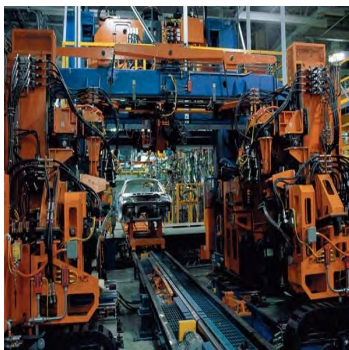


aerospace  
climate control  
electromechanical  
**filtration**  
fluid & gas handling  
hydraulics  
pneumatics  
process control  
welding & shielding



# Automotive Filters and Fluid Contamination Monitoring

Solutions for the Automotive Industry



ENGINEERING YOUR SUCCESS.

# Parker Automotive Filters

Providing the products and service our customers expect

## **A Global Product Range**

With this catalog, we offer our automotive customers an easy way to find technical specification and ordering information about Parker hydraulic filtration, fluid contamination monitoring and fluid power products.

Products shown in this catalog have a broad range of applications. Our filter products are particularly designed for hydraulic and lubrication systems and transmissions. The fluid power products are also used in many industries and applications.

Typical applications can vary from road sweepers, fork lift trucks, agriculture harvesting machines, grass cutting equipment, lorry mounted cranes, forestry equipment, press brakes, industrial power units, waste management trucks, drilling equipment, marine, military equipment, paper mills, water treatment and filtration systems.

For more information about our products, send your inquiry to your nearest sales location. See contact information at the back of this catalog.

BSP ports offered in this catalog conform to ISO228.

## **Supply chain management, service and support**

Parker is addressing operation efficiency by expanding the systematic approach called 'Lean Manufacturing.' Value stream analysis, flow manufacturing,

reduced set-ups, manufacturing cell flexibility and fool-proofing systems are all contributing to the continuous improvement in our manufacturing sites. 'Lean' is also expressed in our premier customer service and second-to-none customer partnerships in supply chain management.

## **Engineering and manufacturing excellence**

Parker's manufacturing focus is driven by a number of key elements that affect all areas of the business. People productivity, customer satisfaction, production throughput, quality and lean achievements are the drivers that help Parker achieve ISO9001, QS9000, ISO9001 and ISO14001.

Significant investment by our parent, Parker Hannifin Corporation, continues to give the Filtration Group flexible manufacturing systems, automated test equipment and excellent laboratory test facilities.

New product development programs and on-going product improvement initiatives are vital elements in maintaining a product range that meets customer demands for quality, reliability and engineering excellence.

R & D resources at Parker locations in the U.K., Finland, The Netherlands and the U.S. are both complementary and comprehensive. Including, as examples, Multipass Test

Installations, fatigue test unit, cleanliness service (water detection, special analysis, particle counting and analysis), 3D workstations, Thermal Cycle Test Chamber, Salt Spray and Humidity chambers.

Parker Hannifin Corporation, herewith declares that Parker Hydraulic Filtration products are intended to be incorporated into machinery covered by Directive 89/392/EEC, as amended and that the following harmonized standards have been applied; EN982, EN292-1, EN292-2.

We furthermore declare that, machinery incorporating Parker Hydraulic Filtration products, is not allowed to be put into service until the machinery has been found and declared to be in conformity with the provisions of Directive 89/392/EEC and with national implementing legislation.

In line with our policy of continuous product improvement, Parker Hannifin Corporation reserves the right to alter product data and specification without notice. This does not affect your statutory rights.

## *Notes:*

- 1. Within this catalog, each product has been allocated an operating temperature and pressure range.*
- 2. The range listed for each filter is dedicated by the materials of construction and the capability of the seals specified.*
- 3. Consideration should also be given to the characteristics of the system fluid when specifying filters for extreme temperature and/or pressure applications.*
- 4. The use of non-Parker replacement elements and parts may invalidate your warranty.*

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## DIN Series

High Pressure DIN Filters



ENGINEERING YOUR SUCCESS.

# FDA, FDB

## High Pressure DIN Filters

### A range of hydraulic DIN filters to DIN 24550.

Parker's DIN specification high pressure filters utilize the proven high efficiency "Q" media ( $\beta_x \geq 200$ ).

These filters, with a range of bowl lengths, offer exceptional dirt holding capacity for filters with flows up to 65 gpm (250 lpm) and pressures of up to 5,800 psi (400 bar).

With a range of visual and electrical indicators including the 4 LED indicator with two setting points, these filters offer contamination protection for hydraulic systems ranging in use from standard power units to complex automotive systems.



### Specification

#### Maximum Allowable Operating Pressure

5,800 psi (400 bar)  
Design factor of safety 3:1 minimum

#### Operating Temperature

-40°F to 250°F (-40°C to 120°C)

#### Construction

SG Iron head, Steel Bowl

#### Fluid Compatibility

Suitable for use with mineral oils, most water glycols and other water based fluids. For other fluids, please consult the Hydraulic Filter Division.

#### Seals

Head to bowl, diametric with anti-extrusion ring.  
Materials - Nitrile.

#### Bypass valve

98psi  $\pm$ 10% (7.0 bar  $\pm$  10%)

#### Element Condition Indicators (Differential Pressure Type)

- Visual type cartridge, with auto reset.
- Electrical type cartridge, with auto reset and socket to DIN43650.
- 4 LED with 2 set points at 75% & 100%.

#### Ports



See ordering information table.

### Filter element

Microglass III disposable inorganic fiber media. Available as 3, 5, 10 or 20 micron ( $\beta_x \geq 200$ ). Media is supported both up- and downstream and the whole

assembly bonded resulting in a 20 bar collapse rating. End caps and support tube are tin plated giving excellent corrosion protection.

### Electrical Indicator ratings

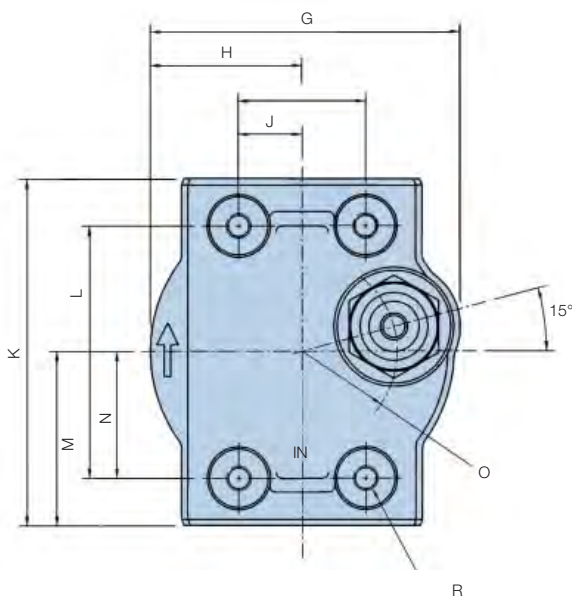
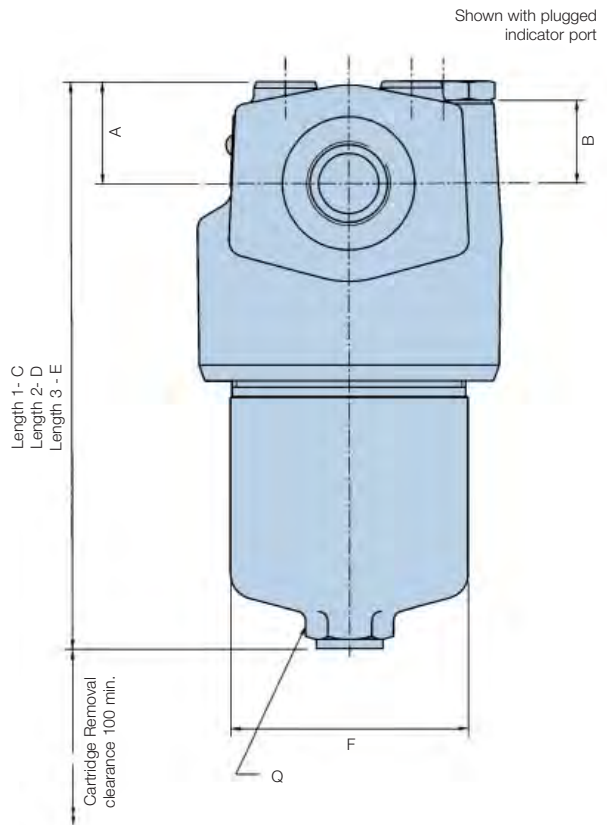
|               | Electrical  | 3 LED   |
|---------------|---|---|
| Power         | 20VA  | 20VA  |
| Current       | 1A  | 1A  |
| Voltage       | 28 Vdc max,<br>28 Vac (50-60Hz) max   | 10 - 30V  |
| Plug Pin Code |  <ul style="list-style-type: none"> <li>1) Common</li> <li>2) N. Closed</li> <li>3) N. Open</li> </ul> |  |

### Weights lbs. (kg)

| Model | Length 1    | Length 2   | Length 3   |
|-------|-------------|------------|------------|
| FDA   | 10.3 (4.7)  | 12.5 (5.7) | 13.6 (6.2) |
| FDB   | 36.8 (16.7) | 44 (20)    | N/A        |

# FDA, FDB

## Installation & Element Service Instructions



### Installation

The FDA and FDB DIN high pressure filters are designed to operate in systems where the operating pressure does not exceed 5,800 psi.

The filter should be mounted with the bowl down and secured to a suitable bracket using the mounting holes provided on the filter head. Ensure that the filter is orientated so that the visual indicator, if fitted, is clearly visible. The arrow stamped on the filter head should coincide with the flow direction.

### Element Servicing

Ensure that the hydraulic system is switched off and that the pipework is de-pressurized. Drain fluid from filter bowl by removing bowl drain plug if fitted. With suitable spanner, unscrew the bowl from the filter head revealing the dirty element. Grasp the element and pull downwards with a slight twisting movement to remove. Discard used element and check head and bowl for damage. Clean inside bowl with a cleaning agent (do not use cloth or paper towels).

Check that the appropriate seal is fitted to the element, lubricate and replace the element in the filter head. Replace the head to bowl seal and anti-extrusion ring as shown in the instructions included with the new element, lubricate and refit the bowl to the head. On re-pressurizing the filter check for leaks.

### Dimensions

| Length | FDA |       | FDB  |       |
|--------|-----|-------|------|-------|
|        | mm  | ins   | mm   | ins   |
| A      | 32  | 1.26  | 49   | 1.93  |
| B      | 26  | 1.02  | 39   | 1.54  |
| C      | 183 | 7.20  | 302  | 11.89 |
| D      | 243 | 9.57  | 392  | 15.43 |
| E      | 333 | 13.11 | N/A  | N/A   |
| F      | Ø75 | Ø2.95 | Ø128 | Ø5.04 |
| G      | 98  | 3.86  | 160  | 6.30  |
| H      | 48  | 1.89  | 80   | 3.15  |
| I      | 40  | 1.57  | 50   | 1.97  |
| J      | 20  | 0.79  | 25   | 0.98  |
| K      | 110 | 4.33  | 164  | 6.46  |
| L      | 80  | 3.15  | 120  | 4.72  |
| M      | 55  | 2.17  | 82   | 3.23  |
| N      | 40  | 1.57  | 60   | 2.36  |
| O      | R30 | R1.18 | R48  | R1.89 |

| Filter | Q = Across Flats           |
|--------|----------------------------|
| FDA    | Hexagonal<br>23.3/24.0 A/F |
| FDB    | Hexagonal<br>35.5/36.0 A/F |

| Filter | R = Mounting Holes                              |
|--------|---|
| FDA    | 4 Mounting Holes<br>M8 x 1.25 -<br>6H x 12 Deep |
| FDB    | M10 x 1.5 -<br>6H x 12 Deep                     |

# FDA, FDB

## Indicators

### ΔP Indicator

4 LEDs giving visual indication:

- Green (G): Power ON
- Yellow 1 (Y1): Pre-alarm 1 (presetting 50%)
- Yellow 2 (Y2): Pre-alarm 2 (presetting 75%)
- Red (R): Indication (presetting 100%)

Setting range: 0,5 – 10 bar

Thermal lock-out range: 0°C – 100°C

Includes a microchip with memory logs

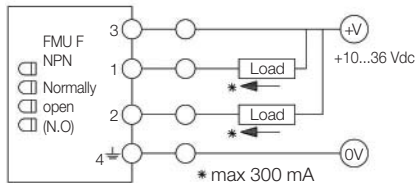


FMUX ATEX certified indicator - contact Parker

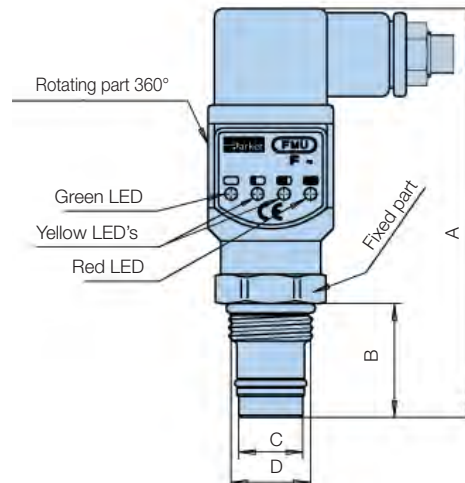
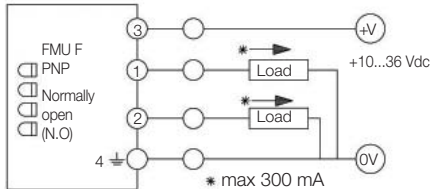
### FMUF Electronic

Contact configuration

NPN



PNP



### Thermal lock-out (standard setting +68°F (+20°C))

- Indicator operates only when temperature is above setting.
- Green LED is blinking if temperature is lower. (not in U12H)

| Ind. press. setting | LED status |    |    |   | Output   |
|---------------------|------------|----|----|---|----------|
|                     | G          | Y1 | Y2 | R |          |
| 50%                 | ⊗          | ⊗  |    |   | –        |
| 75%                 | ⊗          | ⊗  | ⊗  |   | 2 active |
| 100%                | ⊗          | ⊗  | ⊗  | ⊗ | 1 active |

|                      |   |
|----------------------|---|
| Enclosure class      | IP65  |
| Electrical connector | DIN 43650, cable connection PG9 or optionally M12 4-pin |
| Input supply voltage | +10 to 36 Vdc   |
| *Indication output   | max. 300 mA/36 Vdc                                      |
| Output type:         | N.O. or N.C./NPN or PNP                                 |

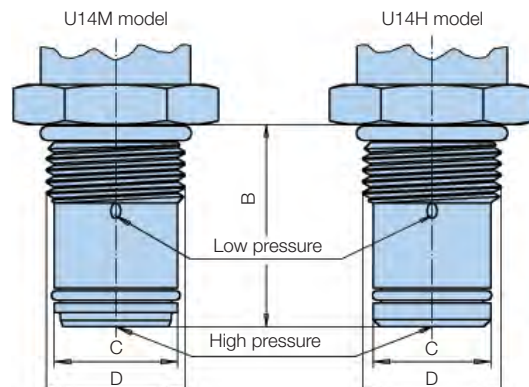
Note: Do not connect output terminals 1 or 2 directly (without load) to power supply terminals, because this will damage the equipment.

### Ordering Information

Automotive Electronic Indicator Option

| Part Number  | Description                      |
|--------------|----------------------------------|
| FMUF5MBMU14H | M12 x 4 Pin Electronic Indicator |

|   | U14M          |       | U14H          |       |
|---|---------------|-------|---------------|-------|
|   | mm            | ins   | mm            | ins   |
| A | 105           | 4.13  | 105           | 4.13  |
| B | 32            | 1.26  | 32            | 1.26  |
| C | ∅19.78 ±0.06  | ∅0.77 | ∅18.83 ±0.06  | ∅0.74 |
| D | 7/8-14 UNF-2A |       | 7/8-14 UNF-2A |       |



# FDA, FDB

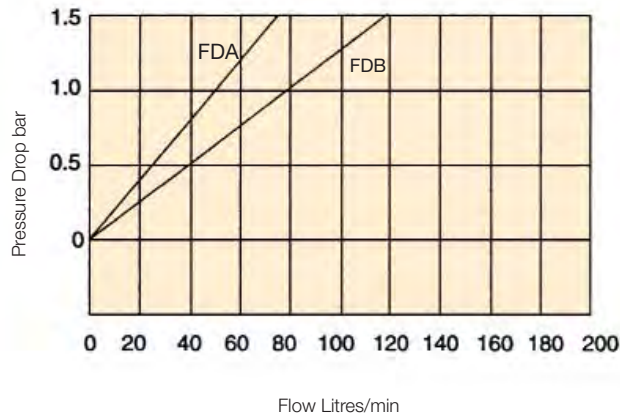
## Performance

To select the correct housing and element, it is recommended that the ratio between the bypass setting and the differential pressure across the filter with a clean element, at the rated flow, should be at least 2:1.

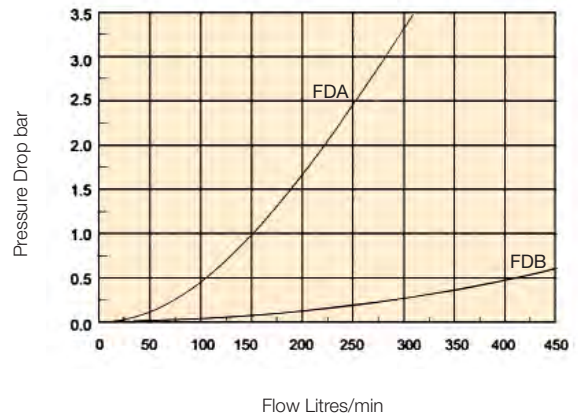
To find total pressure differential through the filter assembly, add the 'housing only' pressure differential to the 'element only' pressure differential, at the rated flow.

Total  $\Delta P$  = Housing  $\Delta P$  + Element  $\Delta P$   
 Flow curves at 30 cSt viscosity.

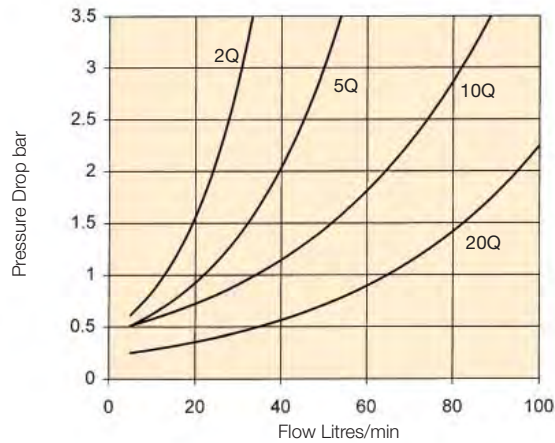
**Bypass Valve FDA, FDB**



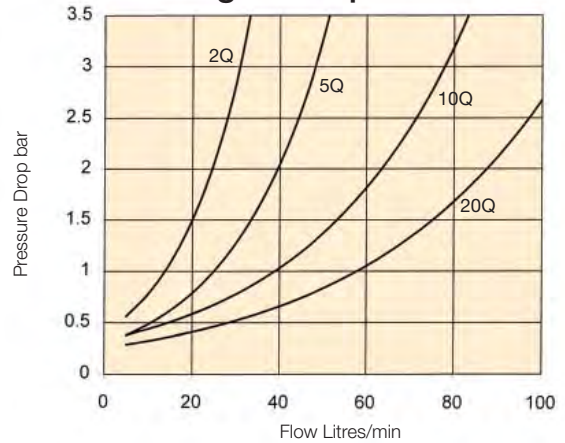
**Housings FDA, FDB**



**FDA-1 Standard Elements**



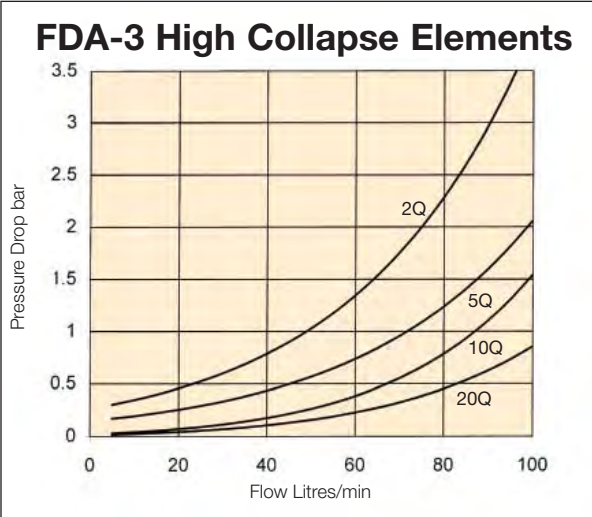
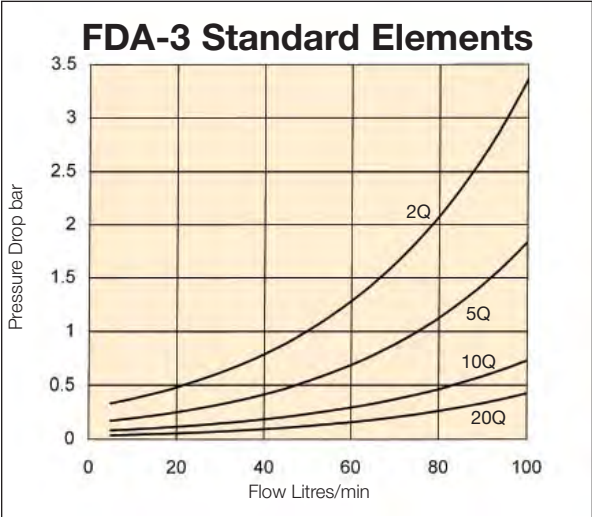
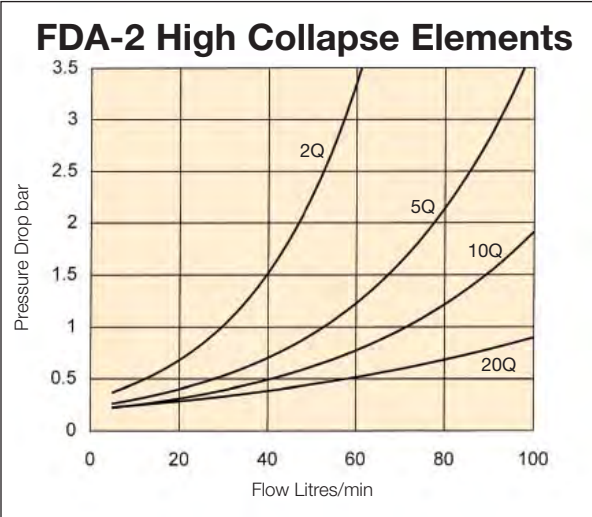
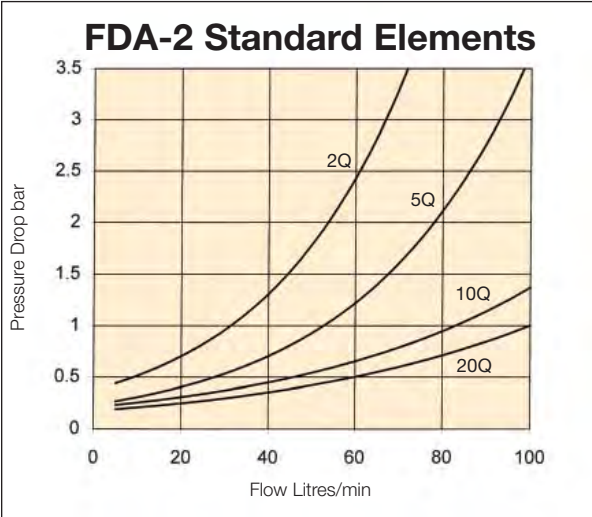
**FDA-1 High Collapse Elements**





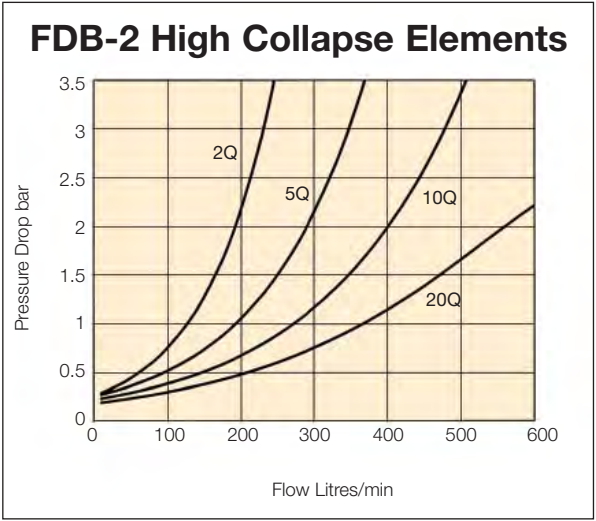
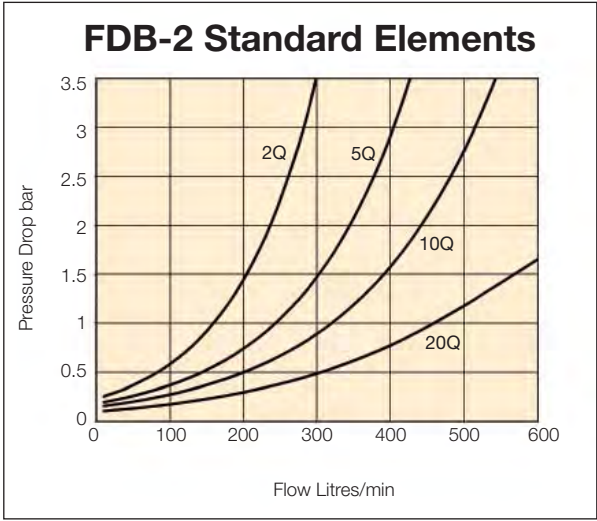
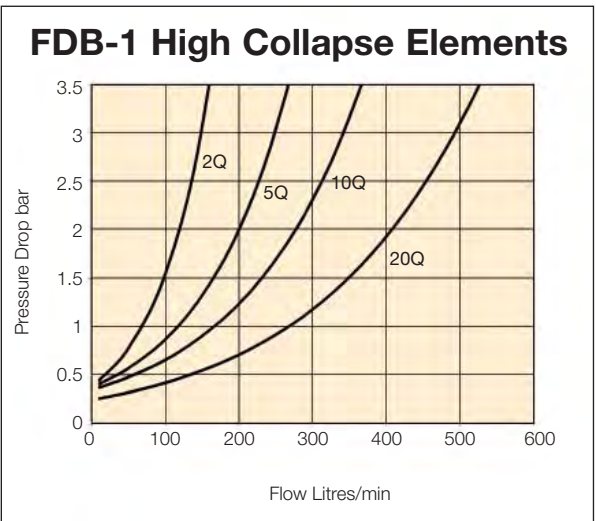
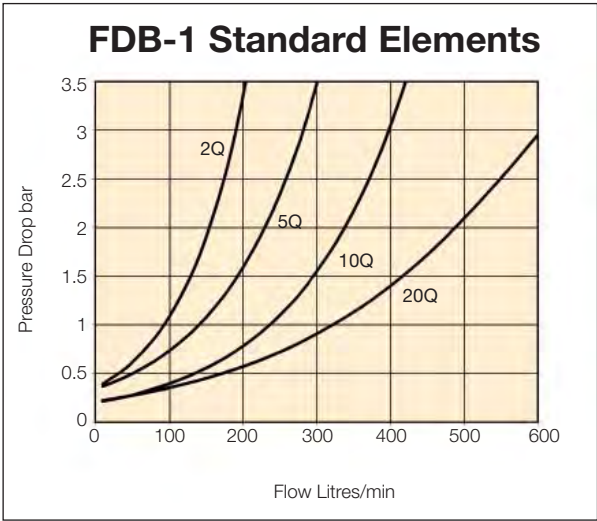
# FDA

## Performance



# FDB

## Performance



# FDA, FDB

## Ordering Information

The following filter assemblies are supplied **WITH** bypass, but **WITHOUT** an indicator.

Indicators should be ordered separately.

Standard products table

| Part number    | Flow (l/min) | Ports (BSP) | Media rating (μ) | Indication | Indicator rating | Bypass rating (bar) | Replacement elements |
|----------------|--------------|-------------|------------------|------------|------------------|---------------------|----------------------|
| FDA3A03N98G16Y | 100          | 1"          | 02               |            | N/A              | 7 bar               | FDAE3A02Q            |
| FDA3A10N98G16Y | 100          | 1"          | 10               |            | N/A              | 7 bar               | FDAE3A10Q            |
| FDB2A03N98G24Y | 250          | 1 1/2"      | 02               | No         | N/A              | 7 bar               | FDBE2A02Q            |
| FDB2A10N98G24Y | 250          | 1 1/2"      | 10               | Indication | N/A              | 7 bar               | FDBE2A10Q            |
| FDB3A03N98G24Y | 400          | 1 1/2"      | 02               |            | N/A              | 7 bar               | FDBE3A02Q            |
| FDB3A10N98G24Y | 400          | 1 1/2"      | 10               |            | N/A              | 7 bar               | FDBE3A10Q            |

The following filter assemblies are supplied **WITH** bypass and 4 LED indicator.

A range of 5,800 psi (400 bar) no bypass, high pressure filters, designed to meet the very specialized requirements of the automotive industry.

Utilizing the same, high quality, high efficiency Microglass III media as fitted to the standard filters, these are designed to be installed where limited flows of unfiltered oil passing through the bypass, as a result of a blocked element, cannot be tolerated.

Standard products table

| Part number    | Flow (l/min) | Ports (BSP) | Media rating (μ) | Indication | Indicator rating | Bypass rating (bar) | Replacement elements |
|----------------|--------------|-------------|------------------|------------|------------------|---------------------|----------------------|
| FDA3A03B98G16Y | 100          | 1"          | 02               |            | 5 bar            | 7 bar               | FDAE3A02Q            |
| FDA3A10B98G16Y | 100          | 1"          | 10               |            | 5 bar            | 7 bar               | FDAE3A10Q            |
| FDB2A03B98G24Y | 250          | 1 1/2"      | 02               | Electronic | 5 bar            | 7 bar               | FDBE2A02Q            |
| FDB2A10B98G24Y | 250          | 1 1/2"      | 10               | 4 LED      | 5 bar            | 7 bar               | FDBE2A10Q            |
| FDB3A03B98G24Y | 400          | 1 1/2"      | 02               |            | 5 bar            | 7 bar               | FDBE3A02Q            |
| FDB3A10B98G24Y | 400          | 1 1/2"      | 10               |            | 5 bar            | 7 bar               | FDBE3A10Q            |

The following filter assemblies are supplied **WITHOUT** bypass **WITH** 4 LED indicator.

Standard products table

| Part number     | Flow (l/min) | Ports (BSP) | Media rating (μ) | Indication | Indicator rating | Bypass rating (bar) | Replacement elements |
|-----------------|--------------|-------------|------------------|------------|------------------|---------------------|----------------------|
| FDA3A03HB98G16Y | 100          | 1"          | 02               |            | 5 bar            |                     | FDAE3A02Q            |
| FDA3A10HB98G16Y | 100          | 1"          | 10               |            | 5 bar            |                     | FDAE3A10Q            |
| FDB2A03HB98G24Y | 250          | 1 1/2"      | 02               | Electronic | 5 bar            | No                  | FDBE2A02Q            |
| FDB2A10HB98G24Y | 250          | 1 1/2"      | 10               | 4 LED      | 5 bar            | bypass              | FDBE2A10Q            |
| FDB3A03HB98G24Y | 400          | 1 1/2"      | 02               |            | 5 bar            |                     | FDBE3A02Q            |
| FDB3A10HB98G24Y | 400          | 1 1/2"      | 10               |            | 5 bar            |                     | FDBE3A10Q            |



## DIN Series

DIN Low Pressure Filters



ENGINEERING YOUR SUCCESS.

# 10DT, 16DT, 25DT

## Tanktop DIN Filters

### A range of hydraulic DIN filters to DIN 24550.

Parker's DT series of DIN specification tanktop filters are available in three size ranges with flows up to 65 gpm (250 lpm).

With two indicators, a visual gauge, and an electrical 3 LED indicator with two setting points, these filters offer contamination protection for hydraulic systems ranging in use from standard power units to complex automotive systems.



### Specification

#### Maximum Allowable Operating Pressure

145 psi (10 bar)

#### Operating Temperature

14°F to 175°F (-10°C to 80°C)

#### Construction

| Model | 10DT      | 16DT     | 25DT     |
|-------|-----------|----------|----------|
| Head  | Aluminum  | Aluminum | Aluminum |
| Cover | Composite | Aluminum | Aluminum |
| Bowl  | Composite | Steel    | Steel    |

#### Ports

| Model | Port   |
|-------|--------|
| 10DT  | G1     |
| 16DT  | G1 1/4 |
| 25DT  | G1 1/2 |

#### Fluid Compatibility

Suitable for use with mineral oils, most water glycols and other water based fluids. For other fluids, please consult Hydraulic Filter Division Europe.

#### Seals

Material - Nitrile

#### Bypass valve

50.8 psi ± 10% (3.5 bar ± 10%)

#### Element condition indicators

Plugged indicator ports allow the installer to select from a choice of optional visual and/or electrical condition indicators.

#### 3 LED (with 2 set points at 75% & 100%)

|                   | Ratings                |
|-------------------|------------------------|
| Set pressure      | 1.7 Yellow/2.2 bar Red |
| Contacts          | Normally Open/Closed   |
| Voltage           | 10 - 30 V              |
| Max. current      | 1 A                    |
| Max. contact load | 20VA                   |
| Protection        | IP 65                  |



#### Visual Indicator

Pressure gauge - 40mm diameter (0 - 6 bar) color coded to indicate bypass condition.

#### Weights (kg)

| Model | Weight kg | Weight lb. |
|-------|-----------|------------|
| 10DT  | 0.74      | 1.6        |
| 16DT  | 2.80      | 6.1        |
| 25DT  | 4.20      | 9.25       |

#### Filter Element

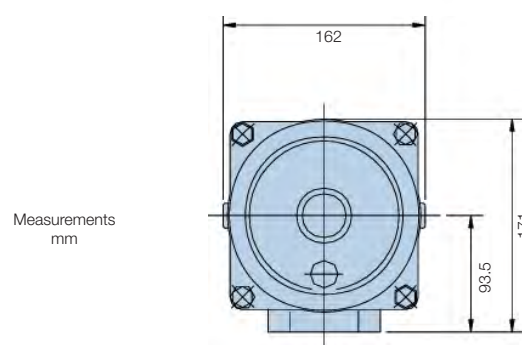
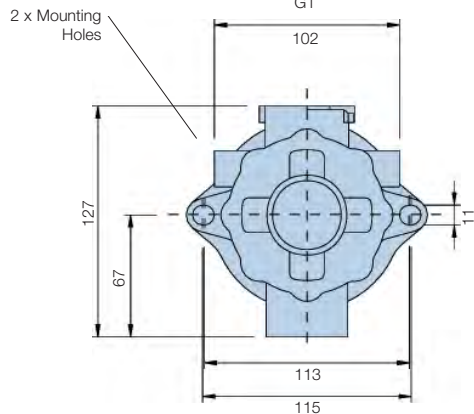
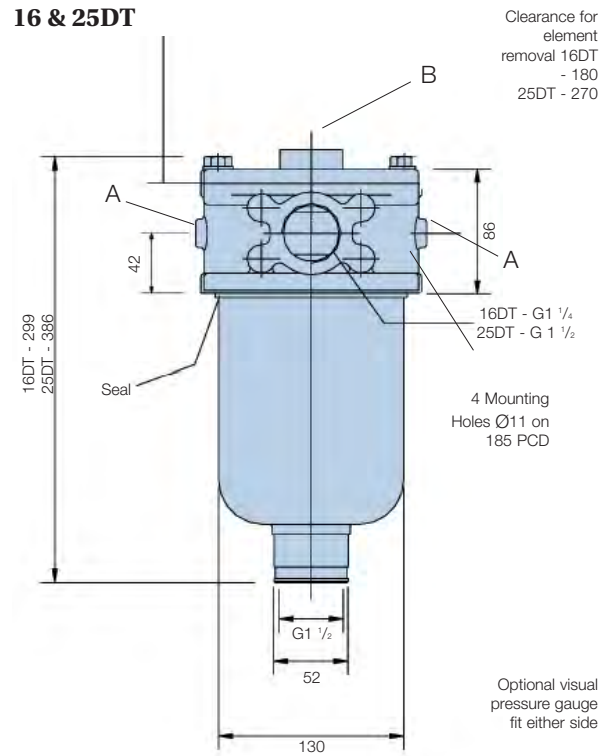
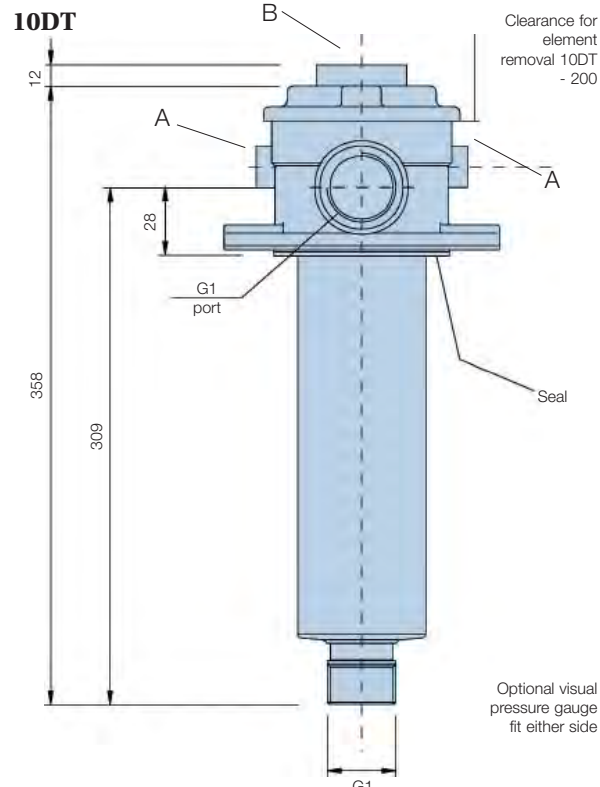
Disposable inorganic fibre media.

Available as 3, 6, 10, 16 and 25 absolute ( $\beta_x \geq 75$ )

# 10DT, 16DT, 25DT

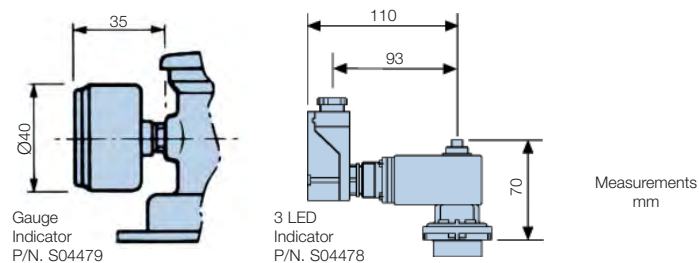
## Installation and Indicators

### Installation



Measurements mm

### Indicators



### Optional Indicator Location

|   |        |        |
|---|--------|--------|
| A | S04479 | Visual |
| B | S04478 | 3 LED  |
| A | 940719 | 3 LED  |

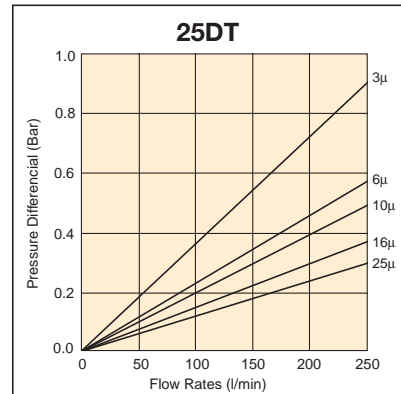
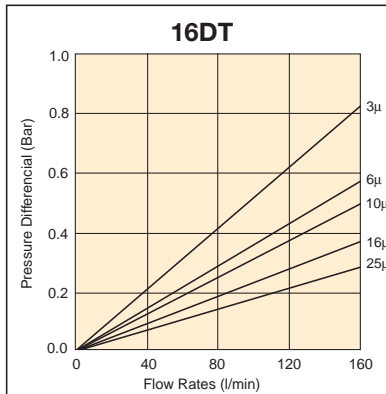
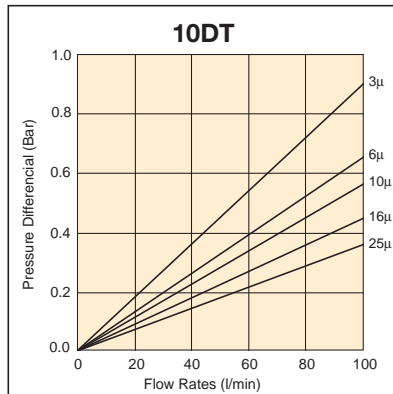
# 10DT, 16DT, 25DT

## Performance

To select the correct housing and element, it is recommended that the ratio between the bypass setting and the differential

pressure across the filter with a clean element, at the rated flow, should be at least 2:1.

Flow curves at 30cSt (140 SUS) viscosity show total pressure drop through housing and element.



## Installation & Element Servicing Instructions

### Installation

The DT series Return Line filters are designed to operate in systems where the operating pressure does not exceed 10 bar. The filter should be mounted to the tank lid via 2 or 4 bolt fixings, with the bowl pointing vertically downwards.

### Element Servicing

Stop and isolate the system and ensure that it has been de-pressurized. Remove the cover by un-screwing the cover on the 10DT or removing the 4 bolts on the cover of the 16DT and 25DT. Remove the filter bowl and element by pulling upwards.

Check the cover and bowl O rings and replace as required using a seal kit. Twist the element slightly to break the seal. Install the new element in the bowl and then refit the bowl into the housing. Re-install the cover.

## Ordering Information

The following filter assemblies are supplied **WITH** bypass and indicator.

### Standard products table

| Part number     | Flow (l/min) | Ports (BSP) | Media rating (μ) | Indication          | Indicator rating | Bypass rating (bar) | Replacement elements |
|-----------------|--------------|-------------|------------------|---------------------|------------------|---------------------|----------------------|
| 10DTA06EL50G16A | 100          | G1"         | 06               | Electronic<br>4 LED | 2.5 bar          | 3.5 bar             | 10DTEA05Q            |
| 10DTA10EL50G16A | 100          | G1"         | 10               |                     | 2.5 bar          | 3.5 bar             | 10DTEA10Q            |
| 25DTA03EL50G24A | 250          | G1½"        | 03               |                     | 2.5 bar          | 3.5 bar             | 25DTEA03Q            |
| 25DTA06EL50G24A | 250          | G1½"        | 06               |                     | 2.5 bar          | 3.5 bar             | 25DTEA05Q            |
| 25DTA10EL50G24A | 250          | G1½"        | 10               |                     | 2.5 bar          | 3.5 bar             | 25DTEA10Q            |

# 40RF, 50RF

## High Flow Tank Mounted Filters

### High Flow Tank Mounted Filters For Hydraulic Return Line Applications

The 40/50 RF series filters supplement the existing tank mounted range. They have been introduced to handle high flow applications incorporating Parker's customary housing strength and

element quality, and yet including optional features to enable the user to install in a wide variety of applications. This filter has also been designed to offer mounting and element interchangeability recommended by the DIN 24550 proposal.



### Specification

#### Operating Temperature

-40°C to 120°C (-40°F to 250°F)

#### Construction

Housing - iron; cover - iron; bowl - steel

#### Inlet Ports

| Model  | Type                      |
|--------|---------------------------|
| 40RF-1 | 2" 3000-M Flange face     |
| 40RF-2 | 2 1/2" 3000-M Flange face |
| 50RF-1 | 3" 3000-M Flange face     |

#### Bypass Settings

3.5 bar (50psi)

#### Indication

Visual pressure gauge 0-6 bar color code to indicate bypass condition or Electrical pressure switch. (Note: Above options mounted on either side of housing) Alternatively differential pressure visual pop-up indicator or Differential electrical pressure switch with pop-up visual indicator or 4 LED with 2 set points at 75% & 100%. Mounted to cover plate position only.

#### Weights

| Model  | kg (lb)   |
|--------|-----------|
| 40RF-1 | 27 (59.5) |
| 40RF-2 | 31 (68.3) |
| 50RF-1 | 36 (79.4) |

#### Fluid Compatibility

Suitable for use with mineral oils. For other fluids, please consult Parker Filtration.

#### Seals

Nitrile

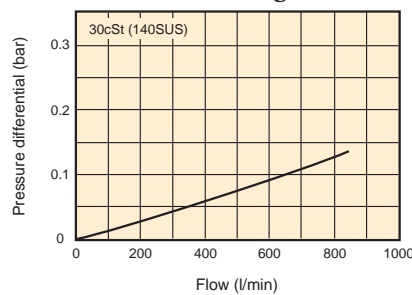
#### Filter Element

Absolute 10, 20 micron microglass

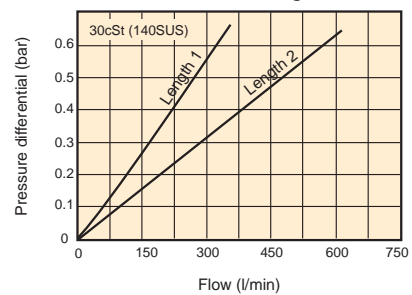
#### Element Collapse Rating

10 bar (145psi)

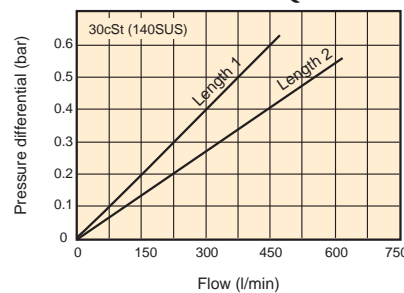
40RF/50RF Housing Flow Curve



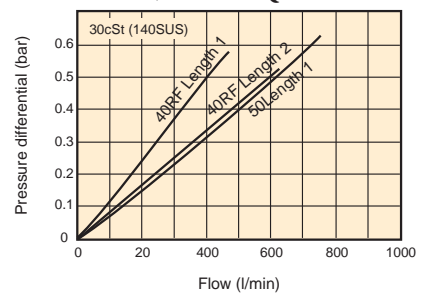
40RF Filter with 3Q Element



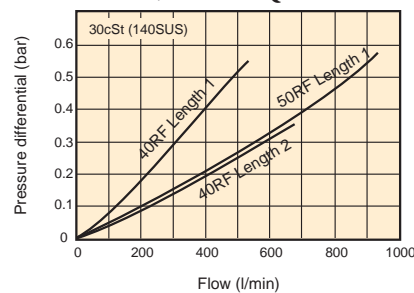
40RF Filter with 6Q Element



40RF/50RF 10Q Element



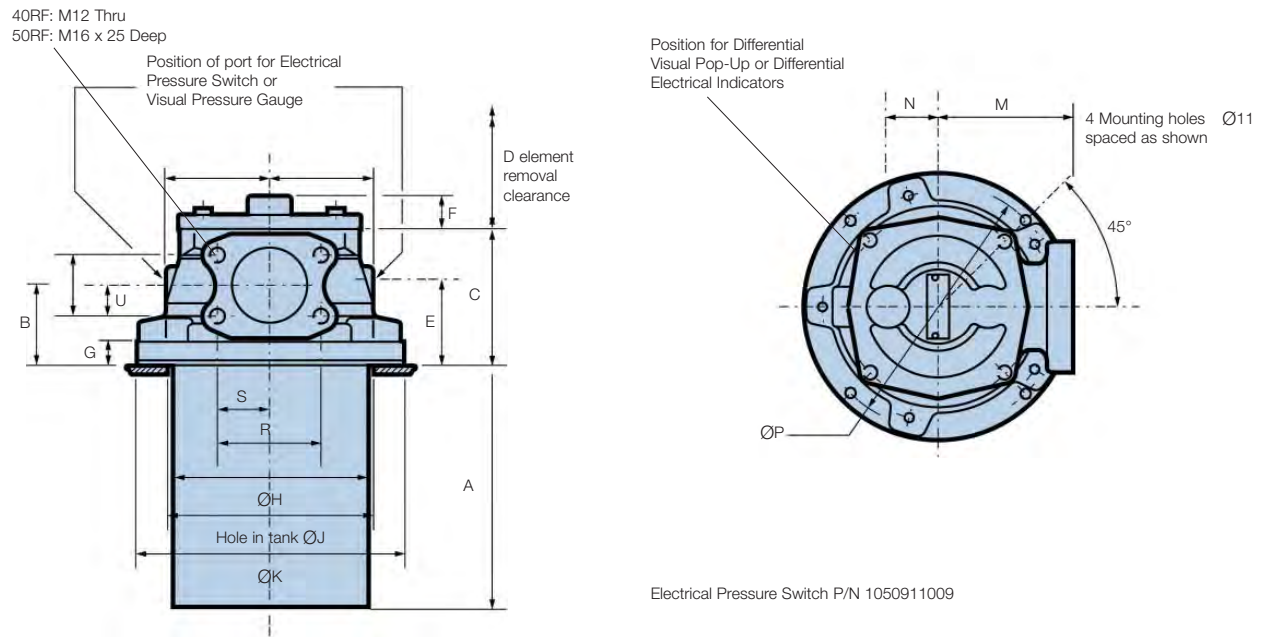
40RF/50RF 20Q Element





# 40RF, 50RF

## Installation Details



Electrical Pressure Switch P/N 1050911009

### Dimensions (mm)

| Model   | A   |       | B   |      | C   |      | D   |       | E   |      | F     |      | G     |      | H     |      | J     |      |
|---------|-----|-------|-----|------|-----|------|-----|-------|-----|------|-------|------|-------|------|-------|------|-------|------|
|         | mm  | ins   | mm  | ins  | mm  | ins  | mm  | ins   | mm  | ins  | mm    | ins  | mm    | ins  | mm    | ins  | mm    | ins  |
| 40 RF-1 | 267 | 10.51 | 73  | 2.87 | 120 | 4.72 | 260 | 10.24 | 80  | 3.15 | 34    | 1.34 | 23    | 0.91 | 178   | 7.01 | 180   | 7.09 |
| 40 RF-2 | 417 | 16.42 | 73  | 2.87 | 120 | 4.72 | 410 | 16.14 | 80  | 3.15 | 34    | 1.34 | 23    | 0.91 | 178   | 7.01 | 180   | 7.09 |
| 50 RF-1 | 402 | 15.83 | 80  | 3.15 | 136 | 5.35 | 410 | 16.14 | 85  | 3.35 | 34    | 1.34 | 23    | 0.91 | 194   | 7.64 | 205   | 8.07 |
| Model   | K   |       | L   |      | M   |      | N   |       | P   |      | R     |      | S     |      | T     |      | U     |      |
|         | mm  | ins   | mm  | ins  | mm  | ins  | mm  | ins   | mm  | ins  | mm    | ins  | mm    | ins  | mm    | ins  | mm    | ins  |
| 40 RF-1 | 240 | 9.45  | 97  | 3.82 | 129 | 5.08 | 52  | 2.05  | 220 | 8.66 | 77.77 | 3.06 | 38.89 | 1.53 | 42.88 | 1.69 | 21.44 | 0.84 |
| 40 RF-2 | 240 | 9.45  | 97  | 3.82 | 129 | 5.08 | 52  | 2.05  | 220 | 8.66 | 88.9  | 3.50 | 44.45 | 1.75 | 50.8  | 2.00 | 25.40 | 1.00 |
| 50 RF-1 | 270 | 10.63 | 104 | 4.09 | 138 | 5.43 | 52  | 2.05  | 250 | 9.84 | 106.4 | 4.19 | 53.19 | 2.09 | 61.93 | 2.44 | 30.96 | 1.22 |

## Ordering Information

### Standard products table

| Part number       | Flow (l/min) | Flow (g/min) | Ports (BSP) | Media rating ( $\mu$ ) | Indication       | Indicator rating | Bypass rating   | Replacement elements |
|-------------------|--------------|--------------|-------------|------------------------|------------------|------------------|-----------------|----------------------|
| 40RF203QPPL50YG91 | 630          | 95           | 2 1/2"      | 03                     | 4 LED Electronic | 2.5 bar (36psi)  | 3.5 bar (50psi) | G04711Q              |
| 40RF206QPPL50YG91 | 630          | 95           | -3000       | 06                     |                  |                  |                 | G04712Q              |
| 40RF210QPPL50YG91 | 630          | 95           | flange      | 10                     |                  |                  |                 | G04713Q              |

Note: Optional side-mounted indicator Part Number 940719



## SAE Series

SAE High Pressure Filters



ENGINEERING YOUR SUCCESS.

# HF15P Series

## High Pressure Filters

Pressure Filters - 3000 psi (207 bar) Application

Mechanical Visual or Electrical Visual Indicator

Mounting Provisions

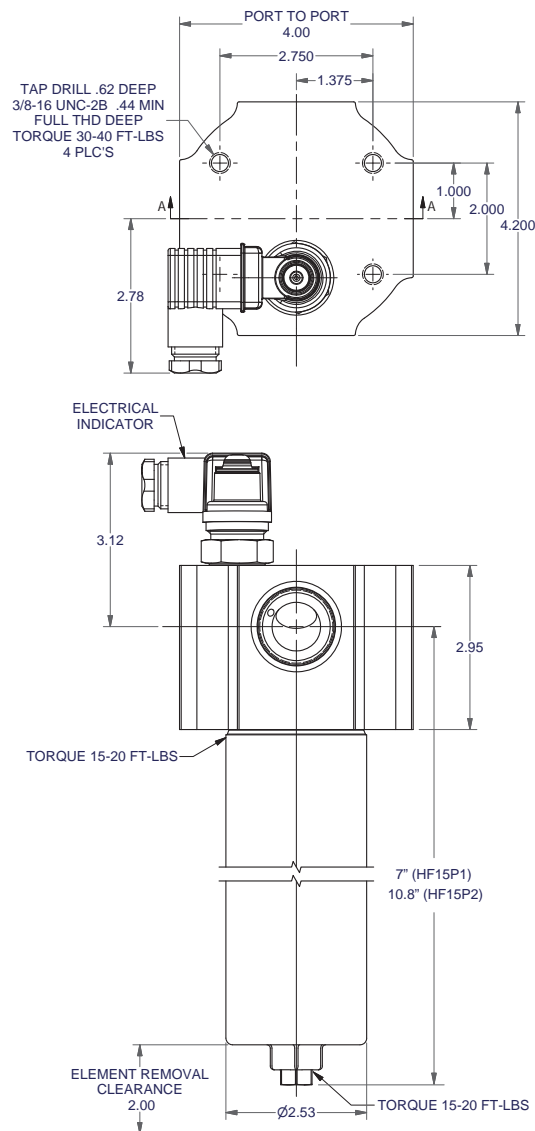
### Pressure Ratings:

Maximum Allowable Operating Pressure (MAOP):

3000 psi (207 bar)

Rated Fatigue Pressure: 3000 psi (207 bar)

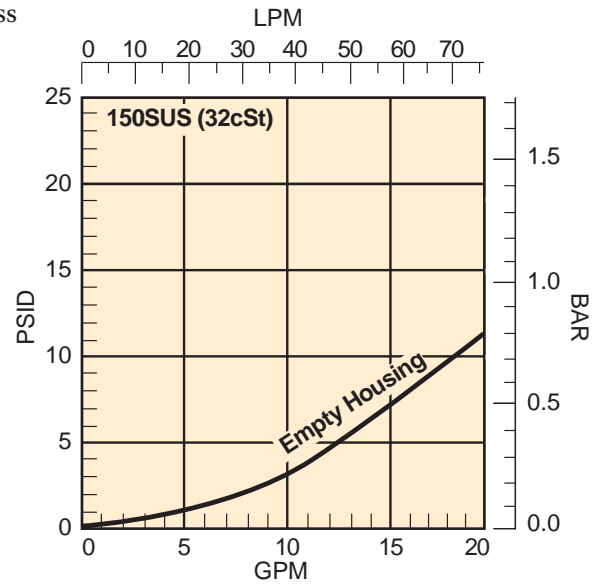
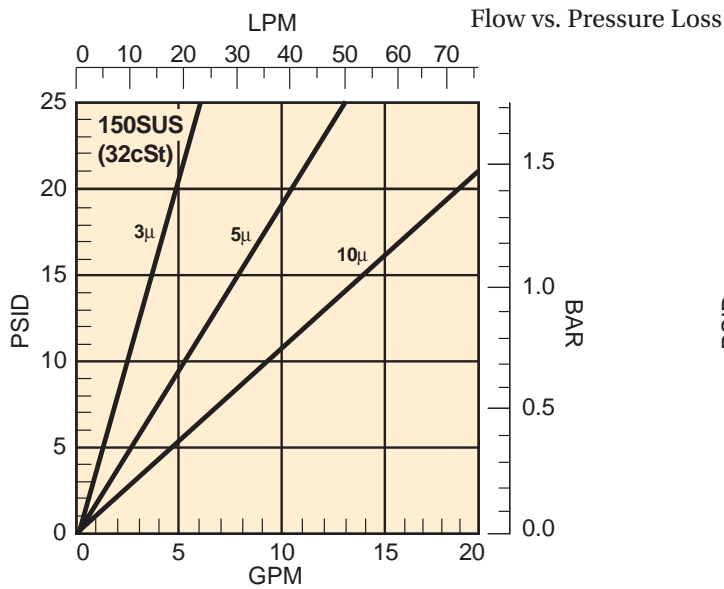
Design Safety Factor: 3:1



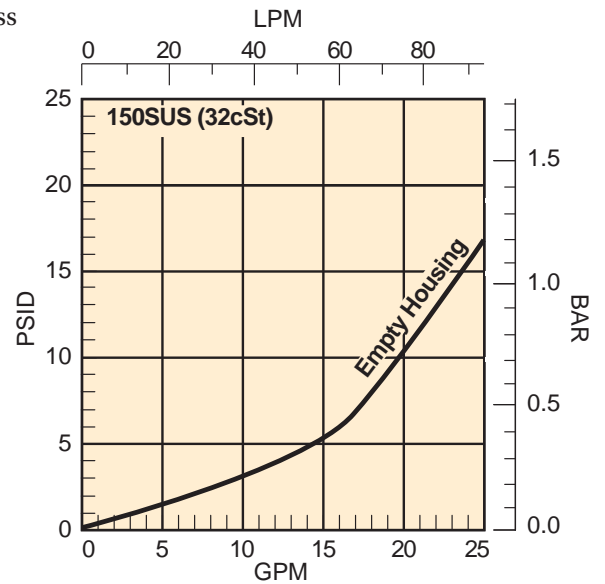
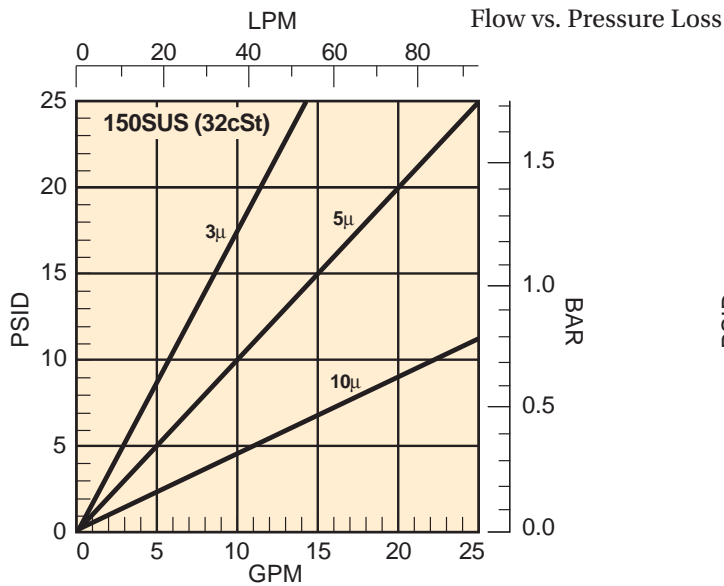
# HF15P Series

## Performance

### HF15P-1 Element Performance



### HF15P-2 Element Performance



| Assembly $\Delta P$ Formula |   |  |   |                                    |   |   |
|-----------------------------|---|--|---|------------------------------------|---|---|
| $\Delta P$<br>Assembly      | = | $\Delta P$ Empty Housing +<br>Element $\Delta P$ | x | $\frac{\text{New Viscosity}}{150}$ | x | $\frac{\text{New Specific Gravity}}{.90}$ |

Note: For "H" High collapse elements use 1.4 x  $\Delta P$  from curves above.

# HF15P Series

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

**Example:**

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 | BOX 9 | BOX 10 | BOX 11 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
|       |       | HF15P | 1     | L     | 3     | M2    | 50    | ST12  | 19     | V      |

| BOX 1: Division Code                                       |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive program identification. |             |

| BOX 2: Plant Code                                  |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive plant location. |             |

| BOX 3: Configuration |                  |
|----------------------|------------------|
| Symbol               | Description      |
| HF15P                | 3,000 psi Filter |

| BOX 4: Housing Bowl Length |                    |
|----------------------------|--------------------|
| Symbol                     | Description        |
| 1                          | 1 Element, 4" Long |
| 2                          | 1 Element, 8" Long |

| BOX 5: Element Collapse Rating |   |
|--------------------------------|---|
| Symbol                         | Description   |
| H                              | 2000 psi (138 bar)<br>(-21 option in Box 10 must be selected) |
| L                              | 150 psi (10 bar)<br>(-19 option in Box 10 must be selected)   |

| BOX 6: Element Filtration Rating |                      |
|----------------------------------|----------------------|
| Symbol                           | Description          |
| 3                                | 3 Micron Microglass  |
| 5                                | 5 Micron Microglass  |
| 10                               | 10 Micron Microglass |
| 20                               | 20 Micron Microglass |

| BOX 7: Indicator Type |   |
|-----------------------|---|
| Symbol                | Description                                 |
| M2                    | Visual                                      |
| E3B*                  | Electrical/Visual                           |
| E4MB*                 | Electrical/Visual                           |
| E4MC*                 | Electrical/Visual                           |
| E5B*                  | Electrical/Visual                           |
| E5MD*                 | Electrical/Visual                           |
| F4MS                  | Standard Dual output electrical indicator   |
| F4MN                  | Device Net Dual output electrical indicator |
| F4MC                  | MC Dual output electrical indicator         |

\*NOTE: Please refer to indicator drawings and chart on pages 54 and 55 for connector and wiring options.

| BOX 8: Indicator Setting |   |
|--------------------------|---|
| Symbol                   | Description   |
| 50                       | 50 psid (3.5 bar)   |
| 125                      | 125 psid (8.6 bar)<br>F4MS/F4MN indicator with option -21 only. |

| BOX 9: Port Size |                            |
|------------------|----------------------------|
| Symbol           | Description                |
| ST12             | 3/4-16 UN-2B (ISO 11926)   |
| M27              | M27 x 2 (ISO 6149)         |
| G12              | G 3/4-14 BSPP (ISO 1179-1) |
| SMP              | SAE Manifold Mount         |
| MMP              | Metric Manifold Mount      |
| GMP              | BSPP Manifold Mount        |

| BOX 10: Options |                       |
|-----------------|-----------------------|
| Symbol          | Description           |
| 19              | Drain Port on Bowl    |
| 21              | Non-Bypass with Drain |

| BOX 11: Seal Compound |              |
|-----------------------|--------------|
| Symbol                | Description  |
| V                     | Fluorocarbon |

## Replacement Elements

| Media     | Element Collapse Rating | Single Length (Fluorocarbon) | Double Length (Fluorocarbon) |
|-----------|-------------------------|------------------------------|------------------------------|
| 3 Micron  | 150 psi (10 bar)        | HF21L3VQ                     | HF22L3VQ                     |
| 3 Micron  | 2000 psi (138 bar)      | HF21H3VQ                     | HF22H3VQ                     |
| 5 Micron  | 150 psi (10 bar)        | HF21L5VQ                     | HF22L5VQ                     |
| 5 Micron  | 2000 psi (138 bar)      | HF21H5VQ                     | HF22H5VQ                     |
| 10 Micron | 150 psi (10 bar)        | HF21L10VQ                    | HF22L10VQ                    |
| 10 Micron | 2000 psi (138 bar)      | HF21H10VQ                    | HF22H10VQ                    |
| 20 Micron | 150 psi (10 bar)        | HF21L20VQ                    | HF22L20VQ                    |
| 20 Micron | 2000 psi (138 bar)      | HF21H20VQ                    | HF22H20VQ                    |

# HF3 Series

## High Pressure Filters

### HF3 Pressure Filter - 2500 psi (172 bar) Application

#### Non-Bypass Design

#### Upstream and Downstream Test Ports

Allows user to do maintenance troubleshooting.

#### Electrical Visual Indicator

For electrical indicator options and factory pin wiring, see pages 53-54 (types E and F4M electrical indicators).

#### Drain Port

#### Elements

3, 5, and 10 micron HF3 elements with  $\beta \geq 200$  with dual stage filtering media for up to 40% increased dirt holding capacity.

#### Mounting Provisions

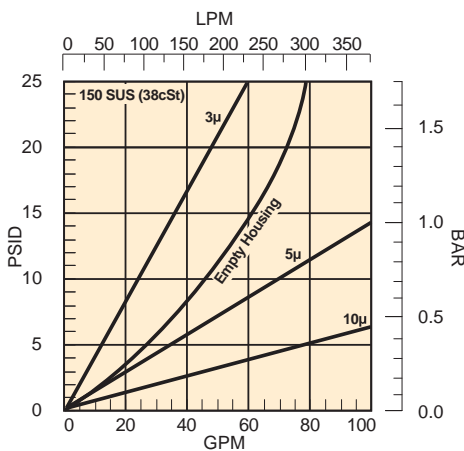
#### Pressure Ratings:

Maximum Allowable Operating Pressure (MAOP): 2500 psi (172 bar)

Rated Fatigue Pressure: 2500 psi (172 bar)

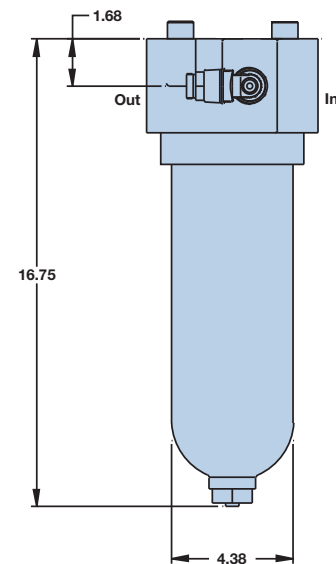
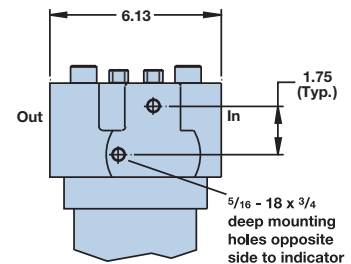
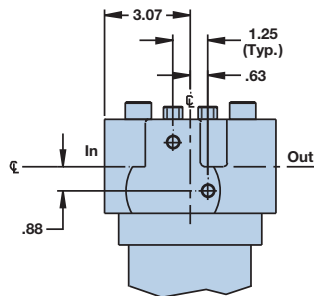
#### Flow Rate Curves

- Select flow rate.
- Determine micron selection.
- For maximum filter life,  $\Delta P$  should not exceed 1/3 bypass/indicator setting.



|   |   |                       |   |                                    |   |   |
|---|---|-----------------------|---|------------------------------------|---|---|
| <b>Assembly <math>\Delta P</math> Formula</b> |   |                       |   |                                    |   |   |
| $\Delta P$                                    | = | $\Delta P$ from curve | x | $\frac{\text{New Viscosity}}{300}$ | x | $\frac{\text{New Specific Gravity}}{.90}$ |
| Assembly                                      |   |                       |   |                                    |   |   |

Note: For "H" High collapse elements use 1.4 x  $\Delta P$  from curves above.



# HF3 Series

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

**Example:**

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 | BOX 9 | BOX 10 | BOX 11 | BOX 12 | BOX 13 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|
|       |       | HF    | 3     | 1     | P3    | H     | 3     | M2    | 50     | ST16   | 11     | V      |

| BOX 1: Division Code                                       |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive program identification. |             |

| BOX 2: Plant Code                                  |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive plant location. |             |

| BOX 3: Configuration |                  |
|----------------------|------------------|
| Symbol               | Description      |
| HF                   | Hydraulic Filter |

| BOX 4: Element Diameter |                  |
|-------------------------|------------------|
| Symbol                  | Description      |
| 3                       | 3 inch (NOMINAL) |

| BOX 5: Housing Bowl Length |                    |
|----------------------------|--------------------|
| Symbol                     | Description        |
| 1                          | 1 Element, 8" Long |

| BOX 6: Housing Pressure Type |               |
|------------------------------|---------------|
| Symbol                       | Description   |
| P3                           | Pressure Type |

| BOX 7: Element Collapse Rating |                                  |
|--------------------------------|----------------------------------|
| Symbol                         | Description                      |
| H                              | 2000 PSI<br>(-11 option, Box 12) |

| BOX 8: Element Filtration Rating         |                      |
|--|----------------------|
| Symbol                                   | Description          |
| 3  | 3 Micron Microglass  |
| 5  | 5 Micron Microglass  |
| 10                                       | 10 Micron Microglass |
| *Consult factory for other requirements. |                      |

| BOX 9: Indicator Type |   |
|-----------------------|---|
| Symbol                | Description                                 |
| M2                    | Visual                                      |
| E3B*                  | Electrical/Visual                           |
| E4MB*                 | Electrical/Visual                           |
| E4MC*                 | Electrical/Visual                           |
| E5B*                  | Electrical/Visual                           |
| E5MD*                 | Electrical/Visual                           |
| F4MS                  | Standard Dual output electrical indicator   |
| F4MN                  | Device Net Dual output electrical indicator |
| F4MC                  | MC Dual output electrical indicator         |

\*NOTE: Please refer to indicator drawings and chart on pages 54 and 55 for connector and wiring options. Located at left side of inlet — for right side, add "R" to symbol. Example: E3BR.

| BOX 10: Indicator Setting |                                     |
|---------------------------|-------------------------------------|
| Symbol                    | Description                         |
| 50                        | 50 psid (3.5 bar)                   |
| 125                       | 125 psid (8.6 bar)<br>F4M indicator |

| BOX 11: Port Size |                                |
|-------------------|--------------------------------|
| Symbol            | Description                    |
| ST16              | 1 5/16-12 UN-2B<br>(ISO 11926) |
| M33               | M33 x 2 (ISO 6149)             |
| G16               | 1-11 BSPP<br>(ISO 1179G228)    |

| BOX 12: Options |             |
|-----------------|-------------|
| Symbol          | Description |
| 11              | Non-Bypass  |

| BOX 13: Seal Compound |              |
|-----------------------|--------------|
| Symbol                | Description  |
| V                     | Fluorocarbon |

## Replacement Elements

| Media     | Element Collapse Rating | Single Length (Fluorocarbon) |
|-----------|-------------------------|------------------------------|
| 3 Micron  | 2000 psi (138 bar)      | HF31H3VQ                     |
| 5 Micron  | 2000 psi (138 bar)      | HF31H5VQ                     |
| 10 Micron | 2000 psi (138 bar)      | HF31H10VQ                    |

# HF3 Duplex

## High Pressure Filter

### 30PDHF3 Duplex Pressure Filter - 3000 psi (207 bar) Application

The Parker 30PDHF3 duplex pressure filter provides uninterrupted filtration for equipment that cannot be shut down for servicing.

The 30PDHF3 allows you to simply switch the diverter valve and service the element while the other side is in service.

A pressure balancing valve and downstream check valves are all neatly assembled in a compact manifold head that makes operation safe, smooth and easy.

Vent valves are also included to insure all air is purged after the off-duty element is serviced so that maximum system performance is achieved.

The Parker 30PDHF3 makes use of industry proven components. Elements are multi-pass tested in accordance with ISO4572/ISO16889. Bowls and head are subjected to rigorous fatigue testing to insure a trouble free service life.

#### Diverter Valve

- Low torque for easy servicing
- Detent for valve handle prevents accidental switching
- Handle indicates which filter is in use

#### Vent Valves

- Allow for convenient purging of trapped air, and pressure

#### Ports

- SAE straight thread/metric/BSPP ports for positive sealing

#### Balance Valve

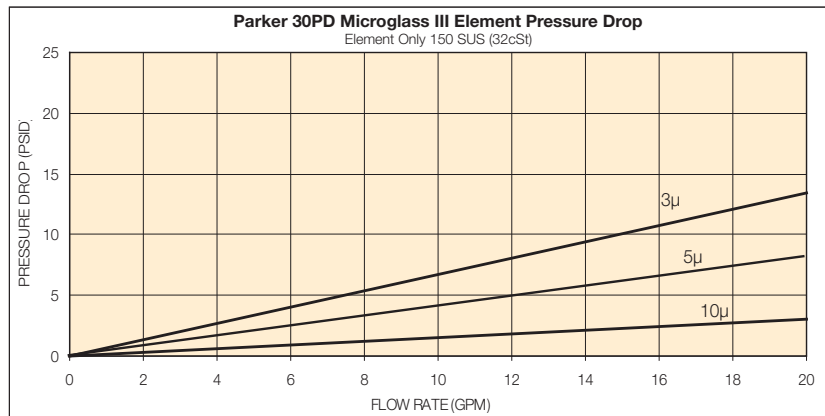
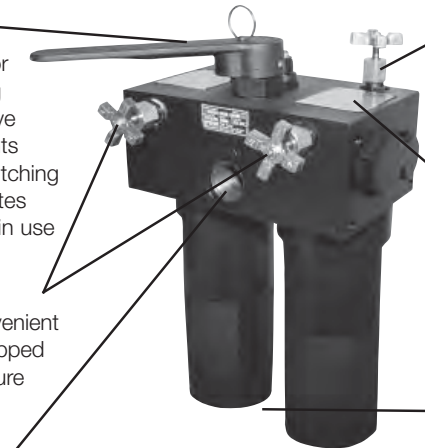
- Safety valve equalizes pressure between the two bowls

#### Operating Instructions

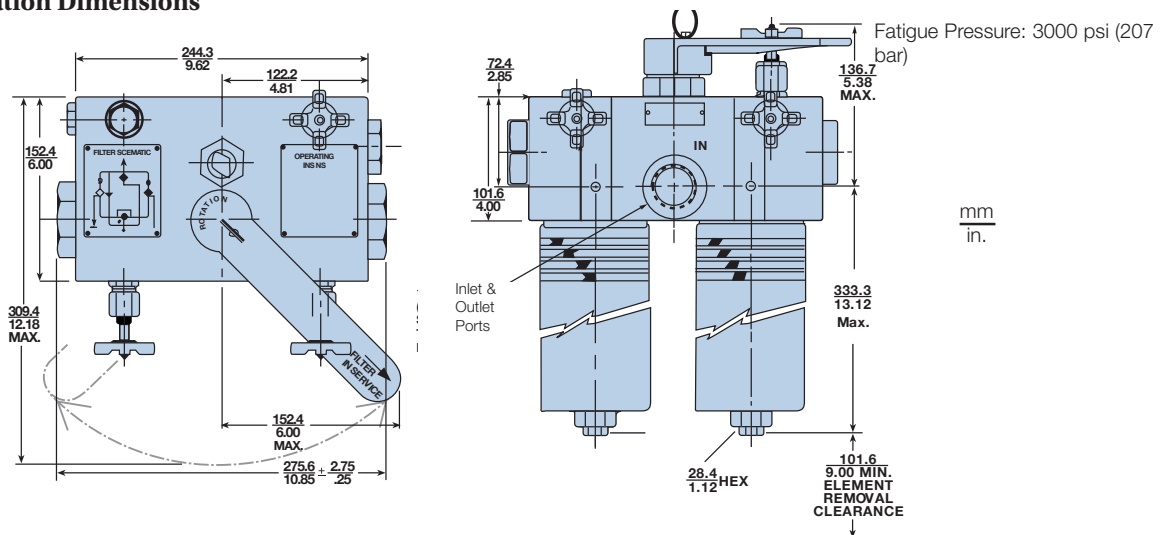
- Name tag and operating instructions riveted to manifold

#### Vent Drains

- SAE-4 'o' ring drain port, both sides



### Installation Dimensions





# HF3 Duplex Series

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

**Example:**

| BOX 1 | BOX 2 | BOX 3   | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 | BOX 9 | BOX 10 | BOX 11 |
|-------|-------|---------|-------|-------|-------|-------|-------|-------|--------|--------|
|       |       | 30PDHF3 | 2     | L     | 10    | E5MD  | 50    | ST16  | 19     | V      |

| BOX 1: Division Code                                       |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive program identification. |             |

| BOX 2: Plant Code                                  |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive plant location. |             |

| BOX 3: Configuration |                          |
|----------------------|--------------------------|
| Symbol               | Description              |
| 30PDHF3              | Hydraulic Filter, duplex |

| BOX 4: Housing Bowl Length |                    |
|----------------------------|--------------------|
| Symbol                     | Description        |
| 2                          | 1 Element, 8" Long |

| BOX 5: Element Collapse Rating |   |
|--------------------------------|---|
| Symbol                         | Description   |
| H                              | 2000 PSI<br>(-21 option in Box 10 must be selected) |
| L                              | 150 PSI<br>(-19 option in Box 10 must be selected)  |

| BOX 6: Element Filtration Rating         |                      |
|--|----------------------|
| Symbol                                   | Description          |
| 3  | 3 Micron Microglass  |
| 5  | 5 Micron Microglass  |
| 10                                       | 10 Micron Microglass |
| *Consult factory for other requirements. |                      |

| BOX 7: Indicator Type |   |
|-----------------------|---|
| Symbol                | Description                                 |
| M2                    | Visual                                      |
| E3B*                  | Electrical/Visual                           |
| E4MB*                 | Electrical/Visual                           |
| E4MC*                 | Electrical/Visual                           |
| E5B*                  | Electrical/Visual                           |
| E5MD*                 | Electrical/Visual                           |
| F4MS                  | Standard Dual output electrical indicator   |
| F4MN                  | Device Net Dual output electrical indicator |
| F4MC                  | MC Dual output electrical indicator         |

\*NOTE: Please refer to indicator drawings and chart on pages 54 and 55 for connector and wiring options.

| BOX 8: Indicator Setting |   |
|--------------------------|---|
| Symbol                   | Description   |
| 50                       | 50 psid (3.5 bar)   |
| 125                      | 125 psid (8.6 bar)<br>F4M indicator with Option -21 only. |

| BOX 9: Port Size |                                |
|------------------|--------------------------------|
| Symbol           | Description                    |
| ST16             | 1 5/16-12 UN-2B<br>(ISO 11926) |
| M33              | M33 x 2 (ISO 6149)             |
| G16              | 1-11 BSPP<br>(ISO 1179G228)    |

| BOX 10: Options |                          |
|-----------------|--------------------------|
| Symbol          | Description              |
| 19              | SAE-5 drain port on bowl |
| 21              | No bypass and drain      |

| BOX 11: Seal Compound |              |
|-----------------------|--------------|
| Symbol                | Description  |
| V                     | Fluorocarbon |

## Replacement Elements

| Media     | Element Collapse Rating | Single Length (Fluorocarbon) |
|-----------|-------------------------|------------------------------|
| 3 Micron  | 150 psi (10 bar)        | HF31L3VQ                     |
| 3 Micron  | 2000 psi (138 bar)      | HF31H3VQ                     |
| 5 Micron  | 150 psi (10 bar)        | HF31L5VQ                     |
| 5 Micron  | 2000 psi (138 bar)      | HF31H5VQ                     |
| 10 Micron | 150 psi (10 bar)        | HF31L10VQ                    |
| 10 Micron | 2000 psi (138 bar)      | HF31H10VQ                    |

# HF4 Series

## High Pressure Filter

### 50P4 Pressure Filter - 3500 psi (241 bar) Applications

#### Air Bleed Port

Guarantees total use of element dirt holding capacity.

#### Mechanical Visual or Electrical Visual Indicator

For electrical indicator options and factory pin wiring, see pages 53-54 (type D electrical indicator).

#### Elements

3, 5 and 10 micron HF4 elements with  $\beta \geq 200$  with dual stage filtering media for up to 40% increased dirt holding capacity.

#### Pressure Ratings:

Maximum Allowable Operating Pressure (MAOP): 3500 psi (241 bar)

Rated Fatigue Pressure: 3500 psi (241 bar)

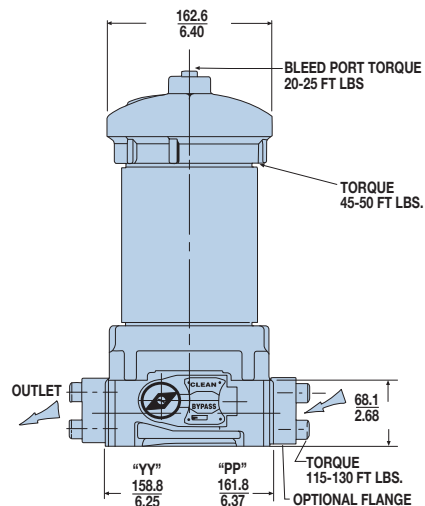
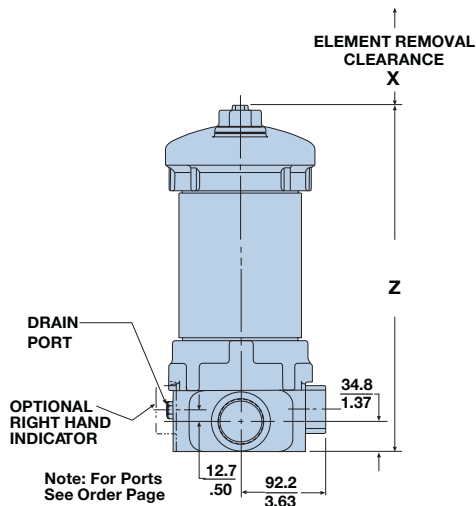
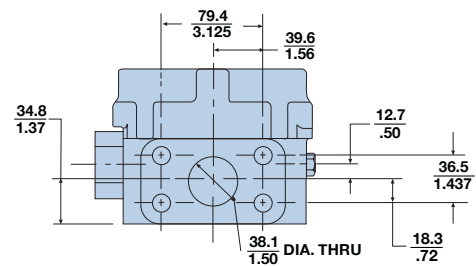
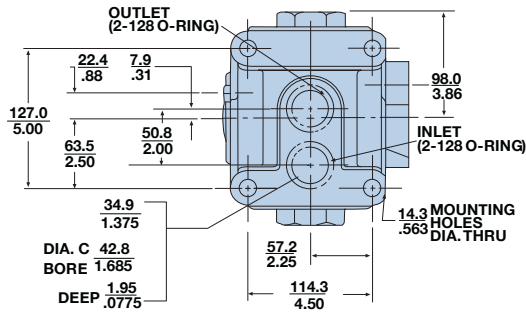
Design Safety Factor: 3:1



50P4-2

Linear Measure: millimeter  
inch

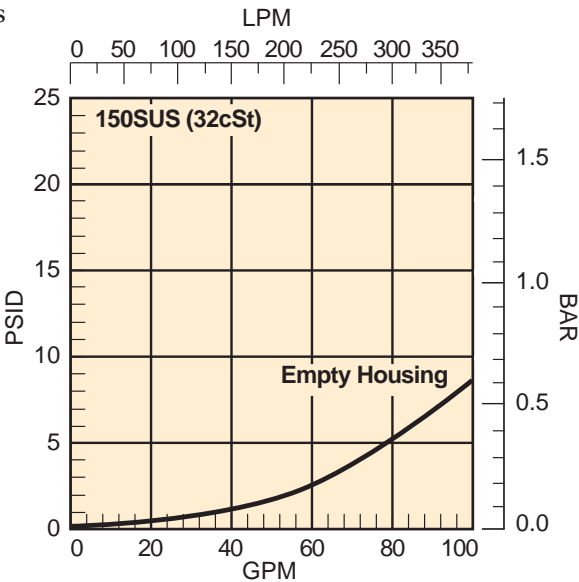
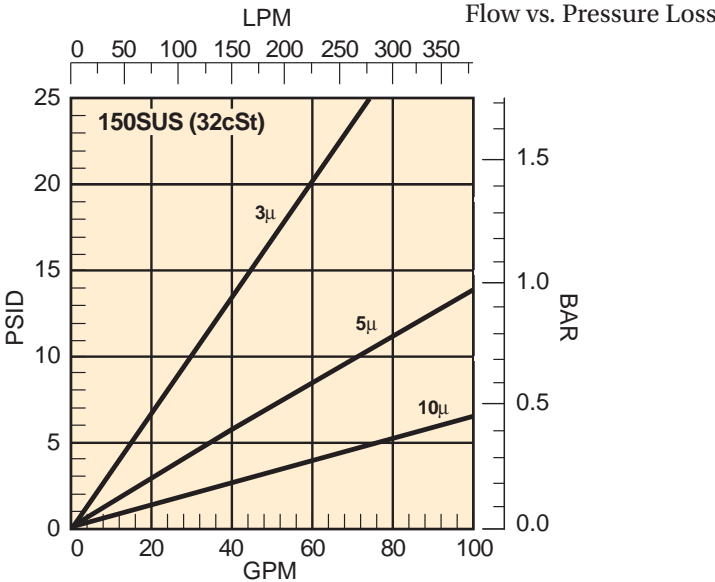
| Length | 50P4-1 | 50P4-2 |
|--------|--------|--------|
| X      | 254.0  | 508.0  |
| Z      | 10.00  | 20.00  |
|        | 387.1  | 622.8  |
|        | 15.24  | 24.52  |



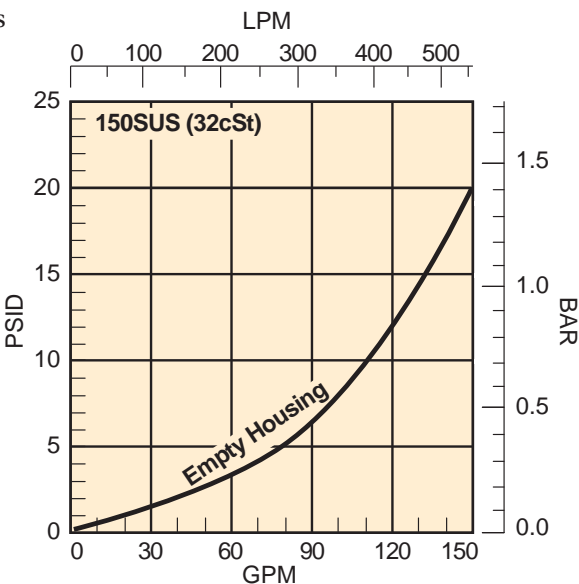
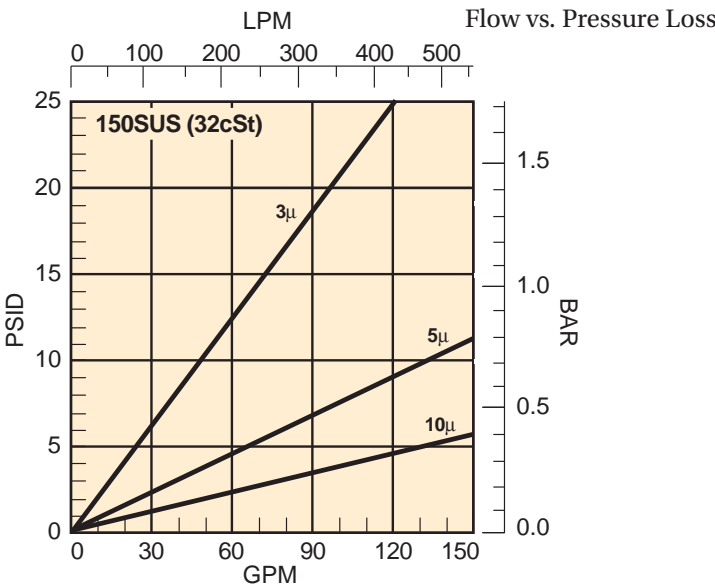
# HF4 Series

## Performance

### 50P4-1 Element Performance



### 50P4-2 Element Performance



**Assembly  $\Delta P$  Formula**

$$\Delta P_{\text{Assembly}} = \Delta P_{\text{Empty Housing}} + \Delta P_{\text{Element}} \times \frac{\text{New Viscosity}}{150} \times \frac{\text{New Specific Gravity}}{.90}$$

Note: For "H" High collapse elements use 1.4 x  $\Delta P$  from curves above.

# HF4 Series

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

**Example:**

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 | BOX 9 | BOX 10 | BOX 11 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
|       |       | 50P4  | 1     | H     | 10    | E4MB  | 50    | FM    | 11     | V      |

| BOX 1: Division Code                                       |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive program identification. |             |

| BOX 2: Plant Code                                  |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive plant location. |             |

| BOX 3: Configuration |                           |
|----------------------|---------------------------|
| Symbol               | Description               |
| 50P4                 | Hydraulic Pressure Filter |

| BOX 4: Housing Bowl Length |             |
|----------------------------|-------------|
| Symbol                     | Description |
| 1                          | 1 Element   |
| 2                          | 2 Elements  |

| BOX 5: Element Collapse Rating |   |
|--------------------------------|---|
| Symbol                         | Description   |
| H                              | 2000 PSI (138 bar)<br>(-11 option in Box 10 must be selected) |
| L                              | 150 PSI (10 bar)<br>(-1 option in Box 10 must be selected)    |

| BOX 6: Element Filtration Rating         |                      |
|--|----------------------|
| Symbol                                   | Description          |
| 3  | 3 Micron Microglass  |
| 5  | 5 Micron Microglass  |
| 10                                       | 10 Micron Microglass |
| *Consult factory for other requirements. |                      |

| BOX 7: Indicator Type |   |
|-----------------------|---|
| Symbol                | Description                                 |
| IR                    | Visual, Right Side                          |
| IL                    | Visual, Left Side                           |
| E3B*                  | Electrical/Visual                           |
| E4MB*                 | Electrical/Visual                           |
| E4MC*                 | Electrical/Visual                           |
| E5B*                  | Electrical/Visual                           |
| E5MD*                 | Electrical/Visual                           |
| F4MS                  | Standard Dual output electrical indicator   |
| F4MN                  | Device Net Dual output electronic indicator |
| F4MC                  | MC Dual output electrical indicator         |

\*NOTE: Please refer to indicator drawings and chart on pages 54 and 55 for connector and wiring options. Located at left side of inlet — for right side, add “R” to symbol. Example: E3BR.

| BOX 8: Indicator Setting                           |                     |
|--|---------------------|
| Symbol   | Description         |
| 50   | 50 psid (3.5 bar)   |
| 125*   | 125 psid (8.62 bar) |
| *NOTE: Only available on F4MS and F4MN indicators. |                     |

| BOX 9: Port Size |  |
|------------------|--|
| Symbol           | Description  |
| ST24             | 1 7/8-12 UN-2B (ISO 11926)                                     |
| M48              | M48 x 2 (ISO 6149)   |
| G24              | 1 1/2-11 BSPP (ISO 1179G228)                                   |
| SMP              | SAE Manifold Mount   |
| MMP              | Metric Manifold Mount  |
| GMP              | BSPP Manifold Mount  |
| FS               | 1 1/2" Flange (ISO 6162)<br>5/8"-11 bolt holes x 1.03 in. deep |
| FM               | 1 1/2" Flange (ISO 6162)<br>M16 x 2 bolt holes, 25.5 mm deep   |

| BOX 10: Bypass Options |   |
|------------------------|---|
| Symbol                 | Description   |
| 1                      | 50 psi (3.5 bar) bypass (-L option in Box 5 must be selected) |
| 11                     | Non bypass (-H option in Box 5 must be selected)              |

| BOX 11: Seal Compound |              |
|-----------------------|--------------|
| Symbol                | Description  |
| V                     | Fluorocarbon |

## Replacement Elements

| Media     | Element Collapse Rating | Single Length (Fluorocarbon) | Double Length (Fluorocarbon) |
|-----------|-------------------------|------------------------------|------------------------------|
| 3 Micron  | 150 psi (10 bar)        | HF41L3VQ                     | HF42L3VQ                     |
| 3 Micron  | 2000 psi (138 bar)      | HF41H3VQ                     | HF42H3VQ                     |
| 5 Micron  | 150 psi (10 bar)        | HF41L5VQ                     | HF42L5VQ                     |
| 5 Micron  | 2000 psi (138 bar)      | HF41H5VQ                     | HF42H5VQ                     |
| 10 Micron | 150 psi (10 bar)        | HF41L10VQ                    | HF42L10VQ                    |
| 10 Micron | 2000 psi (138 bar)      | HF41H10VQ                    | HF42H10VQ                    |

# HF4 Duplex

## Medium and High Pressure Filters

**MPD/MPDH/Duplex Pressure Filter - MPD - Dual 1500 psi (103 bar), MPDH - Dual 3000 psi (207 bar)**

- True duplex design with full neutral center valve
- SAE porting
- Flows to 110 gpm (416 l/min)
- Modular design with double- or triple-length side chamber extensions
- Internal equalization
- HF4 elements as standard
- Non Bypass Option

**Pressure Ratings:**

Maximum Allowable Operating Pressure (MAOP):

MPD - 1500 psi (103 bar)

MPDH - 3000 psi (207 bar)

Rated Fatigue Pressure:

MPD - 1500 psi (103 bar)

MPDH - 3000 psi (207 bar)

Design Safety Factor: 3:1



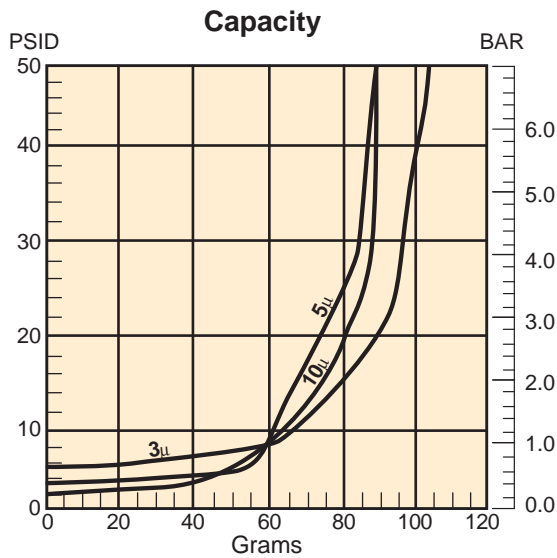
**HF4 Elements**



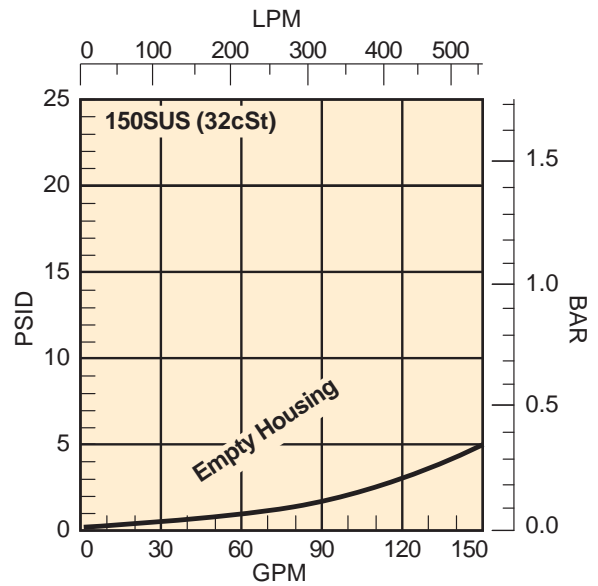
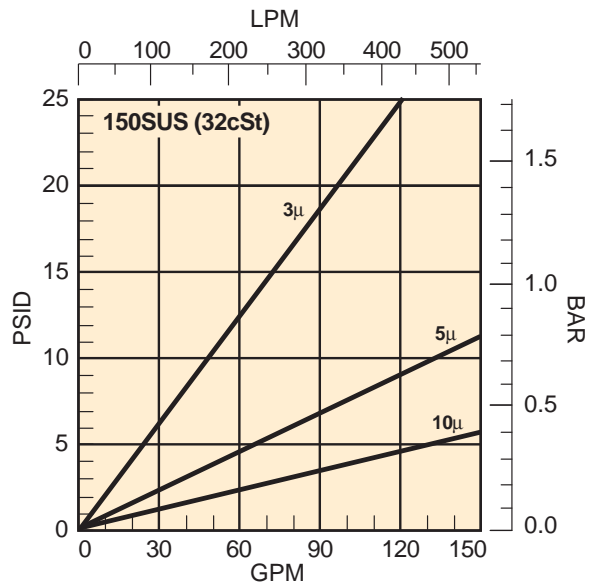
# HF4 Duplex

## Performance

### MPD/MPDH-1 Element Performance



### Flow vs. Pressure Loss



**Assembly  $\Delta P$  Formula**

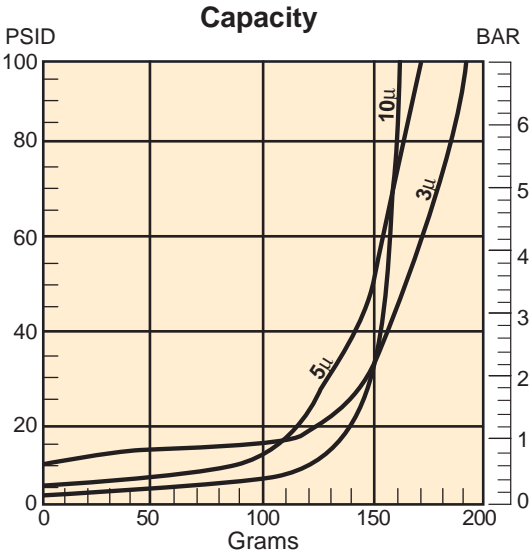
$$\Delta P_{\text{Assembly}} = \Delta P_{\text{Empty Housing + Element}} \times \frac{\text{New Viscosity}}{150} \times \frac{\text{New Specific Gravity}}{.90}$$

Note: For "H" High collapse elements use 1.4 x  $\Delta P$  from curves above.

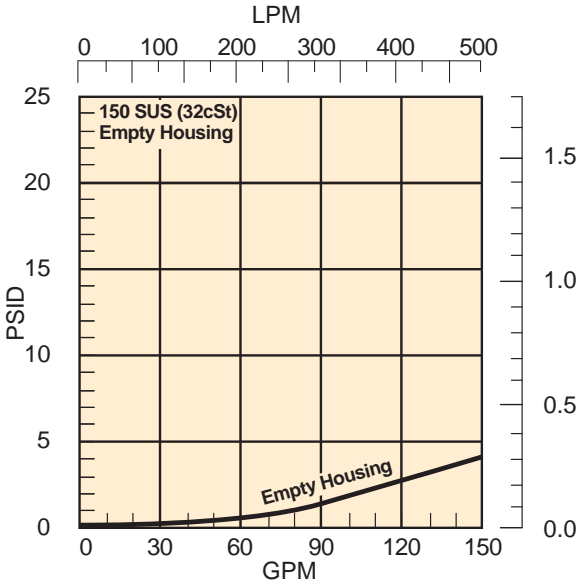
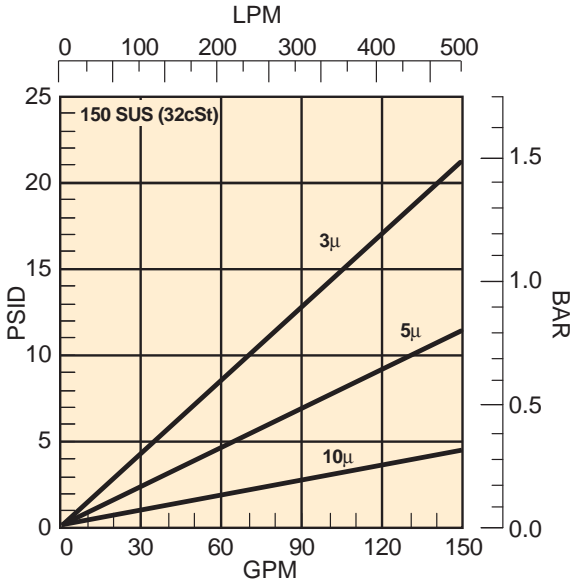
# HF4 Duplex

## Performance

### MPD/MPDH-2 Element Performance



### Flow vs. Pressure Loss



**Assembly  $\Delta P$  Formula**

$$\Delta P_{\text{Assembly}} = \Delta P_{\text{Empty Housing}} + \Delta P_{\text{Element}} \times \frac{\text{New Viscosity}}{150} \times \frac{\text{New Specific Gravity}}{.90}$$

Note: For "H" High collapse elements use 1.4 x  $\Delta P$  from curves above.

# HF4 Duplex Series

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

**Example:**

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 | BOX 9 | BOX 10 | BOX 11 |   |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---|
|       |       | MPD   | 1     | L     |       | 10Q   | E5MD  | 25    | FS     | 1      | V |

| BOX 1: Division Code                                       |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive program identification. |             |

| BOX 2: Plant Code                                  |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive plant location. |             |

| BOX 3: Configuration |                              |
|----------------------|------------------------------|
| Symbol               | Description                  |
| MPD                  | Duplex Filter                |
| MPDH                 | Duplex Filter, High Pressure |

| BOX 4: Housing Bowl Length |             |
|----------------------------|-------------|
| Symbol                     | Description |
| 1                          | Single      |
| 2                          | Double      |
| 3                          | Triple      |

| BOX 5: Element Collapse Rating |   |
|--------------------------------|---|
| Symbol                         | Description   |
| L                              | 150 PSI (10 bar)<br>(-1 option in Box 11 must be selected)    |
| H                              | 2000 PSI (138 bar)<br>(-21 option in Box 11 must be selected) |

| BOX 6: Core |                |
|-------------|----------------|
| Symbol      | Description    |
| None        | Permanent Core |

| BOX 7: Element Filtration Rating |                      |
|----------------------------------|----------------------|
| Symbol                           | Description          |
| 3                                | 3 Micron Microglass  |
| 5                                | 5 Micron Microglass  |
| 10                               | 10 Micron Microglass |

| BOX 8: Indicator Type |  |
|-----------------------|--|
| Symbol                | Description  |
| M2                    | Visual/Auto Reset  |
| E2                    | Electrical (DIN 43650 Hirschman style)                           |
| E3B*                  | Electrical/Visual  |
| E4MB*                 | Electrical/Visual  |
| E4MC*                 | Electrical/Visual  |
| E5B*                  | Electrical/Visual  |
| E5MD*                 | Electrical/Visual  |
| P                     | Indicator Port Plugged   |
| F4MS                  | Standard Dual output electrical indicator with non bypass only   |
| F4MN                  | Device Net Dual output electronic indicator with non bypass only |
| F4MC                  | MC Dual output electrical indicator                              |

\*NOTE: Please refer to indicator drawings and chart on pages 54 and 55 for connector and wiring options.

| BOX 9: Indicator Setting |   |
|--------------------------|---|
| Symbol                   | Description   |
| 25                       | 25 psi (1.7 bar)  |
| 50                       | 50 psi (3.5 bar)  |
| 125                      | 125 psid (8.6 bar)<br>*F4M indicator only (-21 option in Box 11 must be selected) |

| BOX 10: Port Size |  |
|-------------------|--|
| Symbol            | Description  |
| ST24              | 1 7/8-12 UN-2B (ISO 11926)                                     |
| M48               | M48 x 2 (ISO 6149)   |
| G24               | 1 1/2-11 BSPP (ISO 1179G228)                                   |
| SMP               | SAE Manifold Mount   |
| MMP               | Metric Manifold Mount  |
| GMP               | BSPP Manifold Mount  |
| FS                | 1 1/2" Flange (ISO 6162)<br>5/8"-11 bolt holes x 1.03 in. deep |
| FM                | 1 1/2" Flange (ISO 6162)<br>M16 x 2 bolt holes, 25.5 mm deep   |

| BOX 11: Bypass Options |             |
|------------------------|-------------|
| Symbol                 | Description |
| 1                      | None        |
| 11                     | No bypass   |

| BOX 12: Seal Compound |              |
|-----------------------|--------------|
| Symbol                | Description  |
| V                     | Fluorocarbon |

## Replacement Elements

| Media     | Element Collapse Rating | Single Length (Fluorocarbon) | Double Length (Fluorocarbon) |
|-----------|-------------------------|------------------------------|------------------------------|
| 3 Micron  | 150 psi (10 bar)        | HF41L3VQ                     | HF42L3VQ                     |
| 3 Micron  | 2000 psi (138 bar)      | HF41H3VQ                     | HF42H3VQ                     |
| 5 Micron  | 150 psi (10 bar)        | HF41L5VQ                     | HF42L5VQ                     |
| 5 Micron  | 2000 psi (138 bar)      | HF41H5VQ                     | HF42H5VQ                     |
| 10 Micron | 150 psi (10 bar)        | HF41L10VQ                    | HF42L10VQ                    |
| 10 Micron | 2000 psi (138 bar)      | HF41H10VQ                    | HF42H10VQ                    |







## SAE Series

Return Filters



ENGINEERING YOUR SUCCESS.

# 15CN Return Filter: HF2 Series

HF2 Series Filters  
Low Pressure

**15CN Return Filters - 800 psi (55 bar) Applications**

**Mechanical Visual or Electrical Visual Indicator**

For electrical indicator options and factory pin wiring, see pages 53-54 (types E and F4M electrical indicators).

**Element**

HF2 4" and 8" Long. 3, 5, and 10 micron element with  $\beta \geq 200$  and dual stage filtering media for up to 40% increased dirt holding capacity.



**Mounting Provisions**

**Reverse Check Option**

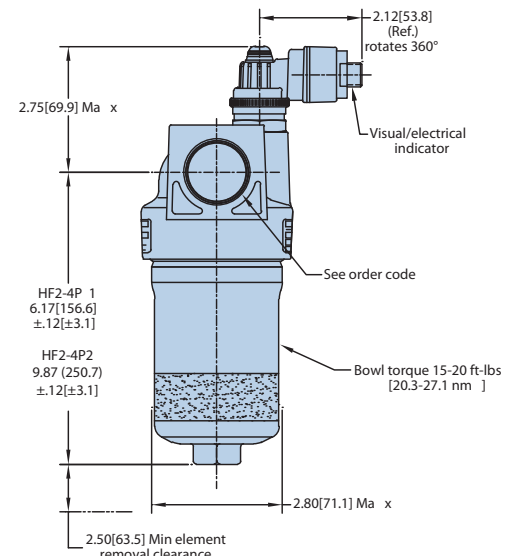
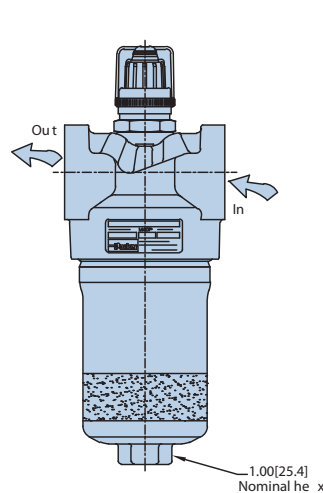
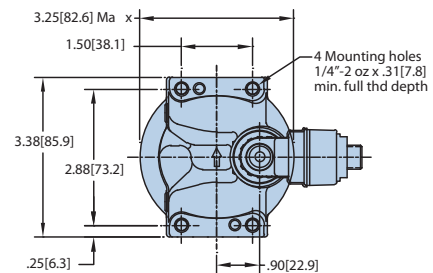
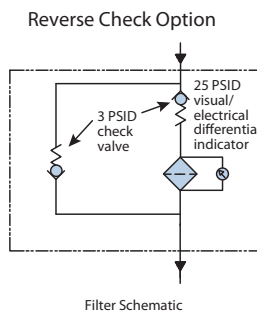
For system decompression, includes Element Check to prevent back flow during system decompression.

**Pressure Ratings:**

Maximum Allowable Operating Pressure (MAOP): 800 psi (55 bar)

Rated Fatigue Pressure: 800 psi (55 bar)

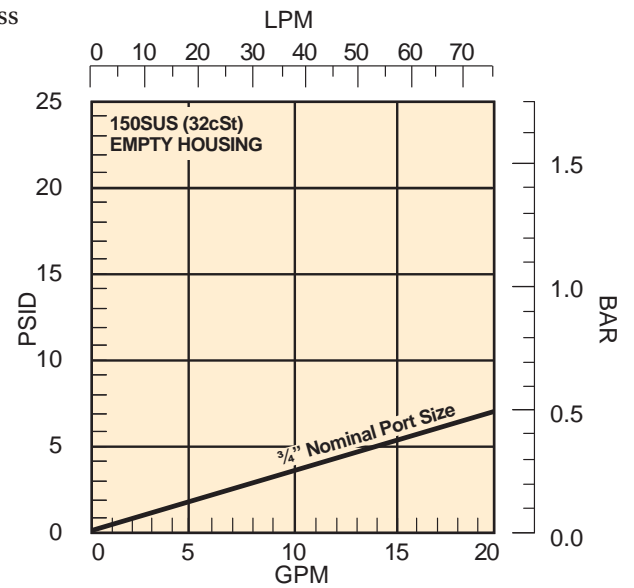
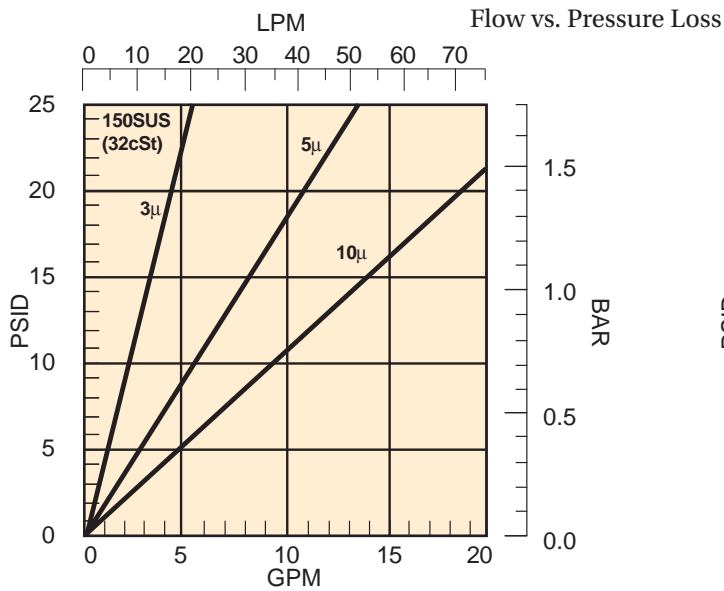
Design Safety Factor: 2.5:1



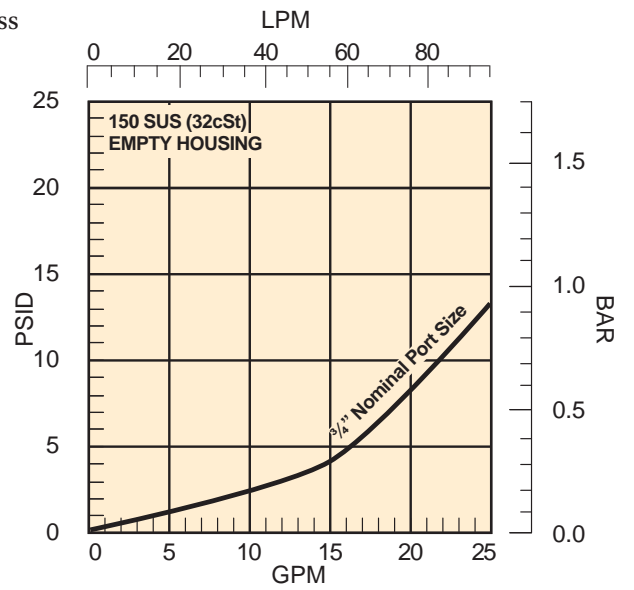
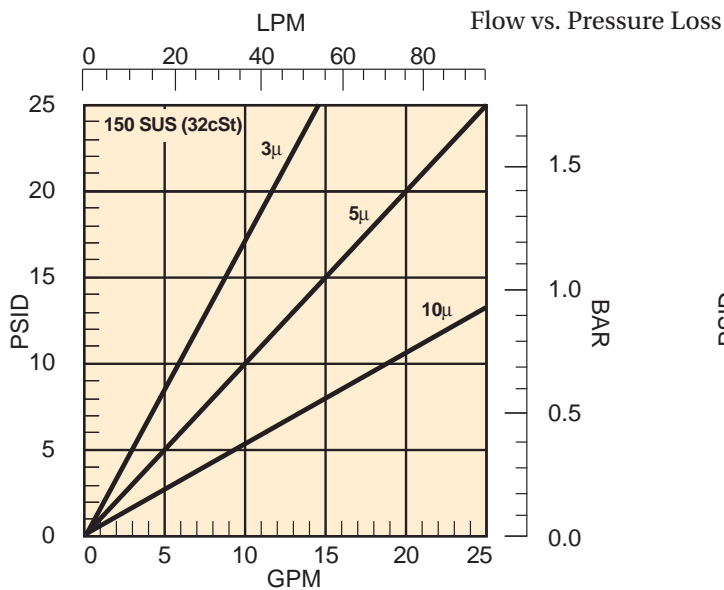
# 15CN Return Filter: HF2 Series

## Performance

### 15CN-1 Element Performance



### 15CN-2 Element Performance



**Assembly  $\Delta P$  Formula**

$$\Delta P_{\text{Assembly}} = \Delta P_{\text{Empty Housing+Element}} \times \frac{\text{New Viscosity}}{150} \times \frac{\text{New Specific Gravity}}{.90}$$

Note: For "H" High collapse elements use 1.4 x  $\Delta P$  from curves above.

# 15CN Return Filter: HF2 Series

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

**Example:**

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 | BOX 9 | BOX 10 | BOX 11 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
|       |       | 15CN  | 2     | L     | 10    | E5B   | 25    | ST12  | 19     | V      |

| BOX 1: Division Code                                       |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive program identification. |             |

| BOX 2: Plant Code                                  |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive plant location. |             |

| BOX 3: Configuration |                      |
|----------------------|----------------------|
| Symbol               | Description          |
| 15CN                 | Hydraulic Filter HF2 |

| BOX 4: Housing Bowl Length |                    |
|----------------------------|--------------------|
| Symbol                     | Description        |
| 1                          | 1 Element, 4" Long |
| 2                          | 1 Element, 8" Long |

| BOX 5: Element Collapse Rating |  |
|--------------------------------|--|
| Symbol                         | Description  |
| H                              | 2000 PSI (138 bar)<br>(-21 or -R5 option in Box 10 must be selected) |
| L                              | 150 PSI (10 bar)<br>(-19 option in Box 10 must be selected)          |

| BOX 6: Element Filtration Rating         |                      |
|--|----------------------|
| Symbol                                   | Description          |
| 3  | 3 Micron Microglass  |
| 5  | 5 Micron Microglass  |
| 10                                       | 10 Micron Microglass |
| *Consult factory for other requirements. |                      |

| BOX 7: Indicator Type |   |
|-----------------------|---|
| Symbol                | Description                                 |
| M2                    | Visual, Top                                 |
| E3B*                  | Electrical/Visual                           |
| E4MB*                 | Electrical/Visual                           |
| E4MC*                 | Electrical/Visual                           |
| E5B*                  | Electrical/Visual                           |
| E5MD*                 | Electrical/Visual                           |
| F4MS                  | Standard Dual output electrical indicator   |
| F4MN                  | Device Net Dual output electrical indicator |
| F4MC                  | MC Dual output electrical indicator         |

\*NOTE: Please refer to indicator drawings and chart on pages 54 and 55 for connector and wiring options.

| BOX 8: Indicator Setting |                   |
|--------------------------|-------------------|
| Symbol                   | Description       |
| 25                       | 25 psid (1.7 bar) |
| 35 <sup>1</sup>          | 35 psid (2.4 bar) |
| 50                       | 50 psid (3.5 bar) |

| BOX 9: Port Size |                             |
|------------------|-----------------------------|
| Symbol           | Description                 |
| ST12             | 1 1/16-12 UN-2B (ISO 11926) |
| M27              | M27 x 2 (ISO 6149)          |
| G12              | G 3/4-14 BSPP (ISO 1179-1)  |

| BOX 10: Bypass Options |   |
|------------------------|---|
| Symbol                 | Description   |
| 19                     | Drain port on bowl                                  |
| 21                     | Non bypass with drain port                          |
| R5                     | Reverse check option for injector type lube systems |

| BOX 11: Seal Compound |              |
|-----------------------|--------------|
| Symbol                | Description  |
| V                     | Fluorocarbon |

### Notes:

- 35 psid indicator setting only available in F4M indicator type.

## Replacement Elements

| Media     | Element Collapse Rating | Single Length (Fluorocarbon) | Double Length (Fluorocarbon) |
|-----------|-------------------------|------------------------------|------------------------------|
| 3 Micron  | 150 psi (10 bar)        | HF21L3VQ                     | HF22L3VQ                     |
| 3 Micron  | 2000 psi (138 bar)      | HF21H3VQ                     | HF22H3VQ                     |
| 5 Micron  | 150 psi (10 bar)        | HF21L5VQ                     | HF22L5VQ                     |
| 5 Micron  | 2000 psi (138 bar)      | HF21H5VQ                     | HF22H5VQ                     |
| 10 Micron | 150 psi (10 bar)        | HF21L10VQ                    | HF22L10VQ                    |
| 10 Micron | 2000 psi (138 bar)      | HF21H10VQ                    | HF22H10VQ                    |

# 40CN Return Filter: HF3 Series

HF3 Series Filters  
Low Pressure

**40CN Return Filter - up to 800 psi (55 bar) Application**

## Non-Bypass Option

Mechanical Visual or Electrical Visual Indicator

With 25 DP setting. For electrical indicator options and factory pin wiring, see pages 53-54 (type E and F4M electrical indicators).

## Element

HF3 8" Long, 3, 5, and 10 micron element with  $b \geq 200$  and dual stage filtering media for up to 40% increased dirt holding capacity.

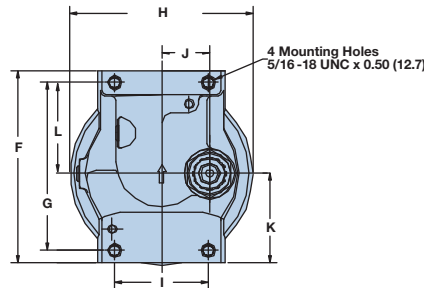
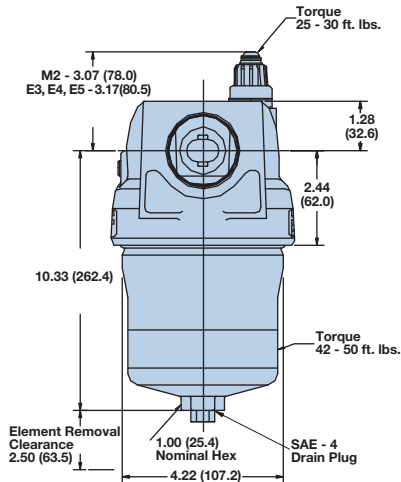
## Mounting Provisions

### Pressure Ratings:

Maximum Allowable Operating Pressure (MAOP): 800 psi (55 bar)

Rated Fatigue Pressure: 800 psi (55 bar)

Design Safety Factor: 2.5:1



Dimensions are inches (mm)

|   |              |
|---|--------------|
| F | 5.00 (127.0) |
| G | 4.37 (111.0) |
| H | 4.80 (121.9) |
| I | 2.44 (62.0)  |
| J | 1.25 (31.8)  |
| K | 2.32 (58.8)  |
| L | 2.37 (60.2)  |

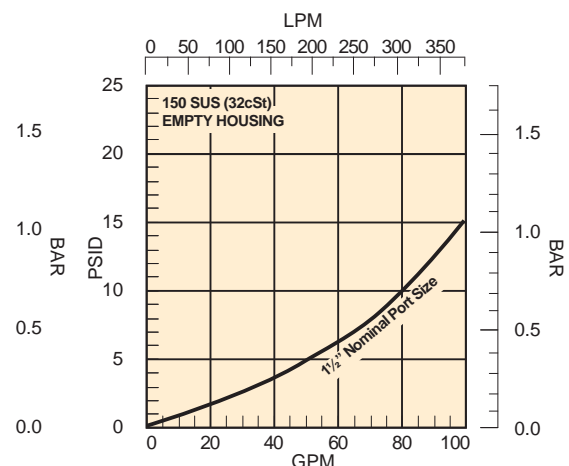
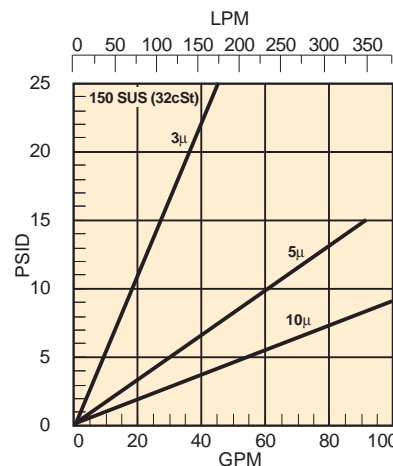
## Assembly $\Delta P$ Formula

$$\Delta P_{\text{Assembly}} = \Delta P_{\text{Empty Housing}} + \Delta P_{\text{Element}} \times \frac{\text{New Viscosity}}{150} \times \frac{\text{New Specific Gravity}}{.90}$$

Note: For "H" High collapse elements use 1.4 x  $\Delta P$  from curves above.

## 40CN HF3-2 Element Performance

Flow vs. Pressure Loss



# 40CN Return Filter: HF3 Series

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

**Example:**

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 | BOX 9 | BOX 10 | BOX 11 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
|       |       | 40CN  | 2     | L     | 10    | E3B   | 50    | ST24  | 19     | V      |

| BOX 1: Division Code                                       |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive program identification. |             |

| BOX 2: Plant Code                                  |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive plant location. |             |

| BOX 3: Configuration |                  |
|----------------------|------------------|
| Symbol               | Description      |
| 40CN                 | Hydraulic Filter |

| BOX 4: Housing Bowl Length |                    |
|----------------------------|--------------------|
| Symbol                     | Description        |
| 2                          | 1 Element, 8" Long |

| BOX 5: Element Collapse Rating |   |
|--------------------------------|---|
| Symbol                         | Description   |
| H                              | 2000 PSI (138 bar)<br>(-21 option in Box 10 must be selected) |
| L                              | 150 PSI (10 bar)<br>(-19 option in Box 10 must be selected)   |

| BOX 6: Element Filtration Rating         |                      |
|--|----------------------|
| Symbol                                   | Description          |
| 3  | 3 Micron Microglass  |
| 5  | 5 Micron Microglass  |
| 10                                       | 10 Micron Microglass |
| *Consult factory for other requirements. |                      |

| BOX 7: Indicator Type  |   |
|--|---|
| Symbol   | Description                                 |
| M2   | Visual, Top                                 |
| E3B*   | Electrical/Visual                           |
| E4MB*  | Electrical/Visual                           |
| E4MC*  | Electrical/Visual                           |
| E5B*   | Electrical/Visual                           |
| E5MD*  | Electrical/Visual                           |
| F4MS   | Standard Dual output electrical indicator   |
| F4MN   | Device Net Dual output electrical indicator |
| F4MC   | MC Dual output electrical indicator         |
| *NOTE: Please refer to indicator drawings and chart on pages 54 and 55 for connector and wiring options. |   |

| BOX 8: Indicator Setting |                   |
|--------------------------|-------------------|
| Symbol                   | Description       |
| 25                       | 25 psid (1.7 bar) |
| 35 <sup>1</sup>          | 35 psid (2.4 bar) |
| 50                       | 50 psid (3.5 bar) |

| BOX 9: Port Size |                                 |
|------------------|---------------------------------|
| Symbol           | Description                     |
| ST24             | 1 7/8-12 UN-2B<br>(ISO 11926)   |
| M48              | M48 x 2 (ISO 6149)              |
| G20              | 1 1/4-11 BSPP                   |
| G24              | 1 1/2-11 BSPP<br>(ISO 1179G228) |

| BOX 10: Bypass Options |                       |
|------------------------|-----------------------|
| Symbol                 | Description           |
| 19                     | Drain port on bowl    |
| 21                     | Non bypass with drain |

| BOX 11: Seal Compound |              |
|-----------------------|--------------|
| Symbol                | Description  |
| V                     | Fluorocarbon |

**Notes:**

- 35 psid indicator setting only available in F4M indicator type.

## Replacement Elements

| Media     | Element Collapse Rating | Single Length (Fluorocarbon) |
|-----------|-------------------------|------------------------------|
| 3 Micron  | 150 psi (10 bar)        | HF31L3VQ                     |
| 3 Micron  | 2000 psi (138 bar)      | HF31H3VQ                     |
| 5 Micron  | 150 psi (10 bar)        | HF31L5VQ                     |
| 5 Micron  | 2000 psi (138 bar)      | HF31H5VQ                     |
| 10 Micron | 150 psi (10 bar)        | HF31L10VQ                    |
| 10 Micron | 2000 psi (138 bar)      | HF31H10VQ                    |

# HT4/IL4/DIL4 Filter: HF4 Series

## Low Pressure HF4 Series Filters

### IL4/DIL4 Filter - 150 psi (10 bar)

#### Application

#### 25# Full Flow Bypass

Mandatory to prevent excessive back pressure into system, which could cause improper adjustments to actuator circuits to meet cycle times.

#### Visual or Electrical Indicator

With 25 psi (1.7 bar) bypass setting. For electrical indicator options and factory pin wiring, see pages 53-54 (type E electrical indicator).

#### Elements

3, 5, and 10 micron HF4 elements with  $\beta \geq 200$  with dual stage filtering media for up to 40% increased dirt holding capacity.

#### Upstream and Downstream Test Ports

Allows user to do maintenance troubleshooting.

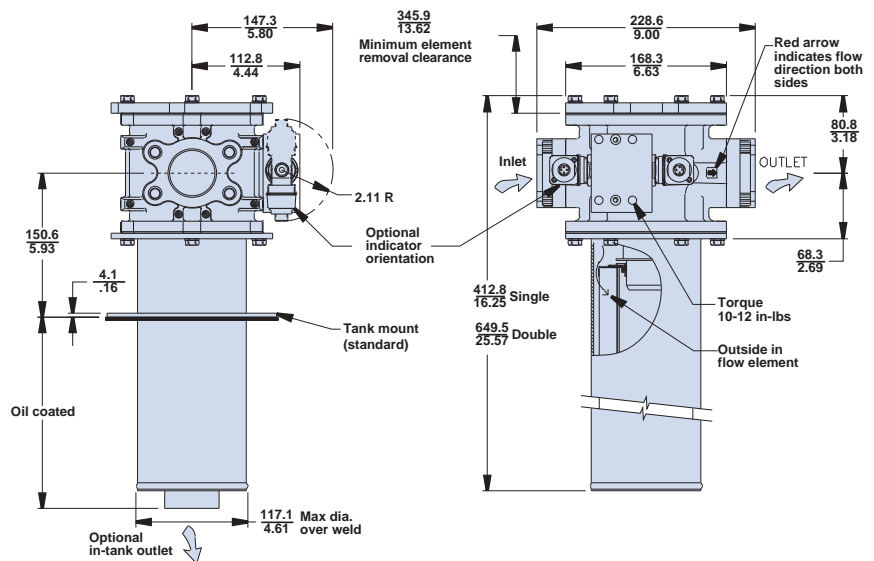
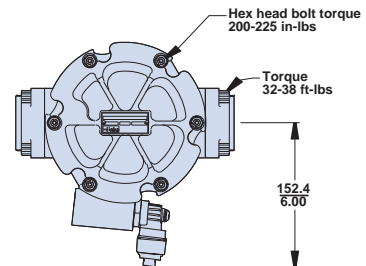
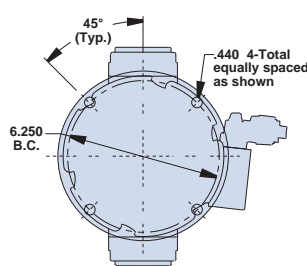
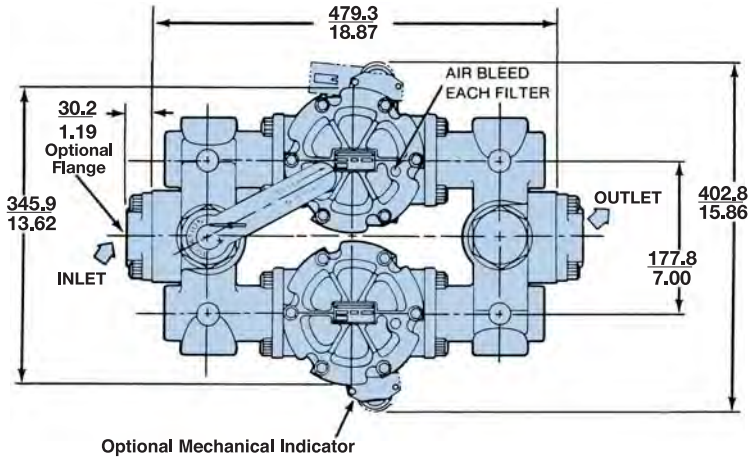
#### Single or Double Length

#### Pressure Ratings:

Maximum Allowable Operating Pressure (MAOP): 150 psi (10 bar)

#### Rated Fatigue Pressure:

150 psi (10 bar)



HT4

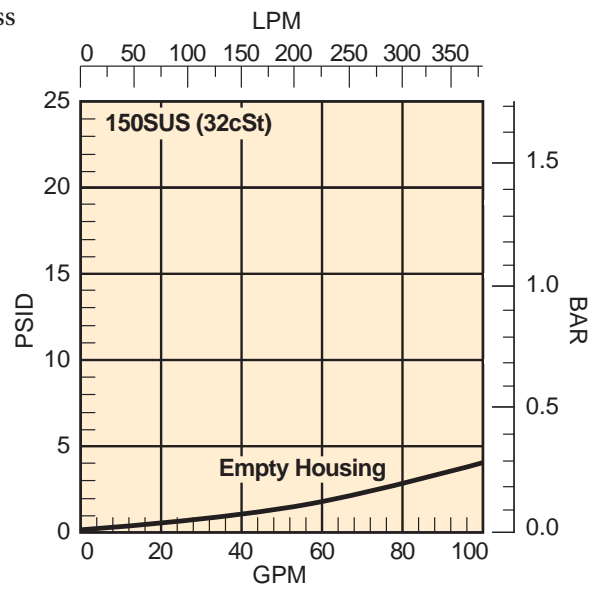
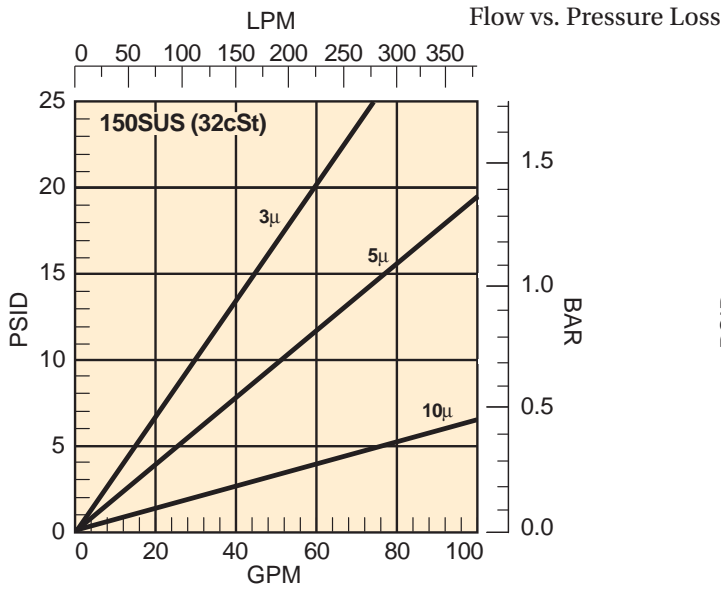
IL4



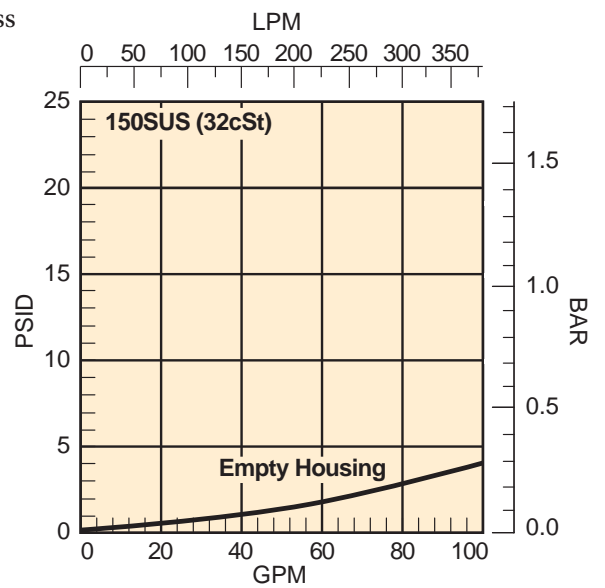
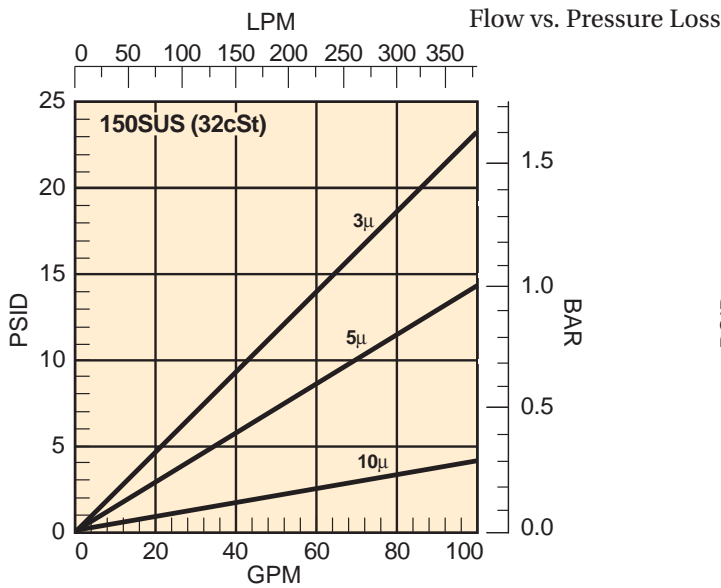
# IL4/DIL4 Filter: HF4 Series

## Performance

### IL4-1/DIL4-1 Element Performance



### IL4-2/DIL4-2 Element Performance



**Assembly  $\Delta P$  Formula**

$$\Delta P_{\text{Assembly}} = \Delta P_{\text{Empty Housing}} + \Delta P_{\text{Element}} \times \frac{\text{New Viscosity}}{150} \times \frac{\text{New Specific Gravity}}{.90}$$

Note: For "H" High collapse elements use 1.4 x  $\Delta P$  from curves above.

# IL4/DIL4 Filter: HF4 Series

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

**Example:**

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 | BOX 9 | BOX 10 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
|       |       | IL4   | 2     | L     | 10    | E5MD  | 25    | FM    | V      |

| BOX 1: Division Code                                       |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive program identification. |             |

| BOX 2: Plant Code                                  |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive plant location. |             |

| BOX 3: Configuration |                       |
|----------------------|-----------------------|
| Symbol               | Description           |
| HT4                  | In-Tank Return Filter |
| IL4                  | In-line Return Filter |
| DIL4                 | In-line Duplex Filter |

| BOX 4: Housing Bowl Length |               |
|----------------------------|---------------|
| Symbol                     | Description   |
| 1                          | Single Length |
| 2                          | Double Length |

| BOX 5: Element Collapse Rating |                  |
|--------------------------------|------------------|
| Symbol                         | Description      |
| L                              | 150 PSI (10 bar) |

| BOX 6: Element Filtration Rating |                      |
|----------------------------------|----------------------|
| Symbol                           | Description          |
| 3                                | 3 Micron Microglass  |
| 5                                | 5 Micron Microglass  |
| 10                               | 10 Micron Microglass |

| BOX 7: Indicator Type |   |
|-----------------------|---|
| Symbol                | Description                                 |
| IR                    | Visual, Right Side                          |
| IL                    | Visual, Left Side                           |
| E3B*                  | Electrical/Visual                           |
| E4MB*                 | Electrical/Visual                           |
| E4MC*                 | Electrical/Visual                           |
| E5B*                  | Electrical/Visual                           |
| E5MD*                 | Electrical/Visual                           |
| F4MS                  | Standard Dual output electrical indicator   |
| F4MN                  | Device Net Dual output electrical indicator |
| F4MC                  | MC Dual output electrical indicator         |

\*NOTE: Please refer to indicator drawings and chart on pages 54 and 55 for connector and wiring options. Located at left side of inlet — for right side, add "R" to symbol. Example: E3BR.

| BOX 8: Indicator Setting |                   |
|--------------------------|-------------------|
| Symbol                   | Description       |
| 25                       | 25 psid (1.7 bar) |
| 35 <sup>1</sup>          | 35 psid (2.4 bar) |

| BOX 9: Port Size |  |               |
|------------------|--|---------------|
| Symbol           | Description  |               |
|                  | HT4  |               |
|                  | <b>INLET</b>   | <b>OUTLET</b> |
| P24              | 1 1/2" NPT   | 1 1/2" NPT    |
| ST24             | 1 7/8-12 UN-2B (ISO 11926)                                 | 1 1/2" NPT    |
| G24              | 1 1/2-11 BSPP (ISO 1179G-228)                              | 1 1/2" BSPP   |
| FS               | 2" Flange (ISO 6162), 1/2-13 bolt holes, 3/4" deep         | 1 1/2" NPT    |
| FM               | 2" Flange (ISO 6162), M12 x 1-3/4 bolt holes, 19.5 mm deep | 1 1/2" BSPP   |
|                  | IL4  |               |
|                  | <b>INLET &amp; OUTLET</b>                                  |               |
| P24              | 1 1/2" NPT   |               |
| ST24             | 1 7/8-12 UN-2B (ISO 11926)                                 |               |
| G24              | 1 1/2-11 BSPP (ISO 1179G-228)                              |               |
| FS               | 2" Flange (ISO 6162), 1/2-13 Bolt Holes, 3/4" deep         |               |
| FM               | 2" Flange (ISO 6162), M12 x 1-3/4 bolt holes, 19.5 mm deep |               |

| BOX 10: Seal Compound |              |
|-----------------------|--------------|
| Symbol                | Description  |
| V                     | Fluorocarbon |

**Notes:**

- 35 psid indicator setting only available in F4M indicator type.

## Replacement Elements

| Media     | Element Collapse Rating | Single Length (Fluorocarbon) | Double Length (Fluorocarbon) |
|-----------|-------------------------|------------------------------|------------------------------|
| 3 Micron  | 150 psi (10 bar)        | HF41L3VQ                     | HF42L3VQ                     |
| 5 Micron  | 150 psi (10 bar)        | HF41L5VQ                     | HF42L5VQ                     |
| 10 Micron | 150 psi (10 bar)        | HF41L10VQ                    | HF42L10VQ                    |

# IL8/HDIL8 Filter

## Low Pressure

### IL8/HDIL8 Filter - 300 psi (20 bar) Applications

- Lube oil systems
- Power generation plants
- Test stands
- Primary metal equipment
- Pulp & paper equipment
- Offshore drilling and oil patch
- Flushing skids

IL8 series filters are excellent choices for your demanding applications whether you require simplex, duplex or quadplex assemblies.

Wherever high flow or high capacity filters are required, the IL8 series can be applied with confidence.

Filter housings have a simple yet critical job... securely contain the filter element with positive internal sealing.

The IL8 series filter housings are the result of careful engineering. High grade materials are used to provide strength at critical stress points.

The cover and base are anodized aluminum, the handle is nickel plated ductile iron and the bowl is rugged carbon steel. The result is a reliable high performance filter for an array of applications.

### Cover

- Handle protects indicators from damage
- Easy on, easy off, for fast service

### Indicators

- You can tell element condition at a glance
- Both visual and electrical available

### Air Bleed

- Helps protect bearings and other sensitive components from trapped air

### Fill Port

- Prefilter the fluid, before it gets into the machine's system
- Purge air while filling

### Bowl

- Rugged cold drawn steel—excellent fatigue resistance
- Three sizes for any application: Single (8"), Double (16"), and Triple (39")

### Ports

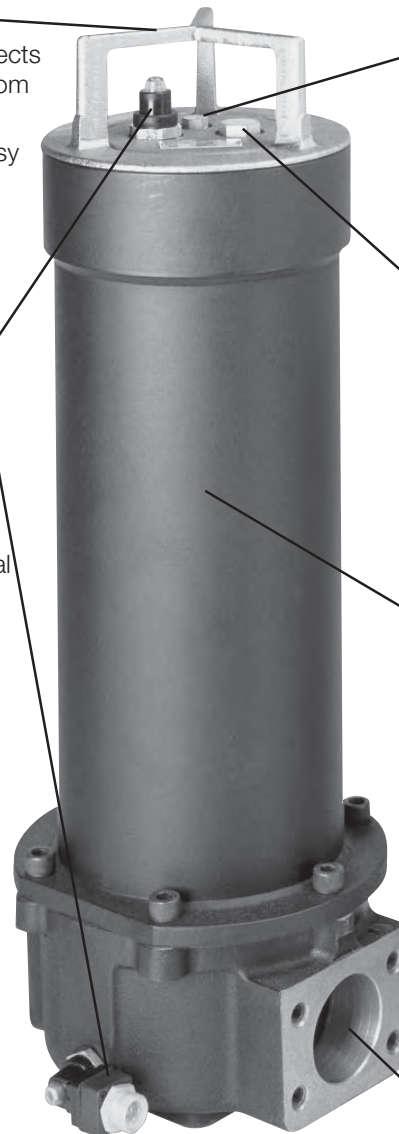
- SAE straight thread or flange face

### Drain Port (not visible)

- Clean and easy servicing
- Lets you drain bowl of fluid before element changes

### Bypass Valve (not visible)

- Soft seat design for zero internal leakage
- Located in cover assembly



# IL8/HDIL8 Filter

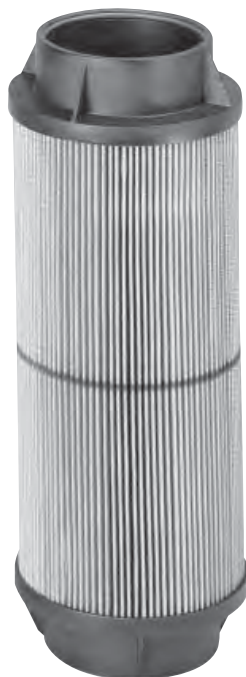
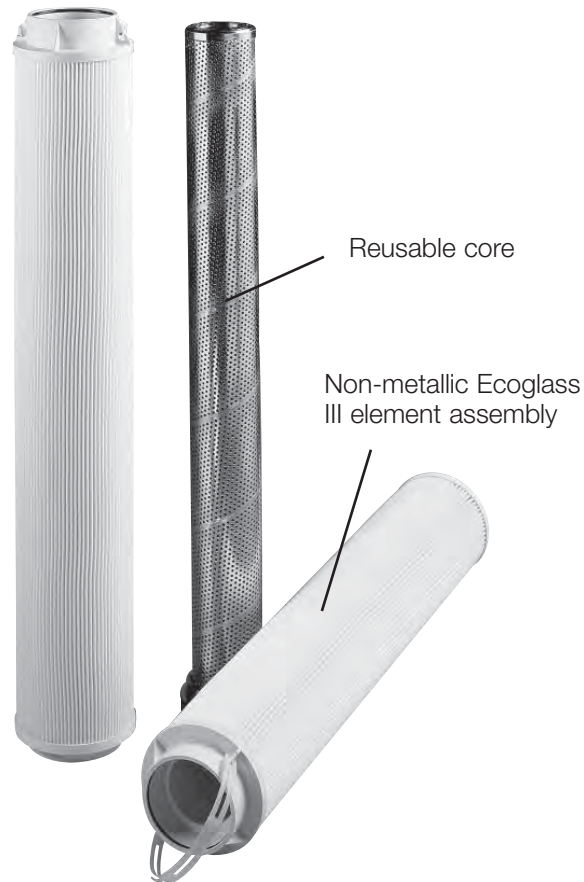
## Low Pressure

### Ecoglass III - Replacement Elements

Ecoglass III represents the merging of high performance filtration technology with environmentally conscious engineering. The Ecoglass III line of replacement elements feature 100% non-metallic construction. The design reduces solid waste and minimizes disposal costs for industry. The non-metallic construction means lightweight elements (60% less weight) for easier servicing.

The Ecoglass III elements utilizes the same proprietary media design as our Microglass III line of replacement elements.

With Ecoglass III, a reusable core is installed into the filter housing and remains in service throughout the life of the assembly.



### Microglass III - Replacement Elements

Microglass III represents a leap forward in the performance obtainable in hydraulic and lube filter elements.

The unique multi-layer design combines high efficiencies with exceptional dirt holding capacities for performance that is unequalled in the industry today. This performance is further

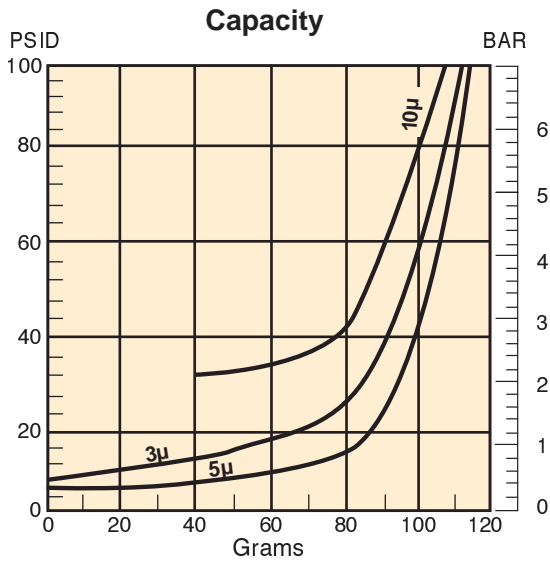
enhanced in the IL8 series with the introduction of the deep pleat design. The deep pleat element design increases the amount of media in the element and therefore capacity.

With Microglass III you do not have to make a compromise between efficiency and capacity, you can have both.

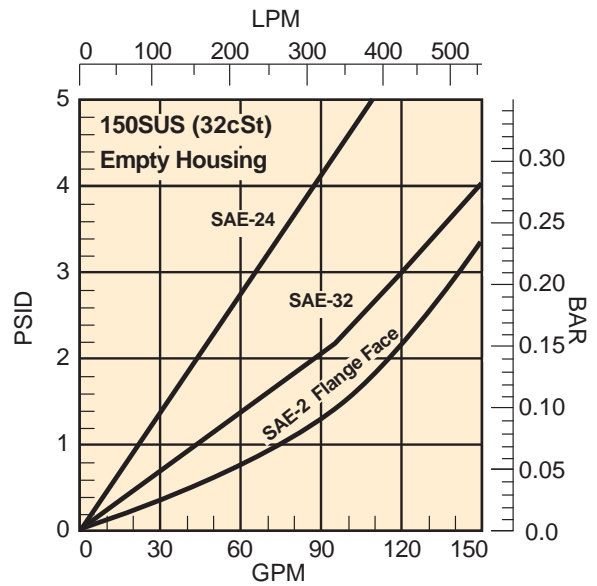
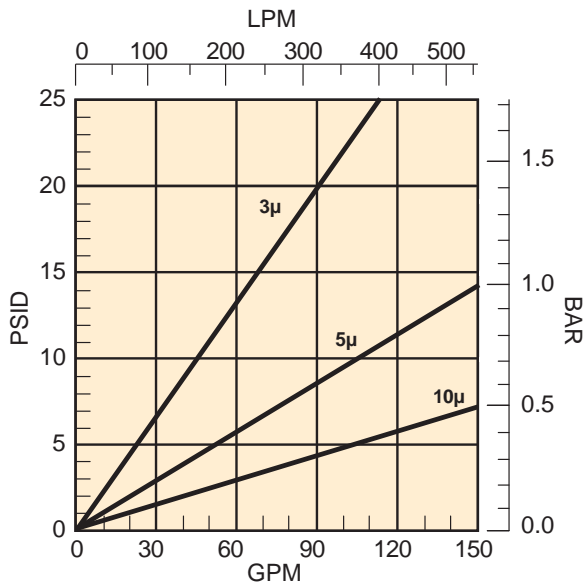
# IL8/HDIL8 Filter

## IL8-1 Performance

### IL8-1 Element Performance



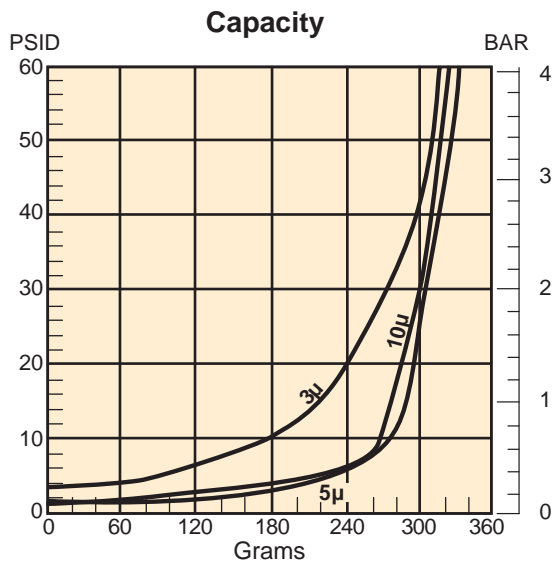
### Flow vs. Pressure Loss



# IL8/HDIL8 Filter

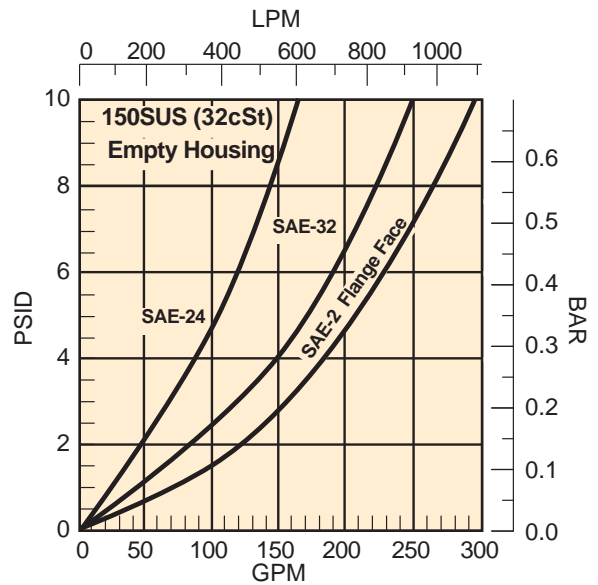
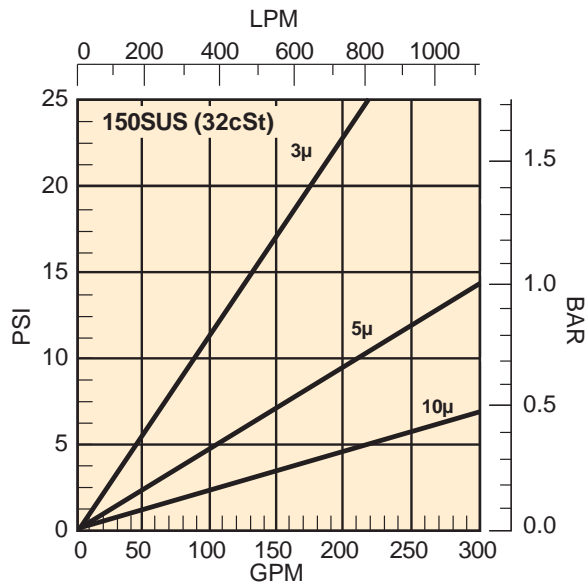
## IL8-2 Performance

### IL8-2 Element Performance



Multipass tests run @ 50 gpm to 50 psid terminal - 10mg/L BUGL

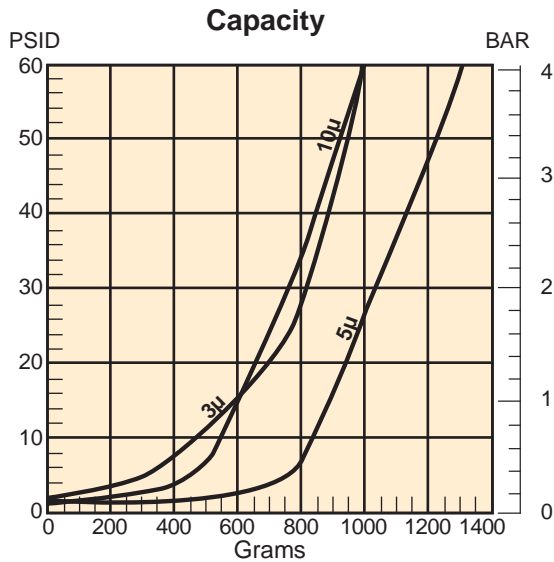
### Flow vs. Pressure Loss



# IL8/HDIL8 Filter

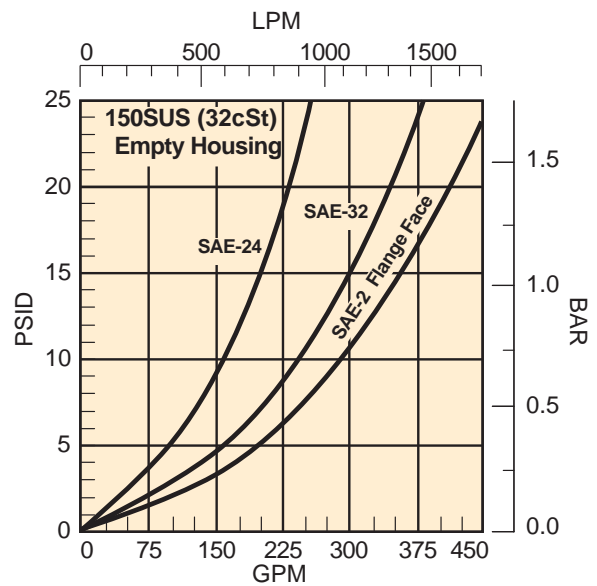
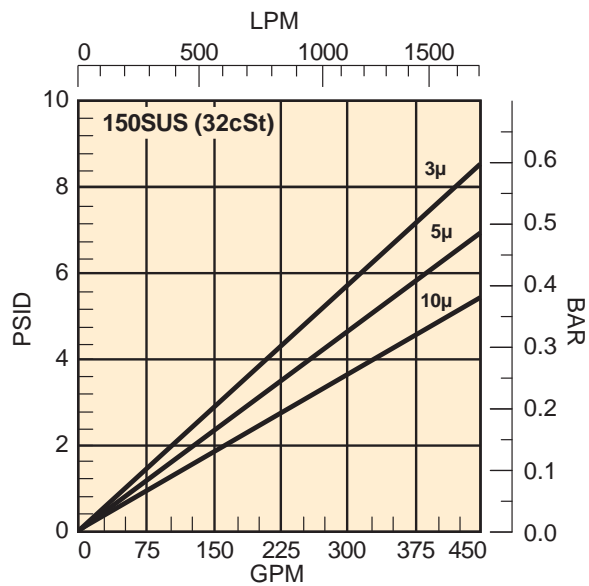
## IL8-3 Performance

### IL8-3 Element Performance



Multipass tests run @ 70 gpm to 50 psid terminal - 10mg/L BUGL

### Flow vs. Pressure Loss



# IL8 Filter

## Specifications

### Pressure Ratings:

Maximum Allowable Operating Pressure (MAOP): 500psi (34.5 bar)

Rated Fatigue Pressure: 330 psi (22 bar)

Design Safety Factor: 3:1

### Operating Temperatures:

Buna: -40°F (-40°C) to 225°F (107°C)

Fluorocarbon: -15°F (-26°C) to 275°F (135°C)

### Element Collapse Rating:

150 psid (10 bar)

### Element Condition Indicators:

Visual (optional)

Electrical -heavy duty (optional)

SPDT .25 amps (resistive) MAX 5 watts 12 to 28 VDC & 110 to 175 VAC

Note: Product of switching voltage and current must not exceed wattage rating

### Materials:

Bowl: low carbon steel

Cover: anodized aluminum

Handle: nickel plated ductile iron

Base: anodized aluminum

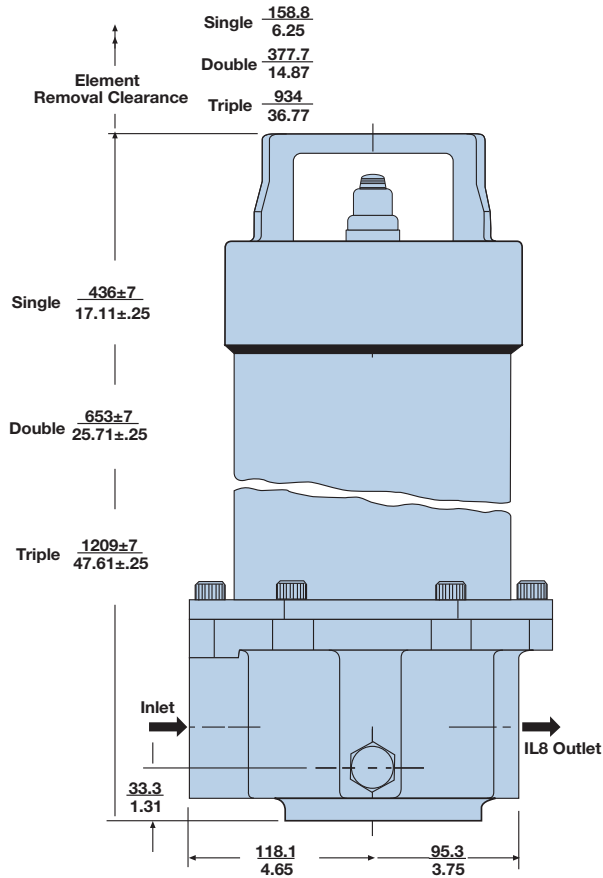
### Shipping Weights

#### (approximate):

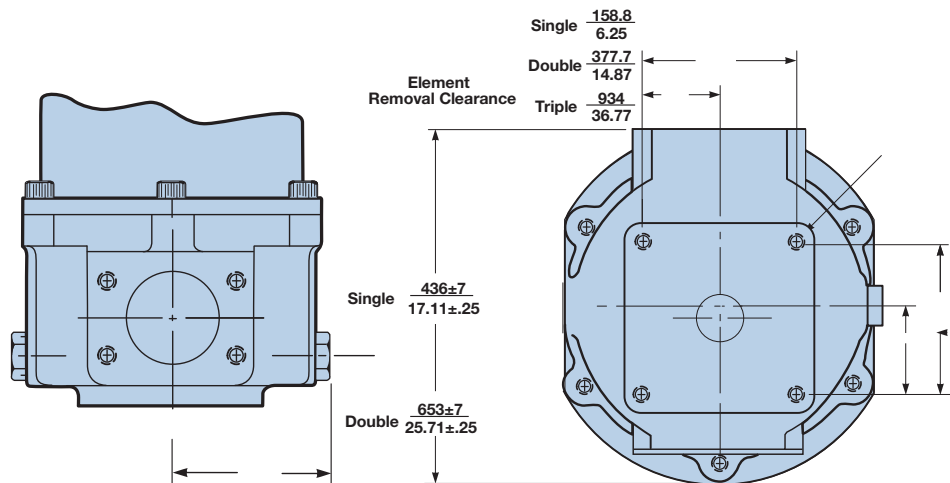
Single: 40 lbs. (18.1 kg)

Double: 50 lbs. (22.7 kg)

Triple: 75 lbs. (34 kg)



Linear Measure:  
 $\frac{\text{millimeter}}{\text{inch}}$





# HDIL8/HQIL8 Filter

## Specifications

### Pressure Ratings:

Maximum Allowable Operating Pressure (MAOP): 400psi (27 bar)  
 Rated Fatigue Pressure: 330psi (22 bar)  
 Design Safety Factor: 2.5:1

### Shipping Weights (approximate):

|         |                   |
|---------|-------------------|
| HDIL8-2 | 320 lbs. (145 kg) |
| HDIL8-3 | 375 lbs. (170 kg) |
| HQIL8-2 | 525 lbs. (238 kg) |
| HQIL8-3 | 650 lbs. (295 kg) |

### Operating Temperatures:

-15°F (-26°C) to 200°F (93°C)

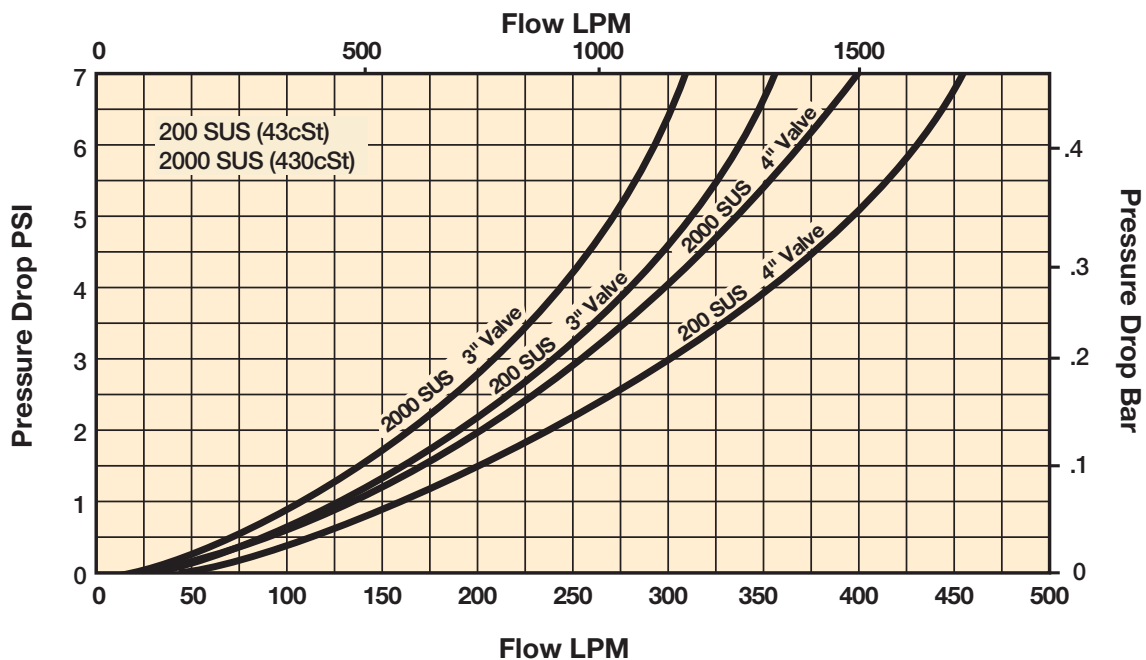
### Element Collapse Rating:

150 psid (10 bar)

### Materials:

Changeover valve: steel  
 Bowl: low carbon steel  
 Cover: anodized aluminum  
 Cover handle: nickel plated ductile iron  
 Base: steel

Changeover Valve Flow vs. Pressure Loss

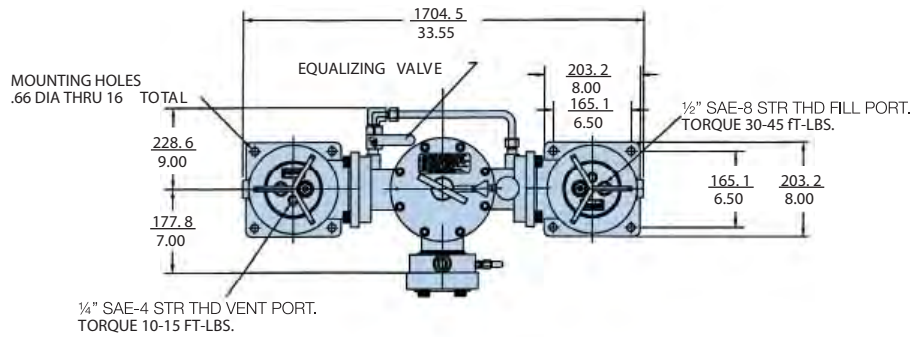


# HDIL8/HQIL8 Filter

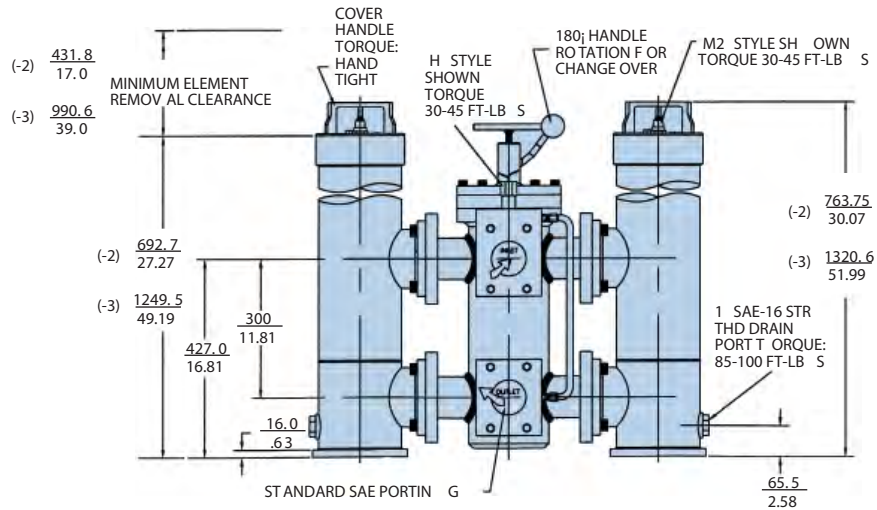
## Specifications

Linear Measure: millimeter  
inch

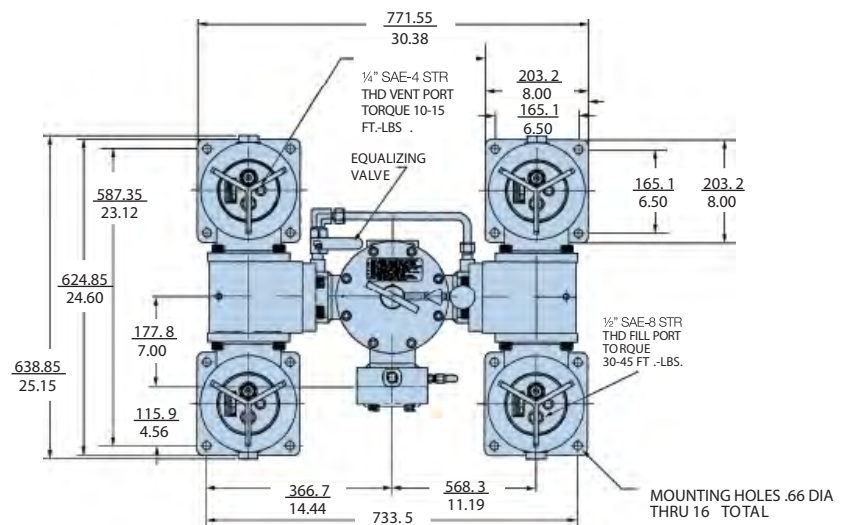
### HDIL8 Top View



### HDIL8/HQIL8 Side View



### HQIL8 Top View



# IL8/HDIL8/HQIL8 Filter

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

**Example:**

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 | BOX 9 | BOX 10 | BOX 11 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
|       |       | IL8   | 3     | R     | 10QE  | E3BP  | 50    | ST24  | 1      | V      |

| BOX 1: Division Code                                       |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive program identification. |             |

| BOX 2: Plant Code                                  |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive plant location. |             |

| BOX 3: Configuration |                          |
|----------------------|--------------------------|
| Symbol               | Description              |
| IL8                  | In-line Hydraulic Filter |
| HDIL8                | In-line Duplex Filter    |
| HQIL8                | In-line Quadplex Filter  |

| BOX 4: Housing Bowl Length               |               |
|--|---------------|
| Symbol                                   | Description   |
| 1*                                       | Single Length |
| 2  | Double Length |
| 3  | Triple Length |
| *NOTE: Not available for HDIL8 or HQIL8. |               |

| BOX 5: Core |                 |
|-------------|-----------------|
| Symbol      | Description     |
| None        | Disposable Core |
| R           | Reusable Core   |

| BOX 6: Element Filtration Rating                             |                      |
|--|----------------------|
| Symbol   | Description          |
| 3  | 3 Micron Microglass  |
| 5  | 5 Micron Microglass  |
| 10   | 10 Micron Microglass |
| 02QE   | Ecoglass III         |
| 05QE   | Ecoglass III         |
| 10QE   | Ecoglass III         |
| NOTE: Ecoglass III elements must utilize -R option in Box 4. |                      |

| BOX 7: Indicator Type  |   |
|--|---|
| Symbol   | Description                                 |
| P  | Port Plugged                                |
| M2   | Visual Auto Reset                           |
| IR   | Visual, Right Side                          |
| IL   | Visual, Left Side                           |
| E3B*   | Electrical/Visual                           |
| E4MB*  | Electrical/Visual                           |
| E4MC*  | Electrical/Visual                           |
| E5B*   | Electrical/Visual                           |
| E5MD*  | Electrical/Visual                           |
| F4MS   | Standard Dual output electrical indicator   |
| F4MN   | Device Net Dual output electronic indicator |
| F4MC   | MC Dual output electrical indicator         |
| NOTE: Two symbols required. First is for housing, second is for the cover(s). Electrical indicators only available on the housing. |   |
| *Please refer to indicator drawings and chart on pages 54 and 55 for connector and wiring options.                                 |   |

| BOX 8: Indicator Setting |  |
|--------------------------|--|
| Symbol                   | Description  |
| 25                       | 25 psid (1.7 bar)  |
| 35 <sup>1</sup>          | 35 psid (2.4 bar)  |
| 50                       | 50 psid (3.5 bar)  |
| 125                      | 125 psid (8.6 bar)<br>F4M indicator<br>w/ option -11 only. |

| BOX 9: Port Size |                              |
|------------------|------------------------------|
| Symbol           | Description                  |
|                  | <b>IL8</b>                   |
| FS               | SAE 2" Flange Face (code 61) |
|                  | <b>HDIL8/HQIL8</b>           |
| FS3              | 3" SAE Flange Face (code 61) |
| FS4              | 4" SAE Flange Face (code 61) |

| BOX 10: Options |                |
|-----------------|----------------|
| Symbol          | Description    |
| 1               | None           |
| 11              | Blocked bypass |

| BOX 11: Seal Compound |              |
|-----------------------|--------------|
| Symbol                | Description  |
| V                     | Fluorocarbon |

**Notes:**

- 35 psid indicator setting only available in F4M indicator type.

## Replacement Elements

| Microglass III (Fluorocarbon) |         |         |         | Ecoglass III (Fluorocarbon) |        |         |         |
|-------------------------------|---------|---------|---------|-----------------------------|--------|---------|---------|
| Media                         | Single  | Double  | Triple  | Media                       | Single | Double  | Triple  |
| 3                             | 927663Q | 933044Q | 932872Q | 02QE                        | NA     | 933834Q | 933734Q |
| 5                             | 927861Q | 933045Q | 932873Q | 05QE                        | NA     | 933835Q | 933612Q |
| 10                            | 927661Q | 933046Q | 932874Q | 10QE                        | NA     | 933836Q | 933735Q |
|                               |         |         |         | Reusable Core               | NA     | 933838  | 933636  |

# Splash Lube Filter

## Special Applications Filters

### Splash Lube Filters - 150 psi Application

#### Non-Bypass Design

#### 10 and 25 Micron Cellulose

#### Electrical or Gauge Indicator

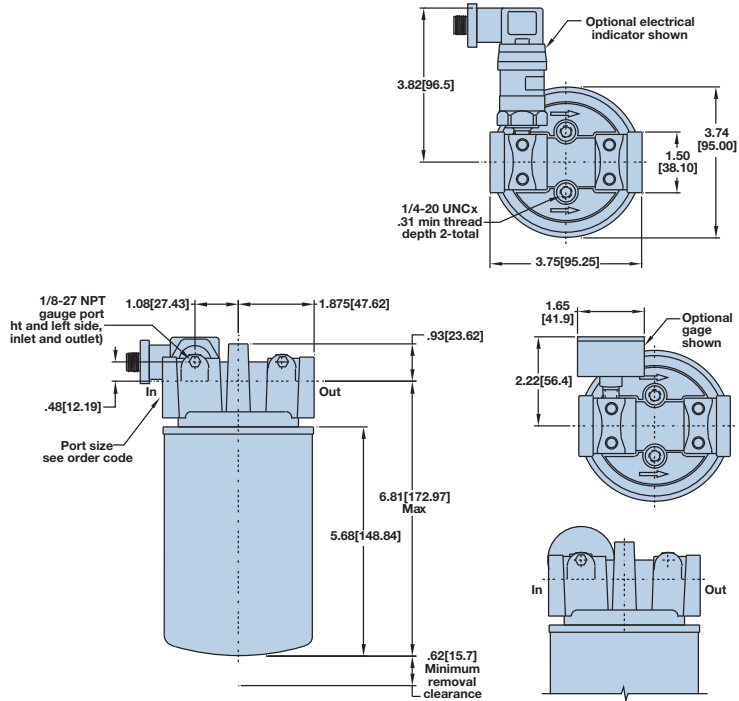
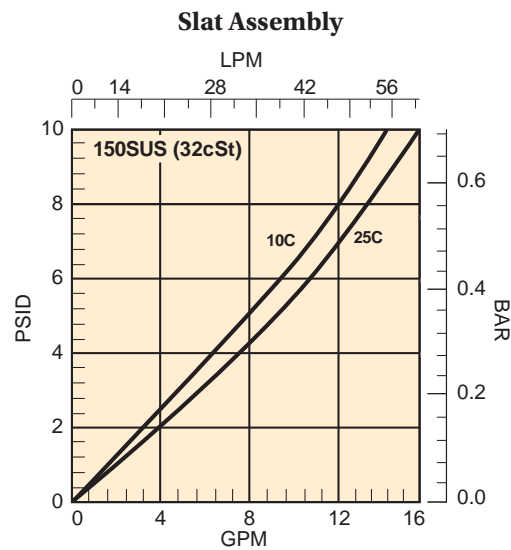
With 25 psi (1.7 bar)  $\Delta P$  setting.  
For electrical indicator options  
and factory pin wiring,  
see pages 53-54.

#### Prevention Feature

Prevents filter operation without  
element in place.

#### Mounting Provisions

Located on top of filter.



|   |   |                           |   |                                    |   |   |
|---|---|---------------------------|---|------------------------------------|---|---|
| <b>Assembly <math>\Delta P</math> Formula</b> |   |                           |   |                                    |   |   |
| $\Delta P$                                    | = | $\Delta P$ Empty Housing+ | x | $\frac{\text{New Viscosity}}{150}$ | x | $\frac{\text{New Specific Gravity}}{.90}$ |
| Assembly                                      |   | Element $\Delta P$        |   |                                    |   |   |

Note: For "H" High collapse elements use 1.4 x  $\Delta P$  from curves above.

# Splash Lube Filter

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

**Example:**

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 |
|-------|-------|-------|-------|-------|-------|-------|-------|
|       |       | SLAT  | 10C   | G     | 25    | ST12  | N     |

| BOX 1: Division Code                                       |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive program identification. |             |

| BOX 2: Plant Code                                  |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive plant location. |             |

| BOX 3: Configuration |                  |
|----------------------|------------------|
| Symbol               | Description      |
| SLAT                 | Splash Lube 12AT |

| BOX 4: Canister Media |                     |
|-----------------------|---------------------|
| Symbol                | Description         |
| 10C                   | 10 Micron Cellulose |
| 25C                   | 25 Micron Cellulose |

| BOX 5: Indicator Type  |  |
|--|--|
| Symbol   | Description  |
| G*   | Gauge, Left Side   |
| PS3*   | Pressure switch, left side with 3-pin Brad Harrison style connection |
| PS4*   | Pressure switch, left side with 4-pin Brad Harrison style connection |
| PS5*   | Pressure switch, left side with 5-pin Brad Harrison style connection |
| *Please refer to indicator drawings and chart on pages 54 and 55 for connector and wiring options. Example: PS4MD. Indicator type gauge or switch supplied with 3 plugs. |  |

| BOX 6: Indicator Setting |                   |
|--------------------------|-------------------|
| Symbol                   | Description       |
| 25                       | 25 psid (1.7 bar) |

| BOX 9: Port Size |                             |
|------------------|-----------------------------|
| Symbol           | Description                 |
| P12              | 3/4-14 NPT                  |
| ST12             | 1 1/16-12 UN-2B (ISO 11926) |
| M27              | M27 x 2 (ISO 6149)          |
| G12              | 3/4-14 BSPP (ISO 1179 G228) |

| BOX 8: Seal Compound |             |
|----------------------|-------------|
| Symbol               | Description |
| N                    | Nitrile     |

## Replacement Canisters

| Symbol | Part Number |
|--------|-------------|
| 10C    | 921999      |
| 25C    | 925023      |

# Electrical Information

## Pictorial Guide and Specifications

### F4M Electronic Indicator

|      |                    | Part Number | Indication Pressure |
|------|--------------------|-------------|---------------------|
| F4MS | PNP N/C Standard   | 937037 W3   | 8.5 bar (125 psi)   |
|      | PNP N/C Standard   | 942638 W6   | 8.5 bar (125 psi)   |
|      | PNP N/C Standard   | 942711 W3   | 1.5 bar (22 psi)    |
| F4MN | PNP N/C Device Net | 937409 W3   | 8.5 bar (125 psi)   |
|      | PNP N/C Device Net | 942743 W6   | 8.5 bar (125 psi)   |
|      | PNP N/C Device Net | 942744 W3   | 1.5 bar (22 psi)    |
| F4MC | PNP N/C            | 942745 W3   | 8.5 bar (125 psi)   |
|      | PNP N/C            | 942746 W6   | 8.5 bar (125 psi)   |
|      | PNP N/C            | 942747 W3   | 1.5 bar (22 psi)    |



**DC3 Pressure Switch  
Type SE Electrical Housing**



**HF2, HF3, HF4  
Type E Electrical Indicator**

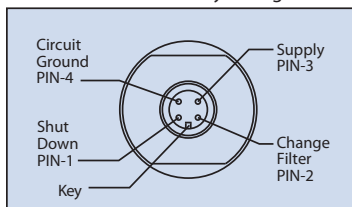


**SLAT  
Type PS Electrical Indicator**

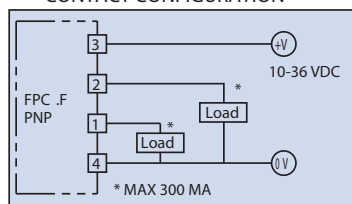
| Ind. press | LED status | Output2  | Output1  |
|------------|------------|----------|----------|
| Power on   | ⊗          | Active   | Active   |
| 50%        | ⊗ ⊗        | Active   | Active   |
| 75%        | ⊗ ⊗ ⊗      | Inactive | Active   |
| 100%       | ⊗ ⊗ ⊗ ⊗    | Inactive | Inactive |

#### F4MS

937037: 4-pin Micro Receptacle  
Standard Factory Wiring

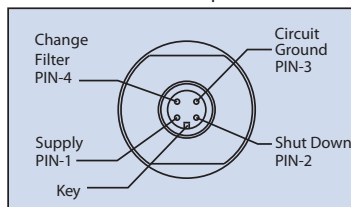


#### CONTACT CONFIGURATION

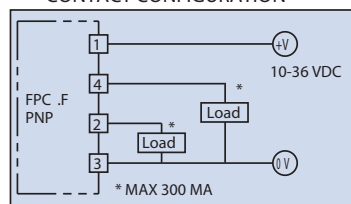


#### F4MN

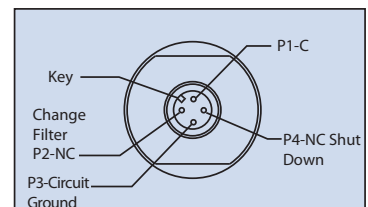
937409: 4-pin Micro Receptacle  
Device Net Compatible



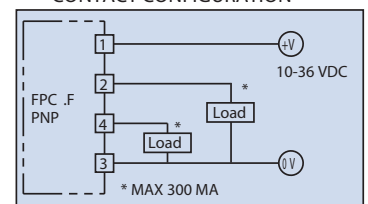
#### CONTACT CONFIGURATION



#### F4MC



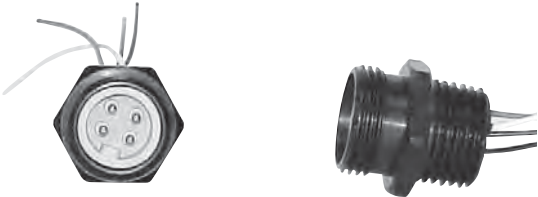
#### CONTACT CONFIGURATION



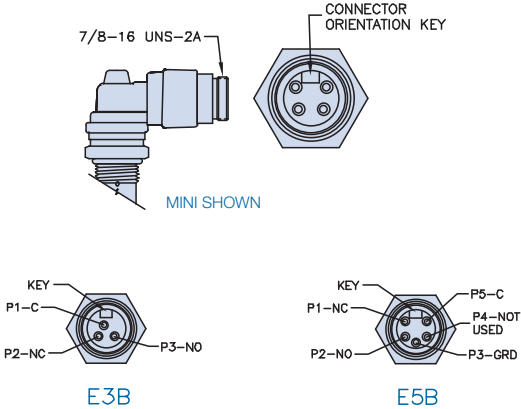
# SAE Series Filters

## Electrical Information

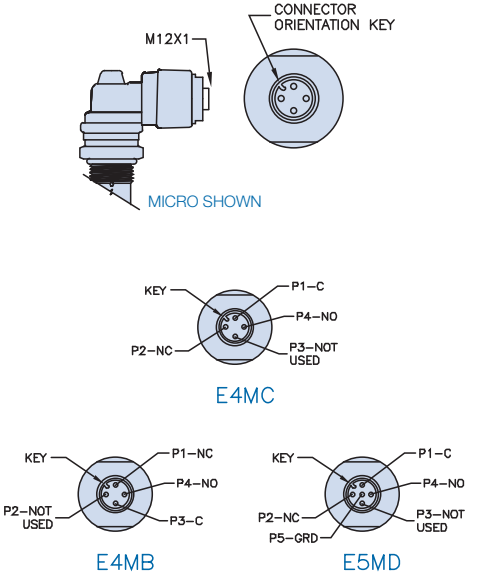
### Pictorial Guide and Specifications



**Mini Connector**



**Micro Connector**



### Connector and Wiring Options

| PINS | TYPE  | WIRING TYPE | PIN 1 | PIN 2    | PIN 3    | PIN 4    | PIN 5 | E TYPE INDICATORS<br>IND. SWITCH SETTING |        |
|------|-------|-------------|-------|----------|----------|----------|-------|--|--------|
|      |       |             |       |          |          |          |       | 25 PSI                                   | 50 PSI |
| 3    | MINI  | E3B         | C     | NC       | NO       |          |       | 935952                                   | *      |
| 4    | MICRO | E4MB        | NC    | NOT USED | C        | NO       |       | 935325                                   | 934912 |
| 4    | MICRO | E4MC        | C     | NC       | NOT USED | NO       |       | 935722                                   | 935723 |
| 5    | MINI  | E5B         | NC    | NO       | GRD      | NOT USED | C     | 934928                                   | 934930 |
| 5    | MICRO | E5MD        | C     | NC       | NOT USED | NO       | GRD   | 934601                                   | 934595 |

\*Consult factory



aerospace  
 climate control  
 electromechanical  
**filtration**  
 fluid & gas handling  
 hydraulics  
 pneumatics  
 process control  
 sealing & shielding



# Portable Filter Carts

Models 5MFP & 10MFP with Moduflow™ *Plus*  
 and Intelli-Cart™



ENGINEERING YOUR SUCCESS.



# Portable Filter Carts

## Applications

- **Filtering new fluid before putting into service**
- **Transferring fluid from drums or storage tanks to system reservoirs**
- **Conditioning fluid that is already in use**
- **Complimenting existing system filtration**
- **Removing free and emulsified water from a system**
- **For use with fluids such as hydraulic, gear and lube oils**

Parker portable filter carts are the ideal way to prefilter and transfer fluids into reservoirs or to clean up existing systems.

Fluid should always be filtered before being put into use. New fluid is not necessarily clean fluid. Most new fluids (right out of the drum) are unfit for use due to high initial contamination levels. Contamination, both particulate and water, may be added to a new fluid during processing, mixing, handling and storage.

Water is removed by installing Par-Gel™ elements in the outlet filter. Par-Gel™ elements are made from a polymer which has a very high affinity for free water.

Once water comes into contact with this material, it is removed from the system.

The Parker portable filter cart uses two high capacity ModuFlow™ Plus filters for long element life and better system protection. The first stage (inlet) filter captures larger particles, while the second stage (outlet) filter captures finer particles or removes water. A rugged industrial quality gear pump gets the job done fast.

Using a Parker portable filter cart is the most economical way to protect your system from the harm that can be caused by contamination.

| Features  | Advantages  | Benefits   |
|---|---|--|
| <ul style="list-style-type: none"> <li>• Two filters instead of one w/ 2.5 times increased dirt holding capacity</li> </ul> | <ul style="list-style-type: none"> <li>• Pump protection and long element life</li> </ul>                     | <ul style="list-style-type: none"> <li>• Element cost savings and trouble-free service</li> </ul>      |
| <ul style="list-style-type: none"> <li>• Wide variety of particulate elements available</li> </ul>                          | <ul style="list-style-type: none"> <li>• Capable of getting a fluid to a desired cleanliness level</li> </ul> | <ul style="list-style-type: none"> <li>• Extends fluid life and system performance</li> </ul>          |
| <ul style="list-style-type: none"> <li>• Par-Gel™ water removal elements available</li> </ul>                               | <ul style="list-style-type: none"> <li>• Removes “free water” from a system</li> </ul>                        | <ul style="list-style-type: none"> <li>• Gets dirt and water out of system with one process</li> </ul> |
| <ul style="list-style-type: none"> <li>• Heavy duty frame</li> </ul>  | <ul style="list-style-type: none"> <li>• Rugged and durable</li> </ul>  | <ul style="list-style-type: none"> <li>• Built to last</li> </ul>                                      |
| <ul style="list-style-type: none"> <li>• Lightweight and portable</li> </ul>  | <ul style="list-style-type: none"> <li>• Easy to move from place-to-place</li> </ul>                          | <ul style="list-style-type: none"> <li>• One person operation</li> </ul>                               |
| <ul style="list-style-type: none"> <li>• Two flow rates available: 5 gpm or 10 gpm</li> </ul>                               | <ul style="list-style-type: none"> <li>• Enables use in low or high viscosity applications</li> </ul>         | <ul style="list-style-type: none"> <li>• Matched to your needs</li> </ul>                              |
| <ul style="list-style-type: none"> <li>• Eleven-foot hose and wand assemblies included</li> </ul>                           | <ul style="list-style-type: none"> <li>• Additional hardware not necessary</li> </ul>                         | <ul style="list-style-type: none"> <li>• Ready to use as received</li> </ul>                           |

# Portable Filter Carts

## Applications

### Hose & wand assembly

- Ready to use; no additional hardware needed
- Flexible hoses for tight spots
- Kink-resistant hose prevents pump cavitation

### Visual indicator

- Tells you when to change element

### Heavy Duty frame

- Rugged and built to last

### Dual filters

- Two stage, double length filtration for long element life and pump protection

### Elements (not shown)

- Available for both particulate and Water Removal (WR) in double length w/ 2.5 times increased dirt holding capacity

### icountPD (Intelli-Cart™ option)

- Early warning LED or digital display indicators for Low, Medium and High contamination levels
- Self diagnostic software

### Service cover

- Top-accessible for easy changing of elements

### Electrical Cord

- 6 ft. with ON/OFF switch
- Optional 20 ft. cord with retractable reel & mounted power switch with thermal overload protection

### 110V/220V AC motor

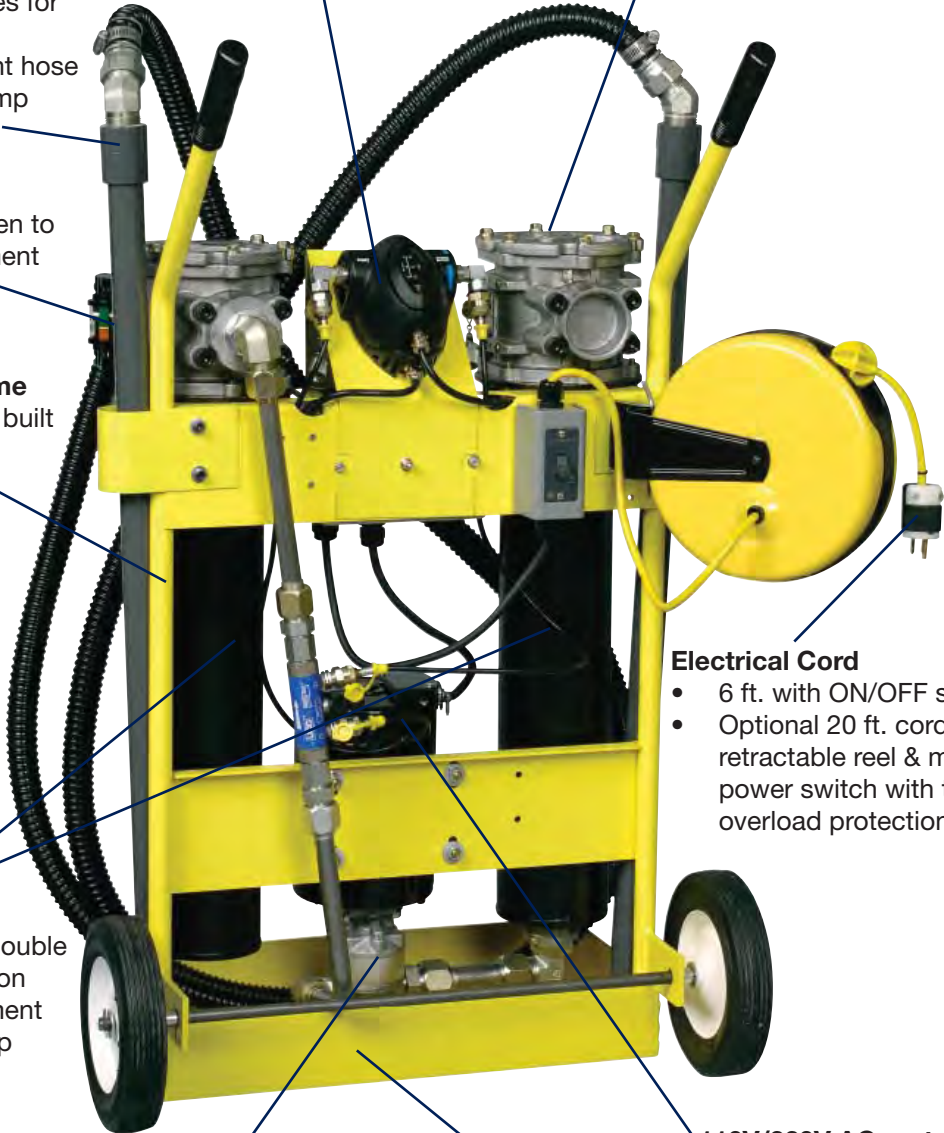
- Industrial brand name

### Gear pump

- Industrial quality
- Quiet operation
- Dependable, long life

### Drip tray

- Helps keep the work area safe and clean



# Portable Filter Carts

## Specifications

### Maximum Recommended Fluid

#### Viscosity:

5MFP – 3000 SUS (647cSt)  
0.85 specific gravity

10MFP – 500 SUS (108 cSt)  
0.85 specific gravity

### Visual Indicator (outlet filter):

Visual differential type  
3-band (clean, change, bypass)

### Filter Bypass Valve Settings

#### (Integral to Element):

Inlet – 3 psid (0.2 bar)  
Outlet – 35 psid (2.4 bar)

### Operating Temperature:

Seal option “B” (standard)  
-40°F to +150°F (-40°C to +66°C)

### Electrical Service Required:

5MFP – 110/220 volts, 60/50  
Hz, single phase, 8/4 amps  
10MFP – 110/220 volts, 60/50  
Hz, single phase, 10/5 amps

### Electrical Motor:

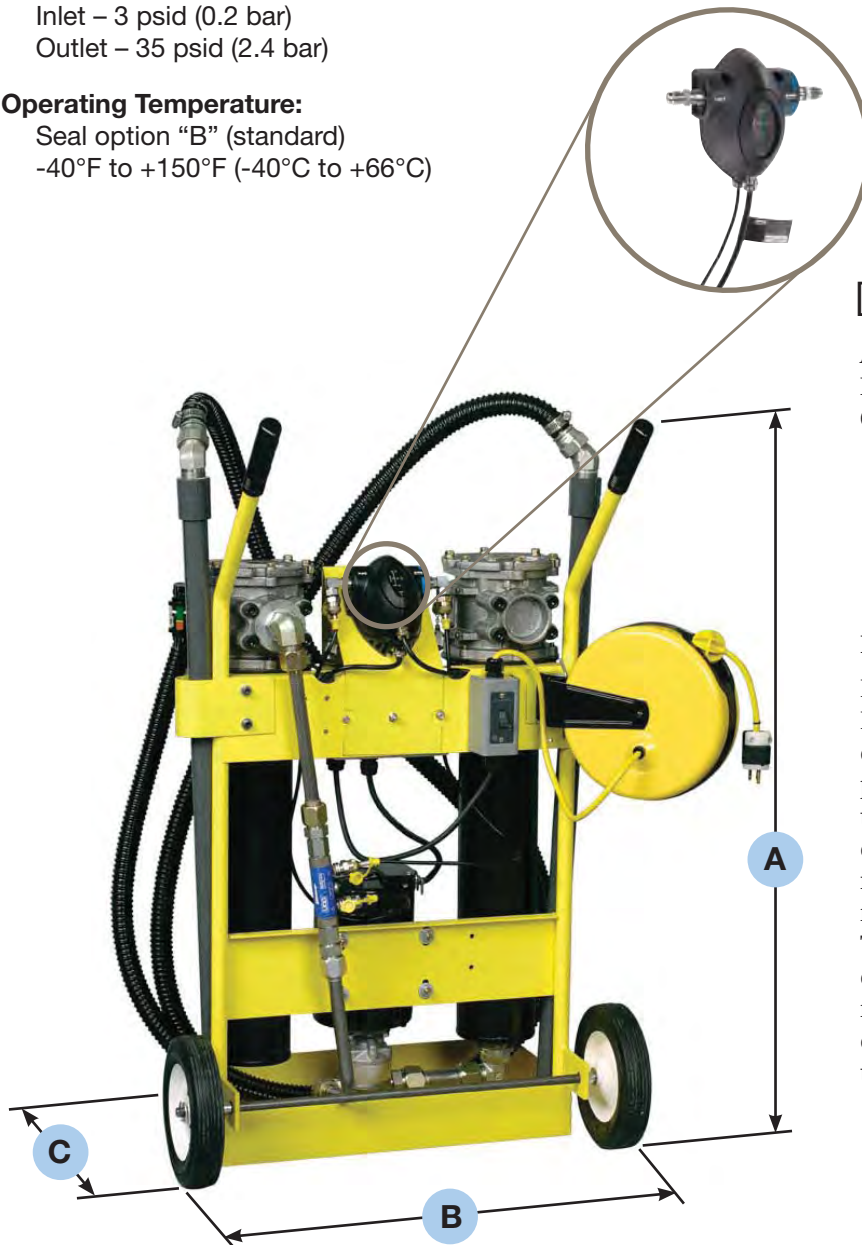
5MFP – ½ hp @ 1725 rpm,  
Open, Drip Proof  
10MFP – ¾ hp @ 3450 rpm,  
Open, Drip Proof  
Thermal overload protection

### Construction:

Cart frame – Steel  
Filter head – Aluminum  
Filter bowl – Steel  
Hoses – PVC (Std.)  
EPDM (high temp option)  
Wands – PVC (Std.)  
Steel tube (high temp  
option)

### Weight:

110 lbs. (45.4kg)



## Dimensions:

A = Height: 1034mm (40.7 in.)

B = Width: 648mm (25.5 in.)

C = Depth: 503mm (19.8 in.)

## New feature!

### Intelli-Cart™

Parker is pleased to announce its R&D effort to offer a diagnostic filter cart - the Intelli-Cart. The icountPD particle detector, the most up-to-date technology in solid particle detection, can be mounted to the standard frame of the filter cart for enhanced monitoring of your hydraulic system. The icountPD, coupled with the filter cart is a cost effective solution to fluid management and contamination control. Ask your sales representative today for more information.

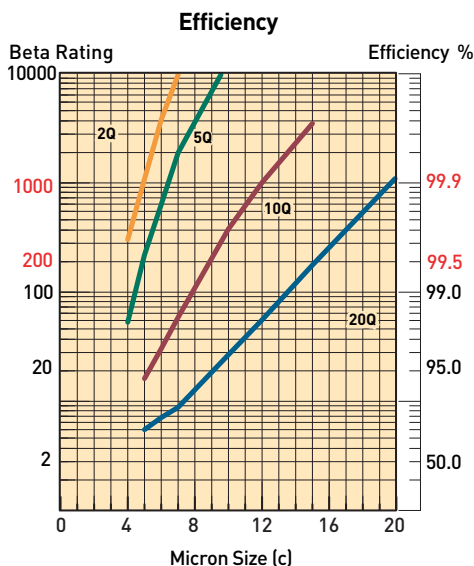
## Typical Fluid Cleanliness Level Requirements

Many manufacturers of hydraulic components have established fluid cleanliness levels for their components. Using a portable filter cart can be a very effective way to reach and maintain these cleanliness levels.

| Component                               | ISO Cleanliness Level |
|---|-----------------------|
| Servo control valves                    | 16/14/11              |
| Proportional valves                     | 17/15/12              |
| Vane and piston pumps/motors            | 18/16/13              |
| Directional and pressure control valves | 18/16/13              |
| Gear pumps/motors                       | 19/17/14              |
| Flow control valves cylinders           | 20/18/15              |
| New fluid                               | 20/18/15              |

## Filter Cart Element Performance

| Media Code | Filter Media   | Capacity (Grams) |
|------------|----------------|------------------|
| 40W        | Woven Wire     | *                |
| 40SA       | Synthetic      | *                |
| 20Q        | Microglass III | 140              |
| 10Q        | Microglass III | 135              |
| 05Q        | Microglass III | 130              |
| 02Q        | Microglass III | 110              |



Notes: Multipass test run @ 80 gpm to 50 psid terminal - 5 mg/l BUGL.

## Filter Cart Performance

Fluid cleanliness levels are a function of initial contamination levels, contamination ingress rates, reservoir size and filter element efficiency. The chart below lists approximate time requirements to achieve certain cleanliness levels based on the assumptions noted.

| Reservoir Capacity (Gallons) | Time Required (Hours) | Projected Cleanliness Level (ISO) |
|------------------------------|-----------------------|-----------------------------------|
| 50                           | 0.5                   | 20/18/15                          |
| 50                           | 1.0                   | 17/15/12                          |
| 50                           | 2.5                   | 16/14/11                          |
| 100                          | 1.5                   | 18/16/13                          |
| 100                          | 2.5                   | 17/15/12                          |
| 100                          | 4.0                   | 16/14/11                          |
| 200                          | 2.5                   | 19/17/14                          |
| 200                          | 3.5                   | 18/16/13                          |
| 200                          | 5.0                   | 17/15/12                          |

Notes:

The results in the chart are based on the following assumption:

1. Initial contamination level is 500,000 particles greater than 10 micrometers per 100 ml of fluid (10MFP cart).
2. Inlet filter fitted with 40SA element; outlet with 20Q element.
3. System ingress rate equal to  $1 \times 10^6$  particles greater than 10 micrometers entering the system per minute.

The Intelli-Cart™ with particle detector provides an excellent method for filtering and trending contamination levels.

For optimum particle detector performance results when monitoring contamination levels, fluid viscosity range should be 50 - 250 SUS.

## Par-Gel™ Media Water Capacity

| Model | Fluid Viscosity | Capacity |
|-------|-----------------|----------|
| 5MFP  | 75 SUS          | 600 ml   |
|       | 200 SUS         | 420 ml   |
| 10MFP | 75 SUS          | 500 ml   |
|       | 200 SUS         | 300 ml   |

Notes:

1. Par-Gel™ elements are designed to remove “free water”, which is defined as water that is above a particular fluid’s saturation level.
2. Capacity is very dependent on flow rate and viscosity. Not recommended with fluids in excess of 500 SUS.

## Assembly

1. Install hoses to inlet and outlet filters by threading the hose end with the straight thread o-ring seal fitting into the filter flange.
2. Connect the PVC tube wands to the swivel fitting on the hose end. When servicing the PVC tube wand, do not over-torque the metal fittings going into the PVC coupling. Over-torque will result in cracking the coupling. Generally, 1/4 turn beyond hand-tight is sufficient.
3. The Intelli-Cart™ is shipped with a bag that contains user manuals, iPD programming disk, and accessory parts.
4. The iPD is shipped with the factory default setting. Users can reprogram the iPD with the cable located in the attached bag, the program disk and the iPD owners manual.

## Operating Instructions

1. Insert the inlet wand assembly into the supply fluid receptacle (drum/reservoir). The RFP filter is the inlet filter.
2. Insert the outlet wand assembly into the clean fluid receptacle (drum/reservoir). The ILP filter is the outlet filter.
3. Verify that the ON/OFF switch is OFF and plug the cord into the proper grounded power source (3 wire).
4. Turn switch to ON position and check outlet wand for oil flow. Allow 30 to 60 seconds for filters to fill with oil. If repeated attempts to obtain oil flow fail, check pump inlet fittings for tightness, remove inlet filter access cover and verify the cover sealing o-ring is in place. For very viscous fluids it may be necessary to pour 1 or 2 quarts of fluid into the RFP inlet filter housing to prime pump initially.
5. The condition of the filter element should be monitored by observing the cleanliness indicator on the outlet filter. When the indicator is in the CHANGE position, both inlet

and outlet filter elements MUST be replaced to prevent fluid from going through the bypass in the filters.

6. The inlet filter element is provided with a 3PSI bypass spring, and prevents the pump from cavitating if the element is not changed. The outlet filter element is provided with a 35PSI bypass spring to prevent excessive pressure which may be harmful to personnel or to the filter cart.

**Warning:** The filter bypass spring acts as a relief valve for the pump. Do not restrict the outlet hose with a shut-off valve which will defeat the function of the bypass valve, causing excessive pressure, which may be harmful to personnel or to the filter cart.

7. The cleanliness indicator works on differential pressure and will indicate the condition of the element (CLEAN, CHANGE, or BYPASS).

**NOTE:** The filter cart must be in operation for the indicator to read properly.

## Maintenance Instructions

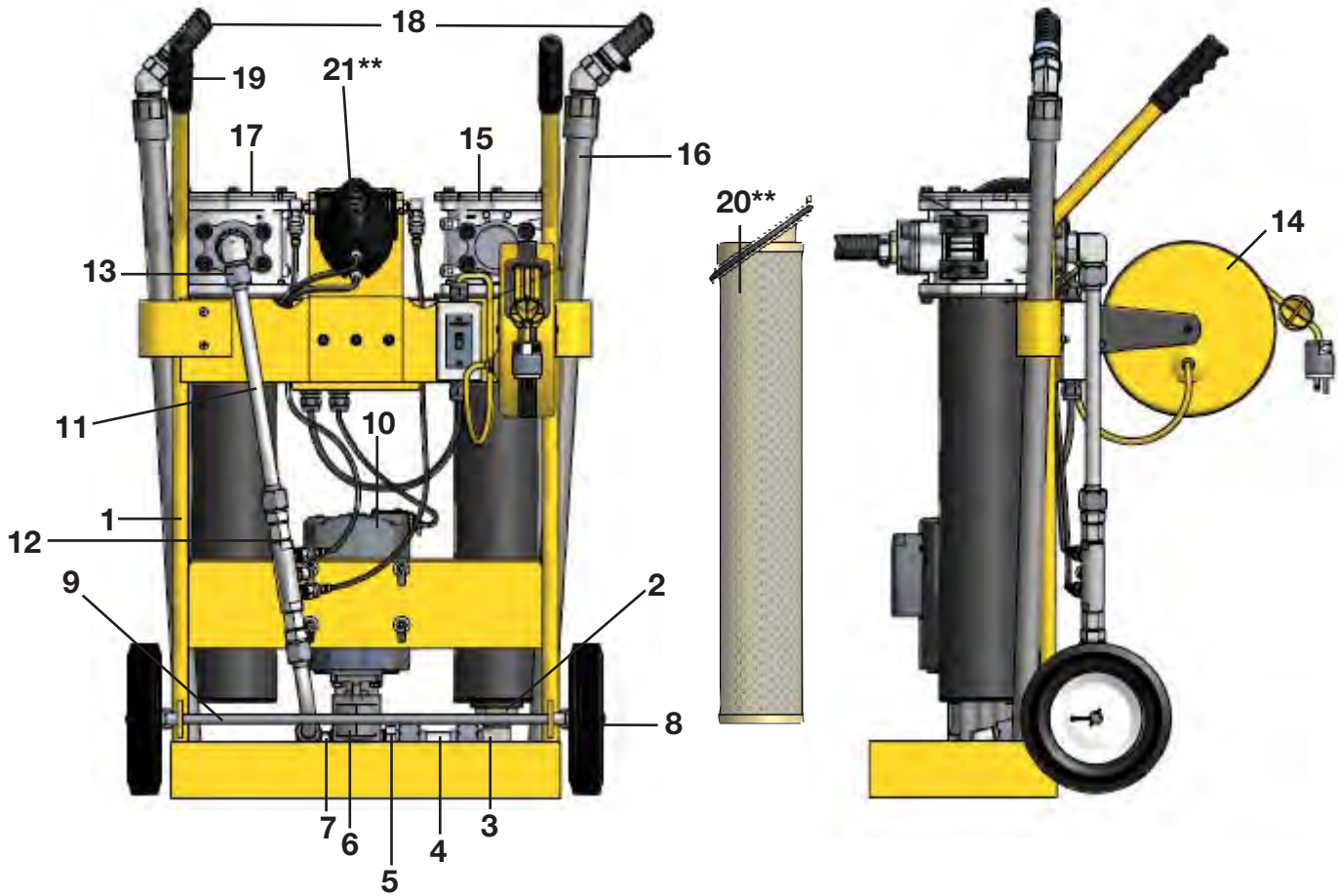
1. Turn switch to OFF position and unplug cord from electrical outlet.

2. Remove tube wands from oil to prevent siphoning.
3. Loosen hex head screws on filter cover. Turn cover to clear screws, remove cover.
4. Pull filter element from the filter head.
  - a) Replace the synthetic or Microglass III elements. Verify correct element replacement.
  - b) Wire mesh elements can be cleaned. Ultrasonic cleaners provide best results.
5. Install element in filter housing. Make sure element o-rings seat properly into the head, making sure that the notch on the element lines up with the notch in the head.
6. Inspect the cover o-ring and replace if necessary.
7. Replace cover and tighten hex head screws until they are snug. Do not over-torque (16 - 19 Ft. Lbs.) these screws. Do not interchange the inlet filter cover with the outlet filter cover. (The inlet filter has a "RFP" prefix, the outlet filter has a "ILP" prefix).
8. Contact the HFD service department at 419-644-0259 regarding iPD calibration.
9. iPD removal: remove oil lines from the iPD at the two fittings closest to the iPD. Disconnect the two cables from the iPD. Remove iPD from cart via two screws. The cart can be used without the iPD as long as the sample hoses are removed from the System 20. Protect sampling connectors from contamination.

## Trouble Shooting

| Problem                           | Cause  | Solution   |
|-----------------------------------|--|--|
| Does not start                    | ON/OFF Switch<br>No electrical power<br>Defective motor                  | Turn switch ON, replace switch if defective<br>Plug in cart<br>Replace   |
| No oil flow or erratic pump noise | Filter housing not filled with oil<br>Suction leak<br><br>Defective pump | Allow pump to run 30 to 60 seconds<br>Check tightness of inlet fittings<br>Check o-ring in inlet filter cover for nicks<br>Kink or restriction in inlet hose<br>Add 1 or 2 quarts of oil to inlet filter<br>Replace pump |
| Indicator reads CHANGE or BYPASS  | Element dirty<br>Oil extremely cold or viscous                           | Replace or clean elements (both filters)<br>Change element to coarser micron rating  |
| Indicator does not seem to move   | No outlet element<br>40 micron element installed in outlet filter        | Install element<br>Check cart model number to verify correct element. The inlet filter has a rating RFP prefix; the outlet filter has an ILP prefix  |

# Filter Cart Replacement Parts



| Item No. | Part No.     | Description                           | Qty |
|----------|--------------|---------------------------------------|-----|
| 1        | 928690       | Frame                                 | 1   |
| 1        | 941468       | Frame (Intelli-Cart™)                 | 1   |
| 2        | 940980       | Pipe Reducer Fitting                  | 1   |
| 3        | 940979       | Tube Fitting                          | 1   |
| 4        | 937526       | Suction Tube Assy.                    | 1   |
| 5        | 928652       | Adapter Fitting                       | 1   |
| 6        | 928731       | Pump                                  | 1   |
| 7        | 940977       | Adapter Fitting                       | 1   |
| 8        | 928650       | Wheel                                 | 2   |
| 9        | 928653       | Axle                                  | 1   |
| 10       | 928678       | Motor 10MFP                           | 1   |
| 10       | 929692       | Motor 5MFP                            | 1   |
| 11       | 937527       | Discharge Tube Assy.                  | 1   |
| 12       | 941467       | Discharge Tube Top (Intelli-Cart™)    | 1   |
|          | 941466       | Discharge Tube Bottom (Intelli-Cart™) | 1   |
|          | STI.0144.100 | System 20 (Intelli-Cart™)             | 1   |
|          | 3/8-8F40HG5S | System 20 Fitting 1 (Intelli-Cart™)   | 2   |
|          | 12/8 F50X-S  | System 20 Fitting 2 (Intelli-Cart™)   | 2   |

| Item No. | Part No.     | Description                      | Qty |
|----------|--------------|----------------------------------|-----|
| 13       | 940978       | Tube Fitting                     | 1   |
| 14       | 928623       | Cord Reel                        | 1   |
| 15       | 940960       | Inlet Filter – Nitrile           | 1   |
| 15       | 941024       | Inlet Filter – Fluorocarbon      | 1   |
| 16       | 928784       | Tube Wand Assy. – Seal Option B  | 2   |
| 17       | 940961       | Outlet Filter – Nitrile          | 1   |
| 17       | 941025       | Outlet Filter – Fluorocarbon     | 1   |
| 18       | 928663       | Hose Assy. – Seal Option B       | 2   |
| 19       | 928651       | Handle Grip                      | 2   |
| 20       | See Chart**  | Element, (1) Inlet & (1) Outlet  | 2   |
| 21       | See Chart**  | icountPD (Intelli-Cart™)         | 1   |
|          | B84654       | icount Cable (Intelli-Cart™)     | 1   |
|          | B84224       | icount Hoses (Intelli-Cart™)     | 2   |
|          | 2/2A40EG4M-S | icount Fitting 1 (Intelli-Cart™) | 2   |
|          | EMA3/1/8ED   | icount Fitting 2 (Intelli-Cart™) | 2   |

\*\*Refer to chart on How to Order page.

# Portable Filter Carts

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

Example:

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 |
|-------|-------|-------|-------|-------|-------|-------|-------|
| 10MFP | 2     | 40SA  | 10Q   | B     | VP    | I     | 1     |

| BOX 1: Basic Assembly |                              |
|-----------------------|------------------------------|
| Symbol                | Description                  |
| 5MFP                  | 5 GPM (3000 SUS MAX.)        |
| <b>10MFP</b>          | <b>10 GPM (500 SUS MAX.)</b> |

| BOX 2: Length |               |
|---------------|---------------|
| Symbol        | Description   |
| <b>2</b>      | <b>Double</b> |

| BOX 3: Inlet Filter Element |   |
|-----------------------------|---|
| Symbol                      | Description                             |
| <b>40SA</b>                 | <b>Synthetic, 40 micron</b>             |
| 40W                         | Stainless Steel Mesh, 40 micron nominal |
| 20Q                         | Microglass III, 20 micron               |

Please note the bolded options reflect standard options with a reduced lead-time. Consult factory on all other lead-time options.

| BOX 4: Outlet Filter Element |                                  |
|------------------------------|----------------------------------|
| Symbol                       | Description                      |
| 02Q                          | Microglass III, 2 micron         |
| 05Q                          | Microglass III, 5 micron         |
| <b>10Q</b>                   | <b>Microglass III, 10 micron</b> |
| 20Q                          | Microglass III, 20 micron        |
| WR                           | Par-Gel™ Water Removal           |

| BOX 5: Seals |                      |
|--------------|----------------------|
| Symbol       | Description          |
| <b>B</b>     | <b>Nitrile (NBR)</b> |

| BOX 6: Indicator |   |
|------------------|---|
| Symbol           | Description   |
| <b>VP</b>        | <b>Visual indicator, 3-band (mounted on Outlet Filter only)</b> |

| BOX 7: Bypass |  |
|---------------|--|
| Symbol        | Description                                      |
| <b>I</b>      | <b>35 PSID (2.4 bar) (outlet filter element)</b> |

| BOX 8: Options |   |
|----------------|---|
| Symbol         | Description   |
| <b>1</b>       | <b>None</b>   |
| 6*             | 20' electrical cord (retractable reel)              |
| 9              | Visual indicator on Inlet Filter                    |
| PD**           | iPD with standard LED Display                       |
| PDL**          | iPD with LCD display and integrated Moisture Sensor |

\* standard with option PD or PDL  
\*\* only available in 10MFP configuration

## Replacement Elements

| Media | Nitrile Seals                         |   | Fluorocarbon Seals                    |   |
|-------|---------------------------------------|---|---------------------------------------|---|
|       | Inlet Filter (3 psid integral bypass) | Outlet Filter (35 psid integral bypass) | Inlet Filter (3 psid integral bypass) | Outlet Filter (35 psid integral bypass) |
| 02Q   | N/A                                   | 937397Q                                 | N/A                                   | 937405Q                                 |
| 05Q   | N/A                                   | 937398Q                                 | N/A                                   | 937406Q                                 |
| 10Q   | N/A                                   | 937399Q                                 | N/A                                   | 937407Q                                 |
| 20Q   | 940971Q                               | 937400Q                                 | 940974Q                               | 937408Q                                 |
| 40SA  | 940802                                | N/A                                     | 940972                                | N/A                                     |
| 40W   | 940803                                | N/A                                     | 940973                                | N/A                                     |
| WR    | N/A                                   | 940734                                  | N/A                                   | 940736                                  |



aerospace  
 climate control  
 electromechanical  
**filtration**  
 fluid & gas handling  
 hydraulics  
 pneumatics  
 process control  
 sealing & shielding



# SMR Series

Submicronic Removal  
 Fluid Purification Systems



ENGINEERING YOUR SUCCESS.



# SMR Series

## Applications

The SMR Series is the smart purification solution for fluid flow in the 2-10 GPM (8 - 38 LPM) range. The SMR contains patented Balanced Charge Agglomeration (BCA™) technology, which maintains hydraulic and lubricating fluids in optimum condition while preventing/removing the build-up of sludge and varnish. The system is available in a PLC or simplified control version.

Balanced Charge Agglomeration (BCA™) technology does not remove water, however with the removal of thousands of sub-micron particles, the majority of sites where water can readily attach are mitigated. Water is more easily separated and removed, improving demulsibility.

- **Power Generation**

- Steam & Gas Turbine
- hydraulics & lubrication

- **Oil & Gas**

- Compressor/Turbine hydraulics & lubrication

- **Pulp & Paper**

- Lube oil
- Hydraulics

- **Manufacturing**

- Hydraulics
- Lubrication
- EDM
- Injection molders

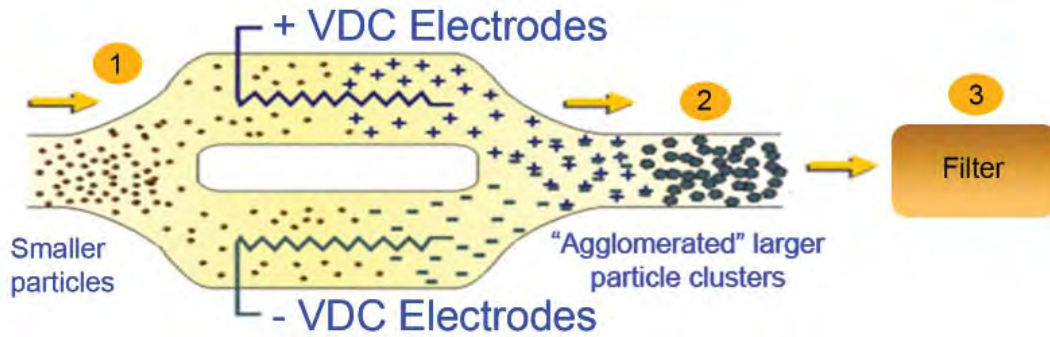
- **Others**

- Cooking oil
- Gear oil
- Fuels
- Bio fuels
- Steel
- Military



# SMR Series

Balanced Charge Agglomeration (BCA™) - How the Technology Works



- 1** Particles are passed across high-voltage electrodes, inducing a charge on the particles (+) and (-) in separate paths.
- 2** Oppositely charged particles are mixed and are attracted to each other, forming larger particle clusters.
- 3** Particle clusters are more efficiently filtered.

## Evaluation of the SMR Process - Actual Test Results

- Varnish is stripped from the hydraulic or lubrication system as fluid is processed through the SMR.
- The varnish is suspended in the hydraulic fluid as sub-micron particulate.
- BCA™ develops larger particles (see graphic above).
- The particulate is effectively removed from the hydraulic or lubrication fluid by high efficiency filters.



Result 1



Result 2



Result 3



Result 4



Result 5



Result 6



Result 7



Result 8



Result 9



Result 10

Results from a 10 month field trial

# SMR Series

## Features and Benefits

- Contaminant Removal to the Sub-Micron Level
- Prevention and Removal of Sludge and Varnish
- Removal of Oxidation Byproducts and Biological Contamination
- Removal of Ferrous and Non-Ferrous Contaminants

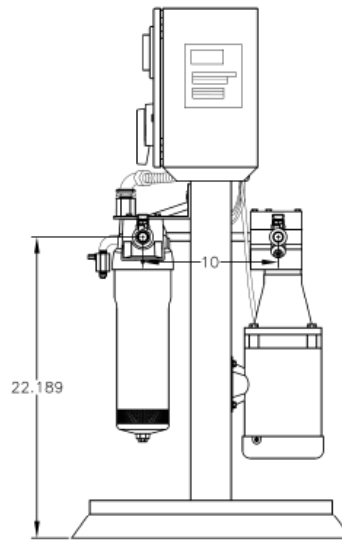
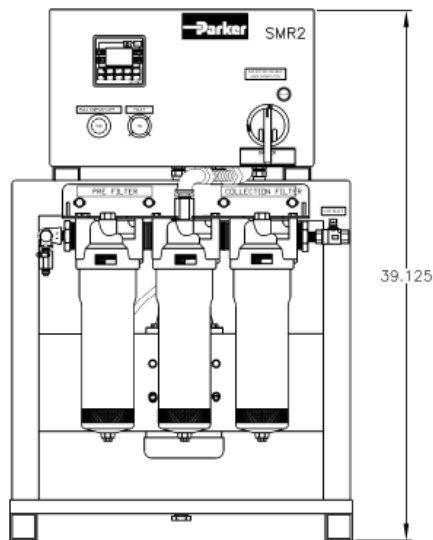
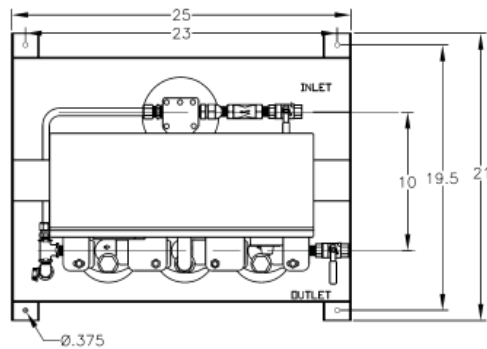
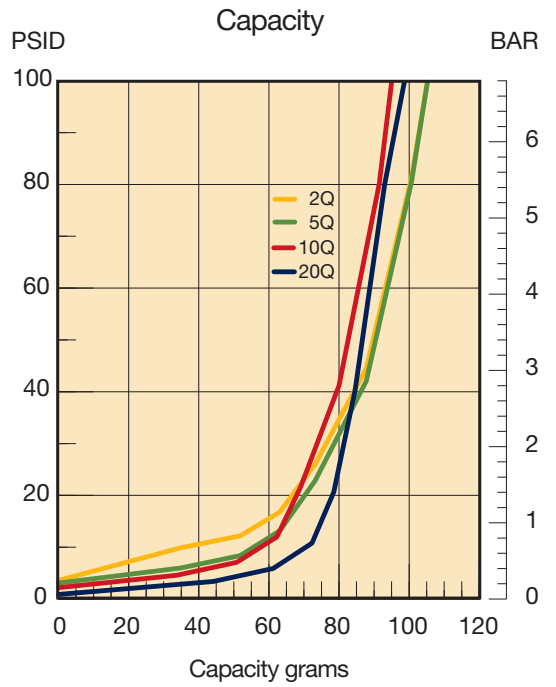
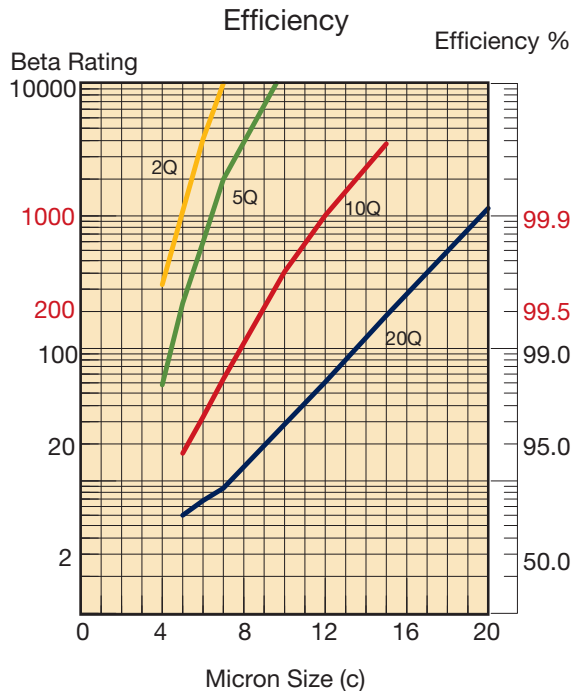
### The Parker SMR Benefit

- Unmatched Fluid Purification & System Polishing
- Proven Varnish Removal
- PLC Control & Data Tracking
- OEM Approvals



# SMR2

## Element Performance



Dimensions are in inches.

Drawings are for reference only. Contact factory for current version.

# SMR2

## Specifications

### Fluid

Viscosity: 1,020 SUS (220 cSt) maximum  
Maximum Pressure: 50/80 PSI (operating/static)  
Minimum Fluid Temperature: 65° F (18° C)  
Maximum Fluid Temperature: 200° F (93° C)  
Minimum Fluid Flash Point: >140° F (60° C)

### Power

Customer Provided  
Voltage: 110VAC/1Ph/60Hz, 230VAC/3Ph/60Hz, 460VAC/3Ph/60Hz  
Phase: 1/3  
Frequency 60Hz

### Motor

Power: 0.5 HP  
Voltage/Ph/Freq: 0-230/460/3/variable  
RPM: 0 to 2000

### Pump

Positive Displacement - Variable Frequency Drive (VFD)  
Design Flow Rate: 0.5 - 2.5 GPM

| <b>Parameter Settings</b>               |                          |                   |                    |
|---|--------------------------|-------------------|--------------------|
| Parameter                               | <b>Default</b>           | Minimum           | Maximum            |
| Flow                                    | <b>2 GPM [7.58 LPM]</b>  | 0.5 GPM [1.9 LPM] | 2.5 GPM [9.45 LPM] |
| Shutdown Pressure                       | <b>70 psi [4.82 bar]</b> | 0 psi/bar         | 75 psi [5.17 bar]  |
| Max Operating Pressure                  | <b>50 psi [3.4 bar]</b>  | 0 psi/bar         | 60 psi [4.13 bar]  |
| Min Operating Pressure                  | <b>0 psi [0.0 bar]</b>   | 0 psi/bar         | 5 psi [0.34 bar]   |
| Maximum Temperature                     | <b>200° F [93.3°C]</b>   | 35° F [1.6°C]     | 200° F [93.3°C]    |
| Minimum Temperature                     | <b>35° F [1.5°C]</b>     | 35° F [1.6°C]     | 200° F [93.3°C]    |
| Upstream Filter Delta-P                 | <b>15 psi [1.0 bar]</b>  | 5 psi [0.34 bar]  | 25 psi [1.7 bar]   |
| Downstream Filter Delta-P               | <b>10 psi [0.67 bar]</b> | 5 psi [0.34 bar]  | 25 psi [1.7 bar]   |
| Auto-Restart after power loss           | <b>OFF</b>               | n/a               | n/a                |
| Auto-Restart after temperature shutdown | <b>OFF</b>               | n/a               | n/a                |
| US or Metric units                      | <b>US</b>                |                   |                    |

# SMR2

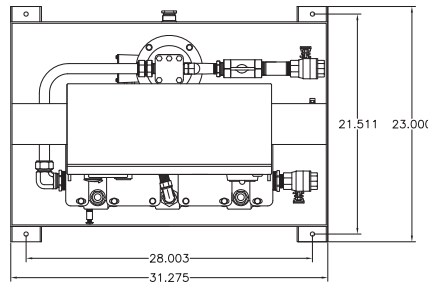
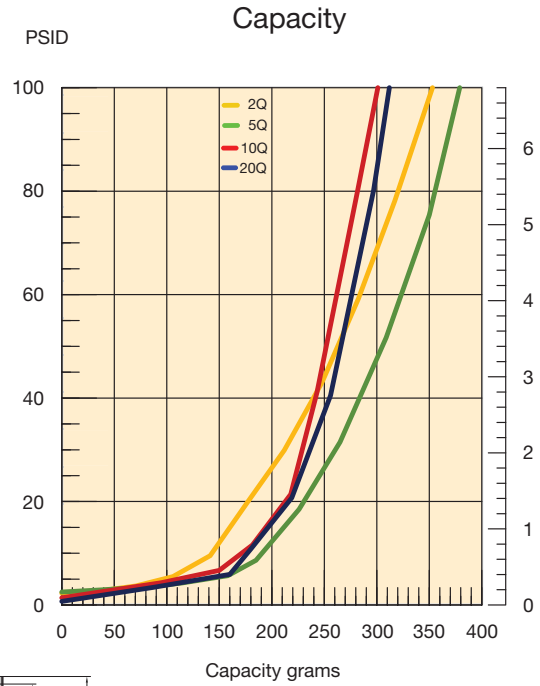
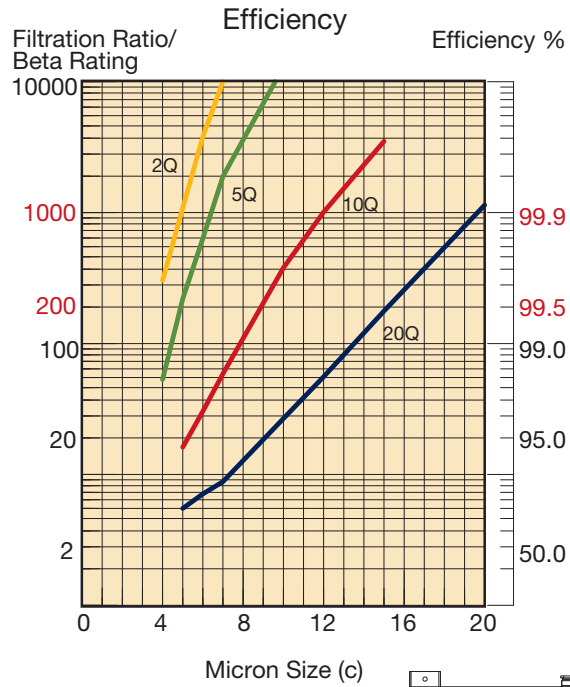
## Parts List

| Quantity | Parker Part # | Description                                |
|----------|---------------|--|
| 1        | 165-00002     | Drive, AC, A/B .5 HP 240V 1 PH             |
|          | 165-00001     | Drive, AC, A/B .5 HP 480V 3 PH             |
|          | 165-00011     | Drive, Line Filter, .5 HP 120V & 240V 1 PH |
|          | 165-00014     | Drive, Line Filter, .5 HP 460V 3 PH        |
| 1        | 270-00006     | PLC/HMI                                    |
| 1        | 275-00007     | Power Supply, H.V.                         |
| 1        | 275-00002     | Power Supply, A/B 24V 110-240V             |
| 1        | 275-00006     | Power Supply, C/H 24V 380-480V             |
| 1        | 290-00001     | Relay, H.V., A/B                           |
| 1        | 245-00006     | Light Module, A/B, Green                   |
| 1        | 245-00005     | Light Module, A/B, Yellow                  |
| 1        | 250-00005     | Motor, .5 HP, 230-380 STD                  |
| 1        | 280-00014     | Pump/Bypass, 2 GPM, STD                    |
| 1        | 255-00016     | O-Ring, vessel 1, 2 or 3                   |
| 1        | 936623Q       | 5 Micron Filter, Upstream                  |
| 1        | 936622Q       | 2 Micron Filter, Downstream                |
| 1        | 195-00003     | Feedthru, H.V.                             |
| 4        | 350-00001     | Transducer, pressure                       |



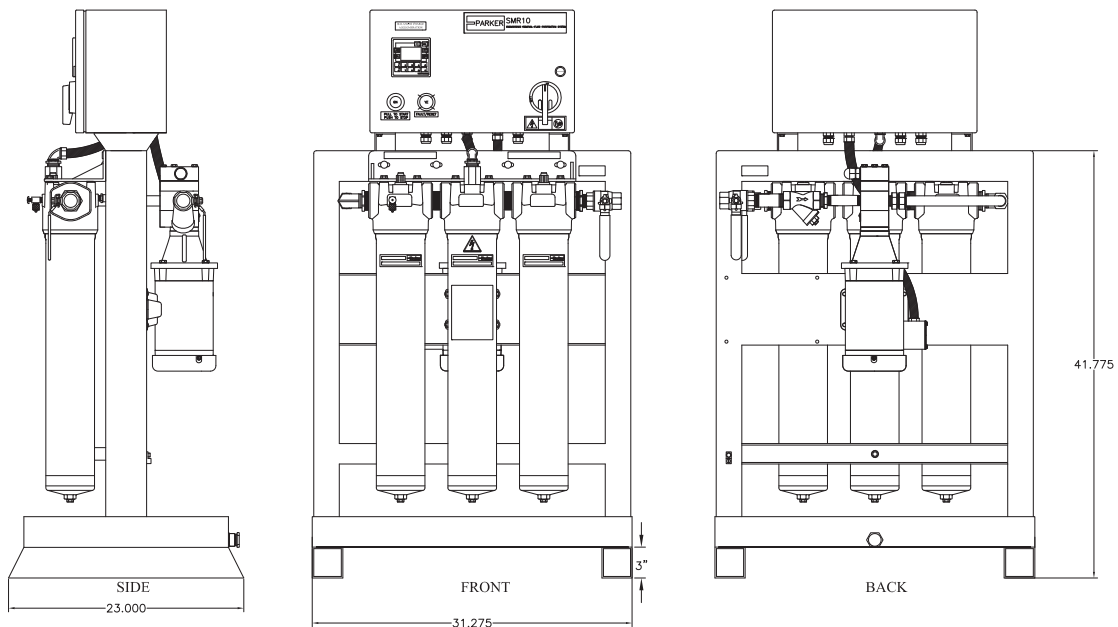
# SMR10

## Element Performance



Dimensions are in inches.

Drawings are for reference only.  
Contact factory for current version.



# SMR10

## Specifications

### Fluid

Viscosity: 1,020 SUS (220 cSt) maximum  
Maximum Pressure: 50/80 PSI (operating/static)  
Minimum Fluid Temperature: 65° F (18° C)  
Maximum Fluid Temperature: 200° F (93° C)  
Minimum Fluid Flash Point: >140° F (60° C)

### Power

Customer Provided  
Voltage: 110VAC/1Ph/60Hz, 230VAC/3Ph/60Hz,  
460VAC/3Ph/60Hz  
Phase: 1/3  
Frequency 60Hz

### Motor

Power: 0.5 HP  
Voltage/Ph/Freq: 0-230/460/3/variable  
RPM: 0 to 2000

### Pump

Positive Displacement - Variable Frequency Drive (VFD)  
Design Flow Rate: 2.5 - 10 GPM

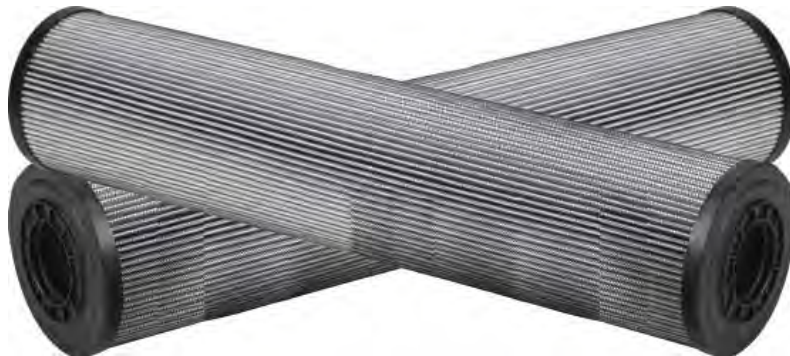
| <b>Parameter Settings</b>               |                          |                    |                    |
|---|--------------------------|--------------------|--------------------|
| Parameter                               | <b>Default</b>           | Minimum            | Maximum            |
| Flow                                    | <b>10 GPM [37.9 LPM]</b> | 2.5 GPM [9.45 LPM] | 10 GPM [37.85 LPM] |
| Shutdown Pressure                       | <b>70 psi [4.82 bar]</b> | 0 psi/bar          | 75 psi [5.17 bar]  |
| Max Operating Pressure                  | <b>50 psi [3.4 bar]</b>  | 0 psi/bar          | 60 psi [4.13 bar]  |
| Min Operating Pressure                  | <b>0 psi [0.0 bar]</b>   | 0 psi/bar          | 5 psi [0.34 bar]   |
| Maximum Temperature                     | <b>200°F [93.3°C]</b>    | 35°F [1.6°C]       | 200°F [93.3°C]     |
| Minimum Temperature                     | <b>35°F [1.5°C]</b>      | 35°F [1.6°C]       | 200°F [93.3°C]     |
| Upstream Filter Delta-P                 | <b>15 psi [1.0 bar]</b>  | 5 psi [0.34 bar]   | 25 psi [1.7 bar]   |
| Downstream Filter Delta-P               | <b>10 psi [0.67 bar]</b> | 5 psi [0.34 bar]   | 25 psi [1.7 bar]   |
| Auto-Restart after power loss           | <b>OFF</b>               | n/a                | n/a                |
| Auto-Restart after temperature shutdown | <b>OFF</b>               | n/a                | n/a                |
| US or Metric units                      | <b>US</b>                |                    |                    |



# SMR10

## Parts List

| Quantity | Parker Part # | Description                                |
|----------|---------------|--|
| 1        | 165-00002     | Drive, AC, A/B .5 HP 240V 1 PH             |
|          | 165-00001     | Drive, AC, A/B .5 HP 480V 3 PH             |
|          | 165-00011     | Drive, Line Filter, .5 HP 120V & 240V 1 PH |
|          | 165-00014     | Drive, Line Filter, .5 HP 460V 3 PH        |
| 1        | 270-00006     | PLC/HMI                                    |
| 1        | 275-00007     | Power Supply, H.V.                         |
| 1        | 275-00002     | Power Supply, A/B 24V 110-240V             |
| 1        | 275-00006     | Power Supply, C/H 24V 380-480V             |
| 1        | 290-00001     | Relay, H.V., A/B                           |
| 1        | 245-00006     | Light Module, A/B, Green                   |
| 1        | 245-00005     | Light Module, A/B, Yellow                  |
| 1        | 250-00005     | Motor, .5 HP, 230-380 STD                  |
| 1        | 280-00014     | Pump/Bypass, 2 GPM, STD                    |
| 1        | 255-00016     | O-Ring, vessel 1, 2 or 3                   |
| 1        | 933219Q       | 5 Micron Filter, Upstream                  |
| 1        | 933218Q       | 2 Micron Filter, Downstream                |
| 1        | 195-00003     | Feedthru, H.V.                             |
| 4        | 350-00001     | Transducer, pressure                       |



# SMR Series

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

Example:

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 | BOX 9 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| SMR   | 2     | 460   | 20QE  | V     | M2    | X     | N08   | MS    |

| BOX 1: Basic Assembly |                               |
|-----------------------|-------------------------------|
| Symbol                | Description                   |
| SMR                   | Submicronic Filtration System |

| BOX 2: Flow Rate |                 |
|------------------|-----------------|
| Symbol           | Description     |
| 2                | 2 GPM (7.6 LPM) |
| 10               | 10 GPM (38 LPM) |

| BOX 3: Power |                   |
|--------------|-------------------|
| Symbol       | Description       |
| 120          | 120VAC, 1Ph, 60Hz |
| 230          | 230VAC, 3Ph, 60Hz |
| 380          | 380VAC, 3Ph, 50Hz |
| 460          | 460VAC, 3Ph, 60Hz |
| 575          | 575VAC, 3Ph, 60Hz |

| BOX 4: Element Media <sup>1</sup> |                           |
|-----------------------------------|---------------------------|
| Symbol                            | Description               |
| <b>SMR2</b>                       |                           |
| 02QE                              | Ecoglass III, 2 micron    |
| 05QE                              | Ecoglass III, 5 micron    |
| 10QE                              | Ecoglass III, 10 micron   |
| 20QE                              | Ecoglass III, 20 micron   |
| <b>SMR10</b>                      |                           |
| 02Q                               | Microglass III, 2 micron  |
| 05Q                               | Microglass III, 5 micron  |
| 10Q                               | Microglass III, 10 micron |
| 20Q                               | Microglass III, 20 micron |

| BOX 5: Seals |                          |
|--------------|--------------------------|
| Symbol       | Description              |
| V            | Fluorocarbon (FKM)       |
| E            | Ethylene Propylene (EPR) |

| BOX 6: Indicator |                         |
|------------------|-------------------------|
| Symbol           | Description             |
| P                | No Indicator            |
| M2               | Analog Visual Indicator |

| BOX 7: Bypass |             |
|---------------|-------------|
| Symbol        | Description |
| X             | No Bypass   |

| BOX 8: Ports |                       |
|--------------|-----------------------|
| Symbol       | Description           |
| <b>SMR2</b>  |                       |
| N08          | ½" NPT threaded ports |
| <b>SMR10</b> |                       |
| N16          | 1" NPT threaded ports |

| BOX 9: Options   |  |
|------------------|--|
| Symbol           | Description                                  |
| SS               | Stainless steel wetted parts                 |
| EXP              | Explosion proof (Class 1, Div. 2, Gp. C & D) |
| MS               | Moisture Sensor                              |
| PD <sup>2</sup>  | Particle Detector                            |
| PDM <sup>2</sup> | Particle Detector with Moisture Sensor       |

Note:

1. Outlet polishing filter is always fitted with 02QE/02Q element.

2. icountPD not available when EXP option is selected.

## Replacement Elements

Note: "CF" = Consult Factory

| SMR2               |              |                    | SMR10                |              |                    |
|--------------------|--------------|--------------------|----------------------|--------------|--------------------|
| Ecoglass III Media | Fluorocarbon | Ethylene Propylene | Microglass III Media | Fluorocarbon | Ethylene Propylene |
| 02QE               | 936622Q      | 940848Q            | 02Q                  | 933218Q      | CF                 |
| 05QE               | 936623Q      | 940847Q            | 05Q                  | 933219Q      | CF                 |
| 10QE               | 936720Q      | 940846Q            | 10Q                  | 933220Q      | CF                 |
| 20QE               | 936721Q      | 940845Q            | 20Q                  | 933221Q      | CF                 |



aerospace  
 climate control  
 electromechanical  
**filtration**  
 fluid & gas handling  
 hydraulics  
 pneumatics  
 process control  
 sealing & shielding



# Guardian®

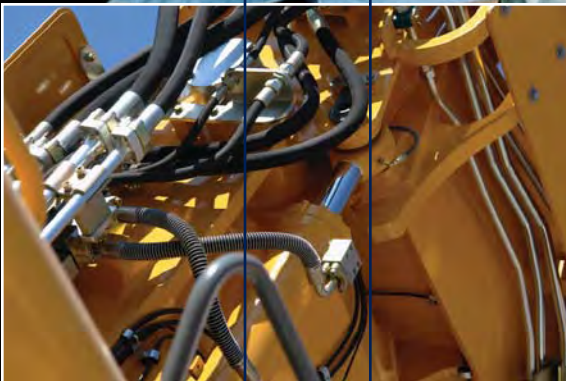
Portable Filtration System



ENGINEERING YOUR SUCCESS.



Ground Support



Hydraulic Service



Mining



The Guardian portable filtration system is a unique pump/motor/filter combination designed for conditioning and transferring petroleum-based and water emulsion fluids. It protects your system from contamination added with new fluid because new fluid is not necessarily clean fluid. Most new fluids right out of the drum are unfit for use due to high initial concentrations of contaminants. Contamination may be added to a new fluid during processing, mixing, handling, and storage.

The Guardian also circulates and “polishes” fluid in your existing systems to reduce the contamination to an acceptable level.

There are literally hundreds of applications that the Guardian is suited for, with more being discovered each day. If your system is sensitive to the harmful effects of contamination, then the Guardian may be ideal for you.

| Features   | Advantages   | Benefits   |
|--|--|--|
| Lightweight, hand held, compact design (less than 24 lbs 16" X 8" approximate foot print).   | Easy to carry and fits easily on top of 55 gallon drums.   | One person operation, capable of getting to hard to reach areas. |
| Flow rate to 4 gpm.  | Filters and transfers simultaneously.  | One step operation.  |
| Powerful pump/motor combination with Carboxylated Nitrile seals standard.                    | Handles fluids up to 16,000 SUS viscosity (11,000 SUS -24 VDC).                                      | Reliable performance in a wide variety of operating conditions.  |
| Built-in relief valve with no downstream fluid bypass.                                       | Only filtered fluid reaches downstream components.   | 100% filtration ensured, even when unattended.                   |
| Wide variety of filter elements available.   | High capacity 2 micron absolute disposable microglass to 74 micron cleanable wire and water removal. | Maximizes element life between changes.                          |
| Clear, wire-reinforced 5' hose assemblies with wand attachments.                             | No additional hardware required.   | Ready to use and easy to maneuver.                               |
| Optional quick disconnect hose connections.  | Fast, easy setup and tear-down.  | Eliminates messy drips.  |
| Heavy-duty ¼ HP, 115 VAC (230 VAC, 24 VDC- optional) motor with thermal overload protection. | UL recognized and CSA listed, with replaceable brushes.  | Safe, reliable performance; field serviceable.                   |
| Gerotor pump with visible serviceable inlet strainer.  | Dirt tolerant design with added protection.  | Pump reliability in highly contaminated fluids.                  |
| Quiet operation.   | Less than 70dB noise level @ 3 feet.   | Can be used most anywhere with minimal disturbance.              |
| Convenient inlet-to-outlet hose connection.  | Contains fluids when transporting.   | Clean and safe operation.  |
| Low center of gravity.   | Guardian stability.  | Unattended reliability.  |
| Dual motor seals.  | Added motor protection.  | Longer motor life.   |
| Auxiliary inlet/outlet ports.  | Used in place of, or in addition to, standard ports. The outlet can also be used as a sampling port. | Flexibility.   |



Mobile



Industrial



Marine

# Guardian Series

## Installation and Specification Data

**Maximum Allowable Operating Pressure (MAOP):** 50 psi (3.4 bar)

**Flow Capacity:** Up to 4 gpm (15 lpm)

**Maximum Recommended Fluid Viscosity:** (.85 specific gravity)  
110-120 VAC and  
220-240 VAC      16,000 SUS  
24VDC              11,000 SUS

**Warning:** Explosion hazard. Do not pump flammable liquids such as gasoline, alcohol, solvents, etc.

**Operating Temperatures:**  
Unit: -15°F to 180°F (-26°C to 82°C)

Wand/Hose: 25°F to 120°F (-4°C to 49°C)

**Visual Indicator:** Differential pressure type, set at 25 psid

**Recommended Fluids:** petroleum based oils, water emulsions, and diesel fuels

**Integral Relief Valve:** set at 50 psi for motor protection.

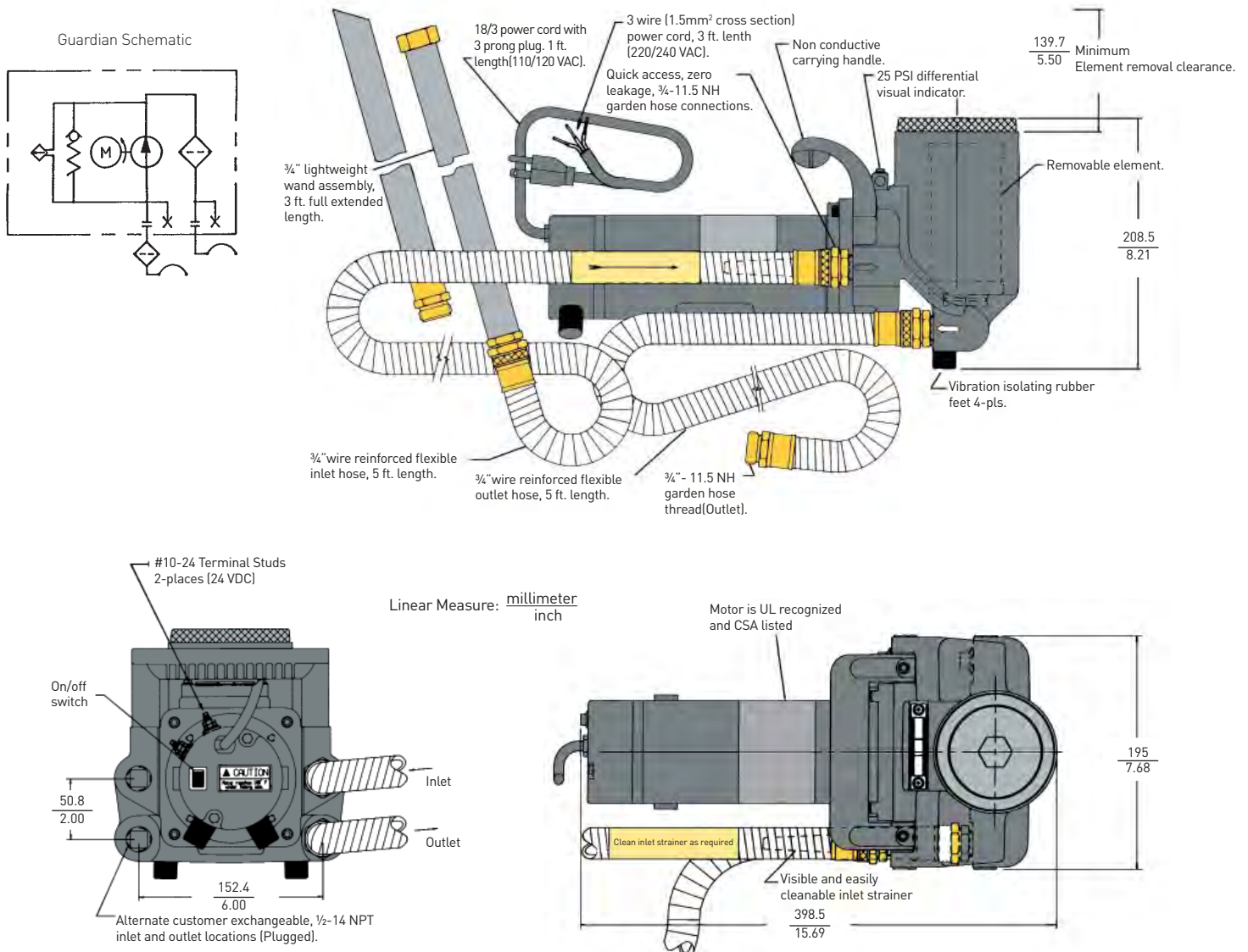
**Noise Level:** <70db at 3 ft.

**Electrical Motor:** ¼ hp@2500 rpm.  
24 VDC; 10A max.  
110-120 VAC; 50/60 Hz; 3A max.  
220-240 VAC; 50/60 Hz; 1.5A max.  
Thermal overload protected.  
Replaceable brushes (500 hours).

**Weight:** approximately 23 lbs. 5 oz.

**Materials:**

Housing: cast aluminum  
Cover: die cast aluminum  
Handle and Indicator: nylon  
Wands and Hose: PVC  
Fittings: brass  
Seals: fluorocarbon/  
carboxylated nitrile



# Guardian Series

## Element Performance

| Media Code | Filter Media   | Time Averaged Beta $x/y/z = 2/20/75$<br>Where $x/y/z$ is: | Dirt Capacity (Grams) |
|------------|----------------|---|-----------------------|
| 74W        | Woven Wire     | 74 micron <sup>1</sup>                                    | *                     |
| 40W        | Woven Wire     | 40 micron <sup>1</sup>                                    | *                     |
| 25W        | Woven Wire     | 25 micron <sup>1</sup>                                    | *                     |
| 20C        | Cellulose      | 20 micron <sup>1</sup>                                    | *                     |
| 10C        | Cellulose      | 5/8/16  | 4                     |
| 20Q        | Microglass III | 7.1/13.7/17.3   | 16.2                  |
| 10Q        | Microglass III | 2.7/7.3/10.3  | 14.4                  |
| 05Q        | Microglass III | <2/2.1/4.0  | 14.9                  |
| 02Q        | Microglass III | <2/<2/<2  | 14.3                  |

| Beta Rating  | Efficiency at x Particle Size |
|--------------|-------------------------------|
| $B_x = 2$    | 50.0%                         |
| $B_x = 20$   | 95.0%                         |
| $B_x = 75$   | 98.7%                         |
| $B_x = 200$  | 99.5%                         |
| $B_x = 1000$ | 99.9%                         |

Multipass test run at 4 gpm to 35 psid

<sup>1</sup>Reference ratings only. Not multipass tested due to coarseness.

\* Not applicable

### Estimated Guardian Element Life and Cleanliness Levels

The following chart shows typical element life (in gallons of oil passed) and cleanliness levels

achieved by standard Parker elements available with the Guardian. Some assumptions have been made.\*

| Media Code | New Oil ISO | ISO Achieved | Element Life | Elements Used per 250 gallons |
|------------|-------------|--------------|--------------|-------------------------------|
| 10C        | 22/20/16    | 21/19/15     | 120 gallons  | 2.08                          |
| 20Q        | 22/20/16    | 21/19/15     | 486 gallons  | .51                           |
| 10Q        | 22/20/16    | 19/16/14     | 407 gallons  | .61                           |
| 05Q        | 22/20/16    | 17/15/12     | 330 gallons  | .75                           |
| 02Q        | 22/20/16    | 15/13/10     | 316 gallons  | .79                           |

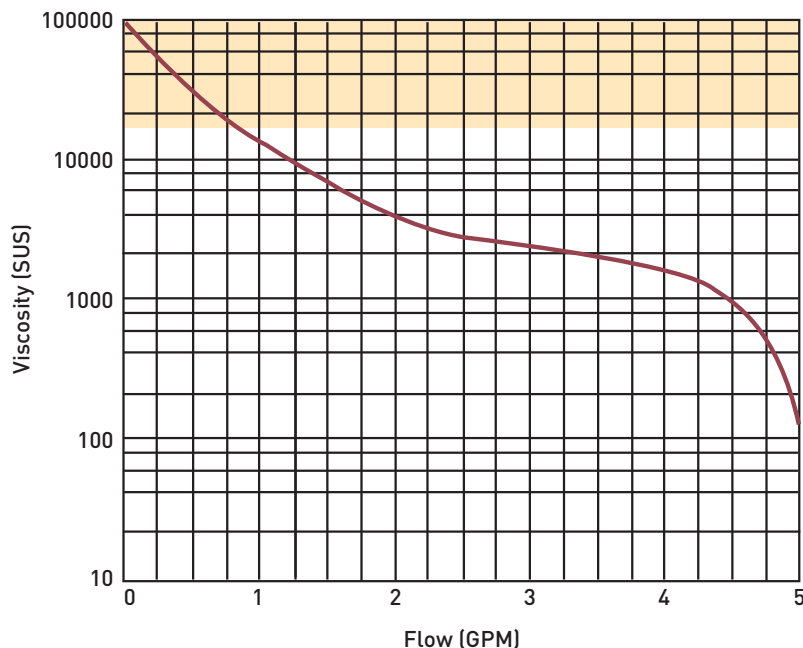
\* 1. New oil is at ISO 22/20/16.

2. No environment or work ingress.

3. Single pass oil transfer.

NOTE: Data for fluid transfer only. For continuous fluid polishing, lower ISO cleanliness levels will be achieved.

### Guardian Flow vs. Viscosity Performance



**Note 1:** Guardian not recommended for fluid viscosities greater than 16,000 SUS (11,000 SUS; 24VDC)

**Note 2:** Flows based on Guardian with no element installed

## Guardian Operation

- A. Remove all shipping plugs from the hoses and fittings.
- B. Connect the inlet and outlet hose assemblies to the unit.
- C. Connect the wand assemblies, if required.
- D. Place the inlet hose wand assembly into the fluid to be filtered and/or transferred.
- E. Place the outlet hose/wand assembly into the container where the fluid discharge is desired.
- F. Plug in the unit.
- G. Flip the switch on the end of the unit to the “on” position.

NOTE: For no-mess transportation, the inlet and outlet hose assemblies can be screwed together by removing the wand assembly.

## Guardian Element Servicing

- A. Flip the switch on the end of the unit to the “off” position and disconnect the electrical plug.
- B. Rotate the cover counter-clockwise and remove.
- C. Remove the element from the housing. Discard all disposable elements. These elements are not cleanable.
- D. Place the new element in the housing, fitting the o-ring neck into the large hole at the bottom.
- E. Inspect the cover o-ring and replace if necessary.
- F. Replace the cover and hand-tighten.

NOTE 1: It is recommended that the Guardian be cleaned and flushed between uses with dissimilar fluids to prevent fluid mixing.

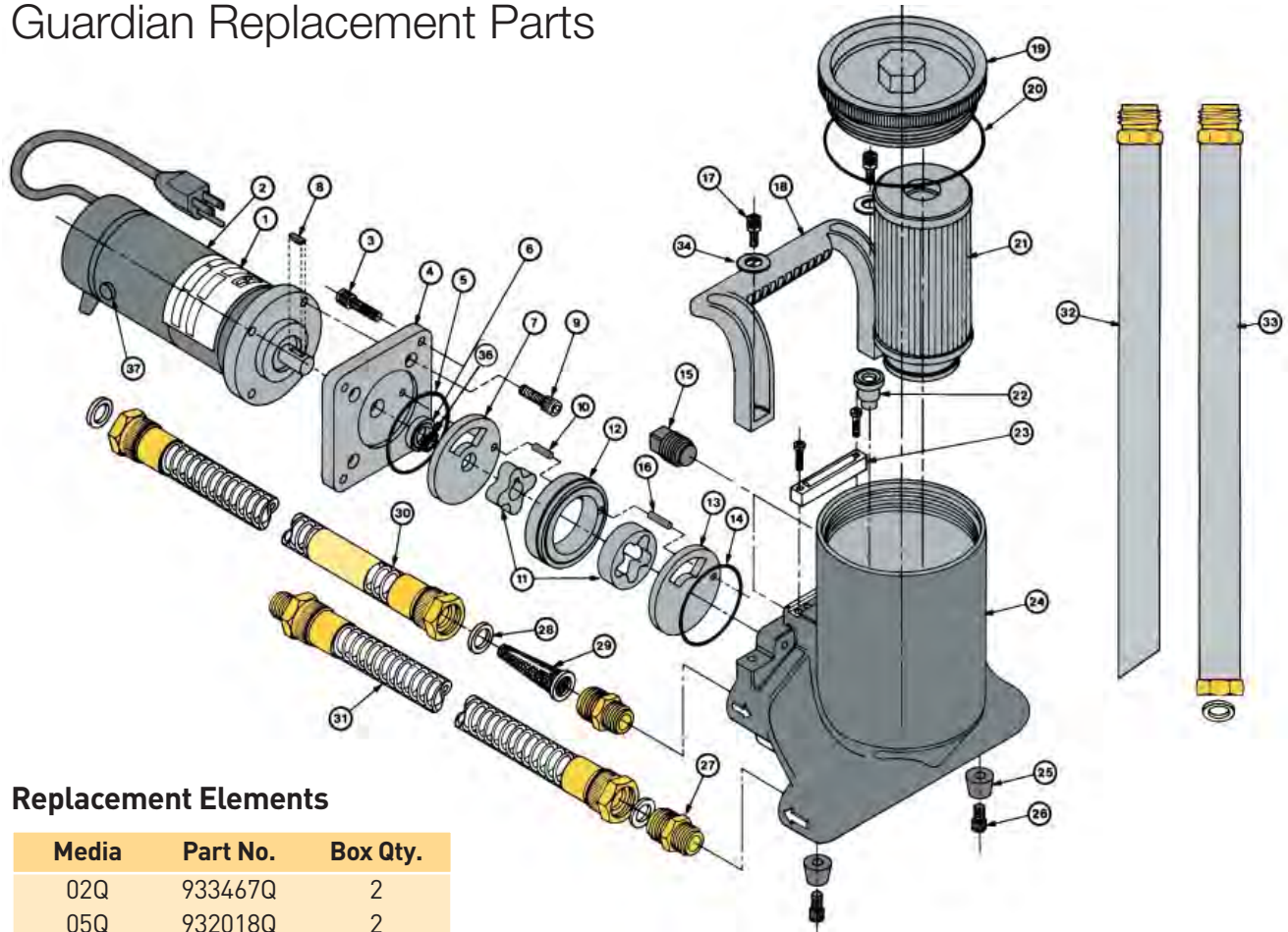
NOTE 2: Motor brushes may require changeout every 500 service hours

## Troubleshooting Guide

| Problem                                       | Cause  | Solution  |
|---|--|---|
| Does not start.                               | ON/OFF switch.<br>No electrical power.<br>Rectifier.<br>Motor overheats (160°F).<br>Defective motor.   | Turn switch on, replace switch if defective.<br>Plug in Guardian, check for tripped circuit breakers, check for blown fuses.<br>Replace if defective.<br>Allow motor to cool, thermal overload will automatically reset.<br>Replace motor.                          |
| Does not start or erratic motor noise.        | Worn motor brushes.  | Replace motor brushes.  |
| Intermittent start/stop operation.            | High viscosity fluids.<br>Worn motor brushes.<br>Defective motor.  | High viscosity fluids can cause the motor to overheat and cycle intermittently.<br>Replace motor brushes.<br>Replace motor.   |
| Hot motor.                                    | Pumping under heavy load.<br>Defective motor.  | It is normal, under a heavy pumping load for the motor to reach 160°F.<br>Replace motor if shell temperature reaches greater than 170°F.  |
| No flow or erratic pump noise.                | Filter housing not filled with oil.<br>Suction leak.<br>Obstructed outlet.<br>Element dirty.<br>Sheared pump key.<br>Defective Guardian.                         | Allow Guardian to run a few seconds.<br>Check tightness of inlet fittings and hoses. Check gaskets are in place and are not damaged. Kink or restriction in the inlet hose.<br>Clear outlet.<br>Replace or clean element.<br>Replace woodruff key.<br>Replace unit. |
| No flow, erratic pump noise, motor overheats. | Gears binding.   | Disassemble Guardian and thoroughly clean the gear set.<br>Always use the inlet strainer provided to protect the unit.<br>Replace defective gears.  |
| No suction.                                   | Plugged strainer.  | Clean or replace the inlet strainer as required.<br>Clean relief valve. Check for damaged internal o-rings.   |
| Reduced oil flow.                             | High viscosity fluids.<br>Element dirty.<br>Relief valve sticks or is lodged open.<br>Partially obstructed inlet or outlet hose.<br>Suction leak.<br>Worn gears. | High viscosity fluids can cause reduced flow, which is normal.<br>Replace or clean element.<br>Clean relief valve or replace if defective.<br>Clear the hose obstruction.<br>Check tightness of inlet fittings and hose.<br>Replace gear set.                       |
| Indicator moves to RED Area.                  | Element dirty.<br>Oil extremely cold or viscous.<br>Obstructed outlet.<br>Defective indicator.   | Replace or clean element.<br>Change element to coarser micron rating.<br>Clear outlet obstruction.<br>Replace indicator.  |
| Indicator does not seem to move.              | No element.<br>Defective indicator.  | Install element.<br>Replace indicator.  |
| Hoses discolor or are hard.                   | Fluid compatibility.   | Certain fluids, over time, will cause the hoses to discolor. This does not impair their performance. But, some fluids will cause the hoses to become brittle, requiring replacement.  |
| Oil formation under unit.                     | Defective shaft seal.  | Replace the motor shaft seal.   |



# Guardian Replacement Parts



## Replacement Elements

| Media | Part No. | Box Qty. |
|-------|----------|----------|
| 02Q   | 933467Q  | 2        |
| 05Q   | 932018Q  | 2        |
| 10Q   | 932017Q  | 2        |
| 20Q   | 933468Q  | 2        |
| 10C   | 932016   | 2        |
| 20C   | 932020   | 2        |
| 25W   | 922627   | 1        |
| 40W   | 922628   | 1        |
| 74W   | 922626   | 1        |
| WR    | 932019   | 2        |

## Parts List

|                                |                 |             |
|--------------------------------|-----------------|-------------|
| 1. Label                       | Consult Factory |             |
| 2. Motor, 110-120 VAC          | 931913          |             |
| 220-440 VAC                    | 932381          |             |
| 24 VDC                         | 932759          |             |
| 3. SHCS(4), 1/4-20x1           | 902734          |             |
| 4. Adapter Plate               | 931890          |             |
| 5. Housing O-Ring              | V72041          |             |
| 6. Polypak Seal                | 931921          |             |
| 7. Shadow Plate                | 931899          |             |
| 8. Woodruff Key 1/8x3/8        | 931877          |             |
| 9. SHCS(4), 1/4-20 x 3/4       | 902679          |             |
| 10. Roll Pin 1/8 x 3/4         | 903630          |             |
| 11. Geroter Set                | 931873          |             |
| 12. Geroter Ring               | 931903          |             |
| 13. Outlet Plate               | 931900          |             |
| 14. Geroter O-ring             | V72135          |             |
| 15. Brass Pipe Plug (2) 1/2-14 | 931920          |             |
| 16. Roll Pin 1/8 x 5/8         | 903426          |             |
| 17. SHCS (2), 1/4-20 x 5/8     | 931889          |             |
| 18. Handle                     | 931897          |             |
| 19. Cover                      | 931892          |             |
| 20. Cover O-Ring               | V72237          |             |
| 21. Element                    |                 |             |
| 22. Relief Valve               | 928981          |             |
| 23. Indicator Kit              | 927422          |             |
| 24. Housing                    | 931838          |             |
| 25. Rubber Bumpers (2)         | 931888          |             |
| 26. SHCS(2), 1/4-20 x 1/2      | 902907          |             |
| 27. Brass Fitting (2)          | 931928          |             |
| 28. Gasket (4)                 | 931956          |             |
| 29. Inlet Screen               | 931927          |             |
| 30. Inlet Hose Assembly        | 931936          |             |
| 31. Outlet Hose Assembly       | 931937          |             |
| 32. Wand Crevice Assembly      | 931965          |             |
| 33. Wand Adapter Assembly      | 931966          |             |
| 34. Washer (2)                 | 926106          |             |
| 35. Quick Disconnect Kit       | 932097          | (Not Shown) |
| 36. Washer                     | 932085          |             |
| 37. Brush Kit (110/120)        | 934329          |             |
| (220/240 VAC)                  | 934327          |             |
| (24 VDC)                       | 932761          |             |
| <b>Seal Kit</b>                | 932263          |             |
| <b>Bowl Extension Kit</b>      | 932081          |             |

NOTE: SHCS denotes "socket head cap screw"

# Guardian Series

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

Example:

| BOX 1 | BOX 2 | BOX 3 | BOX 4 |
|-------|-------|-------|-------|
|       | GT4   | 10C   | 1     |

**BOX 1: Seals**

| Symbol | Description                            |
|--------|--|
| None   | <b>Carboxylated Nitrile (Standard)</b> |

Note: Consult factory for fluids not compatible with fluorocarbon.

**BOX 2: Model**

| Symbol     | Description                  |
|------------|------------------------------|
| <b>GT4</b> | <b>Guardian® 110/120 VAC</b> |
| GT4D       | 24VDC                        |
| GT4E       | 220/240 VAC                  |

**BOX 3: Media**

| Symbol     | Description      |
|------------|------------------|
| 74W        | Wire Mesh        |
| 40W        | Wire Mesh        |
| 25W        | Wire Mesh        |
| <b>10C</b> | <b>Cellulose</b> |
| 20Q        | Microglass III   |
| 10Q        | Microglass III   |
| 05Q        | Microglass III   |
| 02Q        | Microglass III   |
| WR         | Water Removal    |

**BOX 4: Options**

| Symbol   | Description                       |
|----------|-----------------------------------|
| <b>1</b> | <b>None</b>                       |
| 6        | Quick disconnect hose connections |

Please note the bolded options reflect standard options with a reduced lead-time. Consult factory on all other lead-time options.



aerospace  
 climate control  
 electromechanical  
**filtration**  
 fluid & gas handling  
 hydraulics  
 pneumatics  
 process control  
 sealing & shielding



# Portable Purification Systems

Models PVS 185, 600, 1200, 1800, 2700



ENGINEERING YOUR SUCCESS.

# PVS Series

## Principles of Operation

Contaminated oil is drawn into the Parker Portable Purification System by a vacuum of 25 In/Hg. The oil passes through the in-line low watt density heater where the oil is heated to an optimum temperature of 150° F (66°C).

The oil then enters the distillation column where it is exposed to the vacuum through the use of special dispersal elements. This increases the exposed surface area of the oil and converts the water to vapor form, which is then drawn through the condenser by the vacuum pump.

The water-free oil falls to the bottom of the column and is removed by a heavy duty lube oil pump. This pump forces the dry oil through a final particulate removal filter. Clean oil passes out of the unit, back to the reservoir — and into the system.

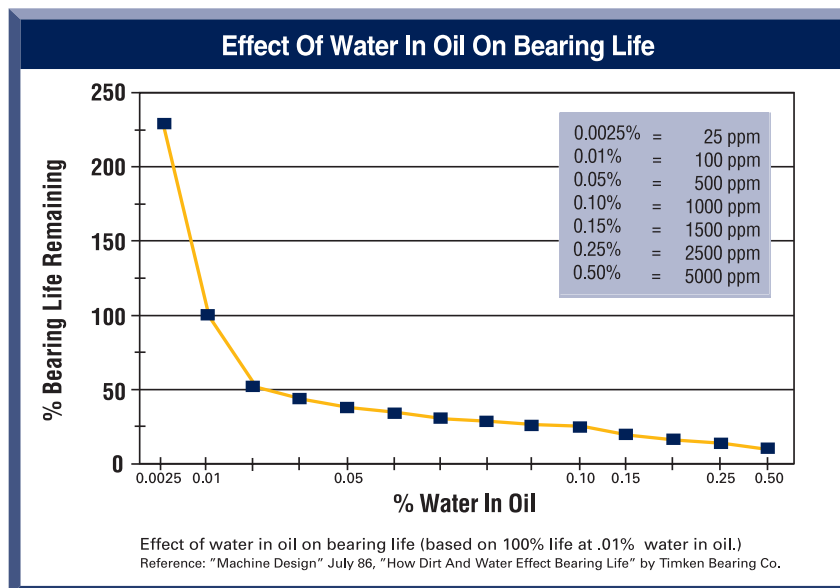
### Effects of Water Contamination

Water is one of the most common contaminants in a fluid system and one of the most damaging. When water contaminates a system, it can cause serious problems such as:

- Corrosion by etching metal
- Fluid breakdown, reduction of lubricating properties, additive precipitation, and oil oxidation
- Reduced dielectric strength
- Abrasive wear in hydraulic components

| Typical Saturation Points |     |       |
|---------------------------|-----|-------|
| Fluid Type                | PPM | %     |
| Hydraulic Fluid           | 300 | .03%  |
| Lubrication Fluid         | 400 | .04%  |
| Transformer Fluid         | 50  | .005% |

Free water occurs when oil becomes saturated and cannot hold any more water. This water is usually seen as cloudy oil or puddles of water at the bottom of an oil reservoir. Water which is absorbed into the oil is called dissolved water. At higher temperatures, oil has the ability to hold more water in the dissolved stage due to the expansion of oil molecules. As the oil cools, this ability reverses and free water will appear where not visible before. In addition to temperature, fluid type also determines the saturation point for your system (see chart above).



# PVS Series

## Applications

- Hydraulic Systems
- Lubrication Systems
- Turbine Oil
- Transformer Oil
- New Oil (oil storage)
- Seal Oil
- Explosion Proof

## Environments



NEMA 7 Explosion Proof

## Markets

- Power Generation
- Pulp and Paper
- Primary Metals
- Mining
- Plastic Injection Molding
- Oil Exploration
- Petrochemical
- Automotive
- Aerospace
- Refineries
- Transportation

| Standard Features   | Advantages   | Benefits   |
|---|--|--|
| Variable flow circuit   | <ul style="list-style-type: none"> <li>• Allows oil to heat more quickly so water is removed faster</li> </ul>       | <ul style="list-style-type: none"> <li>• Time savings</li> </ul>   |
| Moisture sensor   | <ul style="list-style-type: none"> <li>• Real-time water content indication in % saturation</li> </ul>               | <ul style="list-style-type: none"> <li>• At-a-glance visual confirmation</li> </ul>                            |
| Automatic operation   | <ul style="list-style-type: none"> <li>• Unattended use</li> <li>• Designed for 24/7 operation</li> </ul>            | <ul style="list-style-type: none"> <li>• Reduces labor costs</li> <li>• Increases operation time</li> </ul>    |
| 316 Stainless steel used for primary wetted surfaces              | <ul style="list-style-type: none"> <li>• No corrosion</li> </ul>   | <ul style="list-style-type: none"> <li>• Product reliability</li> </ul>  |
| Ecoglass particulate element                                      | <ul style="list-style-type: none"> <li>• Coreless, non-metallic construction</li> </ul>                              | <ul style="list-style-type: none"> <li>• Environmentally friendly, easy disposal</li> </ul>                    |
| Clear plexiglass covers on the condensate tank and vacuum chamber | <ul style="list-style-type: none"> <li>• See the vacuum dehydration process work</li> </ul>                          | <ul style="list-style-type: none"> <li>• Visual verification of water removal</li> </ul>                       |
| Desiccant breather  | <ul style="list-style-type: none"> <li>• Insures dry, clean intake air</li> </ul>                                    | <ul style="list-style-type: none"> <li>• More efficient operation</li> </ul>                                   |
| Reverse phase switch  | <ul style="list-style-type: none"> <li>• Enables easy changing of motor rotation if out-of-phase</li> </ul>          | <ul style="list-style-type: none"> <li>• Ease of maintenance</li> <li>• Prevents incorrect rotation</li> </ul> |
| Condensate holding tank with optional auto drain                  | <ul style="list-style-type: none"> <li>• Large volume for infrequent servicing intervals</li> </ul>                  | <ul style="list-style-type: none"> <li>• Reduces maintenance costs</li> </ul>                                  |
| Programmable thermostat   | <ul style="list-style-type: none"> <li>• Maintains oil within 1°F</li> <li>• Prevents overheating the oil</li> </ul> | <ul style="list-style-type: none"> <li>• Unattended operation</li> </ul>                                       |
| Forklift guides and lifting eyes                                  | <ul style="list-style-type: none"> <li>• Provides safe and secure method of lifting the unit</li> </ul>              | <ul style="list-style-type: none"> <li>• Employee safety</li> </ul>  |
| Coalescing or packed tower oil dispersal elements                 | <ul style="list-style-type: none"> <li>• Flexibility with various fluid viscosities</li> </ul>                       | <ul style="list-style-type: none"> <li>• Greater efficiency in removing moisture</li> </ul>                    |

# PVS Series

## Vacuum Dehydration Performance

| Potential Contaminant | PVS Performance  |
|-----------------------|--|
| Solid particulate     | ISO Cleanliness Code*<br>14/13/10 Attainable                             |
| Water                 | Removes 100% of free water,<br>90% of dissolved water                    |
| Air/Gases             | Removes 100% of free air<br>and gases, 90% of dissolved<br>air and gases |

\*When utilizing 02Q media.

| Typical Performance |   |
|---------------------|---|
| Tank Size           | 60 Gallons (227 liters)                           |
| Run Time            | 62 minutes  |
| Parker Model        | PVS 600 (10 GPM)                                  |
| Water Content (ppm) | Start: 10,000 PPM (1.0%)<br>Stop: 50 PPM (0.005%) |
| Contamination Level | Start: ISO 21/18/16<br>Stop: ISO 16/14/11         |



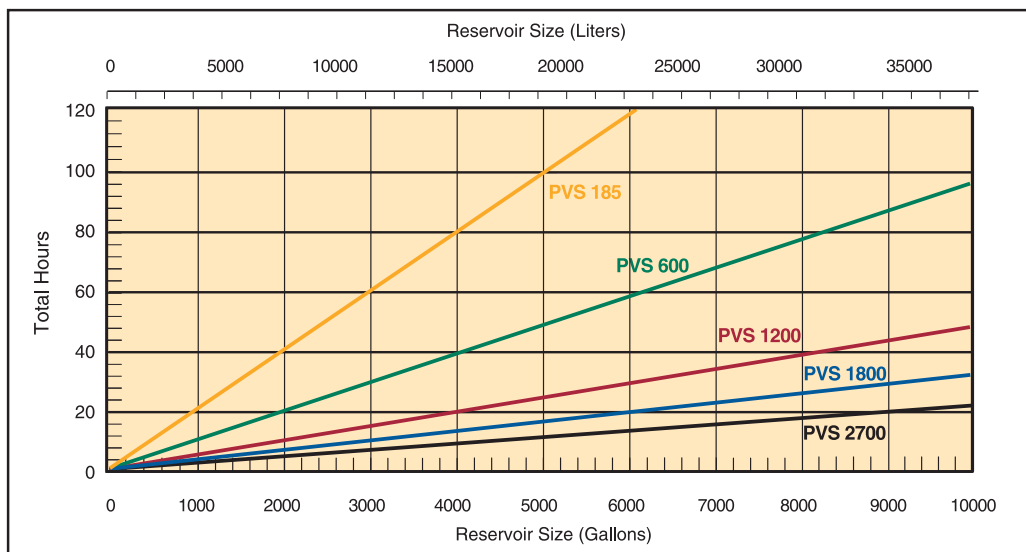
## PVS (Vacuum Dehydration) Compared to Other Technologies

**Centrifuge units** – Removes free water only; has difficulty breaking stable emulsions; larger envelope dimensions but lower flows; higher initial and operating costs.

**Desiccant units** – Have limited water removal capability due to absorbing material; only removes air ingressed particles; expensive compared to the volume of water removed.

**Coalescer units** – Removes free water only; has difficulty breaking stable emulsions; does not work well in viscous fluids (>100 sus); much larger in size compared to PVS.

**Estimated Water Removal Time  
5000 ppm (0.5%) to 150 ppm (0.015%)**



# PVS 185 Series

## Specifications

|                            |   |
|----------------------------|---|
| Flow rate                  | 5 gpm (18.9 lpm)  |
| Dimensions                 | 65" H x 33" W x 48" L<br>(1651mm x 838mm x 1219mm)              |
| Weight                     | 650 lbs. (295 kg)   |
| Seal material              | Fluorocarbon (EPR optional)                                     |
| Condensate tank            | 4.1 gal (15.5 ltrs)   |
| Dispersal elements         | 1   |
| Minimum operating capacity | 5 gal (18.9 ltrs)   |
| Vacuum (max)               | 25 In/Hg  |
| Viscosity (max)            | 500 sus (108 cSt)-Disposable<br>2150 sus (460 cSt)-Packed Tower |
| Outlet pressure (max)      | 60 psi (4.1 bar)  |
| Ports                      | 3/4" JIC (male) inlet<br>3/4" JIC (male) outlet                 |
| FLA (full load amps)       | 15-41 amps<br>(Depending on options & voltages)                 |
| <b>Shipping Weight</b>     | 1400 lbs. (635 kg) maximum                                      |
| <b>Shipping Dimensions</b> | 70" H x 48" W x 60" L<br>(1778mm x 1219mm x 1524mm)             |



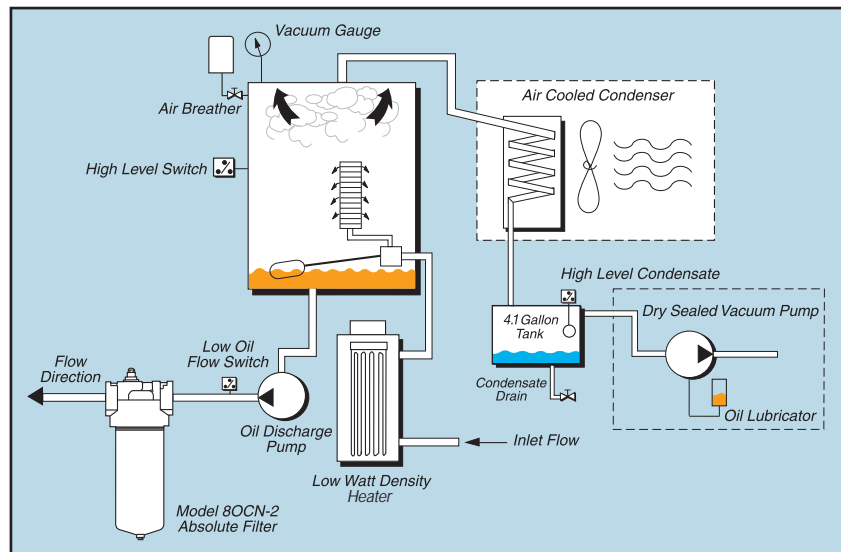
Note: Dimensions and weights are approximate and for reference only.

UL and CUL Marked

## Replacement Elements

| Standard Coreless Particulate (80CN-2) |         |
|--|---------|
| 02QE (2 micron)                        | 936716Q |
| 05QE (5 micron)                        | 936717Q |
| 10QE (10 micron)                       | 936718Q |
| 20QE (20 micron)                       | 936719Q |
| Optional Coreless Particulate (IL8-3)  |         |
| 02QE (2 micron)                        | 933734Q |
| 05QE (5 micron)                        | 933612Q |
| 10QE (10 micron)                       | 933735Q |
| 20QE (20 micron)                       | 933736Q |
| Dispersal                              |         |
| Disposable (Coalescing)                | 933180  |
| Packed tower (Cleanable)               | 933553  |

## PVS 185 Flow Diagram



# PVS 600 Series

## Specifications

|                            |   |
|----------------------------|---|
| Flow rate                  | 10 gpm (37.9 lpm)   |
| Dimensions                 | 65" H x 33" W x 48" L<br>(1651mm x 838mm x 1219mm)              |
| Weight                     | 900 lbs. (408.2 kg)   |
| Seal material              | Fluorocarbon (EPR optional)                                     |
| Condensate tank            | 4.1 gal (15.5 ltrs)   |
| Dispersal elements         | 2   |
| Minimum operating capacity | 6 gal (22.7 ltrs)   |
| Vacuum (max)               | 25 In/Hg  |
| Viscosity (max)            | 500 sus (108 cSt)-Disposable<br>2150 sus (460 cSt)-Packed Tower |
| Outlet pressure (max)      | 60 psi (4.1 bar)  |
| Ports                      | 1" JIC (male) inlet<br>1" JIC (male) outlet                     |
| FLA (full load amps)       | 24-38 amps<br>(Depending on options & voltages)                 |
| <b>Shipping Weight</b>     | 1500 lbs. (680 kg) maximum                                      |
| <b>Shipping Dimensions</b> | 70" H x 48" W x 60" L<br>(1778mm x 1219mm x 1524mm)             |



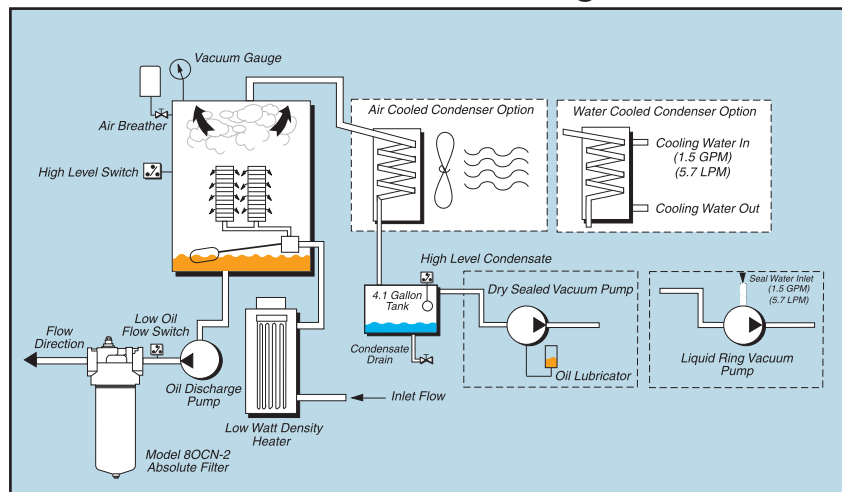
Note: Dimensions and weights are approximate and for reference only.

## Replacement Elements

| Standard Coreless Particulate (80CN-2) |         |
|--|---------|
| 02QE (2 micron)                        | 936716Q |
| 05QE (5 micron)                        | 936717Q |
| 10QE (10 micron)                       | 936718Q |
| 20QE (20 micron)                       | 936719Q |
| Optional Coreless Particulate (IL8-3)  |         |
| 02QE (2 micron)                        | 933734Q |
| 05QE (5 micron)                        | 933612Q |
| 10QE (10 micron)                       | 933735Q |
| 20QE (20 micron)                       | 933736Q |
| Dispersal                              |         |
| Disposable (Coalescing)                | 933180  |
| Packed tower (Cleanable)               | 933553  |

UL and CUL Marked

## PVS 600 Flow Diagram





# PVS 1200 Series

## Specifications

|                            |   |
|----------------------------|---|
| Flow rate                  | 20 gpm (75.7 lpm)   |
| Dimensions                 | 65" H x 44" W x 61" L<br>(1651mm x 1118mm x 1549mm)             |
| Weight                     | 1550 lbs. (703 kg)  |
| Seal material              | Fluorocarbon (EPR optional)                                     |
| Condensate tank            | 8.3 gal (31.4 ltrs)   |
| Dispersal elements         | 4   |
| Minimum operating capacity | 11 gal (41.6 ltrs)  |
| Vacuum (max)               | 25 In/Hg  |
| Viscosity (max)            | 500 sus (108 cSt)-Disposable<br>2150 sus (460 cSt)-Packed Tower |
| Outlet pressure (max)      | 60 psi (4.1 bar)  |
| Ports                      | 1½" JIC (male) inlet<br>1" JIC (male) outlet                    |
| FLA (full load amps)       | 30-48 amps<br>(Depending on options & voltages)                 |
| <b>Shipping Weight</b>     | 2300 lbs. (1043 kg) maximum                                     |
| <b>Shipping Dimensions</b> | 70" H x 48" W x 65" L<br>(1778mm x 1651mm x 1524mm)             |



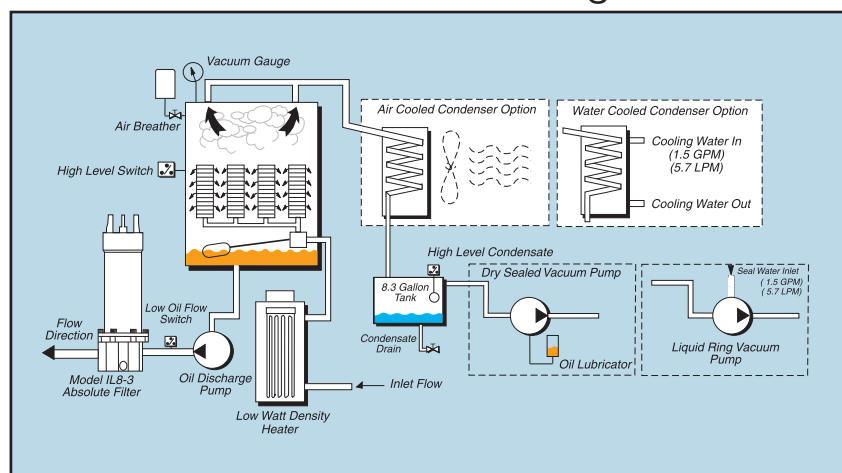
Note: Dimensions and weights are approximate and for reference only.

UL and CUL Marked

## Replacement Elements

| Standard Coreless Particulate (IL8-3) |         |
|---------------------------------------|---------|
| 02QE (2 micron)                       | 933734Q |
| 05QE (5 micron)                       | 933612Q |
| 10QE (10 micron)                      | 933735Q |
| 20QE (20 micron)                      | 933736Q |
| Dispersal                             |         |
| Disposable (Coalescing)               | 933180  |
| Packed tower (Cleanable)              | 933553  |

## PVS 1200 Flow Diagram



# PVS 1800 Series

## Specifications

|                            |   |
|----------------------------|---|
| Flow rate                  | 30 gpm (113.6 lpm)  |
| Dimensions                 | 68" H x 42" W x 75" L<br>(1727mm x 1067mm x 1905mm)             |
| Weight                     | 2550 lbs. (1157 kg)   |
| Seal material              | Fluorocarbon (EPR optional)                                     |
| Condensate tank            | 8.3 gal (31.4 ltrs)   |
| Dispersal elements         | 8   |
| Minimum operating capacity | 18 gal ( 68.1 ltrs)   |
| Vacuum (max)               | 25 In/Hg  |
| Viscosity (max)            | 500 sus (108 cSt)-Disposable<br>2150 sus (460 cSt)-Packed Tower |
| Outlet pressure (max)      | 60 psi (4.1 bar)  |
| Ports                      | 2" JIC (male) inlet<br>1.5" JIC (male) outlet                   |
| FLA (full load amps)       | 40-65 amps @ 460 V/60hz   |
| <b>Shipping Weight</b>     | 3000 lbs. (1361 kg) maximum                                     |
| <b>Shipping Dimensions</b> | 70" H x 48" W x 80" L<br>(1778mm x 1219mm x 2032mm)             |

Note: Dimensions and weights are approximate and for reference only.

## Replacement Elements

| Standard Coreless Particulate (IL8-3) |         |
|---------------------------------------|---------|
| 02QE (2 micron)                       | 933734Q |
| 05QE (5 micron)                       | 933612Q |
| 10QE (10 micron)                      | 933735Q |
| 20QE (20 micron)                      | 933736Q |
| Dispersal                             |         |
| Disposable (Coalescing)               | 933180  |
| Packed tower (Cleanable)              | 933553  |



UL and CUL Marked

# PVS 2700 Series

## Specifications

|                            |   |
|----------------------------|---|
| Flow rate                  | 45 gpm (170.3 lpm)  |
| Dimensions                 | 65" H x 42" W x 75" L<br>(1727mm x 1067mm x 1905mm)             |
| Weight                     | 2550 lbs. (1157 kg)   |
| Seal material              | Fluorocarbon (EPR optional)                                     |
| Condensate tank            | 8.3 gal (31.4 ltrs)   |
| Dispersal elements         | 8   |
| Minimum operating capacity | 18 gal ( 68.1 ltrs)   |
| Vacuum (max)               | 25 In/Hg  |
| Viscosity (max)            | 500 sus (108 cSt)-Disposable<br>2150 sus (460 cSt)-Packed Tower |
| Outlet pressure (max)      | 60 psi (4.1 bar)  |
| Ports                      | 3" JIC (male) inlet<br>2" JIC (male) outlet                     |
| FLA (full load amps)       | 50-70 amps @ 460 V/60hz   |
| <b>Shipping Weight</b>     | 3000 lbs. (1361 kg) maximum                                     |
| <b>Shipping Dimensions</b> | 70" H x 48" W x 80" L<br>(1778mm x 1219mm x 2032mm)             |

Note: Dimensions and weights are approximate and for reference only.



UL and CUL Marked

## Replacement Elements

| Standard Coreless Particulate (IL8-3) |         |
|---------------------------------------|---------|
| 02QE (2 micron)                       | 933734Q |
| 05QE (5 micron)                       | 933612Q |
| 10QE (10 micron)                      | 933735Q |
| 20QE (20 micron)                      | 933736Q |
| Dispersal                             |         |
| Disposable (Coalescing)               | 933180  |
| Packed tower (Cleanable)              | 933553  |

# PVS Series

## Specification Worksheet

1. Application: \_\_\_\_\_
2. Fluid Type: \_\_\_\_\_ Brand: \_\_\_\_\_  
Grade: \_\_\_\_\_ Specific Gravity: \_\_\_\_\_
3. Viscosity:   Min \_\_\_\_\_ SUS/cSt @ \_\_\_\_\_ °F/°C  
                  Max \_\_\_\_\_ SUS/cSt @ \_\_\_\_\_ °F/°C  
                  Normal \_\_\_\_\_ SUS/cSt @ \_\_\_\_\_ °F/°C
4. Contamination level:   Current ISO level \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_  
                                  Desired ISO level \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_
5. Water concentration:   Current PPM level \_\_\_\_\_  
                                  Desired PPM level \_\_\_\_\_
6. Suction head:       Positive/Negative \_\_\_\_\_ Ft./meters \_\_\_\_\_
7. Operating distance: \_\_\_\_\_ Ft./meters \_\_\_\_\_
8. System fluid operating temperature: \_\_\_\_\_ °F/°C   Is there a cooler? \_\_\_\_\_
9. Operating environment air temperature: (air cooled model)  
                                  Min \_\_\_\_\_ °F/°C  
                                  Max \_\_\_\_\_ °F/°C  
                                  Normal \_\_\_\_\_ °F/°C
10. Water supply temperature: (liquid ring model)  
                                  Min \_\_\_\_\_ °F/°C  
                                  Max \_\_\_\_\_ °F/°C  
                                  Normal \_\_\_\_\_ °F/°C
11. Operating environment above/below sea level: \_\_\_\_\_ Ft./meters
12. Voltage options:   • 230VAC, 3P, 60Hz (185, 600)  
                              • 380VAC, 3P, 50Hz (185, 600, 1200, 1800, 2700)  
                              • 460VAC, 3P, 60Hz (185, 600, 1200, 1800, 2700)  
                              • 575VAC, 3P, 60Hz (185, 600, 1200, 1800, 2700)
13. Available amperage: \_\_\_\_\_
14. Reservoir volume: \_\_\_\_\_
15. Special requirements: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
16. Any previous filtration problems with the application: \_\_\_\_\_
17. PVS model selected: \_\_\_\_\_

**NOTE: Specification sheet must be completed before order can be entered.**

# PVS Series

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

Example:

| BOX 1 | STD | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 | BOX 9         |
|-------|-----|-------|-------|-------|-------|-------|-------|-------|---------------|
|       | PVS | 600   | 460   | DS    | D     | 10QE  | 12    | AC    | ACD<br>DFL CR |

| BOX 1: Seals |              |
|--------------|--------------|
| Symbol       | Description  |
| None         | Fluorocarbon |
| E8           | EPR          |

| BOX 2: Base Unit Flow rate |                    |
|----------------------------|--------------------|
| Symbol                     | Description        |
| 185                        | 5 GPM (18.9 lpm)   |
| 600                        | 10 GPM (37.9 lpm)  |
| 1200                       | 20 GPM (75.7 lpm)  |
| 1800                       | 30 GPM (113.6 lpm) |
| 2700                       | 45 GPM (170.3 lpm) |

| BOX 3: POWER SUPPLY * |        |                  |
|-----------------------|--------|------------------|
| Model                 | Symbol | Description      |
| 185                   | 230    | 230VAC, 3P, 60HZ |
|                       | 380    | 380VAC, 3P, 50HZ |
|                       | 460    | 460VAC, 3P, 60HZ |
|                       | 575    | 575VAC, 3P, 60HZ |
| 600                   | 380    | 380VAC, 3P, 50HZ |
|                       | 460    | 460VAC, 3P, 60HZ |
|                       | 575    | 575VAC, 3P, 60HZ |
| 1200                  | 380    | 380VAC, 3P, 50HZ |
|                       | 460    | 460VAC, 3P, 60HZ |
|                       | 575    | 575VAC, 3P, 60HZ |
|                       | 575    | 575VAC, 3P, 60HZ |
| 1800                  | 380    | 380VAC, 3P, 50HZ |
|                       | 460    | 460VAC, 3P, 60HZ |
|                       | 575    | 575VAC, 3P, 60HZ |
| 2700                  | 380    | 380VAC, 3P, 50HZ |
|                       | 460    | 460VAC, 3P, 60HZ |
|                       | 575    | 575VAC, 3P, 60HZ |

\*Consult factory for special voltages.

| BOX 4: Vacuum Pump |             |
|--------------------|-------------|
| Symbol             | Description |
| DS                 | Dry sealed  |
| LR                 | Liquid ring |

| BOX 5: Dispersal Element |                          |
|--------------------------|--------------------------|
| Symbol                   | Description              |
| D                        | Coalescing (disposable)  |
| P                        | Packed tower (cleanable) |

| BOX 6: Particulate Element |                         |
|----------------------------|-------------------------|
| Symbol                     | Pressure Setting        |
| 02QE                       | Ecoglass III, 2 micron  |
| 05QE                       | Ecoglass III, 5 micron  |
| 10QE                       | Ecoglass III, 10 micron |
| 20QE                       | Ecoglass III, 20 micron |

Note: Above elements are rated for Beta 200+ (99.5% efficiency)

| BOX 7: Heater |        |               |
|---------------|--------|---------------|
| Model         | Symbol | Description   |
| 185           | 12     | 12 KW/3 phase |
|               | 24     | 24 KW/3 phase |
|               | 36     | 36 KW/3 phase |
| 600           | 12     | 12 KW/3 phase |
|               | 24     | 24 KW/3 phase |
|               | 36     | 36 KW/3 phase |
| 1200          | 24     | 24 KW/3 phase |
|               | 36     | 36 KW/3 phase |
|               | 48     | 48 KW/3 phase |
| 1800          | 36     | 36 KW/3 phase |
|               | 48     | 48 KW/3 phase |
| 2700          | 48     | 48 KW/3 phase |

| BOX 8: Condenser |                      |
|------------------|----------------------|
| Symbol           | Description          |
| AC               | Air cooled           |
| LC               | Liquid cooled        |
| BC               | Air and water cooled |

| BOX 9: Options* |   |
|-----------------|---|
| Symbol          | Description   |
| 3HP             | 3HP High Viscosity Circuit                            |
| 5DW             | 5" Diameter Wheels                                    |
| ACD             | Auto Condensate Drain                                 |
| CDC             | Condensate Drain Counter                              |
| CE              | CE Marked   |
| CF              | Carbon Exhaust Filter                                 |
| CR              | Cable Reel  |
| DFL             | Dirty Filter Light                                    |
| DPG             | Differential pressure gauge                           |
| EX1             | Explosion Proof (Class I, Division I, Zone I and II)  |
| EX2             | Explosion Proof (Class I, Division II, Zone I and II) |
| NM7             | NEMA 7 Explosion Proof                                |
| ICV             | Inlet Control Valve                                   |
| IL8             | Upgrade to IL8-3 coreless filter                      |
| PNW             | Pneumatic Wheels                                      |
| RHM             | Resetable Hour Meter                                  |
| SFI             | Sight Flow Indicator                                  |
| PD              | LED Particle Detector                                 |
| PDL             | LCD Particle Detector                                 |
| NYM             | No Yellow Metals                                      |

\* Consult factory for other options.

Global products as identified are offered worldwide through all Parker locations and utilize a common ordering code.





aerospace  
 climate control  
 electromechanical  
**filtration**  
 fluid & gas handling  
 hydraulics  
 pneumatics  
 process control  
 sealing & shielding



# Stationary Offline System

SOS for Indoor/Outdoor Fluid Filtration Needs



ENGINEERING YOUR SUCCESS.

# Stationary Offline System

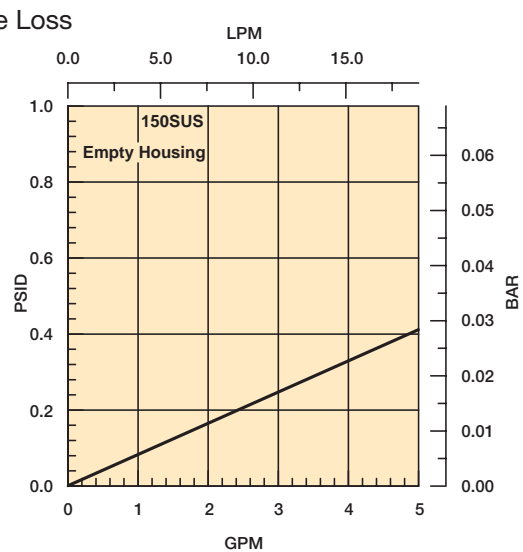
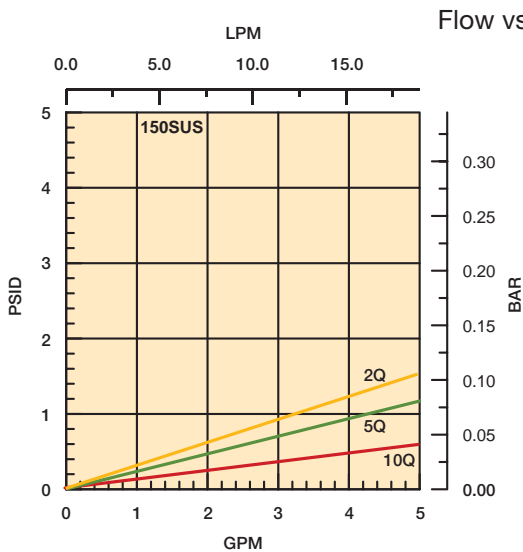
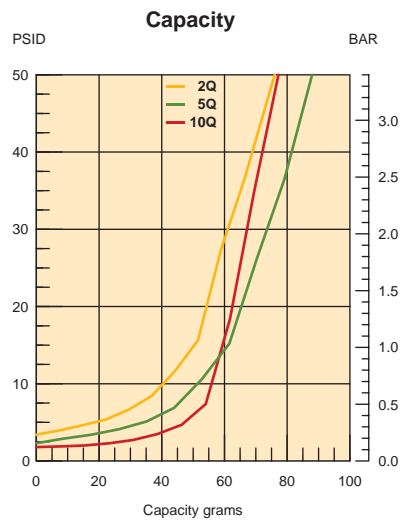
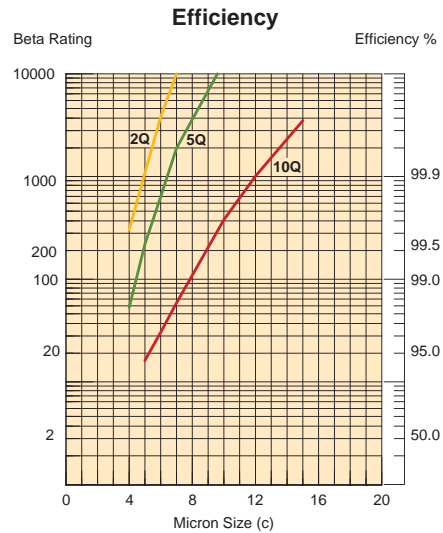
## Performance Data



Parker's new patented Moduflow™ Plus element was designed with built-in diverter cone and bypass valve, to meet your application needs.

### Applications

- Oil & Gas
- Plastic Injection Molding
- Die Casting
- Steel
- General Industrial
- Power Generation
  - Load Tap Changer
  - Wind Turbines
  - Transformer
- Mining
- Off-highway Equipment
- Food Processing
- Refining
- Paper Mills
- Aircraft Ground Support



# Stationary Offline System

## Specifications

**Flow rate:** 5 gpm

**Filtration:** High efficiency Microglass III  
( $B_x = 200+$ ).

**Enclosure:** Weatherproof NEMA 4 IP 65 with sealed safety glass window.

**Electrical service required:** 115V, 10A, single phase, 60 Hz

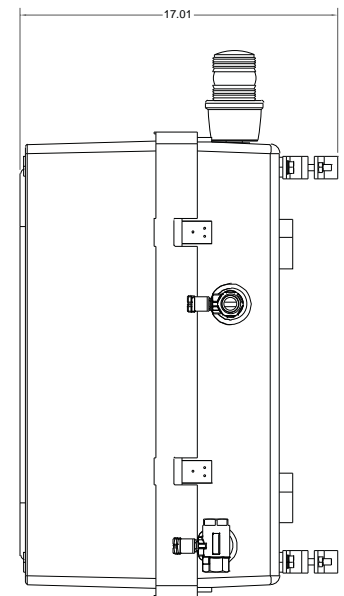
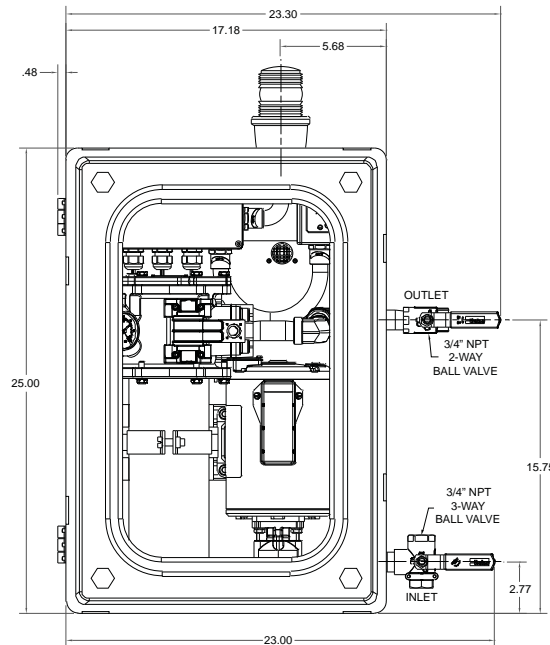
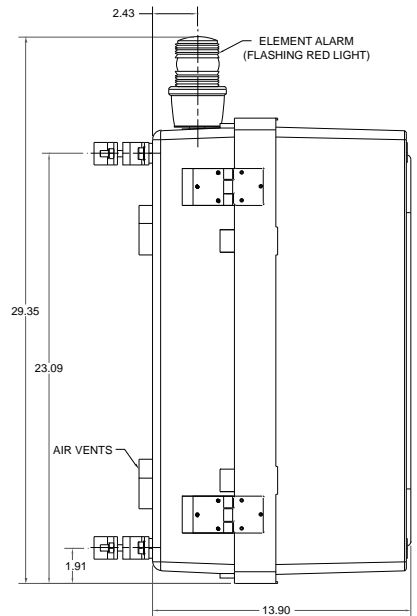
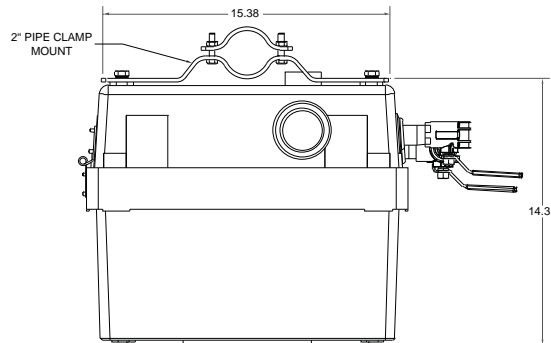
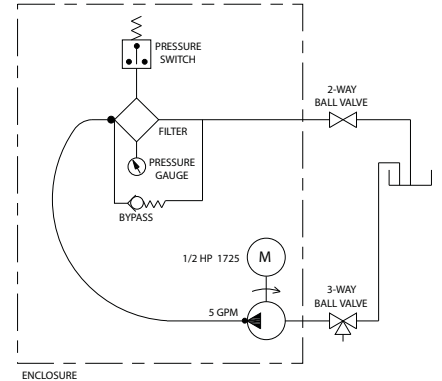
**Electrical motor:** 1/2 HP @ 1725 rpm w/ thermal overload protection.

**Filter bypass alarm:** Red strobe light indicates at 20 psid filter element pressure drop. Auto shut-down at 40 psid.

**Seals:** Nitrile

**Weight:** Approximately 80 lbs.

**Compatible with most petroleum based fluids, including dielectric oils. Rated for continuous duty.**



The Moduflow™ Plus filter is known for its performance and durability. It has been engineered to provide the highest level of performance for today's demanding filtration requirements.

Drawings are for reference only.  
Contact factory for current version.

Dimensions are in inches.



# Stationary Offline System

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

Example:

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 | BOX 8 |
|-------|-------|-------|-------|-------|-------|-------|-------|
| SOS   | 5     | 02Q   | B     | E     | I     | N12   | 1     |

| BOX 1: Filter Series |                           |
|----------------------|---------------------------|
| Symbol               | Description               |
| SOS                  | Stationary Offline System |

| BOX 2: Model |                 |
|--------------|-----------------|
| Symbol       | Description     |
| 5            | 5 gpm flow rate |

| BOX 3: Media Code |                           |
|-------------------|---------------------------|
| Symbol            | Description               |
| 02Q               | Microglass III, 2 micron  |
| 05Q               | Microglass III, 5 micron  |
| 10Q               | Microglass III, 10 micron |
| WR                | Water removal             |

| BOX 4: Seals |                    |
|--------------|--------------------|
| Symbol       | Description        |
| B            | Nitrile (NBR)      |
| V            | Fluorocarbon (FKM) |

| BOX 5: Indicator |  |
|------------------|--|
| Symbol           | Description  |
| E                | Electrical with visual gauge<br>(includes external lighted beacon) |

| BOX 6: Bypass |             |
|---------------|-------------|
| Symbol        | Description |
| I             | 35 PSID     |

| BOX 7: Ports |                         |
|--------------|-------------------------|
| Symbol       | Description             |
| N12          | ¾" NPT integral threads |

| BOX 8: Options |   |
|----------------|---|
| Symbol         | Description                             |
| 1              | With Bypass<br>Heater (consult factory) |

Please note the **bolded options** reflect standard options with a reduced lead-time. Consult factory on all other lead-time options.

## Replacement Elements

| Media | Nitrile Seals<br>Part Number | Fluorocarbon Seals<br>Part Number |
|-------|------------------------------|-----------------------------------|
| 02Q   | 937393Q                      | 937401Q                           |
| 05Q   | 937394Q                      | 937402Q                           |
| 10Q   | 937395Q                      | 937403Q                           |
| WR    | 940733                       | —                                 |



# Environmental Air Filters Reservoir Equipment

Automotive Filter Catalog



ENGINEERING YOUR SUCCESS.

# EAB Series

## Reservoir Equipment

### Typical Applications

- Agricultural machines
- Articulated dump trucks
- Forestry equipment
- Wheeled loaders
- Lubricating systems
- Excavators
- Mobile cranes
- Industrial power units

### Technical Data

The filter has been designed to achieve a low pressure drop and high dirt holding capacity with airflows up to 1500 l/min (400 gpm). A compact EAB10 with airflows up to 1000 l/min (260 gpm) is also available.

#### Construction:

Glass reinforced composite housing with Eco-element.

#### Filter media options:

P020: High quality polyester media. 2µm (abs).

C015: Polyester media with water-resistant layer. 1.5µm (abs)

Q010: Glass fibre media. 1.0µm (abs)

#### Mounting options:

With 6 screws. Includes machine and plate screws, a strainer and gaskets.

External threads G3/4", G1"

Internal thread G3/4"

#### Options:

Visual gauge type vacuum/pressure indicator.

Overpressure valve, pressure setting 0.2 bar (2.9 psi). (available for EAB20 only)

EAB10 cannot be specified with an overpressure valve and vacuum/pressure gauge at the same time.

#### Advantages of the EAB filters:

Easy maintenance.

Indicator states the need for element change.

Quick and easy element change (no tools required).

#### Environmentally friendly:

EAB elements contains no metal parts: therefore it can be crushed and burned minimising the volume of waste material.

#### Other features:

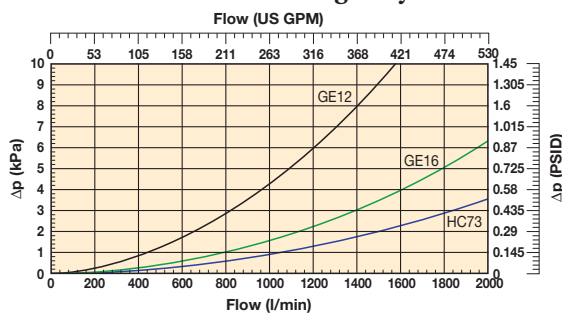
The optional indicator is located in a safe place inside the housing. Housing includes mounting holes for a padlock, which allows you to increase the security against theft and vandalism.

### Pressure Drop Curves

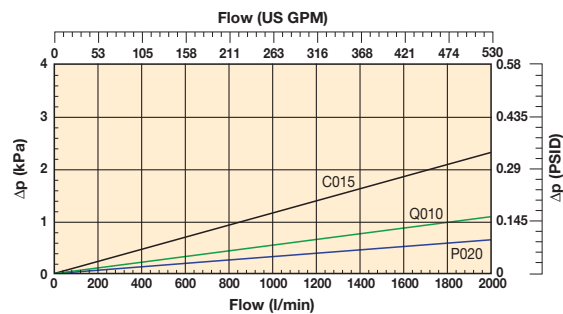
$\Delta P_{total} = \Delta P_{housing} + \Delta P_{element}$

The recommended level of the initial pressure drop for this filter is max 0.02 bar/2.0kPa (0.29 psi).

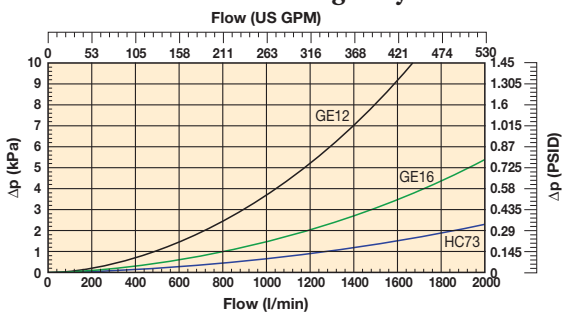
**EAB10 Housing Only**



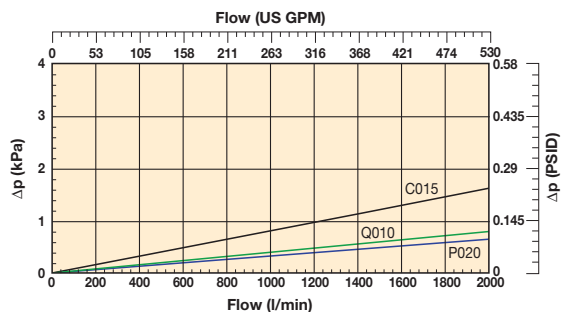
**EAB10 Elements**



**EAB20 Housing Only**



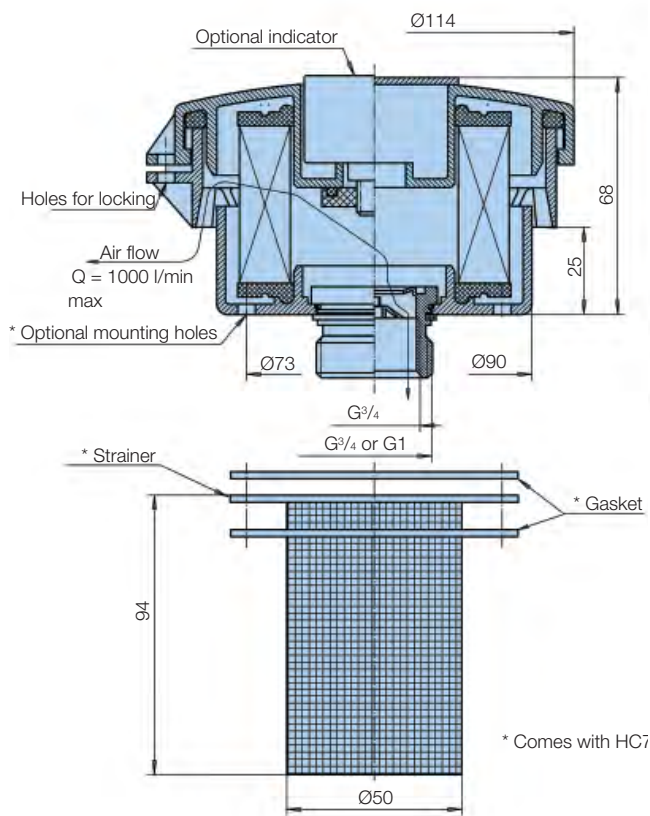
**EAB20 Elements**



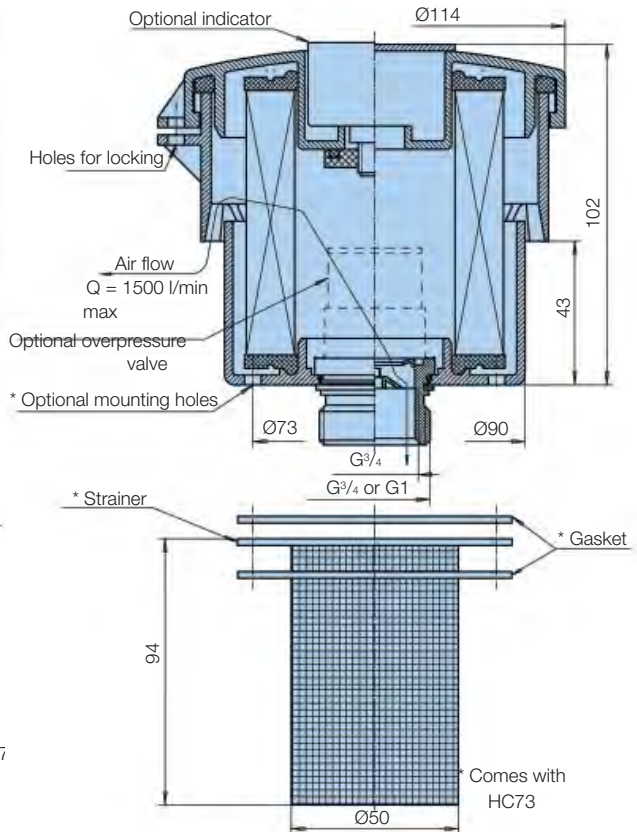
# EAB Series

## Specifications

### EAB10



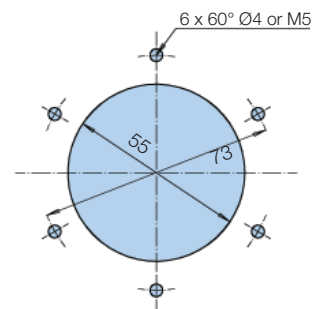
### EAB20



**NOTICE!**  
Air filters are an essential part of the system and the element needs to be replaced regularly.

| Mounting                 | Code |
|--------------------------|------|
| 6 mounting holes         | HC73 |
| G1 external              | GE16 |
| G $\frac{3}{4}$ external | GE12 |
| G $\frac{3}{4}$ internal | GS12 |

6 hole fixing mounting dimensions



# EAB Series

## How to Order

### Standard products table

| Part number           | Supersedes | Model | Media | Mounting | Overpressure valve | Indicator | Replacement elements |
|-----------------------|------------|-------|-------|----------|--------------------|-----------|----------------------|
| <b>EAB20P020GE16A</b> | N/A        | EAB20 | P020  | GE16     | V2                 | A         | <b>EAC20P020</b>     |

### Product configurator

| Product number | Media options |                          | Mounting options |  | Overpressure valve options |                       | Indicator options |                       |
|----------------|---------------|--------------------------|------------------|--|----------------------------|-----------------------|-------------------|-----------------------|
| <b>EAB20</b>   | <b>P020</b>   | 2µ abs polyester         | <b>HC73</b>      | 6 hole fixing  |                            | No overpressure valve |                   | No indicator          |
| <b>EAB10</b>   | <b>C015</b>   | 1.5µ abs water resistant | GE12             | G <sup>3</sup> / <sub>4</sub> external thread                | <b>V2</b>                  | 0.2 bar               | <b>A</b>          | Vacuum/pressure gauge |
|                | <b>Q010</b>   | 1.0µ abs glass fibre     | <b>GE16</b>      | G1 external thread<br>G <sup>3</sup> / <sub>4</sub> internal |                            |                       |                   |                       |
|                |               |                          | GS12             | thread<br>M33 x 2 external                                   |                            |                       |                   |                       |
|                |               |                          | ME33             | thread   |                            |                       |                   |                       |

### Replacement elements

| Product number | Media options |                          |
|----------------|---------------|--------------------------|
| <b>EAC20</b>   | <b>P020</b>   | 2µ abs polyester         |
| <b>EAC10</b>   | <b>C015</b>   | 1.5µ abs water resistant |
|                | <b>Q010</b>   | 1.0µ abs glass fibre     |

Note 1: Part numbers featured with bold highlighted codes will ensure a 'standard' product selection.

Note 2: For alternative part number options, consult Parker Filtration.

# ABL Series

## Reservoir Equipment

### Typical Applications

#### The Parker Filtration ABL-2 Series Air Filters.

- Saw mills
- Agricultural machines
- Articulated dump trucks
- Forestry equipment
- Wheeled loaders
- Lubricating systems
- Excavators
- Industrial power units
- Mobile cranes



### Technical Data

#### Assembly:

Tank top mounted.

#### Connections:

Threads G1<sup>1</sup>/<sub>4</sub> (ISO 228), 1<sup>1</sup>/<sub>2</sub>" (UN-16-2B).

#### Seal material:

Seals integrated in LEIF<sup>®</sup> element.

#### Operating temperature range:

-20°C (-4F), +80°C (176F)

#### Filtration media:

3 micron.

#### Flow fatigue characteristics:

Filter media is supported so that the optimal fatigue life is achieved.

#### Vacuum indicator:

ABL-2 0.04 bar. Visual with latch out memory.

#### Breather housing:

High impact strength composite.

#### Filter element:

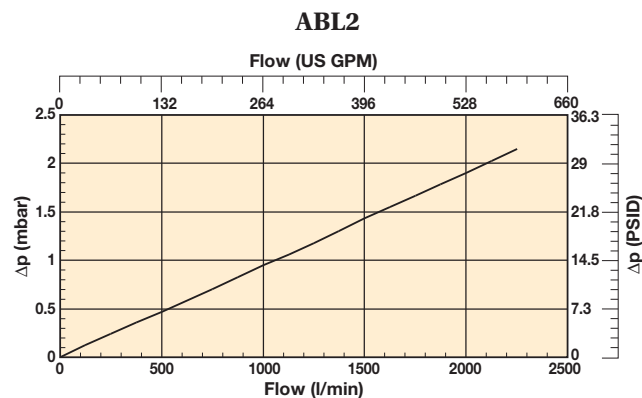
LEIF<sup>®</sup> element.

#### Options:

- Adaptor with filter connection.
- Single adaptor.
- Breather with integrated pressure relieve valve for pressurised tank on request only.

LEIF<sup>®</sup> elements can be used for hydraulic fluids only. For other fluids contact Parker Filtration.

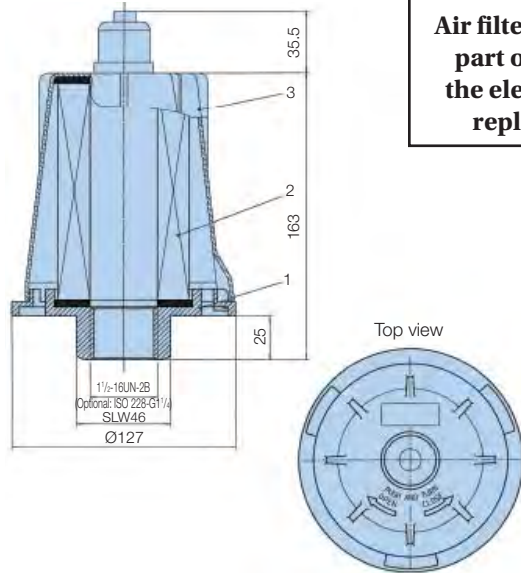
### Pressure Drop Curves



# ABL Series

## Specifications

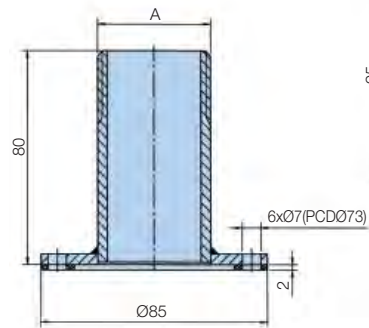
ABL-2



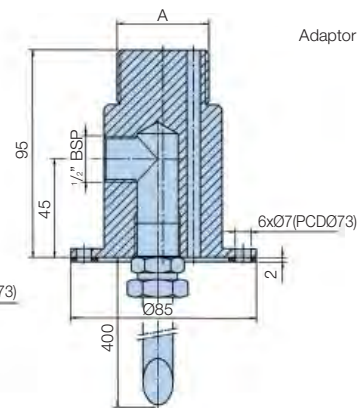
**NOTICE!**  
Air filters are an essential part of the system and the element needs to be replaced regularly.

## Extensions and filling mounting adaptors

Adaptor single



Adaptor with filler connection



# ABL Series

## How to Order

### Standard products table

| Part number             | Supersedes          | Replacement elements |
|-------------------------|---------------------|----------------------|
| <b>ABL2G114QXWL13V</b>  | ABL2-G1¼-QXWL-1-3-V | <b>QXWL13</b>        |
| <b>ABL2U112QXWL13V</b>  | ABL2-U1½-QXWL-1-3-V | <b>QXWL13</b>        |
| <b>ADAPTORABLG114FP</b> | ADAPTOR-ABL-G1¼-FP  | -                    |

### Product configurator

| Product number |            | Mounting options |             | Filtration (3µm) |           | Indicators |        | Options |                                |
|----------------|------------|------------------|-------------|------------------|-----------|------------|--------|---------|--------------------------------|
|                |            | <b>S11U</b>      |             |                  |           |            |        |         |                                |
| <b>ABL2</b>    | 2000 l/min |                  | 1½ UN-16-2B | <b>QXWL13</b>    | ABL2 Only | <b>V</b>   | Visual | SNG     | Vacuum/Pressure Gauge          |
|                |            |                  |             |                  |           |            |        | FP      | Adaptor With Filler Connection |

### Product configurator

| Product number     | Mounting options |                     | Options    |                                |
|--------------------|------------------|---------------------|------------|--------------------------------|
| <b>Adaptor ABL</b> | <b>G114</b>      | ISO 228 - G1¼ (BSP) | <b>SNG</b> | Single Adaptor                 |
|                    | <b>U112</b>      | 1½ UN-16-2B         | <b>FP</b>  | Adaptor With Filler Connection |

### Replacement elements

| Part number   | Supersedes | Description |
|---------------|------------|-------------|
| <b>QXWL13</b> | QXWL1-3    | 3µ          |

Note 1: Part numbers featured with bold highlighted codes will ensure a 'standard' product selection.

Note 2: Alternate displayed part number selection will require you to contact Parker Filtration for availability.





# AB Series

## Reservoir Equipment

### AB Series - Reservoir Breathers

- High Efficiency Air Breather
- Indicator Notes Replacement Condition

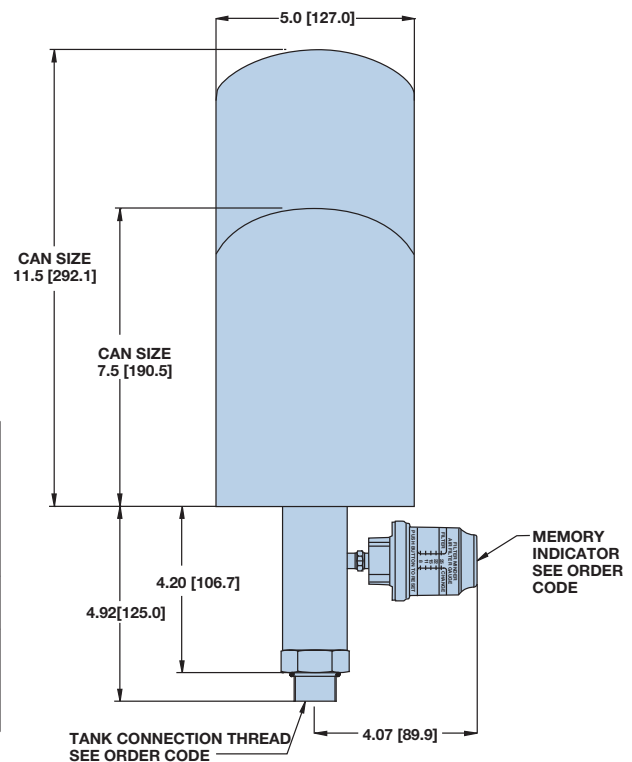
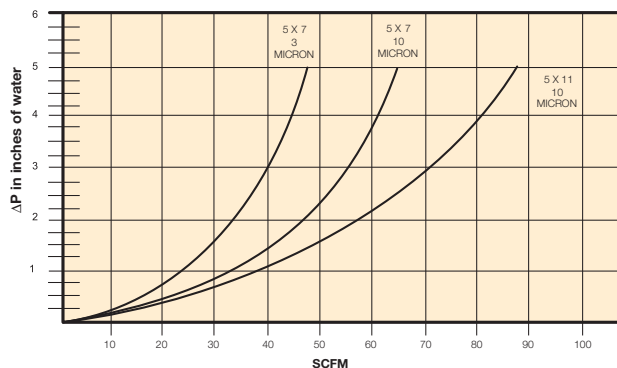


Air Breather With Memory Indicator



### Flow Rate Curves

- Determine maximum exchange flow of reservoir in GPM.
- Divide GPM by 7.4 to get SCFM.
- Select Air Filtration Required (in Microns). (Air filtration level should be the same or finer than the filtration level of your Hydraulic system.)
- Select proper can size from the graph below. (Initial clean pressure drop should not exceed 6 inches of water.)



# AB Series

## How to Order

Select the desired symbol (in the correct position) to construct a model code.

**Example:**

| BOX 1 | BOX 2 | BOX 3 | BOX 4 | BOX 5 | BOX 6 | BOX 7 |
|-------|-------|-------|-------|-------|-------|-------|
|       |       | AB    | 3     | ST16  | 10    | MI    |

| BOX 1: Division Code                                       |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive program identification. |             |

| BOX 2: Plant Code                                  |             |
|--|-------------|
| Symbol   | Description |
| None   | Leave Blank |
| Note: Used for specific automotive plant location. |             |

| BOX 3: Configuration |              |
|----------------------|--------------|
| Symbol               | Description  |
| AB                   | Air Breather |

| BOX 4: Can Size |             |
|-----------------|-------------|
| Symbol          | Description |
| 2               | 3.5" x 5"   |
| 3               | 5" x 7.5"   |
| 4               | 5" x 11"    |

| BOX 5: Tank Connection Thread |  |
|-------------------------------|--|
| Symbol                        | Description  |
| P12                           | 3/4" NPT male<br>*Only available with option -2, Box 4                                 |
| G12                           | G 3/4"-14 BSPP thread (ISO 1179-1)<br>*Only available with option -2, Box 4            |
| ST16                          | 1 5/16-12 SAE straight thd. (ISO 11926)<br>*Only available with options -3 & -4, Box 4 |
| M27                           | M27 x 2 metric thread (ISO 6149)   |
| G16                           | G 1"-11 BSPP thread (ISO 1179-1)<br>*Only available with options -3 & -4, Box 4        |

| BOX 6: Air Filtration  |                     |
|--|---------------------|
| Symbol   | Description         |
| 3*   | 3 micron Cellulose  |
| 10   | 10 micron Cellulose |
| *Note: 3 micron Cellulose is not available in can size 4 (5" x 11"). |                     |

| BOX 7: Indicator                          |                  |
|---|------------------|
| Symbol                                    | Description      |
| MI  | Memory Indicator |
| Note: Not available for option -2, Box 4. |                  |

## Replacement Breather Cans

| Media    | Designate Size 3.5" x 5" | Designate Size 5" x 7.5" | Designate Size 5" x 11" |
|----------|--------------------------|--------------------------|-------------------------|
| 3 Micron | 926543                   | 926541                   | NA                      |
| 5 Micron | 921999                   | 926169                   | 927136                  |



# LaserCM Portable Particle Counter

Fluid Condition Monitoring



ENGINEERING YOUR SUCCESS.

# LaserCM

## Portable Particle Counter

### Typical Applications

- Construction machinery
- Industrial plant
- Hydraulic equipment & system manufacturers
- Research & testing institutes
- Offshore & power generation
- Marine
- Military equipment applications



### Parker LaserCM Portable Particle Counter.

With 15 years experience in manufacturing the world's best selling 'white light' portable particle counter - CM20, the progression to the LaserCM with its opto-mechanical, continuous wave single point source laser (SPSL) is both a natural and customer driven development.

### Features & Benefits

**Test time:** 2 minutes

#### Particle counts:

>2 $\mu$ , >5 $\mu$ , >15 $\mu$ , >25 $\mu$ , >50 $\mu$  and >100 $\mu$  microns

>4 $\mu$ , >6 $\mu$ , >14 $\mu$ , >21 $\mu$ , >38 $\mu$  and >70 $\mu$  microns(c)

#### International codes:

ISO 7-22, NAS 0-12, SAE 0-12

#### Data retrieval:

Memory access gives test search facility

#### Max. working pressure:

420 bar (100 USgpm)

#### Max. flow rate:

400 l/min (6000 psi) when used with system 20 Sensors. Higher with single point sampler (consult Parker)

#### Working conditions:

LaserCM will operate with the system working normally

#### Computer compatibility:

Interface via RS232 connection @ 9600 baud rate.

- Special 'diagnostics' are incorporated into the LaserCM microprocessor control to ensure effective testing.
- Routine contamination monitoring of oil systems with LaserCM saves time and saves money.
- Contamination monitoring is now possible while machinery is working - LaserCM saves on production downtime.
- Data entry allows individual equipment test log details to be recorded.
- Data retrieval of test results from memory via hand set display.
- Automatic test cycle logging of up to 300 tests can be selected via hand set display.
- Totally portable, can be used as easily in the field as in the laboratory.
- Automatic calibration reminder.
- Instant, accurate results achieved with a 2 minute test cycle.
- Data entry allows individual equipment footprint record.
- Data graphing selectable via the integral printer.
- Auto 300-test cycle logging via LCD handset input.
- RS232 serial port computer interface.
- Limit level output to control peripheral equipment such as off-line filtration via internal relay limit switches.
- Auto-testing allows for the conducting of automatic sequencing tests on flushing systems for example.
- Optional bar code swipe wand to allow handset data loading.
- Worldwide service and technical support.
- Re-calibration - Annual certification by an approved Parker Service Center.

# LaserCM

## Specifications

Automatic Particle Counters (APC's), have been widely used for many years in condition monitoring of hydraulic fluids. However, it is only recently that APC's have become flexible enough to enable the instruments to be taken out of the laboratory and used on-line in order to obtain the most credible form of results.

Unusually, the move from fixed laboratory use, to portable field use has not been at the expense of accuracy or user flexibility, but has actually enabled the instruments to be used over a wider range of applications and situations.

The most common monitoring technique used in APC's is that of light obscuration or light blockage. Here, a focused light source is projected through a moving column of oil, (in which the contaminants being measured are contained), causing an image of the contaminant to be projected on to a photo diode cell, (changing light intensity to an electrical output).

The electrical output of the photo diode cell will vary in accordance with the size of the particles contained in the column of oil; the larger the particle, the bigger the change in the photo diode electrical output.

On-line APC's must be able to test the oil sample at whatever cleanliness it is delivered to the machine. Parker therefore had to develop technology to ensure the on-line APC was able to test a sample without the conventional laboratory technique which requires dilution - a practice

that would have been simply impossible with a portable unit.

By careful design and window sizing, gravimetric levels as high as 310mg of dirt per litre, (equivalent to up to 4 million particles >5 micron per 100 ml), can be achieved without making the instrument susceptible to counter saturation.

These high saturation point on-line APC's, whilst losing none of the accuracy of their laboratory counterparts, enable particle counting to be carried out quickly and accurately.

### Core technology that proves itself in LaserCM

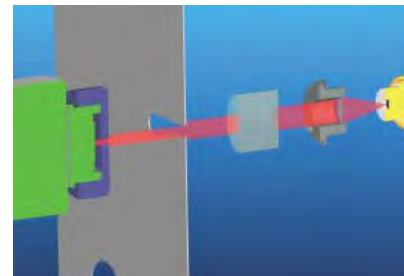
The LaserCM portable particle counter features microprocessor controlled optical scanning for accurate contaminant measurement with a calibration range from ISO 7 to ISO 22 (NAS 0-12) with no counter saturation.

### How does LaserCM work?

- The particles are measured by a photo diode that converts light intensity to a voltage output which is recorded against time.
- As the particle moves across the window the amount of light lost is proportional to the size of the particle. This reduction in voltage is measured and recorded.
- This "voltage" lost relates directly to the area of the particle measured, is changed into a "positive" voltage and then in turn changed into a capacitance value.
- This value is counted and stored in the LaserCM computer in one of 6 channels, >2, >5, >15, >25, >50 and >100 $\mu$  according to particle size.
- Readouts are displayed on the hand-held LCD in the accepted ISO and NAS standards ready for hard copy printing or RS232 computer download.
- The on-board computer allows storage of up to 300 test results.



A focused light source is projected through a moving column of oil.



Laser Optical Sensing

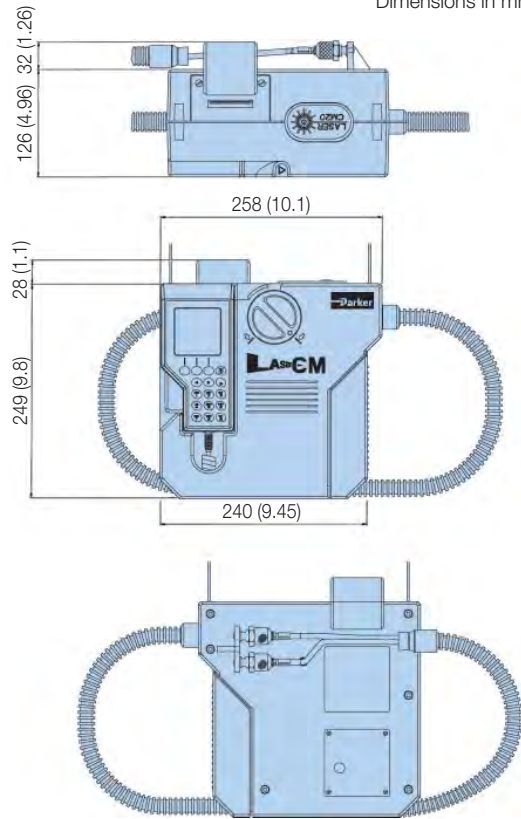
# LaserCM

## Specifications

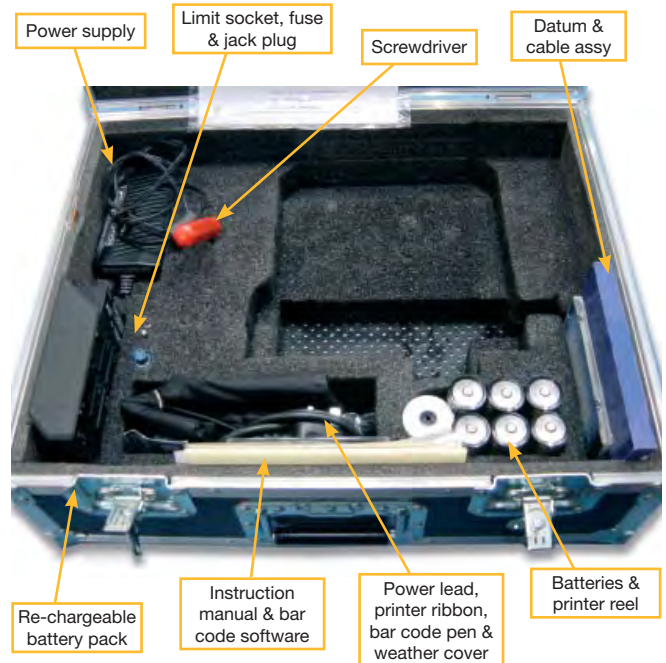
| Description  | LaserCM (LCM20.2021) | LaserCM (LCM20.2061) |
|--|----------------------|----------------------|
| Lexan, structural foam and ABS case  | •                    | •                    |
| ABS handheld display   | •                    | •                    |
| Mechanical composition – Brass, plated steel, stainless steel and aluminum | •                    | •                    |
| Fluorocarbon seals   | •                    | •                    |
| Perfluoroelastomer seals   | •                    | •                    |
| Nylon hoses (kevlar braided microbore)                                     | •                    | •                    |
| Stainless steel armoured hose ends   | •                    | •                    |
| 1.2m (4ft) fluid connection hose   | •                    | •                    |
| System 20 sensors. Higher with single point sampler                        | •                    | •                    |
| Rechargeable battery pack  | •                    | •                    |
| 12Vdc power supply   | •                    | •                    |
| Fast blow fuse   | •                    | •                    |
| Unique optical scanning system   | •                    | •                    |
| Bonded glass optical window enclosed in SS plate                           | •                    | •                    |
| Micron channels analysis (2µ,5µ,15µ,25µ,50µ & 100µ)                        | •                    | •                    |
| Analysis range ISO 7 to 22 incl. (NAS 0 to 12)                             | •                    | •                    |
| 32 character dot matrix LCD. Alpha numeric keypad                          | •                    | •                    |
| Data retrieval   | •                    | •                    |
| Calibration to ISO standards*  | •                    | •                    |
| Viscosity range 2 to 100 cSt. 500 cSt.with SPS                             | •                    | •                    |
| Operating temp.+5 to +80°C (+41 to +176°C)                                 | •                    | •                    |
| Ambient temp.+5 to +40°C (+41 to +104°C)                                   | •                    | •                    |
| 2 minute test completion time  | •                    | •                    |
| Memory store – 300 test memory   | •                    | •                    |
| 12Vdc regulated power supply input   | •                    | •                    |
| Battery operated 6 x 1.5 D cells   | •                    | •                    |
| Phosphate Ester group compatibility  | •                    | •                    |
| Mineral oil & petroleum based fluid compatibility                          | •                    | •                    |
| Up to 420 bar (6000 psi)   | •                    | •                    |
| Integral 16 column printer   | •                    | •                    |
| RS232 computer interface   | •                    | •                    |
| Astra board case weight – Kg (lbs)   | 5 (11lbs)            | 5 (11lbs)            |
| Unit weight – Kg (lbs)   | 8 (17.6lbs)          | 8 (17.6lbs)          |
| DATUM software and cable link pack   | •                    | •                    |
| Weather protector cover  | •                    | •                    |
| CE certified   | •                    | •                    |
| Auto logging   | •                    | •                    |

\*Note: In compliance with international standards, all Parker portable particle counters can meet the ISO Medium test dust standards. The LaserCM's, in addition to the complete range of Condition Monitoring products, are capable of achieving certification to ISO 4406:1999 and with traceability to ISO 11171 for SRM 2806, via ISO 11943.

Dimensions in mm (ins)



### Commissioning Kit



# LaserCM

## Operation



Operating the Parker LaserCM is as simple as pressing the start button and turning the dial. The test procedure is automatic and in the case of the LaserCM takes no more than 2 minutes to complete.

### LaserCM makes the difference in industry

Fully accredited to BS EN 60825:1992 and IEC 60825-1 (safety of laser products) Standards, accredited to USA Standards and achieving full ISO certification. LaserCM offers users advanced laser technology, a fast, dynamic and on-line 2 minute system test cycle. A LaserCM Aggressive Fluids model is also available, suitable for monitoring corrosive fluids such as phosphate ester based lubricants used in commercial aviation.

### MTD calibration

Laser CM20 MTD Calibration variants are certified via a primary ISO 11171 calibrated automatic particle counter. All MTD Laser CM20's achieve ISO 4406:1999 criteria, via ISO 11943.

### Understanding MTD

ACFTD (Air Cleaner Fine Test Dust) was formatted in the 1960's, but is no longer being produced. The obsolescence of this dust has led to the adoption of a new dust MTD.

MTD (Medium Test Dust) having a particle size distribution close to ACFTD was selected as a replacement. However, MTD produced results somewhat different to ACFTD, so the NIST (National Institute of Standards & Technology) undertook a project to certify the particle size distribution of ISO MTD.

The result was particle sizes below 10µm were greater than previously measured.

Particles sizes reported based on NIST would be represented as µm (c), with "c" referring to "certified". Therefore the CM20 reported sizes are as follows:

### ACFTD MTD

|      |         |
|------|---------|
| 2µ   | 4µ (c)  |
| 5µ   | 6µ (c)  |
| 15µ  | 14µ (c) |
| 25µ  | 21µ (c) |
| 50µ  | 38µ (c) |
| 100µ | 70µ (c) |

MTD offers true traceability, improved particle size accuracy and better batch to batch reproduction.





# LaserCM

## Portable Particle Counter

### Why On-Site Fluid Contamination Monitoring

- Certification of fluid cleanliness levels.
- Early warning instrument to help prevent catastrophic failure in critical systems.
- Immediate results with laboratory accuracy.
- To comply with customer cleanliness requirements and specifications.
- New equipment warranty compliance.
- New oil cleanliness testing.



### Datum Data Management



Datum, dedicated software, provides the link between a Laser CM20, System 20 EM20 or the H2Oil - Water in Oil and your computer management system.

#### Features:

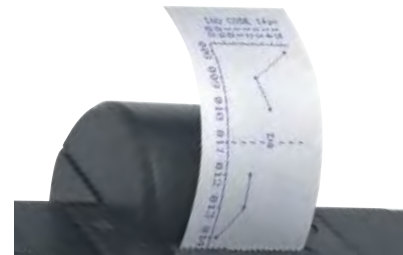
- Windows based, Icon driven program
- Full graphic output
- Tables/results download
- Trend analysis and predictive maintenance
- Auto test communication allows Datum to control particle counter testing and water in oil monitoring
- Certification creator using downloaded data
- Customer customized fields

|                 |          |
|-----------------|----------|
| Laser CM Test   |          |
| ON LINE TEST    |          |
| TEST NUMBER 022 |          |
| D M Y           |          |
| Date            | 04-03-06 |
| Time            | 15-52    |
| NAS CLASS:      | 7        |
| Count / 100ml   |          |
| 4/6µ (c)        | 789157   |
| 6/14µ (c)       | 31250    |
| NAS CLASS       | 7        |
| 14/21µ (c)      | 250      |
| NAS CLASS       | 3        |
| 21/38µ (c)      | 50       |
| NAS CLASS       | 3        |
| 38/70µ (c)      | 14       |
| NAS CLASS       | 4        |
| >70µ (c)        | 0        |
| NAS CLASS       | 0        |
| NOTES           |          |

|                 |          |
|-----------------|----------|
| Laser CM Test   |          |
| ON LINE TEST    |          |
| TEST NUMBER 022 |          |
| D M Y           |          |
| Date            | 04-03-06 |
| Time            | 15-52    |
| ISO:            | 20/15/09 |
| Count / 100ml   |          |
| >4µ (c)         | 820721   |
| >6µ (c)         | 31564    |
| >14µ (c)        | 314      |
| >21µ (c)        | 64       |
| >38µ (c)        | 14       |
| >70µ (c)        | 0        |
| NOTES           |          |

ISO 4406 - 1996  
(MTD calibration comes under ISO 4406 - 1999 revised standards)

Correlation to NAS 1638



16-column printer for hard copy data. A feature of the LaserCM is the on-board printout data graphing option developed to support predictive maintenance procedures.

# LaserCM

## Portable Particle Counter

### Introducing the new LCM 'Classic'

There is a new addition to the proven range – the LCM 'Classic'. Only available from Parker, the 'Classic' retains all the technology that made the LaserCM one of the most accurate, reliable and popular portable particle counters available.

Our design engineers have re-configured the LaserCM specification in a way that has reduced our manufacturing costs. These savings have been passed onto LCM 'Classic' customers.

### How have we done this?

First we talked to our existing customers and then to the engineers and maintenance operatives to find out the features that make the LaserCM a unique predictive maintenance instrument.

Then, we removed peripheral items such as the aluminum case and all the accessories, so a customer receives the monitor, with a CD user guide, professionally and securely boxed. One thing that has not altered is laser accuracy and laser reliability. Our in-house software engineers have re-configured the EPROM, removing Data programming, User ID, Automatic Testing, Data retrieval, Alarm level settings, the barcode pen and Graph printing functions to reduce costs still further without in any way reducing the efficiency of the monitor. The LCM 'Classic' is an instrument to be proud of.



## Ordering Information (LaserCM and 'Classic' LaserCM)

### Standard products table

| Part number      | Supersedes | Description                   |
|------------------|------------|-------------------------------|
| <b>LCM202022</b> | N/A        | MTD calibrated                |
| <b>LCM202026</b> | N/A        | Classic unit - MTD calibrated |
| <b>B84702</b>    | B.84.702   | Printer paper (5 rolls)       |
| <b>P843702</b>   | N/A        | Printer ribbon                |
| <b>B84729</b>    | B.84.729   | 12Vdc power supply            |
| <b>B84609</b>    | B.84.609   | Re-chargeable battery pack    |
| <b>P849613</b>   | N/A        | Weather protector cover       |
| <b>B84779</b>    | B.84.779   | Datum software pack           |
| <b>B84708</b>    | B.84.708   | Cable and adaptor             |

Note 1: Part numbers featured with bold highlighted codes will ensure a 'standard' product selection.

Note 2: Alternate displayed part number selection will require you to contact Parker Filtration for availability.

### Product configurator

| Model          | Fluid type |                   | Options  |                                 |
|----------------|------------|-------------------|----------|---------------------------------|
| <b>LCM2020</b> | <b>2</b>   | Hydraulic mineral | <b>1</b> | ACFTD calibrated                |
| <b>LCM2020</b> | <b>6</b>   | Skydrol           | <b>2</b> | MTD calibrated                  |
|                |            |                   | <b>3</b> | ACFTD calibrated + bar code pen |
|                |            |                   | <b>4</b> | MTD calibrated + bar code pen   |
|                |            |                   | <b>5</b> | Classic unit - ACFTD calibrated |
|                |            |                   | <b>6</b> | Classic unit - MTD calibrated   |

Note 1: Part numbers featured with bold highlighted codes will ensure a 'standard' product selection.

Note 2: Alternate displayed part number selection will require you to contact Parker Filtration for availability.





# SPS Single Point Sampler

Fluid Condition Monitoring



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# SPS Single Point Sampler

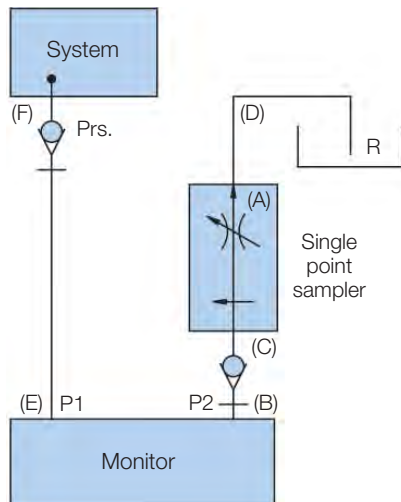
## Features & Benefits

The Single Point Sampler provides a means to connect a CM20 or H2Oil to a single pressure test point and balance the differential pressure across the system, to provide a controlled flow of oil into the monitor and away into a waste oil receptacle.

- Lightweight, compact and easy to use design
  - Fingertip operated control valve even at high pressures
  - 420 bar (6000 psi) rated
  - Facilitates testing from large diameter pipes
  - Capability to test up to 500cSt (106 SUS) viscosity oils (pressure permitting)
  - Pressure compensated flow control mechanism
  - Possible to control the valve with the same level of accuracy whether the device is operating at high or low pressure
  - Capable of allowing a flow rate
- in excess of 10ml/min when operating at any viscosity within the product specification
  - Suitable for fluid temperatures from +5°C to +80°C (+41°F to +176°F)
  - High quality polished finish. (stainless steel/ aircraft grade aluminum)
  - Capable of working with a CM20 or H2Oil connected into a system via the standard one meter extension hose kit
  - Suitable for use with mineral and biodegradable oils, petroleum based and phosphate ester fluids
  - Phosphate ester version utilises the  $\frac{5}{8}$ " BSF HSP style fitting
  - Designed so that it meets the lowest possible level of magnetic permeability
  - Supplied with accessories kit
  - It will maintain the set flow
- rate between upper and lower limits within a 100 bar (1450 psi) inline pressure change
  - Clear product identification to ensure that it is connected correctly. (i.e. downstream of the CM20 or H2Oil)



### Connection Instructions



1. Ensure valve is closed (A).
2. Connect P2 on monitor (B) to P2 on Single Point Sampler (SPS) (C).
3. Connect drain line on SPS (D).
4. Connect P1 of monitor (E) to the system (F).
5. The SPS is ready to operate.
6. Open valve (A) slowly until the oil flows continuously from the drainline (D).
7. Switch on monitor and begin testing.

### LCM20 Only

Carry out flow test as shown in the manual. If test is showing below  $\Delta t$  3.6°C (38°F) then carry out test as normal. If, however, test is above  $\Delta t$  3.6°C (38°F) then increase oil flow by turning valve (A) counterclockwise and then carry out flow test. Do this until  $\Delta t$  is below 3.6°C (38°F) and carry out test as normal once this is achieved.

**WARNING! Ensure that SPS valve is closed and monitor is connected to the SPS BEFORE connection to system.**

# SPS Single Point Sampler

## Specifications

### Specification

#### Fluid compatibility:

Mineral oil and petroleum based fluids (standard version).  
Aggressive fluid (dual seal version) for other fluids consult Parker Hannifin.

#### Seals:

Fluorocarbon or Perfluoroelastomer.

#### Maximum working pressure:

420 bar (6000 psi).

#### Weight:

500 grams (18 oz) max. (Not including hoses).

#### Packaging standard:

Cardboard carton (military usage - plastic carry case).

#### Unit size:

45mm dia x 123mm long. (1.77 dia x 4.84 long)

#### System connection:

Standard - minimess M16 (G<sup>1</sup>/<sub>4</sub>" BSP) with cap,  
Aggressive - 5/8" BSF HSP.

#### Operating temp range:

+5°C to +80°C (+41°F to +176°F).

#### Storage temperature range:

-26°C to +80°C (-15°F to +176°F).

#### Construction:

Body: Aluminum BS 1470  
- pressurized end stainless steel.  
Finish: Anodized blue (standard version). Anodized red (dual seal version).

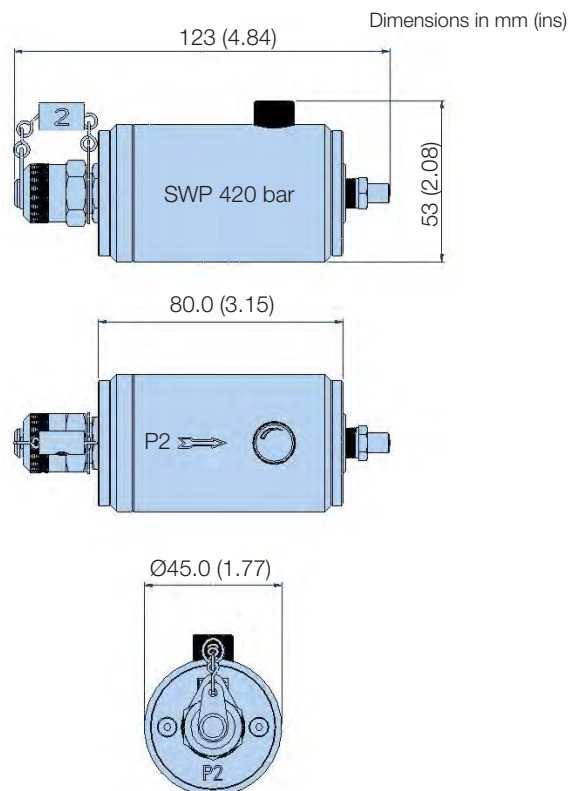
### Ordering Information

#### Standard products table

| Product number | Supersedes | Description                            |
|----------------|------------|--|
| <b>SPS2021</b> | N/A        | Mineral single point sampler           |
| <b>SPS2061</b> | N/A        | Aggressive single point sampler        |
| <b>B84784</b>  | B.84.784   | Mineral or aggressive bottle assembly  |
| <b>B84224</b>  | B.84.224   | Mineral oil extension hose/coupling    |
| <b>B84225</b>  | B.84.225   | Aggressive oil extension hose/coupling |
| <b>B84788</b>  | B.84.788   | Mineral oil waste hose                 |
| <b>B84787</b>  | B.84.787   | Aggressive oil waste hose              |

Note 1: Part numbers featured with bold highlighted codes will ensure a 'standard' product selection.

Note 2: Alternate displayed part number selection will require you to contact Parker Filtration for availability.



# System 20

## Inline Sensors & Monitors/Fluid Condition Monitoring



### Specification: Sensors

#### Construction:

Machined steel body. Electroless nickel coating to minimum depth of 40 microns  
Brass/stainless steel internal components

#### Flow capacities:

All suitable for use with oil, water and water/oil emulsion  
Size 0 – 6-25 l/min (1.58-6.60 US GPM)  
Size 1 – 20-100 l/min (5.28-26.4 US GPM)  
Size 2 – 80-380 l/min (21.1-100 US GPM)

#### Max. working pressure:

420 bar (6000psi)

#### Capability:

Reverse flow

#### Pressure drop:

At max. rated flow,  $\Delta P$  is 1.1 bar (16 psi) (mineral oil fluid at 30 cSt 140 SSU).

#### Ports:

Size 0 – G3/8  
Size 1 – G3/4 (SAE threads also available)  
Size 2 – G1 1/4

#### Repeatability:

$\pm 1\%$  FSD

#### Accuracy:

Flow  $\pm 2.5\%$  full scale deflection

#### Weight:

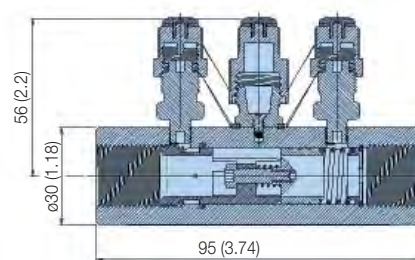
Size 0 – 0.5kg (1.2lbs)  
Size 1 – 3.5kg (8.4lbs)  
Size 2 – 4.4kg (9lbs)

#### Aggressive Fluid Applications:

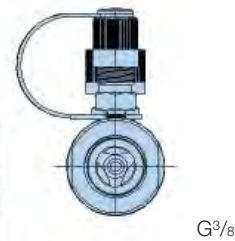
EPDM internal/external o-rings and seals

### Installation Details

#### Size 0 Sensor

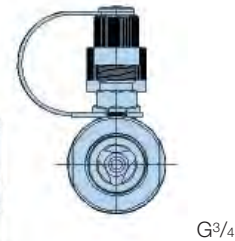
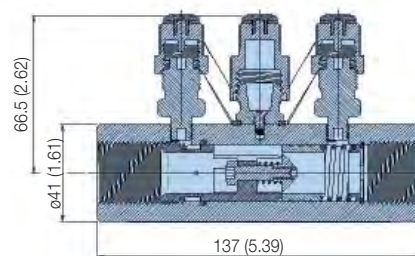


Dimensions in mm (ins)



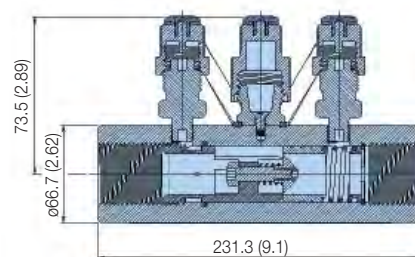
G<sup>3</sup>/<sub>8</sub>

#### Size 1 Sensor



G<sup>3</sup>/<sub>4</sub>

#### Size 2 Sensor



G1 1/4

### Ordering Information

#### Standard products table

| Product number    | Supersedes   | Size | Flow range l/min (USgpm) | Fluid type | Port threads                |
|-------------------|--------------|------|--------------------------|------------|-----------------------------|
| <b>STI0144100</b> | STI.0144.100 | 0    | 6-25 (1.58-6.60)         | Mineral    | <sup>3</sup> / <sub>8</sub> |
| <b>STI1144100</b> | STI.1144.100 | 1    | 20-100 (5.28-26.4)       | Mineral    | <sup>3</sup> / <sub>4</sub> |
| <b>STI2144100</b> | STI.2144.100 | 2    | 80-380 (21.1-100)        | Mineral    | 1 1/4                       |
| <b>STI0148100</b> | STI.0148.100 | 0    | 6-25 (1.58-6.60)         | Aggressive | <sup>3</sup> / <sub>8</sub> |
| <b>STI1148100</b> | STI.1148.100 | 1    | 20-100 (5.28-26.4)       | Aggressive | <sup>3</sup> / <sub>4</sub> |
| <b>STI2148100</b> | STI.2148.100 | 2    | 80-380 (21.1-100)        | Aggressive | 1 1/4                       |

Note 1: Part numbers featured with bold highlighted codes will ensure a 'standard' product selection.

Note 2: Alternate displayed part number selection will require you to contact Parker Filtration for availability.

Note 3: Mobile Sensors are also available - Contact Parker



## Icount PD

Online Particle Detector



ENGINEERING YOUR SUCCESS.



# Icount PD

The Icount Particle Detector from Parker represents the most up-to-date technology in solid particle detection.



The design dynamics, attention to detail, and small size of the permanently mounted, on-line particle detector brings a truly innovative product to all industry.

The laser based, leading-edge technology is a cost effective market solution to fluid management and contamination control.

## Features and benefits of the Icount PD include:

- Independent monitoring of system contamination trends.
- Early warning LED or digital display indicators for Low, Medium and High contamination levels.
- Moisture % RH LED indicator (optional).
- Cost effective solution in prolonging fluid life and reducing machine downtime.
- Visual indicators with power and alarm output warnings.
- Continuous performance for dependable analysis.
- Hydraulic, phosphate ester & fuel fluid compatible construction.
- Self diagnostic software.
- Fully PC/PLC integration technology such as:  
RS232 and 0-5 Volt, 4-20mA.

## Typical Applications

### Mobile Equipment

- Earth Moving Machinery
- Harvesting
- Forestry
- Agriculture

### Industrial Equipment

- Production Plants
- Fluid Transfers
- Pulp & Paper
- Refineries

### Power Generation

- Wind Turbines
- Gearboxes
- Lubrication Systems

### Maintenance

- Test Rigs
- Flushing Stands



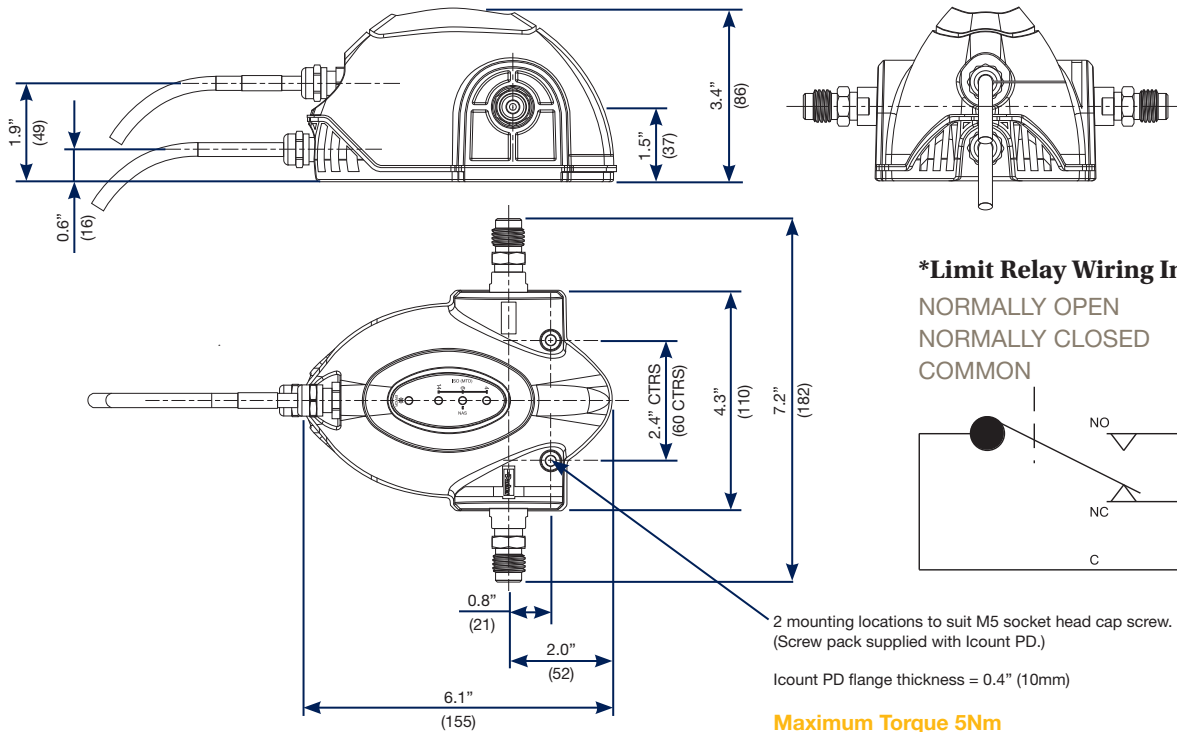
# Icount PD

## Features and Benefits

|  |  |
|--|--|
| Diagnostic self check start-up time                  | 5 seconds  |
| Measurement period                                   | 5 to 180 seconds   |
| Reporting interval through RS232                     | 0 to 3600 seconds  |
| Digital LED display update time                      | Every second   |
| Limit relay output                                   | Changes occur +/- 1 ISO code at set limit (Hysteresis ON) or customer set (Hysteresis OFF)   |
| 4-20mA output signal                                 | Continuous   |
| Principle of operation                               | Laser diode optical detection of actual particulates   |
| Reporting codes                                      | ISO 7 – 21, NAS 0 – 12, (AS 00 – 12 contact Parker)<br>Icount will also report less than ISO 7, subject to the statistical uncertainty defined in ISO4406:1999, which is shown in the RS232, reporting results as appropriate e.g “>6” |
| Calibration  | By recognized on-line methods, confirmed by the relevant International Standards Organization procedures   |
| Calibration recommendation                           | 12 months  |
| Performance  | +/- 1 ISO Code (dependant on stability of flow)  |
| Reproducibility / Repeatability                      | Better than 1 ISO Code   |
| Power requirement                                    | Regulated 9 to 40Vdc   |
| Maximum current draw                                 | 150mA  |
| Hydraulic connection                                 | M16 x 2 hydraulic test points (5/8” BSF for aggressive version)  |
| Flow range through the device                        | 40 to 140 ml/min (optimum flow = 60ml/min)   |
| Online flow range via System 20 Inline Sensors       | Size 0 = 6 to 25 l/min - (optimum flow = 15 l/min)<br>Size 1 = 24 to 100 l/min - (optimum flow = 70 l/min)<br>Size 2 = 170 to 380 l/min - (optimum flow = 250 l/min)   |
| Required differential pressure across Inline Sensors | 5.8 psi (0.4 bar) minimum  |
| Viscosity range                                      | 10 to 500 cSt  |
| Temperature  | Operating environment: -20°C to +60°C (-4°F to +140°F)<br>Storage: -40°C to +80°C (-40°F to +176°F)<br>Operating fluid: 0°C to +85°C (+32°F to +185°F)   |
| Working pressure                                     | 2 to 420 bar (30 to 6,000 PSI)   |
| Moisture sensor calibration                          | ±5% RH (over compensated temperature range of +10°C to +80°C)  |
| Operating humidity range                             | 5% RH to 100% RH   |
| Moisture sensor stability                            | ±0.2% RH typical at 50% RH in one year   |
| Certification  | IP66 rated<br>EMC/RFI – EN61000-6-2:2001<br>EN61000-6-3:2001   |
| Materials  | User friendly construction<br>Stainless Steel hydraulic block<br>Viton seals   |
| Dimensions   | 7.2” x 6.1” x 3.4” (182mm x 155mm x 86mm)  |
| Weight   | 2.9 lbs. (1.3 kg)  |

# Icount PD

## Dimensions / Installation Details



## M12 Communication Cable: Wiring Configuration

| Pin | 4-20mA option connections                       | 0-5V/0-3V option connections                    |
|-----|---|---|
| 1   | NOT USED  | NOT USED  |
| 2   | RS232 Ground (pin 5**)                          | RS232 Ground (pin 5**)                          |
| 3   | Channel A, ISO 4µm (c)*                         | Channel A, ISO 4µm (c)*                         |
| 4   | Channel B, ISO 6µm (c)*<br>or NAS (if selected) | Channel B, ISO 6µm (c)*<br>or NAS (if selected) |
| 5   | RS232 Receive (Pin 3**)                         | RS232 Receive (Pin 3**)                         |
| 6   | RS232 Transmit (Pin 2**)                        | RS232 Transmit (Pin 2**)                        |
| 7   | Moisture sensor channel (if fitted)             | Moisture sensor channel (if fitted)             |
| 8   | Channel C, ISO 14µm (c)*                        | Channel C, ISO 14µm (c)*                        |

Note: It is the responsibility of the end user to ensure that the cable's braided screen is terminated to a suitable earth bonding point.

\* Optional - refer to the Icount PD part number specifier section in the manual.

\*\* A standard USB serial adaptor can be used with the recommended 9-way D-type connector to convert RS232 to USB.

## \*M12 Limit Relay & Alarm Levels: Wiring Configuration

| Pin | Current loop option connections        | 0-5V/0-3V option connections           |
|-----|--|--|
| 1   | Product supply 9-40Vdc                 | Product supply 9-40Vdc                 |
| 2   | 4-20mA supply 12-20Vdc                 | 0-5 / 0-3V supply 12-24Vdc             |
| 3   | Relay (Normally Closed)*** (if fitted) | Relay (Normally Closed)*** (if fitted) |
| 4   | Relay (Normally Open)*** (if fitted)   | Relay (Normally Open)*** (if fitted)   |
| 5   | NOT USED                               | NOT USED                               |
| 6   | NOT USED                               | 0-5 / 0-3V supply 0Vdc                 |
| 7   | Main supply 0Vdc                       | Product supply 0Vdc                    |
| 8   | Relay (Common)*** (if fitted)          | Relay (Common)*** (if fitted)          |

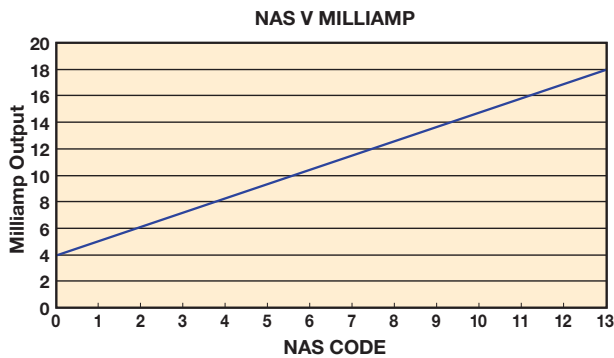
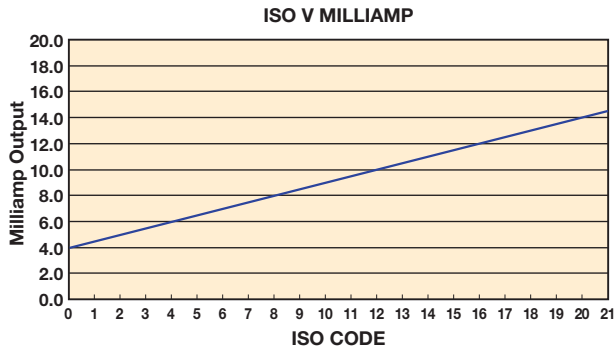
Note: If the moisture sensor is fitted without either option, then the output is RS232.

Parker recommends that the mating M12 connector cables are screened. These cables are available from Parker through the ordering information section.

\*\*\* Optional - refer to ordering information section.

# Icount PD

## Variable mA output settings



The following table can be used to equate the analogue output to an ISO or NAS Code.

Example: ISO code 12 is equal to 10mA.

| mA   | ISO       | mA | NAS   |
|------|-----------|----|-------|
| 4.0  | 0         | 4  | 00    |
| 4.5  | 1         | 5  | 0     |
| 5.0  | 2         | 6  | 1     |
| 5.5  | 3         | 7  | 2     |
| 6.0  | 4         | 8  | 3     |
| 6.5  | 5         | 9  | 4     |
| 7.0  | 6         | 10 | 5     |
| 7.5  | 7         | 11 | 6     |
| 8.0  | 8         | 12 | 7     |
| 8.5  | 9         | 13 | 8     |
| 9.0  | 10        | 14 | 9     |
| 9.5  | 11        | 15 | 10    |
| 10.0 | 12        | 16 | 11    |
| 10.5 | 13        | 17 | 12    |
| 11.0 | 14        | 18 | **    |
| 11.5 | 15        | 19 | **    |
| 12.0 | 16        | 20 | ERROR |
| 12.5 | 17        |    |       |
| 13.0 | 18        |    |       |
| 13.5 | 19        |    |       |
| 14.0 | 20        |    |       |
| 14.5 | 21        |    |       |
| 15.0 | **        |    |       |
| 15.5 | **        |    |       |
| 16.0 | **        |    |       |
| 16.5 | **        |    |       |
| 17.0 | **        |    |       |
| 17.5 | **        |    |       |
| 18.0 | **        |    |       |
| 18.5 | **        |    |       |
| 19.0 | OVERRANGE |    |       |
| 19.5 | OVERRANGE |    |       |
| 20.0 | ERROR     |    |       |

### 4-20mA output settings

ISO Setting

$\text{mA current} = (\text{ISO Code} / 2) + 4$

eg.  $10\text{mA} = (\text{ISO } 12 / 2) + 4$

or

$\text{ISO Code} = (\text{mA current} - 4) * 2$

eg.  $\text{ISO } 12 = (10\text{mA} - 4) * 2$

NAS Setting

$\text{mA current} = \text{NAS Code} + 5$

eg.  $15\text{mA} = \text{NAS } 10 + 5$

or

$\text{NAS Code} = \text{mA current} - 5$

eg.  $\text{NAS } 10 = 15\text{mA} - 5$

## Variable voltage output settings

The variable voltage output option has the capability of two different voltage ranges: a 0-5Vdc range as standard, and a user-selectable 0-3Vdc range. The full list of

commands on how to change the voltage output is available from Parker.

The following tables can be used to relate the analog output to an ISO or NAS code.

For example, in a 0-5Vdc range, ISO code 16 is equal to an output of 3.5Vdc. In a 0-3Vdc range, ISO code 8 is equal to an output of 1.0Vdc.

### Table relating ISO codes to voltage output

| ISO    | Err   | 0   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | ▶▶ |
|--------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| 0-5Vdc | <0.2  | 0.3 | 0.5 | 0.7 | 0.9 | 1.1 | 1.3 | 1.5 | 1.7 | 1.9 | 2.1 | 2.3 | 2.5 |    |
| 0-3Vdc | <0.15 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 |    |

▶▶

cont.

| ISO    | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | Err   |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 0-5Vdc | 2.7 | 2.9 | 3.1 | 3.3 | 3.5 | 3.7 | 3.9 | 4.1 | 4.3 | 4.5 | 4.7 | >4.8  |
| 0-3Vdc | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 | >2.45 |

### Table relating NAS codes to voltage output

| ISO    | Err  | 00   | 0   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | Err  |
|--------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 0-5Vdc | <0.4 | 0.6  | 0.9 | 1.2 | 1.5 | 1.8 | 2.1 | 2.4 | 2.7 | 3.0 | 3.3 | 3.6 | 3.9 | 4.2 | 4.5 | >4.6 |
| 0-3Vdc | <0.2 | N.S. | 0.3 | 0.5 | 0.7 | 0.9 | 1.1 | 1.3 | 1.5 | 1.7 | 1.9 | 2.1 | 2.3 | 2.5 | 2.7 | >2.8 |

# Icount PD

## Display parameters (ISO 4406/NAS 1638)

### Digital display indication

The digital display will show the actual measured codes, the channel ( $\mu$ ) size and the user defineable limits. Note that the channel size and limits will alternate between the two.

The moisture sensor reading (%RH) will also be shown - if the moisture sensor option is fitted.

The order of trigger for both of the codes and moisture sensor option is:

- Solid digit(s) = code(s) that are at or below the set point (limit)
- Flashing digit(s) = code(s) that are above the set point (limit)

The display for ISO4406 and NAS1638 are identical. The ISO display is shown below.



### LED display indication

The LED display uses 3 sets of LED for the indication of ISO 4406 and NAS1638 code figures. Individual code lights will trigger based on the customer settings.

The order of trigger will be:

- Solid green = one ISO code, or better, below the set point (limit)
- Blinking green = ISO code at the set point (limit)
- Solid red = one ISO code above the set point (limit)
- Blinking red = two ISO codes, or more, above the set point (limit)

### Error detection

In the unlikely event of an error occurring, the digital display on the Icount PD will simply display the actual error code only - i.e. ERROR 13 (a full list of error codes is detailed in the Icount PD user manual).

### Moisture sensor output settings

The moisture sensor is an option that can be included when specifying the Icount PD. The moisture sensor reports on the saturation levels of the fluid passing through the Icount PD sensing cell. The output is a linear scale, reporting within the range of 5% saturation to 100% saturation.

| Saturation | 4-20mA | 0-3Vdc | 0-5Vdc |
|------------|--------|--------|--------|
| 5%         | 4.8    | 0.15   | 0.25   |
| 25%        | 8      | 0.75   | 1.25   |
| 50%        | 12     | 1.50   | 2.50   |
| 75%        | 16     | 2.25   | 3.75   |
| 100%       | 20     | 3.00   | 5.00   |

# Icount PD

## Auxilliary Flow Device

The pressure compensated, flow control device (Part Number S840074) has been developed to give the Icount PD user greater flexibility. The flow control device will enable testing where flow ranges are outside the Icount PD specifications (40 - 140 ml/min), or where pipe diameters do not allow the Icount PD to be installed.

The flow control device fits onto the downstream (outlet) side of the Icount PD, connecting through a manifold block, via a self-sealing quick connection test point and is fitted with a differential pressure valve.

This flow control device automatically compensates for pressure and viscosity changes, while maintaining its setting even as the workload changes.

Simply position the valve to match the viscosity of the oil you are testing.

The chart below can be used to determine the valve position:

| Valve Position | cSt Range |
|----------------|-----------|
| 3              | up to 100 |
| 3.8            | 90 - 200  |
| 4.2            | 190 - 320 |
| 5              | 310 - 500 |

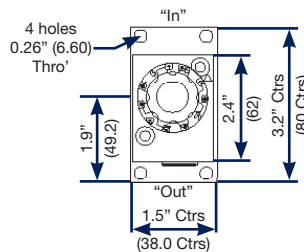
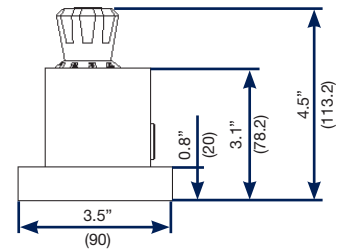
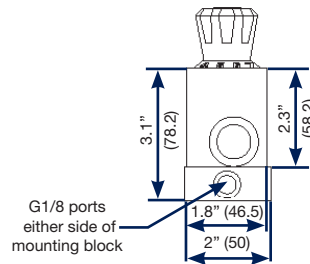
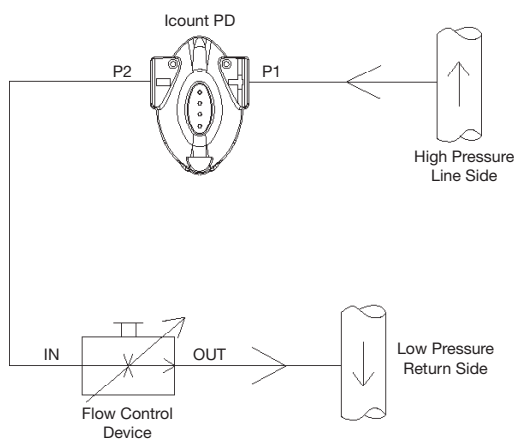
Example:

If the fluid you wish to analyse has a viscosity of 50cSt under normal operating conditions then the control knob on the Flow Control Device should be set to valve position '3'.

The flow device will now automatically control the flow rate through the IcountPD to within its working range of 40-140ml/min.

Note: The flow control device will still operate correctly even with the high pressure side at 200bar and the return back to an open system of 0 bar (DP = 200bar).

## Hydraulic Connection Diagram



|                             |   |
|-----------------------------|---|
| Actuator                    | Manual flow rate adjustable via control knob          |
| Mounting type               | 4 off mounting holes to suit M6 screws (not supplied) |
| Mounting position           | Any   |
| Weight                      | 3.7 lb. (1.7 kg)                                      |
| Fluid temperature           | +41°F to +176°F (+5°C to +80°C)                       |
| Ambient storage temperature | -4°F to +104°F (-20°C to +40°C)                       |
| Viscosity range             | 20cSt to 500cSt (if lower than 20cSt, contact Parker) |
| Differential pressure range | 5 to 315 bar  |
| Maximum pressure            | 315 bar   |
| Flow direction              | IN to OUT flow control function                       |
| Port thread detail          | 1/8" BSPP (test points not supplied)                  |
| Internal seals              | Viton   |



# Icount PD

## Communication Options

The IcountPD may be configured using the Icount PD Setup Utility. For more direct control of the device using its communications protocol, you may also use the Microsoft Windows® HyperTerminal program (this program is not currently supplied with the Windows Vista™ operating system).

### Communication protocol

The communication protocol for the serial communication link is to be used with Microsoft Windows HyperTerminal. The settings are as follows:

Baud rate . . . . . 9600  
 Data bits . . . . . 8  
 Parity . . . . . None  
 Stop bits . . . . . 1  
 Flow control . . . . . None

The commands used with this product are made up of Set, Read and Start/Stop commands.

- Set commands allow the value or values of parameters to be set
- Read commands allow the value or values of parameters to be read
- Start/Stop allows the user to start and stop tests

All commands are sent in ASCII characters, and the protocol accepts both upper and lower case characters as the examples below:

SDF  
 SdF

Note: A full list of commands is detailed in the user manual.

## Ordering Information

| Key | Fluid Type                             | Calibration | Display | Limit Relay | Communication  | Moisture Sensor | Cable Connector Kit            |
|-----|--|-------------|---------|-------------|----------------|-----------------|--------------------------------|
| IPD | 1 Mineral                              | 1 ACFTD     | 2 LED   | 2 Yes       | 2 RS232/4-20mA | 1 No            | 10 Deutsch DT series connector |
|     | 2 Aggressive                           | 2 MTD       | 3 LCD   |             | 3 RS232/0-5V   | 2 Yes           | 30 M12, 8-pin plug connector*  |
|     | 3 Aviation fuel<br>Hazardous areas     | 3 AS4059    |         |             |                |                 |                                |
|     | 4 Aviation fuel<br>Non Hazardous areas |             |         |             |                |                 |                                |

| Accessories                                    | Part Number     |                    |
|--|-----------------|--------------------|
|  | Mineral         | Aggressive         |
| 1 Meter Hose Length                            | B.84.224        | B.84.827           |
| 2 Meter Hose Length                            | B.94.802        | B.94.801           |
| 5 Meter Hose Length                            | B.84.730        | B.84.828           |
| 1/4" BSP Test point                            | P.653109 (M16)  | P.843081 (5/8 BSF) |
| 1/8" BSP Test point                            | P.653110 (M16)  | P.853008 (5/8 BSF) |
| 1/8" NPT Test point                            | P.653512 (M16)  | P.853005 (5/8 BSF) |
| Single Point Sampler                           | SPS2021         | SPS2026            |
| External Flow Device                           | S840074         | Contact Factory    |
| Power Supply                                   | B.84.829        | B.84.829           |
| 5 meter, M12, 8-pin plug and socket cable kit* | Contact Factory | Contact Factory    |

\*M12 Cable kit consists of two 5 meter cables to enable all output options (Communications cable and Relay/Power Supply cable)



aerospace  
 climate control  
 electromechanical  
**filtration**  
 fluid & gas handling  
 hydraulics  
 pneumatics  
 process control  
 welding & shielding



# icountBS - Bottle Sampler

The benchtop solution to fluid contamination bottle sampling



ENGINEERING YOUR SUCCESS.



# The Complete Solution - Industrial Design Combined with State of the Art Technology

**The icountBS - Bottle Sampler from Parker, with its innovative industrial design, has been developed for customers looking for state of the art technology, attention to detail and the compactness of a permanent laboratory particle analysis instrument.**

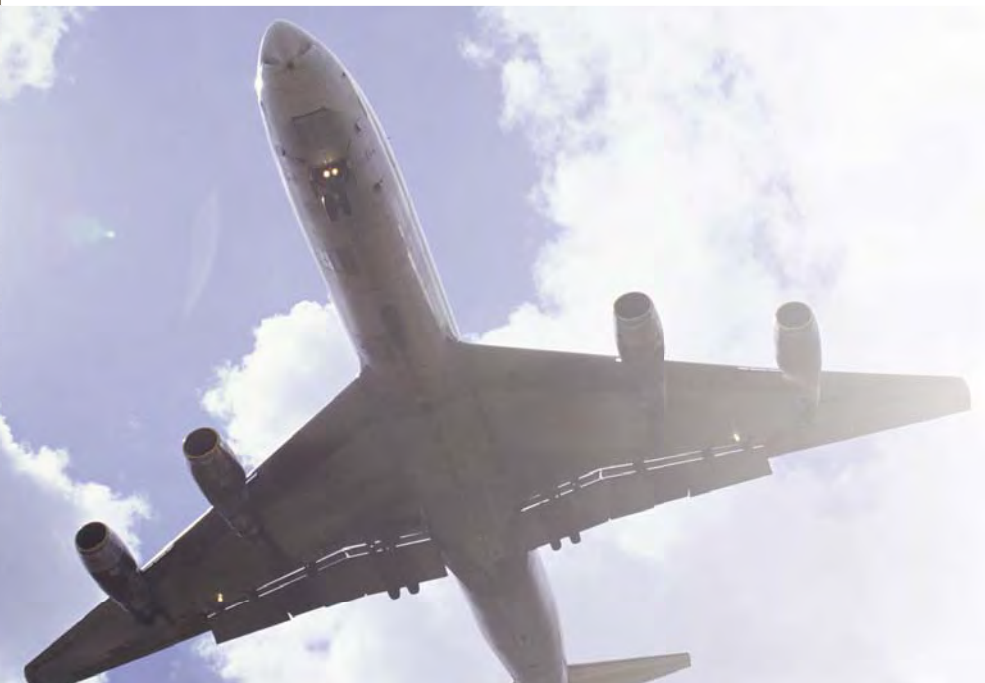
Combine this with on-board, laser based, leading edge technology to bring to all industries a truly revolutionary Particle Counter. The innovative icountBS is a product from the next generation of Parker's fluid particle analysis and monitoring solutions.

The IBS features an easy to use interactive touch screen, environmentally controlled pressurized bottle chamber, an internal compressor pump, automated door locking mechanism, sample tube cleaning sleeve that minimizes cross contamination, and an internal printer.

The icountBS benefits from Parkers knowledge and experience of providing fluid analysis equipment to the market for over 15 years.

## icountBS - Bottle Sampler Features & Benefits

- Customer programmable number of sample runs/sample bottle averaging and pre-test flush volumes from 10ml min. to 100ml max.
- Input via fluid resistant touch screen display.
- Repeatable and reproducible performance to ISO4406:1999, jAS4059E, and NAS1638 particle count distributions. Other calibration standards are included.
- On-board compressor and 'shop' air capable.
- Design concept allowing for portability. DC and rechargeable battery pack options built in.
- Sample tube self cleaning sleeve minimizing cross contamination.
- 500 test sample memory.
- Data download via USB jump drive or USB to USB included.
- Internal printer.





Home Screen



Sample ID Input



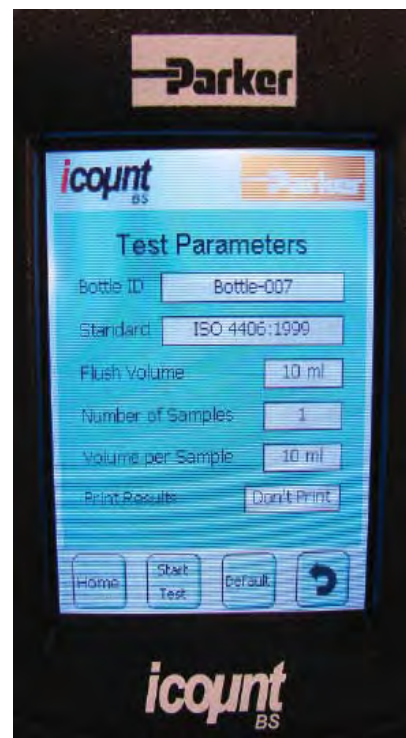
Number of Sample Runs



Sample Volume



Flush Volume



Start Test

# Analyzing the Test Results

## Once the automatic oil sample test has been completed, what next?

Solid contaminants in fluid power systems vary in size, shape, form and quantity. The most harmful contaminants are normally between 6 microns and 14 microns. The ISO code is the preferred method of reporting quantity of contaminants.

The ISO code number corresponds to contamination

levels relating to three sizes. The first scale number represents the number of particles that are equal to and greater than  $4\mu\text{m}$  (c) per ml of fluid, the second number for particles that are equal to and greater than  $6\mu\text{m}$  (c) per ml of fluid and the third number for particles that are equal to and greater than  $14\mu\text{m}$  (c) per ml of fluid.

**For example:** An ISO code 20/18/14 indicates that there are between 5,000 - 10,000 particles that are equal to and greater than  $4\mu\text{m}$  (c), between

1,300 - 2,500 particles that are equal to and greater than  $6\mu\text{m}$  (c), and between 80 - 160 particles that are equal to and greater than  $14\mu\text{m}$  (c).



# icountBS Product Specification

|   |   |
|---|---|
| <b>Principle of Operation</b>                       | Laser based light obscuration   |
| <b>Dimensions</b>                                   | H=20.9" x W=7.48" (8.27" Door) x D=16.1"  |
| <b>Weight</b>                                       | 31 lb. (14kg)   |
| <b>Mechanical Composition</b>                       | Stainless steel 316, plated mild steel and aluminum   |
| <b>Plastics Composition</b>                         | Precision polyurethane RIM moldings and ABS plastic   |
| <b>Environmental Operating Temperature (Tested)</b> | 41°F to 140°F (+5°C to +60°C)   |
| <b>Operating RH Range</b>                           | 20 - 85% [Tested at 86°F (30°C), no condensation]   |
| <b>Storage Temperature</b>                          | 40°F to 194°F (-40°C to +90°C)  |
| <b>Storage RH Range</b>                             | 10 - 90% (Tested at 30°C, no condensation)  |
| <b>Channel Sizes</b>                                | MTD - >4μ(c), >6μ(c), >14μ(c), >21μ(c), >38μ(c), >70μ(c), ACFTD - >2μ, >5μ, >15μ, >25μ, >50μ, >100μ   |
| <b>Analysis Range</b>                               | ISO 7 to 21, NAS 0 to 12  |
| <b>Contamination Standards</b>                      | MTD - ISO 4406:1999 & NAS 1638 ACFTD - ISO 4406:1987, ISO 4406:1991, NAS 1638, and jAS4059E<br>For further contamination standards consult Parker |
| <b>Calibration Standard</b>                         | ISO MTD and ACFTD calibration to traceable ISO Standards. (Contact Parker for further details)  |
| <b>Fluid Management</b>                             | Maximum single sample = 100ml, Minimum single sample = 10ml   |
| <b>Possible Test Configurations</b>                 | User selectable from single test up to 5 tests per run (eg. 1 x 100ml up to 5 x 50ml per run)   |
| <b>Pre-Test Flush Volume</b>                        | Minimum = 10ml, Maximum = 100ml   |
| <b>Viscosity Range</b>                              | 5 to 400 cSt  |
| <b>Fluid Compatibility</b>                          | Mineral oils, petroleum and hydrocarbon based fluids. For all other fluids, consult factory.  |
| <b>Sample Bottle Size</b>                           | No specific bottle required. Maximum size = 2.95" (Dia.) x 5.90" (H). Maximum volume = 250ml  |
| <b>Memory Storage</b>                               | 500 tests (capacity warning after 450 tests)  |
| <b>Output Display</b>                               | Backlight 256 color STN transmissive  |
| <b>Output Display Resolution</b>                    | 320 x 3 (RGB) (H) x 240 (W) dots  |
| <b>Display Active Area</b>                          | 115 (H) x 86 (W) mm   |
| <b>Data Input</b>                                   | Via icon driven resistive touch screen  |
| <b>Printer</b>                                      | Thermal dot-line printing   |
| <b>Printer Paper</b>                                | Ø50mm - (57mm x 25mm)   |
| <b>Test Certification</b>                           | Calibration & Certificate of Conformity   |
| <b>Power Supply</b>                                 | DC output - 12V @ 6.60Amps, 80 watts max. AC input - 100 to 240V @ 1.2Amps (50 - 60 Hz)   |
| <b>Battery Power</b>                                | 2 hours (recommended to be fully charged every 3 months)  |
| <b>Battery Stand-By Time</b>                        | 1 month (then 1 hour of operation)  |
| <b>Battery Fuse</b>                                 | 6.3 Amps (anti-surge)   |
| <b>Air Pressure Source</b>                          | 50 psi (3.5 bar) internal mini-compressor or 101 psi (7 bar) shop air   |



# icountBS - Bottle Sampler Ordering Information

| Part Number                  |
|------------------------------|
| IBS3100US                    |
| IBS3000FUS (fuel version)    |
| IBS3000MUS (minilab version) |

| Accessories                | Part Number | Included   |
|----------------------------|-------------|------------|
| 250ml Sample Bottle (2/pk) | ACC6NW001   | * (2 pks.) |
| Sample Bottle Pack (50)    | ACC6NW002   |            |
| Vapour/Waste Bottle        | ACC6NW003   | *          |
| Waste Bottle Folder        | ACC6NW004   |            |
| Printer Paper Reel (x1)    | ACC6NW005   | *          |
| Transport Case             | P893865     | *          |
| 1m Waste Tube (Clear)      | ACC6NW009   | *          |
| 1m Vapour Hose (Blue)      | ACC6NW010   | *          |
| USB Memory Stick           | ACC6NW011   | *          |
| icountBS CD Manual         | ACC6NW012   | *          |
| Air Connector              | P.893318    | *          |

\* These items included with IBS unit within a transportation case.

# icountMS Range

## Moisture Sensors



### Fast, reliable and accurate inline detection of moisture in fluids

MS moisture sensors provide fast, reliable and accurate inline detection of moisture in fluids. Technology developed for preventative maintenance programmes. MS200 is the 'Programmable' sensor monitoring and reporting relative humidity (RH), moisture content in oils. MS300 'Intrinsically safe' sensor ATEX certified for use in hazardous Zone 0 environments.



### Product Features

- MS moisture sensors provide fast, reliable and accurate inline detection of moisture in fluids.
- Technology developed for preventative maintenance programs.
- MS200 'Programmable' sensor monitoring and reporting relative humidity (RH), moisture content in oils. 6,000 PSI (420 bar) MAOP.
- MS300 'Intrinsically safe' sensor ATEX certificated for use in hazardous Zone 0 environments. 6,000 PSI (420 bar) MAOP.
- Temperature Outputs on all versions.

# icountMS Range

## Features and Benefits

- Continuous, online moisture indication, for hydraulic and lubricating systems.
- Reporting of % relative humidity of water content, giving the user information on how close to the fluids real saturation point.
- Reliable data on the rate of water absorption.
- Sensing cell technology using a laser trimmed thermoset polymer, for capacitive sensing that is capable of absorbing water molecules due to its micro porous structure.
- Uses a thermistor for temperature compensation correction. Offering total confidence in reporting the %RH relative humidity over the sensors temperature range.
- A purpose designed tee adaptor allows for easy installation into an existing fluid system.
- The MS200 can also be specified with a bench top wand offering the end user greater flexibility.

## Typical Applications

- Ground support vehicles
- Pulp and paper plants
- Marine hydraulics
- Power transmission & distribution
- Forestry
- Industrial hydraulics
- Earth moving applications
- Agricultural
- Hazardous Areas (Zone II)
- Simulators



## In-Line Moisture Measurement of Hydraulic & Lubricating Fluids.

Parkers Moisture Sensor Range offers fast, reliable and accurate in-line detection of moisture in fluids. The MS transducer type technology has been especially designed with the preventative maintenance programme environment in mind.

The industry accepted sensing cell device will monitor and report Relative Humidity (RH), moisture content in oils. The water content measurement technique offers the end user benefits over the current standard form of water content reporting (PPM).

This allows for real time preventative maintenance to be undertaken and corrective actions to be made. By knowing that the water contamination is still within the oils absorbing range, less than 100%, reclaiming fluid properties before additive damage occurs can initiate calculable cost savings.

# MS150 Moisture Sensor

## Specifications

### Pressure:

Maximum allowable operating pressure. (MAOP): 10 bar (145 PSI).

### Operating temperature:

Minimum: -20°C (-4°F).  
Maximum: +85°C (+185°F).

### Flow through sensor cell:

Installed in active flowstream.

### Fluid compatibility:

Mineral oils, petroleum-based and Phosphate ester.

### Viscosity range:

Unlimited.

### Port connections:

1/4" BSPT or 1/4" NPT.

### Supply voltage:

+8 to +30 Vdc.

### Sensor size/weight/material:

80mm x 43mm/0.1kg/Aluminium

### IP ratings:

IP68

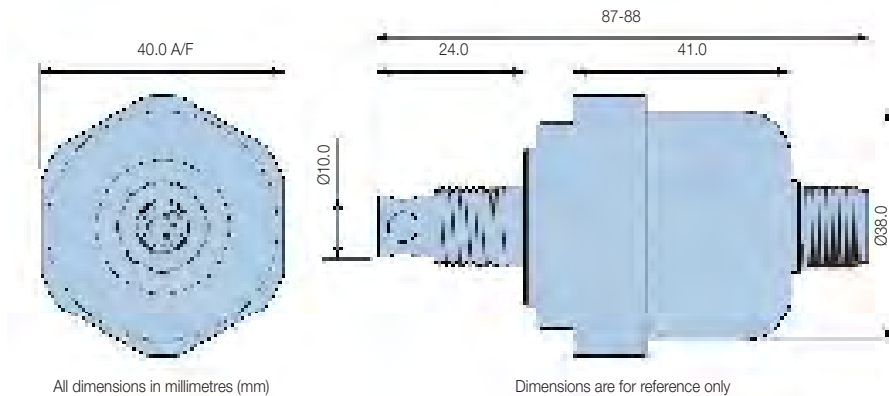
### %RH Outputs:

(+1 to +5 Vdc) or (4 to 20mA)

### Temperature Outputs:

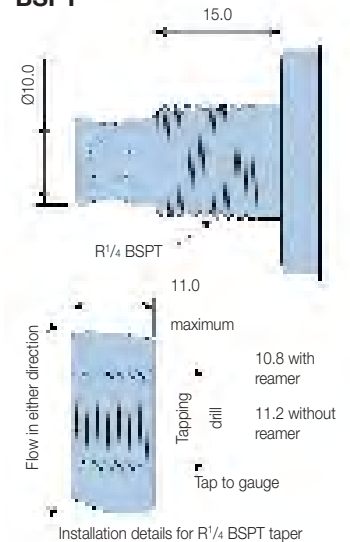
0 to +5 Vdc

## Installation Details

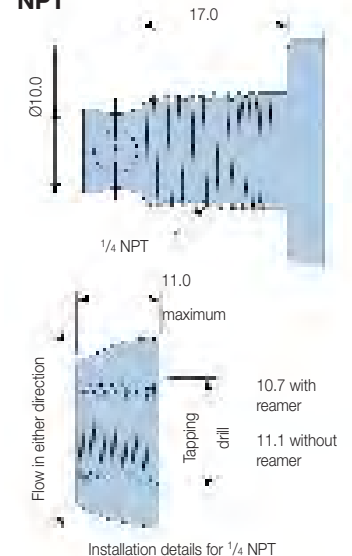


## Thread Form Options

### BSPT



### NPT



## Sensor Outputs

| MS150 moisture sensor pin designations |             |        |   |
|--|-------------|--------|---|
| Pin                                    | Designation | I/O    | Description   |
| 1                                      | Supply      | Input  | Supply voltage (+8 to +30Vdc)                               |
| 2                                      | %RH         | Output | % Saturation out (+1 to +5Vdc)                              |
| 3                                      | %RH         | Output | % Saturation out (+4 to +20mA)                              |
| 4                                      | Temperature | Output | Temperature out (0 to +5Vdc)                                |
| 5                                      | Common      | Input  | Common (0Vdc) ground from power supply (not chassis ground) |

## Interpreting the data

Oil type: Texaco Rando 46.

Saturation point: 400ppm @ 150°F (65°C).

At the above operating condition, the meter displays 100% saturation. As the meters scale indicates a reduction in the saturation percentage, there is also a corresponding reduction in PPM at a constant temperature. In the example above, a meter reading of 50% saturation could be interpreted as 200ppm at 150°F (65°C).

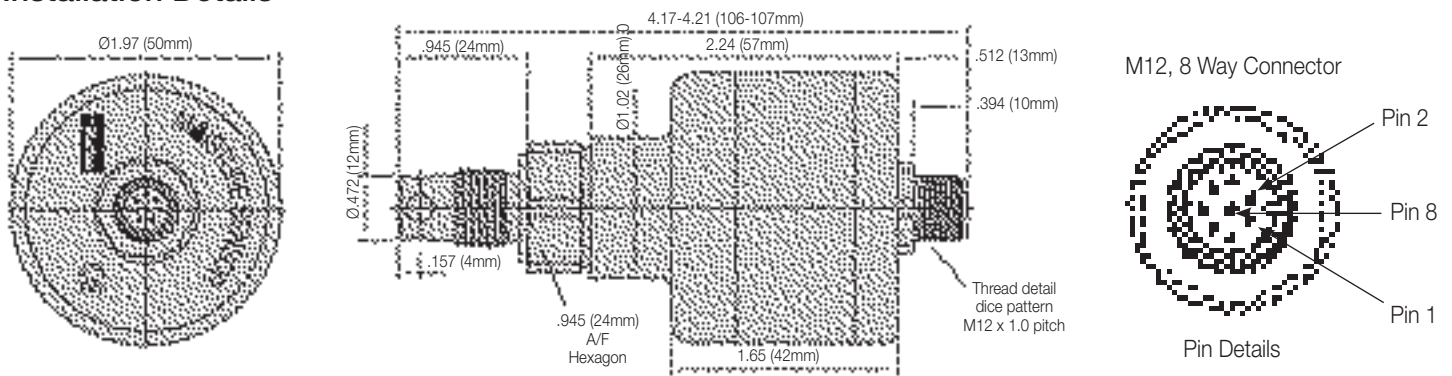


# MS200 Moisture Sensor

## Specifications

|                                    |  |
|------------------------------------|--|
| % Saturation Calibration Accuracy: | +3% RH   |
| Temperature Calibration Accuracy:  | ±1°C   |
| Thermal Stability:                 | ±1% RH (over compensated temperature range +10 to +80°C)             |
| Stability:                         | ±0.2% RH typical at 50% RH in 1 year                                 |
| Linearity:                         | ±0.5% RH typical   |
| Analog Output Hysteresis:          | ±0.5% RH Full Scale  |
| Switched Output Hysteresis:        | 2% RH  |
| Operating Temperature Range:       | -40°F to +185°F (-40°C to +85°C)                                     |
| Operating Humidity Range:          | 5 to 100% RH (non condensing)  |
| Response Time:                     | 60 sec in slow moving air at 25°C                                    |
| Maximum Rated Pressure:            | 6,000 PSI (420 Bar)  |
| Maximum Torque:                    | 22 ft-lbs  |
| Seal Material (depending on MS):   | Fluorocarbon, EPDM, Perfluoroelastomer                               |
| Material:                          | Stainless Steel 303  |
| Connector Details:                 | M12x1, 8 Way, IP67 Connector (IP68 when mated with molded cable)     |
| Maximum Cable Length:              | 33 ft (10 m) with Voltage Output, 330 ft (100 m) with current output |
| Output:                            | SEE ORDERING INFORMATION   |

## Installation Details



## Moisture Sensor Wiring and Pin Designations

dimensions in inch (mm)

| Pin | Wire Colour | Designation  | I/O    | Description  |
|-----|-------------|--------------|--------|--|
| 1   | Brown       | Analogue     | Output | Temperature - Degí Celsius.<br>User Select Output (0-3Vdc, 0-5Vdc, 1-6Vdc and 4-20mA).   |
| 2   | Green       | Alarm Limit  | Output | Alarm Limit.<br>Output that directly corresponds to the alarm set point.   |
| 3   | Yellow      | Analogue     | Output | % Saturation.<br>User Select Output (0-3Vdc, 0-5Vdc, 1-6Vdc and 4-20mA).   |
| 4   | Grey        | Receive      | Input  | RS232 Communication.   |
| 5   | Pink        | Send         | Output | RS232 Communication.   |
| 6   | Blue        | Common       | Input  | Common (0Vdc).<br>Ground from power supply.  |
| 7   | White       | Alarm Switch | Output | Alarm Switch.<br>Constant 5Vdc when in normal operation.<br>Switch to 0Vdc when in alarm condition.<br>Red LED illuminates when Sensor is in an alarm condition. |
| 8   | Red         | Supply       | Input  | Supply Voltage (+8 to +30Vdc).<br>Green LED illuminates when power is properly applied.  |

# MS300 Intrinsically Safe

## Specifications

**Pressure:**

(MAOP): 6,000 PSI (420 bar)

**Operating temperature:**

Minimum: -40°F (-40°C) - dependent on seal material  
Maximum: +185°F (+85°C)

**Flow through sensor cell:**

Installed in active flowstream

**Fluid compatibility:**

Mineral oils, petroleum-based and Phosphate ester-Skydrol option available

**Viscosity range:**

Unlimited

**Thread form connections:**

See ordering information

**Outputs:**

4-20mA (current loop)

**Calibration accuracy:**

+/- 5% RH

**Compensated thermal stability:**

+/- 1% RH (+ 50°F to +176°F)

**Materials:**

Stainless steel 303

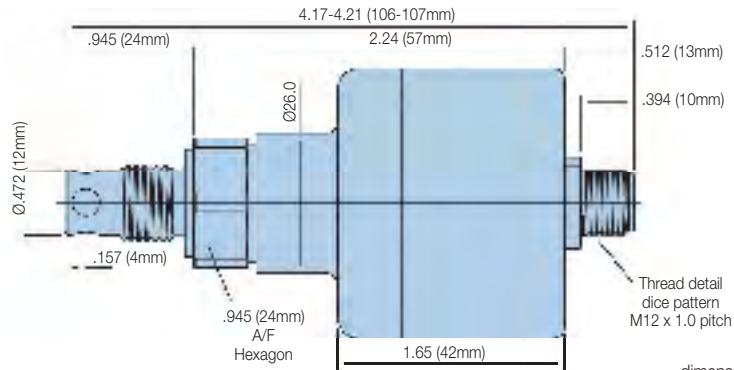
**Sensor size/weight:**

4.21in x ø1.97in/0.66 lb (107mm x ø50mm/0.3Kg)

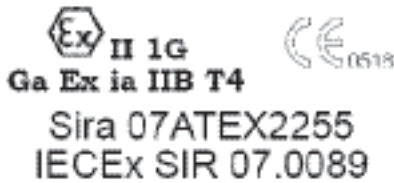
**IP ratings:**

IP68 (with specified molded cable)

Developed in association with Triteq Ltd.

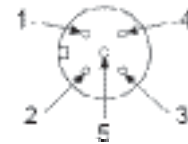


dimensions in inch (mm)



**Moisture Sensor Connection Diagram**

- |                           |         |
|---------------------------|---------|
| 1. Supply (4-20 mA - IN)  | - Brown |
| 2. Signal (4-20 mA - OUT) | - White |
| 3. Not Used               | - Blue  |
| 4. Not Used               | - Black |
| 5. Not Used               | - Grey  |



The MS300 has been certified as Intrinsically Safe Electrical Apparatus and offers fast, reliable and accurate in-line detection of moisture in fluids for use in hazardous areas.

ATEX Certification allows the MS300 into areas of a potentially explosive atmosphere, that have previously not been allowed without permits, it is intended for use in Zone 0 hazardous areas requiring the use of category 1G equipment and has been designed for use with galvanic isolators to the specified values stated below:

The electrical parameters: Ui: 28V li: 93mA Pi:0.65W Ci: 380nF Li: 0

The following instructions apply to MS300 - 4-20mA Current Loop Moisture Sensor covered by certificate number Sira 07ATEX2255:

1. The equipment may be located where flammable gases of Group I may be present. The equipment is only certified for use in ambient temperatures in the range -4°F to +104°F (-20°C to +40°C) and should not be used outside this range.
2. The equipment has not been assessed as a safety-related device (as referred to by Directive 94/9/EC Annex II, clause 1.5).
3. Installation of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice.
4. Repair of this equipment shall be carried out by the manufacturer or in accordance with the applicable code of practice (IEC 60079-19).

# Moisture Sensor Displays

## Specifications

### Bar Graph Indicator (PBG8341A)

#### Construction:

Housing – nylon 6/6, window – acrylic,  
bezel/board supports – ABS,  
pins – phosphor bronze

#### Power supply:

11 – 30 Vdc

#### Signal input: (By dipswitch configuration)

Off – differential up to 5V

A – single signal (Ref. 0V) up to 5V

B – single signal (Ref. 1V) up to 6V

#### Cut out size:

45.6mm x 45.6mm

#### Fixing:

Push fit panel thickness 0.9mm to 3.2mm

#### Sealing:

Designed to IP50 standard.

(Front face may be silicon sealed after LED configuration)

#### Scale:

Supplied 0 to 100% in horizontal

Other scales, in volume, consult Parker Hannifin

#### Scaling factors:

10% to 100% range. Fully adjustable

#### Lamp intensity:

4mcd each

#### Front viewing:

Polarized

#### Weight:

29gms

### Alternative Indicator

| Description         | DDU1001         | DDU1002         |
|---------------------|-----------------|-----------------|
| Power supply        | 11 - 30 Vdc     | 110 - 240 Vdc   |
| Accuracy            | ± 0.1% typical  | ± 0.1% typical  |
| Sample rate         | 2.5 per second  | 2.5 per second  |
| Operating temp (°C) | 0 - 50          | 0 - 50          |
| Storage temp (°C)   | -10 to +70      | -10 to +70      |
| Display             | N3.5 digit LEDA | 3 1/2 digit LED |
| Power output (Vdc)  | 24              | 24              |
| Weight (kg)         | 0.30            | 0.30            |
| Panel cutout (mm)   | 93x45 ± 0.5     | 93x45 ±/0.5     |
| Dimensions (mm)     | 48x96x93        | 48x96x93        |



PBG8341A



DDU1001/DDU1002

### Product accessories part numbers

| Product Number | Supersedes   | Description                            |
|----------------|--------------|--|
| DDU1001        | P.9732PVC-10 | Digital display unit 22-55 Vdc         |
| DDU1002        | P.9732PVC-05 | Digital display unit 110-240 Vdc       |
| PBG8341A       | PBG.8341.1A  | Bar Graph Indicator (+11 to +30 Vdc)   |
| PAM8342        | PAM.8342     | Bar Graph alarm module                 |
| ACC6NF000      | B97200       | 5 meter M12, 8 pin molded cable (IP68) |
| ACC6NF001      | P973200      | M12, 5 pin rewirable connector (IP65)  |
| ACC6NF002      | S970410      | 10 meter extension box                 |
| ACC6NE008      | S970400      | UK 12 volt power supply                |
| ACC6NE009      | S970400      | European 12 volt power supply          |
| ACC6NE010      | S970400      | US 12 volt power supply                |
| ACC6NF003      | N/A          | 5 meter M12, 5 pin molded cable (IP68) |

### Moisture sensor output setting

The Moisture sensor reports on the saturation levels of the fluid passing through the sensing cell. The output is a linear scale, reporting within the range of 5% saturation to 100% saturation.

| Saturation | 4-20mA | 0-3Vdc | 0-5Vdc |
|------------|--------|--------|--------|
| 5%         | 4.8    | 0.15   | 0.25   |
| 25%        | 8      | 0.75   | 1.25   |
| 50%        | 12     | 1.50   | 2.50   |
| 75%        | 16     | 2.25   | 3.75   |
| 100%       | 20     | 3.00   | 5.00   |

# Ordering Information

## MS200 - Product Configurator

| Key       | Model          | Fluid Type                                 | Output Options   | Thread Forms               | Connector   | Future Option |
|-----------|----------------|--|------------------|----------------------------|-------------|---------------|
| <b>MS</b> | 2 Programmable | 2 Mineral                                  | 01 0 - 3 Vdc     | 1 G 1/4" BSP Bonded Seal   | 1 M12 8 Way | 0 No          |
|           |                |  | 02 0 - 5 Vdc     | 2 G 1/4" BSP Integral Seal |             |               |
|           |                | 03 1 - 6 Vdc                               | 3 R 1/4" Taper   |                            |             |               |
|           |                | 04 4 - 20 mA                               | 4 1/4" NPT Taper |                            |             |               |
|           |                | 5 9/16 - 18 UNF 2A Integral Seal           |                  |                            |             |               |
|           |                | 6 Hand Held Unit                           |                  |                            |             |               |
|           |                | 7 G 3/8" BSP Female Swivel Equal T Adaptor |                  |                            |             |               |

## MS300 - Product Configurator

| Key       | Model          | Fluid Type                           | Output Options | Thread Forms               | Connector | Future Option |
|-----------|----------------|--------------------------------------|----------------|----------------------------|-----------|---------------|
| <b>MS</b> | 3 Programmable | 2 Mineral                            | 04 4 - 20 mA   | 1 G 1/4" BSP Bonded Seal   | 1 5 Way   | 0 No          |
|           |                |                                      |                | 2 G 1/4" BSP Integral Seal |           |               |
|           |                | 3 R 1/4" Taper                       |                |                            |           |               |
|           |                | 4 1/4" NPT Taper                     |                |                            |           |               |
|           |                | 5 9/16 - 18 UNF 2A Integral Seal     |                |                            |           |               |
|           |                | 6 G 3/8" BSP Female Swivel Equal Tee |                |                            |           |               |



aerospace  
 climate control  
 electromechanical  
**filtration**  
 fluid & gas handling  
 hydraulics  
 pneumatics  
 process control  
 sealing & shielding



# Par-Test<sup>TM</sup>

Fluid Analysis



ENGINEERING YOUR SUCCESS.

# Fluid Analysis

## Par-Test™

Fluid analysis has proven to be a critical tool for any preventive maintenance program. Fluid analysis is able to identify potential problems that cannot be detected by human senses.

A comprehensive fluid analysis program can help prevent major hydraulic or lube oil system failures.

Par-Test is a complete laboratory analysis, performed on a small volume of fluid. The report you receive is a neatly organized three page format. One may quickly analyze the test results of an individual sample and/or look at a trend analysis for up to five different samples. Two types of services are offered through Par-Test, a water base fluid analysis kit or a petroleum base fluid analysis kit. For both types of services the Par-Test kit includes a pre-cleaned glass bottle, mailing container with pre-addressed label, sample information data sheet (to be completely filled out by end user) and the



following analysis:

Fluid sampling for Par-Test involves important steps to insure you are getting a representative sample. Often, erroneous sample procedures will disguise the true nature of the system fluid. A complete sampling procedure is detailed on the back of this brochure. There also is a National Fluid Power Association standard (NFPA T2.9.1-1972) and an American National Standards Institute Standard (ANSI B93.13-1972)

for extracting samples from a fluid power system.



**Petroleum Base Kit**  
 Particle Count  
 Photomicrograph  
 Free Water Analysis  
 Spectrometric Analysis  
 Viscosity Analysis  
 Water Analysis (PPM)  
 Neutralization Analysis

**Water Base Kit**  
 Particle Count  
 Photomicrograph  
 Spectrometric Analysis  
 Viscosity Analysis  
 Neutralization Analysis

| How to Order   |             |
|--|-------------|
| Description  | Part Number |
| Petroleum base fluid kit (single test bottle)        | 927292      |
| Petroleum base fluid kit (Carton of 10 test bottles) | 927293      |
| Water base fluid kit (single test bottle)            | 932995      |

# Fluid Analysis

Par-Test™

| FLUID ANALYSIS REPORT  |   |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
|--|---|---|---|----------|----------|---------|--|----------|---------|--|-----------|--------|--|-----------|--------|----------|-----------|--------|--|-----------|-------|--|-----------|------|--|-----------|-----|--|--|--|----------------|--|--|------------|----------|----------------------|--|--|--|--|--|
| SAMPLE CODE: 93844<br>Parker Hannifan<br>16810 Fulton Rd. Co #2<br>Metamora, OH, 43540<br>ATTN: Kevin Noe  |   | DATE: 09/01/04<br>  |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| PARTEST Fluid Analysis Service<br>Parker Hannifan Corporation<br>1016 E. Airport Rd.<br>Stillwater, OK 74075<br>Tele: (405)624-0400<br>Fax: (405)624-0401  |   |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| <b>COMPANY NAME:</b><br><b>SYSTEM TYPE:</b><br><b>EQUIPMENT TYPE:</b><br><b>MACHINE ID:</b><br><b>FILTER ID:</b>   | ABC Corporation<br>Hydraulic<br>Press<br>Machine #1<br>Parker 10 micron | <b>SAMPLE DATE:</b><br><b>HOURS:</b><br><b>SYSTEM VOLUME:</b><br><b>FLUID TYPE:</b><br><b>ANALYSIS PERFORMED:</b> | 7/12/2004<br>(on oil) 948 (on unit) 2000<br>200 Gallons<br>AW 46<br>N2,S,T,V4,W                         |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| <b>AUTOMATIC PARTICLE COUNT ISO 11171</b>  |   |   | <b>FREE WATER PRESENT</b><br><br><input type="checkbox"/> YES<br><input checked="" type="checkbox"/> NO |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Size</th> <th>Counts per ml.</th> <th>ISO Code</th> </tr> </thead> <tbody> <tr><td>&gt;4 µm(c)</td><td>35000.0</td><td></td></tr> <tr><td>&gt;6 µm(c)</td><td>15498.0</td><td></td></tr> <tr><td>&gt;10 µm(c)</td><td>6000.0</td><td></td></tr> <tr><td>&gt;14 µm(c)</td><td>2600.0</td><td>22/21/19</td></tr> <tr><td>&gt;21 µm(c)</td><td>1468.0</td><td></td></tr> <tr><td>&gt;38 µm(c)</td><td>754.0</td><td></td></tr> <tr><td>&gt;50 µm(c)</td><td>58.0</td><td></td></tr> <tr><td>&gt;70 µm(c)</td><td>3.0</td><td></td></tr> </tbody> </table> | Size  | Counts per ml.  |   | ISO Code | >4 µm(c) | 35000.0 |  | >6 µm(c) | 15498.0 |  | >10 µm(c) | 6000.0 |  | >14 µm(c) | 2600.0 | 22/21/19 | >21 µm(c) | 1468.0 |  | >38 µm(c) | 754.0 |  | >50 µm(c) | 58.0 |  | >70 µm(c) | 3.0 |  | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: center;">PHOTO ANALYSIS</th> </tr> <tr> <td>Mag.: 160x</td> <td>Vol 20ml</td> <td>Scale: 1 div = 20 µm</td> </tr> </thead> <tbody> <tr> <td colspan="3" style="text-align: center;"> </td> </tr> <tr> <td colspan="3" style="text-align: center;"> <b>ALARMS/REMARKS</b><br/>           *The red line in the ISO chart graph indicates recommended cleanliness level.         </td> </tr> </tbody> </table> |  | PHOTO ANALYSIS |  |  | Mag.: 160x | Vol 20ml | Scale: 1 div = 20 µm |  |  |  | <b>ALARMS/REMARKS</b><br>*The red line in the ISO chart graph indicates recommended cleanliness level. |  |
| Size   | Counts per ml.  | ISO Code  |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| >4 µm(c)   | 35000.0   |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| >6 µm(c)   | 15498.0   |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| >10 µm(c)  | 6000.0  |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| >14 µm(c)  | 2600.0  | 22/21/19  |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| >21 µm(c)  | 1468.0  |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| >38 µm(c)  | 754.0   |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| >50 µm(c)  | 58.0  |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| >70 µm(c)  | 3.0   |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| PHOTO ANALYSIS   |   |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| Mag.: 160x   | Vol 20ml  | Scale: 1 div = 20 µm  |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
|  |   |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
| <b>ALARMS/REMARKS</b><br>*The red line in the ISO chart graph indicates recommended cleanliness level.   |   |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |
|  |   |   |   |          |          |         |  |          |         |  |           |        |  |           |        |          |           |        |  |           |       |  |           |      |  |           |     |  |  |  |                |  |  |            |          |                      |  |  |  |  |  |

For our Par-Test™ customers, the analysis report is available online for your ease and convenience. Historical data is also available. Visit [www.partestlab.com](http://www.partestlab.com)

## Sample Data

Information supplied by the user regarding the fluid to be analyzed. Complete and accurate information is crucial for a useful analysis.

## Particle Count

Results are reported over 6 different particle size ranges and expressed as an ISO code (modified). The counts are per milliliter of fluid and the reporting is cumulative; ie. The particle count in the >2 micron row includes the number of particles greater than 5, 10, 15, 25 and 50 microns as well as particles between 2-5 microns in size. Particle resuspension method is utilized for water based fluid samples.

## Free Water Analysis

Determines if the water present is beyond the saturation point of the fluid. At the saturation point, the fluid can no longer dissolve or hold any more water. Its appearance becomes cloudy or "milky". Many hydraulic oils saturate between 500 and 1000 PPM of water.

## Photo Analysis

A photomicrograph of a small volume of fluid (20 ml) magnified 100X. This analysis gives a quick glance at the contamination present in the fluid. Each line of the graduated scale represents 20 microns in size.


The full color photomicrograph helps identify particles which would otherwise be grouped by class.

## ISO Chart

Graphically illustrates the particle count on a graph. The recommended cleanliness code level, if given on the submittal form, is shown by a broken line on the ISO chart.

# Fluid Analysis

Par-Test™

| FLUID ANALYSIS REPORT   |                        |   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
|---|------------------------|---|--|---------------------------|---------------|---------|------|-------|---|--------|-------|---|----------|-------|---|------|-------|---|-----------|-----|---|-----|-------|---|---------|-------|---|------|-------|---|-----------|-------|---|---------|-------|---|------------|------|---|--------|-----|---|-------|-------|---|--------|-------|---|------------|-------|---|--------|-------|---|--------|-------|---|----------|-------|---|-----------|-------|---|----------|-------|---|---|-----------|-----------|----------------|-----------------|------|------|----------------------|-------|
| <p>SAMPLE CODE: 93844<br/>                     Parker Hannifan<br/>                     16810 Fulton Rd. Co #2<br/>                     Metamora, OH, 43540<br/>                     ATTN: Kevin Noe</p>  | <p>DATE: 09/01/04</p>  | <div style="text-align: center;">  </div> <p>PARTEST Fluid Analysis Service<br/>                     Parker Hannifin Corporation<br/>                     1016 E. Airport Rd.<br/>                     Stillwater, OK 74075<br/>                     Tele: (405)624-0400<br/>                     Fax: (405)624-0401</p> |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: center;">SPECTROMETRIC ANALYSIS</th> </tr> <tr> <th style="text-align: left;">WEAR METALS AND ADDITIVES</th> <th style="text-align: center;">PPM BY WEIGHT</th> <th style="text-align: center;">STATUS*</th> </tr> </thead> <tbody> <tr><td>IRON</td><td style="text-align: center;">120.0</td><td style="text-align: center;">H</td></tr> <tr><td>COPPER</td><td style="text-align: center;">510.0</td><td style="text-align: center;">H</td></tr> <tr><td>CHROMIUM</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> <tr><td>LEAD</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> <tr><td>ALUMINIUM</td><td style="text-align: center;">1.0</td><td style="text-align: center;">N</td></tr> <tr><td>TIN</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> <tr><td>SILICON</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> <tr><td>ZINC</td><td style="text-align: center;">423.0</td><td style="text-align: center;">N</td></tr> <tr><td>MAGNESIUM</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> <tr><td>CALCIUM</td><td style="text-align: center;">540.0</td><td style="text-align: center;">H</td></tr> <tr><td>PHOSPHORUS</td><td style="text-align: center;">10.0</td><td style="text-align: center;">L</td></tr> <tr><td>BARIUM</td><td style="text-align: center;">1.0</td><td style="text-align: center;">N</td></tr> <tr><td>BORON</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> <tr><td>SODIUM</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> <tr><td>MOLYBDENUM</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> <tr><td>SILVER</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> <tr><td>NICKEL</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> <tr><td>TITANIUM</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> <tr><td>MANGANESE</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> <tr><td>ANTIMONY</td><td style="text-align: center;">&lt; 1.0</td><td style="text-align: center;">N</td></tr> </tbody> </table> <p style="text-align: center;">L = LOW N = NORMAL H= HIGH</p> | SPECTROMETRIC ANALYSIS |   |  | WEAR METALS AND ADDITIVES | PPM BY WEIGHT | STATUS* | IRON | 120.0 | H | COPPER | 510.0 | H | CHROMIUM | < 1.0 | N | LEAD | < 1.0 | N | ALUMINIUM | 1.0 | N | TIN | < 1.0 | N | SILICON | < 1.0 | N | ZINC | 423.0 | N | MAGNESIUM | < 1.0 | N | CALCIUM | 540.0 | H | PHOSPHORUS | 10.0 | L | BARIUM | 1.0 | N | BORON | < 1.0 | N | SODIUM | < 1.0 | N | MOLYBDENUM | < 1.0 | N | SILVER | < 1.0 | N | NICKEL | < 1.0 | N | TITANIUM | < 1.0 | N | MANGANESE | < 1.0 | N | ANTIMONY | < 1.0 | N | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center;">Viscosity Analysis - ASTM D445</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">CST@100C:</td> <td style="width: 50%;">SSU@210F:</td> </tr> <tr> <td>CST@40C: 46.25</td> <td>SSU@100F: 215.0</td> </tr> </table> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="font-size: small;">Viscosity at 40C (100F) is reported in Centistokes (cSt) and SUS (Saybolt Universal Seconds). The test is conducted in accordance with ASTM D445 procedures for determining the kinematic viscosity of fluids</p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center;">Neutralization Analysis - ASTM D794</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">TAN:</td> <td style="width: 20%; text-align: right;">0.44</td> </tr> </table> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="font-size: small;">The Total Acid Number (TAN) test measures the acidity of a hydraulic fluid. The higher the number, the more acidic the fluid. Over time this may mean the fluid is becoming oxidized.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center;">Water Analysis - ASTM D6304</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">WATER CONTENT (PPM):</td> <td style="width: 20%; text-align: right;">410.0</td> </tr> </table> </div> <div style="border: 1px solid black; padding: 5px;"> <p style="font-size: small;">The water analysis test shows the actual parts per million of water in a sample. This is known as the Karl Fischer titration test and is conducted in accordance with ASTM D6304.</p> </div> | CST@100C: | SSU@210F: | CST@40C: 46.25 | SSU@100F: 215.0 | TAN: | 0.44 | WATER CONTENT (PPM): | 410.0 |
| SPECTROMETRIC ANALYSIS  |                        |   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| WEAR METALS AND ADDITIVES   | PPM BY WEIGHT          | STATUS*   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| IRON  | 120.0                  | H   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| COPPER  | 510.0                  | H   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| CHROMIUM  | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| LEAD  | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| ALUMINIUM   | 1.0                    | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| TIN   | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| SILICON   | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| ZINC  | 423.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| MAGNESIUM   | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| CALCIUM   | 540.0                  | H   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| PHOSPHORUS  | 10.0                   | L   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| BARIUM  | 1.0                    | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| BORON   | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| SODIUM  | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| MOLYBDENUM  | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| SILVER  | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| NICKEL  | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| TITANIUM  | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| MANGANESE   | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| ANTIMONY  | < 1.0                  | N   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| CST@100C:   | SSU@210F:              |   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| CST@40C: 46.25  | SSU@100F: 215.0        |   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| TAN:  | 0.44                   |   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| WATER CONTENT (PPM):  | 410.0                  |   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| <div style="border: 1px solid black; padding: 5px;"> <p style="font-size: small;">The Spectrometric Analysis reports the ppm level of 20 different wear metals and additives in the sample. Generally the first 7 and last 5 elements are considered wear elements not normally present in hydraulic oil. Zinc through molybdenum (shaded) represent some common additives in oil. If a baseline oil sample (new oil out of a drum) is provide, then comments on the analyzed sample can be provided on whether the status of the elements are low, normal, or high.</p> </div>   |                        |   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |
| <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">Comments</p> <p style="font-size: small;">*Please check spectrometric status for abnormal conditions.</p> </div>  |                        |   |  |                           |               |         |      |       |   |        |       |   |          |       |   |      |       |   |           |     |   |     |       |   |         |       |   |      |       |   |           |       |   |         |       |   |            |      |   |        |     |   |       |       |   |        |       |   |            |       |   |        |       |   |        |       |   |          |       |   |           |       |   |          |       |   |   |           |           |                |                 |      |      |                      |       |

## Viscosity Analysis

Viscosity is a very important property of a fluid in terms of system performance. Viscosity expresses the internal friction between molecules in the fluid. Typically a breakdown in viscosity will be seen as an increase. Both SSU at 100° F and cSt at 40° C are reported.

## Neutralization Analysis

Referred to as the Total Acid Number (TAN) this titration test measures the acid level of the sample fluid. The production of acidic material causes oxidation degradation or aging of most fluids. This activity is promoted by elevated temperatures, presence of entrained metal particles, and intimate contact with air. It is the rate of increase of the TAN during any given time period that is significant, not just the absolute value.

## Water Analysis

Karl Fischer test gives accurate measure of water concentration in the sample fluid. The results are reported in parts per million (PPM) and allow for detection of water levels well below the saturation point.

## Remarks

Quick statements or alerts about any unusual results from one of the tests reported on this page.

## Spectrometric Analysis

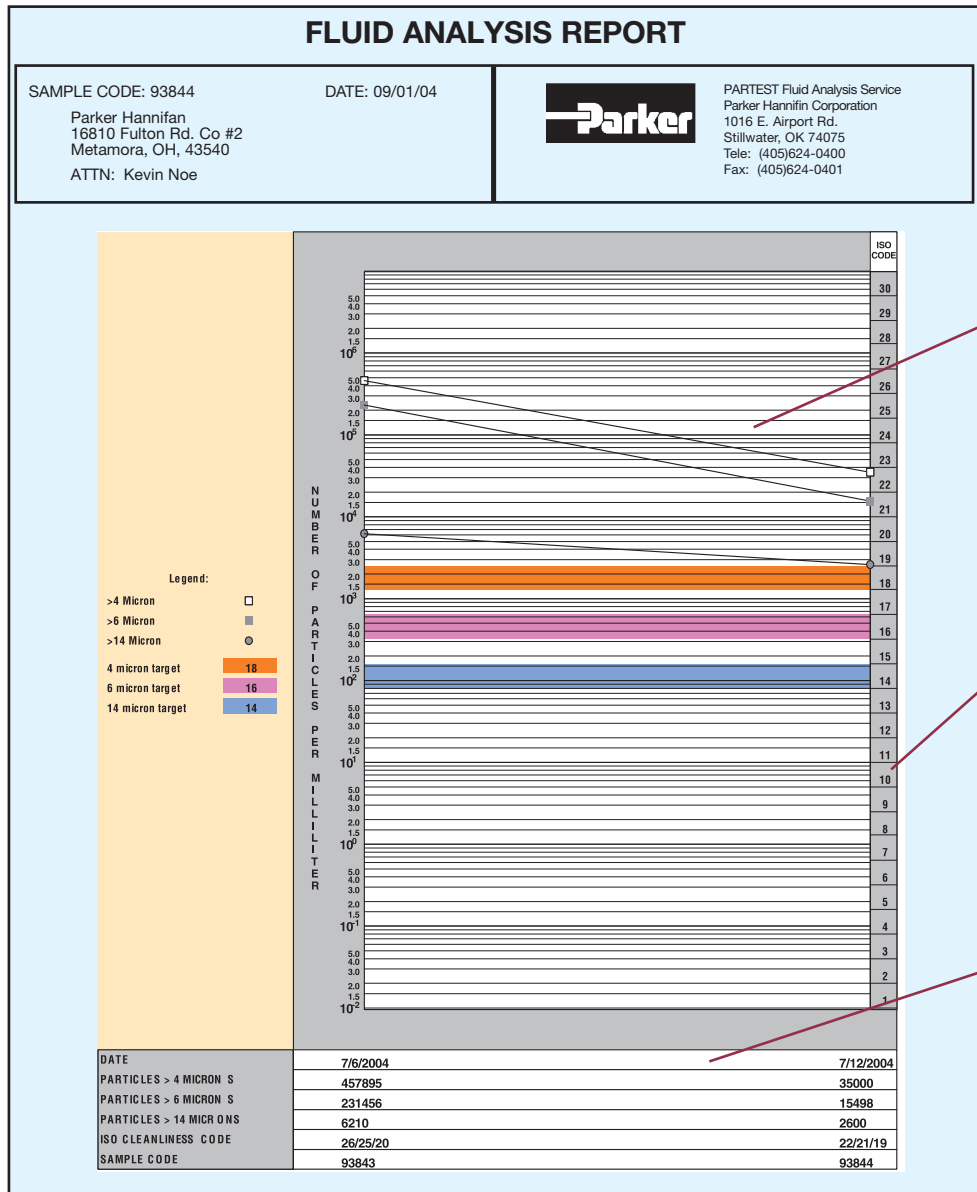
Results obtained by Rotating Disk Electrode (ROE) Spectrometer and reported in terms of parts per million (PPM). Twenty different wear metals and additives are analyzed to help determine the condition of the fluid. The spectrometric test is limited to identifying particles below 5-7 micron in size. Base line (new) fluid samples should be sent in for each different fluid to be analyzed. This will be used to determine the status.

| WEAR METALS AND ADDITIVES   |   |
|---|---|
| <p>Iron: Ferrous wear particle typically from pumps, gears, cylinders, or rust</p> <p>Copper: Brass (copper/zinc) and bronze (copper/tin) in bearings and bushings</p> <p>Chromium: (white non ferrous metal) Chrome from cylinder rods, bearings, valve spools</p> <p>Lead: Babbitt or copper lead bearings</p> <p>Aluminum: White nonferrous metal from pump bodies, bushings, bearings, and grinding compounds</p> <p>Tin: Babbitt bearings, plating</p> <p>Silicon: Sand/dirt contamination or antifoaming additive in oil</p> <p>Zinc: Plating or anti-wear additive in oil</p> <p>Magnesium: Detergent, dispersive additive in oil, bearings, water</p> | <p>Calcium: Dispersant additive or acid neutralizer</p> <p>Phosphorous: Anti-wear or fire resistant additive in fluid</p> <p>Barium: Corrosion, rust inhibitor additive in oil</p> <p>Boron: Detergent, dispersive additive in oil</p> <p>Sodium: Detergent or coolant additive</p> <p>Molybdenum: Alloy metal or anti friction additive</p> <p>Silver: White non ferrous metal</p> <p>Nickel: Alloy metal</p> <p>Titanium: White non ferrous metal</p> <p>Manganese: White non ferrous metal</p> <p>Antimony: Babbit bearings, greases</p> |



# Fluid Analysis

Par-Test™



For our Par-Test™ customers, the analysis report is available online for your ease and convenience. Historical data is also available. Visit [www.partestlab.com](http://www.partestlab.com)

### Trend Analysis

Graphical history for up to 5 samples plotted for 2, 5 and 15 micron and greater size particles. This analysis is a valuable tool for tracking the progress of a system over a given time period.

### ISO Range Code

Index Number that is associated with a range of particles. Below is a list of the range numbers and the corresponding particle quantities.

### Sample Code

Assigned to the test kit form for a ready reference. This code can be used to track the sample from start to finish.

| NUMBER OF PARTICLES PER ML |           |                     |            |           |                     |
|----------------------------|-----------|---------------------|------------|-----------|---------------------|
| Range Code                 | More than | Up to and including | Range Code | More than | Up to and including |
| 30                         | 5,000,000 | 10,000,000          | 18         | 1,300     | 2,500               |
| 29                         | 2,500,000 | 5,000,000           | 17         | 640       | 1,300               |
| 28                         | 1,300,000 | 2,500,000           | 16         | 320       | 640                 |
| 27                         | 640,000   | 1,300,000           | 15         | 160       | 320                 |
| 26                         | 320,000   | 640,000             | 14         | 80        | 160                 |
| 25                         | 160,000   | 320,000             | 13         | 40        | 80                  |
| 24                         | 80,000    | 160,000             | 12         | 20        | 40                  |
| 23                         | 40,000    | 80,000              | 11         | 10        | 20                  |
| 22                         | 20,000    | 40,000              | 10         | 5         | 10                  |
| 21                         | 10,000    | 20,000              | 9          | 2.5       | 5                   |
| 20                         | 5,000     | 10,000              | 8          | 1.3       | 2.5                 |
| 19                         | 2,500     | 5,000               | 7          | .64       | 1.3                 |
|                            |           |                     | 6          | .32       | .64                 |

# Fluid Analysis

Par-Test™

## SAMPLING PROCEDURE

Obtaining a fluid sample for analysis involves important steps to make sure you are getting a representative sample. Often erroneous sampling procedures will disguise the true nature of system cleanliness levels. Use one of the following methods to obtain a representative system sample.

### I. For systems with a sampling valve

- A. Operate system for at least 1/2 hour.
- B. With the system operating, open the sample valve allowing 200 ml to 500 ml (7 to 16 ounces) of fluid to flush the sampling port. (The sample valve design should provide turbulent flow through the sampling port.)
- C. Using a wide mouth, pre-cleaned sampling bottle, remove the bottle cap and place in the stream of flow from the sampling valve. Do NOT “rinse” out the bottle with initial sample.
- D. Close the sample bottle immediately. Next, close the sampling valve. (Make prior provision to “catch” the fluid while removing the bottle from the stream.)
- E. Tag the sample bottle with pertinent data; include date, machine number, fluid supplier, fluid number code, fluid type, and time elapsed since last sample (if any).

### II. Systems without a sampling valve

There are two locations to obtain a sample in a system without a sampling valve: in-tank and in the line. The procedure for both follows:

#### A. In the Tank Sampling

1. Operate the system for at least 1/2 hour.
2. Use a small hand-held vacuum pump to extract sample. Insert sampling device into the tank to one half of the fluid height. You will probably have to weight the end of the sampling tube. Your objective is to obtain a sample in the middle portion of the tank. Avoid the top or bottom of the tank. Do not let the syringe or tubing come in contact with the side of the tank.
3. Put extracted fluid into an approved, pre-cleaned sample bottle as described in the previous sampling valve method.
4. Cap immediately.
5. Tag with information as described in sampling valve method.

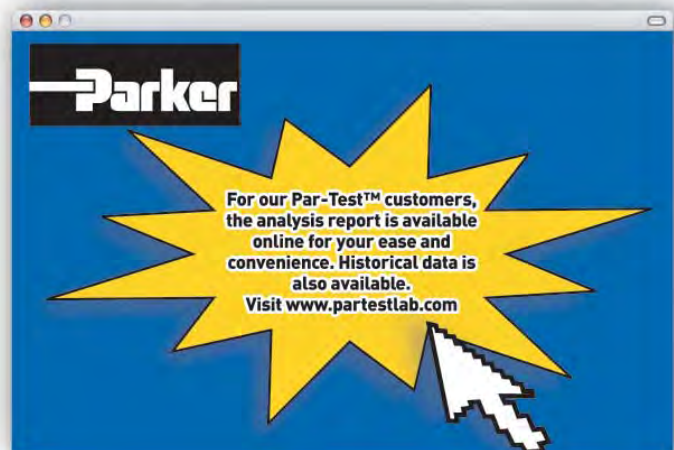
#### B. In-line Sampling

1. Operate the system for at least 1/2 hour.
2. Locate a suitable valve in the system where turbulent flow can be obtained (ball valve is preferred). If no such valve ex-

ists, locate a fitting which can be easily opened to provide turbulent flow (tee or elbow).

3. Flush the valve or fitting sample point with a filtered solvent. Open valve or fitting and allow adequate flushing. (Take care to allow for this step. Direct sample back to tank or into a large container. It is not necessary to discard this fluid.)
4. Place in an approved, pre-cleaned sample bottle under the stream of flow per sampling valve methods.
5. Cap sample bottle immediately.
6. Tag with important information per the sampling valve method.  
Note: Select a valve or fitting where the pressure is limited to 200 PSIG (14 bar) or less.

## ON-SITE FLUID ANALYSIS PRODUCT



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