



**Installation Instructions /
Operating & Maintenance Manual
“Dose & Fill®” Pressurisation & Dosing Unit
Models – DF15 & DF22**



Model shown - DF15

FOREWORD

Dose & Fill® - DF - 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 can also automatically dose the system with inhibitor both during the initial fill and subsequent top-ups. It is recommended the empty system is filled in “AUTO DOSE – DOSE FILL STOPS!” mode to ensure the system is correctly dosed and preventing flash corrosion.

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

SUPPORTING LITERATURE

- Dose & Fill® - DF – Datasheet
- Wiring Diagram AM166*

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 CONTROLLERS
4.0	BUTTON LOCK
5.0	HIGH CUT-OUT SETTING - PRESSURISATION
6.0	COLD FILL SETTING - PRESSURISATION
7.0	PUMP DISABLE / ENABLE - PRESSURISATION
8.0	ELECTRONIC WATER METER / FLOOD PROTECTION SYSTEM (FPS) - PRESSURISATION
9.0	PUMP TEST / MANUAL RUN - PRESSURISATION
10.0	WARNINGS / FAULTS - PRESSURISATION
11.0	MENUS - PRESSURISATION
12.0	PUMP MENU - PRESSURISATION
13.0	SET UP MENU / BMS USER CONFIGURABLE RELAY
14.0	DOSE UNIT – DOSING MODES
15.0	SUITABLE INHIBITORS
16.0	FILLING INTERNAL CONTAINER
17.0	TARE ZEROING
18.0	CONCENTRATION SET UP
19.0	SCALE CALIBRATION / SPECIFIC GRAVITY
20.0	PUMP TEST / PRIMING – DOSING UNIT
21.0	WARNINGS / FAULTS – DOSING UNIT
22.0	MENUS - DOSING
23.0	DOSING DISPLAYS
24.0	COMMISSIONING
25.0	TESTING SYSTEM CONCENTRATION
26.0	TESTING BOILER CONTROL & BMS CIRCUITS
27.0	MAINTENANCE
28.0	OPTIONS
29.0	SET UP CHART

1.0 INSTALLATION – MECHANICAL

- 1.1. The Dose & Fill® 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 using 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 template.
 - 1.4.2. Mark centres of top of the 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 DF 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 – normally 15mm copper tube. Please note that the outlet push-fit connection is not suitable for use with stainless steel pipe – *contact us for help*. 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 27.0. The 22 mm version has the Automatic Flow Limiter in the ¾" male brass tail. *Note - if*

- 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 DF unit and the primary pipe is in excess of 4 m, the pipe diameter should be increased (e.g. 22 mm for DF15 and 28 mm for DF22). *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 DF15 – push the float arm down. Model DF22 – 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 DF unit is isolated. **Warning!** – the high and low pressure cut-out features would then be inoperative.
- 2.5. Four 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, two, three or four 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 13.0. Alternatively O3 relay may be configured as a pulsed water meter (1 pulse/Lt) see 8.0
- 2.7. Factory wiring has the dosing warnings and faults linked to the Pressurisation controller. If required for additional signals, the dosing links can be removed. Dose Warnings - Pink wire O3-iD. Dose Faults – violet wire O4-i2. This provides up to four volt-free BMS monitoring relays.
 - Pressurisation Faults
 - Pressurisation Faults or Warnings
 - Dosing Faults
 - Dosing Faults and Warnings – or pulsed output water meter.

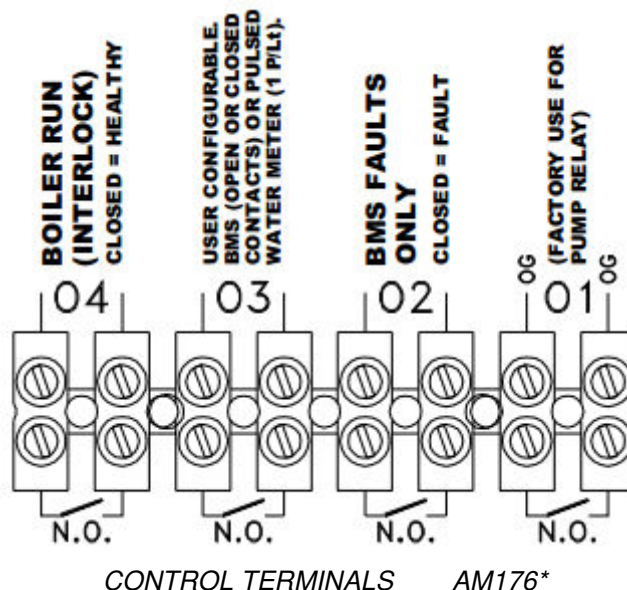
Note – Wiring diagram AM166* inside control box cover

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	●
DOSE FAULT STOPS! mode		● G2	●
FILLING DISABLED		● G2	●
WARNING - EXCESSIVE FILLING THIS MONTH		● G3	●
PULSED WATER METER OUTPUT ENABLED INSTEAD OF BMS		● ● ● ● ●	●
DOSING			
HEALTHY (no faults)			●
FAULT - LOW CHEMICAL LEVEL < 2 litres (dosing disabled)	●	● G5	●
FAULT - DOSE PUMP OVERHEAT	●	● G5	●
FAULT - NOT AUTO DOSING	●	● G5	●
WARNING - AUTO DOSING DISABLED		● G4	●
WARNING - DOSING DISABLED - PRESSURE ABOVE LIMIT		● G4	●
WARNING - LOW CHEMICAL LEVEL < 4 litres (dosing operative)		● G4	●

User Configurable relay O3 notes -

G1, G2, G3, G4, G5 refer to groups, which can be ignored (disabled) – see 13.0.

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



CONTROL TERMINALS AM176*

3.0 KEY PAD CONTROLLERS –

- 3.1. The Dose & Fill® has two controllers with backlit LCD displays. The left controller operates the pressurisation unit and the right controls the dosing. Whilst the controllers are generally independent, there is communication between the two, such as the option of the dosing unit to prevent pressurisation filling when in DOSE FAULT STOPS! mode.
- 3.2. Upon power up – the controllers will scroll through “Welcome” messages with brief instructions. The backlight is permanently powered to denote a power source.
- 3.3. 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.

- 3.4. If the buttons are inactive the Button Lock has been activated – see 4.0.

4.0 BUTTON LOCK - APPLICABLE TO BOTH CONTROLLERS

- 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 - PRESSURISATION (LEFT CONTROLLER)

- 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 Dose & Fill 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 - PRESSURISATION (LEFT CONTROLLER)

- 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 - PRESSURISATION (LEFT CONTROLLER)

- 7.1. The pump may be switched off but the DF unit 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 DF unit is supplied with all pumps disabled.
- 7.2. To active, press “A” until the Pump Disable Menu is displayed. Press “OK” to change status.



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



Operating & Maintenance Manual – Dose & Fill® Pressurisation & Dosing Unit – DF15 & DF22 – Arrow Valves
ELECTRONIC WATER METER / FLOOD PROTECTION SYSTEM (FPS) - PRESSURISATION (LEFT CONTROLLER)

- 7.4. The pressurisation controller (left) incorporates built-in electronic water meter, which determines the system volume. 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 8.9. The pump is stopped if the monthly warning trigger value is exceeded. The fault relay closes and “FAULT FPS FLOOD” is displayed.
- 7.5. Repeatedly press “A” to scroll to the water meter menu.



- 7.6. Press “B” to scroll through the sub menus.
- 7.7. 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 8.9.*



- 7.8. 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.



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



- 7.11. 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.
Note - Pressurisation controller - relay O2 is available for BMS faults. Dosing controller - relay O3 (Dose warnings) and O4 (Dose faults) if links to pressurisation controller removed.



- 7.12. The DF 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 8.4 – filling is suspended and boiler may cut-out due to low system pressure.



8.0 PUMP TEST / MANUAL RUN - PRESSURISATION (LEFT CONTROLLER)

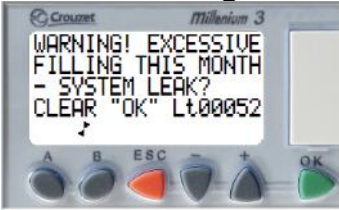
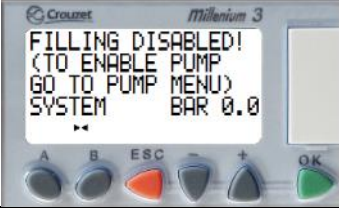
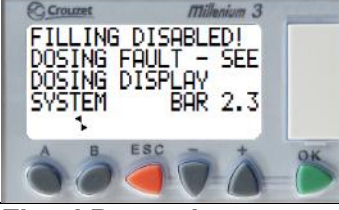
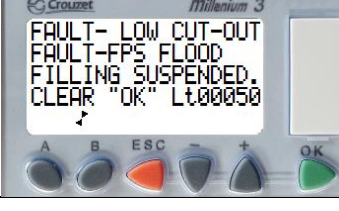
- 8.1. The pressurisation pump can be tested by pressing “B”, when in the Pump Test / Run Menu.
 8.2. If chemical dosing has been injected just after the unit – e.g. inhibitor from the Dose & Fill® unit using INTERNAL or EXTERNAL DOSE POT menus - it is recommended that the pressurisation pump is run for a few seconds to push the chemical from the “deadleg” into the heating circuit.



9.0 WARNINGS / FAULTS - PRESSURISATION (LEFT CONTROLLER)

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

FAULT / WARNING	POSSIBLE CAUSE	POSSIBLE SOLUTION
Low Level 	No or low water in the internal tank.	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.

FAULT / WARNING	POSSIBLE CAUSE	POSSIBLE SOLUTION
Low Pressure Cut-Out 	System pressure has dropped more than 0.5 bar below cold-fill pressure.	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.
High Pressure Cut-Out 	System pressure more than the High Cut-Out setting.	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.
Pump Fault (seized) / Transducer fault 	The internal diagnostics believe the pump is not developing pressure (seized, disconnected, or PCB failure), or transducer fault.	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.
Excessive Filling 	The unit has pumped in more than the warning trigger value (default 50 Lt/month).	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?
Pump Disabled 	The pump has been disabled from the PUMP MENU.	Enable pump on from the menu. Go to PUMP MENU and "OK" to enable.
Dosing Fault 	Filling has been disabled due to a fault with the dosing unit (e.g. chemical container empty). This only occurs if DOSE FAULT STOPS! has been selected.	See the dosing display to identify fault. If the pressurisation unit is required to run independently of a dosing fault, go to PUMP MENU - and select 2/4 ENABLE PUMP- see 12.0
Flood Protection 	(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.	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 – 8.4.

10.0 MENUS –

PRESSURISATION

(Left Controller)

Press “ESC”



The welcome menus are displayed when power is restored.

The normal HEALTHY display alternates between the last filled date and the cold fill switch on pressure. If pressing “A” has no effect, the buttons have been locked – see section 4.0.

If in PUMP MENU, mode has been set to DOSE FILL STOPS! the display shows this instead of HEALTHY - see below.



Press “A”



Press “A”



Press “A”



Press “A”



See
PUMP MENU -
12.0

Press “A”



Press “A”



Press “A” or “ESC”

See
SET UP MENU -
13.0



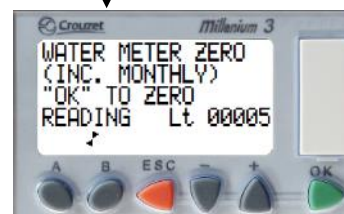
Press “A”



Press “B”



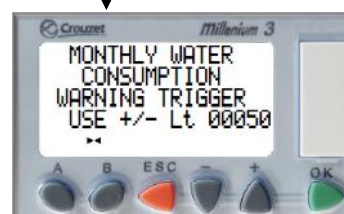
Press “B”



Press “B”



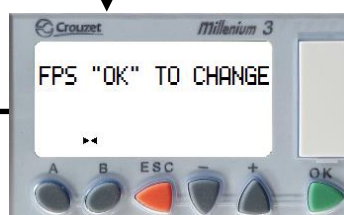
Press “B”



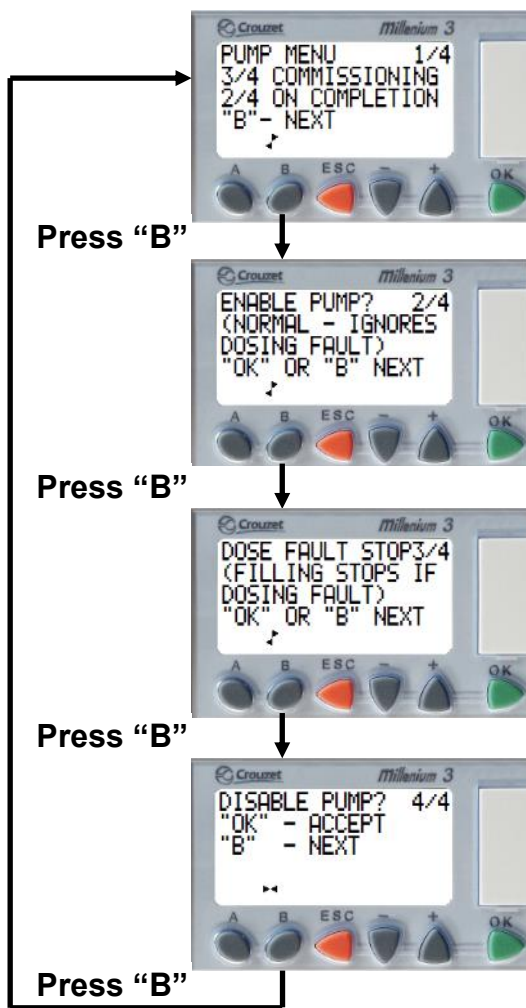
Press “B”



Press “B”



11.0 PUMP MENU - **PRESSURISATION** – (Left Controller)



1/4 – PUMP MENU - Information display - prompting "B" for next display.

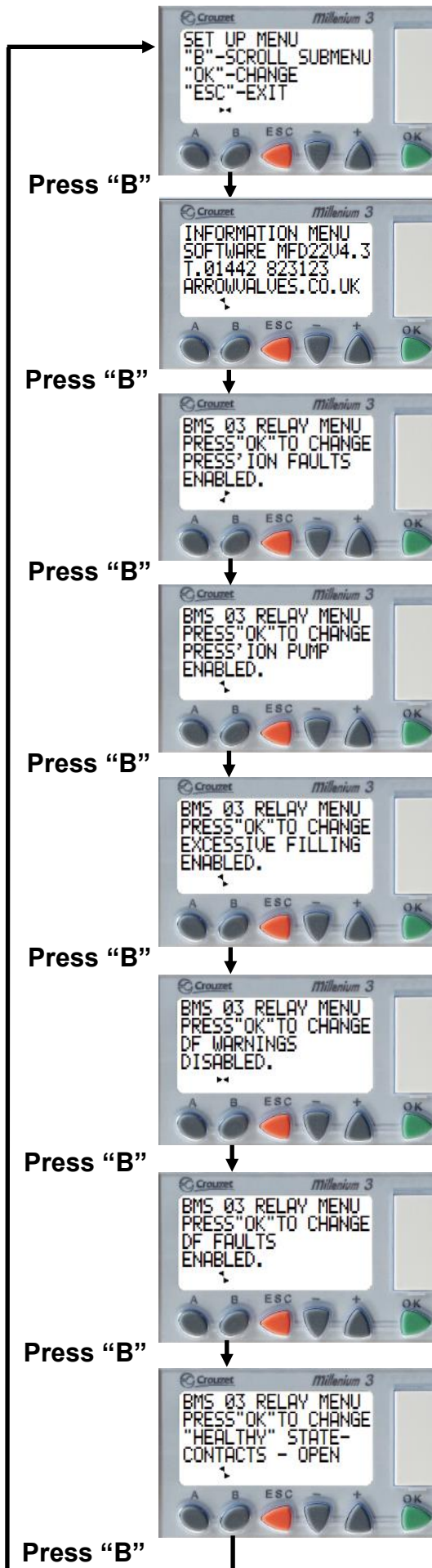
2/4 - This mode should be selected after filling an empty system using Auto Dosing. Press "OK". The display will then show the normal "Healthy" display. The pressurisation unit continues to function even if there is a dosing fault, such as chemical container empty.

3/4 - This mode should be selected when filling an empty system using Auto Dosing. Press "OK". If the chemical container runs dry, the water filling pressurisation pump stops. This allows unattended filling, ensuring the correct concentration of fluid is added. Do not leave in this mode after commissioning as the boiler could cut-out on low pressure if the chemical container empties.

4/4 - Press "OK" to disable pump. The unit is supplied disabled to ensure the unit does not start dosing before the user is ready and set up the concentration etc.

The pump will still run via the PUMP TEST / RUN MENU.

12.0 SET UP MENU / BMS USER CONFIGURABLE RELAY – (Left Controller)



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 8.0

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 two warnings,

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

DOSE FAULT STOPS! mode.

FILLING DISABLED

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

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

WARNING - EXCESSIVE FILLING THIS MONTH

G4 To prevent the BMS relay O3 detecting the following three warnings,

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

WARNING - AUTO DOSING DISABLED

WARNING - DOSING DISABLED - PRESSURE ABOVE LIMIT

WARNING - LOW CHEMICAL LEVEL < 4 litres (dosing operative)

G5 To prevent the BMS relay O3 detecting the following three faults,

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

FAULT - LOW CHEMICAL LEVEL < 2 litres (dosing disabled)

FAULT - DOSE PUMP OVERHEAT

FAULT - NOT AUTO DOSING

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.

DOSING UNIT

13.0 DOSE UNIT - DOSING MODES

- 13.1. Before filling an empty system, the dosing method should be chosen. “Flash corrosion” occurs when oxygen rich raw water is admitted to a clean system, resulting in heavy corrosion and magnetite sludge within a few hours. To avoid this, it is recommended that the system is filled in AUTO DOSING mode which will add the correct amount of inhibitor. This also avoids volume calculations and manual dosing. Any system leaks should have been detected during the pre commission cleaning stage. The three modes are explained below - .
- 13.2. **AUTO DOSING** – The dosing pumps inject 0.5 litres of chemical after an appropriate quantity of water has been admitted. E.g. @ 1.0% concentration, every 50 Lt of water. The normal mode allows the pressurisation unit to function if the dosing unit develops a fault - e.g. out of chemical. The “DOSE FAULT STOPS!” mode is selectable for commissioning - allowing unattended filling and dosing. If chemical runs out, filling stops.
- 13.3. **INTERNAL DOSING POT** – Fill the 20 litre internal container and then set the required quantity via the dosing controller. The 18 litre usable quantity @ 1.0% concentration will dose 1800 litres, generally equating to 150 kW. Refill the container as required. This method is accurate (98%) and the pumps will stop once the unit detects less than 2 litres of chemical remaining.
- 13.4. **EXTERNAL DOSING POT** – Place the clear suction hose and foot valve into the manufacturer’s container and then set the required quantity via the dosing controller. Note - since the Dose & Fill® unit cannot weigh the container it uses time-estimation and the **user must supervise, monitoring the quantity injected and ensuring the pumps do not run dry.**

14.0 SUITABLE INHIBITORS

- 14.1. The unit is only suitable for central heating inhibitors, requiring a concentration of 0.5 - 5.0 %. The recommended chemical for the DF unit is Sentinel X100. An alternative suitable make is Fernox F1.
- 14.2. The compatibility of other inhibitors should be verified before use.

15.0 FILLING INTERNAL CONTAINER - AUTO DOSING, INTERNAL DOSING POT

- 15.1. A 20 litre container is supplied, which sits on the scale pan inside the cabinet. To fill, lift container out - allowing the suction tube to slide out - and rest the container on the floor.
- 15.2. No dirt or particles must enter the container.
- 15.3. Refer to manufacturers’ safety sheets.
- 15.4. Remove cap then fill - a large funnel will help. Fill to within 50 mm of the rubber outlet grommet.
- 15.5. Replace cap and **carefully** lower onto the pan - sliding the suction tube into the container.

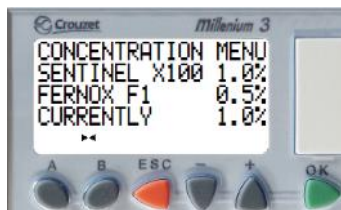
16.0 TARE ZEROING - DOSING UNIT (RIGHT CONTROLLER)

- 16.1. To provide an accurate indication of remaining chemical in the container, the hose foot valve assembly and container weight (0.8 – 1.1 kg) is deducted to provide a zero value when empty. The unit is supplied having been tare zeroed at the factory.
- 16.2. It is permissible to use an alternative and smaller container and there is a facility available to tare the empty container. Note – Warning BMS set to 4 litres and Fault (disables dosing) 2 litres.
- 16.3. Place the **empty** container on the scale with the hose and foot valve inside and from the TARE ZEROING MENU, press “OK”.



17.0 CONCENTRATION SET UP - DOSING UNIT (RIGHT CONTROLLER)

- 17.1. The concentration should be set according to the manufacturer's specification. If the system is partially full and after testing found to be too weak - the concentration can be brought up to strength with a burst of manual dosing - see "INTERNAL DOSING POT".
- 17.2. The unit is factory set to 1%, which is suitable for Sentinel X100. Fernox F1 is normally 0.5%.
- 17.3. Go to CONCENTRATION MENU and note the "CURRENTLY" value. If necessary, use the "+" or "-" buttons to change and then "OK".
The range is 0.5 – 4.0% by volume.



18.0 SCALE CALIBRATION / SPECIFIC GRAVITY - DOSING UNIT (RIGHT CONTROLLER)

- 18.1. The volume of chemical injected and remaining in the container is calculated based on weight. The scales are calibrated with water but inhibitors normally have a specific gravity of 1.1 – 1.2. The SCALE CALIBRATION menu converts a weight into litres. The factory default is for Sentinel X100, with S.G. 1.1. The multiplier is 1 divided by 1.1 * 100% = 91%. (Fernox F1 has S.G. 1.16 and requires setting to 86%). Use the "+" or "-" buttons to change and then "OK".



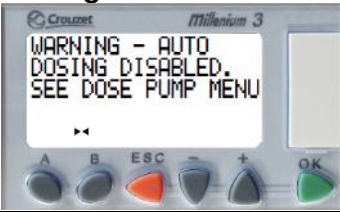
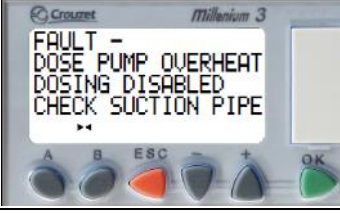
19.0 PUMP TEST / RUN - DOSING UNIT (RIGHT CONTROLLER)

- 19.1. The pumps are generally self priming and the non-return valve in to suction hose foot valve / strainer unit prevents the hose emptying if pulled out the container.
- 19.2. It is preferable to prime the pumps at the commissioning stage to ensure chemical is being pumped. Go to PUMP TEST MENU and press and hold "B". Pump 1 runs for 3 seconds, stops for 3 seconds, then pump 2 runs for 3 seconds, stops for 3 seconds, then both pumps run until "B" is released. Observe the inhibitor moving into the pumps accompanied by a change of sound.
- 19.3. If the suction hose is emptied in service and the system pressure is above 2 bar, the pumps may not self-prime due to the back pressure. Shut servicing valve on the outlet hose, disconnect the green hose above the pumps and then press "B" when in the PUMP TEST MENU until primed. Replace hose and open servicing valve. Note – do this within 50 seconds or to prevent pressurisation pump starting, either disable it or press "ESC" with less than 50 seconds intervals.



20.0 WARNINGS / FAULTS - DOSING UNIT (RIGHT CONTROLLER)

- 20.1. The controller will display an appropriate fault message. The Fault and / or Warning Relay will activate - see table in section 2.0.
- 20.2. The table below shows possible solutions, the controller will give an indication of the possible Fault / Warning.

FAULT / WARNING	POSSIBLE CAUSE	POSSIBLE SOLUTION
Low Level - Fault 	Chemical level less than 2 Lt, which disables dosing (except external dosing). The unit monitors container weight, so ensure container is on scale pan.	Refill container immediately with suitable inhibitor.
Low Level - Warning 	Chemical level between 2 - 4 litres. Auto Dosing still functioning.	Refill container soon with suitable inhibitor.
Dosing Disabled - Warn' 	The pump has been intentionally switched off (disabled). The unit is supplied disabled.	When ready to enable Auto Dosing, go to PUMP MENU - see 10.0.
Pressure - Warning 	The system pressure is above 3.2 bar, which is the limit for Auto Dosing.	Reduce the system pressure - see High Cut-Out on pressurisation controller.
Pump Overheat - Fault 	The dosing pumps are above 60° C. No chemical (external dosing)? Blocked inlet strainer? Diode failure? Seized pump?	Allow pumps to cool and check the foot valve is submerged in the chemical. (More likely to occur in EXTERNAL DOSING POT since AUTO DOSING or INTERNAL DOSING POT produce a NOT AUTO DOSING fault.
Not Auto Dosing - Fault 	The unit has not detected a change in weight over 3 minute period when pump is supposed to be pumping out the container.	Check - Foot valve is submerged in the chemical. Inlet strainer blocked? Diode failure? Seized pump?

21.0 MENUS - DOSING (Right Controller)

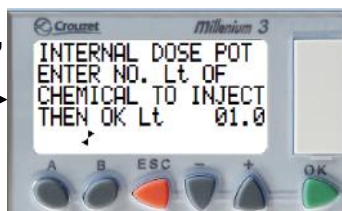
The welcome menus are displayed when power is restored.

Press "ESC"



The normal HEALTHY display alternates between the last dosed date and the chemical remaining in the internal container. If pressing "A" has no effect, the buttons have been locked – see section 4.0.

Press "A"



Press "A"

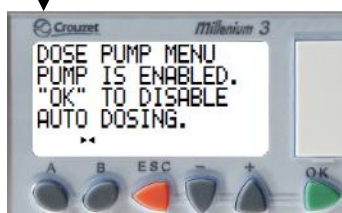
Press "A"



Press "A"



Press "A"



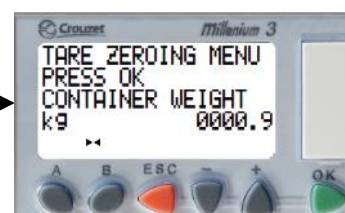
Press "A"



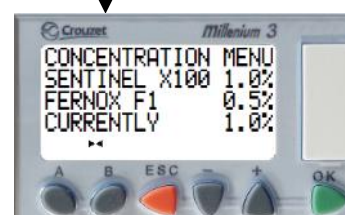
Press "A"



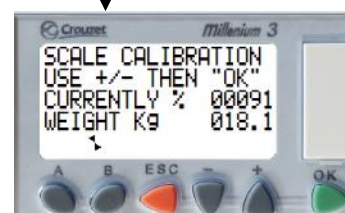
Press "B"



Press "B"



Press "B"



Press "B"



22.0 DOSING DISPLAYS

- 22.1. The display indicates when the unit is dosing – also the reciprocating dosing pumps will be heard.
- 22.2. When Auto Dosing, the display is shown below - *Note* - DOSES TO ADD 01 *is normal*.



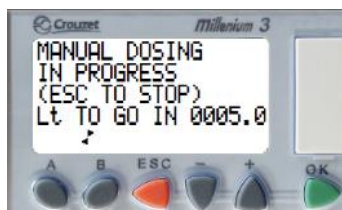
Normal display

- 22.3. If the dosing unit develops a fault – e.g. chemical container empty – the pressurisation pump will continue to fill the system with water - when in NORMAL MODE - see 12.0 – the dosing controller will spool (memorise) any dose shots that it is unable to perform, up to a maximum of 6. This would equate to a maximum of $6 \times 0.5 \text{ litres} = 3 \text{ litres}$ of inhibitor. When the fault is rectified (e.g. container refilled) the unit automatically performs the number of doses (X) according the last line of text on the display DOSES TO ADD 0X. *Note – when in DOSE FAULT STOPS! mode, the pressurisation unit water filling will stop if there is a dosing fault and therefore the unit will not miss any more than 1 shot.*
- 22.4. To cancel spooled doses, press “ESC” during dosing for every shot that is to be cancelled – observe the display.



Display shows 6 dose shots will be added after “fault” rectified

- 22.5. When manually dosing via the INTERNAL DOSE POT, the message displayed during dosing is shown below. The display Lt TO GO IN counts down to zero and then the pumps stop.

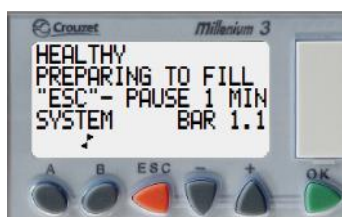


- 22.6. When manually dosing via the EXTERNAL DOSE POT, the message displayed during dosing is shown below. The display counts up to the quantity requested and then the pumps stop.



23.0 COMMISSIONING

- 23.1. There generally is no need for a service engineer to attend as the installer can set up the pressurisation and dosing units via the keypads. However Arrow Valves can normally offer a commissioning service – please contact us.
- 23.2. 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.
- 23.3. Refer to the SET UP CHART – see 28.0.
- 23.4. The final message is POWER RESTORED, Press “**ESC**”. The pressurisation 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.



24.0 TESTING SYSTEM CONCENTRATION

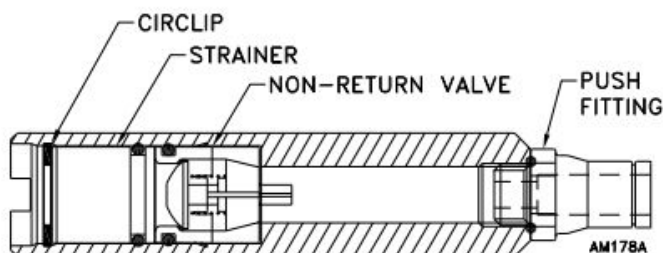
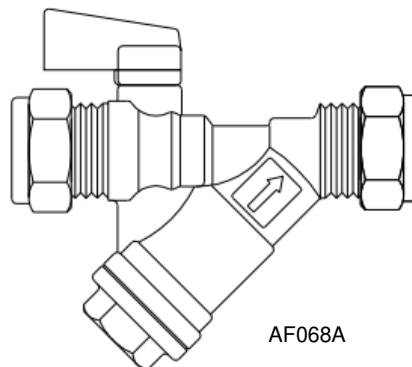
- 24.1. Run the circulation pump for several hours and take sample from circuit – not the “deadleg” between the dosing unit and the circuit.
- 24.2. Test the system inhibitor concentration with X100 test kit or similar.
- 24.3. If the test result indicates insufficient inhibitor, and inhibitor using INTERNAL DOSE POT facility – see 14.3. The water meter system volume reading can help determine the quantity to add.

25.0 TESTING BOILER CONTROL & BMS CIRCUITS

- 25.1. The boiler cut-out and BMS controls should be tested.
- 25.2. The High Cut-Out can be tested by temporarily shutting the outlet servicing valve on the hose and running the pressurisation pump from PUMP TEST / RUN menu – see 9.0.
- 25.3. The Warning relay can be tested by temporarily disabling the pressurisation pump – see 7.0.
- 25.4. The Fault relay can be tested by lifting the chemical container off the pan.

26.0 MAINTENANCE

- 26.1. If low inlet flow is suspected – check and clean the inlet strainer in the servicing valve. See AF068A diagram below.
- 26.2. Close valve.
- 26.3. Unscrew hexagonal cap.
- 26.4. Remove strainer cartridge with long nose pliers.
- 26.5. Remove flow limiter from strainer (if fitted) by pushing out with small screwdriver.
- 26.6. Clean or replace basket and cartridge, with the same size and colour.
- 26.7. D15 only - Insert the flow limiter into strainer - push to limit, insert strainer into valve – push to limit.
- 26.8. Replace hexagonal cap.
- 26.9. Turn valve on.
- 26.10. DF22 only - check and clean if necessary the electrodes with “Scotch-Brite” or similar plastic scourer.
- 26.11. If the unit develops a FAULT - NOT AUTO DOSING message, this may be due to a blocked strainer in the foot valve of the suction hose.
- 26.12. Pull the foot valve assembly out the container.
- 26.13. Observe the strainer in the end. If it appears obstructed –
- 26.14. Remove circlip.
- 26.15. Remove strainer cartridge with long nose pliers. *Note – it is not possible to blow down the tube due to the non-return valve.*
- 26.16. Clean or replace basket and cartridge. Assemble.



Foot Valve Assembly

- 26.17. DF22 only – under normal operation the Filling Solenoid is closed – open when energised, closed when de-energised.
- 26.18. If the DF22's tank is constantly overflowing, with the power isolated, this is likely to be caused by dirt/debris trapped in the diaphragm of the Solenoid Valve.
- 26.19. Please use the following link to a service video for instructions on how to inspect and clean the Solenoid Valve - <https://www.youtube.com/watch?v=qf-1iMNBKc0&t=13s>

27.0 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 DF15 and DF22.

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

