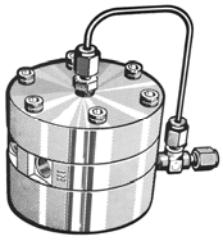
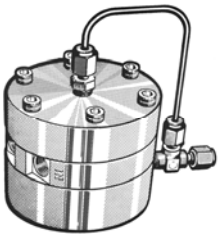
Collins Products Company
2017 Catalog

Manufacturers of the Collins Swirlklean™ Filters
& Filtering Systems





Swirlklean™ Model 1 Filters
Swirlklean™ Model 2 Filters
Swirlklean™ Model 3 Filters
Swirlklean™ Model 8 Filters
Model 9150 Filter System
Element and O-ring Lists

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Quality Products Since 1968

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The Collins Swirlklean Bypass Filter

The Collins Swirlklean bypass filter was developed to remove small micron and submicron size particles from both liquid and vapor samples. Small pore membrane filters are used in the filter. Membrane filters are thin (0.005 in. thick) porus structures composed of polymeric materials. These filter elements have uniform pore size for excellent surface retention of particles.

Features:

Sampling system and analyzer maintenance is reduced.

Uses membrane filter elements for surface filtration.

Tangential entry of bypass creates swirling action.

Keeps filter elements clean - particles are returned to process.

Small internal volume gives up to date samples ideal for control applications.

Available in corrosion resistant materials.

Replacement elements are inexpensive.

Remove particles to the sub-micron range.

Remove water droplets from vapor samples.

Filter element change out requires about 5 minutes.

Remove entrained water from liquid hydrocarbon streams.

Effective in removing iron sulfide and other small particles without frequent plugging.

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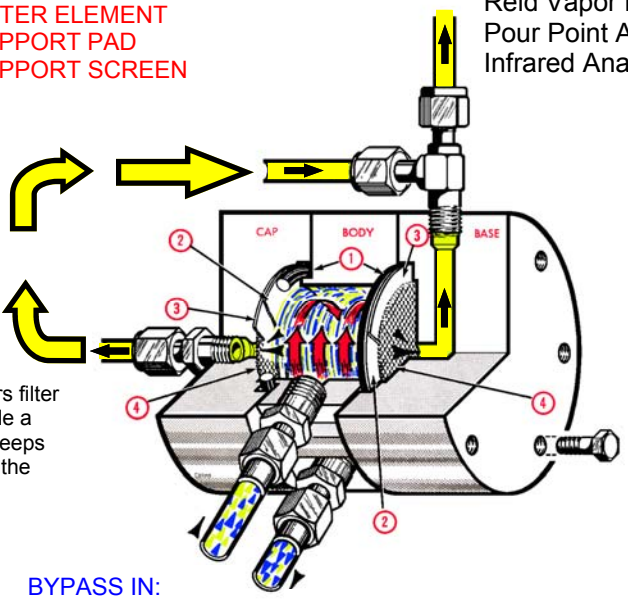
CUTAWAY VIEW OF THE COLLINS SWIRLKLEAN FILTER

REMOVES:
Rust
Iron Sulfide
Other Small Particles For A Clean Sample

1 "O" RING SEAL
2 FILTER ELEMENT
3 SUPPORT PAD
4 SUPPORT SCREEN

OUT TO:
Chromatographic Analyzers
Reid Vapor Pressure Analyzers
Pour Point Analyzers
Infrared Analyzers



Bypass stream enters filter tangentially to provide a swirling action that keeps particles washed off the filtering surface.

BASE MOUNTING:
1/4-20 NCT

BYPASS IN:
A bypass flow of about 1 to 2 GPM is recommended.

BYPASS OUT:
Particles larger than the filter element pore size are removed from the filter in the bypass stream.

Thousands of Collins Swirlklean Bypass Filters have been installed and proven to be excellent analyzer filters by large chemical and petroleum companies worldwide.

Replace those existing filters that have a tendency to plug shortly after being placed in service. The Collins Swirlklean is even recommended for dirty streams containing iron sulfide, iron rust, catalyst and other fine particles. Standard filter elements have a 0.5 micron pore size. Many other pore sizes are available.

Specify the Collins Swirlklean in your next analyzer installation for cleaner samples and more trouble-free operation.

NOTE: Although it is often successfully used as such, the Collins Swirlklean bypass filter alone is not recommended for filtering water. Please inquire about other Collins Filtering Systems such as our Model 9150 for conditioning water streams.

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THE COLLINS SWIRLKLEAN

A New Type Bypass Filter

For Analyzer Sampling Systems And Other Low Flow Filtering Applications

How often have we heard the statement, “an on-stream process analyzer is no better than the analyzer sampling system?” An analyzer may function mechanically and electronically trouble free for months, but if a good representative and up-to-date sample is not provided by the sampling system, little benefit is gained from the instrument. Most on-stream problems can be solved, if a reliable sampling system is installed.

In a majority of on-stream analyzer installations, the sampling system is required to remove small particles such as rust, catalyst, iron sulfide, liquids from slurry stream, etc. The Collins Swirlklean bypass filter was developed to remove these small micron and sub-micron size particles from both liquid and gas streams. Small pore membrane filter elements are used in the filter. These filter elements, unlike some other filters, have uniform pore size for good surface retention of particles. Particles larger than the pore size are retained on the filter surface. For Model 1 Swirlkleans, a bypass flow of 1 to 2 GPM of liquid or 2000 cc. to 1 CFM gas enters the Collins Swirlklean tangentially to provide a swirling action in the filter body. Particles that are retained on the filter surface are washed off of the filtering surface by the swirling action and returned to the process stream in the bypass.

On numerous applications, filter element change or cleaning has been extended from 2-4 hours with other type filters to weeks or months with the Collins Swirlklean. An acid slurry stream containing from 5 to 25 per cent solids down to 1 micron has been successfully filtered with a 0.5 micron filter element. Particles such as iron sulfide are readily removed with the Swirlklean filter.

Water coalescing or free water removal is another function that sampling systems are often required to perform. Hydrophobic filter elements are available that will remove most of the entrained water from both liquid and gas streams. The Collins Swirlklean is being used successfully to remove water from a liquid hydrocarbon stream that contains from 3% water at normal conditions to 25% water during process upsets. The filter is also being used in water scrubber applications to prevent entrained water droplets from entering the analyzer.

A sampling system should also have the ability to prevent undesirable material, such as oils , from entering the analyzer during process upsets. The Collins Swirlklean can minimize this problem on vapor applications. If the bypass is maintained less than 10-12 PSIG, vapor flow through the elements to the analyzer is good under normal conditions. However, when upsets occur and oils are present, they will cling to the elements and eventually coat them, preventing flow to the analyzer. Repairs required to restore the analyzer to service, consists of changing elements (requires about 10 minutes) and cleaning sampling lines. Oils do not enter the analyzer, therefore, chromatographic analyzer column change is not necessary.

An up-to-date sample is very important in all applications, especially analyzers used for control. The internal volume of the Collins Swirlklean is small; about 25 cc on the bypass side and 4 cc on the filtered sample side. By locating the Swirlklean bypass filter close to the analyzer and running 1/4” or 1/8” tubing from the filter to the analyzer, the sample entering the analyzer will have a lag time of less than one minute, in most installations. Series of liquid knockout pots and other components have been eliminated in some sampling systems by installing the Collins Swirlklean bypass filter. Keep the sampling system as simple as possible to improve reliability and simplify trouble shooting.

The Collins Swirlklean bypass filter can be supplied in corrosion resistant materials such as Teflon*, Monel, Hastelloy **, etc. Standard material is 316 stainless steel. Filter elements are available, including Teflon*, that will withstand most chemical attacks and resist temperatures to 450 degrees F.

*Teflon - E. I. Du Pont
**Hastelloy - Union Carbide

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THE COLLINS SWIRLKLEAN

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For Analyzer Sampling Systems And Other Low Flow Filtering Applications

USED ON:
1. Blended Gasoline
2. Light hydrocarbons, liquid and vapor
3. Aromatics
4. Alcohols
5. Ketones
6. Acid containing up to 25% solids
7. Glycols
8. Alum
9. Caustic
10. Spent sulfuric acid containing carbon particles

USED FOR:
1. Removal of solids, iron rust, iron sulfide, catalyst, etc.
2. Partial removal of oils in vapor streams.
3. Removal of free water in liquid hydrocarbon streams.
4. Removal of free water in gas streams.
5. Obtaining liquid sample from slurry stream.

USED WITH TYPE ANALYZER:
1. Chromatograph
2. Reid Vapor Pressure
3. End Point (gasoline sample)
4. Moisture
5. Density, gas
6. Silicon
7. Infrared

In the design and installation of sampling systems, what better insurance can you have against analyzer down-time due to sampling system failure than to have a good filtering system? Under normal conditions, this type of filtering system may not be required. However, sampling systems should be designed for process upset conditions because this is the time when an analyzer is most needed. The Collins Swirlklean can not handle all applications, but it has proved to be superior to other type filters on numerous applications.

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Swirlklean Specs.

Note: Flow rates are based on a 0.5 micron element. Greater flow rates may be obtained by using larger micron elements.
For best results, mount filter bodies close to the analyzer.

	MODEL 1 (3" filter body)	MODEL 2 (6" filter body)
BODY MATERIAL		
Standard	316 Stainless Steel	316 Stainless Steel
Special Order	Teflon, Polypropylene, Monel, Kynar, Nickel, PVC, Hastalloy C, Titanium, and custom.	Teflon, Polypropylene, Monel, Kynar, Nickel, PVC, Hastalloy C, Titanium, and custom.
FILTER ELEMENTS		
Type:	Membrane or Stainless Steel	Membrane or Stainless Steel
Pore Size: (Standard)	0.5 Microns	0.5 Microns
(Available)	100, 65, 50, 30, 21, 10, 5, 3, 0.5, 0.2	100, 65, 50, 30, 21, 10, 5, 3, 0.5, 0.2
Total Filter Surface:	22 Sq. Cm.	126 Sq. Cm.
Element Material:	Depends on Application	Depends on Application
INTERNAL VOLUME		
Bypass Side:	25 Cu. Cm.	160 Cu. Cm.
Analyzer Sample Side:	4 Cu. Cm.	10 Cu. Cm.
RECOMMENDED FLOW RATES - LIQUID		
Bypass Stream:	1 to 2 GPM Minimum 3.78 to 7.57 liters/minute 227 to 454 liters/hour 60 to 120 gallons/hour	3 to 6 GPM Minimum 11.36 to 22.71 liters/minute 681 to 1363 liters/hour 180 to 360 gallons/hour
Analyzer Sample:	50 Cu. Cm./Min. .05 liters/minute .013 gallons/minute 3 liters/hour .79 gallons/hour	275 Cu. Cm./Min. .275 liters/minute .073 gallons/minute 16.5 liters/hour 4.36 gallons/hour
RECOMMENDED FLOW RATES - VAPOR		
Bypass Stream	2000 Cu. Cm./Min. 2 liters/minute 120 liters/hour	0.5 to 2 CFM 14,158 cc/min. to 56,633 cc/min. 14.16 liter/min. to 56.63 liter/min. 849.5 liter/hr. to 3,398 liter/hr.
Analyzer Sample:	To 1000 Cu. Cm./Min. 1 liters/minute 60 liters/hour	To .5 CFM 14,158 cu. cm./minute 14.16 liter/minute 849 liter/hour
PRESSURE TESTED TO:	5000 PSIG	2500 PSIG
MAXIMUM TEMPERATURE:	Depends on elements and "O" rings used.	Depends on elements and "O" rings used.
Standard Element	120 degrees C 250 degrees F	120 degrees C 250 degrees F
PROCESS CONNECTIONS:	1/4" FPT	3/8" FPT
ANALYZER CONNECTIONS:	1/8" Tube Standard 1/4" Tube Available	1/8" Tube Standard 1/4" Tube Available

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Steps for Replacing Filter Elements in Collins Swirlklean Filters

Step 1 Stop bypass flow through filter

Step 2 Remove the tubing that connects the top and bottom pieces of Swirlklean filter. This will require a 7/16" or 9/16" open end wrench. The 7/16" wrench is used on filters with 1/8" tubing.

Step 3 Remove the six bolts that hold the filter body together. A Model 1 Swirlklean will require a 7/16" wrench or socket while a Model 2 requires a 3/4" wrench or socket.

Step 4 Separate the three filter body sections.

Step 5 Remove the "O" rings in the filter top and bottom that hold the filter elements in place. Inspect the "O" rings for damage or deterioration to determine if they need replacing.

Step 6 Remove the used filter elements.

Step 7 Inspect the support pad if your filter element requires one. Generally, stainless steel filter elements do not require a support pad.

Step 8 Periodically inspect the support screen that is snapped into the filter body cap and bottom.

Step 9 To reassemble, reverse the previous process using new filter elements. If the elements have a side that is smoother than the other, then make sure that this smooth side is up when the o-ring is reinstalled so that the smoothest surface is in contact with the bypass stream. This will greatly reduce the ability for particles to adhere to the filter element surface.
O-rings should be installed on top of the filter elements, not over the retention ring of the middle section. Giving the o-rings a slight stretch will help them hold the elements tighter in place during reassembly. To help prevent o-ring pinching, a very light film of silicon grease might be applied to the o-rings before placing into the end caps.

Note: Collins Products Company keeps a complete supply of replacement parts in stock. Most replacement parts ship the same or next day.

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Torque Values for Collins Swirlklean Filters:

Model 1 Swirlklean: 50 inch pounds force

Model 2 Swirlklean: 30 foot pounds force

Model 3 Swirlklean: 50 inch pounds force

Our filter design does not require excessive torque to ensure correct O-ring sealing. Exceeding the above values greatly increases the chances of thread galling.
We do not use thread lubes because many customers do not allow their use on process streams.

Use of Galvanized Bolts in Model 2 Swirlkleans:

The reason we use galvanized steel bolts in Collins Model 2 Swirlkleans is to prevent galling.

Thread galling is most prevalent with fasteners made of stainless steel, aluminum, titanium, and other alloys which self-generate an oxide surface film for corrosion protection.

During fastener tightening, as pressure builds between the contacting and sliding thread surfaces, protective oxides are broken, possibly wiped off, and interface metal high points shear or lock together. This cumulative clogging-shearing-locking action causes increasing adhesion.

In the extreme, galling leads to seizing - the actual freezing together of the threads. If tightening is continued, the fastener can be twisted off or its threads ripped out. At this point the filter body is damaged and the pieces may not come apart.

Using galvanized bolts in stainless steel threads is a way around this problem and the bolts are cheap and readily available if they become corroded and need replacing.

We use stainless steel bolts with Model 1 Swirlkleans because the threads are smaller and much less likely to gall.

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Considerations When Choosing Swirlklean Configurations

For each different application, we need the following information:
Please answer in our units of measurement to avoid discrepancies.

Is this a liquid or vapor stream?_____

Bypass flow rate available: _____ l/min

Flow rate required to analyzer: _____ mil/min.

Micron size of elements: _____ 100, 65, 50, 30, 21, 10, 5, 3, 1, 0.5, 0.2 available depending on filter body.(0.2 or 0.5 micron is required to remove entrained water from gas streams)

Maximum temperature of sample stream: _____ deg. C.

Which o-ring material do you require? _____ Viton, Teflon, EPR, Buna N, Kalrez, Chemrez 505, and Chemrez 615 are available.

Do you prefer 1/8" or 1/4" To Analyzer connector? _____

Filter body material:_____ 316 L Stainless Steel is standard.
Silconert coatings, Polypropylene, Polyethylene, Kynar, Teflon, Monel, Titanium, Hastalloy C are available by special order.

Since we're not on site with your application and unaware of other components being used on the stream, I'll defer to the judgment of you and your engineers as to the chemical compatibility with our materials. We make recommendations of chemical compatibility with our components based on information provided and referenced when available with our chemical composition guides and online resources. However, the final decision is the customer's and should be based on the user's experience and research.

The components most commonly used in our Swirlklean filters are:
316L Stainless Steel
Viton
Teflon
Polypropylene.

If these are not compatible with your stream we can possibly make substitutions.

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Creating Swirlklean Part Numbers

The following is a brief explanation of how to create or decipher Collins Swirlklean part numbers.

Model 1 Examples:

P/N 6800-1104-4 Collins Model 1 Swirlklean
6800 Indicates Model 1 with a 316 stainless steel body
11 Element Section: (last two digits of P/N 6711 filter elements)
04 O-Ring Section: (last two digits of P/N 6704 O-rings)
-4 Tubing Section: (indicates 1/4" analyzer connection. Left blank for standard 1/8")

P/N 6800-5630 Collins Model 1 Swirlklean
6800 Indicates Model 1 with a 316 stainless steel body
56 Element Section: (last two digits of P/N 6756 filter elements)
30 O-Ring Section: (last two digits of P/N 6730 O-rings)
Tubing Section: (Left blank for standard 1/8" tubing/analyzer connection)

Model 2 Examples:

P/N 7200-3330-4 Collins Model 2 Swirlklean
7200 Indicates Model 2 with a 316 stainless steel body
33 Element Section: (last two digits of P/N 7133 filter elements)
30 O-Ring Section: (last two digits of P/N 7130 O-rings)
-4 Tubing Section: (indicates 1/4" analyzer connection. Left blank for standard 1/8")

P/N 7200-2804 Collins Model 2 Swirlklean
7200 Indicates Model 2 with a 316 stainless steel body
28 Element Section: (last two digits of P/N 7128 filter elements)
04 O-Ring Section: (last two digits of P/N 7104 O-rings)
Tubing Section: (Left blank for standard 1/8" tubing/analyzer connection)

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Differential Pressures Across Collins Swirlklean Filters

Across filter body:

For the Swirlklean Model 1 and Model 2: The differential pressure across the "Bypass In" and "Bypass Out" ports of the filter body is typically around 5 psi.

At 2 gpm, the pressure drop is about 2½ psi.
At 5 gpm, the pressure drop is about 5 psi.
At 10 gpm, the pressure drop is about 10 psi.

Across filter elements:

Based on a 0.2 micron hydrophobic filter element, the differential pressure across the Swirlklean filter elements works best around 20 - 25 psi.

For unwetted, hydrophobic elements, the pressure required to force water through is 35psi or greater.

With a 50 micron element, the differential pressure drops to between 5 -10 psi.

Because the elements are well supported, there is no real maximum differential pressure. You will be limited by the pressure limits of the filter body.

Exact numbers are not available due to the wide variety of streams and particles that the Swirlklean filters may be used on. The filter elements will eventually become clogged, and the differential pressures will also change to reflect this.

Flow rates:

Model 1
Minimum flow rate recommended is 1 to 2 gpm.
Normal range is 2 to 10 gpm.
Maximum flow through a Model I should not exceed 10 gpm.

Model 2
Minimum flow rate recommended is 3 gpm.
Normal range is 3 to 10 gpm.
Maximum flow through a Model II should not exceed 15 gpm.

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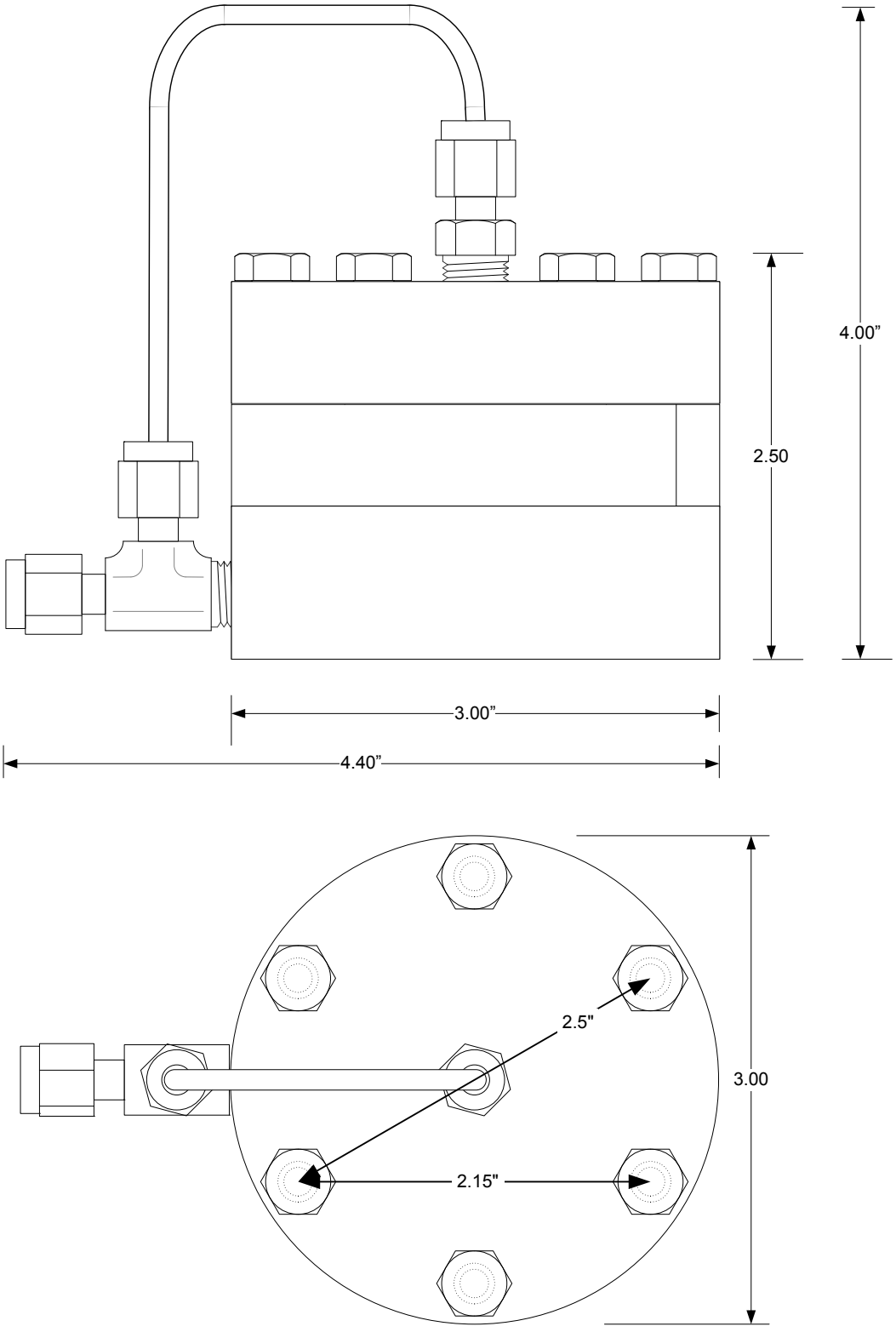
Collins Swirlklean Model 1 External Dimensions



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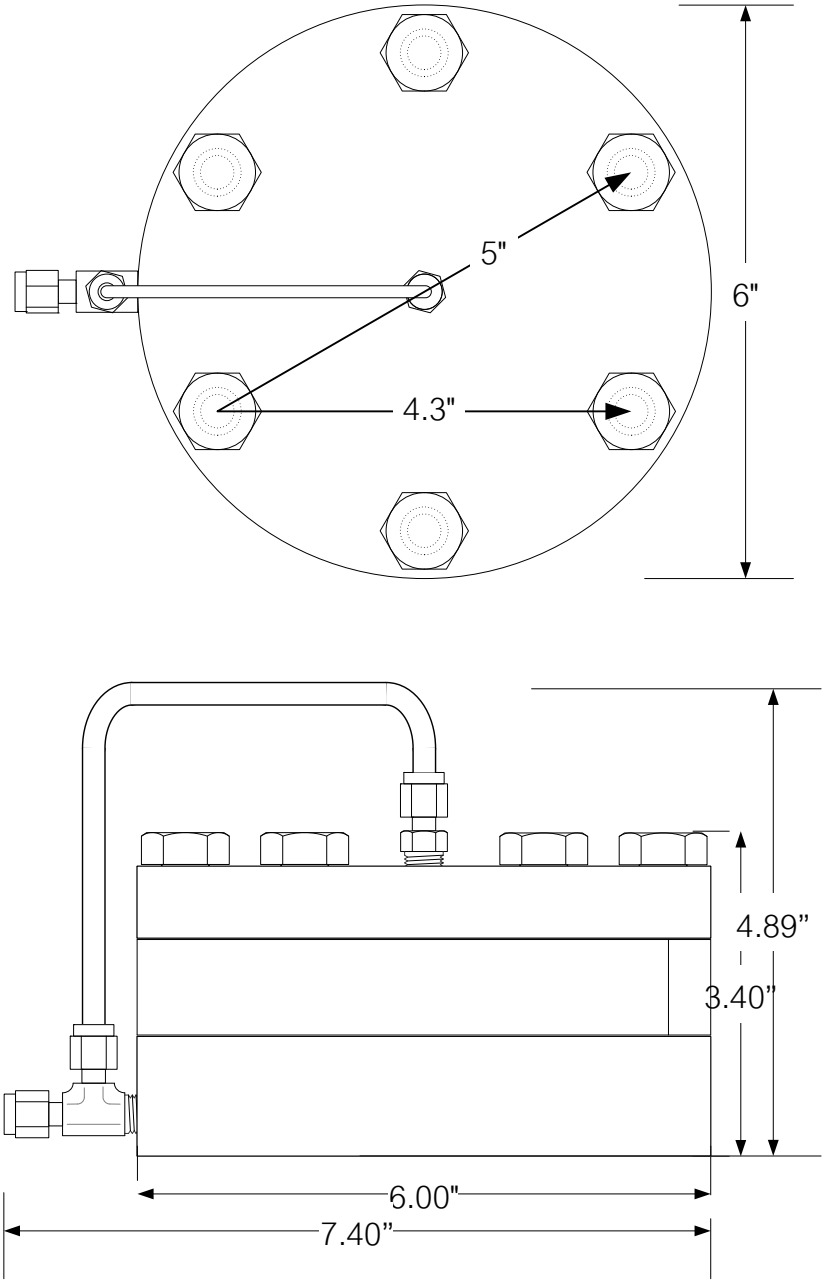
Model 2 Swirlklean External Dimensions

Drawing reduced by 50%



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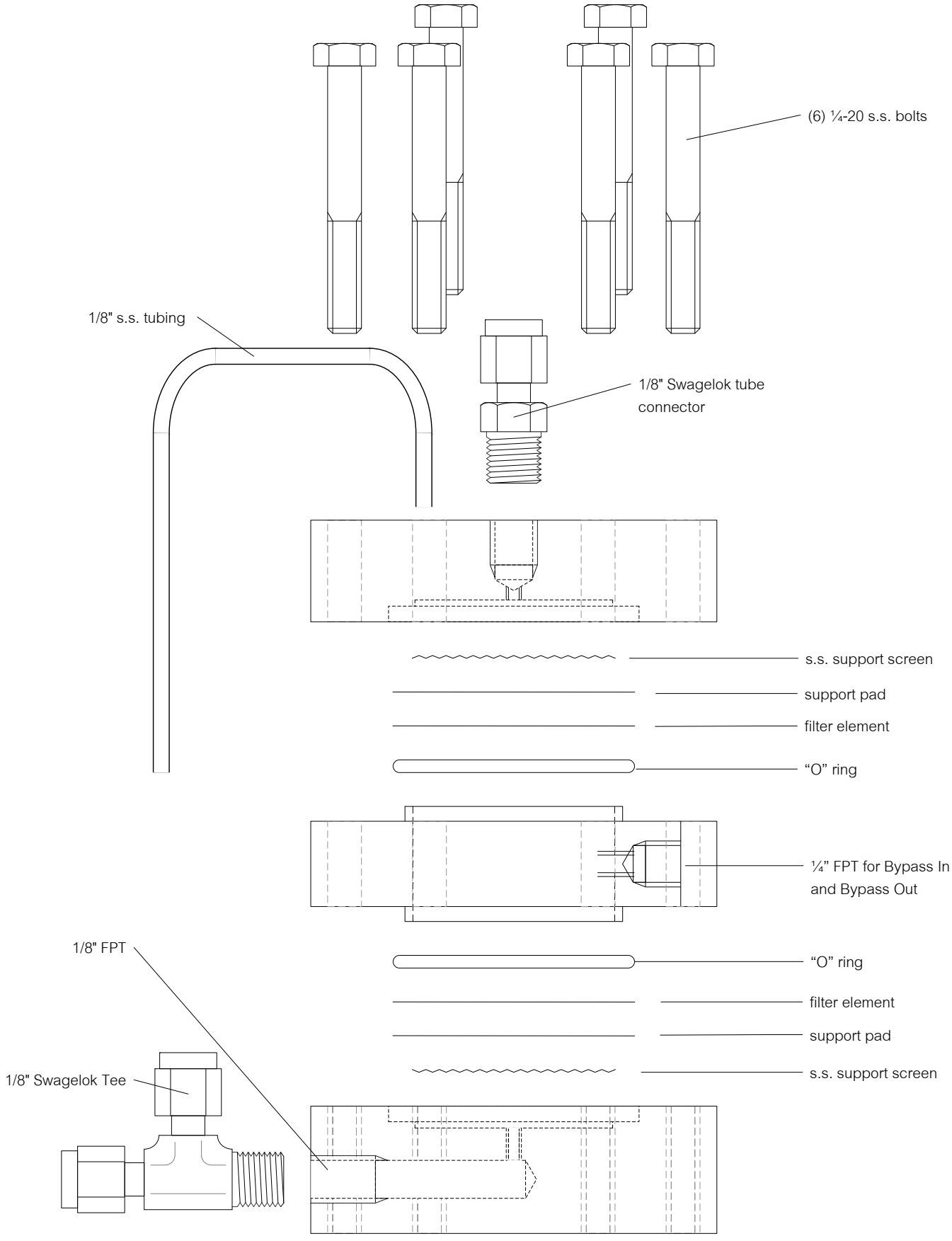
Collins Swirlklean Model 1 Exploded View



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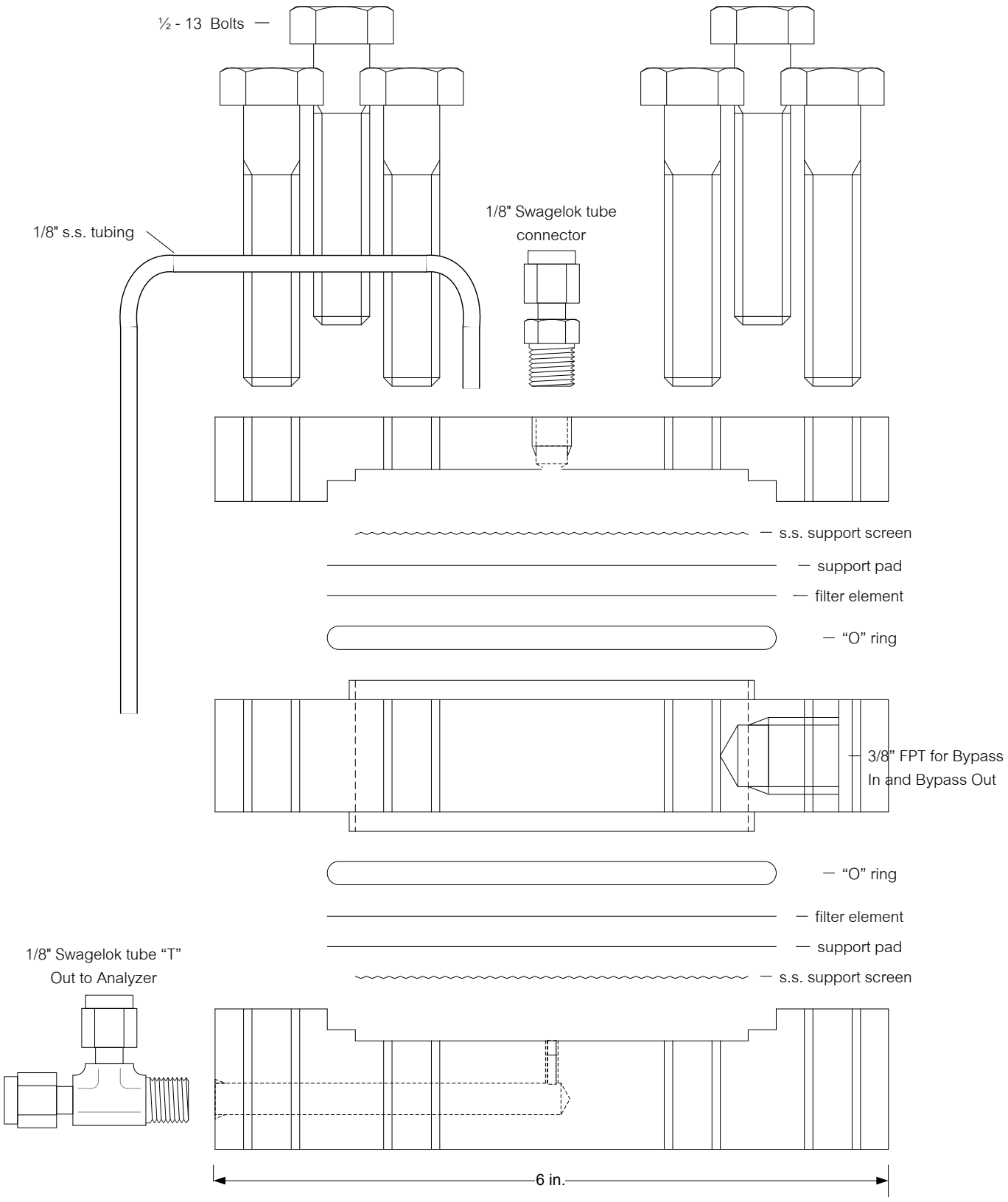
Collins Swirlklean Model 2 Exploded View

shown 80% of actual size



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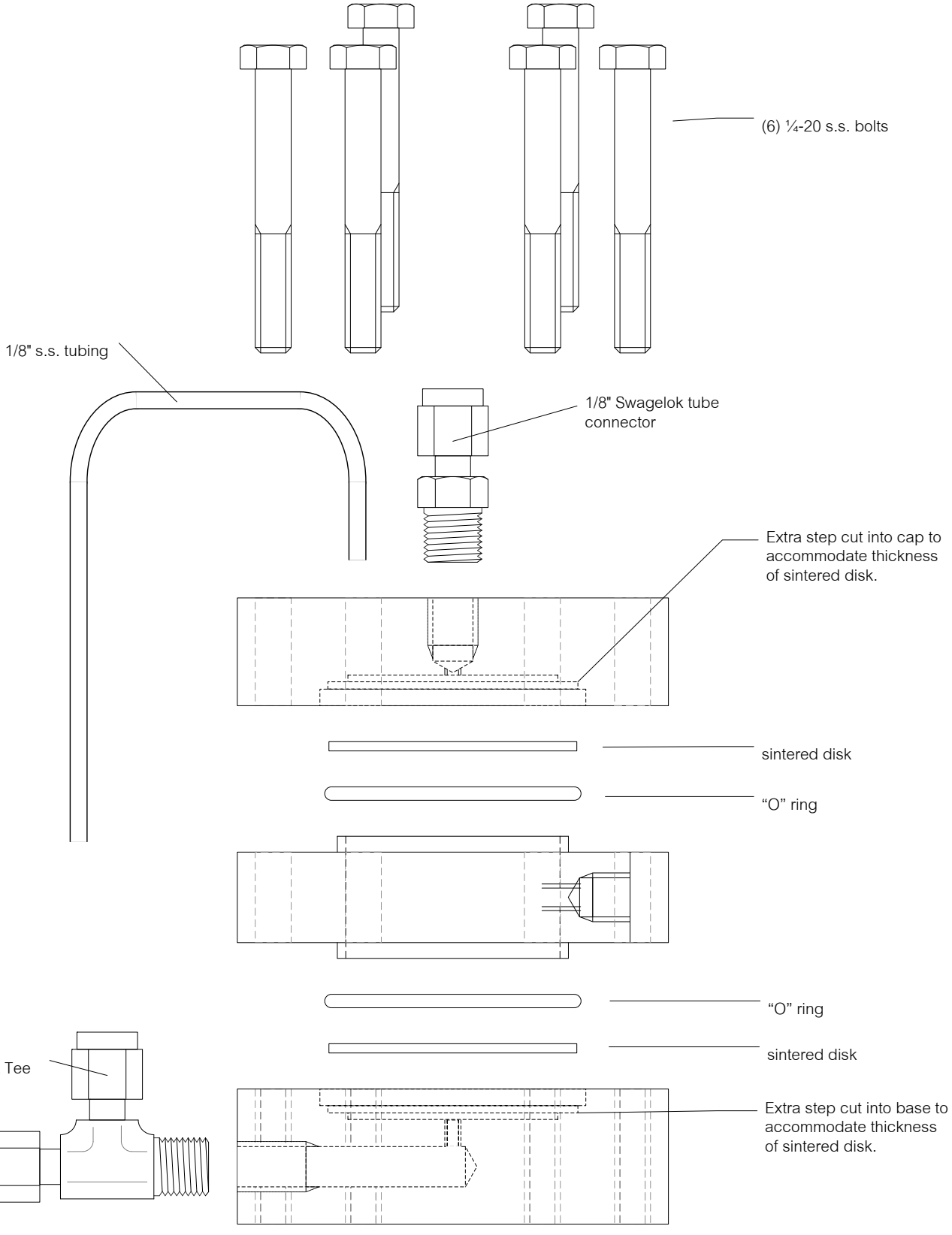
Collins Swirlklean Model 1 SD Exploded View (Sintered Disk)



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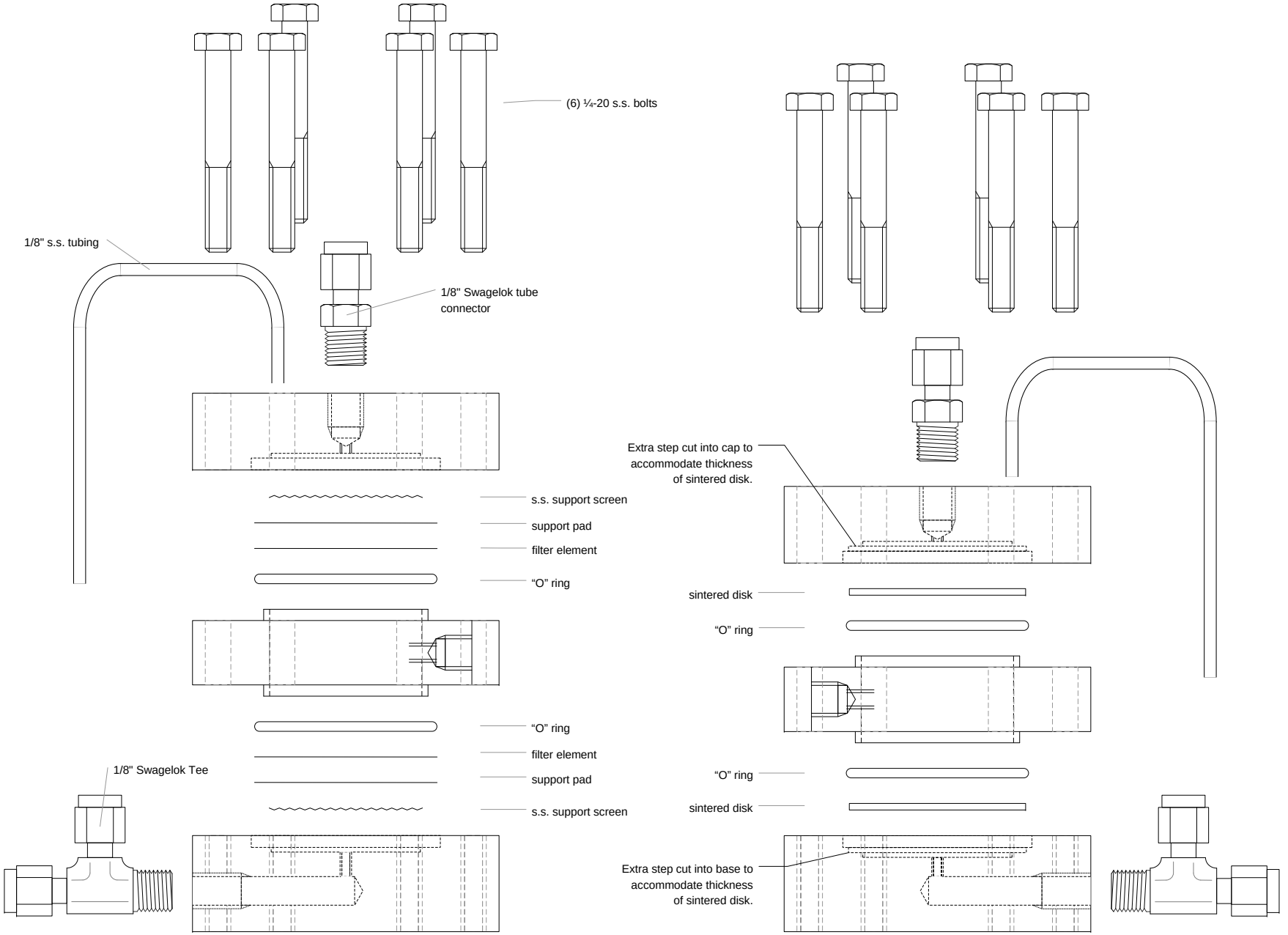
Comparison of Model I Swirlklean and Model I Swirlklean SD (Sintered Disk)



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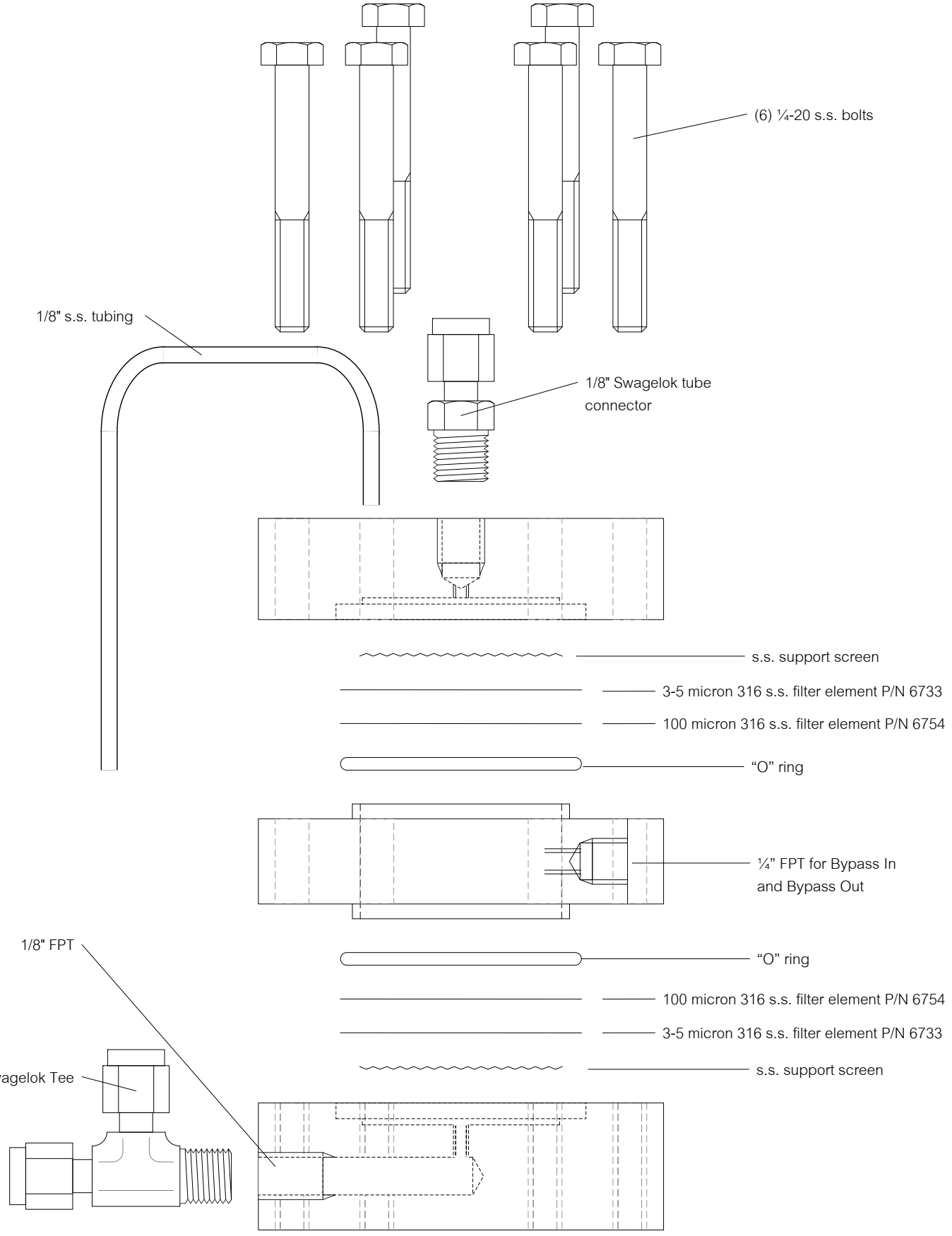
Collins Swirlklean Model 1 Suggested Element Assembly For Steam Blowback Applications



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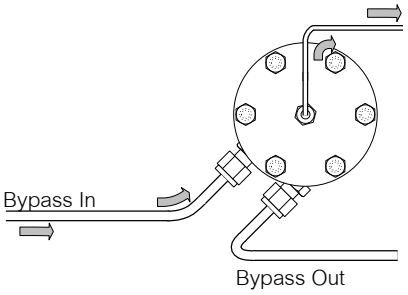
Recommended Flow Rates

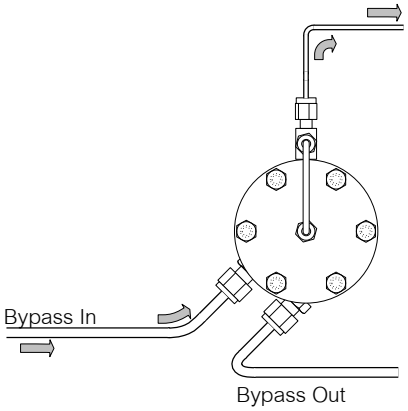
Swirlklean Model 3 Filter



Filtered Sample to Analyzer: 25cc/min. (liquid)
1000cc/min. (vapor)

Bypass: 1/6 to 1 gpm (liquid)
100 to 2000 cc/min (vapor)

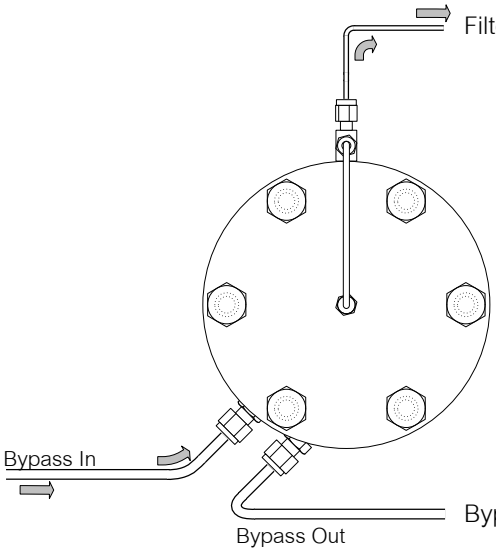
Swirlklean Model 1 Filter



Filtered Sample to Analyzer: 50cc/min. (liquid)
2000cc/min. (vapor)

Bypass: 1 to 5 gpm (liquid)
2000cc/min (vapor)

Swirlklean Model 2 Filter



Filtered Sample to Analyzer: 275cc/min. (liquid)
28317cc/min. (vapor)

Bypass: 3 to 10 gpm (liquid)
14158cc/min (vapor)

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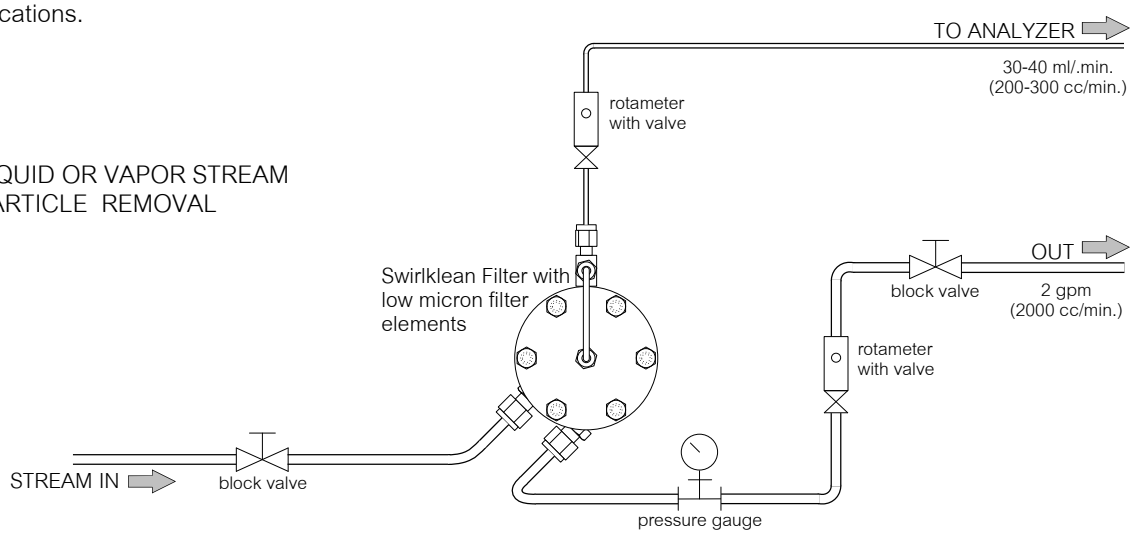
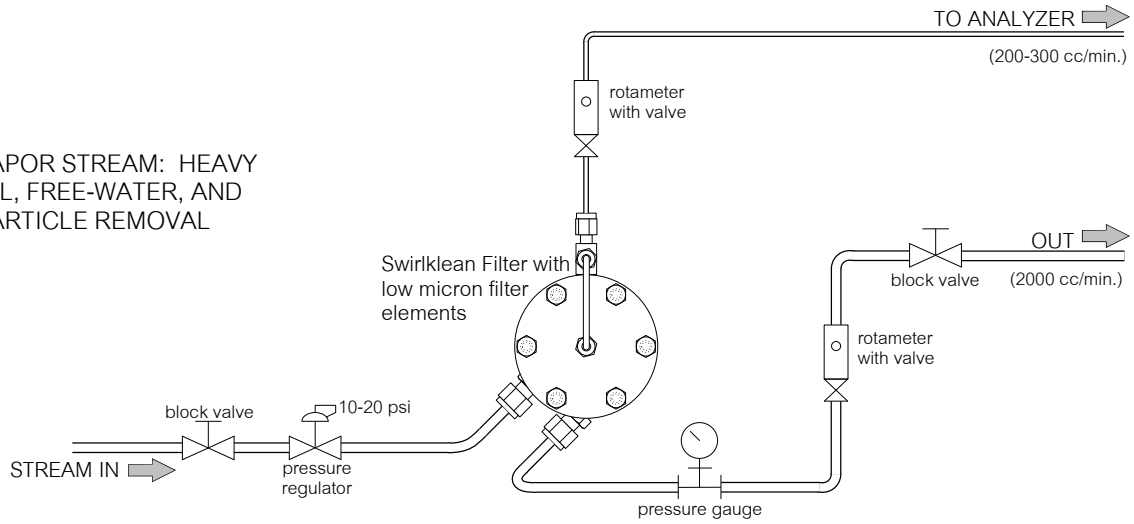
Basic Swirlklean Applications

Sketches below show sampling systems with the Collins Swirlklean Bypass Filter. Most hydrocarbon and vapor applications can be filtered with the systems shown below. Other applications may require additional components for satisfactory analyzer operation. Please inquire about our other filtering systems for more difficult applications.

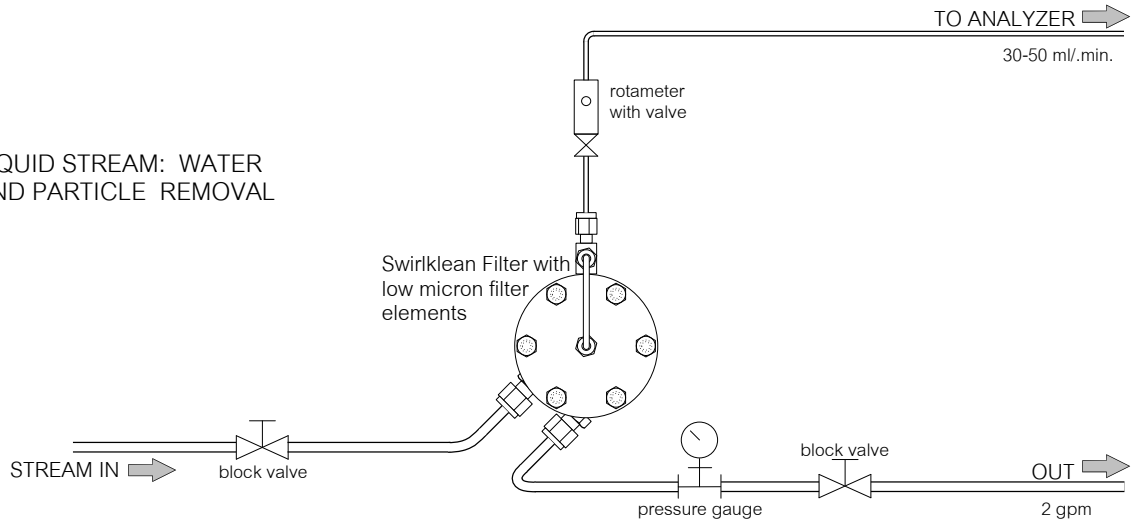
LIQUID OR VAPOR STREAM PARTICLE REMOVAL



VAPOR STREAM: HEAVY OIL, FREE-WATER, AND PARTICLE REMOVAL



LIQUID STREAM: WATER AND PARTICLE REMOVAL



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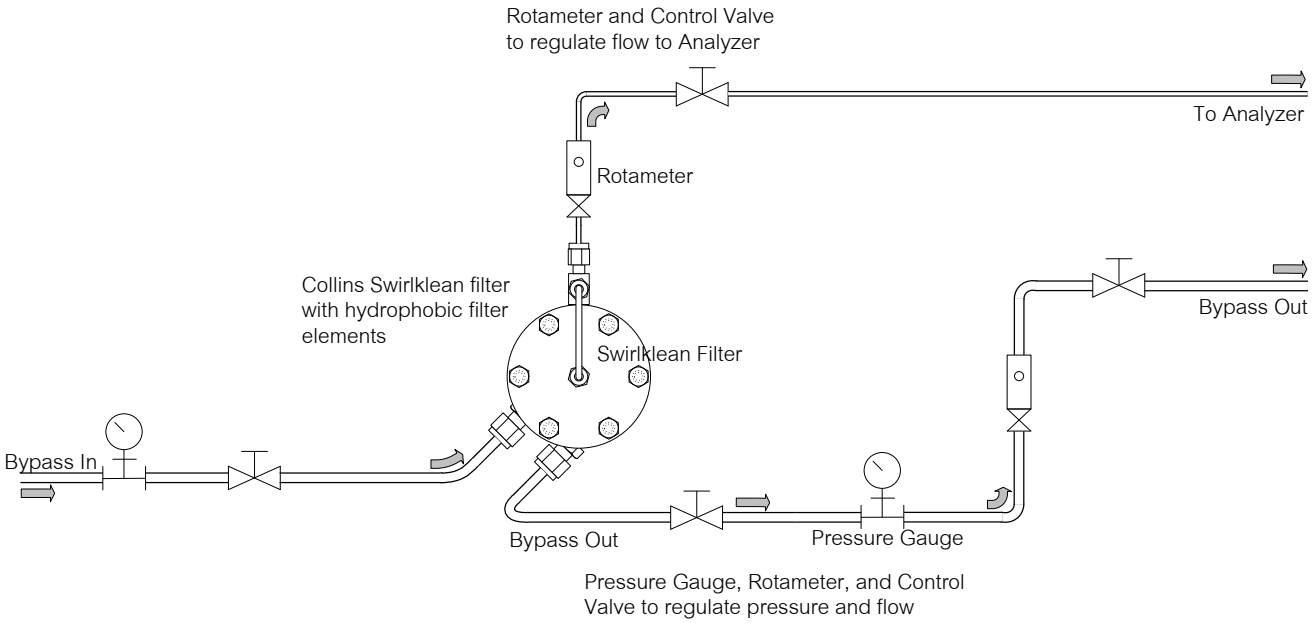
Removing Water from a Vapor Stream

The Collins Swirlklean Filter with hydrophobic filter elements is capable of removing water droplets, but not water vapor.

Keeping sample at maximum pressure in the filter body will create more water droplets for removal.



Note:
The rotameter on the bypass stream may be eliminated and replaced with pressure gauges on the bypass stream before and after the Swirlklean filter.

For optimum performance, maintain a differential pressure of 5-10 psi. across the Bypass In and Bypass Out ports.

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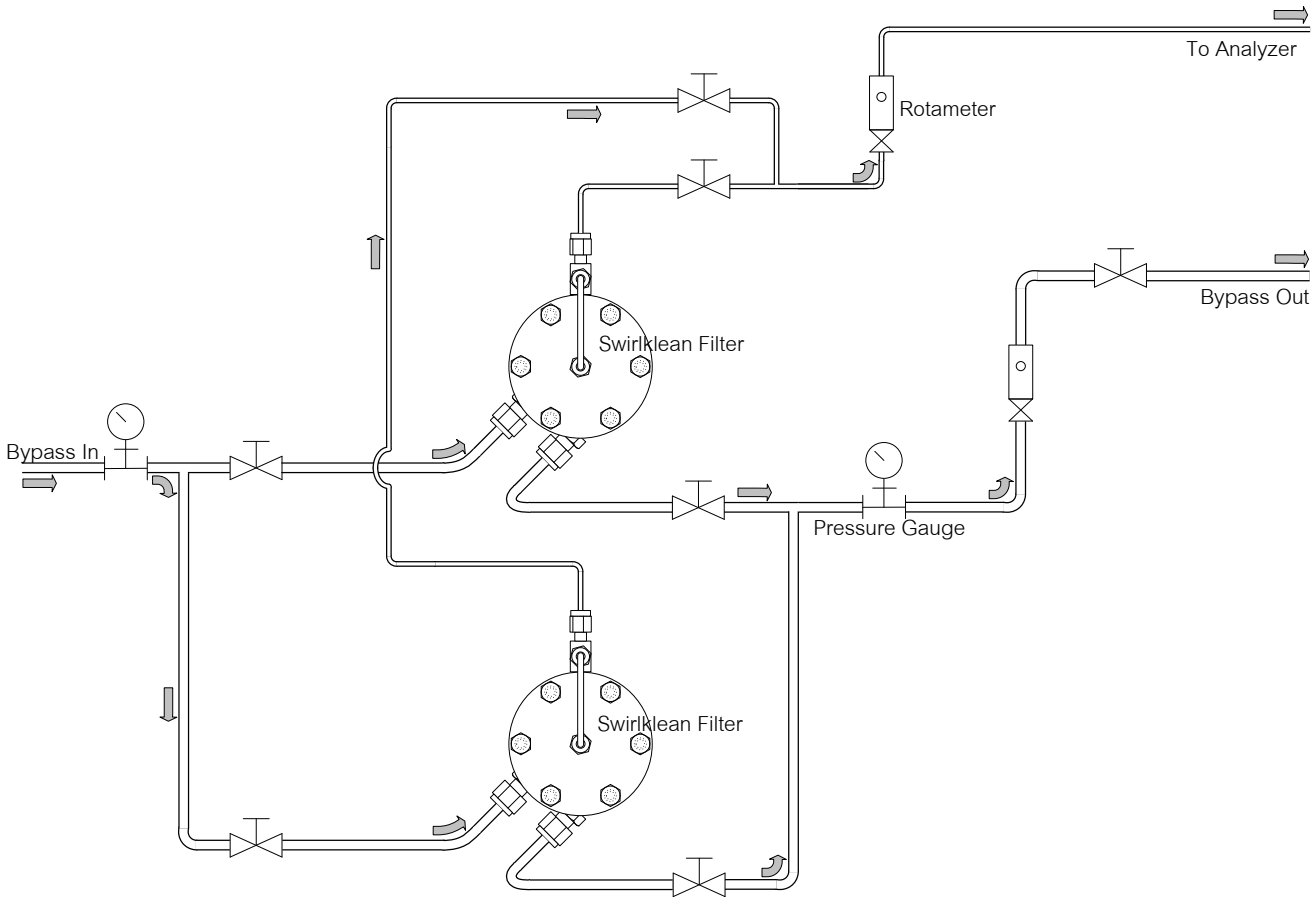
Dual Collins Swirlklean Filters for Maintenance Purposes

Possible layout for allowing continuous filtering while changing elements in the Collins Swirlklean Filters

Bypass flow can be shut off to the filter body needing an element change-out while the other Swirlklean continues to supply a clean sample to your analyzer.



Note:
The rotameter on the bypass stream may be eliminated and replaced with pressure gauges on the bypass stream before and after the Swirlklean filter.

For optimum performance, maintain a differential pressure of 5-10 psi. across the Bypass In and Bypass Out ports.

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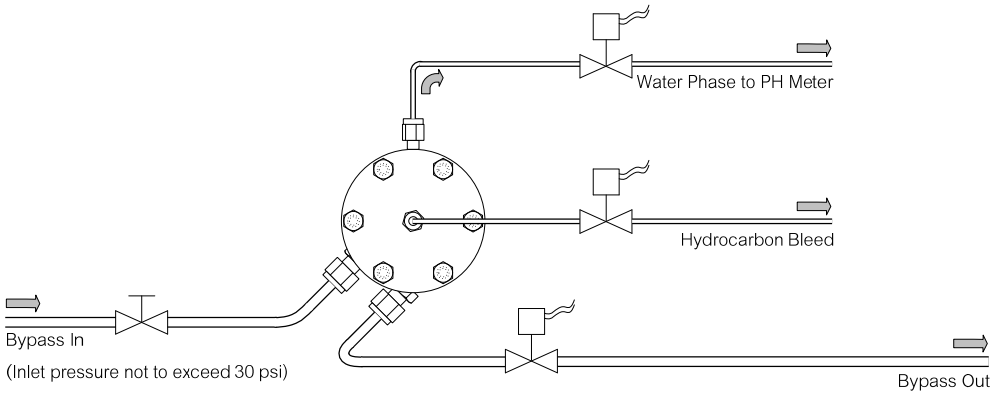
Using a Collins Swirlklean Filter To Sample Water Phase

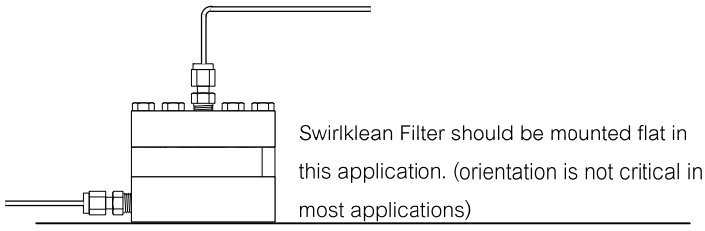
A: Block BYPASS OUT

B: Open HYDROGEN BLEED valve.

C: After 30 sec. to 1 min., open WATER PHASE to PH METER block valve

D: Af ter sample is taken, open BYPASS OUT valve and close HYDROCARBON BLEED and WATER PHASE block valve.





Swirlklean Filter should be mounted flat in this application. (orientation is not critical in most applications)

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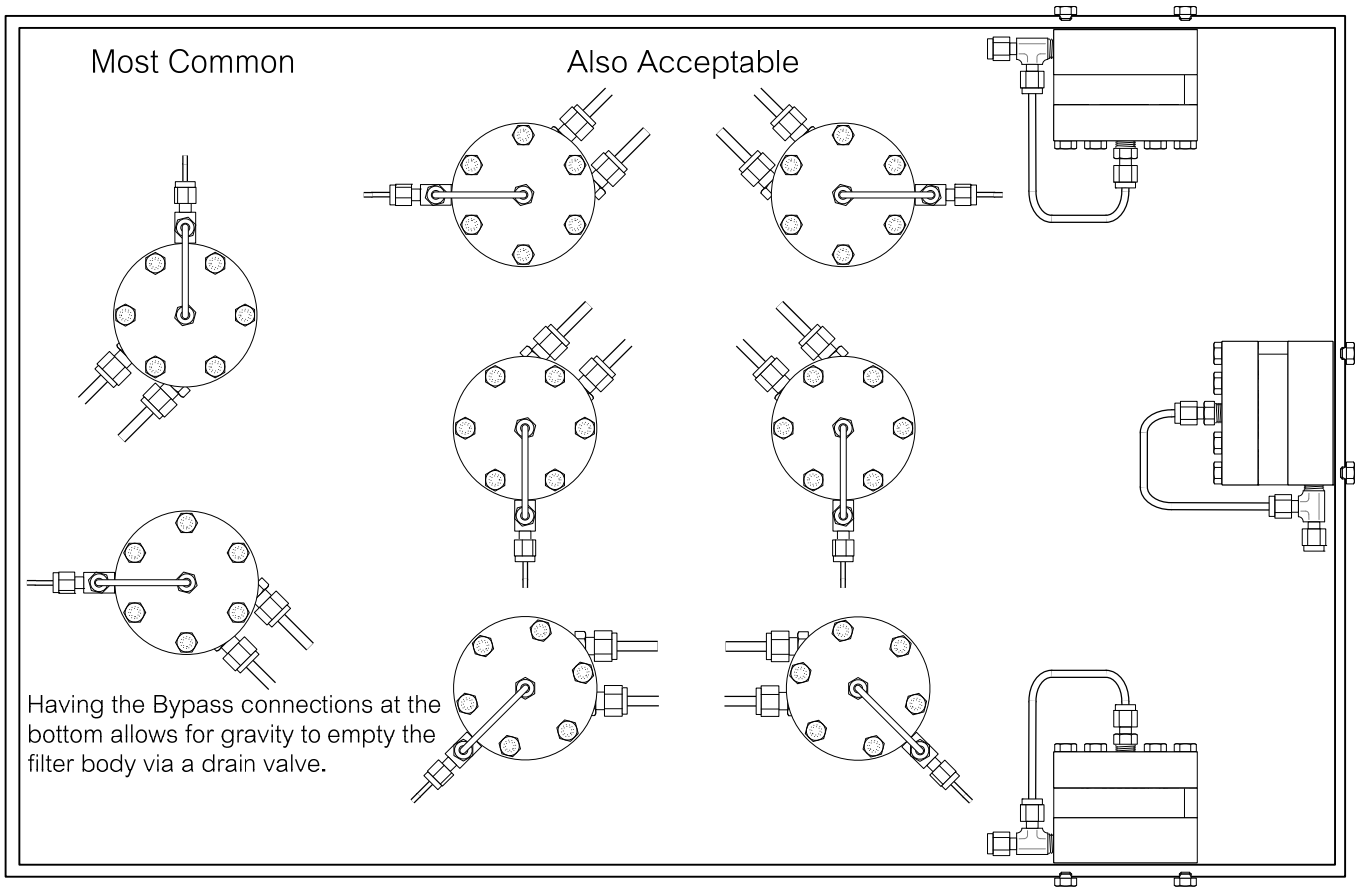
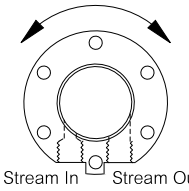
Mounting Orientation for Collins Swirlklean Filters

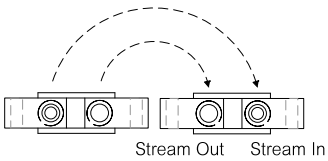
In most applications, the orientation of the Collins Swirlklean Filters is not critical. However, filter should be mounted flat when sampling water phase. (layout examples found on separate page)



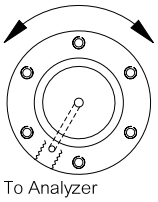
Middle piece top view



Middle piece side view



Bottom piece top view



The Middle and Bottom pieces can be turned to fit installation requirements without affecting the performance of the filter. The Middle section can also be flipped to reverse Stream In and Stream Out to meet installation requirements.

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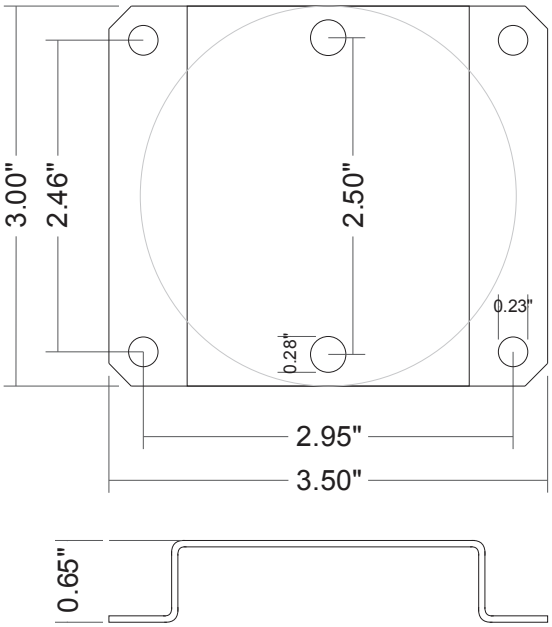
Stainless Steel Mounting Brackets

(optional, useful for removing compete filter body for maintenance)

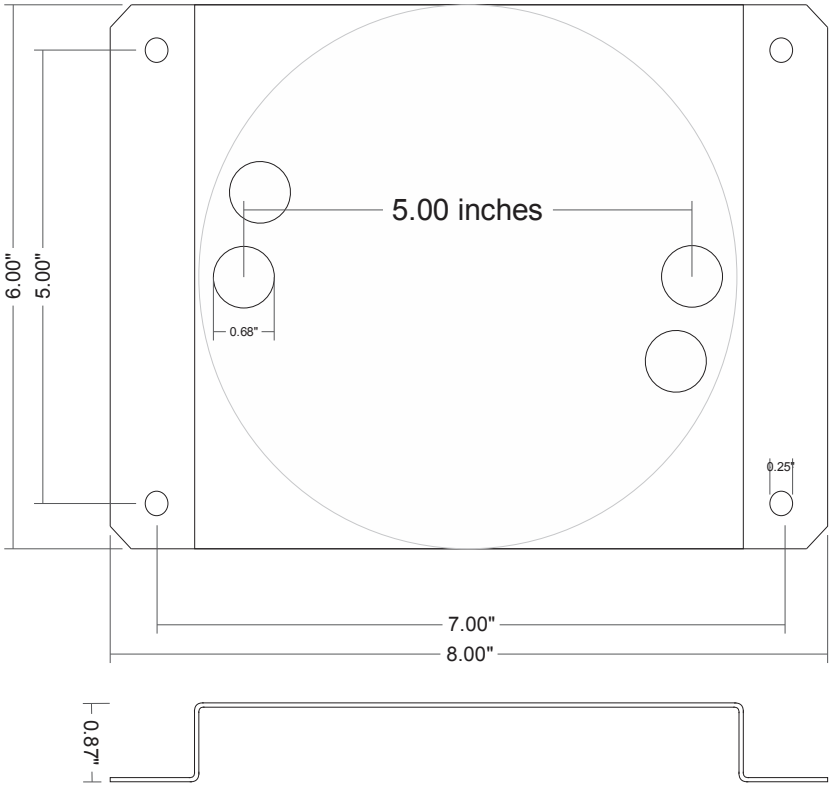
6800-MB

Fits Collins Model 1 and 3 Swirlklean Filters



7200-MB

Fits Collins Model 2
Swirlklean Filters



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Collins Model 3 Swirlklean Bypass Filter

For Pilot Plants Etc.

(One Filter Element Model)

Specifications

Body Material	Standard:	316 Stainless Steel
	Special Order:	other materials
Filter Elements	Number Required:	one
	Types:	membrane or Stainless Steel
	Pore Size: (Standard) (Available)	 0.5 micron 0.2 to 100 micron
	Total Filter Surface:	11 sq. cm.
	Element Material:	depends on application
Internal Volume	Bypass Side:	8 cc.
	Analyzer Sample Side:	.5 cc.
Recommended Flow Rates - Liquid	Bypass Stream:	1/6 to 1/2 GPM
	Analyzer Sample:	25 cc./min. Based on standard 0.5 micron filter elements. Greater flows can be obtained with larger micron filter elements.
Recommended Flow Rates - Vapor	Bypass Stream:	100 to 2000 cc./min.
	Analyzer Sample:	to 1000 cc./min.
Pressure Tested To:		1000 PSIG
Maximum Temp.:		120 to 324 degrees C depending on o-ring and element combinations.
	Standard Element:	120 degrees C
Process Connection (Bypass):		1/8 inch
Overall Filter Diameter:		3 inches

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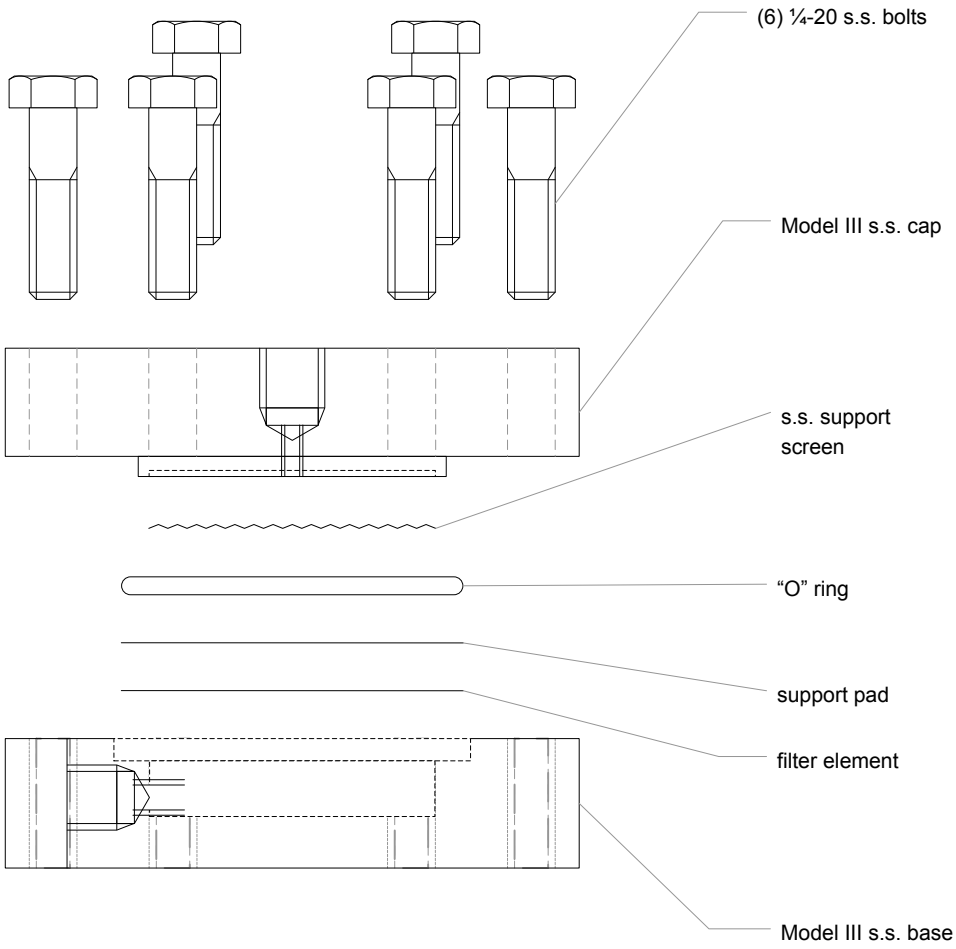
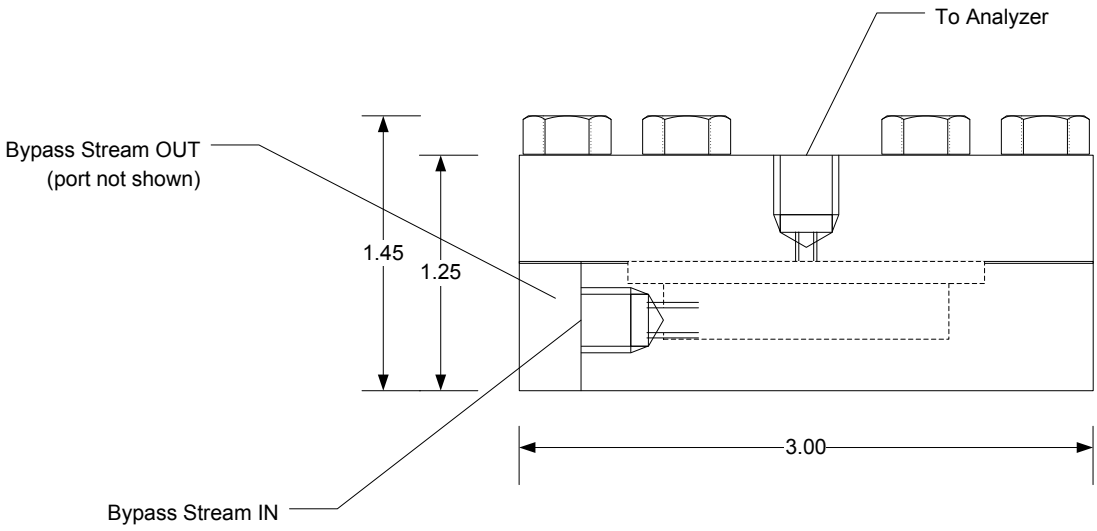
Collins Model 3 Swirlklean Filter





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Collins Model 8 Swirlklean Bypass Filter

(Model 9500 Available in quantities of 5 or more only)

Specifications

- Body Design — Same as Models 1 and 2 Swirlkleans
- Body Material — 316 S. S.
- Filter Elements
  - Type: Membrane or Stainless Steel Mesh
  - Pore size:
    - (Standard) 0.5 microns
    - (Available) 0.2 to 100 microns
  - Total filter surface: 690 Square cm or 106 square inches
    9½" diameter elements
- Internal Volume
- Bypass side: 0.45 gallon
- Recommended flow rates
  - Bypass stream: 15 GPM/min
  - Analyzer Sample: 1500 ml/min - maximum
- Process Connection — 1/2" FPT
- Analyzer Connections: 1/4" tube
- Dimensions
  - Diameter: 12"
  - Height: $5^{1}/_{2}$"
  - Weight: 80 lbs.

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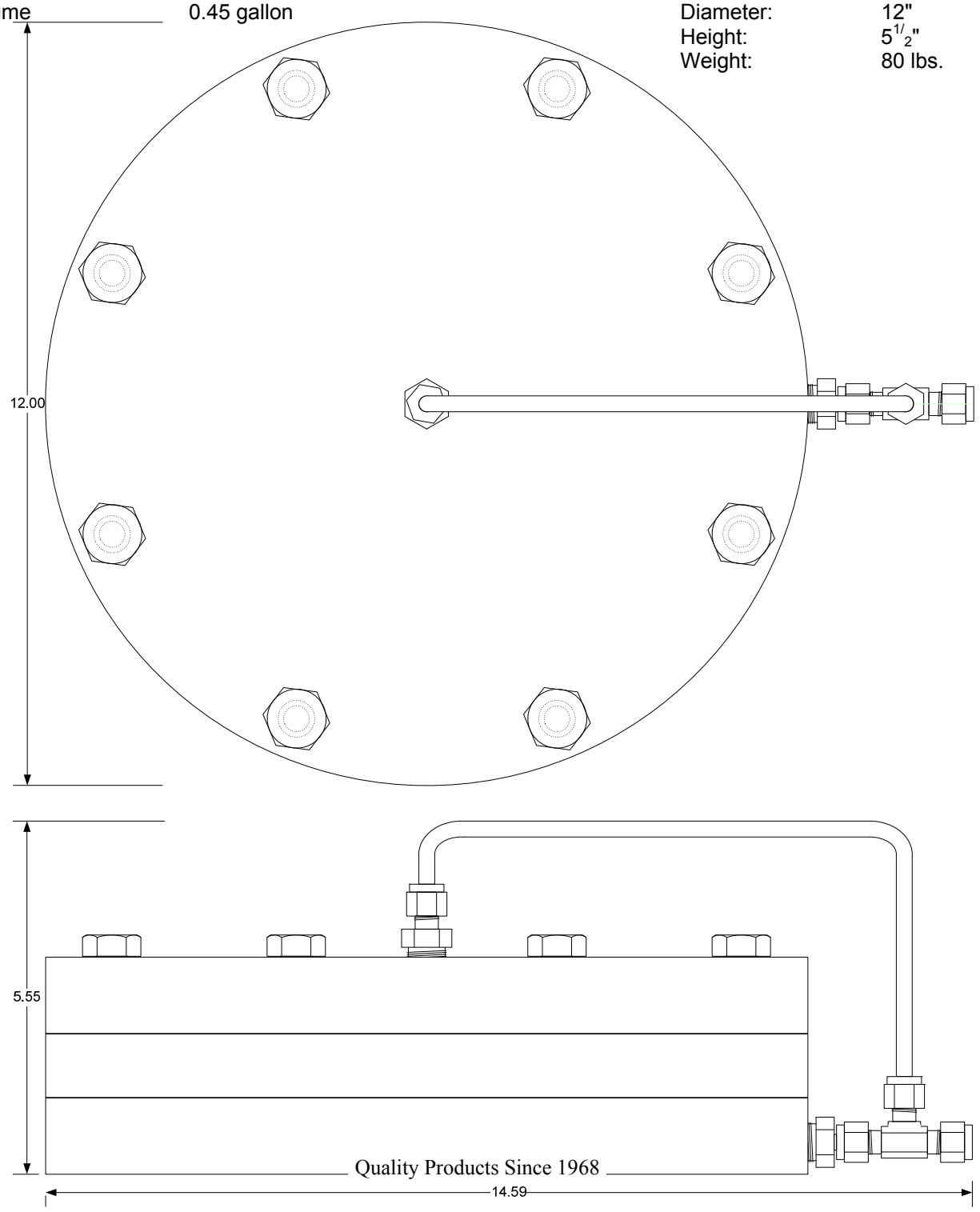
Collins Model 8 Swirlklean Bypass Filter Specifications

Body Design	Same as Models 1 and 2 Swirlkleans
Body Material	316 S. S.
Filter Elements	
Type:	Membrane or Stainless Steel Mesh
Pore size:	
(Available)	0.2 to 100 microns
Total filter surface:	690 Square cm or 106 square inches
Internal Volume	0.45 gallon

Recommended flow rates	
Bypass stream:	15 GPM/min
Analyzer Sample:	1500 ml/min - max.
Process Connection	1/2" FPT
Analyzer Connections:	1/4" tube
Pressure Tested To:	400 psi
Dimensions	
Diameter:	12"
Height:	$5^{1}/_{2}$"
Weight:	80 lbs.



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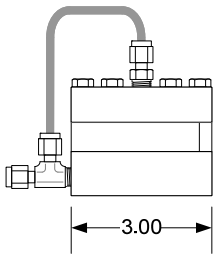
Collins Swirlklean Size Comparisons

Model 1 Swirlklean

Filter body diameter: 3”

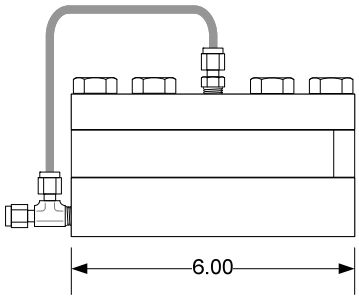
Weight: 5 lbs.



Model 2 Swirlklean

Filter body diameter: 6”

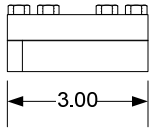
Weight: 20 lbs.



Model 3 Swirlklean

Filter body diameter: 3”

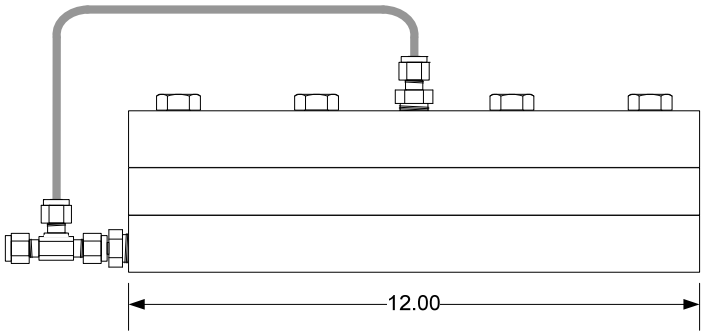
Weight: 3 lbs.



Model 8 Swirlklean

Filter body diameter: 12”

Weight: 80 lbs.



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Collins Model 9150 Filtering System

The Model 9150 Filter system is based on the highly effective Model 9300 and is recommended for small sample flow applications where the sample to the analyzer can be blocked during part of the sampling cycle. Blocking the analyzer sample flow provides a time for maximum cleaning of the filter element. Maximum cleaning occurs during the time the differential pressure across the element is zero.

Locate the model 9150 close to the analyzer to minimize the 1/8" tube sample line. Use the bypass flow stream to continuously update the sample. Bypass flow is used only to update the sample. Turbulence to clean the filter element is provided by the 3000 RPM motor driven agitator.

FEATURES:

√ Removes particles larger than 0.2 micron

√ Built in agitator creates turbulence to clean filter element

√ Agitator and motor are magnetically coupled to prevent shaft leaks

√ Small internal volume of the filter housing gives fast response to stream composition changes

√ System uses an inexpensive disposable filter element

√ Cleaning action of the filter element does not depend on bypass flow rate

Use a peristaltic pump or solenoid valve to block flow to the analyzer until sample purge starts. Starting the pump or energizing the solenoid valve allows the analyzer sample to be purged. A 1 minute purge time with a sample flow of 30 - 35 ml/minute should be more than enough time to flush the 1/8" tube and sample valve.

A peristaltic pump gives a number of positive results:

a. Can be used to block flow on applications where bypass pressure is below 25 PSI.

b. Allows the Model 9150 to operate on applications with bypass pressures down to 5 PSI. Without the peristaltic pump, minimum pressure is 15 PSI.

c. Control flow through the filter element to extend filter element life.

SPECIFICATIONS:

Filter: One Collins Model VI Bypass Filter
Materials of Construction: UHMW Polyethylene,Polypropylene, Stainless Steel, (316 S.S. body construction is also available)
Filter Element: 0.2 Micron Membrane (standard)
Mixer: Magnetic Coupled Agitator
Maximum Pressure: 75 PSI
Recommended Flow Rates: Bypass 0.25-6 GPM Analyzer Sample 35 - 50 ml/min
Maximum Temperature: 212°F
Electrical: 115 Volts 60Hz or 230 Volts 60Hz
Panel Size: 12" x 12"

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Applying the Collins Model 9150 Filtering System

Ideal Way to Use the Model 9150
Analyzers that require a sample on a cyclic basis can use the sampling system shown in the drawing below:

The Model 9150 is mounted near the analyzer in a bypass loop. A bypass flow 2 GPM or greater will keep a good up to date sample. Bypass pressure should be greater than 15 PSI or 1 Bar for good filter operation. Cleaning of the filter element is dependent on the motor driven, magnetically coupled agitator and is not dependent on the bypass flow. Unlike our Swirlklean models, the Collins Model 9150 uses a magnetically coupled agitator spinning at 3000 rpm and does not rely on bypass flow for self-cleaning of the filter element.

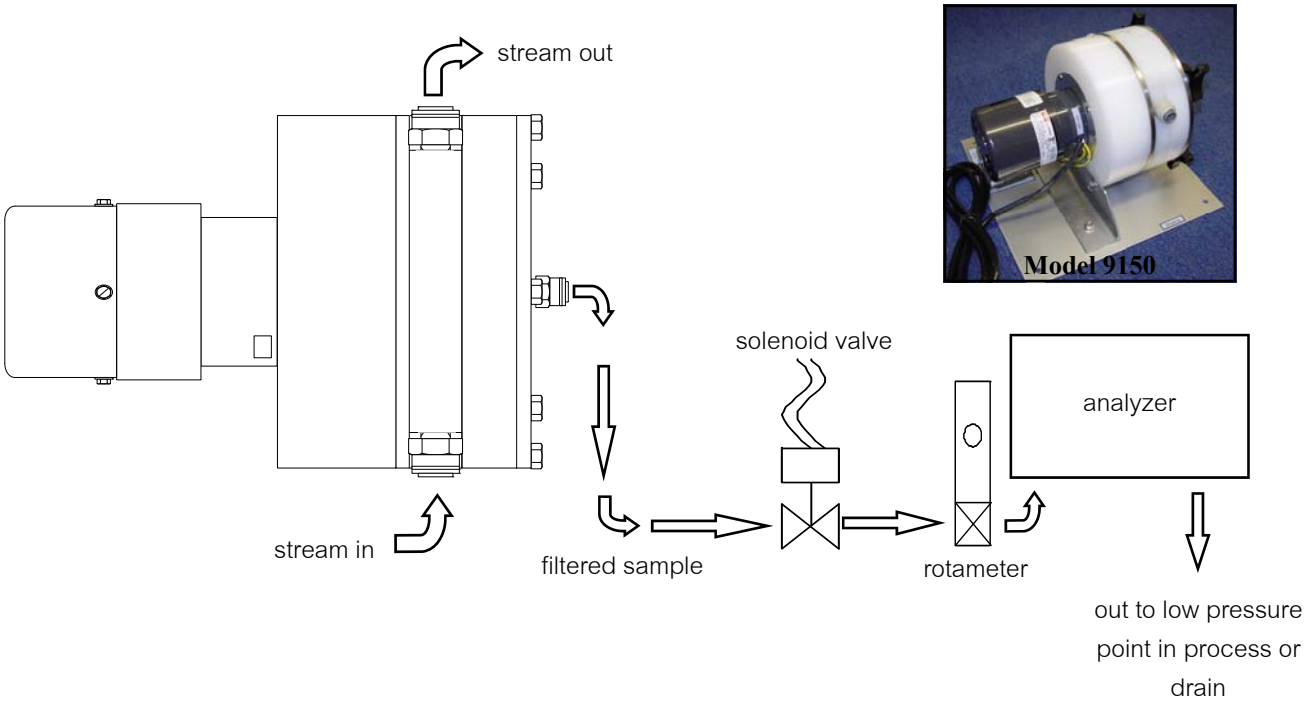
Place a normally closed solenoid valve in the sample line going to the analyzer. This solenoid valve normally blocks the sample to the analyzer. The maximum continuous cleaning of the filter element is taking place when the solenoid valve is closed to create a zero differential across the filter element. Use 1/8" tubing to connect the filter to the analyzer for a quick response time.

The solenoid valve is opened during the analyzer purge cycle. This allows 35-50 ML per minute sample to flow through the analyzer to purge the analyzer sampling valve and supply an up to date sample for analysis. At the end of the purge cycle, the sample blocking solenoid valve is closed. Filter life should be greatly extended using this method of sample preparation.

Analyzers Requiring Continuous Sample
Install the Model 9150 as shown in the drawing except do not include the solenoid valve. Sample will continuously flow to the analyzer. Filter element life may not be quite as good as with the method given above.

Expected flow of clean sample to analyzer: 50 ml./ min. based on the standard 0.2 micron filter element Part No. 9056.

Always maintain bypass flow through filter when motor is running to prevent overheating of unit



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The Model 9150 Filtering System

(Patent # 4,693,815)

The Model 9150 is a sampling conditioning system designed to supply a 35-50 ml. filtered sample to on-stream process analyzers. Membrane filter elements are used to remove submicron and larger particles from analyzer samples. Standard filter elements have 0.2 micron rating.

Components of the Model 9150 Filtering System

a. One Model VI Bypass Filter
b. One motor with magnetic coupled mixer

One Model VI bypass filter houses the membrane filter element. A bypass flow of 2-6 GPM updates the sample and provides part of the cleaning action of the filter element. Sample stream flow alone does not provide sufficient turbulence in the Model VI filter to keep the element clean. Instead a mixer is located in the filter housing to agitate the sample for better cleaning of the filter element. The mixer is driven by a 1/8 HP, 3000 RPM motor. A magnetic coupled drive is used to eliminate shaft seals.

Membrane filter elements are thin (0.005" thick) sheets of polymer material that have a closely controlled porosity. The thin filter element gives a surface type filtering action. Particles larger than the pore size remain on the filter surface. With the standard 0.2 micron filter element, particles larger than 0.2 micron will not enter the filter element pores. Particles on the surface of the filter element are washed off and carried out in the 2-6 GPM bypass stream. The Model 9700 uses 7 inch diameter filter elements.

Recommended Stream Conditions

Bypass flow rate	2-6 GPM
Pressure into system	15-50 PSI
Temperature - Maximum	212º F
Filtered sample to analyzer	35-50 ml./min.

A larger amount of abrasive material in the sample stream will reduce the filter element life.

Replacing filter elements: The Collins Model 9150 Filtering System uses 7 inch diameter filter elements. A small, sealed, hole is located in the center of the filter element for mounting purposes. Filter elements do not require replacement until the flow has reached a minimum or a breakthrough in the filter element occurs. A breakthrough is indicated when there is a drastic increase in flow, and particles appear in the filtrate to the analyzer.

*******Teflon Filter Elements Have To Be Wet With 70% Isopropyl Alcohol*******

a. Disconnect the 1/4" tubing from the filter top. Remove the thumb-nuts and/or bolts on the Model VI filter.
b. Remove the filter top.
c. Remove the 6-32 screw and washer that fastens element to filter cap. This will release the filter element.
d. Fasten new filter element to filter top using the 6-32 screw and washer. (Smooth side of element is next to bypass stream).
e. Make sure the filter element lays flat in the filter body and is not wrinkled or creased, and replace "O" ring.
f. Replace filter top and backing plate. Make sure "O" ring is seated properly.
g. Replace and tighten the 8 bolts and tubing.

Back pressure: A back pressure on the Model 9150 can be maintained by putting a long run (15 to 20') of 3/8" diameter tubing (1/4" tubing on small flows) on the bypass out. The tubing eliminates the plugging problems associated with valves that are sometimes used to maintain a back pressure. A pressure gauge is useful on the input of the filtering system to observe the bypass flow condition.

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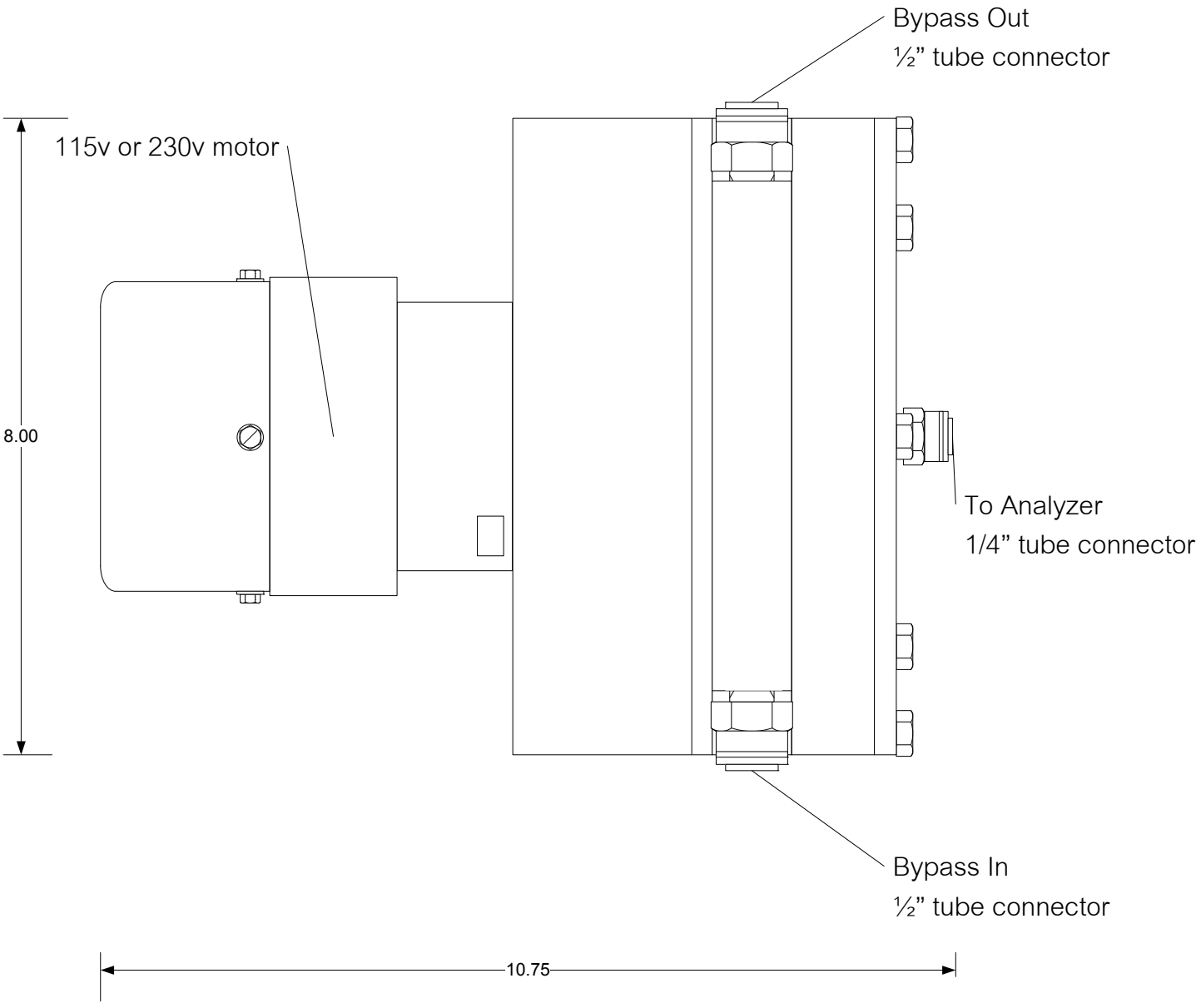
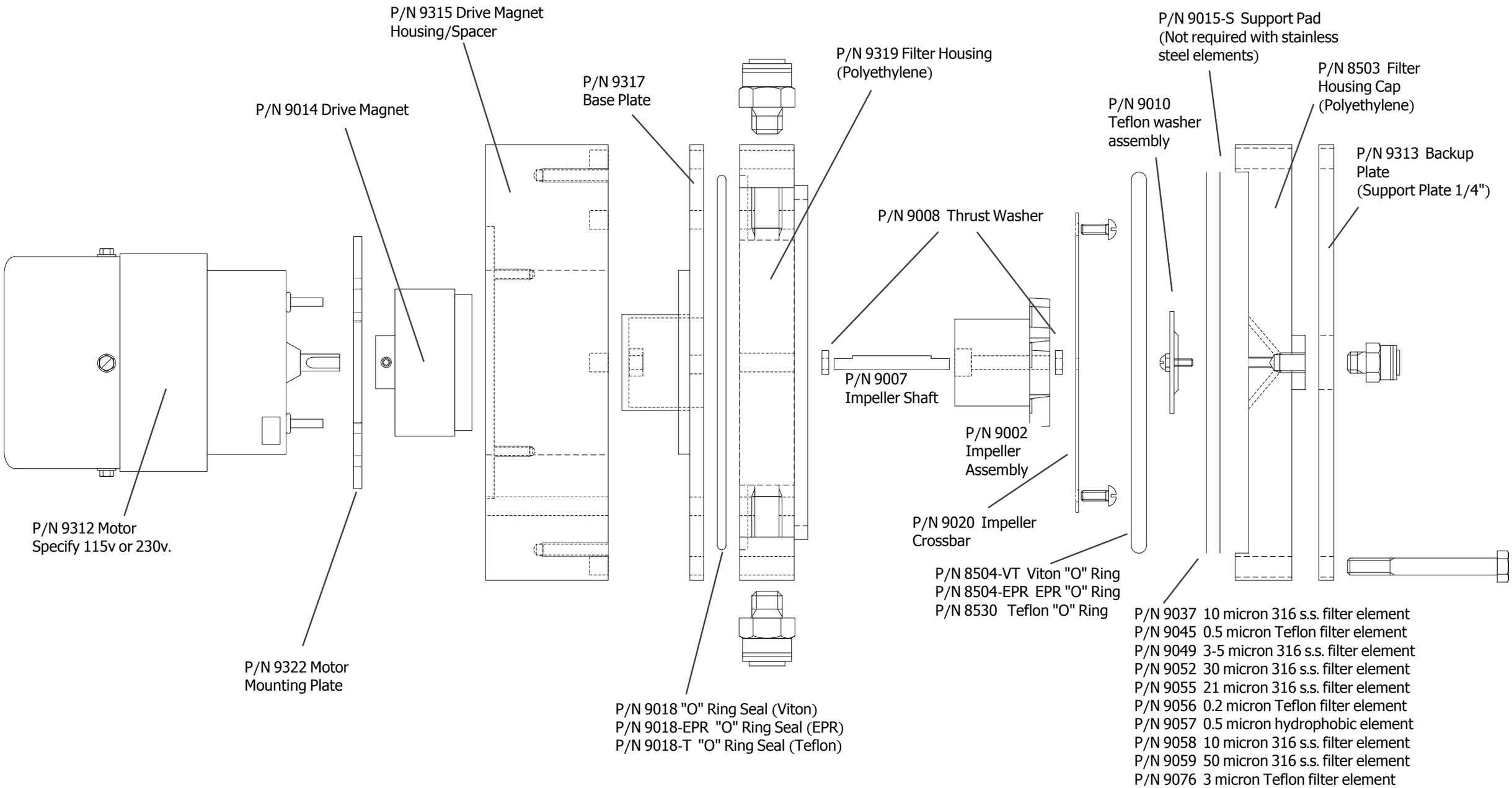
Collins Model 9150 and 9300 Filter Body and Motor



Collins Model 9150 and 9300 Filter Body and Motor (Exploded View)



P/N 9037 10 micron 316 s.s. filter element
P/N 9045 0.5 micron Teflon filter element
P/N 9049 3-5 micron 316 s.s. filter element
P/N 9052 30 micron 316 s.s. filter element
P/N 9055 21 micron 316 s.s. filter element
P/N 9056 0.2 micron Teflon filter element
P/N 9057 0.5 micron hydrophobic element
P/N 9058 10 micron 316 s.s. filter element
P/N 9059 50 micron 316 s.s. filter element
P/N 9076 3 micron Teflon filter element

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Comparison of Collins Filtering Systems

	Model 1	Model 2	Model 3	Model 8 (9500)	Model 9150
Amount of filtered sample supplied to analyzer. (based on standard element)*	50 cc/min.	275 cc/min.	25 cc/min.	1500 cc/min.	50 cc/min
Capable of filtering down to:	0.2 microns	0.2 microns	0.2 microns	0.2 microns	0.2 microns
Standard element:	0.5 micron	0.5 micron	0.5 micron	0.5 micron	0.2 micron
Other elements available:	100, 65, 50, 30, 21, 10, 5, 3, 1, 0.5, 0.2 micron	100, 65, 50, 30, 21, 10, 5, 3, 0.5, 0.2 micron	100, 65, 50, 30, 21, 10, 5, 3, 1, 0.5, 0.2 micron	100, 65, 50, 30, 21, 10, 5, 3 0.5, 0.2 micron	100, 65, 50, 30, 21, 10, 5, 3, 0.5, 0.2 micron
Inlet sample stream pressure: Minimum	20 psi.	20 psi.	20 psi.	20 psi.	20 psi.
Inlet sample stream pressure: Maximum	5000 psi.	2000 psi.	5000 psi.	400 psi.	75 psi.
Bypass flow rate: Recommended Minimum	2 gpm.	3 gpm.	1 gpm.	10 gpm.	½ gpm.
Bypass flow rate: Recommended Maximum	5 gpm.	10 gpm.	2 gpm.	15 gpm.	10 gpm.
Maximum temperature of sample:	250° to 615° F depending on elements and o-rings	250° to 615° F depending on elements and o-rings	250° to 615° F depending on elements and o-rings	250° to 615° F depending on elements and o-rings	210° F

* Greater flow rates may be achieved by using elements with a larger pore size
** Higher temperatures can be achieved by using stainless steel elements and Teflon, Kalrez, or Chemraz "O" rings

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Additional Notes on Replacement Elements and O-Rings

A few of the white, membrane elements we sell do have a front and back. In every instance, the smoother surface is installed facing “up” - against the o-ring - so that it is in contact with the bypass stream. Having the smooth surface in contact with the bypass stream helps the internal swirling action keep particles from sticking to the filter surface which would eventually reduce flow to the analyzer. The “rough side” is a polypropylene backing to reinforce the Teflon surface. The Teflon side does the actual filtering.

Our stainless steel filter elements do not have a front or back.

We do not recommend re-using the Teflon, polypropylene, or copolymer elements. Attempts at cleaning them might result in small tears that would compromise the filtering surface.

P/N 6745 (0.5 micron) has a Teflon film with a polypropylene support backing. (Teflon on spunbonded polypropylene support)

P/N 6711 (0.5 micron) is an acrylic copolymer on a non-woven nylon support material and the filter surface isn’t as slick as the Teflon coated one (P/N 6745).

We recommend the Teflon elements when possible because the slicker surface helps in keeping particles from accumulating on the face of the element. However, we have some customers that prefer the P/N 6711 copolymer material for their applications. Plus the 6711 is cheaper.

The difference between PN/ 7128 and 7145:
P/N 7128—(0.5 micron) Acrylic copolymer on non-woven nylon support
P/N 7145—(0.5 micron) Teflon on spunbonded-polypropylene support

Statement on Teflon O-rings
We recommend using Viton instead of Teflon o-rings whenever possible, especially in our Swirlklean Model II filters. Because of Teflon’s hardness and tendency to “creep” it does not seal as well as Viton in some applications. In applications with higher temperatures, Chemraz and Kalrez o-rings are also options.

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Collins Model 1 Filter Elements

Swirlklean Model 1 Spec Sheet

Part #	Description	Max Temps.
6705	Support Screen	980ºC / 1800ºF
6711	0.5 Micron Hydrophobic	120ºC / 250ºF
6712	5 Micron Teflon	200ºC / 390ºF
6715	Support Pad, Polypropylene 65 micron	120ºC / 250ºF
6715-T	Support Pad, Teflon	200ºC / 390ºF
6718	1 micron Teflon	120ºC / 250ºF
6720	125 Micron Polypropylene	120ºC / 250ºF
6725	5 Micron Polypropylene	120ºC / 250ºF
6727	0.2 Micron Copolymer	120ºC / 250ºF
6733	3-5 Micron S.S.	980ºC / 1800ºF
6735	10 Micron Teflon	200ºC / 390ºF
6737	10 Micron S.S.	980ºC / 1800ºF
6745	0.5 Micron Teflon Hydrophobic	120ºC / 250ºF
6747	0.5 Micron S.S. Sintered Disc	980ºC / 1800ºF
6752	30 Micron S.S.	980ºC / 1800ºF
6753	50 Micron S.S.	980ºC / 1800ºF
6754	100 Micron S.S.	980ºC / 1800ºF
6755	21 Micron S.S.	980ºC / 1800ºF
6756	0.2 Micron Teflon Hydrophobic	120ºC / 250ºF
6758	0.2 Micron pure Teflon Hydrophobic	232ºC / 450ºF
6776-E	3 Micron Teflon	200ºC / 390ºF

Note: Model 1 requires two elements/change-out.

Model 1 O-Rings

Part #	Type	Maximum Temp.
6704	Viton	204ºC / 400ºF
6730	Teflon	232ºC / 450ºF
6710	EPR	149ºC / 300ºF
6709	Buna N	107ºC / 225ºF
6704-K	Kalrez**	260ºC / 500ºF
6704-CH505	Chemraz 505**	216ºC / 425ºF
6704-CH615	Chemraz 615**	324ºC / 615ºF

**Kalrez and Chemrez "O" rings have similar chemical resistance properties, although maximum temperatures may be different.

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Collins Model 2 Filter Elements

Swirlklean Model 2 Spec Sheet

Part #	Description	Max Temps.
7105	Support Screen S.S.	980ºC / 1800ºF
7115	Support Pad, Polypropylene 65 Micron	120ºC / 250ºF
7120	125 Micron Polypropylene	120ºC / 250ºF
7125	5 Micron Polypropylene	120ºC / 250ºF
7128	0.5 Micron Hydrophobic	120ºC / 250ºF
7133	3-5 Micron S.S.	980ºC / 1800ºF
7134	65 Micron Polypropylene	120ºC / 250ºF
7137	10 Micron S.S.	980ºC / 1800ºF
7145	0.5 Micron Teflon Hydrophobic	120ºC / 250ºF
7152	30 Micron S.S.	980ºC / 1800ºF
7153	50 Micron S.S.	980ºC / 1800ºF
7154	100 Micron S.S.	980ºC / 1800ºF
7155	21 Micron S.S.	980ºC / 1800ºF
7156	0.2 Micron Teflon Hydrophobic	120ºC / 250ºF
7158	0.2 Micron pure Teflon Hydropho.	232ºC / 450ºF
7176-E	3 Micron Teflon	200ºC / 390ºF

Note: Model 2 requires two elements/change-out.

Model 2 O-Rings

Part#	Type	Maximum Temp.
7104	Viton	204ºC / 400ºF
7130	Teflon	232ºC / 450ºF
7110	EPR	149ºC / 300ºF
Special order	Buna N	107ºC / 225ºF
7104-K	Kalrez**	260ºC / 500ºF
7104-CH505	Chemraz 505**	216ºC / 425ºF
7104-CH615	Chemraz 615**	324ºC / 615ºF

* All prices are in U.S. Dollars. Prices subject to change without notice.
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Collins Model 3 Filter Elements

Swirlklean Model 3 Spec Sheet

Part #	Description	Max Temps.
6705	Support Screen	980ºC / 1800ºF
6711	0.5 Micron Hydrophobic	120ºC / 250ºF
6712	5 Micron Teflon	200ºC / 390ºF
6715	Support Pad, Polypropylene 65 micron	120ºC / 250ºF
6715-T	Support Pad, Teflon	200ºC / 390ºF
6720	125 Micron Polypropylene	120ºC / 250ºF
6725	5 Micron Polypropylene	120ºC / 250ºF
6727	0.2 Micron Copolymer	120ºC / 250ºF
6733	3-5 Micron S.S.	980ºC / 1800ºF
6735	10 Micron Teflon	200ºC / 390ºF
6737	10 Micron S.S.	980ºC / 1800ºF
6745	0.5 Micron Teflon Hydrophobic	120ºC / 250ºF
6752	30 Micron S.S.	980ºC / 1800ºF
6753	50 Micron S.S.	980ºC / 1800ºF
6754	100 Micron S.S.	980ºC / 1800ºF
6755	21 Micron S.S.	980ºC / 1800ºF
6756	0.2 Micron Teflon Hydrophobic	120ºC / 250ºF
6758	0.2 Micron pure Teflon—no backing	232°C / 450°F
6776-E	3 Micron Teflon	200ºC / 390ºF

Note: Model 3 requires one element/change-out.

Model 3 O-Rings

Part #	Type	Maximum Temp.
6704	Viton	204ºC / 400ºF
6730	Teflon	232ºC / 450ºF
6710	EPR	149ºC / 300ºF
6709	Buna N	107ºC / 225ºF
6704-K	Kalrez**	260ºC / 500ºF
6704-CH505	Chemraz 505**	216ºC / 425ºF
6704-CH615	Chemraz 615**	324ºC / 615ºF

**Kalrez and Chemrez "O" rings have similar chemical resistance properties, although maximum temperatures may be different.

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Collins Model 8 Filter Elements

Model 8 Spec Sheet

Part #	Description	Max Temps.
9505-T	Support Screen, Teflon	
9515	Support Pad, Polypropylene	120ºC / 250ºF
9533	3-5 Micron S.S.	980ºC / 1800ºF
9537	10 Micron S.S.	980ºC / 1800ºF
9545	0.5 Micron Teflon Hydrophobic	120ºC / 250ºF
9552	30 Micron S.S.	980ºC / 1800ºF
9553	50 Micron S.S.	980ºC / 1800ºF
9554	100 Micron S.S.	980ºC / 1800ºF
9555	21 Micron S.S.	980ºC / 1800ºF
9556	0.2 Micron Teflon Hydrophobic	120ºC / 250ºF
9076-E	3 Micron Teflon	200ºC / 390ºF

Note: Model 8 requires two elements/change-out.

Model 8 O-Rings

Part #	Type	Maximum Temp.
9504	Viton	204ºC / 400ºF

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Collins Model 9150 Filter Elements

Model 9150 Spec Sheet

Part #	Description	Max Temps.
9015-S	Support Pad, Polypropylene	120ºC / 250ºF
9033	3-5 Micron S.S.	980ºC / 1800ºF
9037	10 Micron S.S.	980ºC / 1800ºF
9045	0.5 Micron Teflon Hydrophobic	120ºC / 250ºF
9052	30 Micron S.S.	980ºC / 1800ºF
9054	100 Micron S.S.	980ºC / 1800ºF
9055	21 Micron S.S.	980ºC / 1800ºF
9056	0.2 Micron Teflon Hydrophobic	120ºC / 250ºF
9057	0.5 Micron Hydrophobic	120ºC / 250ºF
9059	50 Micron S.S.	980ºC / 1800ºF
9076-E	3 Micron Teflon	200ºC / 390ºF

Note: Model 9150 requires one element/change-out.

Model 9150 O-Rings

Part #	Type	Maximum Temp.
8504-VT	Viton	204ºC / 400ºF
8504-T	Teflon	232ºC / 450ºF
8504-EPR	EPR	149ºC / 300ºF
8504-N	Buna N	107ºC / 225ºF
Special order	Kalrez**	260ºC / 500ºF
Special order	Chemraz 505*	216ºC / 425ºF
Special order	Chemraz 615**	324ºC / 615ºF

* All prices are in U.S. Dollars. Prices subject to change without notice.
**Kalrez and Chemrez "O" rings have similar chemical resistance properties, although maximum temperatures may be different.