

# Things to consider when installing wireless heating controls

**Wireless devices are now an accepted way of life and wireless heating controls are offering both installers and home owners/occupiers a greater level of control and flexibility when it comes to where to install controls and also day to day use.**

As with any technology, the key to efficient operation is to understand how the equipment operates and how that means it integrates into everyday life. One common concern with wireless products is how they will operate in the home environment when surrounded by other devices and materials that may block or deflect the signal. This guide is designed to explain how the Honeywell wireless products have been designed to ensure they work as designed in all domestic environments, and gives a few pointers on how to minimise any installation problems that may require the products to be repositioned dependent on environment.

The Honeywell wireless heating control range is made up of a variety of controls ranging from boxed sets of controls that offer a complete solution to individual wireless controls that can be integrated into a heating system to add specific additional flexibility.

The full wireless range is detailed in the Honeywell wireless products guide that can be found in the Professional Zone section at <http://www.honeywelluk.com/professional-zone/resource-centre/Sales-Literature/>

## **Considering the modern domestic wireless environment**

It is very rare these days not to have at least one, if not more, devices that operate wirelessly in and around the home. Cordless telephones; baby alarms and wireless door bells all sit alongside computer data wireless networks, wireless lighting switches and other devices that provide a wireless capability.

So, it is important to understand that there is a structure within this seemingly invisible world:

### **Carrier frequencies:**

There are three general bands that are being used by Radio Frequency (RF) emitting products

**433MHz:** This is commonly used by garage door remotes, video senders and radio controlled toys. It is a relatively low frequency that gives good propagation (broadcast) properties but interference from other devices can make it unreliable.

**868MHz:** This is the RF frequency that has been adopted by Europe as to be the frequency that if used must then operate within agreed criteria, for example standards for this frequency specify the communication power levels and dictate the number of times a product can transmit (cycle) over a given time period. It is a well controlled relatively 'quiet' band used by manufacturers

broadcasting ZigBee & Z-wave protocols and it is the protocol adopted by Honeywell whose bespoke protocol Ramses II works in this area. It allows Honeywell to provide wireless capability offering the greatest protection from outside interference but also ensuring that these wireless controls do not have an effect on other wireless products.

**2.4GHz:** Well controlled, globally accepted but very busy waveband. Used by Bluetooth devices, WiFi, and video senders.

**Wireless Communications – the expected range of communications:**

Within a typical house wireless products should communicate reliably within a 30m range. It is important to take into consideration that walls and ceilings will reduce the RF signal. The strength of the RF signal reaching the control depends on the number of walls and ceilings separating it from the room thermostat, as well as the building construction - the diagram below illustrates an example of typical signal strength reduction. Walls and ceilings reinforced with steel or plasterboard walls lined with metal foil reduce the RF signal significantly more.

**How we have designed our devices to minimize the risk of reduced efficiency in areas where other wireless signals are operating?**

The sophisticated wireless technology that is at the heart of the Honeywell wireless products has been carefully chosen to ensure that our wireless communications are robust and do not interfere with other wireless technologies that can be found in normal domestic situations.

Our products do not broadcast continuously, and we transmit only on a single band with a high data transmission rate which minimizes the transmission time which reduces the risk of conflict with other transmissions in the area.

The output power of the wireless devices is, dependent on the device, between 200 to 400 times less than a mobile phone.

Our products conform with the demanding class 2 receiver requirements as defined by ETSI EN300220-1

**How reliable is 2-way RF communication?**

The 2-way RF communication (also known as wireless communication) used by Honeywell is extremely robust and reliable. When installed correctly the signal strength test feature allows the Installer to locate the system components where mutual signal reception is strong. During communication, signals are sent several times to ensure receipt, and if any message is garbled, the

error detection software recognises this and ensures the message is repeated again. The benefit of the two way RF is that symbols showing successful communications and systems operation can appear on both transmitter and receiver, making testing and fault finding easy.

**How we have designed our devices to minimize the risk of causing reduced efficiency in other wireless devices**

In order to ensure that other devices do not get wireless instructions that may interfere with their operation we have developed our own protocol (language) so that even if a message is received by another device it will not act upon it as it will not recognize the instructions, thus ensuring we avoid conflict with other products in same frequency band.

Finally, to maximise transmission reliability the transmission times are randomised. In this way the risk that some transmissions will 'collide' is minimised.

**The comprehensive specifications of our wireless products mean that:**

They are suitable for many types of buildings including single homes; apartments; multi occupancy homes; shops & small businesses.

The wireless signal is proven to work through a wide variety of building materials (Concrete, brick, wood, etc). We have tested the devices and our stated wireless ranges are:

- Open field range approximately 100 metres
- In home range 30 metres

The wireless signals will operate through one concrete floor up and down.



**Before installing the different components of a wireless heating system there are a few things you need to consider before committing to the position of the programmer; thermostat or cylinder thermostat:**

Metal objects are the greatest barrier that wireless signals encounter. It is good practice to consider:

What metal objects are there in a direct line between the thermostat, evohome radiator controller or wireless relay box and the wireless enabled programmer (with the in-built receiver box) or evohome controller. In most cases the wireless signal will find a communications route but large metal objects will act as a reflector and a simple repositioning of a few centimeters in any direction may be enough to improve signal reception.

Is there a metal object within 30 cm of the thermostat? If so you may be creating a permanent reflector for the signal that will interfere with operations. Again, moving the thermostat a few centimeters away from the risk of interference should solve the problem.

Is the thermostat mounted onto the wall using a metal mounting box? Standard metal wall boxes may have an effect on operations, we suggest you test signal strength before preparing any permanent fixings.

Wireless signals will pass through walls and ceilings but foil backed plaster or insulating board may have an effect on signal strength or the range of the wireless communications.

Whilst, as we have already said, our heating controls are operating in a way that will not cause any clashes with other wireless signals, it can happen that any electronic device emitting a signal in close proximity to the programmer or evohome controller or thermostat can saturate the surrounding area and cause disruption to the signal.

We therefore recommend that you:

Mount the product at least 1 metre away from any other wireless device

If you are mounting a pair of Honeywell products together, allow at least 1 metre gap between the two to avoid signal saturation

In addition larger non wireless electrical controls can sometimes emit a radiating signal as part of their normal operation, it is a good idea therefore to mount devices at least 1 metre away from electrical devices.

**Installing the Thermostat**

Wireless thermostats make it easy and convenient for the homeowner to control the temperature wherever they are in the property and the strength of wireless controls is that they can be moved around the property to ensure that the control of temperature is always available to the home owner/occupier.

For best performance, install the wireless thermostat in an open space where it can sense the room temperature, and where the signal strength is high. The Room Thermostat can be mounted on a wall or on the optional table stand. Preferred height from the floor is at least 1.2m.

Do not mount on metal wall-boxes. Leave at least 30cm distance from any metal objects and at least 1 metre from any other electrical equipment. Select the preferred location and test the signal strength before installation. Additionally, we would recommend that some simple facts are communicated to whoever is going to be using the heating controls:

1. When using a wireless thermostat on a free standing table mount, remember to check that the correct indicators are showing on the screen when moving the thermostat to a new location. If the product does not seem to be working, a simple repositioning should enable the signal to be received. Most products have a simple form of signal strength test built in.
2. Remember that if you have Thermostatic Radiator Valves (TRVs) fitted in the property that positioning a thermostat in a room with a TRV may develop a clash of instructions to the boiler. If the TRV is set at a lower set point than the thermostat then the room may never get to the temperature you desire to fire the boiler.

**Signal strength testing**

We recommend that prior to installing a wireless device in an area where the level of metal, other wireless devices and other major electrical devices would seem to offer a potential for interference that a signal strength test is carried out prior to carrying out any work that causes disruption to the fixtures or décor of the property.

How to carry out a signal strength test varies according to the Honeywell wireless product you are fixing. For full details of how to carry out signal strength tests, please consult the installation instructions for the product.

Finally, whilst this guide goes into a lot of detail about the do and don'ts of wireless controls, we would point out that it is very rare for insurmountable problems to be encountered, and understanding this simple guidance that should be followed when considering where to site these controls will often ensure a trouble free installation,

allowing the home owner to get the full benefit from the full functionality modern heating controls offer.

**The key points about the wireless transmissions in general**

In respect of all our wireless products, we are governed by the ETSI Harmonized Standards for Radio & Telecommunications Terminal Equipment Directive 1999/5/EC, in particular the ETSI EN 300 220 standard covering Electromagnetic compatibility and Radio spectrum Matters (ERM) for Short Range Devices. We occasionally get asked about the strength of our wireless transmissions, and also if there is any transmissions that are in the ‘microwave’ frequency. In RF engineering microwaves are defined as electromagnetic radiation with frequencies of above 1GHz. Our wireless products do not generate radiation that is above this 1GHz level. The system uses low power radio technology at 868MHz.

To put this into context, the power of radiation emitted by our wireless products is a minimum of ten times lower than radiation generated by many other devices we use on daily bases:

<b>Product</b>	<b>electromagnetic generation in milliwatts (mW)</b>
The Honeywell Evohome controller	<10mW
A domestic WiFi router	100mW (x10 times evohome)
Cordless phone handset peak	240mW (x24 times evohome)
GSM mobile handset	1-2W (x100 times evohome)

Note:  
All specified values refer to maximum emitted power.