PROCESSTEC

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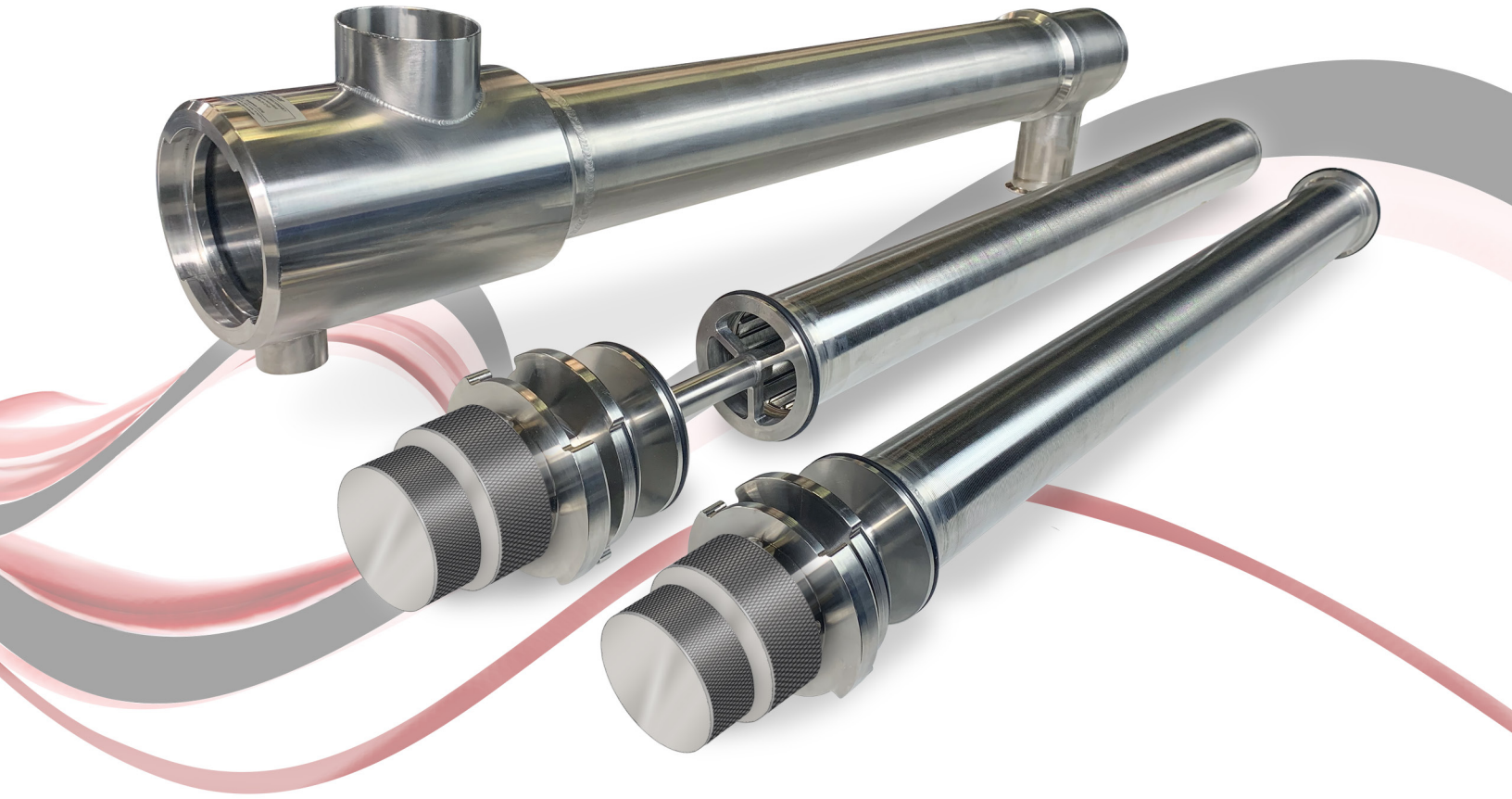
SafeStrainer

Operation & Maintenance Manual

Published July 10th, 2023



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1. ABOUT SAFESTRAINER

1.1 Safety Notes

This manual contains instructions which should be heeded to ensure personal safety and prevent damage to property. These instructions are highlighted by a warning triangle and a color to indicate the degree of the hazard. The following warnings should be observed when working around **SafeStrainer**, as well as when working around Twin Screw pumps in general:

CRUSHING PARTS
Indicates moving parts that can crush and cut. Perform work with awareness of how parts move and where these crushing parts can be encountered.

HOT SURFACE
Indicates a surface is hot to the touch and can cause burn injury. Do not maintain or touch a hot surface until the pump is turned off and allowed to cool. If immediate repair is necessary, it is advised to wear protective gloves while handling a hot part.

CAUTION
When operating SafeStrainer, it is essential to wear appropriate protective equipment.

Commissioning and operating the **SafeStrainer** may only be performed by qualified personnel. Qualified personnel in terms of the safety instructions in this operating and safety manual are persons who have completely read this Operation & Maintenance Manual.

Furthermore, maintenance can only be performed by qualified maintenance technicians. Qualified maintenance technicians in terms of the maintenance instructions in this operating and safety manual are persons who have read and understood Chapter 4 "Maintenance" of the **SafeStrainer** Operation & Maintenance Manual and/or have been trained by **PROCESSTEC** in the use and maintenance of the **SafeStrainer**.

In addition to this operating manual, general on-site regulations as well as city, state, and federal regulations applicable to accident prevention must be made available and followed.

The **SafeStrainer** may only be used in the applications as specified in Chapter 3 "Operation", in the **SafeStrainer** Operation & Maintenance Manual, and only in connection with the spare parts recommended by **PROCESSTEC, Inc**.

1.2 Introduction

The **SafeStrainer** is a static inline filter for a wide range of particulate sizes and applications. It is designed to keep the operator harmless during the complete filter insert removal process.

If the piping system with the associated **SafeStrainer** would be under pressure, the unique opening mechanism prevents the removal of the filter insert without engaging the internal pressure release valve to the dedicated drain.

The instructions for the SafeStrainer installation in Chapter 2 must be followed. The dedicated drain line must remain open at all times.

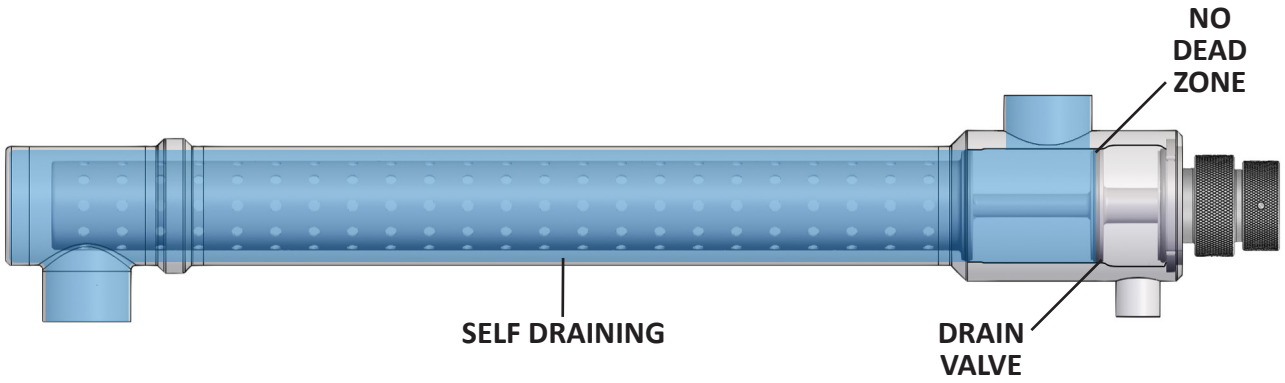
1.3 Working Principle

The **SafeStrainer** can be picked for many different applications. Filter insert and pore size, flow direction and housing size can be optimized for different applications. The filter could be used for:

- the removal of larger foreign bodies
- for quality assurance to ensure that no lumps or coarse product parts remain in the final product.

Products that may or may not contain particulates are pumped through the strainer. It's main purpose is to filter particulates larger than the pore size and remove it from the product stream.

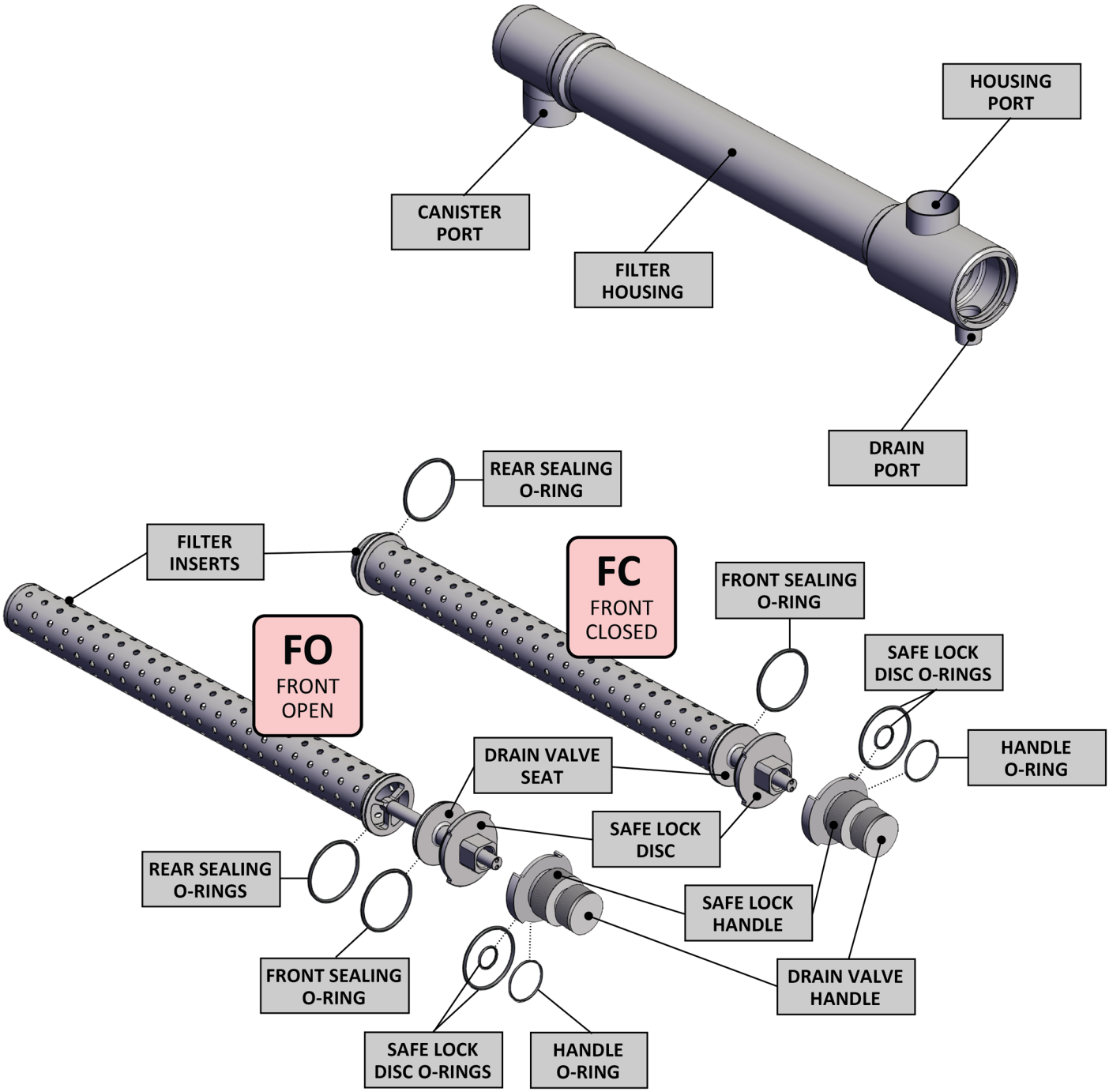
The **SafeStrainer** is designed according 3A and EHEDG guidelines. It follows the most stringent requirements for food processing equipment. The construction of the **SafeStrainer** was created in such a way that no dead ends with stationary product occur during the production cycle. All dead zones that could accumulate stagnant product during the production process are eliminated regardless of installation orientation.



Within the main body size, the internal design of the Housing and SafeLock mechanism is always the same. The filter inserts are exchangeable. The filter insert specification can vary greatly (5um to 5mm).

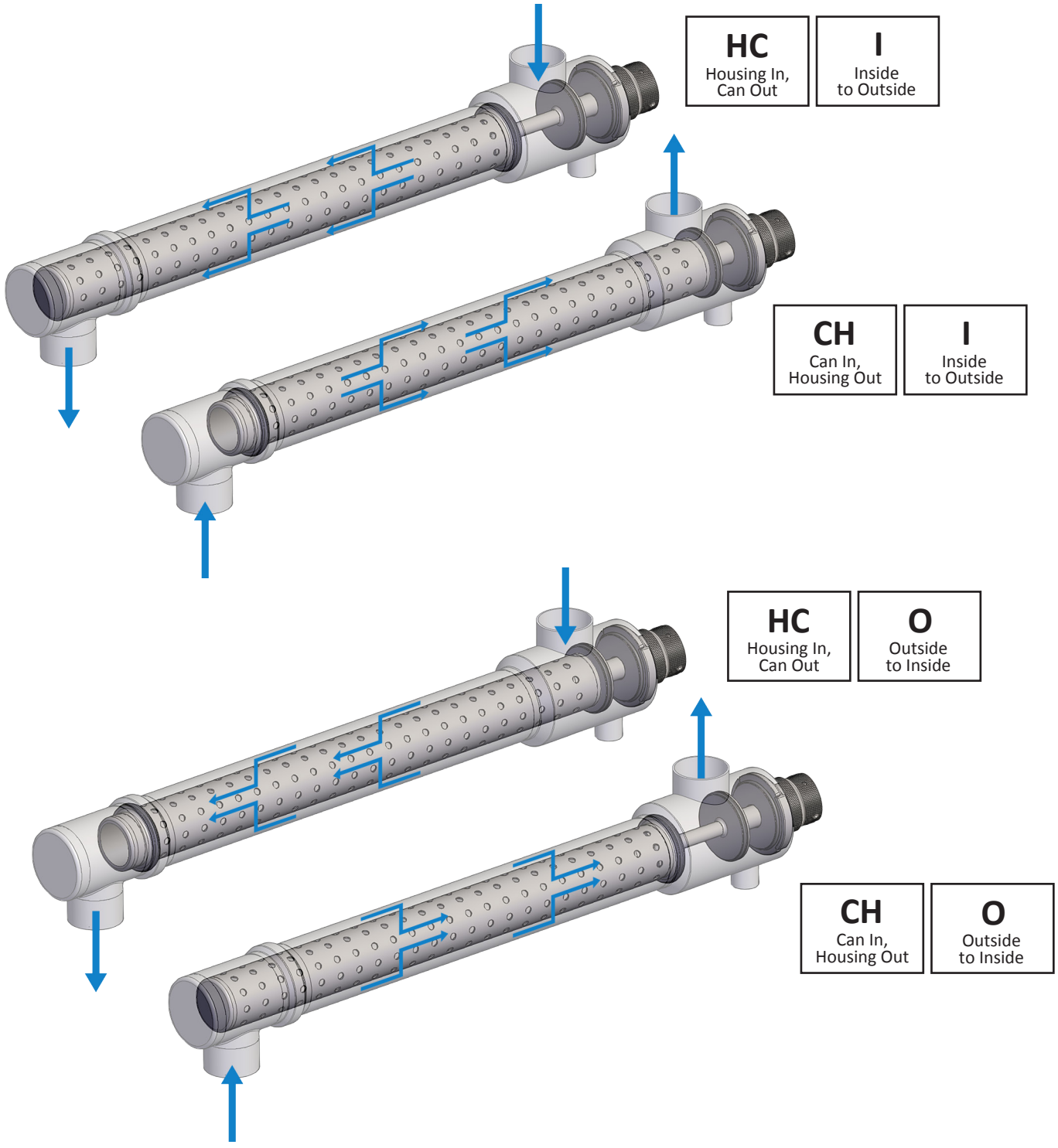
When the **SafeStrainer** insert is removed for inspection or manual cleaning, the piping system is opened up. The piping content can be under pressure, hot, contain chemicals or otherwise prove harmful to operator and environment. The SafetyLock mechanism insures that the drain valve can not be bypassed during the opening process. Operator and environment are permanently protected during the 2-step opening process.

1.4 General Overview

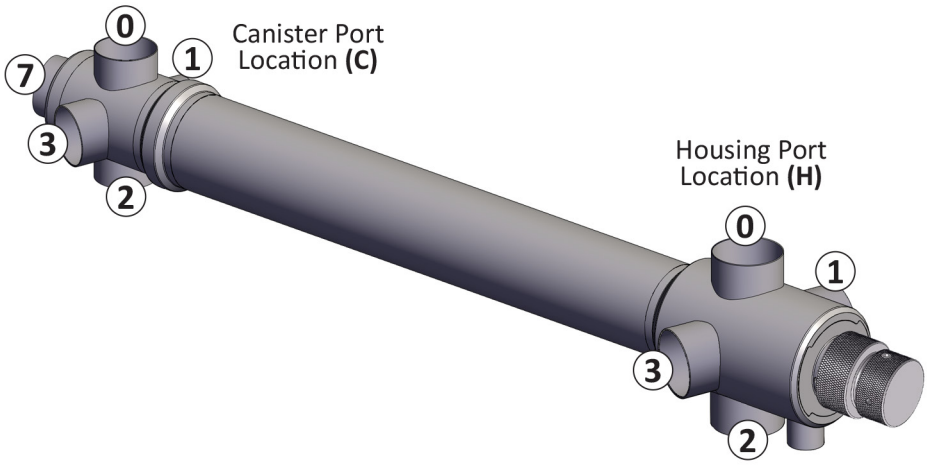


1.5 Options

The **SafeStrainer** comes in 3 main body sizes for various flowrates and pipe size connections. The flowdirection can be reversed, Housing to Can (HC) or Can to Housing (CH), as well as the filtration process through the screen: Inside to Outside (I) or Outside to Inside (O)



There are many different process connection sizes and standards as well as orientation of the process connections available.



Safe Strainer Size	Code	Size	DIN Norm	Old Norms	Outside Dia.	WS
1	C10	OD1.0"	11866_C	OD, ASME, A270	25.4mm	1.65mm
	C15	OD1.5"	11866_C	OD, ASME, A270	38.1mm	1.65mm
	C20	OD2.0"	11866_C	OD, ASME, A270	50.8mm	1.65mm
2	C25	OD2.5"	11866_C	OD, ASME, A270	63.5mm	1.65mm
	C30	OD3.0"	11866_C	OD, ASME, A270	76.2mm	1.65mm
	C40	OD4.0"	11866_C	OD, ASME, A270	101.6mm	2.11mm
3	C50	OD5.0"	11866_C	OD, ASME, A270	127.0mm	2.11mm
	C60	OD6.0"	11866_C	OD, ASME, A270	152.4mm	2.11mm
1	A25	DN25	11866_A	DIN 11850	28.0mm	1.5mm
	A32	DN32	11866_A	DIN 11850	34.0mm	1.5mm
	A40	DN40	11866_A	DIN 11850	40.0mm	1.5mm
	A50	DN50	11866_A	DIN 11850	52.0mm	1.5mm
2	A65	DN65	11866_A	DIN 11850	70.0mm	2.0mm
	A80	DN80	11866_A	DIN 11850	85.0mm	2.0mm
	A100	DN100	11866_A	DIN 11850	104.0mm	2.0mm
3	A125	DN125	11866_A	DIN 11850	129.0mm	2.0mm
	A150	DN150	11866_A	DIN 11850	154.0mm	2.0mm
1	B10	1.0"	11866_B	ISO-2037	42.4mm	2.0mm
	B15	1.5"	11866_B	ISO-2037	48.3mm	2.0mm
	B20	2.0"	11866_B	ISO-2037	60.3mm	2.0mm
2	B25	2.5"	11866_B	ISO-2037	76.1mm	2.0mm
	B30	3.0"	11866_B	ISO-2037	88.9mm	2.0mm
3	B40	4.0"	11866_B	ISO-2037	114.3mm	2.0mm
	B60	6.0"	11866_B	ISO-2037	139.7mm	2.6mm

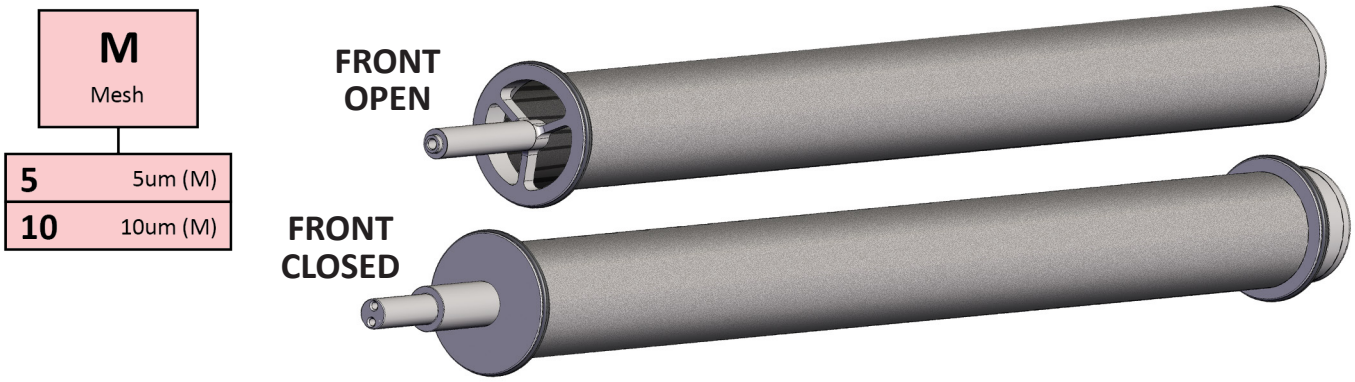
1.5.1 Pressure

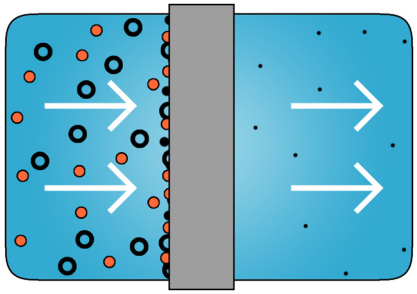
Standard pressure for the **SafeStrainer** is 10 bar. With appropriate manufacturing process and certification, a maximum of 25 bar system pressure can be achieved.

1.5.2 Filter Insert Options

There are 3 different house sizes and 3 different Filter Insert types with different pore sizes to choose from. The application determines the pore size, the required flow rate determines the housing size. The pore size can be selected based on the selected insert style: Meshfilter (M), Wedgewire (W), Perforated tube (P).

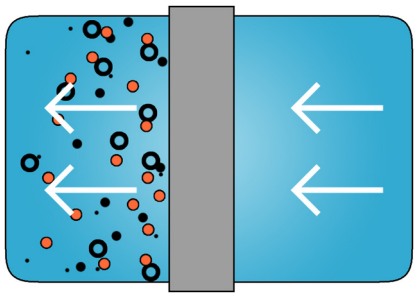
A Startup Kit Filter Insert is also available (see Section 5.1 Spare Parts for SafeStrainer on Page 26).





MESH FILTERING PROCESS

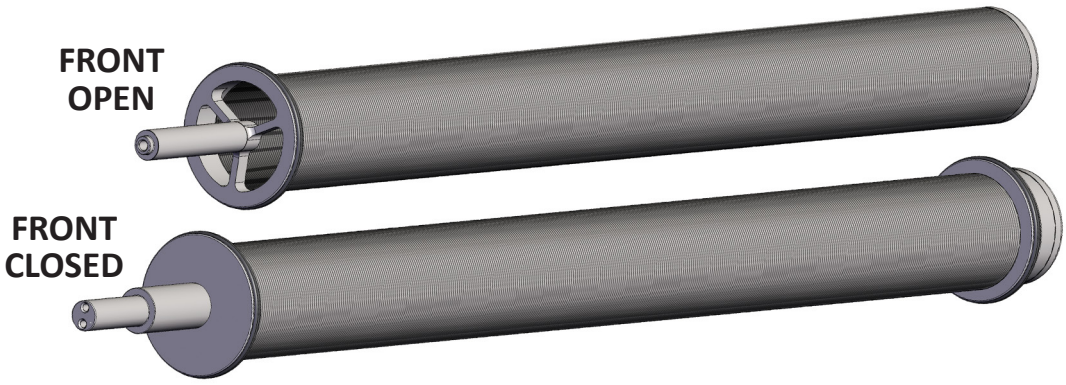
During the filter cycle, the solids are deposited on the smooth surface. This 'cake' acts as an extra filter for finer particles. The fines that slip through do not become lodged in the conical slots.

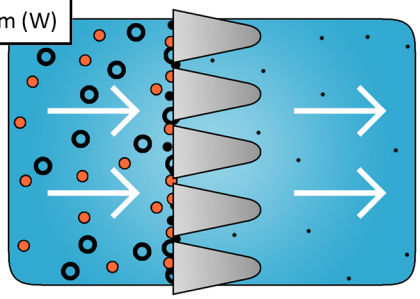


MESH BACKWASHING PROCESS

By reversing the flow, the cake and dirt are removed from the filter surface.

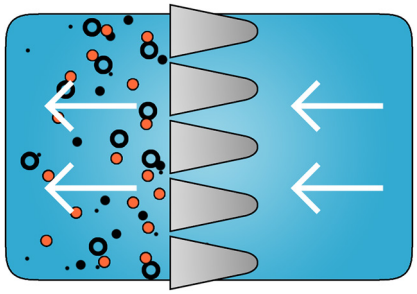
W Wedgewire	
25	25um (W)
50	50um (W)
100	100um (W)
150	150um (W)
200	200um (W)
250	250um (W)
300	300um (W)





WEDGEWIRE FILTERING PROCESS

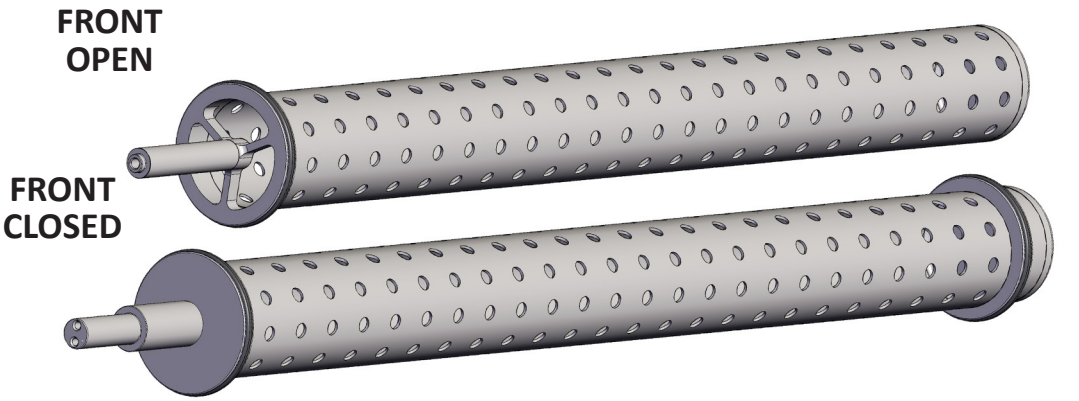
During the filter cycle, the solids are deposited on the smooth surface. This 'cake' acts as an extra filter for finer particles. The fines that slip through do not become lodged in the conical slots.



WEDGEWIRE BACKWASHING PROCESS

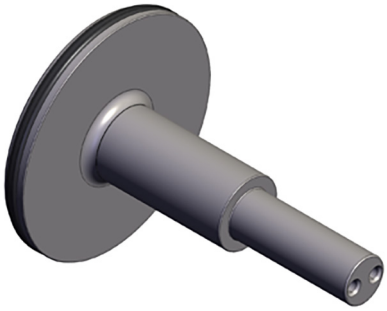
By reversing the flow, the cake and dirt are removed from the filter surface.

P Perforated Cylinder	
800	800um (P)
1000	1000um (P)
1500	1500um (P)
2000	2000um (P)
3000	3000um (P)
5000	5000um (P)



Other pore sizes are available upon request

1.5.3 Startup Kit Filter Insert



A Startup Kit Filter Insert is also available (see Section 5.1 Spare Parts for SafeStrainer on Page 28).

1.5.3 Elastomers

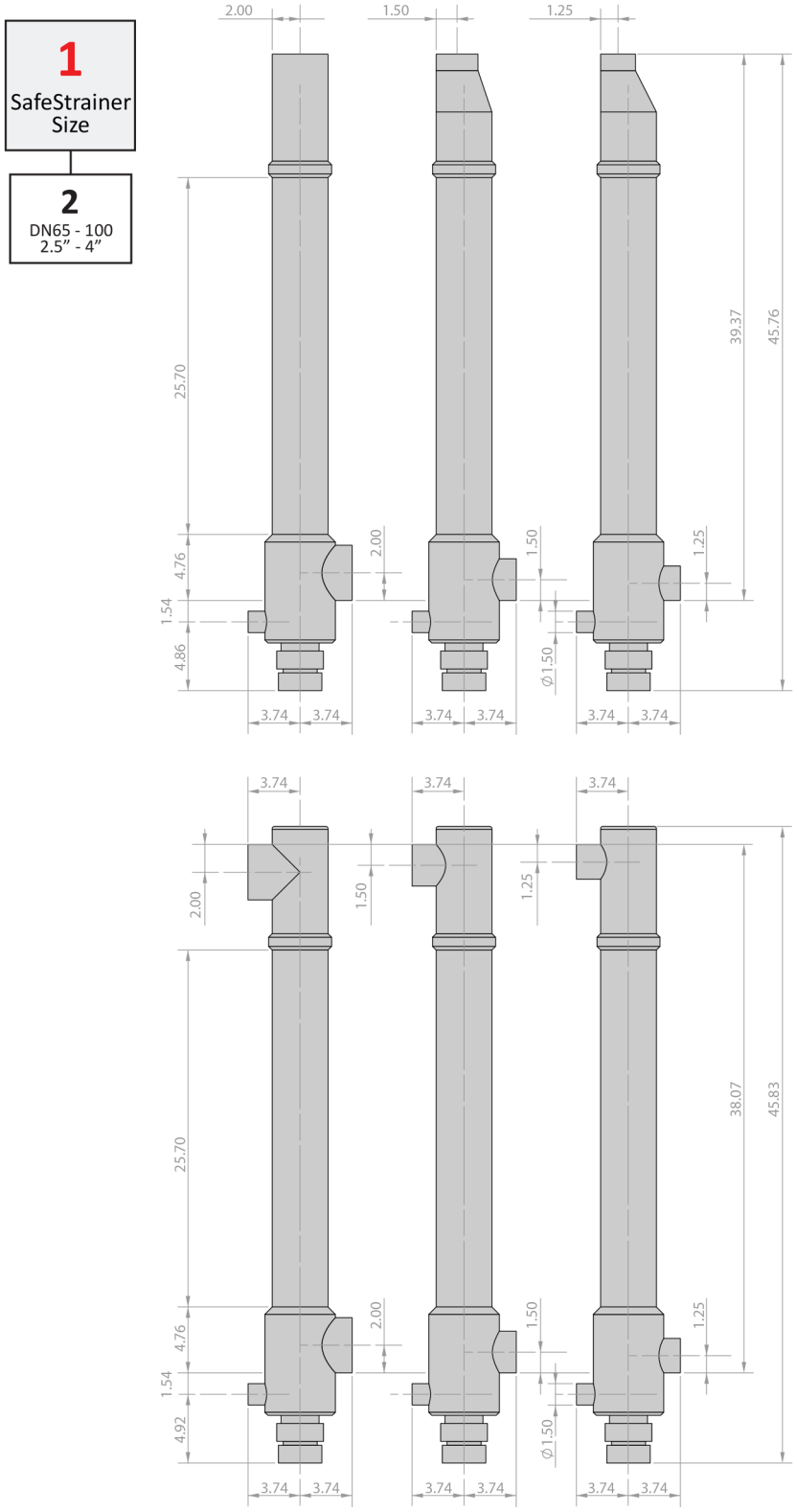
The following Elastomers are available:

ELASTOMERS	
FKM (F)*	For Standard Temperatures with Fatty Products
EPDM (E)	For Standard Temperatures with Low Fat Applications
PERLAST (P)	For High Temperatures with Fatty Products
HNBR (H)	...

**FKM is used as standard elastomer.*

1.5.4 Housing Dimensions

The **SafeStrainer** Housing is 4" in diameter, but the connecting pipes are available in various popular sizes.



1.6 Configuration Chart

On the following page is a Configuration Chart showing all the available options for the **SafeStrainer**. It is formatted in such a way that each unique configuration can be identified by the specific code on the part using this chart as a quick reference guide.

Examples of the formatting would be:

1HCOW5EC25BWC25BWH0

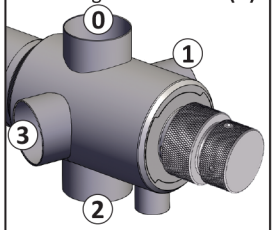
2CHIP5000HC4051C4051C3

1. ABOUT SAFESTRAINER

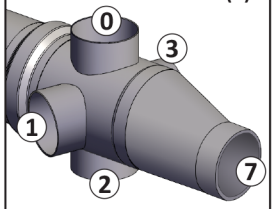
1	2	3	4	5	6	7	8	9	10	11	12	13
SafeStrainer Size	Housing Flow Direction	Incidental Filter Flow	Filter Element	Gap / Pore Size	Elastomers	Housing Port	Housing Process Connection	Canister Port	Canister Process Connection	Housing Port Arrangement	Canister Port Arrangement	Pressure

1	HC	O	M	5 5um (M)	F	C10 OD1"	BW	C10 OD1"	BW	H0	C0	10
DN25 - 50 1" - 2"	Housing In, Can Out	Outside to Inside	Mesh	10 10um (M)	FKM	C15 OD1.5"	Butt Weld	C15 OD1.5"	Butt Weld	Housing 12 Can Horizonal	Housing 12 Can 12	10 bar Pressure
2	CH	I	W	25 25um (W)	E	C20 OD2"	TC	C20 OD2"	TC	H1	C1	25
DN65 - 100 2.5" - 4"	Can In, Housing Out	Inside to Outside	Wedgewire	50 50um (W)	EPDM	C25 OD2.5"	Tri Clamp	C25 OD2.5"	Tri Clamp	Housing 3 Can Horizonal	Housing 12 Can 3	25 bar Pressure
3				100 100um (W)	P	C30 OD3"	64	C30 OD3"	64	H2	C2	
DN125 - 150 5" - 6"				150 150um (W)	PERLAST	C40 OD4"	DIN 11864 (Groove End)	C40 OD4"	DIN 11864 (Groove End)	Housing 6 Can Horizonal	Housing 12 Can 6	
				200 200um (W)	H	C50 OD5"	51	C50 OD5"	51	H3	C3	
				250 250um (W)	HNBR	C60 OD6"	DIN 11851 (Groove End)	C60 OD6"	DIN 11851 (Groove End)	Housing 9 Can Horizonal	Housing 12 Can 9	
				300 300um (W)		A25 DN25		A25 DN25			C7	
				500 500um (W)		A32 DN32		A32 DN32			Housing 12 Can Horizontal	
			P	800 800um (P)		A40 DN40		A40 DN40				
			Perforated Cylinder	100 1000um (P)		A50 DN50		A50 DN50				
				1500 1500um (P)		A65 DN65		A65 DN65				
				2000 2000um (P)		A80 DN80		A80 DN80				
				3000 3000um (P)		A100 DN100		A100 DN100				
				5000 5000um (P)		A125 DN125		A125 DN125				
						A150 DN150		A150 DN150				
						B10 1"		B10 1"				
						B15 1.5"		B15 1.5"				
						B20 2"		B20 2"				
						B25 2.5"		B25 2.5"				
						B30 3"		B30 3"				
						B40 4"		B40 4"				
						B60 6"		B60 6"				

Housing Port Location **(H)**



Canister Port Location **(C)**



Customized Solutions are available upon request

1.7 SafeStrainer Videos

PROCESSTEC has created a few videos for the **SafeStrainer**, showing its features and functionality.

Please use the QR Codes below to view the videos on your mobile device.

Assembling SafeStrainer *VIDEO*

Disassembling SafeStrainer *VIDEO*

2. INSTALLATION

2.1 Unpacking

Check the contents and all wrapping when unpacking the **SafeStrainer**. Inspect the entire shipment carefully for any damage that may have occurred during shipping. Immediately report any damage to the carrier.

If the SafeStrainer is equipped with a wedgewire or mesh insert the startup kit is installed and the filter element is packaged separately.

2.2 Inspection / Technical Documentation

Inspect the **SafeStrainer** for visible shipping damages on housing, as well as the strainer iteself. Locate the technical documentation that is shipped with the **SafeStrainer** including:

0. Shipping Documents

1. **SafeStrainer** Configuration Key
2. Commissioning Protocol

3. Pictures

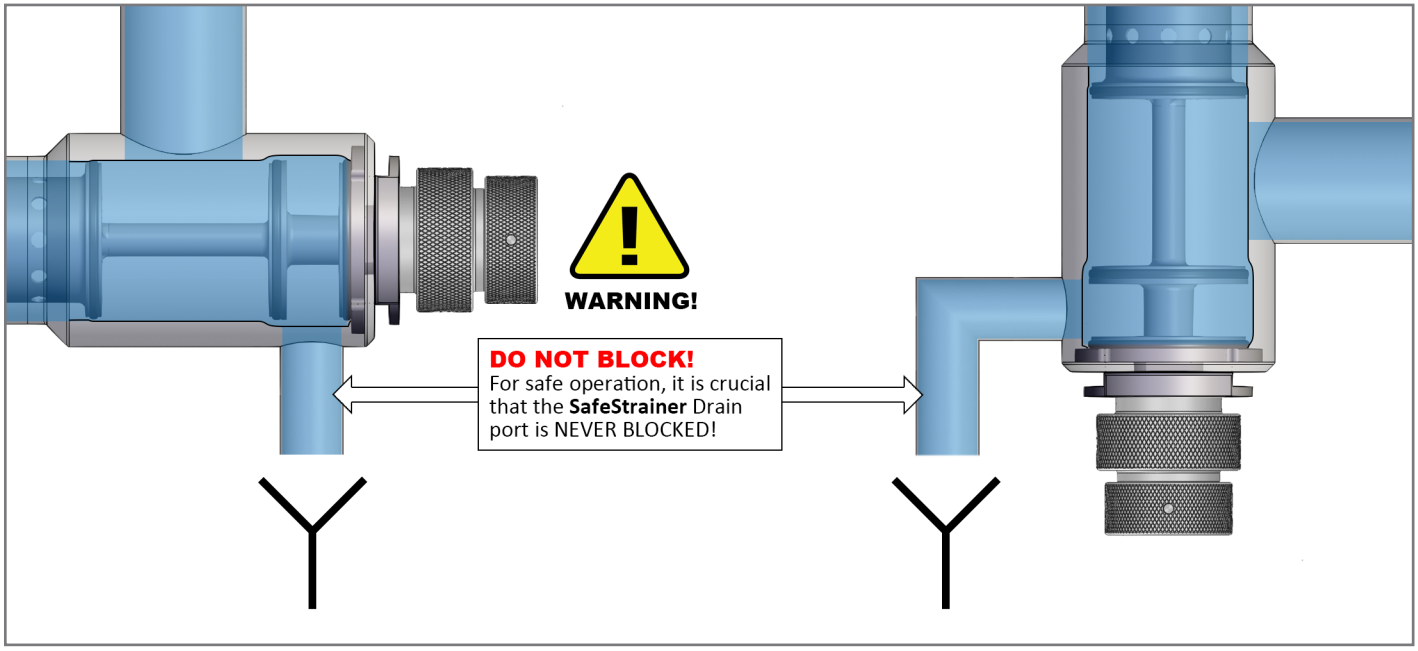
4. SafeStrainer Manual

Use these documents to ensure the **SafeStrainer** is shipped as ordered, and store these documents safely for future reference. All **SafeStrainers** are labeled with a adhesive label that contains the Serial Number, the Configuration Key, and other relevent information.

2.3 Installation

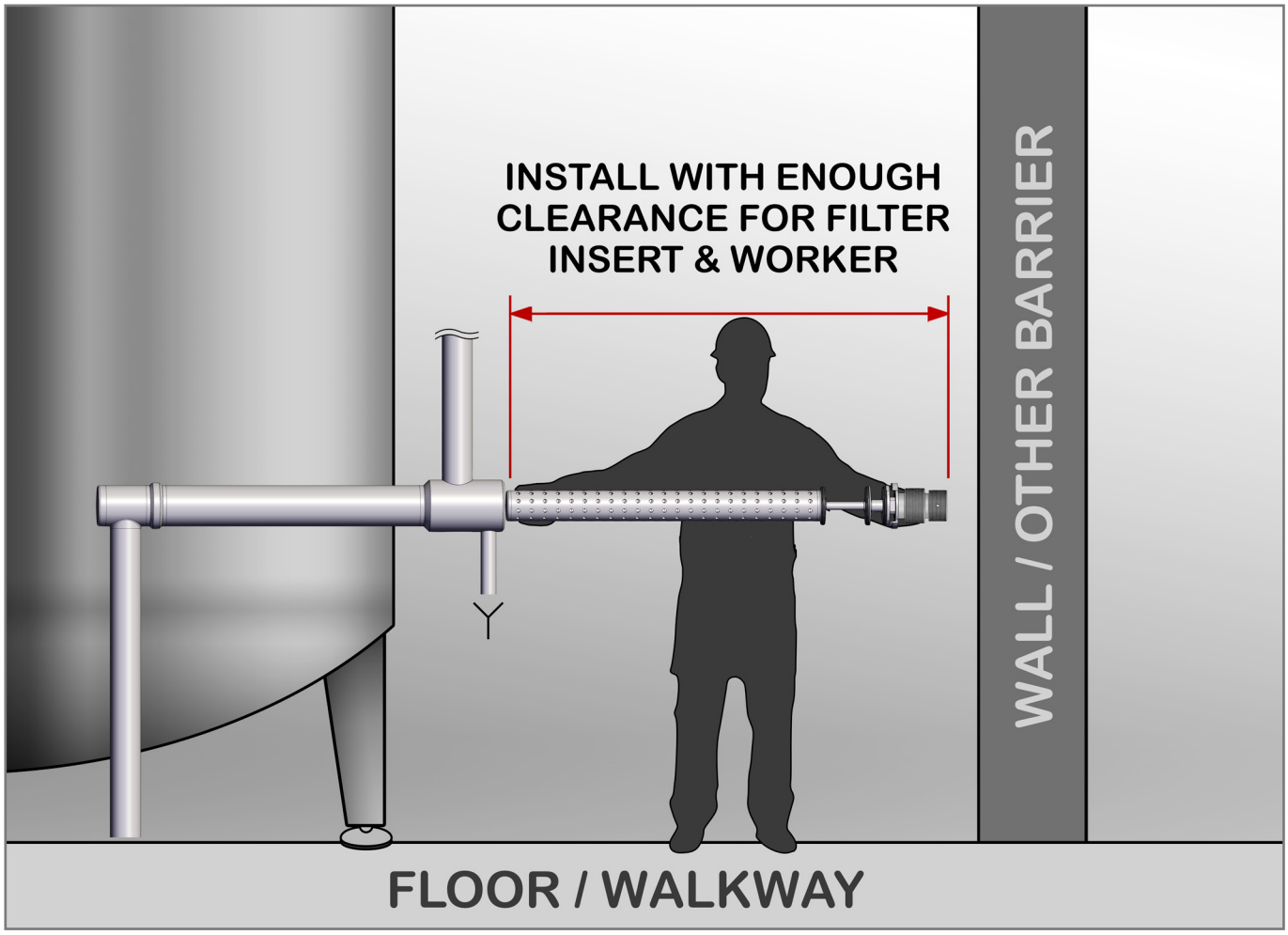
The following points need to be considered while installing the **SafeStrainer**:

1. The drain port must remain open at all times. No valves may be installed in the 1.5" drain pipe.



2. If the operator cannot see the end of the drain pipe, it is recommended to install a sight glass in the drain pipe so that the operator can ensure that the entire pipe system is completely emptied before opening the Safe Lock Disc by turning the Safe Lock Handle (as shown in Step 2 of **3.1 Removing the Filter Insert** on page 19).

3. In order to be able to pull the strainer out of the enclosure unhindered, it must be ensured that the operator has sufficient space in front of the **SafeStrainer**.



4. On defaullt, the **SafeStrainer** is installed horizontally so that the housing empties completely when the drain valve is opened. All installation directions are possible for pressure relief. However, the **SafeStrainer** can be installed in every possible position and safe operation is ensured if the instructions above are followed.

5. In order to minimize backflow of liquids from the connected piping through the strainer drain, it might be neccessary to isolate the strainer with valves.

6. It is possible to detect the position of the Filter Insert with a proximity switch for:
   - Filter Insert in the Housing
   - Drain Valve Closed

7. If the **SafeStrainer** is equipped with a Mesh or Wedgewire screen, it is strongly recommended to perform the first system flush with the startup-kit. The startup-kit consists of the drain valve disc with stem and O-ring. It replaces the screen insert mounted to the SafeLock Handle.

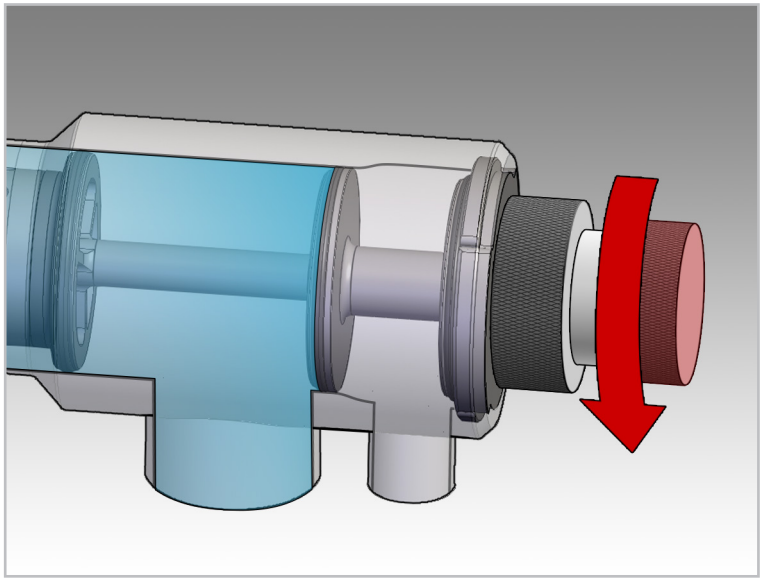
3. OPERATION

3.1 Removing the Filter Insert

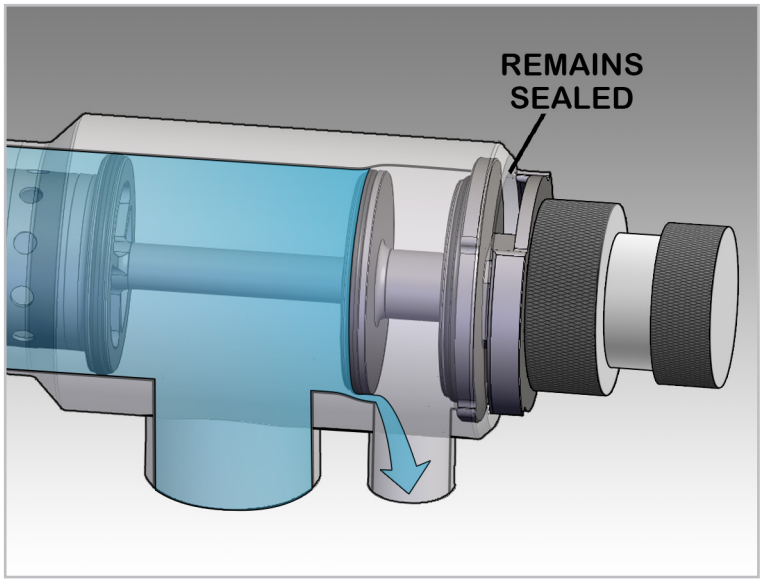
STEP 1)
OPEN THE DRAIN VALVE HANDLE

Turn the Drain Valve Handle Counter-Clockwise until the Safe Lock Handle is protruding from the housing.

During this process, the internal drain valve is opened and the piping content directed to the internal drain. The radial seal in the Safe Lock mechanism prevents spillage towards the operator during the whole process.

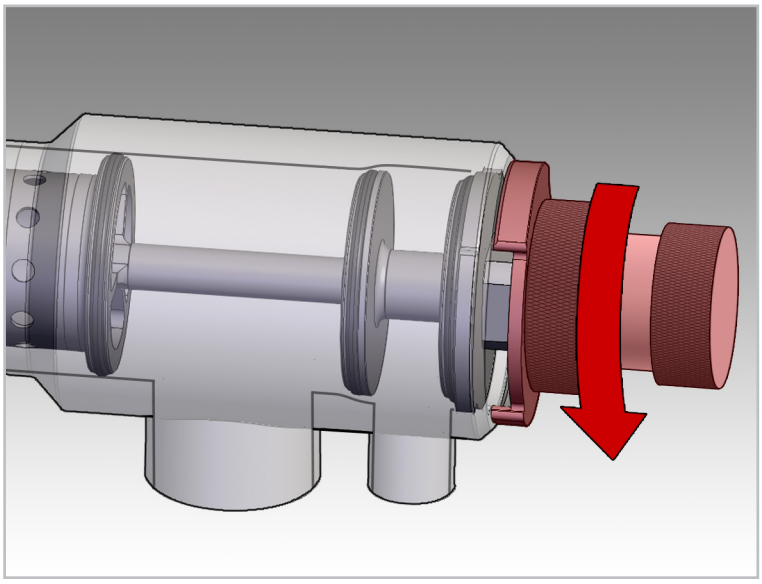


The operator decides on the basis of the residual emptying into the sequence when the system is sufficiently emptied to unlock the bayonet protection with a 90° rotation movement. After unlocking, the filter insert can be removed from the house in the axial direction.



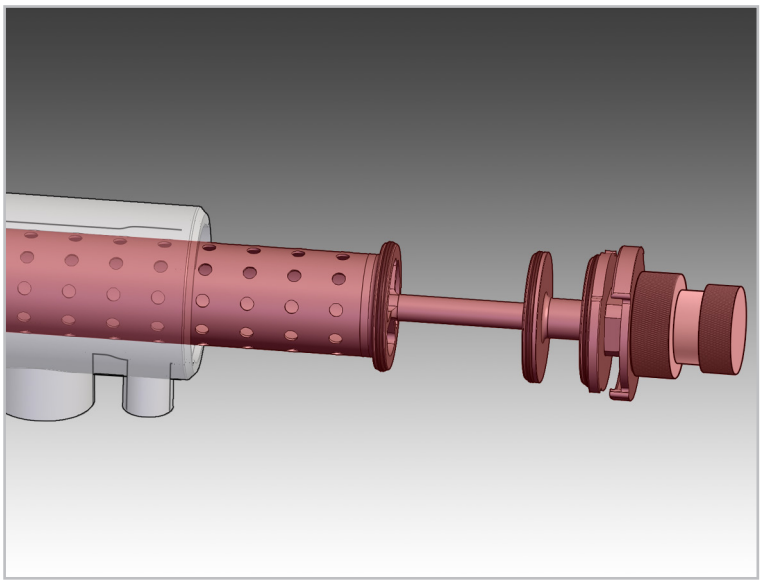
STEP 2)
OPEN THE SAFE LOCK HANDLE

Once the Drain Valve Handle is disengaged and the piping content is drained, it is safe to turn the Safe Lock Handle 90° to disengage the Safe Lock Disc.



STEP 3)
REMOVE THE FILTER INSERT

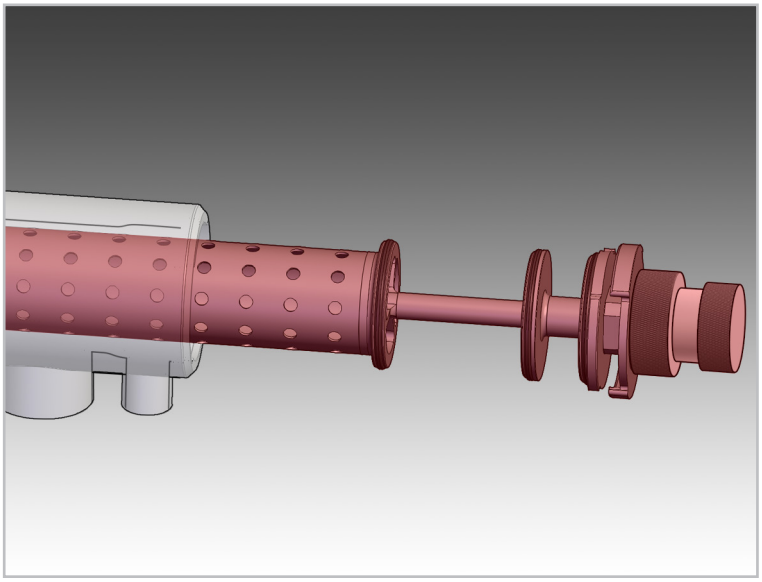
When the Safe Lock Disc is disengaged, the **SafeStrainer** insert can be safely removed axially from the housing.



3.2 Installing the Filter Insert

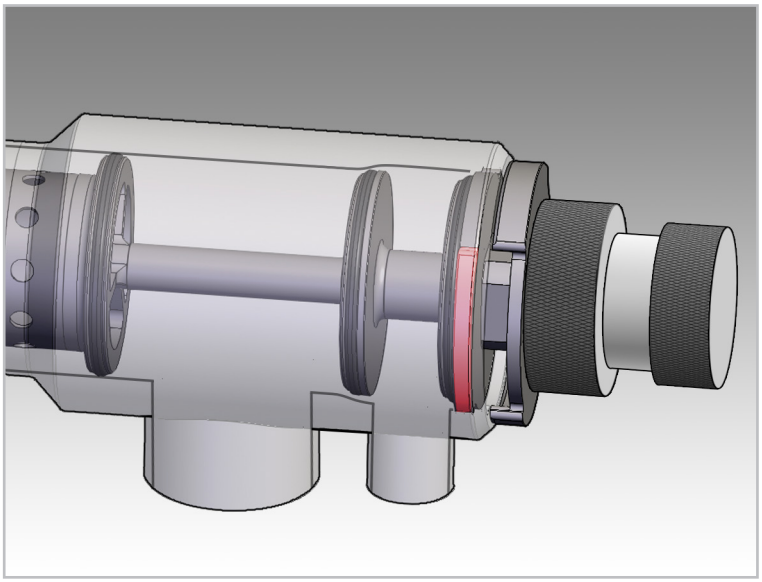
STEP 1)
INSTALL THE FILTER INSERT

Slide the Filter Insert into the housing of the **SafeStrainer**, taking care to keep it aligned to the center of the tube until the Drain Valve Seat O-ring is in the Housing.



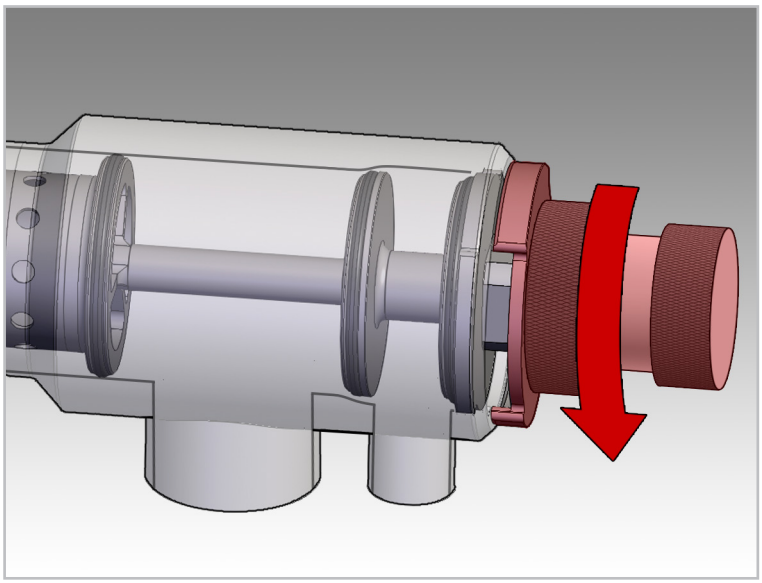
STEP 2)
ALIGN THE SAFE LOCK DISC

You will need to align the protruding tabs of the Safe Lock Disc to the slots on the Housing to be able to slide the Filter Insert into the housing.



STEP 3)
ROTATE THE SAFE LOCK HANDLE

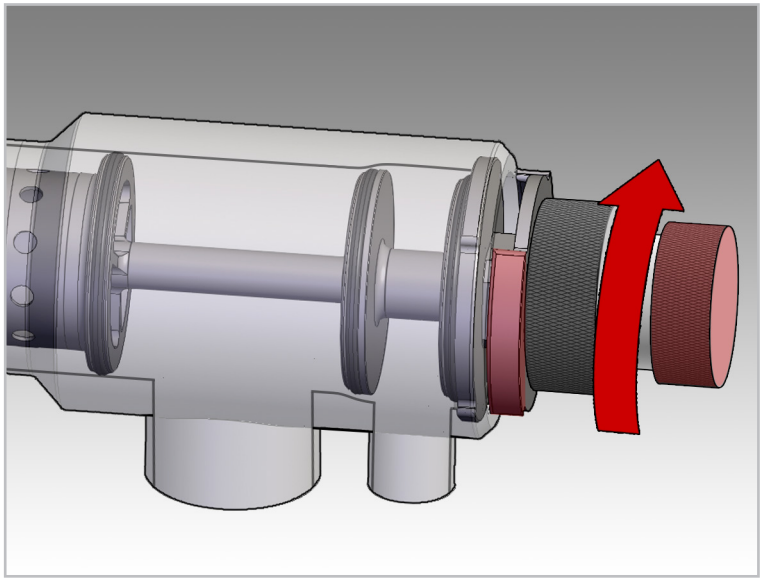
Rotate the Safe Lock Handle 90° to lock the Filter Insert into the **SafeStrainer** Housing.

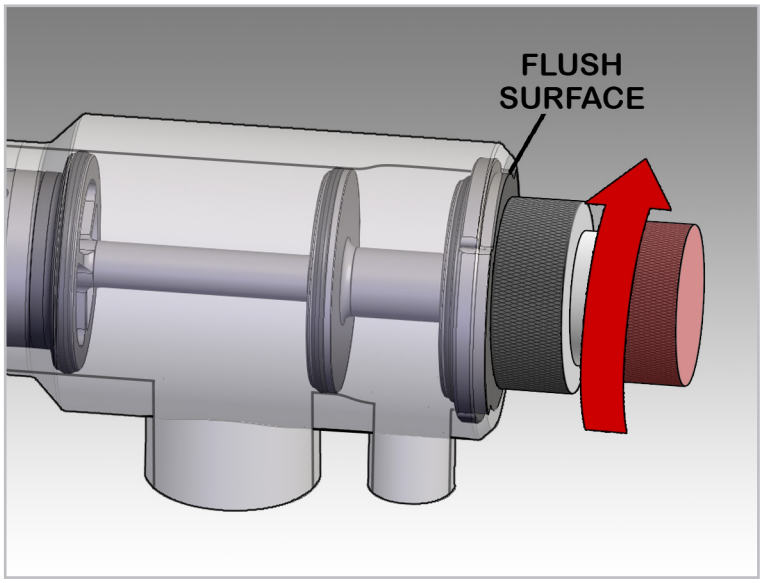


STEP 4)
CLOSE THE DRAIN VALVE HANDLE

Turn the Drain Valve Handle clockwise to completely collapse the tabs on the Safe Lock Handle into the **SafeStrainer** Housing.

You will know when the **SafeStrainer** is completely closed when the handle will not turn any further, and the face of the Drain Valve Handle is flush with the front surface of the **SafeStrainer** Housing.





3.3 Strainer Inspection and Manual Cleaning

The **SafeStrainer** itself can be cleaned and sanitized by using standard cleaning chemicals for the surface cleaning of Stainless Steel.

Depending on flow direction, the remains will accumulate on the filter surface:

- Inside to Outside flow (I) on the inside of the filter
- Outside to Inside flow (O) on the outside of the filter.

Depending on the application, it is recommended to manually remove the filter insert before or after CIP cleaning, to inspect it, and possibly to pre-clean it manually. All filter inserts are made of CIP-able food-grade stainless steel.

When the flow is passing the filter from the outside to the inside, the filtered parts accumulate on the outside of the filter. This makes the filtered particulates visible by eye and easier to remove by hand.

Tip: *It is easier to inspect the filter with bare eye if the remains accumulate on the outside of the filter element. If the flow enters at the Housing and exits at the Can (HC), the O-Ring at the end of the insert will scrape the remains towards the drain when removing the Filter Insert from the housing. The inside of the can is scraped clean and the filter element is easy to inspect.*

4. MAINTENANCE

4.1 Maintenance Preparation

Practice workplace safety *AT ALL TIMES* and have the proper tools neatly arranged for quick and easy access.

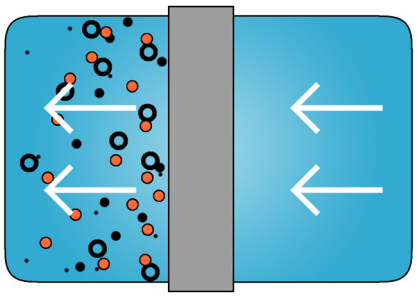
4.2 Notes About Longevity

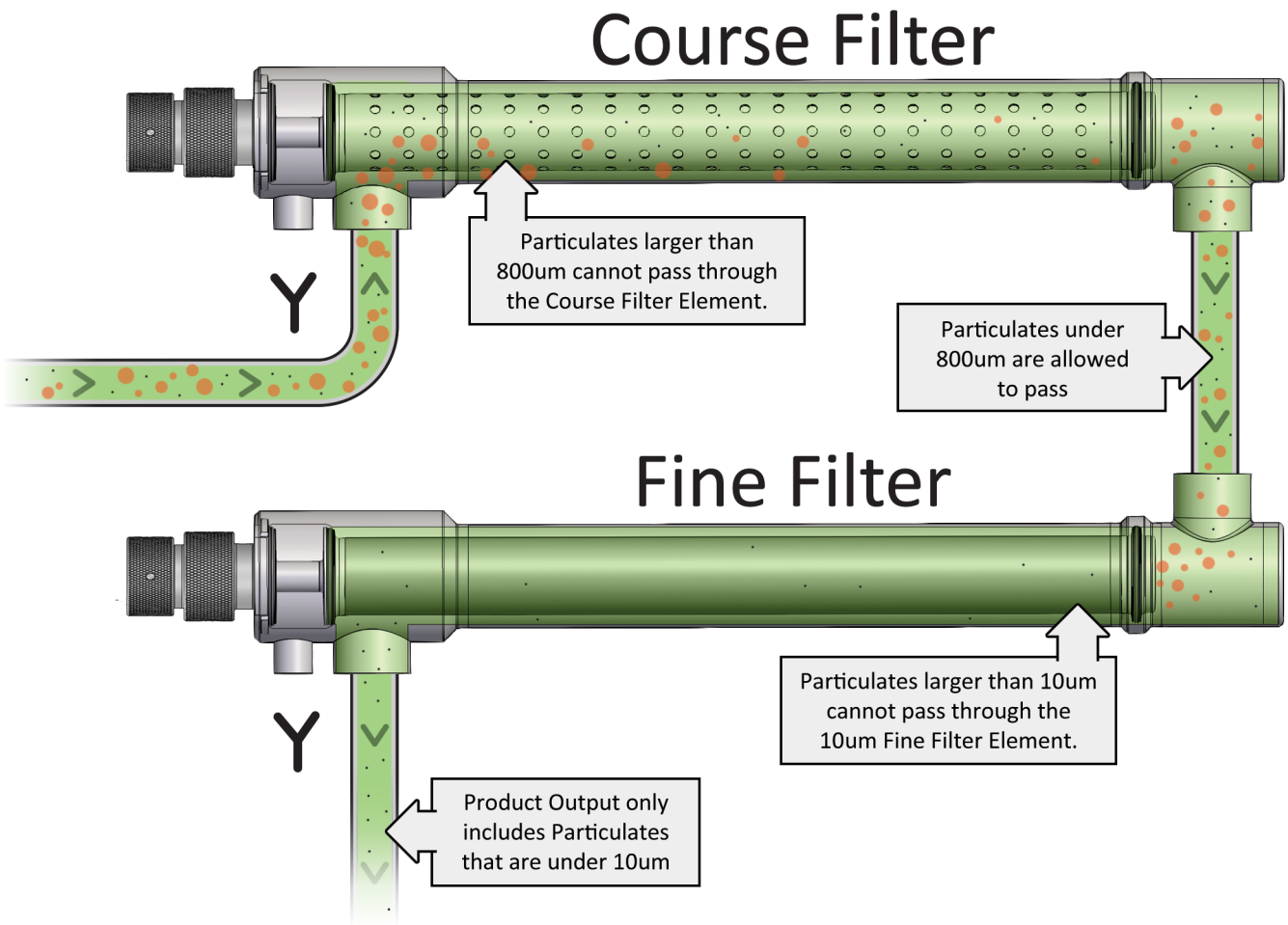
Following specified operating procedures will ensure that your **SafeStrainer** has a maximum lifespan. Improperly trained technicians, unsafe shortcuts, and other improper uses of the **SafeStrainer** may contribute to an overall shorter lifespan. Take proper care of the **SafeStrainer** to maximize it's operational longevity.

The recommended flow direction and pressures shall not be changed or exceeded without consulting **PROCESSTEC**.

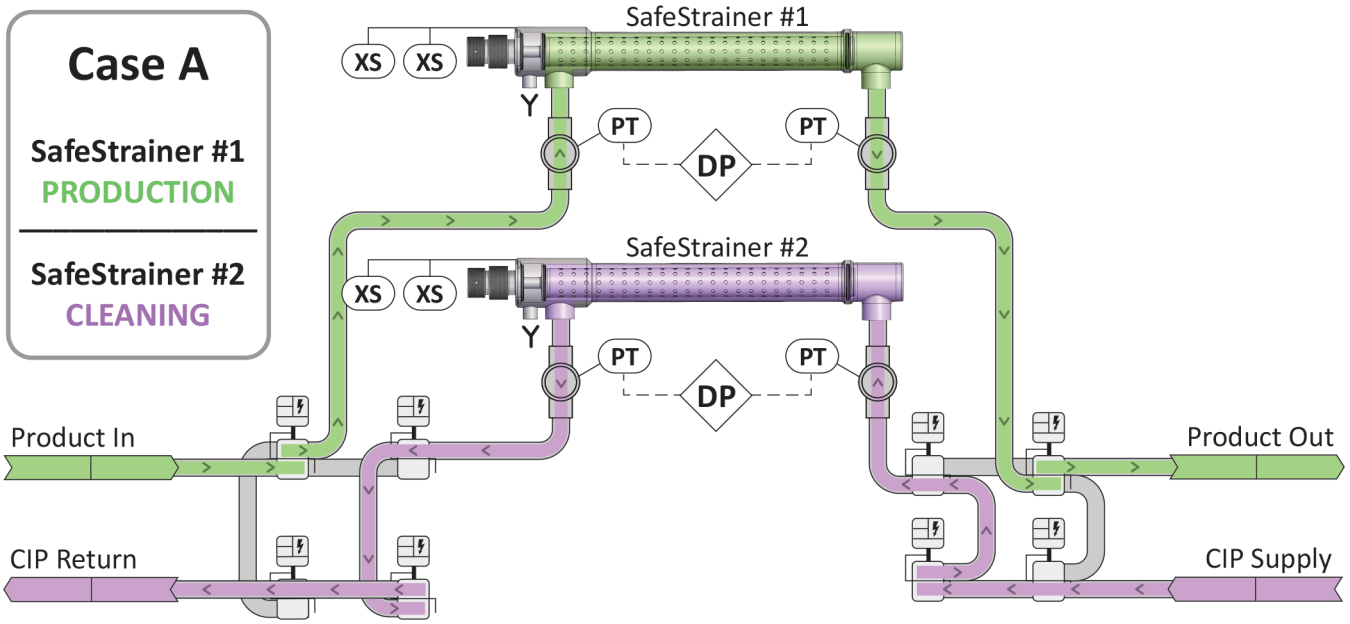
4.3 Strainer Backwash

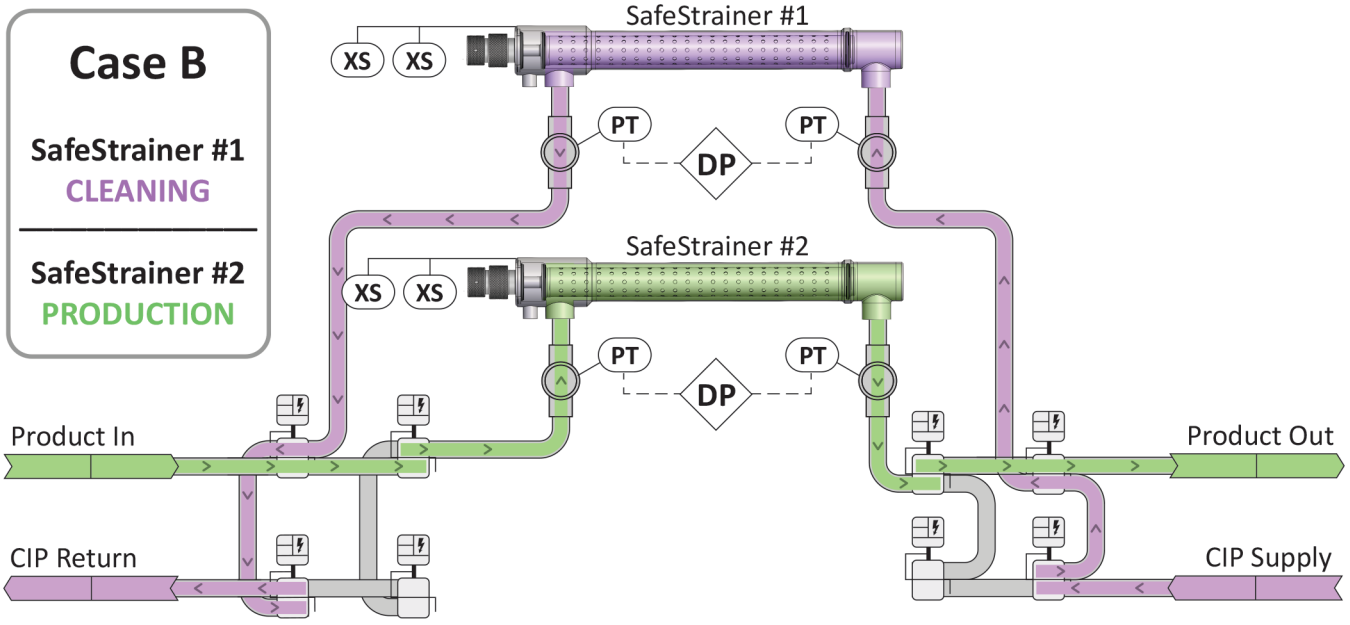
In this section, we will lay out the complete steps for running the **SafeStrainer** through the Backwashing process. Below is a diagram showing how two **SafeStrainers** can be installed with different Filter Inserts, so that the first one is filtering large particulates, and the second one is catching finer particulates. This also works well for the Backwashing process, as the fine filter can be backwashed with the debris pushing back through the couse filter easily.

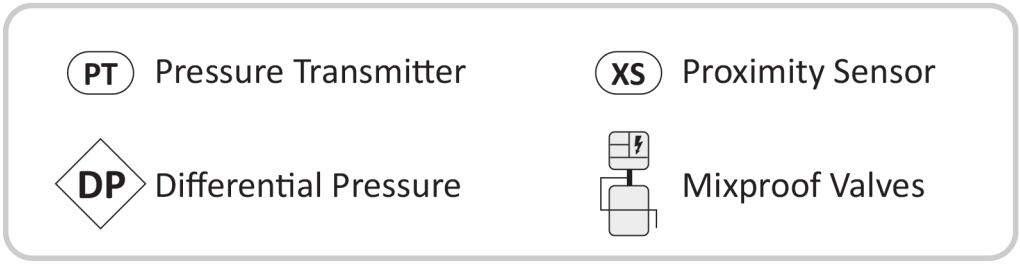




The next Backwashing diagram shows one **SafeStrainer** that is filtering product (See Case A) while the other is being backwashed, and then they change roles (See Case B). This setup relies on Mixproof Valves, which allows both the CIP solution and the product to flow through the same valves without ever mixing. Backwashing removes accumulated debris from the filter elements and the CIP solution sanitizes the filter element to prepare it for the next product cycle (see next page).

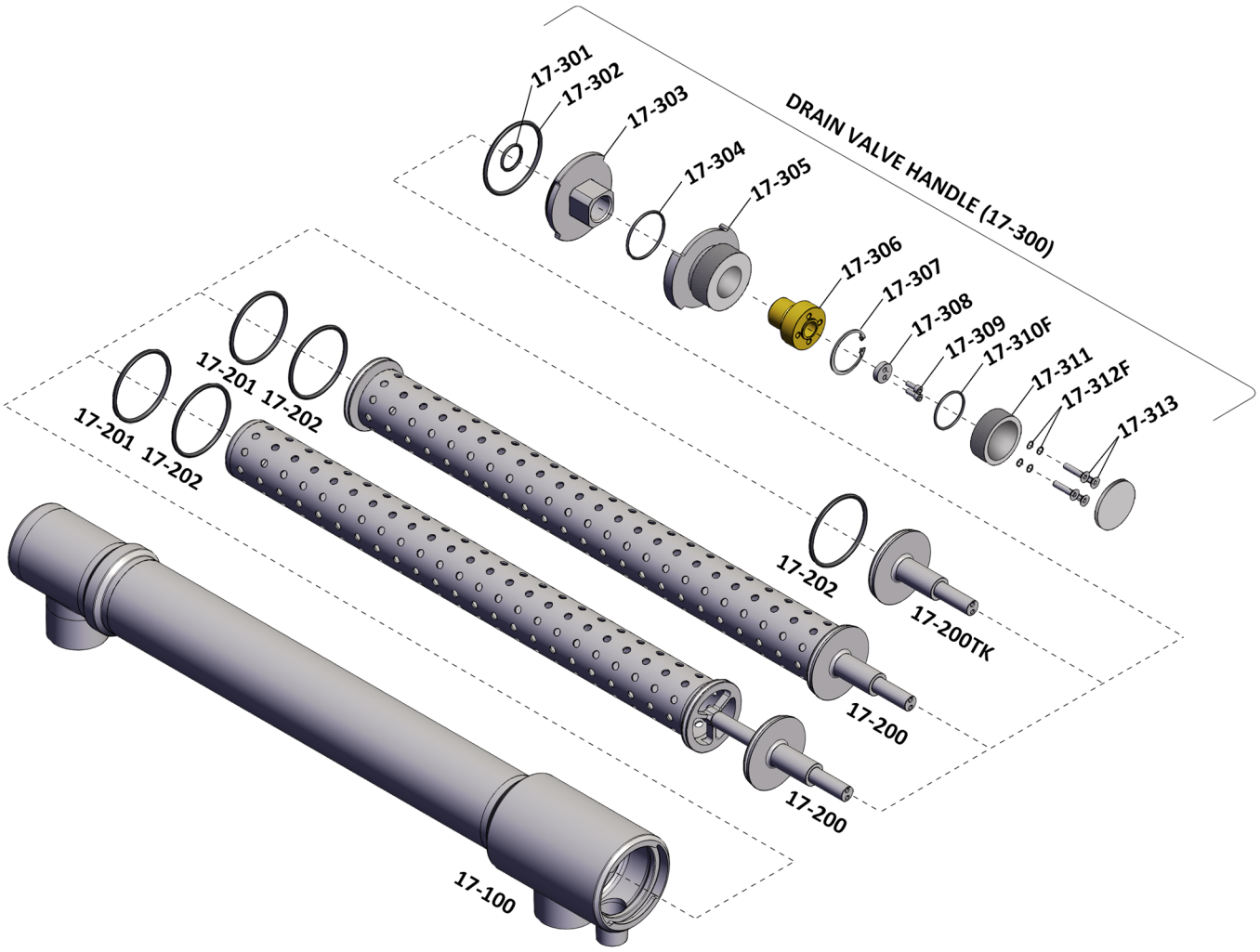

Case A
SafeStrainer #1
PRODUCTION
SafeStrainer #2
CLEANING
SafeStrainer #1
SafeStrainer #2
XS
XS
Y
PT
DP
Product In
Product Out
CIP Return
CIP Supply


Case B
SafeStrainer #1
CLEANING
SafeStrainer #2
PRODUCTION
SafeStrainer #1
SafeStrainer #2
XS
XS
PT
DP
Product In
Product Out
CIP Return
CIP Supply


PT
Pressure Transmitter
XS
Proximity Sensor
DP
Differential Pressure
Mixproof Valves

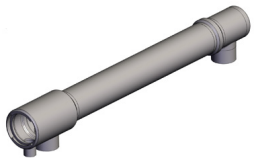
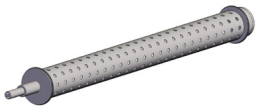
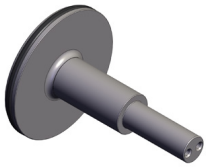
5. TOOL-BOX

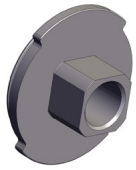
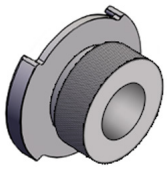
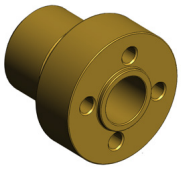
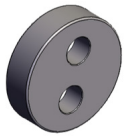
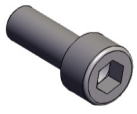
5.1 Explosion Drawing

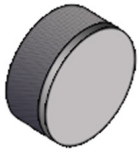


5.2 Spare Parts for SafeStrainer

Below are all of the Spare Parts available from **PROCESSTEC** for use on the **SafeStrainer**.

POSITION #	PART #	REQUIRED	DESCRIPTION	IMAGE
17-100	23387	1	SafeStrainer Housing	
17-200	**2mm** 23372 **50µ** 23373 **150µ** 23376 **300µ** 23377	1	Front Open Filter Insert	
17-200	**2mm** 23371 **50µ** 23374 **150µ** 23375 **300µ** 23378	1	Front Closed Filter Insert	
17-200TK	23388	1	Startup Kit Filter Insert	
17-201	**FKM** 23316 **EPDM** 23334	1	Front Sealing O-ring	
17-202	**FKM** 23316 **EPDM** 23334	1	Rear Sealing O-ring	
17-301	**FKM** 23317 **EPDM** 23335	1	Inner Safe Lock Disc O-ring	

POSITION #	PART #	REQUIRED	DESCRIPTION	IMAGE
17-302	**FKM** 23316 **EPDM** 23334	1	Outer Safe Lock Disc O-ring	
17-303	23386	1	Safe Lock Disc	
17-304	**FKM** 23391	1	Drain Valve Handle O-ring	
17-305	23384	1	Safe Lock Handle	
17-306	23385	1	Bayonet Lock	
17-307	23390	1	Circlip	
17-308	23382	1	Drain Valve Handle Inner Cap	
17-309	23383	2	Drain Valve Handle Socket Head Screws	

POSITION #	PART #	REQUIRED	DESCRIPTION	IMAGE
17-310F	**FKM** 23318 **EPDM** 23336	1	Drain Valve Handle Inner O-ring	
17-311	23381	1	Drain Valve Handle Outer Cap	
17-312F	23380	4	Drain Valve Handle Bolt O-rings	
17-313	23379	4	Drain Valve Handle Bolts