Parker
Instrumentation

Instrumentation Filtration Products

Bulletin IP-A

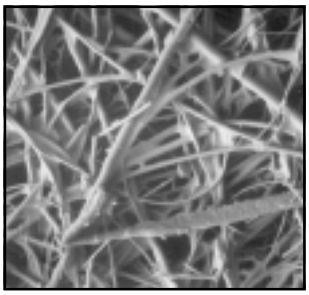
Parker's instrumentation and point-of-use product line offers sample filtration solutions for food processing, chemical processing, and compressed natural gas applications. Typical installations include fast loop sampling, by-pass sampling, protection of high temperature sample systems and hydrophobic membrane filtration.

Our unique fiber matrix technology allows us to make high efficiency particulate and coalescing filter elements with high void volume yielding lower pressure drops. Parker's elements are made from high quality glass microfiber and are constructed in 2 porosity grades and 3 media types to meet most air/gas applications.

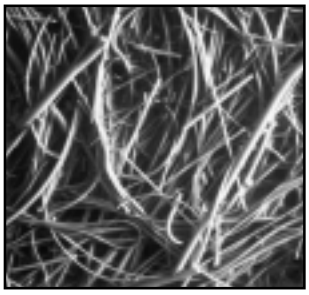
Our instrumentation filter housings are carefully engineered to meet critical application specifications. We offer stainless steel housings with various pressure ratings and flow for corrosive applications.

Disposable plastic in-lines are offered for low flow applications. A PTFE housing is available for special chemical compatibility and corrosion resistance applications.

Media Applications



Grade 70 Filters are used for particulate removal or as prefilters for Grade 01 to remove gross amounts of aerosols or tenacious aerosols which are difficult to drain.



Grade 01 Filters are used in critical air coalescing applications when "total removal of liquid aerosols and suspended fines" is required.

Media Types

Type	Description	Type	Description
Flow - Inside to Out		**Flow - Outside to In**	
C	Coalescing element composed of an epoxy saturated, borosilicate glass microfiber tube surrounded by a coarse fiber drain layer. Rated to 300°F (150°C).	**E**	Particulate removal element constructed of the same fiber matrix as type "C", but with no drain layer.
T	High temperature binderless cartridge, quartz construction. Rated to 900°F (482°C).	**F**	Particulate removal element like the "C" tube, except PTFE saturant replaces epoxy.
FR	Ideal for removal of solids and trace liquids in gases. Fluorocarbon resin binder.	**FRC**	Combines the solids holding capacity of the "FR" with the coalescing benefits of the "C". Rated to 300°F (150°C). Fluorocarbon resin binder.

Media Specifications

Grade Designation	Coalescing Efficiency 0.3 to 0.6 Micron Particles	Coalescing Filters Maximum Oil Carryover 1 PPM w/w	Particulate Filters Micron Rating	Pressure Drop (PSID) @ Rated Flow Media Dry	Media Wet with 10-20 wt. oil
01	**99.97%**	**.008**	**.01**	**1.0**	**2-3**
70	**95%**	**.85**	**.7**	**.5**	**.5**

P120P

Application: The P120P filter assembly is used where high chemical resistance is required. These filters are also used in low adsorption applications. The P120P accepts high efficiency coalescers and particulate elements.

P120

Application: The P120 Series is used for gas bypass sampling, high pressure compressed natural gas filtration, and applications with elevated pressures and corrosion resistance requirements. High efficiency particulate and coalescing elements are available with these units.

P116IL

Application: The P116IL filter is typically applied for the particulate filtration of bottled gas or as a last chance filter where there is limited space availability. It does not have a drain port and should only be used when little or no liquid contaminant is expected.

P120P

P116IL

P120

Flow Data (rated air flow in SCFM at specified psig)

Media	Grade	25 psig	100 psig	1000 psig	5000 psig
P120P	01	4.7	8.4	—	—
P120P	70	5.7	10	—	—
P120	01	4.7	8.4	74	367
P120	70	5.7	10	90	437
P116IL	01	2.7	4.7	42	207
P116IL	70	3.2	5.7	51	247

Principal Specifications

Model Number	Port Size	Element End Seals	Max. Pressure	Max. Temp. °F/°C	Materials of Construction Head	Bowl	Internals	O-Rings	Shipping Weight
P120P	1/4" NPT	N/A	100 PSIG/7Bar	125°F/52°C	PTFE	PTFE	PTFE	N/A	.52 lbs/.2358 kgs.
P120	1/4" NPT	N/A	5000 PSIG/345 Bar	350°F/177°C	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel	Fluorocarbon	1.16 lbs/.5260 kgs.
P116IL	1/4" NPT	N/A	5000 PSIG/345 Bar	350°F/177°F	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel	Fluorocarbon	.75 lbs/.34 kgs

P138G

Application: P138G filter units are used for gas analyzer protection and corrosive applications where element visibility is required. Coalescing and particulate elements are available. These units are designed for lower operating pressures and have a small internal volume which will allow quick evacuation and fast sampling times. P138G is supplied with a bowl guard (not shown in photo).

P138G

Flow Data (rated air flow in SCFM at specified psig)

Media	Grade	25 psig	50 psig	100 psig
P138G	01	11	16	22
	70	21	28	37

Principal Specifications

Model Number	Port Size	Element End Seals	Max. Pressure	Max. Temp. °F/°C	Materials of Construction Head	Bowl	O-Rings Internals	Shipping	Weight
P138G	1/4" NPT	N/A	100 PSIG/7Bar	175°F/79°C	316 Stainless Steel	Heat Resistant Borosilicate Glass	316 Stainless Steel	Fluorocarbon	2.29 lbs/1.0403kgs

Ordering Information

Housing Model	Element Number
P120P	P01-1257*/6
P120P	P70-1257*/6
P120	P01-1257*/6
P120	P70-1257*/6
P116IL	P01-1232*/6
P116IL	P70-1232*/6
P138G	P01-2564*/6
P138G	P70-2564*/6

* Insert Media Type - Note: FRC not available for Models P120, P120P, P116L.

Media Descriptions

E	Particulate removal. Borosilicate microglass with epoxy binder (350°F).
F	Particulate removal. Borosilicate microglass with fluorocarbon binder (250°F).
C	Liquid removal. Borosilicate glass microfiber, epoxy saturated with glass drain layer.
FRC	Liquid removal. Borosilicate glass microfiber, fluorocarbon resin binder with drain layer (300°F).
FR	Particulate and trace liquids removal. Borosilicate microfiber with fluorocarbon binder (300°F).

High Efficiency Disposable In-Line Filters

Features and Benefits

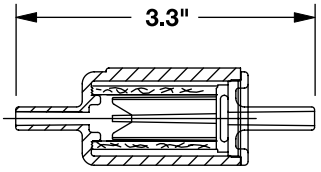
- Clear nylon housing allows visible inspection of particulate collected
- Full length tube support for higher strength, even with system upsets
- All microglass media grades available to best suit customer applications
- Positive serrated tube seals prevent bypass of element
- High flow rates with high retention rates allow customers to meet filtration requirements
- Maximum pressure of 100 psig/7 bar
- Maximum temperature of 125°F/52°C

Applications:

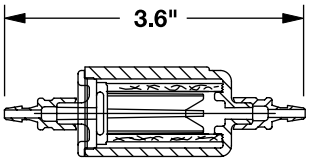
- Analyzer and sensor protection
- Gas sample cleansing and purification
- Micro-system operation
- Robot and animation air preparation

Type DIF

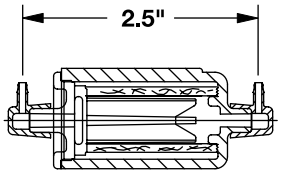
The Type DIF enclosure in conjunction with an “E” series element is designed to provide the most reliable, long lived, instrument air source, sensor protection, sample cleansing and purification available today. The center core provides stable backup support, reduces internal (tare) volume, centers the tube in the housing, provides a dropout pocket for large solids and distributes the contaminant load along the tube’s entire length. Elements in the housing are sealed by a positive serrated arrangement with built-in redundancy.



Long Tang Version (N)



Short Tang Version (S)



Short Tang Version (A)

How To Order

P❑❑-DIF-❑/6 → /6 = Indicates box quantity of 6 pieces.

“70” = 0.7 µm
“01” = 0.01 µm

N = 1/4" OD Tubing
S = 1/8" Straight Barbs
A = 1/8" Right Angle Barbs

Performance Specifications for Type ID and MD

Grade	Filter Efficiency 0.3-0.6 Micron	Particulate Filter Micron Rating	Flow Rate SCFH @ 1 PSID Operating Pressure 1 PSIG	25 PSIG	100 PSIG
01	99.97%	0.01	24	58	210
70	95%	0.7	32	80	320

All 316 Stainless steel construction

Accepts Parker disposable microfibre filter cartridge and stainless steel cartridge

Compact design for fast response time

Process stream inlet/outlet ports and sample flow ports are identical, eliminating backup pressure in the system

Model P126IL-3

Model P146IL-3

Description

Parker fast loop filters are constructed of 316 stainless steel with an optional stainless steel bowl or pyrex bowl. This flow through design continuously flushes the filter cartridge carrying the contaminates back out to the process stream, thus maximizing the filter cartridge life. The low flow sample stream pulled into the analyzer is filtered to ranges of 25 micron to 0.01 micron (depending on the filtration efficiency required). Two designs are available. The T-type design is suitable for high flow, high volume applications. The In-line design is ideal for heavily contaminated applications.

Operation

Axial velocity flushes the bulk contaminants through the filter housing back to the process stream. The sample stream passes through the filter cartridge wall with low flow and radial velocity. The clean side of the sample filter system has very low volume which minimizes lag time. A four to one flow rate is recommended to realize the benefits of prolonged filter cartridge life associated with continuous flushing.

Principal Specifications

Model	P1261L-3	P1461L-3
Inlet and Outlet Ports	1/4" NPT	1/2" NPT
Drain Port	—	—
Materials of Construction		
Head	316 SS (2)	316 SS (2)
Bowl (1)	316 SS (2)	316 SS (2)
Internals	316 SS (2)	316 SS (2)
Seals	Viton	Viton
Maximum Temperature	400°F (204°C)	400°F (204°C)
Maximum Pressure (2)	5,000 psig	1,500 psig
Shipping Weight	1.1 lbs/0.2 kg	2.5 lbs/0.4 kg
Dimensions	1.35"D x 4"L (3.2cm x 10cm)	1.9"D x 7"L (4.8cm x 17.8cm)

Notes:

1 Maximum pressure ratings are for temperatures to 200°F (104°C). Please consult factory for maximum pressure ratings at elevated temperatures.

2 Constructed of materials which comply with NACE Specification MR-01-75. Request certificate of compliance.

Ordering Information

Filter Housing Model	P126IL-3	P146IL-3
Support Core, Required for Liquid Filtration	Included	Included
Filter Cartridges	P??-1257F	P??-25140F
Use only these Filter types	P01, P70	P01, P70

Stainless steel construction

Pressure to 100 psig

Temperature to 900°F (482°C)

Ideal end use filter

Models P136IL, P146IL

Models P136IL and 146IL

Designed specifically for quantitative measurement of solids in gases to 900°F (482°C), the filter cartridge and element retainer disc in the Model P136/146 housings may be weighed as a unit.

Principal Specifications

Filter Housing Model	P136IL	P146IL
Inlet and Outlet Ports	1/2" NPT	1/2" NPT
Drain Port	None	None
Materials of Construction		
Head	303 SS	303 SS
Bowl	304 SS	304 SS
Internals	303 SS	303 SS
Seals	Carbon Fiber	Carbon Fiber
Maximum Temperature	900°F (482°C)	900°F (482°C)
Maximum Pressure (1)	100 psig	100 psig
Shipping Weight	2 lbs (9 kg)	3 lbs (14 kg)
Dimensions	1.9"D x 4.4"L (4.8cm x 11.2 cm)	1.9"D x 8.6"L (4.8cm x 22 cm)

Notes:

1 Maximum pressure rating is 15 psig for temperature to 900°F (482°C) or 100 psig to 400°F (204°C).

2 Replace "??" with Filter Grade 70 or 10 when ordering.

Ordering Information

Filter Housing Model	P136IL	P146IL
Support Core, Required for Liquid Filtration	N/A	N/A
Filter Cartridges (2)	P??-2564T	P??-25178T

Stainless steel, Teflon®*, or Monel construction

Pressure to 5000 psig

T-type construction allows for non-disruptive maintenance

Ideal sample filters for on-line analyzers

Model P110

Model P110

These models are miniature T-type filters constructed of 316 stainless steel (5000 psig). The model P110 has a small internal volume of 15 ml, which is ideal for applications requiring fast sampling response time.

* "Teflon" is a registered trade mark of the Dupont company.

Principal Specifications

Model	P110
Inlet and Outlet Ports	1/8" NPT
Drain Port	1/8" NPT
Materials of Construction	
Head (1)	316SS
Bowl (1)	316SS
Internals (1)	316SS
Seals	Viton
Maximum Temperature	400°F (204°C)
Maximum Pressure (2)	5000 psig
Shipping Weight	1 lb. (0.4 kg)
Dimensions	1.8"D X 3.3"L (4cm X 8cm)

Ordering Information

Model	P110
Support Core, Required for Liquid Filtration	Included
Filter Cartridges (3)	P??-1238
Use only these filter types	Media Type FR or T

Notes:

1 Constructed of materials which comply with NACE Specification MR-01-75. Request certificate of compliance.

2 Maximum pressure ratings are for temperatures to 200°F (93°C). Please consult factory for maximum pressure ratings at elevated temperatures.

3 Replace "??" with Filter Grade 70 or 10 when ordering.

Ideal for protecting GCs, Mass Spectrometers, O_2 Analyzers, and Moisture Analyzers

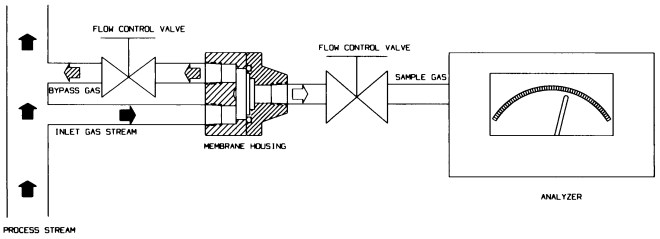
Removes entrained water, submicron sulfuric acid aerosol, and ultra fine particulate

Much lower initial cost and operating costs than other membrane filters

Series P101 Membrane Filter

Series P101 Membrane Filter

The Series P101 Membrane Filter consists of a housing with a porous membrane filter, which is supported by a sintered porous disk located on the "outlet" side of the housing. Gas enters through the "inlet" port on the upstream side of the membrane, and exits from the "outlet" port on the downstream side. Entrained liquid will not flow through the membrane, and will exit through the "bypass" port on the upstream side of the membrane, completely protecting sensitive instrumentation from moisture. Two models are available: The P101 (standard) and the P101-H (high flow). The P101 Series is identical to other hydrophobic membranes offering the same performance and features but at a much lower price.



Typical Location of a Membrane Filter in an Analyzer Application

(Note: For the membrane to operate correctly, there **must** be a bypass flow.)

The Membrane

Microscopic pores contained within the membrane permit molecules of gas or vapor to flow through easily, allowing the composition of the sample gas to remain unchanged. Even the smallest liquid molecules remain trapped and are unable to flow through the membrane's small passages under normal operating conditions. This is due to the high surface tension which causes liquid molecules to bind tightly together to form a group of molecules, moving together, which is too large to fit through the pores of the membrane.

The membrane is extremely inert, and is recommended for most process liquid applications, with the exception of hydrofluoric acid. It is also recommended for use in systems designed for PPB, PPM, and "percent level" component concentrations, as a result of its very low absorption characteristics. The membrane is strong and durable, but also very soft and pliable.

How to Select the Membrane and Model

1. Determine the following application requirements:

A. Gas flow rate to the analyzer excluding the bypass flow.

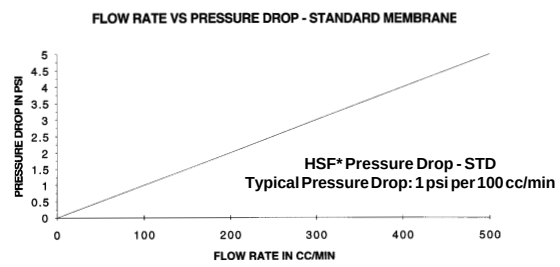
B. Type of suspended liquid to be separated and amount normally present in the sample.

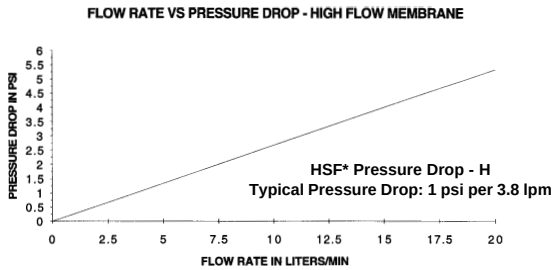
C. Gas sample supply pressure at membrane filter inlet.

2. Use Table 1 to select a membrane filter model and membrane type which meet your application requirements. Note that the membrane differential pressure for the model and membrane type selected must be lower than the available gas sample supply pressure.

Selecting the Appropriate Type of Membrane

There are two basic types of membranes for the P101 Series Membrane Filters: The Model P101 (Standard) is suitable for separation of most liquids from gases. The Model P101-H (High Flow) is best suited for the separation of water and other high surface-tension liquids from gases.





* HSF= Hydrophobic Sample Filter

Table 1 Housing and Membrane Selection Guide

Model	P101	P101-H
Membrane Type	Standard (1)	High Flow (2)
Max. Recommended Flow Rate in L/Min. (3)	0.60	10
Normal Amount of Liquid Present in Gas (4)	Low to Medium	Low to Medium

Notes:

1 Standard membrane is suitable for most suspended liquids.

2 High flow membrane is suitable for suspended water, solutions consisting primarily or water, sulfuric acid, caustic, glycols, oily liquids, other high surface-tension type liquids.

3 Maximum recommended flow rate of gas through the membrane. Does not include the "bypass" flow rate.

4 Amount of liquid normally expected to be present in the sample gas: Low: aerosol or occasional droplets. Medium: continuous droplets. High: continuous flowing liquid.

Principal Specifications

Model	P101
Inlet, Outlet, Bypass Ports	1/4" NPT
Materials of Construction	
Housing	316 Stainless Steel (2)
O-rings	Viton (standard) Kalrez, Buna, EPDM (optional)
Maximum Operating Pressure	1000 psig @ 200°F
Maximum Temperature	212°F (100°C)
Maximum Flow Rate	
Standard Membrane	.60 L/Min.
High Flow Membrane	10 L/Min.
Typical Membrane Pressure Drop (1)	
Standard Membrane	1 psig per 100 cc/min. flow through membrane
High Flow Membrane	1 psig per 3.8 liters/min. flow through the membrane
Outside Dimensions	2"D x 2"L (5cm X 5cm)
Shipping Weight	1.5 lbs. (0.7 kg)

Notes:

1 Pressure Drops are for temperatures to 212°F (100°C).

Ordering Information

Filter Assembly Maintenance Kits	P101 (standard)	P101-H (high flow)
PMD-8002/5	5 each Membranes P101	
PMD-8020/5	5 each Membranes P101-H	

P101C Series offers continuous coalescing of all liquid and the security of hydrophobic membrane protection all in one unit

Fewer fittings required - reducing risk of leaks

More compact - no need for separate coalescers

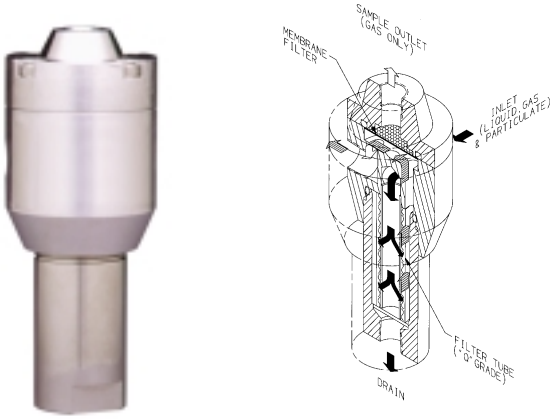
Less maintenance and downtime as the membrane is fully protected from solids & liquids

Series P101C Coalescer Membrane Combination Filter

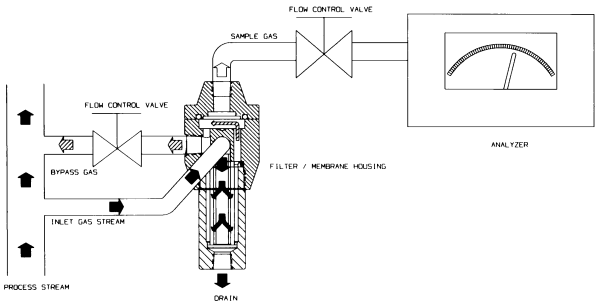
The Coalescer Membrane Combination Filter is designed to remove entrained liquid and particulate in gas samples for a wide variety of applications, and thereby prevents contamination or damage to the analyzers and sample system components. Typically located upstream from the analyzer or component it is protecting, the Coalescer Membrane Combination provides protection even if other sample system components fail.

The Coalescer Membrane Combination offers the performance and protection of the P101C Series Membrane Filter with the additional benefits of coalescing liquids and entrapment of particulates, offering maximum protection of the membrane. There is no need for prefiltration which places more volume in the sample system, and requires more space for installation and more potential for leaks.

The Series P101C consists of a housing with a porous membrane filter, which is supported by a sintered porous disk located on the "outlet" side of the housing. Gas enters through the "inlet" port and is directed down through the coalescing filter. The coalescer traps all particulates and continuously drains liquid contaminants. The sample gas then flows upward to the upstream side of the membrane, and exits from the "outlet" port on the downstream side. Entrained liquid will not flow through the membrane, and will exit through the drain port on the downstream side of the coalescer.



Series P101C Coalescer Membrane Combination Filter



Typical Location of a Membrane Filter in an Analyzer Application

(Note: For the membrane to operate correctly, there **must** be a bypass flow.)

The Membrane

Microscopic pores contained within the membrane permit molecules of gas or vapor to flow through easily, allowing the composition of the sample gas to remain unchanged. Even the smallest liquid molecules remain trapped and are unable to flow through the membrane's small passages under normal operating conditions. This is due to the high surface tension which causes liquid molecules to bind tightly together to form a group of molecules, moving together, which is too large to fit through the pores of the membrane.

The membrane is extremely inert, and is recommended for most process liquid applications, with the exception of hydrofluoric acid. It is also recommended for use in systems designed for PPB, PPM, and "percent level" component concentrations, as a result of its very low absorption characteristics. The membrane is strong and durable, but also very soft and pliable.

P101C Series Coalescer Membrane Combination Filter

How to Select the Membrane and Model

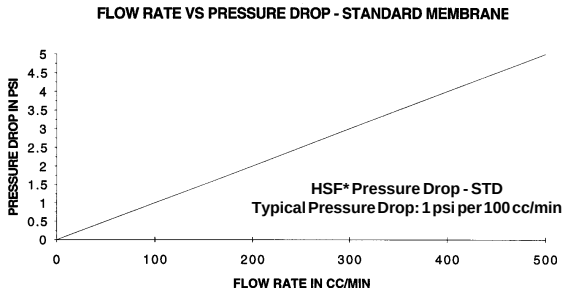
1. Determine the following application requirements:
   - A. Gas flow rate to the analyzer excluding the bypass flow.
   - B. Type of suspended liquid to be separated and amount normally present in the sample.
   - C. Gas sample supply pressure at Membrane Filter inlet.

2. Use Table 1 to select a Membrane Filter model and Membrane type which meet your application requirements. Note that the membrane differential pressure for the model and membrane type selected must be lower than the available gas sample supply pressure.

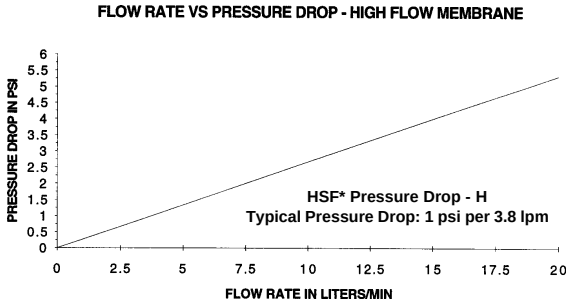
Selecting the Appropriate Type of Membrane

There are two basic types of membranes for this Series Membrane Filters: The Model P101C (Standard) is suitable for separation of most liquids from gases. The Model P101C-H (High Flow) is best suited for the separation of water and other high surface-tension liquids from gases.

Model P101C



Model P101C-H



* HSF= Hydrophobic Sample Filter

Table 1 Housing and Membrane Selection Guide

Model	P101C	P101C-H
Membrane Type	Standard (1)	High Flow (2)
Max. Recommended Flow Rate in L/Min. (3)	0.60	10
Normal Amount of Liquid Present in Gas (4)	Low to Medium	Low to Medium

Notes:

1 Standard membrane is suitable for most suspended liquids.

2 High flow membrane is suitable for suspended water, solutions consisting primarily or water, sulfuric acid, caustic, glycols, oily liquids, other high surface-tension type liquids.

3 Maximum recommended flow rate of gas through the membrane. Does not include the "bypass" flow rate.

4 Amount of liquid normally expected to be present in the sample gas: Low: aerosol or occasional droplets. Medium: continuous droplets. High: continuous flowing liquid.

Principal Specifications

Model	P101C
Inlet, Outlet, Bypass Ports	1/4" NPT
Materials of Construction	
Housing	316 Stainless Steel
O-rings	Viton (standard) Kalrez, Buna, EPDM (optional)
Maximum Operating Pressure	1000 psig @ 200°F
Maximum Temperature	212°F (100°C)
Maximum Flow Rate	
Standard Membrane	.60 L/Min.
High Flow Membrane	10 L/Min.
Typical Membrane Pressure Drop (1)	
Standard Membrane	1 psig per 100 cc/min. flow through membrane
High Flow Membrane	1 psig per 3.8 liters/min. flow through the membrane
Outside Dimensions	2"D x 4"L (5cm X 10cm)
Shipping Weight	2.4 lbs. (1.1 kg)

Notes:

1 Pressure Drops are for temperatures to 212°F (100°C).

2 Constructed of materials which comply with NACE Specification MR-01-75. Request certificate of compliance.

Ordering Information

Filter Assembly	P101C, P101C-H
PMD-8002/5	5 ea. Membranes for P101-C
PMD-8020/5	5 ea. Membranes for P101-H
P??-1257C/6	6 ea. Coalescing Filter Cartridges

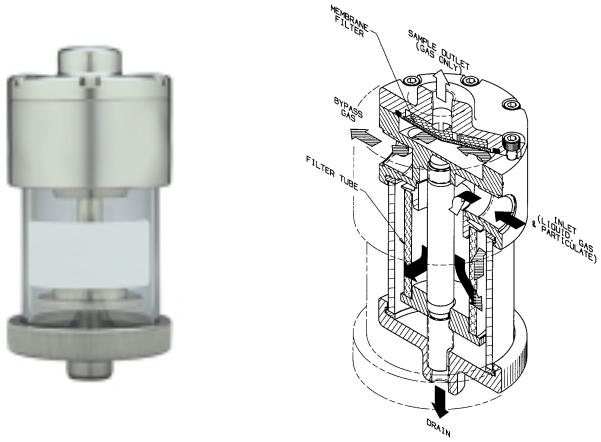
P130C Series Coalescer Membrane Combination Filters

The P130C Series offers continuous coalescing of all liquid and the security of hydrophobic membrane protection all in one unit

Fewer fittings required - reducing risk of leaks

More compact - no need for separate coalescers

Less maintenance and downtime as the membrane is fully protected from solids & liquids



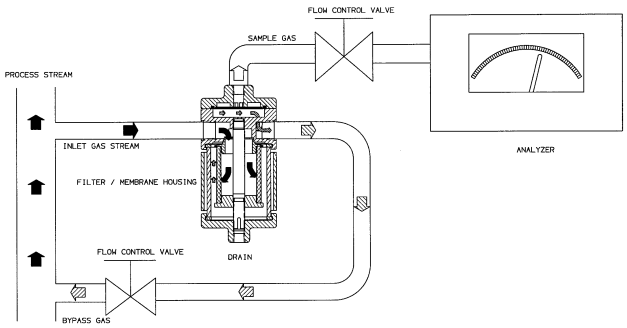
Series P130C Coalescer Membrane Combination Filter

Series P130C Coalescer Membrane Combination Filter

The Coalescer Membrane Combination Filter is designed to remove entrained liquid and particulate in gas samples for a wide variety of applications, and thereby prevents contamination or damage to the analyzers and sample system components. Typically located upstream from the analyzer or component it is protecting, the Coalescer Membrane Combination provides protection even if other sample system components fail.

The Coalescer Membrane Combination offers the performance and protection of the P130C Series Membrane Filter with the additional benefits of coalescing liquids and entrapment of particulates, offering maximum protection of the membrane. There is no need for prefiltration which places more volume in the sample system, and requires more space for installation and more potential for leaks.

The P130C Series consists of a housing with a porous membrane filter, which is supported by a sintered porous disk located on the "outlet" side of the housing. Gas enters through the "inlet" port and is directed down through the coalescing filter. The coalescer traps all particulates and continuously drains liquid contaminants. The sample gas then flows upward to the upstream side of the membrane, and exits from the "outlet" port on the downstream side. Entrained liquid will not flow through the membrane, and will exit through the drain port on the downstream side of the coalescer.



Typical Location of a P130C Membrane Filter in an Analyzer Application

(Note: For the membrane to operate correctly, there **must** be a bypass flow.)

The Membrane

Microscopic pores contained within the membrane permit molecules of gas or vapor to flow through easily, allowing the composition of the sample gas to remain unchanged. Even the smallest liquid molecules remain trapped and are unable to flow through the membrane's small passages under normal operating conditions. This is due to the high surface tension which causes liquid molecules to bind tightly together to form a group of molecules, moving together, which is too large to fit through the pores of the membrane.

The membrane is extremely inert, and is recommended for most process liquid applications, with the exception of hydrofluoric acid. It is also recommended for use in systems designed for PPB, PPM, and "percent level" component concentrations, as a result of its very low absorption characteristics. The membrane is strong and durable, but also very soft and pliable.

How to Select the Membrane and Model

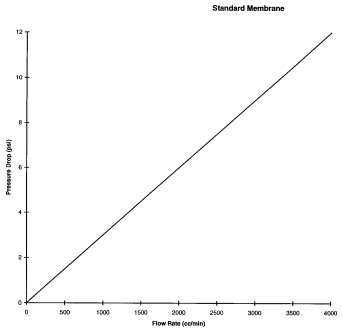
1. Determine the following application requirements:
   - A. Gas flow rate to the analyzer excluding the bypass flow.
   - B. Type of suspended liquid to be separated and amount normally present in the sample.
   - C. Gas sample supply pressure at Membrane Filter inlet.

2. Use Table 1 to select a Membrane Filter model and Membrane type which meet your application requirements. Note that the membrane differential pressure for the model and membrane type selected must be lower than the available gas sample supply pressure.

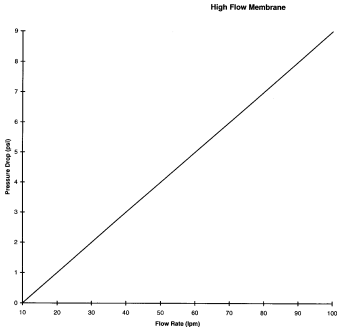
Selecting the Appropriate Type of Membrane

There are two basic types of membranes for the P130C Series Membrane Filters: The Model P130C (Standard) is suitable for separation of most liquids from gases. The Model P130C-H (High Flow) is best suited for the separation of water and other high surface-tension liquids from gases. A Pyrex bowl is available which offers full visibility of coalescing chamber.

Model P130C



Model P130C-H



* HSF= Hydrophobic Sample Filter

Table 1 Housing and Membrane Selection Guide

Model	P130C	P130C-H
Membrane Type	Standard (1)	High Flow (2)
Max. Recommended Flow Rate in L/Min. (3)	1.0 lpm	70 lpm
Normal Amount of Liquid Present in Gas (4)	Low to Medium	Low to Medium

Notes:

1 Standard membrane is suitable for most suspended liquids.

2 High flow membrane is suitable for suspended water, solutions consisting primarily or water, sulfuric acid, caustic, glycols, oily liquids, other high surface-tension type liquids.

3 Maximum recommended flow rate of gas through the membrane. Does not include the "bypass" flow rate.

4 Amount of liquid normally expected to be present in the sample gas: Low: aerosol or occasional droplets. Medium: continuous droplets. High: continuous flowing liquid.

Principal Specifications

Model	P130C
Bypass Ports	1/2" NPT
Sample Port	1/4" NPT
Materials of Construction	
Housing	316 Stainless Steel (2)
O-rings	Viton (standard) Kalrez, Buna, EPDM (optional)
Maximum Operating Pressure	425 psig @ 200°F (100 psig @ 200°F with Pyrex bowl)
Maximum Temperature	212°F (100°C)
Maximum Flow Rate	
Standard Membrane	1 L/Min.
High Flow Membrane	70 L/Min.
Typical Membrane Pressure Drop (1)	
Standard Membrane	1 psig per 250 cc/min. flow through membrane
High Flow Membrane	1 psig per 20 liters/min. flow through the membrane
Outside Dimensions	3.3"D x 7.3"L (8.4 cm X 18.5 cm)
Shipping Weight	7 lbs. (1.1 kg)

Notes:

1 Pressure Drops are for temperatures to 212°F (100°C).

2 Constructed of materials which comply with NACE Specification MR-01-75. Request certificate of compliance.

Ordering Information

Filter Assembly	P130C, P130C-H
PMD-9002/5	5 ea. Membranes for P130C
PMD-9020/5	5 ea. Membranes for P130C-H
P01-3864C/6	6 ea. Coalescing Filter Cartridges

Notes:

1 For Glass Bowl version order: P130C-G, P130C-HG

P130 Series Membrane Filters

Ideal for protecting GCs, Mass Spectrometers, O_2 Analyzers, and Moisture Analyzers

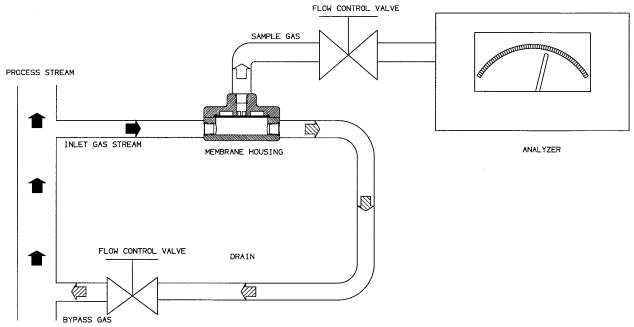
Removes entrained water, submicron sulfuric acid aerosol, and ultra fine particulate

Much lower initial cost and operating costs than other membrane filters

P130 Series

The P130 Series Membrane Filter

The P130 Series Membrane Filter consists of a housing with a porous membrane filter, which is supported by a sintered porous disk located on the "outlet" side of the housing. Gas enters through the "inlet" port on the upstream side of the membrane, and exits from the "outlet" port on the downstream side. Entrained liquid will not flow through the membrane, and will exit through the "bypass" port on the upstream side of the membrane, completely protecting sensitive instrumentation from moisture. Two models are available: P130 (standard) and the P130H (high flow). The P130 Series is identical to other hydrophobic membranes offering the same performance and features but at a much lower price.



Typical Location of a P130 Membrane Filter in an Analyzer Application

(Note: For the membrane to operate correctly, there **must** be a bypass flow.)

The Membrane

Microscopic pores contained within the membrane permit molecules of gas or vapor to flow through easily, allowing the composition of the sample gas to remain unchanged. Even the smallest liquid molecules remain trapped and are unable to flow through the membrane's small passages under normal operating conditions. This is due to the high surface tension which causes liquid molecules to bind tightly together to form a group of molecules, moving together, which is too large to fit through the pores of the membrane.

The membrane is extremely inert, and is recommended for most process liquid applications, with the exception of hydrofluoric acid. It is also recommended for use in systems designed for PPB, PPM, and "percent level" component concentrations, as a result of its very low absorption characteristics. The membrane is strong and durable, but also very soft and pliable.

How to Select the Membrane and Model

1. Determine the following application requirements:

   A. Gas flow rate to the analyzer excluding the bypass flow.

   B. Type of suspended liquid to be separated and amount normally present in the sample.

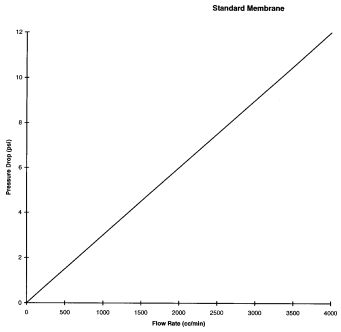
   C. Gas sample supply pressure at membrane filter inlet.

2. Use Table 1 to select a membrane filter model and membrane type which meet your application requirements. Note that the membrane differential pressure for the model and membrane type selected must be lower than the available gas sample supply pressure.

Selecting the Appropriate Type of Membrane

There are two basic types of membranes for the P130 Series Membrane Filters: The Model P130 (Standard) is suitable for separation of most liquids from gases. The Model P130H (High Flow) is best suited for the separation of water and other high surface-tension liquids from gases.

Model P130



Model P130H

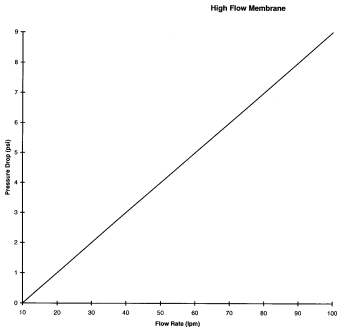


Table 1 Housing and Membrane Selection Guide

Model	P130	P130-H
Membrane Type	Standard (1)	High Flow (2)
Max. Recommended Flow Rate in L/Min. (3)	1.0 lpm	70 lpm
Normal Amount of Liquid Present in Gas (4)	Low to Medium	Low to Medium

Notes:

1 Standard membrane is suitable for most suspended liquids.

2 High flow membrane is suitable for suspended water, solutions consisting primarily of water, sulfuric acid, caustic, glycols, oily liquids, other high surface-tension type liquids.

3 Maximum recommended flow rate of gas through the membrane. Does not include the "bypass" flow rate.

4 Amount of liquid normally expected to be present in the sample gas: Low: aerosol or occasional droplets. Medium: continuous droplets. High: continuous flowing liquid.

Principal Specifications

Model	P130 Series
Bypass Ports	1/2" NPT
Sample Port	1/4" NPT
Materials of Construction	
Housing	316 Stainless Steel (2)
O-rings	Viton (standard) Kalrez, Buna, EPDM (optional)
Maximum Operating Pressure	500 psig @ 200°F (100 psig @ 200°F with Pyrex bowl)
Maximum Temperature	212°F (100°C)
Maximum Flow Rate	
Standard Membrane	1 L/Min.
High Flow Membrane	70 L/Min.
Typical Membrane Pressure Drop (1)	
Standard Membrane	1 psig per 250 cc/min. flow through membrane
High Flow Membrane	1 psig per 20 liters/min. flow through the membrane
Outside Dimensions	3.3"D x 2"L (8.4cm x 5.1cm)
Shipping Weight	3 lbs.

Notes:

1 Pressure Drops are for temperatures to 212°F (100°C).

2 Constructed of materials which comply with NACE Specification MR-01-75. Request certificate of compliance.

Ordering Information

Filter Assembly	P130, P130H
PMD 9002/5	5 ea. Membranes for P130
PMD 9020/5	5 ea. Membranes for P130-H

Horizontal mounting minimizes space requirement on panel

All connections are made to the head eliminating the need to break the lines for filter changeouts

The only filter available that is mounted at an angle to ensure complete removal of all liquids

Includes cadmium plated steel mounting bracket

Model PFCE

Model PFCE

The Model PFCE is designed to filter particulates and liquids from a gas sample, protecting on-line process analyzers from contamination. This unique design allows the filter to be mounted horizontally which minimizes the amount of space taken up on the panel.
It is also angled at 10° which ensures all collected liquids drain back to the drain port and not carried downstream to the analyzer. The drain port is drilled and tapped at an opposing angle eliminating the need to bend tubing.
Additionally, all connections (including the drain connection) are made to the head which eliminates the need to break the lines for filter changeouts.
This is an ideal filter for those applications requiring high efficiency filtration with the need for convenient filter changes on crowded panels.

Principal Specifications

Model	PFCE
Inlet and Outlet Ports	1/4" NPT
Drain Port	1/4" NPT
Materials of Construction	316 SS (2)
Seals	Viton
Maximum Temperature	400°F (204°C)
Maximum Pressure	1500 psig (1)
Shipping Weight	1lb. (0.4 kg)
Dimensions	1.5"D x 3.7"L (4cm x 9cm)

Ordering Information

Filter Housing Model	PFCE
Filter Cartridges (Box of 6)	P??-1257F/6
	P01, P70
Support Core required for liquid filtration	Included

Notes:

1 1500 psig @ 200°F consult factory for pressure ratings at elevated temperatures.

2 Constructed of materials which comply with NACE Specification MR-01-75. Request certificate of compliance.

Flow Rates for Air and Gas Filters

Filter Housing Model	Vol. of Housing (ml)	Flow Rate (CFM) at Filter Tube Grade	10°F Water Press. Drop 0 psig	2 PSIG	20 PSIG	40 PSIG	60 PSIG	80 PSIG	100 PSIG	125 PSIG	150 PSIG	200 PSIG	250 PSIG	300 PSIG	500 PSIG	750 PSIG	1000 PSIG	1500 PSIG	2000 PSIG	2500 PSIG	3000 PSIG	3500 PSIG	4000 PSIG	4500 PSIG	5000 PSIG
P110	11.33	70	0.7	3	7	10	14	18	22	27	32	41	51	60	99	147	195	290	386	482	578	674	770	886	962
		70	0.2	0.9	1.8	3	4	5	6	7	9	11	14	16	26	39	52	77	103	128	154	179	205	230	256
PFCE	19.82	70	1.5	3.9	8	13	18	22	27	33	39	51	62	74	121	180	239	357	470	590	710	830	940	1060	1180
	36.81	01	0.3	1.5	3	5	7	8	10	12	14	19	23	27	45	67	88	132	180	220	260	310	350	390	440
P126IL-3		70	N/A	2.5	10	16	23	28	33	40	47	61	75	89	145	210	280	420	560	700	840	980	1120	1260	1400
		01	N/A	2	5	8	9	10	11	13	16	20	25	29	46	70	90	130	180	220	260	300	340	380	420
P136IL	158.58	70	3.0	12	26	40	55	70	85	103	122	159	196	233	381	567	752	1122	1493	1863	2234	2600	2970	—	—
		01	0.5	3	7	10	14	18	22	27	32	41	51	60	99	147	195	291	387	483	579	695	770	—	—
P146IL-3		70	N?A	13	28	45	61	78	94	115	135	177	218	259	423	629	834	1245	—	—	—	—	—	—	—
		01	N/A	6	13	21	28	35	43	53	62	81	100	119	194	288	383	571	—	—	—	—	—	—	—
P146IL	419.09	70	7.5	17	36	57	78	99	120	146	172	225	277	329	538	800	1062	1585	2108	2631	3156	3680	4200	—	—
		01	1.3	8	17	26	36	45	55	67	79	103	127	151	247	367	487	727	967	1207	1447	1690	1930	—	—

Coalescing Filtration: Separating Liquids From Gases

Microfibre Filter Cartridges efficiently separate suspended liquids from gases. The micro fibers capture the fine liquid droplets suspended in the gas and cause the droplets to run together to form large drops within the depth of the filter cartridge. The large drops, forced by the gas, flow to the downstream surface of the filter cartridge, from which the liquid drains by gravity. This process is called “coalescing”. Since the coalesced liquid drains from the cartridge at the same rate that liquid droplets enter the cartridge, the cartridge has an unlimited life when coalescing liquids from relatively clean gases, and the filters operate at their initial retention efficiency even when wet with liquid (see Figure 1). Note that the flow direction is inside-to-outside, to permit the liquid to drip from the outside of the filter to the housing drain.

Since the coalesced liquid drips from the downstream surface of the filter cartridge in the presence of filtered gas, it is important to avoid carryover, or entrainment, of liquid droplets by the gas leaving the filter housing. The possibility of entraining coalesced liquid is minimized by using a C-Type filter cartridge. The C-Type filter cartridges are constructed of two layers, an inner high-efficiency coalescing layer and an outer layer of coarse glass fibers. The coarse, rapidly-draining outer layer ensures that the liquid drips continuously from the bottom of the filter cartridge and minimizes the chance of liquid carryover. (The small internal volume of some filter housings does not permit use of the thick-wall C-Type cartridges, and therefore F or E-Type cartridges must be used.) Re-entrainment of coalesced liquid is also avoided by ensuring that the gas flow rate through the housing is safely below the maximum shown in the flow charts. For most requirements for removing liquid from gas samples, Grade 70 filter cartridge should be used.

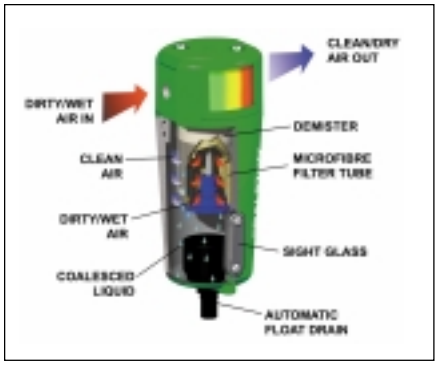


Figure 1

Compressed Air Filter

Draining Collected Liquid

If liquid is carried into the filter in slugs rather than dispersed as droplets in the gas, a filter which is properly sized for steady-state conditions can be flooded and permit liquid carryover. If slugging of liquid is expected, a filter with a relatively large bowl should be selected to provide adequate liquid holding capacity and provisions should be made to drain the liquid automatically from the bowl of the housing as fast as it accumulates. An automatic float drain can be used if the pressure is in the 10-400 psig range. Above 400 psig, the possibilities are: a constant bleed drain, a valve with automatic timed actuator (supplied by customer), or an external reservoir with manual valves (see Figure 2). The external reservoir can be constructed of pipe or tubing with sufficient volume to hold all the liquid which is expected to be collected during any period of unattended operation.

If the filter is under vacuum, the external reservoir is a practical method of collecting coalesced liquid for manual draining from time to time. If an external vacuum source, such as an aspirator, is available, the liquid may be drained continuously from the housing drain port.

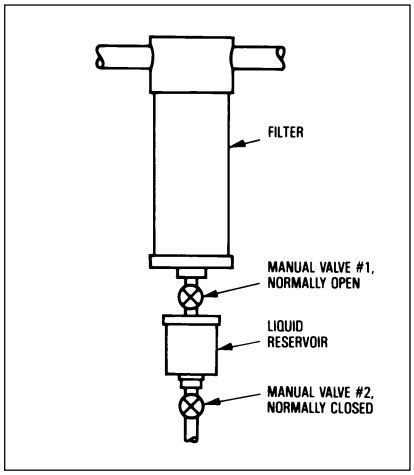


Figure 2

To drain liquid while filter is operating at pressure or vacuum conditions, close valve #1, and open valve #2

Coalescing Filtration: Separating Two Liquid Phases

In principle, Microfibre Filter Cartridges separate suspended droplets of a liquid which is immiscible in another liquid by the same process as they separate droplets of liquid from a gas. The liquid droplets suspended in the continuous liquid phase are trapped on the fibers and run together to form large drops, which are then forced through the filter to the down-stream surface. The large drops separate from the continuous liquid phase by gravity difference, settling if heavier than the continuous phase and rising if lighter. The coalescing action of Parker filters is effective with aqueous droplets suspended in oil or other hydrocar-bons, and also with oil in water suspensions.

In practice, liquid-liquid separations are much more difficult than liquid-gas separations. The specific gravity difference between two liquids is always less than between a liquid and a gas, and therefore a longer phase separation time is needed. Either the filter housing must be oversized or the flow rate greatly reduced to avoid carryover of the coalesced phase. As a rule of thumb, flow rate for liquid-liquid separation should be no more than one-fifth the flow rate for solid-liquid separation shown in the chart on page 4. Even at low flow rates, if the specific gravity difference between the two liquids is less than 0.1 units (for example, if an oil suspended in water has a specific gravity between 0.9 and 1.1), the separation time for the coalesced phase may be impracticably long. In that case, if there is only a small quantity of suspended liquid, the filter tube can be used until saturated with the suspended liquid and then changed.

Another practical problem with liquid-liquid separations is that small quantities of impurities can act as surface-active agents and interfere with the coalescing action. For that reason it is not possible to predict accurately the performance of a liquid-liquid coalescing filter, and each system must be tested on site. The general guidelines for the system to start testing are to use Grade 70 filter cartridges, and flow inside-to-outside at very low flow rates. If the suspended liquid is lighter than the continuous phase, the housing should be oriented so that the drain port is up. In general, Microfibre Filter Cartridges should be used for liquid-liquid coalescing in slipstream sampling applications only.

Membrane Separation of Sample Streams

A Coalescer Membrane Combination Filter is designed to remove entrained liquid and particulate in gas samples for a wide variety of applications, and to prevent contamination or damage to the analyzers and sample system components. Microscopic pores contained within the membrane permit molecules of gas or vapor to flow through easily, allowing the composition of the sample gas to remain unchanged. However, even the smallest liquid molecules remain trapped and are unable to flow through the membrane's small passages under normal operating conditions. This is due to the high surface tension which causes liquid molecules to bind tightly together to form a group of molecules, moving together, which is too large to fit through the pores of the membrane.

The membrane is extremely inert, and is recom-mended for most process liquid applications, with the exception of hydrofluoric acid. It is also recommended for use in systems designed for PPB, PPM, and "percent level" component concentrations, as a result of its very low absorption characteristics. The mem-brane is strong and durable, but also very soft and pliable. Typically located upstream from the analyzer or component it is protecting, the Coalescer Membrane Combination provides protection even if other sample system components fail.

Removing Gas Bubbles from Liquids

Microfibre Filter Cartridges readily remove suspended gas bubbles from liquid, eliminating the need for deaeration tanks, baffles, or other separation devices. Flow direction through the filter is outside-to-inside. The separated gas bubbles rise to the top of the housing and are vented through the drain port. If slipstream sampling is used, the separated bubbles are swept out of the housing with the bypassed liquid. Grade 70 is a good choice for gas bubble separation.

Quantitative Measurement of Solids in Gas

Quantitative determination of solids in gas, often a requirement in stack gas or other exhaust gas sampling, is readily accomplished using a P136IL or P146IL filter housing. In this housing, the filter cartridge is sealed in place by a stainless steel spring acting on a lightweight stainless retainer disc (Figure 3). The retainer disc is pressed firmly into the end of the filter cartridge. When the housing is disassembled, the filter cartridge and retainer disc may be easily removed as a unit. At the beginning of the run, a tare weight is obtained on the filter cartridge-retainer disc assembly. When the filter is in service, flow through the filter cartridge is inside-to-outside so that even large solid particles which fall off the filter cartridge are held in the cartridge-disc assembly. At the conclusion of the run with a known volume of gas, the cartridge-disc assembly is reweighed, and the increase in weight can be expressed as solids concentration in the gas. Grade 70 Filter Cartridges are recommended for high temperature sampling (up to 900°F/482°C).

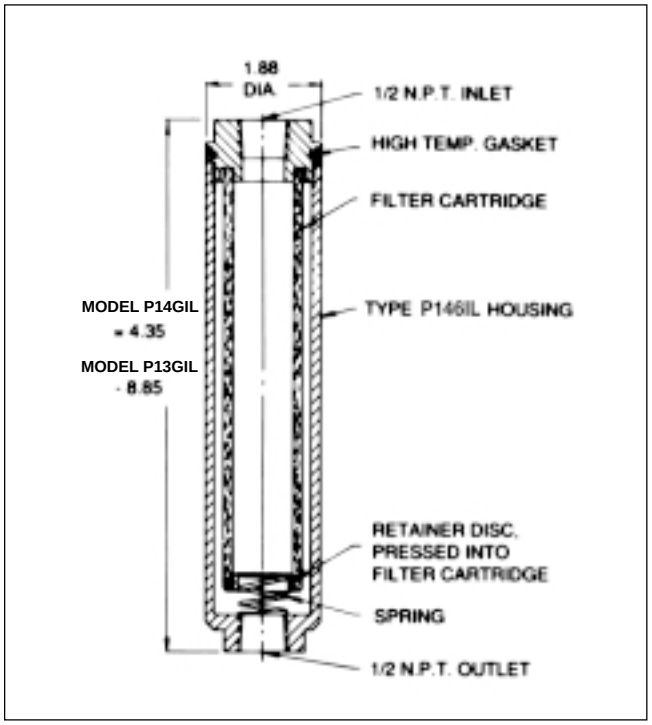


Figure 3

Filter cartridge and retainer disc of Model P13G/14G housing may be weighed as a unit for quantitative determination of solids in gases.

Slipstream or Bypass Sampling

Instrument sample use rates are invariably quite low, yet it is essential to minimize lag time in the sample system. Since analyzers often are located some distance from the sampling point, samples are usually transported to the analyzer at a relatively high flow rate to minimize lag time. The sample is divided at the analyzer, with the analyzer using the portion it requires (usually a very small fraction of the total sample), and the balance recycled to the process, or vented.

If the sample filter is located in the low-flow line to the analyzer, it will have good life between filter element changes because the solids loading rate is very low; however, the filter must be carefully selected to avoid introducing unacceptable lag time. If the filter is located in the high-flow portion of the sample system, its effect on sample lag time can be relatively low, but the life between filter changes may be inconveniently short because the element is filtering a much greater volume of material than the analyzer is using.

Ideally, a filter should be located at the point where the low-flow stream is withdrawn to the analyzer (Figure 4). This arrangement permits the main volume of the filter to be swept continuously by the high flow rate stream, thus minimizing lag time; at the same time, only the low-flow stream to the analyzer is filtered, thus maximizing filter life.

A slipstream filter requires inlet and outlet ports at opposite ends of the filter element to allow the high flow rate of the by-passed material to sweep the surface of the filter element and the filter reservoir, and a third port connected to the low flow rate line to the analyzer, which allows filtered samples to be withdrawn from the filter reservoir.

The P126IL-3 and P146IL-3 are ideal designs for slipstream sampling, since the inlet and the bypass ports are located at opposite ends of the housing, and the bypass port is as large as the inlet port.

If bubble removal from a liquid is a requirement, this function may be combined with slipstream filtration, since the recommended flow direction for bubble removal is outside-to-inside, and the separated bubbles will be swept out of the housing by the bypass stream. In this case, the liquid feed should enter at the bottom of the housing and the bypass liquid exit at the top of the housing.

Quantitative Measurement of Liquids in Gas

Quantitative determination of nonvolatile liquids suspended in a gas may be accomplished by a procedure similar to the solids determination. In the case of liquids, the test is designed so that all the liquid entering the filter cartridge during the test period remains trapped on the fibers; i.e., the sample period is short enough that the filter cartridge does not become saturated and begin to drain liquid.

Any convenient filter housing may be used. The filter cartridge should be Grade 01, to assure quantitative retention of aerosols, no matter what droplet size. With a known gas flow rate and test duration, the increase in weight of the filter cartridge will be a measure of the weight concentration of aerosol in the gas.

Considerable care must be taken to obtain a representative sample of aerosol in gas. If sampling from a large line, the sample probe should enter the pipe from above and if possible, extend into the pipe to avoid picking up liquid clinging to the wall of the pipe. There should be no valves, reducers, or sharp elbows in the sample line upstream from the filter.

Sampling Ambient Air or Other Atmospheric Pressure Gas

The filtration requirement for ambient air samplers is usually to remove solid particles or liquid droplets which could deposit on analyzer optical surfaces or cause other calibration problems. Grade 70 filter cartridges are recommended. For low flow rate personal samplers, the compact and lightweight DIF is often used.

Ambient air sampling systems are often under negative pressure, induced by the sampling pump. If it is necessary to drain coalesced liquid from the system, the external reservoir is often the most convenient method.

Application Notes

Application Notes

Application Notes

Parker Worldwide Sales Offices

Contact Parker's worldwide service and distribution network by calling:

Argentina	+54 1 752 4129
Australia	+61 2 634 7777
Austria	+43 2622 23501 5
Belgium	+32 2 762 1800
Brazil	+55 11 847 1222
Canada	1-800-272-7537
Central & South America/Caribbean	1-305-470-8800
China	+86 21 6445 9339
Chile	+562 623-1216
Czech Republic	(420) (2) 830 85 22
Denmark	+45 43 541133
Finland	+358 3 54 100
France	+33 4 50 258025
Germany	+49 3727 90991
Hong Kong	+852 2428 8008
Hungary	+36 1 25 22 539
India	+91 22 577 1671
Italy	+39 2 451921
Japan	+81 45 861 3811
Jordan	(962) (6) 810679
Korea Choongnam	+82 417 583 1410
Korea Kyoungnam	+82 523 389 0100
Korea	+82 2 561 0414
Mexico	1-800-272-7537
Netherlands	+31 541 58500
New Zealand	+64 9 573 1523
Norway	+47 64 86 77 60
Poland	+48 22 8634942
Singapore	+65 261 5233
South Africa	+27 11 3927280
Spain	+34 1 6757300
Sweden	+46 8 760 2960
Switzerland	+41 (81) 2 526676
Taiwan	+886 2 8787 3780
Thailand	+662 693 3304
United Arab Emirates	+971 2 788587
United Kingdom	+44 1924 487000
USA	1-800-272-7537
Venezuela	+58 2 238 5422

Note: *The (+) sign in front of the country code indicates that you may need to dial an additional prefix.*

Parker Instrumentation

Parker Hannifin Corporation
Instrumentation Group Headquarters
6035 Parkland Blvd.
Cleveland, Ohio 44124-4141
Telephone: (216) 896-3000
Fax: (216) 896-4000
www.parker.com

Bulletin IP-A
Printed July 2002