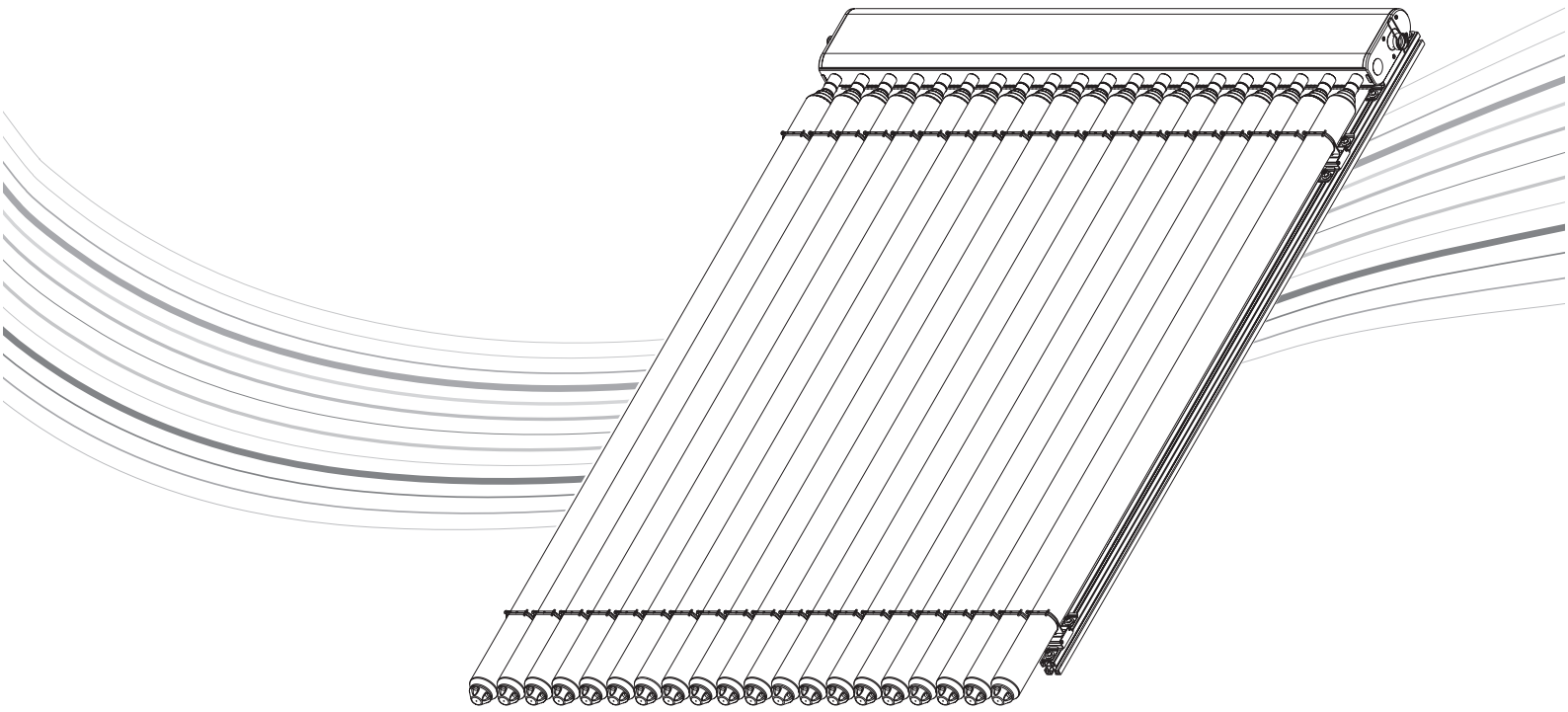
BAXI

Installation Guide



Solarflo™

Evacuated Tube Collector

These instructions must be used in conjunction with the Commissioning, Maintenance & Servicing Guide

Please read these instructions before installing or commissioning. Solarflo™ (Solar Thermal Domestic Hot Water System) should only be installed by a competent person.

PLEASE LEAVE THESE INSTRUCTIONS WITH THE USER FOR SAFE KEEPING.

Content

Section		Page
1.0	Introduction to Solar	3
2.0	Solar Collector Specifications	4
3.0	Pump Station Specifications	5
4.0	Solar Controller	6
5.0	Ancillary Components	7
6.0	Cylinder Specifications	8
7.0	General	10
8.0	Installation of Collector Sensor	12
9.0	Installation of Pump Station	13
10.0	Installation of Solar Controller	19

1.0 Introduction to Solar

1.1 Description

Thank you for purchasing a high quality Solarflo™ 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 Solarflo™ 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 collectors through which a special heat transfer fluid is pumped. As the fluid passes through the collector 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 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. As the sun's energy input to the collector is variable supplementary heating by a conventional boiler or electric immersion heater should be provided. The optional cylinders that can be supplied with the Solarflo™ package provide a supplementary heat exchanger coil and immersion heater as standard.

1.2 General

Avoid the use of hacksaws if at all possible. Using the correct pipe cutting tools will reduce the amount of debris in the system prior to flushing.

Read in conjunction with Solar Collector Guide.

Fig. 1- Schematic

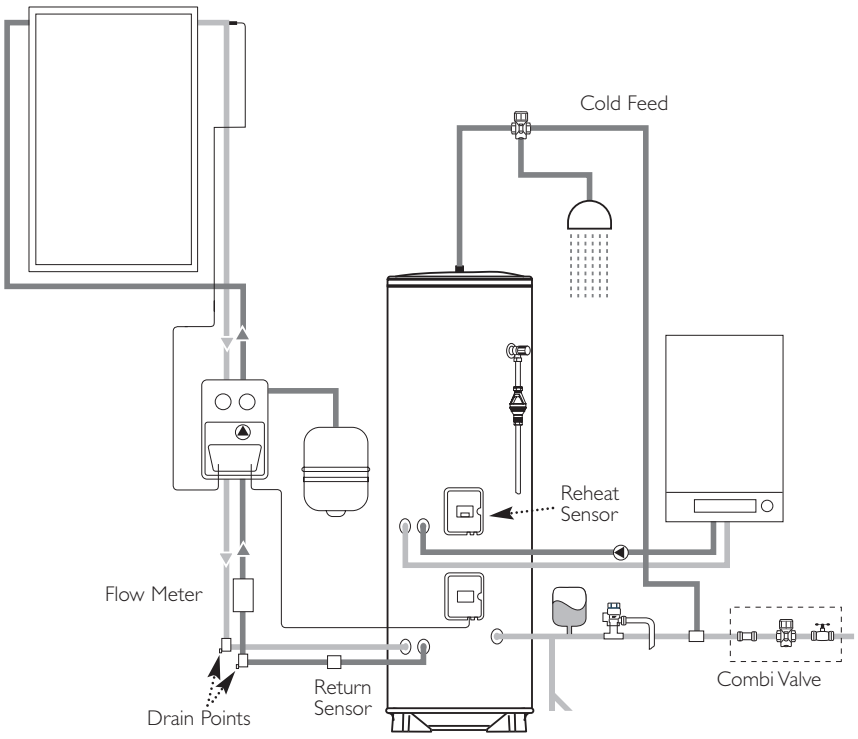


Fig. 2

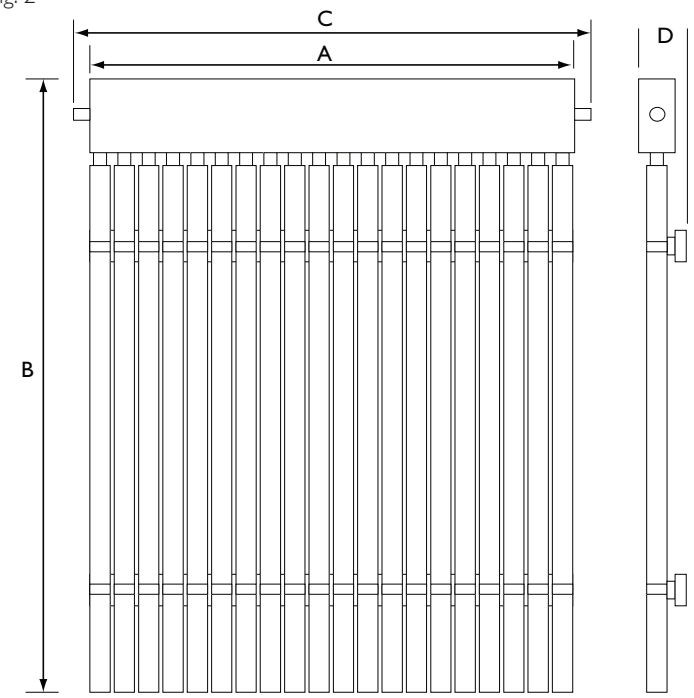
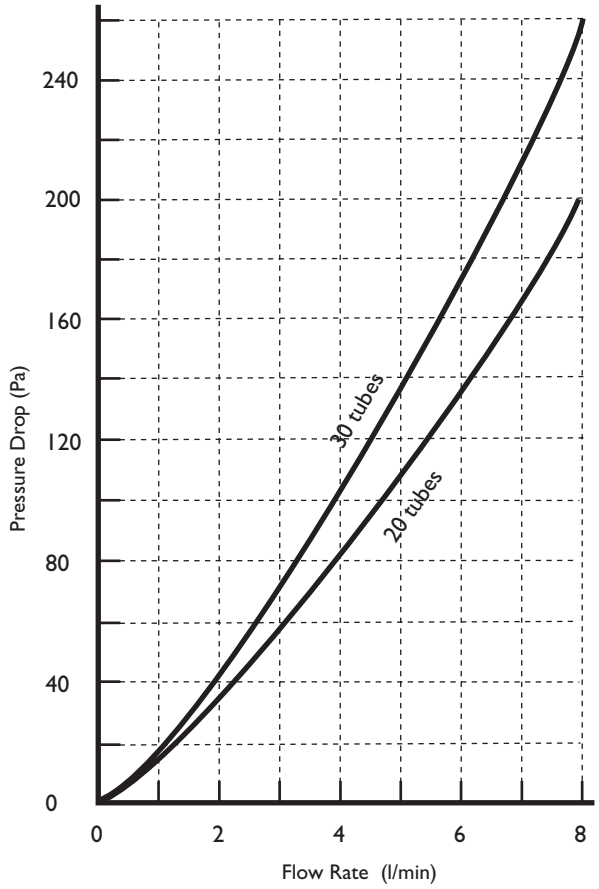


Table of dimensions (mm)

	20 tube	30 tube
A	1418	2127
B	1996	1996
C	1475	2184
D	97	97

All dimensions shown in mm

Fig. 3



2.0 Solar collector specifications

2.1 Technical Data

	20 tube	30 tube
Gross area:	2.83m²	3.23m²
Net area:	2.00m²	3.00m²
Weight:	54.8 kg	81.4 kg
Fluid Volume:	3.8 litres	5.6 litres
Pressure:	8 bar	8 bar
Absorption:	95%	95%
Emission:	5%	5%
Stagnation temp:	286°C	286°C
Glass:	65mmØ Low-iron - transmission 0.92	
Light transmittance:	>90.8% ± 2%	

Coefficients of efficiency (20 tubes)
(determined in the sun simulator SUSI 1)

$$\eta = \eta_o - a_1.(t_m - t_a)/G - a_2.(t_m - t_a)^2/G$$

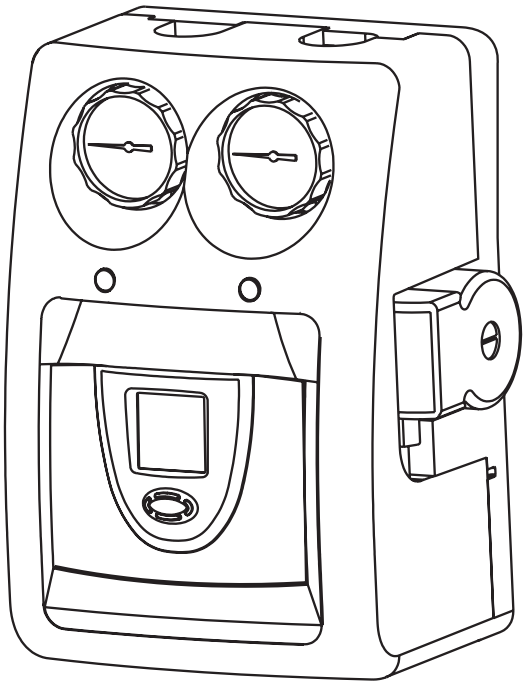
Based on:	aperture area	absorber area
η_o =	0.773	0.830
a_1 =	1.43 W/m²K	1.53 W/m²K
a_2 =	0.0059 W/m²K	0.0063 W/m²K

Coefficients of efficiency (30 tubes)
(determined outdoor)

$$\eta = \eta_o - a_1.(t_m - t_a)/G - a_2.(t_m - t_a)^2/G$$

Based on:	aperture area	absorber area
η_o =	0.779	0.832
a_1 =	1.07 W/m²K	1.14 W/m²K
a_2 =	0.0135 W/m²K	0.0144 W/m²K

Fig. 4



3.0 Pump station specifications

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:	40W
	Setting 2:	60W
	Setting 3:	80W
Maximum Pump Head:		6 metres
Maximum Pump Capacity:		4.5 m3/h / 3.5 m3/h
Flow meter scale:		2 to 15 l/min

Features

Air Separator

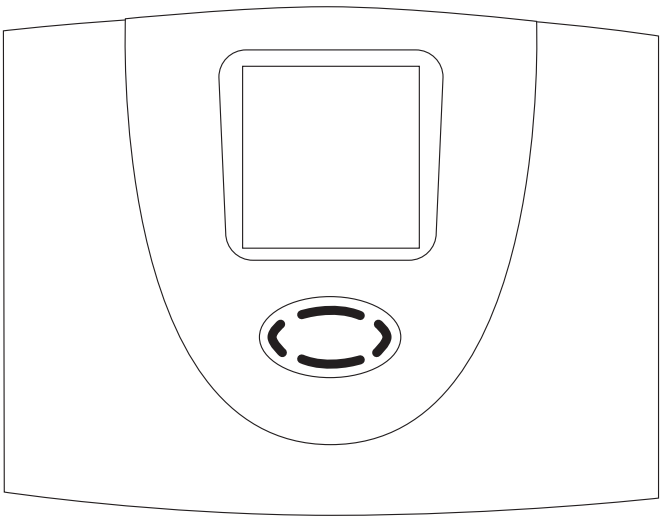
Adjustable Control Valves

Drain Point

Temperature Gauges

Flow Gauge

Fig. 5



4.0 Solar controller

4.1 Technical Data

Housing Material	100% recyclable ABS
Dimensions L x W x D in mm weight	 175 x 134 x 56 360 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 / 230VA for cos j = 0.7-1.0
Total capability of all outputs	2A / 460VA maximum
Fuse protection	fine-wire fuse 5 x 20mm, 2A/T (2 amperes, slow)

Features

Menu driven operation

System monitoring

Solar gain measurement

Suitable for flat plate and evacuated tube type collectors

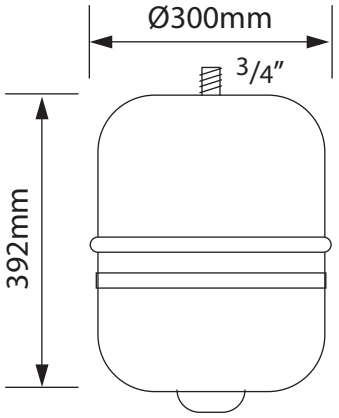
Auxiliary heat source control

Can be used in a number of system configurations see Fig. 27

NOTE: This controller is suitable for S plan and Y plan systems. However, in the event of an installation having a 'Y' plan boiler system that is to be controlled by the solar controller, a relay is required (not supplied). This is available as a Baxi Spares Item, Code No. 5122765.

Fig. 6

Expansion vessel



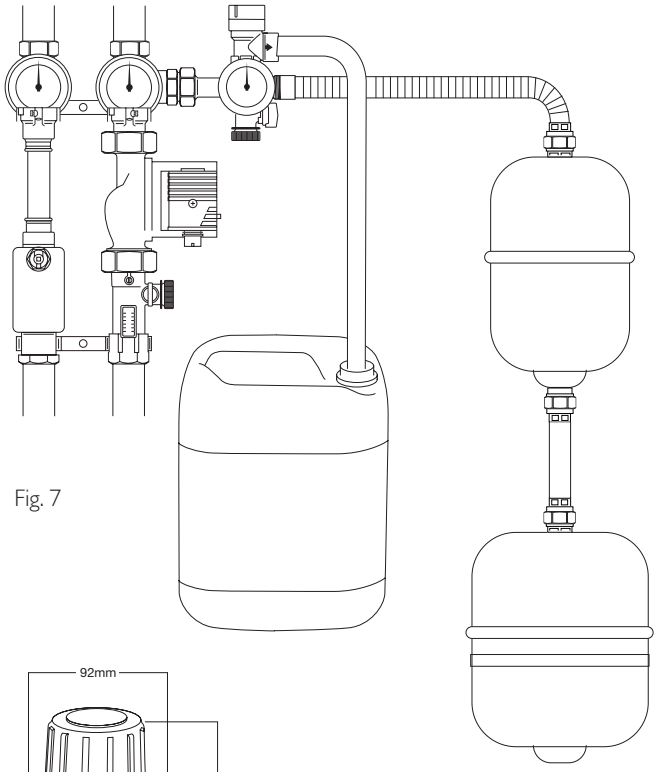


Fig. 7

Fig. 8

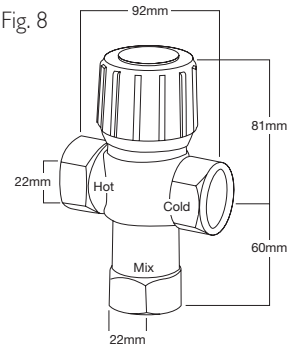
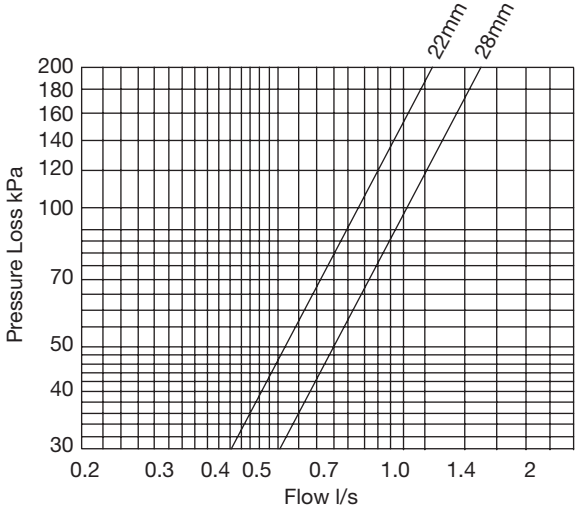


Fig. 9



5.0 Ancillary components

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).

Factory set charge pressure 2.5 bar.

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

Maximum working temperature +110°C.
Maximum percentage of glycol 40% (Pre-mixed).
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.

Under the following circumstances, a protection vessel should be used in the Return Leg of the solar loop from the pump station. The following distances should be observed:

20 tube collectors should have a Protection Vessel fitted if the expansion vessel is less than 8 metres away from its nearest collector. This should be sited at a suitable point between the expansion vessel and nearest collector.

30 tube collectors should have a Protection Vessel fitted if the expansion vessel is less than 12 metres away from its nearest collector. This should be sited at a suitable point between the expansion vessel and nearest collector.

Instances where a protection vessel should be included		
	20 tube system	30 tube system
Pipe Diameter	Distance to nearest collector	
15mm	<8m	<12m
22mm	<4m	<6m

The size of the protection vessel should be at least the combined volume of the following:

Total Collector volume + total pipe work volume from collector to protection vessel.

For positioning on protection vessel (Fig. 7).

5.2 Solar Heat Transfer Fluid

Pre-mixed (40% glycol / 60% water) Solar thermal transfer fluid. Based on1,2 - propylene glycol with corrosion inhibitors.
DO NOT dilute or mix with water.

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.

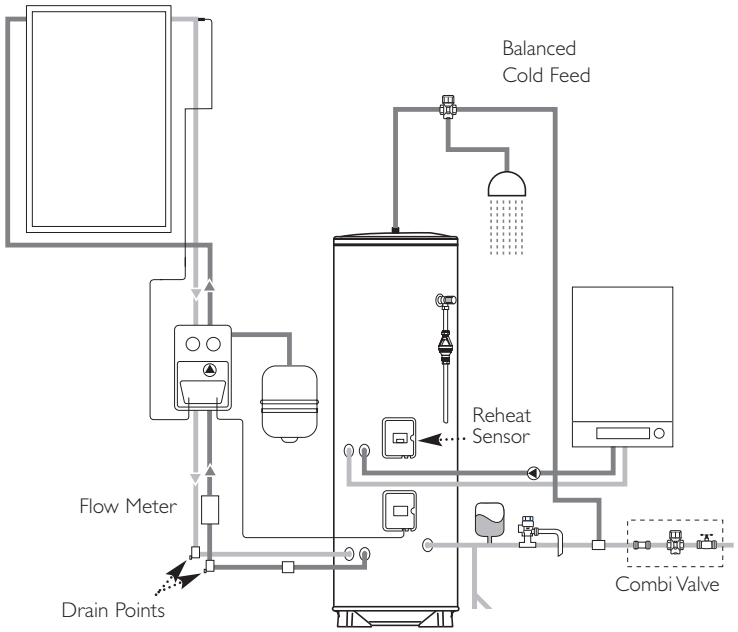
Connections: 22mm compression
Max working pressure (static): 14 bar
Max working pressure (dynamic): 5 bar
Min working pressure (dynamic): 0.2 bar
Max inlet pressure ratio: 2:1
Min flow required for stable control: 5 l/min

For pressure drop diagram and dimensions see Figs. 8 & 9

NOTE: For optimum operation the cold connection must be taken from a balanced cold water feed. For details of balanced cold water feed please refer to the cylinder manufacturer's instructions.

Fig. 10

Unvented system - schematic diagram



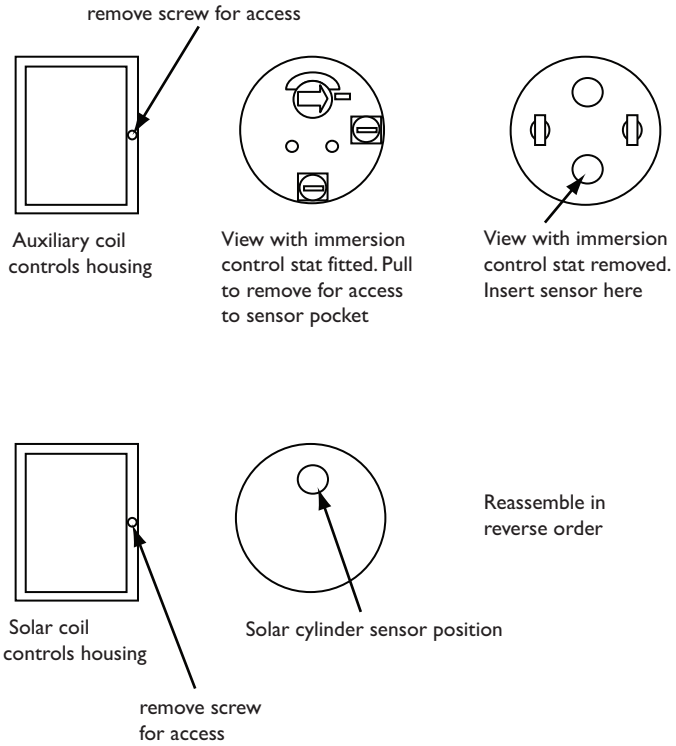
Note: Indirect twin coil unit shown.

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

Fig. 11

Location of solar sensor pockets

Warning: Isolate mains supply before accessing controls housings



6.0 Cylinder specifications

6.1 Unvented

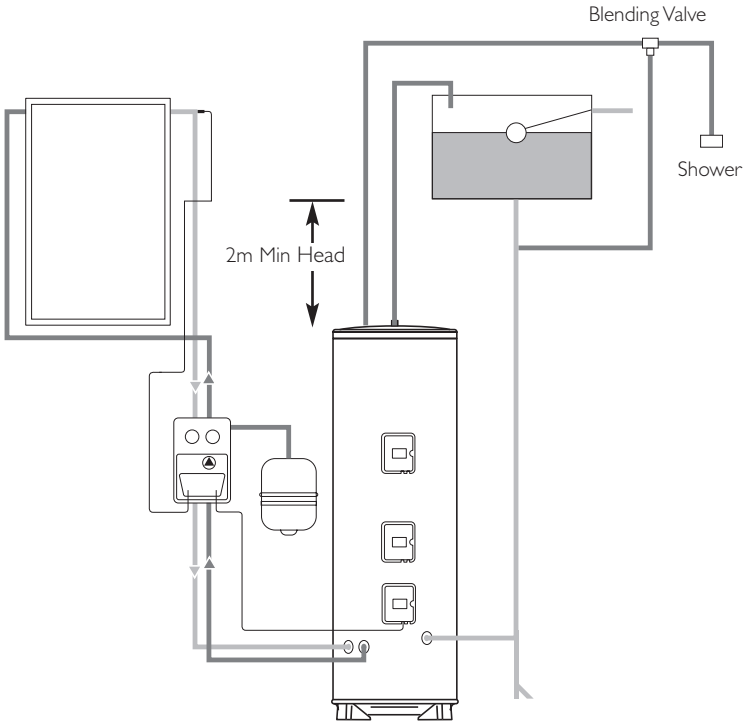
Solarflo™ is designed to work with the Heatrae Sadia Megaflo Solar Unvented.

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 tested 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 80° ±3°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 80°C ±3°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.
NOTE: 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.

Fig. 12

Vented system - schematic diagram



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

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

6.0 Cylinder specifications

6.2 Cistern-fed Vented

Solarflo™ is designed to work with the Heatrae Sadia Megaflo Solar Unvented and Megalife Solar Vented cylinders.

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 80°C ±3°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.

7.0 General

7.1 Safety Information

In order to reduce the number of fatalities 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.

7.2 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.

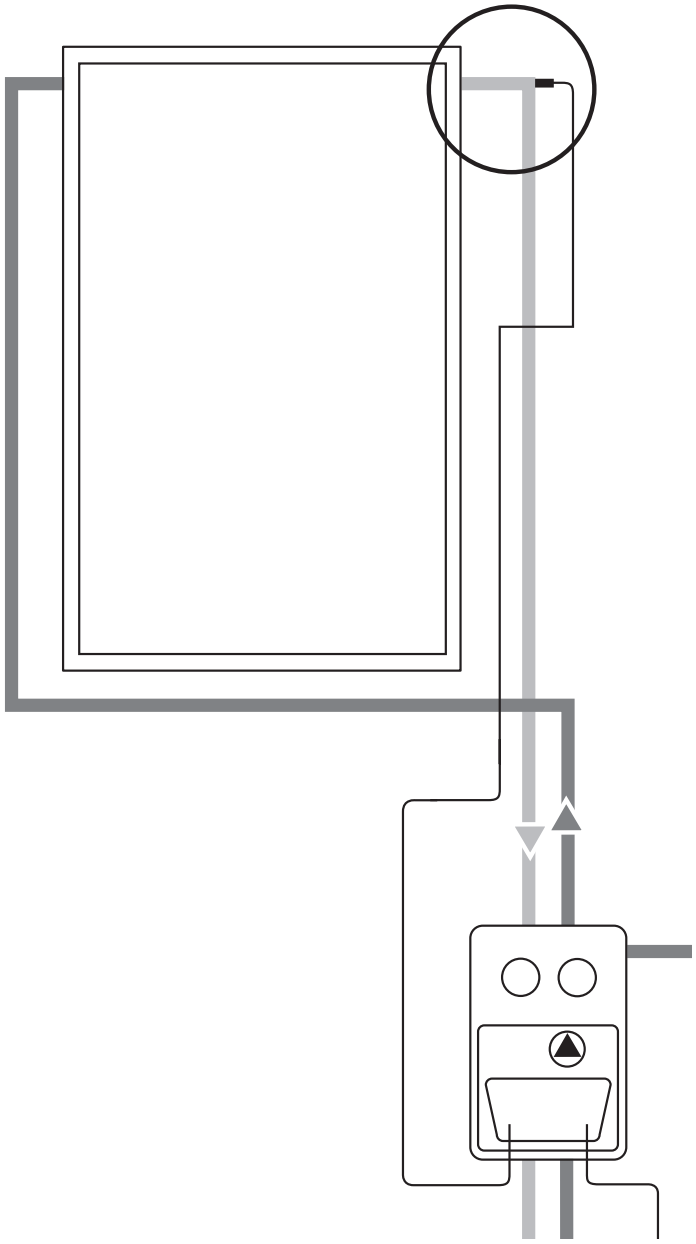
Step 2: Decide who may be harmed and how
This might mean considering the particular risks that young workers or trainees might face and thinking about the residents of the household or visitors who could be hurt by your activities.

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. 13



8.0 Installation of collector sensor

8.1 Installation

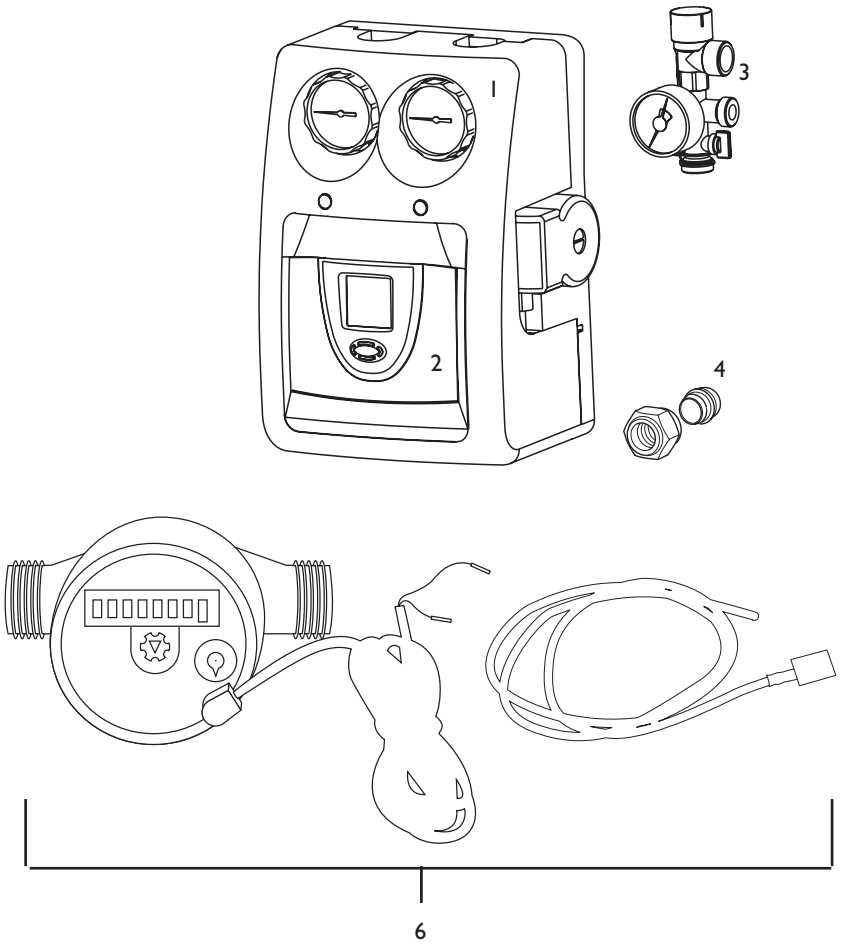
The Solar Collector temperature sensor should be installed in the sensor pocket securely. The sensor with the black silicone sheathing must be used in the solar collector pocket.

All materials used for installing temperature sensors (sensor element, conducting compound, cables, sealing and insulating materials) must be suitably temperature resistant (up to 200°C).

Solar Collector sensor may be extended (using the 13m extension cable supplied) as described in section 10.7. The sensor may be extended up to 50m but 0.75mm screened flex must be used, see page 22 section 10.7.

9.0 Installation of pump station

Fig. 14 (Diagrams not to scale)



9.1 Components List

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

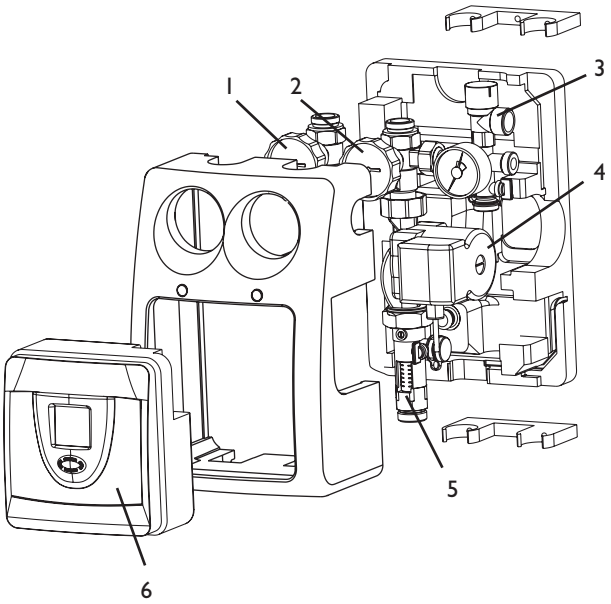
Hydraulic Station carton:

1. Hydraulic pump station with insulation incorporating wall mounting bracket.
2. Solar differential controller.
3. Safety group, comprising-
   Pressure relief valve, pressure gauge and fill & drain valve.
4. 22mm compression fitting (4 off).
5. Re Heat sensor (auxiliary heat source).
6. Solar Gain Module comprising-
   Flowmeter and return temperature sensor.
7. Sensor extension cable (13m) (not shown) see Fig 24.

Ancillary component cartons:

8. Solar expansion vessel complete with mounting bracket assembly.
9. Expansion vessel connecting flexible pipe.
10. Expansion vessel self sealing connection.
11. Thermostatic Blending valve.
12. 2m insulated flexible steel hoses for connection to collectors
13. 30m coil with insulation and fittings (not shown)

Fig. 15



9.0 Installation of pump station

9.2 Identification of Components (Fig. 15)

The main components of the pump station are:

– Two isolating valves (Fig. 15, Item 1 & 2) with integral thermometers which display the solar primary flow and return temperatures.

– A safety group (Fig. 15, 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. 15, Item 4).

– A flow gauge and regulator with fill & drain valve and shut-off valve (Fig. 15, Item 5).

– An air separator.

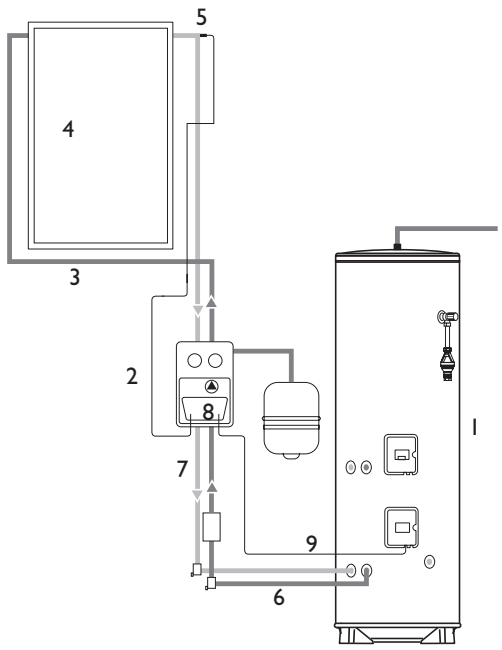
The heat transfer fluid is circulated by the solar circulation pump integrated in the hydraulic pump station (Fig. 15).

In most instances the 20 litre container of Tyfocor LS will be sufficient quantity of transfer fluid to fill 30 metres of pipework when connected to a 30 tube collector.

The pump station has a solar controller (Fig. 15 Item 6) integrated into the front insulation moulding. This is pre-wired to the solar pump.

9.0 Installation of pump station

Fig. 16



9.3

See Fig. 16

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

9.4 Pipework installation - general

The collectors, the pump station and the solar cylinder (Fig. 16) must be connected with the stainless steel pipework supplied. For additional lengths over 15 metres use copper pipe with compression fittings.
NOTE: Plastic pipes **MUST NOT** be used.

Connections supplied are suitable for pipe diameters up to 22mm. However for short pipe runs (up to 10m flow and return) 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 quoted and resistant to glycol.

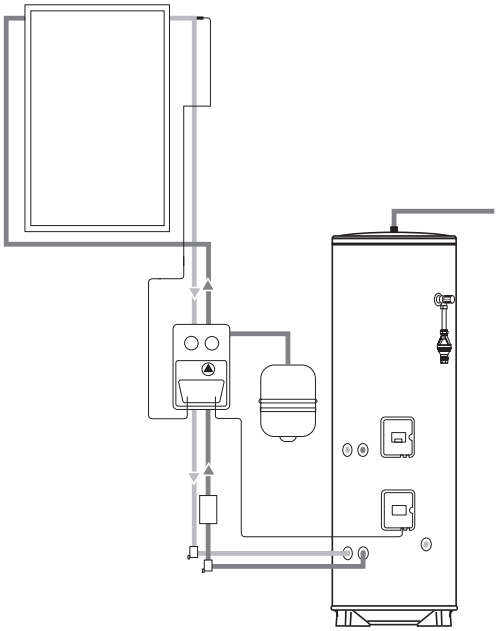
The height difference between the highest point in the pipework (collector) and the pump station may be a maximum of 15m (this is called the 'static height'). If the static height is greater than 15m a larger expansion vessel may be required.

If any pipe sealants are used these should be resistant to glycol and able to withstand temperatures of up to 200°C.

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. 6mm^2 diameter.

Fig. 17



9.0 Installation of pump station

9.4 Pipework installation - general (cont)

Venting the pipework

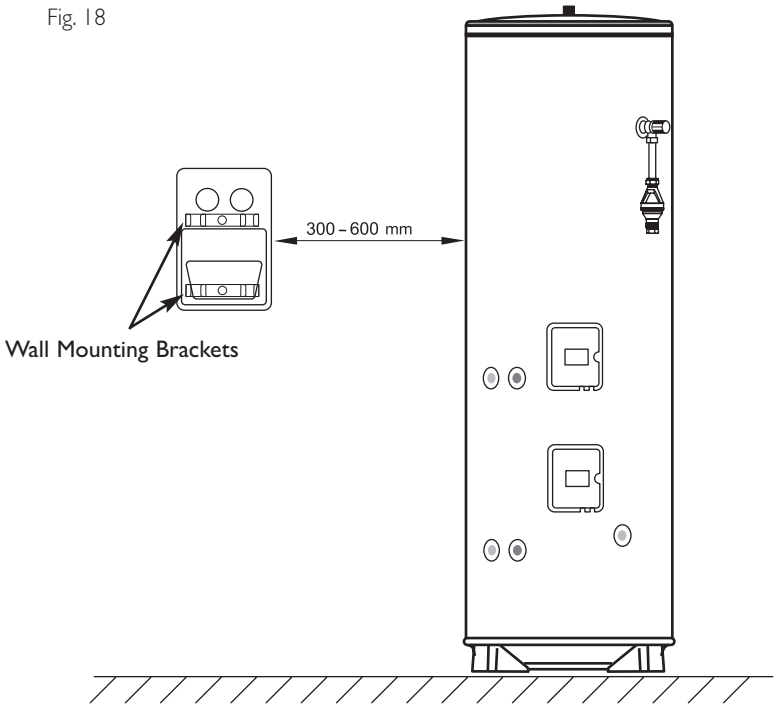
The Solarflo™ hydraulic station includes an air collector/separator and bleed point so an automatic air vent is not necessary. Any section of solar pipework that falls and rises again may require an additional air vent valve to relieve any trapped air which may cause air locking in the system. The air vent must be compatible with solar primary systems, i.e. be resistant to glycol and temperatures up to 200°C.

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. The Solarflo™ is supplied with 2x2m pre insulated flexible stainless steel tubes and with additional lengths (30m) of stainless steel flexible tubes and high temperature insulation.

9.0 Installation of pump station

Fig. 18

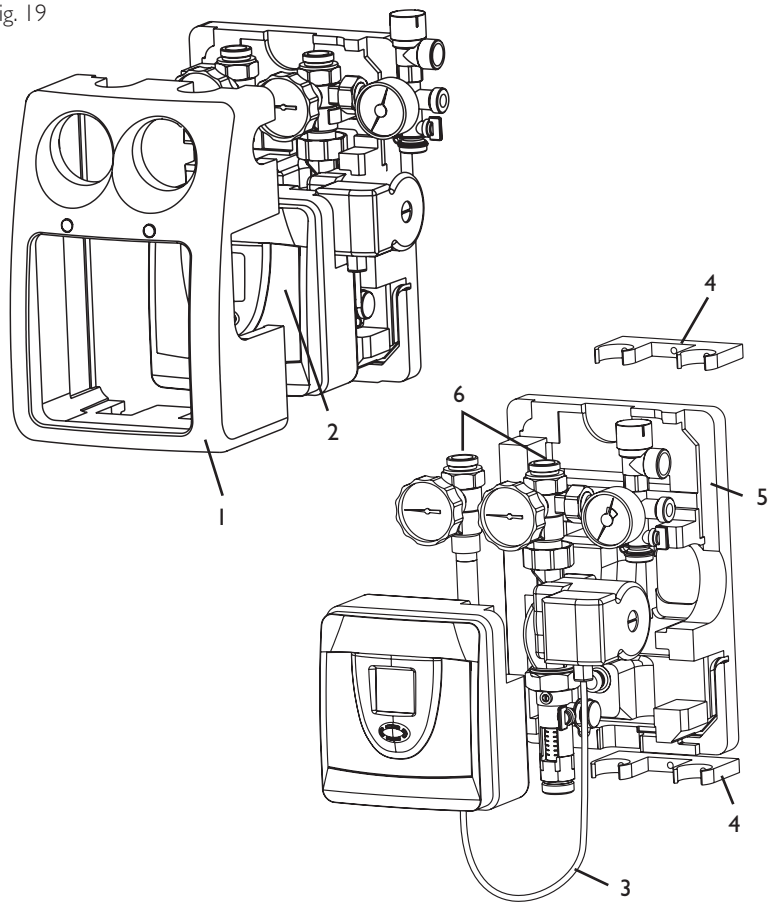


9.5 Installing the pump station - positioning

It is usual to install the hydraulic station and solar 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 controller should be accessible for system operational monitoring. Also if an auxiliary heating source is to be controlled by the solar controller, consideration must be given to the accessibility of the controls to allow the user to make adjustments to the settings. If not in close proximity to the solar cylinder it will be necessary to extend the solar cylinder temperature sensor cable, refer to section 10.7 for details of how to do this. It is recommended that the upper mounting bracket of the hydraulic station is positioned for ease of access and operation of the controls, see Fig. 18.

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.

Fig. 19



9.6 Installing the wall brackets and pump station

Remove the front insulation moulding (Fig 19. Item 1) by pulling forward whilst holding the solar controller moulding (Fig 19. Item 2) in place. Carefully remove the solar controller mounting by pulling forward and disconnect the pump cable connector (Fig 19. Item 3). Place the pump 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 19. Item 4) and remove rear insulation moulding (Fig 19. Item 5). Drill and plug the mounting positions and secure the mounting brackets into position using the fixings provided. These fixings may not be suitable for all wall materials. Push the rear insulation moulding over the wall brackets and refit the hydraulic assembly (Fig 19. Item 6) to the mounting clips on the wall brackets.

Fig. 20

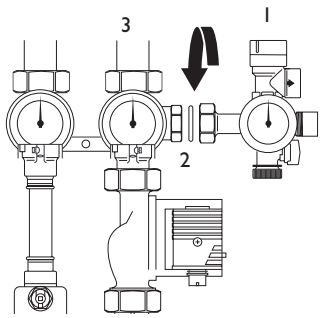


Fig. 21

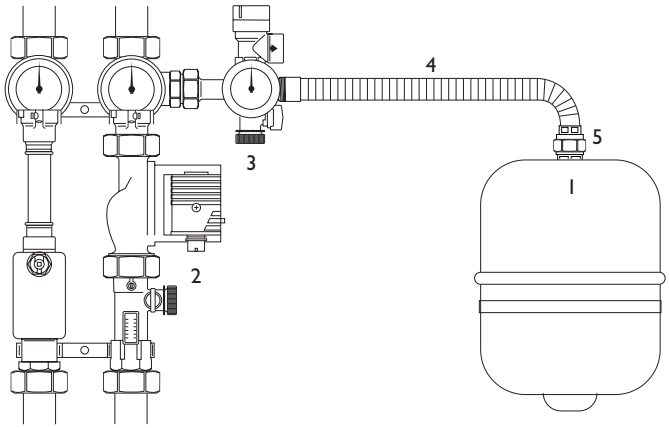


Fig. 22

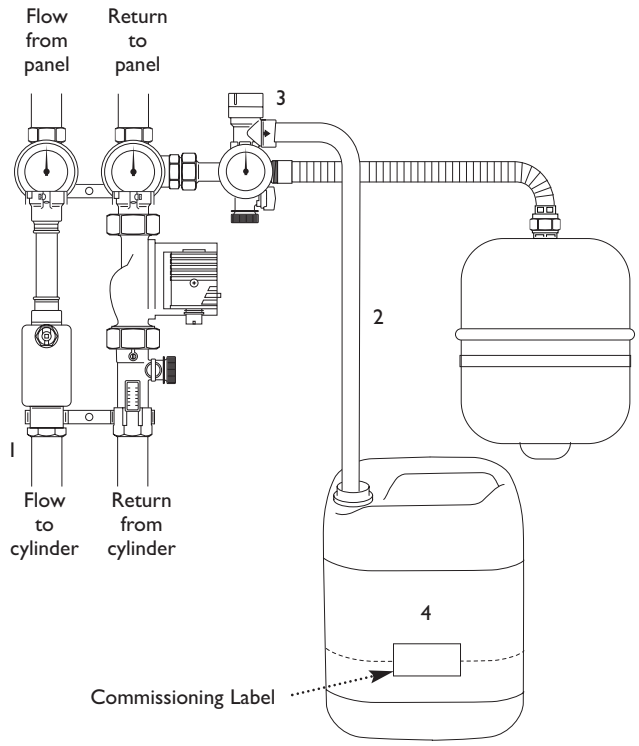
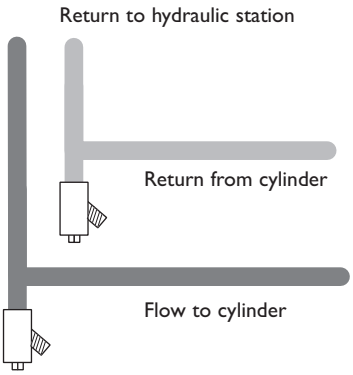


Fig. 23



9.0 Installation of pump station

9.7 Installing the safety group

Connect the safety group (Fig 20 Item 1) with the washer (Fig 20 Item 2) enclosed to the connection on the hydraulic station return isolating valve assembly (Fig 20 Item 3).

9.8 Connecting the solar expansion vessel

Mount the solar expansion vessel (Fig 21 Item 1) adjacent to the hydraulic station (Fig 21 Item 2) so that the vessel can be connected to the vessel connection of the safety group (Fig 21 Item 3) using the flexible pipe (Fig 21 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. 21 Item 5).

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

Solar expansion vessel has a pre-set pressure of 2.5 bar and must be adjusted to suit your installation.

The charge pressure at the solar expansion vessel should be adjusted such that when not under load the charge pressure is 0.7 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 1.5 bar.
The maximum static system head is 15m (1.5 bar).

9.9 Connecting pipework

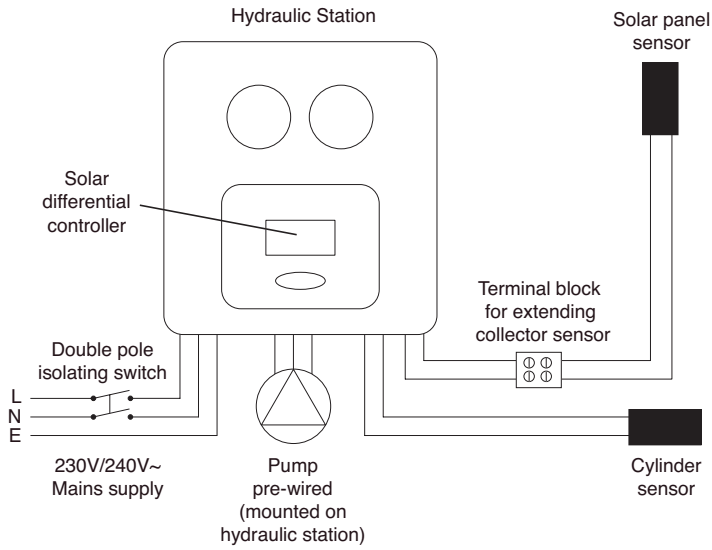
Connect the flow and return pipes to the collectors and to the cylinder via compression fittings (Fig 22 Item 1). Fittings are for 22mm o/dia pipe. **Support the pump assembly when tightening connections.**

Run a pipe (Fig 22 Item 2) from the exit opening in the pressure relief valve (Fig 18 Item 3) to a suitable container (Fig 22 Item 4) and secure it. Ensure the pipe enters the container to a level which will allow a safe discharge of fluid in the event of the pressure relief valve opening. Ensure the catchment container can be removed after the pipe has been secured. After commissioning, add the pressure relief catchment vessel warning label to the container. Align the arrows on the label with any remaining fluid in the container.

Installing a drain valve
Install a device for draining the solar heating system (tee piece with drain valve, Fig. 23) into the flow and return at the lowest point in the solar heating system. Drain valve must be suitable for glycol, 180° C and 6 bar.

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

Fig. 24



10.0 Installation of solar controller

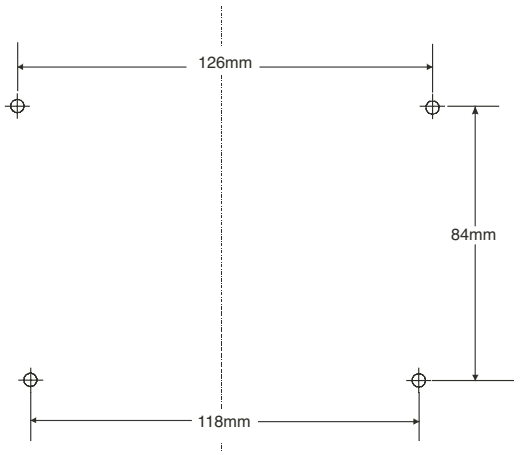
10.1 Appliance installation

Always disconnect from the mains before opening the controller cover.

The solar controller is designed to be mounted on the front of the pump 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.



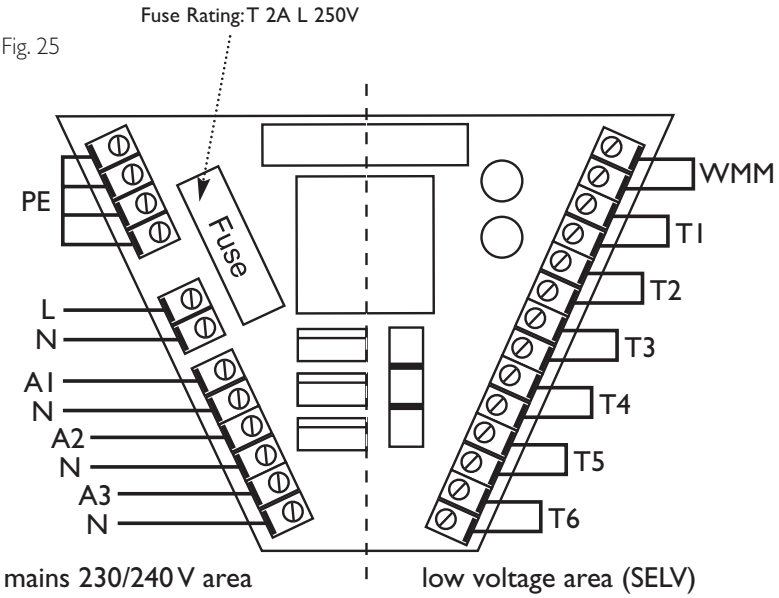
10.2 Opening the controller

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 hinged open.

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 safety extra low voltage connections (SELV) (temperature sensors and flow transmitters). The terminals on the left side of the terminal block are for 230/240 V~ connections.

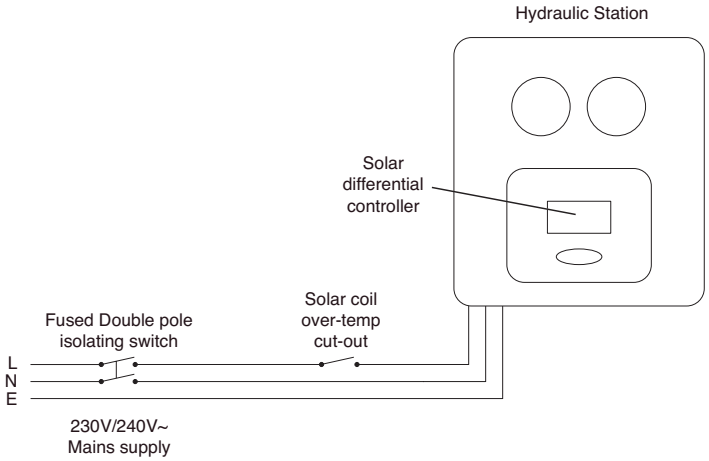
Fig. 25



PE	Earthed connection	WMM	Flow meter
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		
A2	Switch output 2 to second system pump if used (east/west)	T4	Temp.- sensor collector return
N	Neutral wire switch output 2	T5	Temp.- sensor thermostat or for 2nd temperature differential controller
A3	Switch output 3 to auxiliary heating control		
N	Neutral wire switch output 3	T6	Temp.- frost protection or for 2nd temperature differential controller

For switch functions A2 and A3 see Fig. 27

Fig. 26



10.0 Installation of solar controller

10.4 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.

Flexible 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.

Protect flexible cables from damage by hot pipework.

The controller must be earthed.

10.5 230/240V~ connections

For 230V connections you must follow the following points:

The mains supply to the controller should be via a suitable fused 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. 26).

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.

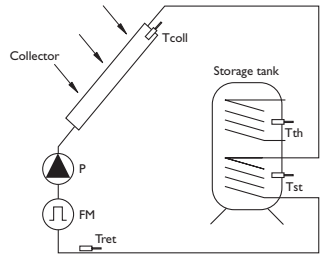
All switch outputs (A1, A2 and A3) are 230/240V~ 1 Amp max load outputs. If voltage free contacts are required, this must be done via a relay (see Fig. 28 Block Wiring Scheme C or E) order accessory Code No. 5122765.

NOTE: The Solar Differential Controller's internal 1A switch outputs are not suitable for Y plan systems.

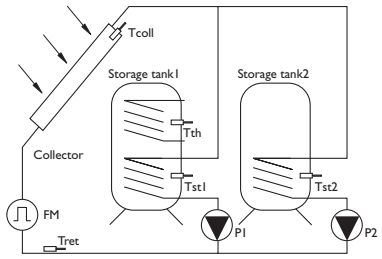
NOTE: This controller is suitable for S plan and Y plan systems. However, in the event of an installation having a 'Y' plan boiler system that is to be controlled by the solar controller, a relay is required (not supplied). This is available as a Baxi Spares Item, Code No. 5122765.

Fig. 27

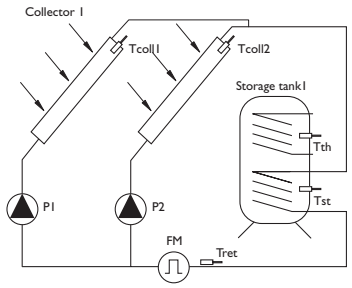
Type 0:
1 collector, 1 storage tank



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

10.6 Solar Gain measurement

For solar gain measurement it is necessary to fit the flowmeter and collector return sensor (Tret) as shown in the diagram in Fig. 27. The collector return sensor must be securely attached to the return pipework using the securing ties 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 Controller. Refer to the Solarflo™ "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 auxiliary sensor
Tret	Temperature measuring point collector return
Tst	Temperature measuring point storage tank
P	Pump
FM	Flowmeter

System type		Output terminal designation (see Fig. 25)		
Type	**Description**	**A1**	**A2**	**A3**
0	1 collector array, 1 storage cylinder	P1	-	Auxiliary heating
2	1 collector array, 2 storage cylinder (pump-pump)	P1	P2	
4	2 collector array, 1 storage cylinder (pump-pump)	P1	P2	

System type		Sensor terminal designation (see Fig. 25)					
Type	**Description**	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**
0	1 collector array, 1 storage cylinder	Tcoll1	Tst1	-	Tret	Tth	
2	1 collector array, 2 storage cylinder (pump-pump)	Tcoll1	Tst1	Tst2	Tret	Tth	
4	2 collector array, 1 storage cylinder (pump-pump)	Tcoll1	Tst1	Tcoll2	Tret	Tth	

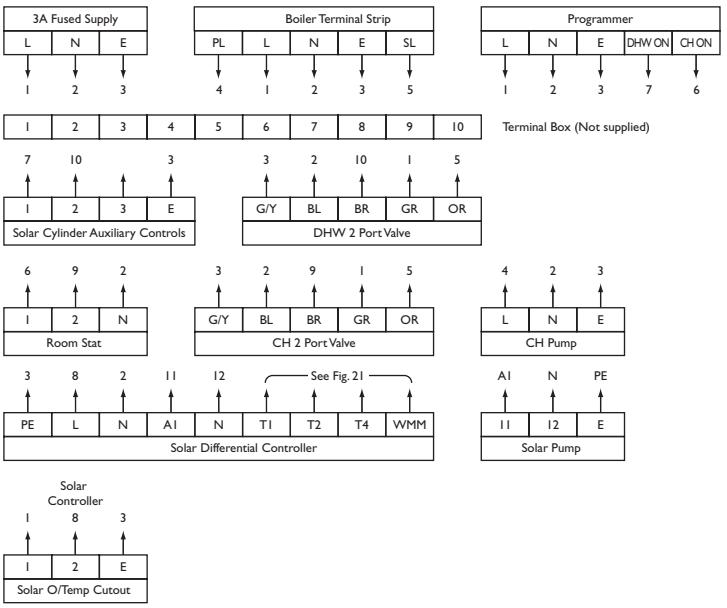
NOTE: The solar gain flowmeter must be connected to sensor terminals marked WMM (see Fig. 25).

Fig. 28

NOTE: Arrows identify wires which go to wiring centre terminal block.

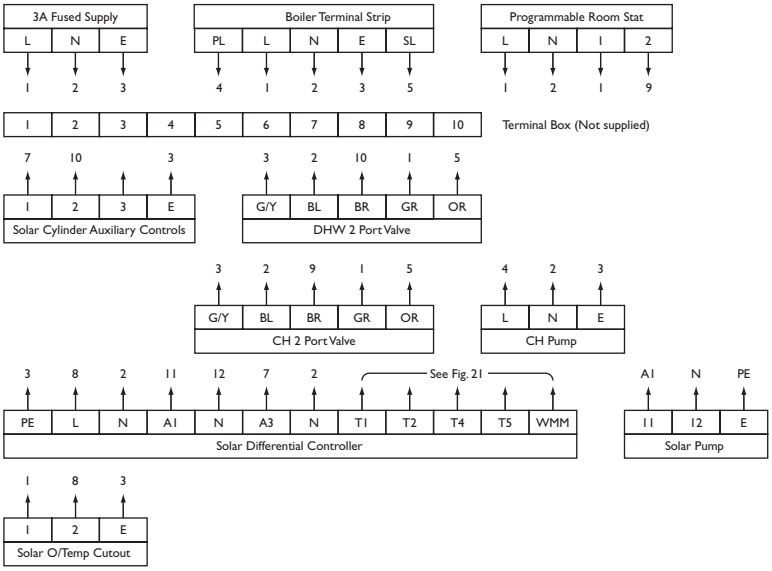
Block Wiring Schemes

A. Solarflo™ in conjunction with auxiliary heating by boiler - no reheat control by solar controller.

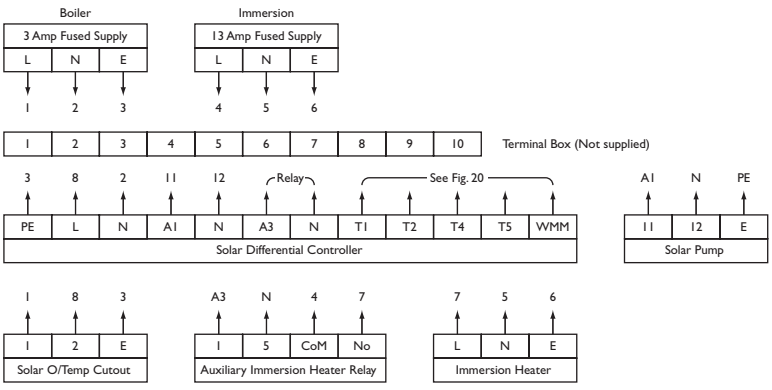


Note: If boiler has PL - Pump Live connection, pump must be connected to this (4), if not Pump Live should be connected to SL (5).

B. Solarflo 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

10.7 Connection of temperature sensors

The sensor with black silicone sheathing must be used for the solar collector sensor.

The controller uses precise platinum temperature sensors type PT1000. The controller is supplied with 3 sensors.

Installation / cabling of temperature sensors:
Mount the sensors in the pockets provided in the collector and storage tank.

The wires of the temperature sensors can be lengthened. Up to 15m long you need a 2 x 0,5mm^2 cross-section, up to 50m 2 x 0,75mm^2. 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 25.
The sensors are polarity free.

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

10.8 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 terminal T5 of the solar controller and the sensor element inserted into the controls pocket at the auxiliary heater level (see Fig. 11).

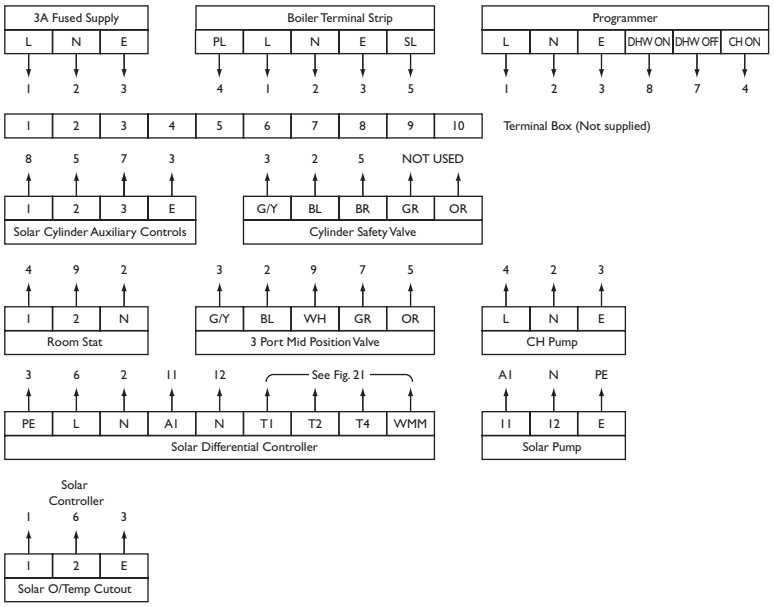
NOTE: The maximum switching current of the controller is 2 Amp in total, 1 Amp per output. If switching an electrical immersion heater or using a 3 port valve system this **MUST be done via a relay** (see Fig. 28 Block Wiring Scheme C or E) order accessory code No. 5122765.

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

Fig. 29

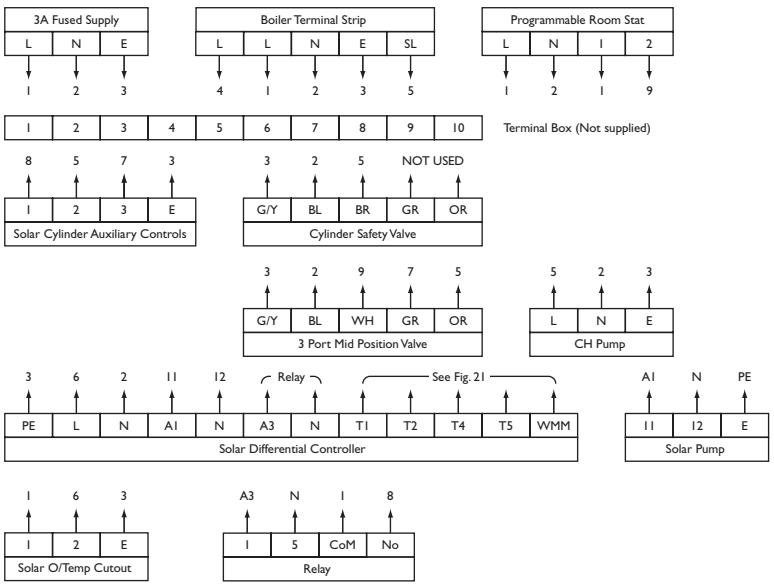
D. Auxiliary heating by boiler with 3 port mid position valve system - no reheat control by solar controller.

NOTE: Must use 2 port safety valve supplied with cylinder



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

NOTE: Must use 2 port safety valve supplied with cylinder



10.0 Installation of 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 cylinder.

NOTE: For open vented cylinders 1 to 6 connection is required in the wiring centre.

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

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 Solarflo™ System.

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.

BAXI
A Trading Division of Baxi Heating UK Ltd (3879156)
A Division of Baxi Group
Brooks House, Coventry Road, Warwick. CV34 4LL
After Sales Service and Technical Enquiries 08700 603261
Our contact centre is open Monday to Friday 8am to 6pm,
Weekends and Bank Holidays 8.30am to 2pm.
We are closed Christmas Day and New Years Day.
Website www.baxi.co.uk
e&oe

A BAXI GROUP company

Comp No 5130226 - Issue 1 - 5/08