Hamworthy Chesil

Wall Hung & Floor Standing
Pressurisation Units to 3.4 bar

and

Hamworthy Burstock

Vertical
Expansion Vessels

For use in sealed systems for Heating, DHW, and Chilled Water Applications

CE

Hamworthy

Heating *at work.*

Chesil

Sealed System Pressurisation Units

Hamworthy's range of Chesil pressurisation units offer a choice of floor standing or wall hung configurations with standard or electronic controls.

Designed to maintain automatically the minimum pressure requirements of modern low / medium temperature hot water sealed systems, the Chesil range can also be used for the constant pressure requirements of chiller systems.

The Chesil pressurisation units will provide automatic replacement of water losses from both hot and cold sealed systems, and are available for systems with cold fill pressure requirements up to 3.4 bar. The units are enclosed in a robust lightweight steel casing, ensuring the units perform effectively and quietly during operation.

The floor standing range has been designed to reduce space requirements and both models are extremely compact in size.

The floor standing single pump models are available with standard or electronic controls. The floor standing twin (duty/standby) pump model is available with electronic controls only.

The wall hung units are single pump configuration only, and are available with either standard or electronic controls.

Chesil pressurisation units with electronic controls provide a user interface through a simple control fascia which features a 16 character back-lit LCD display for viewing operating and system information.

BENEFITS

- **Compact design saves space**
- **Choice of configurations**
- **Increases security of heating system**
- **BMS compatible for system integration**
- **Easy access for operation and settings**
- **Reduces installation costs**

A pumped pressurisation unit removes the need for cold water header tanks with associated pipe work, or eliminates reliance on mains pressure to provide the system head.

Options

- **Floor standing or wall hung**
- **Standard or electronic controls**
- **Single or twin pumps**
- **Expansion vessels**

Typical plant room with a wall-mounted Chesil pressuration unit, Burstock expansion vessel, and Merley sequence controller, supporting an array of Hamworthy Fleet boilers

Specification

Chesil Pressurisation Units

Totally enclosed in a robust powder coated steel casing, Chesil pressurisation units have a removable cover providing access to all internal components, whilst reducing noise from the unit during operation.

System Safety

The pressurisation units incorporate comprehensive safety circuits to shut down the boiler or chiller in the event of a fault, ensuring that systems operate within health and safety requirements at all times.

Key Features—All models

- 7.6 litres capacity break tank
- Pump non return valve
- Plant interlock circuit
- Volt-free contacts for
  - Low system pressure
  - High system pressure

Additional Features—Standard Control Models

- Class AF air gap and overflow
- Float valve
- Single pump
- System pressure gauge
- Low system pressure switch
- High system pressure switch
- Pump pressure switch

Additional Features—Electronic Control Models

- Class AF air gap and overflow
- Float valve
- Single or twin pumps
- Pump kick function
- Low level switch in break tank
- Intelligent control unit
- 16 character back-lit LCD display
- Pressure transducer
- Additional volt-free contacts for:
  - General fault with LCD interrogation

Chesil Pressurisation Units–Wall Hung Models

System	Pump	Controls	Controls
Heating or Chiller	Single	Standard	WSS
Heating or Chiller	Single	Electronic	WSE

Chesil Pressurisation Units–Floor Standing Models

System	Pump	Controls	Controls
Heating or Chiller	Single	Standard	FSS
Heating or Chiller	Single	Electronic	FSE
Heating or Chiller	Twin	Electronic	FTE

Break Tank

There is a make-up (break) tank providing a buffer water store, eliminating problems associated with mains water isolation. Units for heating and chiller systems feature float valves in the make-up tank, providing automatic mains cold water top up. Electronic models have an additional low water level interlock.

Pump Layout

The lower part of the unit houses the pump(s) with associated flow and pressure controls, plus all interconnecting pipe work.

Wall mounted and floor standing models share a common layout.

A twin pump model is available in floor standing electronic units only, providing a duty / standby or shared duty configurations.

Burstock Expansion Vessels

Hamworthy Heating also offer the Burstock range of expansion vessels to accommodate the expanded system water. These vessels are designed to complement the pressurisation units and ensure that the design pressures are maintained. Vessel sizes range from 25 litres to 1000 litres and operate up to working pressures of 10 bar. To ensure reliable and safe operation Hamworthy Heating utilise butyl rubber diaphragms which are suitable for temperatures of 70°C at the vessel.

All expansion vessels are WRAS approved and suitable for use in sealed systems for domestic hot water (DHW) systems as well as in sealed heating and chilled water systems. They may also be used in sealed, glycol-based solar circuits provided they are given adequate protection from excessive heat or excessive cold, by including an intermediate tank and/or appropriate length of pipe between the Burstock expansion vessel and the solar circuit.

Expansion vessels are pre-charged using Nitrogen which has larger molecules than air resulting in less permeation through the diaphragm and so extending the time period between any necessary pressure top-ups.

Details of expansion vessel operation are shown on page 9, and guidance for expansion vessel sizing is given on page 14.

Controls

Chesil Pressurisation Units

Chesil pressurisation units are available with a choice of either standard or electronic controls, both of which are compatible with Building Management Systems (BMS) and provide differing levels of sophistication, depending on the application requirements.

Standard Control and Operation

Standard controls are designed to maintain and monitor system pressure using pressure switch control. These units are equipped with pressure switches to control pump operation, low system pressure alarm and high system pressure alarm.

Cold fill pressure is regulated by the pump pressure switch, operating the pump to ensure a positive pressure at the highest circulation point at all times. When pressure falls below the pressure switch setting, the pump will continue to operate until the switch set point is reached.

Should operating conditions fall outside of normal parameters, then low and high system pressure switches provide a volt free signal that can be used for an alarm alert at a remote location or via a BMS.

It is recommended that the low and high system pressure switches are used as an interlock circuit, to shut down the associated plant in the event of a system fault condition.

Electronic Control and Operation

Electronic models use a pressure transducer and electronic processor to maintain and monitor system operating pressure. Floor standing Chesil pressurisation units with the electronic control can be supplied with single or twin pumps and include programmable software to adapt the pump control and monitoring processes to suit end user requirements.

Cold fill pressure is regulated by pump operation according to the programmed pressure setting.

The electronic control features include adjustable set points for pump operation times to govern how long the pump will run. The minimum period setting prevents undue wear and tear on the motor by preventing excessive stop starts. The maximum period setting enables an alarm to alert a system fault, triggering an investigation into the cause of the condition. This will also avoid excessive consumption of water should there be a system leak.

Chesil wall hung models

Fault conditions are shown on the 16 character back-lit LCD display, and an alarm can be signalled remotely via a volt free contact.

Additional pump controls provide an adjustable delay of pump operation after use to prevent rapid cycling as well as a pump kick start function to reduce risk of seizure during prolonged periods without operation.

The electronic models have a comprehensive capability for monitoring the unit to display the following fault conditions:

- Low system pressure
- High system pressure
- Leakage volume exceeded
- Make-up tank low level
- Pump 1 fault – high current
- Pump 2 fault – high current
- Pump 1 time out *
- Pump 2 time out *

* Exceeded maximum running time.

Electronic units are provided with volt free contacts for remote alarm or BMS signal for the following conditions:

- Low system pressure
- High system pressure
- General fault condition

A system monitoring and data logging feature enables the following to be reviewed on the electronic units:

- Current system pressure
- Make up water volume used since last reset
- Pump operation cycles since last reset
- Pump 1 hours run since last reset
- Pump 2 hours run since last reset

This function is password protected via the ‘Engineers menu’.

Twin Pump Model

The Chesil electronic control can be set for permanent operation using either the duty or standby pump, or alternatively for sharing of pump operation to maintain even usage.

Technical Data

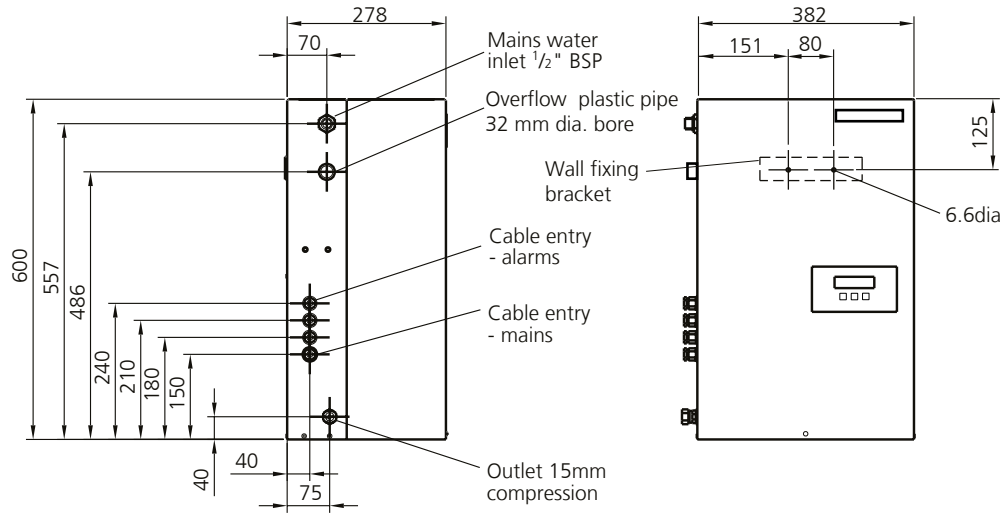
Chesil Pressurisation Units

Specification		Units	Floor Standing Models			Wall Mounted Models	
			Single Pump		Twin Pump	Single Pump	
			Standard Controls	Electronic Controls	Electronic Controls	Standard Controls	Electronic Controls
General Data	Weight (empty)	kg	23		29	21	
	Weight (full)	kg	30.6		36.6	28.6	
	Maximum cold fill pressure	bar	3.4				
	Minimum cold fill pressure	bar	1.0	0.5		1.0	0.5
	Maximum water flow rate	l/min	6.0				
	Maximum water flow rate @ maximum cold fill pressure	l/min	0.1				
	Noise level	dBA	<60 @ 1 metre				
Electrical Data	Electrical supply		230V AC 50Hz 1Ph				
	Pressure switch contact rating		15A 230V AC	n/a		15A 230V AC	n/a
	Volt free contact rating		n/a	13A 230V AC		n/a	13A 230V AC
	Start current (per pump motor)	Amps	9				
	Run current (per pump motor)	Amps	2.8				
Factory Settings	Cold fill pressure	bar	1.8				
	Low pressure switch setting	bar	1.3				
	High pressure switch setting	bar	3.6				
	Expansion vessel charge pressure	bar	1.7				
System Parameters for Factory Settings	Maximum water flow temperature	°C	82				
	Maximum static height	m	16.5				
	Minimum system operating pressure	bar	3.3				
	Maximum system operating pressure	bar	7				
	Safety relief valve setting (Not HHL supply)	bar	4				
	Nominal pressure differential	bar	0.2				
Connections	Mains cold water inlet	inch	½" BSP				
	Overflow (polythene pipe) diameter	mm	32				
	System connection compression fitting, diameter	mm	15				

Dimensional Details

Chesil Pressurisation Units

Wall Hung

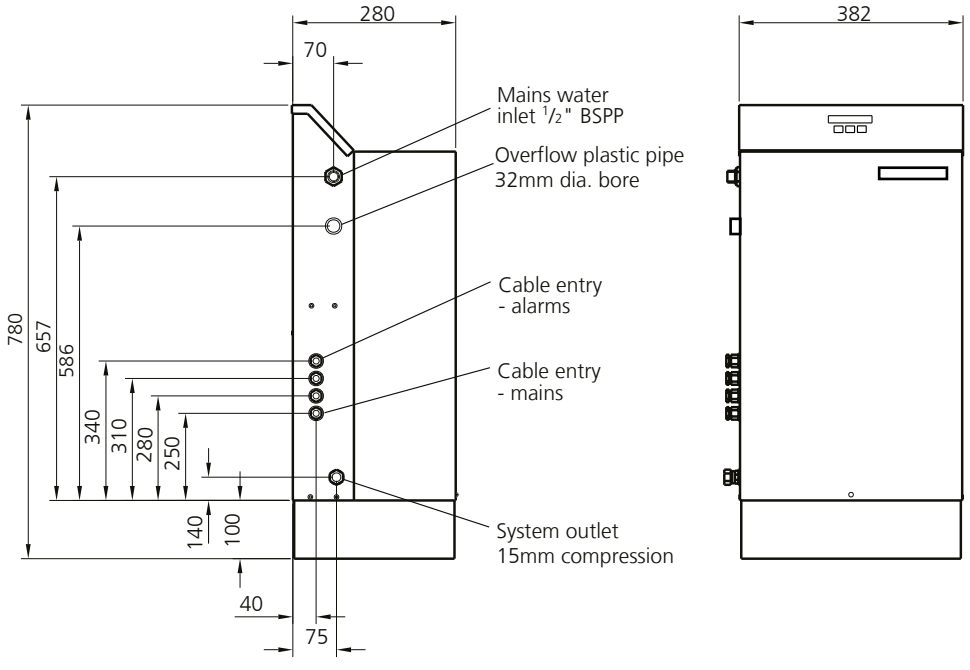


All dimensions in mm

Side View (Left Hand Side)

Front View

Floor Standing



All dimensions in mm

Side View (Left Hand Side)

Front View

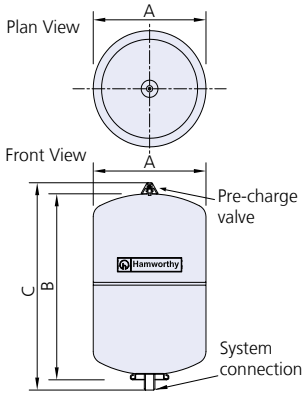
Minimum Recommended Clearances for Access and Maintenance

	Wall Hung Models, Clearance (mm)	Floor Standing Models, Clearance (mm)
Top	100	300
Sides	100	100
Front	600	600
Bottom	450	-

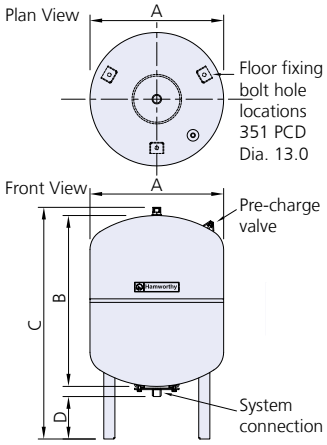
Dimensional Details

Burstock Expansion Vessels

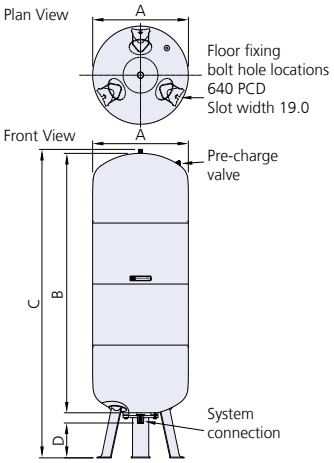
Burstock Expansion Vessel Dimensions



Burstock PV25W



Burstock PV100W



Burstock PV800W

All dimensions in mm

Specification

Model No.	Capacity (litres)	Connection Size	Max Pressure (bar)	Shipping Weight (kg)	Pre-charge Pressure (bar) for use in:		Dimensions (mm)			
					Heating	DHW	A	B	C	D
PV25W**	25	G 3/4"	10	5	1.7	3.5	280	448	499	n/a
PV60W	60	G 1"	10	14	1.7	3.5	409	510	734	161
PV80W	80	G 1"	10	16	1.7	3.5	480	510	729	152
PV100W	100	G 1"	10	19	1.7	3.5	480	615	834	152
PV200W	200	G 1 1/4"	10	40	1.7	*	634	740	967	144
PV300W	300	G 1 1/4"	10	54	1.7	*	634	1040	1267	144
PV400W	400	G 1 1/4"	10	70	1.7	*	740	1030	1245	133
PV500W	500	G 1 1/4"	10	79	1.7	*	740	1260	1475	133
PV800W	800	G 1 1/2"	10	195	1.7	*	740	1955	2325	263
PV1000W	1000	G 1 1/2"	10	228	1.7	*	740	2235	2604	263

*3.5 bar pre-charge available on request. **Wall bracket kit variant available.

Expansion Vessel Selection For Heating Systems at 80°C

Model No.	Vessel(s) Capacity (litres)	*Max. System Volume Supported for Given Vessel Capacity (litres)		**Estimated Max. Installed Boiler Power for Given Vessel Capacity (kW)	
		Water Only	@10% Antifreeze	Water Only	@10% Antifreeze
PV25W**	25	302	266	30	26
PV60W	60	724	638	72	63
PV80W	80	966	851	96	85
PV100W	100	1207	1064	120	106
PV200W	200	2414	2127	241	212
PV300W	300	3621	3191	362	319
PV400W	400	4828	4255	482	425
PV500W	500	6034	5319	603	531
2 x PV300W	600	7241	6383	724	638
1 x PV300W +1 x PV400W	700	8448	7447	845	744
PV800W	800	9655	8511	965	851
1 x PV500W +1 x PV400W	900	10862	9574	1086	957
PV1000W	1000	12069	10638	1206	1063

**Based on 80°C maximum flow temperature, and factory presets*: Cold fill pressure=1.8 bar, vessel charge pressure=1.7 bar, acceptance volume factor 0.35, expansion factors: water 0.029, antifreeze @10% solution 0.0329. **Estimated using 1 kW of installed power for every 10 litres of system volume. Note that the maximum system volume supported by a given vessel capacity is around 12% less for a system using antifreeze @10% solution in water when compared against one using water alone.*

Operation

Chesil Pressurisation Units

Cold Fill Pressure and Pump Control

In all buildings there is a requirement for the highest point in the circulating system to be maintained under positive pressure, to prevent any possibility of air being drawn in, resulting in poor operating conditions.

Cold fill pressure is directly linked to the height of the building, with a small additional pressure margin to ensure positive pressure at the highest point of the circulating system. Chesil pressurisation units are preset to maintain a cold fill pressure of 1.8 bar which will suit a wide variety of applications.

Where necessary it is possible to change the settings permitting cold fill pressures in the range 0.5 bar to 3.4 bar for electronic models, or in the range 1.0 bar to 3.4 bar for standard models. These settings will need to be made on site during commissioning. At the same time, the low system pressure setting and high system pressure setting will also require a change, to suit the new operating parameters.

The pressurisation unit is pre-set at the factory to start the pump for maintaining a cold fill pressure of 1.8 bar.
On heating systems the expansion vessel charge pressure (cushion pressure) should be set 0.1 bar below the cold fill pressure. For chiller systems the expansion vessel charge pressure should be set 0.35 bar below cold fill pressure.

Hot Water Applications

As the water heats up in the system, due to boiler operation (heat source), the expanded volume is absorbed by the expansion vessel. A small pressure rise takes place (Boyle's Law) which the vessel is designed to accept.

When the system eventually cools down, and if there has been some loss of system fluid, the pump pressure switch will operate the pump to recharge the system, maintaining the required minimum cold fill pressure.

If a twin pump unit is installed and the pressure is not satisfied, or the maximum pump running time is exceeded by the duty pump, then the control processor will automatically changeover to the standby pump.

A visual alarm message will be shown on the LCD display, once this changeover has been initiated.

Should the pressure continue to fall, then the system low pressure switch will shut down the heat source, ensuring a fail safe condition.

Depending on which control option is fitted and which fault is present, the appropriate fault condition volt free contacts will be energised, closing any looped signal path from the boiler or chiller alarm indication or control circuits. At the same time, with the electronic unit only, an additional fault message will be shown at the pressurisation unit's LCD display. Immediate action can then be taken to remedy the fault condition.

The pressurisation unit will continue in its attempt to re-establish pressure within the system if the pump(s) are operative. However, if the fault is due to a major leak, then the water level in the make-up tank could drop to the low level condition, shutting down the pump.

Similarly, the high pressure switch continually monitors the system, and if a high pressure fault occurs, then the heat source and the pressurisation unit are shut down.

Chilled Water Applications

The operation of a pressurisation unit when used on a chiller system is identical to that of a hot water system, however, the expansion vessel operates in a different way.

When the system has been filled, some water is stored in the expansion vessel due to the cushion pressure being some 0.35 bar below the cold fill pressure.

When the chiller is switched on, the water will contract due to cooling of the system fluid. The pressurisation unit will operate to maintain the required cold fill pressure.

When the chiller is switched off, the system fluid temperature will increase up to the nominal ambient temperature. As this happens, fluid will expand and increase pressure within the system. Fluid will then be forced into the expansion vessel until the pressure is stabilised. This fluid is then stored in the expansion vessel until the chiller is operated again.

Standard Chesil pressurisation units feature only a system pressure gauge display; high and low pressure switches are set manually.

Electronic Chesil pressurisation units feature an easy-to-use 3-pushbutton menu-driven control panel with backlit status display.

Operation

Expansion Vessels

Burstock Expansion Vessels

Hamworthy can supply a wide range of expansion vessels from its Burstock range to complete the installation. The available range is listed on page 7. Expansion vessels may be combined to increase the total vessel capacity as required by the system.

In order to accurately process an enquiry the following details will be required:

1. The system water content - litres (Sv). The installed boiler or chiller power, (kW) rating is acceptable if water content is not known.
2. The static head from the base of the expansion vessel to the highest point in the system - Metres (Ph).
3. The system flow temperature - °C (Tf).
4. The maximum system working pressure - bar (Pw). This is normally determined by the weakest part of the system.

With all of the above data our Technical Applications Team will be pleased to offer assistance and arrange for a quotation to be prepared.

If the required system working pressure is below 3.3 bar, or the boiler installation is on or near the roof, then the factory preset pressure settings may be adequate.

Refer also to the calculations on page 14.

Expansion Vessel Operation for Hot Water Applications

(Refer to the figure below.)

1. Diaphragm position at the cold fill/charge pressure. The vessel is empty of system fluid.
2. Diaphragm position at the hot working pressure. The system volume has expanded due to the temperature rise. The gas in the vessel is compressed. Acceptance factor = 0.35 maximum (recommended).
3. Diaphragm position at high system pressure. The boiler system is shut down by the system pressure safety circuits.
4. Diaphragm at the safety valve lift pressure caused by boiler temperature limiter failure for example. Acceptance factor = 0.5 maximum (recommended)

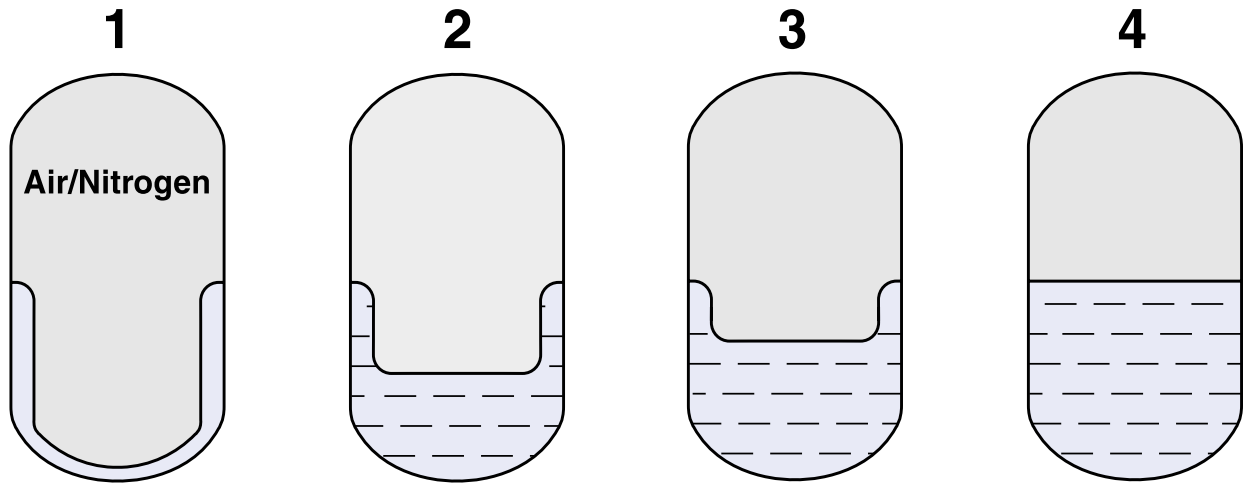
Expansion Vessel Operation for Chilled Water Applications

(Refer to the figure below.)

1. Diaphragm position at the charge pressure. The charge pressure is 0.35 bar less than the cold fill pressure. The vessel is empty of system fluid.
2. Diaphragm position at the cold fill pressure. As the chiller operates the system fluid contracts due to the drop in temperature. The pressurisation unit operates to maintain the system at the cold fill pressure. The gas in the vessel is compressed to equalise the system pressure.
3. Diaphragm position at the maximum ambient temperature. When the chiller is switched off the system water expands due to the rise in system temperature to ambient. The gas in the vessel is compressed. Acceptance factor = 0.35 maximum (recommended).
4. Diaphragm at the safety valve lift pressure. Acceptance factor = 0.5 maximum (recommended).

The chiller will have been shut down by the system pressure safety circuit.

Expansion Vessel Operation



Application & System Data

Chesil Pressurisation Units

Installation must be in accordance with the relevant requirements of the Building Regulations, IET Regulations and the Water Supply (Water Fittings) Regulations. It should also be in accordance with any relevant requirements of the Local Authority and the relevant recommendations of the following documents:

These British Standard Codes of Practice and additional publications have relevant recommendations regarding the installation of Chesil pressurisation units.

British Standards

BS 6644 Specification for installation of gas fired boilers of rated input between 70kW net and 1.8MW net (2nd and 3rd family gases).

BS 6880 Part 1, 2 & 3 Code of practice for low temperature hot water heating systems of output greater than 45kW.

BS 7074 Part 2: Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems. Code of practice for low and medium temperature hot water heating systems

BS 7074 Part 3: Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems. Code of practice for chilled and condenser systems

BS 7671 Requirements for electrical installations. IEE Wiring Regulations. Seventeenth edition.

BS EN ISO 4126-1 Safety devices for protection against excessive pressure. Safety valves.

BS EN 12828 Heating systems in buildings. Design for water-based heating systems.

BS EN 60335 Part 1 Household and similar electrical appliances - Safety General requirements

Health & Safety Executive

Guidance Note PM5 Automatically controlled steam and hot water boilers.

Statutory Instruments

The Water Supply (Water Fittings) Regulations 1999.

Water industry England and Wales

Pressure Systems and Transportable Gas Containers Regulations 1989

General Requirements

All connections to the local water main must comply with Water Supply (Water Fittings) Regulations 1999. Additionally the water supply connection must also comply with all local WRAS regulations.

If conditions within the boiler house are likely to fall below freezing, then consideration should be made for providing thermostatically controlled heating of the expansion vessel connection pipe and anti-gravity loop. Water movement in this section of pipe is slow and at the most vulnerable times (overnight) may have no movement. Electrical trace heating of this pipe section is recommended, operating at approximately 5°C.

Location

The location must provide adequate space for servicing and air circulation around each unit. This includes any electrical trunking laid along the floor and to the appliance.

The pressurisation unit can be mounted directly onto a wall or supported on a floor, depending on model variant.

In either case the mounting surface should be a non combustible flat and level surface capable of supporting the weight of the unit when full of water and any additional ancillary equipment.

System Safety

Extra safety features built into the Hamworthy pressurisation units ensures that the plant operates within health and safety requirements at all times, and with the assurance that should an unmanned plant room develop a problem, the pressurisation unit will ensure fail safe operation along with remote indication, enabling rapid response and rectification.

The Chesil pressurisation units and Burstock expansion vessels (where supplied) are factory pre-set to suit the following conditions:

i. System flow temperature of 82°C maximum
ii. System static height of 16.5 metres maximum
iii. System working pressure of 3.3 bar minimum, i.e. safety valve set at 4.0 bar minimum.

Note that in general, for LTHW (Low Temperature Hot Water: up to 90°C) and MTHW (Medium Temperature Hot Water: 90–120°C) systems, maximum working pressures are defined by the heat generator (i.e. boiler).

The expansion vessel will be factory preset and so the assembly will only require a check to ensure settings have not changed during transport or installation before switching on the unit, however where system requirements dictate a higher or lower setting then this will require adjustments to be made on commissioning.

Expansion Vessel Selection

A table of calculated expansion vessel sizes based on a set of fixed parameters, suitable for LTHW systems, is detailed on page 7. If your system complies with these requirements, the data as tabled may be used. For other applications outside these parameters refer to page 14 for a more detailed sizing method.

System Connection

The unit must be connected to the system by an anti-gravity loop. The anti-gravity loop must be made in pipework no smaller than the expansion vessel connection, and have a minimum height of 2 metres. It should include a lockshield (or lockable) valve at the system connection point for servicing, and an automatic air vent fitted at the highest point of the loop.

The pipe work and fittings should be pressure tested to 1.5 times the safety valve lift pressure.

Application & System Data

Chesil Pressurisation Units

Unit Settings

The Chesil pressurisation units are designed to operate up to a maximum cold fill pressure of 3.4 bar, with a maximum working pressure of 7 bar.

The pressurisation units are factory pre-set to suit a wide range of applications having the following settings:

Heating and chiller units

i. Cold fill pressure = 1.8 bar
ii. System low pressure switch = 1.3 bar
iii. System high pressure switch = 3.6 bar

Expansion vessels where supplied are pre-charged to 1.7 bar. This provides a small buffer of water within the vessel, even at cold fill pressure conditions, ensuring the attached system remains full of water at the highest point.

System Filling

It is a requirement of the Water Supply (Water Fittings) Regulations 1999 that system filling is via an RPZ (Reduced Pressure Zone) valve with integral Type BA air gap.

Information regarding the application, use and maintenance requirements for RPZ valves with Type BA air gap is available from WRAS.

It is also advisable to contact the local water utility company to verify notification requirements for the use of these valves.

With the electronic model of Chesil pressurisation unit it is not always necessary to use an RPZ valve assembly for system filling. These units have a fill function that is suitable for use with small systems up to a maximum capacity of 200 litres. Where the fill function is used, it is not necessary to have a quick fill loop with RPZ valve.

Delivery

Chesil pressurisation units are supplied fully assembled from the factory, packaged in a cardboard carton for protection. The packaging identifies the unit model.

All Hamworthy deliveries are made to site using a vehicle with a tail-lift, and are closely co-ordinated with the customer to suit the site construction programme. Standard delivery is to ground level from the tail-lift vehicle.

To enquire about special delivery services please contact our customer services team. Tel. 0845 450 2865.

Commissioning

Hamworthy Heating strongly recommends that all units are commissioned by their service department. *For more information on commissioning contact Hamworthy Heating Service team: Tel. 0845 450 2866*

It is imperative that expansion vessels are commissioned to suit the system. Heating and chilled water systems will need commissioning if the system operating conditions do not fall within the factory pre-set operating parameters.

Warranty

Products from Hamworthy carry a standard two-year warranty on parts, and where the product is commissioned by Hamworthy service engineers, then the warranty covers parts and labour. In offering flexible solutions for after-sales support, Hamworthy can tailor packages to suit individual customer requirements, many of which include extended warranty benefits.

Hamworthy Horton Dosing Pots

Dosing pots are used to introduce liquid chemicals such as corrosion inhibitors into sealed systems. A simple construction offering a safe and effective solution for manual chemical dosing.

The dosing pot is best installed across the main flow and return pipe work with the flow from the bottom of the pot and the return in at the top. This will create the ideal conditions for a rapid intake of chemicals.

Hamworthy offers the **Horton** range of dosing pots in 4 different sizes. These dosing pots are manufactured with a mild steel shell with flow and return valves, drain valve, filling valve, steel tundish, air release valve, non-return valve and wall mounting brackets.

Hamworthy Clentston Air and Dirt Separators

Air and dirt separators are used to remove micro air bubbles and system debris from wet circulating systems.

Where a combined air and dirt separator or an air separator only is used in a heating system, it should be installed in the hottest part of the system, before the pumps, in the main flow pipe work close to the boilers.

Where a combined air and dirt separator or an air separator only is used in a cooling system, it should be installed in the return, close to the chiller.

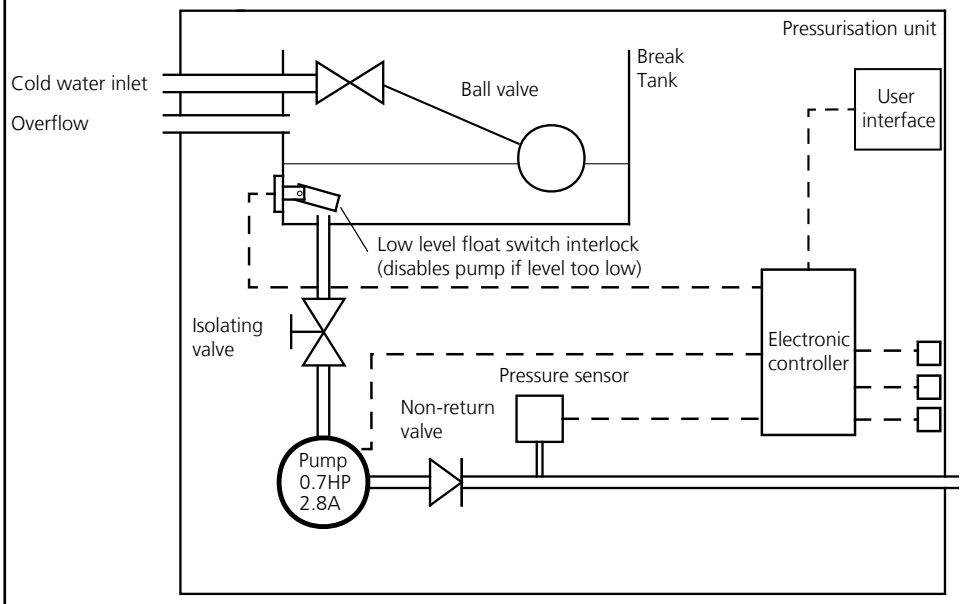
Where a dirt separation unit only is used, this should be installed in the return pipe work, before the flow of water enters the plant such as boilers, pumps etc.

Hamworthy offers the **Clenston** range of air and dirt separators in seven different sizes. These models manufactured from mild steel and are supplied complete with flushing valve and automatic air vent.

Product Schematic

Chesil Pressurisation Units

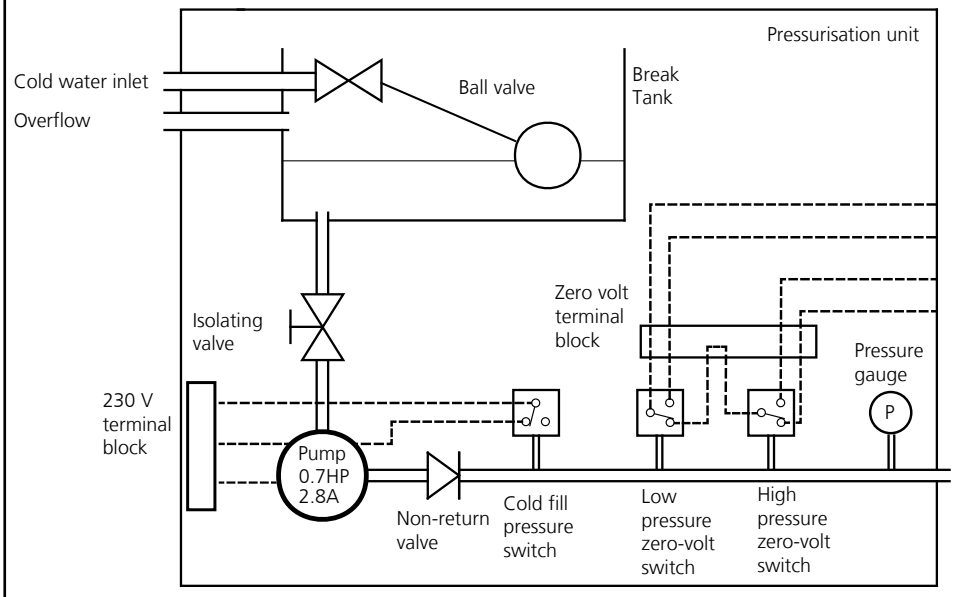
Chesil Pressurisation Units with Electronic Controls



Menu-driven user interface displays pressurisation unit data and system pressure. Passcode protected access allows parameters to be programmed for pump cut-out (max. cold fill pressure), pump cut-in, pump switchover, alarm limit settings, etc., with option to reset to factory defaults.

For more details, refer to O&M manual 500001181

Chesil Pressurisation Units with Standard Controls



For more details, refer to O&M manual 500001182

Product Layout

Chesil Pressurisation Units

Floor Standing Twin Pump, Electronic Controls Model

Wall Hung Single Pump, Standard Controls Model

Sealed System Calculations

Expansion Vessel Sizing

Hot Water Applications

1) Total system water content = _____ litres. (Sv.)
   Note: an assumed ratio of 10 litres/kW of installed boiler capacity can be used if not known.
2) Static head from base of expansion vessel to highest point of system = _____ metres. (Ph.)
3) System flow temperature (maximum under normal operation) = _____ °C. (Tf.)
4) System return temperature = _____ °C
5) Maximum system working pressure = _____ bar. (Pw.)
   Note: normally determined by the weakest part of the system - boiler, radiators etc. If system is below pressurisation unit (i.e. roof top boiler house), the maximum static head of components fitted must be considered.
6) Acceptance = proportion of expansion vessel filled = 0.35

Preliminary sizing sheet

Sv = ☐ litres Ph = ☐ metres Tf = ☐ °C

Cold fill/charge pressure, Pf = $\left(\frac{Ph}{10.2}\right)$ + 0.2 + Vp (see table below)

∴ Pf = $\left(\frac{\square}{10.2}\right)$ + 0.2 + ☐ bar

∴ Pf = ☐ bar (Max 3.4 bar)

(Note: if Pf (calculated) is < 1.0, then use Pf = 1.0)

To size expansion vessel

Total vessel volume = $\frac{\text{Sv x expansion factor}}{0.35}$ (see table below)

∴ Total vessel volume = $\frac{\square \times \square}{0.35}$

= ☐ litres (calculated)

∴ Using the next larger standard expansion vessel(s):

☐ litres (calculated) = ☐ off @ ☐ litres

\+ ☐ off @ ☐ litres

Nitrogen charge pressure = Pf (fill press.) - 0.1 = ☐ bar

Chiller Applications

1) Total system water content = _____ litres. (Sv.)
2) Static head from base of expansion vessel to highest point of system = _____ metres. (Ph.)
3) Maximum ambient temperature = _____ °C. (Tf.)
4) Maximum system working pressure = _____ bar.
   Note: normally determined by the weakest part of the system - chiller unit, air handling unit etc. If system is below pressurisation unit (i.e. roof top air conditioning unit), the maximum static head of components fitted must be considered.
5) Acceptance = proportion of expansion vessel filled = 0.35

Preliminary sizing sheet

Sv = ☐ litres Ph = ☐ metres Tf = ☐ °C

Cold fill pressure = $\left(\frac{Ph}{10.2}\right)$ + 0.2

∴ Pf = $\left(\frac{\square}{10.2}\right)$ + 0.2 bar

∴ Pf = ☐ bar (Max 3.4 bar)

(Note: if Pf (calculated) < 1.0 then Pf = 1.0)

To size expansion vessel

Vessel volume = $\frac{\text{Sv x expansion factor}}{0.35}$ (see table below)

∴ Vessel volume = $\frac{\square \times \square}{0.35}$

= ☐ litres (calculated)

∴ Using the next larger standard expansion vessel(s):

☐ litres (calculated) = ☐ off @ ☐ litres

\+ ☐ off @ ☐ litres

Charge pressure = Pf (fill press.) -0.35 = ☐ bar

Hot Water Applications

Max. system temperature (Tf) °C	70	75	80	82	85	90	95	100	105	110	115	120
Vapour pressure Pv (bar)	0	0	0	0	0.10	0.35	0.60	0.90	1.20	1.55	1.90	2.35
Water expansion factor (ew)	0.023	0.026	0.029	0.031	0.033	0.036	0.040	0.044	0.048	0.052	0.056	0.060
Anti-freeze expansion factor (ea)	0.061	0.064	0.068	0.069	0.071	0.075	0.079	0.083	0.087	0.090	0.094	0.098

Chiller Applications

Max. ambient temperature (Ta) °C	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5
Water expansion factor* (ew)	0.0002	0.0003	0.0007	0.0010	0.0014	0.0018	0.0024	0.0030	0.0037	0.0044	0.0052
Anti-freeze expansion factor (ea)	0.0169	0.0188	0.0206	0.0224	0.0242	0.0261	0.0279	0.0298	0.0316	0.0330	0.0345

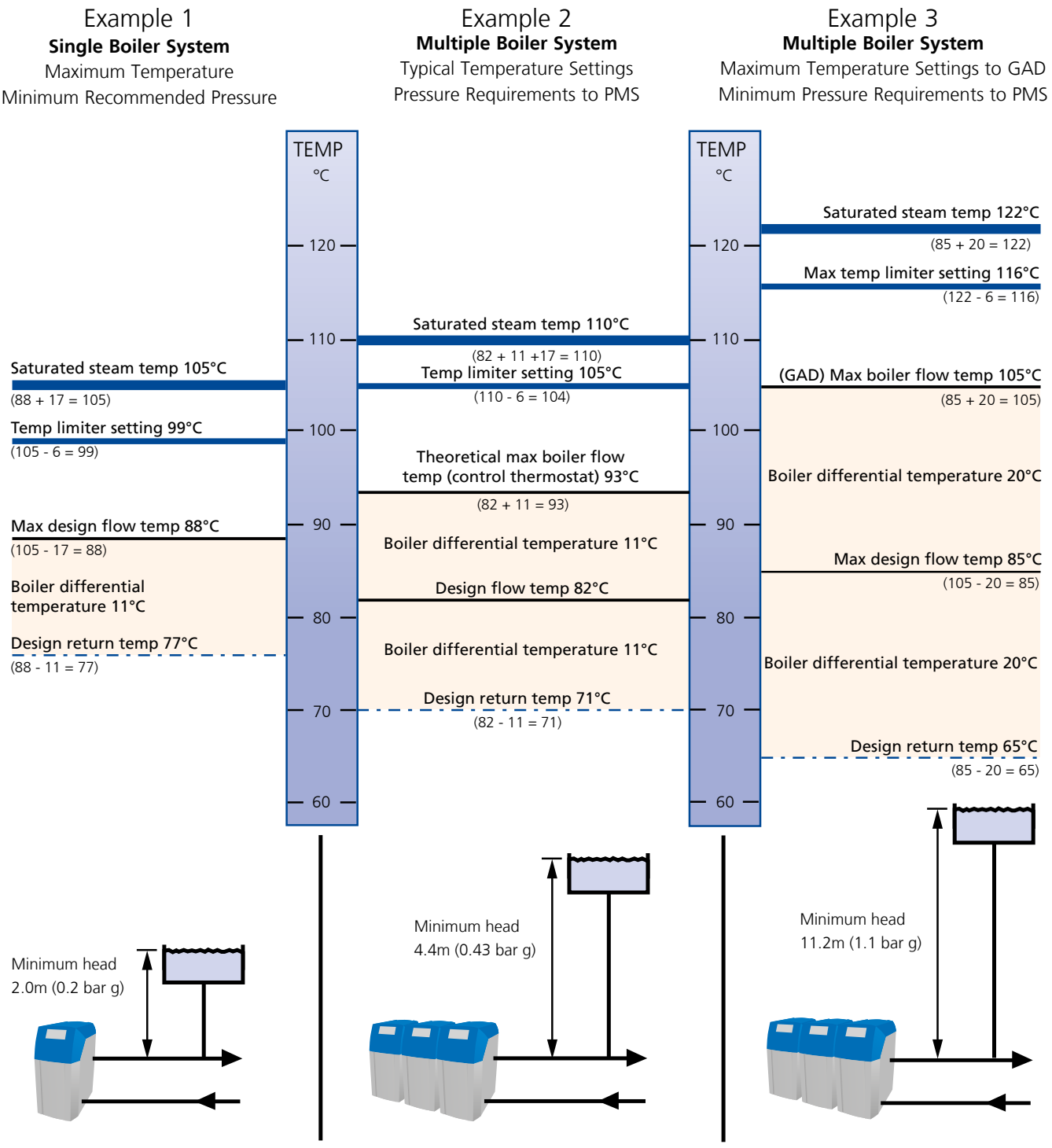
**Note: these figures apply to water systems only*

Pressures & Temperatures

Open Vented Systems

The diagram shows example variations of temperature settings and system pressures required for single and multiple boilers with reference to HSE Guidance Note PM5, and the European Gas Appliance Directive (GAD).

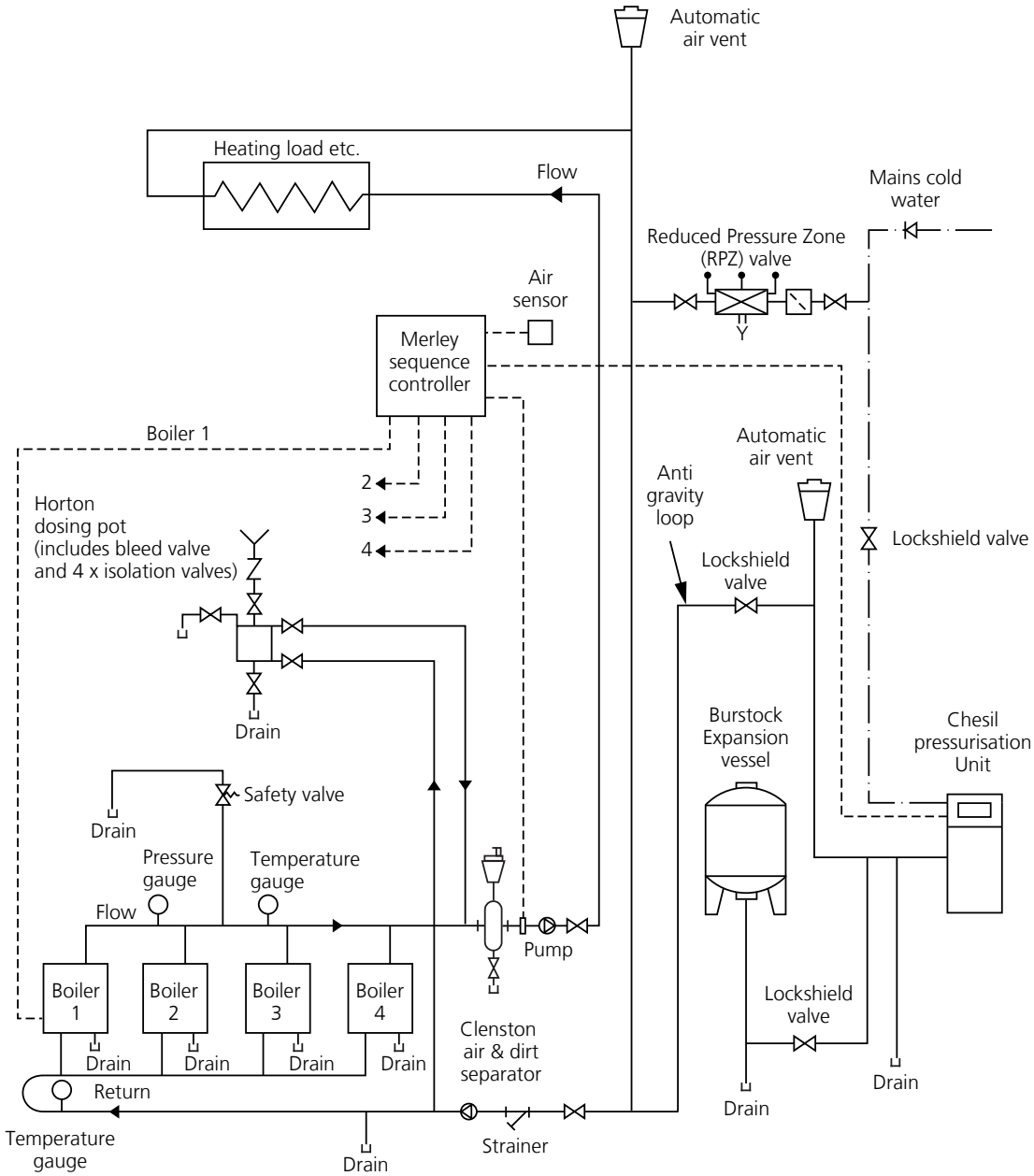
Temperature settings and system pressures are particularly important in installations of boilers in single storey buildings or on rooftops where it may be difficult to provide the required pressure (head). In such cases, a sealed pressurised system using a Hamworthy Chesil pressurisation unit will result in a simple and effective solution.



System Schematic

Chesil Pressurisation Units

System Schematic Boiler



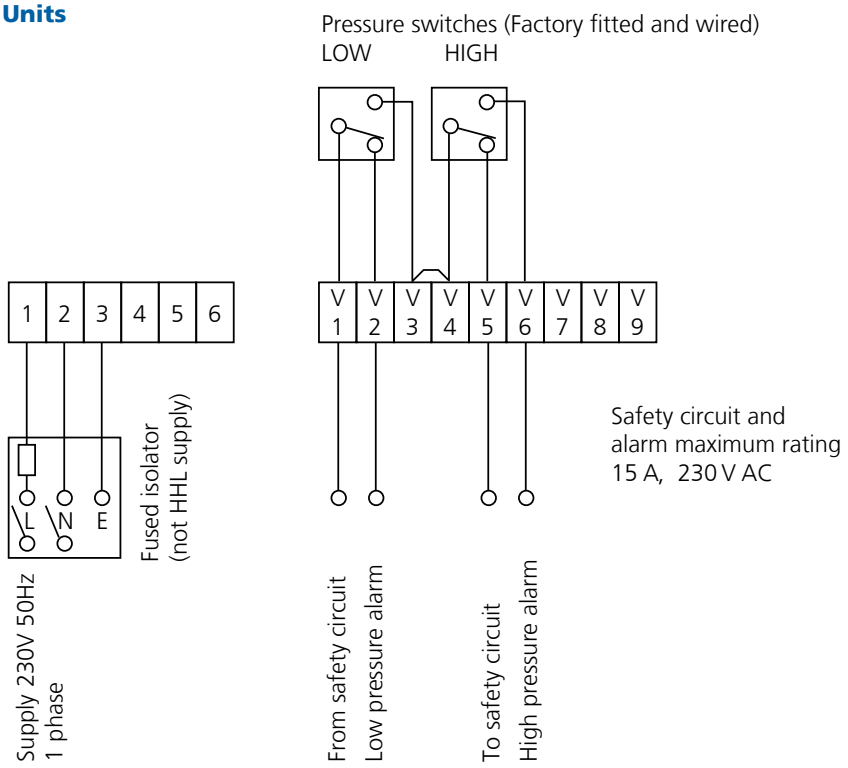
The Hamworthy Chesil pressurisation unit is now supported by additional ancillary branded products from Hamworthy.
These include:

- Hamworthy Burstock expansion vessels
- Hamworthy Horton dosing pots
- Hamworthy Clenston air and dirt separators

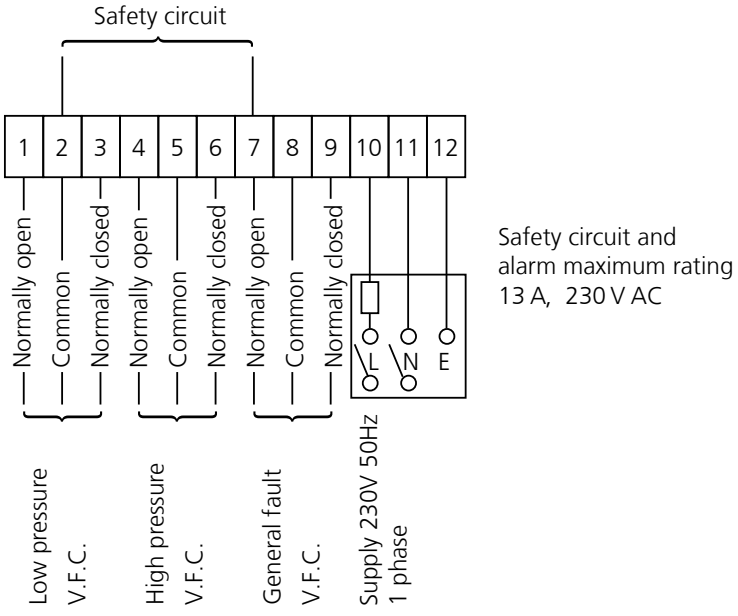
Wiring Diagrams

Chesil Pressurisation Units

Site Wiring Details of Standard Chesil Pressurisation Units



Site Wiring Details of Electronic Chesil Pressurisation Units



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