REZNOR®

ELECTRIC UNIT HEATER CONTROLLER
QUICK SET UP GUIDE

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Contents

Note:

Sections 1 and 2 give useful information about the e+ electric unit heater controller.

Sections 3 to 7 detail how to set up and use the e+ electric unit heater controller.

Sections 8 and 9 detail how to access the advanced settings provided by the e+ electric unit heater controller.

1. Introduction

The function of the Electric Unit Heater Controller is to control the e+ unit heater fan and heating element to maintain a set air outlet temperature from the unit as measured by a temperature sensor.

The outlet set point, fan speed (F1 normal / F2 boost) and heat on commands are sent from the panel to the unit heater controller via an RS485 communication interface. The controller returns data to the panel via the same communication interface.

Up to 16 controllers (and hence unit heaters) can be present on the RS485 network; each has an address set via a 4-way DIL switch at the controller. Each controller is a drone on the network and only transmits in response to a message from the panel which is the master.

Temperature sensors provide feedback on the heater output, monitor the PCB temperature for overheat and provide the panel with room temperature readings, namely: -

1. Air outlet temperature. Measurement range 0°C to 100°C. Used by the controller as feedback to adjust heat level to achieve desired outlet air temperature. Thermistor bead on 1.1m black wires.
2. Room temperature. Measurement range -10°C to 50°C. Not directly used by the controller, is sent to the remote control panel to adjust operation. A remote wall mounted room sensor is required (part number 29-01-219 supplied separately or provided with the EUH-CTRL-KIT-10M/30M/50M accessory kit). If no room sensor is present on the system the heater (or networked heaters) will be held off and the panel will display an error message. If one room sensor is present on the system, then that will be used for all heaters within a network. If more than one room sensor is fitted within a network, the controller averages these sensors.
3. PCB temperature. Measurement range 0°C to 100°C. Used by the controller for protection of the controller and its' components. Thermistor bead mounted to PCB near to thyristor connections.

A configuration program key (resistor key) at the controller sets the type of heater and its' rating (see section 2 for fan speeds and heater output):

e+ 10 = 22kΩ
e+ 20 = 15kΩ
e+ 30 = 10kΩ

Note that the heater will not operate without a resistor key and an error signal will provided at the display.

The heater output is a PWM signal using a PID control.

The fan speed control is by 0 ~ 10V output.

Additional external inputs can be connected to the controller which adjust the control behaviour: Timer/BMS, Door switch and Stat input.

Stat input - is used to protect the system when an over temperature condition trips the thermostat. When the Stat input is closed the control operates normally. When the Stat input is open circuit the fan output is set to maximum, 10V, and the heating is forced off although it may continue to heat if the controller triacs or drive circuit fail, hence the maximum fan speed. If the Stat input returns to closed state the fan will continue to operate at 10V until the mains is turned off to clear the error. Stat input has the highest priority and overrides all other operation modes. Stat input status is sent to the panel.

Timer/BMS input - has no direct effect on the heater. The signal is passed to the panel for action. On the panel, in Engineers settings, the timer mode can be set to external/BMS where the control will ignore the time program and control to On/Day temperature when Timer input is closed and Off/Night settings when the Timer input is open. All controls on the network will be controlled from one Timer input. Unused Timer inputs should be left open-circuit.

Door/Off input - when the Door/Off input is closed-circuit the control operates to time and temperature settings sent from the panel. When the Door input is open-circuit the heater is forced off, this will override any settings from the panel, including frost protection. Door input only affects the heater it is connected to. Door/Off input status is sent to the panel for information. On delivery the electric heater controls will have a link fitted to disable Door/Off input.

2. Default Settings

The following default values have been factory set in the controller:

PIN protection = OFF i.e. no PIN required

Time program On 1 = 08.30
Off 1 = 17:00
Days = Monday to Friday

Heater air temperature = H2 (see table below)

Fan speed = F1 (see table below)

Optimum start see 7k) = OFF (0)

Model	Fan Speed	Air Volume (m^3/h)	Outlet Temperature (°C)		
			H1	H2	H3
10	F1	1275	30	34	38
	F2	1500	30	33	36
20	F1	2000	30	38	45
	F2	2250	30	35	40
30	F1	3000	30	38	45
	F2	3250	30	35	40

3. Initial Start Up

On first start up after installation, the control panel will ask for a language to be set:

- The options are EN - English, FR - French, ES - Spanish, NL - Netherlands and DE - German.
- Press the + button to scroll through the languages.
- Once the required language shows, press the OK button

Once a language has been set, the controller will carry out a network address scan (to check if more than one heater is networked) then the display will revert to the Normal Operation Display (see section 6 following).

4. Setting up the controller

To set up the controller once the language has been set:

a) Set the current time and day:
- Press the MENU button 6 times and then OK to select and adjust the current time and day
- Use +/- to select the required day, then press OK
- Use +/- to select the required time (hours and minutes), then press OK

b) Set the time program:
- Press the MENU button 7 times and then OK to select and adjust the time program
- Use +/- to select the first day i.e. Monday, then press OK
- Set the first ON time using the +/- buttons and press OK
- Set the first OFF time using the +/- buttons and press OK
- Set the second ON time using the +/- buttons (if required) and press OK
- Set the second OFF time using the +/- buttons (if required) and press OK
- Set the third ON time using the +/- buttons (if required) and press OK
- Set the third OFF time using the +/- buttons (if required) and press OK
- Once Monday has been set, the controller will give the option to copy the ON / OFF times to Tuesday and once set, to Wednesday and so on.
- To adjust specific days, select the required day and make changes
- To turn the heater off on a specific day, hold the + button until the time shows --:-- indicating that the time clock is removed for that day

c) Set the required temperatures:
- Press the MENU button 8 times and then OK to select and adjust the required temperatures
- Use +/- to select the required day time temperature, then press OK
- Use +/- to select the required night-time temperature (night set back) then press OK

d) Set the required operating mode:
- Press the MENU button 5 times and then OK to select and adjust the required operating mode
- Select AUTO and press OK for the heater to operate under automatic control, that is fully automatic control of heating and fan-only to the time program [see b) above] using On (day) temperature and Off (night) temperature [see c) above]. In On periods, the unit will provide heating and fan-only operation as determined by the controller. In Off periods, the unit will provide heating only.

- Select OFF and press OK to stop the heater operating, that is the heater only operates if the sensed temperature is below 5°C to provide frost protection. If Frost Operation is disabled in the Engineers Menu (see section 8d) then unit will not operate at all.
- Select HEAT ONLY and press OK for the heater to provide heating only, that is automatic control of heating to the time program [see b) above] using On (day) temperature and Off (night) temperature.
- Select FAN ONLY and press OK for the heater to provide ventilation only, that is automatic control of fan-only (no heating) to the time program [see b) above] using On (day) temperature. There is no fan-only operation in Off periods.

5. Operating the heater (user menu)

Once the controller has been set up, the heater will operate under the required operating mode described in 4d) previously under normal operation.

a) Open User Menu:
   - Press MENU once to open the user menu

b) Display temperatures:
   - Press MENU then OK, the display will show various temperatures ROOM [sensed average], DAY [see 4c) previously], NIGHT [see 4c) previously]

If PIN protection has been enabled in the Engineers Menu [see 8p) and 8q) following], the PIN must be entered to access the following functions:

c) Set overtime operation. If the heater is required to operate for a short term ON period, such as overtime working:
   - Press MENU twice and then OK to display the set overtime menu
   - Press the +/- buttons to increment the on period by 10 minutes per press
   - Press the OK button once the required overtime period has been set
   - In overtime mode, the unit heats to On (day) temperature, no fan-only, for the number of hours and minutes set.
   - From the normal operating display, if MENU is pressed in overtime mode, the overtime is cleared immediately.

d) Set fan only overtime operation. If the fan is required to operate for a short term ON period, such as overtime working:
   - Press MENU three times and then OK to display the set fan only overtime menu
   - Press the +/- buttons to increment the on period by 10 minutes per press
   - Press the OK button once the required overtime period has been set
   - In fan only overtime mode, the unit no fan-only, for the number of hours and minutes set.
   - From the normal operating display, if MENU is pressed in fan overtime mode, the fan overtime is cleared immediately.

e) Set holiday operation. If the heater is required to not operate for a short-term period, such as a holiday shut down. When holiday is set the system operates with Off mode for the number of days set. Holiday starts at midnight on the day it is programmed and counts down one day every midnight thereafter:
   - Press MENU four times and then OK to display the set holiday menu
   - Press the +/- buttons to increment the holiday off period by one day per press
   - When holiday mode is set the system operates with Off mode for the number of days set. Holiday starts at midnight on the day it is programmed and counts down one day every midnight thereafter.
   - From the normal operating display, if MENU is pressed in holiday mode, the holiday is cleared immediately.

f) The current time and day can be adjusted by following 4a) previously.

g) The time program can be adjusted by following 4b) previously.

h) The required day and night-time temperatures can be adjusted by following 4c) previously.

i) The required operating mode can be adjusted by following 4d) previously.

6. Display overview in normal operation

Once the setup is complete, the controller's main screen will display:

a) Panel status:
   - Day and time or Ext BMS (when the unit is controlled via a BMS)
   - On / Off period set
   - Optimum Start / Stop times (if set)
   - Overtime or Fan only time (if set) with remaining time
   - Holiday (if set) with remaining days
   - Any warning messages:
     1) Holiday pending
     2) Battery low
     3) No battery
     4) No room sensors

b) Heater status:
   - Heater identification (0 if only one heater, 0-15 if more than one heater is networked)
   - Heater function - OFF, HEAT or FAN
   - Heater status - warning messages for:
     1) DOOR OPEN (if door sensor installed)
     2) OVER TEMP ERROR (overheat thermostat temperature error)
     3) TEMP SENSOR ERROR (room sensor or control temperature sensor error)
     4) COMMS ERROR (error in communication between panel and heater)

   It should be noted that if more than one heater is networked, the heater status will cycle through each heater, displaying the above details.

7. Network Address Scan

A network address scan will be automatically carried out every time the panel is powered up to check if more than one heater is networked.

8. Engineer settings

a) Open Engineer Setting menu:
   - Hold + and press Menu to enter Engineer Setting menu

If PIN protection has been enabled in steps p) and q) below, the pin must be entered to access the following functions:

b) Set Internal or External Timer Operation:
   - Internal or External Timer Operation can be selected here
   - Internal Timer uses the time settings set in 4c) previously
   - External Timer Operation should be selected in the heater is to be controlled by a BMS or other form of external timer
   - If a number of heaters are networked, this setting will apply to all heaters.
   - Under external timer operation, the controller will ignore the time program and control to On/Day temperature when Timer input is closed and Off/Night settings when the Timer input is open. All controls on the network will be controlled from one Timer input. In a network, only one heater should have a Timer input, all other heaters should be left with the input open-circuit as the panel will respond if any of the Timer inputs is closed-circuit.

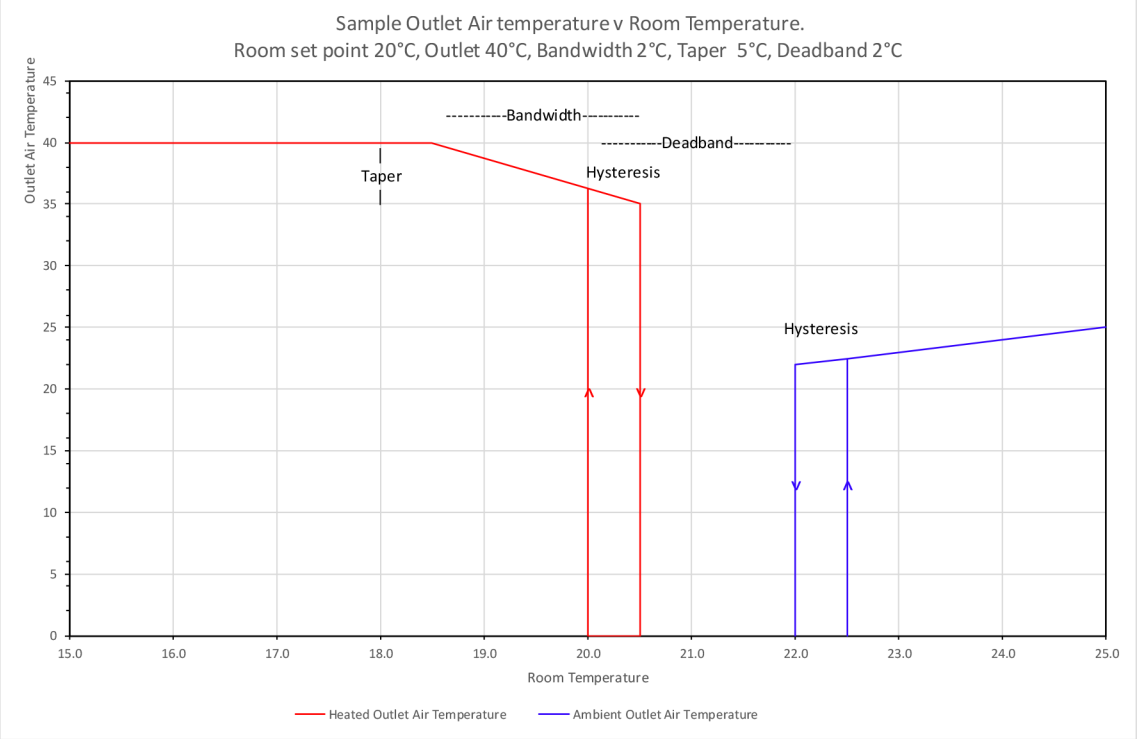
c) Enable Night Operation:
   - Night operation can be switched on or off here
   - If set to on, the heater will operate to provide the night time temperature set in 4c) previously.
   - If a number of heaters are networked, this setting will apply to all heaters

d) Enable Frost Operation:
   - Frost protection can be switched on or off here
   - If set to on, the heater will operate to provide a non-adjustable frost protection temperature of 5°C.
   - If a number of heaters are networked, this setting will apply to all heaters

e) Set Outlet Temperature:
   - The outlet temperature can be modified here within the range H1, H2 and H3 (see chart on page 2)

f) Set Fan Speed:
   - The fan speed can be modified here within the range F1 (normal) or F2 (boost) with F1 being the default (see chart on page 2)

g) Set Bandwidth:
- The control bandwidth, bandwidth taper and deadband (see graph below) can be adjusted here
- The bandwidth can be set within a range of 2°C to 10°C. The default is 2°C
- The bandwidth taper can be set within a range of 2°C to 20°C. The default is 5°C
- The deadband can be set here within a range of -5°C to +5°C. The default is 2°C
- If a number of heaters are networked, these settings will apply to all heaters



Note: the hysteresis on the room temperature setpoint is +0.5°C, i.e. heat to Set Point + 0.5°C then cool to Set Point. The heater outlet temperature is adjusted using the algorithm shown in the graph above as room temperature nears the setpoint.

h) Set Sensor Offset:
- The room sensor offset can be adjusted here with a range of -5°C to +5°C. The default is 0°C

i) Set Overtime Maximum:
- The maximum value for the overtime setting in 4c) can be adjusted here with a range of 0 to 10 hours. The default is 1 hour.

j) Set Fan Only Maximum:
- The maximum value for the fan only run time setting in 4d) can be adjusted here with a range of 0 to 10 hours. The default is 1 hour.

k) Set Optimum Start / Stop Time:
- Optimum start and stop times can be adjusted here
- Optimum start time can be set here with a range of 0 to 240 minutes. The default is 60 minutes.
- Optimum stop time can be set here with a range of 0 to 120 minutes. The default is 30 minutes.
- If a number of heaters are networked, these settings will apply to all heaters
- Optimum start will start heating before an upcoming On period; the time depends on the temperature raise required to give the set day temperature, historical heat-up times and the Optimum Start time set.
- Optimum stop will stop heating before an upcoming Off period; the time depends on historical cool-down times and the Optimum Stop maximum time set. The controller will not allow the temperature to drop more than 2°C in this period.

l) Display Hours Run Per Heater:
- The number of hours run per heater will be displayed here
- If a number of heaters are networked, the hours run for all heaters will be displayed

m) Set Language:
- The language used for the display can be set here. The settings are as discussed in 2. Initial Start Up previously

n) Heater Address Scan:
- If a number of heaters are networked, a network address scan will be carried out on all heaters in the network.

o) Factory Reset:
- The controller can be reset back to the original factory settings.

p) PIN Protection On / Off:
- The option for PIN protection can be set here.

q) Set PIN:
- If PIN protection is required, it can be set here.

r) Engineer Menu End:
- Once the above settings have been cycled through, select Menu End to escape back to the Normal Operation Display as discussed in section 5. previously.

9. Diagnostic Display

a) Open Diagnostic Display:
   - Hold + and – then press Menu to enter the Diagnostic Display

b) The Diagnostic Display gives a per heater display of the following:

- Heater ID, 0 to 15
- Config, ‘C’: 0 error, 1-3 is 10 to 30kW, ‘d’ is development.
- Heat, ‘H’: 0/1 is on/off.
- Fan, ‘F’: 0/1 is on/off.
- Heating element output power: xxx%.
- Room temperature, if sensor fitted, Rttt = ttt°C, ‘xxx’ = sensor out of range, ‘---' no sensor fitted.
- Outlet air temperature, Ttt = tt°C, ‘xx’ = sensor out of range.
- PCB temperature, Ptt = tt°C, ‘xx’ = sensor out of range.
- Limit Stat open circuit, ‘S’ = open circuit (fault, heat off).
- External door input, ‘D’ = open circuit (door open).
- External input, ‘T’ = open circuit (timer off).

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Current full Part No.

Reznor Electric Unit Heater Quick Set Up Guide
EN October 2025 D301672 Issue 1

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