

English

## Instruction Manual Purifier TF-5060PMH

# Installation and operation guide



The TF-5060PM saves you money year after year on operating and capital expenditures by maintaining clean oil on your capital equipment.

All systems are by-pass models engineered to maintain oils at standard NAS 4 - ISO 13/10



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- **Before installation it is important to drain out any free water and “sludge” that might have settled in the bottom of your oil tank.**
  - **This is to prevent the filters from clogging up and prevents prematurely change of filters.**
  - **The unit might also not work properly if it gets filled by free water.**
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Purifiner Technology AS

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## Instructions for the daily maintenance of TF5060



1. Daily check if the power is "ON" and the machine is running.
2. Oil flow from the filter system is operating normally
  - Can be observed in the inspection glass on the filter.
3. Replace both filters at 1800hours / 3-4 months.  
(This is based on normal oil contamination)

**Main filter: WP-80FC**

**Pre-filter: WP-110T60**

4. Check that all seals and o-rings are installed correctly on the replacement filter.

### **If any problems:**

1. Check the filter for contamination (if not replaced) Replace if necessary.

(Although they seem to be OK and the filter range is now reached.)

2. Check the nozzle inside / bottom of the main filter tank. (Blocked)
3. Is the filter pads in the correct position?

## **Purifiner Technology AS Oil** Maintenance Solutions

Its designs and manufactures custom-made oil maintenance systems for hydraulic and lube oil applications. Our systems ensure that customers save money year after year on operating and capital expenditures by maintaining clean oil on their capital equipment. All our systems are by-pass models engineered to maintain oils at standard NAS 4 - ISO 13/10 and designed for continuous (24/7) filtration on hydraulic and lube oil systems with oil volumes of 50 – 3,000 gallons.

The oil maintenance systems maintain the oil by continuous removal of particles, free and emulsified water, sludge and acids in a two stage process; Stage one utilizes natural, 100% long-strand cotton fibers to capture particles from 1 micron and sludge. Stage two in the purification process is a patented flash evaporation process that dehydrates the oil and removes chemical contamination; water content is cut to 100-200 ppm (0.01-0.02%).





## Introduction

**TF-5060 must be mounted above the tank to allow the clean oil to flow/return freely back to reservoir.**

TF-5060PMH is for use on non-pressurized systems, especially hydraulic and lubrication systems with sizable oil tanks / reservoirs.

TF-5060 is a by-pass filtration system and is installed on hydraulic and lubrication systems to maintain high oil quality – engineered for ISO 13/10 – NAS 4 classification. TF-5060 removes particles, water, acids and corrosive gases from the oil and is built on a powder coated steel frame and uses highest quality components.

TF-5060 filters the oil with a pure cotton filter element that removes particles down to 1 micron. There is a heating element in the top of the filter housing where both free and emulsified water is removed down to 100 ppm by a thin film evaporation process. Furthermore, during the thin film process, harmful gasses that aid in the creation of acid are vented off and thereby removed.

Slow passage of the oil through the filter element achieves the best filtration results and the TF-5060 operates with a capability to filter 600 liters / 160 gallons in 24 hours. The unit is designed to run continuously to ensure clean oil on the system 24/7.

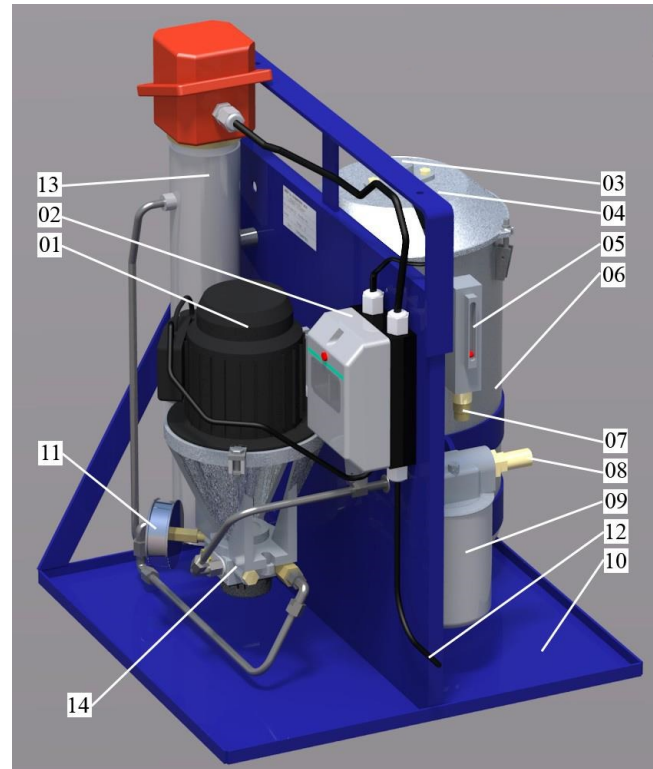
Connection to the TF-5060 is with 3/8" BSP thread for the inlet, and outlet is 3/4" hose coupling with hose clamp.

The inlet / suction line connects to the pre-filter and the suction pump pulls oil from the tank or reservoir / sump. Depending on the fluid viscosity, the oil can be pulled to a vertical height of up to 6-8 meters, depending on the temperature and the viscosity. The oil is then forced through the pre-heater and into the main filter element. **The oil is not under pressure once it leaves the main filter and must return to the tank or sump by gravity – i.e. free flowing.**



## Main Components

1. El. motor
2. Control box – ON/OFF switch
3. Heater element main filter
4. Vapor valve
5. Level Gauge
6. Purifiner Fiter
7. Return of clean oil to tank at zero pressure
8. Suction inlet for used oil from tank
9. Pre filter - type WP-110T60
10. Steel frame
11. Filter feed pressure gauge - Pressure 3 to 5 bar
12. Power supply - 220/230V 50/60 Hz
13. Oil pre-heater



Power consumption – 2.200 watt with pre-heater activated  
Weight 35 Kg, dimensions L x D x H: 17.7 x 18.5 x 22.8 inches





## Purifiner TF-5060 Operation

**Ensure the TF-5060 is mounted above the oil tank / reservoir.**

Assuming the TF-5060 is connected to the electrical main:

Pre-Installation:

- 1) Take a pre installation oil sample of the used oil on the hydraulic / lube system - label the sample.
- 2) Empty the used oil from the system.
- 3) Install sump or reservoir suction line for TF-5060 using 3/8 inch connectors & pipe - hard piping is highly recommended and make sure the suction line is installed low enough on the reservoir to get the contamination on the bottom of the reservoir.
- 4) Add new oil to system.
- 5) Turn ON the TF-5060 and run for 15 minutes under supervision.
- 6) Take 2nd oil sample on the outlet on the TF-5060 while the unit is running – labels the oil sample.

**Note: These initial oil samples will give you a base line record for comparisons with later samples after filtration.** The TF-5060 is fully capable of cleaning highly contaminated used oil, but the process may take a few days depending on oil condition and initially require changing the main filter element more frequently.



1 - Connect the suction line to oil reservoir. It is recommended that the suction line is below the lowest oil level. Sump plug banjo fittings are ideal for this purpose and the connection to the TF-5060 should be onto the pre-filter.

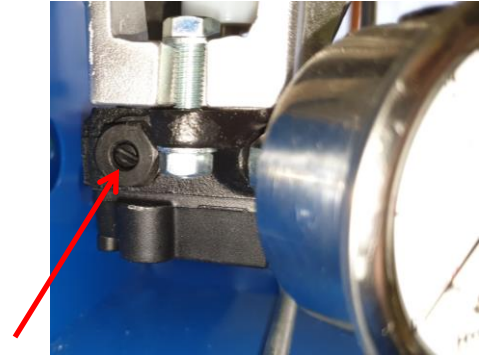
2 - Connect the return line to the flow meter. The return pipe should lead back to the sump or reservoir. The returning oil should exit the return line 1 inch below the normal oil level to avoid introduction of air bubbles with the returning oil. The base of the TF-5060 must be mounted min 0.5 meter or 1.6 feet above the upper oil level inside the tank or reservoir.

3 - Open any valves (inlet/outlet) that may have been installed.

4 - Switch on the TF-5060.

5 - Make sure oil pressure is showing up on the oil pressure gauge.

6 - If required, adjust the pump feed pressure between 3 to 4 bar.  
Pump pressure can be adjusted by turning the screw on the left side.



7 - Wait to ensure return oil is flowing freely. This can take between 20 and 40 minutes depending on the oils viscosity.

8 - Check returns flow. If adequate, the installation is complete.

9 - To increase flow, make sure oil feed pressure is between 3 to 4 bar (maximum). Adjust the oil temperature setting on the pre-heater dial to lower the oils viscosity. Do not raise it beyond the suitable operating temperature recommended for the oil involved.



10 - Installation with solid permanent piping is recommended.

## Electrical drawing

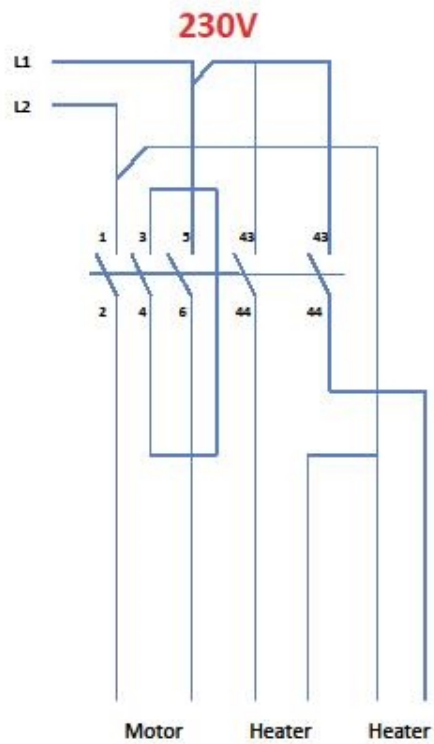
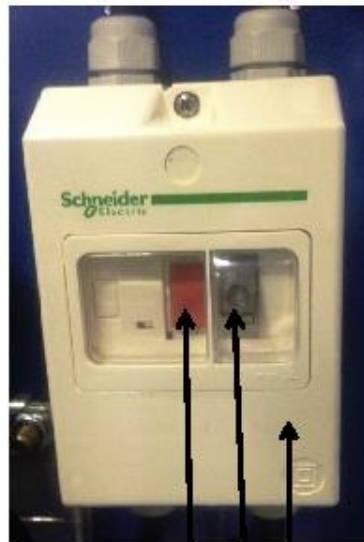


Diagram Control box  
TF-Serie  
EHJ 02.04.2013

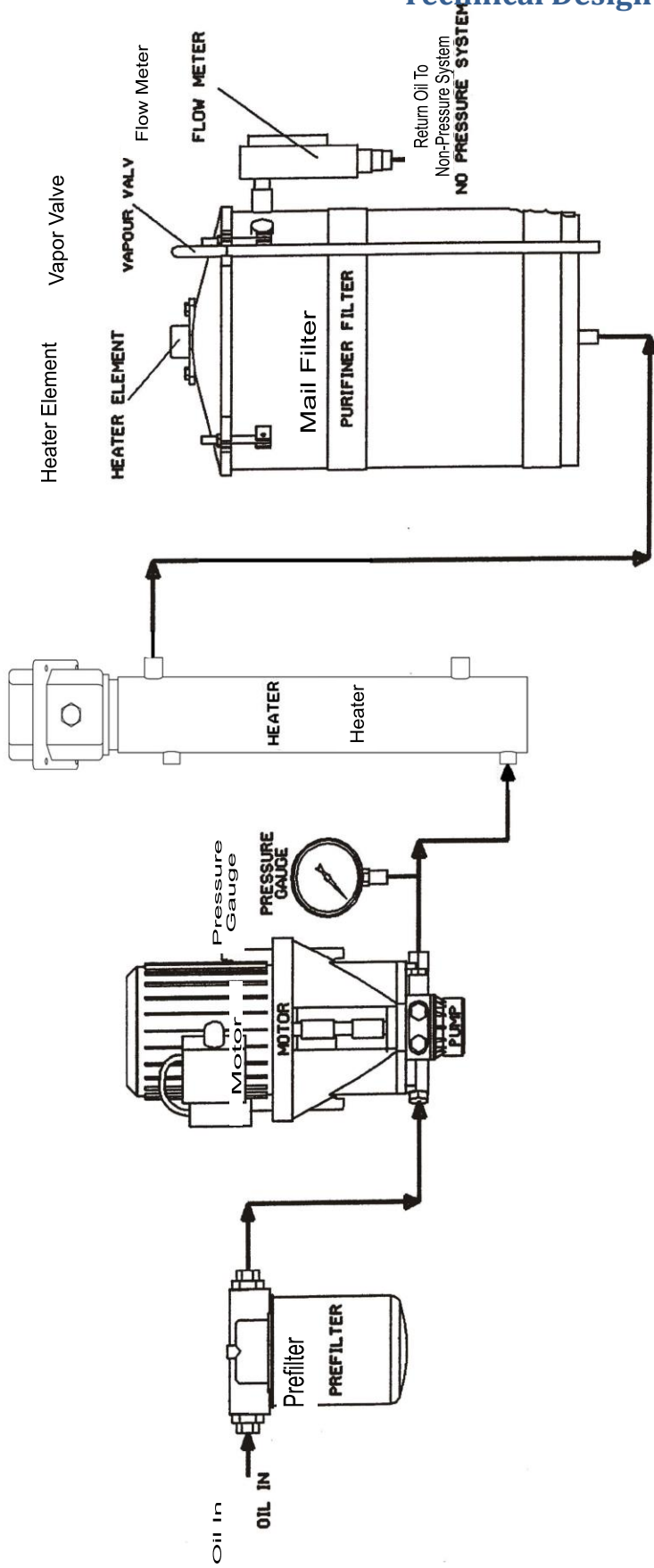


1 2 3

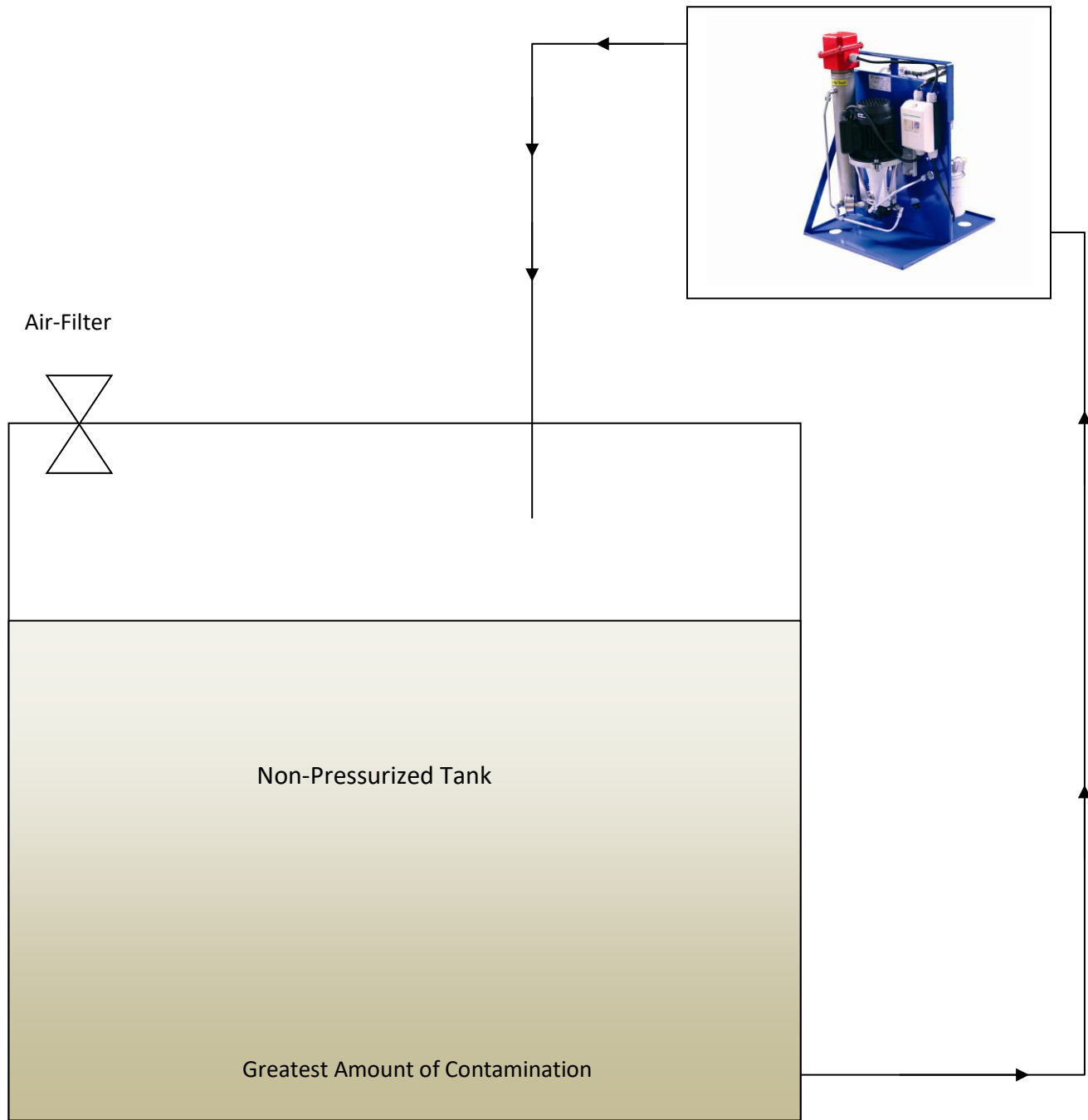


4 5

Illustration	Function		Part number
1	ON		
2	OFF		
3	Cover		KON01
4	Contactor	GV2GVAN11	4321708
5	Main Switch	GV2ME07	4321722



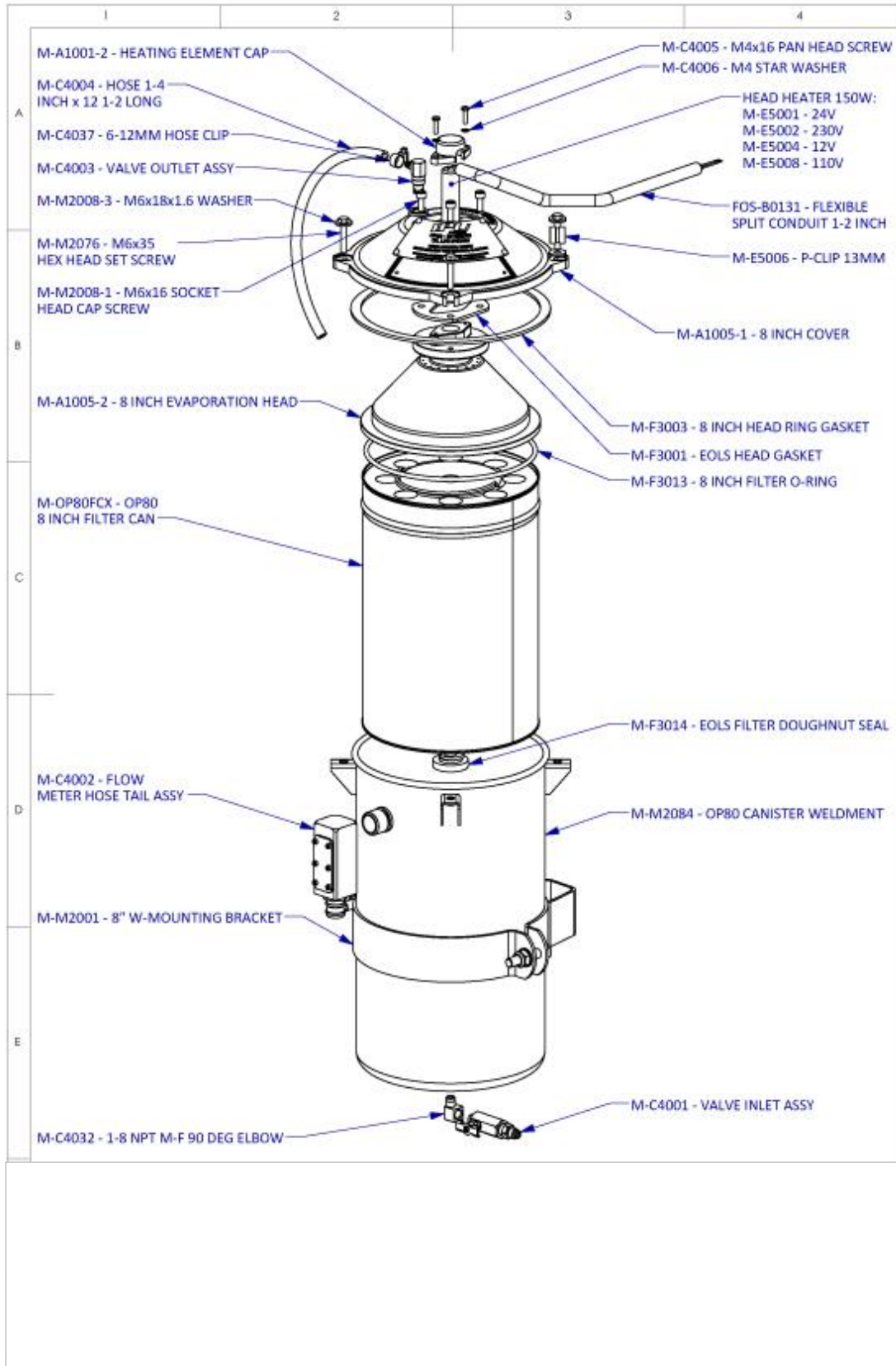
ARCTURUS PF FOR NO PRESSURE SYSTEMS  
TYPICAL FLOW DIAGRAM PF MODEL

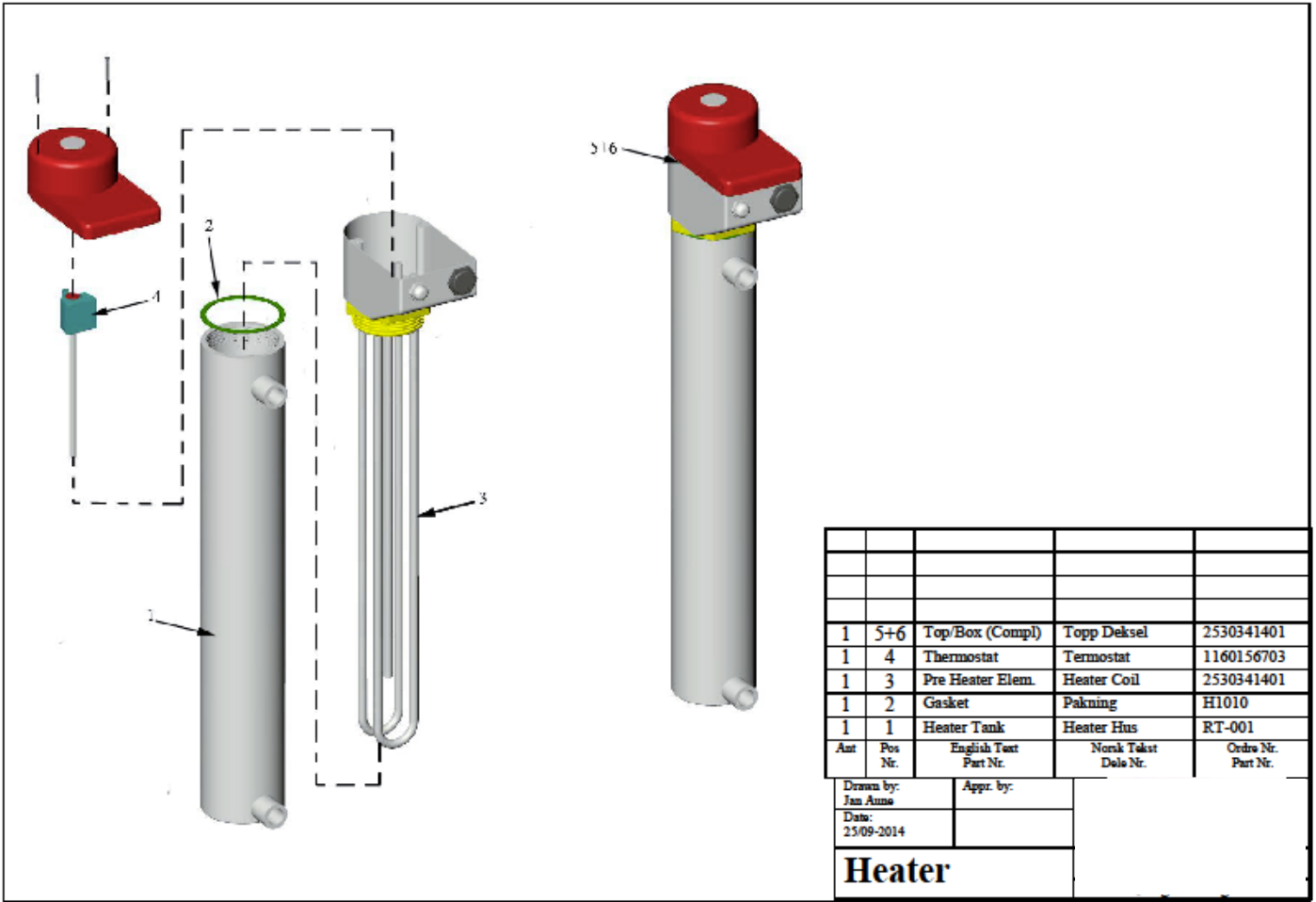


**TF-series must be placed above tank.**

The suction pump is capable of getting oil from a low point, this is often where the contaminations are.

## Main Filter





J.AUNE - Tel: +47 90 96 78 36 - Fax: +47 35 46 91 19 - janne@janne.no

**Thermostat settings**  
**From factory thermostat set at 65°C**

**The following table is only a guide at 15-20°C**

Oil viscosity	Temperature
32-68	65°C
68-150	70°C
150-250	75°C
250-320	80°C





Aut	Pos Nr.	English Text Parts	Norsk Tekst Deler	Order Nr. Art. Nr.
1	04	Filter (Sift)	Filter (Sif)	1667520
1	03	Lid Seal	Lokkpakning	1667310
1	02	Seal (Simring)	Pakning (Simring)	1667110
1	01	Main Axel	Drivaksel	1083820
Drawn by: Jan Aune		Appr. by:		
Date: 26/08-2014				
<b>Fremo Pump</b>				

## Regular Maintenance

Minimum once a week, check on oil return flow to ensure that the filter is not clogged.

## Service / Repairs

The service or repairs required to the TF-5060 system are few and far between. The main service includes changing filter elements and cleaning the mesh filter below the pump. Refer to drawings on previous pages.

**Pump / Motor** The pump is assembled to the motor housing and is driven directly by the 1/4 hp motor. The pump is a simple gear pump and it is possible to adjust the pumps outlet pressure. This is achieved by way of the adjustment screw in the pump body. This is set by the factory and should not require further adjustment. The pressure reading on the gauge should be between 3 to 4 Bar.

The only maintenance required is the occasional cleaning of the mesh filter. This is easily done by removing the four screws holding the filter housing to the pump. Make sure that a new gasket is properly installed when reinstalling the filter. Occasionally checks for bearing noise that may indicate excessive wear.

**Pre- heater** It is important to check the operation of the pre-heater when changing the filters. This is done by using a temperature sensor / thermometer. **CAUTION – NEVER TOUCH the heating elements as it may cause severe burns.** The pre-heater is used to reduce the viscosity of the oil, which aids the flow of oil through the fine filter. Heat is generated by the heating element. The temperature can be adjusted between 40 °C and 90 °C. It is pre-set at 65 °C. The parts at risk of failure are the heating element and the thermostat. If the heater is found not to be operational, both of these components should be tested. Testing of the element is usually possible by measuring the resistance / continuity between the electrical connections. The thermostat can also be tested for continuity, however the probe must be heated to check the making / breaking of the switch. This can be achieved using hot water and a thermometer. If there is no continuity, the switch requires replacement.

**The Main Filter Element** has to be replaced from time to time and this can be determined as the flow in the flow gauge decreases. Replacement is a simple case of removing the filter lid, removing the evaporation plate and the main filter element. **Note - When the filter element is replaced, make sure new gaskets are installed and that they are installed correctly.** While changing the filter, the operation of the heating element should be checked. This can be checked by using a thermometer. Occasionally the flow jet at the base of the filter element should also be cleaned.

## TF-5060 Start-Up

1. Pour new oil in the hydraulic system, or other type of equipment. Use high quality oil. You may also use synthetic oil if approved by the equipment manufacturer. Take a small amount of the new oil, this should be sent to Purifiner Technology AS for an oil analysis. You will receive a report that establishes a base line for later comparison of the condition and additive level of your oil. It is also necessary to take a sample of the old oil as this will indicate the current condition of your equipment.
2. Remove the head of the TF-5060 complete with heated cone and remove filter. Replace filter, being sure that the O rings are in place on top and bottom of filter. Place head assembly on top of filter.
3. Start TF-5060 and visually check all fittings for oil leak.
4. After 10-15 minutes of operation, using a suitable temperature measuring device, check temperature of the head near heater cap. It should be in the region of 40°C - 50°C. This assures you that heater element is working properly.
5. Let the unit run for 10-40 minutes, depending on the size of the unit. Larger units, with their bigger filters will take longer to fill than the smaller units. As soon as you see oil flowing through the sight glass (it will be about 1/3 full) shut the unit off.
6. Record dates and miles/hours on your equipment, so you can keep an accurate record of when filter was changed and oil analysis was taken.

## Oil Sampling and Filter Changing Procedure

### Filter element change for TF-5060

1. With the unit running, remove plastic dust cap from oil sample valve and place a plastic cup under the valve. Open valve slowly and fill cup about half way. Close valve and pour oil back into tank. This is done to clear valve of any contaminants that may have settled.
2. Hold the small bottle included in oil analysis kit under the oil sample valve and open it slowly. Fill sample bottle to over half full. Close valve and tighten securely. Replace dust cap and shut off unit.
3. Complete oil analysis information sheet, tighten sample container securely and put both in the container and send to Purifiner Technology AS.
4. Loosen the four head nuts, swing down bolts out of the slots and remove head and diffuser plate  
**Be careful, the head and diffuser plate will be hot.**
5. Lift filter out of canister with built in handle. Ensure that both O rings come out of the filter. Properly discard used filter. The best method to prevent oil spillage is to place used filter in the bag the new filter is supplied in.
6. Do not remove oil that is in the bottom of canister. Install new filter element into the TF-5060 canister.
7. **Remove old gasket from the underside of the head. Replace with new head gasket and spread a thin film of oil on the gasket.**
8. Place diffuser plate and head on top of the O ring. Swing up the four bolts into slots in the head and tighten head nuts securely. This completes filter element installation.

## Start Up After Filter Replacement

Start the unit and let it run until you have a flow of oil in the sight glass.

## Oil Analysis

Oil analysis is the key to evaluating benefits that result from optimized oil life (with reasonable safety precautions) and extend oil drain intervals. In addition, oil analysis is the only economical way to measure wear or contamination in your equipment. Of primary importance is interpretation of test data, which is easy to read and self-explanatory.

Metals must be monitored to fully evaluate the lubrication system. The analysis is not simple, but will provide a picture and warning, if necessary, of any impending problems.

## Troubleshooting the TF-5060

The TF-5060 has been engineered to be as simple and trouble-free as possible. It is manufactured from the highest quality materials available with superior workmanship. If, however, your TF-5060 is not functioning properly, check the following conditions, and correct as indicated

1. Restricted oil flow.
  - a. Shutoff valve closed – open valve
  - b. Filter is dirty and clogged – change filter
  - c. Clogged strainer – clean strainer
  - d. Clogged metering jet – clean metering jet
2. Oil coming out of vent.
  - a. Look for sharp bend, dip, or trap in return hose – re-route hose to solve problem.
  - b. Make sure that the oil return line is always dropping into a non-pressurized location on the system. For best results, the oil return should be located above the oil level in the tank.
3. Top of the TF-5060 not hot after five minutes of operation.
  - a. Check power source and ground. If you have power, the heating element is burned out and needs to be replaced.

**NOTE: The items listed above are the only reasons the TF-5060 will fail to function properly.**

## Oil Maintenance

The Purifiner system is unique in its inherent ability to address all forms of contaminants that occur in oils used in lubrication and hydraulic systems.

These contaminants can be divided into:

- Solid contaminants – for example wear metal, soot (carbon), dirt (silicon, sludge, etc.).
- Liquid contaminants – water, fuel (NB light hydrocarbons, etc.).
- Gaseous contaminants – sulphur dioxide, sulphur trioxide, nitrous oxide.
- Acidic contaminants – sulphuric acid, nitric acid. (Typically present as a result of reaction between liquid and gaseous contaminants).

To effectively remove these contaminant groups – and (of critical importance to oil quality) prevent the formation of certain contaminants – the Purifiner system incorporates the actions of:

- Fine filtration.
- Flash evaporation.

## Filtration

On entering the Purifiner system, oil will initially pass through a filter consisting of long strand, unprocessed cotton.

We need to recognize the reasons for using this (cotton) filter medium as well as the effect of fine filtration combined with essential chemical reactions that take place in cotton filter.

Unprocessed cotton provides an excellent filtration material and is the basis for the ability of the Purifiner system to provide an absolute filtration capability of 1 micron.

Why 1 micron filtration

1. Particles size of less than one micron will not have an abrasive effect in hydraulic or lubrication oils.
2. Most quality oils will keep solid contaminants (such as sludge) in suspension to a particle size of 3 - 4 microns. When the particle size agglomerates to greater than this the contaminant will fall out of suspension to be deposited in the sump or other areas of the system, with resultant detrimental effect on the qualities of oil and system performance.

## Evaporation

Equally important to the effect of filtration is that of evaporation.

### Removal of liquid and gaseous contaminants

It is understood that water is present in oil due to condensation or other conditions. However, critically, the evaporation action takes time due to the fact that, in a hydraulic or lubrication system, there is a large quantity of oil.

We create the effect with the heated diffuser plate in the Purifiner system – i.e. a small volume of oil relative to surface area – this is known as the “thin film evaporation effect” and is critical to the performance of the Purifiner system in removing and, vitally, preventing the formation of harmful contaminants. We have discussed the effect of the cotton filter in the Purifiner system in addressing acid contamination, however, it would obviously be of greater benefit to oil condition (in terms of maintaining alkali additive levels and the fundamental ability of the oil to flow and shear) if acid build up was prevented in the first place. This is achieved by the Purifiner system due to the evaporation chamber – water and sulphur dioxide / trioxide will still pass through the filter and flow over the diffuser plate. This is where the thin film evaporation effect will allow the release of both liquid contaminant (water) and gaseous contaminant (SO<sub>3</sub>). Liquid and gases are evaporated by the same process, preventing the formation of sulphuric acid; the same will also apply to nitric or other acids that might be formed. In general terms: - prevention is better than cure.

Due to this effect alkali additive in oil – calcium and magnesium – will not be depleted and condition of the oil will remain stable.

Aluminum is the material used in the evaporation chamber due to its ability to quickly and uniformly radiate heat generated by the heating element. Note:- the Purifiner system will not add heat to engine or hydraulic oil – tests have proven that hydraulic oil entering the system at 50 degrees C will exit at the same temperature.

## Summary

The Purifiner system is unique in its ability to: -

- Filter solid contaminants
- Retain acid contaminants
- Evaporate liquid and gaseous contaminants
- Prevent the accumulation of harmful contaminants in the oil



## Partslist

### TF5060PMH

PART	Parts Nuber	Qnt
MAIN FILTER (Complete) Inform about Power coated steel canister og Stainless Steel at order.	WP-80	1
Chassis	CH5060F	1
HYDRAULIC Pump (Shaft seals can be ordered separately)	1081075	1
Onninen contactor GV2GVAN11	4321708	2
Pre - Filter holder	FA11	1
Pre - Filter	WP-110T60	1
Heater housing	TF5066	1
Heater Element	2530341401	1
Heating Belt Main Filter	90000006	1
Pipe	TF1	1
Pipe	TF2	1
Pipe	TF3	1
Pipe	TF4	1
Purifiner Filter (Complete)	WP-80B	1
Manometer	96839-10	1
Electrical box with oil sensor	KON02	1
el. Box IP55 GV2MC02	4320327	1
Main switch GV2ME07	4321722	1

**Pre-Filter: WP-110T60**

**Main Filter: WP-80FC**