Installation Manual

Combi Konverter Solar System

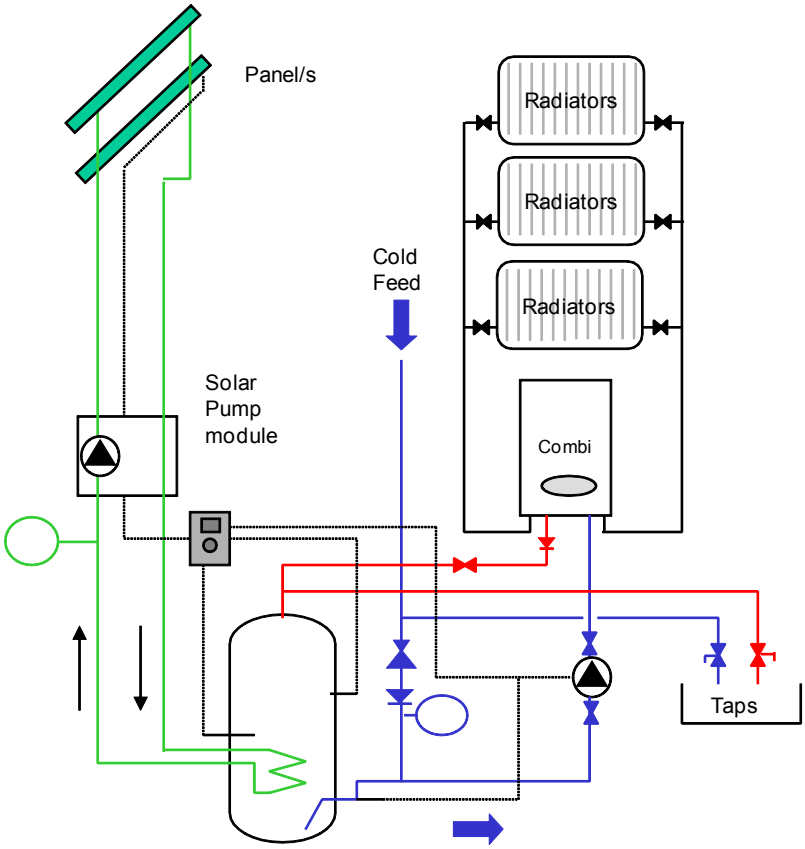
Issue 1

These instructions are specific to the integration of the RMSolar Combi Konverter system with the combi boiler. The RMSolar instructions should be used in terms of the overall solar installation. Particular attention should also be paid to the cylinder instructions bearing in mind that the system uses an unvented hot water storage cylinder which still has to meet Building Regulation Part G3 installation requirements.

The basic principles of operation are as follows:-

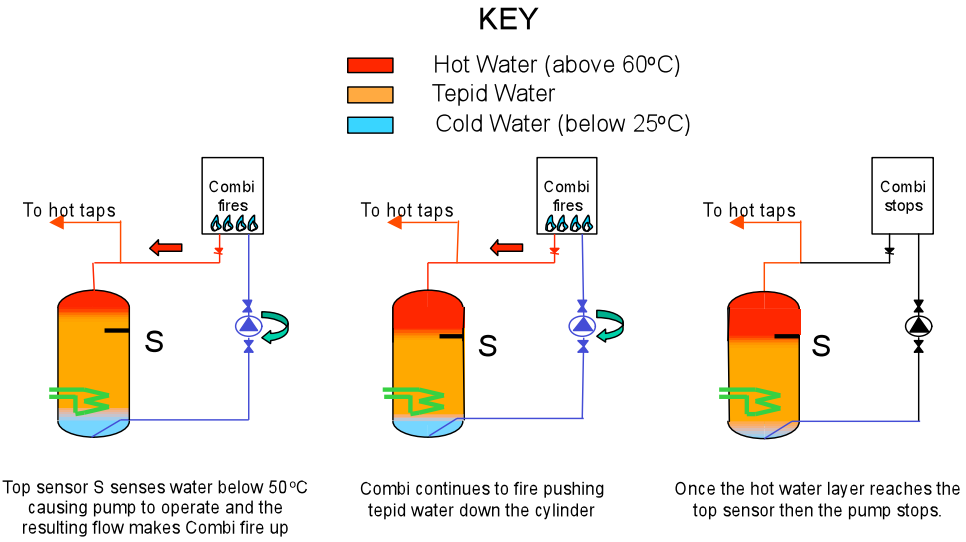
The system is shown schematically by Figs 1 and 2 using the high output domestic hot water output of the combi to 'charge up' the top of the solar cylinder should insufficient solar heating be available.

Fig 1 General Schematic



In a conventional system a combi will fire up on demand when it senses a flow to a hot water outlet. In the Konverter system the combi will fire up only in response to a flow through the appliance from a circulation pump triggered by a cylinder sensor when the top of the cylinder is below a pre determined temperature.

Fig 2 Charging Sequence



Preparing for installation

The installation can be carried out by any competent person in accordance with the relevant building regulations.

In order to properly commission the system the installer should be equipped with a suitable digital thermometer to check flow temperatures. In most instances the combi boiler will already be in place thus a route has to be found for additional pipe-work from the boiler to the hot water cylinder.
You will need to run two additional 22mm pipes from the boiler to the cylinder, one for the cold water feed and one for the hot water draw off. The 22mm pipe that is allocated to the hot water draw off needs to be adequately insulated.

As the cylinder is unvented it can be sited virtually anywhere in the dwelling but bearing in mind the likely position of the solar panels then an upstairs position will probably be favourite.
If the combi boiler was retrofitted to replace an old vented hot water storage system then a suitable site might be the old airing cupboard. As is the case with all unvented systems the provision of a suitable route for the discharge pipe might be the over riding factoring determining the best position.

In order for the system to operate there has to be a flow and return circuit from the combi to the cylinder and for optimum performance the hydraulic resistance of this circuit needs to be minimised . The circulating pump is capable of overcoming a 6 metre head resistance but some of this will be needed to overcome the hydraulic resistance of the combi itself. This proportion will vary from combi to combi and needs to be checked by the installer. In some circumstances it may be necessary to order an additional bronze circulator pump to overcome the hydraulic resistance.

Before contemplating an installation the installer should check that the combi boiler is capable of providing domestic hot water at circa 60oC. This might mean operating the appliance at a reduced flow rate and adjusting the external and internal controls (if possible). The combis instructions or manufacturers data should also be checked to ensure that the combi will fire under conditions of low flow and pressures of down to 0.5 bar. Some manufactures provide conversion 'packs' for low water pressure areas and one of these might be required in some circumstances, normally this simply means removing a flow restrictor.

It is advised that provision is made for a manual isolating switch on the feed to the circulation pump. This should ideally be supplemented by the time controller provided and thought should be given to the best position for these devices.

Connections and Pipe work

Where the combi boiler and the cylinder are in fairly close proximity with less than 5 metres of total (flow plus return) pipe run then 15 mm copper will normally suffice. Once the length exceed this it is generally required to use 22mm pipe. The pipe work runs should be designed to minimise hydraulic losses with swept bends etc preferred to elbows.
The hot side (flow) of the circuit should be adequately insulated to minimise any temperature drop between the combi and the cylinder. The cold feed (return) side of the circuit from the cylinder to the combi should not be insulated.

The circulation circuit contains domestic hot water which may carry large amounts of dissolved air and care should be taken to eliminate the possibility of air traps with pipe-work running as far as possible from the boiler to the cylinder in a horizontal or uphill manner. Where this is not possible then consideration should be given to automatic air traps or air separation devices.

Fig 3 Typical Installation

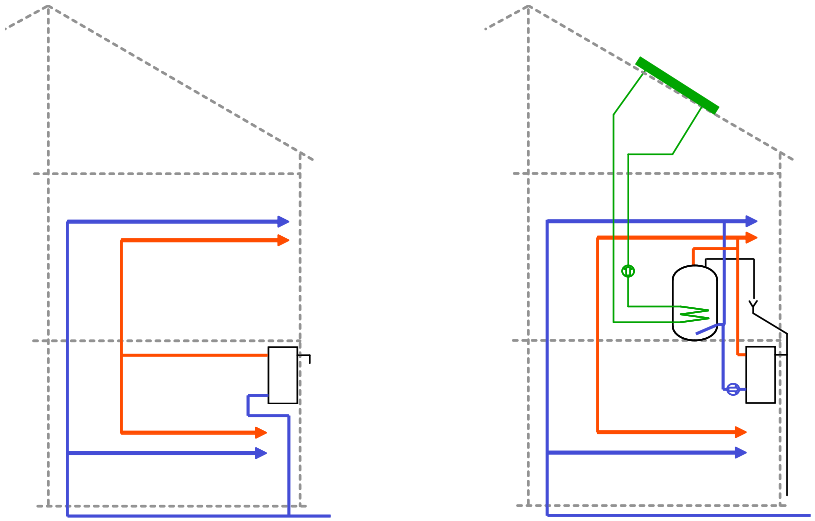
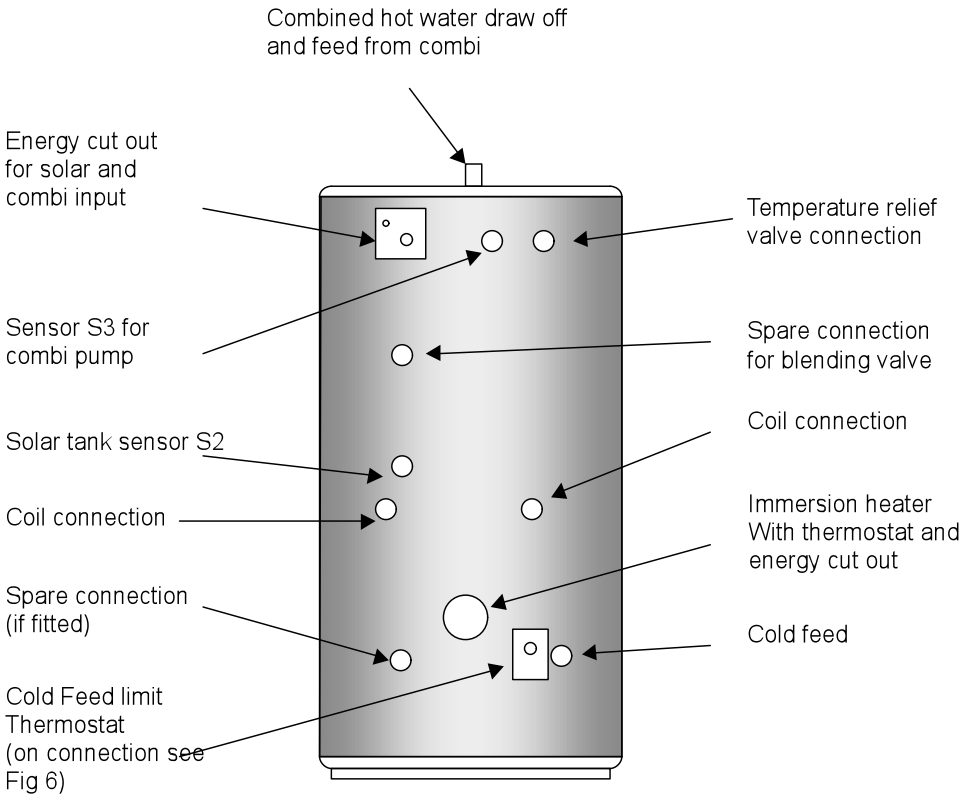


Fig 4 Cylinder Connections

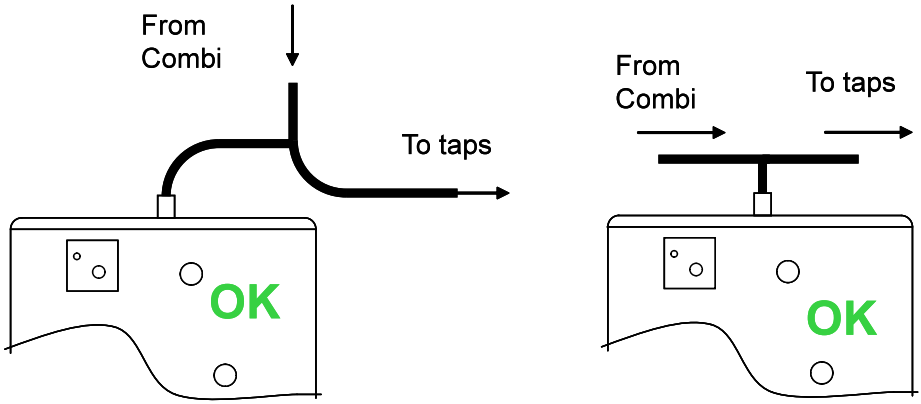


Hot Flow Pipe

The hot outlet from the Combi boiler should be piped directly to the cylinder hot draw off (there should be no taps on this pipe that serve baths, basins, sinks ect), but should be fitted with a suitable full flow gate valve or similar so that if required the flow rate can be regulated as part of the commissioning process. In circumstances where the combi is sited at a higher level than the cylinder then a non return valve should be fitted to the hot outlet where it exits the Combi boiler to prevent gravity circulation.

The hot water draw off at the cylinder should be tee'd into the hot water pipe coming from the Combi (as shown in Fig 5) and then the outlets (taps, showers ect,) connected down stream of the cylinder so that now both the Combi and the cylinder can supply hot water on demand.

Fig 5



Cold Return Pipe

The mains cold feed needs disconnecting from the Combi boiler and a new cold feed given to the mains pressure cylinder via the unvented inlet control set components.
(DO NOT use the 22mm pipe laid early, as instructed in Connections and Pipe work)
Connection at the cylinder should be made using the ½"x22x22mm compression tee (supplied). The probe thermostat and pocket (supplied) are connected to this tee as illustrated. (See fig 6).

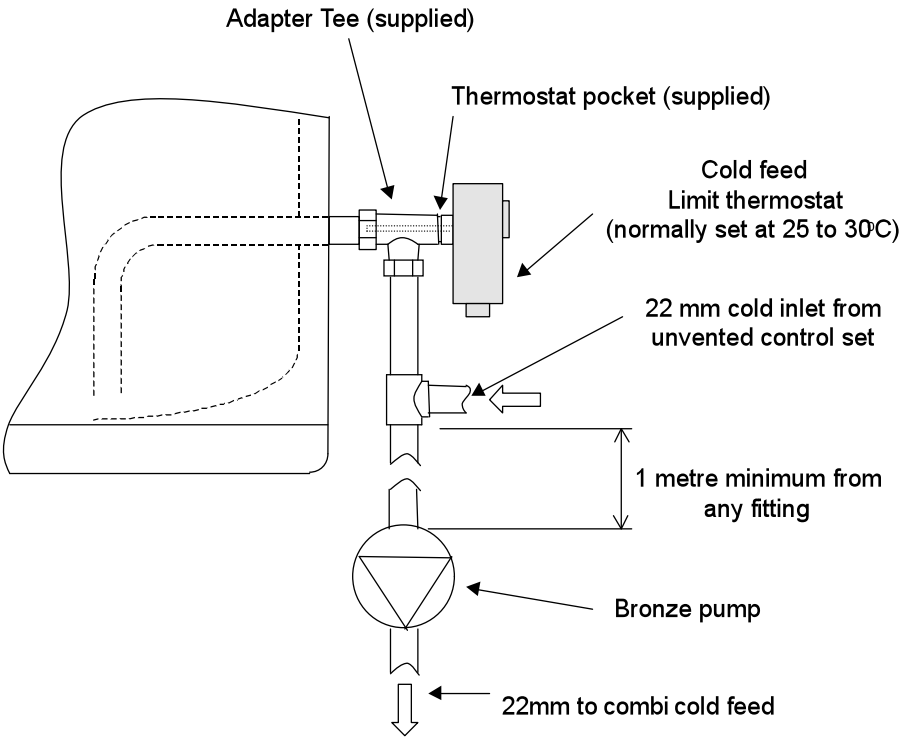
Cut a Tee into the cold mains feed to the cylinder, (It is important that the Tee is connected at a point between the unvented inlet control set components and ½"x22x22mm Tee cylinder connection see fig 6) and now connect the 22mm pipe laid earlier (as instructed in connections and pipe work) to the spare tapping on this Tee. (This pipe will be referred to as Combi cold feed from here onwards).

On the Combi cold feed pipe, install the Bronze pump and valves (supplied) with the pump flow pumping to the Combi boiler.

Most installed combis are not tolerant to incoming 'cold' water temperatures of above 30oC but if in doubt the Combi manufacturers advice on the maximum temperature should be sought . A limit thermostat (see Fig 6) is fitted on the cold feed to the cylinder, this can be set to the appropriate maximum temperature (normally 30oC).

Where the combi is 'solar compatible' then this limit thermostat can be set at a higher temperature as required.

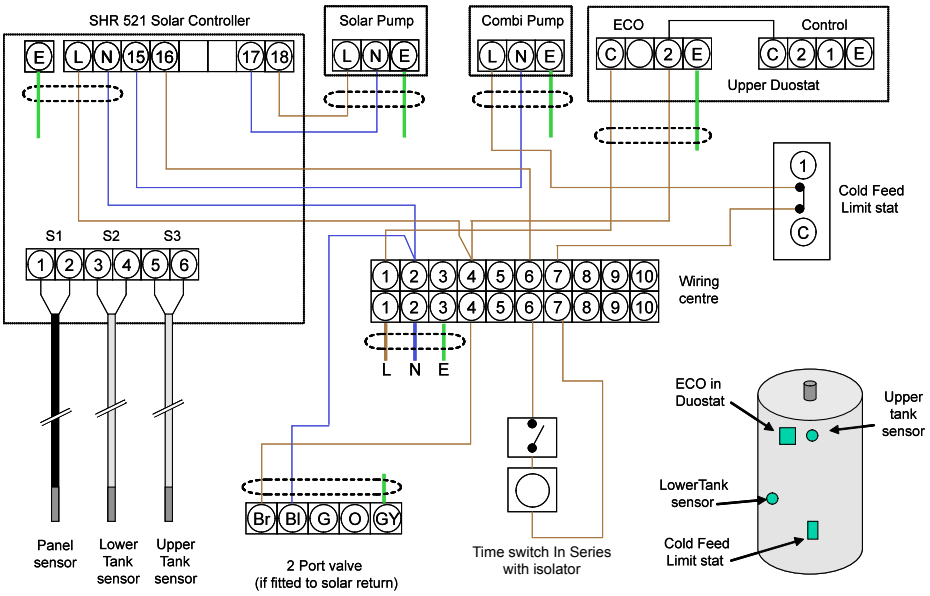
Fig 6 Cold Inlet Thermostat



Circulation pump

The pump should always be sited with the motor spindle horizontal .Care should be taken to ensure there is a minimum hydraulic restriction on the inlet side of the pump as this could cause a significantly reduced pressure zone thus encouraging dissolved air to cause pumping problems.

Fig 7b SHR Controller Wiring Diagram



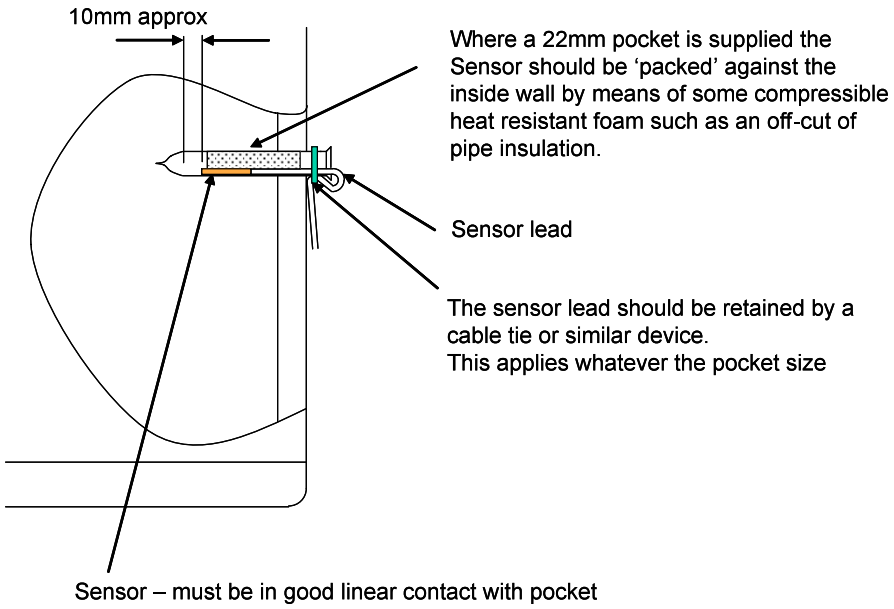
The important points are as follows.

To meet G3 requirements the live feed to the solar controller circuit should be taken via the energy cut out at the top of the cylinder.

The system should be fitted with an isolating switch to disable the feed to the circulating pump, a timer is also supplied, this should be fitted in an area accesible to the end user.

Care should be taken to secure the sensors such that they can not slip out of the sensor pockets. This can be achieved by means of a nylon tie or similar device (Fig 8)

Fig 8 Sensor attachment



Commissioning

The important factor here is to ensure that the combi fires in response to the circulation pump and delivers water at a suitably high temperature circa 60oC.

The flow rate through the combi should be reduced to a level at which a 60oC charging temperature is achievable. Too high a flow rate might also result in a high velocity stream of water entering the top of the cylinder and destroying the stratification required to maintain the 'hot top'.

In normal circumstances the pump speed should be set at either speed 2 or 3 but a certain amount of fine tuning may be required to suit the particular installation.

The temperature setting for the combi circulation pump is achieved by programming the SHR controller using the separate instructions provided and should be set such that the pump stops operating once it senses water at 55oC at the upper sensor position .A digital thermometer with a thermocouple probe is invaluable in setting up the system.

The cylinder is fitted with a lower probe thermostat (fig 6) which is set at the highest temperature permitted by the combi manufacturer for cold water feed. This is typically 30oC but may be higher if the combi is 'solar-compatible'.

Setting the SHR controller

There are 3 settings that need to be changed in order for the system to operate correctly; -

	Factory setting	Re-set To
Arr -	1	2
AHO -	40.0 oC	50.0 oC
AHF -	45.0 oC	55.0 oC
Optional; -		
S MX	60.0 oC	Not above 75.0 oC

(S MX = The maximum store temperature achievable by solar input, if this is set above 60.0 oC then a solar blending valve is strongly recommended on the cylinder hot outlet pipe).

Please adjust the settings in this order, see controller booklet for operating instructions.

Testing the system

Usually the hot water setting on the Combi needs to be set at maximum and the customer needs informing that it needs leaving at this setting.

Take note of the temperature readings on the controller display panel, readings TSTU and TSTL are the relevant ones.

When testing the system is operating correctly, sensor TSTU on the controller display (S3 fig 4) should gradually raise to 55.0 oC whilst the bronze pump and Combi boiler are running. This can take 10-15mins depending on the boiler type. Once TSTU has reach 55.0 oC the boiler and pump will stop.

Open a hot tap and drain the cylinder until display TSTU reaches 50.0 oC then close the tap. The Combi should re-start and continue to run until TSTU again achieves 55.0 oC then it should switch off.

Re-check the temperature of TSTL (S2 fig 4), this reading should only have fluctuated by 0-5 oC when the flow rate from the bronze pump is set correctly. If the fluctuation is greater that 5 oC then selecting a lower pump speed on the Bronze pump and/or semi closing one of the Bronze pump gate valves (located on the Combi cold feed pipe) will slow the flow rate and stop the problem. Re-test after making any adjustments.

Hydraulic Balancing

As part of the commissioning process the installer should ensure that adequate hot temperature, albeit at reduced flow rate, is provided from the Combi under conditions when the cylinder is depleted of hot water. To ensure this, it is essential that the hydraulic resistance through the Combi circuit is such that at the point where the flows from the cylinder and Combi combine, the Combi flow circuit will have a sufficient pressure differential to prevent excessive cooling of the combined flow due to cold water emerging from the cylinder

Handing over the system

Following commissioning it is important that the householder is made aware of the basic operation of the system including the end user adjustable settings on the solar controller.

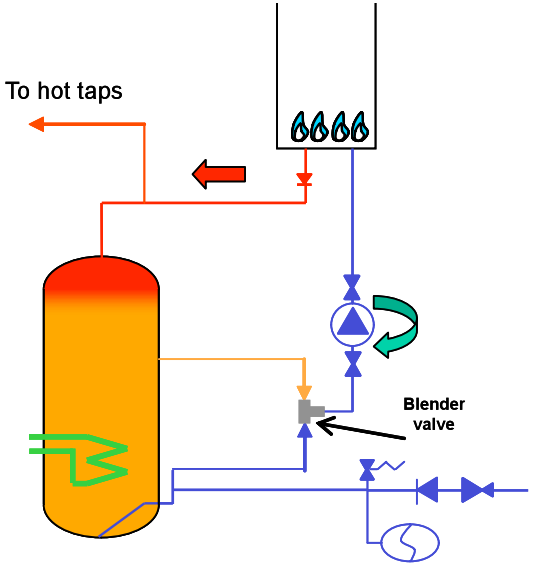
It should be explained to the householder that in situations where low levels of solar input coincide with a high hot water demand such as bath filling, the hot water delivery characteristics will change significantly once the pre-charge of water from the cylinder is exhausted. Under these circumstances by reducing the flow at the tap (semi-closing the tap) the water temperature will increase to a usable temperature.

Under these circumstances a continuous flow of hot water can still be maintained albeit at a reduced flow rate.

Optional Blender

If the Combi is known to be solar compatible then an optional blender (see fig 7) can be used with an outlet temperature set to the maximum permissible inlet temperature of the Combi. This is connected using the 'spare' 22mm male connection on the cylinder (see Fig 9).

Fig 9 – Optional Blender



The same option can also be used with most other combis provided the blender set outlet temperature does not exceed 30oC.

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