Resource
Data Management

Mercury Controller

Installation & User Guide
Software Revisions 5.1M & 5.4E

PR0744 CAS

Contents

The Mercury Case/Coldroom Controller

From Resource Data Management

This user guide is specifically for the hardware variant PR0744 with relays to IEC 60079-15 which is specifically for use with hydrocarbon refrigerants. For the standard Mercury controller see the PR0740 range.

The Mercury & Intuitive Mercury controllers are primarily intended for use in refrigeration display cabinets or coldroom applications. It will switch the evaporator valve (LLV or PWM EEV) based on the value of its temperature or pressure input. It has outputs to control lights, fans, suction valve, trim heaters and defrost control. It can have variable inputs for reading a pressure transducer along with two digital inputs. A further four digital inputs can be added by utilising the switched resistors feature.

The controller has many features, some of which are energy saving, such as pulsed trim heaters or the case off with lights parameter (see parameter section for further details). There are several hardware variants of the Mercury controllers split into two main types; an **E-version** that has Relay 1 as a **Solid-State Relay** for switching PWM EEVs and the second is an **M-version** that has Relay 1 as an **electro-mechanical relay** for switching solenoid LLVs or compressor. For these two types, there are further options of serial or built in IP communications along with either a remote or integral display option (see ordering PR0744).

The controller supports PT1000, NTC2K, 470R, 700R, 3K, 5K, 6K, NTC2K25, NTC10K or NTC10K (Type2)

Hardware Variants

As mentioned above, the Mercury controller offer a number of choices concerning the physical hardware including choice of IO, Display and communications type. Depending on the valve type (electronic expansion or mechanical solenoid valve) the option of either a solid state or mechanical relay is available. For specific part numbers see Ordering Information.

Inputs/ Outputs	Relay 1	Display	Comms
6 Probe, 2 Digital Inputs / 5 Relay Outputs	Mechanical Relay	Integral/ Remote Display	Serial/ Ethernet
6 Probe, 2 Digital & 2 Analogue Inputs / 5 Relay Outputs	Solid State Relay		

Current Software Versions

Variant	Version
E-type (PWM Electronic Expansion Valve)	5.2
M-type (Mechanical Expansion Valve or Compressor)	5.0

Compatible Displays

The following displays are compatible with the Mercury / Intuitive Mercury Remote Display Controllers:

Description	Part Number
Mercury DIN Remote Display with 5m cable	PR0327
Mercury DIN Key switch Remote Display with 5m cable	PR0328
Mercury Remote Display with 5m cable	PR0725
Mercury Remote Display with 1.5m cable	PR0725A
Mercury Coldroom Display with 1.5m cable	PR0152

Configuration

The controller gives you up to six configuration options (see 'Type' menu):

Display value	Mercury Mechanical Expansion Valve	Mercury PWM Electronic Expansion Valve
1	Integral controller (HT)	N/A
2	Integral controller (LT)	N/A
3	Remote piped case controller (LT)	Remote piped case controller (LT)
4	Remote piped case controller (HT)	Remote piped case controller (HT)
5	Coldroom controller (LT)	Coldroom controller (LT)
6	Coldroom controller (HT)	Coldroom controller (HT)

Note: The controllers are delivered pre-configured as **Type 1** and **Type 3** for variants **M** and **E** respectively.

Compatible Network Interfaces

Mercury controllers which do not have an IP interface built in are capable of connecting to either a TCP/IP local area network, an RS485 Genus compatible network or they 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 'Net' menu set up screens available to you. **Note** controllers with built in IP will be able to communicate to any IP switch, including the rear ports of the RDM Mercury Hub/Intuitive Switch.

Description	Part Number
IP Futura (Single Mercury to IP Interface)	PR0016
IP Futura, DIN rail mounted	PR0016-DIN
IP Futura, DIN rail mounted with 2 x CAT 5 sockets	PR0016-DUALDIN
Intuitive Switch with 6 x RS232 ports, 4 x Ethernet Ports and a 4-20mA Pressure Transducer connection.	PR0758-6P4E-PHI
Intuitive Switch with 12 x RS232 ports and 4 x Ethernet Ports	PR0758-12P4E
Intuitive Switch with 12 x RS232 ports, 4 x Ethernet Ports and a 4-20mA Pressure Transducer connection.	PR0758-12P4E-PHI
Intuitive Switch with 16 x RS232 ports, 4 x Ethernet Ports and a 4-20mA Pressure Transducer connection.	PR0758-16P4E-PHI
Intuitive Switch with 16 x RS232 ports, 3 x Ethernet Ports and 1 x Fibre connection.	PR0757-16P3E-F
Intuitive Switch with 16 x RS232 ports, 3 x Ethernet Ports, 1 x Fibre connection and a 4-20mA Pressure Transducer connection.	PR0757-16P3E-F-PHI
Bluetooth RS232 Network Module	PR0630

Front Display Features

LEDs:
Valve (Relay 1)

Fans (Relay 2)

Lights (Relay 3)

Defrost (Relay 5)

On-Line Status

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

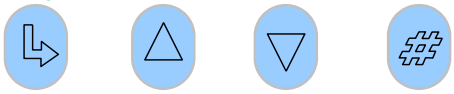
Service (See P-18)

Alarm

HACCP

Mercury Display

Keys



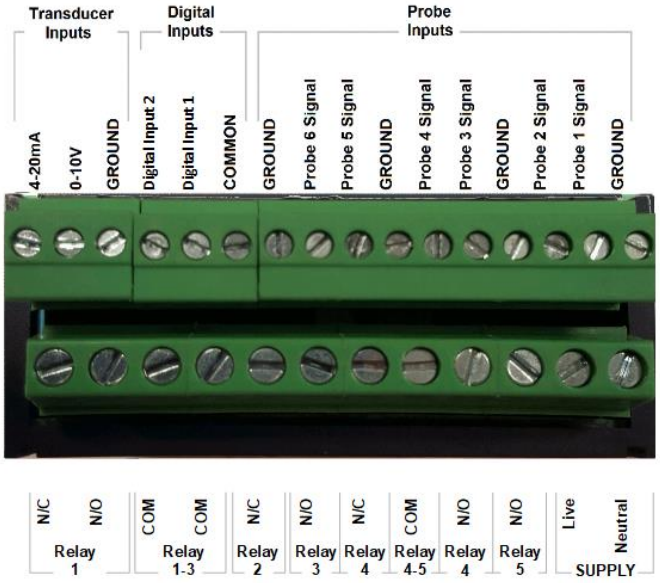
Enter Up Down Defrost

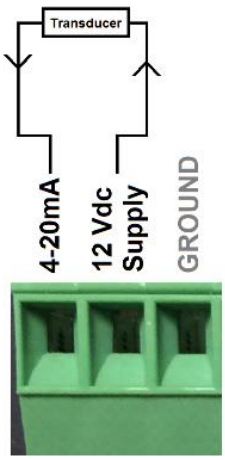
Defrost: Press and hold the defrost button to force a manual defrost

Main Display

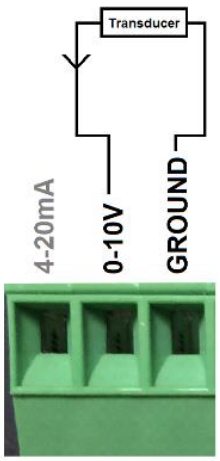
4 character LED display, used to display temperature and status messages.

Mercury I/O Connections (PR0744)





4-20mA Pressure Transducer connections



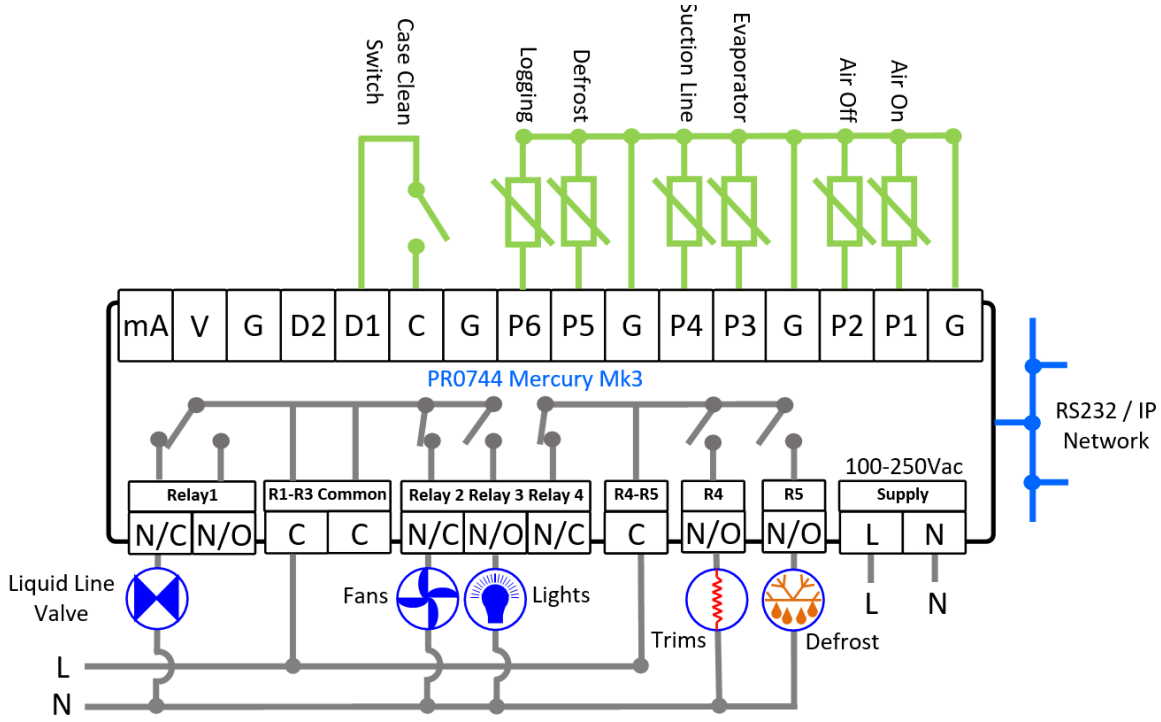
0-10V Pressure Transducer connections

On the PR0744 variant the terminals are fixed and are not of the plug and socket type.

Note: On the Mercury E, relay 1 will be an SSR and valve should be connected to COM and N/C terminals, N/O is not used.

Note: If using a 0-10v pressure transducer it will require its own power supply, power is not obtained from the Mercury controller.

Typical Wiring Diagram



Input and Output Allocation Tables

The following tables indicate; on a controller type basis, 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.

M-type (Mechanical Expansion Valve or Compressor)

I/O	Integral Case Types 1&2	Remote Case Types 3&4	Coldroom Controller Types 5&6	Alarm Action	Plant Input (Switched Resistors)
Input 1	Air on Temperature	Air on Temperature	Air on Temperature	Yes	
Input 2	Air off Temperature	Air off Temperature	Air off Temperature	Yes	Person Trap alarm type 5 & 6
Input 3	Evaporator Temperature	Evaporator Temperature	Evaporator Temperature	No	Plant fault 3 or External Defrost Input
Input 4	Suction Line Temperature	Suction Line Temperature	Suction Line Temperature	No	Case Clean Switch
Input 5	Defrost Termination or Monitor probe (if used)	Defrost Termination or Monitor probe (if used)	Defrost Termination or Monitor probe (if used)	Conditional*	Plant fault 4 on types 1 & 2 Door switch on types 5 & 6
Input 6	Logging Probe (If fitted)	Logging Probe (If fitted)	Logging Probe (If fitted)	Conditional**	
Variable Inputs	Not used			N/A	
Digital 1	Selectable; Plant 1 N/O, Plant 1 N/C, Case Switch, Temp Switch, Defrost	Selectable; Plant 1 N/O, Plant 1 N/C, Case Switch, Temp Switch, Defrost	Selectable; Plant 1 N/O, Plant 1 N/C, Case Switch, Temp Switch, Defrost, Door, Person Trap	Conditional	
Digital 2	Selectable; Plant 2 N/O, Plant 2 N/C, Case Switch, Temp Switch, Defrost	Selectable; Plant 2 N/O, Plant 2 N/C, Case Switch, Temp Switch, Defrost	Selectable Plant 2 N/O, Plant 2 N/C, Case Switch, Temp Switch, Defrost, Door, Person Trap	Conditional	
Relay 1	Compressor A	Liquid Line Valve	Liquid Line Valve	N/A	
Relay 2	Fans	Fans	Fans	N/A	
Relay 3	Lights/Alarm Relay	Lights/Alarm Relay (2)	Lights/Alarm Relay	N/A	
Relay 4	Compressor B	Suction Line Valve/Trim Heater/Alarm Relay (1)/Remote Relay	Suction Line Valve/Alarm Relay/Remote	N/A	
Relay 5	Defrost Heater	Defrost Heater (N/O)	Defrost Heater (N/O)	N/A	

* Probe will alarm if set to monitor probe in parameters.
** Probe will alarm if log probe type is set to 'Logging/Alarm' in parameters

E-type (PWM Electronic Expansion Valve)

I/O	Remote Case Types 3&4	Coldroom Controller Types 5&6	Alarm Action	Plant Input (Switched Resistors)
Input 1	Air on Temperature	Air on Temperature	Yes	Plant fault 3 or External Defrost
Input 2	Air off Temperature	Air off Temperature	Yes	Case Clean Switch
Input 3	Evaporator Temperature	Evaporator Temperature	Yes	
Input 4	Suction Line Temperature	Suction Line Temperature	Yes	
Input 5	Defrost Termination or Monitor probe (if used)	Defrost Termination or Monitor probe (if used)	Conditional*	Door Switch on types 5 & 6
Input 6	Logging Probe (If fitted)	Logging Probe (If fitted)	Conditional**	Person Trap on types 5 & 6
Variable Input mA	Transducer Input (if fitted)	Transducer Input (if fitted)	Yes	
Variable Input V	Transducer Input (if fitted)	Transducer Input (if fitted)	Yes	
Digital 1	Selectable; Plant 1 N/O, Plant 1 N/C, Case Switch, Temp Switch, Defrost	Selectable; Plant 1 N/O, Plant 1 N/C, Case Switch, Temp Switch, Defrost, Door Switch, Person Trap	Conditional	
Digital 2	Selectable; Plant 2 N/O, Plant 2 N/C, Case Switch, Temp Switch, Defrost	Selectable; Plant 2 N/O, Plant 2 N/C, Case Switch, Temp Switch, Defrost, Door Switch, Person Trap	Conditional	
Relay 1	Electronic Expansion Valve	Electronic Expansion Valve	N/A	
Relay 2	Fans	Fans	N/A	
Relay 3	Lights/Alarm Relay	Lights/Alarm Relay (2)	N/A	
Relay 4	Suction Line Valve/Trim Heater/Alarm Relay/Remote Relay	Suction Line Valve/Alarm Relay (1) /Remote	N/A	
Relay 5	Defrost Heater (N/O)	Defrost Heater (N/O)	N/A	

* Probe will alarm if set to monitor probe in parameters.
** Probe will alarm if log probe type is set to 'Logging/Alarm' in parameters

Switched Resistor Values

The switched resistor functionality can be turned on and off within the parameter section (P-19). When switched on, it adds the benefit of adding further digital inputs for switches using fixed resistors. For wiring, please see the 'Switched Resistor Wiring' section. 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.

For the function to work, it requires specific resistors depending on the probe type used;

Probe Type	Resistor
PT1000	820Ω
NTC2K, NTC2K25, 3K	590Ω
5K, 6K	1kΩ
NTC10K	2k7Ω
NTC10K(2)	2k2Ω

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.

The temperature range for all probe types for probe inputs which do not have a secondary function (switched resistors) is -49°C to +128°C. Inputs which have use the secondary (digital) function are restricted to -42°C to +60°C. If the full temperature range is required on all inputs and no switch resistor features are needed then please see Switch Resistor parameter P-19.

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.

Transducer Input – Electronic Expansion Valve type only

There are two possible inputs that can be used for a transducer on the Mercury & Intuitive Mercury E hardware variant; either using the 0-10v or the 4-20mA. Please consult the I/O Connections for wiring. Depending on the type of transducer (0-10v or 4-20mA) the physical input can be chosen using p-17. The parameters on the controller (p-35 & p-36) must then be set so the transducer is read.

Ordering Information

When ordering a Mercury controller the following ordering scheme can be used to purchase the desired hardware configuration.

PR0744- X Y Z CAS

X	Description
M	Mechanical Relay
E	Solid State Relay

Y	Description
D	Local/ Integral Display
R	Remote Display

Z	Description
IP	Ethernet Comms
232	RS232 Comms

Example

To order a Mercury with a Solid state relay (for PWM EEV's), Remote display and IP comms;

PR0744 – E R IP CAS

Setting up the controller

Access to the controller can be achieved by several ways;

Serial Communications Variant

- Through the front mounted buttons of the display
- Direct access by PC into the serial 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).

Ethernet Communications Variant

- Through the front mounted buttons of the display.
- Across an IP network (Current controller IP address required).
- Through the Data Manager.

Setup through front buttons

ENTER

UP

DOWN

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	FANS	Toggle Fans Only mode	Fans Only
PrES	Set Pressure Units	Set Pressure Unit	CASE	Toggle Case Off mode	Case Off
diSP	Display whole units or decimal	Display	Ligt	Toggle Lights Only mode	Lights Only
dtyP	Set/view display type	Display Type	OFSt	Probe Offset	Probe Offset
tyPE	Set/View Controller Type	Set/view controller type	tESt*	Test Mode	See Note Below
rtc	Set/view Clock (rtc = Real Time Clock)	Real Time Clock	ESC	Exit Setup mode	

***Note**: When first powered up the controller will have the 'tESt' option in the menu setup. This allows the user to toggle the relays for testing purposes. Upon entering the menu, the display will show r-01 (relay 1) to r-05 (relay 5), select the desired output and toggle the value from 0 to 1 (confirm by pressing enter) to switch the selected relay.

This option is only available for 30 seconds after power up. After this time, the menu setup will return to its standard options.

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 if networked to a DM Touch or Mini DM)

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

type. Set/view controller type

a. From the function menu scroll to select 'type', press enter
b. Use the up/ down buttons to scroll through case/ coldroom configuration types. (see configuration table on page 4)
c. Press enter.
d. Scroll to select "ESC"
e. Press enter

Controller type configuration is 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.
c. 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.
d. Pressing the Enter button will show the current value of the selected parameter.
e. Press Up or Down to modify the value and press Enter again to save the value.
f. The parameter list number will be displayed again.
g. Two other options are present in the parameter menu – dFLt and ESC. Selecting ESC will exit the setup mode and save all changes.
h. Selecting dFLt will reset all parameters back to the default values for the current type of controller

Unit. Set/view temperature unit and Probe type

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

Probe Types

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

PrES. Set Pressure Units

From the function menu scroll to and select 'PrEs'. Press enter and one of the following values will be shown:

0: Set units for any pressure reading to Bar.
1: Set units for any pressure reading to Psi.

diSP. Display selection

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. (Default)
1: Controller display will show temperatures as a whole number.

dtyP. Set / view display type

From the function menu scroll to and select dtyP. Press enter and one of the following values will be shown: -

0. Controller will be set to use a Mercury display.
1. Controller will be set to use a Coldroom display (PR0152).

Note: The software defaults to 0 for the Mercury display. If using a Mercury 1 display, changing from type 1 to 0 needs to be done through the webpage and can't be done through the display.

Parameter Tables

Not all parameters apply to all controller types. For example, P-08 is the Superheat reference which only applies to the PWM EEV variant of controllers (available types on the E are 3, 4, 5 & 6). This parameter will not appear if the controller is a Mechanical variant. In the following table, the type columns on the right-hand side will be greyed out if that parameter does not apply to that controller type.

Number	Parameter	Range °C (°F)	Step	Units	Default LT °C (°F)	Default HT °C (°F)	M Type 1&2	M Type 3&4	M Type 5&6	E Type 3&4	E Type 5&6
P-01	Cut-in Temp.	-42 to 30 (-43.6 to 86)	0.1	Deg	-20 (-4)	0.0 (32)		✓	✓	✓	✓
	Cut-in Temp. (Integral)	-42 to 30 (-43.6 to 86)	0.1	Deg	-20 (-4)	3.5 (38.3)	✓				
P-02	Diff.	0 to 10 (0 to 18)	0.1	Deg	2 (3.6)	1.5 (2.7)		✓	✓	✓	✓
	Diff. (Integral)	0 to 10 (0 to 18)	0.1	Deg	2.5 (4.5)	2.5 (4.5)	✓				
P-03	Control Weight	0 to 100	1	%	50	50		✓	✓	✓	✓
	Control Weight (Integral)	0 to 100	1	%	40	30	✓				
P-04	Display Weight	0 to 101	1	%	50	50		✓	✓	✓	✓
	Display Weight (Integral)	0 to 101	1	%	40	30	✓				
P-05	Lag Comp Delay (M Type 1 & 2)	00:00 to 15:00	00:05	mm:ss	00:40	00:10	✓				
	Alarm Weight (E Type)	0 to 100	1	%	0	0				✓	✓
P-06	Anti-SC Time	00:00 to 15:00	00:05	mm:ss	03:00	03:00	✓				
P-07	Lag Cut Out Diff	0 to 10 (0 to 18)	0.1	Deg	2.5 (4.5)	2.5 (4.5)	✓				
P-08	Superheat Ref	0 to12 (7.2 to 21.6)	0.1	Deg	6 (10.8)	6 (10.8)				✓	✓
P-09	Response On	1 to 30	1		10	10				✓	✓
P-10	Response Off	1 to 30	1		10	10				✓	✓
P-10	Alarm Weight (M Type)	0 to 100	1	%	0	0	✓	✓	✓		
P-11	Control Type	0 = EEV 1 = EET 2 = EEV/T	1		0	0				✓	✓
P-51	EEV Minimum Opening	0 to 100	1	%	10	10				✓	✓
P-52	Superheat Problem	0 to 12 (0 to 21.6)	0.1	Deg	0	0				✓	✓
P-53	Superheat EEV Problem Opening	0 to 100	1	%	10	10				✓	✓
P-54	Superheat EEV Problem Time	00:00 to 99:00	01:00	mm:ss	03:00	03:00				✓	✓
P-56	EEV Start Opening	0 to 100	1	%	10	10				✓	✓
P-55	Average Valve Opening	0 to 100	1	%	100	100				✓	✓
P-57	EEV Divide Value	0 to 100	1	%	50	50				✓	✓
P-12	Relay 4 Mode	0 = Suction Line 1 = Trim Heater 2 = Alarm 3 = Remote 4 = Trim Hub	1		0	0		✓		✓	
	Relay 4 Mode (Coldroom)	0 = Suction Line 1 = Alarm 2 = Remote	1		0	0			✓		✓
P-13	Trim in Defrost	0 = Off 1 = On			0	0		✓		✓	

Number	Parameter	Range °C (°F)	Step	Units	Default LT °C (°F)	Default HT °C (°F)	M Type 1&2	M Type 3&4	M Type 5&6	E Type 3&4	E Type 5&6
P-14	Trim Level	0 to 100	1	%	100	100		✓		✓	
P-85	Key-switch Mode	0 = Case Off 1 = Fans only 2 = toggle 3 = Off	1		0	0	✓	✓	✓	✓	✓
P-87	Control Probe type	0 = Air on Probe 1 = Log Probe	1		0	0	✓	✓	✓	✓	✓
P-90	Resistor Case Off	0 = Disabled 1 = Enabled			0	0	✓	✓	✓	✓	✓
P-92	Fans temperature mode	0 = Off 1 = Temperature 2 = Over-temperature 3 = Temp/OT	1		0	0	✓	✓	✓	✓	✓
P-93	Fans Off Temperature	-42 to 30 (-43.6 to 86)	0.1	Deg	-10 (14)	8 (46.4)	✓	✓	✓	✓	✓
P-83	Fan Control	0 = Off 1 = Run 2 = Pulse	1		1	1	✓	✓	✓	✓	✓
P-78	Fan Pulse On	00:00 to 99:00	01:00	mm:ss	05:00	05:00	✓	✓	✓	✓	✓
P-79	Fan Pulse Off	00:00 to 99:00	01:00	mm:ss	30:00	30:00	✓	✓	✓		✓
P-15	Probe 5 Select	0 = Defrost 1 = Monitor	1		0	0	✓	✓	✓	✓	✓
P-16	Relay 3 Mode	0 = Lights 1 = Alarm	1		0	0	✓	✓	✓	✓	✓
P-17	Evap Select	0 = Local 1 = Rem1 2 = Rem2 3 = Rem3 4 = Trans V 5= Trans mA 6= Cust V 7= Cust mA	1		0	0				✓	✓
P-97	Control Fail On/Off (Mechanical Valve)	00:00 to 10:00	01:00	mm:ss	00:00	00:00		✓	✓		
	Control Fail Valve Level (EEV)	0 to 100	0.1	%	0	0				✓	✓
P-29	Probe 3 Resistor function (Mechanical Valve)	0 =Plant fault 3 N/O 1 =Plant fault 3 N/C 2 =External Defrost	1		0	0	✓	✓	✓		
	Probe 1 Resistor Function (EEV)		1		0	0				✓	✓
P-18	Service Interval time	0 to 128	1	KHrs	60	60	✓	✓	✓	✓	✓
P-19	Switch Resistors	0 = Off 1 = On	1		1	1	✓	✓	✓	✓	✓
P-77	Trap Stop LLV/Fans	0 = Off 1 = On	1		0	0			✓		✓
P-98	Lights Case Off	0 = Off 1 = On 2 = Unused	1		0	0		✓		✓	
P-99	Load Shedding	0 = Off 1 = Mode 1 2 = Mode 2	1		0	0		✓	✓	✓	✓
P-100	Digital Input 1	Types 1&2; 0 =Plant 1 N/O 1 =Plant 1 N/C 2 =Case Switch 3 =Temp Switch 4 =Defrost	1		0	0	✓	✓	✓		
		Types 3&4; 0 =Plant 1 N/O	1		0	0	✓	✓	✓	✓	✓

Number	Parameter	Range °C (°F)	Step	Units	Default LT °C (°F)	Default HT °C (°F)	M Type 1&2	M Type 3&4	M Type 5&6	E Type 3&4	E Type 5&6
		1 =Plant 1 N/C 2 =Case Switch 3 =Temp Switch 4 =Defrost									
		Types 5&6; 0 =Plant 1 N/O 1 =Plant 1 N/C 2 =Case Switch 3 =Temp Switch 4 =Defrost 5 =Door NO 6 =Door NC 7 =Person Trap	1		5	5	✓	✓	✓	✓	✓
P-101	Digital Input 2	Types 1&2; 0 =Plant 2 N/O 1 =Plant 2 N/C 2 =Case Switch 3 =Temp Switch 4 =Defrost	1		3	3	✓	✓	✓		
		Types 3&4; 0 =Plant 2 N/O 1 =Plant 2 N/C 2 =Case Switch 3 =Temp Switch 4 =Defrost	1		1	1	✓	✓	✓	✓	✓
		Types 5&6; 0 =Plant 2 N/O 1 =Plant 2 N/C 2 =Case Switch 3 =Temp Switch 4 =Defrost 5 =Door NO 6 =Door NC 7 =Person Trap	1		6	6	✓	✓	✓	✓	✓
P-102	Cut In Offset	-30 to 30 (-22 to 86)	1	Deg	5	5	✓	✓	✓	✓	✓
P-103	Evap Cust Off	0.0 – 20.0	0.1		0.0	0.0				✓	✓
P-104	Evap Cust High	0.0 – 20.0	0.1		0.0	0.0				✓	✓
P-20	Alarm Delay	00:00 to 99:00	01:00	mm:ss	20:00	20:00	✓	✓	✓	✓	✓
P-21	Under Temp Alm	-49 to 60 (-56.2 to 140)	0.1	Deg	-30 (-22)	-2 (28.4)	✓	✓	✓	✓	✓
P-22	Over Temp Alarm	-49 to 60 (-56.2 to 140)	0.1	Deg	-15 (5)	5 (41)	✓	✓	✓	✓	✓
P-23	Log Probe Type	0 =Off 1 =Logging 2 =Log/Alarm 3 =Df/Alm	1		Off	Off	✓	✓	✓	✓	✓
P-24	Slug Log Probe	0 = Off 1 = On			Off	Off	✓	✓	✓	✓	✓
P-25	Log Alarm Delay	00:00 to 03:00	00:01	hh:mm	00:20	00:20	✓	✓	✓	✓	✓
P-26	Log UT Alarm	-49 to 60 (-56.2 to 140)	0.1	Deg	-35 (-31)	-1 (30.2)	✓	✓		✓	✓
	Log UT Alarm (Mechanical Valve Coldroom)	-49 to 60 (-56.2 to 140)	0.1	Deg	-30 (22)	-2 (28.4)			✓		
P-27	Log OT Alarm	-49 to 60 (-56.2 to 140)	0.1	Deg	-12 (10.4)	6 (42.8)	✓	✓		✓	✓
	Log OT Alarm (Mechanical Valve Coldroom)	-49 to 60 (-56.2 to 140)	0.1	Deg	-15 (5)	5 (41)			✓		
P-28	Monitor OT Alarm	-49 to 60 (-56.2 to 140)	0.1	Deg	20 (68)	20 (68)	✓	✓	✓	✓	✓

Number	Parameter	Range °C (°F)	Step	Units	Default LT °C (°F)	Default HT °C (°F)	M Type 1&2	M Type 3&4	M Type 5&6	E Type 3&4	E Type 5&6
P-58	Probe 2 Alarm (E Type)	0 = Off 1 = On			1	1				✓	✓
P-75	Def Log AlmDey	00:00 to 03:00	00:01	hh:mm	00:20	00:20	✓	✓	✓	✓	✓
P-76	Def Log O/T Alm	-49.0 – 128.0	0.1	Deg	-12.0	6.0	✓	✓	✓	✓	✓
P-40	Defrost Mode	0 = Local 1 = Remote 2 = External			Local	Local	✓	✓	✓	✓	✓
P-41	Defrost Start	00:00 to 23:59	00:01	hh:mm	01:00	01:00	✓	✓	✓	✓	✓
P-42	Defrosts per Day	0 to 8	1		6	6	✓	✓	✓	✓	✓
P-43	No Defrost Time	0 to 25	1	hours	8	8		✓	✓		
	No Defrost Time (Integral)	0 to 25	1	hours	8	5	✓				
	No Defrost Time (EEV)	0 to 25	1	hours	12	12				✓	✓
P-44	Def Terminate Temp.	-42 to 30 (-43.6 to 86)	0.1	Deg	14 (57.2)	10 (50)		✓	✓	✓	✓
	Def Terminate Temp. (Integral)	-42 to 30 (-43.6 to 86)	0.1	Deg	10 (50)	10 (50)	✓				
P-45	Def Min Time	00:00 to 99:00	01:00	mm:ss	05:00	05:00	✓	✓	✓	✓	✓
P-46	Def Max Time	00:00 to 99:00	01:00	mm:ss	24:00	24:00		✓	✓	✓	✓
	Def Max Time (Integral)	00:00 to 99:00	01:00	mm:ss	25:00	30:00	✓				
P-47	Drain Down	00:00 to 24:00	00:15	mm:ss	01:30	01:30		✓	✓	✓	✓
	Drain Down (Integral)	00:00 to 24:00	00:15	mm:ss	01:30	00:30	✓				
P-48	Recovery Time	00:00 to 99:00	01:00	mm:ss	30:00	30:00	✓	✓	✓	✓	✓
P-89	Pump Down Time	00:00 to 99:00	01:00	mm:ss	00:00	00:00	✓	✓	✓	✓	✓
P-86	Fan Delay mode	0 = Time 1 = Temp	1		0	0	✓	✓	✓	✓	✓
P-49	Fan Delay Time Types (Cabinet)	00:00 to 99:00	01:00	mm:ss	00:00	00:00		✓		✓	
	Fan Delay Time Types (Integral & Coldroom)	00:00 to 99:00	01:00	mm:ss	03:00	03:00	✓		✓		✓
P-88	Fan Delay Temp	-42 to 30 (-43.6 to 86)	0.1	Deg	-20 (-4)	0.0 (32)	✓	✓	✓	✓	✓
P-50	Fans In Defrost	0 = Off 1 = On			On	On	✓	✓		✓	
	Fans In Defrost (Coldroom)	0 = Off 1 = On			Off	Off			✓		✓
P-91	Defrost Type M & E	0 = Elec. 1 = Elec/Cln	1		0	0	✓	✓	✓	✓	✓
	Defrost Type (Integral)	0 = Elec. 1 = Gas. 2 = Elec Cln 3 = Gas 2.									
P-94	Defrost Hold	0 = Off 1 = On			Off	Off		✓	✓	✓	✓
P-95	Defrost Skip	0 = Off 1 = On			Off	Off	✓	✓	✓	✓	✓
P-96	Defrost Skip Time	00:00 to 99:00	01:00	mm:ss	12:00	12:00	✓	✓	✓	✓	✓
P-51	Display Def Button	0 = No 1 = Yes			Yes	Yes	✓	✓	✓		
P-120										✓	✓
P-80	Door Alarm Delay	00:00 to 99:00	01:00	mm:ss	20:00	20:00			✓		✓
P-81	Door Closes LL	0 = No 1 = Yes			No	No			✓		✓

P-82	Door Stops Fan	0 = No 1 = Yes			No	No			✓		✓
P-60	Lights Mode	0 = Local 1 = Remote 2 = Man Off 3 = Man On			Local	Local	✓	✓	✓	✓	✓
P-61	Sun Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00	✓	✓	✓	✓	✓
P-62	Sun Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00	✓	✓	✓	✓	✓
P-63	Mon Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00	✓	✓	✓	✓	✓
P-64	Mon Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00	✓	✓	✓	✓	✓
P-65	Tue Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00	✓	✓	✓	✓	✓
P-66	Tue Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00	✓	✓	✓	✓	✓
P-67	Wed Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00	✓	✓	✓	✓	✓
P-68	Wed Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00	✓	✓	✓	✓	✓
P-69	Thu Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00	✓	✓	✓	✓	✓
P-70	Thu Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00	✓	✓	✓	✓	✓
P-71	Fri Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00	✓	✓	✓	✓	✓
P-72	Fri Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00	✓	✓	✓	✓	✓
P-73	Sat Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00	✓	✓	✓	✓	✓
P-74	Sat Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00	✓	✓	✓	✓	✓
P-30	Broadcast ID	0 to 999	1		0	0				✓	✓
	Probe 2 Alarm (M Type)	0 = Off 1 = On			1	1	✓	✓	✓		
P-31	Refrigerant	0 to 25	1		0	0				✓	✓
P-110	Ref Weight	0 to 100	1	%	0	0				✓	✓
P-32	Pressure Units	0 = Absolute 1 = Gauge	1		0	0				✓	✓
P-33	Evap Offset	0.0 to 1.0	0.1		0.0	0.0				✓	✓
P-34	Glide	-15.0 to 15.0	0.1	Deg	0.0	0.0				✓	✓
P-35	Trans Span*	-3.4 to 180.0	0.1	Bar	13.8	13.8				✓	✓
P-36	Trans Offset*	-3.4 to 180.0	0.1	Bar	0.0	0.0				✓	✓
P-37	MOP Cut-in	-3.4 to 180.0	0.1	Bar	3.4	3.4				✓	✓
P-38	MOP Diff	-3.4 to 180.0	0.1	Bar	0.3	0.3				✓	✓
P-39	MOP Delay	00:00 to 02:00	00:01	mm:ss	00:05	00:05				✓	✓
P-150	Custom A1	-999 to 999	1		0	0				✓	✓
P-151	Custom B1 Hi	-999 to 999	1		-220	-220				✓	✓
P-152	Custom B1 Lo	0 to 999	1		384	384				✓	✓
P-153	Custom C1	-999 to 999	0.1		262.5	262.5				✓	✓
P-154	Custom A2	-999 to 999	1		0	0				✓	✓
P-155	Custom B2 Hi	-999 to 999	1		-220	-220				✓	✓
P-156	Custom B2 Lo	0 to 999	1		384	384				✓	✓
P-157	Custom C2	-999 t 999	0.1		262.5	262.5				✓	✓
P-121	Allow SH Offset	0 = Off 1 = On			0	0				✓	✓
dFLt	Restore defaults						✓	✓	✓	✓	✓

* Transducer Span and Offset allows for the full range of the transducer to be used by the Mercury Controller. 'Span' is the full range of the transducer, 'Offset' is the value below zero.

Example: RDM PR0162 with range -1 bar to 65 bar Span would be 66 Bar (957 psi) Offset would be -1 Bar (-15 psi)

Refrigerant Table for P-31

No.	Gas	No.	Gas	No.	Gas	No.	Gas	No.	Gas
0	None	6	R401A	12	R407A	18	R507	24	R449A
1	Custom*	7	R401B	13	R407B	19	R717	25	R513A
2	R32	8	R401C	14	R407C	20	R290	26	R454C
3	R134a	9	R402A	15	R500	21	R744	27	R455A
4	R142B	10	R402B	16	R502	22	R407F		
5	R227	11	R404A	17	R503	23	R410A		

***Note:** When P-31 is set to Custom, the controller will use the settings in P-150 – P-157.

Parameter Descriptions

Number	Parameter	Description
P-01	Cut-in Temp	Temperature at which the EEV/ LLV or compressor will switch on.
P-02	Diff	Differential temperature below the cut-in temperature. The EEV/ LLV or lead compressor switches off when below this temperature.
P-03	Control Weight	Percentage of the Air-On temperature that is used to calculate the control temp. The remaining percentage will be used on the Air-Off temperature. Example, P-03 set to 30% Control temp = 30% Air-on + 70% Air-off
P-04	Display Weight	As above only applied to the display temperature. **Note** If this is set to 101, the display will show the Product Probe temperature.
P-05	Lag Comp Delay	Delay before the second compressor is switched on if the temperature is still above set-point.
	Alarm Weight	Percentage of the Air-On temperature that is used to calculate the over temperature alarm.
P-06	Anti-SC Time	Allows the user to set the compressor for a given number of starts/hour
P-07	Lag Cut Out Diff	Diff below the Cut-In Temp the lag compressor switches off. **Note:** Lead and Lag compressors rotate duty after every defrost cycle. **Single Compressor Operation** To disable compressor B operation and use only a single compressor for control set parameter P-07 to 0. This will allow the controller work with just one compressor (A) and ignore compressor B.
P-08	Superheat Ref	The controller will attempt to maintain this superheat value
P-09	Response on	Allows the user to speed up the EEV on time. With 30 providing the quickest response and 1 providing the slowest response.
P-10	Response off	Allows the user to speed up the EEV off time. With 30 providing the quickest response and 1 providing the slowest response.
	Alarm Weight	As per P-05
P-11	Control Type	Allows the user to select either EEV control, EET control or EEV/EET control. **Note** the Evaporator Temperature probe should be fitted to the coldest point in the evaporator. EEV uses the superheat as its main reference with the cabinet temperature as a secondary control. EET use the cabinet temperature as its main reference. EEV/EET uses cabinet temperature as the main control until the SH gets close to the SH reference point, then it switches to EEV control, it switches back to EET control when the SH reference is satisfied. **See:** Valve Control Type
P-51	EEV Minimum Opening	Sets the minimum valve opening level, during normal operation the valve will not go below this level. (Default 10%) IF used in conjunction with a Mercury Pressure Hub PR0018-PHI or Intuitive Switch PR0757/758, remote pressure from Plant Pack or local pressure from a daughter card, then the Minimum value should be set at **0%**
P-52	Superheat Problem	Sets the point at which the algorithm will go to the "EEV Problem" state due to the superheat temperature. For example, if this parameter is set to 0 Degrees and the Superheat value falls to 0 degrees or below, for the duration of P-54, then the controller will enter the superheat problem state.
P-53	Superheat EEV Problem Opening	Sets the valve open position when entering the "Superheat EEV Problem" state.

Number	Parameter	Description
P-54	Superheat EEV Problem Time	Sets the time the algorithm stays in the "Superheat EEV Problem" state.
P-56	EEV Start Opening	Sets the initial valve opening % which is used when there is a demand for cooling or when the device is first powered on.
P-55	Average Valve Opening	Normally the valve during recovery will open to the last average position. This setting allows for that value to be reduced by said percentage. For example, if the average valve opening is calculated as 80% and P-55 is set to 50% then the valve will open at 40%.
P-57	EEV Divide value	When the Mercury controller generates a MOP alarm the controller reduces the maximum valve opening to this percentage. For example, if this parameter is set to 50% and the MOP alarm is generated then the maximum valve opening will be limited to 50%. Therefore, as the controller pulses the valve the maximum the valve will open is 50%. Note P-51 EEV Minimum opening overrides the valve output operation and the valve will not pulse below this setting. Please see Maximum Operating Pressure (MOP) note. **Please note** parameters P-51 through to P-57 should not be altered without first understanding the effects they may have on the case operation. If incorrectly set they may have undesired affects.
P-12	Relay 4 Mode	Relay 4 can be a Suction, Trim Heater, Alarm, Remote or Trim Hub relay. ➢ Suction – set for Suction Line Valve operation. ➢ Trim Heater – set as trim relay which pulses in accordance with P-14 or the Data Manager Energy feature trim control. ➢ Alarm – The alarm relay is energised for no alarm. Use the NC and Common for "Loop make" on alarm or use the NO and Common for "Loop break" on alarm. Note: shows as 'Alm Relay 1' in IO list. ➢ Remote – The relay is available for remote purposes such as the Data Manager GP timer channel or Data Builder software. ➢ Trim Hub – Relay is pulsed in accordance with the Trim Control feature present in the Mercury Switch (PR0018-PHI) or Intuitive Switch (PR0757/758). Please see the Mercury/Intuitive switch user document for further details.
P-13	Trim in Defrost	Allows the trims to be off or on during a defrost.
P-14	Trim Level	Sets a percentage level, of a 5-minute period, to pulse the trim heater relay off/on. Example: - P-14 set to 50% = 2.5 minutes on, 2.5 minutes off. If the controller is networked to a Data Manager operating the energy feature Trim Control then the Data Manager feature will override this parameter setting. Please refer to the Data Manager user document for further details. **Note** the trims are turned off when an over temperature alarm occurs.
P-85	Key-switch Mode	Allows the keys switch to be: - ➢ Single turn for case off (Case off mode) ➢ Single turn for Fans only (Fans Mode) ➢ Single turn for case off, double turn for fans only (Toggle mode)
P-87	Control Probe type	Switches between using the air-on probe and the Logging probe. Note the control and display temperature will still be a derivative of the weighted Average of the control probe + Air-off probe
P-90	Resistor Case Off	Turns on/off the switched resistor case off function
P-92	Fans temperature mode	Allows the user to set the fans to turn off when: - ➢ A pre-determined temperature is reached (P93) ➢ When an over-temperature alarm is present ➢ When either P93 is reached or an OT alarm is present
P-93	Fans Off Temperature	Temperature for the above (P92) operation. **Note** the defrost termination probe is the source of the temperature reading used in this feature. If the defrost termination probe isn't fitted then a similar process to P-44 is used.
P-83	Fan Control	This feature allows for coldroom fans to be stopped when the cabinet/coldroom is down to temperature thus saving energy. This feature is present in both the M and E software. ➢ Off – When the LLV closes the fans stay on for the Fan Pulse On (P-78) time before going off until the LLV next operates. ➢ Run – fans operate as per the normal control strategy. ➢ Pulse – When the LLV closes the fans will stop when the Fan Pulse On parameter (P-78) time expires. The fans then remain off for the Fan Pulse Off time (P-79). When the parameter Fan Pulse Off time expires the fans come back on for the Fan Pulse on time. The cycle then repeats. The fans resume normal operation if the LLV operates. The fans pulse on/off to ensure the circulation of air within the coldroom.

Number	Parameter	Description
		Placement of the temperature control probes is important when using this feature
P-78	Fan Pulse On	The duration of the fans are pulsed on in Fan Control.
P-79	Fan Pulse Off	The duration of the fans are pulsed off in Fan Control.
P-15	Probe 5 Select	This input can be used as a defrost termination probe (default) or as a monitor probe with an OT alarm level (P-28)
P-16	Relay 3 mode	This changes the function of relay 3 from Lights (default) to an alarm relay. The alarm relay is energised for no alarm. Use the NC and Common for "Loop make" on alarm or use the NO and Common for "Loop break" on alarm. Note: shows as 'Alm Relay 2' in IO list.
P-17	Evap Select	This allows the control algorithm to use either, the Evaporator in probe temperature, a remote temperature input in place of the Evaporator in value or a transducer connected to the controller via the transducer inputs. In the event of no remote value being received, the control algorithm will revert to using the evaporator in probe value until the remote value is restored. Please see: EEV Control Using Pressure.
P-97	Control Fail Valve Value	This value is used in the event of a control probe fail; In the EEV control algorithm the valve will remain at this opening until the probe fault has been cleared. **Please note** the incorrect setting of this value may result in flood back causing damage to the pack compressors. Do not adjust this parameter if you are unsure of the consequences. In M software this is the value to which the LLV/compressor relay will be pulsed open/closed. For example if set to 2 minutes then the LLV will be open for 2 minutes and then closed for two minutes. This process will continue until the control probe fail has been rectified.
P-29	Probe 1 or Probe 3 Resistor	Selects whether the switched resistor invokes either a Plant fault or an External Defrost. If E software then probe input 1 is used. If M software then probe input 3 is used.
P-18	Service Interval Time (Run Hours)	Time (in 1000 x hours) before the service icon (Spanner icon) comes on. The Run Hours timer increments based on the number of hours the controller has been powered up and running. Reset the spanner icon to off by changing this parameter to 0 and then back to the desired service interval. This process also resets the Run Hours value to 0. To view the current Run Time value, refer to the I/O list.
P-19	Switch Resistors	Enables switched resistors to be used for Plant Faults, External Defrosts, Case Clean, Person Trap, Door Switch See: Switched Resistor Values
P-77	Trap Stops LLV/Fans	When parson trap input is activated the LLV closes and Fans are stopped. Normal operation resumes when the person trap input is deactivated.
P-98	Lights Case Off	Used to place the controller into Case Off when its lighting timer is in the off state. When the lighting timer is in the on state the controller follows its normal control operation. This feature is disabled if the set point (P-01) is below 6°C. Please note that when the controller is in case off all alarms are inhibited and all outputs are turned off. Therefore, care must be taken when enabling this parameter. ➢ Off – Feature is not used and only the controller lights relay follows the lighting timer status. ➢ On – Feature is in use and controller will be in Case Off whenever the lights timer is in the off state. ➢ Unused – This selection has no effect and should not be used. Please select from either Off or On. This feature operates in either Local, using controller RTC, or Remote, using Data Manager GP timer channel, lighting applications.
P-99	Load Shedding	➢ Off – Feature is not used ➢ Mode 1 – Case goes to Load Shedding Mode 1 (Valve open and fans off) ➢ Mode 2 – Case goes to Load Shedding Mode 2 (Valve closed and fans off) See: Load Shedding
P-100 / P-101	Digital Input 1 / Digital Input 2	Sets the status input type for the two Digital Inputs; ➢ Plant ½ – When the DI is activated, it would alarm Plant Fault ½ (N/O or N/C) ➢ Case Switch – Would carry out the operation set on the 'Key Switch mode' (p-85) ➢ Temp Switch – Adds temperature setpoint offset value set in P-102 ➢ Defrost – The DI activation would signal the unit to go into a defrost (must be set to external df). ➢ Door – The DI activation would signal if the door is open or closed. ➢ Person Trap – If the DI signal is received, it would activate a Person Trap alarm.

Number	Parameter	Description
P-102	Cut In Offset	The value added to the Cut-In Setpoint, OT and UT alarm thresholds when a temperature offset is applied. This can be done from a digital input set to 'Temp Switch' or via a Data Manager TDB command.
P-103	Evap Cust Off	Offset of 0 for the locally connected transducer. For example, if the parameter value is set to 1 and P-104 is set to 4 then this will give the transducer a span of 1 – 4.
P-104	Evap Cust High	High Limit of the local transducer
P-20	Alarm Delay	Delay for the over and under-temperature alarms
P-21	UT Alarm	Under temperature alarm set point. This alarm uses the control temperature.
P-22	OT Alarm	Over temperature alarm set point. This alarm uses the air-off temperature.
P-23	Log Probe Type	Allows the user to set the logging probe mode: - ➢ Off ➢ Logging with no alarms ➢ Logging with alarms ➢ Logging with alarms during defrost
P-24	Slug Log Probe	Applies a damping factor. This can be used to make a standard probe have the same temperature response as a logging probe.
P-25	Log Alarm Delay	Delay for the Logging probe over and under-temperature alarms.
P-26	Log UT Alarm	Logging probe under temperature alarm set point.
P-27	Log OT Alarm	Logging probe over temperature alarm set point.
P-28	Monitor OT Alarm	Monitor probe over temperature alarm set point.
P-58	Probe 2 Alarm	Allows user to disable Probe 2 alarms if probe is not fitted.
P-75	Def Log AlmDey	Delay for the Logging probe over temperature alarms that occur during a defrost.
P-76	Def Log O/T Alm	Logging probe over temperature alarm set point during a defrost.
P-40	Defrost Mode	Allows the user to set the defrost mode: - ➢ Local (Uses the internal parameters P-41 and P-42) ➢ Remote (Requires a defrost schedule in the front end) ➢ External (uses a switched resistor in input 1 or 3 (M)). When this signal is present a defrost is initiated. Note: If the external defrost signal is not removed then the controller will defrost according to the "No Defrost" time and a missed defrost alarm will be generated. See P-29 for external defrost signal setup.
P-41	Defrost Start	When defrost mode is set to "Local", this is the start time for the 1st defrost
P-42	Defrosts per Day	When defrost mode is set to "Local", this is the number of defrosts per day equally spaced from the start time.
P-43	No Defrost Time	If the controller misses a defrost command for any reason, a defrost will initiate after this time has elapsed from the last defrost. Normally set to 2 hours over the normal defrost period.
P-44	Def Terminate	The defrost will terminate (defrost control relay off) when the temperature of the defrost termination probe reaches this value. If the "defrost termination" probe is not fitted, defrost termination will occur when: - The "coil in" probe reaches the set point (If fans are selected as "off during defrost") Or The "air off" probe reaches the set point (If fans are selected as "on during defrost"). If the "coil in" probe is not fitted, the "air off" probe will be used.
P-45	Def Min Time	Minimum time that a defrost will use (Defrost can't terminate until this time has elapsed. If termination temperature is reached during this period, the defrost control relay is turned off, but the controller will not continue the defrost cycle until the end of the defrost min period)
P-46	Def Max Time	Time period after defrost minimum that defrosts are allowed to terminate
P-47	Drain Down	A period after defrost max to allow the draining of any surplus water
P-48	Recovery Time	The LLV is switched on at the start of this period to allow the temperature to recover to the normal operating point. This period also inhibits the OT alarm. Note that if the air-off temperature is still above the OT alarm setpoint when this period expires, an immediate OT alarm occurs; there is **not** a further alarm delay.
P-89	Pump Down Time	Time period before the defrost min period to allow for a pump down
P-86	Fan Delay mode	This parameter allows the fans start after a drain-down period to be delayed, either by time (P-49) or when the temperature point (P-88) is reached. This parameter uses the same probe strategy as the defrost terminate.

Number	Parameter	Description
P-49	Fan Delay	Time after a drain-down period before the fans start if P-86 is set to time
P-88	Fan Delay Temp	Temperature at which the fans start after a drain-down period when P-86 is set to temperature.
P-50	Fans In Defrost	Allows the user to set the fans on or off in defrost.
P-94	Defrost Hold	Turns the defrost hold feature on and off. When switched on, the controller can be held in defrost until a remote command from the front end starts the recovery process.
P-95	Defrost Skip	Allows user to enable/disable defrost skip. This feature allows the controller to skip defrosts. If the current defrost terminates on temperature, then the controller will skip the next scheduled defrost providing the previous defrost terminated before the defrost skip time (P-96).
P-96	Defrost Skip Time	Time factor used in defrost skip. The previous defrost has to terminate before this value expires to allow the controller to skip a defrost.
P-91	Defrost Type	Electric – Defrost heater will go off during defrost min. period, if defrost termination is achieved, and will stay off. Gas (Mobile) – If Gas is selected, one compressor is kept running for the duration of the defrost cycle. Electric Cin – Defrost heater will go off during defrost min. period if defrost termination is achieved but will then cycle on and off around the termination temperature setpoint until the end of the defrost min. period. Gas 2(Mobile) – If Gas 2 is selected, both compressors is kept running for the duration of the defrost cycle.
P-80	Door alarm delay	Delay after the door open input is activated before the alarm occurs.
P-81	Door Closes Valve	This parameter is used to close the LLV or EEV if the door opens. If the door remains open then the valve will resume normal operation on the expiry of the door alarm delay (P-80).
P-82	Door Stops Fan	This parameter is used to stop the fans if the door opens. If the door remains open then the fans will resume normal operation on the expiry of the door alarm delay (P-80).
P-60	Lights Mode	Allows the user to set the lights mode: - ➢ Always off ➢ Always on ➢ Use a local schedule P-61 to P-74) ➢ Use a remote schedule (Set up in the system front end)
P-61	Sun Lights On	When P-60 is set to Local, Sunday on time
P-62	Sun Lights Off	When P-60 is set to Local, Sunday off time
P-63	Mon Lights On	When P-60 is set to Local, Monday on time
P-64	Mon Lights Off	When P-60 is set to Local, Monday off time
P-65	Tue Lights On	When P-60 is set to Local, Tuesday on time
P-66	Tue Lights Off	When P-60 is set to Local, Tuesday off time
P-67	Wed Lights On	When P-60 is set to Local, Wednesday on time
P-68	Wed Lights Off	When P-60 is set to Local, Wednesday off time
P-69	Thu Lights On	When P-60 is set to Local, Thursday on time
P-70	Thu Lights Off	When P-60 is set to Local, Thursday off time
P-71	Fri Lights On	When P-60 is set to Local, Friday on time
P-72	Fri Lights Off	When P-60 is set to Local, Friday off time
P-73	Sat Lights On	When P-60 is set to Local, Saturday on time
P-74	Sat Lights Off	When P-60 is set to Local, Saturday off time
P-30	Broadcast ID	ID of Plant Controller being used to broadcast Suction Pressure The Broadcast ID is derived from the Rotary Switch positions set on the Plant controller which is providing the remote suction pressure. **Note:** No two Plant controllers on a local area network can have the same rotary switches positions set. This will have adverse effects on control.
	Probe 2 Alarm (M Type)	See P-58
P-31	Refrigerant	Type of refrigerant used in system. See: Refrigerant Table above
P-110	Ref Weight	When using a local pressure transducer or a transmitted pressure from a pack controller is used to calculate superheat, the Mercury controller can use a weighted average of liquid pressure and vapour pressure to calculate the temperature. When the refrigerant weight

Number	Parameter	Description
		parameter is set to 0% then the liquid pressure is used (bubble), when set to 100% the vapour pressure is used (dew). For example, when the Ref Weight parameter is set to 50%, then the controller will use a weighted average of 50% liquid pressure and 50% vapour pressure. Any percentage from 1 to 99% will give an appropriate weighted average between the two pressures. For evaporator control vapour pressure would normally be used so the Ref Weight parameter should be set to 100%.
P-32	Pressure Units	Absolute or Gauge
P-33	Evap Offset	Offset to allow for pressure drop over distance
P-34	Glide	Allows a glide value to be applied for a particular refrigerant mix where the component gases have different boiling points (at the same pressure).
P-35	Trans Span	Total range of the transducer
P-36	Trans Offset	Value below zero
P-37	MOP Cut-in	If the pressure exceeds this value, then the controller's valve will close or be reduced to a predetermined percentage. A MOP alarm is also created. (See Maximum Operating Pressure (MOP))
P-38	MOP Diff	When the pressure reduces below this value, the controller's valve will recover to their normal operational
P-39	Mop Delay	Delay after the MOP value has been exceeded before the MOP actions and alarm occurs.
P-150	Custom A1	For more information regarding the setting up of custom refrigeration, please contact RDM Technical Support.
P-151	Custom B1 Hi	
P-152	Custom B1 Lo	
P-153	Custom C1	
P-154	Custom A2	
P-155	Custom B2 Hi	
P-156	Custom B2 Lo	
P-157	Custom C2	
P-121	Allow SH Offset	Allows for the superheat reference setpoint (P-08) to be offset by +/-12 degrees using a remote command. See Remote Commands. **Note: -** The controller will only take this command for 10 minutes before reverting back. The incorrect setting of this value may result in flood back causing damage to the pack compressors, do not adjust this parameter if you are unsure of the consequences.
dFLt	Restore default values	Restores all of the parameters to their default values

Load Shedding

Used on CO2 sites for load shedding on CO2 Compressor Faults or CO2 Vessel High Pressure Alarms.
Cases can be put into a "CO2 Case Off" mode 1 or mode 2 to reduce the load on the pack or to reduce the CO2 vessel pressure.
Mode 1 will open the LLV/EEV and stop the fans, mode 2 will close the LLV/EEV and stop the fans.
See: RDM CO2 load shedding user guide.

Superheat Options

The superheat for EEV control can be calculated using different means to suit the application. Selectable from parameter P-17 – Evap Select;

- **Local** - Based on the value of the Evaporator and Suction line temperature probe inputs connected directly to the controller.
- **Rem1** - The local suction line temperature probe and a local suction pressure measured by a transducer connected to the refrigeration case island Mercury Hub (PR0018-PHI) or Intuitive Switch (PR0757/758) **Note**: **RS232 comms variants only**. The pressure read from the Mercury Hub pressure transducer is converted to a temperature based on the gas type being used by the system. This temperature is transmitted to all controllers connected to the Mercury Hub. **Note**: Broadcast ID (P-30) must be set to 0. See section: Mercury Switch below.

- **Rem1/2/3**– The local Suction line temperature probe and a remote suction pressure value broadcast by an Intuitive Pack controller on the same IP network. The pressure received from the Intuitive Pack controller is converted to a temperature based on the gas type being used by the system. Using an IP Futura or Mercury Switch. **Note**: Broadcast ID (P-30) must be set to the pack's network ID (rotary address), this method cannot be used when using a PR0018-PHI Hub or PR0757/758 Switch, See section: Plant Pack Controller below.
- **Trans V/ Trans mA / Cust V / Cust mA**– The local suction line temperature probe and a local suction pressure measured by a transducer connected to the controller's internal transducer input and converted to evaporator temperature. See section: Local Analogue Input below.

EEV Control Using Pressure

There are several ways to use the suction pressure to calculate the evaporator in temperature;

Mercury Switch (PR0018-PHI) or Intuitive Switch (PR0757/758)

(P-17 set to Rem1)

The Mercury Switch can be used for EEV control on an Island-by-island basis. A suction pressure transducer is connected from the case Island to the 4-20mA input of the Mercury Switch and the pressure read from this transducer is converted to a temperature based on the gas type being used by the system. This temperature is transmitted to each controller connected to the switch and along with the suction temperature probe, local to the controller, the superheat is calculated. Please note that RDM recommended that the evaporator in temperature probe is fitted as the controller will use this to calculate the superheat in the event of a communication loss with the Mercury Switch. P-17 allows for the use of this remote temperature provided by the Mercury Switch. Please see the Mercury Switch or Intuitive Switch user document for further details. **Note**: **RS232 comms variants only**

Remote pressure from a networked RDM Pack Controller

(P-17 set to Rem1/ Rem2/ Rem3)
(P-30 set to network ID of Plant Pack)
(P-31 set to refrigerant type)

P-17 is set depending on which input the suction transducer is connected to on the plant controller (Transducer input 1, 2 or 3). The broadcast ID (P-30) should be set to the network ID of Plant Pack Controller (Rotary Switch Setting). The Refrigerant type (P-31) must be set along with pressure units (P-32) set to Absolute or Gauge. This method cannot be used when using a PR0018-PHI Hub or PR0757/758 Switch.

Local Analogue Input – mA or V

(P17 set to Trans mA / Trans V / Cust V / Cust mA)
(P-31 to P-36 must be set accordingly)

A suction transducer can be connected directly to the analogue input of the controller (See I/O Connections of the Mercury and Intuitive Mercury). The controller will calculate the evaporator temperature from the suction pressure, and along with the suction temperature probe local to the controller, the superheat is calculated. Please note that RDM recommend that the evaporator in temperature probe is fitted as the controller will use this to calculate the superheat in the event of a transducer fault.

Maximum Operating Pressure (MOP)

If the controller is set to use a local or remote pressure transducer to calculate the suction temperature, then a MOP alarm can be generated (using parameters (P-37/P-38/P-39). When a MOP alarm is generated on the controller, it will either close or reduce the EEV valve opening when a predetermined pressure is reached. This MOP value is configured in the Mercury controller. When the MOP alarm is generated, the controller reduces the maximum valve opening to this percentage. For example, if the "EEV Divide Value" parameter is set to 50% and the MOP alarm is generated then the maximum valve opening will be limited to 50%. For M controllers the LLV is closed for the MOP alarm duration. The alarm LED on the display will also appear in this state.

Ref Weighting

When using a local pressure transducer to calculate superheat, the Mercury controller can use a weighted average of liquid pressure and vapour pressure to calculate the temperature. For example, when the Ref

Weight parameter is set to 50%, then the controller will use a weighted average of 50% liquid pressure and 50% vapour pressure. Any percentage from 1 to 99% will give an appropriate weighted average between the two pressures. For evaporator control vapour pressure would normally be used so the Ref Weight parameter should be set to 100%

Valve Control Type

The controller has three methods of valve control selectable using P-11.

EEV

This is the default method and most commonly used. The control temperature (air on and air off average) is used to start the valve operation, when the temperature rises above the cut in temp parameter (P-01) the valve will switch on and open to its start opening value (P-56) for 30 seconds to establish a superheat reading, valve state will show "Start".

After 30 seconds the valve state will change to "Run" and valve opening is controlled according to the superheat value referenced to the superheat target parameter (P-08). Generally speaking, if the superheat value is higher than the target (P-08, default 6 degrees) then the valve will open, if the superheat is below target then the valve will start to close.

As a safety feature to prevent liquid flood back, if the superheat drops too low (below the superheat problem setting P-52, default 0 degrees) for a period longer than the problem time (P-54, default 3 minutes) then the valve will close to the problem opening value (P-53, default 10%) for the superheat problem time (P-54), valve state will show "Problem". After the valve problem opening period has expired, the valve will go through the normal "Start" and "Run" process as detailed above. If the superheat value still remains low after another problem time period, then the valve will re-enter the problem state and the process will be repeated.

If at any point the control temperature (air on and air off average) drops below the cut in parameter (P-01) minus the diff (P-02), the valve will be switched off and closed fully. Once the control temperature rises above the setpoint again (P-01), the valve will start up again and the above procedure will be repeated.

In summary, the control temperature (air on air off average) acts as a thermostat to switch the valve on and off, once switched on the valve will control to the superheat target.

EET

This method uses the control temperature (air on and air off average) to control the valve around the cut in set point (P-01). If the control temperature is above setpoint then the valve will start opening and if below setpoint the valve will start closing, the further away the temperature is from setpoint the faster the valve will open and close.
As a safety feature the superheat will still be monitored but will only take control of the valve if the superheat drops below the superheat problem value and will then enter the "problem", "start" and "run" sequences as detailed above. Once the superheat has recovered valve control will pass back to the air on and air off probes.

EEV/EET

This method uses a combination of EEV and EET control detailed above. The control temperature (air on/air off average) will control the valve around the cut in setpoint (P-01). At the same time the superheat is monitored and if this gets close to the superheat target (P-08) then valve control will pass to the superheat value referenced against the superheat target. Control will switch between superheat and air on/air off temperature control and will attempt to maintain the superheat target (P-08) and the control temperature (P-01) alternatively.

Relay State and functional operation

Relay 1-3 State	Function State	Wired contact	Relay 4-5 State	Function State	Wired contact
Relay 1 off	Valve / Comp. A on	N/C	Relay 4 off	Suction Valve on	N/C
Relay 1 on	Valve / Comp. A off	N/C	Relay 4 on	Suction Valve off	N/C
Relay 2 off	Fans on	N/C	Relay 4 off	Trims off	N/O
Relay 2 on	Fans off	N/C	Relay 4 on	Trims on	N/O
Relay 3 on	Lights on	N/O	Relay 4 off	Alarm Relay = Alarm	N/C
Relay 3 off	Lights off	N/O	Relay 4 on	Alarm Relay = OK	N/C
Relay 3 on	Alarm Relay = Alarm	N/O	Relay 4 off	Compressor B off	N/O
Relay 3 off	Alarm Relay = OK	N/O	Relay 4 on	Compressor B on	N/O
			Relay 5 off	Defrost control off	N/O
			Relay 5 on	Defrost control on	N/O

Normally open (N/O) and normally closed (N/C) contacts refer to the relay contacts that are fed from the common connection when the controller is unpowered. Items connected to the N/C contact, such as fans and LLV, will remain on if the controller loses power. Items connected to the N/O contact, such as defrost and trim heaters, will switch off if the controller loses power.

Relay and screen states during defrost

State:	Pump Down	Defrost Min	Defrost Max	Drain Down	Fan Delay	Recovery
Screen:	DEF	DEF	DEF	DEF	DEF	REC
Def LED:	On	On	On	Off	Off	Off
RLY 1 LLV	Closed	Closed	Closed	Closed	Open	Open
RLY 4 Suction Line	Off	On	On	On	Off	Off
RLY 4 Trim on in defrost	On	On	On	On	On	On
RLY 4 Trim off in defrost	Off	Off	Off	Off	Off	On
RLY 5 Defrost Relay	Off	On	On	Off	Off	Off
RLY 3 Lights relay	On	On	On	On	On	On
RLY 2 Fans (On in DF)	On	On	On	On	Off	On
RLY 2 Fans (Off in DF)	On	Off	Off	Off	Off	On

Defrost Type (P-91)

If P-91 is set to Gas, compressor 1 is switched on for the duration of the defrost cycle. If set to Gas 2, both compressors are switched on for the duration of the defrost cycle

Defrost Termination

Defrost termination will be when the temperature parameter "def terminate" has been reached on the "defrost termination" probe. If the "defrost termination" probe is not fitted, defrost termination will occur when: -

The "coil in" probe reaches the set point (If fans are selected as "off during defrost")
Or The "air off" probe reaches the set point (If fans are selected as "on during defrost")

If the "coil in" probe is not fitted, the "air off" probe will be used. If the "air off" probe is faulty termination will occur when the time-out period has elapsed.

Fan Delay after Defrost

The fans will come back on when: -

The fan delay time has elapsed if the "fan delay mode" is set to time
Or If the fan delay mode is set to "temp", the fans will come on when the defrost termination probe reaches the fan delay set point, or on the time parameter, whichever occurs first.

If the "defrost termination" probe is not fitted, the fans will come on when: -

The "coil in" probe reaches the control set point (If fans are selected as "off during defrost")
Or The "air off" probe reaches the control set point (If fans are selected as "on during defrost")

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.

For the Mercury there are two standard hardware variants; RS232 interface or built in IP (See Ordering details for more information).

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 IP Futura network interface, the standard fitment RS232 network card is utilised.

Mercury RS232 Variant & Intuitive Mercury

When logging a Mercury with an RS232 interface onto a network you must first connect the controller to a communications module, this is either a 485 Legacy, IP Futura, Mercury Switch or Bluetooth network module.

IP Futura module & Intuitive Internal IP Network card

In an IP system there are two options;

- IP-L – setting rotary address of module to 000
- IP-r – setting rotary address of module to a unique number that is not 000

IP-L allows the user to statically assign an IP address in the controller which could be used, for example, when connecting the controllers onto a customer's local area network that does not use DHCP.

IP-r allows the network ID (rotary switch address) to be used by a system running a DHCP server (for example the RDM Data Manager) to issue out an IP address automatically.

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.

- From within the device's display navigate to the 'nEt' menu and press the 'enter' key.
- 'IP-L' will be displayed, press enter again.
- The user 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 (see the network mask length table above)
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. **Note:** This option **must** be selected to save any changes made in this menu.

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
255.255.255.252	30
255.255.255.248	29
255.255.255.240	28
255.255.255.224	27
255.255.255.192	26
255.255.255.128	25
255.255.255.0	24

Mask	Length
255.255.254.0	23
255.255.252.0	22
255.255.248.0	21
255.255.240.0	20
255.255.224.0	19
255.255.192.0	18
255.255.128.0	17
255.255.0.0	16

Mask	Length
255.254.0.0	15
255.252.0.0	14
255.248.0.0	13
255.240.0.0	12
255.224.0.0	11
255.192.0.0	10
255.128.0.0	09
255.0.0.0	08

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, then power up before connecting to the network. To view the issued IP address from the DHCP server;

- Select 'nEt' from the function menu and press the 'Enter' key.
- 'IP-r' will be shown, press enter again
- Similar to the tables above, the network details can be viewed.

Mercury Switch/Intuitive Switch

A similar process to that of the IP Futura can be used with the 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.

Bluetooth Network module

Connecting a Bluetooth Network Module to the controller will update the screens available under the 'Net' menu. They are detailed below;

Display	Option
485t	1: 485 Genus Network (See RS485 module/ Intuitive Internal RS485 Network card) 2: Bluetooth
485A	Bluetooth device name. As it will appear on DMTouch's device list (RC00-0 – RC99-9)
nI d	Select Bluetooth Network ID (0 – 4)
gAdd	Shows underlying network address assigned to controller
rLog	Re-log the controller back onto the network
ClrA	Clear the address/ name from the controller
ESC	Exit network menu. **Note:** this option **must** be selected to save any changes made in this menu.

- Ensure the 485t is set to '2' (Bluetooth)
- Provide a unique device alias under the 485A menu (e.g., 01-5)
- Select the Network ID. Please see the Bluetooth wireless mesh setup guide for more details.
- Press the 'ESC' to save

The green network LED will flash to show it is attempting to log on and go solid when connected.

RS485 module/ Intuitive Internal RS485 Network card

Connecting an RS485 legacy Module or an Intuitive Internal RS485 network card to the controller will govern which set up screens available under the 'Net' menu. Both modules support the Genus protocol only. They are detailed below;

Display	Option
485t	1: 485 Genus Network 2: Bluetooth (See Bluetooth Network module)
485A	RS485 device name. As it will appear on DMTouch's device list (RC00-0 – RC99-9)
gAdd	Shows underlying network address assigned to controller
rLog	Re-log the controller back onto the network
ClrA	Clear the address/ name from the controller
ESC	Exit network menu. **Note:** this option **must** be selected to save any changes made in this menu.

- Ensure the 485t is set to '1' (Genus RS485)
- Provide a unique device alias under the 485A menu (e.g., 01-5)
- Press the 'ESC' to save

The green network LED will flash to show it is attempting to log on and go solid when connected.

Mercury IP Variant

When logging a Mercury with an in-built IP interface it be connected directly into an IP network without the need of a communications module.

When networking the Ethernet variant, the 'Net' menu will have the following menus:

Display	Option
IP-L / IP-r	Read/ Write Static IP address / Read Only DHCP IP address
Id	The 3-digit network address
AtyP	IP-r / IP-L selection
ESC	Exit Menu

Similar to the IP Futura setup, IP-L allows you to fix a static IP address into the controller and IP-r allows you to give each controller on the system a unique network number (using the Id).

- To firstly select between IP-L and IP-r navigate to 'AtyP'.

IP-r

Once IP-r is selected the controller must be given a unique 3 digit 'network address' that no other device on the network has (**note** if logging on to a Data Manager, this will be the device ID). Once the ID has been set connect the controller to the IP network for it then to be given an IP address by the DHCP server. To view the IP address given, within the Net menu, navigate to 'IP-r'.

IP-L

If IP-L has been selected from the 'AtyP' menu the IP address must be set in the controller by navigating to 'IP-L' within the 'Net' menu. The following menus will be available:

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 (see the network mask length table above)
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

Once the IP address has been entered, the controller can be connected to the IP network.

Viewing IO

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. Inputs and outputs that do not apply to a particular controller type will be greyed out.

Input / Output Table

Number	IO	Range* °C (°F)	Step	Units	M Type 1&2	M Type 3&4	M Type 5&6	E Type 3&4	E Type 5&6
I-01	Control Temp.	-42 to 128 (-43.6 to 262)	0.1	Deg	✓	✓	✓	✓	✓
I-02	Display temp.	-42 to 128 (-43.6 to 262)	0.1	Deg	✓	✓	✓	✓	✓
I-03	Air on Probe	-49 to 128 (-56.2 to 262)	0.1	Deg	✓	✓	✓	✓	✓
I-04	Air off Probe	-49 to 128 (-56.2 to 262)	0.1	Deg	✓	✓	✓	✓	✓
I-05	Evaporator Probe	-42 to 128 (-43.6 to 262)	0.1	Deg	✓	✓	✓	✓	✓
I-06	Suction Line Probe	-42 to 128 (-43.6 to 262)	0.1	Deg	✓	✓	✓	✓	✓
I-07	Superheat	-30 to 60 (-54 to 108)	0.1	Deg	✓	✓	✓	✓	✓
I-08	Logging Probe	-49 to 128 (-56.2 to 262)	0.1	Deg	✓	✓	✓	✓	✓
I-09	Defrost Probe	-49 to 128 (-56.2 to 262)	0.1	Deg	✓	✓	✓	✓	✓
I-10	Alarm Temp	-49 to 128 (-56.2 to 262)	0.1	Deg	✓	✓	✓	✓	✓
I-11	Case Clean	0 (Off), 1 (On)			✓	✓	✓	✓	✓
I-12	Door Sensor	0 (Closed), 1 (Open)					✓		✓

Number	IO	Range* °C (°F)	Step	Units	M Type 1&2	M Type 3&4	M Type 5&6	E Type 3&4	E Type 5&6
I-13	Person Trapped	0 (OK), 1 (Alarm)					✓		✓
I-14	Plant Fault 2 (Integral)	0 (OK), 1 (Alarm)			✓				
	External Defrost (EEV)	0 (Off), 1 (On)			✓			✓	✓
I-15	Monitor Probe	-49 to 128 (-56.2 to 262)	0.1	Deg		✓	✓	✓	✓
I-16	Remote Evap Temp	-49 to 128 (-56.2 to 262)	0.1	Deg					
I-17	MOP	0 (Off), 1 (On)				✓	✓	✓	✓
I-18	External Defrost (Mechanical Valve)	0 (Off), 1 (On)			✓	✓	✓		
	Hub Trim Level (EEV)	0 to 100	1.0	%				✓	
I-19	Divide Input	0 to 100	1.0	%				✓	✓
I-20	Remote Pressure	-3.4 to 180.0	0.1	Bar				✓	✓
I-21	Local Pressure	-3.4 to 180.0	0.1	Bar				✓	✓
I-22	Local Calc temp	-49 to 128 (-56.2 to 262)	0.1	Deg				✓	✓
I-25	Load Shed	0 (Off), 1 (On)				✓	✓	✓	✓
I-30	Plant Fault 1	0 (OK), 1 (Alarm)			✓	✓	✓	✓	✓
I-31	Plant Fault 2	0 (OK), 1 (Alarm)			✓	✓	✓	✓	✓
I-32	Plant Fault 3	0 (OK), 1 (Alarm)			✓	✓	✓	✓	✓
O-01	Liquid Line Valve	0 (Off), 1 (On)				✓			
O-02	Suction Line Valve	0 (Off), 1 (On)					✓		✓
O-03	Compressor A	0 (Off), 1 (On)			✓				
O-04	Compressor B	0 (Off), 1 (On)			✓				
O-05	Defrost Control	0 (Off), 1 (On)			✓	✓	✓	✓	✓
O-06	Lights	0 (Off), 1 (On)			✓	✓	✓	✓	✓
O-07	Case Fans	0 (Off), 1 (On)			✓	✓	✓	✓	✓
O-09	EEV Opening	0 to 100	0.1	%				✓	✓
O-10	Last Def. Time	00:00 to 23:59		hh:mm	✓	✓	✓	✓	✓
O-11	Last Def. Length	00:00 to 03:00		hh:mm	✓	✓	✓	✓	✓
O-12	Last Def. Ctrl Temp.	-42 to 128 (-43.6 to 262)	0.1	Deg	✓	✓	✓	✓	✓
O-13	Last Def. Type	0 (None), 1 (Internal), 2 (External), 3 (Network), 4 (Display), 5 (Timed) 6 (Forced), 7 (Skipped)			✓	✓	✓	✓	✓
O-14	Suction Line Valve/Trim Heaters	0 (Open/Off), 1 (Closed/On)				✓		✓	
O-15	Alarm Relay 1 (Relay4)	0 (Unused), 1 (OK), 2 (Alarm)				✓	✓	✓	✓
O-16	Alarm Relay 2 (Relay3)	0 (Unused), 1 (OK), 2 (Alarm)			✓	✓	✓	✓	✓
O-17	Remote Relay (Relay 4)	0 (Off), 1 (On)			✓	✓	✓	✓	✓
O-18	Run Time	0 – 128 K Hours	1	k hrs	✓	✓	✓	✓	✓
O-20	Door Open Time	00:00 to 23:59		hh:mm					✓
O-21	Door Open Length	00:00 to 03:00		hh:mm					✓
O-30	Set Point Offset	-49 to 128 (-56.2 to 262)	0.1	Deg.	✓	✓	✓	✓	✓
O-31	Trim Off Period	00:00 to 05:00	00:01	mm:ss		✓		✓	
0-32	Superheat Offset	-12.0 to 12.0					✓	✓	✓
S-01	Control State	0 (Stabilise),1 (Normal), 2 (Defrost Min),3 (Defrost Max), 4 (Drain Down),5 (Fan Delay), 6 (Recovery),7 (OT Alarm), 8 (UT Alarm),9 (Fans Only), 10 (Lights Only),11 (Case Off),12 (Pump			✓	✓	✓	✓	✓

Number	IO	Range* °C (°F)	Step	Units	M Type 1&2	M Type 3&4	M Type 5&6	E Type 3&4	E Type 5&6
		Down),13 (Defrost Hold),14 (Load Shed)							
S-02	Valve State	0 (Off), 1 (Start), 2 (Run), 3 (Problem),4 (Fail), 5 (Shed)							

* Range is dependent on probe type

Maximum and Minimum Control Temperature

Type M only (Not supported in type E).

To view the maximum or minimum Control Temperature the controller has reached since last power off/on press and hold the Up and Down Buttons together for 3 seconds. The display will show "diSP", press the Up Button to view the maximum Control Temperature the controller has reached or press the Down Button to view the minimum Control Temperature the controller has reached.

Display will revert back to normal operation if the Enter Button is pressed or after 1 minute of no button presses. The top bar of the left-hand segment will be lit when the maximum temperature is being displayed. The bottom bar of the left-hand segment will be lit when the minimum temperature is being displayed. Resetting the controller will clear out these values.

Display Messages

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

Display Message	System status	Display Message	System status
Ft	Control Fault	Plt3	Plant Fault 3
Prb1	Probe 1 Fault	Plt4	Plant Fault 4
Prb2	Probe 2 Fault	FanSONLy	Controller in Fans Only
Prb3	Probe 3 Fault	LitSONLy	Controller in Lights Only
Prb4	Probe 4 Fault	CASE OFF	Controller in Case Off
Prb5	Probe 5 Fault	Ot	Over Temperature Alarm
Prb6	Probe 6 Fault	Ut	Under Temperature Alarm
rEC	Control State in Recovery	door	Door Open Alarm
dEF	Control Sate in Defrost	TrAP	Person Trapped Alarm
AL	Control State in Alarm	LgOt	Log Probe Over Temperature
Plt1	Plant fault 1	LgUt	Log Probe Under Temperature
Plt2	Plant Fault 2		

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)	Alarm text	Type # (index)
Missed defrost	15	Product under temperature	9
Plant Fault 1,2,3 or 4	3	Person Trapped	1
Case over temperature	4	Monitor Probe OT	12
Case under temperature	5	Case Clean	29
Probe 1,2,3,4,5 or 6 Faulty	6	Remote evap temperature	6
Door Left Open	2	Transducer Fault	6
Product over temperature	8	Load Shedding	7
MOP Alarm	3	Lights Only	29

Modifying controller states

During normal operation you can change the following states from the function menu

Fans Only "FanS"

Selecting the Fans Only option will put the controller into the Fans Only state if the current state is not Fans Only. If the current state is Fans Only then the controller will change to the Normal state. Selecting this option will exit the setup menu automatically. The display will show "FanSOnLy"
If a remote display with key switch is being used, this function can be invoked by turning the key switch to the fans only position (90 degrees clockwise) with parameter P85 set to "fans".

Case Off "CASE"

Selecting the Case Off option will put the controller into the Case Off state if the current state is not Case Off. If the current state is Case Off then the controller will change to the Normal state. Selecting this option will exit the setup menu automatically. The display will show "CASE OFF". An alarm is generated, fixed delay of 1 minute, when the controller is placed into the Case Off state.
If a remote display with key switch is being used, this function can be invoked by turning the key switch to the case-off position. (Clockwise 90 degrees) with parameter P85 set to "case".

Lights Only "Ligt"

Selecting the Lights Only option will put the controller into the Lights Only state if the current state is not Lights Only. If the current state is Lights Only then the controller will change to the Normal state. Selecting this option will exit the setup menu automatically. The display will show "LitSOnLy". An alarm is generated, fixed delay of 1 minute, when the controller is placed into the Lights Only state.
Note. When lights are being used in "Remote" mode with a timing channel: -
If the controller goes offline, the lights are turned ON after a delay of 5 minutes. The lights will stay on until the controller comes back on-line where they will revert to the state of the timing channel being used.

Probe Offset

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

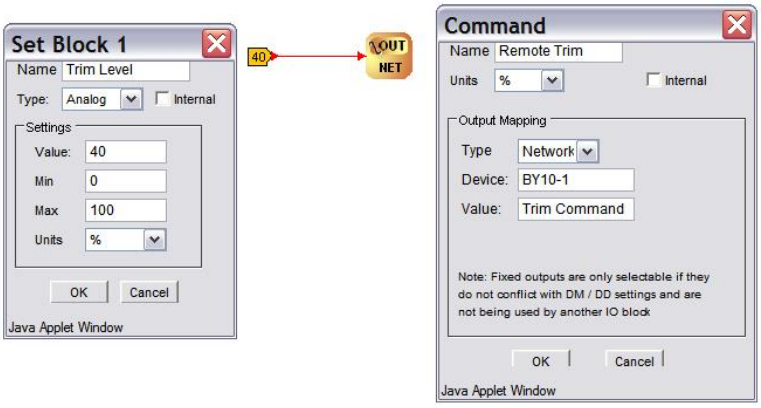
Remote Commands

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

Command	Value to send	Description	Conditions
Defrost Command	1	Initiates a defrost cycle	Defrost mode: remote
Defrost Command	3	Terminates the defrost	Defrost mode: remote Defrost hold: On Defrost min state complete
Trim Command	0 to 100%	Sets the trim level to this value (Trim period is 5 min)	Relay 4 mode: Trim Heater
Setpoint Command	+/-18	Is added to or subtracted from the setpoint	
Case Off Command	5 6 8 0	Sets the controller to Case Off Sets the controller to Fans Only Sets the controller to Lights Only Restores the controller from Case Off to Normal	
Haccp Command	0 1 2	HACCP LED OFF HACCP LED On HACCP LED Flashes	
Button Command	0 1	Buttons backlights Off Buttons backlights On	
EEV Command	2 1	Shuts the valve off Restores the valve to normal operation	
Divider Command	0 to 100%	Sets the maximum valve opening to this percentage.	MOP input from Merc PHI hub must be 'Off'.
Superheat Command	+/-12	Is added to or subtracted from the Superheat reference target (P-08). Adding a negative offset will reduce the Superheat reference and will generally cause the valve to open more.	P-121 "Allow SH Offset" must be set to ON

Use an "Analogue Out" block configured to the controller's 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 sets the Trim Heater on BY10-1 at 40%.



Specification

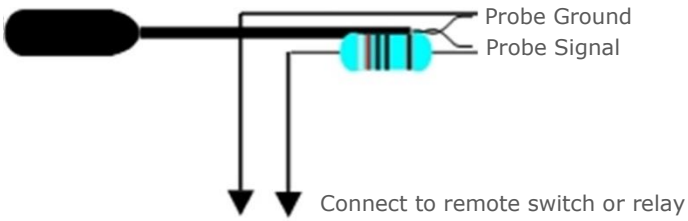
	Mercury Controller PR0744
Power requirements	
Supply Voltage Range	100 – 240 Vac ±10%
Supply Frequency	50 – 60 Hz
Maximum supply current	1.2 Amps
Typical supply current	<1 Amp
General	
Operating temperature range	-10^{0}Cto 55^{0}C (14°F to 131°F)
Storage temperature range	-20^{0}Cto 65^{0}C (-4°F to 149°F)
Environmental	Indoor use at altitudes up to 2000m (6562ft), pollution degree 1, installation category II. Voltage fluctuations not to exceed ±10% of nominal voltage.
Size	78mm(W) x 36mm(H) x 110mm(D) 3.1" (W) x 1.42" (H) x 4.3" (D)
Approx. Weight	177 grams (6.2 oz)
Safety	EN60730-1, EN60730-2-9, UL607030-1, UL607030-2-9
EMC	EN61326; 2013
Ventilation	There is no requirement for forced cooling ventilation
Class 2 Insulation	Class II insulation is achieved when properly fitted with only the front side (Display) of the controller is accessible. **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: 2A 240 Vac Anti-surge (T) HRC conforming to IEC 60127
Or MCB	2A, 240 VAC Type C conforming to BS EN 60898
Inputs	
Probe Input resistance	3.01K Ohms (for PTC or NTC type probes)
Probe Input type	Selectable. See: Units
Digital Inputs	Volt Free
Transducer Input mA	4-20mA current loop powered by 12vdc supply terminal provided.
Transducer Input V	0-10V dc signal.
Comms	
Serial Variant	RS232 with flow control
Ethernet Variant	IP comms

Relay Specification

	Mercury Controller PR0744
	Relay 1–4 Mechanical Type
Max current	**(EN60730)** 5A Resistive (CosØ = 1) Derated from 5A to 3A linearly from 35ºC to 55ºC 2A Inductive (CosØ = 0.4) Relays conform to EN60079-0 and EN60069-15 **(UL60730)** 2 FLA, 240 Vac, Motor load
Max voltage	240Vac
Relay Fuse	N/A
Relay Output Electrical Life	1,000,000 operations @ 3A 10,000 operations @ 5A
	Relay 1 Solid State (Type E)
Max Current	1.1A General Use
Max Voltage	250vac (ac only, will not switch dc)
	Relay 5
Max current	**(EN60730)** 3 A Resistive Load **(UL60730)** 2 FLA, 240 Vac, Motor load
Max voltage	240Vac
Relay Action Type	Type 1.B micro disconnection
SSR Action Type	Type 1.Y electronic interruption

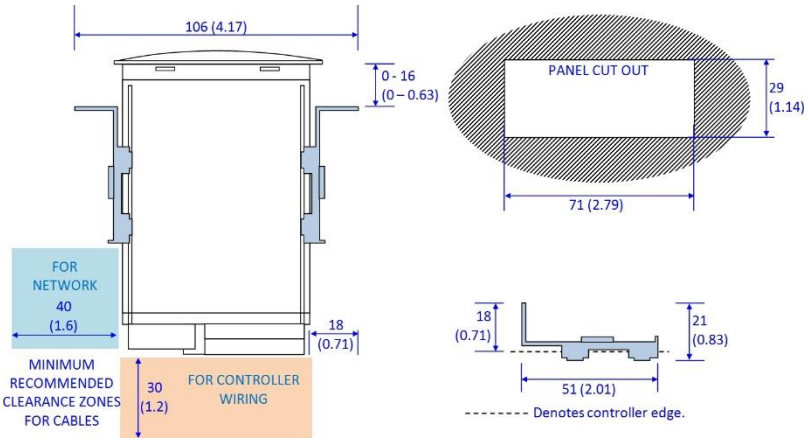
Switched Resistor Example Wiring

Example of resistor fitted on a probe input.



Installation& Dimensions

Panel Cut-out and Clearances

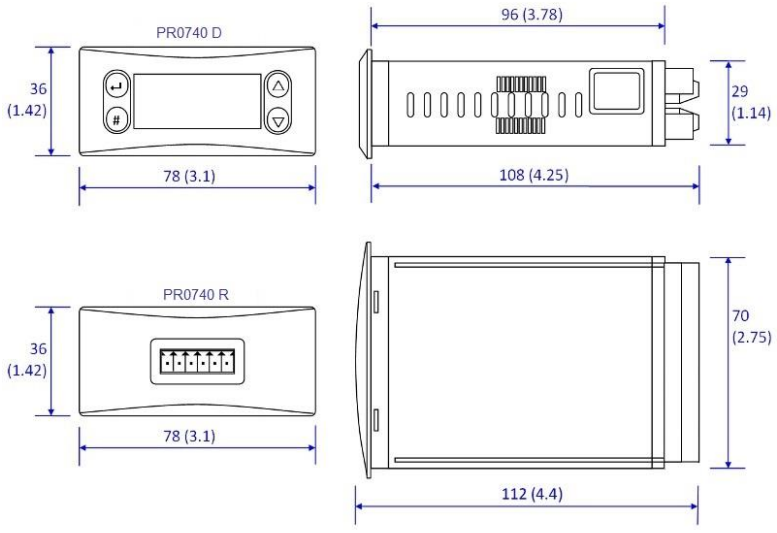


Fixing

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

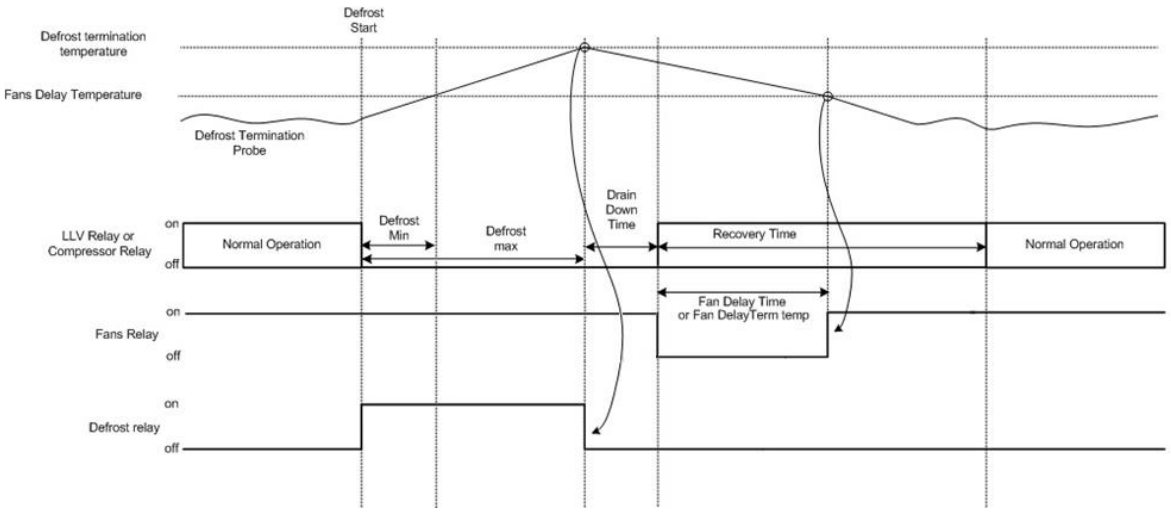
Dimensions – PR0744 Range



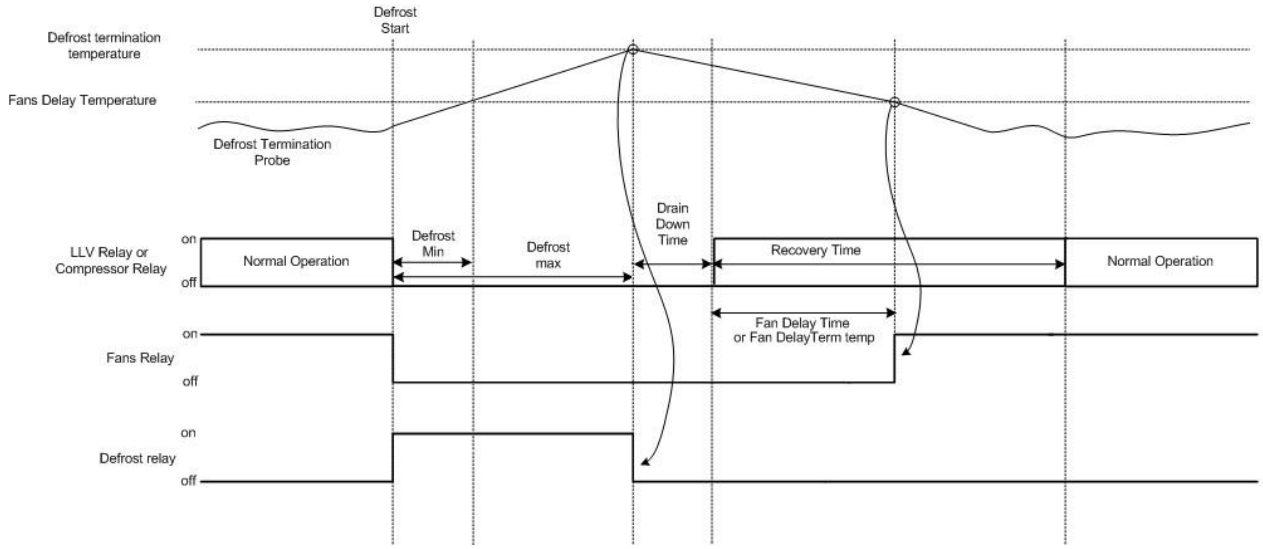
Do not wet the controller when cleaning. Clean the front by wiping with slightly damped lint free cloth.

Appendix 1: Defrost Cycles

Fans On in Defrost



Fans Off in Defrost



Appendix 2: Trim Heater Control via Mercury

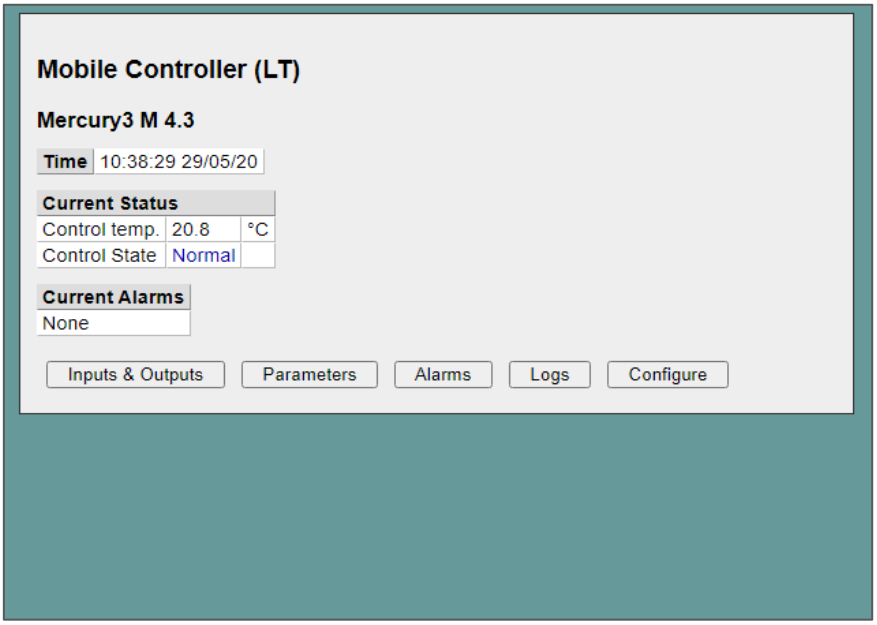
Energy savings via the RDM's range of case controllers can be achieved in a number of ways. One of which is pulsing the trim heater relay off for a given period of time. One way to pulse the trim heater is by configuring P-14. For greater energy savings the Data Manager Energy feature trim control or the Mercury Switch trim control feature can be used. These two options pulse the trim relay dependant on the actual shop floor humidity levels. Thus, if the shop floor humidity is relatively low the trim heaters can be pulsed off for longer durations. Please see the relevant user guides for further details.

Due to the high switching rate, trim heaters must not be switched directly from the Mercury trim heater relay and a Trim Heater Pulse Module (PR0723) must be 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 Controller which is pulsing the heater. The trim heater module output provides a smoother power distribution, compared to using the relay output directly, 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.

Appendix 3: Webpage Appearance

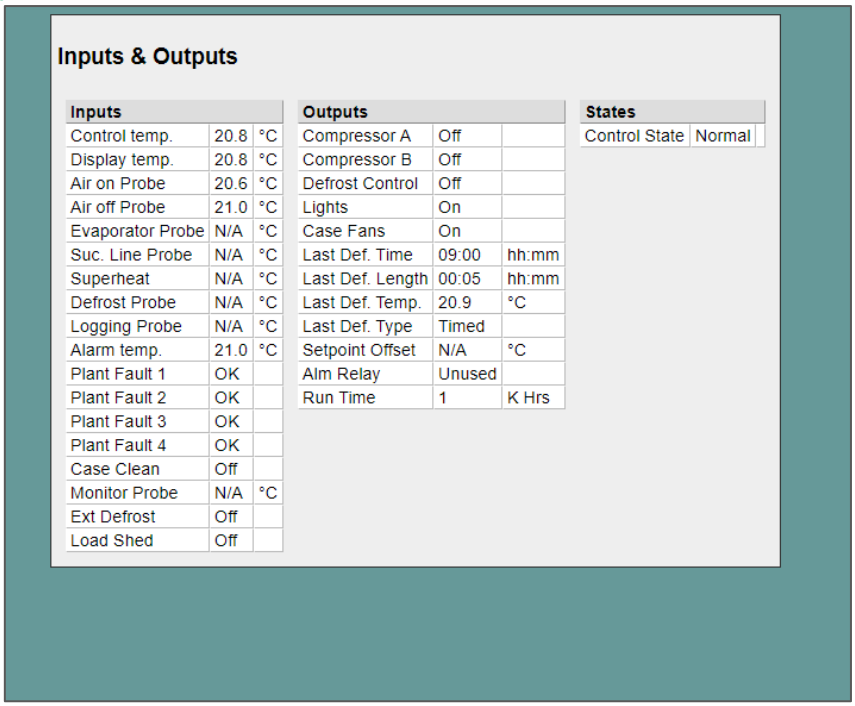
It is possible to view the controller across an IP connection using one of the methods outlined in the Network Configuration section.



The following screens are samples of how values and settings appear when viewed through a PC/Laptop connection.

The user has a choice of entering the following pages: - **Inputs & Outputs, Parameters, Alarms, Logs & Configure.**

Inputs & Outputs



Inputs & Outputs

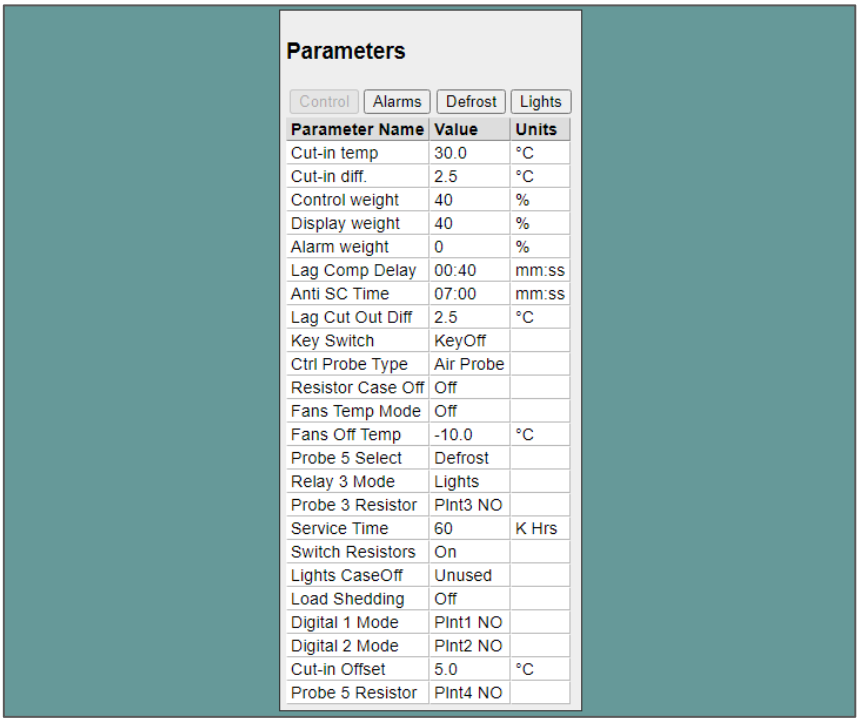
Inputs		
Control temp.	20.8	°C
Display temp.	20.8	°C
Air on Probe	20.6	°C
Air off Probe	21.0	°C
Evaporator Probe	N/A	°C
Suc. Line Probe	N/A	°C
Superheat	N/A	°C
Defrost Probe	N/A	°C
Logging Probe	N/A	°C
Alarm temp.	21.0	°C
Plant Fault 1	OK	
Plant Fault 2	OK	
Plant Fault 3	OK	
Plant Fault 4	OK	
Case Clean	Off	
Monitor Probe	N/A	°C
Ext Defrost	Off	
Load Shed	Off	

Outputs		
Compressor A	Off	
Compressor B	Off	
Defrost Control	Off	
Lights	On	
Case Fans	On	
Last Def. Time	09:00	hh:mm
Last Def. Length	00:05	hh:mm
Last Def. Temp.	20.9	°C
Last Def. Type	Timed	
Setpoint Offset	N/A	°C
Alm Relay	Unused	
Run Time	1	K Hrs

States	
Control State	Normal

This is view only screen and shows the states of the inputs and outputs.

Parameters



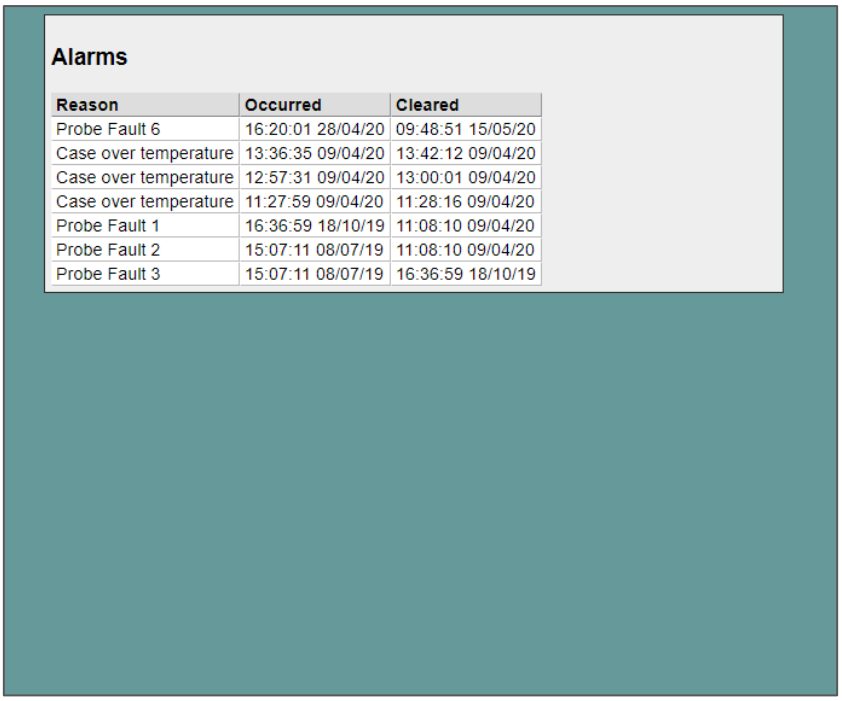
Parameters

Control | Alarms | Defrost | Lights

Parameter Name	Value	Units
Cut-in temp	30.0	°C
Cut-in diff.	2.5	°C
Control weight	40	%
Display weight	40	%
Alarm weight	0	%
Lag Comp Delay	00:40	mm:ss
Anti SC Time	07:00	mm:ss
Lag Cut Out Diff	2.5	°C
Key Switch	KeyOff	
Ctrl Probe Type	Air Probe	
Resistor Case Off	Off	
Fans Temp Mode	Off	
Fans Off Temp	-10.0	°C
Probe 5 Select	Defrost	
Relay 3 Mode	Lights	
Probe 3 Resistor	PInt3 NO	
Service Time	60	K Hrs
Switch Resistors	On	
Lights CaseOff	Unused	
Load Shedding	Off	
Digital 1 Mode	PInt1 NO	
Digital 2 Mode	PInt2 NO	
Cut-in Offset	5.0	°C
Probe 5 Resistor	PInt4 NO	

This is a view only screen and shows the parameter settings

Alarms

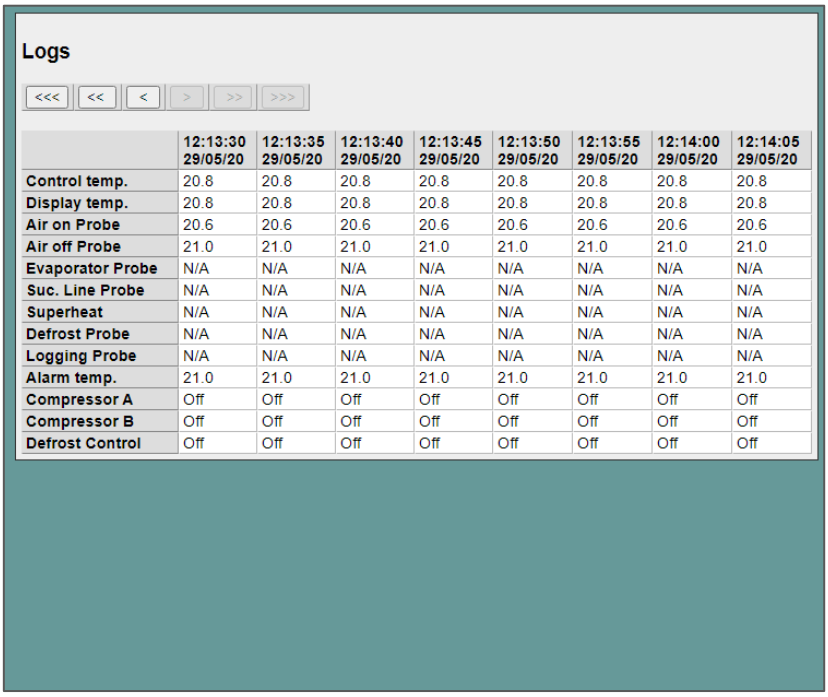


Alarms

Reason	Occurred	Cleared
Probe Fault 6	16:20:01 28/04/20	09:48:51 15/05/20
Case over temperature	13:36:35 09/04/20	13:42:12 09/04/20
Case over temperature	12:57:31 09/04/20	13:00:01 09/04/20
Case over temperature	11:27:59 09/04/20	11:28:16 09/04/20
Probe Fault 1	16:36:59 18/10/19	11:08:10 09/04/20
Probe Fault 2	15:07:11 08/07/19	11:08:10 09/04/20
Probe Fault 3	15:07:11 08/07/19	16:36:59 18/10/19

This is a view only screen.

Logs



Logs

<<< << < > >> >>>

	12:13:30 29/05/20	12:13:35 29/05/20	12:13:40 29/05/20	12:13:45 29/05/20	12:13:50 29/05/20	12:13:55 29/05/20	12:14:00 29/05/20	12:14:05 29/05/20
Control temp.	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8
Display temp.	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8
Air on Probe	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6
Air off Probe	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Evaporator Probe	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Suc. Line Probe	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Superheat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Defrost Probe	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Logging Probe	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Alarm temp.	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Compressor A	Off	Off	Off	Off	Off	Off	Off	Off
Compressor B	Off	Off	Off	Off	Off	Off	Off	Off
Defrost Control	Off	Off	Off	Off	Off	Off	Off	Off

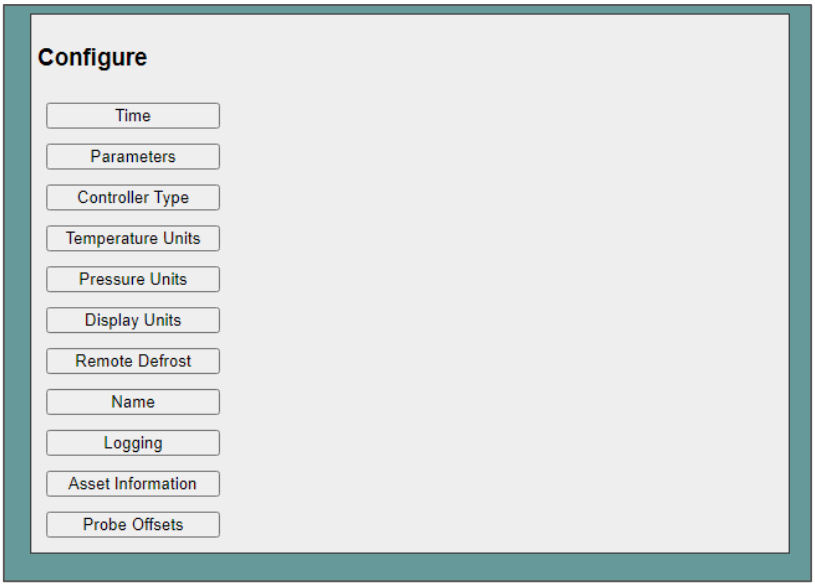
This is a view only screen

Configure

Alternatively, click on the **Configure** button to access the setup menu.

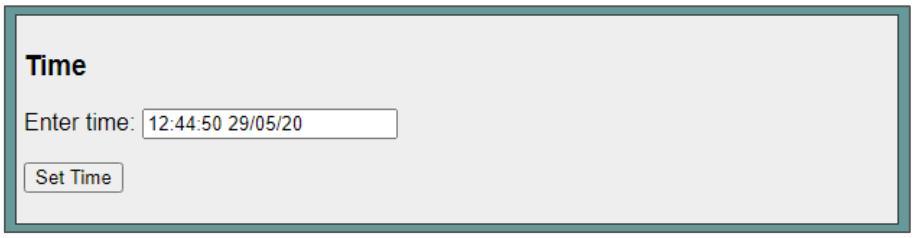
Note: login credentials required to access Configure menu are as follows;

Username: 'service'
Password: '1234'



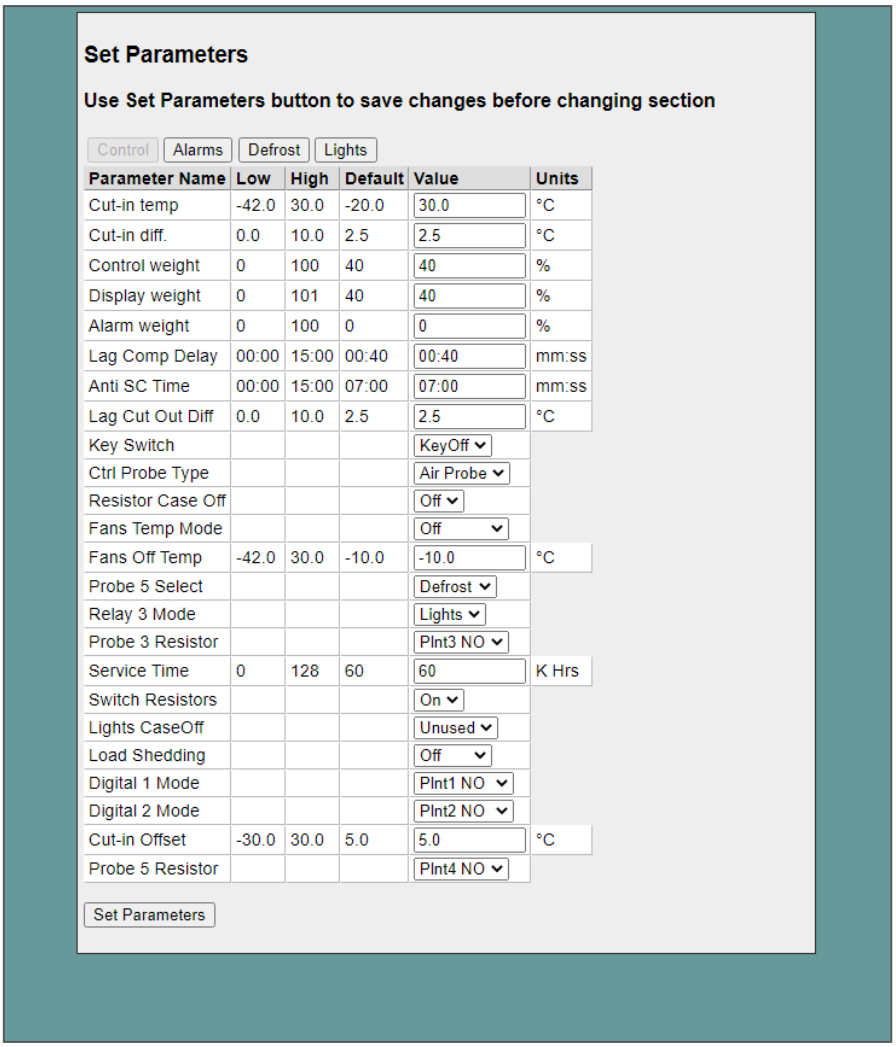
This screen allows the user to configure the controller and set-up the following: - **Time, Parameters, Controller Type, Pressure Units, Display Units, Remote Defrost, Name, Logging, Asset Information and Probe Offsets**

Time Screen



Enter the time and date in the format displayed and press "Set Time" to update the controller. A screen showing the set time will be displayed, and then revert to the initial (Home) screen.

Parameter Screen



Set Parameters

Use Set Parameters button to save changes before changing section

Control | Alarms | Defrost | Lights

Parameter Name	Low	High	Default	Value	Units
Cut-in temp	-42.0	30.0	-20.0	30.0	°C
Cut-in diff.	0.0	10.0	2.5	2.5	°C
Control weight	0	100	40	40	%
Display weight	0	101	40	40	%
Alarm weight	0	100	0	0	%
Lag Comp Delay	00:00	15:00	00:40	00:40	mm:ss
Anti SC Time	00:00	15:00	07:00	07:00	mm:ss
Lag Cut Out Diff	0.0	10.0	2.5	2.5	°C
Key Switch				KeyOff	
Ctrl Probe Type				Air Probe	
Resistor Case Off				Off	
Fans Temp Mode				Off	
Fans Off Temp	-42.0	30.0	-10.0	-10.0	°C
Probe 5 Select				Defrost	
Relay 3 Mode				Lights	
Probe 3 Resistor				PInt3 NO	
Service Time	0	128	60	60	K Hrs
Switch Resistors				On	
Lights CaseOff				Unused	
Load Shedding				Off	
Digital 1 Mode				PInt1 NO	
Digital 2 Mode				PInt2 NO	
Cut-in Offset	-30.0	30.0	5.0	5.0	°C
Probe 5 Resistor				PInt4 NO	

Set Parameters

This screen allows the parameters to be changed. Once the values are changed, the "Set Parameter" button must be clicked to set the parameters into the controller.

A screen will show the number of parameters and the number changed, then revert back to the Home screen.

Controller Type

Controller Type

Mobile Controller (LT)

Set Type

This screen allows the controller type to be changed. For this controller, there is 6 for the Mechanical type and 4 for the EEV type.

Temperature Units

This screen allows the user to set the probe type for the controller and if it's in degrees Centigrade or Fahrenheit.

Pressure Units

This screen allows the user to set the pressure units displayed to Bar or PSI.

Display Units

This screen allows the user to set if the display on the controller will display only whole numbers (Whole) or whole numbers and tenths (Decimal).

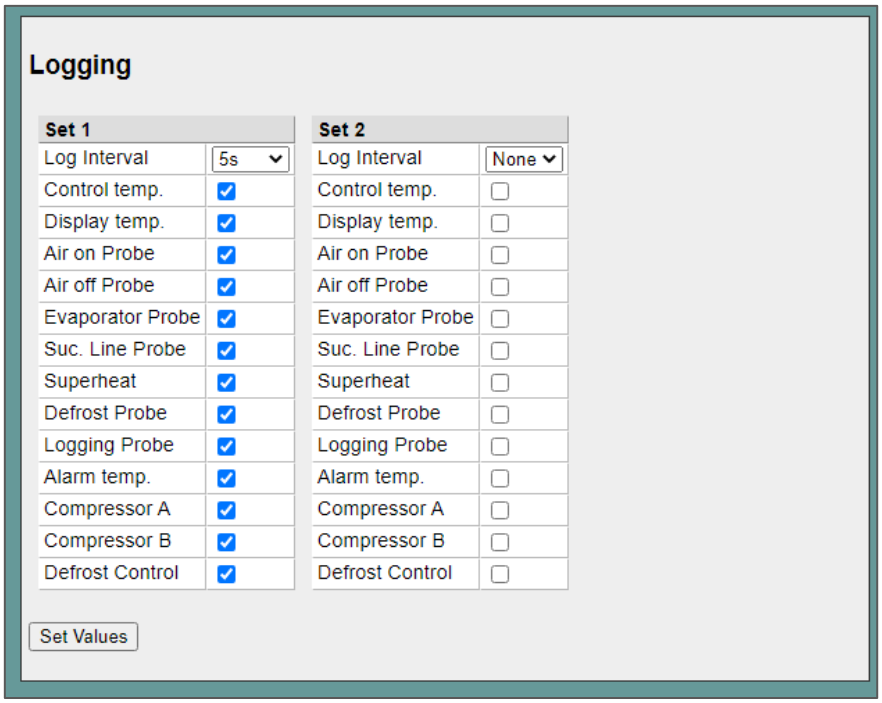
Remote Defrost

This screen allows the user to send a remote defrost to the controller (note: defrost mode must be set to local)

Name

This screen allows the user to give the controller a name. Type in a name of your choice (upper- or lower-case alpha-numeric) up to 32 characters. Click "Set Name" to load into the controller. A screen will show the name has been set and then revert back to the home screen. (The Home screen will also now show the controller's name.)

Logging

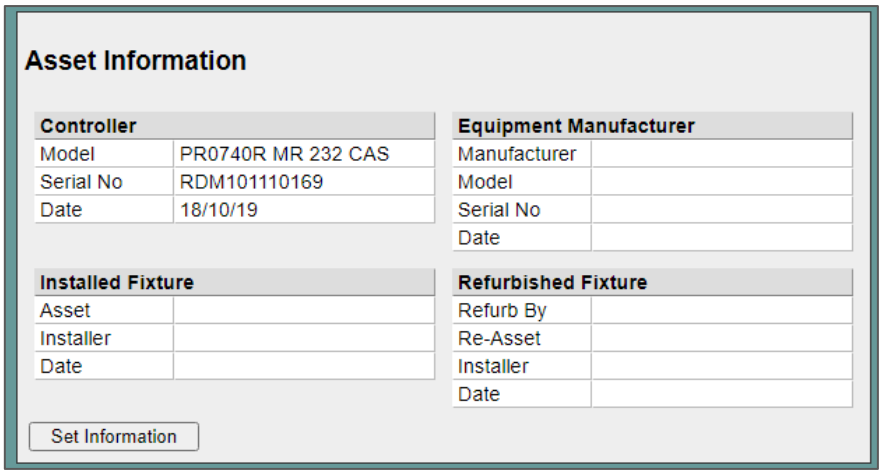


This screen allows the user to set the logging features. There are two sets so that values can have different log intervals.

Set the interval required on set1 and set 2, tick the required values to be logged, then click "Set Values" to load into the controller.

A screen will display "Log configuration set" then revert back to the Home page.

Asset Information

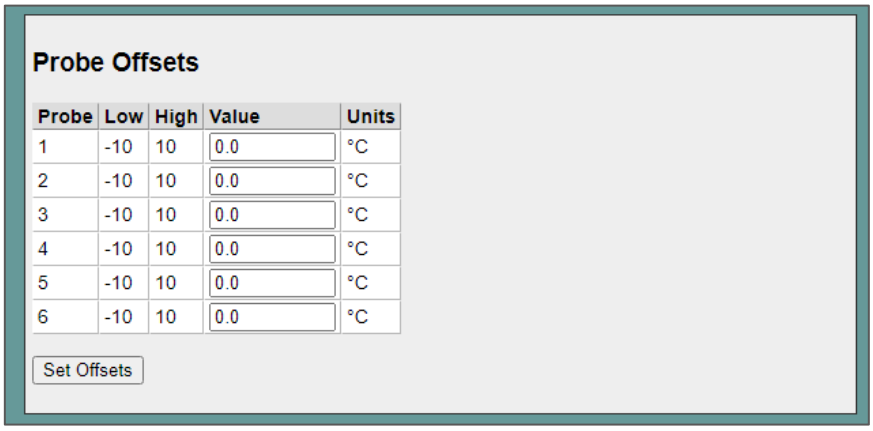


This screen allows the user to set asset information into the controller.

Caution: This is a once only operation.

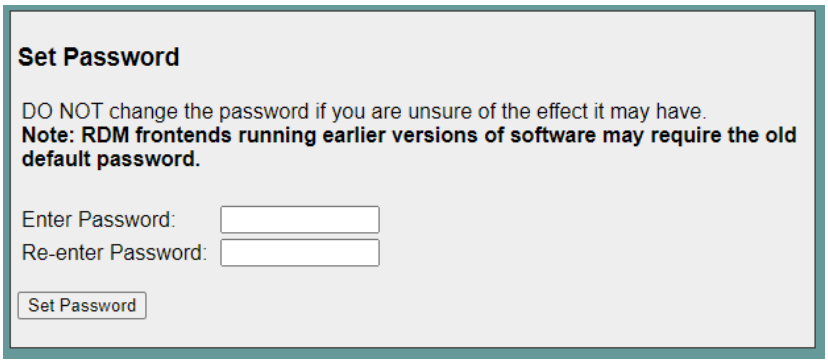
Click "Set Information" and follow the on-screen instructions to set up your asset information.

Probe Offsets



This screen allows the user to set a probe offset between to any of the six probes connected to the controller.

Set Password



This screen allows the user to change the password from the default '1234'. Please be aware that this could have an adverse effect on communications between an RDM frontend running software earlier than version V4.3.2. Please contact RDM Technical Support for more information.

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Revision History

Soft M	Soft E	Doc Revision	Date	Changes
5.0	5.1	B	17/02/2022	New hardware platform PR0744 with relays to standards IEC60079-0 and IEC60079-15 specified.
5.0	5.2	C	25/10/2022	4-20mA transducer accuracy added +/- 0.5mA
5.0	5.2	D	30/01/2023	Relay 5 supply details updated
5.0	5.2	E	20/10/2023	Separate user guide created for PR0744 Variant
5.0	5.2	F	28/08/2024	Typical Wiring Diagram Added
5.0	5.3	A	01/09/2024	Improvements made to defrost cycle on EEV software
5.1	5.4		03/10/2024	Support for front end overrides added. Controller password can be changed from default.

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