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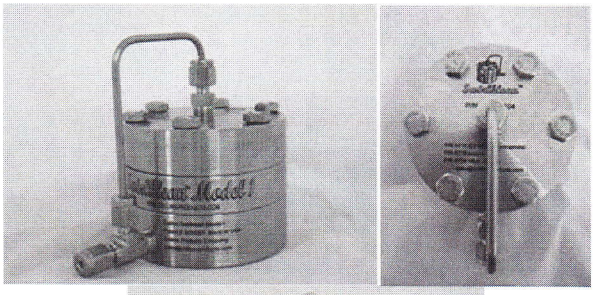
The Collins Swirlklean Bypass Filter

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 good surface retention of particles.

Features:

Sampling system and analyzer maintenance is reduced.

Uses membrane filter elements for surface filtration.

Tangental 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 form 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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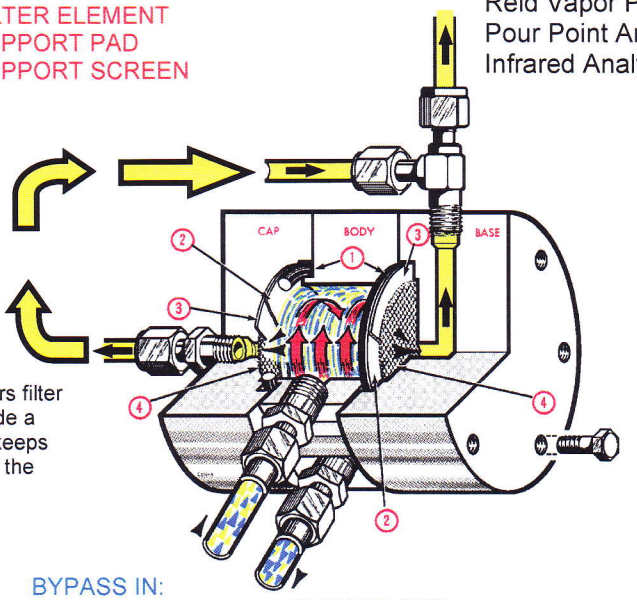
CUTAWAY VIEW OF THE COLLINS SWIRLKLEAN FILTER

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 3 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: The Collins Swirlklean bypass filter alone is not recommended for filtering water. Please inquire about other Collins Filtering Systems such as our Models 8800, 9150 and 9300 for conditioning water streams.

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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 I	MODEL II
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 1 CFM 14158 cc/min. to 28317 cc/min. 14.16 liter/min. to 28.31 liter/min. 849.5 liter/hr. to 1699 liter/hr.
Analyzer Sample:	To 1000 Cu. Cm./Min. 1 liters/minute 60 liters/hour	To 1 CFM 28317 cu. cm./minute 28.31 liter/minute 1699 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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THE COLLINS SWIRLKLEAN

A New Type Bypass Filter

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 (1) handle all applications, but it has proved to be superior to other type filters on numerous applications.

(1) Please inquire about other Collins Filtering Systems.

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Collins Model III 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. greater flow rates can be obtained
Recommended Flow Rates - Vapor	Bypass Stream:	100 to 2000 cc./min.
	Analyzer Sample:	to 1000 cc./min.
Pressure Tested To:		1000 PSIG
Maximum Temp.:		150 to 200 degrees C
	Standard Element:	150 degrees C
Process Connection (Bypass):		1/8 inch
Overall Filter Diameter:		3 inches

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Collins Model VIII Swirlklean Bypass Filter

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

Specifications

- Body Design — Same as Models I and II 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: $3^{1}/_{2}$"
  - Weight: 75 lbs.

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Collins Model III 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. greater flow rates can be obtained
Recommended Flow Rates - Vapor	Bypass Stream:	100 to 2000 cc./min.
	Analyzer Sample:	to 1000 cc./min.
Pressure Tested To:		1000 PSIG
Maximum Temp.:		150 to 200 degrees C
	Standard Element:	150 degrees C
Process Connection (Bypass):		1/8 inch
Overall Filter Diameter:		3 inches

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  - 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
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  - Height: $3^{1}/_{2}$"
  - Weight: 75 lbs.

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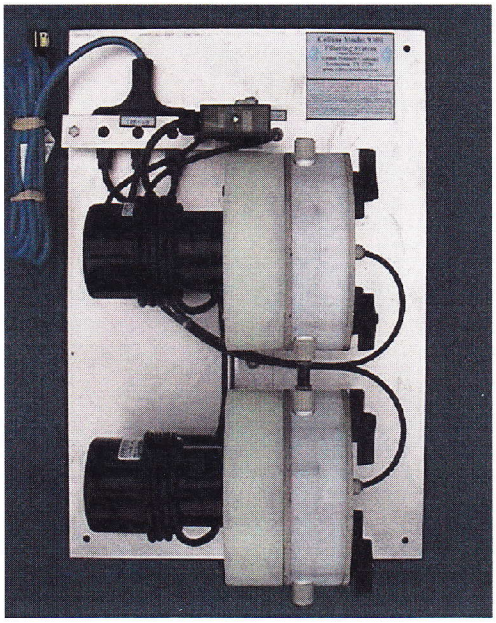
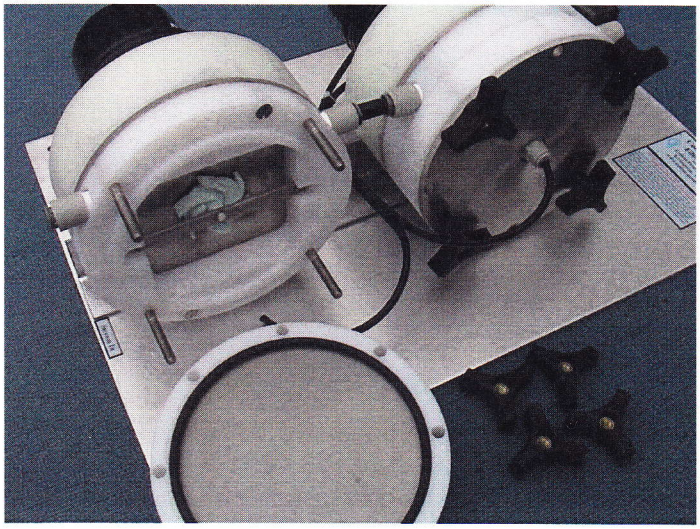
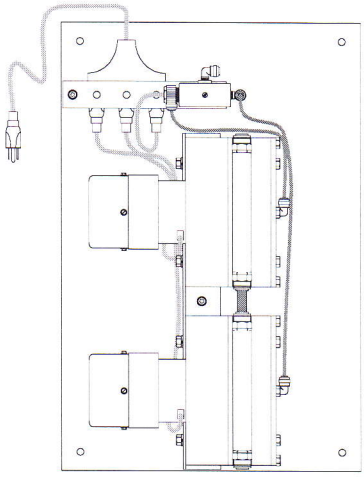
COLLINS MODEL 9300 FILTERING SYSTEM

Provides your "On-Stream" Analyzer with Laboratory Quality Samples







Continuously filter the following difficult streams with the Model 9300

- Chemical Plant and refinery wastewater streams
- Chemical Plant process streams with solid slurries
- Limestone slurry streams (to 15% solids) in flue gas scrubbers
- Primary clarifier and other streams in sewage treatment plants
- Process cooling water and boiler feedwater streams

The Collins Model 9300 is a unique filtering system that uses membrane filter elements to remove particles larger than 0.2 micron from analyzer samples. Membrane filter elements provide surface type filtration. Particles larger than the rated pore size remain on the filter surface.

Magnetic coupled agitators run at 3000 RPM to provide turbulence for particle removal from the filter surface. To further enhance the filter element cleaning process, a three-way solenoid valve operated by a cycle timer is used to alternately block the flow from the two filters. When flow is blocked, maximum cleaning occurs because the differential pressure across the filter element is zero. Particle washed from the filter surface are removed from the Model 9300 in the bypass stream. Two Collins Model VI filters are used in the system.

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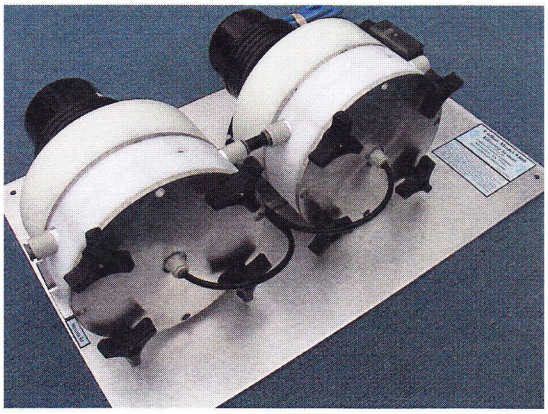
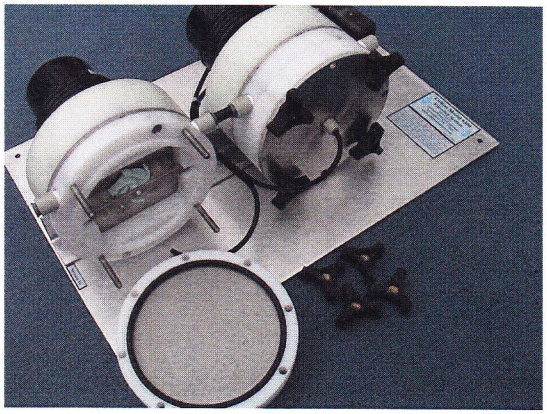
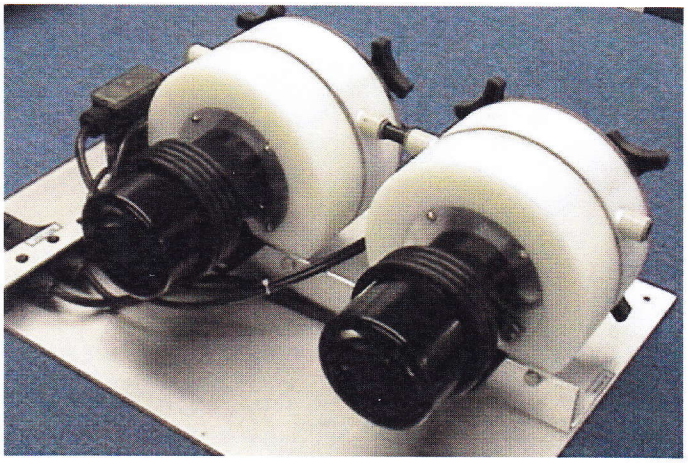
Model 9300 Features:

- Removes particles larger than 0.2 micron
- Built in agitators create turbulence to clean the filter elements
- Agitators and drive motors are magnetically coupled to prevent shaft leaks
- Small internal volume of filter housing gives fast response to stream composition changes
- Cleaning action of filter elements does not depend on bypass flow rate





Specifications:



Filter Body: Two Collins Model VI Bypass Filters

Filter Elements: 0.2 Micron Membrane (other sizes available)

Mixer: Magnetic Coupled Agitator

Maximum Pressure: 100 PSI

Maximum Temperature: 212 degrees F.

Electrical: 115 Volts 60 Hz (standard), 230 Volt available

Materials of Construction: UHMW Polyethylene, Polypropylene, Stainless Steel, (316 S.S. body construction is also available)

Recommended Flow Rates: Bypass 0.25 - 6 GPM, Analyzer Sample 50 to 100 ml/mn

Panel Size: 16" x 24" x 1/4"

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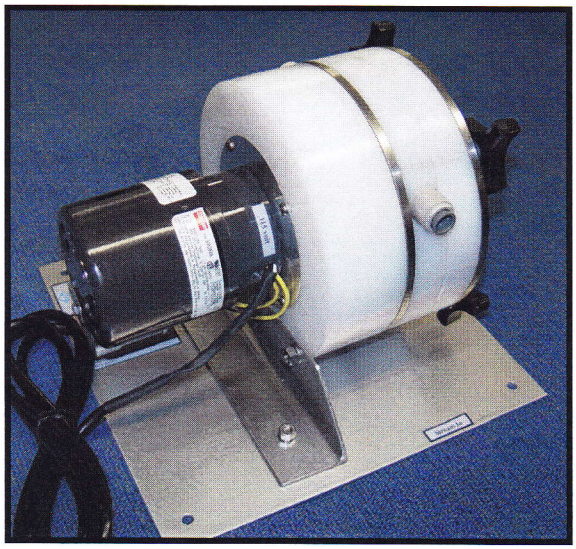
Collins Model 9150 Filtering System

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: 100 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

The Model 9150 is essentially one half of a Collins Model 9300 Filtering system. It has one motor and one filter housing (and one filter element), instead of having two as with a Model 9300. The solenoid valve that stops sample flow through the element to create zero pressure differential for maximum element cleaning has been eliminated on the 9150. This can create some problems on applications where continuous sample flow to an analyzer is required. Although there is a great amount of turbulence in the filter body, filter element life may be shortened by not stopping the analyzer flow to create a zero differential pressure across the element.

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 agitator and is not dependent on the bypass flow.

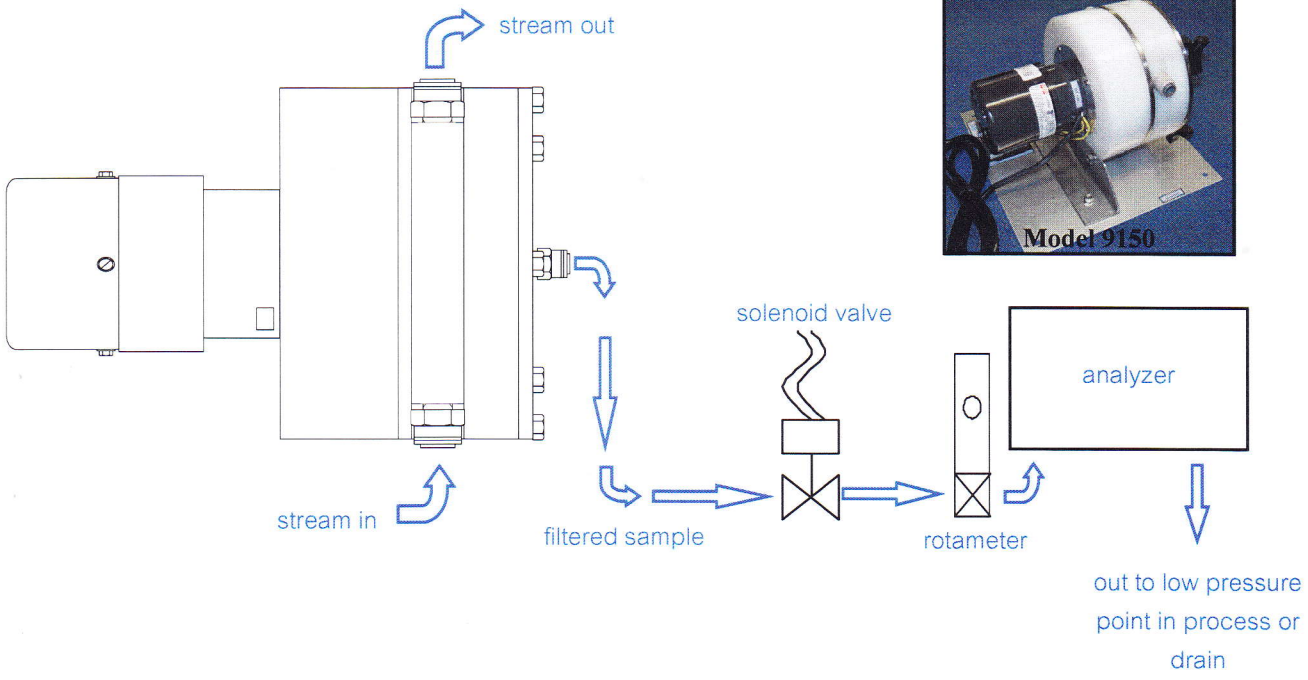
Place a normally closed solenoid valve in the sample line going to the analyzer. This solenoid valve normally blocks the sample to the analyzer. The maximum continuous cleaning of the filter element is taking place when the solenoid valve is closed to create a zero differential across the filter element.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

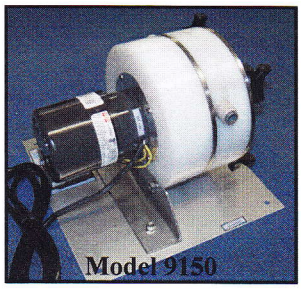
The solenoid valve is opened during the analyzer purge cycle. This allows 35-50 ML per minute sample to flow through the analyzer to purge the analyzer sampling valve and supply an up to date sample for analysis. At the end of the purge cycle, the sample blocking solenoid valve is closed. Filter life 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 as good as with the method given above. Consider the Collins Model 9300 Filtering System when continuous sample flow is required.

Recommended flow to analyzer: 50 ML per min. max.

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





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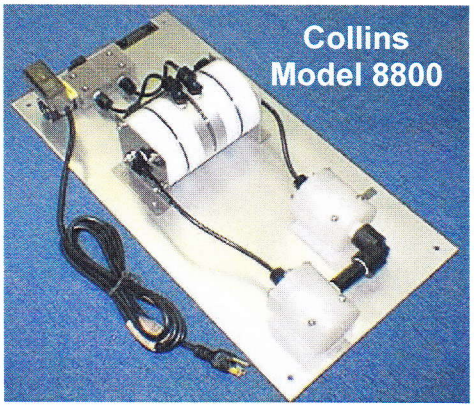
THE COLLINS MODEL 8800 FILTER SYSTEM

A SAMPLING SYSTEM TO FILTER WATER AND OTHER DIFFICULT STREAMS

DESIGNED FOR ANALYZERS MONITORING:

- Pollutants in Effluents from Units & Plants
- Process Leaks of Valuable Product
- Leaks in Heat Exchangers to Water Side
- Chromate Level in Cooling Water
- Other Difficult Streams where Frequent Filter Element Plugging Occurs



The Backflow Sampling System will supply about 100 cc/minute filtered sample to an analyzer. Two Collins Model IV bypass filters with 50 or larger micron rated filter elements are used to remove the solid particles. The turbulent action of the 4-6 GPM bypass flow at 15-30 PSI pressure keeps the particles swept from the filter surface and minimizes buildup on the filters. A backwash feature is added to the Collins Model IV filters to knock or remove the slime deposits from the surface of the filter elements. Part of the filtered sample is trapped and periodically backflowed through the two filter elements. Backflow is accomplished when the trapped sample in the piston cavity is displaced by an air actuated piston. The elements are washed one at a time on a cyclic basis. Since two Collins Model IV filters are used, flow is maintained through the other filter element while one is being washed.

Slurry streams with 25% solids have been successfully filtered with the Backflow system. Solid particles 1/8" diameter and smaller do not interfere with the system operation.

A momentary flow pause may take place when the backflow switch occurs. The momentary pause does not affect analyzers such as pH, TOD, TOC, chromatographs and similar instruments.

Frequency of backflowing the filter elements depends on the application. Streams that contain large quantities of material such as slime and algae require frequent backflowing (every 15 seconds). The frequency of backflowing is changed by adjusting the setting on a solid state cycle timer.

Filter elements are easily changed by removing six bolts and breaking tubing connections. An air supply of 30-40 PSI is required for the air cylinder operation. The standard sampling system uses 115 volt 60 Hz power for solenoid valve operation.

Sample systems are furnished on a 12" x 24" aluminum panel.

SPECIFICATIONS

Filters: Two Collins Model IV Bypass Filters
Filter Element: 50 Micron and Larger
Materials of Construction: Stainless Steel, Polypropylene, PVC, Polyethylene, Viton or Buna N in contact with Sample
Recommended Flow Rates: Bypass Stream: 4-6 GPM at 15 PSI Minimum
Analyzer Sample: 100 cc/minute
Maximum Pressure: 100 PSI
Maximum Temperature: 150 degrees F (212 degrees F available)
Utility Requirement: Air: 40 PSI minimum
Electrical: 115 volt 60 Hz (standard)

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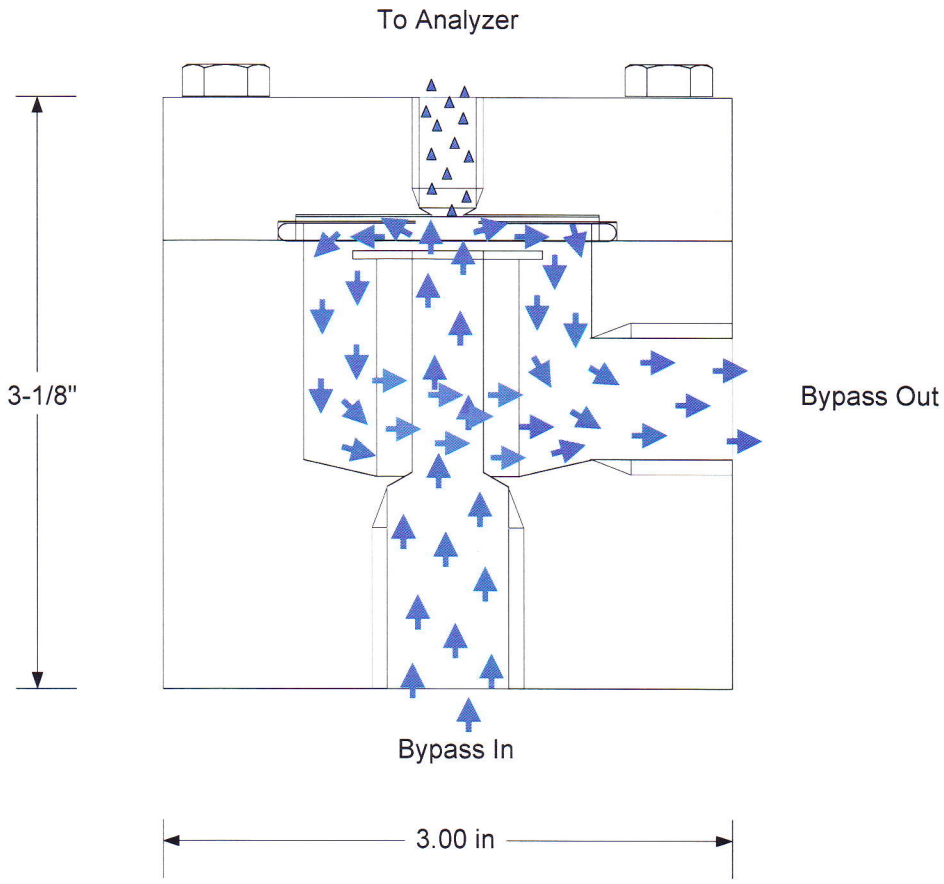
Collins Model IV Filter
Flow Diagram



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Comparison of Collins Filtering Systems

	Model I	Model II	Model III	Model VIII	Model 8800	Model 9300	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.	100 cc/min.	100 cc/min	50 cc/min
Capable of removing particles larger than:	0.2 microns	0.2 microns	0.2 microns	10 microns	50 microns	0.2 microns	0.2 microns
Standard element:	0.5 micron	0.5 micron	0.5 micron	21 micron	50 micron	0.2 micron	0.2 micron
Other elements available:	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	100, 65, 50, 30, 21, 10, 5, 3, 0.5, 0.2 micron	100, 65, 50, 30, 21, 10, 5, 3 micron	100, 65, 50, 30, 21, 10 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.	20 psi.	20 psi.
Inlet sample stream pressure: Maximum	5000 psi.	2000 psi.	5000 psi.	200 psi.	100 psi.	80 psi.	80 psi.
Bypass flow rate: Minimum	2 gpm.	3 gpm.	1 gpm.	10 gpm.	2 gpm.	½ gpm.	½ gpm.
Bypass flow rate: Maximum	5 gpm.	10 gpm.	2 gpm.	15 gpm.	5 gpm.	10 gpm.	10 gpm.
Bypass flow rate: Recommended							
Maximum temperature of sample:	250° F. **	250° F. **	250° F. **	400° F.	210° F.	210° F.	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 Chemrez "O" rings