ADVANCED WATER TECHNOLOGY

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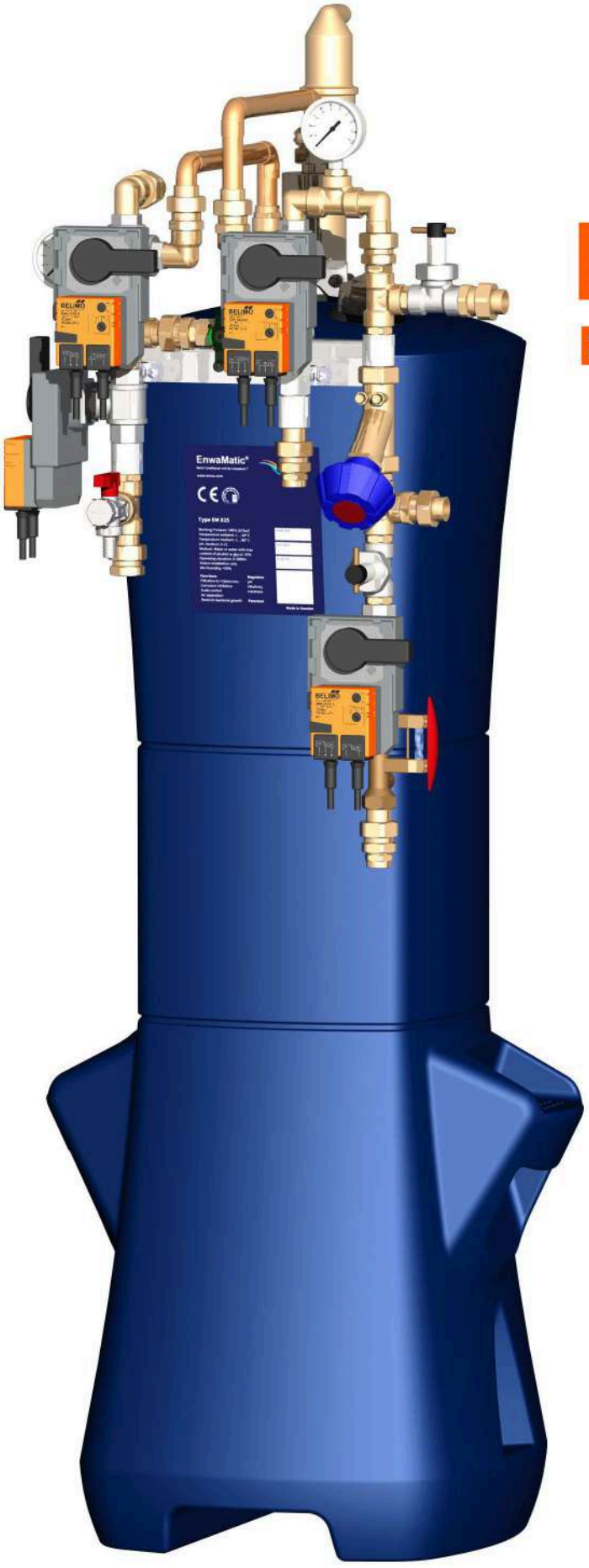
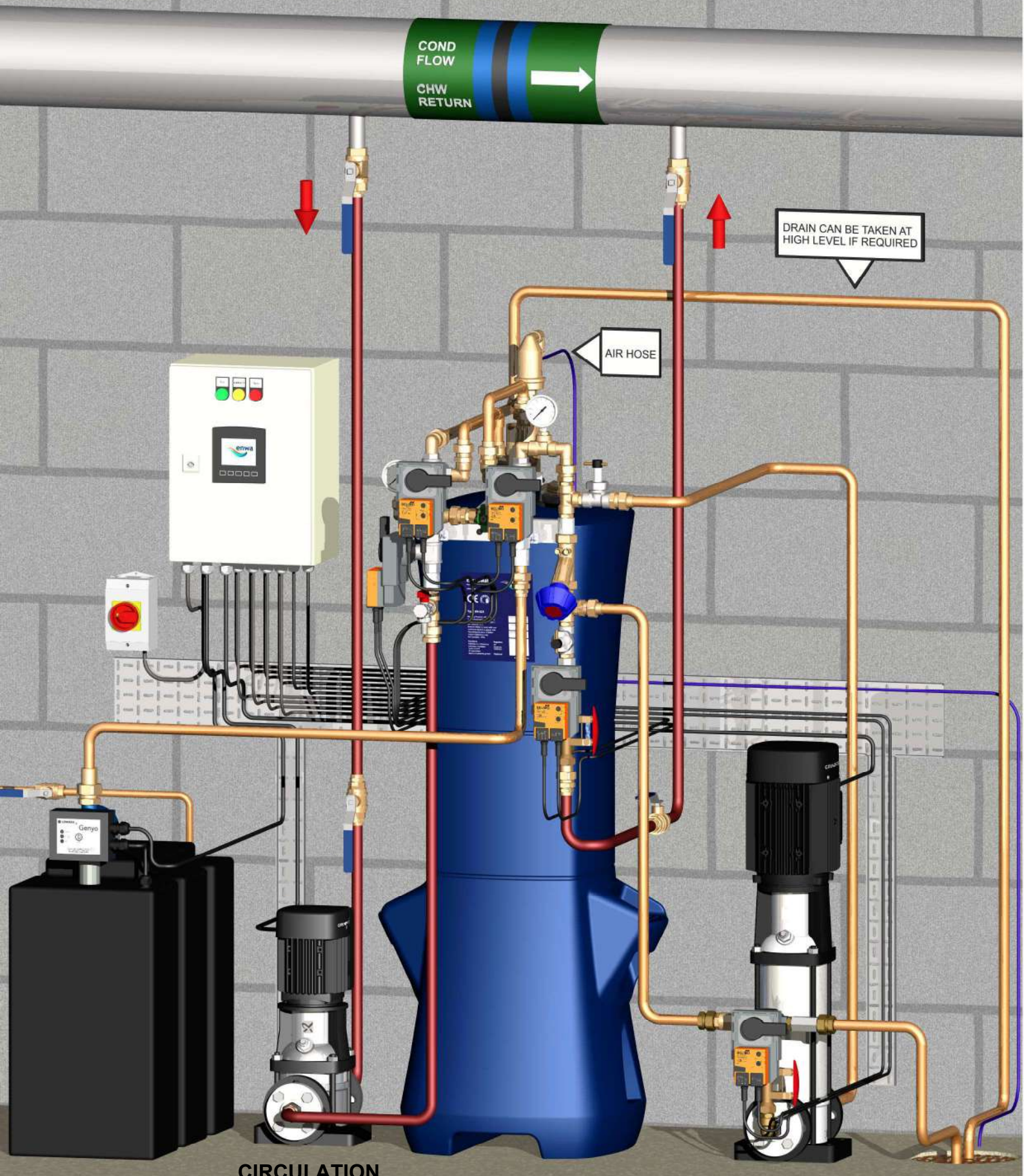
EnwaMatic®

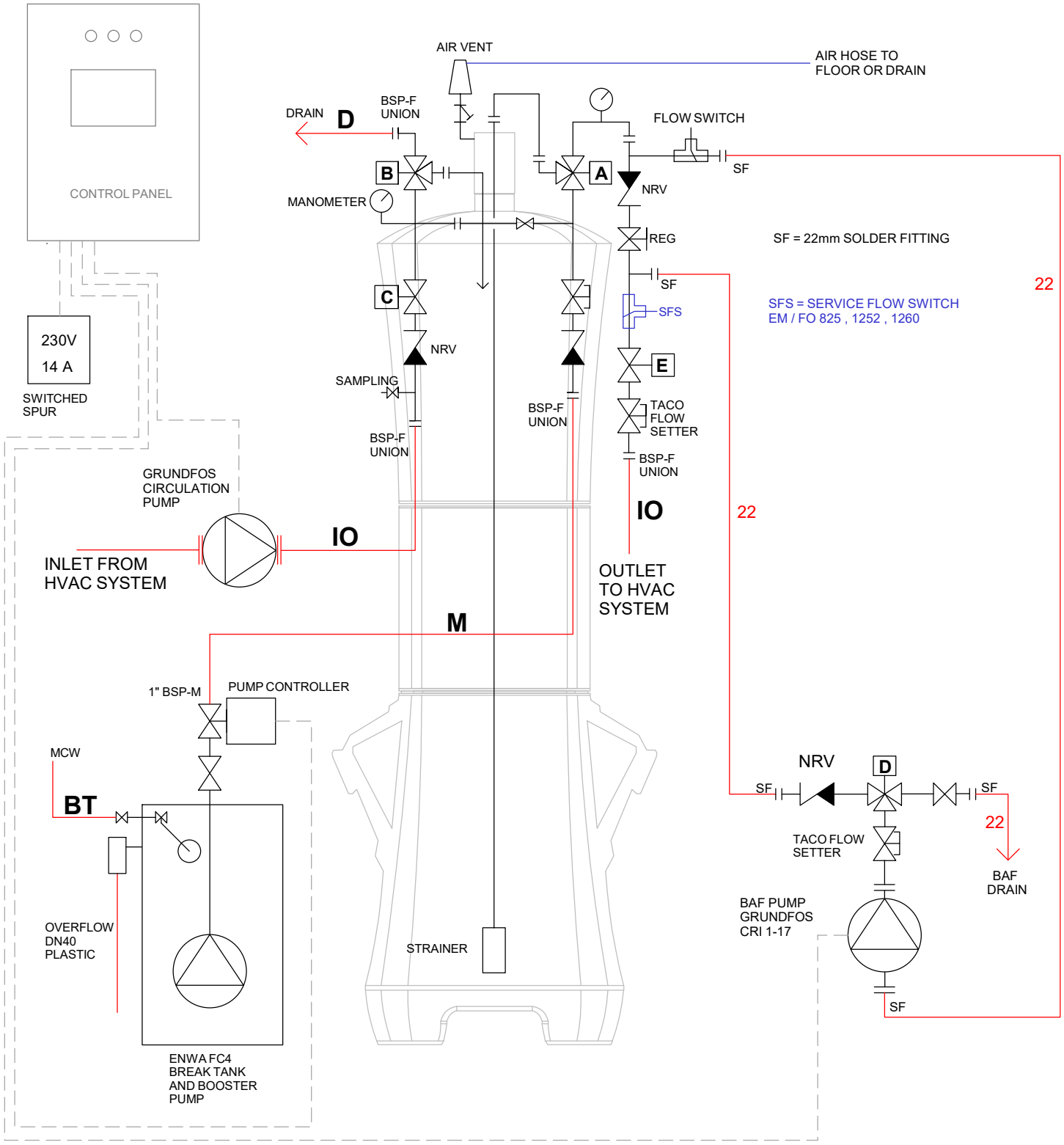
BAF Glycol Retention



ENWA WATER TECHNOLOGY UK 01530 830 354 ukservice@enwa.com www.enwa.co.uk

INSTALLATION OVERVIEW





UNIT	CIRC PUMP	BREAKTANK			IO	M	D	BT	
EM 825	Magna1 25-120	65 L		**DN**	20	20	20	15	PIPEWORK BY INSTALLER
EM 1252	CRI 1-3	65 L		**DN**	20	20	20	15	
EM 1260	CRI 3-5	227 L		**DN**	20	20	20	15	
EM 1665	CRI 5-4	227 L		**DN**	25	25	25	15	230V BY INSTALLER
EM 1672	CRI 5-5	227 L		**DN**	40	25	25	15	

	PROJECT:	TITLE:	DATE:
enwa	**EnwaMatic BAF**	**Installation Schematic**	1.6.20

EnwaMatic® EM BAF

Installation Notes

Refer to 'BAF Mechanical Schematic':

Mechanical installation:

The BAF (Glycol Recovery automated backwash option) assembly is comprised of:

EnwaMatic (EM) unit with BAF upgrade pipework assembly

BAF control panel with colour touchscreen display

BAF pump (Grundfos CRI)

BAF pump outlet assembly

BAF pump inlet assembly

In addition, the standard EM installation options:

Dedicated circulation pump (Grundfos CRI)

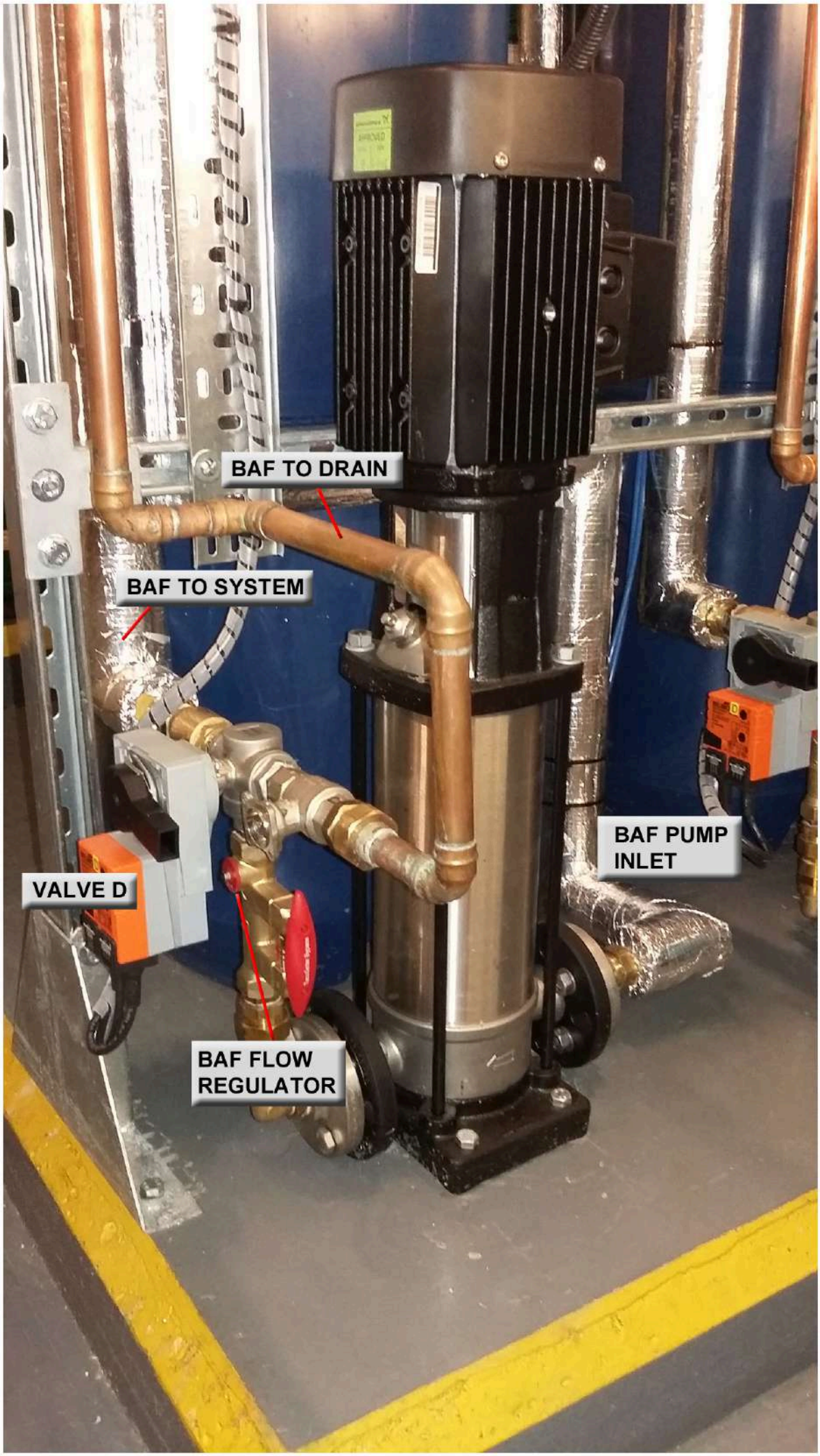
Fluid Category 4 breaktank / booster pump assembly for MCW connection.

BAF pump inlet assembly

BAF pump outlet assembly

BAF pump inlet & outlet assemblies bolt to the BAF pump – bolts / gaskets included.

An example installation is shown on the following page.


BAF TO DRAIN
BAF TO SYSTEM
BAF PUMP INLET
VALVE D
BAF FLOW REGULATOR

BAF assembly:

Connections between the EM unit and BAF pump are 22mm copper. Each connection point has a 22mm solder fitting. The exact layout and positioning of the equipment can be determined by the installer to suit the specific location, provided compliance with the mechanical schematic is maintained.

Glycol system inlet / outlet:

Isolation valves should be fitted / located on the main system for each connection point.

EM units should be on the hottest part of the system – ie) CHW RETURN.

The dedicated circulation pump is fitted on the unit inlet. (BSP flanges supplied).

Mains cold water (MCW) supply (FC4 Breaktank option):

The MCW supply is required to backwash the filter bed. To ensure the correct flow rate and pressure is achieved, and to comply with Water Regulations, a Fluid Category 4 (Type AF air gap, screened overflow) breaktank / booster pump assembly is supplied.

The booster pump is controlled by a Lowara Genyo pump controller, which is activated by pressure drop on the outlet side when valves move into backwash positions.

Alternative MCW protection can be employed - please contact ENWA for advice

Drains:

Two drain connections are required, the normal EM backwash outlet and the BAF pump drain.

Ideally the both would be piped separately to a local drain. This allows the option of opening the EM drain valves during BAF pump operation, allowing more air flow into the vessel.

If a common drain is required, a local tundish arrangement should be employed, such that both drains are open ended. The tundish and common drain pipework should be sized to prevent the possibility of backing up with flows up to 45 l/min.

If only a closed, common drain pipe is available, please advise ENWA, who can set up an alternative backwash configuration at commissioning.

Electrical Installation:

The electrical installer must provide the 230V wiring between the local spur, control panel, circulation pump and BAF pump.

The installer may fit the actuator and flow switch cables, or ENWA can complete this at commissioning. Please ensure there are cable trays or approved containment available for all cabling.

The control panel requires a single phase, 230V, 14 A supply, with local isolator switch.

The panel has internal MCB's for the pumps (10A) and control circuit (4A).

All actuators and controls are 24 vdc.

BMS:

The panels have 3 relays, which provide indicator lamps and BMS volt free contacts for 'Run', 'Backwash' and 'Alarm' conditions.

BMS connection terminals are included within the wiring diagrams.

EnwaMatic® EM BAF

Control Panel Operation

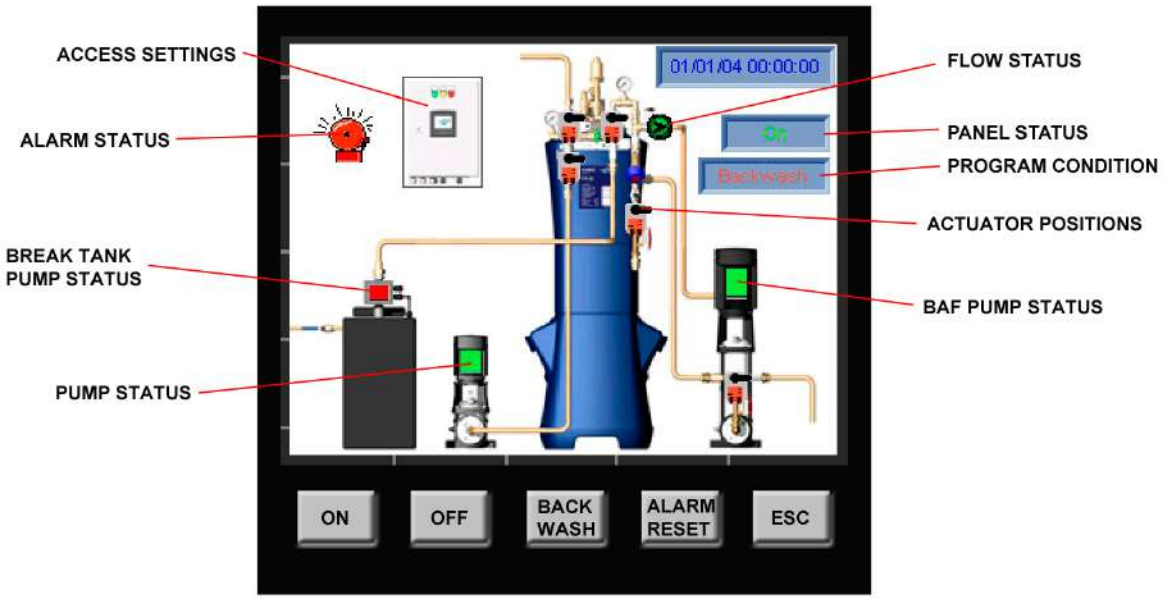
Indicator lamps are provided for basic 'Run', 'Backwash' and 'Fault' status. These outputs are linked to relays which provide volt free contacts for BMS connection.

PLC display (HMI):

Project specific software is installed to control and monitor the installation.

The HMI has 5 direct switch inputs:

ON	-	returns panel to normal operation after alarms or manual shut-down.
OFF	-	provides manual shutdown, without loss of power. Pumps are switched off. All valves are closed.
BACKWASH	-	allows user to initiate a complete automated backwash cycle.
ALARM RESET	-	investigate and reset alarms.
ESC	-	return from menus.



In standby mode the PLC will display the ENWA logo only. Touch the screen to access the main HMI display. The various status indicators are shown above.

Alarm menu:

Pressing the HMI button 'ALARM RESET' allows any alarms generated to be investigated.

Pressing the magnifying glass icon on the screen will expand any alarm groups.

Pressing the 'Reset' screen button will clear the alarm – if the cause has been rectified or is currently inactive. Unless the cause is immediately apparent and can be safely restored, please contact ENWA for further assistance.

Pressing 'ALARM RESET' when no current alarms are present allows the alarm history to be seen.

Alarm conditions:

Alarm ID:	**Description:**	**Notes:**
000	Alarm Valve A	*Valve in wrong position for current status*
001	Alarm Valve B	*Valve in wrong position for current status*
002	Alarm Valve C	*Valve in wrong position for current status*
003	Alarm Valve D	*Valve in wrong position for current status*
005	Alarm pump BAF	*Incorrect operation during backwash sequence*
006	Alarm MCW in Tank	*Failure to correctly transfer vessel contents during backwash sequence.*
014	Alarm Valve E	*Valve in wrong position for current status*
020	Alarm Flow Switch BAF	*Failure to transfer contents for required time*
023	Alarm Flow Switch Run	*Lack of flow in RUN, with pre-set delay period*
024	Alarm circuit breaker	*Tripped MCB's in control panel.*

Additional options:

Pressing the control panel icon on the HMI screen accesses additional options.

Select **'Backwash Log'** to view history. Press the 'ESC' button to return.

'Settings' requires a password number and is not recommended for normal operation. ENWA can advise if further access is required – for example to change backwash dates. In general, the correct settings are established at commissioning and refined on the initial follow-up visits. Further adjustment should not be required, and may affect correct operation of the unit and backwash process.

EnwaMatic® EM BAF

Operation & Maintenance

On site maintenance:

There is no on-site maintenance requirement. It is recommended only that routine checks are made when visiting the plantroom:

- Visible flow on the main TacoNova flow regulator
- Green light on control panel. LCD Panel 'On', status 'Run'.

Any problems should be reported to ENWA.

Alarm outputs:

'Run': Green light, BMS output. Green status indicator on PLC display.

Should be present during normal operation. Should only be absent during the backwash sequence.

Lack of 'Run' should be investigated.

'Backwash': Orange light, BMS output.

Present during the discharge phase of the backwash process.

'Alarm': Red light, BMS output. Red alarm symbol on PLC display.

All alarms will switch off the unit and close all valves.

See 'Control Panel Operation' and 'Fault Diagnosis' for further details.

Warranty / Maintenance Agreement:

There is a 2 year warranty on all equipment supplied by ENWA. This will cover site attendance, repairs and replacements.

Any problems should be reported directly to ENWA, who will advise or attend as required.

Annual Maintenance:

Annual servicing by ENWA should be carried out to check all components, clean the filter media, replenish reaction media and analyse system water.

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EnwaMatic® EM BAF

Fault Diagnosis

Troubleshooting:

Lack of flow through units:

Check main system isolation valves.
Check circulation pump is running.
Check panel status.
Report to ENWA.

Control panel:

No green light:

Check power supply. Is the PLC display active?
Units may be in initial or final stage of backwash.
Check panel status message – unit may be manually switched off.
Panel not switched back on after alarm reset.
Report to ENWA.

Orange light:

Unit is in backwash. Actuators A, B should be in raised position.

This should continue for 10-15 minutes maximum.

Red light:

Check alarm condition message. Reset if cause is clear.

Otherwise: **=> Isolate unit and report to ENWA**

Lack of flow during backwash:

Check power supply to break tank and reset Genyo unit.
Check mains water supply to the break tank – observe level within the tank.
Check isolation valve at units MCW inlet.
Check panel status.

Report to ENWA.

Discharge of water from break tank overflow:

Worn or impeded float valve. Isolate MCW. Reset, replace or report to ENWA.

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EnwaMatic® EM BAF (Backwash Anti-Freeze)

Overview

The EnwaMatic® BAF is a combined side stream filtration and active water treatment process for systems containing glycol or similar additives. A small percentage of the main flow is diverted through the vessel, such that total system volume is turned over twice in a 24 hour period.

The units provide:

- Side-stream filtration to less than 10 microns.
- Elevation and regulation of pH, maintaining a level of 9.0 – 10.5.
- Inhibition of corrosion and removal of dissolved iron levels.
- A stabilising process for the existing glycol content.
- Removal of air through integral air separation device.
- Environmental restriction of bacterial growth.

EnwaMatic internal view

Normal operation:

During normal operation, water enters the top of the vessel, passing through a combined filtration / reaction media bed to a strainer on the outlet pipe.

Filter media: A light, granular silicate based material that traps fine particles during downward flow. Reversing the flow during backwashing lifts and fluidises the media, allowing the collected debris to be washed to drain.

Reaction media: A calcite / dolomite blend containing alkaline materials. This media dissolves until an equilibrium pH is established (9.0 – 10.5). The process is self-regulating and will always strive to maintain this level, even where system water exchange occurs.

pH elevation accomplishes a number of tasks:

- Passivation (corrosion inhibition) of internal metal surfaces
- Precipitates dissolved iron from solution
- Counteracts the acidic nature of glycol products
- Stabilises the glycol content
- Reduces bacterial growth

Base layers: A gravel bed to prevent downward migration of reaction media. A final layer of glass beads to maintain free water flow around the strainer.

Water exits the vessel via the central pipe, returning to the system via the flow regulator.

The 'Service Flow Switch' on the unit outlet will generate an alarm if flow is lost.

Air separation:

The EnwaMatic unit will collect and expel any excess air entering the sidestream flow. In addition, air will be expelled and drawn in during the backwash process.

To prevent discharge of water / glycol vapour to air, the air eliminator is supplied with 6mm air hose. This can be piped to floor or drain, or piped into the breaktank via a M16 cable gland.

Automated backwash:

To remove collected debris and maintain a fluid media bed, the units will backwash at regular intervals.

Backwashing is a reversal of the direction of flow, created by operation of the 3 way valves (A&B). The unit is isolated from the main system during this process, and backwashing is carried out using mains water (MCW).

The units have a pressure independent flow regulator on the MCW inlet, to ensure excessive flow rates cannot lift filter media into the backwash output. Additional regulation is provided on the breaktank outlet.

The units will backwash for 5-10 minutes. Observation of the flow to drain will show a transition from clear, to orange / brown and back to clear. The removed debris will be predominantly fine iron oxides, and does not present a discharge or drainage issue.

The backwash interval is set by calendar date and time.

The default settings will backwash on the 1st and 15th of the month. This will be reviewed at commissioning and an appropriate regime for the water quality selected.

Default time: 01.00 am.

BAF (Backwash Anti-Freeze): Glycol recovery system

Isolation of the vessel and backwashing with MCW reduces any loss of system water and is suitable for the majority of closed systems. However, the volume of water trapped within the vessel at the start of the process is discharged to drain, which is not suitable where glycol is present.

The BAF system prevents this loss by transferring the vessel contents into the main system before backwashing commences. This temporary storage uses the system's expansion capacity, so consideration should be given to the available volume of expansion vessels.

To prevent the creation of a ‘dead leg’ in the BAF assembly during normal operation and to provide priming for the pump, a proportion of the service flow is diverted through the BAF pump.

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EnwaMatic® EM BAF

BAF automated backwash sequence

1) Backwashing activated by date / time, or manual activation (PLC 'BACKWASH')
2) Unit isolation Valve C closes. Green light on panel goes out.
3) BAF pump starts – pumping the vessel contents into the glycol system.
   Flow rate regulated to allow the expansion system to respond gradually.
   Small increase is system pressure during transfer of vessel contents.
4) Valve B opens to drain, to allow more air flow into the vessel during pump out.
5) BAF pump continues until air reaches the BAF flow switch. Vessel empty.
6) Valve A moves to backwash position. Outlet Valve E closes.
7) Orange light on panel.
8) Backwash commences. Duration: 5 - 10 minutes.
9) Valve B returns to service position, bringing the vessel to fill water pressure.
10) Valve D moves to BAF drain position.
11) Valve A returns to service position.
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12) BAF pump starts – transferring the vessel contents to drain.
13) Valve B opens to drain, allowing more air flow into the vessel.
14) BAF pumps continues until air reaches the BAF flow switch. Vessel empty.
15) Valve B returns to service position.
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16) Valve D moves to service position.
17) Valve C opens partially, allowing a slow refill of the vessel from the glycol circuit.
    System pressure / expansion volume returns to original levels.
18) A time delay allows all air to be expelled and the vessel to reach system pressure.
19) Outlet Valve E opens.
20) Unit returns to service.