



Mercury

PR0710-RTU



Intuitive

PR0750-RTU

Mercury 2 & Intuitive Mercury Roof Top Unit Controller Installation & User Guide

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The Mercury & Intuitive Range From Resource Data Management

Description

The Mercury Roof Top Unit (RTU) can be configured for heating and/or cooling applications. Control can be achieved from either temperature probe input 1 or by a percentage weighting of input 1 and input 2. There is a 7-day timer with two on and off times. The Mercury 2 RTU Controller has a number of energy saving features one of which allows a user to offset the heating and cooling differentials from a TDB program. For example when the building is unoccupied the differentials can be adjusted to reduce the required level of heating/cooling. A second energy reducing feature, activated from TDB, allows the user to turn the *fans off when heating/cooling demand has been satisfied. See [Remote Commands](#) for further details. There is also the ability to signal fan alarms through the switched resistor function. The RTU has the option to invert relay operation to use either N/C or N/O contacts. Care MUST be taken to make sure these are set correctly before use as incorrect setting / wiring could have adverse effects.

* At least one relay output must be selected as a fan before the thermostat control will operate. This is a precautionary measure to prevent the user from enabling a heater without the appropriate fan(s) being selected as in some applications this could damage the heating equipment or cause a fire hazard.

The Intuitive Mercury range is designed to be used in a control panel or electrical tray. This range has the same features as the Mercury Mk2 controller with additional benefits such as higher rated relays each protected by an integral fuse and fuse protection for the incoming power supply, all connections are plug in socket. There are multiple network interfaces to choose from including Ethernet.

The controller supports PT1000, NTC2K, 470R, 700R, 3K, 5K, 6K, NTC2K25, NTC10K or NTC10K(2) USA temperature probes (note: probe types cannot be mixed)

Variants

Description	Part Number
Mercury Mk2 Control Thermostat.	PR0710-RTU
Intuitive Mercury Control Thermostat.	PR0750-RTU

Configuration

There is only one type of configuration in the Mercury RTU controller.

Compatible Network Interfaces

Mercury and Intuitive Mercury controllers are capable of connecting to a TCP/IP local area network or can be used in standalone mode with no network output. To connect to a network you must add the correct communications module. Connecting to any of these communication modules will automatically be detected on power up and will affect the set up screens available to you.

Description	Part Number
IP Futura (Single Mercury to IP Interface)	PR0016
Mercury IP Switch (IP support for 10 controllers)	PR0018
Mercury IP Switch with Pressure/Humidity Inputs	PR0018-PHI

The Intuitive Mercury Controller is supplied as standard with an internal RS232 network card, this allows connection to any of the above external network interfaces. An alternative internal network card is also available, this can be supplied factory fitted as an option or purchased separately as an interface kit.









Description	Part Number
Intuitive Internal IP Network Card Interface Kit	PR0770



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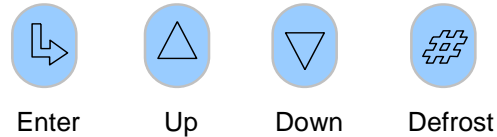
Front Display Features

LED's: -

- Valve** (On when cooling) 
- Fans** (On when fan is on) 
- Lights** (Not Used) 
- Defrost** (On when heating) 
- On-Line** 
 - Off No network attached
 - Flashing Attempting to Log on to network
 - Steady On-line
- Service** (Not used) 
- Alarm** (On when in alarm state) 
- HACCP** 



Keys



Note: Function keys illuminate when pressed, illumination is turned off 20 seconds after the key is used. Press and hold the defrost button to force a manual defrost

Main Display



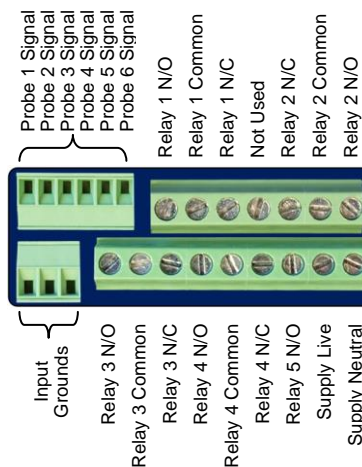
4 character LED display, used to display temperature and status messages.

Note the Intuitive Mercury display is green in color when lit.

Connections

Mercury Mk2

Input and Output connections are made to the back of the controller, the RS232 communication port is on the side. The diagram shows the connection detail. Inputs and outputs are assigned according to the chosen configuration. See [Input/Output](#) tables for further details on connections.

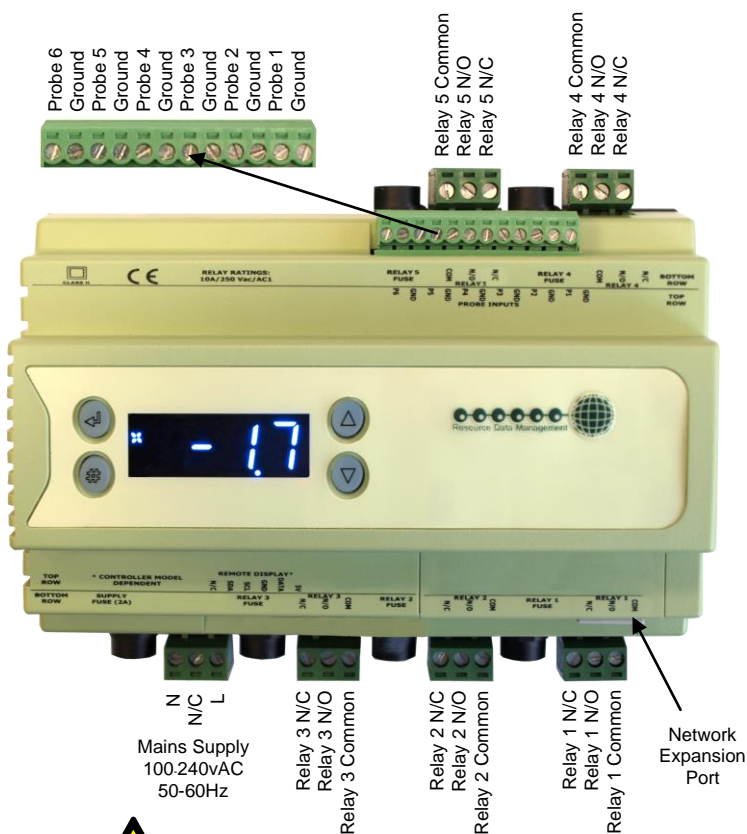


Do not connect an earth



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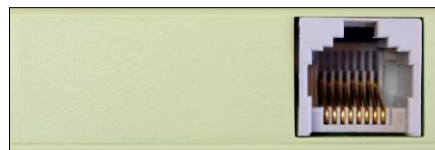
Intuitive Mercury Controller



! Do not connect an earth

Intuitive Mercury Network Expansion Options

RS232 Network Card (Default)



The Intuitive Mercury is supplied with an RS232 Network Card fitted as standard. Some example optional network cards are shown below

IP Network Card (PR0770)



Rotary Address Switches, Network Collision LED, Network Activity LED

All inputs and outputs are plug and socket. The supply voltage and relay outputs have individual fuse protection.

Input / Output allocation table

The following table indicates the functions of the inputs and outputs. Also shown are the digital inputs that are derived by switching in a fixed value resistor across the input.

Input	Description	Alarm Action	Plant Input (Switched Resistors)
Probe 1	Probe 1	Yes	
Probe 2	Probe 2	Yes	
Probe 3	Probe 3*	No	
Probe 4	Probe 4*	No	
Probe 5	Probe 5*	No	Fan Signal 1
Probe 6	Probe 6*	No	Fan Signal 2
Relay 1	Configurable	N/A	
Relay 2	Configurable	N/A	
Relay 3	Configurable	N/A	
Relay 4	Configurable	N/A	
Relay 5	Configurable	N/A	

* Probes 3 to 6 are for monitoring purposes only.

Switched Resistor Values

For PT1000 probes use 820 Ohm switched resistors. For NTC2K, NTC2K25 and 3K probes use 590 Ohm switched resistors. For 5K and 6K use 1K Ohm switched resistors. For NTC10K probes use 2k7 Ohm switched resistors. For NTC10K(2) probes use 2k2 Ohm switched resistors. The resistors used must have a tolerance of 1% or better and the resistor must have a power rating of 0.25W. For improved accuracy whilst using switched resistors RDM recommend resistors with 0.1% accuracy are used. Note the switched resistor features will **not** function when using 470R or 700R probes. When a resistor is switched across the appropriate input it signals to the Mercury to enable the switched resistor function described for that input whilst still recording the probe temperature on the input.

Temperature range for all probe types is -49°C to +128°C for probe inputs which do not have a secondary function (switched resistors). Inputs which have a secondary function are restricted to -42°C to +60°C.



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Note: switched resistors will operate in LT (Low Temperature) and HT (High Temperature) applications using PT1000, NTC2K or NTC2K25 probe types only. For all other probe types the switched resistor inputs will work in HT applications only.

Setting up the controller

Access to the controller can be achieved several ways

- Through the front mounted buttons
- Direct access by PC or palm top into the rear comms port. This requires a software package available on the RDM website
- Through the RDM Data Manager.
- Across an IP network. (Current controller IP address required)

Setup through front buttons



To enter 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 list.

Setup Function Menu (Common to all types)

Display	Option	Explained in Paragraph	Display	Option	Explained in Paragraph
IO	View Inputs / Outputs and States	Input / output table	nEt	Set/view network configuration	Network Configuration
PArA	Set/View Parameters	Set view parameters	SoFt	View software version	
Unit	Probe type and Celsius/Fahrenheit option	Set View Unit	OFSt	Probe Offset	Probe Offset
diSP	Display whole units or decimal	Display	rLy	Invert Relay Function	Invert Relays
tyPE	Set/View Controller Type	Set/view controller type	ESC	Exit Setup mode	ESC
rtc	Set/view Clock (rtc = Real Time Clock)	Real Time Clock			

Recommended set-up method

If you are not connecting to a network and want to set up the controller through the buttons we recommend you use the following order from the function menu.

rtc. Real time clock (This will automatically synchronise on network systems)

- Use the up or down buttons to scroll through the display until the display reads "rtc"
- Press enter. The display will show "t-1". press enter again
- Scroll hours up or down (0 – 23) press enter
- Use up button to select "t-2", press enter
- Scroll minutes up or down (0 – 59) press enter
- Repeat for t-3 (seconds 0 – 59)
- Repeat for t-4 (Days up to 31)
- Repeat for t-5 (months up to 12)
- Repeat for t-6 (Year up to 99)
- Use up button to display "ESC", press enter to display "rtc"

Timeclock is now set



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Unit. Set/view temperature unit and Probe type

From the function menu scroll to select Unit
Press enter and the value will be displayed: -

- | | |
|-------------------------|--|
| 0 for PT1000 Celsius | 10 for NTC2K25 Celsius |
| 1 for PT1000 Fahrenheit | 11 for NTC2K25 Fahrenheit |
| 2 for NTC2K Celsius | 12 for 5K Celsius |
| 3 for NTC2K Fahrenheit | 13 for 5K Fahrenheit |
| 4 for 470R Celsius | 14 for 6K Celsius |
| 5 for 470R Fahrenheit | 15 for 6K Fahrenheit |
| 6 for 700R Celsius | 16 for NTC10K Celsius |
| 7 for 700R Fahrenheit | 17 for NTC10K Fahrenheit |
| 8 for 3K Celsius | 18 for NTC10K(2) Celsius (USA NTC10K) |
| 9 for 3K Fahrenheit | 19 for NTC10K(2) Fahrenheit (USA NTC10K) |

Use the up or down keys to select the units and press enter. This function is now complete.

Display

From the function menu scroll to and select diSP.

Press enter and one of the following values will be shown: -
0 controller display will show the whole number and tenths value of a temperature reading.
1 controller display will show temperatures as a whole number.

Display defaults to 0.

PArA. Set/view parameters (This can be achieved at the network front end)

- From the function menu scroll to select PArA
- 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 list below 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 controller.

Parameter Table for RTU

Number	Parameter	Range °C (°F)	Step	Units	Default
P-01	Set Point	-49 to 30 (-56.2 to 86)	0.1	°C (°F)	21.1 (70.0)
P-02	Set Up Limit	-49 to 30 (-56.2 to 86)	0.1	°C (°F)	24.4 (76.0)
P-03	Set Dn Limit	-49 to 30 (-56.2 to 86)	0.1	°C (°F)	17.8 (64.0)
P-04	Heat Diff 1	0 to 20 (0 to 36)	0.1	°C (°F)	1.1 (2.0)
P-05	Heat Diff 2	0 to 20 (0 to 36)	0.1	°C (°F)	2.2 (4.0)
P-06	Cool Diff 1	0 to 20 (0 to 36)	0.1	°C (°F)	1.1 (2.0)
P-07	Cool Diff 2	0 to 20 (0 to 36)	0.1	°C (°F)	2.2 (4.0)
P-08	Control Weight	0 to 100	1	%	50
P-09	Display Weight	0 to 100	1	%	50
P-30	Fans Control	0 = On, 1 = Pulsed	1		0
P-31	Fans Run On	00:00 to 99:00	01:00	mm:ss	20:00
P-32	Fan Pulse On	00:00 to 99:00	01:00	mm:ss	05:00
P-33	Fan Pulse Off	00:00 to 99:00	01:00	mm:ss	05:00
P-34	Fan 1 Fault	00:00 to 99:00	01:00	mm:ss	00:00
P-35	Fan 2 Fault	00:00 to 99:00	01:00	mm:ss	00:00
P-40	Heat Stg Dly	00:00 to 99:00	01:00	mm:ss	05:00
P-41	Cool Stg Dly	00:00 to 99:00	01:00	mm:ss	05:00
P-43	OT / UT Alm Dly	00:00 to 99:00	01:00	mm:ss	20:00
P-44	Under Temp Alm	-98 to 128 (-144 to 262)	0.1	°C (°F)	15.6 (60.0)
P-45	Over Temp Alm	-98 to 128 (-144 to 262)	0.1	°C (°F)	29.4 (85.0)
P-50	Probe 2	0 = Monitor 1 = Control	1		0
P-54	Relay Mode 1*	0 = Unused, 1 = Heat 1, 2 = Heat 2, 3 = Cool 1, 4 = Cool 2, 5 = Fan, 6 = Timer, 7 = Alarm	1		5
P-55	Relay Mode 2*	0 = Unused, 1 = Heat 1, 2 = Heat 2, 3 = Cool 1, 4 = Cool 2, 5 = Fan, 6 = Timer, 7 = Alarm	1		3



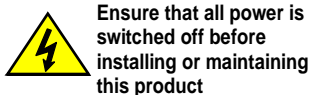
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Number	Parameter	Range °C (°F)	Step	Units	Default
P-56	Relay Mode 3*	0 = Unused, 1 = Heat 1, 2 = Heat 2, 3 = Cool 1, 4 = Cool 2, 5 = Fan, 6 = Timer, 7 = Alarm	1		4
P-57	Relay Mode 4*	0 = Unused, 1 = Heat 1, 2 = Heat 2, 3 = Cool 1, 4 = Cool 2, 5 = Fan, 6 = Timer, 7 = Alarm	1		1
P-58	Relay Mode 5*	0 = Unused, 1 = Heat 1, 2 = Heat 2, 3 = Cool 1, 4 = Cool 2, 5 = Fan, 6 = Timer, 7 = Alarm	1		2
P-70	Fan Mode	0 = Local, 1 = Remote, 2 = Man Off, 3 = Man On	1		0
P-71	Sunday On Time 1	00:00 to 23:59	00:01	hh:mm	08:00
P-72	Sunday Off Time 1	00:00 to 23:59	00:01	hh:mm	20:00
P-73	Sunday On Time 2	00:00 to 23:59	00:01	hh:mm	08:00
P-74	Sunday Off Time 2	00:00 to 23:59	00:01	hh:mm	20:00
P-75	Monday On Time 1	00:00 to 23:59	00:01	hh:mm	08:00
P-76	Monday Off Time 1	00:00 to 23:59	00:01	hh:mm	20:00
P-77	Monday On Time 2	00:00 to 23:59	00:01	hh:mm	08:00
P-78	Monday Off Time 2	00:00 to 23:59	00:01	hh:mm	20:00
P-79	Tuesday On Time 1	00:00 to 23:59	00:01	hh:mm	08:00
P-80	Tuesday Off Time 1	00:00 to 23:59	00:01	hh:mm	20:00
P-81	Tuesday On Time 2	00:00 to 23:59	00:01	hh:mm	08:00
P-82	Tuesday Off Time 2	00:00 to 23:59	00:01	hh:mm	20:00
P-83	Wednesday On Time 1	00:00 to 23:59	00:01	hh:mm	08:00
P-84	Wednesday Off Time 1	00:00 to 23:59	00:01	hh:mm	20:00
P-85	Wednesday On Time 2	00:00 to 23:59	00:01	hh:mm	08:00
P-86	Wednesday Off Time 2	00:00 to 23:59	00:01	hh:mm	20:00
P-87	Thursday On Time 1	00:00 to 23:59	00:01	hh:mm	08:00
P-88	Thursday Off Time 1	00:00 to 23:59	00:01	hh:mm	20:00
P-89	Thursday On Time 2	00:00 to 23:59	00:01	hh:mm	08:00
P-90	Thursday Off Time 2	00:00 to 23:59	00:01	hh:mm	20:00
P-91	Friday On Time 1	00:00 to 23:59	00:01	hh:mm	08:00
P-92	Friday Off Time 1	00:00 to 23:59	00:01	hh:mm	20:00
P-93	Friday On Time 2	00:00 to 23:59	00:01	hh:mm	08:00
P-94	Friday Off Time 2	00:00 to 23:59	00:01	hh:mm	20:00
P-95	Saturday On Time 1	00:00 to 23:59	00:01	hh:mm	08:00
P-96	Saturday Off Time 1	00:00 to 23:59	00:01	hh:mm	20:00
P-97	Saturday On Time 2	00:00 to 23:59	00:01	hh:mm	08:00
P-98	Saturday Off Time 2	00:00 to 23:59	00:01	hh:mm	20:00
dFLt	Factory Defaults				

* At least one relay output must be selected as a fan before the thermostat control will operate. This is a precautionary measure to prevent the user from enabling a heater without the appropriate fan(s) being selected as in some applications this could damage the heating equipment or cause a fire hazard.

Parameter Descriptions

Number	Parameter	Description
P-01	Set Point	Thermostat target temperature. Point at which Heating or Cooling will switch off.
P-02	Set Up Limit	Maximum upper temperature limit the user can adjust the setpoint too via the quick key feature on the controller display. (Using the up and down button)
P-03	Set Down Limit	Maximum lower temperature limit the user can adjust the setpoint range via the quick key feature on the controller display. (Using the up and down button)
P-04	Heat Diff 1 (Below Set-Point)	Differential temperature below the set-point temperature. The first heating stage switches on when this temperature is reached.
P-05	Heat Diff 2 (Below Set-Point)	Differential temperature below the set-point temperature. The second heating stage switches on when this temperature is reached.
P-06	Cool Diff 1 (Above Set-Point)	Differential temperature above the set-point temperature. The first cooling stage switches on when this temperature is reached.
P-07	Cool Diff 2 (Above Set-Point)	Differential temperature below the set-point temperature. The second cooling stage switches on when this temperature is reached.
P-08	Control Weight	Percentage of Probe 1 temperature that is used to calculate the control temp. The remaining percentage will be used on Probe 2 temperature Example, P-08 set to 30% Control temp = 30% Probe 1 + 70% Probe 2 Note P-50 must be set to Control to use the weighted average. If P-50 set as Monitor then all of probe one used for control temperature.



Number	Parameter	Description
P-09	Display Weight	As above only applied to the display temperature
P-30	Fans Control	Local selected at P-70 > On - Always On when timer is on (P-71 to P-98) > Pulsed - Pulsed on and off using parameters P-32 and P-33
P-31	Fans Run On	The period of time for which the fans remain on after Heating or Cooling has stopped or the thermostat has been turned off.
P-32	Fan Pulse On	The On period for the fans when Pulsed selected by P-30 (1)
P-33	Fan Pulse Off	The Off period for the fans when Pulsed selected by P-30 (1)
P-34	Fan 1 Fault	Time delay before Fan 1 Fault alarm is generated if fan signal 1 is not active when the fan relay is on. If set to 00:00 the feature is disabled.
P-35	Fan 2 Fault	Time delay before Fan 2 Fault alarm is generated if fan signal 2 is not active when the fan relay is on. If set to 00:00 the feature is disabled.
P-40	Heat Stage Delay	Time delay before heating stage 2 is turned on once below the setpoint. Please note the heating stage is turned on when either the delay time expires or the temperature drops below heating 2 diff setpoint whichever occurs first.
P-41	Cool Stage Delay	Time delay before cooling stage 2 is turned on once above the setpoint. Please note the cooling stage is turned on when either the delay time expires or the temperature rises above cooling 2 diff setpoint whichever occurs first.
P-43	OT / UT Alarm Delay	Delay applied before an alarm is signalled for over/under temperature alarm.
P-44	Under Temp Alarm	Under temperature alarm set point. This alarm uses the control temperature.
P-45	Over Temp Alarm	Over temperature alarm set point. This alarm uses the control temperature
P-50	Probe 2	Selects Probe 2 as a Monitor Probe only or Control using weighted average P-08 and P-09 along with Probe 1. Note if set as monitor no probe fault alarm is created for Probe 2. If set as control both probe 1 & 2 must fail before a probe fault is created.
P-54	Relay Mode 1	> Unused – Relay has no operation > Heating stage 1 – Operates in relation to heating diff 1 and the controller set-point. > Heating stage 2 - Operates in relation to heating diff 2 and the controller set-point. > Cooling stage 1 - Operates in relation to cooling diff 1 and the controller set-point. > Cooling stage 2 - Operates in relation to cooling diff 2 and the controller set-point. > Fan – Operation dependant on parameter "Fans Control", "Run on" and "Fans Pulse" > Timer – Relay operation follows the timer on/off status. > Alarm – When enabled the alarm relay can be configured to either energise or de-energise on alarms.
P-55	Relay Mode 2	As above
P-56	Relay Mode 3	As above
P-57	Relay Mode 4	As above
P-58	Relay Mode 5	As above
P-70	Fan Mode	> Local – Use parameter P-30 and timer parameters P-71 to P-98 > Remote – Use Remote Commands from TDB Program. See Note : Remote Commands Fan Command > Man Off – Never turn fans On > Man On – Never turn fans Off
P-71	Sunday On Time 1	Timer : Sunday on time 1
P-72	Sunday Off Time 1	Timer : Sunday off time 1
P-73	Sunday On Time 2	Timer : Sunday on time 2
P-74	Sunday Off Time 2	Timer : Sunday off time 2
P-75	Monday On Time 1	Timer : Monday on time 1
P-76	Monday Off Time 1	Timer : Monday off time 1
P-77	Monday On Time 2	Timer : Monday on time 2
P-78	Monday Off Time 2	Timer : Monday off time 2
P-79	Tuesday On Time 1	Timer : Tuesday on time 1
P-80	Tuesday Off Time 1	Timer : Tuesday off time 1
P-81	Tuesday On Time 2	Timer : Tuesday on time 2
P-82	Tuesday Off Time 2	Timer : Tuesday off time 2
P-83	Wednesday On Time 1	Timer : Wednesday on time 1
P-84	Wednesday Off Time 1	Timer : Wednesday off time 1
P-85	Wednesday On Time 2	Timer : Wednesday on time 2
P-86	Wednesday Off Time 2	Timer : Wednesday off time 2
P-87	Thursday On Time 1	Timer : Thursday on time 1
P-88	Thursday Off Time 1	Timer : Thursday off time 1
P-89	Thursday On Time 2	Timer : Thursday on time 2
P-90	Thursday Off Time 2	Timer : Thursday off time 2
P-91	Friday On Time 1	Timer : Friday on time 1
P-92	Friday Off Time 1	Timer : Friday off time 1
P-93	Friday On Time 2	Timer : Friday on time 2



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Number	Parameter	Description
P-94	Friday Off Time 2	Timer : Friday off time 2
P-95	Saturday On Time 1	Timer : Saturday on time 1
P-96	Saturday Off Time 1	Timer : Saturday off time 1
P-97	Saturday On Time 2	Timer : Saturday on time 2
P-98	Saturday Off Time 2	Timer : Saturday off time 2
dFLt	Factory Defaults	Restores all of the parameters to their default values

Network Configuration

The final section to setup is the network address. In all instances, this must be done before the controller is plugged into the site network. The controllers have an auto-initialise function, which will automatically log the device onto the site network. If the wrong address has been entered onto the network, you will have to reset the controller address by setting the address to 00-0, and then re-enter the correct address. (You may have to deregister the wrong address from the home system as well).

When logging a Mercury or Intuitive Mercury with an RS232 interface onto a network you must first connect the controller to a communications module, this is either an IP Futura or Mercury Switch. When using an Intuitive Mercury controller, the controller has to have the correct network card fitted (see “compatible network interfaces”). For connection to a Mercury Switch (Hub) or an external network interface, the standard fitment RS232 network card is utilized.

IP Futura module / Intuitive Internal IP Network card

In an IP system there are two options,

- IP-L
- IP-r

IP-L allows you to fix an IP address into the controller, which you would use when you are connecting the controllers onto a customer’s local area network. This would allow the customer to view each controller using Internet Explorer

IP-r allows you to give each controller on the system a unique number. This number is then allocated a dynamic IP address by the system DHCP server (such as the RDM Data Manager or Data Director)

IP-L

To configure the communication module or network card for IP-L, set all three rotary switches to zero. The module should then be connected to the controller. In the case of an Intuitive Mercury controller where the network card is already fitted, the controller should be powered off, all three rotary switches set to zero and the controller powered on.

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

IP-r

To configure the communication module for IP-r, set the three rotary switches to give each controller a unique identifier. The module should then be connected to the controller and the network. In the case of an Intuitive Mercury controller where the network card is already fitted, the three rotary switches must be set when the controller is powered off, the controller should then be powered on to connect 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:



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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

Mercury Switch

Please refer to the Mercury Switch user guide, which can be obtained from the RDM website, for information regarding connecting a controller to a network.

Viewing

Apart from setting up the controller, you can also view the status of the inputs and outputs and controller states. From the function menu, select "I/O", press enter. You can now scroll through the IO table as set out below

Input / Output Table

Number	IO	Range °C (°F)	Step	Units
I-01	Control temp	-98 to 128 °C (-144 to 262)	0.1	Deg °C (°F)
I-02	Display temp	-98 to 128 °C (-144 to 262)	0.1	Deg °C (°F)
I-10	Probe 1	-98 to 128 °C (-144 to 262)	0.1	Deg °C (°F)
I-11	Probe 2	-98 to 128 °C (-144 to 262)	0.1	Deg °C (°F)
I-12	Probe 3	-98 to 128 °C (-144 to 262)	0.1	Deg °C (°F)
I-13	Probe 4	-98 to 128 °C (-144 to 262)	0.1	Deg °C (°F)
I-14	Probe 5	-98 to 128 °C (-144 to 262)	0.1	Deg °C (°F)
I-15	Probe 6	-98 to 128 °C (-144 to 262)	0.1	Deg °C (°F)
I-20	Fan 1 Signal	0 (Off), 1 (On)		
I-21	Fan 2 Signal	0 (Off), 1 (On)		
O-01	Relay 1	0 (Off), 1 (On)		
O-02	Relay 2	0 (Off), 1 (On)		
O-03	Relay 3	0 (Off), 1 (On)		
O-04	Relay 4	0 (Off), 1 (On)		
O-05	Relay 5	0 (Off), 1 (On)		
O-11	Heat 1	0 (Off), 1 (On) 2 (Unused)		
O-12	Heat 2	0 (Off), 1 (On) 2 (Unused)		
O-13	Cool 1	0 (Off), 1 (On) 2 (Unused)		
O-14	Cool 2	0 (Off), 1 (On) 2 (Unused)		
O-15	Fan	0 (Off), 1 (On) 2 (Unused)		
O-16	Timer	0 (Off), 1 (On) 2 (Unused)		
O-17	Set Point	-98 to 128 °C (-144 to 262)	0.1	Deg °C (°F)
O-08	Remote Offset	0 to 18	0.1	Deg °C (°F)
O-09	Remote Fan	0 (Off), 1 (On), 2, (AutoOn)		
O-20	Alarm	0 (Off), 1 (On) 2 (Unused)		
S-01	Control State	0 (Stabilise), 1 (Normal), 2 (OT Alarm), 3 (UT Alarm), 4 (Probe Fail)		
S-02	Fan State	0 (Off), 1 (On), 2 (Pulse On), 3 (Pulse Off), 4 (Run On)		

Display Messages

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

Display Message	System status
Ot AL	Over Temperature Alarm
Ut AL	Under Temperature Alarm
Prb Flt	Probe Fault



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Network Alarms

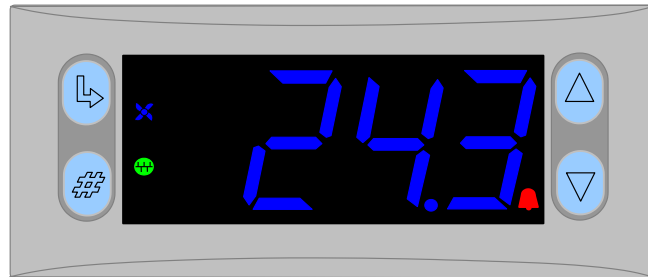
The table below shows the text and associated type number that is sent to the system “front end”. The type number is normally used to provide different alarm actions.

Alarm text	Type # (index)
Over Temperature	4
Under Temperature	5
Fan 1 Fault	7
Fan 2 Fault	7

Alarm text	Type # (index)
Probe 1	6
Probe 2	6

Normal Operation

During normal operation, the controller will show the display temperature, if there are no alarms. If there is a current alarm then an alarm message will be shown on the display and the alarm LED will come on. If the Control Stat is on a network and on-line, the green network LED will be on.



Faults

If a fault is detected, the Controller will indicate the fault on the display and the red alarm LED will come on

Network

The Network green LED flashes if the controller goes off-line or loses its given address

Probe Offset

This feature allows each probe value to be modified by an “offset”. Offset values are from -10°C (-18°F) to +10°C (+18°F) and on a channel basis. Example C1 = Probe 1.

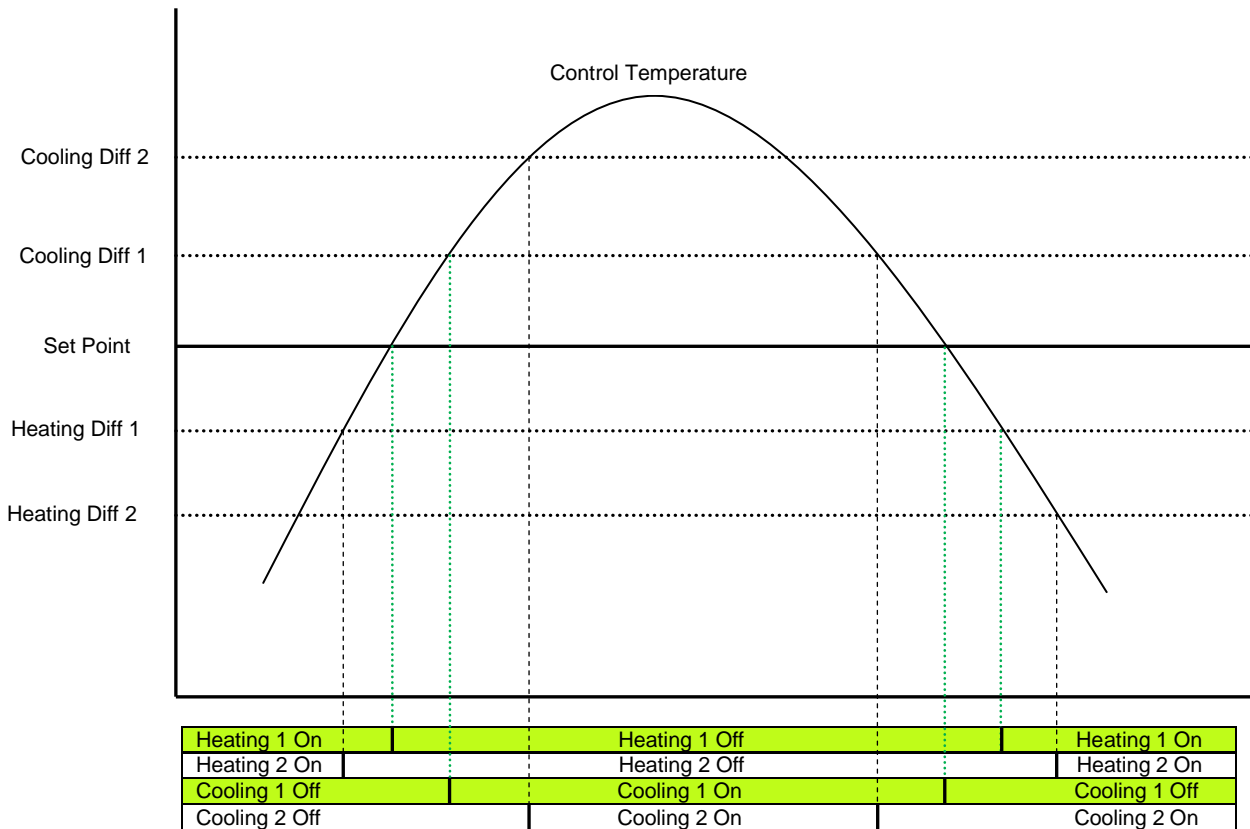
Set Point

Shows the current operating set point of the thermostat. If for example the set point has been adjusted via the controller display (up & down button press). Set point can be viewed from a front-end via the values page or Communicator software or from the controller IO (Output O-07).



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Operation



The thermostat will operate to the above graph, the thermostat will require a fan to be running before it will operate. Heating and cooling stage 2 can be configured to come on at a pre-determined temperature or after a time delay.

During normal operation, the up and down keys can be used to adjust the current operating setpoint, limited by the upper and lower setpoint settings. Press and hold both the up and down keys until the service icon, the spanner symbol, is displayed. The value shown on the screen is the current temperature setpoint, use the up or down button to adjust the setpoint. Hit the enter button when complete to save and exit. Note this will not change the parameter "Set Point" it will only allow the user to change the current operating setpoint. Once adjusted the stat will continue to control to this setpoint until the controller is either power cycled or the process is followed to adjust the operating setpoint back to the previous setpoint. If the current control setpoint has been adjusted via this process and the parameter "Set Point" is then adjusted then the offset will still remain and is added/subtracted to the new setpoint. E.g. Parameter "Set Point" is set to 16. The above process is used to adjust the operating setpoint to 18. The parameter "Set Point" is now changed to 17. The operating setpoint will now be 19 (set point 17 + 2 offset through up/down buttons).

The controller has 2 probe inputs that can be used together (weighted) to form the control temperature, or the controller can be configured to use Probe 1 only (Setting Probe 2 to be a Monitor Probe). Setting control weight to 100% would use only probe 1 for control. 0% would use only probe 2 for control. 50% would use an average of probe's 1 & 2.

Energy saving using Remote Offset Command

An offset command can be sent from a TDB program operating on the Data Manager. This offset command affects all diffs (Heat Diff 1, Heat Diff 2, Cool Diff 1 and Cool Diff 2). Please see the following example: - Parameters are set as the following: - Remote Offset can be viewed from a front-end via the values page or Communicator software or from the controller IO (Remote Offset O-08)

- Heat Diff 1 P-04 = 2
- Heat Diff 2 P-05 = 4
- Cool Diff 1 P-06 = 2
- Cool Diff 2 P-07 = 4

An analog output block in a Data Manager TDB program is used to send the value 2. The new operating diff parameters are now: -

- Heat Diff 1 = 4 (From 2)
- Heat Diff 2 = 6 (From 4)
- Cool Diff 1 = 4 (From 2)
- Cool Diff 2 = 6 (From 4)



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Therefore with a Cut-In Set Point of 20 Degrees the first Cooling stage will come on at 24 degrees (From 22 Degrees). The first Heating stage will come on at 16 degrees (From 18 degrees)

Energy saving for Fan Operation

Fans Mode P-70 Set for Local (0)

Fan control uses Fan Control parameter P-30 and timer parameters P-71 to P-98 (On and Off times)

Fan control P-30 set for On (0) : The fan(s) will run continuously when the controller is operational, even if the temperature is in the dead zone where no cooling or heating relays are on, and the timer is in the on state. When timer in the off state the fans will be off.

Fan control P-30 set for Pulsed (1) : Fans will pulse on for period set in parameter P-32 and pulse off for period set in parameter P-33, whether in heating or cooling mode (i.e. Heating or Cooling will go Off/On with Fan), when the timer is in the on state. When timer in the off state the fans will be off.

Fans Mode P-70 Set for Remote (1)

Fan control uses commands sent from a TDB Program.
 Commands sent from TDB to "Fan Command" using an "Analog Out" block.
 Sending command "0" will send command "Off" and fans will never turn on.
 Sending command "1" will send command "On" and fans will run continuously.
 Sending command "2" will send command "AutoOn" and will put fans in energy saving mode. Fans will only run when cooling or heating is called for and will go off after a run-on period P-31 has expired.

Note : If set for Remote and controller goes off line control will revert back to Local operation after 10 minutes.

Note : If set for Remote commands from a TDB Program. If the TDB program is stopped for any reason or communication with the Data Manager TDB is lost, control will revert back to Local operation after 10 minutes

Fans Mode P-70 Set for Man Off (2)

Fans will never run.

Fans Mode P-70 Set for Man On (3)

Fans will run continuously.

During the heating cycle, heating stage 1 will come on, then heating stage 2 will come on after a delay period or if the temperature reaches the set point (parameter: - Heating Stage Delay)

During the cooling cycle, cooling stage 1 will come on, then cooling stage 2 will come on after a delay period or if the temperature reaches the set point (parameter: - Cooling Stage Delay)

Note: - At least one relay output must be selected as a fan before the thermostat control will operate. This is a precautionary measure to prevent the user from enabling a heater without the appropriate fan(s) being selected as in some applications this could damage the heating equipment.

Relay Actions

Invert Relays

Each individual relay can be configured to use N/C or N/O contacts for operation. Individual relays can be inverted by selecting the required relay via the Mercury display (Navigate to the menu option **rLy** and select the relay output you wish to invert) For example : Select r-01 to select polarity of Relay 1. R-02 for Relay 2, etc.

NOTE : Correct configuration and wiring of relays **MUST** be set up before operation of controller. Care should be taken when inverting the relay operation as incorrect wiring could have adverse results e.g. heaters running when they should be off.

Default Relay Status

Relay 1 N/C, Relay 2 N/O, Relay 3 N/O, Relay 4 N/O ,Relay 5 N/O.

Default Relay Operation Status

Relay	Operation	Relay Contacts
Relay 1	Fan	N/C
Relay 2	Cooling Stage 1	N/O
Relay 3	Cooling Stage 2	N/O
Relay 4	Heating Stage 1	N/O
Relay 5	Heating Stage 2	N/O



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If the order of operation of the relays is altered from above to any other combination then care must be taken to ensure the Relay Contacts are inverted to correct polarity for the operation of relay i.e. If Relay 3 was being used as another Fan instead of Cool 2 the relay would still be N/O and would have to be inverted if fan was required to be wired to N/C contacts.

If setting a Timer or Alarm relay use N/O relay Contacts

The alarm relay is De-Energised for no alarm. Use the NC and Common for "Loop break" on alarm or use the NO and Common for "Loop make" on alarm.

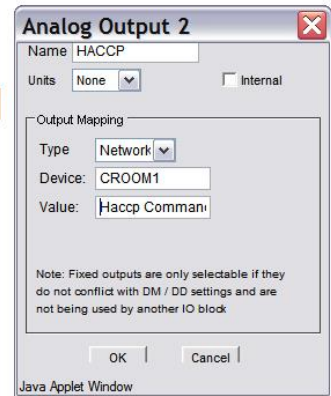
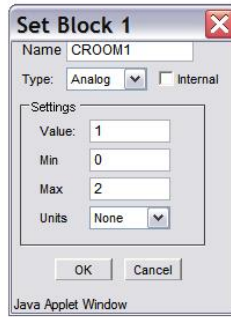
Remote Commands

The following commands can be used by a Data Builder program: -

Command	Value to send	Description
Haccp Command	0	HACCP LED OFF
	1	HACCP LED On
	2	HACCP LED Flashes
Button Command	0	Buttons backlights Off
	1	Buttons backlights On
	2	Buttons Backlights Flash
Button Command	0	Buttons backlights Off
	1	Buttons backlights On
	2	Buttons Backlights Flash
Fan Command	0	Off – Never turn Fan On
	1	On – Never turn Fan Off
	2	Auto On – Turn fan off after Run On Period P-31 expires after heating / Cooling has been turned off

Use an "Analogue Out" block configured to the controller name and in the value field type in the command you require. Use a "Setting block" as the input to the "Analogue Out" block to send the Value.

See Example on the right, which switches on the Haccp LED on CROOM1



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Specification

	Mercury Mk2 Controller PR0710-RTU	Intuitive Mercury controller PR0750-RTU
Power requirements		
Supply Voltage Range	100 – 240 Vac ±10%	100 – 240 Vac ±10%
Supply Frequency	50 – 60 Hz	50 – 60 Hz
Maximum supply current	5.2 Amps (when relay 5 is fully loaded)	2 Amps
Typical supply current	<1 Amp	<1 Amp
General		
Operating temperature range	-10°C to 60°C (14°F to 140°F)	-10°C to 60°C (14°F to 140°F)
Storage temperature range	-20°C to 65°C (-4°F to 149°F)	-20°C to 65°C (-4°F to 149°F)
Environmental	Indoor use at altitudes up to 2000m, pollution degree 1, installation category II. Voltage fluctuations not to exceed ±10% of nominal voltage.	Indoor use at altitudes up to 2000m, pollution degree 1, installation category II. Voltage fluctuations not to exceed ±10% of nominal voltage.
Size	78mm (W) x 36mm (H) x 110mm (D)	157mm (W) x 67mm (H) x 120 (D)
Approx Weight	170 grams	500 grams
Safety	EN61010	EN61010
EMC	EN61326; 1997 +Amdt. A1; 1998	EN61326; 1997 +Amdt. A1; 1998
Ventilation	There is no requirement for forced cooling ventilation	There is no requirement for forced cooling ventilation
Class 2 Insulation	No protective Earth is required and none should be fitted	No protective Earth is required and none should be fitted
Supply Fuse	The host equipment must provide a suitable external over-current protection device such as: - Fuse: 6.3A 240 Vac Antisurge (T) HRC conforming to IEC 60127	Built in fuse holder, fuse 2A 240Vac Antisurge (T) HRC conforming to IEC60127, 32 x 6.3mm
Or MCB	6A, 240 VAC Type C conforming to BS EN 60898	2A, 240 VAC Type C conforming to BS EN 60898 (Note: controller has integral 2A fuse)
Relay Fuse	Not Fitted	10A 240Vac Antisurge (T) HRC conforming to IEC60127, 32 x 6.3mm
Relay Specification		
Relays 1-4 Exclusive common		
Max current	6A Resistive (CosØ = 1) 2A Inductive (CosØ = 04)	.10A Resistive (CosØ = 1) 3A Inductive (CosØ = 04)
Max voltage	250Vac, 30V dc	250Vac. 30V dc
Relay Fuse	N/A	10A 240Vac Antisurge (T) HRC conforming to IEC60127, 32 x 6.3mm
Relay 5 Common connected to supply live		Relay 5 Exclusive common
Max current	3A (non inductive), COSØ=0.4 2A (inductive load) 200,000 operations	10A Resistive (CosØ = 1) 3A Inductive (CosØ = 0.4)
Max voltage	250Vac (Internal supply)	250Vac. 30V dc (external supply)
	For compliance with the LVD, relays 3, 4 and 5 commons must be at the same potential as the supply voltage	All relays are independent and can operate at different potentials to the supply voltage.



Warning: Relay 5 output has hazardous voltages (Supply input voltage potential)
This does not apply to the Intuitive Mercury controller



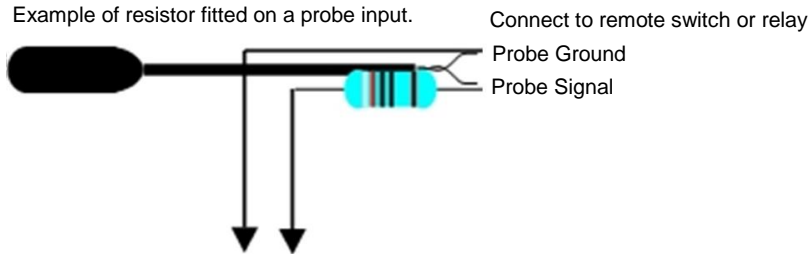
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Inputs

Input resistance: 3.01K Ohms (for PTC or NTC type probes)
 Input type: PT1000 or NTC2K or NTC2K25 or NTC10K (selectable)

Comms: RS232 with flow control

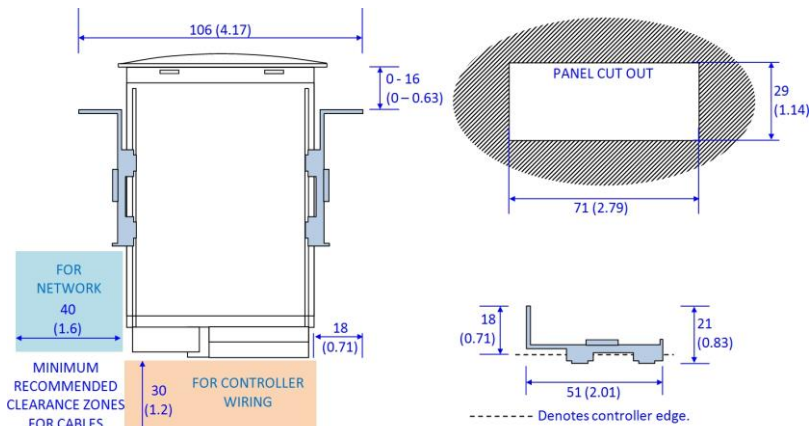
Switched Resistor Example Wiring



Installation

Panel Cut-out and Clearances

Mercury Mk2 (Flush mount controller)



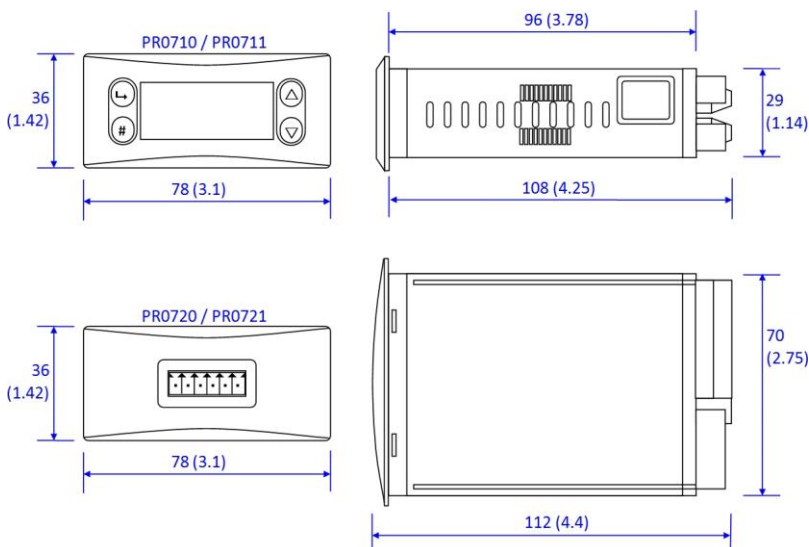
Fixing

The controller is fixed by sliding the 2 plastic retaining clips up to rear of the panel. These clips have a ratchet action and can be removed by holding in the clip sides and sliding back.

There is no requirement for forced cooling ventilation

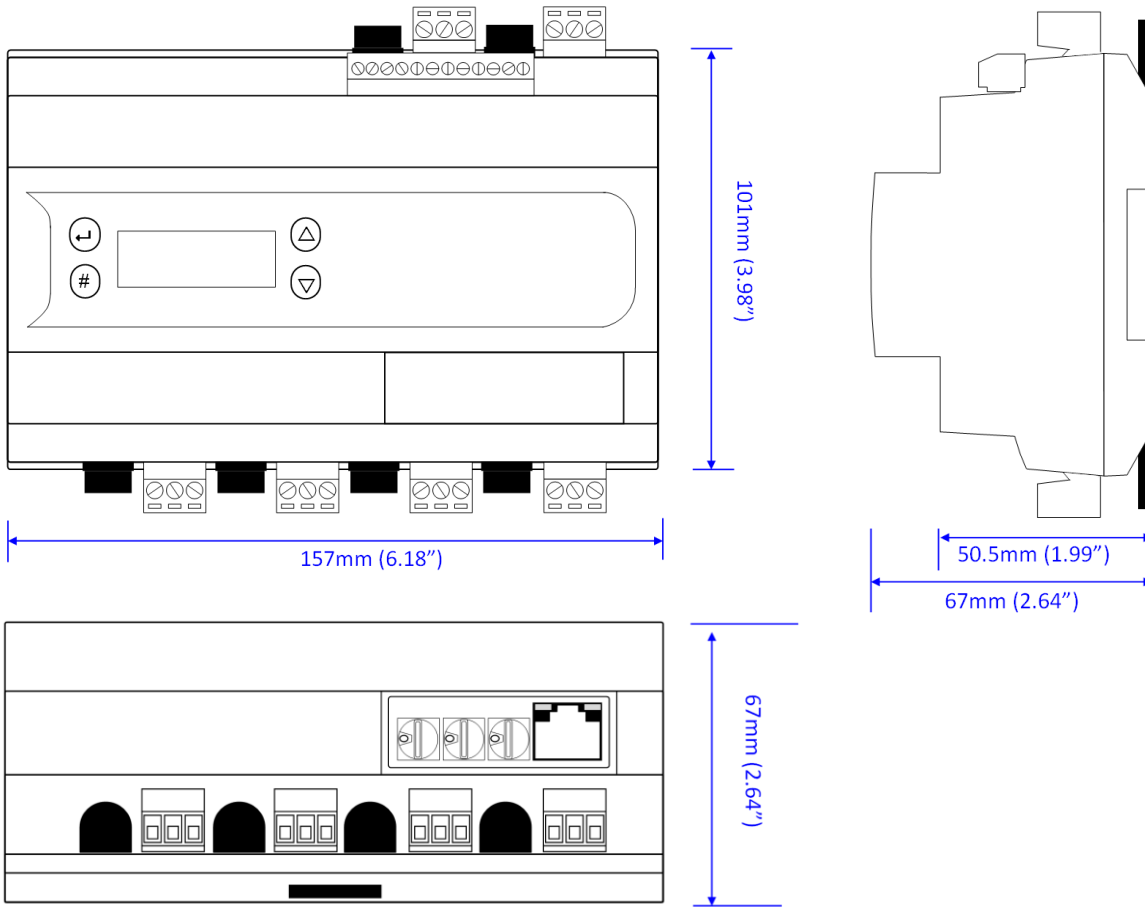
Dimensions

Mercury Mk2

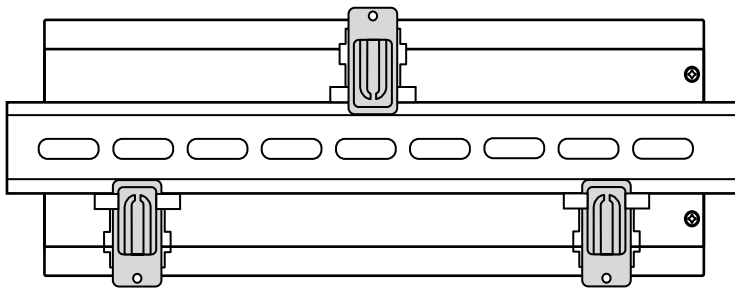


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Intuitive Mercury controller



Intuitive Mercury Mounting Instructions



Three clips fix the Intuitive Mercury securely to DIN rail. Pull each clip until it “clicks” to remove the controller. Each clip has a mounting hole to provide an alternative fixing mechanism to DIN mounting.

Cleaning

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

Disclaimer

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Revision History

Revision	Date	Changes
1.0	03/05/11	Introduction of Intuitive range
1.0a	06/01/14	Operating temperature range updated
1.4	24/10/15	Revision history altered to reflect software version. Extra outputs added to show the current state of the heating and cooling relays.
1.5	18/12/2015	Digital input capability added.
1.5b	17/05/2017	Operating temperature amended.



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