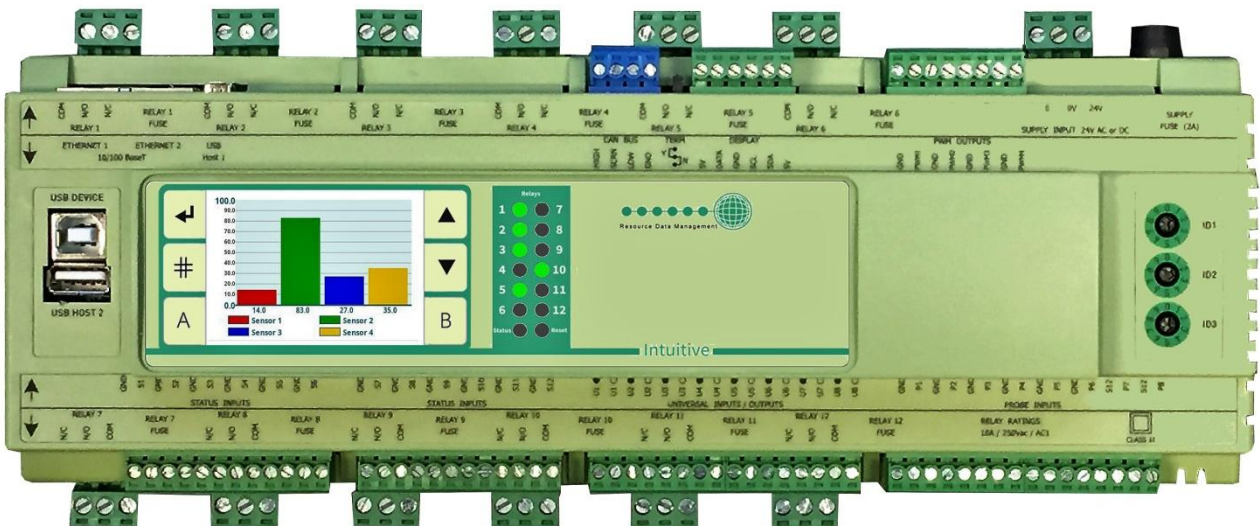


Resource
Data Management

Intuitive Pack Controller V2

Commissioning/User Guide

Revision 4.5



PR0650-PACK

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The Intuitive Range

From Resource Data Management

This documentation refers to the Intuitive V2 Pack Controller.

Description

The Intuitive Pack Controller is intended for Pack and/or Condenser control. The controller has twelve relay outputs that are configurable for compressors, loaders, trim compressors or fans. The twelve status inputs can be assigned for Pack or Condenser section inputs or general alarms. There are three (4-20mA, 0-5Vdc or 0-10Vdc) inputs for pressure transducers; two for control purposes and one for pressure or liquid level monitoring. The Pressure readings obtained from the three inputs can be broadcast over a Data Manager IP network for use by RDM networked evaporator controllers. There are eight temperature probe inputs and two analogue outputs (either can be set to 0-10Vdc, 0-5Vdc, 4-20mA or 0-20mA) to control variable speed devices. Both controller types have ten control type options, see table below

The "Fuzzy" based algorithm, will give enhanced control whilst maintaining the starts per hour requirement. The algorithm also reduces the number of input parameters required for control; only a target pressure is needed.

Note: In fuzzy logic if an inverter is being used it is not included in anti-short cycle timer (Starts per hour P-23/43)

The "staged" type allows the user to fully program the output stages to a fixed deadband control with on and off delay periods.

The Plant controller has two embedded Ethernet ports to allow for connection to a Data Manager system without the need for a communications module. A USB port allows for a direct PC connection.

All relays are volt-free and can be mixed between low and high voltage sources. The controllers require a 24Vac or 24Vdc PSU (PSU available from RDM: - PR0625). The controller can be programmed using a USB lead without the need for a 24v supply, power being obtained via the USB lead.

Intuitive / Plant Controller Descriptions	Part Number
Intuitive Pack Controller (No Internal Display)	PR0650-PACK
Intuitive Pack Controller (Internal Display)	PR0650CD-PACK

Configuration - Types

The controller has ten configuration options:

Display value	Type	Control Type
1	Pack	Fuzzy
2	Dual Pack	Fuzzy
3	Pack/Condenser	Fuzzy
4	Dual Condenser	Fuzzy
5	Condenser	Fuzzy
6	Pack	Staged
7	Dual Pack	Staged
8	Pack/Condenser	Staged
9	Dual Condenser	Staged
10	Condenser	Staged

Both controllers are delivered pre-configured as a Pack Controller (Type 1) See [Type Change](#)

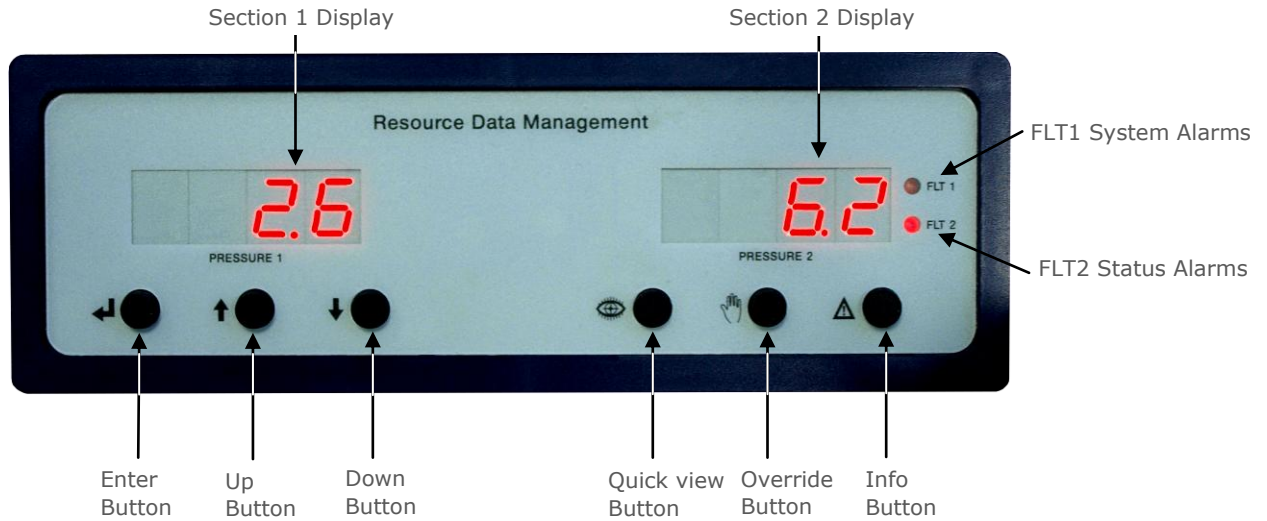
See [Set-up](#) to change the controller type.



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Front Display Panel

Remote Display (PR0620)



Left Hand Display

- The 4 character display shows the pressure for section 1.
- In set-up mode, displays the set-up menu items.
- In quick view mode, indicates the target pressure.
- In Override mode, indicates and allows the relays to be forced on and off.

Right Hand Display

- The 4 character display shows the pressure for section 2 (if used).
- In set-up mode, display is blank.
- In Override mode, display is blank.

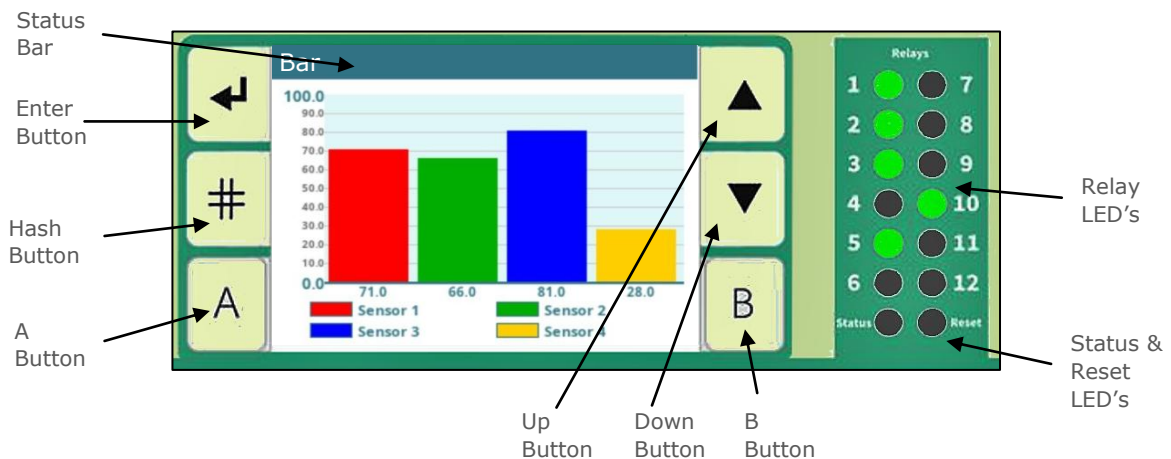
Front Panel Remote Display Buttons

Enter Button	Used along with down button to enter menu items.
Up Button	Used to scroll up.
Down Button	Used to scroll down.
Quick View Button	Used to view the target pressures (See Quick view section).
Override Button	Used with the "Enter" button, to go into the override mode or to view current variable output values (See Override section).
Info Button	Used to view the current alarms. (See Info section).



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Integral Graphical Display (optional)



The internal graphical display, if fitted, can be used to display user customisable graphical information such as line graphs, bar graphs gauges and values. For custom display set up see: [Internal Screen Setup section](#).

The screen can also be used to view values and set parameters however it is not intended as a commissioning tool.

Enter Button	Used along with down button to enter menu items.
Up Button	Used to scroll up.
Down Button	Used to scroll down.
"B" Button	Used to scroll to the next page
"A" Button	Used to scroll back a page
"#" Button	Used to escape from the current page

If a custom graphical display is set up then this will be shown as default, if multiple graphical displays are set up use the "A" and "B" buttons to scroll between pages.

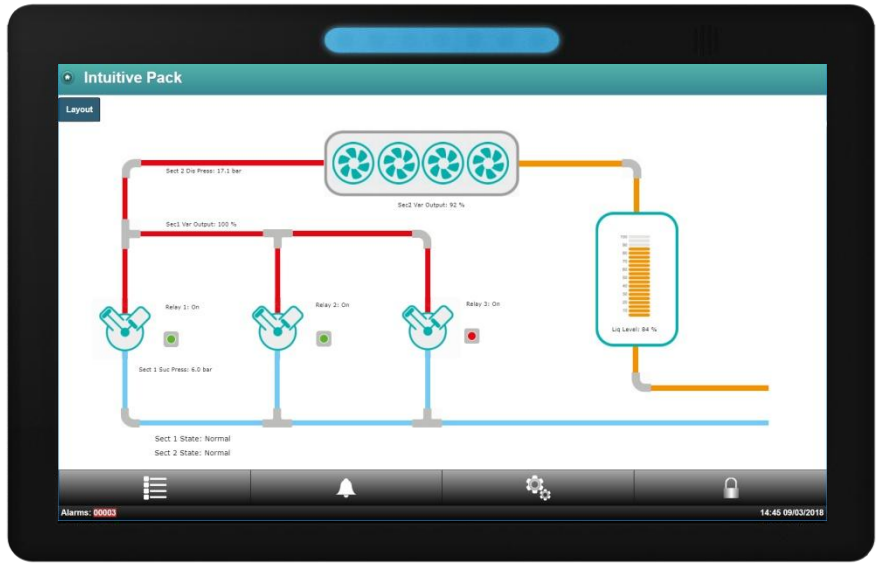
To enter the setup menu hold the "Enter" and "Down" buttons together then use the "Up" and "Down" keys to scroll through the options and "Enter" to select. Press the "#" button to go back.

Relay LEDs	These will illuminate when the associated relay is energised.
Status LED	This will flash twice at one second intervals when the controller is functioning normally.
Reset LED	This will flash if the controller is in a fault condition and is resetting.
Status Bar	Will be blue in colour during normal operation and will turn red if any alarm condition is present.



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Touch XL



The TouchXL, when connected to the controller, is used as a display mimicking the view of the standard web interface to the controller. It is used to interact with the application software and alarm indication.

As default, the TouchXL will show an overview list of current values such as pressures, temperatures and fault inputs. An optional graphical layout can be loaded onto the Pack controller which will appear on the TouchXL. Layouts can be generated using the RDM Layout Editor software which is available separately.

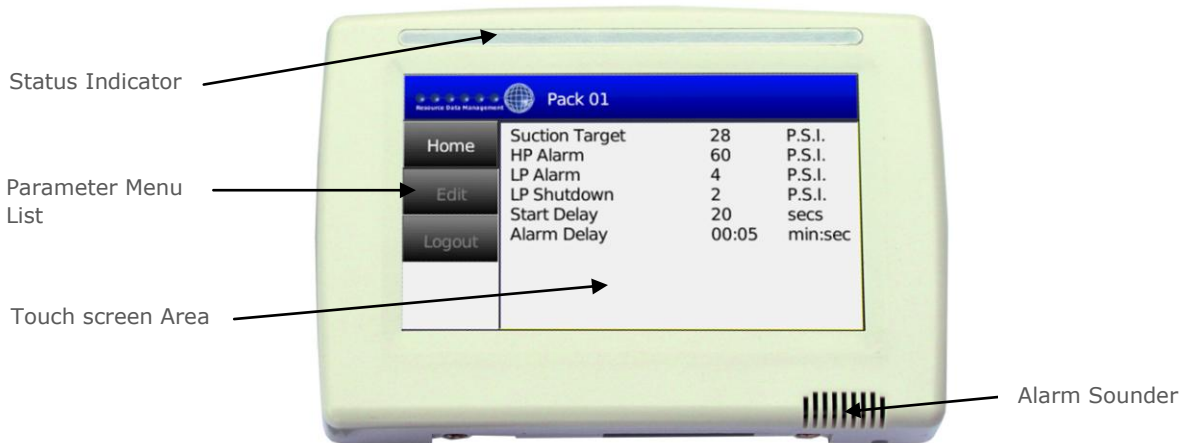
The TouchXL has the benefit of being able to connect to the Intuitive device via USB (USB host 1 or 2) to micro USB or standard Ethernet connections over IP.

When connecting using the USB method, the communication of the two devices is automatic and the Touch XL will automatically configure itself for use.

Connecting over Ethernet comms requires the configuration of the TouchXL to be setup to 'look at' the Intuitive Pack device. This can be carried out in the 'Network Configuration' page within the TouchXL service menus (only accessible directly on the touch screen). Please consult the specific documentation for more details.

Note: The TouchXL display is only compatible with Intuitive Pack software V4.3 and above.

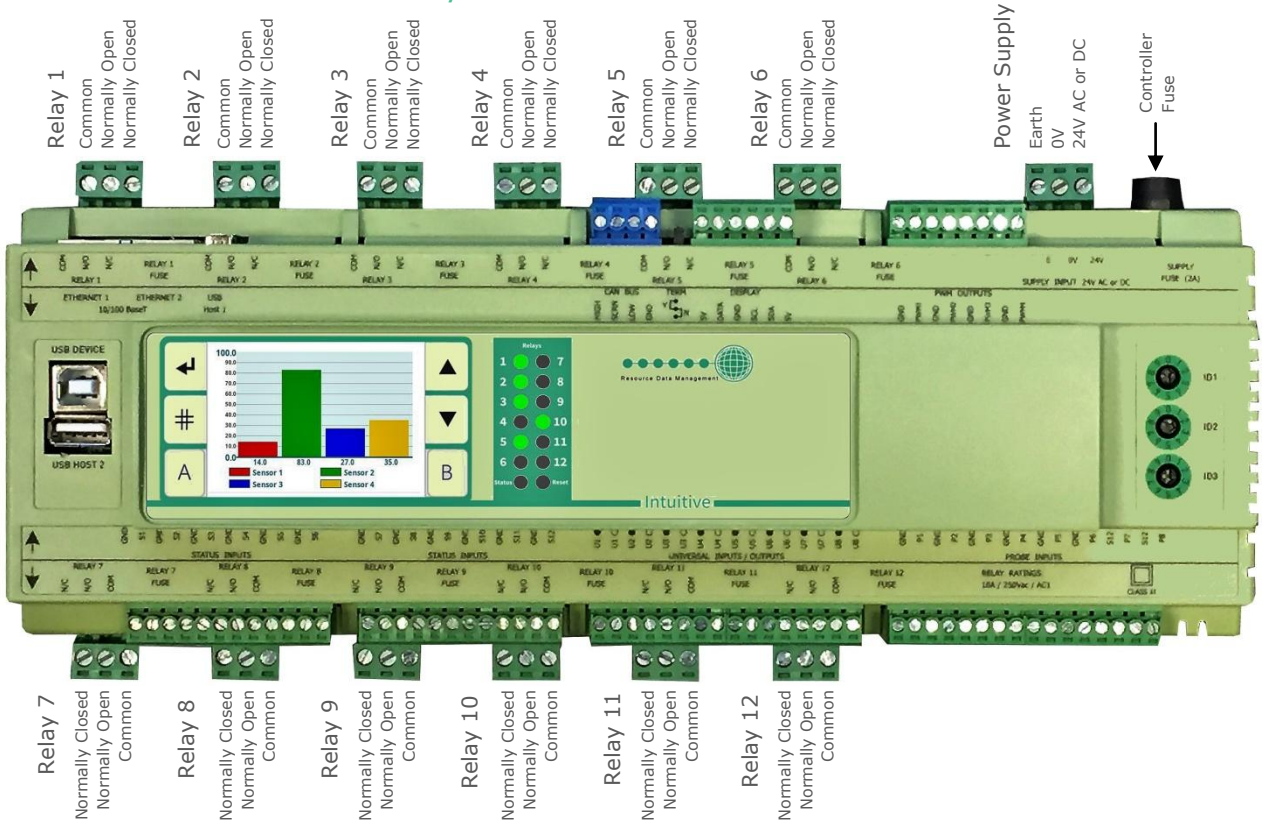
USB Touch Screen Display (PR0615)



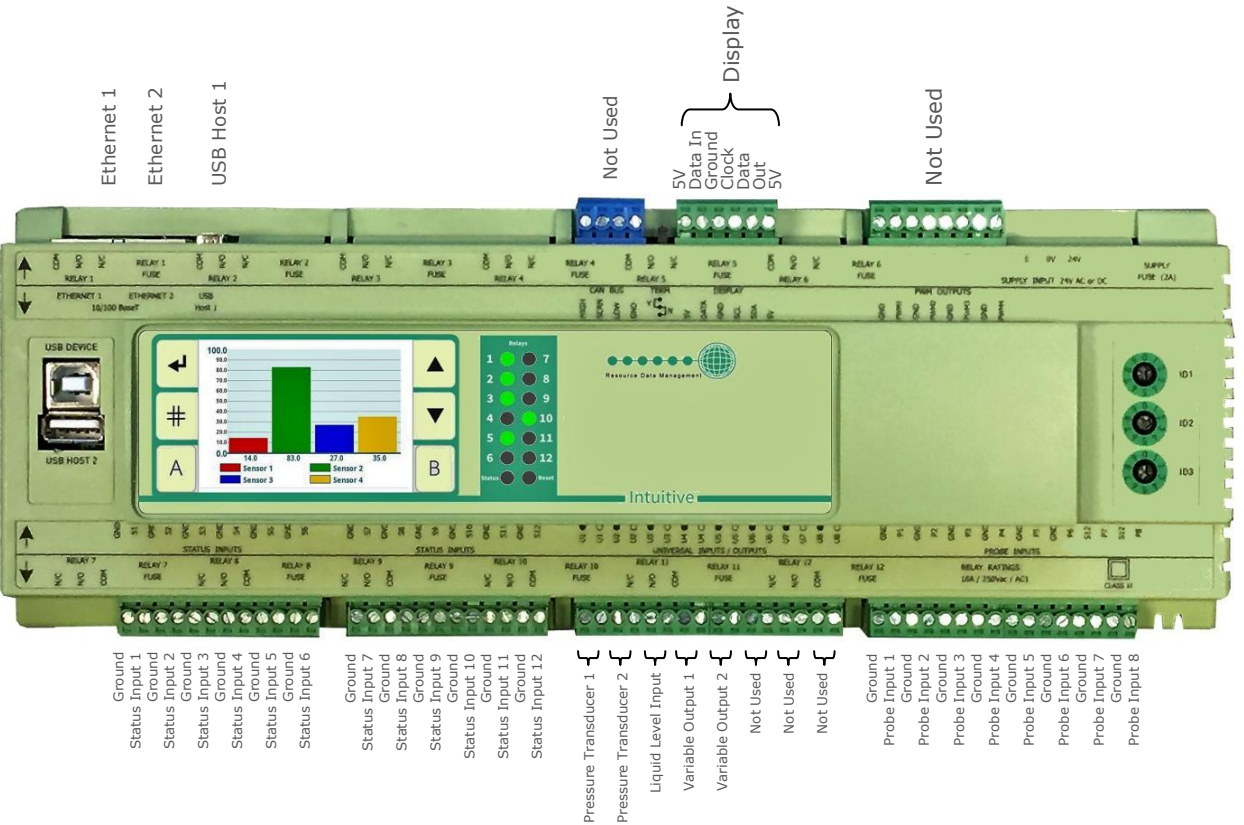
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Intuitive Plant Controller I/O Connections

Bottom Row Connections



Top Row Connections



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Intuitive Plant Controller, Universal Analogue Input / Output Connections

0 or 4 -20mA Input	
U1-U3 ●	0 or 4-20mA Loop Input or 0-10V / 5V Ground
U1-U3 ○	12v Transducer Feed or 0-10V / 5V Input
U4-U5 ●	Ground
U4-U5 ○	0 or 4-20mA Output or 0-10V / 5V Output
U6-U8	Unused

Inputs & Outputs

All Types	Description	Comments
Status Inputs 1-12	0V return or 24 Vac	Note 1
Analogue Inputs 1-8	Probe input	Note 2
Analogue Inputs 1-3	Analogue input	4-20mA or 0-10V / 5V Input See note 3
Analogue Outputs 4-5	Analogue output	0 / 4-20mA or 0-10V / 5V Output
Relay 1-12	N/O, N/C and Common	Volt Free
Status LED	Healthy LED	When powered up the LED will flash off/on every 0.5 seconds. Note 3

Note 1: 24 Vac must have the same 24 Vac return as the supply voltage. If using the Plant controller 24V power supply only the 24Vac signal from the supply is required for the status input.

Note 2: Several probe types are available, see [Probe Type](#).

Setting up the controller

Set-up access to the controller can be achieved several ways

- Through the front mounted buttons on the remote display (PR0620)
- Direct access by PC via a USB connection
- Direct access by a PC via an Ethernet Connection
- Through the RDM Data Manager.
- Through a USB Touch screen display (PR0615)

Recommended set-up method

Due to the number of parameters available, it is recommended that this controller is set-up using a direct connection to a PC See [Setup via a PC](#). If you are not connecting to a network and want to set up the controller through the remote display buttons (PR0620), below is the structure within the display's menus.

Set-up through front buttons on remote display (PR0620)

To enter set-up 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. Alternatively use either a PC connection for configurations or load a configuration from a memory-stick



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Set-up Menu

LH Display	RH Display	Option	Explained in Paragraph
IO		View Input/Output States	View Input/Output States
PArA		Set/view Parameters	Set/view parameters
Unit		Set/View Probe Type & Units	Set/View Units
Uni		Set Universal I/O	Universal IO
PrES		Set/view pressure units	Set to 0 for Bar or 1 for psi.
StA		Set Status Input Type	Set Input Type
rLy		Inverts the relay function	Set Relay Output
TyPE		Set/View Controller Type	Set/view product type
rtc		Set/view Clock (rtc = Real Time Clock)	Real Time Clock
nEt		Set/view network configuration	Network Configuration
bCSt		Broadcast (Pressures)	Broadcast
SoFt		View software version	
USb		Save/Load onto USB device	USB
OFSt		Temperature probe offsets	Set Probe Offsets
ESC		Exit set-up mode	

Universal IO

Setting up from controller display, navigate to the screen "Uni" and select from the following table for U-01 to U-08

This selects what Universal IO (U-01 to U-08) can be set for.

NOTE: UniIO U-01 to U-03 can only be set as Inputs, **UniIO U-04 and U-05** can only be set for Outputs and **UniIO U-06 to U-08** are seen in settings but are not present on the controller hardware and are for future development.

U-01 to U-03 (Variable Inputs) can be set to 0, 1 or 2.

U-04 and U-05 (Variable Outputs) can be set to 3, 4, 5 or 6.

U-06 to U-08 do not do anything.

- | | |
|----|---------------|
| 0. | 4-20mA Input |
| 1. | 0-10V Input |
| 2. | 0-5V Input |
| 3. | 4-20mA Output |
| 4. | 0-20mA Output |
| 5. | 0-10V Output |
| 6. | 0-5V Output |

NOTE: Universal I/O U-01 to U-03 can only be set as Inputs, **Universal I/O U-04 and U-05** can only be set for Outputs and **Universal I/O U-06 to U-08** are not used in this application and should not be changed.

Input Type

The 3 analogue inputs can be set to either of the following

0. 4 – 20mA Input
1. 0 – 10Vdc Input (Default)
2. 0 – 5Vdc Input



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Output Type

The 2 analogue outputs can be set to either of the following: -

3. 4 – 20mA Output
4. 0 – 20mA Output
5. 0 – 10V dc Output (Default)
6. 0 – 5V dc Output

Status Input Type

Navigate to the screen "StA"

Selects whether the status inputs require a 0V return or 24Vac return See: [Note 1](#)

Select 1 for Input type 0V return

Select 2 for Input type 24V ac return

rtc. Real time clock

(This will automatically synchronise on network systems)

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

Time clock is now set

type. Set/ view controller type

1. From the function menu scroll to "type", press enter
2. Use the up/down buttons to scroll through the type values. (See [configuration](#) on page 5)
3. Press enter.

The controller will reset with the selected type now programmed.

Type Change

NOTE: When changing controller types from one type to another always check the parameters and the controller configuration to ensure they are appropriate for the application selected.



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

Broadcast

0 = No broadcast. 1 = Broadcast Pressures. 2 = Broadcast CO2 Load Cycling

Set for 1: Allows pressure readings from the pressure transducers to be broadcast over a Data Manager IP network. This remote pressure is used by the RDM case/coldroom controller to calculate the Evaporator temperature.

Set for 2: Allows a pressure reading from the variable analogue inputs to be used by the Data Manager to start shutting down controllers (load shedding) on the IP network if certain pressure limits are exceeded, the relevant Data Manager set up page is shown below,

Other settings:			
Ambient Temperature Device	245	Load Pressure Limit 1	34
Ambient Temperature Input	Probe 4	Load Pressure Diff	2
Pressure Device	\$Pack245	Load Pressure Time 1 (s)	60
Pressure Item	Press1	Load Pressure Limit 2	36
Pack Type	Old	Load Pressure Time 2 (s)	60
		Load Pressure Start Stage 2	2

Pressure Device must be "\$Pack" followed by the rotary switch network setting of the plant controller (245 in this case)

Pressure Item must be Press1, Press2 or Press3 depending on which of the analogue inputs is being read.

Pack Type set to "Old"

Note: Intuitive Pack Controller Software must version 2.4 or higher

Note: If broadcasting pressure to a Mercury Switch. Mercury switch must be software version 1.9 or higher.

Note: If broadcasting to a Mercury IP Module. IP Module must be software version 1.1 or higher

See RDM Mercury Switch User Guide (PR0018-PHI) for further information.

USB Operation

The following operations can be performed using a memory-stick plugged into the USB port: -

1. Export event log U-01
2. Export logged data U-02 (not used on this variant)
3. Save configuration U-03
4. Load configuration U-04
5. Upgrade the software U-05

The above requires the user to enter the USB menu via the display and press enter at the appropriate display option.

For example to save the current configuration insert a USB Memory stick into one of the USB Host ports, go to the USB software menu option, press enter, then use the up key to scroll to U-03. Now press enter, the screen will flash "USB" until the operation has completed.



The file is transferred to the memory-stick in .zip format. The USB memory stick must be formatted as FAT32.



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

Main Menu Overview (PC Connection)

All available options are shown below, for setup via the PC connection, please see [Setup via a PC](#).

Section	Section	Shows the current control values and control state.
MainBrd	MainBrd	Shows the current hardware values such as temperature probe readings, relay states and mA/voltage inputs and outputs.
Stats	Stats	Shows number of individual relay run hours and starts.
	Alarm	Shows all current alarms generated by the controller.
	Service	Enters the service menu, default user name "install" passcode "1234"

Service Menu Overview

Control	Values	Shows all the current control values (suction pressure for example).
Section	Settings	Shows the current control parameters (section 1 target for example).
	Set Parameters	Allows the control parameters to be changed.
Alarms	View current and old (cleared) alarms.	
Stats	View relay run hours and number of starts. Reset run hours and starts.	
Hardware	Values	Shows the current hardware values. (relay states for example)
MainBrd	Settings	Shows the current hardware settings (universal IO type for example)
	Set Parameters	Allows hardware settings to be changed.
Override Status	Shows an overview of any outputs that are overridden.	
System	System Log	Shows the controller's system log.
	Mute All Alarms	Mutes alarm sounder on touchscreen displays.
	Clear Alarm Log	Clears alarm log, controller will restart.
	Network	View network address information and allow a static address to be entered (if rotary switches set to 000).
	Time	Allows controller's time clock to be set.
	Version	Shows the current firmware version.
	Touch XL Status	Shows the status of the Touch XL user interface if used.
	LCD Display Setup	Allows setting of built in LCD display (if fitted).
	LCD Display Layout	Allows customised graphics, such as gauges and graphs, to be added to the built in LCD display (if fitted).
	Layout	Manage Layouts
Maintenance	Main Config	Allows setting of the configuration (pressure units for example).
	Save Config	Allows all controller settings to be saved to a PC.
	Load Config	Allows a configuration to be loaded from a PC.
	View Config Info	Shows any mismatches that may have occurred when loading a config saved from another controller and allows a config error alarm to be cleared
	Reset	Restarts the controller.



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

IP Network Configuration

There are two network connection options

- IP-L (Rotary switches set to "000")
- IP-r (Rotary switches set to "xxx" where x is a number between 0 and 9)

IP-L allows a static IP address to be assigned to the controller, which would be used to connect the device onto a customer's local area network. This would allow the customer to view each controller using an internet browser.

IP-r (more commonly used) allows the device to be automatically assigned an IP address from a DHCP server running on the same network (e.g. a DMTouch). It uses the rotary switch address as a unique Network ID.

IP-L

To configure the Plant Controller for IP-L, set all three rotary switches to zero. The unit should then be connected to the network.

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	<u>Network Mask</u> 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. Note: this option must be selected to save any changes made in this menu

Network Mask Length

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

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

IP-r

To configure the device for IP-r, set the three rotary switches to give each controller a unique identifier (other than 000). Connect the IP network via the Ethernet port. The Data Manager (or 3rd party server) will use DHCP to allocate the controller an IP address.

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

IP1: Shows the first IP address value
 IP2: Shows the second IP address value
 IP3: Shows the third IP address value
 IP4: Shows the fourth IP address value

Example: 10.1.2.86



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Parameter Tables

Parameter table for Controller (Types 1-5, Fuzzy)

Not all parameters apply to all controllers types, for example P-401 is night setback for condenser fans so will not appear on a controller if it is set up as a pack (compressor) controller (type 1). In the right hand columns, a tick will be shown if that parameter applies to that type, if it does not apply it will be greyed out.

No.	Parameter	Range	Step	Units	Default				
					Pack (Type 1)	Dual Pack (Type 2)	Pack/Condenser (Type 3)	Dual Condenser (Type 4)	Condenser (Type 5)
P-01	Transducer 1 Span *	-3.4 - 180	0.1	Bar	13.8	13.8	13.8	34.4	34.4
P-02	Transducer 1 Offset	-3.4 - 180	0.1	Bar	0	0	0	0	0
P-03	Transducer 2 Span *	-3.4 - 180	0.1	Bar	13.8	13.8	34.4	34.4	13.8
P-04	Transducer 2 Offset	-3.4 - 180	0.1	Bar	0	0	0	0	0
P-05	Transducer 3 Span *	-3.4 - 180	0.1	Bar	13.8	13.8	13.8	13.8	13.8
P-06	Transducer 3 Offset	-3.4 - 180	0.1	Bar	0	0	0	0	0
P-20	Section 1 Target Pressure	-3.4 - 180	0.1	Bar	2.1	2.1	2.1	12.7	12.7
P-21	Section 1 Target Pressure Above P-20	-3.4 - 180	0.1	Bar	0.5	0.5	0.5	0.5	0.5
P-22	Section 1 Target Pressure Below P-20	-3.4 - 180	0.1	Bar	0.5	0.5	0.5	0.5	0.5
P-23	Section 1 Starts/Hour	0 - 60	1	-	10	10	10		
P-24	Section 1 Run Smallest **	0 = Off, 1 = On	1	-	0	0	0		
P-26	Section 1 Inverter	0 = Off, 1 = On	1	-	0	0	0	0	0
P442	Section 1 INV Bypass	0 = Disabled 1 = 1 + no retry 2 = 1 + 1 retry 3 = 1 + 2 retries 4 = 1 + 3 retries 5 = 1 + 4 retries	1	-	0	0	0	0	0
P444	Section 1 INV Minimum	0 - 100	1	%	0	0	0	0	0
P446	Section 1 INV Maximum	0 - 100	1	%	100	100	100	100	100
P490	Section 1 Gas Dump	0 = Off, 1 = On	1	-	0	0	0		
P492	Section 1 Gas Diff	-3.4 - 180	0.1	Bar	0.5	0.5	0.5		
P470	Section 1 Always Run last	0 = Off, 1 = On	1	-	0	0	0		
P495	Sect 1 Compressor Unload	0 = Off, 1 = On	1	-	0	0	0		
P497	Sect 1 Equal	0 = Off, 1 = On	1	-	0	0	0		
P-27	Section 1 Response On Speed	1 - 60	1	-	5	5	5	5	5
P-28	Section 1 Response Off Speed	1 - 60	1	-	5	5	5	5	5
P-29	Section 1 Optimise Limit	-3.4 - 180	0.1	Bar	2.0	2.0	2.0		
P-30	Section 1 Alarm Delay	00:00 - 99:00	01:00	min:sec	05:00	05:00	05:00	05:00	05:00
P-31	Section 1 HP Alarm	-3.4 - 180	0.1	Bar	4.1	4.1	4.1	17.9	17.9
P-32	Section 1 LP Alarm	-3.4 - 180	0.1	Bar	0.6	0.6	0.6	6.8	6.8



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

No.	Parameter	Range	Step	Units	Default				
P-33	Section 1 LP Shut-down	-3.4 - 180	0.1	Bar	0.4	0.4	0.4	6.2	6.2
P-34	Section 1 Low Alarm Delay	00:00 - 99:00	01:00	min:sec	00:00	00:00	00:00	00:00	00:00
P448	Section 1 Fail	0 = Off, 1 = On	1	-	0	0	0	0	0
P400	Section 1 Sticky Fans	0 - 12	1	-				0	0
P401	Section 1 Night Set Back	0 = Off 1 = On 2 = Local 3 = Remote	1	-				0	0
P402	Section 1 Night Reduction	0 - 100	1	%				30	30
P403	Section 1 Night Set Back On Time	00:00 - 23:59	00:01	min:sec				20:00	20:00
P404	Section 1 Night Set Back Off Time	00:00 - 23:59	00:01	min:sec				08:00	08:00
P405	Section 1 Night Set Back Pressure Limit	-3.4 - 150	0.1	Bar				25	25
P406	Section 1 Day Reduction	0 - 100	1	%				30	30
P407	Section 1 Day Pressure Limit	-3.4 - 150	0.1	Bar				25	25
P600	Section 1 Fan Rev	0 = Off 1 = On 2 = Local 3 = Remote	1	---				0	0
P601	Section 1 Fan Rev Start	00:01 - 23:59	00:01	hrs:min				00:00	00:00
P602	Section 1 Fan Rev Length	00:00 - 99:00	01:00	min:sec				00:00	00:00
P603	Section 1 Fan Rev Delay	00:00 - 00:99	01:00	min:sec				00:00	00:00
P604	Section 1 Fan Rev Fix	0 = Off, 1 = On	1	---				1	1
P605	Section 1 Fan Rev Variable	0 - 100	1	%				0	0
P408	Section 1 Transducer fail Level	0 - 100	1	%				45	45
P409	Section 1 Control Type	0 = Fixed 1 = Floating 2 = Float Drop	1	-				0	0
P410	Section 1 Float Select	0 = Probe 1 1 = Probe 2 2 = Probe 3 3 = Probe 4 4 = Probe 5 5 = Probe 6 6 = Probe 7 7 = Probe 8 8 = Remote	1	-				1	1
P411	Section 1 Drop select	0 = Probe 1 1 = Probe 2 2 = Probe 3 3 = Probe 4 4 = Probe 5 5 = Probe 6 6 = Probe 7 7 = Probe 8 8 = Remote	1	-				2	2
P414	Section 1 Pressure at 0°C/32°F	-3.4 - 180	0.1	Bar				6.0	6.0



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

No.	Parameter	Range	Step	Units	Default				
P415	Section 1 Pressure at 10°C/50°F	-3.4 - 180	0.1	Bar				8.2	8.2
P416	Section 1 Pressure at 20°C/68°F	-3.4 - 180	0.1	Bar				10.9	10.9
P417	Section 1 Pressure at 30°C/86°F	-3.4 - 180	0.1	Bar				14.2	14.2
P418	Section 1 Pressure at 40°C/104°F	-3.4 - 180	0.1	Bar				18.1	18.1
P419	Section 1 Pressure at 50°C/122°F	-3.4 - 180	0.1	Bar				23.0	23.0
P420	Section 1 Low Limit	-3.4 - 180	0.1	Bar				8.2	8.2
P421	Section 1 High Limit	-3.4 - 180	0.1	Bar				23.0	23.0
P422	Section 1 Condenser offset	0 - 20	0.1	°C				6	6
P438	Section 1 Split	0 = Off, 1 = On	1					0	0
P430	Section 1 Split Temp	-60.0 - 128.0	0.1	°C				7.2	7.2
P432	Section 1 Split Temp Diff	0.0 - 10.0	0.1	°C				2.0	2.0
P434	Sect 1 Split Press	-3.4 - 150	0.1	Bar				15.2	15.2
P436	Sect 1 Split Press Diff	-3.4 - 150	0.1	Bar				1.4	1.4
P440	Section 1 Heat Reclaim	0 = Off, 1 = On, 2 = On Rly.	1	-				0	0
P473	Section 1 Ext Target	-3.4 - 180	0.1	Bar	3.1	3.1	3.1	14.7	14.7
P-40	Section 2 Target Pressure	-3.4 - 180	0.1	Bar		2.1	12.7	12.7	
P474	Section 2 External Target Pressure	-3.4 - 180	0.1	Bar		3.1	14.7	14.7	
P-41	Section 2 Target Pressure Above P-40	-3.4 - 180	0.1	Bar		0.5	0.5	0.5	
P-42	Section 2 Target Pressure Below P-40	-3.4 - 180	0.1	Bar		0.5	0.5	0.5	
P-43	Section 2 Starts/Hour	0 - 60	1	-		10			
P-44	Section 2 Run Smallest **	0 = Off, 1 = On	1	-		0			
P-46	Section 2 Inverter	0 = Off, 1 = On	1	-		0	0	0	
P443	Section 2 INV Bypass	0 = Disabled 1 = 1 + no retry 2 = 1 + 1 retry 3 = 1 + 2 retries 4 = 1 + 3 retries 5 = 1 + 4 retries	1	-		0	0	0	
P445	Section 2 INV Minimum	0 - 100	1	%		0	0	0	
P447	Section 2 INV Maximum	0 - 100	1	%		100	100	100	
P471	Section 2 Always Run last	0 = Off, 1 = On	1	-		0			
P496	Sect 2 Compressor Unload	0 = Off, 1 = On	1	-		0			
P498	Sect 1 Equal	0 = Off, 1 = On	1	-		0			
P-47	Section 2 Response On Speed	1 - 60	1	-		5	5	5	
P-48	Section 2 Response Off Speed	1 - 60	1	-		5	5	5	
P-49	Section 2 Optimise Limit	-3.4 - 180	0.1	Bar		2.0			
P-50	Section 2 Alarm Delay	00:00 - 99:00	01:00	min:sec		05:00	05:00	05:00	
P-51	Section 2 HP Alarm	-3.4 - 180	0.1	Bar		4.1	17.9	17.9	



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

No.	Parameter	Range	Step	Units	Default			
P-52	Section 2 LP Alarm	-3.4 - 180	0.1	Bar		0.6	6.8	6.8
P-53	Section 2 LP Shut-down	-3.4 - 180	0.1	Bar		0.4	6.2	6.2
P-35	Section 2 Low Alarm Delay	00:00 - 99:00	01:00	min:sec		00:00	00:00	00:00
P449	Section 2 Fail	0 = Off, 1 = On	1	-		0	0	0
P450	Section 2 Sticky Fans	0 - 12	1	-		0	0	
P451	Section 2 Night Set Back	0 = Off 1 = On 2 = Local 3 = Remote	1	-		0	0	
P452	Section 2 Night Reduction	0 - 100	1	%		30	30	
P453	Section 2 Night Set Back On Time	00:00 - 23:59	00:01	min:sec		20:00	20:00	
P454	Section 2 Night Set Back Off Time	00:00 - 23:59	00:01	min:sec		08:00	08:00	
P455	Sect 2 Night Set Back Pressure Limit	-3.4 - 180	0.1	Bar		25	25	
P456	Section 2 Day Reduction	0 - 100	1	%		30	30	
P457	Section 2 Day Pressure Limit	-3.4 - 180	0.1	Bar		25	25	
P610	Section 2 Fan Reverse	0 = Off 1 = On 2 = Local 3 = Remote	1	---		0	0	
P611	Section 2 Fan Rev Start	00:01 - 23:59	00:01	hrs:min		0	0	
P612	Section 2 Fan Rev Length	00:00 - 99:00	01:00	min:sec		00:00	00:00	
P613	Section 2 Fan Rev Delay	00:00 - 99:00	01:00	min:sec		00:00	00:00	
P614	Section 2 Fan Rev Fix	0 = Off, 1 = On	1	---		0	0	
P615	Section 2 Fan Rev Variable	0 - 100	1	%		0	0	
P458	Section 2 Transducer fail Level	0 - 100	1	%		45	45	
P459	Section 2 Control Type	0 = Fixed 1 = Floating 2 = Float Drop	1	-		0	0	
P460	Section 2 Float Select	0 = Probe 1 1 = Probe 2 2 = Probe 3 3 = Probe 4 4 = Probe 5 5 = Probe 6 6 = Probe 7 7 = Probe 8 8 = Remote	1	-		1	1	
P412	Section 2 Drop Select	0 = Probe 1 1 = Probe 2 2 = Probe 3 3 = Probe 4 4 = Probe 5 5 = Probe 6 6 = Probe 7 7 = Probe 8 8 = Remote	1	-		2	2	
P461	Section 2 Pressure at 0°C/32°F	-3.4 - 180	0.1	Bar		6.0	6.0	



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

No.	Parameter	Range	Step	Units	Default				
P462	Section 2 Pressure at 10°C/50°F	-3.4 - 180	0.1	Bar			8.2	8.2	
P463	Section 2 Pressure at 20°C/68°F	-3.4 - 180	0.1	Bar			10.9	10.9	
P464	Section 2 Pressure at 30°C/86°F	-3.4 - 180	0.1	Bar			14.2	14.2	
P465	Section 2 Pressure at 40°C/104°F	-3.4 - 180	0.1	Bar			18.1	18.1	
P466	Section 2 Pressure at 50°C/122°F	-3.4 - 180	0.1	Bar			23.0	23.0	
P467	Section 2 Low Limit	-3.4 - 180	0.1	Bar			8.2	8.2	
P468	Section 2 High Limit	-3.4 - 180	0.1	Bar			23.0	23.0	
P469	Section 2 Condenser offset	0 - 20	0.1	°C			6	6	
P439	Section 2 Split	0 = Off, 1 = On	1	-			0	0	
P431	Section 2 Split Temp	-60 - 128	0.1	°C			7.2	7.2	
P433	Section 2 Split Temp Diff	0.0 - 10.0	0.1	°C			2.0	2.0	
P435	Sect 2 Split Press	-3.4 - 180	0.1	Bar			15.2	15.2	
P437	Sect 2 Split Press Diff	-3.4 - 180	0.1	Bar			1.4	1.4	
P441	Sect 2 Heat reclaim	0 = Off 1 = On 2 = On Rly	1	-			0	0	
P475	Discharge Trip	-3.4 - 50.0	0.1	Bar			22.8		
P476	Discharge Trip Diff	-3.4 - 50.0	0.1	Bar			2.0		
P472	Run Proof	0 = Off, 1 = On	1	-	0	0	0		
P-60	Status fault Delay	00:00 - 60:00	00:01	min:sec	00:10	00:10	00:10	00:10	00:10
P-61	General Alarm Delay	00:00 - 60:00	00:01	min:sec	00:10	00:10	00:10	00:10	00:10
P-62	Standby Delay	00:00 - 60:00	00:01	min:sec	00:10	00:10	00:10	00:10	00:10
P480	Liquid Level	0 = Off, 1 = On	1	-	0	0	0	0	0
P481	High Liquid Level	0 - 100	1	%	80	80	80	80	80
P482	Low Liquid Level	0 - 100	1	%	20	20	20	20	20
P483	Liquid Level Alarm Delay	00:00 - 99:00	01:00	min:sec	05:00	05:00	05:00	05:00	05:00
P494	Dual Standby See: Standby Mode	0 = Off, 1 = On	1	-		1	1	1	
P-80	Status Fault 1	((0) Unused (1) Comp N/O (2) Comp N/C (3) Cond N/O (4) Cond N/C (5) Gen N/O (6) Gen N/C (7) Standby1 N/O (8) Standby1 N/C (9) Standby2 N/O (10) Standby2 N/C (11) Run1 N/O (12) Run1 N/C (13) Run2 N/O (14) Run2 N/C (15) INV N/O (16) INV N/C	1	-	0	0	0	0	0
P-91	Status Fault 12								



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

No.	Parameter	Range	Step	Units	Default				
P100 ↓ P111	Section 1 Stage 1 ↓ Section 1 Stage 12	(0) None (1) Unused (2) Compressor (3) Loader (4) Fan (5) Inverter (6) Trim (7) Comp Run	1	-	0	0	0	0	0
P120 ↓ P131	Section 1 Stage 1 Size ↓ Section 1 Stage 12 Size	0.0 – 60.0	0.1	-	0.0	0.0	0.0		
P140 ↓ P151	Section 2 Stage 1 ↓ Section 2 Stage 12	(0) None, (1) Unused, (2) Compressor, (3) Loader, (4) Fan (5) Inverter (6) Trim (7) Comp Run	1	-		0	0	0	
P160 ↓ P171	Section 2 Stage 1 Size ↓ Section 2 Stage 12 Size	0.0 – 60.0	0.1	-		0.0			
Hardware Parameters									
P701 ↓ P708	Universal IO 1 ↓ Universal IO 8	0= 4-20mA In 1= 0-10v In 2= 0-5v In 3= 4-20mA Out 4= 0-20mA Out 5= 0-10v Out 6= 0-5v Out	1	-	0	0	0	0	0
P710	Status Input Type	0= Volt Free 1= 24vac	1	-	0	0	0	0	0
P720 ↓ P731	Invert Relay 1 ↓ Invert Relay 12	0 = Off 1 = On	1	-	0	0	0	0	0
P740 ↓ P747	Probe Offset 1 ↓ Probe Offset 8	-20 - +20	0.1	°C	0	0	0	0	0
P801	Reset Stats	0 = Off 1 = On	1	-	0	0	0	0	0
dFLt	Restore Default Settings								



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

Parameter table for Controller (Types 6-10, Staged)

Not all parameters apply to all controllers types, for example P-401 is night setback for condenser fans so will not appear on a controller if it is set up as a pack (compressor) controller (type 6). In the right hand columns, the controller type will be shown (6-10) if that parameter applies to that type, if it does not apply it will be greyed out.

No.	Parameter	Range	Step	Units	Default				
					Pack (Type 6)	Dual Pack (Type 7)	Pack/Condenser (Type 8)	Dual Condenser (Type 9)	Condenser (Type 10)
P-01	Transducer 1 Span *	-3.4 - 180	0.1	Bar	13.8	13.8	13.8	34.4	34.4
P-02	Transducer 1 Offset	-3.4 - 180	0.1	Bar	0	0	0	0	0
P-03	Transducer 2 Span *	-3.4 - 180	0.1	Bar	13.8	13.8	34.4	34.4	13.8
P-04	Transducer 2 Offset	-3.4 - 180	0.1	Bar	0	0	0	0	0
P-05	Transducer 3 Span *	-3.4 - 180	0.1	Bar	13.8	13.8	13.8	13.8	13.8
P-06	Transducer 3 Offset	-3.4 - 180	0.1	Bar	0	0	0	0	0
P-20	Section 1 Target Pressure	-3.4 - 180	0.1	Bar	2.1	2.1	2.1	12.7	12.7
P473	Section 1 Ext. Target Press	-3.4 - 180	0.1	Bar	3.1	3.1	3.1	14.7	14.7
P-21	Section 1 Target Pressure Above P-20	-3.4 - 180	0.1	Bar	0.5	0.5	0.5	0.5	0.5
P-22	Section 1 Target Pressure Below P-20	-3.4 - 180	0.1	Bar	0.5	0.5	0.5	0.5	0.5
P-23	Section 1 Number of Stages	0 - 12	1	-	0	0	0	0	0
P-24	Section 1 Stage On Delay	00:00 - 60:00	00:01	min:sec	00:10	00:10	00:10	00:10	00:10
P-25	Section 1 Stage Off Delay	00:00 - 99:00	00:01	min:sec	00:10	00:10	00:10	00:10	00:10
P-26	Section 1 Inverter	0 = Off, 1 = On	1	-	0	0	0	0	0
P442	Section 1 INV Bypass	0 = Disabled 1 = 1+no retry 2 = 1 + 1 retry 3 = 1 + 2 retries 4 = 1 + 3 retries 5 = 1 + 4 retries	1	-	0	0	0	0	0
P444	Section 1 INV Minimum	0 - 100	1	%	0	0	0	0	0
P446	Section 1 INV Maximum	0 - 100	1	%	100	100	100	100	100
P490	Section 1 Gas Dump	0 = Off, 1 = On	1	-	0	0	0		
P492	Section 1 Gas Diff	-3.4 - 150	0.1	Bar	0.5	0.5	0.5		
P470	Section 1 Always Run last	0 = Off, 1 = On	1	-	0	0	0		
P-27	Section 1 Response On Speed	1 - 60	1	-	5	5	5	5	5
P-28	Section 1 Response Off Speed	1 - 60	1	-	5	5	5	5	5
P-29	Section 1 Optimise Limit	-3.4 - 150	0.1	Bar	2.0	2.0	2.0		
P-30	Section 1 Alarm Delay	00:00 - 99:00	01:00	min:sec	05:00	05:00	05:00	05:00	05:00
P-31	Section 1 HP Alarm	-3.4 - 180	0.1	Bar	4.1	4.1	4.1	17.9	17.9
P-32	Section 1 LP Alarm	-3.4 - 180	0.1	Bar	0.6	0.6	0.6	6.8	6.8
P-33	Section 1 LP Shut-down	-3.4 - 180	0.1	Bar	0.4	0.4	0.4	6.2	6.2



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

No.	Parameter	Range	Step	Units	Default	No.	Parameter	Range	Step
P-34	Section 1 Low Alarm Delay	00:00 – 99:00	01:00	min:sec	00:00	00:00	00:00	00:00	00:00
P448	Section 1 Fail	0 = Off 1 = On	1	-	0	0	0	0	0
P400	Section 1 Sticky Fans	0 – 12	1	-				0	0
P401	Section 1 Night Set Back	0 = Off 1 = On 2 = Local 3 = Remote	1	-				0	0
P402	Section 1 Night Reduction	0 – 100	1	%				30	30
P403	Section 1 Night Set Back On Time	00:00 – 23:59	00:01	min:sec				20:00	20:00
P404	Section 1 Night Set Back Off Time	00:00 – 23:59	00:01	min:sec				08:00	08:00
P405	Section 1 Night Set Back Pressure Limit	-3.4 - 180	0.1	Bar				25	25
P406	Section 1 Day Reduction	0 – 100	1	%				25	25
P407	Section 1 Day Pressure Limit	-3.4 - 180	0.1	Bar				25	25
P600	Section 1 Fan Rev	0 = Off 1 = On 2 = Local 3 = Remote	1	---				0	0
P601	Section 1 Fan Rev Start	00:01 – 23:59	00:01	hrs:min				00:00	00:00
P602	Section 1 Fan Rev Length	00:00 – 99:00	01:00	min:sec				00:00	00:00
P603	Section 1 Fan Rev Delay	00:00 – 00:99	01:00	min:sec				00:00	00:00
P604	Section 1 Fan Rev Fix	0 = Off 1 = On	1	---				1	1
P605	Section 1 Fan Rev Variable	0 – 100	1	%				0	0
P408	Section 1 Transducer fail Level	0 – 100	1	%				45	45
P409	Section 1 Control Type	0 = Fixed 1 = Floating 2 = Float Drop	1	-				0	0
P410	Section 1 Float Select	0 = Probe 1 1 = Probe 2 2 = Probe 3 3 = Probe 4 4 = Probe 5 5 = Probe 6 6 = Probe 7 7 = Probe 8 8 = Remote	1	-				1	1
P411	Section 1 Drop select	0 = Probe 1 1 = Probe 2 2 = Probe 3 3 = Probe 4 4 = Probe 5 5 = Probe 6 6 = Probe 7 7 = Probe 8 8 = Remote	1	-				2	2
P414	Section 1 Pressure at 0°C/32°F	-3.4 - 180	0.1	Bar				6.0	6.0



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

No.	Parameter	Range	Step	Units	Default	No.	Parameter	Range	Step
P415	Section 1 Pressure at 10°C/50°F	-3.4 - 180	0.1	Bar				8.2	8.2
P416	Section 1 Pressure at 20°C/68°F	-3.4 - 180	0.1	Bar				10.9	10.9
P417	Section 1 Pressure at 30°C/86°F	-3.4 - 180	0.1	Bar				14.2	14.2
P418	Section 1 Pressure at 40°C/104°F	-3.4 - 180	0.1	Bar				18.1	18.1
P419	Section 1 Pressure at 50°C/122°F	-3.4 - 180	0.1	Bar				23.0	23.0
P420	Section 1 Low Limit	-3.4 - 180	0.1	Bar				8.2	8.2
P421	Section 1 High Limit	-3.4 - 180	0.1	Bar				23.0	23.0
P422	Section 1 Condenser offset	0 - 20	0.1	°C				6	6
P438	Section 1 Split	0 = Off, 1 = On	1	-				0	0
P430	Section 1 Split Temp	-60.0 - 128.0	0.1	°C				7.2	7.2
P432	Section 1 Split Temp Diff	0.0 - 10.0	0.1	°C				2.0	2.0
P434	Sect 1 Split Press	-3.4 - 180	0.1	Bar				15.2	15.2
P436	Sect 1 Split Press Diff	-3.4 - 180	0.1	Bar				1.4	1.4
P440	Section 1 Heat Reclaim	0 = Off, 1 = On 2 = On Rly	1	-				0	0
P-40	Section 2 Target Pressure	-3.4 - 180	0.1	Bar		2.1	12.7	12.7	
P474	Section 2 External Target Pressure	-3.4 - 180	0.1	Bar		3.1	14.7	14.7	
P-41	Section 2 Target Pressure Above P-40	-3.4 - 180	0.1	Bar		0.5	0.5	0.5	
P-42	Section 2 Target Pressure Below P-40	-3.4 - 180	0.1	Bar		0.5	0.5	0.5	
P-43	Section 2 Number of Stages	0 - 12	1	-		0	0	0	
P-44	Section 2 Stage-on Delay	00:00 - 60:00	00:01	min:sec		00:10	00:10	00:10	
P-45	Section 2 Stage-off Delay	00:00 - 99:00	00:01	min:sec		00:10	00:10	00:10	
P-46	Section 2 Inverter	0 = Off, 1 = On	1	-		0	0	0	
P443	Section 2 INV Bypass	0 = Disabled 1 = 1+ no retry 2 = 1 + 1 retry 3 = 1 + 2 retries 4 = 1 + 3 retries 5 = 1 + 4 retries	1	-		0	0	0	
P445	Section 2 INV Minimum	0 - 100	1	%		0	0	0	
P447	Section 2 INV Maximum	0 - 100	1	%		100	100	100	
P491	Section 2 Gas Dump	0 = Off, 1 = On	1	-		0			
P493	Section 2 Gas diff	-3.4 - 180	0.1	Bar		0.5			
P471	Section 2 Always Run last	0 = Off, 1 = On	1	-		0			
P-47	Section 2 Response On Speed	1 - 60	1	-		5	5	5	
P-48	Section 2 Response Off Speed	1 - 60	1	-		5	5	5	
P-49	Section 2 Optimise Limit	-3.4 - 180	0.1	Bar		2.0			



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

No.	Parameter	Range	Step	Units	Default	No.	Parameter	Range	Step
P-50	Section 2 Alarm Delay	00:00 - 99:00	01:00	min:sec		05:00	05:00	05:00	
P-51	Section 2 HP Alarm	-3.4 - 180	0.1	Bar		4.1	17.9	17.9	
P-52	Section 2 LP Alarm	-3.4 - 180	0.1	Bar		0.6	6.8	6.8	
P-53	Section 2 LP Shut-down	-3.4 - 180	0.1	Bar		0.4	6.2	6.2	
P-35	Section 2 Low Alarm Delay	00:00 - 99:00	01:00	min:sec		00:00	00:00	00:00	
P449	Section 2 Fail	0 = Off, 1 = On	1	-		0	0	0	
P450	Section 2 Sticky Fans	0 - 12	1	-			0	0	
P451	Section 2 Night Set Back	0 = Off, 1 = On 2 = Local 3 = Remote	1	-			0	0	
P452	Section 2 Night Reduction	0 - 100	1	%			30	30	
P453	Section 2 Night Set Back On Time	00:00 - 23:59	00:01	min:sec			20:00	20:00	
P454	Section 2 Night Set Back Off Time	00:00 - 23:59	00:01	min:sec			08:00	08:00	
P455	Section 2 Night Set Back Pressure Limit	-3.4 - 180	0.1	Bar			25	25	
P456	Section 2 Day Reduction	0 - 100	1	%			25	25	
P457	Section 2 Day Pressure Limit	-3.4 - 180	0.1	Bar			25	25	
P610	Section 2 Fan Reverse	0 = Off, 1 = On 2 = Local 3 = Remote	1	---			0	0	
P611	Section 2 Fan Rev Start	00:01 - 23:59	00:01	hrs:min			0	0	
P612	Section 2 Fan Rev Length	00:00 - 99:00	01:00	min:sec			00:00	00:00	
P613	Section 2 Fan Rev Delay	00:00 - 99:00	01:00	min:sec			00:00	00:00	
P614	Section 2 Fan Rev Fix	0 = Off, 1 = On	1	---			0	0	
P615	Section 2 Fan Rev Variable	0 - 100	1	%			0	0	
P458	Section 2 Transducer fail Level	0 - 100	1	%			45	45	
P459	Section 2 Control Type	0 = Fixed 1 = Floating 2 = Float Drop	1	-			0	0	
P460	Section 2 Float Select	0 = Probe 1 1 = Probe 2 2 = Probe 3 3 = Probe 4 4 = Probe 5 5 = Probe 6 6 = Probe 7 7 = Probe 8 8 = Remote	1	-			1	1	



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

No.	Parameter	Range	Step	Units	Default	No.	Parameter	Range	Step
P412	Section 2 Drop Select	0 = Probe 1 1 = Probe 2 2 = Probe 3 3 = Probe 4 4 = Probe 5 5 = Probe 6 6 = Probe 7 7 = Probe 8 8 = Remote	1	-			2	2	
P461	Section 2 Pressure at 0°C/32°F	-3.4 - 180	0.1	Bar			6.0	6.0	
P462	Section 2 Pressure at 10°C/50°F	-3.4 - 180	0.1	Bar			8.2	8.2	
P463	Section 2 Pressure at 20°C/68°F	-3.4 - 180	0.1	Bar			10.9	10.9	
P464	Section 2 Pressure at 30°C/86°F	-3.4 - 180	0.1	Bar			14.2	14.2	
P465	Section 2 Pressure at 40°C/104°F	-3.4 - 180	0.1	Bar			18.1	18.1	
P466	Section 2 Pressure at 50°C/122°F	-3.4 - 180	0.1	Bar			23.0	23.0	
P467	Section 2 Low Limit	-3.4 - 180	0.1	Bar			8.2	8.2	
P468	Section 2 High Limit	-3.4 - 180	0.1	Bar			23.0	23.0	
P469	Section 2 Condenser offset	0 - 20	0.1	°C			6	6	
P439	Section 2 Split	0 = Off, 1 = On	1	-			0	0	
P431	Section 2 Split Temp	-60 - 128	0.1	°C			7.2	7.2	
P433	Section 2 Split Temp Diff	0.0 - 10.0	0.1	°C			2.0	2.0	
P435	Sect 2 Split Press	-3.4 - 180	0.1	Bar			15.2	15.2	
P437	Sect 2 Split Press Diff	-3.4 - 180	0.1	Bar			1.4	1.4	
P441	Sect 2 Heat reclaim	0 = Off 1 = On 2 = On Rly	1	-			0	0	
P475	Discharge Trip	-3.4 - 50.0	0.1	Bar			22.8		
P476	Discharge Trip Diff	-3.4 - 50.0	0.1	Bar			2.0		
P472	Run Proof	0 = Off, 1 = On	1	-	0	0	0		
P-60	Status fault Delay	00:00 - 60:00	00:01	min:sec	00:10	00:10	00:10	00:10	00:10
P-61	General Alarm Delay	00:00 - 60:00	00:01	min:sec	00:10	00:10	00:10	00:10	00:10
P-62	Standby Delay	00:00 - 60:00	00:01	min:sec	00:10	00:10	00:10	00:10	00:10
P480	Liquid Level	0 = Off, 1 = On	1	-	0	0	0	0	0
P481	High Liquid Level	0 - 100	1	%	80	80	80	80	80
P482	Low Liquid Level	0 - 100	1	%	20	20	20	20	20
P483	Liquid Level Alarm Delay	00:00 - 99:00	01:00	min:sec	05:00	05:00	05:00	05:00	05:00
P494	Dual Standby See Standby Mode	0 = Off, 1 = On	1	-		1	1	1	



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

No.	Parameter	Range	Step	Units	Default	No.	Parameter	Range	Step
P-80	Status Fault 1	(0) Unused (1) Comp N/O (2) Comp N/C (3) Cond N/O (4) Cond N/C (5) Gen N/O (6) Gen N/C (7) Standby 1 N/O (8) Standby 1 N/C (9) Standby 2 N/O (10) Standby 2 N/C (11) Run 1 N/O (12) Run 1 N/C (13) Run 2 N/O (14) Run 2 N/C (15) INV N/O (16) INV N/C	1	-	0	0	0	0	0
P-91	Status Fault 12								
P100	Section 1 Stage 1 Relay 1	0 = Off 1 = On	1	-	0	0	0		
P111	Section 1 Stage 1 Relay 12								
P112	Section 1 Stage 2 Relay 1	0 = Off 1 = On	1	-	0	0	0		
P123	Section 1 Stage 2 Relay 12								
P124	Section 1 Stage 3 Relay 1	0 = Off 1 = On	1	-	0	0	0		
P135	Section 1 Stage 3 Relay 12								
P136	Section 1 Stage 4 Relay 1	0 = Off 1 = On	1	-	0	0	0		
P147	Section 1 Stage 4 Relay 12								
P148	Section 1 Stage 5 Relay 1	0 = Off 1 = On	1	-	0	0	0		
P159	Section 1 Stage 5 Relay 12								
P160	Section 1 Stage 6 Relay 1	0 = Off 1 = On	1	-	0	0	0		
P171	Section 1 Stage 6 Relay 12								



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No.	Parameter	Range	Step	Units	Default	No.	Parameter	Range	Step
P172	Section 1 Stage 7 Relay 1	0 = Off 1 = On	1	-	0	0	0		
↓	↓								
P183	Section 1 Stage 7 Relay 12								
P184	Section 1 Stage 8 Relay 1	0 = Off 1 = On	1	-	0	0	0		
↓	↓								
P195	Section 1 Stage 8 Relay 12								
P196	Section 1 Stage 9 Relay 1	0 = Off 1 = On	1	-	0	0	0		
↓	↓								
P207	Section 1 Stage 9 Relay 12								
P208	Section 1 Stage 10 Relay 1	0 = Off 1 = On	1	-	0	0	0		
↓	↓								
P219	Section 1 Stage 10 Relay 12								
P220	Section 1 Stage 11 Relay 1	0 = Off 1 = On	1	-	0	0	0		
↓	↓								
P231	Section 1 Stage 11 Relay 12								
P232	Section 1 Stage 12 Relay 1	0 = Off 1 = On	1	-	0	0	0		
↓	↓								
P243	Section 1 Stage 12 Relay 12								
Hardware Parameters									
P701	Universal IO 1	0= 4-20mA In 1= 0-10v In 2= 0-5v In 3= 4-20mA Out 4= 0-20mA Out 5= 0-10v Out 6= 0-5v Out	1	-	0	0	0	0	0
↓	↓								
P708	Universal IO 8								
P710	Status Input Type	0= Volt Free 1= 24vac	1	-	0	0	0	0	0
P720	Invert Relay 1	0 = Off 1 = On	1	-	0	0	0	0	0
↓	↓								
P731	Invert Relay 12								
P740	Probe Offset 1	-20 - +20	0.1	°C	0	0	0	0	0
↓	↓								
P747	Probe Offset 8								
P801	Reset Stats	0 = Off 1 = On	1	-	0	0	0	0	0



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Parameter Descriptions

Number	Parameter	Description
P-01/03/05	Transducer 1/2/3 Span	Range of the transducers
P-02/04/06	Transducer 1/2/3 Offset	Transducer value above or below zero.
P-20/40	Target Pressure	Pressure target, control will try to maintain this pressure
P473/474	External Target Pressure	Pressure target when Sect1 Run/Sect2 Run is off. Control will try to maintain this pressure until Sect1 Run/Sect2 Run is on. At this point P-20/40 used. Please see: Status Inputs
P-21/41	Target Pressure Above P-20	Set-point above the target, used to obtain a "dead-band"
P-22/42	Target Pressure Below P-20	Set-point below the target, used to obtain a "dead-band"
P-23/43	Number of Stages	Number of stages in the system
P-23/43Fuzzy	Starts per hour	Limits a compressor to this many starts per hour
P-24/44Fuzzy	Run smallest	See explanation under the parameter tables for this parameter Run Smallest
P-24/44Staged	Stage-on Delay	Delay time between stages on (Staged types only)
P-25/45Staged	Stage-off Delay	Delay time between stages off (Staged types only)
P-26/46	Inverter	Enables the inverter analogue output and associated relay.
P442/443	Inverter Bypass	Enable for Inverter Bypass feature. See INV Bypass
P444/445	Inverter Min	The minimum percentage the inverter will operate to when Inverter Bypass parameter (P-442/443) is on e.g. if set to 25% the inverter output will never go below this value
P446/447	Inverter Max	The maximum percentage the inverter will operate to when Inverter Bypass parameter (P-442/443) is on e.g. if set to 80% the inverter output will never go above this value
P490/491	Section 1/2 Gas Dump	Enables Gas Dump feature.
P492/493	Section 1/2 Gas Diff	Diff below the set point that the Gas Dump valve is opened. See Gas Dump
P470/471	Always run last	Keeps the last stage running except for a Low Shutdown condition. If the last stage is an inverter, the inverter enable will stay energised, but the inverter analogue output may well decrease to 0% if pressure is below the set-point.
P495/497	Sect 1/2 Compressor Unload	Selects the order the compressor loaders are switched off See: Compressor Loaders
P496/498	Sect 1/2 Equal	Equalises compressor run times. See: Equal run Times
P-27/47	Response On Speed	Allows the user to speed up/slow down the stage on speed (Option: - 1 to 60 with 60 being fastest response) Note: This parameter applies to the inverter output only when using any of the Staged types.
P-28/48	Response Off Speed	Allows the user to speed up/slow down the stage off speed (Option: - 1 to 60 with 60 being fastest response) Note: This parameter applies to the inverter output only when using any of the Staged types.
P-29/49	Optimise 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
P-30/50	Alarm Delay	Delay before HP and LP alarms are signalled
P-31/51	HP Alarm	HP alarm set-point
P-32/52	LP Alarm	LP alarm set-point
P-33/53	LP Shut-down	LP shut-down set-point, all stages go off when this is reached
P-34/35	Low Alarm	Delay applied before 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.



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Number	Parameter	Description
P448/449	Sect 1 / 2 Fail	The following will occur in the event of pressure transducer fault on Section 1 or 2: - 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.
P400/450	Sticky Fans	Sticky fans operation allows the user to turn the fans off in a way that keeps a number of fans running longer. See Sticky Fans
P401/451	Night Set Back	Turns on the night set back level. Note This feature is intended to be used when all of the fans are controlled by the inverter. If fan relays are selected, they will never come on as the inverter is required to go to 100% before staging the next fan. There are 4 options : - Off : Night Feature is not used. Controller uses what is set in Day Reduction (P406/456) On : Night Reduction (parameter 402 / 452) is always used Local : Uses times in Night Set On and Night Set Off parameters (P403/453) (P404/454) to determine Day / Night Remote : Uses GP Timer to determine Day / Night
P402/452	Night Reduction	Reduces inverter output by this amount during night settings.
P403/453	Night Set Back On Time	Time for the night set back feature to operate
P404/454	Night Set Back Off Time	Time for the night set back feature to go off
P405/455	Night Set Back Pressure Limit	Pressure set-point to disable the night set back feature. Night set back is disabled above this level and enabled below it.
P406/456	Day Reduction	Reduces the inverter output by this amount when the timer is not in its night zone.
P407/457	Day Pressure Limit	Pressure set-point to disable the day reduction feature. Day reduction is disabled above this level and enabled below it.
P610	Section 1/2 Fan Rev (used on variable speed fans only)	This feature allows a relay to be allocated as a fan reverse signal, this will reverse the condenser fans at a preset time for a preset period to assist clearing debris that may have accumulated in the fans. The last unallocated relay before the alarm relay will be used once a fan reverse length (P-622) has been set 0 = Off, feature not used 1 = On, allows fans to be forced manually into reverse. Note: If this parameter is left set to On by mistake then there will only be one reverse fan cycle, the parameter will then need to be set to Off before it can be set to On again. 2 = Local, uses the controller's internal GP timer to switch the fans into reverse. 3 = Remote, allows a remote command sent from a TDB program running on a Data Manager.
P-611	Section 1/2 Fan Rev Start	Set the local time of day when fans are switched into reverse (only applies if P-620 set to local)
P-612	Section 1/2 Fan Rev Length	Sets the length of time fans will run in reverse
P-613	Section 1/2 Fan Rev Delay	Sets a delay period between fans stopping and being switched into reverse.
P-614	Section 1/2 Fan Rev Fix	If set to On then the fans will run in reverse at a fixed speed (set in P-625), if set to Off then the fans will run at their normal control speed.
P-615	Section 1/2 Fan Rev Variable	Sets the fixed reverse fan speed if P-624 set to On.
P-616	Section 1/2 Fan Rev Level	Fan reverse will not operate if the pressure is below this value, this is to prevent over condensing. If the pressure drops below this value during a fan reverse cycle then normal forward operation will be resumed, another reverse fan cycle cannot be activated for a minimum of one hour.
P408/458	Transducer fail Level	Sets the output level of the inverter if the transducer fails



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Number	Parameter	Description
P409/459	Control Type	Selects between Fixed, Floating or Float/ Drop Leg control for Condenser sections only. Fixed - Uses the set-point parameter as its target (P-20/40) with the corresponding pressure transducer. Floating - Uses the temperature of a selected probe converted to a pressure as the set-point along with the corresponding pressure transducer. See Floating Head Pressure Float/ Drop leg - Uses the same control method as 'Floating'. It also allows a monitoring feature for drop leg, where it uses the temperature of a selected probe mounted on the drop leg to calculate control pressure. See Drop Leg
P410/460	Float Select	Selects the probe that measures the "floating" temperature (Note : This would be fitted to the Air On of the Condenser) See Note Floating Head Pressure
P411/412	Sect 1 / 2 drop Select	Selects which probe is used to measure Drop Leg temperature. See Note Drop Leg
P414/461	Pressure at 0°C	Used to program the temperature to pressure conversion for floating pressure use.
P415/462	Pressure at 10°C	Used to program the temperature to pressure conversion for floating pressure use.
P415/463	Pressure at 20°C	Used to program the temperature to pressure conversion for floating pressure use.
P417/464	Pressure at 30°C	Used to program the temperature to pressure conversion for floating pressure use.
P418/465	Pressure at 40°C	Used to program the temperature to pressure conversion for floating pressure use.
P419/466	Pressure at 50°C	Used to program the temperature to pressure conversion for floating pressure use.
P420/467	Low Limit	Stops the floating pressure target from going below this level
P421/468	High Limit	Stops the floating pressure target from going above this level
P422/469	Condenser offset	Used to set a condenser differential, which is added to the incoming temperature to produce a "floating" set-point
P438/439	Sect 1 / 2 Split	Set to "On" to enable Condenser Split feature.
P430/431	Sect 1 / 2 Split Temp	If outside ambient air temperature falls to this value then the condenser split relay will come on. Note the Condenser Float temperature probe is used as the air temperature reference.
P432/433	Sect 1 / 2 Split Temp Diff	Diff above for the split temp feature (P-430/431). If outside ambient air temperature rises above Sect 1/2 Split Temp parameter plus Sect 1/2 Split Temp Diff parameter then the Condenser split relay will go off
P434/435	Sect 1 / 2 Split Pressure	If the discharge pressure rises above this setting then the condenser split relay will be forced off regardless of temperature.
P436/437	Sect 1 / 2 Split Pressure Diff	Diff below parameter for Split Pressure feature (P-434/435). If the pressure for Section1/2 falls below Sect 1/2 Split Pressure setpoint plus Sect 1/2 Split Pressure Diff parameter then the condenser split relay will return to normal operation (status depends on P-430/431).
P440/441	Sect 1 / 2 Heat Reclaim	Enable for Heat Reclaim. See : Relay Outputs 0 = Off (Not Used) 1 = On (Uses Ext Set Point) 2 = On Rly(Uses Ext Set Point and allocates a Relay)
P475	Discharge trip	If Discharge Pressure exceeds this setting All compressors go off immediately and all fans come on immediately. A Discharge Trip Alarm is generated. Note: If using an Inverter on the Compressors the output to the Inverter will go to 0% immediately as well as all compressors going off



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Number	Parameter	Description
P476	Discharge Trip Diff	Diff below for parameter P-475 at which point control goes back to normal and alarm clears.
P472	Run Proof	See section Run-Proof
P-60	Status fault Delay	Time delay before status faults are activated
P-61	General Alarm Delay	Time delay before general faults are activated
P-62	Standby Delay	Time delay before controller goes into standby mode after activation of the standby input.
P480	Liquid Level	Enable for Liquid Level feature. See Note : Liquid Level
P481/482	Liquid Level Alarm	Settings at which High and Low Liquid Level alarms are generated
P483	Liquid Level Alarm Delay	Delay applied before the Low or High liquid alarm is generated.
P494	Dual Standby	Used to place two sections into Standby from one Standby status input. (Note "Std 1 N/O or Std 1 N/C must be utilised when using this feature) See Note Standby Mode
P-80 ↓	Status Fault 1 ↓	Used to select the type of input required See: Status Inputs
P-91	Status Fault 12	
P100/140 Fuzzy ↓	Stage 1 ↓	Select the output device for this stage
P111/151 Fuzzy	Stage 12	
P120/160 Fuzzy ↓	Stage 1 Size ↓	Sets the relative size for each compressor
P131/171 Fuzzy	Stage 12 Size	
P100 ↓	Stage 1 Relay 1 to 12 ↓	Maps compressor relays to stages
P243 Staged	Stage 12 Relay 1 to 12	

Applies to Staged type Only

Refrigerant Table

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

* 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 (305 psi)
 Offset would be -1 Bar (-15 psi)



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Liquid Level

Liquid Level Detector uses 4-20mA or 0-5V / 10V dc on Universal Input 3 on the Plant controller. 0mA, 4mA or 0V will give a reading of 0% and 20mA, 5V or 10V will give a reading of 100%. The Span and Offset parameters for Transducer input 3 do not require adjustment and can be left at the default values. "Low Liquid Level Alarm" (P-482) and "High Liquid Level Alarm" (P-481) can be generated. The alarm has a settable delay.

Run-Proof

This is a "global" parameter. If set to ON, the Status fault inputs are used to prove that compressors are running. Configure the status inputs, using either Compressor Normally Closed or Compressor Normally Open, that correspond with each relay output. When set to N/O the input is required to become closed circuit to confirm compressor run, and vice versa. When the relay output is energised and the run proof signal isn't returned within the specified time period, then the compressor relay will go off and be taken out of the control strategy until the run proof has been reset. The run-proof feature uses the status fault delay (P-60) and all run proof signals must be returned within this delay period. Run proofs are used with compressor (Comp) stages only. This feature can be used in both Fuzzy and Staged applications.

Note: If using "Run Proofs" and Compressor Loaders.

If you have a compressor with loaders and the compressor is taken out of the control strategy all the associated loaders will be as well. You need to set up a Compressor N/O or Compressor N/C status input for the compressor **and** each loader for this to operate correctly although the loader fault inputs do not need to be physically connected.

To reset the run proof for any stage, after maintenance, and return a compressor back into the control strategy, press and hold the Override and Info buttons on the Plant Display for 3 seconds. "OFF" will show briefly on the display and the run proofs will be reset.

If a Plant Display is not fitted then the controller will need to be reset using the Touch Screen Display or local PC or the controller power cycled.

Gas Dump

Gas Dump Enable (P-490/491). In Fuzzy pack control the Gas dump relay will come on when the Suction Pressure drops below the Set Point (P-20/40) plus the Gas Diff (P-492/493) and all but the last compressor has turned off.

When an Inverter output is configured using Fuzzy pack control the Gas dump relay will come on only when the Inverter is active, i.e. above 0% and all other Compressors configured in that section are off.

With Staged pack control the Gas Dump relay will come on only when last compressor is running.

The Gas dump relay will go off again when: -

The pressure rises above the Set Point (P-20/40)

Or

When the last stage compressor goes off, or Inverter Enable is turned off.

Compressor Loaders

Parameters P495/496 determine the order the compressor loaders are switched off giving the option to turn off one compressor and its loaders before turning off the next or to switch off all the loaders first leaving compressors running unloaded.

If P495/496 set for 0 (Off) then a compressor loader and compressor body will be switched off before another loader is switched off.



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

If P495/496 set for 1 (On) then all loaders will be switched off before a compressor body will be switched off leaving any compressors running unloaded before switching a compressor body off.

Example 1 (Type 1 Fuzzy)

Pack set up: 2 compressors with 2 Loaders each

Sect 1 stage 1 = Comp. Sect 1 stage 2 = Loader. Sect 1 stage 3 = Loader.

Sect 1 stage 4 = Comp. Sect 1 stage 5 = Loader. Sect 1 stage 6 = Loader.

Parameter P495 = 0 (Off)

Switching On sequence: Pressure above set point + diff

First compressor comes on. Compressor loader 1 comes on. Compressor loader 2 comes on.

Second compressor comes on. Compressor loader 1 comes on. Compressor loader 2 comes on.

Switching Off sequence: Pressure below set point – diff

One compressor loader 2 goes off. Compressor loader 1 goes off. Compressor body goes off.

Next compressor loader 2 goes off. Compressor loader 1 goes off. Compressor body goes off.

This configuration switches off one compressor and its loaders before switching off the next compressor loader. Thus leaving one compressor fully loaded till first one is completely off.

Example 2 (Type 1 Fuzzy)

Pack set up: 2 compressors with 2 Loaders each

Sect 1 stage 1 = Comp. Sect 1 stage 2 = Loader. Sect 1 stage 3 = Loader.

Sect 1 stage 4 = Comp. Sect 1 stage 5 = Loader. Sect 1 stage 6 = Loader.

Parameter P495 = 1 (On)

Switching On sequence: Pressure above set point + diff

First compressor comes on. First compressor loader 1 comes on. First compressor loader 2 comes on.

Second compressor comes on. Second compressor loader 1 comes on. Second compressor loader 2 comes on.

Switching Off sequence: Pressure below set point – diff

One compressor loader 2 goes off. Compressor loader 1 goes off.

Next compressor loader 2 goes off. Compressor loader 1 goes off.

One compressor body goes off. Next compressor goes off.

This configuration switches off all loaders before switching off a compressor

Thus leaving both compressors running unloaded before switching one completely off.

NOTE: If using an Inverter with loaders

The Inverter and its loader/s will always be the last to go off.

Equal Run Times

With parameter 'Equal Run' (P-498) Set to 1 (On) the controller will bring on the compressors in a way that the running times are as near equal as possible.

If the pressure is above set point, the next compressor that comes on will be the compressor that has been running for the least amount of time.

If the pressure is below set point the next compressor to go off will be the one that has been running the longest.

This configuration will try to make each compressors run hours equal.

Run smallest

Set to 'on' - When all compressors are off (because the target pressure has been satisfied) the controller, when the pressure rises, will always turn on the smallest compressor after the variable output has reached 100%. If the ASC timer is running for the smallest compressor, the controller will **NOT** bring on any other available compressors, the variable output will remain at 100% and the controller will wait until the ASC Timer has elapsed and then turn on the smallest.

Please note that this is true for **any** pressure condition.



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Fan Reversal

This feature allows a relay to be allocated as a fan reverse signal. This will reverse the condenser fans, once prompted, for a pre-set period to assist clearing debris that may have accumulated in the fans. The relay used for fan reversal depends on which other features are in use that require a relay allocated, these are allocated in the following order,

Compressor / Fan stages
 Condenser Split
 Heat Reclaim
 INV Bypass
 Gas Dump

Fan Reverse

Alarm (An alarm relay will always be allocated as long as a relay is available for it)

The feature can be activated manually, use a local scheduled time (daily) or wait for a remote command, sent from the Data Manager. When activated, there is an optional delay period (P.613) between the fans stopping and being switched into reverse. Following the delay, the assigned relay will be activated for fan reverse length (P612). During the 'fan reverse' period, the speed of the fans will either be at a fixed value (P.614/ P.615) or varying, depending on current pressures. The fan reversal delay will also be met when returning the fans to 'forward'.

Inverter Bypass

Inverter Bypass Parameter (P442/443) is used to set however many retries are required if the Inverter run signal is not returned in the allocated time after the inverter enable has been turned on.

P442/443 set for 1 to 5 is the number of times enable comes on including initial inverter enable turned on.

- 0 = Feature disabled.
- 1 = Inverter enable will come on once with no retries
- 2 = Initial turn on and 1 retry
- 3 = Initial turn on and 2 retries
- 4 = Initial turn on and 3 retries
- 5 = Initial turn on and 4 retries

Firstly assign the desired inverter run input using the Status Fault inputs. This input can be set as either normally closed (INV N/C) or normally open (INV N/O). When the inverter enable relay is called for by the control strategy then the inverter run signal has to be returned to the appropriate input within 2 seconds. If the run signal is received then the control strategy will continue as normally and the variable output will begin to ramp up.

If the signal is not returned within the allotted time then the following will occur.

P442/443 set for 1 the inverter enable will stay off and bypass relay will come on.

P442/443 set for 2 to 5 the inverter enable relay will be turned off for a further 15 seconds.

This process will occur a further 1 to 4 retries depending on (P442/443) if the inverter run signal is not received in any test instance. After the retries the inverter will be taken out of the control logic, until the fault is cleared using the reset process, and the pack will operate as a standard digital pack without the use of the inverter output. At this point the Bypass relay will become like another staged relay and will cycle on and off when called for.

An "INV Bypass" alarm will be generated.

Note if the inverter run signal is not returned within the allotted time in the first instance but is successful in the second, third or fourth attempt (Depending on (P442/443) then any future inverter run tests must still complete all tests.

To reinstate the inverter output, once the fault has been rectified, either reset the Plant controller or by using the [Override](#) feature force the relay associated to the inverter on.

The status inputs should be mapped to the relay used as the Inverter Enable relay for a given section i.e. if relay 1 is the first Inverter relay then status Input 1 would become the inverter run input for Section 1. If the second Inverter relay is 5 then status Input 5 would become the inverter run input for Section 2.

Please see [Relay Outputs – Configuration](#).



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Relay Run Hours and Relay Starts

The total run hours and the total number of starts for each relay can be viewed via a Laptop/PC/TouchXL (See Stats) or from the Data Manager front end outputs. This feature informs the user of the total number of hours a given relay has been on. Therefore if a compressor is assigned to a relay the total run hours for the compressor can be viewed. It also gives the total number of starts for a given relay. Therefore gives the total number of starts for that compressor.

To reset the run hours and relay starts connect to the controller using PC/Laptop/TouchXL. Log in and select "Stats" and "Set Parameters" Change the value from "Reset 1" to "Reset 2" or if value is at "Reset 2" change it to "Reset 1" It makes no difference which value is shown, just the operation of changing it from one to the other will reset the run hours and relay starts.

Likewise this can be done from the front end by selecting "Set Parameters" and carrying out the same operation

This applies to all relays including the Alarm relay.

Setup via a PC

The controller can communicate directly to a PC using a USB lead (Type A to Type B). Depending on the PC's operating system, it may require the necessary USB drivers to be installed and configured. On Windows 10 machines, no drivers are required to be installed. For older versions, the necessary drivers can be obtained from the 'Download Software' section of the RDM website which is found under 'Support'. Along with the driver, there will be a walk through guide of how to set it up. The Intuitive V2 Pack controller hardware platform (firmware version 4.3 or higher) does not require the user's PC network card settings to be altered to connect to the controller, it will self-configure. Power up the controller allowing at least 30 seconds to complete booting. Then, connect from the 'USB Device' port on the controller to a USB connection on the PC and using a standard internet browser (such as Internet explorer, Firefox or Chrome) browse to the address 10.255.255.254. The controller's processor can be powered via the USB lead (V2 hardware only) which enables controller set up and programming to be accomplished without the need to connect a power supply. It should be noted however that the controller's inputs and outputs, such as relays and temperature probes, will not operate unless the 24v power supply is connected.

Home page

The home page of the device will show a values page detailing all inputs, outputs and states. Additionally there are tabs to the left where users can also view hardware details under "MainBrd", (milliamp input levels for example) and relay run hours and number of starts (Stats).

The screenshot shows the 'Intuitive Pack' web interface. On the left, there are navigation tabs for 'Section', 'MainBrd', and 'Stats'. The 'Stats' tab is active, displaying a table with three columns: 'Input', 'Output', and 'State'. Each column has sub-columns for 'Value' and 'Unit'.

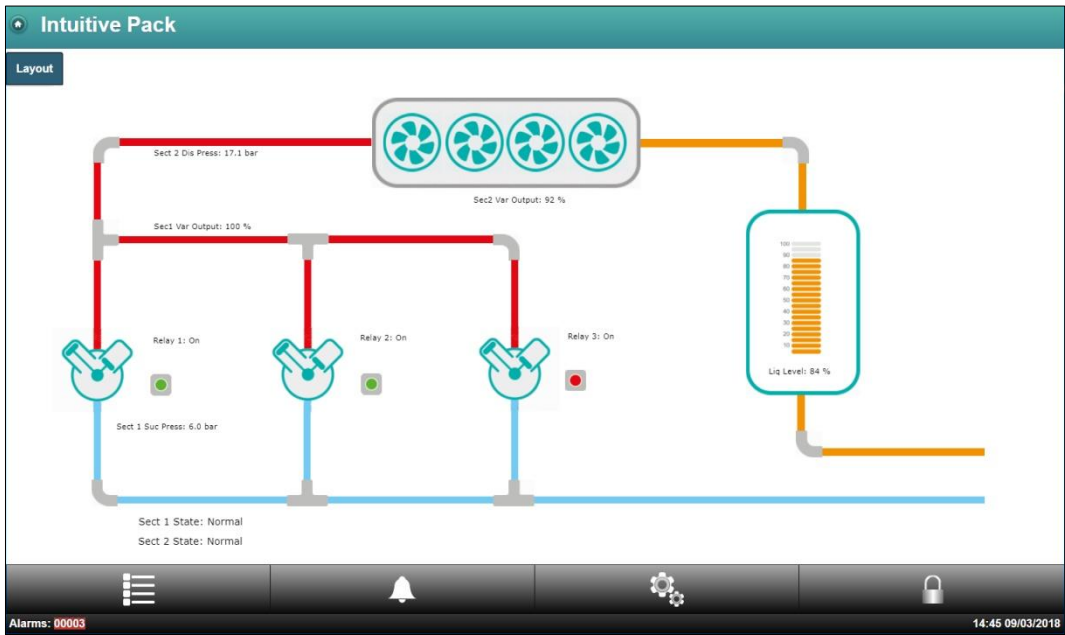
Input	Value	Unit	Output	Value	Unit	State	Value	Unit
Sect 1 Suc Press	7.8	bar	Relay 1	On		Sect 1 State	Normal	
Sect 2 Dis Press	16.8	bar	Relay 2	On		Sect 2 State	Normal	
Press Trans 3	????????	bar	Relay 3	On				
Probe 1	-2.1	°C	Relay 4	On				
Probe 2	-1.7	°C	Relay 5	Off				
Probe 3	-1.0	°C	Relay 6	Off				
Probe 4	25.5	°C	Relay 7	Off				
Probe 5	????????	°C	Relay 8	Off				
Probe 6	????????	°C	Relay 9	Off				
Probe 7	????????	°C	Relay 10	Off				
Probe 8	????????	°C	Relay 11	Off				
Status 1	Unused		Relay 12	Off				
Status 2	Alarm		Sec1 Var Output	100	%			
Status 3	Alarm		Sec2 Var Output	78	%			
Status 4	Unused		Sec1 Bypass	Off				
Status 5	Unused		Sec2 Bypass	Off				
Status 6	Unused		Sec1 Gas Dump	Off				
Status 7	Unused		Optimise 1	0.0	bar			
Status 8	Alarm		Sec2 Float	14.7	bar			
Status 9	Unused		Sec2 Drop Leg	25.5	°C			
Status 10	Unused		Sec2 Drop Leg	12.7	bar			
Status 11	OK		Sec2 Split	Off				
Status 12	OK		Sec2 HeatReclaim	Off				
Sect1 Run	Unused		Sec2 Night SetBack	Off				
S2 Rem Float	????????	°C	Sec2 Day SetBack	On				
S2 Rem Drop Leg	????????	°C	Sec2 Fan Mode	Fwd				
Sec2 Heat	Unused							
Liq Level	100	%						
Rem Ext 2	????????	bar						

At the bottom of the interface, there is a status bar showing 'Alarms: 00004' on the left and the time '13:43 09/03/2018' on the right. There are also icons for a bell, settings, and a lock.



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Alternatively, if a layout has been uploaded it will be shown. An example is below



Clicking on the Service icon (cogs), will prompt the user to enter the Username and Password for the device. Default is "install" and "1234". Setup operations can then be accessed by clicking on the appropriate link from the drop down menus.

Hardware

Main Board

The Main Board drop down, within the Hardware menu permits the user to; view the real time I/O values being returned, view the current settings for the I/O and the option to set the configuration of the Main Board. An example of the real time I/O is shown below;

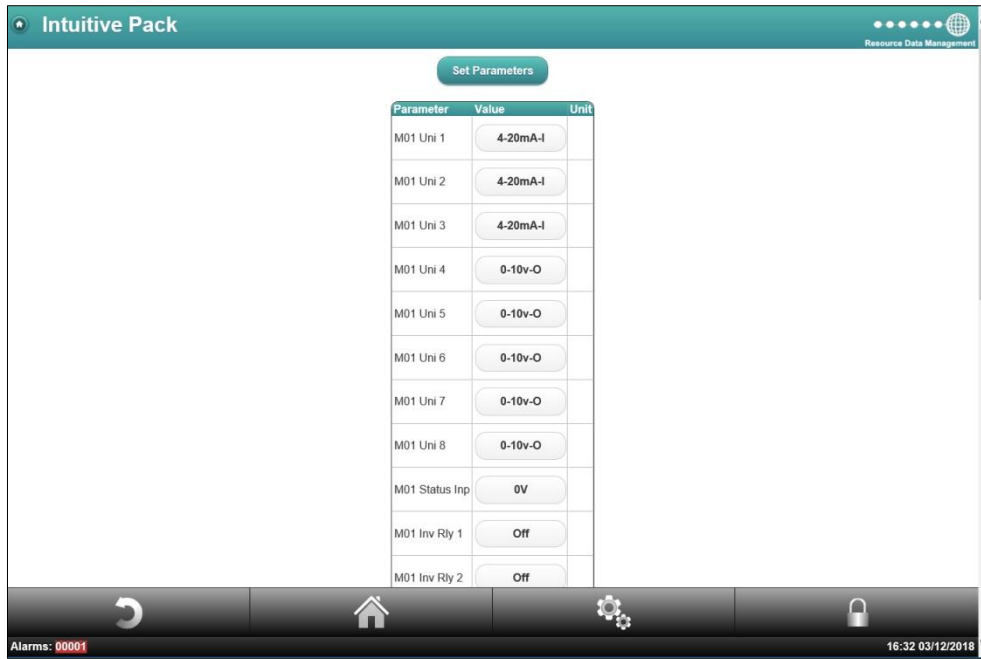
The screenshot shows the 'MainBrd' view of the Intuitive Pack interface. It displays a table of real-time I/O values. The table is organized into three columns: Input, Output, and State. The 'Input' column lists various pressure and temperature sensors (Prb 1-8) and units (Unil 1-8). The 'Output' column lists various I/O units (Unio 1-8) and relays (Rly 1-12). The 'State' column shows the current status of the system (M01 State: Normal). The interface includes a navigation menu, a home icon, a settings gear icon, and a lock icon. The bottom status bar shows 'Alarms: 00000' and the time '16:23 03/12/2018'.

Input	Value	Unit	Output	Value	Unit	State	Value	Unit
M01 Prb 1	-2.1	°C	M01 Unio 1	0.0		M01 State	Normal	
M01 Prb 2	-1.7	°C	M01 Unio 2	0.0				
M01 Prb 3	-1.0	°C	M01 Unio 3	0.0				
M01 Prb 4	29.5	°C	M01 Unio 4	10.0				
M01 Prb 5	????????	°C	M01 Unio 5	9.2				
M01 Prb 6	????????	°C	M01 Unio 6	0.0				
M01 Prb 7	????????	°C	M01 Unio 7	0.0				
M01 Prb 8	????????	°C	M01 Unio 8	0.0				
M01 Unil 1	19.9		M01 Rly 1	On				
M01 Unil 2	18.3		M01 Rly 2	On				
M01 Unil 3	8.0		M01 Rly 3	On				
M01 Unil 4	0.0		M01 Rly 4	On				
M01 Unil 5	0.0		M01 Rly 5	On				
M01 Unil 6	0.0		M01 Rly 6	Off				
M01 Unil 7	0.0		M01 Rly 7	Off				
M01 Unil 8	0.0		M01 Rly 8	Off				
M01 Status 1	Off		M01 Rly 9	Off				
M01 Status 2	Off		M01 Rly 10	Off				
M01 Status 3	Off		M01 Rly 11	Off				
M01 Status 4	Off		M01 Rly 12	Off				
M01 Status 5	Off							
M01 Status 6	Off							
M01 Status 7	Off							
M01 Status 8	On							
M01 Status 9	Off							
M01 Status 10	Off							
M01 Status 11	Off							
M01 Status 12	Off							

If the user enters the 'Set Parameters' section, it will allow all the Main Board's I/O to be configured, similar to below;



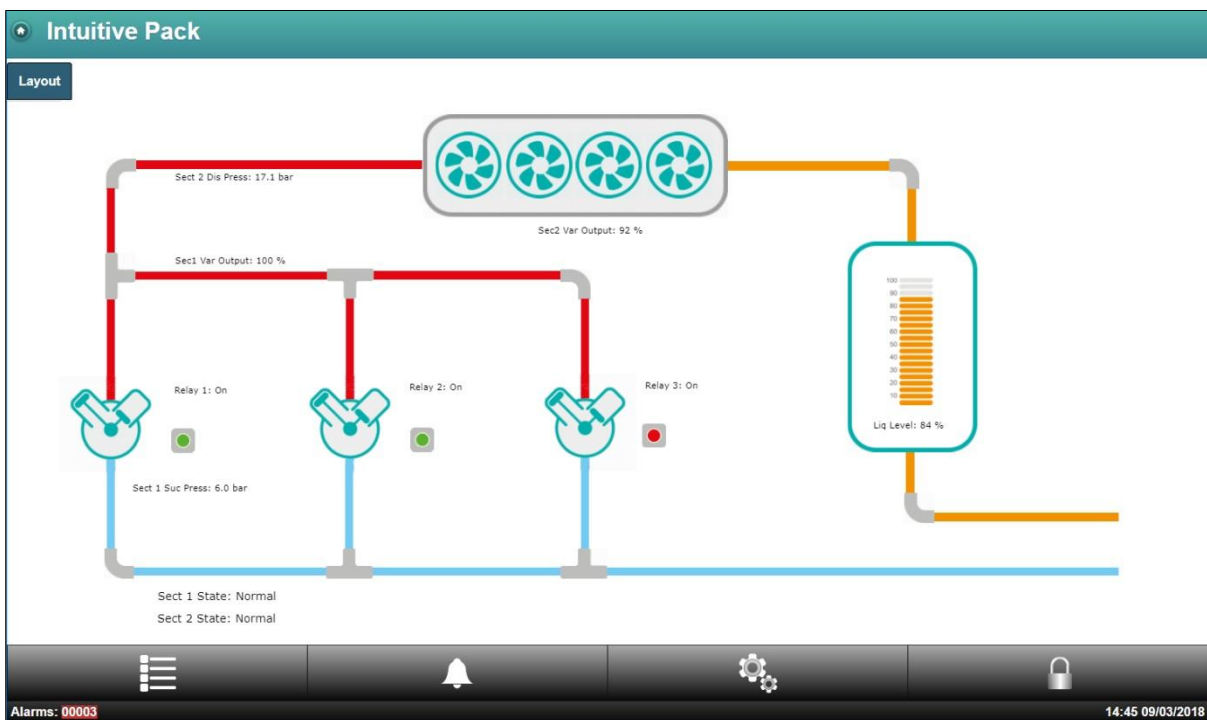
Please ensure all power is switched off before installing or maintaining this product.



Link	Operation
Values	Shows the values being returned on the main controllers inputs and outputs
Settings	Shows the main controllers configuration settings
Set Parameters	Set the Universal IO, Status Input type, Invert Relay and Probe Offset configuration of the controller.

Layout

The controller provides the option for users to upload a layout which is visible when viewed using a PC or TouchXL display. Utilising RDM’s Layout Editor software, users can generate their own layout to represent the control strategy in the device. Please consult RDM Technical Support for more details on the Layout Editor. The below shows an example of such a layout;



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Link	Operation
Configure	Allows the user to provide a description of the Layout
Set Default	Not used in this variant.
Get	This option allows the layout to be download to the user's PC.
Remove	Select this option to permanently remove the layout from the controller. Note: Once removed the layout cannot be recovered.
Preview	Use this option for a quick view of the selected layout without leaving the setup page.

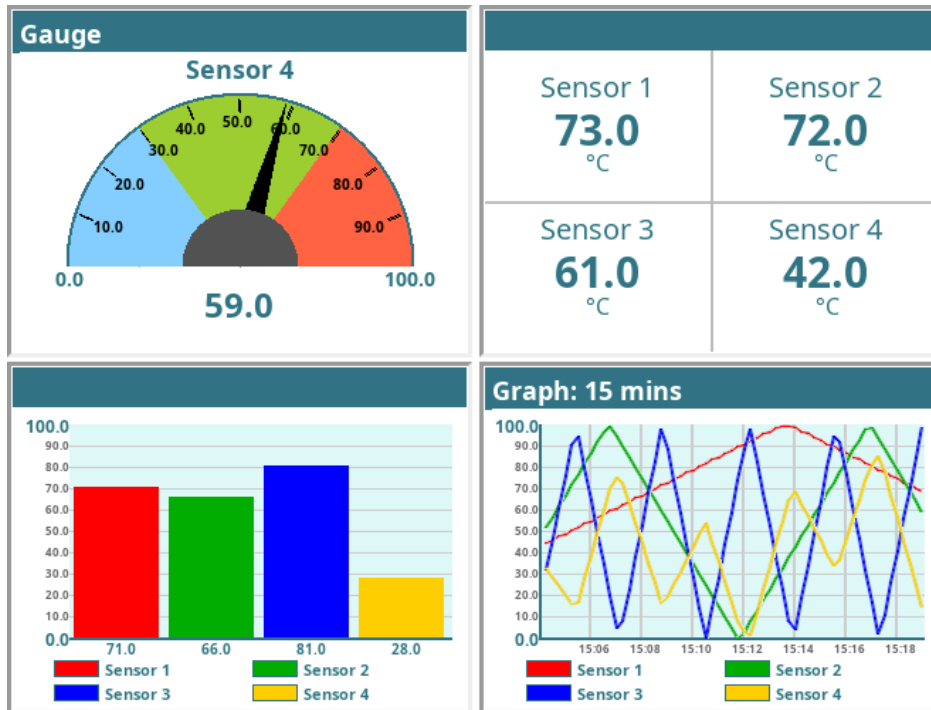
Note: The current hardware will support a dynamic image which will only allow one level at a maximum size of 1MB.



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Internal Screen Setup

The controller can be specified with a colour LCD display built in, this display allows a maximum of 6 pages of information to be displayed with a maximum of four values on each page. The values displayed can be in the form of a gauge, a line graph, a bar graph or a numerical value, an example of each is shown below.

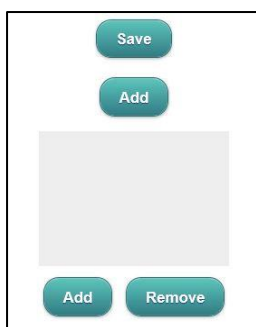


LCD Display Setup

From the service menu select "system" followed by "LCD Display Setup", here there are three set up parameters:

- Screen Home (mins):** After this time period of inactivity (no button presses) the screen will revert to the home page.
- Screen Off (mins):** After this time period of inactivity the display will switch off automatically.
- Set Parameters Allowed:** If this is selected then controller parameters can be altered using the inbuilt display.

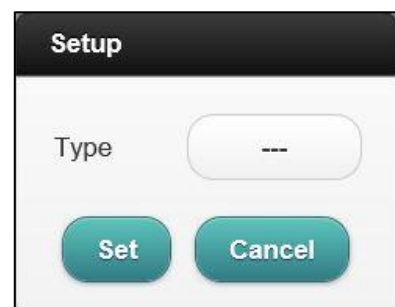
LCD Display Layout



From the service menu select "system" followed by "LCD Display Layout", here the display layout can be customised, a maximum of 6 different screens can be set up.

To add a new screen click "Add". A blank selection screen will be shown (see left), double clicking on the blank area will produce a drop down box (see right).

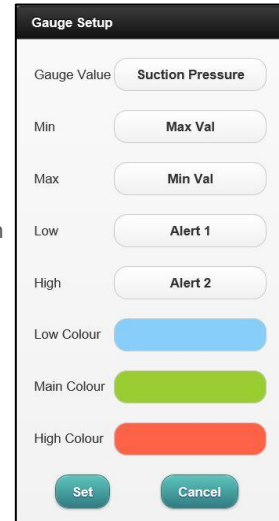
From the drop down box gauge, value, graph or bar can be selected.



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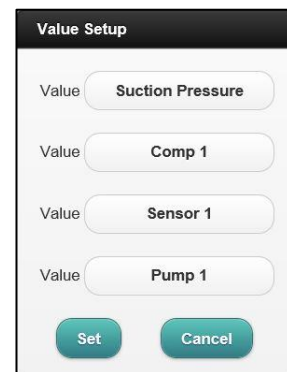
Gauge

- Gauge Value: Selects an analogue value from the controller that is to be shown in gauge form, "S01 Suction Pressure" for example.
- Min: Selects the minimum value that the gauge can display. This needs to be an analogue value within the controller's parameter list, for example if suction pressure is being displayed then "S01 Offset 1" could be selected which is typically -1 Bar and would become the low limit of the scale on the gauge.
- Max: Selects the maximum value that the gauge can display. This needs to be an analogue value within the controller's parameter list, for example if suction pressure is being displayed then "S01 Span 1" could be selected which is the maximum pressure value that can be read.
- Low: This selects a low region on the gauge where the colour changes, for example a low pressure region. The area between the min value and the low value will then be the colour selected in the "Low Colour" parameter. As an example, if suction pressure is being displayed then "S01 LP Alm" could be selected.
- High: This selects a region on the gauge where the colour changes, for example a high pressure region. The area between the max value and the high value will then be the colour selected in the "High Colour" parameter. For example, if displaying suction pressure then "S01 HP Alm" could be used.



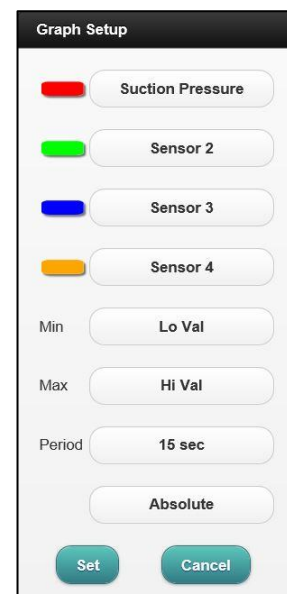
Value

- Value: Selects up to four analogue values from the controller that can be shown in the form of text.



Graph

- Value: Selects up to four analogue values from the controller that can be shown in the form of a real time graph.
- Min: Selects the minimum value that the graph can display. This needs to be an analogue value within the controller's parameter list, for example if suction pressure is being displayed then "S01 Offset 1" could be selected which is typically -1 Bar and would become the low limit of the scale on the graph.
- Max: Selects the maximum value that the graph can display. This needs to be an analogue value within the controller's parameter list, for example if suction pressure is being displayed then "S01 Span 1" could be selected which is the maximum pressure value that can be read.



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Period: Selects the sample period of the graph, the controller will automatically scale the horizontal axis of the graph to match this sample period.

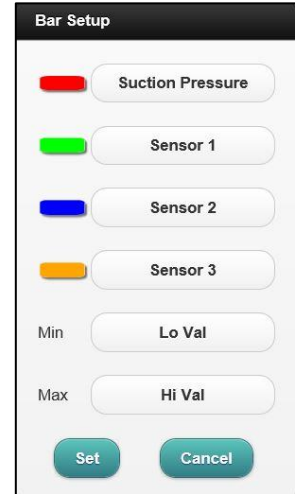
Absolute: Selects whether the graph will display an absolute value or relative value. Relative will show how much the value has changed and not what the actual value is.

Bar

Value: Selects up to four analogue values from the controller that can be shown in the form of a bar graph.

Min: Selects the minimum value that the graph can display. This needs to be an analogue value within the controller's parameter list, for example if suction pressure is being displayed then "S01 Offset 1" could be selected which is typically -1 Bar and would become the low limit of the scale on the bar graph.

Max: Selects the maximum value that the graph can display. This needs to be an analogue value within the controller's parameter list, for example if suction pressure is being displayed then "S01 Span 1" could be selected which is the maximum pressure value that can be read.



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Maintenance

Link	Operation
Main Config	Allows the configuration of the controller setup. (See information below)
Save Config	Use this option to save the Pack configuration to a file
Load Config	Use this option to load the Pack configuration to a file
View Config Info	Provides information on the last loaded configuration file and any mismatches
Reset	This allows the user to reset the controller.

Main configuration screen

Control Type: Select the [configuration](#) required.

Probe Type: Sets probe type being used and temperature units (Centigrade or Fahrenheit)

Press Type: Sets how pressure is to be displayed (Bar or psi).

Broadcast: Allows pressure to be broadcast over a Data Manager IP network for use with a Mercury, Controller, Switch or IP Module or to broadcast load shedding Case off commands.

IP 1 - IP 9: Current IP address, netmask and gateway.

Static id: If rotary switches have been set to 000 this can be used as the broadcasting id.

Screen Dev: For use with the PR0615 display. When set to 0 will show normal IO and parameters. Set to 1 will show hardware values and parameters (such as mA in levels). Set to 2 will show Stats such as run hours and relay starts.

Select Tabs:
Off: Section information tabs not displayed.
Web Interface: Display section information tabs on webpage.
Touch: Displays section information tabs on TouchXL.
Web/Touch: Displays section information tabs on Webpage and TouchXL.

Override Display: Selects which type of display is to be used to initiate overrides.

Off: Overrides not used.
Plant: Uses the PR0620 remote display.
LCD: Uses the built in LCD display (if fitted)
Touch: Uses the PR0617-ID Touch XL display interface

Override in HP/LP: If overrides are currently active (such as a compressor relay) and a pressure alarm occurs then the override will be deactivated if set to "Yes"

Override Period: The period an active override will remain in operation if not manually switched off.

Set Configuration

Configuration	Value	Unit
Control Type	PkCd Fuzz	
Probe Type	PT1000C	
Press Type	bar	
Broadcast	Off	
IP1	10	
IP2	2	
IP3	2	
IP4	82	
nL	24	
Gt 1	0	
Gt 2	0	
Gt 3	0	
Gt 4	0	
Static Id	<input style="width: 80px;" type="text" value="0"/>	
Screen Dev	<input style="width: 80px;" type="text" value="0"/>	
Select Tabs	WebInterface	
Override Display	Lcd	
Override in HP/LP	Yes	
Override Period	<input style="width: 80px;" type="text" value="00:30"/>	mm:ss

Set Configuration



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Configuration of inputs and outputs

Status Inputs

Section Inputs can be set up as: -

Selection	Selection Name	Description
0	Unused	Input is not used
1	Compressor Normally Open	When selected "Make" to generate Compressor Fault
2	Compressor Normally Closed	When selected "Break" to generate Compressor Fault
3	Condenser Normally Open	When selected "Make" to generate Condenser Fault
4	Condenser Normally Closed	When selected "Break" to generate Condenser Fault
5	General Normally Open	When selected "Make" to generate General Fault
6	General Normally Closed	When selected "Break" to generate General Fault
7	Standby 1 Normally Open	When selected "Make" to place Section 1 into standby and generate Standby alarm.
8	Standby 1 Normally Closed	When selected "Break" to place Section 1 into standby and generate Standby alarm.
9	Standby 2 Normally Open	When selected "Make" to place Section 2 into standby and generate Standby alarm.
10	Standby 2 Normally Closed	When selected "Break" to place Section 2 into standby and generate Standby alarm.
11	Run 1 Normally Open	When selected "Break" to use Sect 1 Ext Target (P473) OR "Rem Ext 1" See note : Ext Target
12	Run 1 Normally Closed	When selected "Make" input to use Sect 1 Ext Target (P473) OR "Rem Ext 1" Ext Target
13	Run 2 Normally Open	When selected "Break" input to use Sect 2 Ext Target (P474) OR "Rem Ext 2" Ext Target
14	Run 2 Normally Closed	When selected "Make" input to use Sect 2 Ext Target (P474) OR "Rem Ext 2" Ext Target
15	INV N/O	When selected "Break" to signal Inverter Run. Used when using Inverter Bypass relay. See Note : INV Bypass
16	INV N/C	When selected "Make" to signal Inverter Run. Used when using Inverter Bypass relay. See Note : INV Bypass

For the above, any alarms will be generated after the Status Fault Delay (P-60) has timed out. Note Standby Alarm follows the Standby Delay (P-62)

Relay Outputs

Compressor(s)/Loader(s)/Fan(s) relays are assigned using the Stage parameters for a given section.

Additional relay outputs will be assigned (if they are required) in the following order once the Stage parameters have been configured

Condenser Split
Heat Reclaim
INV Bypass
Gas Dump
Fan Reverse

Alarm (An alarm relay will always be allocated as long as a relay is available for it)



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Section Stages

Stage	Description	
None	Use this option to end the number of stages in the controller	
Unused	Use this option to skip a relay output within a stage	
Comp	Use this option to assign a relay output to a compressor	See note 5
Loader	Use this option to assign a relay output to a compressor loader	See note 9
Fan	Use this option to assign a relay to a fan	
Inverter	Use this option to assign a relay to an Inverter	
Trim	Use this option to set a relay to a trim compressor	See note 6
Comp Run	Use this option to set a relay as a separate compressor used only when other compressors are running	See note 8

Note 5: In a pack configuration, at least 1 output must be assigned to a compressor. Loader outputs will not energise without a compressor being on. When assigning stages a Loader should follow the Compressor on which it is mounted.

Note 6: This option can be used to delay the onset of the inverter output. The "Trim" relay will come on with the Inverter enable relay but will use the starts per hour parameter. Once the trim stage is on the inverter enable relay would be energised and the inverter analogue output would begin to ramp up. The trim relay would remain on until all other stages are off and then will go off with the inverter enable relay.

Note 8: This option is used to bring on a separate compressor. This output is active when any of the other defined compressors (Comp stages) are running. This output is off when the last compressor in its section is turned off. Note if only the inverter output is configured and no other Comp stages then the Comp Run is active when the inverter output is active.

Note 9: Relays can be configured as Loaders, selected after a Compressor stage or a Compressor running on an Inverter

Alarm Relay

Note 7. The alarm relay is assigned automatically to the last available relay after the stage relays, condenser split, heat reclaim, inverter bypass, gas dump and fan reverse have been allocated. At first power on this is likely to be relay 1 until programming of the controller is complete. The relay is energised with no alarm and de-energised when in alarm.

Stage Sizes

Stage sizes will determine the order in which compressors or loaders are switched on and off. This is a relative number between 0 and 60, reflecting the size of the compressor (usually horse power)
The default stage size is 0; stage sizes must be entered for correct operation.

Operation (Fuzzy)

Once the controller has been set-up and configured, normal operation will resume. If the appropriate Type has been selected the controller will operate using a "fuzzy logic" based control algorithm. The controller will determine the stages to bring on and off using the fuzzy logic rules and adhering to the starts/hr criteria. The response time for devices switching on and off can be varied by adjusting the response on and response off parameters (1 is the slowest response, 60 is the quickest). The fuzzy logic will attempt to optimise the compressor starts and keep them at a minimum. Before a compressor or fan is switched on, Relay 1 will energise and the variable output will ramp to 100%, when it reaches this point, the fixed device (compressor, loader or fan); will switch on and the variable output will begin its cycle again starting from 0%. When demand is satisfied, and all compressor relays are off, the variable output ramps down 0%, if demand is still satisfied, the enable relay de-energises.



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Operation (Staged)

Staged operation requires the output relays to be “mapped” to a particular stage. Each stage (there are 12 stages) has to have at least 1 relay assigned for the controller to operate correctly. More than one relay can be assigned to stages in a given section and the same relay can be used in multiple stages. Note a relay cannot be assigned in both Section 1 and Section 2. As the pressure rises above the target setpoint, plus the target above value, the controller will enter Stage 1 after the stage on delay has expired. At this point any relay assigned in Stage 1 will come on and the stage on delay timer will be reset. If the pressure remains above the setpoint, plus the target above value, and the stage on delay has expired for a second time the controller will enter stage 2. At this point any relay assigned in Stage 2 will come on. Note if a relay has been assigned in Stage 1 but not used in Stage 2 then it will go off at this point. The reverse occurs when the pressure falls below the setpoint plus the target below value. The controller will step down the stages using the stage off delay (P-08) until all stages are off.

When using a variable output as the pressure rises above target setpoint, plus target above, the variable speed output will ramp up from 0% to 100% without following the stage on delay. If the pressure stays above the target setpoint and the variable output is at 100% and the stage on delay has timed out then the controller will enter Stage 1. At this point the variable output will reset to 0% and start ramping up again towards 100%. If the pressure stays above the target setpoint and the variable output is at 100% and the stage on delay has timed out then the controller will enter Stage 2. As the pressure drops below the setpoint, minus the target below, the variable output will ramp from 100% down to 0%, once the stage off delay expires the controller will stage down. Note if the variable output reaches 100% and the stage on delay has not expired the output will remain at 100% until the stage on delay has expired.

For example if set to dual Pack and pack 1 has 4 Compressors the following could be set: -

Sect1 Stg1: Rly 1 = On, **Sect1 Stg2:** Rly 1 and Rly 2 = On, **Sect1 Stg 3:** Rly 1, Rly 2 and Rly 3 = On. **Sect1 Stg 4:** Rly 1, Rly 2, Rly 3 and Rly 4 = On. This would stage relay 1 through to four on after the appropriate stage delay if the pressure is above the target setpoint and differentials.

Pack 2 would start as follows:-

Sect2 stg1: Rly 5 = On (**Note:** Starting at Relay 5 as the first 4 relays have already been allocated to Pack 1)

Other operational features

Floating Head Pressure

When the condenser controller is used in the “Floating Head pressure” mode, the temperature to pressure parameters must be used to profile a pressure curve from the air on temperature probe for the condenser (P414 to P419 and P461 to P466). The value read from the temperature probe is added to a “Condenser Offset” (P422) and then converted to a pressure. This converted pressure replaces the “Target Setpoint” (P01) as the target pressure and P01 is only used as a default; for instance when the probe is disconnected or develops a fault. Low and high pressure levels allow for a lower and upper limit to be set for the pressure range.

The air on temperature can be read from probe inputs 1 to 8 and is settable via parameter P-410/P-460. The float temperature can also be received as a TDB command sent from a Data Manager TDB program. This would allow for a single probe temperature to be shared with multiple Plant controllers. Please see the relevant Data Builder user guide with regards to creating a TDB program. The following commands would be used in TDB to send the temperature data to the Plant controller. If P-410 is set to Remote then “S1 Rem Float” would be used in TDB to send the remote temperature used for Section 1 condenser float or if P-460 is set to Remote then “S2 Rem Float” would be used in TDB to send the remote temperature used for Section 2 condenser float.

Drop Leg

When the condenser is used in the “Float/ Drop Leg” mode, the temperature measured from the condenser Drop Leg probe is converted to a pressure and displayed. Note this is for monitoring only.



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Drop Leg temperature can be read from probe inputs 1 to 8 or set to remote (settable on P411/412). When set to 'remote', it can then be read from another pack controller, which is reading the Drop Leg Temperature and sending temperature via a TDB Program to Input "S1 Rem Drop Leg" or "S2 Rem Drop Leg". This is then converted to a pressure. Please see the relevant Data Builder user guide with regards to creating a TDB program.

External Target

Pack Controller

To use Sect 1/2 Ext Target (P473/474) instead of Section 1/2 Target Pressure (P-20/40) a status Input must be set to "Run 1/2 N/O or N/C".

- When the input is activated the Target Pressure will change from (P-20/40) to (P473/474)
- When the input is de-activated the Target Pressure will revert back to (P-20/40)

Condenser Controller

Heat Reclaim must be set to "On" or "On/Rly".

To use Sect 1/2 Ext Target (P473/474) instead of Section 1/2 Target Pressure (P-20/40) a Status Input must be set to "Run 1/2 N/O or N/C".

With Heat Reclaim parameter (P440/441) set to "On" the following will occur: -

- When the input is activated the Target Pressure will change from (P-20/40) to (P473/474)
- When the input is de-activated the Target Pressure will revert back to (P-20/40)

Or

With Heat Reclaim parameter (P440/441) set to "On/Rly" the following will occur: -

- When input is activated the Target Pressure will change from (P-20/40) to (P473/474) and turn on the Heat Reclaim relay output.
- When input is de-activated the Target Pressure will revert back to (P-20/40) and turn off the Heat Reclaim relay output.

Remote TDB Command for Heat Reclaim

To use a Remote Discharge Target Set Point sent from a Data Manager TDB Program Instead of the value entered for the Ext 1/2 Target setpoint (P473/474), then the following must be configured: -

- Status Input must be set to "Run 1/2 N/O or N/C" and Heat Reclaim has to be set (P440/441) to either "On" or "On/Rly".
- When input is activated the Target Pressure will change from (P-20/40) to whatever Target Pressure is being sent from TDB program. The settable range for "Rem Ext 2" is -3.4 Bar to 150 Bar.
- When input is de-activated the Target Pressure will revert back to (P-20/40)

Send Ext Target Set Point Command to "Rem Ext 1" or "Rem Ext 2" using a Data Manager TDB program. Analogue Output block.

This command can only be used to change the discharge setpoint and does not apply to the suction setpoint.

Night Set-back

This controller; when in condenser mode has a "Night Set-back" feature for the condenser controller. The variable output can be set to reduce to a pre-determined level; either by an internal timer, or by times sent to the controller over the network. (Use a GP Timer channel in a data Manager or Data Director)

There is a High pressure limit, over which the night set-back feature will be turned off. As the pressure reduces under this limit the night set-back feature is switched on again.



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

Day Set-back

Similarly, this controller; when in condenser mode has a day Set-Back feature. The Day Set-Back feature uses the local night Set-Back clock, (if it's out of the night set-back time, day set-back will be on) Note: - When Set-Back mode is on, no further fan stages will come on unless the variable output reaches 100%, either by reaching the high pressure point or Set-Back going off. When configured as a condenser controller, loss of the pressure input will result in the variable output going to the value defined in P17.

Invert Relays

The operation of the relays can be inverted so that N/C contacts can be used for energisation. This can be done from the configure screen on web page. Choose the relay(s) you wish to invert and set them to on. This process can also be completed from the controller display. Navigate to the menu option **rly** and select the relay output you wish to invert for example **r-05** is relay output 5. Change from "0" to "1" to invert the relay so that the N/C contact is in use.

Please note: This operation does not invert the Alarm relay. The alarm relay is energised when there are no alarms present.

Sticky Fans

Sticky fan operation allows the user to turn the fans off in a way that keeps a number of fans running longer.

Example:

If in a Condenser configuration fans are mapped to relays 5, 6, 7, 8, 9, and 10; the following sequence will apply if **sticky fans (P-450) is set to 2:**

	Fan1	Fan2	Fan3	Fan4	Fan5	Fan6
On Sequence	1 st	2 nd	3 rd	4 th	5 th	6 th
Relay #	Relay 5	Relay 6	Relay 7	Relay 8	Relay 9	Relay 10
Off Sequence	6 th	5 th	1 st	2 nd	3 rd	4 th

USB Operation

The following operations can be performed using a memory-stick plugged into the USB port: -

1. Export event log U-01
2. Export logged data U-02 (not used in this variant)
3. Save configuration U-03
4. Load configuration U-04
5. Upgrade the software U-05

The above requires the user to enter the USB menu via the display and press enter at the appropriate display option.

For example to save the current configuration insert a USB Memory stick into one of the USB Host ports, go to the USB software menu option, press enter, then use the up key to scroll to U-03. Now press enter, the screen will flash "USB" until the operation has completed.

The file is transferred to the memory-stick in .zip format. The USB memory stick must be formatted as FAT32.



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Viewing Inputs and Outputs

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

1. From the function menu, select "IO", press enter
2. You can now scroll through the IO tables as set out below. The tables you view will depend on the controller type configuration.

Input / Output table

Number	IO	Range	Units	Single Pack	Dual Pack	Pack/Condenser	Dual Condenser	Single Condenser
I-01	Pressure Input 1	-3.4 to 180	Bar	✓	✓	✓	✓	✓
I-02	Pressure Input 2	-3.4 to 180	Bar	✓	✓	✓	✓	✓
I-03	Pressure Input 3	-3.4 to 180	Bar	✓	✓	✓	✓	✓
I-10	Analogue Input 1	-60 to +128	°C	✓	✓	✓	✓	✓
↓	↓							
I-17	Analogue Input 8							
I-20	Section 1 remote float	-60 to +128	°C				✓	✓
I-21	Section 2 remote float	-60 to +128	°C			✓	✓	
I-22	Section 1 remote leg drop	-60 to +128	°C				✓	✓
I-23	Section 2 remote leg drop	-60 to +128	°C			✓	✓	
I-30	Status Input 1	0 = OK 1 = Alarm 2 = Unused		✓	✓	✓	✓	✓
↓	↓							
I-41	Status Input 12							
I-50	Section 1 Run	0 = Off, 1 = On 2 = Unused		✓	✓	✓		
I-51	Section 2 Run	0 = Off, 1 = On 2 = Unused			✓			
I-52	Section 1 Heat Reclaim	0 = Off, 1 = On 2 = Unused					✓	✓
I-53	Section 2 Heat Reclaim	0 = Off, 1 = On 2 = Unused				✓	✓	
I-54	Liquid Level	0 - 100	%	✓	✓	✓	✓	✓
I-55	Remote External Temp.1	-60 to +128	°C				✓	✓
I-56	Remote External Temp.2	-60 to +128	°C			✓	✓	
Hardware Inputs								
I-101	Temperature Probe 1	-60 to +128	°C	✓	✓	✓	✓	✓
↓	↓							
I-108	Temperature Probe 8							



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Number	IO	Range	Units					
I-120 ↓	Universal Input 1 ↓	0-20	mA/Volts	✓	✓	✓	✓	✓
I-127	Universal Input 8							
I-140 ↓	Status Input 1 ↓	0 = Off, 1 = On		✓	✓	✓	✓	✓
I-151	Status Input 12							
O-01 ↓	Relay 1 ↓	0 = Off, 1 = On		✓	✓	✓	✓	✓
O-12	Relay 12							
O-20	Section 1 Stage (staged only)	0-12		✓	✓	✓	✓	✓
O-21	Section 2 Stage (staged only)	0-12			✓	✓	✓	
O-31	Variable Output 1	0 – 100	%	✓	✓	✓	✓	✓
O-32	Variable Output 2	0 – 100	%		✓	✓	✓	
O-41	Optimisation Level	-3.4 to 180	Bar	✓	✓	✓		
O-42	Optimisation Level Pack 2	-3.4 to 180	Bar		✓			
O-51	Section 1 Float Pressure	-3.4 to 180	Bar				✓	✓
O-52	Section 2 Float Pressure	-3.4 to 180	Bar			✓	✓	
O-53	Sect 1 Drop Leg Temp	-60 to +180	°C				✓	✓
O-54	Sect 2 Drop Leg Temp	-60 to +180	°C			✓	✓	
O-55	Sect 1 Drop Leg Press	-3.4 to 180	Bar				✓	✓
O-56	Sect 2 Drop Leg Press	-3.4 to 180	Bar			✓	✓	
O-57	Sect 1 Split	0 = Off, 1 = On					✓	✓
O-58	Sect 2 Split	0 = Off, 1 = On				✓	✓	
O-59	Sect 1 Heat Reclaim	0 = Off, 1 = On					✓	✓
O-60	Sect 2 Heat Reclaim	0 = Off, 1 = On				✓	✓	
O-61	Section 1 Night Set-back	0 = Off, 1 = On					✓	✓
O-62	Section 1 Day Set-back	0 = Off, 1 = On				✓	✓	
O-63	Section 2 Night Set-back	0 = Off, 1 = On					✓	✓
O-64	Section 2 Day Set-back	0 = Off, 1 = On				✓	✓	
O-70	Sect.1 Bypass	0 = Off, 1 = On		✓	✓	✓	✓	✓
O-71	Sect.2 Bypass	0 = Off, 1 = On			✓	✓	✓	
O-72	Section 1 Gas Dump	0 = Off, 1 = On		✓	✓	✓		
O-73	Section 2 Gas Dump	0 = Off, 1 = On			✓			
O-90	Section 1 Fan Mode	0 = Forward 1 = Forward to Reverse Delay 2 = Reverse 3 = Reverse to Forward Delay					✓	✓
O-91	Section 2 Fan Mode	0 = Forward 1 = Forward to Reverse Delay 2 = Reverse 3 = Reverse to Forward Delay				✓	✓	



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Number	IO	Range	Units					
Hardware Outputs								
O-101	Universal Output 1	0-20	mA/Volts	✓	✓	✓	✓	✓
	↓							
O-107	Universal Output 8							
O-110	Relay 1	0 = Off, 1 = On		✓	✓	✓	✓	✓
	↓							
O-121	Relay 12							
Stats								
O-131	Relay 1 Run Hours	0 - 32767	Hours	✓	✓	✓	✓	✓
	↓							
O-142	Relay 12 Run Hours							
O-150	Relay 1 Number of Starts	0 - 32767		✓	✓	✓	✓	✓
	↓							
O-161	Relay 12 Number of Starts							
S-01	Section 1 Control States	(0) Stabilise (1) Initial (2) Normal (3) High Pressure (4) Low Pressure (5) Low Shut-down (6) Transducer Fail (7) Standby (8) Trip		✓	✓	✓	✓	✓
S-02	Section 2 Control States	(0) Stabilise (1) Initial (2) Normal (3) High Pressure (4) Low Pressure (5) Low Shut-down (6) Transducer Fail (7) Stand-by (8) Trip			✓	✓	✓	
S-03	Hardware Control State	(0) Normal		✓	✓	✓	✓	✓



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Quick View (PR0620 Remote Display)

Pressing the "quick view" button during normal operation displays the target pressures. Repeated presses will scroll through section 1 then section 2.

Override (PR0620 Remote Display)

The override function allows the user to switch output stages on or off.

- Press the override and enter button together for approx. 3 seconds until "r-01" is displayed.
- Use the "up" or "down" button to display the relays (r-01 to r-12) and analogue outputs (A-01 and A-02).
- For (r-01 to r-12) Press "Enter" and select "1" to turn the relay on and "0" to turn the relay off.
- For (A-01 and A-02) Press "Enter" and use up and down buttons to select the desired output for A-01 or A-02. Press the "Enter" button when the desired output percentage is reached. Each output can be set between 0% and 100%.

Override will last for the override period setting (Main Config. page) then the output will return to normal operation.

Info Button (PR0620 Remote Display)

When this button is used, Section 1 and Section 2 analogue output values can be displayed. When pressed the current analogue output percentage is shown on the corresponding Section display.

Standby Mode

Once in standby all configured stages are turned off and a standby alarm is generated for the given section. There is an adjustable delay period (P-62) before a section enters standby. Once this delay expires the controller enters standby and a standby alarm is also generated for the relevant section.

Section 1 and Section 2 can be placed into standby independently using two separate status inputs or both sections can be placed into standby at the same time from a single status input. P494 determines the Standby configuration.

P494 set to 1 = On

Controller uses one status input to place both sections into standby. Parameters P-80 to P-91 (Option 7 Std 1 N/O or Option 8 Std 1 N/C) are used to place both sections into standby from a single status input

P494 set 0 = Off

Controller uses two independent status inputs to place each section into standby independently. Controller uses P-80 to P-91 (Option 7 Std 1 N/O or 8 Std 1 N/C) to put section 1 into standby. Controller uses P-80 to P-91 (Option 9 Std 2 N/O or 10 Std 2 N/C) to put section 2 into standby

Display Messages (PR0620 Remote Display)

The following messages can appear on the display during normal operation.

Display	System status
HP	High Pressure alarm
LP	Low Pressure alarm
Ft TrAn	Pressure Transducer Fault
Ft	Fault
Sd	Low Pressure Shut-down
CP	Compressor Fault Compressor Run Fault
Cd	Condenser Fan Fault
gn	General Fault
Stby	Controller in Standby
Conf	Configuration / Set up error
triP	Discharge Pressure Trip alarm



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Note 10: If Only 1 Transducer is fitted and the controller is set to a single section type, for example Pack, then Display 1 will show the current suction pressure and Display 2 will show Sec 1.

If Only 2 Transducers are fitted and the controller is set to a dual section type, for example Pack and Condenser, then Display 1 will alternate between section 1 and 2 pressures and Display 2 will alternate between Sec 1 and Sec 2 for whatever pressure is being displayed

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 #
High Pressure Alarms	8
Low Pressure Alarms	9
Low Pressure Shutdown	10
Transducer Faults	6
General Faults	20
Compressor faults	3
Condenser Faults	3
Configuration fault	20
Controller in standby	20
INV Bypass	3
Liquid Level Fault	6
Liquid Level High	4
Liquid Level Low	5
Discharge Trip	20
Float Probe Fault	6
Drop Leg Probe Fault	6



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Specification

Power requirements

Supply Voltage Range	24 Vac $\pm 10\%$ or 24 Vdc $\pm 10\%$
Supply Frequency	50 – 60 Hz $\pm 10\%$
Maximum supply current	1.8 Amp
Typical supply current	0.3 Amp
Class 2 Insulation	No protective Earth is required. A functional earth can be connected if the equipment is located in an electrically noisy environment.

Note: The use of centre tapped to earth transformers is not allowed. This is to prevent damage to the transformer and/or controller. The host equipment must provide adequate protection against contact to hazardous live parts.

Insulation and Fuse Requirements

	Intuitive PR0650
Class 2 Insulation	No protective Earth is required. A functional Earth may be fitted in noisy environments.
Supply Fuse	Built in fuse holder, fuse 2A 240Vac Ant surge (T) HRC conforming to IEC60127, 32 x 6.3mm
Or MCB	2A, 240 VAC Type D conforming to BS EN 60898 (Note: controller has integral 2A fuse)
Relay Fuse	10A 240Vac Ant surge (T) HRC conforming to IEC60127, 32 x 6.3mm

RDM advise the use of a suitable external over-current protection device on the Mercury Plant Controller.

Warranty may be invalidated due to excess current being unlimited if there are no fuses/circuit breakers installed.

General

Operating temperature range	Without Internal LCD Display : -40°C to +65°C (-40°F to +149°F) With Internal LCD Display or SRR fitted: -20°C to +65°C (-4°F to +149°F)
Operating Humidity	80% maximum
Storage temperature range	Without Internal LCD Display : -40°C to +65°C (-40°F to +149°F) With Internal LCD Display or SSR fitted : -30°C to +65°C (-22°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
Dimensions	Intuitive Plant Controller 280mm (L) x 122mm (W) x 67mm (H)
Weight	Intuitive Plant Controller 750 Grams
Safety	EN 61010-1:2010
EMC	EN 61326-1:2013 FCC CFR 47 Parts 15.107 & 15.109 and ICES-003 Issue 6
UL Compliance	UL 60950-1 and CAN/CSA C22.2 No. 60950-1-07 Information Technology Equipment - Safety - Part 1: General Requirements.
Ventilation	There is no requirement for forced cooling ventilation

Inputs

Probe Input type	See Set/change Units for probe types
Status Input type	The preferred option is a 0 volt return through a volt free relay or 24 Vac referenced to the supply voltage. If a 24Vac signal is being sourced from the Plant controller power supply then do not ground the Status Input common rail, this is grounded internally.
4-20mA	4-20mA current loop, use the 12 Vdc output to feed the device.



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Outputs

Analogue Outputs	0-10 Volts DC or 4-20mA. (Selected in hardware settings page)
Note 1	The 4-20mA output will not operate correctly if the target device input impedance is $>75\Omega$
Note 2	The 0-10V output will not operate correctly if the target device input impedance is $< 10K\Omega$ A 50mA fuse is recommended for this output.
Note 3	When using the universal 0-10V output to drive an inductive load such as a relay coil, a back e.m.f. protection diode must be fitted. The cathode should connect to the output terminal and the Anode to GND/Return terminal. The maximum load current that can be supplied from these outputs is 38mA. The mercury plant cannot be used to drive a relay coil.
Relay Ratings, Intuitive Plant Pack Controller	
Mechanical Relay	10A/250 Vac/AC1 (Resistive load)
	10A/30 Vdc (Resistive load)
	5A/250 Vac $\cos\phi=0.4$
Solid State Relay (SSR)	1A/250 Vac (AC only, will not switch DC)

Internal Display

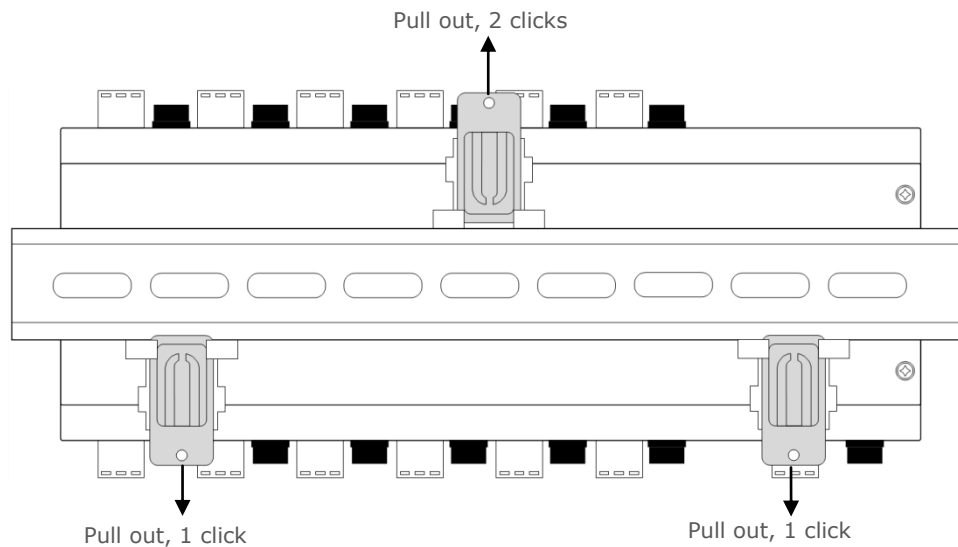
Intuitive PR0650	
Display	2.4" 320x240 Full Colour TFT Graphic LCD
Buttons	6x Pushbuttons

Comms

Comms	Ethernet
-------	----------

Installation

Mounting on to a DIN rail, Intuitive Plant Controller



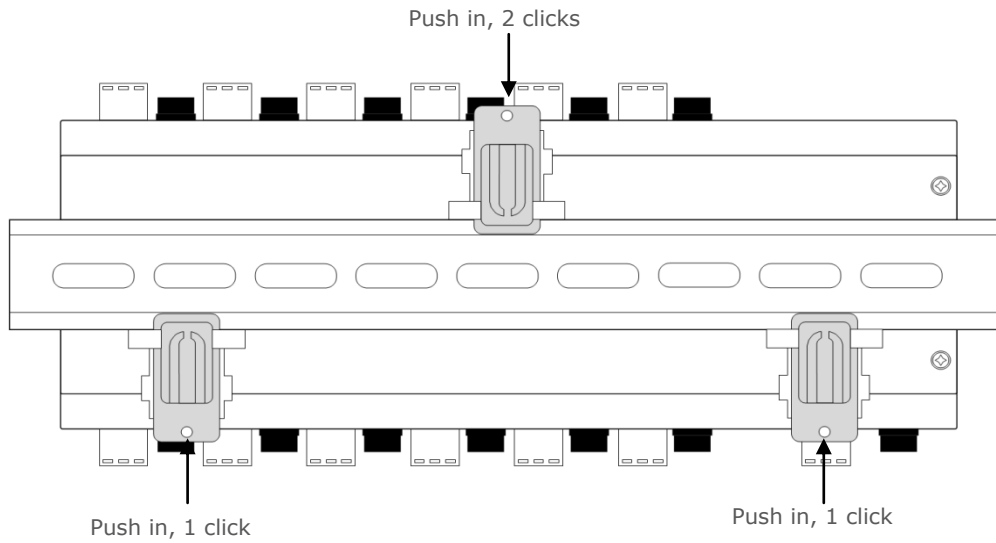
The Intuitive plant controller has three DIN rail mounting feet which can slide in and out to three different positions, sliding into each position is accompanied by a “click” which locks the foot into that position.

To install the controller onto a DIN mounting rail, from the fully pushed in position slide the top mounting foot out by 2 clicks so that the foot is clear of the DIN rail channel. Slide the bottom two feet out by one click so



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that they are protruding slightly into the DIN rail channel. The controller can now be inserted onto the DIN rail by inserting the bottom lip of the DIN rail behind the two bottom mounting feet



The controller can now be pushed flat onto the DIN rail and the top foot pushed in 2 clicks to hold the controller in place. Finally, push the bottom two feet in by one click to secure the controller.

The mounting feet also have M3 holes for direct mounting where DIN rail is not being used.

Clearances

The controller requires 40mm clearance top and bottom to allow fuse access and removal and USB cable connection, otherwise 10mm is required, side clearance is 15mm. Clearance at the front and rear is dependent on the site wiring.

There is no requirement for forced cooling ventilation

Cleaning

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

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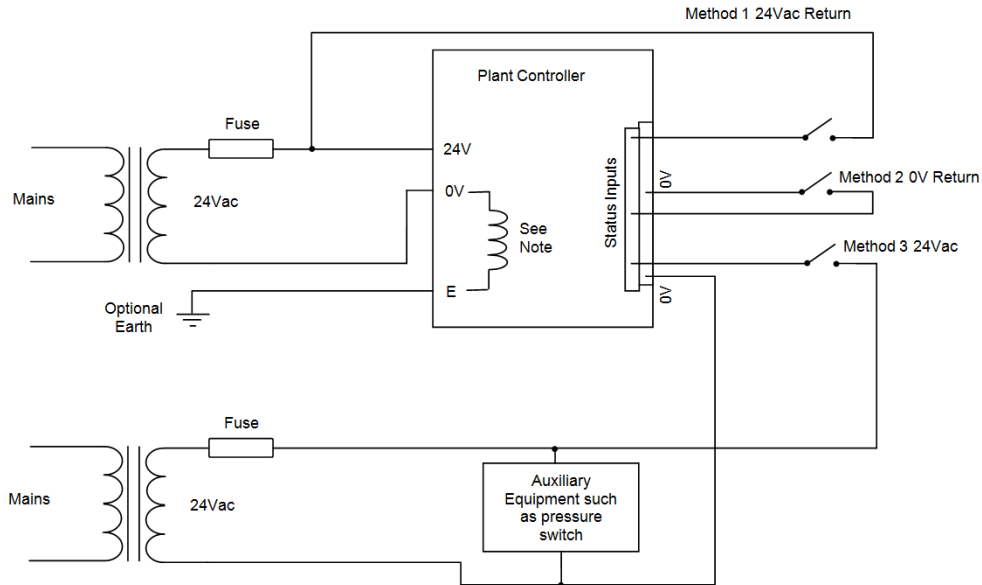
Please ensure all power is switched off before installing or maintaining this product.

Appendix 1 – Supply & Status Input Wiring

Appendix four applies to the current version of the Plant controller hardware.

- Method 1. Uses the 24Vac of the transformer supplying the input voltage; which is returned via a switch (or relay) to the status input signal line. No 0V is required at the status connector.
- Method 2. Uses a 0V return (from the status connector) to the status signal input.
- Method 3. Uses a 24Vac signal derived from another transformer (supplying an auxiliary piece of kit) to feed the status input signal line. Note the auxiliary transformer must be referenced to the Plant Controller supply transformer.

All transformers that have a connection to the Plant Controller must have their primaries connected to the same phase. Transformer should have fuse fitted in line with 24V input as per diagram.



The use of centre tapped to earth transformers is not allowed. This is to prevent damage to the transformer and/or controller.

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Revision History

Revision	Date	Changes
4.3	15/03/2018	First Issue of V2 Hardware.
4.4	23/03/2018	USB Memory stick support added, internal screen operation improvements.
4.5	02/05/2018	Improvements to override menus on internal display.



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