How to implement electric heater controls

Heating controls help you make your electric heating system more efficient, by giving you control over timing and temperature. And there are big savings to be had – you could cut between 8% and 30% of the energy you use for heating.

Building regulations set minimum standards for controlling new and replacement electric heating, but many other electric systems could be upgraded to make them more energy-efficient too.

The business case

As a guide, an occupancy detector, time controller or temperature sensor would each cost around £200 to install using a contractor.

Take a room heated using 2kW of electric heating that's left on continuously for six months of the year. This adds up to around 2,190kWh of electricity. If you install a timer to switch off the heating for eight hours overnight, you'd save 730kWh a year. This equates to £58, based on electricity at 7.9p/kWh, including Climate Change Levy. You'd recover your costs in around 3½ years.

If you already have a room thermostat, simply lowering the temperature by 1˚C would save 8% of the heating energy, saving you about £9 a year in electricity costs.

The technology

There are three kinds of controls for electric heating – time controllers, thermostats and occupancy sensors.

Time controllers

Time controllers can be separate from or integrated into the electric heater. They range from simple 24-hour and seven-day timers to more sophisticated units that give you more flexible control – setting the heating to go off over a holiday period, for example.

Tamper-proof controls ensure the heating isn't adjusted unnecessarily, while run timers allow the heating to be switched on, on demand, but only for a specified period.

A heating time controller

Temperature controllers

Temperature controllers can also be separate from or integrated into the electric heater. Warm air systems use room thermostats, while radiant heating systems are controlled with black bulb thermostats[1] positioned in the line of sight of the heater.

You should fit tamper-proof controls wherever possible, to ensure that the temperature isn't left unnecessarily high. You can also get controllers with set-back timers. These let you set different temperatures for different times – day and night, for example. You can manually increase the temperature, but it will automatically be reset for the next time period.

[1] See How to implement radiant heaters (CTL039)

Occupancy sensors

Occupancy sensors switch the heating on when they detect people in the area, and off when the area has been unoccupied for a while. They're positioned away from the heating unit.

They work either by passive infrared (PIR) or ultrasonic/microwave, or a combination[2]. Remember, though that you shouldn't use PIR sensors within 2m of the heat source.

A heating temperature controller

Applications

The following table summarises where and how electric heating controls can be used.

Table 1

Occupancy type	Controller type		
	Time	Temperature	Occupancy
Regular pattern of occupancy[1] – offices, for example	On when space is regularly occupied, off outside normal hours. A seven-day timer.	Appropriate to activities in the area at the time – 20˚C for office work and 12˚C for frost protection overnight, for example.	Unlikely to be needed.
Irregularly or infrequently occupied spaces used for specific activities	Run timers.	Appropriate to activities in the area at the time – 17˚C for strenuous activities. Set-back timers useful.	Could be used to ensure heating is on only when the area is occupied. An alternative option to run timers.
Irregularly occupied by general public – waiting room, for example	On at a low level for the period the space is open to the public, off outside those hours. Set to ensure the heating is off outside these hours. A seven-day timer.	Appropriate to activities in the area at the time – 17˚C for spaces where outdoor clothing is worn. Set-back timers useful.	Very useful. Heating on at a low level, and set to increase only when the space is occupied.

1 If the space is used regularly, electric heating isn't a cost-effective or energy-efficient option. You might want to consider other types of system.

2 There's more information about sensors in How to implement automatic lighting controls (CTL161)

Table 2 Specification checklist

Considerations	Comments
Type of electric heating system	On when space is regularly occupied, off outside normal hours. A seven-day timer.
Number of heaters	Run timers.
Independent heaters or linked as a system	On at a low level for the period the space is open to the public, off outside those hours. Set to ensure the heating is off outside these hours. A seven-day timer.
Independent heaters or linked as a system	Ring main for electric heating system or local power switching only where the heater is plugged in.
Power of the heater or heating system	Measured in kW
Physical space available and connection options	
Usual occupancy	Regularly or infrequently occupied, or used as a public space.
Controller types	• Time, temperature or occupancy. • Temperature sensor appropriate to heating system type. Time controller with increments to cover typical usage – a seven-day timer, for example, if the building isn't used at weekends.

Specification checklist

The above table lists the main points to discuss with your supplier when deciding on controls for electric heaters.

Commissioning procedure

Your installer or manufacturer should train staff in how to use the controls. Settings for the time, temperature and occupancy detection range really depend on your individual needs, but as a rule:

- occupancy sensor controlled systems need a delay of at least 10 minutes before switch-off to avoid constant switching on and off
- the temperature set-point should be as low as possible without making the space too chilly.

Hard-wired controls need to be electrically tested and your electrician should give you a minor electrical installation work certificate (IMN2).

Common problems

- If temperature sensors are covered or the airflow to them is obstructed, the area may get too hot.
- People may fiddle with the controls, allowing the heating to stay on too long or at too high a temperature. Use tamper-proof controllers in public areas. In other areas, it may be enough to have a clear policy about who can adjust the settings.

Finding a supplier

Contact a local electrical or heating wholesaler, or look on the web for heating control manufacturers. Do ask for references to check how a product has performed in a similar situation to yours.

Heating controls should always be fitted by an NICEIC approved electrical contractor. You may already know of a good contractor; if not, contact a trade association.

The Heating and Ventilating Contractors' Association (HVCA)
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