

A CLASS

BoilerMate OV SOL

**An open vented central heating
and mains pressure hot water
supply appliance with a thermal
store designed specifically for use
with solar energy**

Design, Installation & Servicing Instructions

Model Numbers

BMA 215 OV-SOL
BMA 225 OV-SOL
BMA 235 OV-SOL
BMA 245 OV-SOL
BMA 265 OV-SOL
BMA 285 OV-SOL

**All models comply with the water heater manufacturers
specification for integrated thermal stores**



ISSUE 5: 06-08

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Building Regulations and Benchmark Commissioning

The Building Regulations (England & Wales) require that the installation of a heating appliance be notified to the relevant Local Authority Building Control Department. From 1st April 2005 this can be achieved via a Competent Person Self Certification Scheme as an option to notifying the Local Authority directly. Similar arrangements will follow for Scotland and will apply in Northern Ireland from 1st January 06.

CORGI operates a Self Certification Scheme for gas heating appliances.

These arrangements represent a change from the situation whereby compliance with the Building Regulations was accepted if the Benchmark Logbook was completed and this was then left on site with the customer).

With the introduction of a self certification scheme, the Benchmark Logbook is being replaced by a similar document in the form of a commissioning check list and a service interval record is included with all gas appliance manuals. However, the relevant Benchmark Logbook is still being included with all Thermal Storage products and unvented cylinders.

Gledhill fully supports the Benchmark aims to improve the standards of installation and commissioning of central heating systems in the UK and to encourage the regular servicing of all central heating systems to ensure safety and efficiency.

Building Regulations require that the heating installation should comply with the manufacturer's instructions. It is therefore important that the commissioning check list is completed by the competent installer. This check list only applies to installations in dwellings or some related structures.

The Gledhill BoilerMate range is a WBS listed product and complies with the WMA Specification for integrated thermal storage products. The principle was developed in conjunction with British Gas. This product is manufactured under an ISO 9001:2000 Quality System audited by BSI.

Patents Pending

The Gledhill Group's first priority is to give a high quality service to our customers.

Quality is built into every Gledhill product and we hope you get satisfactory service from Gledhill.

If not please let us know.

These instructions should be read in conjunction with the Installation and Servicing Instructions issued by the manufacturers of the heat source e.g. the boiler used and the solar panel manufacturer.

Any water distribution, central heating and solar installation must comply with the relevant recommendations of the current version of the Regulations and British Standards listed below:-

Gas Safety Regulations
Building Regulations
I.E.E. Requirements for Electrical Installations
Water Regulations

All the minimum requirements of the domestic heating appliance guide must be met to ensure compliance with the latest building regulations.

British Standards

BS6798, BS5449, BS5546, BS5440:1, BS5440:2, CP331:3, BS6700, BS5258, BS7593 and BS7671.

A competent person as stated in the Gas Safety Regulations must install the boiler heating system. A suitably trained and competent person must also install the solar system. The manufacturer's notes must not be taken as overriding statutory obligations.

The BoilerMate A-Class OV SOL model is only suitable for use with an open vented central heating system. An SP model is available for sealed central heating systems.

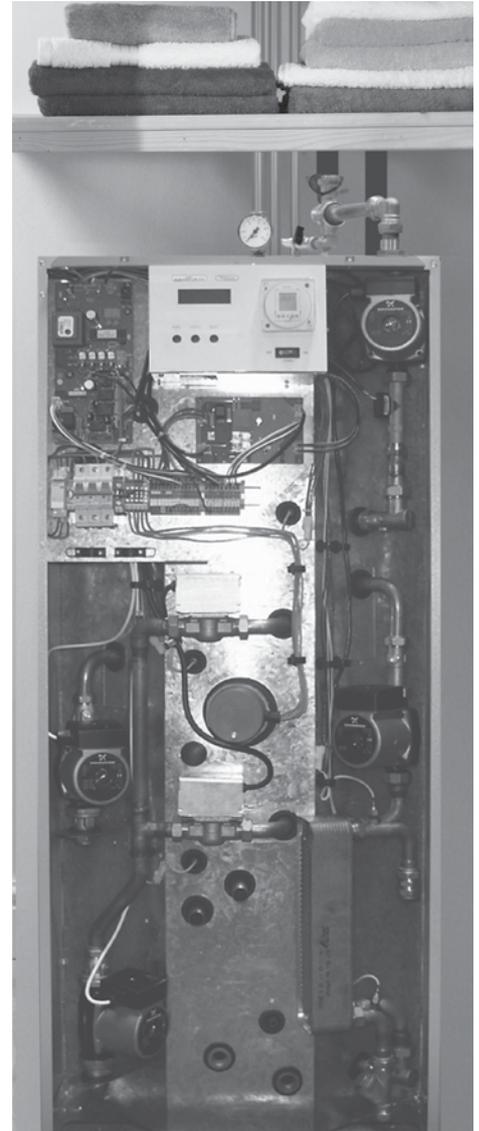
The BoilerMate A-Class OV SOL is not covered by section G3 of the current Building Regulations and has no special requirements with regard to Building Control.

The information in this manual is provided to assist generally in the selection of equipment. The responsibility for the selection and specification of the equipment must however remain that of the customer and any Designers or Consultants concerned with the design and installation.

Please Note: We do not therefore accept any responsibility for matters of design, selection or specification or for the effectiveness of an installation containing one of our products unless we have been specifically requested to do so.

All goods are sold subject to our Conditions of Sale, which are set out at the rear of this manual.

In the interest of continuously improving the BoilerMate range, Gledhill Water Storage Ltd reserve the right to modify the product without notice, and in these circumstances this document, which is accurate at the time of printing, should be disregarded. It will however be updated as soon as possible after the change has occurred.



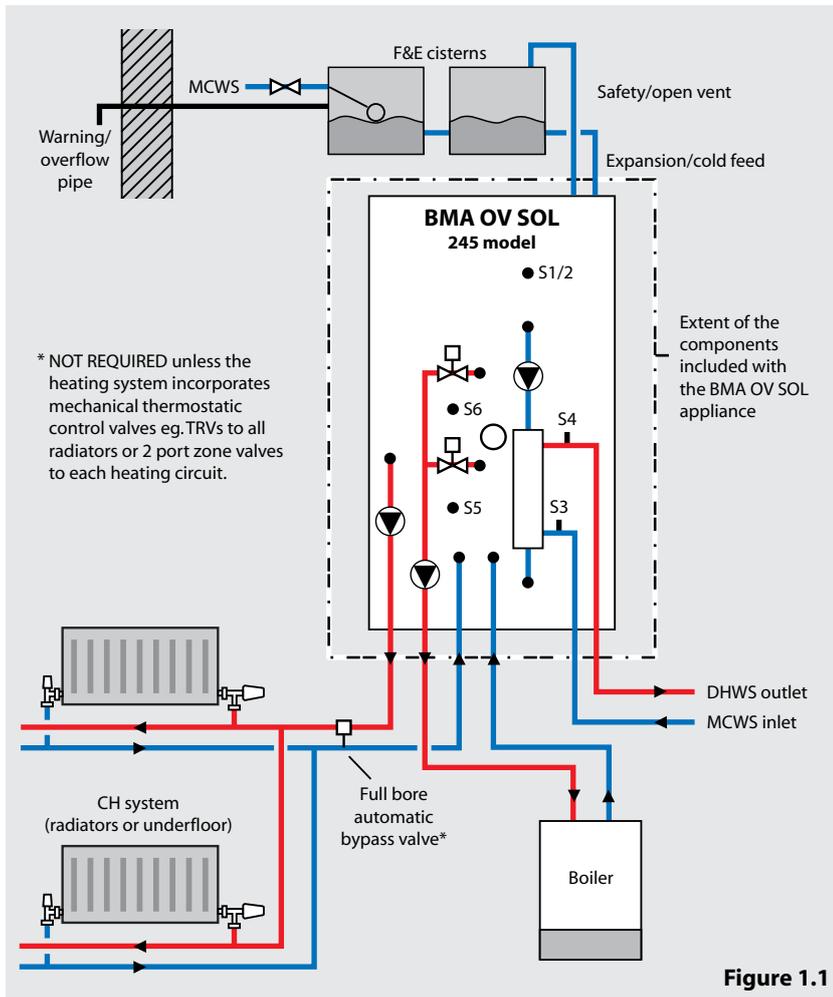


Figure 1.1

The arrangement of a typical BoilerMate A-Class OV SOL installation is shown schematically opposite in Figures 1.1 and 1.2. The basic unit incorporates all the necessary controls to allow the system to operate automatically once it has been properly commissioned.

One cistern complete with ballvalve and overflow connector is provided separately with each 215-225 model BoilerMate A-Class OV SOL appliance. This is normally fitted in the same cupboard as the BoilerMate appliance.

Two cisterns complete with ballvalve and overflow connector are provided separately with the 235-285 model BoilerMate A-Class OV SOL appliances, for remote fixing on site by the installer as shown in Figure 1.1.

The principle of a BoilerMate A-Class OV SOL is to separate the heat generator e.g. a boiler from heat emitters (radiators) by a thermal store, which evens out the fluctuating demands for heating and hot water.

The BoilerMate A-Class OV SOL appliance generally follows the principles of the standard BoilerMate A-Class OV appliance but is fitted with a separate set of coils to allow it to maximise the available amount of heat available from the solar panels/controls. **This is then used to supplement both the heating and hot water systems.**

Because this product does not require a safety discharge from a temperature and pressure relief valve, any installations will be easy to incorporate into the building and will not suffer from the problems associated with using PVCu soil stacks to take the discharge from unvented cylinders.

An important feature of these appliances is that hot water can be supplied directly from the mains at conventional flow rates without the need for temperature and pressure relief safety valves or expansion vessels. This is achieved by passing the mains water through a plate heat exchanger. The outlet temperature of the domestic hot water is maintained by a printed circuit board (A.C.B.), which controls the speed of the pump circulating the primary water from the store through the plate heat exchanger.

The solar pump/pipework can get extremely hot and all solar pipework fitted to the appliance is therefore provided with suitable insulation. However, care should be taken, particularly in high solar gain conditions.

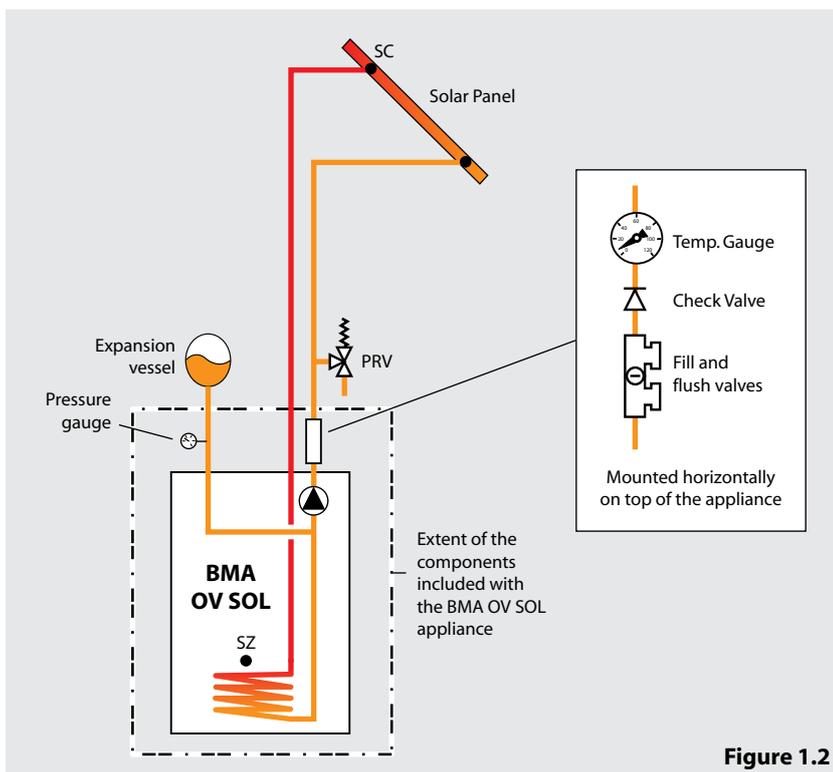


Figure 1.2

The Building Regulations L1A: New dwellings/L1B: Existing dwellings and the requirements set out in the Domestic Heating Compliance Guide specify that “where the mains water hardness exceeds 200ppm provision should be made to treat the feed water to water heaters and the hot water circuit of combination boilers to reduce the rate of accumulation of lime scale”

To comply with this requirement the hardness of the mains water should be checked by the installer and if necessary the optional factory fitted electronic in-line scale inhibitor should be specified at the time of order for hardness levels between 200 and 300 ppm (mg/l).

Where the water is very hard ie 300ppm (mg/l) and above the optional polyphosphate type, inhibitor should be specified at the time of order. However, this will need to be fitted by the installer at a suitable point in the cold water supply to the appliance.

If scale should ever become a problem the plate heat exchanger is easily isolated and quickly replaced with a service exchange unit which can be obtained at a nominal cost from Gledhill.

The controller built into the BoilerMate A-Class OV SOL appliance automatically opens the 2 port valves fitted in the boiler return to allow the maximum possible energy input to be provided from the solar collectors whilst ensuring that at times of low solar gain/peak use the boiler is automatically energised to boost the store temperature to ensure customer satisfaction. The solar pump speed is also modulated, which alters the flow rate and allows it to extract the maximum amount of heat possible from the solar collectors.

The built in controller also incorporates the facility to operate the heating pump for a few seconds every few days when the heating is not being used (to reduce the likelihood of the pumps sticking) as well as providing a boiler pump overrun facility.

Any automatic boiler designed to operate on an 82°C flow and a 71°C return up to a maximum of 35kW can be linked to any suitable model of BoilerMate A-Class OV SOL and the deciding factor is the space heating and the hot water requirements of a dwelling. See the Technical Data section in these instructions for further details.

The BoilerMate A-Class OV SOL is supplied complete with ‘Switch’ which will provide a 6kW electrical emergency backup in case of failure of the main heat source. See page 21 for further information.

If a summer towel rail circuit is required, this will need to be a separate zoned circuit from the heating circuit complete with its own time and temperature controls.

The heat losses from thermal stores should not be directly compared with heat losses from unvented or vented cylinders because they are treated differently in SAP. The SAP calculator takes account of the type of store and various correction factors are included to reflect the different ways that the hot water and heating operates.

For further information please request a copy of the SAP 2005 Data Sheet which provides the information required to produce SAP calculations for all Gledhill Thermal Storage products.

Gledhill are part of the ‘Benchmark’ scheme and a separate commissioning/service log book is included with the product.

Note

The BoilerMate A-Class OV SOL is a SYSTEM appliance and only requires a basic boiler. If a system boiler is chosen this will present wiring/operational difficulties as well as incurring extra costs.

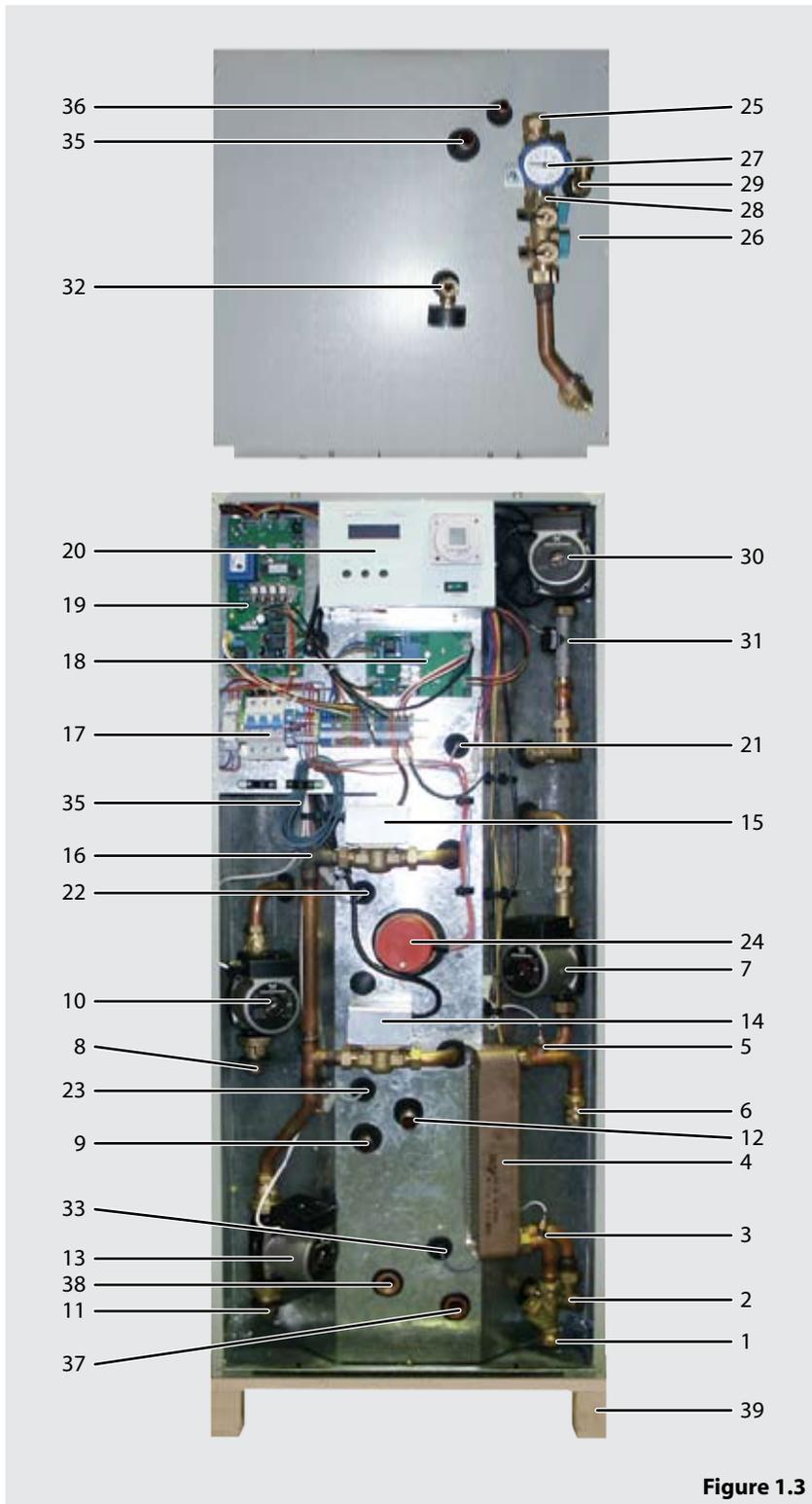


Figure 1.3

Standard Equipment

The standard configuration of the BoilerMate A-Class OV SOL is shown opposite. The Appliance Controllers mounted inside the appliance, control the operation of the complete system. These are pre-wired to a terminal strip where all electrical connections terminate. It is supplied with the following factory fitted equipment:-

- 1 Domestic mains cold water inlet
- 2 Y type strainer/flow regulator
- 3 Cold water inlet sensor (S3)
- 4 Plate heat exchanger (PHE)
- 5 Hot water outlet sensor (S4)
- 6 Hot water outlet
- 7 PHE circulating pump (modulating)
- 8 Central heating flow
- 9 Central heating return
- 10 Central heating circulating pump
- 11 Boiler return connection (to boiler)
- 12 Boiler flow connection (from boiler)
- 13 Boiler circulating pump
- 14 Boiler return zone valve (normally closed)
- 15 Boiler return zone valve (normally open)
- 16 Manual air vent for boiler circuit
- 17 Electrical terminal/connection strip
- 18 Solar controller
- 19 Appliance/system controller
- 20 User panel and 2 channel clock
- 21 Temperature/overheat sensor - top (S1/S2)
- 22 Temperature sensor - middle (S6)
- 23 Temperature sensor - bottom (S5)
- 24 'Switch' electrical emergency backup heater
- 25 Solar return (to collector)
- 26 Fill and flush valve
- 27 Temperature gauge
- 28 Single check valve (anti gravity)
- 29 Solar flow (from collector)
- 30 Solar circulating pump (modulating)
- 31 Flow and temperature sensor (SR)
- 32 Expansion vessel connection (solar circuit)
- 33 Temperature sensor (SZ)
- 34 Temperature Sensor (SC) - is supplied complete with 2.5 metres of 2 x 0.75mm² high temperature silicon cable
- 35 Safety/open vent
- 36 Cold feed/expansion
- 37 Thermal store drain
- 38 Solar coil drain
- 39 100mm high installation base

Optional Equipment

- Hot and cold water manifolds for use with plastic pipework (Set 1 or 2).
- Electronic scale inhibitor for mains water services with hardness levels above 200ppm (mg/l) fitted in the appliance.
- Polyphosphate scale and corrosion inhibitor for mains water services with hardness levels above 300ppm (mg/l) for fitting on site by the installer.

Note 1: All the panels, pipework and other components necessary for the installation of the remainder of the solar system can be supplied by Gledhill with the BMA OV SOL appliance. For further details please contact the Gledhill Technical Sales Dept.

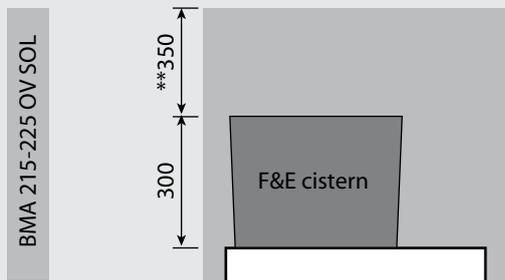
Note 2: One plastic feed and expansion cistern will be supplied for the 215-225 models including a ballvalve float and overflow fitting. this is normally fitted in the same cupboard as the BoilerMate appliance. Two plastic feed and expansion cisterns will be supplied separately for the 235-285 models including a ballvalve, float and overflow fitting for remote fitting by the installer.

Table 1.1

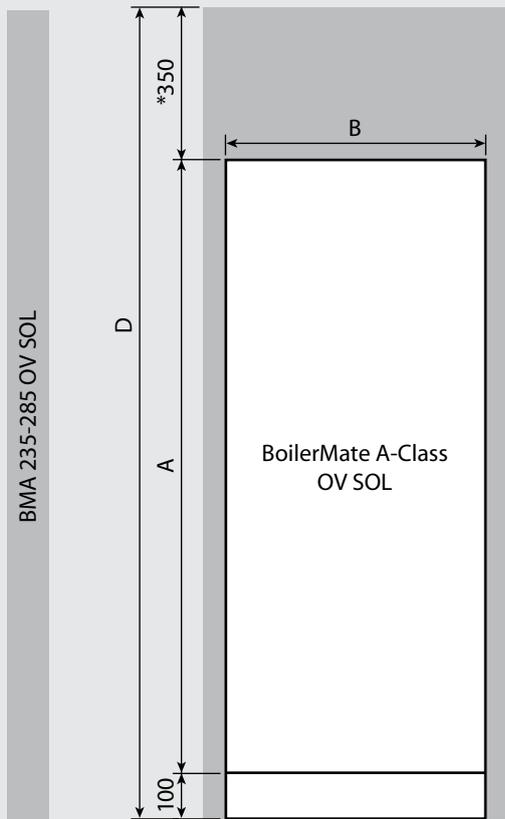
Technical Data									
Model	BMA 215 OV SOL	BMA 225 OV SOL	BMA 235 OV SOL	BMA 245 OV SOL	BMA 265 OV SOL	BMA 285 OV SOL			
Weight (empty)	67	67	75	85	95	106			
Weight (full)	231	255	300	363	405	466			
DHW pump	Grundfos UPR 15/50								
Heating pump	Grundfos UPS 15/50			Grundfos UPS 15/60					
Boiler pump	Grundfos UPS 15/50			Grundfos UPS 15/60					
Solar pump	Grundfos UPR 15/60 Solar								
Primary/heating pipe connections	22mm			28mm					
MCW & DHW pipe connections	22mm								
Cold feed/expansion connection	15mm								
Safety open vent connection	22mm								
Drain connections	Rc ½								
Maximum head	6 metres								
Hot water flow rate (l/m) up to	35								
Max heating system size	8kW	10kW	13kW	17kW	22kW	28kW			
'Switch'	6kW								
Typical Dwelling Types - Model Selection									
Bedrooms	2-3	2-4	3-4	3-5		4-5		4-6	
Bathrooms	1	2	2	1	2	1	2	1	3
En-suite shower	2	1	2	4	3	5	4	6	3
Max. floor area (m ²)	80	100	130	170		220		280	

Notes:-

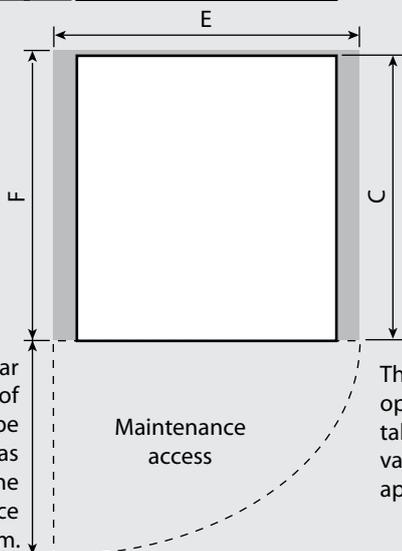
- For larger properties the incoming main should be a minimum of 32mm MDPE with a pressure of not less than 2 bar dynamic and an adequate flow in line with the pipe sizing calculations.
- The flow rates are based on a 35°C temperature rise and assume normal pressure and adequate flow to the appliance. The actual flow rate from the appliance is automatically regulated to a maximum of 28 litres/min.
- Unit is supplied on a 100mm high installation base.
- The domestic hot water outlet temperature is automatically regulated to approximately 52°C (± 2°C) at the bath flow rate of 18 litres/min recommended by BS 6700. The temperature is not user adjustable.
- The suggestions under Model Selection for any appliance size are maximums, and in the same way as the criteria used for sizing the water distribution systems, are based on a typical diversity of use. Therefore it will be impractical to expect the appliance or the water distribution system to be able to support simultaneous use of the sanitary fittings shown.
- In projects requiring Building Regulations approval, the maximum floor area figure **must** not be exceeded to ensure compliance with ADLI requirements. However, final selection should be made on the basis of the minimum model (appliance size) that meets **all** the criteria i.e. heating load/number of bathrooms and shower rooms/floor area.



**To comply with the access requirements of the Water Regulations.



*Minimum access / maintenance access above the appliance case.



The minimum clear opening in front of the appliance to be at least the same as the depth of the appliance plus 50mm.

The cupboard door opening will need to take into account the various sizes of appliances.

Appliance Dimensions			
Model	Height (A)	Width (B)	Depth (C)
BMA 215 OV SOL	1330	560	620
BMA 225 OV SOL	1330	560	620
BMA 235 OV SOL	1575	560	620
BMA 245 OV SOL	1575	610	690
BMA 265 OV SOL	1575	640	715
BMA 285 OV SOL	1485	710	785

The above dimensions do not include the 100mm high installation base.

Minimum Cupboard Dimensions			
Model	Height (D)	Width (E)	Depth (F)
BMA 215 OV SOL	2080	660	630
BMA 225 OV SOL	2080	660	630
BMA 235 OV SOL	2025	660	630
BMA 245 OV SOL	2025	710	700
BMA 265 OV SOL	2025	740	725
BMA 285 OV SOL	1935	810	795

The above dimensions include the 100mm high installation base. In the case of the 215-225 models, they assume the F&E cistern is in the same cupboard. However, for the 235-285 models they allow space for installation/maintenance of the appliance only.

Note: With the 235-285 models, space will be required, in addition to the above, for two feed and expansion cisterns (280mm wide x 420mm deep x 300 high), which are provided separately, complete with a ballvalve and overflow connector. 350mm will still be required above the cisterns to meet the minimum access requirements of the Water Regulations for the ballvalve.

Figure 1.4

Connection Details/Dimensions - 215, 225 and 235 models

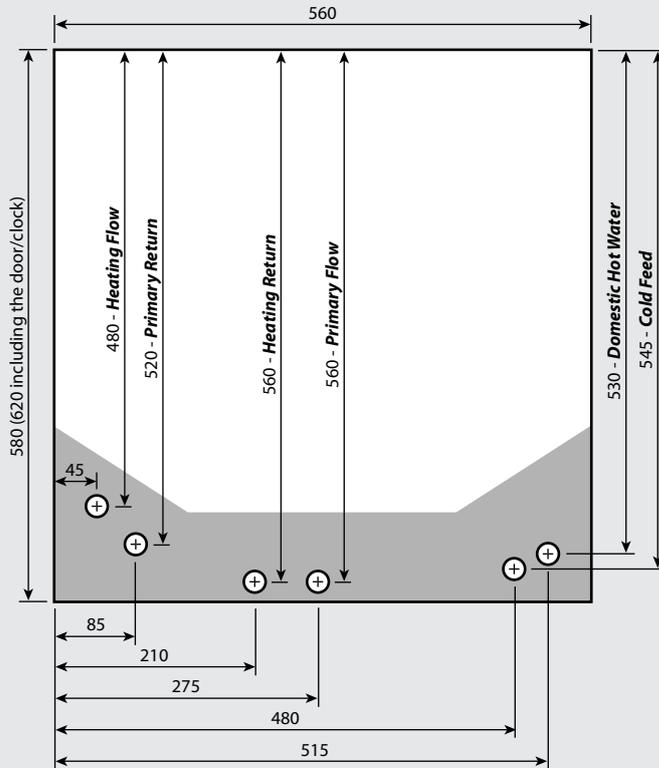


Figure 1.5

Connection Details/Dimensions - 245 model

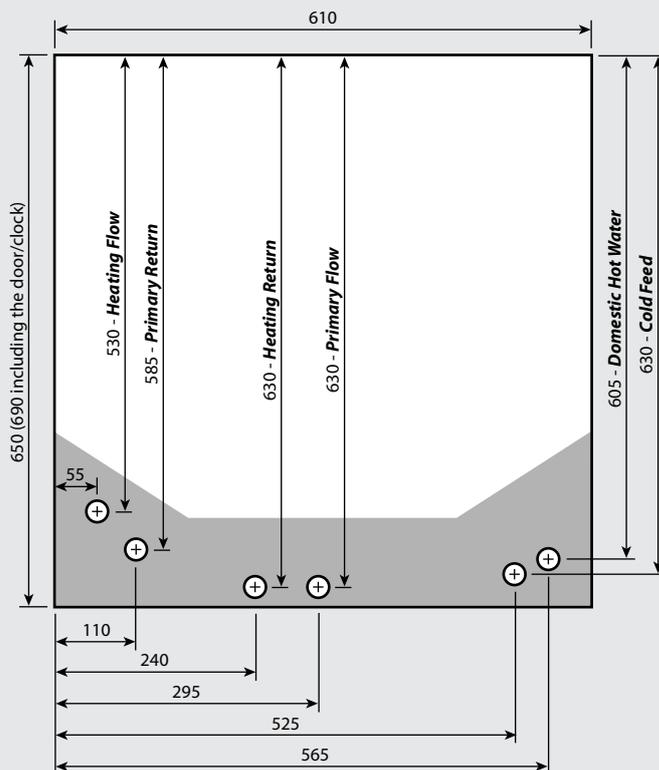


Figure 1.6

Connection Details/Dimensions

Diagrams opposite show the connection details and dimensions for the BoilerMate A-Class OV SOL appliance.

The BoilerMate A-Class OVSOL units are supplied on an installation base to allow the pipe runs to connect to the appliance from any direction. It is easier if all pipes protrude vertically in the cut out area shown. Compression or push fit connections can be used. All pipe positions are approximate and subject to a tolerance of +/-20mm in any direction. A 15mm cold water supply and a 22mm warning/overflow pipe will also be required for the separate feed and expansion tank.

Note: All dimensions are shown in mm and are to the centre line of pipework/gland.

Connection Details/Dimensions - 265 model

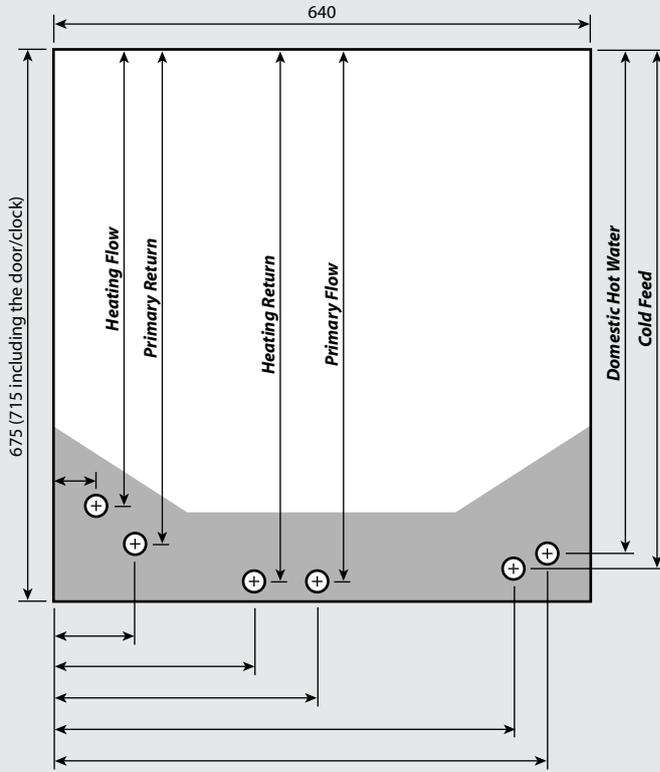


Figure 1.7

Connection Details/Dimensions

Diagrams opposite show the connection details and dimensions for the BoilerMate A-Class OV SOL appliance.

The BoilerMate A-Class OV SOL units are supplied on an installation base to allow the pipe runs to connect to the appliance from any direction. It is easier if all pipes protrude vertically in the cut out area shown. Compression or push fit connections can be used. All pipe positions are approximate and subject to a tolerance of +/-20mm in any direction. A 15mm cold water supply and a 22mm warning/overflow pipe will also be required for the separate feed and expansion tank.

Note: All dimensions will be updated in the next issue of the manual.

Connection Details/Dimensions - 285 model

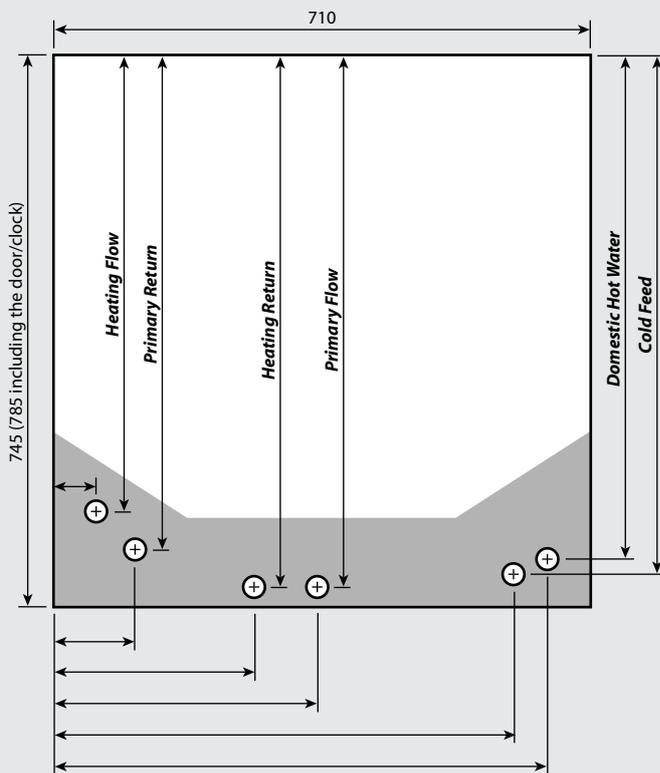


Figure 1.8

Front Panel Controls

The front panel user controls are shown in the picture opposite and their functions are described below.

Three different windows can be displayed in the visual display panel on the front of the appliance. Pressing the select button below the display allows you to move from one window to the next.

Standard Display Window

In normal automatic operation the display will be as shown opposite.

If a fault occurs with the boiler, the 'Switch' emergency electric back-up system can be selected by pressing and holding the 'Switch' button below the display for at least 5 seconds. The 'Normal' will change to 'Switch' and will flash.

Once the problem has been resolved, the appliance can be returned to normal operation by pressing the 'Switch' button for at least 5 seconds.

Active/Demand Window

Press the select button when the display is in standard mode to move to this window.

Use this window to check the current active status of the appliance/systems.

Symbol	Description
☐	No active demand
■	Demand present/component active
P-HW	Shows if a demand is present for hot water from channel 1 of the clock
Store	Shows if there is a demand for the store to be heated by a boiler/primary circuit
Boiler	Shows if the boiler is on
P-CH	Shows if the demand is present for central heating from channel 2 of the clock
Rstat	Shows if there is a demand from the room thermostat
CHpump	Shows if the central heating pump is on
SolH	Shows if there is a demand for heat from the solar circuit - the solar system can be disabled, if required, by pressing and holding the 'Switch' button for 5 seconds when the window is in this mode
Spump	Shows if the solar pump is on
DHWuse	Shows if there is a sufficient temperature differential between sensors S3 and S4 to activate the domestic hot water system
Qs	Shows the total contribution in kilowatt hours made by the solar system (scale 0-9999 when it will automatically reset)

Current Status Window

Press the select button when the display is in the Active/Demand mode to move to this window.

Use this window to check the actual current temperatures/performance of the appliance.

The top two rows of the display show the actual current temperature at the various store/solar sensors used to control the operation of the appliance i.e. in the example shown opposite, the actual temperature at S1 is 75°C and at S6 is 65°C etc.



Normal mode



Switch mode



Active/demand window



Current status window

DESIGN

The duty/location of the various sensors is as follows.

Sensor	Duty	Location
S1	T Overheat 1	Top of store in dry pocket (S1 & S2 are in single housing)
S2	T Overheat 2	
S3	T DHW in	In cold water inlet pipe (Wet i.e. direct)
S4	T DHW out	In hot water outlet pipe (Wet i.e. direct)
S5	T Store bottom	Bottom of store in dry pocket for store charging
S6	T Store middle	Middle of store in dry pocket for store charging
SC	T Solar collector - flow	Supplied wired - to be fitted by the installer in the sensor pocket provided in the solar panel (collector) or in the flow pipe immediately adjacent to the collector.
SR	T Solar return	In solar return pipe - integrated with flow sensor
SZ	T Solar zone - store	Bottom of store in dry pocket for solar charging of store

Symbol	Description
S3 and S4	Show the actual current temperature at the domestic cold water inlet/hot water outlet sensors respectively. The respective control set points are 35°C and 55°C respectively
Q	Shows the current actual energy input in kilowatts from the solar system
F	Shows the actual current flow rate in litres/minute in the solar circuit
Sp	Shows the actual current speed of the modulating solar circulating pump as a percentage of the maximum

The temperature at which the thermal store is satisfied, when being supplied with heat from the boiler is 77°C (i.e. the off control set point of sensor S6).

The solar system will start from a minimum 10°C differential between the temperature in the store SZ and the temperature at the solar panel (collector) SC i.e. the solar circulating pump only runs if the temperature as SC is at least 10°C above the temperature at SZ. The solar will continue to run, once started, until the differential narrows to 2°C and will then stop until a differential of 10°C is achieved between SZ and SC. The pump speed will continually modulate to ensure that any available solar energy is always being transferred to the store.

2 Channel Clock

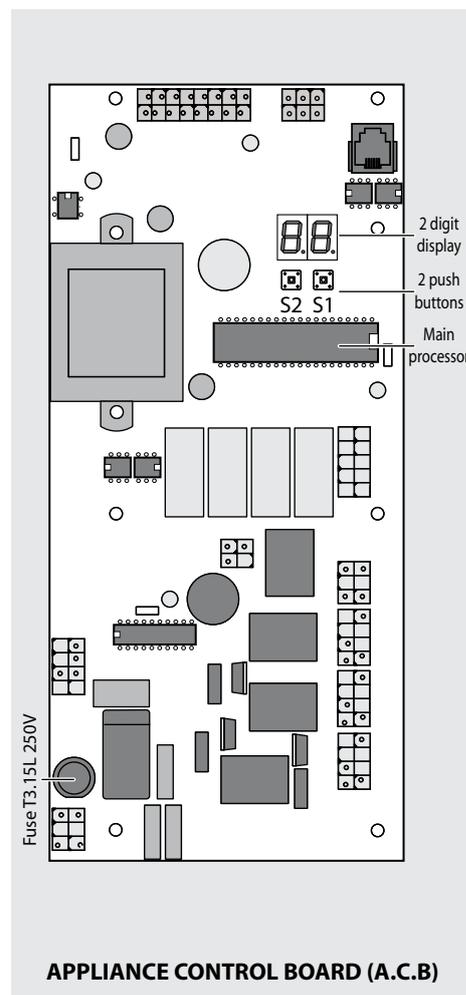
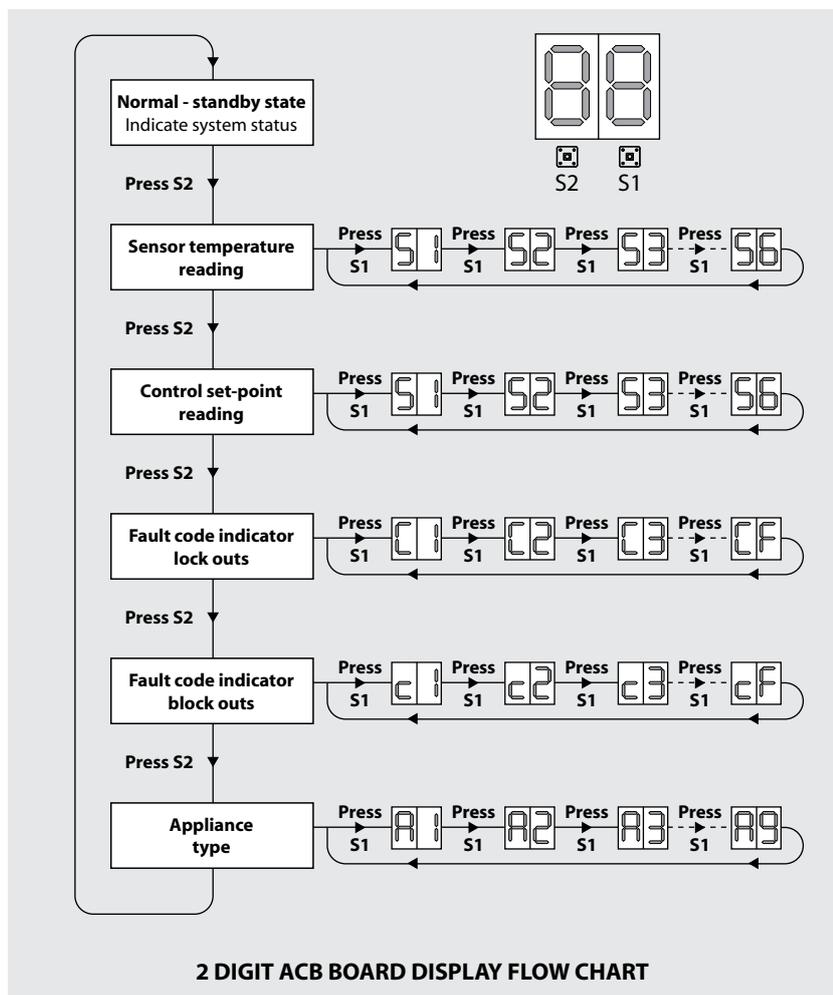
A 2 channel digital Grasslin clock is provided to allow separate control of the hot water and heating requirements in accordance with the latest Building Regulations.

Details of how to set the clock are provided on the User label and in the User Instructions.

Channel 1 controls the operating times for the boiler/primary circuit. This should normally be set to constant to allow the hot water to be available 24 hours a day.

The appliance controls will always give priority to heat input from the solar system and will only energise the boiler if this is required to meet the hot water and heating demands placed on the appliance.

Channel 2 controls the operating times for the central heating circuit and should be set to suit the householders lifestyle.



Appliance Control Board

The appliance control board (shown above) has a 2 digit display and 2 push buttons. Although this can be used to check the status of the appliance, we would suggest that this is done on the control panel/display window on the front of the appliance, unless this is faulty. However the controls should be used to check and set the appliance identity and to interrogate it for any current faults and the fault history.

The 2 digit display is controlled by 2 buttons S1 and S2. The flow chart of display modes is shown above. Generally, each press of button S2 cycles the display from top to bottom and each press of button S1 cycles the display functions from left to right.

The button S2 is also used to reset the appliance i.e. clear the lockout errors and reset the appliance. (Note: Appliance resetting can also be carried out using the push button on the front panel)

Display in Normal (Standby) Mode

In the standard/normal mode the 2 digit display indicates the status of the appliance inputs and outputs by switching on the appropriate segments of the display. Details of the function/operation of the display are described in the Installation section of these instructions.

Appliance Type Selection

The BoilerMate is fitted with an identity (ID) resistor which is read by the controller for comparison with the appliance type (code) set on the controller. The two must

match for the controller/appliance to function. Therefore if either the appliance code setting or the ID resistor is wrong, the appliance will shut down safely and flag the error code until the fault is rectified. The controller codes and the ID resistor values for the BoilerMate are A01 and 1K5 respectively. The procedure for checking and setting the appliance code on the controller is described below.

- The appliance selection menu (A0 ... A9) on the controller is hidden. It is only possible to get to the appliance selection using the reset button (Left hand, S2) on the main board.
- When going from the show 'locking error' to show 'blocking error' menu (see opposite), do not release the button but hold it for 10 seconds. The display will change from 'c'to 'A'. At this stage the push button (S2) can be released.
- The appliance type can now be selected by using right hand push button, S1, e.g. for this appliance A01.

Press the reset button, S2, to accept the setting.

If the selected appliance code does not match with the ID resistor fitted to the appliance, then, an error '33' will be displayed.

A table showing this and other common fault codes is shown below.

Fault Codes

Fault code locations are numbered C0 - CF and c0 - cF.

CO/cO locations hold the latest fault recorded.

A code of FF indicates that the fault location is empty.

If a sensor is faulty instead of a temperature it will show E1 if open circuit and E2 if short circuit.

Common Fault Codes			
Code		Code	
10	Overheat error	45	S1 overheat 1 shorted
30	Phase error	48	I.D.resistor shorted
33	Appliance selection	49	S4 sensor shorted
37	S1 overheat 1 open	50	S5 sensor shorted
40	I.D.resistor open	51	S6 sensor shorted
41	S4 sensor open	52	S2 overheat 2 shorted
42	S5 sensor open		
43	S6 sensor open		
44	S2 overheat 2 open		

Any other code displayed should be checked against the full chart.

Please ring Gledhill Technical Helpline for details.

Hot and Cold Water System

General

A schematic layout of the hot and cold water services in a typical small dwelling is shown below. BoilerMate A-Class OV SOL will operate at mains pressures as low as 1 bar and as high as 5 bar although the recommended range is 2-3 bar. These pressures are the minimum dynamic pressures at the cold connection to the BoilerMate A-Class at the time of the maximum calculated simultaneous demand. If the manifolds (available as an optional extra) are being used the inlet pressure to the manifold must be a minimum of 2 bar. Particular consideration should also be given to available pressures in the case of 3 storey properties. It is also important to check that all other equipment and components in the hot and cold water system are capable of accepting the mains pressure available to the property. If the mains pressure can rise above 5 bar (or the maximum working pressure of any item of equipment or component to be fitted in the system) a pressure limiting (reducing) valve set to 3 bar will be required (or the pressure rating of the piece of equipment or component).

If you encounter a situation where the water pressure is adequate but flow rates are poor please contact our technical helpline for details of an effective solution.

Note: Each BoilerMate A-Class OV SOL is fitted with a strainer and flow regulator on the cold mains supply connection. If the supply pressure is less than 2 bar or if the manifolds (available as an optional extra) are being used or if all taps are provided with flow regulators the flow regulator on the cold inlet should be removed.

No check valve or similar device should be fitted on the cold water supply branch to the BoilerMate A-Class OV SOL.

The Building Regulations L1A: New dwellings/L1B: Existing dwellings and the requirements set out in the Domestic Heating Compliance Guide specify that "where the mains water hardness exceeds 200ppm provision should be made to treat the feed water to water heaters and the hot water circuit of combination boilers to reduce the rate of accumulation of lime scale".

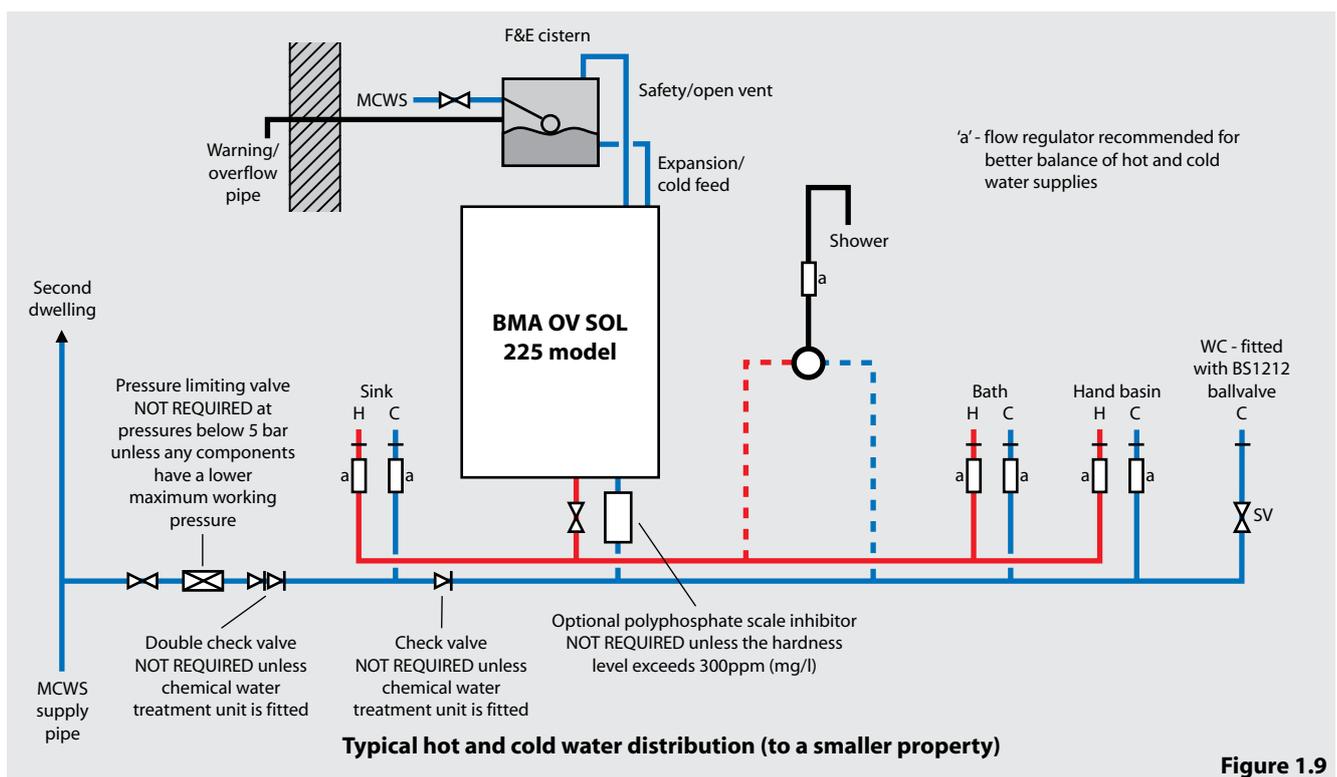
To comply with this requirement the hardness of the mains water should be checked by the installer and if necessary the optional factory fitted in-line scale inhibitor should be specified at the time of order for hardness levels between 200 and 300 ppm (mg/l).

Where the water is very hard ie 300ppm (mg/l) and above the optional polyphosphate type, inhibitor should be specified at the time of order. However, this will need to be fitted by the installer at a suitable point in the cold water supply to the appliance.

If scale should ever become a problem the plate heat exchanger is easily isolated and quickly replaced with a service exchange unit which can be obtained at a nominal cost from Gledhill.

The hot water flow rate from the BoilerMate A-Class OV SOL is directly related to the adequacy of the mains cold water supply to the dwelling. This must be capable of providing for those services, which could be required to be supplied simultaneously, and this maximum demand should be calculated using procedures defined in BS 6700.

If a water meter is fitted in the service pipe, it should have a nominal rating to match the maximum hot and cold water peak demands calculated in accordance with BS 6700. This could be up to 80ltr/min in some properties.



Hot and Cold Water System

Pipe Sizing / Materials

To achieve even distribution of the available supply of hot and cold water, it is important in any mains pressure system, that the piping in a dwelling should be sized in accordance with BS 6700. This is particularly important in a large property with more than one bathroom.

However, the following rule of thumb guide lines should be adequate for most smaller property types as long as water pressures are within the recommended range of 2-3 bar.

1. A 15mm copper or equivalent external service may be sufficient for a small 1 bathroom dwelling (depending upon the flow rate available), but the minimum recommended size for new dwellings is 22mm (25mm MDPE). For the BMA 245 OV SOL model and above we recommend a 28mm (32mm MDPE) supply pipe.
2. The internal cold feed from the main incoming stop tap to the BoilerMate should be run in the same size pipework as the incoming mains supply. The cold main and hot draw-off should also be run in 22mm as far as the branch to the bath tap.
3. The final branches to the hand basins and sinks should be in 10mm and to the baths and showers in 15mm. (1 metre minimum)
4. If an external hose tap is provided this should be branched in 15mm pipework from the cold pipework as near to the incoming mains as possible and before the pressure reducing valve (if fitted).
5. **We would recommend that best results for a balanced system are achieved by fitting appropriate flow regulators to each hot and cold outlet. This is particularly relevant where the water pressures are above the recommended water pressure range of 2-3 bar, or the dwelling is 3 storey. Details of suitable flow regulators are provided in Appendix A.**

Note: If manifolds (available as an optional extra) are being used suitable flow regulators are automatically provided in the manifold and do not need to be provided at each outlet - See Appendix B for further details.

All the recommendations with regard to pipework systems in this manual are generally based on the use of BS/EN Standard copper pipework and fittings.

However, we are happy that plastic pipework systems can be used in place of copper internally as long as the chosen system is recommended for use on domestic hot and cold water systems by the manufacturer and is installed fully in accordance with their recommendations.

It is also essential that if an alternative pipework material/system is chosen the manufacturer confirms that the design criteria of the new system is at least equivalent to the use of BS/EN Standard copper pipework and fittings or the pipework sizes are increased accordingly.

Taps/Shower Fittings

Aerated taps are recommended to prevent splashing.

Any type of shower mixing valve can be used as long as both the hot and cold supplies are mains fed. However, all mains pressure systems are subject to dynamic changes particularly when other hot and cold taps/showers are opened and closed. This will cause changes in the water temperature at mixed water outlets such as showers. For this reason and because these are now no more expensive than a manual shower we strongly recommend the use of thermostatic showers with this appliance. These must be used in 3 storey properties where the impact on pressure/temperature of opening another tap in the system is greater than normal.

The shower head provided must also be suitable for mains pressure supplies.

If it is proposed to use a 'whole body' or similar shower with a number of high flow/pressure outlets please check suitability with the Gledhill Technical Department before installation.

The hot water supply to a shower-mixing valve should be fed wherever practical directly from the BoilerMate A-Class OV SOL or be the first draw-off point on the hot circuit. The cold supply to a shower-mixing valve should wherever practical be fed directly from the rising mains via an independent branch. The shower must incorporate or be fitted with the necessary check valves to provide back-siphonage protection in accordance with the Water Regulations.

The supply of hot and cold mains water directly to a bidet is permitted provided that it is of the over-rim flushing type and that a type 'A' air gap is incorporated.

Hot and Cold Water System.

If the length of the hot water draw off pipework is excessive the time before hot water is available at the tap may be unacceptable. In these circumstances, you may wish to consider using trace heating to the hot water pipework such as the Raychem HWAT system. Please consult Gledhill Technical Department for further details.

It is important that the cold water pipework is adequately separated/protected from any heating/hot water pipework to ensure that the water remains cold and of drinking water quality.

Heating System

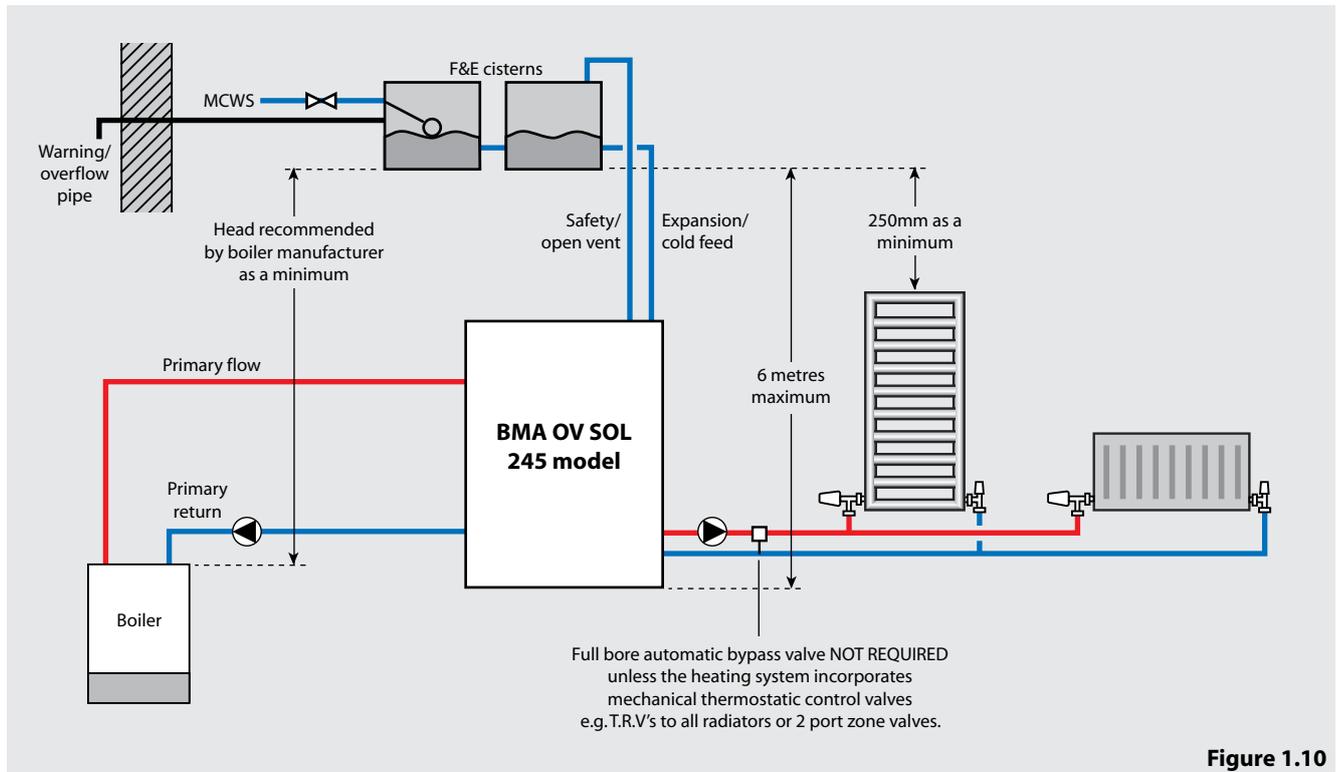


Figure 1.10

General

A schematic layout of the heating system in a typical small dwelling is shown above.

The flow and return from the boiler must always run directly to the BoilerMate A-Class OV SOL and the flow should rise continuously to facilitate venting. The heating circuit is taken from the BoilerMate A-Class OV SOL and is piped in the conventional manner.

The BoilerMate A-Class OV SOL is only suitable for an open vented system.

The F & E cisterns can be fitted remotely up to 6 m above the base of the BoilerMate A-Class OV SOL i.e. the maximum static pressure in the store must not exceed 0.6 bar.

The F&E cisterns must be installed at the same level and a typical arrangement is shown above. If installed in a roofspace, suitable insulation will need to be provided to the cisterns/any pipework to protect them from damage by frost.

If any radiators are located above the level of the BoilerMate A-Class OV SOL the system should be designed so that gravity circulation does not occur when the heating pump is not running. To be certain of preventing this it is recommended that a check valve, or valves, are fitted on the vertical flow pipes.

The F & E cisterns should be at least 250mm above the highest point on the system including the radiators and must also be high enough to provide the minimum head required by the boiler being used.

The boiler manufacturer's instructions with regard to minimum head must always be followed. This is particularly important in situations where the headroom is restricted (e.g. in a flat).

Range rated boilers can be used but should always be set at the **highest** output. The system efficiency will not be impaired while the recovery rate will be improved.

It is not necessary to provide a boiler bypass on the primary circuit (i.e. between the boiler and the thermal store).

Heating System

Equipment/Pipe Sizing and Materials

The primary pipework connecting the boiler and the thermal store should be sized to achieve a maximum of 8°C rise across the boiler or the maximum temperature rise specified by the boiler manufacturer, whichever is smaller, but in any instance it should not be less than 22mm copper tube.

The store sensor off control point is 77°C and it is important that the boiler/primary circuit are capable of providing this temperature at the store sensor.

Note: There should be no valves in the pipework connecting the boiler to the BoilerMate A-Class OV SOL.

The heating circuit operates on the normal primary boiler temperatures i.e. 82°C flow and 71°C return. Therefore any traditional hot water radiators or convectors can be used with this system and no special over-sizing of the heat emitters is necessary.

All the recommendations with regard to pipework systems in this manual are generally based on the use of BS/EN Standard copper pipework and fittings.

However, we are happy that plastic pipework systems can be used in place of copper internally as long as the chosen system is recommended for use on domestic heating systems by the manufacturer and is installed fully in accordance with their recommendations. We always recommend the use of barrier pipe for these systems.

It is also essential that if an alternative pipework material/system is chosen the manufacturer confirms that the design criteria of the new system is at least equivalent to the use of BS/EN Standard copper pipework and fittings or the pipework sizes are increased accordingly.

It is only necessary to calculate the heating requirements in accordance with BS 5449. The allowances shown below should be added for domestic hot water. The control system automatically gives priority to hot water when necessary.

Allowance for domestic hot water	
Model	(kw)
BMA 215 OV SOL	3
BMA 225 OV SOL	4
BMA 235 OV SOL	5
BMA 245 OV SOL	6
BMA 265 OV SOL	6
BMA 285 OV SOL	6

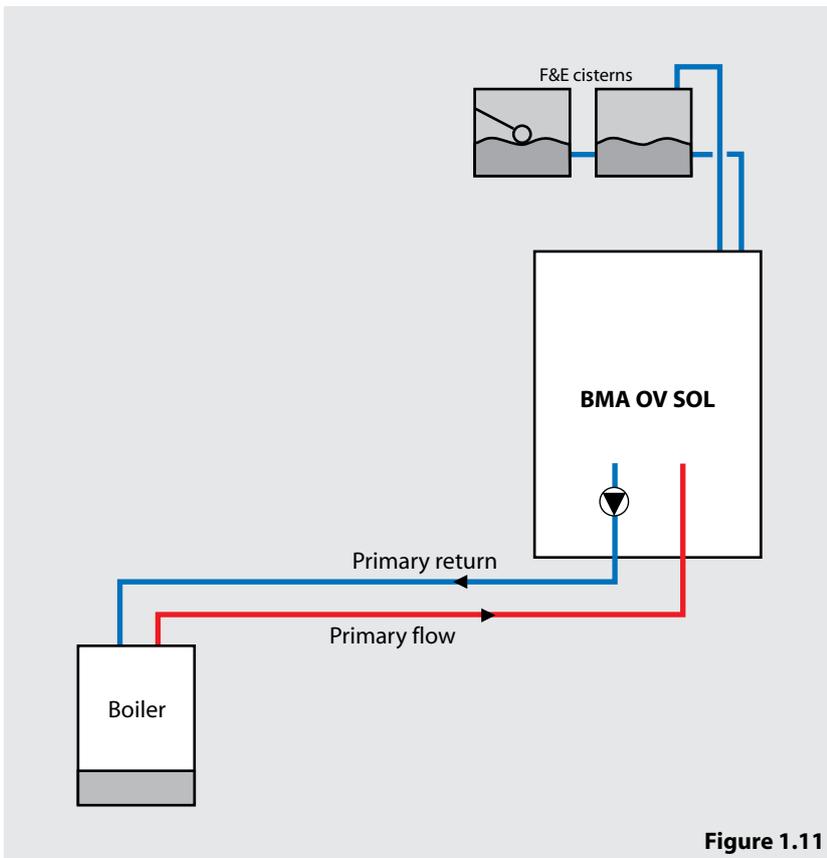


Figure 1.11

Boiler Sited Below BoilerMate A-Class

Any temperature controlled boiler can be used when the flow pipe from the boiler to the BoilerMate A-Class rises continuously. The primary flow also acts as the open vent/safety for the boiler, therefore no valve shall be fitted in the primary flow or open vent.

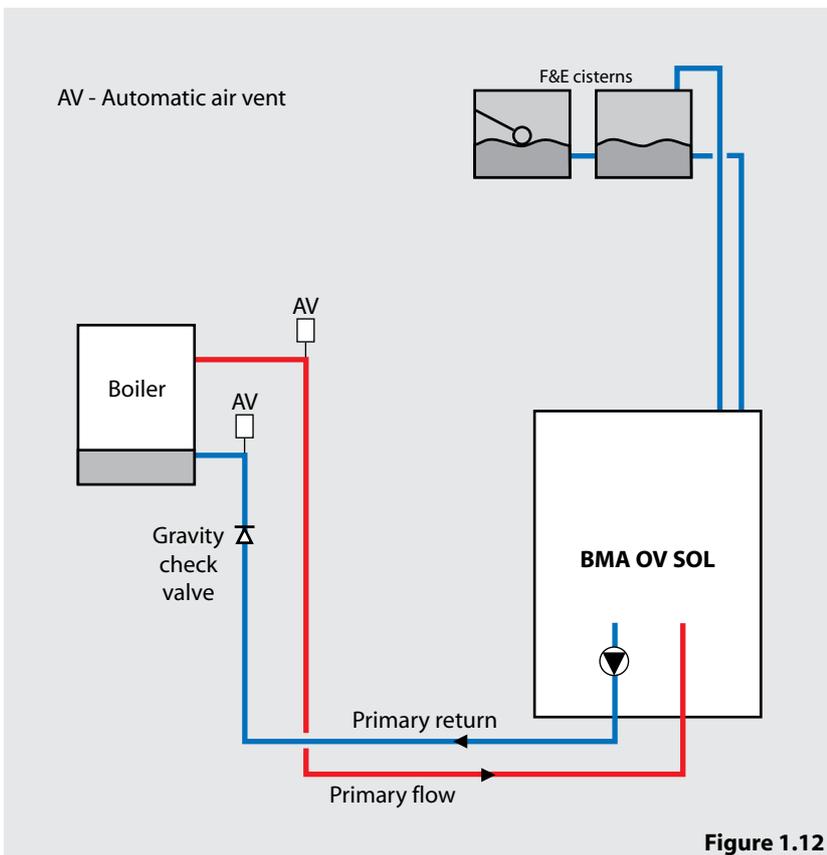


Figure 1.12

Boiler sited above the BoilerMate

Any boiler used must be fitted with an overheat thermostat i.e. it must be suitable for use in a sealed system.

An automatic air vent will be required on the flow and return connections adjacent to the boiler.

The F & E cistern must be fitted at a height which will provide the minimum head required for the boiler and must also be at least 250mm above the highest point of the system.

The height of the bottom of the F & E cistern from the base of the store should be no greater than 6m.

A gravity check valve should be fitted in the boiler return pipework to prevent gravity circulation between the BoilerMate A-Class and the boiler during dormant periods.

Connection of Bathroom Radiator/Towel-Rail for Summer use

If separate Summer/Towel rail circuits are required, these must be piped as a separate zone from the main heating circuit with their own zone valve and time/temperature control (programmable room thermostat) as shown in the Installation section of these instructions - Zoned Heating Systems.

Solar System

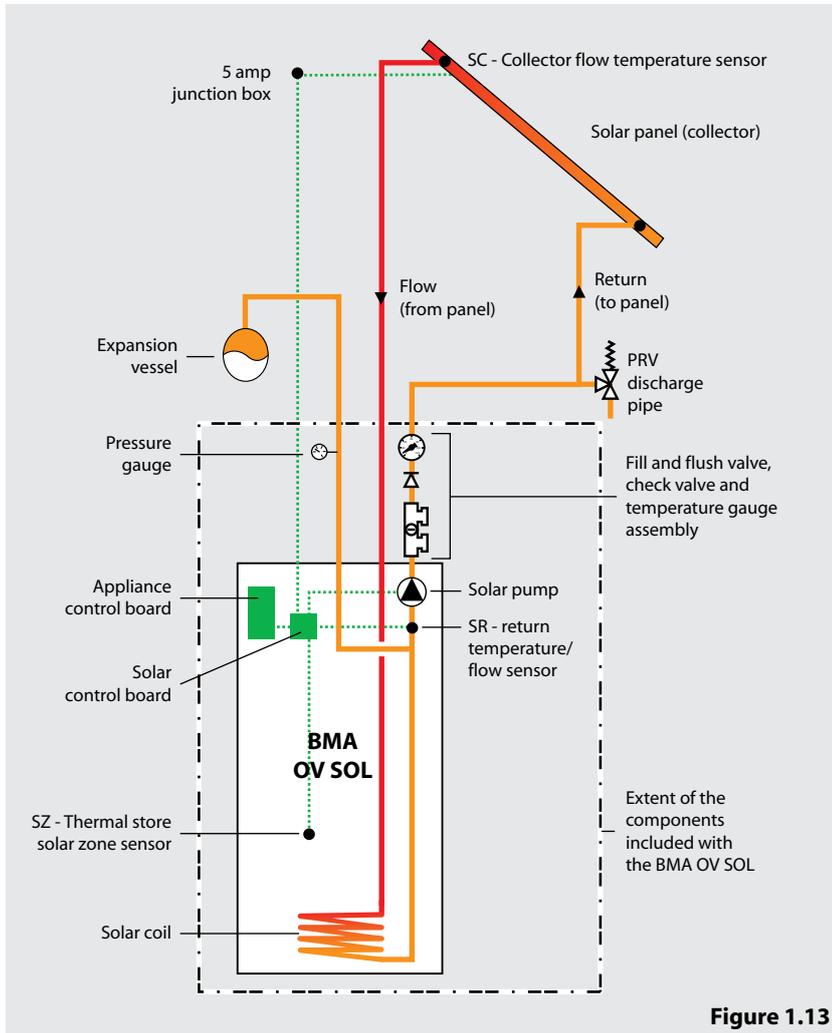


Figure 1.13

A schematic layout of a solar system incorporating a BoilerMate A-Class OV SOL appliance is shown above.

As can be seen, the BoilerMate A-Class OV SOL appliance includes almost all the equipment normally provided in a solar pumping station.

On this basis, the flow and return pipework from the solar panel(s) (collectors) should be run directly from the panel to the BoilerMate A-Class OV SOL.

A 6 bar pressure relief (safety) valve will be required on the solar return to the solar collector. To allow future maintenance/testing, its location shall be accessible. The discharge pipe shall be of a rigid and non-deformable constitution i.e. metal. **No valves should be fitted in the pipework between the solar collector and the pressure relief (safety) valve.** The discharge from the pressure relief (safety) valve shall terminate in a position where the discharge of steam/scalding water will not cause any injuries or harm to persons or property. A suitably sized, high temperature receptacle, an internal gully or at low level externally, are all normally considered acceptable termination points. However, a high level termination from walls or on roofs is not normally considered acceptable because of the possible harm to people below.

A suitable solar expansion vessel will also be required and a 15mm connection with pressure gauge is provided on the top of the appliance. The vessel shall be sized and the initial filling pressure established in accordance with an approved method such as set out in Appendix D of the Solar Heating, Design and Installation Guide produced by the Domestic Building Services Panel of the Chartered Institute of Building Services Engineers.

However, the chart opposite provides an indication of the likely vessel size and fill pressures required when using a flat plate collectors and a 6 bar safety valve (allowing 1.0 bar over pressure).

The collector flow temperature sensor (SC) is wired into the BoilerMate OV SOL complete with 2.5 metres of cable (2 x 0.75mm² double insulated). However, dependant on the location of the solar panel(s) this may need extending by the installer on site (up to a maximum of 50 metres). It is recommended that the cable is jointed in a 5amp junction box fitted in the roof space adjacent to the panel(s). The sensor (6mm diameter) will need to be fitted in the solar panel or flow pipe from the solar panel as near to the panel as possible.

The solar panel(s), expansion vessel, pressure

Expansion Vessel Sizing Chart			
System Height (metres)	2.5	5.0	10.0
System Volume (litres)/Maximum Collector Area (m ²)	Vessel size/pre-charge pressure/initial fill pressure (litres/bar/bar)		
<10/5	18/1.3/1.6	18/1.5/1.8	18/2.0/2.3
20/7.5	25/1.3/1.6	25/1.5/1.8	35/2.0/2.3
30/12.5	35/1.3/1.6	35/1.5/1.8	40/2.0/2.3
50/15	40/1.3/1.6	50/1.5/1.8	50/2.0/2.3

Note: System height refers to the difference in height from the top of the collector to the expansion vessel.

relief valve and the necessary length of pre-insulated corrugated stainless steel pipework and sensor cable to complete the solar installation can be supplied by Gledhill. Please ring our Technical Sales Department for details.

If it is proposed to use copper pipework, the components and insulation will need to take account of the extremely high temperatures and pressures which can be experienced, and the ethylene glycol antifreezes which are used. Standard soft soldered fittings and pipe insulation will not be adequate. The insulation needs to be Class 'O' standard and the bracketting needs to allow for the increased thickness required. Brazing, press fit type with green viton seals or copper weld type fittings are all acceptable. Any compression joints will need to have brass olives. Because of the high temperatures, the pipework should be routed to allow for the necessary expansion or provided with flexible connectors.

It is recommended that a filling tank/pump should be used to fill and vent the solar system but the fill and flush valve does incorporate a spare connection for a standard temporary filling loop (as used for central heating systems) so that once the system has been filled with the necessary antifreeze mixture, mains water pressure can

be used to charge the system. Details of the filling/commissioning procedure using a filling tank/pump are included later in the Installation section of these instructions.

All the necessary Health and Safety requirements should be followed when lifting and fitting the solar panels (collectors) on the roof.

To prevent overheating in the summer (and discharge from the pressure relief valve), we suggest a saving of 50% of the energy required for the domestic hot water should be used as the target when calculating the number/area of solar panels (collectors) required. In addition to this we believe that a further 10-15% saving will be achieved because the BoilerMate A-Class OV SOL also contributes energy to the heating system.

Switch

The BoilerMate A-Class OV SOL is supplied with a 6kW electrical emergency back up system called 'Switch' which can be used to provide some heating/hot water in the case of failure of the main heat source i.e. gas boiler.

This must NOT be used for prolonged periods or used to supplement hot water production only in summer if the main system is working correctly.

Full details of the electrical requirements are provided in the Site Requirements and Installation sections of these instructions.

'Switch' will be activated by pressing the centre push button (marked 'Switch') located on the front control panel for at least 5 seconds (see diagram opposite). This replaces the function of the external boiler with the internal electric emergency boiler. The operating mode shown on the display will change from 'Normal' to 'Switch'. The 'Switch' symbol will flash as long as Switch is active.

Once the fault has been resolved return to normal boiler operation by pressing in the centre push button marked 'Switch' for at least 5 seconds. The operating mode on the display will return to 'Normal'.

During Switch operation the hot water and central heating will still operate in a timed mode. The operating times can be altered by resetting the clock, if required, to suit the reduced energy input available.



INSTALLATION

Site Requirements

The appliance is designed to be installed in an airing/cylinder cupboard and the relevant minimum dimensions are provided in the Technical Data section.

Because of the ease of installation we recommend that the cupboard construction is completed and painted before installation of the appliance. The cupboard door can be fitted after installation.

If the unit needs to be stored prior to installation it should be stored upright in a dry environment and on a level base/floor.

Installation and maintenance access is needed to the front of the appliance and above the F & E cisterns. See page 8 for further details.

The minimum dimensions shown allow for the passage/connection of pipes under the appliance from any direction as long as the appliance is installed on the installation base provided. If the installation base is not used extra space may be needed to allow connection to the pipework and the whole of the base area should be continuously supported on a material which will not easily deteriorate if exposed to moisture.

The floor of the cupboard needs to be level and even and capable of supporting the weight of the appliance when full. Details of the weight when full is provided in the Technical Data section.

The appliance is designed to operate as quietly as practicable. However, some noise (from pumps etc) is inevitable in any heating system. This will be most noticeable in cupboards formed on bulkheads, or at the mid span of a suspended floor. In these cases the situation can be improved by placing the appliance on a suitable sound deadening material.

Cupboard temperatures will normally be higher than in a conventional system and the design of the cupboard and door will need to take this into account. No ventilation is normally required to the cupboard.

A suitable location will be needed for the two separate feed and expansion cisterns. With the two smaller appliances, it may be possible to fit these at high level in the cupboard housing the BoilerMate A-Class OV SOL. However, it is normal for these to be fitted elsewhere in the property such as the roofspace. The 2 cisterns must be fitted at the same level and above the appliance in accordance with the details shown in Figure 1.10. The location will need to provide a suitable route from the appliance for the cold feed/expansion pipe and the open vent/safety pipe, as well as the warning/overflow pipe and the ballvalve supply from the mains cold water system.

An electrical supply must be available which is correctly earthed, polarized and in accordance with the latest edition of the IEE requirements for electrical Installations BS 7671.

The electrical mains supply needs to be 230V/50Hz.

Connection must be made using a double-pole linked isolator which has a contact separation of 3mm in both poles and is located within 1m of the appliance. The supply must only serve the appliance.

The minimum breaking capacity of the main isolator/cable sizes/lengths at 230V shall follow the recommendations in the table shown opposite.

A 3 core and earth 1.0mm² cable will be required from the BoilerMate A-Class OV SOL appliance to the remote boiler.

A 3 core and earth 1.0mm² cable will be required from the BoilerMate A-Class OV SOL appliance to the room thermostat.

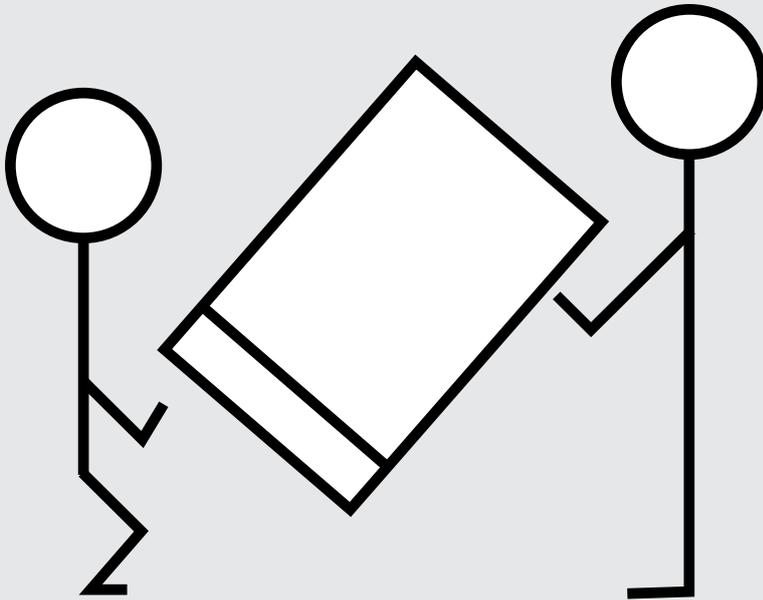
If the boiler incorporates a frost thermostat an extra 3 core and earth 1.0mm² supply cable will be required between the boiler and the BoilerMate to provide a supply to the boiler pump - see Electrical Connection for further details.

Note: A 2 x 0.75mm² sensor cable will be needed between the BoilerMate A-Class OV SOL and the solar panel. Dependant on the location of the panels/appliance, this may need to be fitted at first fix stage.

SITE REQUIREMENTS

Nominal full load current	Min rating of the isolator	Cable size	Max. recommended cable run-based on not exceeding 4% of the nominal voltage supply of 230 VAC using a type B breaker
28.5 Amps	32 Amps	6 mm ² (2 core & earth)	44 metres
Recommended circuit protection device - based on 0.4 second disconnection time		32 A type B circuit breaker to BS EN 60898 or 32A type B RCBO to BSEN 61009	

Electrical Supply requirements for BoilerMate A-Class



HANDLING

When lifting the unit work with someone of similar build and height if possible.
Choose one person to call the signals.
Lift from the hips at the same time, then raise the unit to the desired level.
Move smoothly in unison.

A specific manual handling assessment is shown in Appendix D at the rear of this manual.

Preparation/placing the appliance in position.

Details of the recommended positions for termination of the first fix pipework are provided in section the Technical Data section. The pipework can be located or its position checked using the template provided with each appliance. If these have been followed installation is very simple and much quicker than any other system.

The appliance is supplied shrink wrapped on a timber installation base. Carrying handles are also provided in the back of the casing.

The two feed and expansion cisterns complete with ballvalve and overflow/warning fitting are provided in a separate box. If manifold sets have been ordered these will also be provided separately.

The appliance should be handled carefully to avoid damage and the recommended method is shown opposite. Before installation the site requirements should be checked and confirmed as acceptable. The plastic cover and protective wrapping should be removed from the appliance and the installation base (provided) should be separated and placed in position.

The appliance can then be lifted into position in the cupboard on top of the base and the front panel removed by unscrewing the 2 screws and lifting the door up and out, ready for connection of the pipework and electrical supplies. The feed and expansion cistern support shall be installed ensuring that the base is fully supported, the working head of the appliance is not exceeded and the recommended access is provided for maintenance - see the Technical Data section.

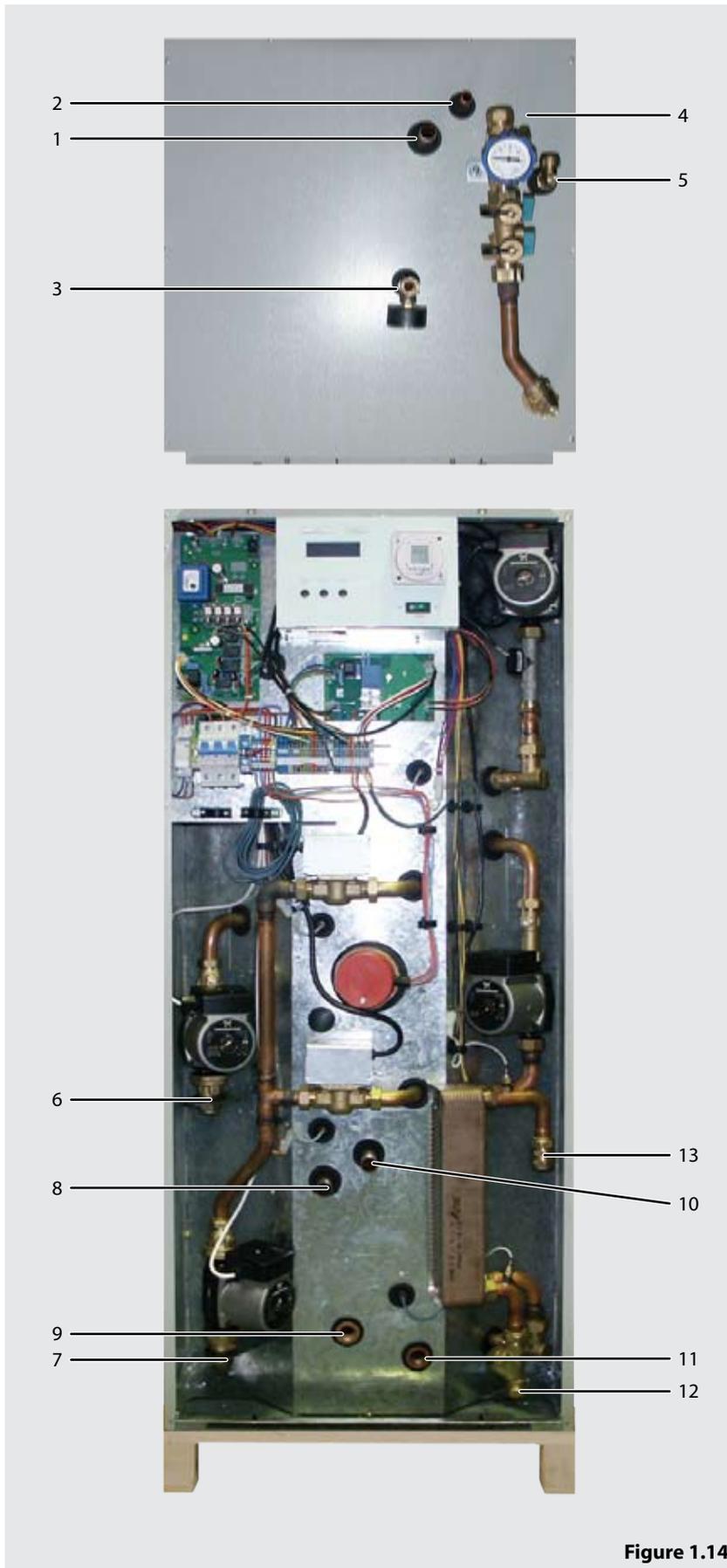
Note: Although the above guidance is provided any manual handling/lifting operations will need to comply with the requirements of the Manual Handling Operations Regulations issued by the H.S.E. See Appendix D for further details.

The appliance can be moved using a sack truck on the rear face although care should be taken and the route should be even.

In apartment buildings containing a number of storeys we would recommend that the appliances are moved vertically in a mechanical lift.

If it is proposed to use a crane expert advice should be obtained regarding the need for slings, lifting beams etc.

INSTALLATION



Connection/Supply Arrangements

The position of the pipework connections is shown opposite. Dimensions are shown in the Technical Data section.

All the connections are also labelled on the appliance. It is essential that the pipework is connected to the correct connection.

- 1 - Safety/open vent connection - 22mm copper tube
- 2 - Cold feed/expansion connection - 15mm copper tube
- 3 - Solar expansion vessel connection - 15mm compression
- 4 - Solar return connection (to collector) - 22mm compression
- 5 - Solar flow connection (from collector) - 15mm compression
- 6 - Heating flow connection - 22mm compression
- 7 - Primary return connection (to boiler) - 22mm compression
- 8 - Heating return connection - 22mm copper tube
- 9 - Solar coil drain connection - Rc 1/2
- 10 - Primary flow connection (from boiler) - 22mm copper tube
- 11 - Thermal store drain connection - Rc 1/2
- 12 - Domestic mains cold water connection - 22mm compression
- 13 - Domestic hot water connection - 22mm compression

All factory made joints should be checked after installation in case they have been loosened during transit.

All the fittings for the feed and expansion cistern should be installed to meet the Water Regulations, in a position to suit the particular site location and the cistern fitted on its supports/base.

The cold feed/expansion and safety/open vent pipework provided should be installed between the appliance and the feed and expansion cistern.

Figure 1.14

Note: When fitting the cistern, it must not be more than 6 metres above the base of the BoilerMate A-Class OV SOL appliance.

The open vent must have a continuous rise from the appliance to its discharge point above the F&E cistern.

Check and comply with the requirements of the Water Regulations/boiler manufacturer regarding the arrangement of the open vent.

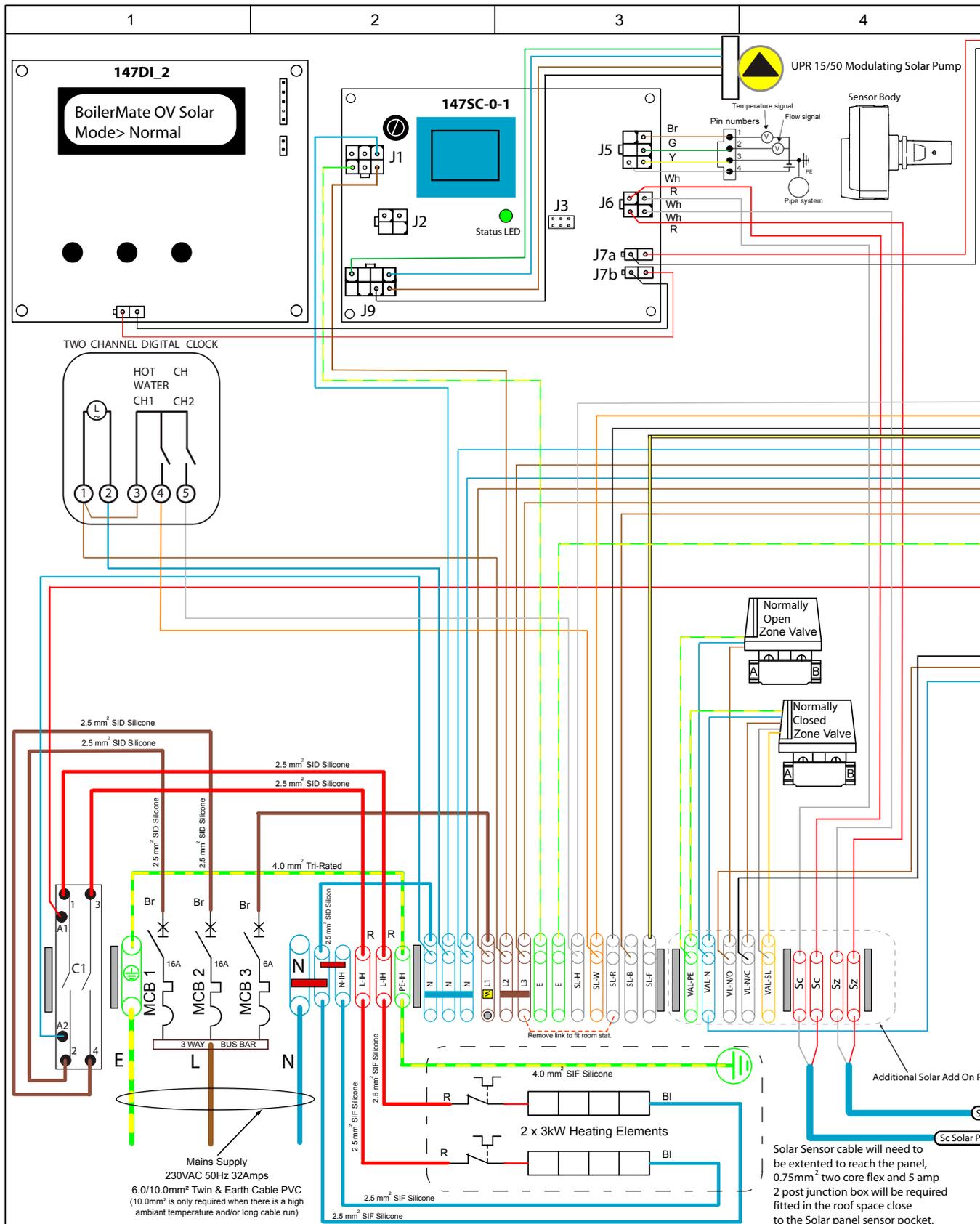
Obviously, if the feed and expansion cistern is being fitted in the roof space, then this and the pipework will need to be adequately insulated to protect against frost damage.

Combined feed and open vent pipe arrangements must not be used.

No valves should be fitted in the safety open vent which must be a minimum of 22mm copper pipe or equivalent.

The overflow/warning pipe shall have a continuous fall, be fitted to discharge clear of the building and be sited so that any overflow can be easily observed. It shall also be installed in a size and material suitable for use with heating feed and expansion cisterns in accordance with BS 5449 i.e. HT plastic or copper and should not have any other connections to it.

INSTALLATION



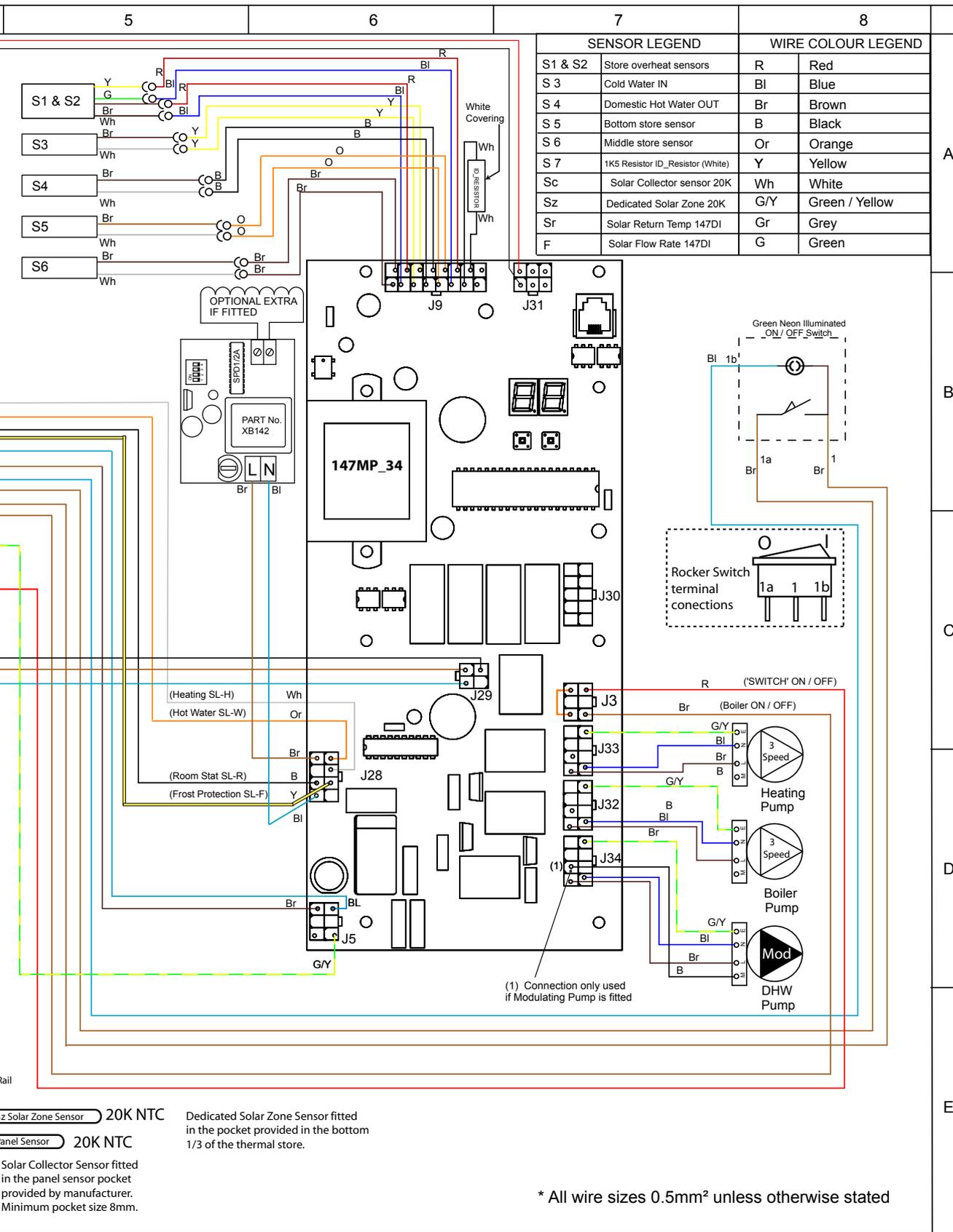
Solar Sensor cable will need to be extended to reach the panel, 0.75mm² two core flex and 5 amp 2 post junction box will be required fitted in the roof space close to the Solar panel sensor pocket.

INSTALLATION

DRN. S. McGachie	DATE 03-03-08	CH'KD. S. Gataroa	SIGN.	DATE 03-03-08	APP'D. S. Gataroa	SIGN.	DATE 03-03-08
DATE : MARCH 2008		ISSUE No : 4			DO NOT SCALE FROM THIS DRAWING. COPYRIGHT OF THIS DRAWING IS RESERVED. IT IS NOT TO BE REPRODUCED COPIED OR DISCLOSED TO A THIRD PARTY EITHER WHOLLY OR IN PART WITHOUT OUR WRITTEN CONSENT. © GLEDHILL WATER STORAGE LTD.		
APPROVED							



INSTALLATION



GLEDHILL WATER STORAGE LTD.
 SYCAMORE TRADING ESTATE
 SQUIRES GATE LANE
 BLACKPOOL
 LANCASHIRE
 FY4 3RL

TITLE
 BOILERMATE 'A' Class OV SOL ADL1
 With Gledhill Solar Controller
 and two 2 port valves, factory fitted
 2 channel digital clock.

JOB NAME
 Electrical Schematic for :
 BOILERMATE 'A' class OV SOL
 Appliance fitted with 2 channel digital clock

DRG. SIZE	DRG. NAME
A3	'A' Class BoilerMate OV SOL issue4.ai

INSTALLATION

INSTALLATION

Electrical Connection

The BoilerMate A-Class OV SOL is pre-wired to DIN rail terminals from the A.C.B. and plumbers are well able to complete the electrical installation provided they adhere strictly to the IEE Requirements for Electrical Installations BS 7671.

All the terminals are suitably labelled.

Note: Do not attempt the electrical work unless you are competent to carry it out to the above standards.

Before commencing check that the power source is in accordance with the Site Requirements section and ensure that it is isolated.

Run the external wiring through the service slot provided in the base of the appliance.

The twin and earth 2 core input cable from the isolator to the appliance must not be less than 6mm² PVC grade to BS 6500.

This supply cable must be fed via a 32 amp double pole isolator no more than 2 metres from the appliance.

Make the connections as shown opposite.

The appliance is provided with a link between terminals L2 and SL-R on the terminal connections. This must be removed if a room thermostat is fitted see opposite.

Clamp the cables in the clamps provided below the terminal connections and ensure all cables are routed to avoid hot surfaces.

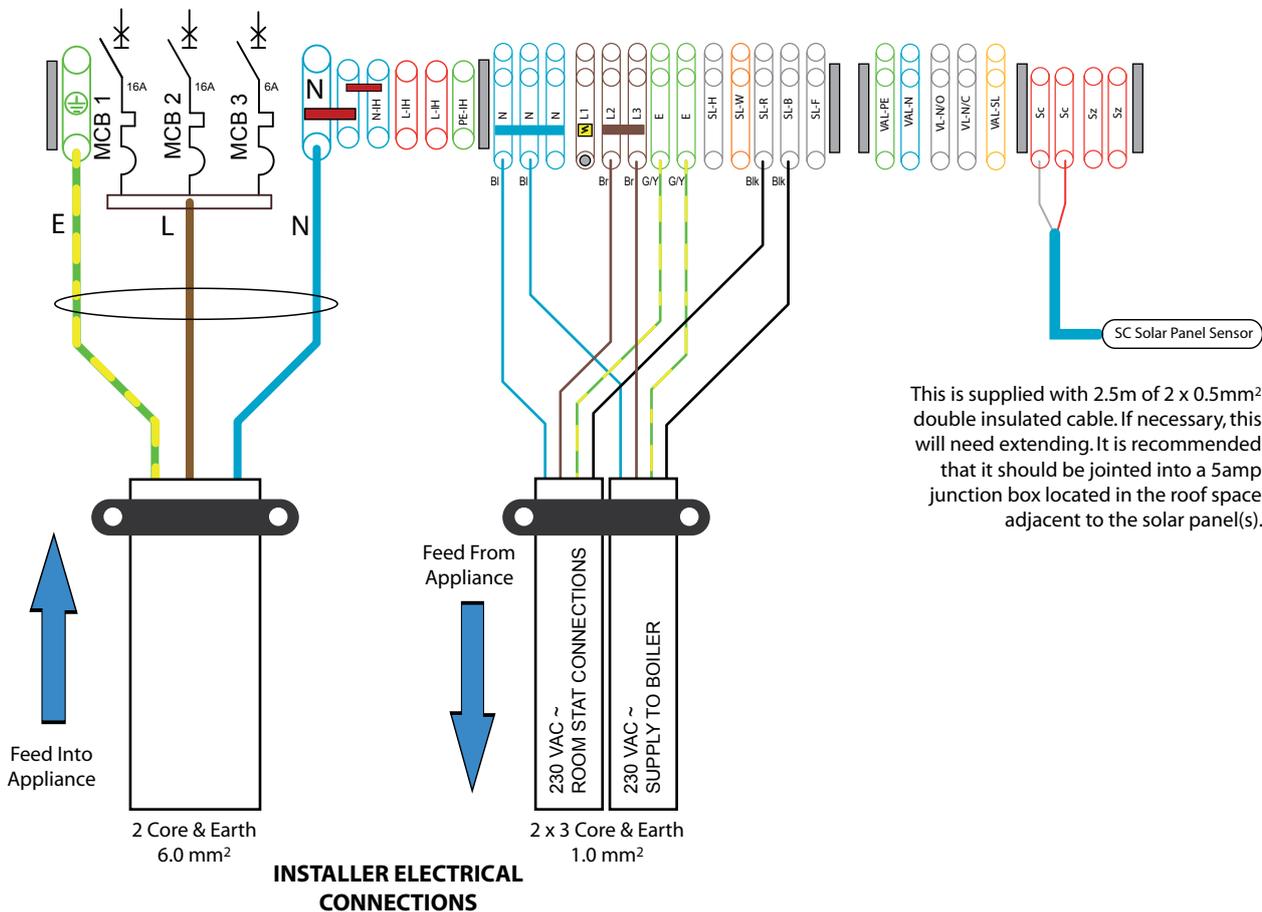
The supply to the BoilerMate A-Class OV SOL must be protected by a type B MCB to BS EN 60898 of at least 32 amps rating.

Two installer supplied cables are required to connect the external room thermostat and boiler. These cables must each be 4 core and at least 1mm² or above in size.

For maintenance purposes it is essential that a 3 pole isolator is positioned within 2 metres of the remote boiler installation. This ensures the installation meets Corgi requirements for future maintenance/service.

Note: The appliance controller is polarity sensitive therefore if the live and neutral cables are connected incorrectly the red light on the front panel will flash rapidly and can not be reset by operating the push button.

BOILERMATE 'A' CLASS OV SOL EXTERNAL CABLE CONNECTION DIAGRAM



INSTALLATION

The BoilerMate A-Class OV SOL incorporates a pump overrun for the boiler pump. If a permanent live is required for the boiler then use L3 which is live whenever the power ON/OFF rocker switch is in the ON position

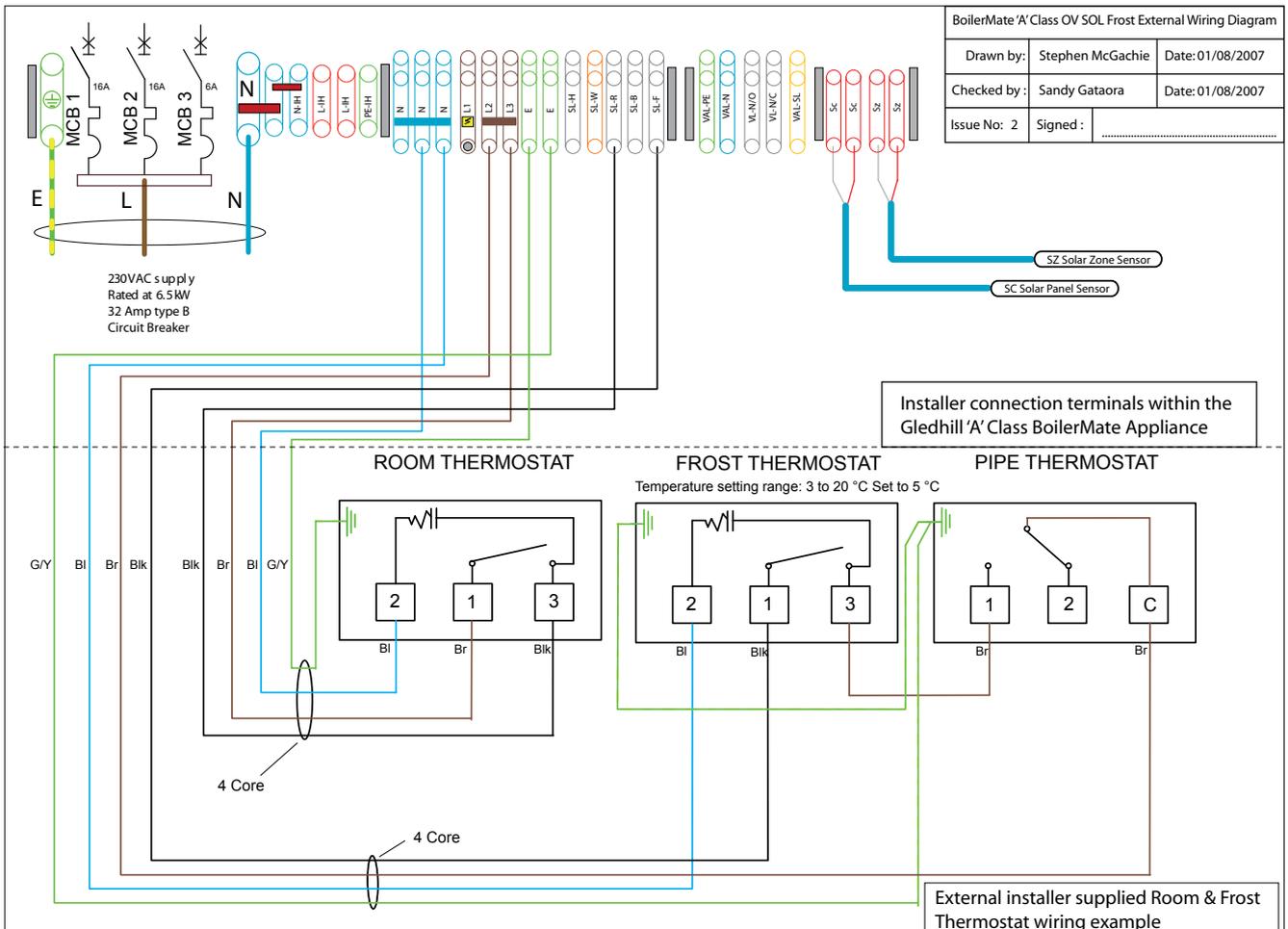
The boiler manufacturers wiring instructions should be read in conjunction with this manual.

Before switching on the electrical supply check all the factory made terminal connections to ensure they have not become loose during transit.

Frost Protection

When frost protection is required for the whole house or where a base temperature is required during cold weather the central heating channel (2) of the clock should be put in the constant position and the room thermostat adjusted to a suitable setting.

When the location of the boiler means that frost protection is required for the boiler circuit then a frost thermostat and pipe mounted thermostat should be fitted in the normal way and wired back to the special terminal (SL-F) provided in the appliance as shown below.



INSTALLATION

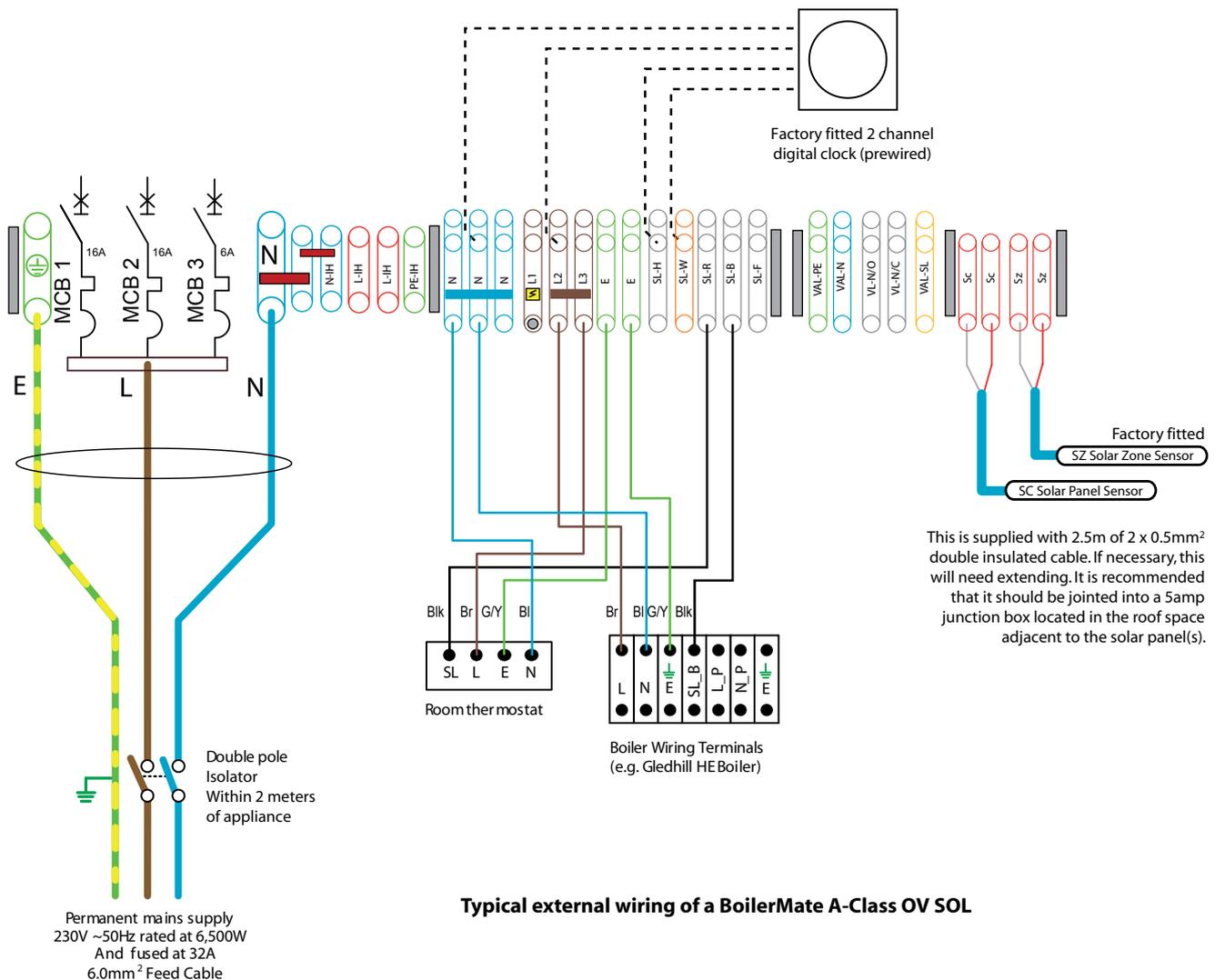
Electrical Power/Control Supplies

WARNING: THE BOILERMATE A-CLASS OV SOL IS FITTED WITH AN ELECTRIC BACKUP SYSTEM 'SWITCH':

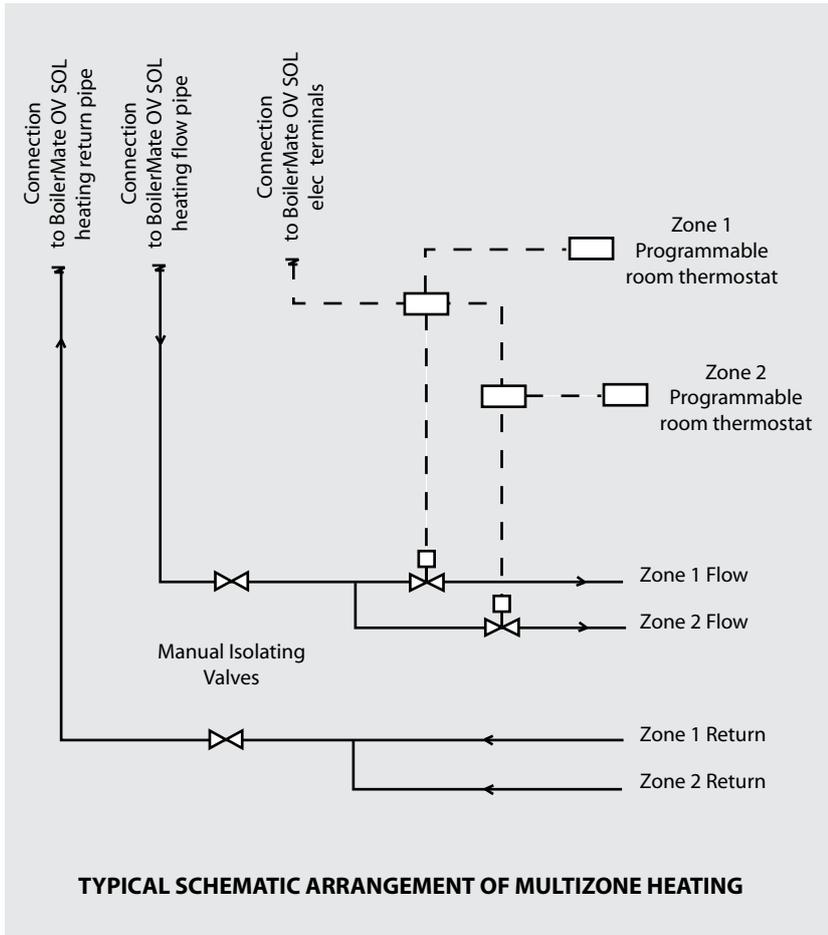
IMPORTANT: ELECTRICIAN/INSTALLER PLEASE NOTE.

THE 2 x 16A MCB's (MCB1 and MCB2) FOR THE 'SWITCH' ELECTRIC BACKUP SYSTEM ARE SUPPLIED SET IN THE 'OFF' POSITION BY AN ADHESIVE WARNING LABEL. MCB3 IS SUPPLIED SET IN THE 'ON' POSITION. THE GAS BOILER CAN BE COMMISSIONED WITH THE SWITCHES IN THESE POSITIONS AND MCB1 AND 2 MUST NOT BE SWITCHED ON BEFORE THE GAS BOILER HAS BEEN FULLY TESTED/COMMISSIONED.

AFTER THE GAS BOILER HAS BEEN COMMISSIONED MOVE MCB'S 1 AND 2 TO THE 'ON' POSITION WHICH WILL BREAK THE WARNING LABEL AND THEN COMMISSION THE SWITCH FACILITY.



Typical external wiring of a BoilerMate A-Class OV SOL



Zoned Heating Systems

If a zoned heating system (or a separate towel rail circuit) is required, this can be provided in the conventional way from the main heating flow and return.

In many cases this has been achieved by raising the appliance in the cupboard to create an accessible space which will allow easy maintenance of the necessary zone valves etc.

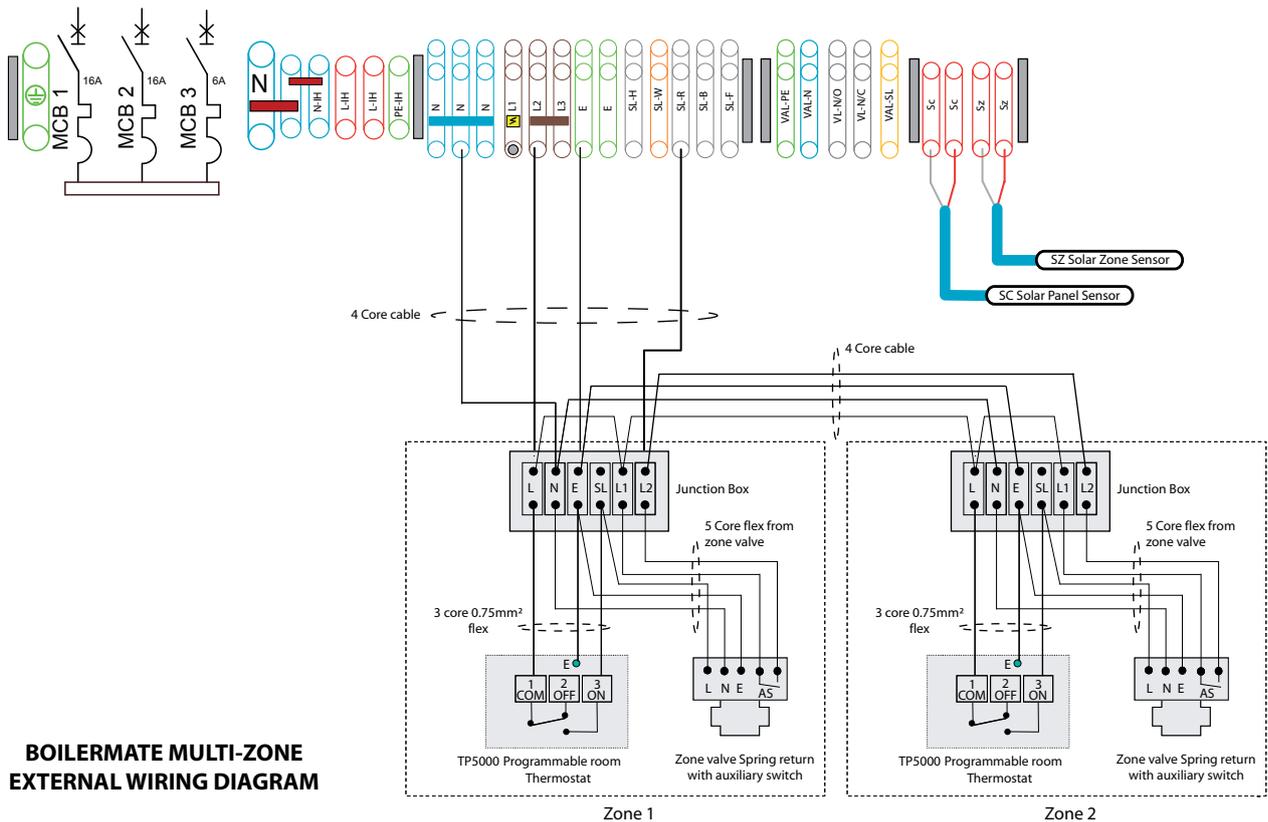
A typical schematic arrangement for a 2 zone system is shown opposite. Further zones can be added in the same way if required.

Time and temperature control of each zone valve can be achieved by fitting a programmable room thermostat.

A typical wiring arrangement based on the use of a Danfoss TP5000 programmable room thermostat is shown below.

However other ways of controlling the zones using multi channel clocks and room thermostats can be used if preferred.

When used in this way channel 1 of the digital clock fitted to the front of the BoilerMate A-Class OV SOL can be set as normal to control the hot water but channel 2 must be set to continuous operation mode.



INSTALLATION

Domestic Water and Heating Systems

Open the incoming stop valve and fill the domestic mains cold and hot water systems.

Fill the whole of the primary heating system with potable water through the feed and expansion cisterns.

Check the water level in the feed and expansion cisterns and adjust the ballvalve if necessary.

Check the whole of the primary heating and domestic hot and cold distribution system, including the boiler and BoilerMate A-Class OV SOL, for leaks.

It is essential that all systems function properly for optimum performance.

To achieve this, the primary system should be commissioned in accordance with good practice and generally in accordance with the requirements of BS 6798, BS 5449 and BS 7593.

Full details of the requirements for system preparation/water treatment and commissioning are given in the Domestic Heating Compliance Guide.

When using either cleansing or corrosion inhibitor chemical, the manufacturers instructions must be followed.

Although the BoilerMate A-Class OV SOL has no special water treatment requirements because of the nature of materials in these systems, we recommend the use of a cleansing agent as well as a corrosion inhibitor. We generally recommend the use of Fernox products with the BoilerMate A-Class OV SOL appliances.

Model	Minimum volume to be added to the system (packs)
	Cleansing agent - Fernox cleaner (F3)
BMA 215 OV SOL	2.25
BMA 225 OV SOL	2.50
BMA 235 OV SOL	3.00
BMA 245 OV SOL	3.75
BMA 265 OV SOL	4.50
BMA 285 OV SOL	5.25

Model	Minimum volume to be added to the system (packs)
	Corrosion inhibitor agent - Fernox protector (F1)
BMA 215 OV SOL	2.25
BMA 225 OV SOL	2.50
BMA 235 OV SOL	3.00
BMA 245 OV SOL	3.75
BMA 265 OV SOL	4.50
BMA 285 OV SOL	5.25

Note: The above quantities have been based on 500ml pack/100 litres of primary water in accordance with the manufacturers recommendations.

Cleansing the Primary System

When determining the quantity of cleanser required, be sure to allow for the increased volume of water in the primary circuit due to the thermal store - see the Technical data section for volumes.

In most cases the quantities shown opposite will be adequate for a typical installation.

Primary Water System Treatment

When determining the quantity of inhibitor required, be sure to allow for the increased volume of water in the primary circuit due to the thermal store - see the Technical data section for volumes.

In most cases the quantities shown opposite will be suitable for a typical installation.

Failure to adequately clean and inhibit the heating system will lead to problems which will not be covered by the appliance warranty.

POWERFLUSHING/CLEANING OF THE HEATING SYSTEM

If it is proposed to 'powerflush' the heating system the BoilerMate appliance must be isolated from the heating system being cleaned. Failure to do this could seriously damage the appliance. Therefore, any damage caused to the appliance during powerflushing will not be covered by the appliance warranty.

Note: Do not plug the cold feed/open vent to carry out powerflushing as this will also cause serious damage to the appliance.

When carrying out the work always comply fully with the manufacturers instructions for the powerflushing equipment being used.

If in any doubt please consult our Technical Helpline.

INSTALLATION

Once the system is finally filled turn down the servicing valve for the ballvalve in the F & E cistern to the point where the warning/overflow will cope with the discharge arising from a ballvalve failure.

Cleansing Hot/Cold Water System Treatment

Fully flush and if necessary chlorinate the hot and cold water system in accordance with the recommendations in the Model Water Byelaws and BS 6700.

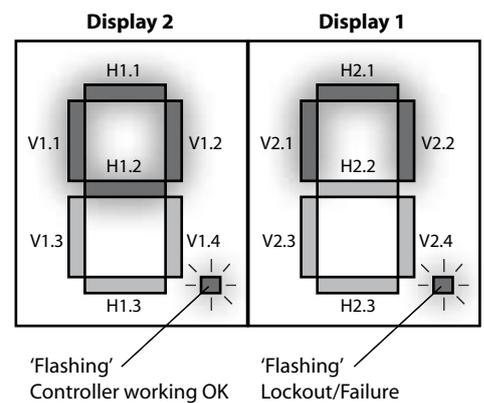
Note: Incorrect chlorination will damage the plate heat exchanger so care must be taken that the system is fully flushed. Failure to do this will lead to problems that are not covered by the appliance warranty.

Commissioning the BoilerMate/Primary System

For maximum system efficiency the store thermostat must be in control of the boiler i.e. the boiler will operate to suit the demands of the store thermostat and not on its own integral thermostat. Once commissioned, the appliance will operate automatically on its controls.

- The operation of the BoilerMate A-Class OV SOL appliance is controlled by the main appliance control board. The functions can be checked on the display window on the front of the appliance or on the 2 digit display on the appliance control board. The following descriptions generally refer to the 2 digit display but details of the operation of the display window on the front of the appliance are covered on pages 13-14 of these instructions. Either can be used. The demands are shown on display 2 (left hand) and the resultant actions on display 1 (right hand).
- A diagram and table showing the function of each LED is shown opposite.
- Set the BoilerMate A-Class OV SOL power switch to on (the dot in the right hand corner of display 2 will flash).
- Set the hot water channel (1) on the digital clock on the front of the appliance to 'Continuous Operation Mode'. V1.1, H1.1 and H1.2 will be on.
- Set the heating channel (2) on the digital clock to the off position.
- Set the boiler power switch to the on position and the thermostat to maximum (H2.3 and V2.1 will be on).
- Commission the boiler as per the boiler manufacturers instructions, making sure any air is vented from the primary circuit.
- Check that the store sensor reaches its set point (77°C) and switches off the boiler. The primary pump will continue to run for a period of time to ensure the boiler cools down safely and any residual heat is transferred to the BoilerMate A-Class OV SOL (V2.1 will go off but H2.3 will remain on for 3 minutes).
- Check and adjust the speed of the boiler pump to provide a differential temperature of less than 8°C across the primary flow and return (with the heating off).
- Once the boiler/primary circuit is commissioned, the operation of the 'Switch' emergency electric back up system can be checked.
- Switch off the boiler.
- Draw a bath full of hot water to lower the store temperature and allow 'Switch' to operate.
- Switch on MCB1 and MCB2 which will break the warning label and allow power to be provided to the system.

- Press in the centre button on the front panel marked 'Switch' for 5 seconds. The mode indication on the display panel will change from normal to Switch and will flash. Check that current is being drawn (it should be about 26 amp) with the aid of a clamp meter on the supplies to the element.
- If a suitable meter is not available once the bath full of hot water has been drawn from the appliance the store temperature should be noted. With no further demand a rise in store temperature of 5 - 10°C in about 15 - 20 minutes (dependent on store size) should be observed. Display segment V2.2 will be on whilst 'Switch' is working.
- Switch the boiler back on and set channel 1 (HW) of the clock as required.



Note: If both 'dots' are flashing then the controller is working. However it is a warning of limited/alternative control functionality.

LED	Description
H1.1	Middle store sensor calling for heat
H1.2	Bottom store sensor calling for heat
H1.3	Spare
V1.1	Clock (channel 1) calling for heat (HW)
V1.3	Clock (channel 2) calling for heat (CH)
V1.4	Room thermostat calling for heat
H2.1	PHE pump on
H2.2	Heating pump on
H2.3	Boiler system pump on
V2.1	Boiler on
V2.2	Switch on / electric boost on
V2.4	Boiler boost mode on

COMMISSIONING

INSTALLATION

Commissioning the Space Heating

- The central heating is best commissioned when the store is hot and therefore should be carried out after commissioning the BoilerMate A-Class OV SOL/Primary system.
- Set channel 2 of the digital clock to continuous operation mode and ensure that the room thermostat is calling for heat. This will be indicated by display segments V1.3 and V1.4 being on respectively. The BoilerMate A-Class OV SOL controller will now turn on the central heating pump and this will be indicated by display segment H2.2 being lit.
- The boiler will switch on to achieve/maintain the temperature in the heating circuit which will be indicated by V2.1 and H2.3 being lit.
- Wait until the heating circuit has reached its normal temperature before balancing the system in the usual way to achieve a temperature drop of about 10°C.
- Set channel 2 of the digital clock and room thermostat as per manufacturer's instructions supplied and ensure that the digital clock instructions along with the user instructions for the appliance are left with the user.

Commissioning the Domestic Hot Water System

- When the store is fully up to temperature, open a hot water tap nearest to the appliance at approximately 10 litres/minute. After about 2 – 3 seconds, the plate heat exchanger pump will start. This is indicated on the A.C.B. by display segment H2.1.
- The hot water flow temperature should settle at about 52°C. Close this tap and open the hot bath tap at maximum flow rate and record the flow rate and the hot water temperature in the 'Benchmark' logbook.
- Close the hot water tap(s) and after few seconds, the plate heat exchanger pump will stop running and display segment H2.1 will turn off.

Filling/Commissioning The Solar System Using A Solar Filling Tank/Pump

- Make sure all solar connections are fully tightened and all electrical connections are sound.
- Make sure the BoilerMate A-Class OV SOL appliance has been commissioned and is working correctly.
- Check the air side of the solar expansion vessel is set to the correct pressure (normally 1bar) and top up if necessary.
- Ensure controller display on the BoilerMate A-Class OV SOL is illuminated and that no error messages are present.
- Close the regulating valve between the fill and drain connections on the fill and flush valve using a flat blade screwdriver.
- Connect the hoses to the connections provided on the fill and flush valve on the top of the appliance ensuring the flow pipe from the pump is connected to the filling connection (nearest the temperature gauge) and the return pipe is connected to the flush/drain connection.
- Close the quarter turn regulating valve, sited below the filling tank on the return to the pump.
- Fill the pumping station tank with at least 30 litres of the antifreeze solution¹.
- Ensure the switch on the pump is in the OFF position.
- Connect the pump to an available electrical supply. Make sure you use an RCD safety device. (IF THE FILLING PUMP IS IN A POSITION AWAY FROM THE FILL AND FLUSH VALVE, IT MUST BE CONTROLLED VIA AN EXTENSION LEAD AND RCD CIRCUIT BREAKER. THIS IS SO THE POWER TO THE FILLING PUMP CAN BE ISOLATED SAFELY LOCAL TO THE FILLING POINT).
- Open both the quarter turn valve handles on the fill and flush valve fully.
- Fully open the quarter turn isolation valve on the return pipe on the top of the fill tank.
- Slightly open the quarter turn isolation valve on the feed to the pump.
- Slightly loosen the connection on the expansion vessel.
- Turn on the filling pump - checking all the connections you have made.
- Now wait for the antifreeze solution to slowly vent from the loosened expansion vessel connection, closing the connection when venting is complete.
- Visually inspect all connections you have made for leakage.
- You should see bubbles appearing from the return pipe into the filling tank from the flush/drain connection point.
- Occasionally you will have to vent air from the system until the antifreeze solution is evident.
- As the bubbles lessen you will need to open the quarter turn valve on the feed to the pump more, but only slightly. This is a continuous process that needs to be done as the bubbling decreases.
- When all bubbles have stopped, (WHICH WILL NORMALLY TAKE OVER AN HOUR) you need to turn off the return isolation tap on the filling pump and pressure the system to 4 bar (WATCHING THE LEVEL OF FLUID IN YOUR BOTTLE) and adding more antifreeze solution if required.
- When a pressure of 4 bar is achieved close the filling point on the fill and flush valve at the SAME time switch off the power at the RCD safety device.
- Now leave the system under this pressure for at least 30 minutes. Check the system for leaks, including the roof connections.
- If after 30 minutes the pressure has not dropped and there are no leaks evident, slowly drop the pressure in the system to 1 bar.
- Repeat the above operations identified by the grey background.
- You will now see bubbles in your bottle again (this is because you left the system at rest and the air has settled).
- Continue until the bubbles stop. Stop the pump on the filling tank and open the regulating point on the fill and flush valve with a screw driver. Set the solar pump on the Gledhill Sol appliance running.
- Leave this running for approximately 10 minutes (venting any air as required).
- Re-set the system pressure to the expansion vessel calculation.
- The system is now commissioned and will operate automatically under control of the solar controller fitted to the BoilerMate A-Class OV SOL appliance.

NB: THE MINIMUM SYSTEM PRESSURE SHOULD BE SET AT NO LESS THAN 1.3 BAR THE EXPANSION VESSEL PRESET PRESSURE SHOULD BE SET AT NO LESS THAN 1.0 BAR.

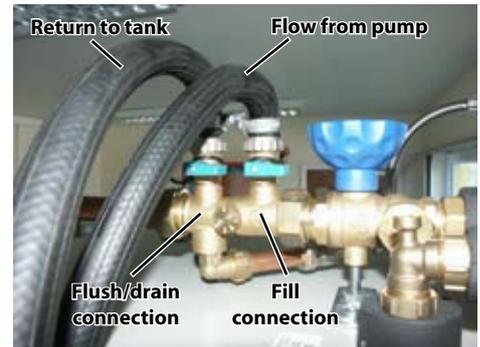


Figure 1.15



Figure 1.16

- ¹ Note: You should only fill the collector when there is no direct irradiation from the sun (or cover the collectors). You must only use the correct antifreeze for the type of panel/collector being installed (Premixed FS10 for the ORET evacuated tube collectors and FS10 antifreeze mixed 40% antifreeze/60% water (-24°C) for the IRCP and ORCP flat plate collectors. As it may not be possible to fully empty the panels/collectors once they have been filled, we would recommend that any collector arrays likely to be exposed to frost should only be filled with the correct antifreeze at the right strength even for pressure/function tests.

The method of filling/commissioning the solar system is relevant to the Gledhill Solar Package and is based on the use of filling tank/pump which is available as an optional extra.

Although the previously described method of filling is recommended, other methods can be used if required. A connection is provided on the fill and flush valve (opposite the fill connection), to allow a temporary filling loop to be fitted to allow the system to be repressurised back to system pressure without the need for the filling tank/pump during subsequent maintenance visits.

INSTALLATION

Important Do's and Don'ts

1. **DO** check the incoming mains water pressure and flow rate are adequate. (The preferred range of mains pressure is 2-3bar).
2. **DO** check that all connections are in accordance with the labelling on the thermal store.
3. **DO** adjust the ballvalve so that the water level in the F & E cistern when the system is cold is correct and does not overflow when the whole of the system is at maximum temperature.
4. **DO** make sure that there is adequate clearance above the F & E cistern to service the ballvalve/meet the Water Regulation Requirements.
5. **DO** ensure that any range rated boilers are set at the **highest output** and the boiler thermostat is set to **maximum** for all boilers.
6. **DO** ensure that the bottom of the F & E cistern is at least 250mm above the highest point on the radiator circuit or the highest point of the system.
7. **DO** check that the bottom of the F & E cistern is not more than 6m above the base of the BoilerMate appliance.
8. **DO** insulate any exposed pipework in the BoilerMate A-Class OV SOL cupboard.
9. **DO** plumb the overflow/warning pipe in a 20mm internal diameter pipe material which is suitable for use with a heating F & E cistern, in accordance with BS 5449 (such as copper or H.T. plastic) and ensure that it has a continuous fall and discharges in a conspicuous external position.
10. **DO** check the pump settings
 - a. The boiler pump should be set to give a temperature difference across the boiler of 8°C or less.
 - b. The heating pump should be set to give a temperature difference across the flow and return of not more than 11°C.
 - c. The hot water plate heat exchanger pump should be set at **maximum**.
11. **DO** ensure that the bypass valve for the heating system (if fitted) is set correctly.
12. **DON'T** use a combined feed and vent on BoilerMate A-Class OV SOL installations.
13. **DON'T** use a BoilerMate A-Class OV SOL on a sealed primary i.e. closed system.
14. **DON'T** use pipe smaller than 28mm between the boiler and the BoilerMate A-Class OV SOL when the boiler rating exceeds about 20kW (about 70,000 Btu/h).
15. **DON'T** use dipped flow and return between the boiler and the BoilerMate A-Class OV SOL unless the boiler is fitted with an overheat thermostat. If necessary check with the suppliers of the boiler.
16. **DON'T** operate the 'switch' backup facility until the system is fully fitted, vented and commissioned.
17. **DON'T** place any clothing or other combustible materials against or on top of this appliance.

Hand over to User

- Explain the system and the BoilerMate A-Class OV SOL appliance controls to the user.
- Explain how to operate the heating and hot water controls to the user. This should include setting 'on' and 'off' times and the room temperature on the room thermostat as well as the use of thermostatic radiator valves.
- Advise on boiler operation and maintenance advised in the boiler manual.
- Explain how to select and check the operation of the emergency backup electric boiler 'switch operation' - if there is a failure of the boiler.
- Handover appliance and room thermostat user instructions and put the completed "Benchmark" logbook and the appliance instruction manual in the pocket on the inside of the appliance front panel.
- DON'T place any clothing or other combustible materials against or on top of this appliance.

This product is covered by the 'Benchmark' scheme and a separate commissioning/service log book is included with this product. This must be completed during commissioning and left with the product to meet the Warranty conditions offered by Gledhill.

These Instructions should be placed along with the component manufacturers instructions in the pocket provided on the rear of the front panel. The front panel should then be refitted.

Annual Servicing

No annual servicing of the BoilerMate A-Class OV SOL appliance is necessary.

However, if required, the operation of the controls and a hot water performance test can be carried out when servicing the boiler to prove the appliance is working satisfactorily and within its specification.

At the same time, a check should be made of the solar system pressure/expansion vessel charge pressure along with a visual check of the solar panels.

It is recommended that after five years, the concentration/quality of the solar system antifreeze solution is checked and, if necessary, replaced.

Changing Components

Free of charge replacements for any faulty components are available from Gledhill during the in-warranty period (normally 12 months).

After this, spares should be obtained direct from Gledhill using the 'Speed Spares' service, or through any of the larger plumbers merchants/specialist heating spares suppliers.

Help and advice is also available from the Technical Helpline on 01253 474401.

However, all components are readily accessible and can be changed quickly and easily by the installer using common plumbing practice.

Note:

The PHE circulating pump is a Grundfos UPR 4 wire type and any replacement must be the same model obtained direct from Gledhill. Failure to do this will affect the hot water performance.

The solar flow / temperature sensor fits in to a wet pocket. DO NOT REMOVE before isolating / safely draining down this part of the solar circuit using the valve provided as part of the fill / flush valve and the solar pump isolating valve.

The solar circulating pump is also a Grundfos UPR 4 wire type produced specially for solar systems and is identified by the yellow label on the head. Again, any replacement must be the same model obtained direct from Gledhill. Failure to do this will affect the solar performance.

Take care when carrying out any work on the solar circuit as the pipework / solar fluid could be extremely hot.

SERVICING

Key No.	Description	Supplier/Components	Stock Code No.	Models	Gas Council No.
1	PHE pump	Grundfos UPR 15-50 (modulating)	GT089	All	
2	Plate heat exchanger (PHE)	SWEP 24 Plate heat exchanger	GT017	All	
3	PHE pump isolating valve - inlet	Vemco	GT133	All	
4	PHE pump isolating valve - outlet	Vemco	GT135	All	
5	CW inlet Y-line strainer		XB314	AI	
6	DHW in/out sensor	Tasseron	GT198	All	
7	Central heating pump	Grundfos, UPS 15-50	XB004	215, 225, 235	
		Grundfos, UPS 15-60	XB241	245, 265, 285	
8	Central heating pump isolating valves	Vemco, Inlet & Outlet	XB121	215, 225, 235	
		Vemco, Inlet & Outlet	XB122	245, 265, 285	
9	Boiler pump	Grundfos, UPS 15-50	XB004	215, 225, 235	
		Grundfos, UPS 15-60	XB241	245, 265, 285	
10	Boiler pump isolating valves	Vemco, Inlet & Outlet	XB121	215, 225, 235	
		Vemco, Inlet & Outlet	XB122	245, 265, 285	
11	Boiler return zone valves	Honeywell 28mm 2 port valve n/o (top)	XB165	235 - 285	
		Honeywell 28mm 2 port valve n/c (bottom)	XG012	235 - 285	
		Honeywell 22mm 2 port valve n/o (top)	XB164	215, 225	
		Honeywell 22mm 2 port valve n/c (bottom)	XG083	215, 225	
12	F&E cistern ball valve	Vemco	FT206	All	
13	1 x 6 kW switch immersion heater	Wardtec	XB468	All	
14	Bottom store sensor	Tasseron	GT198	All	
15	Middle store sensor	Tasseron	GT198	All	
16	Top (OHT) store sensor	Tasseron	GT199	All	
17	Main PCB controller	Argus Vision	XB442	All	
18	Front panel digital display membrane	R H Technical	XB473	All	
19	Front panel display wiring harness	R H Technical	XB057	All	
20	Internal fuses/circuit protection	MCB Single Pole 6A x 1	XB449	All	
		MCB Single Pole 16A x 2	XB450	All	
21	Switch contactor	Telemecanique	XB014	All	
22	DIN rail terminals	Wago	NSI	All	
23	Complete DIN rail assembly	Wago	XB466	All	
24	Complete wiring harness			All	
25	On-Off rocker switch	Arcoelectric	CA006	All	
26	2 channel digital programmer	Grasslin	XB218	All	
27	Solar pump	Grundfos, UPR 15-60 (modulating)		All	
28	Solar pump inlet valve		GT135	All	
29	Solar flow/temperature sensor (SR)	Grundfos		All	
30	Solar fill/flush valve assembly	Sonnenkraft	XB160	All	
31	Solar anti gravity check valve	Sonnenkraft	XB161	All	
32	Solar temperature gauge	Sonnenkraft	XB162	All	
33	Solar pressure gauge	Sonnenkraft	XB163	All	
34	Solar store sensor (SZ)	Tasseron		All	
35	Solar collector sensor (SC)	Tasseron		All	
36	Solar control board	Argus Vision		All	

SERVICING



SHORT PARTS LIST

SERVICING

Fault Finding

Despite everyone's best efforts some problems could occur and lead to complaints from the householder.

The main appliance control board has some fault diagnostic ability, particularly in relation to the electrical system/sensors. Details of this are provided on page 13. Other complaints can generally be grouped into the following three main categories:-

1. The system is noisy
2. Hot water service is unsatisfactory
3. Space heating is unsatisfactory

The following checks should be carried out by the installer before calling the manufacturer.

1. Causes of a 'Noisy' System

Noisy pump operation

Check the level of water in the F & E cistern - adjust and vent the pump/system if necessary.

Check the pump speed setting of the boiler pump - reduce if necessary but ensure that the temperature rise across the boiler does not exceed 8°C.

Check the pump speed setting of the heating pump - reduce if necessary but ensure a temperature difference across the flow and return does not exceed 11°C.

Check and adjust if necessary the heating system bypass valve.

Check that the radiators are correctly balanced.

Noisy boiler operation

Check the flow rate through the boiler at full gas rate by measuring the temperature rise across the boiler. If the temperature rise is greater than 8°C, then increase the pump speed.

Check the level of water in the F & E cistern and the working head on the boiler.

Check and vent the system if necessary.

Check that the firing of the boiler is being controlled by the BoilerMate A-Class OV SOL appliance and that it is not cycling on its own thermostat.

Noise when hot water tap is opened

If the plate heat exchanger pump is noisy when the hot water tap is opened, then check the level of water in the F & E cistern and vent the pump if necessary.

Water hammer - loose pipework and/or tap washers.

2. Causes of 'Unsatisfactory Hot Water Service'

Check that the BoilerMate is full of water i.e. level of water in the F & E cistern is correct when system is cold.

Check boiler thermostat - this should be set at maximum.

Check that the boiler flow temperature is adequate when it stops firing.

Check that the store is charging to at least 77°C.

Check that the hot water plate heat exchanger pump stops and starts when the hot water tap is opened and closed.

Check that the space heating and hot water load is not greater than the boiler output and that the BoilerMate A-Class OV SOL model is suitable for the type of dwelling.

If all the above checks are satisfactory then it is possible that the performance of the heat exchanger is impaired by scale. In this case the hot water flow rate will be noticeably less than the cold water flow rate. Replace with a factory exchange unit and re-check hot water performance.

3. Causes of 'Unsatisfactory Space Heating'

Check the boiler thermostat - this should be set at maximum.

Check that the boiler flow temperature is adequate to satisfy the store sensor.

Check the operation and the settings of the heating programmer and the room thermostat.

Check that the heating system pump is circulating the water to the radiator circuit.

If some rooms are not being heated properly, then balance the system/check the operation of the thermostatic radiator valves (if fitted).

Overflow from Feed and Expansion Cistern

Check that the controlled level of water in the cistern is no higher than necessary. Adjust if required.

If problems occur with the solar system, they should be investigated by a suitably qualified solar installer.

Powerflushing/Cleaning Of The Heating System

If it is proposed to 'powerflush' the heating system we would recommend that the BoilerMate A-Class OV SOL appliance is isolated from the heating system being cleaned. Failure to do this could seriously damage the appliance.

When carrying out the work always comply fully with the manufacturer's instructions for the powerflushing equipment being used.

If in any doubt please consult our Technical Helpline.

Note: If the A.C.B. board is replaced it will need setting to the appliance type - see page 13 for further details.

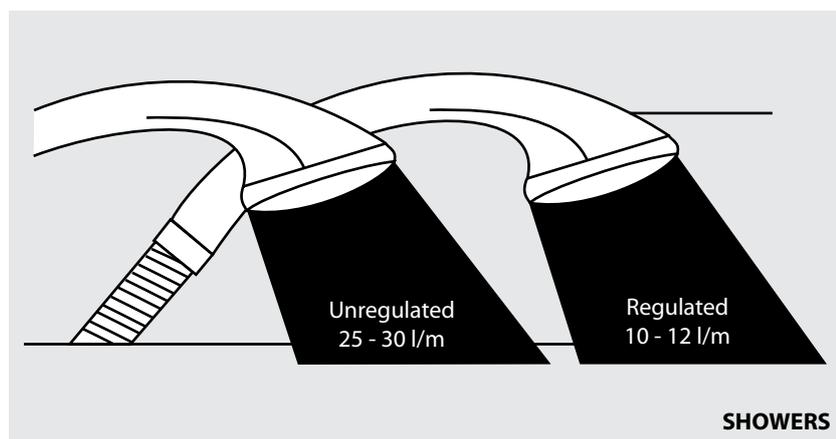
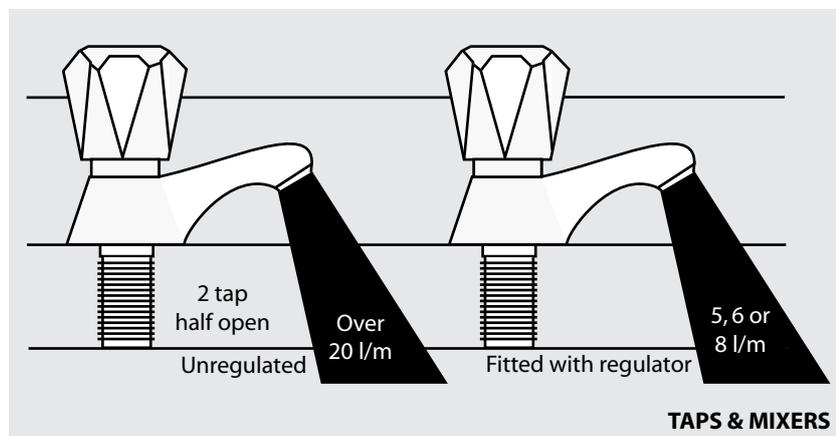
The system controls/operation should then be checked.

If the problem cannot be resolved the switch emergency electric backup should be switched on and operated in accordance with the instructions on the label fitted to the appliance until the installer/manufacturer can attend.

When requesting a visit from the manufacturer the installer must have the completed 'Benchmark' commissioning/service record sheet to hand to enable help to be provided.

Water Savings

Water Related Costs Can Be Reduced By Good Plumbing Practice



Vast quantities of water are needlessly run off to waste due to Taps, Mixers and Showers discharging flow rates far in excess of the rates required for them to perform their duties.

The contrasting flow rates shown on this leaflet clearly illustrate the savings that can be made whilst still providing a good performance.

British made Aquaflow Regulators provide constant flow rates by automatically compensating for supply pressure changes between 1 bar & 10 bars.

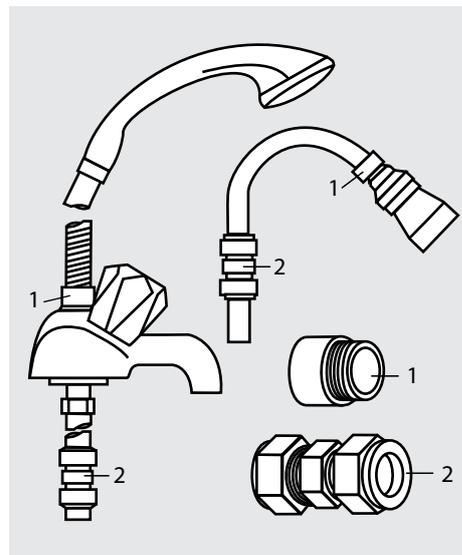
To facilitate installation into the wide range of plumbing equipment which is encountered in the U.K, Four Fixing Options are available:-

Options For Showers

1. MXF "DW" Range - For fitting behind Fixed Shower Heads or onto Flexible Hoses for Handshowers (preferably onto the inlet end when lightweight hoses are used).
2. Compression Fitting Range. "In Line" regulators as in Option 4 for Taps & Mixers.

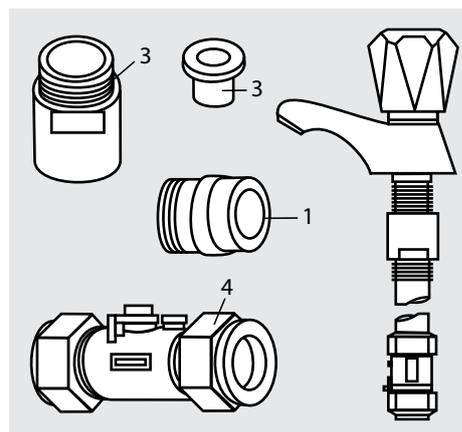
Information by courtesy of
AQUAFLOW REGULATORS LTD

Haywood House, 40 New Road, Stourbridge, West Midlands DY8 1PA
TELEPHONE (01384) 442611 FAX: (01384) 442612



4 Fixing Options For Taps & Mixers

1. MK Range - Combined Regulators & Aerators for screwing onto Taps & Mixers with internal or external threads on their noses. Anti Vandal models also available.
2. MR05-T Range - Internal Regulators. Push-fit into Tap or Mixer seats. Produced in three sizes - 12.5mm (BS1010), 12mm & 10mm, Flangeless models also available for Taps with Low Lift washers.
3. MXF Standard Range - Screw on tail models for Taps & Mixers. Fix onto the tails before fitting the tap connectors. Available in 3/8", 1/2", 3/4" and 1" BSP.
4. Compression Fitting Range - "In Line" regulators housed in 15mm & 22mm CXC Couplers & Isolating Valves. "UKWFBS" listed by the Water Research Centre. Isolation valves available for slotted screwdriver operation or with coloured plastic handles. Now available also in plastic bodied push-fit couplers & valves.

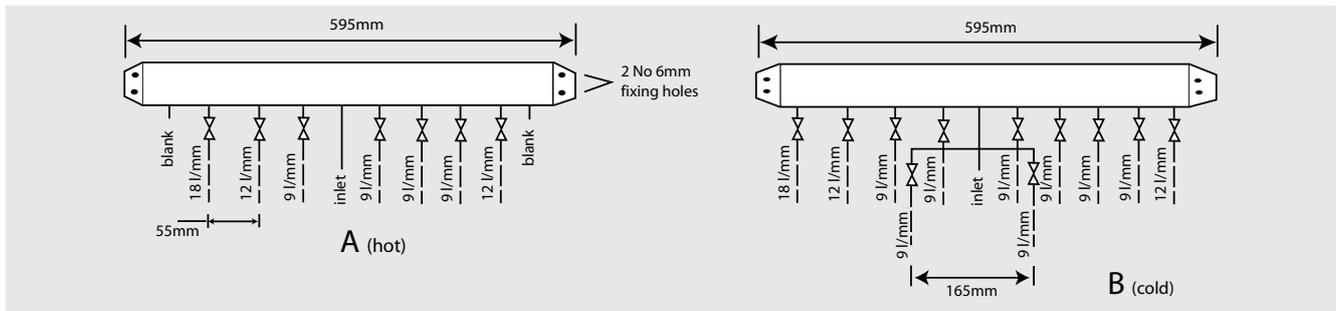


APPENDIX

Manifolds

Manifold type: 1 - Stock Code MIP 050 (one bathroom, one en suite shower room, one cloakroom, one kitchen)			
Flow regulator (litres/minutes)	Terminal fitting	Hot water manifold outlets Quantity	Cold water manifold outlets Quantity
18	Bath tap	1	1
9	Hand basin	3	3
12	Kitchen sink	1	1
9	Toilet cistern	None	3
9	Shower	1	1
12	Washing machine	1	1
9	Dishwasher	None	1
Total		7	11

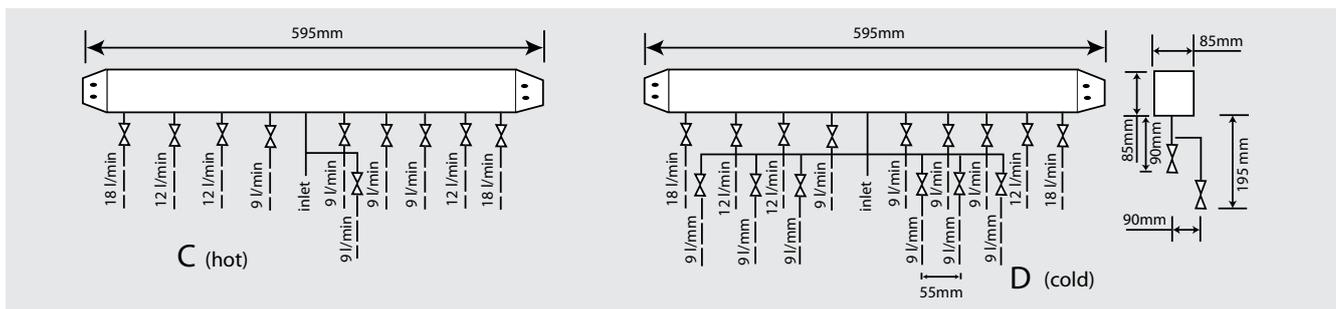
Two sets of manifolds are available as an optional extra. Each set comprises a separate hot and cold water manifold. Both are provided with a 22mm inlet connection located centrally. All outlet connections are 15mm compression. The centre to centre dimension of each branch is 55mm.



Manifold type: 2 - Stock Code MIP 060 (two bathrooms, one en suite shower room, one cloakroom, one kitchen, one utility room)			
Flow regulator (litres/minutes)	Terminal fitting	Hot water manifold outlets Quantity	Cold water manifold outlets Quantity
18	Bath tap	2	2
9	Hand basin	4	4
12	Kitchen sink	2	2
9	Toilet cistern	None	4
9	Shower	1	1
12	Washing machine	1	1
9	Dishwasher	None	1
Total		10	15

The arrangement of each manifold is supplied as shown. This provides the best balance of flows but the flow regulators/duty of each branch can be changed if required as long as a reasonable balance is maintained. If it is necessary to change or clean the flow regulator this can be done without needing to drain the system by closing the valve and removing the screwed cover below the white plastic cover.

The manifolds are designed to be used with plastic pipework and are supplied complete with isolation valves and flow regulators on each branch. They would normally be installed in the same cupboard as the thermal storage appliance (as shown below) but can be installed in another cupboard close to the appliance if required.





The preferred solution where space will allow



An optional location where cupboard space is tight

The pressure loss through a flow regulator at the designated flow rate is about 1.8 bar. Therefore for the flow regulator to control the flow rate at pre-set level, the inlet pressure must be greater than 1.8 bar. If the inlet pressure is lower, the flow rate will be correspondingly less than the pre-set values.

The maximum equivalent pipe lengths from the manifold to the terminal fittings can be estimated from the above information and the resistance characteristics of the pipes. The examples presented below are for 15mm copper pipe in table 1 and for plastic pipework in table 2.

The size of the distribution pipes supplying the manifold should be calculated using the method set out in BS 6700. A typical diagrammatic arrangement of a system using Manifold Type 1 is shown below.

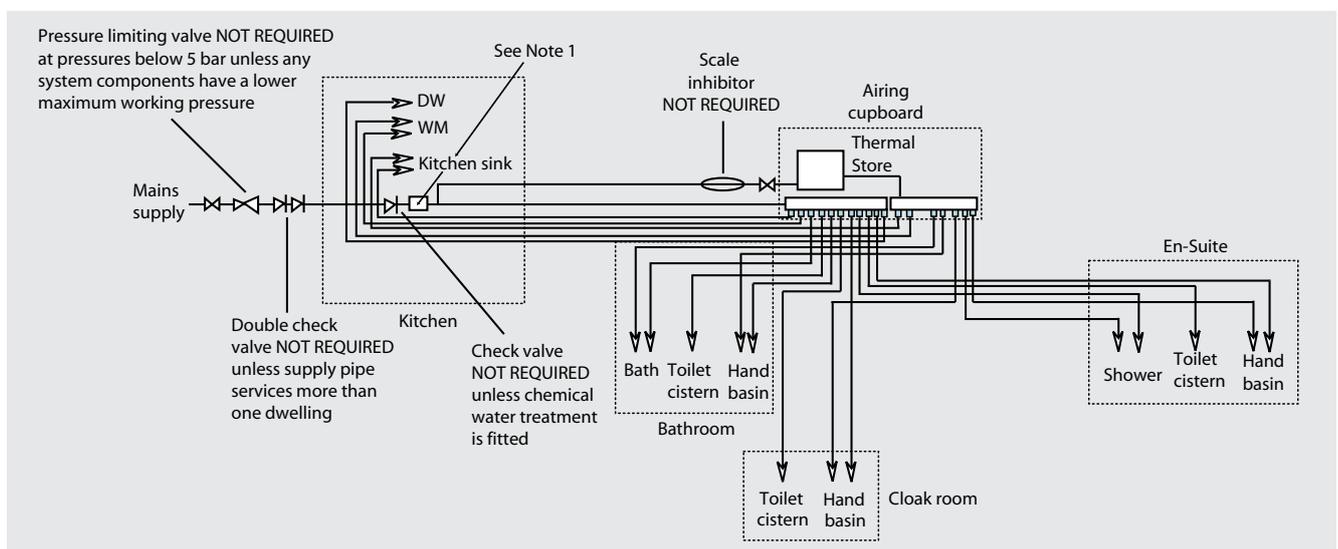
Table 1: Maximum equivalent pipe length in 15mm copper			
Inlet pressure (bar)	Maximum equivalent length of pipe (m)		
	@ 9 l/m	@ 12 l/m	@ 18 l/m
2.0	25	10	5
2.5	75	30	15
3.0	150	60	30

Table 2: Maximum equivalent pipe length in plastic pipe			
Inlet pressure (bar)	Maximum equivalent length of pipe (m)		
	@ 9 l/m	@ 12 l/m	@ 18 l/m
2.0	1.5	15mm : 10	15mm : 4.5 22mm : 40
2.5	3.0	15mm : 20	15mm : 9.0 22mm : 80.0
3.0	4.5	15mm : 30	15mm : 13.5 22mm : 120

This is only meant to show the principles involved and the actual connection of fittings to the manifold will need to suit the arrangements shown on page 42.

Note: If it is proposed to fit chemical water treatment such as a water softener this should be fitted in this location and the cold water branch in the sink should be branched off the cold water main prior to the treatment device instead of the cold water manifold.

Any other isolating/control valves and backflow protection devices should be provided as necessary to comply with the Water Regulations.



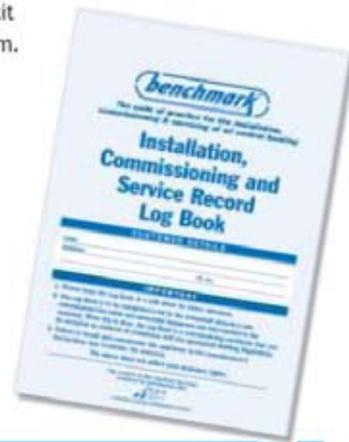
2 Inhibitor (Corrosion & scale protection of primary heating circuit)

On filling the heating system and before the boiler is fired up, it is important to ensure the system water is treated with a suitable corrosion inhibitor, in accordance with the boiler manufacturer's instructions.

Since the concentration of inhibitor present in a system can become diluted, for a number of different reasons, the system should be checked annually and re-treated as required, or after every full or partial drain-down. A water treatment manufacturer's test kit may be used to check the correct concentration of inhibitor in the system.

Where recommended by a boiler manufacturer, a 'physical corrosion protection device' may be fitted in the primary pipework in accordance with the boiler manufacturer's instructions.

The Benchmark log book should be completed indicating the date and details of any of the above products added and a permanent label should be fixed to the system in a prominent location.



3 Scale protection (Domestic hot water service)

Where a combi boiler and/or a hot water storage vessel is installed in areas where the mains water can exceed 200ppm Total Hardness (as defined by BS 7593: 1993 Table 2) a scale reduction device should be installed, in accordance with the boiler manufacturer's instructions.

The levels of water hardness may be measured using a water hardness test kit.

BUILDING REGULATIONS

Completion of the BENCHMARK log book requires that the 'competent person' undertaking the installation and commissioning provide information relating to Cleaning, Inhibitor and Scale Protection. This will demonstrate that the work complies with the requirements of the appropriate Building Regulations.

This Guidance Note is produced on behalf of its members by the Central Heating Information Council. For a full list of members visit www.centralheating.co.uk and for further advice on water treatment contact the following members:

 Culligan  Sentinel  Ferox  Salamander Engineering  Scalemaster

Heating & Hotwater Information Council, 36 Holly Walk, Leamington Spa, Warwickshire CV32 4LY Tel: 0845 600 2200 Fax: 01926 423284
www.centralheating.co.uk

MANUAL HANDLING OF APPLIANCE PRODUCTS

Description

Manual handling means any transporting or supporting of a load (including lifting, putting down, pushing, pulling, carrying or moving) by hand or bodily force.

Scope

This assessment will cover the largest Appliance, namely ElectraMate, GulfStream, BoilerMate, SysteMate, PulsaCoil, Accolade and Stainless Lite manufactured by Gledhill.

The maximum weight of the largest product in each range is 98kg and the size is 595 x 595 x 2020 mm high.

Main Hazards

Vision may not be clear due to the size of the products. Adopting an incorrect method of lifting may cause injury, attempting to lift these products will require help from others. (Team lifts)

Control Measures

Manual lifting procedure

The lift, key factors in safe lifting are:

- a. **Balance**
 - b. **Position of back**
 - c. **Positioning of the arms and body**
 - d. **The hold**
 - e. **Taking the lead for team lifts**
- a. **Balance** - Since balance depends essentially upon the position of the feet, they should be apart about hip breadth with one foot advanced giving full balance sideways and forward without tension. In taking up this position, lifting is done by bending at the knees instead of the hips and the muscles that are brought into use are those of the thigh and not the back.
 - b. **Position of back** - Straight - not necessary vertical. The spine must be kept rigid, this coupled with a bent knee position, allows the centre line of gravity of the body to be over the weight so reducing strain.
 - c. **Positioning of arms and body** - The further arms are away from the side, the greater the strain on the shoulders, chest and back. Keep elbows close to the body arms should be straight.
 - d. **The hold** - Before lifting ensure you have a good hold. Two handles are provided on Appliance products at the top rear side, these allow one or two persons to have a purposely-designed hold at the top of the appliance to ensure easy lifting at the top of the product. Each appliance is supplied with a pallet, which has been attached to the unit via the packaging. The pallet will also allow for one or two persons to get a good hold.

- e. **Taking the lead for team lifts**- As more than one person is required for these products ensure that one person is taking the lead. **This may be you** so ensure that each person that is helping is made aware of the weight and of the items listed within this assessment. Make sure you and any others helping know the route you intend to take that it is clear of any obstructions. Never jerk the load as this will add a little extra force and can cause severe strain to the arms, back and shoulders. If there are steps involved decide on where you will stop and take a rest period. Move smoothly and in unison taking care to look and listen to others helping with the lift. Where possible use a sack truck to move the product over long flat distances, only lift the products when necessary. If in doubt stop and get more help. The unit handles and packaging with the pallet have been designed to ensure that two-four people can assist when lifting up stairs or over longer distance.

Individual capability

Individual capability plays an important part in handling these products. Persons above average build and strength will find it easier and should be in good health. Persons below average build and strength may require more rest periods during the handling process. Pregnant women should not carry out this operation. Persons who are not in good health should seek medical advice prior to commencing any lifting or manual handling operation.

Residual risk

Following the guidelines given above will reduce any risk to injury. All persons carrying out this operation must be fully trained and copies of the specific risk assessment made available for inspection and use in their training process.

Further guidance on Manual Handling can be obtained from the Health and Safety Executive. Manual Handling Operations Regulations 1992.

Gledhill (Water Storage) Ltd

AMD. JUNE 2008

CONDITIONS OF SALE & GUARANTEE TERMS

1. Gledhill (Water Storage) Ltd ("We" or "Gledhills") only do business upon the Conditions which appear below and no other. Unless we so agree in writing these Conditions shall apply in full to any supply of goods by us to the exclusion of any Conditions or terms sought to be imposed by any purchaser. These Conditions of Sale and Warranty Terms override those which are contained on the Invoice Forms and all Sales are now subject to these Conditions of Sale and Warranty terms only.

2. PRICE

Once an order or call off has been accepted the price will be held for three months **but if delivery is extended beyond that period at the purchaser's request, then we reserve the right to amend the price when necessary.** The company reviews its pricing annually to adjust for changes in our cost base. We reserve the right to alter prices at any time for severe movements in raw materials (mainly copper and steel). If there is to be a change we will give customers at least **four weeks** notice but **anything delivered** after that date will be at the revised price. An order may not be cancelled or varied after acceptance without the written consent of the company. Such cancellation or variation shall be subject to such reasonable charges as may be appropriate.

3. SPECIFICATION

The goods are supplied in accordance with the Specifications (if any) submitted to the Purchaser and any additions and alterations shall be the subject of an extra charge. Any goods not so specified shall be in accordance with our printed literature or the literature of any of our component suppliers (subject to any modifications made since publication). If we adopt any changes in construction or design of the goods, or in the specification printed in our literature, the Purchaser shall accept the goods so changed in fulfilment of the order.

4. PAYMENT

The invoice price of goods shall be payable within 30 days of despatch by us of our invoice for the goods or such longer time as may be stated by our quotation or invoice. If we receive payment in full on or before the due date we will allow an appropriate settlement discount except where we have quoted a special net price. If payment is not received in full on or before the due date we shall be entitled in addition to the invoice price to:

- (i) payment of a sum equal to any increase in the copper price supplement applicable to the particular goods sold between the date of receipt of order and the date of receipt of payment in full; and
- (ii) interest on any part of the invoice price unpaid after the due date at the rate of 3% per annum over the base rate for the time being of HSBC Bank plc.

5. TIME

We give estimates of delivery dates in good faith and time of delivery is not nor shall be made of the essence of any contract nor shall we be liable for any loss or damage occasioned by delay in delivery.

6. DELIVERY

We deliver free normally by our own vehicles within 25 miles of any of our manufacturing depots. Delivery to any place more than 25 miles from one of our manufacturing depots may be subject to our quoted delivery charges. We reserve the right to make delivery of goods contained in one order by more than one consignment and at different times. Where a period is agreed for delivery and such period is not extended by our Agreement, the Purchaser shall take delivery within that period. If the Purchaser fails to take delivery, we shall be entitled at the Purchaser's risk and expense to store the goods at the Purchaser's premises or elsewhere and to demand payment as if they had been despatched. Off loading at point of delivery shall be the responsibility of and be undertaken by the Purchaser.

7. SHORTAGES OR DAMAGE

Goods must be inspected before signature of delivery note and any damage, shortage or discrepancy noted on the delivery note and the goods returned on the same vehicle. The buyer must also give us immediate written notice of the damage, shortage or discrepancy so that we may prompt investigation.

8. RETURN OF GOODS

Goods may not be returned to the Company except by prior written permission of an authorised officer of the Company and such return shall be subject to payment by the Purchaser of handling and re-stocking charges, transport and all other costs incurred by the Company.

9. COMPANY LIABILITY AND GUARANTEE

9.1. Subject to the terms of these Conditions of Sale and Guarantee Terms Gledhills provide Guarantees in respect of specific products as set out in this clause.

9.2. Each Guarantee is strictly conditional upon the following:-

9.2.1. Complaints must be given to us immediately, before any action is taken, as responsibility cannot be accepted if repairs or renewals are attempted on site without our written approval.

9.2.2. The unit has been installed in accordance with our installation and service instructions and all relevant codes of practice and regulations in force at the time of installation.

9.2.3. All necessary inlet controls and safety valves have been fitted correctly.

9.2.4. The unit has only been used for the storage of potable water supplied from the public mains.

9.2.5 Where appropriate the unit has been regularly maintained as detailed in the installation and service instructions

9.2.6. Defects caused by corrosion or scale deposits are not covered by any Guarantee.

9.2.7. Where we agree to rectify any defect we reserve the right to undertake the work on our own premises.

9.3. Guarantees are provided in respect of specified goods supplied by Gledhills as follows:-

(a) Domestic and Commercial Open Vented Cylinders and Tanks.

The copper storage vessel is guaranteed for ten years and if it proves to be defective either in materials or workmanship, we will either repair or supply replacement at our option with the closest substitute in the case of any obsolete product to any address in Great Britain.

(i) free of all charge during the first year after delivery by us.

(ii) thereafter at a charge of one-tenth of the then current list price and any copper price supplement and delivery charge during the second year after delivery by us and increasing by a further one-tenth on the second and subsequent anniversary of delivery by us.

(b) Domestic Mains Fed Products (Primary Stores)

The copper storage vessel is guaranteed for five years and if it or any integral pipework as part of the storage vessel assembly proves to be defective either in materials or workmanship, we reserve the right to either repair or supply replacements or the closest possible substitute in the case of any obsolete product and will collect and deliver to any address in England, Wales and Scotland (excluding all Scottish Islands).

(i) free of all charge during the first year after delivery by us.

(ii) thereafter at a charge of one-fifth of the then current list price or any copper price supplement and delivery charge during the second year after delivery by us increasing by a further one-fifth on the second and subsequent anniversary of delivery by us.

(c) Integrated Boiler and Storage Vessel Products and Stand Alone Boilers

In the case of the GulfStream range of products and the Gledhill boiler range of products, Gledhill guarantees the heat exchanger (boiler) for material and construction faults for two years. THE RESPONSIBILITY FOR THE EXECUTION OF THIS GUARANTEE LIES WITH THE INSTALLER.

The guarantee becomes null and void if the appliance is used incorrectly, or in the event of proven negligence or incorrectly implemented repairs **OR FAILURE TO CARRY OUT THE RECOMMENDED INSPECTION/ MAINTENANCE.** The guarantee also becomes null and void if changes are made to the appliance without our knowledge, or if the serial number on the appliance is removed or made illegible.

The annual service must be carried out by a competent installer in accordance with the advice given by Gledhill and using Gledhill approved parts.

(d) Stainless Steel Unvented Cylinders

Gledhill guarantee the components including controls, valves and electrical parts for two years from the date of purchase. IT SHOULD BE NOTED THAT THE FACTORY FITTED TEMPERATURE AND PRESSURE RELIEF VALVE MUST NOT BE REMOVED OR ALTERED IN ANY WAY OR THE GUARANTEE WILL NOT BE VALID. GLEDHILL WILL NOT BE RESPONSIBLE FOR ANY CONSEQUENTIAL LOSS OR DAMAGE HOWEVER IT IS CAUSED.

The guarantee for the stainless steel vessel is for twenty five years if the original unit is returned to us **AND PROVIDED THAT:**

(i) It has been installed as per the Design, Installation & Servicing Instructions, relevant standards, regulations and codes of practice.

(ii) It has not been modified, other than by Gledhill.

(iii) It has not been subjected to wrong or improper use or left uncared for.

(iv) It has only been used for the storage of potable water.

(v) It has not been subjected to frost damage.

(vi) The benchmark log book is completed after each annual service.

(vii) The unit has been serviced annually.

It should be noted that the guarantee does not cover:

- the effects of scale build up

- any labour charges associated with replacing the unit or parts.

If the stainless steel vessel proves to be defective either in materials or workmanship we reserve the right to either repair or supply replacements or the closest possible substitute in the case of any obsolete product and will collect and deliver to any address in England, Scotland and Wales (excluding all islands):

(i) free of charge during the first year after delivery by us.

(ii) thereafter at a charge of one twenty fifth of the then current list price during the second year after delivery by us and increasing by a further one twenty fifth on the second and subsequent anniversary of delivery by us.

ACTION IN THE EVENT OF FAILURE

If the stainless steel cylinder develops a leak we will ask for a deposit against the supply of a new one. This will be refunded if the failure is within the terms of the warranty when it has been examined by us.

(e) Solar Panels and ancillary equipment

Gledhill provides a five year warranty for defects in the collectors (except broken glass and collector accessories eg metal edgings). If the collector demonstrably fails to meet one of the requirements of the standard DIN 4757 part 3 we will replace it free of charge based on the date of invoice. We can not be responsible for damage caused by mechanical stress and/or changes caused by weather related influences. The warranty excludes minor surface damage that does not affect performance or malfunction due to improper assembly or installation.

Please note:

- Installation must have been carried out by a licensed specialized company (heating contractor or plumber) following the version of installation instructions in force.

- Gledhill or its representative was given the opportunity to check complaints on site immediately after any defect occurred.

- Confirmation exists that the system was commissioned properly and that the system was checked and maintenance was performed annually by a specialised company licensed for this purpose.

(f) Components of our products other than Storage Vessels and Integral Pipework.

We will either extend to the purchaser the same terms of warranty as we are given by the manufacturer of the component or if the manufacturer does not give any warranty, replace free of charge any component which becomes defective within two years after the date of the delivery by us and is returned to us at the purchaser's expense but we shall not meet the cost of removal or shipping or return of the component or any other cost charges or damages incurred by the purchaser.

If the appliance manufactured by Gledhill incorporates a factory fitted scale inhibitor then during the period

of three years from the date of delivery Gledhill will replace, free of charge, any plate heat exchanger fitted in the appliance as original equipment in which scale formation occurs that materially reduces the effectiveness of the plate heat exchanger. This guarantee does not extend to any other component installed within the Gledhill appliance or elsewhere in the Purchasers domestic water system.

9.4.

9.4.1. In respect of goods supplied by us and in respect of any installation work carried out by or on our behalf, our entire liability and the purchaser's sole remedies (subject to the Guarantees) shall be as follows:-

- (a) We accept liability for death or personal injury to the extent that it results from our negligence or that of our employees
- (b) Subject to the other provisions of this clause 9 we accept liability for direct physical damage to tangible property to the extent that such damage is caused by our negligence or that of our employees, agents or subcontractors.
- (c) Our total liability to the purchaser over and above any liability to replace under the Guarantees (whether in contract or in tort including negligence) in respect of any one cause of loss or damage claimed to result from any breach of our obligations hereunder, shall be limited to actual money damages which shall not exceed £20,000 provided that such monetary limit shall not apply to any liability on the part of ourselves referred to in paragraph (a) above
- (d) Except as provided in paragraph (a) above but otherwise notwithstanding any provision herein contained in no event shall we be liable for the following loss or damage howsoever caused and even if foreseeable by us or in our contemplation:-
 - (i) economic loss which shall include loss of profits, business revenue, goodwill or anticipated savings
 - (ii) damages in respect of special indirect or consequential loss or damage (other than death, personal injury and damage to tangible property)
 - (iii) any claim made against the purchaser by any other party (save as expressly provided in paragraph (b) above)
- (e) Except in respect of our liability referred to in paragraph (a) above no claim may be made or action brought (whether in contract or in tort including negligence) by the purchaser in respect of any goods supplied by us more than one year after the date of the invoice for the relevant goods.
- (f) Without prejudice to any other term we shall not be liable for any water damage caused directly or indirectly as a result of any leak or other defect in the goods. We cannot control the conditions of use of the goods or the time or manner or location in which they will be installed and the purchaser agrees to be fully responsible for testing and checking all works which include the goods at all relevant times (up to, including and after commissioning) and for taking all necessary steps to identify any leaks and prevent any damage being caused thereby.
- (g) Nothing in these Conditions shall confer on the purchaser any rights or remedies to which the purchaser would not otherwise be legally entitled

10. LOSS OR INJURY

Notwithstanding any other provision contained herein the purchaser's hereby agree to fully indemnify us against any damages losses costs claims or expenses incurred by us in respect of any claim brought against us by any third party for:-

- (a) any loss injury or damage wholly or partly caused by any goods supplied by us or their use.
- (b) any loss injury or damage wholly or partly caused by the defective installation or substandard workmanship or materials used in the installation of any goods supplied by us.
- (c) any loss injury or damage in any way connected with the performance of this contract.
- (d) any loss resulting from any failure by the purchaser to comply with its obligations under these terms as to install and/or check works correctly.

PROVIDED that this paragraph will not require the purchaser to indemnify us against any liability for our own acts of negligence or those of our employees agents or sub-contractors

FURTHER in the case of goods supplied by us which are re-sold and installed by a third party by the purchaser it will be the sole responsibility of the purchaser to test the goods immediately after their installation to ensure that inter alia they are correctly installed and in proper working order free from leaks and are not likely to cause any loss injury or damage to any person or property.

11. VARIATION OF WARRANTY AND EXCLUSION

Should our warranty and exclusion be unacceptable we are prepared to negotiate for variation in their terms but only on the basis of an increase in the price to allow for any additional liability or risk which may result from the variation.

Purchasers are advised to insure against any risk or liability which they may incur and which is not covered by our warranty.

12. RISK AND RETENTION OF TITLE

- (a) goods supplied by us shall be at the Purchaser's risk immediately upon delivery to the Purchaser or into custody on the Purchaser's behalf or to the Purchaser's Order. The Purchaser shall effect adequate insurance of the goods against all risks to the full invoice value of the goods, such insurance to be effective from the time of delivery until property in the goods shall pass to the Purchaser as hereinafter provided.
- (b) property in the goods supplied hereunder will pass to the Purchaser when full payment has been made by the Purchaser to us for :-
 - (i) the goods of the subject of this contract.
 - (ii) all other goods the subject to of any other contract between the Purchaser and us which, at the time of payment of the full price of the goods sold under this contract, have been delivered to the Purchaser but not paid for in full.
- (c) until property in the goods supplied hereunder passes to the Purchaser in accordance with paragraph (2) above.
 - (i) the Purchaser shall hold the goods in a fiduciary capacity for us and shall store the same separately from any other goods in the Purchaser's possession and in a manner which enables them to be identified as our goods.
 - (ii) the Purchaser shall immediately return the goods to us should our authorised representative so request. All the necessary incidents associated with a fiduciary relationship shall apply.
- (d) the Purchaser's right to possess the goods shall cease forthwith upon the happening of any of the following events, namely :-
 - (i) if the Purchaser fails to make payment in full for the goods within the time stipulated in clause 4 hereof.
 - (ii) if the Purchaser, not being a company, commits any act of bankruptcy, makes a proposal to his or her creditors for a compromise or does anything which would entitle a petition for a Bankruptcy Order to be presented.
 - (iii) if the Purchaser, being a company, does anything or fails to do anything which would entitle an administrator or an administrative receiver or a receiver to take possession of any assets or which would entitle any person to present a petition for winding up or to apply for an administration order.
- (e) the Purchaser hereby grants to us an irrevocable licence to enter at any time any vehicle or premises owned or occupied by the Purchaser or in the possession of the Purchaser for the purposes of repossessing and

recovering any such goods the property in which has remained in us under paragraph (2) above. We shall not be responsible for and the Purchaser will indemnify us against liability in respect of damage caused to any vehicle or premises in such repossession and removal being damaged which it was not reasonably practicable to avoid.

- (f) notwithstanding paragraph (3) hereof and subject to paragraph (7) hereof, the Purchaser shall be permitted to sell the goods to third parties in the normal course of business. In this respect the Purchaser shall act in the capacity of our commission agent and the proceeds of such sale :-
 - (i) shall be held in trust for us in a manner which enables such proceeds to be identified as such, and;
 - (ii) shall not be mixed with other monies nor paid into an overdrawn bank account.We, as principal, shall remunerate the Purchaser as commission agent a commission depending upon the surplus which the Purchaser can obtain over and above the sum, stipulated in this contract of supply which will satisfy us.
- (g) in the event that the Purchaser shall sell any of the goods pursuant to clause (6) hereof, the Purchaser shall forthwith inform us in writing of such sale and of the identity and address of the third party to whom the goods have been sold.
- (h) if, before property in the goods passes to the Purchaser under paragraph (2) above the goods are or become affixed to any land or building owned by the Purchaser it is hereby agreed and declared that such affixation shall not have the effect of passing property in the goods to the Purchaser. Furthermore if, before property in the goods shall pass to the Purchaser under paragraph (2) hereof, the goods are or become affixed to any land or building (whether or not owned by the Purchaser), the Purchaser shall:-
 - (i) ensure that the goods are capable of being removed without material injury to such land or building.
 - (ii) take all necessary steps to prevent title to the goods from passing to the landlord of such land or building.
 - (iii) forthwith inform us in writing of such affixation and of the address of the land or building concerned.The Purchaser warrants to repair and make good any damage caused by the affixation of the goods to or their removal from any land or building and to indemnify us against all loss damage or liability we may incur or sustain as a result of affixation or removal.
 - (i) in the event that, before property in the goods has passed to the Purchaser under paragraph (2) hereof, the goods or any of them are lost, stolen, damaged or destroyed :-
 - (ii) the Purchaser shall forthwith inform us in writing of the fact and circumstances of such loss, theft, damage or destruction.
 - (iii) the Purchaser shall assign to us the benefit of any insurance claim in respect of the goods so lost, stolen, damaged or destroyed.

13. NON-PAYMENT

If the Purchaser shall fail to make full payment for the goods supplied hereunder within the time stipulated in clause 4 hereof or be in default of payment for any other reason then, without prejudice to any of our other rights hereunder, we shall be entitled to stop all deliveries of goods and materials to the Purchaser, including deliveries or further deliveries of goods under this contract. In addition we shall be entitled to terminate all outstanding orders.

14. VALUE ADDED TAX

All prices quoted are exclusive of Value Added Tax which will be charged at the rate ruling at the date of despatch of invoice.

15. TRADE SALES ONLY

We are only prepared to deal with those who are not consumers within the terms of the Unfair Contract Terms Act 1977, the Sale of Goods Act 1979 and the Supply of Goods and Services Act 1982. Accordingly any person who purchases from us shall be deemed to have represented that he is not a consumer by so purchasing.

16. JURISDICTION

The agreement is subject to English law for products delivered in England and Scottish law for products delivered in Scotland and any dispute hereunder shall be settled in accordance therewith dependent upon the location.



*The code of practice for the installation,
commissioning & servicing of central heating systems*



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