Bringing
power to life.

BEAMA UNDERFLOOR HEATING CONTROLS GUIDE FOR DOMESTIC PROPERTIES

FOR WARM WATER (HYDRONIC) SYSTEMS ONLY

May 2020

DISCLAIMER

Published in Great Britain in 2019 by BEAMA Underfloor Heating (the UK's underfloor heating trade association), Rotherwick House, 3 Thomas More Street, London E1W 1YZ

askforunderfloor.org.uk

www.beama.org.uk/underfloorheating.html

CONTENTS

1.
OVERVIEW

As with all central heating systems, the installation of appropriate controls cannot be overstated. With UFH, correctly specified and installed heating controls can provide high levels of comfort along with economical fuel usage.

The Building Regulations, and in particular the supporting Domestic Building Services Compliance Guide (DBSCG), provide detailed guidance on the method and type of heating control required for a new Underfloor Heating system.

CLICK HERE to download a copy of the DBSCG

The DBSCG states the following minimum standards for the warm water distribution system:

Table 31 Recommended minimum standards for control of wet and electric underfloor heating systems

	Minimum standard	Supplementary information
1.0 System temperature control: wet and electric underfloor heating systems	a. All floor heating systems, whether warm water or electric, should be fitted with controls to ensure safe and comfortable operating temperatures. b. To prevent damage to floors and occupant discomfort, the temperature of the flow water from warm water systems connected to a high temperature (>60°C) heat source should be controlled using: i. multi-port mixing valves and thermo-mechanical or thermo-electric actuators ii. a separate high-limit thermostat. c. Electric floor heating systems should comply with the rules in BS 7671:2008+A1:2011 *Requirements for electrical installations*, Section 753, *Floor and ceiling heating systems*, for protection against electric shock and thermal effects, and for selection and installation of equipment.	Mixed systems with radiators and underfloor heating connected to a common high temperature heat source may benefit from being operated at the same low water temperature. For optimum long-term efficiency, consider using weather compensating controllers with thermo-electric mixing valves.
2.0 Room temperature control: wet and electric underfloor heating systems	a. Each room should have its own thermostat, sensor or programmable thermostat. b. Where two adjacent rooms have a similar function – for example a kitchen and a utility room – it may be appropriate for both rooms to share a single temperature control.	
3.0 Time control: wet and electric underfloor heating systems	a. Dwellings with a total floor area up to 150 m² should have at least two space heating zones with independent temperature control, one of which is assigned to the living area. b. Dwellings with a total floor area >150 m² should have at least two space heating zones with independent on/off time and temperature control. c. For single-storey, open-plan dwellings in which the living area is greater than 70% of the total floor area, sub-zoning of temperature control is not appropriate. d. Thick screed floor heating systems (>65 mm) should have facilities for automatic setback of room temperature to a lower level at night or during unoccupied periods.	Facilities for automatic setback of room temperature to a lower level at night or during unoccupied periods are recommended for both electric and warm water systems.
4.0 Boiler control: wet underfloor heating systems only	a. The heating system controls should be connected so that when there is no demand for heat, the heat source and pump are switched off.	

If we expand on the DBSCG requirements, it can be seen that all UFH systems need safe controls that provide comfort. The minimum standard required for the warm water heat distribution system would be as follows:

System Temperature Control

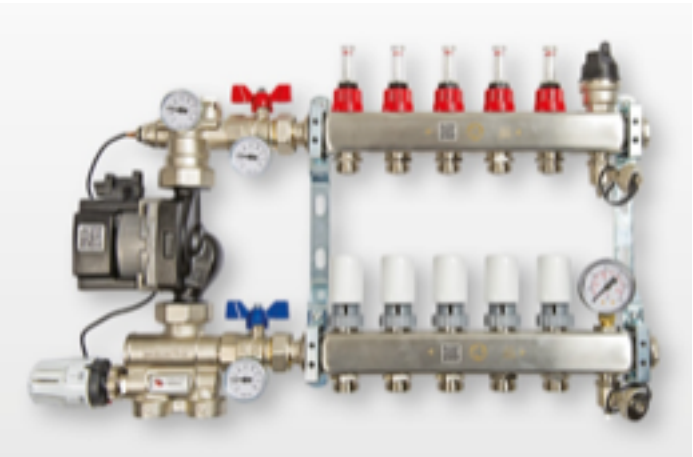
- Should a standard high temperature boiler be the heat source, a blending device must be installed to ensure the UFH receives water at the appropriate design temperature, which typically may be between 40°C and 55°C.
- A High Limit thermostat should also to be fitted to the UFH distribution system if the heat generator can provide water temperatures in excess of 60°C. This is a thermostat that prevents water above 60°C entering the UFH loops should there be a failure with other water temperature controls in the system. For example this thermostat may isolate the electrical supply to the UFH wiring centre causing the UFH pump to stop and any thermo electrical actuators to close. There are however several ways the High Limit thermostat may be installed, but the result must always be to prevent water at a temperature >60°C entering the UFH system.

Time Control

- One single time controller may be used for a heated area of up to 150m^2. Each additional heating zone of with an area of up to 150m^2 must have its own separate time controller.
- Where UFH is installed into a floor that may have a significant amount of thermal inertia, such as a screed in excess of 65mm in depth, a night setback timing facility is required which will allow the room only to cool by around 3°C overnight, therefore preventing excessive temperature swings.

Room Temperature Control

- Each room must have its own room thermostat or sensor. It is not permissible to have one single room thermostat controlling the air temperature of several different rooms. However it may be permissible for one room thermostat to control the temperature of two rooms with a similar function, such as a Kitchen and a Utility. Bedrooms and En-Suites must each have individual temperature controls as they do not serve a similar function. It may be beneficial to use programmable room thermostats which will allow greater flexibility in the use of the heating system, so each room may be heated precisely in accordance with its usage pattern, saving fuel.
- Generally each room thermostat controls a thermoelectric actuator situated on the UFH distribution manifold which in turn controls the flow of warm water into the appropriate UFH loop.
- UFH is particularly suited to the use of Smart Controls where the time and temperature of a room can be controlled by a smart 'phone or similar device. It is extremely useful to be able to easily control the building's thermal performance in this manner, either inside or outside the property. This greater flexibility and ease of use can equate to energy savings and lower fuel bills.



Here is a typical pump, blending valve and manifold assembly showing thermo electrical actuators on the bottom (return) manifold

Control of the Heat Source

As with all heating control systems, the UFH system controls MUST be configured such that, when there is no demand for heat from the UFH system, the heat source and the circulating pump should be switched off. This is commonly known as having a "boiler interlock", and is enabled by having the boiler switched on and off via a main heating system Wiring Centre. The schematic diagram below shows the typical functional control of a UFH heating system.

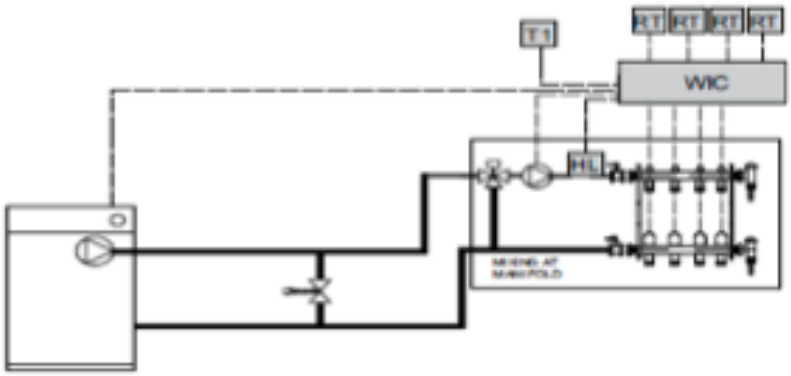
Setting Flow Meters and Balancing the UFH system

A UFH system must be balanced to ensure the correct amounts of heat are being distributed to the appropriate areas. The UFH design should detail how many litres per minute of water each circuit should receive, and the flow metres on the manifold adjusted accordingly. On the manifold pictured above, the flow meters are the red devices on the top (flow) manifold. Different brands of manifold will have slightly different methods of setting the flow meters, however this simple task must be carried out to ensure correct and economical system performance.

Floor Surface Limiting Thermostats

Certain floor coverings may have a maximum permissible surface temperature that should not be exceeded. An example of this is a floor covering containing a high vinyl content which generally has a maximum operating temperature of 27°C. When using a floor covering, where the manufacturer specifies such a maximum operating temperature, consideration should be given to installing a floor surface limit thermostat. This simple device should be installed such that it measures the hottest part of the floor and, if the maximum permissible temperature is exceeded, be able to shut the heating off in that area until the floor surface temperature reaches an acceptable level.

A typical Smart Room Thermostat System with Internet enabled Programmable Room Thermostats



T1 = Timer
RT = Room thermostat
WIC = Wiring centre
HL = High limit thermostat

THE UFH SYSTEM CONTROLS MUST BE CONFIGURED SUCH THAT, WHEN THERE IS NO DEMAND FOR HEAT FROM THE UFH SYSTEM, THE HEAT SOURCE AND THE CIRCULATING PUMP SHOULD BE SWITCHED OFF.

MORE INFORMATION

For more information about BEAMA, the Ask for Underfloor campaign and underfloor heating, please visit www.askforunderfloor.co.uk.

Rotherwick House
3 Thomas More Street
London E1W 1YZ

www.beama.org.uk