

# INSTRUCTIONS

## WLM Underfloor Heating Controller



57542 4/06 (BJ)

Type WLM underfloor heating controller is suitable for connecting multiple room thermostats and electric actuators (thermo heads) for an underfloor or radiator based heating system.

**Thermostats requiring a 230 V or 24V live & neutral must NOT be connected. Only OJ thermostats type WLxx that are prepared for 2 wire or wireless communication can be used.**

### PRODUCT PROGRAMME

Product	Thermo heads	Type
Master for 6 zones	230V AC	WLM-1BA (basic system)
Master for 6 zones with display	230V AC	WLM-1FS (full system)
Master for 6 zones	24V	WLM-3BA (basic system)
Master for 6 zones with display	24V	WLM-3FS (full system)

### TECHNICAL DATA

Power Supply	230V AC +10/-15%, 50 HZ
Max load pumps and Thermal actuators	10A
Boiler relay	Volt free signal. Max 4A
Main pump	230V AC, 50Hz Max. 4A
Secondary pump	230V AC, 50Hz Max. 4A
Thermal actuators:	
WLM-1BA	6 x 230V
WLM-1FS	6 x 230V
Max. 2A per output. Max. 5A in total	
WLM-3BA	6 x 24V
WLM-3FS	6 x 24V
Max. 10VA per output. Max. 35VA in total	
External Switch (Timer) for night setback	Open terminals for NSB Closed terminals for day operation
Thermostat Bus 2 wire low voltage	bus signal from thermostats

### Additional data for WLM-1FS & WLM-3FS (not applicable to the basic version)

Limit sensor	NTC type ETF-1899A for Supply water temperature
Control signal for mixing valve actuator	0-10V DC
Power supply for mixing valve actuator	24V AC. Max 6VA

### Environment and recycling

Please help us to protect the environment by disposing of the packaging in accordance with the national regulations for waste processing.

### Recycling of obsolete appliances

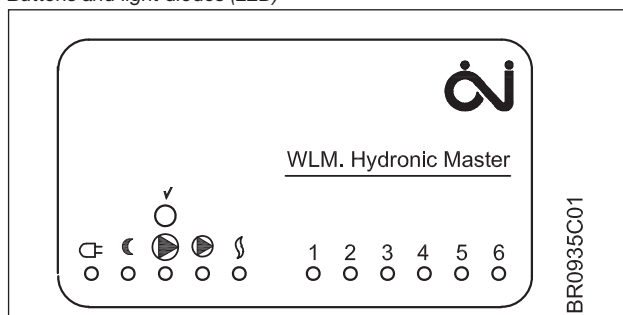


Appliances with this label must not be disposed off with the general waste. They must be collected separately and disposed off according to local regulations.

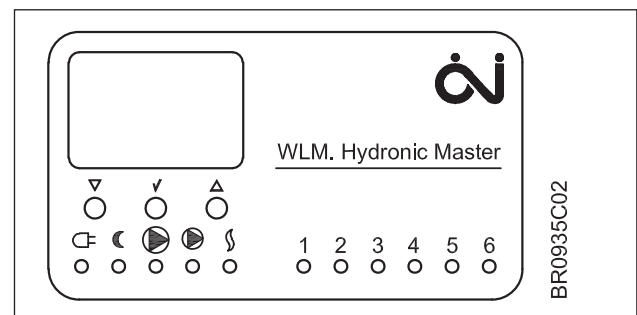
### CONFIGURING THE TOTAL SYSTEM

Each master module is capable of controlling 6 heating zones, each of which may use one or more loops of piping, with one or more thermal actuators. These zones are referred to later in this instruction as channels 1 to 6. If you wish to control more than 6 zones, it is necessary to install ADD ON (AO) modules, each of which can provide another 4 outputs. The first AO module then controls channels 7 to 10, and the second module controls channels 11 to 14. This is achieved by setting a switch in the AO module to either 7/10 or 11/14 (see separate instruction provided with the module). All the thermostats of the complete system must be connected to the master control, and not to the AO modules.




### Buttons and light diodes (LED)





Type WLM-1BA and WLM-3BA



Type WLM-1FS and WLM-3FS

-  Power supply connected (Flashing LED indicate failure)
-  Timer for night setback active
-  Main boiler (primary) pump is running (if installed)

-  Secondary UFH pump is running
-  Boiler enable signal is activated
- 1..6 Zone 1 to 6 indicating heating is on

**INSTALLATION**

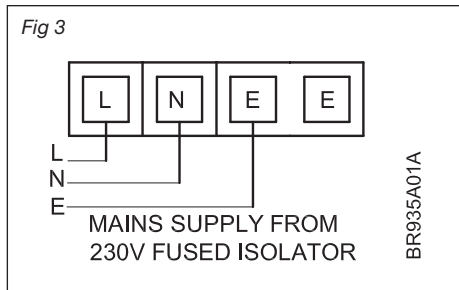
Fit the WLM master to a suitable wall. It will generally be found more convenient if the unit is within 0.8 metre of the manifold, as most thermal actuators are supplied with 1m cables. Cables can be run on the surface into the terminals using either the cable releases in the cover or by pressing out the cable entries in the lower part of the cover.

**ELECTRICAL INSTALLATION**

PLEASE ENSURE THAT ALL WIRING IS CARRIED OUT IN ACCORDANCE WITH LOCAL ELECTRICAL REGULATIONS. When wiring is completed, fit the cover on the master using the screws provided.

**Mains supply (see fig. 3)**

WLM requires a 230V AC mains supply connected to the terminals marked L, N, & E.



**BOILER DEMAND (see fig. 4a +4b)**

The master has a volt-free relay output that can be used to control a boiler, or to open a motorised valve.

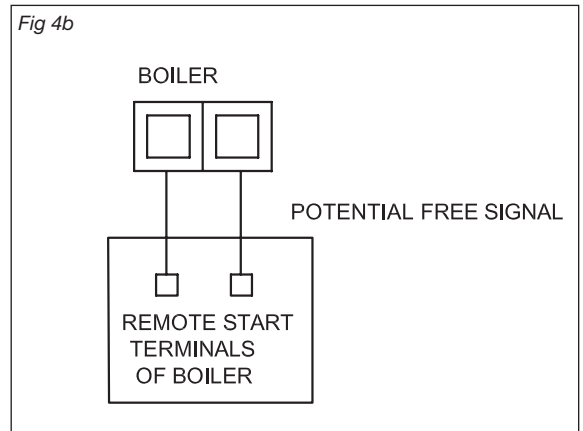
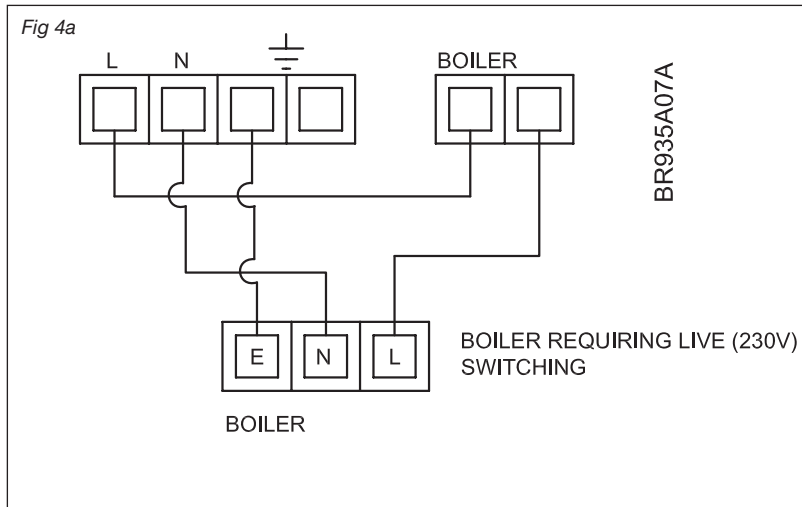
- A) To control a boiler that requires switching of the live supply, take a link from L (230V) to the terminals marked BOILER - B1. Connect the boiler L to the terminal marked BOILER - B2. Connect the boiler N terminal to the N terminal on the master, and the boiler E to the master terminal E. (see fig. 7A).
- B) To control a boiler that has a pair of dedicated terminals for remote switching (e.g. by a room thermostat), connect these terminals to B1 and B2 on the master. B1 and B2 terminals are "volt free" so they can be used for both a 240V and a 24V circuit from the boiler.
- C) To control a motorised valve, follow the instructions in section A above.

Many motorised valves have wires coloured BROWN and BLUE for power connections. In this case BROWN goes to the terminal B2 under the heading BOILER and BLUE goes to the N terminal of the master. The boiler relay will be energised after a delay of 10 sec after the start of the main pump.

**Basic versions without display. Type WLM-1BA and WLM-3BA** The boiler relay will stop if there is no heat demand measured by the thermostats.

**Versions with display. Type WLM-1FS and WLM-3FS.**

These units have supply water temperature control, and the boiler relay will be ON once the control valve has reached 20% open, and will remain on as long as a heat demand exists.



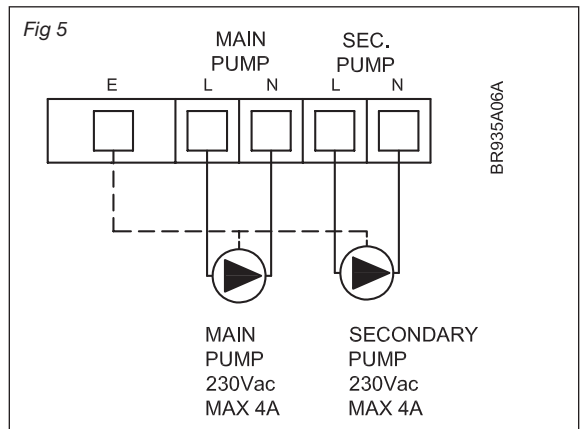
**PUMP OUTPUT (see fig. 5)**

The master has two different pump outputs to control the main pump and the secondary pump. The relay output for pump control will be energised after a delay when any connected room thermostat calls for heat. The delay is to allow time for the thermal actuator on the manifold to start opening.

**Delay times**

Secondary UFH pump	180 sec
Main pump	190 sec

The 230V AC pump can be directly connected to terminal L and N under the heading MAIN. PUMP or SEC. pump. Connect the pump E terminal to E on the master. Pump Load Max 4 A, 230V AC. In order to use any remaining heat in the pipes the pumps will remain running for 1 minutes after the demand for heat from a thermostat disappears. A further pause of 5 minutes has been built into the system before the pumps and boiler are allowed to start again.

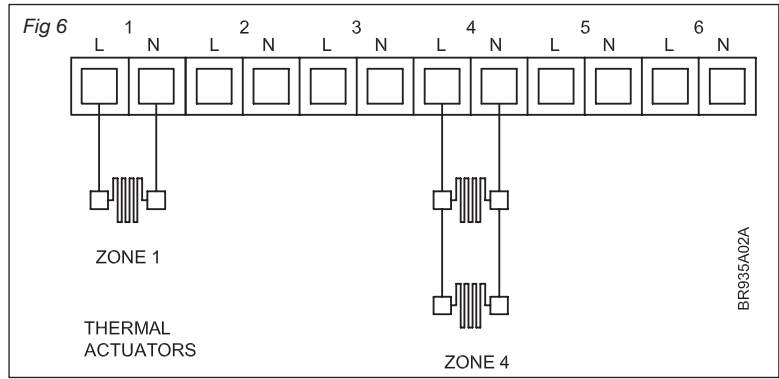


**Thermal actuators (Thermoheads) (see fig. 6)**

These actuators are fitted to the underfloor heating manifolds and control the supply of water through the various loops. The voltage of the thermal actuators, 230V or 24V, must correspond to the master. Master type WLM-1BA and WLM-1FS are for 230 V thermal actuators, and master type WLM-3BA and WLM-3FS are for 24V Thermal actuators. Up to 6 different zones can be controlled by the master. Connect the thermal actuators on the loop(s) for each zone to the corresponding terminals on the master. Thermal actuators belonging to zone 1 must be connected to output terminal 1, and thermal actuators for zone 2 must be connected to output terminal 2, etc, etc.

**Guideline**

More than 1 head can be connected to a single terminal, provided that the heads are to be controlled by the same room thermostats. Connect the Brown wire to the L terminal, and the Blue wire to the N terminal. When the installation is complete, check that the thermostat in e.g. room(zone) 1, operates the correct thermo actuator(s) for that room on the manifold. If the heads appear to be in the wrong position on the manifold, it may be simpler to change them on the manifold, rather than reconnecting them on the master.

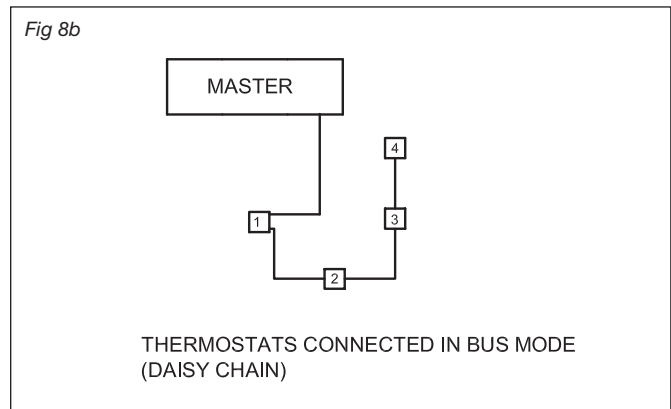
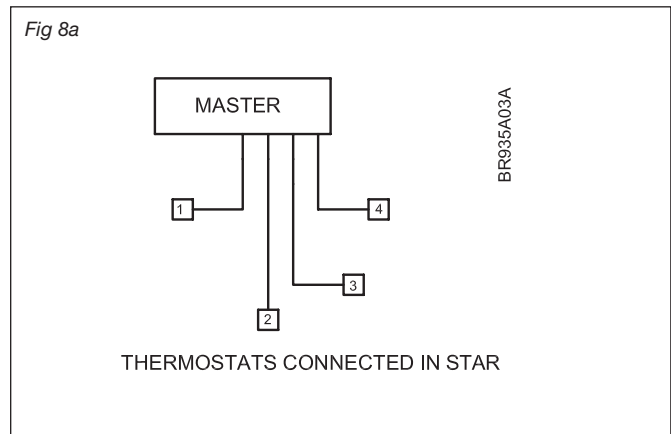
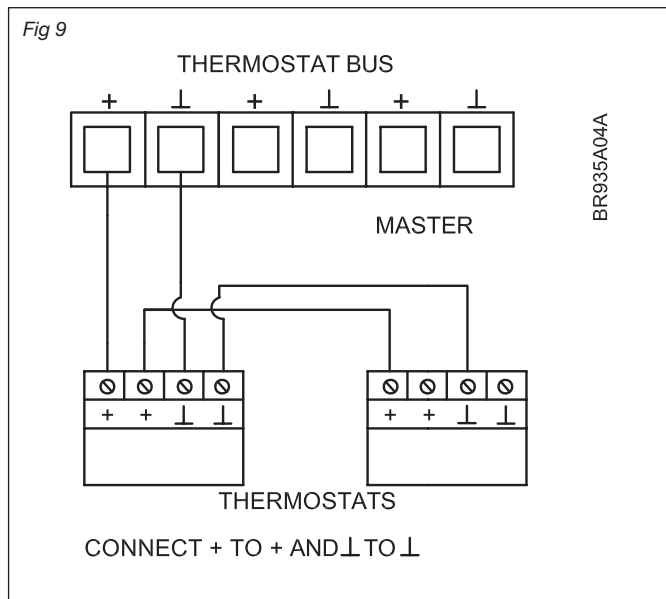
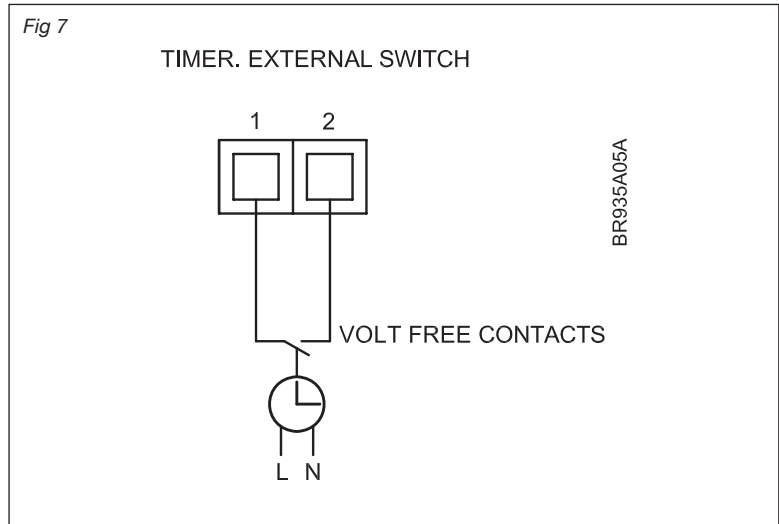


**EXTERNAL SWITCH (TIMER) for night setback (fig 7)**

From factory the master is delivered with a jumper in the switch/ timer terminals I & O. The day temperature setpoint is defaulted to 20°C and the night temperature to 15°C. These default settings can be changed if the master has a display. The current operating set point of the master can be changed from the day temperature into night temperature, and vice versa by using an input from an external switch or timer. The input must be a volt free switch, and will need to open circuit for night temperature and close circuit for day temperature. When the external switch or timer is used to switch to night setback, this will override any time settings in a WLCT clock thermostat, including any thermostats that are part of a group allocated to that clock thermostat.

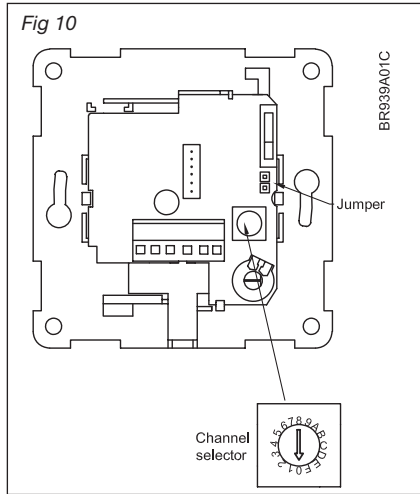
**THERMOSTATS – BUS CONNECTION (see fig. 8a + 8b + 9)**

Only OJ thermostats type WLxx that are prepared for 2 wire communication can be used. Standard installation cable, minimum 2 x 0.25 mm2 can be used. The thermostats can be connected in the conventional star wiring format, or in a bus connected mode (Daisy chain) see fig 8 A + fig 8B. The master has 3 sets of terminals marked THERMOSTAT BUS that can be used for connecting the 2-wire signal from the thermostats. There are 3 identical sets of terminals for convenient installation. Any thermostat can be connected to any pair of terminals. The total length of the 2-wire system can be up to 300 m with a maximum length of 100m between any 2 thermostats. Remember to connect + to + and - to - .



**SETTING UP WHICH THERMOSTAT SHOULD WORK WITH WHICH THERMAL ACTUATOR**

Each thermostat can be selected to operate a specific output which in turn controls the thermal actuators on the manifold. Under the front cover of the thermostat, a selector can be accessed, and the number of its output (its CH channel) can be set with a screwdriver. (See fig 10) Up to 14 channels can be set on the selector, and there are two auxiliary channels. (see later). A WLM master has 6 outputs and additional slave modules each with 4 outputs can be connected creating a system of 14 individual zones.



Please note that channels 10 to 14 are marked as A through E on the selector,

A thermostat set for CH1 will activate the thermal actuator connected to output 1 on the master. The channel number can be selected without any power connected to the system. The channel of the thermostat can be changed afterwards if needed.

If two thermostats are placed in the same room and set to the same channel, the temperature control will work according to the average temperature of both thermostats.

**Channel 0:**

Each thermostat is delivered with the switch in position 0 ensuring that it must be set to operate correctly. Channel 0 can also be used for a clock thermostat controlling a group of thermostats where the control position should be somewhere central, e.g. the kitchen, rather than in the area where the thermostats are installed. Setting it to Ch 0 means that times and temperatures are set on the WLCT for the group, but that the WLCT will not control a specific output itself.

**Channels 1..14:**

A thermostat set for channel 1 will activate the thermal actuator connected to output 1 on the master.

If several thermostats are set to the same channel number, they will control in the following way,

- The actual room temperature is calculated as an average.
- The room temperature set point is calculated as an average.
- If a limit sensor is connected to the thermostats

The lowest value of any thermostat is taken as the MIN Limit Temperature.

The highest value of any thermostat is taken as the Max Limit Temperature.

Channel 15 (position F on the switch) Party and vacation function.  
Special function see FUNCTIONALITY.

**Supply water temperature limit sensor**

This feature is not available on the basic master's version WLM-1BA and WLM-3BA

The limit sensor is directly connected to the master at the terminals marked limit sensor. Sensor type ETF-1899A must be used.

The temperature sensor should be placed on the supply water pipe to the underfloor heating system,

If a limit sensor is installed, without a weather compensation module (WLOC) the master will control the maximum water temperature. The factory default setting is 55°C, but this value can be changed via the display.

If a weather compensation module (WLOC) is added to the system, the master will vary the supply water temperature setting based on the outdoor temperature. A standard compensation curve has been programmed at the factory. If needed the curve can be changed, see separate USER MANUAL for the master control.

**Control signal for mixing valve actuator, 0-10V DC**

This feature is not available on the basic master's version WLM-1BA and WLM-3BA

The mixing valve is positioned via a 0-10V DC signal.

The mixing valve will close if the heating demand disappears.

The master can provide 6 VA, 24 V ac to the mixing valve.

The mixing valve actuator can be a 3 or a 4-wires version (3 wire version shown in FIG 11)

**GUIDELINES AND SPECIAL FEATURES**

**POWER UP RECOMMENDATIONS**

When all connections are complete, we recommend the following procedure:

- 1) Set the channel selector in the various thermostats so that it corresponds with the thermal actuator output that it must activate.
- 2) Turn all thermostats to their lowest setting.
- 3) Turn on the power to the master. The green LED should light. For each of the thermostats connected, the appropriate red LEDs on the master will now flash once.
- 4) Turn up each thermostat in turn and make sure that the correct thermal actuator opens, and that the water circulation is going to the required area.
- 5) When any heating demand exists, the appropriate red LED will light. After 2 min. the secondary pump will start followed by the main pump approx 10 seconds later. The boiler will start after an additional 10 seconds.

The green LED's for pump and boiler will light when the relays are activated.

NOTE: If you are not sure that the thermostats, thermal actuators and water loops are connected as they should be, set the channel selector in all the thermostats to CH 0. Now set the thermostat in area 1 on CH 1 and make sure that the red LED for channel 1 is lit. (Increase the temperature setting to maximum, if required). Check that the thermal actuator connected to the valve / water loop going to area 1 is opening (the actuator may take up to 5 minutes to open). Continue to area 2 and repeat above procedure  
N.B. If the heads appear to be in the wrong position on the manifold, it may be simpler to change them on the manifold, rather than reconnecting them on the master.

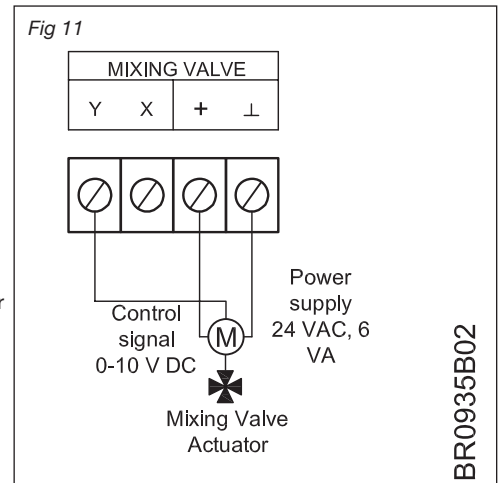
**CHECKING THE CONTROL SETUP**

After setting up the system, it is possible to check if the correct number of thermostats has been found and if all the thermostats have been set to the correct channel number. To test, press the "V" button for 6 seconds and all the LED's will be lit. This is known as a HARD RESET. Release the button.

A sequence of flashes will now start on some or all of the LED's of the master, including the green power LED, and if AO (additional) modules are used, the sequence will continue through these AO modules for up to the 14 channels. The sequence will start at the green POWER led and continue through channel 1, channel 2, etc.

If the Green power LED flashes on its own, this means that you still have one or more thermostats set to Channel 0.

If the system is correct, you will see one flash of each red output LED, starting at channel 1.



reset the system to accept only those thermostats that are functioning correctly.

A factory reset will always be followed by a read-out of the new system configuration (see the section "Checking the control setup")

If any LED flashes more than once, this indicates that you have more than one thermostat set to this same channel. If any thermostat has been set to channel 15 (common channel) all the LED's will flash together.

### ERROR/FAULT MESSAGES AND TROUBLE SHOOTING

During normal operation the green power LED will be ON when the master control is energised. The red output LED's (1 to 6 on the master, and 7 to 14 on the add-on modules) will indicate if the channel output relay is ON/OFF.

An error / fault message is shown by flashing the green power LED or one of the 6 red output LED's. From the number of flashes on any one LED, the problem can be diagnosed, and identified from the following:

The error number will be indicated by the number of flashes, with a pause of less than a 1/2 second between the flashes. The indication will be followed by a pause of 2 seconds, whereafter the sequence will be repeated.

#### Flashing Power LED (green)

- 1 flash ' One or more thermostats that are set to channel 0 or channel 15 are no longer sending data to the master control. The fault is corrected by replacing the thermostat. The master will need to be HARD RESET (see below) (NOTE: If the thermostat is of the WIRELESS type, the error /fault message could be an indication that the power has failed, and that the internal battery of the thermostat needs to be replaced)
- 2 flashes ' One or more thermostats have been set to a channel number which does not exist in the system. For example, the message will occur if the units are set to channels 7..14 and the required add on (AO) modules are not found in the system. The error is corrected by setting the channel number of the thermostat to a channel that does exist or by connecting the necessary AO module.
- 3 flashes ' Both AO modules have been set to the same channel group (either 7 to 10 or 11 to 14). The error is corrected by moving the selector switch placed in the lower right corner of the PCB of the AO module to position A for output 7 to 10 or to position B acting for output 11 to 14. If more than 2 AO modules are found, the 3th modules must be removed.
- 4 flashes ' The outdoor compensation module (WLOC) is defective. The fault is corrected by changing the outdoor compensation module. If the module has been removed deliberately to change the operation of the system, follow the HARD RESET instruction below.
- 5 flashes ' The external limit sensor (type ETF-1899) is defective. The fault is corrected by changing the temperature sensor. If the sensor has been removed deliberately to change the operation of the system, follow the HARD RESET instruction below.
- 6 flashes ' Internal overheating. The master has its own internal safety temperature protection system. The problem is corrected by improving the ventilation around the master module.
- 7 flashes ' Defective internal overheat sensor. The Master will control as normal, however the protection against internal over heating is no longer active. The fault can only be corrected by replacing the master module.
- 8 flashes ' The communication to an AO module has been lost. The fault is corrected by re-establishing the connection to the AO module or by changing the AO module if it is defective - or if it has been deliberately removed, with a HARD RESET.
- 9 flashes ' Indicates total number of input units exceeded. Please refer to factory or your local service engineer.

Only one error/fault condition can be shown at a time. If more than one error occurs, they will be prioritised in the shown sequence (1..9).

#### Flashing output LED (red):

The appropriate output channel LED can flash, indicating that the thermostat on that channel has a fault/error.

- 1 flash ' The master has lost communication to the thermostat. The fault is corrected by re-establishing the connection to the thermostat and the fault condition will be automatically reset once correct communication is resumed. If the thermostat is defective and has to be changed, or if it has been deliberately removed, it is necessary to make a HARD RESET. (NOTE: If the thermostat is of the WIRELESS type, the error /fault message could be an indication that the power has failed, and that the internal battery of the thermostat needs to be replaced)
- 2 flashes ' The internal sensor in the thermostat is defective. The fault can only be corrected by replacing the thermostat. Remember to make a HARD RESET after installing the new thermostat.
- 3 flashes ' The limit sensor on the thermostat is defective. Replace the faulty sensor. Reset is NOT required.
- 4 flashes ' Defective WLCT clock thermostat. If a clock thermostat operating a group of thermostats becomes defective, the remaining thermostats will control within the maximum and minimum limits programmed into the clock thermostat.
- 5 flashes ' The floor temperature is below the setpoint if the WLTD is set for min. limitation. If set for max. limitation, the floor temperature is above the max. allowed temperature.

### RESET

There are 3 different reset actions that can be used.

#### SOFT RESET

If the 'V' button is activated for 3 seconds, a SOFT RESET will be initiated. (Indicated by all the red output LED's(1-6) lighting in sequence when the 'V' button is released). A SOFT RESET will clear failure messages, in the next 5 minutes.

#### HARD RESET

If the 'V' button is pressed for 8 seconds, a HARD RESET will be initiated. (Indicated by flashes of all six red output LED's and the green power LED simultaneously). This reset will remove from the system any thermostat unit with a defective input sensor, or a defective AO module. The fault message will be reset but the defective items will no longer participate in the system. Once a defective unit is replaced, the new unit will automatically be recognised by the master control and become part of the system. To erase the identity of the defective component from the master memory a HARD RESET must be performed

Hard resets do not alter the temperature settings already programmed into the master control.

A hard reset will always be followed by a read-out of the new system configuration (see the section "Checking the control setup")

## FACTORY RESET

If the (V) button is pressed for more than 10 seconds, a total factory reset will be initiated. This is indicated through flashes of channel LEDs 1,3, and 5 alternating with channel LEDs 2, 4, and 6 (while the "V" button is pressed).

A factory reset will put all programmed temperature settings back to the factory defaults. It will also remove all thermostats from the master memory, and

## DEFAULT SETTINGS & SPECIAL FUNCTIONS

The master control has the following default temperature settings:

For the master with display, the setpoints can be altered on the display

DAY SETPOINT	20°C
NIGHT SETPOINT	15°C
OFF (FROST PROTECTION) SETPOINT	5°C
MAX LIMIT	27°C
MIN LIMIT	17°C
MAX SUPPLY WATER TEMP	55°C

Each thermostat with manual adjustment is capable of increasing or decreasing the preset DAY & NIGHT setpoints on the master by +/- 4C for the heating zone which it is controlling.

The Clock Thermostat WLCT has its own DAY & NIGHT temperature settings that can be set separately, and if manual thermostats are attached to its "group" these will operate to the same settings as the WLCT, but still with the possibility of local  $\pm 4^{\circ}\text{C}$  adjustment.

## CHANNEL 15 OPERATION

It is possible to override all the automatic functions of the master control, and the clock thermostats with a single function. This action is used for holiday periods (e.g. to set the whole system under a frost protection mode), or to temporarily override all the temperature control of the system.

It is achieved by using the any WLTM thermostat, as this has the override selector. If the cover is removed and the channel selector is set to F (channel 15), that thermostat will cease to operate its own output channel but will instead operate all the output channels of the system.

Using the WLTM thermostat, the slide selector on the right side can be used for as follows:

Auto will allow the whole system to operate to the automatic settings.

DAY will keep the whole system working to the DAY Setpoint, but only for those thermostats that are set for auto.

NIGHT will keep the whole system working to the NIGHT Setpoint, but only for those thermostats that are set for either auto or day.

OFF will turn the whole system OFF, but still under a frost protection level of 5°C

## NIGHT SETBACK (see also EXTERNAL SWITCH on page 3)

The external switch or timer function on the master module allows the whole system to be changed from the DAY Setpoint to the NIGHT Setpoint.

The external switch must have volt free contacts that are OPEN for NIGHT Setpoint, and CLOSED for DAY Setpoint. The factory fitted link wire is removed when a remote switch/timer is used.

If a WLCT clock thermostat is employed in a part of the system, the external switch action of going to NIGHT Setpoint will override the clock thermostat.

## Emergency programme for room control

If a thermostat is defective or if the communication to the unit is interrupted, an alarm will be triggered. Depending on the system configuration the regulation will continue in one of the following ways,

- If there are several units on the same channel which have a room sensor (which is still intact), the regulation will continue as before, however without contribution from the defective unit

- If no valid room sensor is found, the system will run at constantly 20% ON

The emergency programme is only valid for channels with heat control. Channels with cooling control will always run at 100% OFF in connection with a defective room sensor.

## Exercise of valves

If no automatic on/off sequence of valves or pumps occurs over a 72 hour period, an exercise of these components will take place. The actuators will be activated for 3 minutes. The pumps will be started for 10 secs during that period, and the mixing valve, if fitted will be opened and closed.

The following chart enables you to write down the zone name, the number of loops serving it, and the control thermostat type.  
PLEASE LEAVE THIS INSTRUCTION WITH THE CLIENT.

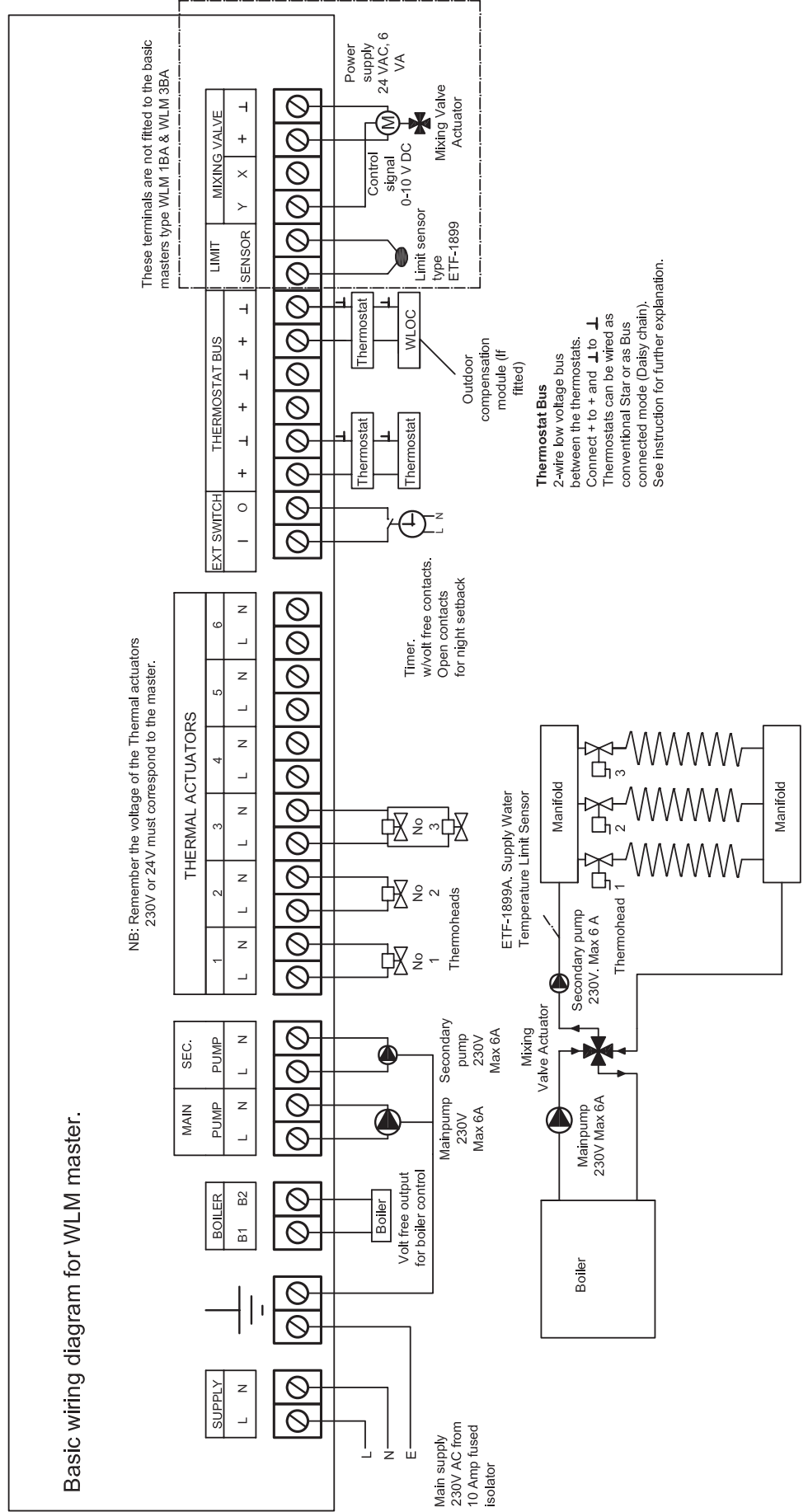
Thermostats	Thermo heads / Output	Zone	Water loops	Thermostats
CH 1	1			
CH 2	2			
CH 3	3			
CH 4	4			
CH 5	5			
CH 6	6			
CH 7	7			
CH 8	8			
CH 9	9			
CH A	10			
CH B	11			
CH C	12			
CH D	13			
CH E	14			
CH F	Special function		None	
Example				
Thermostat	Thermo heads / Output	Zone		
CH 1	1	Kitchen	3 loops marked 1, 2 and 3	W adjustment and MIN limit sensor

**OJ Electronics A/S**  
 Stenager 13B · DK-6400 Sønderborg  
 Tel +45 73 12 13 14 · Fax +45 73 12 13 13  
 www.oj.dk



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### Basic wiring diagram for WLM master.



**Thermostat Bus**  
2-wire low voltage bus between the thermostats. Connect + to + and - to -  
Thermostats can be wired as conventional Star or as Bus connected mode (Daisy chain). See instruction for further explanation.