

# Partial Flow Filter DSF and Partial Flow Filter Units DSFU

User manual

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## 1 Introduction

The partial flow filter and partial flow filter unit handle the capture of contaminants in the water of various industrial central heating systems. The unit uses a magnet to collect steel particles and a filter bag for other, finer contaminants. PRESSCON designs and manufactures the partial flow filters in its own factory and, in that way, can adjust the design of the filter to the user's specific requirements. For example, the filter is available in two capacities, can be combined with a filter unit, can be given an alternative colour and, if required, can be equipped with a frequency controlled pump control unit that automatically detects contaminants.

## 2 The type of partial flow filters and units

The partial flow filter can be used separately in a central heating system, but can also be installed as a composite unit. The individual partial flow filter is connected to the existing pipe system and then filled according to its filtration function. The partial filter unit consists of a frame, one or more parallel-positioned filters, a pump and a control unit for the pump. Thanks to the pump, the partial filter unit is therefore an actively driven device as opposed to a simple separate filter. The following sections describe the external features of the partial flow filter and the partial filter unit.

### 2.1 The partial flow filter

The simple partial flow filter is available in two models: the DSF 40-80 and the DSF 20-50. These indications stand for the flow rate capacity that the filter can handle and the size of the connections. The following table provides an overview of this.

Type	Flow rate capacity m³/h	Flange size
DSF 40-80	40 m³/h	DN80 /88.9 PN6 M16
DSF 20-50	20 m³/h	DN50/60.3 PN6 M12

The partial flow filter is the basic component that is also used in the partial flow filter units. This section deals only with the simple filters. The following figures show the construction of the filters.



Figure 1. DSF 40-80

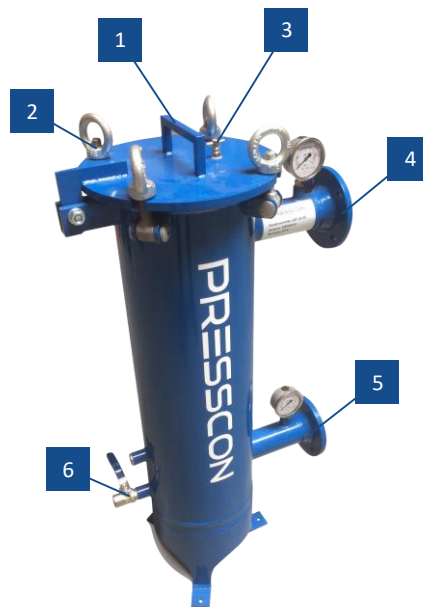


Figure 2. DSF 20-50

Ref. No.	Description	Function
1.	Filter cover	Cover attached to the filter with a hinge and that can be opened to change the filter bag in the filter.
2.	Ring nut	Fixing nut to mount the cover of the filter in a leak-proof way when the cover is closed.
3.	Ventilation valve	Valve with which the remaining air pressure can be released from the filter after the filter is shut down.
4.	Partial flow filter intake	Intake where the contaminated water flows into the partial flow filter. A manometer is located at the intake.
5.	Partial flow filter outlet	Outlet from which the filtered water flows out of the partial flow filter. A manometer is placed at the outlet.
6.	Ball valve	½" valve for various purposes. Can be used, for example, to dose a specific substance into the water.

## 2.2 The partial filter unit

The partial filter unit is a combination of one or more filters. The function of the partial filter unit is the same as that of the simple filter, specifically collecting contaminants in the water from various central heating systems. However, the filter unit is a bit more complex construction, giving the filter greater capacity in comparison with the simple filter and is always equipped with a pump. Both the filter type DSF 40-80 and the DSF 20-50 can be used on a filter unit, but are usually not combined. Basically, the partial filter unit therefore always consists of one or more filters of the same type, a frame, a pump, a control unit for the pump and extra pipes.

The partial filter unit has a modular design. The basic design is always the same, but an extra filter requires a larger frame and extra pipes. The diameter of the pipes and the flanges become larger as the total capacity of the filter unit increases. The following figures show the usual types of partial flow filter units, in which you can also see the modular structure.

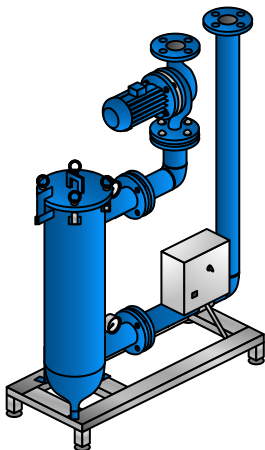


Figure 3. DSFU-40-80

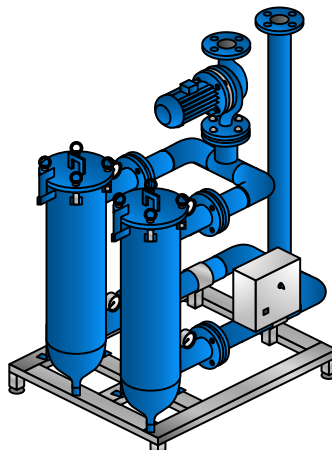


Figure 4. DSFU-80-100

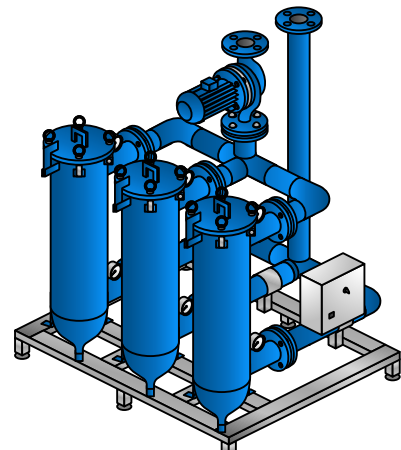


Figure 5. DSFU-120-125

**2.2.1 Selection overview**

The following overview shows what combinations are possible for a partial filter unit and shows how the name of the equipment is arrived at.

		Example: DSF-40-80				
		DSF	-	40	-	80
<b>Type</b>	<b>Single filter</b> : DSF <b>Filter unit</b> : DSFU (incl. pump and frame)					
<b>Capacity</b>	<b>20</b> : 20 m <sup>3</sup> /h (1x DSF 20-50) <b>40</b> : 40 m <sup>3</sup> /h (2x DSF 20-50 of 1x DSF 40-80) <b>60</b> : 60 m <sup>3</sup> /h (3x DSF 20-50) <b>80</b> : 80 m <sup>3</sup> /h (2x DSF 40-80) <b>120</b> : 120 m <sup>3</sup> /h (3x DSF 40-80)					
<b>Flange size of connection with pipe diameter.</b>	<b>50</b> : DN50 /60.3 PN6 M12 , Steel pipe 2" 60.3 x 2.9 mm <b>80</b> : DN80 /88.9 PN6 M16 , Steel pipe 3" 88.9 x 3.25 mm <b>100</b> : DN100 /114.3 PN6 M16, Steel pipe 4" 114.3 x 3.6 mm <b>125</b> : DN125 /139.7 PN6 M16, Steel pipe 5" 139.7 x 4.0 mm					

The flange sizes of the connections on the filter unit depends on the total capacity of the unit. A flange that is too small must not be mounted on the filter because the flow of the unit can be restricted. The larger the combined capacity of the filters, the larger the connection flange must be. The diameter of the pipe on which the flanges will be mounted also increases, so that the pipe diameter corresponds with the diameter of the flange. The following overview shows what flange sizes are used for each type of partial flow filter unit.

Partial flow filter unit.	Flange	Pipe
DSFU-20-50	DN50/60.3 PN6 M12	Steel pipe 2" 60.3 x 2.9 mm
DSFU-40-80	DN80 /88.9 PN6 M16	Steel pipe 3" 88.9 x 3.25 mm
DSFU-60-80	DN80 /88.9 PN6 M16	Steel pipe 3" 88.9 x 3.25 mm
DSFU-80-100	DN100 /114.3 PN6 M16	Steel pipe 4" 114.3 x 3.6 mm
DSFU-120-125	DN125 /139.7 PN6 M16	Steel pipe 5" 139.7 x 4.0 mm

**2.3 The partial filter unit with simple pump control unit**

The partial filter unit comes equipped as standard with a simple pump control unit and can optionally be equipped with a frequency controlled pump control unit. This section deals only with the simple control unit of the pump.

The function of the pump control unit is to safely provide power to the pump and manual switching on and off of the pump. For this, the filter unit is equipped with a control panel containing the required thermal protection. On the exterior of the control panel, there are two indicator lights and one switch. The lights indicate whether the thermal protection is working properly and whether the magnet switch for the pump is switched on. Using the manual switch, the pump control unit can be switched on or off.

## 2.4 The partial filter unit with a frequency controlled pump control unit

The partial filter unit can also be equipped with an additional frequency controlled pump control unit. This control unit is intended to enable you to detect whether the filter bag in the partial flow filter is soiled. If the filter bag becomes soiled, the regulator will slow the operation the pump and ultimately show a notification if the filter has become too soiled. In this case, the filter unit consists of a pump, a control panel, pipes and a stainless steel frame. The following figure provides an overview of the components and the functionality.

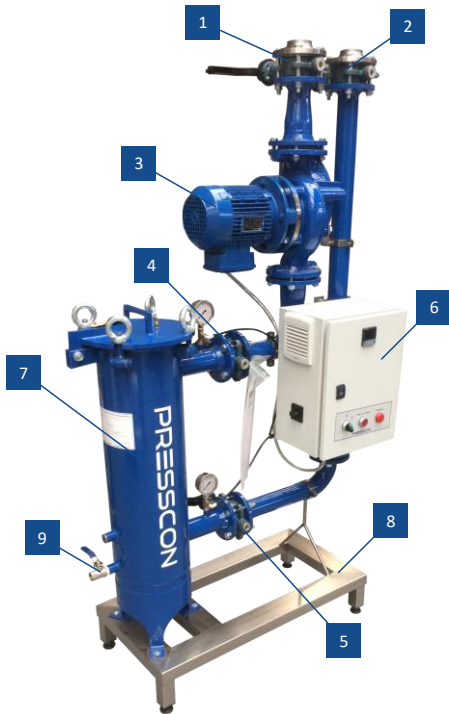


Figure 6.

Ref. No.	Description	Function
1.	Connection to water supply	Flange connection for the water supply of the contaminated water from the heating system to the partial flow filter.
2.	Water outlet connection	Flange connection for the water discharge of the filtered water from the partial flow filter to the heating system.
3.	Pump	Water pump that pumps the water through the partial flow filter. Powered by means of a frequency regulator.
4.	Partial flow filter intake	Intake where the contaminated water flows into the partial flow filter. A manometer is located at the inlet with a drain to the pressure differential gauge.
5.	Partial flow filter outlet	Outlet from which the filtered water flows out of the partial flow filter. A manometer is also located at the outlet with a drain to the pressure differential gauge.
6.	Control panel	Switching panel on which the pump control unit is found with, among other things, a frequency regulator. On the front of the panel is the readout and control unit of the partial filter unit.
7.	Partial flow filter	A filter with a magnet and a filter bag that captures iron particles and solid contaminants from the water.
8.	Stainless steel frame	Frame on which the components of the partial flow filter are assembled. The frame is equipped with steel feet to stabilise the frame.
9.	Ball valve	½" valve for various purposes. Can be used, for example, to dose a specific substance into the water.

## 2.5 The control panel of the control unit with frequency control

The partial filter unit is equipped with a control panel on which the control unit of the machine can be found. The following figure provides an overview of the components and the functionality.

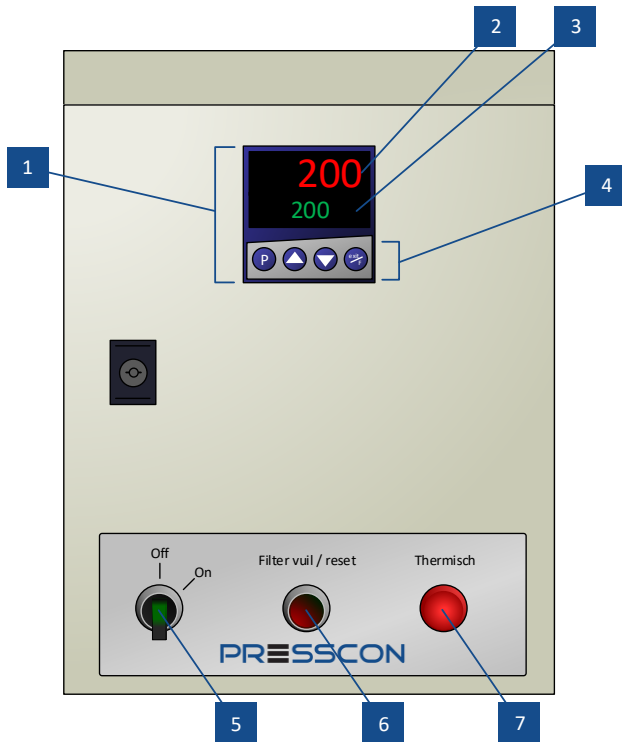


Figure 7.

Ref. No.	Description	Function
1.	cTRON 16 controller module	Controller module that processes incoming signals from a pressure sensor and elsewhere and generates the corresponding output signals for the control unit of the partial filter unit. Among other things, the module drives a frequency regulator for the pump.
2.	Current pressure measurement indicator	Display of the pressure in the partial flow filter unit. This value is presented in millibars (mBar).
3.	Setpoint value indicator	Display of the setpoint value to which the partial flow filter unit is set. Based on this value, the controller module determines, among other things, how the frequency regulator must be controlled and when an alarm will be triggered.
4.	cTRON 16 Control buttons	Buttons to configure the cTRON 16 controller module.
5.	On / Off switch	Switch with which the control unit or the pump is switched on and off using the controller module. If the control unit is switched on, a green light comes on behind the button. If the control unit is switched off, an additional measurement will be displayed on the controller module, but the pump will not be operated and the alarm lights also will not work.
6.	Reset button with notification light	If the partial filter unit is soiled, this will be indicated by this button. The red light behind the light then comes on. When the contamination is removed, the error warning can be reset by pushing this button.
7.	Notification light	If the thermal protection of the pump is tripped, this will be indicated by means of this light. This red light will then come on.

### 3 Functioning of the partial flow filter and the partial filter unit

The partial filter unit is a combination of a separate partial flow filter consisting of a pump, a control panel and a pipe on a stainless steel frame. In this way, the functioning of the partial filter unit can be split into two parts. Specifically, this can be divided into the functioning of the partial flow filter itself and the operation of the pump for circulating water through the partial flow filter.

#### 3.1 The partial flow filter

Inside the partial flow filter there are a filter bag and a magnet. The water of the heating system is pumped through the partial flow filter from the top down. The iron particles from the water will be captured by the magnet. The rest of the dirt will be captured in the filter bag. Over time, the filter bag will become soiled and eventually will cause counter-pressure. This can be noticed due to the fact that pressure difference is created between the intake and outlet on the filter. Specifically, a manometer is located on incoming and outgoing connections of the filter on which the pressure difference can be read. If the pressure difference is too great, the filter bag is too soiled and must be replaced.

#### 3.2 The simple pump control unit

The front side of the control panel on the partial filter unit has a switch for turning the pump on and off. If the rocker switch is in the on position and the power supply for the filter unit is working properly, the pump will start running. If the rocker switch is placed in the off position, if the power supply is disconnected or if the pump has a thermal problem, the pump will stop.

#### 3.3 The frequency controlled pump control unit

A pump is found on the partial filter unit that pumps the water through the partial flow filter. The pump is controlled by a regulator located in the control panel on the frame of the partial filter unit. The regulator uses a pressure sensor to measure what the pressure differential is between the intake and outlet of the partial flow filter. The pressure differential measured will be shown in red on the screen of the cTRON 16 controller module (Figure 7no. 2). Based on the pressure differential measured, the controller module controls a frequency regulator by means of an analogue 4...20mA signal. The frequency regulator in turn determines how fast the pump must run.

If there is little contamination, the pressure differential will also be low. The controller module will then send a high analogue signal to the frequency regulator, as a result of which the pump will run at the highest specified speed. That is generally 50 Hz. In case of more contamination in the partial flow filter, the pressure differential will also increase. If the pressure differential is too great, the controller module will send a lower analogue signal to the frequency regulator, as a result of which the pump will also run more slowly. Generally, the pump will wind down from 50 Hz to 35 Hz and a pressure differential of between 160 mbar and 170 mbar. The pump will not completely wind down, but rather will continue running at a minimum speed. At a pressure differential of 170 mbar and higher, the pump will continue to run at 35 Hz. When the pressure differential is ultimately too great, that means that the filter bag is too badly soiled. This will generally be a pressure of 190 mbar, after which the pump will be stopped and a notification will appear on the control panel. The light behind the reset button will then turn on (Figure 7no. 6).

The pressure values shown in this description are based on factory settings and can be different in practice. The standard factory settings as follows:

Pressure difference	Analogue signal	Frequency pump	Description
0 mbar	20 mA	50 Hz	Clean filter, no pressure difference, pump running at highest speed
160 mbar	7.2 mA	50 Hz	Filter soiled, there is a pressure difference, pump starts to wind down.
170 mbar	6.4 mA	35 Hz	Filter is contaminated, there is a considerable price difference, pump at lowest speed.
190 mbar	4.8 mA	35 Hz	Filter too soiled, pressure differential too great, pump will be stopped.
200 mbar	4 mA	-	Maximum measurable pressure differential.



## 4 Mounting

Both the separate partial flow filter and the partial filter unit can be mounted between the lines of the return portion of a heating system. Both sides of the partial flow filter and filter unit must be equipped with a butterfly valve. It is important for the filter of the filter unit to be placed on a solid surface. Under the frame, the partial filter unit has a number of adjustable feet with which it can be set up in a stable way, if desired.

If this is a partial filter unit rather than a separate filter, a power supply of 3F 400V AC +N is required to be able to provide power to the pump and the pump control unit. The level of the current protection depends on the type of pump that the unit is equipped with.

## 5 Commissioning

### 5.1 Commissioning a separate partial flow filter

Before the partial flow filter can be put into operation, it is important to ensure that it is mounted properly. Generally speaking, all of the valves are still closed. Open only the butterfly valve on the bottom so that the filter fills with water from the bottom to the top. No air must be allowed to enter the filter, therefore, use the vent valve on top of the partial flow filter to remove the air. When the partial flow filter is completely filled with water, the butterfly valve on the inlet of the partial flow filter can also be opened.

### 5.2 Commissioning the partial filter unit

Before the partial filter unit can be put into use, it is important to check whether the filter unit is mounted properly. All of the valves will normally still be closed. Open the butterfly valves for the water supply and discharge to allow water into the filter (Figure 6 no. 1 & 2). Next, open only the butterfly valve on the outlet of the partial flow filter so that the filter fills with water from the bottom to the top (Figure 6 no. 5). No air must be allowed to enter the filter, therefore, use the vent valve on top of the partial flow filter to remove the air. When the partial flow filter is completely filled with water, the butterfly valve at the inlet of the partial flow filter can be opened.

Switch on the control panel by flicking the main switch located on the left side of the panel.

## 6 CLEANING

### 6.1 Cleaning interval for a separate partial flow filter and filter unit with simple control unit

The filter bag must be replaced when the intake manometer and the outlet manometer shows a pressure differential of 0.5 bar to 1.0 bar. We recommend that you clean the filter at least every week in the first several weeks by replacing the filter bag. As the filter removes more contaminants from the system, the less often the filter bag will need to be replaced.

### 6.2 Cleaning interval for the filter unit with a frequency controlled pump control unit

The filter bag must be replaced when indicated by the control panel. If the filter bag is soiled, the pressure differential across the partial flow filter will become too great. The control panel will detect that and then give a notification by means of the button with the indication "Filter soiled / Reset" (Figure 7 no. 6). The light behind the button will then come on. At first, it will generally be necessary to replace the filter bag weekly. Over time, the filter bag will require less frequent replacement.

### 6.3 Replacement of the filter bag

Ensure that the partial flow filter or partial filter unit is shut down. The unit is shut down when the butterfly valves are closed to stop the supply of water and the pump control unit on the partial filter unit is switch off. The on and off switch on both the simple control unit and the control unit with frequency control are located on the front of the control panel. Next, open the vent valve on top of the partial flow filter to allow the excess pressure to escape. Then, allow the remaining water to drain from the filter by opening the ball valve on the bottom of the filter. If required, connect a hose temporarily to allow the water to flow to the desired drainage point. Wait until the drain is free of water.

Remove the nuts on top of the partial flow filter and open the cover. Take the magnet holder out of the filter and remove the soiled filter bag. Clean the magnet with a cloth. Replace the soiled filter bag with a new filter bag (do not clean the bag) and place the magnet holder with the magnet back in the filter. Close the cover and secure it with the nuts on top of the partial flow filter. Open the butterfly valves of the intake and outlet of the partial flow filter. No air must be allowed to enter the filter, therefore, once again use the vent valve on top of the partial flow filter to remove the air. Eventually, only water will come out of the vent valve, which indicates that all the air is out. The pump control unit can be started up again and the filter is once again ready for use.

## 7 Technical specifications

	DSF 20-50 partial flow filter	DSF 40-80 partial flow filter
<b>Filter type</b>	DSF 20-50	DSF 40-80
<b>Intake flange</b>	DN50/60.3 PN6 M12	DN80 /88.9 PN6 M16
<b>Outlet flange</b>	DN50/60.3 PN6 M12	DN80 /88.9 PN6 M16
<b>Filter bag</b>	1 piece	1 piece
<b>Magnet</b>	1 piece	1 piece
<b>Fineness</b>	10 micron	10 micron
<b>Capacity</b>	20 m <sup>3</sup> /h	40 m <sup>3</sup> /h
<b>Max. allowable pressure</b>	10 bar(g)	10 bar(g)
<b>Pressure difference</b>	initially 0.1 bar	initially 0.1 bar
<b>Max. temp.</b>	70°C	70°C

## 8 Appendix

Along with this document, additional information is provided on this topic in the following appendix:

Appendix ID	Description	Version
-	-	V0.0_R00

## 9 Document history

Version 1.0 to 2.0 indicates : **CHANGE**, in layout, design, structure or other major modifications.

Version 1.0 to 1.1 indicates : **ADDITION**, the expansion of the manual with a chapter or extra text.

Revision \_R01 to \_R02 indicates : **CORRECTION**, replacement of a figure, grammar errors, text error corrections.

Version	Date	Change
1.0_R00	19-06-2019	First release.

## 10 Conclusion

This manual was written to support mechanics, fitters or you as a customer with modifying, changing or operating a PRESSCON product. The goal is to maintain and, if possible, improve the quality of the product. If you would like additional information or support, please contact PRESSCON.

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