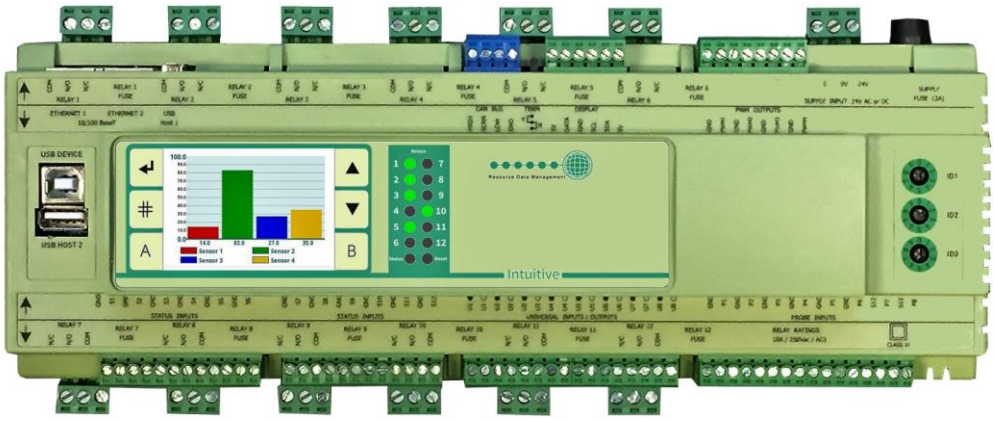
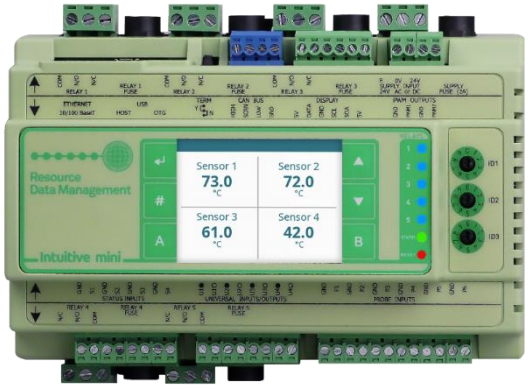
Resource
Data Management

Intuitive V2 & Mini Superpack Controller

Commissioning/User Guide

Revision 5.0a





PR0650-SUP

Contents

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

The Intuitive Range

From Resource Data Management

This documentation refers to the Intuitive V2 and Mini Super Pack Controllers.

Description

This is a versatile controller intended for up to 3 sections of Pack and/or Condenser control as well as up to 3 General sections which can be used for additional control requirements. Each of the 3 Pack/Condenser sections has up to 16 relay outputs that are configurable for compressors, loaders, trim compressors, digital scroll compressors or fans. Each section has up to 16 status inputs that can be assigned to various purposes, such as compressor or fan faults or general alarms. Each section has three analogue (mA or dc volts) inputs for pressure transducers and/or a liquid level sensor. The Pressure readings obtained from Sections 1, 2 and 3 can be broadcast over a Data Manager's IP network for use by the RDM Mercury Switch (PR0018-PHI) or Mercury controller. Each section has up to 8 temperature probe inputs and 1 analogue output (mA or dc volts) that can be used to control a variable speed device. There are 8 software type options, see configuration table below.

The "Fuzzy" based algorithm, will give enhanced control whilst maintaining the starts per hour requirement. This algorithm also reduces the number of parameters required for control thus reducing commissioning time.

Note: In fuzzy logic, if an inverter is being used, it is not included in the anti-short cycle timer (Starts per hour P-23) but has its own anti-short cycle timer (P-22).

The "Staged" type allows the user to fully program the output stages to the desired elements but requires the user to enter more parameters.

Up to 10 expansion modules can be connected to the controller to expand the number of inputs and outputs available to match a specific requirement, for example if each of the 3 sections has 16 compressor relays, then a minimum of 48 relays would be required (the main controller has 12 relays).

The Plant controller has two embedded Ethernet ports to allow for connection to an RDM Data Manager system using standard IP, or a third party system using BACnet over IP. BACnet communications is an optional feature, part number PR0655-BAC, this feature can be activated at a later date if required.

A USB port also allows for a direct PC connection.

All relays have volt-free contacts and can be mixed between low and high voltage sources. Each controller or expansion requires a 24Vac or 24Vdc supply (a 2A PSU is available from RDM: - PR0625).

Default Username & Password

From Software version V4.4 the default username and password is unique to every individual controller. The specific credentials will be detailed in the documentation that ships with the unit.

The user name will be '**install**'.
The password will be '**PleaseChange**' followed by the panel ID which is found within the log in page (ignore the small letter at the end, "d" in the example below).

For example if the panel ID is BC123456 d, user name is: **install**
Password is**: PleaseChangeBC123456**
Once logged in, the end user MUST add their own install level user.

These default credentials will only be enabled when accessing the system locally from a device connected within the systems local subnet. User names and passwords require a minimum of 6 characters so "Install" and "1234" cannot be used.

Note:
In the unlikely event username and/or password is unknown, for example a new service contract is undertaken and the previous contractor has not passed across the login credentials, it is possible for RDM Technical Support to generate a panel specific, time limited, 'ONCE' code which allows temporary access to only the device in question at install level allowing an engineer to add a new 'Install' level user.

To do this RDM requires in writing, from the end-user/owner of the device, permission to provide access to the system. There will also be an administration charge for this request.

For further information please contact Technical Support.

Part Numbers & Variants

Intuitive / Plant Controller Descriptions	Part Number
Intuitive Superpack Controller (No Internal Display)	PR0650 SUP
Intuitive Superpack Controller (Internal Display)	PR0650 CD SUP
Intuitive Superpack Controller (No Internal Display) and one solid state relay (for digital scroll)	PR0650 SUP E1
Intuitive Superpack Controller (No Internal Display) and two solid state relays (for digital scroll)	PR0650 SUP E2
Intuitive Mini Superpack Controller (Internal Display)	PR0680 CD SUP
Intuitive Mini Superpack Controller (Internal Display) and one solid state relay (for digital scroll)	PR0680 CD SUP E1
Intuitive Mini Superpack Controller (No Internal Display)	PR0680 SUP
Intuitive Mini Superpack Controller (No Internal Display) and one solid state relay (for digital scroll)	PR0680 SUP E1
Intuitive IO expansion board with 8 status inputs, 8 universal IOs and 12 relays	PR0661
Intuitive Mini IO expansion with 4 Universal Inputs and 5 relays.	PR0663
Intuitive Mini IO expansion with 4 Universal IO, 5 relays, 6 probes inputs and 4 status inputs.	PR0663 4-4
Intuitive Mini IO expansion with 4 Universal IO and 5 relays.	PR0681

Configuration - Types

The controller has 8 configuration options:

Display value	Type	Control Type
1	Triple Pack	Fuzzy
2	Dual Pack and Condenser	Fuzzy
3	Pack and Dual Condenser	Fuzzy
4	Triple Condenser	Fuzzy
5	Triple Pack	Staged
6	Dual Pack and Condenser	Staged
7	Pack and Dual Condenser	Staged
8	Triple Condenser	Staged

The controller is delivered pre-configured as a Dual Pack and Condenser Controller (Type 2). See note on changing type.

Quick Start Guide (using a PC) V5.0

If the controller's firmware version is V4.7 or higher (Nov 2019 onward) there is an additional "Setup" menu available which allows a quicker setup process.
If the controller has earlier firmware then go to: Quick Start Guide (using a PC) V4.6 or earlier.

Controller menus and parameters as shown on the PC screen are shown in **bold** text.

- Select the **Service Menu** (the cogwheel icon at the bottom of the screen) enter service username and password then **Maintenance** and Main **Config** menu. Select the required control type, for example **FuzzPPC** sets sections 1 & 2 to pack (compressor) control and section 3 to condenser (fan) control using fuzzy logic control algorithm (as opposed to staged control). Set the number of sections required, probe type and the number of expansion boards being used. Select **Set Configuration** to save settings.

- Select the **Service Menu – Hardware - MainBrd 1** then **Set Parameters**. The **Set Parameters** menu will appear - this allows the hardware configuration for the main board to be set.
  - Set **M01 Uni1** to **Uni8** as required, for example if the first two universal inputs are 4-20mA pressure transducers and the third is a 0-10Vdc output to drive an inverter then **M01 Uni1** and **M01 Uni2** will be set to **4-20mA_I** and **M01 Uni3** will be set to **0-10v_O**.
  - Set **M01 Status Inp** as required, **0v** sets the status inputs to volt free contacts and **24vAC** sets them to require a 24vAC signal to switch on.
  - If a solid state relay (SSR) is fitted (to drive a digital scroll compressor) then **M01 Inv/Ssr Rly1** and/or **Rly2** need to be set to **SSR.**
  - Any expansion boards to be used are set up in the same way by selecting the **ExtBrd 1** to **ExtBrd 10** sections. Extension board 1 should have it's rotary module ID switch set to 0, board 2 to position 1 and so on.

- Select the **Service Menu, Setup** and select section 1.
- Select **Stages**, set the number of stages required for that section and press **Set**
- If set to Fuzzy select the stage type for each stage (**Comp** or **Inverter** for example), if set to Staged then select the relays to be used for that stage. Set each stage size in kW and the location of the relay to be used (Main board relay 1 for example). The stage output names can also be changed at this point if desired, for example "S01 Rly 1" can be renamed to "HT Comp 1". If using a digital scroll compressor, when set to fuzzy, stage 1 should be set to **SSR** and stage 2 set to **INV**. When set to staged, stage 1 should be set as **Relays 1 & 2** both **On.**
- Repeat the above process for **Status** to set status (digital) inputs (if used), **Pressure** to set up pressure transducers, **Inv** to set up the inverter on that section (if used), **Probes** to set up temperature probes (if used) and **Superheat** to set up the superheat parameters (if used, pack sections only)
- If using a digital scroll compressor, select **Service Menu – Control - Section 1** and set parameter **Pwm** to On.
- If using the Superheat feature, select **Service Menu – Control - Section 1** and set parameter **Refrigerant** to the gas type being used.

- Select the **Service Menu - Setup** and set up sections 2 & 3 (if used) in the same manner as above.

The controller is now ready to run. More detailed setup, such as altering target setpoints and alarm levels can be adjusted under the **Control** menus for each section.

Quick Start Guide (using a PC) V4.6 or earlier.

Controller menus and parameters as shown on the PC screen are shown in **bold** text.

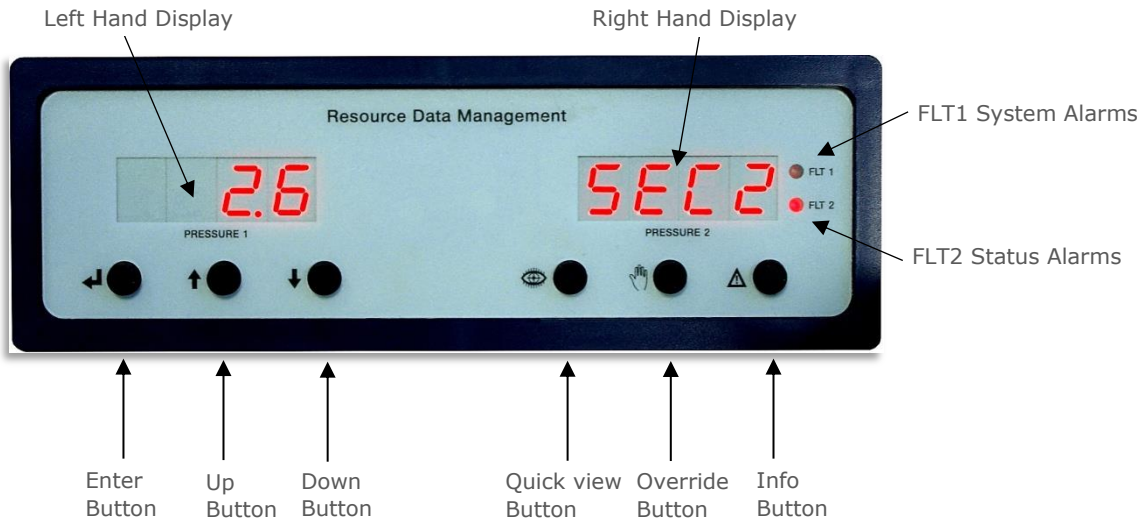
- Select the **Service Menu** (the cogwheel icon at the bottom of the screen) enter service username and password then **Maintenance** and Main **Config** menu. Select the required control type, for example **FuzzPPC** sets sections 1 & 2 to pack (compressor) control and section 3 to condenser (fan) control using fuzzy logic control algorithm (as opposed to staged control). Set the number of sections required, probe type and the number of expansion boards being used. Select **Set Configuration** to save settings.

- Select the **Service Menu – Hardware - MainBrd 1** then **Set Parameters**. The **Set Parameters** menu will appear - this allows the hardware configuration for the main board to be set.
  - Set **M01 Uni1** to **Uni8** as required, for example if the first two universal inputs are 4-20mA pressure transducers and the third is a 0-10Vdc output to drive an inverter then **M01 Uni1** and **M01 Uni2** will be set to **4-20mA_I** and **M01 Uni3** will be set to **0-10v_O**.
  - Set **M01 Status Inp** as required, **0v** sets the status inputs to volt free contacts and **24vAC** sets them to require a 24vAC signal to switch on.
  - If a solid state relay (SSR) is fitted (to drive a digital scroll compressor) then **M01 Inv/Ssr Rly1** and/or **Rly2** need to be set to **SSR.**
- If using expansion boards then **ExtBrd 1** to **ExtBrd 10** should be set in a similar manner to **MainBrd**.
  - Select the **Service Menu – Control - Section 1** then **Set Parameters**, if section 1 is set to pack (compressor) control then the basic parameters that need to be set are as follows:
    - **S01 Span 1** and **S01 Offset 1** set to match the pressure transducer, for example if the transducer is -1 to 14 Bar then the span is set to 15 Bar and the offset to -1.
    - Set **S01 Day Trgt** to the required target pressure.
    - If a variable speed inverter drive or a digital scroll compressor is being used then **S01 Inv** should be set to on.
    - If a digital scroll compressor is being used then **S01 Pwm** should be set to on.
    - Compressor stages now need to be set up (**S01 Stage 1** to **S01 stage 16**), for example, if 8 single stage compressors are being used then **SO1 Stage 1** to **S01 stage 8** should all be set to **Comp, S01 Stage 9** to **S01 Stage 16** should be left as **None**. If a compressor has loaders then the main compressor body should be set to **Comp** and the loaders set to **Loader**. If a variable speed (inverter) compressor is being used then the stage should be set to **Inv** as an inverter run signal. If a digital scroll compressor is being used then **S01 Stage 1** should be set as **SSR** and **S01 Stage 2** set to **Inv**.
  - If **Section 2** is also set to pack (compressor) control then all **S02** parameters should be set up in a similar way to **Section 1 (S01).**
  - If **Section 3** is set to Condenser (fan) control the **S03** should be set up as follows:
    - Select **Control**, **Section 3** then **Set Parameters**, set **S03 Span 1** and **S03 Offset 1** to match the pressure transducer being used.
    - Set **S03 Day Trgt** to the target setpoint required.
    - If variable speed fans are being used then **S03 Inv** should be set to **On** and **S03 Stage 1** should be set to **INV** as an inverter enable signal.
  - All three sections are now set up - if a section is not required then the transducer span for that section should be set to 0. As the sections are set up, the inputs and outputs are not automatically mapped to the physical inputs and outputs of the hardware (relays for example), this needs to be done manually. Although this makes the setup more complicated it does mean that a pack section, for example, can use all the IO on the main controller and the condenser section can use all the IO on an expansion board allowing the boards to be located in different locations (up to 500m apart) via the CANbus network.
  - Select **the Service Menu – Mapping - IO Map 1** then **Set Parameters.** Each section can use up to 3 pressure transducers for monitoring but normally just use one for control, in this case **IO01 PressPos1** would be mapped to **Main Board Position 1** and **IO01 PressPos2** and **IOPressPos3** set to unused. Temperature probes 1-8, status inputs 1-16, Inverter position and relay positions 1 to 24 are mapped in a similar way.
  - Sections 2 & 3 should now be mapped in a similar way to section 1 using **IO Map 2** and **IO Map 3**. If these sections are using the same main board as section 1 then the mapping would continue from where **IO Map 1** left off. For example, if section 1 has 4 compressors mapped to main board relay positions 1 to 4 then section 2 would start at main board relay position 5. If section 2 is using its own expansion board then **IO Map 2** would start at **Board 1** (not main) **position 1** and so on using up the available IO on expansion board 1. If section 3 is also using its own board then **IO Map 3** would start at **Board 2 position 1** and so on. Two stage outputs cannot be mapped to the same relay position (section 1 alarm and section 2 alarm for example) but two status inputs can be mapped to the same physical input (section 1 standby and section 2 standby for example).

These are the minimum settings required to enable the controller to start operating, other parameters such as run proofs, status inputs, alarm settings and night setback can now be set as required.

Front Display Panel

Remote Display (PR0620)



Left Hand Display

- The 4 character display shows the pressure (suction for pack, discharge for condensers). It scrolls through all sections.
- 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.

Right Hand Display

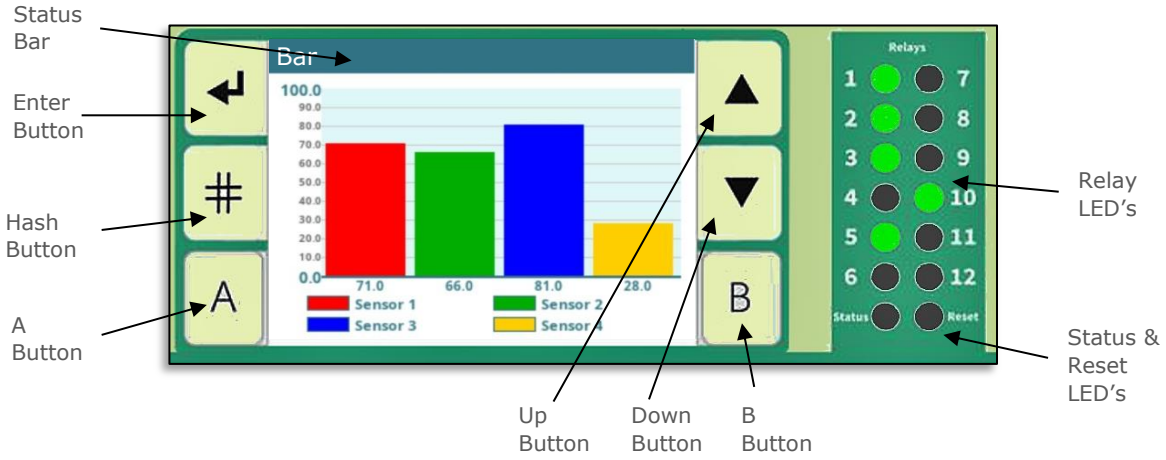
- The 4 character display shows the section number of the pressure being displayed in left hand display "SEC 1", "SEC 2" etc.
- In set-up mode, display is blank.
- In Override mode, display is blank.

Front Panel Remote Display Buttons

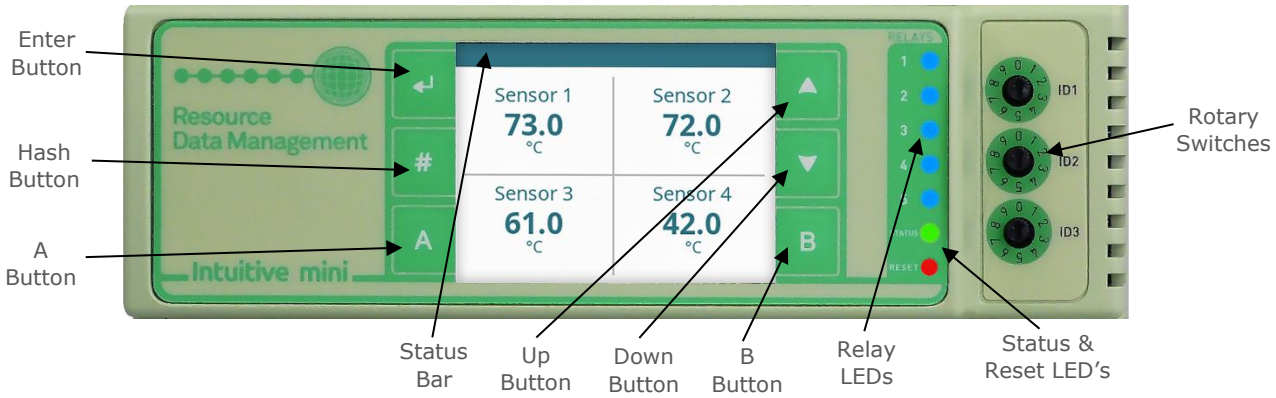
Enter Button	Used along with down button to enter menu items.
Up Button	Used to scroll up.
Down Button	Used to scroll down.
Quick View Button	Used to view the target pressures (See Quick view section).
Override Button	Used with the "Enter" button, to go into the override mode or to view current variable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

NOTE: If using V1 hardware (pre 2018 with a single Ethernet socket) with a built in display, the button operation is the same as the Remote Display (PR0620) however an alarm condition is indicated by an orange LED symbol 

Integral Intuitive V2 Graphical Display (optional)



Intuitive Mini Integral 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

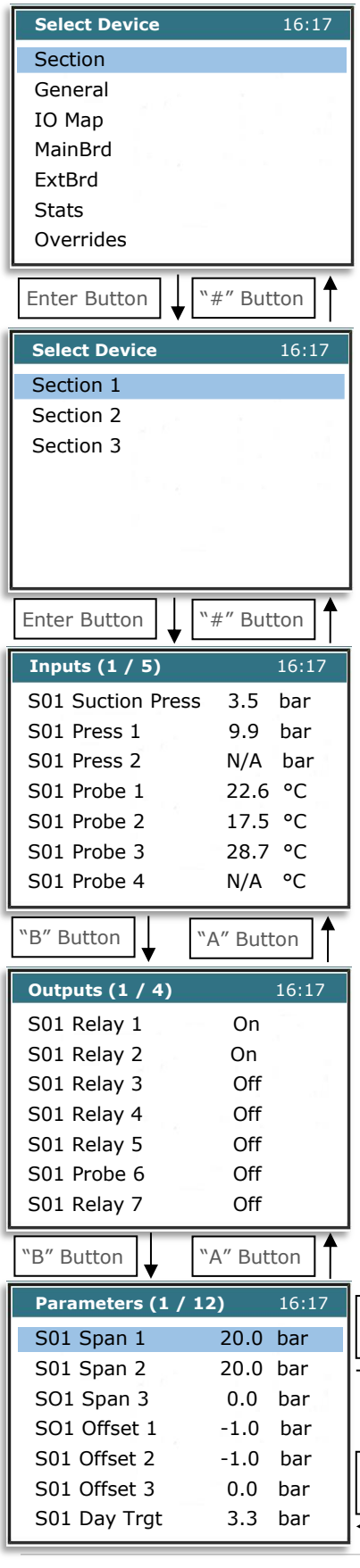
If a custom graphical display is set up then this will be shown as default, if multiple graphical displays are set up use the "A" and "B" buttons to scroll between pages.

If a custom graphical display is in use, hold the "Enter" and "Down" buttons together to enter the setup menu 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.

Integral Graphical Display Menu Navigation

(Software version V3.9 onwards)



From the main menu, the first submenu will be highlighted, press the Up and Down arrows to select and Enter to access the submenu.

Section: Allows the inputs, outputs and status of each control section in use to be viewed (HT pack, LT pack and Condenser for example), control parameters can also be viewed and changed.

General: Allows viewing and setting of the General sections (if used).

IO Map: Allows viewing and setting of Input and Output mapping for each control section.

MainBrd: Allows viewing and setting of main board hardware parameters, such as Universal IO type (mA or Voltage) and probe offsets.

ExtBrd: Allows viewing and setting of expansion board hardware parameters (if used).

Stats: Allows viewing and resetting of relay starts and run hours for each control section.

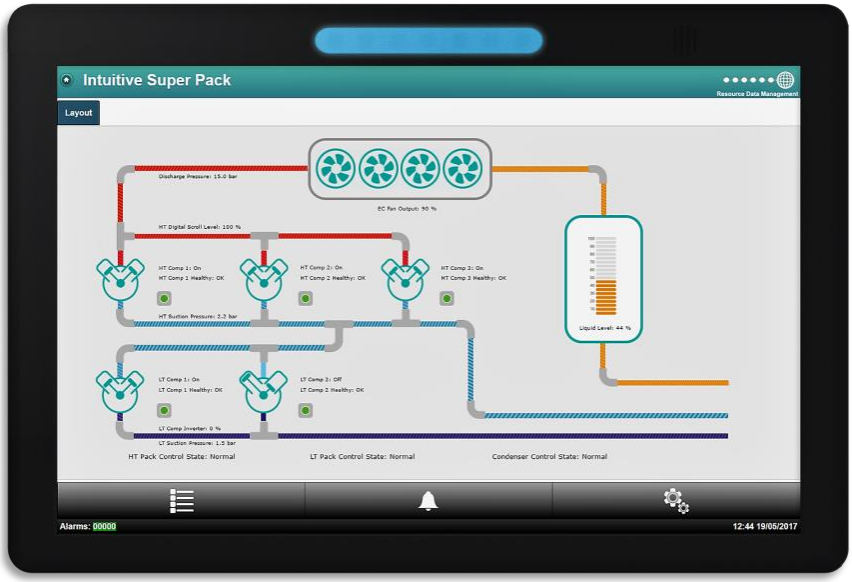
Overrides: Allows relays and variable outputs to be manually forced on and off for testing and commission purposes. This menu will only appear if set in the main configuration page in the controller using a PC.

The sequence on the left shows how to navigate through the menu pages for the section menus, the process is the same to navigate through the other menus like "IO Map".

The menus that appear are dependent on what is configured in the "Config" menu, if no expansion boards are being used and there are no current monitors being used then the "Udev" and "ExtBrd" menus will not appear.

There is also a setting in the "Config" menu called "Config in LCD", if this is turned off then the "Config" menu is no longer available and cannot be re instated without the use of a PC.

Touch XL (PR0617)



The TouchXL when connected to the Superpack, 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 Superpack 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.

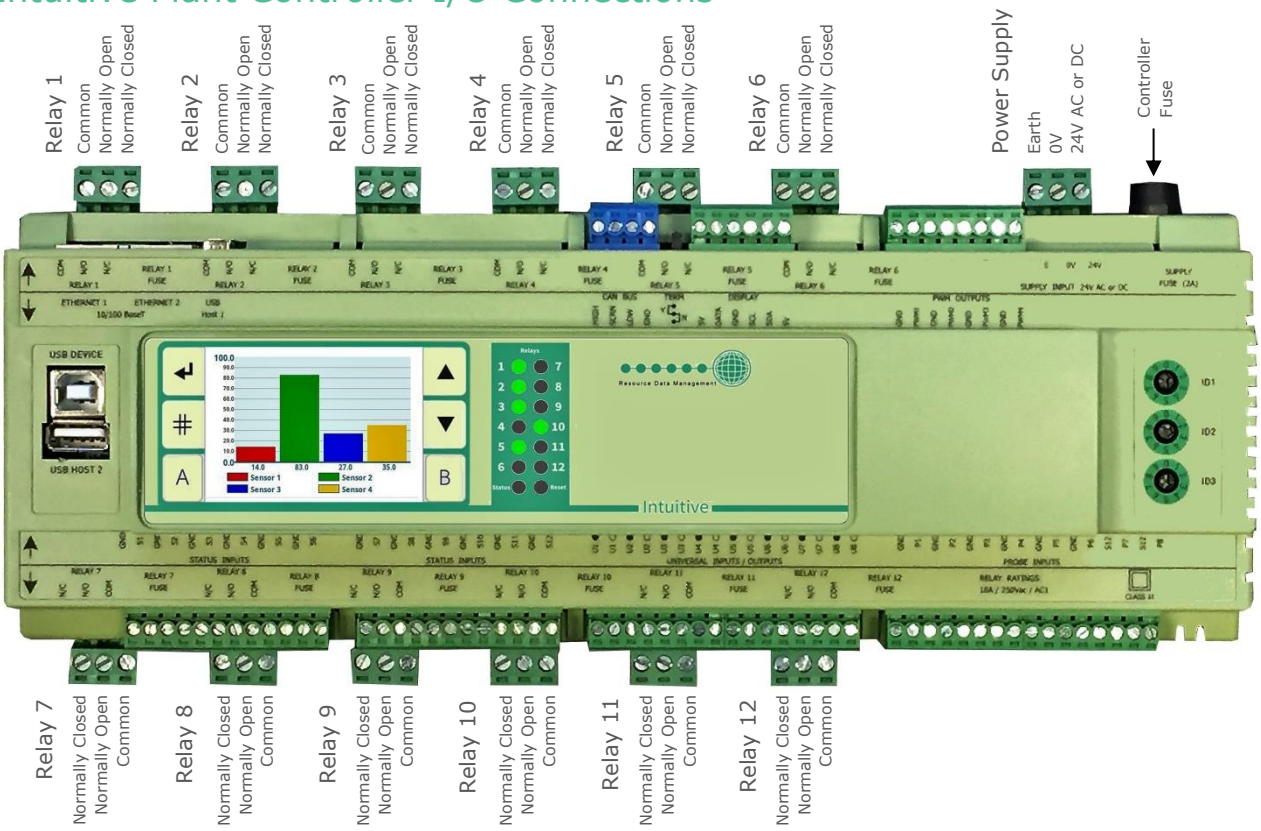
When connecting using the USB method, the communication of the two devices is automatic and the Touch XL will automatically configure itself for use.

Connecting over Ethernet comms requires the configuration of the TouchXL to be setup to 'look at' the Intuitive Superpack 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 Superpack software V3.3 and above.

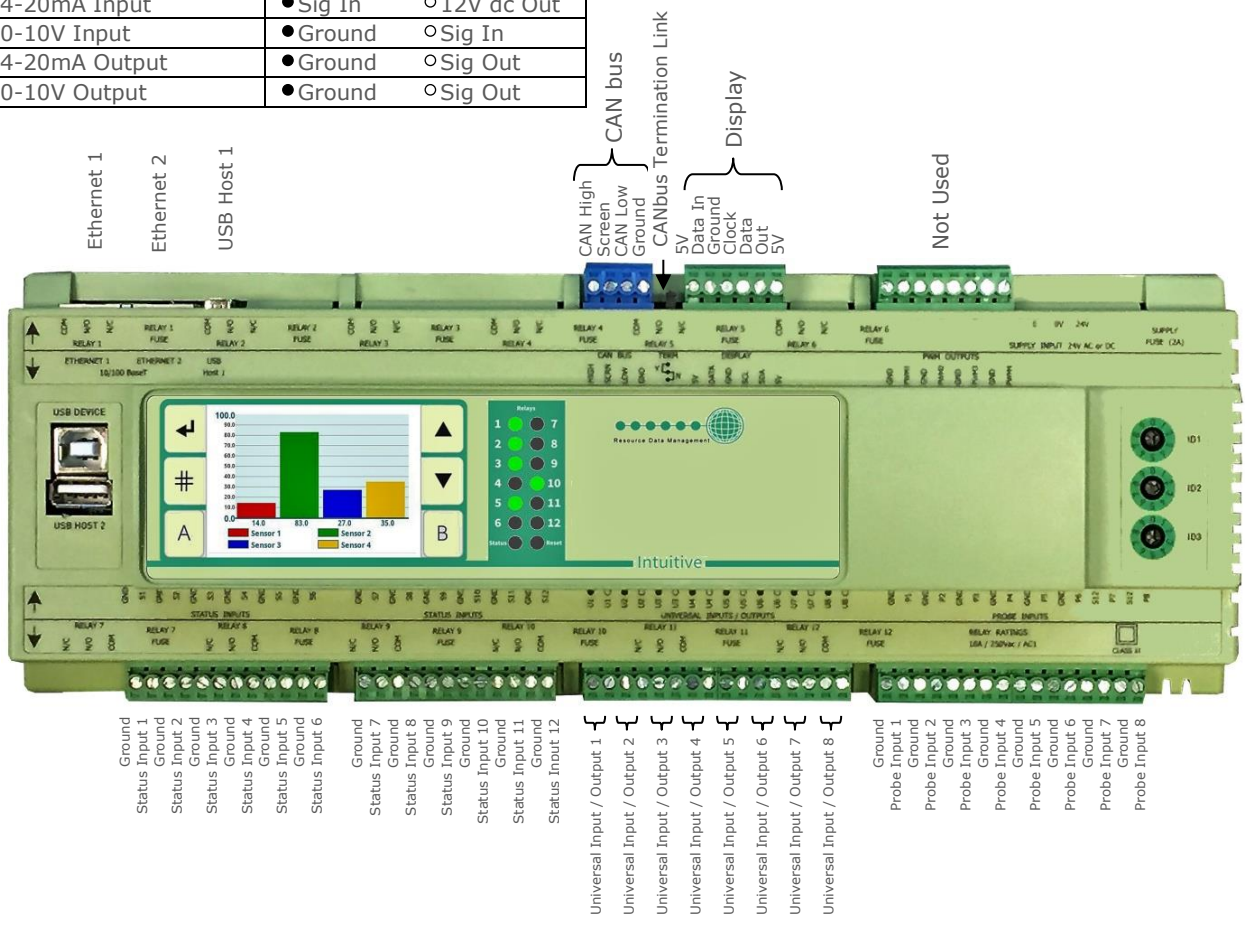
Intuitive Plant Controller I/O Connections

Bottom Row Connections



Universal IO Type	Terminal Markings	
4-20mA Input	● Sig In	○ 12V dc Out
0-10V Input	● Ground	○ Sig In
4-20mA Output	● Ground	○ Sig Out
0-10V Output	● Ground	○ Sig Out

Top Row Connections



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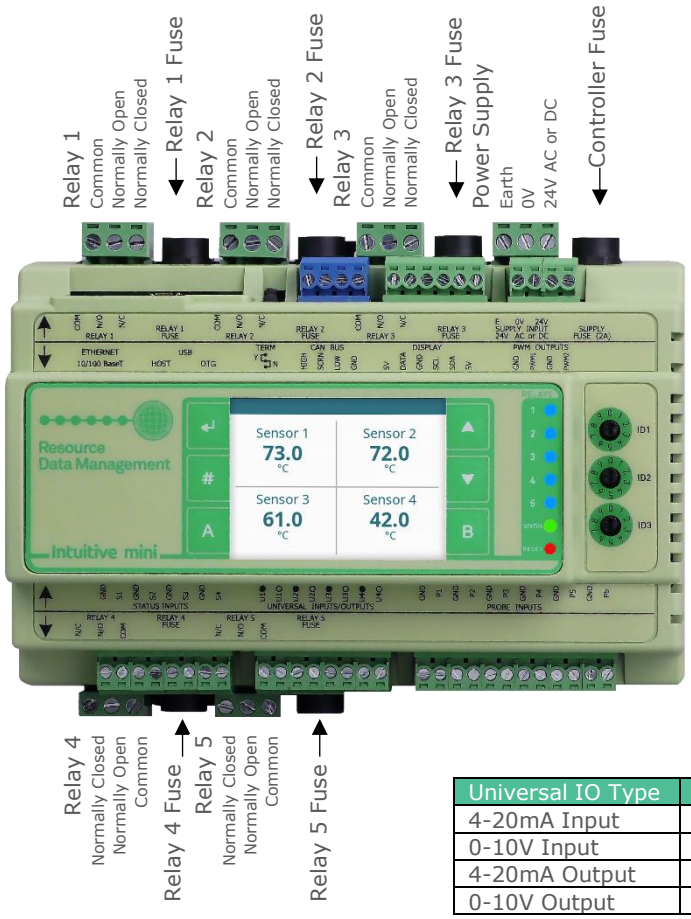
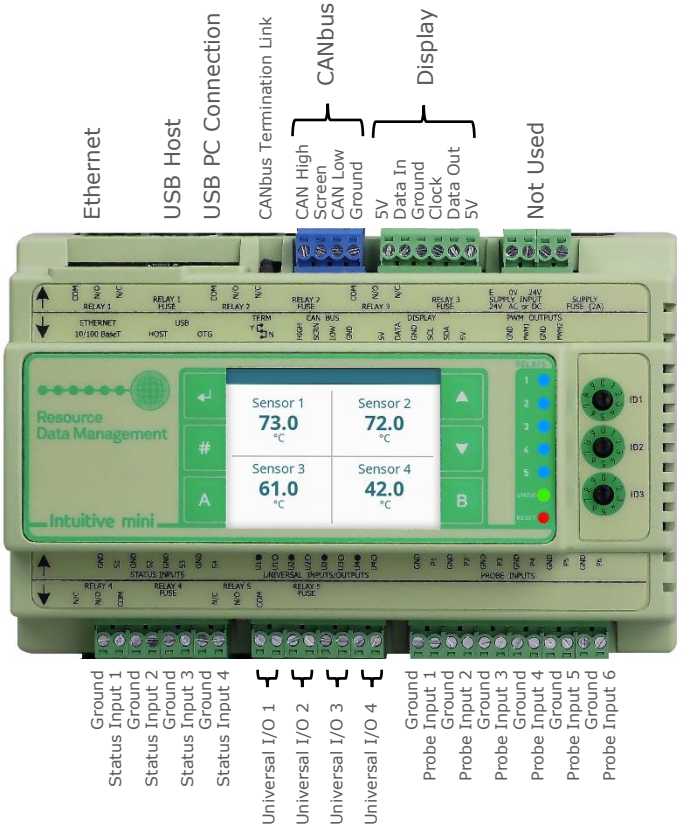
I/O Connections - Mini Intuitive Controller – PR0680

Bottom row connections



Universal IO Type	Terminal Markings
4-20mA Input	●Sig In ○12V dc Out
0-10V Input	●Ground ○Sig In
4-20mA Output	●Ground ○Sig Out
0-10V Output	●Ground ○Sig Out

Top row connections



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

Mini I/O Connections (PR0663)

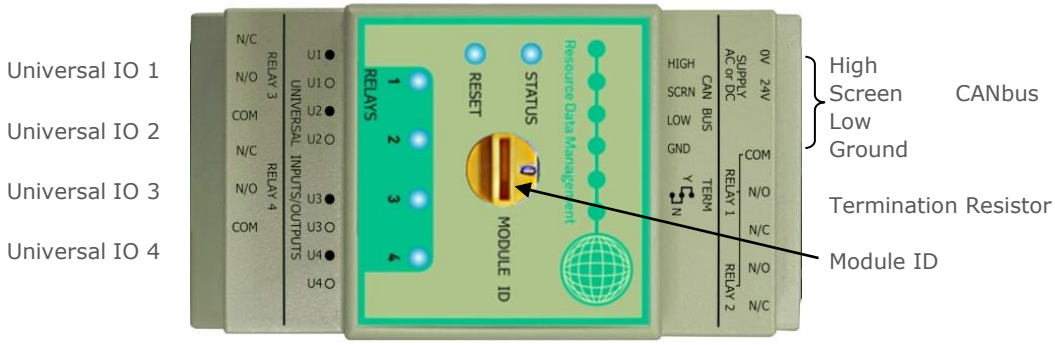
Bottom Row Connections

Top Row Connections

Mini I/O Connections (PR0663 4-4)

Bottom Row Connections

Top Row Connections



Universal Analogue Input / Output Connections

	0 or 4 -20mA or 0 – 10V Input
U1-U8 ●	0 or 4-20mA loop input or variable dc voltage ground.
U1-U8 ○	12v transducer feed or variable dc voltage input.

Inputs & Outputs

All Types	Description	Comments
Status Inputs	0V return or 24 Vac	See Note 1 below
Analogue Inputs	Probe input	See Note 2 below
Universal IO	Analogue Input/ Output	4-20mA, 0-10V, 0-5V, 0.5-4.5V, 0.5-9.5V, 1-2V, or 1-6V Input. 4-20mA, 0-20mA, 0-10V, 0-5V or 1-5V output (factory default is 0-10v In) (Inputs only on Mini IO Expansion)
Relays	N/O, N/C and Common	Volt Free. If SSR is fitted then only the Common and N/C are connected
Status LED	Healthy LED	When powered up the LED will flash off/on every 0.5 seconds

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 but cannot be mixed, 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), the optional built in LCD display, the USB Touch display (PR0615) or the Touch XL display (PR0617)
- Direct access by PC via a USB or Ethernet connection, this is the preferred method.
- Through the RDM Data Manager.*

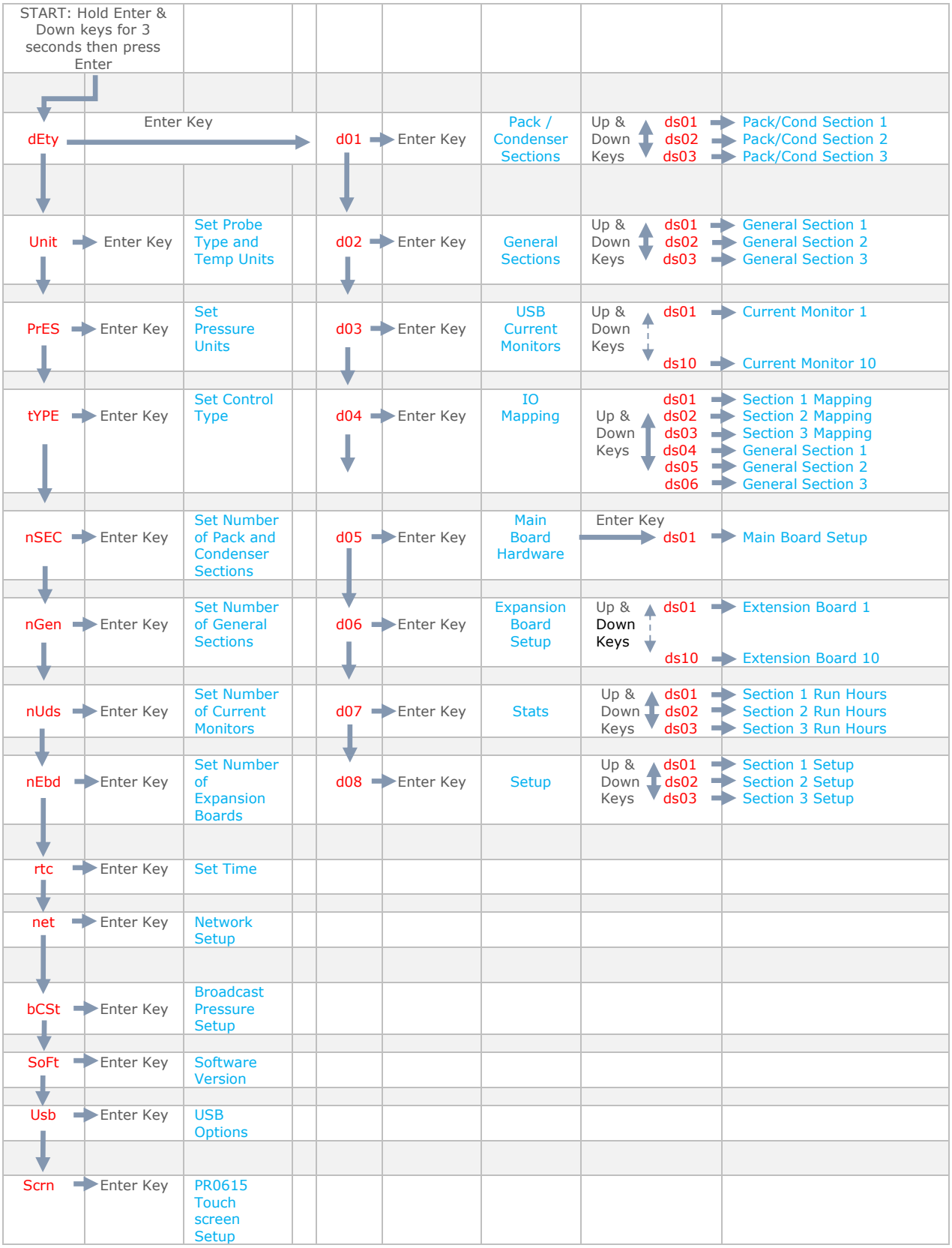
*Note: Due to the high number of data points within the Superpack controller it is not advisable to network the controller to a Data Manager with firmware V2.0.8 or earlier. Doing so will not affect the operation of the Superpack controller but it will have an adverse effect on the Data Managers operation and therefore a Data Manager firmware update is required.

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, dEty will be displayed. Scroll up or down to go through the list. Menus as they appear on the display are shown in red.



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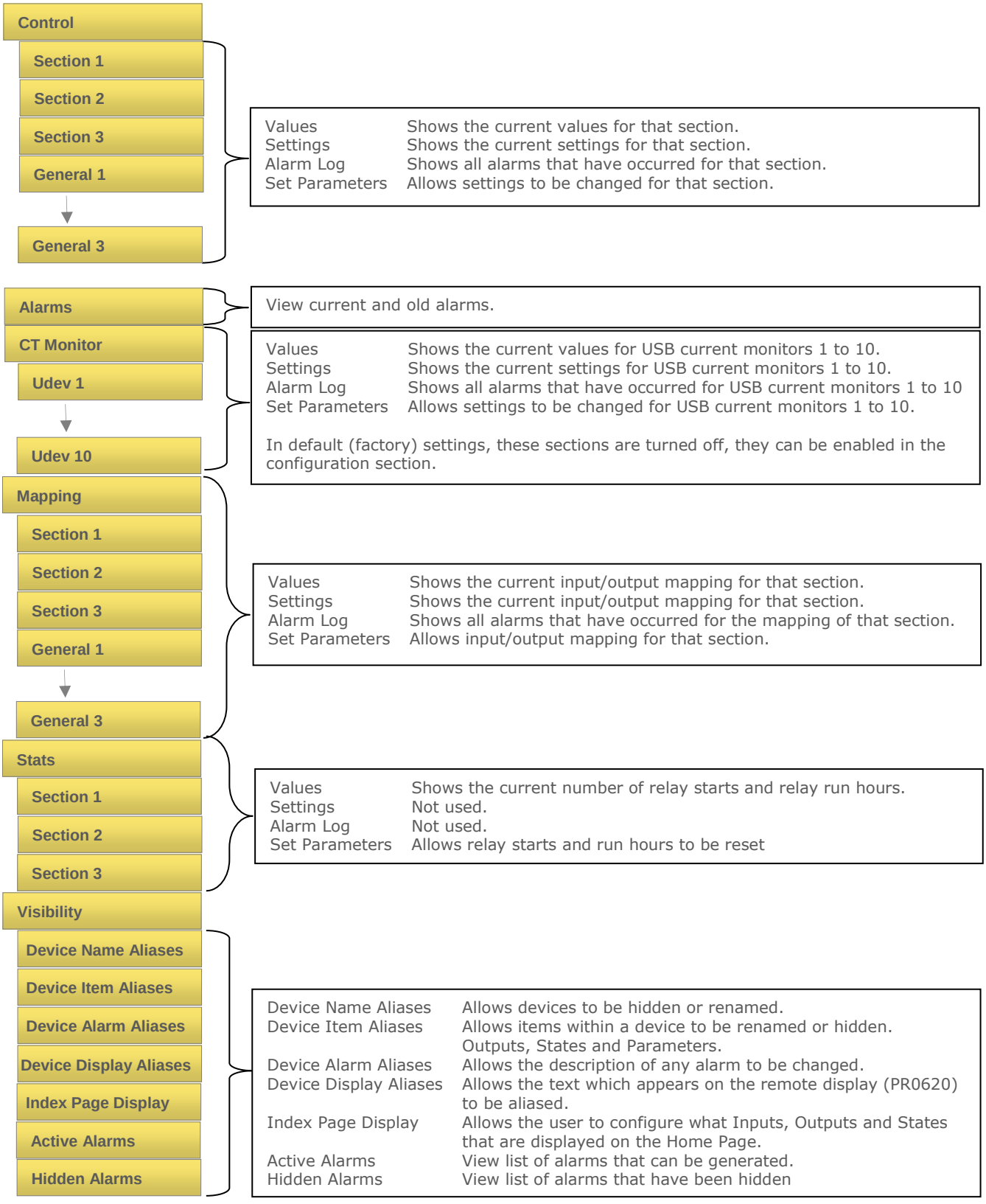
Main Menu Overview (PC Connection)

All available options are shown below. By default the Udev, General and ExBrd sections will be set to unused and will not show on the main menu. For setup via the PC connection, please see Setup via a PC.



Hardware
- **MainBrd**
- **ExtBrd 1**
- ↓
- **ExtBrd 10**

Values	Shows the current hardware input/output values for the main control board and expansion boards 1 to 10
Settings	Shows the current hardware settings for the main control board and expansion boards 1 to 10.
Alarm Log	Shows all hardware alarms that have occurred for the main control board and expansion boards 1 to 10.
Set Parameters	Allows hardware settings to be changed for the main control board and expansion boards 1 to 10, password protected

In default (factory) settings, these sections are turned off, they can be enabled in the configuration section.

Setup
- **Section 1**
- **Section 2**
- **Section 3**

Stages	Allows the number of stages, type, size and mapping to be set up.
Status	Allows the number of status inputs, type, and mapping to be set up.
Pressure	Allows the transducer inputs to be set up and mapped.
Inv	Allows the inverter (if used) to be setup and mapped.
Probes	Allows the number of probe inputs, type, and mapping to be set up.
Superheat	Allows the superheat (if used) to be setup and mapped.

Override Status

Shows the current status of any outputs that are currently overridden, these can be relays or variable outputs.

Mapping Summary
- **Section 1**
- **Section 2**
- **Section 3**
- **General 1**
- ↓
- **General 3**

Gives an overview of all physical inputs and outputs that are mapped for each individual section.

System

System Log	View system log
Mute All Alarms	Silences all alarms
Clear Alarm Logs	Removes the alarm log
Clear Aliases	Clears all aliases that have been assigned IO. Additionally clears the visibility of sections and IO's and will reset the visibility on the display to default.
Features	Shows current features enabled.
Network	Shows current set up: - Rotary switches, IP address, Netmask & Default gateway.
Time	Set the Time or synchronise with the PC
Version	Shows the controller and expansion board's software version
TouchXL Status	Shows IP Address, MAC address, name, connection status details.
LCD Display Setup	Allows setting of screen timers and set parameter permission.
LCD Display Layout	Allows configuration of internal LCD display mimics. See: Internal Screen Setup section

Network

Allows the user to alter the BACnet configuration of the controller.

Layout

Allows the user to upload, configure, download, remove and preview layouts.

Users

List	Shows a list of all the current users allowed to access the controller and allows service users to be removed (by an install level user).
Add User	Allows an Install level user to add new users at service and install level. In a new controller the initial user name is "install" and passcode "PleaseChange" followed by the panel ID number, for example "PleaseChangeBC360EF0". For security reasons this must be removed or changed when commissioning. The new user name and Passcode must have a minimum of 6 digits. Passcode "1234" will then be removed and permanently blocked.

Maintenance

Main Config	Shows the current configuration of the controller.
Save Config	Saves the current Configuration
Load Config	Allows the user to upload a previously saved configuration, NOTE: file needs to be named "Setup.xml"
View Config Info	Shows details on the last loaded config including any unmatched items dues to differences in firmware.
Add Feature	Shows the system key to allow features to be enabled remotely.
Upgrade	Allows the controller firmware to be updated.
Reset	Allows the user to reset the controller.

Export

Log	Allows logged data to be extracted to a PC in the form of a CSV file which can be opened using Microsoft Excel or similar.
Settings	Allows the controller's control parameters to be extracted in the form of an html file which can be viewed by a web browser (such as Chrome) or similar.
Mapping	Allows the controller's mapping parameters to be extracted in the form of an html file.
System Log	Allows the controller's system log to be extracted in the form of an html file.
Alarm Log	Allows the controller's alarm log to be extracted in the form of an html file.
Alarm Settings	Allows the controller's alarm parameters to be extracted in the form of an html file.

Mail

Sender Setup

Name	The sender name that appears on the received alarm email
Address	The sender email address that appears on the received alarm email
Force TLS	If set to 'No', then if TLS Authentication fails it will try Plain Authentication. If Force TLS is set to 'Yes', it will only try TLS Authentication
Send email Directly	Sends the e-mails directly to the destination server, please note this may or may not work depending on the setting of firewalls and e-mail servers between the controller and the remote system.
Through Server	Sends the e-mails through an intermediate server. If enabled complete the fields required for Server Setup.

Server Setup

Address	Address of mail server used to send alarms e.g. office mail server.
Port	Set email server port number.
Authenticate	This option should be set to 'Yes' if you need to authenticate when sending a mail.
Username	If authentication required enter a valid username for the mail server account.
Password	If authentication required enter a valid password.
Test	Allows a test email to be sent.

For setup using the external display (PR0620), we recommend using the following section order;

Set/ View Probe Types & Units

This operation is only available at the controller display or via a PC connection to the Plant controller. It cannot be set remotely via the Data manager front end system. Probe type changes apply to all probes on a controller and cannot be set individually to different types.

This option allows the user to set the probe types and units.

Unit Number	Probe Type	Units
0	Probes not used	°C
1	PT1000	°C
2	PT1000	°F
3	NTC2K	°C
4	NTC2K	°F
5	NTC470R	°C
6	NTC470R	°F
7	NTC700R	°C
8	NTC700R	°F
9	NTC3K	°C
10	NTC3K	°F
11	NTC2K25	°C

Unit Number	Probe Type	Units
12	NTC2K25	°F
13	NTC100K	°C
14	NTC100K	°F
15	NTC5K	°C
16	NTC5K	°F
17	NTC6K	°C
18	NTC6K	°F
19	NTC10K	°C
20	NTC10K	°F
21	NTC10K (2)	°C
22	NTC10K (2)	°F

Temperature probe range -60 degrees Celsius to +128 degrees Celsius.

Set/ View Pressure Units

This operation is only available at the controller display or via a PC connection to the Plant controller. It cannot be set remotely via the Data manager front end system. This allows the pressure units to be set to Bar or Psi.

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 4)
3. Press enter.

The controller will reset with the selected type now programmed.

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.

Set/ View Number of Sections

This allows the number of sections being used (1 to 3) to be set. For example, if the controller is being used to control a single suction section and single discharge section then only two sections need to be used, the third section will not be shown which will reduce the amount of unnecessary information displayed.

Set/ View Number of General Sections

This allows the number of sections being used (0 to 3) to be set

Set/ View Number of Udev Devices

This allows the number of Udev devices (USB current monitors) being used (1 to 10) to be set. As default (factory) setting this is set to 0 which will reduce the amount of unnecessary information displayed.

View Number of Expansion Boards

This allows the number of expansion boards being used (1 to 10) to be set. As default (factory) setting this is set to 0 and will reduce the amount of unnecessary information displayed.

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)

Use up button to display "ESC", press enter to display "rtc"

Time clock is now set

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	Network Mask Length
gt-1	Gateway Address byte 1
gt-2	Gateway Address byte 2
gt-3	Gateway Address byte 3
gt-4	Gateway Address byte 4
ESC	Exit network menu. **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 (10 in the example below)
IP2: Shows the second IP address value (1 in the example below)
IP3: Shows the third IP address value (2 in the example below)
IP4: Shows the fourth IP address value (86 in the example below)

Example: 10.1.2.86

Broadcast

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

Set for 1. Broadcasts Pressure.

This allows pressure readings on the variable analogue Inputs to be broadcast over a Data Manager IP network for use with a Mercury Switch or Mercury IP Module. This remote pressure is used by the Mercury Switch or IP Module to calculate the Evaporator temperature.

Set for 2. Broadcasts CO2 commands

Allows the pack controller to send commands to the Data Manager which in turns sends "CO2 Case Off" commands to any cases set up on system to do CO2 load shedding

Note: See CO2 Load shedding documentation and RDM Data Manager User guide for further information on CO2 Load Shedding

USB Operation

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

1. Export system log U-01
2. Export log data U-02
3. Save configuration U-03
4. Load configuration U-04
5. Upgrade the software U-05
6. Export Parameter list U-06
7. Export mapping list U-07
8. Export alarm log U-08
9. Export alarm settings U-09

The above requires the user to enter the USB menu via the PR0620 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 the use the up key to scroll to U-03. Now press enter, the screen will flash "USB" until the operation has completed.

If using the inbuilt LCD display, the USB menus will appear automatically after the USB memory stick is detected, pressing the UP and DOWN keys allows the different USB menus to be selected and pressing the Enter button will select that process.

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

PArA. Set/view parameters

1. From the function menu, scroll to dEty (device).
2. Select d01 (sections).
3. Select between ds01 (section 1), ds02 (section 2) or ds03 (section 3)

4. Scrolling to Para and pressing the enter key will show the first parameter (P-01). See: Set up Menus and subsequent parameter sections.

Section 1, 2, 3 Parameter table (d-01/ Sections)

Not all parameters apply to all controller types, for example P-71 is night setback for condenser fans so will not appear on a controller if it is set up as a pack (compressor) controller. In the right hand columns, the controller type will be shown, if that parameter applies to that type, if it does not apply it will be greyed out.

Note: All sections 1, 2, and 3 have the same parameter numbers

No.	Section Parameters	Range	Step	Units	Default			
					All Pack Fuzzy Default Settings	All Pack Staged Default Settings	All Condenser Fuzzy Default Settings	All Condenser Staged Default Settings
P-01	Span 1 *	-3.4 - 180	0.1	Bar	13.8	13.8	34.4	34.4
P-02	Span 2 *	-3.4 - 180	0.1	Bar	13.8	13.8	34.4	34.4
P-03	Span 3 *	-3.4 - 180	0.1	Bar	13.8	13.8	34.4	34.4
P-05	Offset 1	-3.4 - 180	0.1	Bar	0.0	0.0	0.0	0.0
P-06	Offset 2	-3.4 - 180	0.1	Bar	0.0	0.0	0.0	0.0
P-07	Offset 3	-3.4 - 180	0.1	Bar	0.0	0.0	0.0	0.0
P-09	Day Target Pressure	-3.4 - 180	0.1	Bar	2.1	2.1	12.7	12.7
P-10	Night Target Pressure	-3.4 - 180	0.1	Bar	2.1	2.1	12.7	12.7
P-11	Target Pressure Above P-9/10	-3.4 - 180	0.1	Bar	0.5	0.5	0.5	0.5
P-12	Target Pressure Below P-9/10	-3.4 – 180	0.1	Bar	0.5	0.5	0.5	0.5
P-13	Ext. Target Pressure	-3.4 - 180	0.1	Bar	3.1	3.1	14.7	14.7
P-15	Optimise Limit	-3.4 - 150	0.1	Bar	2.0	2.0		
P-16	Response On Speed	1 – 60	1	---	5	5	5	5
P-17	Response Off Speed	1 – 60	1	---	5	5	5	5
P-22	Inverter Starts Per Hour	0 – 60	1	---	0	0		
P-23	Starts per Hour	0 – 60	1	---				
P-24	Run Smallest	0 = Off, 1 = On	1	-	0			
P-25	Always Run Last	0 = Off, 1 = On	1	-	0	0		
P-26	Comp Unload	0 = Off, 1 = On	1	-	0			
P-27	Equal Run	0 = Off, 1 = On	1	-	0			
P-28	Run Proof	0 = Off, 1 = On	1	-	0	0		
P-20	Proof Auto Reset	00:00 – 99:00	01:00	min:sec	00:00	00:00		
P-29	Gas Dump	0 = Off, 1 = On	1	-	0	0		
P-30	Gas Diff	-3.4 – 150	0.1	Bar	0.5	0		
P-31	Inverter	0 = Off, 1 = On	1	-	0	0	0	0
P-32	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
P-33	INV Minimum	0 – 100	1	%	0	0	0	0
P-34	INV Maximum	0 – 100	1	%	100	100	100	100
P-37	INV Hold	0 – 5	1	Seconds	0	0	0	0
P-38	Max Ramp On	0 – 10	1	% / sec	0	0	0	0
P-39	Max Ramp Off	0 – 10	1	% / sec	0	0	0	0
P-43	In Band Control	0 = Off, 1 = On	1	-	0	0	0	0
P-35	PWM Control	0 = Off, 1 = On	1	-	0	0		

P-36	PWM Cycle Time	00:10 – 00:30	00:01	min:sec	00:20	00:20		
P-39	Fan Interlock	0 = Off 1 = On	1	---			0	0
P-40	Number of Stages	0 – 20	1	-		0		0
P-41	Stage On Delay	00:00 – 60:00	00:01	min:sec	00:10	00:10		00:10
P-42	Stage Off Delay	00:00 – 60:00	00:01	min:sec	00:10	00:10		00:10
P-50	Alarm Delay	00:00 – 99:00	01:00	min:sec	05:00	05:00	05:00	05:00
P-51	HP Alarm	-3.4 – 180	0.1	Bar	4.1	4.1	17.9	17.9
P-52	LP Alarm	-3.4 – 180	0.1	Bar	0.6	0.6	6.8	6.8
P-53	LP Shut-down	-3.4 – 180	0.1	Bar	0.4	0.4	6.2	6.2
P-54	Low Alarm Delay	00:00 – 99:00	01:00	min:sec	00:00	00:00	00:00	00:00
P-55	Fail	0 = Off, 1 = On	1	-	0	0	0	0
P-56	Probe Alarms	0 = Off, 1 = On	1	-	0	0	0	0
P-60	Liquid Level	0 = Off, 1 = On	1	-	0	0		
P-61	High Liquid Level	0 – 100	1	%	80	80		
P-62	Low Liquid Level	0 – 100	1	%	20	20		
P-63	Liquid Level Alarm Delay	00:00 – 99:00	01:00	min:sec	05:00	05:00		
P-70	Sticky Fans	0 – 16	1	---			0	0
P-71	Night Set Back	0 = Off, 1 = On 2 = Local, 3 = Remote	1	---			0	0
P-72	Night Reduction	0 – 100	1	%			30	30
P-73	Night Set On Time	00:00 – 23:59	00:01	min:sec	20:00	20:00	20:00	20:00
P-74	Night Set Off Time	00:00 – 23:59	00:01	min:sec	08:00	08:00	08:00	08:00
P-75	Night Pressure Limit	-3.4 – 180	0.1	Bar			25.0	25.0
P-76	Day Reduction	0 – 100	1	%			0	0
P-77	Day Pressure Limit	-3.4 – 180	0.1	Bar			25.0	25.0
P-78	Transducer fail Level	0 – 100	1	%			45	45
P-80	Control Type	0 = Fixed, 1 = Floating, 2 = Drop Leg, 3 = Float/ Drop Leg	1	---			0	0
P-81	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	---			0	0
P-79	Drop Leg 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	---			0	0
P-82	Refrigerant	0 – 29 See: Refrigerant Table	1	---	0	0	0	0
P-500	Cust_A1 Hi	For more information regarding the setting up of the custom refrigeration, please contact RDM Technical Support	0.1					
P-501	Cust_A1 Lo		1					
P-502	Cust_B1 Hi		1					
P-503	Cust_B1 Lo		0					
P-504	Cust_C1 Hi		0					
P-505	Cust_C1 Lo		0					
P-506	Cust_A2 Hi		0.1					
P-507	Cust_A2 Lo		1					

P-508	Cust_B2 Hi		1					
P-509	Cust_B2 Lo		1					
P-510	Cust_C2 Hi		1					
P-511	Cust_C2 Lo		1					
P-84	Low Limit	-3.4 – 180	0.1	Bar			8.2	8.2
P-85	High Limit	-3.4 – 180	0.1	Bar			23.0	23.0
P-86	Condenser offset	0 – 20	0.1	°C			6.0	6.0
P-87	Discharge Trip	-3.4 – 180	0.1	Bar			16.0	16.0
P-88	Discharge Stop	-3.4 – 180	0.1	Bar			18.0	18.0
P-89	Discharge Offset	-3.4 – 180	0.1	Bar			2.0	2.0
P-64	Discharge Temperature	0 = Off 1 = Probe 1 2 = Probe 2 3 = Probe 3 4 = Probe 4 5 = Probe 5 6 = Probe 6 7 = Probe 7 8 = Probe 8	1	---			0	0
P-65	Discharge Trip Temperature	-60 – 256	0.1	°C			85	85
P-66	Discharge Stop Temperature	-60 – 256	0.1	°C			90	90
P-67	Discharge Temperature Differential	-60 – 256	0.1	°C			10	10
P-97	Ref Weight	0 – 100	1	%		0	0	0
P-90	Do Discharge Trip	0 = Off, 1 = Sect 2 2 = Sect 3	1	---	0	0		
P-620	Do Superheat	0 = Off, 1 = Alarm, 2 = Alarm / Low Shut	1	---	Off	Off		
P-621	Superheat Select	0 = Off 1 = Probe 1 ↓ 8 = Probe 8			Off	Off		
P-622	SH Low Target	-60 – 256	0.1	°C	8.0	8.0		
P-623	SH Low Diff	0.0 –20.0	0.1	°C	2.0	2.0		
P-624	SH Low Alarm	-60 – 256	0.1	°C	5.0	5.0		
P-625	SH High Target	-60 – 256	0.1	°C	30.0	30.0		
P-626	SH High Diff	0.0 –20.0	0.1	°C	3.0	3.0		
P-627	SH High Alarm	-60 – 256	0.1	°C	50.0	50.0		
P-628	SH Delay	00:00 – 99:00	01:00	min:sec	02:00	02:00		
P-91	Do Split	0 = Off, 1 = Mode 1 2 = Mode 2 3 = Mode 3 4 = Mode 4	1	---			0	0
P-92	Split Temperature	-60.0 – 256.0	0.1	°C			7.2	7.2
P-93	Split Temperature Diff	0.0 – 20.0	0.1	°C			2.0	2.0
P-94	Sect 1 Split Press	-3.4 – 180	0.1	Bar			15.2	15.2
P-95	Split Press Diff	-3.4 – 180	0.1	Bar			1.4	1.4
P-96	Glide	-15 – +15	0.1	---			0.0	0.0
P-98	Heat Reclaim	0 = Off, 1 = On,	1	---			0	0
P.600	Fan Reversal Select	0 = Off, 1 = On, 2 = local, 3 = remote	1	---			0	0
P-601	Fan Reversal Start Time	00:00 – 23:59	00:01	hrs:min			00:00	00:00
P-602	Fan Reversal Length	00:00 – 99:00	01:00	min:sec			00:00	00:00
P-603	Fan Reversal Delay	00:00 – 60:00	00:01	min:sec			00:00	00:00

P-604	Fan Reversal Fixed Speed on/off	0 = Off, 1 = On	1				1	1
P-605	Fan Reversal Fixed Speed	0 – 100	1	%			100	100
P-606	Fan Reverse Level	-3.4 - 180	0.1	Bar			7.0	7.0
P-100	Status Fault Delay	00:00 – 60:00	00:01	min:sec	00:10	00:10	00:10	00:10
P.101	General Fault Delay	00:00 – 60:00	00:01	min:sec	00:10	00:10	00:10	00:10
P-102	Standby Delay	00:00 – 60:00	00:01	min:sec	00:10	00:10	00:10	00:10
P-650 ↓ P-657	Probe Select Type 1 ↓ Probe Select Type 8	0 = Off 1 = Probe 2 = Plant N/O 3 = Plant N/C	1	---	1	1	1	1
P-670	Loader Status	0 = Off, 1 = On	1	---	0	0	0	0
P.103 ↓ P.118	Status Fault 1 ↓ Status Fault 16	0 = Unused 1 = Comp N/O (pack) 1 = Cond N/O (cond.) 2 = Comp N/C 2 = Cond N/C (cond.) 3 = Gen N/O 4 = Gen N/C 5 = Standby N/O 6 = Standby N/C 7 = Run N/O (pack) 7 = Heat N/O (cond.) 8 = Run N/C (pack) 8 = Heat N/C (cond.) 9 = INV N/O 10 = INV N/C 11=Proof N/O 12=Proof N/C	1	---	0	0	0	0
P.120 ↓ P.135	Stage 1 ↓ Stage 16	0 = None 1 = Unused 2 = Inv 3 = Comp or Fan 4 = Loader (pack) 4 = Remote (cond.) 5 = Trim (pack) 6 = SSR (pack) 7 = Remote (pack)	1	---	0		0	
P.140 ↓ P.155	Stage 1 size ↓ Stage 16 Size	0.0 – 60.0	0.1	kW	0.0			
P.160 ↓ P.175	Stage 1 Relay 1 ↓ Stage 1 Relay 16	0 = Off 1 = On	1	---		0		
P.180 ↓ P.195	Stage 2 Relay 1 ↓ Stage 2 Relay 16	0 = Off 1 = On	1	---		0		
P.200 ↓ P.215	1 Stage 3 Relay 1 ↓ S1 Stage 3 Relay 16	0 = Off 1 = On	1	---		0		
P.220 ↓	S1 Stage 4 Relay 1 ↓	0 = Off 1 = On	1	---		0		

P.235	S1 Stage 4 Relay 16							
P.240 ↓ P.255	S1 Stage 5 Relay 1 ↓ S1 Stage 5 Relay 16	0 = Off 1 = On	1	---		0		
P.260 ↓ P.275	S1 Stage 6 Relay 1 ↓ S1 Stage 6 Relay 16	0 = Off 1 = On	1	---		0		
P.280 ↓ P.295	S1 Stage 7 Relay 1 ↓ S1 Stage 7 Relay 16	0 = Off 1 = On	1	---		0		
P.300 ↓ P.315	S1 Stage 8 Relay 1 ↓ S1 Stage 8 Relay 16	0 = Off 1 = On	1	---		0		
P.320 ↓ P.335	S1 Stage 9 Relay 1 ↓ S1 Stage 9 Relay 16	0 = Off 1 = On	1	---		0		
P.340 ↓ P.355	S1 Stage 10 Relay 1 ↓ S1 Stage 10 Relay 16	0 = Off 1 = On	1	---		0		
P.360 ↓ P.375	S1 Stage 11 Relay 1 ↓ S1 Stage 11 Relay 16	0 = Off 1 = On	1	---		0		
P.380 ↓ P.395	S1 Stage 12 Relay 1 ↓ S1 Stage 12 Relay 16	0 = Off 1 = On	1	---		0		
P.400 ↓ P.415	S1 Stage 13 Relay 1 ↓ S1 Stage 13 Relay 16	0 = Off 1 = On	1	---		0		
P.420 ↓ P.435	S1 Stage 14 Relay 1 ↓ S1 Stage 14 Relay 16	0 = Off 1 = On	1	---		0		
P.440 ↓ P.455	S1 Stage 15 Relay 1 ↓ S1 Stage 15 Relay 16	0 = Off 1 = On	1	---		0		
P.460 ↓ P.475	S1 Stage 16 Relay 1 ↓ S1 Stage 16 Relay 16	0 = Off 1 = On	1	---		0		

dFLt	Restore Default Settings	(Panel Mount Display Only)						

Refrigerant Table

No.	Gas	No.	Gas	No.	Gas	No.	Gas	No.	Gas
0	None	6	R401A	12	R407A	18	R507	24	R449A
1	Custom	7	R401B	13	R407B	19	R717	25	R513A
2	R32	8	R401C	14	R407C	20	R290	26	R454C
3	R134a	9	R402A	15	R500	21	R744	27	R455A
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 PR0162 with range: -1 bar to 65 bar
Span would be 66 bar, offset would be -1 bar.
If only transducer input 1 and/or 2 in use please see note on the display.

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.

General Section Parameters (d-02/ General)

Note: All General Sections 1 to 3 have the same parameter numbers

Section Parameters	Range	Step	Units	Default
Stat1	0 = Off, 1 = On, 2 = Run N/O, 3 = Run N/C 4 = On/Tm, 5 = RunNO/Tm, 6 = RunNC/Tm	1	-	0
Stat1 Cut-In	-60.0 – 256.0	0.1	°C	15.0
Stat1 Diff	0.0 – 20.0	0.1	°C	1.0
Stat1 Type	0 = Direct, 0 = Indirect	1	-	0
Stat1 High Temp	-60.0 – 256.0	0.1	°C	25.0
Stat1 Low Temp	-60.0 – 256.0	0.1	°C	0.0
Stat1 Alm Delay	00:00 – 99:00	00:01	hr:min	01:00
Stat1 On Time	00:00 – 23:59	00:01	hr:min	08:00
Stat1 Off Time	00:00 – 23:59	00:01	hr:min	20:00
Stat2	0 = Off, 1 = On, 2 = Run N/O, 3 = Run N/C 4 = On/Tm, 5 = RunNO/Tm, 6 = RunNC/Tm	1	-	0
Stat2 Cut-In	-60.0 – 256.0	0.1	°C	15.0
Stat2 Diff	0.0 – 20.0	0.1	°C	1.0
Stat2 Type	0 = Direct, 0 = Indirect	1	-	0
Stat2 High Temp	-60.0 – 256.0	0.1	°C	25.0
Stat2 Low Temp	-60.0 – 256.0	0.1	°C	0.0
Stat2 Alm Delay	00:00 – 99:00	00:01	min:sec	01:00
Stat2 On Time	00:00 – 23:59	00:01	hr:min	08:00
Stat2 Off Time	00:00 – 23:59	00:01	hr:min	20:00
Stat3	0 = Off, 1 = On, 2 = Run N/O, 3 = Run N/C 4 = On/Tm, 5 = RunNO/Tm, 6 = RunNC/Tm	1	-	0
Stat3 Cut-In	-60.0 – 256.0	0.1	°C	15.0

Stat3 Diff	0.0 – 20.0	0.1	^{O}C	1.0
Stat3 Type	0 = Direct, 0 = Indirect	1	-	0
Stat3 High Temp	-60.0 – 256.0	0.1	^{O}C	25.0
Stat3 Low Temp	-60.0 – 256.0	0.1	^{O}C	0.0
Stat3 Alm Delay	00:00 – 99:00	00:01	min:sec	01:00
Stat3 On Time	00:00 – 23:59	00:01	hr:min	08:00
Stat3 Off Time	00:00 – 23:59	00:01	hr:min	20:00
PStat	0 = Off, 1 = On, 2 = Run N/O, 3 = Run N/C 4 = On/Tm, 5 = RunNO/Tm, 6 = RunNC/Tm	1	-	0
PStat Cut-In	-3.4 – 180	0.1	Bar	15
PStat Diff	-3.4 – 180	0.1	Bar	1.0
PStat Type	0 = Direct, 0 = Indirect	1	-	0
PStat High Press	-3.4 – 180	0.1	Bar	30
PStat Low Press	-3.4 – 180	0.1	Bar	6.8
PStat Alm Delay	00:00 – 99:00	00:01	min:sec	01:00
PStat On Time	00:00 – 23:59	00:01	hr:min	08:00
PStat Off Time	00:00 – 23:59	00:01	hr:min	20:00
PStat Span	-3.4 – 180	0.1	Bar	34.0
PStat Offset	-3.4 – 180	0.1	Bar	0.0

Current Transformer Parameters (d-03/ CT Monitor - UDev)

Note: All Current Transformers Interfaces 1 to 10 have the same parameter numbers

No.	Section Parameters	Range	Step	Units	Default
P-01 ↓ P-05	CT Range 1 ↓ CT Range 5	0 - 500	1	Amps	0
P-11 ↓ P-15	CT Position 1 ↓ CT Position 5	0 - 48	1	---	0
P-21 ↓ P-25	CT Low Amp 1 ↓ CT Low Amp 5	0 - 500	1	Amps	5
P-31 ↓ P-35	CT High Amp 1 ↓ CT High Amp 5	0 - 500	1	Amps	80
P-41 ↓ P-45	CT Alarm Delay 1 ↓ CT Alarm Delay 5	00:00 – 99:00	01:00	min:sec	05:00

Pressure, Probe, Status, Inverter and Relay Position Parameters (d-04/ Mapping - IOMap)

Controller inputs and outputs are not automatically allocated by the controller, these are manually allocated by the user and provides greater flexibility as to where the expansion modules (if used) are located. For example, if section 2 is set to use 4 compressors then these can be mapped to any relay position on any expansion board. Relays can also be mapped to the main controller if there are relays available which have not been mapped to section 1. The same applies to all other inputs and outputs such as pressure transducers and fault inputs.

All sections 1, 2 and 3 have the same parameter numbers.

The Range covers all possible positions including the maximum amount of expansion modules.

No.	Section Parameters	Range	Step	Units	Default
P-01 ↓ P-03	Pressure Position 1 ↓ Pressure Position 3	0 - 88	1	---	0
P-10 ↓ P-17	Probe Position 1 ↓ Probe Position 8	0 - 88	1	---	0
P-20 ↓ P-35	Status Position 1 ↓ Status Position 16	0 - 92	1	---	0
P-40	Inverter Position	0 - 88	1	---	0
P-50 ↓ P-73	Relay Position 1 ↓ Relay Position 24	0 - 132	1	---	0

Universal I/O, Status Inputs, Invert Relays, Probe Offsets Configuration (d-05/ Hardware - Main Board)

No.	Section Parameters	Range	Step	Units	Default
P-01 ↓ P-08	Universal I/O 1 ↓ Universal I/O 8	0 = 4-20mA Input 1 = 0-10V Input (Default) 2 = 0-5V Input 3 = 0.5-4.5V Input 4 = 0.5-9.5V Input 5 = 1-2V Input 6 = 1-6V Input 7 = 4-20mA Output 8 = 0-20mA Output 9= 0-10V Output 10 = 0-5V Output 11 = 1-5V Output 12 = Custom mA Input 13 = Custom V Input 14 = Custom mA Output 15 = Custom V Output	1	---	1
P-50	Uni Custom In Low	-100 to 100	0.1	V/mA	0
P-51	Uni Custom In High	-100 to 100	0.1	V/mA	0
P-52	Uni Custom Out Low	-100 to 100	0.1	V/mA	0
P-53	Uni Custom Out High	-100 to 100	0.1	V/mA	0
P-10	Status Inputs	0V / 24V ac	1	---	0
P-20 ↓ P-31	Invert/SSR Relay 1 ↓ Invert/SSR Relay 12	0 = Off 1 = On 2 = SSR	1	---	0

P-40 ↓ P-47	Offset 1 ↓ Offset 8	-20 to +20	0.1	°C	0.0

Universal I/O, Status Inputs, Invert Relays, Probe Offsets Configuration (d-06/ Hardware - Ext Board)

No.	Section Parameters	Range	Step	Units	Default
P-01	Board Type	0 = Unused 1 = IO 2 = 5 Relay/5 Analogue In 3 = 4 Relay/4 Uni IO 4 = Mini IO	1	---	0
P-02 ↓ P-09	Universal I/O 1 ↓ Universal I/O 8	0 = 4-20mA Input 1 = 0-10V Input (Default) 2 = 0-5V Input 3 = 0.5-4.5V Input 4 = 0.5-9.5V Input 5 = 1-2V Input 6 = 1-6V Input 7 = 4-20mA Output 8 = 0-20mA Output 9= 0-10V Output 10 = 0-5V Output 11 = 1-5V Output 12 = Custom mA Input 13 = Custom V Input 14 = Custom mA Output 15 = Custom V Output	1	---	1
P-50	Uni Custom In Low	-100 to 100	0.1	V/mA	0
P-51	Uni Custom In High	-100 to 100	0.1	V/mA	0
P-52	Uni Custom Out Low	-100 to 100	0.1	V/mA	0
P-53	Uni Custom Out High	-100 to 100	0.1	V/mA	0
P-10	Status Inputs	0V / 24V ac	1	---	0
P-20 ↓ P-31	Invert Relay 1 ↓ Invert Relay 12	0 = Off 1 = On	1	---	0
P-41 ↓ P-48	Offset 1 ↓ Offset 8	-20 to +20	0.1	°C	0.0

Compressor Run Hours and Compressor Starts (d-07/ Stats)

Note: All sections 1, 2 and 3 have the same parameter number

No.	Section Parameters	Range	Step	Units	Default
P-01	Reset Stats	0 - 1	1	---	0

Setup (d-08 / Quick Setup menu)

No.	Section Parameters	Range	Step	Units	Default
P-01	Number of Stages	0 – 16	1	---	0
P-02	Number of Status Inputs	0 – 16	1	---	0
P-03	Number of Pressure Inputs	1 – 3	1	---	0
P-04	Number of Probe Inputs	0 – 8	1	---	0

Parameter Descriptions

Section Parameters Description (d-01/ Compressor/Condenser Sections)

No.	Parameter	Description
P-01/02/03	Transducer 1/2/3 Span	Range of the transducers.
P-05/06/07	Transducer 1/2/3 Offset	Transducer value above or below zero.
P-09	Day Target Pressure	Pressure target, control will try to maintain this pressure during day time. See P-74
P-10	Night Target Pressure	Pressure target, control will try to maintain this pressure during night time. See P-73
P-11	Target Pressure Above P-09/10	Set-point above the target, used to obtain a "dead-band".
P-12	Target Pressure Below P-09/10	Set-point below the target, used to obtain a "dead-band".
P-13	External Target Pressure	Pressure target when Sect1/2/3 Run is off. Control will try to maintain this pressure until Sect1/2/3 Run is on. At this point P-09/10 used. See: Status Inputs
P-15	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 set point up to a maximum of 2.6 Bar.
P-16	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-17	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-22	Inverter Starts Per Hour	Limits the inverter starts to this many starts per hour, set to 0 if not required.
P-23	Starts per hour	Limits a compressor to this many starts per hour, set to 0 if not required.
P-24	Run smallest	See explanation under the parameter tables for this parameter Run Smallest
P-25	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.
P-26	Comp Unload	Selects the order the compressor loaders are switched off. See Compressor Loaders
P-27	Equal run Times	Equalises compressor run times. See Equal run Times
P-28	Run Proof	See section Run-Proof
P-20	Proof Auto Reset	If the Run Proof feature is in use (P-28 set to On) then an automatic proof reset time can be set. If this value is set to 00:00 then automatic proof reset is not used and the reset has to be done manually.
P-29	Gas Dump	Enables Gas Dump feature. See Gas Dump
P-30	Gas Diff	Diff below the set point that the Gas Dump valve is opened. See Gas Dump
P-31	Inverter	Enables the inverter analogue output and associated relay.
P-32	Inv Bypass	Enable for Inverter Bypass feature. See INV Bypass
P-33	Inverter Min	The minimum percentage the inverter will operate to.
P-34	Inverter Max	The maximum percentage the inverter will operate to e.g. if set to 80% the Inverter output will never go above this value
P-37	INV Hold	When using a variable output, like an inverter drive or digital compressor, the control algorithm will constantly monitor the changing pressure value and continually adjust the variable output accordingly. The INV Hold

		parameter allows a "sample and hold" time in seconds to be set from 1 to 5 seconds. If set to a value of 3 for example, then every 3 seconds the pressure will be sampled and the variable output calculated. This output value will be fixed for the next 3 seconds until the next sample and so on. This parameter can be used to eliminate sudden changes of variable output which may result from a momentary spike in pressure.
P-38	Max Ramp On	When using a variable output, this limits how quickly the output percentage can change when responding to rising pressure. For example, if set to 5%/s then the output cannot increase more quickly than 5% in one second.
P-39	Max Ramp Off	When using a variable output, this limits how quickly the output percentage can change when responding to falling pressure. For example, if set to 5%/s then the output cannot decrease more quickly than 5% in one second.
P-43	In Band Control	When using a variable output, when the pressure is within the control dead band (within set point and target above and target below differentials.) the variable output will not change. With this parameter set to On the variable output will be allowed to change continually when inside the dead band. If however the variable output reaches 0% or 100% (or Inverter Min and Max settings) the next stage will not switch on or off until the pressure is outside the dead band.
P-35	PWM Control	Pulse width modulation control, used to control a digital scroll compressor.
P-36	PWM Cycle Time	The total time for one on/off cycle.
P-39	Fan Interlock	When set to "On" the first condenser fan stage will switch on when any compressor is running. (Only applies if a fan stage is set to "fan", if stage is set to "inverter" the interlock will have no effect on that stage.)
P-40	Number of Stages	Number of stages in the system
P-41	Stage On Delay	Delay time between stages on (not normally required when set to fuzzy control)
P-42	Stage Off Delay	Delay time between stages off (not normally required when set to fuzzy control)
P-50	Alarm Delay	Delay before HP and LP alarms are signalled
P-51	HP Alarm	HP alarm set-point
P-52	LP Alarm	LP alarm set-point
P-53	LP Shut-down	LP shut-down set-point, all stages go off when this is reached
P-54	Low Alarm	Delay applied before LP Shutdown alarm is generated. Note as soon as the LP Shutdown set point is reached any Compressor/Condenser stages, for the associated section, still operating will go off immediately and does not wait for the LP Shutdown alarm to be created.
P-55	Fail	The following will occur in the event of pressure transducer fault: – If set to On then all Compressors or Fans will turn On in the event of a transducer failure. If set to Off then all Compressors or Fans will turn Off in the event of a transducer failure.
P-56	Probe Alarms	If any temperature probes are being used for general monitoring then this parameter selects whether or not to create a probe fail alarm if the probe goes faulty or is disconnected. The exception is the suction temperature probe which will always alarm on probe failure if the Superheat calculation feature is being ued.
P-60	Liquid Level	Enable for Liquid Level feature See Liquid Level
P-61	High Liquid Level	Settings at which High Liquid Level alarm is generated
P-62	Low Liquid Level	Settings at which Low Liquid Level alarm is generated
P-63	Liquid Level Alarm Delay	Delay applied before the Low or High liquid alarm is generated.
P-70	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
P-71	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 (P-76).

		On - Night Reduction (P-72) is always used. **Local -** Uses times in Night Set On and Night Set Off parameters (P-73) and (P-74) to determine Day / Night. **Remote –** Uses GP Timer to determine Day / Night.
P-72	Night Reduction	Reduces inverter output by this amount during night settings.
P-73	Night Set Back On Time	Time for the night set back feature to operate.
P-74	Night Set Back Off Time	Time for the night set back feature to go off.
P-75	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.
P-76	Day Reduction	Reduces the inverter output by this amount when the timer is not in its night zone.
P-77	Day Pressure Limit	Pressure set-point to disable the day reduction feature. Day reduction is disabled above this level and enabled below it.
P-78	Transducer fail Level	Sets the output level of the inverter if the transducer fails.
P-80	Control Type	Selects between; Fixed, Floating Head, Drop Leg or Floating Head/ Drop leg for Condenser control only. **Fixed** - Uses the set-point parameter as its target (P-09/10) 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. **Drop Leg** – Uses a temperature probe converted to a pressure. **Float/ Drop Leg** – Uses both Floating Head and Drop Leg control strategies.
P-81	Float Select	Selects the probe that measures the "floating" temperature. **Note**: This would be fitted to the Air On of the Condenser. See Floating Head Pressure
P-79	Drop Leg Select	Selects the probe that measures the temperature which is converted to the corresponding pressure using the selected refrigerant. See Drop Leg Control
P-82	Refrigerant	Select the refrigerant used in the system. See Refrigerant Table
P-500	Cust_A1 hi	For more information regarding the setting up of the custom refrigeration, please contact RDM Technical Support
P-501	Cust_A1 Lo	
P-502	Cust_B1 Hi	
P-503	Cust_B1 Lo	
P-504	Cust_C1 Hi	
P-505	Cust_C1 Lo	
P-506	Cust_A2 Hi	
P-507	Cust_A2 Lo	
P-508	Cust_B2 Hi	
P-509	Cust_B2 Lo	
P-510	Cust_C2 Hi	
P-511	Cust_C2 Lo	
P-83	Pressure Type	Select whether Absolute pressure or Gauge pressure being used.
P-84	Low Limit	Stops the floating pressure target from going below this level.
P-85	High Limit	Stops the floating pressure target from going above this level.
P-86	Condenser offset	Used to set a condenser differential, which is added to the incoming temperature to produce a "floating" set-point.
P-87	Discharge Trip	If Discharge Pressure exceeds this setting, compressors will turn off gradually or Inverter will ramp down to try to reduce the discharge pressure before it reaches discharge stop parameter P-88.
P-88	Discharge Stop	If Discharge Pressure exceeds this setting **All** compressors on the assigned pack 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. The controller will remain in the stop state for a minimum of 1 minute regardless of pressure.
P-89	Discharge Offset	This is the pressure diff below P-87 & P-88 below which comps start staging

		in again.
P-64	Discharge Temperature	Allows a discharge temperature probe to be fitted to the condenser section which shuts down compressor(s) in the pack section(s) if the temperature goes too high. The "Do Discharge Trip" parameter (P-90) needs to be set in the associated pack section(s).
P-65	Discharge Trip Temperature	If this temperature is reached, the controller will start staging off compressors. Compressors will start staging back on once the temperature drops below the set point minus the differential (P-67) and a one minute delay has expired.
P-66	Discharge Stop Temperature	If this temperature is reached, the controller will stop the digital scroll compressor(s) on the pack section(s). The compressor(s) will start staging back on once the temperature drops below the set point minus the differential (P-67) and a one minute delay has expired.
P-67	Discharge Temperature Dif.	The value below the discharge trip (P-65) and discharge stop temperature (P-66) before the compressor(s) will restart, this is subject to a one minute delay.
P-90	Do Discharge Trip	Enable feature by selecting which condenser is used on this pack, this should be switched on if using a digital scroll compressor.
P-620	Do Superheat	Enables the superheat functionality. This can be set to "Alarm" which will generate superheat high and low alarms or can be set to "Alarm/Low Shut" which as well as generating alarms will shut off the compressors stages if the low superheat drops below the low superheat alarm setting. The superheat value is calculated as the suction temperature measured by the suction temperature probe minus the suction pressure converted to temperature. Refrigerant gas type must be set to enable the pressure to temperature conversion.
P-621	Superheat Select	Selects which temperature probe is used to measure the suction temperature used in the superheat calculation.
P-622	SH Low Target	If the superheat falls below this value the superheat low relay will switch on.
P-623	Superheat Low Diff	The diff above Superheat Target that the superheat low relay will switch off.
P-624	Superheat Low Alarm	Low superheat alarm setpoint.
P-625	Superheat High Target	If the superheat rises above this value the superheat high relay will come on
P-626	Superheat High Diff	The differential below Superheat Target that the superheat relay will switch off.
P-627	Superheat High Alarm	High superheat alarm setpoint.
P-628	Superheat Delay	Time delay applied to superheat high and low alarms.
P-91	Do Split	Enables the Condenser Split feature and setting of modes 1 to 4. Mode 1: Condenser split relay only operates. Mode 2: All staged condenser fans switch off, and split relay operates. Mode 3: All even numbered staged fans switch off, and split relay operates. Mode 4: All odd numbered staged fans switch off, and split relay operates. The split condenser feature has no effect on the operation of the Inverter output (if used), this will operate as normal.
P-92	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.
P-93	Split Temp Diff	Diff above for the split temp feature. If outside ambient air temperature rises above Split Temp parameter plus Split Temp Diff parameter then the Condenser split relay will go off.
P-94	Split Pressure	If the discharge pressure rises above this setting then the condenser split relay will be forced off regardless of temperature.
P-95	Split Pressure Diff	Diff below parameter for Split Pressure feature. If the pressure falls below Split Pressure set point plus Split Pressure Diff parameter then the condenser split relay will return to normal operation.
P-96	Glide	The glide value applied to the refrigerant (when using floating head pressure control)
P-97	Ref Weight	This is the weighting value applied to the refrigerant temperature to pressure look up tables (when using floating head pressure control). When set to 0% the calculated pressure is the liquid (bubble) value, when set to 100% the calculated pressure is the vapour (dew) value, when set to 50% it is half way between the liquid and vapour value.
P-98	Heat Reclaim	Enable for Heat Reclaim. See IO Mapping

		0 = Off (Not Used) 1 = On (Uses Ext Set Point) 2 = On Rly(Uses Ext Set Point and allocates a Relay)
P-600	Fan Reversal Select (For use with 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 pre-set time for a pre-set period to assist clearing debris that may have accumulated in the fans. For relay mapping see IO mapping. When activated the assigned relay will activated for fan reverse length (P602). 0 = Off, feature not used 1 = On, allows fans to be forced manually into reverse 2 = Local, uses the controller's internal GP timer to switch the fans into reverse. 3 = Remote, uses the Data Manager's GP timer to switch the fans into reverse.
P-601	Fan Reversal Start Time	Set the local time of day when fans are switched into reverse (only applies if P-600 is set to local).
P-602	Fan Reversal Length	Sets the length of time fans will run in reverse.
P-603	Fan Reversal Delay	Sets a delay period between fans stopping and being switched into reverse.
P-604	Fan Reversal Fixed Speed on/off	If set to On, the fans will run in reverse at a fixed speed (set in P-605), if set to Off then the fans will run at their normal control speed.
P-605	Fan Reversal Fixed Speed	Sets the fixed reverse fan speed if P-604 set to On.
P-606	Fan Reverse Level	If the discharge pressure drops below this value then the fan reverse cycle will not operate, this is to prevent over condensing. If the pressure drops below this value during a fan reverse cycle then the cycle will be stopped and cannot be reinstated for a minimum of one hour.
P-100	Status fault Delay	Time delay before status faults are activated.
P-101	General Alarm Delay	Time delay before general faults are activated.
P-102	Standby Delay	Time delay between the standby input being activated and the controller going into standby.
P-650 P- ↓ 657	Probe Select Type 1 ↓ Probe Select Type 8	Allows a temperature probes to be used as a plant fault input if required. 0 = Off 1 = Probe (default) 2 = Plant N/O 3 = Plant N/C If set to Plant the input type must be volt free (0v return), 24v cannot be used.
P-670	Loader Status	When using compressor loaders when set to staged control and using run proofs, the status inputs from the loaders should be mapped to the same input as the compressor main body. When the compressor main body is shut down due to a run proof signal then the associated loaders will also shut. When loader status parameter is set to "On" then the main compressor body will stage on first with the subsequent loaders staging on in the normal sequence.
P103 ↓ P118	Status Fault 1 ↓ Status Fault 16	Used to select the type of input required See: Status Inputs
P120 ↓ P135	Stage 1 ↓ Stage 16	Select the output device for this stage
P140 ↓ P155	Stage 1 Size ↓ Stage 16 Size	Sets the relative size for each compressor
P160 ↓ P475	Stage 1 Relay 1 to 16 ↓ Stage 12 Relay 1 to 16	Allocates compressor relays to stages (staged type only, not fuzzy)

General Section Parameters Description (d-02 / General)

The controller has 3 general sections available. The number of general sections required is set in the "Main Config." settings page.

Each general section has 3 thermostats available each with a probe input, an enable input, a switched relay output and a timer relay output. There is also a single pressure stat with a pressure transducer input, an enable input, a switched relay output and a timer relay output.

As with the compressor and condenser control sections each general section requires it's temperature probes, status inputs, pressure transducer input and relay outputs to be mapped to physical IO on the main controller or expansion boards.

The general sections are independent from the compressor and condenser control sections (although they can be mapped to use the same inputs) and can be used to control various functions such as plant room ventilation fans or auxiliary pumps.

General Section Parameters Description

Parameters	Description
Stat1	Off - Thermostat is not used. On - Thermostat is active and does not require a run signal to operate. Run N/O - Thermostat requires a status input to be closed before operating. Run N/C – Thermostat requires a status input to be opened before operating. On/Tm – Thermostat is active when the channel timer is on and does not require a run signal to operate. RunNO/Tm - Thermostat is active when the channel timer is on and requires a status input to be closed before operating. RunNC/Tm - Thermostat is active when the channel timer is on and requires a status input to be opened before operating.
Stat1 Cut-In	Thermostat cut in set point.
Stat1 Diff	Set point differential. If Stat Type is set to Direct then Diff operates below the setpoint, if Stat Type is set to Indirect then Diff operates above setpoint.
Stat1 Type	Direct: Output switches ON above setpoint, normally used for cooling. Indirect: Output switches OFF above setpoint, normally used for heating.
Stat1 High Temp	High temperature alarm threshold.
Stat1 Low Temp	Low temperature alarm threshold.
Stat1 Alm Delay	Temperature alarm delay period.
Stat1 On Time	The start time for the operational period if Stat 1 Parameter is set to a timed mode.
Stat1 Off Time	The end time for the operational period if Stat 1 Parameter is set to a timed mode.
Stat2	Off - Thermostat is not used. On - Thermostat is active and does not require a run signal to operate. Run N/O - Thermostat requires a status input to be closed before operating. Run N/C – Thermostat requires a status input to be opened before operating. On/Tm – Thermostat is active when the channel timer is on and does not require a run signal to operate. RunNO/Tm - Thermostat is active when the channel timer is on and requires a status input to be closed before operating. RunNC/Tm - Thermostat is active when the channel timer is on and requires a status input to be opened before operating.
Stat2 Cut-In	Thermostat cut in set point.
Stat2 Diff	Set point differential. If Stat Type is set to Direct then Diff operates below the setpoint, if Stat Type is set to Indirect then Diff operates above setpoint.
Stat2 Type	Direct: Output switches ON above setpoint, normally used for cooling. Indirect: Output switches OFF above setpoint, normally used for heating.
Stat2 High Temp	High temperature alarm threshold.
Stat2 Low Temp	Low temperature alarm threshold.
Stat2 Alm Delay	Temperature alarm delay period.
Stat2 On Time	The start time for the operational period if set to a timed mode.
Stat2 Off Time	The end time for the operational period if set to a timed mode.

Stat3	Off - Thermostat is not used. On - Thermostat is active and does not require a run signal to operate. Run N/O - Thermostat requires a status input to be closed before operating. Run N/C – Thermostat requires a status input to be opened before operating. On/Tm – Thermostat is active when the channel timer is on and does not require a run signal to operate. RunNO/Tm - Thermostat is active when the channel timer is on and requires a status input to be closed before operating. RunNC/Tm - Thermostat is active when the channel timer is on and requires a status input to be opened before operating.
Stat3 Cut-In	Thermostat cut in set point.
Stat3 Diff	Set point differential. If Stat Type is set to Direct then Diff operates below the setpoint, if Stat Type is set to Indirect then Diff operates above setpoint.
Stat3 Type	Direct: Output switches ON above setpoint, normally used for cooling. Indirect: Output switches OFF above setpoint, normally used for heating.
Stat3 High Temp	High temperature alarm threshold.
Stat3 Low Temp	Low temperature alarm threshold.
Stat3 Alm Delay	Temperature alarm delay period.
Stat3 On Time	The start time for the operational period if set to a timed mode.
Stat3 Off Time	The end time for the operational period if set to a timed mode.
PStat	Off – Pressure stat is not used. On – Pressure stat is on and does not require a run signal to operate. Run N/O – Pressure stat requires a status input to be closed before running. Run N/C – Pressure requires a status input to be opened before running. On/Tm – Pressure stat is active when the channel timer is on and does not require a run signal to operate. RunNO/Tm – Pressure stat is active when the channel timer is on and requires a status input to be closed before operating. RunNC/Tm – Pressure stat is active when the channel timer is on and requires a status input to be opened before operating.
PStat Cut-In	Pressure stat cut in set point.
PStat Diff	Set point differential. If Stat Type is set to Direct then Diff operates below the setpoint, if Stat Type is set to Indirect then Diff operates above setpoint.
PStat Type	Direct: Output switches ON above setpoint. Indirect: Output switches OFF above setpoint.
PStat High Press	High pressure alarm threshold.
PStat Low Press	Low pressure alarm threshold.
PStat Alm Delay	Pressure alarm delay period.
Stat4 On Time	The start time for the operational period if set to a timed mode.
Stat4 Off Time	The end time for the operational period if set to a timed mode.
PStat Span	The total range of the pressure transducer (21 Bar for example)
PStat Offset	The offset of the pressure transducer below 0 (-1 Bar for example)

Pressure, Probe, Status, Inverter and Relay Position Parameters Description (d-03/ Mapping - IOMap)

No.	Parameter	Description
P-01 ↓ P-03	Pressure Position 1 ↓ Pressure Position 3	Position of transducer inputs
P-10 ↓ P-17	Probe Position 1 ↓ Probe Position 8	Position of probe inputs
P-20 ↓ P-35	Status Position 1 ↓ Status Position 16	Position of status inputs
P-40	Inverter Position	Position of Inverter output

P-50 ↓ P-73	Relay Position 1 ↓ Relay Position 24	Position of relay outputs, see: IO Mapping

Universal I/O, Status Inputs, Invert Relays, Probe Offsets Configuration Description (d-04/ Hardware - Main Board)

No.	Parameter	Description
P-01 ↓ P-08	Universal I/O 1 ↓ Universal I/O 8	Select the type of universal input or output
P-50	Universal Custom In Low	If the Universal IO type is set to "Custom mA Input" or "Custom V Input" then the range of the mA or voltage input can be set by the user. As an example, if a pressure transducer with a 1v to 5v signal is being used then the Universal IO parameter (P-01 to P-08) would be set to "Custom V Input" and the "Universal Custom In Low" parameter (P-50) would be set to 1 (for 1volt dc).
P-51	Universal Custom In High	If the Universal IO type is set to "Custom mA Input" or "Custom V Input" then the range of the mA or voltage input can be set by the user. As an example, if a pressure transducer with a 1v to 5v signal is being used then the Universal IO parameter (P-01 to P-08) would be set to "Custom V Input" and the "Universal Custom In High" parameter (P-51) would be set to 5 (for 5volt dc).
P-52	Universal Custom Out Low	If the Universal IO type is set to "Custom mA Output" or "Custom V Output" then the range of the mA or voltage output can be set by the user. As an example, if an inverter drive requires a 1v to 9v speed control signal then the Universal IO parameter (P-01 to P-08) would be set to "Custom V Output" and the "Universal Custom Out Low" parameter (P-52) would be set to 1 (for 1volt dc).
P-53	Universal Custom Out High	If the Universal IO type is set to "Custom mA Output" or "Custom V Output" then the range of the mA or voltage output can be set by the user. As an example, if an inverter drive requires a 1v to 9v speed control signal then the Universal IO parameter (P-01 to P-08) would be set to "Custom V Output" and the "Universal Custom Out High" parameter (P-53) would be set to 9 (for 9 volts dc).
P-10	Status Inputs	Select whether 0V return or 24V ac
P-20 ↓ P-31	Invert/SSR Relay 1 ↓ Invert/SSR Relay 12	Used to invert relay operation or to set the relay as an SSR (solid state relay)
P-40 ↓ P-47	Offset 1 ↓ Offset 8	Offset probes by this amount

Universal I/O, Status Inputs, Invert Relays, Probe Offsets Configuration Description (d-05/ Hardware - Ext Board)

No.	Parameter	Description
P-01	Board Type	Select the type of expansion board being used.
P-01 ↓ P-08	Universal I/O 1 ↓ Universal I/O 8	Select the type of universal input or output
P-10	Status Inputs	Select whether 0V return or 24V ac
P-20 ↓ P-31	Invert Relay 1 ↓ Invert Relay 12	Used to invert relay operation
P-40 ↓ P-47	Offset 1 ↓ Offset 8	Offset probes by this amount

Compressor Run Hours and Compressor Starts Description (d-06/ Stats)

No.	Parameter	Description
P-01	Reset Stats	Reset stats by changing from Reset 1 to Reset 2 or vice versa

Using a Digital Scroll Compressor

A digital scroll compressor requires an Inverter relay allocated to it to switch on the compressor and a solid state relay (SSR) to energise the capacity solenoid. The SSR output is switched **off** to fully load the compressor and **on** to fully unload the compressor**.** The compressor is loaded and unloaded in 20 second cycles as default (P-36 cycle time) so if the compressor is required to run at 50% capacity then the SSR output will be on for 10 seconds and off for 10 seconds. Similarly, if the compressor is required to run at 75% capacity the SSR will be off for 15 seconds and on for 5 seconds. The SSR output will show as "On" when the compressor is fully loaded although the output will be switched off. The relay LED will always show the actual status of the SSR, On when energised (unloaded) and off when de energised (fully loaded).

The following procedure is an example of how the controller should be set up to run a digital scroll compressor:

- When ordering, the controller must be specified with a solid state relay fitted in relay position 1 (PR0650-SUP-E1) or if two digital scrolls are being controlled then a solid state relay is required in relay positions 1 & 2 (PR0650-SUP-E2). Only one digital scroll compressor can be controlled on each compressor section.
- Under the Main Board set up page, set relay 1 to SSR and relay 2 to SSR if fitted.
- Under the section parameters set Inverter to **on** (P-31) and set inverter minimum to 10% (P-33) or refer to compressor manufacturer's specification for a minimum capacity (to provide compressor cooling).
- Set PWM Control to **on** (P-35) and set PWM Cycle time to 20 seconds (P-36) or refer to compressor manufacturer's specification.
- Set stage 1 to SSR and stage 2 to Inverter (P-120 & P-121).
- Under the stage IO map, map the SSR to the position the SSR is fitted on the controller (relay position 1 or 2) and the inverter relay to any other relay which is being used to switch the compressor on.
- The Discharge Stop and Trip parameters need to be set according to manufacturer's specification (P-64, P-65, P-66, P-87, P-88 and P-89), even if the condenser section is not being used, and the "Do Discharge Trip" parameter must be set to **on** (P-90). These parameters enable the digital scroll compressor to be stopped automatically if pressure and/or temperature limits are exceeded.
- If the controller is set to staged control (Types 5-8) then stage 1 should be set to relays 1 & 2 ON (SSR & INV). When there is a demand for the digital scroll to run the enable relay (INV) will switch on and the capacity solenoid (SSR) will be modulated on and off as required.

If using suction pressure optimisation as well as floating head pressure control, particular attention should be paid to the optimise limit parameter (P-15) and the float low limit parameter (P-84). These should be set so that it is not possible for the suction and discharge pressures to get too close to each other, typically a 5.2 Bar differential must be maintained, again refer to the compressor manufacturer's specification for the correct limits.

Liquid Level

Each pack section has the option of a liquid level input using a variable mA or dc voltage on a Universal Input on the Plant controller.

- An input of 0mA, 4mA or 0V will give a reading of 0%, and an input of 20mA, 5V or 10V will give a reading of 100%.
- When the liquid level parameter (P-60) is set to on, the controller will use the "S0x Press 2" input as the liquid level input, the transducer span and offset settings (Span 3 and Offset 3) will have no effect and can be left as default.
- If the liquid level parameter is set to off then this input will become the third pressure transducer input "S0x Press 2" (after Suction Press and Press 1) and the parameters Span 3 and Offset 3 can be set to match the pressure transducer.
- The parameters "Low Liquid Level Alarm" (P-62) and "High Liquid Level Alarm" (P-61) can be set if level alarms are required, the alarm has a settable delay (P-63).
- When mapping the liquid level input to one of the physical universal inputs (mA or voltage), the parameter "PressPos 3" is used.

Note: Each pack section has 3 pressure inputs available, by default these are named "Suction Press", "S0x Press 1" and "S0x Press 2". Only the Suction pressure input is used for control purposes, S0x Press 1 and S0x Press 2 are used for optional monitoring only. The parameters that relate to these three inputs are "Span 1", "Span 2", "Span 3", "Offset 1", "Offset 2" and "Offset 3". Care should be taken as, for example, "Span 3" applies to the input "Press 2".
If the controller has the "Setup" menu option (V4.7 onwards) the number of pressure inputs needs to be set to 3 so that "PressPos3" can be mapped to the liquid level sensor input. "S01 Press 1" can then be hidden if required.

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, so that correspond with each relay output.
- When the relay output is energised and the run proof signal isn't returned within the specified time period, 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.100) 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.
- Example, when the status input is set to Compressor Normally Closed then the input must become open circuit for the compressor run to be confirmed and vice versa.

Note: If using "Run Proofs" and Compressor Loaders.
If you have a compressor with loaders you need to set up status inputs for the compressor body and the loaders and map the inputs accordingly. For example, if relay 1 is a compressor and relays 2 & 3 are the associated loaders then status inputs 1, 2 & 3 would be set as compressors, if inputs 1, 2 & 3 are then mapped to physical input 1 on the controller then when the compressor fault input is activated the associated loaders will be switched off as well as the compressor body.

Run proof inputs must not be used on Inverter (variable speed) stages. If an Inverter is being used that is required to be stopped in the event of a run proof signal not being returned then the stage should be set to "Inv" the fault input set to "Inv N/O" or "Inv N/C" and the Inverter bypass parameters set up as required.
See "Inverter Bypass" section

Resetting a Run Proof
To reset the run proof for any stage, after maintenance, and return a compressor back into the control strategy, the proof status input should be activated momentarily. If a proof status input is not set up then resetting the controller will have the same effect.

From firmware version V5.0 or newer the proof auto reset parameter has been added, this will attempt to restart the compressor automatically after the auto reset period has expired. If the compressor run signal is not confirmed then the compressor will switch off again and will be locked out until the next auto or manual reset.

Gas Dump

Enabled by setting 'Gas Dump Enable' (P-29) to 'on'.

Fuzzy Logic
In Fuzzy pack control the Gas dump relay will come on when the Suction Pressure drops below the Set Point (P-09/10) plus the Gas Diff (P-30) 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.

Staged Logic
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 either:

The pressure rises above the Set Point (P-09/10)
Or
When the last stage compressor goes off, or Inverter Enable is turned off.

Compressor Loaders

Parameter 'Comp Unload' (P-26) determines the order the compressor loaders are switched off, providing 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 (P-26) is set for 0 (Off) then the compressor loaders and compressor body will be switched off before another loader is switched off.

If (P-26) is 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 (P-26) = 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 (P-26) = 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-27) 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.

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. For the fan reversal relay mapping see IO mapping.

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.603) between the fans stopping and being switched into reverse. Following the delay, the assigned relay will be activated for fan reverse length (P602). During the 'fan reverse' period, the speed of the fans will either be at a fixed value (P.604/ P.605) 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 (P-32) 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.
The Run Proof parameter (P-28) needs to be set to "On".

(P-32) 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.

(P-32) set for 1 - the inverter enable will stay off and bypass relay will come on.

(P-32) 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 (P-32) 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 P-32), 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.

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 (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. 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

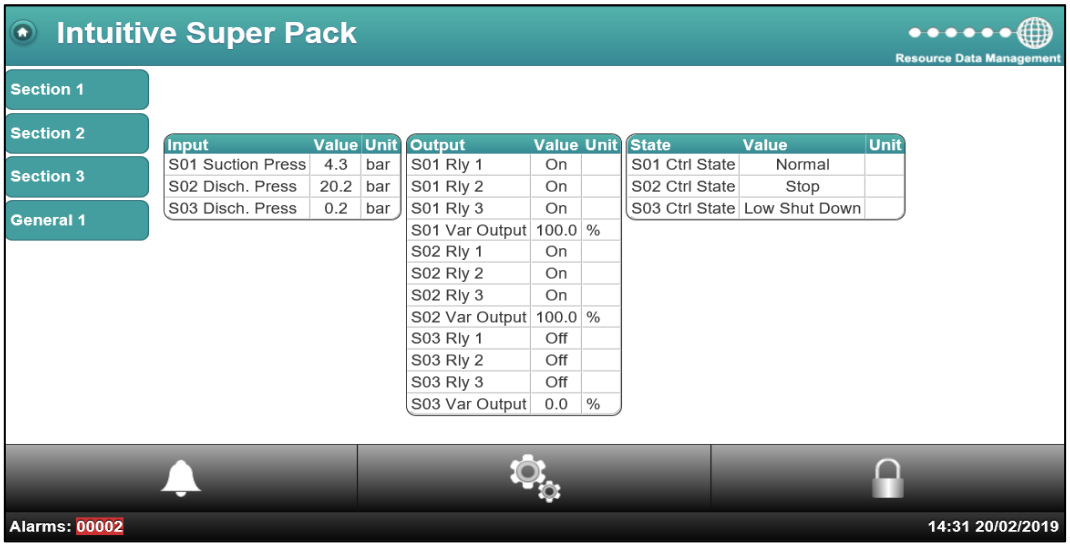
This applies to all relays including the Alarm relay.

Setup via a PC

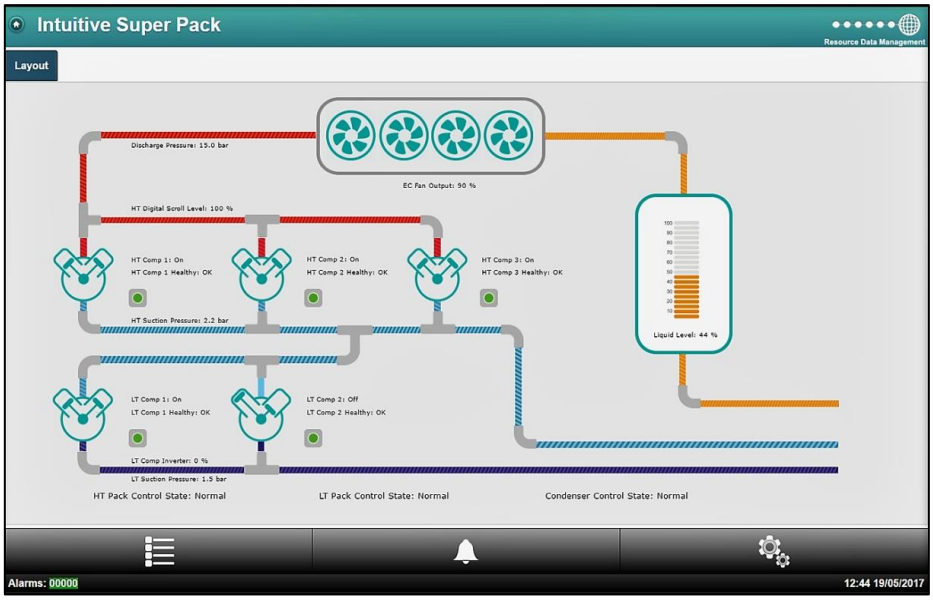
The Superpack controller can communicate directly to a PC using a USB lead (Type A to Type B on the Intuitive controller or Type A to micro USB on the Mini Intuitive controller). Depending on the PC's operating system, it may require the necessary USB drivers to be installed and configured. On Windows 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 Superpack controller hardware platform (firmware version 3.5 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 of the main and general sections in use. Addition tabs such as Mapping, Hardware and Maintenance are available by clicking the service menu. 



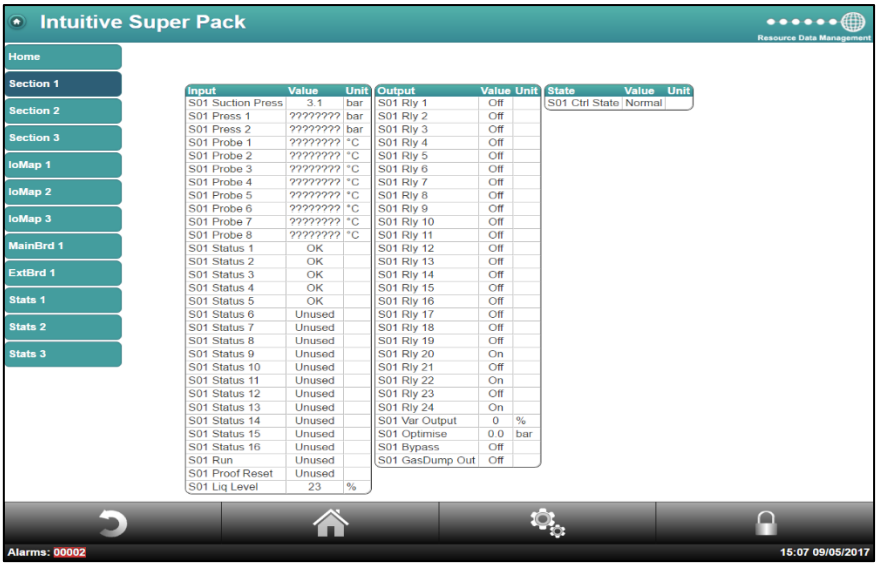
Alternatively, if a layout has been uploaded it will be shown. An example is below



Clicking on the Service icon (cogs), will prompt the user to enter the Username and Password for the device. Setup operations can then be accessed by clicking on the appropriate link from the drop down menus. These menus will look similar to those shown in the Main Menu Overview (PC Connection).

Control

From within the 'Control' menu, the user can select between Section 1, 2 or 3. Each of which offers; Values, Settings, Alarm Log or Set Parameters. The below shows an example of the 'Values' within Section 1. It details the Inputs, Outputs and States.

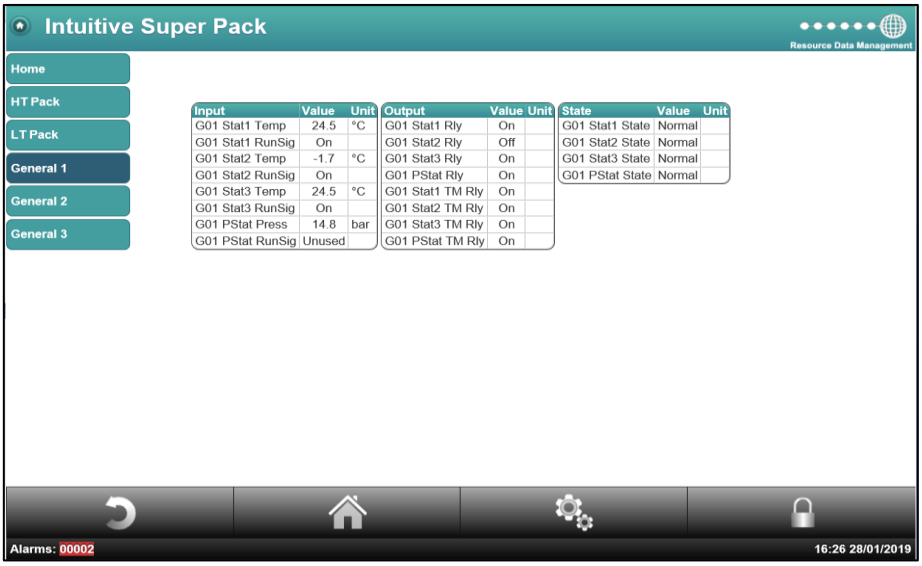


Link	Operation
Values	Shows the values being returned on the controller's inputs, outputs and state for each section
Settings	Shows the controllers parameter settings for each section
Alarm Log	Shows the controllers alarm history for sections 1, 2, 3: 1000 alarms are stored.
Set Parameters	Set parameters for each section

Alarms

Link	Operation
Current Alarms	Shows the current alarms for all sections.
Old Alarms	Shows the historical alarms for all sections

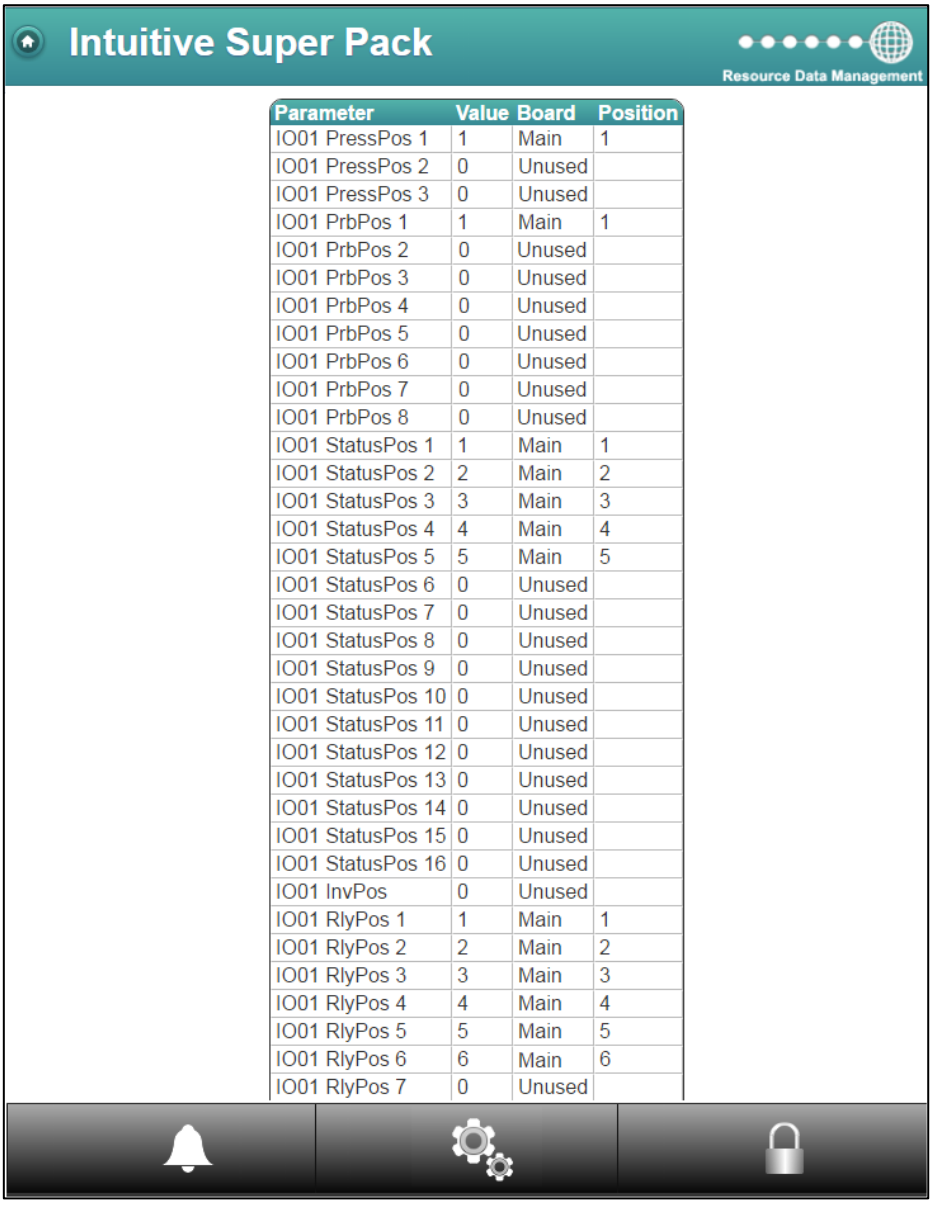
General Sections (If Used)



Link	Operation
Values	Shows the current values of the General section such as stat temperature, pressure and relay states.
Settings	Shows the controllers parameter settings for each of the General sections.
Alarm Log	Shows the controllers alarm history for the General section.
Set Parameters	Set parameters for each section

Mapping

From within the 'Mapping' menu, the user can select between IoMap 1, 2 or 3 for the pack and condenser sections and IoMap 1, 2 or 3 for the General sections (if used). Each of which offers; Values, Settings, Alarm Log or Set Parameters. The below shows an example of the 'Settings' within IoMap 1.



Parameter	Value	Board	Position
IO01 PressPos 1	1	Main	1
IO01 PressPos 2	0	Unused	
IO01 PressPos 3	0	Unused	
IO01 PrbPos 1	1	Main	1
IO01 PrbPos 2	0	Unused	
IO01 PrbPos 3	0	Unused	
IO01 PrbPos 4	0	Unused	
IO01 PrbPos 5	0	Unused	
IO01 PrbPos 6	0	Unused	
IO01 PrbPos 7	0	Unused	
IO01 PrbPos 8	0	Unused	
IO01 StatusPos 1	1	Main	1
IO01 StatusPos 2	2	Main	2
IO01 StatusPos 3	3	Main	3
IO01 StatusPos 4	4	Main	4
IO01 StatusPos 5	5	Main	5
IO01 StatusPos 6	0	Unused	
IO01 StatusPos 7	0	Unused	
IO01 StatusPos 8	0	Unused	
IO01 StatusPos 9	0	Unused	
IO01 StatusPos 10	0	Unused	
IO01 StatusPos 11	0	Unused	
IO01 StatusPos 12	0	Unused	
IO01 StatusPos 13	0	Unused	
IO01 StatusPos 14	0	Unused	
IO01 StatusPos 15	0	Unused	
IO01 StatusPos 16	0	Unused	
IO01 InvPos	0	Unused	
IO01 RlyPos 1	1	Main	1
IO01 RlyPos 2	2	Main	2
IO01 RlyPos 3	3	Main	3
IO01 RlyPos 4	4	Main	4
IO01 RlyPos 5	5	Main	5
IO01 RlyPos 6	6	Main	6
IO01 RlyPos 7	0	Unused	

In the example above:

Section 1 Pressure Position 1 is mapped to Main board Universal Input 1.
Section 1 Probe Position 1 is mapped to Main board probe input 1.
Section 1 Status Positions 1 to 5 are mapped to Main board status inputs 1 to 5.
Section 1 Relay Positions 1 to 6 are mapped to Main board relays 1 to 6.

Link	Operation
Values	Shows the number of I/O that are mapped for each section
Settings	Shows the Inputs and outputs that each section has mapped
Alarm Log	Shows the controllers alarm history for I/O mapping
Set Parameters	Set the I/O Mapping for each section; See: IO Mapping below

Note on mapping relays on expansion modules using the built in LCD display, a local display (PR0615 or PR0620) or a Data Manager

To maintain a standard mapping template for relays, each expansion board can be allocated 12 relay positions, (13 to 24 for example). As the Mini IO expansion module only has 5 physical relays then the next 8 relay positions should be skipped ***if*** there is another expansion module fitted after the Mini IO. If an Intuitive expansion module (12 relays) is being used as well as a Mini IO expansion module (5 relays) then by having the Mini IO as the last expansion module (highest CANbus rotary address switch position) then any confusion over relay positioning is avoided.

If two Mini IO expansion modules are in use then the relays on the first module would be allocated positions 13 to 17 (relays 1 to 12 are on the main controller), and the relays on the second module would be allocated positions 25 to 29 (13 to 24 are skipped).

This setup only applies when setting the relay mapping using a local display or a Data Manager panel where relay positions are allocated numbers (as shown in the table above).

When using a PC or Touch XL to set up the controller directly then the drop down menus automatically limit the relays available to the relevant expansion module so the above note can be disregarded.

IO Mapping

Map Inputs and Outputs to Main Board or up to 10 Expansion Boards. When setting parameters in sections 1, 2 & 3 above, the inputs and outputs allocated are "virtual" positions, these can be mapped to "physical" positions on the hardware. For example, in sections 1, 2 & 3 "virtual" relay position 24 is always the alarm relay but these can be mapped to "physical" relays 8, 9 & 10 for example.

Virtual Relay Position	Pack		Condenser	
Relay Positions 1 to 16	Compressor stages	(Fixed)	Condenser stages	(Fixed)
Relay Position 17	Bypass Relay	(If used)		
Relay Position 18	Gas Dump	(If used)	*See Relay Positioning Below*	
Relay Position 19	Superheat High	(If Used)		
or	or			
Relay Position 19	Superheat Low	(If used)		
Relay Position 20	Standby Relay	(Fixed)	Standby Relay	(Fixed)
Relay Position 21	Remote Relay	(Fixed)	Remote Relay	(Fixed)
Relay Position 22	Offline Relay	(Fixed)	Offline Relay	(Fixed)
Relay Position 23	Run	(Fixed)	Run	(Fixed)
Relay Position 24	Alarm Relay	(Fixed)	Alarm Relay	(Fixed)

All Relay Positions can be mapped to any physical relay on main board or any relay on any expansion board.

Relay Positions

For sections set as condenser, relays 17-19 change depending on the features enabled. The positions will be taken up using up to 4 features, in order of; Condenser split, Heat Reclaim, Bypass and Fan Reversal.

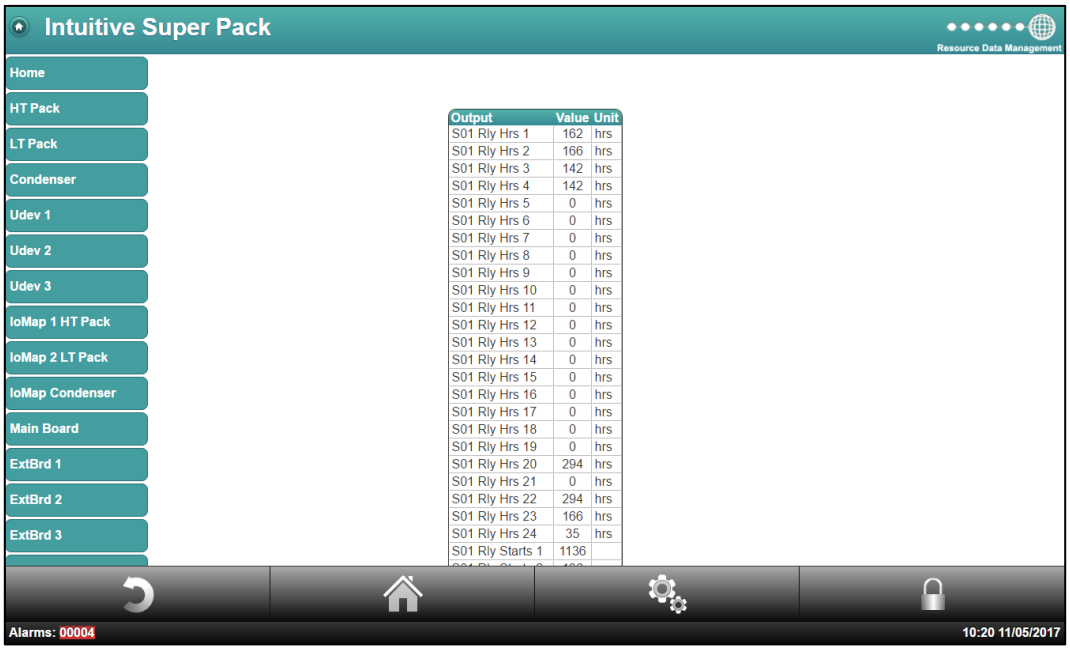
For sections set as pack, relays 17-19 change depending on the features enabled. The positions will be taken up using up to 4 features, in order of; Inverter Bypass, Gas Dump, Superheat High and Superheat Low.

Example 1 - If condenser uses Split, Heat Reclaim and Bypass;
Relay Position 17 will be Condenser Split
Relay Position 18 will be Heat Reclaim Relay
Relay Position 19 will be Bypass Relay

Example 2 – Pack uses Inverter Bypass and Superheat control;
Relay Position 17 will be Inverter Bypass
Relay Position 18 will be Superheat High Relay
Relay Position 19 will be Superheat Low Relay

Stats 1-3

From within the 'Stats' menu, the user can select between Stats 1, 2 or 3. Each of which offers; Values, Settings, Alarm Log or Set Parameters. The below shows an example of the 'Values' within Stats 1.



Link	Operation
Values	Displays the Relay run hours and the relay starts per hour section 1
Settings	Displays the reset Values for each section
Alarm Log	Displays alarm log
Set Parameters	Reset run hours and starts per hour

Visibility

To simplify the appearance of the controller when being viewed with a PC or TouchXL, devices, items, alarms and display values can be hidden or renamed using the Aliases section.

Link	Operation
Device Name Alias	Allows devices to be hidden or renamed such as Section 1, Udev1, MainBrd1, ExtBrd1 and General 1, for example Section 1 can be renamed to "HT Pack" or hidden if not used.
Device Item Alias	Allows items within a device to be renamed or hidden such as S01 Press 1, this can be renamed to "HT Suction Press" for example or hidden if not used. There are four subsections or classes, Inputs, Outputs, States and Parameters.
Device Alarm Alias	Allows the description of any alarm to be changed, for example S01 High Pressure can be renamed to "HT Suction High Pressure" or hidden if not used. Each alarm type alias can be set which allows alarm filtering when connected to a Data Manager front end. Each alarm has a tick box "Send Alert" and "Send Clear" this allows the alarm to be sent via e mail when the alarm occurs and when the alarm clears. The mail setup page needs to be configured accordingly for this feature to operate.
Device Display Alias	Allows the text which appears on the remote display (PR0620) to be aliased, for example "HP SEC1" can be changed to "HP SUCt". Characters that can be used are limited by the 8 segment LED display, for example S, A and L can be used but X, Y and Z cannot.
Index Page Display	Allows the user to configure the Inputs (max 30), Outputs (max 60) and States (max 3), that are shown on the homepage.
Active Alarms	Shows a complete list of alarms that can be generated by the Superpack
Hidden Alarms	Shows a list of alarms that are hidden / disabled (e.g. Udev alarms if no Udev devices)

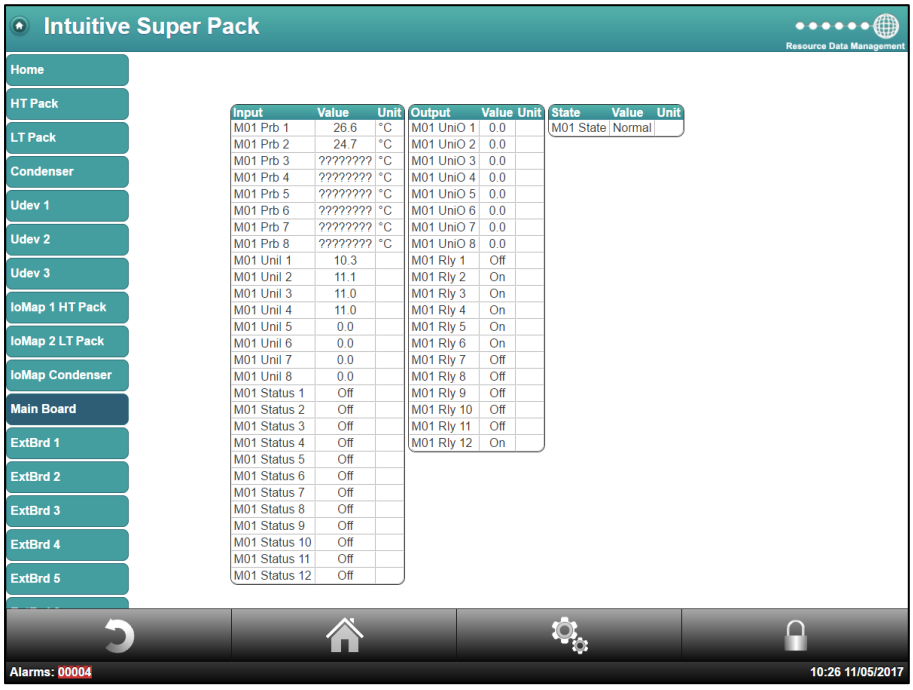
If items are aliased or hidden this will only apply to the controller when viewed directly, all values will be shown when connected to a Data Manager, the Data Manager has its own aliasing page which can be used if required.

To set an alias back to factory setting leave the required filed blank and then set aliases.

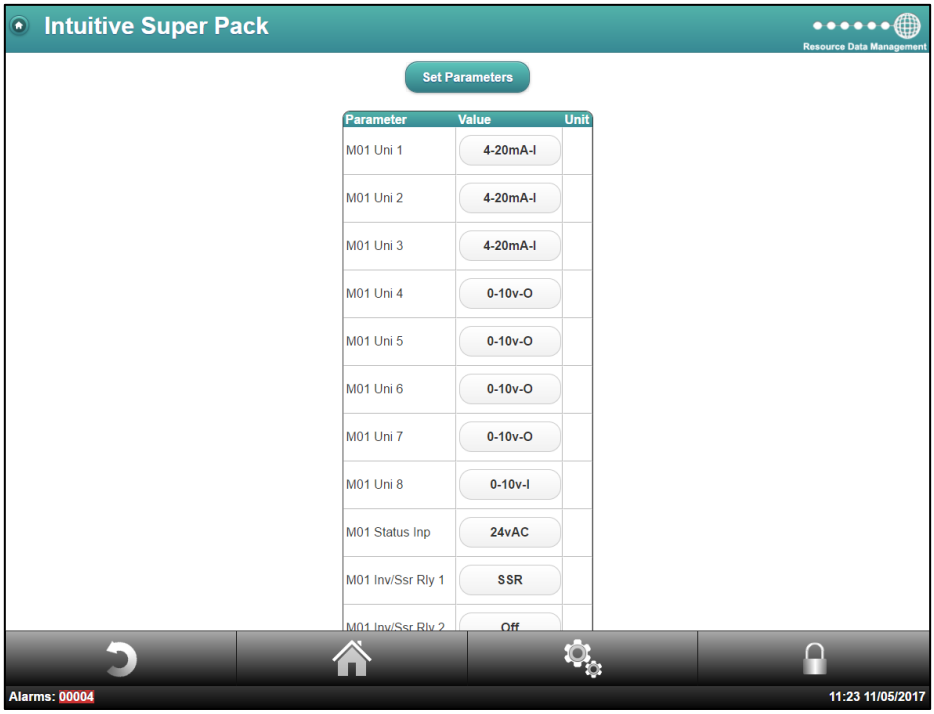
Hardware

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, view the associated alarm log and the option to set the configuration of the Main Board. An example of the real time I/O is shown below;



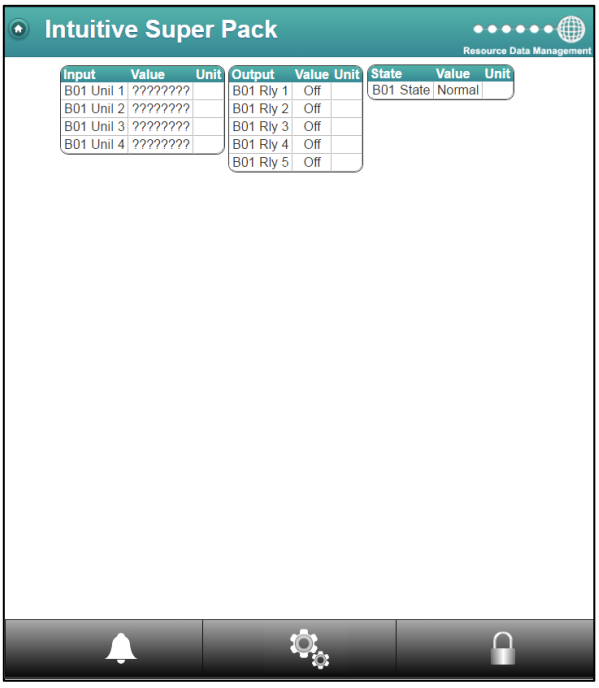
If the user enters the 'Set Parameters' section, it will allow all the Main Board's I/O to be configured, similar to below;

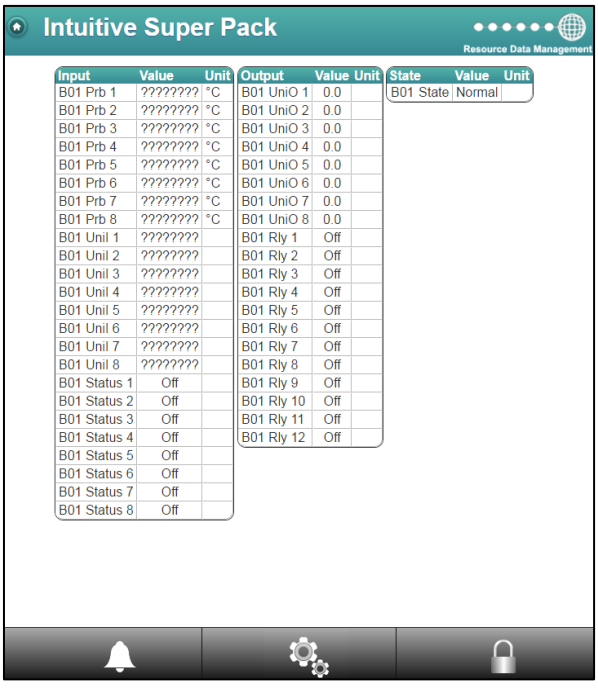


Link	Operation
Values	Shows the values being returned on the main controllers inputs and outputs
Settings	Shows the main controllers configuration settings
Alarm Log	Shows the controllers alarm history; 1000 alarms are stored
Set Parameters	Set the Universal IO, Invert Relay and Probe Offset configuration of the Main Board

ExtBrd 1-10

The Extension Board's hardware set up uses the same method as described in the 'Main Board' section above. The one difference refers to the first parameter; "Board". This option allows the user to detail what board type is being used in this position; select between an IO Expansion Board and a Mini IO board. Examples of both are shown below.





Link	Operation
Values	Shows the values being returned on the controllers Expansion Boards inputs and outputs
Settings	Shows the expansion boards settings
Alarm Log	Shows the expansion boards alarm history; 1000 alarms are stored
Set Parameters	Set the Universal IO, Invert Relay and Probe Offset configuration of the expansion boards

Expansion Board Rotary Switches

Up to 10 expansion boards can be connected to the main controller using a CANbus network cable. The expansion boards are identified by the main controller from their rotary switch position, the **first expansion board should be set to switch position 0**, the second expansion board set to position 1 and so on. The rotary switch is marked as "Module id" on the expansion board.

Mapping Summary

This menu provides an overview for each section's mapping configuration. The example below shows mapping values for configuration PPC (Pack, Pack and Condenser). Section 1 has 6 compressors. Section 2 has 6 compressors. Section 3 has 6 condenser fans.

Section 1 (Pack)

Parameter	Value	Board	Position
IO01 PressPos 1	1	Main	1
IO01 PressPos 2	0	Unused	
IO01 PressPos 3	0	Unused	
IO01 PrbPos 1	1	Main	1
IO01 PrbPos 2	0	Unused	
IO01 PrbPos 3	0	Unused	
IO01 PrbPos 4	0	Unused	
IO01 PrbPos 5	0	Unused	
IO01 PrbPos 6	0	Unused	
IO01 PrbPos 7	0	Unused	
IO01 PrbPos 8	0	Unused	
IO01 StatusPos 1	1	Main	1
IO01 StatusPos 2	2	Main	2
IO01 StatusPos 3	3	Main	3
IO01 StatusPos 4	4	Main	4
IO01 StatusPos 5	5	Main	5
IO01 StatusPos 6	6	Main	6
IO01 StatusPos 7	0	Unused	
IO01 StatusPos 8	0	Unused	
IO01 StatusPos 9	0	Unused	
IO01 StatusPos 10	0	Unused	
IO01 StatusPos 11	0	Unused	
IO01 StatusPos 12	0	Unused	
IO01 StatusPos 13	0	Unused	
IO01 StatusPos 14	0	Unused	
IO01 StatusPos 15	0	Unused	
IO01 StatusPos 16	0	Unused	
IO01 InvPos	0	Unused	
IO01 RlyPos 1	1	Main	1
IO01 RlyPos 2	2	Main	2
IO01 RlyPos 3	3	Main	3
IO01 RlyPos 4	4	Main	4
IO01 RlyPos 5	5	Main	5
IO01 RlyPos 6	6	Main	6
IO01 RlyPos 7	0	Unused	

Section 2 (Pack)

Parameter	Value	Board	Position
IO02 PressPos 1	9	Ext 1	1
IO02 PressPos 2	0	Unused	
IO02 PressPos 3	9	Ext 1	1
IO02 PrbPos 1	0	Unused	
IO02 PrbPos 2	0	Unused	
IO02 PrbPos 3	0	Unused	
IO02 PrbPos 4	0	Unused	
IO02 PrbPos 5	0	Unused	
IO02 PrbPos 6	0	Unused	
IO02 PrbPos 7	0	Unused	
IO02 PrbPos 8	0	Unused	
IO02 StatusPos 1	13	Ext 1	1
IO02 StatusPos 2	14	Ext 1	2
IO02 StatusPos 3	15	Ext 1	3
IO02 StatusPos 4	16	Ext 1	4
IO02 StatusPos 5	17	Ext 1	5
IO02 StatusPos 6	18	Ext 1	6
IO02 StatusPos 7	0	Unused	
IO02 StatusPos 8	0	Unused	
IO02 StatusPos 9	0	Unused	
IO02 StatusPos 10	0	Unused	
IO02 StatusPos 11	0	Unused	
IO02 StatusPos 12	0	Unused	
IO02 StatusPos 13	0	Unused	
IO02 StatusPos 14	0	Unused	
IO02 StatusPos 15	0	Unused	
IO02 StatusPos 16	0	Unused	
IO02 InvPos	0	Unused	
IO02 RlyPos 1	13	Ext 1	1
IO02 RlyPos 2	14	Ext 1	2
IO02 RlyPos 3	15	Ext 1	3
IO02 RlyPos 4	16	Ext 1	4
IO02 RlyPos 5	17	Ext 1	5
IO02 RlyPos 6	18	Ext 1	6
IO02 RlyPos 7	0	Unused	

Section 3 (Condenser)

Parameter	Value	Board	Position
IO03 PressPos 1	17	Ext 2	1
IO03 PressPos 2	0	Unused	
IO03 PressPos 3	0	Unused	
IO03 PrbPos 1	17	Ext 2	1
IO03 PrbPos 2	18	Ext 2	2
IO03 PrbPos 3	19	Ext 2	3
IO03 PrbPos 4	0	Unused	
IO03 PrbPos 5	0	Unused	
IO03 PrbPos 6	0	Unused	
IO03 PrbPos 7	0	Unused	
IO03 PrbPos 8	0	Unused	
IO03 StatusPos 1	20	Ext 1	8
IO03 StatusPos 2	20	Ext 1	8
IO03 StatusPos 3	20	Ext 1	8
IO03 StatusPos 4	20	Ext 1	8
IO03 StatusPos 5	20	Ext 1	8
IO03 StatusPos 6	20	Ext 1	8
IO03 StatusPos 7	0	Unused	
IO03 StatusPos 8	0	Unused	
IO03 StatusPos 9	0	Unused	
IO03 StatusPos 10	0	Unused	
IO03 StatusPos 11	0	Unused	
IO03 StatusPos 12	0	Unused	
IO03 StatusPos 13	0	Unused	
IO03 StatusPos 14	0	Unused	
IO03 StatusPos 15	0	Unused	
IO03 StatusPos 16	0	Unused	
IO03 InvPos	0	Unused	
IO03 RlyPos 1	25	Ext 2	1
IO03 RlyPos 2	26	Ext 2	2
IO03 RlyPos 3	27	Ext 2	3
IO03 RlyPos 4	28	Ext 2	4
IO03 RlyPos 5	29	Ext 2	5
IO03 RlyPos 6	30	Ext 2	6
IO03 RlyPos 7	0	Unused	

Section 1 (Pack)

Sect 1 Pressure Position 1 is mapped to Main Board Universal Input 1 (Value = 1. 1st Universal I/O in set up)
Sect 1 Probe Position 1 is mapped to Main Board Probe Input 1 (Value = 1. 1st Probe input in set up)
Sect 1 Status Positions 1 to 6 are mapped to Main Board Status Inputs 1 to 6 (Value 1 to 6 1st to 6th Status Inputs in set up)
Sect 1 Relay Positions 1 to 6 are mapped to Main Board Relays 1 to 6 (Value 1 to 6. 1st to 6th Relays in set up)

Section 2 (Pack)

Sect 2 Pressure Position 1 is mapped to Expansion Board 1 Universal Input 1 (Value = 9. 9th Universal I/O in set up)
Sect 2 Probe Position 1 is mapped to Expansion Board 1 Probe Input 1 (Value = 9. 9th Probe input in set up)
Sect 2 Status Positions 1 to 6 are mapped to Expansion Board 1 Status Inputs 1 to 6 (Value 13 to 18 13th to 18th Status Inputs in set up)
Sect 2 Relay Positions 1 to 6 are mapped to Expansion Board 1 Relays 1 to 6 (Value 13 to 18. 13th to 18th Relays in set up)

Section 3 (Condenser)

Sect 3 Pressure Position 1 is mapped to Expansion Board 2 Universal Input 1 (Value = 17. 17th Universal I/O in set up)
Sect 3 Probe Position 1 to 3 are mapped to Expansion Board 2 Probe Input 1 to 3 (Value = 17, 18, 19. 17th to 19th Probe input in set up)
Sect 3 Status Positions 1 to 6 are mapped to Expansion Board 2 Status Inputs 1 to 6 (Value 21 to 26. 21st to 26th Status Inputs in set up)
Sect 3 Relay Positions 1 to 6 are mapped to Expansion Board 2 Relays 1 to 6 (Value 25 to 30. 25th to 30th Relays in set up)

Note: Main Board has 12 status Inputs but Expansion Boards only have 8 each therefore only the first 8 can be used on expansion boards.

System

Link	Operation
System Log	Displays the changes made to the controller in chronological order.
Mute All Alarms	Silences all unacknowledged alarms (Yes/No choice).
Clear Alarm Log	Clears the controller alarm log completely (Yes/No choice).
Clear Aliases	Clears all aliases that have been assigned IO. Additionally clears the visibility of sections and IO's.
Features	Displays what features have been enabled on the controller.
Network	Setup: - Rotary Switches (information only) IP Address Netmask Default Gateway
Time	Set the Time or synchronise with the PC.
Version	Shows the controller and expansion board's software version.
TouchXL Status	Displays the IP Address, MAC Address, Name and status of the TouchXL (if connected).
LCD Display Setup	Allows configuration of the built in LCD display (if fitted).
LCD Display Layout	Allows built in LCD display graphics to be created, such as graphs and dials.

Network

BACnet / RDM-485 Setup

When BACnet has been enabled on the Super Pack (PR0655-BAC), it opens the menu for BACnet configuration. The Intuitive Superpack can communicate over BACnet/IP via it's Ethernet port or by utilising the RDM485 Plant Comms Module (PR0623-DIN TDB) it can communicate over RS485. Once the below options have been set, the user must then navigate to the 'Main Config' page found in the 'Maintenance' menu and select Network type (XML, BACnet/IP or RDM485) for the controller to communicate over. The below options are available within the BACnet/ RDM-485 configuration page;

BACnet/IP Port — Virtual port number for IP protocol to communicate on. Default 47808.

Device Instance — Unique instance number of the controller, default 280028.

Network Number — Network number the controller is to communicate on. Default 10280.

COV Lifetime — Change of Value period in seconds.

RDM-485 Address — Unique address for the controller while communicating over RDM-485. Default 126.

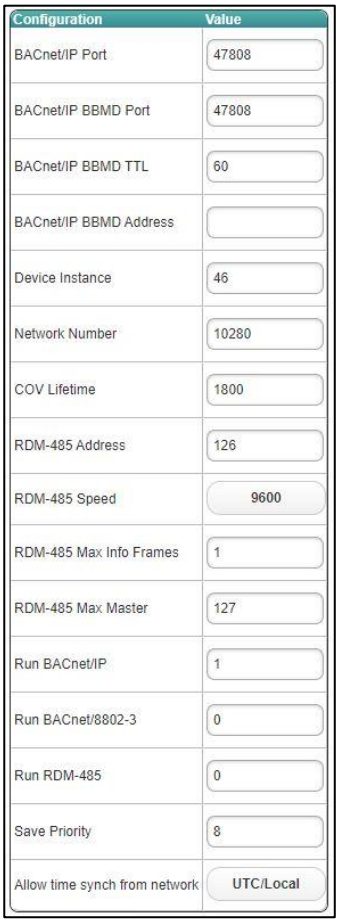
RDM-485 Speed — Select the RDM-485 network speed; 9600 or 38400.

RDM-485 Max Info Frames — RDM-485 Max Info Frames. Default 1.

RDM-485 Max Master — RDM-485 Max Master. Default 127.

Save Priority — The BACnet priority field is selectable between 1 and 16. It sets the priority level, at which an override with this priority number or above, is treated as a non-volatile parameter 'set' and so will be set and saved as that item's parameter value. So, when set to a value of 8, any override of priority 8-16 will be saved as a parameter.

Allow time synch from network — Permits time synchronisation from another networked device.

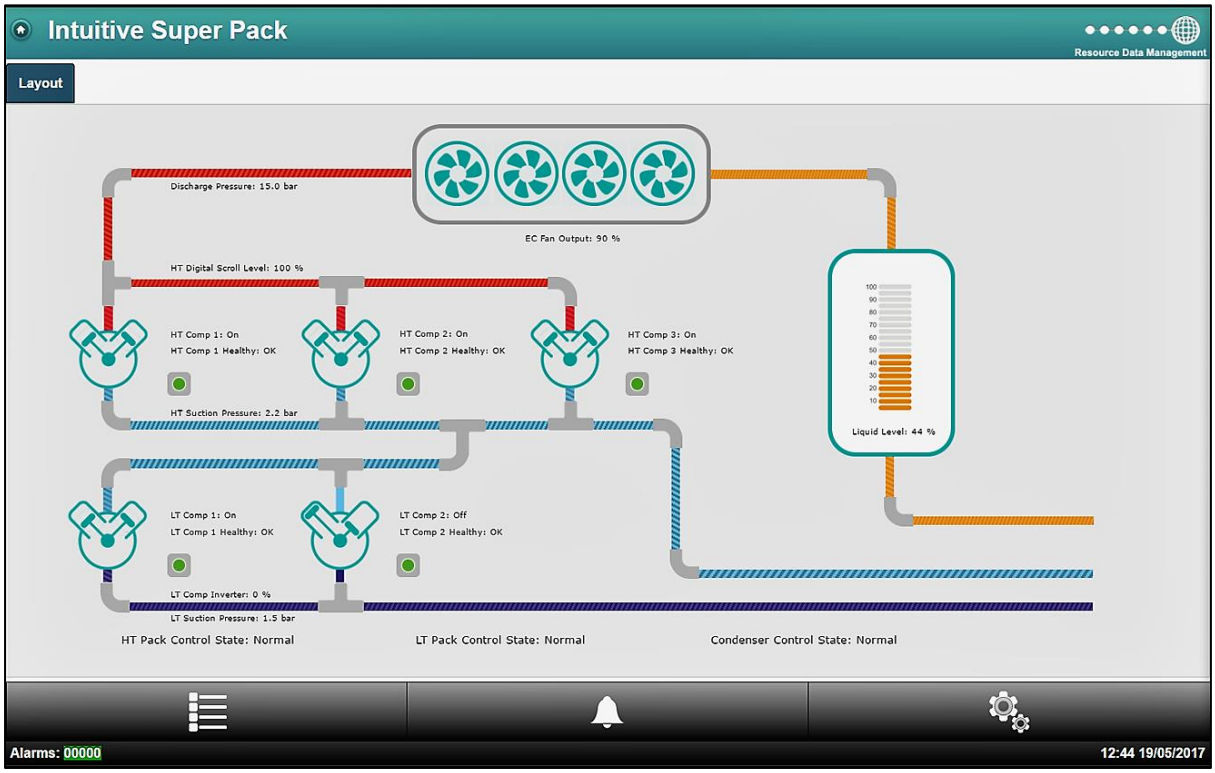


Note: Only users with a detailed knowledge of the BACnet protocol should amend these details as altering them can have detrimental afects on the communications.

Layout

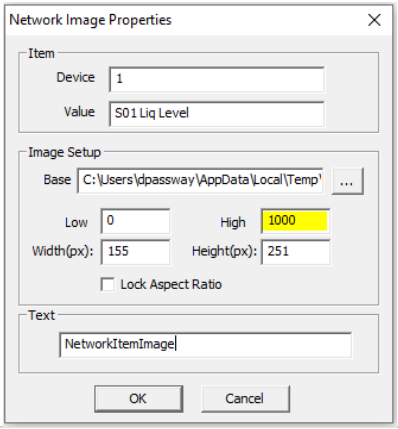
Manage Layouts

The Superpack provides the option for users to upload layouts. 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;



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 Superpack. **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.

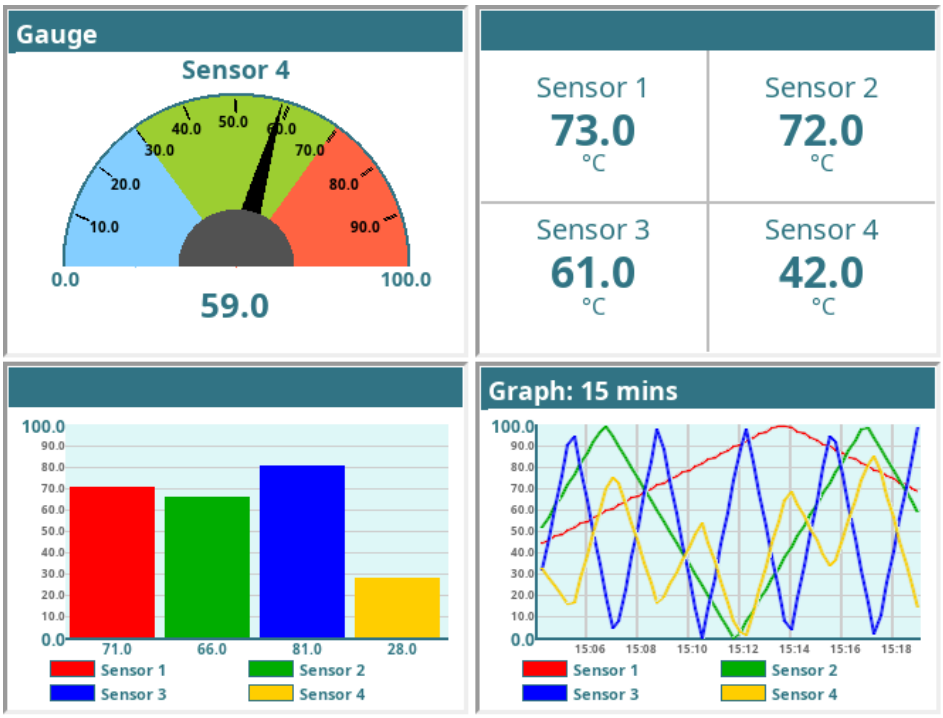
Note: The current Superpack hardware will support a dynamic image which will only allow one level at a maximum size of 1MB.



On Superpack software V4.4 software and above when utilising a Network Item Image (like the liquid level gauge shown above) which has multiple images, the "High" setting in the image properties has to be set to 1000 to operate correctly. This is due to the analogue value having 3 digits and one decimal place, 44.4% for example.

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.

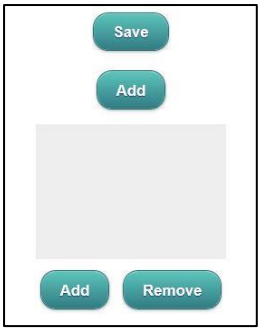


LCD Display Setup

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



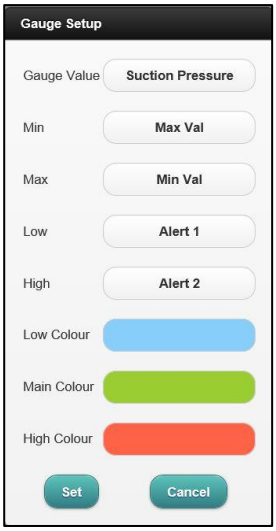
From the service menu select "system" followed by "LCD Display Layout", here the display layout can be customised, a maximum of 6 different screens can be set up.

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.

Gauge

Gauge Value: Selects an analogue value from the controller that is to be shown in gauge form, "S01 Suction Pressure" for example.



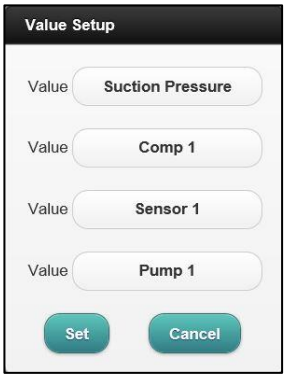
Min: Selects the minimum value that the gauge can display.
This needs to be an analogue value within the controller's parameter list, for example if suction pressure is being displayed then "S01 Offset 1" could be selected which is typically -1 Bar and would become the low limit of the scale on the gauge.

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.

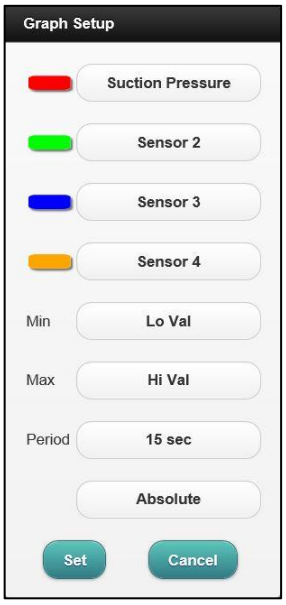
High: This selects a region on the gauge where the colour changes, for example a high pressure region. The area between the max value and the high value will then be the colour selected in the "High Colour" parameter. For example, if displaying suction pressure then "S01 HP Alm" could be used.

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.

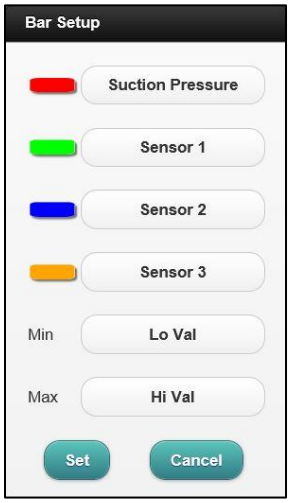
Min: Selects the minimum value that the graph can display.
This needs to be an analogue value within the controller's parameter list, for example if suction pressure is being displayed then "S01 Offset 1" could be selected which is typically -1 Bar and would become the low limit of the scale on the graph.

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.

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

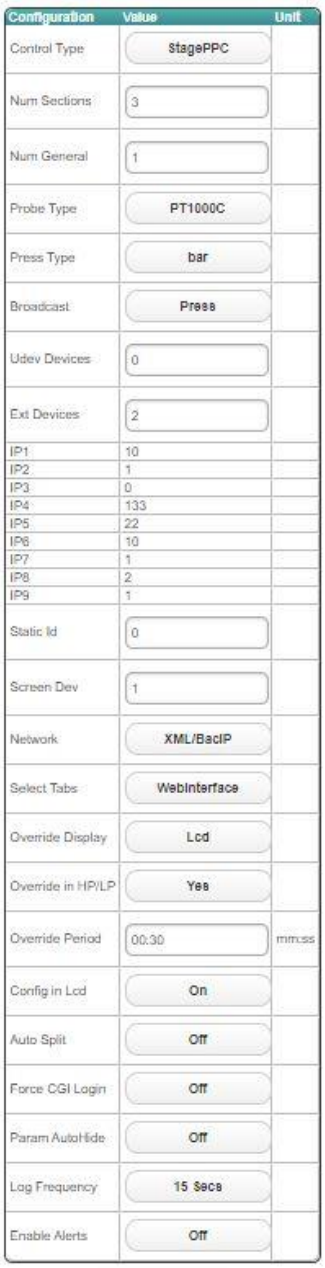


Value: Selects up to four analogue values from the controller that can be shown in the form of a bar graph.

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.

Main configuration screen



Control Type: Select the configuration required.

Num Sections: Sets how many sections are displayed.

Num General: Sets the number of general sections used.

Probe Type: Sets probe type being used.

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 Switch or Mercury IP Module or to broadcast CO2 Case off commands.

Udev Devices: This allows the number of Udev devices (USB current monitors) being used (1-10) to be set

Ext Devices: This allows the number of Modbus expansion boards being used (1-10) to be set

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: Determines what information appears on Touch Display Screen (PR0615)

Set to option 0 Display items can be manually selected
Set to option 1 Displays Section 1-3 info
Set to option 2 Displays Current Transformer info
Set to option 3 Displays Section 1-3 IO mapping info
Set to option 4 Displays Main Board info
Set to option 5 Displays Expansion Boards 1-10 info
Set to option 6 Displays Section 1-3 Stats

Network: Select the type of communication network being used. XML/IP is standard, other networks such as Bacnet are optional features.

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: **Off:** Overrides are not available.
Plant: Overrides are available in the Plant Display (PR0620).
LCD: Overrides are available in the optional inbuilt LCD display.
Touch: Not used at present.

Override HP/LP: If set to "No" then overrides will have no effect if the controller is in a high pressure or low pressure alarm condition.

Override Period: If an override is left active then it will revert back to normal operation automatically after this time period.

Config in LCD: If set to "On" then the configuration menu is available in the optional inbuilt LCD display (software version V3.9 or higher).

Auto Split: Determines whether, when the controller logs onto a DMTouch, if the controller will split (i.e. Section 1, 2 & 3, IO Map 1, 2, & 3, Main Board & Stats 1, 2 & 3) automatically or not.

Force CGI Login: **Off:** When connecting to the controller using a PC or a TouchXL display the home page with all current values will be displayed without having to enter a user name and passcode.
Remote: When viewing from a remote location, user name and passcode must be entered.
Local/Remote: When viewing from any location, user name and passcode must be entered.

Param Autohide: When using the quick "Setup" menu, any IO that are not used such as probe inputs, status inputs and relay outputs are automatically hidden. If autohide is switched off the all IO will appear even if they are not in use.

Log Frequency: The logging frequency can be set from 15 second log intervals up to 60 minute intervals. Setting a fast logging frequency will give more detailed graphs and logs but will use up the memory more quickly reducing the long term logging capacity, export log files will also be much larger in size and take longer to download.

Enable Alerts: When enable alerts is set to ON the controller has the ability to send out alarms via e mail, an additional "Mail" menu will appear at the bottom of the service menu.

Note 1 : - The Auto Split parameter MUST be the same, if connecting more than one Superpack to a DMTouch and they are set to the same Control Type.

Note 2 : - If the controller has logged on to a DMTouch and the Auto Split parameter is changed, the Type file must be deleted from the DMTouch

Maintenance

Link	Operation
Main Config	Allows the configuration of the controller setup. (See information above)
Save Config	Use this option to save the Super Pack configuration to a file
Load Config	Use this option to load the Super Pack configuration to a file
View Config Info	Provides information on the last loaded configuration file and any mismatches
Add Feature	This is a utility to enable features that are currently disabled.
Reset	This allows the user to reset the controller.

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 or Condenser N/O	When selected, "Make" to generate Compressor or Condenser Fault
2	Compressor or Condenser N/C	When selected, "Break" to generate Compressor or Condenser Fault
3	General N/O	When selected, "Make" to generate General Fault
4	General N/C	When selected, "Break" to generate General Fault
5	Standby N/O	When selected, "Make" to place Section 1 into standby and generate Standby alarm.
6	Standby N/C	When selected, "Break" to place Section 1 into standby and generate Standby alarm.
7	Run or Heat Reclaim N/O	When selected, "Break" to use Sect 1 Ext Target (P-13) See Note: Ext Target
8	Run or Heat Reclaim N/C	When selected, "Make" input to use Sect 1 Ext Target (P-13) See Note: Ext Target
9	INV N/O	When selected "Break" to signal Inverter Run. Used when

		using Inverter Bypass relay. See Note: INV Bypass
10	INV N/C	When selected "Make" to signal Inverter Run. Used when using Inverter Bypass relay. See Note: INV Bypass
11	Proof N/O	When the global Run Proof option is being used, this input is "Make" to reset a compressor trip caused by fault input (options 1 or 2 above) or an over or under current trip.
12	Proof N/C	When the global Run Proof option is being used, this input is "Break" to reset a compressor trip caused by fault input (options 1 or 2 above) or an over or under current trip.

For the above any alarms will be generated after the Status Fault Delay (P.100) has timed out. Note: Standby Alarm has a separate alarm delay (P.102).

Note: These are "Virtual" status inputs so the order in which they are allocated is not important as they will be mapped to actual physical inputs later in the setup. Stages should only be set to unused at the end of allocating, for example Input 1=Comp N/O, Input 2=Comp N/O, Input 3=Comp N/O, Input 4=Standby N/C, Inputs 5 onwards=Unused. Do not set a stage input to Unused followed by used input (such as Comp N/O).

External Target

Pack Controller

To use Sect 1/2/3 Ext Target (P-13) instead of Section 1/2/3 Target Pressure (P-09/10) 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-09/10) to (P-13)
- When the input is de-activated the Target Pressure will revert back to (P-09/10)

Condenser Controller Heat Reclaim

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

To use Sect 1/2 Ext Target (P-13) instead of Target Pressure (P-09/10) a Status Input must be set to "Heat 1/2 N/O or N/C".

With Heat Reclaim parameter (P-98) set to "On" the following will occur: -

- When the input is activated the Target Pressure will change from (P-09/10) Target Pressure to (P-13) Ext Target Pressure
- When the input is de-activated the Target Pressure will revert back to (P-09/10)

Or

With Heat Reclaim parameter (P-98) set to "On/Rly" the following will occur: -

- When input is activated the Target Pressure will change from (P-09/10) to (P-13) and turn on the Heat Reclaim relay output.
- When input is de-activated the Target Pressure will revert back to (P-09/10) 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 Pressure (P-13), then the following must be configured: -

- Status Input must be set to "Heat N/O or N/C" and Heat Reclaim has to be set (P-98) to either "On" or "On/Rly".
- When input is activated the Target Pressure will change from (P-09/10) to whatever Target Pressure is being sent from TDB program. The settable range for "S01/02/03 Rem Ext" is -3.4 Bar to 180 Bar.
- When input is de-activated the Target Pressure will revert back to (P-09/10)

Send Ext Target Set Point Command to "S01 Rem Ext", "S02 Rem Ext" or "S03 Rem Ext" using a Data Manager TDB program Analogue Output block.

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

Section Stages

Pack

#	Stage	Description	Notes
0	None	Use this option to end the number of stages in the controller	
1	Unused	Use this option to skip a stage	
2	Inverter	Use this option to assign a stage to an Inverter	
3	Comp	Use this option to assign a stage output to a compressor	See **Note 5** below
4	Loader	Use this option to assign a stage to a compressor loader	See **Note 9** below
5	Trim	Use this option to set a stage to a trim compressor	See **Note 6** below
6	SSR	Use this option to set a stage to a digital scroll solenoid valve	See Using a Digital Scroll
7	Remote	Use this option to set a stage as remotely controlled from a Data Manager GP Timer or TDB program.	

Condenser

#	Stage	Description	Notes
0	None	Use this option to end the number of stages in the controller	
1	Unused	Use this option to skip a stage	
2	Inverter	Use this option to assign a stage to an Inverter	
3	Fan	Use this option to assign a stage to a fan	
4	Remote	Use this option to set a stage as remotely controlled from a Data Manager GP Timer or TDB program.	

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 provide additional capacity if the inverter capacity is too small. The "Trim" relay will always come on first before the Inverter enable relay and 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 the inverter enable relay has been turned off.

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

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.

Operation (Staged)

Staged operation requires the output relays to be "mapped" to a particular stage. Each stage (there are 16 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 or 3. 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-42) 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 Pack and pack 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.

Other operational features

Floating Head Pressure

When the condenser controller is used in the "Floating Head pressure" mode, the following parameters require to be set up

Set Control Type (P-80) to "Floating".

Set Float Select (P-81) to Probe 1 to 8 or Remote whichever is monitoring the temperature.

Select the refrigerant being used in the system (P-82).

Set Pressure Type to Gauge or Absolute (P-83).

Condenser Offset (P-86).

The Air On temperature measured added to the condenser offset along with the Gas and Pressure Type is used to profile a pressure curve. This calculated pressure target "Float" replaces the "Target Set Point" (P-09/10) as the target pressure and (P-09/10) 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-81. 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 temperate 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-81 is set to Remote, then "**S01/ S02/ S03 Rem Float**" would be used in the TDB (broadcasting) to send the remote temperature used for Section 1/2/3 condenser float.

Drop Leg Control

The condenser sections control type can be configured for 'Drop Leg Control' by selecting the following parameters:

Set Control Type (P-80) to "Drop Leg" (or Drop Leg / Floating Head)

Set Drop Select (P-79) to Probe 1 -8 or 'remote'.

Select the refrigerant being used (P-82)

Set Pressure Type to Gauge or Absolute (P-83)

The temperature from the Drop Leg probe is converted to a pressure (based on the refrigerant type selected), which is used for **control only** in place of the discharge pressure transducer. All other functions, i.e. Low shut down and Discharge trip are based on the discharge pressure transducer. If the drop probe is 'lost', the pressure input reverts back to the discharge pressure transducer and a subsequent probe fault alarm is generated.

The Drop Leg Control probe can be selected from probe inputs 1 to 8, settable via parameter P-79. The Drop Leg temperature can also be received as a TDB command sent from a Data Manager TDB program. 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-79 is set to 'Remote', then "**S01/ S02/ S03 Rem Drop**" would be used in the TDB (broadcasting) to send the remote temperature to the controller. **Note**: the value will appear in the 'Rem Drop' input.

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).

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.

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%, or Set-Back going off.

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 "Main Brd" (d-04) and "Ext Brd" (d-05) sections 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 "dEty" and select (d-04) for main board and (d-05) for expansion boards. Select "PArA" and (P-20 to P-31) for relays 1 to 12 for the relay output you wish to invert for example P-24 is relay output 5. Change from "0" to "1" to invert the relay so that the N/C contact is in use.

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

Note: All 12 relays on main and expansion boards can be inverted, but if one is selected as an alarm relay take care as you may not want this inverted as it may be best to have it energised when there is no alarm present and de-energised for an alarm state so in the event of a board losing power the alarm relay drops out.

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-70) is set to 2:**

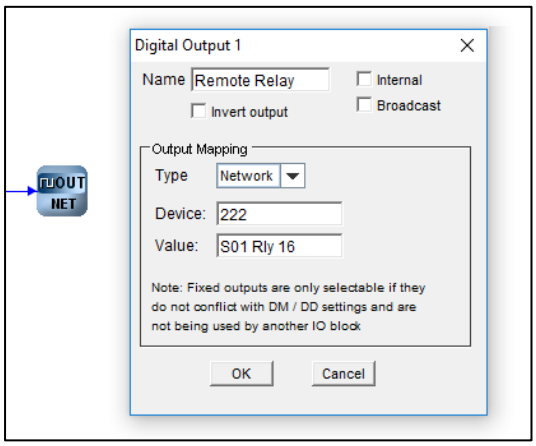
	Fan1	Fan2	Fan3	Fan4	Fan5	Fan6
On Sequence	1st	2nd	3rd	4th	5th	6th
Relay #	Relay 5	Relay 6	Relay 7	Relay 8	Relay 9	Relay 10
Off Sequence	6th	5th	1st	2nd	3rd	4th

Remote Relay

The Superpack controller has two forms of remote relay, a pack/condenser stage that is set to remote and a fixed remote relay that is always allocated to relay 21.

Staged Remote Relay
A section stage is set to "Remote" as opposed to "Comp" or "Fan", this relay can be controlled by a Data Manager GP Timer channel or a Data Manager TDB command.
The GP timer channel should be set to "General", the output mask will be the controller device name as it appears on the Data Manager device list and the output channel set to the physical relay number on the controller. The channel number 0 on the GP timer relates to relay 1 on the Superpack controller so to switch relay 12 on the controller the GP timer channel number would be set to 11.

When using a Data Manager TDB program, a digital out block should be used. Under block properties, the device will be the controller device name as it appears on the Data Manager device list and the value will be "S01 Rly 16" as an example. This will control any stage that is set to Remote in section 1 (Relay 16 in this example), the same applies to sections 2 and 3.



In this example of a digital out block in a Data Manager TDB program, the Superpack device name is 222 on the Data Manager and Section 1 relay 16 is set to remote in the Superpack controller.

Fixed Remote Relay: Virtual relay 21 on each section on the Superpack is always a remote relay, this can be mapped to any physical relay on the controller or an expansion board.

This relay can only be remotely controlled using a digital out block in a Data Manager TDB program. Under block properties, the device will be the controller device name as it appears on the Data Manager device list and the value will be "S01 RemRly Cmd". This will control the remote relay in section 1 (S01), the same applies to sections 2 and 3.

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 (d-01/ Sections)

Note: All sections 1, 2 and 3 has the same I/O numbers.

Number	IO	Range	Units	All Pack Fuzzy	All Pack Staged	All Condenser Fuzzy	All Condenser Staged
I-01	Suction / Discharge 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 ↓ I-17	Probe Input 1 ↓ Probe Input 8	-60 to +128	°C	✓	✓	✓	✓
I-30 ↓ I-45	Status Input 1 ↓ Status Input 16	0 = OK 1 = Alarm 2 = Unused	---	✓	✓	✓	✓
I-50	Run	0 = Off 1 = On 2 = Unused	---	✓	✓		
I-54	Liquid Level	0 – 100	%	✓	✓		
I-60 ↓ I-67	Plant Fault 1 ↓ Plant Fault 8	0 = OK 1 = Alarm 2 = Unused	---	✓	✓	✓	✓
I-22	Heat	0 = Off 1 = On 2 = Unused	---			✓	✓
I-23	Remote Ext Target	-3.4 to 180	Bar			✓	✓
I-24	Remote float	-60 to +128	°C			✓	✓
O-01 ↓ O-24	Relay 1 ↓ Relay 24	0 = Off 1 = On	---	✓	✓	✓	✓
O-28	Stage	0-16	----		✓		✓
O-30	Variable Output	0 – 100	%	✓	✓	✓	✓
O-41	Optimisation Level	-3.4 to 180	Bar	✓	✓		
O-51	Float Pressure	-3.4 to 180	Bar			✓	✓
O-55	Split	0 = Off, 1 = On	---			✓	✓
O-56	Heat Reclaim	0 = Off, 1 = On	---			✓	✓
O-61	Night Set-back	0 = Off, 1 = On	---			✓	✓

O-65	Day Set-back	0 = Off, 1 = On	---			✓	✓
O-70	Bypass	0 = Off, 1 = On	---	✓	✓	✓	✓
O-80	Gas Dump	0 = Off, 1 = On	---	✓	✓		
O-33	Target	-3.4 to 180	Bar	✓	✓		
O-81	Superheat	-60 to +128	^{O}C	✓	✓		
O-82	Superheat Low	0 = Off, 1 = On	---	✓	✓		
O-83	Superheat High	0 = Off, 1 = On	---	✓	✓		
O-110	Total Capacity	0 to 3276	kW	✓	✓		
O-111	Available Capacity	0 to 3276	kW	✓	✓		
O-112	Running Capacity	0 to 3276	kW	✓	✓		
S-01 ↓ S-03	Control States	0 = Off 1 = Stabilise 2 = Initial 3 = Normal 4 = High Pressure 5 = Low Pressure 6 = Low Shut-down 7 = Transducer Fail 8 = Standby 9 = Trip 10 = Stop	---	✓	✓	✓	✓

Input/ Output table (d-02/General Sections)

Number	Inputs Udev	Range	Units
I-01	Stat 1 Temp	-60 to 256	^{O}C
I-11	Stat 1 Run Signal	0 = Off, 1 = On	---
I-02	Stat 2 Temp	-60 to 256	^{O}C
I-12	Stat 2 Run Signal	0 = Off, 1 = On	---
I-03	Stat 3 Temp	-60 to 256	^{O}C
I-13	Stat 3 Run Signal	0 = Off, 1 = On	---
I-04	PStat Pressure	-60 to 256	^{O}C
I-14	PStat Run Signal	0 = Off, 1 = On	---
O-01	Stat 1 Relay 1	0 = Off, 1 = On	---
O-02	Stat 2 Relay 2	0 = Off, 1 = On	---
O-03	Stat 3 Relay 3	0 = Off, 1 = On	---
O-04	PStat Relay	0 = Off, 1 = On	---
O-05	Stat 1 Timer Relay	0 = Off, 1 = On	---
O-06	Stat 2 Timer Relay	0 = Off, 1 = On	---
O-07	Stat 3 Timer Relay	0 = Off, 1 = On	---
O-08	PStat Timer Relay	0 = Off, 1 = On	---
S-01	Control State	0 = Off, 1 = Normal, 2 = Input Fail, 3 = High Alarm, 4 = Low Alarm	---

Input/ Output table (d-03/ CT Monitor - UDev)

Number	Inputs Udev	Range	Units
I-01 ↓ I-05	CT1 ↓ CT5	0 to 500	Amps
S-01	U1 State ↓ U10 State	0 = Unused 1 = Offline 2 = Online 3 = Clash	---

Input/ Output table (d-04/ Mapping - I/O Map)

Number	Inputs Map	Range	Units
I-01	Number of Pressure Mapped	0 to 3	---
I-02	Number of Probe Mapped	0 to 8	---
I-03	Number of Status Mapped	0 to 16	---
O-01	Number of Inverters mapped	0 to 1	---
O-02	Number of Relays mapped	0 to 12	---
S-01	S1 State	0 = OK 1 = Alarm	---

Input/ Output table (d-05/ Hardware - Main Board)

Number	Inputs Main Board	Range	Units
I-01 ↓ I-08	M1 Probe 1 ↓ M1 Probe 8	-60 to +128	°C
I-10 ↓ I-17	M1 Uni 1 ↓ M1 Uin 8	0 to 20	---
I-20 ↓ I-31	M1 Status 1 ↓ M1 Status 12	0 = Off. 1 = On	---
O-01 ↓ O-08	M1 Uni1 ↓ M1 Uni8	0 to 20	---
O-10 ↓ O-21	M1 Relay 1 ↓ M1 Relay 12	0 = Off. 1 = On	---

Input/ Output table (d-06/ Hardware - Expansion Boards)

Number	Inputs Expansion Board	Range	Units
I-01 ↓ I-08	B1 to B10 Probe 1 ↓ B1 to B10 Probe 8	-60 to +128	°C
I-10 ↓ I-17	B1 to B10 Uni 1 ↓ B1 to B10 Uni 8	0 to 20	---
I-20 ↓ I-27	B1 to B10 Status 1 ↓ B1 to B10 Status 8	0 = Off. 1 = On	---
O-01 ↓ O-08	B1 to B10 Uni1 ↓ B1 to B10 Uni8	0 to 20	---
O-10 ↓ O-21	B1 to B10 Relay 1 ↓ B1 to B10 Relay 12	0 = Off. 1 = On	---
S-01	B1 to B10	0 = Unused 1 = Offline 2 = Invalid	

		3 = Mismatch 4 = Reset 5 = Normal	

Input/ Output table (d-07/ Stats)

Number	Inputs Expansion Board	Range	Units
O-01 ↓ O-24	Relay 1 Run Hours ↓ Relay 24 Run Hours	0 to 32767	Hours
O-30 ↓ O-53	Relay Starts 1 ↓ Relay Starts 24	0 to 32767	---

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 and section 3 target pressures.

Override (PR0620 Remote Display)

Using a PC, the "Override Display" value in the main config section needs to be set to "Plant" to allow overrides on the PR0620 display. Pressing the "override" button during normal operation displays the variable output value. Repeated presses will scroll through section 1 then section 2 and section 3 variable output values.

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

- Press the override and enter button together for approximately 3 seconds until "t-01" is displayed.
- "t-01" = main board.
- "t-02" – "t-11 = Ext board 1 to 10.
- Press enter to go to "Main Board" (t-01) overrides.
- "r-01" will be displayed.
- Use the "up" or "down" button to display the relays (r-01 to r-12) and analogue outputs (A-01 and A-08).
- 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 to A-08, press "Enter" and use up and down buttons to select the desired output percentage.
- Press the "Enter" button when the desired value is reached. Each output can be set between 0% - 100%.

Note: A-01 to A-08 must be set for variable outputs. Override will last for 30 seconds then the output will return to normal operation.

Info Button (PR0620 Remote Display)

Pressing the "info" button during normal operation displays the number of current alarms. Repeated presses will scroll through section 1 then section 2 and section 3 number of current alarms

Standby Mode

Once in standby all configured stages are turned off and a standby alarm is generated for the given section. There is a settable delay (P.102) before a section enters standby. Once this delay expires the controller enters standby and an alarm is generated for the relevant section.

Section 1, 2 and 3 can be placed into standby independently using three separate status inputs. Else, 1, 2 or 3 sections can be placed into standby using a common status input by mapping one physical input to each section.

Display Messages (PR0620 Remote Display)

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

Display	System status
HP	High Pressure alarm (Pack or Condenser)
LP	Low Pressure alarm (Pack or Condenser)
Sd	Low Pressure Shut-down (Pack or Condenser)
Lh 1 to Lh 3	Liquid Level High Level alarm
LL 1 to LL 3	Liquid Level Low Alarm
LF 1 to LF 3	Liquid Level Fault
Inv 1 to Inv 3	Inverter Fault
FP 1	Float Probe Fault
trAn Ft	Pressure Transducer Fault
St 1 to St 16	Stage 1 to 16 Fault (Comp or Cond)
PLt 1 to PLt 16	Plant fault 1 to 16
gn 1 to gn 16	General Fault
Stby	Controller in Standby
triP	Discharge Pressure Trip
StoP	Discharge Pressure Stop
ShFt	Superheat Fault
ShOt	Superheat Over Temperature
ShUt	Superheat Under Temperature
br 1 to br 10	Board Offline Alarm
rCL1 to rCL3	Relay Mapping Clash
ShUt	Low Superheat Shutdown

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
Discharge Trip	8
Discharge Stop	8
Discharge Temp	6
General Faults	20
Stage Faults	3
Inverter Fault	3
Board Offline	20
Superheat Fault	6
Superheat Low	5

Alarm text	Type #
Float Probe Fault	6
Liquid Level Fault	6
Liquid Level High	4
Liquid Level Low	5
Controller in standby	20
Float Probe Fault	6
Dropleg Probe Fault	6
CT High Amp	16
CT Low Amp	17
CT Offline	6
Board Config	20
Superheat High	4

Specification

Power requirements (for each Main Controller or expansion module)

Supply Voltage Range	24 Vac ±10% or 24 Vdc ±10%
Supply Frequency	50 – 60 Hz ±10%
Maximum supply current	1.8 Amp
Typical supply current	Intuitive V2: 0.3A, Mini Intuitive: 0.2A

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 ±10% of nominal voltage
Dimensions	Intuitive Plant Controller 280mm (L) x 122mm (W) x 67mm (H) Intuitive Mini Plant Controller 157mm (L) x 122mm (W) x 67mm (H)
Weight	Intuitive Plant Controller 750 Grams Intuitive Mini Plant Controller 500 Grams
Safety	EN 61010-1:2010, UL 62368-1
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
Disposal	Please observe local legislation with regards to electrical products.
Origins	Product designed in the UK manufactured in Taiwan.
Battery	The controller contains a lithium battery to retain time and date information when the controller is not powered. Caution: this battery is not user replaceable and there is a danger of explosion if the battery is replaced incorrectly.

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.

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 >75Ω
Note 2	The 0-10V output will not operate correctly if the target device input impedance is < 10KΩ 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 if the controller is V1 hardware. (V1 hardware is identifiable by having a single CAT5 socket, V2 hardware has two). The cathode should connect to the output terminal and the Anode to GND/Return terminal. V2 Hardware and the Intuitive Mini Hardware do not require a protection diode. The Mercury Plant Controller (PR0600) cannot be used to drive a relay coil. The maximum load current that can be supplied from these outputs is 38mA.
Relay Ratings	
Mechanical Relay	10A/250 Vac/AC1 (Resistive load)
	10A/30 Vdc (Resistive load)
	5A/250 Vac cosφ=0.4 (Inductive load)
Solid State Relay (SSR)	1A/250 Vac (AC only 12-280Vac, will not switch DC) minimum load 60mA
Safety	Conforms to EN60730-1 based on UL 60950-1; UL 62368-1 as referenced to IEC60730-1

Internal Display

	Intuitive PR0650
Display	2.4” 320 x 240 Full Colour TFT Graphic LCD
Buttons	6 x Pushbuttons

Comms

Comms	Ethernet 10/100baseT
Inter-board Comms	CANbus (see specification below)

CANbus cable specification

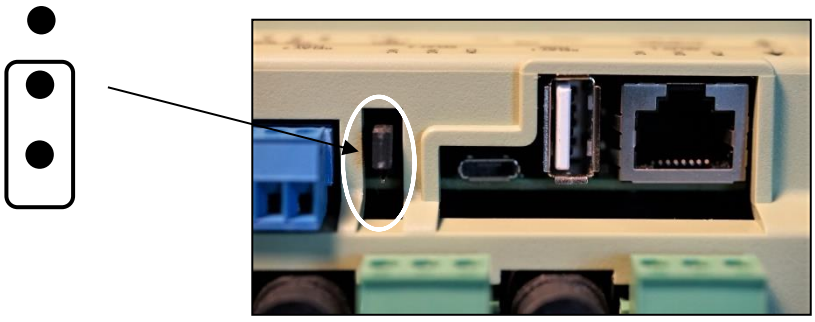
CANbus communication cable **must** be of a standard to meet ISO11898 or equivalent and the screen cable **must** be connected.

Firstly, wire the CANbus network from the controller to each Expansion board. The Intuitive Controller has a termination resistor built in which is selected by a jumper. The network should be wired in a daisy chain configuration. Only one Intuitive Plant controller should be connected to a single CANbus network. The maximum allowable network cable length is 500M in total from one end of the network to the other providing a CANbus network cable which meets ISO11898 or equivalent is used.

A maximum of 10 expansion boards can be connected to a single Intuitive Plant controller. When connecting an expansion board to an Intuitive Plant controller or another Expansion board the following must be observed.

Plant Controller/Expansion Board		Expansion Board
CAN High	Connects to	CAN High
Screen	Connects to	Screen
CAN Low	Connects to	CAN Low
Ground	Connects to	Ground

End of line termination resistor

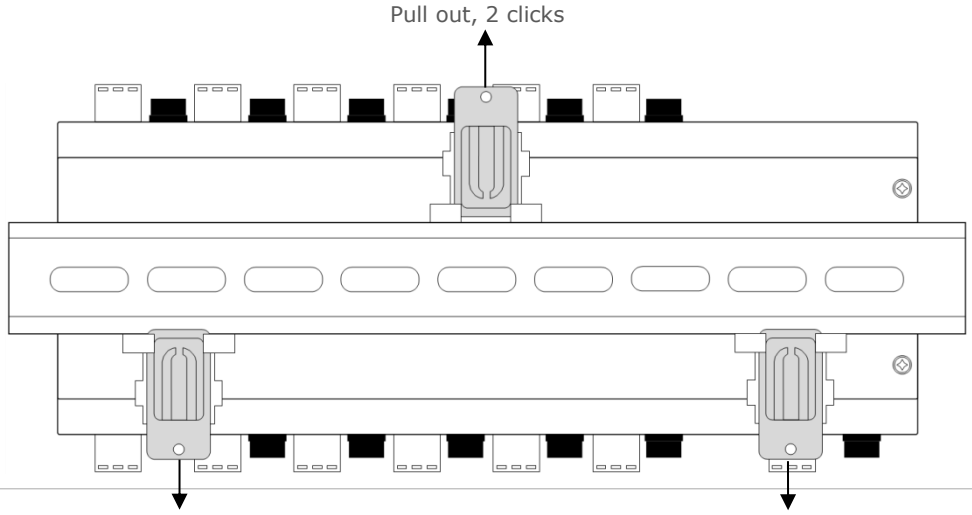


The end of line termination resistor link should be fitted to the middle and bottom pins on the Main control board and on the last expansion board on the CANbus network. All other expansion boards should have the link removed or fitted to the middle and top pins.

Picture shows PR0680 hardware

Installation

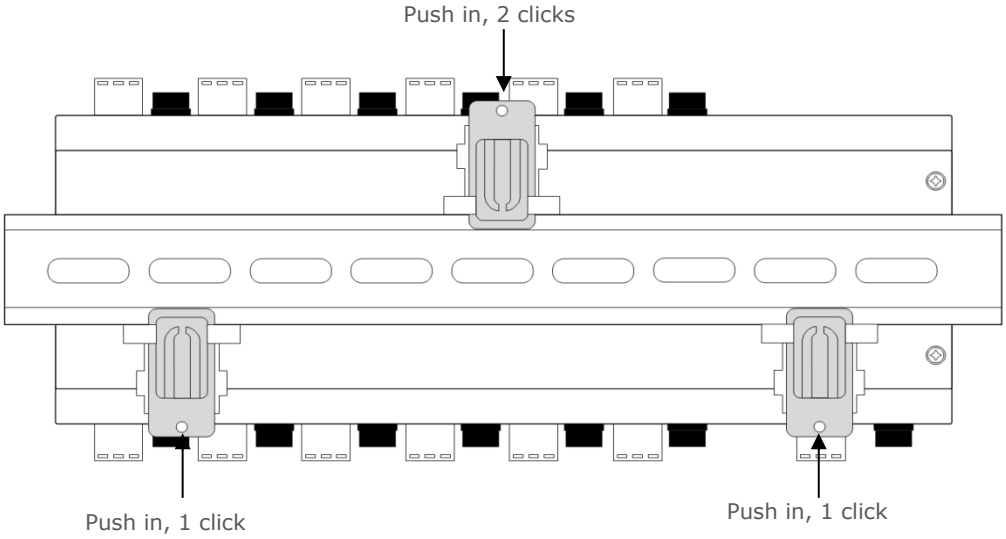
Mounting on to a DIN rail, Intuitive Plant Controller



Please ensure switched off before installing or maintaining this product.

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 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 damped lint free cloth.

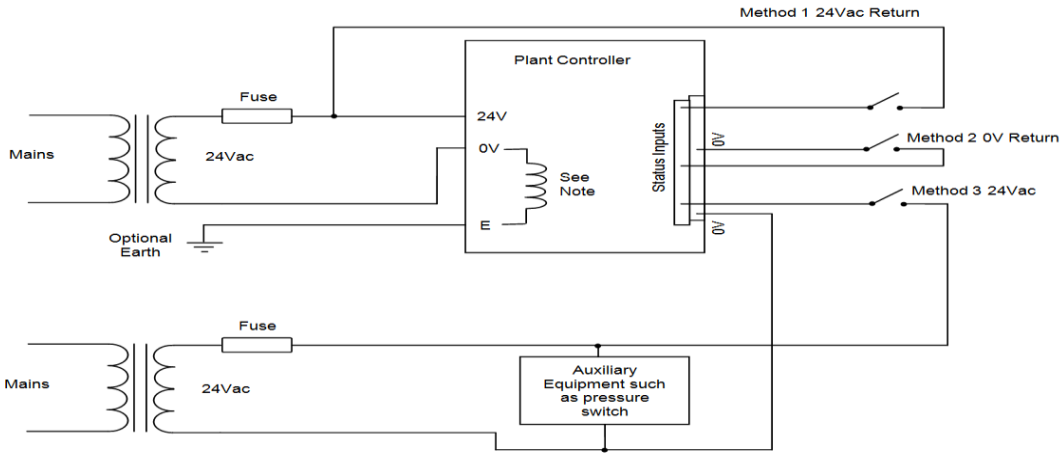
Please note: The specifications of the product detailed on this set up guide may change without notice. RDM Ltd shall not be liable for errors or for incidental or consequential damages, directly or indirectly, in connection with the furnishing, performance or misuse of this product or document.

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.

Appendix 2 – Data Manager Load Shedding Setup

Typical Data Manager Load shedding settings are shown below when using a Superpack controller:

Pressure device: This should be entered a "$Pack001" where 001 is the network address of the controller (usually the rotary switch positions).

Pressure Item: This can be Press1, Press2 or Press3 and relates to which of the pressure transducers on that section you want to use.

Pack Type: This can be set to New (Section1), New (Section 2) or New (Section3) depending on which section you want to use.

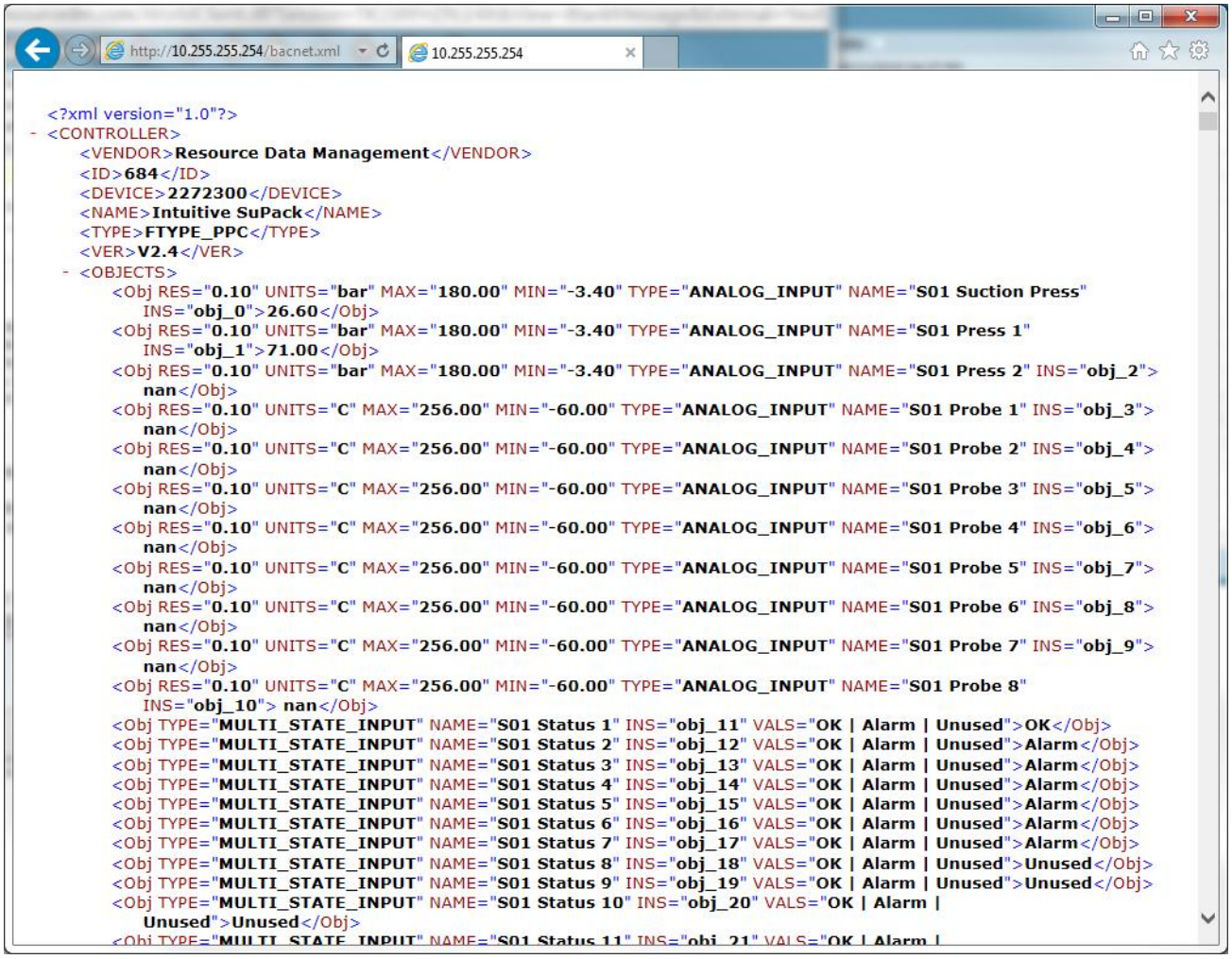
Other settings:			
Ambient Temperature Device	------	Load Pressure Limit 1	50
Ambient Temperature Input	------	Load Pressure Diff	5
Pressure Device	$Pack001	Load Pressure Time 1 (s)	20
Pressure Item	Press1	Load Pressure Limit 2	55
Pack Type	New (Section 1)	Load Pressure Time 2 (s)	20
		Load Pressure Start Stage 2	2

Appendix 3 – BACnet object list.

The BACnet object list can be viewed by appending "bacnet.xml" to the end of the device's IP address in the browser address bar, for example;

http://10.255.255.254/bacnet.xml

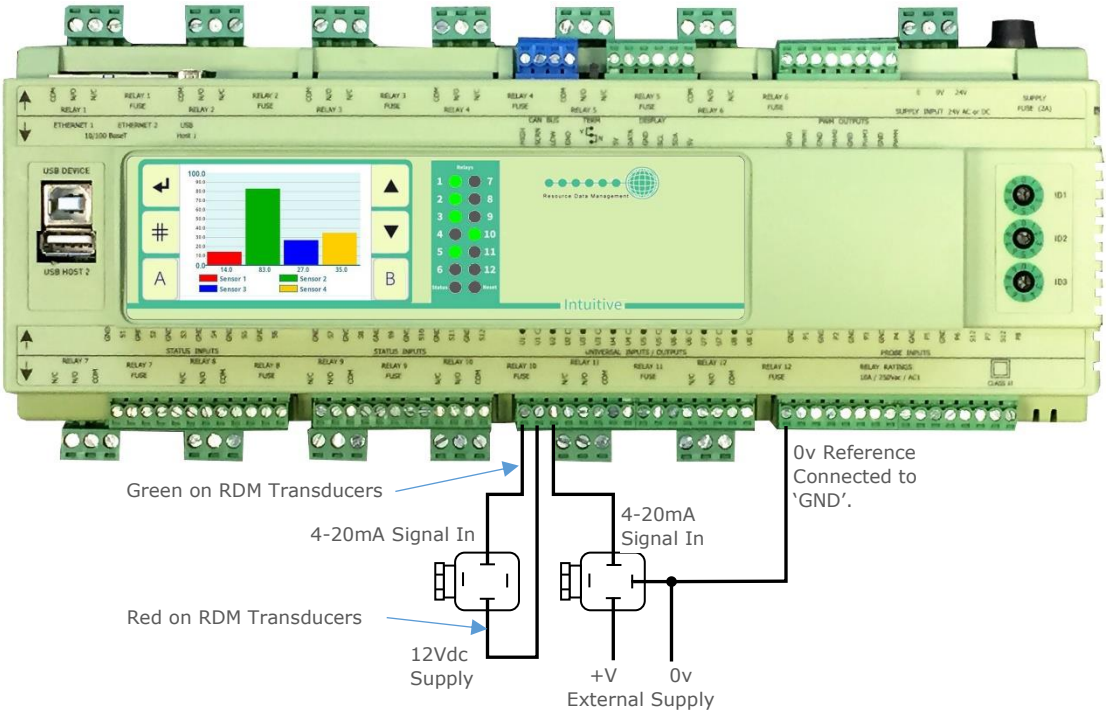
This list will vary depending on controller setup and type. An example is shown below:



Appendix 4: Typical 4-20mA Input Connection

When using a 4-20mA input device (such as a pressure transducer or liquid level sensor), the controller supplies a 12vdc supply to power the device and measures the 4-20mA current level being returned by the device, the connections for this setup are shown below on the below left, connected to universal IO1.

If the 4-20mA device utilises it's own power supply then the 12vdc supply from the controller is not required and should not be connected, only a 4-20mA signal input (black dot) and 0v reference should be connected. This setup is shown below on the right, connected to universal IO2:



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

Disclaimer

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Revision History

Date	Revision	Update No	Changes
18/01/2018	3.5	01	First Issue of V2 Hardware
23/01/2018	3.6	01	Note added on Windows 7 drivers
		02	UL Compliance statement.
02/02/2018	3.7	01	Improvement of built in display button operation.
01/06/2018	3.9	01	New Auto-Split feature used with DMT.
		02	Added New LCD Menu.
		03	USB options added to LCD menus.
		04	New Override options for the Main & Expansion Boards.
		05	Added Override Options in Config.
		06	Aliased and hidden items carried through to LCD display.
03/07/2018	4.0	01	Improvement to relay overrides.
13/07/2018	4.1	01	Enhancement of built in display operation.
26/07/2018	4.2	01	Protection improved for uploading files through USB.
21/08/2018	4.3	01	Enhancements made for handling configuration files.
26/03/2019	4.4	01	General Section 1 to 3 added
		02	Autosplit feature defaulted to “Off”
		03	Percentage resolution increased to 0.1%
		04	Stage On and Off delays defaulted to 10 seconds
		05	Force CGI login added
		06	Superheat Functionality Added
		07	New Parameters Max Ramp On, Max Ramp Off, In Band Control and Inverter Hold
		08	Superheat Functionality Added
		09	Discharge Stop alarm added
		10	Users Menu added
09/04/2019	4.5	01	Improvements made to display when using timeclock.
19/08/2019	4.6	01	Support added for R454C and R455A.
		02	Ability to use a custom Refrigerant table added
16/10/2019	4.7	01	Support for Mini Intuitive PR0680 and PR0663 expansion modules added, Setup menus added, Parameter Autohide feature added.
		02	Update to specification
09/12/2020	5.0	01	Support added for printing parameters via export
		02	Analogue Output can now be inverted
		03	Added Custom voltage range
		04	Ability to email alerts
		05	Support added for graphing.
		06	Automatic reset of run proofs
		07	Support added for monitoring probes to alarm.
		08	Bacnet enhancements BBMD, IP, 8802-3 and RDM-485
20/08/2021	5.0a	01	Mini Intuitive controller I/O connections updated

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