Resource Data Management

Intuitive

PR0750-MPA-x-x
PR0760-MPA-x-x

Intuitive Mercury Mini Pack / Condenser Controller
Installation & User Guide

Resource Data Management

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Mercury Intuitive Mini Pack Controller Range

From Resource Data Management

For Software Version 1.0

The Mercury Mini Pack controller is primarily intended for use in Compressor Pack and/or Condenser fan control applications. The controller has 5 relay outputs that are configurable as Compressors, Condenser Fans or Inverter Enable. The controller has 6 inputs which can be assigned as a Stage Input, General Alarm, Standby Mode or Temperature Probe. Pressure can be read in either by utilising a suitable mA or Voltage daughter board as well as providing a variable output to control an inverter drive. There is also a hardware option with a SSR (solid state relay) fitted which allows control of a digital scroll compressor.
The controller operates a staged logic control algorithm which allows the user to specify the order of relay switching as the control pressure increases and decreases.

Hardware Variants and Ordering Information

When ordering a Mercury Intuitive controller the following ordering scheme can be used to purchase the desired hardware configuration. If the controller is required to use a 4-20mA (milliamp) pressure transducer then a daughter card with a mA input is required, similarly if it is a 0-10v transducer then a Voltage In daughter card must be selected. If two pressure transducers are required then only a 2 x Vin card can be used and the transducers must be of the voltage input type.
If a variable output is required to control the speed of an inverter drive then a Vi/Vo or Ai/Ao daughter card must be selected.

PR07VW-MPA-X-Y-Z Where **V**, **W**, **X**, **Y** and **Z** are selections from the tables below.

V	Description
5	Internal Display
6	Remote Display

W	Description
0	Relay 1 Mechanical
1	Relay 1 Solid State

X	Description
	Relay 2 Mechanical*
2E	Relay 2 Solid State

Y	Description
	RS232*
IP	IP Interface

Z	Description
Vi/Vo	1 x 0-5V/0-10Vdc Input & 1 x 0-5V/0-10Vdc Output
2xVi	2 x 0-5V/0-10Vdc Inputs
Ai/Ao	1 x 4-20mA Input & 1 x 4-20mA Output

* Fitted by default.

Example – To order a remote display variant with a mechanical relay in position 1, a built in IP module and a 2 x Voltage In board use the following part number: -

PR0760-MPA-IP-2xVi

Configuration

The controller provides five configuration options: -

Display value	Controller Type
1	Single Pack Controller
2	Dual Pack Controller
3	Pack / Condenser Controller
4	Dual Condenser Controller
5	Single Condenser Controller

Quick Start Guide

Set the controller to the type required (see configuration above), this can only be set using the display buttons or by direct connection to the controller using a PC, it cannot be done via a Data Manager.

To use the display buttons:-

1. Press and hold the enter button  and down button  for 3 seconds, “Ent” will appear in the display, press the enter button once,
   “IO” will appear on the display, you are now in the setup menu.

2. Press the down button repeatedly to scroll through the menu options until “tyPE” is displayed, press the enter button once and the current controller type will be displayed, press the up and down buttons to select the type number required and press the enter button (for example selecting type 3 is a combined pack condenser controller). The controller will restart and all the parameters for a pack/condenser controller are now available.

3. Repeat process 1 to enter the setup menu again and press the down button until “PrES” is displayed, press enter to display the pressure type, this defaults to 0 for Bar, if you require Psi then change this value to 1 and press the enter button to return to the setup menu, “PrES” will be displayed again. (This setting cannot be changed using a Data Manager)

4. Press the down button until “Unit” is displayed, press enter to display the probe and temperature unit type, this defaults to 0 for Centigrade and PT1000 probe type, if you require Fahrenheit then change this value to 1 and press the enter button to return to the setup menu, “Unit” will be displayed again. (This setting cannot be changed using a Data Manager)

5. Press the down button until “PArA” is displayed, press the enter key to enter the parameter list, P-01 will be displayed, press enter to show the current P-01 value which is suction pressure transducer span, press the up and down buttons to adjust this as required. This value should match what is marked on the transducer, for example if the range is -1 to 20 Bar then the span should be set to 21 Bar.
   (The parameter numbers P-01 through to P-A5 will vary slightly depending on the controller type, the following parameters are for type 3 which is pack/condenser controller. If you are using a different type then see the parameter table for that type listed later on in this document.)

6. Press the enter button to return to the parameter menu, P-01 will be displayed again, press the up button to select P-02 parameter, this is the span for the discharge transducer, set as required.

7. Set P-03 to set the suction transducer offset, again as marked on the transducer, if the range is -1 to 20 Bar then the offset should be set to -1. Repeat for P-04 which is the discharge transducer offset.

8. Set P-05 which is the suction pressure target setpoint and P-06 which is the discharge pressure target setpoint.

9. Set P-15 which is the number of compressors stages being used and set P-16 which is the number of condenser fan stages being used, if all fans are controller by a single variable speed drive then set P-16 to 1.

10. If you are using an inverter drive on the first compressor or if the first compressor is a digital scroll then set P-21 to 1 (inverter enable), otherwise leave at 0. If using a digital scroll compressor then set the section 1 inverter min value P-23 as specified by the compressor manufacturer, this is typically 10%, and set the Pwm cycle time P-35 as required, this is typically 20 seconds.

11. If you are using an inverter drive on the condenser fans then set P-22 to 1 (inverter enable), otherwise leave at 0.

12. If you are using a digital scroll compressor then set P-33 to 1 (Pwm control), otherwise leave at 0.

13. The status input functions are parameters P-70 (input 1) to P-75 (input 5), these settings define what the status inputs are used for, temperature probe or fault input for example, see parameter descriptions later on in this document for specific details. If not used then leave the values set to 0.

14. Parameters P-A1 to P-A5 define which compressor relays are switched as the compressor stages increase. If the first relay is connected to a single stage compressor or an inverter enable then set P-A1 to 1,
    If using two compressors set P-A2 to 3, otherwise leave at 0
    If using three compressors set P-A3 to 7, otherwise leave at 0
    If using four compressors set P-A4 to 15, otherwise leave at 0
    If using five compressors set P-A5 to 31, otherwise leave at 0

    If using a digital scroll compressor then set P-A1 to 3, this enables relay 1 to energise the capacity solenoid and relay 2 to start the compressor motor.

The above settings are the minimum required to get the system running, all other parameters like alarm limits, alarm delays, stage on and off delays will be at default values and may require adjusting as required.

Compatible Network Interfaces

Mercury and Intuitive Mercury controllers are capable of connecting to a TCP/IP local area network or they can be used in standalone mode with no network output. To connect to a network you must add an IP 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

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.
An Internal IP network card is also available (PR0770) which can be supplied factory fitted as an option or purchased separately as an interface kit (replacing the standard RS232 network card)

Display Features

The controller can be supplied with a built in display or can use a panel mounted remote display (PR0725) or can be used without any display connected. Both display types have the common features shown below. When set as a two section controller, the display will alternate between section 1 and section 2 pressure at three second intervals.

LED's: -

On when section 1 pressure is being displayed

On when section 2 pressure is being displayed

Not Used

Not Used

Network

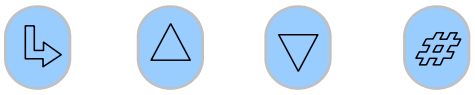
Off: No network attached
Flashing: Attempting to Log on to network
Steady: On-line

Not Used

Alarm

HACCP
Hazard Analysis Critical Control Point
(Only activated by a remote network command)

Keys



Enter Up Down Hash (not used)

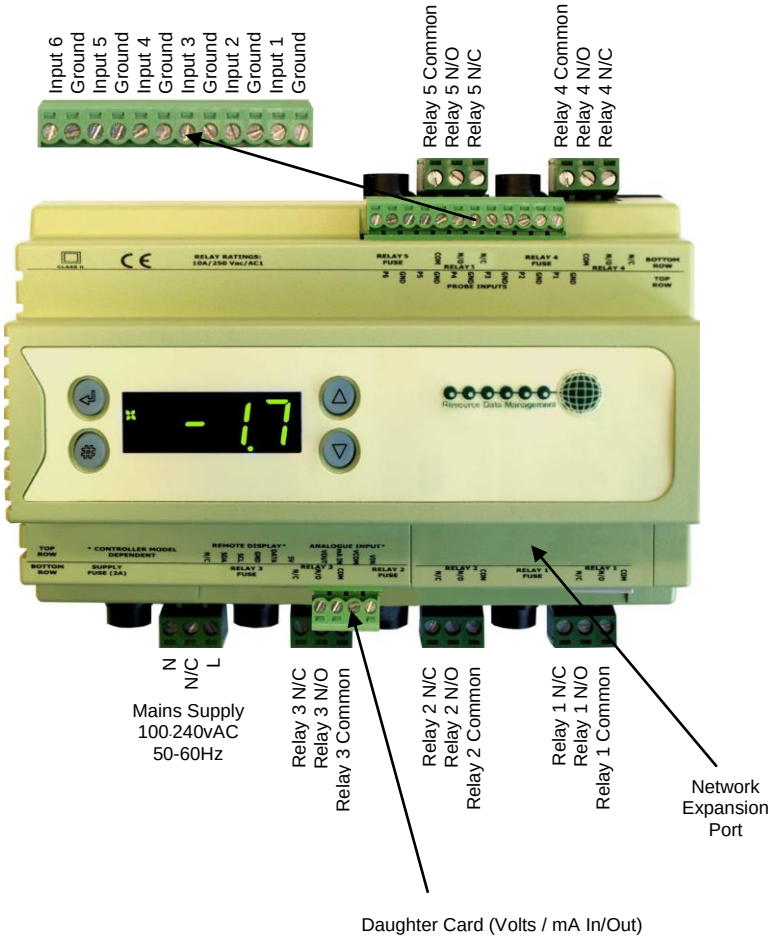
Note: Function keys illuminate when pressed, illumination is turned off 20 seconds after the key is used.

Main Display

4 character LED display, used to Suction and / or Discharge pressure and status messages.

Note: the Intuitive Mercury display is Green in colour when lit.

Connections

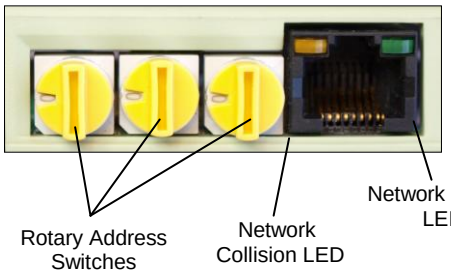


Intuitive Mercury Network Expansion Options

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

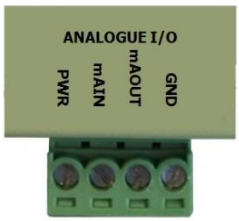
IP Network Card (PR0770)



If a solid state relay is fitted to enable control of a digital scroll compressor, only the N/C and common connections are used. The output is energised to reduce compressor capacity and de-energised to increase capacity.

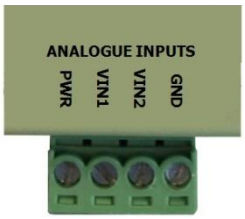
Daughter Board Connection Details

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



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

2x 0-5V/0-10Vdc Input



*If connecting a 4-20mA loop powered pressure transducer like an RDM PR0160 or a Danfoss AKS33, only the PWR and mAIN terminals should be used.

Note: “PWR” is a constant 12vdc feed if it is a mA signal board or 5vdc feed if it is a voltage signal board, this is available to power external equipment if required, maximum current 28mA. GND is a common ground for all inputs and outputs.

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

Alarm relay

The alarm relay is assigned automatically to relay 5 if it has not been utilised in the stage programming, if all five stages are being used then there will be no alarm relay available.

The relay is energised with no alarm and de-energised when in alarm. Any alarm condition will activate the alarm relay.

Setting up the controller

Access to the controller can be achieved several ways

- Through the front mounted buttons
- Direct access by PC into the controller's RS232 comms port. This requires the communicator software package available on the RDM website
- 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 (Common to all types)

Display	Option	Explained in Paragraph		Display	Option	Explained in Paragraph
IO	View Inputs / Outputs and States	Input / output table		rtc	Set/view Clock (rtc = Real Time Clock)	Real Time Clock
PArA	Set/View Parameters	Set view parameters		nEt	Set/view network configuration	Network Configuration
Unit	Probe type and Celsius/Fahrenheit option	Set View Unit		SoFt	View software version	
PrES	Set/View Pressure units, 0=Bar, 1=Psi			OFSt	Probe Offset	Probe Offset
inP	Set.View pressure transducer type. 4-20mA, 0-10v, 0-5v, 0.5-4.5v, 0.5-9.5v, 1-5v.	Input		test	Test Outputs	Test Outputs
tyPE	Set/View Controller Type	Set/view controller type		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"

type. Set/view controller type

a. From the function menu scroll to select type, press enter
b. Use the up/down buttons to scroll through configuration types. (see configuration table on page 3)
c. Press enter.
d. Scroll to select “ESC”
e. Press enter

Inp. Set Transducer Input Type

a. From the function menu scroll to select Inp, press enter
b. Use the up/down buttons to scroll through configuration types 0-5.
0 = 4-20mA, 1 = 0-10v, 2 = 0-5v, 3 = 0.5-4.5v, 4 = 0.5-9.5v, 5 = 1-5v.
c. Press enter.
d. Scroll to select “ESC”
e. Press enter

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

a. From the function menu scroll to select PArA
b. Pressing Enter while PArA is displayed will enter the parameter menu.
c. The first parameter option will be displayed as P-01. Pressing the Up or Down button will present the other parameter options P-02, P-03 etc. See the parameter list below to find what parameter number corresponds to which actual parameter.
d. Pressing the Enter button will show the current value of the selected parameter.
e. Press Up or Down to modify the value and press Enter again to save the value.
f. The parameter list number will be displayed again.
g. Two other options are present in the parameter menu – dFLt and ESC. Selecting ESC will exit the setup mode and save all changes.
h. Selecting dFLt will reset all parameters back to the default values for the current type of controller.

Unit. Set/view temperature unit and Probe type

From the function menu scroll to, and select Unit. Press enter and the value will be displayed: -

Probe Types

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

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

Probe Offset

This feature allows each probe value to be modified by an “offset” to take into account long cable runs. 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.

Test Relay Outputs

Selecting the “tESt” option from display software menu allows for the relay outputs to be tested.
Scroll through r-01 to r-05, press enter to select that relay, set to 1 to force on and set to 0 to force off.

Parameter Tables

Parameter numbers are different for different controller types, for example if the controller is set to type 1 pack controller then no condenser controller parameters, such as discharge trip, are required and are not available.
If set to type 3, pack & condenser controller, section 1 relates to the pack parameters and section 2 relates to condenser parameters.

The parameter tables for the five different controller types are shown below.

Type 1 Pack Controller Parameter Table

Number	Parameter	Range Bar (Psi)	Units
P-01	Transducer Span*	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-02	Transducer Offset*	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-03	Target Setpoint	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-04	Target Above	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-05	Target Below	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-06	Response On	1 – 60	-
P-07	Response Off	1 – 60	-
P-08	Number Of Stages	0 – 5	-
P-09	Stage On Delay	00:00 – 60:00	mm:ss
P-10	Stage Off Delay	00:00 – 60:00	mm:ss
P-11	Inverter	0 = Off, 1 = On	-
P-12	Inverter Min	0 - 100	%
P-13	Inverter Max	0 - 100	%
P-14	Transducer Fail	0 = Off, 1 = On	-
P-15	Run Last	0 = Off, 1 = On	-
P-16	Pwm	0 = Off, 1 = On	-
P-17	Pwm Cycle Time	00:10 - 00:30	mm:ss
P-18	Optimisation Limit	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-56	Pwm Stop	-49 - 128 (-56.2 - 262.4)	°C/°F
P-58	Pwm Diff	-49 - 128 (-56.2 - 262.4)	°C/°F
P-70	Input 1	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-71	Input 2	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-72	Input 3	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-73	Input 4	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-74	Input 5	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-75	Input 6	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-78	Display Pin	1 - 999	-
P-80	Alarm Delay	00:00 – 99:00	mm:ss
P-81	Low Alarm Delay	00:00 – 99:00	mm:ss
P-82	HP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-83	LP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-84	LP Shutdown	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-90	Status Alarm Delay	00:00 – 60:00	mm:ss
P-91	General Alarm Delay	00:00 – 60:00	mm:ss
P-A1	Stage 1	0 -31	-
P-A2	Stage 2	0 -31	-
P-A3	Stage 3	0 -31	-
P-A4	Stage 4	0 -31	-
P-A5	Stage 5	0 -31	-
dFLt	Restore default values		

Type 2 Dual Pack Controller Parameter Table

Number	Parameter	Range Bar (Psi)	Units
P-01	Transducer 1 Span*	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-02	Transducer 2 Span	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-03	Transducer 1 Offset*	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-04	Transducer 2 Offset	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-05	Section 1 Target	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-06	Section 2 Target	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-07	Section 1 Target Above	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-08	Section 2 Target Above	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-09	Section 1 Target Below	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-10	Section 2 Target Below	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-11	Section 1 Response On	1 – 60	-
P-12	Section 2 Response On	1 – 60	-
P-13	Section 1 Response Off	1 – 60	-
P-14	Section 2 Response Off	1 – 60	-
P-15	Section 1 Stages	0 – 5	-
P-16	Section 2 Stages	0 – 5	-
P-17	Section 1 Stage On Delay	00:00 – 60:00	mm:ss
P-18	Section 2 Stage On Delay	00:00 – 60:00	mm:ss
P-19	Section 1 Stage Off Delay	00:00 – 60:00	mm:ss
P-20	Section 2 Stage Off Delay	00:00 – 60:00	mm:ss
P-21	Section 1 Inverter	0 = Off, 1 = On	-
P-22	Section 2 Inverter	0 = Off, 1 = On	-
P-23	Section 1 Inverter Min	0 - 100	%
P-24	Section 2 Inverter Min	0 - 100	%
P-25	Section 1 Inverter Max	0 - 100	%
P-26	Section 2 Inverter Max	0 - 100	%
P-27	Section 1 Transducer Fail	0 = Off, 1 = On	-
P-28	Section 2 Transducer Fail	0 = Off, 1 = On	-
P-31	Section 1 Run Last	0 = Off, 1 = On	-
P-32	Section 2 Run Last	0 = Off, 1 = On	-
P-33	Section 1 Pwm	0 = Off, 1 = On	-
P-34	Section 2 Pwm	0 = Off, 1 = On	-
P-35	Section 1 Pwm Cycle Time	00:10 - 00:30	mm:ss
P-36	Section 2 Pwm Cycle Time	00:10 - 00:30	mm:ss
P-37	Section 1 Optimisation Limit	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-38	Section 2 Optimisation Limit	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-56	Section 1 Pwm Stop	-49 - 128 (-56.2 - 262.4)	°C/°F
P-57	Section 2 Pwm Stop	-49 - 128 (-56.2 - 262.4)	°C/°F
P-58	Section 1 Pwm Diff	-49 - 128 (-56.2 - 262.4)	°C/°F
P-59	Section 2 Pwm Diff	-49 - 128 (-56.2 - 262.4)	°C/°F
P-70	Input 1	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-71	Input 2	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-72	Input 3	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-73	Input 4	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-74	Input 5	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-75	Input 6	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-78	Display Pin	1 - 999	-
P-80	Section 1 Alarm Delay	00:00 – 99:00	mm:ss
P-81	Section 2 Alarm Delay	00:00 – 99:00	mm:ss
P-82	Section 1 Low Alarm Delay	00:00 – 99:00	mm:ss
P-83	Section 2 Low Alarm Delay	00:00 – 99:00	mm:ss
P-84	Section 1 HP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-85	Section 2 HP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-86	Section 1 LP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi

P-87	Section 2 LP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-88	Section 1 LP Shutdown	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-89	Section 2 LP Shutdown	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-90	Status Alarm Delay	00:00 – 60:00	mm:ss
P-91	General Alarm Delay	00:00 – 60:00	mm:ss
P-A1	Section 1 Stage 1	0 -31	-
P-A2	Section 1 Stage 2	0 -31	-
P-A3	Section 1 Stage 3	0 -31	-
P-A4	Section 1 Stage 4	0 -31	-
P-A5	Section 1 Stage 5	0 -31	-
b-01	Section 2 Stage 1	0 -31	-
b-02	Section 2 Stage 2	0 -31	-
b-03	Section 2 Stage 3	0 -31	-
b-04	Section 2 Stage 4	0 -31	-
b-05	Section 2 Stage 5	0 -31	-
dFLt	Restore default values		

Type 3 Pack/Condenser Parameter Table

Number	Parameter	Range Bar (Psi)	Units
P-01	Transducer 1 Span*	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-02	Transducer 2 Span	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-03	Transducer 1 Offset*	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-04	Transducer 2 Offset	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-05	Section 1 Target	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-06	Section 2 Target	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-07	Section 1 Target Above	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-08	Section 2 Target Above	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-09	Section 1 Target Below	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-10	Section 2 Target Below	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-11	Section 1 Response On	1 – 60	-
P-12	Section 2 Response On	1 – 60	-
P-13	Section 1 Response Off	1 – 60	-
P-14	Section 2 Response Off	1 – 60	-
P-15	Section 1 Stages	0 – 5	-
P-16	Section 2 Stages	0 – 5	-
P-17	Section 1 Stage On Delay	00:00 – 60:00	mm:ss
P-18	Section 2 Stage On Delay	00:00 – 60:00	mm:ss
P-19	Section 1 Stage Off Delay	00:00 – 60:00	mm:ss
P-20	Section 2 Stage Off Delay	00:00 – 60:00	mm:ss
P-21	Section 1 Inverter	0 = Off, 1 = On	-
P-22	Section 2 Inverter	0 = Off, 1 = On	-
P-23	Section 1 Inverter Min	0 - 100	%
P-24	Section 2 Inverter Min	0 - 100	%
P-25	Section 1 Inverter Max	0 - 100	%
P-26	Section 2 Inverter Max	0 - 100	%
P-27	Section 1 Transducer Fail	0 = Off, 1 = On	-
P-28	Section 2 Transducer Fail	0 = Off, 1 = On	-
P-31	Section 1 Run Last	0 = Off, 1 = On	-
P-32	Section 2 Run Last	0 = Off, 1 = On	-
P-33	Section 1 Pwm	0 = Off, 1 = On	-
P-35	Section 1 Pwm Cycle Time	00:10 - 00:30	mm:ss
P-87	Section 1 Optimisation Limit	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-51	Section 2 Do Trip	0 = Off, 1 = On	
P-53	Section 2 Discharge Trip	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-54	Section 2 Discharge Stop	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-55	Section 2 Discharge Diff	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-56	Section 1 Pwm Stop	-49 - 128 (-56.2 - 262.4)	°C/°F
P-58	Section 1 Pwm Diff	-49 - 128 (-56.2 - 262.4)	°C/°F
P-60	Section 2 Control Type	0 = Fixed, 1 = Floating	-
P-62	Section 2 Refrigerant	0 - 29**	-
P-64	Section 2 Low Limit	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi

P-66	Section 2 High Limit	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-68	Section 2 Condenser Offset	-49 - 128 (-56.2 - 262.4)	°C/°F
P-70	Input 1	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-71	Input 2	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-72	Input 3	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-73	Input 4	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-74	Input 5	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-75	Input 6	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-78	Display Pin	1 - 999	-
P-80	Section 1 Alarm Delay	00:00 – 99:00	mm:ss
P-81	Section 2 Alarm Delay	00:00 – 99:00	mm:ss
P-82	Section 1 Low Alarm Delay	00:00 – 99:00	mm:ss
P-83	Section 2 Low Alarm Delay	00:00 – 99:00	mm:ss
P-84	Section 1 HP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-85	Section 2 HP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-86	Section 1 LP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-87	Section 2 LP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-88	Section 1 LP Shutdown	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-89	Section 2 LP Shutdown	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-90	Status Alarm Delay	00:00 – 60:00	mm:ss
P-91	General Alarm Delay	00:00 – 60:00	mm:ss
P-A1	Section 1 Stage 1	0 -31	-
P-A2	Section 1 Stage 2	0 -31	-
P-A3	Section 1 Stage 3	0 -31	-
P-A4	Section 1 Stage 4	0 -31	-
P-A5	Section 1 Stage 5	0 -31	-
dFLt	Restore default values		

Type 4 Dual Condenser Parameter Table

Number	Parameter	Range Bar (Psi)	Units
P-01	Transducer 1 Span*	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-02	Transducer 2 Span	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-03	Transducer 1 Offset*	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-04	Transducer 2 Offset	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-05	Section 1 Target	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-06	Section 2 Target	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-07	Section 1 Target Above	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-08	Section 2 Target Above	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-09	Section 1 Target Below	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-10	Section 2 Target Below	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-11	Section 1 Response On	1 – 60	-
P-12	Section 2 Response On	1 – 60	-
P-13	Section 1 Response Off	1 – 60	-
P-14	Section 2 Response Off	1 – 60	-
P-15	Section 1 Stages	0 – 5	-
P-16	Section 2 Stages	0 – 5	-
P-17	Section 1 Stage On Delay	00:00 – 60:00	mm:ss
P-18	Section 2 Stage On Delay	00:00 – 60:00	mm:ss
P-19	Section 1 Stage Off Delay	00:00 – 60:00	mm:ss
P-20	Section 2 Stage Off Delay	00:00 – 60:00	mm:ss
P-21	Section 1 Inverter	0 = Off, 1 = On	-
P-22	Section 2 Inverter	0 = Off, 1 = On	-
P-23	Section 1 Inverter Min	0 - 100	%
P-24	Section 2 Inverter Min	0 - 100	%
P-25	Section 1 Inverter Max	0 - 100	%

P-26	Section 2 Inverter Max	0 - 100	%
P-27	Section 1 Transducer Fail	0 = Off, 1 = On	-
P-28	Section 2 Transducer Fail	0 = Off, 1 = On	-
P-31	Section 1 Run Last	0 = Off, 1 = On	-
P-32	Section 2 Run Last	0 = Off, 1 = On	-
P-60	Section 1 Control Type	0 = Fixed, 1 = Floating	-
P-61	Section 2 Control Type	0 = Fixed, 1 = Floating	-
P-62	Section 1 Refrigerant	0 - 29**	-
P-63	Section 2 Refrigerant	0 - 29**	-
P-64	Section 1 Low Limit	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-65	Section 2 Low Limit	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-66	Section 1 High Limit	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-67	Section 2 High Limit	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-68	Section 1 Condenser Offset	-49 - 128 (-56.2 - 262.4)	°C/°F
P-69	Section 2 Condenser Offset	-49 - 128 (-56.2 - 262.4)	°C/°F
P-70	Input 1	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-71	Input 2	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-72	Input 3	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-73	Input 4	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-74	Input 5	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-75	Input 6	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-78	Display Pin	1 - 999	-
P-80	Section 1 Alarm Delay	00:00 – 99:00	mm:ss
P-81	Section 2 Alarm Delay	00:00 – 99:00	mm:ss
P-82	Section 1 Low Alarm Delay	00:00 – 99:00	mm:ss
P-83	Section 2 Low Alarm Delay	00:00 – 99:00	mm:ss
P-84	Section 1 HP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-85	Section 2 HP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-86	Section 1 LP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-87	Section 2 LP Alarm	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-88	Section 1 LP Shutdown	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-89	Section 2 LP Shutdown	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-90	Status Alarm Delay	00:00 – 60:00	mm:ss
P-91	General Alarm Delay	00:00 – 60:00	mm:ss
P-92	Section 1 Refrigerant Weight	0-100	%
P-93	Section 2 Refrigerant Weight	0-100	%
dFLt	Restore default values		

Type 5 Single Condenser Parameter Table

Number	Parameter	Range Bar (Psi)	Units
P-01	Transducer Span*	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-02	Transducer Offset*	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-03	Target Setpoint	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-04	Target Above	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-05	Target Below	-3.4 - 180.0 (-49.3 - 2610)	Bar/Psi
P-06	Response On	1 – 60	-
P-07	Response Off	1 – 60	-
P-08	Number Of Stages	0 – 5	-
P-09	Stage On Delay	00:00 – 60:00	mm:ss
P-10	Stage Off Delay	00:00 – 60:00	mm:ss
P-11	Inverter	0 = Off, 1 = On	-
P-12	Inverter Min	0 - 100	%
P-13	Inverter Max	0 - 100	%
P-14	Transducer Fail	0 = Off, 1 = On	-
P-15	Run Last	0 = Off, 1 = On	-

P-60	Section Control Type	0 = Fixed, 1 = Floating	-
P-62	Refrigerant Type	0 – 25**	-
P-64	Low Limit	-3.4 – 180.0 (-49.3 – 2610)	Bar/Psi
P-66	High Limit	-3.4 – 180.0 (-49.3 – 2610)	Bar/Psi
P-68	Condenser Offset	-49 – 128 (-56.2 – 262.4)	°C/°F
P-70	Input 1	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-71	Input 2	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-72	Input 3	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-73	Input 4	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-74	Input 5	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-75	Input 6	0=Off, 1=Probe, 2=Ambient, 3=Status N/O, 4=Status N/C, 5=General N/O, 6=Gen N/C, 7=Standby N/O, 8=Standby N/C, 9=Standby 2 N/O, 10=Standby 2 N/C	-
P-78	Display Pin	1 – 999	-
P-80	Alarm Delay	00:00 – 99:00	mm:ss
P-81	Low Alarm Delay	00:00 – 99:00	mm:ss
P-82	HP Alarm	-3.4 – 180.0 (-49.3 – 2610)	Bar/Psi
P-83	LP Alarm	-3.4 – 180.0 (-49.3 – 2610)	Bar/Psi
P-84	LP Shutdown	-3.4 – 180.0 (-49.3 – 2610)	Bar/Psi
P-90	Status Alarm Delay	00:00 – 60:00	mm:ss
P-91	General Alarm Delay	00:00 – 60:00	mm:ss
P-92	Refrigerant Weight	0 -100	%

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

Example: RDM PR0160 with range: -1 bar to 20 bar
Span would be 21 bar
Offset would be -1 bar

** Refrigerant Types:

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

Parameter	Description
Transducer Span	Range of the transducer
Transducer Offset	Transducer value below zero, also allows calibration.
Target	Pressure target, control will try to maintain this pressure
Target Above	Set-point above the target, used to obtain a “dead-band”
Target Below	Set-point below the target, used to obtain a “dead-band”
Response On Speed	When using a variable output (such as digital scroll compressor or inverter drive) this allows the user to speed up/slow down the stage on speed (Option: - 1 to 60 with 60 being fastest response)
Response Off Speed	When using a variable output (such as digital scroll compressor or inverter drive) this allows the user to speed up/slow down the stage off speed (Option: - 1 to 60 with 60 being fastest response)
Stages	Number of stages in the system (Compressors or fans for example)
Stage On Delay	Delay time between stages switching on when demand is present.
Stage Off Delay	Delay time between stages switching off when there is no demand.
Inv	Set to on if using a variable output such as a digital scroll compressor or inverter drive.
Inverter Min	The minimum percentage the inverter or digital scroll will operate to e.g. if set to 25% the output will never go below this value
Inverter Max	The maximum percentage the inverter or digital scroll will operate to e.g. if set to 80% the output will never go above this value

Transducer Fail	The following will occur in the event of pressure transducer fault. If set to On then all Compressors or Fans will turn On in the event of a transducer failure. If set to Off then all Compressors or Fans will turn Off in the event of a transducer failure.
Always run last	Only used with compressors sections, keeps the last stage running except for a Low Shutdown condition. If the last stage is an inverter, the inverter enable relay will stay energised, but the inverter analogue output may well decrease to 0% if pressure is below the set-point. If the section is controlling condenser fans then leave this setting to default (Off)
Pwm	Pulse Width Modulation, when using a digital scroll compressor this parameter needs to be switched on, this enables relay 1 to cycle the solenoid valve in the compressor on and off and thus adjust the compressor's capacity.
Pwm Cl	Pulse Width Modulation Cycle Time, this is the cycle period of the digital scroll compressor, this will typically be 20 seconds.
Optimisation Limit	This is an offset that is added to the target pressure when using the Data Manager Energy feature Pack Optimisation. For example if target pressure is 2.1 Bar and Optimise Limit set to 0.5 Bar. The remote optimise command will only be able to optimise the current suction setpoint up to a maximum of 2.6 Bar
Do Trip	Enables the discharge trip feature which switches off compressors if the discharge pressure gets too high.
Dis Trip	Discharge Trip, if the Discharge Pressure exceeds this setting, compressors will turn off gradually or Inverter will ramp down to try to reduce the discharge pressure before it reaches discharge stop parameter
Dis Stop	Discharge Stop, if the Discharge Pressure exceeds this setting **All** compressors will go off immediately and all fans come on immediately. A Discharge Trip Alarm is generated. **Note:** If using an Inverter or digital scroll compressor, the output will go to 0% immediately as well as all compressors going off. The controller will remain in the stop state for a minimum of 1 minute regardless of pressure.
Dis Diff	Discharge Differential, this is the diff below the Discharge Stop setting, when reached the compressors will start staging in again.
Pwm Stop	This is the high temperature limit which will stop the digital scroll compressor (if used). One of the status inputs has to be set to "Probe" to utilise this feature.
Pwm Diff	The differential below the Pwm stop temperature. When the temperature drops to this value the compressor will start again.
Control Type	Selects between Fixed or Floating. For Condenser control only. Fixed uses the set-point parameter as its target Floating uses the temperature of the ambient temperature probe converted to a pressure as the set-point
Refrigerant	When using floating head pressure control this selects the refrigerant used in the set point calculation.
Refrigerant Weight	When using floating head pressure control in a condenser section the controller will measure the ambient temperature and convert it to pressure to calculate the floating pressure setpoint. When the refrigerant weight parameter is set to 0% then the liquid temperature is used (bubble), when set to 100% the vapour temperature is used (dew). As an example, when the Ref Weight parameter is set to 50%, then the controller will use a weighted average of 50% liquid temperature and 50% vapour temperature. Any percentage from 1 to 99% will give an appropriate weighted average between the two temperatures.
Lo Limit	Stops the floating pressure target from going below this level
Hi Limit	Stops the floating pressure target from going above this level
Cond Offset	Used to set a condenser differential, which is added to the incoming temperature to produce a "floating" set-point.
Inp 1 ↓ Inp 6	Selects the function of the status inputs 1 to 6 as follows:- Probe – Temperature probe for digital scroll compressor safety cut out or general monitoring. Ambient – Ambient temperature probe used for floating head pressure calculation. Sta N/O – Status Normally Open, will generate a stage fault alarm when the input is shorted. Sta N/C – Status Normally Closed, will generate a stage fault alarm when the input is opened. Gen N/O – General Normally Open, will generate a general fault alarm when the input is shorted. Gen N/C – General Normally Closed, will generate a general fault alarm when the input is opened. Std N/O – Standby Normally Open, will put a single section into standby mode when the input is shorted. Std N/C – Standby Normally Closed, will put a single section into standby mode when the input is opened. Std2 N/O – Standby 2 sections Normally Open, will put both sections (if used) into standby mode when the input is shorted. Std2 N/C – Standby 2 sections Normally Closed, will put both sections (if used) into standby mode when the input is opened.
DispPin	Display Pin Number, allows a 3 digit pin code to be set which prevents unauthorised parameter changes via the controller display.
Alarm Delay	Delay before HP and LP alarms are signalled
Lo Alm Dly	Delay applied before LP Shutdown alarm is generated. Note as soon as the LP Shutdown set point is reached any Compressor/Condenser stages, for the associated section, still operating will go off immediately and does not wait for the LP Shutdown alarm to be created.
HP Alarm	HP alarm set-point
LP Alarm	LP alarm set-point, stage off when reached
LP Shutdown	Point at which LP Shutdown alarm is generated. Note as soon as the LP Shutdown setpoint is reached any Compressor/Condenser stages, for the associated section, still operating will go off immediately and does not wait for the LP Shutdown alarm to be created.
Sta Dly	Status fault Delay, time delay before status faults are activated (fault input set to "Sta")
Gen Dly	General fault Delay, time delay before general faults are activated (fault input set to "Gen")

Stg1 ↓ Stg5	Applies to compressor stages only. As the pressure increases, stages will switch on (maximum 5 stages), the stage settings allow the user to select which relays switch on with the respective stage. If the stage is set to 1 then relay 1 will switch on only, if set to 2 relay 2 will switch on only, if set to 4 relay 3 will switch on only, if set to 8 relay 4 will switch on only and if set to 16 relay 5 will switch on only. To switch multiple relays then these numbers are added together so to switch relays 1 and 2 then enter the number 3 (1+2) and to all switch 5 relays then enter the number 31 (1+2+4+8+16). In most applications the stages will be set as follows: Stage1 = 1, Stage2 = 3, Stage3 = 7, Stage4 = 15 and Stage5 = 31, this will switch on an additional relay for each stage, starting with one relay on and ending with 5 relays on.
Probe 1 Offset ↓ Probe 6 Offset	Allows calibration of temperature probes (to account for long cable runs for example).
Restore default values	Restores factory set points. **USE WITH CAUTION**

Stage Inputs

Inputs 1-6 can be set up as the following:

Value	Type	Description
0	Unused	Input is not used
1	Probe	Set input as a digital compressor temperature safety probe if required. If this probe exceeds the Pwm Stop value then the digital compressor will be switched off.
2	Ambient	Set input as an ambient input. For use with Condenser Float feature or as a monitor probe with no alarm.
3	Status Normally Open	When selected apply 0V return signal to generate Condenser/Compressor Fault.
4	Status Normally Closed	When selected remove 0V return signal to generate Condenser/Compressor Fault.
5	General Normally Open	When selected apply 0V return signal to generate General Fault.
6	General Normally Closed	When selected remove 0V return signal to generate General Fault.
7	Standby Normally Open	When selected apply 0V return signal to place the first section (pack or condenser) into standby and generate standby alarm. If the next status input is also set as standby then this will put the second section into standby.
8	Standby Normally Closed	When selected remove 0V return signal to place the first section (pack or condenser) into standby and generate standby alarm. If the next status input is also set as standby then this will put the second section into standby.
9	Standby 2 Normally Open	When selected apply 0V return signal to place both sections (if used) into standby and generate standby alarm. This setting cannot be used if another input is set to single section standby (values 7 or 8)
10	Standby 2 Normally Closed	When selected remove 0V return signal to place both sections (if used) into standby and generate standby alarm. This setting cannot be used if another input is set to single section standby (values 7 or 8)

Staged Compressor Control

When a section is set to pack control, there are a maximum of 5 compressor stages available (as the controller has 5 relays). If the controller is set to combined pack/condenser (type 3) then at least one stage must be allocated to condenser fans (section 2) leaving 4 available for compressor control.
When the suction pressure has risen above target set point plus target diff above then the first stage will switch on after the stage on delay period has expired. If the pressure remains above target set point plus diff then after the stage on delay the second stage will switch on, this process will repeat until all the stages are switched on. If the pressure remains above target setpoint but within the the diff above and diff below values (the dead band) then the current stage will remain on. If the pressure drops below setpoint minus target diff below then after the stage off delay the current stage will be switched off.
Each of the 5 stages has a setting value which specifies which of the 5 relays will switch on for that particular stage, in most cases this would be sequential, for example stage 1 switches relay 1 on, stage 2 switches relays 1 & 2 on, stage 3 switches relays 1,2 & 3 on, and so on. The stage settings for this are shown in the table below:-

	Relay 1	Relay 2	Relay 3	Relay 4	Relay 5
Stage 1 Value = 1	On	Off	Off	Off	Off
Stage 2 Value = 3	On	On	Off	Off	Off
Stage 3 Value = 7	On	On	On	Off	Off
Stage 4 Value = 15	On	On	On	On	Off
Stage 5 Value = 31	On	On	On	On	On

If only one relay is required to be switched for each stage (which is an unlikely setup) then the stage settings would be as follows:-

	Relay 1	Relay 2	Relay 3	Relay 4	Relay 5
Stage 1 Value = 1	On	Off	Off	Off	Off
Stage 2 Value = 2	Off	On	Off	Off	Off
Stage 3 Value = 4	Off	Off	On	Off	Off
Stage 4 Value = 8	Off	Off	Off	On	Off
Stage 5 Value = 16	Off	Off	Off	Off	On

By adding the single relay stage values together (1, 2, 4, 8, 16) you can select any combination of relay switching for each stage, for example if stage 2 is set for value 5 (1+4) then relays 1 and 3 only will switch on in stage 2. This can be useful when using compressors with loaders and you do not want the relays to switch on sequentially as shown in the first example above. An example of this setup is shown as follows:-

	Relay 1 Comp	Relay 2 Loader	Relay 3 Comp	Relay 4 Loader	Relay 5 Comp
Stage 1 Value = 1	On	Off	Off	Off	Off
Stage 2 Value = 5	On	Off	On	Off	Off
Stage 3 Value = 21	On	Off	On	Off	On
Stage 4 Value = 23	On	On	On	Off	On
Stage 5 Value = 31	On	On	On	On	On

Using a Digital Scroll Compressor

A digital scroll compressor requires two relays to control it, a mechanical relay to switch on the compressor and a solid state relay (SSR) to energise the capacity solenoid, the SSR output is switched **off** to fully load the compressor and **on** to fully unload the compressor**.** The compressor is loaded and unloaded in 20 second cycles as default (Pwm cycle time) so if the compressor is required to run at 50% capacity then the SSR output will be on for 10 seconds and off for 10 seconds. Similarly if the compressor is required to run at 75% capacity the SSR will be off for 15 seconds and on for 5 seconds.
The following procedure is an example of how the controller should be set up to run a digital scroll compressor:

- When ordering, the controller must be specified with a solid state relay fitted (See hardware variants and ordering information)
- Under parameters set Inverter to **on** and set inverter minimum to 10% or refer to compressor manufacturer's specification for a minimum capacity (to provide compressor cooling).
- Set number of stages to a minimum of 1 (or the total number of compressors being used)
- Set PWM Control to **on** and set PWM Cycle time to 20 seconds or refer to compressor manufacturer's specification.
- Set stage 1 to value 3, this will enable relays 1 & 2 when the first stage is switched on
- Connect the compressor enable to relay 2 and the compressor solenoid to relay 1 (the solid state relay)
- If using temperature protection on the digital scroll compressor, set one of the status inputs to "probe" and set the Pwm Stop parameter to the desired maximum temperature limit for the compressor.

If using suction pressure optimization as well as floating head pressure control, particular attention should be paid to the optimize limit parameter and the float low limit parameter. These should be set so that it is not possible for the suction and discharge pressures to get too close to each other, typically a 5.2 Bar differential must be maintained, again refer to the compressor manufacturer's specification for the correct limits.

Using a Variable Speed Inverter Drive

Each section has the ability to run a variable speed drive to control the speed of a compressor or condenser fans, however the hardware is limited to a single 0-10V or 4-20mA output signal (the other input on the daughter card being utilised to read a pressure transducer) so the controller can support only one inverter output even if it both sections are set to use an inverter.
"Section 1 Inv" or "Section 2 Inv" (but not both) should be set to on and the first compressor stage on that section allocated to the first relay on that section, this becomes the inverter enable relay and will always be first on and last off for that section. If the inverter output is being used in a condenser section then set the number of stages to a minimum of 1 for that section, again the first relay for that section will become the inverter enable relay.
When operating, the inverter output will ramp up and down according to pressure, when it reaches 100% and the stage on delay has expired then the next stage (if used) will switch on and the inverter output ramp down to 0%. The reverse will happen when the stages are turning off.
The speed at which the inverter output varies in relation to pressure can be adjusted by altering the response on and off speeds, 1 being the slowest and 60 being the fastest. (This is the equivalent of adjusting the proportional, integral and derivative values in a PID control loop)

Floating Head Pressure

When condenser control is achieved using the "Floating Head" pressure mode the correct gas type needs to be selected to provide the temperature to pressure conversion.
The value read from the ambient probe (this can be fitted anywhere on the condenser as required) is added to a "Condenser Offset" and then converted to a pressure. This converted pressure replaces the "Target Setpoint" as the target pressure and. Low and high pressure levels allow for a lower and upper limit to be set for the target pressure range and the target pressure can never be any value out with this range.

Network Configuration

The controller can be logged onto a Data Manager IP network for automatic data logging and alarm reporting. The controller requires a suitable IP network interface card, this can be in the form of an integral IP network card which can be specified when ordering in place of the standard RS232 card, or can added at a later date.
If the controller is supplied with the standard integral RS232 card then this must be connected to an external IP module (IP Futura or Mercury Switch).

With the IP network there are two options: **IP-L** and **IP-r**
IP-L allows you to fix a static IP address into the controller, which you would use when you are connecting the controller onto a local area network or where you do not want the Data Manger to automatically issue an IP address. This would also allow the user to connect to the controller directly using Internet Explorer or another web browser.

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)

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

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

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.

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 (Data Manager)

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
255.255.255.252	30
255.255.255.248	29
255.255.255.240	28
255.255.255.224	27
255.255.255.192	26
255.255.255.128	25
255.255.255.0	24

Mask	Length
255.255.254.0	23
255.255.252.0	22
255.255.248.0	21
255.255.240.0	20
255.255.224.0	19
255.255.192.0	18
255.255.128.0	17
255.255.0.0	16

Mask	Length
255.254.0.0	15
255.252.0.0	14
255.248.0.0	13
255.240.0.0	12
255.224.0.0	11
255.192.0.0	10
255.128.0.0	09
255.0.0.0	08

Viewing Input / Output Tables

Apart from setting up the controller, you can also view the status of the inputs and outputs.

1. IO. View Inputs / Outputs and States
   a. From the function menu, select "IO", press enter
   b. You can now scroll through the IO tables as set out below

Input/Output table

Number	IO	Range Bar (Psi)	Step	Units
I-01	Pressure Transducer Section 1	-3.4 to 50.0 (-49.3 to 725)	0.1	Bar/Psi
I-02	Pressure Transducer Section 2	-3.4 to 50.0 (-49.3 to 725)	0.1	Bar/Psi
I-10	Probe 1	-49 to 60 (-56.2 to 140)	0.1	°C/°F
I-11	Probe 2	-49 to 60 (-56.2 to 140)	0.1	°C/°F
I-12	Probe 3	-49 to 60 (-56.2 to 140)	0.1	°C/°F
I-13	Probe 4	-49 to 60 (-56.2 to 140)	0.1	°C/°F
I-14	Probe 5	-49 to 60 (-56.2 to 140)	0.1	°C/°F
I-15	Probe 6	-49 to 60 (-56.2 to 140)	0.1	°C/°F
I-20	Status 1	0 = OK. 1 = Alarm. 2 = Unused	1	---
I-21	Status 2	0 = OK. 1 = Alarm. 2 = Unused	1	---
I-22	Status 3	0 = OK. 1 = Alarm. 2 = Unused	1	---
I-23	Status 4	0 = OK. 1 = Alarm. 2 = Unused	1	---
I-24	Status 5	0 = OK. 1 = Alarm. 2 = Unused	1	---
I-25	Status 6	0 = OK. 1 = Alarm. 2 = Unused	1	---
O-01	Relay 1	0 = Off. 1 = On	1	---
O-02	Relay 2	0 = Off. 1 = On	1	---
O-03	Relay 3	0 = Off. 1 = On	1	---
O-04	Relay 4	0 = Off. 1 = On	1	---
O-05	Relay 5	0 = Off. 1 = On	1	---
O-10	Section 1 Stage	0 – 5	1	---
O-11	Section 2 Stage	0 – 5	1	---
O-12	Section 1 Variable Out	0 – 100	1	%
O-13	Section 2 Variable Out	0 – 100	1	%
O-20	Section 1 Optimise	-3.4 to 50.0 (-49.3 to 725)	0.1	Bar/Psi
O-21	Section 2 Optimise	-3.4 to 50.0 (-49.3 to 725)	0.1	Bar/Psi
O-21	Run Time	0 - 128	1	K Hrs
O-30	Section 1 Float	-3.4 to 50.0 (-49.3 to 725)	0.1	Bar/Psi
O-31	Section 2 Float	-3.4 to 50.0 (-49.3 to 725)	0.1	Bar/Psi
S-01	Control State Section 1	0 = Off 1 = Stabilise 2 = Initial 3 = Normal 4 = High Pressure 5 = Low Pressure 6 = Low Shut-down 7 = Transducer Fail 8 = Standby 9 = Trip 10 = Stop	1	---
S-02	Control State Section 2	0 = Off 1 = Stabilise 2 = Initial 3 = Normal 4 = High Pressure 5 = Low Pressure 6 = Low Shut-down 7 = Transducer Fail 8 = Standby 9 = Trip 10 = Stop	1	---

Alarm Messages

The following alarms and messages can appear on the Mercury Display,

Display Message	System Status
HP	High Pressure
LP	Low Pressure
Sd	Low Shutdown
Tran	Transducer Fault
Stg1	Stage 1 Fault
Stg2	Stage 2 Fault
Stg3	Stage 3 Fault
Stg4	Stage 4 Fault

Display Message	System Status
Stg5	Stage 5 Fault
gEn 1	General Fault 1
gEn 2	General Fault 2
gEn 3	General Fault 3
gEn 4	General Fault 4
gEn 5	General Fault 5
di Ot	Digital Compressor Over Temp
Stby	Controller in Standby

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)
High Pressure	8
Low Pressure	9
Low Shutdown	10
Transducer Fault	6
Stage 1 Fault	3
Stage 2 Fault	3
Stage 3 Fault	3
Stage 4 Fault	3
Stage 5 Fault	3
Float Fault	6

Alarm text	Type # (index)
Discharge Trip	3
Compressor Over Temp	3
Comp Temperature Fault	6
Configuration Error	20
General Fault 1	20
General Fault 2	20
General Fault 3	20
General Fault 4	20
General Fault 5	20
Controller in Standby	20

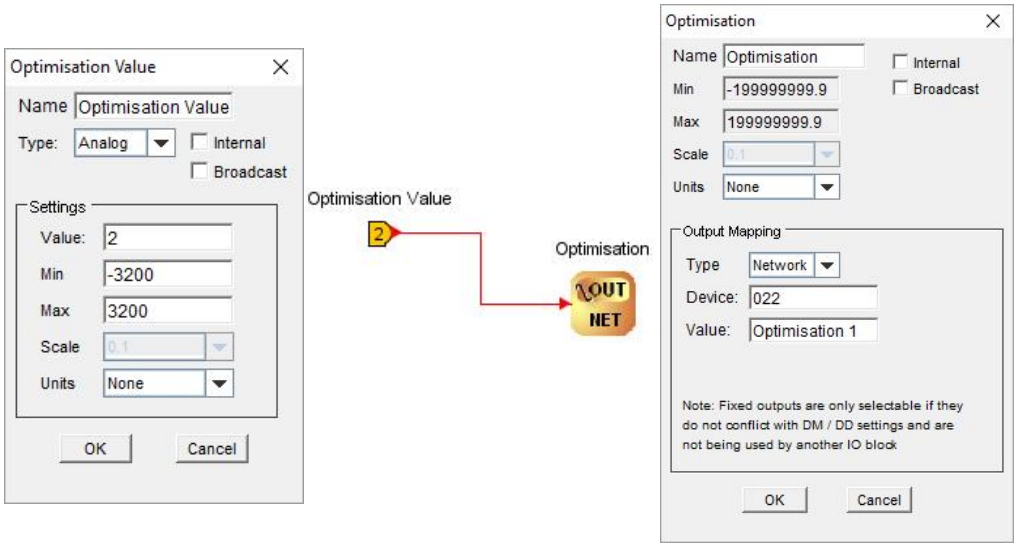
Remote Commands

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

Command	Value to send	Description
Optimisation 1 Optimisation 2	0 1 2 3 4	Stay Zero Up Down None
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

Use an “Analogue Out” block configured to the controller name and in the value field type in the command you require. Send the required value (in this example a setting block) to the input of the “Analogue Out” block.

See Example on the right, which sends an “Optimise up” command to section 1 of controller 022.



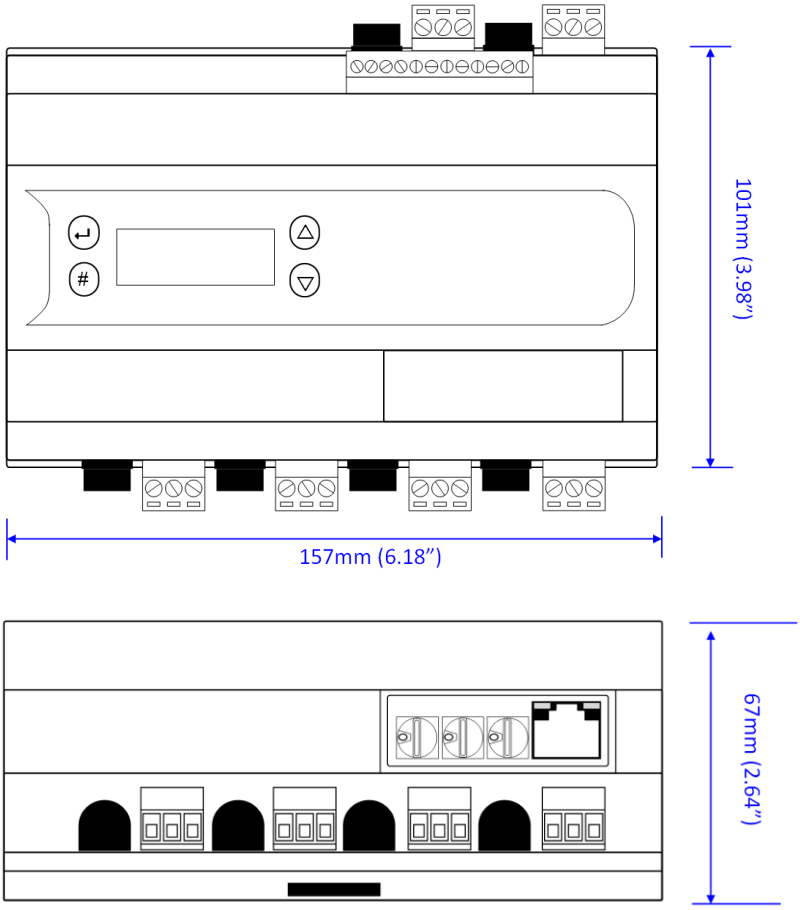
Specification

Power requirements	
Supply Voltage Range	100 - 240 Vac ±10%
Supply Frequency	50 - 60 Hz
Maximum supply current	2 Amps
Typical supply current	<1 Amp
General	
Operating temperature range	-10^{0}C to +60^{0}C (14^{0}F to 140^{0}F)
Storage temperature range	-20^{0}C to +65^{0}C (-4^{0}F to 149^{0}F)
Environmental	Indoor use at altitudes up to 2000m, pollution degree 1, installation category II. Voltage fluctuations not to exceed ±10% of nominal voltage.
Size	157mm (W) x 67mm (H) x 120 (D)
Approx Weight	500 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	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
Relay Specification	
Max current	10A Resistive (CosØ = 1) 3A Inductive (CosØ = 0.4)
Max voltage	250Vac. 30V dc
Relay Fuse	10A 240Vac Antisurge (T) HRC conforming to IEC60127, 32 x 6.3mm
	All relays are independent and can operate at different potentials to the supply voltage.

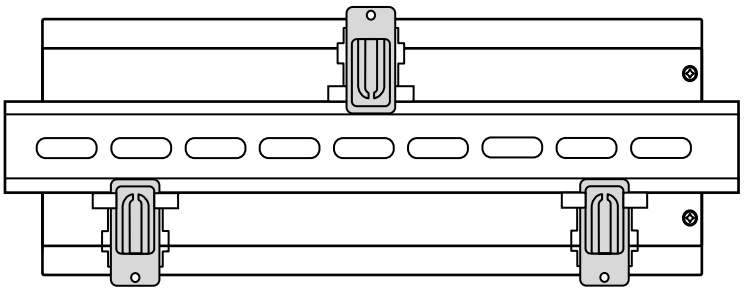
Inputs

Input resistance:	3.01K Ohms (for PTC or NTC type probes)
Input type (temperature probes)	PT1000, NTC2K, 470R, 700R, 3K, 5K, 6K, NTC2K25, NTC10K or NTC10K(2)
Input Types (pressure transducer)	4-20mA, 0-10v, 0-5v, 0.5-4.5v, 0.5-9.5v, 1-5v. (Dependant on daughter board type fitted)
Comms:	RS232 with flow control

Installation



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.

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.

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

Revision History

Revision	Date	Changes
1.0	18/02/2016	First Release
1.0a	24/02/2016	Alarm relay description corrected, relay rating corrected, EMC standard updated and other small corrections. Quick start guide added, 4-20mA transducer connections added.
1.0b	06/04/2016	Part description changed from Two Section to Mini Pack, part numbering detail updated to include twin SSR version.
1.6	13/07/2017	Refrigerant weight parameter added, refrigerant gas table list updated, document revision changed to match software version.
1.6a	05/10/2017	Additional voltage in types added, 0-10v, 0-5v, 0.5-4.5v, 0.5-9.5v, 1-5v.