FLOWSERVE

USER INSTRUCTIONS

Installation
Operation
Maintenance

Pipeline Filter Series

Experience In Motion

CONTENTS

1. Introduction

1.1 About this manual

This manual (which is intended for operation, maintenance, and supervisory personnel) provides information on installing, operating, and maintaining the Pipeline filter series.

Installation in accordance with the following instructions will contribute to long and trouble-free operation of the assembly.

1.2. How to use this manual

Before using this manual, make sure you have fully read and understood the safety section, which can be found in chapter 2. When being new to the Pipeline filter series, pay attention to section 4, which describes the Pipeline filter series in detail.

Only trained and qualified personnel should operate the Pipeline filter series. Refer to section 2.3. inexperienced personnel should work on this system under the supervision of qualified personnel.

When maintaining the Pipeline filter series, always make sure maintenance procedures are followed. Pay particular attention to the alerts and icons.

The Pipeline filter series shall be used for as described in this manual. Discuss with Flowserve if adjustments beyond its regular use are required.

Changes, modifications, repairs or use under conditions deviating from the design specifications without prior permission of Flowserve can invalidate the product certification, declaration of conformity and / or nameplate.

Note: As hazardous conditions can result from planned as well as unforeseen circumstances, pressurized equipment shall always be operated with caution, per site and local policies. Before installation, equipment should always be fully inspected including, but not limited to:

- Any possible damage due to transport or storage
- Cleanliness required before operation
- Existence of an affixed nameplate with correct inspection markings and design/test conditions

1.3. Other supplied Documents

Annex II contains the assembly drawing and sub-component manuals.

1.4. Conformity with Standards and Directives

The Pipeline filter series conforms to the following standards and directives:

- ASME VIII Div. 1 (with optional U-stamp)
- Optional certification to Pressure Equipment Directive (PED) 2014/68/EU
- Canadian Registration Number (CRN standard)

1.5. Use of alerts and icons

This manual uses “Notes”, “Cautions” “Warnings” and “Dangers” to alert you of important information and/or hazardous situations.

Note: “Notes” inform you of important additional information.

CAUTION	
	The equipment, product or surrounding area can be damaged if the “caution” is not obeyed.

WARNING	
	Personnel can be (seriously) injured, or the equipment can be seriously damaged if the “warning” is not obeyed.

DANGER	
	Personnel can be (seriously) injured if the “danger” sign is not obeyed.

The above icons are the general icons that are used for “Caution”, “Warning” and “Danger”. More specific icons are also used, depending on the type of hazard. All Icon used in this manual are listed below:

WARNING	
	HIGH PRESSURE: Take caution when de-pressurizing the Pipeline filter series. The Pipeline filter series might have energy stored inside. Make sure that de-pressurizing happens slowly.

WARNING	
	HOT SURFACES: The Pipeline filter series and surrounding surfaces might be hot. Take care when touching components. Wear the appropriate Personal Protection Equipment (PPE), according to plant regulations.

WARNING	
	HAZARDOUS CHEMICALS: Dangerous chemical might be released during removal of the Pipeline filter series. Wear Personal Protective Equipment (PPE). Follow all safety regulations and Plant regulations.

2. Safety

2.1. Types of hazardous exposures

The following hazards can be present in the system:

- High pressure
- Dangerous or Toxic chemicals
- Temperature (hot or cold surfaces)
- Dangerous moving parts (during installation or maintenance)
- Electrical Hazards

If the Pipeline filter series has any external leaks, the process in which the Filter is used should be stopped immediately and have the leak repaired by qualified personnel. When extreme conditions occur, and the possibility of a failure is imminent, plant and end-user safety regulations shall be followed.

2.2. General Safety

When installing, operating and maintaining the Pipeline filter series, pay attention to safety:

- Obey all applicable safety laws and regulations
- Obey all plant regulations
- Make sure that only trained and qualified personnel work on it. Refer to section 2.3
- Read and understand each part of this manual
- Follow the installation, operation, and maintenance procedures
- Wear the relevant Personal Protective Equipment (PPE). Refer to section 2.4
- Never work alone (to prevent the possibility of an accident)
- Read the plant requirements for handling hazardous materials

2.3. Trained and qualified personnel

Qualified personnel are people who have been authorized by those responsible for the safety of the plant to perform the necessary work, and who can recognize and avoid possible dangers.

The following aspects determine the qualification of personnel:

- Appropriate training
- Relevant experience
- Knowledge of relevant standards and specifications
- Knowledge of accident prevention regulations
- Knowledge of plant regulations and operating conditions

2.4. Personal protective equipment (PPE)

The Pipeline filter series is often used for applications containing high-pressure, hightemperature and/or toxic chemicals. When performing operating or maintenance tasks, make sure you wear the appropriate Personal Protective Equipment (PPE): protective clothing, gloves, safety glasses, etc.

Always follow local regulations regarding PPE.

2.5. Actions in extreme conditions

In the unlikely event of emergency operating conditions always follow emergency plant regulations. Immediate evacuation of service personnel shall follow plant regulations.

3. Environmental Considerations

CAUTION	
	You are required by law to dispose waste products and end of life equipment, according to local regulations.

3.1. Disposing of waste products

Make sure waste products are diverted to a safe and suitable location. Always follow local and plant regulations.

Any waste products resulting from the use or maintenance of the Pipeline filter series must be recycled or disposed of according to local environment laws and regulations.

3.2. End of life equipment

WARNING	
	HAZARDOUS CHEMICALS: Dangerous chemical might be released during removal of the Pipeline filter series. Wear Personal Protective Equipment (PPE). Follow all safety regulations and Plant regulations.

WARNING	
	HIGH PRESSURE: Take caution when de-pressurizing the Pipeline filter series. The Pipeline filter series might have energy stored inside. Make sure that de-pressurizing happens slowly.

WARNING	
	HOT SURFACES: The Pipeline filter series and surrounding surfaces might be hot. Take care when touching components. Wear the appropriate Personal Protection Equipment (PPE), according to plant regulations.

When the equipment reaches the end of life, the shutdown procedure (section 7.4) shall be followed. The equipment must then be deinstalled and transported to a safe location. Always pay extra attention to safety!

Note: End of life equipment must be disposed of according to local environment laws and regulations.

4. Description

4.1. Product purpose

The Pipeline filter series is a new standard system to support pipeline pump seals operating in oil, light hydrocarbon, CO2, water or comparable fluids, with a filtration system used in a configuration similar to an API 682 Plan 12. The contaminated process fluid flows in the tubing from the pump discharge into the system, where the contaminants are captured in a removable filter cartridge. The filtered fluid is then directed to the seal flush thru an orifice plate to control the flow, as shown in Figure 1. The Pipeline filter series duplex arrangement allows for continuous operation, given the backup filter can be used when the primary filter reaches a high dP. The flow can be diverted to one filter or the other using ball valves. The level of contamination of the filter cartridge can be monitored using a differential pressure transmitter with a local display. The Pipeline filter series has multiple options for filtration ratio, certifications, system connections, flow restricting orifice and differential pressure transmitter.

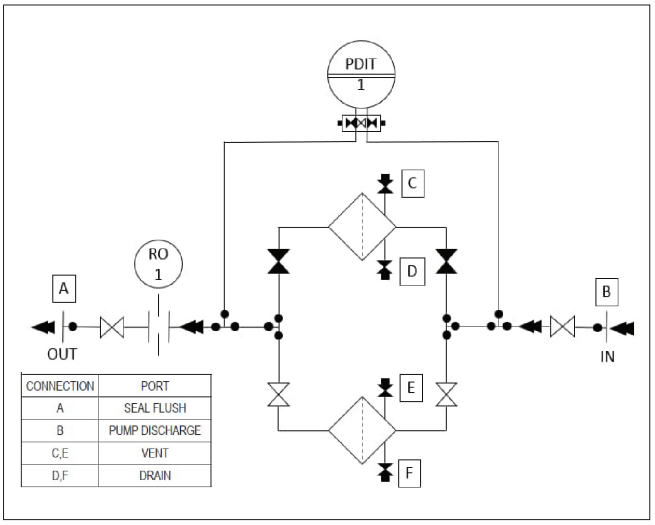


Figure 1: Pipeline filter series Typical P&ID

Figure 2 shows a typical General Arrangement isometric view of the assembly.

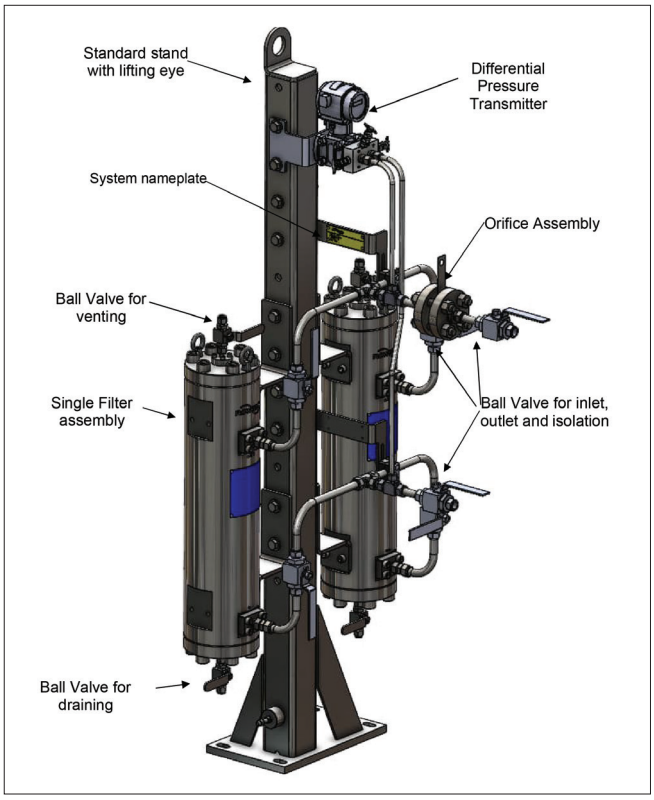


Figure 2: Pipeline filter series Typical General Arrangement Isometric View

Note: The image of parts shown in these instructions may differ visually from the actual parts due to manufacturing processes that do not affect the part function or quality. Refer to specific product drawing for connection and dimensional details.

4.2. Configuration

The Pipeline filter series can be configured based on the following options, as shown in figure 3:

- Filtration rate
- Certifications
- System connections
- Flow restriction orifice size
- Pressure transmitter
- Replacement kit

PLF	X	X	X	X	X	X

Filter Element Option (Table 1)	
Code	**Nominal Rating**
1	1 Micron
2	5 Micron
3	10 Micron
4	20 Micron

Certification Options (Table 2)	
Code	**Description**
0	Flowserve Standard (Includes CRN)
U	U-Stamp
P	PED

System Connection Type (Table 3)	
Code	**Description**
T	¾ Tubing
A	¾ Class 600 RF FLanges
B	¾ Class 1500 RF FLanges

Filter Restriction Orifice Option (Table 4)	
Code	**Orifice Size**
0	No Orifice
1	Φ.094 [2.39]
2	Φ.125 [3.18]
3	Φ.188 [4.78]
4	Φ.250 [6.35]

Replacement KIT (Table 6)		
Code	**Description**	**Part Number**
0	Non Provided	-
1	Replacement O-Ring and 1 Micron Filter Element	C100025067
2	Replacement O-Ring and 5 Micron Filter Element	C100025066
3	Replacement O-Ring and 10 Micron Filter Element	C100025070
4	Replacement O-Ring and 20 Micron Filter Element	C100025072

Instrumentation Option (Table 5)				
Code	**Description**	**Model Number**	**Certifications**	**Operating Temperature Range**
0	Customer Supplied Instrumentation	-	-	-
1	E&H PDIT HART, -600 psi to 600 psi [-40 bar to 40 bar]	PMD75	IEC/ATEX/NEC/ CEC	-40ºF to 180ºF [-40ºC to 82.2ºC]
2	E&H PDIT FIELDBUS, -600 psi to 600 psi [-40 bar to 40 bar]	PMD75	IEC/ATEX/NEC/ CEC	-40ºF to 180ºF [-40ºC to 82.2ºC]
3	ROSEMOUNT PDIT HART, -600 psi to 600 psi [-41.4 bar to 41.4 bar]	2051CD5	IEC/ATEX/NEC/ CEC	-40ºF to 175ºF [-40ºC to 80ºC]
4	ROSEMOUNT PDIT FIELDBUS, -600 psi to 600 psi [-41.4 bar to 41.4 bar]	2051CD5	IEC/ATEX/NEC/ CEC	-40ºF to 175ºF [-40ºC to 80ºC]
5	ROSEMOUNT PDIT HART, -600 psi to 600 psi [-20.7 bar to 20.7 bar]	3051CD4	IEC/ATEX/NEC/ CEC	-50ºF to 180ºF [-50ºC to 82.2ºC]
6	ROSEMOUNT PDIT FIELDBUS, -600 psi to 600 psi [-20.7 bar to 20.7 bar]	3051CD4	IEC/ATEX/NEC/ CEC	-50ºF to 180ºF [-50ºC to 82.2ºC]

Figure 3: Pipeline filter series Configuration Menu

5. Preservation, Packing, Transport and Storage Requirements

5.1. Mechanical preservation instructions

5.1.1. Preservation

Equipment should not be sealed in a way that it will obstruct inspection. Access for normal inspection and preservation maintenance shall be provided. Internal surfaces of pressure vessels, piping systems and similar equipment shall be dried and cleaned of surface corrosion and foreign material.

The Pipeline filter series shall be thoroughly cleaned and dried after manufacturing and testing, prior to application of preservatives.

Internal surfaces wholly consisting of corrosion resistant materials shall not be preserved unless stated otherwise.

5.1.2. De-Preservation

For de-preservation the applicable dust caps/plugs need to be removed prior to commissioning. During hook up it is mandatory to keep these caps/plugs in place for as long as possible to prevent contamination.

5.2. Packing

WARNING	
	CRUSH HAZARD: Possible injury and/or trapped limbs. Take care to avoid being trapped or crushed between heavy, moving objects when (un)boxing the cooler.

The Pipeline filter series shall be lifted carefully with proper equipment.

Always make sure that proper lifting devices are used.

To prevent damage during transport all equipment needs to be properly secured inside their package with suitable bolting, straps, or wooden supports.

For unboxing, the equipment must be lifted carefully out of its shipping box.

5.3. Transportation and storage requirements

Note: The following requirements apply to the Pipeline filter series and all related equipment:

Transport and storage criteria	Requirements
Transportation	The system must be transported and stored in the unopened, original shipping box.
Suspect damaged during transportation	Carefully inspect equipment that has been dropped or has been subjected to impacts during transport to confirm that they are operational before installation.
Warehouse requirements	The warehouse must be dry and dust free.
Long-term storage	After a storage period of 2 years, inspect the Pipeline filter series before installation.

Table 2 - Transport and Storage Criteria

6. Installation

6.1. Introduction

WARNING	
	CRUSH HAZARD: Possible injury and/or trapped limbs. Take care to avoid being trapped or crushed between heavy, moving objects when installing the filters.

Before installing the Pipeline filter series, make sure you have read and understood the installation requirements in this section. If you have any questions regarding the installation of the Pipeline filter series, contact your local Flowserve representative.

6.2. Safety considerations

WARNING	
	CHECK BEFORE DISASSEMBLING: Under no circumstances should the Pipeline filter series be disassembled while it still contains any hazardous materials or when it is pressurized.

DANGER	
	SUFFOCATION HAZARD: Breathing hazardous chemicals in a confined space can result in sudden unconsciousness or death. Take extra care when working in confined areas.

Position the Pipeline filter series as close to your main equipment as possible. Make sure there is sufficient room for:

- Evacuation of the plant in case of an emergency (do not block walkways and emergency exits)
- Safe operation and maintenance of the system

6.3. Installation requirements

Before installation the following shall be checked:

- Any possible damage due to transport or storage
- Cleanliness, required before operation
- Existence of the nameplate with correct inspection markings and design/test conditions

6.4. Product Set-Up

6.4.1. Mounting

- Connect the pump discharge to the filter connection B - inlet.
- Connect the seal flush to the filter connection A - outlet.
- Connect wiring to any instruments included with the system such as a pressure transmitter.

6.4.2. Interconnecting piping

The interconnecting piping between the Pipeline filter series and the main equipment must be correctly fitted to prevent negative impact on the performance.

Pay attention to the following points:

- Minimize the number of restrictions (for example, limit the number of elbow/tee fittings).
- Unless otherwise specified, the construction size should be ¾" seamless tubing.
- The pipes must be clean and free of burrs.
- The total pipe length and number of bends shall be kept to a minimum.
- Use smooth, large radius bends; do not use elbows, tees, etc.
- Pipe runs should be sloped continuously up or down to allow for adequate circulation, proper venting and draining.
- Make sure that the loop, including seal flange, does not include vapor traps. When vapor traps cannot be avoided, a proper venting solution shall be added.
- For threaded connections, do not use Teflon tape but an anaerobic thread sealant.
- Leak test the system and interconnect tubing after installation. Refer to end user specifications or procedures.

6.5. Installation procedure

Use this procedure to install or reinstall the system.

Procedure

1. Before installing the Pipeline filter series, inspect all components for damage. If any of the components are damaged, you should report this to your local Flowserve representative. Refer to section 6.3.
2. Determine the installed position of the system. Refer to the mounting requirements, section 6.4.1.
3. The Pipeline filter series shall not be moved by hand. The stand is equipped with a lifting lug. Use an appropriate lifting device to position the Pipeline filter series as close as possible to the main equipment. Make sure you leave sufficient room for operation and maintenance purposes.

WARNING	
	CRUSH HAZARD: Possible injury and/or trapped limbs. Take care to avoid being trapped or crushed between heavy, moving objects when installing the cooler.

4. Make sure that the Pipeline filter series is installed in a rigid support to counteract any vibrations and instability.

WARNING	
	HIGH PRESSURE: Take caution when de-pressurizing the Pipeline filter series. The Pipeline filter series might have energy stored inside. Make sure that de-pressurizing happens slowly.

5. Connect the Pipeline filter series connections. Refer to section 6.4.2.
6. Manufacture the interconnecting piping according to the Installation requirement. Refer to section 6.4.3.
7. Make sure the installation is correctly earthed to prevent the potential risk of explosion caused by static electricity.

Note: Leak testing is recommended after assembly. Refer to end user specifications or procedures.

6.6. Differential Pressure Transmitter

- The level of contamination of the filter cartridge can be monitored using the differential pressure transmitter with a local display. Record the filter differential pressure at commissioning, replace the filter element when the differential pressure exceeds 15 psi [1 bar] above the value found for a clean filter element. Flowserve recommends system inspection and replacing a filter cartridge after one year of use, irrespective of differential pressure.
- For additional information on how to operate the instrumentation, refer to the IOM specific to the instrument.

7. Operation

7.1. Start-Up

1. Make sure the Pipeline filter series is installed correctly, refer to chapter 6.5.
2. Open the interconnecting valving for the system.
3. Make sure commissioning of the system has been performed properly. Ensure that all the trapped gas/air is vented from the system and interconnecting piping and that the system can be completely drained.
4. Start up the pump according end user/plant procedures.

7.2. Product Monitoring

WARNING	
	HIGH PRESSURE: Take caution when de-pressurizing the Pipeline filter series. The Pipeline filter series might have energy stored inside. Make sure that de-pressurizing happens slowly.

WARNING	
	HOT SURFACES: The Pipeline filter series and surrounding surfaces might be hot. Take care when touching components. Wear the appropriate Personal Protection Equipment (PPE), according to plant regulations.

WARNING	
	HAZARDOUS CHEMICALS: Hazardous chemicals might be released during removal of the Pipeline filter series. Wear Personal Protective Equipment (PPE). Follow all safety regulations and Plant regulations.

1. Monitor the Pipeline filter series for correct operation. Also refer to the Periodic maintenance tables in section 8.2.
2. Make sure:
   - there are no leaks
   - there is no cavitation in the system
   - there is no heavy vibration in the system
3. If you notice any problems with the Pipeline filter series, follow plant regulation for reporting and correcting faulty equipment.

The Pipeline filter series performance should be monitored periodically. The baseline differential pressure should be collected soon after equipment commissioning.

7.3. Changing Filter Housing in Operation

Per manufacturer recommendations, the filter element shall be replaced when the differential pressure exceeds 15 psi [1bar] above the dP for a clean filter element. Filter element damage can occur at filter differential pressures above 45 psi [3 bar].

WARNING	
	FILTER ELEMENT FAILURE: Monitor the differential pressure to ensure that the filter element dP does not exceed 45 psi [3 bar] to prevent filter element damage and contamination reaching the seal.

a. Open the inlet ball valve of the backup filter (refer to figure 1)

b. Open the outlet valve of the backup filter

c. Close the inlet and outlet valves for the filter housing with the dirty filter element

d. The backup filter is now the operational filter. The dirty filter element can now be changed out following 7.4.

7.4. Filter Element Change Out

WARNING	
	WORKING ON PRESSURIZED EQUIPMENT: Be aware of the inherent dangers associated with working with pressurized equipment. Flowserve recommends for the equipment to be depressurized before replacing the filter element.

a. Following site procedures, connect the drain valve for the housing with the dirty element to a reservoir to collect the fluid inside the filter housing. Open the drain valve and empty the filter housing.

WARNING	
	HAZARDOUS CHEMICALS: Hazardous chemicals might be released during removal of the Pipeline filter series. Wear Personal Protective Equipment (PPE). Follow all safety regulations and Plant regulations.

b. Open the vent valve for the housing with the dirty filter element.

c. Remove the 6 Socket Head Cap Screws from the top cover, set apart in a clean area

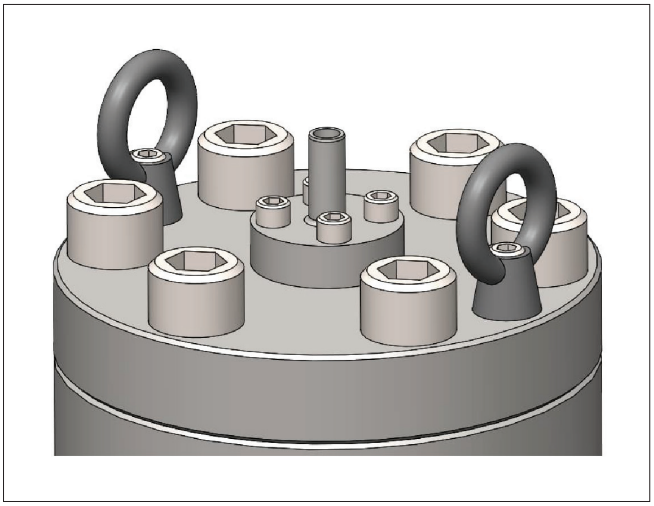


Figure 4: Top Cover with SHCS

d. Using the two eye bolts, remove the top cover. Inspect the O-Rings and back up rings, confirm that these are free of damage, set apart in a clean area

Figure 5: Top Cover with O-Rings and Back-up rings

e. Remove filter retainer using a ½" hex socket. Inspect filter retainer, ensure its free of damage and set apart in a clean area

f. Pull out dirty filter element. Inspect for contaminants and note anything out of the ordinary. Discard following facility procedures and local legislation

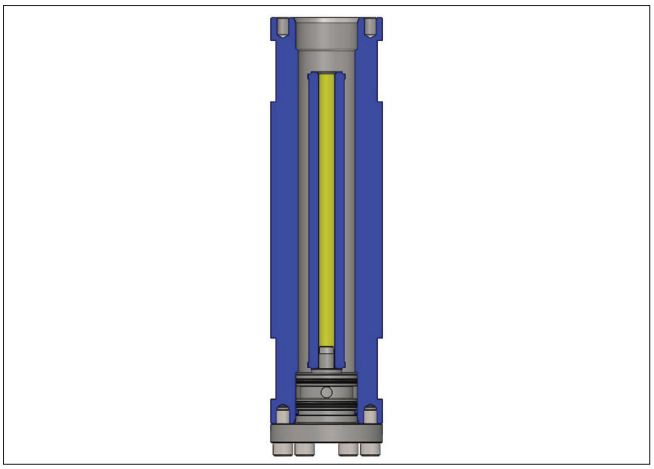


Figure 6: Filter Element inside housing.

g. Inspect Filter Housing sealing surface (see figure 6). Ensure component is not contaminated or damaged

h. Inspect new filter element. Install inside housing (see figure 6)

i. Inspect Filter Retainer and the mating thread in the Housing Filter. Ensure components are not contaminated or damaged. Lubricate contact surface of the Filter Retainer with a nickel based anti-seize compound. Turn Filter Retainer into Filter Housing so that the nozzle of Filter Retainer is fitted into the Filter Cartridge, as shown on Figure 7. **Turn Retainer by hand until a snug fit is felt then stop to prevent Filter Cartridge damage**

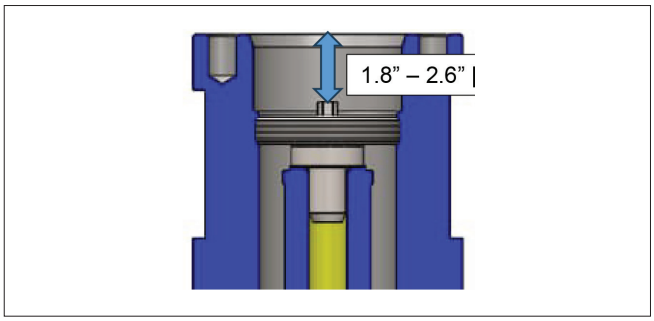


Figure 7: Filter Element and retainer inside housing.

j. Measure distance from Filter Retainer to top end of Filter Housing and ensure it is within 1.8-2.6 in. [45 – 66 mm] If not correct, disassembly Filter Retainer, inspect and reinstall

k. Start insertion of Top Cover into Filter Housing as shown in Figure 8. Resistance will be felt once the upper O-Ring contacts the sealing gland.

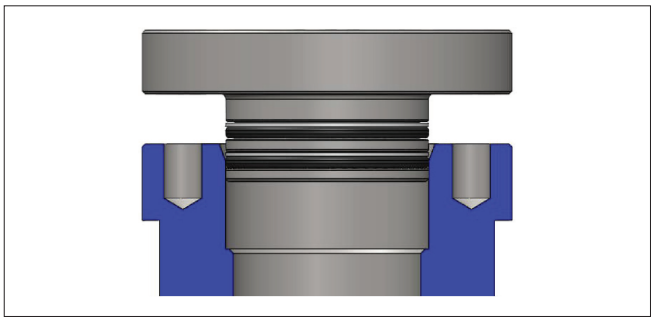
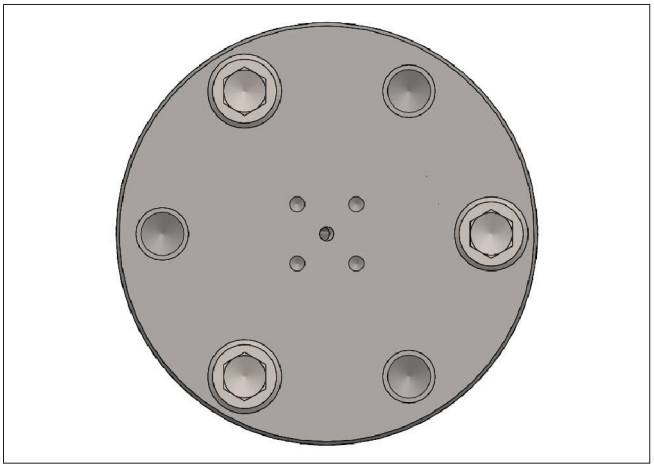


Figure 8: Top Cover insertion in housing.

l.

m. Install 3 SHCS by hand into 3 Holes at 120° from each other, until the Top Cover contacts the Filter Body.



n. Turn the 3 SHCS one full turn at a time in a crisscross pattern, until the Housing and Top Cover contact each other. **Failure to follow these instructions can cause permanent component damage.**

o. Install the remaining SHCS by hand.

p. Following a crisscross pattern, torque SHCS to 170 ft-lb (230 N-m). If desired, the torque can be reached in steps.

q. Close the filter drain and vent valves. The serviced filter is now the backup filter, and is ready for future use.

Monitor the temperature and differential pressure periodically to prevent damage or failure to the equipment.

7.5. Removing System from Operation

WARNING	
	HIGH PRESSURE: The Pipeline filter series and surrounding surfaces might be hot. Take care when touching components. Wear the appropriate Personal Protection Equipment (PPE), according to plant regulations.

WARNING	
	HOT SURFACES: The A625 Seal Cooler and surrounding surfaces might be hot. Take care when touching components. Wear the appropriate Personal Protection Equipment (PPE), according to plant regulations.

WARNING	
	HAZARDOUS CHEMICALS: Hazardous chemicals might be released during removal of the Pipeline filter series. Wear Personal Protective Equipment (PPE). Follow all safety regulations and Plant regulations.

The Pipeline filter series may be operated and serviced only by qualified personnel, in accordance with national, facility and end-user safety regulations and Chapter 2 in this manual.

Check if the Pipeline filter series can be removed from operation. Check if the system can be de-pressurized without negatively affecting the mechanical seal installed in main equipment. System cannot be shut down if any of the following main equipment conditions occur:

- Main equipment/ Pump is on hot stand-by
- Main equipment/ Pump is pressurized
- Main equipment/ Pump is in operation

Note: Always shut down the system according to plant regulations/ end user safety procedures.

- Make sure the pump is shut down following end-user and facility regulations
- Isolate the system
- De-pressurize and drain the Pipeline filter series

8. Maintenance

8.1. General guidelines

Periodic maintenance must be done at regular intervals (weekly, monthly, yearly). Refer to the following tables.

All liabilities and warranties to Flowserve for damage incurred using non-original replacement parts and accessories will be rendered null and void.

8.2. Periodic maintenance tables

Use the following table to plan the periodic maintenance for your system (refer to the table of contents and the Appendix for the relevant information)

Weekly (or Monthly) maintenance
Check the seal, Pipeline filter series, and interconnecting pipe work for leaks. Rectify if necessary.
Confirm that the Pipeline filter series is not subject to vibration.
Check the filter differential pressure.

Table 7 - Periodic Maintenance Table

8.3. Inspection Procedure

WARNING	
	HIGH PRESSURE: Take caution when de-pressurizing the Pipeline filter series. The Pipeline filter series might have energy stored inside. Make sure that de-pressurizing happens slowly.

WARNING	
	HOT SURFACES: The Pipeline filter series and surrounding surfaces might be hot. Take care when touching components. Wear the appropriate Personal Protection Equipment (PPE), according to plant regulations.

WARNING	
	HAZARDOUS CHEMICALS: Hazardous chemicals might be released during removal of the Pipeline filter series. Wear Personal Protective Equipment (PPE). Follow all safety regulations and Plant regulations.

The product maintenance procedure is as follows:

- Remove the Pipeline filter series from service. Refer to section 7.3. Removing System from Operation.
- Clean the Pipeline filter series internally and externally. Follow the assembly drawing. If in doubt, ask a Flowserve representative for clarification.
- Inspect all components for damage or corrosion and replace as needed.
- Re-install the Pipeline filter series. Refer to section 6.5. Installation Procedure.

9. Troubleshooting

Use the following table to troubleshoot the system. Once you have identified the problem, use the procedures in this manual to maintain the Filter. If you are not sure how to troubleshoot or maintain your Pipeline filter series, please contact your local Flowserve representative.

Note: the recommended response actions always include notify the supervisory authority and respond according to plant regulation.

Parameter	Indication	Possible Cause	Solution
Sealing Pressure	Low	• Leakage in connections, gaskets, piping • Mechanical seal failure • Flush source supply pressure fails.	• Check connections for leakage • Check gaskets for leakage • Check piping for leakage • Check mechanical seal
Sealing Pressure	High	• Inner mechanical seal failure	• Repair mechanical seal • Open discharge line
Differential Pressure	High	• Filter element is clogged	• Switch filter in operation, replace filter element (see section 6.7)
Flow	Low	• Closed Seal Supply or Seal Return Isolation Valve • Clogged interconnecting piping • Flush source supply pressure fails • Filter element is clogged	• Check for blockages, open valves as necessary • Localize blockage and resolve • Review supply source • Switch filter in operation, replace filter element (see section 6.7)

Table 8 - Localization and Elimination of Faults, Damages and their Consequences

ANNEX I

System logbook

Copy and use this logbook to record periodic or corrective maintenance done on your system.
Use the following codes and enter remarks, the date, and your name:

Weekly maint = W	Monthly maint = M	Yearly maint = Y	Adjust = A	Replace = R

Code	Remarks	Date	Name

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