Aquatech Pressmain

Water Technology Pressure Maintained

INSTRUCTIONS FOR

0. GENERAL SAFETY INFORMATION, WARNINGS & CAUTIONS
1. INSTALLATION
2. THE USER
3. SERVICING
4. DISPOSAL

AQUAMATIC AMV, AMF, HYAV SERIES COLD WATER PRESSURE BOOSTER SETS

MODELS: AMV-FB, AMV-FE, AMV-ES, AMF

XLM-300210 ISSUE 30 7/03/2022

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WRAS APPROVED PRODUCT

bsi. ISO 9001 Quality Management ISO 14001 Environmental Management FM 33090 EMS 596248

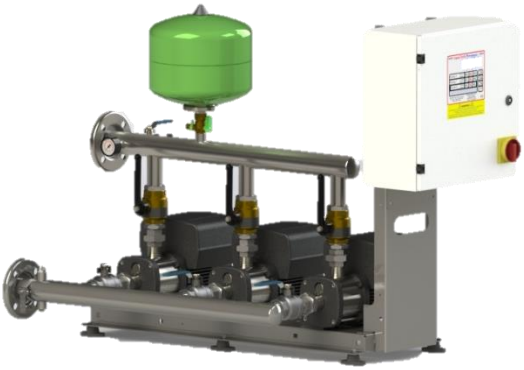
MADE IN BRITAIN

PRODUCT IDENTIFICATION

All units described in this manual are used to automatically increase and maintain the water supply pressure to a preset 'Duty' pressure.
In addition AMV-FE and HYAV-DS units built in accordance with BS9251 are capable of supplying Domestic Sprinkler installations (when “Fire Sprinkler Mode” is activated) as well as domestic water services.
Please note that the Serial Number “SO:xxxxx” and model reference will be visible on a label on or near the control panel/consumer unit and on the back page of the manual supplied with the unit.
Examples of units manufactured by Aquatech Pressmain are shown below: -
Please note: it is also possible for the components to have been sold as separate items, in which case the O&M manual and CE declaration may only be applicable in part.

AquaMatic AMV2-FB: twin pump
Variable speed booster set with
Flow Through Vessel. Standard Control

AquaMatic AMV3-FE: triple pump
Variable speed booster set with
Flow Through Vessel & Enhanced Controller



AquaMatic AMV3-ES: triple pump
Variable speed booster set with
Flow Through Vessel & Enhanced Controller

AquaMatic AMV-FE: five pump
Variable speed booster set with Enhanced Control
Control

AquaMatic AMF3: triple pump fixed speed
with flow through vessel & Enhanced

Model number examples: -

AMV	2	F	B	2-4	AquaMatic Cold water pressure booster set series
AMV					All **V**ariable speed pumps
AMF					All **F**ixed speed pumps
	2to8				Number of pumps
					Standard vessel (not flow through)
		F			**F**low Through vessel
		ES			End Suction pumps
			B		**B**asic controller
			E		**E**nhanced 2020+ controller with BMS
				2-4	Pump series

e.g. AMV2-FB-2-4 = 2 variable speed pumps series 2-4, with flow through vessel and Basic controller.

CONTENTS

0. GENERAL SAFETY INFORMATION

- These instructions are intended for the installer/operator/user/maintenance of this equipment and must be kept with the equipment, for the life of the equipment and made available to all persons. Please read GENERAL SAFETY INFORMATION 0.0, WARNINGS 0.1 and CAUTIONS 0.2, 0.3 & 0.4 before doing anything else, and then follow them carefully.
- The unit must only be installed/operated/used/maintained by a competent person; *A competent person is someone who is technically competent and familiar with safety practices and the hazards involved*.
- Hydraulic Accumulators/Expansion Vessels installed as part of/in conjunction with this equipment, with Pressure x Volume above 250 Bar-litres, require regular formal inspection by a *competent person.* This is a Legal Requirement under the "Pressure Systems Safety Regulations" (PSSR) and the Owner/User should be made aware of their responsibility for this. (see section 3. Servicing).
- Failure to install/operate/use/maintain the equipment as recommended below could cause damage to the equipment and anything subsequently connected to it, and invalidate the warranty provided by AquaTech-Pressmain to the buyer.

- Any damage caused to the equipment by misapplication, mishandling or misuse could lead to risk of **Electrocution, Burns, Fire, Flooding or injury to people or damage to property** dependent upon the circumstances involved.
- This equipment contains moving/rotating parts that must remain guarded. Removal of or missing guards could lead to serious personal injury.
- This equipment automatically restarts after a power interruption.
- We accept no responsibility or liability for any consequences or damage/losses due to misapplication, mishandling or misuse of the equipment.
- It should be noted that the assembly of pressure equipment on site under the responsibility of the user (or his representative) is not subject to the Pressure Equipment Directive 2014/68/EU. (National legislation covering assembly on site will apply)
- The combined water booster and sprinkler pump set is built in accordance with the Fire Sprinkler Systems for Domestic and Residential Occupancies – code of practice BS9251:2014 Assumptions made by Aquatech Pressmain in order to quote & supply a combined sprinkler and domestic supply pumps as section 5.9.2 of the standard are detailed below:
  - Customer has determined the category of the system 1, 2 or 3 (section 4.4)
  - Customer has determined the System flow rate (section 5.3) also with reference to installation with/without priority demand valve (section 5.9.2)
  - Customer has determined the System pressure (section 5.6)
  - Customer has determined the Stored water capacity (section 5.8.4)
  - As a combined sprinkler and domestic supply pump, the section 5.9.3 "Dedicated sprinkler pump" is not applicable.
  - Aquatech Pressmain does not supply any alarm devices to comply with section 5.13 "Alarm system".
- The latest version of this instruction manual with up to date safety information can be downloaded from our website at www.aquatechpressmain.co.uk

0.1 WARNINGS

0.1.1 **Do not touch any live parts for at least 5 minutes after switching off the electricity supply. Failure to observe this will constitute a severe Electric shock and/or Burns hazard and may be lethal.**

0.1.2 **The equipment is only suitable for earth referenced supplies and must be permanently earthed to avoid Electric shock hazard.**

0.1.3 **With equipment isolator OFF, mains voltage may still be present from BMS system. This constitutes an Electric shock hazard.**

0.1.4 **Emergency stop button does not remove dangerous voltages from control panel/pump motor assemblies. This constitutes an Electric shock hazard.**

0.1.5 **Power must not be interrupted to the unit more than 4 times per hour otherwise damage could occur to the inverter motors.**

0.1.6 **Metal parts (e.g. heat sinks) may reach temperatures of 90 degrees centigrade and will constitute a Burns hazard.**

0.1.7 **Some equipment is designed to operate with liquid temperatures up to 150 degrees centigrade and will constitute a Burns/scalding hazard.**

0.1.8 **The equipment must not be pressurised beyond the maximum working pressure as stated on pumps/pipework/vessels/control panel otherwise serious mechanical damage/destruction could occur causing injury to people or damage to property.**

0.1.9 **The equipment must not be heated/chilled beyond the maximum/minimum working temperature as stated on pumps/pipework/vessels/control panel otherwise serious mechanical damage/destruction could occur causing injury to people or damage to property.**

0.1.10 **Any damage to equipment, pumpset, vessels, pipework or system components caused by misapplication, mishandling or misuse could lead to Electric shock hazard, Burns hazard, Fire hazard, Flooding hazard or cause injury to people or damage to property.**

0.1.11 **This equipment may contain moving/rotating parts that must remain guarded. Removal of or missing guards could lead to serious personal injury.**

0.1.12 **Pressure vessels must never be disassembled whilst in use, they contain high pressure air/gas charge which could cause injury to people or damage to property.**

0.1.13 **Pump motors with lifting eyes; the lifting eyes are only suitable for lifting motors NOT the entire pump assembly. This could cause injury to people or damage to property.**

0.1.14 **Ensure the base/foundation/plinth/wall to which the equipment is to be attached is sufficiently strong enough to carry the entire mass of the equipment including the water that it will contain under worst-case fault conditions. E.g. fully saturated pressure vessel with no air charge, break tank full to overflowing, etc. Failure to observe this could cause serious mechanical damage/destruction resulting in injury to people or damage to property.**

0.1.15 **This equipment contains a fluid which may under certain circumstances leak/drip/spray fluid (e.g. servicing, repair or malfunction). Ensure any fluid discharge will not cause damage to the surroundings by taking appropriate action. E.g. install in a place that will not be damaged by leakage or install in a bunded area with adequate drainage.**

0.2 CAUTIONS FOR INSTALLATION

0.2.1 READ GENERAL SAFETY INFORMATION 0.0, WARNINGS 0.1 and CAUTIONS 0.2, 0.3 & 0.4

0.2.2 The unit should only be installed/operated by a competent person; *A competent person is someone who is technically competent and familiar with safety practices and the hazards involved.*

0.2.3 Do not lift the pumpset by pipework. Lift the pumpset by the container pallet using a pallet/forklift or crane by passing strops underneath the skid using a spreader bar. Use built-in lifting eyes on pump base where fitted, together with a spreader bar. Failure to utilise these facilities will result in damage to the pumpset.

0.2.4 Store in a dry place to avoid damp conditions deteriorating the equipment.

0.2.5 Protect against dirt, damage and frost. It is absolutely essential that no foreign matter such as pipe thread swarf, welding slag, grit or stones are allowed to enter the set. Debris of this type can cause severe damage to the mechanical seals, diaphragms and impeller. Frost/freezing will damage pumps/pipework and control panel components.

0.2.6 The equipment is only suitable for installation in a clean, dust free indoor environment, with adequate protection from heat and frost, and sufficient ventilation to ensure cooling of the motors. Ambient air temperature should be between 5 and 40 degrees centigrade, non-condensating. Operation outside of these conditions could seriously damage the equipment. If condensation in the motors is likely to occur, open the drain holes in the motor flange (where fitted).

0.2.7 If the equipment were to be stored or taken out of service for a period of time (e.g. 1 week or more), then we would recommend draining the equipment of all water/liquid (with due regard to any local regulations) to prevent frost damage to components. When restarting is required we would recommend commissioning by our authorised service agent.

0.2.8 Ensure the base/foundation/plinth/wall to which the equipment is to be attached has sufficient mass compared to the equipment, in order to avoid noise/vibration transmission. E.g. the mass of the base should be at least five times the mass of the equipment.

0.2.9 Ensure the electrical supply is the correct voltage, current, frequency and type for the equipment supplied and that suitable circuit protection equipment is installed in the supply. Incorrect electrical installation could be an electric shock/burns/fire hazard.

0.2.10 When accessing the control panel to make electrical connections adopt anti-static procedures e.g. wear anti-static earthed wristband, to avoid risk of damaging the controller.

0.2.11 All products that are packaged to include Pressure vessel(s)/Hydraulic Accumulator(s)/Expansion Vessel(s) are classed as “Assemblies” under the Pressure Equipment

Directive (PED). Where units are despatched with "Loose" vessel(s) for assembly on site it is absolutely essential that they be installed as detailed in the instructions using the fittings provided where appropriate. Failure to observe this will nullify compliance with the PED and may present a safety hazard. Your warranty may also be affected.

0.2.12 Where Hydraulic Accumulator(s)/Expansion Vessel(s) are supplied as a loose item, they must be installed/connected correctly before operating the equipment, otherwise serious damage from over-pressure/pump overheating could occur.

0.2.13 Do not operate this equipment/pumpset prior to commissioning (section 2.2) This could cause irreparable damage to equipment/pumpset/pipework/system components.

0.2.14 Isolate the equipment/pumpset before pressure testing system. Excess pressure could irreparably damage the pressure transducer, pressure switches (where fitted) and the diaphragms of pressure vessel/hydraulic accumulators.

0.2.15 It is the installers' responsibility to ensure subsequent pipework etc can accept the pressures generated by the equipment/pumpset and to install an overpressure safety device into the system with due respect to the suction pressure present on the pumpset, the pump closed valve pressure stated on the pump, the maximum working pressure stated on any of the attached pressure vessels and any other device connected to the system e.g. boilers, calorifiers etc.

0.2.16 When chlorination of the system is carried out, ensure that any residual chlorine is removed by thorough flushing as detailed in the HSE approved code of practice L8, to avoid damaging the equipment/pumpset. The normal level of chlorination is up to 2 parts per million (ppm), but shock dosing for sterilization purposes, at 25-50 ppm for 24-48 hours is acceptable as long as all chlorine is removed once the process is complete. Chlorination beyond these limits could seriously damage pumpset components and WILL NOT be covered by the warranty.

0.2.17 The installer/user is responsible for the installation of the correct earthing and protection according to valid national and local standards. All operations must be carried out by a suitably qualified person.

0.2.18 The equipment is only suitable for earth referenced supplies and must be permanently earthed to avoid electric shock hazard.

0.2.19 The equipment must be permanently earthed with appropriate sized Earthing.

0.2.20 Equipment containing variable speed drives/motors has high earth leakage current >3.5mA and will require additional earth bonding whereby a single conductor of increased size or duplicate earth conductors must be provided.

0.2.21 Never perform high voltage resistance tests on control panels, variable speed drives/motors without first disconnecting the panel/drive/motor from the circuit being tested as this will damage the built in electronic components.

0.2.22 Equipment containing variable speed drives/motors that has been stored/not powered up for long periods of time (i.e. 1 year or more) may require the variable speed drive/motor capacitors to be reformed. Please contact AquaTech-Pressmain for more information. Failure to reform capacitors will result in drive/motor damage.

0.2.23 Metal parts (e.g. heat sinks) may reach temperatures of 90 degrees centigrade.

0.2.24 RCD's/ELCB's are not recommended for use with variable speed drives/motors. Where their use is mandatory use type B RCD's. For single phase sets with inverter motors the earth leakage circuit breaker must trip out when earth fault currents with DC content (pulsating DC) occur. For three phase sets with inverter motors the earth leakage circuit breaker must trip out when earth fault currents with DC content (pulsating DC) and smooth DC earth fault currents occur.

0.2.25 RCD's/ELCB's suitable for use with variable speed drives/motors are not suitable for personnel protection.

0.2.26 EMC – inverter motors 0.37kW to 7.5kW Electromagnetic disturbance – first environment (residential areas) – unrestricted distribution, corresponding to CISPR 11, class B, group 1. Inverter motors= > 11kW Electromagnetic disturbance – first environment (residential areas) – restricted distribution. Immunity to Electromagnetic disturbance – second environment (industrial areas) – unrestricted distribution, corresponding to CISPR 11, class A, group 2. Inverter motors => 11kW for installation in first environment (residential areas) require additional EMC filter to obtain class B, group 1 status.

0.2.27 EMC - With respect to BS EN61000-3-2 this equipment is defined as 'professional equipment' and therefore the installer/user may need to seek permission from the supply utility to connect this equipment to the public low voltage mains supply.

0.2.28 Where "Expansion vessels" are used on Domestic hot water systems (DHWS) or LTHW heating system pressurisation units, the temperature of the fluid returning to the vessels should not exceed 70 degrees Centigrade for standard vessels or 100 degrees centigrade for Solar vessels, as this could damage the vessel diaphragm. Where the temperature exceeds 70/100C an intermediate cooling vessel should be fitted.

0.2.29 Where "Expansion vessels" are used on Domestic hot water systems (DHWS) or LTHW heating system pressurisation units, the glycol content in the water must not exceed 50%.

0.2.30 Drain cocks/valves and air bleed screws must not be left open as this could cause flooding.

0.2.31 **Combined Booster set and Domestic Sprinkler unit** (AMV-FE "Booster+Sprinkler" units).Where the pumpset is used to supply the domestic cold water services and combined with a connection to the domestic sprinkler system (BS9251) the pumpset generally works as described in this manual for the AMV-FE and/or HY-AV units, with the following exceptions/additions: -In the event of a fire there must be a volt-free signal from the sprinkler system to force the booster set into "fire sprinkler mode" and run pump(s) continuously until manually switched off at the mains isolator switch (IS1). This is in accordance with BS9251 code of practice "The sprinkler system is normally only to be turned off following liaison with the fire and rescue service and when deemed safe to do so". Note: pumps must be in "Auto" if they have been switched to hand or off they will perform their normal hand or off function. If pumps are left running in "fire sprinkler mode" with no or low flow, then the pumps will quickly (within minutes) heat up leading to pump seal failure and leakage, possibly followed by seizure. Damage of this type will not be covered under warranty.

0.3 CAUTIONS FOR OPERATION/USER

0.3.1 READ GENERAL SAFETY INFORMATION 0.0, WARNINGS 0.1 and CAUTIONS 0.2, 0.3 & 0.4

0.3.2 The unit should only be operated/used by a competent person; *A competent person is someone who is technically competent and familiar with safety practices and the hazards involved.*

0.3.3 The Owner/User of this equipment has a Legal Responsibility to ensure that it is subject to regular formal inspections. See Section 3. Servicing, for details.

0.3.4 Where Hydraulic Accumulator(s)/Expansion Vessel(s) are supplied as a loose item, they must be installed/connected correctly before operating the equipment, otherwise serious damage from over-pressure could occur.

0.3.5 The set must not be run until commissioned by an authorised AquaTech-Pressmain agent, this could irreparably damage the pump set and/or system components/pipework connected to it.

0.3.6 The pumpset should be left switched ON with the pumps switched to AUTO (where appropriate) for normal operation.

0.3.7 Where appropriate the pumpset should not be left in "Hand" operation for more than 1 minute. This could lead to severe damage of pumpset components and/or pipework system from over-pressure and/or overheating.

0.3.8 Ensure pumpset has an adequate water supply at all times to prevent dry running causing pump seal damage and water leakage.

0.3.9 Do no attempt to start pumps without liquid in volutes (pumps must be fully primed); mechanical seals must have a film of liquid between faces for proper operation and to prevent damage.

0.3.10 Minimum flow rate: Due to the risk of overheating, do not use the pump at a flow below the minimum flow rate. For cold water this is generally 10% of the pump flow rate as displayed on the pump data plate, on the pump body.

0.3.11 Portable telephones or other electro-magnetic equipment must not be used near the set to avoid corruption of program and unpredictable operation of unit.

0.3.12 **Combined Booster set and Domestic Sprinkler unit** (AMV-FE "Booster+Sprinkler" units).Where the pumpset is used to supply the domestic cold water services and combined with a connection to the domestic sprinkler system (BS9251) the pumpset generally works as described in this

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0.4  CAUTIONS FOR MAINTENANCE

0.4.1 READ GENERAL SAFETY INFORMATION 0.0, WARNINGS 0.1 and CAUTIONS 0.2, 0.3 & 0.4

0.4.2 The unit should only be operated/maintained by a competent person; *A competent person is someone who is technically competent and familiar with safety practices and the hazards involved.*

0.4.3 Where the set is fitted with Building Management Services (BMS) interconnections, notify the appropriate persons before switching OFF for maintenance or adjustments, to avoid unnecessary alarm conditions occurring. WARNING: With pumpset isolator OFF, mains voltage may still be present from BMS system. This constitutes an Electric shock hazard.

0.4.4 To prevent seizing, pumpsets must not be left unused for long periods (e.g. 1 week).

0.4.5 The pumps must be run regularly to avoid stagnation of water in the pumps/pipework (e.g. daily).

0.4.6 Do not vent air from air valves on vessels. These are for adjustment of pre-set cushion pressures. If wrongly adjusted this will lead to incorrect operation of the pumpset and possible damage to pumps, pipework and system components from overheating and over-pressure.

0.4.7 Switch OFF pumpset before accessing pumps and/or control panel.

0.4.8 **Combined Booster set and Domestic Sprinkler unit** (AMV-FE “Booster+Sprinkler” units).Where the pumpset is used to supply the domestic cold water services and combined with a connection to the domestic sprinkler system (BS9251) the pumpset generally works as described in this manual for the AMV-FE and/or HY-AV units, with the following exceptions/additions: -In the event of a fire there must be a volt-free signal from the sprinkler system to force the booster set into “fire sprinkler mode” and run pump(s) continuously until manually switched off at the mains isolator switch (IS1). This is in accordance with BS9251 code of practice “The sprinkler system is normally only to be turned off following liaison with the fire and rescue service and when deemed safe to do so”. Note: pumps must be in “Auto” if they have been switched to hand or off they will perform their normal hand or off function. If pumps are left running in “fire sprinkler mode” with no or low flow, then the pumps will quickly (within minutes) heat up leading to pump seal failure and leakage, possibly followed by seizure. Damage of this type will not be covered under warranty.

1. INSTALLATION INSTRUCTIONS

These instructions are intended for the installer of this pressure booster set. Please follow them carefully.

The unit should only be installed by a competent person; *A competent person is someone who is technically competent and familiar with safety practices and the hazards involved*.

Failure to install the equipment as recommended below could invalidate the warranty provided by AquaTech-Pressmain to the purchaser.

1.1 ADDITIONAL WARNINGS

DO NOT TOUCH ANY LIVE PARTS FOR AT LEAST 5 MINUTES AFTER SWITCHING OFF THE POWER. Failure to observe this will constitute an ELECTRIC SHOCK HAZARD.

READ GENERAL SAFETY INFORMATION 0.0, WARNINGS 0.1 and CAUTIONS 0.2, 0.3 & 0.4

1.2 ADDITIONAL CAUTIONS

1.2.1 READ GENERAL SAFETY INFORMATION 0.0, WARNINGS 0.1 and CAUTIONS 0.2, 0.3 & 0.4.

1.2.2 AMV-FB units must have the low water protection float switch fitted into the supply tank in order to protect the pumps from running dry and damaging the pump seals. AMV-FE sets have the Low Water protection sensor built into the suction manifold.

1.2.3 For low water protection float switch fitted into the side of the supply tank, take care when drilling 23mm diameter hole in tank, this should only be carried out by a competent person. Normal supply is an externally fitted switch with compression seal. Use the green (Viton) seal.

1.3 PROCEDURE

1.3.1 OFF-LOADING AT SITE

Do not lift pumpset by pipework. Lift the pumpset by the container pallet using a pallet/forklift or crane by passing strops underneath the skid using spreader bar.

Use built-in lifting eyes on pump base where fitted, together with a spreader bar (see below).

Failure to utilise these facilities could result in damage.

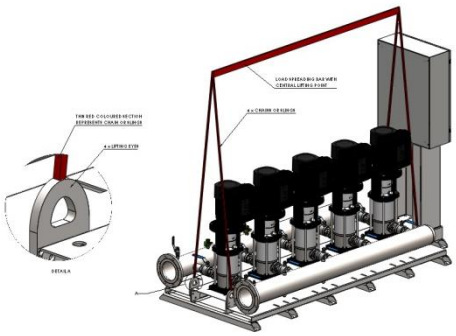


Fig. 1.1 Typical lifting eye arrangement on larger booster set bases.

1.3.2 LOCATION

If the set is to be installed in an unheated room, ensure that there is adequate frost protection.

The location of the equipment should have adequate drainage, bunding or other appropriate measures to protect assets and the building fabric in the event of leakage or water spillage. Failure to provide such measures may result in water damage to property and assets.

Ensure that location for pumpset provides adequate clear space to accommodate unit with reasonable access to all parts; AquaTech-Pressmain recommend a minimum distance of 500mm all round. There must be sufficient room to: -

fully open consumer unit/control panel door;

lift and withdraw pumps;

withdraw diaphragms from vessels.

remove manifolds from pumps.

If necessary, provide overhead lifting eyes for possible future use.

Any Hydraulic Accumulator supplied should be located as near as possible to the discharge side of the pumpset.

Should any of these location conditions not be satisfied AquaTech-Pressmain reserve the right to charge labour on any warranty work required on the pumpset.

1.3.3 FIXING

Install the set on a flat, even and level surface, where practical on a raised plinth to keep set above damp floor.

Locate unit in position; fit anti-vibration mounts if supplied. If necessary, level the base by inserting packing strips adjacent to bolt positions. Firmly attach pumpset to base.

1.3.4 PIPEWORK

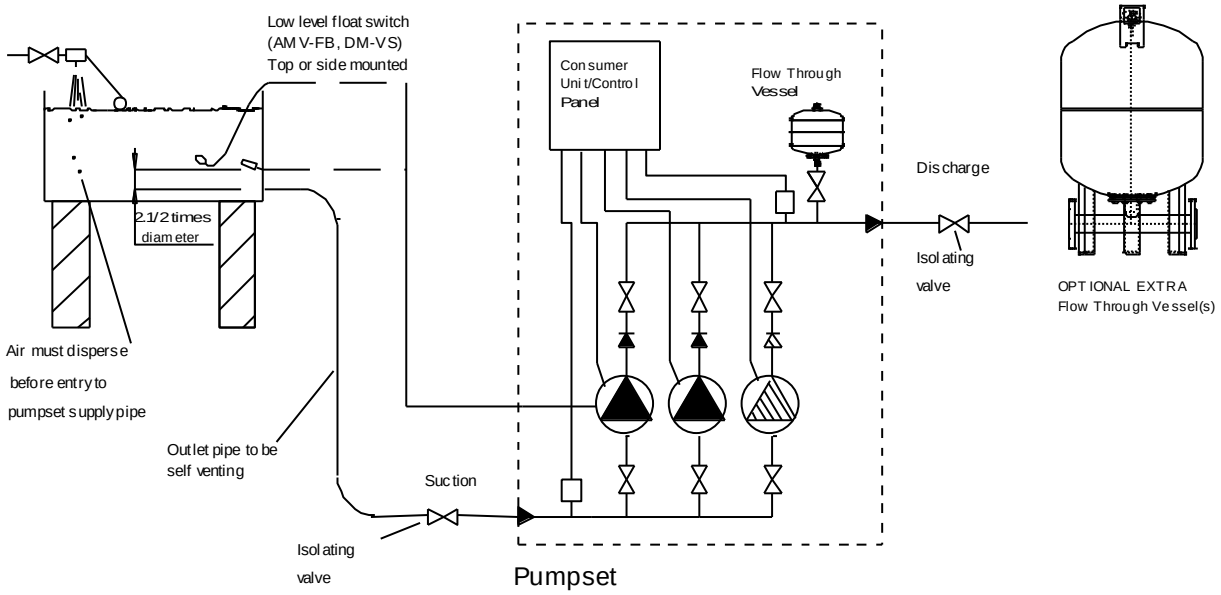


Fig. 1.2 Typical Pipework arrangement

1.3.4.1 **Arrange mains water breaktank to ensure fully flooded suction conditions to all pumps within the unit**, unless otherwise specified. Minimum requirement = 0.15 bar (1.5 metres)

1.3.4.2 **Arrange the suction pipework to be self-venting** between the mains water breaktank and the pumpset suction manifold (see fig.1.2).

1.3.4.3 **Fit isolating valves to the suction side and discharge side of the pumpset** (see fig.1.2), to enable the pumpset to be isolated from the system for maintenance purposes.

1.3.4.4 **Under no circumstances fit an extra non-return valve**, to either the suction or the discharge, as it may interfere with the correct operation of the non-return valves already fitted as standard in the pumpset.

1.3.4.5 **Remove any protective end plugs from suction and discharge pipework on pumpset**.

1.3.4.6 **Connect site pipework to suction and discharge manifolds**, ensuring adequate support is provided to avoid imposing pipe strain on manifolds. The connecting pipework should not be smaller than that of the pumpset. Where flexible pipe connections are fitted, ensure that the correct distance is allowed between flanges, that the pipework is also aligned axially, and no strain is imposed by the site pipework. (see fig.1.3)

MAX. PERMISSIBLE MOVEMENT					
BORE OD (mm)	NOM. Length (mm)	AXIAL EXTN (mm)	AXIAL COMP (mm)	SHEAR (mm)	ANGULAR MOVEMENT DEG
32	130	4	8	8	15
40	130	4	8	8	15
50	130	5	8	8	15
65	130	6	12	10	15
80	130	6	12	10	15
100	130	10	18	12	15
125	130	10	18	12	15
150	130	10	18	12	15

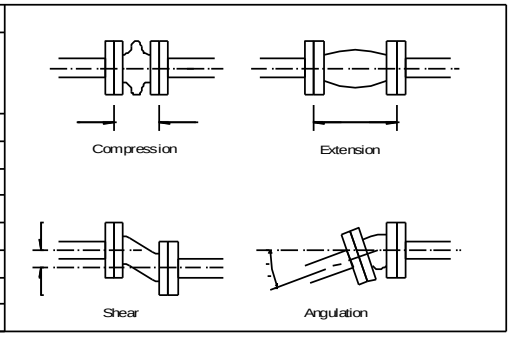


Fig. 1.3 Flexible pipework connections

1.3.4.7 Where Hydraulic Accumulator(s)/Expansion Vessel(s) are supplied as a loose item, they must be installed/connected correctly before operating the equipment, otherwise serious damage from over-pressure/pump overheating could occur (see also 1.3.5 for correct mounting).

1.3.4.8 All hydraulic accumulators and expansion vessels fitted to the system must have isolating and drain off valves to enable them to be serviced and removable pipework to enable the diaphragm to be replaced.

Fig. 1.4a & b Isolation valve on manifold & Flexible hose with drain cock on vessel (non-flow through vessel shown)

1.3.4.9 AMV-FE, AMF and HY-AV sets have a low water protection sensor mounted in the suction pipework, no further action is required.

1.3.4.10 AMV-FB sets; Install low level float switch in mains water breaktank at a level which stops the pumps when the water level reaches a point 2½ times the outlet pipe diameter above the outlet pipe. Make contacts = low water fault. Break contacts = water level ok.

1.3.4.11 Ensure that any swarf, debris, etc that may have entered the tank is removed as it could cause damage to the tank or connected equipment.

1.3.4.12 For side mounted level switch (where supplied), drill a 23mm diameter hole in the side of the tank at the correct height, assemble switch in correct order (as shown below), insert into tank from the outside ensuring the float is the right way up, right up to the flange of the seal, tighten nut to deform seal, sealing the hole in the tank. Connect the wires to the appropriate terminals of the pumpset.

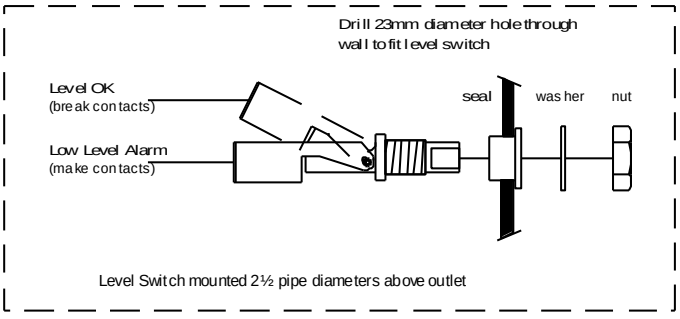


Fig. 1.5 Typical Low Water float switch for AMV-FB

1.3.5 FLOW THROUGH VESSELS

AMV, AMF and some HY-AV sets have 12, 18 or 25 litre flow through vessel(s) supplied loose for site fitting into the discharge manifold via a flowjet isolation and drain valve. The number and size of vessels supplied depends upon the number and size of pumps fitted.

Ensure "O-ring" is in place inside valve to prevent leakage.

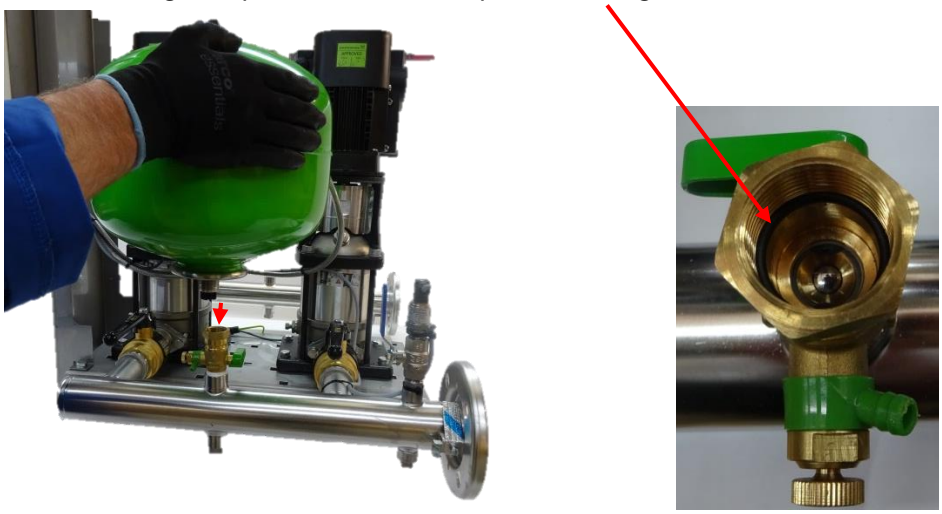


Fig. 1.6a & b Fit flow through vessel into discharge manifold flowjet valve.

In order to reduce power consumption still further, we would recommend fitting an additional (optional extra), larger flow through vessel to the discharge pipework of the system. This would store an amount of water at high pressure which would then be released to satisfy small demands from the system thereby reducing the number of pump starts.

Larger floor standing flow through vessels may be provided as optional extra items fitted on site. Sizes available from 60 litre to 3,000 litre with 1 ¼" up to DN100 connection.

Fig. 1.7 Typical Flow Through Vessels (12l, 300l and 800l shown).

All vessels must be securely mounted to prevent any movement from imposing strain on the attached pipework. Vessels MUST be mounted vertically on the integral legs with water connection lowermost.

Set up the vessel so the air charge filling valve (top) and the diaphragm (bottom) are accessible for future maintenance. All vessels must have isolating and drain off valves fitted to enable them to be serviced. The connecting pipework should be removable to give access for replacing the diaphragm and should be the same size as the vessel connection to minimise friction losses. In the case of floor standing vessels, if the system cannot be turned off then supply dual flow through vessels connected in parallel to enable isolation/draining of one vessel at a time. Contact AquaTech Pressmain for further information.

Set the air cushion pre-charge pressure to the correct level (see section 2.4), dependent on the application required for the vessel. Refer to the Operating parameters at the back of this manual or contact Aquatech-Pressmain for advice.

Caution: If the air cushion pre-charge pressure required exceeds 4.0 Bar then you must follow the procedure shown in section 2.4 to avoid damaging/rupture of the internal diaphragm and consequences of. E.g. High and/or low pressure problems, unstable pump operation.

1.3.6 ELECTRICAL

WARNING: DO NOT TOUCH ANY LIVE PARTS FOR AT LEAST 5 MINUTES AFTER SWITCHING OFF THE POWER TO ALLOW CAPACITORS TO DISCHARGE

READ GENERAL SAFETY INFORMATION 0.0, WARNINGS 0.1 and CAUTIONS 0.2, 0.3 & 0.4

1.3.6.1 All wiring must comply with the latest edition of local wiring Regulations.

1.3.6.2 **Wear anti-static wrist strap at all times** to avoid static discharge causing problems with the built in electronic program.

1.3.6.3 Connect incoming electrical mains supply to identified terminals on isolator SW1 in consumer unit or IS1 in control panel (see fig. 1.8a or b). Ensure voltages and frequency indicated on the motor nameplates and wiring diagrams correspond with supply mains data and that the supply fuse type & rating is correct for the total current rating of the equipment. Note: some 3 phase units may require Neutral supply for special applications. Refer to wiring diagram supplied with the unit or AquaTech-Pressmain.

1.3.6.4 AMV-FB sets; complete the wiring from the master pump (the one with the pressure sensor) terminals 2 & 10 (remove wire link between 2 & 10) to the installed low level float switch in mains water breaktank. Make contacts = low water fault. Break contacts = water level ok.

1.3.6.5 Where optional remote fault signal is required connect volt free terminals in motor terminal box for AMV-FB units or in control panel for AMV-FE, AMF & HY-AV units, to remote panel. See fig 1.8a or b and wiring diagram provided.

1.3.6.6 Complete any required earth bonding.

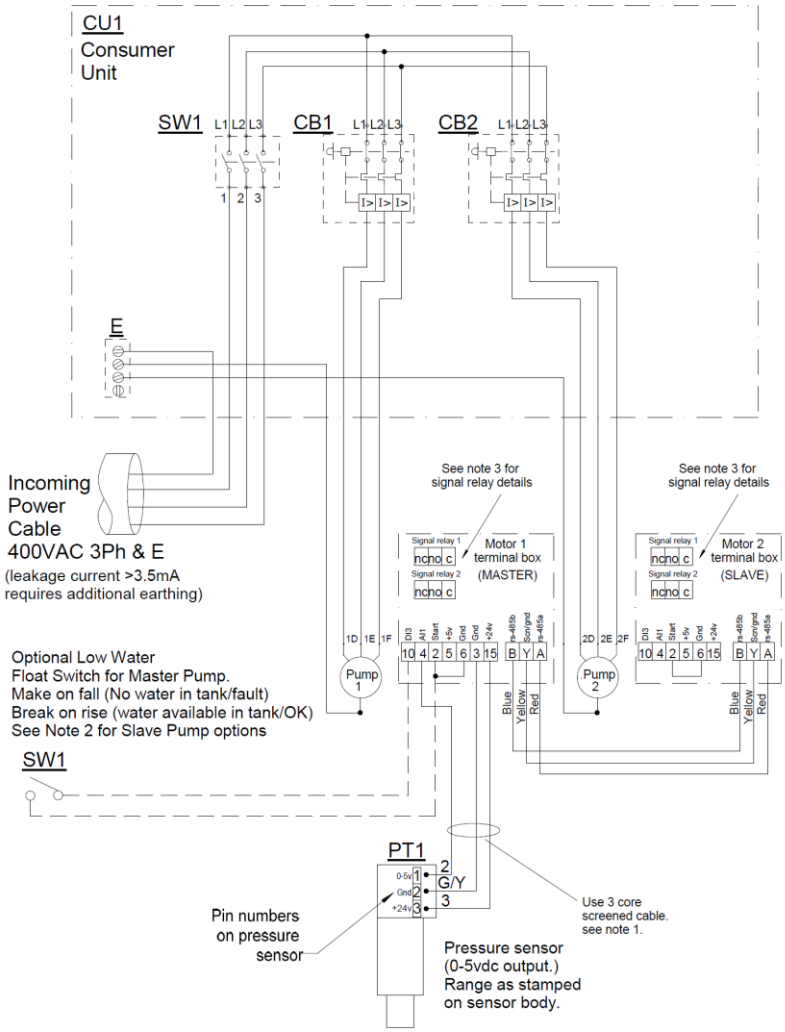


Fig. 1.8a Typical example of AMV-FB 400VAC 3 phase electrical connections

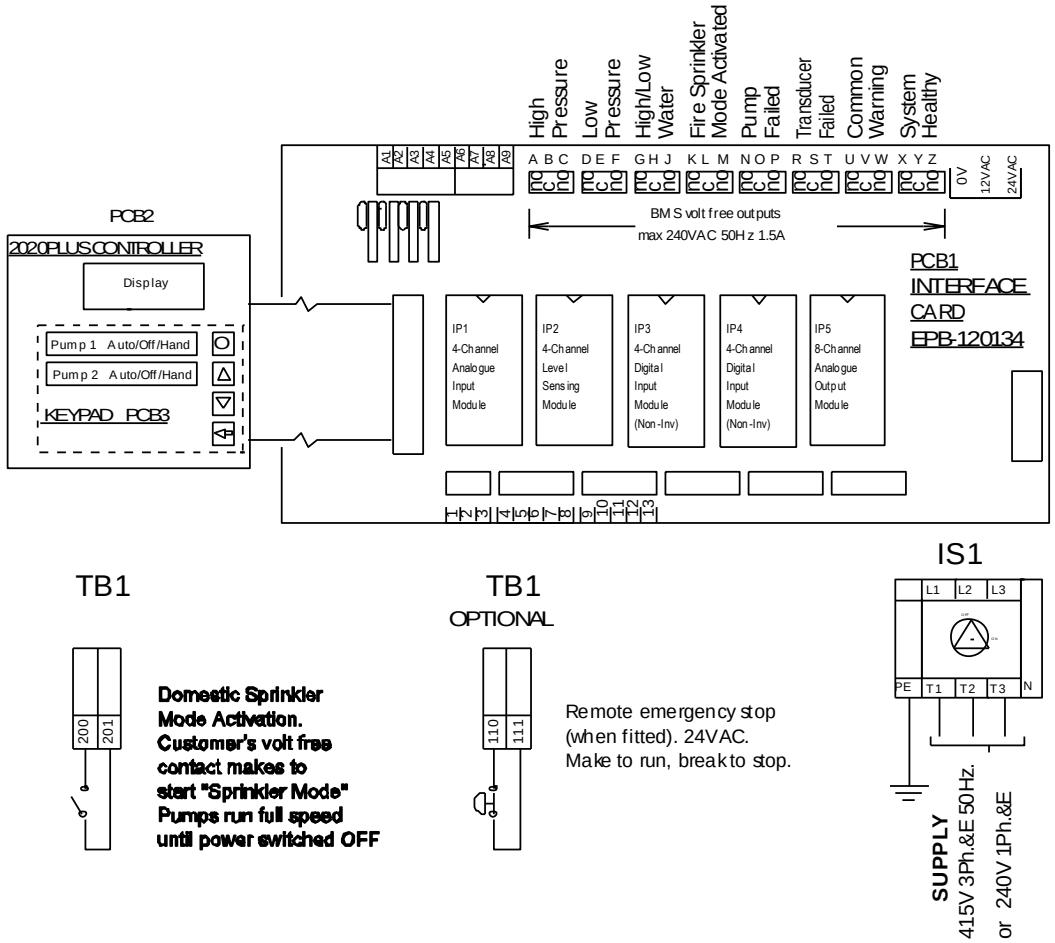


Fig. 1.8b Typical example of AMV-FE, AMF & HY-AV electrical & BMS connections

1.3.7 GUIDANCE ON SELECTING THE CORRECT EARTH LEAKAGE PROTECTION DEVICE FOR BOOSTER SETS

All wiring must comply with the latest edition of local wiring Regulations.
Where the incoming electrical supply to the booster set is to be protected by the customer using an Earth Leakage Protection Device, we would recommend that in order to prevent nuisance tripping, follow the information provided below: -

1. Generally, a booster set with pumps/motors that are single phase "variable speed" should have protection that is of the RCBO style, with a type "C" MCB part (inrush 5-10 x Amp rating) and 30mA class "A" RCD part (residual AC/pulsed DC fault currents) for twin pump sets, or 100/300mA class "A" RCD part (residual AC/pulsed DC fault currents) for triple pump sets.
2. Generally, a booster set with pumps/motors that are three phase "variable speed" should have protection that is of the RCCB style, with a 30mA or 100/300mA (dependent upon motor size and therefore total leakage current) class "B" RCD part (residual AC/pulsed DC & smooth DC fault currents) which is not of the delayed tripping type.

Variable speed Motor Size (kW)	Leakage Current (mA)
0.75 > 3.0	3.5
4.0 > 5.5	5.0
7.5	10.0
11.0 >	> 10.0

Table 1, Leakage currents according to EN61800-5-1

If you require any further assistance, please contact AquaTech-Pressmain.

1.3.5 INSTALLATION WITH COMBINED DOMESTIC & RESIDENTIAL SPRINKLERS to BS 9251:2021 (AMV-FE ONLY)

WARNING: Information contained within should not be regarded as guidance only it is not intended to be instructional or override any other requirements guidance or legislation. It is merely intended to convey how this equipment best meets the requirements of both BS 9251:2021

READ GENERAL SAFETY INFORMATION 0.0, WARNINGS 0.1 and CAUTIONS 0.2, 0.3 & 0.4

1.3.5.1 Priority Demand Valve

Before continuing, it is important to understand what a Priority Demand Valve (PDV) is and what it does. Fig 1.9a shows a typical combined residential sprinkler and domestic installation.
A PDV is sometimes installed into the domestic water flow pipe after the sprinkler take off (the domestic flow pipe feeds all of the normal outlets) and it capable of stopping the flow, so that all available water can be used by the sprinkler system. This has the benefit of reducing both maximum flow rate and required stored water capacity.

When a sprinkler head activates, the water entering the sprinkler system, lifts the flow switch, closing the PDV which stops the domestic flow.
The PDV will also close on low tank level.

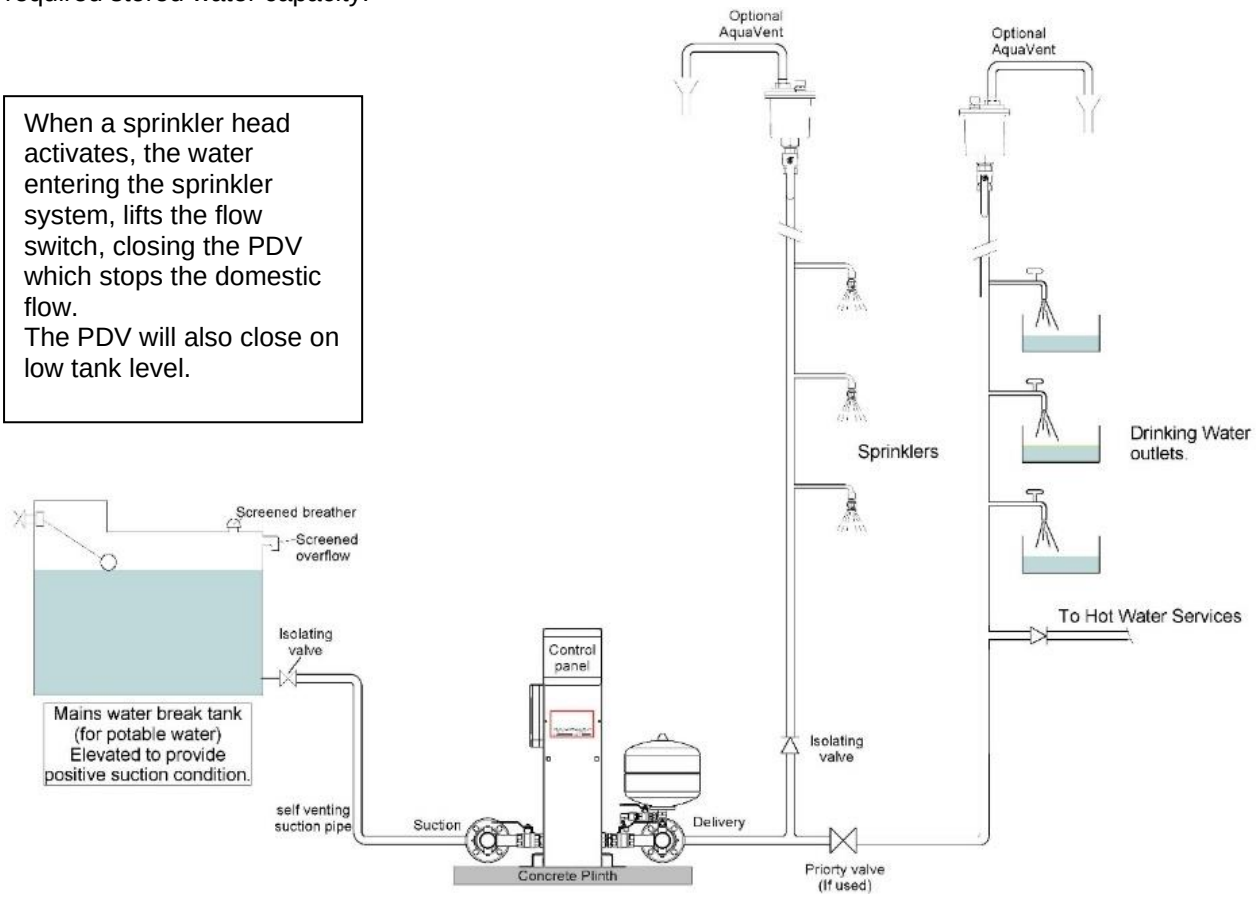
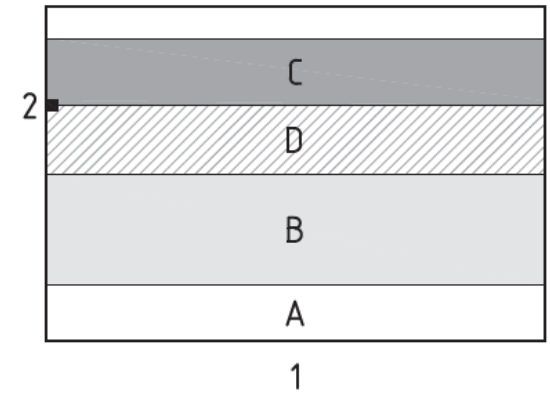


Fig. 1.9a Typical example of AMV-FE, AMF & HY-AV electrical & BMS connections

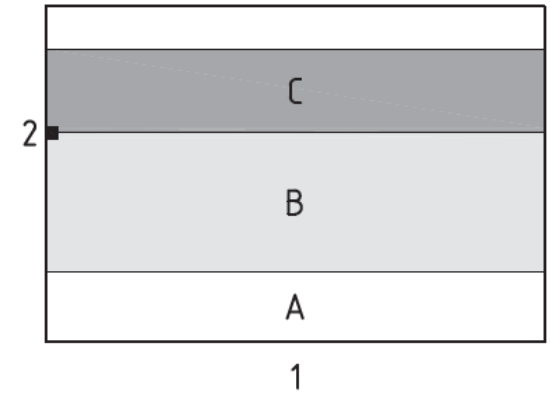
The PDV is activated via the sprinkler flow switch, and also has an input from a break-tank level switch. The operation of which is described further on.

1.3.5.2 Break tank Level Switch

Fig 1.9b, taken from BS 9251:2021 shows the required volumes in the break tank for combined domestic and residential sprinkler systems both with and without a PDV.



a) Shared water supply with no PDV and a shared pump



b) Shared water supply with a PDV and a shared pump

Key

A	Unusable water volume
B	Required sprinkler volume
C	Buffer volume
D	Building's peak domestic volume
1	Shared tank storage tank
2	Low water level alarm trigger position

Fig. 1.9b Break tank volumes with and without a Priority Demand Valve

In both cases it is recommended that a low level switch is installed in the break tank at point 2. Twin or split-tank installations require a switch in both tank sections.

In the case of the top example (no PDV), connect the low level switch to the booster controller (terminals 9, 10, 11). This will stop the pumps at the level, preserving all of the water below this point for a sprinkler event. However please see additional requirement on next page.

In the case of the lower example (with a PDV), connect the low level switch to the PDV control panel. Should the level fall to this point, this will close the PDV, stopping the domestic flow and preserving all of the water below this point for a potential sprinkler event.

1.3.5.3 Additional requirement for Sprinkler Riser Pressure Switch (no PDV)

Because stopping the booster set in low level will stop all water flow within the building, it also prevents the fire sprinkler activation being detected via the flow switch. Therefore a suitable pressure switch should be installed near the flow switch in the sprinkler line see fig 1.9c. If a sprinkler head activates, the resulting drop in pressure activates fire mode in the booster set overriding the low level condition and starting the pumps. The pressure switch should be wired in parallel with the flow switch.
It is recommended that the pressure switch is LBPC approved and should be set to a suitable pressure e.g. Building height + 0.5 Bar.

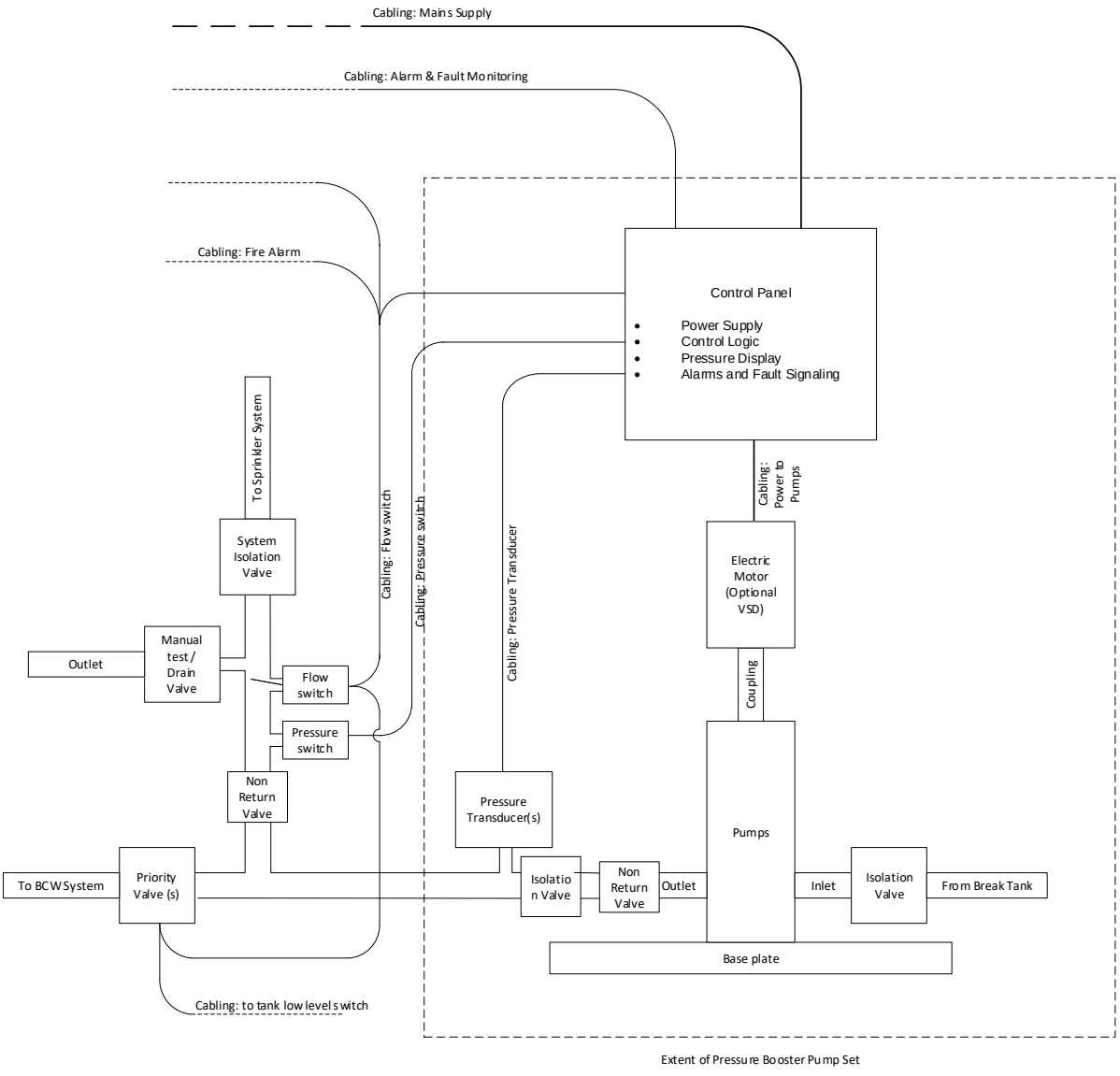


Fig. 1.9c Typical interconnections for sprinkler controls.

2. USER INSTRUCTIONS

2.1 CUSTOMER ASSURANCE

AQUATECH-PRESSMAIN ASSURE YOU THAT IF ANY PART OF THIS EQUIPMENT BECOMES DEFECTIVE DUE TO FAULTY MANUFACTURE OR MATERIALS WITHIN 24 MONTHS FROM THE DATE OF INVOICE OR 12 MONTHS FROM DATE OF COMMISSIONING BY AUTHORISED AQUATECH-PRESSMAIN AGENT, THE PART WILL BE REPAIRED OR REPLACED.

The only conditions are: -

- The equipment must have been installed, commissioned, operated and maintained as recommended by **AquaTech-Pressmain.**
- The equipment must not have been neglected, misused, modified, or used for any other purpose than its original application.
- The commissioning should be carried out within 6 months of the date of invoice by an authorised **AquaTech-Pressmain** agent.
- This Assurance does not apply to those items not supplied by us or to defects arising from parts not made or approved by **AquaTech-Pressmain**. The individual manufacturers own policies for dealing with defects will apply.
- Any part repaired or replaced under these Assurances will be covered for the balance of the appropriate Assurance period.
- If we have any disagreement about these Assurances which we are unable to resolve we will both abide by the decision of an agreed Arbitrator or, if we are unable to agree, one appointed by the Building and Engineering Services Association (B & ES) Arbitration Scheme Rules.
- These Assurances are in addition to, and do not detract from, the contractual rights you have under Statute or at common law.
- Failure to comply with the installation, commissioning and maintenance procedures will invalidate the warranty.

For full details please see the AquaTech-Pressmain "CONDITIONS OF SALE"

2.2 COMMISSIONING

Whilst this set has been tested in the factory to the required settings (detailed in operating parameters at the back of instruction manual), it is impossible to simulate the actual on-site conditions, especially if they are unusual. Also, the settings may have been disturbed since leaving the factory.
Therefore, we strongly recommend **the set is commissioned by our authorised agent** who will prepare the set, make any necessary adjustments and leave the set in operational order.

Commissioning is a requirement to validate the Warranty (see Customer Assurance)

Prior to requesting an engineer to attend the site for commissioning, the client must ensure that;

the equipment has been correctly installed;
a written scheme of examination has been obtained where required under the Pressure Systems Safety Regulations;
any necessary chlorination or other treatment has been completed;
an adequate water supply and permanent electricity supply are available;
the pipework etc in the building being served by the pumpset is capable of accepting the generated pressures.

2.3 OPERATING INSTRUCTIONS

These pumpsets are used for increasing the supply pressure of cold potable water and other liquids. In addition AMV-FE and HYAV-DS units built in accordance with BS9251 are capable of supplying Domestic Sprinkler installations (when "Fire Sprinkler Mode" is activated) as well as domestic water services.

2.3.1 ADDITIONAL WARNINGS

DO NOT TOUCH ANY LIVE PARTS FOR AT LEAST 5 MINUTES AFTER SWITCHING OFF THE POWER

READ GENERAL SAFETY INFORMATION 0.0, WARNINGS 0.1 and CAUTIONS 0.2, 0.3 & 0.4.

2.3.2 ADDITIONAL CAUTIONS

2.3.2.1 READ GENERAL SAFETY INFORMATION 0.0, WARNINGS 0.1 and CAUTIONS 0.2, 0.3 & 0.4.

2.3.2.2 AMV-FB units must have the low water protection float switch fitted into the supply tank in order to protect the pumps from running dry and damaging the pump seals. AMV-FE, AMF & HY-AV sets have the Low Water protection sensor built into the suction manifold.

2.3.2.3 **Combined Booster set and Domestic Sprinkler unit** (AMV-FE "Booster+Sprinkler" units).Where the pumpset is used to supply the domestic cold water services and combined with a connection to the domestic sprinkler system (BS9251) the pumpset generally works as described in this manual for the AMV-FE and/or HY-AV units, with the following exceptions/additions: -In the event of a fire there must be a volt-free signal from the sprinkler system to force the booster set into "fire sprinkler mode" and run pump(s) continuously until manually switched off at the mains isolator switch (IS1). This is in accordance with BS9251 code of practice "The sprinkler system is normally only to be turned off following liaison with the fire and rescue service and when deemed safe to do so". Note: pumps must be in "Auto" if they have been switched to hand or off they will perform their normal hand or off function. If pumps are left running in "fire sprinkler mode" with no or low flow, then the pumps will quickly (within minutes) heat up leading to pump seal failure and leakage, possibly followed by seizure. Damage of this type will not be covered under warranty.

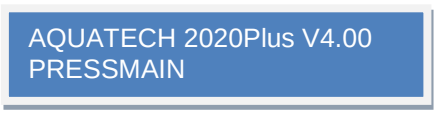
2.3.3 NORMAL OPERATION - COLD WATER PRESSURE BOOSTER

The pressure booster set increases and maintains the supply pressure to a preset 'Duty' pressure.

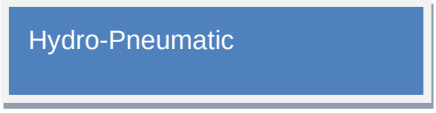
The pumpset consists of two or more pumps mounted on a baseframe together with associated suction and discharge pipework and valves. For AMV-FB units, the controls are motor mounted. For AMV-FE, AMF and HYAV units, the 2020Plus controller is mounted in the control panel. In all cases they work in conjunction with a hydraulic accumulator.
In addition, AMV-FE and HYAV-DS units built in accordance with BS9251 are capable of supplying Domestic Sprinkler installations (when "Fire Sprinkler Mode" is activated) as well as domestic water services. See section 2.3.4 as well as the information below.

2.3.3.1 The AMV-FE, AMF and HYAV units control is by AquaTech-Pressmain "2020Plus" Microprocessor, with a 2-line by 20 or 24-character display on the control panel, showing the current system pressure and status.

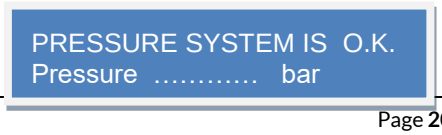
When switched on the display shows,
then self-checks, flashing all LED lights on keypad,



and identifies configuration for pump operation
(e.g. "Hydro-pneumatic" pressure booster set)



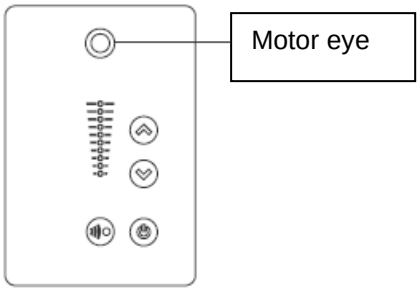
followed by the system status and pressure



2.3.3.2 For "normal" operation, all pump suction and discharge valves should be left open, all hydraulic accumulator/expansion vessel isolating valves should be left open, and drain cock/valves should be left closed. Should it be necessary to have a situation that is not "normal" operation, then we would strongly recommend attendance to site by our trained/authorised service personnel. Please contact AquaTech-Pressmain for more details.

2.3.3.3 Pump Motor Eye (all variable speed models)

The operating condition of the motor is indicated by the Eye on the motor control panel. See below



Grundfos Eye	Indication	Description
	No lights on.	Power off. Motor not running.
	Two opposite green indicator lights rotating in the direction of rotation of the motor when seen from the non-drive end.	Power on. Motor running.
	Two opposite green indicator lights permanently on.	Power on. Motor not running.
	One yellow indicator light rotating in the direction of rotation of the motor when seen from the non-drive end.	Warning. Motor running.
	One yellow indicator light permanently on.	Warning. Motor stopped.
	Two opposite red indicator lights flashing simultaneously.	Alarm. Motor stopped.
	The green indicator light in the middle flashes quickly four times.	Remote control with the Grundfos GO Remote via radio. The motor is trying to communicate with the Grundfos GO Remote. The motor in question is highlighted in the Grundfos GO Remote display to inform the user of the location of the motor.
	The green indicator light in the middle flashes continuously.	When the motor in question is selected in the Grundfos GO Remote menu, the green indicator light in the middle will flash continuously. Press on the motor control panel to allow remote control and data exchange via the Grundfos GO Remote.
	The green indicator light in the middle is permanently on.	Remote control with the Grundfos GO Remote via radio. The motor is communicating with the Grundfos GO Remote via radio connection.
	The green indicator light in the middle flashes quickly while the R100 or Grundfos Go Remote is exchanging data with the motor. It will take a few seconds.	Remote control with the R100 or Grundfos GO Remote via infrared light. The motor is receiving data from the R100 or Grundfos GO Remote via infrared communication.

Fig. 2.1 Pump motor eye

2.3.3.4 Pump Operation

Intermittent running duty pump with or without one or more optional support pumps meeting demand. Pumps are run at Variable speed, except AMF models which are fixed speed.
When demand on the system occurs (e.g. when a tap is turned on or a hose reel valve is opened) the pressure falls as water from the hydraulic accumulator is discharged into the system. The pump operates at the set duty pressure and will run for a set period or until the demand is satisfied and the accumulator is replenished. Should the pressure continue to fall due to increased demand etc. the support pump(s) will automatically start in sequence and run for a set minimum time or until the demand is satisfied.

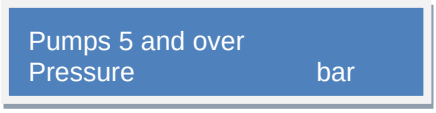
2.3.3.5 Duty Pump Rotation.

To spread the wear evenly across all the pumps, their sequence is automatically rotated.

AMV-FE, AMF and HYAV Models only:

2.3.3.6

Pumpsets with more than 4 pumps use the <Enter> key (9) to toggle operation of the keypad and LED lights between pumps 1 to 4 and pumps 5 to 8.



2.3.3.7 Automatic Restart (when "manual restart" is set to "not enabled" on 2020 Plus controller)

If there is an interruption to the electrical supply the unit will automatically restart on restoration of the supply. Pumps will restart at timed intervals and at reduced speed dependent upon model type.

2.3.3.8 Manual Restart (when set to "enabled" on 2020 Plus controller)

If there is an interruption to the electrical supply, or there is a low water level condition, the unit will need to be manually reset on restoration of the supply, or low water level condition, by pressing the "Reset Alarm" key. Pumps will then restart at timed intervals and at reduced speed dependent upon model type.

All Models: -

2.3.3.9 Pressure Setting

The pumpset is set at the required 'duty' pressure at the factory. If necessary, the pressure will be adjusted at commissioning to suit local conditions.

2.3.3.10 "REPRESS/REFILL" feature (for variable speed booster sets only)

When programmed to suit the site conditions, this parameter is designed to help fill the booster sets system riser/pipe work gradually, after a power interruption.
e.g. we have found in some instances during a power cut that occupiers of flats in a tower block, would use water until the main water riser was partially or completely empty, resulting in the system pressure possibly dropping to 0.0Bar. When power is restored, the booster set would allow all of the pumps to switch on in sequence and operate at full speed (100%) to try to build the pressure back up to the normal level. This could result in fittings at the top of the riser being subjected to high velocity water coming to a sudden stop, and the resultant kinetic energy loosening certain types of fittings. In order to help prevent this situation the controller has some added features to refill the system gradually under automatic control. Once set at commissioning no further user intervention is required.

2.3.3.11 Dry Running Protection

For AMV-FB units, the pumpset is supplied with a float switch for mounting in the mains water break tank, which is wired back to the pump motor terminal box connections to stop the pumps in the event of a low water condition in the break tank. (see Figs1.4 & 1.7 or wiring diagram provided).
The unit is supplied with a link that bridges the low water level switch connections, to inhibit operation until the level switch is fitted.
Note: The pumps will not run until a level switch is fitted. See the wiring diagram supplied with the unit for information.
The Low water level switch circuit is;

- "Made" for fault condition (no water in tank)
- "Open" for water available (water available in tank)

For AMV-FE, AMF and HYAV units, the pumpset is supplied with a low water sensor built into the suction manifold and pre-wired to the control panel. No further action is required.

2.3.3.12 Stop Function

The water flow from the pumpset is tested periodically by momentarily reducing the speed, if flow is present then the pump(s) speed back up and continue on until a low flow condition is sensed, whereupon the speed is increased until the pressure reaches a pre-determined stop pressure, nominally the duty pressure x 1.2 for AMV-FB units, or the duty pressure for AMV-FE, AMF and HYAV units.

2.3.3.13 Low Pressure cut out

For AMV-FB units, if the system pressure falls to, or below 0.5 Bar for a pre-set period of time, the pumps will stop to protect themselves and the system.

For AMV-FE, AMF and HYAV units, if the system pressure falls to, or below the low pressure alarm parameter setting for the adjustable low pressure delay time period, the pumps will stop to protect themselves and the system.

See the table below for the possible causes and cures

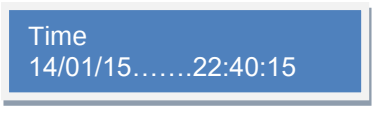
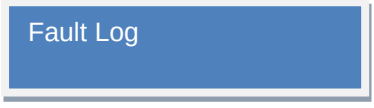
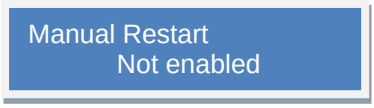
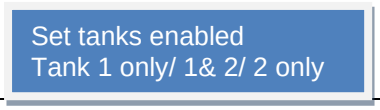
Cause	**Cure**
system pressure remained at or below low pressure setting for duration of low pressure delay timer, and lock out protection is invoked.	Pumps are air locked and need venting? Or running off end of curve due to demand beyond design limit? Pump(s) switched Off or Tripped? Rectify fault, switch pumps off, bleed pumps of air and switch back on.

2.3.3.14 Combined Domestic Booster set and Sprinkler unit (AMV-FE "Booster+Sprinkler" units)

Where the pumpset is used to supply the domestic cold water services and combined with a connection to the domestic sprinkler system (BS9251) the pumpset generally works as described in this manual for the AMV-FE and/or HY-AV units, with the following exceptions/additions: -
In the event of a fire there must be a signal from the sprinkler system to tell the booster set to go into "fire sprinkler mode" and run pump(s) continuously until switched off at the mains isolator. Note: pumps must be in "Auto" if they have been switched to hand or off they will perform their normal hand or off function.
When in sprinkler mode the display shows "fire sprinkler mode", sounds an audible alarm, releases healthy relay, and records a date/time/event stamp in the fault log.

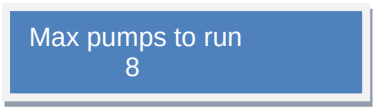
2.3.3.15 <u>To view the parameters</u> (AMV-FE, AMF and HYAV units only)

Press <SET/VIEW> on the keypad. Then, press the same key **4** more times.
Press the <UP> (7) key, to view the next parameter.
Page through the parameters by using the <UP> (7) and <DOWN> (8) keys to view:
Various parameters will be displayed dependent upon unit type. The main parameters that customers are interested in are shown on the following page.

Date and Time (24 hour clock)		not password protected to allow on site adjustment.
Fault Log (last 30 faults)		press <view> to see log followed by <up> (7) or <down> (8) to view log. press <enter> to return
Manual Restart upon power failure or low water level condition		not password protected to allow user to enable/disable
Set Tanks enabled		not password protected to allow user to enable/disable

		break tank Low level & High level alarms for cleaning etc.
Pumps 1 & 2 hours run time	Pump x run time 000123.4 Hours	
Time elapsed since last service	Since last service 000987.6 Hours	service reminder after 6 months
Total run time (power up time)	Total run time 005000.0 Hours	not resetable
Enable service call	Enable service call Enabled	enable/disable service reminder
Low pressure Lockout	LP Lockout Active	pump dry run/over-run protection
Low pressure alarm	Low pressure 1.0 Bar	low pressure alarm. Note: low pressure approach warning is 0.2 bar more than this value
Low pressure delay	Low p delay 30 sec	time before alarm is initiated.
High pressure	High pressure 8.0 Bar	high pressure alarm. Note: high pressure approach warning is 0.2 bar below this value
High pressure delay	High p delay 10 sec	time before alarm is initiated.
Duty delay	Duty delay 0 sec	to delay duty pump starting. NOT used on booster sets.
Support delay	Support delay 10 sec	to delay support pump starting in normal operation preventing electrical/pressure dips/surges
Starts in 12 minutes	Starts/12 mns 0	sets frequency of pump starts warning (system leak detection) NOT used on booster sets!
Duty pressure	Duty pressure 1.6 bar	duty pump cut-out pressure. All other pumps are derived from this value.
Minimum run time	Min run time 30 sec	for each pump

Maximum number of pumps to run



limits number of pumps allowed to run simultaneously (and therefore number of standbys)

2.3.4 NORMAL OPERATION – COMBINED BOOSTER & DOMESTIC SPRINKLER SET

The pressure booster set increases and maintains the supply pressure to a preset 'Duty' pressure.
In addition AMV-FE and HYAV-DS units built in accordance with BS9251 are capable of supplying Domestic Sprinkler installations (when "Fire Sprinkler Mode" is activated) as well as domestic water services.

2.3.4.1 Combined Domestic Booster set and Sprinkler unit (AMV-FE & HYAV-DS "Booster+Sprinkler" units)
Where the pumpset is used to supply the domestic cold water services and combined with a connection to the domestic sprinkler system (BS9251) the pumpset generally works as described in this manual for the AMV-FE and/or HY-AV units, with the following exceptions/additions: -
In the event of a fire there must be a (volt-free) signal from the sprinkler system to tell the booster set to go into "fire sprinkler mode" and **run pump(s) continuously until switched off at the mains isolator**. This is in accordance with BS9251 code of practice "The sprinkler system is normally only to be turned off following liaison with the fire and rescue service and when deemed safe to do so". Note: pumps must be in "Auto" if they have been switched to hand or off, they will perform their normal hand or off function.

2.3.4.2 When in sprinkler mode the display shows "fire sprinkler mode", sounds an audible alarm, releases healthy relay, operates "Fire sprinkler mode activated" relay and records a date/time/event stamp in the fault log.

2.3.5 SYSTEM WARNINGS (AMV-FE, AMF and HYAV units only)

Flashing display giving type of fault and a common warning volt free output signal (where fitted)

***** Warning *****	Cause	Check
High pressure approach	system pressure at high pressure setting minus 0.2 Bar	Pressure vessel air charge wrong? Or insufficient expansion capacity?
Low pressure approach	system pressure at low pressure setting plus 0.2 Bar	Pressure vessel air charge wrong? Or water usage exceeds design capacity?
Pump starts exceeded/is system leaking?	duty pump starts exceeded "starts in 12 mins" parameter. NOT normally used for booster sets.	System pipework is leaking excessively? Starts parameter set too low?
Excessive run time/ is system leaking?	duty pump continuously running for 12 minutes. NOT normally used for booster sets	System pipework is leaking excessively?
Commissioning needed	Unit has not been commissioned by authorised service engineer	Have unit commissioned by authorised service engineer.
Tank 1 Disabled	Tank 1 alarms have been disabled using controller keypad	Tank 1 alarms disabled for tank cleaning? Re-enable alarms when finished.
Tank 2 Disabled	Tank 2 alarms have been disabled using controller keypad	Tank 2 alarms disabled for tank cleaning? Re-enable alarms when finished.

Power Up	Power interruption started “Power Up” sequence	Incoming electrical supply interruption? Or missing phase? Or loose connections?
Support pump started	Fire pump set has started support pump to maintain pressure.	Duty pump failed? Or excess water usage/leakage?
Low level delay	A low water level condition has reset, and a 4-minute delay is now initiated before normal operation will resume	Check pumps are vented and wait for the delay time to expire
Manual restart (when set to enabled)	A power interruption or low water level has occurred,	Carry out all necessary checks, then press the “Reset alarm” key on the micro
Flow switch activated	For fire hose reel/sprinkler sets where sufficient water is drawn off to activate flow switch	Check for water usage (pump will run continuously until manually stopped/switched off and/or alarm reset).

2.3.6 **SYSTEM ALARMS** (AMV-FE, AMF and HYAV units only)

Flashing display giving type of fault and volt-free output signals on BMS Enhanced models (where fitted)
Alarms are manually muted and reset using the <UP> (7) or <DOWN> (8) buttons on the keypad.
(Automatic reset facility can be provided)

***** Alarm *****	Cause	Check
Booster system Fault	Check pumps 1 to 4, or 5 to 8 for a pump-tripped condition. (by pressing <Enter> key)	Check electrical supply is within tolerance, or missing phase? Pump seized? motor failed? Variable speed drive/inverter trip? Motor thermistor overheated?
High pressure	system pressure at/above high pressure setting & delay timer expired	Pressure vessel air charge wrong? Or insufficient expansion capacity? Pump(s) left in Hand?
Low pressure	system pressure at/below low pressure setting & delay timer expired	Pressure vessel air charge wrong? Or water usage exceeds design capacity? Pump(s) switched Off or Tripped?
Transducer failed	Pressure sensor output above normal range of pressure sensor or pressure sensor not connected correctly.	Pressure higher than sensor range? Or pressure sensor failed? Or pressure sensor wiring loose?
Pump overload fault	Pump/Inverter tripped signal present	Check electrical supply is within tolerance, or missing phase? Pump seized? motor failed? Motor thermistor overheated?
No water in feed tank	water level below supply tank low water alarm probe or pipework sensor dry. (240 second delay on automatic restart, after restoration of water level).	Break tank float valve stuck closed? Or output of pumpset exceeds mains water supply into break tank? Mains water interruption to break tank?
Pump overheated	Pump motor temperature too high.	Pump seized? motor failed? Motor thermistor overheated?
High water level Tank 1 or 2	water level above supply tank high water alarm probe	Break tank float valve wrongly adjusted, stuck open or letting by?
Low pressure lockout/ please vent the pumps	system pressure remained at or below low pressure setting for duration of low pressure delay timer, and lock out protection is invoked.	Pumps are air locked and need venting? Or running off end of curve due to demand beyond design limit? Pump(s) switched Off or Tripped?
Low water level Tank 1 or 2	water level below supply tank low water alarm probe or pipework sensor dry. (240 second delay on automatic restart, after restoration of water level).	Break tank float valve stuck closed? Or output of pumpset exceeds mains water supply into break tank? Mains water interruption to break tank?
Leak Detect Lock-out Pumps Disabled	Not normally active on a booster set but if used will stop the pumps should the frequency of starts alarm or continuous running detection operate.	Check cause of too many pump starts or continuous run e.g. serious leak.
Fire Sprinkler Mode	Sprinkler system has activated, forcing pumps to run continuously	Check sprinkler operation, switch pumpset off/on to reset.
Other Fault	Hardware shutdown	Please call AquaTech-Pressmain for advice

2.3.7 **PUMP FAULTS** (All models)

WARNING: When accessing the control panel take care not to touch ANY LIVE PARTS. These should be left to discharge for at least 5 minutes after switching off the power, to allow capacitors to discharge (where fitted)

Pump Faults

Where appropriate a fault is indicated by a red light on the motor terminal box. Detailed information is obtained by the use of a R100 remote control or Grundfos Go App.

Grundfos Eye	Condition/cause	Remedy
 Two opposite red indicator lights flashing simultaneously.	**External fault (3)**	
	An external signal has reported an "External fault" to the digital input set up for this function.	Check the parameter or the unit reporting the external fault. Correct the fault.
	Too many restarts (4)	
	The pump has restarted to many times in connection with a fault that forced the pump to stop and restart automatically.	a) Check the warning and alarm log for faults that caused to many restarts. b) Replace the pump if the fault cannot be found.
	Overvoltage (32)	
	Supply voltage to the pump too high.	a) Check that the power supply is within the specified range.
	Undervoltage (40)	
	Supply voltage to the pump too low.	a) Check that the power supply is within the specified range.
	Overload (49)	
	The motor is overloaded and has automatically reduced the speed and thus the pump performance.	a) Check that the viscosity and temperature of the pump liquid is within the limits for the pump. If not, change the properties of the liquid. b) Dismantle the pump, and remove any foreign matter or impurities preventing the pump from rotating. c) If none of the above causes are present, replace the pump.
	Blocked pump (51)	
	The pump is blocked.	a) Dismantle the pump, and remove any foreign matter or impurities preventing the pump from rotating.
 One yellow indicator light permanently on.	**Pump communication fault (10)**	
	Communication fault between this pump and the other pumps of the multipump system.	a) Check that all pumps of the multipump system have been correctly set up.
	Forced pumping (29)	
	Other pumps or sources force flow through the pump even if the pump is stopped.	a) Check the system for defective non-return valves and replace, if necessary. Check the system for correct position of non-return valves, etc.
	Dry running (56, 57)	
	No water at the pump inlet or the water contains too much air.	a) Prime and vent the pump before a new start-up. Check that the pump is operating correctly. If not, replace the pump.
	Internal fault (72, 83, 85, 155, 157, 163)	
	Internal fault in the pump electronics.	a) Replace the functional module, power module or terminal box.

Fig. 2.2a Pump Faults

Grundfos Eye	Condition/cause	Remedy
 One yellow indicator light permanently on.	**High motor temperature (65, 66)**	
	1. The motor temperature is too high.	a) Check that the ambient temperature is within the specified range. b) Check that the pump is not covered by dust, dirt or other foreign matter which reduces the air cooling of the pump. c) If none of the above causes are present, replace the motor.
	Internal communication fault (76)	
	1. Communication fault between different parts of the electronics.	a) Replace the terminal box.
	Soft pressure buildup, timeout (215)	
	1. The system has been in the mode "soft pressure buildup" longer than the set time limit.	a) Check the system for leakages.
 One yellow indicator light rotating in the direction of rotation of the motor when seen from the non-drive end.	**Replace motor bearings (30)**	
	1. The bearings must be replaced.	a) Follow the instructions for the pump, see *7.12 Replacing the bearings*.
	Internal sensor fault (88)	
	1. The pump is receiving a signal from the internal sensor which is outside the normal range.	a) Check that the plug and cable are connected correctly to the sensor. The sensor is on the back of the pump housing. b) Replace the sensor.
	Pt100/1000 sensor 1 (91) and 2 (175)	
	1. Pt100/1000 input 1 is receiving a signal which is outside the normal range.	a) Check that the sensor resistance corresponds to ≈ 100 or 1000 ohm. If not, replace the sensor. b) Check the sensor cable for damage. c) Check the cable connection at the pump and at the sensor. Correct the connection, if required. d) Replace the sensor.
	Supply fault, 5 V (161)	
	1. Fault in the output voltage to sensor or potentiometer.	a) Check the output voltage and wire to sensor or potentiometer.
	Supply fault, 24 V (162)	
	1. Fault in the output voltage.	a) Check the output voltage and wire.
	LiqTec sensor fault (164)	
	1. The pump is receiving a signal from the LiqTec sensor which is outside the normal range.	a) Check that the plug and cable are connected correctly to the sensor. b) Replace the sensor.
	Signal fault, sensor 1 (165), 2 (166) and 3 (167)	
	1. Analog input 1, 2 or 3 is receiving a signal which is outside the normal range.	a) Check the setup of the analog input corresponds to the sensor output as regards electrical (0.5 - 3.5 V, 0-5 V, 0-10 V, 0-20 mA or 4-20 mA). If not, change the setting, or replace the sensor with one that matches the setup. b) Check the sensor cable for damage. c) Check the cable connection at the pump and at the sensor. Correct the connection, if required. d) Check if the sensor has been removed, but the input was not deactivated. e) Replace the sensor.
	Limit 1 exceeded (190) and limit 2 exceeded (191)	
	1. Limit 1 or 2 has reached the limit for warning/alarm.	a) Identify and remove the fault cause.

Fig. 2.2b Pump Faults

2.3.8 COMMON FAULTS

VENTING PUMPS

Fig 2.3 Venting Pumps (Multi-Stage type pump shown above, End-Suction type pump below)

To vent pumps:

Isolate pumpset from system by closing a common discharge valve.
ISOLATE control panel
Undo air vent screw on each pump body until all the air is released
Re-tighten screws
Switch ON panel isolator.
After pumpset has initialised, **SLOWLY** open discharge valve to bring the pumpset back online.

Note: Failure to close the discharge valve, or reopening it too quickly could cause damage to the system.

If a problem persists, contact AQUATECH-PRESSMAIN service department quoting the serial number SO or WN: _____ (on control panel fascia)

2.3.9 REMOTE SIGNALS

2.3.9.1 - **AMV-FE, AMF and HYAV** volt free contacts in control panel (see fig 1.8b) :
High Pressure, Low Pressure, Low Water in suction pipe, Pump failed, Transducer failed, Common warning & System healthy

Optional – provided if requested when ordered:
High water in the supply tank, Remote emergency stop (24 VAC).

2.3.9.2 - **AMV-FB** volt free contacts in each Pump motor if configured at time of order (see fig 1.8a):

Relay 1 maximum contact load = 250VAC, 2A or 30VDC, 2A (Default setting = Alarm)
Relay 2 maximum contact load = 30VDC, 2A (Default setting = Running)

Description	Grundfos Eye	Contact position for signal relays when activated					Operating mode
		Operation	Running	Ready	Alarm	Warning	
Power off.	Off	C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	-
Pump running in "Normal" mode	Green, rotating	C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	Normal, Min. or Max.
Pump running in "Manual" mode.	Green, rotating	C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	Manual
Pump in operating mode "Stop".	Green, steady	C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	Stop
Warning, but the pump is running.	Yellow, rotating	C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	Normal, Min. or Max.
Warning, but the pump is running in "Manual" mode.	Yellow, rotating	C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	Manual
Warning, but the pump was stopped via "Stop" command.	Yellow, steady	C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	Stop
Alarm, but the pump is running.	Red, rotating	C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	Normal, Min. or Max.
Alarm, but the pump is running in "Manual" mode.	Red, rotating	C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	Manual
Pump stopped due to an alarm.	Red, flashing	C NO NC	C NO NC	C NO NC	C NO NC	C NO NC	Stop

Fig. 2.4 Remote Signals

2.4 MAINTENANCE INSTRUCTIONS

DO NOT TOUCH ANY LIVE PARTS FOR AT LEAST 5 MINUTES AFTER SWITCHING OFF TO ALLOW CAPACITORS TO DISCHARGE.

2.4.1 ADDITIONAL CAUTIONS

2.4.1.1 READ GENERAL SAFETY INFORMATION 0.0, WARNINGS 0.1 and CAUTIONS 0.2 to 0.4**.**

2.4.2 PROCEDURE

Every 6 months the pumpset should be maintained by authorised AquaTech-Pressmain service agents - see Servicing (Section 3.)

Pump Lubrication

Pumps require no lubrication as the impeller shafts are carried on the motor bearings.

Motor Lubrication

Motor bearings for 0.37 to 7.5kW motors are normally sealed and require no lubrication. Motor bearings for 11 to 22kW motors, should have a grease point, use polycarbamide-based grease, and completely renew every 4000 running hours. Remove the bottom plug in the motor flange and the plug in the bearing cover to ensure that old and excess grease can escape.

Expansion, Control and Hydro Accumulator vessels

Air Charge Pressure. The correct charge pressure provides reliable operation of the system and a prolonged lifetime of the diaphragm. This should be checked regularly. Caution: If the air cushion pre-charge pressure required exceeds 4.0 Bar then you must follow the procedure shown below to avoid damaging/rupture of the internal diaphragm and consequences of. E.g. High and/or low pressure problems, unstable pump operation.

1. **To adjust air charge pressure < 4.0Bar**: isolate the vessel from the system and release pressure on water side by opening the drain cock disposing of the water-mix in the appropriate manner. The water inside the bladder will be pushed back by the air charge pressure. Remove cap on the filling valve, set air charge pressure refilling using dry air or nitrogen. Screw cap firmly on filling valve. Close the drain cock and slowly open water connection to the system.
2. **To adjust air charge pressure > 4.0Bar**: If vessel is already in use then isolate hydraulically, reduce the air charge to 4.0Bar then evacuate the water side of the vessel followed by evacuation of the air side. With the vessel empty of water and air, set the air charge pressure (using dry air or nitrogen) to 4.0Bar, bring the water side pressure up to 5.0Bar and close isolating valve, then add more air until the air side pressure is equal to the required pre-charge pressure multiplied by 1.2 e.g. for a pre-charge pressure of 6.0Bar after filling vessel with air to 4.0Bar followed by water to 5.0Bar, fill the air side to 6.0 x 1.2 = 7.2Bar. Screw cap firmly on filling valve and slowly open isolating valve & water connection to the system.

LEAVE SET WITH ALL PUMPS SWITCHES IN THE AUTO POSITION,
THE MAINS SUPPLY SWITCHED ON,
AND THE SYSTEM CONNECTION OPEN

3. SERVICING

3.1 MAINTENANCE AND CARE OF YOUR EQUIPMENT

The AquaTech-Pressmain equipment that is described in this instruction booklet has been manufactured and tested to the highest standards of design and quality. It will give trouble free operation over many years provided it is maintained regularly from when it is commissioned. To keep it operating efficiently in a safe, economical and environmentally friendly condition, regular maintenance is an essential part. AquaTech-Pressmain along with its' service division, AGM Pressurisation Services are the official providers of commissioning and maintenance services. (see below).
Several companies operating under the Aquatronic Group Management structure are available to fulfil a wide range of servicing and maintenance requirements, as detailed below.

3.2 LEGAL REQUIREMENTS

Hydraulic Accumulators/Expansion Vessels installed as part of/in conjunction with this equipment, with Pressure x Volume above 250 Bar-litres, require formal inspection in accordance with a "Written Scheme of Examination". This is a Legal Requirement on the part of the Owner/User under the "Pressure Systems Safety Regulations" (PSSR). A "Written Scheme" and regular inspection can be provided by either AGM Pressurisation Services (combined maintenance and inspection) or ESIS Ltd (inspection only), see details below.

AGM Pressurisation Services

Plant Servicing & Inspection
AGM PRESSURISATION SERVICES,
AGM House, London Rd, Copford, Colchester Essex, CO6 1GT.
Phone: 01206 215151
10 Wheel Forge Way, Manchester. M17 1EH. Ph: 0161 226 4727

AGM provides maintenance and installation of all types of packaged water pumping equipment for building services. Its specialist fields are Pressure booster equipment and sealed systems for heating and chilled water distribution systems.
Regular servicing of any plant for essential services is vital because wear and tear are very gradual processes. With preventative maintenance, the costs are small and benefits in reliability, safety and economy can be significant. AGM Pressurisation Services can provide a complete package of schemes for preventative maintenance on all AquaTech-Pressmain and other makes of equipment.

ESIS

Pressure Vessel Inspection
ESIS ENGINEERING SAFETY & INSPECTION SERVICES LTD,
AGM House, London Rd, Copford, Colchester, Essex, CO6 1GT.
Phone: 01206 215141

Under the Pressure Systems Safety Regulations, expansion vessels and hydraulic accumulators, generally 250 bar-litres and greater, and protection devices, require a Written Scheme of Examination before they can be operated. ESIS Inspection and Insurance Services Limited specifications can provide the means to comply with these regulations. These services can be extended to cover other units e.g. air pressure receivers etc.

3.3 SERVICE CONTACTS

For service during warranty period contact: AQUATECH-PRESSMAIN Service Department
Head Office Tel: 01206 215121
For regular servicing, contact service division: AGM PRESSURISATION SERVICES
Head Office Tel: 01206 215151 Manchester Office Tel: 0161 226 4727
who will be pleased to give you expert advice on this or any other servicing matter.

4. DISPOSAL

Disposal of this product or parts of it must be carried out in accordance with the following guidelines:

Use the local public or private recycling/waste collection service.
In case such a recycling/waste collection service does not exist or cannot handle the materials used in this product, please deliver the product or any hazardous material from it to your nearest AquaTech-Pressmain office.

EU Declaration of Conformity

We, Aquatronic Group Management Plc, declare that the equipment detailed below:

PRESSURE BOOSTER SET

MODEL: Aquamatic AMV (1-8), AMF (1-8) according to drawing A12289

Complies with the requirements of the following European Directives:

Machinery Directive 2006/42/EC
Low Voltage Directive 2014/35/EU
Electro Magnetic Compatibility Directive 2014/30/EU

1/1/2021

I.D.Taylor, I.Eng. MIET, Director
Aquatronic Group Management Plc
T/A AquaTech-Pressmain
AGM House, London Rd, Copford, Colchester, Essex CO6 1GT UK
Telephone: 01206 215121

OPERATING PARAMETERS

SERIAL No. ..... **MODEL** .....

THE SERIAL & MODEL NUMBERS MUST BE QUOTED WHEN REQUESTING ASSISTANCE

ELECTRICAL DATA:

Supply	. .....	volts	.....	Ph	.....	Hz
Full load current of pumpset	.....	Amps				
Max. pumpset loading:	.....	Kw	Method of starting:		Variable speed	

NOISE LEVEL: less than 70 db(A) unless otherwise stated .....

NOMINAL FLOW RATE: ..... litres/sec

PRESSURE SETTINGS:

AS FACTORY SET				❖ **AMENDED AT COMMISSIONING**	
	bar		secs	bar	secs
Pump Duty pressure	.....			.....	
Hyd. Accumulator:	.....			.....	
Pump closed valve press.	.....			.....	
		Minimum run time	.....		.....
Low pressure	.....	Low pressure delay	.....	.....	.....
High pressure	.....			.....	

❖ On commissioning it may be found necessary to modify these settings. Providing this information is left with the equipment, the figures will be updated by the commissioning engineer.

Updated by commissioning engineer ..... Date .....