

Resource
Data Management

Mercury 3 I/O Module

Commissioning/User Guide
Revision 3.0d



PR0740-IOR

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The Mercury 3 I/O Module

From Resource Data Management

Description

The Mercury 3 IO Module is intended for use with the Data Builder Program to access networked I/O. There is no functional program inside the I/O module, its inputs and outputs are all available to be used as remote I/O by the Data Builder running on a DMTouch (See Controller Editor in appendix 1).

Each input has to be locally configured before use, see parameter table for set-up options.

When an input is configured for probe use, a switched resistor can be used as a digital switch on that channel.

The monitor supports the following probe types, PT1000, NTC470R, NTC700R, NTC2k, NTC2k25, NTC3k, NTC5k, NTC6k or NTC10K.

Variants

Description	Comms	Part Number
Mercury Mk3, I/O Module	Serial	PR0740-232-IOR
Mercury Mk3, I/O Module	IP	PR0740-IP-IOR

Configuration

The controller is delivered pre-configured with all 6 input channels configured as PT1000 probes.

Compatible Network Interfaces

The Mercury I/O module requires connection to a TCP/IP local area network in order to communicate with the DMTouch. 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
Mercury IP Switch (IP support for 10 controllers)	PR0018
Mercury IP Switch with Pressure/Humidity Inputs	PR0018-PHI



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Front Display Features

LED's: -

Valve (Not Used) 

Fans (Not Used) 

Lights (Not Used) 

Defrost 

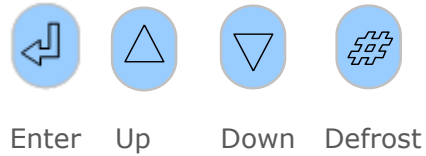
On-Line 

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

Service (Not Used) 

Alarm 

HACCP (Not Used) 



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 time and status messages.

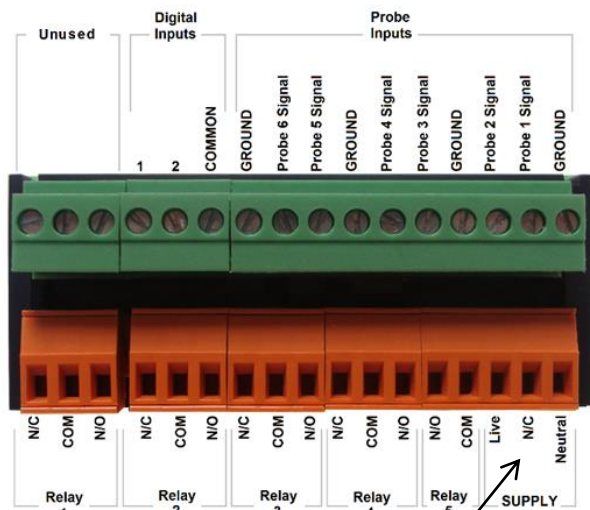
Connections

Mercury Mk3

Input and Output connections are made to the back of the controller, the RS232/IP 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.



Do not connect an earth.



Note : On the supply, N/C equates to 'No Connection'



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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 defrost inputs that are derived by switching in a fixed value resistor across the input.

Input / Output allocation table

	Description	Switch Function (resistor*)
Probe 1	Probe 1 or Plant Fault	Yes, when in probe mode
Probe 2	Probe 2 or Plant Fault	Yes, when in probe mode
Probe 3	Probe 3 or Plant Fault	Yes, when in probe mode
Probe 4	Probe 4 or Plant Fault	Yes, when in probe mode
Probe 5	Probe 5 or Plant Fault	Yes, when in probe mode
Probe 6	Probe 6 or Plant Fault	Yes, when in probe mode
Relay 1	Relay with Common, N/O & N/C	N/A
Relay 2	Relay with Common, N/O & N/C	N/A
Relay 3	Relay with Common, N/O & N/C	N/A
Relay 4	Relay with Common, N/O & N/C	N/A
Relay 5	Relay with Common, N/O	N/A
Digital 1	Digital Input 1	N/A
Digital 2	Digital Input 2	N/A

- PT1000 temperature range is -42°C to +128°C

Switched Resistor Values

For PT1000 probes, use 820 Ohm switched resistors

For NTC470R and NTC700R probes, switch resistor features are not available

For NTC 2k, NTC2k25, NTC3K use 590 Ohm switched resistors

For NTC5k, NTC6k and NTC10K Use 2k7 Ohm switched resistors

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.

Relays 1 to 4: (Software) Outputs shows Off = Relay Energised

Relay 5: (Software) Outputs shows Off = Relay De-Energised

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 the RDM DMTouch.
- 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

Display	Option	Explained in Paragraph	Display	Option	Explained in Paragraph
IO	View Inputs / Outputs and States	Input / output table	SoFt	View software version	
PArA	Set/View Parameters	Set view parameters	OFSt	Probe Offset	Probe Offset
Unit	Probe type and Celsius/Fahrenheit option	Set View Unit	tEst*	Test Mode	See Note Below
Rtc	Set/view Clock (rtc = Real Time Clock)	Real Time Clock	ESC	Exit Setup mode	
nEt	Set/view network configuration	Network Configuration			

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

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

Recommended set-up method

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

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

- 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

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-11, P-21 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.



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

Use the up or down keys to select the units and press enter.

This function is now complete

Probe Offset

From the function menu scroll to select OFSt

Press enter and select the channel (C1 – C6) to 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.

Parameter Tables

Number	Parameter	Range °C (°F)	Step	Units	Default
P-01	Input Type Channel 1	0 = Probe 1 = Plant N/C 2 = Plant N/O	1	Degrees N/A N/A	0
P-11	Input Type Channel 1	0 = Probe 1 = Plant N/C 2 = Plant N/O	1	Degrees N/A N/A	0
P-21	Input Type Channel 1	0 = Probe 1 = Plant N/C 2 = Plant N/O	1	Degrees N/A N/A	0
P-31	Input Type Channel 1	0 = Probe 1 = Plant N/C 2 = Plant N/O	1	Degrees N/A N/A	0
P-41	Input Type Channel 1	0 = Probe 1 = Plant N/C 2 = Plant N/O	1	Degrees N/A N/A	0
P-51	Input Type Channel 1	0 = Probe 1 = Plant N/C 2 = Plant N/O	1	Degrees N/A N/A	0

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 alter the controller address to the correct address. (You may have to deregister the wrong address from the home system as well), and allow the controller to log on again.



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Wireless Mesh Communication Module

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

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.

Network Configuration – IP comms

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

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

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

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

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

IP-r

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

IP-L

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

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

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



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Normal Operation

During normal operation, the controller will display the current time, if there are no alarms and no defrost actions. If the Monitor is on a network and on-line, the green network LED will be on.



The Network green LED flashes if the controller goes off-line or loses its given address.

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	Step	Unit
I-01	Probe 1	-49 to 128	0.1	Deg
I-02	Probe 2	-49 to 128	0.1	Deg
I-03	Probe 3	-49 to 128	0.1	Deg
I-04	Probe 4	-49 to 128	0.1	Deg
I-05	Probe 5	-49 to 128	0.1	Deg
I-06	Probe 6	-49 to 128	0.1	Deg
I-11	Switch 1	0 = off, 1 = on		
I-12	Switch 2	0 = off, 1 = on		
I-13	Switch 3	0 = off, 1 = on		
I-14	Switch 4	0 = off, 1 = on		
I-15	Switch 5	0 = off, 1 = on		
I-16	Switch 6	0 = off, 1 = on		
I-21	Plant 1	0 = off, 1 = on		
I-22	Plant 2	0 = off, 1 = on		
I-23	Plant 3	0 = off, 1 = on		
I-24	Plant 4	0 = off, 1 = on		
I-25	Plant 5	0 = off, 1 = on		
I-26	Plant 6	0 = off, 1 = on		
I-27	Digital 1	0 = off, 1 = on		
I-28	Digital 2	0 = off, 1 = on		
O-21	Relay 1	0 = off, 1 = on		
O-22	Relay 2	0 = off, 1 = on		
O-23	Relay 3	0 = off, 1 = on		
O-24	Relay 4	0 = off, 1 = on		
O-25	Relay 5	0 = off, 1 = on		
S-01	Control State	0 = Normal, 1 = Defrost, 2 = Alarm, 3 = Defrost/ Alarm		



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Remote commands

Values for analogue input block values:

Probe 1 *returns probe 1 value*
Probe 2 *returns probe 2 value*
Probe 3 *returns probe 3 value*
Probe 4 *returns probe 4 value*
Probe 5 *returns probe 5 value*
Probe 6 *returns probe 6 value*

Values for Digital Input (Plant) fault values:

Plant 1 *returns Plant 1 status*
Plant 2 *returns Plant 2 status*
Plant 3 *returns Plant 3 status*
Plant 4 *returns Plant 4 status*
Plant 5 *returns Plant 5 status*
Plant 6 *returns Plant 6 status*

Values for digital input (switch) values:

Switch 1 *returns Switch 1 status*
Switch 2 *returns Switch 2 status*
Switch 3 *returns Switch 3 status*
Switch 4 *returns Switch 4 status*
Switch 5 *returns Switch 5 status*
Switch 6 *returns Switch 6 status*

Send values to "Control State"

0 for Normal
1 for Amber (defrost) LED
2 for Red (alarm) LED
3 for Amber and Red LED's on

Values for Digital Output values *

Remote Relay 1 *controls relay 1*
Remote Relay 2 *controls relay 2*
Remote Relay 3 *controls relay 3*
Remote Relay 4 *controls relay 4*
Remote Relay 5 *controls relay 5*

* Note: Relays 1, 2, 3 & 4 are energised when software state for that relay shows off.
Relays 5 is not energised when software state for that relay shows off.



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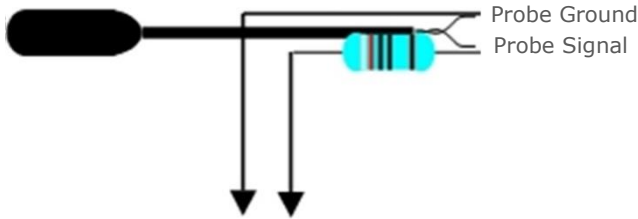
Mercury Mk2 Controller PR0710-IOR	
Power Requirements	
Supply Voltage Range	100 - 240 Vac \pm 10%
Supply Frequency	50 - 60 Hz
Maximum supply current	5.2 Amps (when relay 5 is fully loaded)
Typical supply current	<1 Amp
General	
Operating temperature range	-10°C to 60°C (14°F to 140°F)
Storage temperature range	-20°C to 65°C (-4°F to 149°F)
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	78mm (W) x 36mm (H) x 110mm (D)
Approx Weight	177 grams
Safety	EN61010
EMC	EN61326;2013
Ventilation	There is no requirement for forced cooling ventilation
Class 2 Insulation	No protective Earth is required and none should be fitted
Supply Fuse	The host equipment must provide a suitable external over-current protection device such as:- Fuse: 6.3A 240 Vac Antisurge (T) HRC conforming to IEC 60127
Or MCB	6A, 240 VAC Type C conforming to BS EN 60898
Relay Fuse	Not Fitted
Relays Specification	
Relays 1 – 4 Mechanical Type (M) – Exclusive common	
Max current	6A Resistive ($\text{Cos}\phi = 1$) / 2A Inductive ($\text{Cos}\phi = 0.4$)
Max voltage	250Vac, 30V dc
Relay 5 (M) – Exclusive common	
Max current	3A (non inductive), $\text{COS}\phi=0.4$ 2A (inductive load) 200,000 operations
Max voltage	250Vac (Internal supply)
For compliance with the LVD, relays 3, 4 and 5 commons must be at the same potential as the supply voltage	
Inputs	
Probe Input resistance	3.01K Ohms (for PTC or NTC type probes)
Probe Input type	Selectable. See: Units
Digital Inputs	Volt Free
Comms	
Serial Variant	RS232 with flow control
Ethernet Variant	IP comms



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Switched Resistor Example Wiring

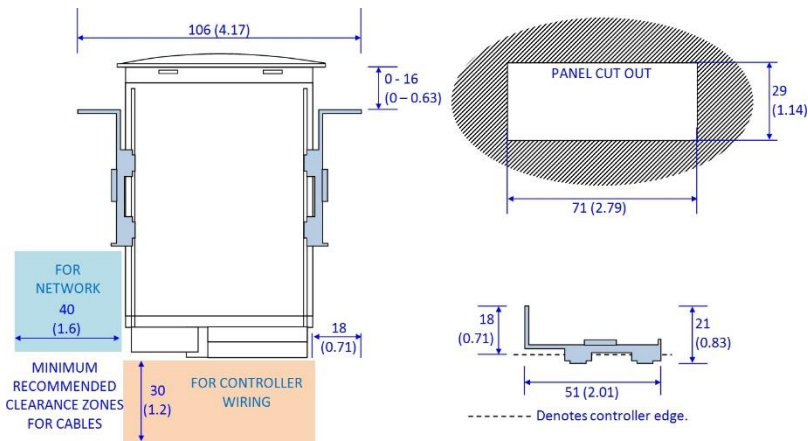
Example of resistor fitted on a Connect to remote switch or relay



Installation

Panel Cut-out and Clearances

Mercury Mk3 (Flush mount controller)



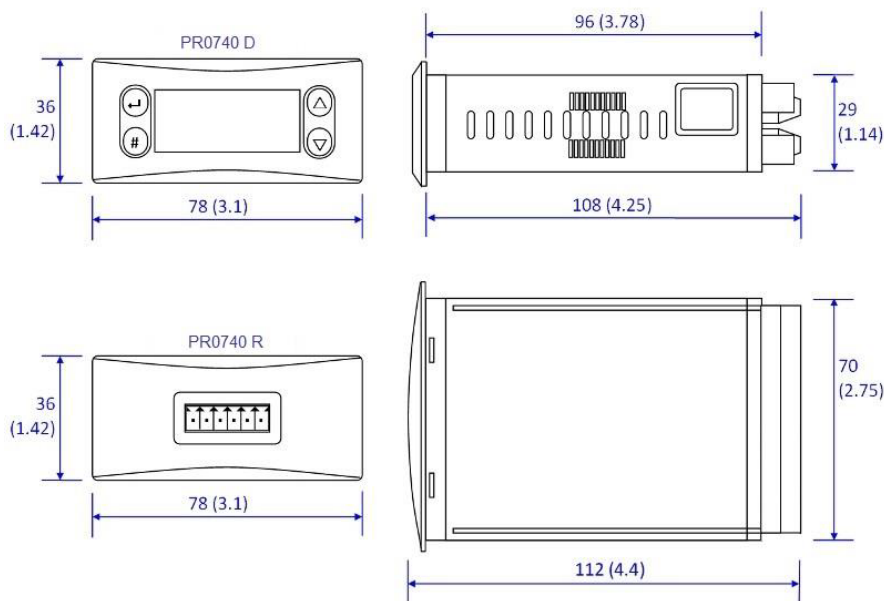
Fixing

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.

There is no requirement for forced cooling ventilation

Dimensions

Mercury Mk3



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Cleaning

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

Disclaimer

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Revision History

Revision	Date	Changes
3.0	07/09/2015	Introduction of Mercury 3 Range.
3.0a	03/11/2015	Connections drawing updated.
3.0b	09/03/2017	New documentation format.
3.0c	17/05/2017	Operating temperature amended.
3.0d	31/05/2019	I/O table updated, Contact details updated.



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