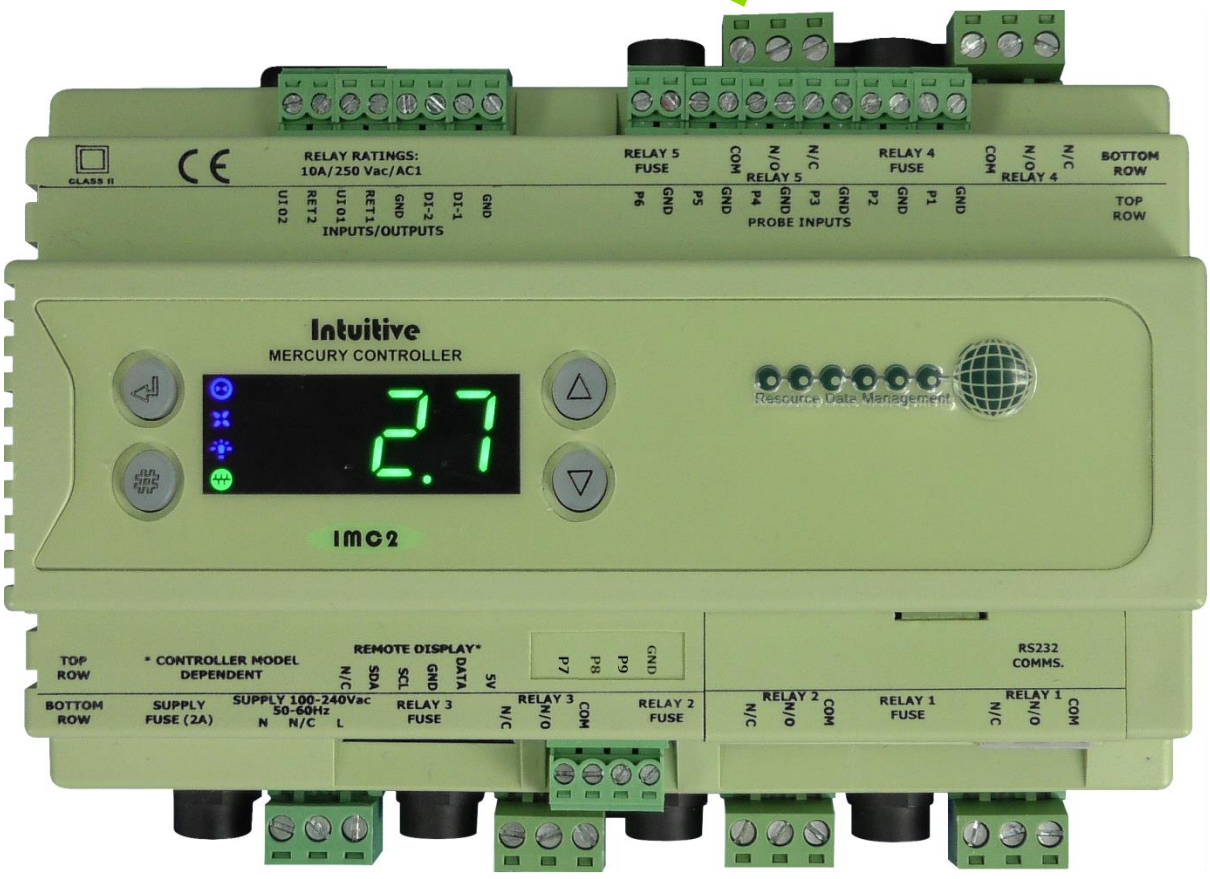
Resource
Data Management

Mercury Intuitive
Twin EEV Controller

Installation & User Guide
Revision 3.1



PR07xx-2E-TWINE-3P

Contents

The Mercury 3 Range

From Resource Data Management

The Intuitive Mercury Twin EEV controller is primarily intended for use in a refrigeration display cabinet with two separate evaporators each fitted with an electronic expansion valve (EEV). The controller is fitted with two solid state relays (SSRs) to control the two EEVs and an additional three standard mechanical relays each of which can be selected to control a single function: lights, fans, trim heaters or alarm. Temperature control is achieved by measuring the air temperature of each evaporator (air on probe only or average of air on and air off probes) and controlling the superheat across the evaporator using evaporator pipe probes or from a pressure transducer connected to a Mercury hub or RDM Plant Controller. The controller has many features, some of which are energy saving, such as the "pulse trim heaters" parameter, see parameter section for further details.

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

Variants

The controller is available with built in display or remote display and can be specified with an IP network card fitted otherwise it is supplied with an RS232 card as default.

The controller requires a minimum of 8 temperature probes to operate correctly and as such is supplied with a 3 probe expansion board factory fitted, this is the only expansion board option available.

Hardware Variants

Description	Part Number
Intuitive Mercury Twin EEV, integral display.	PR0751-2E-TWINE-3P
Intuitive Mercury Twin EEV, remote display.	PR0761-2E-TWINE-3P
Intuitive Mercury Twin EEV, integral display with IP communication	PR0751-2E-TWINE-IP-3P
Intuitive Mercury Twin EEV, remote display with IP communication	PR0761-2E-TWINE-IP-3P

Displays and Accessories

The following optional displays and accessories are available:

Description	Part Number
Mercury DIN Remote Display with 5m cable	PR0327
Mercury DIN Key switch Remote Display with 5m cable	PR0328
Mercury mk2 Remote Display with 5m cable	PR0725

Compatible Network Interfaces

Intuitive 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 Switch.

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

Configuration

The controller provides two configuration options (see 'Type' menu). It will default to type 3

Display value	Controller Type
1	Two Section Controller (LT)
2	Two Section Controller (HT)

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

Description	Part Number
Intuitive Internal IP Network Card Interface Kit	PR0770
Intuitive Internal RS485 Network Card Interface Kit	PR0771

Front Display Features

LED's:

Valve

Fans

Lights

Defrost

On-Line Status

Off - No network attached

Flashing - Attempting to Log on to network

Steady - On-line

Intuitive Mercury

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.

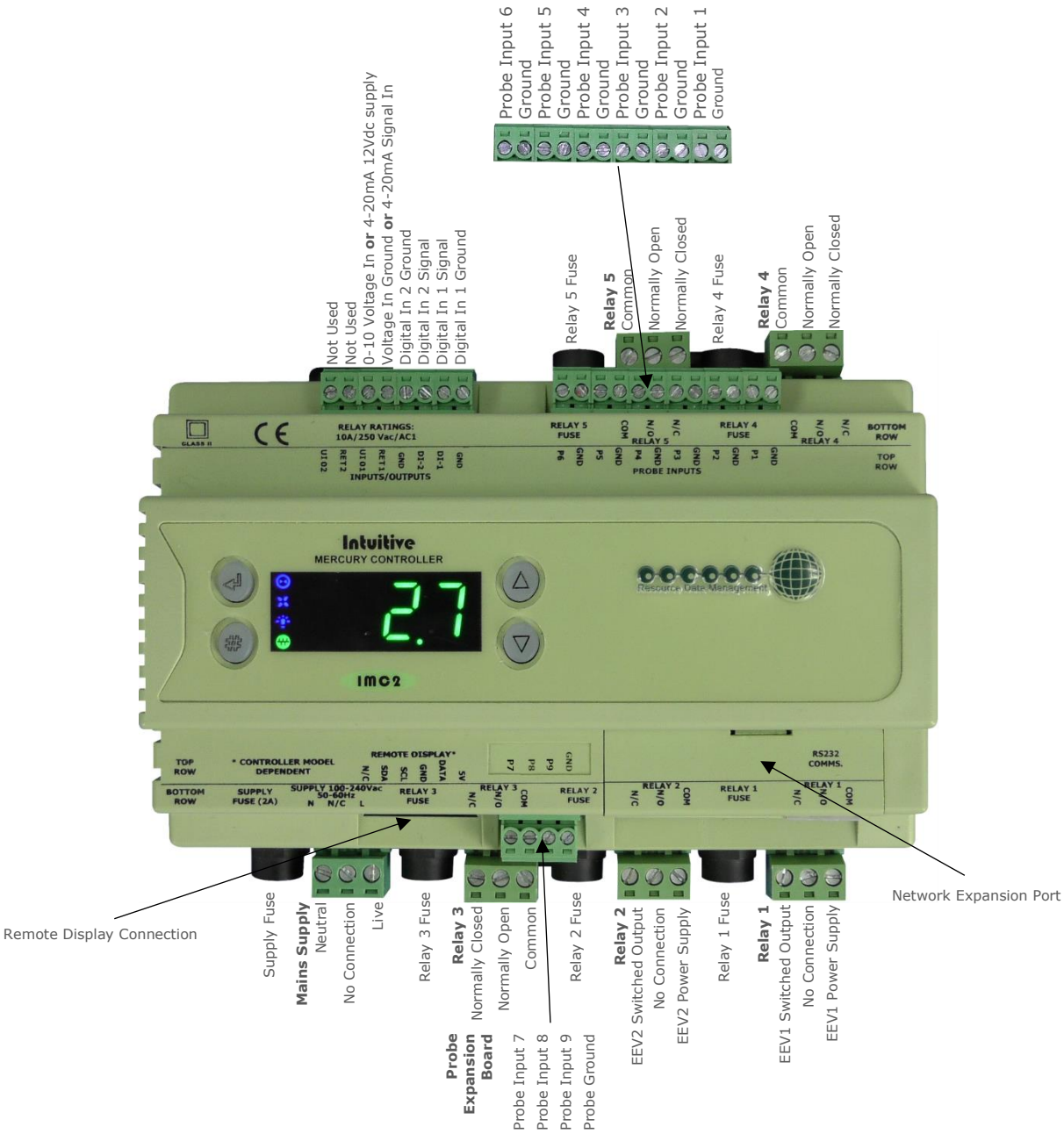
Service
(See Parameter
28 for setup)

Alarm

HACCP

Intuitive 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.



Please ensure 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.

I/O	Function	Alarm Action	Plant Input (Switched Resistors)
Probe Input 1	Air on temperature section 1	Yes	Plant fault or defrost input section 1
Probe Input 2	Air on temperature section 2	Yes	Plant fault or defrost input section 2
Probe Input 3	Air off **or** defrost temperature section	Yes	
Probe Input 4	Air off **or** defrost temperature section	Yes	
Probe Input 5	Evaporator temperature	Yes	
Probe Input 6	Evaporator temperature	Yes	
Probe Input 7	Suction line temperature	Yes	
Probe Input 8	Suction line temperature	Yes	
Probe Input 9	Monitor	Yes	Case Off (Select using parameter P-30 set to Prb/Case)
UI01/RET1	Pressure transducer connection	No	Evap. select set to Trans and Trans Mode set to V or mA
UI02/RET2	Not used	N/A	
Digital Input 1	Plant fault or defrost input section 1	Yes	
Digital Input 2	Plant fault or defrost input section 2	Yes	
Relay 1	Electronic Expansion Valve Section 1	N/A	
Relay 2	Electronic Expansion Valve Section 2	N/A	
Relay 3	Fans (default), defrost, lights, trim	N/A	
Relay 4	Fans. defrost (default), lights, trim	N/A	
Relay 5	Fans. defrost, lights (default), trim	N/A	

Transducer Input

UI01 connection can be used for a pressure transducer, 0-10v or 4-20mA input type can be used. Please consult the I/O Connections for wiring.
Depending on the type of transducer (0-10v or 4-20mA) the input type can be chosen using the Evap Select parameters P-130/131 and Trans Mode P=138 set to V or mA.

Ordering Information

When ordering an Intuitive Mercury Mk3 controller the following ordering scheme can be used to purchase the desired hardware configuration.

PR07X1 Y 2E TWINE Z 3P

X	Description
5	Integral Display
6	Remote Display

Y	Description
Blank	Fused
NF	Non-Fused

Z	Description
IP	Ethernet Comms
232	RS232 Comms

Example

To order an Intuitive Mercury MK3 twin EEV controller with a remote display, non-fused and IP comms;

PR0761 NF 2E TWINE IP 3P

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 Only
PrES	Set/View remote display type. Set to 1 for coldroom display	Display Type		CASE	Toggle Case Off mode	Case Off
diSP	Display whole units or decimal	Display		Ligt	Toggle Lights Only mode	Lights Only
dtyP	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 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 configuration types. (see configuration table on page 5)
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.

Display Type

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

0. Controller uses a standard Mercury remote display or DIN display (Default)
1. Controller uses a coldroom display.

Parameter Tables

Number	Parameter	Range °C (°F)	Step	Units	Default LT °C (°F)	Default HT °C(°F)
P-01	Section 1 Cut-in Temp.	-42 to 30 (-43.6 to 86)	0.1	Deg	-20 (-4)	0.0 (32)
P-02	Section 2 Cut-in Temp.	-42 to 30 (-43.6 to 86)	0.1	Deg	-20 (-4)	0.0 (32)
P-03	Section 1 Differential Below	0 to 10 (0 to 18)	0.1	Deg	2 (3.6)	1.5 (2.7)
P-04	Section 2 Differential Below	0 to 10 (0 to 18)	0.1	Deg	2 (3.6)	1.5 (2.7)
P-05	Section 1 Control Weight	0 to 100	1	%	50	50
P-06	Section 2 Control Weight	0 to 100	1	%	50	50
P-07	Section 1 Display Weight	0 to 100	1	%	50	50
P-08	Section 2 Display Weight	0 to 100	1	%	50	50
P-09	Section 1 Superheat Reference	0 to 12	0.1	Deg	6 (10.8)	6 (10.8)
P-10	Section 2 Superheat Reference	0 to 12	0.1	Deg	6 (10.8)	6 (10.8)
P-11	Section 1 Response On	1 to 30	1		10	10
P-12	Section 2 Response On	1 to 30	1		10	10
P-13	Section 1 Response Off	1 to 30	1		10	10
P-14	Section 2 Response Off	1 to 30	1		10	10
P-15	Section 1 Superheat Problem	0 to 12	0.1	Deg	0 (0)	0 (0)
P-16	Section 2 Superheat Problem	0 to 12	0.1	Deg	0 (0)	0 (0)
P-17	Section 1 Control Type	0=EEV 1=EET 2=EEV/EET	1		0	0
P-18	Section 2 Control Type	0=EEV 1=EET 2=EEV/EET	1		0	0
P-19	Section 1 Air Probe Number	1 to 2	1		2	2
P-20	Section 2 Air Probe Number	1 to 2	1		2	2
P-21	Section 1 Switched Resistors	0=Off 1=Plant 2=Defrost	1		0	0
P-22	Section 2 Switched Resistors	0=Off 1=Plant 2=Defrost	1		0	0
P-28	Service Time	0 to 128	1	K Hrs	0	0
P-29	Key Switch	0=Case 1=Fans 2=Toggle 3=Key Off	1		0	0
P-30	Probe 9 Select	0=Probe 1=Probe/Case Off	1		0	0
P-31	Probe 3 Select	0=Fans 1=Defrost 2=Lights 3=Trims 4=Alarm	1		0	0

P-32	Relay 4 Select	0=Fans 1=Defrost 2=Lights 3=Trims 4=Alarm	1		1	1
P-33	Relay 5 Select	0=Fans 1=Defrost 2=Lights 3=Trims 4=Alarm	1		2	2
P-40	Section 1 EEV Start Opening	0 to 100	1	%	50	50
P-41	Section 2 EEV Start Opening	0 to 100	1	%	50	50
P-42	Section 1 Minimum Opening	0 to 100	1	%	10	10
P-43	Section 2 Minimum Opening	0 to 100	1	%	10	10
P-44	Superheat 1 Problem Time	00:00 to 99:00	01:00	mm:ss	03:00	03:00
P-45	Superheat 2 Problem Time	00:00 to 99:00	01:00	mm:ss	03:00	03:00
P-46	Superheat 1 Problem	0 to 100	1	%	10	10
P-47	Superheat 2 Problem	0 to 100	1	%	10	10
P-48	Section 1 EEV Average	0 to 100	1	%	100	100
P-49	Section 2 EEV Average	0 to 100	1	%	100	100
P-50	Section 1 EEV Fail	0 to 100	1	%	0	0
P-51	Section 2 EEV Fail	0 to 100	1	%	0	0
P-60	Section 1 OT/UT Alarm Delay	00:00 to 99:00	01:00	mm:ss	20:00	20:00
P-61	Section 2 OT/UT Alarm Delay	00:00 to 99:00	01:00	mm:ss	20:00	20:00
P-62	Section 1 Under Temp. Alarm	-49.0 to 128.0	0.1	Deg	-30.0 (-22.0)	-2.0 (28.4)
P-63	Section 2 Under Temp. Alarm	-49.0 to 128.0	0.1	Deg	-30.0 (-22.0)	-2.0 (28.4)
P-64	Section 1 Over Temp. Alarm	-49.0 to 128.0	0.1	Deg	-15.0 (5.0)	5.0 (41.0)
P-65	Section 2 Over Temp. Alarm	-49.0 to 128.0	0.1	Deg	-15.0 (5.0)	5.0 (41.0)
P-69	Trim Mode	0=Local, 1=Hub	1		0	0
P-70	Trim in Defrost	0=Off 1=On	1		0	0
P-71	Trim Level	0 to 100	1	%	100	100
P-72	Fan Delay mode	0=Time 1=Temperature	1		0	0
P-73	Fan Delay Time	00:00 to 99:00	01:00	mm:ss	00:00	00:00
P-74	Fans Temperature Mode	0=Off 1=Temp 2=OT 3=Temp/OT	1		0	0
P-75	Section 1 Fans Off Temp.	-42 to 30	0.1	Deg	-10 (14.0)	8.0 (46.4)
P-76	Section 2 Fans Off Temp.	-42 to 30	0.1	Deg	-10 (14.0)	8.0 (46.4)
P-77	Fan Delay Temperature	-42 to 30	0.1	Deg	-20.0 (-4.0)	-8.0 (32.0)
P-78	Fans In Defrost	0=Off 1=On	1		1	1
P-80	Defrost Mode	0=Local 1=Remote 2=External	1		0	0
P-81	Defrost Start	00:00 to 23:59	00:01	hh:mm	01:00	01:00
P-82	Defrost Number Per Day	0 to 8	1		6	6
P-83	No Defrost Time (Hours)	0 to 180	1	Hours	12	12
P-84	Defrost Type	0=Electric 1=Electric/Cycle	1		0	0
P-85	Section 1 Defrost Termination	-42 to 30	0.1	Deg	14.0 (57.2)	10.0 (50.0)
P-86	Section 2 Defrost Termination	-42 to 30	0.1	Deg	14.0 (57.2)	10.0 (50.0)
P-87	Defrost Minimum Time	00:00 to 99:00	01:00	mm:ss	05:00	05:00
P-88	Defrost Maximum Time	00:00 to 99:00	01:00	mm:ss	24:00	24:00
P-89	Drain Down Time	00:00 to 24:00	01:00	mm:ss	00:00	00:00
P-90	Recovery Time	00:00 to 99:00	01:00	mm:ss	30:00	30:00
P-91	Pump Down Time	00:00 to 99:00	01:00	mm:ss	00:00	00:00

P-92	Defrost Hold	0=Off 1=On	1		0	0
P-94	Digital 1 Mode	0=Plant1 N/O 1=Plant1 N/C 2= Defrost	1		0	0
P-95	Digital 2 Mode	0=Plant2 N/O 1=Plant2 N/C 2= Defrost	1		0	0
P-100	Lights Mode	0=Local 1=Remote 2=Man Off 3=Man On	1		0	0
P-101	Sun Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00
P-102	Sun Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00
P-103	Mon Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00
P-104	Mon Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00
P-105	Tue Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00
P-106	Tue Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00
P-107	Wed Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00
P-108	Wed Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00
P-109	Thu Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00
P-110	Thu Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00
P-111	Fri Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00
P-112	Fri Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00
P-113	Sat Lights On	00:00 to 23:59	00:01	hh:mm	08:00	08:00
P-114	Sat Lights Off	00:00 to 23:59	00:01	hh:mm	20:00	20:00
P-120	Broadcast ID	0 to 255	1	-	0	0
P-121	Refrigerant	See Refrigerant Table Below	1	-	0	0
P-122	Pressure Units	0=Absolute 1=Gauge	1	-	0	0
P-123	Glide	-15.0 to 15.0	0.1	Deg	0.0	0.0
P-124	Load Shedding	0=Off 1=Mode 1 2=Mode 2	1		0	0
P-125	Ref Weight	0 to 100	1	%	0	0
P-130	Section 1 Evaporator Select	0=Local 1=Rem1 2=Rem2 3=Rem3	1		0	0
P-131	Section 2 Evaporator Select	0=Local 1=Rem1 2=Rem2 3=Rem3	1		0	0
P-132	Section 1 Evaporator Offset	0.0 to 5.0	0.1	Bar/Psi	0.0	0.0
P-133	Section 2 Evaporator Offset	0.0 to 5.0	0.1	Bar/Psi	0.0	0.0
P-134	Evap Cust Off	0.0 to 20.0	0.1		0.0	0.0
P-135	Evap Cust High	0.0 to 20.0	0.1		0.0	0.0
P-136	Trans Span	-3.4 to 180.0	0.1		13.8	13.8
P-137	Trans Offset	-3.4 to 180.0	0.1		0.0	0.0
P-138	Trans Mode	0=V 1=mA 2=Cust V 3=Cust mA	1		0	0
P-139	Section 1 MOP Cut-in	-3.4 to 180.0	0.1	Bar	3.4	3.4
P-140	Section 1 MOP Diff	-3.4 to 180.0	0.1	Bar	3.4	3.4
P-141	Section 1 MOP Delay	00:00 to 02:00	00:01	mm:ss	00:05	00:05
P-142	Section 2 MOP Cut-in	-3.4 to 180.0	0.1	Bar	3.4	3.4
P-143	Section 2 MOP Diff	-3.4 to 180.0	0.1	Bar	3.4	3.4
P-144	Section 2 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	-999 to 0	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	-999 to 0	1		384	384
P-157	Custom C2	-999 to 999	0.1		262.5	262.5
dFLt	Restore defaults	**USE WITH CAUTION!**				

* Transducer Span and Offset allows for the full range of the transducer to be used by the Intuitive Mercury Controller. 'Span' is the full range of the transducer, 'Offset' is the value below zero.
Example: RDM PR0160 with range -1 bar to 20 bar, Span would be 21 bar, Offset would be -1 bar.

Refrigerant Table for P-121

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		

Parameter Descriptions

Number	Parameter	Description
P-01	Section 1 Cut-in Temp.	Temperature below which section 1 EEV will start to open.
P-02	Section 2 Cut-in Temp.	Temperature below which section 2 EEV will start to open.
P-03	Section 1 Differential Below	Differential temperature below section 1 cut-in temperature. The EEV closes below this temperature
P-04	Section 2 Differential Below	Differential temperature below section 1 cut-in temperature. The EEV closes below this temperature
P-05	Section 1 Control Weight	Percentage of the Air-On temperature that is used to calculate section 1 control temp. The remaining percentage will be the Air-Off temperature Example, P-03 set to 30% Control temp = 30% Air-on + 70% Air-off
P-06	Section 2 Control Weight	Percentage of the Air-On temperature that is used to calculate section 2 control temp. The remaining percentage will be the Air-Off temperature Example, P-03 set to 30% Control temp = 30% Air-on + 70% Air-off
P-07	Section 1 Display Weight	Percentage of the section 1 Air-On temperature that is shown in the temperature display. The remaining percentage will be the Air-Off temperature Example, P-03 set to 30% Display temp = 30% Air-on + 70% Air-off
P-08	Section 2 Display Weight	Percentage of the section 2 Air-On temperature that is shown in the temperature display. The remaining percentage will be the Air-Off temperature Example, P-03 set to 30% Display temp = 30% Air-on + 70% Air-off
P-09	Section 1 Superheat Reference	Once there is a demand for cooling on section 1 (cabinet temperature is above setpoint), the controller will attempt to maintain this superheat value.
P-10	Section 2 Superheat Reference	Once there is a demand for cooling on section 2 (cabinet temperature is above setpoint), the controller will attempt to maintain this superheat value.
P-11	Section 1 Response On	Allows the user to speed up section 1 EEV opening rate. With 30 providing the quickest response and 1 providing the slowest response.
P-12	Section 2 Response On	Allows the user to speed up section 2 EEV opening rate. With 30 providing the quickest response and 1 providing the slowest response.
P-13	Section 1 Response Off	Allows the user to speed up section 1 EEV closing rate. With 30 providing the quickest response and 1 providing the slowest response.
P-14	Section 2 Response Off	Allows the user to speed up section 2 EEV closing rate. With 30 providing the quickest response and 1 providing the slowest response.
P-15	Section 1 Superheat Problem	If the superheat on section 1 drops below this value then the valve will go to the problem opening state, this is a safety opening to prevent liquid flooding back to the compressor.

P-16	Section 2 Superheat Problem	If the superheat on section 2 drops below this value then the valve will go to the problem opening state, this is a safety opening to prevent liquid flooding back to the compressor.
P-17	Section 1 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-18	Section 2 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-19	Section 1 Air Probe Number	This selects the function of probe 3. If this is set to 2 then probe 3 becomes the section 1 air off probe (probe 1 is always the section 1air on probe). If set to 1 then probe 3 becomes the section 1 defrost termination probe.
P-20	Section 2 Air Probe Number	This selects the function of probe 4. If this is set to 2 then probe 4 becomes the section 2 air off probe (probe 2 is always the section 2 air on probe). If set to 1 then probe 4 becomes the section 2 defrost termination probe.
P-21	Section 1 Switched Resistors	Selects the function of switched resistor on probe 1 position, this can be set to Off (switched resistor not used), Plant Fault or Defrost input.
P-22	Section 2 Switched Resistors	Selects the function of switched resistor on probe 2 position, this can be set to Off (switched resistor not used), Plant Fault or Defrost input.
P-28	Service Time	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-29	Key Switch	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-30	Probe 9 Select	Probe 9 is an additional monitoring probe if required, if set to Prb/Case then it can also be used as a case off signal using a switched resistor.
P-31	Relay 3 Select	The function of relay 3 is selectable, it can be set to either fans, defrost, lights, trim heaters or alarm.
P-32	Relay 4 Select	The function of relay 4 is selectable, it can be set to either fans, defrost, lights, trim heaters or alarm.
P-33	Relay 5 Select	The function of relay 5 is selectable, it can be set to either fans, defrost, lights, trim heaters or alarm.
P-40	Section 1 EEV Start Opening	Sets the section 1 valve opening % which is used immediately after the device is powered on.
P-41	Section 2 EEV Start Opening	Sets the section 2 valve opening % which is used immediately after the device is powered on.
P-42	Section 1 Minimum Opening	Sets the minimum section 1 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 or remote pressure from Plant Pack controller then the Minimum value should be set at **0%**

P-43	Section 2 Minimum Opening	Sets the minimum section 2 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 or remote pressure from Plant Pack controller then the Minimum value should be set at **0%**
P-44	Superheat 1 Problem Time	Sets the time section 1 stays in the "Superheat EEV Problem" state.
P-45	Superheat 2 Problem Time	Sets the time section 2 stays in the "Superheat EEV Problem" state.
P-46	Superheat 1 Problem	Sets section 1 valve open position when entering the "Superheat EEV Problem" state.
P-47	Superheat 2 Problem	Sets section 2 valve open position when entering the "Superheat EEV Problem" state.
P-48	Section 1 EEV Average	Normally section 1 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-48 is set to 50% then the valve will open at 40%.
P-49	Section 2 EEV Average	Normally section 2 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-49 is set to 50% then the valve will open at 40%.
P-50	Section 1 EEV Fail	In the event of probe failure, the controller will be unable to control superheat and will open the section 1 valve to this fixed value.
P-51	Section 2 EEV Fail	In the event of probe failure, the controller will be unable to control superheat and will open the section 2 valve to this fixed value.
P-53	Section 1 Div 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-42/43 Section 1/2 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-139 through to P-144 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-54	Section 2 Div Value	
P-60	Section 1 OT/UT Alarm Delay	Temperature alarm delay period for section 1
P-61	Section 2 OT/UT Alarm Delay	Temperature alarm delay period for section 2
P-62	Section 1 Under Temp. Alarm	Section 1 under temperature alarm set point. This alarm uses the control temperature.
P-63	Section 2 Under Temp. Alarm	Section 2 under temperature alarm set point. This alarm uses the control temperature.
P-64	Section 1 Over Temp. Alarm	Section 1 over temperature alarm set point. This alarm uses the air-off temperature if two air probes are being used otherwise it will use the air on probe.
P-65	Section 2 Over Temp. Alarm	Section 2 over temperature alarm set point. This alarm uses the air-off temperature if two air probes are being used otherwise it will use the air on probe.
P-69	Trim Mode	Selects a fixed trim level (local) or a trim level from a Mercury Hub (Hub). If the Data Manager network trim feature is in use then this parameter should be set to local.
P-70	Trim in Defrost	Allows the trims to be off or on during a defrost.
P-71	Trim Level	Sets a percentage level, of a 5-minute period, to pulse the trim heater relay off/on. Example: If 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-72	Fan Delay mode	This parameter allows the fans start after a drain-down period to be delayed, either by time (P-73) or when the temperature point (P-77) is reached. This parameter uses the same probe strategy as the defrost terminate.

P-73	Fan Delay Time	Time after a drain-down period before the fans start if P-72 is set to time
P-74	Fans Temperature Mode	Allows the user to set the fans to turn off when: - A pre-determined temperature is reached (P75 & P76) **or** When an over-temperature alarm is present **or** A pre-determined temperature is reached or when an over-temperature alarm is present
P-75	Section 1 Fans Off Temp.	Section 1 temperature for the above (P74) 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 the air off probe is used.
P-76	Section 2 Fans Off Temp.	Section 2 temperature for the above (P74) 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 the air off probe is used.
P-77	Fan Delay Temperature	Temperature at which the fans start after a drain-down period when P-72 is set to temperature.
P-78	Fans In Defrost	Allows fans to run or not during defrost.
P-80	Defrost Mode	Allows the user to set the defrost mode: - ➢ Local (Uses the internal parameters P-81 and P-82) ➢ Remote (Requires a defrost schedule in the front end) ➢ External (uses a switched resistor in input 1 and/or 2 or digital input 1 or 2). 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.
P-81	Defrost Start	When defrost mode is set to "Local", this is the start time for the 1st defrost
P-82	Defrost Number Per Day	When defrost mode is set to "Local", this is the number of defrosts per day equally spaced from the start time.
P-83	No Defrost Time (Hours)	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-84	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.
P-85	Section 1 Defrost Termination	The defrost cycle will terminate (defrost control relay switch off) when the temperature of the defrost termination probe or air off probe reaches this value. Section 1 or section 2 can terminate defrost, whichever one reaches it's termination temperature first.
P-86	Section 2 Defrost Termination	The defrost cycle will terminate (defrost control relay switch off) when the temperature of the defrost termination probe or air off probe reaches this value. Section 1 or section 2 can terminate defrost, whichever one reaches it's termination temperature first.
P-87	Defrost Minimum Time	Minimum time that a defrost will last. If termination temperature is reached during this period, the defrost control relay is turned off, but the controller will remain in defrost (not cooling) until the end of the defrost minimum period.
P-88	Defrost Maximum Time	The maximum allowable defrost period if the defrost termination temperature is not reached.
P-89	Drain Down Time	A period after defrost max to allow the draining of any surplus water
P-90	Recovery Time	The time period after defrost to allow the temperature to recover to the normal operating point, over temperature alarms are inhibited during recovery. Note that if the air-off temperature (or air on temperature if the air off probe is not being used) is still above the OT alarm setpoint when this period expires, an immediate OT alarm occurs; there is **not** a further alarm delay.
P-91	Pump Down Time	Time period before the start of defrost to allow for a pump down
P-92	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-94	Digital 1 Mode	Selects the operation of digital input 1 (volt free).

		Plant1 N/O: When the input is closed circuit a Plant Fault 1 alarm will be generated. Plant 1 N/C: When the input is open circuit a Plant Fault 1 alarm will be generated. Defrost: When the input is closed a defrost cycle is initiated (P-80 defrost mode must be set to External)
P-95	Digital 2 Mode	Selects the operation of digital input 2 (volt free). Plant2 N/O: When the input is closed circuit a Plant Fault 2 alarm will be generated. Plant 2 N/C: When the input is open circuit a Plant Fault 2 alarm will be generated. Defrost: When the input is closed a defrost cycle is initiated (P-80 defrost mode must be set to External)
P-100	Lights Mode	Allows the user to set the lights mode: - ➢ Always off ➢ Always on ➢ Use a local schedule P-101 to P-114) Use a remote schedule (Set up in the system front end)
P-101	Sun Lights On	When P-60 is set to Local, Sunday on time
P-102	Sun Lights Off	When P-60 is set to Local, Sunday off time
P-103	Mon Lights On	When P-60 is set to Local, Monday on time
P-104	Mon Lights Off	When P-60 is set to Local, Monday off time
P-105	Tue Lights On	When P-60 is set to Local, Tuesday on time
P-106	Tue Lights Off	When P-60 is set to Local, Tuesday off time
P-107	Wed Lights On	When P-60 is set to Local, Wednesday on time
P-108	Wed Lights Off	When P-60 is set to Local, Wednesday off time
P-109	Thu Lights On	When P-60 is set to Local, Thursday on time
P-110	Thu Lights Off	When P-60 is set to Local, Thursday off time
P-111	Fri Lights On	When P-60 is set to Local, Friday on time
P-112	Fri Lights Off	When P-60 is set to Local, Friday off time
P-113	Sat Lights On	When P-60 is set to Local, Saturday on time
P-114	Sat Lights Off	When P-60 is set to Local, Saturday off time
P-120	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 affects on control.
P-121	Refrigerant	Type of refrigerant used in system. See: Refrigerant Table above
P-122	Pressure Units	Absolute or Gauge
P-123	Glide	Offset to allow for pressure drop over distance
P-124	Load Shedding	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 EEV and stop the fans, mode 2 will close the EEV and stop the fans.
P-125	Ref Weight	Allows for a weighted average between liquid and vapour pressure to be used in the pressure to temperature calculation. See: Ref weight
P-130	Section 1 Evap Select	This allows the section 1 superheat to be calculated from a pressure transducer. The pressure is converted to temperature and used in place of the evaporator in temperature probe 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. The pressure value can be broadcast from an RDM pack controller on the same IP network or a pressure transducer connected to a local Mercury Hub. Please see: EEV Control Using Pressure.
P-131	Section 2 Evap Select	This allows the section 2 superheat to be calculated from a pressure transducer. The pressure is converted to temperature and used in place of the evaporator in temperature probe 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. The pressure value can be

		broadcast from an RDM pack controller on the same IP network or a pressure transducer connected to a local Mercury Hub. Please see: EEV Control Using Pressure.
P-132	Section 1 Evap Offset	Offset to allow for pressure drop over distance
P-133	Section 2 Evap Offset	Offset to allow for pressure drop over distance
P-134	Evap Cust Off	Offset applied to the locally connected transducer if the parameter "Transducer Mode" is set to Custom V or Custom mA. This is the lower limit of the transducer in Volts or mA.
P-135	Evap Cust High	Upper limit for the locally connected transducer if the parameter "Transducer Mode" is set to Custom V or Custom mA. This is the upper limit of the transducer in Volts or mA. For example: If using a 0.5v to 4.5v pressure transducer, P-134 "Evap Cust Off" would be set to 0.5v and P-135 "Evap Cust High" would be set to 4.5v.
P-136	Trans Span	The total range of a locally connected pressure transducer in Bar or psi.
P-137	Trans Offset	The offset from 0 of a locally connected pressure transducer in Bar or psi. For example, if the transducer has a range of -1 to 20 Bar then the Span is set to 21 Bar and the offset to -1 Bar.
P-138	Trans Mode	Selects the type of locally connected pressure transducer. V = 0-10 vdc input. mA = 4-20mA input. Cust V = voltage input range can be configured using P-134 and P-135 Cust mA = mA input range can be configured using P-134 and P-135
P-139	Section 1 MOP Cut-in	If the pressure exceeds this value, then the controller's section 1 valve will close or be reduced to a predetermined percentage. A MOP alarm is also created. (See Maximum Operating Pressure (MOP))
P-140	Section 1 MOP Diff	When the pressure reduces below this value, the controller's section 1 valve will recover to their normal operational
P-141	Section 1 MOP Delay	Delay after the MOP value for section 1 has been exceeded before the MOP actions and alarm occurs.
P-142	Section 2 MOP Cut-in	If the pressure exceeds this value, then the controller's section 2 valve will close or be reduced to a predetermined percentage. A MOP alarm is also created. (See Maximum Operating Pressure (MOP))
P-143	Section 2 MOP Diff	When the pressure reduces below this value, the controller's section 2 valve will recover to their normal operational
P-144	Section 2 MOP Delay	Delay after the MOP value has been exceeded before the MOP actions and alarm occurs.
P-150	Custom A1	If a refrigerant gas is being used that is not listed under P-121 "Refrigerant Type" then a custom pressure/temperature look up table can be generated by 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	
dFLt	Restore defaults	Resets all parameters back to default values, USE WITH CAUTION.

Operating Principal

The following applies when control type (P-17 & P-18) is set to EEV (default).

The control temperature for each section is measured using an average of the air on and air off probes, this average ratio can be adjusted (P-05 & P-06) but as default it will use 50% air on and 50% air off temperature. If number of air probes is set to 1 (P-19 & P-20) then only the air on probe is used for temperature control (the air off probe is not used).

Once the control temperature rises above the cut in setting (P-01 & P-02) then there is a requirement for cooling and the electronic expansion valve will start opening, valve state will change from "off" to "start".

The valve will open to a value which is the average valve opening since the last defrost cycle (this opening value can be reduced using P48 & P-49 if required) the valve will remain at this opening value for 30 seconds to establish a superheat reading.

The valve state will now change from "start" to "run", the controller will now adjust the valve opening to maintain the superheat target reference (P09 & P-10, default 6 degrees C).

If the superheat drops below the superheat problem setting (P-15 & P-16, default 0 degrees C) for the superheat problem time (P-44 & P-45, default 3 minutes) then the valve opening will go to the problem opening value (P-46 & P-47, default 10%), this is to prevent liquid flooding back to the compressors, valve state will change from "run" to "problem". The valve will stay at this fixed opening for the problem time (3 minutes default) and will then start to open the valve normally and control to the superheat value for 30 seconds, valve state will change from "problem" to "start". If after 30 seconds the superheat does not rise above the problem setting (0 degrees default) then the valve will revert back to the problem opening (default 10%) and the process will repeat.

If at any point the cabinet temperature drops below the cut in temperature (P-01 & P-02) minus the differential below (P-03 & P-04) then there is no demand for cooling and the valve will close, valve state will go from "run", "start" or "problem" to "off".

Selecting a Pressure Source

Direct Transducer Connection

P-130 and P-131 set to Trans V, Trans mA, Cust V or Cust mA. A suction transducer can be connected directly to 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.
(Parameters P121/136/137/138 will need to be set accordingly)

Mercury Switch (PR0018-PHI)

P-131 and P-132 set to Rem1. The Mercury Switch can be used for superheat control on an island by island basis. In the application the evaporator temperature is obtained from the Mercury switch on which the controller is connected. 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. P-131/132 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-131/132 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). Set the broadcast ID (P-120) to the ID of Plant Pack Controller (Rotary Switch Setting), P-121 set to refrigerant type, P-122 set to pressure units absolute or gauge

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-139 to P-144). 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%.

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.

Load Shedding

Used on in conjunction with the Pack Fail Setup feature in the DMTouch for load shedding on Compressor Faults or High Pressure. Cases can be put into a "Load Shed" mode 1 or mode 2 to reduce the load on the pack or to reduce the pack pressure.
Mode 1 will open the valve and stop the fans, mode 2 will close the valve and stop the fans.

Relay State and functional operation

Relay State	Function State	Wired contact	Relay State	Function State	Wired contact
SSR 1 Energised	EEV 1 open	N/C	Relay 3/4/5 on	Fans off	N/C
SSR 1 De Energised	EEV 1 closed	N/C	Relay 3/4/5 off	Alarm Relay = Alarm	N/C
SSR 2 Energised	EEV 2 open	N/C	Relay 3/4/5 on	Alarm Relay = OK	N/C
SSR 2 De Energised	EEV 2 Closed	N/C	Relay 3/4/5 off	Trims off	N/O
Relay 3/4/5 off	Lights on	N/C	Relay 3/4/5 on	Trims on	N/O
Relay 3/4/5 on	Lights off	N/C	Relay 3/4/5 off	Defrost control off	N/O
Relay 3/4/5 off	Fans on	N/C	Relay 3/4/5 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
SSR1 EEV1	Closed	Closed	Closed	Closed	Open	Open
SSR2 EEV2	Closed	Closed	Closed	Closed	Open	Open
RLY 3/4/5 Trim on in defrost **RLY 3/4/5 Trim off in defrost**	On Off	On Off	On Off	On Off	On Off	On On
RLY 3/4/5 Defrost Relay	Off	On	On	Off	Off	Off
RLY 3/4/5 Lights relay	On	On	On	On	On	On
RLY 3/4/5 Fans (On in DF)	On	On	On	On	Off	On
RLY 3/4/5 Fans (Off in DF)	On	Off	Off	Off	Off	On

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 probes reach the fan delay set point, or on the time parameter, whichever occurs first.

Note: If the "fan delay mode" is set to temp then at least one defrost probe must be fitted. If not, the controller will bring the fans on straight after drain down.

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

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.

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 (see table below)

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 Intuitive Mercury (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

Intutive Mercury 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 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
I-01	Section 1 Control Temp.	-49 to 128 (-56.2 to 262)	0.1	Deg
I-02	Section 2 Control Temp.	-49 to 128 (-56.2 to 262)	0.1	Deg
I-03	Section 1 Air on Probe	-49 to 128 (-56.2 to 262)	0.1	Deg
I-04	Section 2 Air on Probe	-49 to 128 (-56.2 to 262)	0.1	Deg
I-05	Section 1 Air off Probe	-49 to 128 (-56.2 to 262)	0.1	Deg
I-06	Section 2 Air off Probe	-49 to 128 (-56.2 to 262)	0.1	Deg
I-07	Section 1 Evaporator Probe	-49 to 128 (-56.2 to 262)	0.1	Deg
I-08	Section 2 Evaporator Probe	-49 to 128 (-56.2 to 262)	0.1	Deg
I-09	Section 1 Suction Line Probe	-49 to 128 (-56.2 to 262)	0.1	Deg
I-10	Section 2 Suction Line Probe	-49 to 128 (-56.2 to 262)	0.1	Deg
I-11	Section 1 Superheat	-49 to 128 (-56.2 to 262)	0.1	Deg
I-12	Section 2 Superheat	-49 to 128 (-56.2 to 262)	0.1	Deg
I-13	Section 1 Defrost	-49 to 128 (-56.2 to 262)	0.1	Deg
I-14	Section 2 Defrost	-49 to 128 (-56.2 to 262)	0.1	Deg
I-15	Section 1 Plant Fault	0 (OK), 1 (Alarm)	1	
I-16	Section 2 Plant Fault	0 (OK), 1 (Alarm)	1	
I-17	Section 1 External Defrost	0 (Off), 1 (On)	1	
I-18	Section 2 External Defrost	0 (Off), 1 (On)	1	
I-19	Probe 9	-49 to 128 (-56.2 to 262)	0.1	Deg
I-20	Section 1 Remote Evaporator Temperature	-49 to 128 (-56.2 to 262)	0.1	Deg
I-21	Section 2 Remote Evaporator Temperature	-49 to 128 (-56.2 to 262)	0.1	Deg
I-22	Section 1 Remote Pressure	-3.4 to 180 (-49 to 2610)	0.1	Bar/psi
I-23	Section 2 Remote Pressure	-3.4 to 180 (-49 to 2610)	0.1	Bar/psi
I-24	Section 1 Local Pressure	-3.4 to 180 (-49 to 2610)	0.1	Bar/psi
I-25	Section 2 Local Pressure	-3.4 to 180 (-49 to 2610)	0.1	Bar/psi
I-26	Local Calculated Temperature	-49 to 128 (-56.2 to 262)	0.1	Deg
I-30	Network Trim Level	0 to 100	1	%

I-34	Case Clean	0 (Off), 1 (On)	1	
I-35	Load Shedding	0 (Off), 1 (On)	1	
O-03	Section 1 Thermostat	0 (Off), 1 (On)	1	
O-04	Section 2 Thermostat	0 (Off), 1 (On)	1	
O-05	Defrost Relay	0 (Off), 1 (On)	1	
O-06	Lights Relay	0 (Off)	1	
O-07	Fan Relay	0 (Off)	1	
O-08	Trim Relay	0 (Off)	1	
O-09	Alarm Relay	0 (Off)	0.1	%
O-20	Section 1 EEV Opening	0 to 100	0.1	%
O-21	Section 2 EEV Opening	0 to 100	0.1	%
O-22	Last Defrost Time	00:00 to 03:00	00:01	hh:mm
O-23	Last Defrost Length	00:00 to 03:00	00:01	hh:mm
O-24	Section 1 Last Def. Ctrl Temp.	-42 to 128 (-43.6 to 262)	0.1	Deg
O-25	Section 2 Last Def. Ctrl Temp.	-42 to 128 (-43.6 to 262)	0.1	Deg
O-26	Last Def. Type	0 (None), 1 (Internal), 2 (External), 3 (Network), 4 (Display), 5 (Timed) 6 (Forced), 7 (Skipped)	1	
O-30	Section 2 Set Point Offset	-49 to 128 (-56.2 to 262)	0.1	Deg.
O-31	Section 2 Set Point Offset	-49 to 128 (-56.2 to 262)	0.1	Deg.
O-33	Trim Off Period	00:00 to 05:00	00:01	mm:ss
O-40	Run Time	0 – 128 K Hours	1	Hours x 1000
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	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-03	Valve State	0 (Off), 1 (Start), 2 (Run), 3 (Problem), 4 (Fail), 5 (Shed)		
S-04	Valve State	0 (Off), 1 (Start), 2 (Run), 3 (Problem), 4 (Fail), 5 (Shed)		

* Range is dependent on probe type

Display Messages

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

Display Message	System status	Display Message	System status
Ft	Control Fault	rEC	Control State in Recovery
Prb1	Probe 1 Fault	dEF	Control Sate in Defrost
Prb2	Probe 2 Fault	AL	Control State in Alarm
Prb3	Probe 3 Fault	FanS ONLy	Controller in Fans Only Mode
Prb4	Probe 4 Fault	Ligt OnLY	Controller in Lights Only Mode
Prb5	Probe 5 Fault	CASE OFF	Controller in Case Off Mode
Prb6	Probe 6 Fault	rFt1	Remote Evap temp Section 1 Fault
Prb7	Probe 7 Fault	rFt2	Remote Evap temp Section 2 Fault
Prb8	Probe 8 Fault	Ot AL	Over Temperature Alarm
Prb9	Probe 9 Fault	Ut AL	Under Temperature Alarm
		Ld ShEd	Load Shedding

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	Case Off	29
Plant Fault	3	Remote evap temperature	6
Case over temperature	4	Load Shedding	7
Case under temperature	5	Lights Only	29
Probes 1 to 9 Faulty	6		

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". 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°C (-18°F) to +10°C (+18°F) and on a channel basis. Example C1 = Probe 1.

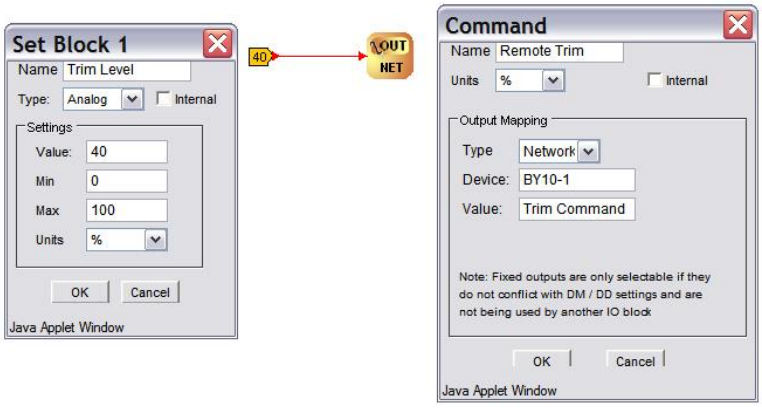
Remote Commands

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 minutes)	Relay 3, 4 or 5 set to Trim Heater
S1 Setpoint Cmd	+/-18	Is added to or subtracted from section 1 setpoint	
S2 Setpoint Cmd	+/-18	Is added to or subtracted from section 2 setpoint	
Case Off Command	5 8 0	Sets the controller to Case Off Sets the controller to Lights Only Restores the controller from Case Off / Lights Only to Normal	
Haccp Command	0 1 2	HACCP LED OFF HACCP LED On HACCP LED Flashes	
Button Command	0 1 2	Buttons backlights Off Buttons backlights On Buttons Backlights Flash	
S1 EEV Command	2 1	Shuts the valve 1 off Restores the valve to normal operation	
S2 EEV Command	2 1	Shuts the valve 2 off Restores the valve to normal operation	

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.

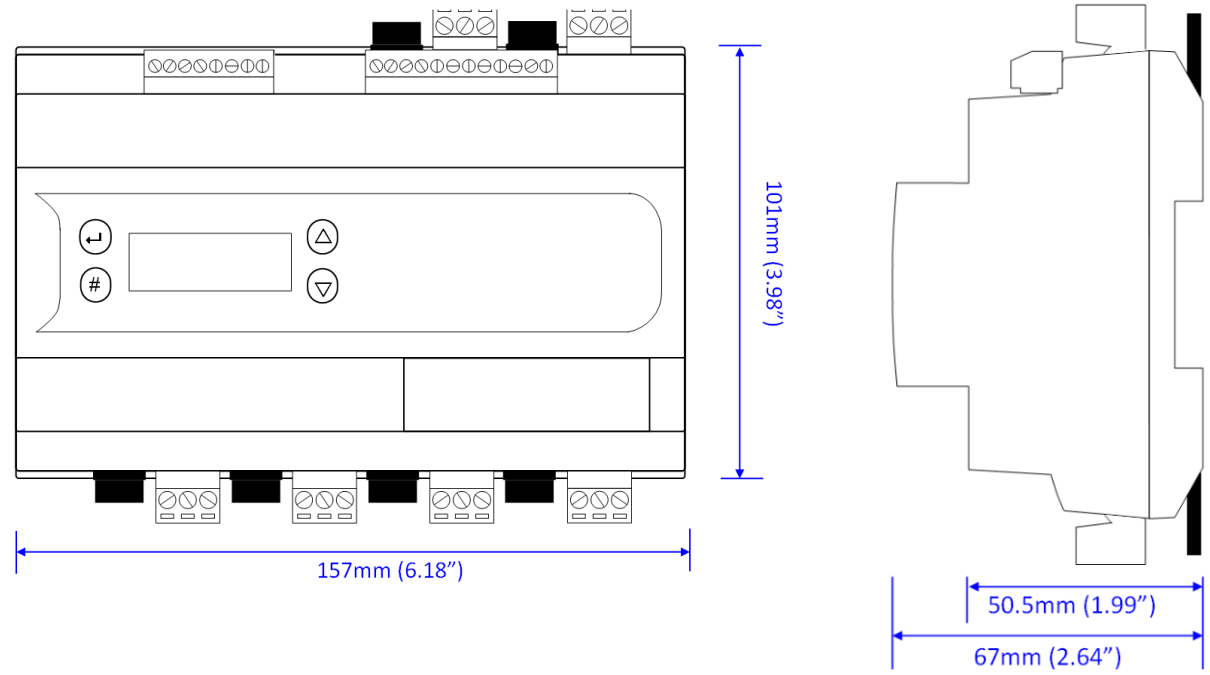
See Example on the right, which sets the Trim Heater on BY10-1 at 40%.

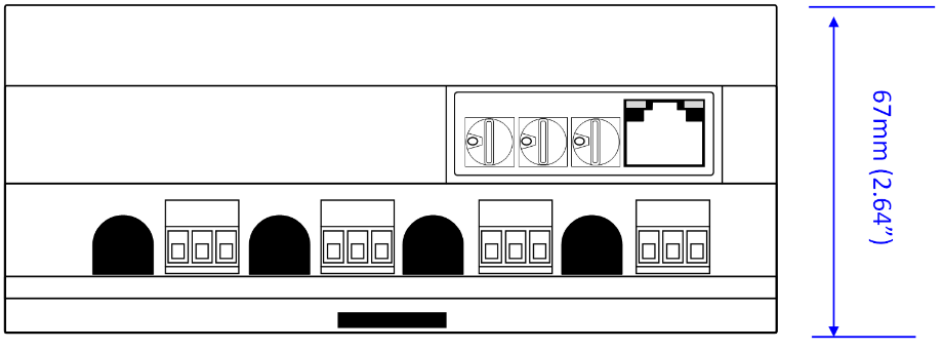


Specification

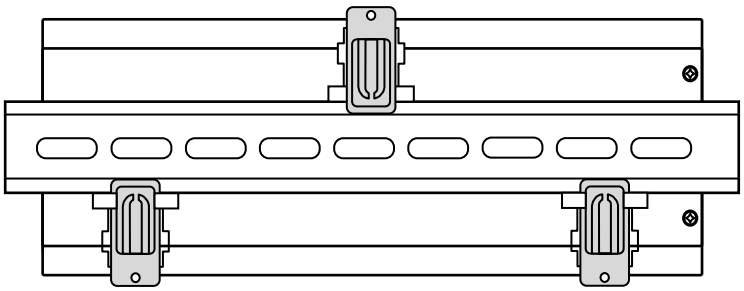
Intuitive Mercury Controller PR07XX-TWINE	
Power Requirements	
Supply Voltage Range	100 – 240 Vac ±10%
Supply Frequency	50 – 60 Hz
Maximum supply current	2 Amps
Typical supply current	<1 Amp
General	
Operating temperature range	-10^{0}C to 60^{0}C (14°F to 140°F)
Storage temperature range	-20^{0}C to 65^{0}C (-4°F to 149°F)
Environmental	Indoor use at altitudes up to 2000m, pollution degree 2, installation category II. Voltage fluctuations not to exceed ±10% of nominal voltage.
Size	157mm (W) x 67mm (H) x 120mm (D)
Approx. Weight	500 grams
Safety	EN61010
EMC	Conforms to EN60730-1 based on UL 60950-1; UL 62368-1 as referenced to IEC60730-1
Ventilation	There is no requirement for forced cooling ventilation
Class 2 Insulation	**No** protective Earth is required and **none** should be fitted
Supply Fuse	Built in fuse holder, fuse 2A 240Vac Anti-surge (T) HRC conforming to IEC60127, 32 x 6.3mm
Or MCB	2A, Type C conforming to BS EN 60898
Relay Specification	
Relays 1&2 SSR	
Max current	1.0A
Max voltage	250Vac (ac only, will not switch dc)
Relays 3 – 5 Mechanical	
Max current	Relays 2-5: 6A Resistive (CosØ = 1) 2A Inductive (CosØ = 0.4)
Max voltage	250Vac, 30V dc
Mechanical Relay Operational Life	
Switching 3A load (non-inductive)	350,000 operations
Switching 500mA load (non-inductive)	2,000,000 operations
Safety	Conforms to EN60730-1 based on UL 60950-1; UL 62368-1 as referenced to IEC60730-1
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, provides a 12 Vdc output to power the pressure transducer. See wiring
Digital Inputs	Volt Free
Comms	
Serial Variant	RS232 with flow control
Ethernet Variant	IP comms

Dimensions





Intuitive Mercury Mounting Instructions

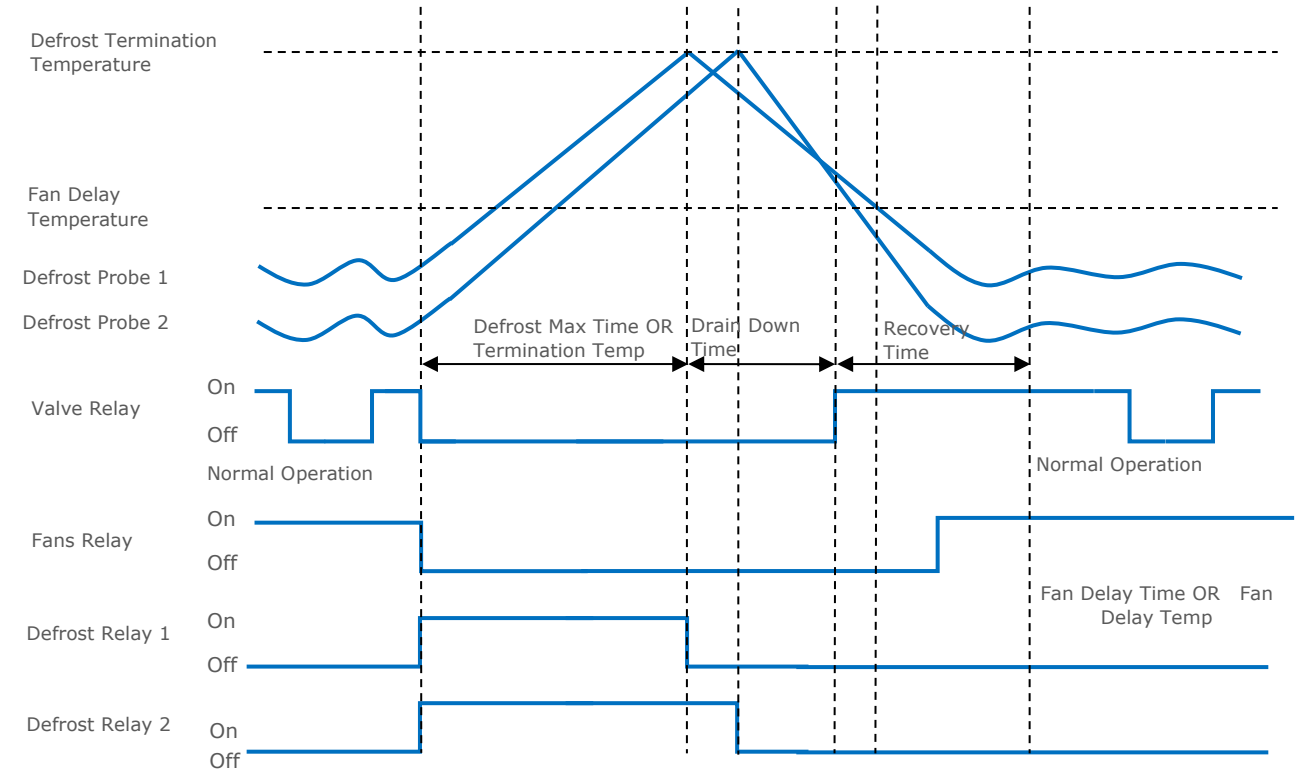


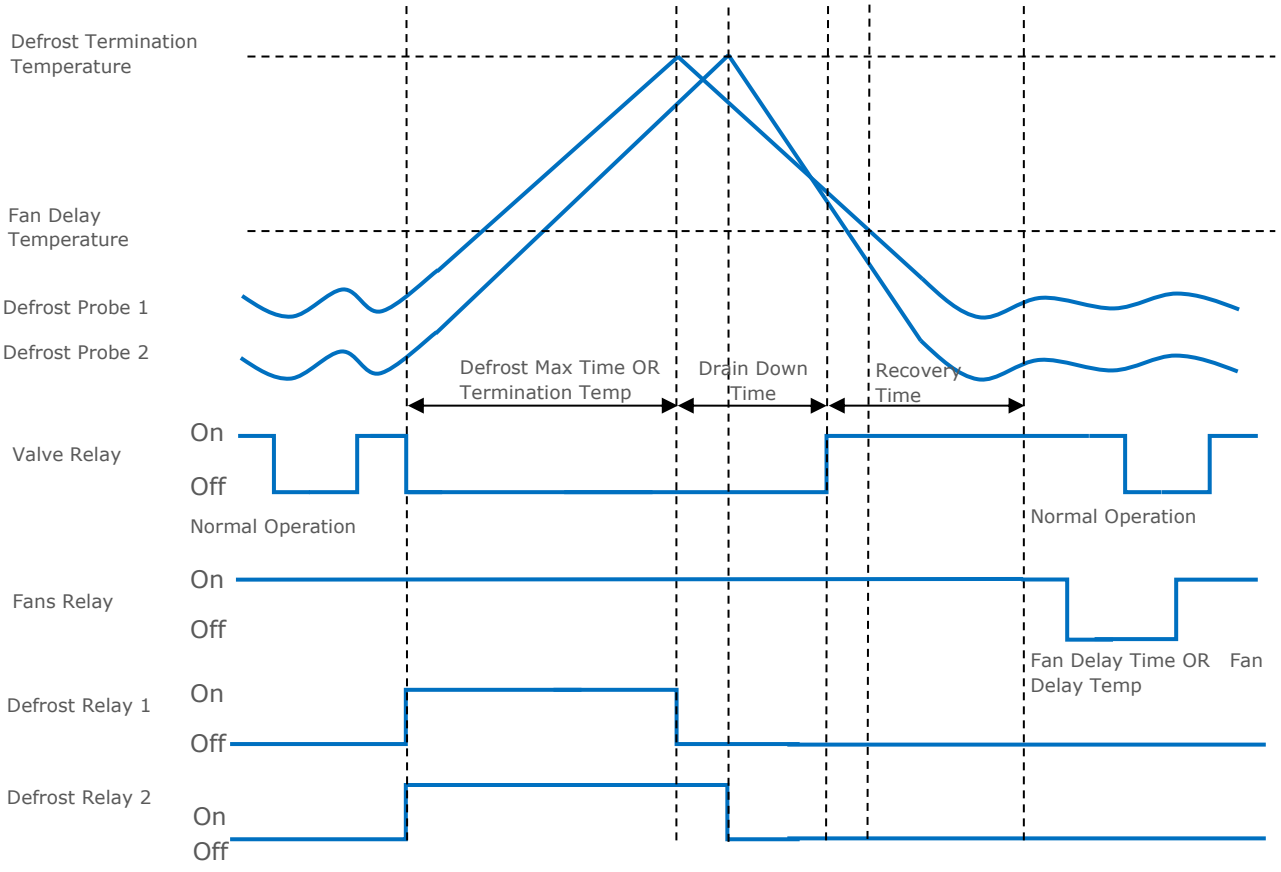
Three clips fix the Intuitive Mercury securely to DIN rail. Pull each clip until it "clicks" to remove the controller. Each clip has a mounting hole to provide an alternative fixing mechanism to DIN mounting.

Cleaning

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

Appendix 1: Defrost Cycles





Appendix 2: Trim Heater Control via Intuitive Mercury 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-71. 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.

Disclaimer

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Revision History

Revision	Date	Changes
3.0	04/02/2020	First Issue Mercury Intuitive Two Section EEV Case Controller
3.0a	01/09/2022	Second SSR output description corrected to Section 2 from Section 1
3.1	29/12/2023	Added MOP functionality, SSR current rating updated.

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