

# Chesil & Burstock

## Chesil

- Floor standing and wall hung
- Pressurisation units to 3.4bar

## Burstock

- Floor standing
- Expansion vessel

FOR  
**SEALED**  
HEATING  
SYSTEMS



15 MODELS



Chesil

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## Increase security of sealed heating

Hamworthy's Chesil pressurisation units and Burstock expansion vessels work together to provide automatic replacement of water losses, ensure minimum head requirements are maintained and deal with the effects of heating fluid expansion and contraction in sealed heating systems.



## Saves space, improves system cleanliness and eases maintenance

The compact Chesil pressurisation unit is available in floor standing and wall hung options, giving you flexibility in siting within your plant room. Designed to ensure minimum head requirements are maintained eliminating reliance on mains pressure to provide the system head. For use in sealed heating systems and chiller systems they also remove the need for cold water header tanks with associated pipe work, by providing automatic replacement of water losses.

With options for electronic or standard controls some Chesil pressurisation units offer the additional benefit of monitoring system pressure, so that appliances can be interlocked to prevent operation in the event of operating pressure conditions being too high or too low. They can also monitor water volumes introduced to the system which can help identify leaks as well as helping decide when corrosion inhibitors may need re-dosing.

The Burstock expansion vessels complement the Chesil range by accommodating the expanded system water and ensuring the design pressures are maintained. Dealing with the effects of heating fluid expansion and contraction that will occur as the heating fluid temperature changes across the entire operating temperature range of the sealed heating system.

Available in a range of sizes from 25 litre to 1,000 litre means you can accurately size for your heating system. By removing header tanks you have the benefits of improved water quality and reduced oxygen ingress plus all equipment - pressurisation units and expansion vessels - is located in the boiler room, making service and maintenance access simpler.



## Key benefits



Compact design saves space



Increases security of system



Large range for accurate sizing (Burstock)



Improves cleanliness of system



Choice of configurations - wall hung and floor standing (Chesil)

# Key features:

## Burstock

- ⊗ 10 models
- ⊗ 10 bar working pressures
- ⊗ 70°C maximum operating temperature
- ⊗ Nitrogen pre-charged

## Chesil

- ⊗ 5 models – floor standing/wall hung and standard/electronic
- ⊗ 7.6 litres capacity break tank
- ⊗ For systems with cold fill pressure requirements up to 3.4 bar
- ⊗ Plant interlock circuit
- ⊗ Compatible with Building Management Systems (BMS)
- ⊗ Volt free contacts for low and high system pressure

## Options – Chesil

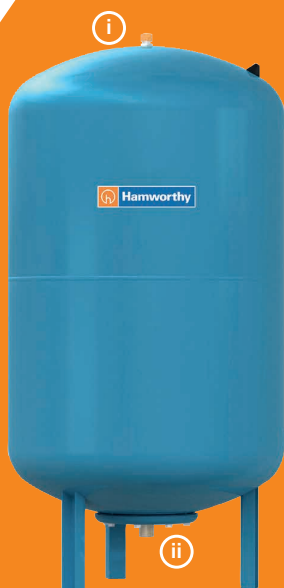
- ⊗ Frost protection kit
- ⊗ Hours run kit
- ⊗ Twin pump (floor standing electronic model only)
- ⊗ Standard control models include:
  - Class AF air gap and overflow
  - Float valve
  - Single pump
  - System pressure gauge
  - Low system pressure switch
  - High system pressure switch
  - Pump pressure switch

- ⊗ Electronic control models include:
  - 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

## Service & Warranty (Page 21)

- ⊗ 2-year warranty
- ⊗ Range of service options
- ⊗ Commissioning

## Anatomy of the Burstock



- i Pre charge valve
- ii System connection

## Anatomy of the Chesil

- ① Electronic processor & LCD interface
- ② Break tank
- ③ Pump 2
- ④ Non-return valve assembly
- ⑤ Pump 1
- ⑥ Air purge point
- ⑦ Pressure transducer
- ⑧ Hinged door



# Technical data & dimensions

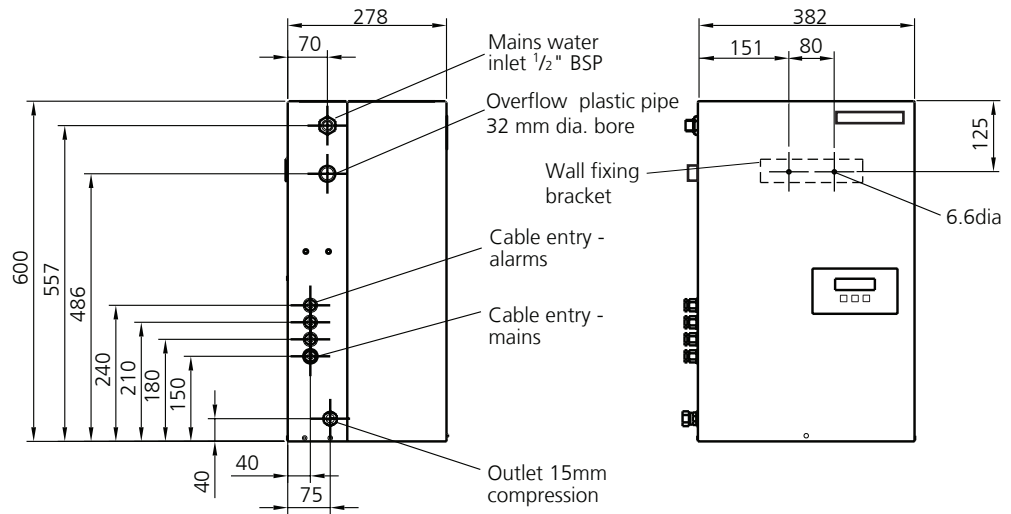
## Chesil pressurisation units

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

# Dimensions

All Models

## Wall hung

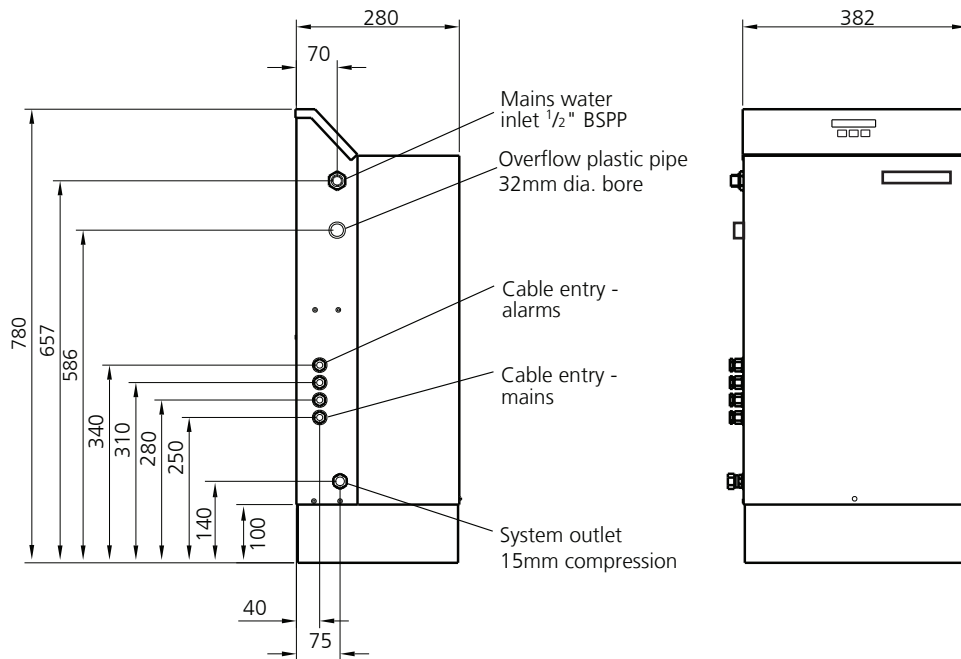


Note: All dimensions in mm unless otherwise stated.

Side View (Left Hand Side)

Front View

## Floor standing



Note: All dimensions in mm unless otherwise stated.

Side view (Left hand side)

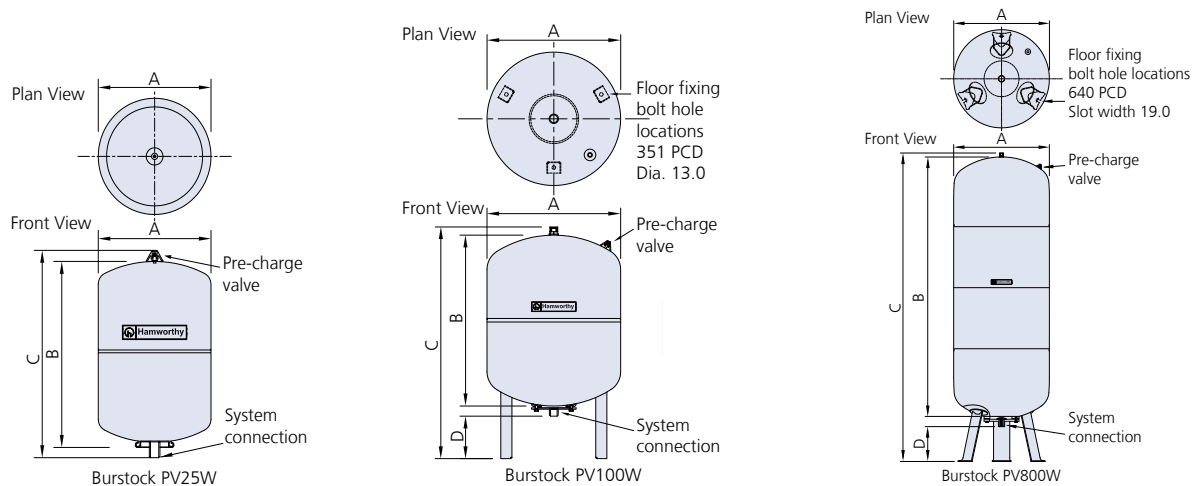
Front view

## 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	-

# Technical data & dimensions

## Burstock expansion vessel



Note: All dimensions in mm unless otherwise stated.

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=1.8bar, vessel charge pressure=1.7bar, acceptance volume factor 0.35, expansion factors: water 0.029, antifreeze @10% solution 0.0329. \*\*Estimated using 1kW of installed power for every 10litres 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.

# Specification

## Chesil steel casing

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 during operation.

## Chesil 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.

## Chesil break tank (1)

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.

## Chesil pump layout (2)

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 rubber diaphragm

To ensure reliable and safe operation Hamworthy Heating utilise butyl rubber diaphragms which are suitable for temperatures of 70°C at the vessel.

## Burstock WRAS approved (3)

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.

## Burstock nitrogen pre-charge

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 16.

1. Chesil break tank



2. Twin pumps



3. WRAS approved



# 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.



# 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 6. 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 16.

## Expansion vessel operation for hot water applications (Refer to the figure below)

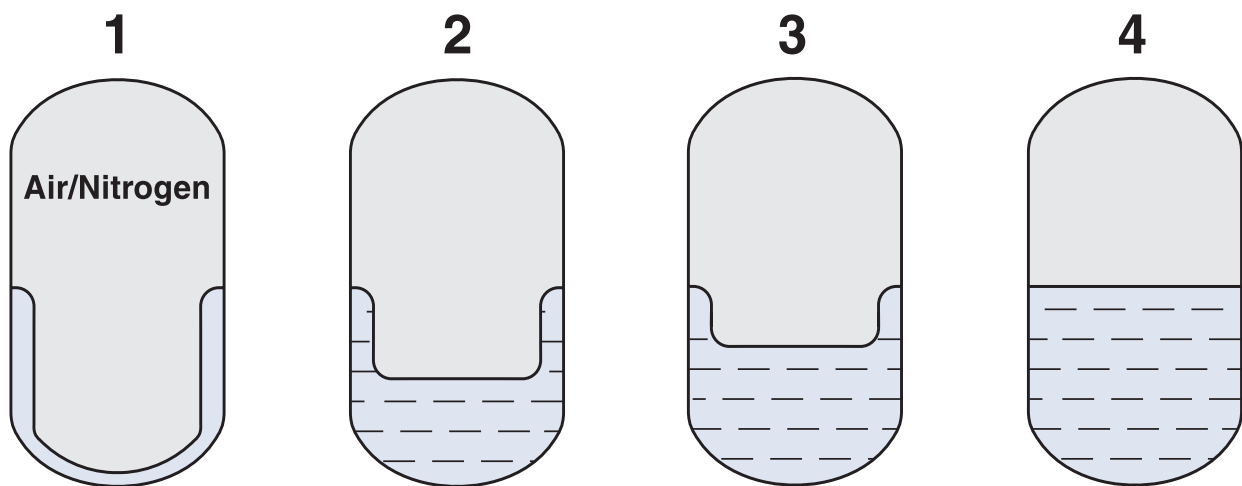
1. Diaphragm position at the cold fill/charge pressure. The vessel is empty of system fluid.
2. Diaphragm position at the hot working pressure. The system volume has expanded due to the temperature rise. The gas in the vessel is compressed. Acceptance factor = 0.35 maximum (recommended).
3. Diaphragm 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



# Chesil controls

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



Chesil wall hung models

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.

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

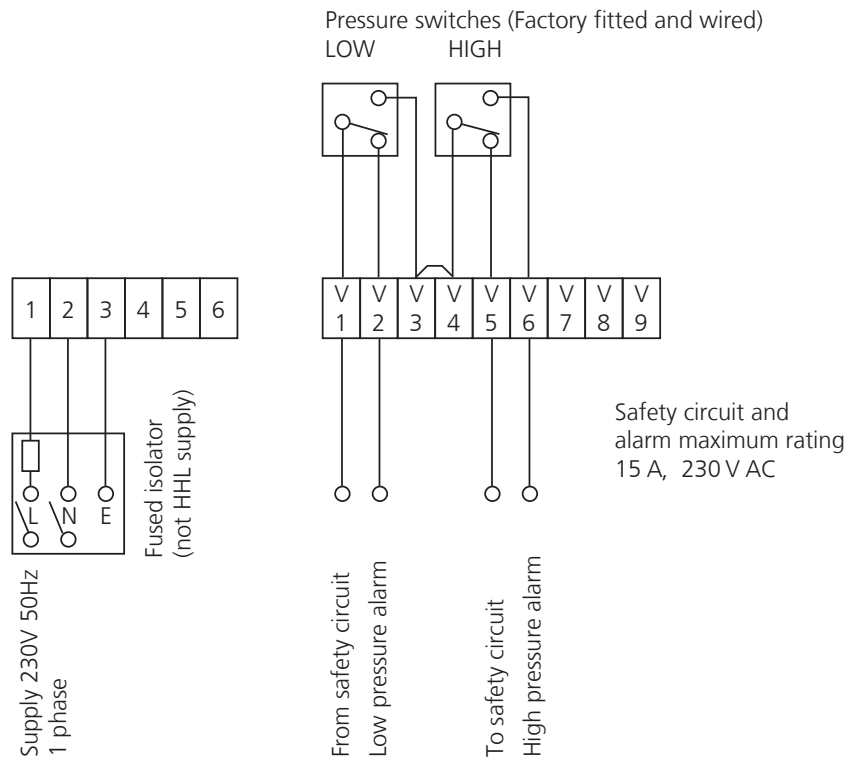
This function is password protected via the 'Engineers menu'.

## Twin pump model

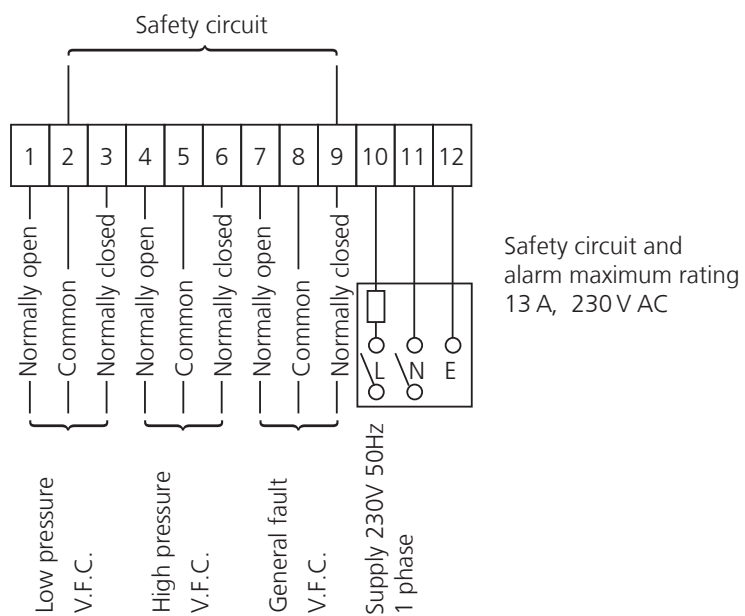
The Chesil electronic control can be set for permanent operation using either the duty or standby pump, or alternatively for sharing of pump operation to maintain even usage.

# Chesil wiring diagrams

## Site wiring details of standard Chesil pressurisation units

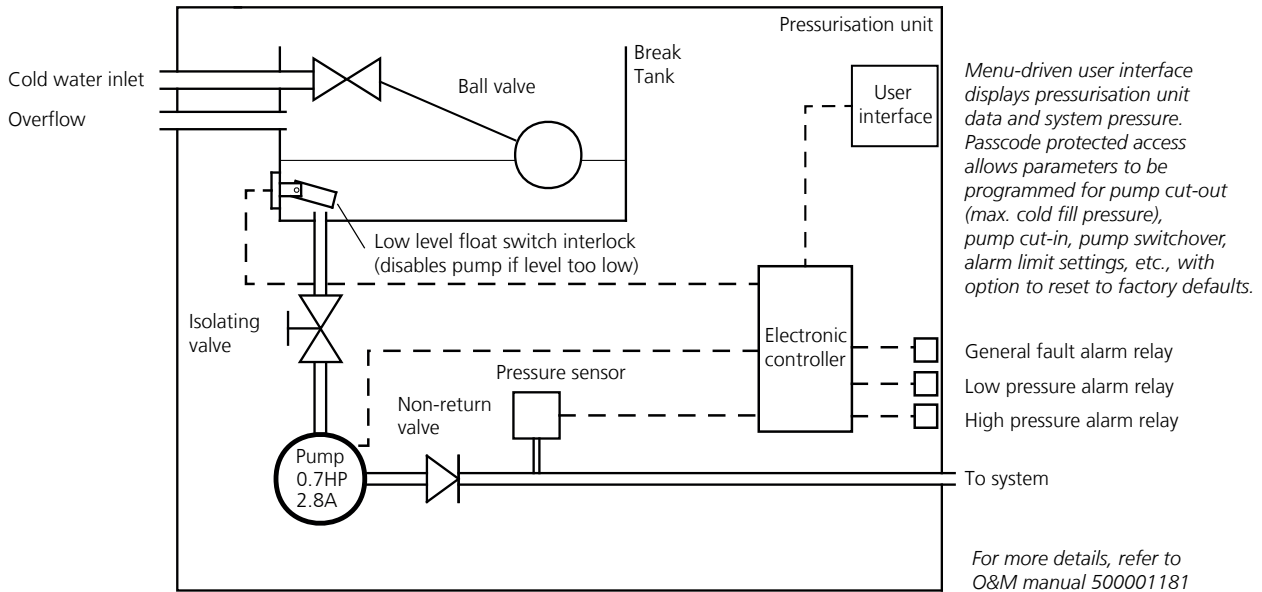


## Site wiring details of electronic Chesil pressurisation units

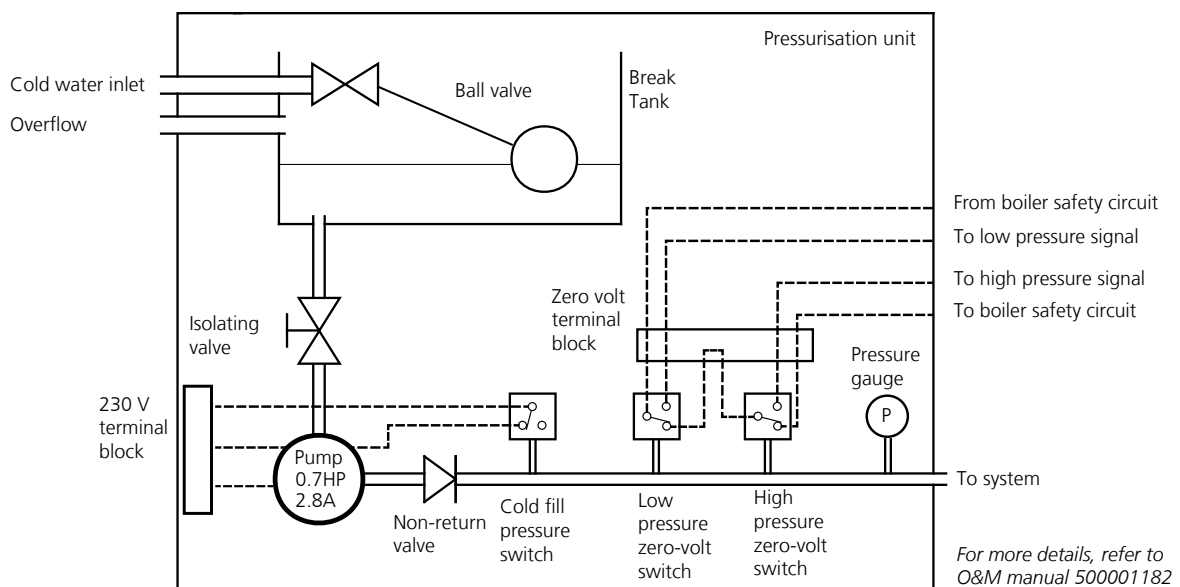


# Chesil product schematic

## Chesil pressurisation units with electronic controls

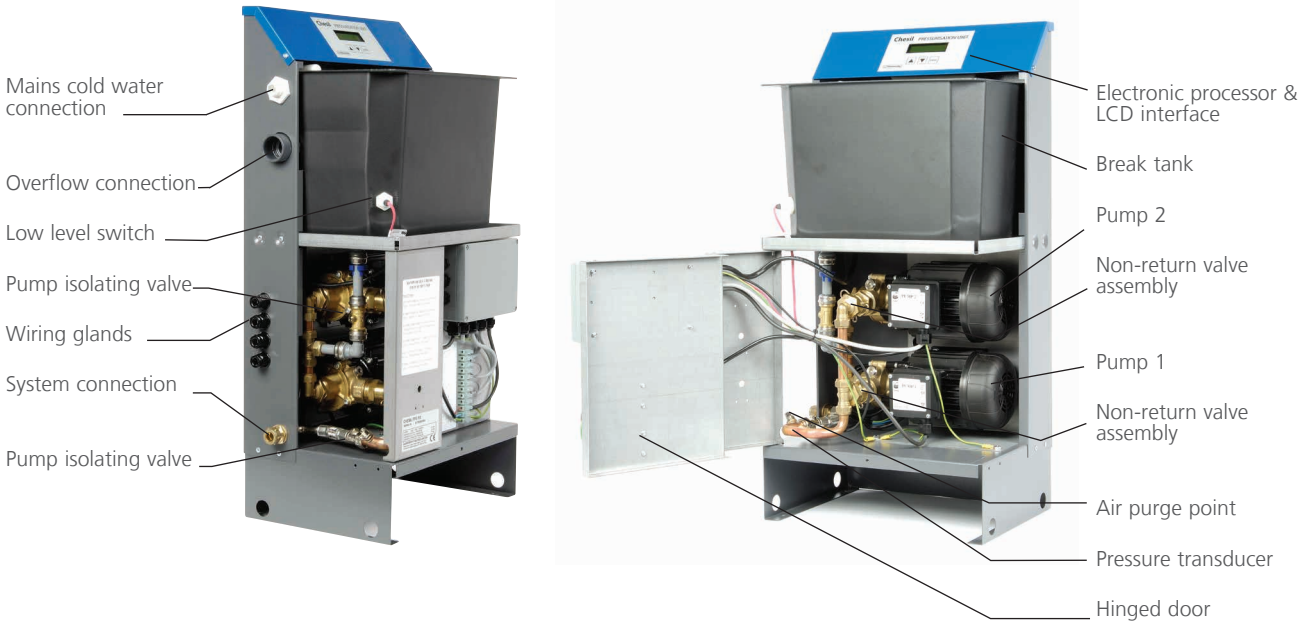


## Chesil pressurisation units with standard controls

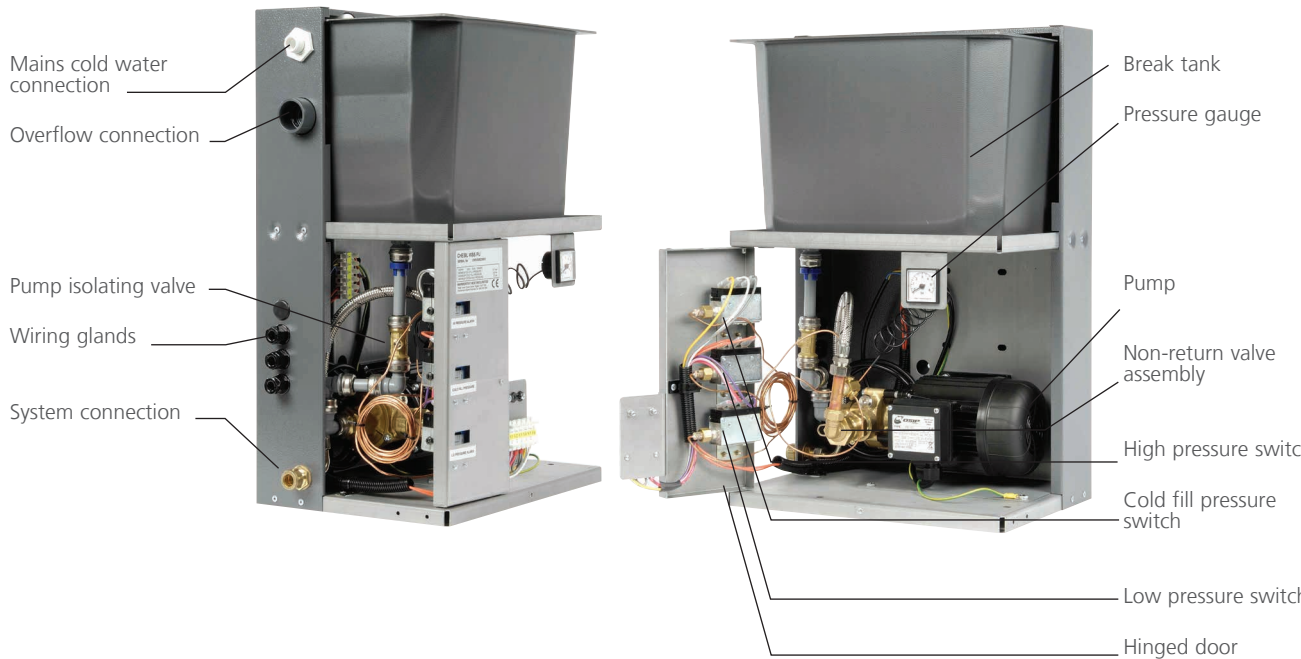


# Chesil product layout

*Floor standing twin pump, electronic controls model*



*Wall hung single pump, standard controls model*



# Application & system data

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.

## 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 3.3bar minimum, i.e. safety valve set at 4.0bar 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 6. If your system complies with these requirements, the data as tabled may be used. For other applications outside these parameters refer to page 16 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.

## 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.

# System integration

As well as energy efficient commercial boilers, we supply direct and indirect fired water heaters plus equipment to enhance the efficiency and longevity of your heating system.

Dosing pots and air & dirt separators are available for system cleanliness.

## 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.

## Clenston 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.



# Boilers

## Floor standing condensing boilers

We have an extensive range of floor standing modular boilers with outputs from 70kW up to 1050kW. With natural gas and LPG options available they can be used across the UK.

The Upton and Wessex ModuMax mk3 boilers are designed as vertically stacking modular boilers to fit in the smallest of plant rooms – offering over 1MW output from 1 metre squared footprint.

Purewell Variheat mk2 boilers are built around a cast iron heat exchanger for tolerance to older heating circuits, making them a perfect choice for refurbishment and replacing an old atmospheric boilers.

For larger heat loads or simplified design, the Varmax boilers do not need to be installed with a primary circuit and have split temperature return connections for improved efficiency.



Upton



Purewell Variheat mk2



Stratton mk2



Wessex ModuMax mk3



Ensbury LT

## Wall hung condensing boilers

The Stratton mk2 wall hung boiler offers the benefits of a long life and corrosion resistance with a stainless steel heat exchanger. It can also fit into low height plant rooms thanks to a built in flue gas non return valve and low height pipework kits.

## Pressure jet boilers

For higher heating demands and a greater choice of fuel options, including oil and biofuel, Hamworthy can provide pressure jet/power flame boilers. With outputs from 75kW right up to 10MW, and a choice of matched burners.

# Sealed system calculations

## Expansion vessel sizing

### Hot water applications

- Total system water content = \_\_\_\_\_ litres. (Sv.)  
Note: an assumed ratio of 10 litres/kW of installed boiler capacity can be used if not known.
- Static head from base of expansion vessel to highest point of system = \_\_\_\_\_ metres. (Ph.)
- System flow temperature (maximum under normal operation) = \_\_\_\_\_ °C. (Tf.)
- System return temperature = \_\_\_\_\_ °C
- 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.
- Acceptance = proportion of expansion vessel filled=0.35

### Preliminary sizing sheet

$$Sv = \boxed{\phantom{000}} \text{ litres} \quad Ph = \boxed{\phantom{000}} \text{ metres} \quad Tf = \boxed{\phantom{000}} \text{ }^\circ\text{C}$$

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

$$\therefore Pf = \left( \frac{\boxed{\phantom{000}}}{10.2} \right) + 0.2 + \boxed{\phantom{000}} \text{ bar}$$

$$\therefore Pf = \boxed{\phantom{000}} \text{ bar (Max 3.4 bar)}$$

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

### To size expansion vessel

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

$$\therefore \text{Total vessel volume} = \frac{\boxed{\phantom{000}} \times \boxed{\phantom{000}}}{0.35}$$

$$= \boxed{\phantom{000}} \text{ litres (calculated)}$$

\therefore Using the next larger standard expansion vessel(s):

$$\boxed{\phantom{000}} \text{ litres (calculated)} = \boxed{\phantom{000}} \text{ off @ } \boxed{\phantom{000}} \text{ litres}$$

$$+ \boxed{\phantom{000}} \text{ off @ } \boxed{\phantom{000}} \text{ litres}$$

$$\text{Nitrogen charge pressure} = Pf (\text{fill press.}) - 0.1 = \boxed{\phantom{000}} \text{ bar}$$

### Chiller applications

- Total system water content = \_\_\_\_\_ litres. (Sv.)
- Static head from base of expansion vessel to highest point of system = \_\_\_\_\_ metres. (Ph.)
- Maximum ambient temperature = \_\_\_\_\_ °C. (Tf.)
- 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.
- Acceptance = proportion of expansion vessel filled=0.35

### Preliminary sizing sheet

$$Sv = \boxed{\phantom{000}} \text{ litres} \quad Ph = \boxed{\phantom{000}} \text{ metres} \quad Tf = \boxed{\phantom{000}} \text{ }^\circ\text{C}$$

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

$$\therefore Pf = \left( \frac{\boxed{\phantom{000}}}{10.2} \right) + 0.2 \text{ bar}$$

$$\therefore Pf = \boxed{\phantom{000}} \text{ bar (Max 3.4 bar)}$$

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

### To size expansion vessel

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

$$\therefore \text{Vessel volume} = \frac{\boxed{\phantom{000}} \times \boxed{\phantom{000}}}{0.35}$$

$$= \boxed{\phantom{000}} \text{ litres (calculated)}$$

\therefore Using the next larger standard expansion vessel(s):

$$\boxed{\phantom{000}} \text{ litres (calculated)} = \boxed{\phantom{000}} \text{ off @ } \boxed{\phantom{000}} \text{ litres}$$

$$+ \boxed{\phantom{000}} \text{ off @ } \boxed{\phantom{000}} \text{ litres}$$

$$\text{Charge pressure} = Pf (\text{fill press.}) - 0.35 = \boxed{\phantom{000}} \text{ bar}$$

### 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
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

\*Note: these figures apply to water systems only



# Pressures & temperatures

## Open vented systems

The diagram shows example of 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.

### Example 1

#### Single boiler system

Maximum temperature  
Minimum recommended pressure

### Example 2

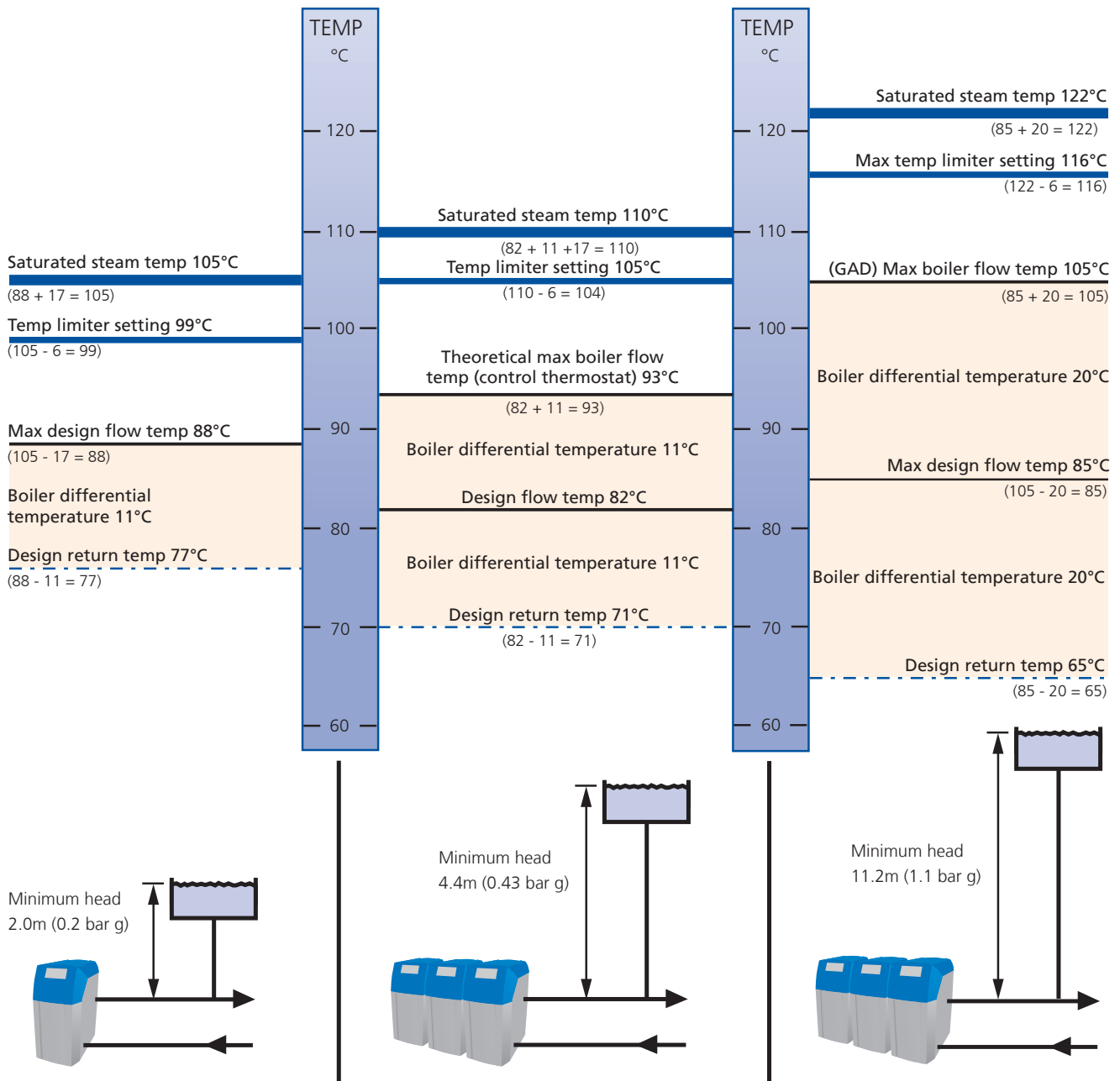
#### Multiple boiler system

Typical temperature settings  
Pressure requirements to PM5

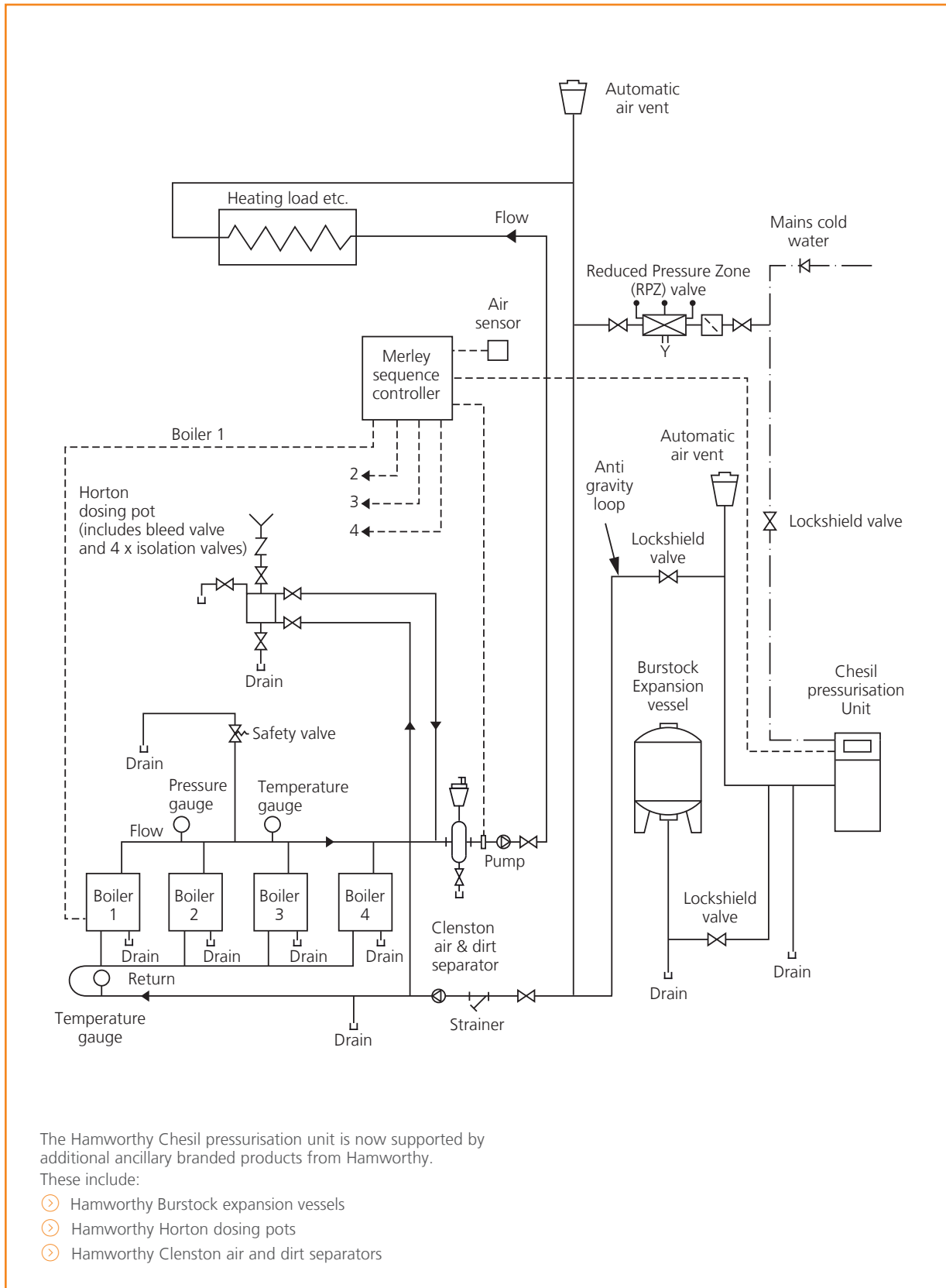
### Example 3

#### Multiple boiler system

Maximum temperature settings to GAD  
Minimum pressure requirements to PM5



# System schematic



# Product training

## Get hands on training with Hamworthy's commercial boilers and water heaters

We can provide training onsite or you can attend a course at one of our training centres. Delivered by Hamworthy engineers with years of product knowledge and industry experience, by attending our training you'll be more confident in running our equipment.

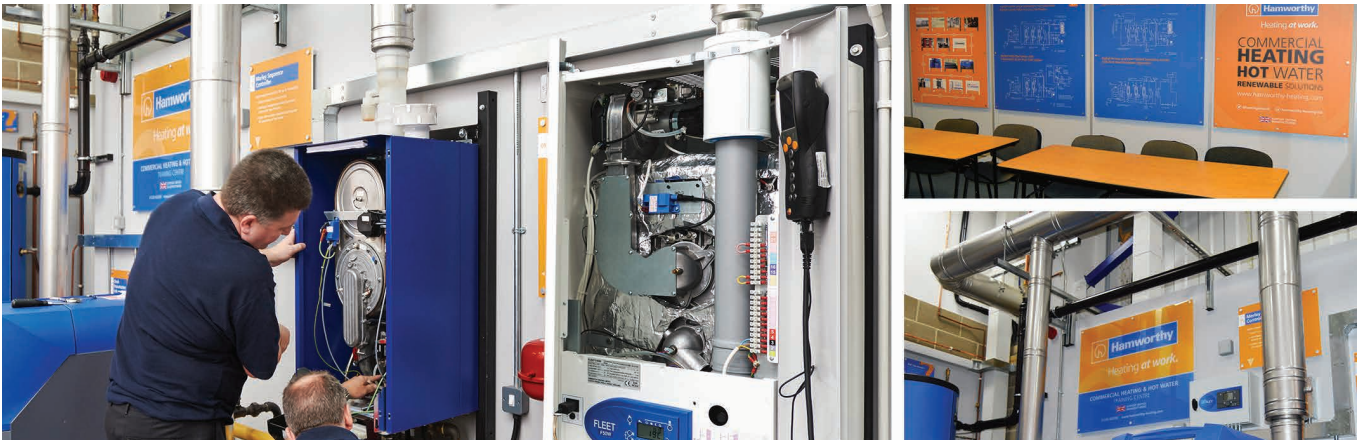
The course will guide you through the servicing and fault finding of Hamworthy products to ensure they are operating at their maximum efficiencies.

### Training centres

- ⦿ Wokingham near Reading
- ⦿ Northolt, London
- ⦿ Leeds

Each training centre has live firing boilers as well as a display of boilers, water heaters and additional system equipment.

[www.hamworthy-heating.com/training](http://www.hamworthy-heating.com/training)



## Want to improve your industry knowledge?

Book a CIBSE accredited CPD seminar for you and your colleagues today and we'll even provide the lunch.



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- ⦿ Best practice heating and hot water plant refurbishment
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Find out more at:

[www.hamworthy-heating.com/cpd](http://www.hamworthy-heating.com/cpd)

Email: [marketing@hamworthy-heating.com](mailto:marketing@hamworthy-heating.com)

Tel: 01202 662500



*"Very good session with lots of very detailed and relevant information. Would highly recommend!"*

*"Very interesting topic and relevant cost benefit analysis for replacing boilers."*

# Case study

## Braithwaite House Tower Block

### Project

- ⊙ Social housing refurbishment

### Products

- ⊙ Ensbury pressure jet boiler
- ⊙ Chesil pressurisation unit



### The challenge:

Braithwaite House in Islington, London, had been facing problems with their current boilers and heating system.

Reaching 55 metres tall with 19 floors consisting of 108 dwellings, this residential building needed a boiler that was long lasting and could cope with the high demands placed on it.

### The solution:

Two Ensbury low temperature 510kW boilers, with matched Riello RS modulating burners using natural gas, were specified for the project. CBS Maintenance Services Ltd installed the boilers along with a floor standing Chesil pressurisation unit and expansion vessel to maintain the correct pressure in the system for water to reach the highest radiator in the building. Sandy Yogendra, mechanical design engineer at Islington Council, commented,

*"We had numerous problems with the previous boiler, so turned to Hamworthy to provide us with a reliable, long lasting and high efficiency boiler solution. The Ensbury boilers suited the brief perfectly."*

As part of the heating system replacement, the plant room was moved from the rooftop of the building to the ground floor; enabling it to support the weight of the steel shell boilers. This had implications for the flue which now needed to have a 50m riser due to it being installed in a residential area. Sandy worked closely with Hamworthy and their flue partners Midtherm to install a flue system that would run the full height of the building.

A combined flue with a draught stabiliser was installed with twin wall insulation to maintain internal stack temperatures whilst ensuring exposed surfaces are safe to touch. The flue was powder coated to suit the exterior of the building - helping it to blend in. Sandy went on to say,

*"There were many practical obstacles to overcome in relocating the plant room, but the whole project went smoothly and we are very pleased with the outcome."*

Hamworthy's Ensbury LT boiler range comprises 14 models with outputs from 70kW to 580kW, for use with fully modulating or high/low matched burners, delivering operating efficiencies up to 95 per cent net (86 per cent gross) at part load.

Enabling return water temperature to reach as low as 15°C without condensing, and with no minimum flow rate, the steel boilers provide versatility in system applications.

Ensbury LT boilers from Hamworthy feature a three-pass heat exchanger, which has been designed to reduce the level of NOx. With a range of low NOx matched burners, the boilers achieve up to European Class 5 performance.



Ensbury pressure jet boiler

The thermal mass within the Ensbury boiler can accommodate fluctuating operating conditions, and with no minimum water flow requirement, eliminates the need for a shunt pump, simplifying the hydraulic system design. A high level of insulation also ensures very low standing losses at just 0.15 – 0.5 per cent.

# Services and warranty



## Commissioning

We strongly recommend that all our products are commissioned by our service department, and some specifications state that it must be carried out by the manufacturer. As well as ensuring your product is set up correctly for maximum efficiencies, you will receive extra benefits on warranty (see below). On completion, you will get a report with details of the initial operating settings.

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.

## Service

To maintain your products, we have a range of servicing options that can be tailored to your requirements. For more information on commissioning and service please contact Hamworthy Heating service department.



## Warranty

Chesil and Burstock carry Hamworthy's standard two years warranty (except for consumables in line with our Terms and Conditions). Where the product is commissioned by Hamworthy service engineers within 6 months of delivery date, then the two-year warranty covers parts and labour from date of commissioning. We offer tailored packages to suit individual customer requirements, many of which include extended warranty benefits. Full details of warranty terms and conditions are available on request.



## Spares

Essential to any maintenance and service regime is the availability of quality spare parts.

By coming to us, you can be assured of genuine spare parts and may also benefit from technological improvements. We have a long-term commitment to spare parts for our products.

## Delivery

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

Deliveries are closely co-ordinated with the customer, to suit the site construction programme. Products are delivered to ground level and it is the responsibility of the customer to arrange movement of products from there to the required location on site. Standard delivery for all Hamworthy products is free of charge.

To enquire about special delivery services including FORS and time critical deliveries (additional charges apply), please contact our customer services team.

## Service

Tel: **01202 662555**

Email: **service@hamworthy-heating.com**

## Spares

Tel: **01202 662525** Fax: **01202 662551**

Email: **spares@hamworthy-heating.com**

# About Hamworthy



Hamworthy Heating is a leading British commercial boiler manufacturer. Our energy efficient heating, hot water and renewable solutions are used in buildings across the UK.

## The Hamworthy difference

### British engineering excellence

Here in the UK, we design, test, manufacture and source market-leading products. We know our products inside out, back to front and from start to finish. You can trust that we know what we're talking about.

### Lifetime support

From design and specification, through to commissioning, training and maintenance, as well as commitment to spares availability. We provide long term support for businesses with their commercial heating and hot water needs.

### People first

It's not just our products that set us apart, it's our people. Truly excellent customer service, great technical knowledge and being easy to deal with.

That's the Hamworthy difference.



## Everyone's got history, we've got heritage

Our roots date back to 1914 when two brothers in Poole set up Hamworthy Engineering. Decades of experience go in to every nut, screw and bolt. Every phone call, text and email. Since 2008, we've been part of Groupe Atlantic, a company with a similar ethos to us. Groupe Atlantic was founded in 1968 by two engineers and is now one of the market leaders in the European heating and hot water industry. We're now part of their growing UK, ROI and North America Divisions.



### Our associations

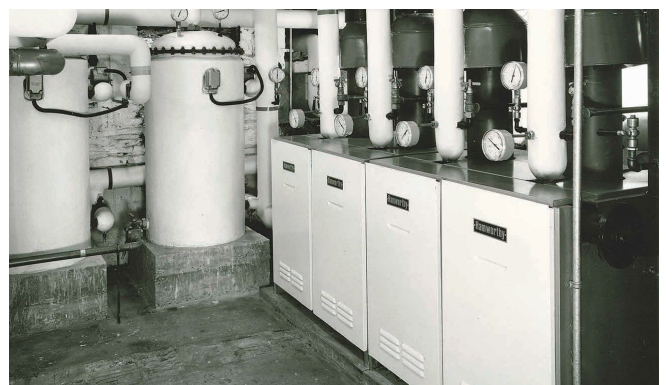
We are an active member of trade associations and professional bodies supporting the industries we work in.

### Our accreditations

International Organisation for Standardisation (ISO) is the world's largest developer of voluntary International Standards. We are proud to have been awarded the following ISO accreditations:

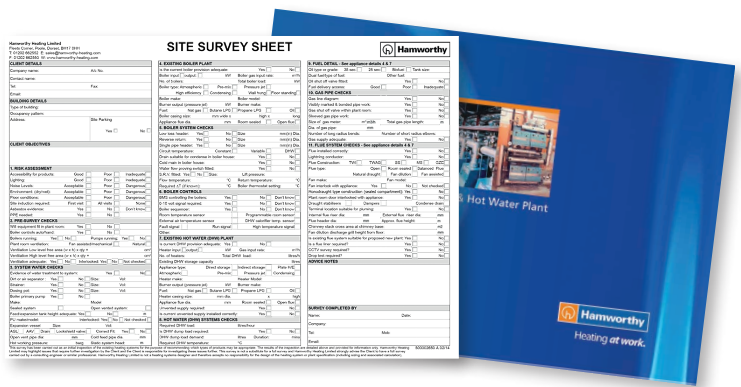
- ISO 9001 Quality Management System
- ISO 14001 Environmental Management System
- OHSAS 18001 Health and Safety Management System

When you deal with Hamworthy, have confidence that we're working within a defined set of standards that are internationally recognised.



## Book a free site survey

[www.hamworthy-heating.com/site-survey](http://www.hamworthy-heating.com/site-survey)



## View our full CPD and product training offer

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## Get information for discontinued products

[www.hamworthy-heating.com/discontinued-products](http://www.hamworthy-heating.com/discontinued-products)



## Contact our in-house technical support team

on **01202 662505**

Your local contact is:



British engineering excellence from Hamworthy Heating;  
the commercial heating and hot water specialists.



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[www.hamworthy-heating.com](http://www.hamworthy-heating.com)



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