

Trim Heater Optimiser Installation & User Guide



For Products: -

PR0442



Ensure that all power is switched off before installing or maintaining this product

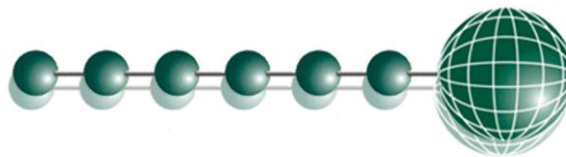


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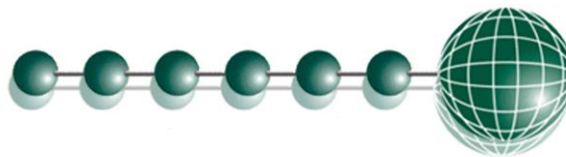
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Trim Heater Controller

From Resource Data Management

Type

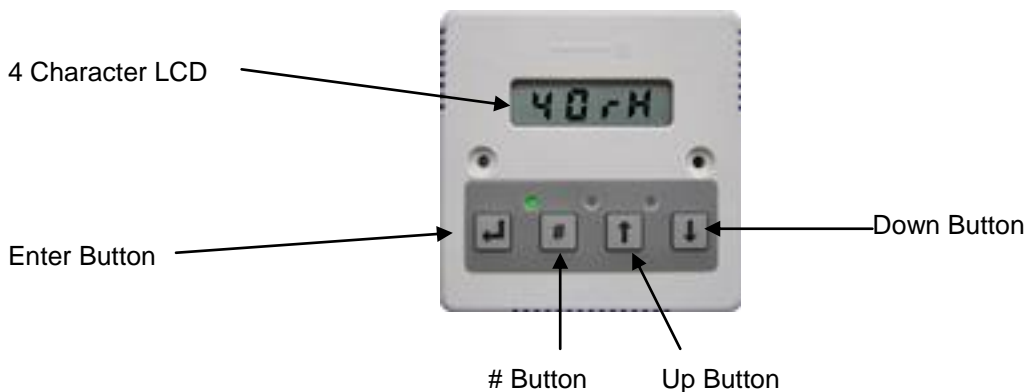
There is 1 type of controller embedded in the Trim Heater controller: -

Display value	Type
1	Trim Heater Controller

This controller is for the control of refrigeration display cabinet trim heaters. By pulsing the trim heaters to a value other than 100% saves energy. Based on the local humidity value (that's read in from either the integrated display sensor or a remote sensor) the trim heater(s) will be pulsed on/off to a pre-determined percentage. An additional energy saving feature of the controller is the inclusion of a timer. This allows the user to further limit the power the trim heaters use or it can completely disable the heaters when the store is not trading. The pulse period is 5 minutes, giving the heaters 2½ minutes on and 2½ minutes off when the percentage value is 50.

There are 3 relays which can be configured to switch, using any one of the 3 possible humidity sensors attached to the system.

Front Panel Features



Display:

The display fits a standard UK single socket patress. The display values can be selected by changing the "display" parameter. The display has an integrated temperature probe and humidity sensor.

Enter Button:

Button used to enter values after a change.

Up Button:

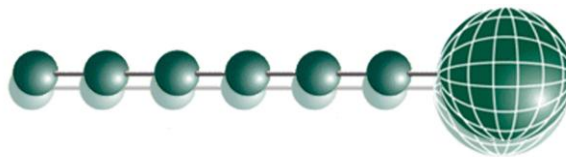
Normally the up button will increment the setpoint. When in the menu, the up button is used to scroll up through the menu items.

Down Button:

Normally the down button will decrement the setpoint. When in the menu, the down button is used to scroll down through the menu items



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Button:

Overrun function. Use this button to provide up to 6 hours of “on” time, if the timer is off, or if the timer is on, extend its time by up to 6 hours. The overrun function will switch off the amber LED if it’s on, or keep it off for the extra hours. Press and hold the # button until “run 1” appears. Use the up button to select between a run on of 1 to 6 hours. Press the enter button to confirm the desired run on hours.

Press the # button during an overrun period to cancel the overrun and turn the relay(s) off.

Green LED:

Green LED used to indicate network Status:

- Off No network attached
- Flashing Attempting to Log on to network
- Steady On-line

Yellow LED:

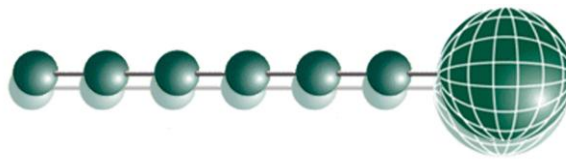
The yellow LED indicates the current state of the Timer. If the LED is off the Timer is in the on state. If the LED is on the Timer is in the off state.

Red LED:

Red LED, used to indicate a probe fault.



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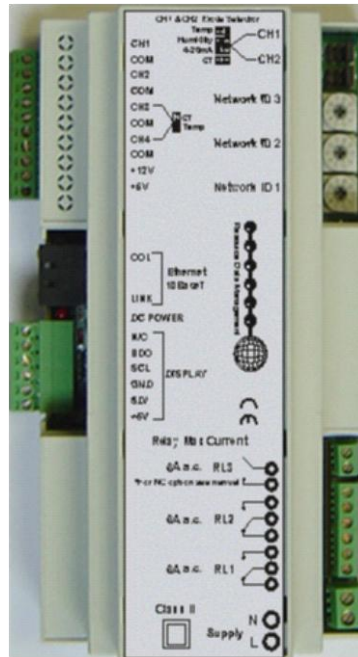
Connections

Analogue Inputs

- Channel 1 Input
- Channel 1 Ground
- Channel 2 Input
- Channel 2 Ground
- Channel 3 Input
- Channel 3 Ground
- Channel 4 Input
- Channel 4 Ground

Display Connector

- Not Connected
- SDO (Data Out)
- SCL (Clock)
- GND
- SDI (Data In)
- +5V (Vcc)



- CH1 Jumper
- CH2 Jumper
- Network ID Switch 3
- Network ID Switch 2
- Network ID Switch 1

Relays

- Relay 3 Normally Open
- Relay 3 Common
- Relay 2 Normally Open
- Relay 2 Common
- Relay 2 Normally Closed
- Relay 1 Normally Open
- Relay 1 Common
- Relay 1 Normally Closed



- Mains Neutral
- Mains Live

Do not connect an earth.

Display Connection:

Controller	Display
SDO (Serial Data Out)	Data In
SCL (Serial Clock)	Clock
GND	GND
SDI (Serial Data In)	Data Out
+5V (Vcc)	Vcc

Inputs Jumper Settings:

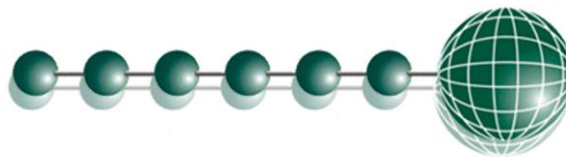
- Channel 1 Input selection Jumper  Channel 1 set to Humidity
- Channel 2 Input selection Jumper  Channel 2 set to Humidity

Note: It is very important for the normal operation of the Humidistat controller that these jumpers are set to the correct position for the inputs being used.

Note: This product has been designed to drive contactors with coil currents of less than 2 Amps @230 Vac. It must **NOT** be used to switch the heaters directly.



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Input/Output Allocation Table

Input/Output	Description	Alarm Action
Display Temperature	Fixed Sensor in the display	yes
Display Humidity	Fixed sensor in the display	yes
Input 1 (Jumper selects)	Humidity sensor	yes
Input 2 (Jumper selects)	Humidity sensor	yes
Input 3	Not Used	yes
Input 4	Not Used	yes
Relay 1	Trim 1 Control 1	N/A
Relay 2	Trim 2 Control 2	N/A
Relay 3	Trim 3 Control 3	N/A

Setting up the controller

Access to the controller can be achieved by 2 ways

- Through the front mounted buttons on the display
- Through the RDM Data Director or Data Manager

Setup Mode

Setup through front buttons



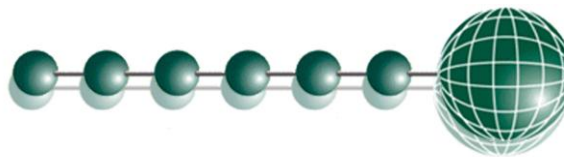
To enter the setup mode, hold the **Enter** and **Down** buttons together for approximately 3 seconds until the message “Ent” appears on the display. Now press the Enter button again to enter the function menu. IO will be displayed. Scroll up or down to go through the menu items.

Setup Function Menu

Display	Option	Explained in Paragraph
IO	View Input and Output States	IO
PArA	View or change Parameters	Para
Unit	View or change Units and Probe types	Unit
tyPE	View or change controller type	type
rtc	View or change the Real Time Clock	RTC
nEt	View or change the network settings	net
SoFt	View the Software version	
ESC	Escape the menu	



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Recommended set-up method

The first items (Type) is preset at the factory and cannot be changed.

type. view controller type

- a. From the function menu scroll to select type, press enter
- b. View the type number 1
- c. Press enter.
- d. Scroll to select "ESC"
- e. Press enter

Unit. Set/view temperature unit and Probe type

Units must be set locally at the controller before the controller is connected to the network. Changing units after the controller has been logged on to the network will cause the front end system to log an extra controller at this address.

From the function menu scroll to select Unit

Press enter and the value will be displayed: -

Probe Types

- 0 = PT1000 Display temperature °C
- 1 = PT1000 Display temperature °F
- 2 = NTC2K Display temperature °C
- 3 = NTC2K Display temperature °F
- 4 = NTC2K25 Display temperature °C
- 5 = NTC2K25 Display temperature °F

Use the up or down keys to select the units and press enter.

Units are now set

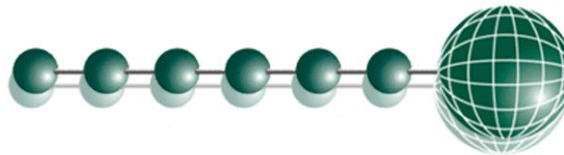
PArA. Set/view parameters

(This can be achieved at the network front end)

- a. From the function menu scroll to select PArA
- b. Pressing Enter while PArA is displayed will enter the parameter menu. The first parameter option will be displayed as P-01. Pressing the Up or Down button will present the other parameter options P-02, P-03 etc. See the parameter tables to find what parameter number corresponds to which actual parameter. Pressing the Enter button will show the current value of the selected parameter. Press Up or Down to modify the value and press Enter again to save the value. The parameter list number will be displayed again. Two other options are present in the parameter menu – dFLt and ESC. Selecting ESC will exit setup mode. Selecting dFLt will reset all parameters back to the default values for the current type of controller.



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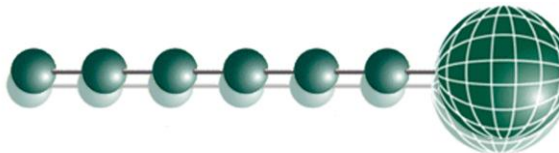


Parameter Table:

Number	Parameter	Range	Step	Units	Def.
P01	Relay 1 control Sensor	0 to 2 0 = Display sensor 1 = Sensor channel 1 2 = Sensor channel 2	1		0
P02	R1 Humidity Low point	0 to 100	1	rH	20
P03	R1 Humidity High point	0 to 100	1	rH	60
P04	R1 Trim Low point	0 to 100	1	%	30
P05	R1 Trim High point	0 to 100	1	%	100
P06	R1 Timer Off Trim Level	0 to 100	1	%	0
P07	Control 1 Type	0 = Off 1 = Humidity 2 = Dew Point	1		1
P08	Temperature 1 Input	0 = Display 1 = Input 1 2 = Input 2 3 = Input 3 4 = Input 4	1		0
P09	Dew Point 1 Low	-59 to 128	1	°C	4
P10	Dew Point 1 High	-59 to 128	1	°C	8
P11	Relay 2 control Sensor	0 to 2 0 = Display sensor 1 = Sensor channel 1 2 = Sensor channel 2	1		0
P12	R2 Humidity Low point	0 to 100	1	rH	20
P13	R2 Humidity High point	0 to 100	1	rH	60
P14	R2 Trim Low point	0 to 100	1	%	30
P15	R2 Trim High point	0 to 100	1	%	100
P16	R2 Timer Off Trim Level	0 to 100	1	%	0
P17	Control 2 Type	0 = Off 1 = Humidity 2 = Dew Point	1		1
P18	Temperature 2 Input	0 = Display 1 = Input 1 2 = Input 2 3 = Input 3 4 = Input 4	1		0
P19	Dew Point 2 Low	-59 to 128	1	°C	4
P20	Dew Point 2 High	-59 to 128	1	°C	8
P21	Relay 3 control Sensor	0 to 2 0 = Display sensor 1 = Sensor channel 1 2 = Sensor channel 2	1		0
P22	R3 Humidity Low point	0 to 100	1	rH	20
P23	R3 Humidity High point	0 to 100	1	rH	60
P24	R3 Trim Low point	0 to 100	1	%	30
P25	R3 Trim High point	0 to 100	1	%	100
P26	R3 Timer Off Trim Level	0 to 100	1	%	0
P27	Control 3 Type	0 = Off 1 = Humidity 2 = Dew Point	1		1



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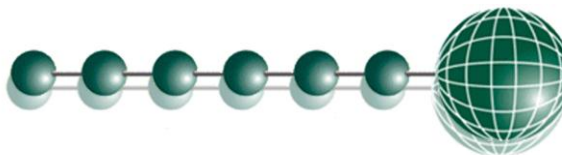


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P28	Temperature 3 Input	0 = Display 1 = Input 1 2 = Input 2 3 = Input 3 4 = Input 4	1		0
P29	Dew Point 3 Low	-59 to 128	1	°C	4
P30	Dew Point 3 High	-59 to 128	1	°C	8
P70	Timer Mode	0 = local 1 = Remote 2 = manual off 3 = manual on	1		0
P71	Sunday On Time 1	00:00 to 23:59	00:01		08:00
P72	Sunday Off Time 1	00:00 to 23:59	00:01		20:00
P73	Sunday On Time 2	00:00 to 23:59	00:01		08:00
P74	Sunday Off Time 2	00:00 to 23:59	00:01		20:00
P75	Monday On Time 1	00:00 to 23:59	00:01		08:00
P76	Monday Off Time 1	00:00 to 23:59	00:01		20:00
P77	Monday On Time 2	00:00 to 23:59	00:01		08:00
P78	Monday Off Time 2	00:00 to 23:59	00:01		20:00
P79	Tuesday On Time 1	00:00 to 23:59	00:01		08:00
P80	Tuesday Off Time 1	00:00 to 23:59	00:01		20:00
P81	Tuesday On Time 2	00:00 to 23:59	00:01		08:00
P82	Tuesday Off Time 2	00:00 to 23:59	00:01		20:00
P83	Wednesday On Time 1	00:00 to 23:59	00:01		08:00
P84	Wednesday Off Time 1	00:00 to 23:59	00:01		20:00
P85	Wednesday On Time 2	00:00 to 23:59	00:01		08:00
P86	Wednesday Off Time 2	00:00 to 23:59	00:01		20:00
P87	Thursday On Time 1	00:00 to 23:59	00:01		08:00
P88	Thursday Off Time 1	00:00 to 23:59	00:01		20:00
P89	Thursday On Time 2	00:00 to 23:59	00:01		08:00
P90	Thursday Off Time 2	00:00 to 23:59	00:01		20:00
P91	Friday On Time 1	00:00 to 23:59	00:01		08:00
P92	Friday Off Time 1	00:00 to 23:59	00:01		20:00
P93	Friday On Time 2	00:00 to 23:59	00:01		08:00
P94	Friday Off Time 2	00:00 to 23:59	00:01		20:00
P95	Saturday On Time 1	00:00 to 23:59	00:01		08:00
P96	Saturday Off Time 1	00:00 to 23:59	00:01		20:00
P97	Saturday On Time 2	00:00 to 23:59	00:01		08:00
P98	Saturday Off Time 2	00:00 to 23:59	00:01		20:00
dFLt	Factory Defaults				



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rtc. Real time clock

(This will automatically synchronise on network systems)

- a. Use the up or down buttons to scroll through the display until the display reads “rtc”
- b. Press enter. The display will show “t-1”. press enter again
- c. Scroll hours up or down (0 – 23) press enter
- d. Use up button to select “t-2”, press enter
- e. Scroll minutes up or down (0 – 59) press enter
- f. Repeat for t-3 (seconds 0 – 59)
- g. Repeat for t-4 (Days up to 31)
- h. Repeat for t-5 (months up to 12)
- i. Repeat for t-6 (Year up to 99)
- j. Use up button to display “ESC”, press enter to display “rtc”

Time clock is now set

Network Configuration

The final section to setup is the network ID. In all instances, this must be done before the controller is connected to the site network. Set the 3 rotary network switches to an appropriate setting, the controllers have an auto-initialise function, which will automatically log the device onto the site network. If the wrong ID has been entered onto the network, you will have to reset the controller ID by setting the ID to 0-0-0, power cycle and then re-enter the correct ID.

This controller does not require an external communications module.

IP-L (Local IP Address)

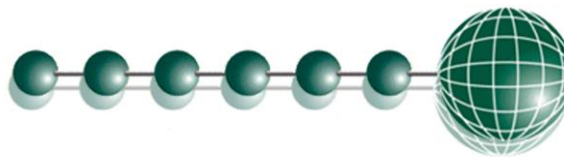
To configure the controller for IP-L, set all three rotary switches to zero.

1. nEt. From the function menu you can now select nEt
 - Press enter and the display will show “IP-L”, press enter
 - You can now set the address using the table below

Display	Option
IP-1	IP Address byte 1
IP-2	IP Address byte 2
IP-3	IP Address byte 3
IP-4	IP Address byte 4
nL	Network Mask Length
gt-1	Gateway Address byte 1
gt-2	Gateway Address byte 2
gt-3	Gateway Address byte 3
gt-4	Gateway Address byte 4
ESC	Exit network menu. N.B. this option must be selected to save any changes made in this menu



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IP-r (IP Address issued by the DHCP server)

To configure the controller for IP-r, set the three rotary switches to give each controller a unique identifier. The controller should then be connected to the network.

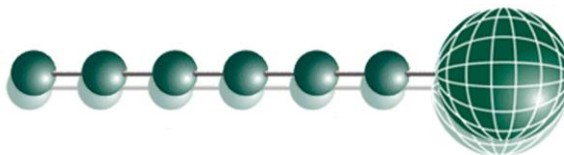
2. nEt. From the function menu you can now select nEt
 - Press enter and the display will show “IP-r”, press enter
 - You can now view only the address given by the DHCP server

To ease setup, a single network mask length value is used. If the address has been specified with a network mask value in dotted IP format e.g. 255.255.255.0 then the table below gives the conversion:

Mask	Length	Mask	Length	Mask	Length
		255.255.254.0	23	255.254.0.0	15
255.255.255.252	30	255.255.252.0	22	255.252.0.0	14
255.255.255.248	29	255.255.248.0	21	255.248.0.0	13
255.255.255.240	28	255.255.240.0	20	255.240.0.0	12
255.255.255.224	27	255.255.224.0	19	255.224.0.0	11
255.255.255.192	26	255.255.192.0	18	255.192.0.0	10
255.255.255.128	25	255.255.128.0	17	255.128.0.0	09
255.255.255.0	24	255.255.0.0	16	255.0.0.0	08

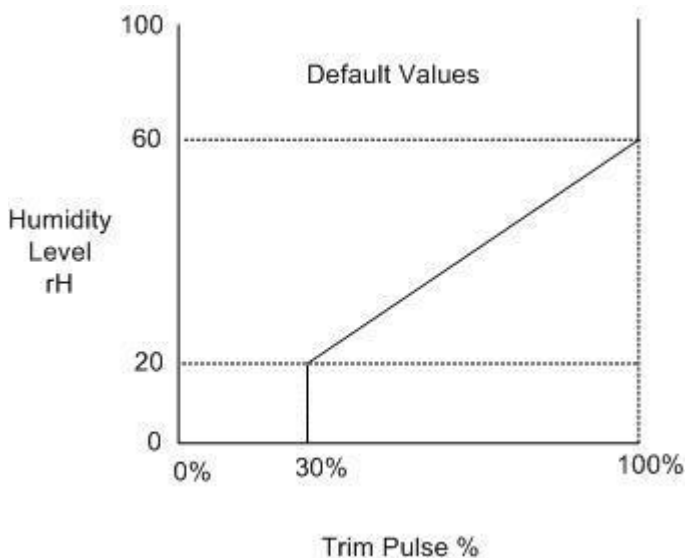


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Operation:

There are three channels in this controller each channel will switch its associated relay in accordance with the setup parameters. When rH is below the “rH Min level”, the relay will pulse to a duration set by the “Trim Min” parameter. When rH is above the “rH Min” level, but below the “rH Max” level, the relay will pulse the relay in proportion to the line drawn between the min and max levels (see the example below). When rH goes above the “rH Max” level, the trims will remain at the “Trim Max” setting. The default sensor is in the display, and this will switch relay 1, relay 2 and 3 can be switched by selecting the sensor. 2 more external sensors can be used or all 3 relays can use the same sensor.



Similarly, Dew Point can be used instead of Humidity, select this option from the parameters. If Dew Point control is selected, the Y axis on the graph is Dew Point Temperature, not %rH.

Trim Off Level

When the timer is in the on period the relay will pulse as described above. During the timer off period the relay will pulse to the preset “timer off trim level”. For example if the trim off level is zero then the trims will be completely off. Thus allowing the user to save energy when the store isn’t trading and the trims are not required.

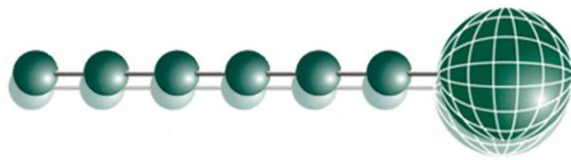
GP Timer Set-up

It is possible to set the Trims Optimiser for remote operation (P70 = 1). A GP Timer must be set up to control the timer on/off periods of the Trims Optimiser. For GP Timer set up please refer to the Data Manager user guide found on the RDM website. The following settings should be followed in the GP setup.

- Output Type – This should be set to “General”.
- Output Mask – This should match the “Controller Name” .
- Output Channel – This should be set to “6”. This will allow the GP Timer to control the state of the timer.



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Viewing

Apart from setting up the controller, you can also view the status of the inputs and outputs.

1. IO. View Inputs / Outputs and States
 - a. From the function menu, select "IO", press enter
 - b. You can now scroll through the IO tables as set out below. The tables you view will depend on the controller type configuration.

Input/Output table

Number	IO	Range (dependant on probe type) °C (°F)	Step	Units
I-01	Display Temperature	-59 - 120 (-74 - 248)	1	Deg
I-02	Display Humidity	0-100	1	rH
I-010	Humidity 1	0-100	1	rH
I-11	Humidity 2	0-100	1	rH
I-12	Humidity 3	0-100	1	rH
O-01	Relay 1	0 = off, 1 = on	1	-
O-02	Relay 2	0 = off, 1 = on	1	-
O-03	Relay 3	0 = off, 1 = on	1	-
O-11	Relay 1 Pulse Level	0-100	1	%
O-12	Relay 2 Pulse Level	0-100	1	%
O-13	Relay 3 Pulse Level	0-100	1	%
O-21	Timer State	0 = off, 1 = on	1	-

Alarm Messages

The following alarms and messages can appear on the Mercury display.

Display Message	System status
Ft	Probe or sensor fault

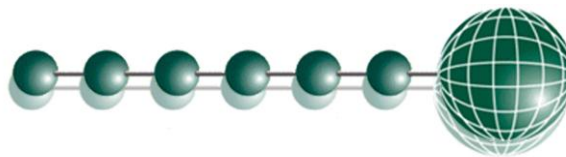
Network Alarms

The table below shows the text and associated type number that is sent to the system "front end". The type number is normally used to provide different alarm actions.

Alarm text	Type # (index)
Display Probe fault	6
Display Sensor fault	6
Channel 1 sensor fault	6
Channel 2 sensor fault	6
Channel 3 sensor fault	6



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Specification

Power requirements:

Supply Voltage Range:	100 - 240 Vac \pm 10%
Supply Frequency:	50 - 60 Hz
Maximum supply current:	0.2 Amp (Not including Relay current)
Typical supply current:	<0.1 Amp (Not including Relay current)
Operating temperature range:	+5 ^o C to +50 ^o C
Operating Humidity:	80% maximum
Storage temperature range:	-20 ^o C to +65 ^o C
Environmental:	Indoor use at altitudes up to 2000m, Pollution Degree 1, Installation Category II. Voltage fluctuations not to exceed \pm 10% of nominal voltage
Size:	
Weight:	
Safety:	EN61010
EMC:	EN61326; 1997 +Amdt. A1; 1998
Ventilation:	There is no requirement for forced cooling ventilation
Class 2 Insulation:	No protective Earth is required and none should be fitted.

The host equipment must provide a suitable external over-current protection device such as:

Fuse:	1A 240 Vac Antisurge (T) HRC conforming to IEC 60127
Or MCB:	1A, 240 VAC Type C conforming to BS EN 60898

The host equipment must provide adequate protection against contact to hazardous live parts.

Relays

Relay 1: contacts: - N/C, N/O and Common

Max current relay 1:	2A (non inductive)
Max Voltage relay 1:	260Vac (external supply)

Relay 2: contacts: - N/C, N/O and Common

Max current relay 2:	2A (non inductive)
Max Voltage relay 2:	260Vac (external supply)

Relay 3: contacts: - N/O and Common

Max current relay 3:	2A (non inductive)
Max Voltage relay 3:	260Vac (external supply)

Relay Life:

If the full current of 2A is used, the relay life expectancy is <12 months. To extend relay life, reduce the current to a value <200mA. This will give the relay a life expectancy of >5 years.

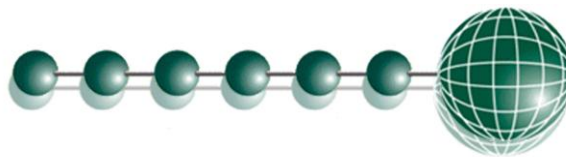
For compliance with the LVD, supplies to all three relays must be the same voltage.

Inputs:

CH1:	Factory set to Humidity Sensor
CH2:	Factory set to Humidity Sensor
CH3:	Not Used
CH4:	Not Used

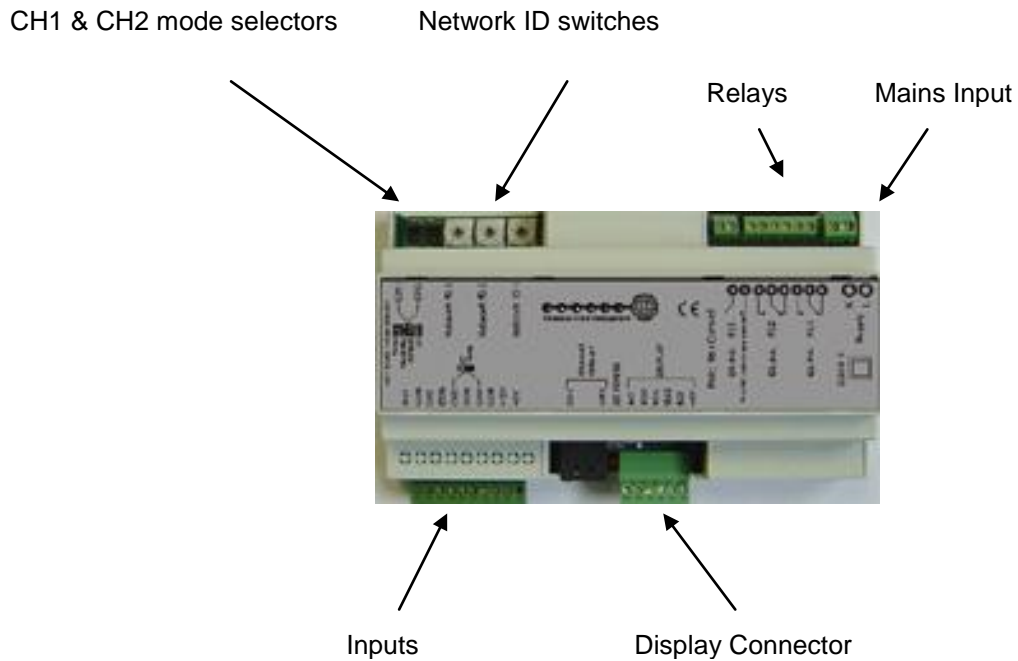


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Installation:

Wiring:



Fixing:

The Humidistat Display is designed to fix on to a single socket patress, either wall or flush mount.

The Humidistat Controller fits a standard DIN rail, or the clips can be extended to allow for a surface screw fixing.

Clearances:

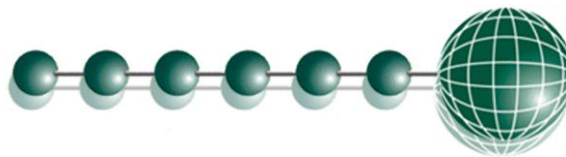
There are no clearance rules associated with this controller.

Remote Sensor

Farnell part number 732849 or similar device can be used.



Ensure that all power is switched off before installing or maintaining this product



Fuse:

The host equipment must provide a suitable external over-current protection device such as: -

Fuse: 1A 110Vac or 240 Vac Antisurge (T) HRC conforming to IEC 60127

Or MCB: 1A, 110Vac or 240 Vac Type C conforming to BS EN 60898

Cleaning:

Do not wet the controller when cleaning. Clean the top by wiping with slightly dampened lint free cloth.

Appendix 1: Trim Heater Control

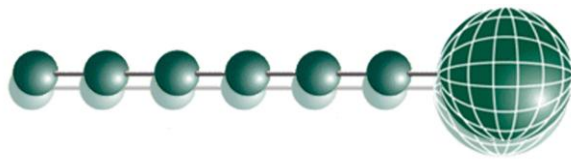
Energy savings via the Mercury range of case controllers can be achieved in a number of ways. One of which is pulsing the trim heater relay off for a given period of time. This can be achieved by utilising the Trim Heater Control energy feature in the Data Manager. RDM recommend that the Trim Heater Pulse Module (PR0723) is used in all instances of trim control. This module is fitted in between the trim heater of the case and the relay output of the Mercury case controller or the Trim Optimiser which is pulsing the trim heater. The trim heater module output provides a smoother power distribution, compared to using the Mercury case controller trim relay output direct, as it switches at the zero voltage crossover point. Switching the trim heater on and off via a normal relay, without using the RDM trim heater pulse module, may damage the trim heater and reduce the operational life of the heater. Please see the Trim Heater Pulse Module user guide for further details.

Disclaimer:

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Revision History

Revision	Date	Changes	Comments
1.0		First Issue	
1.1	04-01-2006	Minor tidy ups	
1.2	31-01-2006	Relay Life paragraph added	
1.2a	01-02-2006	Description changed to include the energy saving feature of this controller	
1.3	29-06-2006	Parameter table revised	
1.4	10-08-2006	Description included for the new timer software	
1.5	09-02-2007	Dew Point Control added	
1.5A	23-02-2010	Yellow LED operation updated. P-70 selection details updated.	



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