Translation of the original operating manual
Version 1.1

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1. Safety information

1.1. Signal glossary

- Failure to observe the safety instructions in this manual implies various risks and endangerment of life and the physical condition of the operator. The notices are marked with the following signal words:

  ▶️ **DANGER** implies a dangerous situation which causes death or serious injuries in case of nonobservance.

  ▶️ **WARNING** implies a dangerous situation which can cause death or serious injuries in case of nonobservance.

  ▶️ **CAUTION**, implies, together with the danger symbol, a dangerous situation which can cause light, medium or heavy injuries in case of nonobservance.

- Failure to observe the safety instructions in this manual, which does not cause injuries but destruction of the system and its operability, are marked with the following signal word:

  ▶️ **NOTICE** describes the correct way of handling the device.

- The above signal words can be combined with the safety symbols or the warning symbols.

  ▶️ General danger

  ▶️ Danger caused by electricity

  ▶️ Danger for the environment

1.2. Safety notes

- The gas conveyed by the IFPM/S contains remainders of oil.

- Inhalation of process gas over extended periods can be harmful.

- The room into which the process gas is discharged must be sufficiently vented.

- In order to keep the emission on the lowest possible level only genuine Internormen coalescent elements shall be used.

- **DANGER** Danger: The IFPM/S-units are not for treatment of any kind of fuel (also not Diesel)!

- **CAUTION** Caution: The IFPM/S-units are not for treatment of water based fluids!

- **DANGER** Arbitrary Reconstruction and changes at the IFPM/S are not allowed!

- Use safety shoes!
At mobile units **set the locking brake** before operation!

The air outlet must be **open**!

At **leakages** please **dispose the oil professional** (oil binding agent)!

**NOTICE**  The IFPM/S-units are only for indoor operation and not for outdoor installation!

1.3. **Intended use**

- The IFPM/S-units are oil purification systems, which take oil from a reservoir with a hoseline or a pipeline. This oil will be purified of water, solid contamination and gases.
- The purified oil will be pumped back into the same reservoir.
- The solid contamination will be separated by the filter element, the removed water will be blown out as humid air into the atmosphere.
- The removed gases also will be blown into the atmosphere.
- The unit works unattended after starting it.

2. **Technical data**

- **Operating temperature:** 20...80 °C
- **Ambient temperature:** 0...40 °C
- **Viscosity:** 12...700 mm²/s
- **Noise pressure level:** 69 dB (A)*
- **Degree of protection:** IP54
- **Circulation flow rate:**
  - IFPM21: 20 l/min*
  - IFPM31: 30 l/min*
  - IFPM/S71: 70 l/min*
  - IFPS101: 100 l/min*
- **Mass:**
  - IFPM21: 315 kg
  - IFPM31: 325 kg
IFPM/S71: 590 kg
IFPS101: 790 kg

**Heating power:**
- IFPM21: 3 kW
- IFPM31: 3 kW
- IFPM/S71: 4 kW
- IFPS101: 8 kW

*Viscosity of the liquid of 32 mm²/s and adjusted vacuum of -0.6 bar!*
3. Product description

3.1. Layout

1. Preheater
2. Solenoid valve
3. Vacuum chamber
4. Silicagel air filter
5. Throttle valve
6. Temperature sensor
7. Water sensor WSPS05
8. Level switches
9. Hydraulic pump aggregate with pressure relief valve
10. Nonreturn valve
11. Filter
12. Clogging indicator
13. Vacuum pump
14. Water collecting vessel
15. Demister
3.2. Electronic control unit

- **Manometer**
- **WFD 01 Display**
  - Water saturation
  - Filter clogging indication
- **Switch off temperature**
  - Reduce
  - Increase
- **Display**

- **Main switch**
- **Alarm**

---

**Diagram:**

- Numbers 1 to 15 correspond to parts of the control unit.

---

**Text:**

- **Manometer:**
- **WFD 01 Display:** Water saturation and filter clogging indication.
- **Switch off temperature:** Reduce, Increase.
- **Display:**
- **Main switch**
- **Alarm**

---

**Legend:**

- **Tower Vacuum**
- **Water & Filter Indicator**
- **Temp down, up, START**
- **Low oil level vacuum pump**

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**Instructions:**

1. Turn ON Power
2. Pull ON E-STOP
3. Push START ON
4. Monitor first 1 Minute
5. Push E-STOP to clear Alarm

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**Company:** INTERNORMEN-Filter

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- **Phone:** +49 - (0) 6205-2094-2
- **Fax:** +49 - (0) 6205-2094-40
- **Website:** www.internormen.com
- **E-mail:** info@internormen.com

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**Brand:** internormen - fluid management
3.3. **Functional principle**

- The oil is drawn into the system by a vacuum, generated by an oil lubricated rotary vane vacuum pump (13).
- First it will pass a preheater (1), afterwards it goes into the vacuum chamber (3) through a 2/2 solenoid valve (2).
- In the vacuum chamber the fluid will be dispersed over the dispersion material, which creates a larger free surface.
- Water will vaporize due to the lowered evaporation point in vacuum.
- An air stream is introduced to the vacuum chamber through the silica-gel air filter (4). The flow direction of this air is against the flow direction of the oil and it functions as a carrier for the water vapour.
- The vacuum can be adjusted with a throttle valve (5).
- These conditions do not only help to remove the free water. Free, emulsified and dissolved water will be removed.
- The humid air will be sucked by the vacuum pump and it is blown out through a condenser (14) and a demister (15) into the atmosphere.
- The oil will be pumped back into the reservoir with a hydraulic pump, which is specially designed for vacuum operation.

4. **Operation**

4.1. **Commissioning**

The commissioning will be executed as follows:

- Connection of the IFPM/S to the oil reservoir.
- Electrical connection of the IFPM/S.
- Check the rotating direction of the motors.
- Remove the seal of the Silica-Gel air filter and open completely the throttle valve of the air line.
- Emptying of the vacuum chamber.
- Selection of the viscosity range.
- Adjustment of the switch off temperature of the preheater.

4.1.1. **Connection to the oil reservoir**

- The IFPM/S should be installed near the oil reservoir.
  
  **NOTICE** At installation please make sure that the machine is in a level position. If this is not possible make sure that the vacuum pump with the oil level switch is located at the lower end of the system.
- The suction line can be closed with a ball valve.
- The oil outlet is after the filter with an SAE-flange
- Both lines must be fixed connected to the oil reservoir
4.1.2. Electrical connection

- The electrical connection is made with a CEE three phase current connector according IEC 60309 with phase changing switch

- Before initial operation please check the position of the ball valves:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OIL OUT</td>
<td>closed</td>
</tr>
<tr>
<td>WATER OUT</td>
<td>open</td>
</tr>
<tr>
<td>IN</td>
<td>open</td>
</tr>
</tbody>
</table>

4.1.3. Checking the rotating direction

- The checking of the rotating direction must be made as follows:
  - Switch on the machine
  - Wait for the display message

- By short hitting the button [ ▪ ] (yes) (maximum 2 seconds) the motor of the hydraulic pump will be started.
- The correct rotating direction is marked with an arrow at the housing of the motor.
• The rotating direction of the vacuum pump is synchronized with the hydraulic pump. **NOTICE** After checking the rotating direction switch off the unit.

• If the rotating direction is wrong, the phases can be changed at the connector with a screwdriver.

4.1.4. Silica-Gel air filter

• Before initial operation remove the sealing of the Silica-Gel air filter and open completely the throttle valve of the air line.

4.1.5. Emptying the vacuum chamber

• This message will allow emptying of the vacuum chamber in order to conserve the system or as preparation for handling of a different tank.
4.1.6. Selection of the viscosity range

- This message is for selection of the viscosity of the oil which will be purified.
- Temperature influences must be considered at this selection.

**NOTICE** ⚠️ ⚠️ This adjustment influences the overflow safety of the unit and can lead to malfunction and breakdowns at a wrong selection.

- Select viscosity setup with [↓].

- Select viscosity range and confirm with [↓].

- The adjustment of the viscosity is classified into three ranges:

ISO VG 32  ISO VG 100  ISO VG 220
ISO VG 46  ISO VG 150  ISO VG 320
ISO VG 68  ISO VG 220  ISO VG 460

Hit [↓] to start.
4.1.7. Adjustment of the switch off temperature of the preheater

- During operation the switch off temperature of the heating can be adjusted with the buttons [↵] [↵].
- Furthermore the actual temperature will be shown at the display.

4.2. Suggested adjustments

4.2.1. Temperature

- Generally, the higher the oil temperature, the higher is the dewatering speed.
  
  **NOTICE** ⚠️ For this adjustment please pay attention to the maximum operating temperature of the oil!

4.2.2. Vacuum

- For the vacuum adjustments the following parameters are suggested:
  
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLP:</td>
<td>-0.7 bar</td>
</tr>
<tr>
<td>CLP:</td>
<td>-0.6 bar</td>
</tr>
<tr>
<td>HF-E:</td>
<td>-0.7 bar</td>
</tr>
<tr>
<td>Transformer oils:</td>
<td>-0.9 bar</td>
</tr>
</tbody>
</table>

4.3. Hour meter

- The hour meter can show at any time how long the IFPM/s-unit has been working
  
  - Activate hour meter:
    - Hit [↵] + [↵].  
      **NOTICE** Please make sure to push the [↵]-button first, otherwise the switch switch off temperature will be raised.
    - At the display there will be shown the operating hours.
    - When the buttons are pushed, the displayed time will not change. Internally the hour meter is continuing to count the time.
    - As soon as the buttons are released, the display will switch back to the initial state.

4.4. Display of the maintenance interval

- In order to ensure that all expendable materials needed for maintenance are ordered on time, an internal clock for the maintenance intervals is integrated in the software.
• By hitting [↵] + [↵] the time left till the next maintenance is being displayed.

**NOTICE** As before, please hit the [↵] – button first.

• If the maintenance interval is exceeded, pushing these buttons will display the time that has elapsed since that point.

• Furthermore an excess of the service interval is signalized by a blinking of the alarm lamp at the front plate

• If the service interval is exceeded and the unit is switched on again, there will be the request “Service completed” at the start-up. If this request is confirmed with “yes”, the service interval will be reset to 0.
4.5. Water sensor

- The **WSPS 05** is a capacitive sensor for the saturation level of water in oil.
- There is a difference to the measurement of the absolute water content with the Karl-Fischer-method. The Karl-Fischer-method determines the total amount of free and emulsified water in mg – water / kg – oil. The **WSPS 05** gives the saturation level of the fluid with water in percent.
- The indication **100 %** means that the fluid is **totally saturated**.
- Saturation values depend on the temperature!
- A relation to the measured saturation values and the stated ppm (mg / kg) value according to Karl Fisher’s method is ascertained by the 100 % saturation curve (100% of saturation = f(T)) for the measured fluid and the fluid temperature measured at the same time with the saturation.

4.6. Display unit WFD01

![Display unit WFD01](image)
• The **WFD 01 – Indicator** is an efficient diagnostic tool to determine both the saturation level of oil with water and the contamination level of the filter element.

• It utilizes the WSPS0X (03/04/05) as well as a VS 1 series clogging indicator. It works very reliably and fulfills all requirements of daily measurements.

• It consists of two separate and independent LED – display units with separate power supply.

  • „**Water Saturation Level (%)**“: The LED – display for the indication of the water saturation level is a mere indicator.
  
  • „**Clogging Indicator**“: The LED – display to indicate the contamination of the filter element has two voltage free relay switch contacts. One at 75 % and one at 100 % of the VS1’s nominal pressure difference range and cold start indication at oil temperatures < 25 °C.

4.6.1. **Water saturation display**

- **(0...70% Saturation)**
The presence of free water is **not likely**. There is **no** danger of water dissolved in oil!

- **(70...90% Saturation)**
The presence of free water in small amounts is **likely**. Measures to reduce the water content are suggested.

- **(90...100% Saturation)**
- Free water is present. This is dangerous for the hydraulic and the lubrication system. **NOTICE** Measures to reduce the water content of the fluid have to be taken immediately!

• A **calculation** to the **mg/kg** (ppm) – water content is only possible with the **100% saturation curve**. This must be determined for every oil. Saturation curves on request.
4.6.2. Indication of filter clogging

- **t**
  pressure peak suppression
  0...60 s

- **Ø**
  cold start indication (Fluid temperature < 25 °C), no indication about contamination

- **< 50%**
  filter element not used, pressure difference: < 50 % $\Delta p$-nominal

- **50%**
  starting contamination, pressure difference: $\geq$ 50 % $\Delta p$-nominal

- **75 % and S1**
  moderate contamination, pressure difference: $\geq$ 75 % $\Delta p$-nominal, warning contact 1 switched

- **90 % and S1**
  strong contamination, pressure difference: $\geq$ 90 % $\Delta p$-nominal

- **100 % and S2**
  filter element used, pressure difference: $\geq$ 100 % $\Delta p$-nominal, warning contact 2 switched

4.7. Input and output seizure

- The digital inputs of the PLC are used as follows:

<table>
<thead>
<tr>
<th>Input N°</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>lower sensor (min.)</td>
</tr>
<tr>
<td>2</td>
<td>middle sensor (max)</td>
</tr>
<tr>
<td>3</td>
<td>upper sensor (Overcharge lock)</td>
</tr>
<tr>
<td>4</td>
<td>signal “filter clogged”</td>
</tr>
<tr>
<td>5</td>
<td>oil level switch for the vacuum pump</td>
</tr>
<tr>
<td>6</td>
<td>motor protector hydraulic pump</td>
</tr>
<tr>
<td>7</td>
<td>motor protector vacuum pump</td>
</tr>
</tbody>
</table>

- The **temperature sensor of the vacuum chamber** is connected to the **analogue input N°1**.
- The **temperature sensor of the heating element** is connected to the **analogue input N°2**.
• The different components of the system are controlled by the following digital outputs of the PLC:

<table>
<thead>
<tr>
<th>Output N°</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>hydraulic pump</td>
</tr>
<tr>
<td>2</td>
<td>vacuum pump</td>
</tr>
<tr>
<td>3</td>
<td>heating</td>
</tr>
<tr>
<td>4</td>
<td>solenoid valve</td>
</tr>
<tr>
<td>6</td>
<td>signal light for low oil level in the vacuum pump</td>
</tr>
</tbody>
</table>

• The digital input signals and outputs can be either ON (LED is light) or OFF (LED is dark).

4.8. Other

• With the buttons [◄] (Temp. up) respectively [►] (Temp. down) the switch off temperature can be set.

• At achieving of the set temperature the preheater switches off, if the actual oil temperature is again lower than the set temperature the preheater is switched on again.

  **NOTICE** Please note that the set temperature value is only a switch off criteria. It cannot be assured that the oil temperature actually reaches that setpoint.

  **CAUTION** The surface area of the heating can be more than 70°C during operation. Risk of burns!

• The humid air of the vacuum pump will be led through a moisture separator and then emitted to the atmosphere.

  **NOTICE** The level of the reservoir should be checked daily.

• The collected humidity in the condenser can be discharged with the ball valve “Water out”

• Most of the separated water will leave the IFPM/S as humid air.

  **NOTICE** At lower water contents in the oil there will hardly be any water collected in the condenser.

  **NOTICE** It is not a mistake if no water is collected in the separator. This only indicates low water content or low temperature of the oil.

• The vacuum in the vacuum chamber can be adjusted with opening and closing the throttle valve (9).

  **NOTICE** The optimum vacuum and the optimum temperature depend on the fluid type which should be dewatered and on its condition. The vacuum should not be higher than -0,9 bar and not lower than -0,6 bar.

• The actual flow rate depends on the following parameters:
o oil viscosity
o oil temperature
o adjusted vacuum
o length and cross section of the suction line
o position of the IFPM/S relative to the reservoir

**NOTICE** In exceptional cases, for example at very high tanks, the vacuum chamber can overflow. This can be detected, if oil comes out at the separator. In these cases it is suggested to throttle the suction line, for example with the inlet ball valve.

5. Failure messages

- In case of malfunction of a component, the system will shut off and one of the following messages will appear in the display:
  - No oil
  - Overflow
  - Filter clogged
  - No lubricating oil in v – pump
  - Motor overload hydraulic pump
  - Motor overload vacuum pump

5.1. No oil

- This message will be displayed if no fluid reaches the lowest level switch after a certain amount of time. The reasons for this error could be the following:
  - high viscosity
  - small diameter of the suction line or too long suction line
  - suction height to high
  - closed inlet ball valve
  - contaminated solenoid valve
5.2. Overflow

- This message will be displayed, if at closed solenoid valve and running hydraulic pump the oil level reached the highest level switch for a certain amount of time.
- The reaction time is determined by the chosen viscosity during the starting procedure.
- The reasons for this error could be the following:
  - chosen a wrong viscosity
  - high vacuum
  - defect hydraulic pump
  - clogged pressure line

5.3. Filter clogged

- This message indicates a clogged particulate filter element.
  ⇒ Exchange filter element and restart the system

5.4. No lubricating oil in v-pump

- Indicates a low oil level in the vacuum pump
- This can be caused by clogging the coalescent element of the vacuum pump and the loss of oil related to that.
  ⇒ Exchange the coalescent element, fill up oil and restart the system.
5.5. **Motor overload hydraulic pump**

- This message will be displayed, if the switch to protect the motor of the hydraulic pump is activated.
  - ⇒ Check the power supply, all three phases must be present.
  - ⇒ After checked, open the control box and reset the motor protection switch manually

5.6. **Motor overload vacuum pump**

- This message will be displayed, if the switch to protect the motor of the vacuum pump is activated.
- ⇒ Check the power supply, all three phases must be present.
- ⇒ After checked, open the control box and reset the motor protection switch manually
## 5.7. Troubleshooting

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible reasons</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overflow</td>
<td>1. Malfunction of the middle level switch</td>
<td>- Check viscosity</td>
</tr>
<tr>
<td></td>
<td>2. Malfunction of the highest level switch</td>
<td>- Check middle and highest level switch</td>
</tr>
<tr>
<td></td>
<td>3. Extreme foaming</td>
<td>- Reduce incoming flow rate</td>
</tr>
<tr>
<td></td>
<td>4. Loose connection to the PLC-controls</td>
<td>- Reduce vacuum</td>
</tr>
<tr>
<td></td>
<td>5. Too high vacuum</td>
<td>- Remove the sealing of the Silica-Gel air filter</td>
</tr>
<tr>
<td></td>
<td>6. Sealing of the Silica-Gel air filter not removed</td>
<td>- Open the throttle valve</td>
</tr>
<tr>
<td></td>
<td>7. Throttle valve completely closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. Very high oil reservoir</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Too high pressure in the return line/return line clogged</td>
<td></td>
</tr>
<tr>
<td>No oil</td>
<td>1. Closed suction line</td>
<td>- Open inlet ball valve</td>
</tr>
<tr>
<td></td>
<td>2. Clogged solenoid valve</td>
<td>- Check suction line</td>
</tr>
<tr>
<td></td>
<td>3. Viscosity too high/suction line too long</td>
<td>- Check solenoid valve and clean it, if necessary</td>
</tr>
<tr>
<td></td>
<td>4. Malfunction of the lowest level switch</td>
<td>- Check lowest level switch, check connection of lowest level switch, exchange if necessary</td>
</tr>
<tr>
<td></td>
<td>5. Loose connection to the PLC-controls</td>
<td></td>
</tr>
<tr>
<td>Filter clogged</td>
<td>1. Filter element clogged</td>
<td>- Exchange filter element</td>
</tr>
<tr>
<td>Low lubricating oil</td>
<td>1. Low oil level in the vacuum pump</td>
<td>- Fill oil into the vacuum pump</td>
</tr>
<tr>
<td></td>
<td>2. Floater is stuck</td>
<td>- Check level switch with floater</td>
</tr>
<tr>
<td></td>
<td>3. Loose connection to the PLC-controls</td>
<td>- Check connection</td>
</tr>
<tr>
<td></td>
<td>4. The unit is not in an even position</td>
<td>- Prevent a sloping position</td>
</tr>
<tr>
<td>Motor overload hydraulic pump</td>
<td>1. Breakdown of one or multiple phases</td>
<td>- Check availability of all three phases</td>
</tr>
<tr>
<td></td>
<td>2. Breakdown of one or multiple fuses</td>
<td>- Check fuses and exchange if necessary</td>
</tr>
<tr>
<td></td>
<td>3. Incorrect supply voltage</td>
<td>- Check supply voltage</td>
</tr>
<tr>
<td>Motor overload vacuum pump</td>
<td>1. Breakdown of one or multiple phases</td>
<td>- Check availability of all three phases</td>
</tr>
<tr>
<td></td>
<td>2. Breakdown of one or multiple fuses</td>
<td>- Check fuses and exchange if necessary</td>
</tr>
<tr>
<td></td>
<td>3. Incorrect supply voltage</td>
<td>- Check supply voltage</td>
</tr>
<tr>
<td></td>
<td>4. Too high pressure at the air outlet side</td>
<td>- Check air outlet</td>
</tr>
<tr>
<td></td>
<td>5. Coalescent elements saturated</td>
<td>- Exchange coalescent element</td>
</tr>
<tr>
<td>Wrong direction or the motor</td>
<td>1. Wrong polarity of the three-phase power system</td>
<td>- Change polarity with the three phase current connector</td>
</tr>
<tr>
<td>Oil is coming out after the separator after the vacuum pump</td>
<td>1. Vacuum pump has sucked in oil from the vacuum chamber</td>
<td>- Throttle the inlet flow rate, for example with the inlet ball valve</td>
</tr>
</tbody>
</table>


EG-Konformitätserklärung
EC-Declaration of Conformity
CE-Déclaration de conformité

Hersteller:
Manufacturer/fabricant:

Anschrift:
Adresse/adresse:

Geräteart:
Type of device/Description:

Typen:
Types/types:

Wir erklären in alleiniger Verantwortung, daß das (die) oben bezeichnete Produkt(e) mit folgenden Europäischen Richtlinien übereinstimmt (übereinstimmen):
We declare under our sole responsibility that above product(s) is (are) in conformity with the following directives:
Déclarons sous notre seule responsabilité, que le(s) produit(s) repond(ent) aux directives suivantes:

Angewandte harmonisierte Normen und technischen Spezifikationen:
Applied harmonised standards and technical specifications:
Normes harmonisées et spécifications techniques:

Prüfstellen:
Inspected by/Organisme de contrôle:

The risk estimation was made with support of the engineering office Horstkotte from D-76530 Baden-Baden.
L'évaluation des risques a été effectuée avec l'aide du bureau d'ingénieur Horstkotte de D-76530 Baden-Baden.

Altlussheim, 12.08.2010

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