FAS
FluidAnalysis Set

Operating and Maintenance Instructions

English (translation of original instructions)

Document no.: 3160265d
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We reserve the right to make technical changes.
All content is subject to revision without notice.

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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.

Note that the information on the unit’s engineering contained in the documentation was that available at the time of publication. There may be deviations in technical details, figures, and dimensions as a result.

If you discover errors while reading the documentation or have suggestions or other useful information, contact us at:

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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:

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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 may mean that the information in the operating instructions is no longer applicable or adequate.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

We assume warranty in accordance with the General Terms of Sale and Delivery of HYDAC Filter Systems GmbH.

Refer to these at www.hydac.com ⇒ General terms and conditions.
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 assign the information I require to a subject area.

WHERE can I find the information I’m looking for?
The document has a table of contents at the beginning. There, I select the chapter I’m looking for and the corresponding page number.

The documentation no. with index is used for identifying and reordering the instructions. The index is incremented by one every time the manual is revised or changed.
Safety guidelines

The following designations and symbols are used in this manual to designate hazards, etc.:

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

WARNING denotes situations which can lead to mortal injury 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.

Observe the notes in the operating instructions

These operating instructions contain the key instructions for properly and safely operating the FAS. These operating instructions in general, and the safety guidelines in particular, are to be observed by all those who work with the FluidAnalysis Set. Adherence is to be maintained to pertinent accident prevention regulations applicable at the site where the product is used.

Responsibility of the owner

The owner of the product shall ensure that the FluidAnalysis Set is operated by individuals who are familiar with the basic safety and accident prevention guidelines and who have been trained to handle the FAS.
Hazards posed by using the FAS

The individual components of the FluidAnalysis Set FAS have been constructed according to the latest technology and recognized safety regulations. Nevertheless, their usage can still endanger the operator or third parties. In addition, the FluidAnalysis Set may be damaged during transport or by improper handling. The FAS is only to be used as follows:

The FAS is only to be used as follows:

- Solely for its intended use
- Only when in safe, perfect condition.

The operator bears sole responsibility for compliance with the safety precautions in the safety data sheets of the fluid and solvents used.

Any faults or malfunctions which might impair safety are to be properly repaired or remedied immediately.

Intended use

The FluidAnalysis Set FAS is a combination of units developed to analyze the solid particle contamination of mineral oils. Any use extending beyond or deviating therefrom shall not be considered intended use. HYDAC Filter Systems GmbH will assume no liability for any damage resulting from such use.

Informal safety precautions

Always keep the operating instructions in the vicinity of the FluidAnalysis Set. In addition to the operating instructions, the general and local regulations on accident prevention and environmental protection are to be made available and observed. Keep the safety and hazard symbols and warnings on the FluidAnalysis Set in a legible condition.
Electrical Hazards

**WARNING**

**Electric shock**

**Bodily injury**

► Pull power plug of the FAS before performing any work.

► Do not perform any repairs on the electric vacuum pump.

► In the event of an emergency, pull the power plug to the vacuum pump.

Check the electrical equipment of the FluidAnalysis Set on a regular basis. Replace any loose electrical connections or damaged cables immediately.

**Modifications to the FAS**

Do not modify the design of FAS components without the prior consent of the manufacturer. All component modifications must have written confirmation from Hydac Filter Systems GmbH. Defective parts must be replaced immediately with original spare parts. Use only original spare parts.
Checking the scope of delivery

Check the individual components for possible damage in transit before putting the FAS into operation.

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Silicon hose Ø 6x3, Length 1 m</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>Membrane filter discs</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Electric vacuum pump 12 V DC</td>
</tr>
<tr>
<td>-</td>
<td>1</td>
<td>Multi voltage power unit 100-240 V AC / 12 V DC, including 3 mains adapter</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Tweezers</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Centering ring with strainer</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>Spring clip</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>Mixing cylinder 100 ml with plug</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Glass top section with smooth plane surface 250 ml</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>Wide mouth plastic bottle 500 ml</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
<td>Petri dish, type PD 1504700</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>Spray bottle</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>Glass bottom section with smooth plane surface</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>Suction flask, 1000 ml with suction port connection</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>Rubber stopper</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>Disposable membrane filter for spray bottle</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>Hose connection for suction flask</td>
</tr>
<tr>
<td>17</td>
<td>3</td>
<td>Dropper 3 ml</td>
</tr>
<tr>
<td>18</td>
<td>1</td>
<td>Contamination handbook</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
<td>Operating and Maintenance Instructions</td>
</tr>
</tbody>
</table>
FAS description

The FluidAnalysis Set with electric vacuum pump and laboratory-quality filtration unit creates contamination monitors from oil samples. The reference photographs provide a quick estimate of the fluid contaminants (assignment of cleanliness codes). The type and origin of the particles in the hydraulic system are then determined with a microscope.

Current standards: ISO 4405 - Gravimetric method for determining the contamination content in hydraulic systems.

FAS Features

Compliance with and regular monitoring of the particle load in fluid and lubrication technology is essential for efficient, economical system use. A contamination monitor can be created very simply with the FluidAnalysis Set FAS.

When this contamination monitor is viewed under a microscope, it is possible to determine:

- The type and size of the contamination (metal particles, fibers, plastic particles, etc.)
- The cleanliness code (ISO 4406, NAS 1638) using reference photographs
- The concentration of particles in fluids by means of microscopic counting (ISO 4407).

In addition, precision scales can be used to determine the gravimetric content of the contamination monitor. This weight increase in relation to the filtered volume gives the contamination concentration in mg/l (ISO 4405).

Restrictions on use

**NOTICE**

**Impermissible operating media**

The FluidAnalysis Set will be damaged

- The unit is only to be used with mineral oils
- Only use detergents and solvents with a flash point >170°C (e.g. n-heptane).
Information on oil contamination

Source of the oil contamination

Contamination of hydraulic media is classified according to the particular physical state:

- Solid
- Gaseous
- Liquid

Solid particles enter the hydraulic system because the unit is inadequately sealed, through maintenance work or new oil, for example. Once present, these particles produce new ones, leading to a "chain reaction of wear".

Gaseous contamination often results from leakage on the suction side of hydraulic pumps, poor return flow of the medium to the tank or when pipelines must be opened (e.g. for maintenance work).

Hydraulic media water contamination can either be caused by condensation or penetration. The condensation of water is caused by temperature differences in the hydraulic reservoir. Water can enter through faulty cooler hoses, faulty seals or a leaky reservoir.
Effects of oil contamination

Solid particles

In addition to the enormous damage to hydraulic components from wear caused by solid particles, the materials of these particles also have an impact on oil aging that cannot be ignored. Reactions with hydrocarbons and additives, which change the properties of the oil (saponification, for example), can occur. On the other hand, metal can act as a catalyst for the oxidation of the hydrocarbon molecules, which reduces the oil's service life considerably. This occurs especially quickly when several contaminants act on the oil at the same time.

Air

Under normal conditions, mineral oils always contain a certain percentage of dissolved air. In unfavorable conditions, e.g. when generating a vacuum, this air can be released. This escaped air is responsible for an increased compressibility of the medium, an increased cavitation tendency and above all for a drastic acceleration in oil aging.

Water

The aging process of mineral oil accelerates when there is water in the oil, and when there are particles acting as catalysts the process speeds up. The oil additives are used up quickly, and the charge of oil becomes unusable in a fraction of the service life of "dry" oil.
Removing/installing the FAS

Proceed as follows to install the FAS

1. Install the filter onto the spray bottle.
   The direction of flow is defined by the connections on the filter. Incorrect installation is therefore ruled out.

2. Dampen the bottom section before inserting.
   Push the dampened bottom section into the rubber plug until it stops.
3. Place the rubber plug with the bottom section into the suction flask. Make sure it fits tightly.

4. Place the centering ring with strainer on the bottom section.

5. Connect the silicon hose with the hose coupling. For easier mounting, warm up the silicon hose in hot water.
6. Turn the hose coupling with the mounted hose onto the bayonet connection of the suction flask.

7. Connect the other hose end with the hose connection on the vacuum pump.

8. Connect the vacuum pump to the power supply and make sure that the unit is shut off.
9. Connect both parts with the spring clip.
   Make sure the suction flask is safely inserted.

10. The montage is complete.

The FAS is disassembled in reverse order (Step 10. → 1.).
Creating a contamination monitor

**WARNING**

Danger of explosion due to flammable gas/air mixture

Bodily injury

- Only use detergents and solvents with a flash point >170°C (e.g. n-heptane).

- Do not operate the pump in closed rooms / containers

- Provide sufficient ventilation when the pump is in operation.
To create a contamination monitor, proceed as follows.

1. **Place the membrane filter disc on the strainer.**
   Check the membrane filter disc for fluid resistance.

2. **Moisten the membrane filter disc with solvent.**
   Use the spray bottle.
   Make sure that the solvent is miscible or compatible with the medium to be filtered.
3. Place the top section (250 ml) on the bottom section.

4. Connect both parts with the spring clip.

Place the suction flask on an even surface so it cannot tip over.
5. Fill the measurement cylinder with the test volume (100 ml, depending on the analysis guidelines).

6. Close the regulating valve (1) by turning in a clockwise direction.
   Use the switch (2) to turn on the vacuum pump.
7. Pour the test volume into the top section. Open the regulating valve (3) of the vacuum pump in a counter-clockwise direction. Now the medium is drawn into the suction flask through the membrane filter disc.

8. If the test fluid is drawn completely into the suction flask, rinse the top section and the membrane filter using the spray bottle and solvent.

9. If the solvent has been completely suctioned through the membrane filter disc, close the regulating valve (1) on the vacuum pump in a clockwise direction. Use the switch (2) to turn the vacuum pump off.
Performing maintenance

The FluidAnalysis Set is a combination of laboratory-quality components. For an error-free analysis, clean the FAS after every use.

Cleaning the FAS

NOTICE

Contamination in the FAS

The analysis results will be falsified

► Maintain the highest level of cleanliness during all work with the FAS. Every particle that enters the sample or solvent due to contamination will be isolated on the filter membrane and distort the results.

► Dispose of used cleaning agents properly. Observe the notes provided by the manufacturers of the cleaning agents.

Use N-heptane for rinsing and cleaning the laboratory bottles and the vacuum filtration device. Fill the spray bottle with membrane filter with the N-heptane.

Disposing of the FAS

Dispose of the packaging material as appropriate for your area.

When decommissioning and/or disposing of the FAS, observe all local guidelines and regulations pertaining to occupational safety and environmental protection. This applies in particular to the oil in the unit, components covered with oil and electronic components.

After disassembling the unit and separating the various materials, reuse them or dispose of them properly in accordance with local regulations.
## Spare Parts List

<table>
<thead>
<tr>
<th>Item</th>
<th>Designation</th>
<th>Part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Silicone hose, 6x3, length = 1 m</td>
<td>638956</td>
</tr>
<tr>
<td>2</td>
<td>Membrane filter discs, Ø 47 mm, 0.8 µm, for mineral oil, packing unit = 100 pieces</td>
<td>309354</td>
</tr>
<tr>
<td>3</td>
<td>Electric vacuum pump 12 V DC</td>
<td>6076303</td>
</tr>
<tr>
<td>4</td>
<td>Multi voltage power supply unit, 110-230 V AC / 12 V DC</td>
<td>6076711</td>
</tr>
<tr>
<td>5</td>
<td>Tweezers, 105 mm</td>
<td>637341</td>
</tr>
<tr>
<td>7</td>
<td>Measurement cylinder with plug, 100 ml</td>
<td>637342</td>
</tr>
<tr>
<td>9</td>
<td>Wide mouth bottle, 500 ml</td>
<td>309360</td>
</tr>
<tr>
<td>10</td>
<td>Petri dish, type PD 1504700, packing unit = 50 pieces</td>
<td>309377</td>
</tr>
<tr>
<td>13</td>
<td>Suction flask with hose coupling, 1000 ml</td>
<td>637344</td>
</tr>
<tr>
<td>18</td>
<td>Contamination handbook</td>
<td>349339</td>
</tr>
<tr>
<td>19</td>
<td>Operating and Maintenance Instructions</td>
<td>3160265</td>
</tr>
<tr>
<td>14</td>
<td>Hand vacuum pump with manometer</td>
<td>309345</td>
</tr>
<tr>
<td>13</td>
<td>Aluminum adapter</td>
<td>309349</td>
</tr>
<tr>
<td>15</td>
<td>Set of sample flasks (2 pieces)</td>
<td>309352</td>
</tr>
<tr>
<td>16</td>
<td>Spray bottle with removable nozzle, 500 ml</td>
<td>309358</td>
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</table>

HYDAC Filter Systems GmbH
<table>
<thead>
<tr>
<th>Item</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>Disposable membrane filter for spray bottle, Packing unit = 2 pieces</td>
<td>309371</td>
</tr>
<tr>
<td>Plastic hose, length = 2 m</td>
<td>309374</td>
</tr>
<tr>
<td>Telescope, length: 90 m</td>
<td>309342</td>
</tr>
<tr>
<td>Cable strip, 20 pcs.</td>
<td>627500</td>
</tr>
<tr>
<td>Dynamic sampling device</td>
<td>309348</td>
</tr>
<tr>
<td>Minimess hose (screw - screw)</td>
<td>309350</td>
</tr>
<tr>
<td>Minimess hose (screw - plug)</td>
<td>309351</td>
</tr>
<tr>
<td>Case</td>
<td>637561</td>
</tr>
<tr>
<td>Vacuum filtration device, consisting of:</td>
<td>637345</td>
</tr>
<tr>
<td>- top section, 250 ml</td>
<td></td>
</tr>
<tr>
<td>- bottom section</td>
<td></td>
</tr>
<tr>
<td>- centering ring with strainer</td>
<td></td>
</tr>
<tr>
<td>- spring clip</td>
<td></td>
</tr>
</tbody>
</table>

**Customer Service**

Shipping Address for Repair Work

HYDAC Servicenter GmbH
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Telephone: ++49 (0)681 509 - 883
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