Resource
Data Management

Intuitive Mercury & Mercury 2 Stepper Plate Heat Exchanger

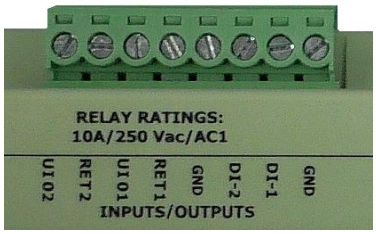
Commissioning/User Guide
Revision 2.4b

PR0712-PHX PR0722
PR0752/762-PHX-XX

Contents

The Mercury & Intuitive Range Stepper Plate Heat Exchanger Controller

This user guide relates to the Mercury 2 and Intuitive Mercury hardware platforms with firmware V2.6 or lower, for Mercury 3 and Intuitive hardware platforms please refer to the Intuitive Mercury & Mercury 3 PHX controller user guide.
The Mercury 2 PHX controller can be identified by it's base part number PR0712, the Mercury 3 PHX controller has base part number PR0740.
All variants of Intuitive controller use the same part numbering system and descriptions. The Intuitive controller, to which this user guide refers, can be identified by **not** having an 8-way analogue and digital input connector fitted as shown below. If the controller has this connector fitted then please refer to the Mercury 3 and Intuitive user guide.



This controller is primarily intended for use in Plate Heat Exchanger (PHX) applications. The controller will operate the PHX stepper valve to maintain superheat. The superheat can be obtained in several different ways which are user selectable: -

1. Based on the value of the Evaporator and Suction line temperature probe inputs connected directly to the controller.
2. The local Suction line temperature probe and a remote suction pressure value broadcast by a Plant/Intuitive Pack controller on the same IP network. The pressure received from the Plant/Intuitive Pack controller is converted to a temperature based on the gas type being used by the system.
3. The local suction line temperature probe and a local suction pressure measured by a transducer connected to the controller's internal daughter card and converted to evaporator temperature. Intuitive Mercury variant only.
4. The local suction line temperature probe and a local suction pressure measured by a transducer connected to the controller's external daughter card (PR0722). This configuration requires the use of PT1000 probes only (units selected as 0 or 1).
5. The local suction line temperature probe and a local suction pressure measured by a transducer connected to the refrigeration case island Mercury Hub (PR0018-PHI). The pressure read from the Mercury Hub pressure transducer is converted to a temperature based on the gas type being used by the system. This temperature is transmitted to all controllers connected to the Mercury Hub.

The controller has relay outputs to indicate "run", "fail" and "alarm" and can operate a variety of stepper motors.
The controller supports PT1000, NTC2K, 470R, 700R, 3K, 5K, 6K, NTC2K25, NTC10K or NTC10K(2) temperature probes (note: probe types cannot be mixed)

Variants

Description	Part Number
Mercury Mk2 Stepper Plate Heat Exchanger Controller, Integral Display.	PR0712-PHX
Intuitive Mercury Stepper PHX controller, Integral Display.	PR0752-PHX
Intuitive Mercury Stepper PHX controller, Remote Display.	PR0762-PHX
Intuitive Mercury Stepper PHX with a 4-20mA Input Daughter Card, Integral Display and IP network interface.	PR0752-PHX-IP-AiAo
Intuitive Mercury Stepper PHX with a 0–10Vdc Input Daughter Card, Integral Display and IP network interface.	PR0752-PHX-IP-ViVo
Intuitive Mercury Stepper PHX with a 4-20mA Input Daughter Card, Remote Display and IP network interface.	PR0762-PHX-IP-AiAo
Intuitive Mercury Stepper PHX with a 0–10Vdc Input Daughter Card, Remote Display and IP network interface.	PR0762-PHX-IP-ViVo

Configuration

The controller has only one type, this is fixed as type 3.

Intuitive Power Store

The Intuitive power store (IPS), part number PR0627, is designed for use with both the Mercury 2 and Intuitive Mercury stepper controller platforms. In the event of a power failure to the stepper controller the IPS provides a backup power supply to enable the controller to fully close the stepper valve. Utilising the latest in capacitor technology the IPS provides a reliable and maintenance free solution.

Compatible Network Interfaces

Mercury and Intuitive Mercury controllers are capable of connecting to a TCP/IP local area network, an RS485 Genus compatible network, an RDM wireless mesh network or they can be used in standalone mode with no network output. To connect to a network you must add the correct communications module. Connecting to any of these communication modules will automatically be detected on power up and will affect the 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
Intuitive Internal Wireless Mesh Network Card Interface Kit	PR0772

Front Display Features

LED's: -

Valve (Stepper O/P)

Fans (Not Used)

Lights (Not Used)

Defrost (Not Used)

Network

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

Service

(See Parameter 33 for setup)

Alarm

HACCP

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

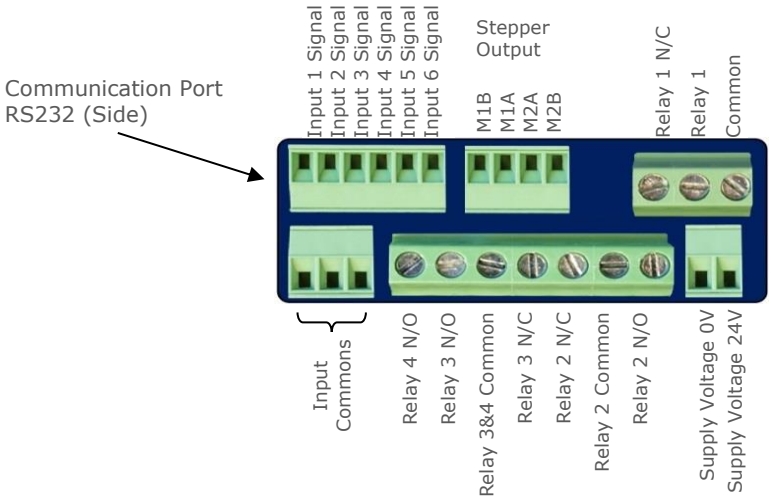
Main Display

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

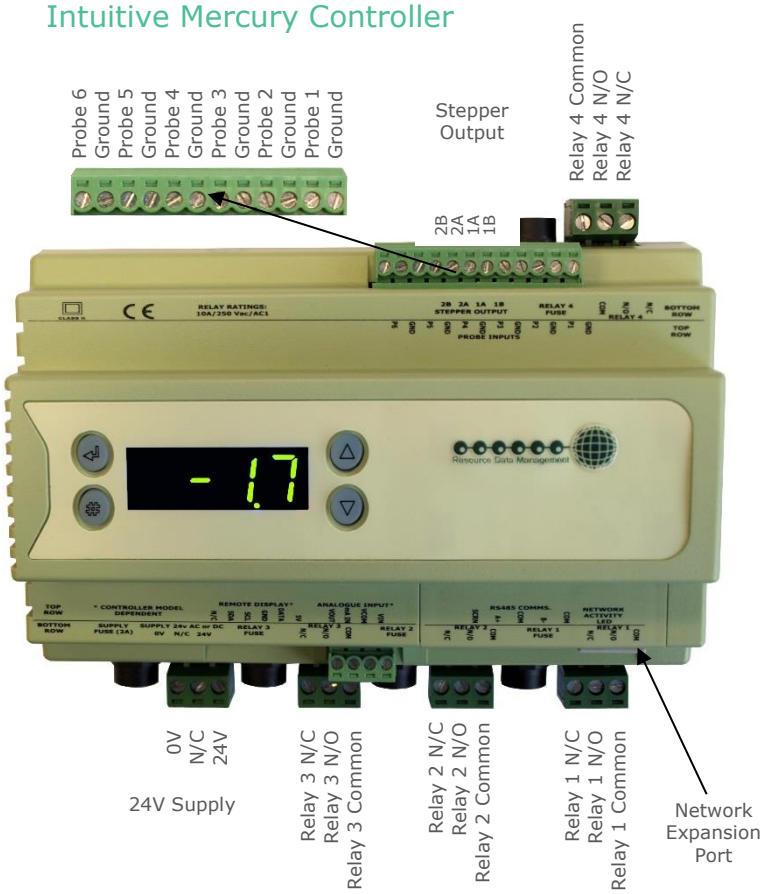
Connections

Mercury Mk2 6-5

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



Intuitive Mercury Controller



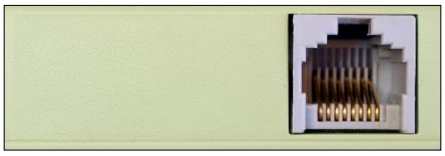
All inputs and outputs are plug and socket. The supply voltage and relay outputs have individual fuse protection.

PR0772 Wireless Mesh Option also available. The network interfaces work in the same way as their external counterparts.

Do not connect an earth

Intuitive Mercury Network Expansion Options

RS232 Network Card (Default)



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

IP Network Card (PR0770)

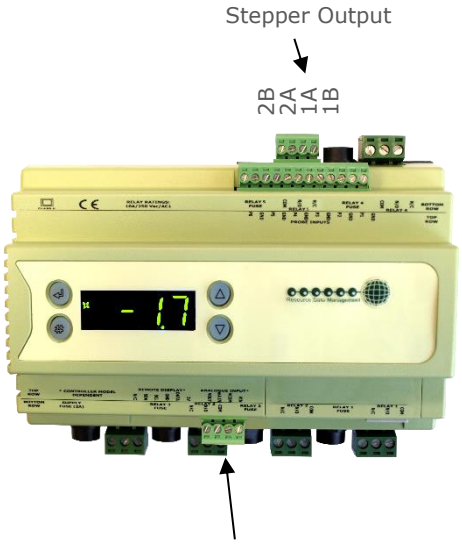
RS485 Network Card (PR0771)

Intuitive Mercury Stepper PHX with Daughter Board Option

The Intuitive Mercury Stepper PHX controller can be purchased with optional daughter boards to read in suction pressure to use to calculate a remote evaporator temperature to use to calculate superheat

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

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

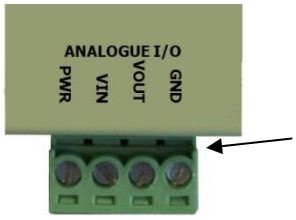


Note: Only 0–10Vdc or 4–20mA Inputs used (Outputs are not used)

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

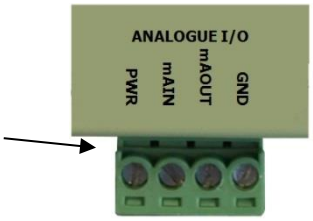
Daughter Board Connection Details

1 x 0-5V/0-10Vdc Input & 1 x 0-5V/0-10Vdc



Connector colour will change depending on board type.

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



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.

Ordering Information

When ordering a Mercury Intuitive controller the following ordering scheme can be used to purchase the desired hardware configuration. This ensures the controller ships with the optional hardware pre-fitted.

PR075X-Y-Z Where **X**, **Y** and **Z** are selections from the tables below.

X	Description
5	Internal Display
6	Remote Display

Y	Description
	RS232*
IP	IP Interface
RS485	RS485 Interface

Z	Description
	No Daughter Card**
Vi/Vo	0-10Vdc Input
Ai/Ao	1 x 4-20mA Input

* Fitted by default.
** If no daughter card required leave field blank

Example – To order an internal display variant, with a built in IP module and a 4 – 20mA board use the following part number: -

PR0752-PHX-IP-AiAo

Input / Output allocation table for the PHX controller

	Description	Alarm Action	Comments
Input 1	Temperature Monitor Probe or Shut Enable	Configurable	
Input 2	Temperature Monitor Probe	Configurable	
Input 3	Evaporator Temperature	Yes	
Input 4	Suction Line Temperature	Yes	
Input 5	Run Input		0V Return
Input 6	Pressure Transducer*	Yes	See Interface Board
Intuitive Daughter Card	Pressure Transducer*	Yes	
Stepper Output	Stepper Motor Valve	N/A	
Relay 1	Run	N/A	
Relay 2	Fail	N/A	
Relay 3	Alarm	N/A	
Relay 4	Remote	N/A	

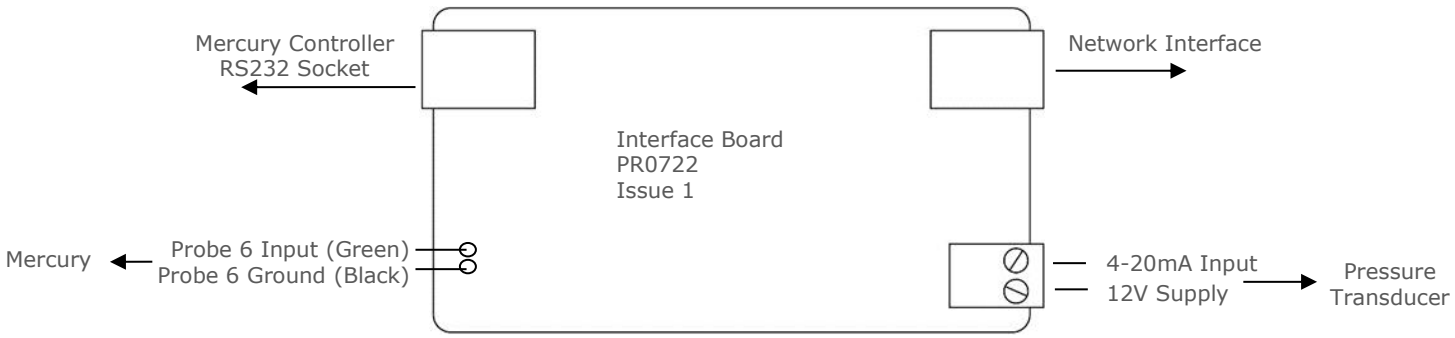
*Probe 6 pressure transducer connection via a PR0722 interface board applies only to the MK2 Mercury (PR0712).
The Intuitive Mercury controller (PR0752/762) requires a factory installed daughter board to be fitted to utilise a pressure transducer.

Temperature range for all probe types is -49°C to +60°C

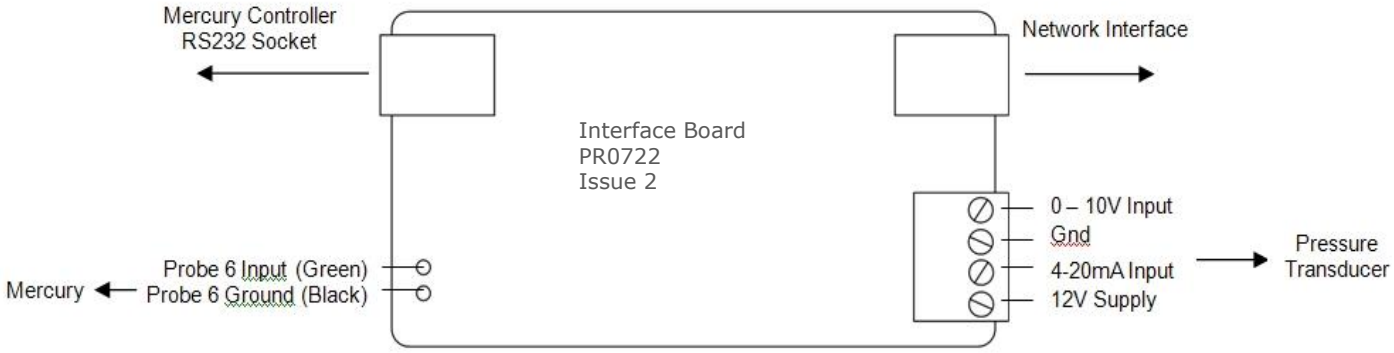
Pressure Transducer Interface Board for Mercury Mk2 PHX

The controller uses an external 4-20ma interface board (PR0722) which allows a pressure transducer to be connected to the probe 6 input. Pressure transducers must be of the current loop 4-20mA type. Excitation voltage (12 Vdc) is provided for the transducer. The range of the transducer will vary according to the application, the Span and Offset parameters allow for this.
Issue 2 Interface has a 4-20mA input and a 0 – 10V input for transducer.

Note: The PR0722 works with PT1000 probes only (units selected as 0 or 1)



Note: Interface Board PR0722 Issue 1 is now obsolete and is superseded by Interface Board PR0722 Issue 2



The RJ45 socket labelled as "Mercury Controller" on the interface board connects to the Mercury Mini Pack controllers RS232 Comms port. A standard CAT5 patch lead should be used. Maximum cable length 0.1m. The Connector labelled "Probe INP" connects to Input 6 on the Mercury controller's Probe 6 input. Maximum cable length 0.1m.

Setting up the controller

Access to the controller can be achieved several ways

- Through the front mounted buttons
- Direct access by PC or palm top into the rear comms port. This requires a software package available on the RDM website
- Through 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

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

Display	Option	Explained in Paragraph
IO	View Inputs / Outputs and States	Input / output table
PArA	Set/View Parameters	Set view parameters
Unit	Probe type and Celsius/Fahrenheit option	Set View Unit
diSP	Display whole units or decimal	Display
tyPE	Set/View Controller Type	Set/view controller type
rtc	Set/view Clock (rtc = Real Time Clock)	Real Time Clock

Display	Option	Explained in Paragraph
nEt	Set/view network configuration	Network Configuration
SoFt	View software version	
FanS	Not used in this controller	
CASE	Not used in this controller	
Ligt	Not used in this controller	
OFSt	Probe Offset	Probe Offset
ESC	Exit Setup mode	

Recommended set-up method

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

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

a. Use the up or down buttons to scroll through the display until the display reads "rtc"
b. Press enter. The display will show "t-1". Press enter again
c. Scroll hours up or down (0 – 23) press enter
d. Use up button to select "t-2", press enter
e. Scroll minutes up or down (0 – 59) press enter
f. Repeat for t-3 (seconds 0 – 59)
g. Repeat for t -4 (days up to 31)
h. Repeat for t -5 (months up to 12)

i. Repeat for t -6 (year up to 99)
j. Use up button to display "ESC", press enter to display "rtc"

Time clock is now set

type. Set/view controller type

This controller has only one type, this value is set to 3 and cannot be changed.

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. The first parameter option will be displayed as P-01. Pressing the Up or Down button will present the other parameter options P-02, P-03 etc. See the parameter list below to find what parameter number corresponds to which actual parameter. Pressing the Enter button will show the current value of the selected parameter. Press Up or Down to modify the value and press Enter again to save the value. The parameter list number will be displayed again. Two other options are present in the parameter menu – dFLt and ESC. Selecting ESC will exit setup mode. Selecting dFLt will reset all parameters back to the default values for the current type 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	10 for NTC2K25 Celsius
1 for PT1000 Fahrenheit	11 for NTC2K25 Fahrenheit
2 for NTC2K Celsius	12 for NTC5K Celsius
3 for NTC2K Fahrenheit	13 for NTC5K Fahrenheit
4 for 470R Celsius	14 for NTC6K Celsius
5 for 470R Fahrenheit	15 for NTC6K Fahrenheit
6 for 700R Celsius	16 for NTC10K Celsius
7 for 700R Fahrenheit	17 for NTC10K Fahrenheit
8 for 3K Celsius	18 for NTC10K(2) Celsius (USA NTC10K)
9 for 3K Fahrenheit	19 for NTC10K(2) Fahrenheit (USA NTC10K)

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

Display

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

0. Controller display will show the whole number and tenths value of a temperature reading. (Default)

1. Controller display will show temperatures as a whole number.

Parameter Tables

Note: In this application EEV refers to a stepper valve.

Number	Parameter	Range °C (°F)	Step	Units	Default °C (°F)
P-01	Superheat Ref	0 to 12 (7.2 to 21.6)	0.1	Deg	6 (10.8)
P-02	Response on	1 to 60	1	---	10
P-03	Response off	1 to 60	1	---	10
P-20	EEV Minimum Opening	0 – 100%	1	%	10
P-21	Superheat Problem	0 – 12 (0 – 21.6)	0.1	Deg	0
P-22	EEV Problem Opening	0 – 100%	1	%	10
P-23	EEV Problem Time	00:00 to 99:00	01:00	mm:ss	03:00
P-25	EEV Start Opening	0 – 100%	1	%	60
P-27	EEV Start Time	00:00 to 03:00	00:01	mm:ss	00:20
P-26	EEV Divide Value	0 – 100%	1	%	50
P-30	Evap Select	0 = Local temp. 1 = Rem1. 2 = Rem2. 3 = Rem3. 4 = Local mA. 5 = Local Vdc. 6 = IoBrd	1	---	0
P-31	Run Input	0 = Disabled. 1 = N/O. 2 = N/C	1	---	0
P-32	Overdrive Time	1 – 25	1	Hrs	8
P-33	Service Time	0 – 128	1	K Hrs	60
P-50	Control Fail	0 – 100	1	%	0
P-51	Alarm Delay	00:00 to 99:00	01:00	mm:ss	20:00
P-52	Low Superheat	-49 – 60	0.1	Deg	2.0
P-53	Probe 1 type	0 = Monitor. 1 = Monitor + Fault. 2 = Monitor + Fault + Alarm	1	---	0
P-54	Probe 2 type	0 = Monitor. 1 = Monitor + Fault. 2 = Monitor + Fault + Alarm	1	---	0
P-55	Probe Alarm delay	00:00 – 99:00	01:00	mm:ss	05:00
P-56	Probe OT	-49 – 60	0.1	Deg	20.0
P-60	Broadcast ID	0 to 999	1	-	0
P-61	Refrigerant	See: Refrigerant Table below		---	0
P-62	Pressure Type	0 = Absolute. 1 = Gauge	1	---	1
P-63	Evap Offset	0.0 to 1.0	0.1	-	0.0
P-64	Glide	-15.0 –15.0	0.1	Deg	0.0
P-65	Transducer Span	-3.4 – 150	0.1	Bar	13.8
P-66	Transducer Offset	-3.4 – 50	0.1	Bar	0.0
P-67	Tconst	1 – 30	1	-	1
P-34	Refrigerant Weight	0 - 100	1	%	0
P-35	MOP Cut-in	-3.4 - 180	0.1	Bar	3.4
P-36	MOP Diff	-3.4 - 180	0.1	Bar	0.3
P-37	MOP Delay	00:00 – 02:00	01:00	mm:ss	00:05
P-40	Valve Type	0 = Carel, 1 = Sporlan1 , 2 = Sporlan 2, 3= Alco, 4 = Other *	1	---	0
P-41	Step Max	0 to 6400 See : Valve Type	1	---	480
P-42	Step Close	0 to 6400 See : Valve Type	1	---	500
P-43	Step Speed	0 to 6400 See : Valve Type	1	Hz	50
P-44	mA Peak	0 to 500 See : Valve Type	1	mA	450
P-45	Half Step	0 (Off), 1(On) See : Valve Type	1	---	0
P-46	mA Hold Current	0 to 500	1	mA	0
P-47	Shut Speed	0 to 6400	1	Hz	50
P-70	Shut Enable	0 = Not Used, 1 = Normally Open, 2 = Normally Closed	1	-	0
P-71	Shut Time	00:00 to 99:00	01:00	mm:ss	04:00
dFLt		Default Parameters			

* Parameters P-41, P-42, P-43, P-44, P-45 P-46 and P-47 only have an effect if "Other" is selected when configuring parameter P-40.

Refrigerant Table

0 = None	1 = R22	2 = R32	3 = R134a	4 = R142B	5 = R227
6 = R401A	7 = R401B	8 = R401C	9 = R402A	10 = R402B	11 = R404A
12 = R407A	13 = R407B	14 = R407C	15 = R500	16 = R502	17 = R503
18 = R507	19 = R717	20 = R290	21 = R744	22 = R407F	23 = R410A
24 = R449A	25 = R513A				

* 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 (305 psi)
Offset would be -1 bar (-14.5 psi)

Parameter Descriptions

Number	Parameter	Description
P-01	Superheat Ref	The controller will attempt to maintain this superheat value
P-02	Response on	Allows the user to speed up the EEV on time. With 60 providing the quickest response and 1 providing the slowest response.
P-03	Response off	Allows the user to speed up the EEV off time. With 60 providing the quickest response and 1 providing the slowest response.
P-20	EEV Minimum Opening	Sets the minimum valve opening level, during normal operation the valve will not go below this level. (Default 10%) IF used in conjunction with a Mercury Pressure Hub PR0018-PHI, remote pressure from Plant Pack or local pressure daughter card, then the Minimum value should be set at **0%**
P-21	Superheat Problem	Sets the point at which the algorithm will go into the "EEV Problem" state due to the superheat temperature. For example if this parameter is set to 0 Degrees and the Superheat value falls to 0 Degrees or below, for the duration of P-23, then the controller will enter the superheat problem state.
P-22	Superheat EEV Problem Opening	Sets the valve open position when entering the "Superheat EEV Problem" state. Note: the minimum time the controller will remain in problem state is 60 seconds even if the time is set to 00:00.
P-23	Superheat EEV Problem Time	Sets the time the controller stays in the "Superheat EEV Problem" state.
P-25	EEV Start Opening	Sets the valve opening % which is used when the controller first powers up. It is also used when the controller exits a problem state for example Superheat EEV Problem state.
P-27	EEV Start Time	Sets the start opening value (P-25) for this length of time when the controller is first started up.
P-26	EEV Divide value	This parameter only takes effect when the controller is used in conjunction with a Mercury Switch pressure application. When the Mercury Switch generates the MOP (maximum operating pressure) alarm the controller reduces the maximum valve opening to this percentage. For example if this parameter is set to 40% and the MOP alarm is generated then the maximum valve opening will be limited by the controller to 40%. Note P-20 EEV Minimum opening overrides the valve output operation and the valve will not close below this setting. Please see Maximum Operating Pressure (MOP) note. **Please note** parameters P-20 through to P-26 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-30	Evap Select	Local Temp: - The local Evaporator and Suction Line temperature probes are used to calculate the Superheat. Rem1, 2, 3: – The local Suction Line temperature probe and a Remote Suction Pressure value, broadcast from a Plant/Intuitive Pack controller, are used to calculate the Superheat. Local mA: - The local Suction Line temperature probe and Local Evaporator Temperature, calculated from a 4-20mA pressure transducer connected to the Interface PR0722 (4-20mA Input) are used to calculate the Superheat. Local V: - The local Suction Line temperature probe and Local Evaporator Temperature, calculated from a 0-10 V pressure transducer connected to the Interface PR0722 (0-10Vdc Input) are used to calculate the Superheat. IoBrd: Uses The local Suction Line temperature probe and Local Evaporator Temperature, calculated from a 4-20mA or 0-10V pressure transducer connected to the internal daughter card are used to calculate the Superheat. 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-31	Run Input	This input allows the controller to run on the application of a digital input signal. If the feature is enabled the control strategy will not operate unless the Run Input is present. This input can be set to N/O or N/C.
P-32	Overdrive Time	The time interval, in hours, at which the attached stepper motor will be overdriven. Please see Valve State – Overdriving section for further details.
P-33	Service Interval Time	Time (in 1000 x hours) before the service icon (Spanner icon) comes on. Reset the spanner icon to off by changing this parameter to 0 and then back to the desired value.
P-50	Control Fail	This value determines the fixed valve opening percentage when a control fail occurs.
P-51	Alarm Delay	Delay for the Over Temperature and Low Superheat alarms.
P-52	Low Superheat	This value determines the "Low Superheat" alarm threshold. Note this alarm will not be generated when the valve is closed i.e. 0%.
P-53	Probe 1 Type	Set probe 1 to a monitor probe, monitor with probe fault alarms or monitor with probe fault alarms and OT alarm levels. Note: If Shut Enable (P-70) is used then this probe is disabled.
P-54	Probe 2 Type	Set probe 2 to a monitor probe, monitor with probe fault alarms or monitor with probe fault alarms and OT alarm levels.
P-55	Probe Alarm delay	Sets the delay period for alarms on probe 1 & 2
P-56	Probe OT	Sets the over temperature alarm threshold for probe 1 & 2
P-60	Broadcast ID	ID of the 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-61	Refrigerant	Sets the refrigerant type so that a pressure to temperature conversion can be calculated.
P-62	Pressure types	Allow the controller to operate with either gauge or absolute pressure
P-63	Evap Offset	Offset to allow for pressure drop over distance
P-64	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-65	Transducer span	Sets the range of the pressure transducer
P-66	Transducer offset	Sets the value of the transducer that is below zero.
P-67	TConst	This is a damping factor that can be added to the measured pressure value to compensate for sudden changes in pressure (such as when compressors start and stop), the higher the value then the higher the damping effect.
P-34	Refrigerant Weight	Allows for a weighted average between liquid and vapour pressure to be used in the pressure to temperature calculation. See: Ref weight
P-35	MOP Cut-in	If the pressure exceeds this value, then the controller's valve will close or be reduced to a predetermined percentage. A MOP alarm is also created. (See Maximum Operating Pressure (MOP))
P-36	MOP Diff	When the pressure reduces below this value, the controllers valve will recover to their normal operational
P-37	MOP Delay	Delay after the MOP value has been exceeded before the MOP actions and alarm occurs.
P-40	Valve Type	Choose from four preconfigured stepper valve types or select "Other" to enter Stepper characteristics for a valve which is not listed. See Note Valve Type

P-41	Step Max	Number of steps the controller will send to open the valve to 100%. Consult the valve manufacturer to obtain the required number of steps. (Has no effect if Valve Type 0, 1 or 2 selected at P-40) See Note Valve Type
P-42	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 or 2 selected at P-40) See Note Valve Type
P-43	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 or 2 selected at P-40) See Note Valve Type and Appendix 1 Step Speed.
P-44	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 or 2 selected at P-40) See Note Valve Type
P-45	Half Step	Uses half the range of the valve (Uses half value set in P-41 / P42). Has no effect if Valve Type 0, 1 or 2 selected at P-40 See Note Valve type
P-46	mA Current Hold	Current supplied to valve when it is stationary, to prevent any drift in valve position. (Has no effect if Valve Type 0, 1 or 2 selected at P-40) See: Holding Current
P-47	Shut Speed	If the Shut Enable Input (Input 1) is configured then the valve will close at the Shut Speed frequency, only when Shut Enable input is active, instead of the normal Step Speed P-43. Most stepper valve manufacturers allow for this and the maximum step close rate can be found on the valves datasheet. (Has no effect if Valve Type 0, 1 or 2 selected at P-40)
P-70	Shut Enable	If set to N/C or N/O the probe 1 input becomes a shutdown input, if using an Intuitive Power store (PR0627) this should be set to N/C. When this input is activated, for example in the event of a power failure, then the valve will be closed. This input does not require a fixed resistor and cannot be used in conjunction with a temperature probe. **Note:** Valve type must be set to "Other" for this feature to operate. For further information on the Intuitive Power Store and its use please refer to relevant document on the Support section of the RDM website.
P-71	Shut Time	The time that the valve will remain shut once the shutdown input has been activated, this is to prevent the possibility of the valve being stuck in an open position in the event of an intermittent power supply.

Holding Current

If using a type of valve that requires a holding current you must select "Other" at P-40 and make sure parameters P-41, P-42, P-43, P-44, P45, P-46 & P-47 are all set to the correct values. An example of this is a Carel E^2V which requires a holding current, although it is a Carel valve and has the same settings for "Step Max", "Step Close", "Step speed" and "mA Peak" it must be set to "Other" at P-40 for the holding current to operate correctly.

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-41, P-42, P-43, P-44, P-45, P-46 & P-47 only have an effect if "Other" is selected when configuring parameter P-40. Other allows the user to map in the requirements the stepper valve.

Selecting option 1, 2 or 3 at parameter P-40 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-41, P-42, P-43 and P-45.

Note the parameters relating to the Stepper Valve type should be configured prior to wiring the Stepper Valve to the Mercury 2 PHX controller. If one of the three default valve types is selected then changing P-41, P-42, P-43, P-44 and P-45 will have no effect.

Manufacturer	Model	Step Max	Step Close	Step Speed (Hz)*	mA Peak	mA Hold	Half Step	Overdrive (Hours)
Carel	E^3V	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	24

See Appendix 1 Step Speed also.

Valve Wiring

Manufacturer	Model	Wiring (Colours)	Connection Description (See Stepper Output)
Carel	E^3V	Yellow	M1B
		White	M1A
		Green	M2A
		Brown	M2B
Sporlan	SER 1.5 - 20 SER A/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-32) will overdrive the Stepper motor output by 10% of the step max value within the preset period (24 hours for example).

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.

PR0722 Interface

Via the PR0722 connected to a Mercury Mk2 or Intuitive Mercury. (P30 set to Local mA or Local V)
A suction transducer can be connected directly to the input of the PR0722 Interface, 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. Transducers can be 4-20mA or 0 – 10V type. 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 P60/61/62/63/64/65/66) will need to be set accordingly

Local Daughter Card

(P30 set to LoBrd) 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 P60/61/62/63/64/65/66) will need to be set accordingly

Mercury Switch (PR0018-PHI)

(P-30 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 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-30) 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-30 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. The plant controller also needs to be set to broadcast pressure.

Maximum Operating Pressure (MOP)

If the controller is set to use a local or remote pressure transducer to calculate the suction temperature, then a MOP alarm can be generated (using parameters (P-37/P-38/P-39). When a MOP alarm is generated on the controller, it will either close or reduce the Stepper 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 "Divide Value" parameter is set to 50% and the MOP alarm is generated then the maximum valve opening will be limited to 50%.

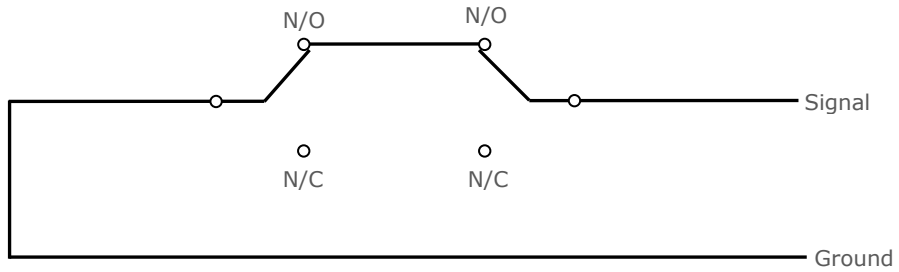
Ref Weighting

When using a local pressure transducer to calculate superheat, the Mercury controller can use a weighted average of liquid pressure and vapor 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% vapor pressure. Any percentage from 1 to 99% will give an appropriate weighted average between the two pressures.

Relay State and functional operation

Relay 1-3 State	Function State	Wired contact
Relay 1 off	Not running	N/O
Relay 1 on	Running	N/O
Relay 2 off	Fail	N/O
Relay 2 on	Normal	N/O
Relay 3 off	Alarm Relay = Alarm	N/C
Relay 3 on	Alarm Relay = OK	N/C

Relay 4 & Stepper State	Function State	Wired contact
Relay 4 off	Remote off	N/O
Relay 4 on	Remote on	N/O
Stepper Valve Off	Stepper Valve Closing	As per I/O Diagram
Stepper Valve On	Stepper Valve Operating	As per I/O Diagram



Example of relay 1 and 2 wired for operation with the CO2 Pump Station Controller

Relay 1 (Run Output) will energise as stepper valve starts to open.
Relay 2 (Run Fail) will be energised during normal operation and will de-energise for transducer faults and superheat low alarms.

Network Configuration

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

When logging a Mercury or Intuitive Mercury with an RS232 interface onto a network you must first connect the controller to a communications module, this is either a 485 Legacy, RDM Wireless Mesh system, IP Futura or Mercury Switch. When using an Intuitive Mercury controller, the controller has to have the correct network card fitted (see "compatible network interfaces"). For connection to a Mercury Switch (Hub) or an external network interface, the standard fitment RS232 network card is utilized.

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

The 485t option shows a value representing the network type, in this controller there is only one type

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

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

Wireless Mesh Communication Module

RDM Wireless Mesh System, please refer to the RDM Wireless Mesh Communication Module user guide, which can be obtained from the RDM website, for information regarding connecting a controller to a Wireless Mesh network.

The value shown in 485A is of the form 05-6. This means the controller would try to log onto a Genus compatible or RDM Wireless Mesh 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.

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

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. Press the Enter button to execute the command, Up or Down buttons to cancel.

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)

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

IP-r

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

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

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

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

Mercury Switch

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

Viewing

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

Input / Output Table

Number	IO	Range* °C (°F)	Step	Units
I-01	Probe 1	-49 to 60 (-43.6 to 140)	0.1	Deg
I-02	Probe 2	-49 to 60 (-43.6 to 140)	0.1	Deg
I-03	Evaporator Probe	-49 to 60 (-56.2 to 140)	0.1	Deg
I-04	Suction Line Probe	-49 to 60 (-56.2 to 140)	0.1	Deg
I-05	PHX Superheat	-49 to 60 (-56.2 to 140)	0.1	Deg
I-06	Run Input	0 = Off, 1 = Run, 2 = Unused	1	
I-07	Remote Evaporator temp	-49 to 60 (-56.2 to 140)	0.1	Deg
I-08	MOP	0 = Off, 1 = On	1	
I-09	Div Input	0 to 100	1.0	%
I-20	Remote Pressure	-3.4 to 180.0	0.1	Bar
I-21	Local Pressure	-3.4 to 180.0	0.1	Bar
I-22	Local Calc Temp	-49 to 60 (-56.2 to 140)	0.1	Deg
I-30	Shut Enable	0 = Off, 1 = On	1	
O-01	Valve Opening	0 to 100	0.1	%
O-02	Run Output	0 = Off, 1 = On	1	
O-03	Run Fail	0 = Off, 1 = On	1	
O-04	Alarm Relay	0 = Off, 1 = On	1	
O-05	Remote Relay	0 = Off, 1 = On	1	
O-18	Run Time	0 – 128 K Hours	1	
O-19	Valve Step	0 - 6400	1	
S-01	Control State	0 = Stabilise, 1 = Normal, 2 = Alarm, 3 = Control Off	1	
S-02	Valve State	0 = Off, 1 = Start, 2 = Run, 3 = Problem, 4 = Fail, 5 =Initial	1	

* 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
AL	Control State in Alarm

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)
Superheat Low	5
Superheat problem	6
Probe 1 fault	6
Probe 2 fault	6
Probe 3 fault	6
Probe 4 fault	6
Probe 5 fault	6

Alarm text	Type # (index)
Transducer fault	6
Monitor Probe 1 OT	4
Monitor Probe 2 OT	4
Controller Off	29
Remote evap temperature	6
Valve Shut	2

Probe Offset

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

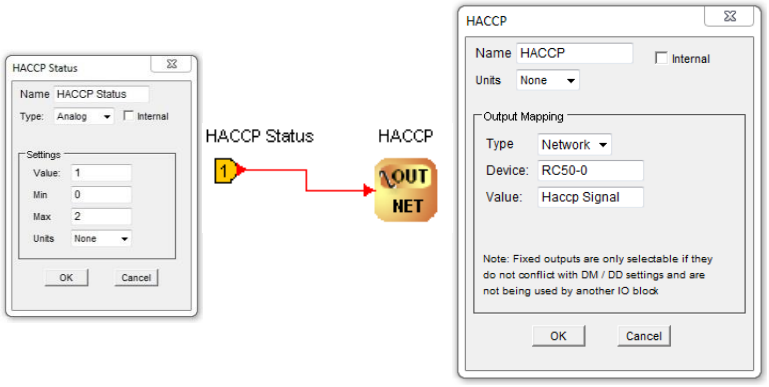
Remote Commands

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

Command	Value to send	Description	Conditions
Haccp Command	0 1 2	HACCP LED OFF HACCP LED On HACCP LED Flashes	Haccp Command
Button Command	0 1 2	Buttons backlights Off Buttons backlights On Buttons Backlights Flash	Button Command
EEV Command	2 1	Shuts the valve off Restores the valve to normal operation	EEV Command
Divider Command	0 to 100%	Sets the maximum valve opening to this percentage.	Divider Command

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 turns on the HACCP LED.



Specification

	Mercury Mk2 Stepper Controller PR0712 & PR0713	Intuitive Mercury Stepper controller PR0752 & PR0762
Power Requirements		
Supply Voltage Range	24 Vac ±10% or 24Vdc ±10%	24 Vac ±10% or 24Vdc ±10%
Supply Frequency	50 – 60 Hz ±10% or dc	50 – 60 Hz ±10% or dc
Maximum supply current	0.5 Amps (Total max. Current dependant on stepper motor used)	0.5 Amps (Total max. Current dependant on stepper motor used)
Typical supply current	<1 Amp	<1 Amp
General		
Operating temperature range	+5^{0}C to +50^{0}C	-10^{0}C to +60^{0}C
Storage temperature range	-20^{0}C to +65^{0}C	-20^{0}C to +65^{0}C
Environmental	Indoor use at altitudes up to 2000m, pollution degree 1, installation category II. Voltage fluctuations not to exceed ±10% of nominal voltage.	Indoor use at altitudes up to 2000m, pollution degree 1, installation category II. Voltage fluctuations not to exceed ±10% of nominal voltage.
Size	78mm (W) x 36mm (H) x 110mm (D)	157mm (W) x 67mm (H) x 120 (D)
Approx Weight	170 grams	500 grams
Safety	EN61010	EN61010
EMC	EN61326; 1997 +Amdt. A1; 1998	EN61326; 1997 +Amdt. A1; 1998
Ventilation	There is no requirement for forced cooling ventilation	There is no requirement for forced cooling ventilation
Class 2 Insulation	**No** protective Earth is required and **none** should be fitted	**No** protective Earth is required and **none** should be fitted
Supply Fuse	The host equipment must provide a suitable external over-current protection device such as: - Fuse: 6.3A 240 Vac Antisurge (T) HRC conforming to IEC 60127	Built in fuse holder, fuse 2A 240Vac Antisurge (T) HRC conforming to IEC60127, 32 x 6.3mm
Or MCB	6A, 240 VAC Type C conforming to BS EN 60898	2A, 240 VAC Type C conforming to BS EN 60898 (Note: controller has integral 2A fuse)
Relay Fuse	Not Fitted	10A 240Vac Antisurge (T) HRC conforming to IEC60127, 32 x 6.3mm
Valve Output		
Max current valve output	Total Max current dependant on Stepper Motor used.	Total Max current dependant on Stepper Motor used.
Stepper Output	Bipolar Stepper Motor 24V 8W Max. Maximum current cannot exceed 825mA Chopper Drive	Bipolar Stepper Motor 24V 8W Max. Maximum current cannot exceed 825mA Chopper Drive
Relay Specification		
Relays 1-3 Exclusive common		
Max current	6A Resistive (CosØ = 1) 2A Inductive (CosØ = 0.4)	10A Resistive (CosØ = 1) 3A Inductive (CosØ = 0.4)
Max voltage	250Vac, 30V dc	250Vac. 30V dc
Relay Fuse	N/A	10A 240Vac Antisurge (T) HRC conforming to IEC60127, 32 x 6.3mm
Relay 4 Exclusive common		
Max current	3A Resistive (CosØ = 1) 1A Inductive (CosØ = 0.4)	10A Resistive (CosØ = 1) 3A Inductive (CosØ = 0.4)
Max voltage	250Vac	250Vac
Relay Fuse	N/A	10A 240Vac Antisurge (T) HRC conforming to IEC60127, 32 x 6.3mm

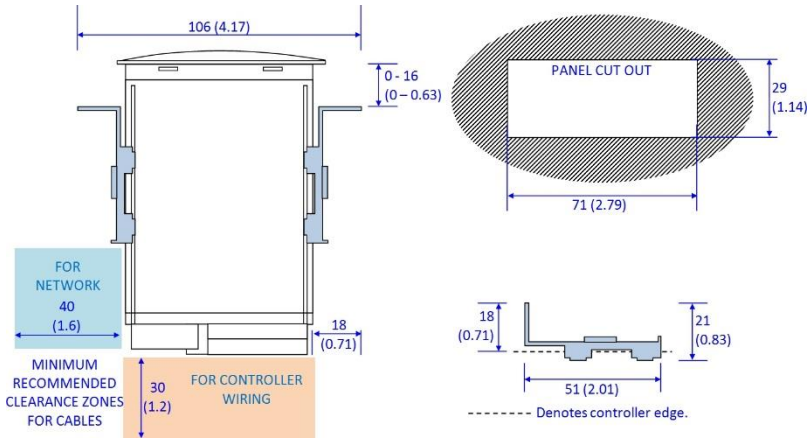
Inputs

Input resistance:	3.01K Ohms (for PTC or NTC type probes)
Input type	Selectable. See: Units
Comms:	RS232 with flow control

Installation

Panel Cut-out and Clearances

Mercury Mk2 (Flush mount controller)

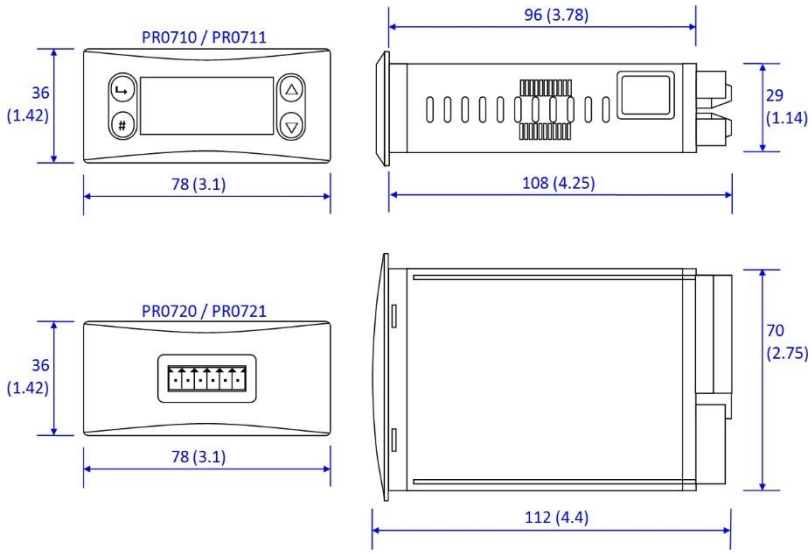


Fixing

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

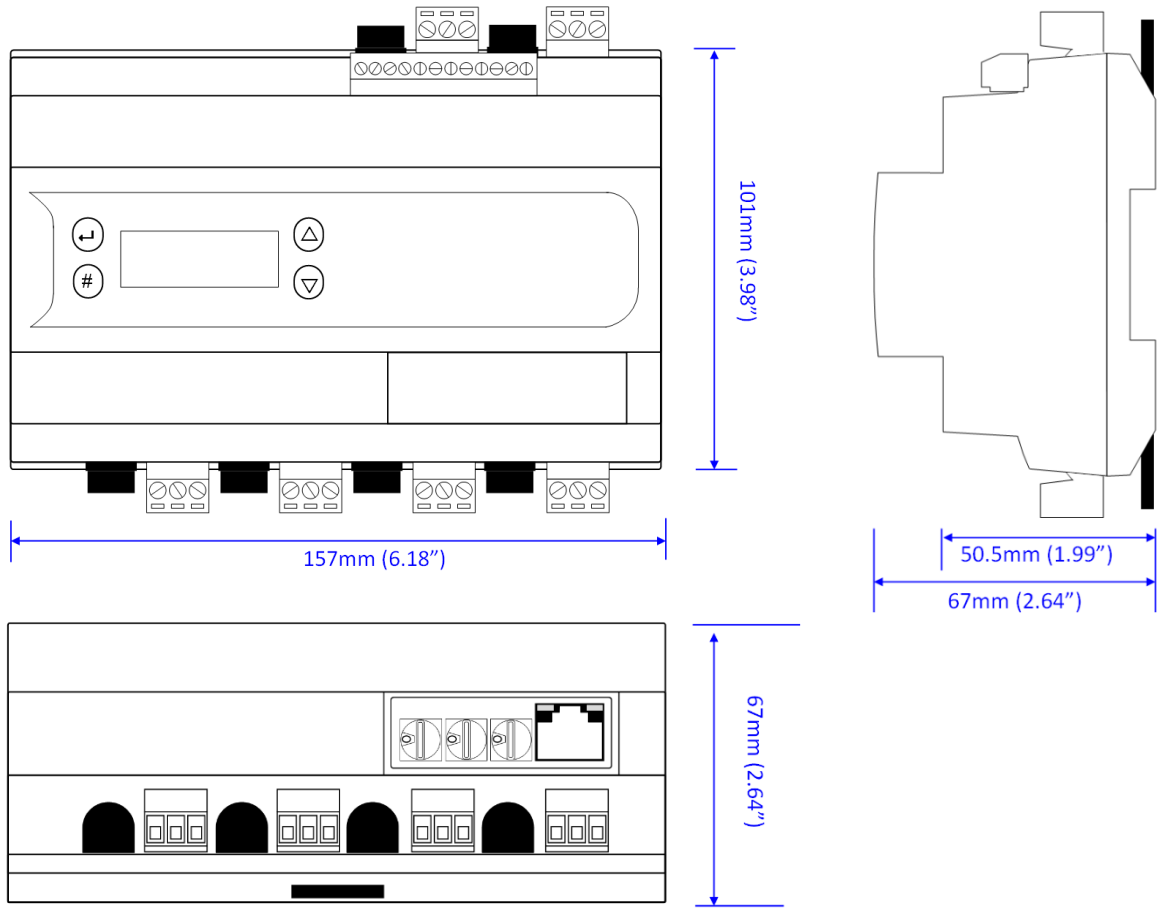
Dimensions

Mercury Mk2

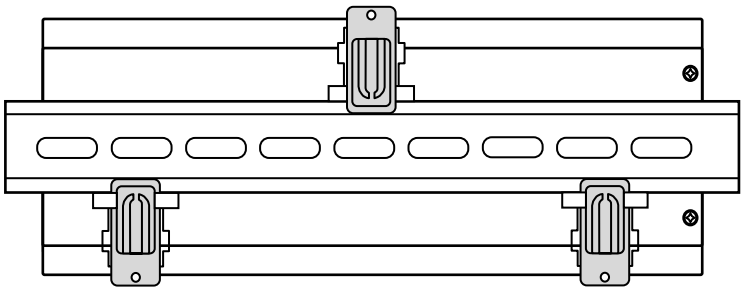


Dimensions

Intuitive Mercury controller



Intuitive Mercury Mounting Instructions



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

Cleaning

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

Appendix 1 Step Speed (Frequency Hz)

When setting the Step Speed, P-43, 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.

Revision History

Revision	Date	Changes
1.3b	30/06/2011	Current Issue
1.3c	13/01/2012	Inp. Option removed
1.3d	02/07/2012	Valve types amended
1.5	01/08/2012	Various ways to measure suction pressure using daughter cards on Intuitive type. Holding current added, Issue synchronized with software version
1.5a	12/08/2012	Parameter numbers corrected
1.6	15/08/2012	PR0722 with 0–10V input as well as 4-20mA added.
2.0	17/04/2013	Following parameters added: - P-27 EEV Start Time P-47 Shut Speed P-67 Time Constant (Tconst), P-70 Shut Enable P-71 Shut Time Intuitive Power Store support added.
2.1	09/07/2013	Gas type R407F added.
2.1a	30/09/2014	Probes types amended.
2.1b	06/01/2015	Operating temperature updated
2.1c	07/01/2015	Description of problem opening time amended, minimum time in problem state is 60 seconds.
2.1d	17/07/2015	Description of control using local transducer updated
2.2	23/09/2015	Description of Glide parameter updated. Sporlan 2 valve added.
2.3	01/10/2015	Gases R513A and R449A added, glide span increased to 15.
2.3a	11/01/2017	Valve selection information updated.
2.3b	15/08/2017	Update to Sporlan mA peak
2.4	13/09/2017	Amendment to MOP functionality added. Refrigerant gas table updated. Ref weight parameter added. Change to stepper mA settings.
2.4a	26/06/2018	New documentation format.
2.4b	17/08/2021	Ordering information updated to include remote display variant and wireless mesh network card removed. Note added to identify hardware types.

Group Offices

RDM Group Head Office
80 Johnstone Avenue
Hillington Industrial Estate
Glasgow
G52 4NZ
United Kingdom
+44 (0)141 810 2828
support@resourcedm.com

RDM Inc
100 North Sixth Street
Suite 630B
Minneapolis, MN
55403
United States
+1 612 354 3923
usasupport@resourcedm.com

RDM Asia
Sky Park at One City
Jalan USJ 25/1
47650 Subang Jaya
Selangor
Malaysia
+603 5022 3188
info@rdmasia.com.my

Visit www.resourcedm.com/support for more information on RDM solutions, additional product documentation and software downloads.

Resource Data Management