

SUREFLOW™

automatic flow regulation system

Operation, installation and maintenance

Your Papa Pump will now operate regardless of water supply
without adjustment!



- Pump will operate with a negligible water flow.
- No need for a range of pump sizes to suit flows.
- Pump will operate at maximum efficiency
- No requirement to adjust pump settings throughout the year
- No need to stop pumps in the summer.
- Allows simple integration of exhaust water recirculation by additional means.

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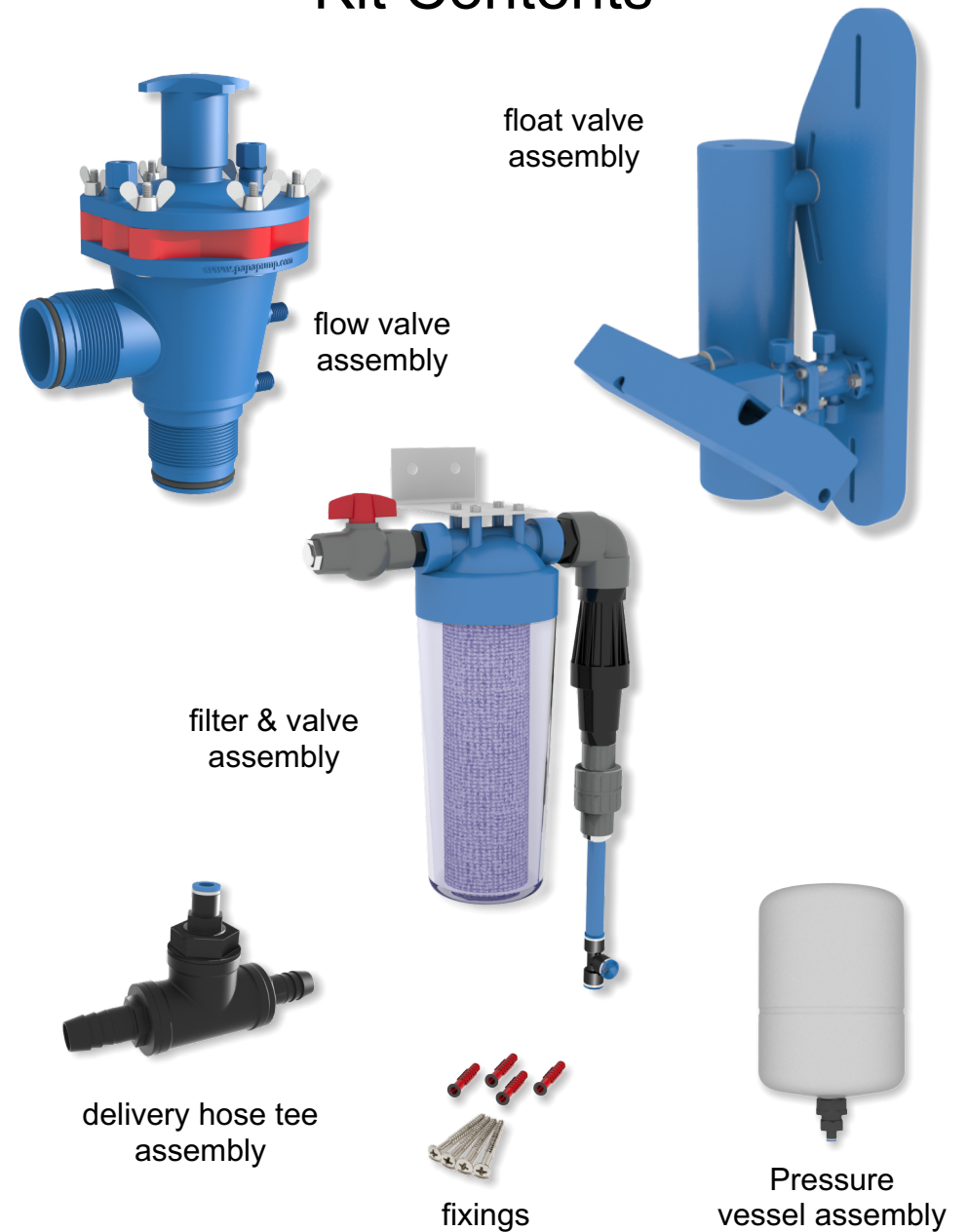
water powered technologies



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Note: You will require 8mm o/d plastic pipes which are not supplied with this kit. Some parts 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

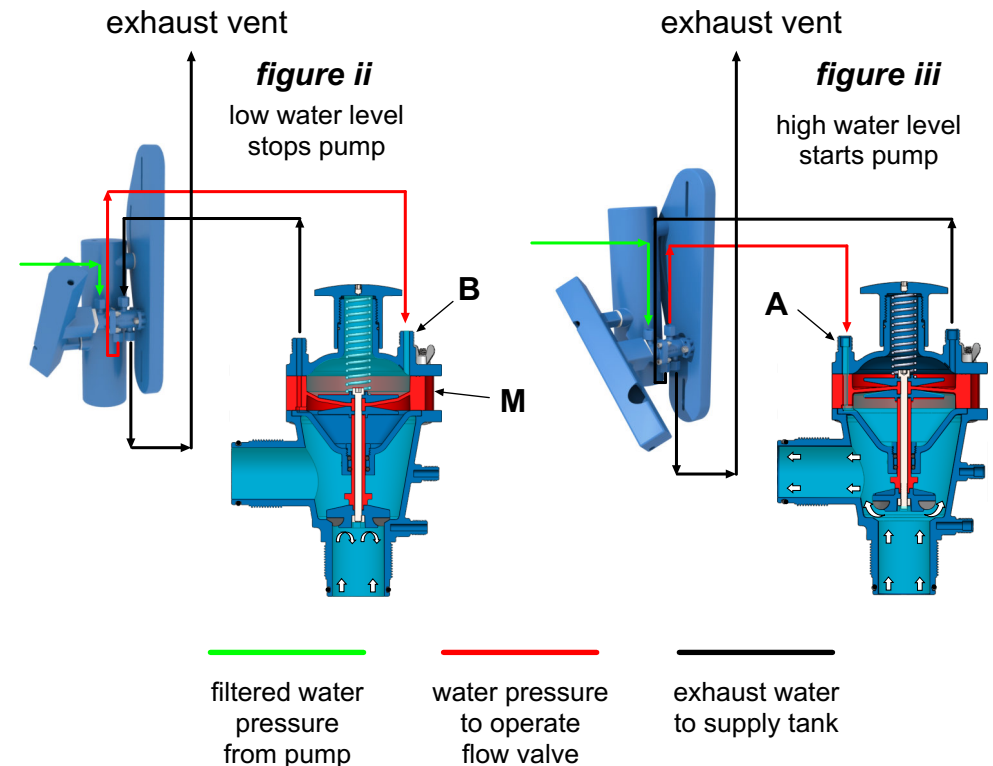
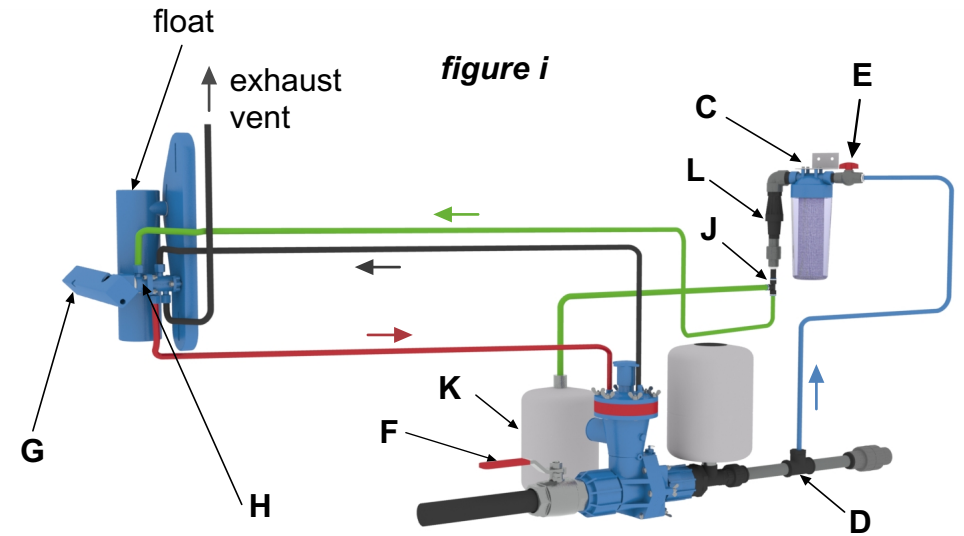
The system comprises of an actuator arm **G** which is connected to the float valve **H**. This arm rotates, causing fluid inside the float valve to be diverted through a series of ports.

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 rolling weight which will momentarily move from one end to the other when the arm is rotated around the horizontal position causing a sudden weight shift, allowing the arm to quickly either rise or fall depending on whether the water level is rising or falling. This sudden action causes the valve to be operated quickly, ensuring that it is either fully open or fully closed.

Using 8mm pipe, 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**.

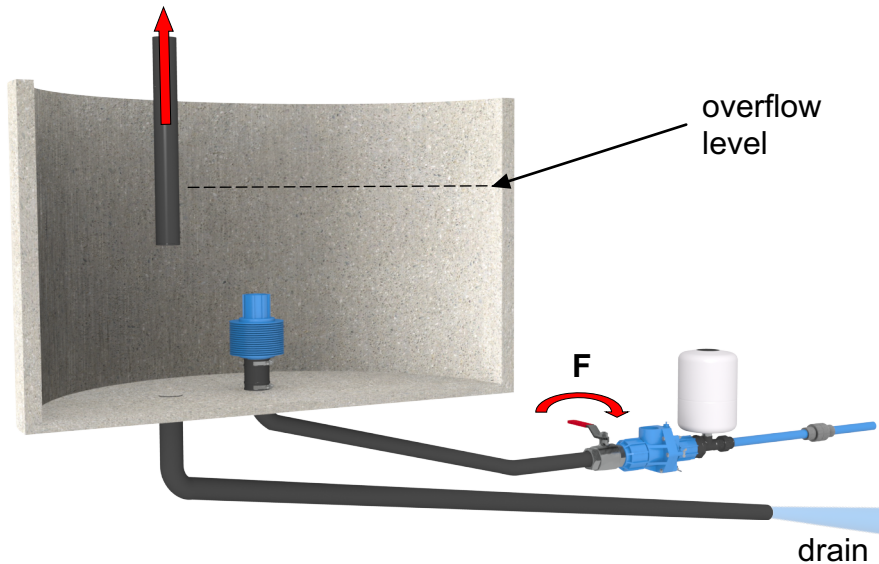
When the float falls, pressure enters the top of the diaphragm via port **B**, closing the flow valve. When the float rises, pressure is then directed to the bottom of the diaphragm via port **A**, opening the valve. Water on the non-pressurised side of the diaphragm is allowed to exhaust back through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



Installation

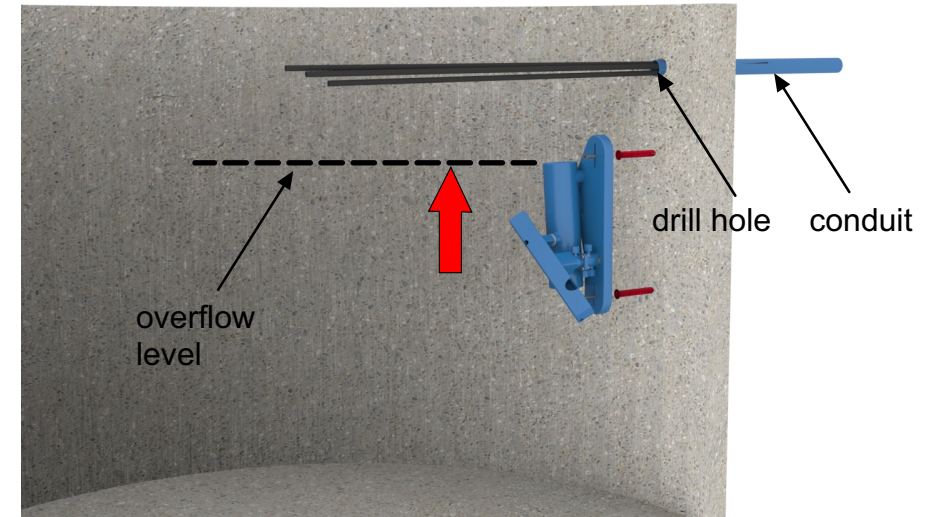
Note: When the flow valve is installed, the pump chamber will require a cover to protect the valve from frost.

1. Turn off the pump by closing valve **F**. Turn or block off the water flow to the supply tank, note the overflow level and allow to drain.

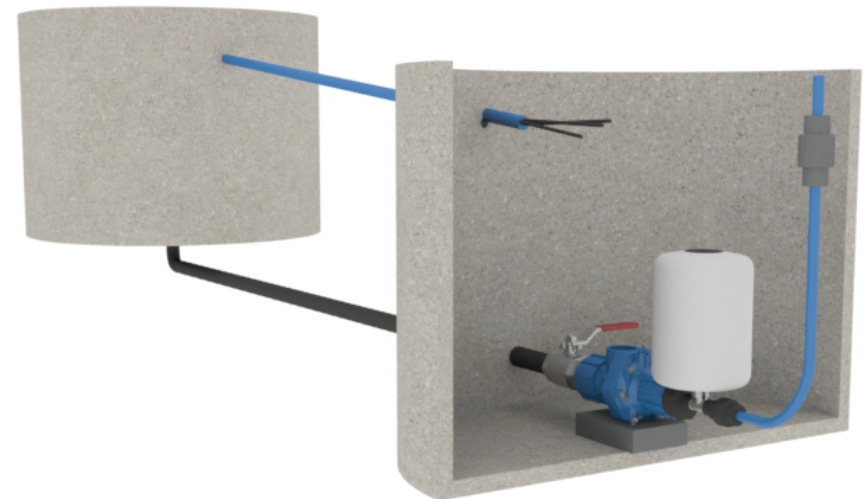


2. Position the float valve assembly so that when the float is in its highest position, the top of the float is in line with the overflow level. Ensure that there is adequate space around the float assembly to allow it to operate freely. Mark the position of the fixing bracket slots on the supply tank wall and drill holes approximately in the centre of the adjusting slots to allow the brackets to be firmly secured using the screws and plugs supplied giving both up and down adjustment.

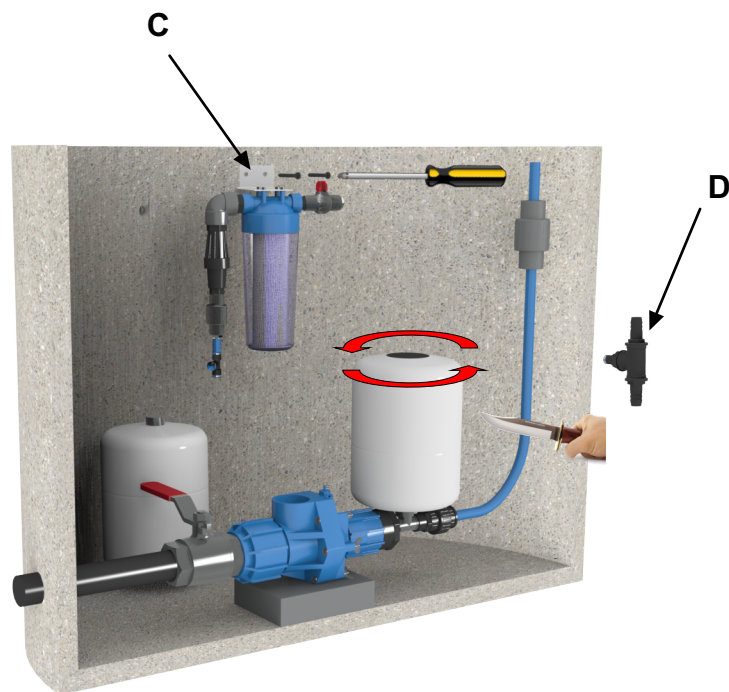
3. Drill a suitable hole in the supply tank above the overflow line to enable the insertion of three 8mm pipes. Feed the three 8mm pipes through the hole. Drill a similar hole in the pump chamber and run



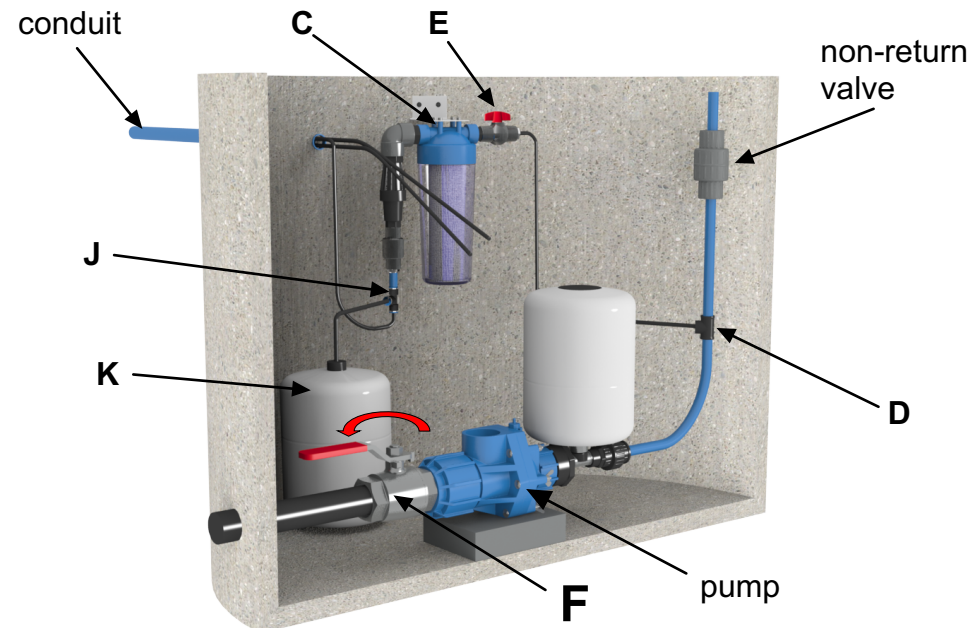
the three 8mm flexible pipes between the supply tank and the pump chamber, ensuring that they are well protected. (It is recommended that these pipes are installed in a conduit pipe for protection - a 25mm internal bore pipe is adequate for this. A length of water delivery pipe is often used for this purpose).



4. Make a suitable hole in the pump chamber and insert the three 8mm pipes into it. Secure the filter and valve assembly **C** to the inner wall of the pump chamber using the screws and plugs provided. Slowly unscrew the pressure vessel to release pressure. Install the tee **D** in a suitable position in the delivery pipe between the pump and the non-return valve.



5. Using 8mm pipe, connect from the tee **D** to the filter shut-off valve **E**. Place the pressure vessel **K** provided in a suitable location ensuring that it is stabilised to prevent movement. Connect the pressure vessel to the tee **J** using 8mm pipe. Connect one of the 8mm pipes from the supply tank into the remaining port of the tee **J**. Ensure that the pump pressure vessel is installed and tight, and that the shut-off valve **E** by the filter/valve assembly is open. Start pump by opening valve **F**.



6. At the supply tank, water will flow from one of the 8mm control pipes. Identify this pipe and turn off the pump by closing valve **F**. With the o ring and locknut installed on this pipe as shown (**figure iv**), cut the pipe to length and insert it into the valve port shown (**figure v**), ensuring that the pipe is pushed fully home in the port. Tighten the locknut by hand, then tighten by a further 180 degrees using a suitable spanner. Cut and fit the remaining two pipes to the ports shown (**figure v**) in the same manner. (*Ensure that all the pipes are positioned to eliminate interference with the float mechanism*).

figure iv

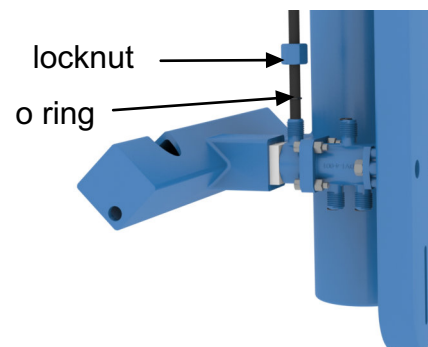
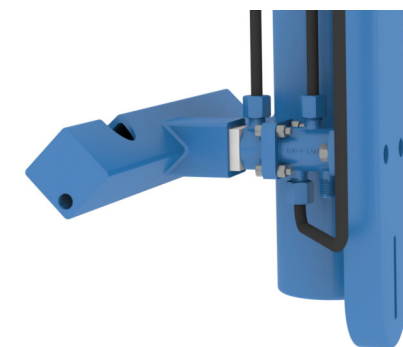
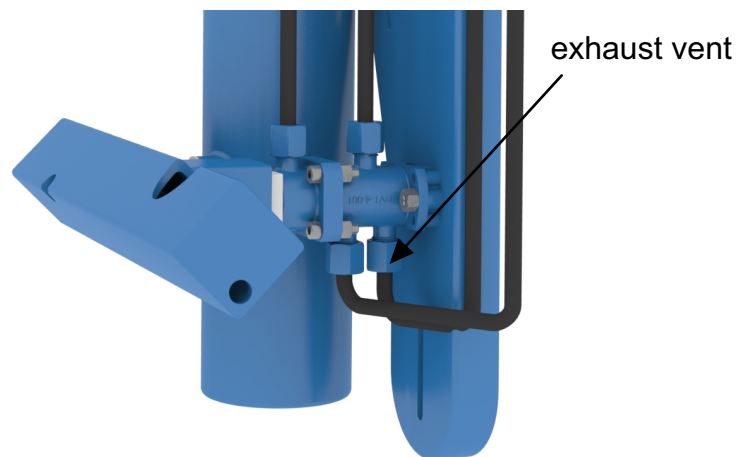


figure v

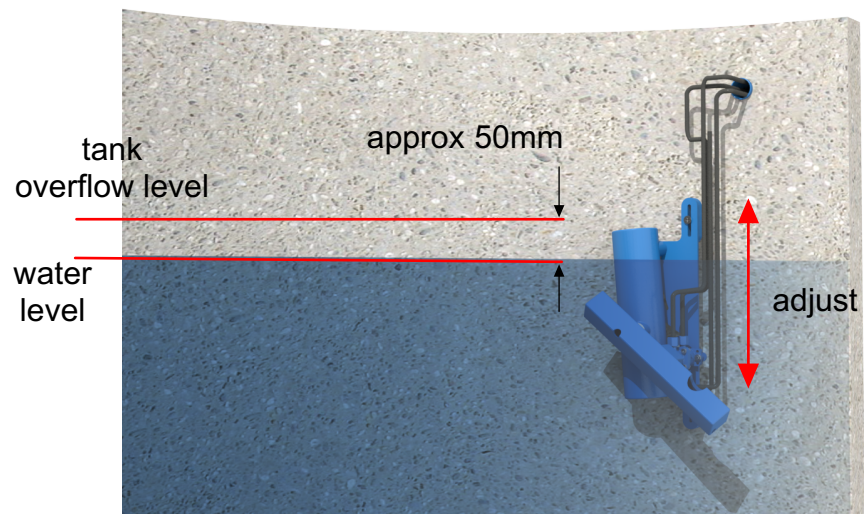


7. Fit an additional length of pipe to the remaining float valve port shown in **figure vi**, so that the open end of the pipe will be visible above the overflow level of the supply tank (this is the exhaust vent shown in **figure i**).

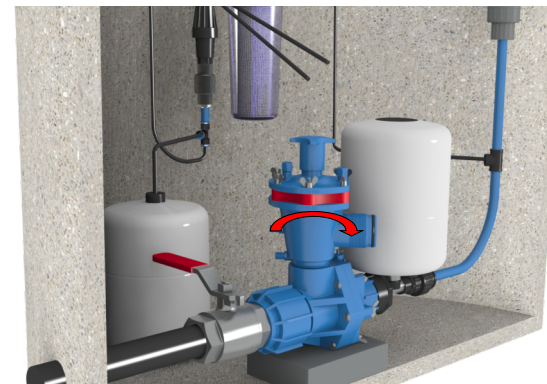
figure vi



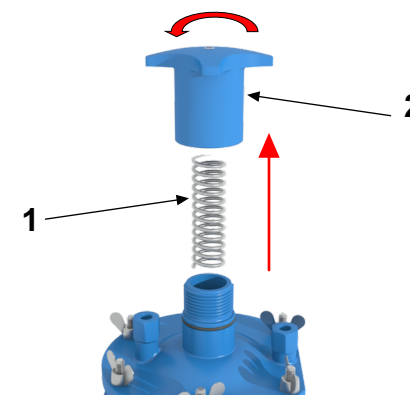
8. Allow water to fill up the supply tank and watch to see if the float rises to its **highest** position. Note that this can be adjusted by re-positioning the float valve higher or lower on the bracket (**figure 5**) so that with the float in its **highest** position, the water level is around 50mm below the overflow.



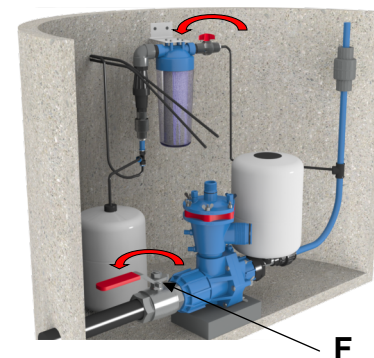
9. At the pump chamber, screw the flow valve into the pump exhaust.



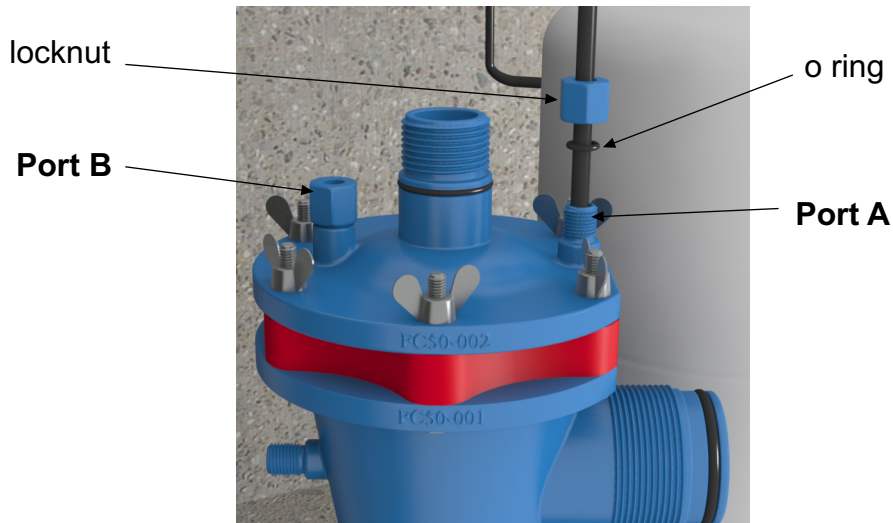
10. Unscrew the spring adjuster 2 and remove the spring 1.



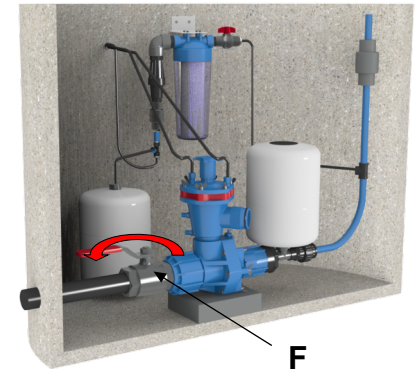
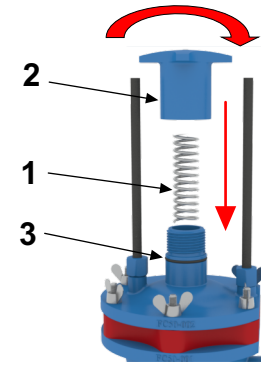
11. Turn on the pump by opening the valve F.



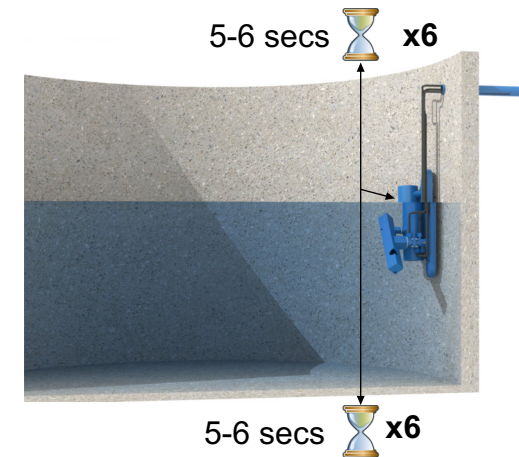
12. After a short while, water will flow from one of the two unconnected 8mm pipes - allow the water to flow until air is expelled. Stop the pump by closing the valve **F** and connect this pipe to the flow valve port **A** using the locknut and o ring, then connect the remaining pipe to port **B**



13. Insert the spring **1** and screw on the spring adjuster **2** two or three turns, ensuring that the o ring seal **3** is not dislodged. Restart the pump by opening the valve **F**.



14. With the pump operating, go to the supply tank and push the float **down** until the float valve switches. Hold down for 5-6 seconds and then lift the float fully **up** for 5-6 seconds. Repeat this operation five or six times.



15. The flow valve should now be operational. To check that it is working correctly, return to the supply tank and operate the float valve manually as before, but waiting each time to hear the pump start and stop. As the float valve operates, water should escape from the 8mm exhaust pipe but should stop flowing after a few seconds. If water flows permanently from the exhaust 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. If no water is flowing through the flow valve exhaust, unscrew the spring adjuster until it does).

Flow valve

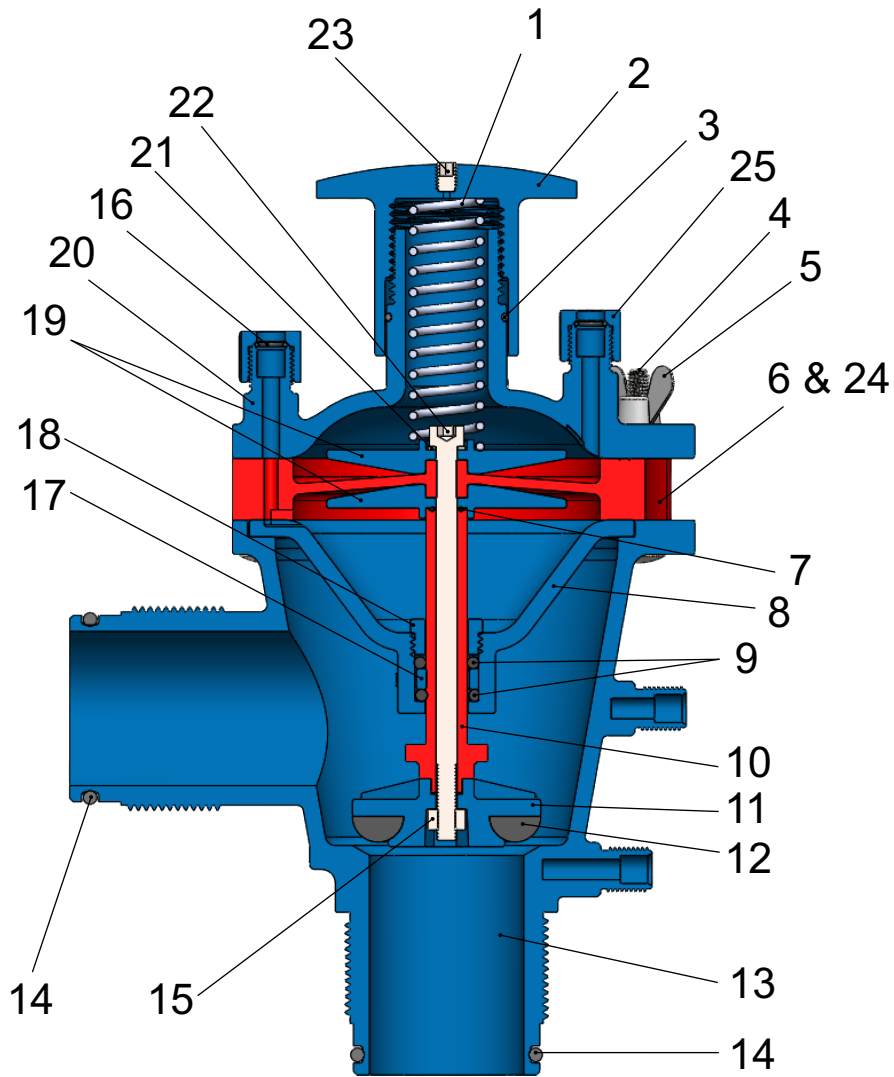


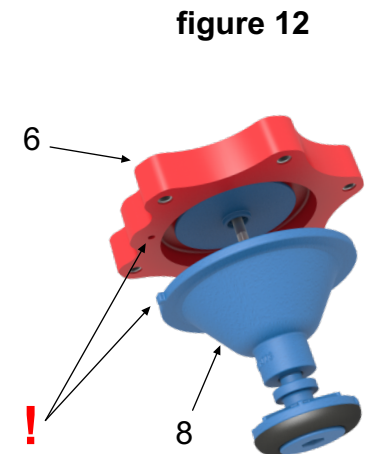
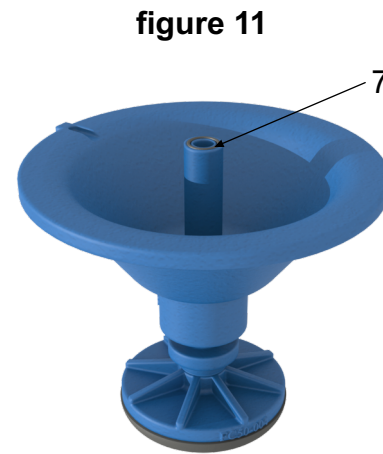
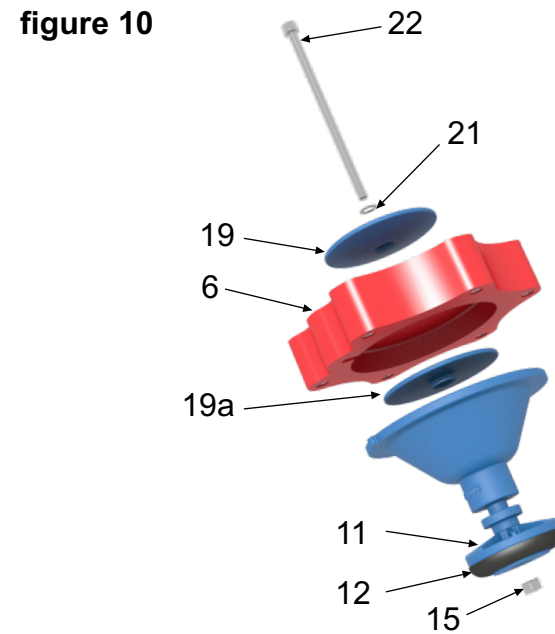
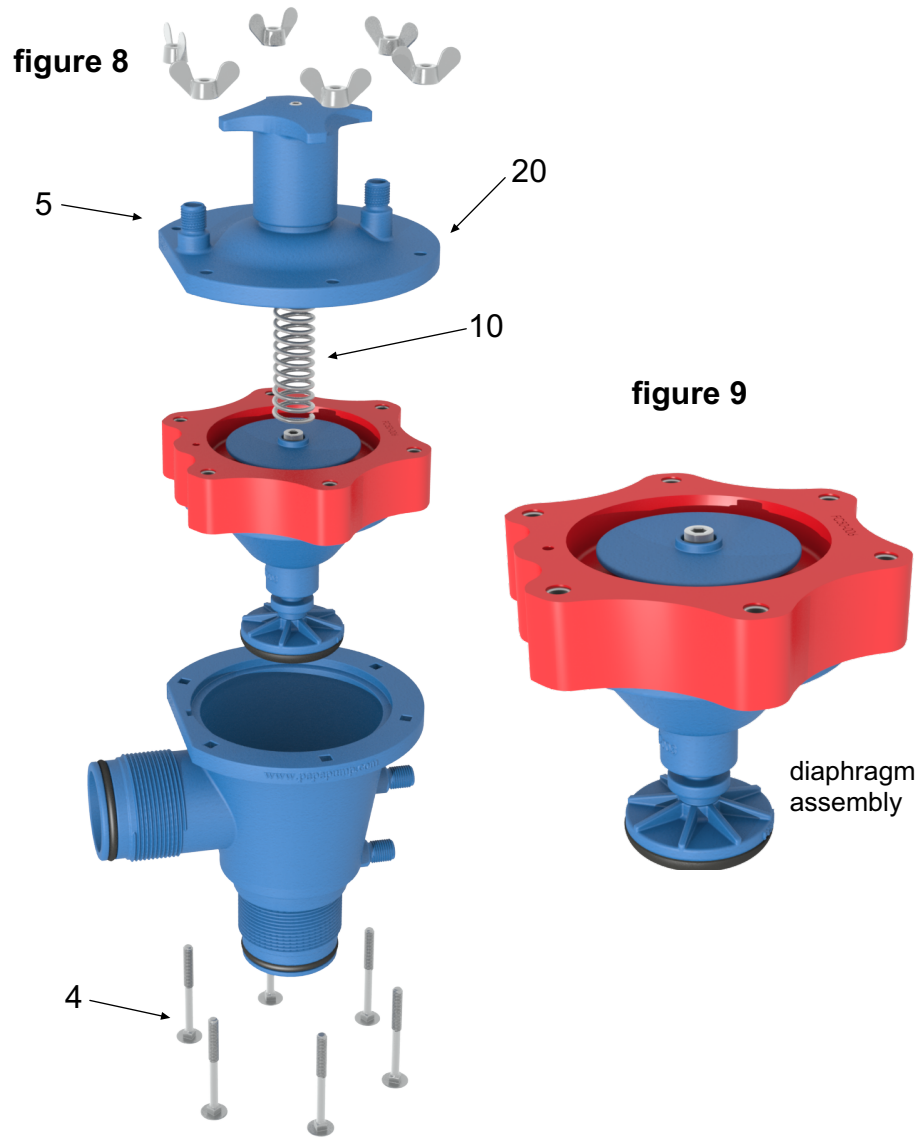
figure 7

Flow valve parts list

Description	Quantity	Part Number
1 Spring	1	FC50-010
2 Spring Adjuster	1	FC50-009
3 O ring, Adjuster	1	FC50-013
4 Coach Bolt	6	FC50-014
5 Wing Nut	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 Seal Seat	1	FC50-004
12 Main Seal	1	MP50-008
13 Main Body	1	FC50-001
14 O Ring, Main Body	2	ACC50-009
15 Nylok Nut	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	1	FC50-017
22 Diaphragm Bolt	1	FC50-016
23 Bleed Screw	1	FC50-022
24 Crush Tube	6	FC50-021
25 Pipe Retaining Nut	2	FC50-020

Complete Flow Valve Assembly part number FC50-A

Flow valve maintenance

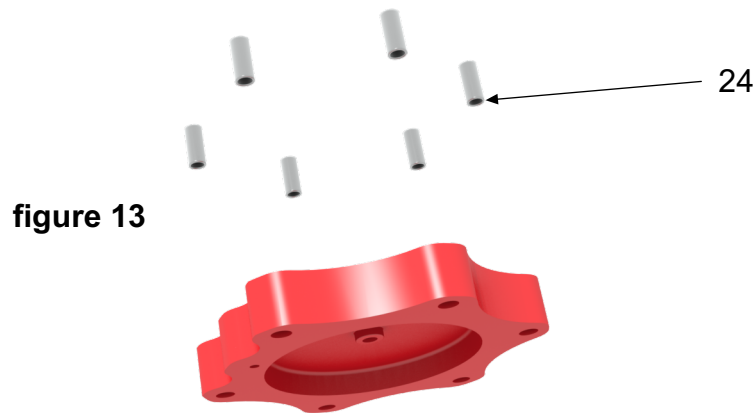


To inspect/replace the diaphragm and valve seal:

1. Stop the pump, disconnect the two 8mm pipes, **noting which pipe goes to each port** and unscrew the valve from the pump. Unscrew the spring adjuster (2) and remove the spring (10). 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 9).

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

3. Inspect the diaphragm for holes/tears and replace if necessary. **Important note:** if replacing the diaphragm, remove the six crush tubes (24, figure 13) from the old diaphragm and insert into the new diaphragm.

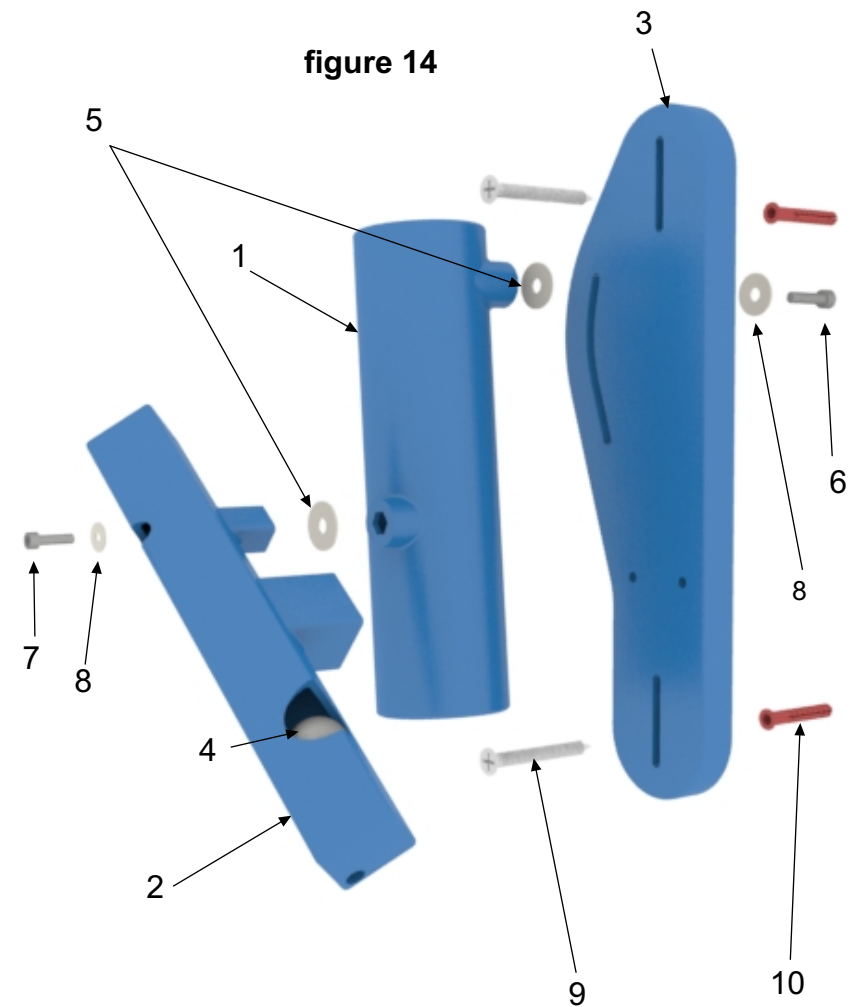


4. Re-assemble the diaphragm assembly,, taking care not to dislodge the small o-ring (7, figure 11), Be careful not to overtighten the diaphragm retaining bolt (22).

5. Inspect the valve seal (12) and replace as necessary.

6. Reassemble the flow valve, ensuring that all the components are correctly positioned. Be careful not to overtighten the wing nuts (5).

Float and Arm assembly



Float and Arm assembly parts list

Float valve

	Description	Quantity	Part Number
1	Float	1	FCS-022
2	Float Arm	1	FCS-023
3	Float Bracket	1	FCS-024
4	Ball 32mm dia S/S	1	FCS-027
5	PTFE Washer	2	FCS-025
6	Float Guide Bolt	1	FCS-028
7	Float Arm Retaining Bolt	1	FCS-026
8	Washer	2	FC50-017
9	Fixing Screw 8g S/S x 50	2	FCS-020
10	Rawlplug size 6-12	2	FCS-021

Complete Float Arm Assembly part number FCS-ARM

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

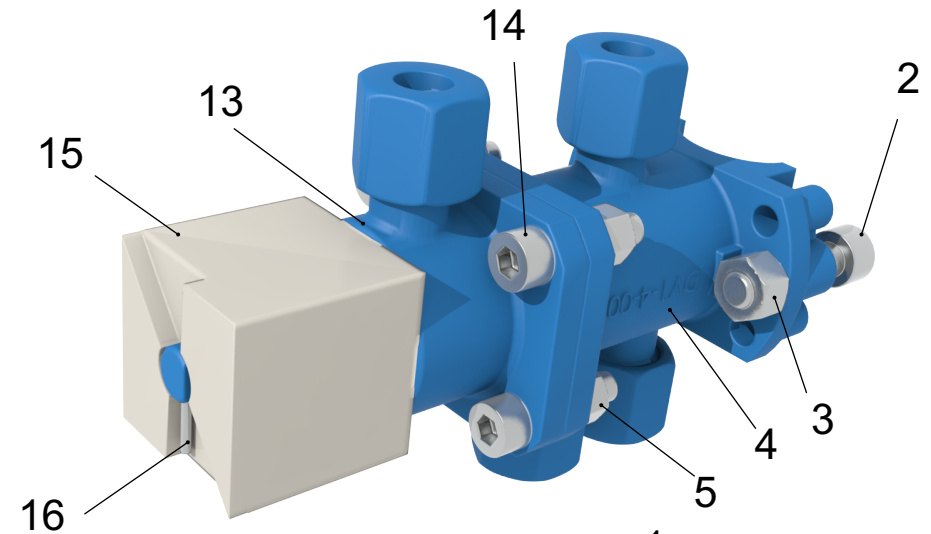


figure 15

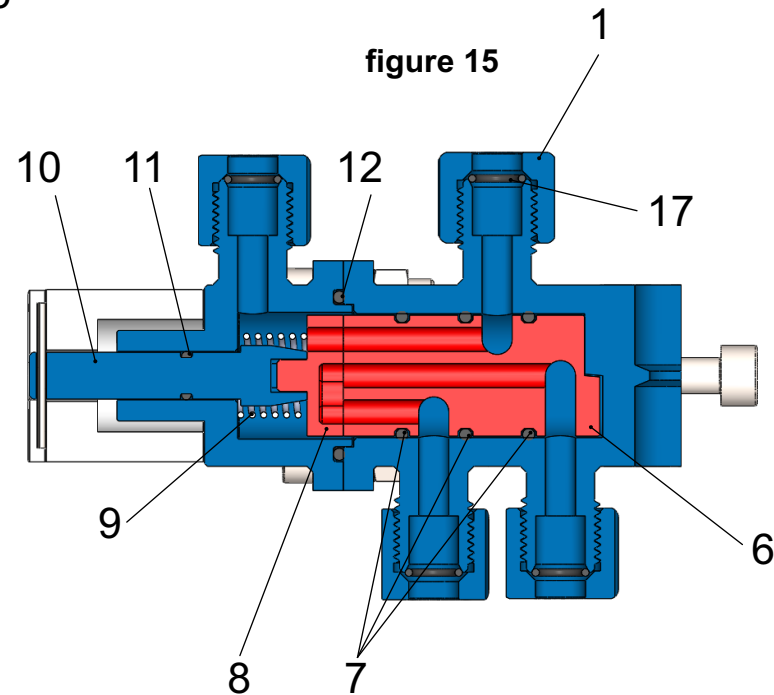


figure 16

Float valve parts list

Description	Quantity	Part Number
1 Pipe Retaining Nut	4	FC50-020
2 Bolt, Bracket	2	DV1-4-015
3 Nylok Nut, Bracket M6 S/S	2	FC50-018
4 Valve Body	1	DV1-4-001
5 Nylok 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	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	4	DV1-4-011
15 Bush	1	DV1-4-016
16 Roll pin	1	DV1-4-017
17 O Ring, Pipe Retaining Nut	4	FC50-024

Complete Float Valve Assembly part number DV1-4-A

Float valve maintenance

1. Turn or block off the water flow to the supply tank and empty.
2. Remove the four 8mm pipes from the float valve, **noting which valve port they are each connected to**.
3. Remove the 2 float bracket fixing screws (18), then the 2 nuts (3) and bolts (2) securing the float valve to the float bracket and finally the float guide bolt (6, figure 14) and washers (5 & 8, figure 14). Separate the float and arm assembly from the float valve.

figure 17

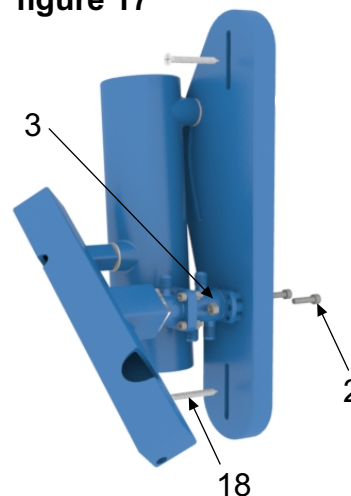


figure 17a

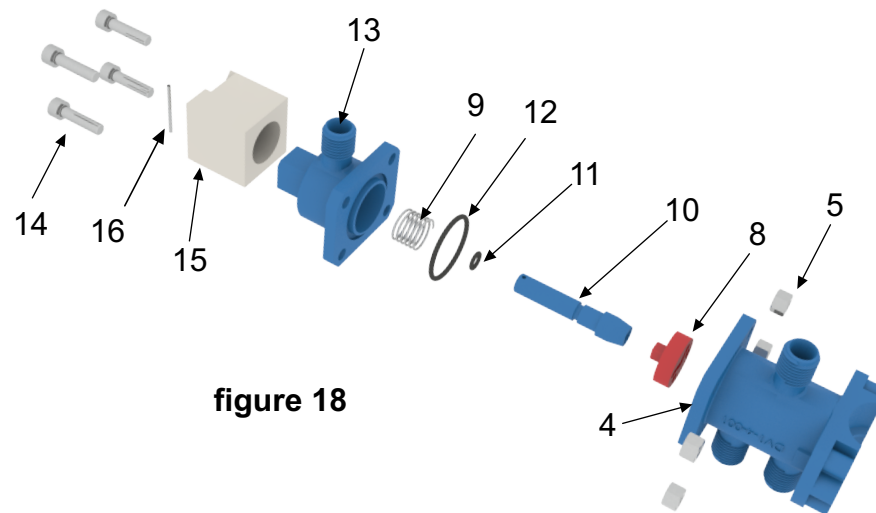
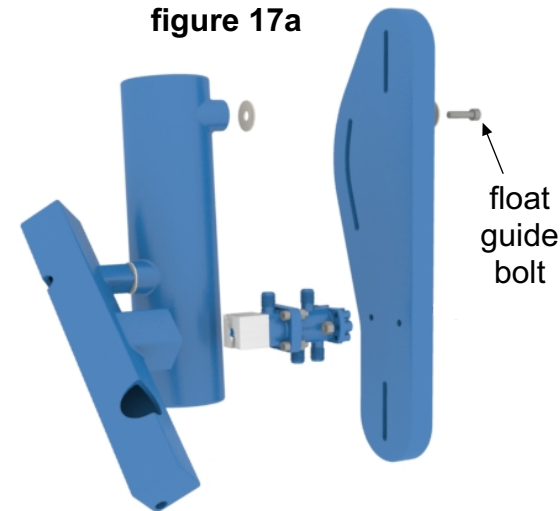


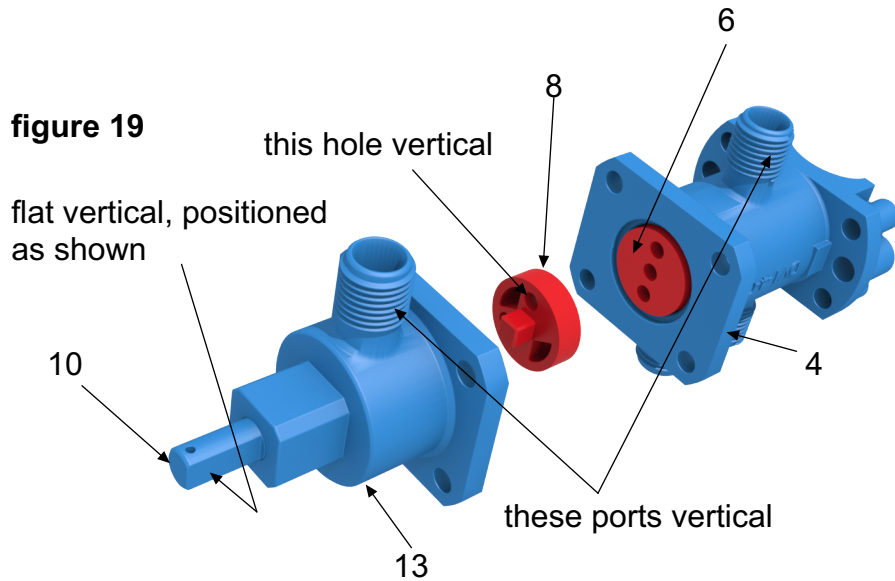
figure 18

5. Carefully remove the roll pin (16) and the bush (15).
6. Remove the four bolts (14) and nuts (5).
7. Remove the valve head (13), the spring (9), the o ring (12) and the rotor (8). Check that the mating faces of the rotor and the distributor (6, figure 19) are smooth with no signs of scoring. Note that the distributor is not a serviceable part and removal **must not** be attempted.

8. Check that the three distributor passages are not blocked by blowing through each of the three ports in the valve body (4).

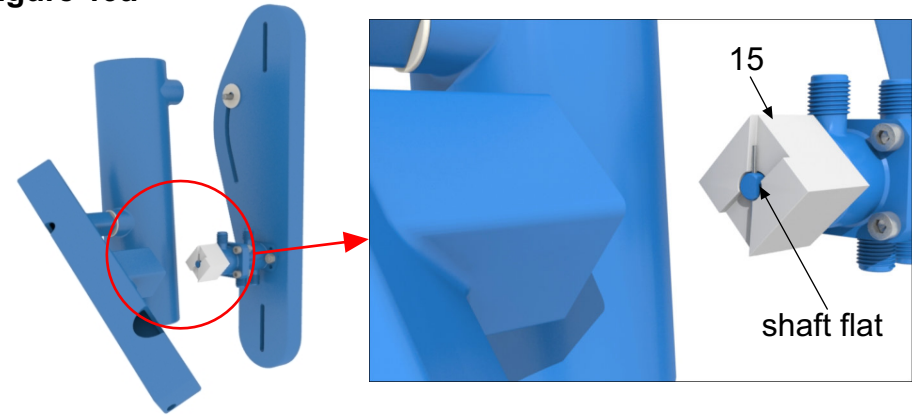
9. Withdraw the shaft (10) from the valve head. Inspect the valve head, shaft and o rings (11) and (12) for signs of wear or damage. Replace if necessary.

10. Reassemble the valve and assemble to the float guide bracket. **Important:** note the orientation of the valve head (13), valve body (4), shaft (10) and the rotor (8) as shown (figure 19). Failure to assemble correctly will cause improper operation of the valve. **DO NOT APPLY GREASE TO THE MATING FACES OF THE DISTRIBUTOR (6) AND ROTOR (8).**



11. Turn the bush (15) to the position shown in figure 19a, ensuring that the flat on the shaft (10) is in the position shown in figures 19 and 19a. Holding the float at the top end so that the float arm hangs down, lift the lower end of the float arm and locate it on the bush. Assemble the float guide washer (5, figure 16) and the float guide bolt and washer (6 & 8, figure 16). Refit the assembly to the tank and re-connect the pipes. Follow the Installation procedure from step 14 to bleed the system.

figure 19a

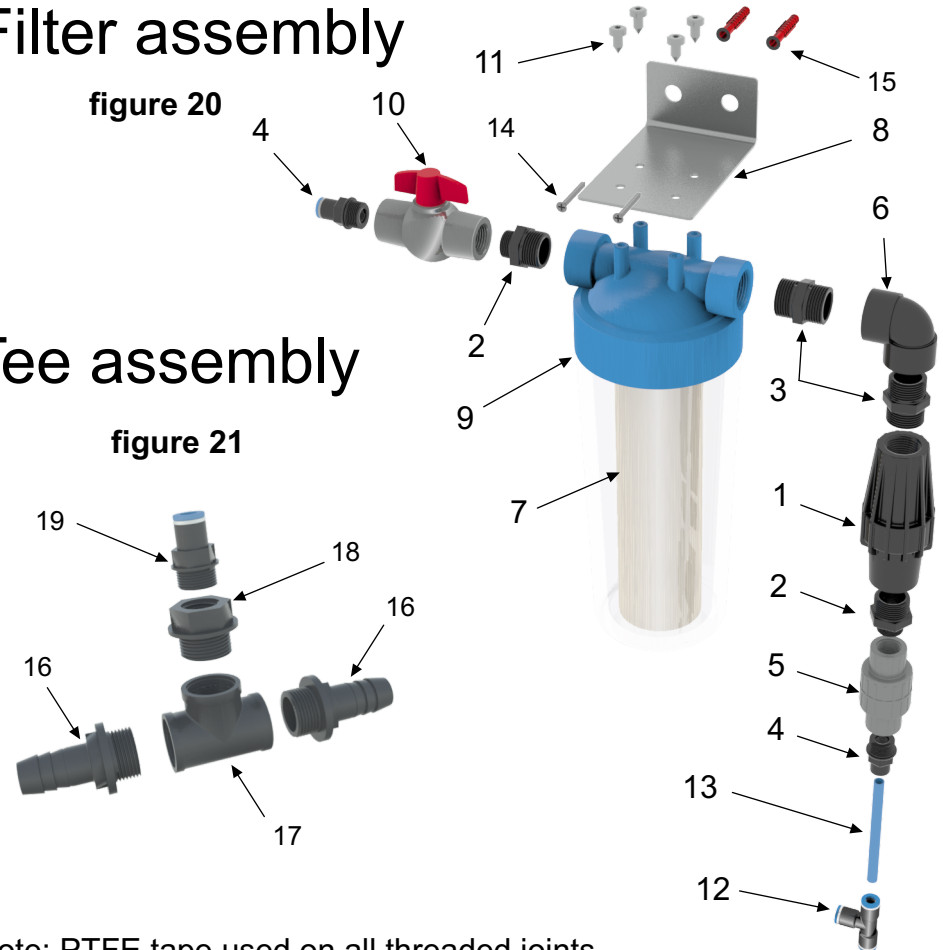


Filter assembly

figure 20

Tee assembly

figure 21



Note: PTFE tape used on all threaded joints

Filter assembly parts list (figure 20)

	Description	Quantity	Part Number
1	Pressure Regulator	1	FCS-001
2	3/4" BSP - 1/2" BSP Nipple	2	FCS-002
3	3/4" BSP Nipple	2	FCS-003
4	1/2" BSP male - 8mm Push-in	2	FCS-004
5	1/2" BSP Non-Return Valve	1	FCS-005
6	3/4" BSP 90deg Female Elbow	1	FCS-006
7	Filter Element	1	FCS-007
8	Filter Bracket	1	FCS-008
9	Filter Housing	1	FCS-009
10	1/2" BSP Ball Valve	1	FCS-010
11	Bracket Screw 12g x 16 s/s	4	FCS-011
12	8mm Push-in Equal Tee	1	FCS-012
13	8mm Plastic Tubing	1	NYTUB-001
14	Bracket Fixing Screw 12g S/S x 35	2	FCS-016
15	Rawlplug size 6-12	2	FCS-021

Complete Filter Assembly part number FCS-FIL

Tee assembly parts list (figure 21)

	Description	Quantity	Part Number
16	3/4" BSP to 20mm Male Hosetail	2	FCS-013
17	3/4" BSP Equal Tee	1	FCS-014
18	3/4" BSP - 1/2" BSP Reducing Bush	1	FCS-015
19	1/2" BSP male - 8mm Push-in	1	FCS-004

Complete Tee Assembly part number FCS-TEE

Pressure vessel assembly parts list (figure 22)

	Description	Quantity	Part Number
20	18 litre Pressure Vessel	1	DH-010
21	1" BSP - 1/2" BSP Reducing Socket	1	FCS-017
22	1/2" BSP male - 8mm Push-in	1	FCS-004

Complete Pressure Vessel Assembly part number FCS-PV

Pressure vessel assembly

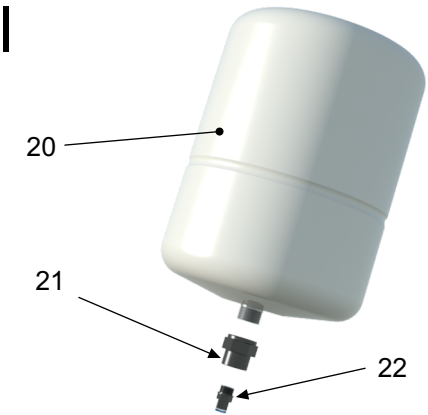


figure 22

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

Filter Assembly spare filter

Part No: FCS-007

Filter Assembly Pressure Regulator

Part No: FCS-001

18litre Pressure Vessel

Part No: DH-010

Fault Diagnosis

Before assuming that the regulator 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). Having checked this, perform the following diagnostic sequence:

1. Turn off the Papa pump with valve **F** and close valve **E** to filter. Unscrew the filter housing and check that the filter is not blocked. Replace if blocked and restart the system by opening valve **E** and then valve **F**. The system should restart. Check that the automatic control valve is operating by lifting up and pushing down the float arm 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, shut off valve **F** and remove the flow valve, noting which pipe is connected to each port. 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. Once the pump is operating correctly, shut off valve **F** and re-fit the flow valve, ensuring the pipes are re-installed on the correct ports.
3. Operate the float arm as previously described in (1) to prime and check that the control valve system is operating correctly.
4. If the control valve still fails to switch the pump on or off, check that water is not continually draining through the vent pipe (**fig 1**). If it is, this indicates that there is a fault with either the float or flow valve.
5. To check the flow valve, turn off valve **F** and wait until the float is in its highest position. Check that there is no water exiting from the float 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 **2** and check that there is no water exiting the pump exhaust with valve **F** firmly closed. A small leak will not be of too much concern but larger leaks will require replacement of valve **F**. With the flow valve still removed, refit both pipes to their respective ports. 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 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**, 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 flow valve.

6. If the flow valve is operating and not leaking, check the float valve exhaust 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*).
7. If the system still fails to operate correctly or 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 will indicate that the pressure vessel needs replacing.
8. If problems persist, check the other components in the system which are connected together after the filter. These are:
 - a) the non-return valve (**5, fig 20**). This can be checked by turning off valve **E** and either unscrewing the filter housing or depressing the priming valve located on top of 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.

Notes

b) the pressure regulating valve (**1, fig 20**). This should prevent excess pressure from entering the control system. This valve is preset at 2 bar (30psi) (*although pressures up to 3 bar are acceptable*). Two faults could occur with this valve:

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