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# **Installation User Guide**

*Flosense 4.0 manifold*

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## **1. Introduction**

This User guide serves as a reference for the operator of a Flosense Manifold system. Please ensure that you have read all relevant User guides (Manifold Installation and Software guides) thoroughly before installing your new Flosense.

During start-up and purge, always follow the quick guide.

### **Warning**

Please ensure that flow never exceeds the sensors' maximum. If pressurized air flow exceeds 0.5 bar, the flow sensors may be damaged due to extreme purge speed.

### **Disclaimer**

Costs connected to any damages to the product caused by lack of following the provided manuals (Installation Manual, Quick guide, Software guide), will be at the customers' own expense

## **2. Basic Safety Instructions**

In order to use the Flosense system correctly please read this section thoroughly.

### **2.1. Warning Indications**

This section covers the safety instructions and proper use of the Flosense system. Please read and follow these instructions thoroughly, in order to prevent damage, injuries or extensive property damage

### **2.2. Proper Use**

The Flosense system is designed by using the latest technical knowledge and safety regulations.

Yet, during use, there can be a risk to cause hazard to the user or third party's life and body, or to cause damage to the Flosense system or other property.

The Flosense system may only be used under proper working conditions and only in accordance with its purpose. It can only be used safely when handling is done in compliance with the instruction manual. In particular, disruption, which may impair the safety, shall be promptly corrected.

The Flosense system is designed exclusively for the stated purpose. Any alternative or additional use is considered out of scope and therefore, the Manufacturer/supplier cannot be made liable for damages resulting from such use. The risk is entirely the user's own.

Proper use also includes observance of operating instructions and compliance with service and maintenance instructions.

### **2.3. Organisational Precautions**

In addition to the instruction manual, all other applicable safety and environmental regulations comply.

Prior to handling the product, the staff assigned to work with the Flosense system must have read the instruction manual thoroughly, especially the chapter on safety.

The owner of the product must ensure that staff uses the Flosense system safely and in accordance with the instruction manual.

All safety and warning instructions on the Flosense system must be respected.

If there are safety or operational changes to the Flosense system, please stop immediately and notify disturbance to the responsible person.

Do not make changes, expansions and renovations on the Flosense system which could impact the safety, without seeking the supplier's permission beforehand.

Spare parts must conform to the technical requirements established by the manufacturer. These requirements are always met by original spare parts.

## **2.4. Safety precautions in relation with the individual operating phases**

### **Normal running**

Any unsafe working methods should be omitted.

Take any necessary precautions in order to ensure that the Flosense system is only used in safe working environment.

In case of any dysfunctions, the Flosense system must be stopped immediately and secured. Malfunctions must be corrected immediately.

## **2.5. Special precautions during use of Flosense, maintenance work and repair of malfunctions during operation and disposal**

The manual prescribed settings, maintenance and service intervals and instructions for replacement parts / equipment must always be respected. This work must only be performed by skilled personnel.

When doing any work on the manifold that requires opening the covers, removing hoses, or otherwise gaining access to the interior of the manifold, please ensure that you have emptied and depressurized the manifold

### **2.5.1. Maintenance**

Maintenance and service intervals and instructions for replacement parts / equipment must always be respected. This work must only be performed by skilled personnel.

### **2.5.2. Disposal**

We strongly recommend safe and environmentally conscious disposal of operating equipment and aids as well as replacement parts!

## 2.6. Directions on Special Hazardous Elements

Only use original cables with the prescribed amperage. If disruption / malfunction of the electrical energy supply occurs, then stop the Flosense system immediately.

Working on electrical systems or equipment must only be performed by an electrician or by trained personnel and must be done under supervision and in compliance with electrical regulations.

When performing inspection-, maintenance- and repair work, Flosense parts must be made electricity free. It should first be checked that these parts are disconnected (electrically), and then they are grounded and short circuited. Parts which are mounted near parts which still are electrical connected, must be insulated.

### Risk of metallic corrosion



Galvanic corrosion will occur when different metals are used in the same water installation. This can potentially lower the lifetime of the product.

Be aware that insufficient grounding of machine parts included in the water system can increase the corrosion of metal parts.



Corrosion will occur very rapidly if the fluid in the system has PH values higher than 8 or lower than 5. This will potentially lower the lifetime of the product.



Be aware that temperatures exceeding 90° Celsius can increase the corrosion of metal parts. High temperatures will potentially lower the lifetime of the product

## **DANGER**

### **RISK OF LEAKING**

Metal corrosion will accrue and can cause leakage. Please make frequent inspections and maintenance of the manifolds metal to prevent this.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

### **Required water quality**

The cooling water must fulfill certain requirements, depending on the type of cooling or tempering of products.

Check the quality of cooling water to protect the environment and machines from corrosion and deposition.

The recommended procedure to treat and/or care the cooling water is based on:

- Water ingredients
- Degree of contamination
- Materials used
- Type and size of cooling or tempering products

Treatment of water must always be managed by professionals, to ensure minimal corrosion and lime scale build up. Untreated and contaminated water is not recommended and will reduce lifetime of the products.

## **WARNING**

## RISK OF CORROSION

If there are any faults or damages to the manifold or sensors caused by different water quality, we cannot guarantee the lifetime.



### 2.7. Safety Precautions for high temperature use

When operating with high temperatures please ensure that you are wearing gloves, safety glasses and any other necessary safety equipment.

## 2.8. Startup

### Prior to Startup:



Check the label on the sensor to identify the flow or pressure sensor type:



Flow must never exceed the maximum capacity; failure to comply with this precaution may damage the sensor.

Flow sensors are called:

VFS8 1-18 E (1-20 l/min standard)

VFS8 2-40 E (2-40 l/min standard)

VFS8 1-18 K (1-20 l/min high temperature)

VFS8 2-40 K (2-40 l/min high temperature)

Pressure sensors are called:

RPS6 0-10 E (0-10 bar standard)

RPS6 0-10 K (0-10 bar high temperature)

## Startup Procedure:



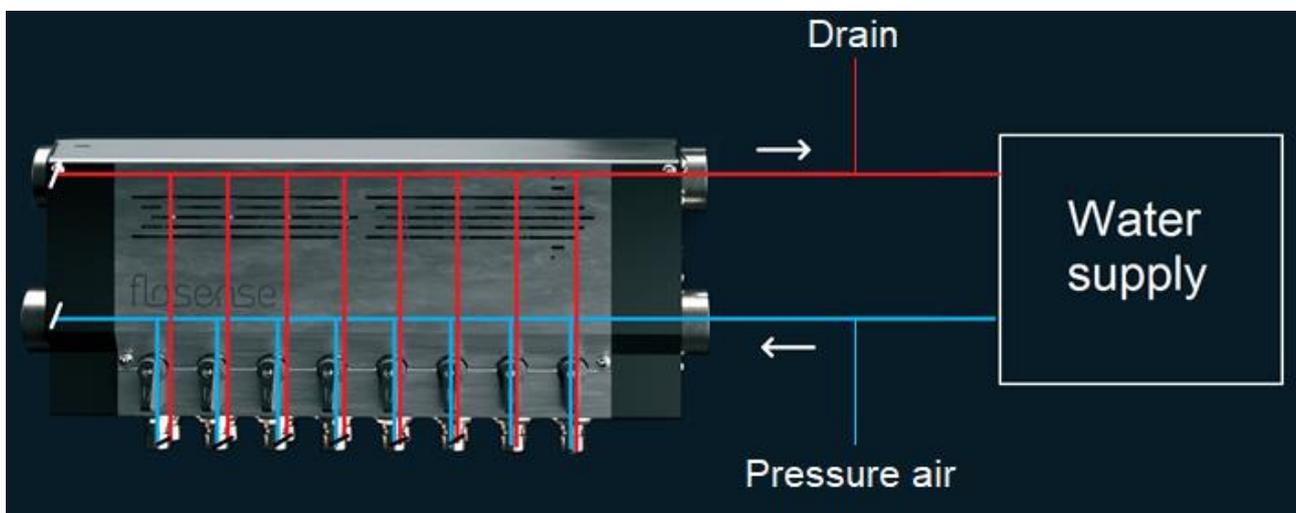
A 3-way ball valve is recommended to be installed either on, or before the main inlet, to enable purging of the manifold and mould with pressurized air. If needed for draining, also add a 3-way ball valve after the main outlet of the manifold. Pressurized air inlet must be adjustable (pressure reducer)

### During startup (empty mould and manifold)

1. Fully open all ball valves to/from the mould
2. Open the main return outlet valve on the manifold
3. Slowly open the main inlet valves on the manifold and start filling the system
4. Adjust the inlet flow to match the needed flow only.
5. Let it run until all air is out of the system before fully opening the main valve.

### Purging (emptying mould with pressurized air)

1. Turn the main inlet valve in blocked/closed position.
2. Turn the main outlet valve in “drain” position
3. Turn the main inlet valve in “pressure air in position”
4. Open the adjustable air without exceeding 0.5 bar and ensure slow purge of water.
5. When the system has been emptied, you can fully open the air supply to blow the circuits dry.



**Warning: if pressurized air supply exceeds 0,5 bar, the flow sensors may be damaged due to extreme purge speed.**

### 3. Description of the system

This section describes the system and its components.

#### 3.1. Overview and use of the system

The Flosense system, is produced as an independent system solution, with the ability to interact and communicate with machines and network connected it.

The Flosense system is capable of measuring, monitoring and logging data from a given number of ports. Furthermore, the Flosense system is capable of sending signals, warnings, activating and deactivating any connected machinery.

#### 3.2. Technical specifications

##### Model

Type	FS-7100
No.:	01
Anno:	2020

##### Screen

Screen dimensions (L x W x H) [mm]	220 x 145 x 60
Cables for manifold	1 M8 cable per manifold
Power supply	12 V 1 Amp

##### System

Noise Level	≤ 70 dB
Measuring range	1-20 & 2-40 l/min
Accuracy ( $\pm 1\sigma$ ) at 0-120°C	$\pm 1\%$ FS
120-160°C	$\pm 2\%$ FS
Response time (63.2 %)	< 2 s
Resolution	0.2 l/min
System burst pressure at 100°C	16 bar
At 160°C	10 bar

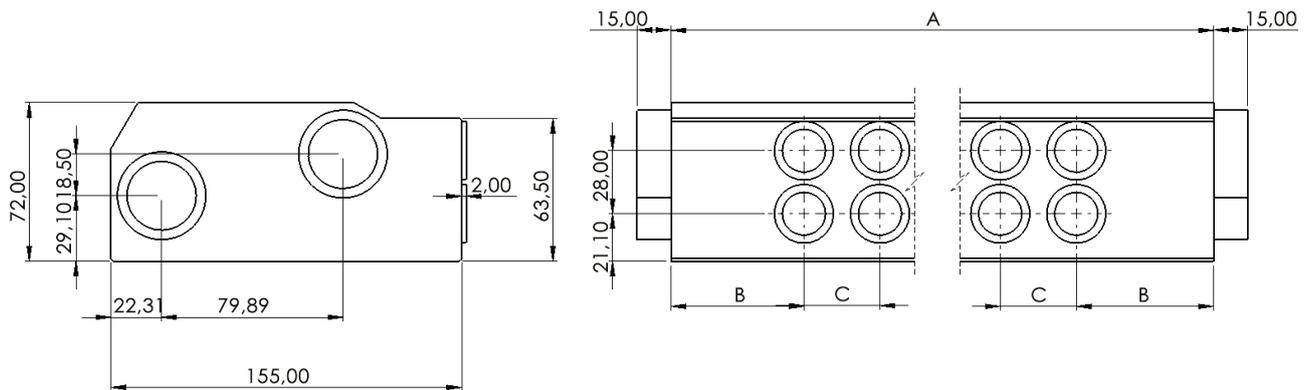
### Temperature

Measuring range	≤ 0 to 160° C
Accuracy ( $\pm 1\sigma$ ), 0 to 120°C	$\pm 1^\circ\text{C}$
Accuracy ( $\pm 1\sigma$ ), 120 to 160°C	$\pm 2^\circ\text{C}$
Response time (63.2 % at 50%FS flow)	250 ms
Resolution	0.006 °C

### Media and environment

Liquid/Media types	Aqueous media compatible with wetted materials. Kinematic viscosity ≤ 2 mm <sup>2</sup> /s (cSt)
System/Media temperature (operation)	0 to 160°C
System/Media temperature (peak)	-25 (non-freezing) to 160°C
Ambient air temperature (operation)	-25 to 60 °C
Ambient air temperature (peak)	-55 to 90 °C
Humidity, relative	0 – 95%, non-condensing

### 3.3. General Dimensions



Model	Channels	A [mm]	B [mm]	C [mm]
Flosense 4-Zone	4	220	59.5	33.5
Flosense 6-Zone	6	287	59.5	33.5
Flosense 8-Zone	8	354	59.5	33.5
Flosense 10-Zone	10	421	59.5	33.5
Flosense 12-Zone	12	488	59.5	33.5

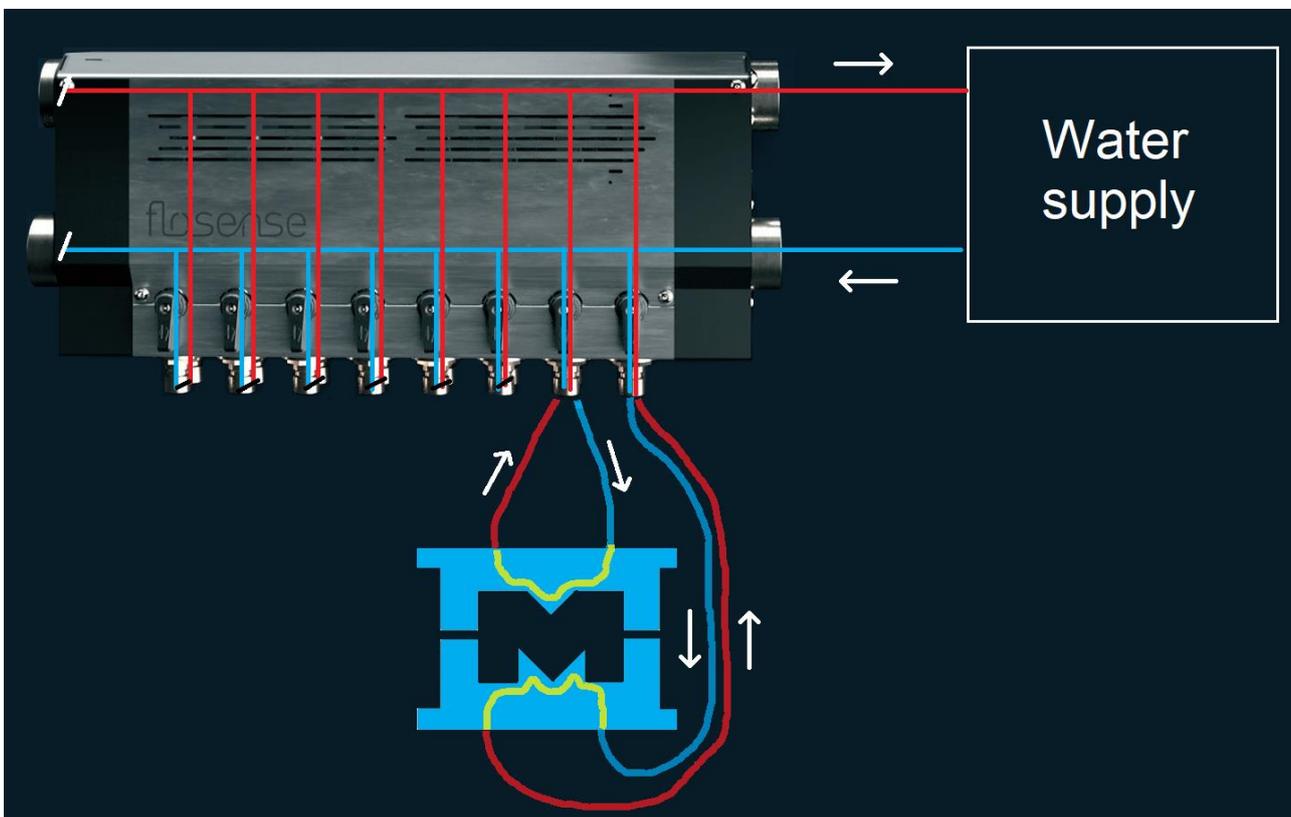
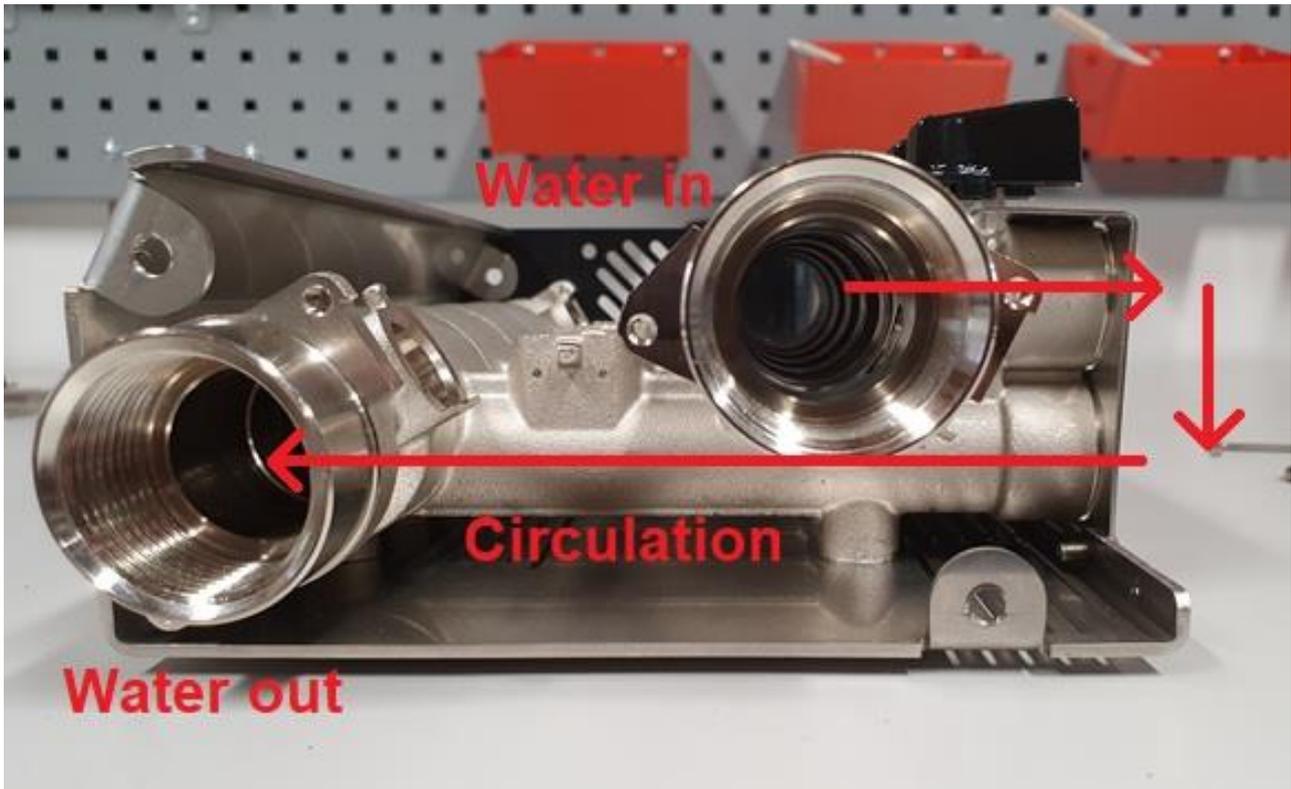
#### Water inlet & outlet:

G 1" (BSP)

#### Channel valve inlet & outlet:

G 1/2" (BSP)

### 3.4. Flow Description



1. The water enters the manifold from the water supply in the inlet (Water in)
2. The water is then distributed in the channels in the manifold (upper piping)
3. From the Channels the water is then supplied to the mould by whichever method the user prefers (most often hoses)
4. After passing through the mould the water is then returned to the manifold (lower piping)
5. The water is finally returned to the water supply

### 3.5. Installation



Complete 4 zone manifold



Incomplete 12 zone manifold

Remember that depending on the size of the manifold, you may need between 8 and 24 fittings in order to fill all channels.



1. Select fittings appropriate for your needs. Remember to have an appropriate O ring on the fitting. The thread in the channels is G 1/2".
2. Insert the fitting in the first channel. It is recommended to start with the top row.



3. Tighten the fitting well, to ensure that the manifold does not leak.



4. Continue mounting fittings for the rest of the channels



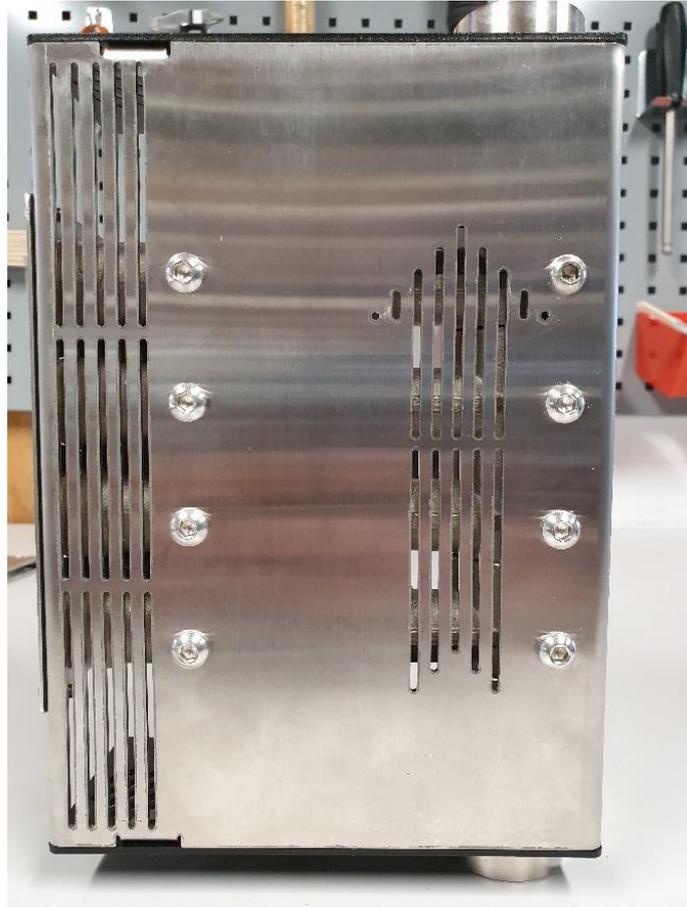
5. It is possible to fit the fittings in any order, but it is recommended to finish either the top or bottom row before starting on the other row.



6. Finish mounting all of the fittings. Once that is done, the manifold is ready to be connected to your system.

### 3.5.1. Brackets

If you wish to mount the manifold on a surface, or if you wish to replace the old flow regulator, Flosense comes with brackets. These brackets are dimensioned so the Flosense system can replace the flow regulators used on most injection moulding machines, and fit in the same place.



1. The underside of the flosense has screws in place, which can be removed to place the brackets.

**WARNING!** The perforations may be sharp, so be careful when mounting brackets.

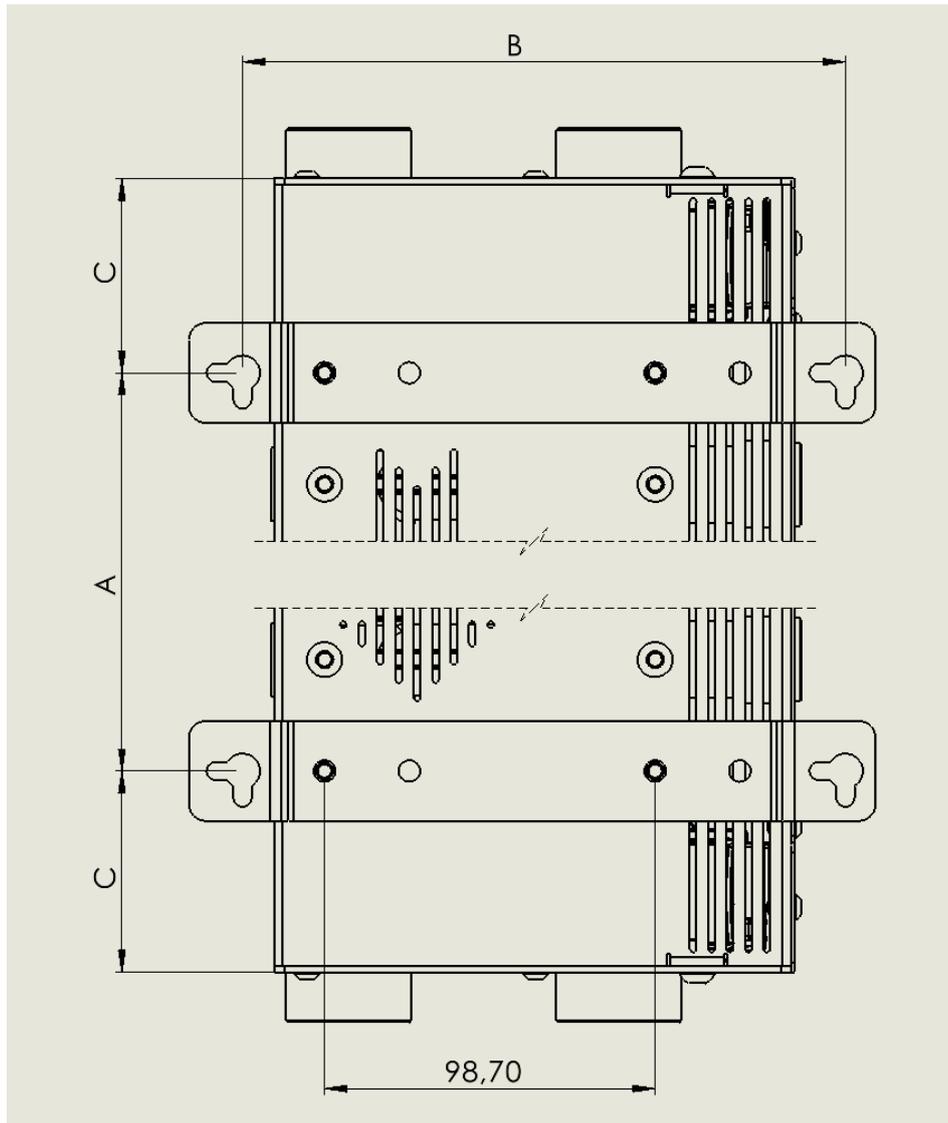


2. Remove up to four screws, two for each bracket. DO NOT remove more than four, as these screws are also a part of how the internal pipings are mounted.



3. Mount the brackets by using the same screws which were just removed. Beware that the bracket should be mounted so the holes at the ends point “upwards” as on the picture. If the holes are pointing “downwards”, then the manifold can still be mounted, if you turn it upside down.

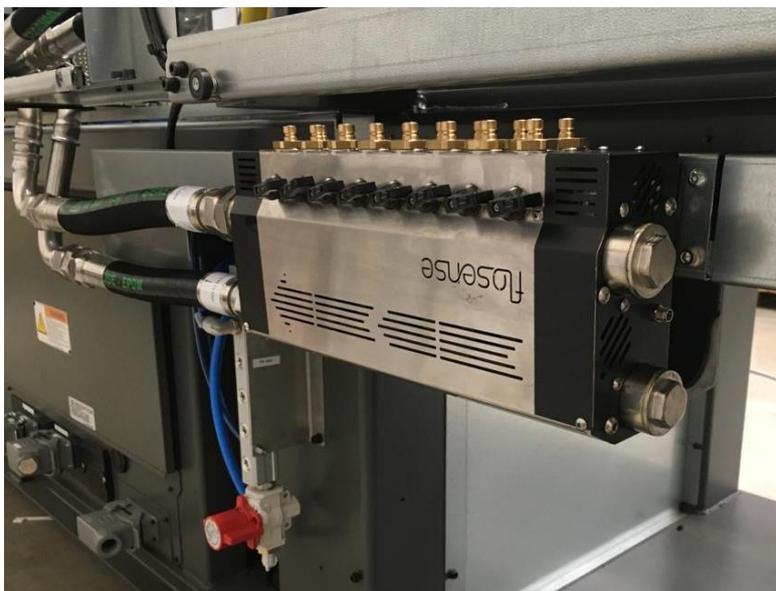
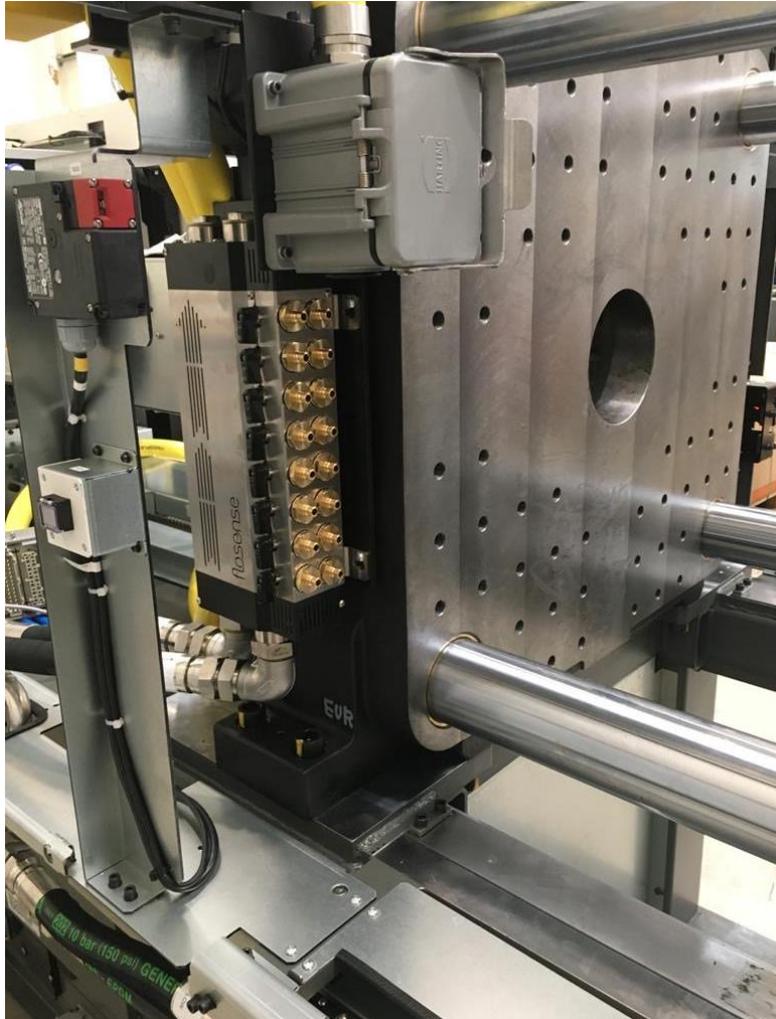
When mounting the Flosense system, a minimum of two brackets are required, and it is highly recommended to place them in the outermost positions as shown in step 3 above, especially for the larger models.



The position of the holes for the bracket can be seen in the figure above, and the dimensions for each model can be seen in the table below.

Model	Channels	A [mm]	B [mm]	C [mm]
Flosense 4-Zone	4	100.50	180	59.5
Flosense 6-Zone	6	167.50	180	59.5
Flosense 8-Zone	8	234.50	180	59.5
Flosense 10-Zone	10	301.50	180	59.5
Flosense 12-Zone	12	368.5	180	59.5

Once the brackets have been mounted on the manifold, the manifold can be mounted on the mould or machine, wherever there is space.



### 3.6. Connecting the Manifold to the display

Once the manifold has been assembled and mounted, it can be connected to the Flosense display, by using an M8 cable. The Manifold has one M8 connector on each side, but the connector on the side which the arrow on the top plate is pointing towards is the one used to connect to the manifold, as seen below.



After connecting the M8 cable to the manifold, connect the other side to the Flosense display. Use an extension cable if necessary.

#### 3.6.1. Connecting manifolds in series

From if your Flosense system has the firmware version V1.07, and software version 5.0.0.440, or any later version, it will be possible to connect manifolds together in series. This is done by connecting the manifolds with a female/female M8 connector from the side opposite the direction the arrow on the top of the first manifold is pointing (covered by a red dust cap on delivery), to the side of the second manifold where the arrow is pointing towards (covered with a white dust cap on delivery).

The image below shows how they should be connected.



The right manifold is the first manifold and is the one that should be connected to the Flosense display on the right side of the picture. On the left side of the right manifold, the cable is connected to the M8 connector (orange connector). The cable is then connected to the left manifold, on its right side (black connector).

### 3.7. Limitations to numbers of manifolds connected

The following rules are in effect for the number of sensors and manifolds which can be connected to the Flosense 4.0 system:

1. The Flosense 4.0 system can have a maximum of 60 sensors connected
2. The Flosense 4.0 system can have a maximum of 30 sensors connected in series
3. The Flosense 4.0 system can have a maximum of 8 manifolds connected
4. The Flosense 4.0 system can have a maximum of 4 manifolds connected in series.

The number of sensors for each Flosense manifold is described in the table below

	Flow sensors	Pressure sensors	<b>Total</b>
4-Zones	4	3	<b>7</b>
6-Zones	6	3	<b>9</b>
8-Zones	8	3	<b>11</b>
10-Zones	10	3	<b>13</b>
12-Zones	12	3	<b>15</b>

This means that while it is possible to connect eight 4-zone manifolds, it is only possible to connect four 12-zone manifolds.

Using the total number of sensors in the table above, it is possible to determine if your system can be set up in the configuration you wish, by checking if the system is following all of the 4 rules above.

## 4. Service & Maintenance

Before disassembling anything, empty the system of water, and disconnect water and power supply.

We strongly recommend having the service done by skilled and experienced personnel, in order to assure proper disassembly and reassembly.

### 4.1. Removing cover

If you need to gain access to any of the internal components, such as sensors, cables or the piping, you need to remove the top cover of the manifold



1. Locate all the screws on the top plate. They are marked with red circles shown above. Depending on the size of the manifold, there may be fewer than shown on the 12-zone manifold shown above.

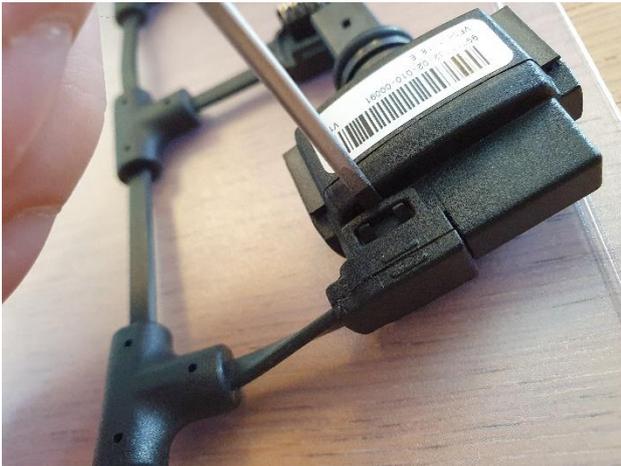


2. Remove all the screws with an Unbrako key



3. Remove the cover

## 4.2. Refitting cables



1. In order to remove the cable, you will need a small tool, such as a screwdriver in order to lift the snap fits holding the sensor.
2. Lift the snap fit gently, so as not to break it. Once it bends slightly, you will know that it has released. Do this for both sides of the sensor.



3. Once both sides are released from the snap fit, you can pull out the sensor gently
4. Continue doing this for all the sensors you need to remove from the cable.



5. Once you have replaced the sensors or the cable, you can connect the new sensors and cables.



6. Place the sensors, so they rest on the cable, and ensure that the sensors and cable are aligned.



7. Once you have verified that they are aligned, mount the sensors and the cable.



8. Make sure that the snap fits on both sides lock the sensor. Do this for all sensors and cables.



You will know that the sensor is NOT LOCKED in place if the snap fits bend out as shown above



### 4.3. Refitting Sensor

In order to replace the sensors as described below, make sure to remove the cables first.



1. Locate the sensor you wish to replace or refit.



2. Pull out the small locking pin at the side of the piping.



3. Once the pin is pulled out far enough, the sensor is no longer locked in place.



4. Remove the sensor by pulling it out



5. Make sure that the sensor is removed correctly. Remove anything from the pipes, like the O ring which commonly gets stuck.



6. Replace sensor if needed, and remount the O ring if it fell off in step 5.



7. Insert the sensor gently in the piping.



8. When the sensor is placed vertically, it can be pushed down into the piping



9. Push the locking pin back in. It may be challenging if it has been pulled out too far in steps 2 and 3



10. Push the locking pin all the way in. You will know that it is all the way in, when it is within the small gap of the hook on the piping.

#### 4.4. Cleaning the system

All surfaces shall be cleaned with a piece of cloth soaked in soap water or any other non-corrosive cleaning agent, concerned steel and brass.

Furthermore, we recommend descaling the system by using Mouldpro Remover Plus Powder Descaling Agent.

Find more information on [www.mouldpro.com](http://www.mouldpro.com)

#### 4.5. Recommended tools for different repairs/maintenance

The following tools are recommended by Mouldpro, when doing the specified type of repair/maintenance on a Flosense 4.0 system.

Type of repair/replacement	Tool	Amount
Mounting/dismounting nuts from cable connector on manifold.	SW-9 Wrench	2
Mounting/dismounting fittings on each channel.	SW-24 Wrench <sup>1</sup>	1
Mounting/dismounting Blanking/End Plugs.	SW-26 Wrench <sup>2</sup>	1
Disconnecting sensors from cable snap fits.	Flat head Screwdriver (0.5x3mm)	1
Mounting/dismounting screw from ground connection in manifold.	2mm Hex key/screwdriver	1
Mounting/dismounting screws from manifold lid.	2.5mm Hex key/screwdriver	1
Mounting/dismounting screws from bottom of manifold and brackets.	4 mm Hex key/screwdriver	1
Mounting/dismounting gaskets inside each channel.  Mounting/dismounting plugs on spine of manifold to access Flow pipes inside modules.	10 mm Hex key/screwdriver	1
Mounting/dismounting locking pins for sensors. <u>ONLY USE IF</u> it is not possible to mount/dismount using fingers	Small Needle nose pliers (or holding pliers in general)	1
Mounting/dismounting fittings on inlet/outlet for cooling liquid	SW 41 Wrench for 19MF/25MF fitting <u>OR</u> SW 46 Wrench for 38MF fitting	1

<sup>1</sup> If Flosense Port connector plugs are used (NRF and MF series)

<sup>2</sup> On the very first batch of Flosense 3.0 and 4.0, the blanking plugs were slightly smaller, so a SW-25 should be used instead.

## Change log

Date of change	Change	Version
29-04-2020	Product release	001
16-06-2020	Updated to be specifically for Flosense 4.0 and minor layout changes	002
07-09-2020	Added section 4.5 regarding recommended tools for maintenance and repair	003
26-03-2021	Added section 3.6.1 about connecting manifolds in series	004