Fluid Purifier Systems
Internormen Product Line

IFPM / IFPS

Fully-automated, Compact Systems for the Removal of Water, Dissolved Gases, and Particulate Contamination

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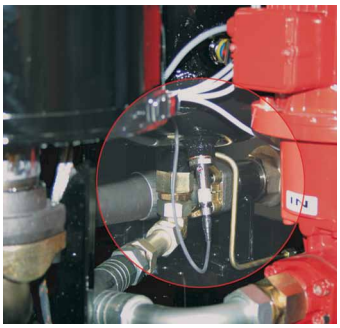
Effects of Water Contamination

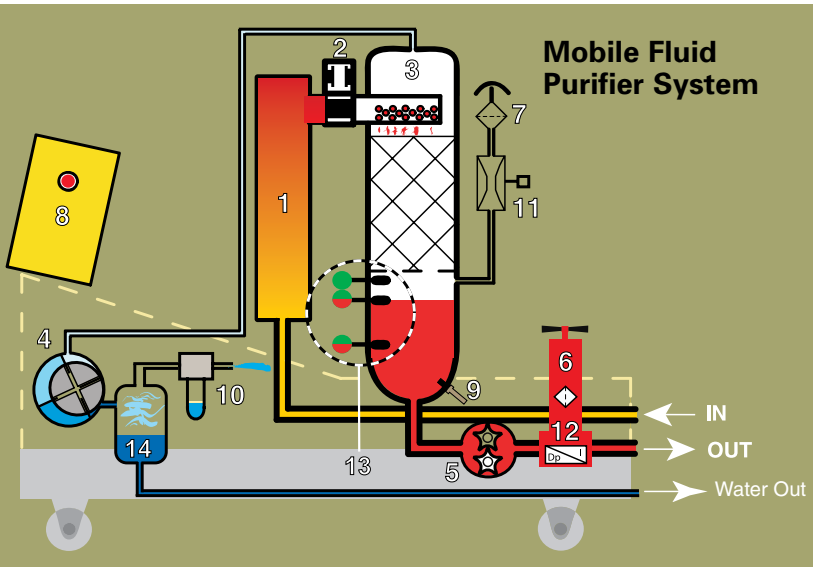
Water is one of the most frequently occurring contaminates, and is second only to particulate contamination as a destructive foreign substance in a system. Some of the problems and damage water contamination can cause include:

- Fluid destruction
- Exhaustion of additives
- Reduction of liquids' lubrication capabilities
- Oil oxidation
- Internal corrosion
- Increased conductivity

Operating Principle

Vacuum evaporation with inert gas is the most effective dehydration method for a fluid purification system. This method combines high water separation rates with efficient energy use for a large variety of application possibilities. Using dry air as inert gas enables the dehydration process to achieve water levels below the saturation point of the processed fluid at any given operating temperature. In contrast, the standard vacuum evaporation process can only reach equilibrium between the fluid and surrounding water vapor.





Mobile Fluid Purifier System

1. Heater
2. Two-port solenoid valve
3. Vacuum chamber
4. Vacuum pump
5. Hydraulic pump
6. Filter
7. Silica gel air filter
8. Electronic control unit
9. Water sensor
10. Separator
11. Throttle valve
12. Clogging sensor
13. Level limit switches
14. Passive condenser

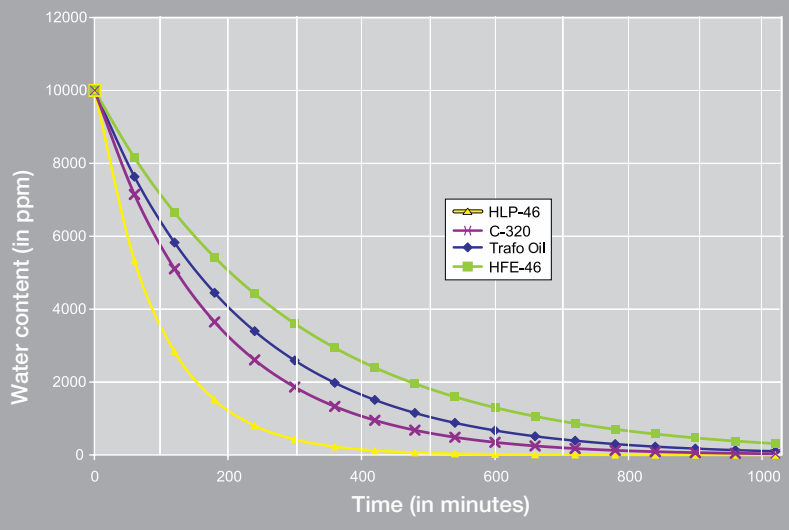
The Structure of IFPM/IFPS Systems

The fluid to be purified is drawn out of a reservoir by a pump generated vacuum. It then enters a tank and is heated to the unit's set operating temperature. A portion of fluid is pulled through a two-port solenoid valve into the vacuum chamber where it is distributed over dispersal material, enlarging its surface area. Free and dissolved water vaporizes in the chamber due to the lower evaporation point caused by the vacuum. Air from the surrounding area is allowed into the vacuum chamber through an air filter and a throttle valve. The air enters approximately in the middle of the chamber, moving upward to the flow of the fluid. Water and gas join the upward airflow, leaving the vacuum chamber and entering the vacuum pump. At this point, the air and water vapor are either condensed and emitted to the atmosphere or emitted immediately.

The Technology Behind Eaton's Internormen Purifier Systems

Eaton's Internormen IFPM/IFPS systems are fully-automated, PLC-controlled units compact enough for use even in tight areas. The implemented water sensor (WSPS 05), in connection with the display unit (WFD 01), allows for a permanent monitoring of the water level in a purified fluid. The electronic Δp sensor (VS1) provides the optimal use and maintenance scheduling of the included particle removal filter element. The IFPM/IFPS' desiccant air breather dries up the inert gas and therefore increases the efficiency of the purifier, even in high humidity environments.

Water Content and Timing Diagram For Various Fluids



The Factors Influencing Purifier Efficiency

The processing time needed to reach the desired level of water in an operating fluid mainly depends on the type of fluid being purified. Other factors influencing the speed of the dehydration process are highlighted in the chart on the right.

Water Extraction Rate	
Temperature:	Strongly increased
Vacuum:	Increased
Initial water content:	Increased
Additive:	Reduced
Flow rate of the IFPM/IFPS systems:	Increased

Technical Data	IFPM 21 IFPS 21	IFPM 31 IFPS 31	IFPM 71	IFPS 71	IFPS 101
Dry weight:	694.6 lbs (315 kg)	716.6 lbs (325 kg)	1300.9 lbs (590 kg)	1300.9 lbs (590 kg)	1741.7 lbs (790 kg)
Dimensions					
Length					
Ball valve closed:	47.3" (1202 mm)	47.3" (1202 mm)	62" (1575 mm)	62" (1575 mm)	65.2" (1655 mm)
Ball valve opened:	48.3" (1226 mm)	48.3" (1226 mm)	65.9" (1676 mm)	65.9" (1676 mm)	70.7" (1797 mm)
Width:	27.7" (703 mm)	27.7" (703 mm)	35.4" (900 mm)	35.4" (900 mm)	49.8" (1265 mm)
Height:	60.9" (1546 mm)	60.9" (1546 mm)	71" (1805 mm)	61.8" (1570 mm)	62.4" (1585 mm)
Inlet connection:	1-1/2" SAE flange	1-1/2" SAE flange	2-1/2" SAE flange	2-1/2" SAE flange	3" SAE flange
Outlet connection:	1-1/4" SAE flange	1-1/4" SAE flange	2" SAE flange	2" SAE flange	2-1/2" SAE flange
Flow rate:*	5.3 gal/min (20 l/min)	7.9 gal/min (30 l/min)	18.5 gal/min (70 l/min)	18.5 gal/min (70 l/min)	26.4 gal/min (100 l/min)
Operating pressure:	145 psi (10 bar)	145 psi (10 bar)	145 psi (10 bar)	145 psi (10 bar)	145 psi (10 bar)
Operating vacuum:**	0.7 to .05 psi (-60 to -90 kPa)	0.7 to .05 psi (-60 to -90 kPa)	0.7 to .05 psi (-60 to -90 kPa)	0.7 to .05 psi (-60 to -90 kPa)	0.7 to .05 psi (-60 to -90 kPa)
Total motor power:	1.1 KW	1.3 KW	2.8 KW	2.8 KW	4.0 KW
Heater capacity:	3000 W	3000 W	4000 W (3 phase)	4000 W (3 phase)	8000 W (3 phase)
Filter type:	1 x NF.631	1 x NF.631	1 x NF.1000	1 x NF.1000	2 x NF.1000
Filter element:	01.NR 630	01.NR 630	01.NR 1000	01.NR 1000	2 x 01.NR 1000
Sealing material:	Viton	Viton	Viton	Viton	Viton
Max. viscosity:	3244.5 SUS (700 mm^2/s)	3244.5 SUS (700 mm^2/s)	3244.5 SUS (700 mm^2/s)	3244.5 SUS (700 mm^2/s)	3244.5 SUS (700 mm^2/s)
Water extraction rate:***	19.8 gal/day (75 l/day)	27.7 gal/day (105 l/day)	83.2 gal/day (315 l/day)	83.2 gal/day (315 l/day)	118.9 gal/day (450 l/day)

* At liquid viscosity of 148.3 SUS (32 mm^2/s) ** Operating vacuum adapted to specific applications *** Water content 6% at 104 °F (40 °C) and 148.3 SUS (32 mm^2/s)

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