

# MOBILE FILTRATION UNITS GRF SERIES



PASSION TO PERFORM



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**Disclaimer**

The details in this manual are for informational purpose only.  
MP Filtri assumes no responsibility for use of the information provided.

# CONTAMINATION MANAGEMENT

## ① HYDRAULIC FLUIDS

The fluid is the vector that transmits power, energy within an oleodynamic circuit. In addition to transmitting energy through the circuit, it also performs additional functions such as lubrication, protection and cooling of the surfaces.

The classification of fluids used in hydraulic systems is coded in many regulatory references, different Standards.

The most popular classification criterion divides them into the following families:

### - MINERAL OILS

Commonly used oil deriving fluids.

### - FIRE RESISTANT FLUIDS

Fluids with intrinsic characteristics of incombustibility or high flash point.

### - SYNTHETIC FLUIDS

Modified chemical products to obtain specific optimized features.

### - ECOLOGICAL FLUIDS

Synthetic or vegetable origin fluids with high biodegradability characteristics.

The choice of fluid for an hydraulic system must take into account several parameters.

These parameters can adversely affect the performance of an hydraulic system, causing delay in the controls, pump cavitation, excessive absorption, excessive temperature rise, efficiency reduction, increased drainage, wear, jam/block or air intake in the plant.

The main properties that characterize hydraulic fluids and affect their choice are:

### - DYNAMIC VISCOSITY

It identifies the fluid's resistance to sliding due to the impact of the particles forming it.

### - CINEMATIC VISCOSITY

It is a widespread formal dimension in the hydraulic field.

It is calculated with the ratio between the dynamic viscosity and the fluid density.

Cinematic viscosity varies with temperature and pressure variations.

### - VISCOSITY INDEX

This value expresses the ability of a fluid to maintain viscosity when the temperature changes.

A high viscosity index indicates the fluid's ability to limit viscosity variations by varying the temperature.

### - FILTERABILITY INDEX

It is the value that indicates the ability of a fluid to cross the filter materials. A low filterability index could cause premature clogging of the filter material.

### - WORKING TEMPERATURE

Working temperature affects the fundamental characteristics of the fluid. As already seen, some fluid characteristics, such as cinematic viscosity, vary with the temperature variation.

When choosing a hydraulic oil, must therefore be taken into account of the environmental conditions in which the machine will operate.

### - COMPRESSIBILITY MODULE

Every fluid subjected to a pressure contracts, increasing its density.

The compressibility module identifies the increase in pressure required to cause a corresponding increase in density.

### - HYDROLYTIC STABILITY

It is the characteristic that prevents galvanic pairs that can cause wear in the plant/system.

### - ANTIOXIDANT STABILITY AND WEAR PROTECTION

These features translate into the capacity of a hydraulic oil to avoid corrosion of metal elements inside the system.

### - HEAT TRANSFER CAPACITY

It is the characteristic that indicates the capacity of hydraulic oil to exchange heat with the surfaces and then cool them.

## ② FLUID CONTAMINATION

Whatever the nature and properties of fluids, they are inevitably subject to contamination. Fluid contamination can have two origins:

### - INITIAL CONTAMINATION

Caused by the introduction of contaminated fluid into the circuit, or by incorrect storage, transport or transfer operations.

### - PROGRESSIVE CONTAMINATION

Caused by factors related to the operation of the system, such as metal surface wear, sealing wear, oxidation or degradation of the fluid, the introduction of contaminants during maintenance, corrosion due to chemical or electrochemical action between fluid and components, cavitation. The contamination of hydraulic systems can be of different nature:

### - SOLID CONTAMINATION

For example rust, slag, metal particles, fibers, rubber particles, paint particles or additives

### - LIQUID CONTAMINATION

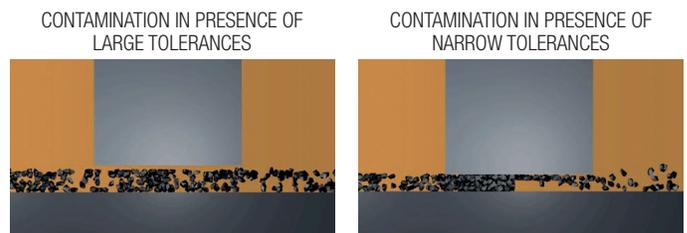
For example, the presence of water due to condensation or external infiltration or acids

### - GASEOUS CONTAMINATION

For example, the presence of air due to inadequate oil level in the tank, drainage in suction ducts, incorrect sizing of tubes or tanks.

## ③ EFFECTS OF CONTAMINATION ON HYDRAULIC COMPONENTS

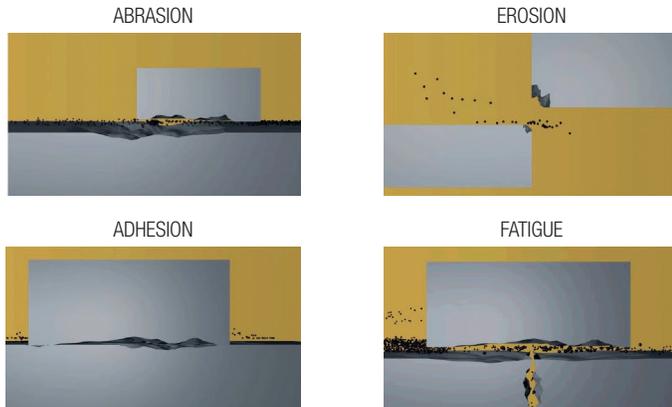
Solid contamination is recognized as the main cause of malfunction, failure and early degradation in hydraulic systems. It is impossible to delete it completely, but it can be effectively controlled by appropriate devices.



Solid contamination mainly causes surface damage and component wear.

- SURFACE EROSION  
Cause of leakage through mechanical seals, reduction of system performance, variation in adjustment of control components, failures.
- ADHESION OF MOVING PARTS  
Cause of failure due to lack of lubrication.
- DAMAGES DUE TO FATIGUE  
Cause of breakdowns and components breakdown.

- MODIFICATION OF FLUID PROPERTIES  
(COMPRESSIBILITY MODULE, DENSITY, VISCOSITY)  
Cause of system's reduction of efficiency and of control.  
It is easy to understand how a system without proper contamination management is subject to higher costs than a system that is provided.
- MAINTENANCE  
Maintenance activities, spare parts, machine stop costs
- ENERGY AND EFFICIENCY  
Efficiency and performance reduction due to friction, drainage, cavitation.



Liquid contamination mainly results in decay of lubrication performance and protection of fluid surfaces.

## DISSOLVED WATER

- INCREASING FLUID ACIDITY  
Cause of surface corrosion and premature fluid oxidation
- GALVANIC COUPLE AT HIGH TEMPERATURES  
Cause of corrosion

## FREE WATER - ADDITIONAL EFFECTS

- DECAY OF LUBRICANT PERFORMANCE  
Cause of rust and sludge formation, metal corrosion and increased solid contamination
- BATTERY COLONY CREATION  
Cause of worsening in the filterability feature
- ICE CREATION AT LOW TEMPERATURES  
Cause damage to the surface
- ADDITIVE DEPLETION  
Free water retains polar additives

Gaseous contamination mainly results in decay of system performance.

- CUSHION SUSPENSION  
Cause of increased noise and cavitation.
- FLUID OXIDATION  
Cause of corrosion acceleration of metal parts.

## 4 MEASURING THE SOLID CONTAMINATION LEVEL

The level of contamination of a system identifies the amount of contaminant contained in a fluid.

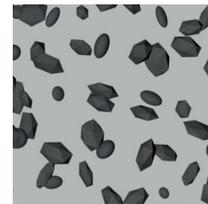
This parameter refers to a unit volume of fluid.

The level of contamination may be different at different points in the system. From the information in the previous paragraphs it is also apparent that the level of contamination is heavily influenced by the working conditions of the system, by its working years and by the environmental conditions.

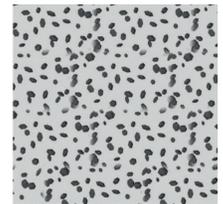
What is the size of the contaminating particles that we must handle in our hydraulic circuit?



HUMAN HAIR  
(75 µm)



MINIMUM DIMENSION  
VISIBLE HUMAN EYES  
(40 µm)



TYPICAL CONTAMINANT  
DIMENSION IN A  
HYDRAULIC CIRCUIT  
(4÷14 µm)

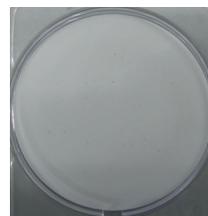
Contamination level analysis is significant only if performed with a uniform and repeatable method, conducted with standard test methods and suitably calibrated equipment.

To this end, ISO has issued a set of standards that allow tests to be conducted and express the measured values in the following ways.

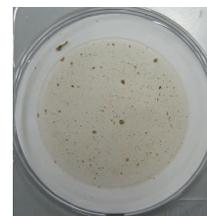
- GRAVIMETRIC LEVEL - ISO 4405

The level of contamination is defined by checking the weight of particles collected by a laboratory membrane. The membrane must be cleaned, dried and desiccated, with fluid and conditions defined by the Standard.

The volume of fluid is filtered through the membrane by using a suitable suction system. The weight of the contaminant is determined by checking the weight of the membrane before and after the fluid filtration.



CLEAN  
MEMBRANE



CONTAMINATED  
MEMBRANE

# CONTAMINATION MANAGEMENT

## - CUMULATIVE DISTRIBUTION OF THE PARTICLES SIZE - ISO 4406

The level of contamination is defined by counting the number of particles of certain dimensions per unit of volume of fluid. Measurement is performed by Automatic Particle Counters (APC).

Following the count, the contamination classes are determined, corresponding to the number of particles detected in the unit of fluid.

The most common classification methods follow ISO 4406 and SAE AS 4059 (Aerospace Sector) regulations.

NAS 1638 is still used although obsolete.

### Classification example according to ISO 4406

The code refers to the number of particles of the same size or greater than 4, 6 or 14  $\mu\text{m}$  in a 1 ml fluid.

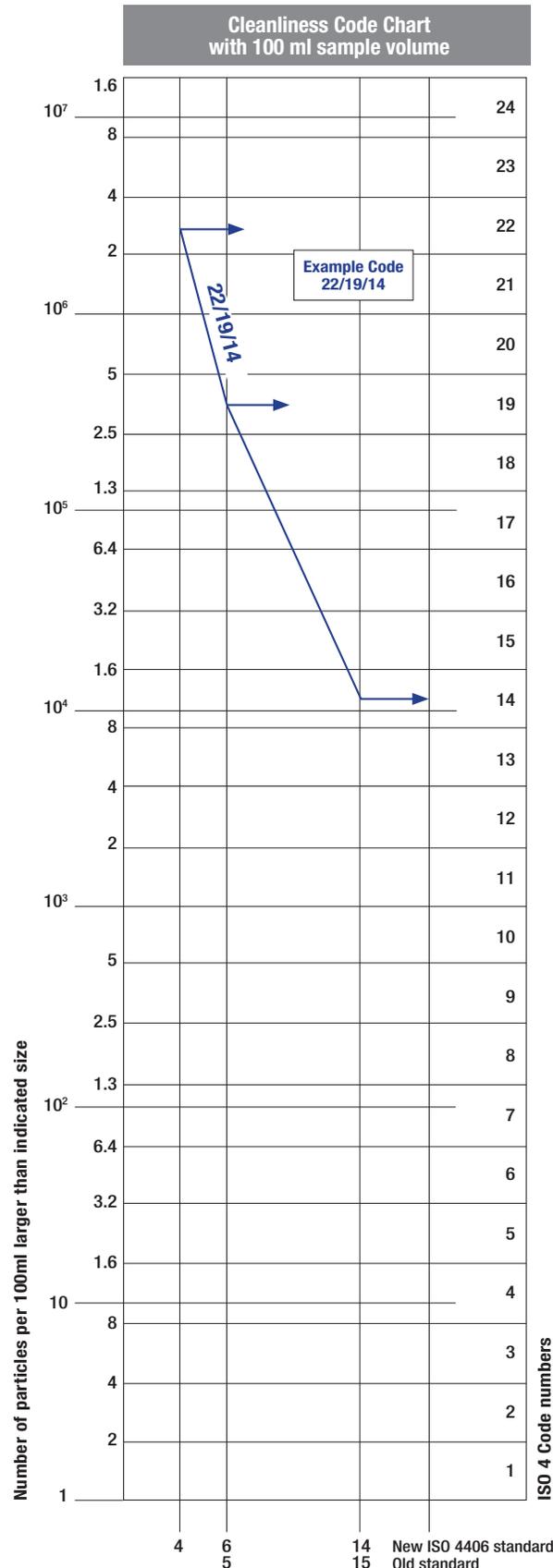
Class	Number of particles per ml	
	Over	Up to
28	1 300 000	2 500 000
27	640 000	1 300 000
26	320 000	640 000
25	160 000	320 000
24	80 000	160 000
23	40 000	80 000
22	20 000	40 000
21	10 000	20 000
20	5 000	10 000
19	2 500	5 000
18	1 300	2 500
17	640	1 300
16	320	640
15	160	320
14	80	160
13	40	80
12	20	40
11	10	20
10	5	10
9	2.5	5
8	1.3	2.5
7	0.64	1.3
6	0.32	0.64
5	0.16	0.32
4	0.08	0.16
3	0.04	0.08
2	0.02	0.04
1	0.01	0.02
0	0	0.01

- > 4  $\mu\text{m}_{(c)}$  = 350 particles
  - > 6  $\mu\text{m}_{(c)}$  = 100 particles
  - > 14  $\mu\text{m}_{(c)}$  = 25 particles
- 16 / 14 / 12

## ISO 4406:2017 Cleanliness Code System

Microscope counting examines the particles differently to APCs and the code is given with two scale numbers only.

These are at 5  $\mu\text{m}$  and 15  $\mu\text{m}$  equivalent to the 6  $\mu\text{m}_{(c)}$  and 14  $\mu\text{m}_{(c)}$  of APCs.



## - CUMULATIVE DISTRIBUTION OF THE PARTICLES SIZE - SAE AS 4059-1 and SAE AS 4059-2

### Classification example according to SAE AS 4059-1 and SAE AS 4059-2

The code, prepared for the aerospace industry, is based on the size, quantity, and particle spacing in a 100 ml fluid sample. The contamination classes are defined by numeric codes, the size of the contaminant is identified by letters (A-F).

It can be made a differential measurement (Table 1) or a cumulative measurement (Table 2)

Table 1 - Class for differential measurement

Class	Dimension of contaminant				
	6÷14 µm <sub>(c)</sub>	14÷21 µm <sub>(c)</sub>	21÷38 µm <sub>(c)</sub>	38÷70 µm <sub>(c)</sub>	>70 µm <sub>(c)</sub>
00	125	22	4	1	0
0	250	44	8	2	0
1	500	89	16	3	1
2	1 000	178	32	6	1
3	2 000	356	63	11	2
4	4 000	712	126	22	4
5	8 000	1 425	253	45	8
6	16 000	2 850	506	90	16
7	32 000	5 700	1 012	180	32
8	64 000	11 400	2 025	360	64
9	128 000	22 800	4 050	720	128
10	256 000	45 600	8 100	1 440	256
11	512 000	91 200	16 200	2 880	512
12	1 024 000	182 400	32 400	5 760	1 024

- 6÷14 µm<sub>(c)</sub> = 15 000 particles
  - 14÷21 µm<sub>(c)</sub> = 2 200 particles
  - 21÷38 µm<sub>(c)</sub> = 200 particles
  - 38÷70 µm<sub>(c)</sub> = 35 particles
  - > 70 µm<sub>(c)</sub> = 3 particles
- Class 6

Table 2 - Class for cumulative measurement

Class	Dimension of contaminant					
	>4 µm <sub>(c)</sub> A	>6 µm <sub>(c)</sub> B	>14 µm <sub>(c)</sub> C	>21 µm <sub>(c)</sub> D	>38 µm <sub>(c)</sub> E	>70 µm <sub>(c)</sub> F
000	195	76	14	3	1	0
00	390	152	27	5	1	0
0	780	304	54	10	2	0
1	1 560	609	109	20	4	1
2	3 120	1 217	217	39	7	1
3	6 250	2 432	432	76	13	2
4	12 500	4 864	864	152	26	4
5	25 000	9 731	1 731	306	53	8
6	50 000	19 462	3 462	612	106	16
7	100 000	38 924	6 924	1 224	212	32
8	200 000	77 849	13 849	2 449	424	64
9	400 000	155 698	27 698	4 898	848	128
10	800 000	311 396	55 396	9 796	1 696	256
11	1 600 000	622 792	110 792	19 592	3 392	512
12	3 200 000	1 245 584	221 584	39 184	6 784	1 024

- > 4 µm<sub>(c)</sub> = 45 000 particles
  - > 6 µm<sub>(c)</sub> = 15 000 particles
  - > 14 µm<sub>(c)</sub> = 1 500 particles
  - > 21 µm<sub>(c)</sub> = 250 particles
  - > 38 µm<sub>(c)</sub> = 15 particles
  - > 70 µm<sub>(c)</sub> = 3 particle
- Class from 2F to 4E

## - CLASSES OF CONTAMINATION ACCORDING TO NAS 1638 (January 1964)

The NAS system was originally developed in 1964 to define contamination classes for the contamination contained within aircraft components.

The application of this standard was extended to industrial hydraulic systems simply because nothing else existed at the time.

The coding system defines the maximum numbers permitted of 100ml volume at various size intervals (differential counts) rather than using cumulative counts as in ISO 4406:1999. Although there is no guidance given in the standard on how to quote the levels, most industrial users quote a single code which is the highest recorded in all sizes and this convention is used on MP Filtri APC's.

The contamination classes are defined by a number (from 00 to 12) which indicates the maximum number of particles per 100 ml, counted on a differential basis, in a given size bracket.

Size Range Classes (in microns)

Maximum Contamination Limits per 100 ml					
Class	5÷15	15÷25	25÷50	50÷100	>100
00	125	22	4	1	0
0	250	44	8	2	0
1	500	89	16	3	1
2	1 000	178	32	6	1
3	2 000	356	63	11	2
4	4 000	712	126	22	4
5	8 000	1 425	253	45	8
6	16 000	2 850	506	90	16
7	32 000	5 700	1 012	180	32
8	64 000	11 400	2 025	360	64
9	128 000	22 800	4 050	720	128
10	256 000	45 600	8 100	1 440	256
11	512 000	91 200	16 200	2 880	512
12	1 024 000	182 400	32 400	5 760	1 024

- 5÷15 µm<sub>(c)</sub> = 42 000 particles
  - 15÷25 µm<sub>(c)</sub> = 2 200 particles
  - 25÷50 µm<sub>(c)</sub> = 150 particles
  - 50÷100 µm<sub>(c)</sub> = 18 particles
  - > 100 µm<sub>(c)</sub> = 3 particles
- Class NAS 8

## - CUMULATIVE DISTRIBUTION OF THE PARTICLES SIZE - ISO 4407

The level of contamination is defined by counting the number of particles collected by a laboratory membrane per unit of fluid volume. The measurement is done by a microscope.

The membrane must be cleaned, dried and desiccated, with fluid and conditions defined by the Standard. The fluid volume is filtered through the membrane, using a suitable suction system.

The level of contamination is identified by dividing the membrane into a predefined number of areas and by counting the contaminant particles using a suitable laboratory microscope.



ISO 4406:1999	Class 16/14/11	Class 22/20/17
SAE AS4059E Table 1	Class 5	Class 11
NAS 1638	Class 5	Class 11
SAE AS4059E Table 2	Class 6A/5B/5C	Class 12A/11B/11C

# CONTAMINATION MANAGEMENT

## - CLEANLINESS CODE COMPARISON

Although ISO 4406:2017 standard is being used extensively within the hydraulics industry other standards are occasionally required and a comparison may be requested. The table below gives a very general comparison but often no direct comparison is possible due to the different classes and sizes involved.

ISO 4406:2017	SAE AS4059 Table 2	SAE AS4059 Table 1	NAS 1638
> 4 $\mu\text{m}_{(c)}$ 6 $\mu\text{m}_{(c)}$ 14 $\mu\text{m}_{(c)}$	> 4 $\mu\text{m}_{(c)}$ 6 $\mu\text{m}_{(c)}$ 14 $\mu\text{m}_{(c)}$	4-6 6-14 14-21 21-38 38-70 >70	5-15 15-25 25-50 50-100 >100
23 / 21 / 18	13A / 12B / 12C	12	12
22 / 20 / 17	12A / 11B / 11C	11	11
21 / 19 / 16	11A / 10B / 10C	10	10
20 / 18 / 15	10A / 9B / 9C	9	9
19 / 17 / 14	9A / 8B / 8C	8	8
18 / 16 / 13	8A / 7B / 7C	7	7
17 / 15 / 12	7A / 6B / 6C	6	6
16 / 14 / 11	6A / 5B / 5C	5	5
15 / 13 / 10	5A / 4B / 4C	4	4
14 / 12 / 09	4A / 3B / 3C	3	3

## 5 RECOMMENDED CONTAMINATION CLASSES

Any are the nature and the properties of fluids, they are inevitably subject to contamination. The level of contamination can be managed by using special components called filters.

Hydraulic components builders, knowing the problem of contamination, recommend the filtration level appropriate to the use of their products.

Example of recommended contamination levels for pressures below 140 bar.

Piston pumps with fixed flow rate	•					
Piston pumps with variable flow rate			•			
Vane pumps with fixed flow rate		•				
Vane pumps with variable flow			•			
Engines	•					
Hydraulic cylinders	•					
Actuators					•	
Test benches						•
Check valve	•					
Directional valves	•					
Flow regulating valves	•					
Proportional valves				•		
Servo-valves					•	
Flat bearings			•			
Ball bearings				•		
ISO 4406 CODE	20/18/15	19/17/14	18/16/13	17/15/12	16/14/11	15/13/10
Recommended filtration $\beta_{x(c)} \geq 1.000$	$\beta_{20(c)} > 1000$	$\beta_{15(c)} > 1000$	$\beta_{10(c)} > 1000$	$\beta_{7(c)} > 1000$	$\beta_{7(c)} > 1000$	$\beta_{5(c)} > 1000$

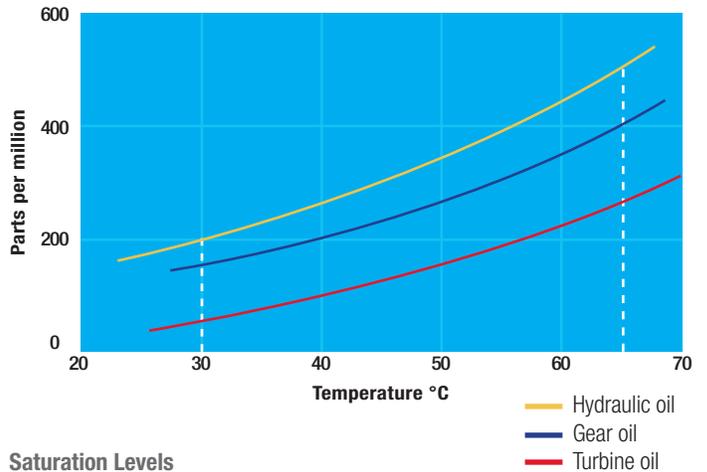
## 6 WATER IN HYDRAULIC AND LUBRICATING FLUIDS

### Water Content

In mineral oils and non aqueous resistant fluids water is undesirable. Mineral oil usually has a water content of 50-300 ppm (@40°C) which it can support without adverse consequences.

Once the water content exceeds about 300ppm the oil starts to appear hazy. Above this level there is a danger of free water accumulating in the system in areas of low flow. This can lead to corrosion and accelerated wear.

Similarly, fire resistant fluids have a natural water which may be different to mineral oil.



### Saturation Levels

Since the effects of free (also emulsified) water is more harmful than those of dissolved water, water levels should remain well below the saturation point.

However, even water in solution can cause damage and therefore every reasonable effort should be made to keep saturation levels as low as possible.

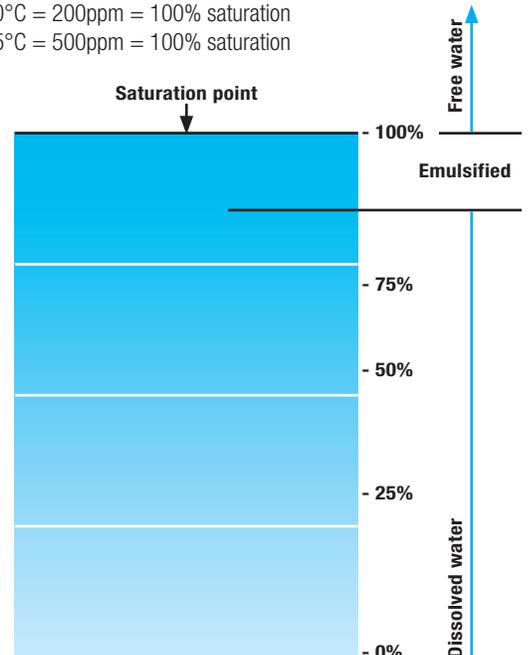
There is no such thing as too little water. As a guideline, we recommend maintaining saturation levels below 50% in all equipment.

### TYPICAL WATER SATURATION LEVEL FOR NEW OILS

Examples:

Hydraulic oil @ 30°C = 200ppm = 100% saturation

Hydraulic oil @ 65°C = 500ppm = 100% saturation



## W - Water and Temperature Sensing

"W" option, in MP Filtri Contamination Monitoring Products, indicates water content as a percentage of saturation and oil temperature in degrees centigrade. 100% RH corresponds to the point at which free water can exist in the fluid. i.e. the fluid is no longer able to hold the water in a dissolved solution.

The sensor can help provide early indication of costly failure due to free water, including but not exclusive to:

- Corrosion
- Metal surface fatigue e.g. bearing failure
- Reduced lubrication & load carrying characteristics

Different oils have different saturation levels and therefore RH (relative humidity) % is the best and most practical measurement.

## Water absorber

Water is present everywhere, during storage, handling and servicing.

MP Filtri filter elements feature an absorbent media which protects hydraulic systems from both particulate and water contamination.

MP Filtri's filter element technology is available with inorganic microfiber media with a filtration rating 25  $\mu\text{m}$  (therefore identified with media designation WA025, providing absolute filtration of solid particles to  $\beta_{x(c)} = 1000$ ).

Absorbent media is made by water absorbent fibres which increase in size during the absorption process.

Free water is thus bonded to the filter media and completely removed from the system (it cannot even be squeezed out).

By removing water from your fluid power system, you can prevent such key problems as:

- corrosion (metal etching)
- loss of lubricant power
- accelerated abrasive wear in hydraulic components
- valve-locking
- bearing fatigue
- viscosity variance (reduction in lubricating properties)
- additive precipitation and oil oxidation
- increase in acidity level
- increased electrical conductivity (loss of dielectric strength)
- slow/weak response of control systems

Product availability - GRF Series:

GRF 015

GRF 1

GRF 3

GRF 5

GRF 6

Filter Media

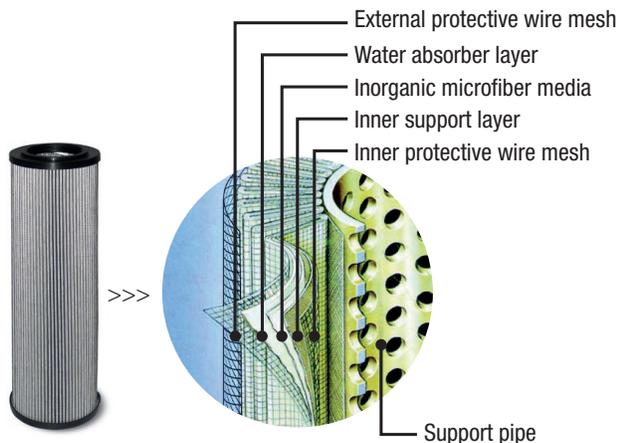


Fabric that absorbs water

Absorber media layer



The Filter Media has absorbed water



# GRF 015

Mobile filtration unit 4 gpm flow rate



# GRF 015 GENERAL INFORMATION

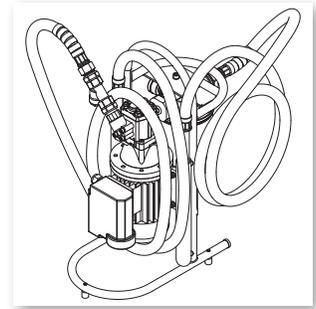
## Description

### Mobile filtration units

The GRF 015 is a portable oil transfer/filtration unit, specifically designed for both filling/transferring hydraulic oils from containers to the hydraulic tank as well as filtering and cleaning hydraulic systems.

The unit utilizes Spin-On element (supplied as option), available in two lengths, thus increasing the dirt holding capacity and lowering pressure drop of the unit.

The unit has the flexibility in being able to offer a wide range of medias and micron ratings to suit any application. The unit is very compact and lightweight.



### > Features & Benefits

- Handle size
- Light
- Easy to use
- Easy maintenance
- Reliable
- Absolute filtration



Technical data

**Pump**

Gear pump

**Electric Motor**

.25 hp 115 V single phase electric motor

**Flow (l/min)**

4 gpm at 1800 rpm

**Max. Operation Pressure**

58 psi

**Viscosity range**

Min. operation 10 cSt

Max. operation 200 cSt

Max. only for cold start 400 cSt

**Suction Filter**

Type Y filtration 500 µm

**Filtration Rating**

1/3/6/10/25 µm  $\beta > 1000$  flow through the element Out/In

**Bypass valve**

Rating 58 psi

**Fluid Temperature**

From 41° to 140 °F

**Ambient Temperature**

From 41° to 104 °F

**Protection Class**

IP 55

**Seal**

NBR

**Fluid Compatibility**

Mineral Oil - Other on request

**Suction hose**

DN18 length 100 in

**lance**

DN/OD20 length 16 in

**Pressure hose**

DN18 length 100 in

**lance**

DN/OD18 length 16 in

**Weight**

32.6 lb

**Equipment**

Visual clogging indicator (gauge)

 Standard

# GRF 015 Series

## Designation & Ordering code

### MOBILE FILTRATION UNIT GRF 015

Series	Configuration example:	GRF	015	M	A	1	0	0	P01
<b>GRF</b>									
<b>Size</b>									
<b>015</b> 4 gpm									
<b>Electric motor</b>									
<b>M</b> 115 single phase									
<b>Seals</b>									
<b>A</b> NBR									
<b>Pressure gauges and Color coded gauge</b>									
<b>1</b>									
<b>Spin-on Element</b>									
Note: Element ordered separately									
<b>0</b> Without element									
<b>Option</b>									
<b>0</b> No options									
<b>Option</b>									
<b>P01</b> MP Filtri standard									
<b>Pxx</b> Customized									

## Element Options

### SPIN ON ELEMENT STANDARD LENGTH

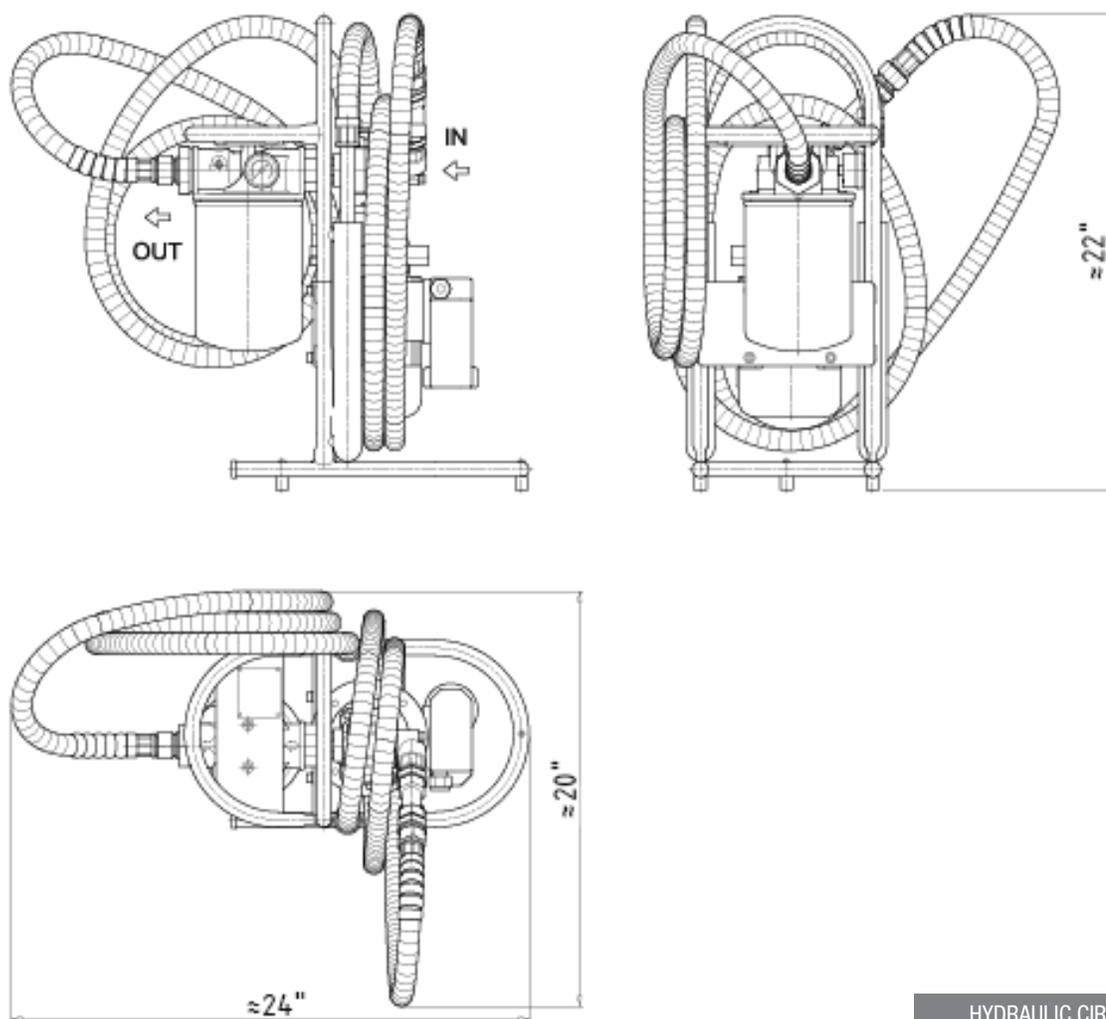
Inorganic microfibre	Wire mesh element
CSG100A01AP01	CSG100M25AP01
CSG100A03AP01	CSG100M60AP01
CSG100A06AP01	
CSG100A10AP01	
CSG100A25AP01	

### SPIN ON ELEMENT EXTENDED LENGTH

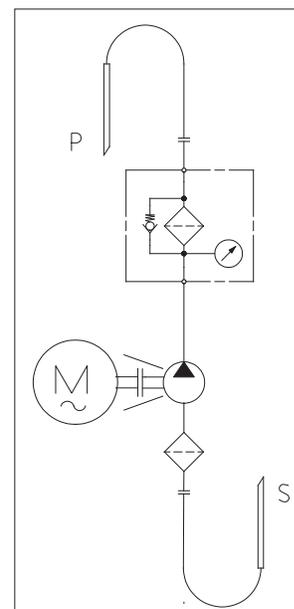
Inorganic microfibre	Wire mesh element
CSG150A01AP01	CSG150M25AP01
CSG150A03AP01	CSG150M60AP01
CSG150A06AP01	
CSG150A10AP01	
CSG150A25AP01	

### WATER REMOVAL -ELEMENT EXTENDED LENGTH

Multi-Layer water absorber
CSGW100P10A
CSGW150P10A
CSGW150P25A
CSGW150A03A



### HYDRAULIC CIRCUIT



# GRF 1 General Information

## Technical Data

### Applications

- Filtering contaminated systems
- Collecting oil samples for analysis
- Dispensing new oil

### Performance

For filtering mineral and synthetic based oils (hydraulic oils, gear oils, and turbine oils) with a maximum operating viscosity range of 3000ssu/648cSt at 100°F within ambient temperature ranges of -15°F to 150°F

### > Features

- Carbon steel frame with drip tray
- 1 HP, 115 VAC, 60 Hz motor
- Low pressure aluminum heads
- Aluminum gear pump - available in 5 and 10 gpm
- Pop-up indicator triggers at 20 psid when elements need to be changed
- Pump relief opens at 150 psi
- Approximate weight 75-80 lbs
- Approximate dimensions 24"L x 12"W X 18"H

### Replacement spin-on element options:

Part Number	Beta Rating	Desired Cleanliness Level (ISO Code)
CSG150A01A	B1(c)=1000	13/11/8 - 12/10/7
CSG150A03A	B3(c)=1000	14/12/19 - 13/11/18
CSG150A06A	B6(c)=1000	17/15/12 - 14/12/19
CSG150A10A	B10(c)=1000	18/16/13 - 17/15/12
CSG150A25A	B25(c)=1000	21/19/16 - 20/18/15
CSGW150A03A	Water Removal	

## STATIONARY FILTRATION UNIT GRF 1

Configuration Example 1: GRF 105 A 1 1 - A03 P01

<b>Series</b>	
<b>GRF 105</b>	5 GPM
<b>GRF 110</b>	10 GPM
<hr/>	
<b>Seal</b>	
<b>A</b>	Buna
<hr/>	
<b>Phase</b>	
<b>1</b>	110 Volt
<b>3</b>	230 Volt
<hr/>	
<b>Auto-Shut Down Control Feature</b>	
<b>-</b>	No auto-shut down control
<b>1</b>	With auto-shut down control *
<hr/>	
<b>*Note: Auto shutdown feature is only applicable with optional ICM</b>	
<hr/>	
<b>Clogging Indicator</b>	
<b>-</b>	No strobe light indicator
<b>1</b>	With strobe light indicator
<hr/>	
<b>Discharge Side Element</b>	
<b>A01</b>	CSG150A01A
<b>A03</b>	CSG150A03A
<b>A06</b>	CSG150A06A
<b>A10</b>	CSG150A10A
<b>A25</b>	CSG150A25A
<b>WA03</b>	CSGW150A03A
<b>WP10</b>	CSGW150P10A
<b>WP25</b>	CSGW150P25A
<hr/>	
<b>Execution</b>	
<b>P01</b>	MP Filtri Standard
<b>Pxx</b>	Customize

ICM contamination monitor is not include and should consult factory

## ICM CONTAMINATION MONITOR

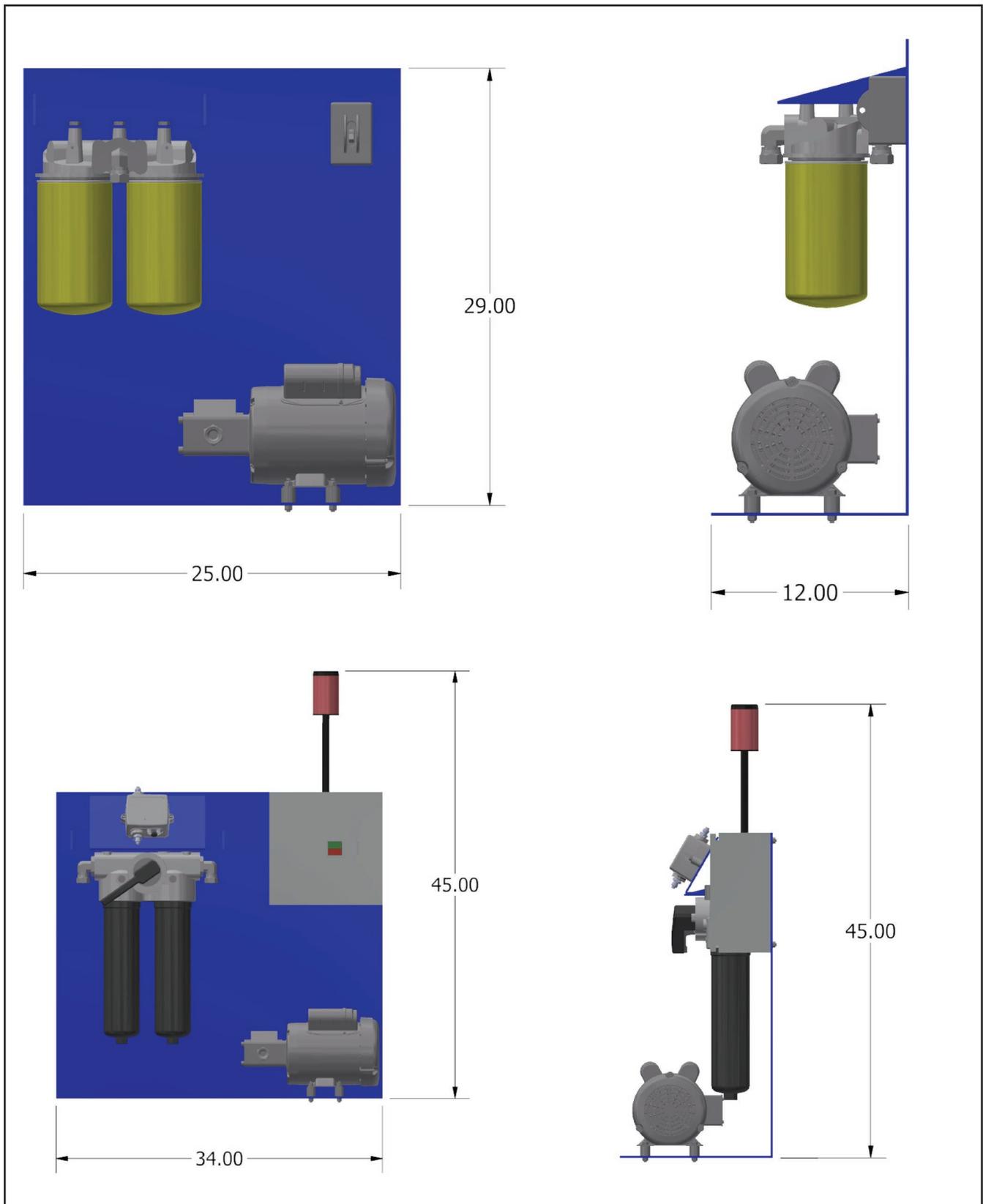
<b>ICM Conamination Monitor</b>	
<b>ICM-O-M-K-R-G1</b>	Without moisture and temperature sensor, with screen, with relays/external alarm outputs
<b>ICM-W-M-K-R-G1</b>	With moisture and temperature sensor with screen, with relays/external alarm outputs
<b>ICM-O-M-K-U-G1</b>	Without moisture and temperature sensor, with screen, with test record transfer plus relays/external alarm outputs
<b>ICM-W-M-K-U-G1</b>	With moisture and temperture, with screen, with test record transfer plus relays/external alarm outputs
<hr/>	
<b>Design Reference</b>	
<b>2.0</b>	ICM 2.0
<b>4.0</b>	ICM 4.0 with integral WiFi

Note: Consult factory for options not listed

MP Filtri reserves the right to make improvements in design, product features and specifications at anytime without notice.

# GRF1 Series

## Dimensions



**Applications**

- Oil transfer from bulk drums to tank
- Reservoir clean-up

**> Features**

- 1 HP, 120 VAC, 1- Phase TEFC motor with cord and plug
- Rugged 5 gpm or 10 gpm gear pump with integral relief valve
- 10 ft. wire reinforced clear suction and discharge hoses with stainless steel wands
- Heavy Duty hand truck with pneumatic tires powder coated MP Filtri blue
- Large drip pan under filter element assemblies
- 2 pc 4ft. stainless steel wands
- Wand storage brackets with accommodations to contain excess in drip pan
- 25 ft. electrical cord with end plug, includes cord storage hook
- On-board sealed on/off switch

**Suction Side**

- 1 pc CSG100M90A - 90 micron wire mesh element

**Discharge Side - 1**

- 1 pc MPS350 Dual Spin-on with 25 psid bypass
- Choice of 1, 3, 6, 10, & 25 micron elements available
- With indicator

**Discharge Side - 2**

- 1 pc LMP 2102 housing with 50 psid bypass
- Choice of 1, 3, 6, 10, & 25 micron elements available
- With indicator

# GRF 3 Series

## Designation & Ordering Code

### MOBILE FILTRATION GRF 3

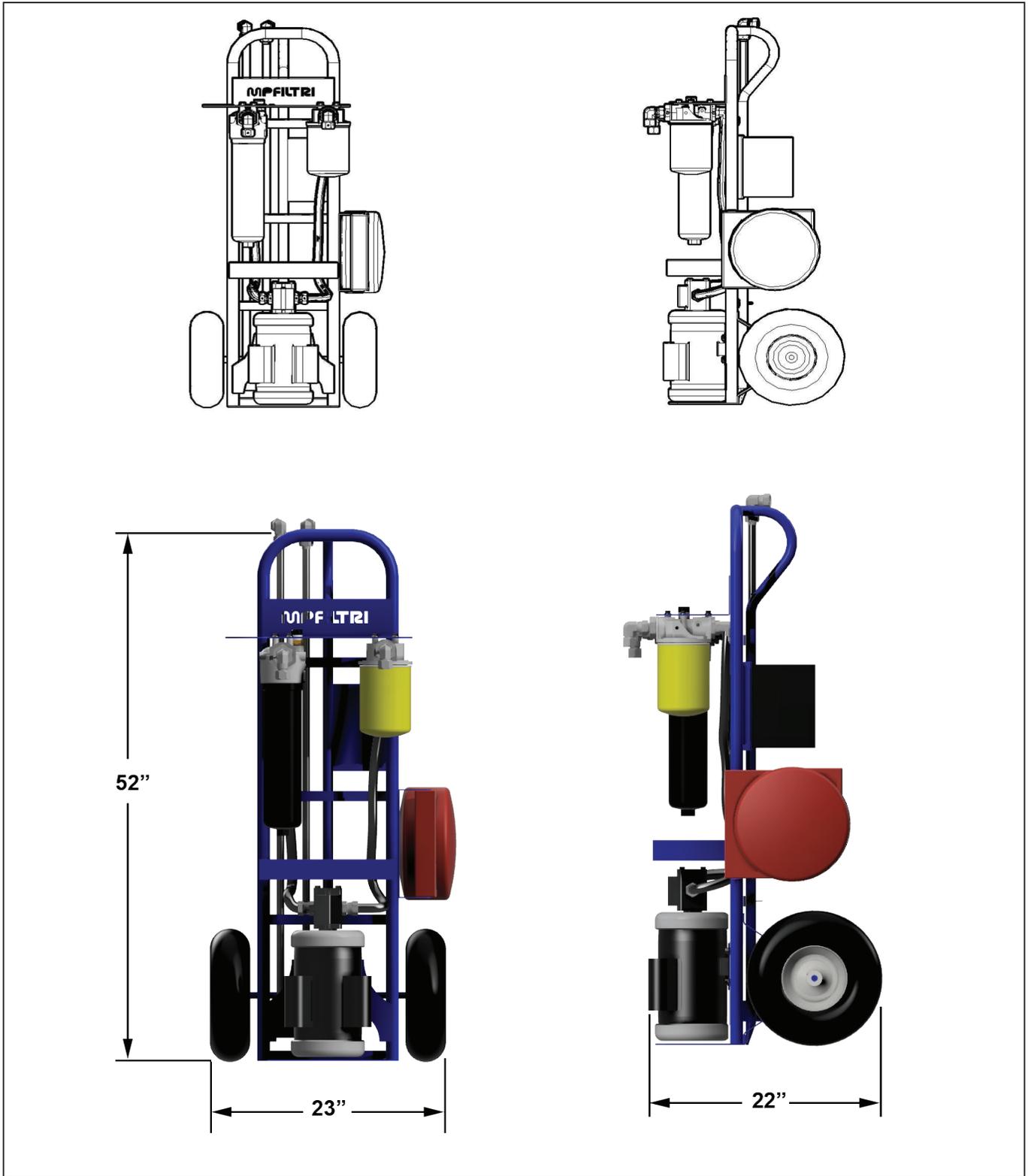
Series		Configuration Example 1: <span style="border: 1px solid black; padding: 2px;">GRF 310</span> <span style="border: 1px solid black; padding: 2px;">1</span> <span style="border: 1px solid black; padding: 2px;">M90</span> <span style="border: 1px solid black; padding: 2px;">A</span> <span style="border: 1px solid black; padding: 2px;">A03</span> <span style="border: 1px solid black; padding: 2px;">P01</span>					
<b>GRF 305</b>	5 GPM						
<b>GRF 310</b>	10 GPM						
Type							
<b>1</b>	MPS300 assembly on discharge						
<b>2</b>	LMP2112 assembly on discharge						
Suction Side Spin-on Element							
<b>M90</b>	90 micron wire mesh						
Seal Material							
<b>A</b>	Buna						
Discharge Side Element (Spin-On Type 1 only)		MPS300	Discharge Side Element (Cartridge Type 2 only)		LMP211		
<b>A01</b>	CSG150A01AP01	•	<b>A01</b>	CU2102A01ANP01	•		
<b>A03</b>	CSG150A03AP01	•	<b>A03</b>	CU2102A03ANP01	•		
<b>A06</b>	CSG150A06AP01	•	<b>A06</b>	CU2102A06ANP01	•		
<b>A10</b>	CSG150A10AP01	•	<b>A10</b>	CU2102A10ANP01	•		
<b>A25</b>	CSG150A25AP01	•	<b>A25</b>	CU2102A25ANP01	•		
<b>WA03</b>	CSGW150A03AP01	•	<b>WA25</b>	CU2102WA25ANP01	•		
<b>WP10</b>	CSGW150P10AP01	•					
<b>WP25</b>	CSGW150P25AP01	•					
Execution							
<b>P01</b>	MP Filtri Standard						
<b>Pxx</b>	Customize						

Note: Consult factory for options not listed

MP Filtri reserves the right to make improvements in design, product features and specifications at anytime without notice.

# GRF 3 Series

Dimensions



## Technical Data

### Applications

- Oil transfer from bulk drums to tank
- Reservoir clean-up

### > Features

- 1 HP, 115 VAC, 1- Phase TEFC motor with motor start/stop, cord and plug
- Rugged 5 gpm or 10 gpm gear pump with integral relief valve
- 10 ft. wire reinforced clear suction and discharge hoses with stainless steel wands
- Mounted inline contamination monitoring (ICM) unit to measure fluid cleanliness
- Heavy duty hand truck with pneumatic tires, powder coated in MP Filtri Blue
- 2 pc 4ft. stainless steel wands
- Wand Storage brackets with accommodation to contain excess in drip pan
- 25 ft. electrical cord with end plug, includes cord storage hook
- On-board sealed on/off switch

### Suction Side

- 1 pc CSG100M90A - 90 micron wire mesh element

### Discharge Side

- 1 pc LMP2112 housing with 50 psid bypass
- Choice of 1, 3, 6, 10, & 25 micron elements available

### ICM

- 8 channel contamination measurement
- International standard formats ISO 4406:1999, NAS 1638 AS 4059E and ISO 11218
- Data logging and 4000 test result memory
- Mineral oil fluid compatibility
- Optional water/temperature sensor
- Optional 6-key keypad and 128 x 64 back-lit display
- Optional relays
- LPA View software included

# GRF 5 Series

Designation & Ordering Code

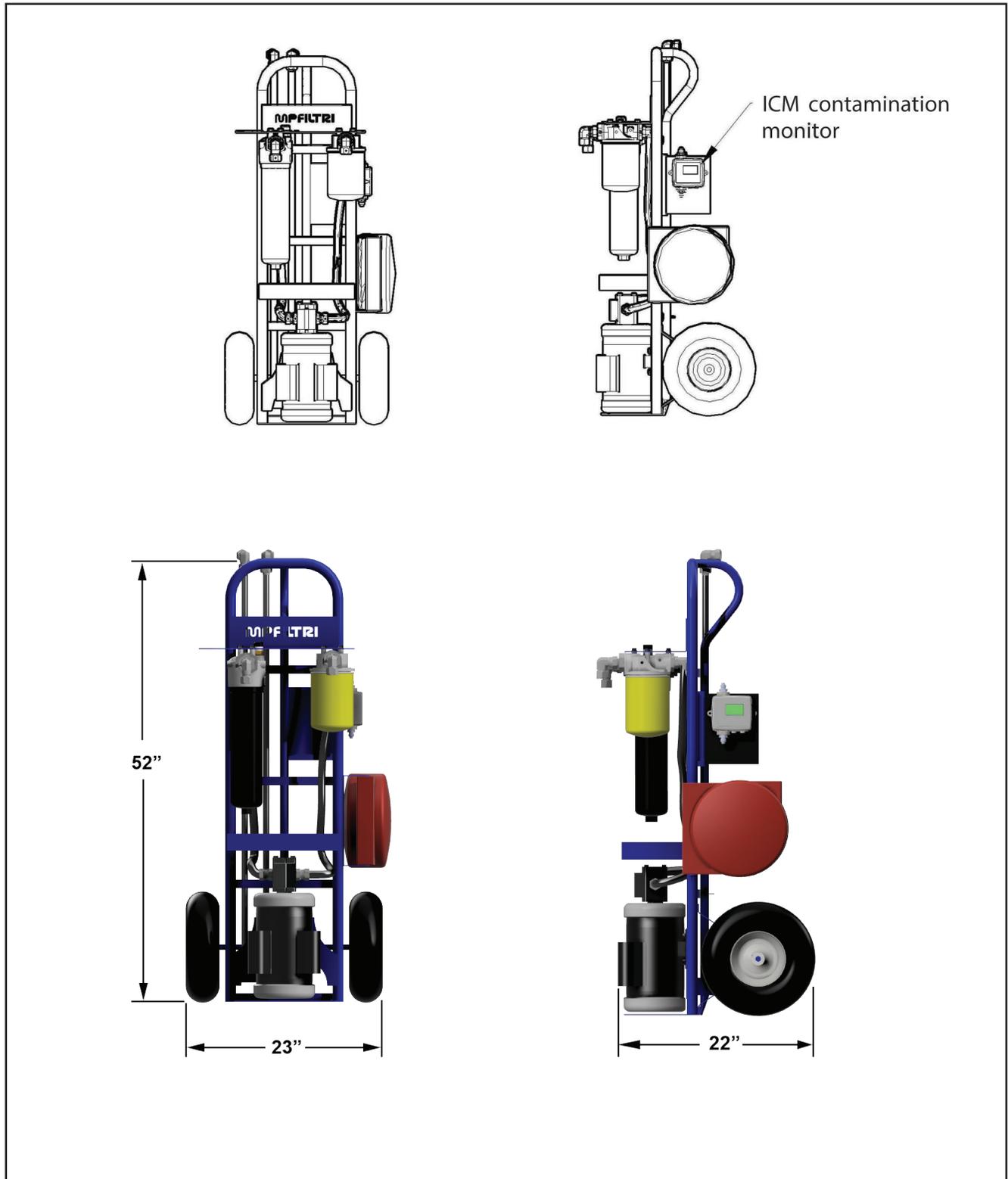
MOBILE FILTRATION GRF 5											
<b>Series</b>	Configuration Example 1: <b>GRF 510</b> <b>2</b> <b>M90</b> <b>A</b> <b>A03</b> <b>ICMW</b> <b>M</b> <b>K</b> <b>U</b> <b>2.0</b> <b>P01</b>										
<b>GRF 505</b>	5 GPM										
<b>GRF 510</b>	10 GPM										
<b>Type</b>	<b>2</b> LMP2112 assembly on discharge										
<b>Suction Side Spin-on Element</b>	<b>M90</b> 90 micron wire mesh										
<b>Seal</b>	<b>A</b> Buna										
<b>Discharge Side Cartridge Element</b>	<b>A01</b> CU2102A01ANP01 <b>A03</b> CU2102A03ANP01 <b>A06</b> CU2102A06ANP01 <b>A10</b> CU2102A10ANP01 <b>A25</b> CU2102A25ANP01 <b>WA25</b> CU2102WA25ANP01										
<b>ICM Water/Temperature Sensor</b>	<b>ICM0</b> Without water/temperature sensor <b>ICMW</b> With water/temperature sensor										
<b>Fluid Compatibility</b>	<b>M</b> Mineral Oil										
<b>Keypad</b>	<b>K</b> With 6-keypad with display										
<b>Relays</b>	<b>R</b> With relays/external alarms										
<b>Design Reference</b>	<b>2.0</b> ICM 2.0 <b>4.0</b> ICM 4.0 with integral WiFi										
	<b>Execution</b> <b>P01</b> MP Filtri Standard <b>Pxx</b> Customize										

Note: Consult factory for options not listed

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# GRF 5 Series

## Dimensions



### Performance Data

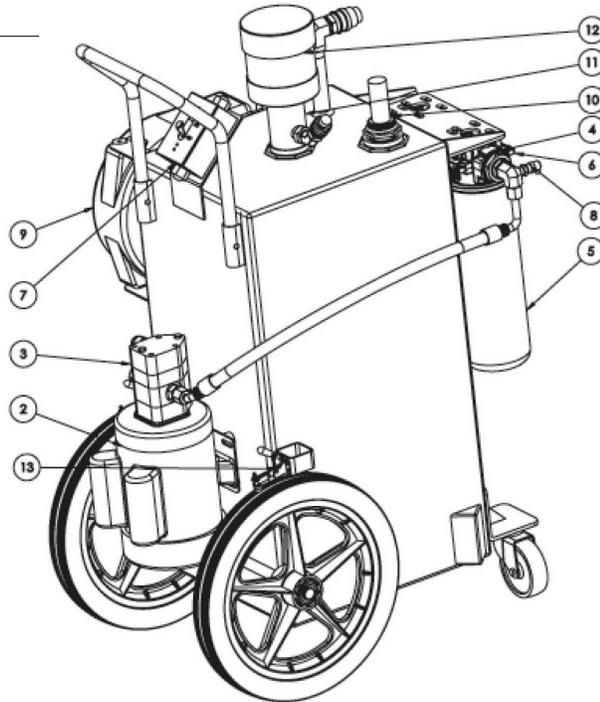
For filtering mineral and synthetic based oils (hydraulic oils, gear oils and turbine oils) with a maximum operating viscosity range of 300ssu / 648cSt at 100°F within ambient temperature ranges of -15°F to 150°F.

### Standard Features

<b>Frame</b>	Carbon steel, 30 gallon tank with 4 wheels
<b>Paint</b>	Blue
<b>Motor</b>	1 HP or 120vac 60Hz
<b>Filter Options</b>	MPS 300 Dual Spin-on or LMP211 Cartridge Style
<b>Pumps</b>	Heavy Duty Cast Iron Gear Pump: Available in 5 and 10 GPM
<b>Connections</b>	3/4" JIC
<b>Hoses</b>	10 ft. Suction and Return
<b>Power Switch</b>	Sealed on/off power switch
<b>Cord</b>	40 ft. retractable cord reel
<b>Breather</b>	Desiccant breather
<b>Filter Indicators</b>	Pop up indicator triggers when elements need to be changed
<b>Pump Relief</b>	Opens at 150psi
<b>Weight</b>	Approx. 125 lbs (will vary depending on options)
<b>Dimensions</b>	Approx. 30"L x 19"W x 35"H

### Components:

Item Number	Description	QTY
1	Tank	1
2	Motor	1
3	Pump	1
4	Filter Head	
5	Filter Element	
6	Filter Indicator	2
7	Switch On/Off	1
8	Sample Port	2
9	Retractable Reel	1
10	Sight Gauge	1
11	Breather Adapter	1
12	Breather	1
13	Brake	2



# GRF 6 Series

## Designation & Ordering Code

### MOBILE FILTRATION GRF 6

<b>Series</b>	Configuration Example 1:	GRF 605	1	A	SA03		1	P01
<b>GRF 605</b> 5 GPM	Configuration Example 2:	GRF 610	3	A	CA03	CA10	1	P01
<b>GRF 610</b> 10 GPM								

<b>Type</b>	
<b>1</b>	MPS300 Dual Spin-On assembly on discharge (2) elements required
<b>2</b>	LMP2112 Single Cartridge assembly on discharge (1) element required
<b>3</b>	LMP2112 + LMP2112 (2) each Cartridge assemblies on discharge in series (2) elements required

<b>Seal Material</b>	
<b>A</b>	Buna

Discharge Side Element (Spin-On Type 1 only)		MPS300	Discharge Side Element (Cartridge Type 2 & 3 only)		LMP211
<b>SA01</b>	CSG150A01A	•	<b>Type 3 requires (2) elements</b>		
<b>SA03</b>	CSG150A03A	•	<b>CA01</b>	CU2102A01ANP01	•
<b>SA06</b>	CSG150A06A	•	<b>CA03</b>	CU2102A03ANP01	•
<b>SA10</b>	CSG150A10A	•	<b>CA06</b>	CU2102A06ANP01	•
<b>SA25</b>	CSG150A25A	•	<b>CA10</b>	CU2102A10ANP01	•
<b>SWA03</b>	CSGW150A03AP01	•	<b>CA25</b>	CU2102A25ANP01	•
<b>SWP10</b>	CSGW150P10AP01	•	<b>CWA25</b>	CU2102WA25ANP01	•
<b>SWP25</b>	CSGW150P25A Cellulos water removal	•	<b>Note:</b> If Type 3, must select applicable 2nd element for unit		

<b>Contamination Monitor Options</b>	
<b>0</b>	Without ICM unit
<b>1</b>	ICM-W-M-K-U-G3-2.0 - mineral oil fluid moisture and temperature sensor with screen, and USB download capability
<b>2</b>	ICM-W-M-K-R-G3-4.0 - mineral oil fluid moisture and temperature sensor with screen, and USB download capability

**Note:**  
 (1) each: ICM-USBi module required for programming ICM (Refer to ICM operator guide for selectable program options)  
 Fluids other than mineral oil consult factory

<b>Execution</b>	
<b>P01</b>	MP Filtri Standard
<b>Pxx</b>	Customize

Note: Consult factory for options not listed

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**The Drum Adapter Kit helps keep your lubricants free of moisture and particulate contamination while in storage or during the fluid transfer process. It also allows you to easily pre-filter your lubricant, ensuring you're only putting clean dry oil into your equipment.**

### Benefits:

- Easily modify your equipment for seamless connection to various filtration systems
- Prevents the ingress of dirt and moisture by utilizing a desiccant breather
- Customizable to fit all your needs

### Features:

- Various quick disconnects with steel dust plugs allow for various configurations
- 2" NPT connection easily replaces standard drum bungs
- Replaceable desiccant breather with 3/4" NPT adapter

### Ordering Information:

- GRF-DAK



*Tube lengths available in various size*

# GRF Accessories

## Hose Wand Kit

**Our heavy-duty stainless steel hose wand kit is great for those applications that require them. Hose wands aren't ideal, but some applications may require them. They can also be used for short term, while quick disconnects are being added to equipment.**



### Benefits:

- A quick connect tool that allows you to draw fluids from tanks, buckets, drums or open reservoirs when this is the only option
- Allows you to reach down into tanks for oil transport

### Features:

- (2) Stainless steel 3/4" tube, 4 ft. long
- 90 degree female JIC swivel end

### Ordering Information:

- GRF-HWKIT-SS

*Pictured photo is cropped for visibility. Tubes are 4 ft. long.*

**Our Hydraulic Adapter Kit allows you to easily adapt your equipment with a desiccant breather and quick connects with the use of your system to remain completely sealed to atmospheric ingress, while allowing for easy access during offline filtration or topping reservoirs off.**



### Benefits:

- Easily modify your equipment for seamless connection to various filtration systems
- Prevents the ingress of dirt and moisture by utilizing a desiccant breather
- Customizable to fit all your needs

### Features:

- Various quick disconnects with steel dust plugs allow for various configurations
- 6 bolt adapter fits most OEM connections
- Replaceable desiccant breather
- Customizable to fit your specific needs

### Ordering Information:

- GRF - HAK

# GRF Accessories

## Tote Adapter Kit

**Our Tote Adapter Kit allows you to easily adapt your equipment with a desiccant breather and quick connects with the use of a 2" NPT threaded adapter. This allows your system to remain completely sealed to atmospheric ingress, while allowing for easy access during offline filtration or topping reservoirs off.**



### Benefits:

- Easily modify your equipment for seamless connection to various filtration systems
- Prevents the ingress of dirt and moisture by utilizing a desiccant breather
- Customizable to fit all your needs

### Features:

- Various quick disconnects with steel dust plugs
- 2" NPT connects to most poly totes
- Replaceable desiccant breather
- Customizable to fit your specific needs
- Spring loaded faucet for easy dispensing

### Ordering Information:

- GRF-TAK



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