AquaTech Pressmain

WORLD CLASS
HIGH TEMPERATURE HOT WATER HEATING SYSTEM
PRESSURISATION UNITS

NITROPACK “AS2ET-N” SERIES
and “SR2-E” SERIES

AGM
Aquatronic Group Management Plc.
Group Member

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"NITROPACK", AS2ET-N & SR2-E

Multi-Pump Spill- Back Pressurisation Unit with 2020+ Microprocessor Controller.

GENERAL

A Modular system offering modular pressurisation units and flexible combinations of spill tanks Nitrogen vessel(s) with or without additional cooling vessels.
The Nitropack AS2ET-N and SR2-E system pressurisation units automatically maintain pressure in pressurised High Temperature Hot Water (HTHW) heating systems which have total expanded volume of water (acceptance) up to 10,000 litres, boiler flow temperatures from 120 to 200 degrees centigrade and cold fill pressures up to 20.0 bar. Larger systems can also be designed for, please ask AquaTech-Pressmain for further details.
Once the system has been initially filled via a quick filling loop or similar (part No. MAF-200001) the "Nitropack" will take over and maintain optimum system conditions. As the system water expands due to increasing temperature, the water level in the nitrogen pressure vessel rises resulting in a rise in pressure. An electro-mechanical spill valve relieves the rising pressure, and surplus water is ejected from the system into the spill tank via an integral spurge pipe. This intermittent spilling system continues until the heating system operating temperature is reached.
The nitrogen pressure vessel compensates for any variation of system temperature between thermostat settings.
As the system cools the pressurisation pumps put water back into the system from the spill tank to automatically compensate for the rate of system contraction.
During the above operations the pressure variation does not normally exceed 1.0 bar.

SPECIFICATION

Nitropack type AS2ET-N-XX-YY-Z (or SR2-E) suitable for an estimated system volume of AAAAA litres having a cold fill pressure of BB bar, incorporating 2020+ microprocessor and pressure transducer control, with twin three phase pumps having automatic alternation of duty pump & anti seizure pulsing, delayed initiation of high and low system pressure cut outs both linked to single pole volt free relays, hand-Off-Auto switches for each pump, pump Run & Tripped L.E.D.s, hours run meters, interlocked door isolator, low water level sensing in spilltank coupled to volt free relay, alarm buzzer, alarm mute and reset buttons/indicators, digital pressure, fault and parameter indicator. Combined spill and mains water break tank, float valve with type AA or AB air gap, overflow connection, and low water level protection, electromagnetic spillvalve with strainer & isolating valves, IP55 powder coated control cabinet, interconnecting piping to spill tank, all mounted on steel base frame. Set assembled, tested and commissioned in accordance with ISO9001 Standards.

OPTIONAL AQUASPHERE BLANKET
This is a single layer ball blanket which floats on the spill tanks' surface, which will significantly reduce moisture & oxygen ingress.
Problems associated with absorption from the atmosphere are not exclusively limited to the adsorption of water. The absorption of free oxygen into hot water contained in boiler feed tanks can lead to serious corrosion of pipes, valves and boiler jackets. Tests have shown that a single layer blanket can reduce water absorption from the atmosphere by up to 60% and oxygen absorption by up to a factor of 42. The Aquasphere Blanket system can therefore be seen as a highly effective two way barrier preventing both evaporation from and absorption into a liquid.

STANDARD FEATURES:

- Maximum expanded volume (acceptance): normally 10,000 litres; maximum system cold fill pressure: 20.0 bar. (Larger systems also available)
- Nitrogen pressure vessel fabrication to BS 5500 and provided with side entry level switch to automatically control nitrogen charging, pressure relief valve, isolating and drain valves with optional sight gauge & automatic shut-off pockets (at extra cost)
- An extra cooling vessel can be used
- Automatic alternation of duty pump to even wear.
- Anti pump-seizure pulsing.
- Low water level pump protection switch mounted in Spilltank.

• Automatic delay on high & low pressure alarms up to 4 minutes to allow circulator pump pressures to stabilise.

• Integral automatic water make-up system.

• Designed, manufactured & tested to ISO9001 Standards.

• Full commissioning and after sales service available nationwide.

• CE marked for full compliance with all relevant European Directives.

• HSE Directive PM5 category B & Optional M & E 3 specification.

• Optional High water level alarm switch mounted in Spilltank.

• Optional duplication of Nitrogen vessel, Spill valves etc, will ensure continuous operation in critical applications.

OPTIONAL EXTRA ECO-FRIENDLY FEATURES:

• Increasing the size and/or number of the Nitrogen control vessel(s) will reduce the spilling/pump back frequency and reduce energy consumption thereby reducing carbon footprint.

• Adding or increasing the size of cooling vessel will lengthen the life of the control vessel and reduce thermal stress on pumps and pipework thereby increasing their working life.

• Adding an Aquasphere blanket will considerably reduce evaporation of system water and oxygen absorption, significantly reducing water loss & system corrosion, therefore prolonging system life.

• Variable speed operation of spill pumps will reduce energy consumption (and carbon footprint) and reduce strain on system components.

• Pre-heating spill back water will reduce thermal shock in boiler and hence reduce corrosion lengthening boiler life.

Fig 1: Example of a “SR2-E” High Temperature Hot Water heating system pressurisation unit, featuring duplicate Nitrogen control vessels and Spill valves etc, to ensure continuous operation in a critical application.

NITROPACK SELECTION FOR HTHW HEATING SYSTEMS:

1) In order to select the correct pressurisation unit, firstly calculate the required **Cold Fill** pressure. i.e. the minimum pressure that is required to ensure the entire system is filled with water and does not flash over to steam at higher flow temperatures (the superimposed pressure).

The **Cold Fill** pressure is calculated by:-

a) adding the static height of the system (i.e. height in metres above the pressurisation unit to the highest point of the heating system) then converting this height into Bar (10.2 metres equals 1.0 Bar)
b) adding the Superimposed pressure from Table 1 (dependent upon boiler flow temperature). This pressure includes an Anti-flash margin.
c) and adding 0.6 Bar for pump switching differentials.

Boiler Flow Temperature °C	Expansion of system water in percent %	Superimposed pressure required in Bar.
120	6.0	1.8
130	7.0	2.7
140	8.0	3.9
150	9.1	5.3
160	10.2	7.1
170	11.4	9.3
180	12.8	11.8
190	14.2	14.9
200	15.7	18.5

Table 1:

Example 1) A system with a static height above the pressurisation unit of 4 metres and a flow temperature of 130°C, would result in: -
Cold Fill Pressure (Bar) = 0.4 (static height in Bar) + 2.7 (superimposed pressure) + 0.6 (pump differentials)
Cold Fill Pressure = 3.7 Bar.

Example 2) A system with a static height above the pressurisation unit of 20 metres and a flow temperature of 150°C, would result in: -
Cold Fill Pressure (Bar) = 2.0 (static height in Bar) + 5.3 (superimposed pressure) + 0.6 (pump differentials)
Cold Fill Pressure = 7.9 Bar.

2) The **High Pressure Alarm** point would under normal circumstances be set to 1.0Bar above the Cold Fill Pressure. This may be increased or possibly decreased for special systems or applications. Please refer to AquaTech Pressmain for further advice.

3) To select the correct **Pump Module** it is necessary to contact your nearest AquaTech-Pressmain office. Due to the bespoke nature of every system it is not possible to provide generic selection data for the pump module.

4) Next select the required size of **Spill Tank.** To size the spill tank accurately, it is necessary to know the **System Content** of water in litres. If this is not known then an estimate of 10 litres per kilowatt of boiler power may be used subject to confirmation by calculation or measuring the actual content when the system is filled.

Example 1) As previous example 1 with a flow temperature of 130°C and system content of 20,000 litres (or 2000kW boiler power multiplied by 10 litres per kilowatt) then the selection would fit on the -20- curve of Chart 1, thereby selecting a 2000 litre spill tank.

Example 2) As previous example 2 with a flow temperature of 150°C and a system content of 60,000 litres (or 6,000kW boiler power multiplied by 10 litres per kilowatt) then the selection would fit on the -80- curve of Chart 1, thereby selecting a 8,000 litre spill tank. For practical purposes it is possible to split this down into 2 off 4,000 litre spill tanks.

Note: for systems requiring a higher system volume or boiler power than shown on the following chart, please refer to AquaTech Pressmain for other available spill tank modules or pressurisation units.

SELECTION CHART FOR HTHW HEATING SYSTEM SPILL TANK BY BOILER FLOW TEMPERATURE & SYSTEM CONTENT:

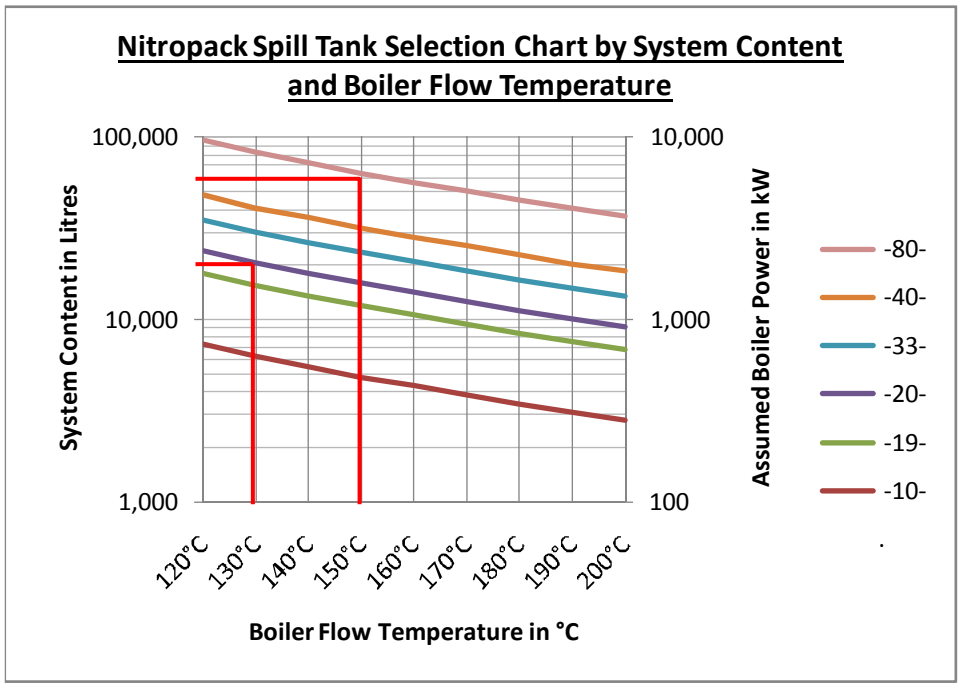

Chart 1: (see Table 2 for more information on Spill tanks)

Larger systems (and therefore larger spill tanks) can easily be accommodated, please refer to AquaTech Pressmain for advice.

Spill Tank Code	Gross Volume in litres	Max. dimensions overall in mm			Approx. Dry weight kg	Overflow BSP	Float valve size (min 1.0 Bar main)
		Length	Width	Height			
-10-	1000	1000	1100	1300	220	1 ½"	1"
-19-	1900	1250	1350	1550	290	1 ½"	1"
-20-	2000	1000	1100	2300	310	1 ½"	1"
-33-	3300	1000	1700	2200	420	1 ½"	1"
-40-	5000	1000	2000	2350	600	1 ½"	1"
-80-	8000	2000	2200	2350	825	1 ½"	1"

Table 2: Spill tank data.

GENERAL ARRANGEMENT DRAWING FOR NITROPACK AS2ET-N & SR2-E UNITS:

Examples of the general arrangement for an AS2ET-N or SR2-E pressurisation unit is shown below, although all units are manufactured to suit site conditions/requirements so actual layout and dimensions will differ from that shown. Please contact AquaTech-Pressmain for details.

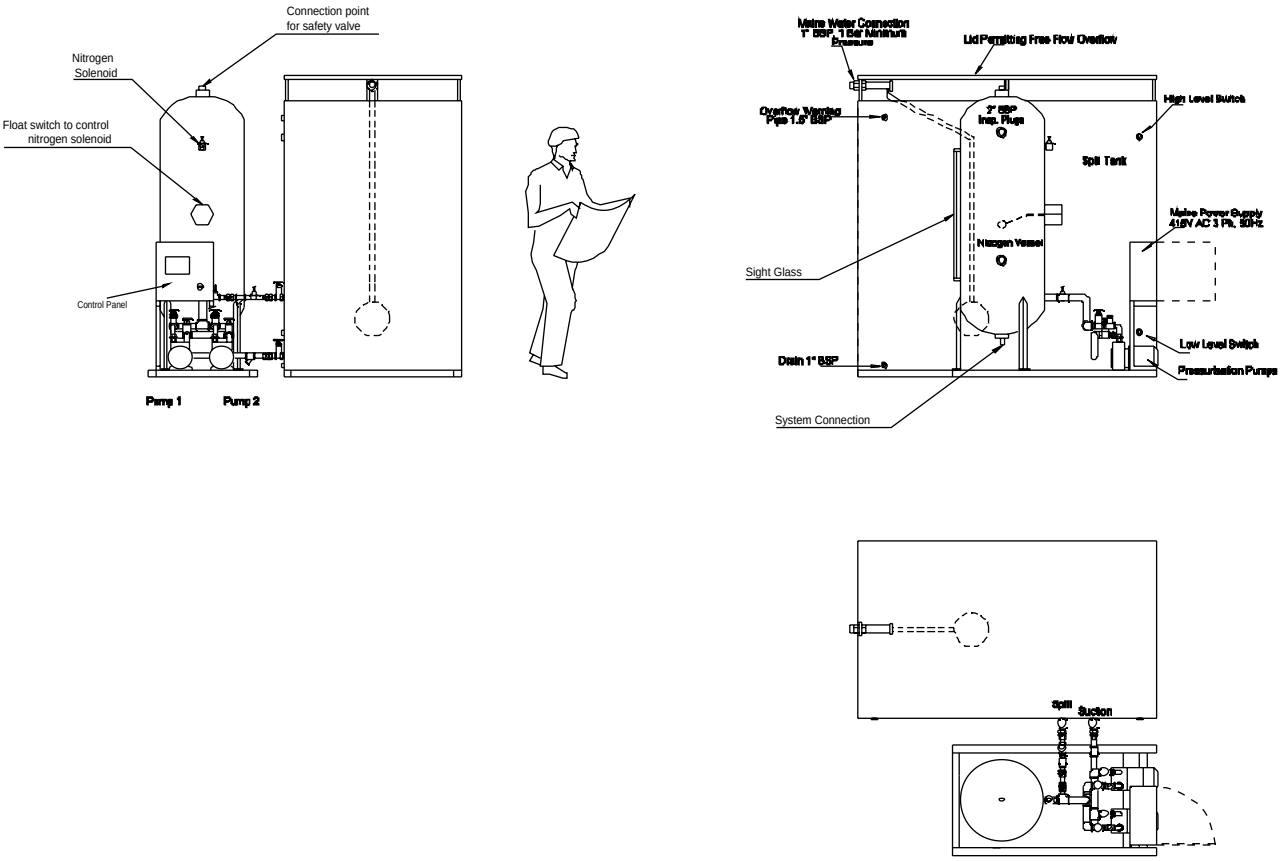

Fig 2: Typical arrangement showing “AS2ET-N” or “SR2-E” with twin pumps and spill tank.

Fig 3: Typical arrangement showing “AS2ET-N”

ELECTRICAL CONNECTIONS:

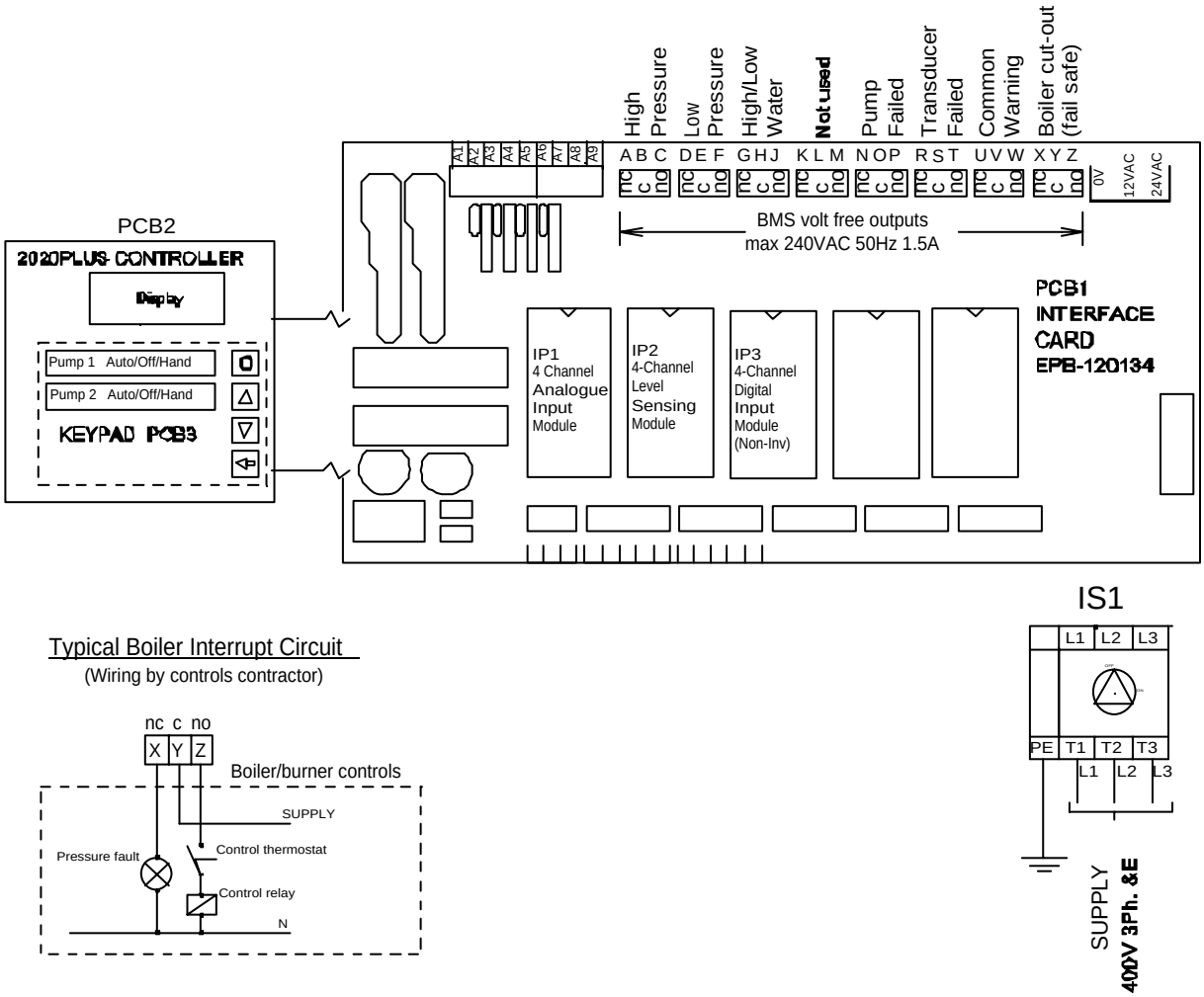

Fig 4: Typical electrical connections.

Electrical supply for all AS2ET-N and SR2-E units: 400/3/50 3 phase motors for most applications although larger single phase motors may be available. Please ask AquaTech-Pressmain for more details.

CONTROL PANEL FASCIA:

Typical control panel fascia layout is shown below, using the AquaTech-Pressmain 2020+ Micro-controller.

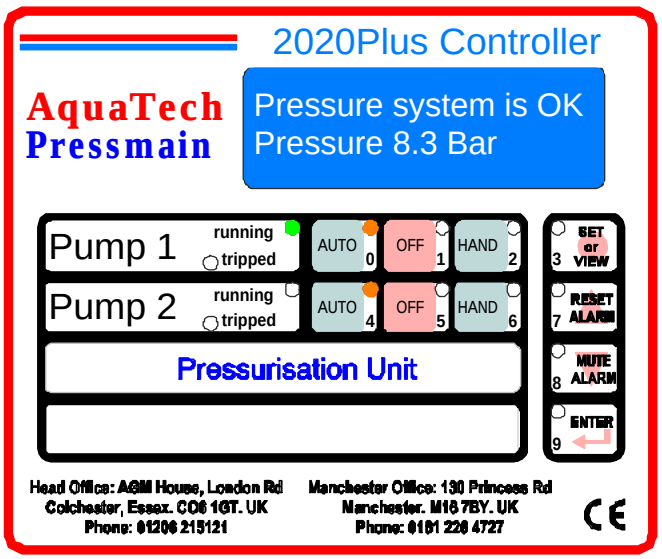

Fig 5:

TYPICAL SCHEMATIC PIPEWORK ARRANGEMENT:

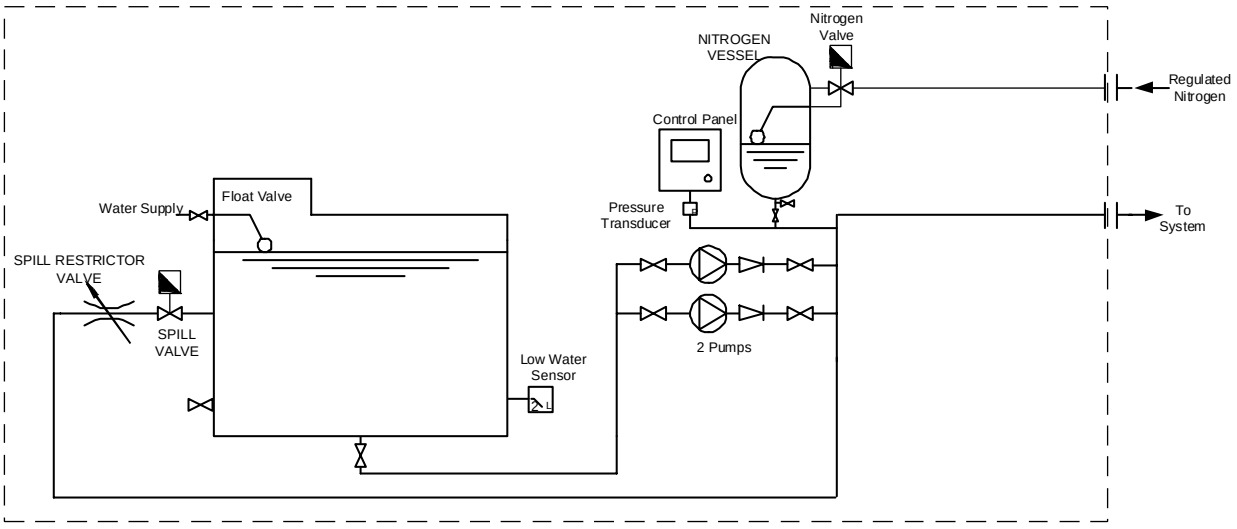

Fig 6:

WORK REQUIRED ON SITE:

1. Position pressurisation unit on raised plinth
2. Attach spill tank(s) where supplied loose
3. Connect correctly sized mains water supply to float valve, minimum pressure of 1 Bar required.
4. Connect overflow warning pipe to drain.
5. Connect to system pipework on underside of return pipe.
6. Connect Nitrogen bottle and regulator (supplied by others)
7. Connect mains electricity supply, boiler interlock wiring and BMS volt frees as required.
8. Contact AquaTech-Pressmain to have unit commissioned when ready.

CONSTRUCTION STANDARDS FOR AQUASPILL PRESSURISATION UNITS			
ITEM	MODEL/SERIES	STANDARD/CLASS	REMARKS
Quality System	Manufacturing	ISO 9001:1994	Cert No. FM33090
Electrical Safety Standard		BS EN 60204-1:2006	EC Declaration of Conformity
Low Voltage Directive		73/23/EEC & 93/68/EEC	EC Declaration of Conformity
EMC Directive 89/336/EEC		EN61000-6-3 & EN61000-6-1	EC Declaration of Conformity
Pressure Equipment Directive		97/23/EC	EC Declaration of Conformity
Nitrogen vessel		BS5500	
Spill tank		Painted welded steel	Bespoke sizing
Mains water float valve	Drop arm	Equilibrium	Type AA or AB air gap
Pipework		Black iron	
Motors		TEFC IP44, Class F Insulation	Thermal overload protected
Control cabinet	2020+	IP55	425x425x200mm
Microprocessor Controller	2020+	89/336/EEC compliant	
Pressure Transducer	392 – 10/20Bar	SS/Ceramic/Wras	

Table 3:

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