

Guidance on how to comply with Part L of the Building Regulations from April 2018

Version 1.3 – 4 February 2019

This guide supports the official 2013 guidance (including 2018 amendments) covering the control of gas and oil fired wet central heating installations in domestic premises under the revised Building Regulation Part L1 for England, with amendments coming into force from 6 April 2018.

Following the recommended system layouts in this document will provide confidence that designs and installations are in accordance with the guidance and therefore comply with the relevant parts of the Building Regulations. Underfloor heating systems are covered in the BEAMA Underfloor Heating guide to Part L.

For further information contact BEAMA Heating Controls via email: BRegs@beama.org.uk

New for 2018

The Domestic Building Services Compliance Guide has been amended for 2018. Informally referred to as ‘Boiler Plus,’ these amendments aim to improve the efficiency of installed heating systems, particularly through the installation of additional controls. The specific requirements that installers will now have to follow when replacing a boiler are as below:

1. Ensure that the system meets minimum standards for boiler interlock, time and temperature control as they would for a new system. (This was generally accepted as a requirement by industry and Building Control in the current building regulations, but it is good that this is now more clearly stated.)
2. When installing a gas combination boiler only into an existing building a minimum of one of the following should also be installed:
 - Flue gas heat recovery
 - Weather compensation
 - Load compensation
 - Smart thermostat with automation and optimisation

These options are covered in more detail below.

NOTE:

These changes only apply to work in existing buildings and are defined in Table 4 of the Domestic Building Services Compliance Guide. For new systems in new buildings the system only needs to comply with minimum standards for boiler interlock, zoning and time and temperature control as defined in Table 3 of the Guide.

Additional measures required with a gas combination boiler (one of the following):

1. Flue gas heat recovery

This is defined as *'a device which pre-heats the domestic hot water supply by recovering heat from the boiler's flue emissions.'* These devices are not part of a standard condensing boiler but may be built in to some boilers or will be a separately supplied device. You should always check with the boiler manufacturer regarding compatibility and installation.

2. Weather compensation

For weather compensation two elements are required:

- i. A means of measuring the local outdoor temperature. This can be either by a sensor fixed to an external wall of the property (in a position where it will not be affected by solar gain), or, with certain devices, by receiving location specific weather data (e.g. from an internet source.)
- ii. A control functionality that varies the flow temperature from the boiler in relation to the measured outside temperature, thereby matching heating output to the heating load. This is achieved either by directly modulating the output of the heater (which requires some communication protocol between the boiler and the control; the boiler instructions will define which protocols are applicable) or by controlling the on/off operation of the heater.

In practice, this can be achieved by either directly connecting an outdoor temperature measuring device directly into the boiler (if this facility is available), by connecting to the boiler a stand-alone weather compensator with an outdoor temperature measuring device, or by replacing the room thermostat and timer with a programmable room thermostat that incorporates weather compensation and is connected to, or incorporates, an outdoor temperature measuring device. System diagrams incorporating these options can be found in page 7. Manufacturers' instructions for both boiler and controls should be consulted.

3. Load compensation

Load compensation operates in a similar way to weather compensation except that it measures internal rather than outdoor temperature. The control will incorporate a functionality that varies the flow temperature from the boiler in relation to the difference between the measured room temperature and the room thermostat set point. This is achieved by either directly modulating the output of the boiler (which requires some communication protocol between the boiler and the control; the boiler instructions will define which protocols are applicable) or by controlling the on/off operation of the boiler, providing that this varies the flow temperature from the boiler.

A load compensation control will usually replace the room thermostat in a dwelling and does not usually require an additional sensor.

4. Smart thermostat with automation and optimisation

For this category there are three clear functionalities that must be incorporated:

- It must include a room thermostat, delivering both time and room temperature control, and therefore replacing any existing thermostat and programmer, or programmable room thermostat.
- It must have the functionality to automatically adjust time and temperature settings based on either manual entries from the occupants or occupancy detection.
- It must be capable of starting the boiler at the optimum time to achieve the set-point temperature at the start of the occupancy period (i.e. optimum start.) Implicit in this is some form of learning within the device.

When these additional measures were introduced to the Domestic Building Services Compliance Guide there was no clear statement on whether there was a specific definition of 'smart' and the Impact Assessment for Boiler Plus indicated there was not, so we did not include this in our guidance. Subsequently, BEIS have stated their view that

they consider smart thermostats to be products that provide consumers with remote control, and which therefore also require some form of connectivity. Therefore, in addition to the three functionalities laid out above, we now add a further one:

- It should allow operation parameters to be set and adjusted without physical access to the control interface, and should incorporate a communications capability that allows information to be exchanged internally or externally to the building (e.g. internet connectivity, Bluetooth etc.)

A formal definition of a smart control is yet to emerge. So, while BEIS have clarified that they want additional functionality that would mark this out as a 'smart thermostat' it also clearly falls into section 1.2 of the Domestic Building Services Compliance Guide on Innovative Systems. This states that the technologies defined in the guide (including those under Boiler Plus) should not exclude "*other more innovative technologies that may offer an alternative means of meeting the functional requirements of the Building Regulations.*" Hence any element of smartness in a device that could offer equivalent carbon savings to remote control could be eligible. For reference, the industry derived Functional Definitions for controls indicate which functions within a control could be classed as 'smart' and therefore meet this classification: <http://www.beama.org.uk/heating-and-ventilation/heatingcontrols/technology/functional-definitions.html>

Quick Guide - Recommended Minimum Standards for Control of New Heating Systems

Dwelling over 150m²¹	With hot water cylinder	Boiler interlock ²
		At least two space heating circuits ³ , each with independent time control, a room thermostat and TRVs ⁴
		A hot water circuit with independent time control and a cylinder thermostat
	No hot water cylinder (combi boiler)	Boiler interlock
At least two space heating circuits, each with independent time control, a room thermostat and TRVs		
In existing buildings one of: <ul style="list-style-type: none"> • Flue gas heat recovery • Weather compensation • Load compensation • Smart thermostat with automation and optimisation 		
Dwelling up to 150m²	With hot water cylinder	Boiler interlock
		A space heating circuit with independent time control, a room thermostat and TRVs
		A hot water circuit with independent time control and a cylinder thermostat
	No hot water cylinder (combi boiler)	Boiler interlock
		A space heating circuit with independent time control, a room thermostat and TRVs
		In existing buildings one of: <ul style="list-style-type: none"> • Flue gas heat recovery • Weather compensation • Load compensation • Smart thermostat with automation and optimisation

Customer information

It is also a requirement in the building regulations to provide users with information on how to use their controls to reduce energy consumption. This should ensure that the customer is able to operate the specific controls that have been installed and to leave the operating instructions with them. It should also help them understand the best way to use the controls to maintain comfort and minimise energy use. A detailed guide to use of controls is available to download from www.beama.org.uk/heatingcontrols and this can be left with customers.

For new systems the regulations suggest that a set of operating and maintenance instructions should be left with the occupants in a durable and easily understood format.

¹ A 2006 report by Nationwide showed that most four-bedroom detached houses fall into this category with the average floor area of such properties being 157m² (the average for five-bedroom detached was over 200m².) Older houses can be larger than modern ones, with the average of all pre-war detached homes being over 150m².

² Boiler interlock means that controls are wired so that when there is no demand for space heating or hot water the boiler and pump are switched off. Use of TRVs alone does not provide interlock.

³ Each heating circuit will form separate heating zone in the dwelling. One zone must cover the 'living area' and heating zones will often be divided to cover 'living' and 'sleeping' areas, or upstairs and downstairs. There are usually significant opportunities for energy saving by matching zones to the lifestyle of occupants (for example with home offices) and installers should look for opportunities to set up zones beyond the minimum requirements.

⁴ It would also be acceptable for each heating circuit to be controlled by individual networked radiator controls in each room on the circuit.

Quick Guide - Recommended Minimum Standards for Control When Replacing Components of Heating Systems

Replacement boiler ⁵	With hot water cylinder	Gravity-fed systems upgraded to fully pumped.
		Boiler interlock
		Maintain existing space heating circuit(s), each with independent time control and a room thermostat. TRVs strongly recommended.
		A hot water circuit with independent time control and a cylinder thermostat
	No hot water cylinder (combi boiler)	Boiler interlock
		Maintain existing space heating circuit(s), each with independent time control and a room thermostat. TRVs strongly recommended. One of: <ul style="list-style-type: none"> • Flue gas heat recovery • Weather compensation • Load compensation • Smart thermostat with automation and optimisation
New heating system with existing pipework ⁶	With hot water cylinder	Gravity-fed systems upgraded to fully pumped.
		Boiler interlock
		Maintain existing space heating circuit(s), each with independent time control, a room thermostat and TRVs
		A hot water circuit with independent time control and a cylinder thermostat
	No hot water cylinder (combi boiler)	Boiler interlock
		Maintain existing space heating circuit(s), each with independent time control, a room thermostat and TRVs One of: <ul style="list-style-type: none"> • Flue gas heat recovery • Weather compensation • Load compensation • Smart thermostat with automation and optimisation
Radiator replacement	Emergency	Good practice to fit a TRV to the replacement radiator(s) if in a room without a room thermostat
	Planned	Good practice to fit TRVs to all radiators in rooms without a room thermostat
Hot water cylinder ⁷	Emergency	A cylinder thermostat.
	Planned	Boiler interlock
		A hot water circuit with independent time control and a cylinder thermostat

Customer information

It is also a requirement in the regulations to provide users with information on how to use their controls to reduce energy consumption. This should ensure that the customer is able to operate the specific controls that have been installed and to leave the operating instructions with them. It should also help them understand the best way to use the controls to maintain comfort and minimise energy use. A detailed guide to use of controls is available to download from www.beama.org.uk/heatingcontrols and this can be left with customers.

⁵ TRVs are only recommended as good practice with replacement boilers, but BEAMA Heating Controls strongly recommend that the opportunity is taken to install these when the system is drained down to ensure effective control of the heating system

⁶ For dwellings over 150m² it is recommended as good practice to upgrade to at least two space heating circuits if only one currently exists.

⁷ It is good practice to upgrade gravity-fed systems to fully pumped, and to install a separate hot water circuit with independent timing even in emergency situations.

Example layouts for new systems in dwellings up to 150m² and for replacement boilers in all dwellings to ensure compliance.

	2 port valve control	3 port valve control
Boiler with hot water cylinder	<p>1</p>	<p>2</p>
	Programmer, room thermostat and TRVs	Programmer, room thermostat and TRVs
	<p>3</p>	<p>4</p>
	Programmable room thermostat and TRVs	Programmable room thermostat and TRVs
Combination boiler	<p>5</p>	<p>6</p>
	Timeswitch, room thermostat and TRVs	Programmable room thermostat and TRVs

KEY TO SYMBOLS



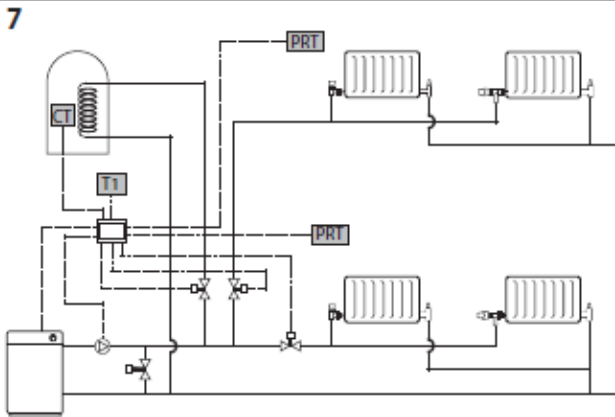
NOTE

- It is defined good practice to fit thermostatic radiator valves to all radiators when the system is drained down. TACMA recommends that this should always be done unless the type of existing radiators or pipework layouts makes it impractical.

Example layouts for new systems in dwellings over 150m² to ensure compliance.

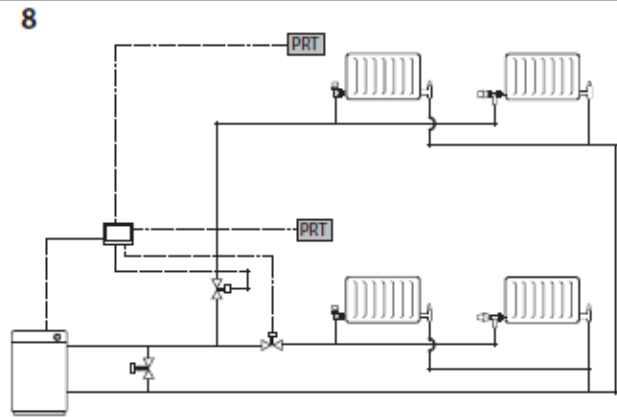
Dwellings over 150m²

Boiler with hot water cylinder

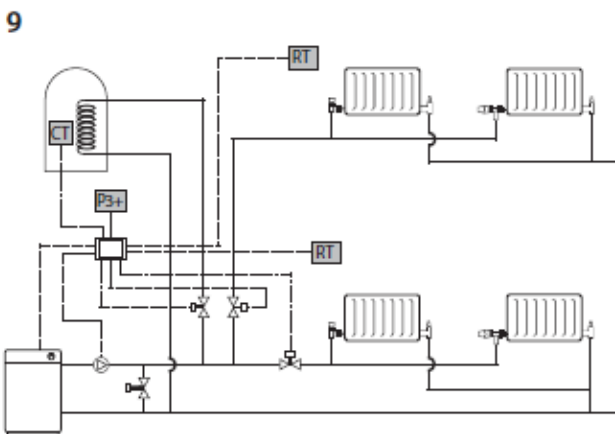


Programmable room thermostat and TRVs

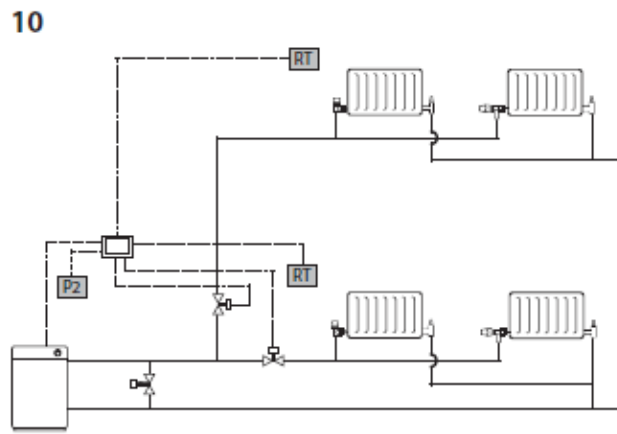
Combination boiler



Programmable room thermostat and TRVs



Multi-channel programmer, room thermostats and TRVs



Two heating zone programmer, room thermostats and TRVs

KEY TO SYMBOLS




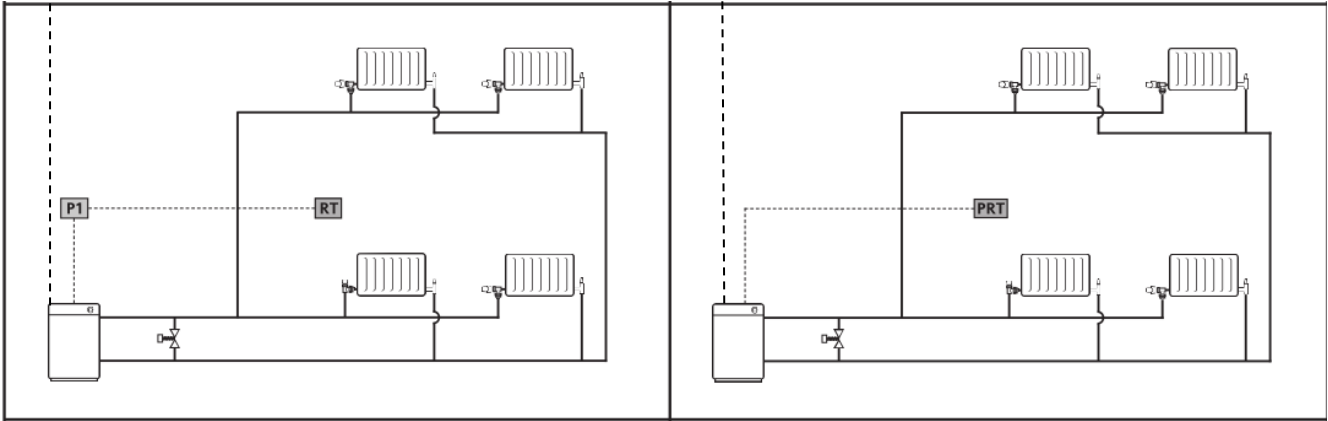
NOTES

- Systems specified for dwellings over 150m² will also satisfy compliance for smaller dwellings.
- Where zone valves are installed in smaller dwellings it is always recommended that both time and temperature control of zones are applied. This can be done for little additional cost but provides far more flexible control options for the occupants.
- All of these systems are preferable approaches where only the boiler is replaced. However pipework changes can incur significant additional work in existing homes so the simplified example layouts for replacement boilers will meet compliance in such circumstances.

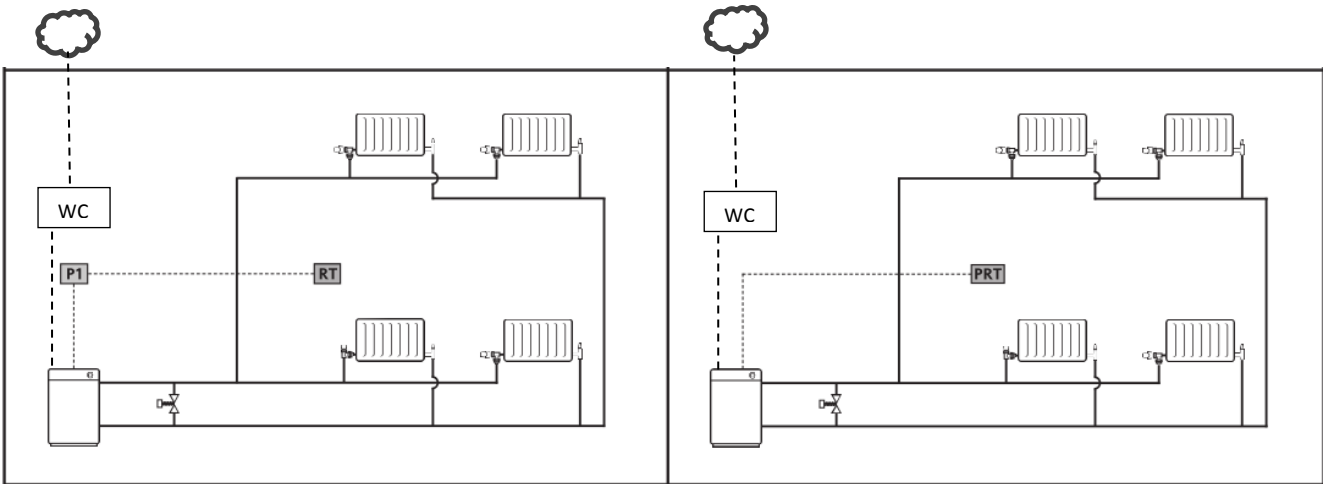
Weather compensation installation options (Draft diagrams to be formatted)

Programmer, room thermostat and thermostatic radiator valves	Programmable room thermostat and thermostatic radiator valves
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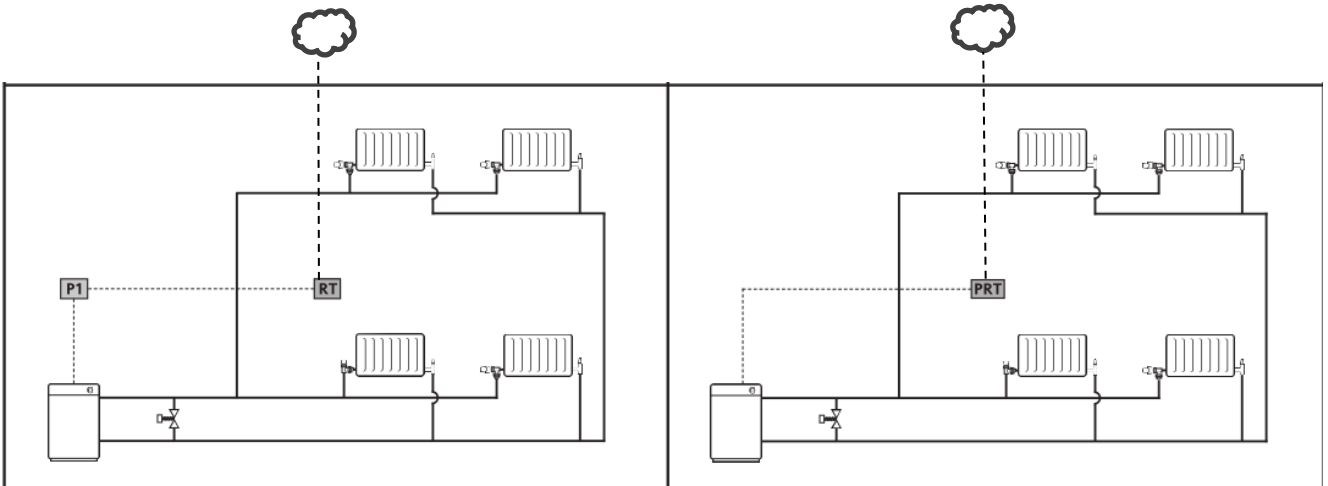
 = local outdoor sensor or internet weather data



Outdoor temperature measuring device connected directly to the boiler



Stand-alone weather compensator with an outdoor temperature measuring device



Room thermostat with weather compensation, connected to, or incorporates, an outdoor temperature measuring device