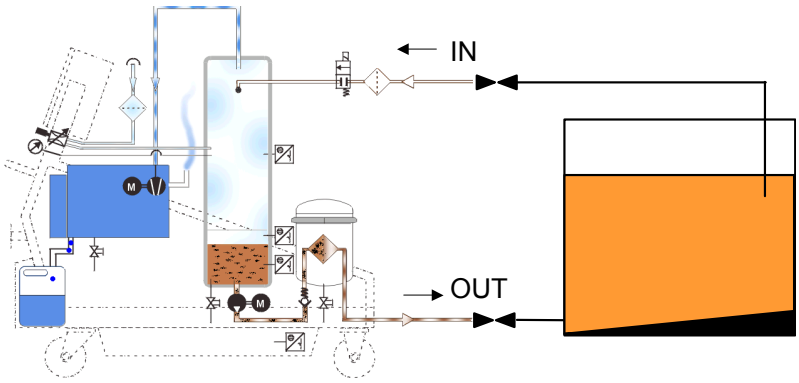
[1] Water ring vacuum pump version only (4.**2**) (FAM-x-x-x-x/xxxx-x-x-x-S/SW-x-/x). In models with a rotary vane pump (**4.1**) (FAM-x-x-x-x/xxxx-x-x-x-D-x-/x), water is discharged from the vacuum pump as water vapor.

[2] Version FAM-x-x-x-x/xxxx-x-x-x-**SW**-x-/x

When the Finish button is pressed, the inlet valve closes and the evacuation pump pumps the vacuum chamber empty.When the emergency-off button is pressed, the vacuum pump and the evacuation pump are switched off and the inlet closes under spring force.

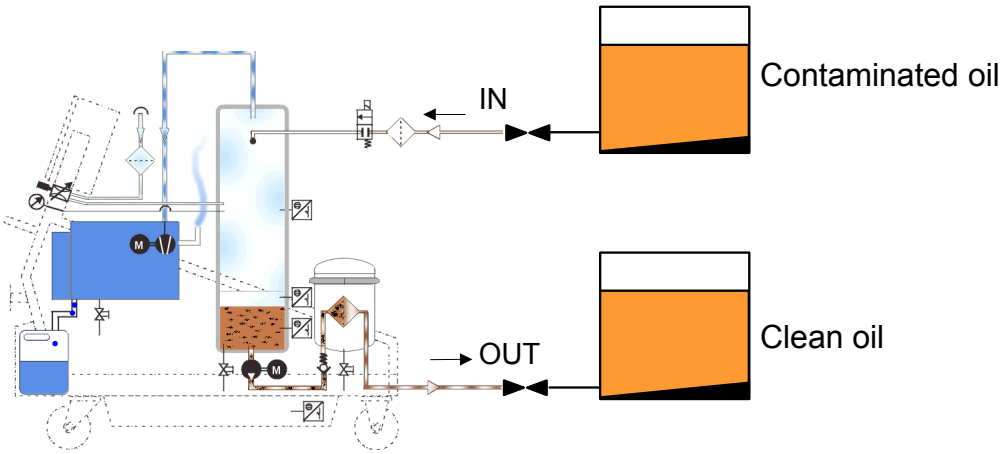
Possible Applications

Bypass purification



The FAM is connected with suction and pressure lines to the tank and cleans the medium to be found there in continuous operation.

Transfer by Pumping



The FAM is connected to the contaminated oil tank by means of a suction line and pumps the fluid into the clean oil tank.

However, better purification results are achieved with bypass purification. Therefore, the FAM should be operated after pumping in the bypass flow.

To avoid overfilling the purified oil tank, permanently monitor the oil level.

Transporting the FAM

The FAM is inspected for leaks and proper functioning at the factory, then carefully packed for shipment. The connectors/ports are closed off so that no contamination can enter the unit while it is in transit.

When receiving and unpacking the unit check it for damage in transit. Report any damage to the forwarding agent immediately.

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 delivery.

The FAM is only intended to be pushed or moved with a forklift (forklift receptacle underneath the unit).

During transportation in trucks, trains, etc. tightly secure the FAM to prevent movement in any direction. Attach extra padding at all corners and any other protruding parts.

Take care to evacuate the vacuum chamber and the fluid filter and to close the drain valve before transport.

Because of the high dead weight of ≈ 500 kg, we recommend that transport be carried out by at least two persons.

Setting up the FAM

The following points must be observed when setting up the FAM:

- The unit has to be set up in a horizontal position on a level surface.
  No fastening/anchoring to the floor is necessary with the Mobile FAM.
- The emergency brakes on the wheels (if present) must be locked to avoid unintended movement of the unit.
- Place the FAM near the tank to be cleaned (length of the hoses max. 5 m, height difference max. 2 m).
- The ambient temperature may not be below 10°C and may not exceed 40°C.
- Access to the main switch has to be unimpeded at all times.
- Maintain a minimum of a 0.8 m clearance to the right and left of the FAM to ensure unimpeded access.

Hydraulic Connection of the FAM

Connecting the suction port connection (IN)

Make the suction-side connection with a flexible hose that is resistant to negative pressure or with pipelines. The nominal diamter of the connection line must correspond at least to the cross-section of the CSM's connecting line so as to prevent excess pressure loss.

In order to keep the pressure loss as low as possible, use as few threaded connections as possible.

The pressure loss in a hydraulic line depends upon:

- flow rate
- kinematics viscosity
- pipe dimensions
- fluid density

The pressure differential can be calculated for hydraulic oils as follows:

$$\Delta p[bar] \approx 6{,}8 \times \frac{L}{d^4} \times Q \times \upsilon \times \rho$$

L = pipe length [m]
d = pipe internal diameter [mm]
Q = flow rate[l/min]
ν = kinematic viscosity [mm²/s]
ρ = density [kg/dm³]
Mineral oil ≈0.9 kg/dm³

This applies to straight pipe runs and hydraulic oils. Additional threaded connections and pipe bends increase the pressure differential.

Permissible suction pressure at suction port of the unit: -0.25 … 2 bar.

Connection to the tank must be done in a manner so that it is always below the oil level.

TIP

The medium may not be suctioned directly from the bottom of the tank.

- ➢ The greatest amount of impurities in the fluid is to be found at the bottom of the tank.
- ➢ High levels of contamination in the fluid can cause damage to the FAM.

Connecting the return port connection (OUT)

The return-flow line or the return-flow hose must be installed below the level of the oil in order to prevent air from entering the medium.

Preparing the Vacuum Pump

Water ring vacuum pump
(only for model code FAM-xx-x-x-x/xxx-xxx-xx-xx-S/SW-x-x/xxx)

TIP

The vacuum pump requires water as its operating medium. Operating the FAM without water in the vacuum pump will destroy the pump.

- The water ring vacuum pump must be checked for sufficient water filling before commissioning.
- If ambient temperatures of <10°C are to be expected, then commercially available automotive antifreeze must be added to the water in the vacuum pump.

Adding Water Manually:

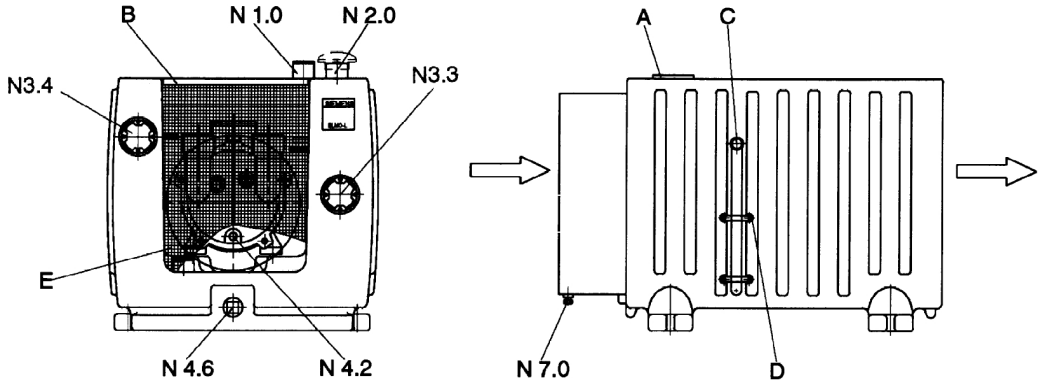
If water is lost due to transport or prolonged storage, then the vacuum pump must be filled with clean tap water through the opening [N3.4] until the water level reaches bottom edge of the opening. The opening is to be sealed again afterwards.

Automatic Water Feed:

The vaccum pump is filled automatically after the FAM is switched on in the version that features automatic water intake.

If no vacuum forms after switching on the FAM, the intake connection [N1.0] should be filled with an additional 2-3 liters of water. To accomplish this, the transparent suction hose is removed from the plug and the water is filled in. The hose must be mounted again afterwards.

During operation, the water filling level is monitored automatically by means of a level switch built into the vacuum pump. A corresponding message will be outputted on the display when the filling level reaches the MIN switch point.



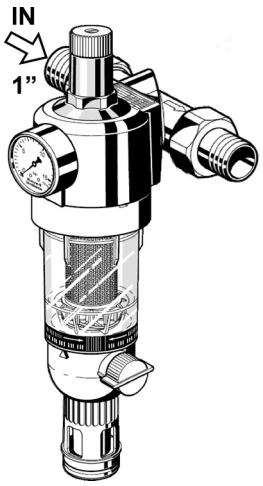
Water connection (optional - only for water ring vacuum pump) (model code FAM-xx-x-x-x/xxx-xxx-xx-xx-SW-x-x/xxx)

The vaccum pump is filled automatically after the FAM is switched on in the version that features automatic water intake.

If no vacuum forms after switching on the FAM, the intake connection [N1.0] of the vacuum pump should be filled with an additional 2-3 liters of water. To accomplish this, the transparent suction hose is removed from the plug and the water is filled in. The hose must be mounted again afterwards.

During operation, the water filling level is monitored automatically by means of a level switch built into the vacuum pump. A corresponding message will be outputted on the display when the filling level reaches the MIN switch point.

The port is constructed with 1" interior thread at the filter combination.



The water connection must meet the following conditions:

Water temperature:	max. 30°C
Operating pressure:	1.5 ... 16 bar

Rotary vane vacuum pump
(only for model code FAM-xx-x-x-x/xxx-xxx-xx-xx-D-x-x/xxx)

As a basic rule, the rotary vane vacuum pump is not filled with oil at the time the FAM is delivered.

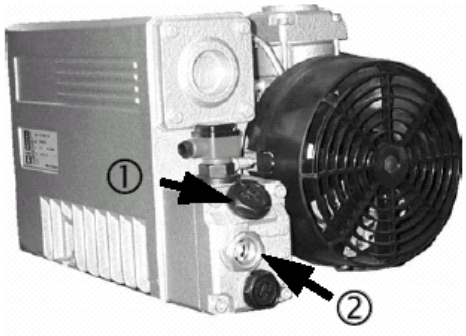
TIP

Operating the FAM without oil in the vacuum pump will cause irreparable damage to the pump.

- The rotary vane vacuum pump must be checked for sufficient filling before commissioning.

To fill the rotary vane vacuum pump, the oil is filled in through the filling screw plug **(1)** until the oil filling has risen above the MIN marking in the viewing glass **(2)**.

Exceeding the MAX marking will lead to fault messages on the control panel.



The amount of oil between the MIN/MAX marking is:

FAM 15 / 30	≈ 0.3 liter
FAM 50 / 70	≈ 1.0 liter

The water level is monitored automatically by the integrated float switch while the FAM is in operation. A message will appear on the control panel when the MIN filling level has been reached.

Synthetic vacuum pump oil in accordance with DIN 51506, Group VDL, ISO VG100 must be used for topping up.

This can be ordered from HYDAC under the part. no.:

Description		Part no.:
Vacuum pump oil VE101 DIN 51506, Group VDL, ISO VG100, synthetic	1 liters	06018128
Vacuum pump oil VE101 DIN 51506, Group VDL, ISO VG100, synthetic	5 liters	06018129

Electrical Connection of the FAM

DANGER

Electric shock

- Any work involving the electrical system may only be done by a properly trained, certified electrician.

The voltage and frequency indicated on the rating plate must coincide with the voltage supply present.

If a plug is present on the FAM or if a plug is mounted, then the FAM is to be operated from a correspondingly fused socket.

Switching on the FAM

Move main switch to the "ON" position and wait until the "Fault" lamp lights up briefly (lamp test) and this message: appears on the display.

```
Ready
--> Press start
```

Press the I key. Now the unit starts with the **starting phase**.

```
FluidAqua is in operation
Starting
```

1. Vacuum pump starts,
2. Inlet valve opens and the vacuum chamber is filled.
3. When the vacuum chamber is filled to filling level 02, the evacuation pump is started up and the starting period is finished.
4. Automatic mode is active:

```
FluidAqua is in operation
Automatic mode
```

Now regulate the vacuum pressure with the throttle valve on the right of the vacuum gauge, depending on the operating viscosity.

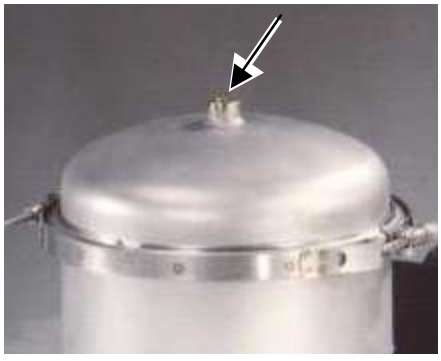
Operating viscosity	Pressure setting (absolute pressure)
50 mm^2/s hydraulic oil	350 mbar / 35 kPa
300 mm^2/s lubrication oil	500 mbar / 50 kPa
50 mm2/s ester oil	400 mbar / 40 kPa

Some oils begin to foam intensively when they enter the vacuum chamber. This can especially be the case when the water content is very high, but also when the oil is old or high viscosity media are used. If too much foam is caused, it is drawn in by the vacuum pump.

In this case, for example, reduce the vacuum from 350mbar to 450mbar.

Bleeding the Fluid Filter

The fluid filter is to be bled through the bleed plug in the cover until fluid emerges. The plug need not be unscrewed completely for this purpose. It is equipped with ventilation slits.



Shut off FAM

Press the  key. Now the unit begins the after-running phase:

```
FluidAqua is in operation
Run-down
```

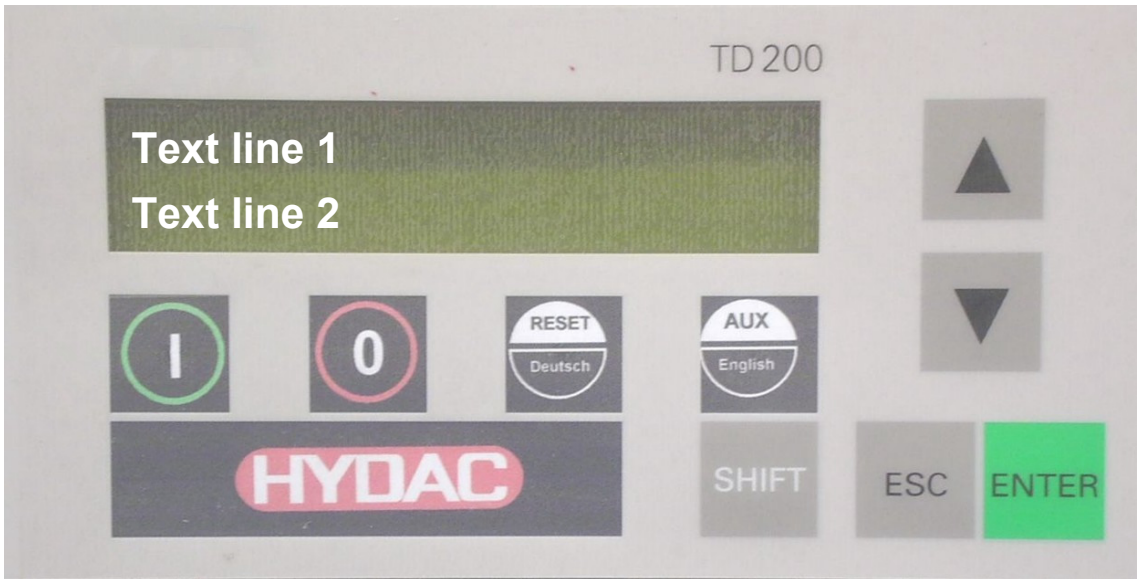
1. The inlet valve closes
2. The vacuum pump is switched off
3. The filter-pump unit runs until the vacuum chamber is emptied.

Wait until the message appears on the display. Now move the main switch to the position "0". The unit is switched off.

```
Ready
--> Press start
```

Operating the FAM

Except the regulation of the vacuum pressure, each function is assigned to a key or a key combination on the control panel. 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 (double allocation of keys), you must press SHIFT beforehand.



The key assignments and the descriptions of the Main and Manual menus are described below.

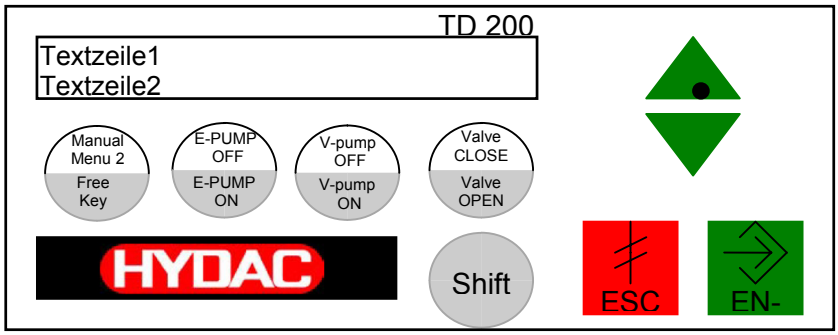
Main menu

Function key	Function
I	Start FAM. Start and transition in Automatic mode.
0	Stop FAM (afterrun with evacuation of the vacuum chamber)
RESET Deutsch	Acknowledging all rectified malfunctions.
AUX English	Button for special functions (depending on version)
SHIFT + RESET Deutsch	Select German language (or other languages depending on version).
SHIFT + AUX English	Select English language (or other languages depending on version).

Manual menus

To access **Manual menu 1**, press the following keys in succession:

SHIFT and I. The key assignment is as follows:

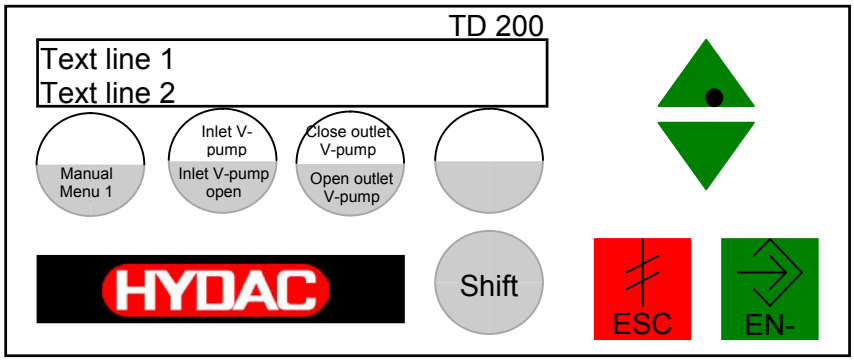


Key assignment in **Manual menu 1**	Function
„E-pump OFF“	Switches evacuation pump off
"E-Pump on"	Switches evacuation pump on
"V-pump off"	Switches vacuum pump off
"V pump on"	Switches vacuum pump on
„Valve close“	Closes the inlet valve.
„Valve open“	Opens the inlet valve.
0 and I	With this key combination you can exit the manual menu.

The menu for manual operation switches off automatically after 15 minutes.

To change from **Manual menu 1** to **Manual menu 2,** press the I key.

Manual menu 2 is only active in FAM version FAM-x-x-x-x/xxxx-x-x-x-**SW**-x-/x.



Key assignment in **Manual menu 2**	Function
"Close feed V-pump"	Closes the solenoid valve of the water feed to the vacuum pump.
"Open feed V-pump"	Opens the solenoid valve of the water feed to the vacuum pump.
"Close discharge V-pump"	Closes the solenoid valve of the water discharge from the vacuum pump.
"Open discharge V-pump"	Opens the solenoid valve of the water discharge from the vacuum pump.
Manual menu 1	Jump back to manual menu 1
0 and I	With this key combination you can exit Manual menu 2.

The menu for manual operation switches itself off automatically after 15 minutes

Performing Maintenance

The safety of all persons coming into contact with the FAM and the availability of the unit for use are extremely dependent on service and maintenance.

Routine service and maintenance work is described in the documentation included:

Maintenance and service instructions FAM-15/30/50/70", Document No.: 3168098

Shutdown, decommissioning

The unit is to be drained completely before being put into extended storage.

Pull out the power cord and securely fasten the tubes to the unit.

Wind the power cord and securely fasten it to the unit.

The unit may only be stored in a clean, dry (non-condensing) space. The storage temperature may not
fall below 0°C or exceed 50°C.

The water ring vacuum pump contains water which can freeze if the temperature falls below 0°C. Use the required amount of commercial anti-freezing compound. Check the freezing point regularly.

Disposing of the FAM

When decommissioning and/or disposing of the CSM, 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 unit and components covered with oil.

Troubleshooting

Error message	Cause	Remedy	Page
reactor overfilled	Maximum filling level 03 in the vacuum chamber exceeded. Check of foam in the vacuum chamber	Reduce the vacuum in the vacuum chamber e.g. from 300 mbar (absolute) to 400 mbar (absolute). For the heater option: Increase the heating temperature to reduce the thickness of the oil film in the vacuum chamber *Note: If the vacuum cannot be reduced any further, change the air filter.* Evacuate vacuum chamber and start FAM again.	36
Level switch 02/03	Level switch defective	Check level switch and replace if necessary	37
Level switch 01/02	Level switch defective	Check level switch and replace if necessary	37
Water level V-pump Feed tank V-Pump	Insufficient water in the water ring vacuum pump For versions with automatic water feed: water is not automatically filled up.	Pour in the water at the side of the vacuum pump as described in the operating instruction. **For version with automatic water intake:** check water feed, flush water filter	38
Change fluid filter	Maximum differential pressure at the filter reached	Changing the Filter Element	-
Level switch	Oilpan of the FAM filled	Drain oil pan, check the FAM for leaks	40
Motor protection E-pump Motor protection V-	Electric motor of evacuation or vacuum pump overloaded	Switch on motor protection in the electronic control unit, check operating viscosity, drain	41

Error message	Cause	Remedy	Page
pump		fluid from vacuum pump, rinse and fill up with fresh water.	
Wrong motor rotation	Wrong phase sequence or operation voltage too low	Exchange two of the three phases, check the voltage	42
Dry running E-pump	Too little medium is being sucked into the vacuum chamber.	Check suction strainer, check suction pipe, suction hose could be attached to the floor. Check vacuum pump and clean as required.	43
Check suction strainer (is always indicated with message „Dry running E-pump“)	Message appears with "Fault dry running evacuation pump"	Check suction filter, check suction part, suction line could drawn in the ground, only FAM 15/30/50.	45
Outlet blocked	No operating fluid is being pumped out of the FAM	Check shut-off device in the return line, check pressure relief valve of the evacuation pump	44

Error message	Cause	Remedy	Page
Entry blocked	No fluid is being pumped into the FAM	Check shut-off device in the suction pipe, check suction strainer, suction hose could have become attached to the floor Check vacuum pump and clean as required	45
Change fluid filter	Maximum differential pressure at the filter reached	Changing the Filter Element	39
V-pump overflow	Water in the container of the water ring vacuum pump cannot run out	Check the overflow valve at the drain of the vacuum pump in the cannister, check drain pipe	46
V-pump fill level < min	Insufficient oil in the rotary vane vacuum pump	Öl gemäß Inbetriebnahme einfüllen.	38
V-pump fill level > max	Too much oil in the rotary vane vacuum pump	Drain oil. Check vacuum settings.	38

Vacuum chamber overfilled

Step		Description	
		Malfunction: "Reactor overfilled"	
1.		Press RESET key	
2.		Select manual menu 1, start evacuation pump	
3.		Can vacuum chamber be emptied within 3.5°minutes from level 03 to level 01?	
4.	->a.	Yes	-> proceed to Step 5.
	->b.	No	-> proceed to Step 6.
5.		Check the evacuation pump for proper functioning	
6.		Excessive foaming -> vacuum in the vacuum chamber too high – reduce vacuum (e.g. from 300 $mbar_{(abs)}$ -> 400 $mbar_{(abs)}$)	
7.		Failure repaired	

Level switch 01/02(02/03)

Step		Description	
		Malfunction: Level switch 01/02(02/03)	
1.		Switch off the FAM at the main switch.	
2		Disconnect plug at level sensor. Remove level sensor	
3.		Manually check the functioning of the switching points	
4.	->a.	Switching points available	-> proceed to Step 5.
	->b.	Switching points not available.	-> proceed to Step 6.
5.		Inspect the plug and the cable to and in the control cabinet for the PLC. Is it functioning?	-> proceed to Step 7.
6.		Replace level switch	
7.	->a.	Function available	-> proceed to Step 8.
	->b.	Function not available	-> proceed to Step 9.
8.		SPS defective	
9.		Replace damaged parts	

V-pump fill level min/max

Step		Description	
		Malfunction: "Filling level V-pump min/max"	
1.		Press RESET key	
2.	->a.	Error message lapsed	-> proceed to Step 6.
	->b.	Error message continues to appear	-> go to Step 3.
3.		Check oil level; fill up or drain oil as necessary Check level sensor of the vacuum pump and the supply lines	
4.	->a.	Malfunction occurs again	-> proceed to Step 5.
	->b.	Malfunction does not recur	-> proceed to Step 6.
5.		Replace damaged parts	
6.		Failure repaired	

Change fluid filter

Step		Description	
		Malfunction: "Replace fluid filter"	
1.		Press RESET key	
2.		Switch off the FAM at the main switch	
3.		Close ball faucets on the IN and OUT connections	
4.		Empty filter housing via the drain ball valve	
5.		Open filter housing, remove filter elements from housing	
6.		Insert new filter elements, close filter housing	
7.		Open ball faucets on the IN and OUT connections	
8.		Switch the FAM on with the main switch	
9		Does malfunction reappear after ≈ 4 minutes?	
10.	->a.	Yes	-> proceed to Step 11.
	->b.	No	-> proceed to Step 12.
11.		Check differential pressure switch and supply lines	
12.		Failure repaired	

You can find details on changing the filter element in the maintenance and service instructions, document no. 3168098.

Float switch

Step		Description	
		Malfunction: "Float switch"	
1.		Empty oil pan	
2.		Press RESET key	
3.		Start FAM	
4.		Carry out leakage check, remedy leakages	
5.		Does malfunction reappear after ≈ 2 seconds?	
6.	->a.	Yes	-> proceed to Step 7.
	->b.	No	-> proceed to Step 8.
7.		Check float switch and supply lines	
8.		Failure repaired	

E/V/R pump motor protection

Step		Description	
		Malfunction: "E/V/R pump motor protection"	
1.		Switch off FAM at the main switch and pull out mains plug	
2		Open the switch cabinet door, switch the motor protection switch and/or fuse back on "I" that has tripped and check the setting of the motor protection switch and/or the voltage capacity of the fuse in accordance with the motor type plate and/or the heater type plate.	
3.	->a.	Malfunction occurs again	-> proceed to Step 4.
	->b.	Malfunction does not recur	-> proceed to Step 8.
4.		Measure the current consumption of the engines whose motor protection switch or fuse has tripped.	
5.		Close switch cabinet door, main switch to "On", start FAM	
6.	->a.	Malfunction occurs again	-> proceed to Step 7.
	->b.	Malfunction does not recur	-> proceed to Step 9.
7.		Check the operating viscosity of the medium (only for motor protection switch), perform maintenance work on the vacuum pump	
8.		Remedy malfunction	

Wrong motor rotation

Step		Description	
		Malfunction: "Wrong motor rotation"	
1.		Switch off FAM, pull out mains plug	
2		Replacement of two phases on the mains plug, check mains voltage	
3.		Plug mains plug back in, switch on main switch	
4.		Check direction of rotation in accordance with the direction of rotation arrow on the pumps	
5.	->a.	Malfunction occurs again	-> proceed to Step 6.
	->b.	Malfunction does not recur	-> proceed to Step 7.
6.		Pull out mains plug, check mains cable and plug, replacing as necessary	
7.		Failure repaired	

TIP

If an engine is replaced at time of service work, then the direction of rotation of the engine in manual operation must be checked before the FAM is switched On.

Dry running E-pump

Step		Description
		Fault "Dry running, E-pump"
1.		Cause: Insufficient feed into vacuum chamber
2.		The suction-side pressure loss is too great. Possible remedies: - Clean the suction strainer. - Reduce the suction height - Reduce absolute pressure in the vacuum chamber e.g. from 500 $mbar_{(abs)}$ -> 400 $mbar_{(abs)}$. - Increase fluid temperature - Increase diameter of suction hose - Shorten suction hose - Check 2/2-way solenoid valve at intake
3.		Suction connection in the tank sucks in air: - Position suction port lower - Tank to be purified too small
4.		Check the functioning of vacuum pump in manual mode
5.		Find and remedy corresponding cause
6.		To reset the failure, press the RESET key
7.		Failure repaired

Outlet (OUT) clogged

Step		Description	
1.		Fault: "Outlet clogged"	
		Cause: Medium cannot flow out of the vacuum chamber (emptying pump pressure limit = 5 bar)	
2.		Check locking features in the return-flow line. Open if blocked.	
3.		To reset the failure, press the RESET key	
4.		Does malfunction reappear after ≈ 4 minutes?	
5.	->a.	Yes	-> proceed to Step 6.
	->b.	No	-> proceed to Step 7.
6.		Check the pressure relief valve of the evacuation pump for proper functioning.	
7.		Failure repaired	

Inlet (IN) clogged

Step		Description	
1.		Malfunction: "Inlet clogged"	
2.		Cause: Medium cannot make its way into the vacuum chamber	
3.		Check shut-off devices in the suction line. Open if blocked. Check suction strainer and clean if necessary	
4.		To reset the failure, press the RESET key	
5.		Does malfunction reappear after ≈ 4 minutes?	
6.	->a.	Yes	-> proceed to Step 7.
	->b.	No	-> proceed to Step 8.
7.		Check the following points: - Check the suction pipe for cross-section constriction - Check the functioning of vacuum pump in manual mode - Check the position of the shut-off device in the suction line	
8.		Failure repaired	

Overflow V-pump

Step		Description
1.		Fault: "V-pump overflow"
2.		Cause: fill level in the vacuum pump is too high
3.		Water ring vacuum pump: - Water does not flow into the condensation tank - Check drain valve and clean if necessary - Check functioning of float switch Rotary vane vacuum pump: - Drain oil until the level is between Min. and Max.
4.		To reset the failure, press the RESET key
5.		Fault appears again?
6.	->a.	Yes -> proceed to Step 7.
	->b.	No -> proceed to Step 8.
7.		Check PLC for proper functioning There may be too much foam in the vacuum chamber -> Reduce the vacuum -> proceed to Step 4.
8.		Failure repaired

FCU plug missing (only in conjunction with accessory FCU)

Step		Description	
1.		Fault: "FCU plug missing"	
2.		Cause: Connection cable to the FluidControl Unit FCU is not connected.	
3.		Establish the connection with a connection cable	
4.		To reset the failure, press the RESET key	
5.		Fault appears again?	
6.	->a.	Yes	-> proceed to Step 7.
	->b.	No	-> proceed to Step 10.
7.		Check connection cable and plug; replace if necessary	
8.		Fault appears again?	
9.	->a.	Yes	-> proceed to Step 4.
	->b.	No	-> proceed to Step 10.
10.		Failure repaired	

Spare Parts

To ensure safe and reliable operation of the unit, use only original spare parts and accessories. When ordering spare parts, always indicate the unit designation (type, material no., serial no., year of manufacture).

Description	Part no.	Qty. for FAM			
		15	30	50	70
Filter element 2 µm N15DM002	1251590	1	2	3	4
Filter element 20µm N15DM020	349576	1	2	3	4
Filter element 1300 R XXX BN3HC	*Upon request*	1	1	1	1
Filter element 2600 R XXX BN3HC	*Upon request*	1	1	1	1
Air filter 0160 MU 003 M	1265765	1	1	1	1
Suction strainer (FAM 15/30/50, only)	635055	1			
Manometer	639989	1			
Inlet valve	639939	1			
Pressure hose	*Upon request*				
Suction hose	*Upon request*				
Level sensor (vacuum chamber)	1204801	1			

* 400V 50Hz 3-phase

For more spare parts and operating resources, please refer to the **"Maintenance and service instructions" Document No.: 3168098.**

Technical Data

Refer to the type label for specific data of the unit.

	FAM 15	FAM 30	FAM 50	FAM 70
Fluid filter (Type Filter Size)	OLF-15	OLF-30	OLF-45	1300 2600
Filter element	N15DMxxx	N15DMxxx	N15DMxxx	1300 R xxx BN3HC 2600 R xxx BN3HC
Contents of the pressure champber in L	20	40	78	12.5 (1300) 24 (2600)
Contamination retention capacity	≈ 500 g	≈ 1000 g	≈ 1500 g	≈ 151-227g (1300) ≈ 303-455g (2600)
Clogging indicator	VM 2 C.x	VM 2 C.x	VM 2 C.x	VM 2 C.x
Reaction pressure, differential pressure gauge	2 bar	2 bar	2 bar	2 bar
Pump types	Gear pump	Gear pump	Gear pump	Gear pump
flow rate	≈ 17 l/min	≈ 36 l/min	≈ 56 l/min	≈ 76 l/min
Operating pressure	4.5 bar	4.5 bar	4.5 bar	4.5 bar
Viscosity range in mm²/s	15 … 500	15 … 500	15 …500	15 ...500
Electrical power consumption in W	1900	2700	3200	5100
Power cable, length	10 m	10 m	10 m	10 m
IP class	IP 55	IP 55	IP 55	IP 55
Suction hose, length*	5 m	5 m	5 m	5 m
Pressure hose, length	5 m	5 m	5 m	5 m
Hoses, material	NBR	NBR	NBR	NBR
Inlet	G 1 ½“	G 1 ½“	G 1 ½“	G 1 ½“
Outlet	G 1"	G 1"	G 1 ½“	G 1 ½“
Material of sealings*	NBR (FPM)	NBR (FPM)	NBR (FPM)	NBR (FPM)
Weight when empty in kg	≈ 425	≈ 440	≈ 500	≈ 520

Fluid temperature in°C	10 … 80	10 … 80	10 … 80	10 … 80
Ambient temperature in °C	10 … 40	10 … 40	10 … 40	10 … 40
Typical dewatering speed	≈ 1 l/h	≈ 1.7 l/h	≈ 2.2 l/h	≈ 2.6 l/h
Minimum water content	<100 ppm	<100 ppm	<100 ppm	<100 ppm

*) According to model code

Type label

The type plate is located on the front panel. Copy the data from the type label into the following, in order to have at hand when required.

Model Code

Entwässerungs- und Filteraggregat
De-watering and filtration unit
Groupe de rétention d'eau et de filtration
FluidAqua Mobil
FAM 15/30/50/70

Typenschlüssel / Model code / *Code de commande*

FAM	-15	-M	-1	-A/1900	-015	-DM	-02	-S	-Z	-1

Grundtyp / Basic model / *Type*
FAM = FluidAqua Mobil

Baugröße / Size / *Taille*
15 = 17 l/min
30 = 36 l/min
50 = 56 l/min
70 = 76 l/min
bei 50 Hz-Betrieb / at 50 Hz operation / *à 50 Hz de service*

Betriebsmedium / Operating fluid / *Fluide de service*
M = **Mineralöl** / mineral oil / *Huile minérale*
I = **Isolieröl** / insulating oil / *Fluide diélectrique*
B = **Biologisch schnell abbaubar** / rapidly biodegradable fluid / *Fluide biodégradable*
X = **HFD-Flüssigkeiten (bitte Flüssigkeitstyp im Klartext eingeben)**
HFD fluid (please state exact fluid type)
HFD (Veuillez indiquer la désignation précise du fluide)

Mechanische Ausführung / Type / *Exécution*
1 = **stationär** / stationary / *Fixe*
2 = **mobil** / mobile / *Mobile*

Spannung/Frequenz/Netz/Leistung / Voltage/Frequency/Supply/Power / *Tension/Fréquence/Alimentation/Puissance*
A = 400 V/50 Hz/3Ph+PE
B = 415 V/50 Hz/3Ph+PE
C = 200 V/50 Hz/3Ph+PE
D = 200 V/60 Hz/3Ph+PE
E = 220 V/60 Hz/3Ph+PE
F = 230 V/60 Hz/3Ph+PE
O = 460 V/60 Hz/3Ph+PE
G = 380 V/60 Hz/3Ph+PE
H = 440 V/60 Hz/3Ph+PE
I = 500 V/50 Hz/3Ph+PE
K = 480 V/60 Hz/3Ph+PE
L = 220 V/50 Hz/3Ph+PE
N = 575 V/60 Hz/3Ph+PE
FAM 15 - 1900 W
FAM 30 - 2700 W
FAM 50 - 3200 W
FAM 70 - 5100 W
X = **andere Spannung** / other voltages / *autre tension*

Filterbaugröße / Filter size / *Type de filtre*
015 = 1 x N15DM0xx
030 = 2 x N15DM0xx
045 = 3 x N15DM0xx
060 = 4 x N15DM0xx
1300 = 1 x 1300 R xxx BN3HC/-KB
2600 = 1 x 2600 R xxx BN3HC/-KB
Z = **ohne Filtergehäuse** / without filter housing / *Sans filtre*
andere auf Anfrage / others on request / *Autre sur demande*

Filtermaterial / Filter material / *Média filtrant*
DM = Dimicron®
BN = Betamicron®
Z = **ohne** / without / *Sans*
andere auf Anfrage / others on request / *Autre sur demande*

Filterfeinheit / Filtration rating / *Finesse de filtration*
02 = 2 µm (DM)
03 = 3 µm (BN)
05 = 5 µm (BN)
10 = 10 µm (DM/BN)
20 = 20 µm (DM/BN)
30 = 30 µm (DM)
Z = **ohne Filterelemente** / without filter element / *Sans élément*
andere auf Anfrage / others on request / *Autre sur demande*

Vakuumpumpentyp/Baugröße / Type of vacuum pump / *Type de pompe vacuométrique*
S = **Standard** / standard / *Standard*
SW = **Autom. Wasserzufuhr** / autom. lubrication system / *Alimentation auto. eau*
D = **Drehschieberpumpe** / rotary vane pump / *Pompe rotative à palettes*

Meßtechnische Ausrüstung / Measurement equipment / *Equipement en appareils de mesure*
Z = **ohne** / without / *sans*
A = **mit AquaSensor (AS)** / with AquaSensor (AS) / *avec AquaSensor (AS)*
C = **mit ContaminationSensor (CS)** / with ContaminationSensor (CS) / *avec ContaminationSensor (CS)*
AC = A + C

Änderungskennzahl / Modification number / *Indice de modification*
1

Ergänzende Angaben / Supplementary details / *Indication complémentaire*
ohne Angabe = Serie / no details = standard / *Sans indication = Standard*

HYDAC INTERNATIONAL

HYDAC Filtertechnik GmbH
Bereich Servicetechnik / Service Technology Division
Industriegebiet
66280 Sulzbach/Saar
Germany

Postfach 1251
66273 Sulzbach/Saar
Germany

Tel: +49 (0) 6897 509 01
Fax: +49 (0) 6897 509 846 Technical Department
Fax: +49 (0) 6897 509 577 Sales Department

Internet: www.hydac.com
email: filtersysteme@hydac.com