WARMFLOW

Cylinder Manual

Incorporating: **User Instructions**
Installation Instructions
Commissioning Instructions
Maintenance Instructions

Nero Unvented Cylinders

Mains Pressure Stainless Steel Water Heaters

Products covered by this manual:

Direct	DI110UV	DI140UV	DI170UV	DI200UV	DI240UV	DI290UV
Indirect	IN110UV	IN140UV	IN170UV	IN200UV	IN240UV	IN290UV
Twin Coil	TW170UV	TW200UV	TW240UV	TW290UV		
Heat Pump	HP170UV	HP200UV	HP240UV	HP290UV		

INSTALLATION, COMMISSIONING & SERVICING

All works to this appliance including installation and commissioning must be conducted as described herein by appropriately certified and competent persons as instructed and in accordance with all applicable current regulations and standards. The Guarantee Registration of the product must be completed and returned to the manufacturer with proof of purchase (e.g. receipts / invoices).

This appliance must be serviced annually by appropriately certified and competent persons, and proof of servicing (e.g. receipts / invoices) retained.

The complete guarantee policy statement is included in Section 9, page 32.

FAILURE TO COMMISSION, REGISTER AND ANNUALLY SERVICE THIS PRODUCT WILL INVALIDATE ALL GUARANTEES

TECHNICAL, SPARES & GUARANTEE CLAIMS

For technical advice about the installation, commissioning, servicing or use of this appliance, please contact the Warmflow Customer Care Centre. Please also refer to our website www.warmflow.co.uk.

Should replacement components be required, a list of available spares is provided in Section 8.3, page 30.

In the unlikely event that replacement components might be required within the guarantee period, please notify the Customer Care Centre stating the serial number of the appliance, stating the nature of the fault and the part number of the replacement components required.

Warmflow Customer Care Centre

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1 USER INSTRUCTIONS

1.1 User Warnings

Do not remove or adjust any part of this unvented water heater.

If the unvented water heater develops fault, such as a flow of water from the discharge pipe switch the heater off.

In all cases contact a competent installer.

Documented records of annual services must be retained by the user.

If cold/warm water is discharged from the cylinder via the tundish, call your installer.

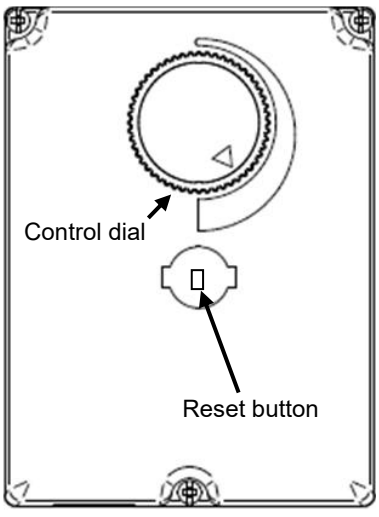
⚠ If extremely hot water is discharged, **immediately** switch off ALL heat sources (which may include boilers, heat pumps, solar thermal systems and immersion heaters), isolate their electrical supplies and call your installer.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

The recommended storage temperature for both direct and indirect cylinders is 60-65°C. In hard water areas consideration should be given to reducing this to 50-55°C. In some applications guidance on Legionella control and safe water delivery temperatures can require a storage temperature of 60 - 65°C, distributing to outlets at 50 - 55°C, using thermostatic mixing valves to control the final outlet temperature. For details consult local regulations applicable to the installation.

When a hot tap is turned on there may be a short surge of water – this is quite normal with unvented systems and does not mean there is a fault. When you first fill a basin, the water may sometimes appear milky. This is due to air bubbles in the water which will clear very quickly.

1.2 Cylinder Thermostat



All cylinders (except Direct models) are fitted with one or more cylinder thermostats to control the heat input to the cylinder from a remote heat source, such as a boiler, heat pump or solar thermal installation. The temperature of each cylinder thermostat is adjustable between ***nominally*** 40°C and 70°C. Turn the control knob clockwise to increase temperature, and anticlockwise to decrease.

Each cylinder thermostat has a built-in manually reset safety thermostat which will 'lock out' in the event of the cylinder overheating and which will need to be reset in order to restore operation.

In the event of a lockout situation occurring, it is vital to contact the installer of the appliance to determine and rectify the cause of lock out.

All electrical supplies to the appliance must be isolated before attempting to reset the thermostat.

1.3 Immersion Thermostat

Direct Models only

Direct model cylinders may be supplied with SMART Thermostats. SMART thermostats learn the routine of hot water use, and adjust their operation to suit this, increasing energy efficiency.

The immersion heater with SMART thermostat must be fitted to the lowest immersion heater position in the cylinder.

Please refer to documentation supplied with the SMART thermostat for operation and reset information.

2 INSTALLATION REQUIREMENTS

Prior to installing this unvented hot water cylinder, please confirm that:

a) The mains water supply is capable of achieving a minimum flow rate of 20 litres per minute at a minimum dynamic pressure of 1.5 bar **at all times**. If this performance cannot be achieved the installation of an unvented cylinder may not be suitable.

b) The maximum mains supply pressure **at any time** does not exceed 16 bar. If this is the case an additional 'special' pressure reducing valve (not supplied) may be required.

c) The mains water supply is from a public source (i.e. not from a private borehole) and that the hardness of the water is less than 200 mg/litre. Where hardness in excess of 200 mg/litre is experienced, a suitable and effective hard water treatment must be installed. The device should be rated for a flow rate of 50 litres per minute in order to maintain maximum performance.

d) All circuits supplying heat to the heat exchanger coils of any cylinder (not applicable to direct cylinders) are fully pumped (gravity circulation is NOT suitable).

e) The pipework supplying the hot water taps is capable of withstanding a maximum pressure of 7 bar at a temperature of 90°C.

f) The mains water supply does not consistently contain a high proportion of suspended matter that could block the strainer.

g) The mains water supply does not contain chloride levels that exceed 250mg/l.

h) This appliance must be installed vertically (not on its side) in a frost-free indoor location.

i) The cylinder will be placed on a floor area that is level and capable of supporting the appliance when full of water.

j) All serviceable components must be accessible after installation.

k) The connection of additional pumps

The installation of this appliance is subject to the Building Regulations:

England & Wales	Building Regulation G3
Scotland	The Building Regulations (Scotland)
Northern Ireland	Building Regulations (Northern Ireland)
Republic of Ireland	Technical Guidance Document Part L

IEE Electrical Regulations

Local Water Regulations

Note: Other regulations may apply for other territories

The appliance and installation must be commissioned as described herein and the Guarantee Registration completed and returned to the manufacturer.

FAILURE TO COMMISSION, REGISTER AND ANNUALLY SERVICE THIS PRODUCT WILL INVALIDATE ALL GUARANTEES

⚠ Under no circumstances must the factory fitted temperature & pressure relief valve be removed. Removal of the valve would create an **extremely dangerous** situation and would invalidate all guarantees.

3 HANDLING AND STORAGE

Prior to installation this product should be handled with care and stored upright in a dry location and in its original packaging.

4 STANDARD EQUIPMENT

Before commencing installation check that all the listed components have been supplied:

1. Temperature & pressure relief valve (factory-fitted)
2. Unvented kit including:
    a. Inlet group
    b. Expansion vessel
    c. Tundish
    d. Control thermostats and pockets
    e. Immersion heater (s)

Heat pump models also include:

a. Potable water circulating pump
b. Plate Heat Exchanger arrangement

One 2-port motorised zone valve is supplied with Indirect and Twin Coil models only, for use on the primary circuit.

Note: This stainless-steel cylinder requires no corrosion protection device e.g. anode.

5 TECHNICAL DATA

5.1 General

	Direct	Indirect	Twin Coil	Heat Pump
OPERATING DATA				
Operating pressure (bar)	3.0	3.0	3.0	3.0
Maximum operating / working pressure (bar)	5.5	5.5	5.5	5.5
Maximum design pressure (bar)	6.0	6.0	6.0	6.0
Maximum supply pressure to inlet group (bar)	16.0	16.0	16.0	16.0
Expansion vessel bladder pre-charge pressure (bar)	3.0	3.0	3.0	3.0
SAFETY DEVICE SETTINGS				
Pressure reducing valve (bar)	3.0	3.0	3.0	3.0
Expansion valve (bar)	6.0	6.0	6.0	6.0
Cylinder thermostat limit temperature (°C)	N/A	80	80	80
Immersion thermostat limit temperature (°C)	80	80	80	80
Temperature & pressure relief (T&P) valve (°C / bar)	90/7.0	90/7.0	90/7.0	90/7.0
HEAT TRANSFER COILS				
Maximum circuit temperature (renewable coil) (°C)	N/A	N/A	95	N/A
Maximum circuit temperature (other coils) (°C)	N/A	85	85	85
Maximum circuit pressure (all coils) (bar)	N/A	6.0	6.0	6.0

Table 1: General data

5.2 Direct Cylinders

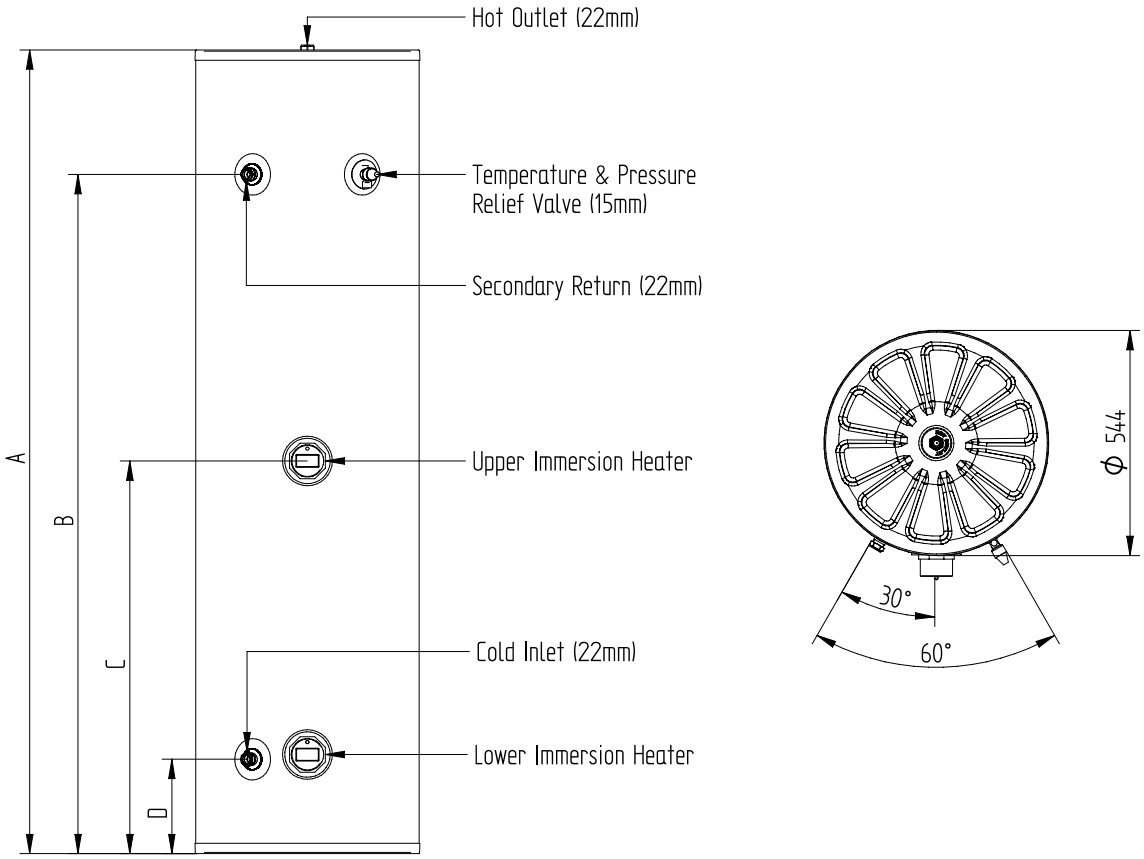


Figure 1: Direct cylinders components & dimensions

	DI110UV	DI140UV	DI170UV	DI200UV	DI240UV	DI290UV
DIMENSIONS						
(A) Height (mm)	830	1005	1205	1380	1655	1940
(B) Secondary return connection / T&P (mm)	N/A / 530	N/A / 705	N/A / 905	1080 / 1080	1355 / 1355	1640 / 1640
(C) Upper immersion (mm)	393	481	581	668	806	948
(D) Cold inlet connection / Lower immersion (mm)	228 / 239	228 / 239	228 / 239	228 / 239	228 / 239	228 / 239
OPERATING DATA						
Rated volume (litres)	107	136	165	194	233	281
Weight when full (kg)	140	180	210	240	290	350
Standing heat loss (kWh/24h)	1.43	1.41	1.68	1.78	2.08	2.15
V40 Hot water volume (litres)	138	181	230	267	345	432
PERFORMANCE						
Heat up time by lower immersion only (mins)	121	154	198	237	287	345
FICHE DATA						
Supplier Name	Warmflow					
Supplier Model Identifier	DI110UV	DI140UV	DI170UV	DI200UV	DI240UV	DI290UV
Declared Load Profile	M	M	L	L	XL	XL
Energy Efficiency Class	C	C	C	C	C	C
Water Heating Energy Efficiency, ηwh (%)	38	38	38	38	38	38
Annual Electrical Consumption, AEC (kWh)	1339	1702	2295	2698	3609	4352
Thermostat Setting (°C)	65	65	65	65	65	65
Sound Power Level (dB)	15	15	15	15	15	15

Table 2: Direct cylinder data

Data listed with SMART Immersion thermostat fitted to lower position.

5.3 Indirect Cylinders

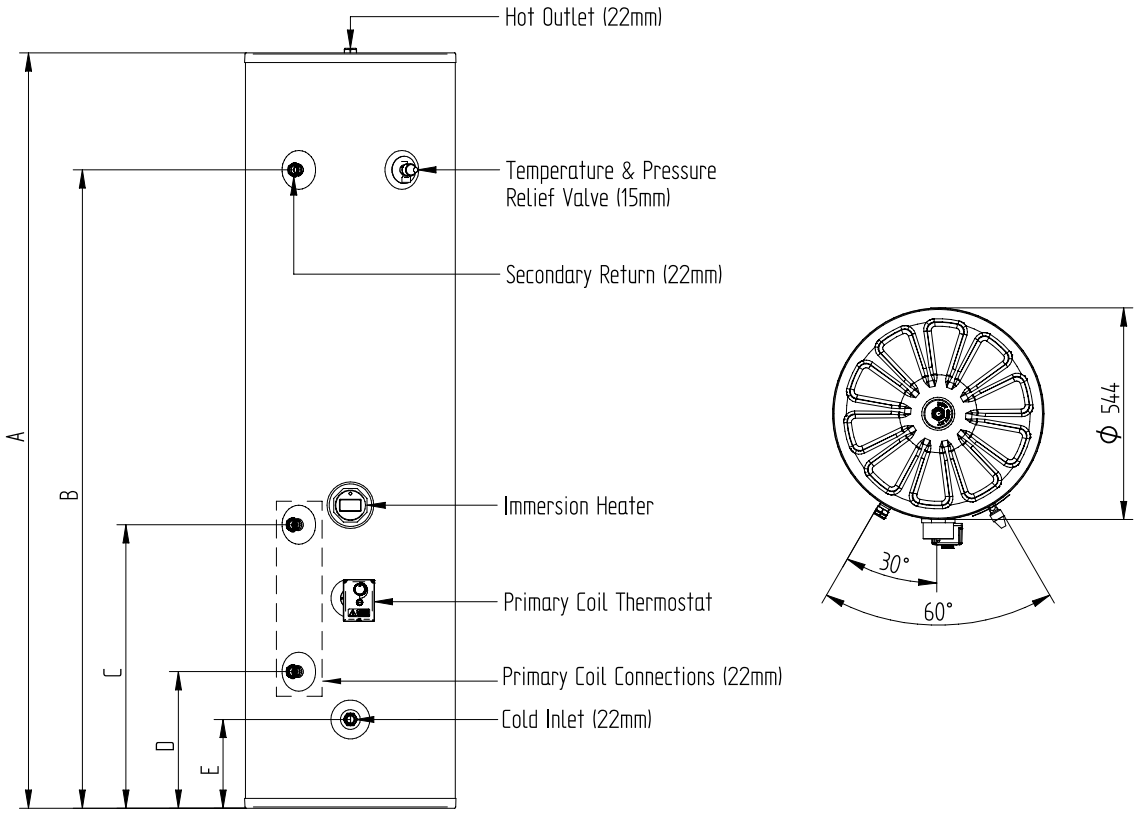


Figure 2: Indirect cylinders components & dimensions

	IN110UV	IN140UV	IN170UV	IN200UV	IN240UV	IN290UV
DIMENSIONS						
(A) Height (mm)	830	1005	1205	1380	1655	1940
(B) Secondary return connection / T&P (mm)	N/A / 558	N/A / 705	N/A / 905	1080 / 1080	1355 / 1355	1640 / 1640
(C) Primary coil upper connection (mm)	451	511	605	605	657	728
(D) Primary coil lower connection (mm)	168	228	228	228	279	351
(E) Cold inlet connection (mm)	168	228	228	228	228	228
OPERATING DATA						
Rated volume (litres)	107	135	165	194	233	281
Weight when full (kg)	140	180	210	240	290	350
Standing heat loss (kWh/24h)	1.43	1.41	1.68	1.78	2.08	2.15
V40 Hot water volume (litres)	157	164	209	263	320	366
COIL PERFORMANCE (EN12897)						
Primary coil rating @ 15L/min (kW)	10.15	12.91	17.51	16.81	15.72	14.66
Primary coil pressure drop @ 15L/min (mbar)	63	63	60	60	60	60
Heat up time by primary coil (mins)	23	26	25	33	42	49
FICHE DATA						
Supplier Name	Warmflow					
Supplier Model Identifier	IN110UV	IN140UV	IN170UV	IN200UV	IN240UV	IN290UV
Energy Efficiency Class	C	C	C	C	C	C
Standing Loss (W)	60	59	70	74	87	90
Storage Volume (litres)	107	136	165	194	233	281

Table 3: Indirect cylinder data

5.4 Twin Coil Cylinders

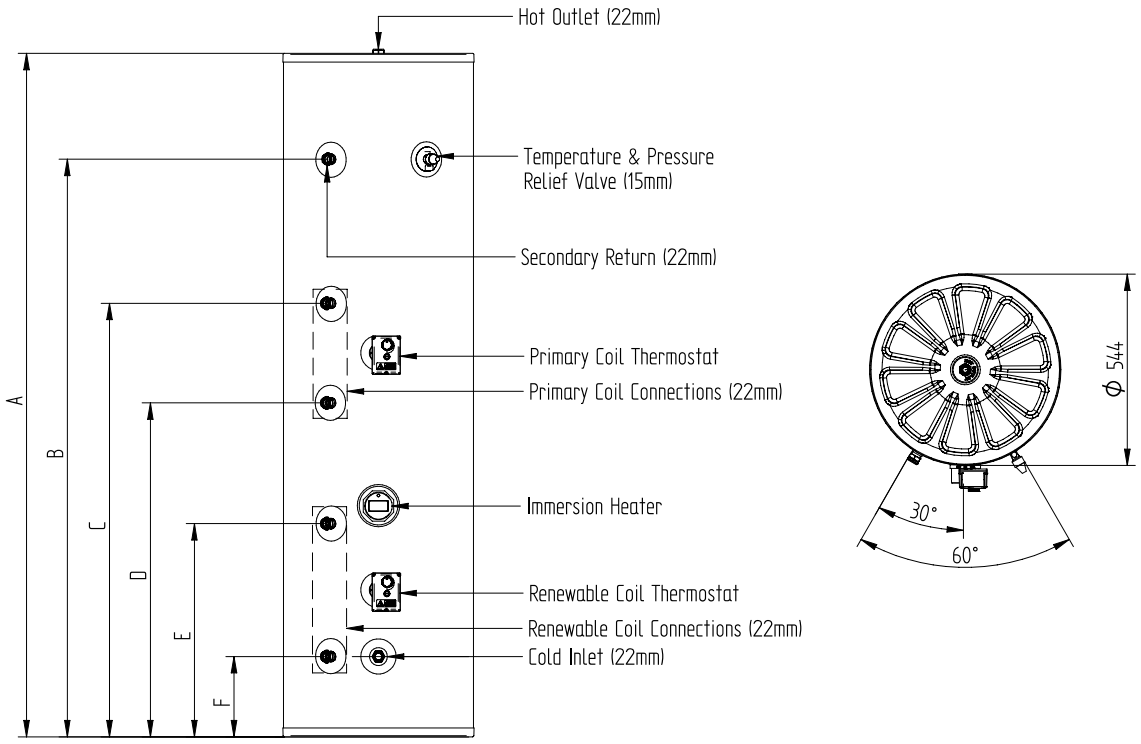


Figure 3: Twin Coil cylinders components & dimensions

	TW170UV	TW200UV	TW240UV	TW290UV
DIMENSIONS				
(A) Height (mm)	1205	1380	1655	1940
(B) Secondary return connection (mm)	N/A	1080	1355	1640
(C) Primary coil upper connection (mm)	883	988	1088	1231
(D) Primary coil lower connection (mm)	601	705	806	948
(E) Renewable coil upper connection (mm)	511	605	605	605
(F) Cold inlet connection / Renewable coil lower connection (mm)	228	228	228	228
OPERATING DATA				
Cold water capacity (litres)	165	194	233	281
Weight when full (kg)	210	240	290	350
Standing heat loss (kWh/24h)	1.66	1.97	2.12	2.26
V40 Hot water volume (litres)	245	253	341	434
COIL PERFORMANCE (EN12897)				
Primary coil rating @ 15L/min (kW)	14.27	14.35	14.28	14.64
Primary coil pressure drop @ 15L/min (mbar)	63	63	63	63
Heat up time by primary coil @ 15L/min (mins)	19	22	29	35
Renewable coil rating @ 15L/min (kW)	12.33	16.62	16.47	15.82
Renewable coil pressure drop @ 15L/min (mbar)	63	60	60	60
Dedicated renewable volume (litres)	83	97	117	141
FICHE DATA				
Supplier Name	Warmflow			
Supplier Model Identifier	TW170UV	TW200UV	TW240UV	TW290UV
Energy Efficiency Class	C	C	C	C
Standing Loss (W)	69	82	88	94
Storage Volume (litres)	165	194	233	281

Table 4: Twin Coil cylinder data

5.5 Heat Pump Cylinders

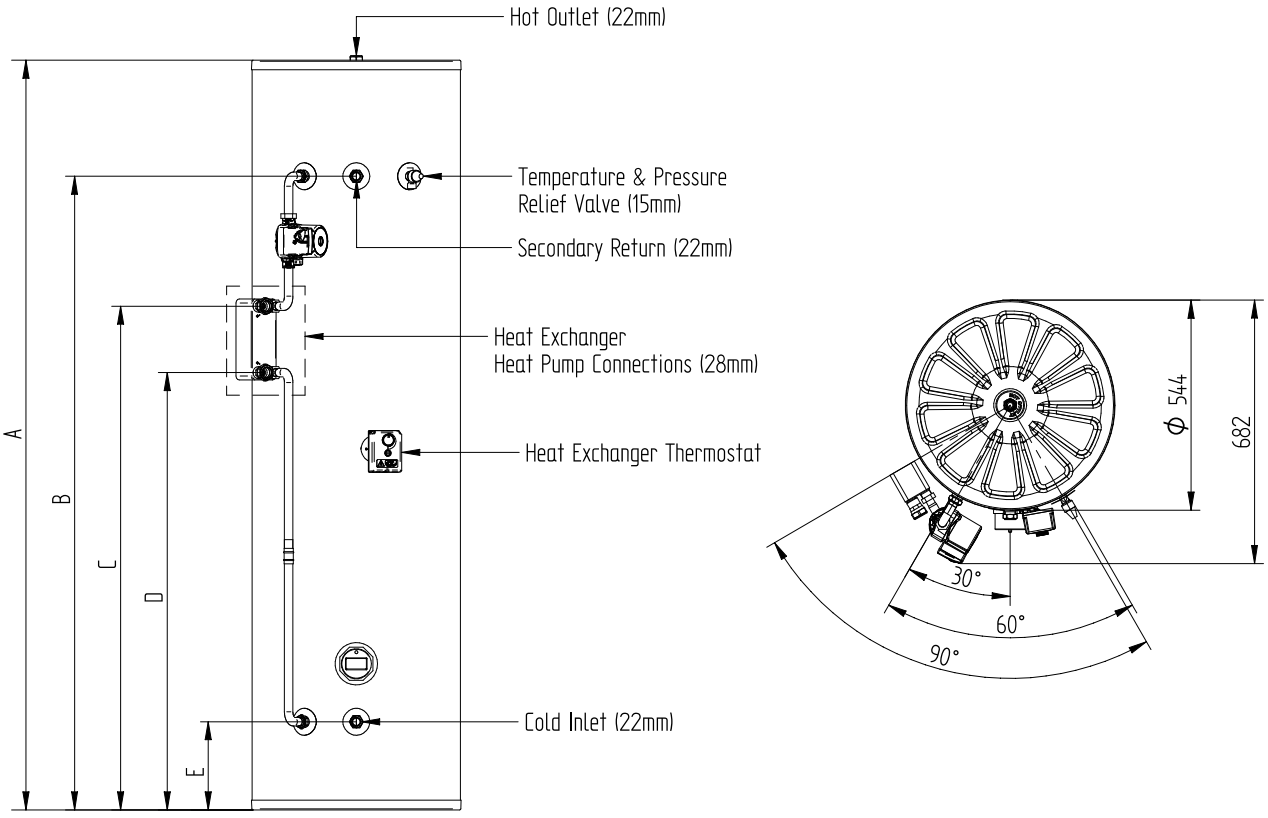


Figure 4: Heat Pump cylinders components & dimensions

	HP170UV	HP200UV	HP240UV	HP290UV
DIMENSIONS				
(A) Height (mm)	1205	1380	1655	1940
(B) Secondary return connection (mm)	905	1080	1355	1640
(C) Plate Heat Exchanger upper connection (mm)	569	744	1019	1304
(D) Plate Heat Exchanger lower connection (mm)	397	572	847	1132
(E) Cold Inlet connection (mm)	228	228	228	228
OPERATING DATA				
Cold water capacity (litres)	165	194	233	281
Weight when full (kg)	210	240	290	350
Standing heat loss (kWh/24h)	1.68	1.78	2.08	2.15
V40 Hot water volume (litres)	229	259	312	401
COIL PERFORMANCE (EN12897)				
Primary coil rating @ 15L/min (kW)	17.08	25.85	29.38	21.92
Primary coil pressure drop @ 15L/min (mbar)	35	30	30	30
Heat up time by primary coil (mins)	25	21	22	34
FICHE DATA				
Supplier Name	Warmflow			
Supplier Model Identifier	HP170UV	HP200UV	HP240UV	HP290UV
Energy Efficiency Class	C	C	C	C
Standing Loss (W)	70	74	87	90
Storage Volume (litres)	165	194	233	281

Table 5: Heat Pump cylinder data

6 INSTALLATION

6.1 Cylinder Location

The unit must be located in a frost-free, indoor location.

The unit can be fitted into a conventional airing cupboard and does not require any additional ventilation. To maximise efficiency of the installation, surfaces of potential heat loss must be insulated. Valves and manifolds can be insulated using manufacturer approved covers.

When selecting a location, consideration should be given to the routing of all discharge pipework and to the relative location of the heat sources (solar panels, heat pumps or boilers) as well as to the domestic hot water outlets – pipe runs should be kept as short as possible for maximum efficiency of the installation.

Ensure the cylinder is positioned such that future servicing and part replacement if necessary is possible. The installation must not prevent items such as thermostats, immersion heaters, temperature & pressure relief valve, inlet group, pumps, heat exchangers or expansion vessel from being removed for service or replacement.

6.2 Hot & Cold Water Connections

⚠ The factory-fitted temperature and pressure relief valve must NOT be removed from the cylinder or tampered with in any way. The valve is pre-calibrated to operate at 7 bar or 90°C and any attempt to adjust or remove it will invalidate the guarantee and will adversely affect the safety of the appliance.

All connections to the cylinder must be made using compression fittings. Mains supply pipework must be a minimum of 22mm diameter to provide adequate flow rate.

⚠ Inlet group

The supplied inlet group must be fitted to the cold water mains before connection to the cold inlet of the cylinder. When connecting the inlet group, ensure the arrow on the body is pointing in the direction of flow (towards the cylinder).

The maximum supply pressure to the inlet group is 16 bar. If the mains supply pressure is likely to exceed 16 bar **at any time**, an additional suitable pressure reducing valve (not supplied) will be required.

A balanced cold connection is provided on the inlet group, from which the cold water supply to the rest of the property can be connected in order to provide balanced supply pressure throughout the property. If this facility is not required, the connection should be capped / stop-ended.

⚠ Stop cock & drain

Install a full bore stop cock or ball valve (not supplied) before the inlet group assembly on the incoming mains water supply so the unit can be isolated when required. A full bore drain cock (not supplied) must be fitted to the supply pipework, between the cylinder and the inlet group, at as low a level as possible. An air break must be provided at the point of drainage. (see

Figure 5a / 5b).

⚠ Distribution pipework

Pipework supplying the hot water taps must be capable of withstanding a maximum pressure of 7 bar at a temperature of 90°C and should be run in 22mm throughout the property. Only short lengths (max 1 metre) of 15mm should be used to connect baths, showers and basin taps etc. If using a secondary / pumped return circuit, all pipework must be well insulated. The circulator (bronze pump) should be time and/or temperature controlled to reduce energy consumption.

⚠ Taps & fittings pressure rating

All taps and fittings incorporated into the unvented system should have a rated operating pressure of 7 bar or above.

6.3 Primary & Renewable Circuits

The working pressure and temperature for all heat exchanger coils is given in Table 1. All connections to the cylinder must be made using compression fittings.

Ensure that the correct concentration and type of corrosion inhibitor is used for the system circuits heating the coils / heat exchanger. This must be checked concentrations adjusted as required during annual service.

⚠ Safety thermostat

Each heat exchanger coil has an associated combined control & safety thermostat. The system controls must be wired in such a manner as to cut off the flow of heat to the cylinder in the event of overheating in order to comply with Building Regulations and to ensure a safe installation. This is typically achieved using a motorised valve wired in series with the thermostat. Refer to Section 6.11 for suggested wiring schematics.

⚠ Motorised valve

A motorised valve is supplied with Indirect and Twin Coil models. This must be fitted to the pipework supplying the primary coil (usually the coil connected to the heat source) and wired in series with the combined control & safety thermostat in order to comply with Building Regulations and to ensure a safe installation. In this manner, if the heat source malfunctions and produces excess heat, the motorised valve will close preventing the cylinder from overheating. Refer to Section 6.11 for suggested wiring schematics.

⚠ Uncontrolled solid fuel boilers and gravity circulation systems must not be used with an unvented hot water system. For guidance on connecting a controllable solid fuel appliance (such as a wood pellet stove or boiler) to an unvented cylinder, reference should be made to the appliance manufacturer's instructions and to Building Control.

⚠ Solar installations

If connecting a solar thermal installation, for example, to the renewable coil of a Twin Coil cylinder, the controls must be wired in series with the combined control & safety thermostat.

Refer to the solar appliance manufacturer's instructions and to Building Control for further guidance.

⚠ Heat Pump Cylinder installations

Heat Pump cylinders can be used with a circulating pump designed for potable water installations in conjunction with a plate heat exchanger.

The power supply to the circulating pump is to be controlled by the thermostat fitted to the cylinder, refer to section 6.11.5 for details.

6.4 Tundish

The tundish supplied must be fitted so it is visible to the occupier, away from electrical equipment, and must be connected with copper pipe (not plastic). Guidance on the Building Regulations requirements for the discharge pipework is provided in Section 6.10.

6.5 Expansion Vessel

An expansion vessel is supplied as part of the unvented kit and must be connected to the pipework between the inlet group and the cylinder in order to accommodate expansion of the stored water due to heating. For ease of installation a dedicated expansion vessel port is provided on the body of the inlet group itself.

Ensure the expansion vessel is mounted with the connection at the bottom and that access is left available for future servicing and removal.

Expansion vessel connections must be piped in copper.

The Expansion vessel must be mounted securely enough to support the weight of the vessel when full.

Where a secondary return circuit is used, increased expansion capacity may be required.

6.6 Pipework Configurations – Excluding Heat Pump models

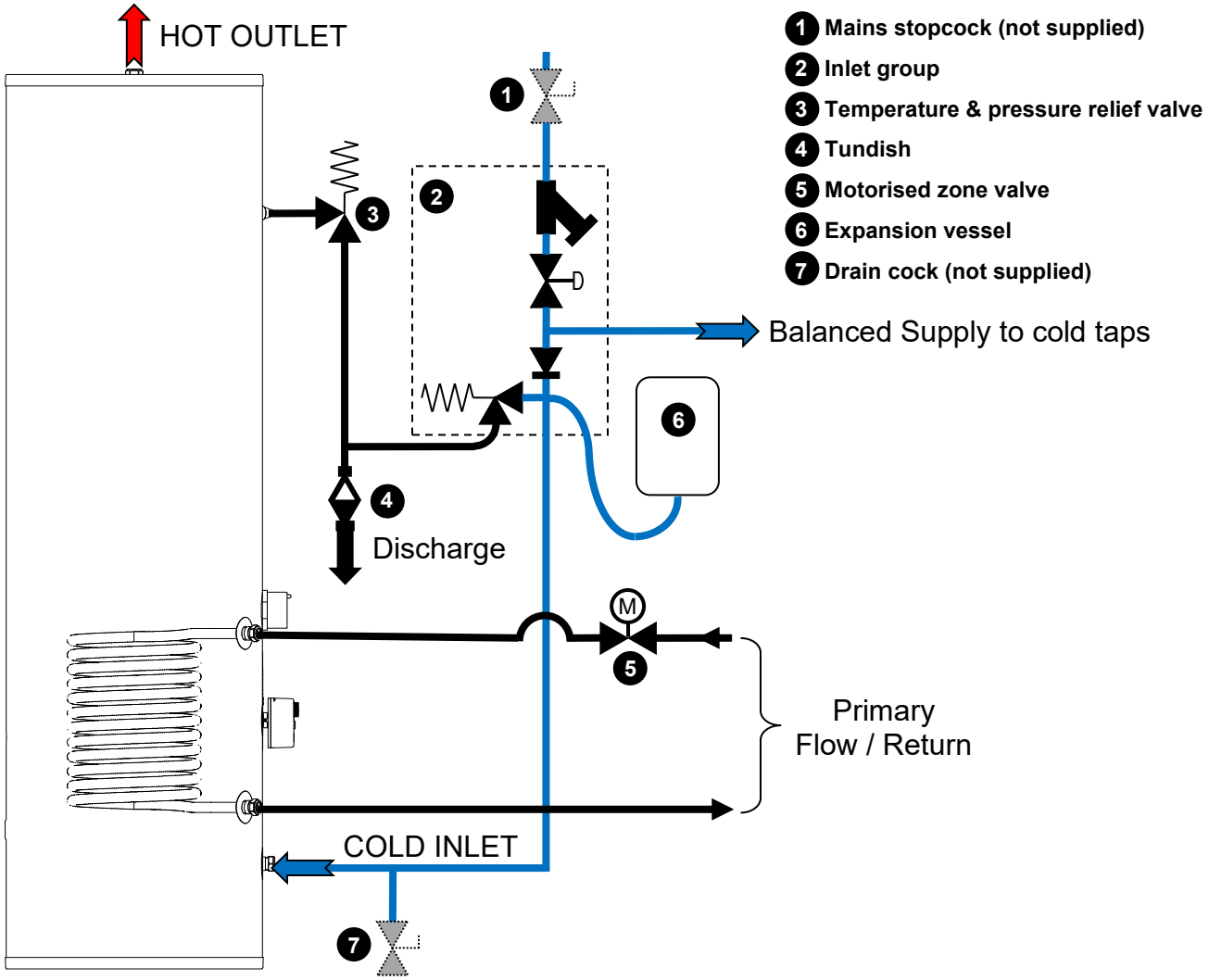
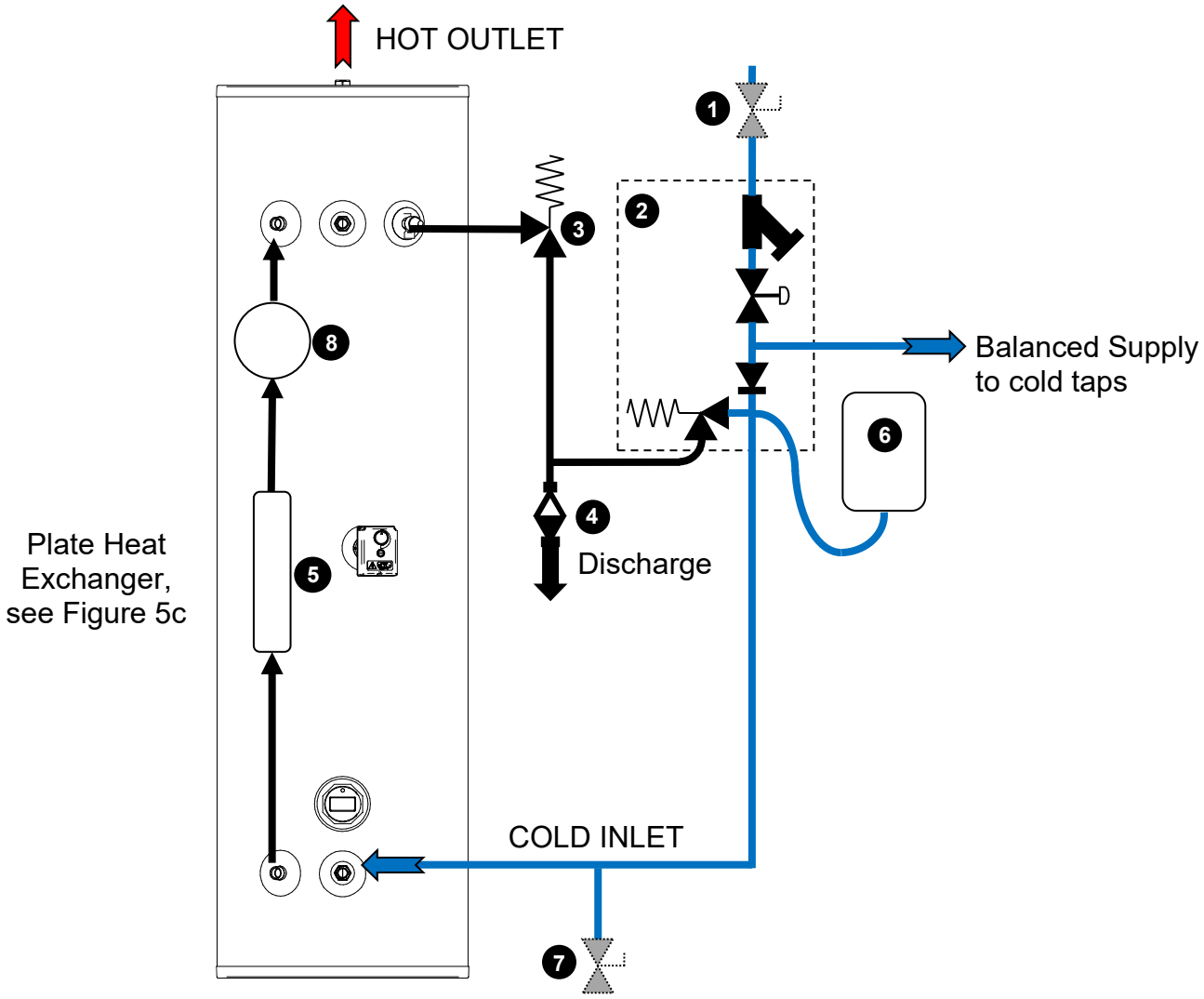


Figure 5a: Typical pipework configuration, excluding Heat Pump models

6.7 Pipework Configurations – Heat Pump models



1. **Mains stopcock (not supplied)**
2. **Inlet group**
3. **Temperature & pressure relief valve**
4. **Tundish**
5. **Plate Heat Exchanger**
6. **Expansion vessel**
7. **Drain cock (not supplied)**
8. **Potable water circulating pump**

Figure 5b: Typical pipework configuration, Heat Pump models

Ensure the connections are clean and tight.

Additional details are included with the kit box, see document Q12-084.

6.8 Plate heat exchanger installation

The plate heat exchanger is of asymmetric design and must be fitted respecting the flow of both potable and system (Heat Pump) water. See separate assembly document provided with the HP cylinder kit.

There are orientation marks on the plate heat exchanger, these are to be connected to the system water circuit.

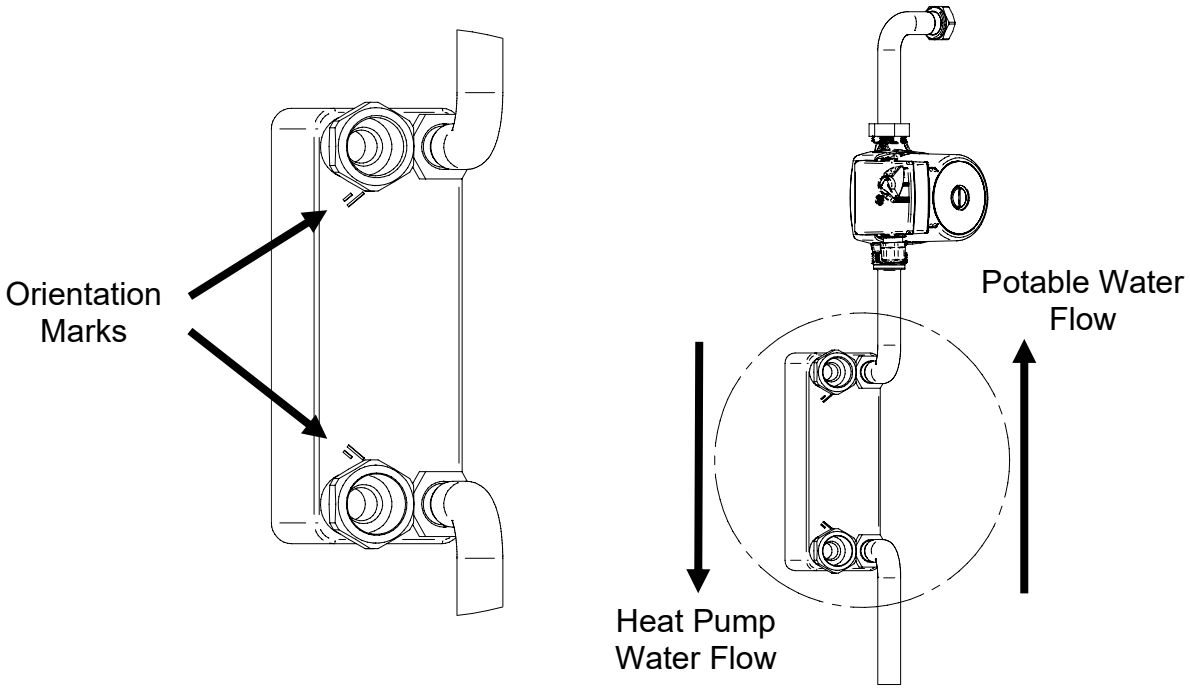


Figure 5c: Heat Pump model plate heat exchanger connections

Potable water circulating pump installation

The circulating pump must always be installed with horizontal motor shaft. At start-up, the rotor can must be vented by removing the plug in the top of the motor. Within a short time, the rotor forces the remaining air out into the system via the shaft.

The circulating pump must be installed with the flow direction as marked on the pump housing from the lower connection towards the upper connection on the cylinder, see Figure 5b for reference.

The circulating pump must be installed with the terminal box above, or to the left or right side of the pump.

6.9 Inlet Group connections – All models

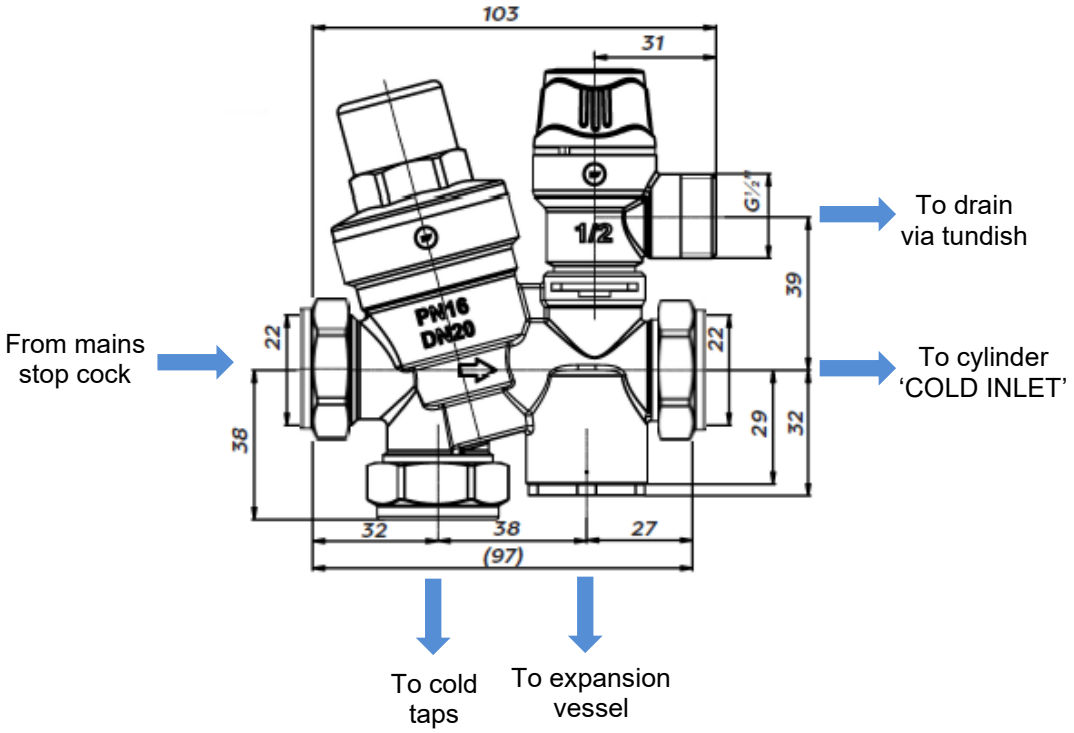


Figure 6: Inlet group connections

6.10 Discharge Pipework

The following is an extract from Section G3 of the Building Regulations for England and Wales and provides guidance on the requirements for discharge pipework. Refer also to Diagram 1. This information is correct at time of publication of this manual. For other regions, please refer to local guidance.

Discharge pipe D1

3.50 *Safety devices such as* ***temperature relief valves*** *or* ***combined temperature and pressure relief valves*** *(see paragraphs 3.13 or 3.18) should discharge either directly or by way of a manifold via a short length of metal pipe (D1) to a* ***tundish****.*

3.51 *The diameter of discharge pipe (D1) should be not less than the nominal outlet size of the safety device, e.g.* ***temperature relief valve****.*

3.52 *Where a manifold is used it should be sized to accept and discharge the total discharge from the discharge pipes connected to it.*

3.53 *Where valves other than a* ***temperature and pressure relief valve*** *from a single unvented hot water system discharge by way of the same manifold that is used by the safety devices, the manifold should be factory fitted as part of the* ***hot water storage system unit*** *or package.*

Tundish

3.54 *The* ***tundish*** *should be vertical, located in the same space as the unvented* ***hot water storage system*** *and be fitted as close as possible to, and lower than, the safety device, with no more than 600mm of pipe between the valve outlet and the tundish (see Diagram 1).*

Note*: To comply with the Water Supply (Water Fittings) Regulations, the* ***tundish*** *should incorporate a suitable air gap.*

3.55 *Any discharge should be visible at the* ***tundish****. In addition, where discharges from safety devices may not be apparent, e.g. in dwellings occupied by people with impaired vision or mobility, consideration should be given to the installation of a suitable safety device to warn when discharge takes place, e.g. electronically operated.*

Discharge pipe D2

3.56 *The discharge pipe (D2) from the* ***tundish*** *should:*

a. have a vertical section of pipe at least 300mm long below the tundish before any elbows or bends in the pipework (see Diagram 1); and

b. be installed with a continuous fall of at least 1 in 200 thereafter.

3.57 *The discharge pipe (D2) should be made of:*

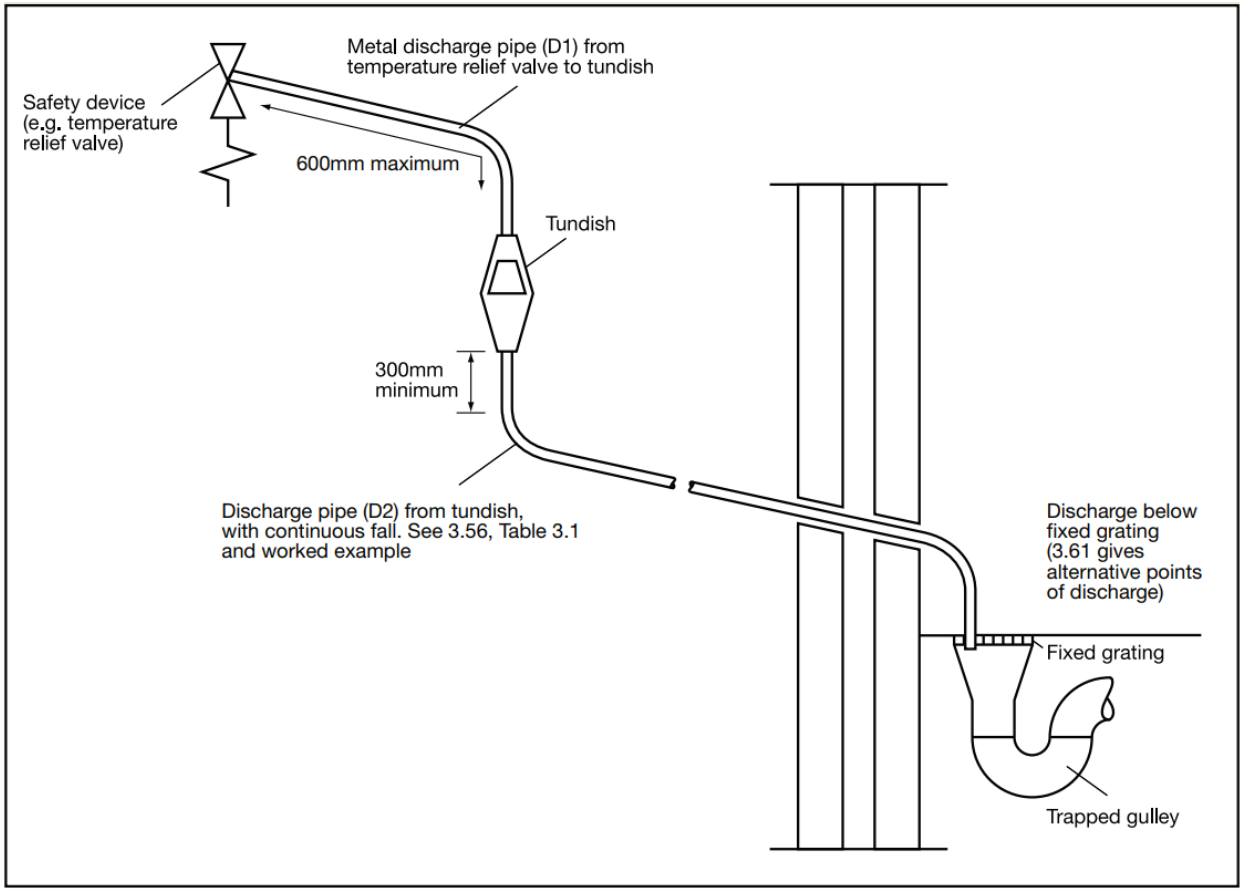
a. metal; or

b. other material that has been demonstrated to be capable of safely withstanding temperatures of the water discharged and is clearly and permanently marked to identify the product and performance standard (e.g. as specified in the relevant part of BS 7291- 1:2006 Thermostatic pipes and fittings for hot and cold water for domestic purposes and heating installations in buildings. General requirements).

3.58 *The discharge pipe D2 should be at least one pipe size larger than the nominal outlet size of the safety device unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9m long, i.e. for discharge pipes between 9m and 18m the equivalent resistance length should be at least two sizes larger than the nominal outlet size of the safety device; between 18 and 27m at least 3 sizes larger, and so on; bends must be taken into account in calculating the flow resistance. See Diagram 1, Table 3.1 and the worked example.*

Note: *An alternative approach for sizing discharge pipes would be to follow Annex D, section D.2 of BS 6700:2006 + A1:2009 Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.*

Diagram 1 ***Typical discharge pipe arrangement***



Worked Example

Extract from Table 3.1 Building Regulations G3

Valve outlet size	Minimum size of discharge pipe D1	Minimum size of discharge pipe D2 from tundish	Maximum resistance allowed, expressed as a length of straight pipe (i.e. no elbows or bends)	Resistance created by each elbow or bend
G½"	15mm	22mm	Up to 9m	0.8m
		28mm	Up to 18m	1.0m
		35mm	Up to 27m	1.4m

Note: Data provided for G½" outlet size and copper pipework only. Other outlet sizes and pipe materials should be calculated using data prepared for the size and type of pipe being used.

Table 6: Sizing of copper discharge pipe (D2) for G½" valve outlet

The example below is for a G½" temperature relief valve with a discharge pipe (D2) having 4 no. elbows and a length of 7m from the tundish to the point of discharge. The calculation shows that 22mm pipe would be **unacceptable**.

UNACCEPTABLE

Discharge pipe (D2) run in 22mm copper:

Length of straight pipe = 7.0m
Resistance created by bends (0.8m x 4) = 3.2m
Total resistance of discharge pipe = 10.2m

Maximum resistance allowed for a 22mm copper discharge pipe (D2) from

a G½" temperature relief valve is 9.0m, which is less than 10.2m.

Therefore, installation **unacceptable**:
Discharge pipe (D2) needs to be *larger* than 22mm.

ACCEPTABLE

Discharge pipe (D2) run in 28mm copper:

Length of straight pipe = 7.0m
Resistance created by bends (1.0m x 4) = 4.0m
Total resistance of discharge pipe = 11.0m

Maximum resistance allowed for a 28mm copper discharge pipe (D2) from

a G½" temperature relief valve is 18.0m, which is more than 11.0m.

Therefore, installation **acceptable**:
Discharge pipe (D2) *can* be run in 28mm.

3.59 *Where a single common discharge pipe serves more than one system, it should be at least one pipe size larger than the largest individual discharge pipe (D2) to be connected.*

3.60 *The discharge pipe should not be connected to a soil discharge stack unless it can be demonstrated that the soil discharge stack is capable of safely withstanding temperatures of the water discharged, in which case, it should:*

a. *contain a mechanical seal, not incorporating a water trap, which allows water into the branch pipe without allowing foul air from the drain to be ventilated through the* ***tundish****;*
b. *be a separate branch pipe with no* ***sanitary appliances*** *connected to it;*
c. *if plastic pipes are used as branch pipes carrying discharge from a safety device, they should be either polybutalene (PB) or cross-linked polyethylene (PE-X) complying with national standards such as Class S or BS 7291-2:2006 or Class S of BS 7291-3:2006 respectively; and*
d. *be continuously marked with a warning that no* ***sanitary appliances*** *be connected to the pipe.*

Notes:

1. *Plastic pipes should be joined and assembled with fittings appropriate to the circumstances in which they are used as set out in BS EN ISO 1043-1:2002.*
2. *Where pipes cannot be connected to the stack it may be possible to route a dedicated pipe alongside or in close proximity to the discharge stack.*

Termination of Discharge Pipe

3.61 *The discharge pipe (D2) from the* ***tundish*** *should terminate in a safe place where there is no risk to persons in the vicinity of the discharge.*

3.62 *Examples of acceptable discharge arrangement are:*

a. *to a trapped gully with the end of the pipe below a fixed grating and above the water seal;*
b. *downward discharges at low level; i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas, etc. are acceptable providing that a wire cage or similar guard is positioned to prevent contact, whilst maintaining visibility; and,*
c. *discharges at high level: e.g. into a metal hopper and metal downpipe with the end of the discharge pipe clearly visible or onto a roof capable of withstanding the temperature discharges of water and 3m from any plastic guttering system that would collect such discharges.*

3.63 *The discharge would consist of high temperature water and steam. Asphalt, roofing felt and non-metallic rainwater goods may be damaged by such discharges.*

The discharge pipe within the building is to be located within a frost free environment.

6.11 Electrical Installation

Note: All wiring activities described in the following sections should only be undertaken by trained persons having an appropriate level of competency/qualification.

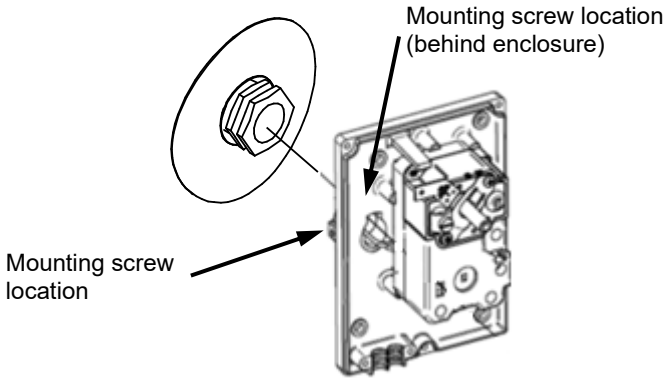
Before proceeding, ensure all electrical supplies to the appliance are verified as isolated and prevented from accidental reconnection.

220 – 240V. 1PH, 50Hz

The Immersion heater(s), thermostats and other external electrical equipment should be wired with correctly rated heat resistant cable, isolating switches and fusing.

⚠ The appliance must be effectively earthed and all external wiring should comply with current IEE Regulations.

Mount the cylinder thermostat by carefully inserting the capillary sensors into the appropriate pocket, then secure the thermostat base to the pocket using the provided screws.



6.11.1 Cylinder Thermostat Wiring

Typical S and Y plan wiring examples are shown in section 6.11.7

⚠ **Thermostats must be earthed.**

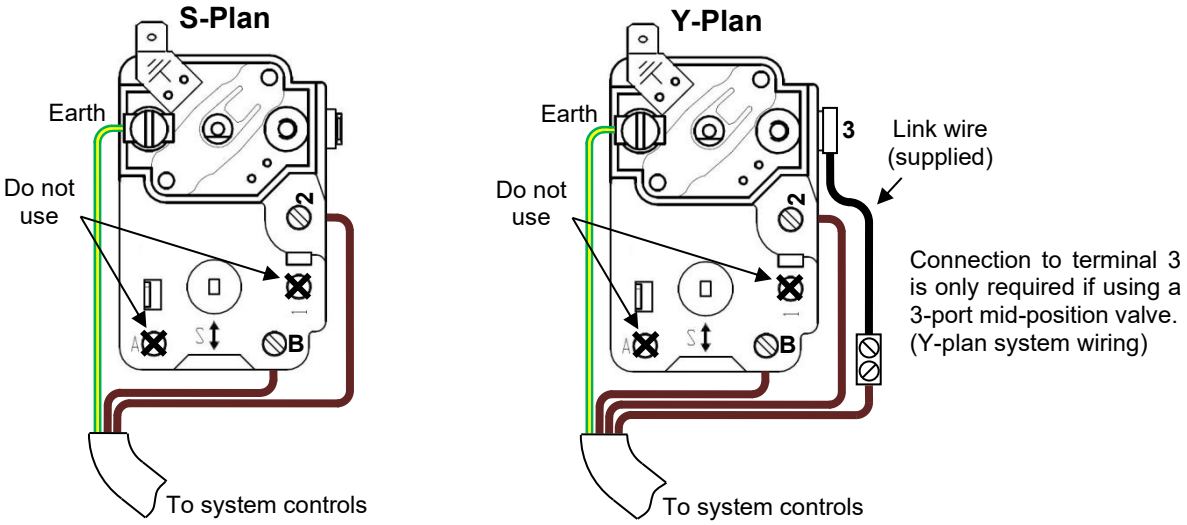


Figure 7: Control thermostat wiring

6.11.2 Immersion Heater(s) - Direct models.

⚠ **The Immersion heater must be earthed.**

Using the immersion heater fitted to the lower connection on the cylinder allows for a greater volume of stored hot water (consideration should be given to the electricity tariff selection to provide maximum efficiency).

Direct model cylinders may be supplied with SMART Thermostats. SMART thermostats learn the routine of hot water use, and adjust their operation to suit this, increasing energy efficiency.

Ensure to use correctly rated cable and isolation methods. Refer to current IEEE guidance for details.

Please also refer to documentation supplied with the SMART thermostat for additional details.

6.11.3 Immersion Heater(s) - other models

⚠ **The Immersion heater must be earthed.**

Ensure to use correctly rated cable and isolation methods. Refer to current IEEE guidance for details.

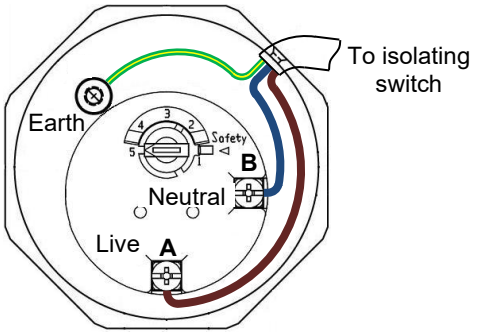


Figure 8: Typical Immersion heater wiring

6.11.4 Supplementary Temperature Sensors

Supplementary temperature sensors should be located in the pocket(s) behind the cylinder thermostat(s). Remove the thermostat cover and base. Pass the sensor through the base then insert into the pocket as shown in Figure 9. Anchor the cable using the clamp provided.

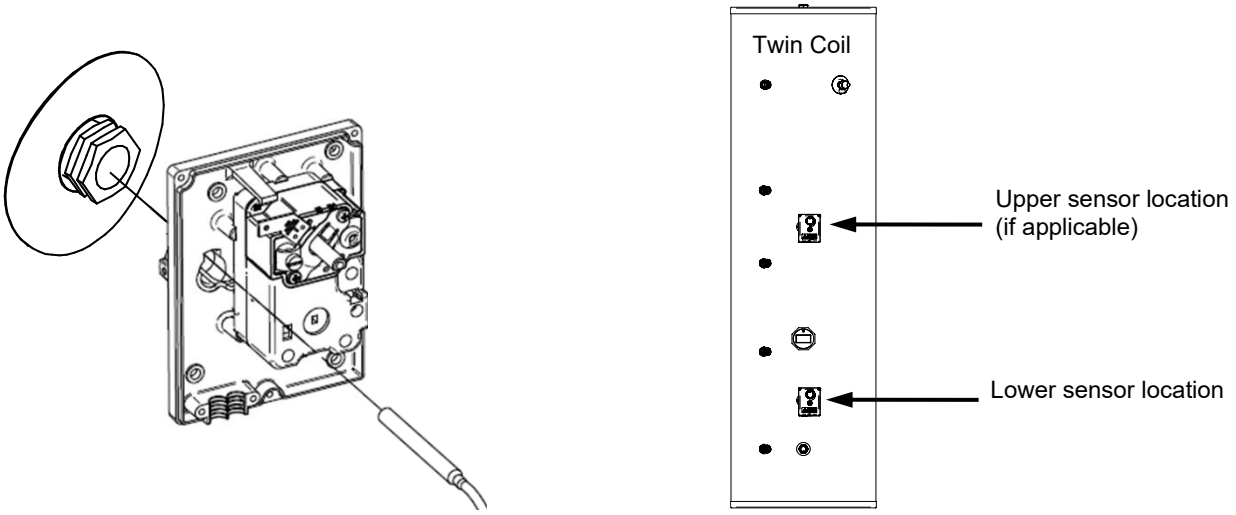


Figure 9: Supplementary temperature sensor installation

6.11.5 Heat Pump cylinder wiring

The potable water circulating pump must be Earthed.

Wiring connections to Heat Pump cylinder models must be configured to operate the potable water circulating pump when a call for heat is made by the cylinder thermostat, see section 6.11.1.

A double pole fused spur isolator must be provided to isolate the potable water circulating pump for servicing.

Depending on the installation, the thermostat and associated potable water circulating pump may be powered by a digital (relay) auxiliary pump output from the heat pump.

When the cylinder thermostat is satisfied, the potable water circulating pump and heat pump DHW call will be switched off.

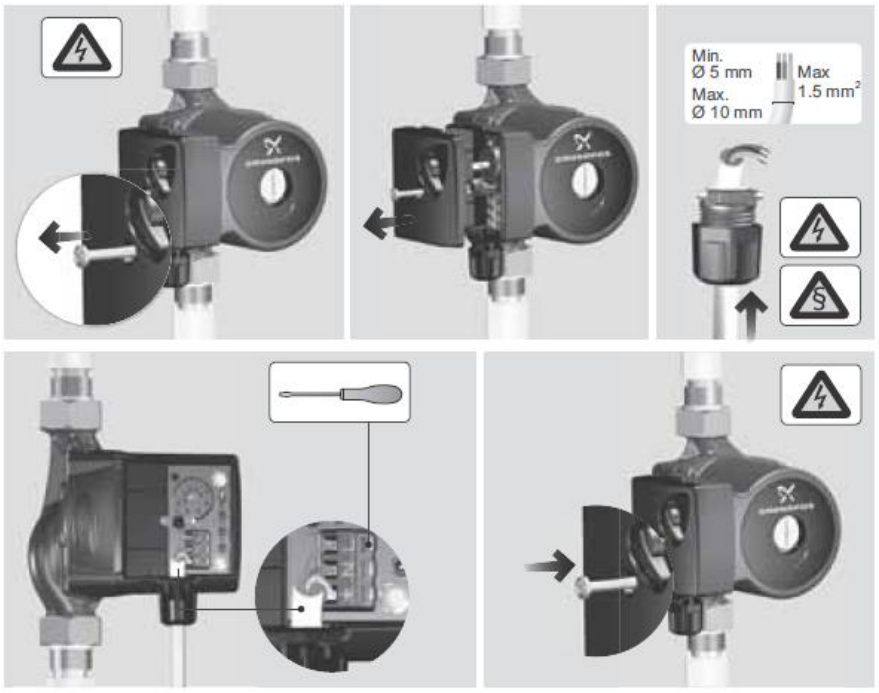
Consideration should be given to control voltages - these may be a combination of 230VAC and / or Volt free, depending on the installation and components used.

Please refer to figure 12 for a wiring example.

6.11.6 Potable water circulating pump wiring

The pump must be connected to an external double pole mains switch.

The operating voltage and frequency are marked on the pump nameplate. Ensure the motor is suitable for the power supply on which it will be used.



6.11.7 System controls

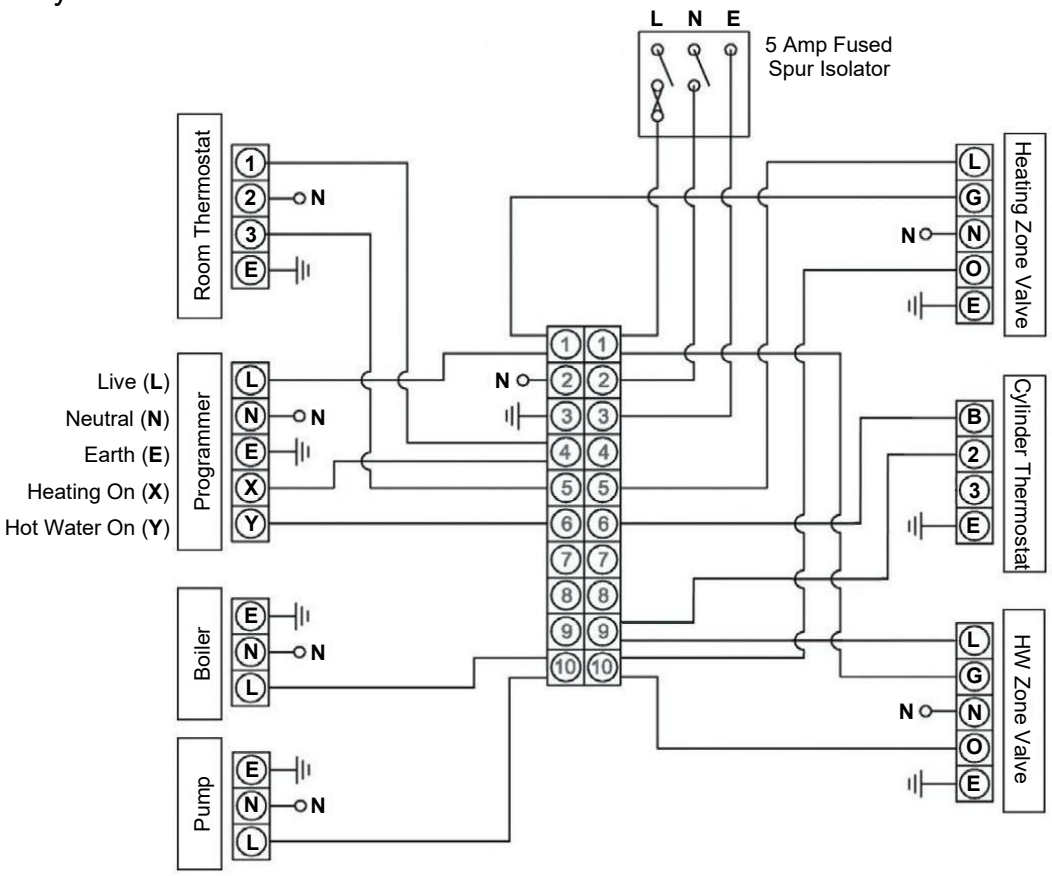


Figure 10: S-plan system wiring

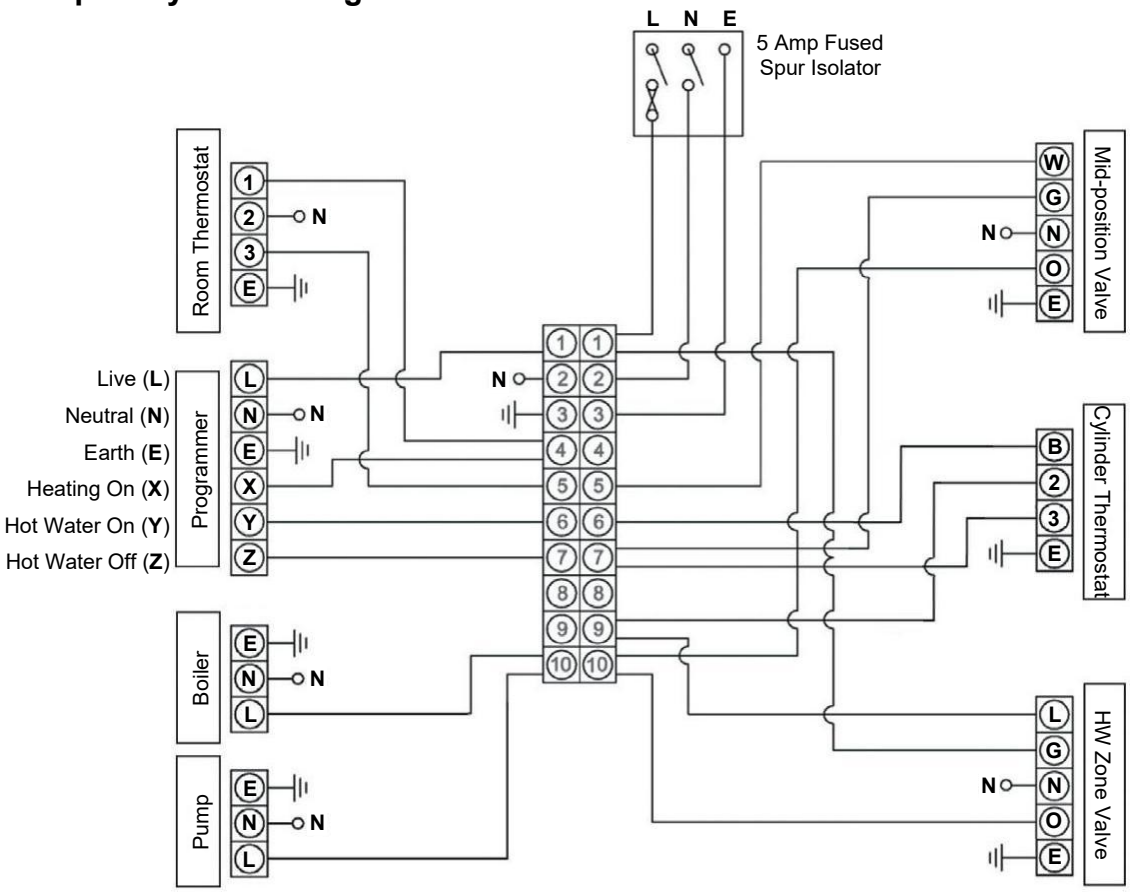


Figure 11: Y-plan system wiring

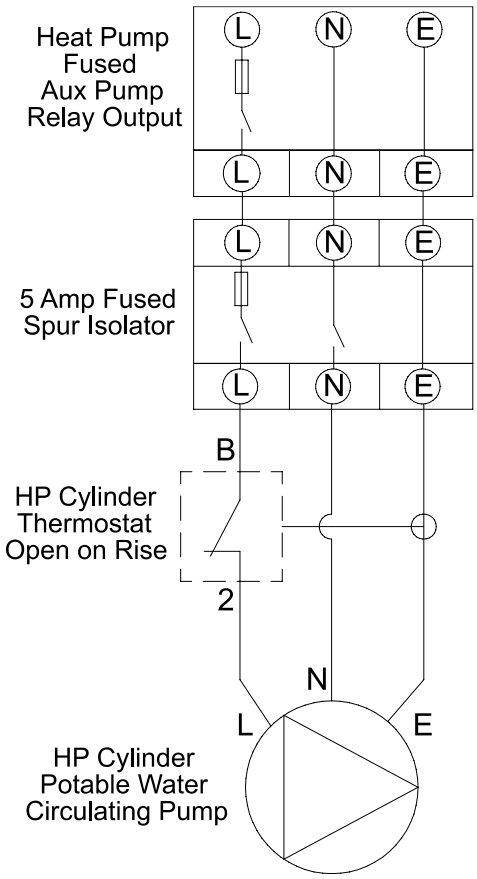


Figure 12: HP Cylinder potable water circulating pump wiring

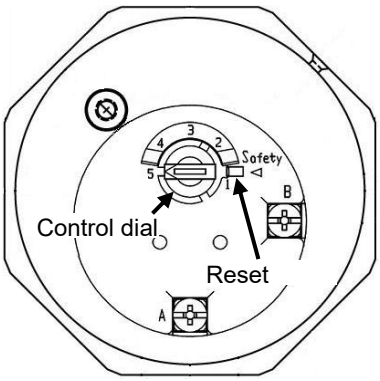
7 COMMISSIONING

The appliance and installation must be commissioned as described below and registered with the manufacturer along with proof of purchase.

FAILURE TO COMMISSION, REGISTER AND ANNUALLY SERVICE THIS PRODUCT WILL INVALIDATE ALL GUARANTEES

7.1 Adjustment of Immersion Thermostat

⚠ Isolate ALL electrical supplies to the appliance before removing the immersion cover.



Typical Immersion heater thermostat shown.

All cylinders are supplied with one or more immersion heaters to allow the cylinder to be heated electrically. Each immersion heater has an immersion thermostat, the temperature of which is adjustable between **nominally** 20°C and 70°C. Remove the immersion heater cover and turn the control dial anticlockwise to increase temperature, and clockwise to decrease.

Each immersion thermostat also has a built-in manually reset safety thermostat which will 'lock out' in the event of the cylinder overheating and which will need to be reset in order to restore operation. Remove the immersion heater cover and depress the reset button to restore operation.

In the event of a lockout situation occurring, it is vital to determine and rectify the cause of lock out.

7.2 Commissioning

⚠ Isolate all electrical supplies until otherwise instructed during the commissioning process.

1 Prior to filling the cylinder (or with the mains isolated and a hot tap open), check the expansion vessel bladder pre-charge – it should be 3.0 bar.

2 Check that all connections are tight and correctly configured.

3 Fill the cylinder and system as follows:

Open the main stopcock and fill the cylinder, ensuring the connections are water tight.

Open successive hot taps to remove trapped air.

Leave each tap open for a few minutes in order to flush out air and debris.

Close all taps.

Check all strainers for obstructions.

4 Drain the cylinder as described in Section 7.3.

5 Refill the cylinder as above, closing each tap when water flows freely.

6 Manually operate (by rotating the knob) both the expansion relief and the temperature and pressure relief valves for a short period to remove trapped air from behind the valve seat and to prove the correct function of the discharge arrangement.

7 Check all joints for leaks and rectify as necessary.

8 Check that all immersion and control thermostats are set to the desired temperature.

9 Commission each primary circuit as follows (not applicable to Direct models):

Fill each primary circuit (e.g. boiler, heat pump or solar circuits) following each heat source manufacturers' instructions.

Check for leaks in each primary circuit and rectify as necessary.

Commission each heat source in accordance with the manufacturer's instructions activating the system controls as required.

10 Activate each heat source to confirm that the system controls function correctly.

11 Check that, while the cylinder is heating up, no water exits from either the expansion relief or the temperature and pressure relief valves, and that the system controls deactivate all heat sources when the cylinder is up to temperature.

7.3 Draining

⚠ Isolate all electrical supplies before draining the cylinder / secondary (hot water) circuit.

1 Close the mains water stopcock.

2 Connect hose to the drain cock and route to a suitable discharge.

3 Open the drain cock.

4 Open the hot water tap nearest the cylinder. If water fails to drain, vent the system by opening the temperature and pressure relief valve.

5 Allow the system to drain fully then close the drain cock when complete.

8 MAINTENANCE

⚠ Isolate all electrical supplies before removing any components for inspection or repair, or before draining the cylinder or heat source circuits.

⚠ The pressure relief valves must be operated regularly to remove lime deposits and to verify they are not blocked.

8.1 Regular Maintenance

This appliance must be serviced annually to ensure continued safe operation and to maintain the guarantee. Servicing must be undertaken by a competent person i.e. qualified professional.

1 Isolate the mains water supply and open a hot tap. Check the expansion vessel bladder pre-charge – it should be 3.0 bar.

2 Check the strainer on the inlet group. Clean the strainer if necessary by unscrewing the pressure reducing valve and withdrawing the strainer.

3 Check and service all hard water treatment devices (if fitted) in accordance with each device manufacturer's instructions.

4 Check that all connections are tight and correctly configured.

5 Manually operate (by rotating the knob) both the expansion relief and the temperature and pressure relief valves to prove the correct function of the discharge arrangement.

6 Check all joints for leaks and rectify as necessary.

7 Check that all immersion and control thermostats are appropriately set.

8 Activate each heat source to confirm that the system controls function correctly.

9 Check that, while the cylinder is heating up, no water exits from either the expansion relief or the temperature and pressure relief valves, and that the system controls deactivate all heat sources when the cylinder is up to temperature.

8.2 Inspection Access

Where necessary, the internal components of the cylinder can be inspected by means of the immersion heater boss (1¾") using an appropriate inspection tool e.g. borescope.

8.3 Replacement Parts

Part description	Code
Cylinder thermostat	WDS7
Immersion heater c/w stat (1¾")	9003602
Motorised valve (22mm)	9003603
T&P valve (½" x 15mm)	9003654
Inlet group (22mm)	9010484
Expansion vessel (12 litres)	9003891
Expansion vessel (19 litres)	9003892
Expansion vessel (24 litres)	9003893
Tundish (15mm x 22mm)	9003670
Cylinder Plate Heat Exchanger	9004384
Potable Water Circulating Pump	9004383

8.4 Fault Finding

Symptom	Possible cause	Possible remedy
Little / no hot water flow	Mains water supply isolated	Open stopcock.
	Strainer blocked	Turn water supply off, remove strainer and clean.
	Pressure reducing valve fitted the wrong way	Refit with arrow pointing in direction of flow (refer to Figure 6).
Water from hot taps is cold	Boiler programmer or immersion timer not calling for hot water	Set programmer / timer to call.
	Cylinder thermostat high limit tripped or immersion thermostat high limit tripped	Check and reset (refer to Section 1).
	Heat source malfunction (e.g. boiler / immersion heater / etc)	Check heat source – if faulty, refer to heat source manufacturer's instructions.
	Motorised valve malfunction (where fitted, n/a to Direct models)	Manually activate motorised valve. If cylinder begins to heat, replace valve.
	Pump malfunction (n/a to Direct models)	Check wiring and/or plumbing connections to pump.
	Plate Heat Exchanger Blocked	Descale / Replace the Plate Heat Exchanger
Water from hot taps extremely hot	Controls malfunction	Isolate all heat sources, call installer
Intermittent water discharge from tundish	Expansion vessel has lost its pre-charge	Turn off water supply, open hot tap, check bladder pre-charge and recharge to 3 bar.
	Inlet group balanced cold / cylinder connections	Check and reconnect (refer to Figure 6).
Continuous water discharge from tundish	Pressure reducing valve not working	Check pressure from pressure reducing valve – if greater than 3 bar, replace cartridge.
	Expansion relief valve not seating correctly	Manually operate the valve for 30 seconds to clear any debris from the seat / replace valve.
	Temperature & pressure relief valve not seating correctly	Manually operate the valve for 30 seconds to clear any debris from the seat / replace valve.
	System control / safety feature failure	IMMEDIATELY switch off all power supplies. Contact your installer.

9 GUARANTEE

Warmflow unvented cylinders are supplied with the following guarantees from the date of purchase:

(a) A 25 year guarantee on the duplex stainless steel cylinder body against defects of material.

(b) A 2 year guarantee on all parts and components as well as any defects that may have occurred from time to time during the normal manufacturing process of the cylinder as carried out by those exercising all relevant skill and experience and complying with all relevant legislation, regulations and codes of practice relating to the manufacturing process.

1. The guarantees provided are from the date of purchase and are conditional upon:

   1.1 the unit being installed and commissioned by competent persons in accordance with the manufacturer's instructions and relevant legislation, regulations and codes of practice in force at the time;

   1.2 the product being registered with Warmflow within 30 days of installation and the guarantee registration completed and returned to Warmflow along with evidence of the date of purchase;

   1.3 the unit not being modified in any way, or misused or subject to neglect;

   1.4 the unit being serviced annually by competent persons in accordance with the manufacturer's instructions and all regulations and codes of practice in force at the time;

   1.5 each service record being completed and proof of purchase and servicing being retained and made available to Warmflow in respect of any claim;

   1.6 the unit being used solely for the purpose of heating potable water that complies at all times with EU standards and not fed from a private source.

Failure to comply with any of the conditions outlined in this clause will invalidate the warranty in its entirety.

2. The guarantee is not transferable and excludes:

   2.1 labour costs associated with the replacement of the unit or its components;

   2.2 any defects that appear after the customer makes any modification or alteration to the unit;

   2.3 defects caused by the improper use or storage of the unit and in particular (but without limitation) Warmflow shall not be liable in the case of defects arising from normal deterioration or improper or faulty handling or processing of the unit by the customer;

   2.4 consequential losses however caused.

3. If within the 2 year guaranteed period, as set out at (b) above, a material defect is discovered in the Unit:

   3.1 the customer must send written notification following discovery giving particulars and either at its own expense and risk shall return the unit to Warmflow within 2 weeks of written notice being provided by Warmflow; or (at Warmflow's sole option) shall permit Warmflow to inspect same; and

   3.2 if such defect has arisen from faulty materials employed or workmanship carried out by Warmflow and is existing but not reasonably discoverable upon inspection at the time of receipt then Warmflow shall supply such part(s) free of charge along with the costs of transporting same to the customer.

   3.3 The replacement parts must be fitted in accordance with the terms of the guarantee set out above.

   3.4 The replacement parts shall be covered under this guarantee for the remainder of the unexpired term of two years.

   3.5 Invoices for call out and/or repair by any third party or parts supplied by a third party will not be accepted unless previously authorised by Warmflow in writing.

4 Warmflow's liability for defective units is limited in all circumstances to delivery of parts for the defective unit and the customer shall accept same as fulfilment of Warmflow's obligations.

5 Warmflow disclaims all other warranties whether express, implied or statutory. Your statutory rights are not affected.

6 This guarantee applies to Warmflow cylinders installed on the UK mainland (excluding Scottish Isles), Isle of Man, Channel Islands, Northern Ireland and Republic of Ireland only. Provision of in warranty cover elsewhere is subject to the agreement in writing of Warmflow.

10 END-OF-LIFE INFORMATION

Warmflow Unvented Cylinders must be disposed of according to local regulations by using a public or private waste collection service.

10.1 Safety Risks

Prior to disassembly, the appliance should be electrically isolated and disconnected.

Any fluids within the appliance must be drained, and disposed of in-line with local regulations.

Care should be taken when handling the appliance due to weight, use appropriate PPE and lifting aids.

Polyisocyanurate foam insulation – suitable PPE should be used for respiration protection, and to avoid skin or eye contact.

10.2 Disassembly of the Product

The main materials of the components are:

- Mild Steel
- Stainless Steel
- Polyisocyanurate Foam
- Plastic Components
- Electronic Components

These may be recycled – depending on the local recycling facilities available.

The appliance is assembled by using mechanical fasteners and can be disassembled with standard tools.

The components of a typical appliance are shown below (not all components may be fitted, depending on appliance specification)

10.3 Casing and key components

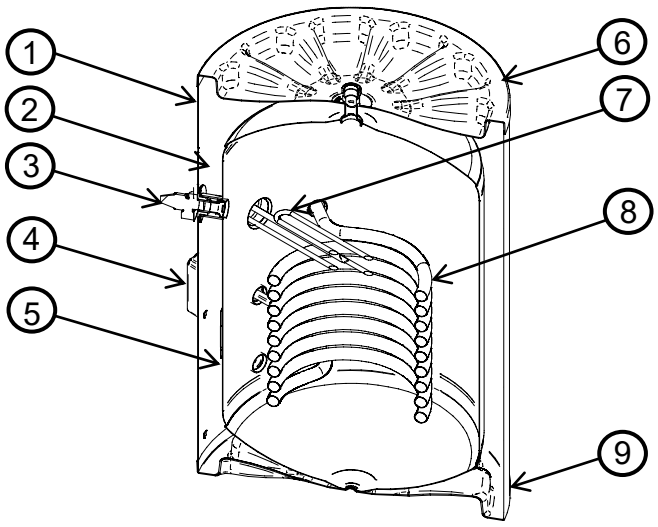


Figure 13: Key Component Diagram

Item	Description	Main Materials	Special Notes
1	Casing	Coated Galvanised Steel	
2	Foam Insulation	Polyisocyanurate Foam	Wear Appropriate PPE
3	T&P Relief Valve	Plastic, Brass	Consult Component Manufacturer
4	Thermostat & Housing	Plastic, Copper, Electronic Components	
5	Storage Tank	Stainless Steel	
6	Casing Top	Plastic	
7	Immersion Heater	Plastic, Brass, Incoloy, Electronic Components	Consult Component Manufacturer
8	Heating Coil (s)	Stainless Steel	
9	Casing Base	Plastic	
Others	Expansion Vessel	Steel, Rubber, Brass	Consult Component Manufacturer
Others	Pump / Heat Exchanger	Composite, Electronic components, Stainless Steel	Consult Component Manufacturer

Various other brackets, fasteners and components may be used, with up to 5% of appliance weight.

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