3 YEAR warranty

Taking comfort further

WATERBASED UNDERFLOOR CONTROL

Heating&Cooling

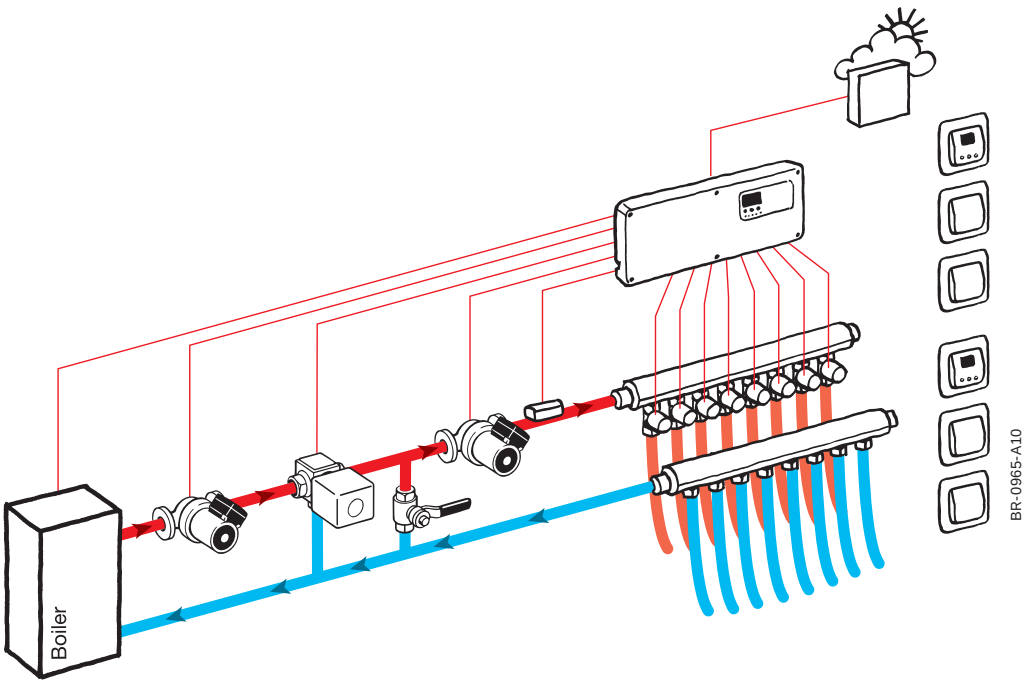
IN ONE

OJ ELECTRONICS

- Heating and cooling control
- Room controller with adaptive function
- Capable of controlling multiple areas
- Sensors for wired or wireless connection
- Network communication for masters
- Easy installation of interconnections

OJ waterline system for underfloor heating

:: Heating and cooling control for true comfort
:: Humidity sensor to avoid condensation on floors
:: Save energy. Comfort advantage with adaptive function
:: Area control for easy operation
:: Flexible installation for wired and wireless connection
:: Network communication for large applications
:: Easy installation with plug and lead connections
:: Optional weather compensation



Heating & Cooling system in one

The waterline system from OJ Electronics has been developed to provide a temperature control system for room heating and room cooling, integrated with switching of the primary heating and cooling sources, and the control of water temperature and mixing devices. This ensures the best possible comfort conditions and also reduces energy consumption.

Underfloor heating makes special demands on the control system
Underfloor heating makes special demands on the control system as users are in direct contact with the heated surfaces. A pleasant floor temperature, maintained within specific limits, is therefore required.

It will feel unpleasant if the floor temperature remains excessive for long periods, but comfort will naturally be lost if the room temperature falls too low.

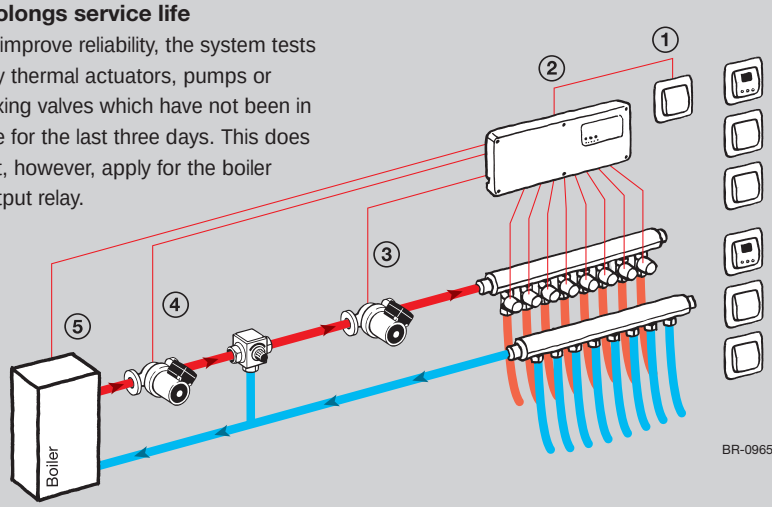
Heating functions
The OJ waterline system provides true comfort through precise room temperature control, always ensuring optimal energy and savings through advanced control of boilers, pumps etc.

Cooling functions
In addition to controlling heating, all WLM masters have the ability to control the system for cooling.

- To enable the cooling function an interface module WLAC and humidity sensor WLH have to be connected.
- By using the humidity sensor the system limits the formation of condensation on floor surfaces due to high humidity.
- If cooling is being limited due to high humidity a dehumidifier can be enabled by the master.
- When cooling is enabled the cooling set point will be pre-determined by the master and will override any settings in any room controller to ensure optimum energy efficiency.

The system saves energy and prolongs service life

To improve reliability, the system tests any thermal actuators, pumps or mixing valves which have not been in use for the last three days. This does not, however, apply for the boiler output relay.



BR-0965-A08

1. *Sensors signal heat demand.*
2. *Master coordinates signals and opens all relevant thermal actuators simultaneously. Opening intervals of 15-45 minutes are used, depending on heat demand.*
3. *Secondary pump starts 3 minutes later, i.e. once all elements are fully open.*
4. *Main pump starts 10 seconds after secondary pump.*
5. *After another minute, the boiler is started. The system thus ensures that the boiler is only started if the heat demand requires more than 3.5 minutes of operation. The pumps are not stopped until 1 minute after the boiler has been turned off to ensure maximum utilisation of the residual heat contained in the pipes. Once stopped, the boiler is not restarted for the next 5 minutes.*

Precise control of room temperature

With traditional thermostat control, 100% heat output is provided for a given length of time. With PI control on the other hand, the water temperature for underfloor heating is controlled in relation to current heat demands. If much heating or cooling is required, the thermal actuator will be fully opened. Otherwise, opening is continually adjusted to suit current demand. PI control ensures rapid and stable control of room temperature, and allows optimum utilisation of supplementary heat sources, e.g. sunshine or people in the room.

Thermal actuators

The Master has 8 outputs for thermal actuators. If more outputs are required, an additional module can be connected, providing a total of 14 outputs. The Master and additional module are available with either 230 V or 24 V outputs for thermal actuators.

Save energy

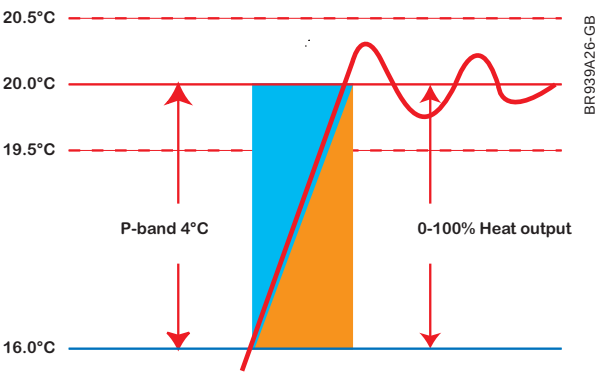
When planning to invest in an underfloor heating and cooling system, it is important to consider that energy prices may rise in the future. It is therefore well worth installing energysaving controls capable of reducing costs at times when comfort heating or cooling is unnecessary.

Interconnection of WLM products

For easy installation, interconnections between master modules, master and add on modules, and master and wireless receivers, are made by pre-wired plug in connectors (RJ45)

Timer control

Time control of the system is by using the WLCT programmable controller, but an external 7 day time switch can be connected to the master to control the entire system.



The thermal actuator is gradually closed as the required room temperature is approached, thus providing more accurate control and saving energy.

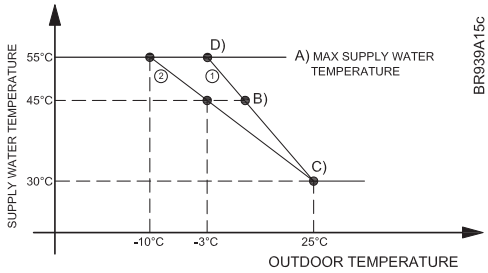
Additional system features

Domestic hot water control
It is possible to control the domestic hot water temperature with a special controller to ensure optimum energy saving.
A sensor from the controller measures the temperature in the storage cylinder.
A zone valve is then controlled via the WLM master, which in turn activates the boiler on demand.

Radiator control
It is possible to control a radiator circuit room temperature with a special room controller to ensure optimum energy saving.
The controller measures the temperature in the room, and a zone valve is then controlled via the WLM master, which in turn activates the boiler on demand.

2 step heating
If there is a need for enabling a secondary heat source in a room (e.g. a backup electrical radiator), it is possible to use a special room controller that will control two separate outputs.
The second output will be activated only if the temperature cannot be achieved within a preset time period.

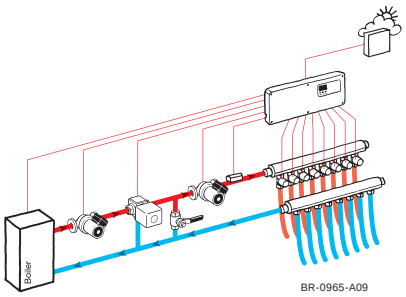
Weather compensation
The digital Master is capable of compensating for outdoor temperature. All that is required is an outdoor compensation module and a supply temperature sensor to be connected.
Based on current outdoor temperature and heat demand, the Master varies the water temperature of the underfloor heating by means of a 2, 3 or 4-way mixing valve.



Temperature settings on the Master are factory-programmed (curve 1) but can easily be altered using the display (curve 2).

Mixing valve control

To obtain controlled supply water temperature the digital master provides a 24Vac, 0-10V output for the mixing valve. Control action is P + I and the parameters are adjustable in the master.
The control signal can be reversed to 10-0V if required.



Initially, the valve is opened 20%. Accumulated hot water is then utilised before the boiler is turned on. Once the boiler has been started, the mixing valve will be fully opened.

Commissioning mode

Digital masters include a special "commissioning mode", which allows the temperature of the supply water to be controlled to assist the drying out of a newly laid concrete floor.

Note: This function relates to BS/EN-1264 part 4.

Adaptive function (optimum start)

The adaptive function allows the start time of the heating system to be automatically varied, thus providing energy savings, but ensuring that the room will reach the correct temperature at the desired time.
A WLCT room controller is necessary on the system for the adaptive function to operate.

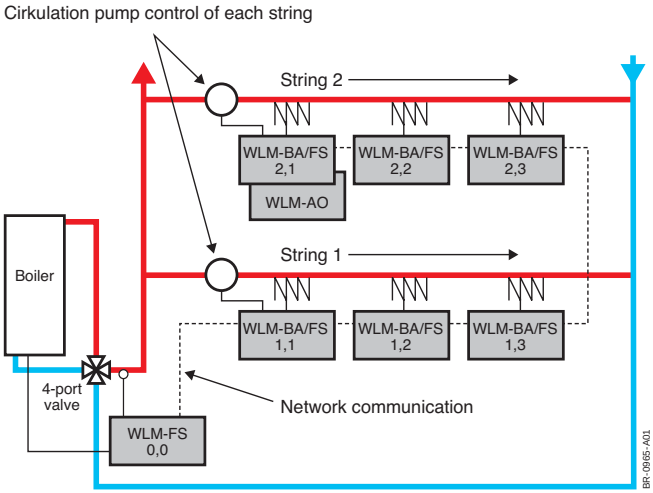
System check

Correct operation of the system can be checked using a special "Install Mode". This enables the installer to individually test and prove each output.

Networking possibilities

In large buildings with multiple areas it is possible to use a master to create a network of multiple zones.

- A "network master" could be a digital version for centralized control of mixed supply water or a basic master where no mixing is required.
- "Slave Masters" can then be added to the network to create additional zones.
- "Slave Masters" controlling a common pump are connected as a string on the network system.
- Up to 15 strings, each of up to 9 masters, can be connected as a network.
- Switching between cooling and heating can be done via the "Network Master"using a single WLAC interface.

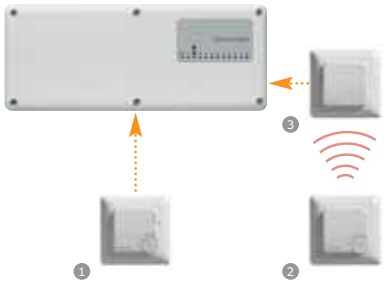


In large buildings with multiple areas it is possible to use a master to create a network of multiple zones.

Wired and wireless communication

Wired and wireless communication

The master is universal and can be used for wireless communication if a receiver is connected. Sensors with either wireless or cable communication can be combined in the same system.

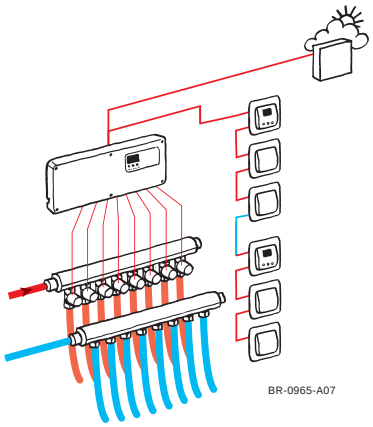


1. *Cable communication.*
2. *Wireless communication.*
3. *Receiver for wireless signal.*

Wired communication

Low-voltage sensors/controllers are connected to the Master in star or series using standard 2-core cables (0.25 mm^2). The total length of cable may be up to 300 m with a maximum of 100 m between any two units.

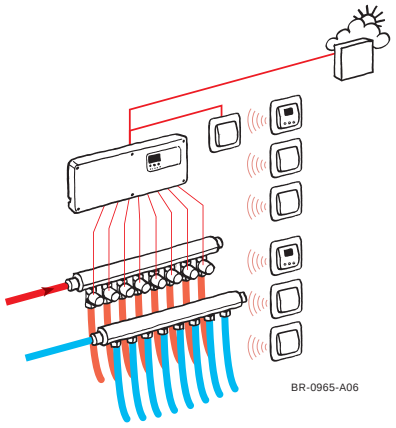
If the system is subsequently extended, the new room sensor/controller is simply connected to the nearest cable or room sensor.



Room sensors/controllers are connected using 2-core cable (0.25 mm^2).

Wireless communication

The Master is universal and wireless communication is possible if a receiver is connected. A frequency band of 868 MHz is used in order to maximise communication stability. Activating the sensors/controllers is extremely easy: simply set the Master in learning mode and then press the activation button on the sensors/controllers.
The sensors/controllers is powered by standard AAA batteries and an alarm signal indicates when these are running low.
The alarm signal can be turned off for 24 hours until the batteries have been replaced.



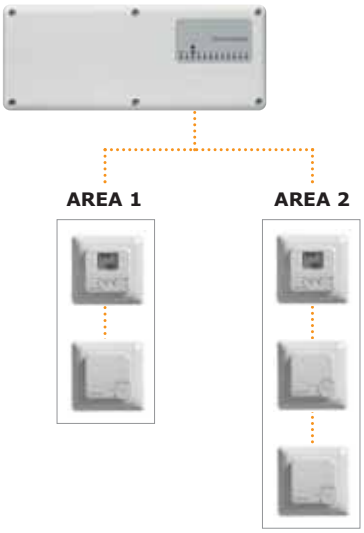
The outdoor compensation module is connected using 2-core cable (0.25 mm^2) while 4-core cable is used for the receiver

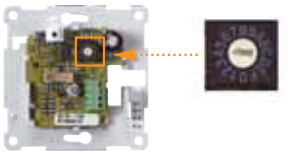
Room sensor/controller features

Area control
Using the room controller, the building can be divided into various areas, each containing rooms with a similar pattern of usage. Time and temperature settings can be made on the room controller for each change of usage, and these settings then apply for all the rooms within the area via a simple programming function in the room controller.

Users can still adjust the temperature of an individual room by +/- 4C.

The room controller can be placed, and used, to control one of the rooms within the area, or it can be placed outside of the area, in a central position, for the convenience of the user. Therefore, a typical installation could have two or three room controllers placed in a central position and controlling all the rooms within the building.





Simple sensor and controller activation
The number of the output for the thermal actuator to be activated by the room sensor/controller must be set on the channel selector located behind the sensor/controller cover. If, for example, channel 4 is selected, the room sensor/controller will activate the thermal actuator connected to output 4 on the Master.

Manual control
A room sensor with function selector can be installed, allowing permanent override for that room to either setback or off condition.

OJ waterline masters

The master provides system brainpower

Based on the room temperatures, the master ensures optimum operation of boilers, pumps, and – on the digital master, water temperature control. It is especially important that operating temperatures are optimised as these are of crucial importance for energy consumption, and system service life.

- Using an external temperature sensor, the Digital Master can compensate for changes in outside temperatures. Water temperature is then adjusted automatically.
- Room temperature demands are communicated to the Master by wired, or by wireless signals.
- Outputs are incorporated in the master for the switching of thermal actuators, boilers, pumps, and mixing valves.
- Temperature settings can be set on the digital master by a simple 3 button system.
- Indicator lights show the status of the outputs, and also give error/fault messages for simple diagnostics.
- Each master can control a maximum of 8 rooms/zones.
- An ADD ON module can extend this to 14.
- A system with greater than 14 zones can be controlled by using more than one master in a network format (see page 6)
- The Master can be used for cooling control in addition to heating. A cooling kit is required and the software enables dewpoint control to be achieved via a WLH room mounted humidity sensor.
- A Master, primarily used for underfloor heating, can also be used for domestic hot water control, and for control of a radiator circuit, by the addition of special versions of the room WLCT controller (see product program and paragraphs on page 11-12)

Digital Master with graphic display which lights up when activated. Temperature parameters are illustrated by means of simple symbols and settings can be changed using the up-arrow, down-arrow and accept buttons.

Digital Master with graphic display

The display lights up when activated and the various temperature parameters are illustrated by simple symbols. Settings can be changed using the up-arrow, down-arrow and accept buttons.
A special service menu allows current readings for the following parameters to be accessed at any time:

- Outdoor temperature (if weather compensation is connected)
- Water temperature for the underfloor heating.
- Mixing valve control signal.

In addition, current room temperature for all room sensors/controllers in the home can be displayed, as can current floor temperature if floor sensors are installed. Whether the room sensors/controllers are functioning correctly can also be checked on the display in a table listing all room sensors/controllers.
Error codes (E0 to E9) are shown if faults occur, making it easy to locate and correct any faults.

Master program

Standard master
8 outputs for thermal actuators

Digital master
8 outputs for thermal actuators
and weather compensation

Additional module
6 outputs for thermal actuators

OJ waterline room sensors/controllers

Sensors and controllers with wireless or cable communication

- can be combined on the same system.
- Wireless sensors use standard AAA batteries and give an alarm signal when the batteries are running low.
- Cable connected sensors use a 5v dc bus system and standard 2 core (0.25 mm²) cable can be used.
- All sensors can be changed from heating to cooling function by a remote signal sent to the master via a WLAC module.

A non adjustable version of the sensor can be provided for public buildings All WLM temperature sensors are elegantly designed for mounting on wall surfaces, or on wall sockets.

- Temperature adjustment is restricted to +/- 4C, preventing unintentional settings to very high or very low levels.
- Precise control is achieved by P+I action of the controlled output
- Optional floor sensors can be used to ensure that floor temperatures are never too high or too low
- A room controller provides for temperature levels to be changed to suit the occupancy of the room, thus ensuring that energy is used efficiently.
- One room controller can control a number of rooms with similar occupancy timings, but still maintaining the local +/- 4C adjustment for individual requirements. (see paragraph on area control, page 8)
- Wireless and cable type sensors.

Room controller with timer

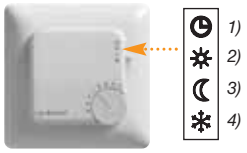
Heating costs can be reduced if the temperature is lowered at night and during weekday daytime hours. Time controllers can thus save money.
The controller is programmed for comfort and setback periods for one or more rooms with similar pattern of use, e.g. three bedrooms. (see Save energy, page 4)

Room sensors/controllers in general

These are specially designed for waterbased underfloor heating systems. Models with wireless or cable communication are available and both types can be combined in the same system. As many as 24 room sensors/ controllers can be combined in a single system, and each of them is capable of controlling one or more thermal actuators. Should a room sensor fail, the system maintains a minimum of 20% heat output, thus preventing unpleasantly low temperatures when occupants return home.

Room sensor with external floor sensor

These room sensors have two sensors. An internal temperature sensor for room temperature control and a floor sensor with higher priority that ensures floor temperature is maintained at a comfortable level all year round or prevents parquet floors from becoming excessively warm.



1) Automatic comfort and setback temperatures
2) Permanent comfort temperature
3) Permanent setback temperature
4) Permanent frost protection, approx. 5°C

Room sensors with function selector

A function selector allows timer settings to be overridden. It is, for example, possible to permanently maintain setback temperature in an unused guest room or to activate the comfort setting in the living room on days off when the setback setting would otherwise have applied.

Floor sensors provide additional comfort and reliability and protection of wodden floors

Sensors/controllers program


WLTA


WLTM


WLTD


WLTP


WLCT

Master program

	STANDARD	DIGITAL	ADDITIONAL MODULE
			
	8 outputs for thermal actuators	**8 outputs for thermal actuators and weather compensation**	**6 outputs for thermal actuators**
Control panel	1 LED indicates power 8 LEDs indicate thermal actuators 3 LEDs indicate pumps and boiler 1 LED indicates setback temp. Reset for alarm and factory settings	1 LED indicates power 8 LEDs indicate thermal actuators 3 LEDs indicate pumps and boiler 1 LED indicates setback temp. Backlit display	1 LED indicates power 6 LEDs indicate thermal actuators
Relay outputs	· Thermal actuators or zone valves 8 outputs, max. 2 A direct Boiler, max. 4 A voltage free · Main pump, max. 4 A direct · Sec. pump, max. 4 A direct	· Thermal actuators or zone valves 8 outputs, max. 2 A direct · Boiler, max. 4 A voltage free · Main pump, max. 4 A direct · Sec. pump, max. 4 A direct	· Sec. pump, max. 4 A direct
Control input	· Setback temp. etc.	· Setback temp. etc.	
In/Outputs for weather compensation	-	· Outdoor compensation module · Supply temperature sensor (incl. with Master) For mixing valve: · 0-10 V control signal · 24 V, 6 VA voltage supply	-
Temperature settings:	Permanent settings:	Standard: Range:	-
Room temperature - Setback temperature - Frost protection - Max. floor temperature - Min. floor temperature - Max. supply water temperature -	[1] 21°C 18°C 5°C 27°C 17°C 55°C	[1] 21°C +5/+40°C 18°C +5/+40°C 5°C +3/+8°C 27°C +20/+40°C 17°C +10/+30°C 55°C +25/+70°C	
Weather compensation:	-	Standard: Range:	
Low outdoor temperature - Supply water temperature -		-3°C -20/+10°C 45°C +30/+60°C	
High outdoor temperature - Supply water temperature -		25°C +10/+35°C 30°C +10/+40°C	
Power supply	230V AC	230V AC	230V AC
Dimensions (H/W/D)	130/315/53 mm	130/315/53 mm	130/315/53 mm

Master types and accessories:			
Outputs for 230 V thermoelements	WLM2-1BA	WLM2-1FS	WLM2-1AO
Outputs for 24 V thermoelements	WLM2-3BA	WLM2-3FS	WLM2-3AO
[2] Receiver for wireless signal	WLRC-19	WLRC-19	-
Outdoor compensation module for weather compensation	-	WLOC-19	-

Cooling kit:			
Cooling kit for standard masters	WLM2-BA-COOL		
Cooling kit for digital masters		WLM2-FS-COOL	

[1] Room temperature can be adjusted ±4°C via the thermostat.

[2] Wireless communication can be achieved by connecting a receiver (type WLRC-19) to the Master. Dimensions: (H/W/D) 80/80/24 mm.

Room sensor/controller program

	ROOM SENSORS				CONTROLLER
					
Sensor type	**Standard**	**Standard with function selector**	**Standard with function selector and floor sensor**	**Non-adjustable**	**4-event timer thermostat**
Temperature adjustment	±4°C	±4°C	±4°C	-	+5/+35°C
Functions	-	Auto, comfort, setback, frost	Auto, comfort, setback, frost	-	Auto, comfort, setback
Room sensor	Internal	[2] Internal	Internal	Internal	Internal
Floor sensor	-	-	Incl. floor sensor	-	Can be connected
Dimensions (H/W/D)	80/80/24 mm	80/80/24 mm	80/80/24 mm	80/80/24 mm	80/80/24 mm

For mounting direct on wall or in wall socket.

Thermostat type:					
Cable communication	WLTA-19	WLTM-19	WLTD-19	WLTP-19	WLCT-19
[1] Wireless communication	WLTA-29	WLTM-29	WLTD-29	WLTP-29	WLCT-29
Floor sensor type	-	-	ETF-144/99A	-	ETF-144/99A
External room sensor type	-	ETF-944/99H	-	-	-

[1] Supplied complete with AAA batteries. [2] External room sensor can be connected instead of internal sensor.

Special types:					
Radiator control					WLCT-19/R WLCT-29/R
Domestic hot water control					[3] WLCT-19/HW [3] WLCT-29/HW
2-step control					WLCT-19/2 WLCT-29/2

[3] External sensor included, temperature range +5/+80°C.

Symbol	Time	Temp.	Explanation
Program for weekdays, Mondays-Fridays:			
☼	06:00	21°C	MORNING: The day begins
⌂→	08:00	19°C	OUT: At work, school, etc.
⌂←	16:00	22°C	HOME: The family returns home
☾	23:00	17°C	NIGHT: Bedtime
Program for Saturdays and Sundays:			
☼	08:00	22°C	MORNING: It is the weekend so the day starts later
☾	23:00	17°C	NIGHT: Bedtime

4-event timer controller

With a WLCT controller with integrated timer, heating costs can be reduced by automatically lowering the temperature at night and during weekday daytime hours.

Besides the current time and weekday, the controller display also shows the active comfort or setback period using logical symbols.

The controller is pre-programmed with comfort and setback periods but these can easily be changed to suit personal requirements. The table shows the symbols used and the factory-programmed periods and temperatures.

Founded in 1964, OJ Electronics develops and manufacturers specialized solutions for underfloor heating and HVAC controls and power. Today, OJ Electronics is one of the worlds leading manufactorers of controls for electrical underfloor heating.
Combining in-house R&D with state-of-the-art production and quality-assurance technologies, OJ´s products are acclaimed for functionality, design and easy of installation. The reliablity of OJ products are considered as being the best on the market.
Headquartered in Denmark, OJ Electronics products are available through distributors worldwide.

OJ.Waterline.GB.07 - Subject to alterations / 2821

OJ ELECTRONICS A/S
STENAGER 13B
DK-6400 SØNDERBORG
DENMARK

T.+45 73 12 13 14
F.+45 73 12 13 13
OJ@OJ.DK
WWW.OJ.DK

OJ ELECTRONICS UK
CRUSADER PARK
WARMINSTER
WILTSHIRE, BA12 8SP
UNITED KINGDOM

T.+44 01985 213 003
F.+44 01985 213 310
SALES@OJUK.CO.UK
WWW.OJUK.CO.UK

OJ ELECTRONICS
taking comfort further