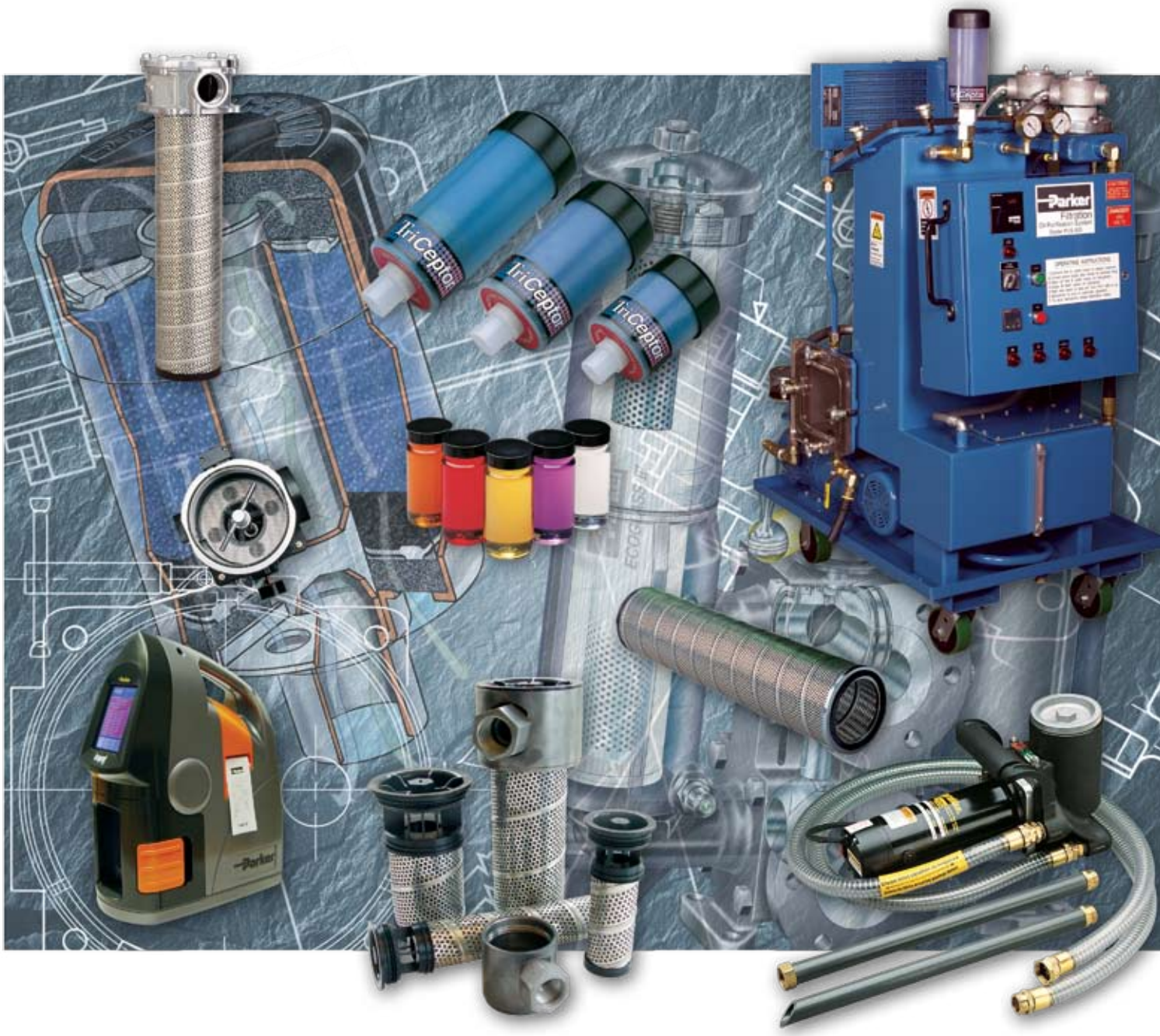
Hydraulic and Lube Filtration Products

Catalog 2300-13 USA



The Parker Hannifin Filtration Group assures:

- Consistent quality
- Technical innovation
- Premier customer service

Parker's technical resources provide the right filtration technologies that conform to your requirements. That's why thousands of manufacturers and equipment users around the world rely on Parker Filtration products and people.

Worldwide Sales and Service

Parker operates sales and service centers in major industrial areas worldwide. Call 1-800-C-PARKER for more information and for a synopsis of our Filtration Technology Textbook.

Hydraulic, Lubrication & Coolant Filtration

High-performance filtration systems for production machinery in industrial, mobile and military/marine.

Compressed Air & Gas Filtration

Complete line of compressed air/gas filtration products; coalescing, particulate and adsorption filters in many applications in many industries.

Process & Chemical Fluid Filtration

Liquid filtration systems for beverage, chemical and food processing; cosmetic, paint, water treatment; photo-processing; and micro-chip fabrication.

Fuel Conditioning & Filtration

Parker air, fuel and oil filtration systems provide quality protection for engines operating in any environment, anywhere in the world.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Table of Contents

Introduction

Parker Hannifin is comprised of eight global groups: Aerospace, Climate & Industrial Controls, Fluid Connectors, Seal, Hydraulics, Filtration, Automation and Instrumentation.

The Filtration group consists of ten technical sales and service locations: Finite Filter, Hydraulic Filter Division North America, Hydraulic Filter Division Europe (two locations), Process Filter, Finn Filter, Racor, Parker Hannifin Brazil and Parker Hannifin Korea.

Customer Support Information

Meeting Your Exact Filter Needs

Parker knows the importance of selecting the right filtration components and systems for optimum effectiveness and efficiency. Our computer aided product selection software, inPHorm, will help find the right solutions for the user. By evaluating the variables, inPHorm will help take out the guesswork typically associated with the sizing process.

Technical Support You Can Count On

Parker's technical resources assure you of the right filtration technologies, advanced designs, consistent manufacturing and a network of helpful, specialized professionals trained to support your team.

We listen to you; then we design the right filtration solution. Parker holds over 150 patents on innovative filtration products, including filtration membranes, differential pressure indicators, cartridge bypass valves and spin-in elements.

Parker Filtration makes the technological investments needed to assure the highest quality products. Examples are modern clean rooms, sophisticated testing equipment, CAD/CAM engineering, CNC integrated equipment and an extensive computer database (inPHorm) that is helping us design tomorrow's filtration products today.

Quality Is Top Priority

Parker Filtration has had a total quality management system in place for years, as well as a Director of Corporate Quality for all of Parker. This structure helps us continually meet our customers' expectations for the highest technical standards, reliable
supply and responsive service. From the Group President on down, "Quality" at Parker means more than making a product the right way. Quality permeates our whole organization so that every employee thinks about what he or she does and what is expected by our customers.

CERTIFIED
ISO 9001:2000

MGMT. SYS.
RvA C 050
Accredited by the Council for Accreditation (RvA)

INTERTEK
CERTIFICATION

ANSI · RAB
QMS
ACCREDITED
National Accreditation Program

"Always Available" Customer Service

Parker Filtration distributors provide local stock and technical design help including 24-hour emergency service. They are further supported by our ever ready" manufacturing teams.

So if you need more technical literature or applications support please call us toll free at 1-800-253-1258 or at our 24 hour corporate help line at **1-800-C-PARKER.**

Parker Hannifin Corporation
Hydraulic Filter Division
16810 Fulton County Road #2
Metamora, OH 43540
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Phone: (419) 644-4311
Fax: (419) 644-6205
http://www.parker.com/hydraulicfilter

12AT/50AT Series

Spin-On Filters

Spin-On Filters

12AT/50AT Series

Applications for Spin-On Filters

- Mobile Equipment
- Hydrostatic Drives
- Industrial Power Units
- Reservoir Breathers

Often, economic conditions dictate what type of filter is used on a piece of equipment. When costs are tight, you need a filter that is inexpensive, yet uncompromising in performance and quality. Parker's spin-on filters fit that need. They are built to fit demanding design parameters in today's mobile and industrial equipment. No compromising.

Mounting
- 6 hole pattern for flexibility

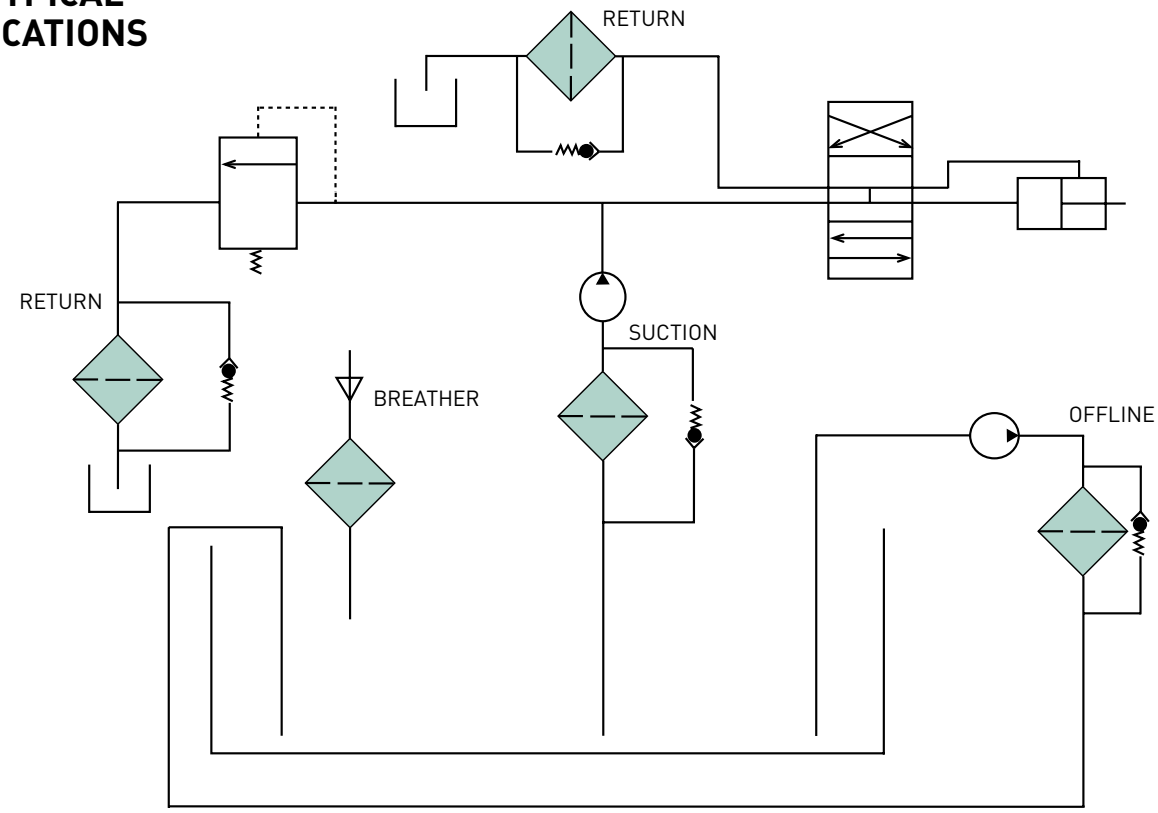
Indicator Gauge
- Shows at a glance when the cannister needs changing

Ports
- Both NPT and SAE straight thread available

Disposable Cannister
- No mess, oil is contained inside
- Easy to handle
- Single and double lengths for longer life

Interchangeability
- Parker cannisters fit many competitors' heads. Contact Hydraulic Filter Division for part numbers

TYPICAL LOCATIONS



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Hydraulic Filter Division
Metamora, OH

Typical Element Performance: 12AT

Media Code	Filter Media	Beta Ratios	Particle Size/Efficiency
25C	Cellulose	B_{25}=2	25 / 50%
10C	Cellulose	B_{10}=2	10 / 50%
03C	Cellulose	B_{3}=2	3 / 50%
20B	Microglass	B_{20}=75	20 / 98.7%
10B	Microglass	B_{10}=75	10 / 98.7%

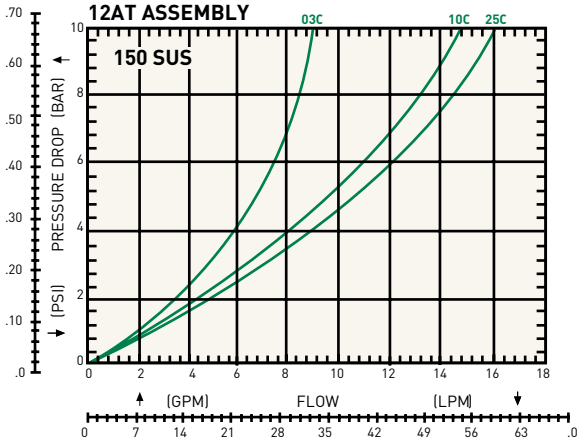
Actual results are dependent on system flow rates, fluid viscosities, and other parameters.

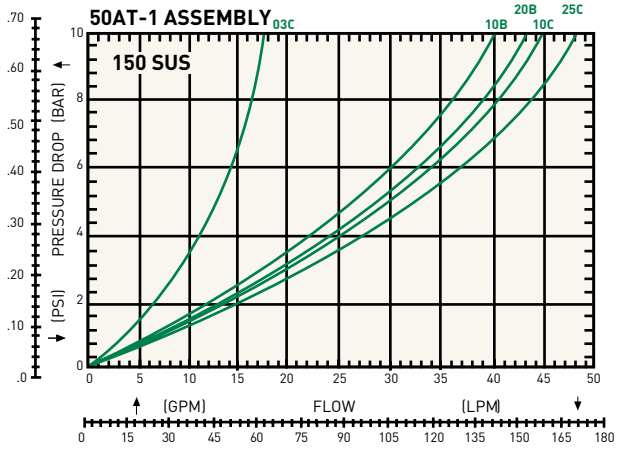
Typical Element Performance: 50AT

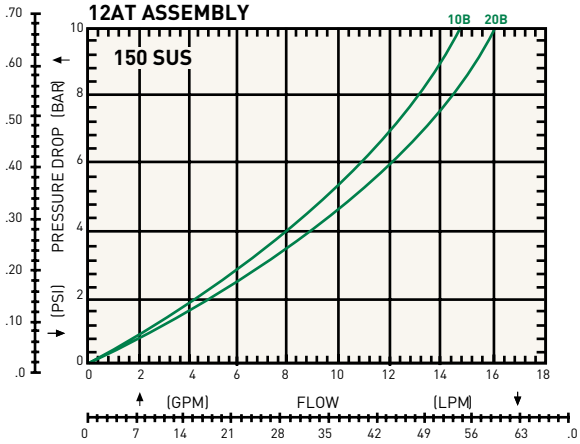
Media Code	Filter Media	Beta Ratios	Particle Size/Efficiency
25C	Cellulose	B_{25}=2	25 / 50%
10C	Cellulose	B_{10}=2	10 / 50%
03C	Cellulose	B_{3}=2	3 / 50%
20B	Microglass	B_{20}=75	20 / 98.7%
10B	Microglass	B_{10}=75	10 / 98.7%
10C-2	Cellulose	B_{10}=2	10 / 50%
20B-2	Microglass	B_{20}=75	20 / 98.7%
10B-2	Microglass	B_{10}=75	10 / 98.7%
03B-2	Microglass	B_{3}=75	3 / 98.7%

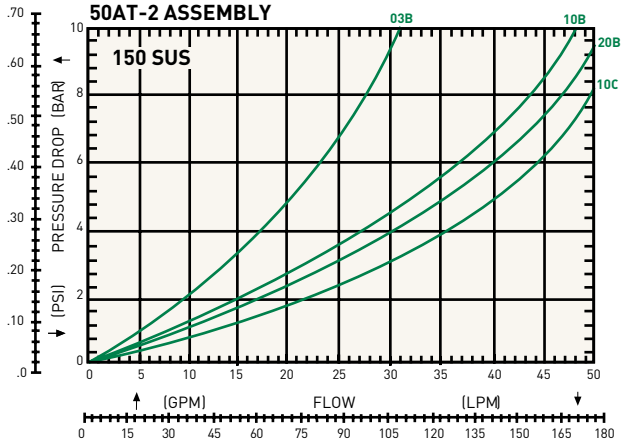
Actual results are dependent on system flow rates, fluid viscosities, and other parameters.

Beta Rating	Efficiency at (X) Particle Size
Bx = 2	50.0%
Bx = 20	95.0%
Bx = 75	98.7%
Bx = 200	99.5%
Bx = 1000	99.99%









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Hydraulic Filter Division
Metamora, OH

Installation and Specification Data Model 12AT

Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 150 psi (10.3 bar)

Design Safety Factor: 2.5:1

Operating Temperatures:
-40ºF to 225ºF (-40ºC to 107ºC)

Element Collapse Rating:
100 psid minimum

Element Condition Indicators:
Gauge: Color coded 15/25 psi

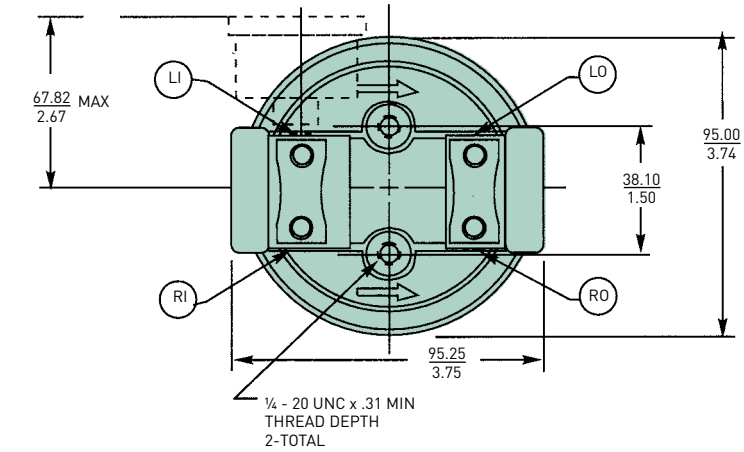
Pressure Switch: Normally open
20 +/- 2 psi
5 Amps @ 24 VDC

Vacuum Switch: Normally open
5" +/- 1" Hg
1.0 Amp @ 120 VAC

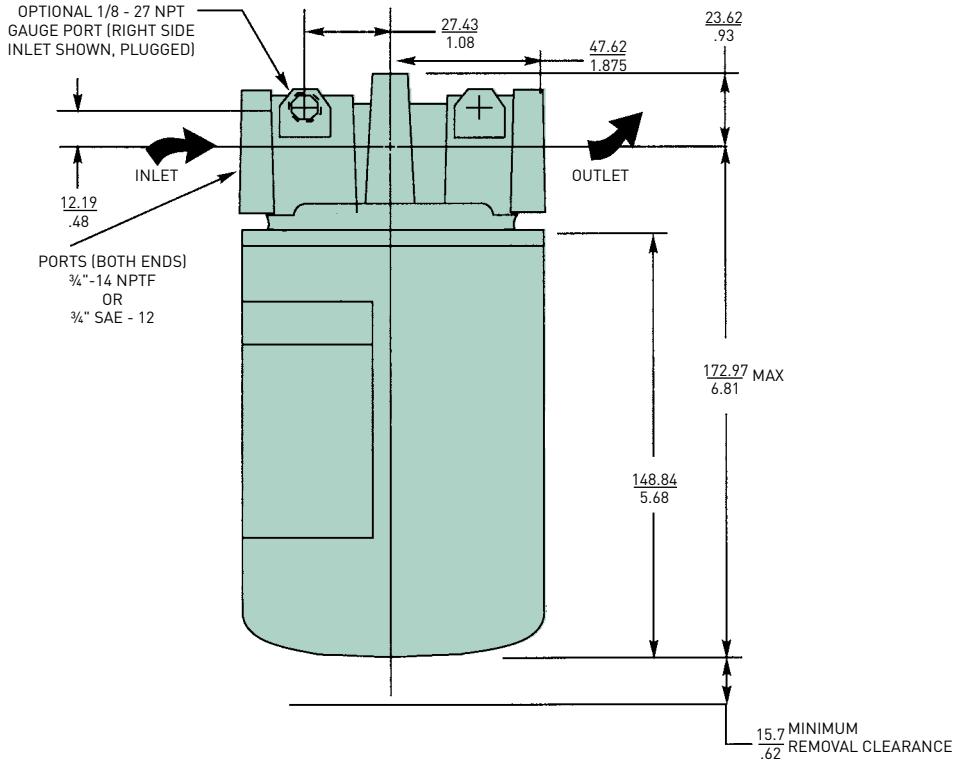
Filter Material:
Head: Aluminum
Cannister: Low Carbon Steel

Shipping Weights (approximate):
1.6 lbs.

Gauge Port Locations:
RI - Right side of inlet
LI - Left side of inlet
RO - Right side of outlet
LO - Left side of outlet



Linear Measure: millimeter / inch



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Installation and Specification Data Model 50AT

Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 150 psi (10.3 bar)

Design Safety Factor: 2.5:1

Operating Temperatures:
-40°F to 225°F (-40° C to 107°C)

Element Collapse Rating:
100 psid minimum

Element Condition Indicators:
Gauge: Color coded 15/25 psi

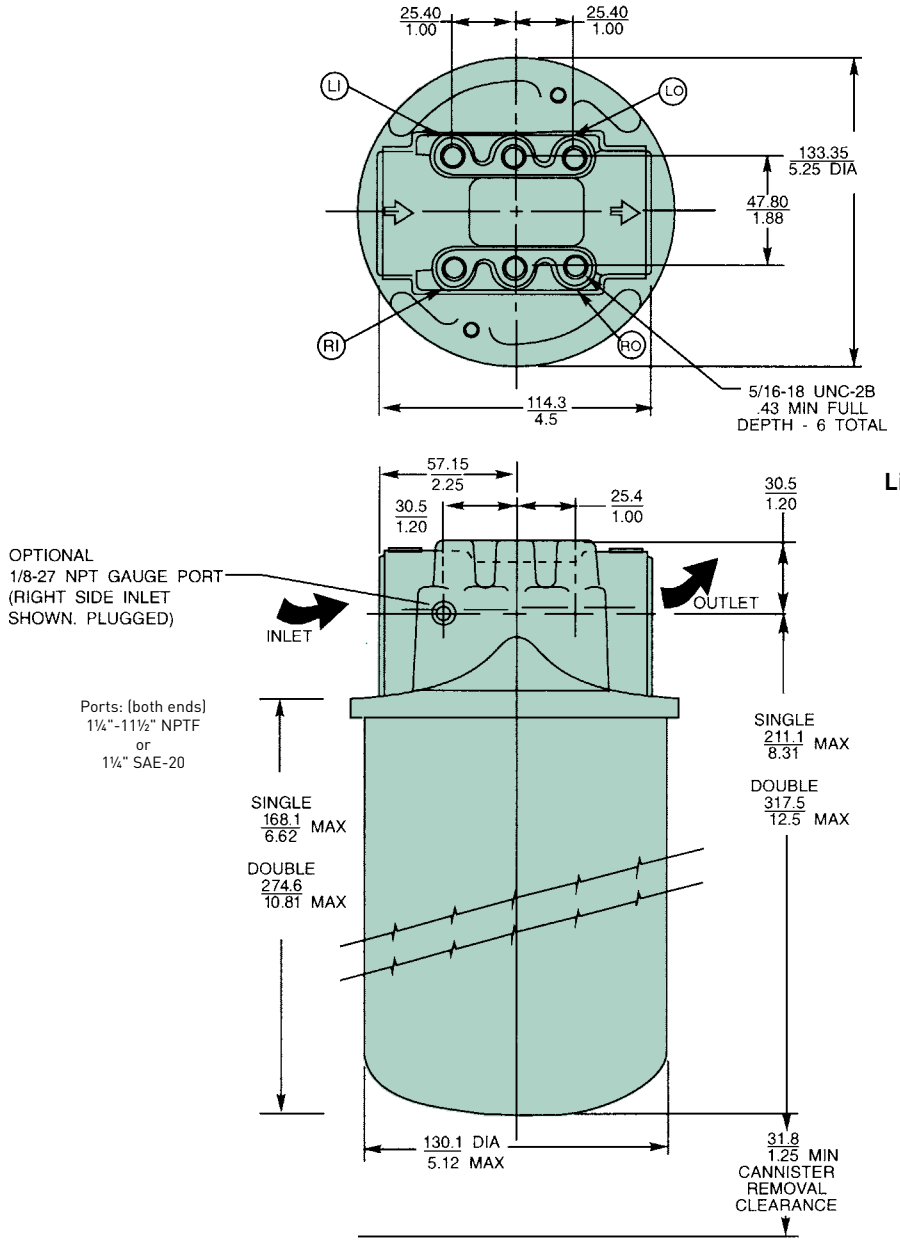
Pressure Switch: Normally open
20 +/- 2 psi
5 Amps @ 24 VDC

Vacuum Switch: Normally open
5" +/- 1" Hg
1.0 Amp @ 120 VAC

Filter Material:
Head: Aluminum
Cannister: Low Carbon Steel

Shipping Weights (approximate):
Single length: 3.7 lbs.
Double length: 5.3 lbs.

Gauge Port Locations:
RI - Right side of inlet
LI - Left side of inlet
RO - Right side of outlet
LO - Left side of outlet



Linear Measure: millimeter / inch

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Reservoir Breather Assemblies 12AT and 50AT

Sizing

Select the proper size cannister for the maximum rate of reservoir draw down or air exchange rate. As a rule of thumb, clean pressure drop should be limited to 0.18 psid (5" H_2O).

A pipe flange, weld collar, etc. may be used to connect the cannister adapter kit to the reservoir. Make sure that air is not able to leak around the adapter. When mounting on the side of the reservoir, make sure the installation is above the surface of the fluid.

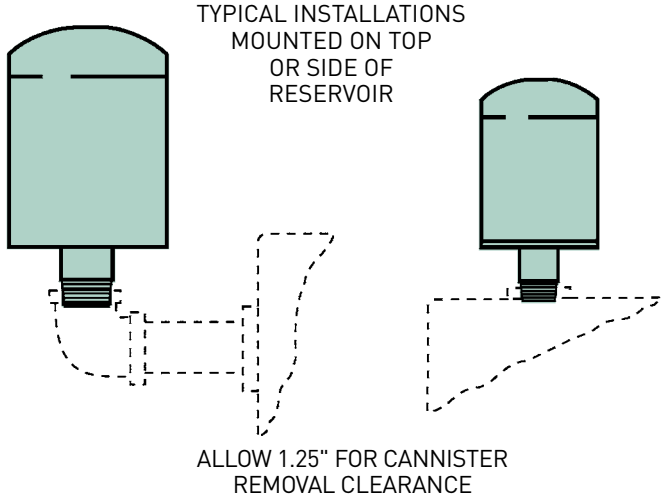
Recommended cannister change out is after 500 hours of operation. More frequent replacement may be required when operated in heavily contaminated areas such as grinding operations, primary metal mills, and on mobile equipment. Under such conditions, increase replacement frequency to every 250 hours.

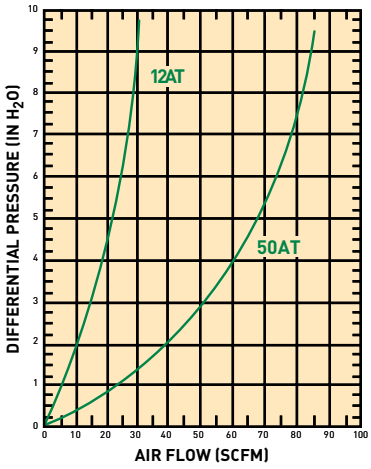
Model	Air Rating*	Element	Adapter Kit
12AT-03C	1 micron	926543	926876
12AT-10C	2 micron	921999	926876
12AT-25C	5 micron	925023	926876
50AT-03C	1 micron	926541	926875
50AT-10C	2 micron	926169	926875
50AT-25C	5 micron	926170	926875

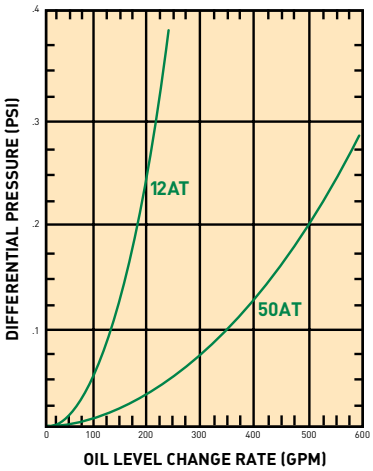
* 99% Removal efficiency for particles larger than the stated size in air.

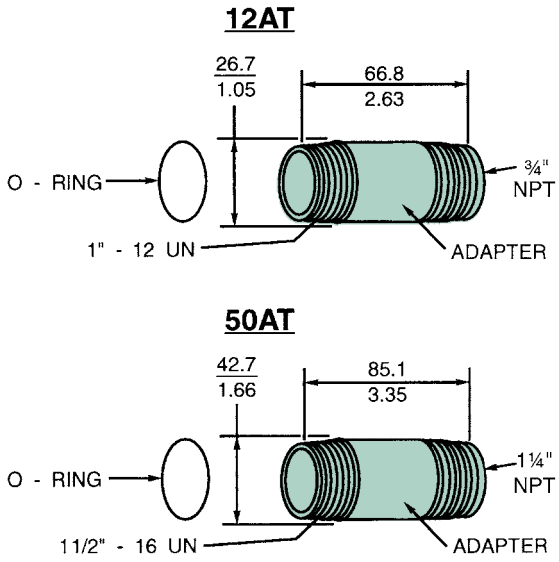
Graphs are for 03C cannisters only. Total pressure drop across cannister, adapter, and pipe may be found by adding pressure drops below:

+ 1.5% for each inch of 12AT adapter or 3/4" pipe used.
+ 3.0% for each 3/4" elbow used.
+ 1.0% for each inch of 50AT adapter or 1-1/4" pipe used.
+ 2.0% for each 1-1/4" elbow used.









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Metamora, OH

Filter Service

Filter cannisters need to be replaced when the pressure gauge reads the filter bypass setting. For example, if a 12AT filter has a 25 psi bypass valve, it needs to be replaced when the pressure gauge reads 25 psi. If no indicator of any kind is used, replace the cannister after the first 50 hours of operation, and every 250 hours thereafter. More frequent replacement could be required depending on operating conditions.

When servicing a 12AT or 50AT filter, use the following procedure:

A. Shut down the main system and release pressure in the filter line.
B. Unthread the cannister and discard it along with the accompanying seal. A strap wrench may be required.
C. Apply a small amount of lubricant to the new cannister seal.
D. Install the new cannister and hand tighten.

Accessory Parts List

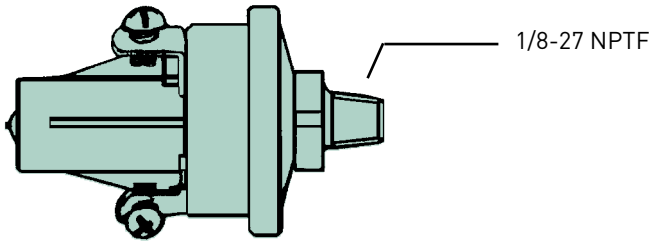
Description	12AT	50AT
Gauge - 15 psi	936911	936911
Gauge - 25 psi	936912	936912
Pressure switch-15 psi	926359	926359
Pressure switch-25 psi	926923	926923
Vacuum switch	926949	926949
Breather adapter kit	926876	926875
Vacuum gauge	936909	936909

Replacement Cannisters

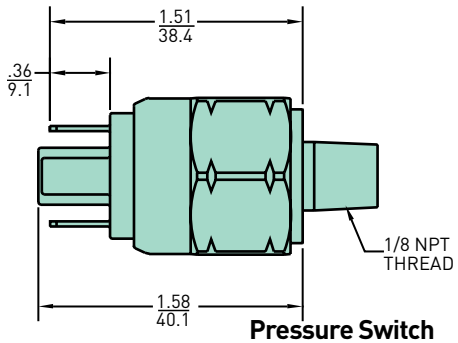
Media	12AT	50AT	50AT-2
25C	925023	926170	N/A
10C	921999	926169	927736
03C	926543	926541	N/A
20B	928764	928767	929446
10B	928763	928766	929445
03B	N/A	934200	932073

Indicator Gauge (15 PSI)

Indicator Gauge (25 PSI)



Vacuum Switch



Pressure Switch

Linear Measure = inches / mm

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

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
	50AT	2	10C	N	25	DD	N

BOX 1: Seals	
Symbol	**Description**
None	**Buna**

BOX 2: Basic Assembly	
Symbol	**Description**
12AT	**Spin-on (¾" nom.)**
50AT	**Spin-on (1¼" nom.)**

BOX 3: Length	
Symbol	**Description**
None	**Single length cannister**
2	Double length cannister (50AT only)

BOX 4: Cannister Media	
Symbol	**Description**
25C*	**Cellulose**
10C	**Cellulose**
03C*	Cellulose
20B	Microglass
10B	Microglass
03B **	Microglass

* Not available in 50AT-2
** Not available in 12AT

BOX 5: Indicator Symbol	
	Description
N	**None**

BOX 6: Bypass Setting	
Symbol	**Description**
25	**25 psid**
15	15 psid
3	3 psid
X	No bypass

BOX 7: Ports	
Symbol	**Description**
12AT	
BB	**3/4" NPTF**
MM	**SAE-12**
50AT	
DD	**1-1/4" NPTF**
OO	**SAE-20vv**

BOX 8: Gauge Port Location	
Symbol	**Description**
N	**None**
H	**Inlet and outlet, both sides (all ports drilled and tapped)**

NOTE: Gauges must be ordered separately.

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

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

PT Series

Tank Top Filters

PT Series
Disposable Filter Cartridge

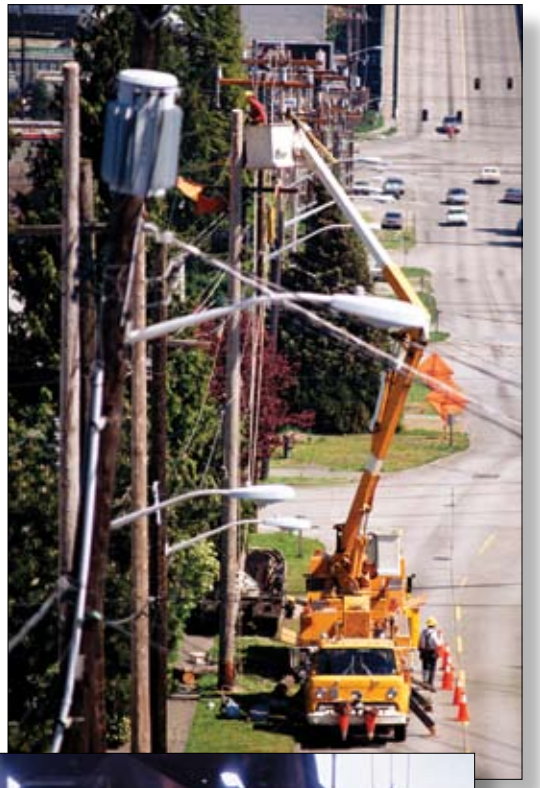
The new PT series filter is available in two diameters and three lengths for flow ranges from 5-50 gpm. The PT2 and PT4 filter cartridges utilize Microglass III media in 2, 5, 10 and 20 microns for the industry's best particle removal efficiency and retention.

This unique design simply threads into a ported tank ring, which can be welded to a metal reservoir or adapted for a plastic reservoir.

The disposable filter cartridge is a single-piece construction, which incorporates the nylon cover and integral 25 psi bypass valve. The flow path is inside-out and requires no special tools for service.

This concept assures minimal installation costs with the least space requirements for return line applications.

For more details or pricing information, please contact your local Parker distributor or the Hydraulic Filter Division at 1-800-253-1258.



The PT Series Filter combines high efficiency Microglass filtration with low cost installation featured in a new patented element design.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Plastic Tank Overview

Parker Hannifin Hydraulic Filter Division worked with a leading manufacturer of rotational molding custom-engineered parts to mold unique features into a rotationally molded hydraulic reservoir that accepts a PT Series disposable filter cartridge. The benefits of designing the new filter into your next rotationally molded reservoir include:

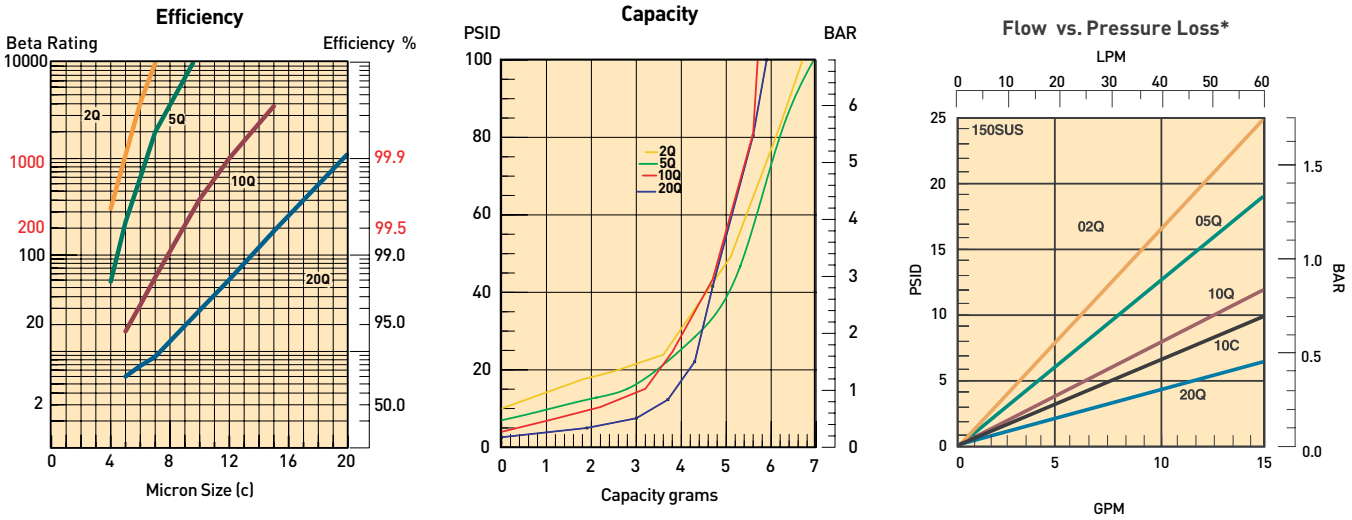
- Reduced installation and hardware costs
- Reduction of external space required for filter
- Flexible tank geometry found in the rotational molding process
- Multiple material choices (cross-linked polyethene, nylon 6 and nylon 11)
- Multiple port options
- Light weight

The PT Series filter concept, coupled with a custom rotationally molded tank, offers an innovative solution to meet your hydraulic system hardware needs.

The PT Series Filter combines high efficency microglass filtration with low cost installlation featured in a new patented element design. A hydraulic reservoir cutaway reveals the molded features that are incorporated into the design.

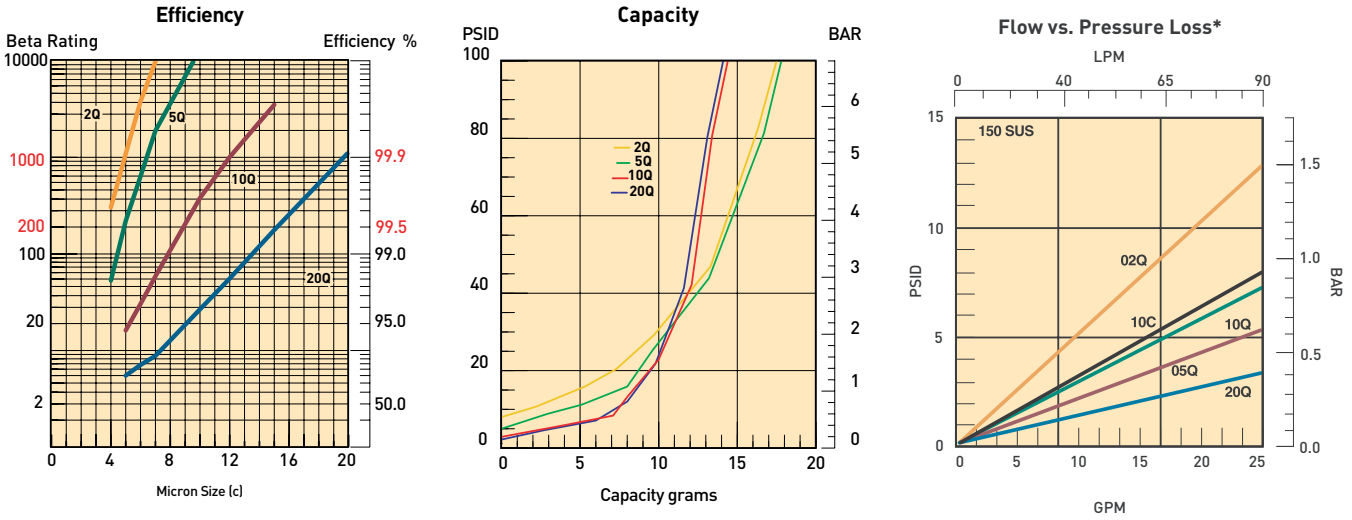
Performance Data

PT2-1 Element Performance



Results typical from Multi-pass tests run per test standard ISO 16889 @ 10 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

PT2-2 Element Performance



Results typical from Multi-pass tests run per test standard ISO 16889 @ 15 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

*Note: Pressure drop calculations are based on SAE-12 porting.

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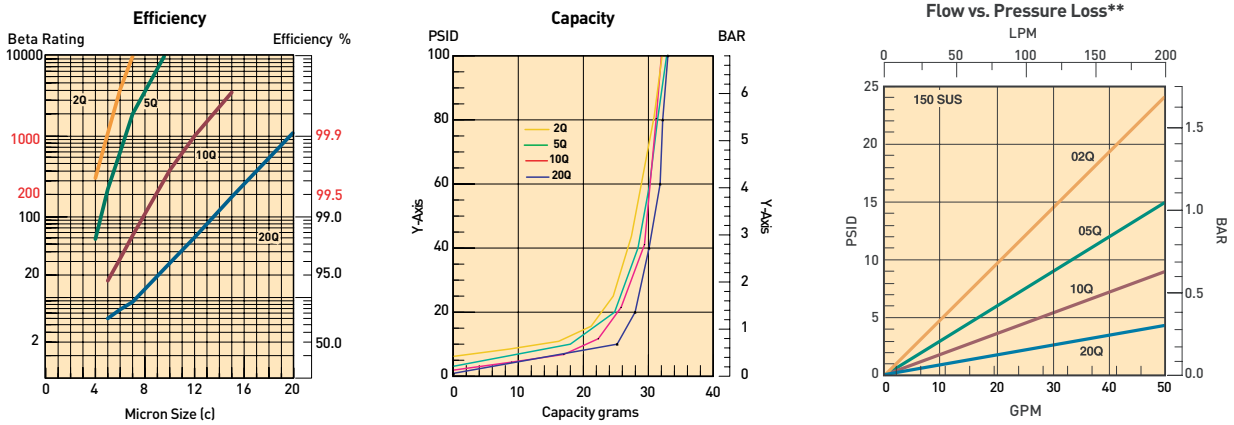
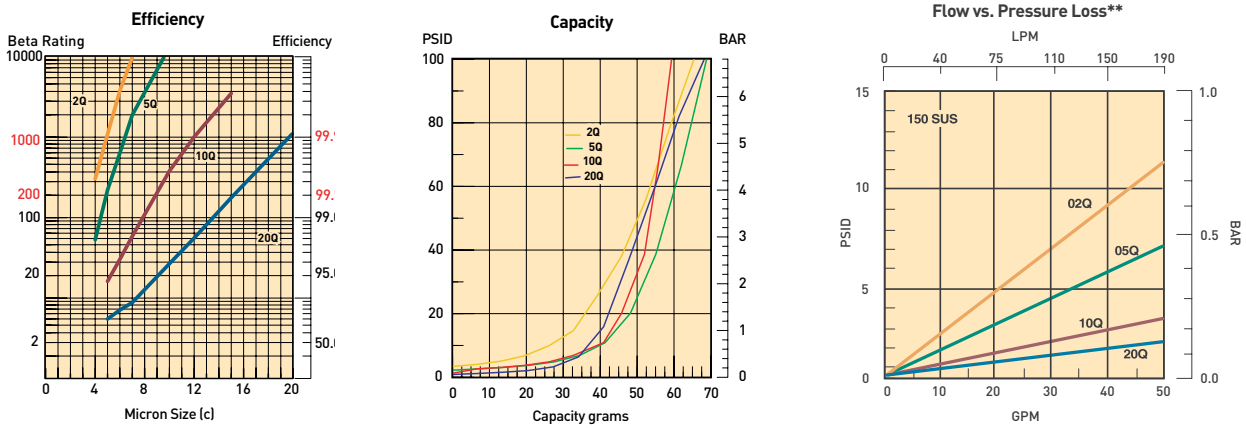
PT4-1 Element Performance



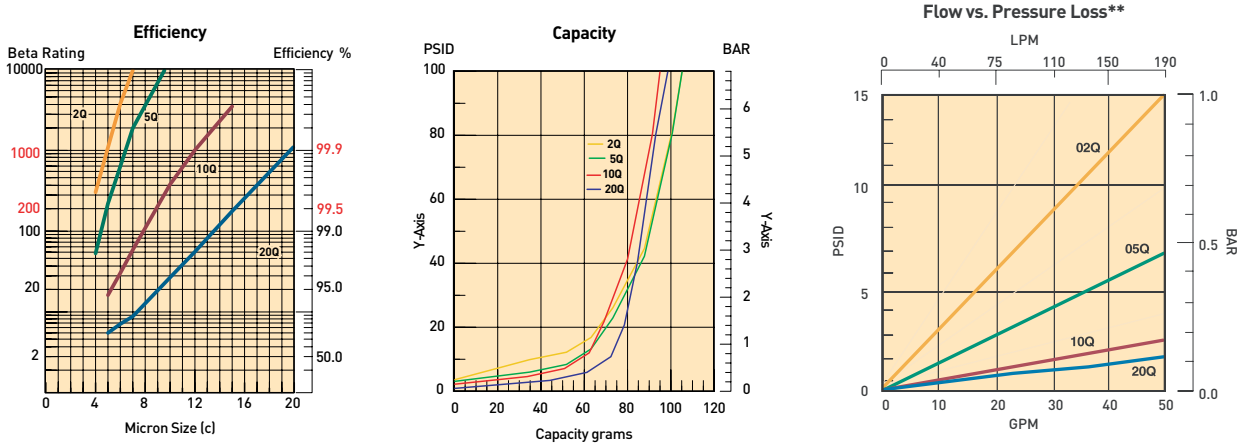
Results typical from Multi-pass tests run per test standard ISO 16889 @ 15 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

PT4-2 Element Performance



Results typical from Multi-pass tests run per test standard ISO 16889 @ 30 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

PT4-3 Element Performance



Results typical from Multi-pass tests run per test standard ISO 16889 @ 45 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

*Note: Pressure drop calculations are based on SAE-16 porting.

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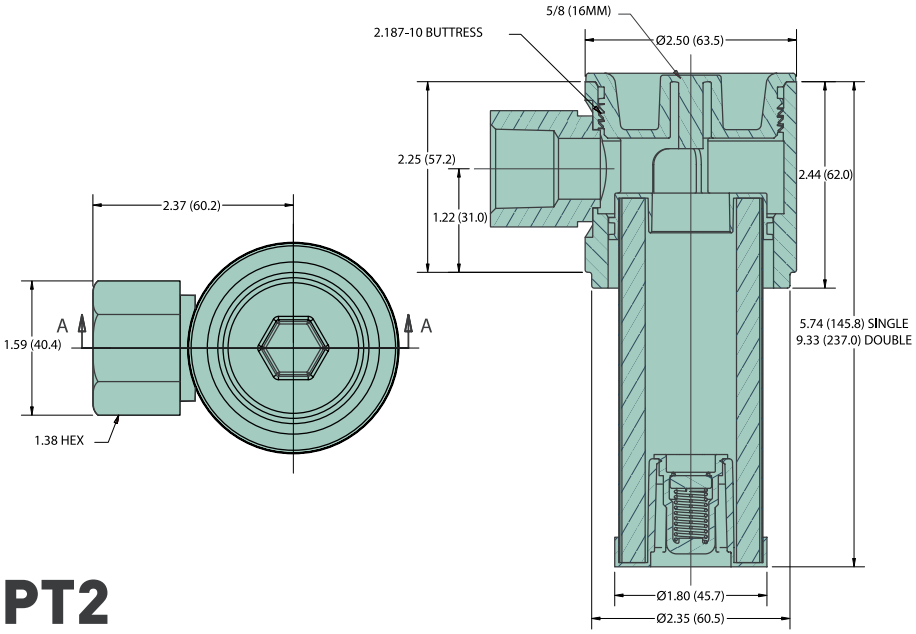
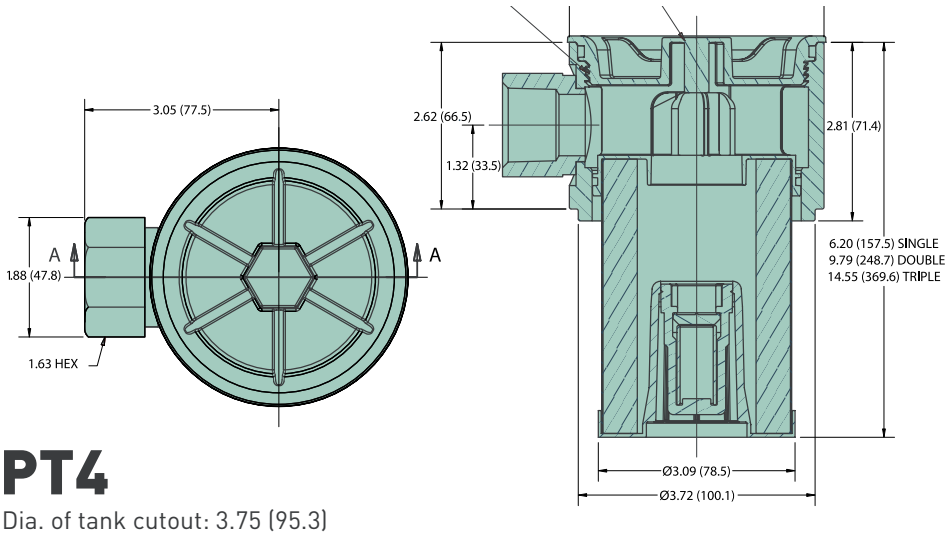


PT2

Dia. of tank cutout: 2:37 (60.2)

Linear messure: Inches (mm)



PT4

Dia. of tank cutout: 3.75 (95.3)

Ordering Information - Replacement Elements

Media	PT2-1	PT2-2	PT4-1	PT4-2	PT4-3
20Q	936753	936757	936745	936749	936879
10Q	936752	936756	936744	936748	936878
05Q	936751	936755	936743	936747	936877
02Q	936750	936754	936742	936746	936876

Tank Rings

Port Size	PT2	PT4
3/4" NPT	936929	–
1" NPT	–	936931
SAE 8	936941	–
SAE 12	936942	–
SAE 16	–	936943

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

KLT and KLS Series

Tank Top Return Line Filters

Tank Top Return Line Filters

KLT and KLS Series

Applications for KLT and KLS Filters

- Mobile Equipment
- Construction, Refuse
- Industrial Power Units
- Machine Tool
- Oil Field

Parker's new KLS /KLT Tank Top Return Line Filters are ideally suited for Mobile and Industrial high to medium flow return applications, from 30 to 120 GPM. This cost-effective, in-tank filter series provides maximum flow and dirt holding capacity for longer filter element life in a simple, easy-to-install-and-service assembly.

The generous element size with extensive media area ensures continuous filtration during cold start up conditions. The inside-to-out flow path with closed bottom provides additional assurance that all contaminants remain captured during element service removal.

The filters have a pressure rating of 150 psi static and a temperature range of -40˚F to 225˚F and are available in a wide range of high-efficiency Microglass III media in 2, 5, 10 and 20 micron for all system cleanliness requirements. Bypass valves are built into the element to ensure further performance integrity. A new bypass is provided with each element change.

This rugged design meets the needs for the demanding applications in mobile off -highway and on-highway applications for construction equipment, logging, refuse vehicles, mining, oil and gas recovery, marine, and industrial power units.

Feature	Advantage	Benefit
• Tank top mounted filter	• Saves space and reduces mounting hardware	• Lower cost, easy to integrate • KLS model directly retrofits competitive housing
• Two-piece head and element construction perforated with metal outer wrap	• No bowl required • Provides excellent flow diffusing, eliminating aeration	• Reduced cost and assembly weight • Improves performance
• High efficiency Microglass III media maximizing filtration area	• Combines high particle capture efficiency with high dirt holding capacity and lower ΔP	• Cleaner fluids, longer lasting with fewer service intervals • Continuous filtration for cold start ups • Lower operating costs
• Element design includes integral disposable bypass valve with closed bottom end cap	• New bypass with each element change • Ensures captured contaminants are removed with each element change	• Ensures reliable bypass performance • No leakage • Cleaner fluids reduce risk for contamination during service
• Magnetic prefiltration	• Removes large ferrous contaminants	• Extends element life • Visual indication of component wear
• Fill and gauge ports	• Add fluid through high performance filter media • Gauge ports allow for added instrumentation	• Initial fluid integrity extends system component life • Monitor element life

Specifications: KLT/KLS

Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 150 psi (10.3 bar)

Operating Temperatures:
-40°F (-40°C) to 225°F (107°C)

Element Burst Rating:
150 psid (10.3 bar)

Filtration Rating:
2, 5, 10 & 20 Microns at Beta ≥ 200

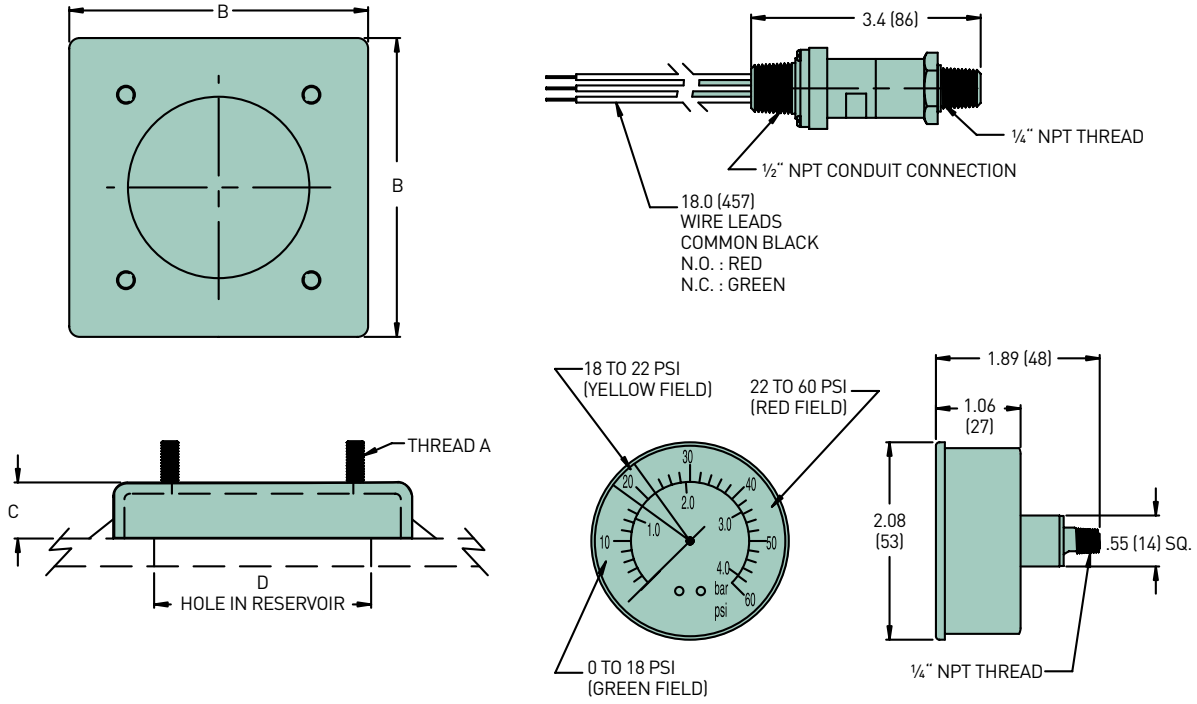
Element Condition Indicators:
Gauge: 0-60 psi color coded
Switch: SPDT 5A @ 24 VDC and 250 VAC

Materials:
Head & Cover: Cast Aluminum Alloy
Bypass Valve: Nylon
Filter Media: Microglass III
Element End Caps: Nylon

Weights (approximate):

KLT-2	3 lbs.	(1.36 kg)
KLT-4	4 lbs.	(1.81 kg)
KLT(S)-7	8 lbs.	(3.63 kg)
KLT(S)-8	10 lbs.	(4.54 kg)

KLT Weld Plate Drawings



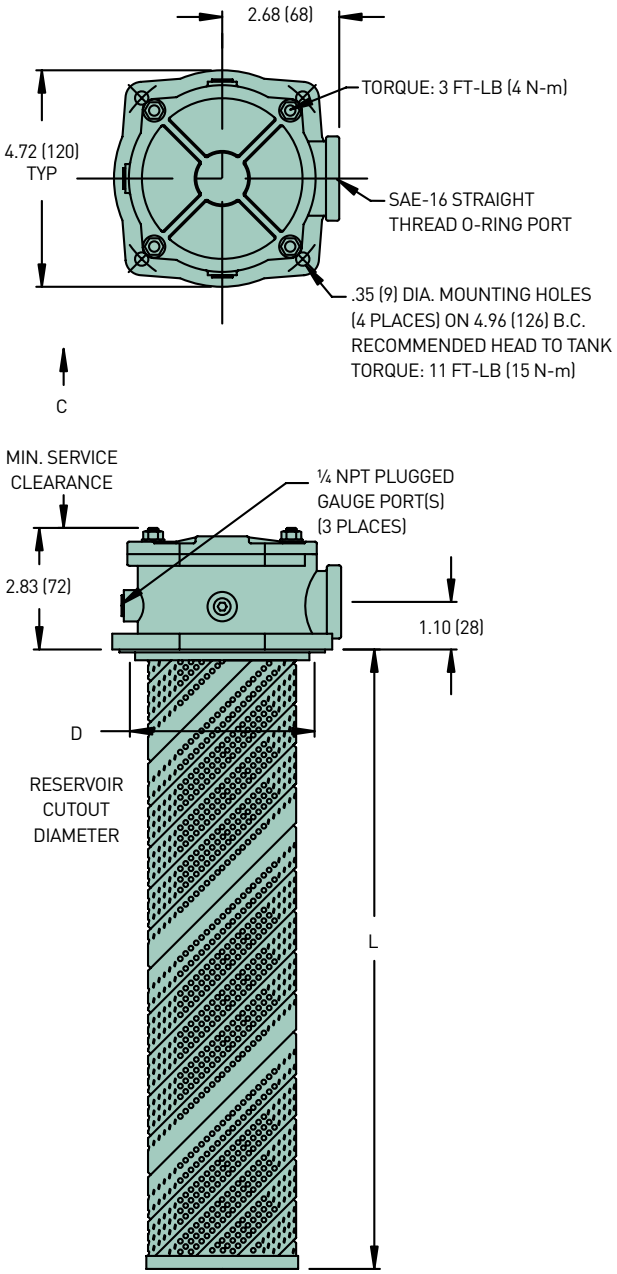
Linear Measure: inch (mm)

Dimensions	KLT Filter Model	
	KLT-2/KLT-4	KLT-7/KLT-8
A	5/16-18 UNC-2A	3/8-16 UNC-2A
B	5.33 (135)	7.15 (182)
C	1.00 (25)	1.00 (25)
D	4.50/3.75 (114/95)	6.25/5.50 (159/140)

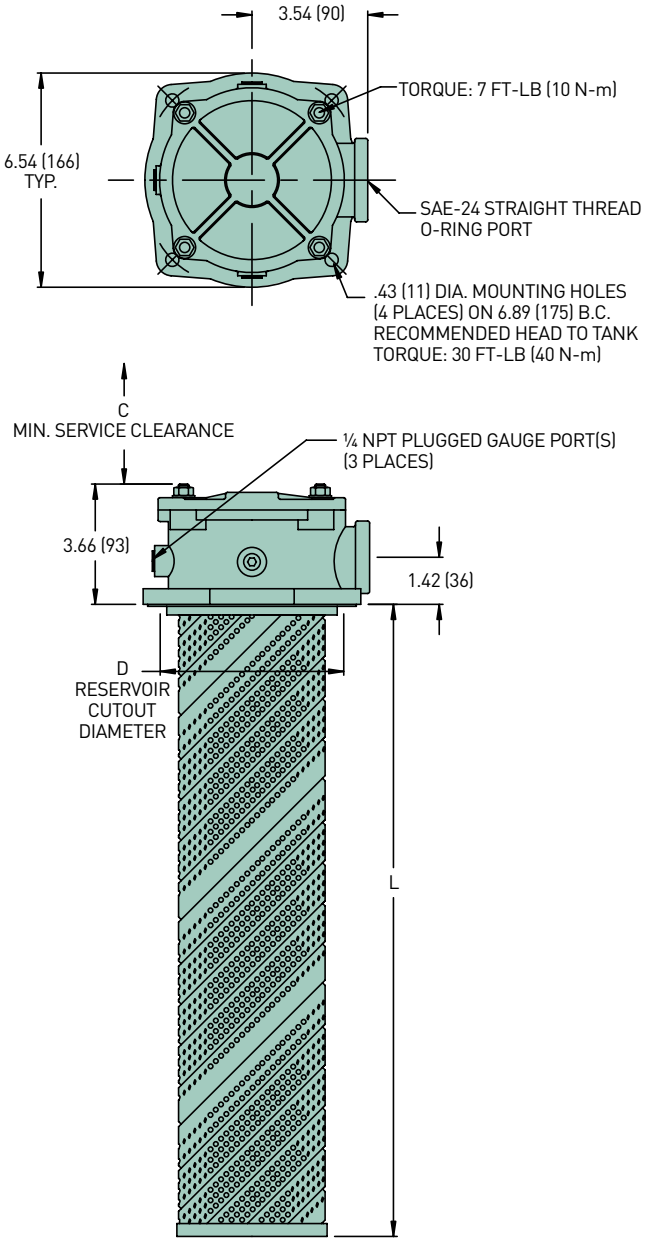
Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

KLT Drawings

KLT 2 / KLT 4



KLT 7 / KLT 8



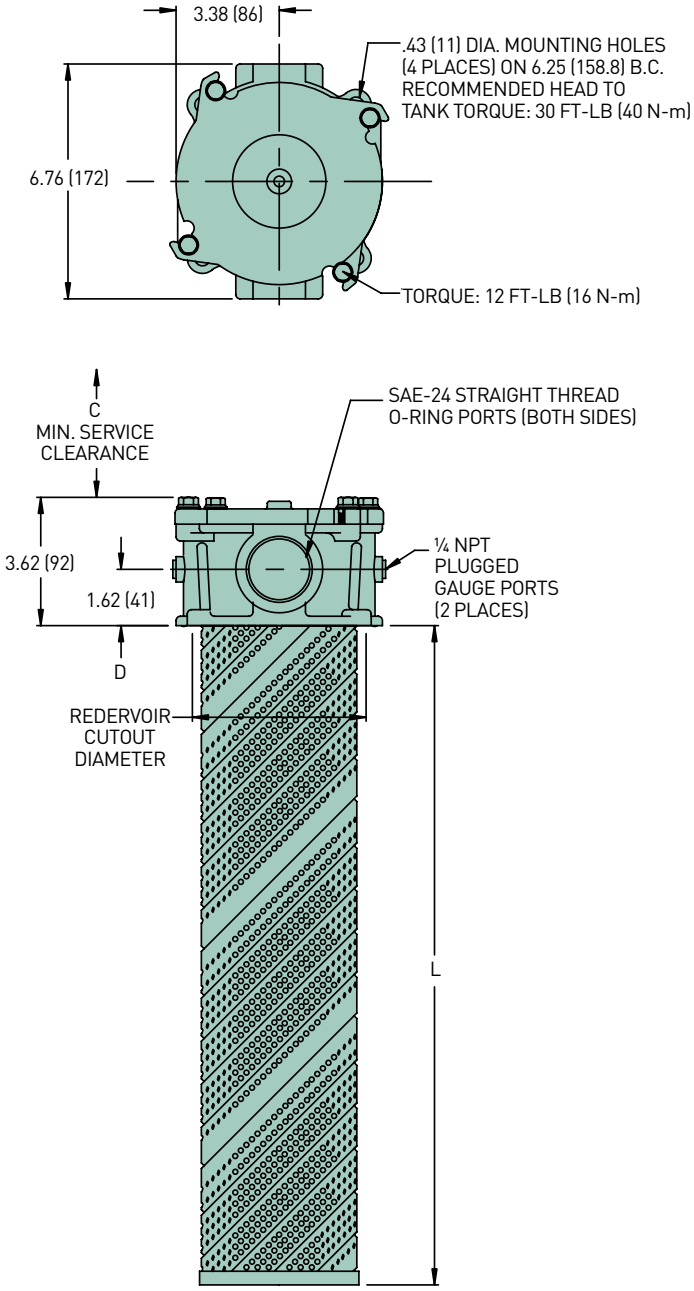
Dimensions	KLT Filter Model	
	KLT-2	KLT-4
C	5.75 (146)	9.50 (241)
L	4.16 (106)	7.75 (197)
D	3.6/3.56 (93/90)	

Dimensions	KLT Filter Model	
	KLT-7	KLT-8
C	13.00 (330)	19.25 (489)
L	11.46 (291)	17.70 (450)
D	5.36/5.26 (136/133)	

Linear Measure: inch (mm)

KLS Drawing

KLS 7 / KLS 8

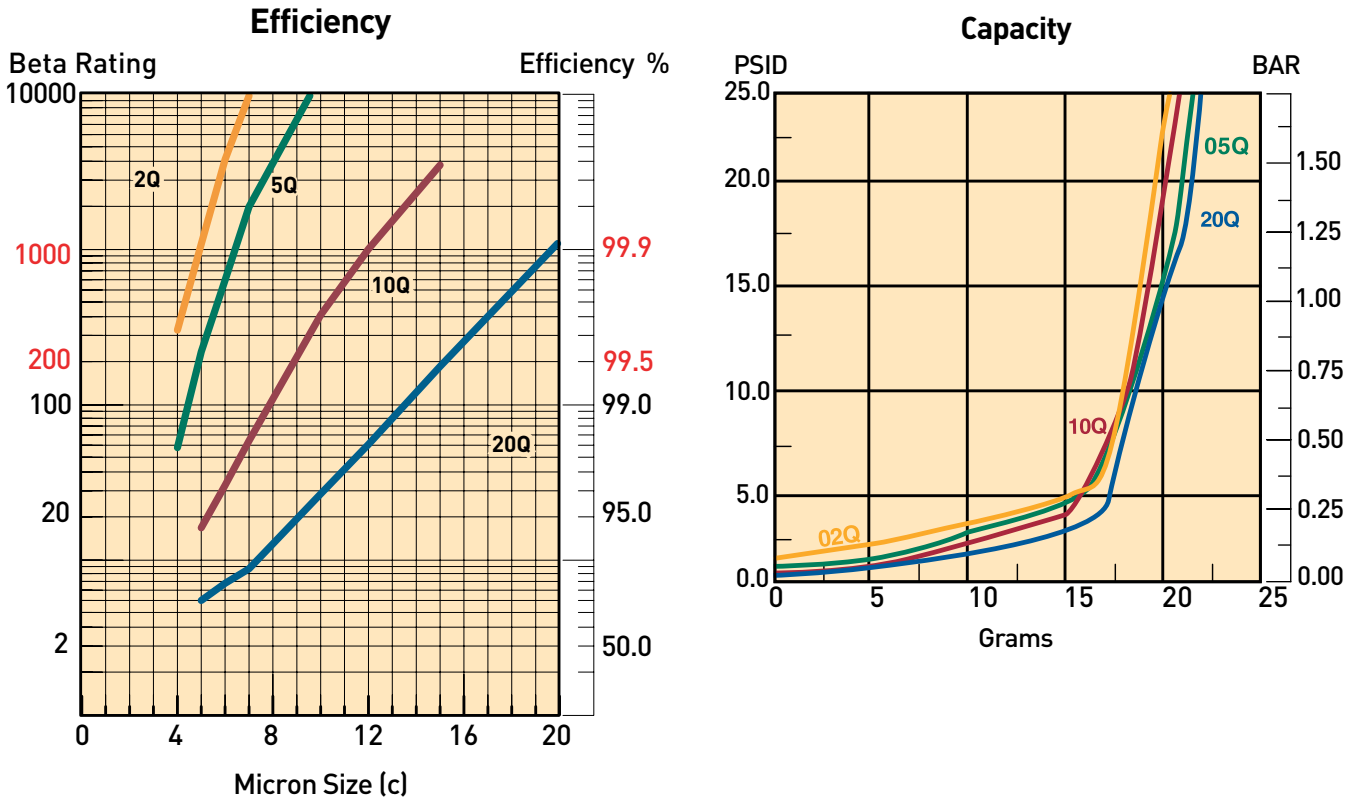


Dimensions	KLS Filter Model	
	KLS-7	KLS-8
C	13.00 (330)	19.25 (489)
L	11.46 (291)	17.70 (450)
D	5.00/4.80 (127/122)	

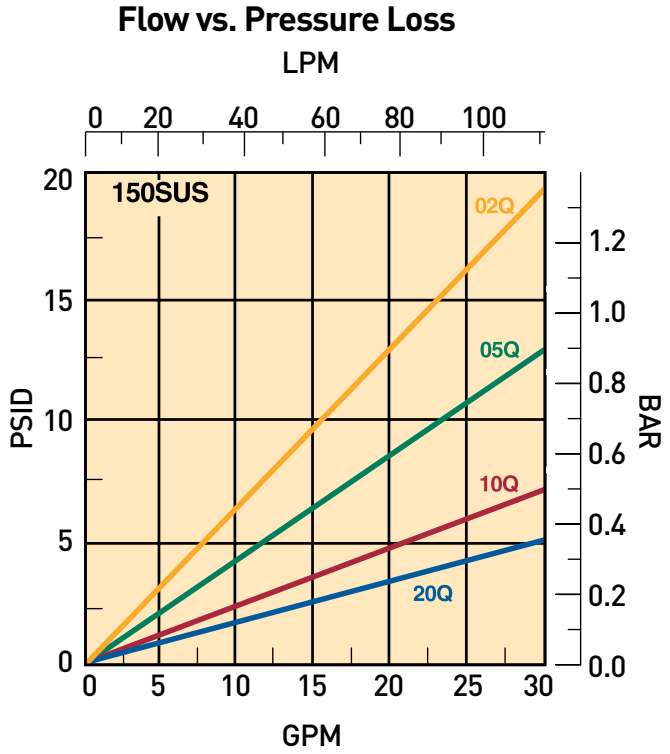
Linear Measure: inch (mm)

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

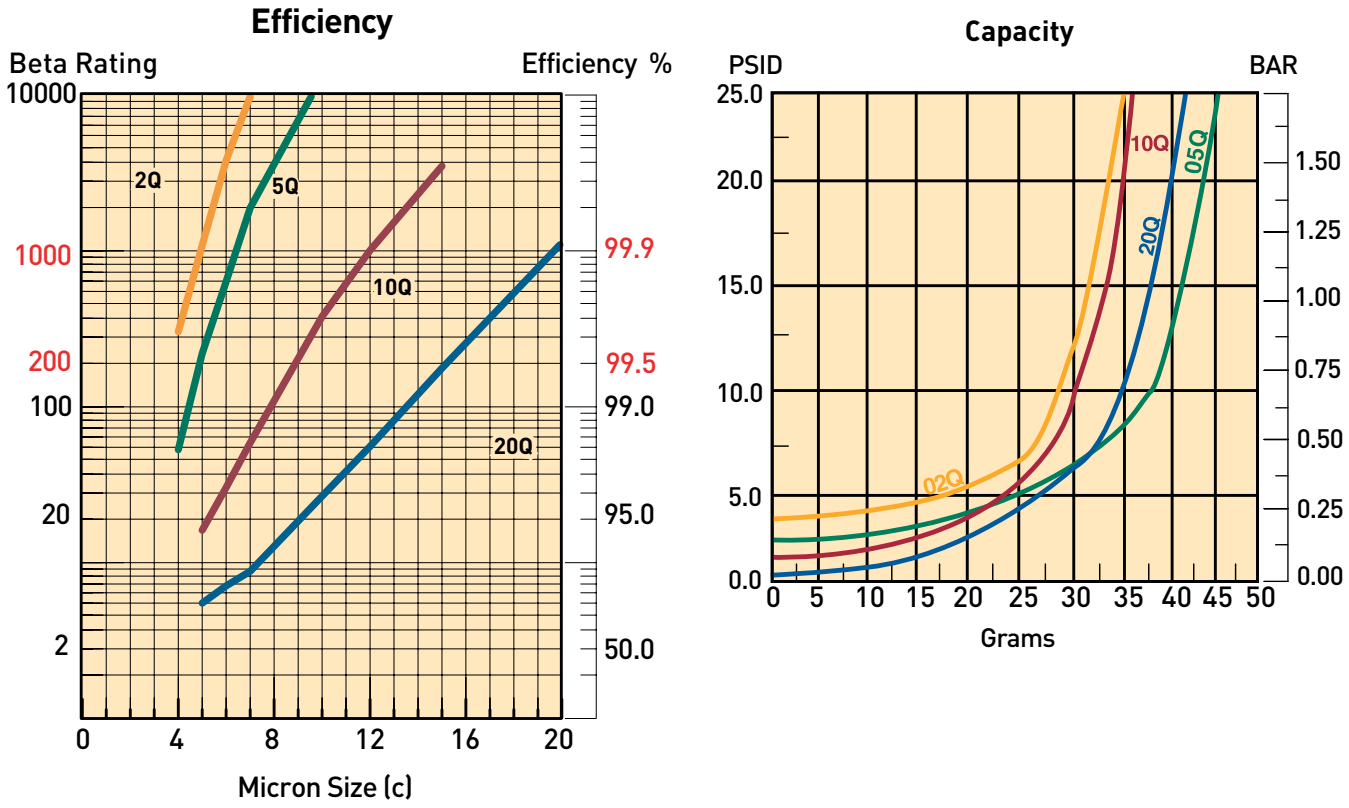
KLT-2 Element Performance



Multipass tests run @ 15 gpm to 25 psid terminal - 10 mg/L BUGL

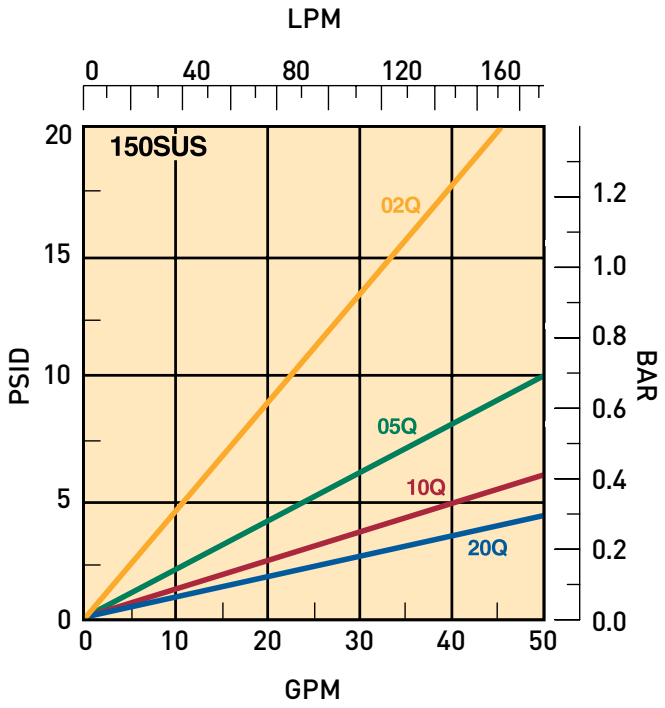


KLT-4 Element Performance

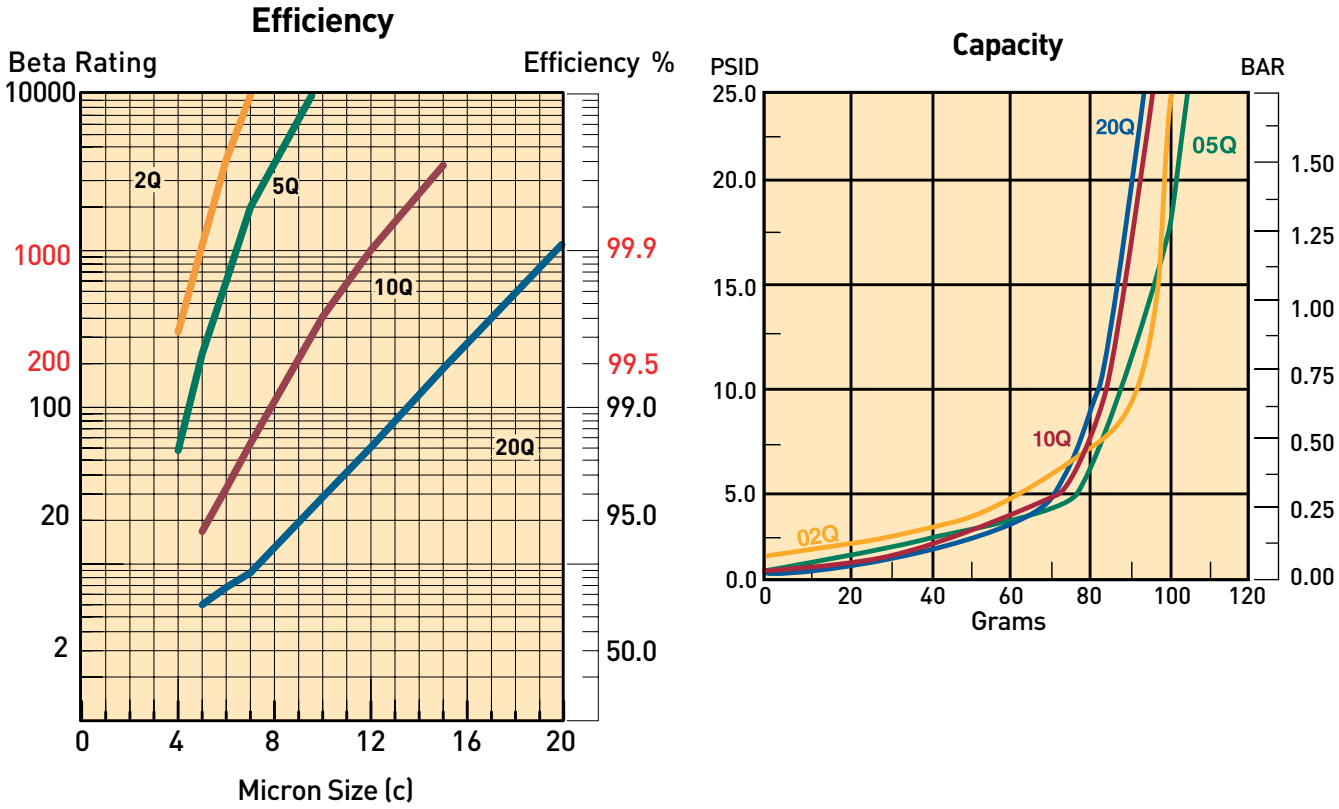


Multipass tests run @ 30 gpm to 25 psid terminal - 10 mg/L BUGL

Flow vs. Pressure Loss

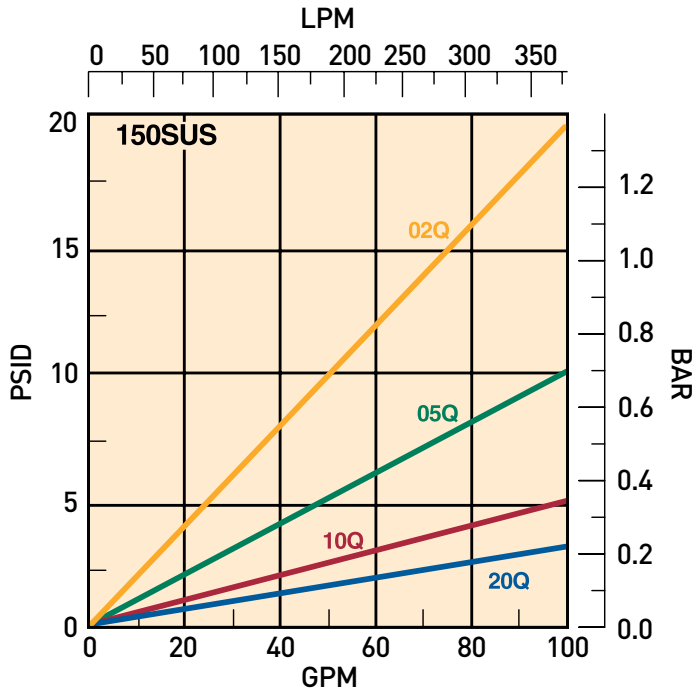


KLT/S-7 Element Performance

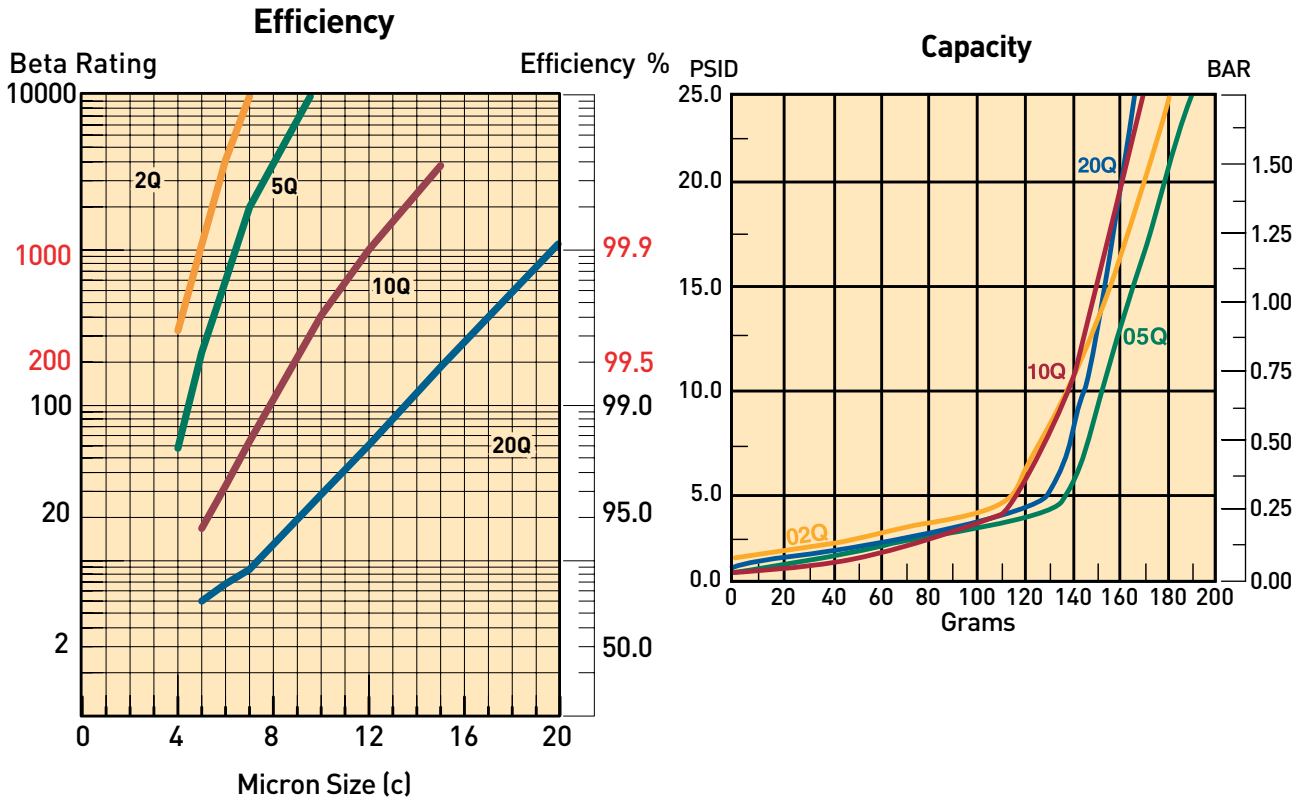


Multipass tests run @ 50 gpm to 25 psid terminal - 10 mg/L BUGL

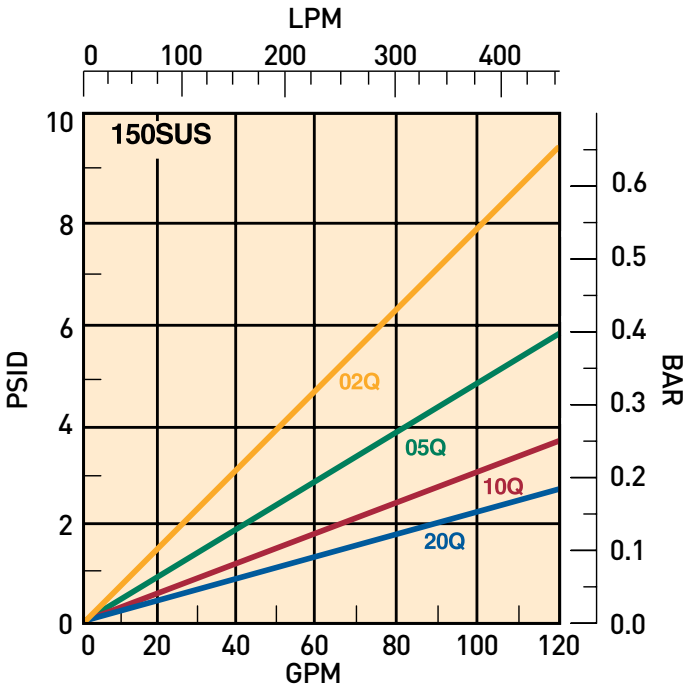
Flow vs. Pressure Loss



KLT/S-8 Element Performance



Multipass tests run @ 70 gpm to 25 psid terminal - 10 mg/L BUGL



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Operating and Maintenance Instructions Model KLT and KLS Tank Top Filters

A. Mounting

1. Standard mounting.
   a. Cut proper size hole in the top of the reservoir.
   b. Drill holes for studs within the proper bolt circle.
   c. Set the filter into the cutout hole and secure with proper size bolts, nuts and lock washers.
   d. Torque nuts in accordance with drawing.
2. Mounting procedure using weld plate.
   a. Rough cut proper size hole in the top of reservoir.
   b. Weld the weld plate concentric to the rough cut hole.
   c. Mount the filter onto the studs and secure with nuts and lock washers.
   d. Torque nuts in accordance with drawing.
3. Utilize proper fittings.

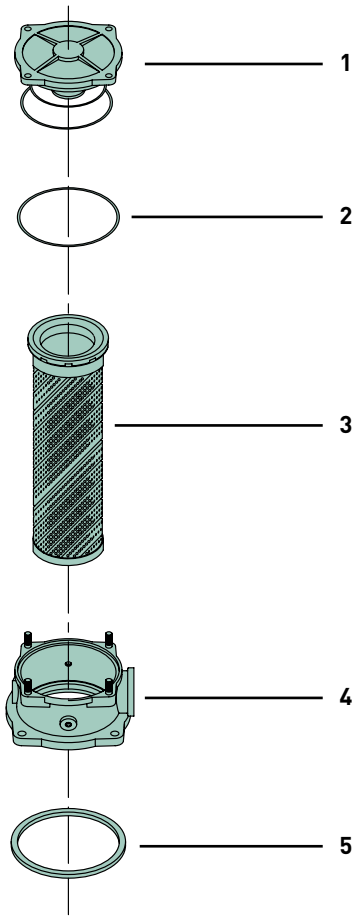
B. Start-Up

1. Check for and eliminate leaks upon system start-up.
2. Check differential pressure indicator, if installed, to monitor element condition.

C. Service

1. An element must be serviced when the indicator indicates service is required.

NOTE: If the filter is not equipped with an indicator, the element should be serviced according to machine manufacturer's instructions.



Parts List

Index	Description	Part Number	Quantity
1	Cover Assembly (Includes Cover O-Ring)		
	KLT2/KLT4	937049	1
	KLT7/KLT8	937047	1
	KLS7/KLS8	937048	1
2	Cover O-Ring		
	KLT2/KLT4, Nitrile	N72239	1
	KLT2/KLT4, FKM	V72239	1
	KLT7/KLT8, Nitrile	N72251	1
	KLT7/KLT8, FKM	V72251	1
	KLS7/KLS8, Nitrile	N72251	1
	KLS7/KLS8, FKM	V72251	1
3	Element (See Model Code Page)		
4	Filter Head (Includes Gauge Plugs & Studs)		
	KLT2/KLT4	5841216	1
	KLT7/KLT8	5841224	1
	KLS7/KL8	937318	1
5	Tank Gasket		
	KLT2/KLT4	108x98x5.5B	1
	KLT7/KLT8	152x136x6B	1
	KLS7/KLS8	N72355	1
Not Shown	Weld Plate		
	KLT2/KLT4	300041	1
	KLT7/KLT8	300042	1
	KLS7/KLS8	C.F.	1
Not Shown	Pressure Switch	NS-1C-19R/EL	1
Not Shown	Pressure Gauge	936913	1

C.F. = Consult Factory

D. Servicing Dirty Element

1. Shut system down to assure that there is NO PRESSURE OR FLOW into the filter housing.
2. Remove the filter cover.
3. Remove and discard the contaminated element cartridge.

E. Before Installing a New Element Cartridge

1. Clean the magnetic core with a lint-free cloth.
2. Check all seals and replace if necessary.

G. To Install a New Element Cartridge

3. Lubricate all seals.
4. Mount new or cleaned filter cartridge.
5. Re-install the cover.
6. Torque the cover nuts per drawing.

Perform procedures B1 and B2 to ensure no leaks are present.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

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
KLT	7	10Q	B	P	G	S24	1

BOX 1: Filter Series

Symbol	Description
KLT	Single Port Return-Line Filter
KLS	Dual Port Return-Line Filter (230 & 300 only)

BOX 2: Model

Symbol	Description
2	30 GPM (115 l/m) nominal flow
4	50 GPM (190 l/m) nominal flow
7	100 GPM (380 l/m) nominal flow
8	120 GPM (455 l/m) nominal flow

BOX 3: Media Code

Symbol	Description
02Q	Microglass III, 2 micron
05Q	Microglass III, 5 micron
10Q	Microglass III, 10micron
20Q	Microglass III, 20micron
WR	Water Removal

BOX 4: Seals

Symbol	Description
B	Nitrile
V	Fluorocarbon

*Note: Nitrile tank gasket always supplied.

BOX 5: Indicator

Symbol	Description
P	No indicator; plugged pressure port(s)
G	Pressure Gauge, 0-60 PSIG
S	Pressure Switch

BOX 6: Bypass

Symbol	Description
G	25 PSI (1.7 bar) setting

BOX 7: Port

Symbol	Description
KLT-2/4	
S16	SAE-16 (1 5/16"-12)
KLT-7/8	
S24	SAE-24 (1 7/8"-12)
KLS-7/8	
S24	2 x SAE-24 (1 7/8"-12)

BOX 8: Options

Symbol	Description
1	None
TP	Weld Plate (KLT only)

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

Replacement Elements

Element Code	Nitrile				Fluorocarbon			
	2	4	7	8	2	4	7	8
20Q	936967Q	936971Q	936975Q	936979Q	937269Q	937273Q	937277Q	937281Q
10Q	936966Q	936970Q	936974Q	936978Q	937268Q	937272Q	937276Q	937280Q
05Q	936965Q	936969Q	936973Q	936977Q	937267Q	937271Q	937275Q	937279Q
02Q	936964Q	936968Q	936972Q	936976Q	937266Q	937270Q	937274Q	937278Q
WR	937258	937259	937260	937261	C.F.	C.F.	C.F.	C.F.

C.F. = Consult Factory

Replacement Cover Kits

Cover Kit		
Assembly/Model		P/N
KLT	2/4	937049
	7/8	937047
KLS	7/8	937048

Notes

Moduflow™ *Plus* Series

ILP and RFP Low Pressure Filters

Applications for Moduflow Filters

- Power Unit Fabrication
- Off-line Filter Loops
- Mobile Equipment

The Moduflow filter is widely considered the most versatile filter available on the market. The unique diverter valve assembly, and inside to outside flow through the element, allows the Moduflow to be configured for in-line, in-tank or suction filtration.

The flow diverter minimizes turbulence and pressure loss through the filter, improving system performance.

The newly designed closed bottom elements for the RFP and ILP models insures all contamination remains trapped within the element as the filter is serviced.

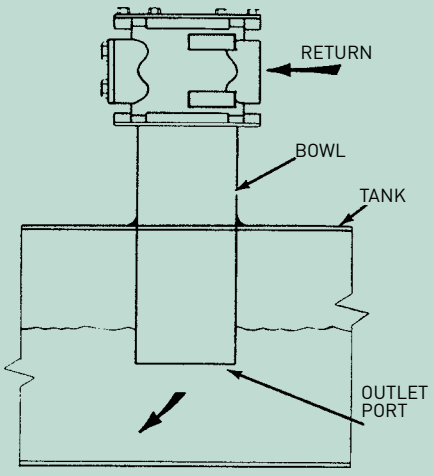
A wide variety of visual and electrical indicators allows you to know exactly when the element needs to be serviced. There is even a "no element" indicator that can sense when there is not an element installed in the filter.

From top to bottom, the Moduflow filter series provides the high level of filtration and long term dependability so vital to today's hydraulic systems.

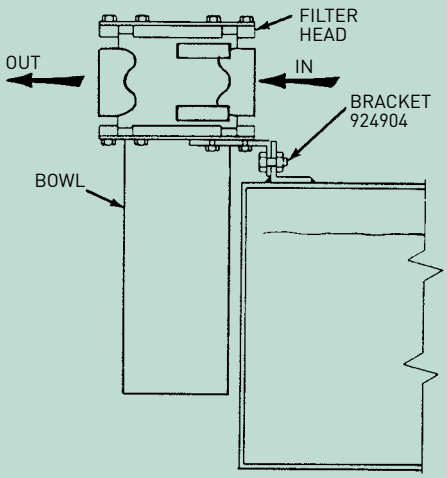
Parker's new patented Moduflow element was designed with built-in diverter cone and bypass valve, to meet your application needs.

Mounting / Porting Styles

RFP Return Filter



ILP In-Line Filter



Features

Flanges
- NPT or SAE ¾" to 2"
- Lightweight aluminum

Cover
- Slotted for quick release
- Lightweight aluminum

Indicators
- Visual or electrical
- Mounted on either side
- Standard "no element" indication

Bowl
- Single or double length
- Durable steel construction

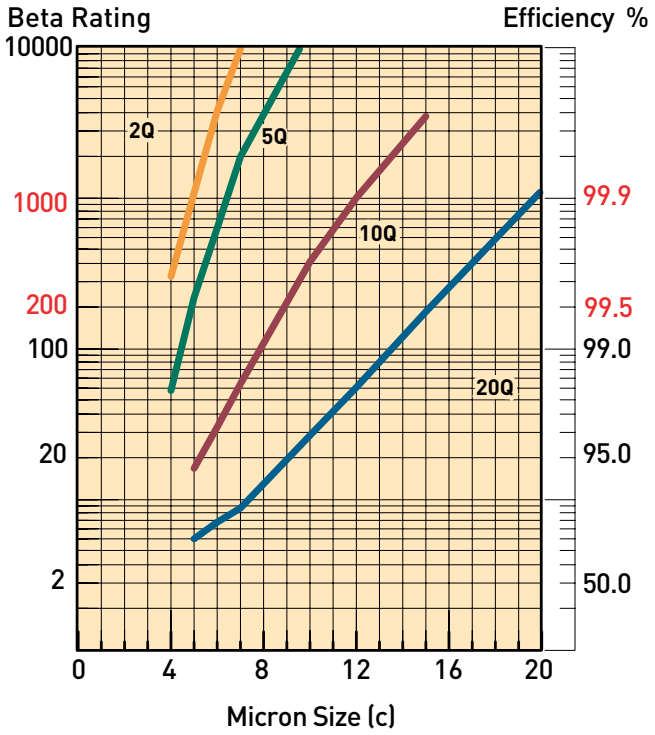
Bypass
(not visible)
- Integral 35 psi bypass replaced with every element change

Element
(not visible)
- Available in cellulose, wire mesh or high performance Microglass III media
- Single or double length

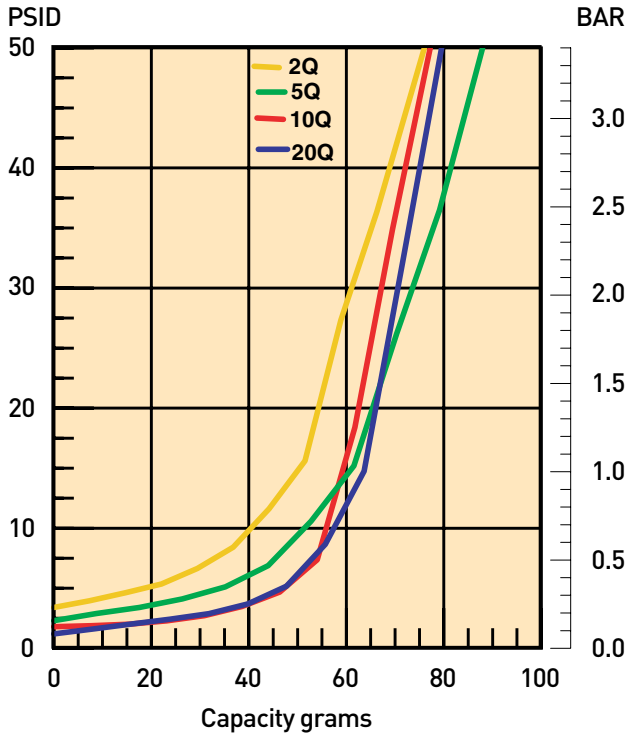
Feature	Advantage	Benefit
• Top access element service	• Oil remains in housing • Quicker elements change	• No Spills • Reduced maintenance costs
• Slotted cover	• Quick release cover • Cap screws remain in housing	• Reduced maintenance costs • No loose parts to lose
• Closed bottom elements	• Removes all contaminant during element service	• No downtime contamination from servicing
• Visual or electrical indicators	• Know exactly when to service elements	• Helps prevent bypass condition • No premature disposal
• Flange face ports	• Flexible mounting (3/4" to 2")	• Easy plumbing to your system

RFP-1 & ILP-1 Element Performance

Efficiency

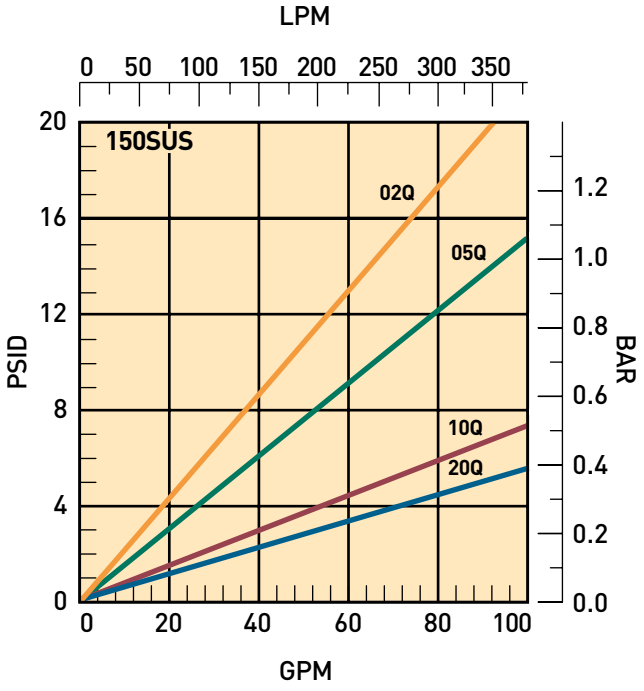


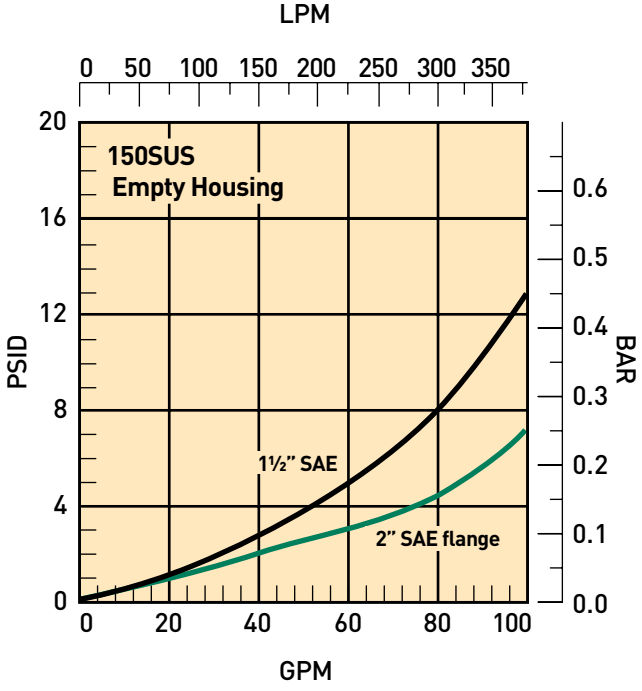
Capacity



Multipass tests run @ 40 gpm to 50 psid terminal - 5mg/L BUGL

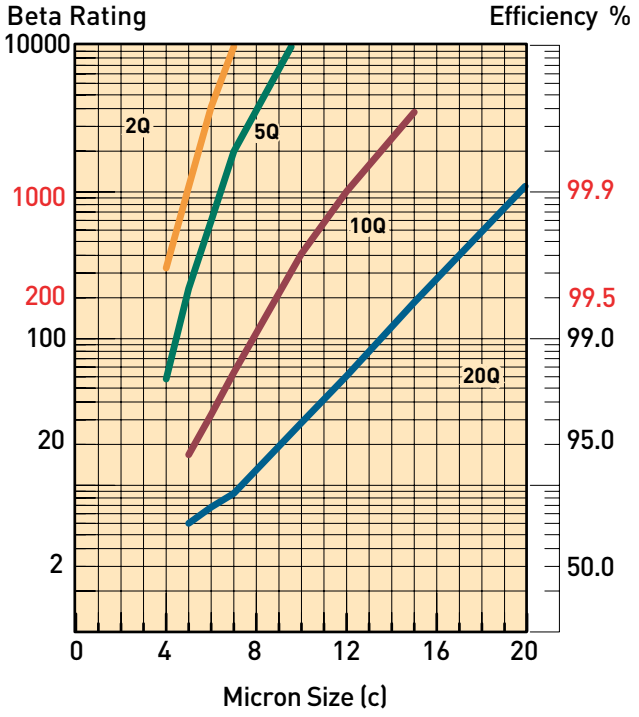
Flow vs. Pressure Loss



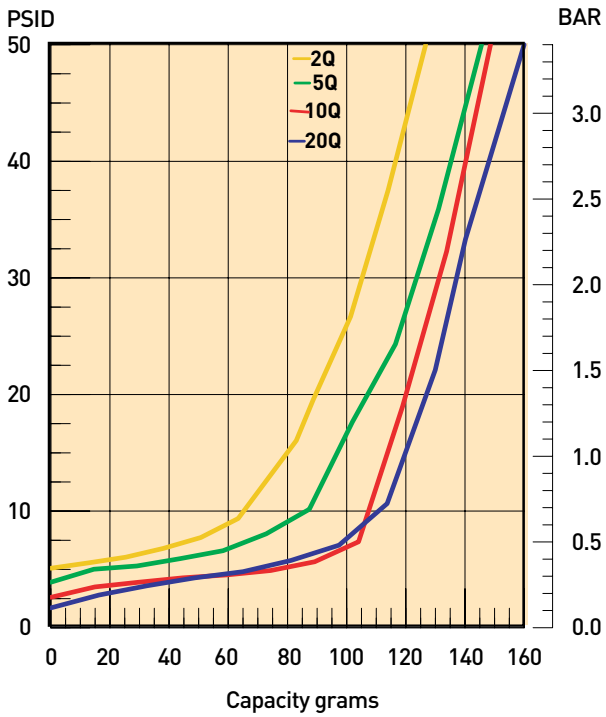


RFP-2 & ILP-2 Element Performance

Efficiency

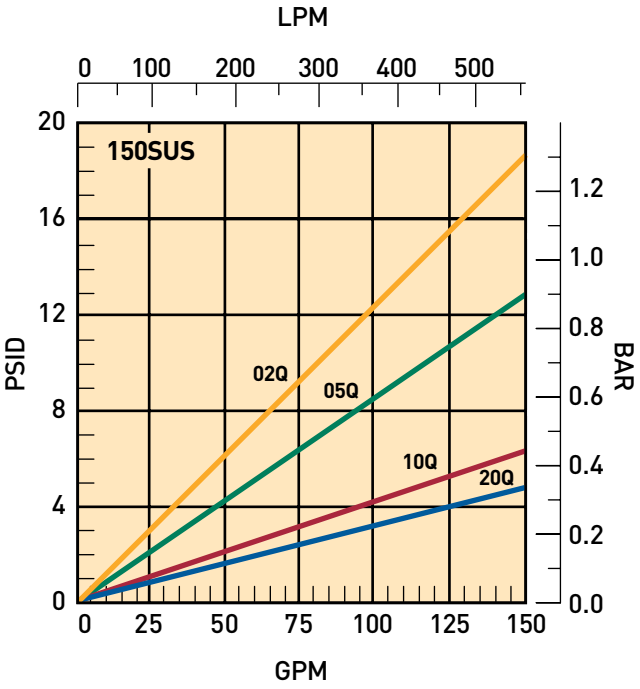


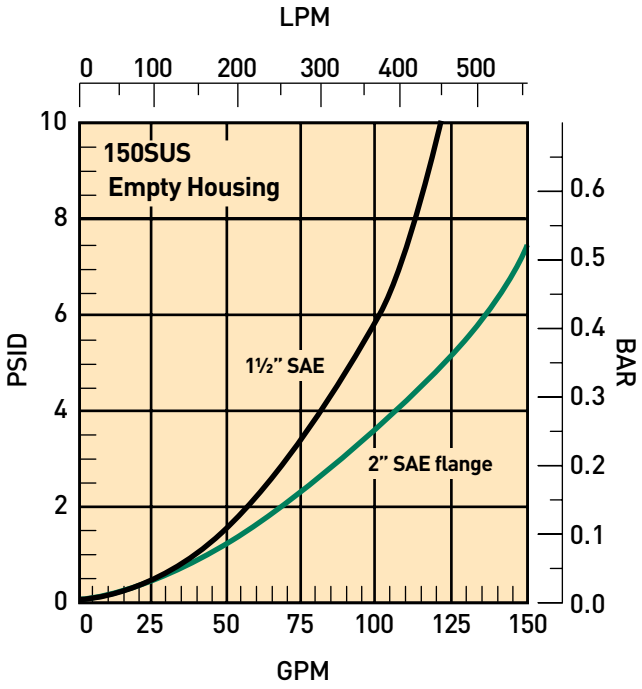
Capacity



Multipass tests run @ 80 gpm to 50 psid terminal - 5mg/L BUGL

Flow vs. Pressure Loss





Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Specifications: RFP, ILP

Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 200 psi (13.8 bar)
Design Safety Factor: 2:1
Rated Fatigue Pressure: 150 psi (10.3 bar)

Element Burst Rating: 70 psid (4.8 bar)

Filter Materials:
Head, Cover, Flanges: die cast aluminum
Bowl: steel

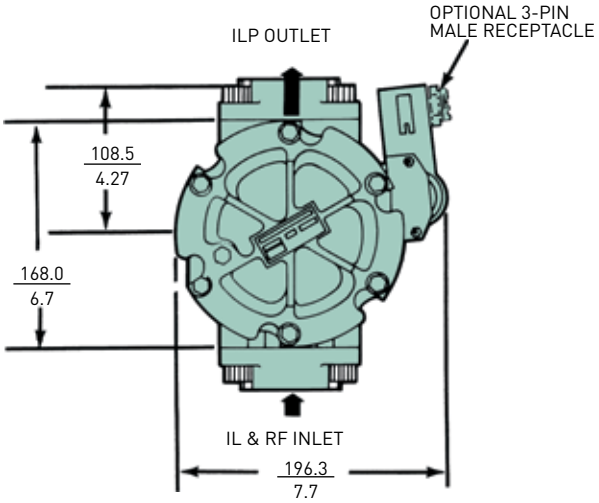
Operating Temperatures:
Nitrile: -40°F to 225°F (-40°C to 107°C)
Fluorocarbon: -15°F to 275°F (-26°C to 135°C)

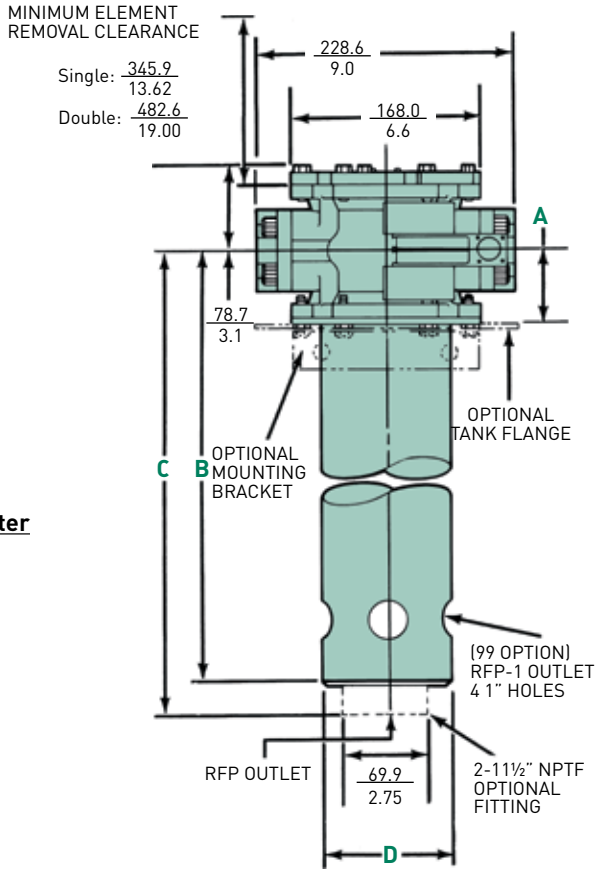
Weight (approximate):
Single: 20 lbs. (9.1 kg)
Double: 25 lbs. (11.3 kg)

Indicators:
Visual (optional)
Electrical (optional) 15A @ 250VAC / .5A @ 125 VDC
Electrical ("D" option) 5A @ 250VAC / 3A @ 28 VDC

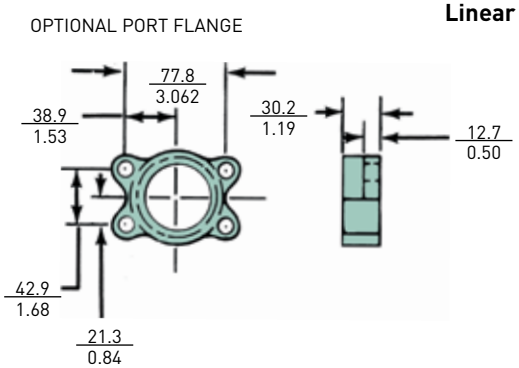
Color Coding:
White (normally closed)
Red (normally open)
Black (common)

	Dimensions: mm / inch			
Model	**A**	**B**	**C**	**D**
RFP-1 without optional 2" fitting	65.0 / 2.56	330.2 / 13.0	–	110.0 / 4.3
ILP-1	65.0 / 2.56	330.2 / 13.0	N/A	110.0 / 4.3
RFP-1 with optional 2" fitting	68.3 / 2.69	–	383.4 / 15.07	114.0 / 4.5
RFP-2	68.3 / 2.69	617.5 / 24.31	623.8 / 24.56	114.0 / 4.5
ILP-2	68.3 / 2.69	617.5 / 24.31	N/A	114.0 / 4.5





Linear Measure: millimeter / inch



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Specifications: DILP

Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 200 psi (13.8 bar)
Design Safety Factor: 2:1
Rated Fatigue Pressure: 150 psi (10.3 bar)

Element Burst Rating: 70 psid (4.8 bar)

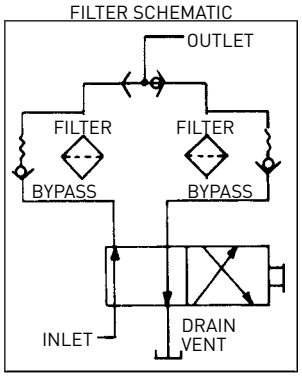
Filter Materials:
Diverter Valve Assembly: die cast aluminum
Check Valve Assembly: die cast aluminum
Filter Assembly: see IL2 specifications

Operating Temperatures:
Nitrile: -40°F to 225°F (-40°C to 107°C)
Fluorocarbon: -15°F to 275°F (-26°C to 135°C)

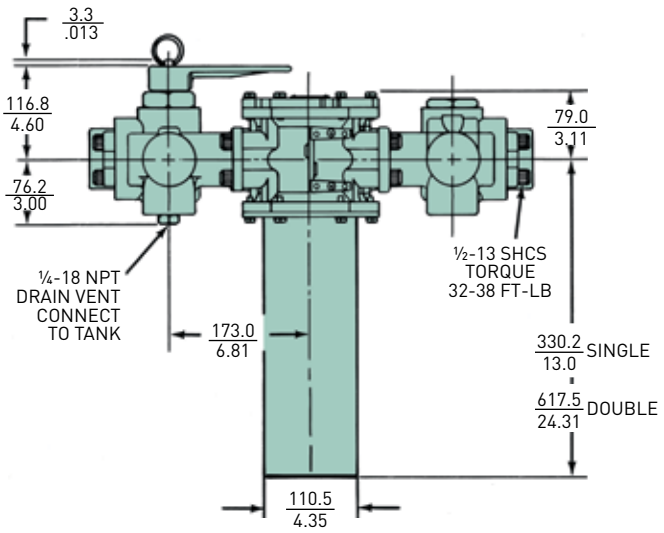
Weight (approximate):
Single: 55 lbs. (24.9 kg) / Double: 65 lbs. (29.5 kg)

Indicators:
Visual (optional)
Electrical (optional) 15A @ 250VAC / .5A @ 125 VDC
Electrical ("D" option) 5A @ 250VAC / 3A @ 28 VDC

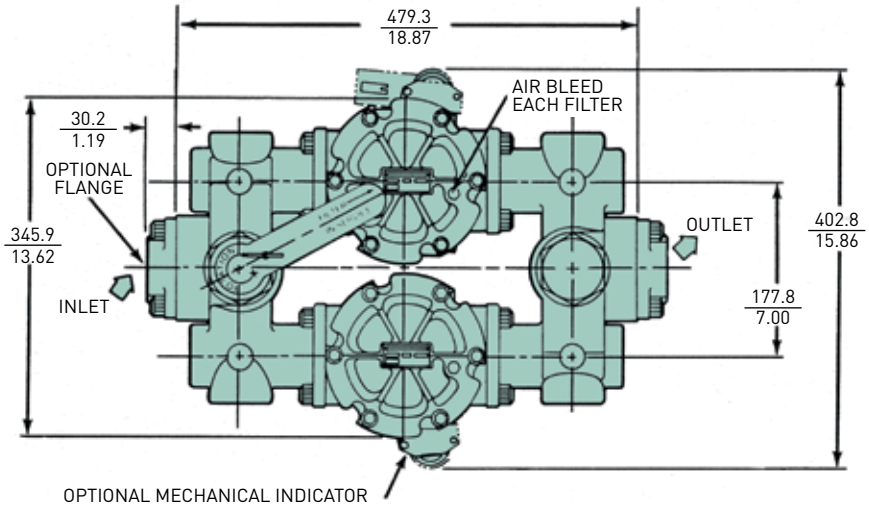
Color Coding:
White (normally closed)
Red (normally open)
Black (common)



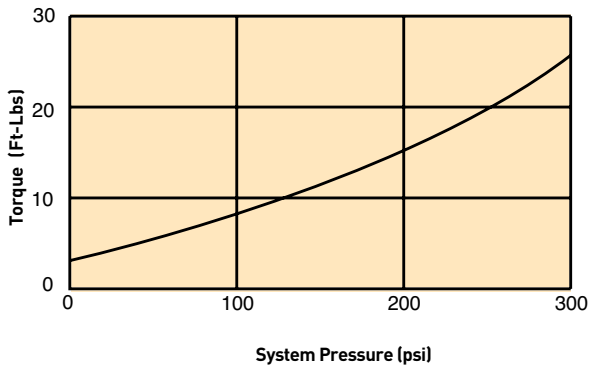
BOTH CHECK VALVES MOVE SAME DIRECTION



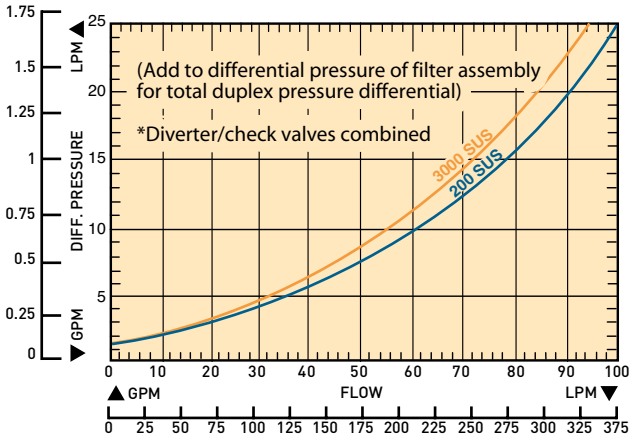
Linear Measure: millimeter / inch



Approximate handle torque required for changeover.



Typical Flow/Pressure Curves For Duplex Valves



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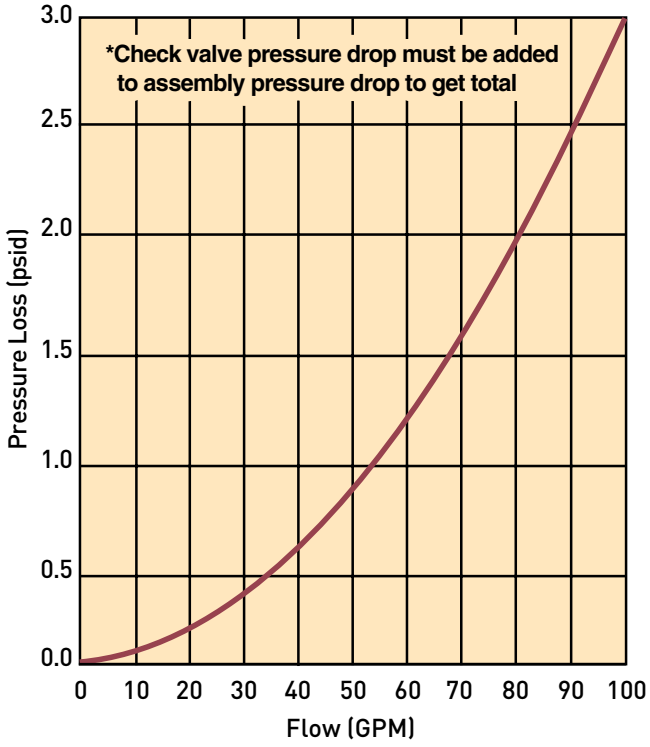
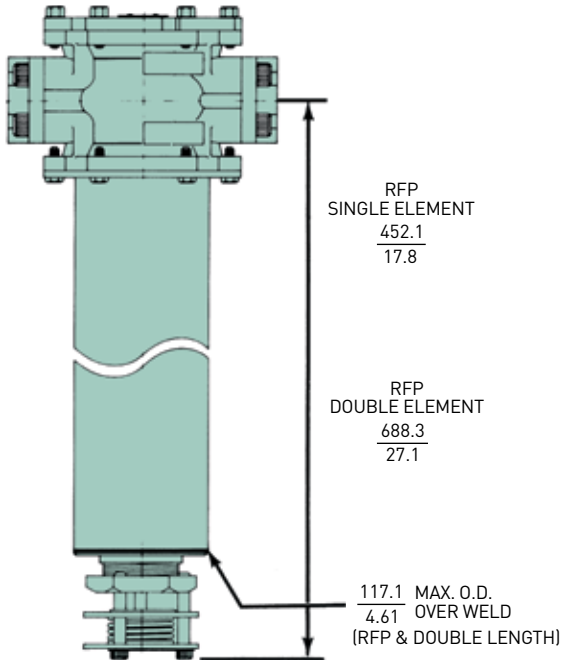
For return line applications (RFP), the fluid returning to the reservoir holds the check valve open. When the system is shut down, the check valve closes automatically.

Check Valve Flow/Pressure Drop



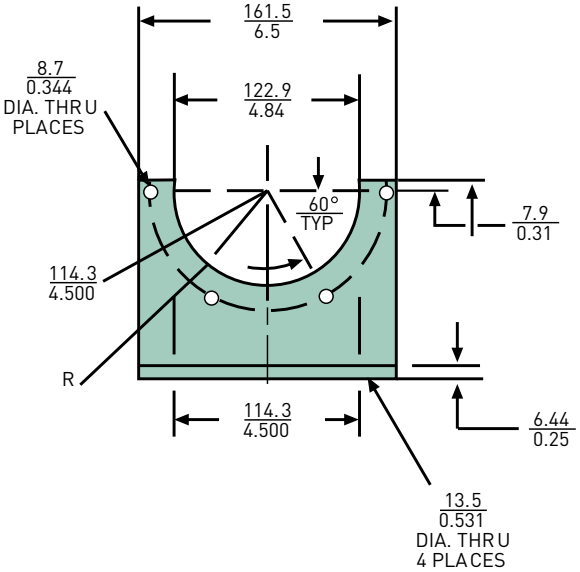
Linear Measure: millimeter / inch

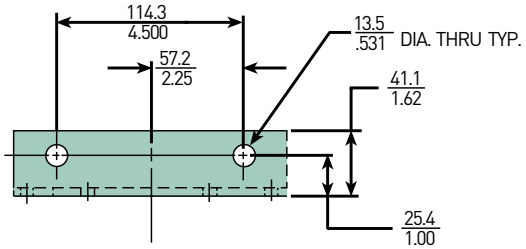


Accessories

Linear Measure: millimeter / inch

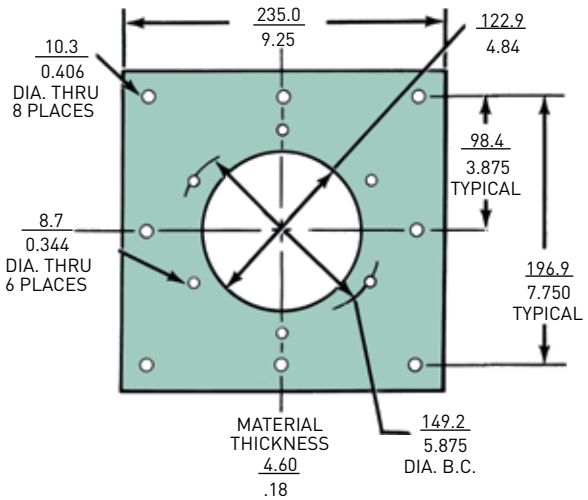
OPTIONAL MOUNTING BRACKET (924904)



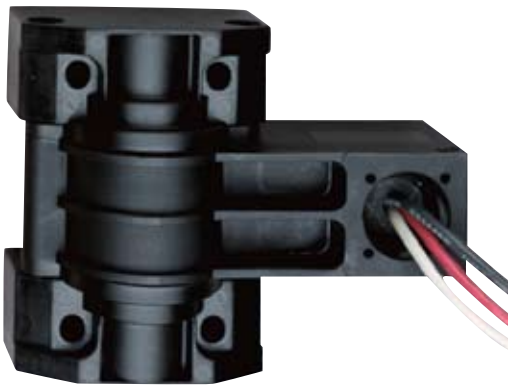


"M" OPTION-VISUAL INDICATOR, NO ELEMENT WARNING

OPTIONAL TANK FLANGE (925167)



"E" OPTION-ELECTRICAL INDICATOR



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Metamora, OH

Lower Cost than many single unit filters.

Moduflow™ Manifold Extended Filter Range

Use Model MM Manifold to handle return line flows up to 130 gpm.

- Rated static pressure: 300 psi
- Typical burst pressure: 900 psi
- Easily mounted on ModuFlow™

High Flows At Low Cost

The model MM manifold is designed to extend the flow range of ModuFlow™ Filters when operating with 10 Micron and finer filter media. When mounted to a pair of RFP-2 or ILP-2 filters, this manifold will allow flows up to 130 gpm in return lines (15 fps velocity).
Note: The Model MM manifold is not applicable to suction lines due to its pressure drop characteristics.

When used with two ModuFlow™ filters, the total cost is often less than a single unit filter rated for 130 gpm flow. Tank-top mounted (Model RFP) filters will require only one manifold on the filter inlet pports. In-line mounted (Model ILPav) filters will require two manifolds, one on the inlet and one on the outlet ports.

Multiple Uses

Although designed for manifold ModuFlow™ filters, the Model MM can be used in a variety of applications which require:

- Splitting flow between components

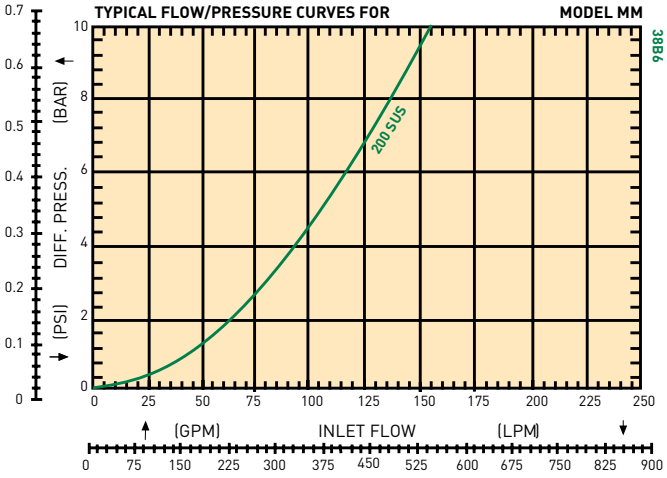
Such applications are frequently encountered on mobile equipment, machine tools, and large lubricating systems. In such applications, use of a manifold can often reduce total piping and installation costs.

Proven Reliability

The rugged design of the Model MM manifold has been proven in demanding mobil equipment applications, At the factory, we have cycle tested the Model MM through the full range of rated flow and pressure to insure reliable service.

Parker Filter Division maintains the same high standards in delivery, quality, and service. Considering this, plus features, flexibility, price, and performance, the Model MM manifold is a valuable addition to your fluid power component list.

FLOW/PRESSURE CURVE



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MANIFOLD SPECIFICATIONS

Rated Static Pressure, maximum:
20.7 bar (300 psi)
Typical Burst Pressure:
62.1 bar (900 psi)
Operating Temperature (Buna seals):
+121ºC to —40ºC (+250ºF to 40ºF)

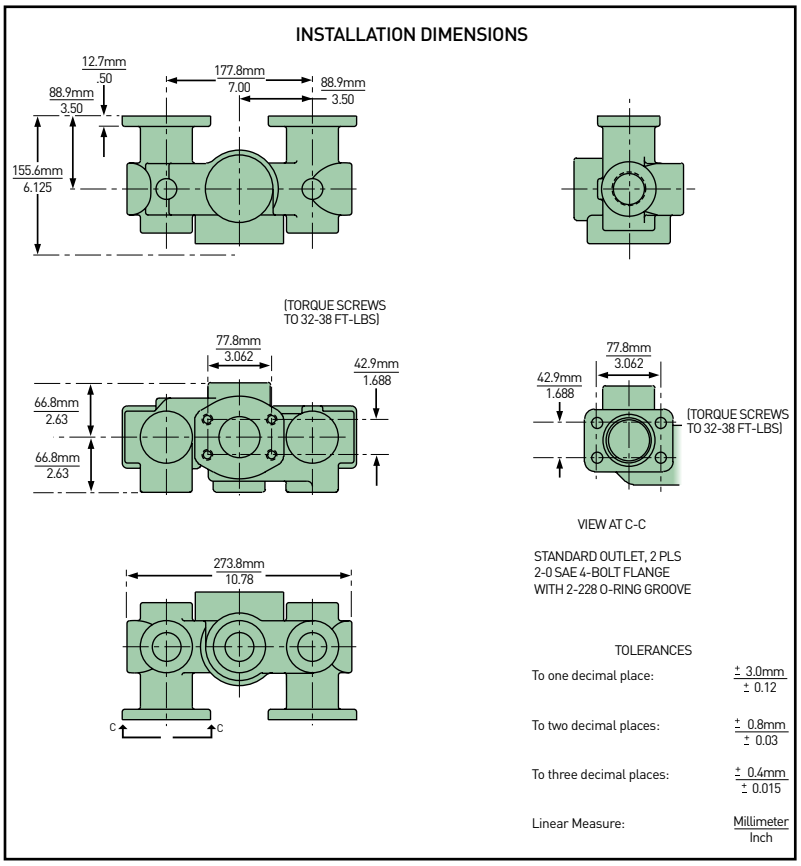
Housing Material:
ANSI 356-T6 cast aluminum
Approximate Shipping Weight:
3.6 kg (8 lbs)
Porting: See Options Below

Order Screws and O-Rings Seperately:
Inlet & outlet screws (12 required):
Order P/N 900228
Outlet port o-rings (2 required):
Nitrite: Order P/N N72228
Fluorocarbon: Order P/N V92228

HOW TO ORDER MANIFOLDS:

Part Number	Description
926466	**Moduflow Manifold**

* Tank-top mounted RFP filters will require one manifold on filter inlets: in-line mounted ILP filters will require two manifolds on both inlets and outlets.



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Flange Kits (flange, 4 bolts, o-ring)

Size	Code	Part Number	
		Buna	Fluorocarbon
¾ inch NPTF	YB	924788	926013
1 inch NPTF	YC	924787	926012
1¼ inch NPTF	YD	924912	926004
1½ inch NPTF	YE	924786	926011
2 inch NPTF	YF	924785	926010
SAE - 12	YM	924784	926009
SAE - 16	YN	924783	926008
SAE - 20	YO	924913	926005
SAE - 24	YP	924782	926007
BLANK FLANGE	—	924782	926006

RFP / ILP / DILP Replacement Elements

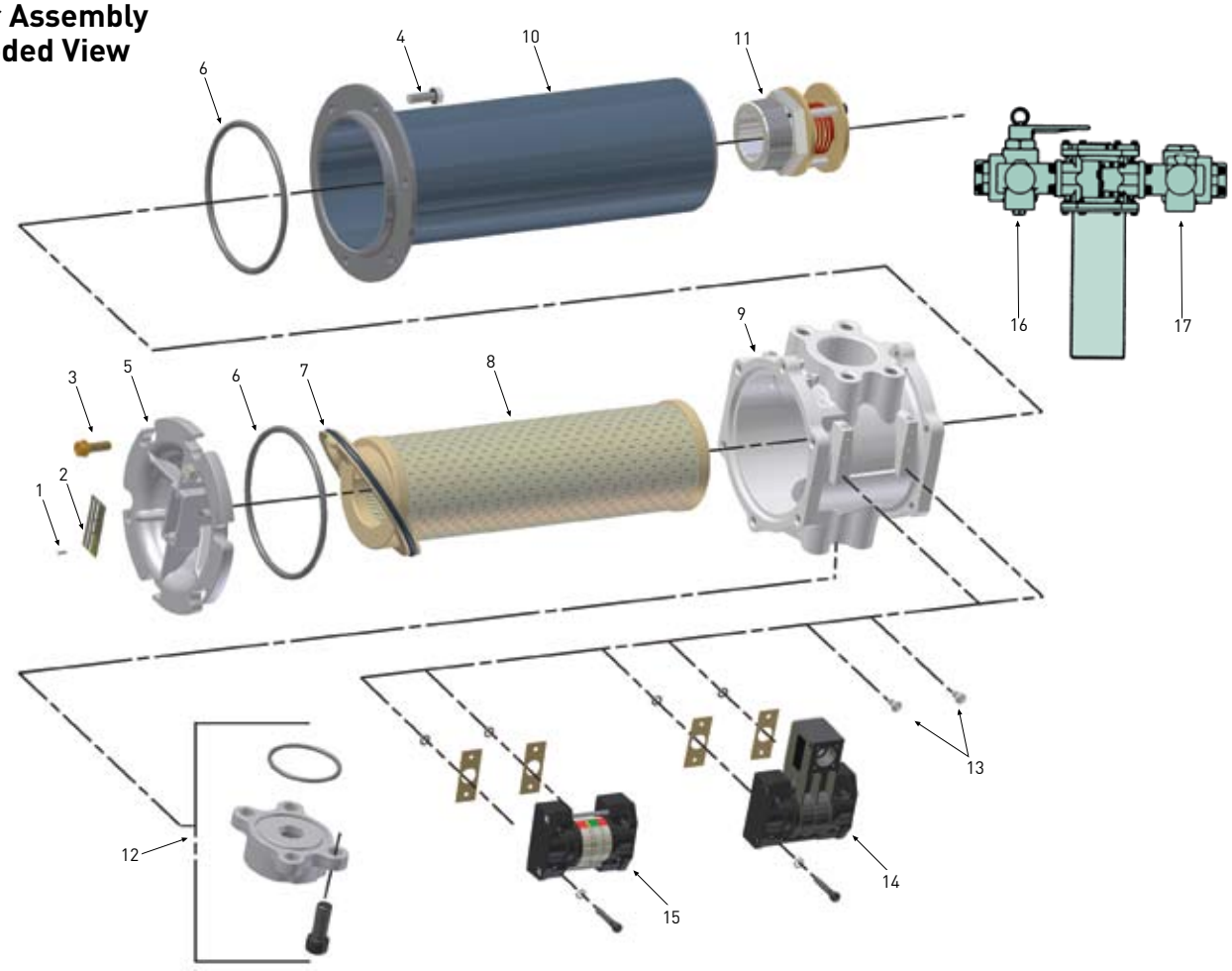
Media	Nitrile Seals				Fluorocarbon Seals			
	New Single	Replaces Old Single	New Double	Replaces Old Double	New Single	Replaces Old Single	New Double	Replaces Old Double
02Q	937393Q	932686Q	937397Q	932692Q	937401Q	932689Q	937405Q	932695Q
05Q	937394Q	932687Q	937398Q	932693Q	937402Q	932690Q	937406Q	932696Q
10Q	937395Q	932688Q	937399Q	932694Q	937403Q	932691Q	937407Q	932697Q
20Q	937396Q	933116Q	937400Q	933117Q	937404Q	933118Q	937408Q	933119Q

Parts List

Index	Description	Part No.	Quantity
1	**Screws**, Nameplate	900028	2
2	**Name Plate**, Unstamped	920928	1
3	**Cover Screws**, 5/16-18 UNC x 1"..	926633	6
4	**Bowl Screws**, 5/16-18 UNC x 1"...	926633	6
5	**Cover**, Without nameplate	924634	1
6	**O-Ring**, cover		
	Nitrile	N72350	2
	Fluorocarbon	V72350	2
7	**Element Seal**		
	Nitrile	937410	1
	Fluorocarbon	937411	1
8	**Element**	Refer to Table	1
9	**Head,** Machined only		1
	2" SAE Flange	925972	1
	1½"SAE Flange	926164	1
	1½" NPTF	925949	
10	**Bowl,** Select desired model		1
	ILP-1	925916	
	ILP-2	924816	
	RFP-1	937626	
	RFP-1 with 2 inch NPTF fitting	924676	
	RFP-2	937627	
	RFP-2 with 2 inch NPTF fitting	924818	

Index	Description	Part No.	Quantity
11	**Check Valve Assy.**	925120	1
12	**Flange Kits**	Refer to Table	1
13	**Plug Kit,** Fastener, self-sealing, o-ring seal included with fastener	925974	2
14	**Indicator Electrical**		Optional
	35 psid	926643	
	35 psid, 3-pin male receptacle	926753	
15	**Indicator Visual**		Optional
	35 psid 4-band	926748	
	Flange, In-tank mounting	925167	Optional
	Bracket, Inline mounting	924904	Optional
	Indicator Kit, Remote mount	924894	Optional
16	**Changeover Valve Assy.,** Duplex	926758	Optional
17	**Check Valve Assy.,** Duplex	926757	Optional
Not Shown	**Drain Plug,** SAE-24 for RFP model		
	Nitrile	909992	1
	Fluorocarbon	928363	1

Filter Assembly Exploded View



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Metamora, OH

Low Pressure Filters

Moduflow™ *Plus* 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
ILP	1	10Q	B	MP	35	Y9Y9	1

BOX 1: Filter Series Symbol	Description
RFP	Return-line filter, inlet on side outlet on bottom
ILP	In-line filter
DILP	In-line duplex

BOX 2: Element Length Symbol	Description
1	Single
2	Double

BOX 3: Media Code Symbol	Description
02Q	Microglass III, 2 micron
05Q	Microglass III, 5 micron
10Q	Microglass III, 10 micron
20Q	Microglass III, 20 micron
WR	Water Removal

BOX 4: Seals Symbol	Description
B	Nitrile
E	EPR
V	Fluorocarbon

BOX 5: Indicator Symbol	Description
P	Pressure ports drilled & plugged only; no indicator
M	Visual indicator w/"no element" warning
E	Electrical indicator only
D	Electrical indicator only, 3-pin male receptacle

Note: First letter of indicator code = left side of filter head when looking into inlet with bowl down; second letter = right side of filter head when looking into inlet with bowl down.

BOX 6: Bypass Setting Symbol	Description
35	35 psid

BOX 7: Port Options

Filter Model	Inlet Symbol/Description		Outlet Symbol/Description	
RFP	Y9	2" flange face	**99**	**No fitting**
	P9	**SAE-24 integral threads**	F9	2" NPTF
	E9	1½ NPTF integral threads	F8	External check valve
ILP	**Y9**	**2" flange face**	**99**	**No fitting**
	P9	SAE-24 integral threads	P9	SAE-24 integral threads
	E9	1½ NPTF integral threads	E9	1½ NPTF integral threads
DILP	**Y9**	**2" flange face**	**Y9**	**2" flange face**

1) First pair of symbols denotes inlet for all filter styles; second pair of symbols denotes outlet.
2) Four symbols required: two for inlet, two for outlet.
3) Unused ports in filters come plugged with a blank flange.
4) See Flange Kits table for port flange options. Flange Kits are ordered separately.

BOX 8: Options Symbol	Description
1	None

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Metamora, OH

RF7 Series

Return Line Filters

Return Line Filters

RF7 Series

Applications for the Parker RF7 Filter

- Mobile equipment
- Power unit fabricators
- Off-line filter loops

The Parker RF7 filter is designed for those applications where dependable, yet economical, return line system protection is required. The in-tank mounting design makes the RF7 ideally suited for use by power unit fabricators and mobile equipment manufacturers...or anyone who views equipment space at a premium, but not at the expense of performance.

Element Condition Indicator

- True pressure differential
- Know, at a glance, when to change the filter element
- Gauge also available

Two-Piece Construction (Head/Tube)

- Easy in-tank mounting

Diffuser Tube

- Disperses return flow below reservoir fluid level
- Prevents fluid aeration
- Closed bottom provides for even fluid dispersal
- Prevents objects from falling into the reservoir during element servicing

Bypass Valves

- Virtually zero leakage
- Multiple valves for high flow

Vent (optional)

- For variable displacement pump applications

Cartridge/Element Handle

- Easy to remove entire assembly for servicing

Bypass Filter Screen

- Prevents gross contamination from passing through the filter — even during bypass

Cover Lock-Band with "T" Handle

- Easy access for servicing
- No loose parts to remove and handle
- No special tools required for removal

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Metamora, OH

Inside each Parker Filter... a quality Parker Element

The important item in a filter assembly is the element. It has to capture and hold contaminants that can damage or stop a machine...while at the same time allowing the required flow of clean fluid so the machine can function properly.

There are many ways to design and build an element, and it's easy to produce a low cost element. However, cost is not a good selection criteria... especially when the risk is loss of critical performance.

For instance, consider wire mesh reinforcement. Not all filter elements have it. It's used in Parker elements to keep the pleats from collapsing or bunching.

If pleats bunch, the effective surface area of the element is reduced, excessive pressure drop develops, and the filter assembly may go into the bypass mode. This condition wastes energy and allows unfiltered fluid flow back into the system, effectively shortening filter life.

Gasket Ring Seal
- Positive sealing for optimum element efficiency

Protective Perforated Cylinder
- Necessary for inside-to-outside flow
- Prevents media "blow out"

Wire Reinforced Media (Not Visible)
- Prevents pleat bunching
- Helps prevent media migration
- Maintains media efficiency

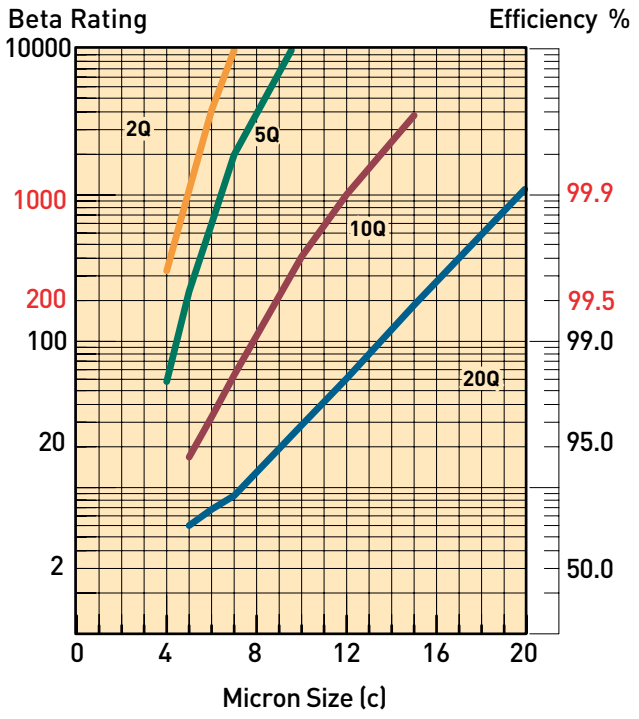
Engineered Element Design
- The right combination of pleat depth and number of pleats means lower pressure losses (longer life)
- Dirt holding capability is maximized for less frequent element change-out

Elements for Every Application
- Standard Microglass III media for long life and excellent system protection
- Economical cellulose elements also available

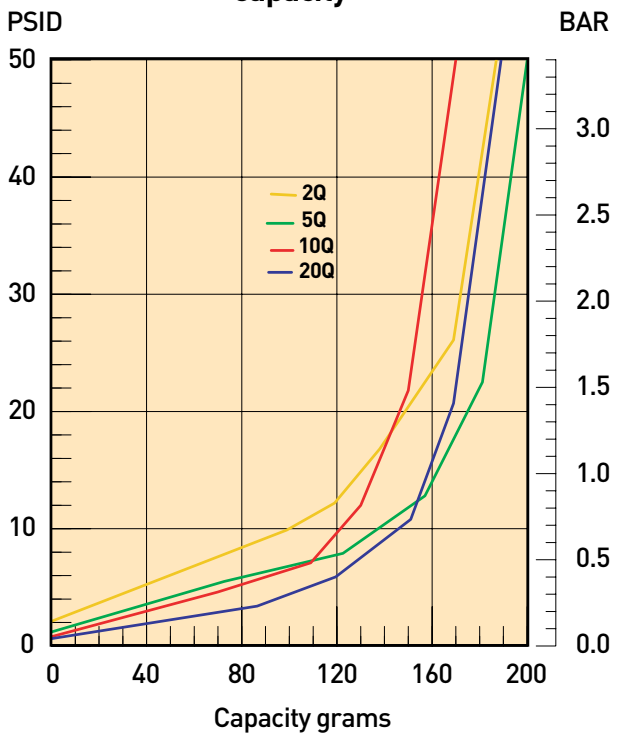
Features	Advantage	Benefits
• Tank mounted design.	• Saves space and reduces hardware requirements.	• Easy to integrate into system design.
• Cover fill port.	• Allows 100% filtration of all new system oil.	• Eliminates contamination before it can cause problems.
• High flow capacity.	• One filter may handle all return line flows.	• Cost savings in filters and hardware.
• Broad range of filter media available – including water removal.	• Choose the proper medium for system parameters.	• Cost savings by avoiding both "over" and "under" filtration.
• Inside-to-outside flow through element with a closed bottom end cap.	• All contamination is trapped inside of element assembly.	• Contamination is not reintroduced into the system during replacement.
• Wire reinforced Microglass III elements.	• Rugged construction stands up to abuse of cyclic flows without performance loss. • Wire support reduces pleat bunching, keeps pressure drop consistent.	• The reliable filtration provided assures equipment protection, reduces downtime, maximizes element life, and allows the hydraulic system to operate properly.
• Multipass tested elements (per ANSI/NFPA T3.10.8.8 R1-1990 modified for fine filtration).	• Filter performance backed by recognized and accepted laboratory test standards.	• Filters you select have consistent performance levels.
• Complete element performance data disclosure.	• All pertinent information is provided in an easy-to-compare format.	• Provides an easy guide to proper filter selection.

RF7-1 Element Performance

Efficiency

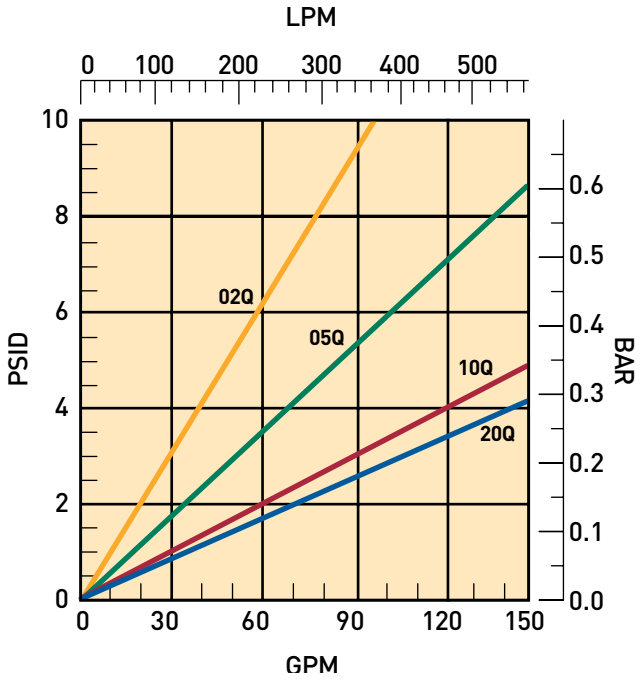


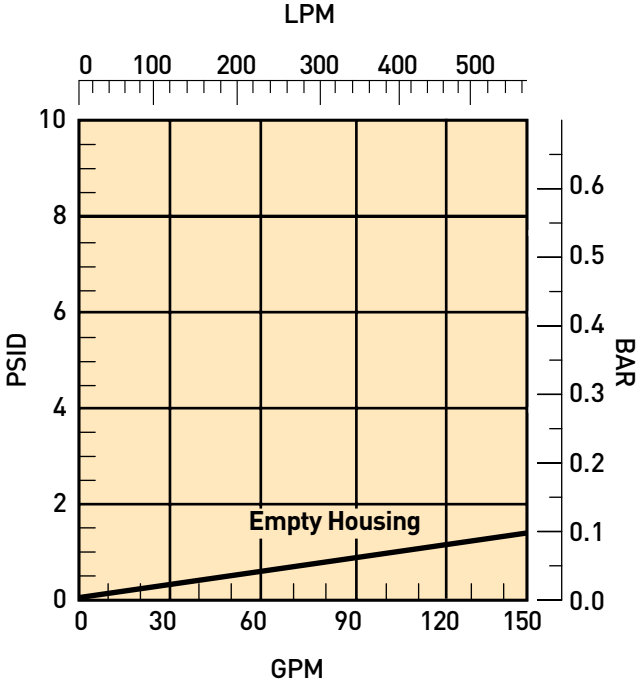
Capacity



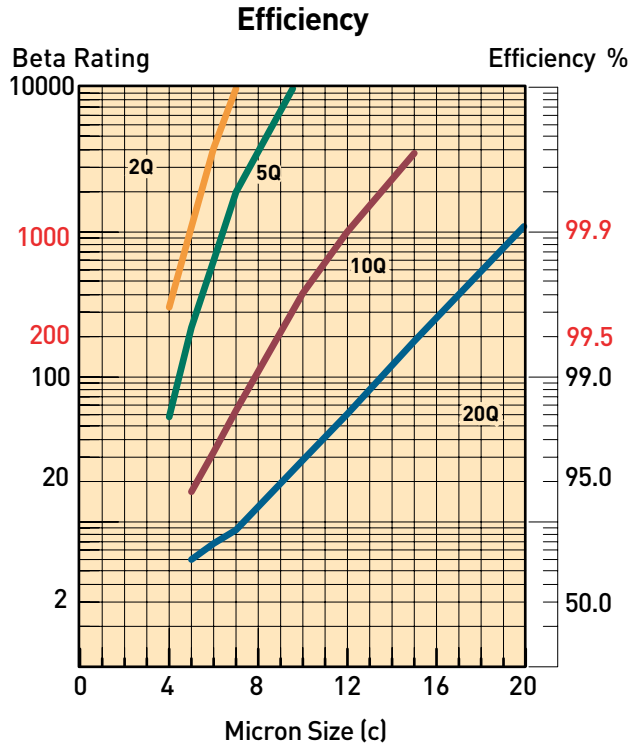
Results typical from Multi-pass tests run per test standard ISO 16889 @ 50 gpm to 50 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

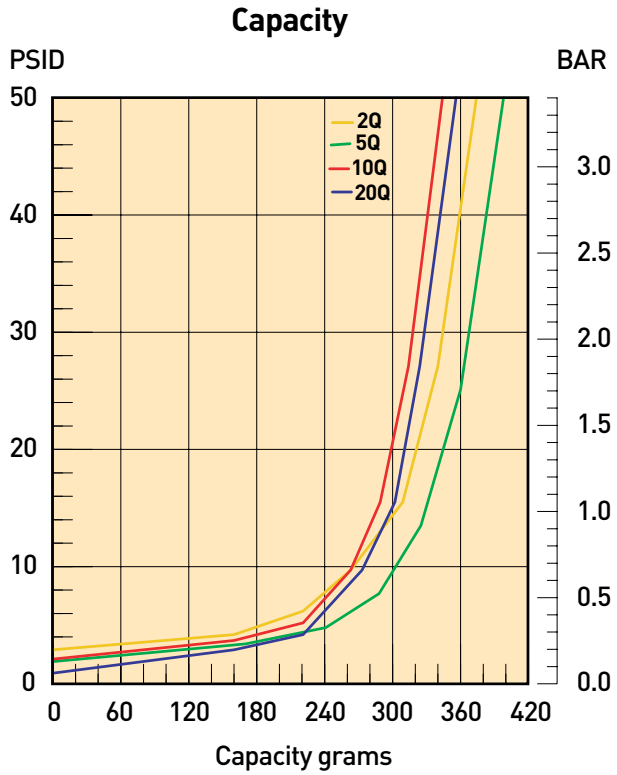
Flow vs. Pressure Loss





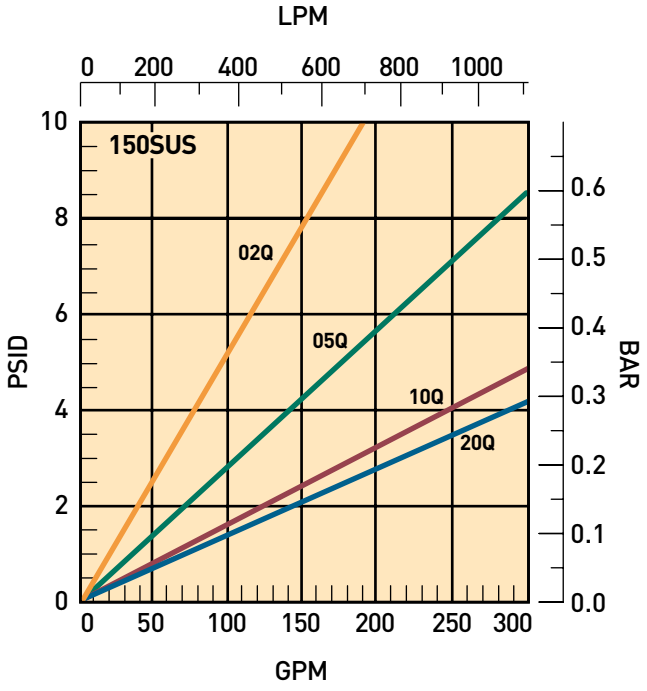
RF7-2 Element Performance

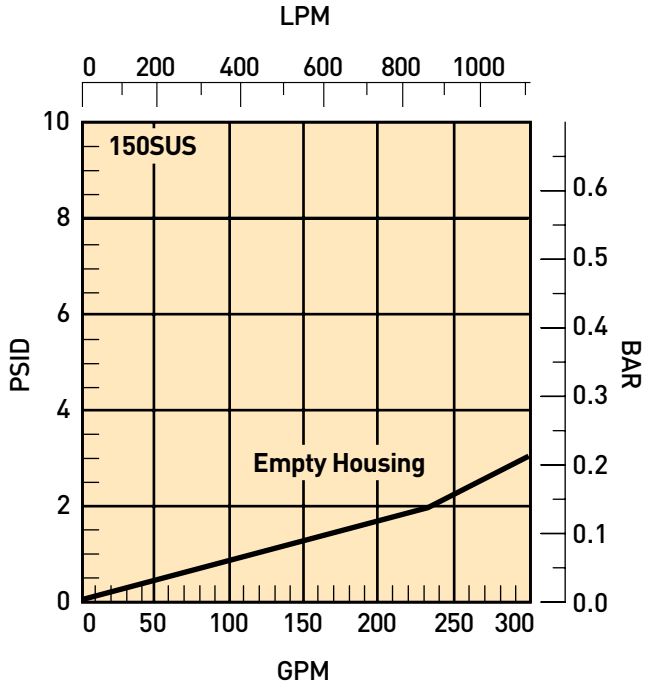




Results typical from Multi-pass tests run per test standard ISO 16889 @ 80 gpm to 50 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





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Hydraulic Filter Division
Metamora, OH

Specifications: RF7

Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 150 psi (10.3 bar)

Design Safety Factor: 3:1

Element Burst Rating:
50 psid (3.4 bar) minimum.

Materials:
Cast Aluminum Head & Cover
Steel Diffuser Tube
Steel Clamp

Operating Temperatures:
Nitrile; -40°F to 225°F (-40°C to 107°C)

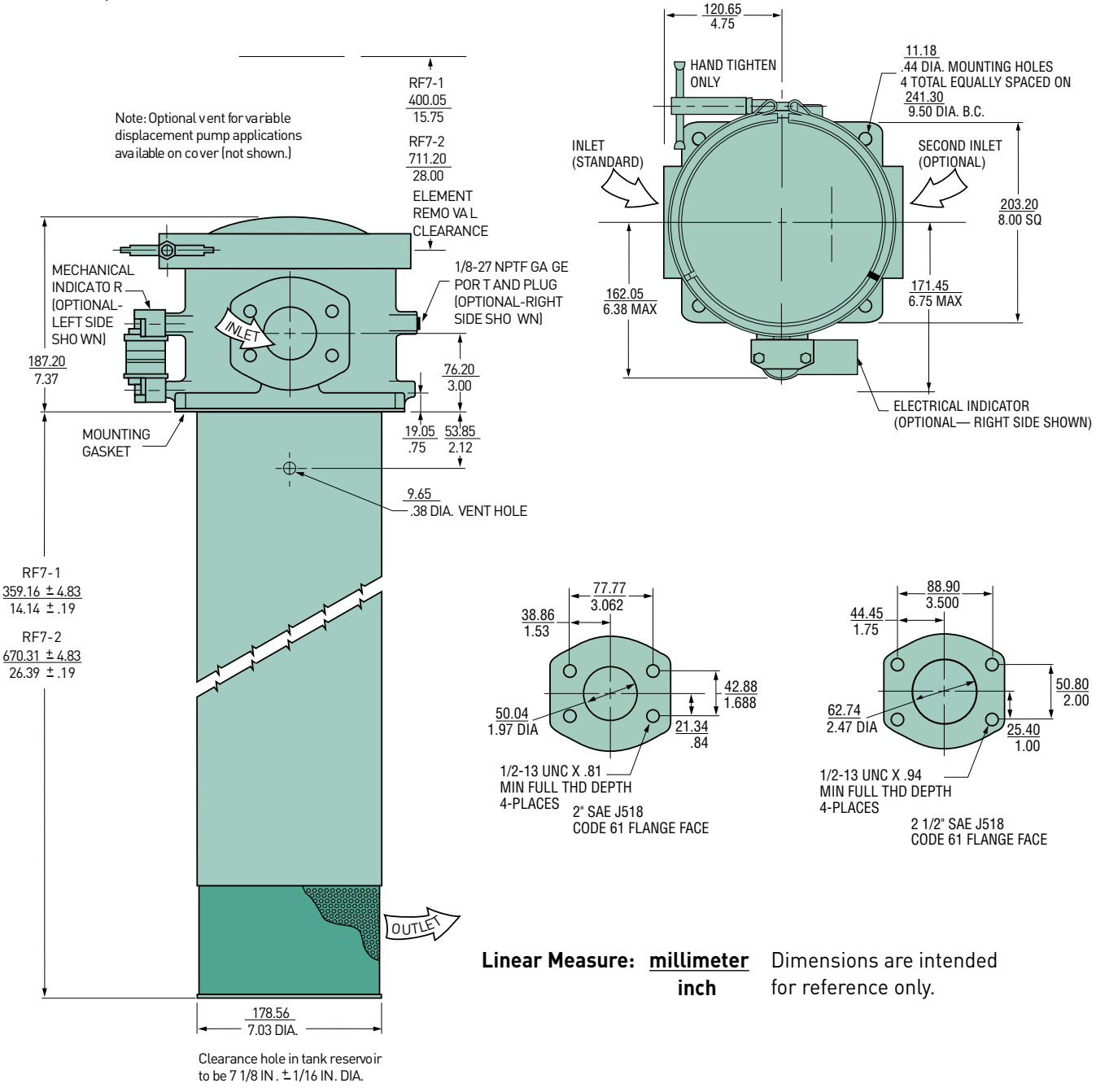
Fluorocarbon; -15°F to 275°F (-26°C to 135°C)

Weight (approximate):
RF7-1 34 lbs. (15.4 kg)
RF7-2 42 lbs. (19 kg)

Indicators:
Visual system pressure type (gauge or pressure switch).

Visual pressure differential type.

Electrical pressure differential type.
15A @ 250 VAC
.5A @ 125 VDC



Linear Measure: **millimeter** / **inch** Dimensions are intended for reference only.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Filter Service

When servicing an RF7 filter, use the following procedure:

A. Stop all flow to the filter.

B. Loosen the clamp handle counterclockwise and remove the clamp assembly.

C. Remove the filter cover by lifting upward.

D. Pull the entire cartridge assembly out by grabbing onto the "T" handle.

E. Unscrew the "T" handle from the bypass assembly (with mesh screen) and remove the bypass assembly.

F. Lift the element over the exposed rod assembly and discard.

G. Place a new element over the rod and seat on the bottom.

H. Re-attach the bypass assembly to the top of the element.

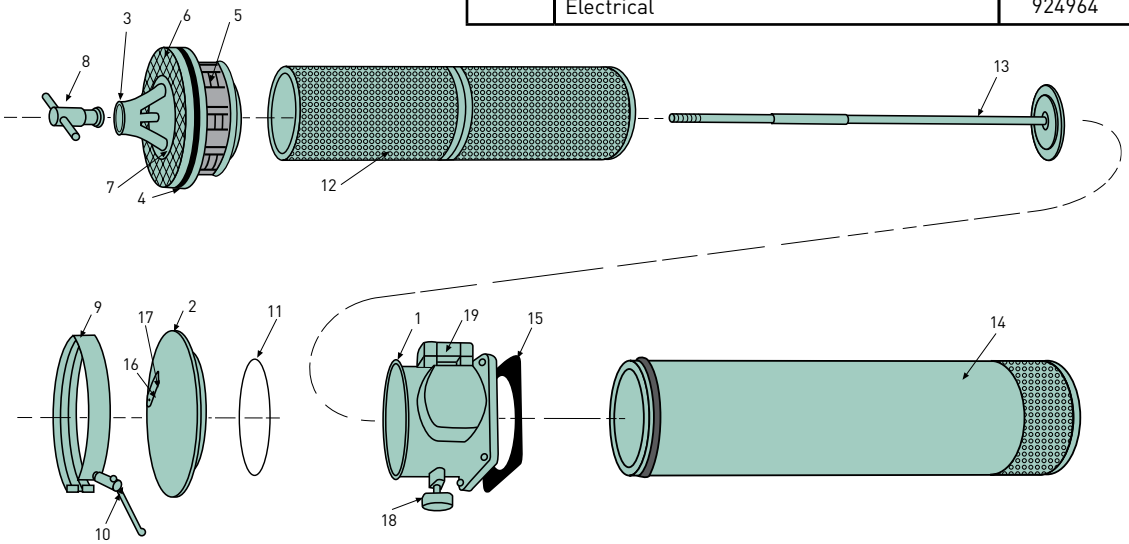
I. Replace the "T" handle and hand-tighten.

J. Firmly place the entire cartridge assembly back into the filter housing.

K. Set the cover back on the housing, reattach the clamp assembly and hand tighten the handle.

Parts List

Index	Description	Part Number	
		RF7-1	RF7-2
1	**Head - Single Inlet**		
	2" SAE Flange Face w/gage ports	932549	932549
	2 1/2" SAE Flange Face w/gage ports	932483	932483
	2" SAE Flange Face w/indicator	932484	932484
	2 1/2" SAE Flange Face w/indicator	932485	932485
	Head - Double Inlets		
	2" SAE Flange Face w/gage ports	932550	932550
	2 1/2" SAE Flange Face w/gage ports	932551	932551
	2" SAE Flange Face w/indicator	932552	932552
	2 1/2" SAE Flange Face w/indicator	932553	932553
2	**Cover**	932288	932288
3	**Bypass Mount**	932521	932521
4	**Lipseal**		
	Nitrile	932415	932415
	Fluorocarbon	932488	932488
5	**Bypass Valve (6)**	930507	930507
6	**Screen**	932416	932416
7	**Screen Retaining Ring**	932417	932417
8	**"T" Handle Assembly**	903889	903889
9	**Clamp**	909876	909876
10	**Clamp Handle**	926768	926768
11	**Cover O-Ring**		
	Nitrile	N72263	N72263
	Fluorocarbon	V72263	V72263
12	**Element (See model code page)**		
13	**Cartridge Rod Assembly**	933067	932418
14	**Diffuser Tube Assembly**	933064	932419
15	**Gasket**		
	Nitrile	932420	932420
	Fluorocarbon	932489	932489
16	**Nameplate**	920928	920928
17	**Drivescrew (2)**	900028	900028
18	**Pressure Gauge**	936912	936912
19	**Indicators**		
	Visual	924776	924776
	Electrical	924964	924964



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Return Line Filters

RF7 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
	RF7	2	10Q	MP	25	Y999	1

BOX 1: Seals Symbol	Description
None	**Nitrile**
F3	Fluorocarbon

BOX 2: Basic Assembly Symbol	Description
RF7	**In-tank return filter**

BOX 3: Length Symbol	Description
1	**Single length**
2	**Double length**

BOX 4: Media Code Symbol	Description
20Q	**Microglass III**
10Q	**Microglass III**
05Q	**Microglass III**
02Q	**Microglass III**
10C	**Cellulose**
WR	Water Removal

BOX 5: Indicator(s) Symbol (2 Required) (See Note A)	Description
P	**Gauge, port plugged**
G	**Gauge, color coded**
S	Pressure switch
M	**Visual indicator**
E	Electrical indicator

Note A: (First letter of indicator code = left side of filter head when looking into inlet with bowl down; second letter = right side of filter head when looking into inlet with bowl down.)

BOX 6: Bypass Setting Symbol	Description
25	**25 psid**

BOX 7: Ports Symbol	Description
Inlet	**Side**
Y9	**2" SAE flange face (Standard)**
Z9	2½" SAE flange face (Standard)
2Y9	Two Inlets, 180° apart (Optional)
2Z9	Two Inlets, 180° apart (Optional)
Outlet	
99	**No fitting**

BOX 8: Modifications Symbol	Description
1	**None**

Replacement Elements

Media	Single Length		Double Length	
	Nitrile	Fluorocarbon	Nitrile	Fluorocarbon
20Q	**933800Q**	**933808Q**	**933812Q**	**933156Q**
10Q	**933802Q**	**933809Q**	**933814Q**	**933155Q**
05Q	**933804Q**	**933810Q**	**933816Q**	**933153Q**
02Q	**933806Q**	**933811Q**	**933818Q**	**933152Q**
10C	908648	923551	932498	932503
WR	928563	933853	932501	932506

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

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

BGTS Series

Return In-Tank Filters

Return In-Tank Filters

BGTS Series

Features/Applications for Tank Top Return Flow Filters

- Flows to 640 GPM
- 3 Micron Absolute to 120 Micron Absolute
- Disposable or Recleanable Elements
- Visual and Electrical Indicators
- Microglass elements
- Magnetic prefiltration
- Full flow bypass valve
- No internal leakage paths
- Inside-to-out flow thru element
- Complete contaminant removal during element service
- Optional LEIF® element (600 and 1000 Series only)

Specifications

Housing Data:

Material:

Head – Aluminum Alloy
Diffusor – Steel
Internals – Carbon Steel and Aluminum
Seals – Nitrile (Standard), Fluorocarbon

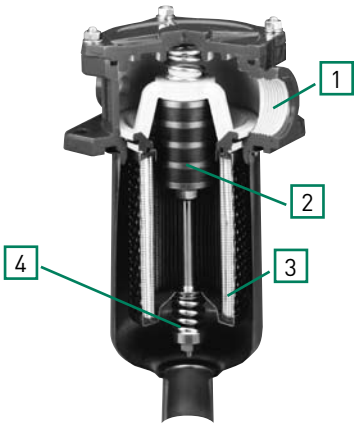
Pressure Rating:

Static – 150 psi (10.3 bar)

Temperature Range:

Operating -40°F to +250°F (-40°C to +120°C)

BGTS Tank Mounted Return Flow Filters



BGTS Filters feature Parker's exclusive Magnetic Prefiltration core which collects ferromagnetic particles from fluid upstream of the filter element. This feature alone could save hundreds of dollars a year by protecting costly equipment from increased wear and malfunction by assuring that the fluid is as pure as possible when it leaves the filter. Even during bypass due to cold start up, contaminant is collected by the magnetic core, a feature of importance on any fluid power system.

Take a close look and compare Parker features with any other filter.

1. Fluid flows through the inlet port into an enlarged area which reduces fluid velocity. Inlet flow does not impinge on the element.

2. Filtration begins with magnetic prefiltration of ferromagnetic particles in the full fluid flow upstream of the element, not downstream or in the reservoir. Built-in or system generated ferromagnetic wear debris (even particles smaller than the element rating) are collected by the high strength (3.0K Gauss) magnetic column. This results in extended element and oil life and reduced maintenance and downtime, which reduces overall operating cost.

3. Fluid passes through the element in an inside-to-outside direction, collecting particles inside the filter cartridge. This eliminates reinjection of contaminant during element change. Clean fluid then returns to the reservoir through the diffusor which prevents fluid aeration.

Normal return line filters, that flow outside-to-inside, allow contaminated fluid to drain back into the reservoir when the element is serviced.

4. Simplified bypass design and location prevents flushing previously collected contaminant back into the system. Since the element serves as the valve there is no troublesome separate valve to remove when changing elements. Magnetic filtration occurs even during bypass. All potential leakage paths are o-ring sealed to eliminate bypass leakage that occurs in loose fitting valve assemblies.

BGTS Filters are available with disposable or cleanable elements of several contamination class levels for use in all common fluids.

Optional accessories include visual and electric warning indicators that assure proper element service.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

How To Size Tank Top Filters

Element Pressure Drop Factor:
Multiply the actual flow rate times the applicable ΔP factor to determine the pressure drop with a fluid viscosity of 140 SSU. Correct for other viscosities by applying the following formula: Flow rate (GPM) x filter factor x (new viscosity in SSU/140 SSU).

Flow/Pressure Drop Data

Fluid Conditions: Viscosity-140 SSU Sp. Gr. - 0.88

Media Code	Size Code 600	1000	2000
3	.082	.0493	.0246
6	.031	.0187	.0091
10	.022	.0129	.0066
20	.014	.0088	.0044
TXX	.005	.0030	.0015
ST40	.004	.0023	.0011

Example:
Element Size Code = 600
Element Media Code = 10
Filter Factor = .022 (From chart)
Flow = 160 GPM
Viscosity = 160 SSU

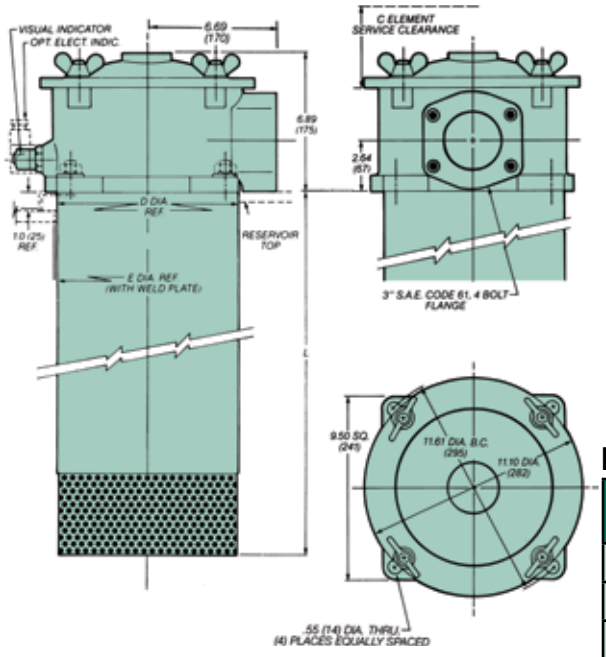
Formula:
160 GPM x .022 x (160 SSU/140 SSU) = 4.0 PSID

Element Data

Media Type	Absolute Rating	Multipass Test Results To ISO 4572 (Time Weighted Averages) B_3	B_6	B_{10}	B_{12}	B_{20}	B_{25}	B_{36}
GDL	3	≥100	800	2000	>5000	∞	∞	∞
GDL	6	8	≥100	1000	2000	>5000	∞	∞
GDL	10	6	22	≥100	≥200	>5000	∞	∞
GDL	20	–	2	8	20	≥100	≥200	>5000
TXX	36	–	–	2	3.5	6	23	≥100

Dimensions

BGTS-600, BGTS-1000, BGTS-2000



Return Line Filter - Series 4

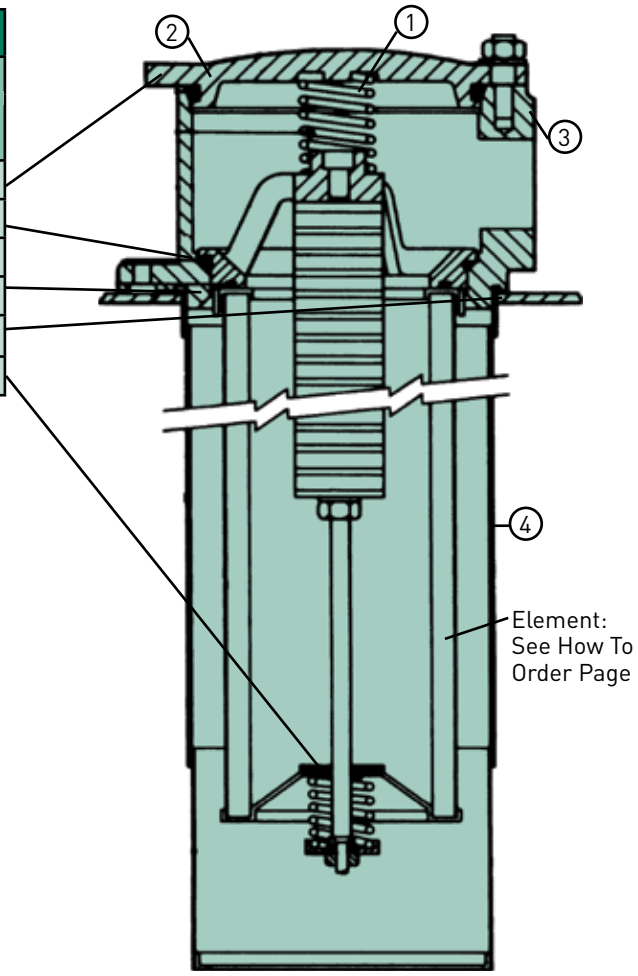
Dimensions inches (mm)	BGTS Filter Model 600	1000	2000
C	18.0 (457)	27.0 (686)	48.0 (1219)
L	16.75 (425)	25.20 (640)	47.25 (1200)
D	9.49/9.47 (241/240.5)		
E	10.25/9.70 (260/246)		

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Parts Breakdown BGTS Series

Seals	
Part Number	
BGTS 600, 1000 or 2000	**Description**
R-8875	Cover O-ring
SOR-90	Insert O-ring
SOR-85	Bypass Seals
R9875	Tank Gasket
SOR-115	Element O-Ring
Nitrile or Fluorocarbon	Material*

*Please specify seal material suffix when ordering Fluorocarbon seals: "-V"



Bypass Assembly	
600, 1000 or 2000	**Pressure**
6903184	Blocked
4903020	4.5 PSID
4903004	12 PSID
4903008	22 PSID

Item	Description	Material	Part Numbers		
			BGTS-600	BGTS-1000	BGTS-2000
1	Top Spring	Steel	48371205		
2	Cover	Die Cast Aluminum	84.22.064.06 (5842206)		
3	Head	Die Cast Aluminum	5841032		
4	Diffusor	Steel	2110084	2110085	21100086

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Operating And Maintenance Instructions Parker Model BGTS Tank Top Filters

A. Mounting

1. Standard mounting.

a. Cut proper size hole in the top of the reservoir.

b. Drill holes for studs within the proper bolt circle.

c. Set the filter into the cutout hole and secure with proper size bolts, nuts and lock washers.

2. Utilize proper fittings.

B. Start-Up

1. Check for and eliminate leaks upon system start-up.

2. Check differential pressure indicator, if installed, to monitor element condition.

C. Service

1. An element must be serviced when the indicator indicates service is required.

NOTE: If the filter is not equipped with an indicator, the element should be serviced according to machine manufacturer's instructions.

D. Servicing Dirty Elements

1. Shut system down to assure that there is NO PRESSURE OR FLOW into the filter housing.

2. Remove the filter cover.

3. Remove the filter insert (bridge which holds the element in place).

4. Remove the bypass spring assembly or non-bypass plate from the stud.

5. Remove the contaminated cartridge with a twisting motion.

6. a. Discard the disposable element cartridge.

b. Wash cleanable or mesh elements in a non-caustic solvent. Compressed air can be used to facilitate cleaning. Use care to prevent damage to the element during cleaning.

NOTE: Elements finer than 150 microns (100 mesh) may require special ultrasonic cleaning. Consult factory for recommendations.

E. Before Installing A New Element Cartridge

1. Clean the magnetic core with a lint-free cloth.

2. Check all seals and replace if necessary.

F. To Install A New Or Cleaned Element Cartridge

1. Lubricate all seals.

2. Mount new or cleaned Parker filter cartridge.

NOTE: For ease of mounting, hold the cartridge away from the magnetic core until the stud is through the hole in the bottom of the element. Then slide it up to securely seat it to the top of the bridge.

3. Install the bypass spring assembly or non-bypass plate, and tighten until snug.

NOTE: Older versions may have a cotter pin/castellated nut retained bypass spring. In these cases, the nut should be turned down the shaft until the cross drilled hole is visible in the base of a castellation and the cotter pin inserted and ends flared to lock the bypass assembly in place.

4. Re-install the insert into the filter housing, making sure that the top-spring is secure.

5. Re-install the cover. Torque the cover nuts to 22 ft./lbs.

Follow procedures B.1 and B.2.

Return In-Tank Filters

BGTS 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
BGTS600	F3	TXW10-10	B	T	22	V	

Element Example:

BOX 3	BOX 4
TXW5-10	B

BOX 1: MODEL Symbol	Description	
	FULL FLOW	SURGE FLOW
BGTS-600	**160 GPM (600 l/min)**	**220 GPM (830 l/min)**
BGTS-1000	**265 GPM (1000 l/min)**	**330 GPM (1250 l/min)**
BGTS-2000	**530 GPM (2000 l/min)**	**640 GPM (2420 l/min)**

BOX 2: PORTS Symbol	Description
	BGTS-600/1000/2000
F3	3" Code 61 SAE Flange

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

BOX 3 : ELEMENT Model	Symbol					
	2µm Microglass III	5µm Microglass III	10µm Microglass III	20µm Microglass III	40µ Stainless Steel Mesh	120µ Stainless Steel Mesh
BGTS-600	TXW10-2	TXW10-5	TXW10-10	TXW10-20	ST10-40	ST10-120
BGTS-1000	TXW12-2	TXW12-5	TXW12-10	TXW12-20	–	–
BGTS-2000	TXW14-2	TXW14-5	TXW14-10	TXW14-20	–	–

BOX 4: SEALS Symbols	Description
B	**Nitrile**
V	Fluorocarbon

BOX 5: Diffuser Symbols	Description
T	**Diffuser**

BOX 6: BYPASS Symbols	Description
22	**22 PSID (1.2 Bar)**

BOX 7: INDICATOR Symbols	Description
V	Visual Indicator (BGTS-600/2000 only)
E	Electrical Indicator w/ Hirschmann (BGTS-600/2000 only)
OMIT	**No Indicator**

BOX 8: OPTIONS Symbols	Description
OMIT	**No Options**

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

IL8 Series

Medium Pressure Filters

Applications for IL8 series filters

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

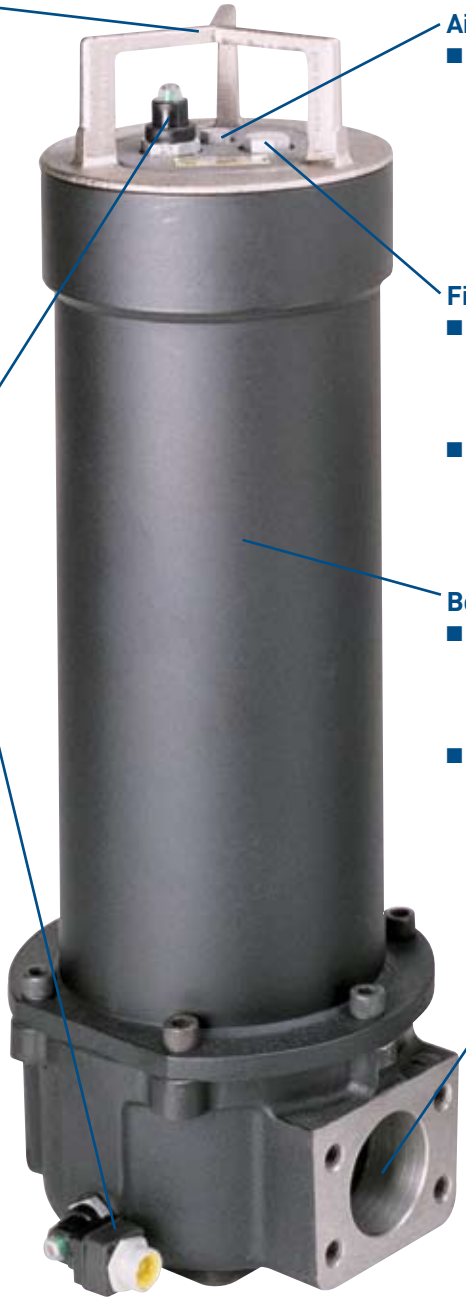
IL8 series filters are excellent choices for your demanding applications whether you require simplex, duplex or quadplex assemblies.

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 annodized 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

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

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

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

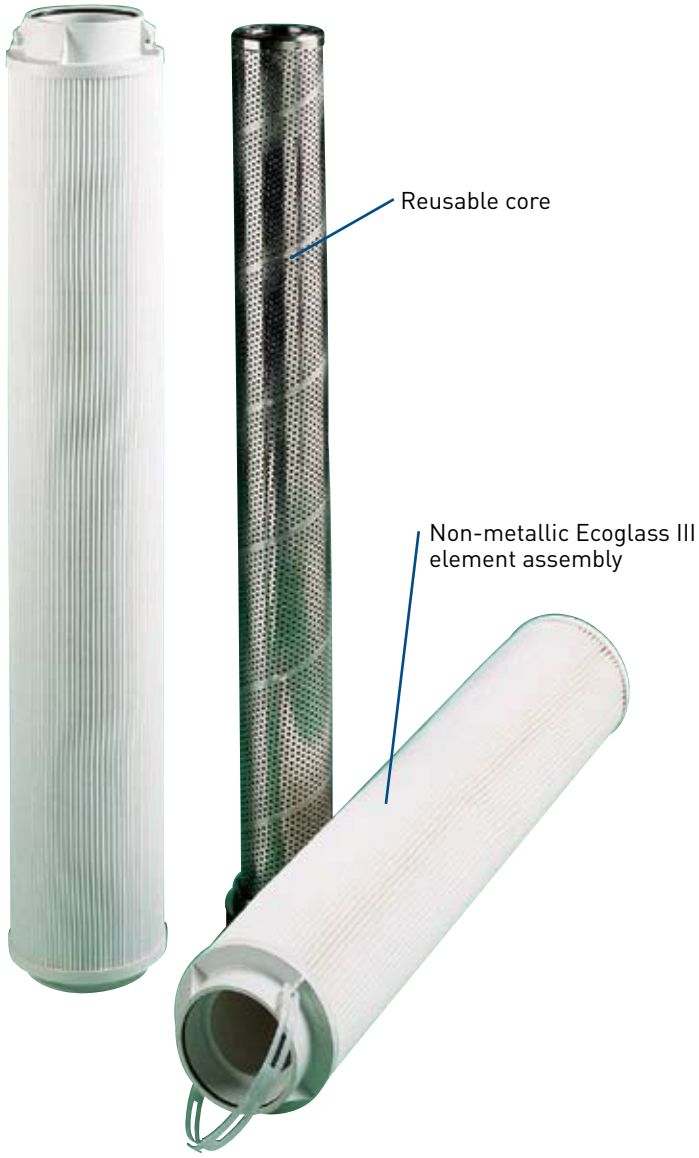
Bypass Valve
(not visible)
- Soft seat design for zero internal leakage
- Located in cover assembly

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 utilize 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

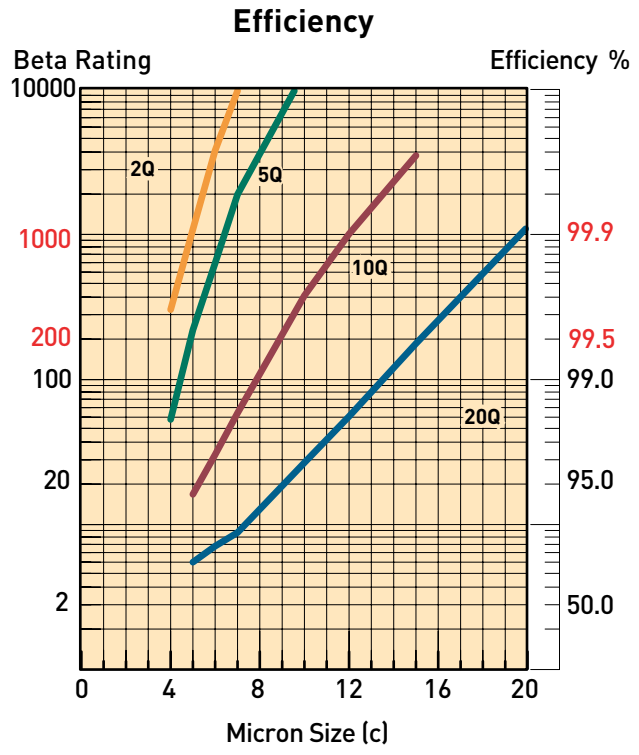
Microglass III represents a leap forward in the performance obtainable in hydraulic and lube filter elements.

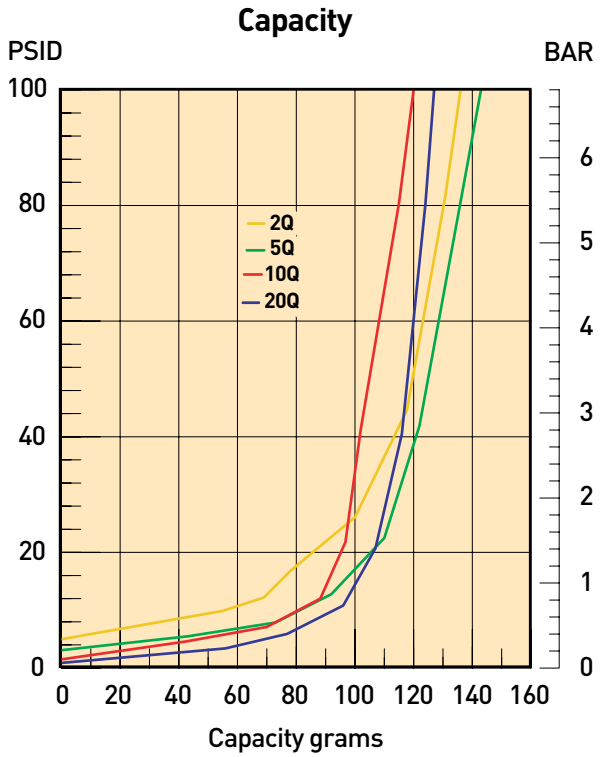
The unique multi-layer design combines high efficiencies with exceptional dirt holding capacities for performance that is unequalled in the industry today. This performance is further enhanced in the IL8 series with the introduction of the deep pleat design. The deep pleat element design increases the 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.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

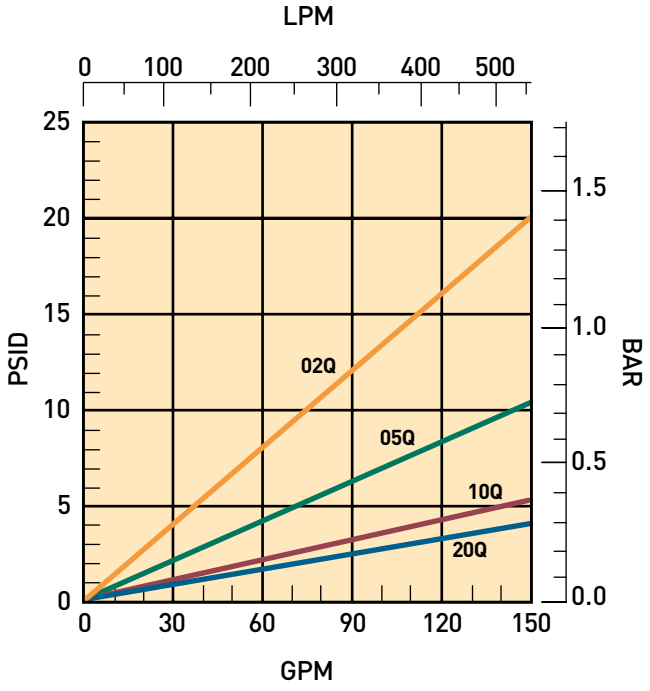
IL8-1 Element Performance

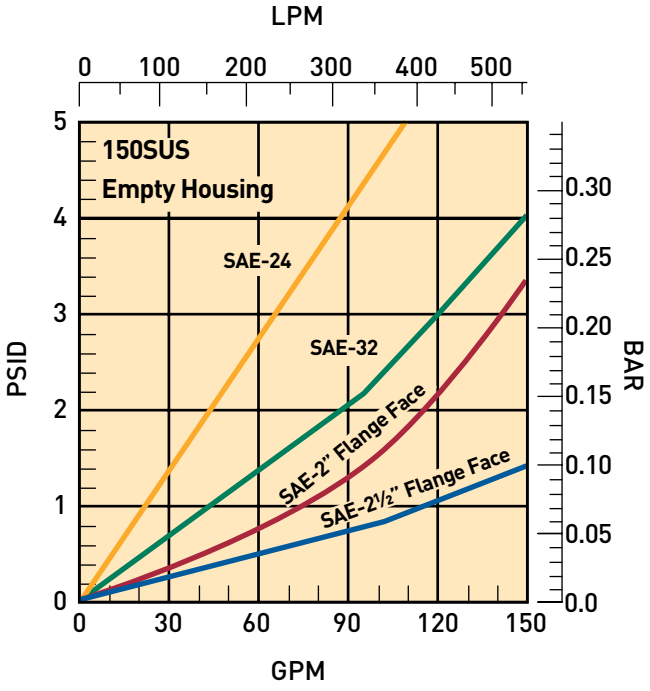




Results typical from Multi-pass tests run per test standard ISO 16889 @ 40 gpm to 60 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

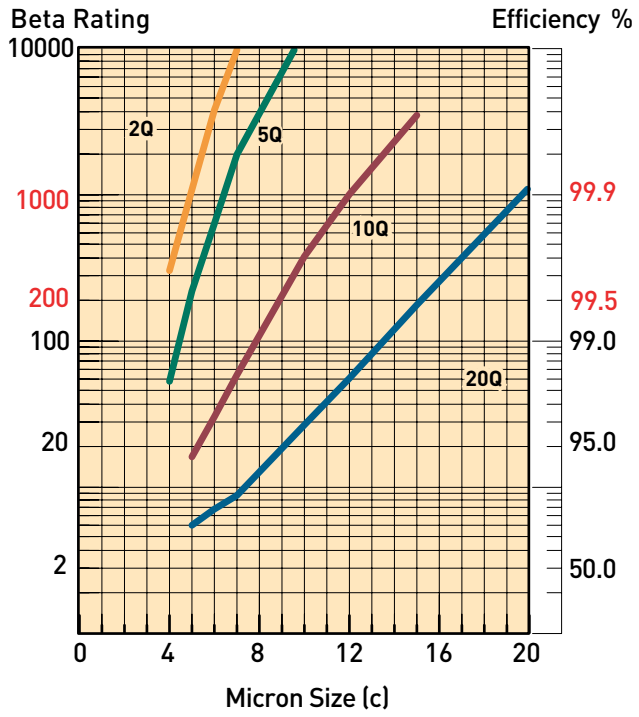
Flow vs. Pressure Loss



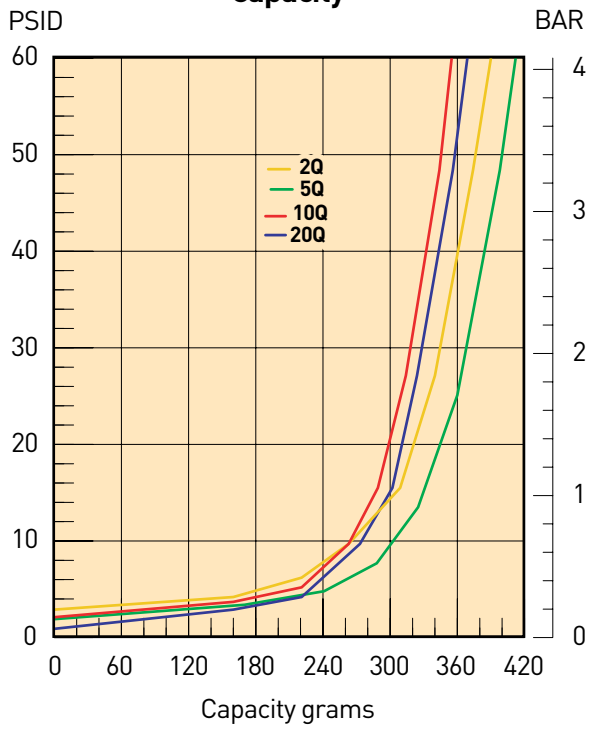


IL8-2 Element Performance

Efficiency

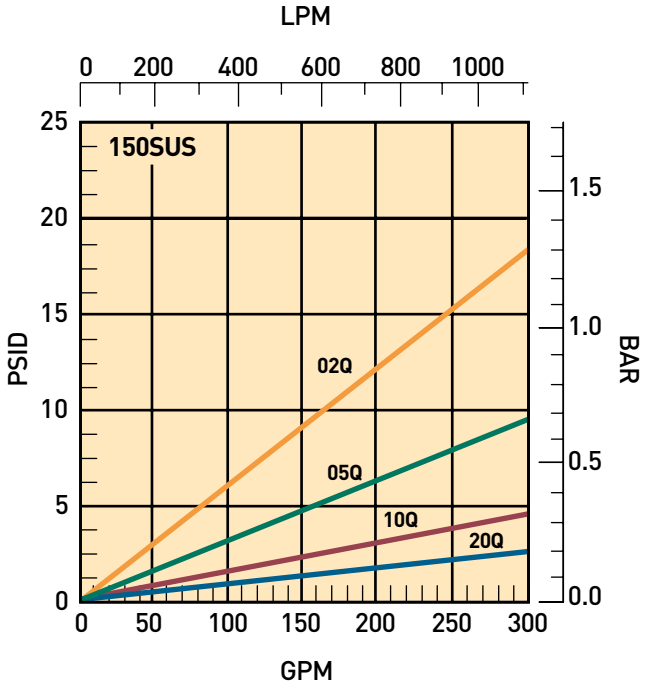


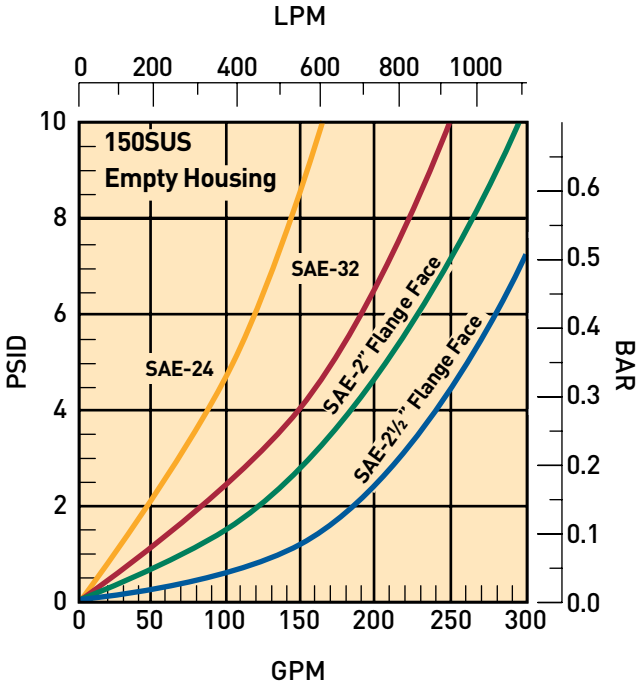
Capacity



Results typical from Multi-pass tests run per test standard ISO 16889 @ 50 gpm to 60 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





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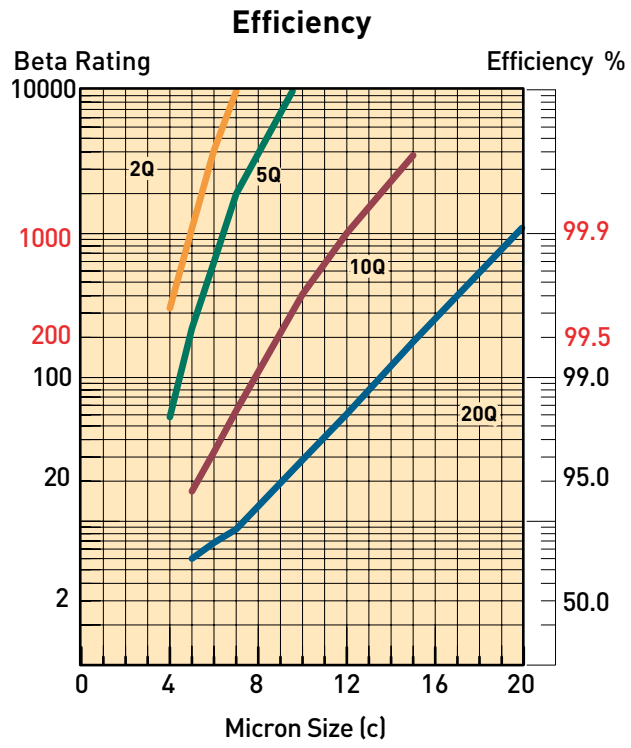
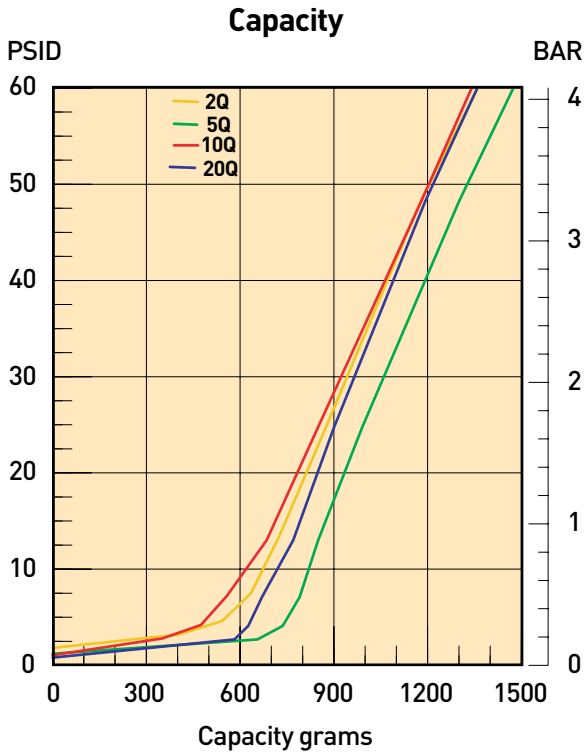
Metamora, OH

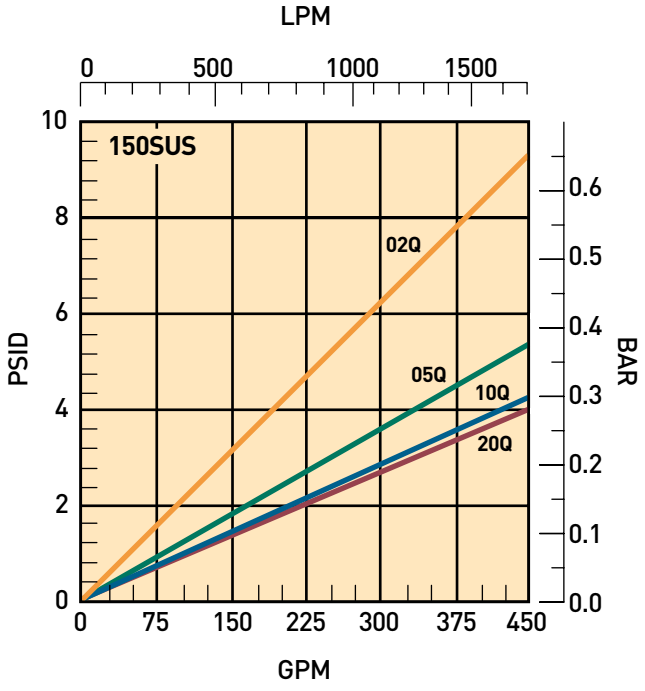
IL8-3 Element Performance

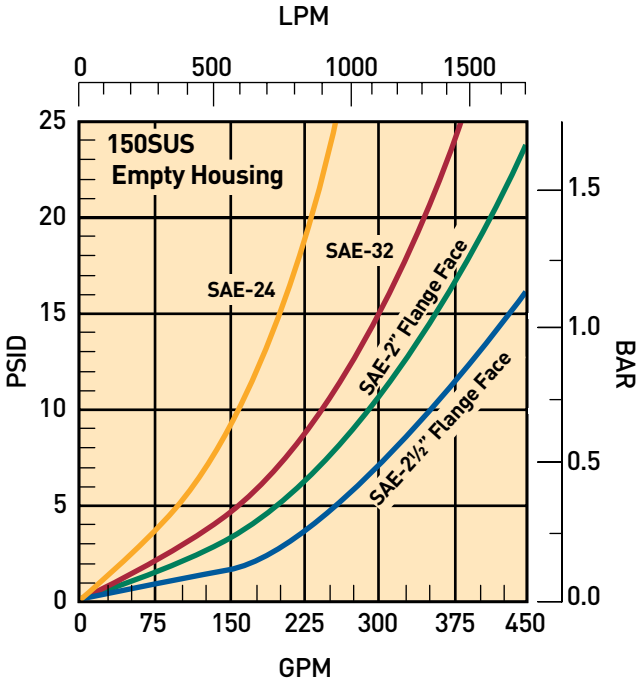




Capacity grams0300600900120015006050403020100432102020Q5Q10Q2QCapacityPSIDEfficiency %BAR
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





Specifications: IL8/LL8

Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 500psi (34.5 bar)
Rated Fatigue Pressure: 330psi (22.8 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)

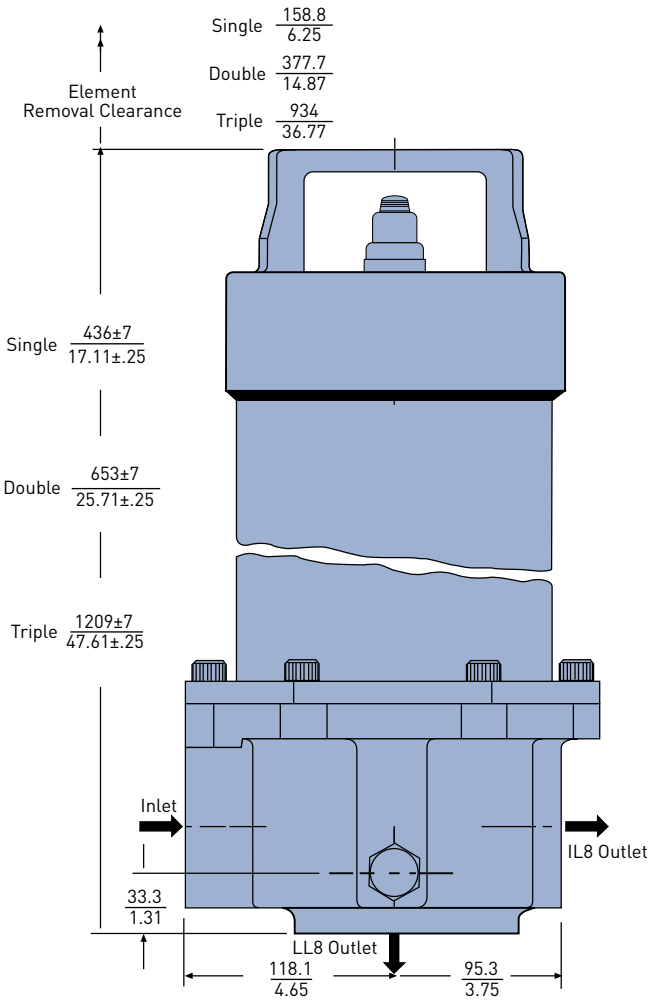
Element Collapse Rating:
150 psid (10.3 bar)

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

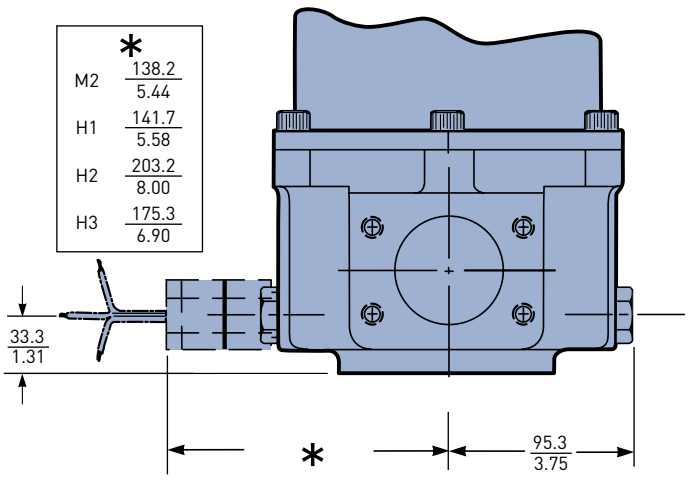
Color Coding:
White (common)
Black (normally open)
Blue (normally closed)

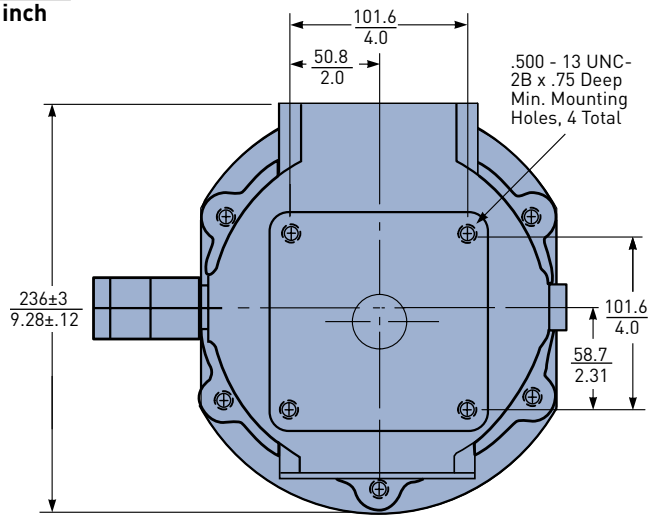
Materials:
Bowl: low carbon steel
Cover: anodized aluminum
Handle: nickel plated ductile iron
Base: anodized aluminum

Shipping Weights (approximate):
Single: 40 lbs. (18.1 kg)
Double: 50 lbs. (22.7 kg)
Triple: 75 lbs. (34 kg)



Linear Measure: millimeter / inch





Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Specifications: HDIL8/HQIL8

Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 400psi (27.6 bar)
Rated Fatigue Pressure: 330psi (22.8 bar)
Design Safety Factor: 2.5:1

Operating Temperatures:
-15°F (-26°C) to 200°F (93°C)

Element Collapse Rating:
150 psid (10.3 bar)

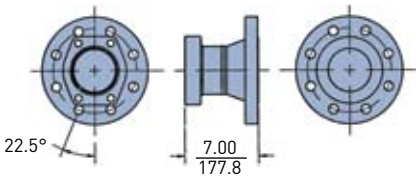
Materials:
Changeover valve: steel
Bowl: low carbon steel
Cover: anodized aluminum
Cover handle: nickel plated ductile iron
Base: steel

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

Color Coding:
White (common)
Black (normally open)
Blue (normally closed)

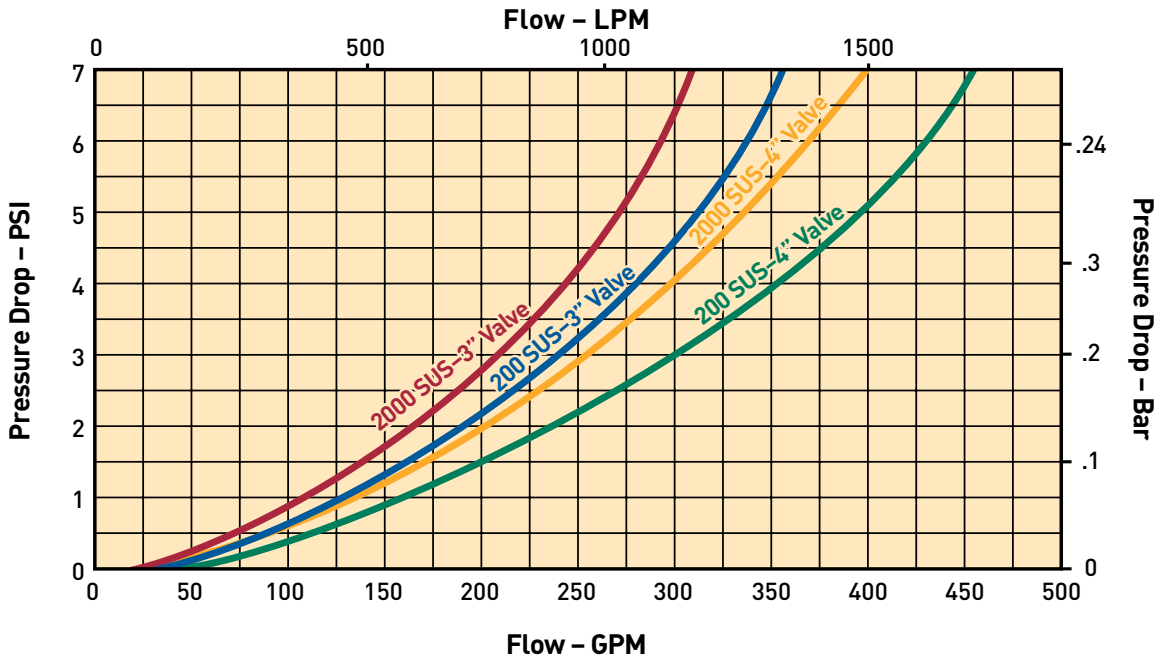
Shipping Weights (approximate):
HDIL8-2 320 lbs. (145 kg)
HDIL8-3 375 lbs. (170 kg)
HQIL8-2 525 lbs. (238 kg)
HQIL8-3 650 lbs. (295 kg)

Ansi Flange Adapter
End, Side View



Linear Measure: millimeter / inch

Changeover Valve Flow vs. Pressure Loss

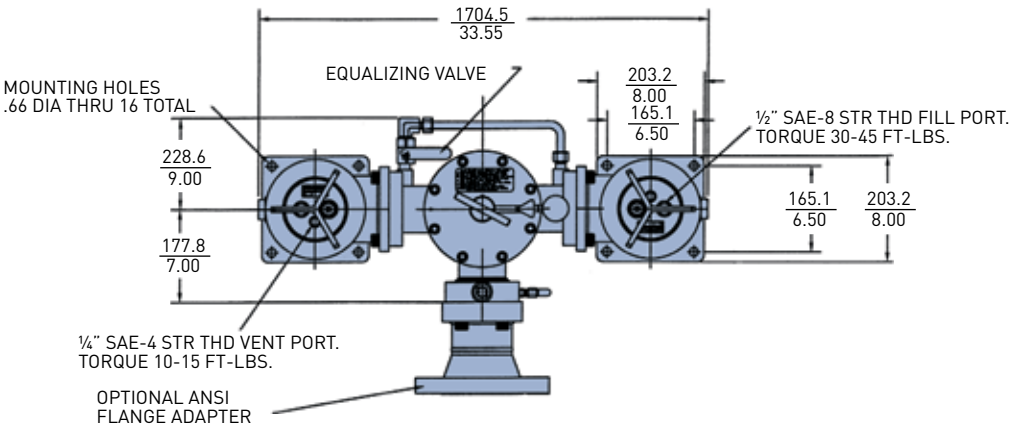


Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

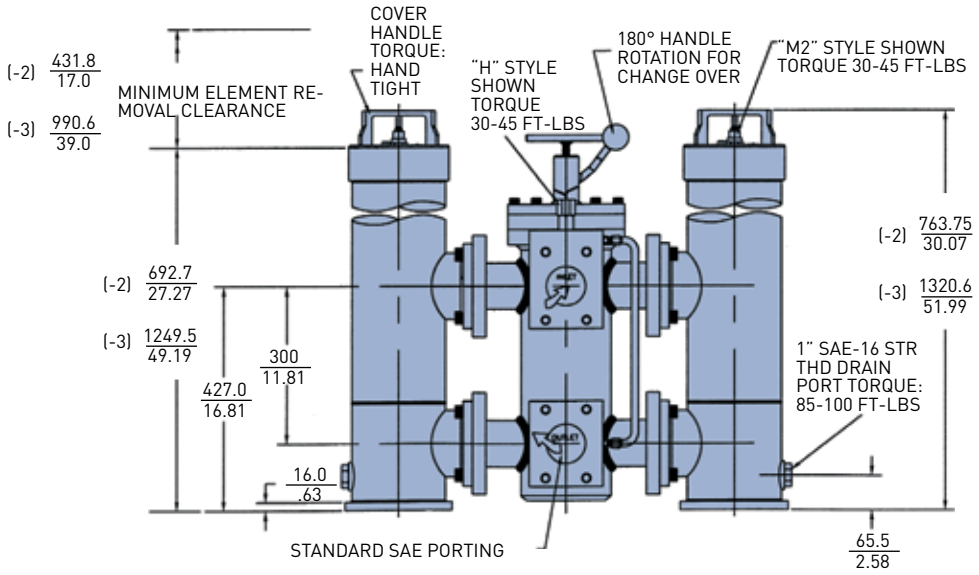
Specifications: HDIL8/HQIL8

Linear Measure: millimeter / inch

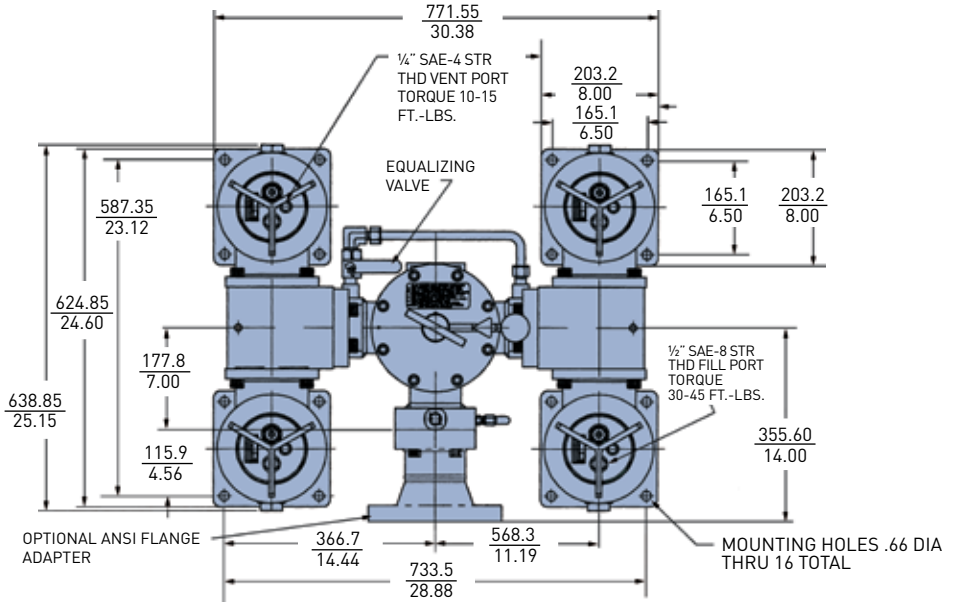
HDIL8
Top View



HDIL8/HQIL8
Side View



HQIL8
Top View

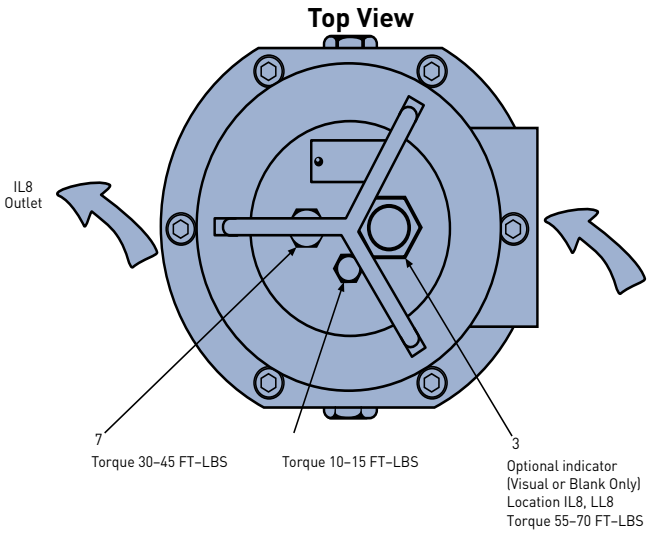


Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Element Servicing Instructions: IL8

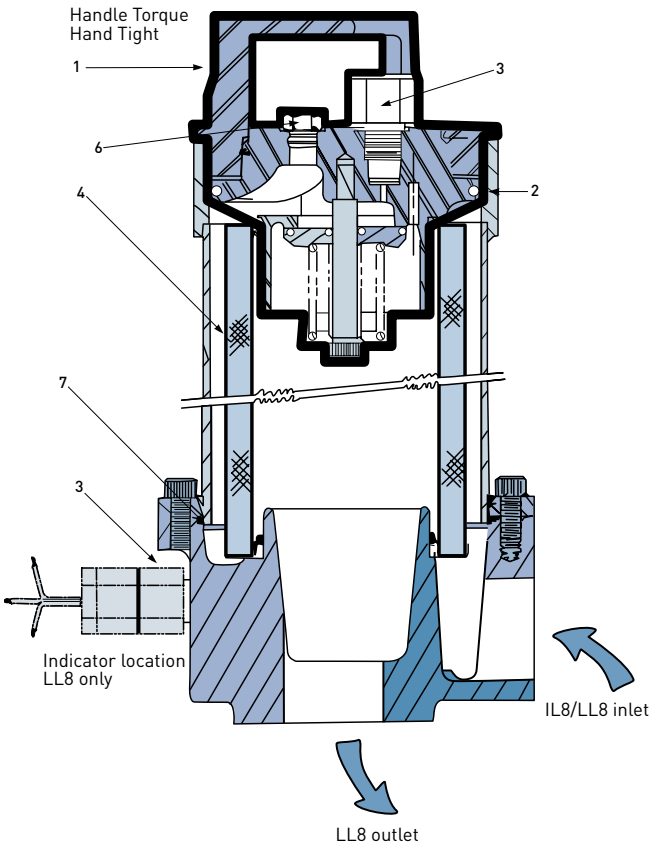
When servicing the IL8/LL8 filter, use the following procedure:

1. Stop the system's power unit.
2. Relieve pressure in the filter line. Drain fluid from housing if desired.
3. Rotate cover handle counter-clock wise. Carefully lift and remove the cover.
4. Remove element from the housing. Discard all disposable elements as they are not cleanable. With Ecoglass III elements the permanent core will remain in the housing.
5. Place new element in housing, centering it on the element locator in the bottom of bowl.
6. Inspect cover o-ring and replace if necessary.
7. Install cover, rotate clockwise and hand tighten.



Parts List

Index	Description	Nitrile P/N	Fluoro-carbon P/N
1	**Cover Assembly**		
	25 psi bypass w/indicator port	928887	928888
	50 psi bypass w/indicator port	928889	928890
	No bypass w/indicator port	928891	928892
2	**Cover o-ring**	N72257	V72257
3	**Indicators**		
	P option-indicator port plug	N/A	925515
	M225 PSI	N/A	932026
	M250 PSI	N/A	932027
	H25 PSI	N/A	933053
	H50 PSI	N/A	932905
	H225 PSI	N/A	933141
	H250 PSI	N/A	933142
	H325 PSI	N/A	934164
	H350 PSI	N/A	934165
4	**Elements** (See chart on model code page)		
not shown	**Bleed (vent) Plug,** SAE 4	931357	931358
6	**Fill Plug,** SAE 8	908822	928628
not shown	**Drain Port Plug,** SAE 10	925513	928883
7	**Base O-ring**	N72262	V72262
	Flange Kits (optional)		
	1 ½" NPTF (w/2" flange face only)	924786	926011
	2" NPTF (w/2" flange face only)	924785	926010
	SAE-24 (w/2" flange face only)	924782	926007
	2½" socket weld (w/2½" flange face only)	929313	929346
	SAE-32 (w/2½" flange face only)	929314	929347
	2½ NPTF (w/2½" flange face only)	929315	929348
NOTE:	The 2½" Flange Face Kits include the minimum width SAE J518 Code 61 Flanges.		



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Element Servicing Instructions: HDIL8/HQIL8

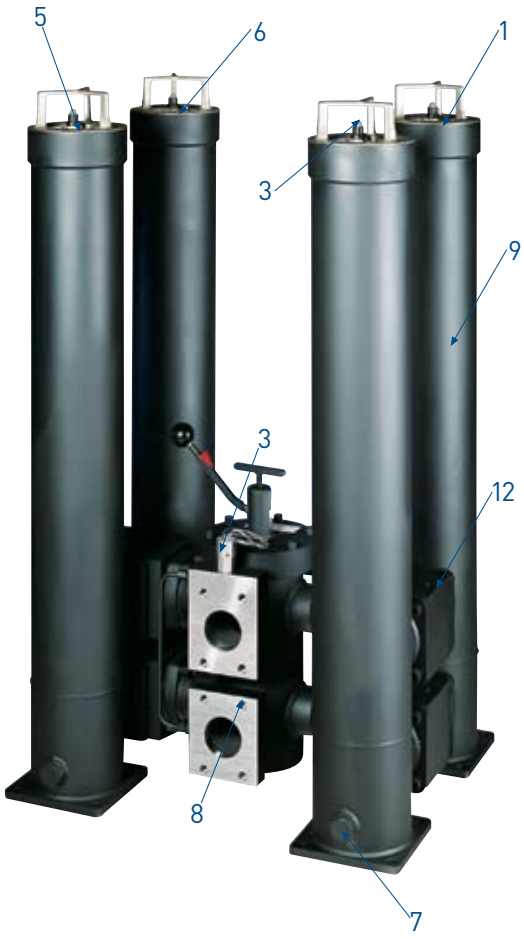
The system does not need to be shut down to service the elements.

1. Red arrow on operating handle points to on-duty chamber(s).
2. Open off-duty vent plug(s). Do not thread out completely.
3. Open the pressure equalizing (fill line) valve slowly to admit fluid to the off-duty chamber(s).
4. When fluid is discharged from the off-duty vent plug(s), close and tighten.
5. Turn the "T" handle, on the center valve section, counter-clockwise 5 turns.
6. Depress the operating handle to unseat the seal shoes, then rotate 180° and return handle upward into the opposite slot.
7. Turn the "T" handle fully clockwise and hand tighten only. This will seat the shoes.
8. Close the pressure equalizing valve.
9. Red arrow now points to the new on-duty chamber(s).
10. Open the new off-duty vent plug(s).
11. Remove the new off-duty chamber cover(s) by rotating counter-clockwise.
12. Remove the new off-duty drain plugs and drain chambers to desired level.
13. Follow steps 3 - 7 on opposite page
14. Close and tighten the vent plug(s)

Warning: You should not rotate the handle until you equalize the pressure.

Parts List

Index	Description	HDIL8		HQIL8	
		Nitrile	Fluoro-carbon	Nitrile	Fluoro-carbon
1	Cover Assembly 25psi bypass w/indicator port 50psi bypass w/indicator port No bypass w/indicator port	 928887 928889 928891	 928888 928890 928892	 928887 928889 928891	 928888 928890 928892
2	**Cover O-ring**	N72257	V72257	N72257	V72257
3	**Indicators** P option-indicator port plug M2 25psi M2 50psi H 25psi H 50psi H2 25psi H2 50psi H3 25psi H3 50psi	 N/A N/A N/A N/A N/A N/A N/A N/A N/A	 925515 932026 932027 933053 932905 933141 933142 934164 934165	 N/A N/A N/A N/A N/A N/A N/A N/A N/A	 925515 932026 932027 933053 932905 933141 933142 934164 934165
4	**Elements** (see chart on model code page)				
5	**Bleed (vent) Plug SAE-4**	931357	931358	931357	931358
6	**Fill Plug SAE-8**	908822	928628	908822	928628
7	**Drain Plug SAE-16**	925353	928364	925353	928364
8	**Transfer Valve** SAE 4" SAE 3"	 933824 933825	 936123 936122	 933824 933825	 936123 936122
9	**Housing Assembly** Double length Triple length	 933832 933831	 933832 933831	 933832 933831	 933832 933831
10	**5/8"-11 x 3" SHCS**	933928	933928	933928	933928
11	**5/8" Lock Washer**	933879	933879	933879	933879
12	**Adapter Block Kit** (block, 3 o-rings, 12 bolts)	N/A	N/A	N/A	933833
13	**Flange Adapter Kit** (flange, o-ring, 4 bolts) 3" SAE 300 lb. flange 4" SAE 300 lb. flange	 934170 934172	 934171 934173	 934170 934172	 934171 934173
14	**Seal Kit Transfer Valve**	Consult factory		Consult factory	
15	**Seal Kit Housing Assembly**	Consult factory		Consult factory	
16	**Equalizing Valve**	Consult factory		Consult factory	



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Medium Pressure Filters

IL8 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
	IL8	3	R	10QE	HP	50	RR	1

BOX 1: SEALS

Symbols	Description
None	**Nitrile**
F3	Fluorocarbon

BOX 2: Basic Assembly

Symbols	Description
IL8	**In-line**
LL8	90° angle porting
HDIL8	Duplex
HQIL8	Quadplex

BOX 3: Basic Assembly

Symbols	Description
1*	**Single length**
2	**Double length**
3	**Triple length**

*Not available for HDIL8 or HQIL8

BOX 4: Core

Symbols	Description
None	**Disposable core**
R*	**Reusable core**

*Not available for HDIL8 or HQIL8

BOX 5: Element Media

Symbols	Description
20Q	**MicroglassIII**
10Q	**MicroglassIII**
05Q	**MicroglassIII**
02Q	MicroglassIII
WR	Water removal
20QE	**Ecoglass III**
10QE	**Ecoglass III**
05QE	**Ecoglass III**
02QE	Ecoglass III

Note: Ecoglass III elements must utilize "R" option in BOX 4.

BOX 6: Indicators

Symbol	Description
P	**Port plugged**
M2	**Visual auto reset**
H	Electrical w/ conduit connection
H2	Electrical w/ DIN 43650 connector
H3	Electrical w/ 3-pin ANSI/B 93.55M connector
E	Electrical/Visual (w/ ½" NPT conduit connection and wire leads)

Note: Two symbols required, first is for housing, the second is for the cover(s). Electrical indicators only available on the housing

BOX 7: Bypass & Indicator Setting

Symbols	Description
25	**25 psid**
50	50 psid
XX	No indicator and blocked bypass

BOX 8: Ports

Symbols	Description
	IL8/LL8
PP	SAE-24 straight thread
RR	SAE-32 straight thread
YY	SAE 2" flange face
ZZ*	SAE 2-½" flange face

* Note: IL8 outlet port requires minimum width SAE J518 code 61 flange.

	HDIL8/HQIL8
WW	3" SAE flange face (code 61)
QQ	4" SAE flange face(code 61

BOX 9: Option

Symbols	Description
1	**None**
11	Blocked bypass

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

Replacement Elements

Microglass III (Fluorocarbon)				Ecoglass III (Fluorocarbon)			
Media	**Single**	**Double**	**Triple**	**Media**	**Single**	**Double**	**Triple**
20Q	**929099Q**	**933047Q**	**932875Q**	**20QE**	**N/A**	**933837Q**	**933736Q**
10Q	**927661Q**	**933046Q**	**932874Q**	**10QE**	**N/A**	**933836Q**	**933735Q**
05Q	**927861Q**	**933045Q**	**932873Q**	**05QE**	**N/A**	**933835Q**	**933612Q**
02Q	**927663Q**	**933044Q**	**932872Q**	**02QE**	**N/A**	**933834Q**	**933734Q**
WR	929103	929109	932006	Reuseable Core	**N/A**	933838	933636

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

15/40/80CN Series

Medium Pressure Filters

Medium Pressure Filters

15/40/80CN Series

Applications for CN series Filters

- Compressor Lube Oil
- Off-line Filter Loops
- Machine Tools (Automotive Standard)
- Hydrostatic Drive Charge Pumps
- Mobile Equipment
- Pilot Lines For Servo Controls
- Oil Patch Drilling Equipment
- Injection Molding

This partial list of applications for Parker "CN" series filters has a common factor, the need for an economical, medium pressure range filter with excellent fatigue pressure ratings. Prior to the availability of the "CN" filter, applications such as those listed were restricted by limitations of a spin-on can, or forced into the higher cost range of high pressure filters.

The "CN" series fills this gap, and now with the newly increased fatigue rating from 550 to 800 psi, the applications are expanded.

Ecoglass III Replacement Elements

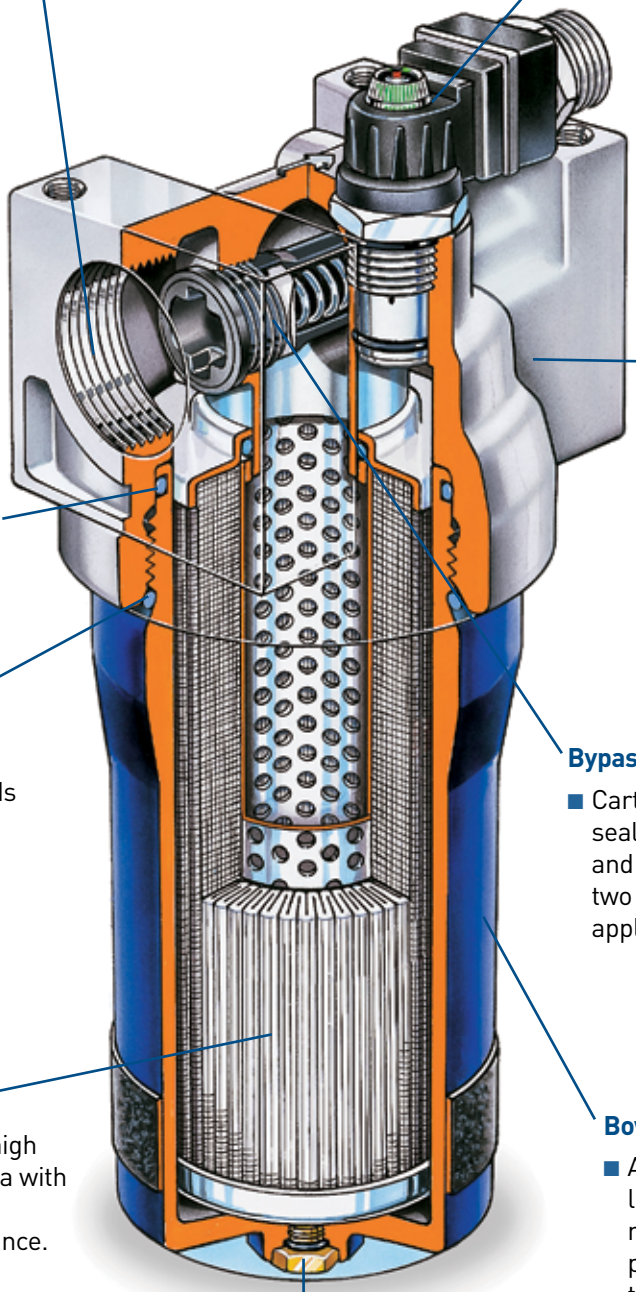
Ecoglass III represents the merging of high performance filtration technology with environmentally conscious engineering. The Ecoglass III line of replacement elements feature 100% non-metallic construction. The design reduces solid waste and minimizes disposal costs for industry. The non-metallic construction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

The Ecoglass III elements utilize 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.

Features	Advantages	Benefits
▪ 800 psi fatigue rating (eight times that of a spin-on)	▪ Ability to provide reliable service under tough cyclic operating conditions ▪ Can be utilized in applications where high pressure filters may have been only option	▪ Reduced downtime due to premature filter failures ▪ Reduced costs, better "fit" for the application
▪ Diametral (side) seal between head and bowl	▪ Proven reliability in cyclic applications ▪ Reduced importance of bowl torque	▪ No downtime, no leaks ▪ Performs with "real world" service
▪ Dust Seal	▪ Prevents contamination from building up on bowl / head threads	▪ Easier service, no galling
▪ 40CN-2 meets automotive HF3 standard ▪ 15CN meets automotive HF2 standard	▪ Automotive industry acceptance	▪ Satisfies specifications without need for further testing and/or approval
▪ Cast aluminum head	▪ Low profile, lightweight and durable	▪ Less weight, smaller envelop and cleaner appearance
▪ Standard Ecoglass III elements	▪ Multi-layered design produced high capacity and efficiency ▪ Reduces pleat bunching, keeps performance consistent	▪ Great performance value ▪ Reliable performance throughout element life ▪ Reduces downtime, maximizes element life
▪ Complete performance data disclosure	▪ All pertinent information is provided in an easy-to-compare format	▪ No hidden deficiencies ▪ Easy selection of proper filtration
▪ Visual, electrical or electrical/visual indicators available	▪ Check element condition at a glance ▪ Right style for the application	▪ Optimize element life, prevent bypassing ▪ Matches your system electrical connections

Features



Ports

- SAE, NPT or flange face (80CN) provides mounting flexibility.

Element Condition Indicators

- Available in visual or electrical, with a choice of several power connections (E3 shown).

Head

- Cast aluminum is rugged with small profile for easy mounting.

Diametral (side) Seal

Dust Seal

- Protects head and bowl threads from external contamination buildup.

Bypass

- Cartridge style bypass has good sealing characteristics and low hysteresis. Choice of two settings to match application needs.

Element Assembly

- High efficiency (B_x>200), high capacity Ecoglass III media with it's multi-layered design is unequalled in performance.

Bowl

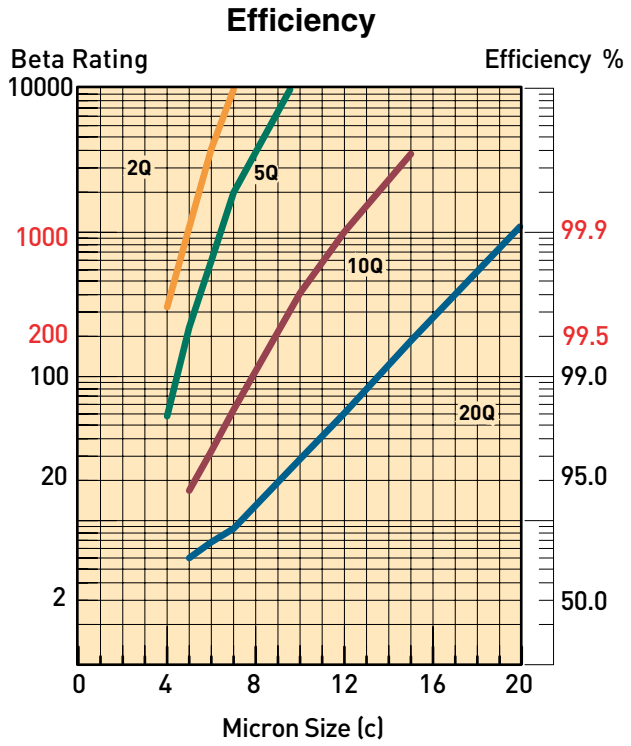
- Anodized aluminum is lightweight and corrosion resistant. Friction grip tape prevents slipping when rotating the bowl during service.

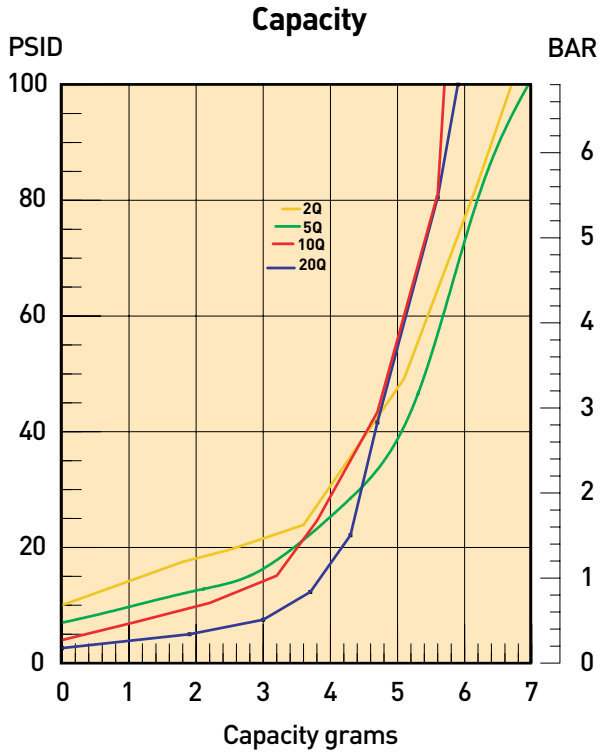
Drain Port (optional)

- Optional drain port allows for easy element servicing.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

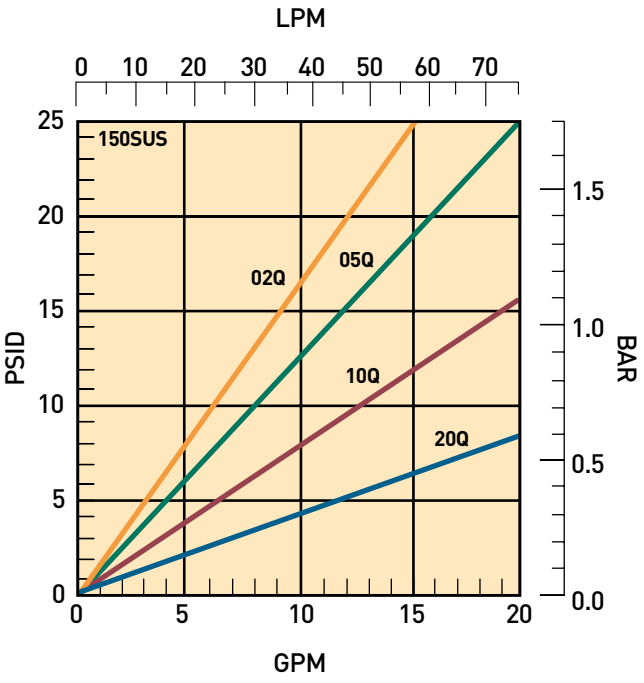
15CN-1 Element Performance

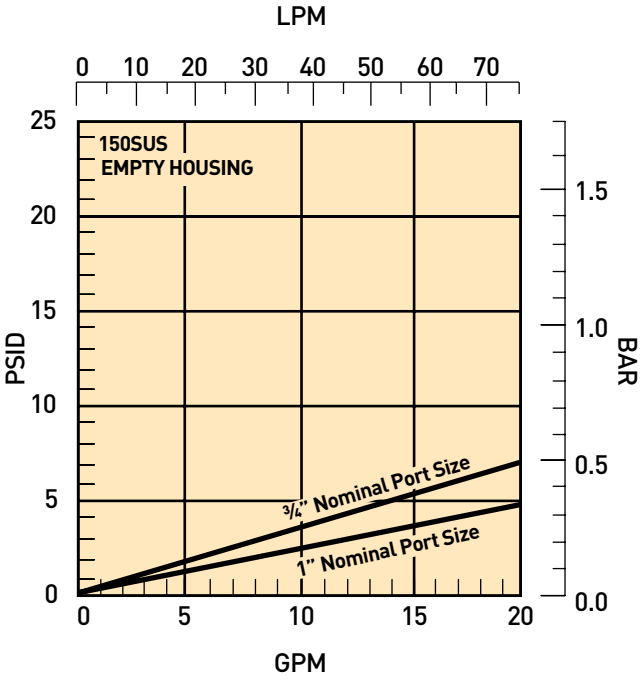




Results typical from Multi-pass tests run per test standard ISO 16889 @ 10 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





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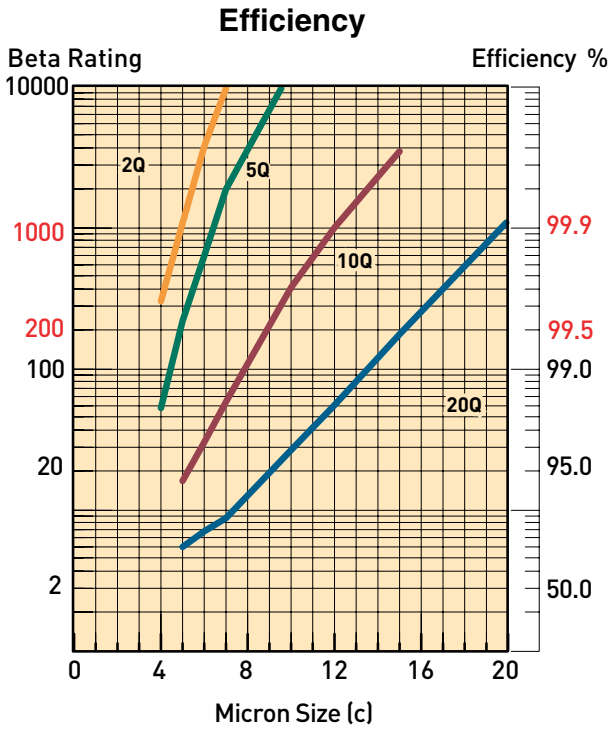
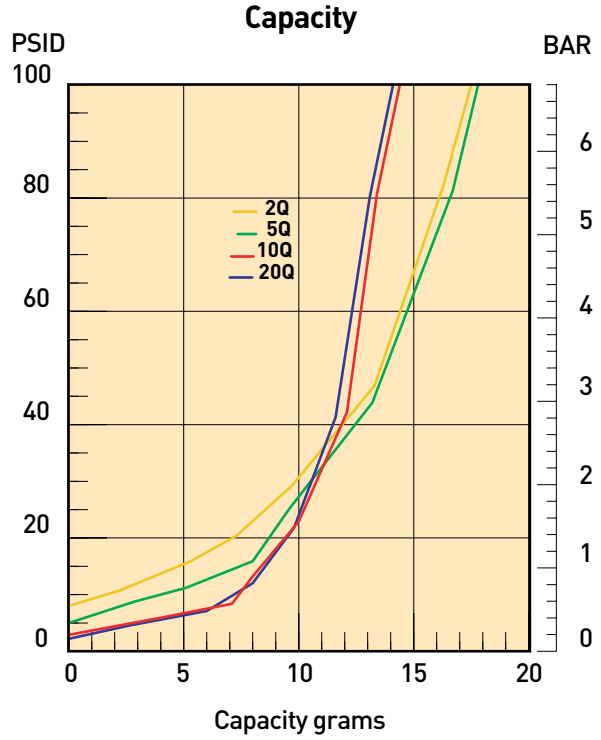
Hydraulic Filter Division
Metamora, OH

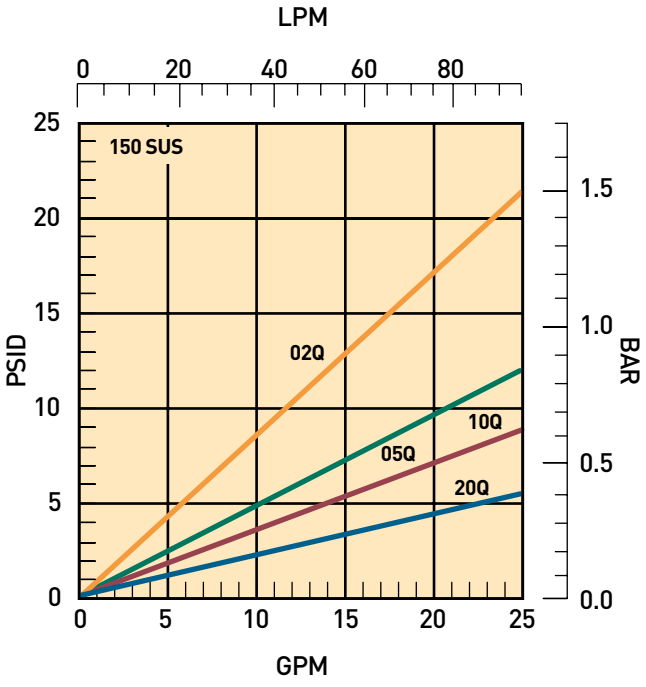
15CN-2 Element Performance

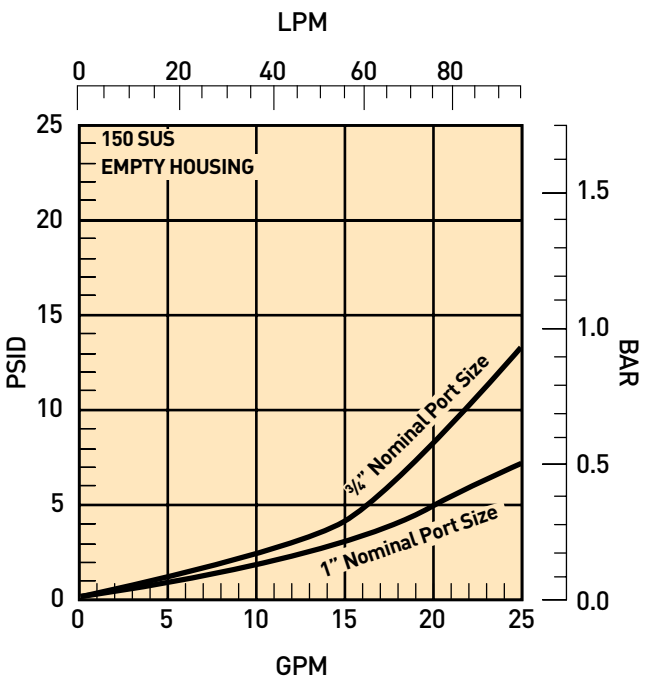




Results typical from Multi-pass tests run per test standard ISO 16889 @ 15 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





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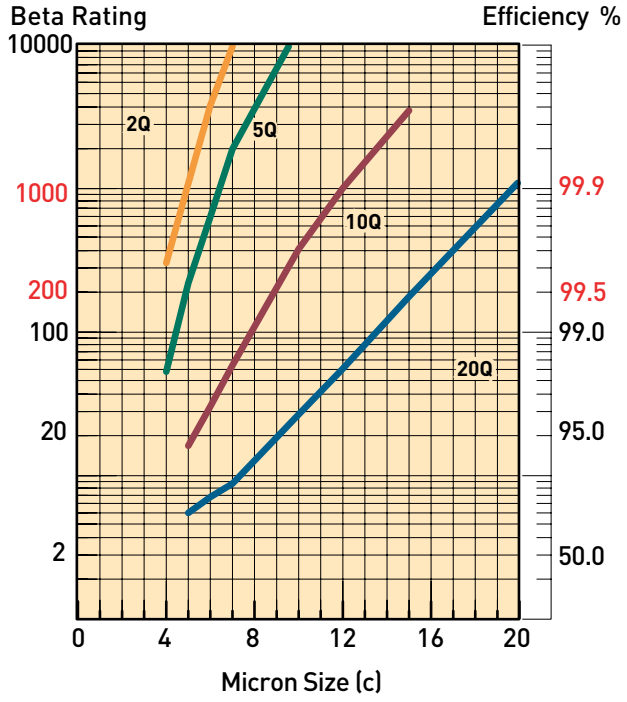
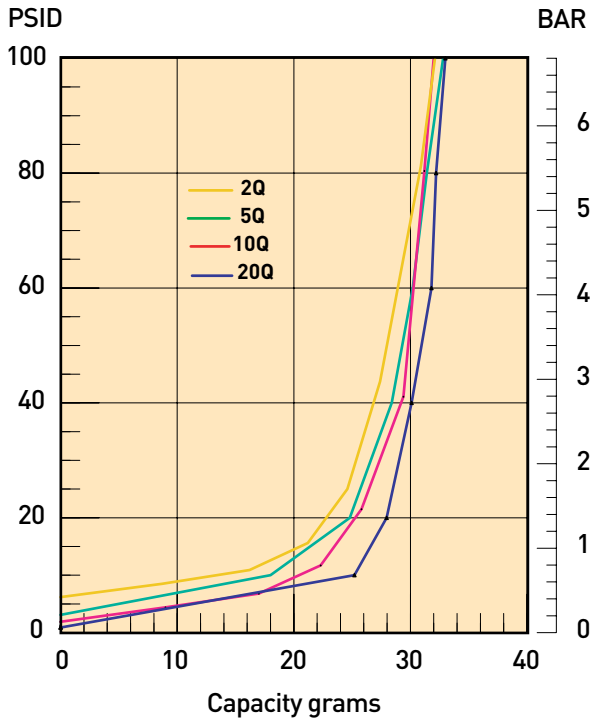
Metamora, OH

40CN-1 Element Performance

Efficiency

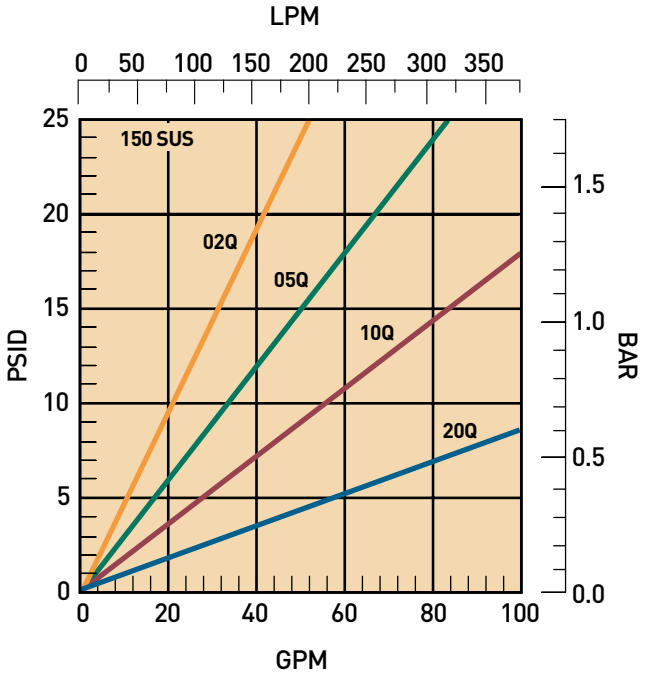


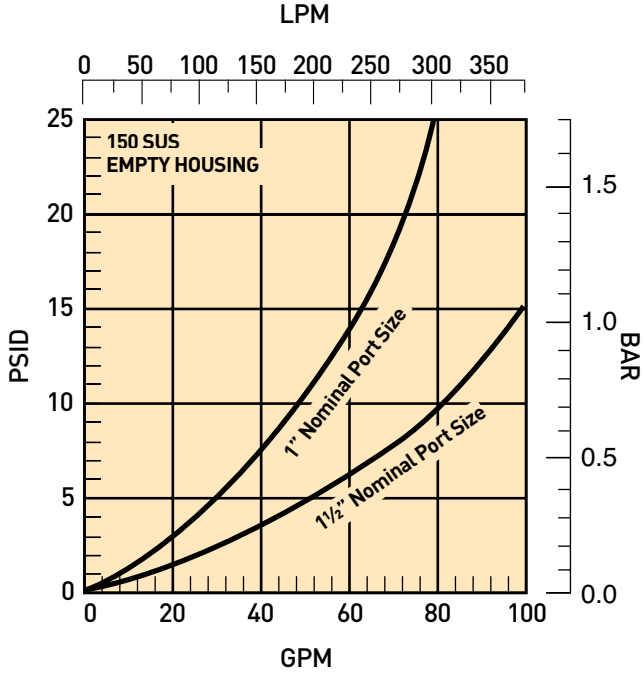
Capacity



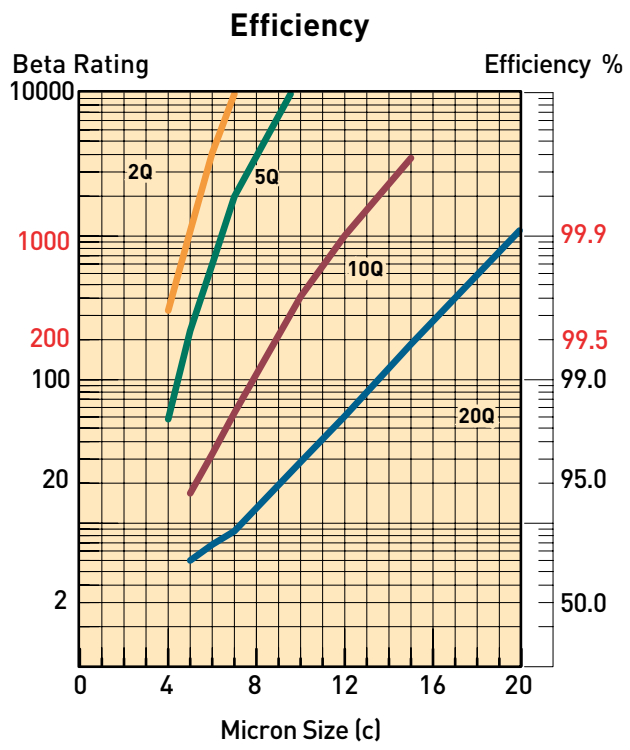
Results typical from Multi-pass tests run per test standard ISO 16889 @ 15 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

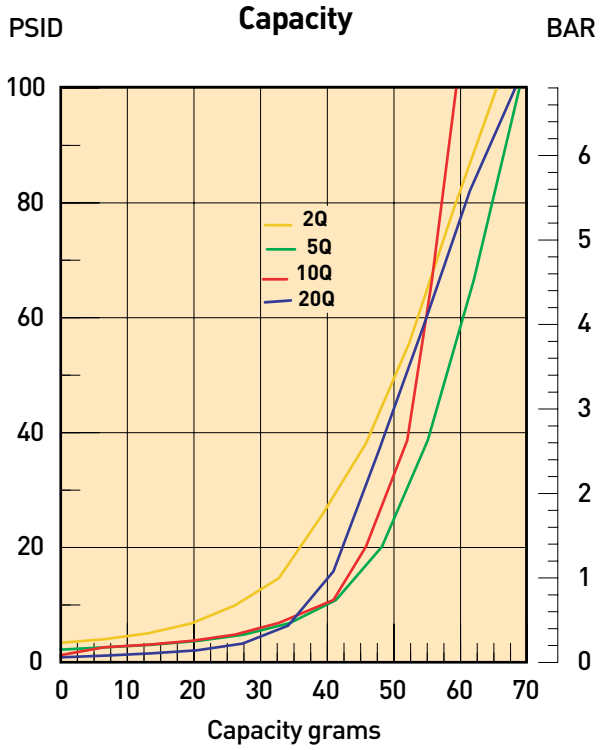
Flow vs. Pressure Loss





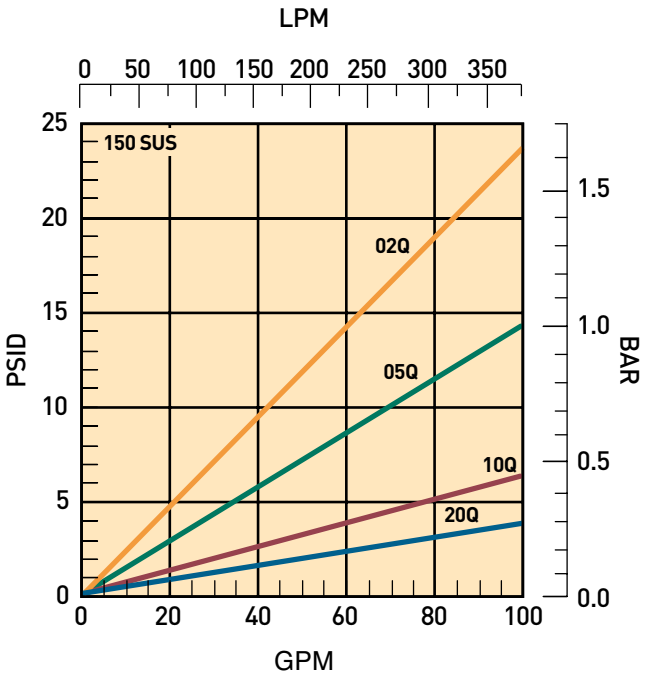
40CN-2 Element Performance

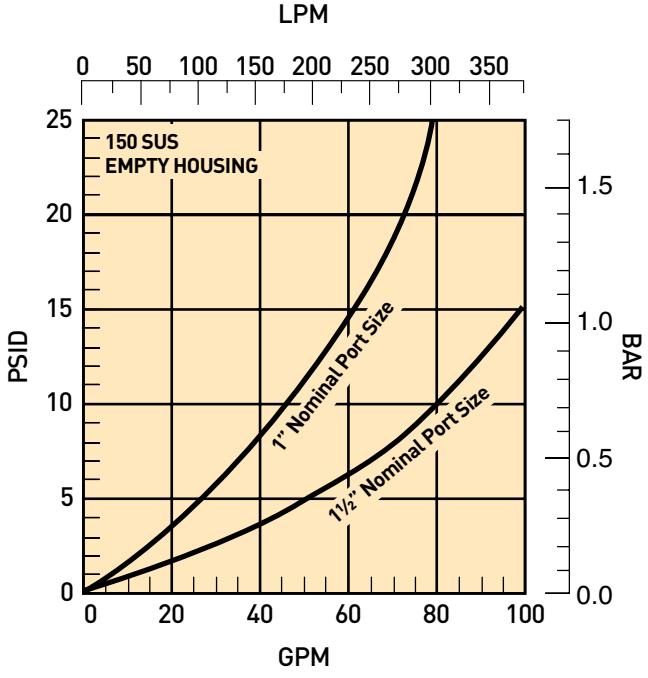




Results typical from Multi-pass tests run per test standard ISO 16889 @ 30 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





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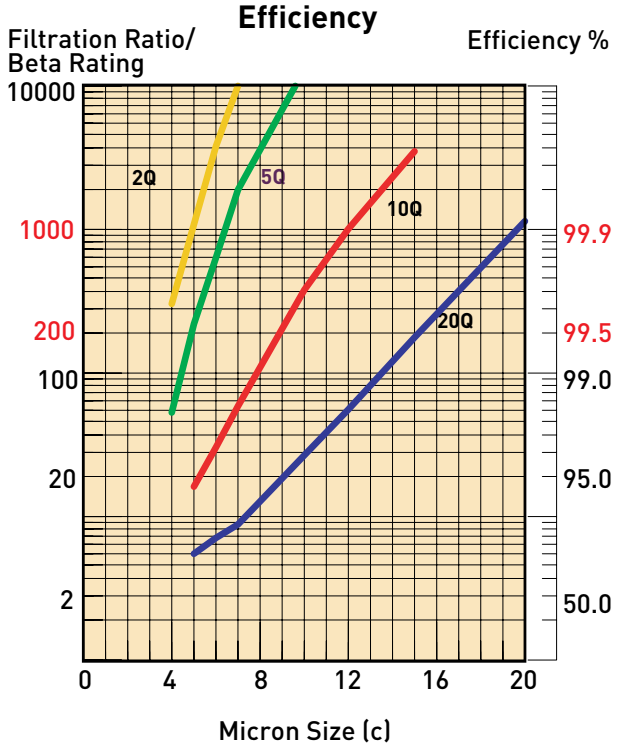
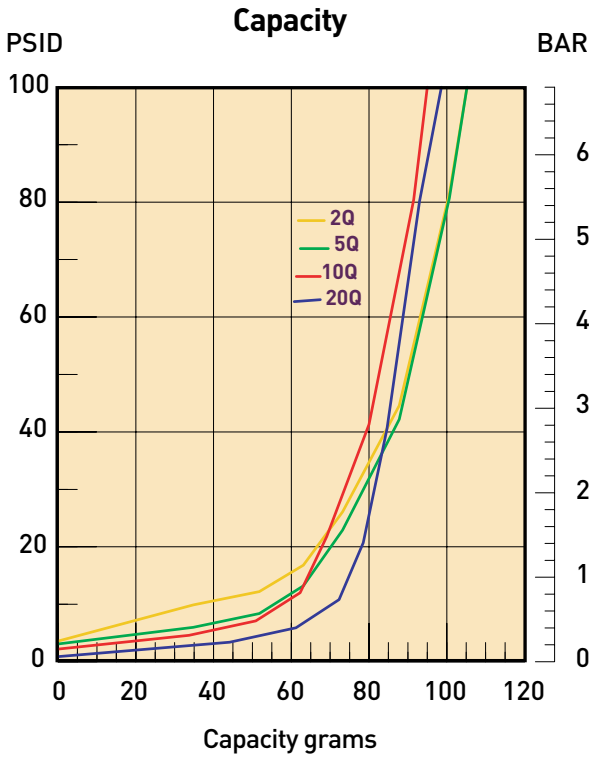
Metamora, OH

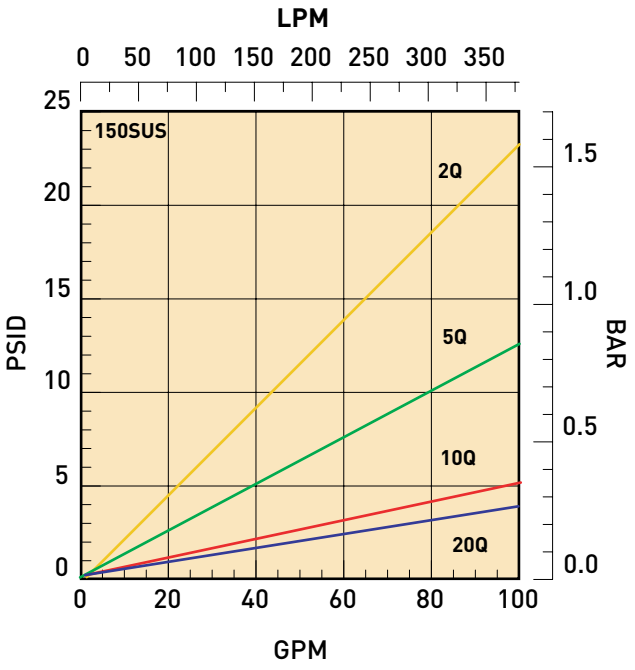
40CN-3 Element Performance

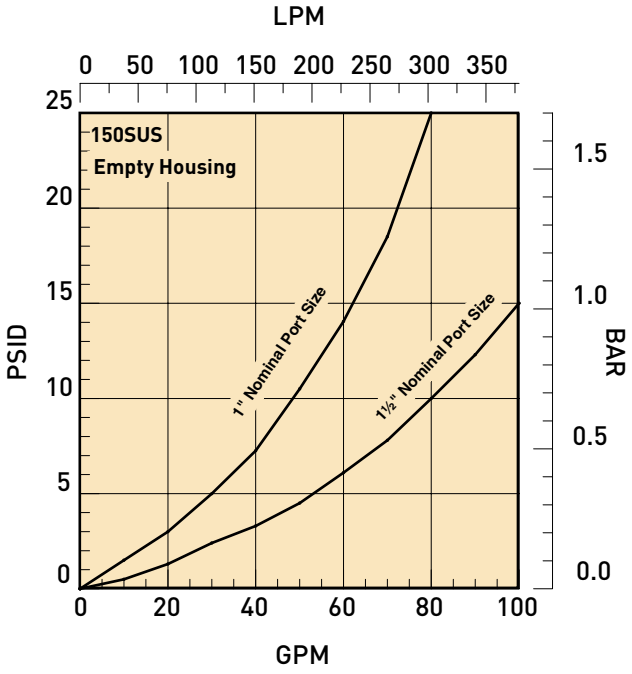




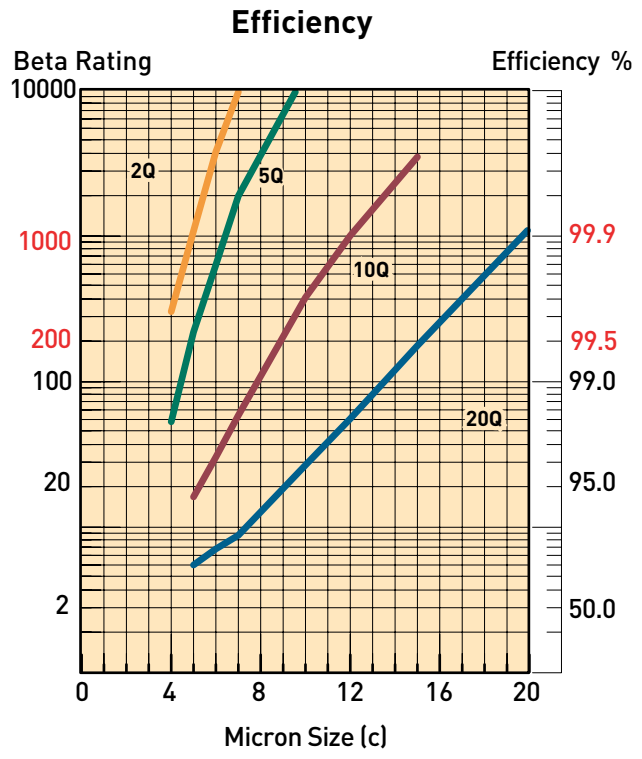
Results typical from Multi-pass tests run per test standard ISO 16889 @ 45 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

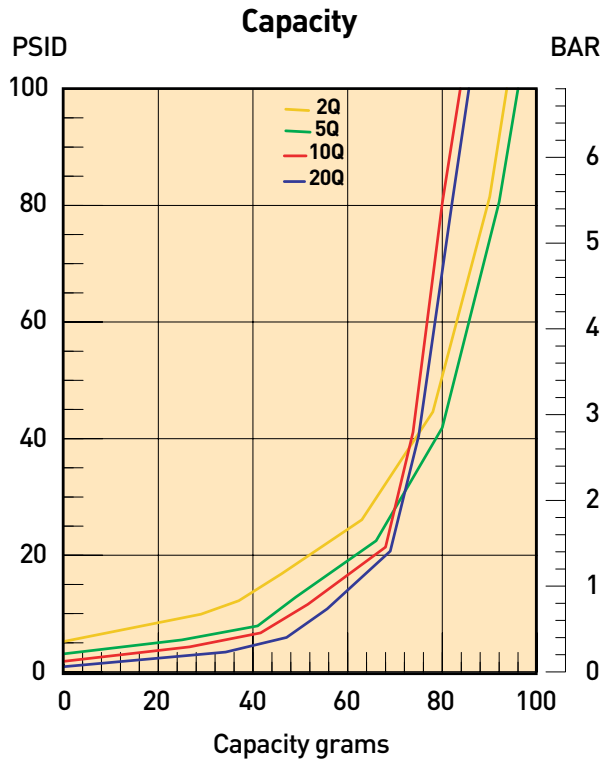
Flow vs. Pressure Loss





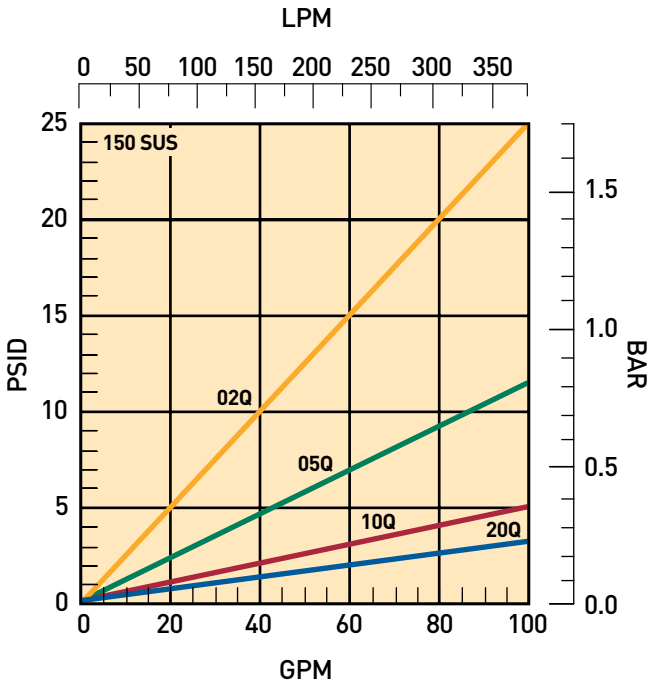
80CN-1 Element Performance

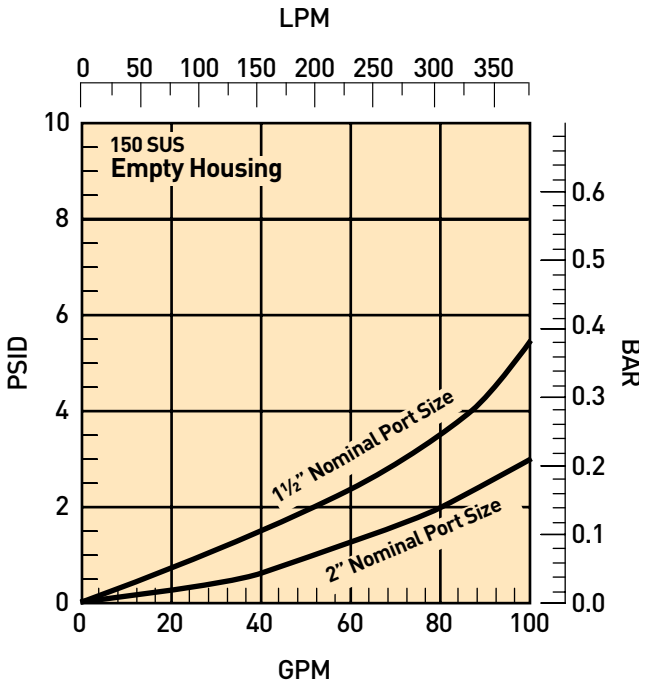




Results typical from Multi-pass tests run per test standard ISO 16889 @ 45 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





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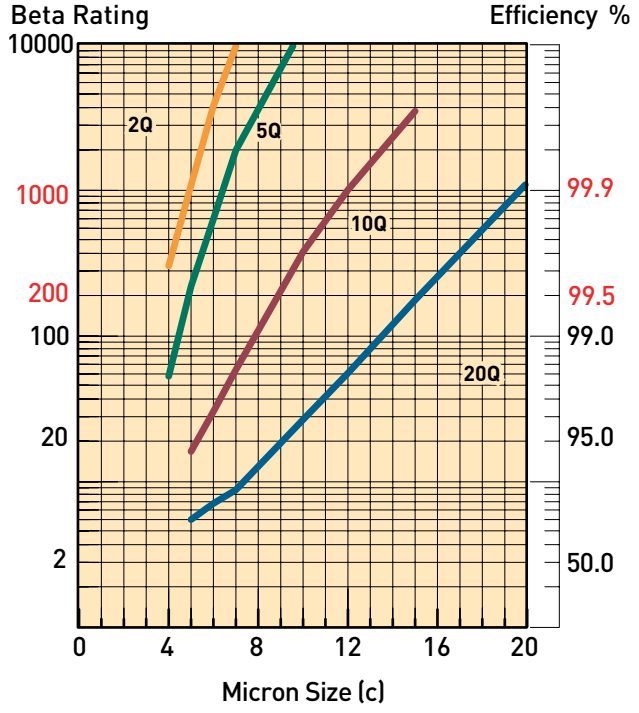
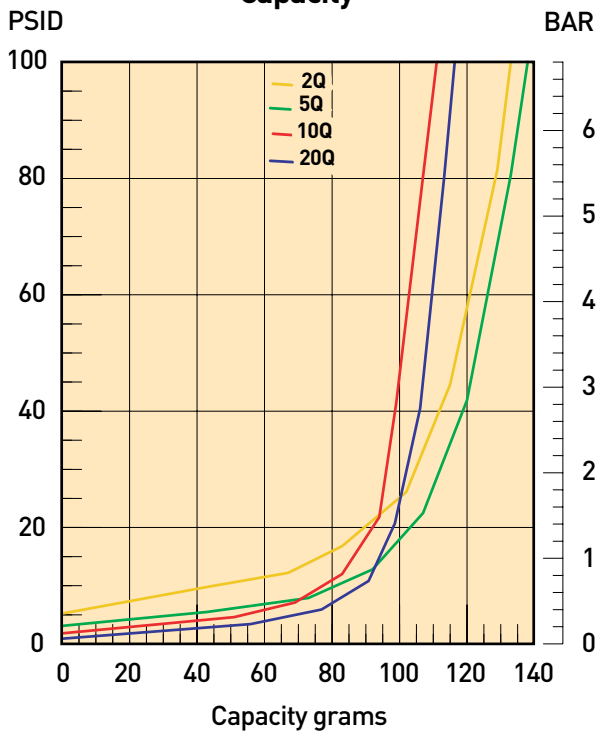
Hydraulic Filter Division
Metamora, OH

80CN-2 Element Performance

Efficiency

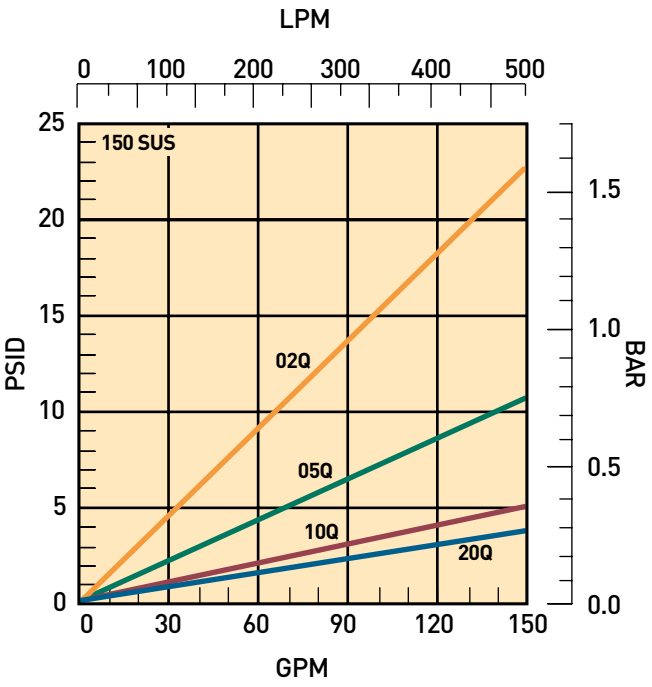


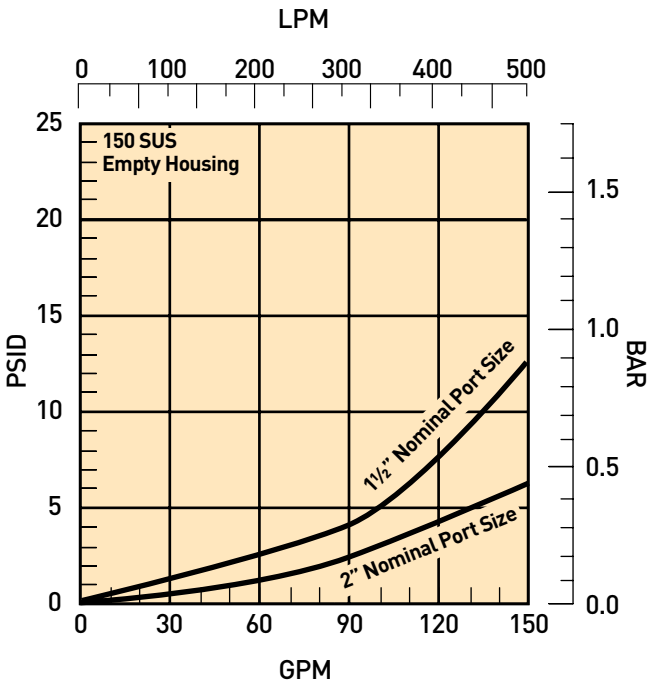
Capacity



Results typical from Multi-pass tests run per test standard ISO 16889 @ 70 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





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Metamora, OH

Specifications: CN Series

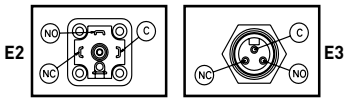
Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 1000 psi (69 bar)
Rated Fatigue Pressure: 800 psi (55.2 bar)
Design Safety Factor: 2.5:1

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:
Standard: 150 psi (10.3 bar)

Materials:
Head and Bowl: Aluminum
Indicators: Aluminum body, plastic connectors
Bypass: Nylon

Element Condition Indicators:
Visual 360° green/red auto reset
Electrical/Visual
5A @ 240VAC, 3A @ 28VDC

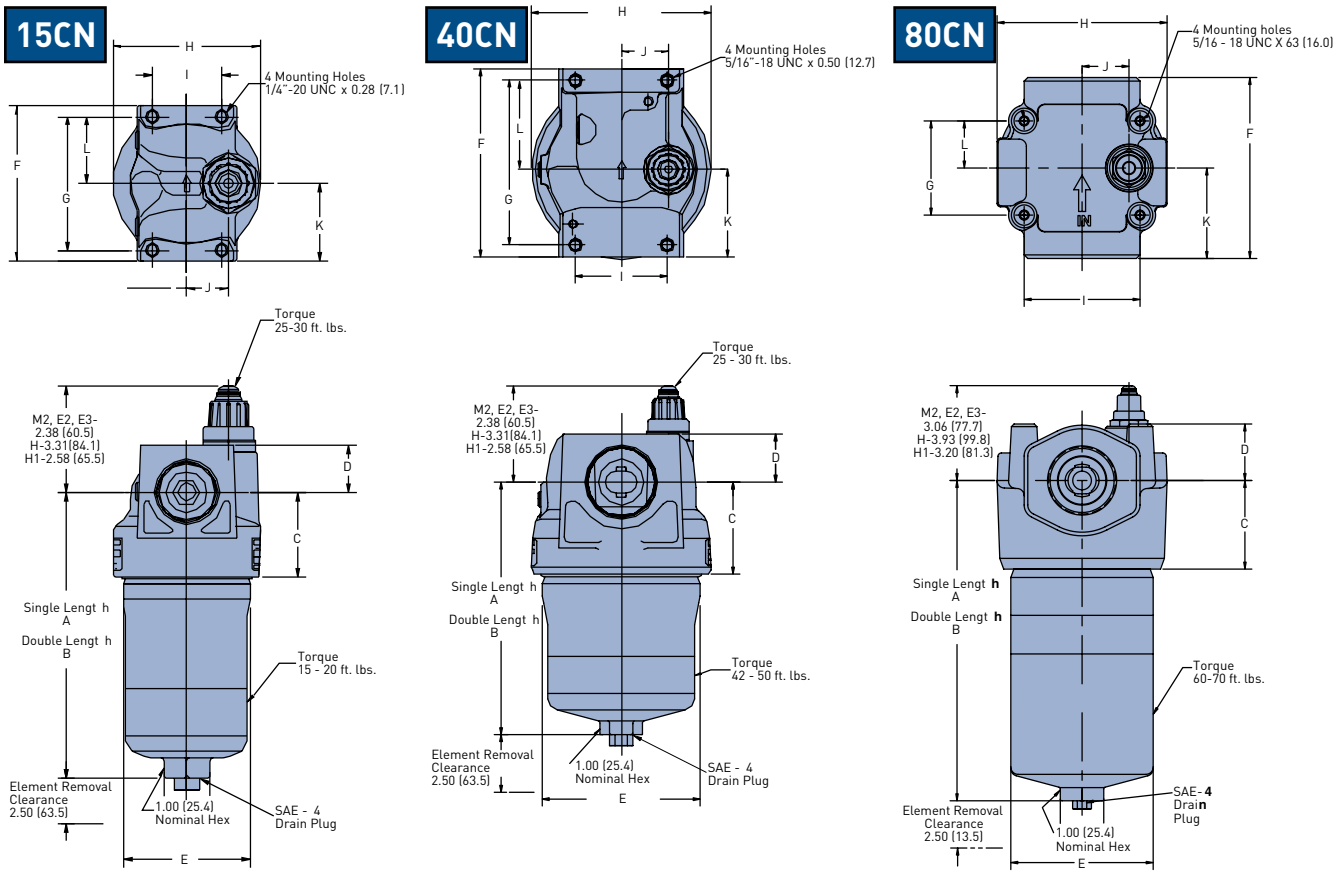


Electrical-Heavy Duty
.25A(resistive) MAX 5 watts
12 to 28 VDC & 110 to 175 VAC
Color code: White (common), Black (normally open), Blue (normally closed)

Weights (approximate):

Model	Single length	Double length
15CN	2.5 lb. (1.13 kg)	3.5 lb. (1.6 kg)
40CN	4.5 lb. (2.00 kg)	5.5 lb. (2.49 kg)
80CN	12.4 lb. (5.62 kg)	15.2 lb. (6.89 kg)

Dimensions are in(mm)	A	B	C	D	E	F	G	H	I	J	K	L
15CN	6.17(156.6)	9.87(250.7)	1.83(46.5)	1.09(25.4)	2.80(71.1)	3.38(85.9)	2.88(73.2)	3.25(82.6)	1.50(88.1)	.90(22.9)	1.69(42.9)	1.44(36.6)
40CN	6.73(170.8)	10.33(262.4)	2.44(62.0)	1.28(32.6)	4.22(107.2)	5.00(127.0)	4.37(111.0)	4.80(121.9)	2.44(62.0)	1.25(31.8)	2.32(58.8)	2.37(60.2)
80CN	11.06(280.9)	15.81(401.6)	3.06(77.7)	1.95(49.5)	4.91(124.8)	6.25(158.7)	3.25(82.6)	5.96(151.4)	4.00(101.6)	1.62(41.1)	3.12(79.4)	1.63(41.3)



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Element Service

A. Stop the system's power unit.

B. Relieve any system pressure in the filter line.

C. Drain the filter bowl if drain port option is provided.

D. Loosen and remove bowl.

E. Remove element by pulling downward with a slight twisting motion and discard.

F. Check bowl o-ring for damage and replace if necessary.

G. Lubricate element o-ring with system fluid and place on post in filter head.

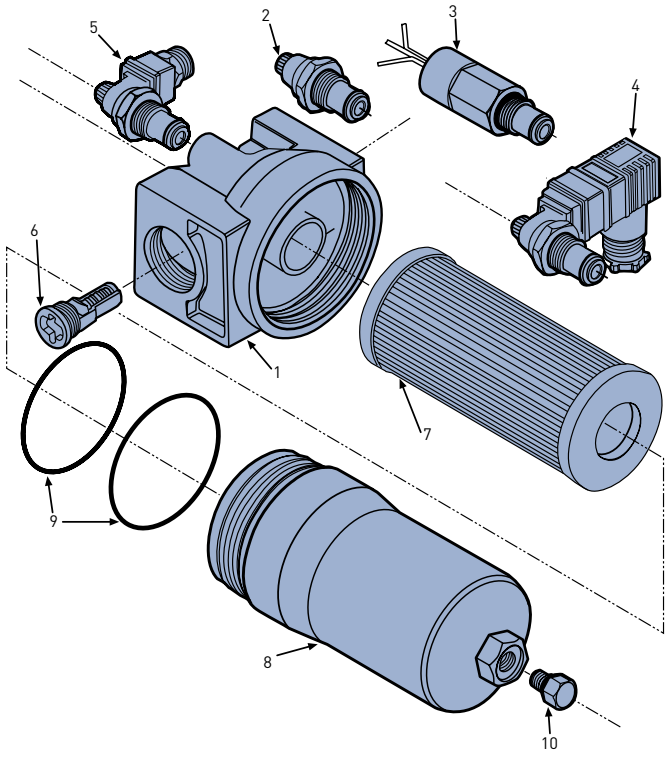
H. Install bowl and tighten to specified torque.

15CN - 15-20 ft. lbs

40CN - 42-50 ft. lbs

80CN - 60-70 ft. lbs

I. Confirm there are no leaks after powering the system.



Parts List

Index	Description	15CN	40CN	80CN
1	**Head**			
	3/4" NPT bypass/ indicator ready	933865	N/A	N/A
	3/4" NPT no bypass/ no indicator	933877	N/A	N/A
	3/4" NPT no bypass/ indicator ready	933869	N/A	N/A
	3/4" NPT no indicator/ bypass ready	933873	N/A	N/A
	SAE-12 bypass/ indicator ready	933863	N/A	N/A
	SAE-12 no bypass/ no indicator	933875	N/A	N/A
	SAE-12 no bypass/ indicator ready	933867	N/A	N/A
	SAE-12 no indicator/ bypass ready	933871	N/A	N/A
	1" NPT bypass/ indicator ready	933864	932950	N/A
	1" NPT no bypass/ no indicator	933876	932986	N/A
	1" NPT no bypass/ indicator ready	933868	932962	N/A
	1" NPT no indicator/ bypass ready	933872	932974	N/A
	SAE-16 bypass/ indicator ready	933862	932947	N/A
	SAE-16 no bypass/ no indicator	933874	932983	N/A
	SAE-16 no bypass/ indicator ready	933866	932959	N/A
	SAE-16 no indicator/ bypass ready	933870	932971	N/A
	1 1/2" NPT bypass/ indicator ready	N/A	932948	934012
	1 1/2" NPT no bypass/ no indicator	N/A	932984	934018
	1 1/2" NPT no bypass/ indicator ready	N/A	932960	934016
	1 1/2" NPT no indicator/ bypass ready	N/A	932972	934014
	SAE-24 bypass/ indicator ready	N/A	932945	934027
	SAE-24 no bypass/ no indicator	N/A	932981	934033
	SAE-24 no bypass/ indicator ready	N/A	932957	934031
	SAE-24 no indicator/ bypass ready	N/A	932969	934029
	2" NPT bypass/ indicator ready	N/A	N/A	934020
	2" NPT no bypass/ no indicator	N/A	N/A	934026
	2" NPT no bypass/ indicator ready	N/A	N/A	934024
	2" NPT no indicator/ bypass ready	N/A	N/A	934022
	SAE-32 bypass/ indicator ready	N/A	N/A	934035
	SAE-32 no bypass/ no indicator	N/A	N/A	934042
	SAE-32 no bypass/ indicator ready	N/A	N/A	934040
	SAE-32 no indicator/ bypass ready	N/A	N/A	934037
	Flange face, SAE 2" bypass/ indicator ready	N/A	N/A	934103
	Flange face, SAE 2" no bypass/ no indicator	N/A	N/A	934109
	Flange face, SAE 2" no bypass/ indicator ready	N/A	N/A	934107
	Flange face, SAE 2" no indicator/ bypass ready	N/A	N/A	934105
	Indicators			
2	M2-Visual auto reset/ 25 psi	932026	932026	932026
	M2-Visual auto reset/ 50 psi	932027	932027	932027
3	H-Electrical/ 25 psi w/ 1/2" conduit connection	933053	933053	933053
	H-Electrical/ 50 psi w/ 1/2" conduit connection	932905	932905	932905
	H1-Electrical/ 25 psi w/ wire leads	933054	933054	933054
	H1-Electrical/ 50 psi w/ wire leads	932906	932906	932906
	Not Shown:			
	E-Electrical/Visual 25 psi w/ wire leads	929610	929610	929610
	E-Electrical/Visual 50 psi w/ wire leads	929587	929587	929587
4	E2-Electrical/Visual 25 psi w/ DIN connection	931153	931153	931153
	E2-Electrical/Visual 50 psi w/ DIN connection	929599	929599	929599
5	E3-Electrical/Visual 25 psi w/ 3-pin connection	932773	932773	932773
	E3-Electrical/Visual 50 psi w/ 3-pin connection	929596	929596	929596
6	**Bypass Valve**			
	25 psid assembly	928979	930507	933628
	50 psid assembly	928981	933424	933630
	Not Shown:			
	No bypass plug	935744	927719	934174
7	**Element (see model code page)**			
8	**Bowl**			
	Single length	936758	936760	936763
	Double length	936759	936761	936764
	Triple length	–	936762	–
9	**Bowl and Dust Seal**			
	Buna N (Nitrile)	N72142	N72239	N72244
	Fluorocarbon	V72142	V72239	V72244
10	**Drain Plug - SAE-4**			
	Buna N (Nitrile)	921088	921088	921088
	Fluorocarbon	928882	928882	928882

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
40CN	1	10QE	B	M2	K	N24	4

BOX 1: Filter Series	
Symbol	**Description**
15CN	**In line Filter**
40CN	**In line Filter**
80CN	**In line Filter**

BOX 2: Element Length	
Symbol	**Description**
1	**Single**
2	**Double**
3	**Triple (40CN Only)**

BOX 3: Media Code	
Symbol	**Description**
02QE	**Ecoglass III, 2 micron**
05QE	**Ecoglass III, 5 micron**
10QE	**Ecoglass III, 10 micron**
20QE	**Ecoglass III, 20 micron**

BOX 4: Seals	
Symbol	**Description**
B	**Nitrile**
E	EPR
V	**Fluorocarbon**

BOX 5: Indicator	
Symbol	**Description**
M2	**Visual auto reset**
H	Electrical indicator, w/½"-14 NPT connection and 12" leads
E	Electrical/visual w/½ NPT conduit connection and wire leads
E2	**Electrical/visual (DIN 43650 Hirschman style connection)**
E3	Electrical /visual (ANSI/ B.9355M 3-Pin Brad Harrison style connection)
P	**Port plugged**

BOX 6:	
Symbol	**Description**
G	**25 PSI (1.7 bar) setting**
K	**50 PSI (3.5 bar) setting**

BOX 7: Port	
Symbol	**Description**
	15CN
N12	¾" NPT
N16	1" NPT
S12	**SAE–12 staight thread**
S16	**SAE–16 staight thread**
	40CN
N16	1" NPT
N24	1½" NPT
S16	**SAE–16 staight thread**
S24	**SAE–24 staight thread**
	80CN
N24	1½" NPT
N32	2" NPT
S24	**SAE–24 staight thread**
S32	**SAE–32 staight thread**
Y32	**Flange face, SAE–2"**

BOX 8: Options	
Symbol	**Description**
4	**Standard drain port on bowl**
21	No bypass and drain port

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

Replacement Elements (Ecoglass)

MEDIA	15CN-1	15CN-2	40CN-1	40CN-2	40CN-3	80CN-1	80CN-2
20Q	936701Q	936705Q	936709Q	936712Q	936721Q	936715Q	936719Q
10Q	936700Q	936704Q	936708Q	936601Q	936720Q	936602Q	936718Q
05Q	936699Q	936703Q	936707Q	936711Q	936623Q	936714Q	936718Q
02Q	936698Q	936702Q	936706Q	936710Q	936622Q	93613Q	936716Q

Notes

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

MPD Series

Medium Pressure Duplex

Medium Pressure Duplex

MPD Series

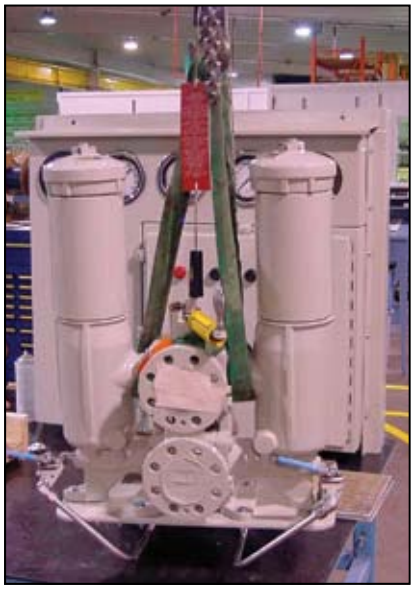
Applications of MPD

- Circulating Lube Oil Systems
- Power Generation Control Systems
- Steel Mill Control Systems
- Pulp & Paper Control Systems
- Test Stands
- Automotive Stamping Presses
- Offshore & Land Based Oilfield Applications

MPD series filters are an outstanding choice for today's demanding hydraulic control and circulating oil systems. The MPD's innovative modular design, rugged ductile iron construction and coreless element technology, combined with many other features, provide solutions across a broad range of industrial applications.

The Modular design provides user flexibility for simplex or duplex applications. Incorporating side chambers as simplex filters along with duplex installations provide common elements across the circuit design.

Construction features like full ported transfer valve with neutral center flow capability offer tremendous benefit in cold start conditions. Standard features like pressure sensing taps, vents, drains and internal pressure equalization make this product incomparable in industry.



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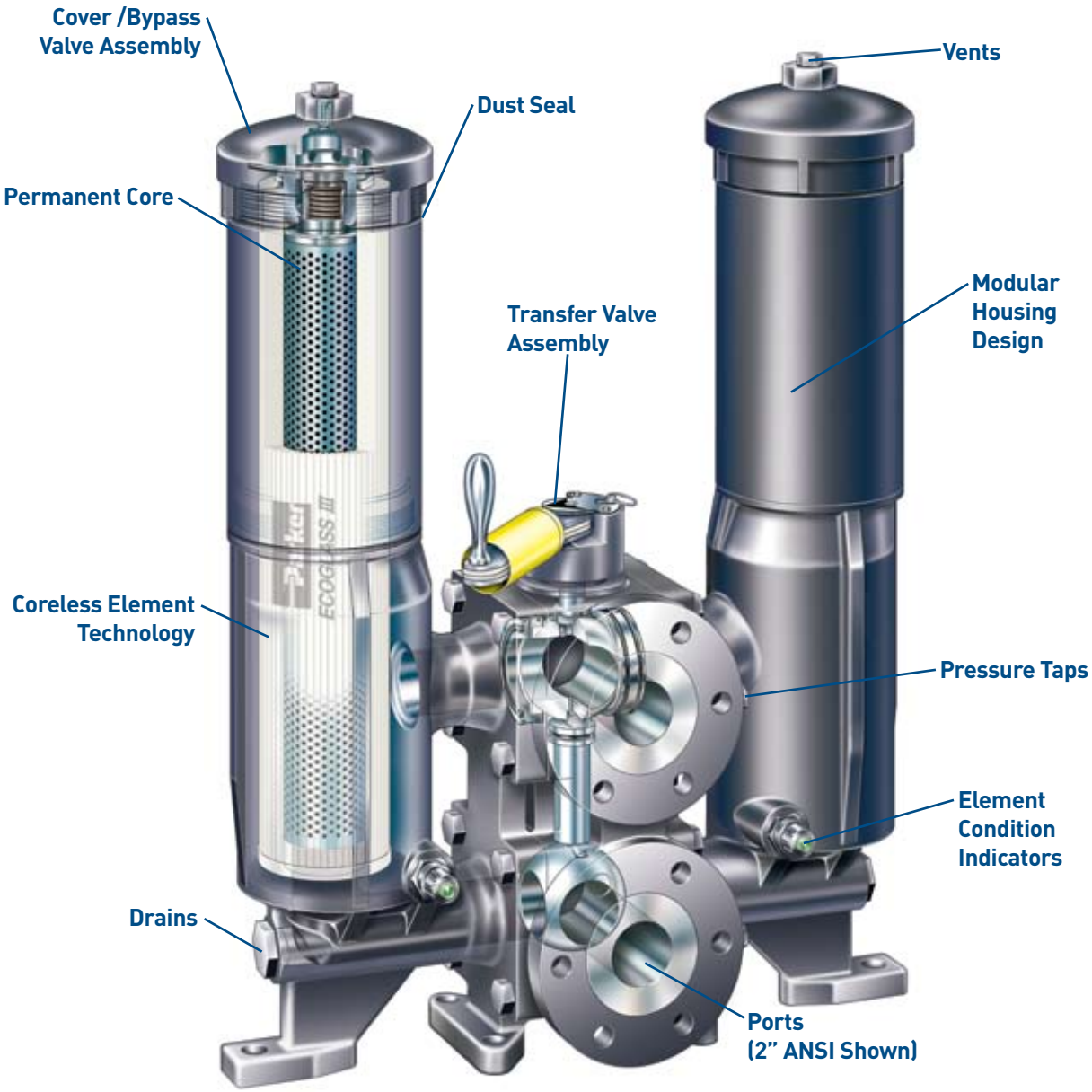
Metamora, OH

MPD Features



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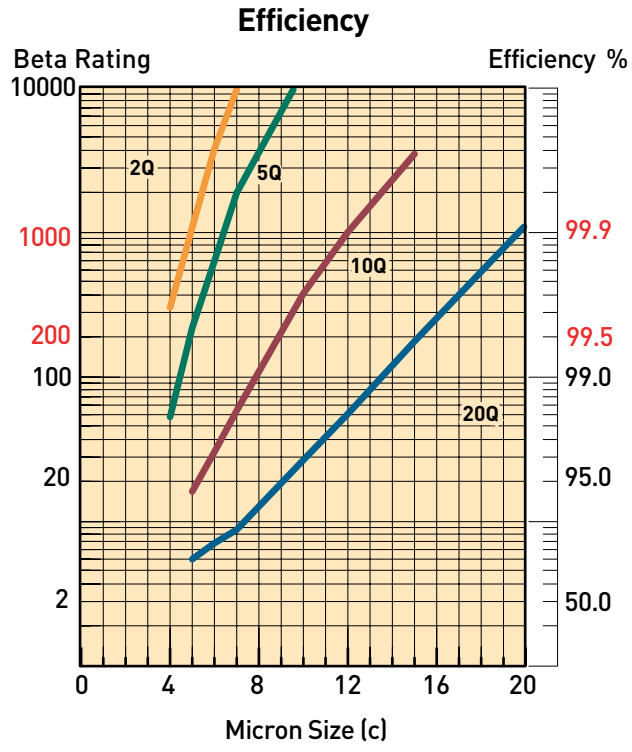
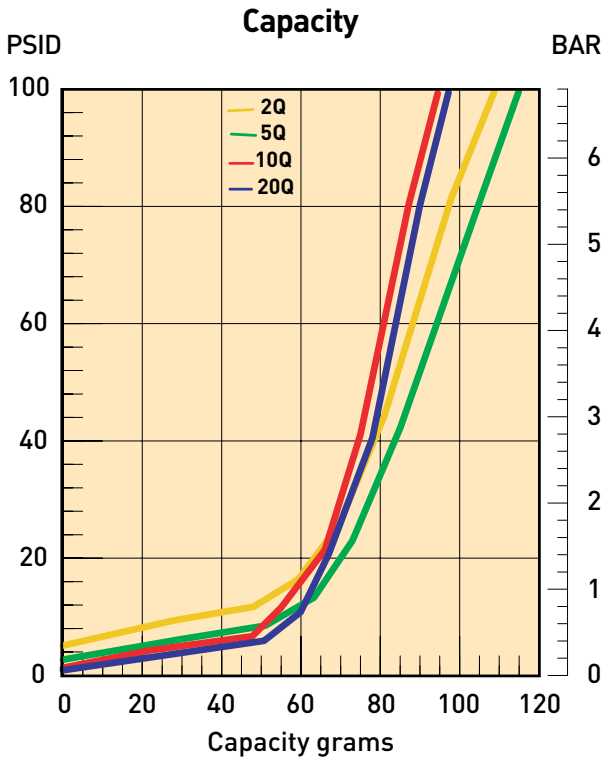
Metamora, OH

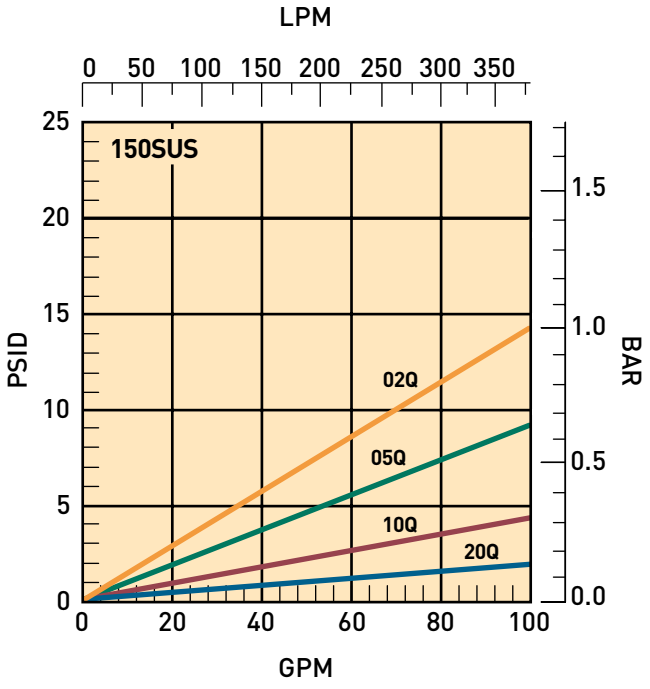
MPD-1 Element Performance

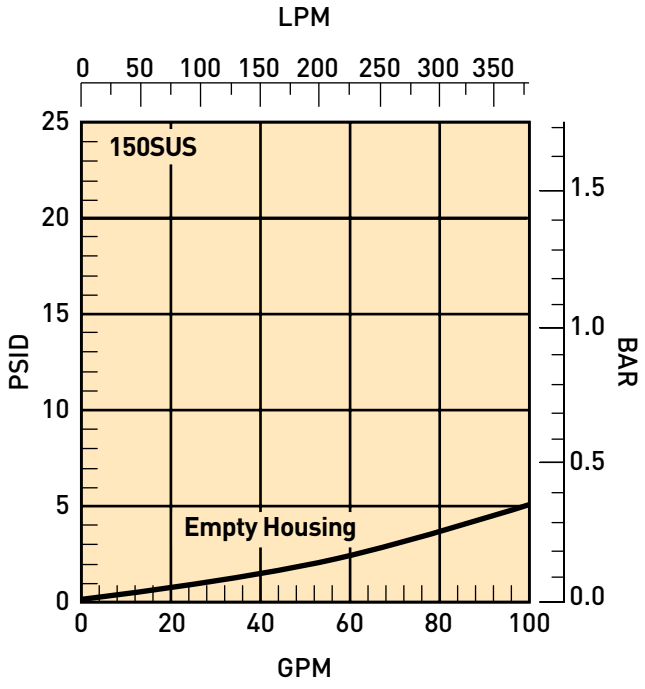




Results typical from Multi-pass tests run per test standard ISO 16889 @ 50 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





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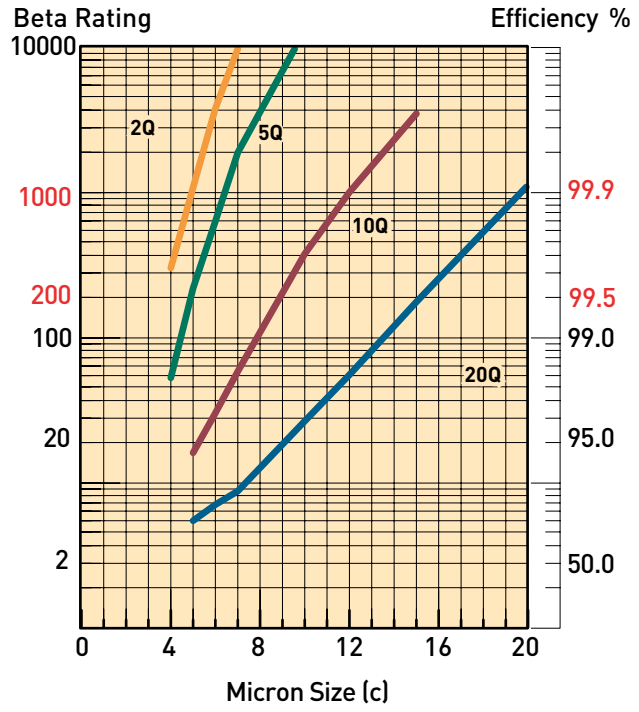
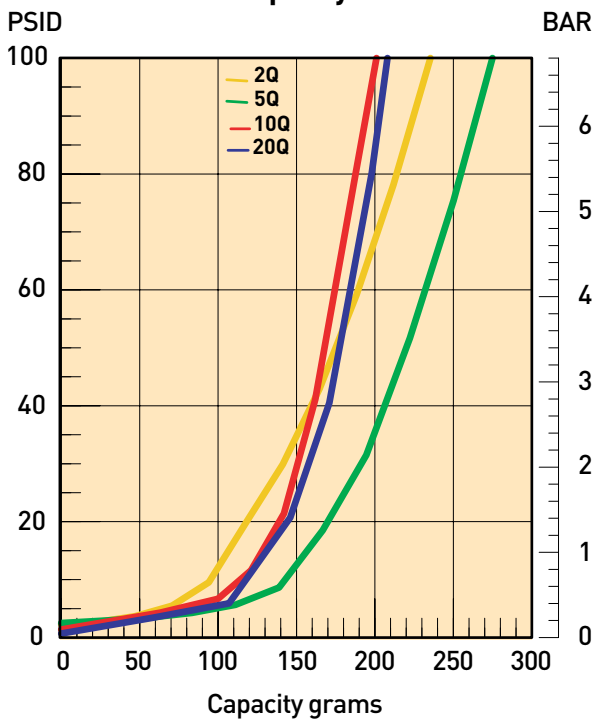
Metamora, OH

MPD-2 Element Performance

Efficiency

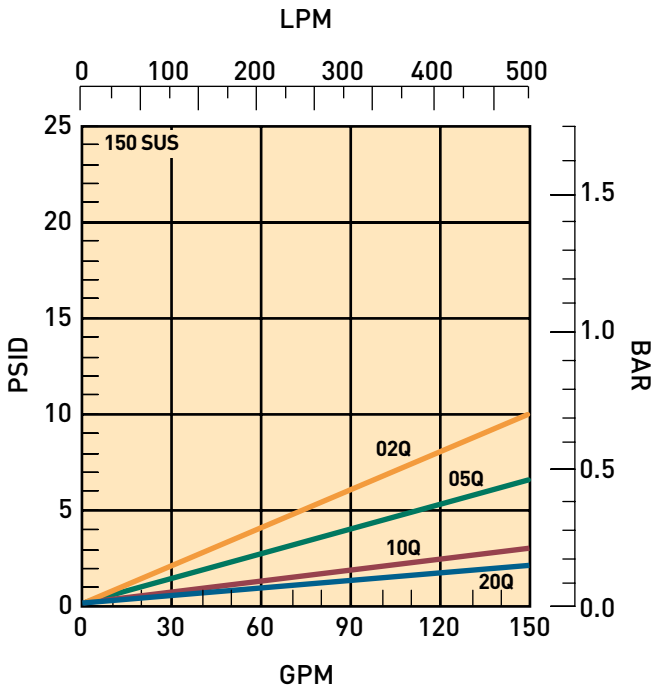


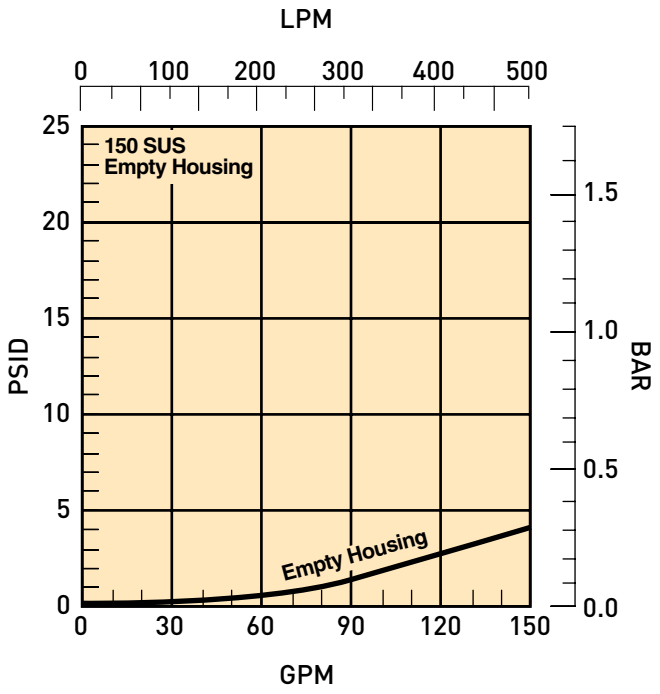
Capacity



Results typical from Multi-pass tests run per test standard ISO 16889 @ 80 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





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 features 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 utilize the same proprietary media design as our Microglass III line of replacement elements.

With Ecoglass III, a reuseable 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 MPD series with the introduction of the deep pleat design. The deep pleat element design increases the amount of media in the element and therefore increases capacity.

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

Feature	Advantage	Benefit
• Modular design filter	• Use a simplex or duplex	• Reduced installation due to common elements • Application flexibility
• Top access cover	• Remove element from top • Lighter than removing entire bowl	• No oil mess
• Visual and electrical indicators	• Know exactly when to service elements	• Keeps system clean
• Drain port	• Drain all oil from assembly prior to servicing	• Eliminates cross contamination
• Vent port	• Purges all trapped air in filter	• Get the maximum performance from elements • Prevents a "spongy" system
• Multipass tested elements (per ANSI/NFPA T3.10.8.8 R1-1990)	• Element performance backed by recognized test standards	• Elements selected will have consistent performance levels
• Option of Ecoglass III or Microglass III elements	• Multi-layer media • Coreless as standard • HF4 as option	• High capacity with high efficiency • No performance loss from pleat bunching
• Equalizing valve & manifold	• No external plumbing	• Safety & reliability
• Upstream & downstream sensing ports	• Add additional instrumentation	• Product flexibility

Specifications: MPD Series

Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP):
3000 psi (206.9) SAE port — MPDH only
1200 psi (81.6 bar) SAE port;
500 psi (34 bar) ANSI port
Rated Fatigue Pressure:
3000 psi (206.9) SAE port — MPDH only
1200 psi (81.6 bar) SAE port;
500 psi (34 bar) ANSI port
Design Safety Factor: 3:1
*Consult factory for higher operating pressures

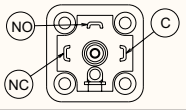
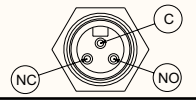
Operating Temperatures:
-15°F (-26°C) to 160°F (71°C)
*Consult factory for temperatures outside specified range

Element Collapse Rating:
Standard: 150 psid (10.3 bar)
High collapse Microglass only:
1200 psid (81.6 bar) (SAE);
500 psid (34 bar) (ANSI)

Materials:
Transfer Valve: Ductile Iron
Side Chamber: Ductile Iron
Side Chamber Extension: Steel
Cover: Ductile Iron (MPD), Carbon Steel (MPDH)
Equalizing Valve and Manifolds: Steel

Shipping Weights (approximate):
MPD-1: 215 lbs. (98 kg)
MPD-2: 285 lbs. (129 kg)
Element Condition Indicators:
Type M2 Series: Visual, auto-resetting with a red indication at the designated differential pressure. In the clean condition, indication is green.

Type E Series: Electrical/Visual, auto-resetting with a red indication at the designated differential pressure. In the clean condition, indication is green. Rated 5 Amps at 125/250 VAC; 5 Amps resistive, 3 amps inductive (sea level) at 28 VDC; SPDT.

'E' SERIES ELECTRICAL INDICATOR CONNECTOR CHART		
CONNECTOR	MODEL CODING	WIRING / MALE CONNECTOR
DIN 43650 3 POLE + EARTH DIN 50005 PLUG PIN CODE	E2	
3 PIN ANSI/B93.55M (DIMENSIONS ONLY)	E3	

Type H Series: Heavy duty electrical/no visual, rated 0.25 Amps resistive, 12 to 28 VDC and .25 Amps resistive, 110-175 VAC; 5 watts; SPDT.

'H' SERIES ELECTRICAL INDICATOR CONNECTOR CHART		
CONNECTOR	MODEL CODING	WIRING / MALE CONNECTOR
½"-14 NPT CONDUIT ADAPTER W/24" WIRE LEADS (FOR ALL LIGHT TO HEAVY CONDUIT USES)	H	BLACK (NO), BLUE (NC), AND WHITE (C)
NONE: 12" WIRE LEADS ONLY	H1	BLACK (NO), BLUE (NC) AND WHITE (C)

No indicator P option: plugged indicator port.
Contact factory for other available indicator options & types.

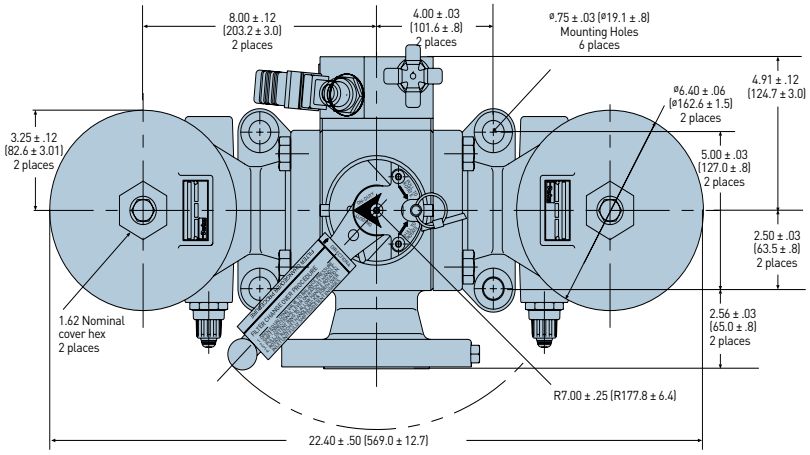
Element Servicing Instructions: MPD

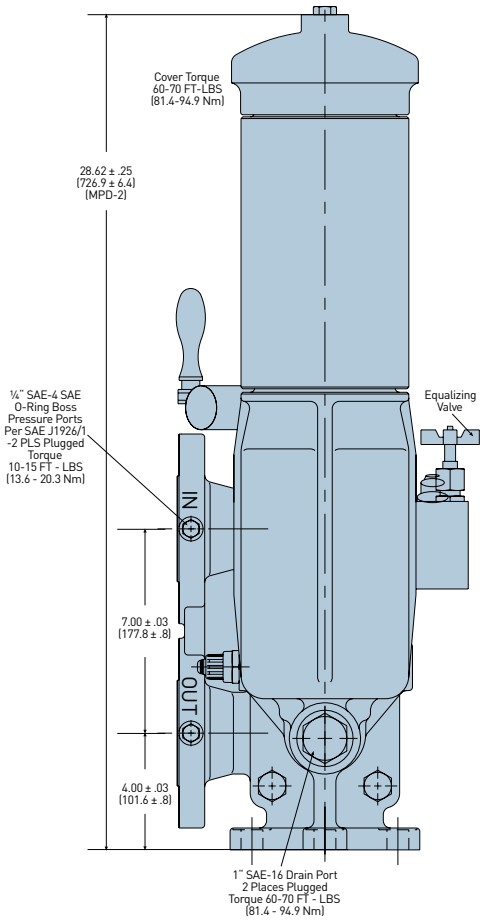
The system does not need to be shut down to service elements; however, pressure must be equalized at both side chambers of the duplex filter before performing transfer valve changeover.

1. Black flow arrow on top of the transfer valve points to the on-duty chamber.
2. Open the equalizing valve (counter-clockwise) to balance pressure at the side chambers.
3. Shift directional lever on the ratchet handle to switch the ratchet direction.
4. Pull detent ring up to disengage the locking pin and allow handle to rotate.
5. Rotate ratchet handle back and forth over the inlet port until the transfer valve is fully shifted and the detent locking pin engages.
6. Slack flow arrow now points to the new on-duty side chamber.
7. Close equalizing valve (clockwise) to isolate the side chambers.
8. Loosen new off-duty vent plug (counter-clockwise) approximately 2 turns. Do not thread out complete.
9. Remove drain plug (counter-clockwise) tram new off-duty chamber to lower oil level.
10. Remove new off-duty chamber cover by rotating (counter-clockwise) until unthreaded then lift from chamber.
11. Pull element out from chamber. Discard used disposable elements as they are not cleanable. With Ecoglass elements the permanent core will remain in the chamber.
12. Install new element by centering it on the element locator in the bottom of the chamber and pushing down into place. For Ecoglass elements slide all the way down onto the permanent core.
13. Inspect cover o-rings and replace if necessary.
14. Install cover onto the chamber by rotating clockwise) and tighting to 90-100 ft.-lbs.
15. Install and tighten drain plug (clockwise) to 60-70 ft.-lbs.
16. Open equalizing valve (counter-clockwise) to purge air from the new off-duty chamber.
17. When oil flows from the vent close the equalizing valve (clockwise).
18. Tighten new off-duty vent plug (clockwise) to 15-20 ft.-lbs.

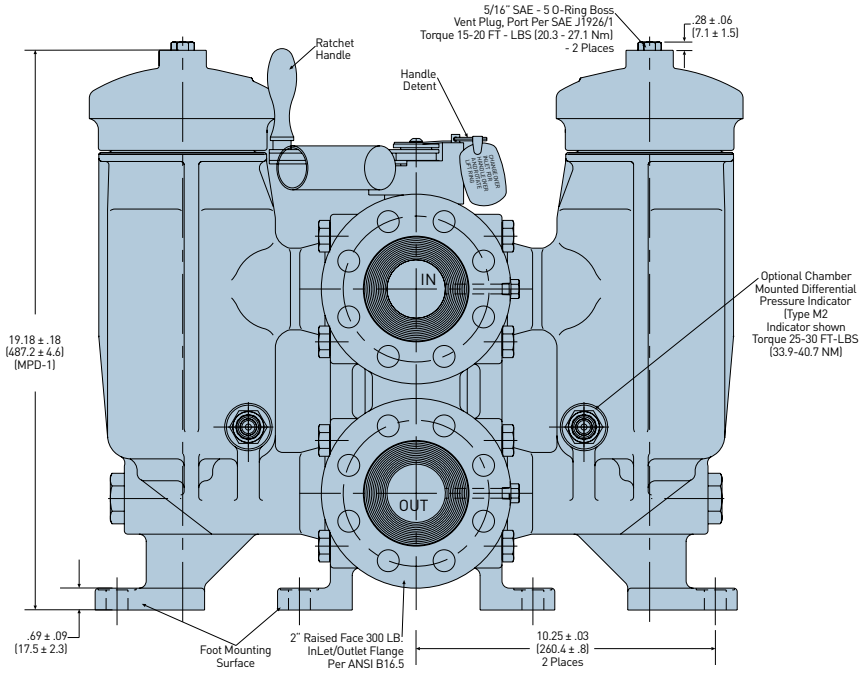
Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

ANSI Dimensional Drawing

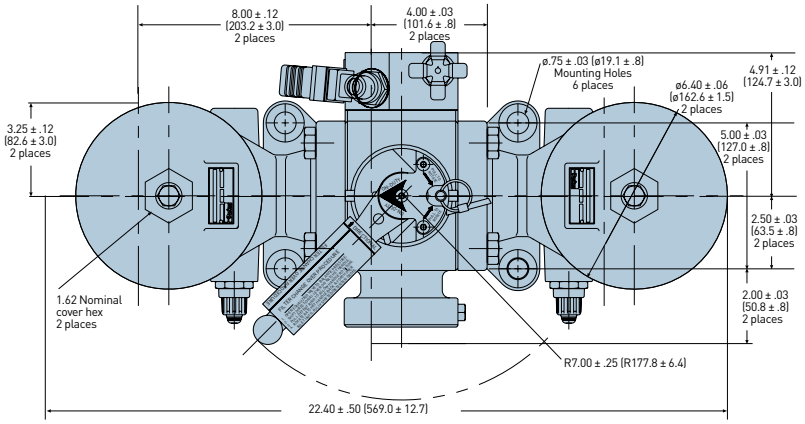




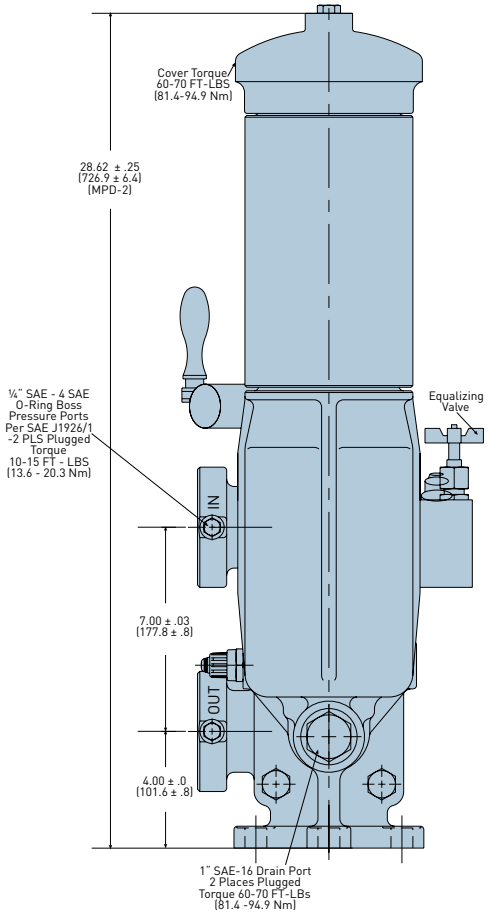
Linear Measure: inch [millimeter]

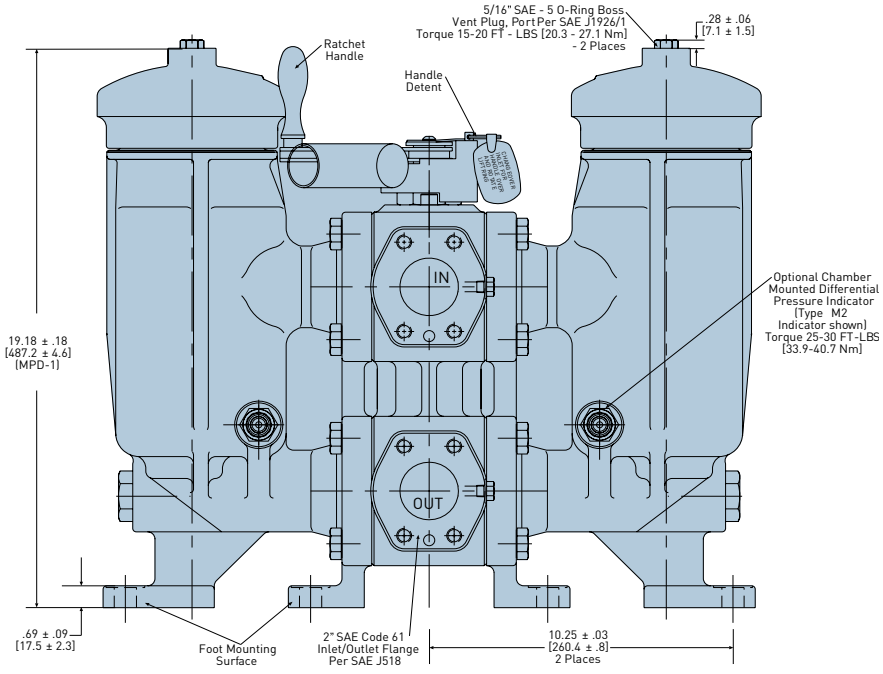


SAE Dimensional Drawing



Linear Measure: inch [millimeter]





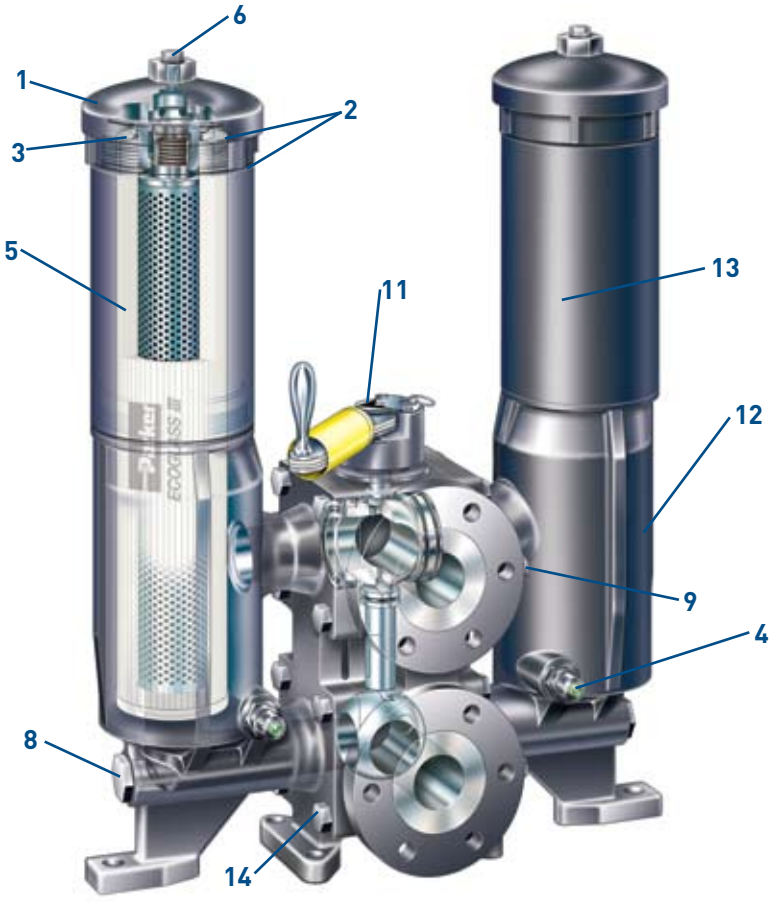
Parts List — Standard MPD*

Index	Description	Element Type Ecoglass	Element Type Microglass
1	Cover Assembly		
	w/ 25psi bypass	936964	936964
	w/ 50psi bypass	935965	935965
	w/ no bypass	935966	935966
2	Cover (O-ring & Dust Seal)	V72247	V72247
3	Cover Backup Ring	935419	935419
4	Indicator		
	P option-indicator port plug	925515	925515
	M2 25psi	932026	932026
	M2 50psi	932027	932027
	E2 25psi	931153	931153
	E2 50psi	929599	929599
	E3 25psi	932773	932773
	E3 50psi	929596	929596
	H 25psi	933053	933053
	H 50psi	932905	932905
	H1 25psi	933054	933054
	H1 50psi	932906	932906
5	Element	(see chart on model code page)	

Index	Description	Element Type Ecoglass	Element Type Microglass
6	Vent Plug	935466	935466
7**	Vent Plug O-ring	V93905	V93905
8	Drain Plug w/ O-ring	928364	928364
9	Pressure Tap Plug w/ O-ring	928882	928882
10**	Equalizing Valve	928118	928118
11	Transfer Valve Assembly		
	ANSI 2" w/ indicator port	935968	935968
	SAE 2" w/ indicator port	935969	935969
12	Housing Assembly		
	right side w/ indicator port	935970	935972
	right side w/o Indicator port	935974	935975
	left side w/ indicator port	935971	935973
	left side w/o Indicator port	935974	935975
13	Housing Extension (MPD-2)	935489	935489
14	5/8" - 11x1¾" HHCS	922812	922812
15**	Seal Kit-Transfer Valve	Consult Factory	
16**	Seal Kit-Housing Assembly	Consult Factory	

* Consult factory for MPDH components

** Not Shown



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

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
	MPD	1	10QE	NE2	25	B2	1	Design number assigned by Parker

BOX 1: Seals

Symbol	Description
None	**Nitrile**
F3	Fluorocarbon

BOX 2: Model Number

Symbol	Description
MPD	**Duplex filter**
MPDH	**High pressure, 3000 psi duplex filter**

BOX 3: Element Length

Symbol	Description
1	**Single**
2	**Double**

BOX 4: Element Media

Symbol	Description
20QE	Ecoglass III
10QE	Ecoglass III
05QE	Ecoglass III
02QE	Ecoglass III
20Q*	Microglass III (HF4)
10Q*	Microglass III (HF4)
5Q*	Microglass III (HF4)
2Q*	Microglass III (HF4)

*Note: For high collapse rated (2000 psid) elements, add "H" after symbol. For Microglass III media only.

BOX 5: Indicators

Symbol	Description
M2	**Visual/Auto reset**
H	Electrical (w/½" npt conduit connection and wire pads)
H1	Electrical (w/12" leads only)
E2	**Electrical (DIN 43650 Hirschman style connection)**
E3	Electrical (ANSI/B93.55M 3-Pin Brad Harrison style connection)
P	Indicator port plugged
N	No side chamber indicator port

Note: Two (2) symbols required. First symbol denotes side chamber indicator mounted on inlet side. Second symbol denotes indicator on equalizing valve manifold.

BOX 6: Bypass

Symbol	Pressure Setting
25	25 PSI (1.7 bar) setting
50	**50 PSI (3.5 bar) setting If "no bypass" option (-11) and an indicator is selected, above symbols (25,50) denote indicator setting**

BOX 7: Ports

Symbol	Description
B2*	**2" 300 lb RF ANSI Flange (500 psi)**
Y9	**2" SAE 4 Bolt Code 61 Flange Face**

Note: * Only available for MPD.

BOX 8: Options

Symbol	Description
1	**None**
11	No Bypass

BOX 9: Design Number

Applied to the filter by Parker Hydraulic Filter Division. Use the full model code, including the design number when ordering replacement parts, elements and cartridges.

Please note the bold options reflect standard options with a reduced lead-time of (8) weeks or less. Consult factory on all other lead-time options.

Ecoglass III Replacement Elements (Fluorocarbon)

Media	MPD-1	MPD-2
20QE	**935519Q**	**935521Q**
10QE	**935518Q**	**935520Q**
05QE	**935517Q**	**935458Q**
02QE	**935516Q**	**935488Q**

HF4 Replacement Elements (Fluorocarbon)

Media	Element Collapse Rating	Single Length	Double Length
3 Micron	150 psi	HF41L3VQ	HF42L3VQ
3 Micron	2000 psi	HF41H3VQ	HF42H3VQ
5 Micron	150 psi	HF41L5VQ	HF42L5VQ
5 Micron	2000 psi	HF41H5VQ	HF42H5VQ
10 Micron	150 psi	HF41L10VQ	HF42L10VQ
10 Micron	2000 psi	HF41H10VQ	HF42H10VQ
20 Micron	150 psi	HF41L20VQ	HF42L20VQ
20 Micron	2000 psi	HF41H20VQ	HF42H20VQ

Notes

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

15P/30P Series

High Pressure Filters

High Pressure Filters

15P/30P Series

Applications for 15P/30P Series filters

- Saw mills
- Aircraft ground support equipment
- Asphalt pavers
- Hydraulic fan drives
- Power steering circuits
- Waste trucks
- Cement trucks
- Servo control protection
- Logging equipment

These application examples have one thing in common...the need for clean hydraulic fluid.

Modern high pressure hydraulic systems are demanding. Better controls and long component life are expected. To deliver the high standards of performance, hydraulic components are built with tighter tolerances which increases their sensitivity to contamination.

That's where Parker pressure filters come into play. They filter out ingressed contamination before it jams a valve or scores a cylinder. They block pump generated debris before it gets to servo or proportional valves. Parker pressure filters are a key ingredient in meeting today's system demands.

Put your hydraulic systems in the care of Parker Hydraulic Filter Division. We are committed to designing and building the best filters available to industry.

Indicators
- Both visual auto reset style and dual indicator visual/ electrical style available to suit your application. Patented design resists false signaling dueto vibration.

Straight Thread Ports
- SAE straight thread for positive sealing

Bypass Valve (not visible)
- May be blocked for critical applications

Bowl Construction
- Formed of high grade 6061 T6 aluminum
- Powder painted, corrosion resistant finish
- Knurled for easier gripping when removing and re-assembling

Hex (not visible)
- Hex formed at base of bowl for easy removal

Bowl Configurations
- Single and double length bowls available to cover a wide range of flows
- 30P available in a duplex version.

Drain Port (not visible)
- Clean and easy servicing
- Lets you drain bowl before element changes

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Hydraulic Filter Division
Metamora, OH

Quality elements make the difference

The important item in a filter assembly is the element. It must capture and retain contaminants that can damage system components. At the same time it must allow flow to pass as freely as possible to perform it's function.

There are many ways to design and build an element, and it's easy to produce a low cost element. However, cost is not the only selection criteria, especially when the risk is loss of critical machine performance.

For instance, wire mesh reinforcement. Not all filter elements have it. It's used in Parker elements to keep the pleats from bunching or collapsing. If pleats bunch, the effective surface area of the element is reduced, excessive pressure drop develops, and the filter assembly may go into premature bypass mode.

There are many other features that are included standard with every quality Parker element. The table below outlines several.

O-Ring Seal
- Positive sealing for optimum element efficiency

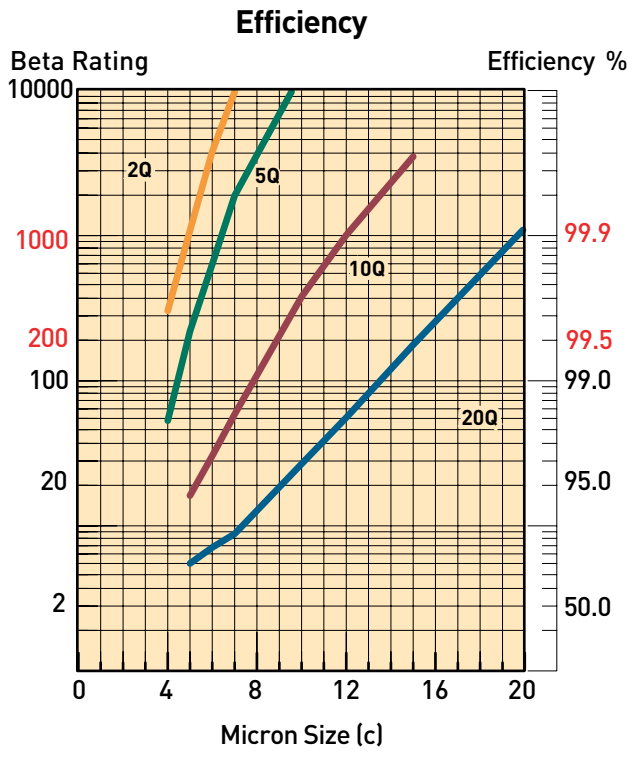
Wire Reinforced Media
- Prevents pleat bunching
- Helps prevent media migration
- Maintains media efficien

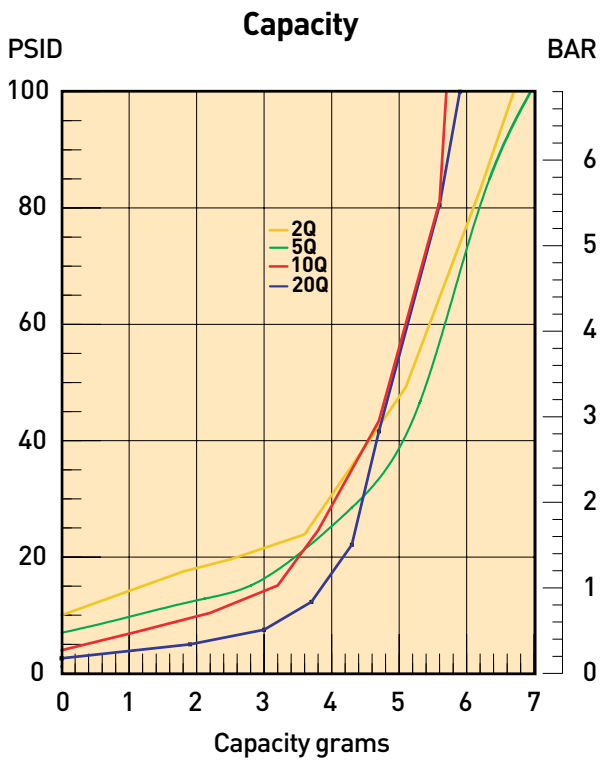
Engineered Element Design
- The right combination of pleat depth and number of pleats means lower pressure losses (longer life)
- Dirt holding capacity is maximized for less frequent element change-out

Elements for Every Application
- Standard Microglass III media for long life and excellent system protection

Feature	Advantage	Benefit
• Wire reinforced Microglass III elements	• Rugged construction, stands up to abuse of cyclic flows without performance loss • Wire support reduces pleat bunching, keeps pressure drops consistent	• The reliable filtration provided assures equipment protection, reduces down-time, maximizes element life, and allows the hydraulic system to operate properly
• Multipass tested elements (per ANSI/NFPA T3.10.8.8 R1-1990)	• Filter performance backed by recognized and accepted laboratory test standards	• Filters you select have known performance levels
• Complete element performance data disclosure	• All pertinent information is provided in an easy-to-compare format	• Provides an easy guide to proper filter selection

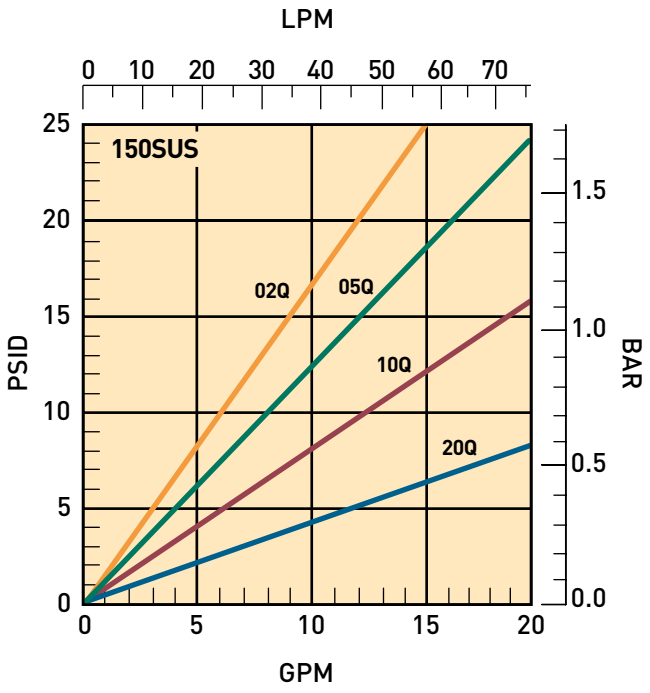
15P-1 Element Performance

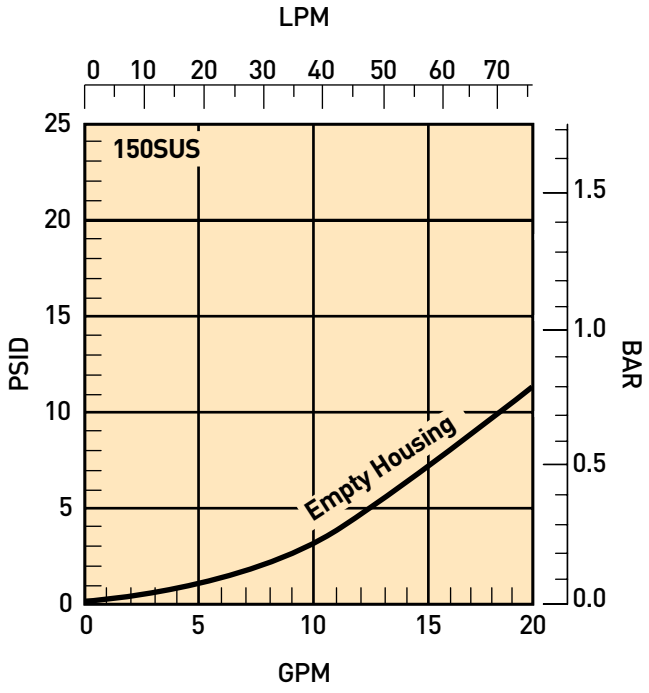




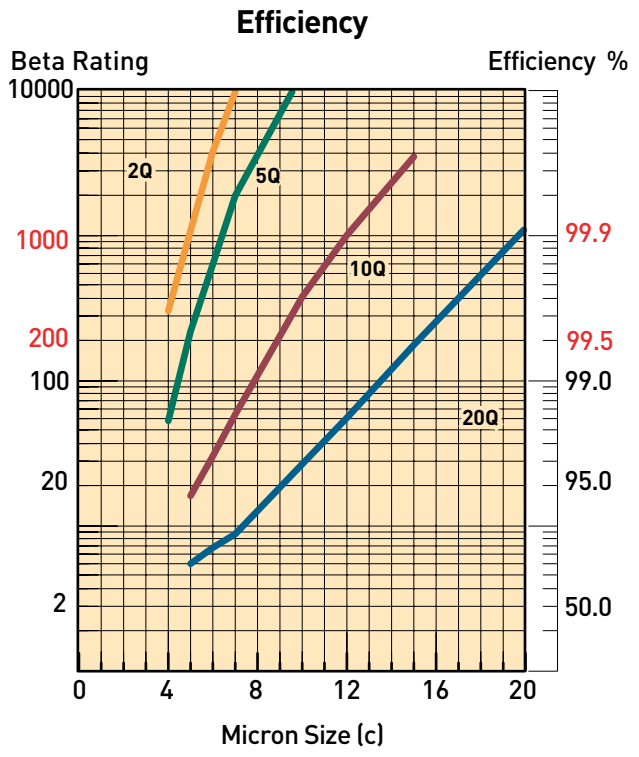
Results typical from Multi-pass tests run per test standard ISO 16889 @ 10 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

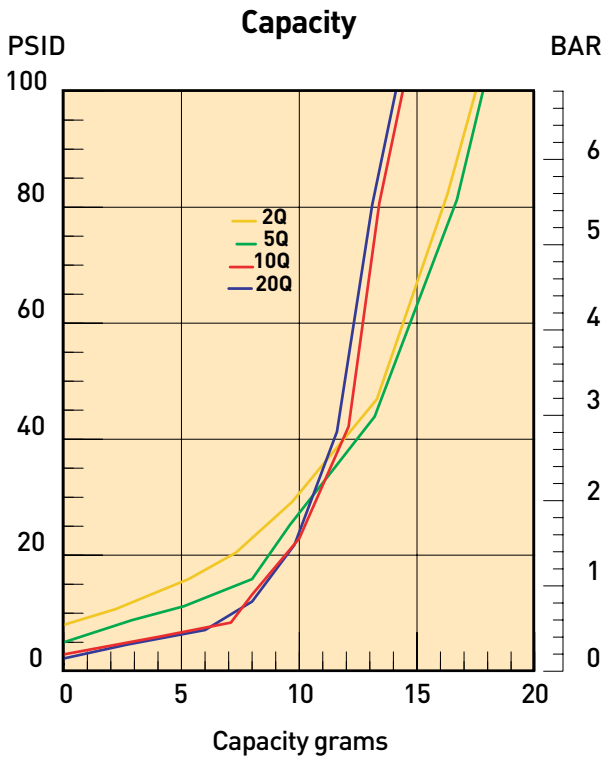
Flow vs. Pressure Loss





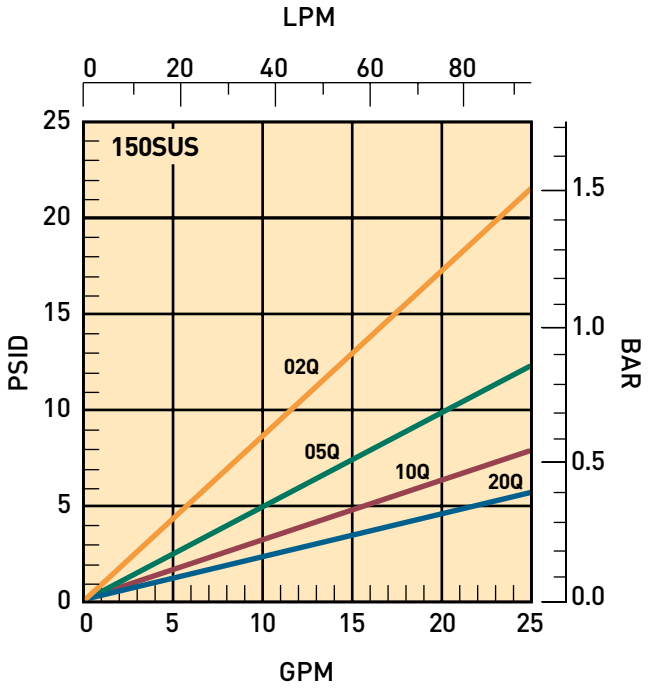
15P-2 Element Performance

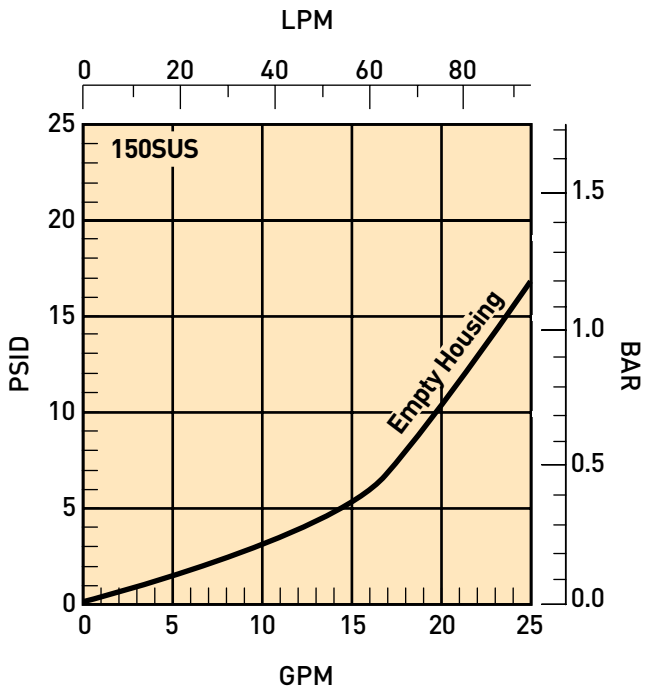




Results typical from Multi-pass tests run per test standard ISO 16889 @ 15 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





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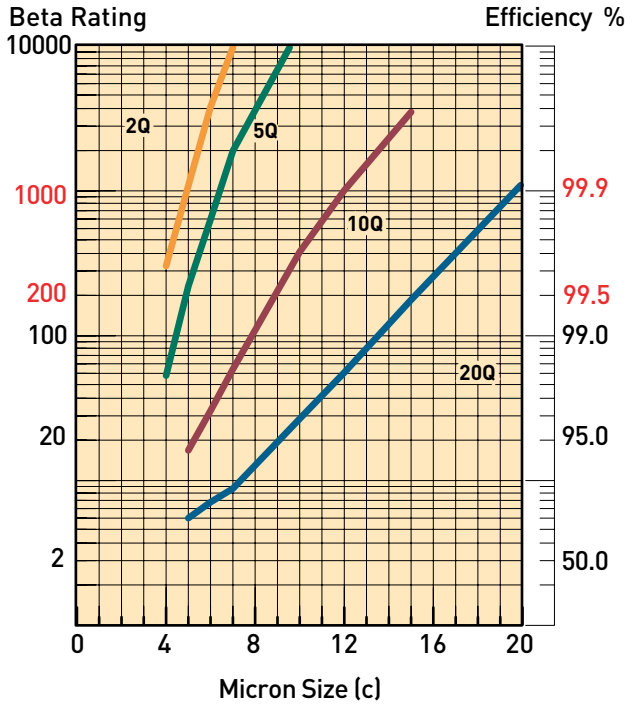
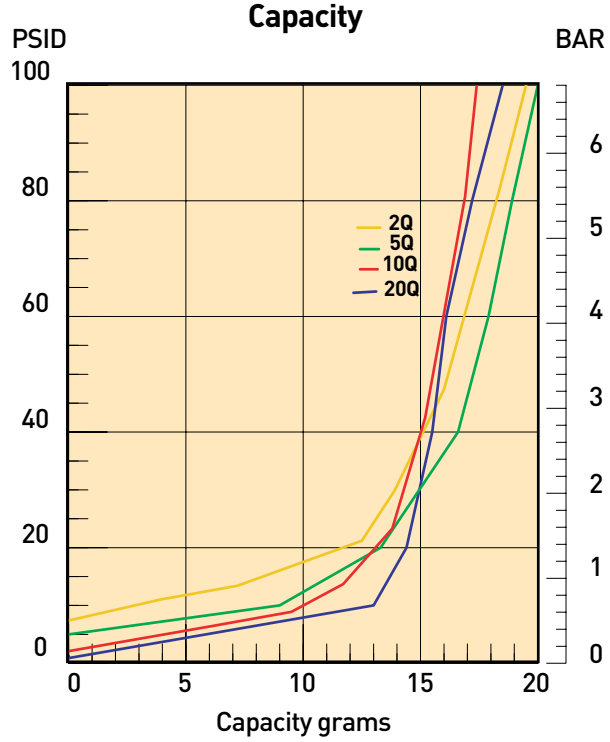
Metamora, OH

30P-1 Element Performance

Efficiency

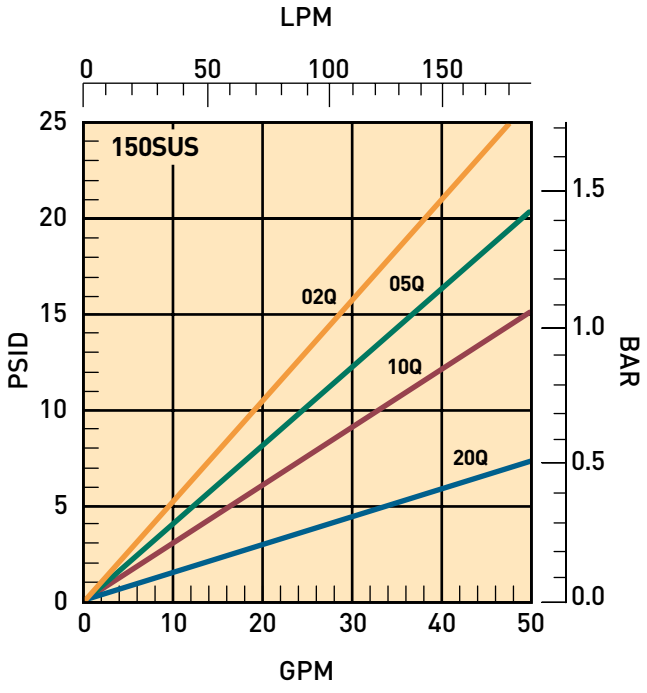


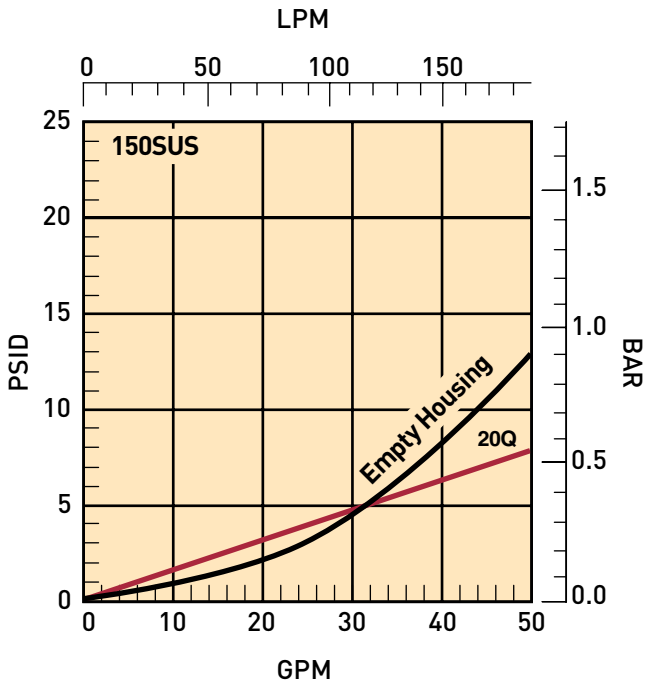
Capacity



Results typical from Multi-pass tests run per test standard ISO 16889 @ 20 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

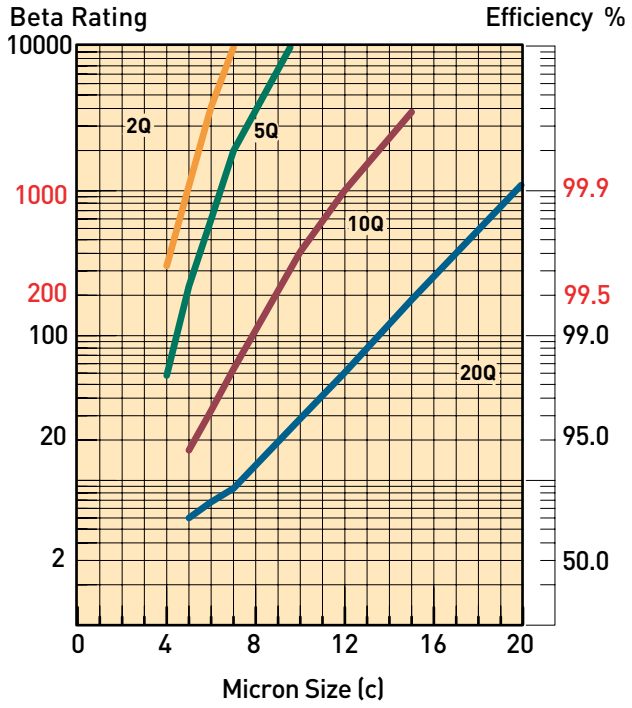
Flow vs. Pressure Loss



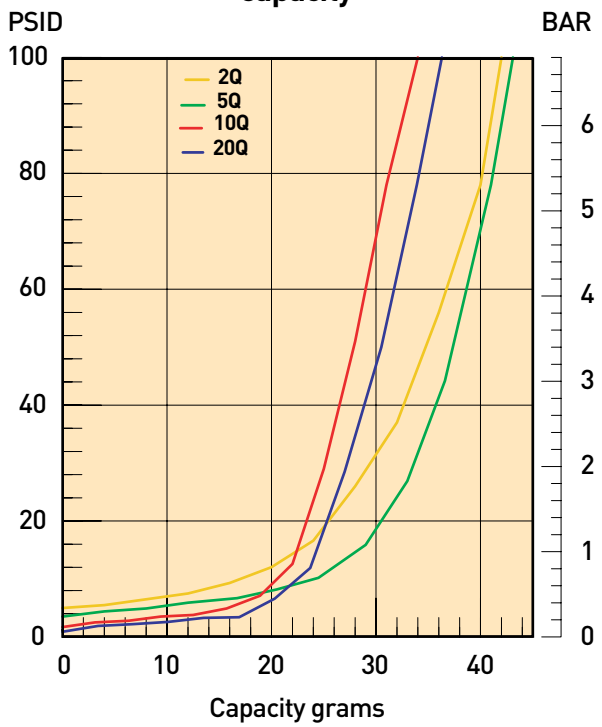


30P-2 Element Performance

Efficiency

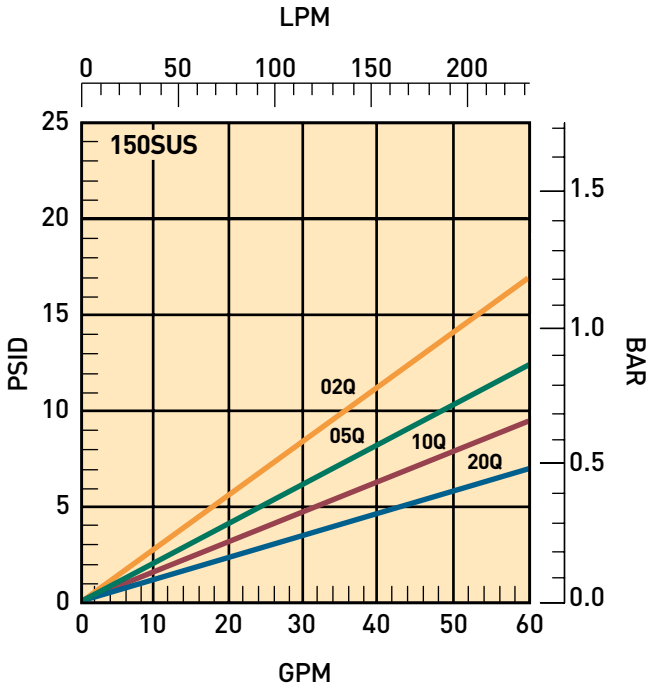


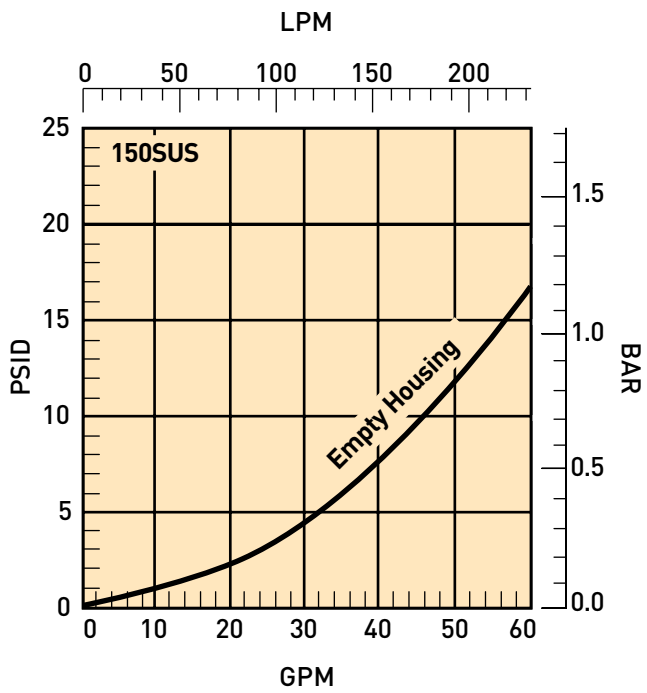
Capacity



Results typical from Multi-pass tests run per test standard ISO 16889 @ 30 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





Parker Hannifin Corporation
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Metamora, OH

Specifications: 15P

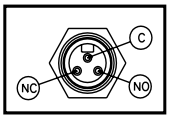
Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 3000 psi (206.9 bar)
Rated Fatigue Pressure: 2000 psi (138 bar)
Design Safety Factor: 3:1

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:
Standard- 350 psid (24.1 bar)
"H" Option- 2000 psid (138 bar)
"X" Option- 3000 psid (206.9 bar)

Materials:
Bowl: impacted aluminum (anodized 6061-T6)
Head: extruded aluminum (anodized 6061-T6)
Bypass: nylon

Element Condition Indicators:
Visual (optional) 360° green/ red
Electrical/ Visual (optional)
5A @ 240VAC, 3A @ 28VDC
Electrical-heavy duty (optional)
.25A (resistive) MAX 5 watts
12 to 28 VDC & 110 to 175 VAC

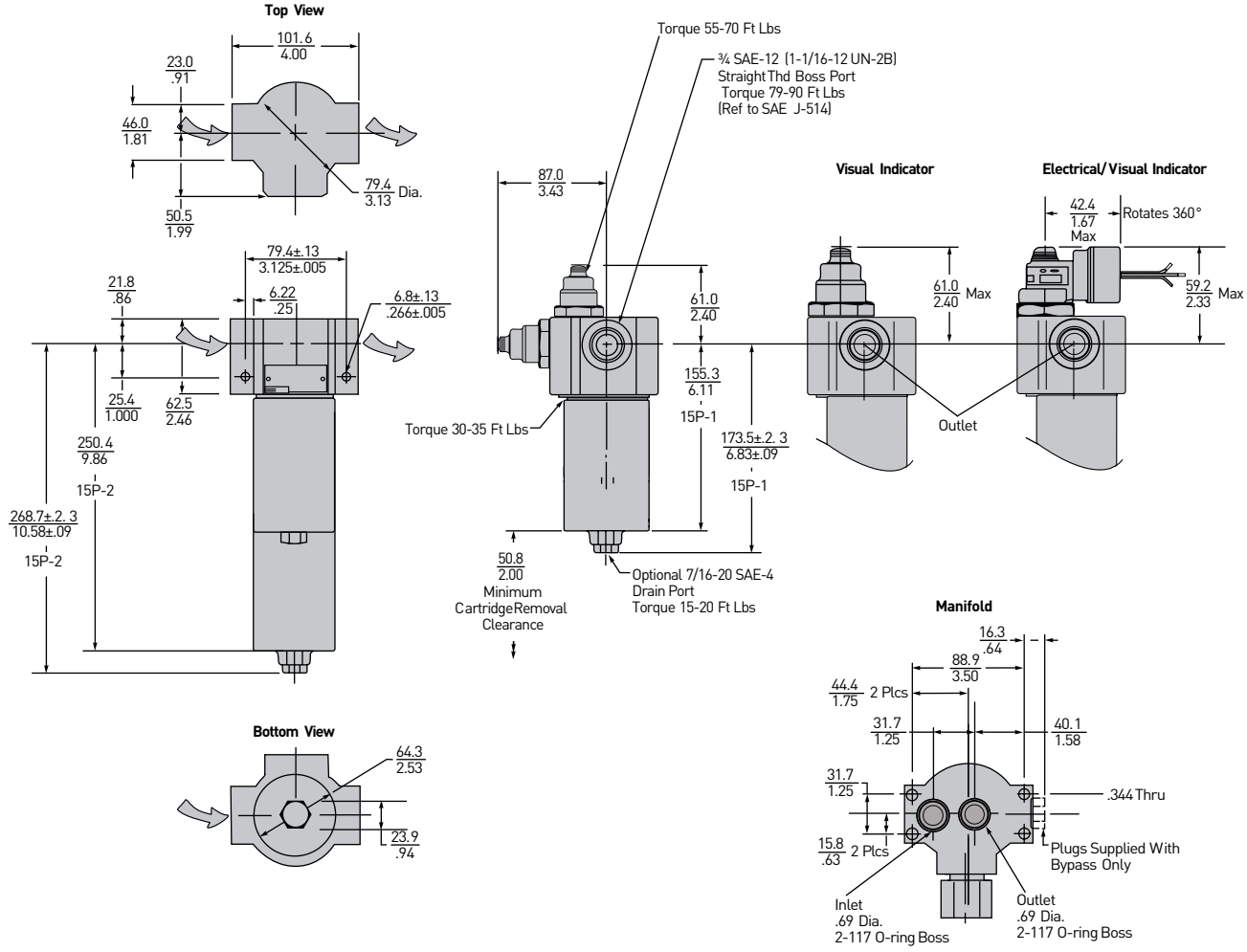


D

Color Coding:
White (common)
Black (normally open)
Blue (normally closed)

Weights (approximate):
15P-1 3.5 lb. (1.6 kg.)
15P-2 4.6 lb. (2.1 kg.)

Linear Measure: millimeter / inch



Dimensional drawings are for reference only.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Specifications: 30P/30PD

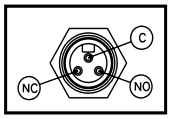
Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 3000 psi (206.9 bar)
Rated Fatigue Pressure: 2000 psi (138 bar)
Design Safety Factor: 3:1

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:
Standard- 350 psid (24.1 bar)
"H" Option- 2000 psid (138 bar)
"X" Option- 3000 psid (206.9 bar)

Materials:
Bowl: impacted aluminum (anodized 6061-T6)
Head: extruded aluminum (anodized 6061-T6)
Bypass: Nylon

Element Condition Indicators:
Visual (optional) 360° green/ red
Electrical/ Visual (optional)
5A @ 240VAC, 3A @ 28VDC
Electrical-heavy duty (optional)
.25A (resistive) MAX 5 watts
12 to 28 VDC & 110 to 175 VAC



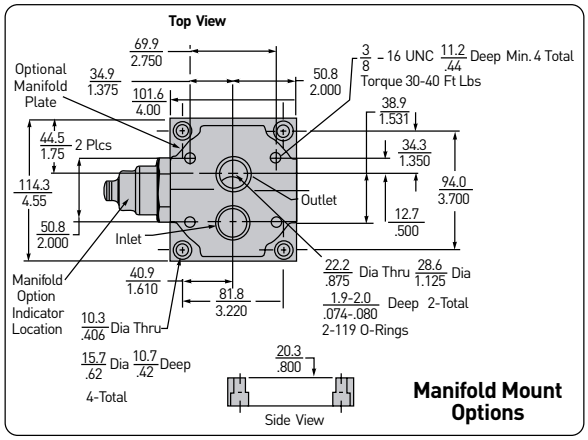
D

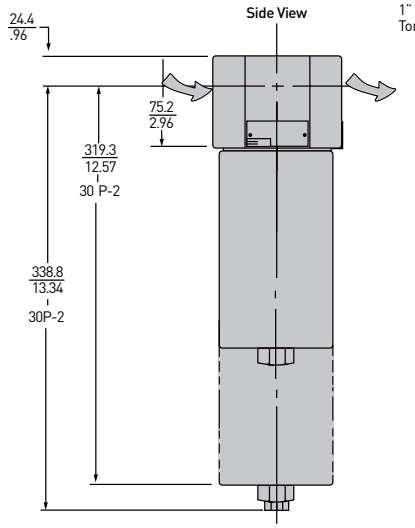
Color Coding:
White (common)
Black (normally open)
Blue (normally closed)

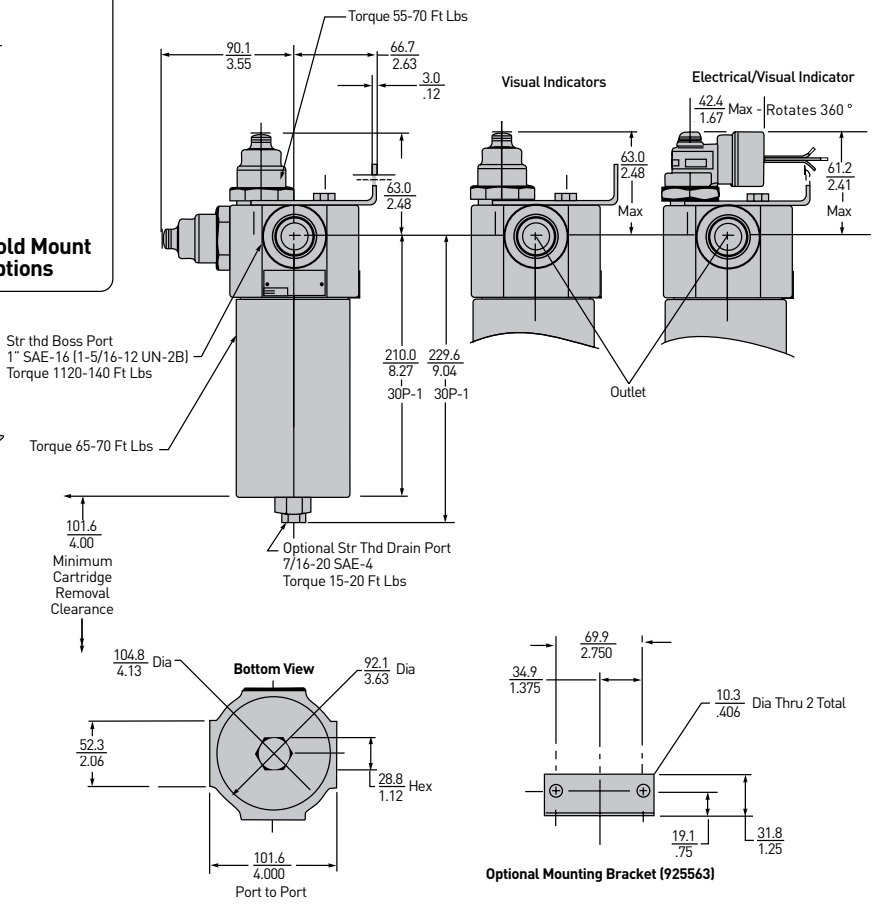
Weights (approximate):

30P-1	6.4 lb.(2.9 kg.)
30PD-1	36 lb. (16.3 kg.)
30P-2	8.7 lb. (3.9 kg.)
30PD-2	40 lb. (18.1 kg.)

Linear Measure: millimeter / inch







Dimensional drawings are for reference only.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

30PD Duplex Filter

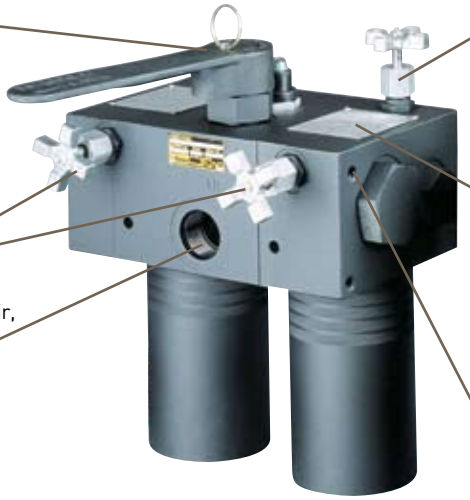
The Parker 30PD duplex pressure filter provides uninterrupted filt ration for equipment that cannot be shut down for servicing.

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

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

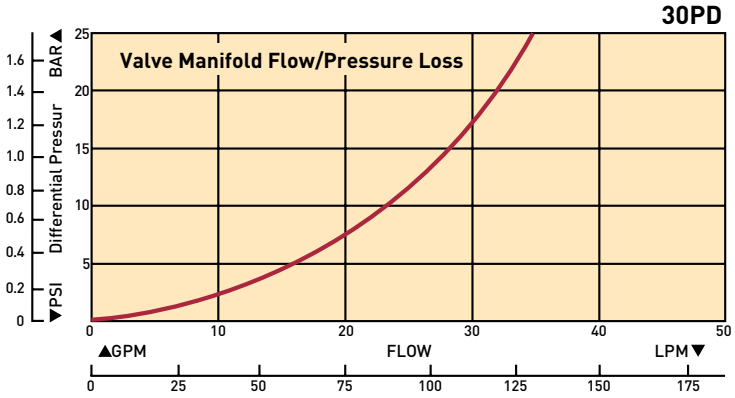
Vent valves are also included to insure that all air is purged during service so that maximum system performance is achieved.

The Parker 30PD makes use of industry proven components. Elements are multi-pass tested in accordance with ANSI/NFPA T3.10.8.8 R1 -1990. Bowls and head are subjected to rigorous fatigue testing to insure a trouble free service life.

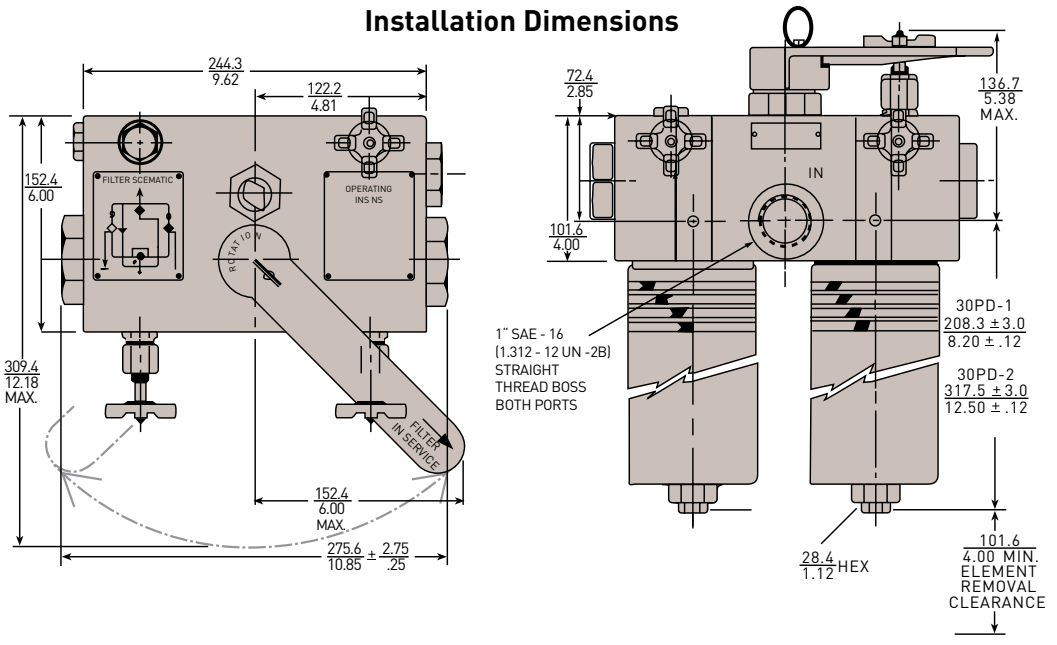


30PD Empty Housing Flow vs Pressure Loss

To obtain total filter assembly pressure loss, add empty housing loss to the pressure loss of selected element on 30P element performance pages.



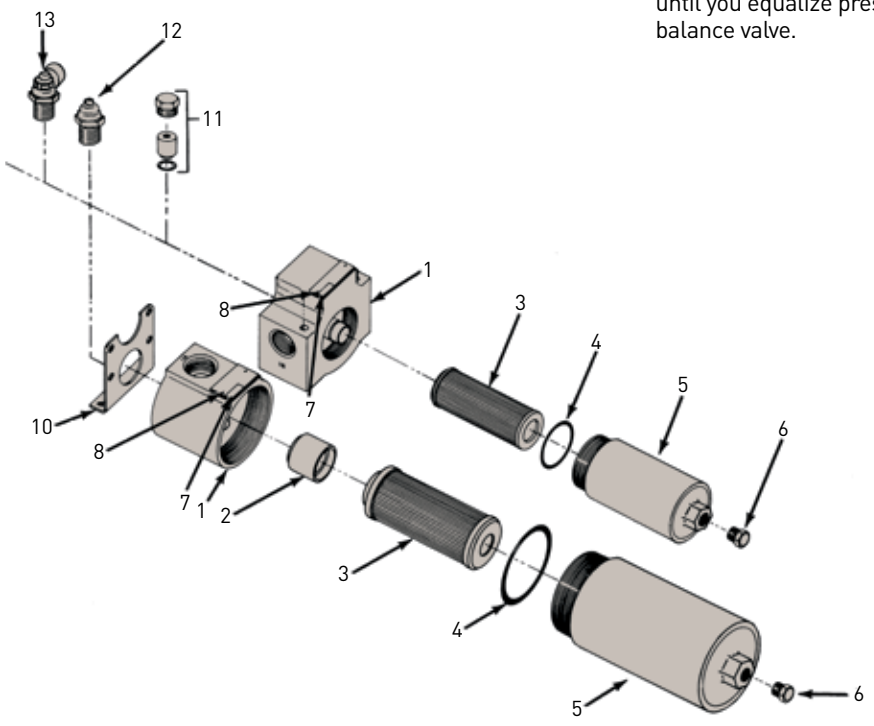
Installation Dimensions



Parts List

Index	Description	15P	30P
1	**Head**		
	In-line Porting		
	Bypass w/top indicator port	931520	933956
	No bypass w/top indicator port	931519	933956
	Bypass w/side indicator port	931522	933955
	No bypass w/side indicator port	931521	933955
	Manifold Porting		
	Bypass w/indcator port	931135	933954
	No bypass w/ indicator port	931523	933954
2	**Bypass Valve Assembly**		
	50 psid (in-line model only)	928981	925127
	No bypass	935744*	925209
3	**Elements (see chart on model code page)**		
4	**Bowl O-Ring**		
	Buna	N92138	N92151
	Fluorocarbon	V92138	V92151
5	**Bowl**		
	Single without drain	937547	937551
	Single with drain	937549	937553
	Double without drain	937548	937552
	Double with drain	937550	937554
6	**Drain Plug, SAE-4**		
	W/buna o-ring	921088	921088
	W/fluorocarbon o-ring	928882	928882
7	**Nameplate(unstamped)**	920928	920928
8	**Drive Screws**	903393	903393
9	**Mounting Spacer Tube (not shown)**	925650	N/A
10	**Mounting Bracket Kit**	N/A	925563
11	**Blank Indicator Kit**	925515	925515
	Indicators (viton seals)		
12	Visual auto reset	932027	932027
	H option (1/2" conduit connection)	932905	932905
	E2 option (DIN 43650 connection)	929599	929599
	E3 option (3 pin ANSI/B93.55M connection)	929596	929596
13	**Manifold Mounting Kit**	N/A	925562
	Manifold O-Rings (2 required)		
	Buna	N92117	N92119
	Fluorocarbon	V92117	V92119

Note: consult factory for EPR part numbers
*Not for manifold-style head



Element Servicing

15P/30P

A. Stop the system's power unit.
B. Relieve any pressure in the filter line and drain filter bowl if drain port is provided.
C. Loosen and remove bowl.
D. Remove element from housing.
E. Place new, clean element in housing, centering it on the element locator.
F. Inspect the bowl o-ring and replace if necessary.
G. Install bowl and tighten to specified torque.

30PD

A. Arrow on diverter handle points to the on-duty chamber.
B. Open off-duty vent valve (vent port should be plumbed back to reservoir).
C. Open balance valve slowly to admit fluid into off duty chamber.
D. When fluid is discharged from vent port, close and tighten.
E. Pull up on detent pin and rotate diverter approximately 90° until detent relocates in seat.
F. Close and tighten balance valve.
G. Open new off-duty vent valve to relieve pressure.
H. Follow steps C-G from 15P/30P instructions above.
I. Close and tighten vent valve.

Warning: Do not try and rotate handle until you equalize pressure with the balance valve.

High Pressure Filters

15P/30P 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
30P	1	10Q	E	M2	K	S16	4

BOX 1: Filter Series

Symbol	Description
15P	**Pressure filter**
30P	**Pressure filter**
30PD	Duplex style 30P

BOX 2: Element Length

Symbol	Description
1	**Single**
2	**Double**

BOX 3: Media Code

Symbol	Description
02Q*	**Microglass III, 2 micron**
05Q	**Microglass III, 5 micron**
10Q*	**Microglass III, 10 micron**
20Q	**Microglass III, 20 micron**

Note: For high collapse rated (2000 psid) elements, add "H" behind Q. For Micro glass media only.*For 3000 psid collapse rated elements, add "X" behind Q.

BOX 4: Seals

Symbol	Description
B	**Nitrile**
E	EPR
V	**Fluorocarbon**

BOX 5: Indicator

Symbol	Description
N	No indicator, no pressure port
P	**Port plugged**
M2	**Visual auto reset**
H	Electrical indicator, w/½"-14 NPT connection and 12" leads
E	Electrical/visual w/ ½" NPT conduit connection and wire leads
E2	**Electrical/visual (DIN 43650 Hirschman style connection)**
E3	Electrical/visual (ANSI/ B.9355M 3-pin Brad Harrison style connection)

Note: For side mount indicators, place a "S" after indicator symbol. Not available on 30PD model.

BOX 6: Bypass

Symbol	Pressure Setting
K	**50 PSI (3.5 bar) setting**

BOX 7: Port

Symbol	Description
15P	
S12	**SAE-12**
X	¾"-manifold porting
30P	
S16	**SAE-16**
X	1"-manifold porting
30PD	
S16	SAE-16

Note: Customer supplies subplate adaptor, or purchases optional Parker subplate.

BOX 8: Options

Symbol	Description
1	**None**
2	No bypass
4	SAE-4 drain port on bowl
21	No bypass and drain port

REPLACEMENT ELEMENTS

Filter Model (Flourocarbon seals)				
Media	**15P-1**	**15P-2**	**30P/30PD-1**	**30P/30PD-2**
20Q	**930369Q**	**930370Q**	**933135Q**	**933136Q**
10Q	**932612Q**	**932618Q**	**932624Q**	**932630Q**
05Q	**932611Q**	**932617Q**	**932623Q**	**932629Q**
02Q	**932610Q**	**932616Q**	**932622Q**	**932628Q**
20QH	934983Q	930544Q	NA	NA
10QH	932615Q	932621Q	932627Q	932633Q
05QH	932614Q	932620Q	932626Q	932632Q
02QH	932613Q	932619Q	932625Q	932631Q
10QX	933577Q	933579Q	933581Q	933583Q
02QX	933576Q	933578Q	933580Q	933582Q

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

50P Series

High Pressure Filters

Applications for 50P series filters

- Automotive specified equipment
- Hydrostatic transmission circuits
- Servo and proportional controls
- Offshore drilling rigs
- Mining equipment
- Power units

The design objective for all Parker filters is to achieve a sensible balance between cost and performance. We use state of the art techno1ogy to arrive at innovative yet practical designs. Designs which are cost effective for OEM's and users alike.

The 50P series allows you to customize each filter to closely match your needs. Choose the options which best fit your application. No need to waste money on features you don't need.

The 50P series filters are base mounted, which provides several possible advantages. The bowl up mounting makes servicing the elements quick and easy. Simply remove the top cover to access the element. A drain port is provided to allow oil be removed from filter prior to element servicing. This design reduces the possibility of oil spillage and injury to maintenance personnel.

The 50P series has optional manifold porting for space saving design that reduces the number of fittings and potential leak points. The porting is also designed to match the installation of many other manufacturers. Most important, the 50P series meets the SAE HF4 automotive standard.

Vent Plug
- Purge all air from filter assembly
- Improves system performance

Cover
- Durable ductile iron
- Top service elements
- No oil spills during service

Bowl
- Single or double length

Head
- Ductile iron construction
- SAE or manifold ports
- Meets SAE HF4 automotive specification

Bypass (not visible)
- Cartridge style
- Precision matched assemblies

Indicators
- Visual or electrical/visual
- Several connector options

Drain Plug (not visible)
- Drain oil for easy service

Features

O-Ring Seal
- Positive sealing for optimum element efficiency

Plastic End Caps
- Excellent corrosion protection
- Laser marked for clear long lasting identification

Microglass III Media
- Multi-layer for high capacity and high efficiency
- Four different micron sizes available
- Wire reinforced to prevent pleat bunching

Spiral Support Cylinders (Not Visible)
- High strength consistent support
- Continuous length eliminates leak points and increases surface area

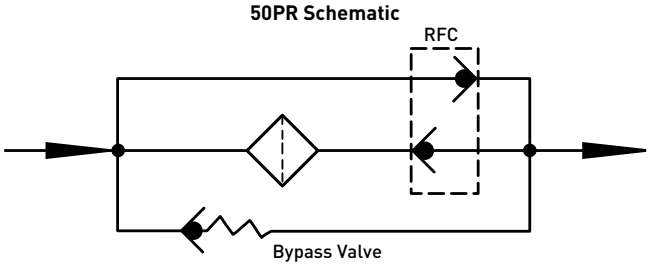
Meets SAE HF4 specificaton for automotive uses

Feature	Advantage	Benefit
• Base mounted filter	• No brackets required for installation	• Reduced installation costs
• Top access cover	• Remove element from top • Lighter then removing entire bowl	• No oil mess
• Visual and electrical indicators	• Know exactly when to service elements	
• Drain port	• Drain all oil from assembly prior to servicing	• Eliminates cross contamination
• Vent port	• Purges all trapped air in filter	• Get the maximum performance from elements • Prevents a "spongy" system
• Multipass tested elements (per ANSI/NFPA T3.10.8.8 R1-1990)	• Element performance backed by recognized test standards	• Elements selected will have consistent performance levels
• Microglass III elements	• Multi-layer media • Wire reinforced pleats	• High capacity with high efficiency • No performance loss from pleat bunching

Model 50PR Reverse Flow Filter

The 50PR was designed specifically for hydrostatic transmission loops because of it's capability to handle reverse flow.

Closed circuit HSTs frequently reverse direction causing flow to reverse in the fluid lines. Pressure filters installed between pump and motor must be able to handle reverse flow without having contaminant washed off of the elements and back into the system. To prevent such an occurrence, the filters require the use of internal check valves to direct the flow through the element in one direction and around the element in the other. Parker's internal check valve design minimizes additional pressure loss and eliminates the cost associated with external valves and fittings. Also the internal design keeps the envelope dimensions of the filter to aminimum as can be seen on the installation drawing.



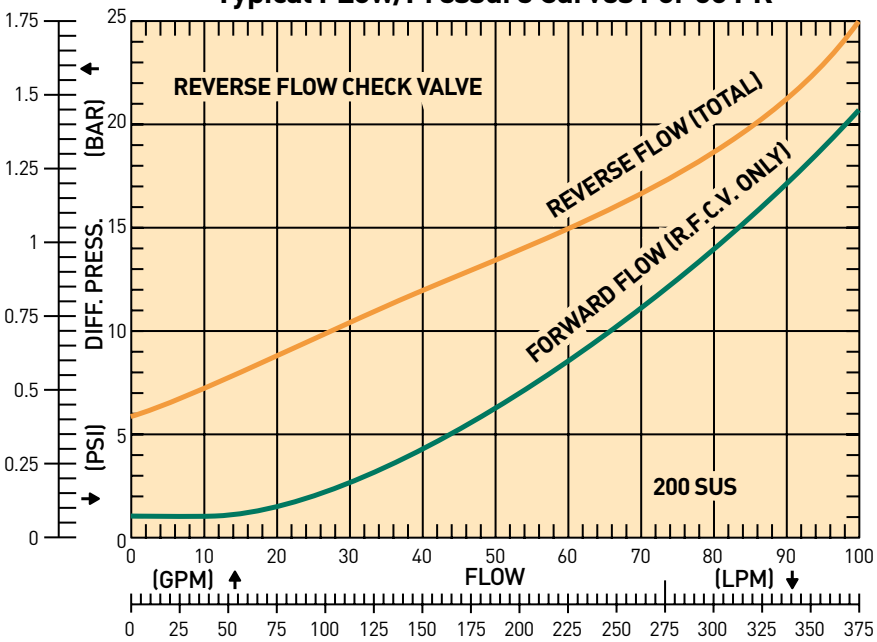
Sizing 50PR Filter Assemblies

To accurately determine the total pressure loss that will be seen when used in your system, the following steps should be taken.

1. Examine the "Flow vs. Pressure" curve below. Find the pressure drop for the maximum system flow on the forward flow curve. Record this value as "housing with check valve pressure loss."
2. Examine the appropriate pressure loss curve for the media and bowl length combination. These curves are found in the Element Performance Data section.
3. Find the pressure drop for the maximum flow rate through the filter and record this value as "element pressure loss."
4. Find the empty housing pressure drop for the maximum flow rate through the filter and record this value as "empty housing pressure loss."
5. Add the values obtained in steps 1 and 3, then subtract out the value from step 4. The resultant pressure loss should not exceed 1/3 of the bypass valve or indicator you intend to select. If this ratio exceeds 1/3, then a double length housing or other media grade may need to be considered.

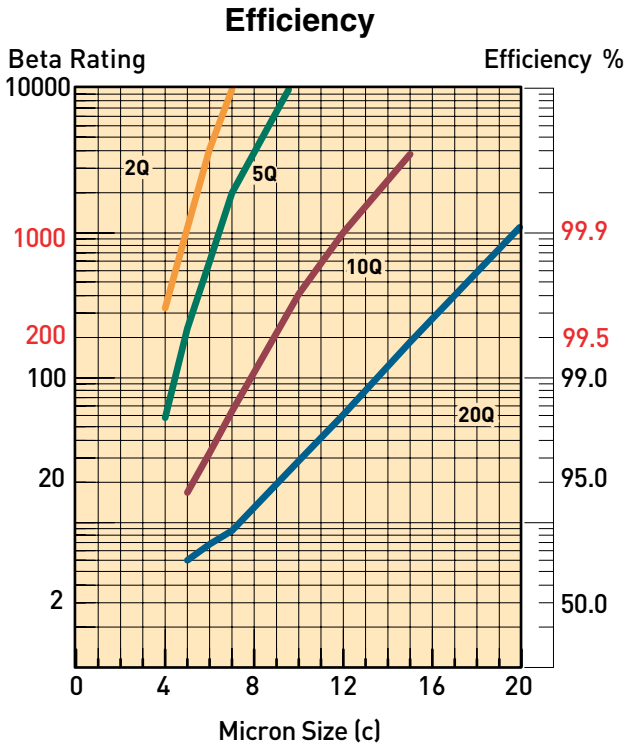
Contact the Hydraulic Filter Division if there is any doubt as to the total pressure loss you have calculated.

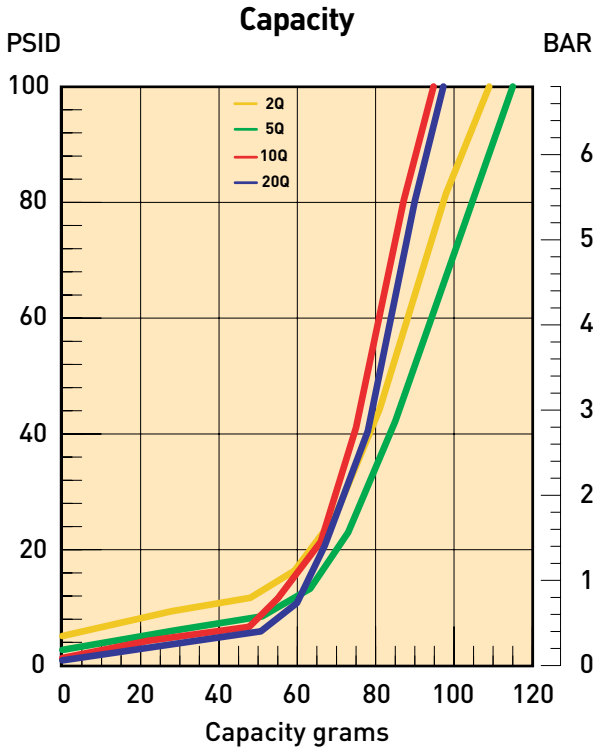
Typical FLow/Pressure Curves For 50 PR



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

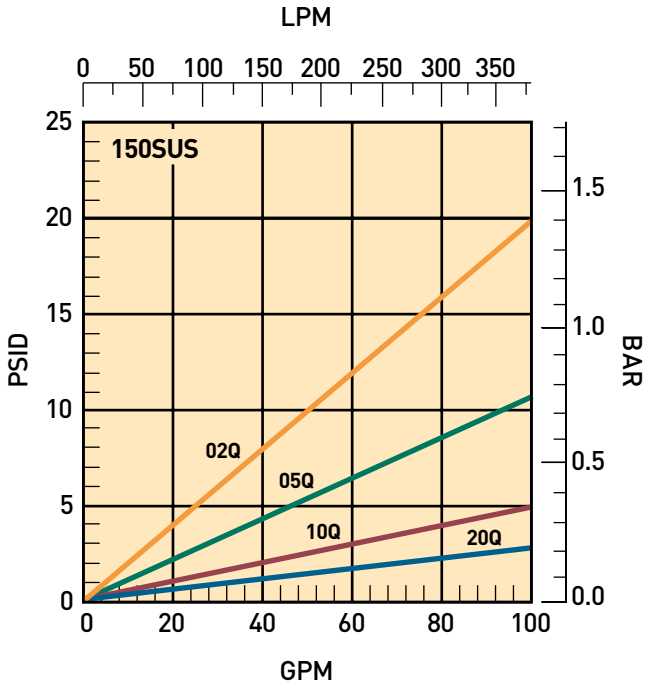
50P-1 Element Performance

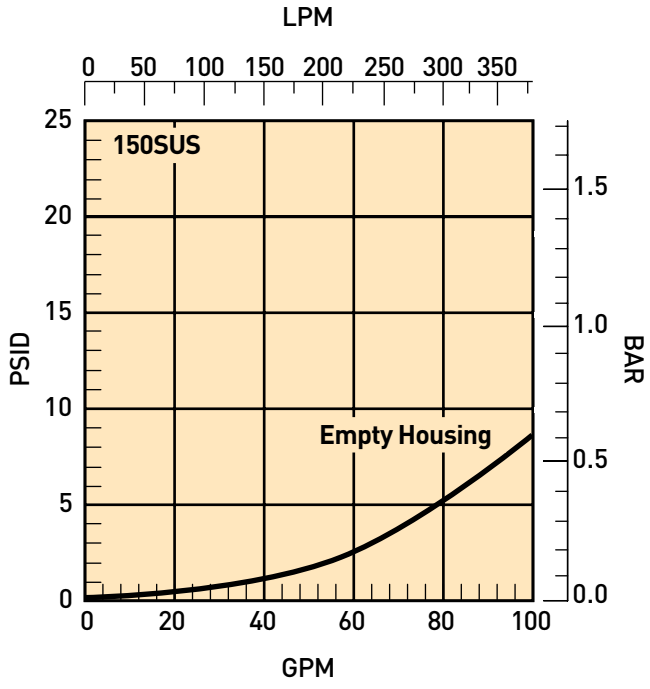




Results typical from Multi-pass tests run per test standard ISO 16889 @ 50 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

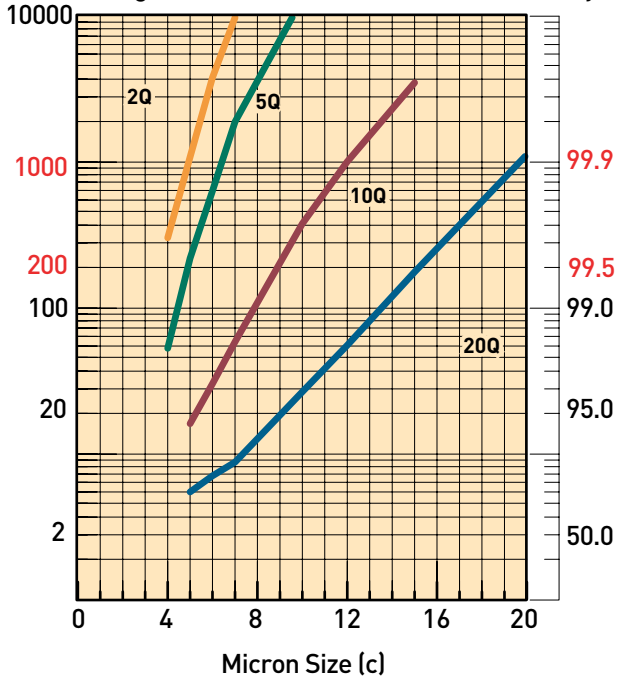
Flow vs. Pressure Loss



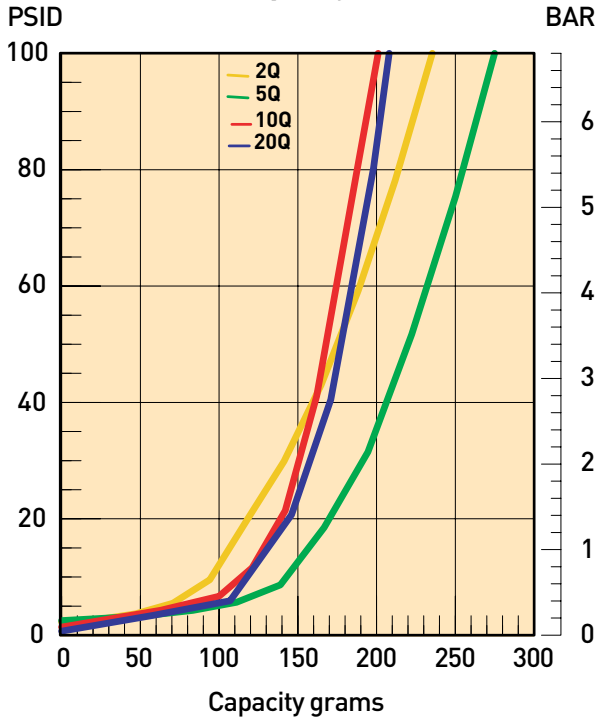


50P-2 Element Performance

Efficiency

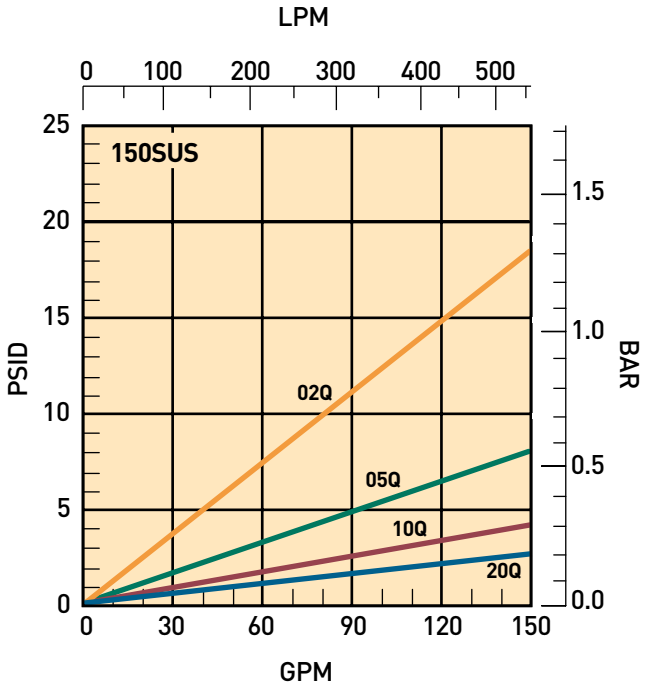


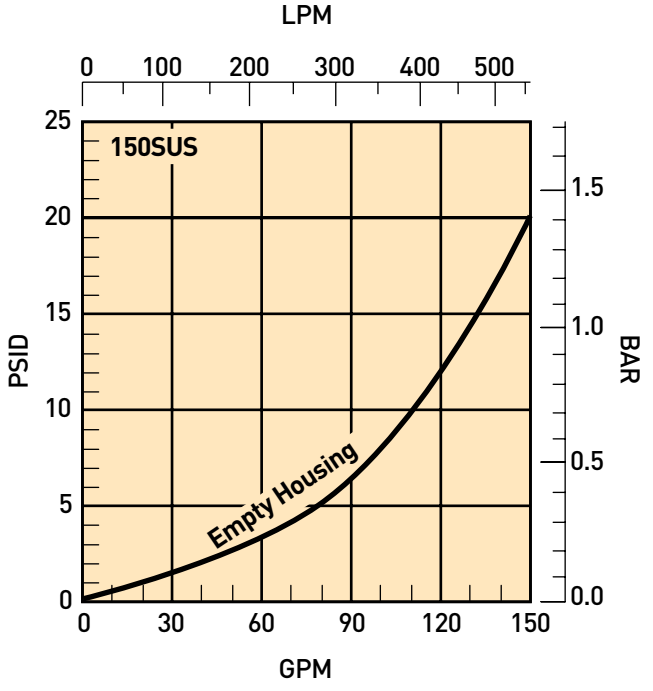
Capacity



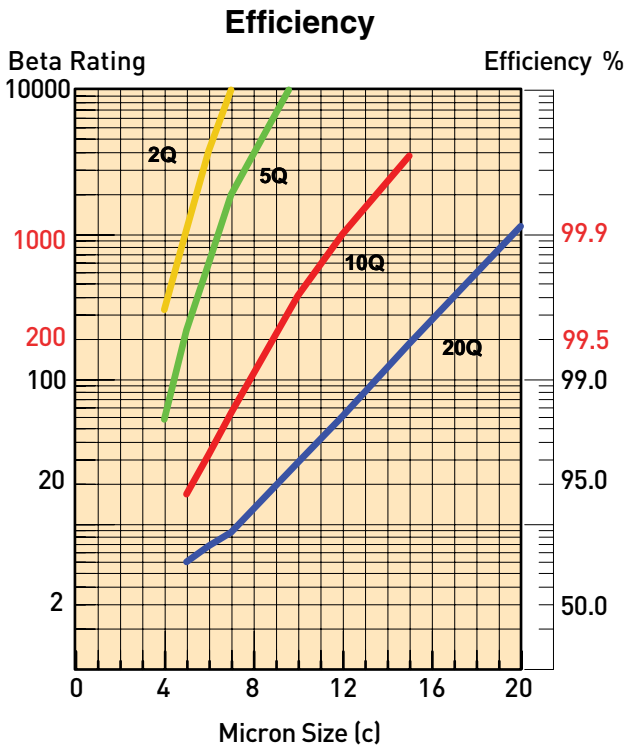
Results typical from Multi-pass tests run per test standard ISO 16889 @ 80 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

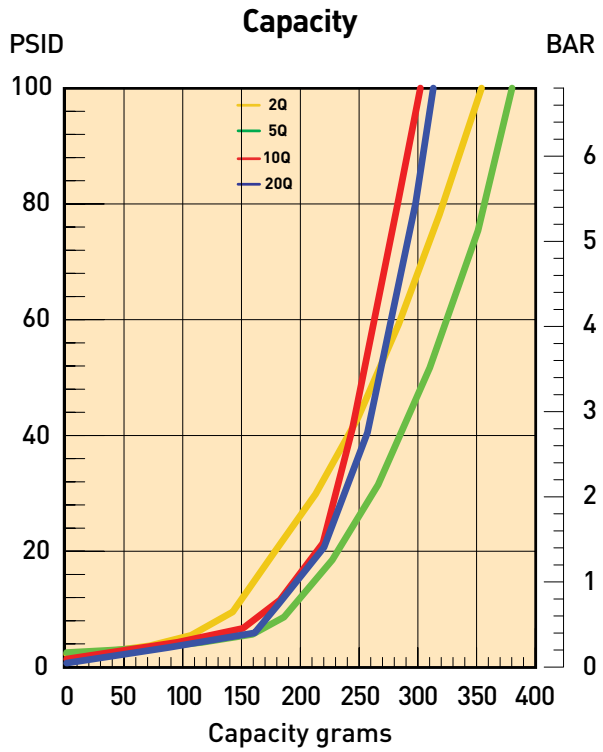
Flow vs. Pressure Loss





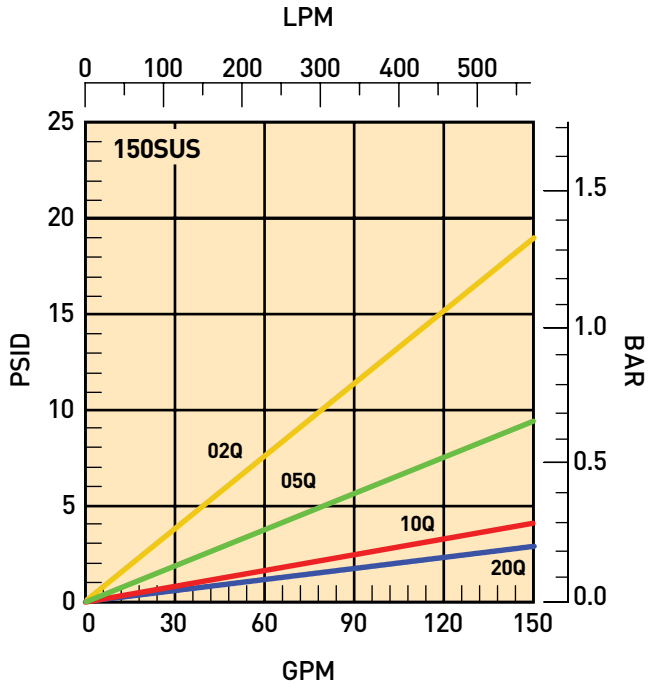
50P-3 Element Performance

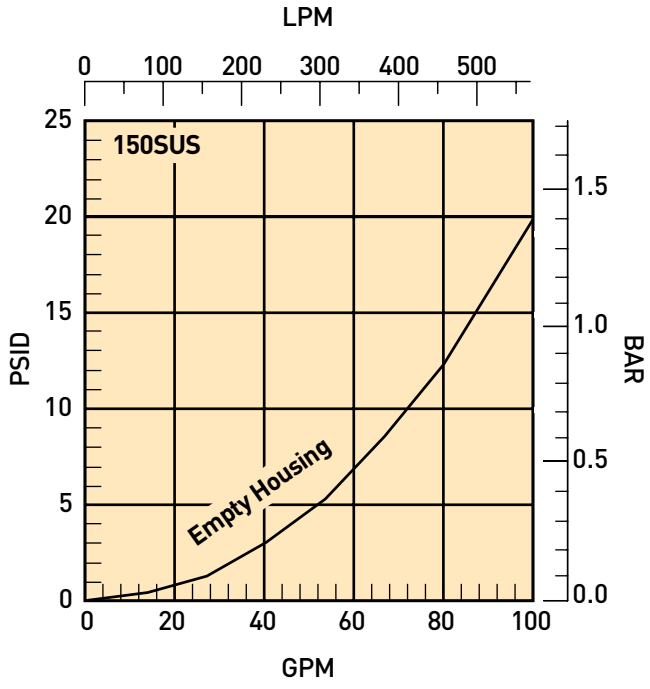




Results typical from Multi-pass tests run per test standard ISO 16889 @ 80 gpm to 100 psid terminal - 10 mg/L BUGL
Refer to Appendix on pages 227-228 for relationship to test standard ISO 4572.

Flow vs. Pressure Loss





Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Specifications: 50P/50PR

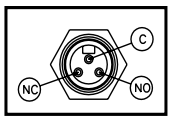
Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 5000 psi (344.8 bar)
Rated Fatigue Pressure: 3500 psi (241.4 bar)
Design Safety Factor: 3:1

Element Collapse Rating:
150 psid (10.2 bar) standard
2000 psid (138 bar) high collapse "H" option

Operating Temperatures:
Buna: -40°F (-40°C) to 225°F (107°C)
Fluorocarbon: -15°F (-26°C) to 275°F (135°C)

Filter Materials:
Head (base) and Cover: ductile iron
Bowl: seamless steel tube

Indicators:
Visual 3 band (clean, change element, bypass)
Electrical: visual as above plus electrical switch with wire leads or connection as selected.
5A @ 240VAC
3A @ 28VDC
SPDT



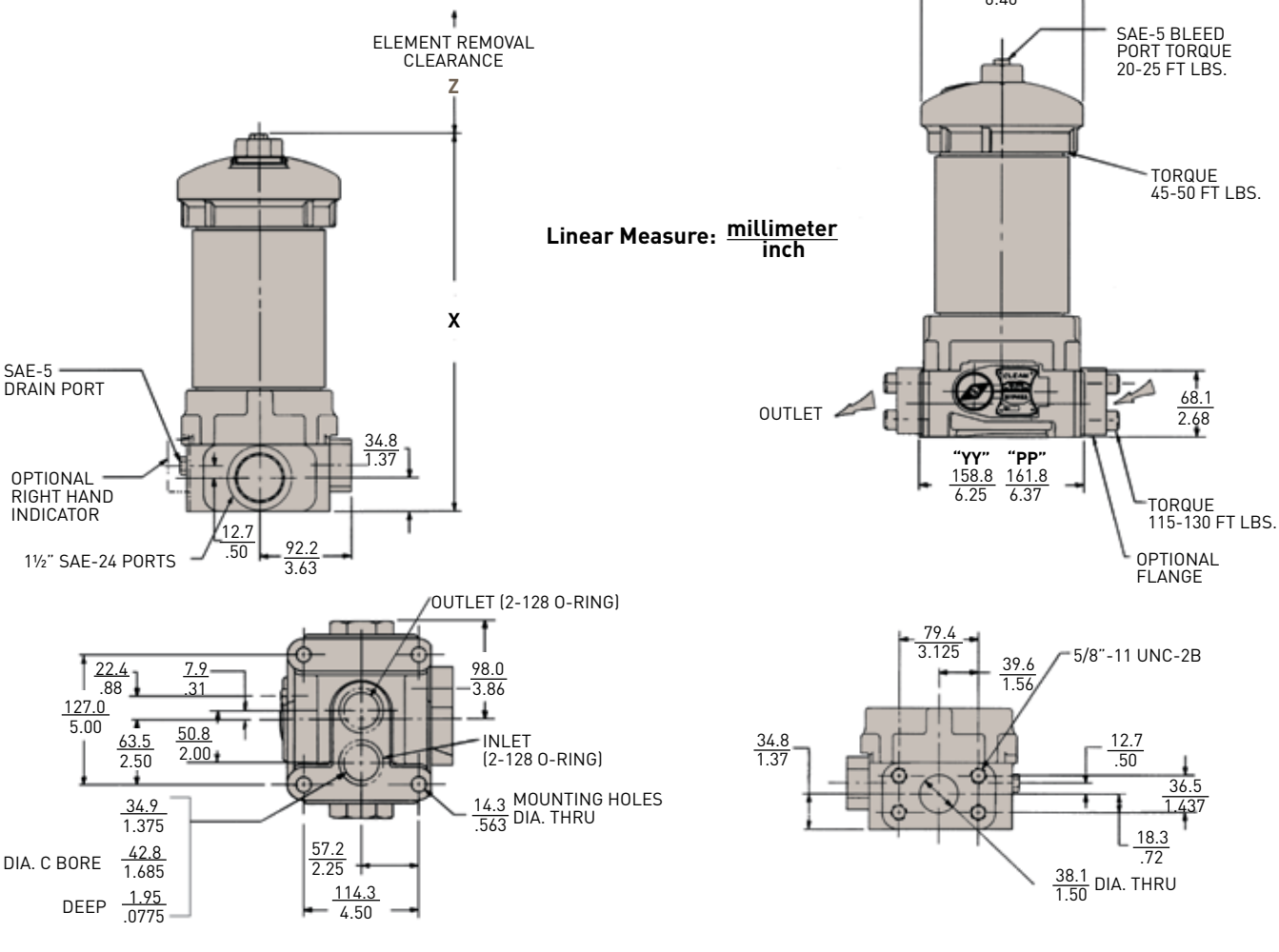
D

Color Coding:
White (normally closed)
Red (normally open)
Black (common)

Shipping Weights (approximate):
50P-1: 56 lb. (25.4 kg)
50P-2: 77 lb. (34.9 kg)
50P-3: 95 lbs. (43.0 kg)
50PR-1: 59 lb. (26.8 kg)
50PR-2: 80 lb. (36.3 kg)

Dimensions= mm/inches	50P-1	50PR-1	50P-2	50PR-2	50P-3
X	387.1 / 15.24	404.6 / 15.93	622.8 / 24.52	640.3 / 25.21	850.4 / 33.48
Z	254.0 / 10.00	254.0 / 10.00	508.0 / 20.00	508.0 / 20.00	760.2 / 30.00

Linear Measure: millimeter / inch



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Parts List

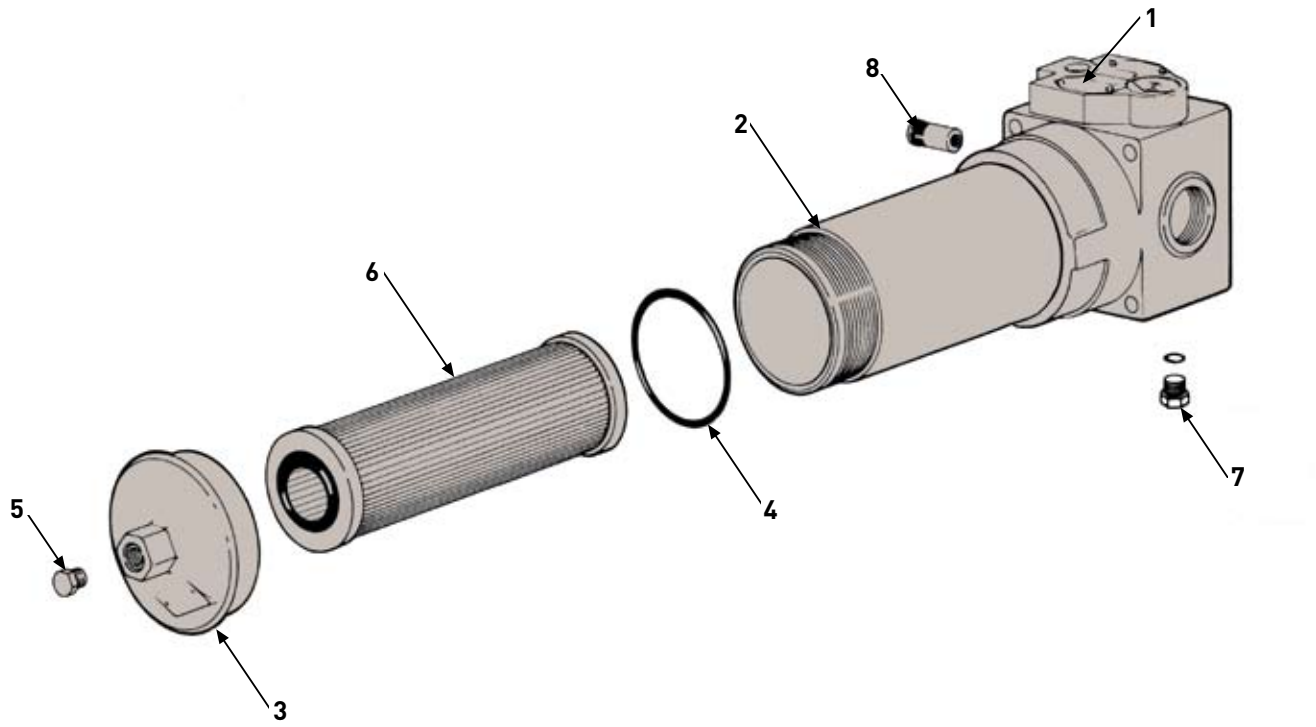
Index	Description	Part Number 50P/PR
1	**Head Assembly**	Consult Factory
2	**Bowl**	Consult Factory
3	**Cover**	926655
4	**Cover O-Ring** Buna Fluorocarbon	 N92246 V92246
5	**Vent Plug** Buna O-ring Fluorocarbon O-ring	**935466** N93905 V93905
6	**Element**	See model code page
7	**Drain Plug** Buna O-ring Fluorocarbon O-ring	**928364** N93905 V93905
8	**Bypass Valve** (50PR valve is not serviceable) 50 psi No bypass, 50 psi indicator 90 psi No bypass, 90 psi indicator **Indicator Kits** Mechanical (left side) Mechanical (right side) Electrical (wire leads) Electrical (3-pin Brad Harrison style) Electrical (DIN 43650 connection) **O-Ring, Manifold Port** Buna Fluorocarbon	 924189 924192 927399 930683 931916 931924 925337 926482 929362 N92128 V92128

Note: Consult factory for EPR compatible part numbers

Element Service Instructions

When servicing the 50P filter, use the following procedure.

A. Stop the system's power unit.
B. Relieve any pressure in the filter or line.
C. If desired, oil can be drained from filter housing by removing the drain port plug located in the head.
D. Rotate the cover counterclockwise and remove.
E. Remove element from housing.
F Place new, clean element into housing centering element over locator.
G. Inspect cover o-ring and replace if necessary
H. Apply cover to filter and tighten to 45-50 ft. lbs.
I. Replace drain plug and tighten 20-25 ft. lbs.



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

High Pressure Filters
50P 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
F3	50P	1	10Q	EL	50	PP	1	Design number assigned by Parker

BOX 1: Seals

Symbol	Description
None	**Buna**
F3	**Fluorocarbon**
E8	EPR

BOX 2: Basic Assembly

Symbol	Description
50P	**5000 PSI (MAOP)**
50PR*	Reverse flow hydrostatic version

*Note: Not available in triple length. Must select "1" or "2" in BOX 3

BOX 3: Length

Symbol	Description
1	**Single**
2	**Double**
3	**Triple**

BOX 4: Element Media

Symbol	Description
20Q	**Microglass III**
10Q	**Microglass III**
05Q	**Microglass III**
02Q	**Microglass III**

Note: For high collapse 2000 psid rated elements, add "H" behind Q.

BOX 5: Indicators

Symbol	Description
P	Port plugged
PL	Port plugged, left side
M	Visual indicator
ML	**Visual indicator, left side**
E	Electrical indicator with wire leads and conduit connection
EL	**Electrical indicator with wire leads and conduit connection, left side**
D	Electrical indicator w/ANSI/B.93.55M 3-pin Brad Harrison style connection
DL	Electrical indicator w/ANSI/B.93.55M 3-pin Brad Harrison style connection, left side

Note: Left side is on viewer's left when looking into inlet port.

BOX 6: Bypass and Indicator Setting

Symbol	Pressure Setting
50	**50 psid**
90	90 psid

BOX 7: Ports

Symbol	Description
PP	**SAE-24 straight thread**
YY	SAE 1½" flange face (J518)
XX	1 3/8" manifold ports on bottom of head

BOX 8: Options

Symbol	Description
1	**None**
11	Blocked bypass

BOX 9: Design Number

Applied to filter assembly by Parker Filter Division. Use the full filter model code, including the design number when ordering replacement parts, elements and cartridges.

50P/50PR Replacement Elements (Fluorocarbon)

Standard Collapse				High Collapse			
Media	Single	Double	Triple	Media	Single	Double	Triple
20Q	**931018Q**	**931020Q**	933489Q	20QH	930438Q	931490Q	936449Q
10Q	**932670Q**	**932679Q**	933488Q	10QH	932676Q	932685Q	936448Q
05Q	**932669Q**	**932678Q**	933487Q	05QH	932675Q	932684Q	936447Q
02Q	**932668Q**	**932677Q**	933486Q	02QH	932674Q	932683Q	936446Q

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

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

18/28/38P Series

High Pressure Filters

Applications for 18/28/38P series

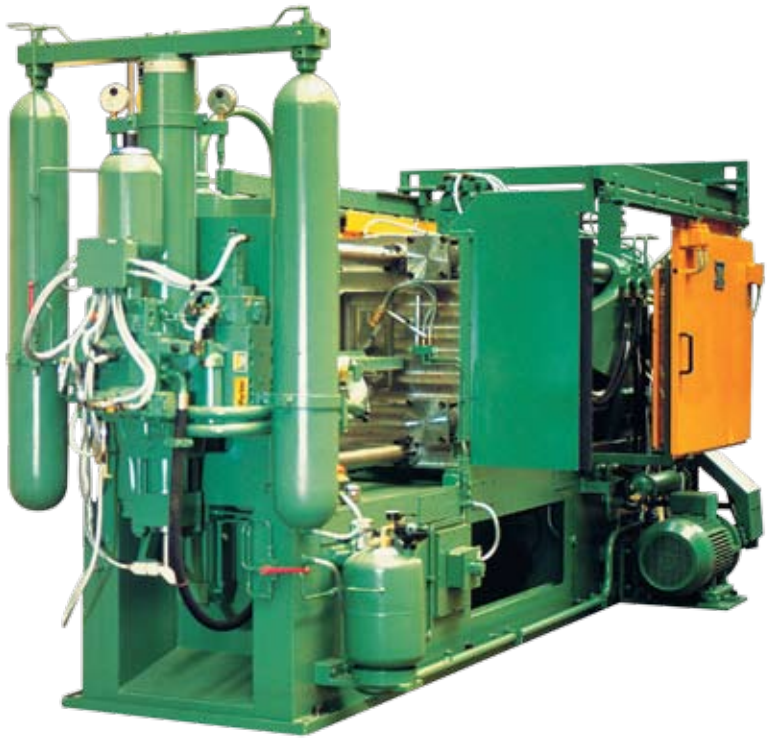
- Injection Molding
- Die Casting
- Servo Controls
- Machine Tools
- Mobile Equipment

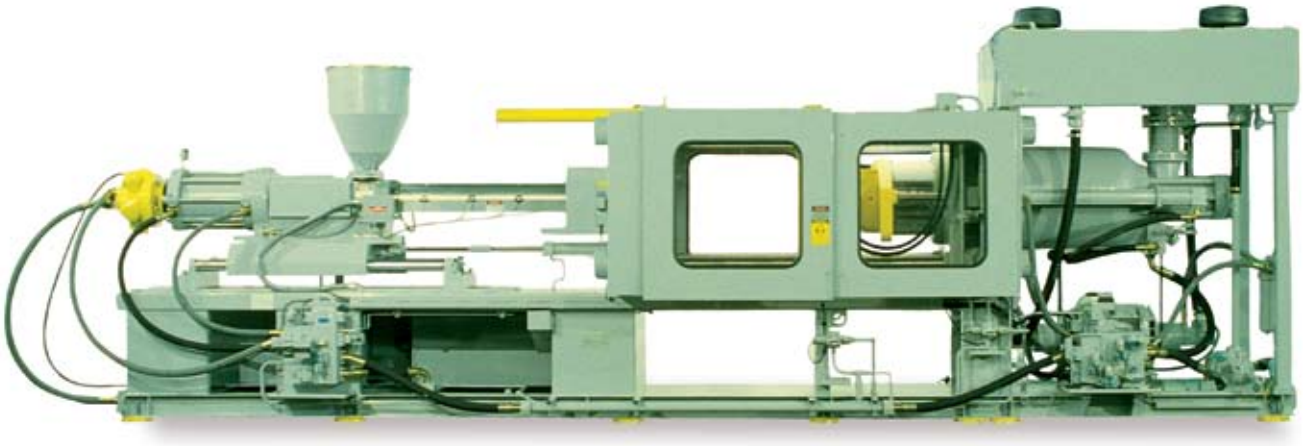
Parker Filtration's Hydraulic Filter Division engineered the 18/28/38P series of high pressure filters to satisfy demanding applications in the mobile and industrial markets throughout the world. With metric mounting and optional ISO 6149 ports, this new series is truly a global design.

Installed downstream of the pump, this new series with their wide range of high capacity Microglass III elements, offer excellent protection to system components.

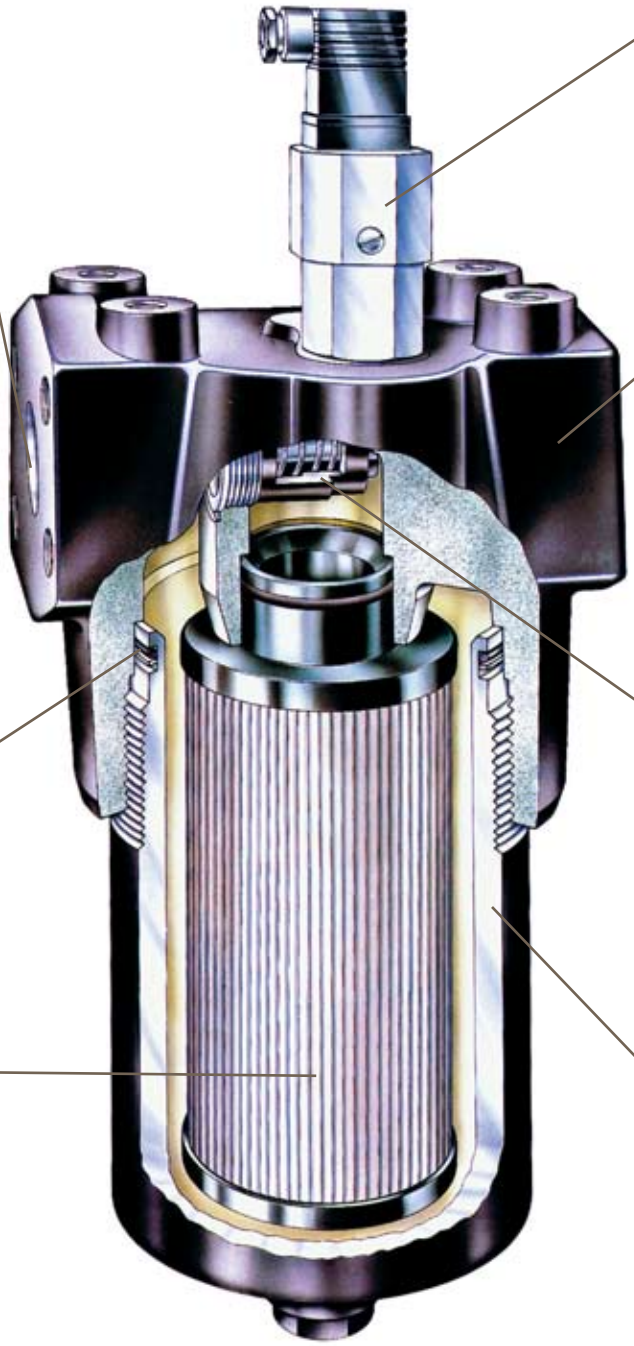
Standard filters come complete with industry proven spool type bypass valve. For more critical applications such as servo or proportional controls, a no bypass high strength element combination ensures maximum protection.

The modular low hysteresis differential pressure indicator fitted to this series is unrivaled in its performance. Tests prove it's accuracy and foolproof design to be a major advance in indicator technology.





Features



Ports ■
SAE, ISO 6149 or flange face ports provide maximum mounting flexibility.

■ Indicator
Available as a visual (auto reset) or electrical with choice of several power connections.

■ Head
SG iron material is used to provide high fatigue strength (6000 psi).

Bowl Seal ■
Diametral head to bowl seal with anti-extrusion ring is reliable for high cyclic applications.

■ Bypass
High precision spool type valve, "no bypass" option available for critical applications.

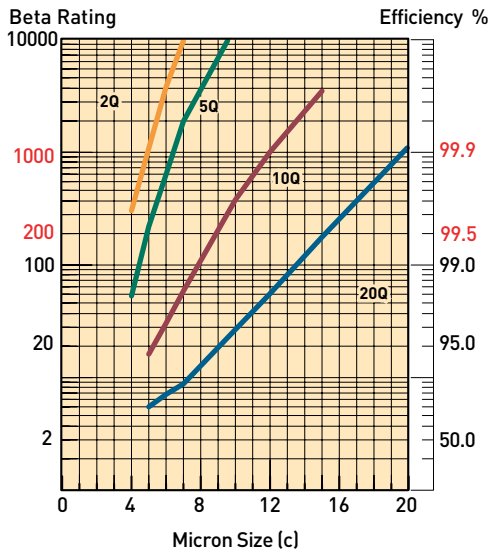
Element Assembly ■
High efficiency ($B_x \geq 200$), high capacity Microglass III media with it's multilayered design is unequalled in performance.

■ Bowl
Steel bowl provides high strength with precision finish for sealing surfaces. Bowl down design allows for draining prior to element servicing.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

18P Element Performance

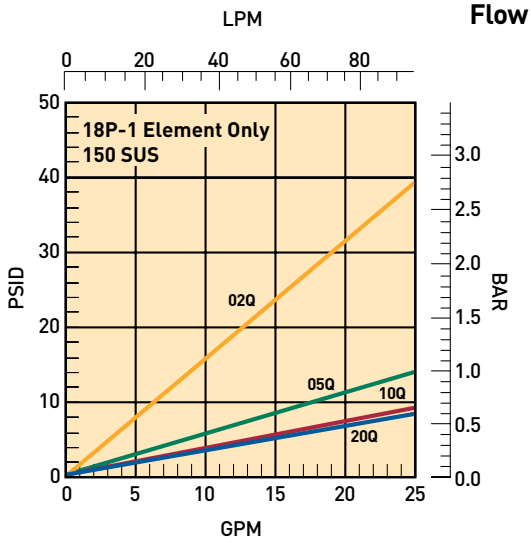
Efficiency

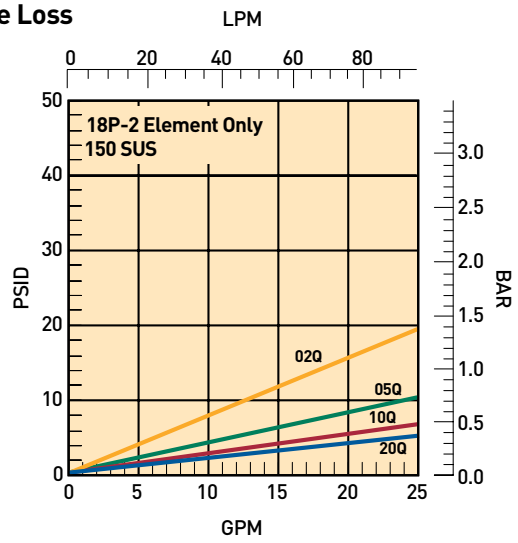


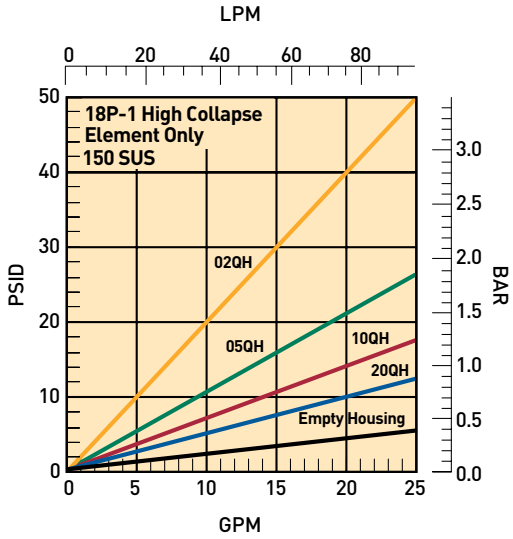
Capacity (grams)

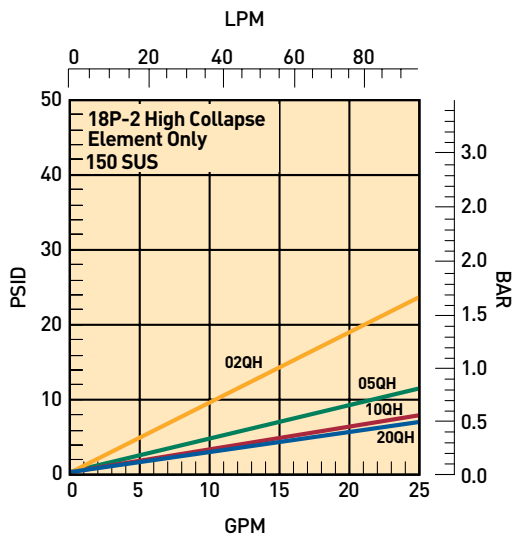
MODEL				
Media Code	18P-1 (50 psid)	18P-1 (98 psid)	18P-2 (50 psid)	18P-2 (98 psid)
02Q	5.9	7.4	18.6	22.7
05Q	8.5	9.4	21.0	23.5
10Q	7.6	8.0	15.8	17.2
20Q	7.7	8.6	16.2	17.7
02QH	4.8	6.3	14.1	17.8
05QH	7.5	8.8	17.1	19.6
10QH	6.7	7.2	14.5	16.1
20QH	6.6	7.2	11.9	12.6

Flow vs. Pressure Loss



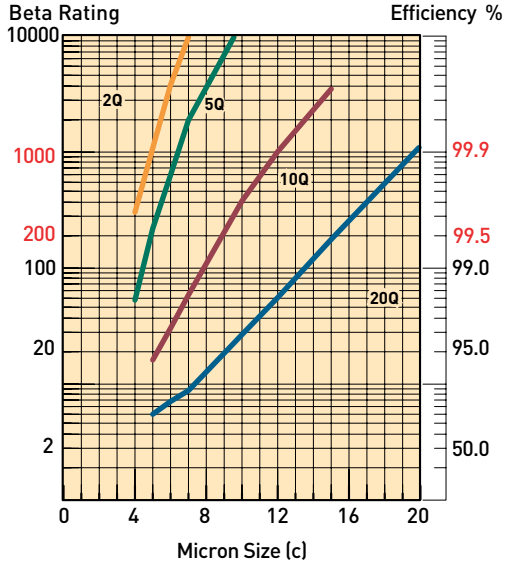






28P Element Performance

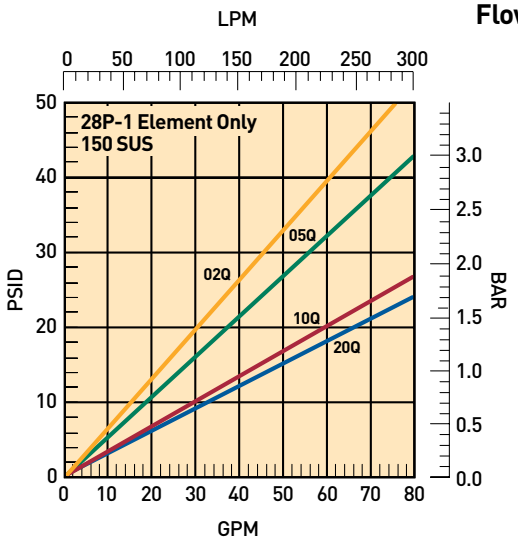
Efficiency

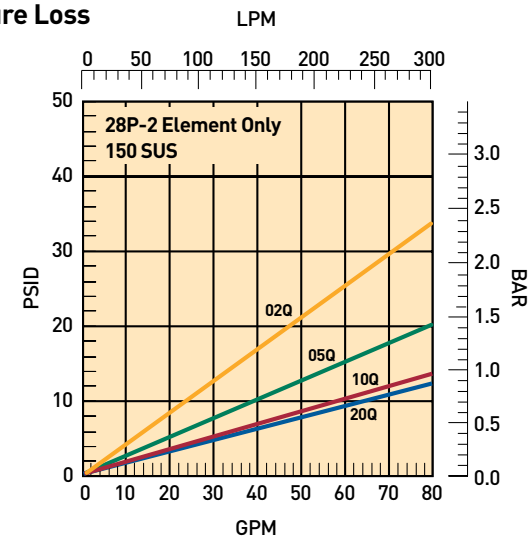


Capacity (grams)

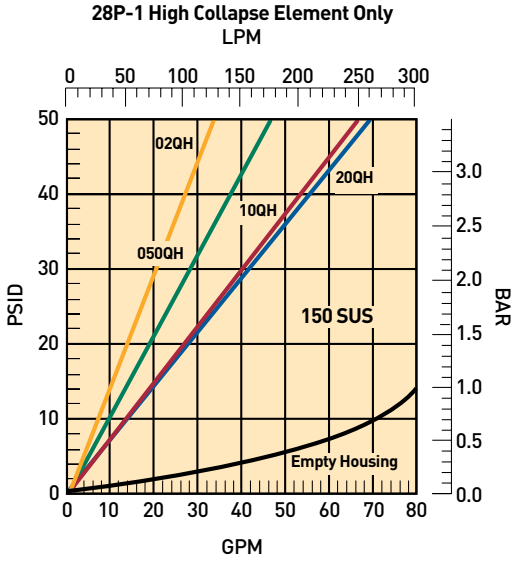
MODEL				
Media Code	28P-1 (50 psid)	28P-1 (98 psid)	28P-2 (50 psid)	28P-2 (98 psid)
02Q	23	28	40	48
05Q	25	28	43	50
10Q	22	24	45	48
20Q	21	24	44	48
02QH	21	24	32	38
05QH	24	27	35	38
10QH	21	23	35	38
20QH	20	22	34	37

Flow vs. Pressure Loss

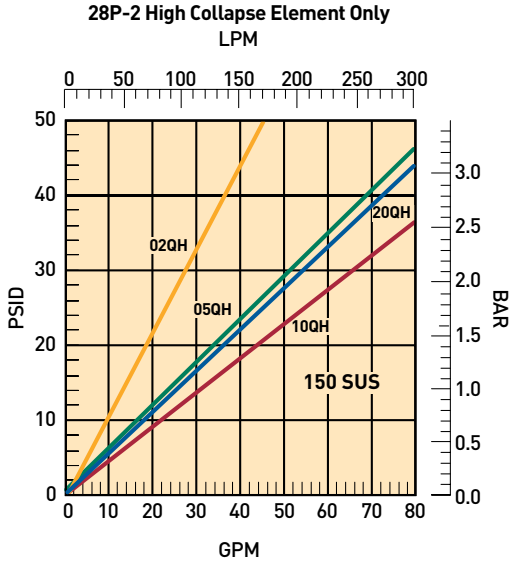




28P-1 High Collapse Element Only



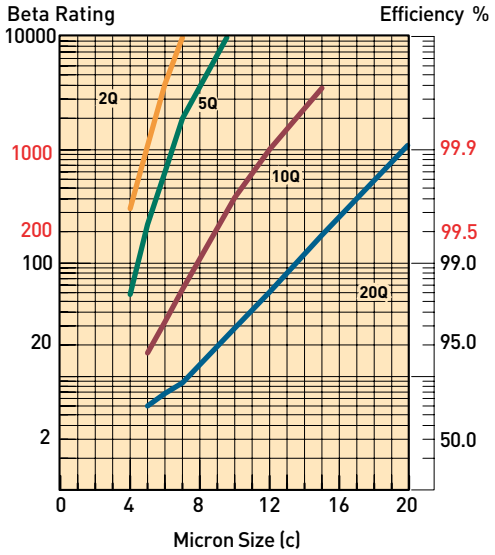
28P-2 High Collapse Element Only



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

38P Element Performance

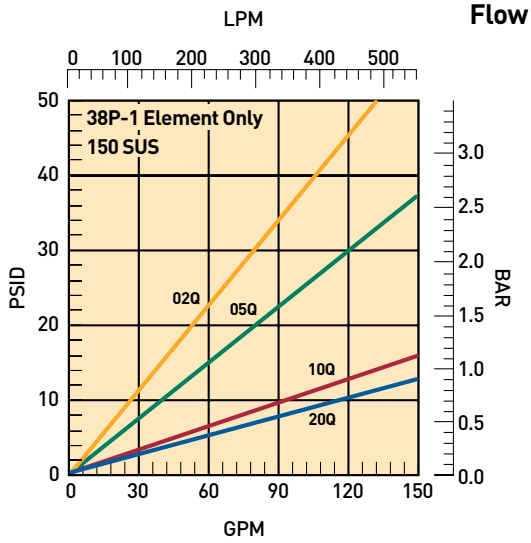
Efficiency

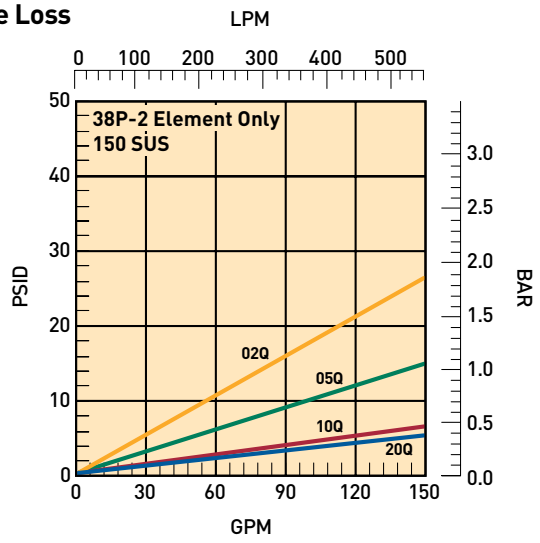


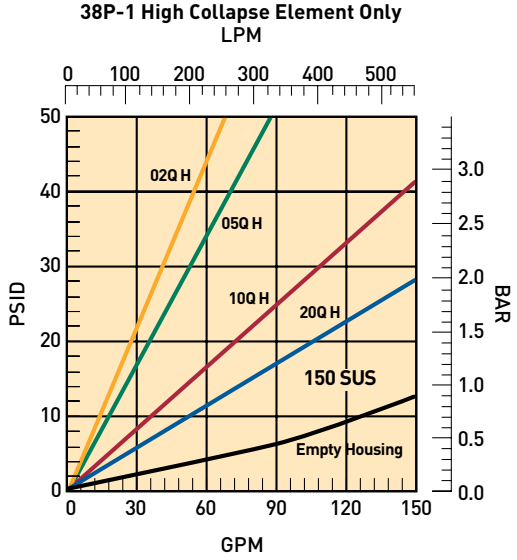
Capacity (grams)

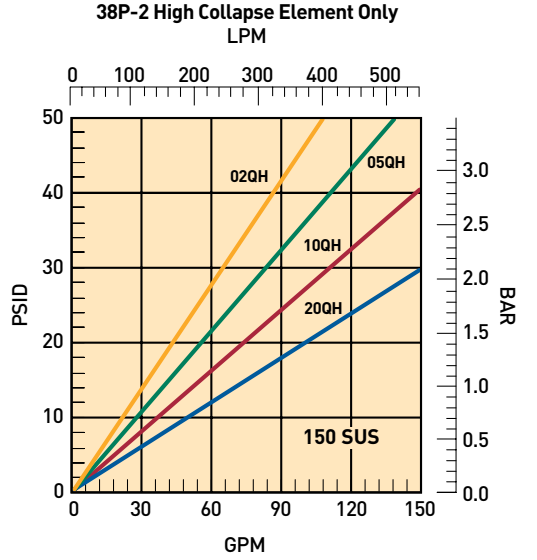
MODEL				
Media Code	38P-1 (50 psid)	38P-1 (98 psid)	38P-2 (50 psid)	38P-2 (98 psid)
02Q	63	74	94	111
05Q	70	78	98	105
10Q	60	67	94	101
20Q	53	60	93	100
02QH	48	57	69	87
05QH	55	61	76	88
10QH	50	56	72	80
20QH	49	54	72	78

Flow vs. Pressure Loss









Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Specifications: 18/28/38P Series

Pressure Ratings:
Maximum Allowable Operating Pressure (MAOP): 6000 psi (413.8 bar)
Rated Fatigue Pressure: 6000 psi (413.8 bar)
Design Safety Factor: 3:1

Operating Temperatures:
-30°F (-34°C) to 250°F (120°C)

Element Collapse Rating:
Standard: 300 psi (20.7 bar)
High Collapse "H" option: 3000 psi (206.9 bar)

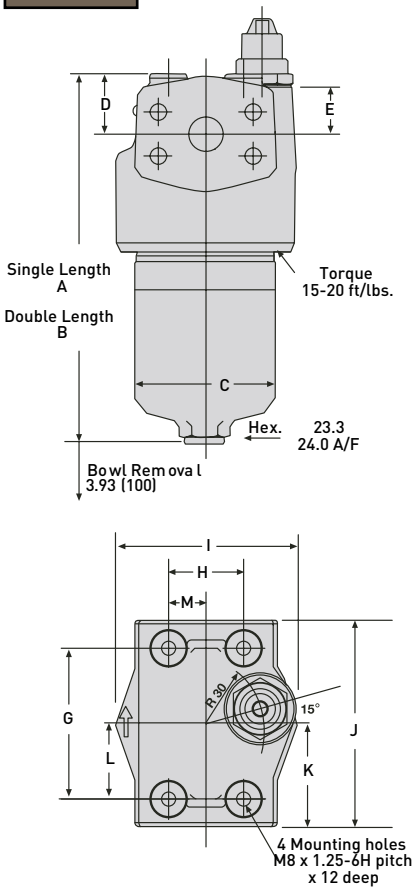
Materials:
Head: SG Iron
Bowl: steel
Indicator: stainless steel body, plastic connectors

Weights (approximate):

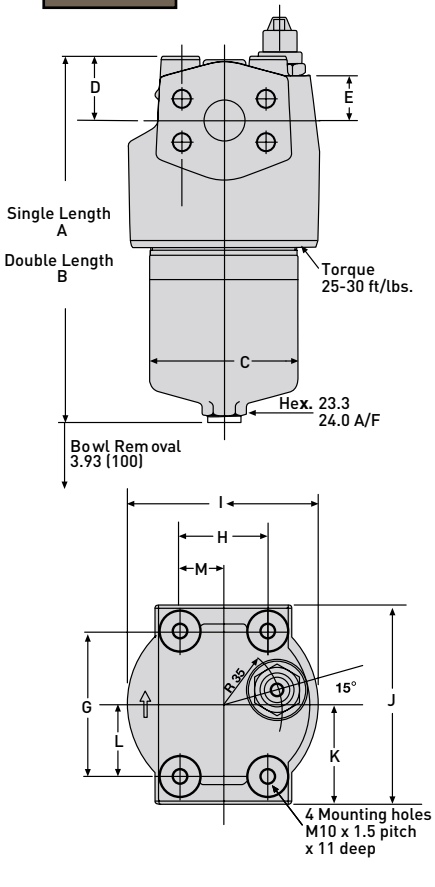
Model	Single length	Double length
18P	9.3 lbs. (4.2 kg)	12.6 lbs. (4.2 kg)
28P	14.8 lbs. (6.7 kg)	20.3 lbs. (9.2 kg)
38P	34.8 lbs. (15.8 kg)	44.8 lbs. (20.3 kg)

Dimensions are in(mm)	A	B	C	D	E	G	H	I	J	K	L	M
18P	7.79 (198)	11.53 (293)	2.95 (75)	1.26 (32)	102 (26)	3.15 (80)	1.57 (40)	3.86 (98)	4.33 (110)	2.17 (55)	1.57 (40)	.78 (20)
28P	9.29 (236)	13.58 (345)	3.66 (93)	1.57 (40)	1.14 (29)	3.54 (90)	2.17 (55)	4.72 (120)	4.88 (124)	2.44 (62)	1.77 (45)	1.08 (27.5)
38P	12.76 (324)	17.44 (443)	5.04 (128)	1.73 (44)	1.37 (35)	4.72 (120)	1.97 (50)	6.30 (160)	6.38 (162)	3.19 (81)	2.36 (60)	.98 (25)

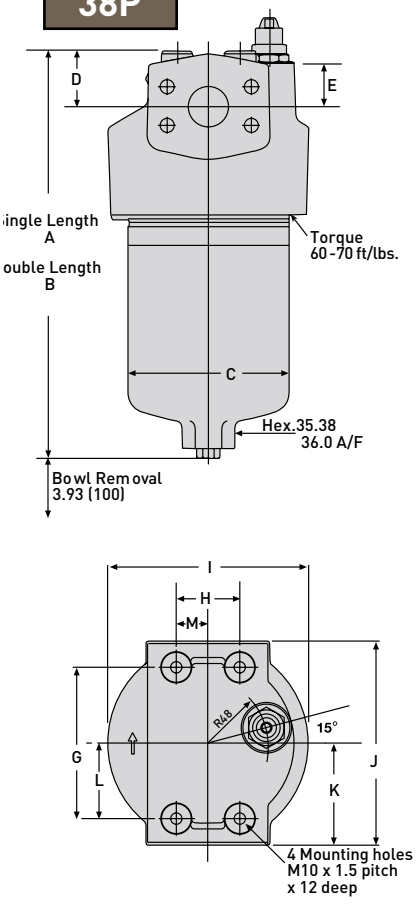
18P



28P



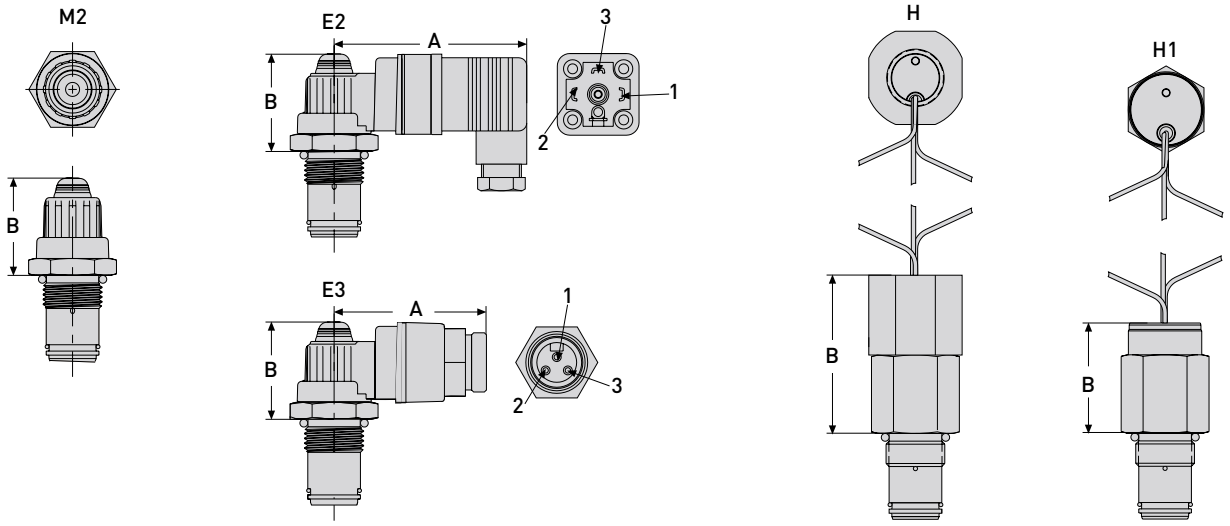
38P



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

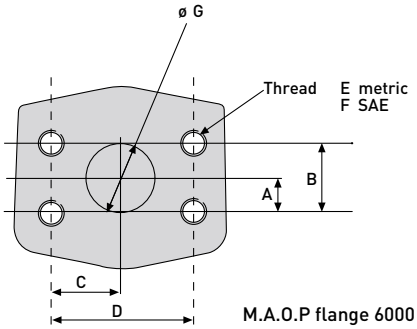
Specifications: 18P/28P/38P

Element Condition Indicators:



Option	Description	Connection/Power	Wiring	"A"	"B"
M2	Visual Auto Reset	N/A	N/A	N/A	1.44 (36.6)
E2	Electrical - Visual	Din 43650 3 Pole + Earth 5A@125/250 VAC, 3A@28VDC	Pin 1 - Common Pin 2 - Normally Closed Pin 3 - Normally Open	2.90 (73.7)	1.44 (36.6)
E3	Electrical - Visual	3 Pin ANSI/B93.55M 5A@125/250 VAC, 3A@28VDC	Pin 1 - Common Pin 2 - Normally Closed Pin 3 - Normally Open	2.32 (58.8)	1.44 (36.6)
H	Electrical - Heavy Duty	½" Conduit adapter w/24" leads .25A (resistive) Max 5 Watts 12 to 28 VDC & 110 to 175 VAC	Black - Normally Open Blue - Normally Closed White - Common	N/A	3.31 (84.1)
H1	Electrical - Heavy Duty	24" wire leads .25A (resistive) Max 5 Watts 12 to 28 VDC & 110 to 175 VAC	Black - Normally Open Blue - Normally Closed White - Common	N/A	2.58 (65.5)

Flange Face Details



M.A.O.P flange 6000 psi (414 bar)

Dimensions are in(mm)	A	B	C	D	E	F	G
18P	.47 (11.9)	.94 (23.8)	1.00 (25.4)	2.00 (50.8)	M10 x 1.5-6H x 18 DP	3/8-16 UNC-2B x 18 DP	.75 (19.0)
28P	.54 (13.9)	1.09 (27.8)	1.10 (28.0)	2.25 (57.1)	M10 x 1.75-6H x 20 DP	7/16-14 UNC-2B x 20 DP	1.00 (25.4)
38P	.62 (15.7)	1.25 (31.7)	1.30 (33.0)	2.63 (66.7)	M14 x 2-6H x 20 DP	1/2-13 UNC-2B x 20 DP	1.25 (31.8)

Element Service

A. Stop the system's power unit.

B. Relieve any system pressure in the filter line.

C. Drain the filter bowl if necessary.

D. Loosen and remove bowl.

E. Remove element by pulling downward with a slight twisting motion and discard.

F. Discard used spiral back-up ring (white) and o-ring from filter bowl.

G. Install new solid back-up ring (black). The top/bottom orientation is non-critical.

H. Ensure the back-up ring is not twisted.

I. Replace the bowl o-ring.

J. Lubricate element o-ring with system fluid and place element on post in filter head.

K. Lubricate bowl o-ring, install bowl and tighten to specified torque.

18P - 15-20 ft. lbs.

28P - 25-30 ft. lbs.

38P - 60-70 ft. lbs

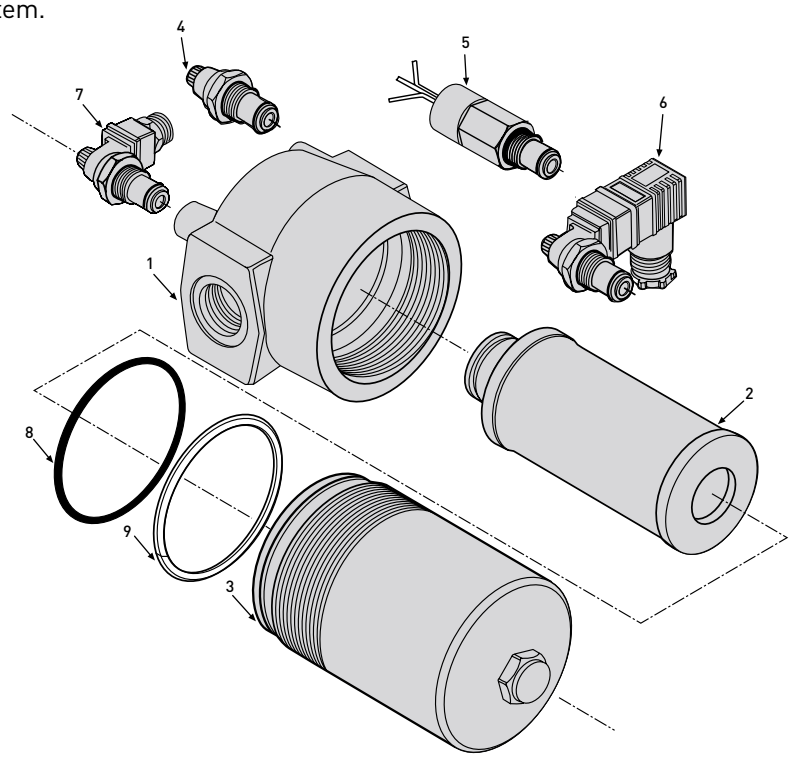
L. Confirm there are no leaks after powering the system.

Parts List

Index	Description	18P	28P	38P
1	**Head Assembly**	Consult Factory (See model code page)		
2	**Element**			
3	**Bowl**			
	Single length w/o drain	S04429	S04437	S04445
	Double length w/o drain	S04430	S04438	S04446*
Not Shown	Drain Plug (SAE-5)	—	—	927363
Not Shown	Drain Plug O-Ring			
	Nitrile	—	—	N93905
	Fluorocarbon	—	—	V93905
	Indicators			
Not Shown	P - Indicator plug kit,	933175	933175	933175
4	M2- Visual autoreset 50 psi	932026	932026	932026
	M2- Visual autoreset 98 psi	932027	932027	932027
5	H - Electrical w/conduit connection 50 psi	933130	933130	933130
	H - Electrical w/conduit connection 98 psi	933131	933131	933131
	H1- Electrical w/12" wire leads (50 psi)	933133	933133	933133
	H1- Electrical w/12" wire leads (98 psi)	933134	933134	933134
6	E2- Electrical/Visual w/ DIN connection (50 psi)	933145	933145	933145
	E2- Electrical/Visual w/ DIN connection (98 psi)	933146	933146	933146
7	E3- Electrical/Visual w/ 3-pin connection (50 psi)	934383	934383	934383
	E3- Electrical/Visual w/ 3-pin connection (98 psi)	934384	934384	934384
8	**Bowl Seal**	V92144	V92235	V92246
9	**Bowl Anti-extrusion Ring**	934798	934799	934800
	****Seal Kit- Nitrile**	S04350	S04352	S04354
	****Seal Kit - Fluorocarbon**	S04351	S04353	S04355

*Drain plug included

**(Includes bowl o-ring, bowl anti-extrusion ring, element o-ring and indicator o-rings.)



High Pressure Filters

18/28/38P 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
28P	2	10Q	V	M2	M	Y16	1

BOX 1: Filter Series

Symbol	Description
18P	**¾" nominal ports**
28P	**1" nominal ports**
38P	**1½" nominal ports**

BOX 2: Element Length

Symbol	Description
1	**Single**
1	**Double**

BOX 4: Media Code

Symbol	Description
02Q	**Microglass III, 2 micron**
05Q	**Microglass III, 5 micron**
10Q	**Microglass III, 10 micron**
20Q	**Microglass III, 20 micron**

Note: For high collapse rated (2000 psid) elements, add "H" behind Q.

BOX 3: Seals

Symbol	Description
B	**Nitrile**
E	EPR
V	**Fluorocarbon**

BOX 5: Indicator

Symbol	Description
N	None
M2	**Visual auto reset**
H	Electrical indicator, w/conduit (no visual)
H1	Electrical/12" leads (no visual)
E2	**Electrical/visual, DIN Connection**
E3	Electrical/visual, 3-pin connection

BOX 6: Bypass

Symbol	Description
K	50 PSI (3.5 bar) setting
M	**98 PSI (7 bar) setting**
X	No Bypass and no Indicator

BOX 7: Ports

Symbol	Description
	18P
S12	**SAE-12**
M27	M27, ISO6149
Y12	¾" SAE flange face
	28P
S16	**SAE-16**
M33	M33, ISO6149
Y16	1" SAE flange face
	38P
S24	**SAE-24**
M48	M48, ISO6149
Y20	1¼" SAE flange face

BOX 8: Options

Symbol	Description
1	**With Bypass**
11	No Bypass

Replacement Elements

	STANDARD COLLAPSE ELEMENTS				HIGH COLLAPSE ELEMENTS			
Model	**02Q**	**05Q**	**10Q**	**20Q**	**02QH**	**05QH**	**10QH**	**20QH**
18P-1	**G04246**	**G04247**	**G04248**	**G04249**	G04294	G04295	G04296	G04297
18P-2	**G04254**	**G04255**	**G04256**	**G04257**	G04302	G04303	G04304	G04305
28P-1	**G04262**	**G04263**	**G04264**	**G04265**	G04310	G04311	G04312	G04313
28P-2	**G04270**	**G04271**	**G04272**	**G04273**	G04318	G04319	G04320	G04321
38P-1	**G04278**	**G04279**	**G04280**	**G04281**	G04326	G04327	G04328	G04329
38P-2	**G04286**	**G04287**	**G04288**	**G04289**	G04334	G04335	G04336	G04337

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

272/372 Series

Reverse Flow Pressure Filters

Reverse Flow Pressure Filters

272/372 Series

Features/Applications for High Pressure Hydraulic Filters 272 Series

- Pressures to 6,000 PSI
- Flows to 65 GPM
- Microglass Elements - 3 to 20 Micron Absolute
- Disposable or Recleanable Elements
- Reverse Flow

Specifications

High Prssure Hydraulic Filters - 200 Series

Flow Rating: 65 GPM

Pressure Rating:

Operating Pressure (Maximum)	6000 PSI
Proof Pressure	9000 PSI
Burst Pressure	12000 PSI
Fatique Pressure (Maximum)	0-4000-0 PSI @3,000,000 Cycles

Fluid Temperature: -40°F to +212°F

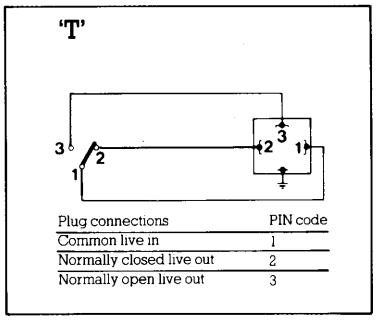
Construction:

Head	Nodular Iron
Bowl	Extruded Steel
Indicators	Consult Factory
Elements	Consult Factory

Weight:

	S.A.E. or Flange Ports	Manifold Ports
Length 1	20 Lbs.	24 Lbs.
Length 2	22 Lbs.	26 Lbs.

Wiring Diagrams:



Plug connections	PIN code
Common live in	1
Normally closed live out	2
Normally open live out	3

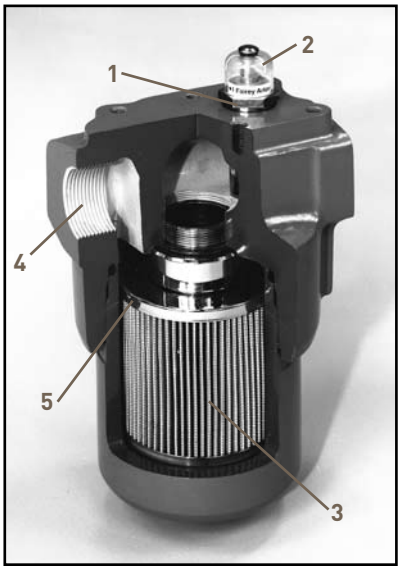
Electrical Ratings:

Hirschman Connector without Lamps:

T - 250 or 110 VAC or 28 VDC Max.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

High Performance New Generation 272 Series Filters



A rugged modular design for applications to 6000 PSI and 65 GPM. Parker's high pressure filters are specified worldwide for industrial, mobile, marine and mining applications.

Parker's high pressure filters are the finest you can buy. Here is why:

TruTell combined bypass valve and indicator.

1. High performance, low hysteresis bypass valve assures quick return to the closed position following cold starts or other short-term bypass conditions. Result: the best filter performance and protection for your system. The location of the bypass valve is 90° to the flow stream, which prevents unwanted valve operation and helps cushion the effect of system shocks (when compared with in-line valve location).
2. The bypass condition is indicated by the appearance of a red band under the transparent dome. The indicator has 360° visibility for easy viewing. Several other indicator options are shown below.

Microglass Media Offering

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

Other Features

4. Port options include SAE straight thread, SAE 3000 or 6000 PSI flanges or manifold mount.
5. Bowl-into-head assembly provides positive sealing and easier servicing.
6. A rugged, low pressure drop reverse flow valve is available.
7. For complete information, see design features section.

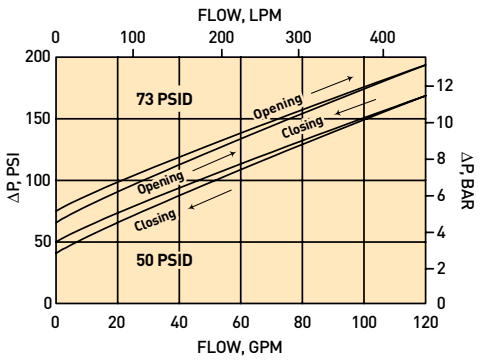
(A) 272 Series length 2
(B) 272 Series length 2 manifold mounting
(C) 272 Series length 1 with visual latching indicator
(D) 272 Series length 1 with dual electrical and visual indicators

TrueTell Bypass Valve/Clogging Indicator

Over 30 years of testing valves of different configurations led to the combined TruTell bypass valve and indicator. This design produces the best all around characteristics for stability, low hysteresis, minimal leakage and reliability.

A bypass valve that closes quickly and completely is important because a filter in bypass offers no system protection, especially from large particles that can cause catastrophic failure.

The TruTell bypass valve and indicator assembly is a precision machined design from which hysteresis effects have been virtually eliminated. See curve.



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Reverse Flow Pressure Filters

272/372 Series

Point 1
Competitive bypass valve designs with significantly different areas between the open and closed position or high friction sliding seals have high hysteresis. As a result these bypass valves do not close as quickly as they should and a large percentage of the fluid continues to bypass the filter element completely after a cold start up (usually anything below 68°F).

Point 2
Most competitive bypass valves dramatically limits filter assembly performance even with a good element in the filter housing.The TruTell design forces as much fluid as possible through the element even when partially open.

Point 3
The TruTell bypass valve location is very important. Our valve and indicator combination is situated near the outlet port at right angles to the flow path. In this position it monitors only element differential pressure. Undesirable leakage and premature bypass associated with in line valve locations are eliminated. This location also helps cushion the effect of system shocks that pass through in-line bypass valves virtually unaffected.

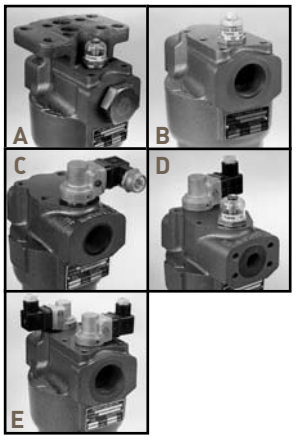
Point 4
Our TruTell Bypass valve is magnetically coupled to the indicator. This assures no false warning that element bypass will ever occur. If the indicator actuates, an impending or bypass condition exists period. Unless the indicator is coupled to the bypass valve, it is impossible to accurately indicate bypass valve position under all operating conditions.

Point 5
Parker offers the widest selection of indicator types in the industry.

Visual types include:
A. A 360° visibility non-latching type
B. A 360° visibility latching type (For remote locations or flow on demand systems, or where systems must be shut down to inspect the filter.)

Electrical indicators include:
C. Visual electrical
D. Electrical and Visual
E. Dual electrical

For electrical indicator connector options see Box 4 on page 126.



Microglass Media High Performance

Multi-Pass Test Results to ISO 4572 (Time Weighted Average)

Filter Type		Media	Code	Filtration Rating						
				β_x>200	β_3	β_6	β_{10}	β_{12}	β_{20}	β_{25}
5	300psi High Collapse	02QX	FF	3	≥200 99.5	>1000 99.9	>3000 99.97	>5000 99.98	INF	INF
		10QX	10	15	3 66.66	12 91.66	50 98.0	75 98.67	>2000 99.95	>5000 99.98
Filter Type		**Media**	**Code**	**Filtration Rating**						
				β_x>200	β_3	β_6	β_{10}	β_{12}	β_{20}	β_{25}
7	290psi Collapse	GDH3	20	3	≥100 99.0	>300 99.67	>1500 99.93	>2000 99.95	>5000 99.98	INF
		GDH6	21	6	12 91.7	≥100 99.0	>1000 99.9	>2000 99.95	>5000 99.98	INF
		GDH10	22	10	8 87.5	22 95.4	100 99.0	≥200 99.5	>5000 99.98	INF
		GDH20	23	20	-	2 50.0	8 87.5	20 95.0	≥100 99.0	≥200 99.5

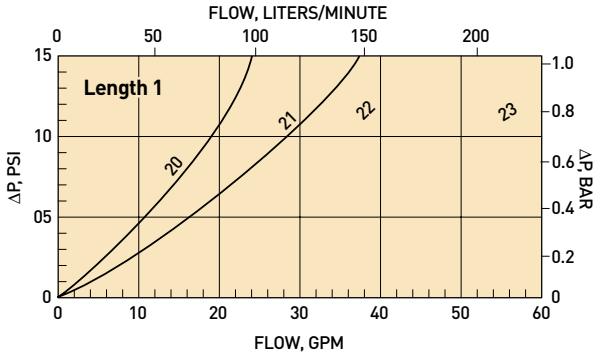
Element efficiency in percent
Element Beta ratio B_x

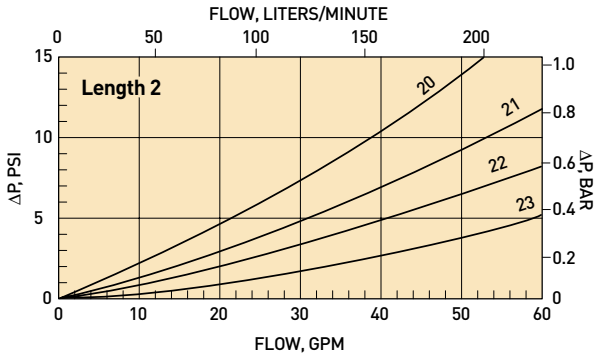
Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Flow/Pressure Drop Curves

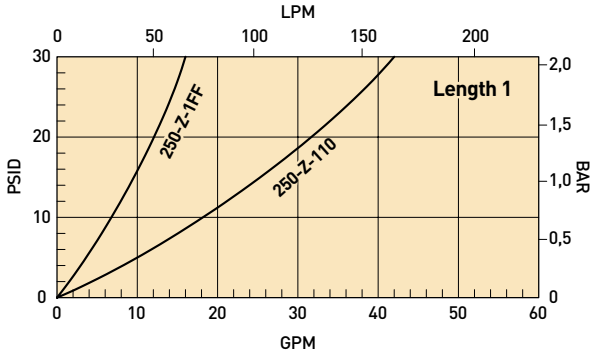
Disposable Elements - 272 Series

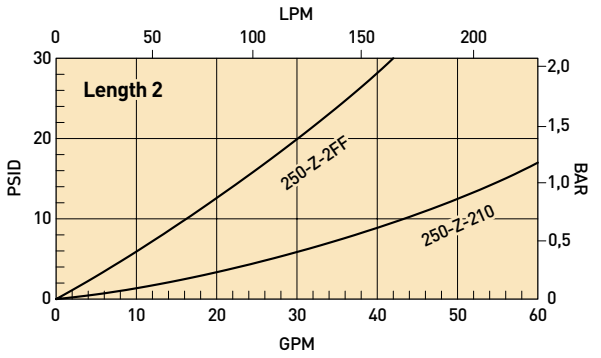
For Bypass Equipped Housings (290 psid min. collapse)





For Non-bypass Housings (3000 psid min. collapse)





Fluid Conditions: Viscosity 140 SSU (30 cSt) and SP. Gr. 0.88

Note: Element ΔP is directly proportional to viscosity.

Find Filter Assembly Pressure Drop

Filter assembly ΔP is equal to the sum of element and housing pressure drops taken from the appropriate curves and adjusted for operating viscosity and specific gravity.

Example:

Filer Model: 272A-BV50-JZ222

Flow: 50 GPM

Viscosity: 225 SSU, Sp. Gr.: 1.0

Step 1. **Correct element ΔP for viscosity.**
Element ΔP = 6 psi x 225SSU/140SSU = 9.6psi

Step 2. **Correct housing ΔP for specific gravity.**
Housing ΔP = 15 psi x 1.0/0.88 = 17.0 psi

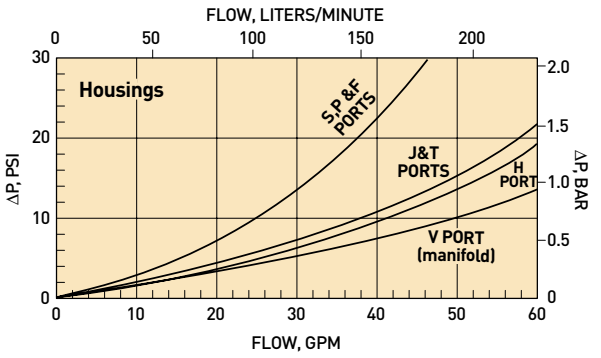
Step 3. **Correct reverse flow**

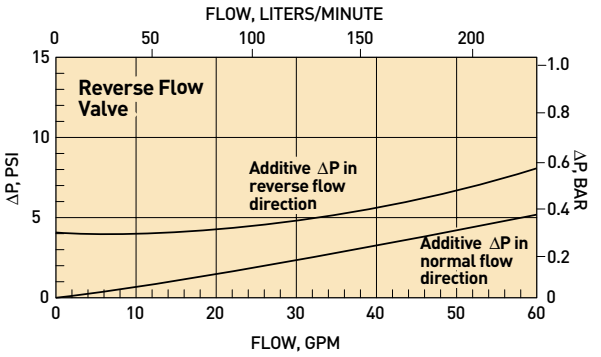
Valve ΔP for specific gravity

RFV ΔP = 4 psi x 1.0/0.88 = 4.5 psi

Step 4. **Calculate assembly**
ΔP = 9.6 psi + 17.0 psi + 4.5 psi = 31.1 psi

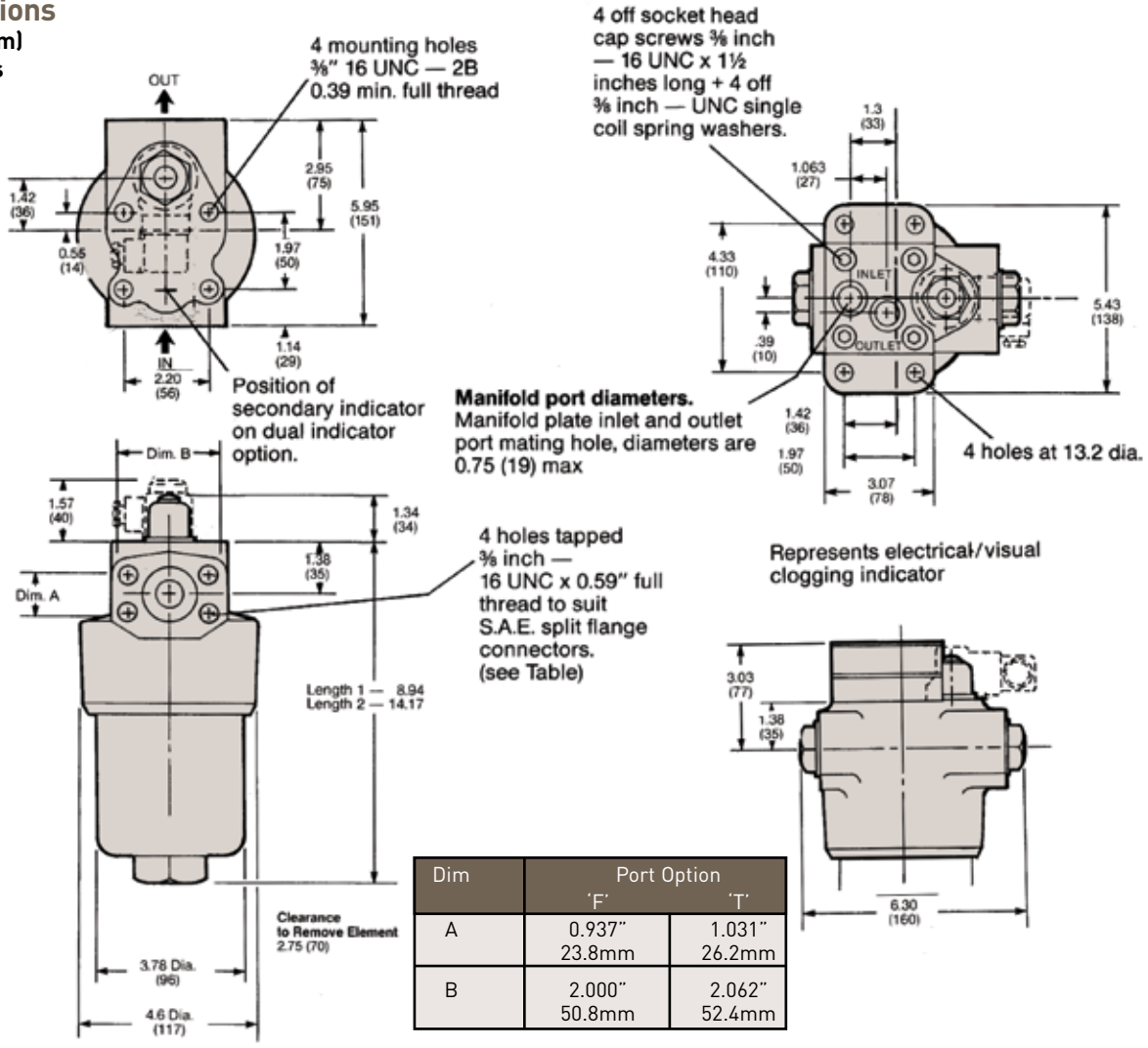
NOTE: Housing and reverse flow valve ΔP are directly proportional to specific gravity.





Dimensions

Inches (mm)
272 Series

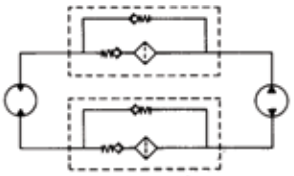


Dim	Port Option 'F'	Port Option 'T'
A	0.937" 23.8mm	1.031" 26.2mm
B	2.000" 50.8mm	2.062" 52.4mm

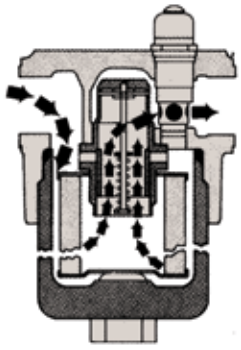
Reverse Flow Valve Better Three Ways

For hydrostatic drives and other systems where reverse flow is required a valve is incorporated which allows fluid to pass through the element in one direction but to bypass the element when flow is reversed. (See diagrams).

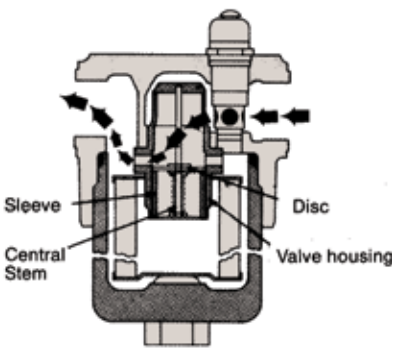
1. Rugged one piece steel body design that is built to last. Unlike stamped metal or aluminum designs. Parker's Reverse Flow Valve (RFV) is a spool/ disc valve caged in a high strength machined steel body. This greatly reduces the risk of valve failure and resultant filter or component damage.
2. Low pressure drop the spool/disc design keeps system pressure losses at a minimum without sacrificing reliability.
3. Our modular design means easy change over or replacement. The reverse flow valve threads directly into the filter head, replacing the standard element adapter. For customers with more that one application or for system conversions, multiple applications from the dame hardware means less inventory.



Normal Flow Condition



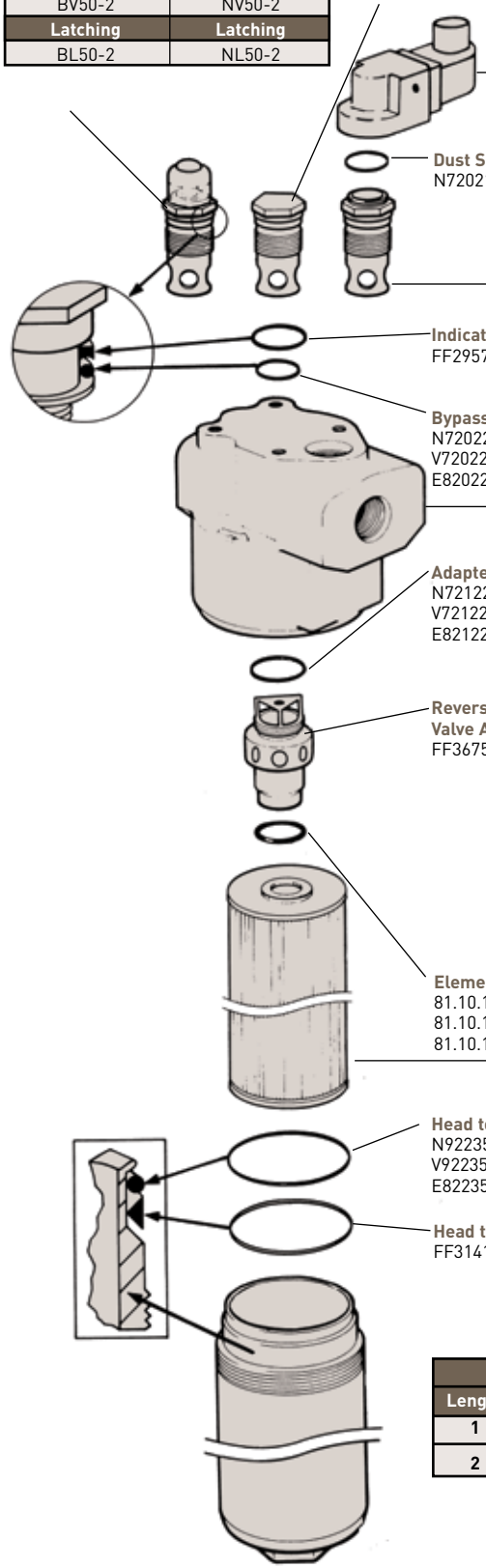
Reverse Flow Condition



Parts Breakdown
272 Series Filter

Visual Indicator Assembly	
Bypass Valve	No Bypass Valve
BV50-2	NV50-2
Latching	Latching
BL50-2	NL50-2

Non-Indicator Assembly	
Non-Bypass Plug	Bypass Assy.
"—"	BN50-2



Electrical Actuator Assembly Hirschmann Connector		
Code	Part Number	Voltages Available
T	FF3468	28 VDC, 250 VAC Max.

Electrical Subassembly	
Bypass Valve	Non-Bypass
90.34.000.29 (73 psid)	90.34.000.27 (73 psid)
90.34.000.28 (50 psid)	90.34.000.26 (50 psid)

HEAD	
Description	Part Number
SAE-12 (1 1/16" 12 Thread)	204-S
SAE-16 (1 5/16" 12 Thread)	204-J
SAE-20 (1 5/8" 12 Thread)	204-H
SAE 6000 PSI 3/4" Flange, Code 62	204-F
SAE 3000 PSI 1" Flange, Code 61	204-T
Manifold Adapter	204-V

Element Kit				
Length	Disposable All Fluids			
	3 µm abs.	6 µm abs.	10 µm abs.	20 µm abs.
1	270-Z-120	270-Z-121	270-Z-122	270-Z-123
2	270-Z-220	270-Z-221	270-Z-222	270-Z-223
	High Collapse Disposable (3000 psid)			
	3 µm absolute		15 µm absolute	
1	250-Z-1FFH		250-Z-110H	
2	250-Z-2FFH		250-Z-210H	
	High Collapse Cleanable (3000 psid)			
	6 µm absolute		20 µm absolute	
1	240-Z-101		240-Z-110	
2	240-Z-201		240-Z-210	
	Cleanable			
	40 µm absolute		75 µm absolute	
1	290-Z-140		290-Z-175	
2	290-Z-240		290-Z-275	

Bowl	
Length	Part Number
1	FF4282
2	FF4283

*Included in Seal Kit: 936057 Nitrile
936058 EPR
936059 Fluorocarbon

Reverse Flow Pressure Filters

272/372 Series

HOW TO ORDER 272 Series Filters:

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

Assembly Example:

STD	BOX 1	BOX 2	BOX 3	BOX 4	BOX 5	BOX 6	BOX 7	BOX 8
2	7	2	A	BV50	S	Z	1	23

Element Example:

STD	BOX 1	STD	BOX 6	BOX 7	BOX 8	BOX 3
2	7	0	Z	1	23	A

BOX 1: FILTER/ELEMENT TYPE

Symbol	Description
7	Microglass Inorganic disposable
5	High Strength Disposable

BOX 2: FILTER FLOW

Symbol	Description
2	With Reverse Flow Valve

BOX 3: SEALS

Symbol	Description
A	Nitrile
H	Fluorocarbon

BOX 4: INDICATOR

Indicator Type	BYPASS INDICATION @ 73 PSID (5.0 BAR)	NO BYPASS INDICATION @ 73 PSID (5.0 BAR)
VISUAL	**BV50**	**NV50**
VISUAL-LATCHING	**BL50**	**–**
ELECTRICAL (**T**) 28 VDC, 110-250 VAC	**BE50**	**NE50**

Dual Indicator Codes:

BEE50 - Bypass with double electrical indicators
NEE50 - No bypass with double electrical indicators
BEV50 - Bypass with (1) mechanical visual (50 psid) and (1) electrical indicator (73 psid)
NEV50 - No bypass with (1) mechanical visual (50 psid) and (1) electrical indicator (73 psid)

Note: Dual Indicators are not available with Port Option "V"

BOX 5: PORT OPTIONS

Symbol	Description	Filter Ser.
S	SAE-12 (1-1/16"-12 Thread)	2
J	SAE-16 (1-5/16"-12 Thread)	2
H	SAE-20 (1-5/8"-12 Thread)	2
F	3/4" SAE Flange, Code 62	2
T	1" SAE Flange, Code 61	2
V	Manifold Adaptor	2

BOX 6: ELEMENT TYPE

Symbol	Element Types	Absolute Ratings Micron
Z	All fluids	All ratings

BOX 7: ELEMENT LENGTH

Symbol	Description	Type
1	Length 1	5, 7
2	Length 2	5, 7

BOX 8: DEGREE OF FILTRATION

Symbol	Absolute Rating	Type
FF	3µ	5
10	15µ	5
20	3µ	7
21	6µ	7
22	10µ	7
23	20µ	7

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Applications/Features for High Pressure Hydraulic Filters 372 Series

- Pressures to 6,000 PSI
- Flows to 120 GPM
- BetaMaze™ Elements - 3 to 20 Micron Absolute
- Disposable or Recleanable Elements
- Reverse Flow

Specifications

High Pressure Hydraulic Filters — 372 Series

Max Flow Rating: 120 GPM

Pressure Rating:

Operating Pressure (Maximum)	6000 PSI
Proof Pressure	9000 PSI
Burst Pressure	12000 PSI
Fatique Pressure (Maximum)	0-4000-0 PSI @3,000,000 Cycles

Fluid Temperature: -40°F to +212°F

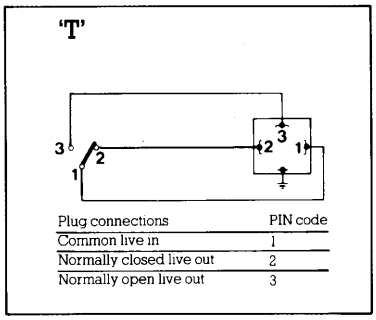
Construction:

Head	Nodular Iron
Bowl	Extruded Steel
Indicators	Consult Factory
Elements	Consult Factory

Weight:

	S.A.E. or Flange Ports	Manifold Ports
Length 1	31 Lbs.	36 Lbs.
Length 2	37.5 Lbs.	42.5 Lbs.
Length 3	44 Lbs.	49 Lbs.

Wiring Diagrams:



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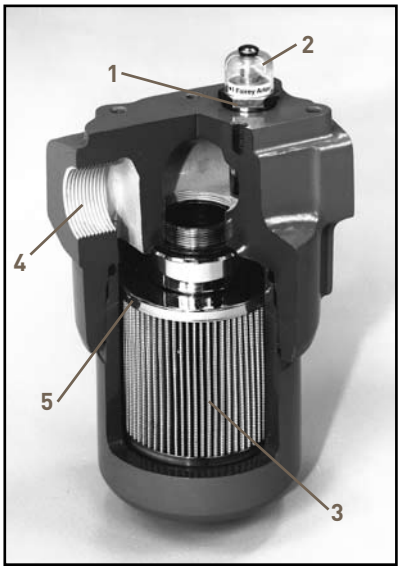
Reverse Flow Pressure Filters

272/372 Series

High Performance New Generation 372 Series Filters



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(B) 372 Series length 3 manifold mounting
(C) 372 Series length 1 with dual electrical and visual indicators
(D) 372 Series length 2 with visual electrical indicator

TruTell Bypass Valve/Clogging Indicator

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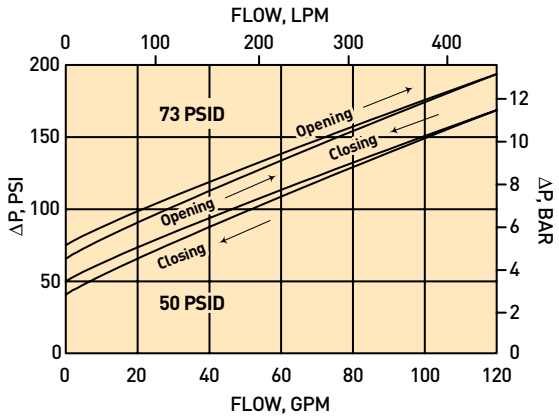

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

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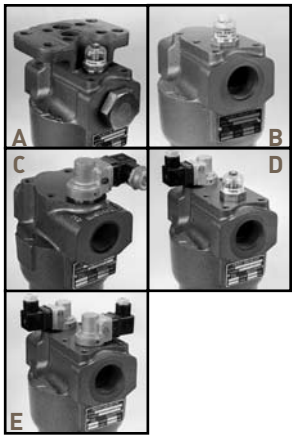
For electrical indicator connector options see Table 5 on back cover.



Microglass Media High Performance

Multi-Pass Test Results to ISO 4572 (Time Weighted Average)

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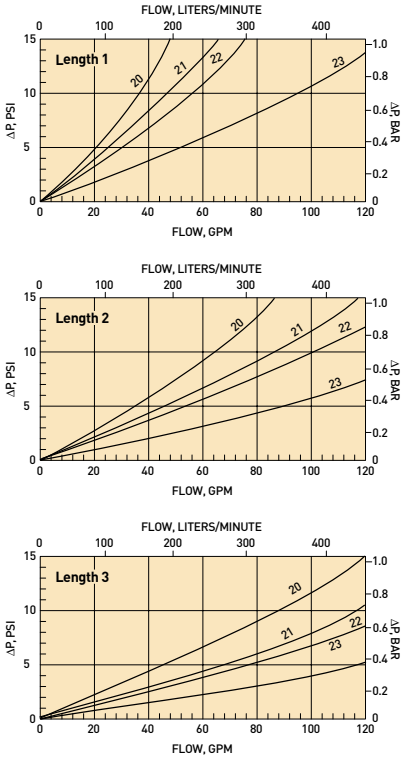
5	300psi High Collapse	02QX	FF	3	≥200 99.5	>1000 99.9	>3000 99.97	>5000 99.98	INF	INF
		10QX	10	15	3 66.66	12 91.66	50 98.0	75 98.67	>2000 99.95	>5000 99.98
Filter Type		**Media**	**Code**	**Filtration Rating**						
				β_x>200	β_3	β_6	β_{10}	β_{12}	β_{20}	β_{25}
7	290psi Collapse	GDH3	20	3	≥100 99.0	>300 99.67	>1500 99.93	>2000 99.95	>5000 99.98	INF
		GDH6	21	6	12 91.7	≥100 99.0	>1000 99.9	>2000 99.95	>5000 99.98	INF
		GDH10	22	10	8 87.5	22 95.4	100 99.0	≥200 99.5	>5000 99.98	INF
		GDH20	23	20	-	2 50.0	8 87.5	20 95.0	≥100 99.0	≥200 99.5

Element efficiency in percent
Element Beta ratio β_x

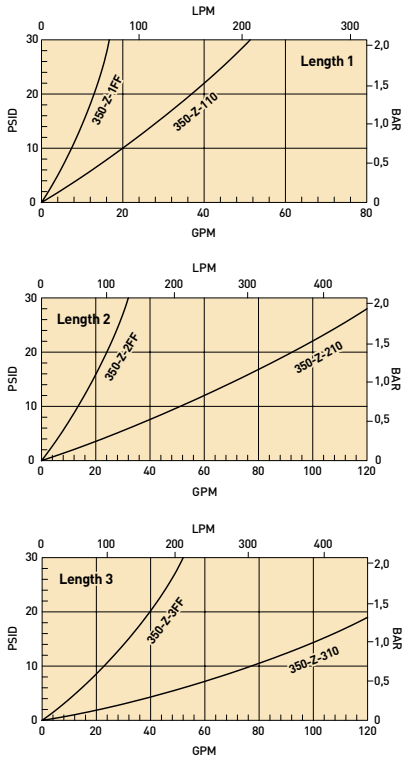
Flow/Pressure Drop Curves

Disposable Elements - 372 Series

For Bypass Equipped Housings (290 psid min. collapse)



For Non-bypass Housings (3000 psid min. collapse)



Fluid Conditions: Viscosity 140 SSU (30 cSt) and SP. Gr. 0.88 **Note:** Element ΔP is directly proportional to viscosity.

Find Filter Assembly Pressure Drop

Filter assembly ΔP is equal to the sum of element and housing pressure drops taken from the appropriate curves and adjusted for operating viscosity and specific gravity.

Example:

Filer Model: 372A-BV50-FL223

Flow: 120 GPM

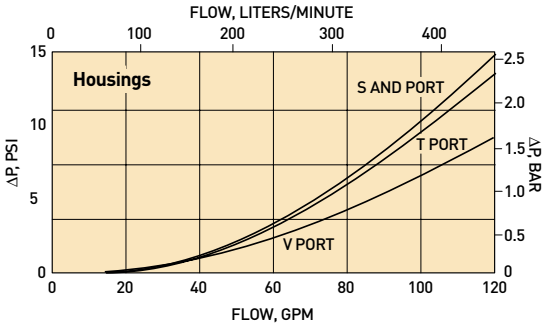
Viscosity: 225 SSU, Sp. Gr.: 1.0

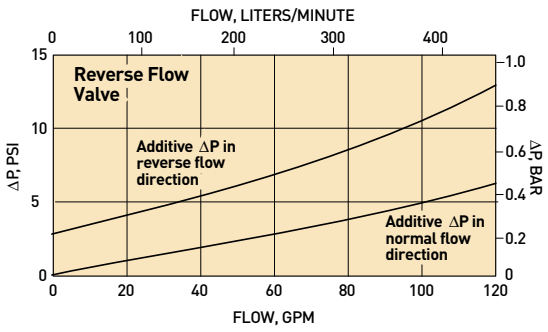
Step 1. **Correct element ΔP for viscosity.**
Element ΔP = 7 psi x 225SSU/140SSU = 11.2psi

Step 2. **Correct housing ΔP for specific gravity.**
Housing ΔP = 27 psi x 1.0/0.88 = 30.7 psi

Step 3. **Correct reverse flow valve ΔP for specific gravity.**
RFV ΔP = 6 psi x 1.0/.88 = 6.8 psi

Step 4. **Calculate assembly.**
ΔP = 11.2 psi + 30.7 psi + 6.8 psi = 48.7 psi



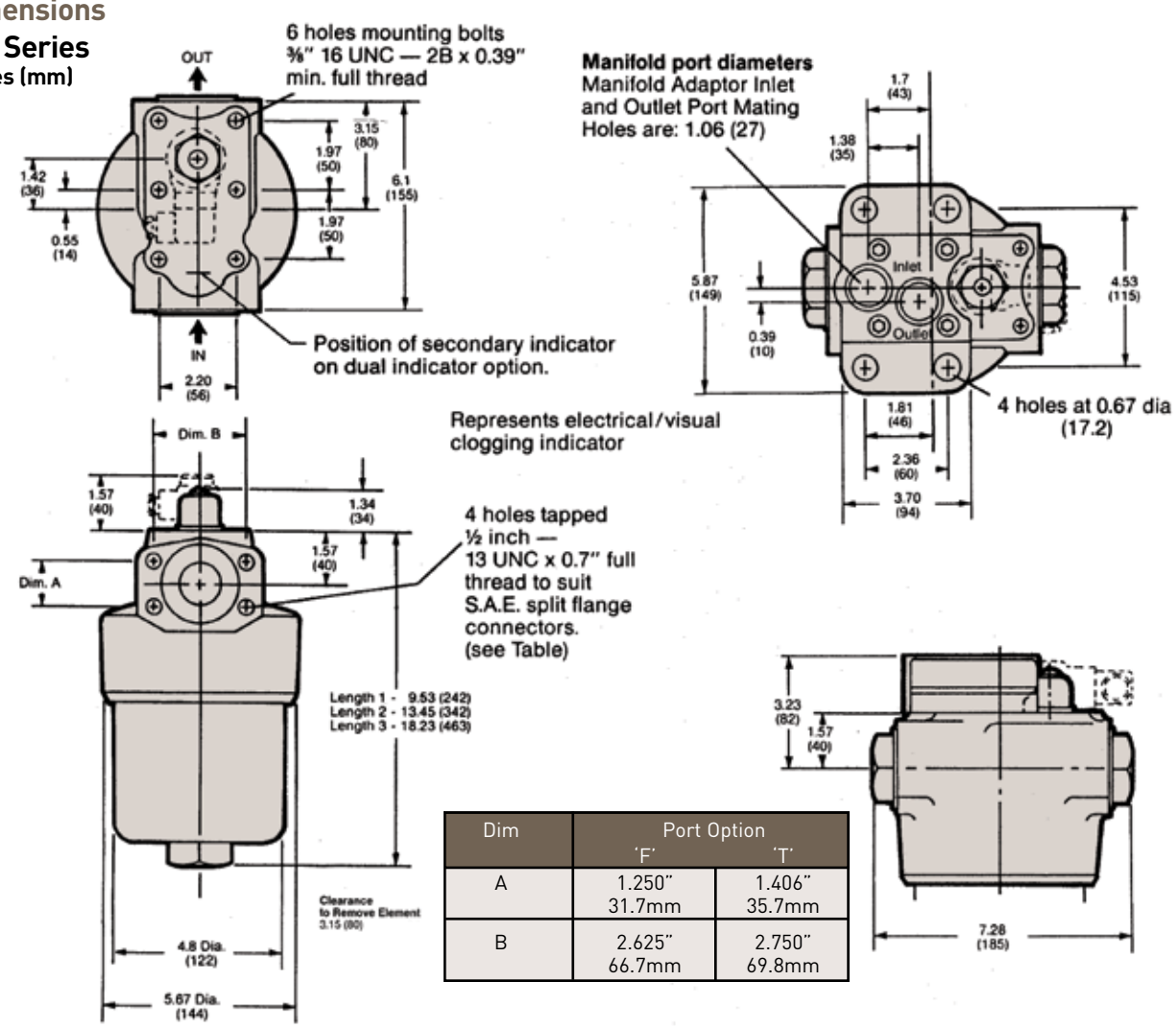


Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Dimensions

372 Series

Inches (mm)

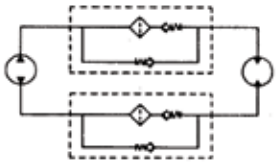


Dim	Port Option 'F'	Port Option 'T'
A	1.250" 31.7mm	1.406" 35.7mm
B	2.625" 66.7mm	2.750" 69.8mm

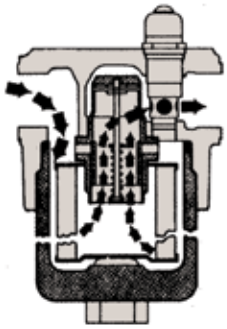
Reverse Flow Valve — Better Three Ways

For hydrostatic drives and other systems where reverse flow is required a valve is incorporated which allows fluid to pass through the element in one direction but to by-pass the element when flow is reversed. (See diagrams).

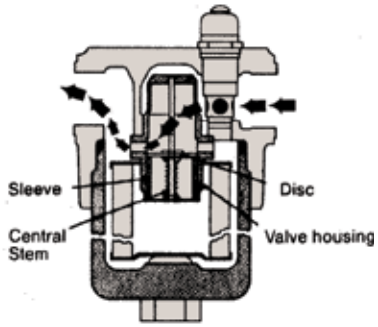
1. Rugged one piece steel body design that is built to last. Unlike stamped metal or aluminum designs. Parker's Reverse Flow Valve (RFV) is a spool/ disc valve caged in a high strength machined steel body. This greatly reduces the risk of valve failure and resultant filter or component damage.
2. Low pressure drop the spool/disc design keeps system pressure losses at a minimum without sacrificing reliability.
3. Our modular design means easy change over or replacement. The reverse flow valve threads directly into the filter head, replacing the standard element adapter. For customers with more that one application or for system conversions, multiple applications from the dame hardware means less inventory.



Normal Flow Condition



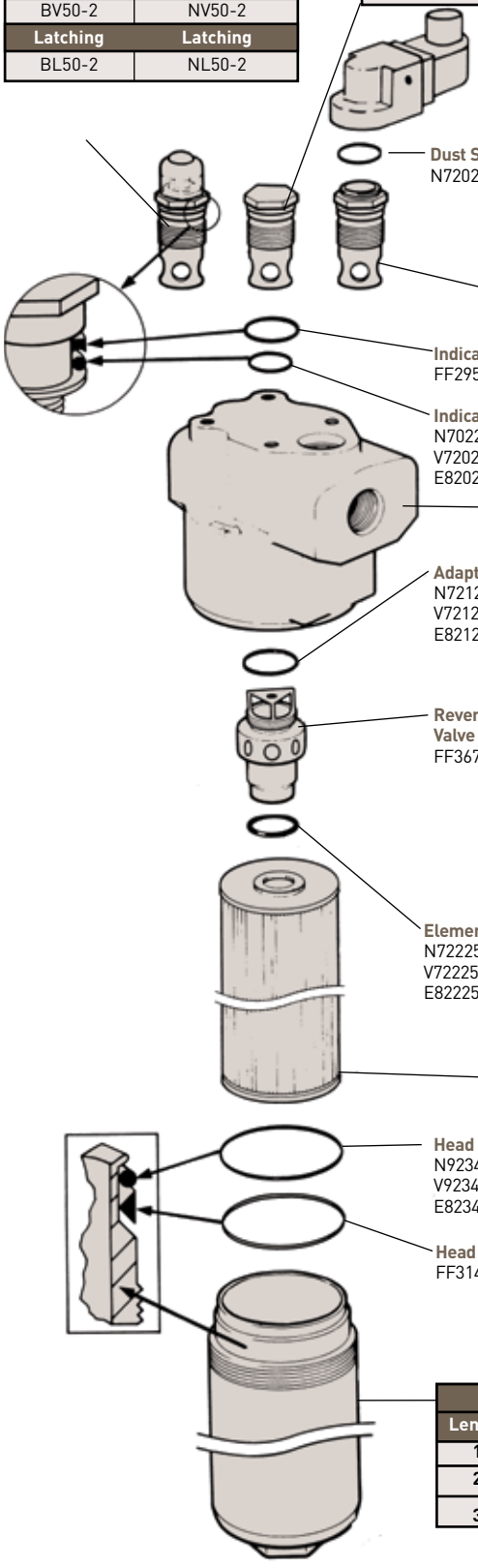
Reverse Flow Condition



Filter Parts Breakdown
372 Series

Visual Indicator Assembly	
Bypass Valve	**No Bypass Valve**
BV50-2	NV50-2
Latching	**Latching**
BL50-2	NL50-2

Non-Indicator Assembly	
Non-Bypass Plug	**Bypass Assy.**
–	BN50-2



Dust Seal
N72021 Nitrile

Electrical Actuator Assembly Hirschmann Connector		
Code	**Part Number**	**Voltages Available**
T	FF3468	28 VDC, 250 VAC Max.

ELECTRICAL SUBASSEMBLY	
Bypass Valve	**Non-Bypass**
90.34.000.29, 73 PSID	90.34.000.27, 73 PSID
90.34.000.28, 50 PSID	90.34.000.26, 50 PSID

Indicator Back-Up Ring
FF2957

Indicator to Head Seal*
N7022 Nitrile
V72022 Fluorocarbon
E82022 EPR

Head	
Description	**Part Number**
SAE-20 (1⅝" 12 Thread)	304-S
SAE 6000 PSI 1¼" Flange, Code 62	304-F
SAE 3000 PSI 1½" Flange, Code 61	304-T
Manifold Adapter	304-V

Adapter to Head Seal*
N72128 Nitrile
V72128 Fluorocarbon
E82128 EPR

Reverse Flow Valve Assembly
FF3677

Element to Adapter Seal*
N72225 Nitrile
V72225 Fluorocarbon
E82225 EPR

Element Kit				
Length	**Disposable All Fluids**			
	3 µm abs.	**6 µm abs.**	**10 µm abs.**	**20 µm abs.**
1	370-Z-120	370-Z-121	370-Z-122	370-Z-123
2	370-Z-220	370-Z-221	370-Z-222	370-Z-223
3	370-Z-320	370-Z-321	370-Z-322	370-Z-323
	Disposable High Collapse (3000 psid)			
	3 µm absolute		**15 µm absolute**	
1	350-Z-1FFH		350-Z-110H	
2	350-Z-2FFH		350-Z-210H	
3	350-Z-3FFH		350-Z-310H	
	Cleanable High Collapse (3000 psid)			
	6 µm absolute		**20 µm absolute**	
1	340-Z-101		340-Z-110	
2	340-Z-201		340-Z-210	
3	340-Z-301		340-Z-310	
	Cleanable Mesh			
	40 µm absolute		**75 µm absolute**	
1	390-Z-140		390-Z-175	
2	390-Z-240		390-Z-275	
3	390-Z-340		390-Z-375	

*Included in Seal Kit: 936060 Nitrile
936061 EPR
936062 Fluorocarbon

Head to Bowl Seal*
N92346 Nitrile
V92346 Fluorocarbon
E82346 EPR

Head to Bowl Back-Up Ring
FF3142

Bowl	
Length	**Part Number**
1	FF4287
2	FF4288
3	FF4289

HOW TO ORDER 372 Series Filters:

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

Example:

STD	BOX 1	BOX 2	BOX 3	BOX 4	BOX 5	BOX 6	BOX 7	BOX 8
3	7	2	A	BV50	S	Z	1	23

Element Example:

STD	BOX 1	STD	BOX 6	BOX 7	BOX 8	BOX 3
3	7	0	Z	1	23	A

BOX 1: FILTER/ELEMENT TYPE

Symbol	Description
7	Microglass Inorganic disposable
5	High Strength Disposable

BOX 2: FILTER FLOW

Symbol	Description
2	With Reverse Flow Valve

BOX 3: SEALS

Symbol	Description
A	Nitrile
H	Fluorocarbon

BOX 4: INDICATOR

Indicator Type	BYPASS INDICATION @ 73 PSID (5.0 BAR)	NO BYPASS INDICATION @ 73 PSID (5.0 BAR)
VISUAL	**BV50**	**NV50**
VISUAL-LATCHING	**BL50**	**–**
ELECTRICAL (**T**) 28 VDC, 110-250 VAC	**BE50**	**NE50**

BOX 5: PORT OPTIONS

Symbol	Description
S	SAE-20 (1-5/8"-12 Thread)
F	S.A.E. 6000PSI 1-¼" Flange
T	S.A.E. 3000PSI 1-½" Flange
V	Manifold Adapter

Dual Indicator Codes:

BEE50 - Bypass with double electrical indicators
NEE50 - No bypass with double electrical indicators
BEV50 - Bypass with (1) mechanical visual (50 psid) and (1) electrical indicator (73 psid)
NEV50 - No bypass with (1) mechanical visual (50 psid) and (1) electrical indicator (73 psid)

Note: Dual Indicators are not available with Port Option "V"

BOX 6: ELEMENT TYPE

Symbol	Element Types	Absolute Ratings Micron
Z	All fluids	All ratings

BOX 7: ELEMENT LENGTH

Symbol	Description	Type
1	Length 1	4, 5, 7, 9
2	Length 2	4, 5, 7, 9
3	Length 3	4, 5, 7,9

BOX 8: DEGREE OF FILTRATION

Symbol	Absolute Rating	Type
FF	3µ	5
10	15µ	5
20	3µ	7
21	6µ	7
22	10µ	7
23	20µ	7

Notes

1000 Series

High Pressure Filters

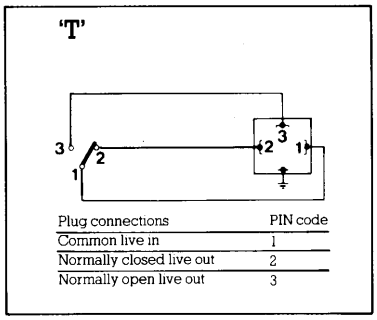
Features/Applications for High Pressure Hydraulic Filters 1000 Series

- Pressures to 6,000 PSI
- Flows to 265 GPM
- Microglass Elements 3 to 20 Micron
- 1½" and 2" Ports - SAE O-Ring or Code 62 Flange
- Reverse Flow Option

Specifications:

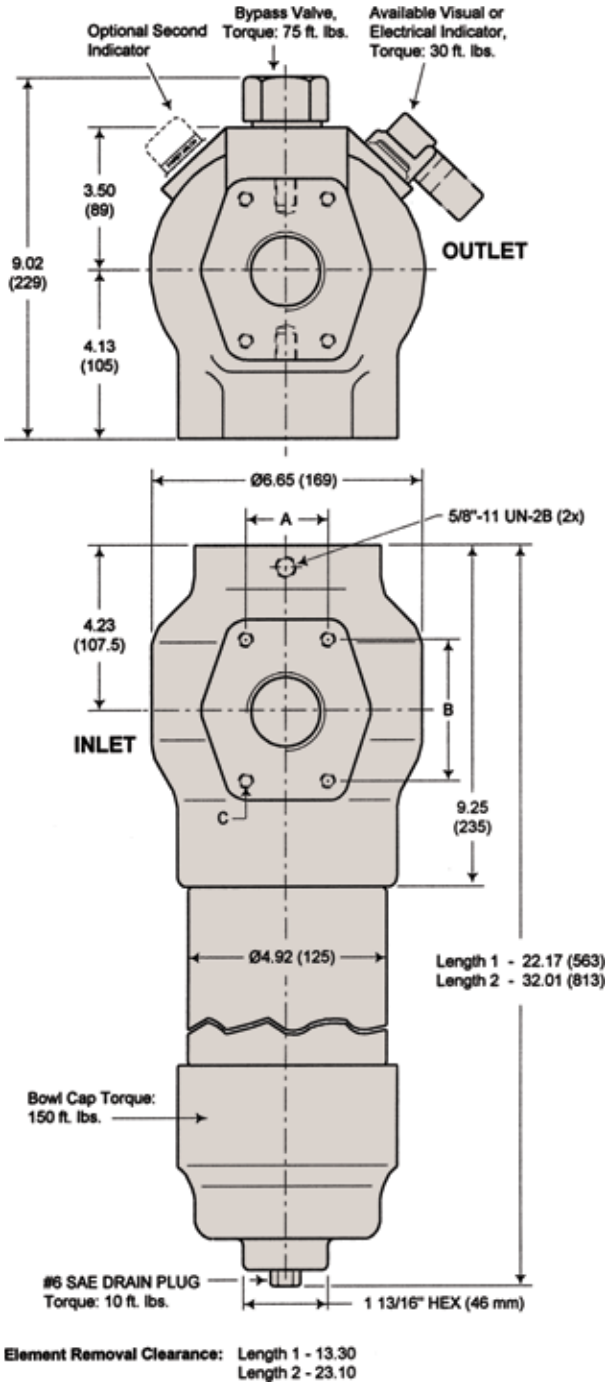
Flow Rating: 265 GPM
Operating Pressure: 6000 PSI
Proof Pressure: 9000 PSI
Burst Pressure: 12,000 PSI
Fatigue Pressure:
0-4000-0 PSI@3,000,000 cycles
Bypass Setting: 100 PSID
Fluid Temperature: -40°F to +212°F
Constrution:
Head and Cap: Nodular Iron
Bowl: Seamless Steel Tube
Indicators: Brass
Elements: Consult Factory
Weight:
Length 1 -84 Lbs.
Length 2 -104 Lbs.

Electrical Ratings:
Hirschman Connector without Lamps:
T - 110 VAC, .5 Amp Ind., 2 Amp Res.
- 250 VAC, .5 Amp Ind., 2 Amp Res.
- 28 VDC, 1 Amp Ind., 2 Amp Res.



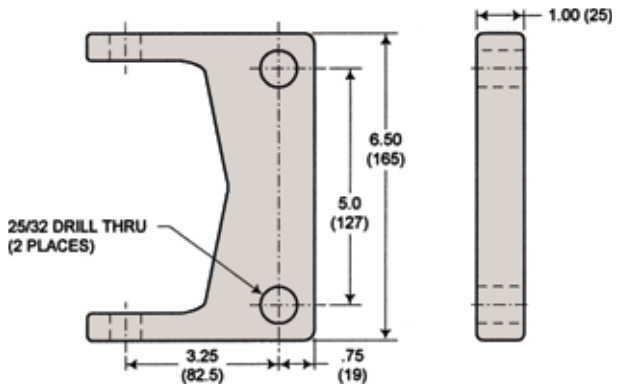
Plug connections	PIN code
Common live in	1
Normally closed live out	2
Normally open live out	3

Dimensions
Inches (mm)



Element Removal Clearance: Length 1 - 13.30
Length 2 - 23.10

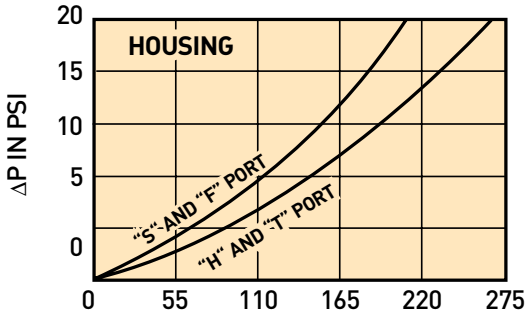
Optional Mounting Bracket

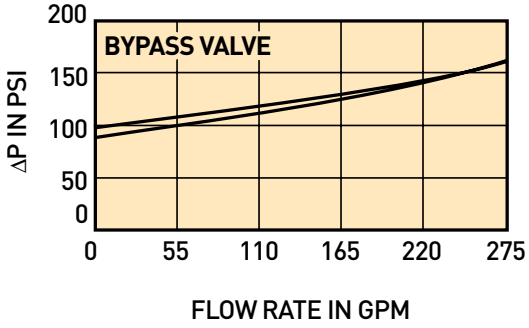


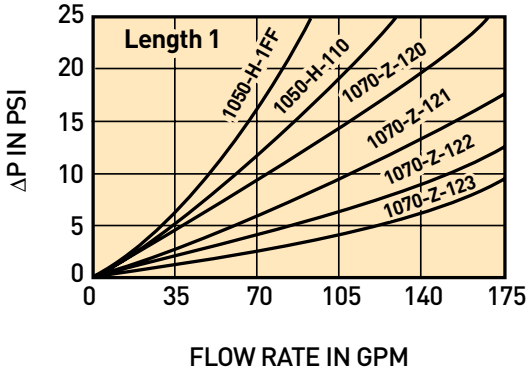
Port	Dimensions		
	A	B	C
F	1.437" 36.5mm	3.125" 79.4mm	5/8"-11 X 1.4"
T	1.750" 44.5mm	3.812" 96.8mm	3/4"-10 X 1.4"

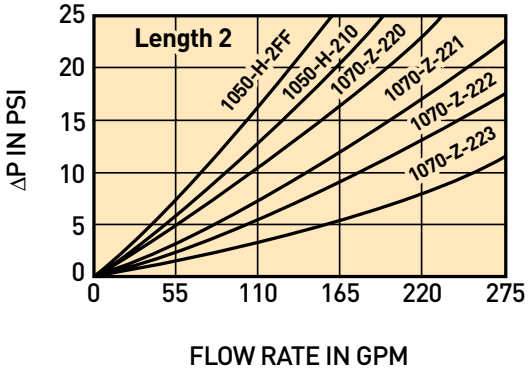
Flow/Pressure Drop Data

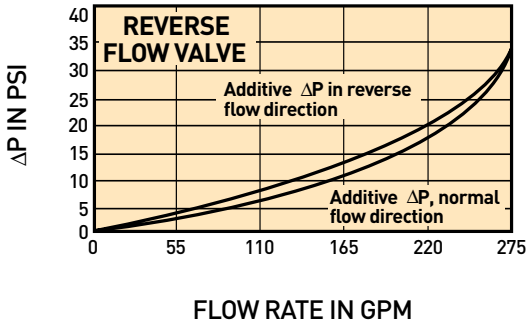
Fluid Conditions: Viscosity 140 SSU and Sp. Gr. 0.88









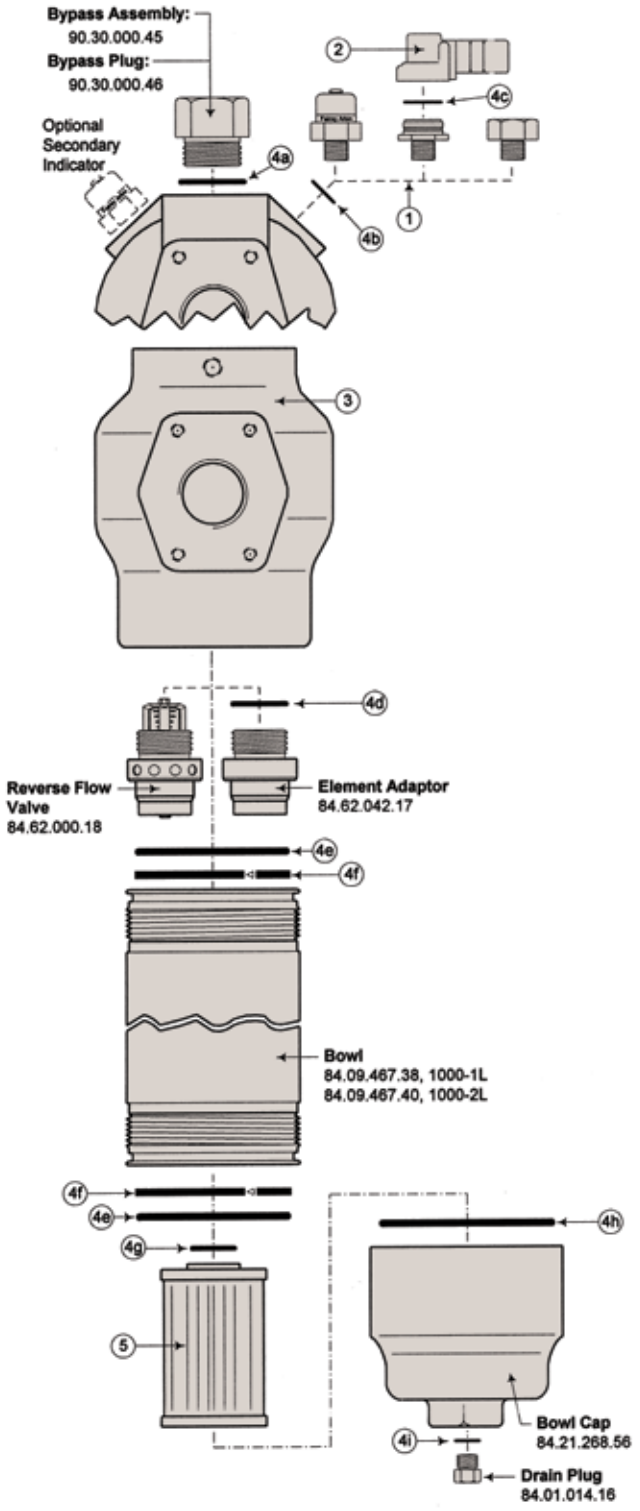


Multipass Test Results to ISO 4572 (Time Weighted Average)

Media Code	Filtration Rating						
	$\beta x \geq 100$	β_3	β_6	β_{10}	β_{12}	β_{20}	β_{25}
20	3	≥100 99.0	>300 99.67	>1500 99.93	>2000 99.95	>5000 99.98	INF
21	6	12 91.7	≥100 99.0	>1000 99.9	>2000 99.95	>5000 99.98	INF
22	10	8 87.5	22 95.4	≥100 99.0	≥200 99.5	>5000 99.98	INF
23	20	–	2 50.0	8 87.5	20 95.0	≥100 99.0	>200 99.5

Element Beta ratio βx
Element efficiency in percent*

Parts Breakdown
1000 Series



1 Indicators		
Visual	**Electrical Sub-Assy**	**Indicator Plug**
6N50-2A	90.34.000.24	84.01.066.30

2 Electrical Actuator Assembly		
Hirschmann Connector		
Code	**Part Number**	**Voltages Available**
T	FF3468	28 VDC, 250 VAC Max.

3 Head	
Description	**Part Number**
1000-S, SAE-24 (1-7/8²-12 Thread)	84.69.268.16
1000-H, SAE-32 (2-1/2²-12 Thread)	84.69.268.18
1000-F, 1-1/2² SAE 6000 PSI Flange, Code 62	84.69.268.20
1000-T, 2² SAE 6000 PSI Flange, Code 62	84.69.268.22

4 Seals			
	Description	**Buna-N**	**Viton**
ⓐ	Bypass Assy/Plug Seal*	N93924	V93924
ⓑ	Indicator to Head Seal*	N72019	V72019
ⓒ	Actuator Dust Seal	N72021	
ⓓ	Adaptor to Head Seal*	81.10.150.15	81.10.152.15
ⓔ	Head/Bowl/Cap Seal*	N92346	V92346
ⓕ	Head to Bowl Back-Up Ring	FF3142	
ⓖ	Element Seal	N72141	V72141
ⓗ	Bowl Cap Seal*	81.10.150.86	81.10.152.86
ⓘ	Drain Plug Seal*	N93906	V93906

5 Element Kit‡				
Disposable All Fluids				
Length	**3 µm abs.**	**6 µm abs.**	**10 µm abs.**	**20 µm abs.**
1	1070-Z-120	1070-Z-121	1070-Z-122	1070-Z-123
2	1070-Z-220	1070-Z-221	1070-Z-222	1070-Z-223
High Collapse Disposable (3000 psid)				
Length	**3 µm absolute**		**15 µm absolute**	
1	1050-H-1FF		1050-H-110	
2	1050-H-2FF		1050-H-210	

*Included in Seal Kit: **936063**, Nitrile **936064**, Fluorocarbon

†Included in Element Kit

‡To specify seal material, add the following suffix to the part number:
A Nitrile **H** Fluorocarbon

Options (Not Shown)	
Part Number	**Description**
402904	Mounting Bracket, Includes (2) 5/8"-11 x 1-1/4" Hex Flange Bolts

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
10	7	4	A	2HN70	S	Z	1	23	TP

Element Example:

	BOX 1		BOX 6	BOX 7	BOX 8	BOX 3
10	7	0	Z	1	23	A

BOX 1: FILTER/ELEMENT TYPE

Symbol	Description
5	Microglass High Strength Disposable
7	**Microglass Inorganic Disposable**

BOX 2: FILTER FLOW

Symbol	Description
2	**With Reverse Flow Valve**
4	**Normal Flow**

BOX 3: SEAL CODE

Symbol	Description
A	Nitrile
H	Fluorocarbon

BOX 4: INDICATOR TYPE

Indicator Type	NO BYPASS INDICATION@ 73 PSID (5.0 BAR)	100 PSID BYPASS INDICATION@ 73 PSID (5.0 BAR)
Visual	4HN00	2HN70
Electrical (T) 28 VDC, 110-250 VAC	5HT00	3HT70

Note: For Dual Indicator availability please consult Factory.

BOX 5: PORT OPTIONS

Symbol	Description
F	**SAE 6000 PSI 1-1/2" Flange (Code 62)**
T	**SAE 6000 PSI 2" Flange (Code 62)**

BOX 6: ELEMENT TYPE

Element Types (with contained O-Ring)		Absolute Micron Ratings
Z	Suitable for all Conventional Hydraulic Fluids, except Phosphate Esters	3, 6, 10 and 20

BOX 7: ELEMENT LENGTH

Symbol	Description
1	**Single length**
2	**Double length**

BOX 8: ELEMENT MEDIA

Symbol	Description	Type
FF	2µm Microglass III, high strength	5
10	10µm Microglass III, high strength	5
20	2µm Microglass III	7
21	5µm Microglass III	7
22	10µm Microglass III	7
23	20µm Microglass III	7

BOX 9: OPTIONS

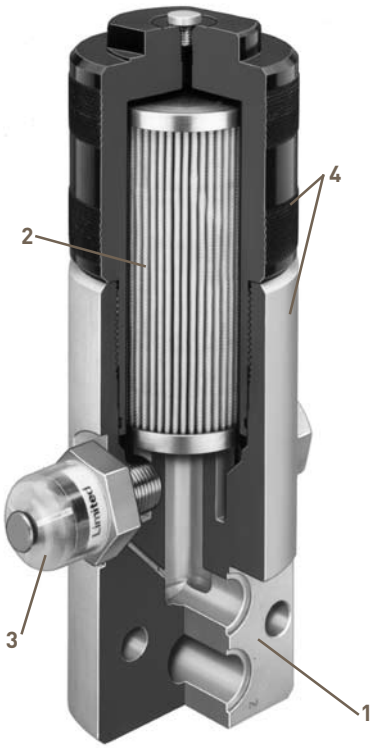
Symbol	Description
TP	Mounting Bracket
OMIT	**If not required**

ServoSaver™ Series

High Pressure Filters

Features/Applications for High Pressure Filters ServoSaver™ Series

- Pressures to 4,000 PSI
- Flows to 30 GPM
- Microglass 3000 PSI Collapse Elements in 3 or 15 Micron Absolute
- Point of use filtration



Model HSS981 ServoSaver™ Filter

ServoSaver filters offer point-of-use filtration for some of the most sensitive hydraulic valves that there are, servo/proportional valves. Complete protection is provided by non-bypass filters equipped with high collapse strength elements installed directly at the valve. The ServoSaver is designed specifically for this use and is not an adaption of an in-line filter intended for bypass filtration.

1. The Parker ServoSaver filter can be mounted directly under the servo or proportional pilot valve through use of a subplate or sandwich plate. This eliminates extra plumbing that causes higher pressure drops and system generated contaminant. Direct mounting assures that contaminant is filtered out before it can damage the valve or cause it to malfunction.
2. Microglass elements in 3 and 15 micron absolute ratings provide high efficiency filtration. Actual dirt holding capacity is excellent and contributes to additional cost savings. Elements have a minimum collapse rating of 3000 PSI and can be used with all common hydraulic fluids.
3. TruTell visual or electrical clogging indicators provide advance warning of impending excessive pressure drop across the filter element so that maintenance can be performed before system stability is affected.
4. Filter head and bowl are manufactured from high strength steel alloy to withstand high continuous or intermittent loads.

Filter Specifications

Material:

Head & Bowl:
Electroless Nickel Plated Steel Alloy

Element Hardware:
Plated, Carbon Steel End Caps and Core

Filter Media:
Glass Micro-Fiber, Epoxy End Cap Adhesive

Fluid Compatabilty:
Suitable for All Conventional Hydraulic Fluids, Except Phosphate Esters

Pressure Rating:

Maximum Operating:
4000 psi (276 Bar)

Burst Pressure:
19,000 psi (1310 Bar)

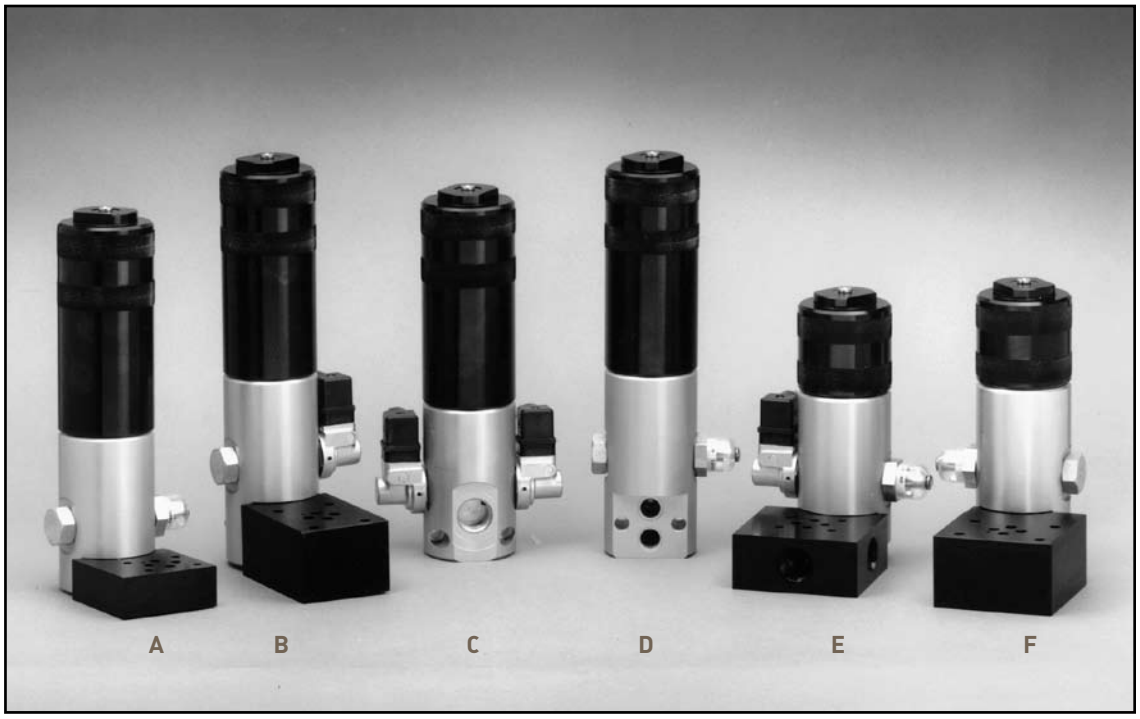
Rated Fatigue Pressure:
0-3000-0 PSID (0-210-0 Bar)
10^6 Cycles per NFPA
T2.6.1 R1-1991 (B/99)

Temperature Range:

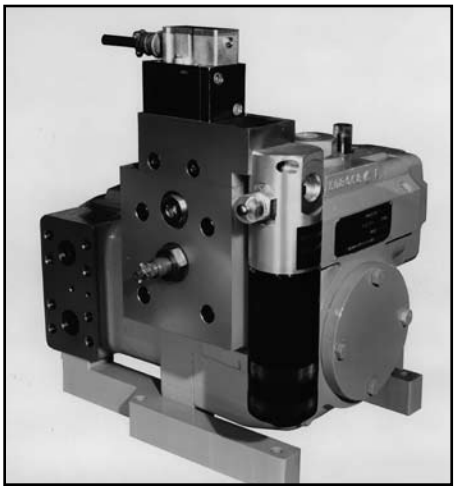
Operating: -40°F to +250°F (-40°C to 120°C)

Weight:

04 Length: 11 lbs. (5.0 Kg)
08 Length: 15.5 lbs. (7.0 Kg)

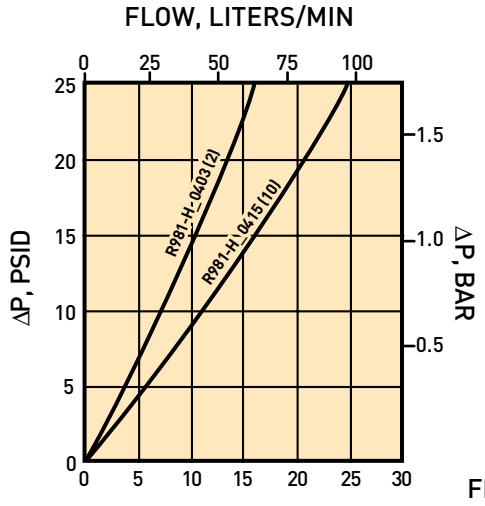


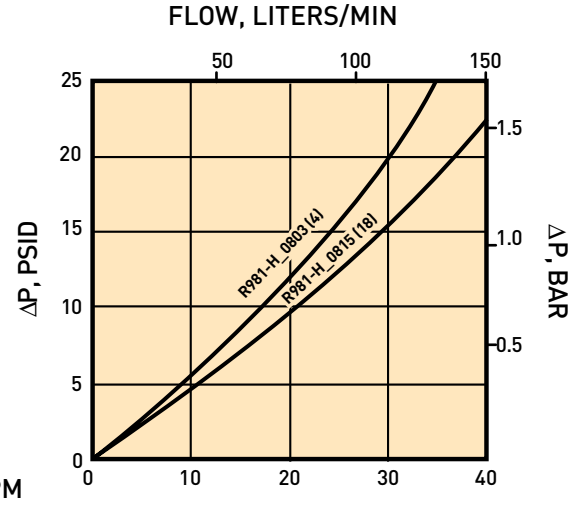
(A) 'S' Port, Visual Indicator and Sandwich Plate Mounting
(B) 'M' Port, Electrical Indicator and Sandwich Plate Mounting
(C) 'S' Port, Dual Electrical Indicator
(D) 'M' Port, Visual Indicator
(E) 'S' Port, Visual and Electrical Indicator and Subplate Mounting
(F) 'M' Port, Visual Indicator and Sandwich Plate Mounting



The ServoSaver filter can also be mounted to pumps, cylinders or other hydraulic devices. Special adapter blocks or manifold porting makes direct mounting simple and provides for compact installation.

Flow/Pressure Drop Curves





Dirt Holding Capacity in Parenthesis (Grams)

Fluid Conditions: Viscosity 140 SSU (30 cSt) and Specific Gravity 0.88 Note: Element ΔP is directly proportional to viscosity.

Find Filter Assembly Pressure Drop

Filter assembly ΔP is equal to the sum of element and housing pressure drops taken from the appropriate curves and adjusted for operating viscosity and specific gravity.

Example:

Filter Model: HSS981A-VR-S0803

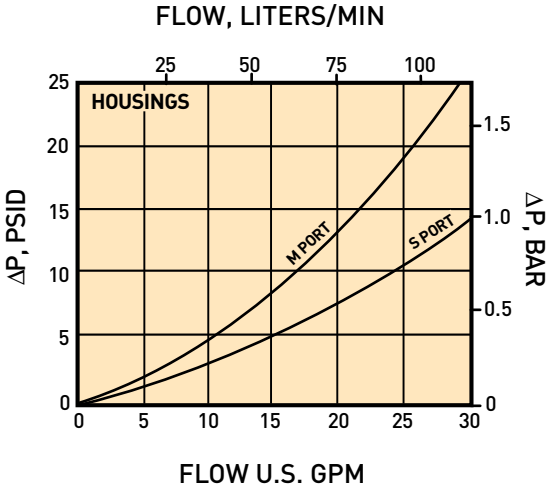
Flow: 20 GPM (76 L/min)

Viscosity: 78 SSU, Sp. Gr.: 0.96

Step 1. **Correct element ΔP for viscosity**.
Element ΔP = 14 psi x 78SSU/140SSU = 7.8 psi
(1.0 bar x 14.6 cSt/30 cSt = 0.5 bar)

Step 2. **Correct housing ΔP for specific gravity**.
Housing ΔP = 7 psi x 0.96/0.88 = 7.6 psi (0.5 bar x 0.96/0.88 = 0.55 bar)

Step 3. **Calculate assembly ΔP**.
Assy ΔP = 7.8 psi + 7.6 psi = 15.4 psi (0.5 bar + 0.55 bar = 1.05 bar)



Fluid Conditions: Specific gravity 0.88
Note: Housing ΔP is directly proportional to specific gravity.

Microglass Media High Performance

Media Code	Nominal Micron Rating	βx>200	Multipass Test Restults To ISO 4572 (Time Weighted Averages)						
			β3	β6	β10	β12	β15	β20	β25
03	**1**	**3**	**200** 99.5	>1000 99.9	>3000 99.96	>5000 99.98	∞	∞	∞
15	10	15	3 66.66	12 91.66	50 98.0	75 98.67	>200 99.50	>2000 99.95	>5000 99.98

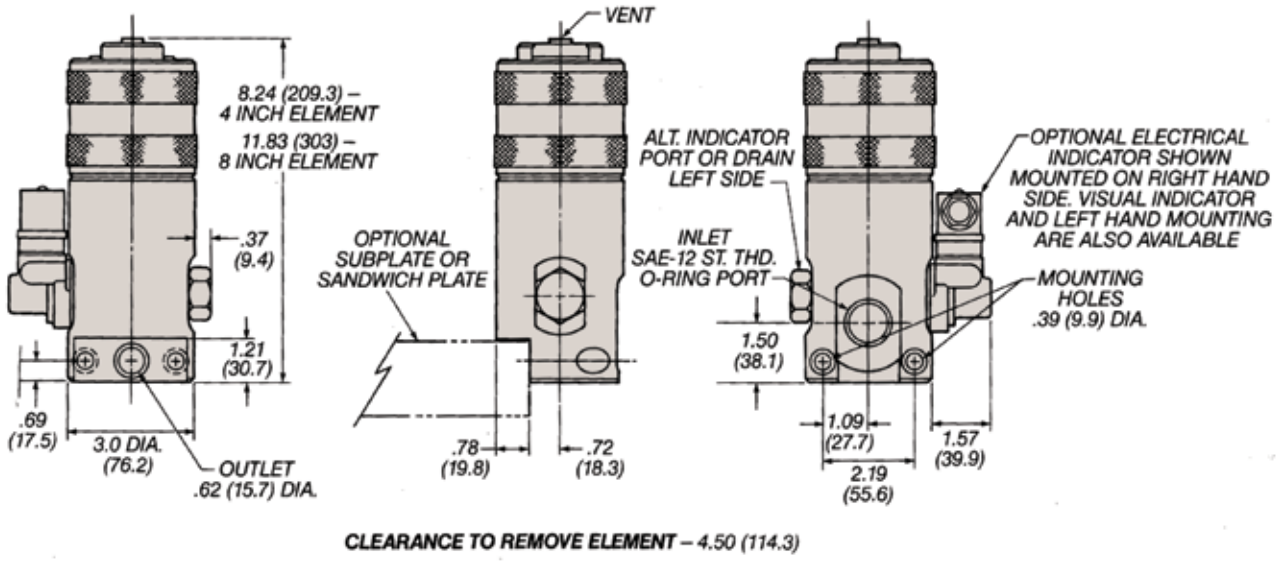
Element Beta ratio βx

Element efficiency in percent

BETA RATING
Beta ratings are the recognized industry standard for measuring filter efficiency. They offer the user an accurate method of comparing different filters' efficiency. Beta ratings are obtained from strictly controlled laboratory tests, to ISO Specification 4572. The higher the Beta ratio the greater the filter's capacity to capture particles larger than the indicated Beta size. A Beta rating of Bx ≥ 75 with a corresponding efficiency of 98.6 % is normally considered the absolute rating.

Dimensions - S Port
Inches (mm)

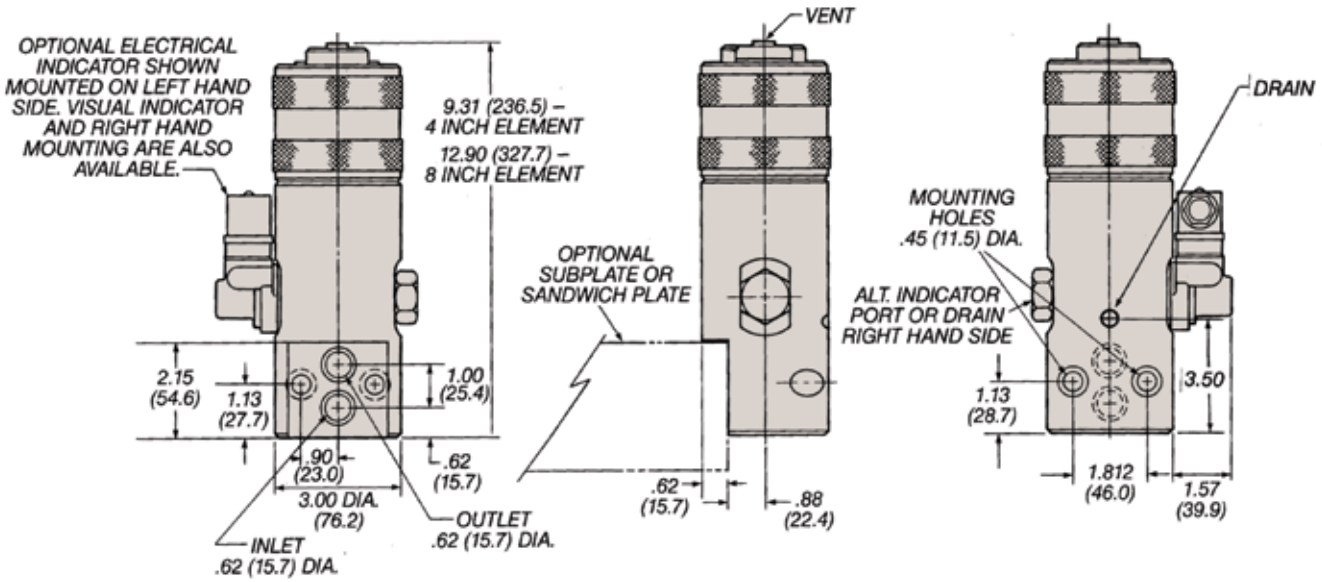
'S' Port Option The pressure line is connected directly to the inlet port of the ServoSaver. The outlet port of the filter is internally connected to the valve through our subplate or a specific manifold pad provided by the user.



CLEARANCE TO REMOVE ELEMENT – 4.50 (114.3)

Dimensions - M Port
Inches (mm)

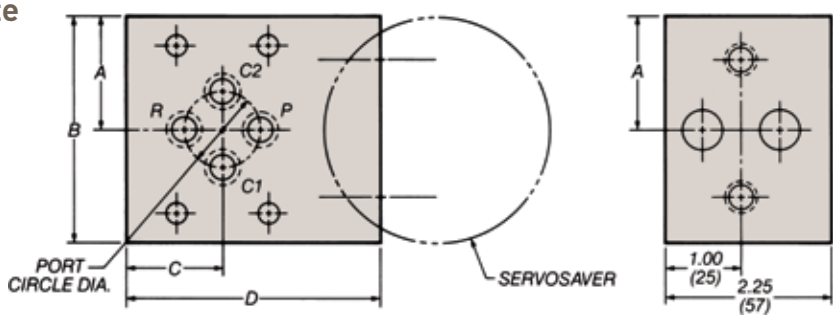
'M' Port Option This unique porting provides internal inlet and outlet porting of the filter as well as an inlet to the valve without any disruption to the existing plumbing. Connection to the valve can be accomplished through our sandwich plate or a specific manifold pad provided by the user.



CLEARANCE TO REMOVE ELEMENT – 4.50 (114.3)

Dimensions - M port Sandwich Plate
Inches (mm)

Sandwich (Manifold) Plate Mounting:
The ServoSaver filter assembly is mounted to a manifold that is sandwiched between the subplate and valve.

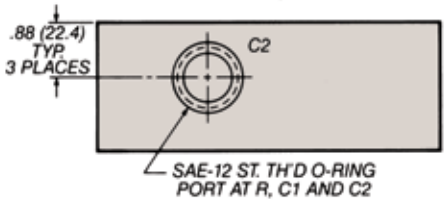


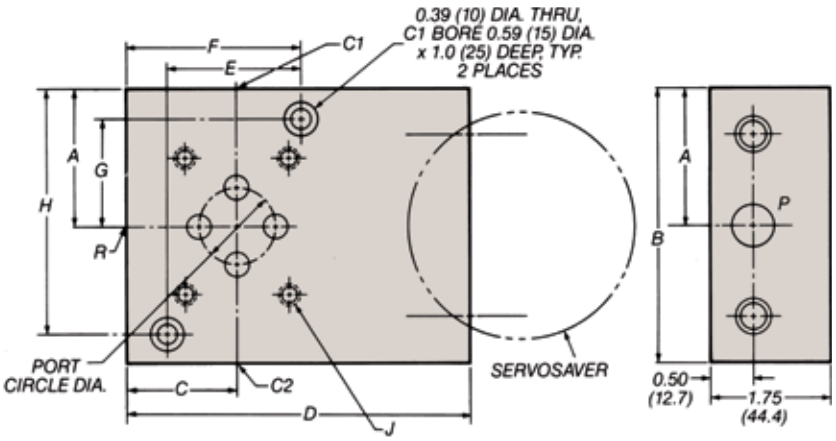
CODE	VALVE INTERFACE	PORT CIRCLE DIA.	A	B	C	D
1A	Vickers SM4-10: Atchley 206 Moog 770 Type II	.625 (15.9)	1.38 (35.1)	2.75 (69.9)	1.19 (30.2)	3.19 (81.0)
2A	Atchley 207, 211; Moog 770 Type III	.780 (19.8)	1.38 (35.1)	2.75 (69.9)	1.19 (30.2)	3.19 (81.0)
1D	NFPA D01, CETOP-3+NG-6	Diamond Pattern	1.44 (36.6)	2.88 (73.2)	.94 (23.9)	2.75 (69.9)
1M	Moog 62: Atchley 215A	.875 (22.2)	1.50 (38.1)	3.00 (76.2)	1.62 (41.1)	4.38 (111.3)
4M	Vickers SM4-40; Parker BD-30	1.750 (44.5)	2.25 (57.2)	4.50 (114.3)	1.68 (42.7)	4.12 (104.6)
1P	Pegasus 142A, 162A, 162R	.937 (23.8)	1.50 (38.1)	3.00 (76.2)	1.19 (30.2)	3.25 (82.6)
2P	Pegasus 122 A	.625 (15.9)	1.38 (35.1)	2.75 (69.9)	1.19 (30.2)	3.19 (81.0)
1V	Vickers SM4-15, Atchley 218A	.937 (23.8)	1.50 (38.1)	3.00 (76.2)	1.19 (30.2)	3.25 (82.6)

FOR DIMENSIONAL INFORMATION ON OTHER SUBPLATES CONTACT PARKER.

Dimensions - S port Sandwich Plate
Inches (mm)

Subplate Mounting: The ServoSaver filter assembly is mounted to a subplate which provides all of the necessary threaded work ports as well as the manifolding surface for the valve.





CODE	VALVE INTERFACE	PORT CIRCLE DIA.	A	B	C	D	E	F	G	H	I
1A	Vickers SM4-10: Atchley 206: Moog 770 Type II	.625 (15.9)	2.00 (50.8)	4.31 (109.4)	2.00 (50.8)	4.00 (101.6)	2.69 (68.3)	3.34 (84.8)	1.75 (44.5)	3.75 (95.3)	10-32
2A	Atchley 207, 211; Moog 770 Type III	.780 (19.8)	2.00 (50.8)	4.31 (109.4)	2.00 (50.8)	4.00 (101.6)	2.69 (68.3)	3.34 (84.8)	1.75 (44.5)	3.75 (95.3)	10-32
1D	NFPA D01, CETOP-3+NG-6	Diamond	2.12 (53.8)	4.25 (108)	1.75 (44.4)	3.75 (95.2)	2.50 (63.5)	3.00 (76.2)	1.72 (43.7)	3.00 (76.2)	10-24
1M	Moog 62: Atchley 215A	.875 (22.2)	2.00 (50.8)	4.00 (101.6)	2.00 (50.8)	4.62 (117.3)	2.56 (65.0)	3.28 (83.3)	1.51 (38.4)	3.52 (89.4)	5/16-18
1P	Pegasus 142A, 162A, 162R	.937 (23.8)	2.00 (50.8)	4.31 (109.4)	2.00 (50.8)	4.00 (101.6)	2.69 (68.3)	3.28 (83.3)	1.75 (44.5)	3.75 (95.3)	1/4-20
2P	Pegasus 122 A	.625 (15.9)	2.00 (50.8)	4.31 (109.4)	2.00 (50.8)	4.00 (101.6)	2.69 (68.3)	3.34 (84.8)	1.75 (44.5)	3.75 (95.3)	10-32
1V	Vickers SM4-15, Atchley 218A	.937 (23.8)	2.00 (50.8)	4.31 (109.4)	2.00 (50.8)	4.00 (1.75)	2.69 (68.3)	3.34 (84.8)	2.31 (58.7)	3.75 (95.3)	1/4-20

FOR DIMENSIONAL INFORMATION ON OTHER SUBPLATES CONTACT PARKER.

Parts Breakdown
ServoSaver™ Series

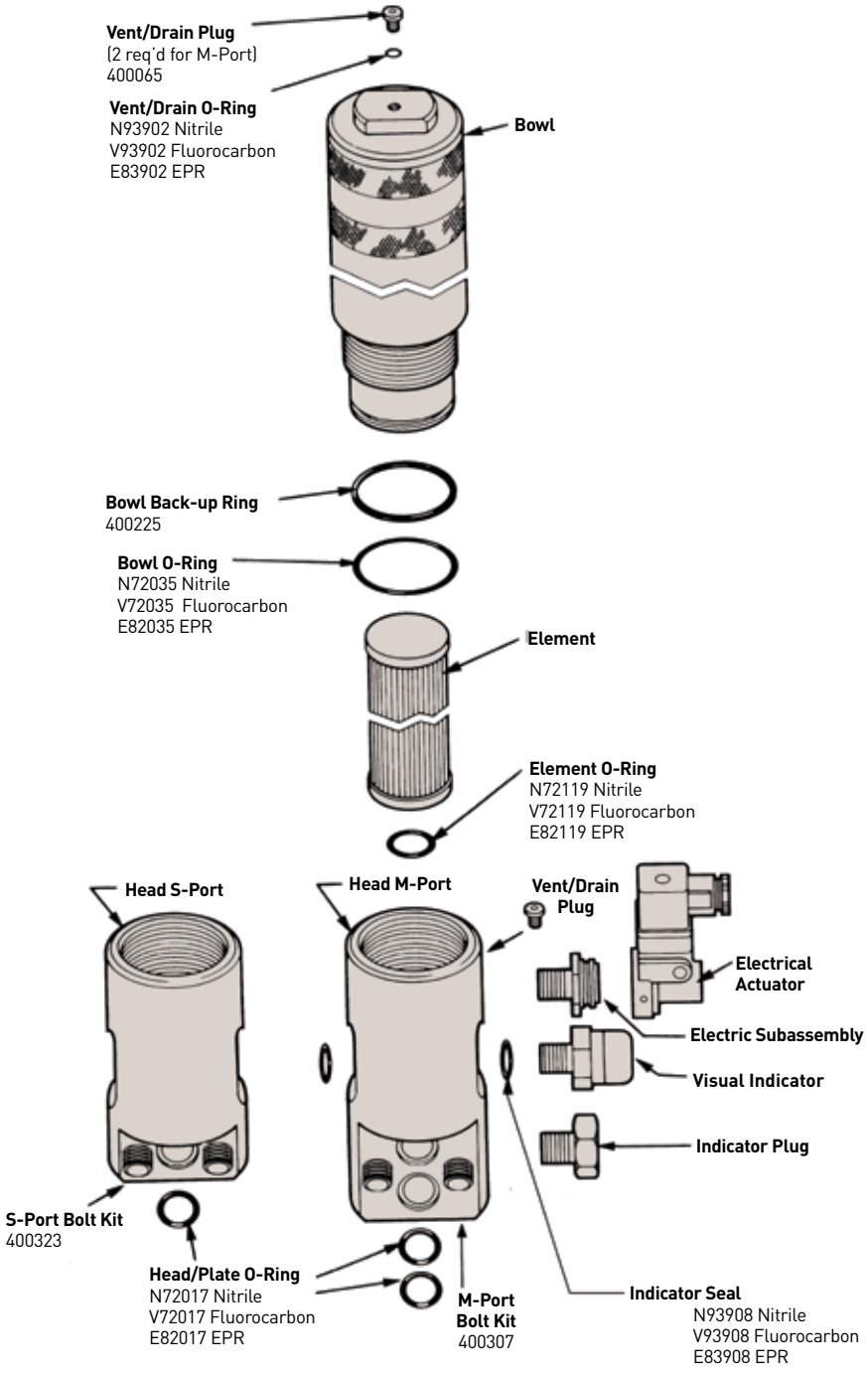
SEAL KIT	
Nitrile	936077
EPR	400913
Fluorocarbon	936078

BOWL	
LENGTH CODE	PART NUMBER
04	401766
08	401767

HEAD ASSEMBLY	
PORT TYPE	PART NUMBER
M	402065
S	402066

VISUAL INDICATOR	
INDICATOR CODE	PART NUMBER
V	401810
B	401811

INDICATOR PLUG	
INDICATOR CODE	PART NUMBER
E, N, V	505918



ELECTRICAL INDICATOR				
	SUB-ASSEMBLY		ACTUATOR	
INDICATOR CODE	QTY	PART NUMBER	PART NUMBER	QTY
B,E	1	401814	FF3468	1
D	1 1	401814 401813	FF3468	2

HOW TO ORDER:
Select the desired symbol (in the correct position) to construct a model code.

Example:

STD	BOX 1	BOX 2	BOX 3	BOX 4	BOX 5	BOX 6	BOX 7
HSS981	A	VR	M	04	03		1D

BOX 1: SEALS	
Symbol	**Description**
A	**Nitrile**
H	Fluorocarbon (FKM)

BOX 2: INDICATOR	
Symbol	**Description**
ER	**Electrical Indicator**
VR	**Visual Indicator**

BOX 3: PORT OPTIONS	
Symbol	**Description**
M	**Manifold inlet & outlet**

BOX 4: ELEMENT LENGTH	
Symbol	**Description**
04	**Single length**
08	**Double length**

BOX 5: DEGREE OF FILTRATION	
Symbol	**Description**
03	**3 Micron**
15	**15 Micron**

BOX 6: MOUNTING STYLE	
Symbol	**Description**
OMIT	**Direct mount**
W	Sandwich Plate

BOX 7: VALVE INTERFACE PLATE	
Symbol	**Description**
OMIT	**Direct Mount, No Plate Required**
1D	NFPA D03, CETOP-3+NG-6

Replacement Elements

Media	Single length	Double length
2µ Microglass III	935191	935193
10µ Microglass III	935192	935192

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

12S Series

High Pressure Filters

Features/Applications

- Offshore – High pressure and aggressive environment
- DI Water – Water fogging
- Food Processing – Caustic washdown (poultry, etc.)
- Test Stands – High pressure

Feature	Advantage	Benefit
Lightweight	Ease of service and installation	Reduced installation cost
Porting	Flexibility	Reduction in piping and use of adaptors
Multipass tested elements (per ANSI/NFPA T3.10.8.8 R1-1990)	Filter performance backed by recognized and accepted laboratory test standards	Filters you select have known performance levels
Optional visual and electrical indicators	Know exactly when to service elements	Keeps system clean
Drain port	Drain all oil from assembly prior to servicing	Eliminates cross contamination
Optional upstream & downstream sensing ports	Add additional instrumentation	Product flexibility
High strength Microglass III elements	2000 psid collapse strength Multi-layer media Wire reinforced pleats	High capacity with high efficiency No performance loss from pleat bunching
100% pressure tested	Quality	Reliability

12SMP (10,000 psi) Specifications

Pressure Ratings:
Maximum Allowable Operating Pressure
(MAOP): 10,000 psi (690 bar)
Proof: 15,000 psi (1035 bar)

Operating Temperatures:

Fluorocarbon (FKM)	-15°F (-26°C) to 275°F (-135°C)
Ethylene Propylene (EPR)	-40°F (-40°C) to 225°F (-107°C)
Perfluoroelastomer (FFKM)	5°F (-15°C) to 536°F (280°C)*

* Consult factory when requesting this seal. A special element may be required to withstand operating temperature.

Element Collapsing Rate:
High Collapse "H" option: 2,000 psi (138 bar)

Materials:
Head: Stainless Steel 316L
Bowl: Stainless Steel 316L

Weight (approximate):

Model	Single Length	Double Length
12SMP	14 lbs. (6.35 kg.)	17 lbs. (7.71 kg.)

12SHP (20,000 psi) Specifications

Pressure Ratings:
Maximum Allowable Operating Pressure
(MAOP): 20,000 psi (1,380 bar)
Proof: 30,000 psi (2,070 bar)

Operating Temperatures:

Fluorocarbon (FKM)	-15°F (-26°C) to 275°F (-135°C)
Ethylene Propylene (EPR)	-40°F (-40°C) to 225°F (-107°C)
Perfluoroelastomer (FFKM)	5°F (-15°C) to 536°F (-280°C)*

* Consult factory when requesting this seal. A special element may be required to withstand operating temperature.

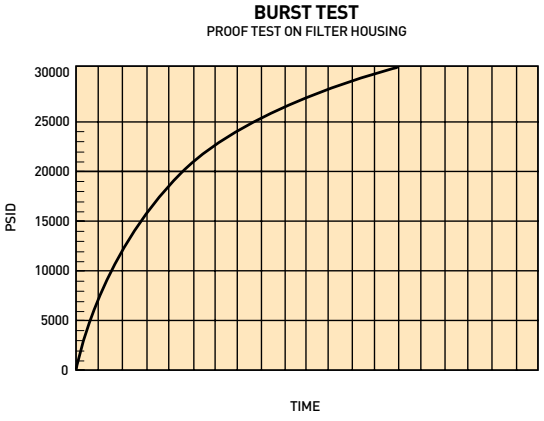
Element Collapsing Rate:
High Collapse "H" option: 2,000 psi (138 bar)

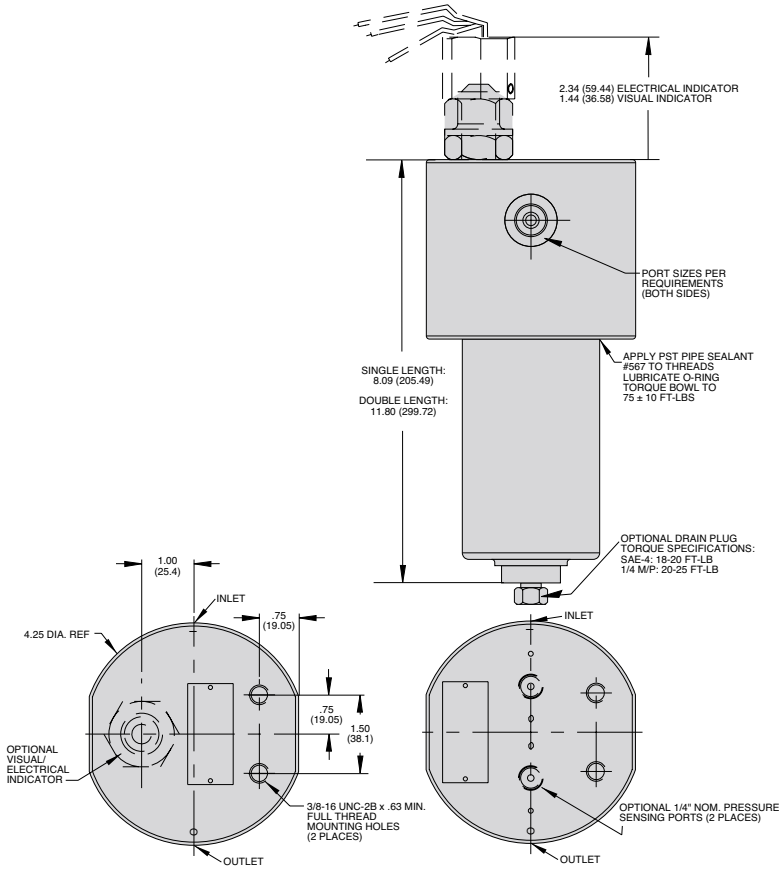
Materials:
Head: Stainless Steel 17-4
Bowl: Stainless Steel 17-4

Weight (approximate):

Model	Single Length	Double Length
12SHP	14 lbs. (6.35 kg.)	17 lbs. (7.71 kg.)

Dimensions

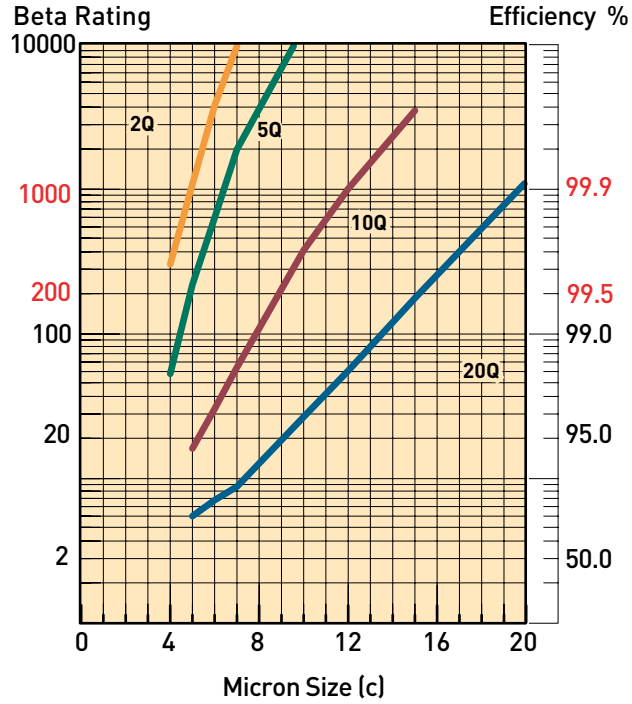




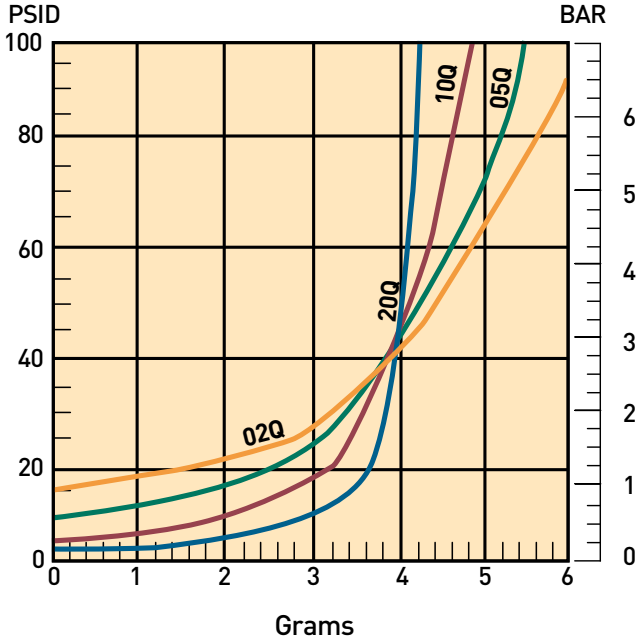
Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

12S-1 Element Performance

Efficiency

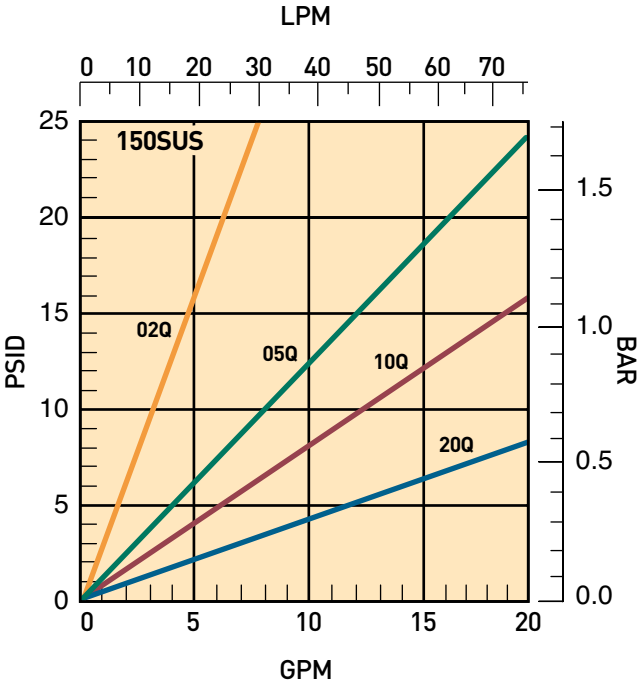


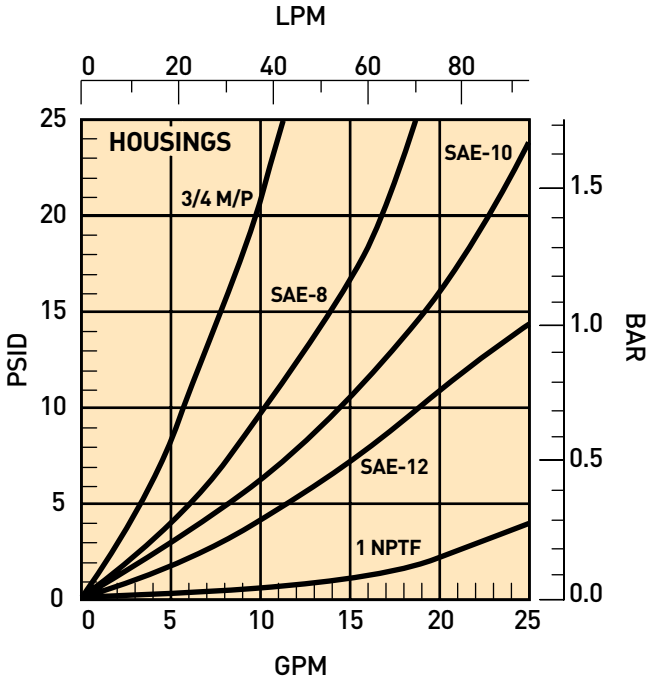
Capacity



Multipass tests run @ 10 gpm to 100 psid terminal - 5mg/L BUGL

Flow vs. Pressure Loss

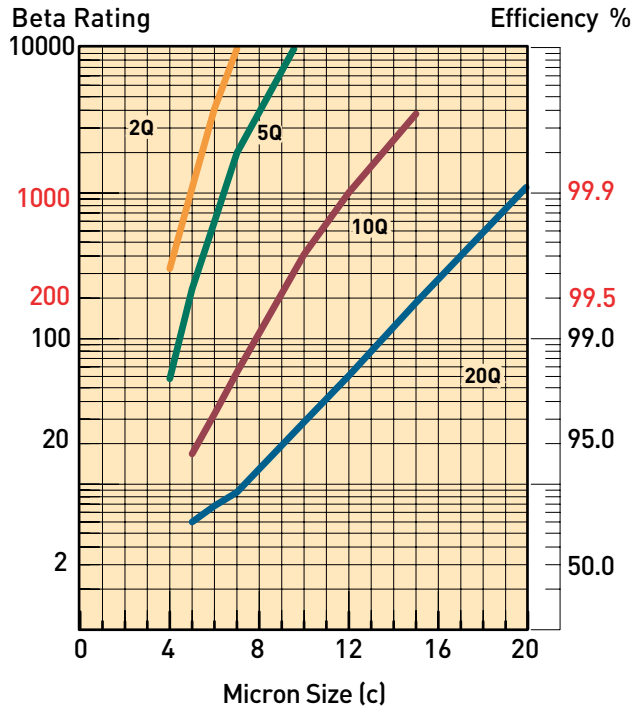




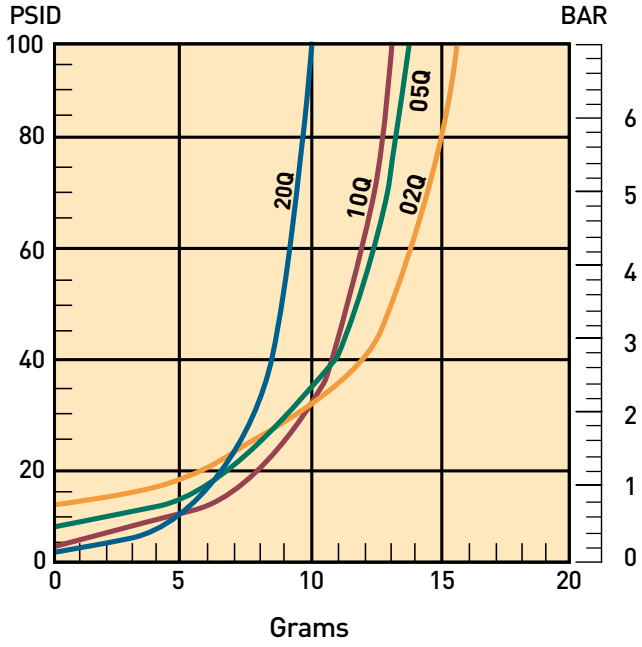
Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

12S-2 Element Performance

Efficiency

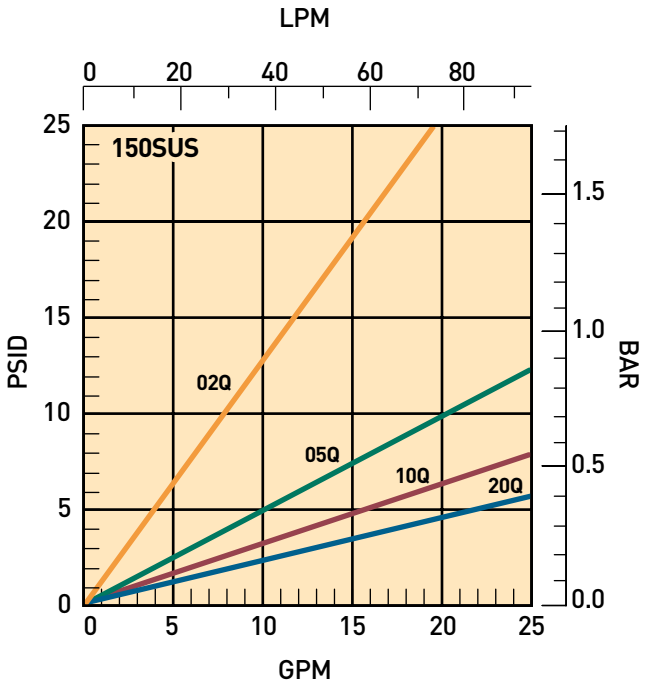


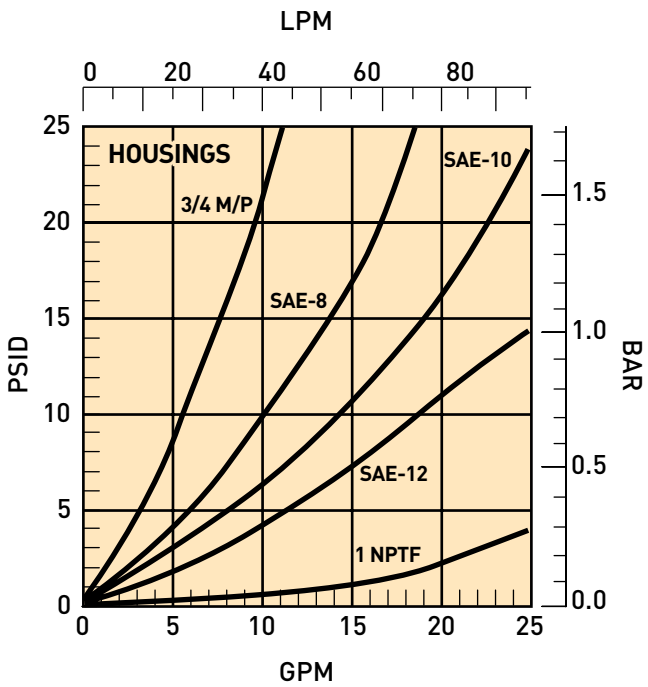
Capacity



Multipass tests run @ 15 gpm to 100 psid terminal - 5mg/L BUGL

Flow vs. Pressure Loss





Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

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
12SMP	1	10QH		SP	MP	6	11

BOX 1: Basic Assembly

Symbol	Description
12SMP	10,000 psi MAOP (316 S.S.)
12SHP	20,000 psi MAOP (17-4 S.S.)

BOX 2: Length

Symbol	Description
1	Single
2	Double

BOX 3: Element Media

Symbol	Description
20QH	20µm Microglass III, 2000 psid collapse
10QH	10µm Microglass III, 2000 psid collapse
05QH	5µm Microglass III, 2000 psid collapse
02QH	2µm Microglass III, 2000 psid collapse

BOX 4: Seals

Symbol	Description
None	Fluorocarbon (FKM)
E[1]	Ethylene Propylene (EPR)
Note:	1.Recomended for DI Water applications

BOX 5: Indicator

Symbol	Description
N	No Indicator, no pressure port
SP[1]	1/4" pressure ports only
4L35[2]	Visual manual reset, 50 psid setting
5T35[2]	Electrical (DIN 43650-A/ISO 4400), 50 psid setting
Note:	1.Pressure ports will match port type selected in BOX 6 2.Available for operating pressure <10,000 psi only

BOX 6: Port Type[1]

Symbol	Description
S[2]	SAE O-ring port
N[3]	NPTF port
MP	Medium pressure Autoclave (M/P) type port
HP	High pressure Autoclave (H/P) type port
Notes:	1. For other options, please contact HFD 2. Available for operating pressure <6,000 psi only 3. Available for operating pressure <10,000 psi only

BOX 7: Port Size

Symbol	Description (Port Type Options)
4	1/4" Nominal (N, MP)
6	3/8" Nominal (N, MP)
8	1/2" Nominal (N)
10	9/16" Nominal (MP, HP)
12	3/4" Nominal (S,N)
16	1" Nominal (S,N)

BOX 8: Options

Symbol	Description
1	Bypass (60 psid)
11	No Bypass (standard)
19[1]	Bypass with 1/4" drian port
21[1]	No bypass with 1/4" drain port
Note:	1.Drain port will be SAE or M/P Autoclave plug as required. Plug is included.

REPLACEMENT ELEMENTS

	Media	Microglass III (Fluorocarbon)		Microglass III (Ethylene Propylene -EPR)	
		Single	Double	12SMP-1 / 12SHP-1	12SMP-2 / 12SHP-2
No-Bypass	20QH 10QH 05QH 02QH	403400 403399 403398 403397	403404 403403 403402 403401	403485 403484 403483 403482	403488 403487 403486 403417
Bypass	20QH 10QH 05QH 02QH	937442 937441 937440 937439	937446 937445 937444 937443	937474 937473 937472 937471	937478 937477 937476 937475

Portable Filter Carts

Models 5MF and 10MF

Applications for Parker Filter Carts

- 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 water from a system
- For use with fluids such as hydraulic, gear and lube oils

Parker 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 an extremely high affinity for free water. Once water comes into contact with this material, it is removed from the system.

The Parker filter cart uses two high capacity ModuFlow™ filters for long element life and better system protection. The first stage (inlet) filter captures larger particles, while the second stage (outlet) filter controls 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
• Two filters instead of one.	• Pump protection and long element life.	• Element cost savings and trouble-free service.
• Wide variety of particulate elements available.	• Capable of getting a fluid to a desired cleanliness level.	• Avoids excess costs due filter to over or under filtration.
• Par-Gel water removal elements available.	• Removes “free water” from a system.	• Gets dirt and water out of system with one process.
• Heavy duty frame.	• Rugged and durable.	• Built to last for many hours of use.
• Lightweight and portable.	• Easy to move from place-to-place.	• One person operation.
• Two flow rates available (5 gpm or 10 gpm).	• Enables use in low or high viscosity applications.	• Matched to your needs.
• Eleven-foot hose and wand assemblies included.	• Additional hardware not necessary.	• Ready to use as received.

Features

Service Cover
- Top-accessible for easy changing of elements

Dual Filters
- Two-stage filtration for long element life and pump protection

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

Gear Pump
- Industrial quality
- Quiet operation
- Dependable, long life

Visual Indicator
- Tells you when to change element

Motor
- Industrial brand name

Heavy Duty Frame
- Rugged and built to last

Drip Pan
- Helps keep the work area safe and clean

Elements (not shown)
- Available for both particulate and water removal

Electrical Cord (not shown)
- 6ft. with on/off switch
- Optional 20 ft. cord with reel

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

5MF and 10MF
Portable Filter Cart

Specifications

Maximum Recommended Fluid Viscosity:
10MF: 500 SUS (108 cSt) (.85 specific gravity)
5MF: 3000 SUS (627 cSt) (.85 specific gravity)

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

Filter Bypass Valve Settings:
Inlet: 3 psid (.2 bar)
Outlet: 25 psid (1.7 bar)

Operating Temperatures:
Buna N (Nitrile) -40°F to 150°F
(-40°C to 66°C)
F3 (high temp option)
-15°F to 200°F
(-26°C to 93°C)

Electrical Service Required:
10MF - 110/220 volts, 60/50 Hz,
single phase, 10/5 amps
5MF - 110/220 volts, 60/50 Hz,
single phase, 8/4 amps

Electrical Motor:
l0MF - ¾ hp @ 3450 rpm, O.D.P.
5MF - ½ hp @ 1725 rpm, O.D.P.
Thermal overload protection

Construction:
Cart Frame: Steel
Filter Head: Aluminum
Filter Bowl: Steel
Hoses: PVC (Std.)
EDPM (high temp option)
Wands: PVC (Std.)
Steel tube (high temp option)

Weight (approximate): 110 Lbs. (45.4 kg)

Dimensions: inches (millimeter)

A - Height: 40.5" (1029)
B - Width: 25.5" (648)
C - Depth: 19.0" (483)

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

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 Performance

Fluid cleanliness levels are a function of initial contamination levels, contamination ingression 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 (10MF cart).
2. Inlet filter fitted with 40SA element. outlet with 10C element.
3. System ingression rate equal to 1 X 10^6 particles greater than 10 micrometers entering the system per minute.

Filter Cart Element Performance

Media Code	Filter Media	Time Averaged Beta x/y/z =2/20/75 Where x/y/z is:	Capacity (Grams)
74W	Woven Wire	0.0029[1]	*
40W	Woven Wire	0.0016[1]	*
40SA	Synthetic	40 Micron Nominal[2]	*
20C	Cellulose	20 Micron Nominal[2]	*
10C	Cellulose	6/18/22 Micron	15
20Q	Microglass III	7.5/12.5/17 Micron	47
10Q	Microglass III	<2/6/9 Micron	42
05Q	Microglass III	<2/<2/3.3 Micron	46
02Q	Microglass III	<2/<2/2 Micron	45

Beta Rating	Efficiency at x,y,z Particle Size
Bx = 2	50.0%
By = 20	95.0%
Bz = 75	98.7%

Notes: Multipass test run @ 40 gpm to 25 psid.
ANSI/NFPA T3.10/8.8 R1-1990 w/50 ppm anti-static additive
*Not Applicable.

1. Not multipass tested- Number shown Is actual pore size in inches.
2. Not multipass tested.

Par-Gel™ Media Water Capacity

Model	Fluid Viscosity	Capacity
5MF	75 SUS 200 SUS	250 ml 140 ml
10MF	75 SUS 200 SUS	190 ml 80 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 excessof 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.

Whenever servicing the PVC tube wand do not overtorque the metal fittings going into the PVC coupling. Overtorque will result in cracking the coupling. Generally, 1/4 turn beyond handtight is sufficient.

Operating Instructions

1) Insert the inlet wand assembly into the supply fluid receptacle (drum/reservoir). The "RF". filter is the inlet filter.

2) Insert the outlet wand assembly into the clean fluid receptacle (drum/reservoir). The "CF" fIlter is the outlet filter.

Caution:
Do not kink the hose assemblies, this may result in excessive vacuum or pressure at the pump.

3) Verify that the ON/OFF switch is OFF and plug the cord into a 115V 10A grounded outlet (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 "RF" inlet filter housing to prime pump initially.

5) The condition of the filter element should be monitored by observing the cleanliness indicator on the discharge filter. When the Indicator is in the CHANGE position, both inlet and outlet filter elements MUST be replaced to prevent fluid from going into bypass in the filters.

6) The inlet filter Is provided with a 3PSI bypass spring, and prevents the pump from cavitating If the element is not changed. The outlet filter is provided with a 25PSl 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 discharge 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 flow diverter assembly from the filter head. Filter element will follow the diverter.

a) Replace the cellulose, synthetic or Microglass II elements. Verify replacement.

b) Wire mesh elements can be cleaned. Ultrasonic cleaners provide best results.

5) Install element on flow diverter and reinstall in filter housing. Make sure diverter "o"-rings seat properly into the head.

6) Check to be sure that the notch on the flow diverter lines up with the notch in the head.

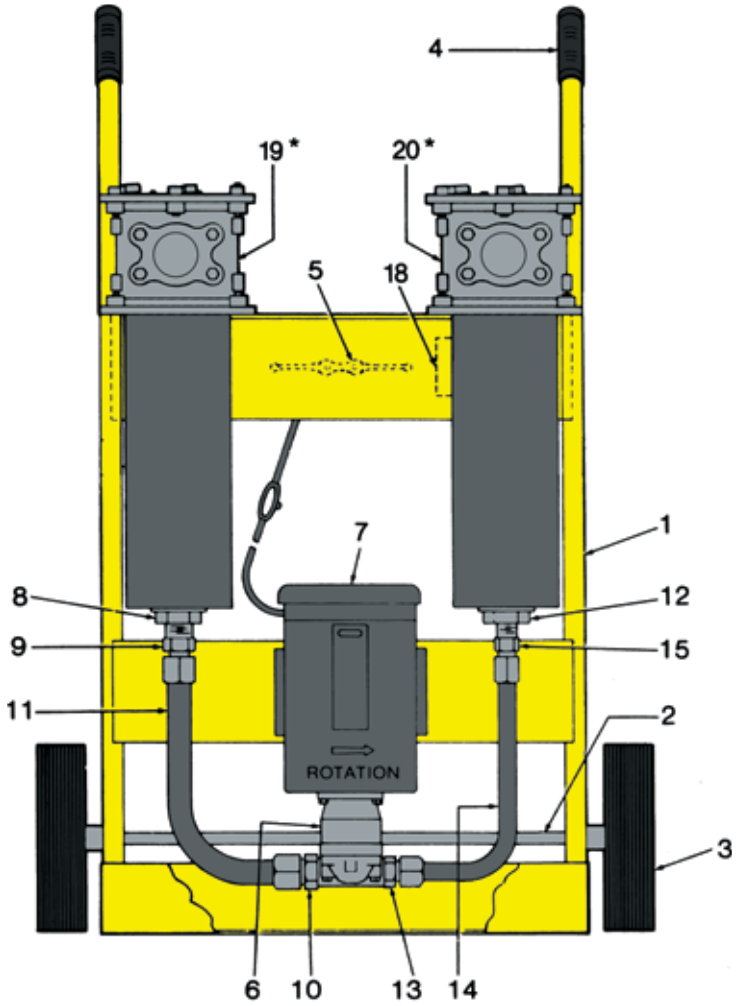
7) Inspect the cover "o"-ring and replace if necessary.

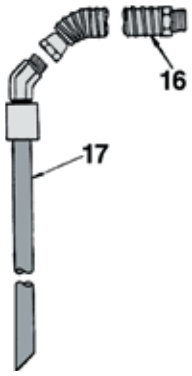
8) Replace cover and tighten hex head screws until they are snug. Do not over-torque these screws. Do not interchange the inlet filter cover with the outlet filter cover. (The inlet filter has a "RF" prefix, the outlet filter has a "CF" prefix).

Trouble Shooting

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

Filter Cart Replacement Parts





Replacement Element Part Numbers

Media Code	Buna Seals (Standard)	Fluorocarbon Seals
74W	924456	925043
40W	924455	925042
40SA	924448	925035
20C	924451	925038
10C	924450	925037
20Q	933742Q	933743Q
10Q	924453Q	925040Q
05Q	924452Q	925039Q
02Q	933068Q	933069Q
WR	927584	928908

Item No.	Part No.	Description	Quantity	Item No.	Part No.	Description	Quantity
1	928690	Frame	1	12	928749	Pipe Reducer	1
2	928653	Axle	1	13	928729	Adapter Fitting	1
3	928650	Wheel	2	14	928676	Discharge Tube Assembly	
4	928651	Handle Grip	2	15	928727	Tube Fitting	1
5	928649	Cord Cleat	1	16	928663	Hose Assy. - Buna N	2
Opt. 5	928623	Cord Reel	1	16	928621	Hose Assy. - Fluorocarbon	ó
6	928731	Pump	1	17	928784	Tube Wand Assy. Buna N	2
7	928678	Motor 10MF	1	17	928620	Tube Wand Assy. Fluorocarbon	
7	929692	Motor 5MF	ó	18	932187	Name Plate	1
8	928748	Pipe Reducer	1	19	RF2-1-**-PP3-YN-F9-1	Inlet Filter - Buna N	1
9	928728	Tube Fitting	1	19	F3-RF2-1-**-PP3-YN-F9-1	Inlet Filter - Fluorocarbon	ó
10	928652	Adapter Fitting	1	20	CF2-1**-MP25-F9-YN-1	Outlet Filter - Buna N	1
11	928677	Suction Tube Assembly		20	F3-CF2-1-**-MP25-F9-YN-1	Outlet Filter - Fluorocarbon	ó

**Refer to table above

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

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
F3	10MF	40SA	10Q	6	Design number assigned by Parker

BOX 1: SEALS

Symbol	Description
None (Std.)	**Nitrile**
F3	**High temperature service**

BOX 3 : INLET FILTER

Symbol	Description
40SA	**Synthetic**
40W	Stainless Steel Mesh
74W	Stainless Steel Mesh
20C	Cellulose
20Q	Microglass III

BOX 5 : OPTIONS

Symbol	Description
1	**None**
3	Magnets in inlet filter
6	20 FT electrical cord (retractable reel)
9	Indicator on inlet filter

BOX 2 : MODEL

Symbol	Description
10MF	**10 GPM (500 SUS MAX.)**
5MF	**5 GPM (3000 SUS MAX.)**

BOX 4 : OUTLET FILTER

Symbol	Description
10C	**Cellulose**
20Q	Microglass III
10Q	**Microglass III**
05Q	Microglass III
02Q	Microglass III
WR	PAR-GEL™ Water Removal

BOX 6 : DESIGN NUMBER

Applied to the filter by Parker Hydraulic Filter Division. Use the full model code, including the design number when ordering replacement parts.

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

Guardian®

Portable Filtration System

Portable Filtration System

Guardian®

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.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

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.
Geroter 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

Portable Filtration System

Guardian®

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 l20°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

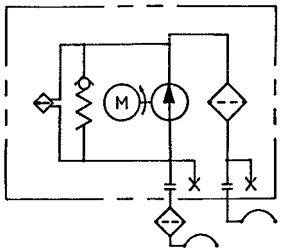
Handle and Indicator: nylon

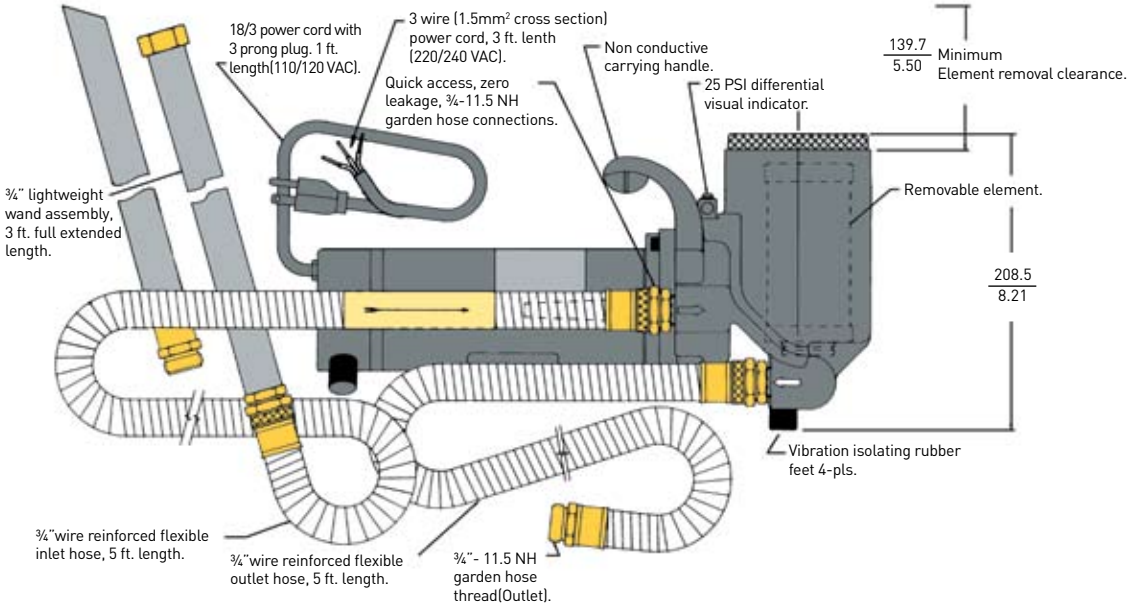
Wands and Hose: PVC

Fittings: brass

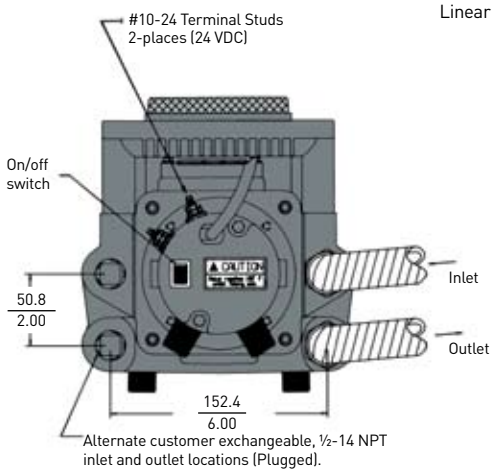
Seals: fluorocarbon/
carboxylated nitrile

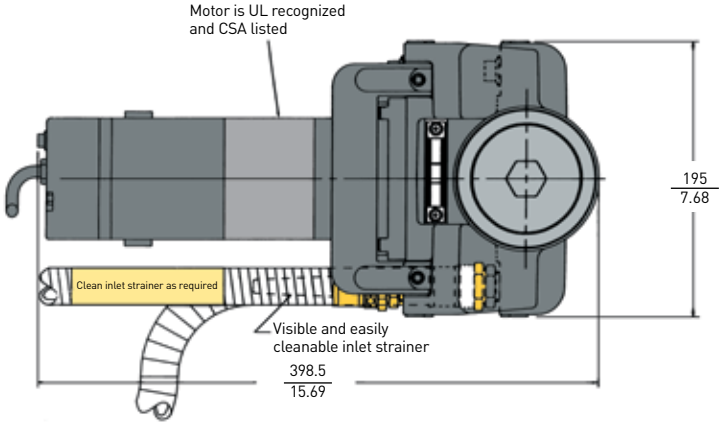
Guardian Schematic





Linear Measure: millimeter / inch





Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Guardian Element Performance

Media Code	Filter Media	Time Averaged Beta x/y/z =2/20/75 Where x/y/z is:	Dirt Capacity (Grams)
74W	Woven Wire	74 micron[1]	*
40W	Woven Wire	40 micron[1]	*
25W	Woven Wire	25 micron[1]	*
20C	Cellulose	20 micron[1]	*
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

Multipass test run at 4 gpm to 35 psid
[1]Reference ratings only. Not multipass tested due to coarseness.
* Not applicable

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%

Estimated Guardian Element Life and Cleanliness Levels

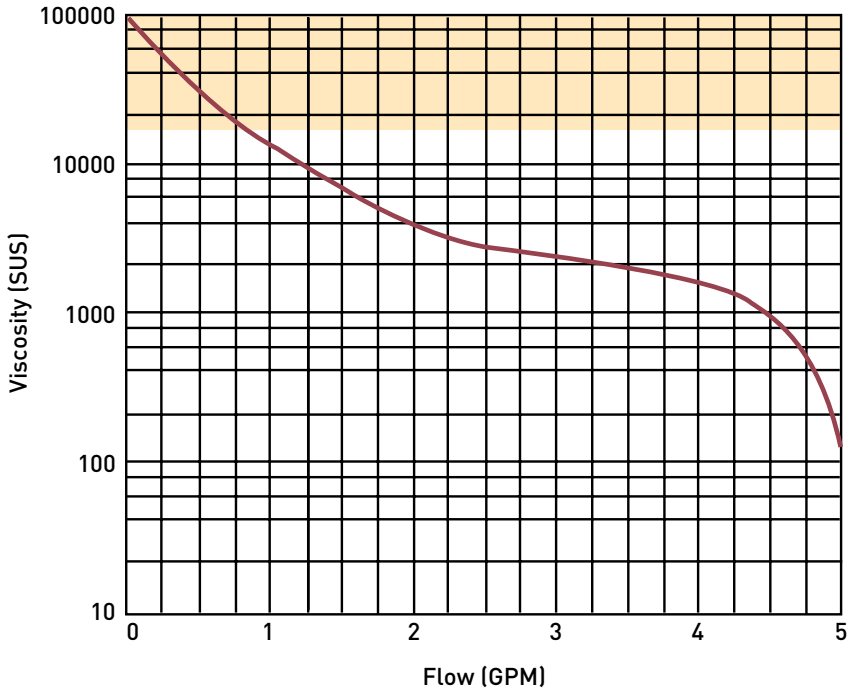
The following chart shows typical element life (in gallons of oil passed) and cleanliness levels achieved by standard Parker elements available with the Guardian. Some assumptions have been made.*

Media	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 ingression.
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

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

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.

Element Servicing

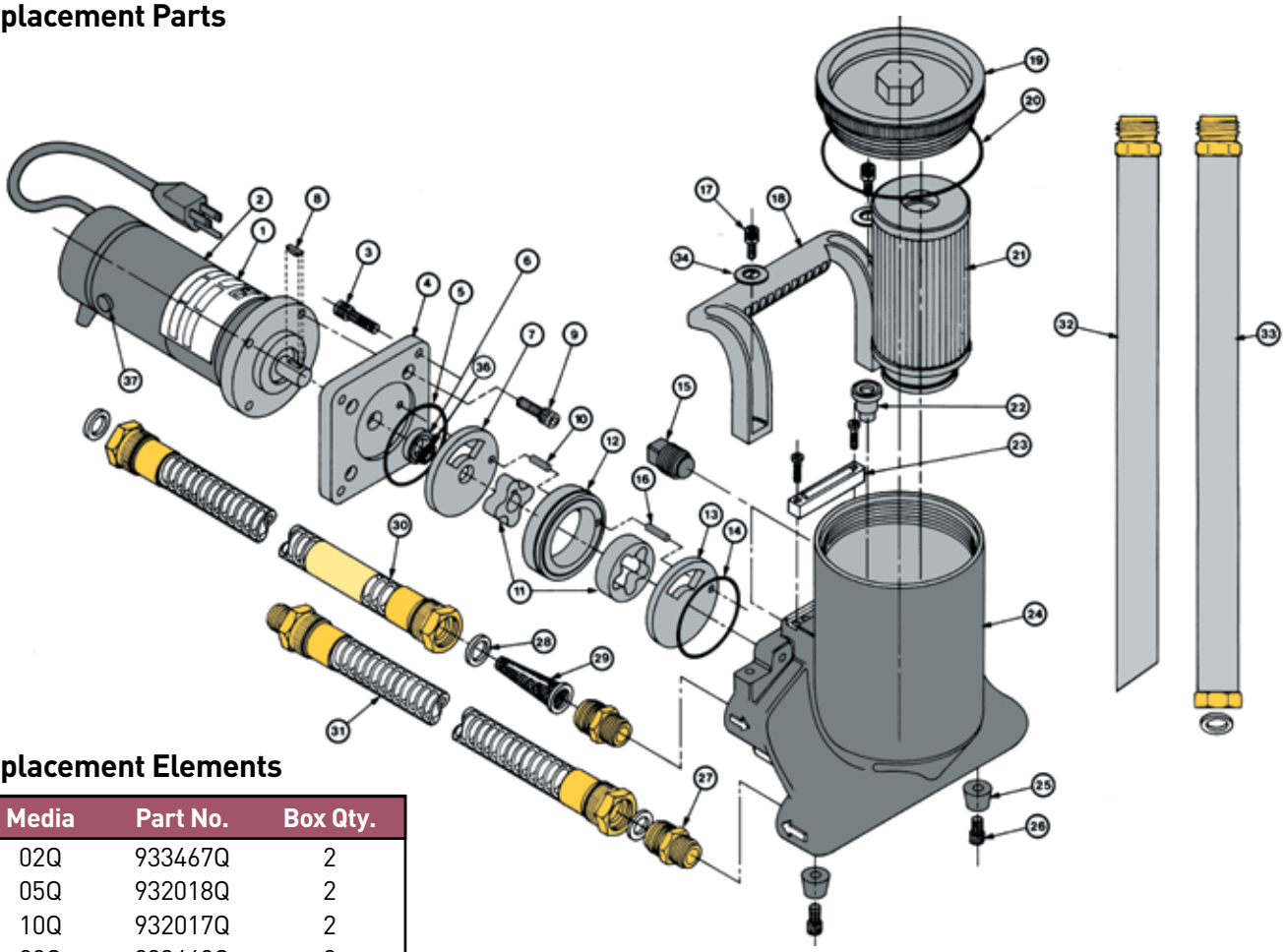
A. Flip the switch on the end of the unit to the "off" position and disconnect the electrical plug.
B. Rotate the cover counter-clockwise and remove.
C. Remove the element from the housing. Discard all disposable elements. These elements are not cleanable,
D. Place the new element In the housing, fitting 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. No electrical power. Rectifier. Motor overheats (160°F) Defective motor.	Turn switch on, replace switch if defective. Plug in Guardian, check for tripped circuit breakers, check for blown fuses. Replace if defective. Allow motor to cool, thermal overload will automatically reset. Replace motor.
Does not start or erratic motor noise.	Worn motor brushes.	Replace motor brushes.
Intermittent start/ stop operation.	High viscosity fluids. Worn motor brushes. Defective motor.	High viscosity fluids can cause the motor to overheat and cycle intermittently. Replace motor brushes. Replace motor.
Hot motor.	Pumping under heavy load. Defective motor.	It is normal, under a heavy pumping load, for the motor to reach 160°F Replace motor if shell temperature reaches greater than 170°F
No flow or erratic pump noise.	Filter housing not filled with oil. Suction leak. Obstructed outlet. Element dirty. Sheared pump key. Defective Guardian.	Allow Guardian to run a few seconds. Check tightness of inlet fittings and hoses. Check gaskets are in place and are not damaged. Kink or restriction in the inlet hose. Clear outlet. Replace or clean element. Replace woodruff key. Replace unit.
No flow, erratic pump noise, motor overheats.	Gears binding.	Disassemble Guardian and thoroughly clean the gear set. Always use the inlet strainer provided to protect the unit. Replace defective gears.
No suction.	Plugged strainer.	Clean or replace the inlet strainer as required. Clean relief valve. Check for damaged internal o-rings.
Reduced oil flow.	High viscosity fluids. Element dirty. Relief valve sticks or is lodged open. Partially obstructed inlet or outlet hose. Suction leak. Worn gears.	High viscosity fluids can cause reduced flow, which is normal. Replace or clean element. Clean relief valve or replace if defective. Clear the hose obstruction. Check tightness of inlet fittings and hose. Replace gear set.
Indicator moves to RED Area.	Element dirty, Oil extremely cold or viscous. Obstructed outlet. Defective Indicator.	Replace or clean element. Change element to coarser micron rating. Clear outlet obstruction. Replace Indicator.
Indicator does not seem to move.	No element. Defective indicator.	Install element. 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.

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),¼-20x1 902734
4. Adapter Plate 931890
5. Housing O-Ring V72041
6. Polypak Seal 931921
7. Shadow Plate 931899
8. Woodruff Key ⅛ x ⅜ 931877
9. SHCS(4), ¼-20 x ¾ 902679
10. Roll Pin ⅛ x ¾ 903630
11. Geroter Set 931873
12. Geroter Ring 931903
13. Outlet Plate 931900
14. Geroter O-ring V72135
15. Brass Pipe Plug (2) ½-14 931920
16. Roll Pin ⅛ x ⅝ 903426
17. SHCS (2), ¼-20 x ⅝ 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), ¼-20 x ½ 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
Seal Kit 932263
Bowl Extension Kit 932081

NOTE: SHCS denotes "socket head cap screw"

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Portable Filtration System

Guardian®

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
	GT4	10C	1	Design number assigned by Parker

BOX 1: SEALS

Symbol	Description
None	**Carboxylated Nitrile (Standard)**

Note: Consult factory for fluids not compatible with fluorocarbon

BOX 2 : MODEL

Symbol	Description	
GT4	**Guardian®**	**110/120 VAC**
GT4 D		24VDC
GT4 E		220/240 VAC

BOX 3 : MEDIA

Symbol	Description
74W	Wire Mesh
40W	Wire Mesh
25W	Wire Mesh
20C	Cellulose
10C	**Cellulose**
20Q	Microglass III
10Q	**Microglass III**
05Q	Microglass III
02Q	Microglass III
WR	Water Removal

BOX 4 : OPTIONS

Symbol	Description
1	**None**
6	Quick disconnect hose connections

BOX 5 : DESIGN NUMBER

Symbol	Description

Applied to the Guardian by Parker Hydraulic Filter Division. Use the full model code, including the design number when ordering replacement parts.

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

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Portable Purification Systems

Models PVS 185, 600, 1200, 1800, 2700

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:

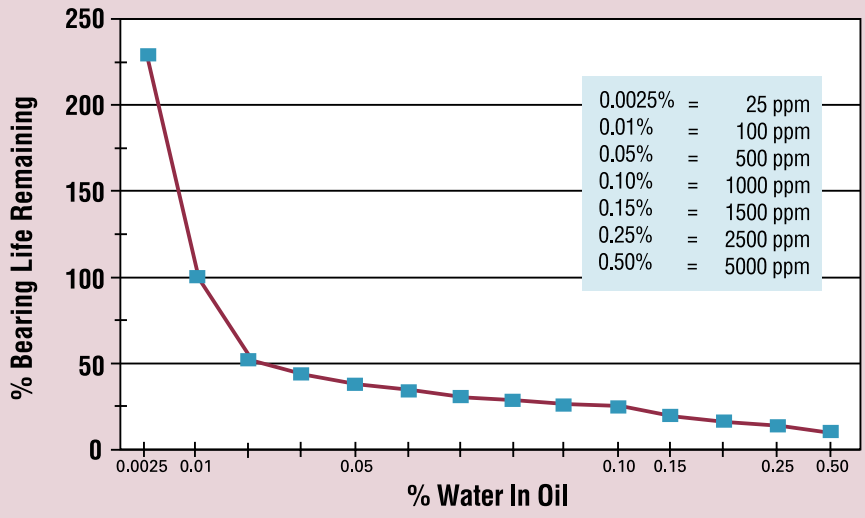
- Corrosion by etching metal
- Fluid breakdown, reduction of lubricating properties, additive precipitation, and oil oxidation
- Reduced dielectric strength
- Abrasive wear in hydraulic components

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).

Effect Of Water In Oil On Bearing Life



Effect of water in oil on bearing life (based on 100% life at .01% water in oil.)
Reference: "Machine Design" July 86, "How Dirt And Water Effect Bearing Life" by Timken Bearing Co.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Applications for PVS Portable Purification Systems

- Paper Mills
  - Dryer Lubrication
  - Hydraulic
  - Compressor Lubrication
  - Calenders
- Steel Mills
  - Bearing Lubrication
  - Continuous Casters
  - Press Roll Lubrication
- Power Generation
  - Turbine Oil
  - Transformer Oil
  - EHC Systems
- Industrial/Aerospace
  - Test Stands
  - Machine Tools

Features	Advantages	Benefits
Variable flow circuit	• Allows oil to heat more quickly	• Starts to remove water more quickly
Moisture sensor	• Real-time water content indication in % saturation	• At-a-glance visual confirmation
Automatic operation	• Unattended use • Designed for 24/7 operation	• Reduces labor costs • Increases operation time
Stainless steel used for all wetted surfaces	• No corrosion	• Product reliability
Compact size	• Smallest envelope in the industry • Ease of portability	• Fits in tight areas • Encourages use
Clear plexiglass covers on the condensate tank and vacuum chamber	• See the vacuum dehydration process work	• Visual verification of water removal
Desiccant breather	• Insures dry, clean intake air	• More efficient operation
Reverse phase switch	• Enables easy changing of motor rotation if out-of-phase	• Ease of maintenance • Prevents incorrect rotation
Condensate holding tank with optional auto drain	• Large volume for infrequent servicing intervals	• Reduces maintenance costs
Programmable thermostat	• Maintains oil within 1°F • Prevents overheating the oil	• Unattended operation
Forklift guides and lifting eyes	• Provides safe and secure method of lifting the unit	• Employee safety
Coalescing or packed tower oil dispersal elements	• Flexibility with various fluid viscosities	• Greater efficiency in removing moisture

Potential Contaminant	PVS Performance
Solid particulate	ISO Cleanliness Code* 14/13/10 Attainable
Water	Removes 100% of free water, 80-90% of dissolved water.
Air	Removes 100% of free air, 90% of dissolved air.
Gases	Removes 100% of free gases, 90% of dissolved gases.

* When utilizing 2Q media

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.

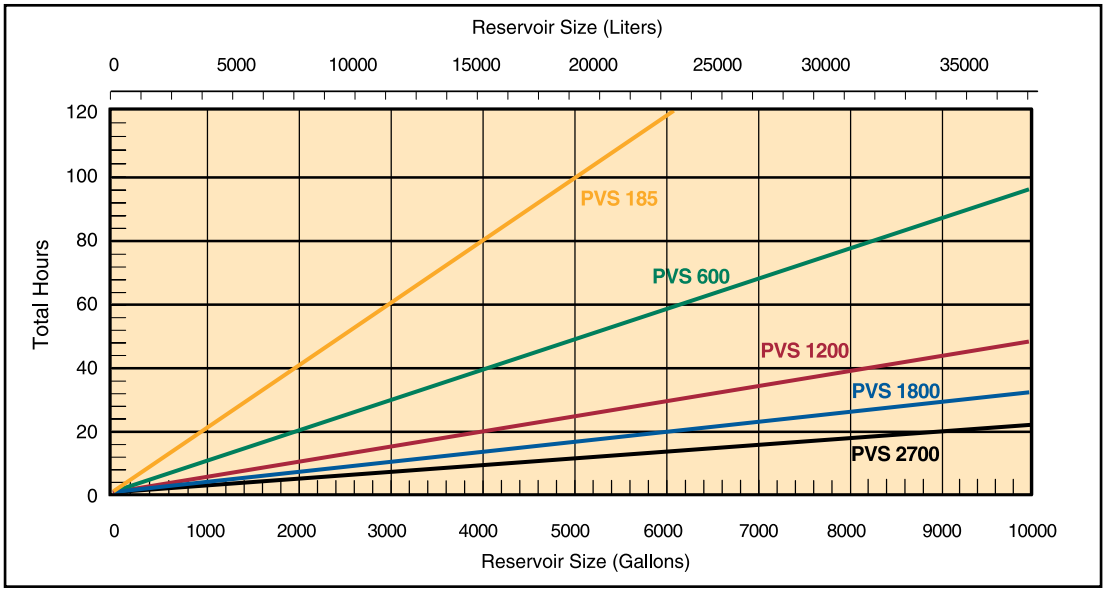
Coalescer units– Removes free water only; has difficulty breaking stable emulsions; does not work well in viscous fluids (>100 sus); much larger in size compared to PVS.

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%) Stop: 50 PPM (0.005%)
Contamination Level	Start: ISO 21/18/16 Stop: ISO 16/14/11

Start Stop

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



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

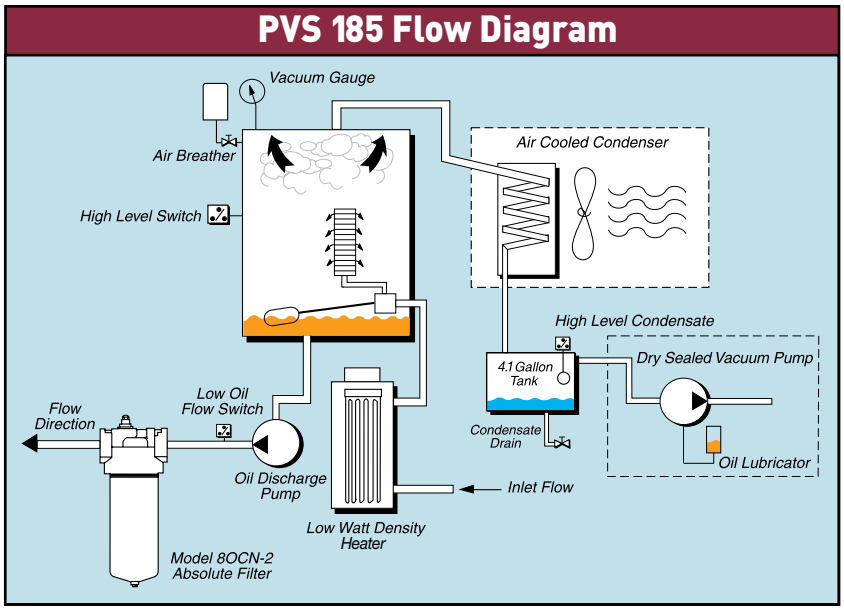
PVS 185

SPECIFICATIONS

Flow rate	5 gpm (18.9 lpm)
Height	65" (1651 mm)
Width	33" (838.2 mm)
Length	48" (1219.2 mm)
Weight	650 lbs. (294.8 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 2150 sus (460 cSt)-Packed Tower
Outlet pressure (max)	60 psi (4.1 bar)
Ports	3/4" JIC (male) inlet 3/4" JIC (male) outlet
FLA (full load amps)	15-41 amps (Depending on voltage used)

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)	
2QE (2 micron)	933734Q
5QE (5 micron)	933612Q
10QE (10 micron)	933735Q
20QE (20 micron)	933736Q
DISPERSAL	
Disposable (Coalescing)	933180
Packed tower (Cleanable)	933553

PVS 185 Flow Diagram



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

PVS 600

S P E C I F I C A T I O N S

Flow rate	10 gpm (37.9 lpm)
Height	65" (1651 mm)
Width	33" (838.2 mm)
Length	48" (1219.2 mm)
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 2150 sus (460 cSt) - Packed Tower
Outlet pressure (max)	60 psi (4.1 bar)
Ports	1" JIC (male) inlet 1" JIC (male) outlet
FLA (full load amps)	24-38 amps (Depending on options & voltages)

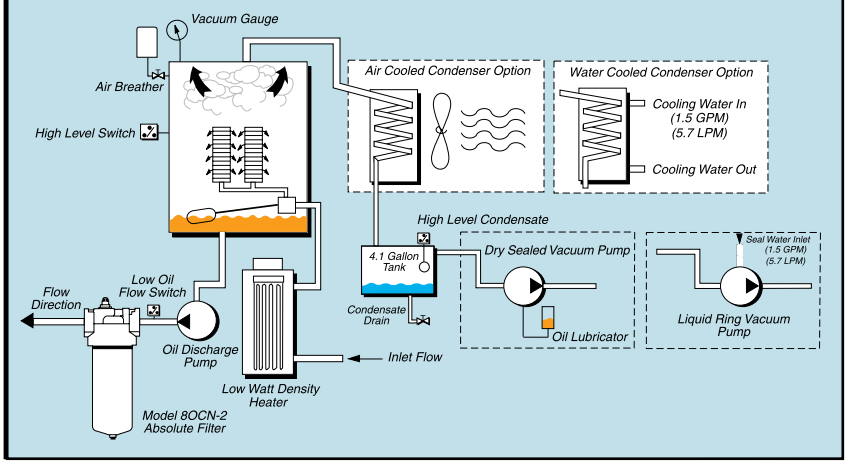
REPLACEMENT ELEMENTS

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)	
2QE (2 micron)	933734Q
5QE (5 micron)	933612Q
10QE (10 micron)	933735Q
20QE (20 micron)	933736Q

DISPERSAL	
Disposable (Coalescing)	933180
Packed tower (Cleanable)	933553

PVS 600 Flow Diagram



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Metamora, OH

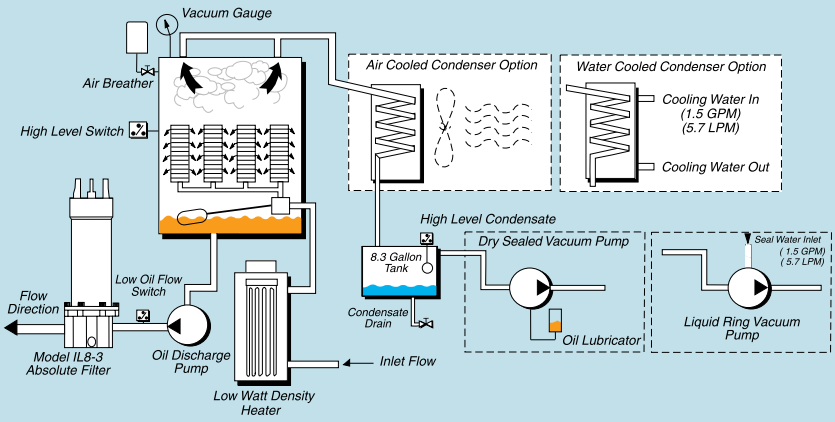
PVS 1200

S P E C I F I C A T I O N S

Flow rate	20 gpm (75.7 lpm)
Height	65" (1651 mm)
Width	44" (1117.6 mm)
Length	61" (1549.4 mm)
Weight	1550 lbs. (703.1 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 2150 sus (460 cSt) - Packed Tower
Outlet pressure (max)	60 psi (4.1 bar)
Ports	1½" NPTF inlet 1" JIC (male) outlet
FLA (full load amps)	30-48 amps (Depending on options & voltages)

REPLACEMENT ELEMENTS	
DISPERSAL	
Disposable (Coalescing)	933180
Packed tower (Cleanable)	933553
STANDARD CORELESS PARTICULATE (IL8-3)	
02QE (2 micron)	933734Q
05QE (5 micron)	933612Q
10QE (10 micron)	933735Q
20QE (20 micron)	933736Q

PVS 1200 Flow Diagram



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Metamora, OH

PVS 1800

S P E C I F I C A T I O N S

Flow rate	30 gpm (113.6 lpm)
Height	66" (1676.4 mm)
Width	42" (1066.8 mm)
Length	73" (1854.2 mm)
Weight	2550 lbs. (1156.7 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 2150 sus (460 cSt) - Packed Tower
Outlet pressure (max)	60 psi (4.1 bar)
Ports	2" NPTF- inlet 1.5" JIC – outlet
FLA (full load amps)	40-65 amps @ 460 V/60hz

REPLACEMENT ELEMENTS	
DISPERSAL	
Disposable (Coalescing)	933180
Packed tower (Cleanable)	933553
STANDARD CORELESS PARTICULATE (IL8-3)	
02QE (2 micron)	933734Q
05QE (5 micron)	933612Q
10QE (10 micron)	933735Q
20QE (20 micron)	933736Q

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

PVS 2700

S P E C I F I C A T I O N S

Flow rate	45 gpm (170.3 lpm)
Height	66" (1676.4 mm)
Width	42" (1066.8 mm)
Length	73" (1854.2 mm)
Weight	2550 lbs. (1156.7 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 2150 sus (460 cSt) – Packed Tower
Outlet pressure (max)	60 psi (4.1 bar)
Ports	3" NPTF - inlet 2" NPTF - outlet
FLA (full load amps)	50-70 amps @ 460 V/60hz

REPLACEMENT ELEMENTS	
DISPERSAL	
Disposable (Coalescing)	933180
Packed tower (Cleanable)	933553
STANDARD CORELESS PARTICULATE (IL8-3)	
02QE (2 micron)	933734Q
05QE (5 micron)	933612Q
10QE (10 micron)	933735Q
20QE (20 micron)	933736Q

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Hydraulic Filter Division
Metamora, OH

PVS 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. **System volume:** _____

15. **Special requirements:** _____

    _____

    _____

16. **Any previous filtration problems with the application:** _____

17. **PVS model selected:** _____

***Specification sheet must be completed before order can be entered**

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

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	12KW	AC	ACD 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
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	Description
2QE	2 Micron Coreless Microglass III
5QE	5 Micron Coreless Microglass III
10QE	10 Micron Coreless Microglass III
20QE	20 Micron Coreless Microglass III
Note:	Above elements are rated for Beta 200+ (99.5% efficiency)

BOX 7: HEATER

Model	Symbol	Description
185	12KW	12 KW/3 phase
600	12KW	12 KW/3 phase
	24KW	24 KW/3 phase
	36KW	36KW/3 phase
1200	24KW	24 KW/3 phase
	36KW	36KW/3 phase
	48KW	48 KW/3 phase
1800	36KW	36 KW/3 phase
	48KW	48 KW/3 phase
2700	48KW	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
None	Lifting eyes (4)
None	Moisture Sensor
None	Variable Flow Circuit
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
CSA	CSA Marked
DFL	Dirty Filter Light
DPG	Differential pressure gauge
EXP	Explosion Proof (Class I, Division II, Zone I and II)
ICV	Inlet Control Valve
IL8	Upgrade to IL8-3 coreless filter
PNW	Pneumatic Wheels
RHM	Resetable Hour Meter
SFI	Sight Flow Indicator

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Notes

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Par-Test™

Fluid Analysis

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

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

FLUID ANALYSIS REPORT

SAMPLE CODE: 93844 DATE: 09/01/04

Parker Hannifan
16810 Fulton Rd. Co #2
Metamora, OH, 43540

ATTN: Kevin Noe

PARTEST Fluid Analysis Service
Parker Hannifin Corporation
1016 E. Airport Rd.
Stillwater, OK 74075
Tele: (405)624-0400
Fax: (405)624-0401

COMPANY NAME:	ABC Corporation	SAMPLE DATE:	7/12/2004
SYSTEM TYPE:	Hydraulic	HOURS:	(on oil) 948 (on unit) 2000
EQUIPMENT TYPE:	Press	SYSTEM VOLUME:	200 Gallons
MACHINE ID:	Machine #1	FLUID TYPE:	AW 46
FILTER ID:	Parker 10 micron	ANALYSIS PERFORMED:	N2,S,T,V4,W

AUTOMATIC PARTICLE COUNT ISO 11171

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	

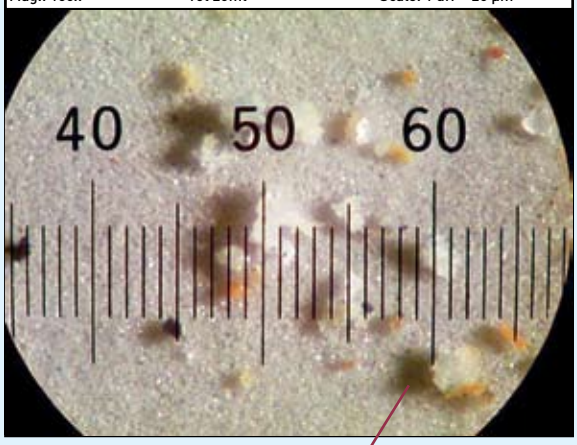
FREE WATER PRESENT

☐ YES

☒ NO

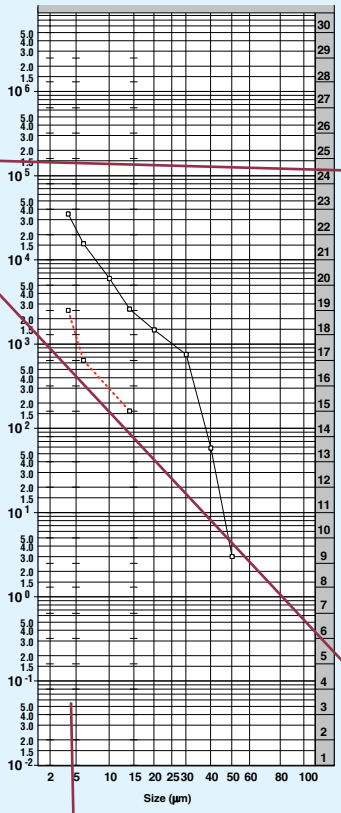
PHOTO ANALYSIS

Mag.: 160x Vol 20ml Scale: 1 div = 20 µm



ALARMS/REMARKS

*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

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 REPORT

SAMPLE CODE: 93844 **DATE:** 09/01/04

Parker Hannifan
16810 Fulton Rd. Co #2
Metamora, OH, 43540

ATTN: Kevin Noe

PARTEST Fluid Analysis Service
Parker Hannifin Corporation
1016 E. Airport Rd.
Stillwater, OK 74075
Tele: (405)624-0400
Fax: (405)624-0401

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
ALUMINUM	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

L = LOW N = NORMAL H= HIGH

The Spectometic 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.

Viscosity Analysis - ASTM D445

CST@100C:		SSU@210F:	
CST@40C:	46.25	SSU@100F:	215.0

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

Neutralization Analysis - ASTM D794

TAN: 0.44

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.

Water Analysis - ASTM D6304

WATER CONTENT (PPM): 410.0

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.

Comments

*Please check spectrometric status for abnormal conditions.

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

Iron: Ferrous wear particle typically from pumps, gears, cylinders, or rust

Copper: Brass (copper/zinc) and bronze (copper/tin) in bearings and bushings

Chromium: (white non ferrous metal) Chrome from cylinder rods, bearings, valve spools

Lead: Babbitt or copper lead bearings

Aluminum: White nonferrous metal from pump bodies, bushings, bearings, and grinding compounds

Tin: Babbitt bearings, plating

Silicon: Sand/dirt contamination or antifoaming additive in oil

Zinc: Plating or anti-wear additive in oil

Magnesium: Detergent, dispersive additive in oil, bearings, water

Calcium: Dispersant additive or acid neutralizer

Phosphorous: Anti-wear or fire resistant additive in fluid

Barium: Corrosion, rust inhibitor additive in oil

Boron: Detergent, dispersive additive in oil

Sodium: Detergent or coolant additive

Molybdenum: Alloy metal or anti friction additive

Silver: White non ferrous metal

Nickel: Alloy metal

Titanium: White non ferrous metal

Manganese: White non ferrous metal

Antimony: Babbit bearings, greases

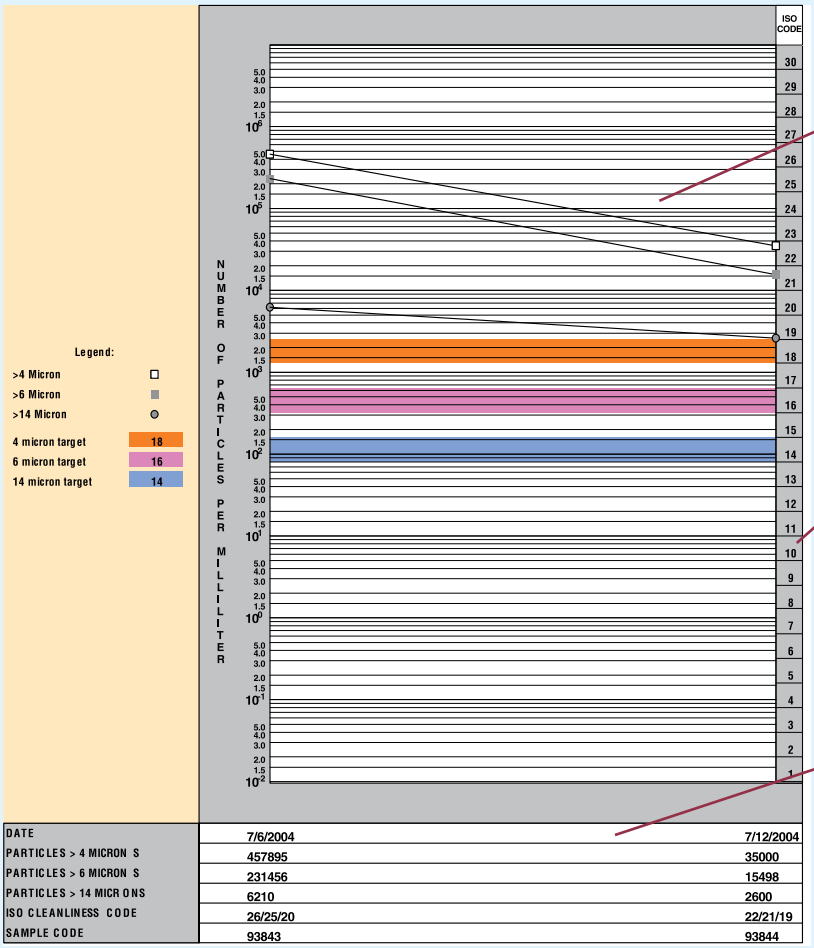
FLUID ANALYSIS REPORT

SAMPLE CODE: 93844 **DATE:** 09/01/04

Parker Hannifan
16810 Fulton Rd. Co #2
Metamora, OH, 43540

ATTN: Kevin Noe

PARTEST Fluid Analysis Service
Parker Hannifin Corporation
1016 E. Airport Rd.
Stillwater, OK 74075
Tele: (405)624-0400
Fax: (405)624-0401



DATE	7/6/2004	7/12/2004
PARTICLES > 4 MICRON S	457895	35000
PARTICLES > 6 MICRON S	231456	15498
PARTICLES > 14 MICR ONS	6210	2600
ISO CLEANLINESS CODE	26/25/20	22/21/19
SAMPLE CODE	93843	93844

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

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

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 came 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 exists, 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

Reservoir Accessories

Filler Breathers, Strainers, Diffusers,
Fluid Level/Temperature Gauges

Non-Metallic Filler Breathers
Single-Hole and Six-Hole Styles

Anti-Splash Design!

Specifications:
Materials:
Body: Non-corrodible glass filled nylon.
Valve: Nylon/Nitrile.
Dipstick: ABS, acetal Hi/Lo indicators.

Filtration Element: Expanded polyurethane foam, 10 micron.

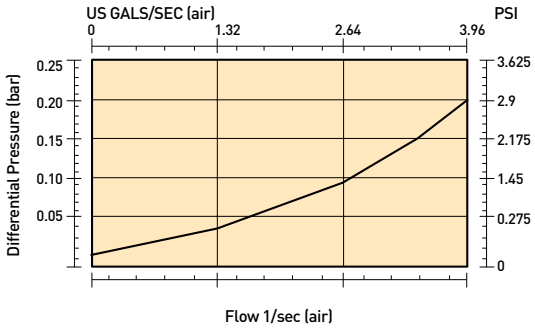
Operating Temperatures: -22°F (-30°C) to 195°F (90°C).

Seals: Nitrile (single-hole), cork gasket (six-hole).

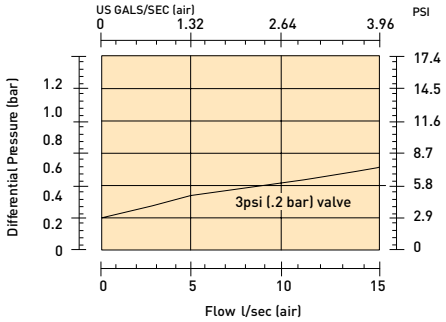
Pressurization Options: 3 psi (0.2 bar).

Dipstick: (optional) 7.9 in. (200 mm) or 15.8 in. (400 mm) lengths with adjustable Hi/Lo indicators.

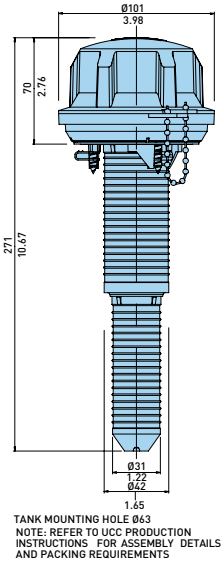
(Non-pressurized)



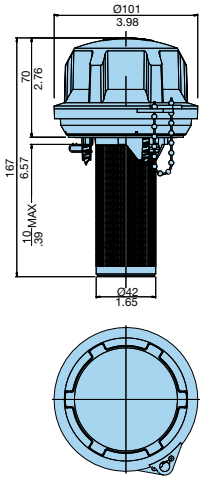
(Pressurized)



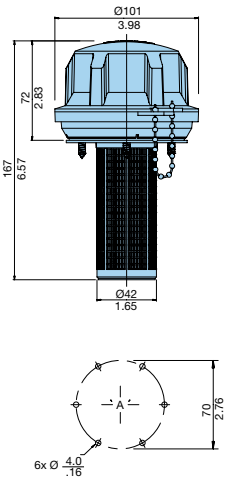
Telescopic Strainer



Single-Hole Option



Six-Hole Option



Linear Measurement= $\frac{mm}{in}$

Non-pressurized

Single-Hole New Part No.	Single-Hole Obs. Part No.	Six-Hole New Part No.	Six-Hole Obs. Part No.	Micron Rating	Description	Screws*
AB.98210001.UC	FB1.A1A1A2P	AB.98810001.UC	FB1.D1A1A2P	10	Filler breather without strainer	(6)-M10x.5
AB.98210011.UC	FB1.A1A1B2P	AB.98810011.UC	FB1.D1A1B2P	10	Filler breather with 3.7" (95 mm) strainer	(6)-M10x.5
AB.98210021.UC	FB1.A1A1C2P	AB.98810021.UC	FB1.D1A1C2P	10	Filler breather with telescopic strainer	(6)-M10x.5

Pressurized

Single-Hole Part No.	Six-Hole New Part No.	Six-Hole Obs. Part No.	Micron Rating	Description	Screws*
Not Available	AB.98812001.UC	FB1.D1B1A2P	10	3 psi (.2 bar) without strainer	(6)-M10x.5
Not Available	AB.98812011.UC	FB1.D1B1B2P	10	3 psi (.2 bar) with 3.7" (95 mm) strainer	(6)-M10x.5
Not Available	AB.98812021.UC	FB1.D1B1C2P	10	3 psi (.2 bar) with telescopic strainer	(6)-M10x.5

Dipsticks

New Part Number	Obsolete Part Number	Description
B.68.206	DIP.FB2	Pack of (10) x 7.9"
DIP.FB4	–	Pack of (10) x 15.8"

*Mounting screws for six-hole only

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Non-Metallic Breathers

Threaded Type

Specifications:

Materials:
Body: Nylon 66.
Valve: Nylon/Nitrile.
Dipstick: ABS, acetal Hi/Lo indicators.

Filtration Element: Expanded polyurethane foam, 10 micron.

Operating Temperatures: -22°F (-30°C) to 195°F (90°C).

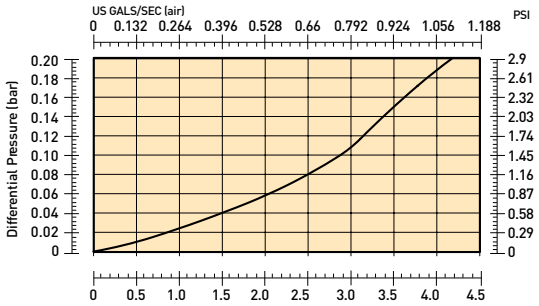
Seals: Nitrile.

Pressurization Options: 3 psi (0.2 bar).

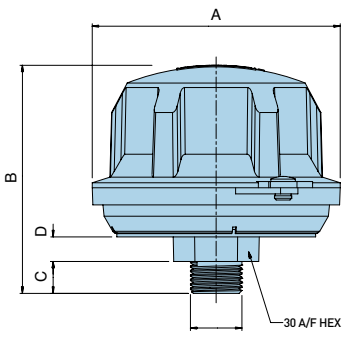
Dipstick: (optional) 7.9 in. (200 mm) or 15.8 in.(400mm) lengths with adjustable Hi/Lo indicators.

Anti-Splash Design!

COMPACT THREADED

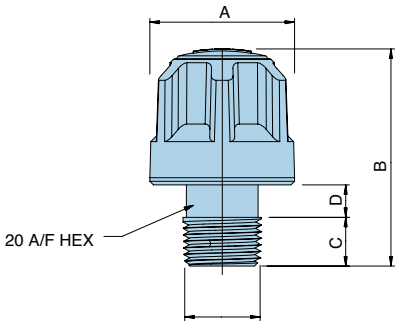


Standard Threaded



Thread size

Compact Threaded



Thread size

Compact Threaded

New Part Number	Obs. Part Number	Micron Rating	Thread	Pressure	"A"	"B"	"C"	"D"
AB.683102.UC*	SB1.A1A2P*	10	1/4"NPT	non-pressurized	1.6" (40 mm)	2.2" (57 mm)	.55" (14 mm)	.24" (6 mm)
AB.68Y102.UC*	SB1.C1A2P*	10	1/2" NPT	non-pressurized	1.6" (40 mm)	2.4" (60 mm)	.53" (13.5 mm)	.35" (9 mm)
AB.68Z102.UC*	SB1.D1A2P*	10	3/4" NPT	non-pressurized	1.6" (40 mm)	2.4" (60 mm)	.55" (14 mm)	.35" (9 mm)

*Pack of (10) pieces.

Standard Threaded

New Part Number	Obs. Part Number	Micron Rating	Thread	Pressure	"A"	"B"	"C"	"D"
Not Available	FB1.C1A3A2P	10	1/2"NPT	non-pressurized	4.0" (101 mm)	3.7" (93 mm)	.51" (13 mm)	.39" (10 mm)
FB1.C1B3A2P	–	10	1/2" NPT	3 psi (.2 bar)	4.0" (101 mm)	3.7" (93 mm)	.51" (13 mm)	.39" (10 mm)
AB.98410201.UC	FB1.B1A3A2P	10	3/4" NPT	non-pressurized	4.0" (101 mm)	3.8" (95 mm)	.63" (16 mm)	.39" (10 mm)
AB.98412201.UC	FB1.B1B3A2P	10	3/4" NPT	3 psi (.2 bar)	4.0" (101 mm)	3.8" (95 mm)	.63" (16 mm)	.39" (10 mm)

Dipsticks

New Part Number	Obs. Part Number	Description
B.68.206	DIP.FB2	Pack of (10) x 7.9"
DIP.FB4	–	Pack of (10) x 15.8"

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Metal Filler Breathers

Flange Type

Specifications:

Materials:
Cap & Plate: Nickel chrome plated steel.
Valve: Nylon/Nitrile.

Gasket: Cork.

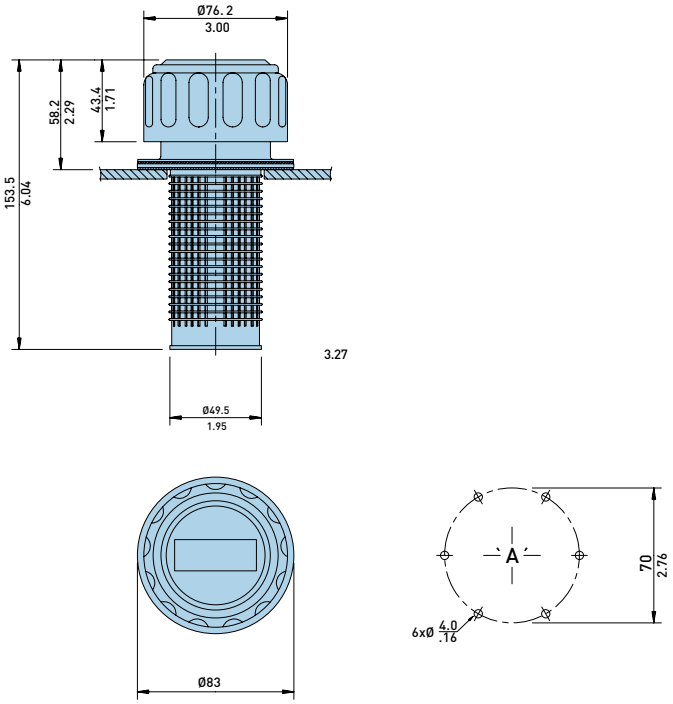
Filtration Element: Expanded polyurethane foam, 10 micron.

Operating Temperatures: -22°F (-30°C) to 195°F (90°C).

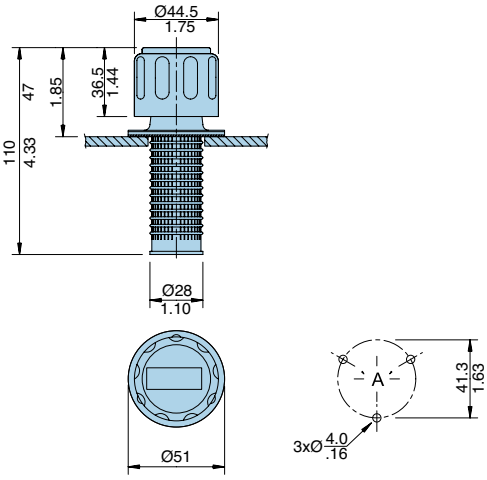
Seals: Nitrile.

Pressurization Options: none, 5 psi (0.35 bar).

3" Diameter



1.75" Diameter



Linear Measurement= mm / in

Flange Type, Non-pressurized

New Part No.	Obs. Part No.	New Part (Cap As.)	Obs. Part (Cap As.)	Micron Rtg	Air Flow	Description	Screws
AB.1163.10	MB1.D1A1B1P	CAP.1163.10	CP1.D1A1A1P	10	2 gal./sec. (7.5 l/sec.)	3" (76 mm) dia.	(6)-M10x.5
5561	MB1.D1A1B2P	Not Available	Not Available	10	2 gal./sec. (7.5 l/sec.)	3" (76 mm) dia., w/lck lug	(6)-M10x.5
AB.1380.10	MB1.A1A1B1P	CAP.1380.40	CP1.A2A1A1P	10	1.3 gal./sec. (5 l/sec.)	1.75" (44.5 mm) dia.	(6)-M10x.5

Flange Type, Pressurized

New Part No.	Obs. Part No.	New Part (Cap As.)	Obs.Part (Cap As.)	Micron Rtg.	Air Flow	Description	Screws
PAB.1730.10.5	MB1.D1C1B1P	CAP.1730.40.5	CP1.D1C1A1P	10	2 gal./sec. (7.5 l/sec.)	5 psi (.35 bar), 3" (76 mm)dia.	(6)-M10x.5

Metal Breathers

Threaded Type

Specifications:

Materials:
Cap & Plate: Nickel chrome plated steel.
Valve: Nylon/Nitrile.

Gasket: Cork.

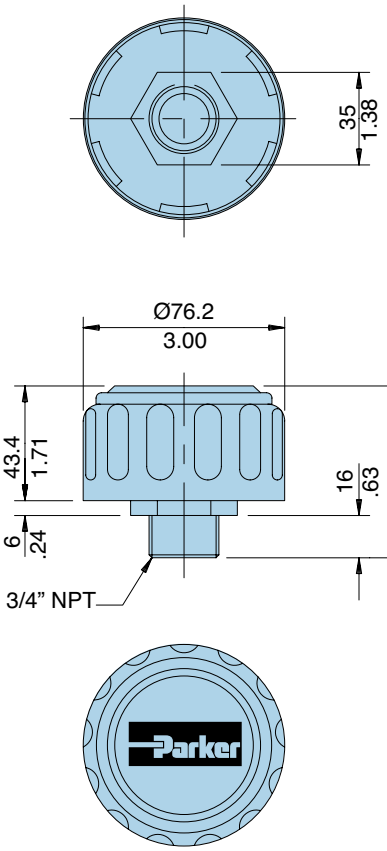
Filtration Element: Expanded polyurethane foam, 10 micron.

Operating Temperatures: -22°F (-30°C) to 195°F (90°C).

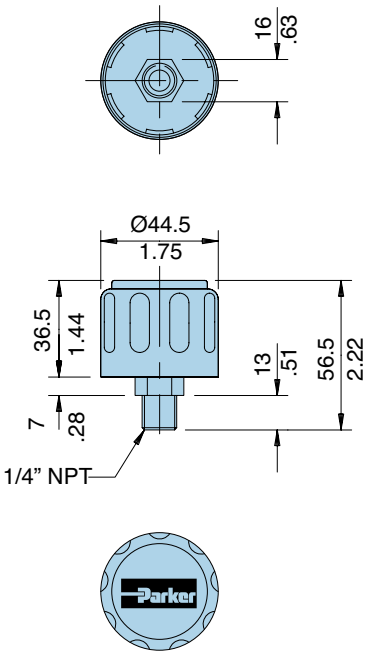
Seals: Nitrile.

Pressurization Options: none, 5 psi (0.35 bar).

¾" Threaded



¼" Threaded



Linear Measurement= mm / in

Threaded, Non-pressurized

New Part Number	Obs. Part Number	Micron Rating	Air Flow	Thread	Description
SAB.1562.10.NPT	MB1.B1A3A1P	10	1.3 gallon/sec. (5 l/sec.)	3/4" NPT	3" (76 mm) diameter
SAB.1563.10.NPT	MB1.C1A3A1P	10	.7 gallon/sec. (2.5 l/sec.)	1/4" NPT	1.75" (44.5 mm) diameter

Threaded, Pressurized

New Part Number	Obs. Part Number	Micron Rating	Air Flow	Thread	Description
SPA.1731.10.5.NPT	MB1.B1C3A1P	10	2 gallon/sec. (7.5 l/sec.)	3/4" NPT	5psi (.35 bar) with 3" (76 mm) diameter

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Breathers

Desiccant Type

Specifications:

Materials:
Casing: Clarified copolymer polypropylene.
Cap: Copolymer polypropylene.
Stand pipe: PVC.

Filtration Element: Polyester, silica gel.

Operating Temperatures: -20°F (-29°C) to 250°F (121°C).

Seals: None.

Maximum Allowable Operating Pressure (MAOP): 5 psi (.34 bar).

Particle Removal Efficiency:
98.7% (beta 75) @ 3 micron
99.5% (beta 200) @ 4 micron
99.9% (beta 1000) @ 5.3 micron

Weight:

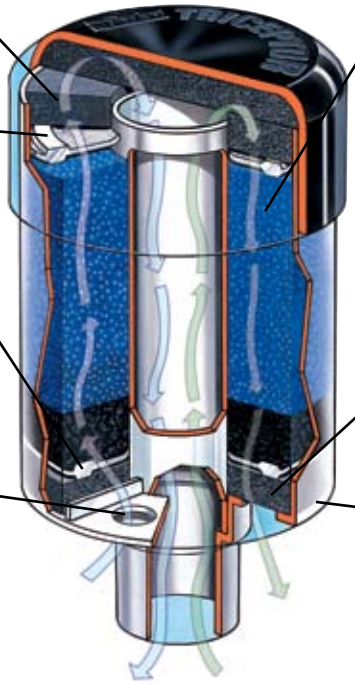
934330T	1.25 lbs. (.57 kg) each.
934331T	1.75 lbs. (.79 kg) each.
934332T	2.25 lbs. (1.02 kg) each.

Features

Foam Pads
Isolates the removal materials from contact with heavy reservoir mist and securely holds materials in place.

Filter Pads
Specially designed filter pads remove solid particulate on upstream side and then regenerate by releasing those particles when air flow reverses direction. Lower pad removes airborne contamination and second pad protects against any migration of desiccant.

Air Intakes
A total of eight air intakes may be exposed to allow air to freely flow in and out of the TriCeptor.



Silica Gel Desiccant
Has the highest removal capability by volume of any adsorption method. Indicates condition by changing color.

Foam pad
Insures filter pad is properly positioned and protects it from external damage.

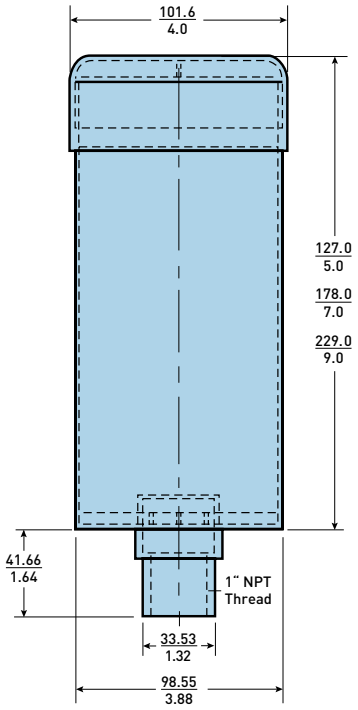
Molded Housing
Durable shock absorbing casing provides reliable service and simple press in mounting.

Installation

TriCeptor breathers are designed for simple installation on most equipment, regardless of mounting connection. Since TriCeptor breathers are disposable, the threaded connection allows for quick and easy maintenance. Several mounting adapters (shown below) are available to provide the desired mounting. The installation/replacement process consists of four easy steps:

1. Remove from protective plastic wrap.
2. Remove 1" blue cap from standpipe.
3. Remove foil label to expose the necessary amount of air intake holes.
4. Twist TriCeptor into mounting adapter.

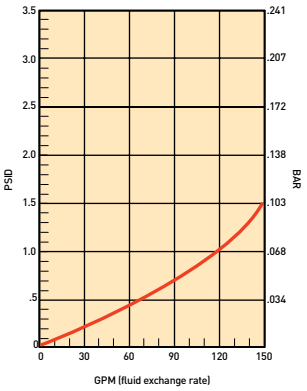
Servicing the TriCeptor breather is also very easy. When the silica gel changes color from blue to a pink, the breather is no longer active and needs to be replaced. Simply remove the unit and discard properly.

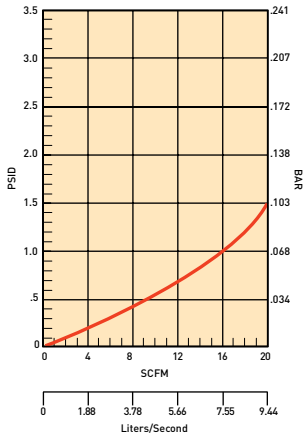


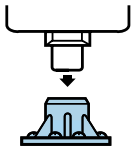
Linear Measurement= $\frac{mm}{in}$

Air Flow Performance

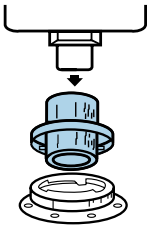
The curves below show the air flow performance of the three TriCeptor breathers. To insure the longest life possible, the initial clean pressure drop should not exceed 1.5 psid (.103 bar).







Field Adapter



Flange Adapter

Model	Part Number	Quantity
5" Breather	934330T	6 pcs.
7" Breather	934331T	6 pcs.
9" Breather	934332T	6 pcs.
Field Adapter	937546	1 pc.
Flange Adapter	937463	1 pc.

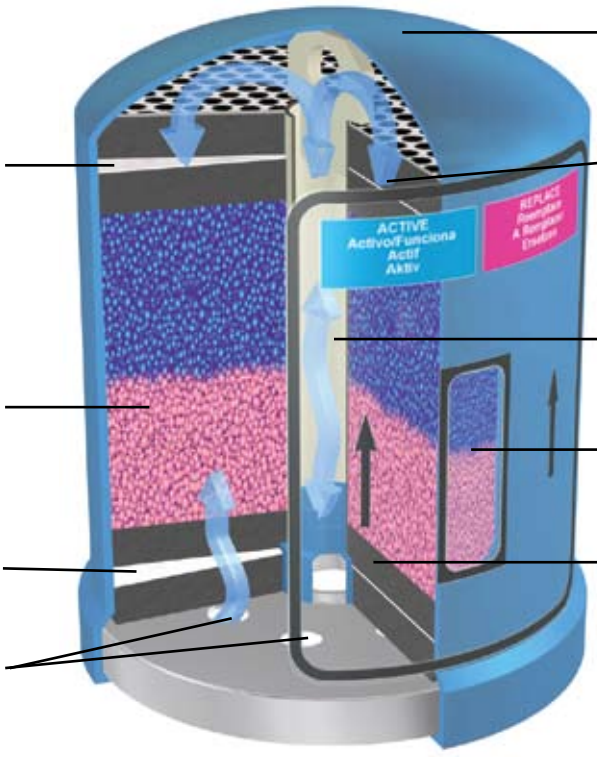
Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Reservoir Accessories
Breathers

Parker's newest air breather is well suited for heavy duty industrial and mobile applications. This new design is equipped to handle high air flow surges as cylinders discharge while providing reliable protection from ingressed water vapor and particulates for clean dry fluids.
This also interchanges Pall's PFD8 series desiccant breather.

Part Number (air breather):	937346
Check vavle breather adaptor:	937347
Dimensions (height x dia):	6.5 in. (165mm) x 5 in. (127mm)
Filtration area:	38 in^2 (0.025 m^2)
Amount of silica gel:	24 oz. (680 g)
Absorption capacity:	9 0z. (266 ml)
Max. flow rate:	20 cfm @ 1 psid
Filtration:	1µm
Operating temp. range:	-20^0 F (-29^0 C) to +250^0 F (+121^0 C)
Hydrophilic agent:	Indicating silica gel
Filter media:	Polyester/Microglass

Optional breather check valve adator extends breather service life.



Rugged aluminum housing.

Second filter element protects against any migration of desiccant dust.

Foam pad stops oil mist and ensures air is evenly disbursed through the filters and desiccant, providing maximum efficiency for "backflushing" and silica gel regeneration.

Stainless steel standpipe.

Color indicating silica gel, absorbs water from incoming air. During exhalation, dry system air is passed back through the silica gel bed partially regenerating the desiccant.

Visual indicator window. Replace breather when desiccant color changes from blue to pink.

High performance filter element provides 1-micron filtration.

Foam pads evenly disperse incoming air over filtration and drying media.

Air inlets are open to meet system requirements, providing "controlled" breathing. This maximizes the lifespan of breather.

*Patented technology

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Breathers

Spin-on Type

Specifications:

Materials: Low carbon steel.

Filtration Element: Cellulose.

Operating Temperatures:
-40°F (-40°C) to 225°F (107°C).

Seals: Nitrile.

Weight: 12AT - 1.2 lbs(.54 kg) each.
50AT - 2.3 lbs. (1.0 kg) each.

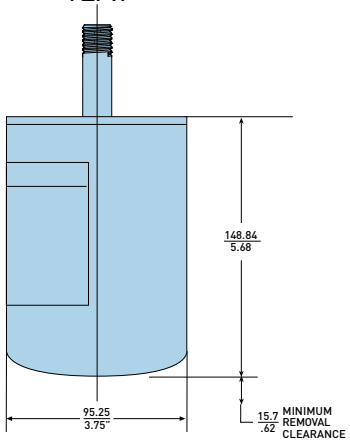
Sizing

Select the proper size cannister for the maximum rate of reservoir draw down or air exchange rate. As a rule of thumb, clean pressure drop should be limited to 0.18 psid (5" H_2O).

Recommended cannister change out is after 500 hours of operation. More frequent replacement may be required when operated in heavily contaminated areas such as grinding operations, primary metal mills, and on mobile equipment. Under such conditions, increase replacement frequency to every 250 hours.

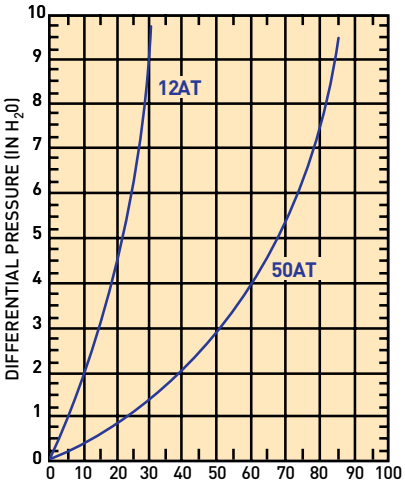
12AT

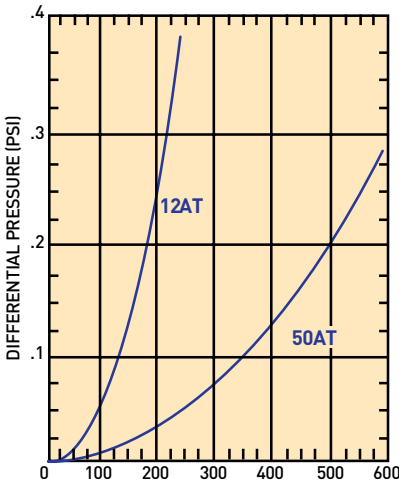
Linear Measurement= $\frac{mm}{in}$

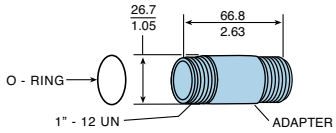


Graphs are for 03C cannisters only. Total pressure drop across cannister, adaptor, and pipe may be found by adding pressure drops below:

+ 1.5% for each inch of 12AT adapter or 3/4" pipe used.
+ 3.0% for each 3/4" elbow used.
+ 1.0% for each inch of 50AT adapter or 1-1/4" pipe used.
+ 2.0% for each 1-1/4" elbow used.

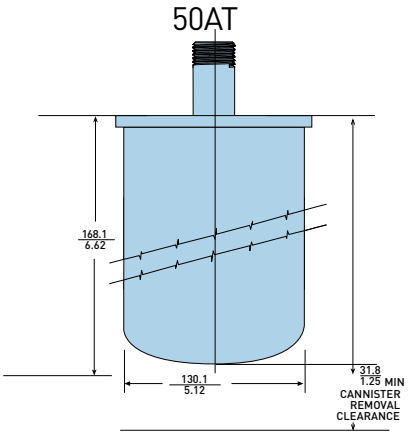


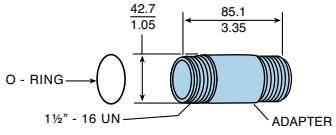




P/N 926876

50AT





P/N 926875

Element	Air Rating*	Diameter	Adaptor Kit
926543	1 micron	3.75"	926876
921999	2 micron	3.75"	926876
925023	5 micron	3.75"	926876
926541	1 micron	5.1"	926875
926169	2 micron	5.1"	926875
926170	5 micron	5.1"	926875

*99% removal efficiency for particles larger than stated size in air.

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Hydraulic Filter Division
Metamora, OH

Diffusers

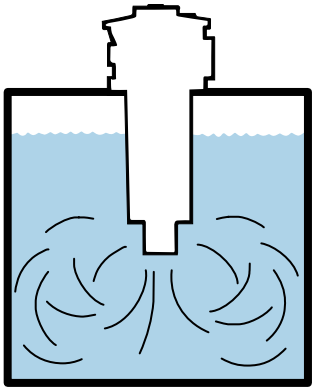
Specifications:

Operating Temperatures: 195°F (90°C) maximum.

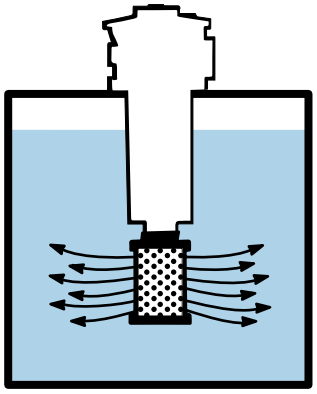
Materials: Body & end cap: Zintec.
Head: glass-filled nylon.

Weight: See chart below.

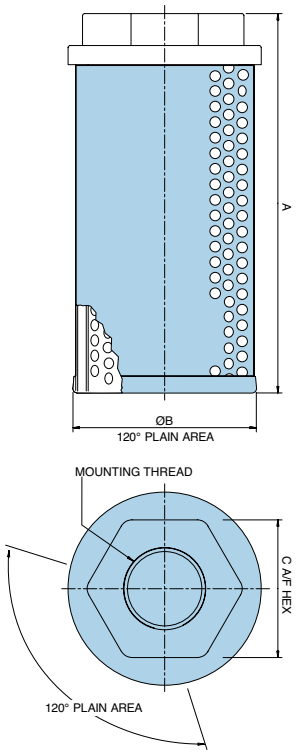
Benefits:
Installing a diffuser in a hydraulic reservoir is a simple change that can make a dramatic difference in system efficiency. With special concentric tubes designed with discharge holes 180° opposed, fluid aeration, foaming and reservoir noise are reduced. Pump life is also extended by reducing cavitation to the pump inlet. The effects of fitting a system with a diffuser are shown below.



Flow without diffuser



Flow with diffuser fitted



New Part Number	Obs. Part Number	Thread (NPT)	Nominal Flow GPM (LPM)	Length "A" Inch (mm)	Diameter "B" Inch (mm)	HEX "C" Inch (mm)	Weight Lbs. (kg)
2250	DF1.A2BP	3/4"	13 (50)	4.7 (120)	2.4 (62)	1.81 (46)	.60 (0.27)
2251	DF1.B4BP	1"	30 (114)	5.0 (127)	3.4 (86)	2.17 (55)	.93 (0.42)
2252	DF1.B6BP	1 1/2"	60 (227)	7.0 (178)	3.4 (86)	2.56 (65)	1.23 (0.56)
2253	DF1.B9BP	2"	120 (454)	9.5 (242)	3.4 (86)	2.95 (75)	1.52 (0.69)

Fluid Level/ Temperature Gauges

Specifications:

Materials:
Lens: Transparent polyamide.
Lens base: Nylon 66.
Shroud: High impact polystyrene (no aluminum content).

Seals: Nitrile.

Maximum Operating Pressure: 14.7 psi (1 bar).

Operating Temperatures: -22°F (-30°C) to 195°F (90°C).

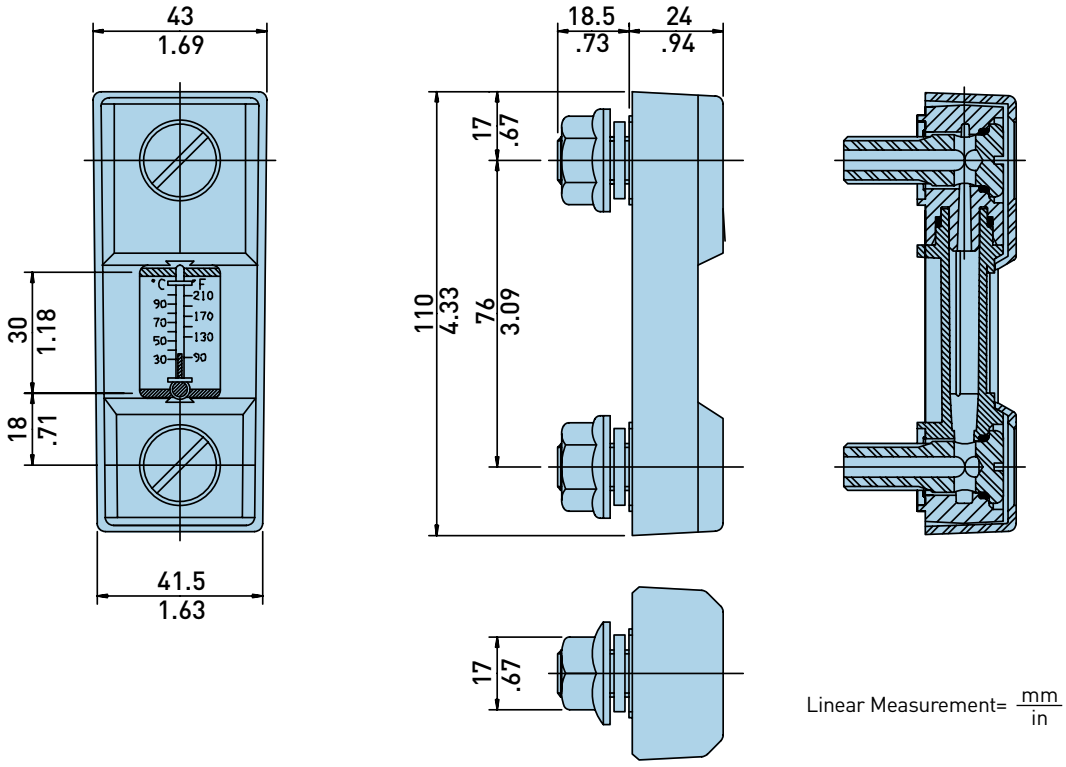
Thermometer Range: 90°F to 210°F (30°C to 90°C).

Indicator: Blue alcohol.

Fluid Compatibility: Mineral and petroleum based fluids.

Mounting: Front or rear fixing, two holes (M10).

Length 3



Linear Measurement= $\frac{mm}{in}$

Part Number	Thread	Length	Description
FL.69121	M10	3	Fluid level and temperature
FL.69221	M10	5	Fluid level and temperature
FL.69321	M10	10	Fluid level and temperature

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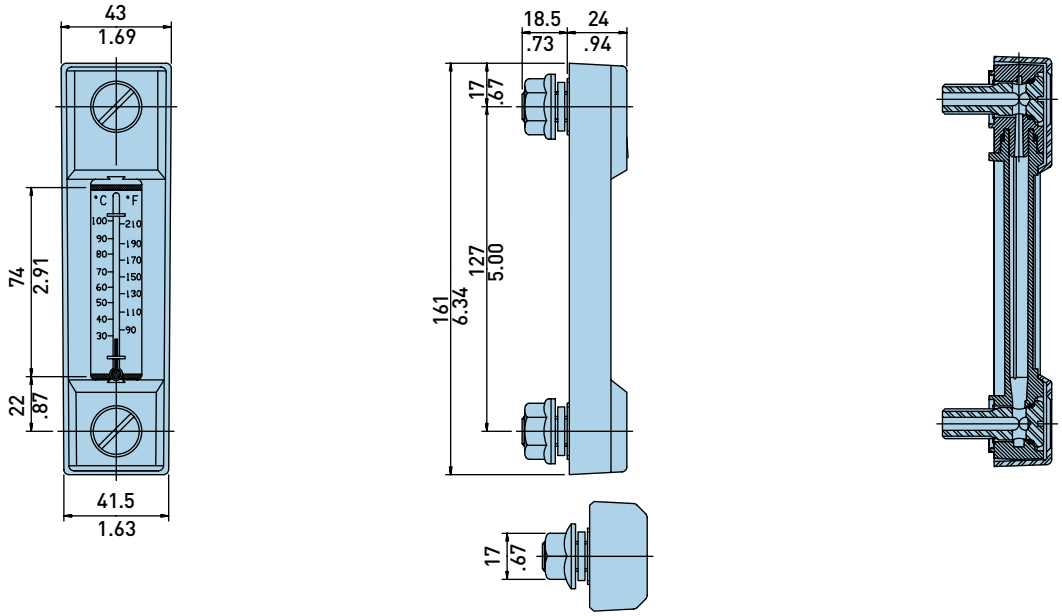
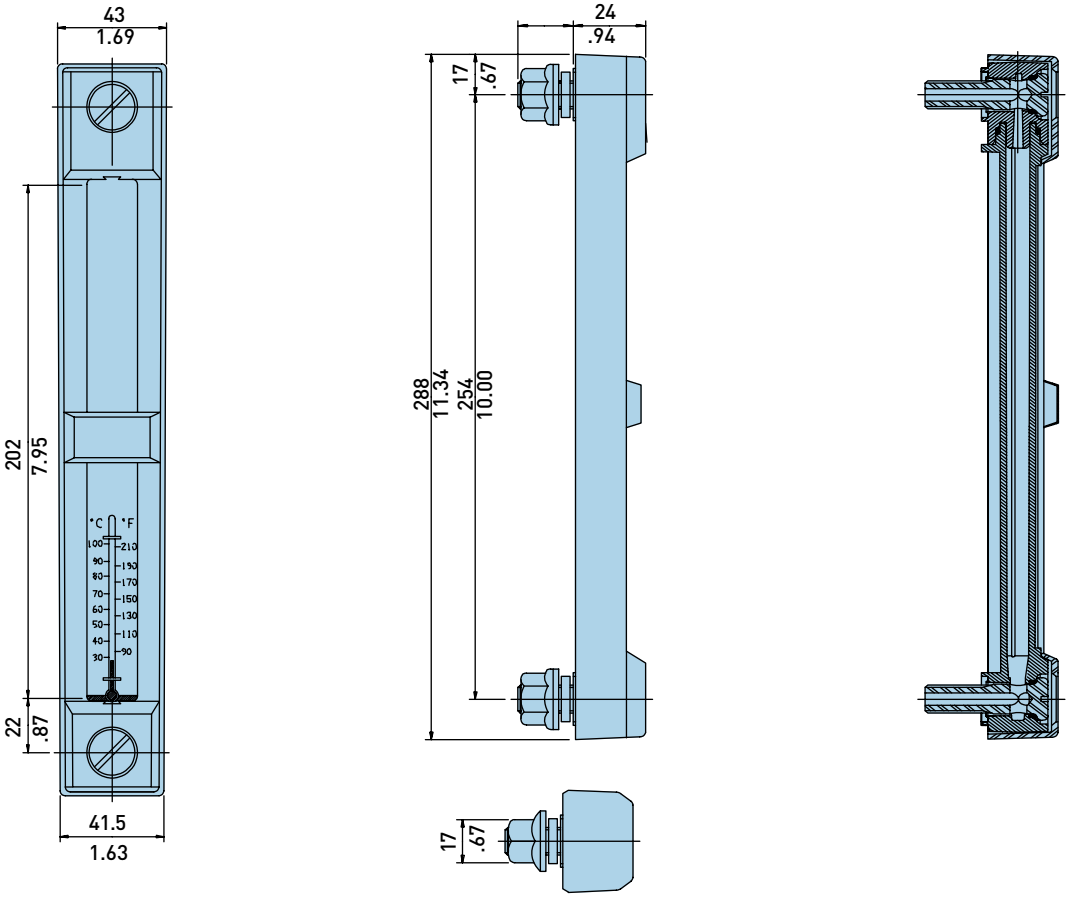
Length 5



Length 10



Linear Measurement= $\frac{mm}{in}$

Suction Strainers

Specifications:

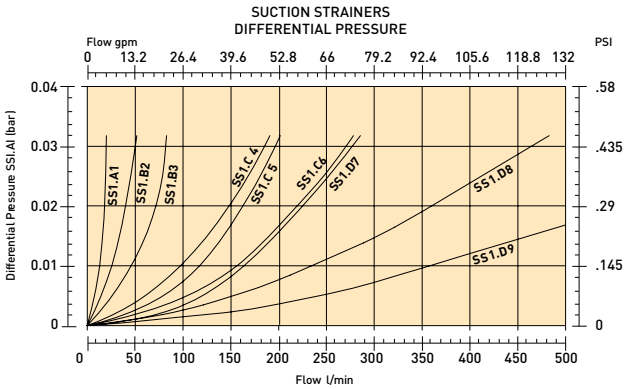
Materials:
Media: Stainless steel.
Tube and endcap: Zintec.
Head: glass filled nylon.

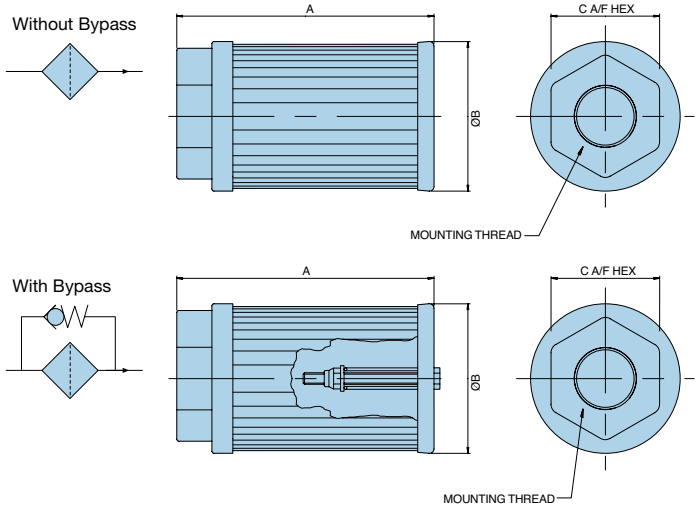
Filtration Element: 100 mesh (149 micron).

Operating Temperatures: 195°F (90°C) maximum.

Bypass: None, 3 psi (0.2 bar).

Weight: See chart below.





New Part No. With Bypass	Obs. Part No. With Bypass	New Part No. W/out Bypass	Obs. Part No. W/out Bypass	Port (NPT)	Nominal Flow GPM (LPM)	Length "A" Inch (mm)	Diameter "B" Inch (mm)	Hex "C" Inch (mm)	Weight Lbs. (kg)
937481	SE.75112111	937480	SE.75112110	1/2"	5 (19)	3.10 (78.7)	2.67 (67.8)	1.42 (36)	0.4 (18)
937483	SE.75222111	937482	SE.75222110	3/4"	8 (30)	3.55 (90.2)	2.67 (67.8)	1.81 (46)	0.5 (.23)
937485	SE.75232211	937484	SE.75232210	1"	10 (38)	5.35 (135.9)	2.67 (67.8)	2.17 (55)	0.7 (.32)
937487	SE.75352211	937486	SE.75352210	1 1/2"	30 (114)	8.01 (203.5)	3.47 (88.1)	2.56 (65)	1.2 (.54)
937489	SE.75352311	937488	SE.75352310	1 1/2"	50 (189)	9.85 (250.2)	4.00 (101.6)	2.56 (65)	1.4 (6.4)
937491	SE.75362411	937490	SE.75362410	2"	50 (189)	9.85 (250.2)	4.00 (101.6)	2.95 (75)	1.8 (.82)
937495	SE.75472311	937494	SE.75472310	2 1/2"	75 (284)	10.1 (256.6)	5.17 (131.3)	3.54 (90)	2.3 (1.04)
937497	—	937496	—	3"	100 (378)	11.8 (299.7)	5.17 (131.3)	3.94 (100)	3.0 (1.36)

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Magnetic Suction Strainers
Now offer dual protection, without cavitation!

Parker's new magnetic suction strainers offer dual protection to the pump inlet without risk of cavitation.

Powerful ceramic magnets located parallel to the pleated mesh attract and protect against damaging ferrous particles of all sizes.

The pleated stainless steel screen provides additional filtration protection for larger particles that would result in catastrophic failure.

The generous open area of the stainless steel pleated mesh screen elimantes the possibility of pump cavitation.

Parkers magnetic suction strainers are available in sizes ranging from one to three inches.

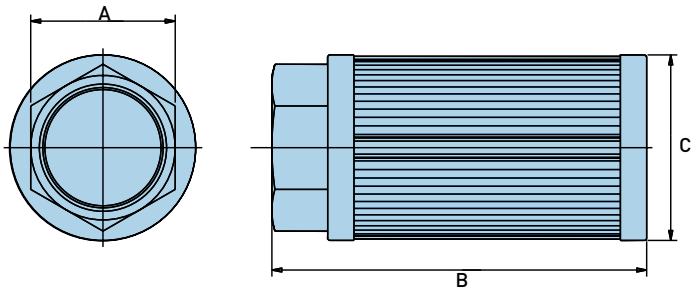
Ordering Information

The information below shows the part numbers, specifications and dimensions of available suction strainers, to help you meet the needs of your specific application.

NOTE: All sizes are standard with 30 mesh screen (560 micron).

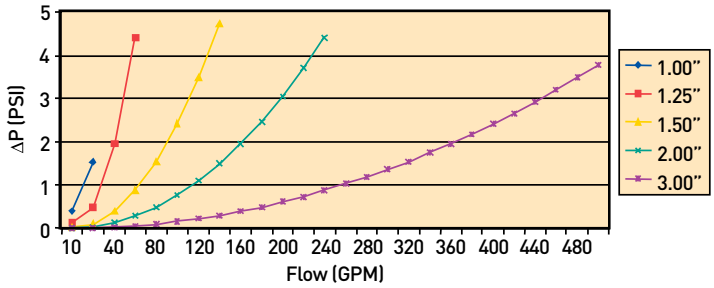
Part Number	NPT Connection	Flow GPM (LPM)	Dimensions			Approx. Shipping Weight lbs. (kg)
			A inches (mm)	B inches (mm)	C inches (mm)	
936547	1.00"	15 (55)	1.88 (47.75)	5.19 (131.83)	3.09 (78.49)	1.59 (0.72)
936548	1.25"	25 (95)	2.38 (60.45)	7.39 (187.71)	3.53 (89.66)	3.16 (1.43)
936549	1.50"	35 (135)	2.38 (60.45)	7.39 (187.71)	3.53 (89.66)	2.88 (1.31)
936550	2.00"	50 (190)	2.75 (69.85)	7.39 (187.71)	3.53 (89.66)	2.22 (1.01)
936551	3.00"	100 (380)	*	9.35 (237.49)	4.47 (113.54)	3.91 (1.77)

*Part number 936551 features a 3" half coupling, not a hex nut.



The rugged steel construction, combined with the generous filtration area, ensures reliable performance for suction applications

Flow Vs. Pressure Loss



Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

ParGel™

Water Removal Filter Elements

Water Removal Filter Elements

Par◇Gel™

Par-Gel filter elements are an effective tool in controlling water related problems in hydraulic power and lubrication systems.

There is more to proper fluid maintenance than just removing particulate matter. You need to remove water as well. Parker has developed Par-Gel water removal elements to be used in combination with particulate filters to provide significant benefits.

- Less component wear, consequently less component generated contaminants.
- Significant reduction of costly downtime and replacement of failed components.
- Increased efficiency of the system, thereby improving machine productivity.
- Less frequent replacement and disposal of contaminated fluid.
- Reduced chance of catastrophic failure.

Water as a contaminant. Whether you use a mineral-base or synthetic fluid, each will have a water saturation point. Above this point, the fluid cannot dissolve or hold any more water. This excessive water is referred to as 'free' or emulsified water. As little as .03% (300 ppm) by volume can saturate a hydraulic fluid.

Many mineral-base and synthetic fluids, unless specifically filtered or treated in some way, will contain levels of water above their saturation point.

Water is everywhere!

Storage and handling. Fluids are constantly exposed to water and water vapor while being handled and stored. For instance, outdoor storage of tanks and drums is common. Water settles on top of tanks and drums and infiltrates the container, or is introduced when the container is opened to add or remove fluid.

In-service. Water can get by worn cylinder and actuator seals, or through reservoir openings. Water can come in contact with these entry points through water based cutting fluids or when water and/or steam are used for cleaning.

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Typical results of wear due to presence of particulate and water contamination.

Condensation is also a prime water source. As fluid cools in a reservoir, temperature drop condenses water vapor on inside surfaces, which in turn causes rust. Rust scale in the reservoir eventually becomes particulate contamination in the system.

Microbial growth as a contaminant.
Once water enters a system, growth of microorganisms begins. Since water is one of the end products of the breakdown of hydrocarbon fluid, once started, the process is somewhat self-sustaining.

Slime is evidence of microbial growth, as is the apparent increase in viscosity of the fluid, obnoxious odor and discolored fluid. The results are: short fluid life, degraded surface finish and rapid corrosion.

Water generated damage and operating problems

- Corrosion
- Accelerated abrasive wear
- Bearing fatigue
- Additive breakdown
- Increased acid level
- Viscosity variance
- Electrical conductivity

Forms of water in fluid

- Dissolved water– below saturation point.
- Free water–emulsified or in droplets*.

Water in the system creates oxides, slimes and resins. Corrosion is an obvious by-product and creates further contaminants in the system.

The effect is compounded, as you now have both particulate contaminant and water working together.

The particulate contamination can be as simple as rust flaking from reservoir walls. Anti-wear additives break down in the presence of water and form acids. The combination of water, heat and dissimilar metals encourages galvanic action. Pitted and corroded metal surfaces and finishes result.

Further complications occur as temperature drops and the fluid has less ability to hold water. As the freeze point is reached, ice crystals form, adversely affecting total system function. Operating functions may become slowed or erratic.

Electrical conductivity becomes a problem when water contamination weakens insulating properties of fluid (decreases dielectric kV strength).

Testing your fluid for water.
A simple 'crackle test' will tell you if there is water in your fluid. Simply take a metal dish or spoon with a small amount of fluid. Apply a flame under the container with a match. If bubbles rise and 'crackle' from the point of applied heat, you have free water.

ParTest™ fluid analysis. For complete analysis, Parker offers Par-Test fluid analysis. Your Parker representative can supply you with a fluid container, mailing carton and appropriate forms to identify your fluid and its use. An independent lab performs complete spectrometric analysis, particle counts, viscosity and water content.

Results are sent directly to the requester.

* Excessive free water must be removed from the system before filtering is attempted. In systems with gross amounts of water (1% to 2% by volume), settling or vacuum dehydration should be considered before using Par-Gel filter elements.

Water Removal Filter Elements

Par◇Gel™

Removing water. Using a Par-Gel water removal element is an effective way of removing free water contamination from your hydraulic system. It is highly effective at removing free water from mineral-base and synthetic fluids.

The Par-Gel filter media is a highly absorbent copolymer laminate with an affinity for water. However, hydraulic or lubrication fluid passes freely through it. The water is bonded to the filter media and forever removed from the system. It cannot even be squeezed out.

Photo above shows 'dry' Par-Gel filter media and the same media swollen with absorbed water.

Parker technology and expertise at your disposal.
Choosing the correct filters can save money and minimize problems caused by particulate and water contaminants in hydraulic and lubricating fluids.

Parker provides hard data and advice on choosing from a wide range of filter configurations, flow patterns and flow pressure capabilities.

How many filter elements will I need? Suppose you would like to remove water from contaminated oil stored in a 200 gallon tank. The tank is found to have 1000 ppm of water (very contaminated). The circulation rate will be 10 gpm for the 200 SUS fluid.

Example: How many single length Moduflow™ elements will be needed to reduce the water to normal saturation levels. To find the answer, use the conversion charts and capacity curves for the Moduflow element.

1. 1000ppm start - 300ppm finish = 700ppm removed
2. 700ppm water x .0001 = .07%
   .07% x 200 gallons = .14 gallons water total
3. Use the capacity curve for Moduflow element P/N 927584. Capacity = 80cc at 200 SUS & 10 gpm to pressure drop of 25 psid. (See graph)
   $80cc \times 0.000264 \frac{gal}{cc} = 0.02$ gallons/element
4. $\frac{0.14 \text{ gallons total water}}{0.02 \text{ gallons/element}} = 7$ elements*

*The replacement value of this fluid may range from $600.00 to $1400.00 ($3 to $7 gallon). At an estimated element cost of $50.00 each, the savings realized would be from $250.00 to $1050.00!

Using Par-Gel filter elements saves money in fluid and replacement component costs. Also, the frequency of fluid disposal and the problems associated with it are greatly reduced.

Filter capacity. There are no accepted and approved water capacity testing or reporting standards. Consequently, there is virtually no way to compare one element capacity with another. It is also difficult to simulate a specific application in testing . . . making it hard to predict field performance.

Why the discrepancies? Water removal media capacity is the result of the interplay among four variables: flow rate, viscosity, bypass setting and the media itself.

Here's an example: two identical elements, testing the same fluid, varying only the flow rate.

	Element A	Element A'
Flow Rate:	**3 gpm**	**10 gpm**
Viscosity:	**75 SUS**	**75 SUS**
Test Capacity:	**425 ml**	**360 ml**

This is a 15% reduction in capacity, due to changing only the flow rate! Now, look at what happens when the test flow rate is the same and the viscosity is changed.

	Element B	Element B'
Flow Rate:	**20 gpm**	**20 gpm**
Viscosity:	**200 SUS**	**75 SUS**
Test Capacity:	**250 ml**	**550 ml**

Twice the capacity can be achieved just by manipulating the test viscosity!

Naturally, having a lower bypass valve setting limits the capacity. Since the life of the element is measured in pressure drop, using higher bypass valve settings will increase apparent life (all other conditions equal).

We recommend 25 psid bypass valves to get adequate life from Par-Gel filter elements.

Capacity also depends on the media itself. That's why Parker spent two years researching the media used in Par-Gel filter elements. We tested all known media, and worked closely with our suppliers to achieve maximum water absorbency.

How we report: Our goal is to give our customers usable data. Why show test results at a lower viscosity (65 SUS for example), if the typical application uses 200 SUS fluid? So, we report at 200 SUS to give typical field application capacity, and 75 SUS for competitive comparisons. But keep in mind when comparing, you still have to consider flowrate.

What it all means: You deserve to know how an element will work for you in your applications. So, we test and report our data in such a way that it helps you predict element performance and life.

Be wary of claims that say . . . "this element holds one quart (or one gallon) of water." What was the test flow rate? fluid viscosity? bypass valve setting? Was it run as a 'single pass' or 'multipass' test?

Rely on Parker to give you the facts and data you need. Our goal is to better protect your systems and components . . . and we start up-front by telling you what you need to know.Is there any other way to do business?

Add it all up. Broad selection, competitive prices, off-the-shelf availability, on-time delivery, high-efficiency filter media, reduced system contaminant and longer component life. When you add it all up, we think you'll agree...

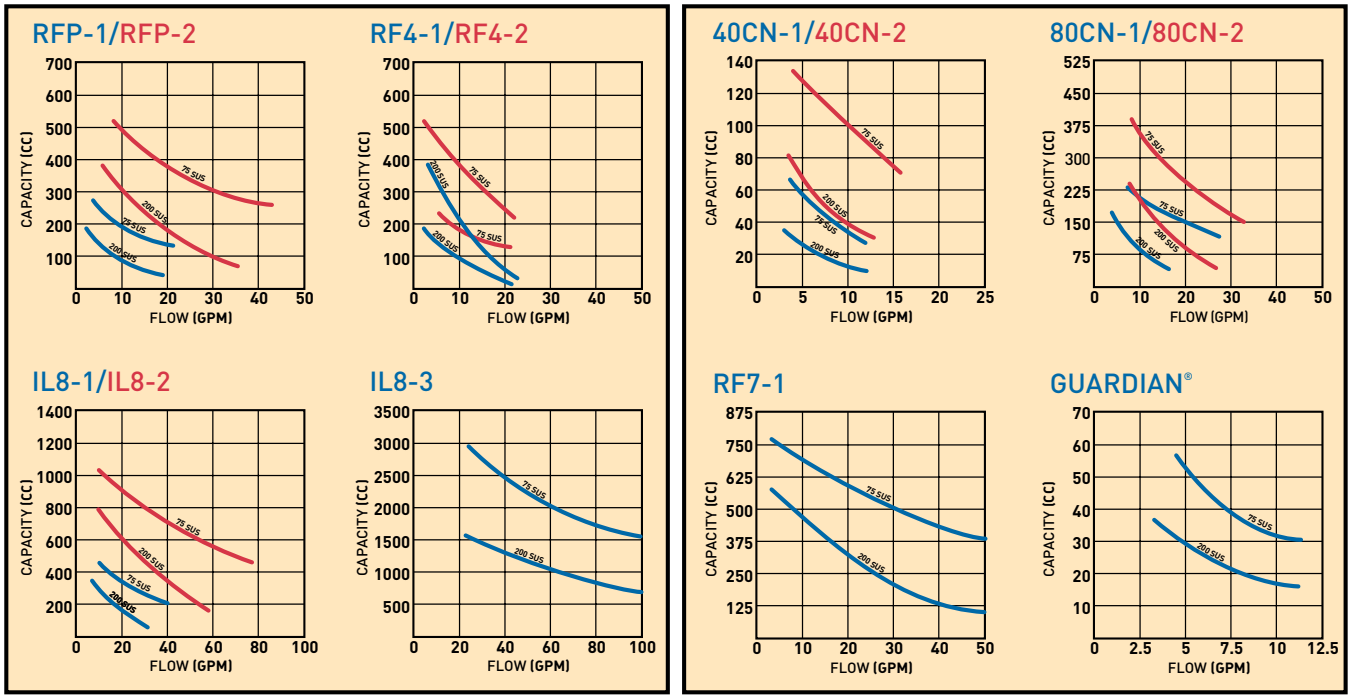
Conversion Factors

If you Have:	Multiply By:	To Get:
mg/l	0.00009	%
ppm	0.0001	%
ml	1.0	cc
cc	0.0338	fluid ounces
cc	0.00106	quarts
cc	0.000264	gallons

Typical Saturation Points

Fluid	PPM	%
Hydraulic	300	0.03%
Lubrication	400	0.04%
Transformer	50	0.005%

MULTI-PASS WATER CAPACITY



Water Removal Filter Elements

Par◇Gel™

Parker Par-Gel water removal filter elements are available in these standard Parker filter housings:

Filter Model Series	Length	Element Part Number
RFP-1	Single	927584
RFP-2	Double	927585
RF4-1	Single	930156
RF4-2	Double	928557
RF7-1	Single	933853
RF7-2	Double	932506
IL8-1	Single	929103
IL8-2	Double	929109
IL8-3	Triple	932006
40CN-1	Single	931412
40CN-2	Double	931414
80CN-1	Single	931416
80CN-2	Double	931418
Guardian®	Single	932019

Ideal applications for Par-Gel filter elements:

Guardian® Portable Filtration System

Filter Cart

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

ParFit™ Elements

Competitive Interchanges

An extensive range of competitively priced Parker quality replacement filter elements, Par-Fit interchange elements allow the users to acquire all their replacement elements from one quality source regardless of the original equipment manufacturer.

Par-Fit competitive interchange elements must conform to all the same rigorous tests as the standard Parker replacement elements. The elements meet or exceed all specifications for the following tests:

IS02941	Element Collapse/Burst Resistance
IS02942	Fabrication Integrity
IS02943	Material Compatibility
IS03724	Flow Fatigue Resistance
IS04572/ISO16889	Multipass Test

In addition to price and quality, the range of interchange elements available is key to a successful program for the user. Parker has worked diligently over the years to develop a range of elements that will meet this challenge. You can view our complete list of Par-Fit interchange elements in our separate Par-Fit brochure, 2300-PFS, or visit us on the web at the address below.

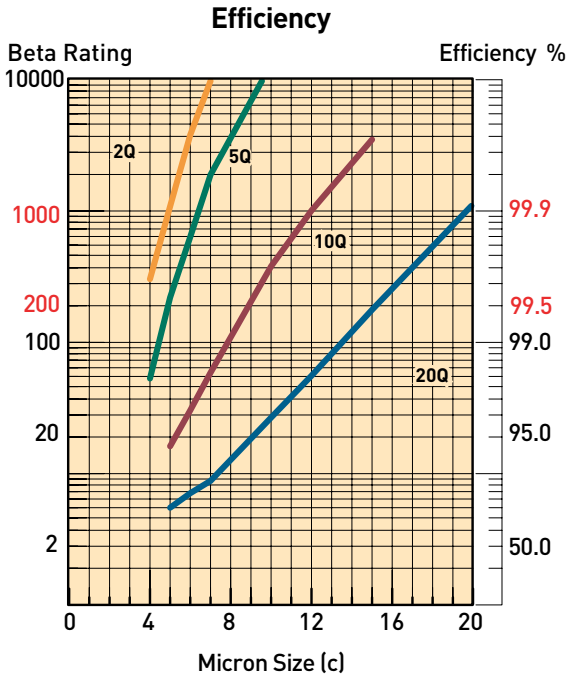
Notes

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Interpreting Data

Element Efficiency

For each configuration Parker reports on a log micron chart the actual test results for each Microglass III media grade available. The information that can be obtained from reporting in this manner far exceeds previous methods. To read the charts simply follow a few quick steps as shown below.



To determine efficiency/beta rating at a Particular micron size:

1. Choose micron size from horizontal axis.
2. Follow line upward until it intersects the media grade of interest.
3. For the beta rating move left perpendicular until you intersect the vertical beta rating axis and record number.
4. For the efficiency rating just follow line across to the right until it intersects the efficiency axis and record number.

To determine which media can provide a particular beta rating:

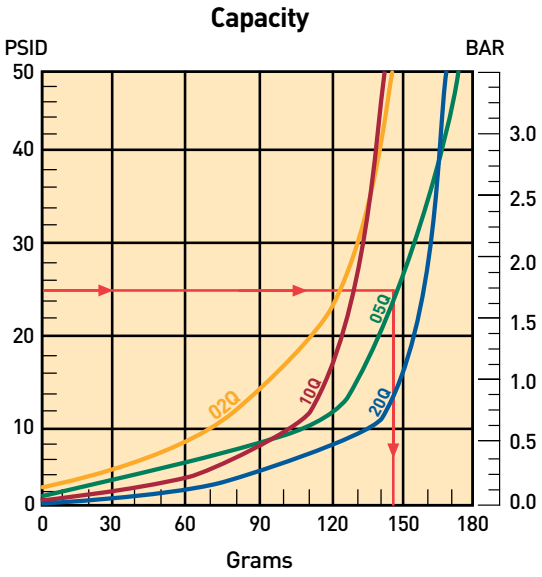
5. Choose beta rating desired on left vertical axis
6. Follow line horizontally across until it intersects media grade.
7. Move downward perpendicular until you intersect the horizontal "Micron Size" axis and record value. If micron value is too low repeat steps until a desired value is achieved.

Element Capacity

Typically element capacities have been plotted on a differential vs grams chart to allow for best comparisons between different indicator/bypass settings and also other manufacturers. Although the construction of a given element remains constant, the actual capacity obtained in a application depends on several variables

- Viscosity
- Flow rate
- Contaminant Type
- Changeout pressure

Since it is not possible to test every possible combination, Parker tests per ISO4572 and ISO16889 which specifies fluid type, contaminant type and flow rate. Therefore the only variable that can be accounted for by the specifier would be changeout pressure. To accomplish this simply determine what indicator setting will be used to signal service is required. If no indicator will be used then use the bypass value for the specified filter.



To determine element capacity

1. Starting along the vertical differential pressure axis choose changeout setting.
2. Move horizontally across until line intersects the media grade desired.
3. Move perpendicular downward until line intersects horizontal axis "Grams" and record value

Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Interpreting Data

Flow vs Pressure Loss

All performance curves are reported at a standard viscosity of 150 SUS (30 cSt) with element pressure curves independent of the housing. The purpose of reporting individually is to allow for adjustment to other operating viscosities. To adjust for a operating viscosity other then 150 SUS (30 cSt) please use the correction formula below.

Viscosity Correction Formula

$$\text{PSID Element} = \text{PSID from catalog} \times \frac{\text{New Viscosity}}{150} \times \frac{\text{New Specific Gravity}}{.90}$$

$$\text{PSID Housing} = \text{PSID from catalog} \times \frac{\text{New Specific Gravity}}{.90}$$

$$\text{PSID Assembly} = \text{PSID Element} + \text{PSID Housing}$$

High Collapse Elements

In most cases, filter assemblies are equipped with an internal bypass valve to limit the differential pressure across the element. In some critical applications it may be necessary to equip the filter with a "no bypass" valve which forces all fluid flow to pass through the element. When a filter is equipped with a "no bypass" valve, the element must be able to withstand much higher differential pressures in the event it is not serviced when indicated. Parker high collapse elements are able to withstand 2000 psid ("H" option) or 3000 psid ("X" option) due to their special construction. The high collapse elements are rated for the same efficiencies as the standard elements but also have a higher clean pressure loss.

The increase in pressure loss from standard collapse "Q" elements to high collapse "Q" elements varies from media grade and series. To insure adequate element life, a correction factor should be applied to the standard pressure loss curves. Below are the factors that should be applied to the standard element performance curves shown in this catalog. The pressure loss of "H" option elements (2000 psid collapse) may increase as much as 40% over the standard, and the "X" option 3000 psid collapse) as much as 90%.

High Collapse Correction Factors

"QH" Elements (2000 psid) = 1.4 times reported loss

"QX" Elements (3000 psid) = 1.9 times reported loss

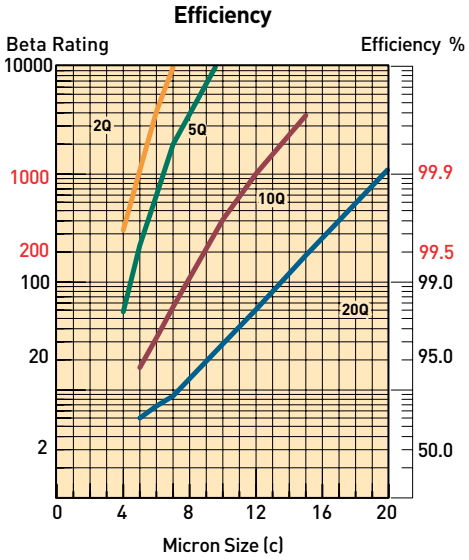
Parker Hannifin Corporation
Hydraulic Filter Division
Metamora, OH

Filter Media Types

Microglass III

The latest of our media lines, these elements have the highest capacity and efficiency available. The Microglass III is referenced by a "Q" after the micron size (i.e. 5Q). Complete information is available for each element size in the catalog. The efficiency is plotted on a beta value versus micron size chart to enable one to find the rating at a specific micron size. The capacity is plotted on a pressure differential versus grams capacity chart. This allows one to find the capacity of the element at the filter's specific bypass or indicator setting.

Flow data is performed at 150 SUS (32cSt) and plotted separately for the element and housing . Pressure loss for different viscosities can be calculated by using the formula on the opposite page.



Cellulose

An economical type of media (denoted by a "C") that provides nominal efficiency and capacity. The pore structure of paper media is not efficient for fine filtration or high capacity applications. The data provided for each individual element is limited to flow versus pressure loss. To the left is an efficiency chart which plots what would be considered typical for the various grades of cellulose media.

As shown in the chart, cellulose elements are not nearly as efficient as Microglass III elements. They are rated for nominal filtration, typically 50% efficient at rated size. Due to the low particle capture efficiency of 20C cellulose elements, it is not practical to plot on the chart. The 20C elements could be considered a $Beta_{20} = 2$ (50% efficient at 20 micron). The same limitations exist with the stainless steel mesh elements.

Stainless Steel Woven Wire

Commonly referred to as "wire mesh" this filtration medium is typically used in suction filters due to the low flow restriction. Wire mesh elements are unique in that they are designed to be cleaned and reused. These elements are rated for efficiency based on the pore size diameter of the mesh and are denoted by a "W" after the micron rating. For example a 74W element would have a nominal rating of 74 micron based on the diameter of the mesh pores. This should not be confused with "mesh" ratings which are the number of wire strands per inch. Mesh ratings can be correlated to micron ratings, see "Micrometer Conversions" on page 224.

General Comparison Of Filter Media

Media Material	Capture Efficiency	Dirt Holding Capacity	Differential Pressure	Life In a System	Initial Cost
FIberglasss	High	High	Moderate	High	Moderate
Cellulose	Moderate	Moderate	High	Moderate	Low
Wire Mesh	Low	Low	Low	Moderate	High

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Appendix

Definitions

Absolute Rating:
The diameter of the largest hard spherical particle that will pass through a filter under specified test conditions. This is an indication of the largest opening in the filter element. Hydraulic Filter Division defines absolute as 99.5% removal (beta 200) at a given particle size.

Absorb/Absorption:
The process of a fluid being taken into the pores of a solid.

Adsorb/Adsorption:
To collect and hold a fluid on the surface of a solid.

Beta Ratio:
The ratio of the number of particles of a given size and larger of a filter to the number of particles of the same size and larger downstream.

Beta Ratios/Efficiencies

Beta Ratio (at a given particle size)	Capture Efficiency (at same particle size)
1.01	1.0%
1.1	9.0%
1.5	33.3%
2.0	50.0%
5.0	80.0%
10.0	90.0%
20.0	95.0%
75.0	98.7%
100	99.0%
200	99.5%
1000	99.9%

Bubble Point:
Pressure drop in inches of water required to expel the first steady (continuous) stream of bubbles from a horizontal disc of wetted filter medium or a filter cartridge immersed in a liquid (usually alcohol). A bubble point test is used to test the integrity of cartridge construction to compare relative porosities of a filter media or monitor product consistency as a quality control method.

Bypass:
Fluid flowing through a passage other than the filter medium and/or leakage around filter media seals.

Burst:
An outward structural failure of the filter element caused by excessive differential pressure.

Cleanliness Codes:
A representation of a fluids contamination level based on a series of index numbers that refer to a table of concentration values.

Cleanliness Level Correlation Table

ISO Code	Particles/Millilitre >2 Micrometers	>5 Micrometers	>15 Micrometers	NAS 1638 (1964)	Disavowed SAE Level (1963)
23/21/18	80,000	20,000	2,500	12	
22/20/18	40,000	10,000	2,500		
22/20/17	40,000	10,000	1,300	11	
22/20/16	40,000	10,000	640		
21/19/16	20,000	5,000	640	10	
20/18/15	10,000	2,500	320	9	6
19/17/14	5,000	1,300	160	8	5
18/16/13	2,500	640	80	7	4
17/15/12	1,300	320	40	6	3
16/14/12	640	160	40		
16/14/11	640	160	20	5	2
15/13/10	320	80	10	4	1
14/12/9	160	40	5	3	0
13/11/8	80	20	2.5	2	
12/10/8	40	10	2.5		
12/10/7	40	10	1.3	1	
12/10/6	40	10	.64		

Collapse Pressure:
An inward structural failure of the filter element caused by excessive differential pressure.

Contaminant:
Undesirable insoluble solid or gelatinous particles present in fluid.

Crest:
The outer fold of a pleat.

Differential Pressure/Pressure Drop:
Difference in pressure between two points in a system. In filters, this is typically measured between the inlet and outlet of the filter housing.

Dissolved Water:
Water capable of being held by the fluid in solution. The amount held must be below the saturation point.

Duplex Filter:
An assembly of two filters with valving for the selection of either element.

Efficiency:
The ability of the filter element to remove particles from the filter stream. Efficiency = (1-1/beta)100.

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Definitions

Effluent:
The fluid that has passed through the filter.

Filter Medium:
The permeable material used for a filter that separates particles from a fluid passing through it.

Flow Fatigue:
The ability of a filter element to withstand structural failure of the filter medium due to flexing of the pleats caused by cyclic differential pressure.

Free Water:
Water droplets or globules in a system that tend to accumulate at the bottom of a system's fluid because it exceeds the solubility of the fluid.

Influent:
Fluid entering the inlet of a filter.

In-Line Filter:
A filter in which the inlet, outlet and element are in a straight axis.

L-Type Filter:
A filter in which the inlet and outlet port axis are at right angles, and the filter element axis is parallel to either port axis.

Laminar Flow:
Flow rate at which liquid is in a nonturbulent state (10ft/sec) and should not exceeded to maintain filtration integrity and consistency.

Media Migration:
Contamination of the effluent by fibers or other material of which the filter is constructed.

Micron:
A unit of length. Correct term is micrometer (µm), which is .000039 inch. Human eye can see a 40 micrometer particle.

Neutralization Number:
A measure of the acidity or basicity of a fluid, this includes organic an inorganic acids or bases, or combination thereof.

Nominal Rating:
Micron size removed at a given efficiency under a manufacturer's defined test condition. An arbitrary term assigned by manufacturers which varies and has therefore depreciated in value.

Pinched Pleat:
A pleat closed off by excessive differential pressure or crowding, thus reducing the effective area of the filter element.

Pleats:
a series of folds in the filter medium usually of uniform height and spacing designed to maximize effective area.

Pressure Line Filter:
A filter located in a line conducting working fluid to a working device or devices.

Return Line Filter:
A filter located in the line which is conducting working fluid form working devices to a reservoir.

Root:
The inside fold of a pleat.

Suction Filter:
A filter located in the intake line of a pump where the fluid is below atmospheric pressure.

T-Type Filter:
A filter in which the inlet and outlet port axes are in a straight line, and the filter element axis is perpendicular to this line.

Varnish:
Materials generated by the hydraulic fluid due to oxidation, thermal instability, or other reactions. These materials are insoluble in the hydraulic fluid and are generally found as brownish deposits in the work surfaces.

Y-Type Filter:
A filter in which the inlet and outlet port axes are in a straight line, and the filter element is at an acute angle to this line.

Appendix

Micrometer Conversions

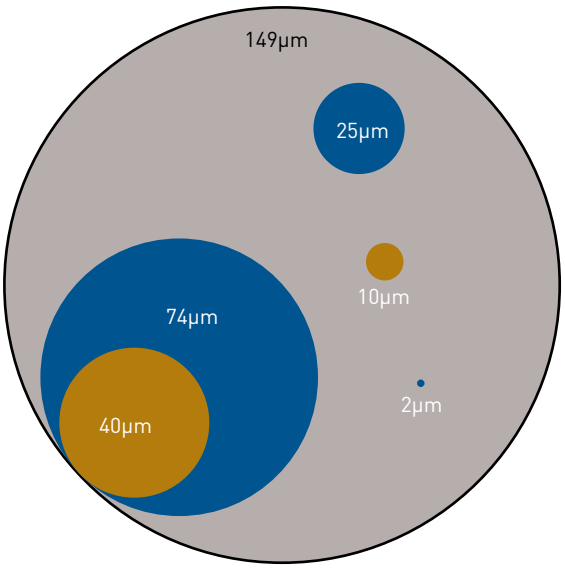
US and ASTM Std Sieve Number	Actual Opening (in)	(µm)
10	0.0787	2000
12	0.0661	1680
14	0.0555	1410
16	0.0469	1190
18	0.0394	1000
20	0.0331	840
25	0.0280	710
30	0.0232	590
35	0.0197	500
40	0.0165	420
45	0.0138	350
50	0.0117	297
60	0.0098	250
70	0.0083	210
80	0.0070	177
100	0.0059	149
120	0.0049	125
140	0.0041	105
170	0.0035	88
200	0.0029	74
230	0.0024	62
270	0.0021	53
325	0.0017	44
400	0.00142	36
550	0.00099	25
625	0.00079	20
1,250	0.000394	10
1,750	0.000315	8
2,500	0.00097	5
5,000	0.000099	2.5
12,000	0.0000394	1

Micrometer Comparisons

Substance	(µm)
Table Salt	100
Human Hair (average dia)	50-70
White Blood Cell	25
Talcum Powder	10
Cocoa	8-10
Red Blood Cell	8
Bacteria (cocci)	2

Note: Lower limit of visibility (naked eye)—40µm

Relative Size of Particles
Magnification 500x



Linear Equivalents

1in	=	25.4 mm	=	25,400 µm
1mm	=	0.0394 in	=	1,000 µm
1µm	=	1/25,400 in	=	0.001 mm
1µm	=	3.94×10^{-5} in	=	0.000039 in

Formulas

Velocity (ft per sec) = $\frac{0.4085 \times gpm}{d^2 \text{ (ID in)}}$

Conversion Rates

1 cu ft	=	7.48 gal	
1 gal	=	231 cu in	
2 cu ft water	=	62.42 lb	
1 gal water	=	8.34 lb	
1 US gal	=	0.833 lmp gal	
1 lb/in^2	=	2.31 ft of water	= 2.036 in Hg
°F	=	9/5°C+32	

Metric Conversion Formulas

mm	=	inches x 25.4
m	=	feet x 0.3048
cm^3	=	cu in x 16.39
m^3	=	cu ft x 0.028
kg	=	pounds x 0.454
kPa	=	psi x 6.895
lpm	=	gpm x 3.785
°C	=	5/9 (°F-32)

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Measurement Conversion Tables

To Convert	Multiply by	To Obtain
A		
atmospheres	33.9	ft of water (at 4×C)
atmospheres	29.92	in mercury (at 0×C)
B		
barrels (US liquid)	31.5	gallons
barrels (oil)	42	gallons (oil)
bars	0.9869	atmospheres
bars	14.5	pounds/sq in
C		
centimeters	0.03281	feet
centimeters	0.3937	inches
centimeters	0.00001	kilometers
centimeters	0.01	meters
centimeters	0.01094	yards
centimeters	10,000	microns
cubic centimeters	0.00003531	cubic feet
cubic centimeters	0.06102	cubic inches
cubic centimeters	0.000001	cubic meters
cubic centimeters	0.001	liters
cubic centimeters	0.002113	pints (US liquid)
cubic centimeters	0.001057	quarts (US liquid)
cubic feet	28,320	cubic centimeters
cubic feet	1,728	cubic inches
cubic feet	0.02832	cubic meters
cubic feet	0.03704	cubic yards
cubic feet	7.48052	gallons (US liquid)
cubic feet	28.32	liters
cubic feet	59.84	pints (US liquid)
cubic feet	29.92	quarts (US liquid)
cubic feet/min	62.43	pounds water/min
cubic feet/min	1.698	cubic meters/hr
cubic feet/sec	448.831	gallons/min
cubic inches	16.39	cubic centimeters
cubic inches	0.0005787	cubic feet
cubic inches	0.00001639	cubic meters
cubic inches	0.00002143	cubic yards
cubic inches	0.004329	gallons
cubic inches	0.01639	liters
cubic meters	35.31	cubic feet
cubic meters	61,023	cubic inches
cubic meters	264.2	gallons (US liquid)
cubic meters	1000	liters
cubic meters/hour	4.4	gallons (US)/min
cubic meters/hour	0.588	cubic feet/min

To Convert	Multiply by	To Obtain
F		
feet	30.48	centimeters
feet	0.0003048	kilometers
feet	0.3048	meters
feet	304.8	millimeters
feet of water	0.0295	atmospheres
feet of water	0.8826	inches of mercury
feet of water	62.43	pounds/sq ft
feet of water	0.4335	pounds/sq in
feet/minute	0.01667	feet/second
G		
gallons	3,785	cubic centimeters
gallons	0.1337	cubic feet
gallons	231	cubic inches
gallons	3.785	liters
gallons (liq br imp)	1.20095	gallons (US liquid)
gallons (US)	0.83267	gallons (Imp)
gallons of water	8.337	pounds of water
gallons/min	0.002228	cubic feet/sec
gallons/min	0.06308	liters/sec
gallons/min	8.0208	cubic feet/hr
grams	0.001	kilograms
grams	0.002205	pounds
grams/cm	0.0056	pounds/in
grams/sq in	45.71	ounces/sq yd
I		
inches	2.540	centimeters
inches	0.02540	meters
inches	25.4	millimeters
inches of mercury	0.03342	atmospheres
inches of mercury	1.133	feet of water
K		
kilograms	2.2046	pounds
kilograms	0.009842	tons (long)
kilograms	0.001102	tons (short)
kilograms/sq cm	2,048	pounds/sq ft
kilograms/sq cm	14.22	pounds/sq in
kilograms/sq meter	0.00009678	atmospheres
kilograms/sq meter	0.00009807	bars
kilograms/sq meter	0.003281	feet of water
kilograms/sq meter	0.002896	inches of mercury
kilograms/sq meter	0.2048	pounds/sq ft
kilograms/sq meter	0.001422	pounds/sq in

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Measurement Conversion Tables

To Convert	Multiply by	To Obtain
L		
liters	0.2642	gallons (US liquid)
liters	2.113	pints (US liquid)
liters	1.057	quarts (US liquid)
liters/min	0.0005886	cubic ft/sec
liters/min	0.004403	gallons/sec
liters/hour	0.004403	gallons (US)/min
M		
meters	3.281	feet
meters	39.37	inches
meters	0.001	kilometers
meters/min	3.281	feet/min
meters/min	0.05468	feet/sec
microns	0.000001	meters
mils	0.00254	centimeters
mils	0.000083333	feet
mils	0.001	inches
mils	0.0000000254	kilometers
O		
ounces	28.349	grams
ounces	0.0625	pounds
ounces (fluid)	1.805	cubic inches
ounces (fluid)	0.02957	liters
ounces/sq in	0.0625	pounds/sq in
ounces/sq yard	20.83	pounds/3000 sq ft
P		
pints (liquid)	0.125	gallons
pints (liquid)	0.4732	liters
pints (liquid)	0.5	quarts (liquid)
pounds	453.59	grams
pounds	16	ounces
pounds/sq ft	0.0004725	atmospheres
pounds/sq ft	0.01602	feet of water
pounds/sq ft	0.01414	inches of mercury
pounds/sq in	0.06804	atmospheres
pounds/sq in	2.307	feet of water
pounds/sq in	2.036	inches of mercury
pounds/sq in	0.0145	kilo pascals (kPa)
pounds/sq in	27.684	inches water column
pounds/3000 sq in	0.048	ounces/sq yard

To Convert	Multiply by	To Obtain
Q		
quarts (liquid)	0.03342	cubic feet
quarts (liquid)	57.75	cubic inches
quarts (liquid)	0.0009464	cubic meters
quarts (liquid)	0.25	gallons
quarts (liquid)	0.9463	liters
S		
square centimeters	0.001076	square feet
square centimeters	0.1550	square inches
square centimeters	0.0001	square meters
square feet	144	square inches
square feet	0.0929	square meters
square inches	0.006944	square feet
square inches	0.0007716	square yards
square meters	10.76	square feet
square meters	155	square inches
square meters	1.196	square yards
square yards	9	square feet
square yards	1,296	square inches
square yards	0.8361	square meters

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Changes to ISO Standards and their impact on Filter Performance Reporting and the Contamination Code.

The recent changes to ISO contamination and filtration standards were brought about to solve accuracy, traceability, and availability issues. It is important to remember that both real world hydraulic system cleanliness levels and actual system filter performance remain unchanged. However, the reporting of cleanliness levels and filter performance has changed due to the new particle counter calibration and multi-pass test procedures.

ISO 11171 is the new particle counter calibration method and utilizes calibration fluid made from ISO Medium Test Dust (ISO MTD) suspended in MIL-H-5606. The calibration fluid is traceable to the National Institute of Standards and Technology (NIST) and is designated by NIST as Standard Reference Material (SRM)2806. ISO 11171 is replacing ISO 4402 which is based on obsolete AC Fine Test Dust (ACFTD).

It is important to note that the ISO 11171 calibration method is based on a distribution of particles measured by their equivalent area diameter, whereas ISO 4402 is based on a distribution of particles measured by their longest chord. Also, the NIST work utilized scanning electron microscopy for particles below 10 um in size, whereas the sizing distribution on ACFTD utilized optical microscopy.

The new calibration method and resulting ISO code will typically produce a one to two level increase in the first digit (the >4um size range) of the three digit code. This is due to the greater number of particles in the small size range. The remaining two digits will typically remain unchanged between old and new calibration methods, and should not impact previously established ISO cleanliness standards.

Table 1 below shows the approximate particle size relationship between the calibration methods.

ACTFD size (per ISO 4402:1991) um	NIST size (per ISO 11171:1999) um (c)
1	4.2
2	4.6
3	5.1
5	6.4
7	7.7
10	9.8
15	13.6
20	17.5
25	21.2
30	24.6
40	31.7

The ISO cleanliness code reporting method will also be affected.

Example: Former two-digit ISO 4406:1987

5 um / 15 um

14 11

Former three-digit ISO code

2 um / 5 um / 15 um

17 14 11

New three-digit **ISO 4406:1999**

4 um (c) / 6 um (c) / 14 um (c)

18 14 11

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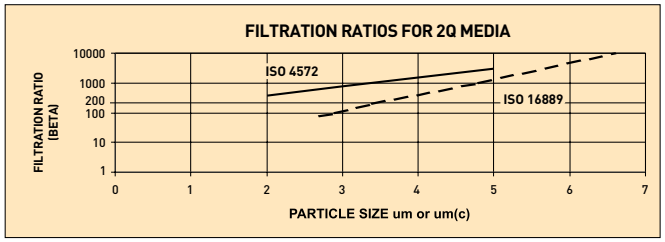
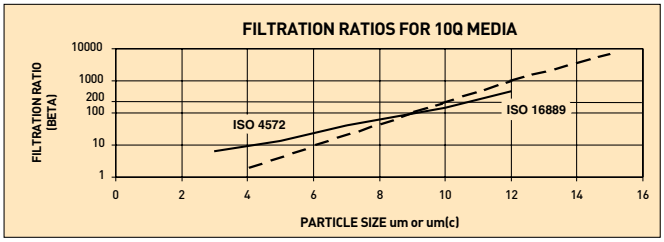
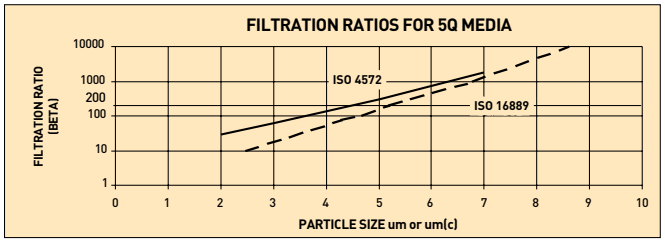
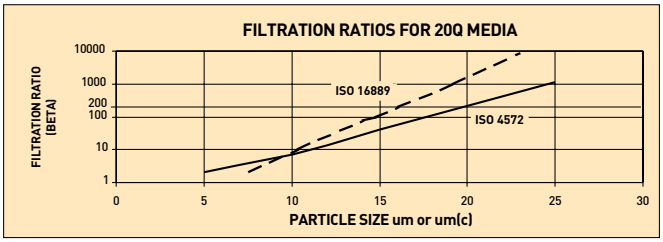
Changes to ISO Standards and their impact on Filter Performance Reporting and the Contamination Code, continued.

ISO 16889 is the new multi-pass test standard for measuring filter performance and utilizes ISO MTD as the contaminant challenge. This standard is replacing ISO 4572 which utilized ACFTD. See the following graphs below for filtration beta ratio comparisons on our 2Q, 5Q, 10Q, and 20Q Microglass III media. The graphs reflect multi-pass test results using ISO 4572 with ACFTD and the revised ISO 16889 using ISO MTD.









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Notes

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3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

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7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

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Parker Hannifin Corporation

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Parker Hannifin is a leading global motion-control company dedicated to delivering premier customer service. A Fortune 500 corporation listed on the New York Stock Exchange (PH), our components and systems comprise over 1,400 product lines that control motion in some 1,000 industrial and aerospace markets. Parker is the only manufacturer to offer its customers a choice of hydraulic, pneumatic, and electromechanical motion-control solutions. Our Company has the largest distribution network in its field, with over 12,000 distributors serving our customers around the world.

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To be a leading worldwide manufacturer of components and systems for the builders and users of durable goods. More specifically, we will design, market and manufacture products controlling motion, flow and pressure. We will achieve profitable growth through premier customer service.

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