IMAGINATION SOLAR LTD

Installation Guide B1

Planning the Plumbing and Wiring

Unit 4 Montpelier Central, Station Road
Bristol BS6 5EE
t: 0117 942 6668 f: 0117 942 8998
e: enquiries@imaginationsolar.com
www.imaginationsolar.com
Reg. in England No. 4226842

B1.1 Introduction

This guide is primarily for a standard **one-collector** system, but with additional notes for two collector systems. Off the shelf drainback units are available for up to 4 solar collectors and are installed following the same principals.

B1.2 Basic Principles of Operation

The layout of different solar hot water systems can be seen in the schematic diagrams in section B1.4.

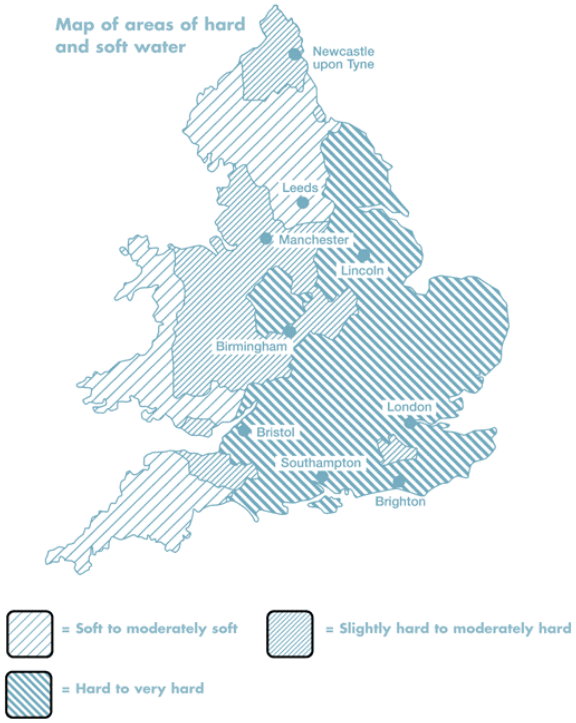
- The standard system uses a mains powered differential temperature controller, with a user friendly LCD display.
- A PV powered option is also available, which uses a simple light level controller, with LED indicator lights.
- All systems are indirect where solar pre-heat is supplied via a solar coil in the bottom of the hot water cylinder.
- The circuit of water from the pump unit, through the solar collector and the solar coil, then back to the drain-back unit, is called the solar circuit.
- The solar circuit is sealed so should not need topping up.
- When the pump is on, water is pumped around the solar circuit, transferring energy from the solar collector to the solar coil (This is called “the flow”).
- When there is not enough energy in the sunlight to heat the solar circuit the pump turns off after a time delay, usually 4 minutes.
- A sensor on the hot water cylinder will also turn off the pump if the cylinder gets to its maximum temperature (e.g. 80ºC or 65ºC).
- When the pump turns off, water drains back one way, from the solar collector, via the solar coil into the drain-back vessel. This is due to a gravity siphon effect which is started by a difference of heads of water in the pipework.
- With no water in the solar collector there is no possibility of damage due to freezing or boiling.
- When the sensor in the collector detects enough energy to heat the water again the pump starts, water is drawn from the drain-back bottle, air is pushed out of the solar circuit and the process begins again, after a time delay.
- If a drainback gradient is not possible it is still possible to use the Imagination Solar system, but antifreeze must be added and serviced to avoid damage to the solar collector and pipework. This is included with the drain-back unit and we ask that this is always added as a precaution in any case (collector guarantee invalid if not added).

Although solar energy could be used as the only source of hot water, in the UK it is normally combined with another heat source such as a boiler. Solar energy will reduce the fuel bills and wear on the boiler. On bright days the boiler should not need to come on at all.

B1.3 Other Considerations

Limescale

In hard water areas (above 200mg/litre) it is recommended to limit solar storage temperature to 65C to minimise limescale growth in cylinders. The map below shows only the general water hardness, so check with the local water company or use a water hardness testing kit to confirm local levels. Alternatively a water softener or effective de-scaling device may be fitted.



Other areas of UK:

Scotland: Supplies range from soft to various levels of hardness, with the majority being in the - soft to soft to moderately soft category.

Northern Ireland:
Northern Division moderately soft
Eastern Division - soft to slightly hard
Southern Division - soft to very hard
Western Division - soft to moderately hard

Legionella

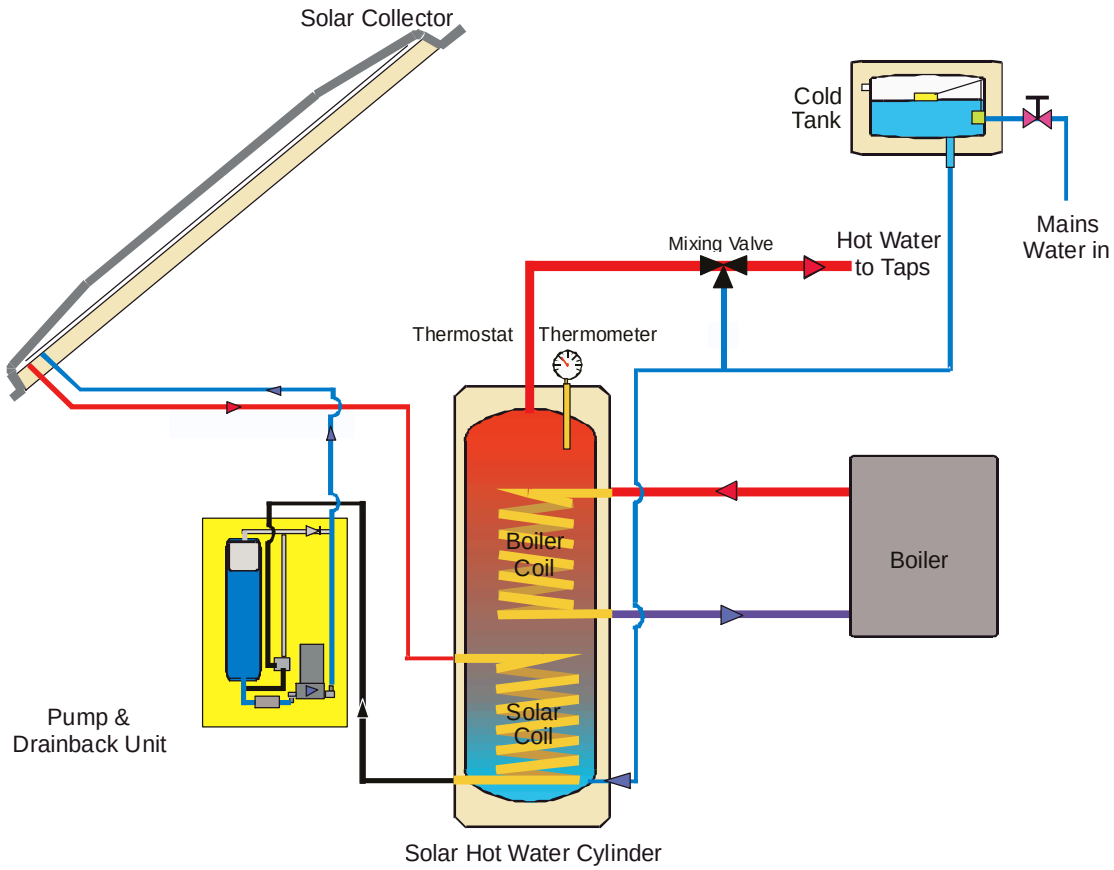
It is advisable to always fit an electric immersion heater to all solar cylinders to allow for a legionella sterilisation cylcle to be run, as and when required, unless sterilisation can be guaranteed by downstream devices.

Insulation

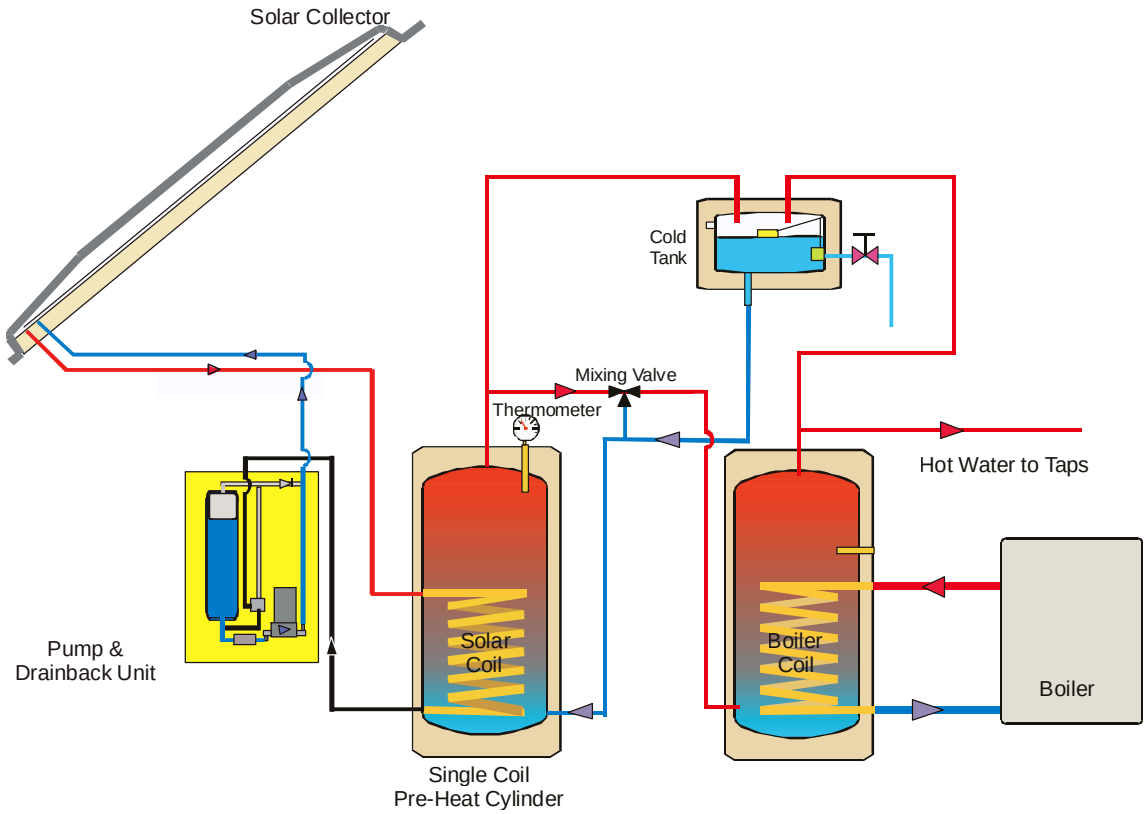
Pipe insulation run external to buildings must be UV and vermin resistant. If not then it can be run inside protective pipework such as 68mm or 110mm plastic pipework.

B1.4 Plumbing Schematics of Five Standard Solar Installations

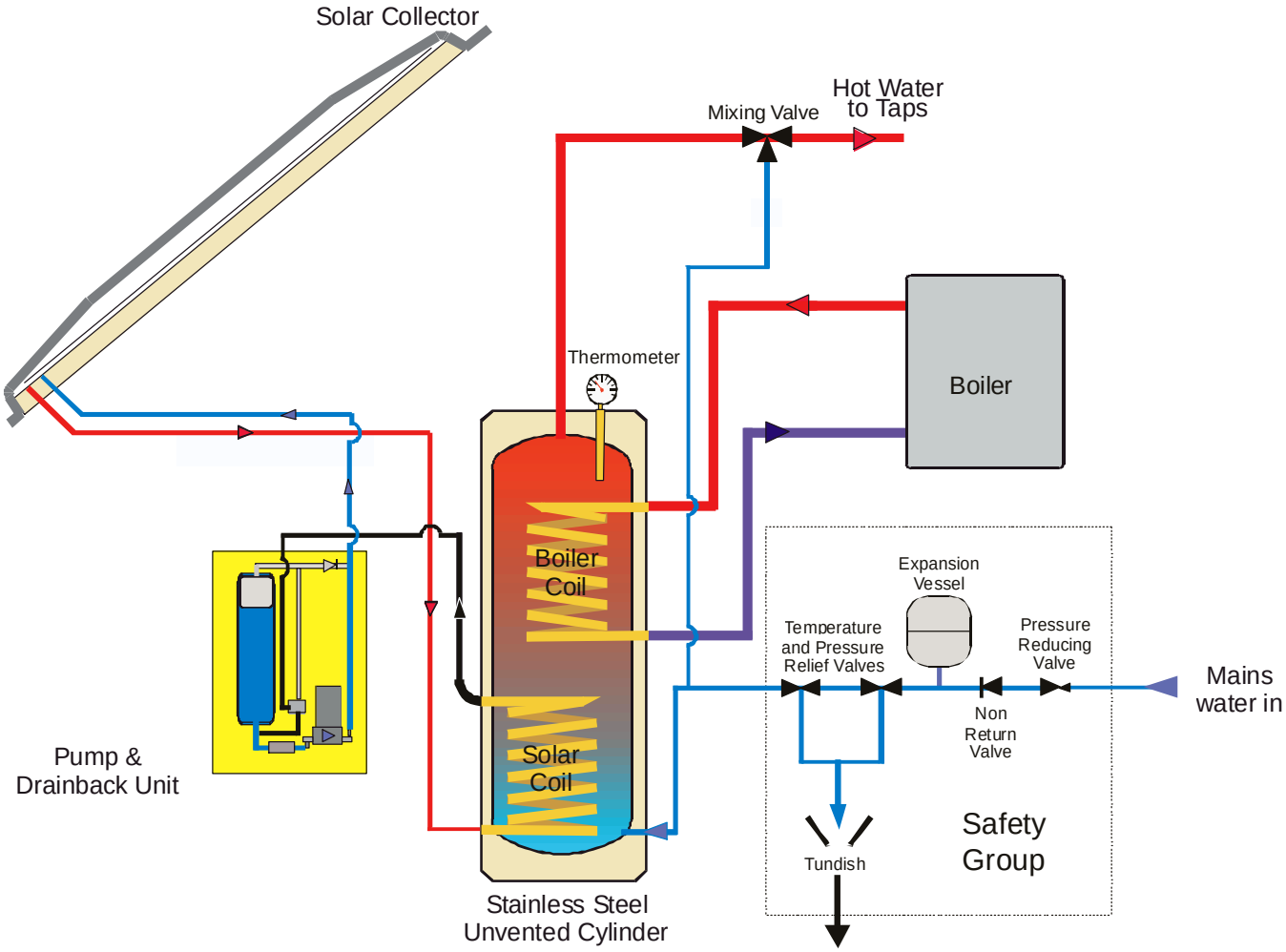
N.B. Different sizes of hot water cylinder are available and several solar collectors can be connected in parallel to heat larger volumes of water.



B1 Figure 1: Vented twin coil solar system



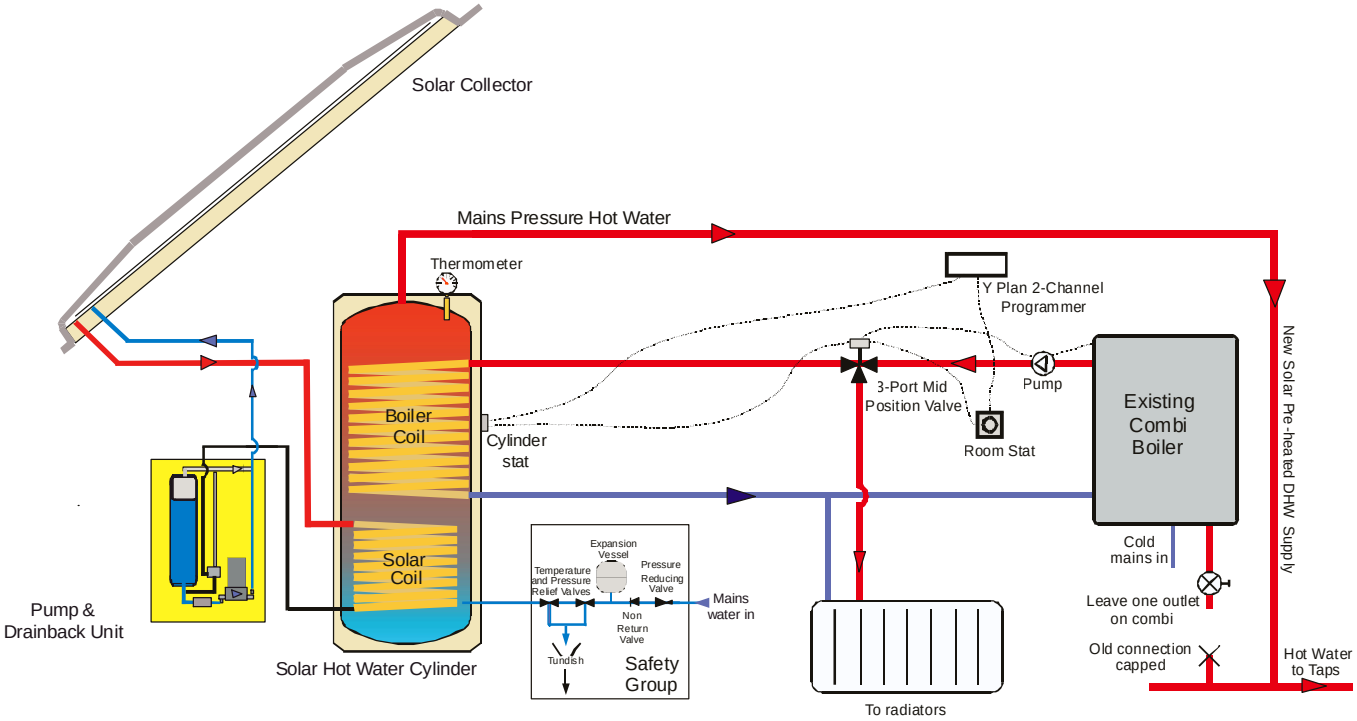
B1 Figure 2: Vented pre heat cylinder solar system



B1 Figure 3: An unvented (mains pressure) system. The system must be fitted with the safety devices as described above. Note that the return from the collector is connected to bottom of solar coil so the direction of flow is upwards through a 22mm coil (see Guide B 3.2).

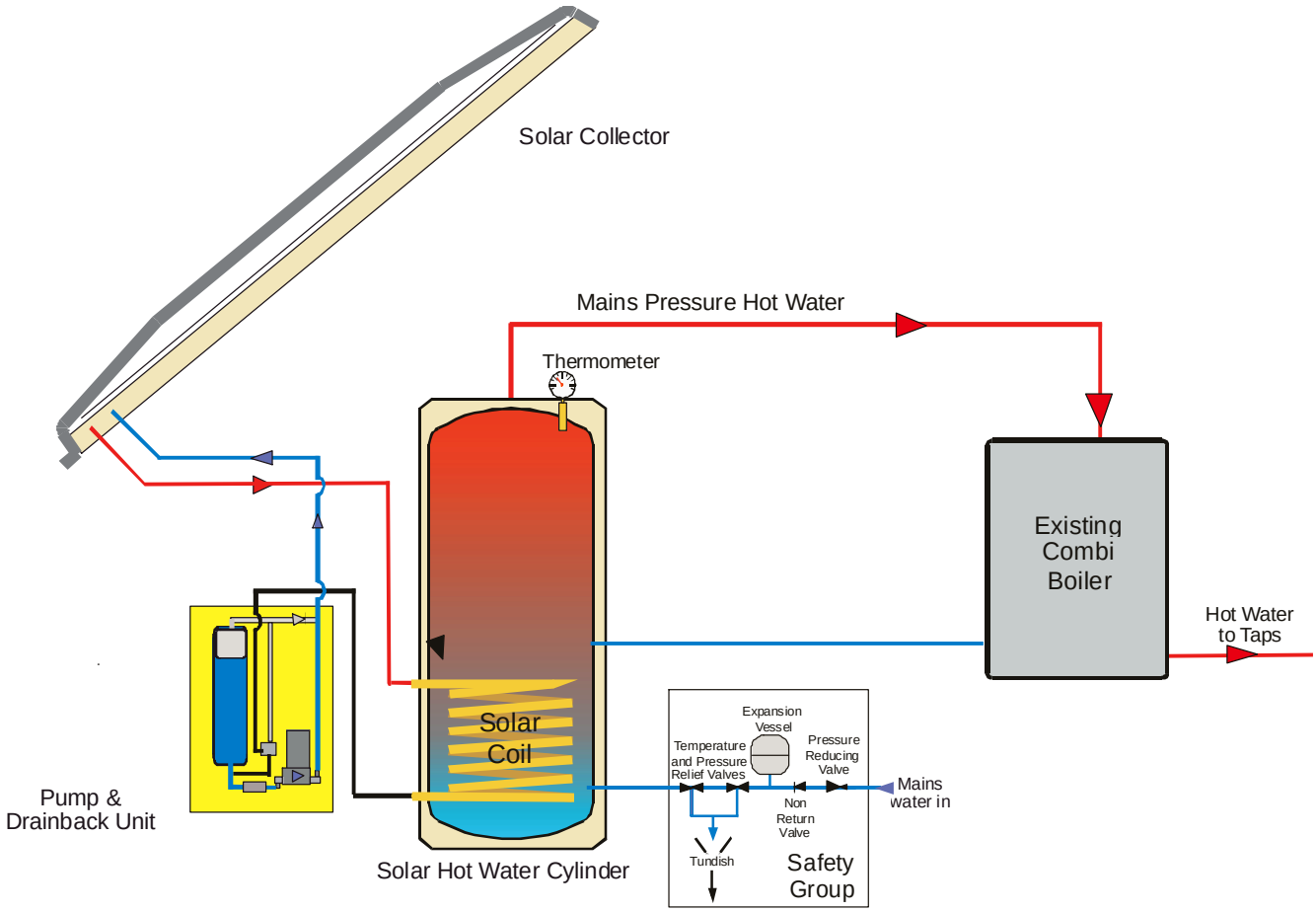
N.B. An unvented system must be installed by a 'competent' person as outlined in G3 of The Building Regulations. That is, they should have had suitable training and should hold a current Registered Operative Identity card issued by CITB, the Institute of Plumbing or an equivalent body.

Incorrect installation of unvented systems can be dangerous and in all cases systems should be fitted with safety devices as per manufacturers instructions.



B1

Figure 4: An unvented (mains pressure) system with a non-solar compatible Combi-boiler

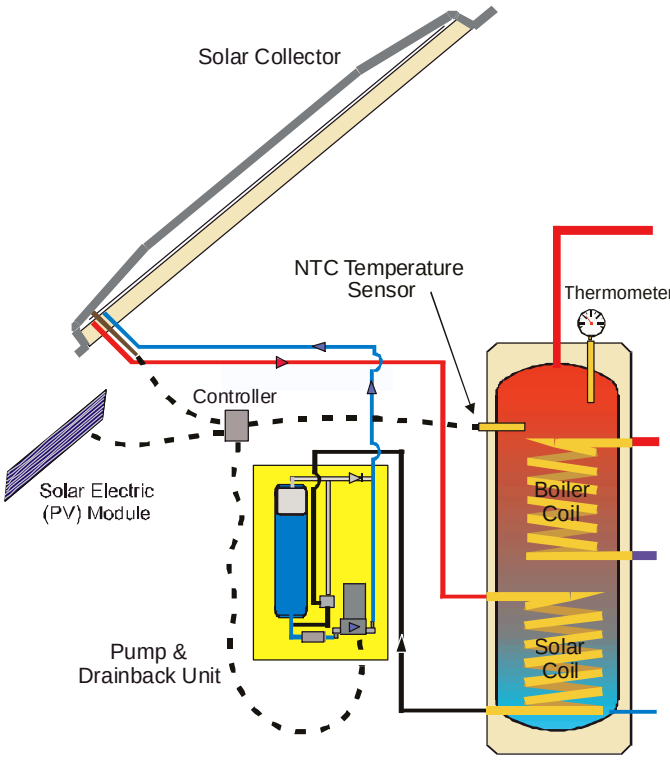


B1 Figure 5: A domestic hot water system with a solar compatible combi boiler.

B1.5 Wiring Schematics

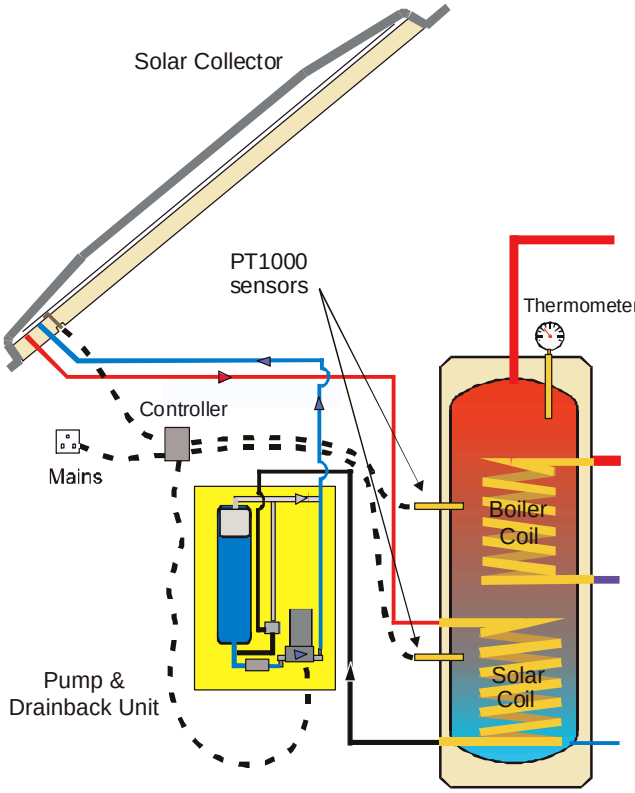
Below are diagrams showing the required wiring arrangements for ATON and RESOL systems.

Installers will need to run a 2-core cable from the collector to the control unit (usually in line with the piping) for the collector sensor. The controller also requires a power supply, and is wired to either 1 or 2 cylinder temperature sensors, depending on whether it is PV or mains powered (see figs. 6 and 7 below).



The ATON PV powered system uses 2 sensors:
- 1x Light sensor placed inside the collector
- 1x NTC temperature sensor placed in the upper pocket of the cylinder as shown.

B1 Figure 6: ATON PV powered light level controller.



The RESOL mains powered system uses 3 sensors:
- 1x Temperature sensor placed inside the collector
- 2x PT1000 temperature sensors placed in the upper and lower pockets of the cylinder as shown.

B1 Figure 7: RESOL mains powered temperature difference (ΔT) controller.

Appendix B1
Tools and materials list : Plumbing and Wiring

Extra materials that may be required (single collector system)

8mm microbore copper pipe (to connect panel to cylinder)	
8mm straight connectors (for microbore pipe runs)	
8-10mm F copper pipe reducers x2 (to connect to solar coil in vented cylinder)	
8mm copper pipe elbows x2	
22mm elbows x2 and 22mm to 8 or 10mm reducers x2 for large diameter (unvented) solar coils	
Spare 8, 10 and 22mm olives	
22mm pipe clips and cable ties	
MDF backboard if mounting pump unit to stud wall	
Switched single gang socket and cable etc for spur from ring main (mains power only)	
Timber batten to support pipe (if run in open space)	
Timber batten to support light sensor back plate inside roof (if applicable)	
2 pole isolation switch (if PV powered)	
Long length of multistrand twin core cable (eg. lighting flex)	
Junction box x1 and chocolate block connector x1	
Snap in plastic conduit and cable clips	
Silicone mastic to secure cylinder temperature sensor	

NB. A two-collector system will also require 10mm pipe, 10mm connectors, T's, and 8-10mm reducers

Special tools that may be required
Microbore pipe cutter
Microbore pipe bender
Funnel and jug for filling DBU
Multimeter