



Please read these instructions before installing or commissioning.
Potterton Solar - Solar Thermal Domestic Hot Water System
should only be installed by a competent person.
Please leave these instructions with the user for safe keeping.

Installation Guide



Potterton Solar - Solar Thermal Domestic Hot Water System

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Thank you for purchasing a high quality Potterton Solar Solar Thermal Domestic Hot Water System.

The sun is the ultimate source of most of our renewable energy supplies. Energy from the sun is clean and abundant.

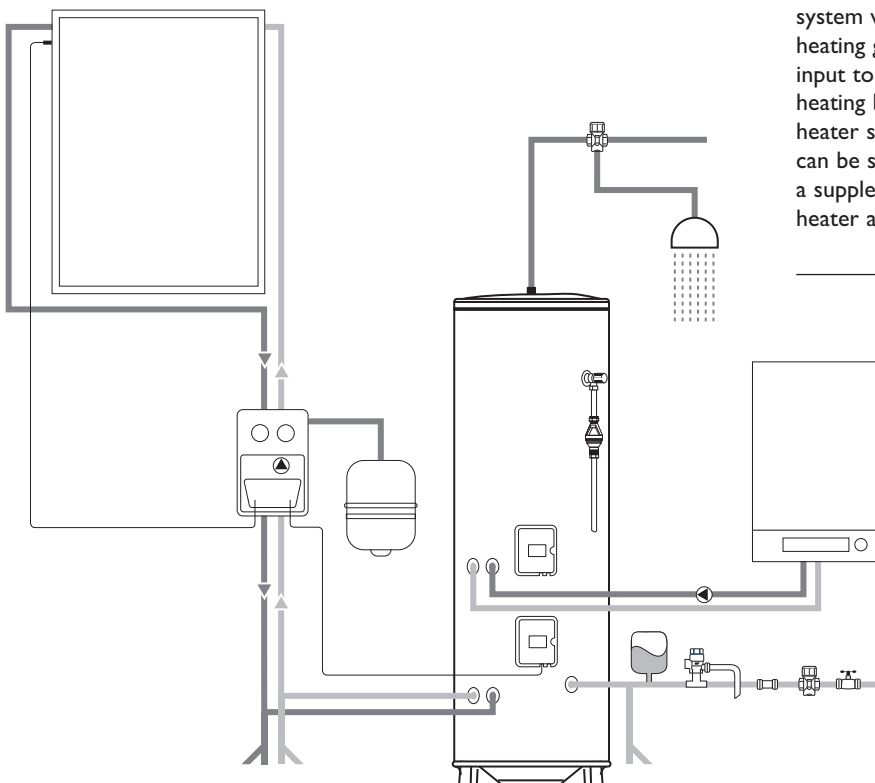
There is a widely held opinion that the UK does not have enough sun to make solar systems worthwhile. In fact parts of the UK have annual solar radiation levels equal to 60% of those experienced at the equator.

However, this energy is not received uniformly throughout the year. Some 70% of UK annual radiation is received over the period April to September and 25% is received in the months of June and July.

Solar water heating technology captures energy from the sun and transfers this to a water heater to raise the water temperature therefore reducing the reliance on fossil fuel energies such as gas, oil and electricity. Up to 60% of a dwelling's annual hot water requirement can be provided by a solar water heating system. The balance is provided by traditional means via a second heat exchanger connected to a fossil fuel boiler or electrical heating by electric boiler or immersion heater.

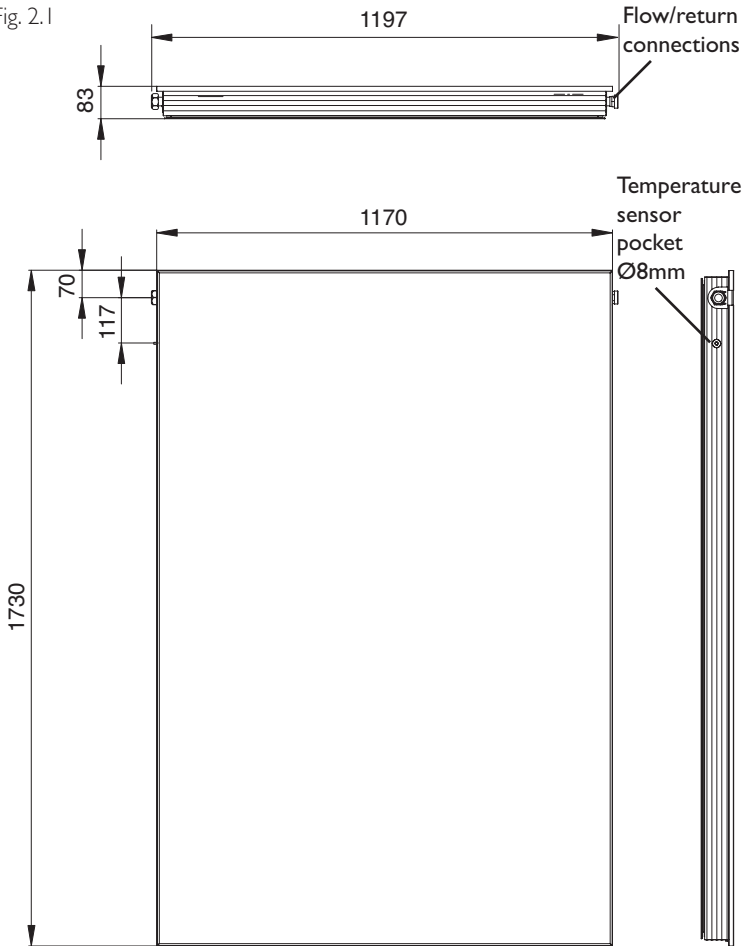
The Potterton Solar water heating system provides all the principal components required for an efficient solar water heating system. The sun's energy is captured by a series of solar collector panels through which a special heat transfer fluid is pumped. As the fluid passes through the collector panels its temperature is raised. The heated fluid is circulated through a heat exchanger coil in the base of the solar storage cylinder transferring the heat gained to the stored water, gradually raising its temperature. The cooled fluid then returns to the collector panel to be heated again. Heating by the solar coil is controlled by a solar differential temperature controller that ensures the system will only operate when there is useful solar heating gain at the collector panel. As the sun's energy input to the collector panels is variable supplementary heating by a conventional boiler or electric immersion heater should be provided. The optional cylinders that can be supplied with the Potterton Solar package provide a supplementary heat exchanger coil and immersion heater as standard.

Fig. 1



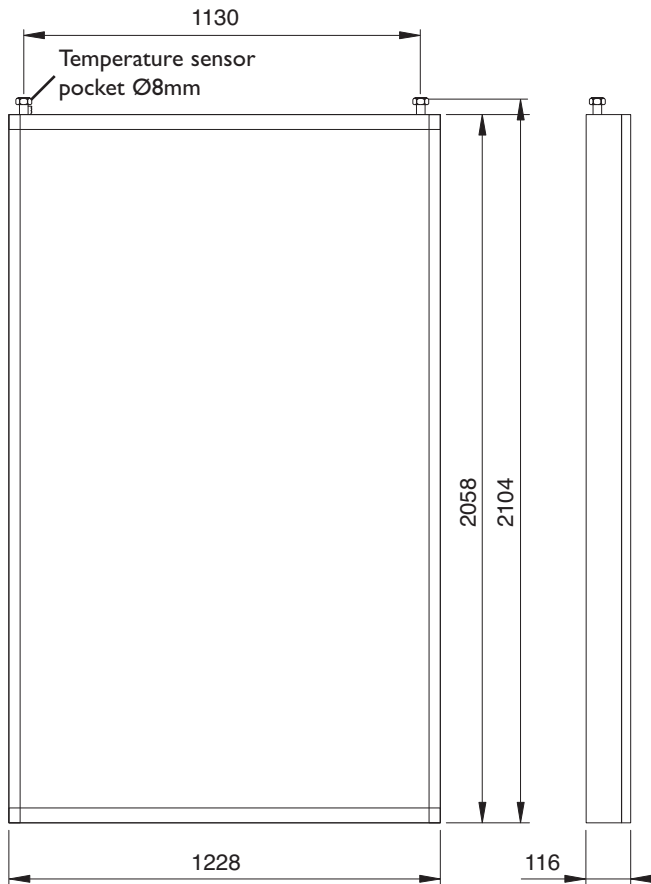
2.0 Solar collector specifications

Fig. 2.1



All dimensions shown in mm

Fig. 2.2



2.1 Technical data FK8200 "on roof" collector

Gross area:	2,02m ²
Net area:	1,84m ²
Weight:	39 kg
Absorber capacity:	1,40 litres
Pressure:	10 bar
Absorption:	95% ± 2%
Emission:	5% ± 2%
Stagnation temp:	184°C (Max)
Glass:	Low-iron solar glass, tempered 3.2mm thick
Light transmittance:	>90.8% ± 2%
Insulation:	40mm Rockwool with black facing. Heat conductivity 0.045W/mK. Gross density 40-50kg/m ³

Pressure loss collector for anti-freeze/water mixture (40%/60%) at a thermal conducting temperature of 50°C.

Pressure loss curve: $\Delta p = 0,000206x^2 + 0,007754x$

Mass flow rate [kg/h]	Pressure loss [mbar]
0	0
50	1
100	3
150	6
200	10
250	15
300	21
350	28
400	36
450	45
500	55

2.2 Technical data IDMK in-roof collector

Gross area:	2,52m ²
Net area:	2,32m ²
Weight:	54 kg
Absorber capacity:	1,70 litres
Pressure:	10 bar
Absorption:	95% ± 2%
Emission:	5% ± 2%
Stagnation temp:	210°C (Max)
Glass:	Low-iron solar glass, tempered 3.2mm thick
Light transmittance:	>90.8% ± 2%
Insulation:	50mm Rockwool with black fleece. Heat conductivity 0.045W/mK. Gross density 50-80kg/m ³

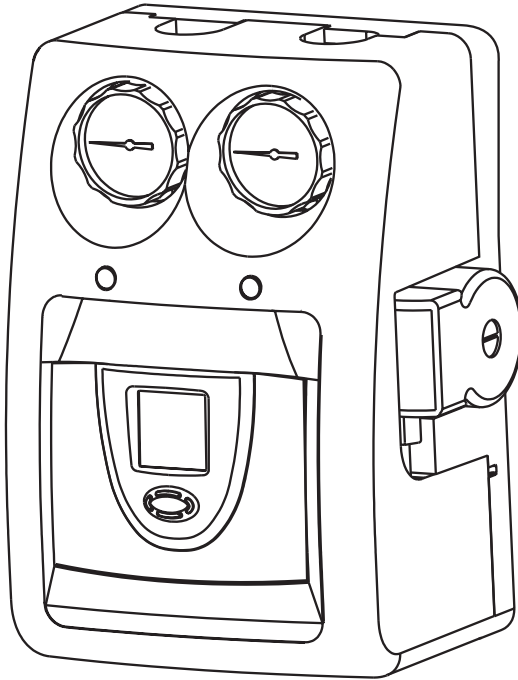
Pressure loss collector for anti-freeze/water mixture (40%/60%) at a thermal conducting temperature of 50°C.

Pressure loss curve: $\Delta p = 0,0002x^2 + 0,00301x$

Mass flow rate [kg/h]	Pressure loss [mbar]
0	0
50	4
100	8
150	12
200	17
250	21
300	26
350	32
400	38
450	43
500	50

3.0 Hydraulic station specifications

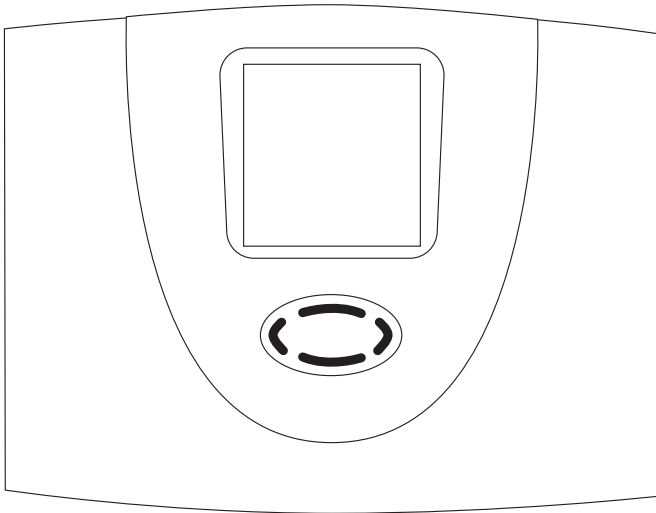
Fig. 3



3.1 Technical data

Dimensions (Height/Width/Depth)	375/250/190mm
Flow and return connections (compression fittings)	22mm
Maximum working temperature:	120°C
Maximum working pressure:	6 bar
Pressure Relief Valve setting:	6 bar
Circulating Pump:	Grundfos UPS 25-60 / Wilo ST 25/6
Circulating Pump voltage:	230/240 V ~
Power consumption Setting 1:	45W / 45W
Setting 2:	68W / 65W
Setting 3:	90W / 85W
Maximum Pump Head:	6 metres
Maximum Pump Capacity:	4.5 m ³ /h / 3.5 m ³ /h
Flow meter scale:	2 to 15 l/min

Fig. 4



4.1 Technical data

Housing

Material	100% recyclable ABS
Dimensions L x W x D in mm weight	175 x 134 x 56 ca. 360 g
Ingress protection	IP40 according to VDE 0470

Electrical values

Operating voltage	230/240V ~ 50 Hz
Interference grade	N according to VDE 0875
Max. conductor cross-section 240V-connections	2.5 mm ² fine-strand/single-wire
Temperature sensor / temperature range	PTF6 - 25°C to 200°C PT1000, 1,000 kΩ at 0°C
Test voltage	4 kV 1 min according to VDE 0631
Switching voltage	230V / 240V
Capability per one switch output	1A / ca. 230VA for cos j = 0,7-1,0
Total capability of all outputs	2A / ca. 460VA maximum
Fuse protection	fine-wire fuse 5 x 20mm, 2A/T (2 amperes, slow)

Features

Self explanatory, menu driven operation

Adjustable control valves

System monitoring

Energy yield, (solar gain) measurement

Suitable for flat plate and evacuated tube type collectors

Reheat thermostat function

Can be used in a number of system configurations

Fig. 5

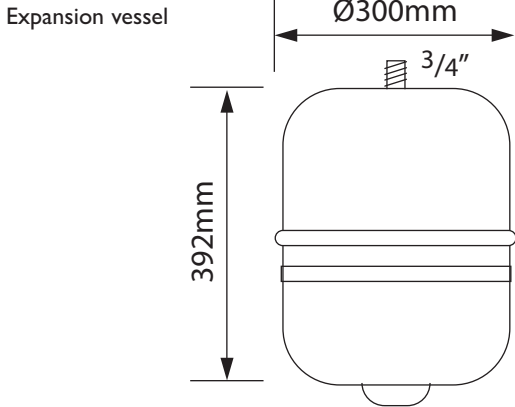


Fig. 6.1

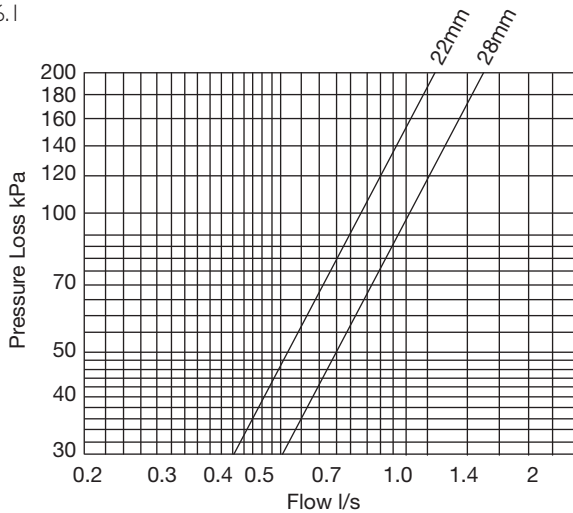
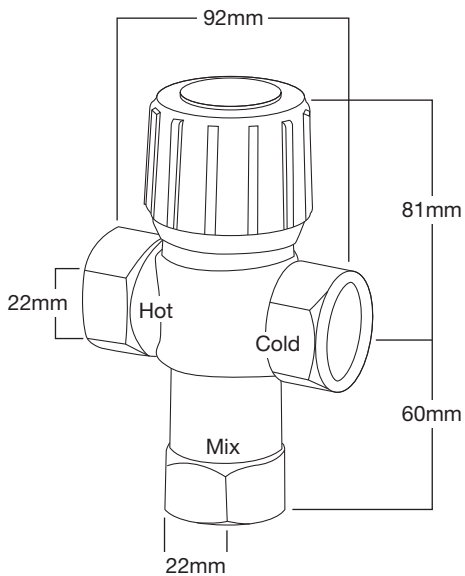


Fig. 6.2



5.1 Expansion vessel

Membrane expansion tanks for solar primary heating circuit. Manufactured according to the Directive PED 97/23/CE (approved noZ-DDK-MUC-02-396876-04).

Butyl membrane suitable for solar primary heating fluid, DIN 4807-3 approval.

Maximum working temperature +110°C.
Maximum percentage of glycol 50%.
Connection: 3/4" BSP male parallel

Expansion vessel supplied with wall mounting bracket and self sealing vessel connection that will allow removal of the vessel for maintenance without losing solar heat transfer fluid.

5.2 Solar heat transfer fluid

Pre-mixed (40% glycol / 60% water) Solar thermal transfer fluid. Based on 1,2 - propylene glycol with corrosion inhibitors.

Non-toxic, odourless, bio-degradable.

The use of chemical resistant gloves and suitable eye protection is required when handling.

A full safety data sheet is available on request.

Supplied in 20litre container. Weight of container full - 21kg.

5.3 Thermostatic Blending Valve

Can be set to control the hot water delivered to the user outlets to a safe working temperature enabling the solar cylinder to store water at a higher temperature.

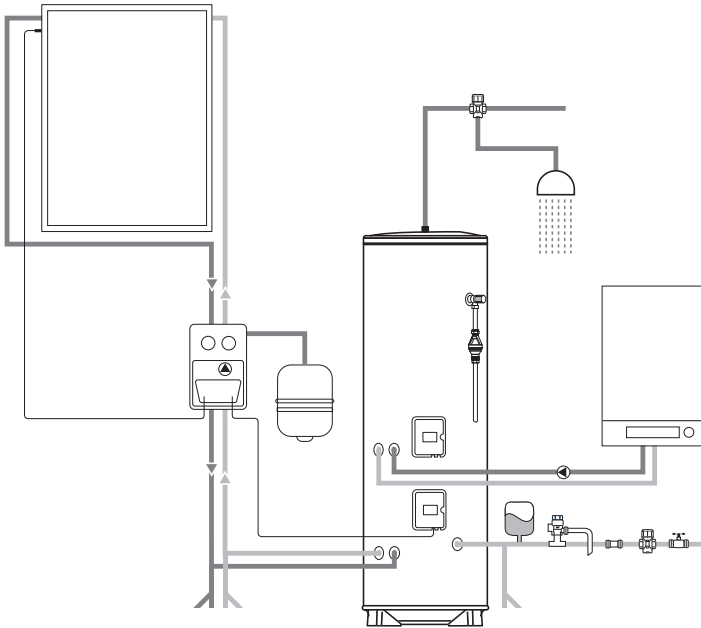
Connections: 22mm compression
Max working pressure (static): 14 bar
Max working pressure (dynamic): 5 bar
Min working pressure (dynamic): 0.2 bar
Max inlet pressure ratio: 2:1
Min flow required for stable control: 5 l/min

For pressure drop diagram and dimensions see Fig. 6.1 & Fig. 6.2

NOTE: For optimum operation the cold connection must be taken from a balanced cold water feed.

Fig. 7

Unvented system - schematic diagram



Note: Indirect twin coil unit shown.

6.0 Unvented

Nominal capacities 190, 210, 250 and 300 litre.

Rating Immersion heater(s) 1 x 3 kW (indirect models),
2 x 3kW (direct models) @ 240V~.

Outer casing White plastic coated corrosion proofed steel.

Thermal insulation CFC/HCFC-free (ODP zero) flame-retardant expanded polyurethane (50mm thick). GWP 3.1 (Global Warming Potential).

Water container Duplex 2304 (Grade 1.4362 EN 10088) stainless steel.

Pressure testing To 15 bar.

Heat unit Long-life Superloy 825 alloy sheathed element/s, incorporated into an easily removable heater plate, should replacement be necessary. Rated 3.0kW @ 240V~.

Primary coil (for Auxiliary boiler heating) 22mm diameter stainless steel. Coil in coil design for improved performance

Solar coil 25mm diameter stainless steel. Coil in coil design and large surface area for improved performance.

Thermostat

Direct models: Element thermostat adjustable from 10°C to 70°C.

Indirect models: Factory-fitted cylinder thermostat adjustable to 70°C.

Solar: Factory fitted control pocket suitable for insertion of solar controller temperature probe.

Factory fitted safety features:

Direct models: Manually re-settable cut-out on heating element operates at 85°C.

Indirect models: High limit thermal cut-out operates at 85°C. Wired in series with two-port motorised valve (supplied) to provide primary over temperature protection when using auxiliary (boiler) coil.

All models: Temperature and Pressure Relief Valve, factory set to operate at 10 bar and 90°C.

High limit thermal cut-out operating at 85°C at solar coil position. Wired in series with the solar differential temperature controller to provide over temperature protection if overheating occurs from solar collector panels.

N.B. This must be used in an unvented installation to comply with the requirements of Building Regulation G3.

Anode Not required.

For full technical and performance specification see cylinder installation instructions.

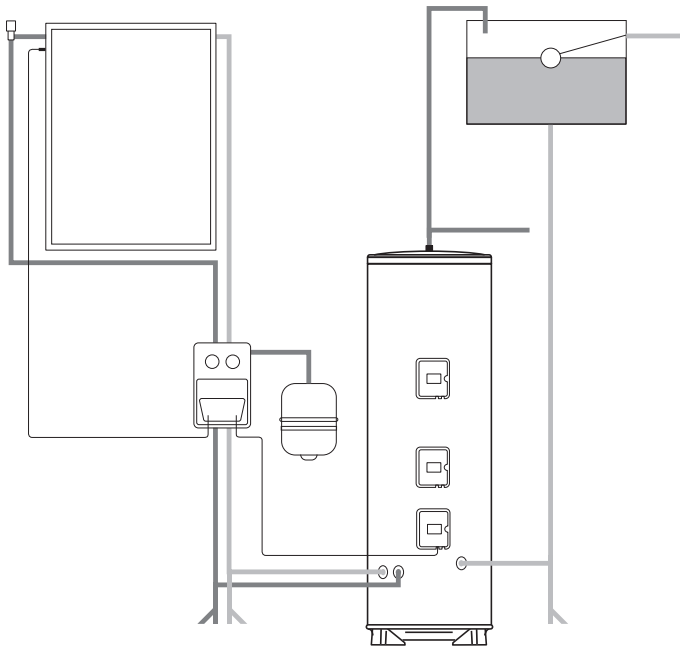
The cylinders are unvented so installation must comply with Building Regulation G3.

Potterton recommend the use of the Santon Premier Plus Solar unvented cylinders.

The use of other cylinders may not satisfy the requirements of Building Regulation G3.

Fig. 8

Vented system - schematic diagram



Note: Direct unit shown. Auxiliary heating by immersion heater.

6.1 Cistern-fed vented

Nominal capacities 190, 210, 250 and 300 litre.

Rating Immersion heater(s) 1 x 3 kW (indirect models),
2 x 3kW (direct models) @ 240V~.

Outer casing White plastic coated corrosion proofed steel.

Thermal insulation CFC/HCFC-free (ODP zero) flame-retardant expanded polyurethane (50mm thick). GWP 3.1 (Global Warming Potential).

Water container Duplex 2304 (Grade 1.4362 EN 10088) stainless steel. 40 metres (4 bar) maximum working head.

Heat unit Tin plated long-life Superloy 825 alloy sheathed element/s, incorporated into an easily removable heater plate, should replacement be necessary. Rated 3.0kW @ 240V~.

Primary coil (for auxiliary boiler heating) 22mm diameter stainless steel. Coil in coil design for improved performance.

Solar coil 25mm diameter stainless steel. Coil in coil design and large surface area for improved performance.

Thermostat

Direct models: Element thermostat adjustable from 10°C to 70°C.

Indirect models: Factory-fitted cylinder thermostat from 10°C to 70°C.

Solar: Factory fitted control pocket suitable for insertion of solar controller temperature probe.

Safety features Thermostats with manually resettable thermal cut-out.

High limit thermal cut-out operating at 85°C at solar coil position. Wired in series with the solar differential temperature controller to provide over temperature protection if overheating occurs from solar collector panels.

Anode Not required.

For full technical and performance specification see cylinder installation instructions.

Detailed installation and commissioning instructions are supplied with the cylinders.

Note: The Potterton Solar is also compatible with cylinders configured for solar DHW systems. For installation and specification details refer to the manufacturers instructions supplied with the solar cylinder.

7.1 Safety information

In order to reduce the number of deaths and major accidents attributable to work at height, the Health and Safety Executive has introduced comprehensive regulations and guidance that should be followed by all businesses working at height.

We consider in the following paragraphs some of the main features of the regulations and guidance. This is, however, only a limited summary and it is recommended that all businesses planning on undertaking solar water heating installations obtain a copy of the regulations and guidance issued by the Health and Safety Executive and carefully consider the contents.

The regulations and guidance state that you are required to carry out a risk assessment for all work conducted at height and to put in place arrangements for:

- Eliminating or minimising risks from work at height.
- Safe systems of work for organising and performing work at height.
- Safe systems for selecting suitable work equipment.
- Safe systems for protecting people from the consequences of work at height.

The regulations and guidance highlight a hierarchy for safe work at height:

- **Avoid** the risk by not working at height if practicable.
- **Prevent** falls, where it is not reasonably practicable to avoid work at height; you are required to take suitable and sufficient steps to prevent the risk of a fall including selecting the most suitable work equipment (in accordance with the regulations).
- **Mitigate** the consequences of a fall; where the risk of a person or object falling still remains, take suitable and sufficient measures to minimise the distance and consequences of any fall.

Collective protection measures, such as guard rails on scaffold, should be given priority over personal protection measures, such as safety harnesses.

Within the regulations' framework, you are required to:

- 1) Assess the risk to help you decide how to work safely.
- 2) Follow the hierarchy for safe work at height (i.e. avoid, prevent and mitigate).
- 3) Plan and organise your work properly, taking account of weather conditions and the possibility of emergencies.
- 4) Make sure those working at height are competent.
- 5) Make use of appropriate work equipment.
- 6) Manage the risks from working on or around fragile surfaces and from falling objects.
- 7) Inspect and maintain the work equipment to be used and inspect the place where the work will be carried out (including access and egress).

When preparing to install a solar water heating system, it is required that you perform a risk assessment in relation to work at height and plan how you will organise your work, taking into account the site, the weather conditions and the experience and competence of colleagues or contractors who may be working at height with you.

Risk Assessments

The HSE has published a number of very useful free publications that advise how to undertake risk assessments.

Two of these that you should obtain are:

Five Steps to Risk Assessment.

A Guide to Risk Assessment Requirements.

The five steps outlined in the HSE leaflet are:**Step 1:** Look for the hazards

This will mean looking at the site and identifying significant hazards. These could be features such as a steep roof, a fragile surface where the collectors may be mounted, uneven ground or obstructions where access to the roof might be required.

Step 2: Decide who may be harmed and how

This might mean considering the particular risks that young workers or trainees might face and thinking about the residents of the household or visitors who could be hurt by your activities.

Step 3: Evaluate the risks and decide which precautions should be made. You should consider how likely it is that each hazard will cause harm, decide which precautions you might take and then assess, after you have taken those precautions, whether the remaining risk will be high, medium or low. Where you identify remaining risks, you should consider which further action you could take to control the risks so that harm is unlikely.

Step 4: Record your findings

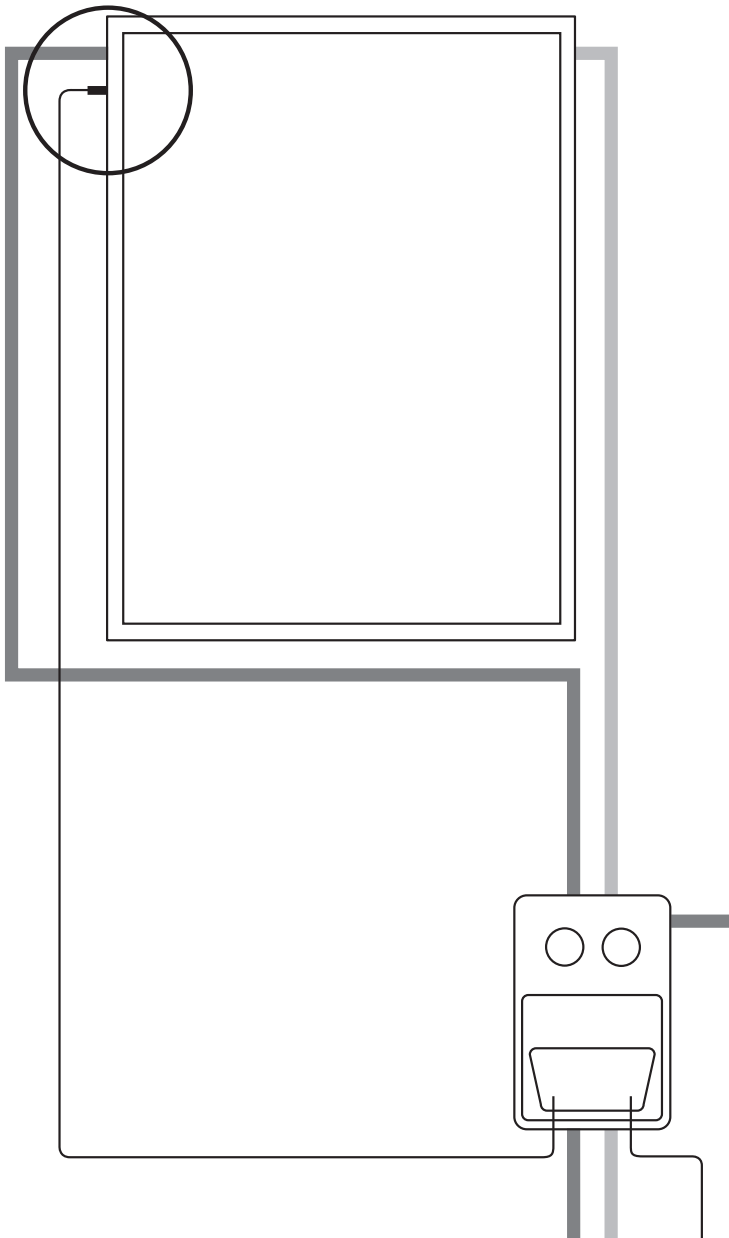
If you have fewer than five employees you do not need to write anything down, though it is useful to keep a written record of what you have done. If you employ five or more people you must record the significant findings of your assessment. You must also tell your employees about your findings. You need to be able to show that a proper check was made, that you considered who might be affected, that you dealt with all the obvious significant hazards, that the precautions you propose are reasonable and that the remaining risk is low.

Step 5: Review your assessment if necessary

Each solar water heating installation may bring its own challenges and present its own particular hazards. You should therefore be careful not to rely on a “standard” risk assessment for installing a solar water heating system in a house, but review the particular hazards for each new situation. The issue of work equipment must be considered, but at the preparation stage you should consider where scaffold or other access equipment might be positioned and look out for any obvious obstacles to this, such as a conservatory or porch.

In addition to the risks associated with work at height, you should also consider the risks associated with lifting and carrying solar collectors, using electric drills and using blow lamps or blow torches for soldering. This is not an exclusive list and so you should consider all aspects of the proposed installation to assess whether there are additional risks that need to be taken into account.

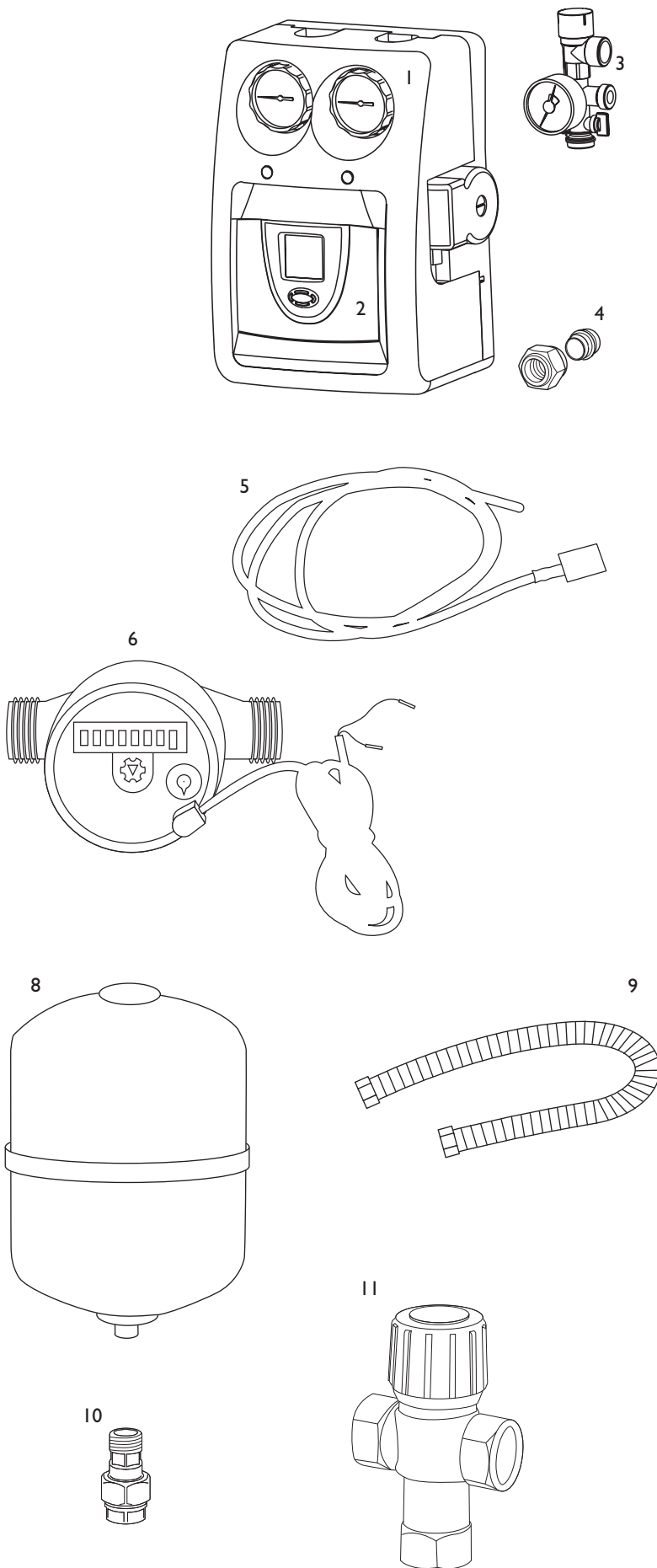
Fig. 9



The Collector panel temperature sensor should be installed in the sensor pocket nearest to the collector array flow. It should be secured in pocket by inserting through the rubber gland provided. All materials used for installing temperature sensors (sensor element, conducting compound, cables, sealing and insulating materials) must be suitably temperature resistant (up to 250°C).

NOTE: "On-roof" type panel shown. The "In-roof" type panel has connections on the top edge of the collector (see Fig. 2.2) and the sensor pocket is located behind the left hand connection.

Fig. 10 (Diagrams not to scale)



9.1 Parts list

Before commencing the installation check all listed components are contained in the following cartons.

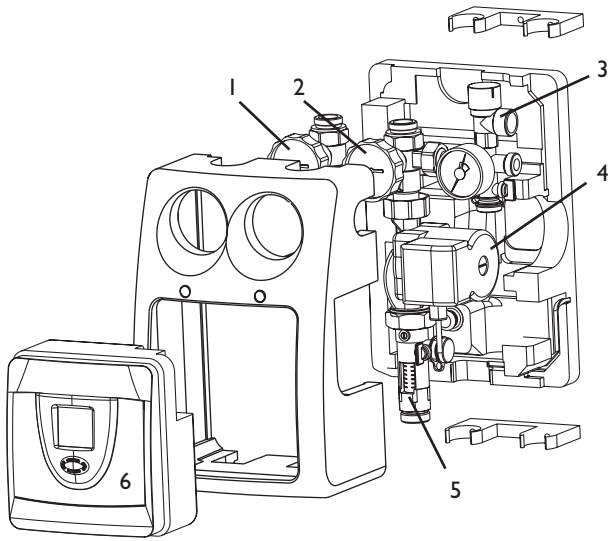
Hydraulic Station carton:

1. Hydraulic pump station with insulation incorporating wall mounting bracket.
2. Solar differential temperature controller.
3. Safety group, comprising- Pressure relief valve, pressure gauge and fill & drain valve.
4. 22mm compression fitting (4 off).
5. Re Heat sensor: (Optional order part no. 5122234)
6. Solar Gain Module comprising- Electric flowmeter and return temperature sensor. (Optional order part no. 5122235)
7. Sensor extension cable (13m) (not shown).

Ancillary component carton:

8. Solar expansion vessel complete with mounting bracket and strap assembly.
9. Expansion vessel connecting hose.
10. Expansion vessel self sealing connection.
11. Thermostatic Blending valve.
12. 2m insulated flexible steel hoses for connection to collectors

Fig. 11



9.2 Identification of components

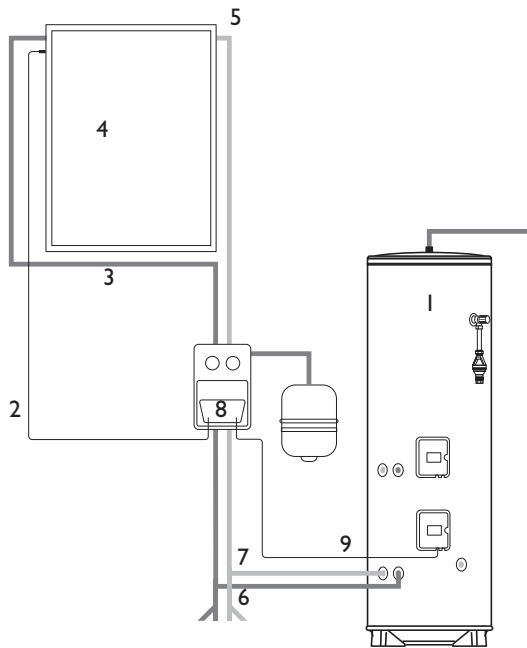
The main components of the hydraulic station are:

- Two isolating valves (Fig. 11, Item 1 & 2) with integral thermometers which display the solar primary flow and return temperatures.
- A safety group (Fig. 11, Item 3, supplied unconnected), which protects the solar primary circuit. The pressure relief valve and pressure gauge are integrated in the safety group.
- A non-return valve in both feed and return prevents the possibility of gravity circulation in the solar primary circuit.
- A solar circulation pump (Fig. 11, Item 4).
- A flow meter with fill & drain valve and shut-off valve (Fig. 11, Item 5).
- An air separator.

The heat transfer fluid is circulated by the solar circulation pump integrated in the hydraulic pump station (Fig. 11).

The hydraulic station has a solar differential temperature controller (Fig. 11 Item 6) integrated into the front insulation moulding. This is pre-wired to the solar pump.

Fig. 12



9.3

See Fig. 12

- 1 Solar cylinder
- 2 Collector temperature sensor lead
- 3 Solar primary flow (from collector)
- 4 Solar collector panel(s)
- 5 Solar primary return (to collector)
- 6 Solar primary flow (to cylinder)
- 7 Solar primary return (from cylinder)
- 8 Solar differential temperature controller
- 9 Cylinder temperature sensor lead

9.4 Pipework installation - general

The collectors, the hydraulic station and the solar cylinder (Fig. 12, Item 1) must be connected with hard soldered copper pipes, compression fittings or multifit accessory flexible steel tube and insulation 5122238.

N.B. Plastic pipes **MUST NOT** be used.

Connections supplied are suitable for pipe diameters of 22mm. However for short pipe runs (up to 10m) the use of 15mm diameter pipe is acceptable.

In solar heating systems, use only pipes and fittings made from copper, brass, bronze brass or stainless steel. Compression fittings only must be used.

All connections and joints must be resistant to temperatures of up to 150°C and resistant to glycol.

The height difference between the highest point in the pipework (collector) and the hydraulic station may be a maximum of 15m (this is called the 'static height'). If the static height is greater than 15m a larger expansion vessel may be required.

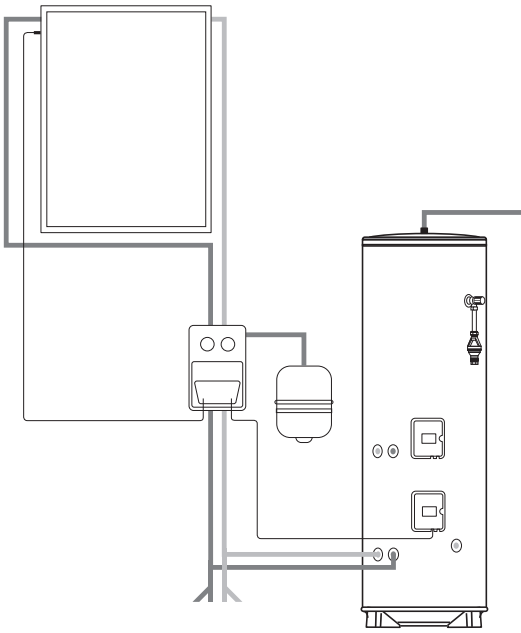
If any pipe sealants are used these should be resistant to glycol and be able to withstand temperatures of up to 150°C.

9.4.1 Earthing pipework

All solar primary pipework between the solar collectors, hydraulic station and solar cylinder must be earth bonded to avoid electrical potential differences. This work must be carried out by a qualified electrician.

Fit earthing clamps to the solar primary flow and return pipes and connect the earth clamps to the earthing system of the property using an earth bonding cable of min. 6mm² diameter.

Fig. 13



9.4.2 Venting the pipework

The Potterton Solar hydraulic station the component includes an air collector/separator and bleed point so an automatic air vent is not necessary. Any section of solar pipework that falls and rises again should be fitted with an additional air vent valve to relieve any trapped air which may cause air locking in the system. The automatic air vent and isolating valve used must be compatible with solar primary systems, i.e. be resistant to glycol and temperatures up to 180°C.

9.4.3 Insulating the pipework

External pipework should be insulated with high temperature resistant materials and be protected against UV degradation. Internal pipework, especially through unheated spaces such as a loft space, should also be insulated with high temperature resistant materials. Mark the outside of any insulation to identify the flow and return pipes.

The Potterton Solar panels are supplied with 2x2m pre insulated flexible stainless steel tubes. Additional lengths (30m) of stainless steel flexible tubes and high temperature insulation can be supplied.

Fig. 14

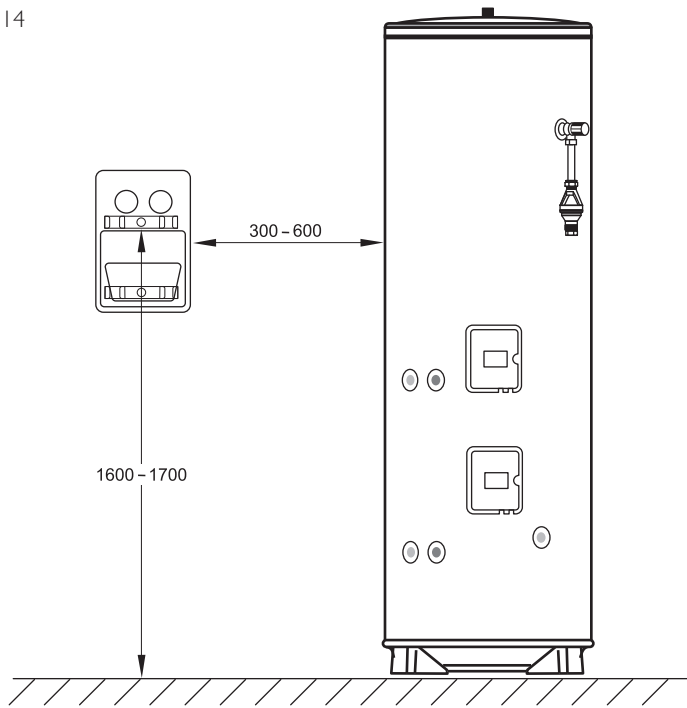
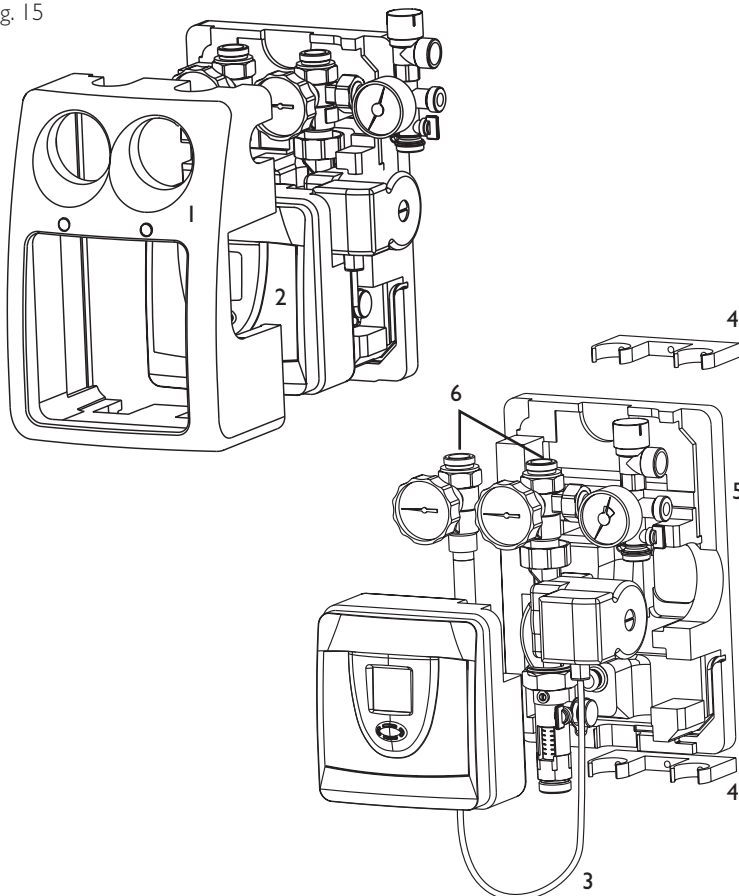


Fig. 15



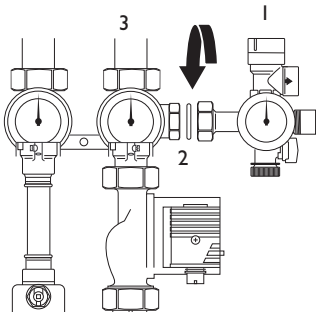
9.5 Installing the hydraulic station - positioning

It is usual to install the hydraulic station and solar differential temperature controller near to the solar cylinder. However this does not have to be the case, the hydraulic station can be installed anywhere convenient on the solar primary pipework although adequate access will be necessary for commissioning and maintenance. The solar differential controller should also be accessible for system operational monitoring. If not in close proximity to the solar cylinder it will be necessary to extend the solar cylinder temperature sensor cable, refer to section 10.6 for details of how to do this. It is recommended that the upper mounting bracket of the hydraulic station is positioned approx. 1600 to 1700mm above the floor level for ease of access and operation of the controls, see Fig. 14. When choosing the site for the hydraulic station provision of a discharge pipe from the safety group and the location of the solar expansion vessel must be considered.

9.6 Installing the wall brackets and hydraulic station

Remove the front insulation moulding (Fig 15. Item 1) by pulling forward whilst holding the solar differential controller moulding (Fig 15. Item 2) in place. Carefully remove the solar differential controller mounting by pulling forward and disconnect the pump cable connector (Fig 15. Item 3). Place the hydraulic assembly on the wall at the desired location and mark the fixing positions through the holes in the mounting brackets. Remove the hydraulic assembly from the mounting brackets (Fig 15. Item 4) and remove rear insulation moulding (Fig 15. Item 5). Drill and plug the mounting positions and screw the mounting brackets into position. Push the rear insulation moulding over the wall brackets and refit the hydraulic assembly (Fig 15. Item 6) to the mounting clips on the wall brackets.

Fig. 16

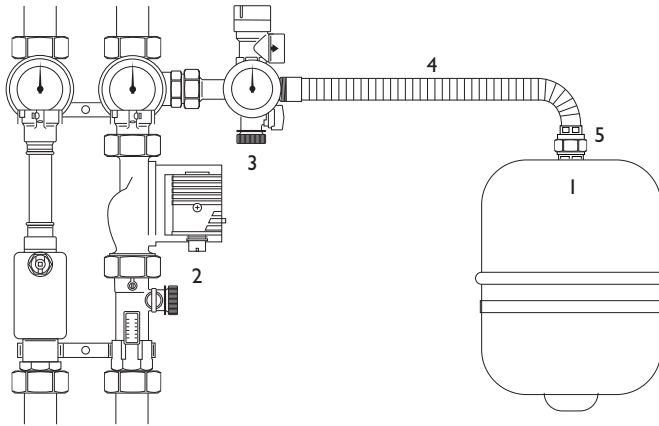


9.0 Installation of hydraulic station

9.7 Installing the safety group

Connect the safety group (Fig 16 Item 1) with the gasket (Fig 16 Item 2) enclosed to the connection on the hydraulic station return isolating valve assembly (Fig 16 Item 3).

Fig. 17



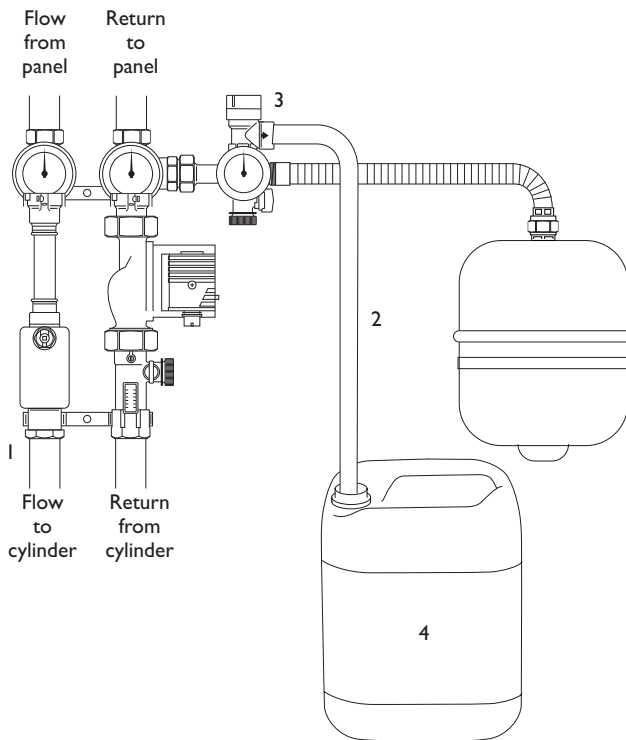
9.8 Connecting the solar expansion vessel

Mount the solar expansion vessel (Fig 17 Item 1) adjacent to the hydraulic station (Fig 17 Item 2) so that the vessel can be connected to the vessel connection of the safety group (Fig 17 Item 3) using the flexible pipe (Fig 17 Item 4) supplied. (Note: Solar expansion vessel, mounting bracket, self sealing connection and flexible pipe are supplied in the Ancillary Components kit). The vessel must be mounted as shown (connection to top) and securely supported using the wall bracket supplied. The self sealing vessel connection should be screwed onto the vessel connection before connecting the flexible pipe (Fig. 17 Item 5).

DO NOT replace the solar expansion vessel with either a potable water expansion vessel or boiler sealed system vessel.

The charge pressure at the solar expansion vessel should be adjusted such that when not under load the charge pressure is 0.4 bar above the static system head (the height of the top of the collector panels above the hydraulic station). A one metre head represents 0.1 bar. However, the charge pressure should be at least 1.2 bar. The maximum static system head is 15m (1.5 bar).

Fig. 18

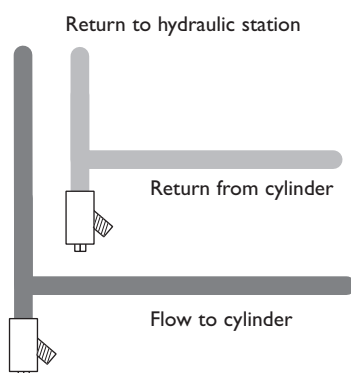


9.9 Connecting pipework

Connect the flow and return pipes to the collectors and to the cylinder via compression fittings (Fig 18 Item 1). Fittings are for 22mm o/dia pipe. Support the hydraulic assembly when tightening connections.

Run a pipe (Fig 18 Item 2) from the exit opening in the pressure relief valve (Fig 18 Item 3) to a suitable container (Fig 18 Item 4) and secure it.

Fig. 19



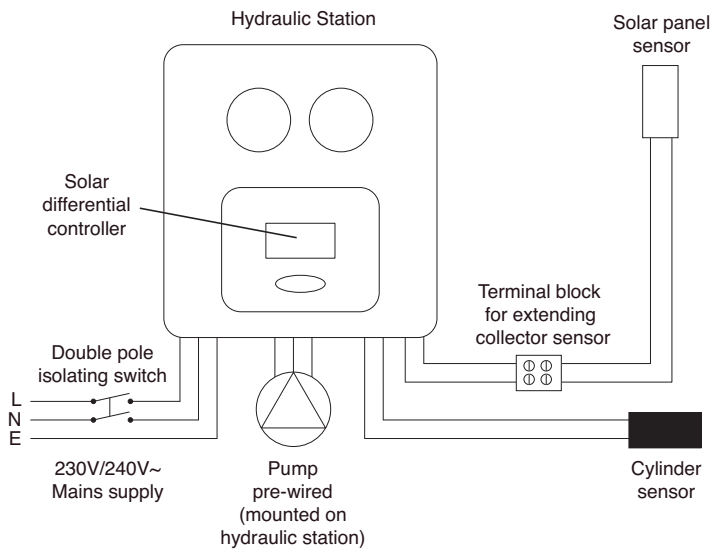
9.9.1 Installing a drain valve

Install a device for draining the solar heating system (tee piece with drain valve, Fig. 19) into the flow and return at the lowest point in the solar heating system.

9.9.2 Connecting the solar cylinder

For detailed installation instructions refer to the installation instructions supplied with the solar cylinder.

Fig. 20



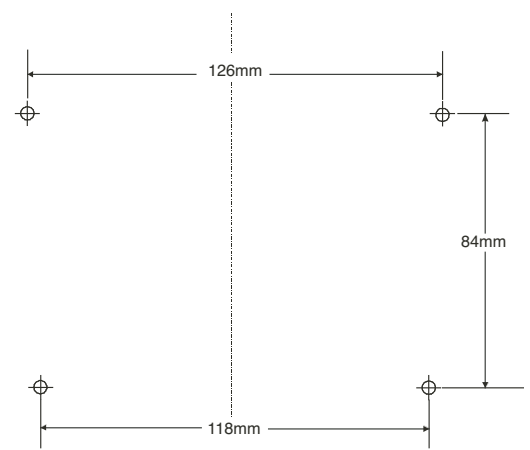
10.1 Appliance installation

The solar differential temperature controller is designed to be mounted on the front of the hydraulic station. Alternatively it can be removed from the insulation and be wall mounted (see panel below). In the case of wall mounting the pump cable may need to be lengthened.

Alternative mounting option

In the case of wall installation proceed in the following way:

Drill installation holes according to the dimensions shown below. Screw in two upper screws up to 6 mm distance. Open the appliance as described in section 10.2 and hang it onto two screws. Now two lower screws can be mounted. Tighten all screws. Do not overtighten to avoid damage to the controller backplate.



10.2 Opening the controller

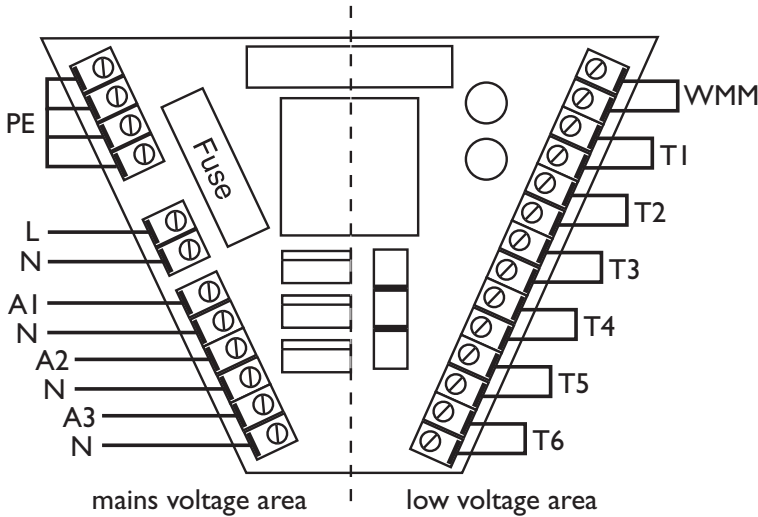
No tools are required to open the controller. The front of the controller is secured by two latches which engage with the controller backplate. It can be opened by gently pulling the lower side edges outwards and then hinging the front upwards.

10.3 Electrical connection overview

Always disconnect from the mains before opening the controller cover. The electrical installation must conform to all current Wiring Regulations and be carried out by a competent electrician.

The connection of all electrical cables is to the terminal block located on the backplate of the controller. The terminals on the right side of the terminal block are for extra low voltage connections (temperature sensors and flow transmitters). The terminals on the left side of the terminal block are for 230/240 V~ connections.

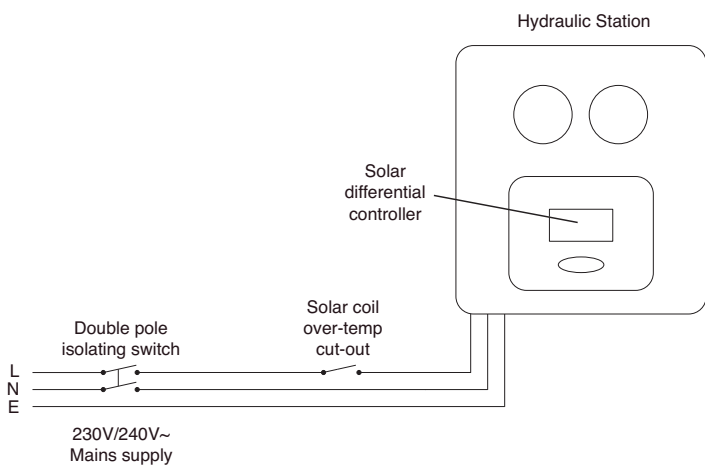
Fig. 21



- | | | | |
|----|--------------------------------|-----|---|
| PE | Earthed wire | WMM | Flow transmitter |
| L | Mains supply live conductor | T1 | Temp.- sensor collector 1 |
| N | Mains supply neutral conductor | T2 | Temp.- storage tank 1 |
| A1 | Switch output to solar pump | T3 | Temp.- sensor collector 2/ storage tank 2 |
| N | Neutral wire to solar pump | T4 | Temp.- sensor collector return |
| A2 | Live switch output 2 | T5 | Temp.- sensor thermostat or for 2nd temperature differential controller |
| N | Neutral wire switch output 2 | T6 | Temp.- sensor antifreeze or for 2nd temperature differential controller |
| A3 | Live switch output 3 | | |
| N | Neutral wire switch output 3 | | |

For switch functions A2 and A3 see Fig. 23

Fig. 22



General connection guidelines.

In the case of all connecting wires the outer sheath should be stripped back to 80mm. The individual conductor sleeving should be stripped approx. 10mm.

Cables are inserted in the controller through knockouts provided in the controller backplate.

Flexible cables must be secured against straining by suitable strain relief bushes or devices.

The controller must be earthed.

10.4 230/240V~ connections

For 230V connections you must follow the following points:

The mains supply to the controller should be via a suitable double pole isolating switch with a contact separation of at least 3mm in both poles. Additionally for unvented solar cylinders the controller should be wired via the solar coil over temperature cutout such that power is interrupted to the controller and hydraulic station in the event of the unvented cylinder overheating (see Fig. 22).

Controllers are intended for the operation in 230/240V~/50Hz mains. Any motorised valves connected must be suitable for this voltage.

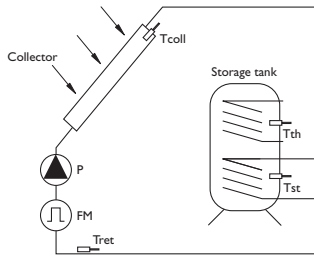
All earth wires must be connected to terminals marked with PE. Any bare wire earth conductors must be sleeved with green/yellow sleeving.

The neutral terminals (N) are electrically connected and are not switched.

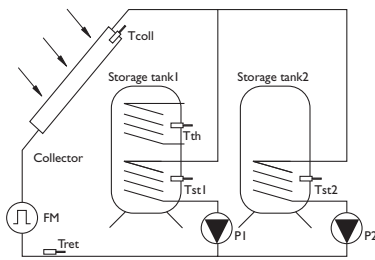
All switch outputs (A1, A2 and A3) are 230/240V~ closers. If potential-free contacts are needed, appropriate accessories are required.

Fig. 23

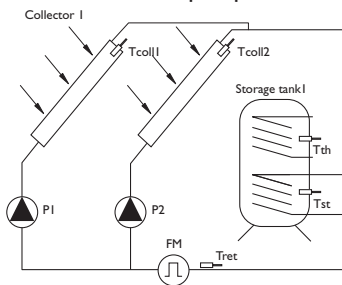
Type 0:
1 collector, 1 storage tank



Type 2:
1 collector, 2 storage tanks with 2 pumps



Type 4:
2 collectors, 1 storage tank with 2 pumps



10.0 Installation of solar controller

10.5 Solar Gain measurement

For solar gain (energy productivity) measurement it is necessary to fit the flowmeter and collector return sensor as shown in the diagram in Fig. 23. The collector return sensor must be securely attached to the return pipework using the securing tiles supplied and then covered by insulation. The solar gain of the system is calculated on the basis of the temperature difference between the collector flow and return and the solar primary circulation flow rate.

The function must be switched “on” when commissioning the Solar Differential Temperature Controller. Refer to the Potterton Solar “Commissioning, Maintenance & Servicing Guide” for further details.

For System Types 2 and 4 the additional pump (P2) can be ordered as an accessory, Part No. 5129362.

- Tcoll Temperature measuring point collector
- Tth Temperature measuring point thermostat
- Tret Temperature measuring point collector return
- Tst Temperature measuring point storage tank
- P Pump
- FM Flowmeter

System type		Output terminal designation (see Fig. 21)		
Type	Description	A1	A2	A3
0	1 collector array, 1 storage cylinder	P1	-	Cooling or thermostat or diff. controller
2	1 collector array, 2 storage cylinder (pump-pump)	P1	P2	Cooling or thermostat or diff. controller
4	2 collector array, 1 storage cylinder (pump-pump)	P1	P2	Cooling or thermostat or diff. controller

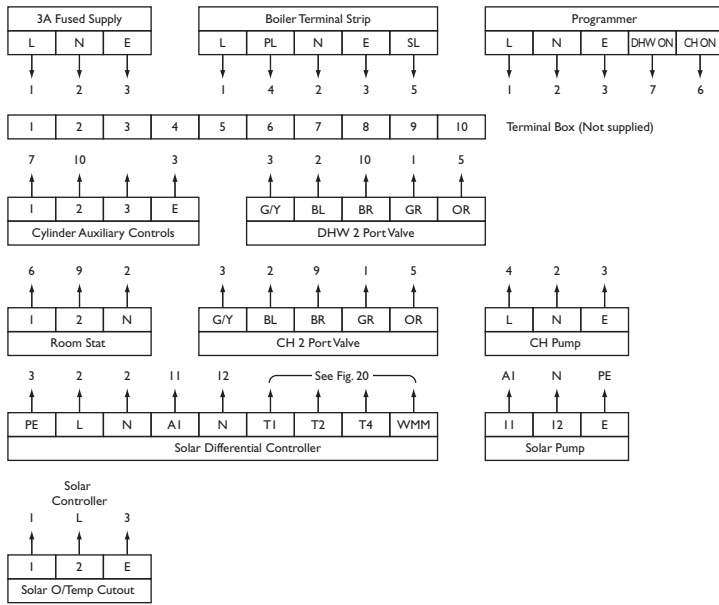
System type		Sensor terminal designation (see Fig. 21)					
Type	Description	T1	T2	T3	T4	T5	T6
0	1 collector array, 1 storage cylinder	Tcoll1	Tst1	-	Tret	Tth/TDiff1	Tfr TDiff2
2	1 collector array, 2 storage cylinder (pump-pump)	Tcoll1	Tst1	Tst2	Tret	Tth/TDiff1	Tfr TDiff2
4	2 collector array, 1 storage cylinder (pump-pump)	Tcoll1	Tst1	Tcoll2	Tret	Tth/TDiff1	Tfr TDiff2

NOTE: The solar gain flowmeter must be connected to sensor terminals marked WMM (see Fig. 21).

Fig. 24

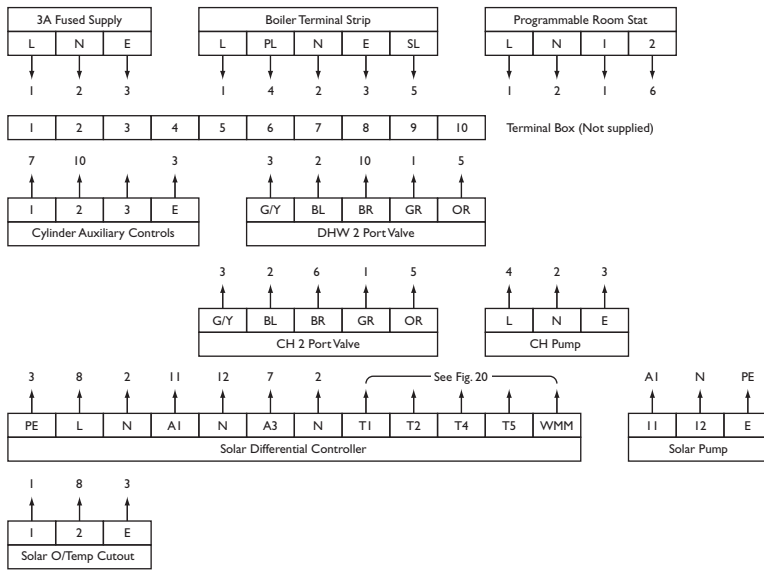
Block Wiring Schemes

A. Potterton Solar in conjunction with auxiliary heating by boiler - no reheat control by solar controller.

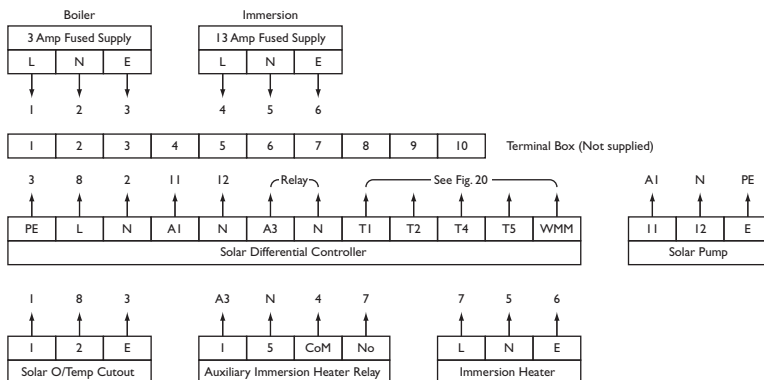


Note: For Boilers without Pump over run connect CH Pump Live Supply to 5

B. Potterton Solar in conjunction with auxiliary heating by boiler - reheat control via solar controller.



C. Solar Cylinder with auxiliary heating by immersion heater.



10.0 Installation of solar controller

10.6 Connection of temperature sensors

The controller uses precise platinum temperature sensors type PT 1000. The controller is supplied with 3 sensors. **The sensor with black silicone sheathing must be used for the solar panel sensor.**

Installation / cabling of temperature sensors:

Mount the sensors in the pockets provided in the collector and storage tank. When installing into the collector panel sensor pocket the sensor should be secured by inserting through the rubber gland provided.

The wires of the temperature sensors can be lengthened. Up to 15m long you need a 2 x 0,5mm² cross-section, up to 50m 2 x 0,75mm². In the case of long connections (collector) shielded extension lead must be used. DO NOT run sensor leads adjacent to mains carrying voltage conductors (at least 50mm separation is recommended).

Temperature sensors are connected according to the appropriate terminals, refer to Fig 21. The sensors are polarity free.

Sensors **MUST NOT** be connected to the 230/240V~ terminals.

10.7 Control of Auxiliary heat input

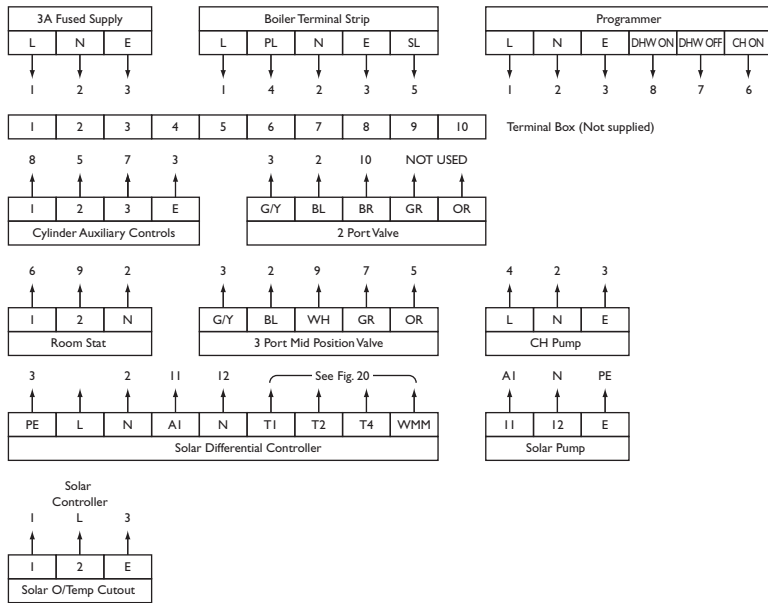
When using the reheat function the operation of the auxiliary heat input device can be controlled via output A3 from the controller.

The reheat sensor cable should be connected to terminals T5 of the solar controller and the sensor element be inserted into the controls pocket at the auxiliary heater level.

N.B. The maximum switching current of the controller is 2A so if switching an electrical immersion heater this MUST be done via a relay (see Fig. 24 Black Wiring Scheme C) order accessory code No. 5122765.

If using a boiler for auxiliary input, the output from the reheat function should be integrated into the boiler control circuit.

D. Auxiliary heating by boiler with 3 port mid position valve system
- no reheat control by solar controller.



Key to abbreviations:

- L - Live
- N - Neutral
- E - Earth
- PL - Pump Live
- SL - Switched Live
- G/Y - Green and Yellow
- BL - Blue
- BR - Brown
- GR - Grey
- OR - Orange
- WH - White

The wiring schemes assume the use of an unvented Solar DHW cylinders.

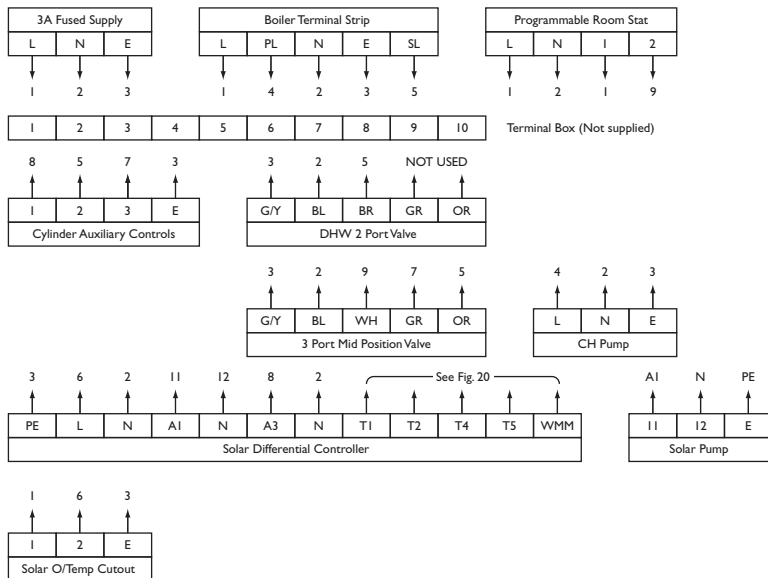
These diagrams are presented for guidance only, terminal numbers may differ between different manufacturers equipment.

Potterton accept no liability for any loss or damage arising from any errors or omissions that may be inadvertently contained within these diagrams.

The various ancillary equipment manufacturers should be consulted to confirm the correct operation of their products within the system.

The Warranty only applies to equipment and controls supplied with the Potterton Solar System.

E. Auxiliary heating by boiler with 3 port mid position valve system
- reheat control by solar controller.



All descriptions and illustrations provided in this leaflet have been carefully prepared but we reserve the right to make changes and improvements in our products which may affect the accuracy of the information contained in this leaflet. All goods are sold subject to our standard Conditions of Sale which are available on request.

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