Resource Data Management

PR0740 - CAS

Mercury 3 Controller
Installation & User Guide

Resource Data Management

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The Mercury 3 Range

From Resource Data Management

For Version 1.0M & 1.0E

The Mercury Mk3 controller is primarily intended for use in refrigeration display cabinets or coldroom applications. It will switch the evaporator valve (LLV or 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 that can be added to, 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 Mk3 controller split into two types; an **E-version** that has Relay 1 as a **Solid State Relay** for switching EEVs and the second is an **M-version** that has Relay 1 as an **electro-mechanical relay** for switching solenoid LLVs. For these two types, there are further options of adding analogue inputs, choice of serial or built in IP communications along with either a remote or integral display option (see ordering information for more details).

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

Hardware Variants

As mentioned above, the Mercury 3 controller offers a number of choices concerning the physical hardware including choice of IO, Display and communications type. Furthermore 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		

Compatible Displays

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

Description	Part Number
Mercury Remote Display with 5m cable	PR0325
Mercury Keyswitch Remote Display with 5m cable	PR0326
Mercury DIN Remote Display with 5m cable	PR0327
Mercury DIN Keyswitch Remote Display with 5m cable	PR0328
Mercury mk2 Remote Display with 5m cable	PR0725

Configuration

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

Display value	Mercury Mk3 Mechanical Expansion Valve	Mercury Mk3 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, an RDM wireless mesh 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.

Description	Part Number
IP Futura (Single Mercury to IP Interface)	PR0016
RS485 Interface (Single Mercury to RS485 Interface)	PR0026
Mercury IP Switch (IP support for 10 controllers)	PR0018
Mercury IP Switch with Pressure/Humidity Inputs	PR0018-PHI
Wireless Mesh Interface (for single Mercury)	PR0730

Front Display Features

LED's: -

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

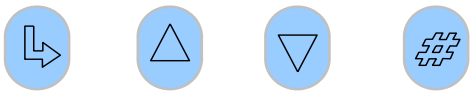
Service
(See Parameter 18 for setup)

Alarm

HACCP

Mercury Mk3

Keys



Enter Up Down Defrost

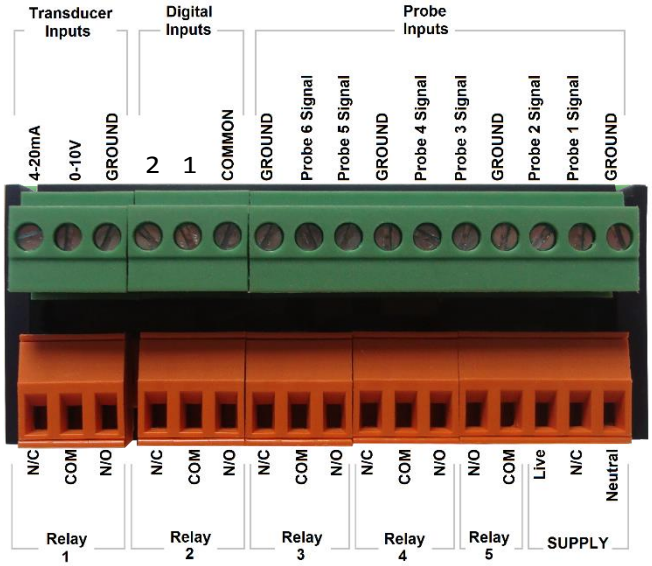
Note: Function keys illuminate when pressed, illumination is turned off 20 seconds after the key is used.
Defrost: Press and hold the defrost button to force a manual defrost

Main Display

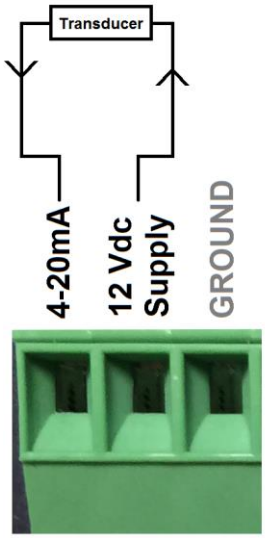
4 character LED display, used to display temperature and status messages.

Mercury Mk3 I/O Connections

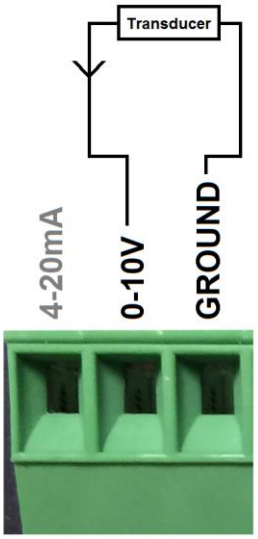
Input and Output connections are made to the back of the controller, the RS232/ Ethernet communication port is on the side. The diagram below shows the connection detail. Inputs and outputs are assigned according to the chosen configuration. See Input/Output tables for further details on connections. Below also shows you the transducer connections available with the Mercury Mk 3 E variant.



Note: On the Mercury E, relay 1 will be an SSR.



4-20mA Transducer Connections



0-10V Transducer Connections

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

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)

TYPE	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	Man Trap alarm type 5 & 6
Input 3	Evaporator Temperature	Evaporator Temperature	Evaporator Temperature	No	Plant fault 1 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 2 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 Input	Not used			N/A	
Digital 1	Selectable; Plant 1, Switch, Defrost, Plant 2	Selectable; Plant 1, Switch, Defrost	Selectable; Plant 1, Switch, Defrost, Door, Man Trap	Conditional	
Digital 2	Selectable; Plant 1, Switch, Defrost, Plant 2	Selectable; Plant 1, Switch, Defrost	Selectable; Plant 1, Switch, Defrost, Door, Man 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	Lights/Alarm Relay	N/A	
Relay 4	Compressor B	Suction Line Valve/Trim Heater/Alarm Relay/Remote Relay	Suction Line Valve/Alarm Relay/Remote	N/A	
Relay 5	Defrost Heater	Defrost Heater (N/O)	Defrost Heater (N/O)	N/A	

E-type (Electronic Expansion Valve)

TYPE	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 1 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**	Man 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, Switch, Defrost	Selectable; Plant 1, Switch, Defrost, Door, Man Trap	Conditional	
Digital 2	Selectable; Plant 1, Switch, Defrost	Selectable; Plant 1, Switch, Defrost, Door, Man 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	N/A	
Relay 4	Suction Line Valve/Trim Heater/Alarm Relay/Remote Relay	Suction Line Valve/Alarm Relay/Remote	N/A	
Relay 5	Defrost Heater (N/O)	Defrost Heater (N/O)	N/A	

* Probe will alarms if set to monitor probe in parameters.
** Probe will alarms 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 type only

There are two possible inputs that can be used for a transducer on the Mercury 3 E 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 Mk 3 controller the following ordering scheme can be used to purchase the desired hardware configuration.

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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 MK3 with a Solid state relay (for EEV's), Remote display and IP comms;

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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 legacy front end panels on 485 networks.
- 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
diSP	Display whole units or decimal	Display		CASE	Toggle Case Off mode	Case Off
tyPE	Set/View Controller Type	Set/view controller type		Ligt	Toggle Lights Only mode	Lights
rtc	Set/view Clock (rtc = Real Time Clock)	Real Time Clock		OFSt	Probe Offset	Probe Offset
				ESC	Exit Setup mode	

Recommended set-up method

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

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

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

Display

From the function menu scroll to and select 'diSP'.
Press enter and one of the following values will be shown: -
0. Controller display will show the whole number and tenths value of a temperature reading. (Default)
1. Controller display will show temperatures as a whole number.

Parameter Tables

Not all parameters apply to all controller types. For example P-08 is the Superheat reference which only applies to the 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 100	1	%	50	50		✓	✓	✓	✓
	Display Weight (Integral)	0 to 100	1	%	40	30	✓				
P-05	Lag Comp Delay	00:00 to 15:00	00:05	mm:ss	00:40	00:10	✓				
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-11	Control Type	0 = EEV 1 = EET 2 = EEV/T	1		0	0				✓	✓
P-51	EEV Minimum Opening	0 - 100%	1	%	10	10				✓	✓
P-52	Superheat Problem	0 – 12 °C (0 – 21.6 °F)	0.1	Deg	0	0				✓	✓
P-53	Superheat EEV Problem Opening	0 - 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 - 100%	1	%	10	10				✓	✓
P-55	Average Valve Opening	0 - 100%	1	%	100	100				✓	✓
P-57	EEV Divide Value	0 - 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		✓		✓	
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 = Use Air on Probe 1 = Use 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	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, 1 = External defrost	1		0	0	✓	✓	✓		
	Probe 1 Resistor Function (EEV)	0 = Plant fault, 1 = External defrost	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	Man 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 / P-101	Digital Input 1 / Digital Input 2	Types 1&2; 0 (Plant 1), 1 (Switch), 2 (Defrost)	1		DI 1: 0 DI 2: 3	DI 1: 0 DI 2: 3	✓	✓	✓		
		Types 3&4; 0 (Plant 1), 1 (Switch), 2 (Defrost)	1		DI 1: 0 DI 2: 1	DI 1: 0 DI 2: 1	✓	✓	✓	✓	✓
		Types 5&6; 0 (Plant 1), 1 (Switch), 2 (Defrost, 3 (Door), 4 (Man Trap)	1		DI 1: 3 DI 2: 4	DI 1: 3 DI 2: 4	✓	✓	✓	✓	✓
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 Alm	-49 to 60 (-56.2 to 140)	0.1	Deg	-15 (5)	5 (41)	✓	✓	✓	✓	✓
P-23	Log Probe Type	0 (Off), 1 (Logging), 2 (Logging/Alarm)			Off	Off	✓	✓	✓	✓	✓
P-24	Slug Log Probe	0 (Off), 1 (On)			Off	Off	✓	✓	✓	✓	✓
P-25	Log Alarm Delay	00:00 to 99:00	01:00	mm:ss	20:00	20:00	✓	✓	✓	✓	✓
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)	✓	✓	✓	✓	✓
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 = Elce/CIn	1		0	0	✓	✓	✓	✓	✓
	Defrost Type (Integral)	0 = Elec. 1 = Gas. 2 = Elec CIn									
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-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				✓	✓
P-31	Refrigerant	See Refrigerant Table Below	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	0.0 to 5.0	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				✓	✓
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: Danfoss AKS 33 with range -1 bar to 12 bar
Span would be 190 (13 bar)
Offset would be -15 (-1 bar)

Refrigerant Table for P-31

No.	Gas	No.	Gas	No.	Gas	No.	Gas	No.	Gas
0	None	6	R32	12	R401A	18	R407A	24	R507
1	R12	7	R114	13	R401B	19	R407B	25	R717
2	R13	8	R134A	14	R402	20	R407C	26	R290
3	R13B1	9	R142B	15	R402A	21	R500	27	R744
4	R22	10	R227	16	R402B	22	R502	28	R407F
5	R23	11	R401	17	R404A	23	R503	29	R410A

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
P-05	Lag Comp Delay	Delay before the second compressor is switched on if the temperature is still above set-point.
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. **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.
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.
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, 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.
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 valve opening % which is used immediately after the device is 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	This parameter only takes effect when the controller is used in conjunction with a Mercury Switch pressure application. When the Mercury Switch generates the 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 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. ➢ 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). Please see the Mercury switch (PR0018) 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 coldroom is down to temperature thus saving energy. This feature is present in both the M and E software. ➢ 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. ➢ 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. ➢ 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.
P-17	Evap Select	This allows the control algorithm to use a remote temperature input in place of the evaporator in value. 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, Man Trap, Door Switch See : Switched Resistor Values
P-77	Man Stop LLV/Fans	When man trap input is activated the LLV closes and Fans are stopped. Normal operation resumes when the mantrap 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 “CO2 Load Shedding Case Off Mode” ➢ Mode 2 – Goes to Case Clean Mode See: Load Shedding
P-100 / P-101	Digital Input 1 / Digital Input 2	Sets the status input type for the two Digital Inputs; ➢ Plant 1 – When the DI is activated, it would alarm Plant Fault 1. ➢ Switch – Would carry out the operation set on the ‘Key Switch mode’ (p-85) ➢ Defrost – The DI activation would signal the unit to go into a defrost (must be set to remote df). ➢ Door – The DI activation would signal if the door is open or closed. ➢ Man Trap – If the DI signal is received, it would activate a Man Trap alarm.
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
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-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 (E) 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.
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. Note if the fans are set to on in defrost, they will go off for the drain-down period and then follow the P-86 rules.
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). Operates only when the controller is set to local defrost scheduling.
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. 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 (Mobile) - If gas is selected, the compressor 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.
P-31	Refrigerant	Type of refrigerant used in system. See: Refrigerant Table above
P-32	Pressure Units	Absolute or Gauge
P-33	Evap Offset	Offset to allow for pressure drop over distance
P-34	Glide	Allows the calculated temperature, derived from the Suction Pressure, to be offset by adding the value at P-34.
P-35	Trans Span	Total range of the transducer
P-36	Trans Offset	Value below zero
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 which will open the LLV/EEV and stop the fans to reduce the load on the pack or to reduce the CO2 vessel pressure.

See: RDM CO2 load shedding user guide.

Superheat Options

The superheat for EEV control can be calculated using different means to suit the application;

- Based on the value of the Evaporator and Suction line temperature probe inputs connected directly to the controller.
- The local Suction line temperature probe and a remote suction pressure value broadcast by a Plant/Intuitive Pack controller on the same IP network. The pressure received from the Plant/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 or built-in IP.
- The local suction line temperature probe and a local suction pressure measured by a transducer connected to the controller’s internal transducer input.
- 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). 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.

EEV Control Using Pressure

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

Local Analogue Input – mA or V

(P17 set to Trans mA or Trans V) A suction transducer can be connected directly to the analogue input of the controller. 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 (P-31 to P-36) will need to be set accordingly.

Mercury Switch (PR0018-PHI)

(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 user document (PR0018-PHI) for further details.

Remote pressure Direct from a Plant Pack Controller

(P-17 set to Rem1, Rem2 or Rem3 depending on which input the suction transducer is connected to on the plant controller, transducer input 1, 2 or 3)
(P-30) set to ID of Plant Pack Controller (Rotary Switch Setting), (P-31) set to refrigerant type, (P-32) set to pressure units Absolute or Gauge

Maximum Operating Pressure (MOP)

MOP is a remote command sent from the Mercury switch (PR0018-PHI) to the controller to either close or reduce the EEV valve opening when a predetermined pressure is reached. This MOP value is configured in the Mercury switch setup. When the Mercury Switch generates the MOP alarm the controller reduces the maximum valve opening to this percentage. For example if the “Div 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.

Note – for the MOP command to work, the device must have serial comms and be connected into the RS232 ports of the PHI hub.

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

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.

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 – RS232 comms

The final section to setup is the network address. In all instances, this must be done before the controller is connected to the site network.

When logging a Mercury 3 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 Wireless Mesh Interface. For Mercury 3's with the IP interface please refer to the Network Configuration – IP comms section for details of networking.

RS485 Legacy module

Using RS485, the controllers have an auto-initialise function, which will automatically log the device onto the site network. If the wrong address has been entered onto the network, you will have to reset the controller address by setting the address to 00-0, and then re-enter the correct address (you may have to deregister the wrong address from the home system as well).

Connecting an RS485 legacy Module to the controller will govern which set-up screens are made available in the '**Net**' menu. The module will support the "Genus" protocol only. Using RS485 will show the below;

Display	Option
485t	485 Network Type
485A	485 Address/ Name
gAdd	Show 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. **N.B.** this option **must** be selected to save any changes made in this menu

The **485t** option shows a value representing the network type. The possible values are:

Value	Network Type
1	Genus compatible (all versions)
2	RDM Wireless Mesh System (Wireless Mesh)

Ensure option '1' is selected (for RS485).

The **485A** option shows a value representing the name of the controller in a Genus compatible network. For example, if the value shown in 485A is shown as "05-6". The controller would try to log onto a Genus compatible network using the name 'RC05-6'.

The **gAdd** option displays (in hexadecimal format) the underlying network address assigned to the controller when it was logged onto the network. Note: this is automatically assigned by the Data Manager.

The **rLog** option allows the controller to be logged back onto the network with its current name. The 'rLog' message will flash, waiting for confirmation. To confirm, press the Enter button to execute the command, Up or Down buttons to cancel.

The **CLrA** option will clear out the network address and name in the controller. The 'ClrA' message will flash for confirmation. Press the Enter button to execute the command, Up or Down buttons to cancel.

Fast Network Address Reset

To enter this mode, hold the Enter, Up and Down buttons together for approximately 3 seconds until the message CLrA appears on the display. CLrA is the first option in the menu consisting of the following options:

Display	Option
CLrA	Clear the address/name from the controller
ESC	Exit Setup mode

Pressing the Enter button to select the CLrA option will cause the 'CLrA' message to flash for confirmation, if the network type is set to Genus compatible. Press the Enter button to execute the command, Up or Down buttons to cancel. If the network type is not set to Genus compatible then the ClrA message will not flash and the ESC option can be used to exit the menu.

Wireless Mesh Module

When a wireless mesh module is connected to the controller the 'Net' menu will show similar options to that off the 'RS485' network. The only difference to the settings would be that the **485t** should be set for '**2'**. Then the same steps should be taken to that of the RS485 option to log the unit on to the wireless mesh. Note, the wireless mesh network should already be set up on the data manager. Please see the Data Manager documentation for setup instructions. Furthermore, please see documentation on the PR0730 Wireless Mesh Network Module for setup instructions.

IP Futura module

In an IP system there are two options;

- IP-L
- IP-r

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

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

IP-L

To configure the communication module, set all three rotary switches to zero. The module should then be connected to the controller.

- From the function menu you can now select '**nEt**'.
- Press enter and the display will show "IP-L", press enter once more.
- You can now set the IP network settings by using the table below

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

IP-r

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

- From the function menu you can now select 'nEt'
- Press enter and the display will show "IP-r", press enter once more.
- You can now view (only) the address given by the DHCP server

Network Mask Length

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

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

Mercury Switch

The method of logging on the Mercury 3 (RS232 comms) will be similar to that of the IP Futura however 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.

Network Configuration – IP comms

Mercury 3 controllers with the IP interface as standard does not require any communications module and will already communicate on the IP network protocol.

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 / switch 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 given to the controller by navigating to 'IP-L' within 'Net'. The following menu's 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	Plant Fault (1)	0 (OK), 1 (Alarm)			✓	✓	✓	✓	✓
I-11	Case Clean	0 (Off), 1 (On)			✓	✓	✓	✓	✓
I-12	Door Sensor	0 (Closed), 1 (Open)					✓		✓
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)				✓	✓	✓	✓
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 (Relay3)	0 (Unused), 1 (OK), 2 (Alarm)				✓	✓	✓	✓
O-16	Alarm Relay (Relay4)	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		✓		✓	
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 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	FanS ONLy	Controller in Fans Only
Prb1	Probe 1 Fault	LitS ONLy	Controller in Lights Only
Prb2	Probe 2 Fault	CASE OFF	Controller in Case Off
Prb3	Probe 3 Fault	Ot	Over Temperature Alarm
Prb4	Probe 4 Fault	Ut	Under Temperature Alarm
Prb5	Probe 5 Fault	door	Door Open Alarm
Prb6	Probe 6 Fault	TrAP	Person Trapped Alarm
rEC	Control State in Recovery	PLnt	Plant Fault
dEF	Control Sate in Defrost	LgOt	Log Probe Over Temperature
AL	Control State in Alarm	LgUt	Log Probe Under Temperature

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	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

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 "FanS OnLy"
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 "LitS OnLy"
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.

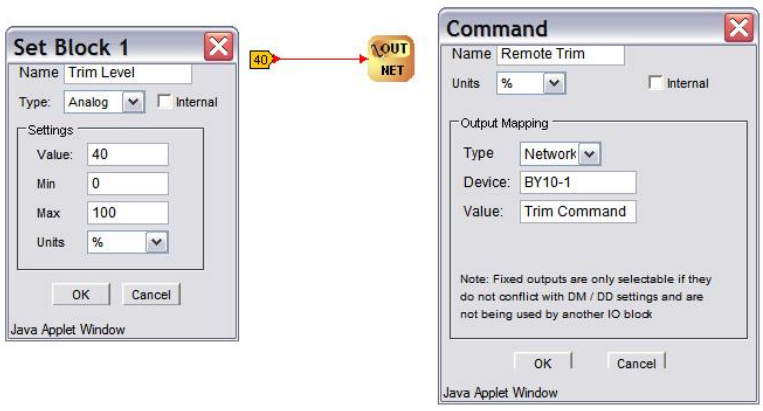
Remote Commands

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 0	Sets the controller to Case Off 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'.

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

See Example on the right, which sets the Trim Heater on BY10-1 at 40%.



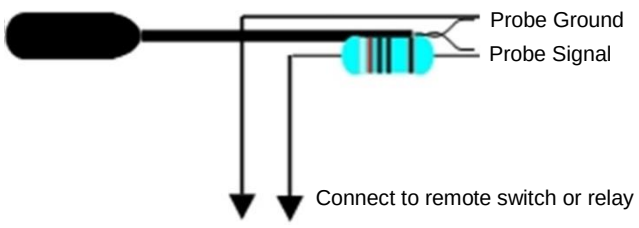
Specification

Mercury Mk3 Controller PR0740 xxx CAS	
Power requirements	
Supply Voltage Range	100 – 240 Vac ±10%
Supply Frequency	50 – 60 Hz
Typical supply current	<1 Amp
General	
Operating temperature range	+5^{0}C to +50^{0}C
Storage temperature range	-20^{0}C to +65^{0}C
Environmental	Indoor use at altitudes up to 2000m, pollution degree 2, installation category II. Voltage fluctuations not to exceed ±10% of nominal voltage.
Size	78mm (W) x 36mm (H) x 110mm (D)

Approx. Weight	177 grams
Safety	EN61010
EMC	EN61326:2013
Ventilation	There is no requirement for forced cooling ventilation
Class 2 Insulation	**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
Relay Specification	
Relays 1 - 4 Mechanical Type (M) - Exclusive common	
Max current	6A Resistive (CosØ = 1) 2A Inductive (CosØ = 0.4)
Max voltage	250Vac, 30V dc
Relay 1 Solid State Type (E) - Exclusive common	
Max current	1.5A
Max voltage	250Vac (ac only, will not switch dc)
Relay 5 Mechanical Type (M&E) – Exclusive common	
Max current	3A (non inductive), COSϕ=0.4 2A (inductive load) 200,000 operations
Max voltage	250Vac
For compliance with the LVD, All relay commons must be at the same potential as the supply voltage	
Inputs	
Probe Input resistance	3.01K Ohms (for PTC or NTC type probes)
Probe Input type	Selectable. See: Units
Transducer 0-10V	Connect a 0-10v signal
Transducer 4-20mA	4-20mA current loop, uses the 12 Vdc output to feed the pressure transducer See wiring
Digital Inputs	Volt Free
Comms	
Serial Variant	RS232 with flow control
Ethernet Variant	IP comms

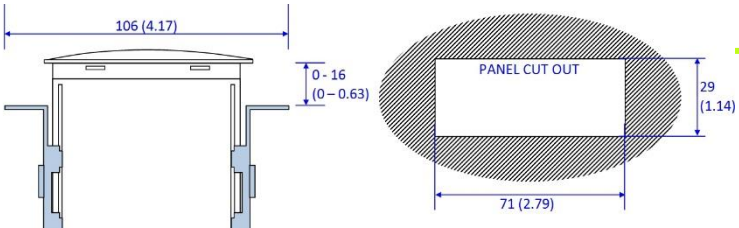
Switched Resistor Example Wiring

Example of resistor fitted on a probe input.



Installation & Dimensions

Panel Cut-out and Clearances

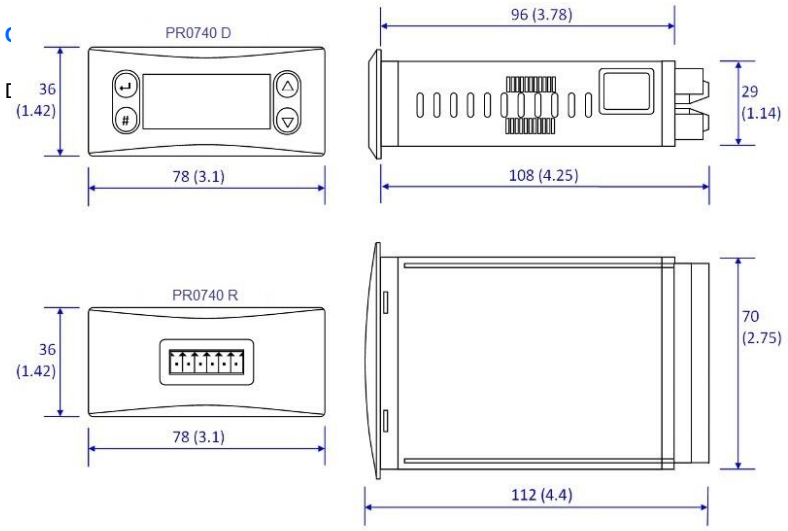


Fixing

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

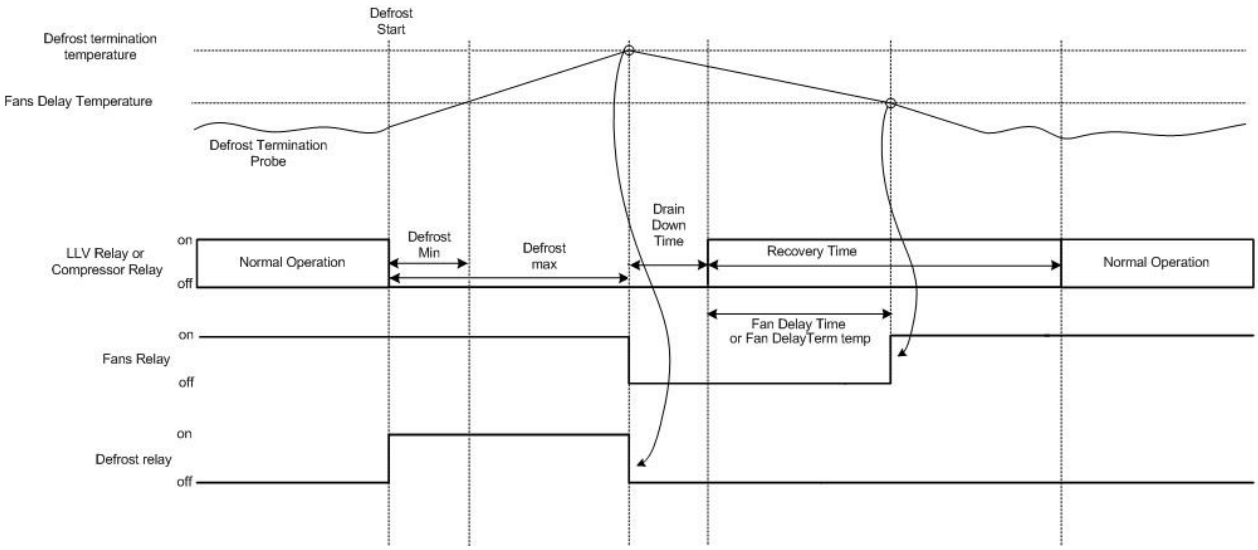
Dimensions



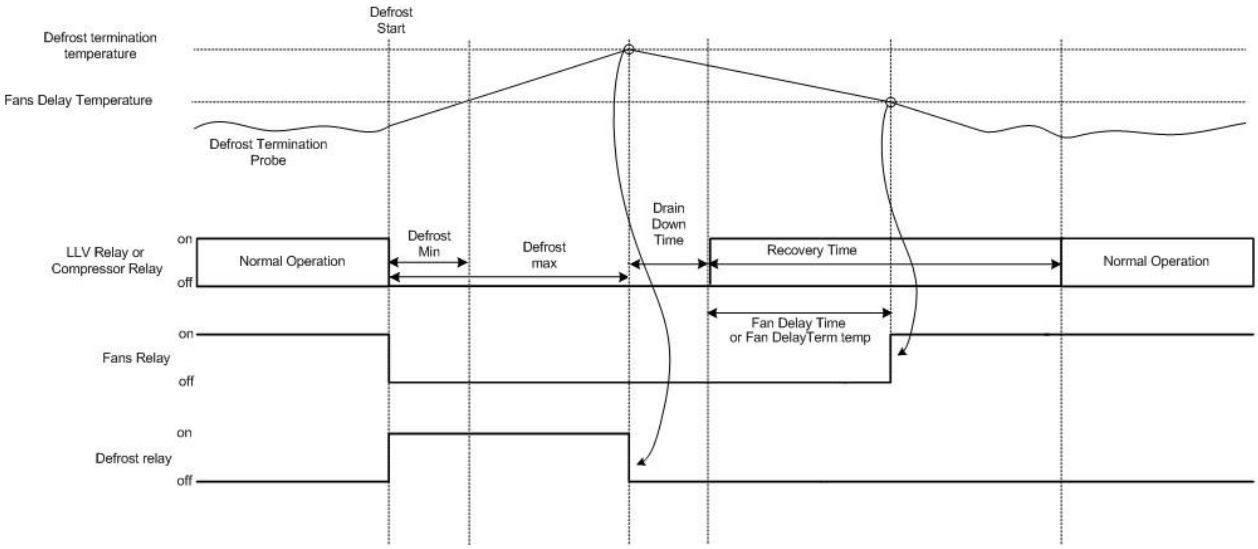
ped lint free cloth.

Appendix 1: Defrost Cycles

Fans On in Defrost



Fans Off in Defrost



Appendix 2: Trim Heater Control via Mercury/Intuitive Range

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.

RDM recommend that the Trim Heater Pulse Module (PR0723) is used in all instances of trim control. This module is fitted in between the trim heater of the case and the relay output of the 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. Therefore RDM recommend the use of this module in every trim heater control application. Please see the Trim Heater Pulse Module user guide for further details.

Revision History

Revision	Date	Changes
1.0	01/03/2015	Introduction of Mercury 3