

Resource
Data Management

Mercury Intuitive Low Temp Stepper Valve Case/Coldroom Controller

Commissioning/User Guide
Revision 1.0a



PR0952-LT PR0954-LT

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The Mercury Intuitive Range

From Resource Data Management

The Mercury Intuitive controller is primarily intended for use in refrigeration display cabinets or coldroom applications. The controller will operate the evaporator stepper valve based on the value of its temperature probe inputs or from a local or remote pressure reading. It has outputs to control lights, fans, a suction line valve, trim heaters and defrost control. The controller has many features some of which are energy saving; such as the "pulse trim heaters" parameter. The low temperature software variant allows operation down to -60°C.

An optional internal daughter card can read suction pressure directly which can then be converted to the evaporator in temperature for use in calculating superheat. The controller can be used with the Intuitive Power Store (PR0627) which provides a backup power supply which enables the valve to be fully closed in the event of a power failure. All connections are plug and socket and there are multiple network interfaces to choose from including IP and RS232.

The controller supports PT1000, NTC2K, 470R, 700R, 3K, 5K, 6K, NTC2K25, NTC10K or NTC10K(2) temperature probes (note: probe types cannot be mixed) however only the PT1000 probe supports switched resistor inputs for digital input signals such as coldroom doorswitch, plant fault and defrost.

Variants

Intuitive Mercury 6-5 (Mains supply)

Description	Part Number
Intuitive Mercury 6-5 Stepper valve controller, integral display.	PR0952-LT
Intuitive Mercury 6-5 Stepper valve controller, remote display.	PR0954-R-LT
Intuitive Mercury 6-5 Stepper valve controller, integral display with a 4-20mA Input Daughter Card	PR0952-IP-LT-AiAo
Intuitive Mercury 6-5 Stepper valve controller, remote display with a 4-20mA Input Daughter Card	PR0954-R-IP-LT-AiAo
Intuitive Mercury 6-5 Stepper valve controller, integral display with a 0 – 10V Input Daughter Card	PR0952-IP-LT-ViVo
Intuitive Mercury 6-5 Stepper valve controller, remote display with a 0 – 10V Input Daughter Card	PR0954-R-IP-LT-ViVo
Intuitive Mercury 6-5 Stepper valve controller, remote display with a 0 – 10V Input and Probe Daughter Card (required for door switch input)	PR0954-R-IP-LT-1PVi
Intuitive Mercury 6-5 Stepper valve controller, remote display with a 4-20mA Input and Probe Daughter Card (required for door switch input)	PR0954-R-IP-LT-1PAi

Compatible Displays

The following displays are compatible with the Intuitive Remote Display Controllers (PR0952/4-R): -

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
Mercury Coldroom Display	PR0152

Configuration

The controller gives you up to four configuration options, the controller is delivered pre-configured as type 3

Display value	Intuitive 6-5
3	Remote piped case controller LT
4	Remote piped case controller HT
5	Coldroom controller LT
6	Coldroom controller HT



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Compatible Network Interfaces

Intuitive Mercury controllers are capable of connecting to either a TCP/IP local area network or a RS485 Genus compatible network or can be used in standalone mode with no network output. To connect to a network you must add the correct communications module. Connecting to any of these communication modules will automatically be detected on power up and will affect the set up screens available to you.

Description	Part Number
IP Futura (Single Mercury to IP Interface)	PR0016
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

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 Displays

Mercury 2


The below display represents both the Mercury 2 internal display and the Mercury 2 (PR0725) remote display. The Mercury (Mk1) display will also be similar.

LED's: -

Valve (Stepper) 

Fans (Relay 1) 

Lights (Relay 2) 

Defrost (Relay 4) 

On-Line 

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

Service
(See Parameter
18 for setup) 





Keys    
Enter Up Down Defrost


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



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Alarm 

HACCP 


Main Display 


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


Mercury Coldroom


The below display represents the remote Mercury Coldroom (PR0152) remote display


LED's: -

Valve 

Fans 


Lights 


Defrost 

On-Line 

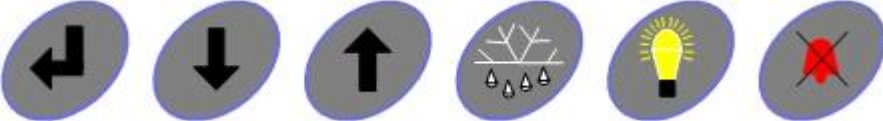


- Off: No network attached
- Flashing: Attempting to Log on to network
- Steady: On-line

Service 

Alarm 

HACCP 

Keys 

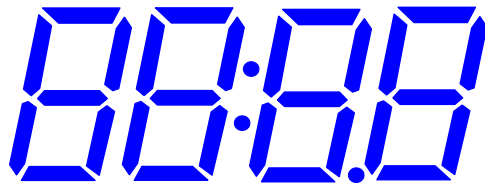
Enter Down Up Defrost Now Not used Not used



Please ensure all power is switched off before installing or maintaining this product.

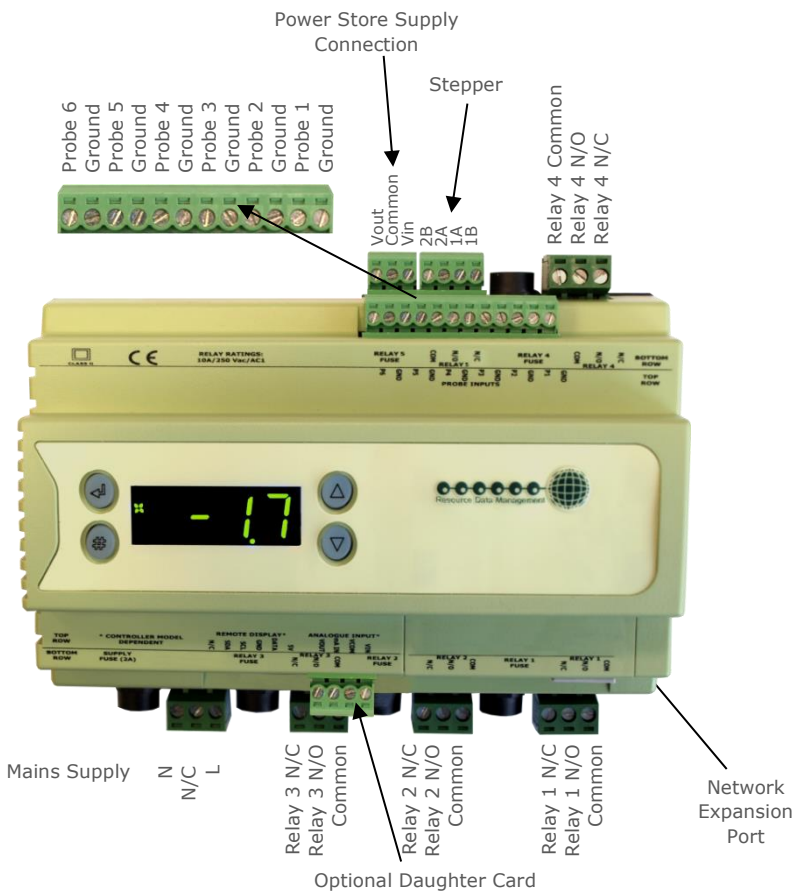
Note: Press and hold the defrost button to force a manual defrost

Main Display



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

Connections



Intuitive Mercury Network Expansion Options

RS232 Network Card (default)



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

IP Network Card



Rotary Address Switches, Network Collision LED, Network Activity LED

RS485 Network Card



Ground, B-, A+, Screen, Network Activity LED

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

Intuitive Mercury Stepper Valve with Daughter Board Option

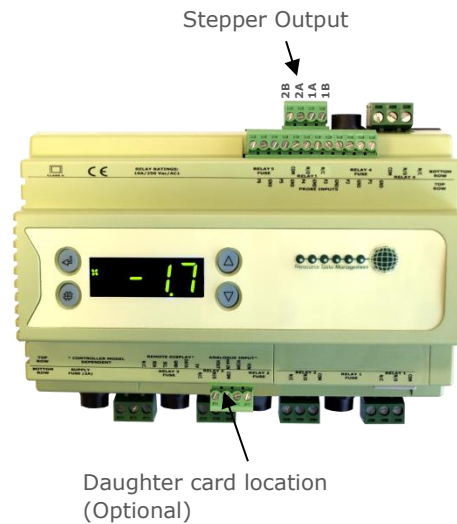
The Intuitive Mercury Stepper Valve controller can be purchased with an optional daughter board to read local suction pressure. The suction pressure is then converted to temperature, and along with the suction line temperature probe, used to calculate superheat

Please note the daughter boards are a factory fit option only and must be ordered with the controller



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Daughter Board Options	Connector Colour *
1 x 0-10Vdc Input & 1 x 0-10Vdc Output	Blue
1 x 4-20mA Input & 1 x 4-20mA Output	Black
1 x 0-10Vdc Input & 1 x Probe Input	Blue
1 x 4-20mA Input & 1 x Probe Input	Black



Note: Only 0 – 10V or 4 – 20mA Inputs used in this application (Outputs are not used)

*Each daughter board comes with a colour coded connector as a visual indication.

Daughter Board Connection Details

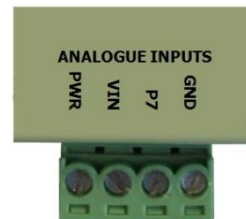
1 x 0-10Vdc Input &
1 x 0-10Vdc Output



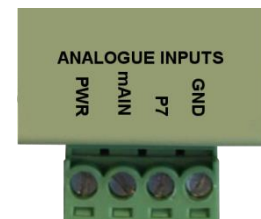
1 x 4-20mA Input &
1 x 4-20mA Output



1 x 0-10Vdc Input &
1 x Probe Input



1 x 4-20mA Input &
1 x Probe Input



Note: "PWR" is a constant voltage output for external equipment, supply voltage is dependent on the board type, see the specification section for more details. GND is a common ground for all inputs and outputs.

As an example, if using an RDM 4-20mA pressure transducer (PR0160-PR0164), the 12vdc supply (red wire) would be connected to the "PWR" terminal and the 4-20mA return signal (green wire) would be connected to the "mA IN" terminal.



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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.

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
Input 2	Air off Temperature	Air off Temperature	Yes	Case Clean
Input 3	Evaporator Temperature	Evaporator Temperature	Yes	
Input 4	Suction Line Temperature	Suction Line Temperature	Yes	
Input 5	Defrost Termination, Monitor or Logging probe (if used)	Defrost Termination, Monitor or Logging probe (if used)	Conditional *	Person Trap on types 5 & 6
Input 6	Valve Shut Input	Valve Shut Input	Yes	
Input 7	Logging Probe Input (Only on 1P/Vi or 1P/Ai daughter card)	Logging Probe Input (Only on 1P/Vi or 1P/Ai daughter card) or Door Switch Input**	Yes	
Relay 1	Fans	Fans	N/A	
Relay 2	Lights / Alarm Relay	Lights / Alarm Relay	N/A	
Relay 3	Suction Line Valve/Trim Heater/Alarm Relay/Remote Relay/ Liquid Line Valve	Suction Line Valve/Alarm Relay/Remote Relay/ Liquid Line Valve	N/A	
Relay 4	Defrost Heater (N/O)	Defrost Heater (N/O)	N/A	
Stepper Output	Stepper Motor Valve	Stepper Motor Valve	N/A	

* Alarm on monitor or logging probe only if used

**Two inputs cannot be wired in. The input is either a Logging Probe or Door Switch.

Switched Resistor Values

For PT1000 probes use 590 Ohm switched resistors, all other probe types cannot use the switched resistor function. 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. 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.

Setting up the controller

Access to the controller can be achieved several ways

- Through the front mounted buttons
- Direct access by PC into the rear 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)

Setup through front buttons



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



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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
dtYP	Set/view display type	Display Type	Ligt	Toggle Lights Only mode	Lights
tyPE	Set/view Controller type	Set/view controller type	OFSt	Probe Offset	Probe Offset
rtc	Set/view Clock (rtc = Real Time Clock)	Real Time Clock	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 display buttons we recommend you use the following order from the function menu.

rtc. Real time clock

(This will automatically synchronise on network systems) Use the up or down buttons to scroll through the display until the display reads "rtc"

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

Time clock is now set

type. Set/view controller type

- From the function menu scroll to select type, press enter
- Use the up/down buttons to scroll through case/coldroom configuration types. (see [configuration table on page 4](#))
- Press enter.
- Scroll to select "ESC"
- Press enter, controller type configuration is now set.

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

- From the function menu scroll to select PArA
- Pressing Enter while PArA is displayed will enter the parameter menu. The first parameter option will be displayed as P-01. Pressing the Up or Down button will present the other parameter options P-02, P-03 etc. See



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the parameter list below to find what parameter number corresponds to which actual parameter. Pressing the Enter button will show the current value of the selected parameter. Press Up or Down to modify the value and press Enter again to save the value. The parameter list number will be displayed again. Two other options are present in the parameter menu – dFLt and ESC. Selecting ESC will exit setup mode. Selecting dFLt will reset all parameters back to the default values for the current type of controller.

Unit. Set/view temperature unit and Probe type

From the function menu scroll to select Unit

Press enter and the value will be displayed: -

Probe Types

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

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

NOTE: The RDM PT1000 temperature probe is limited to a minimum operating temperature of -40°C, if the controller is to be used to control at a lower temperature than this then a suitable alternative probe should be used.

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.

dtyP. Set / view display type

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

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

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

Parameter Tables

Not all parameters apply to all controller types, for example P-83 is Fan Control which only applies to coldroom types 5 & 6, this parameter will not appear if the controller is set up as a type 3 or 4 case types. 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)	Type 3&4	Type 5&6
P-01	Cut-in Temp.	-50 to 30 (-58 to 86)	0.1	Deg	-20 (-4)	0.0	✓	✓
P-02	Diff.	0 to 10 (0 to 18)	0.1	Deg	2 (3.6)	1.5	✓	✓
P-03	Control Weight	0 to 100	1	%	50	50	✓	✓
P-04	Display Weight	0 to 100	1	%	50	50	✓	✓
P-08	Superheat Ref	4 to 12 (7.2 to 21.6)	0.1	Deg	6 (10.8)	6	✓	✓
P-09	Response On	1 to 30	1		10	10	✓	✓
P-10	Response Off	1 to 30	1		10	10	✓	✓



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P-11	Control Type	0 = EEV 1 = EET 2 = EEV/EET	1		0	0	✓	✓
P-51	Valve Minimum Opening	0 - 100%	1	%	10	10	✓	✓
P-52	Superheat Problem	0 - 12 (0 - 21.6)	0.1	Deg	0	0	✓	✓
P-53	Superheat Problem opening	0 - 100%	1		10	10	✓	✓
P-54	Superheat Problem Time	00:00 to 99:00	01:00	mm:ss	03:00	03:00	✓	✓
P-56	Valve Start Opening	0 - 100%	1	%	10	10	✓	✓
P-55	Average Valve Opening	0 - 100%	1	%	100	100	✓	✓
P-57	Divide Value	0 - 100%	1		50	50	✓	✓
P-103	Div Size	0 (Off), 1 (On)	1		0	0	✓	✓
P-12	Relay 3 Mode (Case)	0 = Suction Line, 1 = Trim Heater, 2 = Alarm, 3 = Remote, 4 = Trim Hub, 5 = LLV	1		0	0	✓	
	Relay 3 Mode (Coldroom)	0 = Suction Line, 1 = Alarm, 2 = Remote, 3 = LLV	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	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 Temp	-50 to 30 (-58 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, 2 = Logging	1		0	0	✓	✓
P-16	Relay 2 Mode	0 = Lights, 1 = Alarm	1		0	0	✓	✓
P-17	Evap. Select	0 = Local, 1 = Rem1, 2 = Rem2, 3 = Rem3, 4 = IoBrd	1		0	0	✓	✓
P-97	Control Fail Valve Level	0 to 100%	0.1	%	0	0	✓	✓
P-29	Probe 1 Resistor Function	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	✓	✓
P-98	Lights Case Off	0 (Off), 1 (On), 2 (Unused)			0	0	✓	
P-30	Valve Type	0=Carel, 1=Sporlan1, 2=Sporlan2 3=Alco, 4=Other*	1	---	0	0	✓	✓
P-31	Step Max*	0 to 6800 See: Valve type	1	---	480	480	✓	✓
P-32	Step Close*	0 to 6800 See: Valve type	1	---	500	500	✓	✓
P-33	Step Speed*	0 to 6800 See: Valve type	1	Hz	50	50	✓	✓



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P-34	mA Peak*	0 to 500 See: Valve Type	1	mA	450	450	✓	✓
P-35	Half Step*	0 (Off), 1 (On) See: Valve Type	1	---	0	0	✓	✓
P-36	mA Hold Current*	0 to 500	1		0	0	✓	✓
P-37	Shut Speed	0 to 6800	1	Hz	200	200	✓	✓
P-06	Shut Enable	0 (Off), 1 (N/C), 2 (N/O)	1		0	0	✓	✓
P-07	Shut Time	00:00 to 99:00	01:00	mm:ss	04:00	04:00	✓	✓
P-05	Overdrive Time	1 to 25	1	hours	8	8	✓	✓
P-77	Trap Stop Valve/Fans	0 (Off), 1 (On)	1		0	0		✓
P-20	Alarm Delay	00:00 to 99:00	01:00	mm:ss	20:00	20:00	✓	✓
P-21	UT Alarm	-60 to 60 (-76 to 140)	0.1	Deg	-30 (-	-2	✓	✓
P-22	OT Alarm	-60 to 60 (-76 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	-60 to 60 (-76 to 140)	0.1	Deg	-35 (-	-1	✓	✓
P-27	Log OT Alarm	-60 to 60 (-76 to 140)	0.1	Deg	-12	6	✓	✓
P-28	Monitor OT Alarm	-60 to 60 (-76 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	12	12	✓	✓
P-44	Def Terminate Temp.	-50 to 30 (-58 to 86)	0.1	Deg	14 (57.2)	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	✓	✓
P-47	Drain Down	00:00 to 24:00	00:15	mm:ss	01:30	01:30	✓	✓
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 (Cabinets)	00:00 to 99:00	01:00	mm:ss	00:00	00:00	✓	
	Fan Delay Time (Coldroom)	00:00 to 99:00	01:00	mm:ss	03:00	03:00		✓
P-88	Fan Delay Temp	-50 to 30 (-58 to 86)	0.1	Deg	-20 (-4)	0.0	✓	✓
P-50	Fans In Defrost	0 (Off), 1 (On)			On	On	✓	
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-38	Door Switch	0 (Off), 1 (N/O), 2 (N/C)	1		0	0		✓
P-81	Door Closes Valve	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	✓	✓



Please ensure all power is switched off before installing or maintaining this product.

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-58	Broadcast ID	0 to 999	1	-	0	0	✓	✓
P-59	Refrigerant	0 to 25, See Refrigerant Table Below	1	-	0	0	✓	✓
P-75	Pressure Units	0 = Absolute 1 = Gauge	1	-	0	0	✓	✓
P-76	Evap Offset**	0.0 to 5.0 (0 to 72)	0.1	-	0.0	0.0	✓	✓
P-84	Glide	0.0 to 10.0	0.1	Deg	0.0	0.0	✓	✓
P-91	Trans Span***	-3.4 to 180.0	0.1	Bar	13.8	13.8	✓	✓
P-99	Trans Offset***	-3.4 to 180.0	0.1	Bar	0.0	0.0	✓	✓
P-39	Ref weight	0 to 100%	1	%	0	0	✓	✓
P-100	MOP Cut-in	-3.4 to 180.0	0.1	Deg	3.4	3.4	✓	✓
P-101	MOP Diff	-3.4 to 180.0	0.1	Deg	0.3	0.3	✓	✓
P-102	MOP Delay	00:00 to 02:00	00:01	mm:ss	00:05	00:05	✓	✓
dFLt	Restore defaults						✓	✓

* Parameters P-31, P-32, P-33 & P-35 only have an effect if "Other" is selected when configuring parameter P-30

** If going from PSI to Bar and the Evap Offset parameter is above the limit of 5 bar then the controller will restart with the parameter reset to the default.

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

Example: RDM PR0160 with range: -1 bar to 20 bar (-14.5 to 290 psi)
Span would be 21 bar (304.5 psi)
Offset would be -1 bar (-14.5 psi)

Refrigerant Table

No.	Gas	No.	Gas	No.	Gas	No.	Gas	No.	Gas
0	None	6	R401A	12	R407A	18	R507	24	R449A
1	R22	7	R401B	13	R407B	19	R717	25	R513A
2	R32	8	R401C	14	R407C	20	R290		
3	R134a	9	R402A	15	R500	21	R744		
4	R142B	10	R402B	16	R502	22	R407F		
5	R227	11	R404A	17	R503	23	R410A		

Parameter Descriptions

Number	Parameter	Description
P-01	Cut-in Temp	Temperature at which the valve will switch on.
P-02	Diff	Differential temperature below the cut-in temperature. The valve 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-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.



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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 with the superheat as a secondary control. 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. Note this mode is for specific applications only and should not normally be used.
P-51	Valve 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 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 value. 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 Valve Problem Opening	Sets the valve open position when entering the "Superheat Problem" state.
P-54	Superheat Problem Time	Sets the time the algorithm stays in the "Superheat Problem" state.
P-56	Start Opening	Sets the valve opening % which is used after a defrost or when the controller exits a problem state for, example Superheat Problem state
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	Divide value	This parameter takes effect when the controller is used in conjunction with a pressure transducer. When an MOP (maximum operating pressure) alarm is generated 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%. (When P-103 is set to "on" then the divide value will be used all the time regardless of MOP). Note P-51 Valve Minimum opening overrides the valve output operation and the valve will not open 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-103	Div Size	When this parameter is set to "on" then the Div value set in P-57 will be used at all times and the valve opening will reduced accordingly. This can be useful when an oversized valve is fitted.
P-12	Relay 3 Mode	Relay 3 can be a Suction, Trim Heater, Alarm, Remote, Trim Hub relay or Liquid Line Valve (LLV) <ul style="list-style-type: none"> ➤ 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 user document for further details. ➤ LLV – The relay operates a liquid line valve which is open when the stepper valve is operating and closed when the stepper valve is at 0% (during defrost for example)
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.



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P-85	Key-switch Mode	Allows the keys switch to be: - <ul style="list-style-type: none"> ➤ 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: - <ul style="list-style-type: none"> ➤ 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. <ul style="list-style-type: none"> ➤ Run – fans operate as per the normal control strategy. ➤ Pulse – When the valve 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 valve operates. The fans pulse on/off to ensure the circulation of air within the coldroom. ➤ Off – When the valve 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), a monitor probe with an OT alarm level (P-28) or a logging probe.
P-16	Relay 2 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 : Valve 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.
P-29	Probe 1 Resistor Function	Selects whether the switched resistor invokes either a Plant fault or an External Defrost.
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 Valve/Fans	When man trap input is activated the valve 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. <ul style="list-style-type: none"> ➤ 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.



Please ensure all power is switched off before installing or maintaining this product.

		<ul style="list-style-type: none"> ➤ 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-30	Valve Type	Choose from four preconfigured stepper valve types or select "Other" to enter Stepper characteristics for a valve which is not listed. See Valve Type
P-31	Step Max	Number of steps controller will send to open valve to 100%. Consult the valve manufacturer to obtain the required number of steps. (Has no effect if Valve Type 0, 1, 2 or 3 selected at P-30). See Valve Type
P-32	Step Close	Number of steps controller will send to close valve fully to 0% and overdrive the valve. The Steps required when overdriving the valve can vary. Please consult the valve manufacturer to obtain the required number of steps (Has no effect if Valve Type 0, 1, 2 or 3 selected at P-30) See Valve Type
P-33	Step Speed	Increases and decreases the rate of step change. Enter a value in Hz. Valve Manufacturers specification must be followed. (Has no effect if Valve Type 0, 1, 2 or 3 selected at P-30) See Valve Type and Appendix 3 Step Speed .
P-34	mA Peak	Current requirement of motor. Care should be taken when setting this parameter as too high a setting could damage the valve motor. Valve Manufacturers specification must be followed. (Has no effect if Valve Type 0, 1, 2 or 3 selected at P-30) See Valve Type
P-35	Half Step	Allows the stepper motor to be rotated in half step increments when used in conjunction with a half step compatible valve. The Step Max and Step Close parameters (P-31 & P32) should be set to double the normal values when Half Stepping is enabled. Has no effect if Valve Type 0, 1, 2 or 3 selected at P-30 See Valve type Note: When using a Carel E ² V valve with this controller it is advisable to use half stepping.
P-36	mA Current Hold	Current supplied to valve when it is stationary, to prevent any drift in valve position See: Holding Current
P-37	Shut Speed	This is the speed in Hz that the valve will shut at if the shut input (probe 7) becomes open circuit.
P-06	Shut Enable	Enables the shut input from the Intuitive Power Store, set to N/C. Will only work if valve type P-30 is set to "Other"
P-07	Shut Time	Once the shut input has been activated the valve will stay closed for this period even if the shut input is removed.
P-05	Overdrive Time	This is the period in hours that the valve will close fully to allow the controller to re calibrate the valve position, this is required as there is no feedback to the controller from the valve in regards to it's position. See: Valve State – Overdriving
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: - <ul style="list-style-type: none"> ➤ Off ➤ Logging with no alarms ➤ Logging with alarms See : Log Probe Mapping
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: - <ul style="list-style-type: none"> ➤ 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). 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 1 st 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: -



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		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 valve is opened 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-80	Door alarm delay	Delay after the door open input is activated before the alarm occurs.
P-38	Door switch	Selects if a door switch is used (types 5 & 6 only) and select polarity N/O (normally open) or N/C (normally closed)
P-81	Door Closes Valve	This parameter is used to close the stepper valve 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: - <ul style="list-style-type: none"> ➤ 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



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P-58	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-59	Refrigerant	Type of refrigerant gas used in the system. See: Refrigerant Table above
P-75	Pressure Units	Absolute or Gauge
P-76	Evap Offset	Offset to allow for pressure drop over distance
P-84	Glide	Allows a glide value to be applied for a particular refrigerant mix where the component gases have different boiling points (at the same pressure).
P-91	Trans Span	Total range of the transducer
P-99	Trans Offset	Value below zero
P-39	Ref weight	When using a local pressure transducer or a transmitted pressure from a pack controller is used to calculate superheat, the Mercury controller can use a weighted average of liquid pressure and vapour pressure to calculate the temperature. When the refrigerant weight parameter is set to 0% then the liquid pressure is used (bubble), when set to 100% the vapour pressure is used (dew). For example, when the Ref Weight parameter is set to 50%, then the controller will use a weighted average of 50% liquid pressure and 50% vapour pressure. Any percentage from 1 to 99% will give an appropriate weighted average between the two pressures.
P-100	MOP Cut-in	If the pressure exceeds this value, then the controller's valve will close or be reduced to a predetermined percentage. A MOP alarm is also created. (See Maximum Operating Pressure (MOP)). If the controller is connected to a Mercury switch (PR0018-PHI) with a pressure transducer connected fitted then the MOP parameters are contained within the switch, MOP parameters in the Mercury controller do not apply.
P-101	MOP Diff	When the pressure reduces below this value, the controllers valve will recover to their normal operational
P-102	MOP Delay	Delay after the MOP value has been exceeded before the MOP actions and alarm occurs.
dFLt	Restore default values	Restores all of the parameters to their default values

Holding Current

If using a type of valve that requires a holding current you must select "Other" at P-30 and make sure parameters P-31, P-32, P-33, P-34 and P35 are all set to the correct values.

Warning: Not all valves require a holding current and applying a holding current to valves that do not require one could result in damage to the valve and/or controller. **Refer to Manufacturers Data Sheet for information on holding current.**

Stepper Valve Type

Parameters P-31, P-32, P-33, P-34 and P-35 only have an effect if "Other" is selected when configuring parameter P-30. Other allows the user to map in the requirements the stepper valve.

Selecting option 0, 1, 2 or 3 at parameter P-30 sets the controller for use with the factory set values for the type of valve selected. The controller will override any values set in parameters P-31, P-32, P-33 and P-35.

Note the parameters relating to the Stepper Valve type should be configured prior to wiring the Stepper Valve to the Mercury 2 Stepper controller. If one of the three default valve types is selected then changing P-31, P-32, P-33, P-34 and P-35 will have no effect.

Manufacturer	Model	Step Max	Step Close	Step Speed (Hz)*	mA Peak	mA Hold	Half Step	Overdrive (Hours)
Carel	E ³ V	480	500	50	450	0	Off	8
Sporlan 1	SER A/B/C/D	2500	3500	200	80	0	Off	24
Sporlan 2	SER 1.5 to 20, SEI 6	1596	1756	200	80	0	Off	24
Alco	EX4/5/6	750	825	500	500	0	Off	8
Other	Various	2500	3500	200	80	0	Off	8



Please ensure all power is switched off before installing or maintaining this product.

See [Appendix 3 Step Speed](#) also.

Valve Wiring

Manufacturer	Model	Wiring (Colours)	Connection Description (See Stepper Output)
Carel	E ³ V	Yellow	M1B
		White	M1A
		Green	M2A
		Brown	M2B
Sporlan	SER 1.5 - 20 SER B/C/D SEI 6	Green	M1B
		Red	M1A
		White	M2A
		Black	M2B
Alco	EX4/EX5/EX6	White (A)	M1B
		Black (B)	M1A
		Blue (C)	M2A
		Brown (D)	M2B

Important – Our information is taken from 3rd party data sheets at the time our document is created, any changes since will not be incorporated in our document.

Review the manufacturer’s datasheet for the selected valve before installation. If you are unsure regarding any of the above steps please contact RDM Technical Support for further assistance.

Valve State – Overdriving

Each time the controller is powered on the control valve state has to initialise as the controller will have no knowledge of the current valve opening position for the stepper motor attached. During this process the controller will close the valve by a number of steps greater than the total number of steps for the valve configured. This is achieved using the Step Close parameter and is referred to as “overdriving” the valve. This process will synchronize the controller with the stepper valve output. This ensures the stepper valve is at the 0 steps position, fully closed and the control algorithm will use this for future control operations.

The overdrive parameter (P-05) will overdrive the Stepper motor output by 10% of the step max value at the preset period (24 hours for example), this provides an automatic re-synchronisation of the valve position.

Please consult the stepper valve manufacturer’s data sheet to obtain the number of steps required to overdrive the valve.

Stepper Valve Control Using Pressure

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

Local Daughter Card

(P17 set to IoBrd) A suction transducer can be connected directly to the input of the daughter card, 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

(Parameters P58/59/75/76/84/91/99) 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. In an EEV application the evaporator in temperature probe reading for a case controller can be 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



Please ensure all power is switched off before installing or maintaining this product.

connected to the switch 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 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

Using IP Module

(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). Set the broadcast ID (P-58) to the ID of Plant Pack Controller (Rotary Switch Setting), (P-59) set to refrigerant type, (P-75) set to pressure units absolute or gauge

Maximum Operating Pressure (MOP)

The Mercury controller can calculate it's superheat using a pressure value. This pressure value can be obtained in 3 different ways: transmitted from an RDM pack controller, from a pressure transducer fitted to a local Mercury Switch or a pressure transducer connected directly to the Mercury controller (via an appropriate daughter card). If the MOP cut-in value is exceeded then the stepper valve opening is reduced by the "Div Value" parameter and an MOP alarm generated. 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%.

Relay State and functional operation

Relay 1-3 State	Function State	Wired contact	Relay 3-4 & Stepper State	Function State	Wired contact
Relay 1 off	Fans On	N/C	Relay 3 off	Alarm Relay = Alarm	N/C
Relay 1 on	Fans Off	N/C	Relay 3 on	Alarm Relay = OK	N/C
Relay 2 off	Lights On	N/C	Relay 3 off	LLV = Open	N/C
Relay 2 on	Lights Off	N/C	Relay 3 on	LLV = Closed	N/C
Relay 2 off	Alarm Relay = Alarm	N/C	Relay 4 off	Defrost Control Off	N/O
Relay 2 on	Alarm Relay = OK	N/C	Relay 4 on	Defrost Control On	N/O
Relay 3 off	Suction or Trims Off	N/O	Stepper Valve Off	Stepper Valve Closing	As per I/O Diagram
Relay 3 on	Suction or Trims On	N/O	Stepper Valve On	Stepper Valve Operating	As per I/O Diagram

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
Stepper Valve	Closed	Closed	Closed	Closed	Open	Open
RLY 3 Suction Line	Off	On	On	On	Off	Off
RLY 3 Trim on in defrost	On	On	On	On	On	On
RLY 3 Trim off in defrost	Off	Off	Off	Off	Off	On
RLY 3 Suction LLV	Closed	Closed	Closed	Closed	Open	Open
RLY 4 Defrost Relay	Off	On	On	Off	Off	Off
RLY 2 Lights relay	On	On	On	On	On	On
RLY 1 Fans (On in	On	On	On	On	Off	On
RLY 1 Fans (Off in	On	Off	Off	Off	Off	On



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Defrost Termination

Defrost termination will occur 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")

Log Probe Mapping

Unless Probe 5 Select (P-15) has been set to Logging, the Logging Probe is mapped as follows: -

If 'Shut Enable' (P-06) is set to Off, then Input 6 is used as Logging Probe.

If Shut Enable is set to N/O or N/C then the Logging Probe will become Input 7 (if fitted with a 1PVi or 1PAi daughter board and Probe 5 is not set to logging.)

Note : - Input 7 can only support a Probe input or Door Switch. It cannot have both wired in.

Network Configuration

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

When logging 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 an IP Futura or Mercury Switch. For connection to a Mercury Switch (Hub) or an external network interface, the standard fitment RS232 network card is utilized.

RS485 Legacy module / Intuitive Internal RS485 Network card

Connecting an RS485 legacy Module or an Intuitive Internal RS485 network card to the controller will govern which set up screens are made available. Both modules support the "Genus" protocol only.

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



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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)

The 485A option shows a value representing either the name of the controller in a Genus compatible or Wireless Mesh network.

Fast Network Address Reset

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.

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 / Intuitive Internal IP Network card

In an IP system there are two options,

- IP-L
- IP-r

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

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

IP-L

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

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

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



Please ensure all power is switched off before installing or maintaining this product.

IP-r

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

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

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

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

Mercury Switch

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

Viewing I/O

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	Type 3&4	Type 5&6
I-01	Control Temp.	-60 to 128 (-76 to 140)	0.1	Deg	✓	✓
I-02	Display temp	-60 to 60 (-76 to 140)	0.1	Deg	✓	✓
I-03	Air on Probe	-60 to 60 (-76 to 140)	0.1	Deg	✓	✓
I-04	Air off Probe	-60 to 60 (-76 to 140)	0.1	Deg	✓	✓
I-05	Evaporator Probe	-60 to 60 (-76 to 140)	0.1	Deg	✓	✓
I-06	Suction Line Probe	-60 to 60 (-76 to 140)	0.1	Deg	✓	✓
I-07	Superheat	-30 to 60 (-54 to 108)	0.1	Deg	✓	✓
I-08	Logging Probe	-60 to 60 (-76 to 140)	0.1	Deg	✓	✓
I-09	Defrost Probe	-60 to 60 (-76 to 140)	0.1	Deg	✓	✓
I-10	Plant Fault	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	External Defrost	0 (Off), 1 (On)			✓	✓
I-15	Monitor Probe	-60 to 60 (-76 to 140)	0.1	Deg	✓	✓
I-16	Remote Evaporator Temp	-60 to 60 (-76 to 140)	0.1	Deg	✓	✓
I-17	MOP	0 (Off), 1 (On)			✓	✓
I-18	Hub Trim Level	0 to 100	1.0	%	✓	
I-19	Divide Input	0 to 100	1.0	%	✓	✓
I-20	Remote Pressure	-3.4 to 108.0	0.1	Bar	✓	✓
I-21	Local Pressure	-3.4 to 108.0	0.1	Bar	✓	✓



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I-22	Local Calc Temp	-60 to 60 (-76 to 140)	0.1	Deg	✓	✓
I-30	Shut Input	0 (Off), 1 (On) (Off shuts valve)	1.0		✓	✓
O-02	Suction Line Valve	0 (Open), 1 (Closed)				✓
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	Valve 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.	-60 to 60 (-76 to 140)	0.1	Deg	✓	✓
O-13	Last Def. Type	0 (None), 1 (Internal), 2 (External), 3 (Network), 4 (Display), 5 (Timed)			✓	✓
O-14	Suction Line Valve/Trim Heaters	0 (Open/Off), 1 (Closed/On)			✓	
O-15	Alarm 1 Relay (Relay2)	0 (Unused), 1 (OK), 2 (Alarm)			✓	✓
O-16	Alarm 2 Relay (Relay3)	0 (Unused), 1 (OK), 2 (Alarm)			✓	✓
O-17	Remote Relay (Relay 3)	0 (Off), 1 (On)			✓	✓
O-18	Run Time	0 – 128 K Hours	1		✓	✓
O-19	Valve Step	0-6400	1		✓	✓
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 60 (-56.2 to 140)	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)			✓	✓
S-02	Valve State	0 (Off), 1 (Start), 2 (Run), 3 (Problem), 4 (Fail), 5 (Initial)			✓	✓

* Range is dependent on probe type

Alarm Messages

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

Display Message	System status
Ft	Control Fault
Prb1	Probe 1 Fault
Prb2	Probe 2 Fault
Prb3	Probe 3 Fault
Prb4	Probe 4 Fault
Prb5	Probe 5 Fault
Prb6	Probe 6 Fault
rEC	Control State in Recovery
dEF	Control State in Defrost
AL	Control State in Alarm

Display Message	System status
FanS ONLY	Controller in Fans Only
LitS ONLY	Controller in Lights Only
CASE OFF	Controller in Case Off
Ot	Over Temperature Alarm
Ut	Under Temperature Alarm
door	Door Open Alarm
TrAP	Person Trapped Alarm
PLnt	Plant Fault
LgOt	Log Probe Over Temperature
LgUt	Log Probe Under Temperature



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Network Alarms

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

Alarm text	Type # (index)
Missed defrost	15
Plant Fault 1	3
Case over temperature	4
Case under temperature	5
Probe 1,2,3,4,5 or 6 Faulty	6
Door Left Open	2
Product over temperature	8

Alarm text	Type # (index)
Product under temperature	9
Person Trapped	1
Plant Fault 2	3
Monitor Probe OT	12
Case Off	29
Remote evap temperature	6
IO Brd evap temperature	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 "LitS"

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



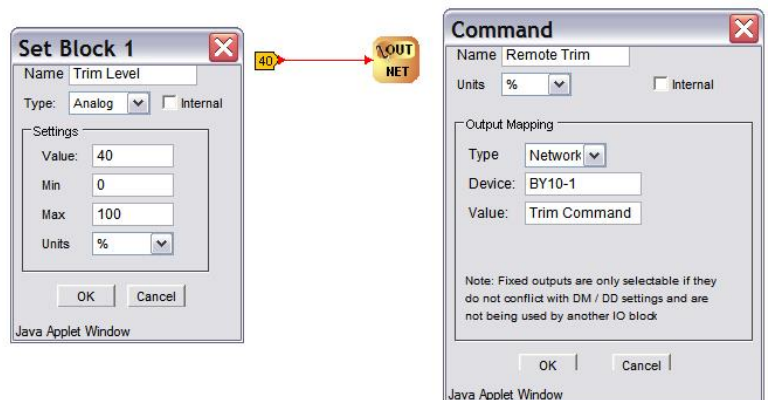
Please ensure all power is switched off before installing or maintaining this product.

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 4 mode: Trim Heater
Setpoint Command	$\pm 20^{\circ}\text{C}$ ($\pm 34^{\circ}\text{F}$)	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 2	Buttons backlights Off Buttons backlights On Buttons Backlights Flash	
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.	

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.



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Specification

Power requirements	
Supply Voltage Range	100 – 240 Vac \pm 10%
Supply Frequency	50 – 60 Hz \pm 10% or dc
Maximum supply current	0.5 Amps (Total max. current dependant on stepper motor used)
Typical supply current	<1 Amp
General	
Operating temperature range	-10°C to +60°C
Storage temperature range	-20°C to +65°C
Environmental	Indoor use at altitudes up to 2000m, pollution degree 1, installation category II. Voltage fluctuations not to exceed \pm 10% of nominal voltage.
Size	157mm (W) x 67mm (H) x 120 (D)
Approx Weight	500 grams
Safety	EN61010
EMC	EN61326; 1997 +Amdt. A1; 1998
Ventilation	There is no requirement for forced cooling ventilation
Class 2 Insulation	No protective Earth is required and none should be fitted
Supply Fuse	Built in fuse holder, fuse 2A 240Vac Antisurge (T) HRC conforming to IEC60127, 32 x 6.3mm
Or MCB	2A, 240 VAC Type C conforming to BS EN 60898 (Note: controller has integral 2A fuse)
Relay Fuse	10A 240Vac Antisurge (T) HRC conforming to IEC60127, 32 x 6.3mm
Safety	Conforms to EN60730-1 based on UL 60950-1; UL 62368-1 as referenced to IEC60730-1
Valve Output	
Max current valve output	Total Max current dependant on Stepper Motor used.
Stepper Output	Bipolar Stepper Motor 24V 8W Max. Maximum current cannot exceed 825mA Chopper Drive
Relay Specification	
Relays 1-3 Exclusive common	
Max current	10A Resistive (Cos ϕ = 1) 3A Inductive (Cos ϕ = 0.4)
Max voltage	250Vac. 30V dc
Relay Fuse	10A 240Vac Antisurge (T) HRC conforming to IEC60127, 32 x 6.3mm
Relay 4 Exclusive common	
Max current	10A Resistive (Cos ϕ = 1) 3A Inductive (Cos ϕ = 0.4)
Max voltage	250Vac
Relay Fuse	10A 240Vac Antisurge (T) HRC conforming to IEC60127, 32 x 6.3mm

Daughter Card Specification (If used)

4-20mA Input / Output

Input: 4-20mA current loop, use the 12Vdc output to feed the 4-20mA device.

Output: The 4-20mA output will not operate correctly if the target device input impedance is > 75 Ω

0-5 or 0-10V Input / Output

Input: Connect a 0-5 or 0-10V Signal, a 5V supply is provided to feed the sensor.

Output: The output will not operate correctly if the target device input impedance is < 10K Ω . A 50mA fuse is recommended for this output.

Inputs

Input resistance: 3.01K Ohms (for PTC or NTC type probes)
Input type: Selectable. See: [Units](#)

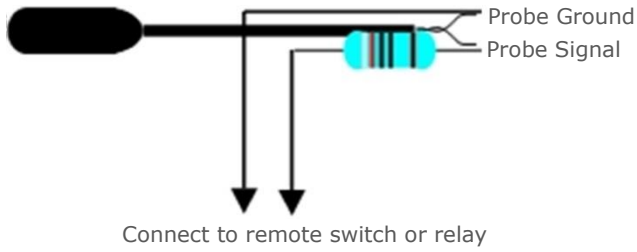


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Comms: RS232 with flow control

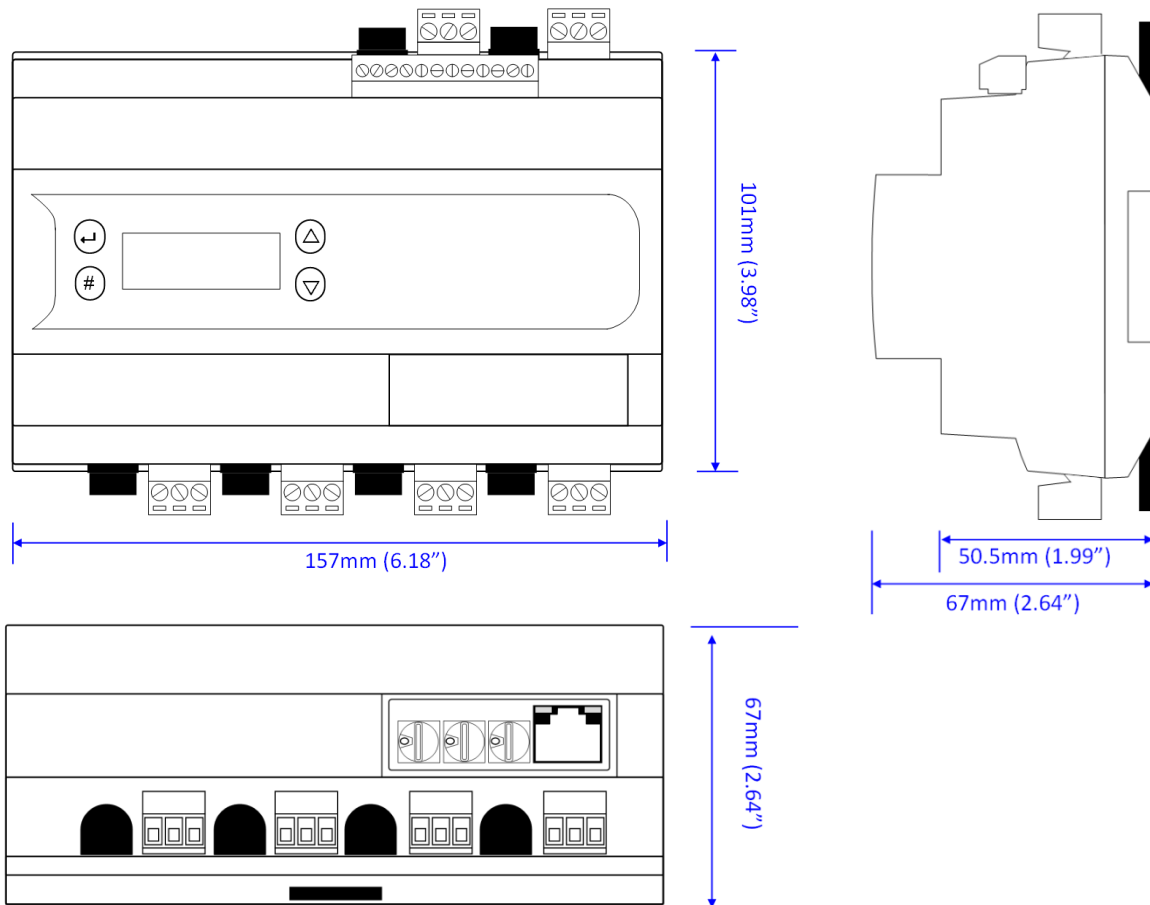
Switched Resistor Example Wiring

Example of resistor fitted on a probe input.



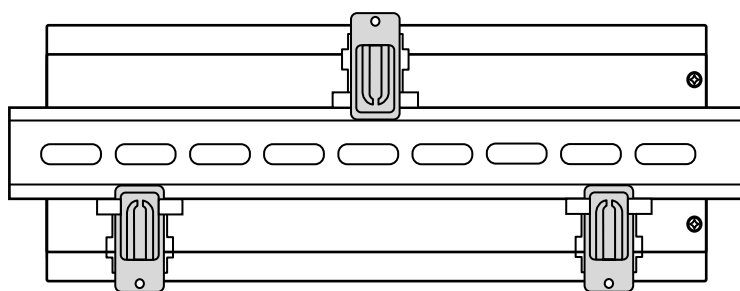
Dimensions

Intuitive Mercury controller



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Intuitive Mercury Mounting Instructions



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

Cleaning

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

Ventilation

There is no requirement for forced cooling ventilation

Disclaimer

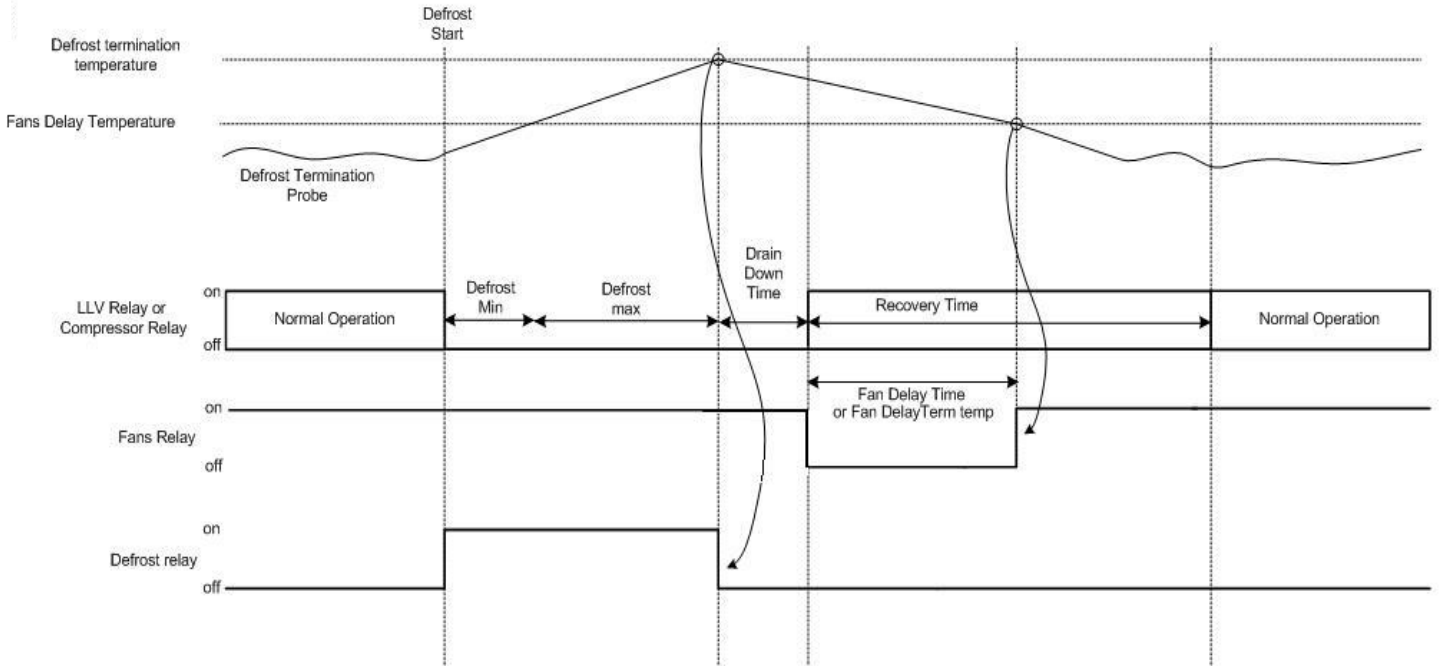
The specifications of the product detailed in this document may change without notice. RDM Ltd shall not be liable for errors or omissions, for incidental or consequential damages, directly or indirectly, in connection with the furnishing, performance or misuse of this product or document.



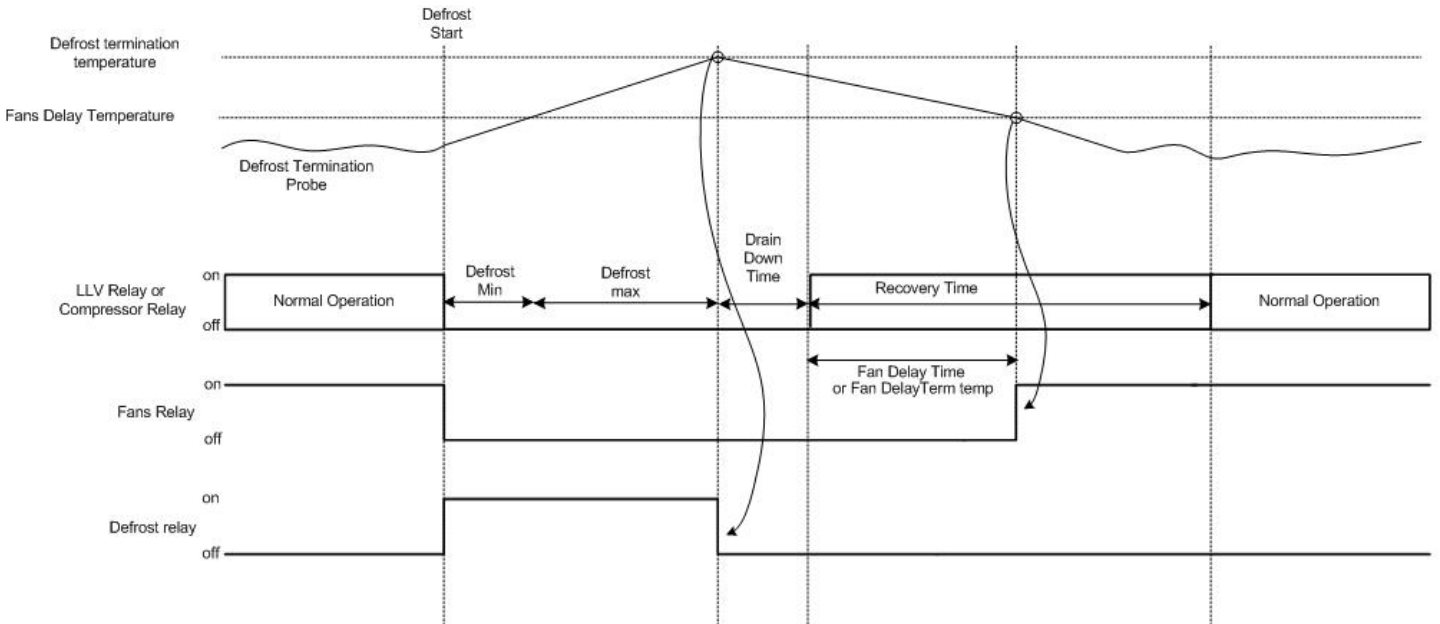
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Appendix 1 Defrost Cycles

Fans On in Defrost



Fans Off in Defrost



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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-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.

Appendix 3 Step Speed (Frequency Hz)

When setting the Step Speed, P-33, the following table applies.

Step Speed Entered	Actual Speed Set (Hz)	Step Speed Entered	Actual Speed Set (Hz)
500 and above	500	86 to 90	90
251 to 333	333	81 to 85	85
201 to 250	250	76 to 80	80
167 to 200	200	71 to 75	75
144 to 166	166	66 to 70	70
126 to 143	143	61 to 65	65
112 to 125	125	56 to 60	60
101 to 111	111	51 to 55	55
96 to 100	100	50 and below	50
91 to 95	95		

Please confirm with the Stepper valve manufacturer datasheets to select the correct step frequency.



Please ensure all power is switched off before installing or maintaining this product.

Revision History

Revision	Date	Changes
1.0	26/06/2019	First Issue
1.0a	15/01/2020	Update to Specification



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