



**Installation Instructions /
Operating & Maintenance Manual
“Midi-Fill” Digital Pressurisation Unit
Models – MFD15 & MFD22**



Model shown – MFD22

FOREWORD

“Midi-Fill” Digital - MFD - is a Pressurisation Unit for filling “other than a house” heating or chilled water systems. The unit incorporates Fluid Category 5 backflow protection and can fill a system from empty. The pump is continuously rated. Filling loops with a double check valve must no longer be used for non-house primary circuits - see Water Regulations, WRAS Interpretations, B09 01.42.14. The unit is WRAS approved.

The unit must be carefully set up before filling the system - read instructions!

SUPPORTING LITERATURE

- [“Midi-Fill” Digital](#) - MFD – Datasheet
- [Wiring Diagram](#) AM164*

WARNING!



Disconnect electrical power before removing electrical cover, guard or any servicing

SECTION	ITEM
1.0	INSTALLATION - MECHANICAL
2.0	INSTALLATION - ELECTRICAL & CONTROLS
3.0	KEY PAD CONTROLLER
4.0	BUTTON LOCK
5.0	HIGH CUT-OUT SETTING
6.0	COLD FILL SETTING
7.0	PUMP DISABLE / ENABLE
8.0	PUMP TEST / MANUAL RUN
9.0	ELECTRONIC WATER METER / FLOOD PROTECTION SYSTEM (FPS)
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14.0	SET UP MENU / BMS CONFIGURABLE RELAY
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1.0 INSTALLATION – MECHANICAL

- 1.1. The Midi-Fill Digital should be installed by a competent person with regard to the relevant requirements of the Health and Safety Regulations, building regulations, IEE Regulations, Water Supply (water fitting), Water Bye-Laws (Scotland) and other local Bye-laws.
- 1.2. Do not install in a potentially freezing location or above 25°C.
- 1.3. Wall mount the unit ensuring a minimum of 25 mm clearance below the cabinet for ventilation and sufficient for overflow and outlet pipes - refer to datasheet for details and diagram. Secure using suitable fasteners or the optional wall bracket – *code MIDIBRA (see section 1.4 for instructions)*. Under fault conditions, water could discharge from the drainage holes in the cabinet base or via the weir slot in the door if the overflow cannot cope. Do not mount above electrical equipment or where any discharge could cause damage. *An optional Drip Tray is available – code BTDT3.*
- 1.4. Instructions for installing optional MIDIBRA wall bracket:
 - 1.4.1. Offer bracket to wall as a template.
 - 1.4.2. Mark centres of top of the two keyhole slots and mark centres of other two holes.
 - 1.4.3. Remove bracket, drill and fit wall plugs to the four holes.
 - 1.4.4. Fit bracket to MFD cabinet with the supplied M6 flanged nuts.
 - 1.4.5. Fit cabinet to wall with suitable fasteners.
 - 1.4.6. Consider fitting screws to two lower holes in the cabinet.
- 1.5. Adequately support the supply pipe. Rubber lined pipe clamps are recommended to help absorb the shock from any water hammer.
- 1.6. Thoroughly flush the cold water supply pipe before connecting. The water supply pressure must be 1.0 bar minimum (dynamic) – 10 bar maximum.
- 1.7. The inlet flexible hose supplied - incorporating a servicing valve and strainer - must be fitted.
- 1.8. The 15 mm version incorporates an Automatic Flow Limiting cartridge in the Y strainer – see 11.0. The 22 mm version has the Automatic Flow Limiter in the ¾” male brass tail. *Note - if dynamic pressure is permanently low and the tank is running dry, try removing the Automatic Flow Limiting cartridge.*
- 1.9. The outlet flexible hose and servicing valve supplied must be fitted. Connect the outlet to the system at the bottom of the primary pipe and before the circulating pump. If the distance between the MFD unit and the primary pipe is in excess of 4 m, the pipe diameter should be increased (e.g. 22 mm for MFD15 and 28 mm for MFD22). *This is to prevent a localised pressure build-up at the unit which would mislead the pressure transducer during filling.*
- 1.10. The overflow should be in accordance with Water Regulations - G16.8, G16.10 & G16.11. It is recommended that the overflow is tested to determine if it can cope with an inlet device failure. Model MFD15 – push the float arm down. Model MFD22 – isolate power and turn the solenoid controller from “UP ST” clockwise with a screwdriver to “DOWN HS” and then reconnect. After testing, isolate power and turn the solenoid controller anti clockwise back to the “UP ST” setting.

Warning! If the overflow cannot cope, water will discharge via the weir slot in the door.

2.0 INSTALLATION – ELECTRICAL & CONTROLS

- 2.1. Electrical supply must be via a multi pole (see 2.2) isolator and RCD or RCBO. An isolator with a neon lamp is recommended. The cabinet features a 20 mm entry for conduit. The unit requires a 230V / 50 Hz supply fused at 5 A (or 6 A MCB or RCBO). *See ratings plate for electrical details.*
- 2.2. Consideration should be given to additional poles on the local isolator for the control circuits.
- 2.3. A volt free relay is provided for Boiler Run control (Interlock). *Note - The term “Boiler” is used but this could apply to any appliance such as chilled water or other applications.*
Power is required to energise the Boiler Run (Interlock) O4 relay.
Do not use relays O2 or O3 for equipment control (Interlock) as the boiler would be unnecessarily stopped – use relay O4 – see table below.
- 2.4. An “over-ride” facility (switch) should be considered at the panel. Power is required to energise the relays. A Boiler Run override facility should be provided by others if it is necessary to run the boiler when the unit is isolated. **Warning!** – the high and low pressure cut-out features would then be inoperative.
- 2.5. Two volt free SPST N.O. relays are provided in the control box for **BMS** (Building Management System) monitoring. The operation is shown in the table below, where ● = contacts closed. The installer has a choice of running one or two BMS monitoring signals back to the panel. Where just one pair of wires is available the installer can choose between - BMS for faults only (relay O2) or combined faults/warnings (relay O3) - see table below and drawing AM176*.
- 2.6. BMS relay O3 is User Configurable, allowing groups of faults and warnings to be monitored or ignored. The state may be reversed from Healthy = contacts open to Healthy = contacts closed. See 14.0. Alternatively O3 relay may be configured as a pulsed water meter (1 pulse/Lt) see 9.0

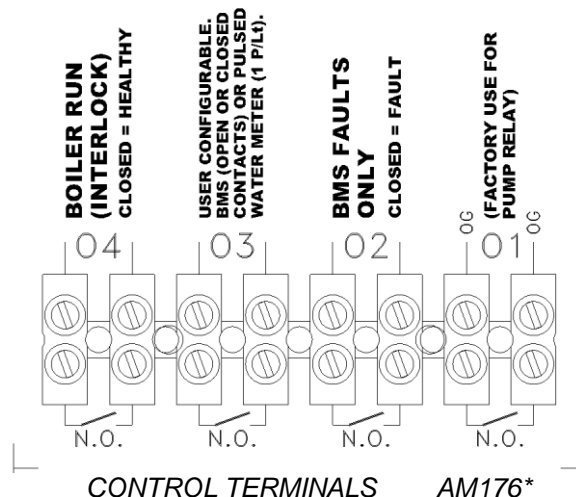
Note – Wiring diagram AM164 inside control box cover*

CONDITION	FAULTS ONLY	BMS USER CONFIGURABLE	BOILER RUN / INTERLOCK
PRESSURISATION (RELAY NUMBER)	O2	O3	O4
NO POWER (e.g. unit isolated or power cut)			
HEALTHY (no faults or warnings)			●
FAULT - LOW LEVEL (internal tank water level)	●	● G1	●
FAULT- LOW CUT-OUT (low system cut-out pressure)	●	● G1	
FAULT - HIGH CUT-OUT (high system cut-out pressure)	●	● G1	
FAULT - PUMP SEIZED? TRANSDUCER FAULT? (inc.. self test)	●	● G1	●
FAULT – FLOOD PROTECTION SYSTEM	●	● G1	●
FILLING DISABLED		● G2	●
WARNING - EXCESSIVE FILLING THIS MONTH		● G3	●
PULSED WATER METER OUTPUT ENABLED INSTEAD OF BMS		● ● ● ● ●	●

User Configurable relay O3 notes -

G1, G2, G3, refer to groups, which can be ignored (disabled) – see 14.0.

Factory default – as above – all faults and warnings enabled. Pulsed water meter disabled.



3.0 KEY PAD CONTROLLERS – SEE 13.0 - MENUS

- 3.1. Upon power up – the controller will scroll through “Welcome” messages with brief instructions. The backlight is permanently powered to denote a power source.
- 3.2. The display prompts which buttons to push, beginning with “A”. Press and release the “A” button to scroll through the menus. Pressing the “ESC” button at any time will return to the normal display. The “+” & “-” buttons increase or decrease the selected value. The “OK” button accepts the value and returns to the normal display. *Note the “ESC” button will also accept any new value entered.* The “B” button scrolls through any submenu.
- 3.3. If the buttons are inactive the Button Lock has been activated – see 4.0.

4.0 BUTTON LOCK

- 4.1. To prevent unauthorised changes – the buttons should be disabled after commissioning. To lock or unlock, press and hold both “ESC” and “A” buttons for at least 5 seconds. When locked, only “ESC” and “OK” will function.
- 4.2. It is recommended the buttons are locked after final commissioning including zeroing of the water meter. *Note - the label inside the locked door advises the unlocking procedure.*

5.0 HIGH CUT-OUT SETTING

- 5.1. Any system pressure above the High Cut-Out setting will open relay O4 contacts (“Boiler Run”), thus stopping the boiler. This may occur if the expansion vessels are isolated, undersized, wrongly charged or faulty. The High Cut-Out should be set at least 0.2 bar below the Safety Relief Valve setting assuming the SRV and “Midi-Fill” Digital at the same elevation.
- 5.2. To change or view the High Cut-Out setting, Press “A” once to display the High Cut-Out Menu.



- 5.3. Use the “+” or “-” buttons and then “OK”.
The lowest setting is 0.5 bar more than the cold fill ($0.6 + 0.5 = 1.1$ bar).
The default setting is 2.8 bar and the maximum is 5.8 bar.

6.0 COLD-FILL SETTING

- 6.1. The Cold Fill pressure is normally equal to the static head **above the unit** plus 0.2 bar to assist venting. However there may be a minimum pressure requirement specified by the boiler – e.g. 1.5 bar. The unit has a “differential”, this being the difference between the switch-on and switch-off pressures, which is about 0.2 bar. The Cold Fill setting on the controller is the switch-on pressure. *Note - the “final working pressure”, i.e. hot pressure will be more than the cold fill.*
- 6.2. The default value is 1.2 bar. Use the “+” or “-” buttons and then “OK”. The range is 0.6 – 3.2 bar. *Note – the value cannot be set more than 0.5 bar below the High Cut-Out. E.g. if High Cut-Out is set to 2.8 bar (default), the max cold fill is 2.3 bar.*



7.0 PUMP DISABLE / ENABLE

- 7.1. The pump may be switched off but the MFD is powered to allow the control relays and circuits to function. This can be useful for contractors during the installation phase and before final commissioning. The MFD unit is supplied with all pumps enabled.
- 7.2. To activate, press “A” repeatedly until the Pump Disable Menu is displayed. Press “OK” to change status.

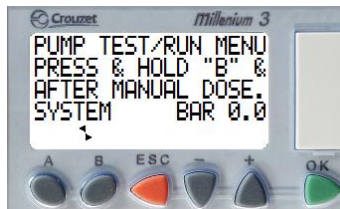


- 7.3. The display will warn if the pump has been disabled.



8.0 PUMP TEST / MANUAL RUN

- 8.1. The pressurisation pump can be tested by pressing “B”, when in the Pump Test / Run Menu.



9.0 ELECTRONIC WATER METER / FLOOD PROTECTION SYSTEM (FPS)

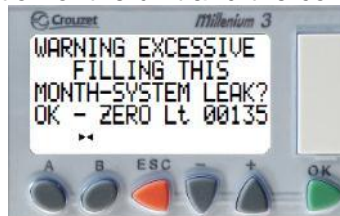
- 9.1. The MFD incorporates a built-in electronic water meter, which determines the system volume; enabling the quantity of inhibitor to be added – e.g. via a dosing pot. The meter also indicates any system leakage, which again helps with re-dosing after repair. A second meter reading illustrates the filling since the 1st of the month. If the filling exceeds the user defined trigger value, a visual warning is displayed on the panel and the warning relay closes. Alternatively, if the Flood Protection System (FPS) has been enabled, the unit will stop filling - to prevent it feeding a major leak – see 9.9. The pump is stopped if the monthly warning trigger value is exceeded. The fault relay closes and “FAULT FPS FLOOD” is displayed.
- 9.2. Repeatedly press “A” to scroll to the water meter menu.



- 9.3. Press “B” to scroll through the sub menus.
- 9.4. The monthly warning trigger default is 50 litres. This can be set between 10 - 1000 litres using the “+” and “-” buttons. *Note - to avoid a false alarm in the first month, the meter should be zeroed after final commissioning. If “FPS ON” - see 9.9.*



- 9.5. During the initial fill the monthly warning message is likely to be displayed. This message is for information only and the operation of the unit and the controls are unaffected.



- 9.6. The warning message and warning BMS can be cleared by pressing “OK”. It will also automatically clear on the 1st of each month.
- 9.7. After final commissioning, both meters should be zeroed from the WATER METER ZERO menu. This simultaneously zeros both the accumulative and monthly readings.

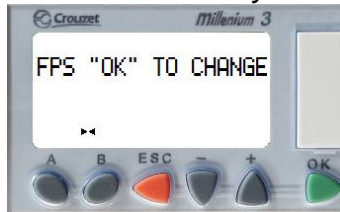


- 9.8. Where a pulsed water meter is required to monitor water consumption, Relay O3 may be configured as a pulsed water meter (1 pulse / litre) – rather than BMS faults.
 - “ENABLED” = Pulsed water meter,
 - “DISABLED” = BMS faults / warnings.



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- 9.9. The MFD is supplied with the Flood Protection System disabled. Press “OK” to change status, “FPS ON” will be displayed in the top right-hand corner of the screen to confirm the change. Warning – if FPS ON and the monthly fill threshold is exceeded due to a small leak - as set paragraph 9.4 – filling is suspended and boiler may cut-out due to low system pressure.



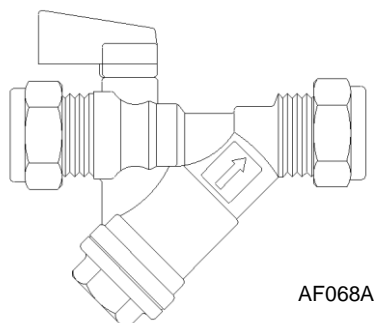
10.0 COMMISSIONING

- 10.1. There generally is no need for a service engineer as the installer can set the Cold Fill and High Cut-Out settings via the keypads. However Arrow Valves can normally offer a commissioning service – please contact us.
- 10.2. Before filling an empty system the following must be complete. System has been flushed / cleaned in accordance with BSRIA code of practice or similar. The system has been pressure tested during the PCC (pre-commission cleaning stage) and any leaks fixed.
- 10.3. Refer to the SET UP CHART – see 15.0.
- 10.4. The final message is POWER RESTORED, Press “ESC”. The display should state PREPARING TO FILL on the second line – and gives a one minute warning of its impending start. To delay – press “ESC”, which delays for 1 minute. This is particularly useful to allow time to access PUMP MENU to disable pressurisation pump if required. Also the delay reduces pump hunting due to pressure surges caused by the circulation pumps starting or stopping.






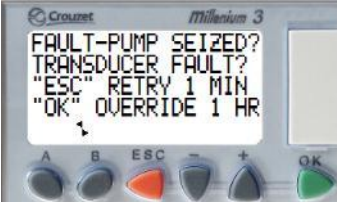
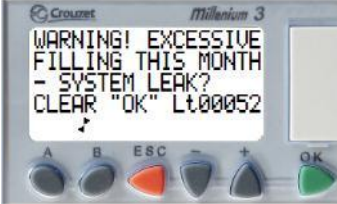

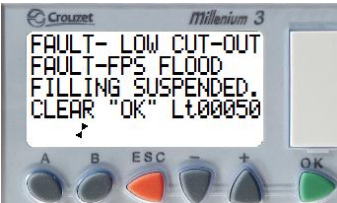
11.0 MAINTENANCE

- 11.1. If low inlet flow is suspected – check and clean the inlet strainer in the servicing valve. See AF068A diagram below. Close valve.
- 11.2. Unscrew hexagonal cap.
- 11.3. Remove strainer cartridge with long nose pliers.
- 11.4. Remove flow limiter from strainer (if fitted) by pushing out with small screwdriver.
- 11.5. Clean or replace basket and cartridge, with the same size and colour.
- 11.6. MFD15 only - Insert the flow limiter into strainer - push to limit, insert strainer into valve – push to limit.
- 11.7. Replace hexagonal cap.
- 11.8. Turn valve on.
- 11.9. MFD22 only - check and clean if necessary the electrodes with “Scotch-Brite” or similar plastic scourer.

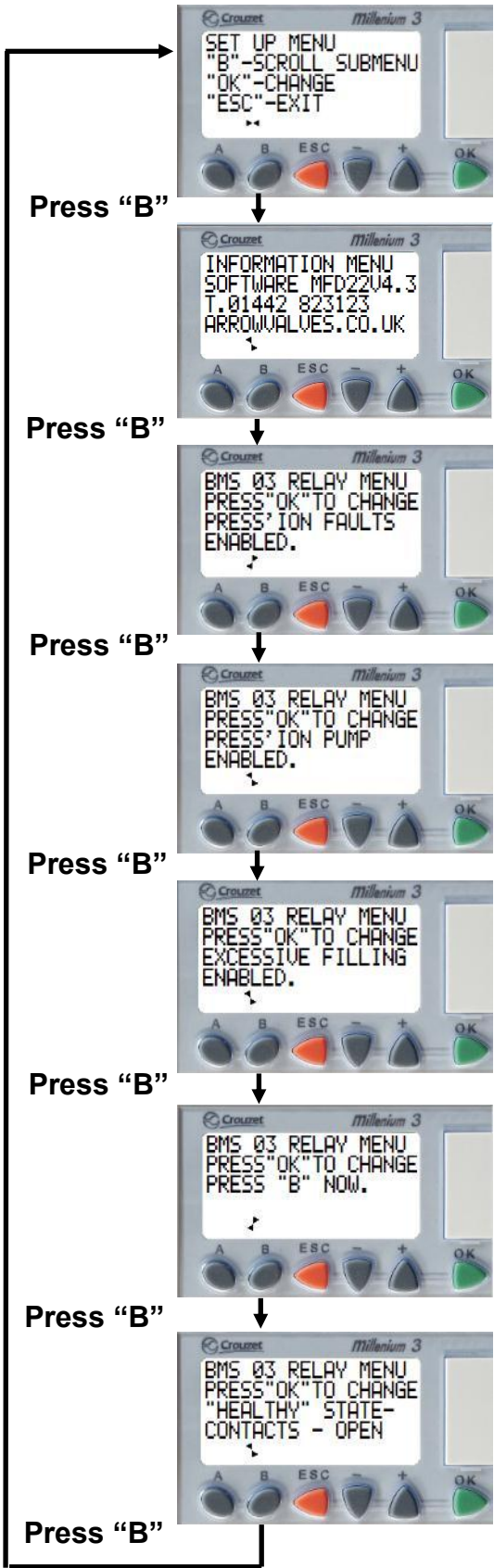


12.0 WARNINGS / FAULTS

- 12.1. The controller will display an appropriate fault message. The Fault and / or Warning Relay will activate - see table in section 2.0.
- 12.2. The table below shows possible causes and solutions.

FAULT / WARNING	POSSIBLE CAUSE	POSSIBLE SOLUTION
	<p>No or low water in the internal tank.</p>	<p>Ensure water supply is on and pressure available. 15 mm – check Torbeck float valve. 22 mm – check solenoid is powered “humming”. Clean strainer in servicing valve. Faulty or stuck float switch - if tank full.</p>
	<p>System pressure has dropped more than 0.5 bar below cold-fill pressure.</p>	<p>This is normal during initial fill. If this occurs in service and the pump is running but cannot make up pressure, there may be a major leak in the system.</p>
	<p>System pressure more than the High Cut-Out setting.</p>	<p>Ensure expansion vessel is connected, correctly charged and sized. Check the High Cut-Out value is correctly set. Check for other filling sources - e.g. quick fill loops Allow to cool then drain some fluid.</p>
	<p>The internal diagnostics believe the pump is not developing pressure (seized, disconnected, or PCB failure), or transducer fault.</p>	<p>The system will automatically try to start the pump again in 1 minute. There is an option to override for an hour by pressing “OK” button. Manually test pump from the PUMP TEST / RUN MENU.</p>
	<p>The unit has pumped in more than the warning trigger value (default 50 Lt/month).</p>	<p>This will occur during initial fill or after partial draining, clear the warning by pressing “OK”. If in service - check for leaks and repair where necessary. Consider increasing the warning trigger level?</p>
	<p>The pump has been disabled from the PUMP MENU.</p>	<p>Enable pump on from the menu. Go to PUMP MENU and “OK” to enable.</p>
	<p>(If “FPS ON”) The unit has pumped in more this month than the warning trigger value (default 50 Lt/month). Filling suspended and it may result in boiler cut-out due to low pressure.</p>	<p>Disable during initial fill or after partial draining. If activated, clear the fault by pressing “OK”. If in service - check for leaks and repair where necessary. Consider increasing trigger value - 9.4.</p>

14.0 SET UP MENU / BMS USER CONFIGURABLE RELAY



DO NOT USE BMS O3 RELAY FOR EQUIPMENT CONTROL (INTERLOCK). USE O4 BOILER RUN.

Press -

“B” to scroll through the submenu.

“OK” to toggle to alternative option.

“ESC” to exit. (Note all new values are accepted).

Displays the software version installed and the manufacturer’s contact details.

IF O3 RELAY USED AS PULSED WATER METER THE MESSAGES BELOW ARE NOT DISPLAYED – SEE 9.0

G1 To prevent the BMS relay O3 detecting the following five faults, Press “OK” – display then states “DISABLED”.

FAULT - LOW LEVEL (internal tank water level)

FAULT- LOW CUT-OUT (low system cut-out pressure)

FAULT - HIGH CUT-OUT (system cut-out pressure)

FAULT - PUMP SEIZED? TRANSDUCER FAULT?

FAULT – FPS FLOOD FILLING SUSPENDED.

G2 To prevent the BMS relay O3 detecting the following warning,

Press “OK” – display then states “DISABLED”.

FILLING DISABLED

G3 To prevent the BMS relay O3 detecting the following warning,

Press “OK” – display then states “DISABLED”.

WARNING - EXCESSIVE FILLING THIS MONTH

The factory default for the BMS relay O3 is -

“Healthy” = contacts open (i.e. no faults or warnings).

Press “OK” to toggle to -

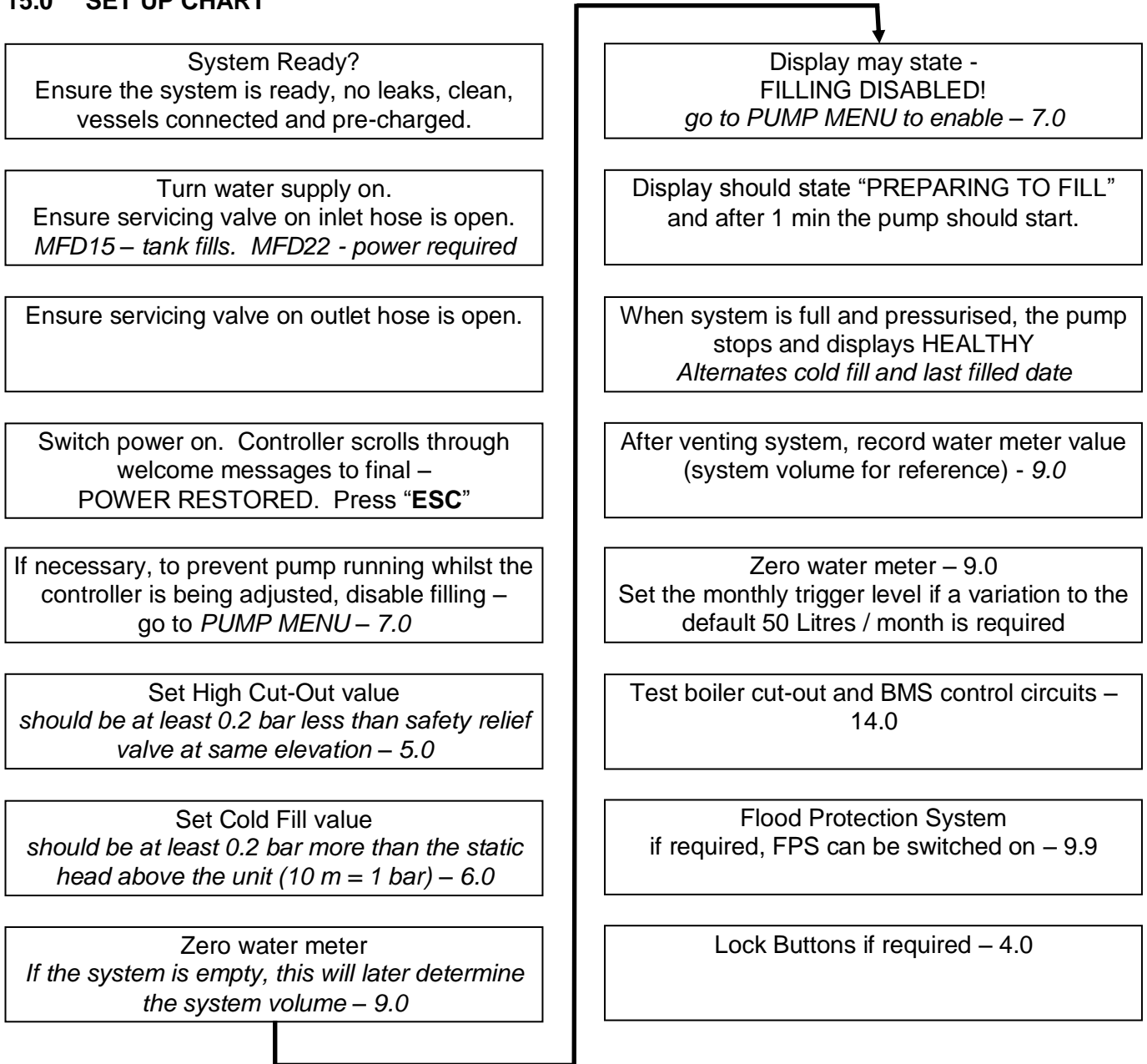
“HEALTHY” STATE – CONTACTS – OPEN

or

“HEALTHY” STATE – CONTACTS – CLOSED

Note – power is required to close contacts, therefore isolation of power opens contacts.

15.0 SET UP CHART



16.0 OPTIONS

Option	Code
Wall Mounting Bracket for Midi range	MIDIBRA
Drip Tray for Midi range Stainless	BTDT3

Wall Mounting Bracket – Stainless steel wall bracket for the MFD15 and MFD22.

Drip Tray – Catches any water discharged through weir if inlet valve is faulty and overflow blocked.