

**Papa Pump**<sup>®</sup>

**SUREFLOW**<sup>™</sup>  
automatic flow regulation system

Installation and maintenance manual



designed in the UK



a unique new flow control valve system which enables the Papa Pump to operate with small and/or intermittent flows without adjustment

[papapump.com](http://papapump.com)

[www.waterpoweredtechnologies.com](http://www.waterpoweredtechnologies.com)



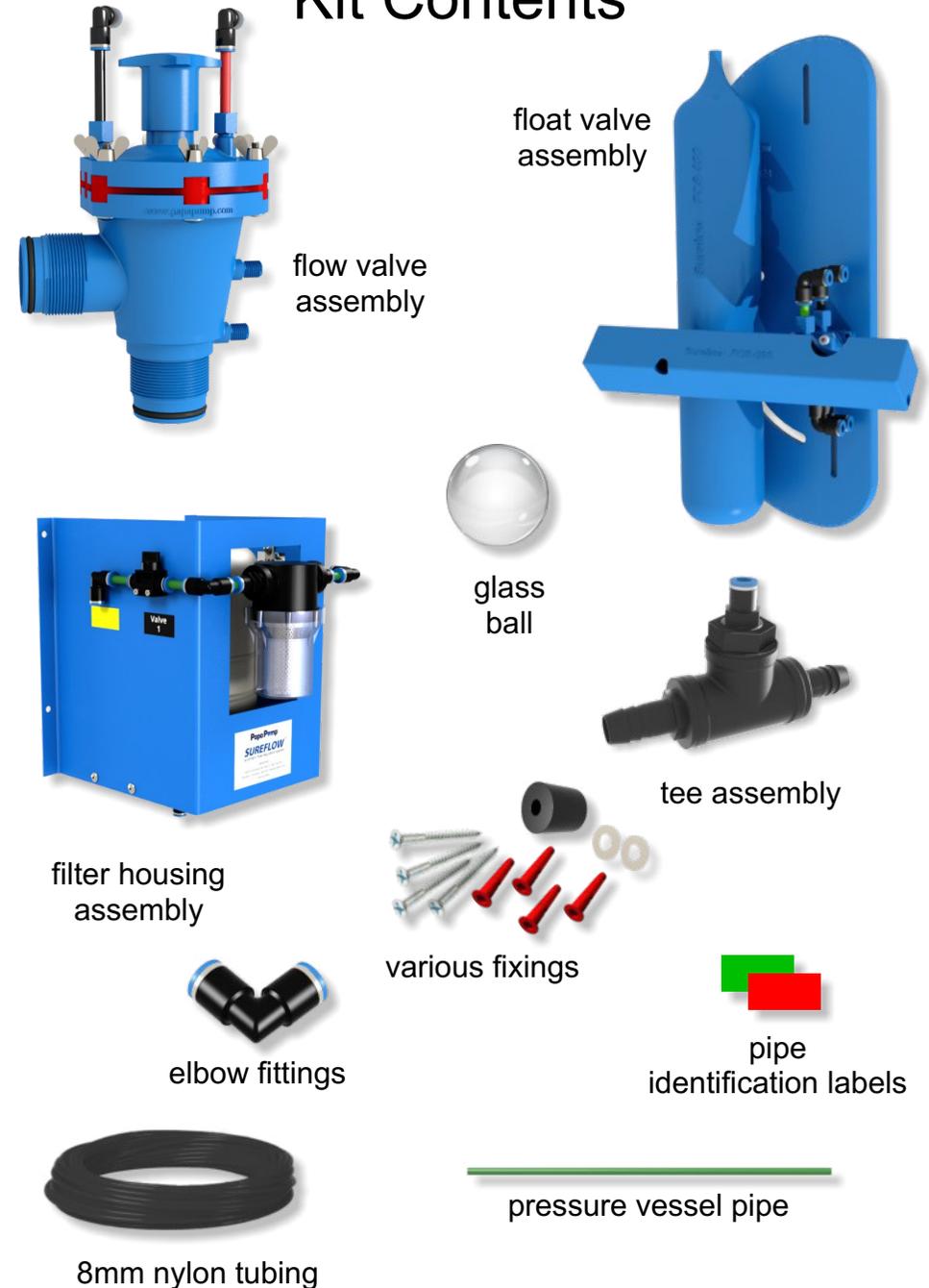
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# Kit Contents



Note: Some items may differ slightly from those shown

# Operation overview

A low water supply entering the pump supply tank might be insufficient to allow the Papa Pump to operate effectively. With a Sureflow system installed, as the level in the tank drops, the float arrangement will cause the float valve to allow water pressure to close the pump flow valve, preventing water from flowing through it.

When the water level in the supply tank rises, it will cause the float arrangement to reverse the float valve, allowing the pump flow valve to re-open and the pump to automatically restart. This allows the Papa Pump to operate at full flow and maximum efficiency.

## How the system operates

The system comprises of an actuator arm **G** which is connected to the float valve **H**. This arm rotates the float valve shaft, causing fluid inside the float valve to be diverted through a series of ports.

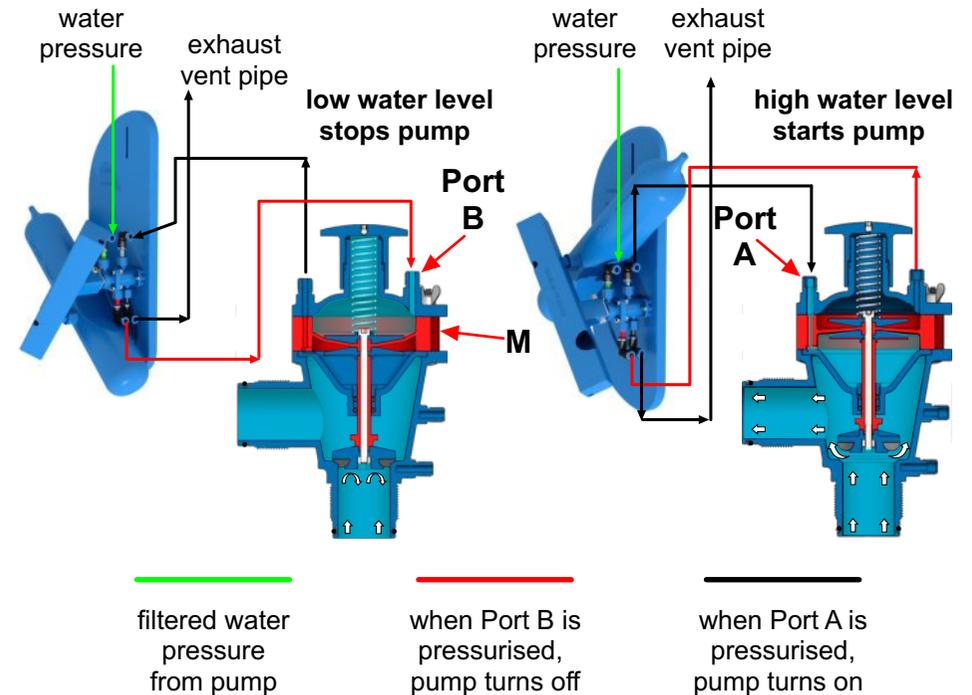
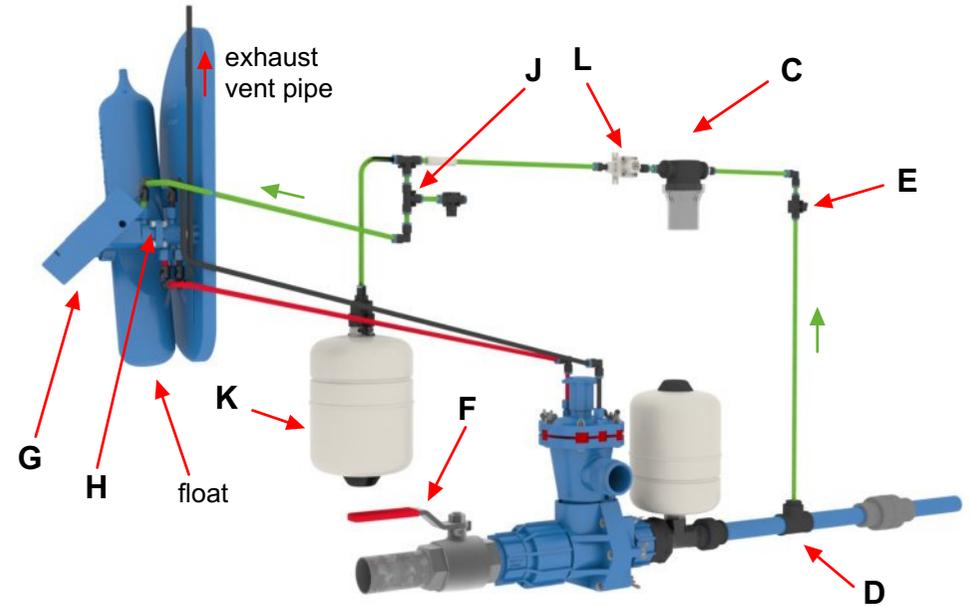
The actuator arm is controlled by the position of an attached float which causes the arm to be raised or lowered with the water level.

Inside the arm is a glass ball which will quickly move from one end to the other when the arm is rotated around the horizontal position, allowing the arm to either quickly rise or fall depending on whether the water level is rising or falling. This sudden action ensures that the valve is either fully open or fully closed.

Pressurised water from the pump is fed into a filter **C** and pressure control device **L** and then stored in the pressure vessel **K**. This clean, pressurised supply is directed by the float valve to operate the flow valve diaphragm **M**.

When the float falls, pressure enters the top of the diaphragm via **port B**, closing the flow valve. When the float rises, pressure is directed to the bottom of the diaphragm via **port A**, thus opening the valve. Water on the non-pressurised side of the diaphragm is allowed to exhaust back through the float valve vent pipe and into the supply tank. Because the flow valve is fitted to the exhaust port of the pump, opening and closing of the valve causes the pump to start and stop accordingly.

# System schematic

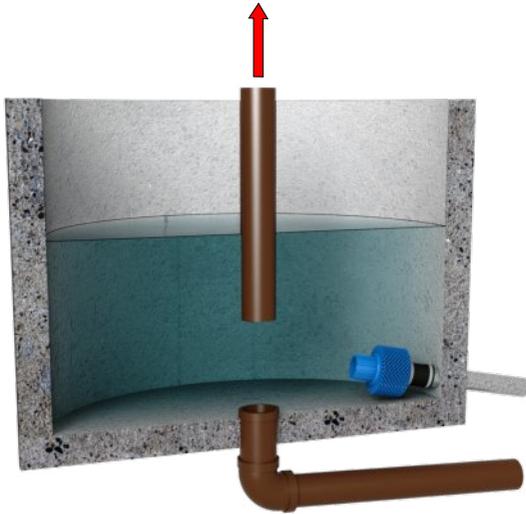


# Installation

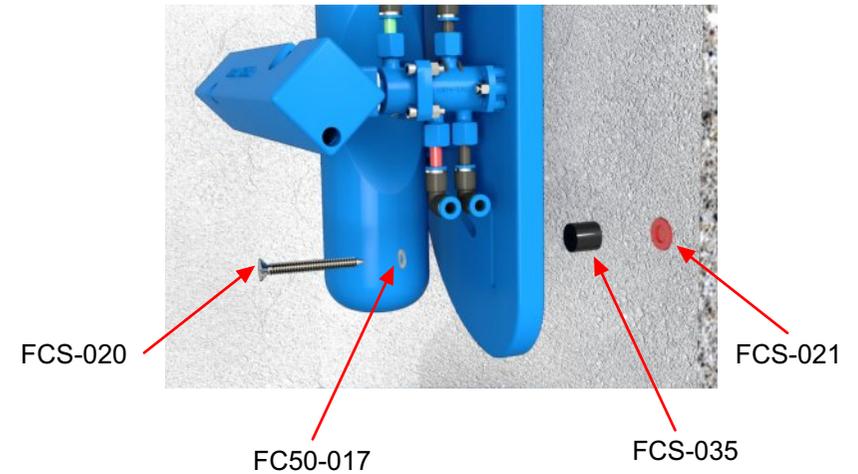
Note: When a Sureflow valve is installed, the pump chamber will require a cover to protect the valve from frost.

1. Turn off the pump by closing valve **F**. Holding the Float Assembly by the bracket FCS-024, lower the assembly into the water and push down - ensuring that float and arm can move freely - until the float is in its highest position. Move the assembly down a further 10-20mm.

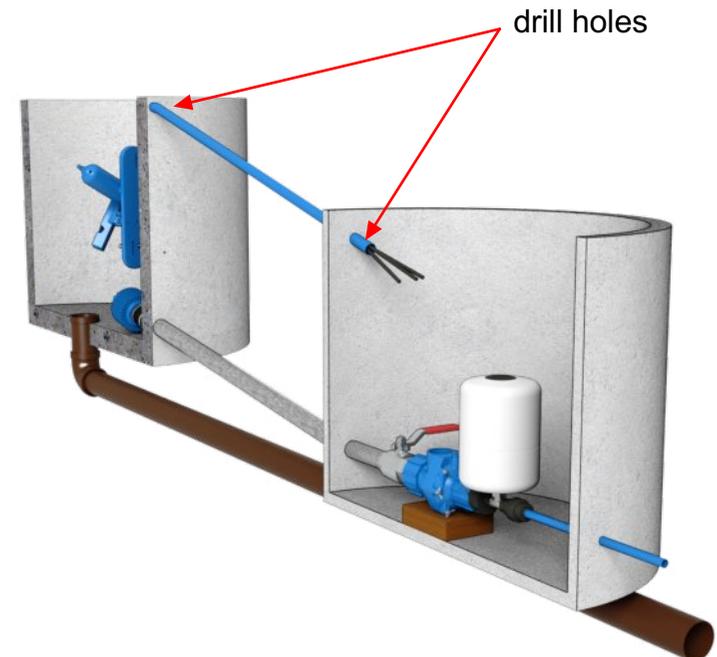
2. With the bracket in a vertical position, mark the position of the fixing bracket slots on the supply tank wall. Remove the standpipe to allow the water level to fall enough to be able to drill the fixing holes and then replace. Do not allow the level to fall below the filter as this could cause air locks in the supply pipe.



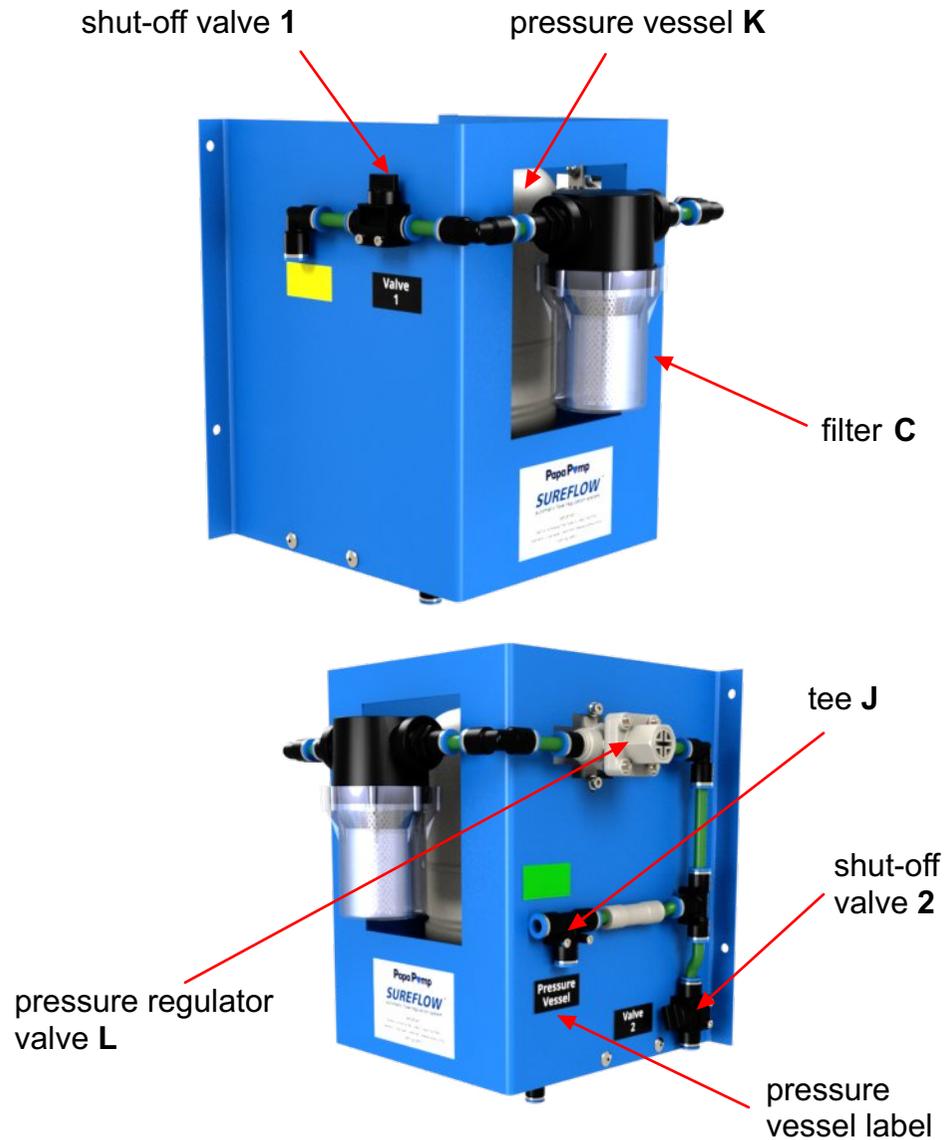
Drill holes to suit the rawlplugs approximately in the vertical centre of the adjusting slots in the bracket to allow for up and down adjustment. Fix the bracket using the spacers FCS-035, screws FCS-020, washers FC50-017 and rawlplugs FCS-021 provided. Drill a suitable hole in the supply tank above the overflow line to enable the insertion of a flexible conduit pipe (*50mm MDPE pipe is advised*). The conduit pipe is fitted between the supply tank and the pump tank.



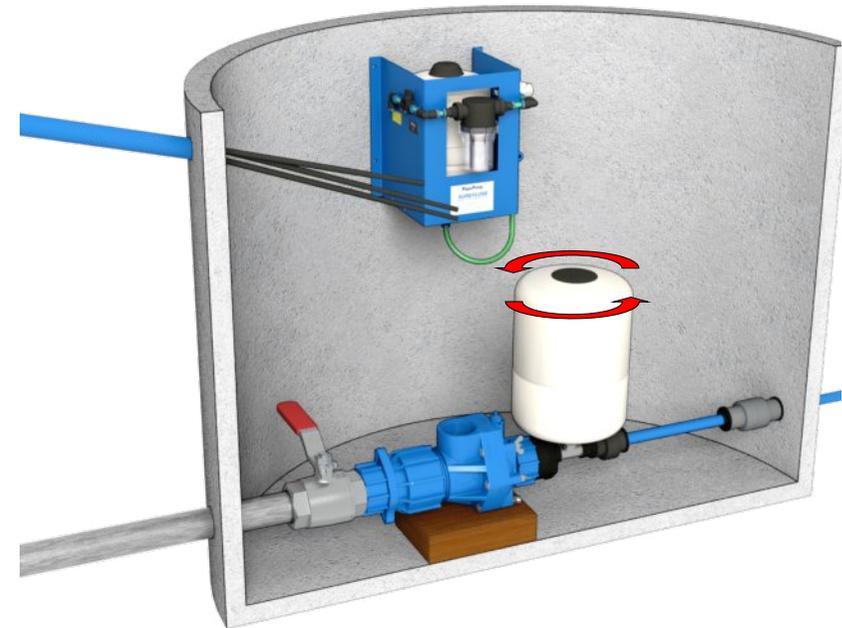
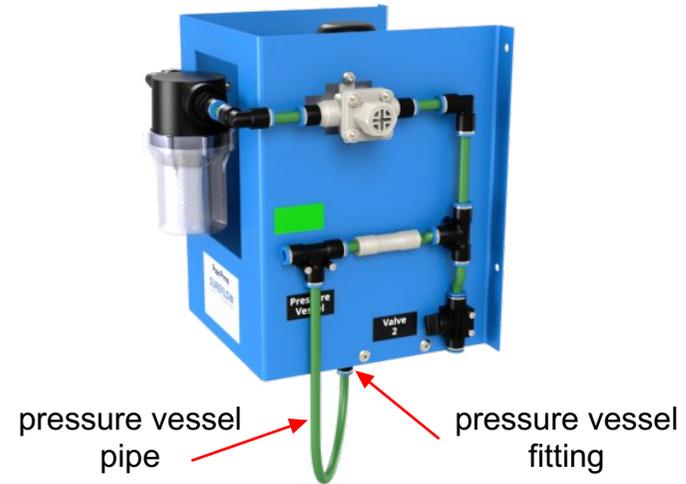
3. Drill a similar hole in the pump chamber. Run the conduit between the supply tank and the pump chamber. From the roll supplied, cut 3 lengths of 8mm flexible pipe to suit and feed into the conduit. This conduit pipe should eventually be buried to protect from frost, so leave enough slack for this.



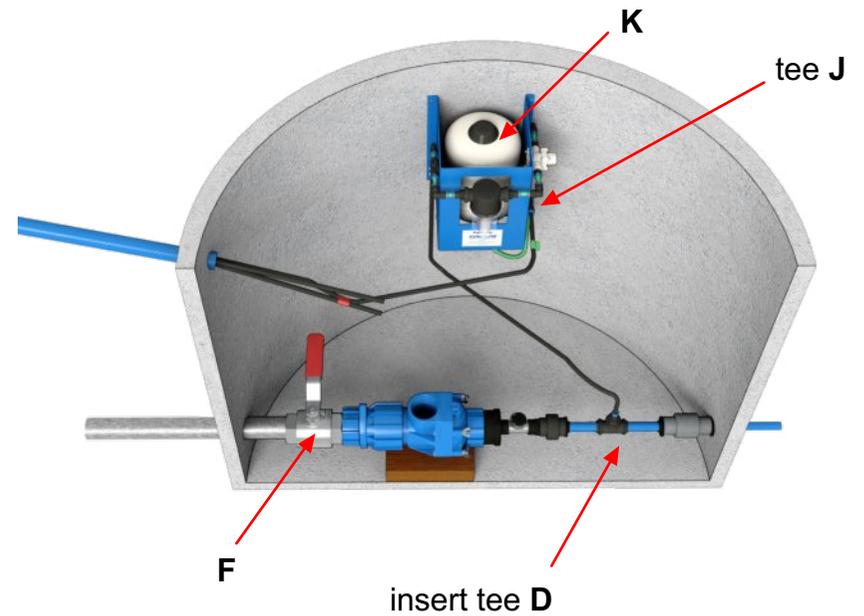
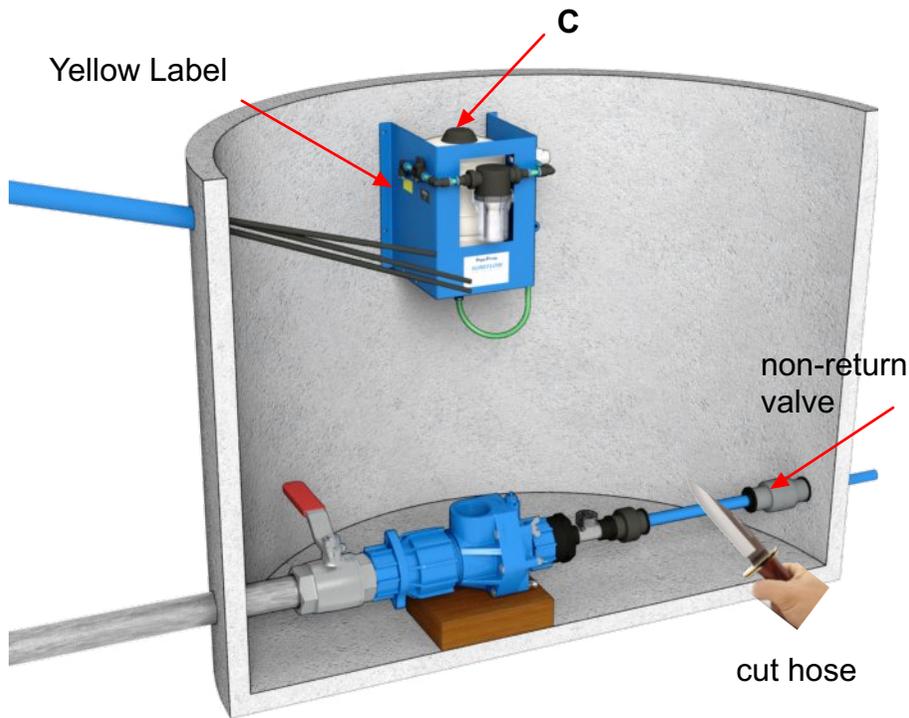
## Filter Housing Assembly



4. Assemble the pressure vessel pipe supplied to the port of tee J marked with the “**Pressure Vessel**” label and connect the other end to the pressure vessel fitting. Fix the housing to the wall of the pump chamber using screws **FCS-016** and rawplugs **FCS-021** provided.

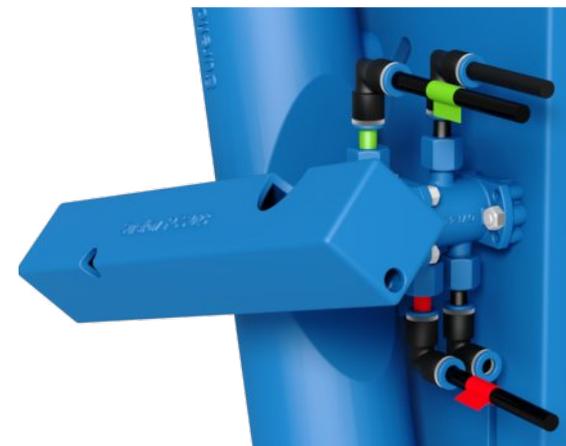
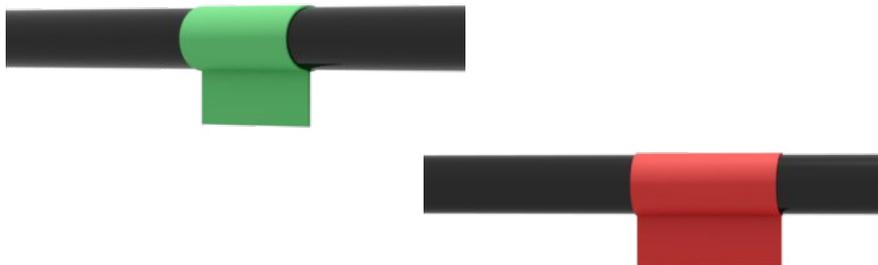


Slowly unscrew the pump pressure vessel a maximum of 2 full turns to release pressure (*fully unscrewing the pressure vessel without first releasing the pressure can result in personal injury*). Remove the pressure vessel. Cut the delivery hose pipe between the pump pressure vessel and the non-return valve and install the tee D between the pump and the non-return valve.

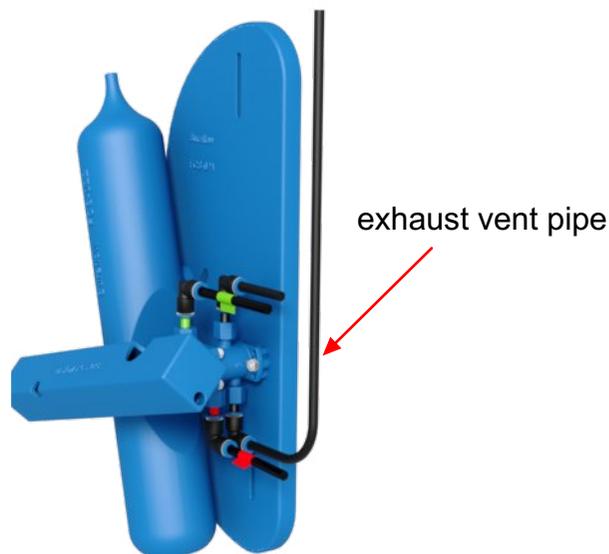


5. Using 8mm pipe, connect from the tee **D** to the fitting marked with the yellow label on the filter housing. Use elbow(s) supplied in the kit to neaten the pipe run if required. Set the pressure in the pressure vessel **K** to 1bar (15psi). Connect any one of the 8mm pipes from the supply tank into the port of tee **J** marked with a green label - use elbow(s) supplied in the kit to neaten the pipe run if required. Fix a green sticky label to this pipe. Select either one of the remaining two pipes and attach a red sticky label.

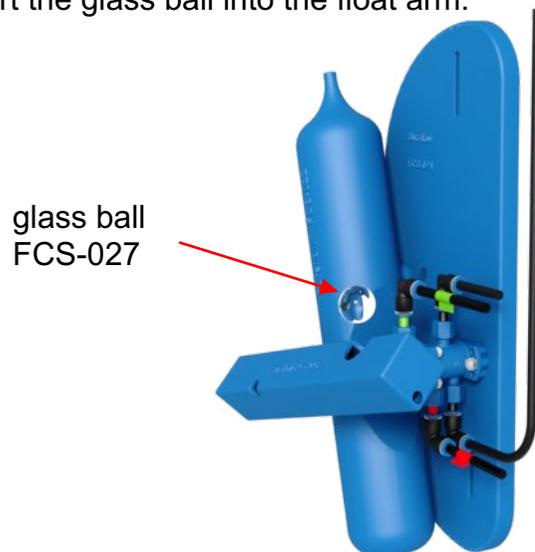
6. At the supply tank, identify which pipe at the pump tank has the green sticker and insert this pipe into the valve port that contains the short length of green pipe. Attach another green sticker to this pipe. Identify which pipe at the pump tank has the red sticker and insert this pipe to the valve port containing the red pipe and attach another red sticker. Fit the remaining pipe into the port with the black pipe next to the port with the green pipe.



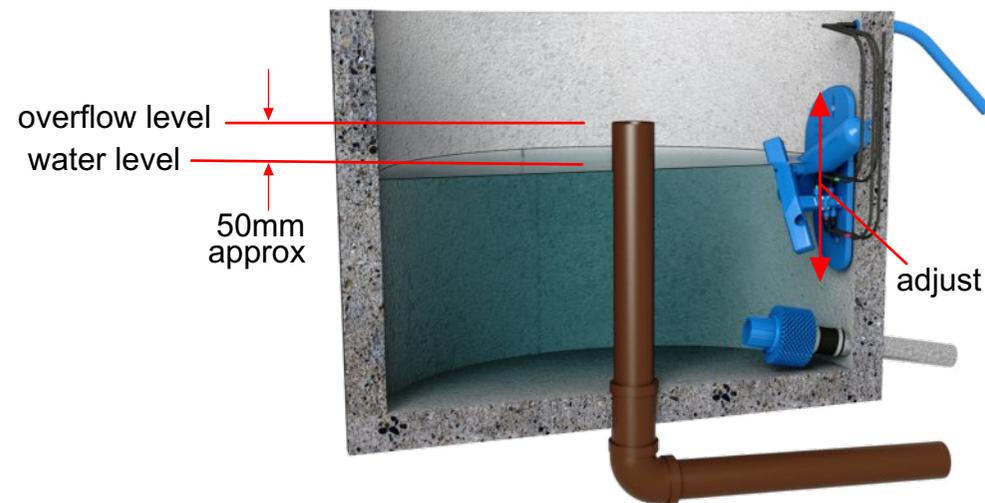
7. Fit an additional length of black pipe to the remaining float valve port shown - this is the exhaust vent. Cut the length so that the open end of the pipe will be visible above the overflow level of the supply tank. **Ensure that all pipes are positioned to eliminate interference with the float mechanism when the float is both fully up and fully down.**



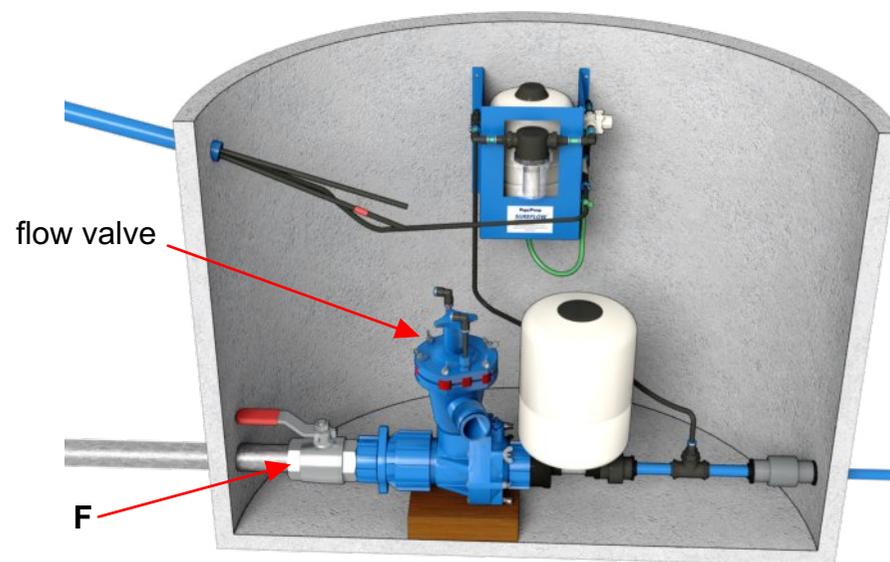
8. Insert the glass ball into the float arm.



9. Allow water to fill up the supply tank and watch to see if the float rises to its **highest** position. This can be adjusted by re-positioning the float valve bracket higher or lower so that with the float in this position, the water level is around 50mm below the overflow.



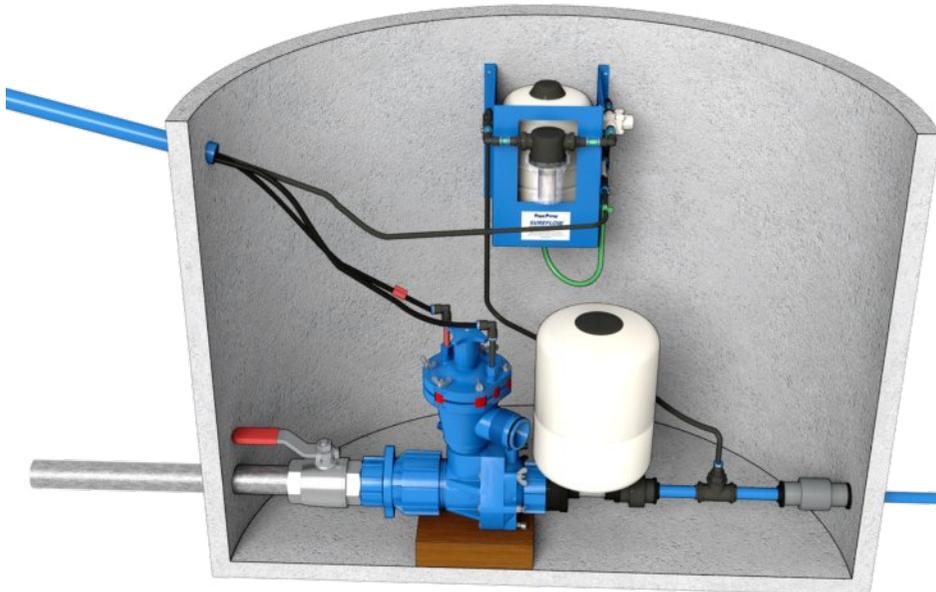
10. At the pump chamber, remove the pressure vessel. Then, **using NO tools**, screw the flow valve into the pump exhaust until it bottoms out, then turn back about 1/4 turn. Replace the pressure vessel and turn on the pump by opening the valve F.



**11.** After a short while, water will flow from the 8mm pipe without a coloured sticker - allow the water to flow for a short while to ensure any air is expelled.



Connect this pipe to the push-in connector on the flow valve port containing the black pipe (**port A**, adjacent to the valve outlet).



**12.** With the pump still operating, go to the supply tank and push the float down. Tie or weigh down the float and return to the pump tank. Water should appear from the pipe with the red sticker. Connect this pipe to the valve port containing the red pipe (**port B**). At the supply tank, free up the float and operate manually 5 or 6 times, holding the float fully up and fully down for 5-6 seconds each time to bleed the system. Note that depending on the gradient and length of the control pipes, this may require more than 5-6 cycles until the system is fully bled.

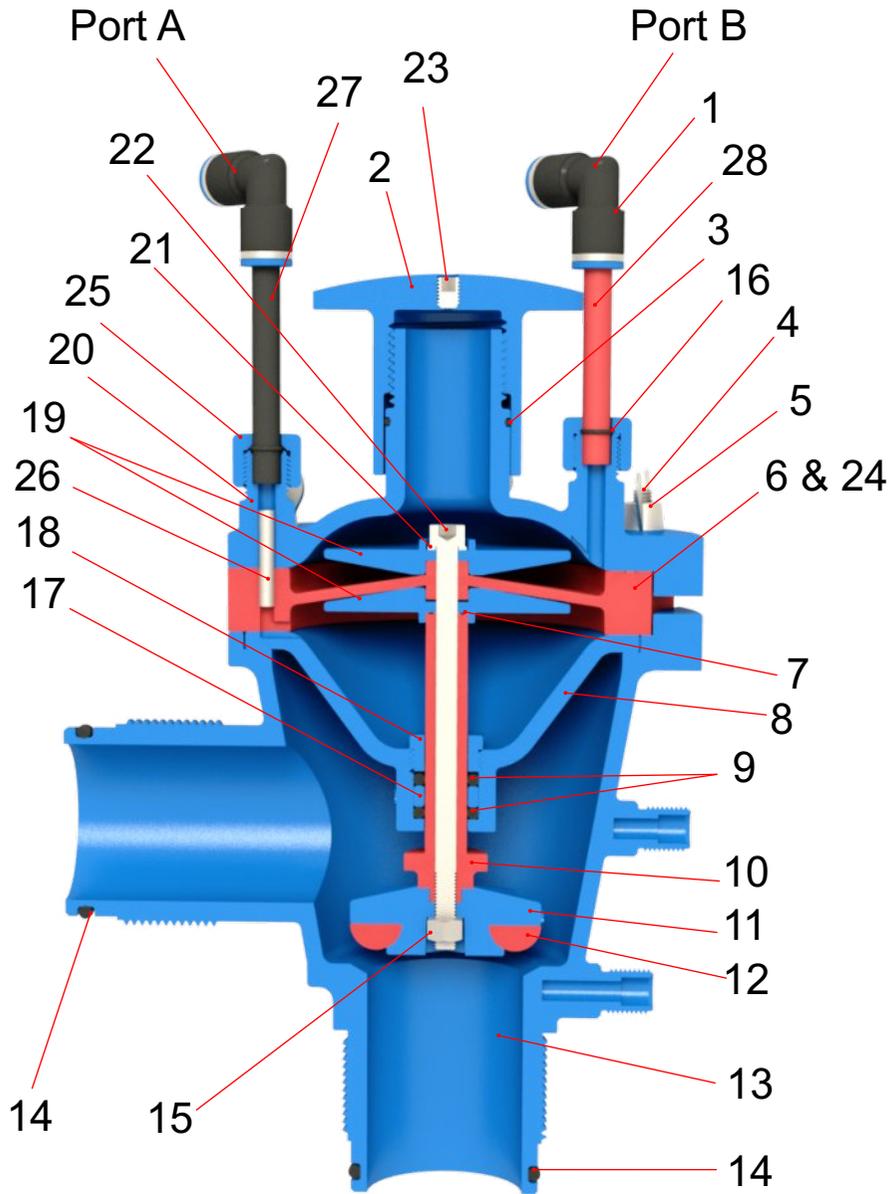


**13.** To check that the valve is working correctly, operate the float valve manually as before, but waiting each time to hear the pump start and stop. Watch at least 2 cycles of the float rising and falling with the level of the water.

As the float valve operates, water should escape from the exhaust vent pipe but should stop flowing after a few seconds. If water flows permanently from this pipe, consult the fault finding guide at the end of this manual.

*(If the pump does not start but water is flowing through the flow valve exhaust, adjust the pump until it starts.)*

# Flow valve

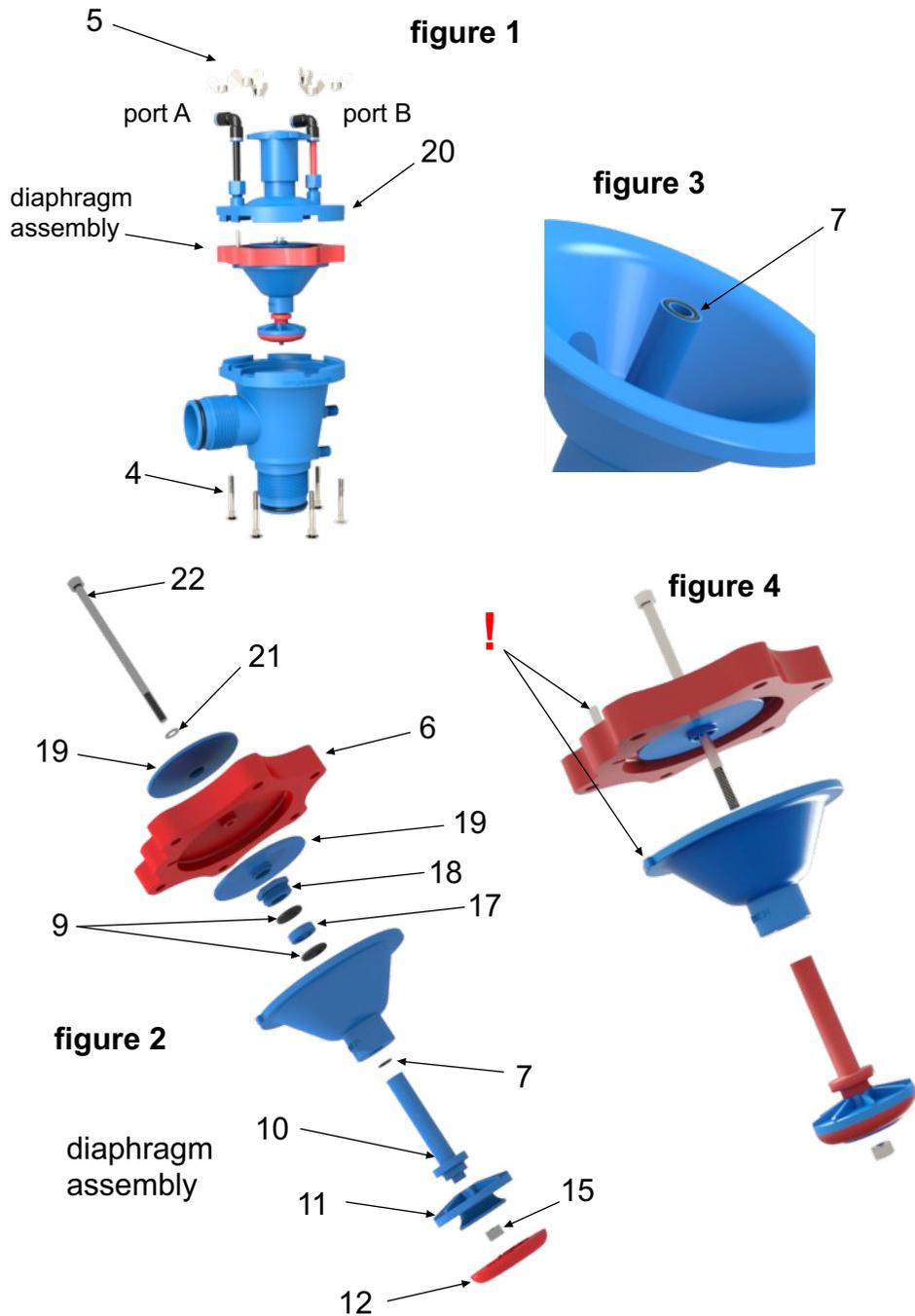


# Flow valve parts list

	Description	Quantity	Part Number
1	8mm Push-in Elbow	2	DV1-4-018
2	Spring Adjuster	1	FC50-009
3	O ring, Adjuster	1	FC50-013
4	Coach Bolt S/S	6	FC50-014
5	Wing Nut S/S	6	PP50-013
6	Diaphragm	1	FC50-006
7	O Ring, Plunger	1	FC50-008
8	Plunger Support	1	FC50-003
9	O Ring, Plunger Support	2	FC50-007
10	Plunger	1	FC50-011
11	Valve Retainer	1	FC50-004
12	Main Seal	1	MP50-008
13	Main Body	1	FC50-001
14	O Ring, Main Body	2	FC50-023
15	Nylok Nut S/S	1	FC50-018
16	O Ring, Pipe Retaining Nut	2	FC50-024
17	Spacer	1	FC50-015
18	Retainer	1	FC50-012
19	Diaphragm Washer	1	FC50-005
20	Valve Top	1	FC50-002
21	Washer, Diaphragm Bolt S/S	1	FC50-017
22	Diaphragm Bolt S/S	1	FC50-016
23	Bleed Grub Screw S/S	1	FC50-022
24	Crush Tube	6	FC50-021
25	Pipe Retaining Nut	2	FC50-020
26	Transfer Tube S/S	1	FC50-025
27	Nylon Tube Black	1	FC50-027
28	Nylon Tube Red	1	FC50-026

Complete Flow Valve Assembly part number FC50-A

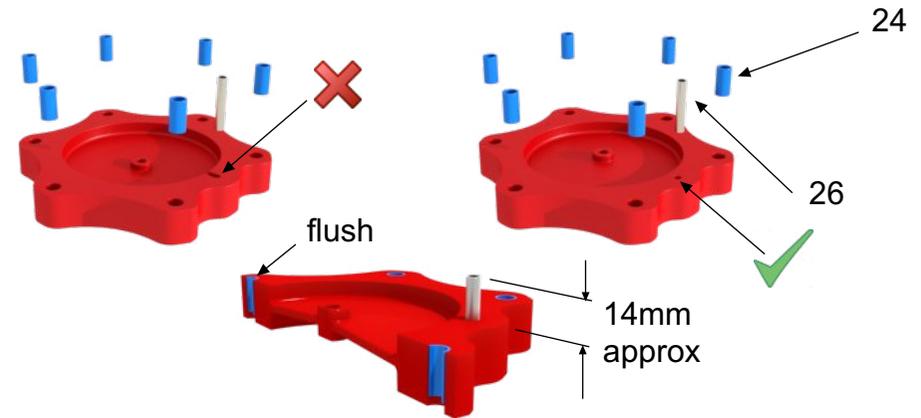
# Flow valve maintenance



1. Turn off valve F. Disconnect and block off to prevent water loss, the two 8mm pipes from the valve, noting which pipe goes to which port. Unscrew the pump pressure vessel a few turns and **wait for the pressure to decay** and remove. Unscrew the valve from the pump. Undo the six wing nuts (5) and remove the valve top (20). Push out the six coach bolts (4) and remove the diaphragm assembly (figure 1).

2. Unscrew the retaining bolt (22) and remove the nut (15), the diaphragm washers (19) and the small washer (21) (figure 2).

3. Inspect the diaphragm for holes/tears and replace if necessary. **Important note:** if replacing the diaphragm, remove the six crush tubes and transfer tube (24 & 26 below) and insert into the new diaphragm, ensuring correct diaphragm orientation as shown below.



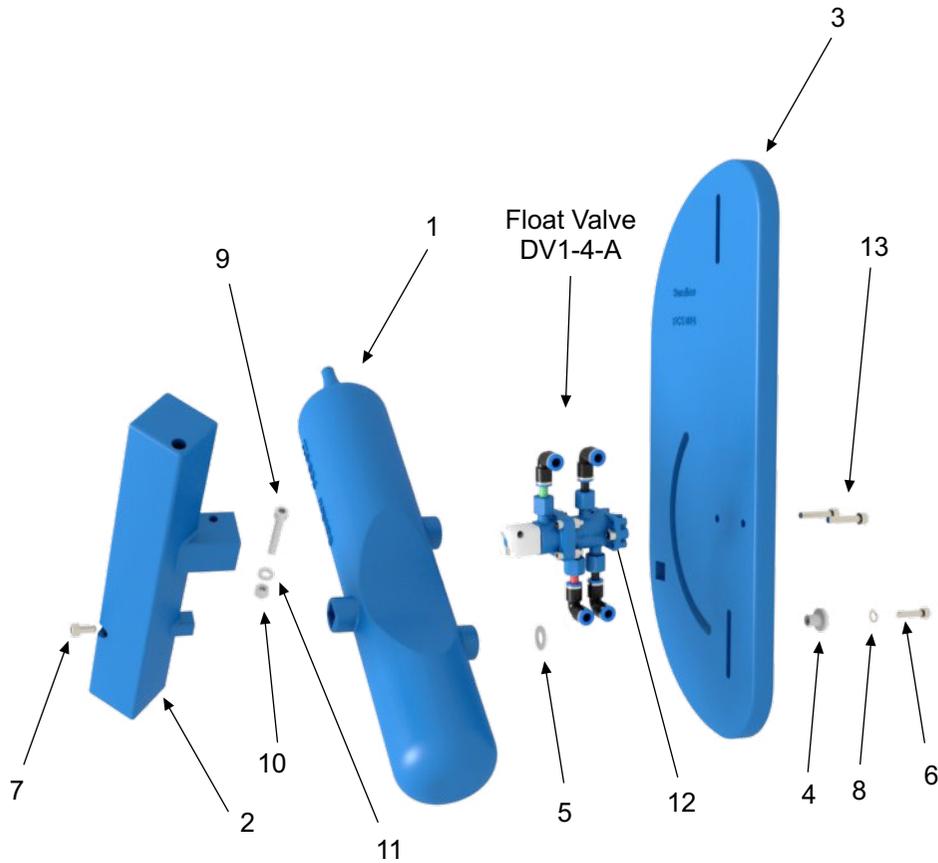
4. Re-assemble the diaphragm assembly, taking care not to dislodge the small o-ring (7, figure 3), Be careful not to overtighten the diaphragm retaining bolt (22).

5. Inspect the main seal (12) and replace if necessary.

6. Reassemble the valve ensuring that all components are correctly positioned, noting the radial position of the diaphragm relative to the plunger support (figure 4). Be careful not to overtighten the wing nuts (5). Reassemble valve to pump. Reassemble the pump pressure vessel, restart the pump as shown in step 12 page 15.

# Float Assembly

figure 5



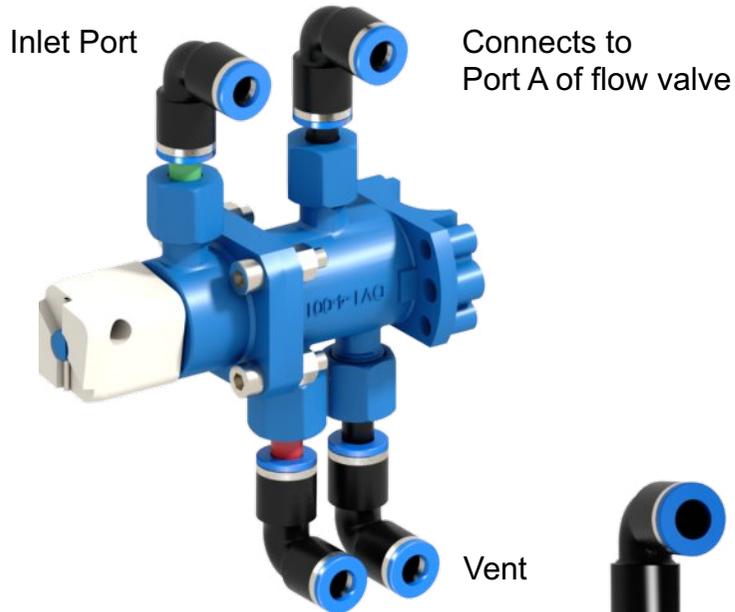
# Float Assembly parts list

	Description	Quantity	Part Number
1	Float	1	FCS-022
2	Float Arm	1	FCS-023
3	Float Bracket	1	FCS-024
4	PTFE Top Hat (runner guide)	1	FCS-029
5	PTFE Washer (runner guide)	1	FCS-025
6	Float Guide Bolt (runner guide)	1	FCS-026
7	Float Arm Retaining Bolt S/S	1	FCS-028
8	Spring Washer (runner guide)	1	FCS-030
9	Retaining Bolt, Arm to Valve	1	FCS-031
10	Nut, Retaining bolt	1	FCS-032
11	Retaining Bolt Washer	1	FCS-033
12	Nut, Valve Mounting	2	DV1-4-013
13	Valve Mounting Bolt	2	DV1-4-015

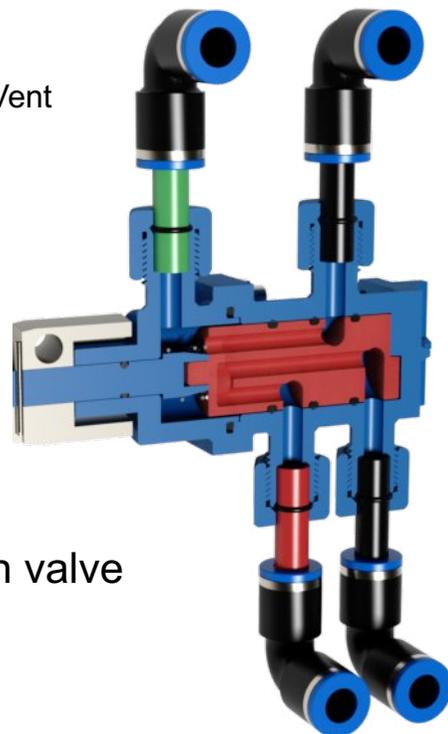
Complete Float Arm Assembly with Float Valve part number FCS-ASM

# Float valve

## Port Identification



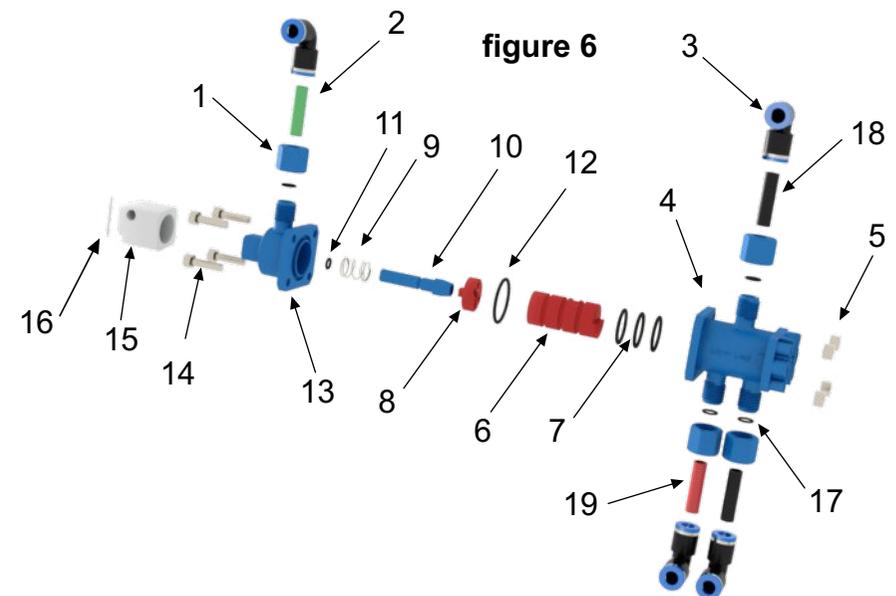
section through valve



# Float valve parts list

	Description	Quantity	Part Number
1	Pipe Retaining Nut	4	FC50-020
2	Green Pipe	1	DV1-4-019
3	5/16" (8mm) Push-in Elbow	4	DV1-4-018
4	Valve Body	1	DV1-4-001
5	Nut, Body M5 S/S	4	DV1-4-012
6	Distributor	1	DV1-4-005
7	O Ring, Distributor	3	DV1-4-009
8	Rotor	1	DV1-4-004
9	Spring S/S	1	DV1-4-014
10	Shaft	1	DV1-4-003
11	O Ring, Shaft	1	DV1-4-007
12	O Ring, Valve Body	1	DV1-4-008
13	Valve Head	1	DV1-4-002
14	Bolt, Body S/S	4	DV1-4-011
15	Bush	1	DV1-4-016
16	Slotted pin S/S	1	DV1-4-017
17	O Ring, Pipe Retaining Nut	4	FC50-024
18	Black Pipe	2	DV1-4-021
19	Red Pipe	1	DV1-4-020

Complete Float Valve Assembly part number DV1-4-A

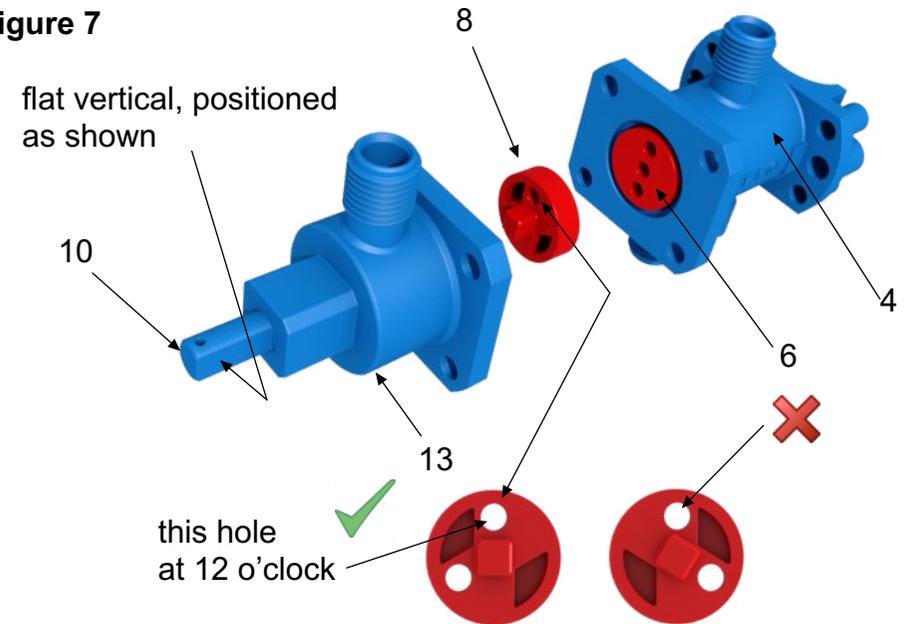


# Float valve maintenance

1. Stop the pump by closing the valve **F**. Turn or block off the water supply to the supply tank and remove the standpipe. Allow to drain until the float falls to its lowest position. Replace standpipe. This will prevent a low water level allowing air to enter the supply pipe and causing an airlock.
2. Remove the four 8mm pipes from the float valve push-in elbows, noting which pipe is fitted to which valve port. Block all pipes except the vent to avoid water loss. This will reduce priming time.
3. Note the vertical position of the bracket, undo the bracket fixing screws and then remove the nuts (**12**) and bolts (**13**) (**figure 5**) securing the float valve to the float bracket. Now remove the float guide bolt (**6**, **figure 5**) and washers (**4**, **5** & **8**, **figure 5**). Remove the plastic fixings (**9**, **10** and **11**, **figure 5**) and separate the arm from the float valve. Ensure the glass ball **FCS-027 (p12)** remains in the arm.
4. Carefully remove the slotted pin (**16**) and the bush (**15**) (**figure 8**).
5. Remove the four bolts (**14**) and nuts (**5**) (**figure 8**).
6. Remove the valve head (**13**), spring (**9**), o ring (**12**) and rotor (**8**). Check that the mating faces of the rotor (**8**) and distributor (**6**) (**figure 7**) are smooth and clean with no signs of scoring. The distributor (**6**) is not a serviceable part and removal **must not** be attempted.
7. Check that the three distributor passages are not blocked by blowing through each of the three ports in the valve body in turn (**4**).
8. Withdraw the shaft (**10**) from the valve head. Inspect the valve head, shaft and the two o rings (**11**, **figure 6**) and (**12**, **figure 6**) for signs of wear or damage. Replace if necessary.
9. Reassemble the valve. **Important:** note the orientation of the valve head (**13**), valve body (**4**), shaft (**10**) and rotor (**8**) (**figure 7**). Incorrect assembly will cause improper operation of the valve.

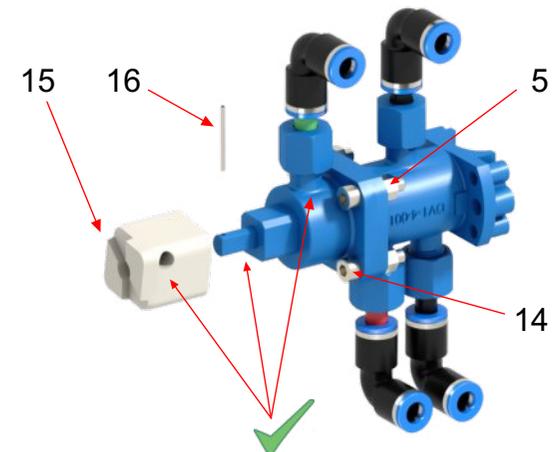
**DO NOT APPLY GREASE TO THE MATING FACES OF THE DISTRIBUTOR (6) AND ROTOR (8).**

**figure 7**

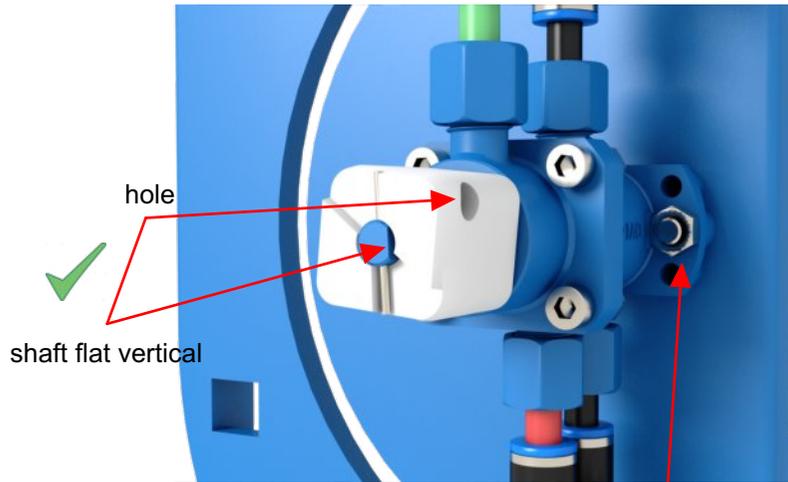


10. Reassemble the pipes and fittings to the correct valve ports. Fit the bush (**15**) and slotted pin (**16**) as shown below, noting the hole position in (**15**) relative to shaft flat and inlet port

**figure 8**

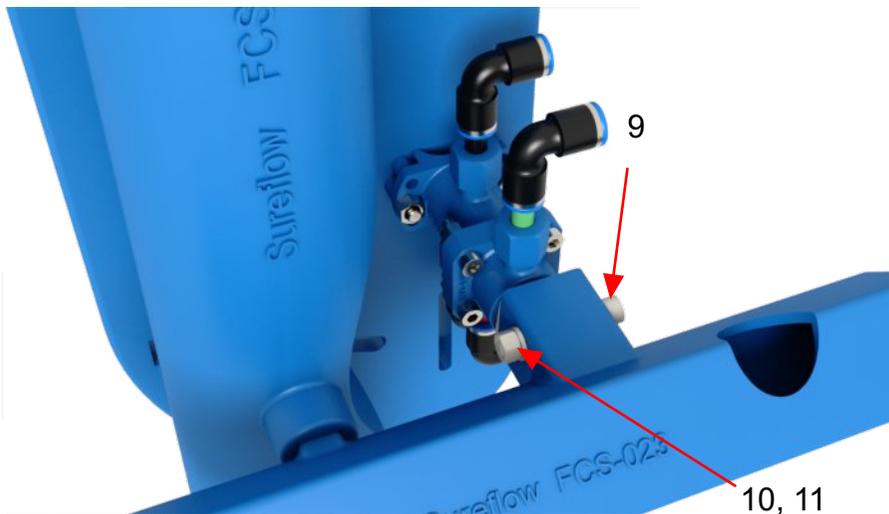


**11.** Re-fit the valve to the float guide bracket using the screws (13) and the nuts (12) (figure 5). Turn the bush (15, figure 8) to the position shown below. Ensure the shaft flat is in position shown below. Locate the float arm on the bush.



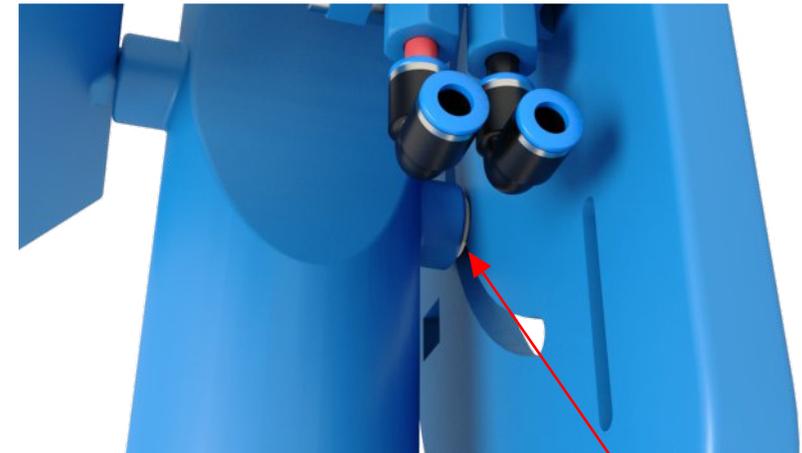
12, 13

**12.** Assemble the plastic bolt (9), washer (10) and nut (11) (figure 5) securing the float arm to the valve.



10, 11

**13.** Assemble the float guide washers, the float guide bolt and the spring washer (4, 5, 6 & 8 figure 5).



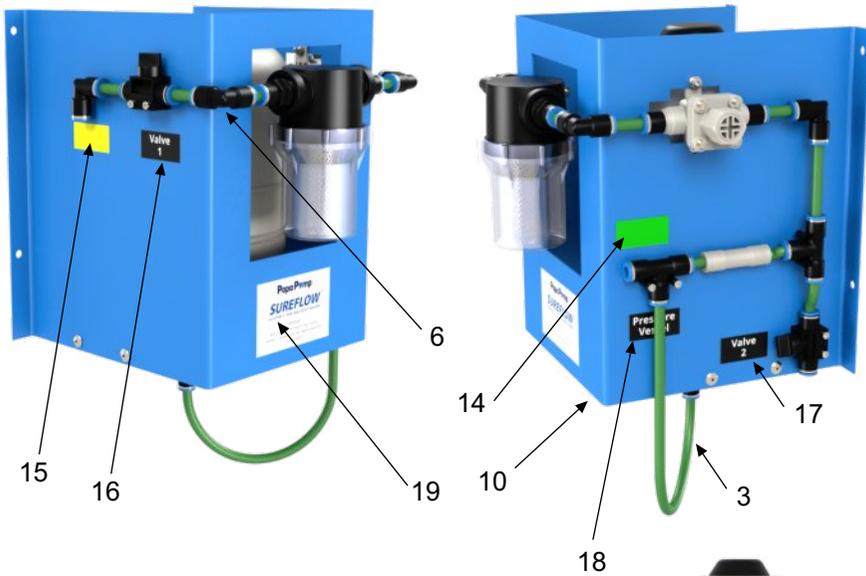
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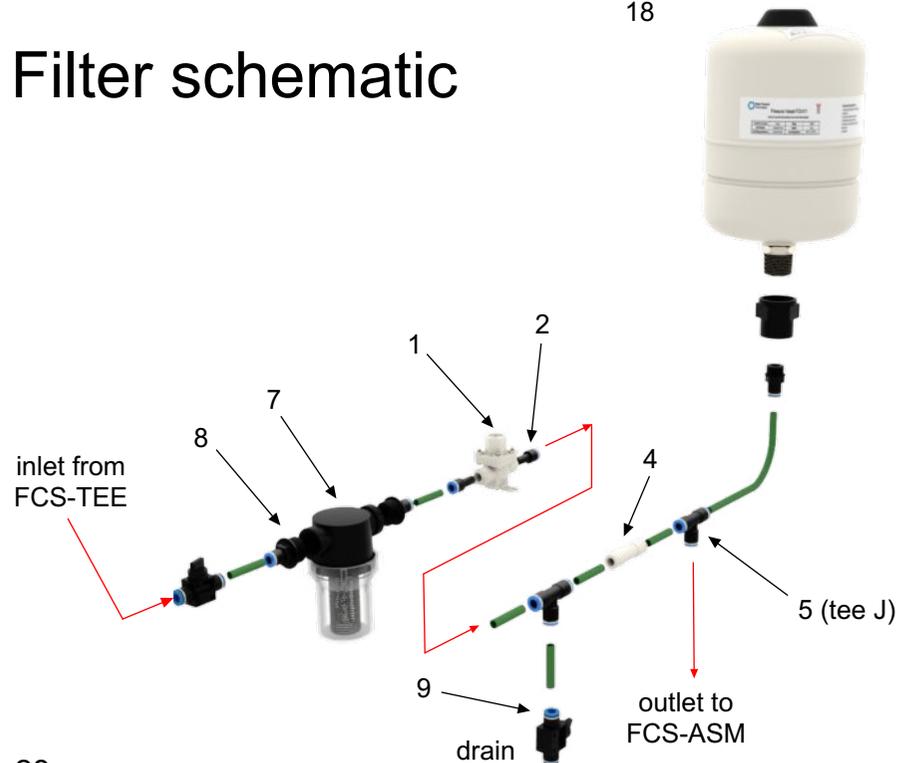
4, 6, 8

**14.** Refit the assembly to the tank and re-connect the pipes. Follow from step 12 (page 15) of the Installation procedure to bleed the system.

# Filter Housing Assembly



## Filter schematic



# Filter Housing Assembly parts list

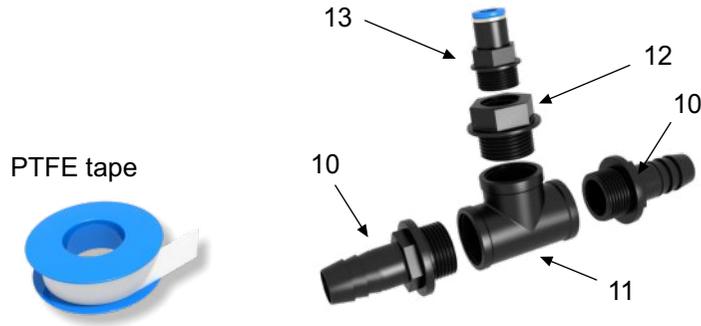
	Description	Quantity	Part Number
1	Pressure Regulator	1	FCS-001
2	3/8" male - 5/16" Push-in adaptor	2	FCS-002
3	Pressure Vessel Pipe	1	FCS-003
4	5/16" Push-in Check Valve	1	FCS-006
5	5/16" Push-in Equal Tee	2	FCS-005
6	5/16" Push-in Equal Elbow	4	DV1-4-018
7	Filter	1	FCS-009
8	1/2" BSP Male to 5/16" Push-in	2	FCS-004
9	Ball Valve 5/16" Push-in	2	FCS-010
10	Filter Housing Assembly	1	FCS-007
11	4 litre Pressure Vessel	1	FCS-011
12	1" BSP - 1/2" BSP Reducing Socket	1	FCS-017
13	1/2" BSP male - 5/16" Push-in	1	FCS-004
14	Green Label	1	FCS-038
15	Yellow Label	1	FCS-039
16	Housing Label Valve1	1	FCS-040
17	Housing Label Valve2	1	FCS-041
18	Housing Label PV	1	FCS-042
19	Main Housing Label	1	FCS-053

Complete Filter Assembly part number FCS-FIL



Note: PTFE tape to be used on all threaded joints

# Tee assembly



## Tee assembly parts list

Description	Quantity	Part Number
10 3/4" BSP to 20mm Male Hosetail	2	FCS-013
11 3/4" BSP Equal Tee	1	FCS-014
12 3/4" BSP - 1/2" BSP Reducing Bush	1	FCS-015
13 1/2" BSP male - 5/16" Push-in	1	FCS-004

Complete Tee Assembly part number FCS-TEE

Note: PTFE tape to be used on all threaded joints

# Fixings kit

Description	Quantity	Part Number
Phillips screw 8g x 75 s/stl	2	FCS-020
Rawlplug size 6-12	6	FCS-021
Glass Ball 30mm dia	1	FCS-027
8mm push-in equal elbow	6	DV1-4-018
Phillips screw 8g x 40 s/stl	4	FCS-016
Spacer	2	FCS-035
M6 washer s/stl	6	FC50-017
Green Pipe id Label	2	FCS-038
Red Pipe id Label	2	FCS-052

Part No: FCS-FIX

## Service kits and parts

### Flow valve service kit

Part No: FLOW-KIT

Kit contains:

1 x Diaphragm	FC50-006
1 x Main Seal	MP50-008
2 x O ring Plunger Support	FC50-007

### Float valve service kit

Part No: DV-KIT

Kit contains:

1 x Shaft	DV1-4-003
1 x Rotor	DV1-4-004
1 x O ring, Shaft	DV1-4-007
1 x O ring, Body	DV1-4-008

### Filter Assembly spare filter

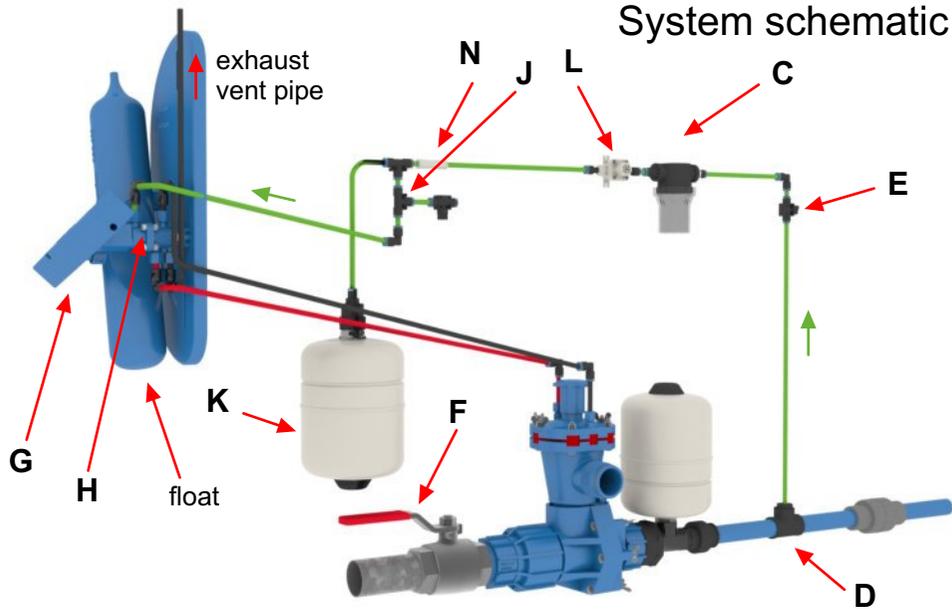
Part No: FCS-009

### Filter Assembly Pressure Regulator

Part No: FCS-001

# Troubleshooting

System schematic



Before assuming that the flow valve is not operating, check that the Papa pump is working correctly, as without pressure the system will not operate. (If necessary, refer to the Papa pump instruction manual). Also check that the float moves freely to its upper and lower limits. Having checked these, perform the following diagnostic sequence:

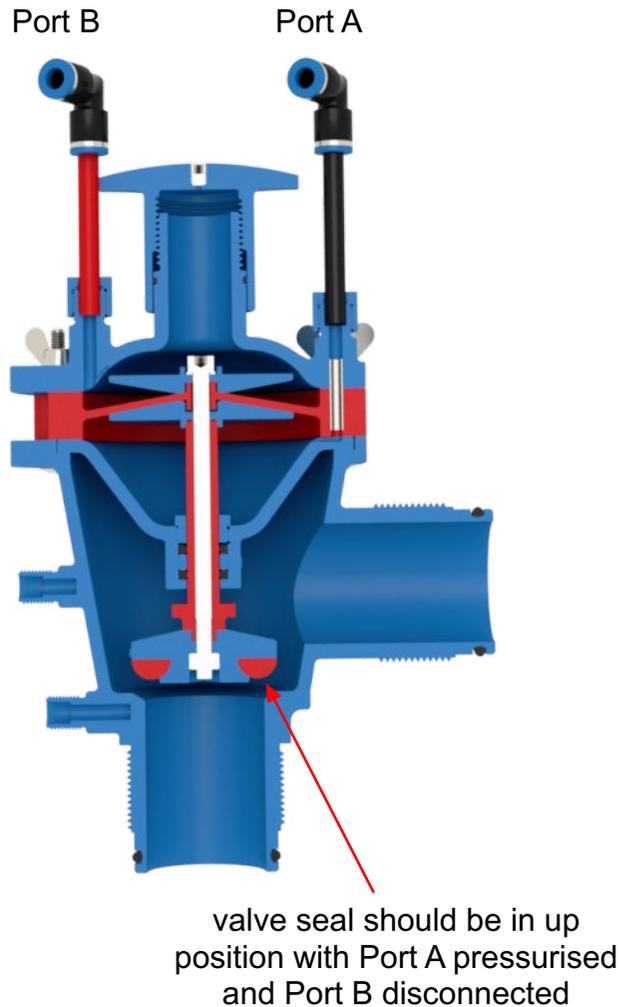
1. Turn off the pump with valve **F** and close shut-off valve **1** to filter. Open shut-off valve **2** to release filter pressure, then remove the filter and check that it is not blocked. Clean or replace if blocked and reassemble. Restart the system by opening valve **F**, shut-off valve **1** and then closing shut-off valve **2**. The system should restart. Check that the automatic float valve is operating by lifting up and pushing down the float arm **G** 5 or 6 times, allowing a few seconds for each cycle for the flow valve to fill and discharge. The pump should then start and stop accordingly.
2. If the pump fails to start, close the shut off valve **F**. Unscrew the pressure vessel a few turns and **wait for the pressure to decay**

**before removing.** Detach the two 8mm pipes from the push-in connectors attached to the flow valve and remove the valve. It is important to note which pipe is connected to **Port A** and **Port B** and to quickly reconnect the the pipes to the flow valve to minimise water loss and thus subsequent priming. Place the valve to one side. Replace the pressure vessel, turn on pump valve **F** and the pump should start. If it fails to start, then consult the Papa pump instruction manual as the fault lies with the pump system. Once the pump is operating correctly, close the shut off valve **F**. Unscrew the pressure vessel a few turns and **wait for the pressure to decay before removing.** Re-fit the flow valve, ensuring the 8mm pipes are re-installed on the correct ports **or the valve will work in reverse.** Refit the pressure vessel.

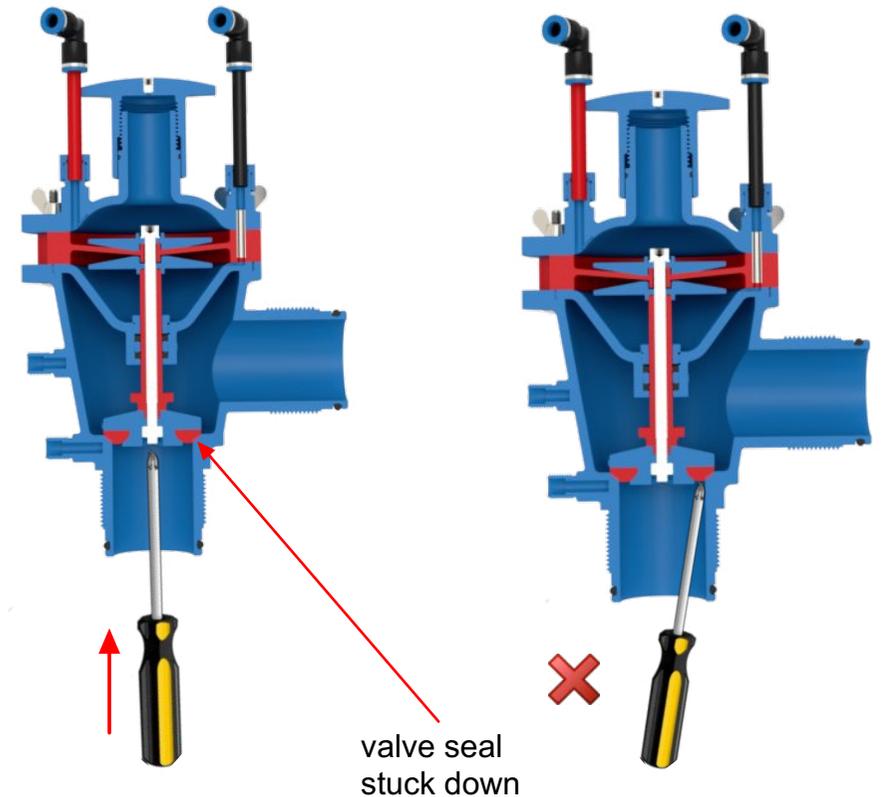


3. Operate the float arm **G** as previously described in step 1 to prime and check that the float control valve system is operating correctly.
4. If the float valve still fails to switch the pump on or off, check to see if water is continually running from the float valve exhaust vent pipe. If it is, this indicates that there is a fault with either the float valve or flow valve.
5. To check the flow valve, turn off valve **F** and wait until the float is in its highest position (this will ensure **Port A** on the flow valve is pressurised). Check that there is no water exiting from the flow valve exhaust. If it is, then the diaphragm and seals will need

replacement (see *flow valve maintenance section*). It is possible that the valve **F** may be leaking or not closing correctly. To check this, remove the flow valve as described in step **2** and check that there is no water exiting the pump exhaust with valve **F** firmly closed. A small leak will be acceptable but larger leaks will require the replacement of this valve.



**6.** With the flow valve still removed, if water exits the flow valve then the diaphragm and seals will require replacement. If no water exits the flow valve, remove the pipe connected to the flow valve **Port B** placing your thumb over the open end of the pipe to prevent water escaping. Check that there is no water leaking from valve **Port B**. If water escapes, then the diaphragm and seals will require replacement. If no water is escaping from valve **Port B**, check that the main seal is not shutting off the valve by looking inside the bottom of the valve and checking the seal position. If the seal is sitting on the valve body with valve **Port A** pressurised, then the plunger may have stuck in the closed position. In this case, insert a screwdriver or other suitable implement and push the plunger up. **Do not push up** on the rubber seal as this could cause damage to the seal.



7. If the valve was in its correct position, remove the pipe connected to valve **Port A** and connect to valve **Port B** (water will initially escape from **Port A** but should stop after a few seconds). If water continues to flow from **Port A**, then the diaphragm and seals will require replacement. Refit the pipes, the flow valve and the pressure vessel.

8. If the flow valve is operating and not leaking, check the float valve exhaust vent pipe. If water is flowing continuously from this pipe in either the up or down positions of the float arm, then the float valve will require maintenance (*see float valve maintenance section*) or replacement.

9. If the system still fails to operate correctly or it is working intermittently, check the pressure in pressure vessel **K**. The pressure should be around 1 bar (15psi) when removed from the system. If the pressure is too high, release air by unscrewing the air cap and depressing the valve. If the pressure is too low, recharge using an air pump. Continual loss of air pressure will indicate that the pressure vessel needs replacing.

10. If problems persist, check the other components in the system which are connected together after the filter. These are:

a) the check-valve **N**. This can be checked by turning off valve **E** and unscrewing the filter housing. Initial water escape should stop within a couple of seconds. If water continues to escape, the non-return valve will require replacement.

b) the pressure regulating valve **L**. This should prevent excess pressure from entering the control system. This valve is preset at 2 bar (30psi) (*although pressures up to 3 bar (45psi) are acceptable*). Two faults could occur with the valve **L**:

- i) A restriction, causing little or no water flow - clean the valve.
- ii) A faulty valve allowing excess pressure to enter the system - check the system pressure using a pressure gauge. Replace the valve if the pressure exceeds 3 bar.

Notes

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