Reversible floor heating and cooling thermostat

The Tio Reversible Floor Heating and Cooling System offers a simple and cost-effective solution for floor heating systems where a heat source is able to deliver cool water in summer periods for circulation through a normal Underfloor heating set up.

Product Code	Product Description
TIOSTA0013	230v white floor heating and cooling thermostat
TIOSTA0014	230v black floor heating and cooling thermostat
TIOSWI0001	Tio Smart switch
TIOSEN0002	Tio Dew point sensor
TIOWIR0002	5 Zone wiring control Centre with valve and timer port (230V)

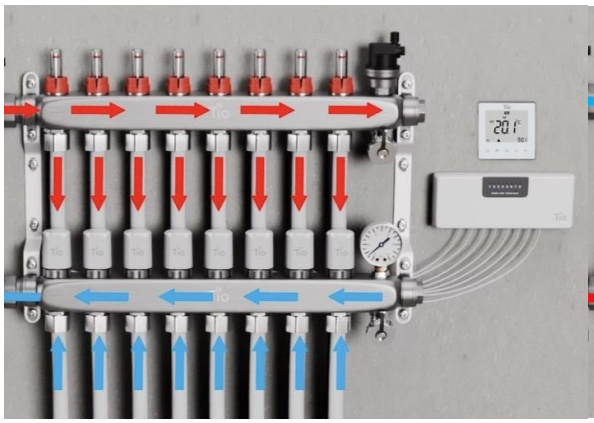
During winter heating periods the system operates in the same way as a normal UFH system, with a basic distribution manifold (non-mixing). A Tio Reversible Room Thermostat allows a dedicated manifold valve to open when the room temperature is below the required temperature set point, the warm water circulates through the floor heating the room.

In summer periods a 230v signal is sent to the manifold wiring centre to switch the unit into cooling mode (the Tio Smart Switch can be used to generate this signal and can also be used to switch a volt free signal from the ASHP/GSHP). When this signal is received, the system and thermostat operation is reversed allowing manifold valve actuators to open when the room temperature is above the desired set point thus allowing cool water through the manifold loops in order to cool the room.

The manifold and wiring centre are fitted with a Dew Point sensor which prevents the system running if condensation build up is present on the manifold body. This is used as a safety feature only to protect building fabric in times of high humidity and not as a primary control, cool water to the manifold should be supplied above dew point.

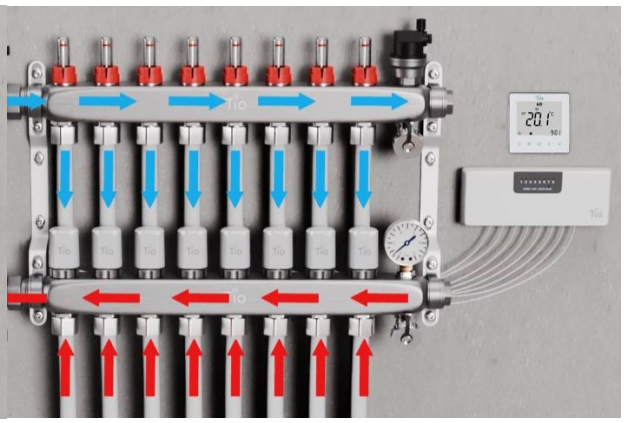
The system is only suitable for basic distribution manifolds (non-mixing) as there is no capacity for localised blending of water temperature, water must be supplied to the manifold at suitable temperature to circulate through the floor, typically 35°C-45°C for heating and 15°C-20°C (above dew point) for cooling.

Heating Mode



System allows warm water to circulate through the floor.

Cooling Mode



System allows cold water to circulate through the floor.

Overview

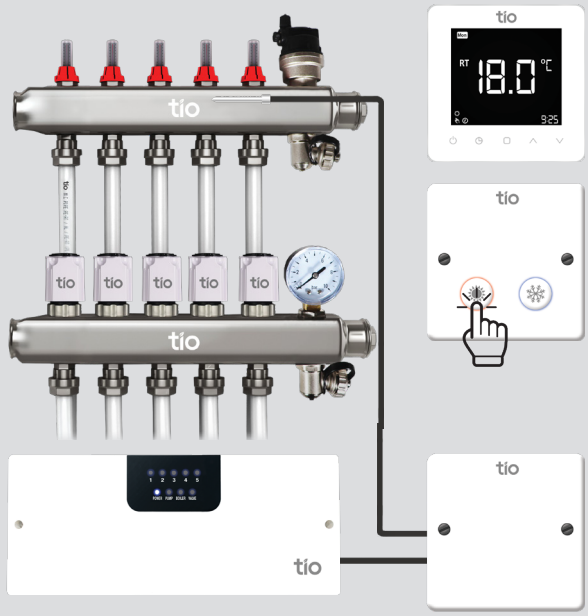
There are 5 key components to a heating and cooling system. The manifold, wiring centre, thermostat, heating and cooling switch and a dew point sensor.

Operating your thermostat as you would regularly for heating, setting the temperature to your desired value using up and down, whilst ensuring the switch is in heating mode. Your thermostat will display a sun when it is in heating mode. You will see the wiring centre activate the designated zone.

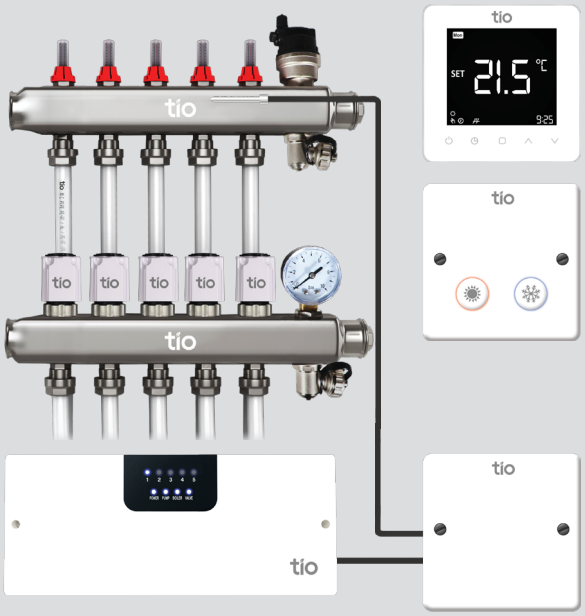
To switch into cooling mode, toggle the heating and cooling switch into cooling mode. A snowflake icon will appear on your thermostat. You will now have to lower the temperature setting on your thermostat in order to activate the function. You will notice the desired zone on the wiring centre light up.

A Dew Point sensor is fitted to detect condensation on the manifold body. If detected, the pump and demand is disabled.

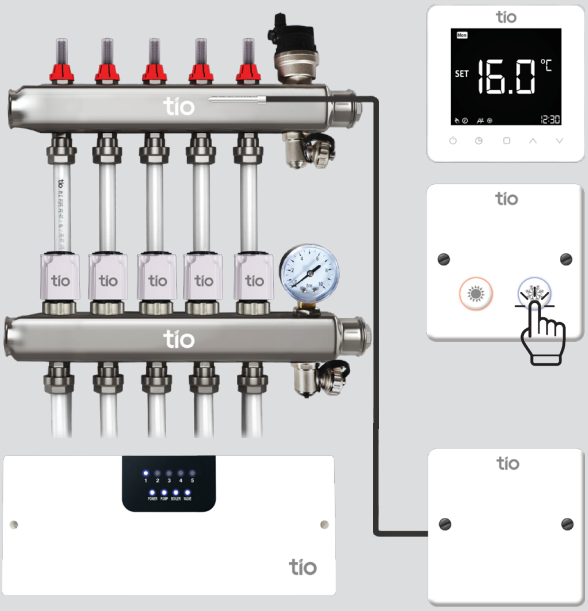
System overview. Switch is set to heating mode, thermostat is not yet calling for heat. (Sun icon visible)



Thermostat is now calling for heat. Zone 1 loop on wiring centre now open and LED signal ON.

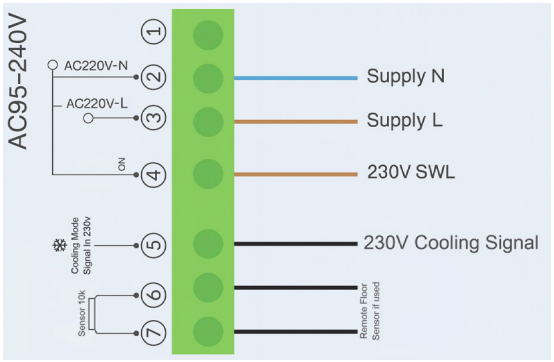


Switching the Smart Switch into cooling mode, the snowflake icon is now visible. Thermostat is set to a low value for cooling. Now calling for Zone 1 loop to open for cooling.



Thermostat Details
Power Consumption: < 1.5W Timing Error: <1 %
Power Supply: 95 - 240VAC, 50 ~60Hz
Current Load: 5A (water heating, water/gas boiler)
Shell material: PC+ABS (flame retardant)
Dimension: 86x86x13.3mm
(Non-condensing) Ambient Temperature: 0-45°C, 5-95% RH
Storage Temperature: -5-55"C
5 + 1 + 1, six period per day programming
Pre-set temperatures maintained within +/- 0.5°C
Internal and external sensors for both air and/or floor temperatures
WIFI/ZIGBEE/MODBUS communication optional

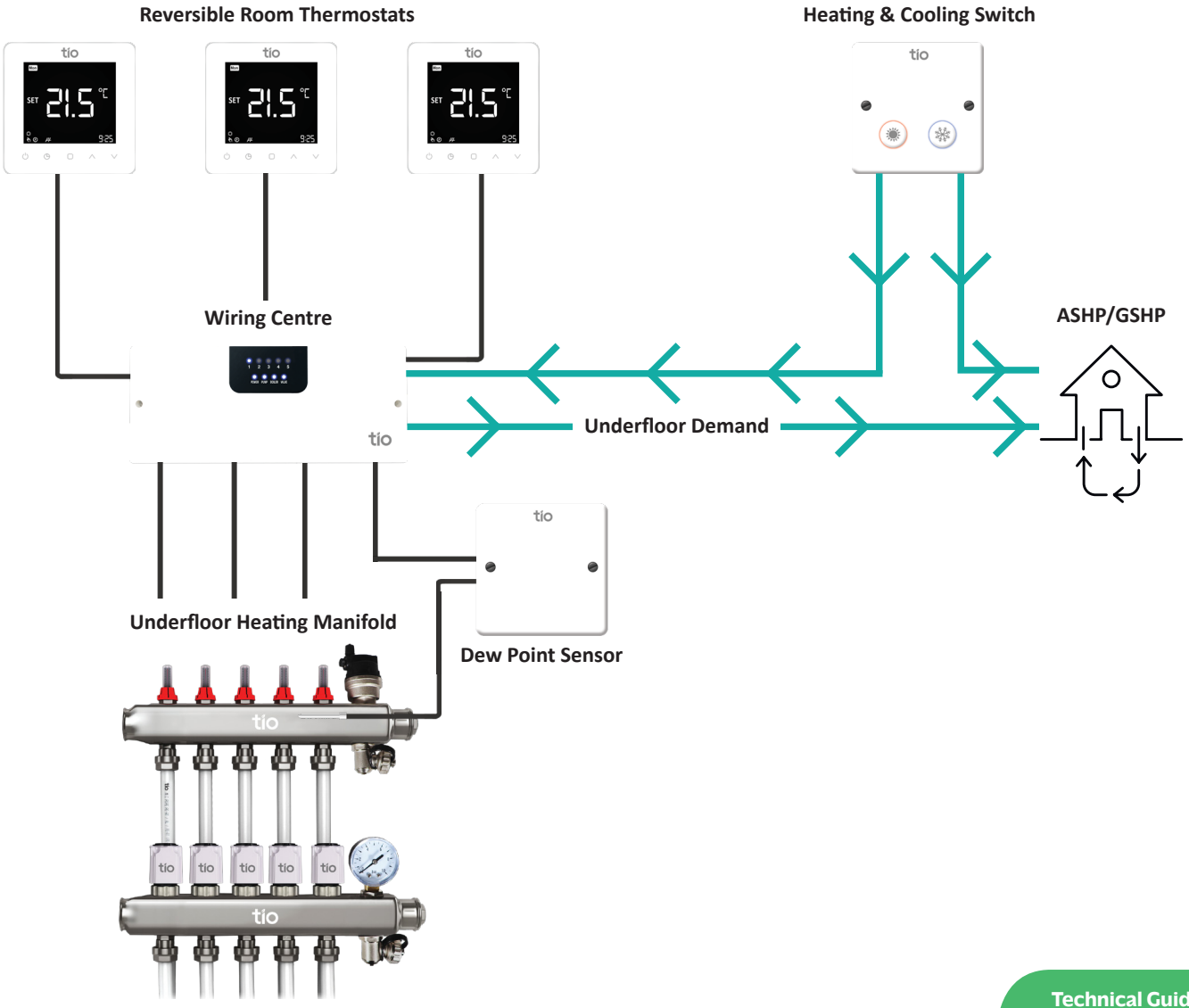
Fig. 1 Thermostat Wiring



Configuration Menu:

No.	Function	Press ^ v to set	Default
1	Calibrate	-9°C to 9°C	0°C
2	Dead zone	0.5°C to 5°C	0.5°C
3	Lock	0: All buttons will operate 1: All buttons will lock except power	0
4	Sensor selection	IN: internal sensor OU: External sensor ALL: Both sensors operating	ALL
5	Minimum temperature setting	5°C to 15°C	5°C
6	Maximum temperature setting	15°C to 45°C	35°C
7	Display mode	0: Room Temperature 1: Setting Temperature	0

8	Standby backlight	0 - 100	10
9	High temperature protection setting	25°C to 70°C	45°C
A	Anti-freeze temperatue range	2°C to 10°C	5°C
B	Anti-freeze protection	0: OFF 1:ON	0
C	Eco Mode	0: **OFF** 1: **ON**	0
D	Eco heating temperature range	5°C to 30°C	16°C
E	Eco cooling temperature range	5°C to 30°C	28°C
F	Backlight	0 - 100	80

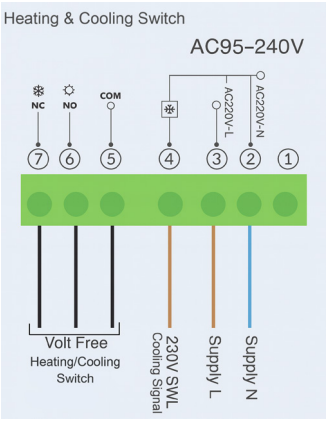


Heating and Cooling Switch

The Tio Heating and Cooling switch is used to switch between summer cooling and winter heating periods when used in conjunction with the Heating and Cooling thermostat.

The switch can also be used to switch heat sources such as ASHPs between heating and cooling via an additional volt free relay.

Fig. 2 Switch Wiring



Dew Point Sensor

The Tio Dew Point Sensor is designed for use in conjunction with the heating and cooling thermostat and Heating and cooling switch, the sensor probe is strapped to the underfloor manifold body and will disable the wiring centre's demand and pump signals and also close the system zone valve as the manifold body approaches dew point.

The sensor can also be used in any application where high-level humidity detection is required.

The sensor comes with a 2.5m fly lead probe and 8A volt free switching relay.

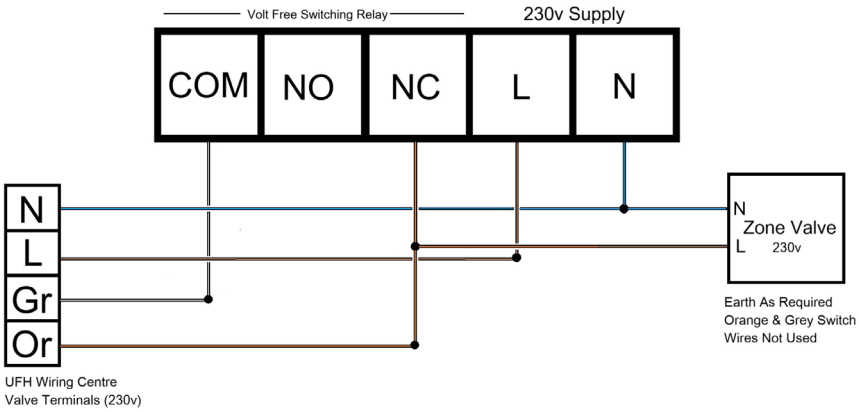
The unit has 3 pre-programmed settings offering versatile operation and compatibility with both plastic and metal pipework and manifolds.

Set Points can be adjusted by holding down the 'set' button for 3 seconds :

1 – **Low Set** – Equivalent to 92-95%RH
2 – **Medium Set** - Equivalent to 95-98%RH
3 – **High Set** - Equivalent to 100%RH

The Sensor light will illuminate if the set point is exceeded.

Fig. 3 Wiring Centre & Zone Valve Connection



Wiring Schematic