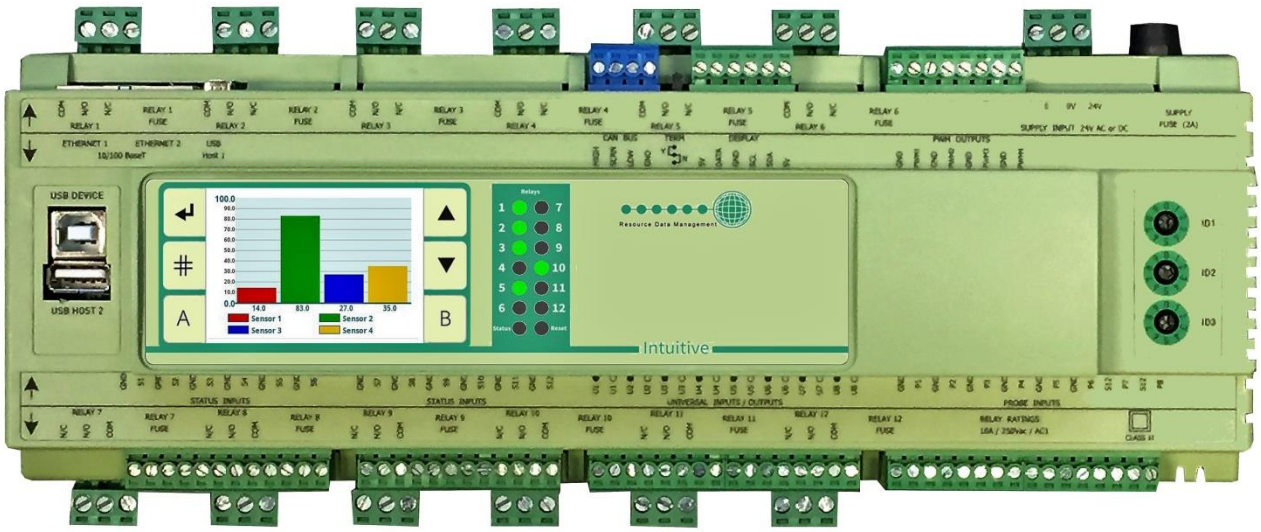
Resource
Data Management

Intuitive Bitzer IQ Rack

Commissioning/User Guide

3.1



PR0650-BITZIQ

Contents

The Intuitive Range

From Resource Data Management

This documentation refers to the Intuitive Bitzer IQ Rack.

Description

This controller is based on the Standard Superpack controller but has the added ability to communicate with up to 24 Bitzer CM-RC-01 compressor control modules using a Modbus network interface. The controller also has three general sections, each of which has three thermostats and one pressure stat, these can be used for independent general purpose temperature and pressure control.

Intended for up to 3 sections of Pack and/or Condenser control, each of the 3 sections can control up to 8 Bitzer compressors via their modbus control interfaces. Relay outputs are also available for direct compressor switching that are configurable for compressors or loaders, if the section is set to condenser control then these relays will switch condenser fans. Each section has up to 12 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 4 control type 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).

Up to 10 expansion modules (IO expansion, Mini IO expansion) 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 8 compressor relays, then a minimum of 24 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, 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 V3.1 the default username and password is unique to every individual panel. 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**
The end user MUST then 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 "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.

Ordering Information

Intuitive / Plant Controller Descriptions	Part Number
Intuitive Bitzer IQ Rack Controller (No Internal Display)	PR0650-BITZIQ
Intuitive Bitzer IQ Rack Controller (Internal Display)	PR0650CD-BITZIQ
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

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

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

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

Quick Start Guide (using a PC)

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. Set the number of sections required, probe type, number of general sections and number of Modbus devices (Bitzer compressor control modules). Select **Set Configuration** to save settings.

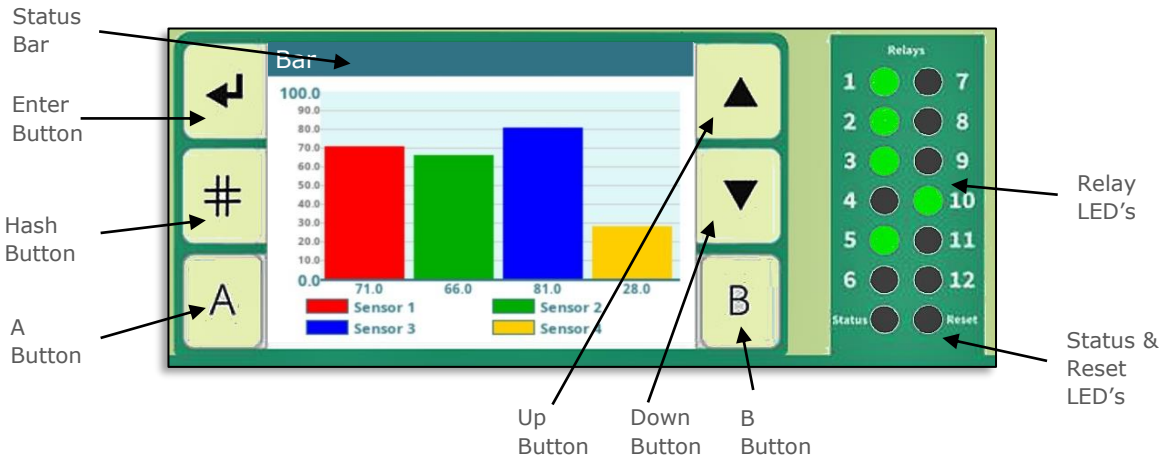
- Select the **Service Menu, Hardware**, **MainBrd 1** then **Set Parameters**. The **Set Parameters** menu will appear - this allows the hardware configuration for the main board to be set.
    - Set **M01 Uni1** to **Uni8** as required, for example if the first two universal inputs are 4-20mA pressure transducers then **M01 Uni1** and **M01 Uni2** will be set to **4-20mA_I.**

  Select the **Modbus Menu** and map each modbus compressor control interface to a modbus section **MBDev1** up to **MBDev24**, this is done by selecting **Set Parameters** and entering the modbus address and network line number. For example if the first compressor interface is set to Modbus address 1 on network line 1 then set these values in **MBDev1 section.**
  MBDev1 is now mapped to the compressor control module with Modbus address 1

- 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.
    - Compressor stages now need to be set up (**S01 Stage 1** to **S01 stage 8**), for example, if 8 Bitzer compressor control modules being used then **SO1 Stage 1** to **S01 stage 8** should all be set to **Comp,** any unused stages should be left as **None**.
- 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 **S03Day 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.
- The sections are now set up however the inputs and outputs are not automatically mapped to the physical inputs and outputs of the hardware (pressure transducers for example) and individual compressors needs to be mapped to Modbus Bitzer control modules, this needs to be done manually.
- Select the **Service Menu, Mapping, IO Map 1** then **Set Modbus Map.** Each compressor stage can now be mapped to an individual Modbus Control module, for example parameter **IO01 MB RlyPos1** would normally be mapped to Modbus Device **MBDev1.**
- To map the physical IO of the controller Select the **Service Menu, Mapping, IO Map 1** then **Set Plant Map.** 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 1-12, 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 fault inputs mapped to main board status positions 1 to 4 then section 2 would start at main board status 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 status inputs, alarm settings and night setback can now be set as required.

Integral Graphical Display (optional)



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

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

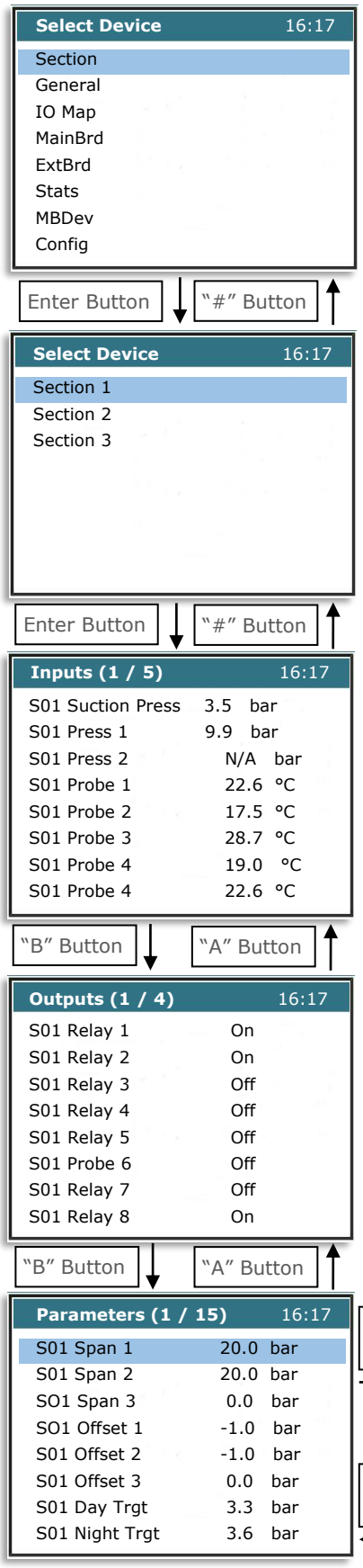
Enter Button	Used along with down button to enter menu items.
Up Button	Used to scroll up.
Down Button	Used to scroll down.
"B" Button	Used to scroll to the next page
"A" Button	Used to scroll back a page
"#" Button	Used to escape from the current page

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

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



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 the inputs, outputs and status of each general section in use to be viewed, control parameters can also be viewed and changed.

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.

MBDev: Allows viewing and setting of Modbus devices (compressor control modules), such as Modbus Address and fault statuses.

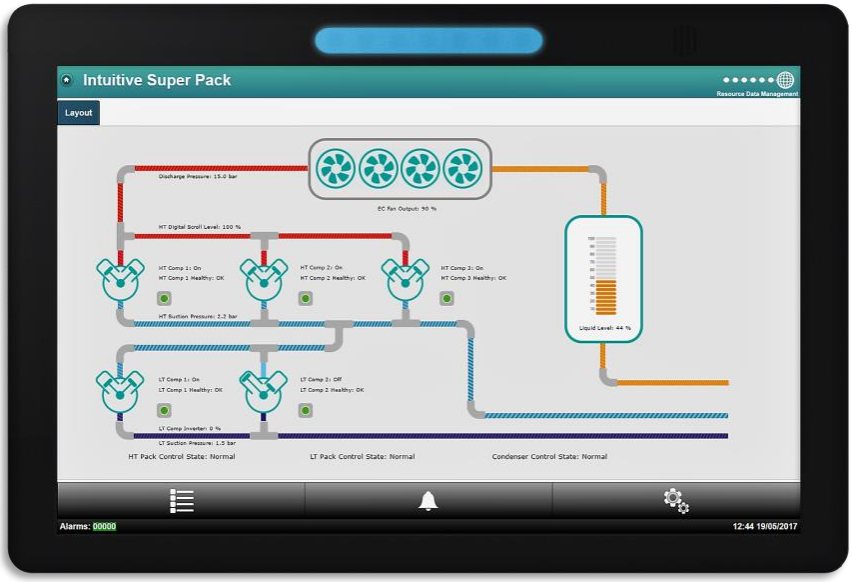
Overrides: Allows relays and variable outputs to be manually forced on and off for testing and commission purposes. This menu will only appear if set in the main configuration page in the controller using a PC.

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, for example if no expansion boards are being used then the "ExtBrd" menu 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 Bitzer IQ Rack, 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 Bitzer IQ Rack controller which will appear on the TouchXL. Layouts can be generated using the RDM Layout Editor software which is available separately.

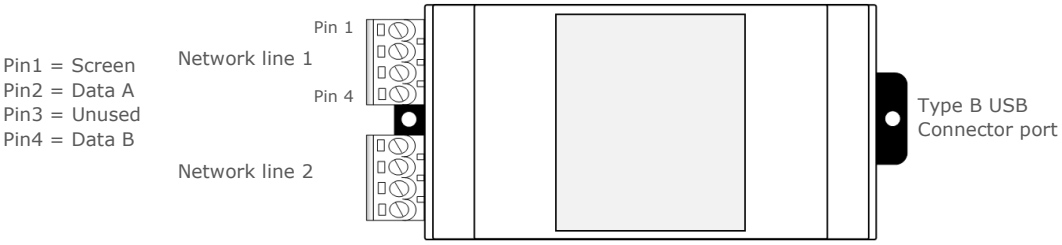
The TouchXL has the benefit of being able to connect to the Intuitive device via USB (USB host 1 or 2) to micro USB or standard Ethernet connections over IP.

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 Bitzer IQ 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.

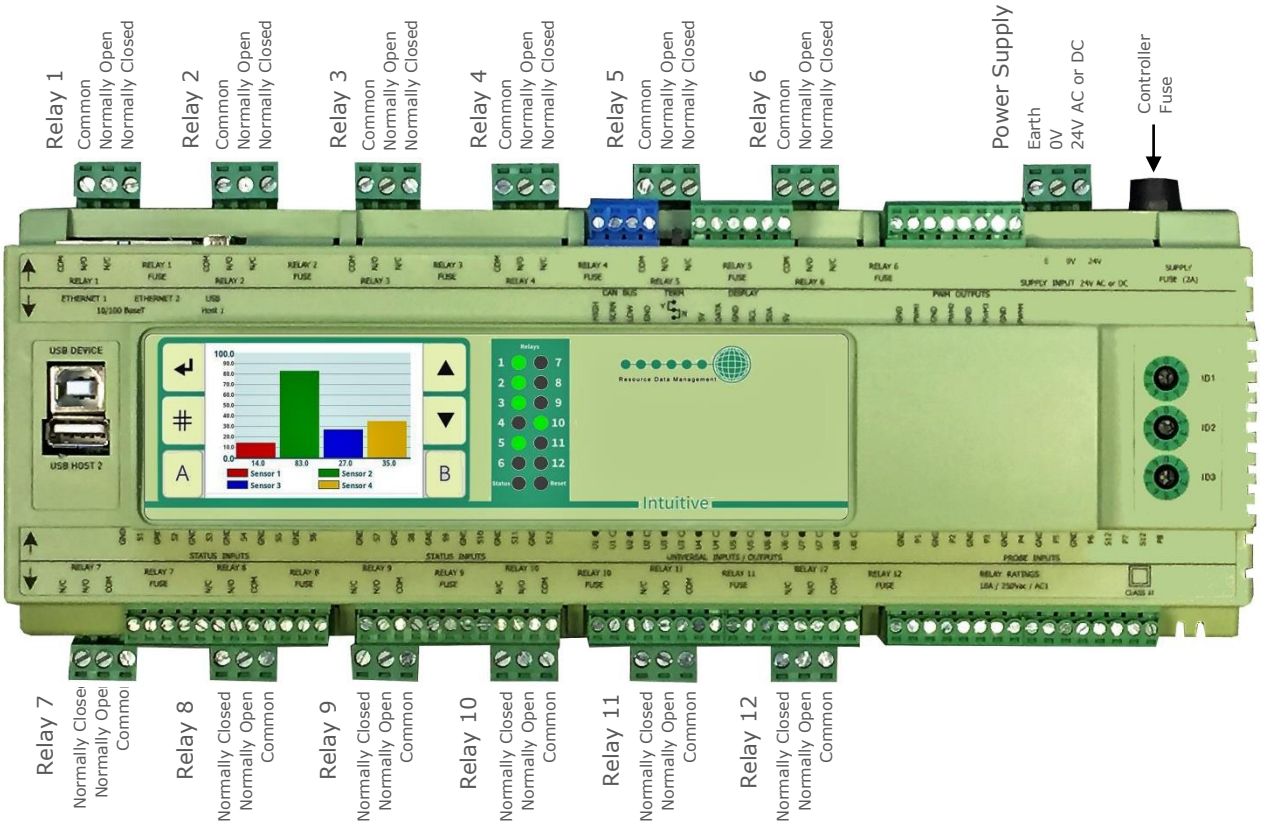
Modbus Network Adapter (PR0623/PR0623-DIN)

The Modbus adaptor connects to any of the controller's USB sockets, up to 24 Bitzer CM-RC-01 compressor control modules can be connected over one or two Modbus network lines.



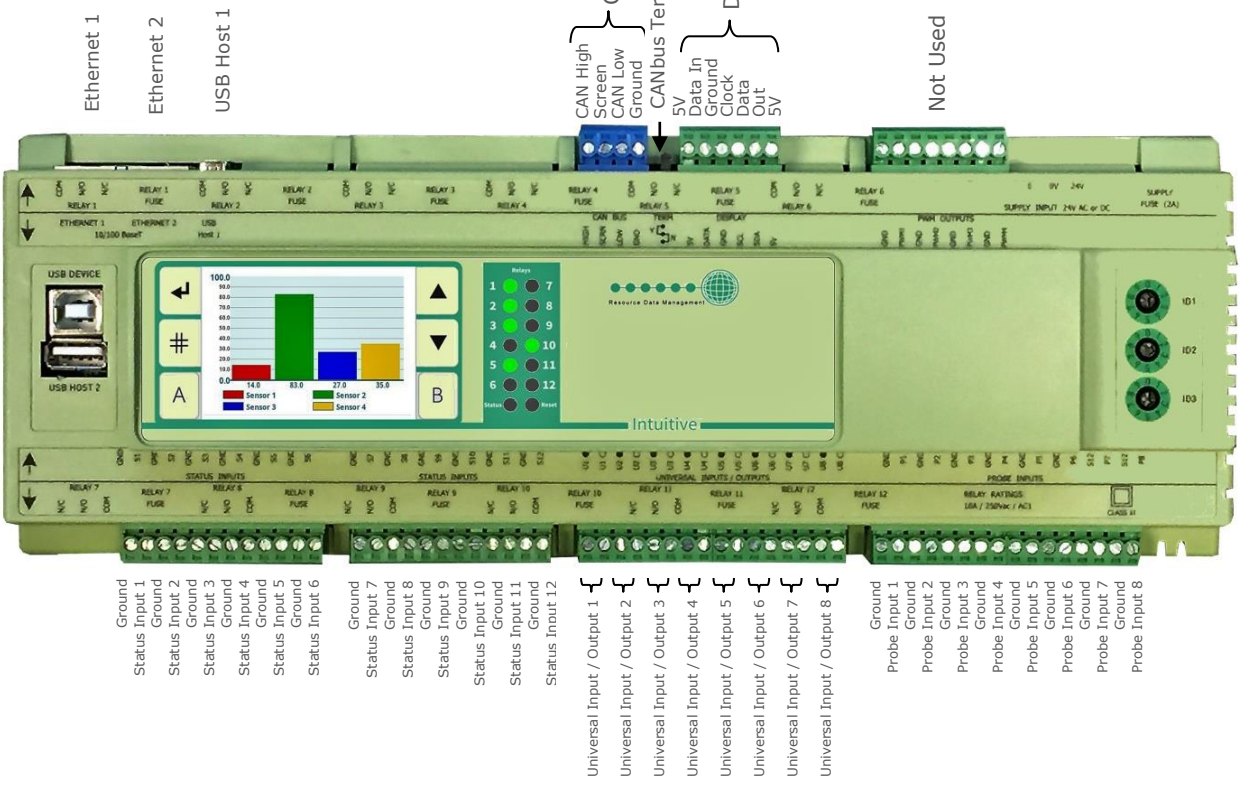
Intuitive Plant Controller I/O Connections

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



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

Mini I/O Connections

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 1-12 (Main) or 1 – 8 (Expansion)	0V return or 24 Vac	See Note 1 below
Analogue Inputs 1-8	Probe input	See Note 2 below
Universal IO 1-8 Universal Input Only 1-4 on Mini IO Expansion	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)
Relay 1-12 Relay 1-5 (On Mini IO Expansion)	N/O, N/C and Common	Volt Free.
Status LED	Healthy LED	When powered up the LED will flash off/on every 0.5 seconds

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

Note 2: Several probe types are available, see Probe Type.

Setting up the controller

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

- Direct access by PC via a USB or Ethernet connection, this is the preferred method.
- Through the front mounted buttons on the optional built in LCD display, the USB Touch display (PR0615), the Touch XL display (PR0617) or through the RDM Data Manager.*

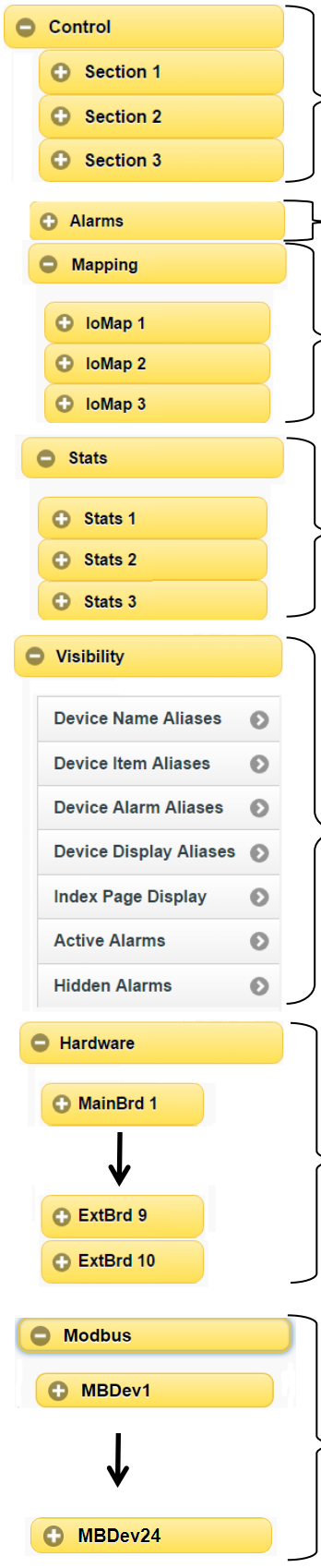
*Note: Due to the high number of data points within the Bitzer IQ controller it is not advisable to network the controller to a Data Manager with firmware V2.0.8 or earlier. Doing so will not affect the operation of the Bitzer IQ controller but it will have an adverse effect on the Data Managers operation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

Main Menu Overview (PC Connection)

All available options are shown below. By default the 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.



Values	Shows the current values for that section.
Settings	Shows the current settings for that section.
Alarm Log	Shows all alarms that have occurred for that section.
Set Parameters	Allows settings to be changed for that section.

View current and old alarms.

Values	Shows the current input/output mapping for that section.
Settings	Shows the current input/output mapping for that section.
Alarm Log	Shows all alarms that have occurred for the mapping of that section.
Set Parameters	Allows input/output mapping for that section.

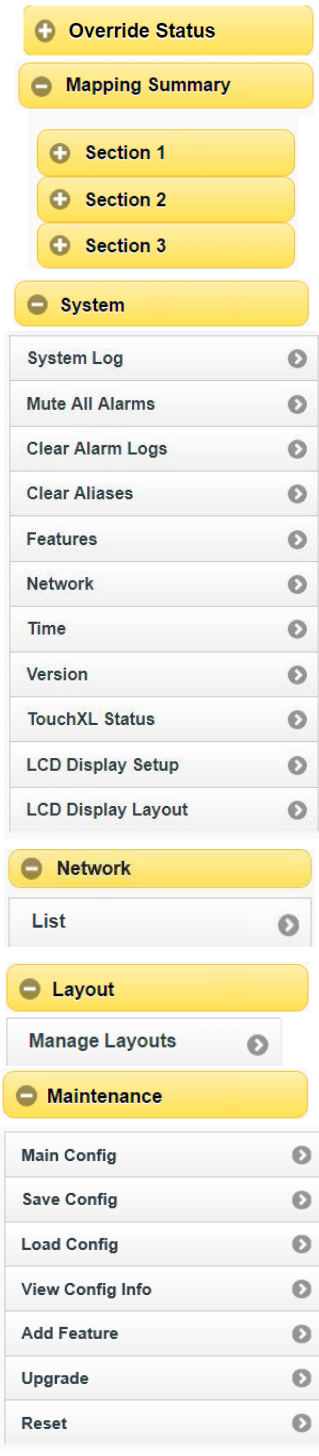
Values	Shows the current number of relay starts and relay run hours.
Settings	Not used.
Alarm Log	Not used.
Set Parameters	Allows relay starts and run hours to be reset

Device Name Aliases	Allows devices to be hidden or renamed.
Device Item Aliases	Allows items within a device to be renamed or hidden. Outputs, States and Parameters.
Device Alarm Aliases	Allows the description of any alarm to be changed.
Device Display Aliases	Allows the text which appears on the remote display (PR0620) to be aliased.
Index Page Display	Allows the user to configure what Inputs, Outputs and States that are displayed on the Home Page.
Active Alarms	View list of alarms that can be generated.
Hidden Alarms	View list of alarms that have been hidden

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.

Values	Shows the current input/output values for the Modbus devices 1 to 24 connected (compressor control modules).
Settings	Shows the current settings, such as Compressor Size, for each connected Modbus device.
Alarm Log	Shows any current main group alarms being generated by the modbus devices.
Local Alarm	Shows any current sub group alarms being generated and allows a Reset ICP command to be sent to reset any currently locked alarms.
Set Parameters	Allows parameters, such as Modbus Network address, to be changed for each modbus device 1 to 24.



Allows the user to view a list of any currently active overrides

Values	Shows the current input/output mapping for that section.
Settings	Shows the current input/output mapping for that section.
Alarm Log	Shows all alarms that have occurred for the mapping of that section.

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

Allows the user to view a list of all networked controllers that are online (Modbus)

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

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 user to upgrade controller firmware.
Reset	Allows the user to reset the controller.

For setup using the optional built in LCD display, 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.

Probes connected to the Modbus CM-RC-01 compressor control unit are PT1000 only and cannot be changed.

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 Modbus Devices

This allows the number of Modbus devices (Compressor control modules) being used (1 to 24) to be set.

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 forth 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 event log
2. Export logged data
3. Save configuration
4. Load configuration
5. Upgrade the software

Not used in this controller variant and will have no effect.

The USB menu will appear on the built in LCD display (if fitted) when a 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

Section 1, 2, 3 Parameter table

Not all parameters apply to all controller types, for example night setback for condenser fans will not appear on a controller section 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.

Section Parameters	Range	Step	Units	Default			
				Fuzzy PPP Default Setting	Fuzzy PPC Default Setting	Fuzzy PCC Default Setting	Fuzzy CCC Default Setting
Span 1 *	-3.4 - 180	0.1	Bar	13.8	13.8	34.4	34.4
Span 2 *	-3.4 - 180	0.1	Bar	13.8	13.8	34.4	34.4
Span 3 *	-3.4 - 180	0.1	Bar	13.8	13.8	34.4	34.4
Offset 1	-3.4 - 180	0.1	Bar	0.0	0.0	0.0	0.0
Offset 2	-3.4 - 180	0.1	Bar	0.0	0.0	0.0	0.0
Offset 3	-3.4 - 180	0.1	Bar	0.0	0.0	0.0	0.0
Day Target Pressure	-3.4 - 180	0.1	Bar	2.1	2.1	12.7	12.7
Night Target Pressure	-3.4 - 180	0.1	Bar	2.1	2.1	12.7	12.7
Target Pressure Above P-9/10	-3.4 - 180	0.1	Bar	0.5	0.5	0.5	0.5
Target Pressure Below P-9/10	-3.4 – 180	0.1	Bar	0.5	0.5	0.5	0.5
Ext. Target Pressure	-3.4 - 180	0.1	Bar	3.1	3.1	14.7	14.7
Optimise Limit	-3.4 - 150	0.1	Bar	2.0	2.0	2.0	
Response On Speed	1 – 60	1	---	5	5	5	5
Response Off Speed	1 – 60	1	---	5	5	5	5
Starts per Hour	0 – 60	1	---	10	10	10	
Comp Min Run	00:00 – 01:00	1	hr:min	00:10	00:10	00:10	
Comp Timing	0 = Str2Str 1 = Stp2Str 2 = Min Run	1	-	0	0	0	
Always Run Last	0 = Off, 1 = On	1	-	0	0	0	
Gas Dump	0 = Off, 1 = On	1	-	0	0	0	
Gas Diff	-3.4 – 150	0.1	Bar	0.5	0.5	0.5	
Inverter	0 = Off, 1 = On	1	-	0	0	0	0
INV Maximum	0 – 100	1	%	100	100	100	100
INV Hold	0 – 5	1	Seconds	0	0	0	0
Max Ramp On	0 – 10	1	% / sec	0	0	0	0
Max Ramp Off	0 – 10	1	% / sec	0	0	0	0
In Band Control	0 = Off, 1 = On	1	-	0	0	0	0
Stage On Delay	00:00 – 60:00	00:01	min:sec	00:10	00:10	00:10	
Stage Off Delay	00:00 – 99:00	00:01	min:sec	00:10	00:10	00:15	
Alarm Delay	00:00 – 99:00	01:00	min:sec	05:00	05:00	05:00	05:00
HP Alarm	-3.4 - 180	0.1	Bar	4.1	4.1	17.9	17.9
LP Alarm	-3.4 - 180	0.1	Bar	0.6	0.6	6.8	6.8
LP Shut-down	-3.4 - 180	0.1	Bar	0.4	0.4	6.2	6.2
Low Alarm Delay	00:00 – 99:00	01:00	min:sec	00:00	00:00	00:00	00:00
Fail	0 = Off, 1 = On	1	-	0	0	0	0
Liquid Level	0 = Off, 1 = On	1	-	0	0	0	
High Liquid Level	0 – 100	1	%	80	80	80	
Low Liquid Level	0 – 100	1	%	20	20	20	
Liquid Level Alarm Delay	00:00 – 99:00	01:00	min:sec	05:00	05:00	05:00	
Sticky Fans	0 - 16	1	-				0

Night SetBack	0 = Off, 1 = On, 2 = Local, 3 = Remote	1	-				0
Night Reduction	-3.4 - 180	0.1	-				30
Night Set On Time	00:00 – 23:59	00:01	min:sec	20:00	20:00	20:00	20:00
Night Set Off Time	00:00 – 23:59	00:01	min:sec	08:00	08:00	08:00	08:00
Night PressLimit	-3.4 - 180	0.1	Bar				25.0
Day Reduction	0 – 100	1	Bar				0
Day PressLimit	-3.4 - 180	0.1	Bar				25.0
Press Fail Val	0 – 100	1	-				45
Fan Interlock	0 = Off, 1 = On	1	-				0
Control Type	0 = Fixed, 1 = Floating. 2 = DropLeg, 3 = FloatDrop	1	-				0
Float Select	0 = Prb1, 1 = Prb 2, 2 = Prb3, 3 = Prb4, 4 = Prb5, 5 = Prb6, 6 = Prb7, 7 = Prb8, 8 = Remote	1	-				0
Drop Select	0 = Prb1, 1 = Prb 2, 2 = Prb3, 3 = Prb4, 4 = Prb5, 5 = Prb6, 6 = Prb7, 7 = Prb8, 8 = Remote	1	-				1
Refrigerant	See Refrigerant Table	1	-	0	0	0	0
Refrigerant Weight	0 – 100	1	%	0	0	0	
Press Type	0 = Absolute, 1 = Gauge	1	-				1
Low Limit	-3.4 - 180	0.1	-				8.2
High Limit	-3.4 - 180	0.1	-				23.0
Cond Offset	0.0 – 20.0	0.1	-				6.0
Glide	-15.0 – 15.0	0.1	-				0.0
Ref Weight	0 – 100	1	-				0
Disch Trip	-3.4 - 180	0.1	-				16.0
Disch Stop	-3.4 - 180	0.1	-				18.0
Disch Offset	-3.4 - 180	0.1	-				2.0
Disch Temp	0 = Off, 1 = Prb 1, 2 = Prb 2, 3 = Prb3, 4 = Prb4, 5 = Prb5, 6 = Prb6, 7 = Prb7, 8 = Prb8	1	-				0
Disch TempTrip	-60.0 – 256.0	0.1	-				90.0
Disch TempStop	-60.0 – 256.0	0.1	-				95.0
Disch TempDiff	-60.0 – 256.0	0.1	-				10.0
DoSplit	0 = Off, 1 = Mode 1, 2 = Mode 2, 3 = Mode 3, 4 = Mode 4	1	-				0
SplitTemp	-60.0 – 256.0	0.1	-				7.2
SplitTempDiff	0.0 – 20.0	0.1	-				2.0
SplitPress	-3.4 - 180	0.1	-				15.2
SplitPressDiff	-3.4 - 180	0.1	-				1.4
HeatReclaim	0 = Off, 1 = On, 2 = On/Rly	1	-				0
FanRev	0 = Off, 1 = On, 2 = Local, 3 = Remote	1	-				0
FanRev Start	00:00 – 23:59	00:01	min:sec				00:00
FanRev Len	00:00 – 99:00	00:01	min:sec				00:00
FanRev Dly	00:00 – 60:00	00:01	min:sec				00:00

FanRev Fix	0 = Off, 1 = On	1	-				1
FanRev Var	0 – 100	1	%				100
FanRev Lev	-3.4 - 180	0.1	Bar				7.0
Do Disch Trip	0 = Off, 1 = Sect 2, 3 = Sect 3	1	-	0	0	0	
Do Superheat	0= Off, 1= Alarm, 2= Alarm & Low Shutdown	1	-	0	0	0	
Superheat Low Target	-60.0 – 256.0	0.1	°C	8.0	8.0	8.0	
Superheat Low Diff	-60.0 – 256.0	0.1	°C	2.0	2.0	2.0	
Superheat Low Alarm	-60.0 – 256.0	0.1	°C	9.0	9.0	9.0	
Superheat High Target	-60.0 – 256.0	0.1	°C	30.0	30.0	30.0	
Superheat High Diff	-60.0 – 256.0	0.1	°C	3.0	3.0	3.0	
Superheat High Alarm	-60.0 – 256.0	0.1	°C	50.0	50.0	50.0	
Superheat Delay	00:00 – 99:00	00:01	min:sec	02:00	02:00	02:00	
Status Fault Delay	00:00 – 60:00	00:01	min:sec	00:10	00:10	00:10	00:10
General Fault Delay	00:00 – 60:00	00:01	min:sec	00:10	00:10	00:10	00:10
Standby Delay	00:00 – 60:00	00:01	min:sec	00:10	00:10	00:10	00:10
Status Fault 1 ↓ Status Fault 12	0 = Unused 1 = Comp N/O or Cond N/O 2 = Comp N/C or Cond N/C 3 = Gen N/O 4 = Gen N/C 5 = Standby N/O 6 = Standby N/C 7 = Run N/O or Heat N/O 8 = Run N/C or Heat N/C 9 = INV N/O 10 = INV N/C	1	-	0	0	0	0
Stage 1 ↓ Stage 8	Pack Condenser 0 = None 0 = None 1 = Unused 1 = Unused 2 = Inv 2 = Inv 3 = Comp 3 = Fan 4 = Remote	1	-	0	0	0	0
Stage 1 Minimum ↓ Stage 8 Minimum	0 – 100	1	%	10	10	10	10

Refrigerant Table

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

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

Offset is the value below zero.

Example: RDM PR0160 with range: -1 bar to 20 bar
Span would be 21 Bar (306 psi)
Offset would be -1 Bar (-14.5 psi)

General sections 1, 2 & 3

Note: All general sections 4, 5, and 6 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	°C	1.0
Stat3 Type	0 = Direct, 0 = Indirect	1	-	0
Stat3 High Temp	-60.0 – 256.0	0.1	°C	25.0
Stat3 Low Temp	-60.0 – 256.0	0.1	°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

Pressure, Probe, Status, Inverter and Relay Position Parameters

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.

Section Parameters	Range	Step	Units	Default
Modbus Pressure Position 1 ↓ Modbus Pressure Position 1	0 - 24	1	---	0
Pressure Position 1 ↓ Pressure Position 3	0 - 88	1	---	0
Probe Position 1 ↓ Probe Position 8	0 - 88	1	---	0
Status Position 1 ↓ Status Position 16	0 - 92	1	---	0
Inverter Position	0 - 88	1	---	0
Relay Position 1 ↓ Relay Position 24	0 - 132	1	---	0

Hardware - Main Board Configuration: Universal I/O, Status Inputs, Invert Relays, Probe Offsets.

Section Parameters	Range	Step	Units	Default
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	1	---	1
Status Inputs	0V / 24V ac	1	---	0
Invert Relay 1 ↓ Invert Relay 12	0 = Off 1 = On	1	---	0
Offset 1 ↓ Offset 8	-20 to +20	0.1	^{O}C	0.0

Hardware – Ext Board Configuration: Universal I/O, Status Inputs, Invert Relays, Probe Offsets

Section Parameters	Range	Step	Units	Default
Board Type	0 = Unused 1 = IO 2 = Mini IO	1	---	0
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	1	---	1
Status Inputs	0V / 24V ac	1	---	0
Invert Relay 1 ↓ Invert Relay 12	0 = Off 1 = On	1	---	0
Offset 1 ↓ Offset 8	-20 to +20	0.1	°C	0.0

Stats: Compressor Run Hours and Compressor Starts

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

Section Parameters	Range	Step	Units	Default
Reset Stats	0 – 1	1	---	0

Modbus Configuration

Section Parameters	Range	Step	Units	Default
MBxx Address	0 – 246	1	---	0
MBxx NW Line	1 – 2	1	---	1
MBxx Press Type	0 = Absolute, 1 = Gauge	1	---	0
MBxx Compressor Size	0 – 99	0.1	kW	0
MBxx Comp ICP Lock	0 = Off, 1 = On	1	---	0

Parameter Descriptions

Pack/Condenser Section Parameters Description

Parameter	Description
Transducer 1/2/3 Span	Range of the transducers.
Transducer 1/2/3 Offset	Transducer value above or below zero.
Day Target Pressure	Pressure target, control will try to maintain this pressure during day time.
Night Target Pressure	Pressure target, control will try to maintain this pressure during night time.
Target Pressure Above Setpoint	Set-point above the target, used to obtain a "dead-band".
Target Pressure Below Setpoint	Set-point below the target, used to obtain a "dead-band".
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. See: Status Inputs
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.
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 variable output only.
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 variable output only.
Starts per hour	Limits a compressor to this many starts per hour, set to 0 if not required.
Comp Min Run	Minimum time a compressor will run for once started. Only applies when Comp Timing Parameter is set to "Min Run" (see below)
Comp Timing	Start to start: The anti short cycle timer starts when the compressor starts. Stop to Start: The anti short cycle timer starts when the compressor stops. Min Run: The Comp Min Run time is used in place of an anti short cycle timer.
Always Run Last	Always keeps the last compressor running unless LT shutdown pressure is reached.
Gas Dump	Enables Gas Dump feature. See Gas Dump
Gas Diff	Diff below the set point that the Gas Dump valve is opened. See Gas Dump
Inverter	Enables the inverter analogue output and associated relay.
Inverter Max	The maximum percentage a condenser fan inverter will operate to e.g. if set to 80% the inverter output will never go above this value
Inverter 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.
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.
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.
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.

Stage On Delay	Delay time between stages on
Stage Off Delay	Delay time between stages off
Alarm Delay	Delay before HP and LP alarms are signalled
HP Alarm	HP alarm set-point
LP Alarm	LP alarm set-point
LP Shut-down	LP shut-down set-point, all stages go off when this is reached
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.
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.
Liquid Level	Enable for Liquid Level feature. See Liquid Level
High Liquid Level	Settings at which High Liquid Level alarm is generated
Low Liquid Level	Settings at which Low Liquid Level alarm is generated
Liquid Level Alarm Delay	Delay applied before the Low or High liquid alarm is generated.
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
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 Parameter. **On -** Night Reduction is always used. **Local -** Uses times in Night Set On and Night Set Off parameters to determine Day / Night. **Remote -** Uses GP Timer to determine Day / Night.
Night Reduction	Reduces inverter output by this amount during night settings.
Night Set Back On Time	Time for the night set back feature to operate.
Night Set Back Off Time	Time for the night set back feature to go off.
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.
Day Reduction	Reduces the inverter output by this amount when the timer is not in its night zone.
Day Pressure Limit	Pressure set-point to disable the day reduction feature. Day reduction is disabled above this level and enabled below it.
Press Fail Val	Sets the output level of the inverter if the transducer fails.
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.)
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 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.
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
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
Refrigerant	Select the refrigerant used in the system. See Refrigerant Table
Refrigerant Weight	When using a pressure transducer to calculate superheat, the controller can use a weighted average of liquid pressure and vapour pressure to calculate the temperature. When the refrigerant weight parameter is set to 0% then the liquid pressure is used (bubble), when set to 100% the vapour pressure is used (dew). For example, when the Ref Weight parameter is set to 50%, then the controller will use a weighted average of 50% liquid pressure and 50% vapour pressure. Any percentage from 1 to 99% will give an appropriate weighted average between the two pressures.
Pressure Type	Select whether Absolute pressure or Gauge pressure being used.
Low Limit	Stops the floating pressure target from going below this level.
High Limit	Stops the floating pressure target from going above this level.
Condenser offset	Used to set a condenser differential, which is added to the incoming temperature to produce a "floating" set-point.
Glide	The glide value applied to the refrigerant (when using floating head pressure control)
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.
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.
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.
Discharge Offset	Offset the discharge temperature by this value. This is the diff below below which comps start staging in again.
Do Discharge Trip	Enable feature by selecting which condenser is used on this pack.
Do Superheat	Enables the superheat feature which switches superheat High and Superheat Low relays when high or low conditions are met.
Superheat Low Target	If the superheat falls below this value the superheat Low Relay will switch on.
Superheat Low Diff	The diff above Superheat Target that the superheat low relay will switch off.
Superheat Low Alarm	Low superheat alarm setpoint.
Superheat High Target	If the superheat rises above this value the superheat high relay will come on
Superheat High Diff	The differential below Superheat Target that the superheat relay will switch off.
Superheat High Alarm	High superheat alarm setpoint.
Superheat Delay	Time delay applied to superheat high and low alarms.
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 needs to be set in the associated pack section(s).
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 and a one minute delay has expired.
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 differentia and a one minute delay has expired.
Discharge Temperature Diff.	The value below the discharge trip and discharge stop temperature before the compressor(s) will restart, this is subject to a one minute delay.
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.
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.
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.
Split Pressure	If the discharge pressure rises above this setting then the condenser split relay will be forced off regardless of temperature.
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.
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)
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. 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.
Fan Reversal Start Time	Set the local time of day when fans are switched into reverse (only applies if Fan Reverse Select is set to local).
Fan Reversal Length	Sets the length of time fans will run in reverse.
Fan Reversal Delay	Sets a delay period between fans stopping and being switched into reverse.
Fan Reversal Fixed Speed on/off	If set to On, the fans will run in reverse at a fixed speed, if set to Off then the fans will run at their normal control speed.
Fan Reversal Fixed Speed	Sets the fixed reverse fan speed if Fan Reverse Select is set to On.
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.
Status fault Delay	Time delay before status faults are activated.
General Alarm Delay	Time delay before general faults are activated.
Standby Delay	Time delay between the standby input being activated and the controller going into standby.
Status Fault 1 ↓ Status Fault 12	Used to select the type of input required See: Status Inputs
Stage 1 ↓ Stage 8	Select the output device for this stage. If the stage is a Bitzer CM-RC-01 then the output must be set to "Comp"
Stage 1 Min ↓ Stage 8 Min	Selects the minimum capacity for each compressor. For example, if a compressor has a minimum set to 20% then it will never operate at less than 20% when there is a pressure demand for that compressor and the compressor is running.

General Sections

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)

IO Map: Pressure, Probe, Status, Inverter and Relay Position Parameters Description

Parameter	Description
Modbus Pressure Position 1 ↓ Modbus Pressure Position 3	Position of Modbus transducer inputs (if used)
Pressure Position 1 ↓ Pressure Position 3	Position of Intuitive controller transducer inputs
Probe Position 1 ↓ Probe Position 8	Position of probe inputs
Status Position 1 ↓ Status Position 16	Position of status inputs
Inverter Position	Position of Inverter output
Relay Position 1 ↓ Relay Position 24	Position of relay outputs Relay Position 17 is reserved for a Condenser split Relay Relay Position 18 is reserved for a Heat Reclaim Relay Relay Position 19 is reserved for a Condenser / Fan Bypass Relay Relay Position 24 is reserved for an alarm relay

Hardware - Main Board Configuration: Universal I/O, Status Inputs, Invert Relays and Probe Offsets.

Parameter	Description
Universal I/O 1 ↓ Universal I/O 8	Select the type of universal input or output
Status Inputs	Select whether 0V return or 24V ac
Invert Relay 1 ↓ Invert Relay 12	Used to invert relay operation
Offset 1 ↓ Offset 8	Offset probes by this amount

Hardware - Ext Board Configuration: Universal I/O, Status Inputs, Invert Relays and Probe Offsets.

Parameter	Description
Board Type	Select the type of expansion board being used
Universal I/O 1 ↓ Universal I/O 8	Select the type of universal input or output
Status Inputs	Select whether 0V return or 24V ac

Invert Relay 1 ↓ Invert Relay 12	Used to invert relay operation
Offset 1 ↓ Offset 8	Offset probes by this amount

Stats: Compressor Run Hours and Compressor Starts.

Parameter	Description
Reset Stats	Reset stats by changing from Reset 1 to Reset 2 or vice versa

Modbus Configuration

Section Parameters	Description
MBxx Address	Modbus address of Bitzer device
MBxx NW Line	Network line Bitzer device is connected to
MBxx Press Type	Select between Absolute and Gauge for pressure type on Bitzer device
MBxx Comp Size	The size in kW of the Bitzer compressor.
MBcc Comp ICP Lock	Enables the Compressor ICP Lock reset functionality for that Bitzer device

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 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" and "High Liquid Level Alarm" can be set if level alarms are required, the alarm has a settable delay.
- 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".

Gas Dump

Enabled by setting 'Gas Dump Enable' to 'on'.

The Gas dump relay will come on when the Suction Pressure drops below the Set Point plus the Gas Diff and all but the last compressor has turned off.

When an Inverter output is configured, 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.

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 between the fans stopping and being switched into reverse. Following the delay, the assigned relay will be activated for fan reverse length. During the 'fan reverse' period, the speed of the fans will either be at a fixed value or varying, depending on current pressures. The fan reversal delay will also be met when returning the fans to 'forward'.

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.

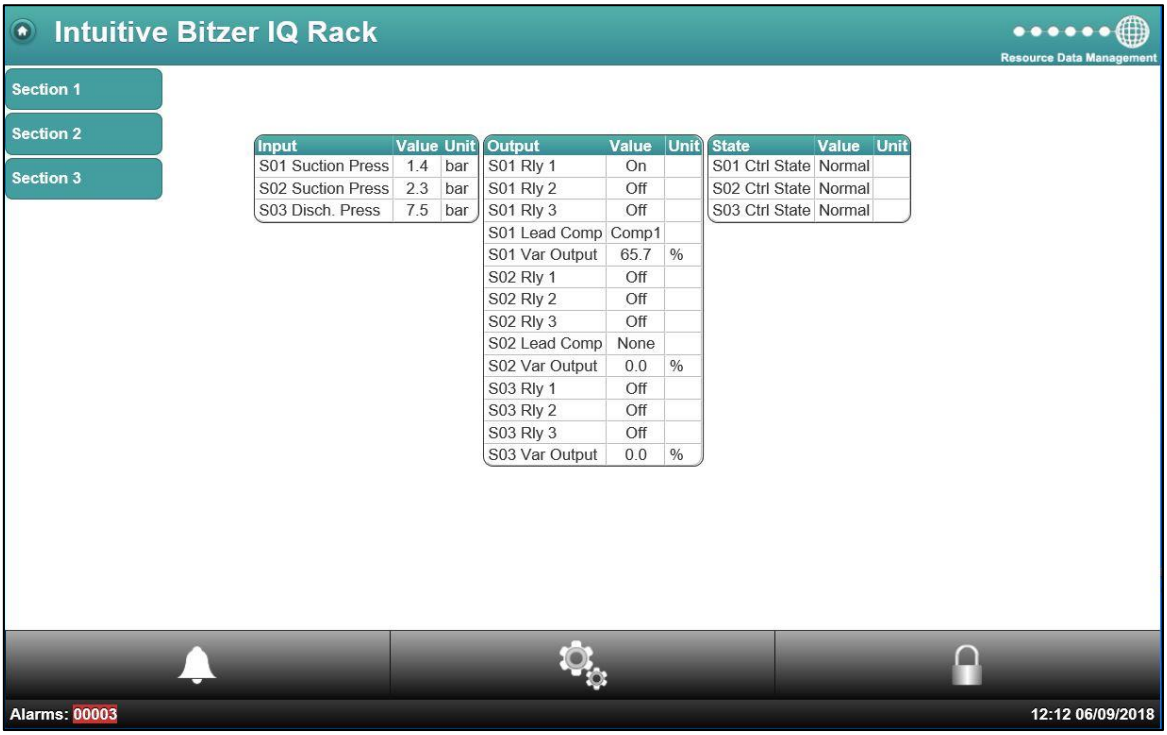
Setup via a PC

The Bitzer IQ Rack controller can communicate directly to a PC using a USB lead (Type A to Type B). Depending on the PC's operating system, it may require the necessary USB drivers to be installed and configured. On Windows 10 machines, no drivers are required to be installed. For older versions, the necessary drivers can be obtained from the 'Download Software' section of the RDM website which is found under 'Support'. Along with the driver, there will be a walk through guide of how to set it up. 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.

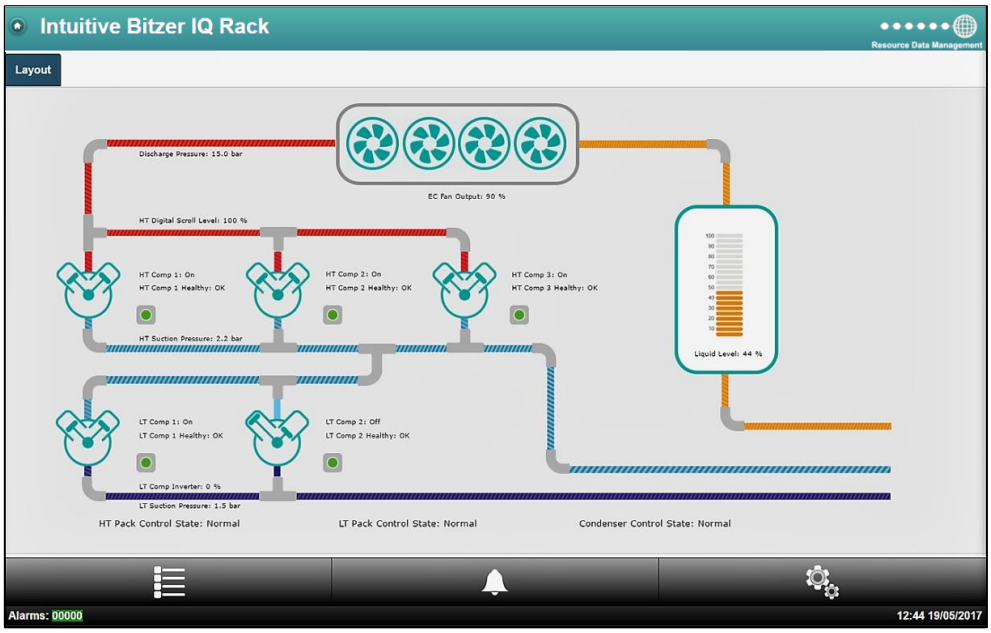
Home page

The home page of the device will show a values page detailing default Inputs, Outputs and states. Additionally there are tabs to the left where users can also view (only) values of specific sections.

The items that are shown on the home page can be manually selected using the Index Display Aliases menu under the Visibility section.



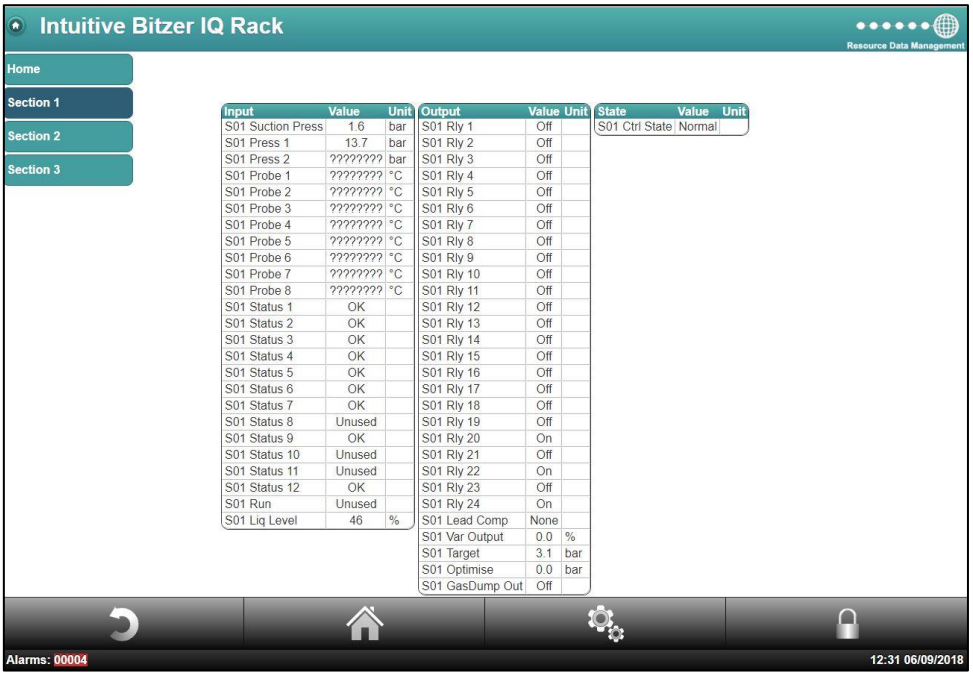
Alternatively, if a layout has been uploaded it will be shown. An example is below



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.



Input	Value	Unit
S01 Suction Press	1.6	bar
S01 Press 1	13.7	bar
S01 Press 2	????????	bar
S01 Probe 1	????????	°C
S01 Probe 2	????????	°C
S01 Probe 3	????????	°C
S01 Probe 4	????????	°C
S01 Probe 5	????????	°C
S01 Probe 6	????????	°C
S01 Probe 7	????????	°C
S01 Probe 8	????????	°C
S01 Status 1	OK	
S01 Status 2	OK	
S01 Status 3	OK	
S01 Status 4	OK	
S01 Status 5	OK	
S01 Status 6	OK	
S01 Status 7	OK	
S01 Status 8	Unused	
S01 Status 9	OK	
S01 Status 10	Unused	
S01 Status 11	Unused	
S01 Status 12	OK	
S01 Run	Unused	
S01 Liq Level	46	%

Output	Value	Unit
S01 Rly 1	Off	
S01 Rly 2	Off	
S01 Rly 3	Off	
S01 Rly 4	Off	
S01 Rly 5	Off	
S01 Rly 6	Off	
S01 Rly 7	Off	
S01 Rly 8	Off	
S01 Rly 9	Off	
S01 Rly 10	Off	
S01 Rly 11	Off	
S01 Rly 12	Off	
S01 Rly 13	Off	
S01 Rly 14	Off	
S01 Rly 15	Off	
S01 Rly 16	Off	
S01 Rly 17	Off	
S01 Rly 18	Off	
S01 Rly 19	Off	
S01 Rly 20	On	
S01 Rly 21	Off	
S01 Rly 22	On	
S01 Rly 23	Off	
S01 Rly 24	On	
S01 Lead Comp	None	
S01 Var Output	0.0	%
S01 Target	3.1	bar
S01 Optimise	0.0	bar
S01 GasDump Out	Off	

State	Value	Unit
S01 Ctrl State	Normal	

Link	Operation
Values	Shows the values being returned on the controllers 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

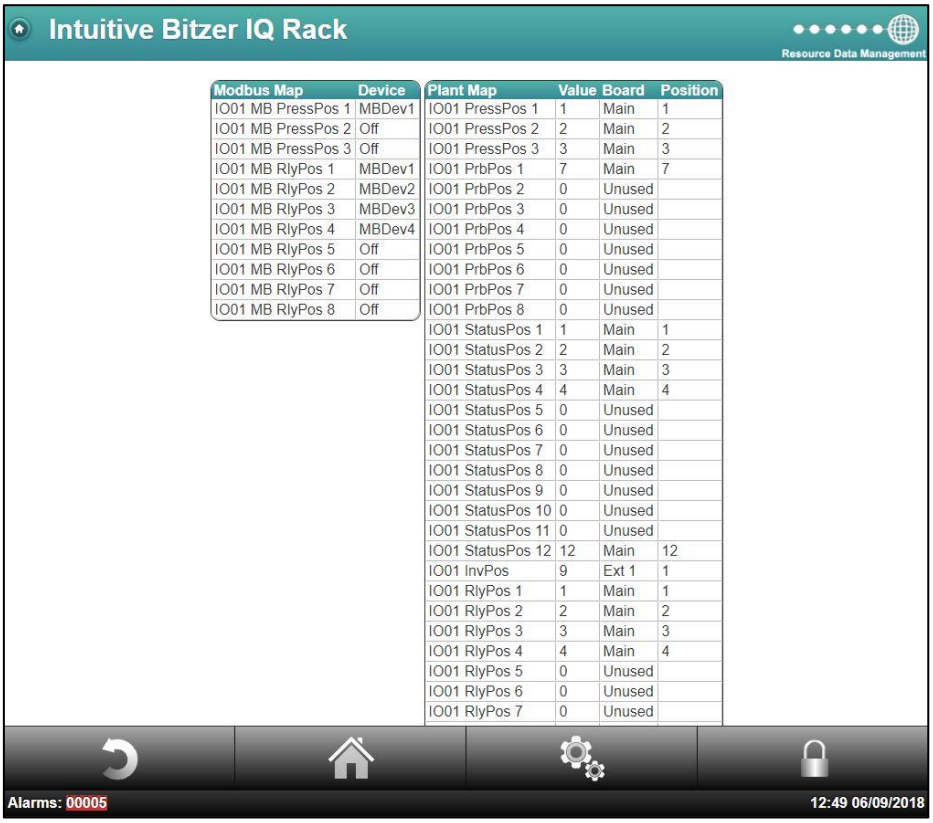
Alarms

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

Mapping

From within the Mapping menu, the user can select between IO Map 1, 2 or 3, each of which offers; Values, Settings, Alarm Log, Set Modbus Map and Set Plant Map. The Modbus Map allows compressor control modules to be mapped to a compressor stages, the Plant Map allows physical inputs and outputs on the Intuitive Bitzer IQ Rack controller to be mapped.

The below shows an example of the Settings within IO Map 1.



Modbus Map	Device
IO01 MB PressPos 1	MBDev1
IO01 MB PressPos 2	Off
IO01 MB PressPos 3	Off
IO01 MB RlyPos 1	MBDev1
IO01 MB RlyPos 2	MBDev2
IO01 MB RlyPos 3	MBDev3
IO01 MB RlyPos 4	MBDev4
IO01 MB RlyPos 5	Off
IO01 MB RlyPos 6	Off
IO01 MB RlyPos 7	Off
IO01 MB RlyPos 8	Off

Plant Map	Value	Board	Position
IO01 PressPos 1	1	Main	1
IO01 PressPos 2	2	Main	2
IO01 PressPos 3	3	Main	3
IO01 PrbPos 1	7	Main	7
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	0	Unused	
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	12	Main	12
IO01 InvPos	9	Ext 1	1
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	0	Unused	
IO01 RlyPos 6	0	Unused	
IO01 RlyPos 7	0	Unused	

In the example above:

Section 1 Pressure Position 1 is mapped Modbus device 1 and to Main board Universal Input 1. The Modbus device will take priority but will revert back to the Main Board Universal Input 1 if a Modbus pressure reading cannot be obtained.

Section 1 Probe Position 1 is mapped to Main board probe input 7.

Section 1 Status Positions 1 to 4 and 12 are mapped to Main board status inputs 1 to 4 and 12.

Section 1 Inverter Position is mapped to Extension Board 1 Universal Output 1.

Section 1 Relay Positions 1 to 4 are mapped to Modbus devices 1 to 4 and Main board relays 1 to 4, Modbus and relay outputs will operate simultaneously.

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 Modbus Map	Set the Modbus I/O Mapping for each section (compressor control module)
Set Plant Map	Set the Hardware Mapping for each section (physical relays, status inputs etc.)

Note on mapping relays on expansion modules using the built in LCD display, a local display PR0615 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 8	Compressor stages (Fixed)	Condenser stages(Fixed)
Relay Position 9	Superheat Low (Fixed)	
Relay Position 10	Superheat High (Fixed)	
Relay Position 17	Bypass Relay (If used)	*See Relay Positioning Below*
Relay Position 18	Gas Dump (If used)	*See Relay Positioning Below*
Relay Position 19	*Not used at present*	*See Relay Positioning Below*
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.

Condenser Relay Positions

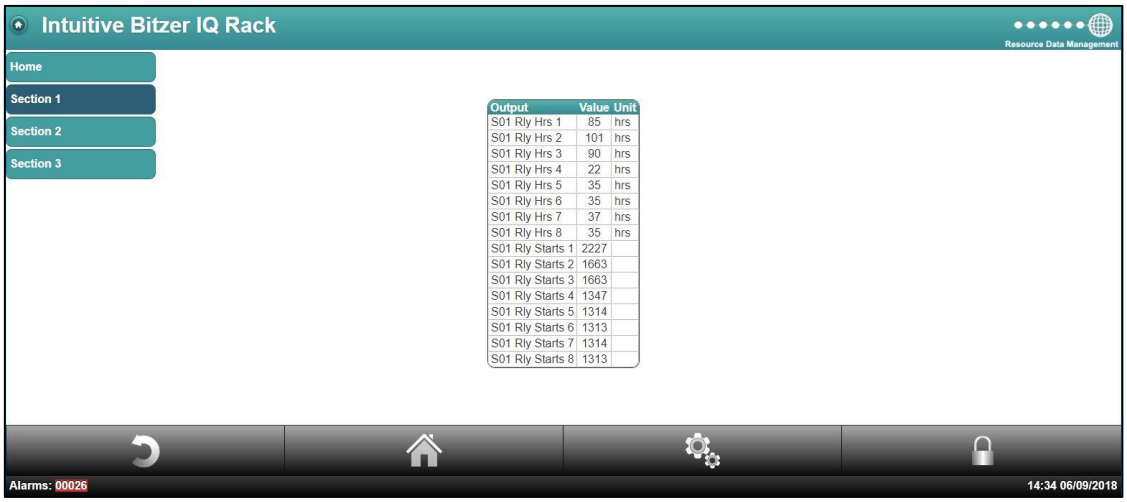
For sections set as condenser, relays 17-19 change depending on the features enabled. The positions will be taken up using up to 4 features, in order of; Condenser split, Heat Reclaim, Bypass and Fan Reversal.

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 – Condenser uses Heat Reclaim and Fan reversal;
Relay Position 17 will be Heat Reclaim
Relay Position 18 will be Fan reversal 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.

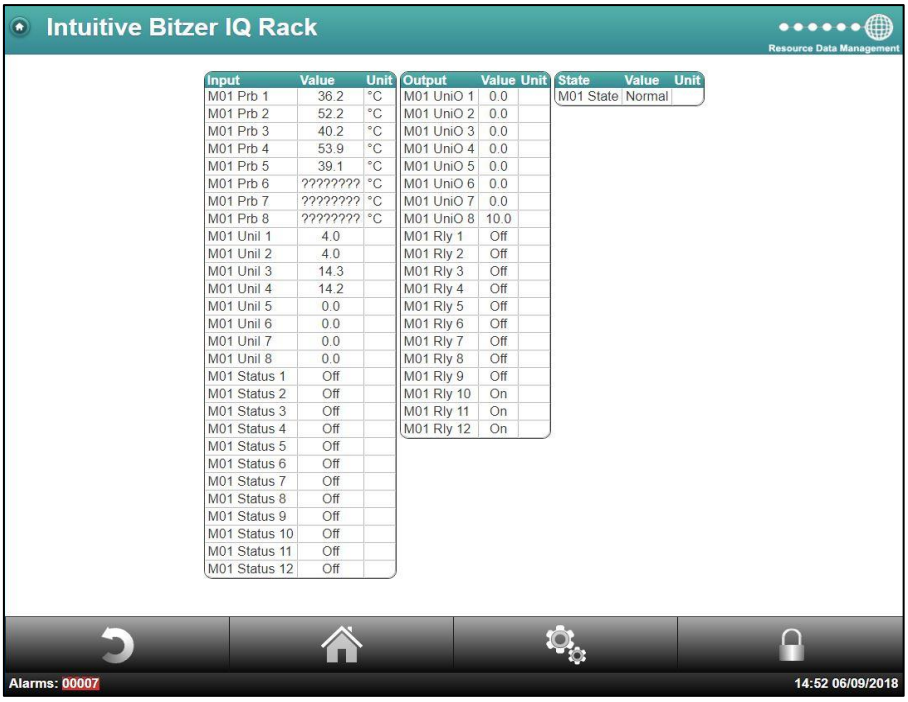
Link	Operation
Device Name Alias	Allows devices to be hidden or renamed such as Section 1, IOMap 1, MainBrd1, ExtBrd1 and Stats1, for example Section 1 can be renamed to "HT Pack" or hidden if not used.
Device Item Alias	Allows items within a device to be renamed or hidden such as S01 Press 1, this can 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.
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 Bitzer IQ Rack
Hidden Alarms	Shows a list of alarms that are hidden / disabled.

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.

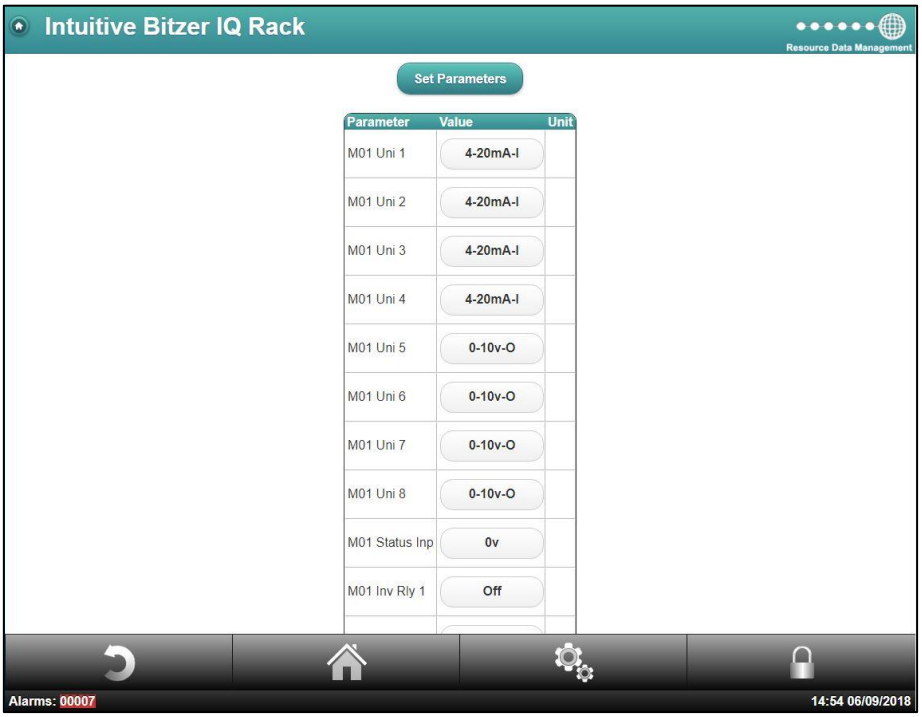
To set an alias back to factory setting leave the required filed blank and then set aliases.

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;



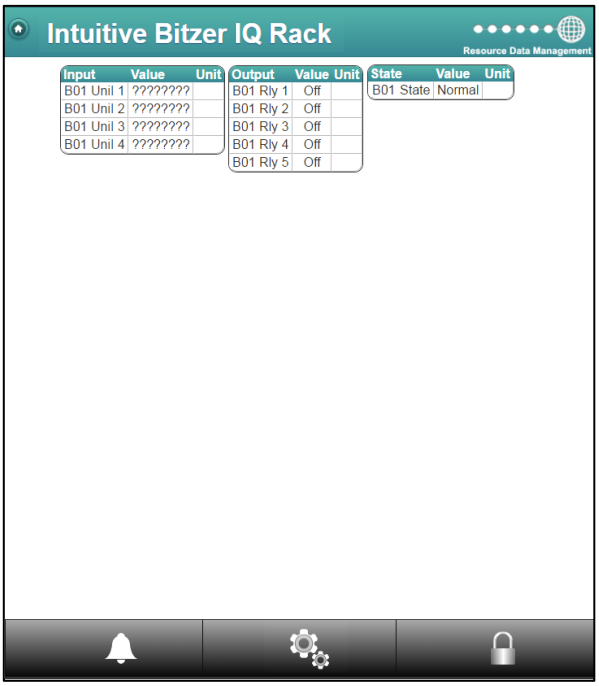
If the user enters the 'Set Parameters' section, it will allow all the Main Board's I/O to be configured, similar to below;

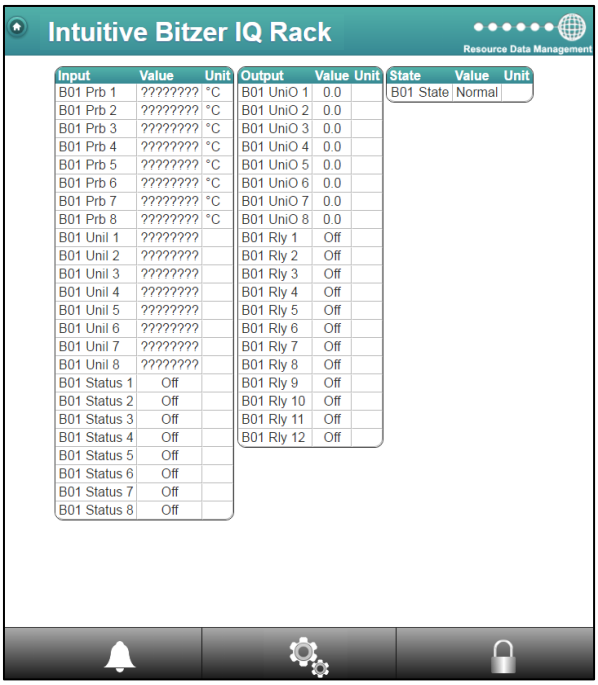


Link	Operation
Values	Shows the values being returned on the main controllers inputs and outputs
Settings	Shows the main controllers configuration settings
Alarm Log	Shows the controllers alarm history; 1000 alarms are stored
Set Parameters	Set the Universal IO, Invert Relay and Probe Offset configuration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

Hardware Extension Board 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.

Modbus

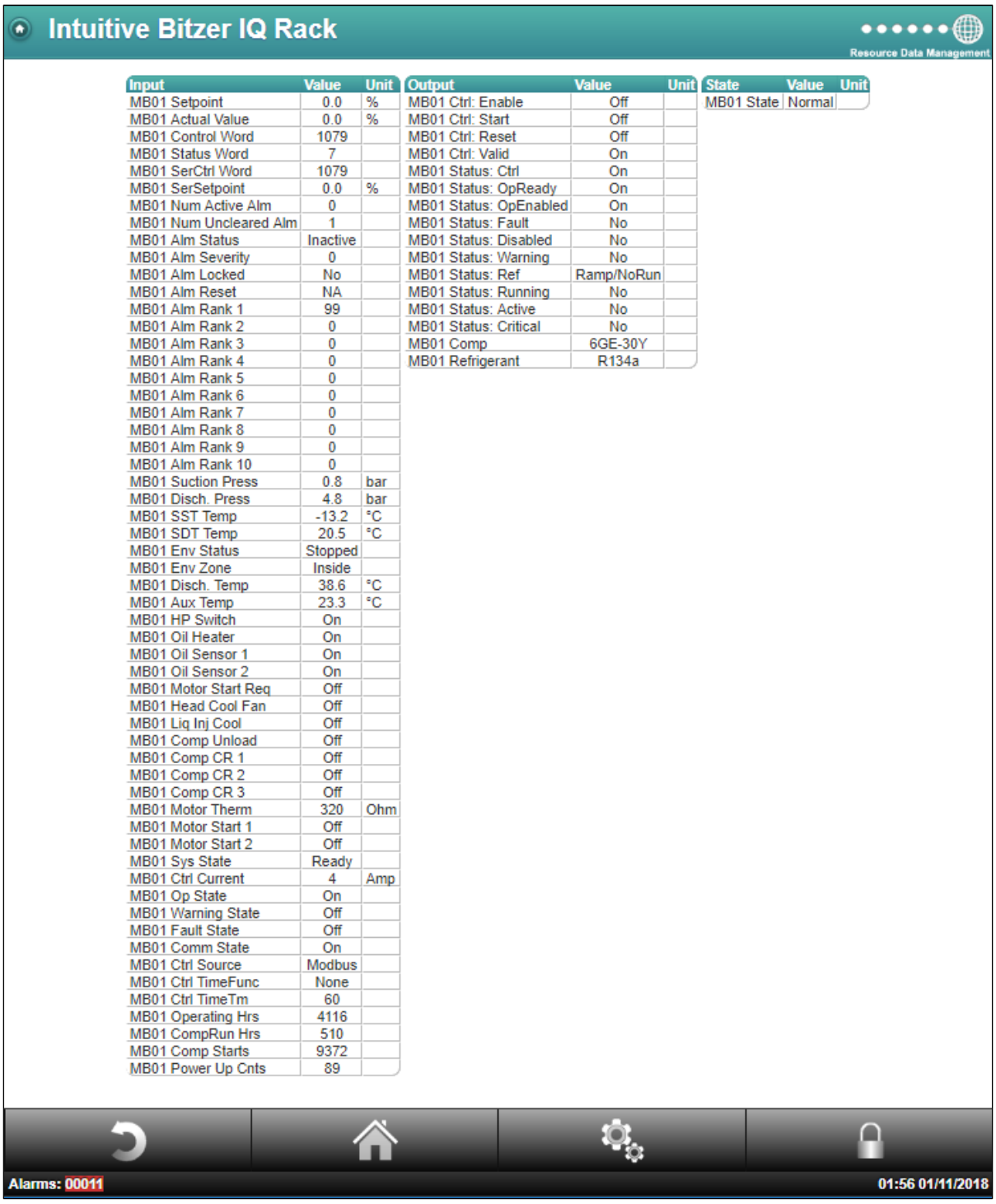
A maximum of 24 Bitzer CM-RC-01 Modbus Compressor Modules can be logged onto the controller using a USB Modbus adapter (PR0623/PR0623-DIN). Each module will control a single compatible Bitzer compressor. Once these compressor modules are logged onto the Intuitive controller each one will be treated as a single variable output compressor stage.

The number of Modbus Compressor modules being used is set in the Main Config menu under the Maintenance tab. Once this is set the same number of Modbus menus will be available under the Modbus tab, these will be shown as MBDev1 up to MBDev24

Link	Operation
Values	This will show all the Inputs, Outputs and control state of the compressor module (see screenshot below)
Settings	Shows the Modbus address, network line number (0 or 1) and pressure type (Gauge or absolute) for that particular Modbus module.
Alarm Log	Shows any general alarms associated with the Modbus module history, "Compressor Run

	Alarm" for example, 1000 alarms are stored.
Local Alarm	Shows individual alarms associated with the Modbus module in more detail, "Too many compressor starts" for example, 1000 alarms are stored. If the compressor control module is locked out (intelligent compressor protection) due to a compressor fault, a "Reset ICP" button is available to send a reset command.
Set Parameters	Sets the Modbus address, network line number (0 or 1), pressure type (Gauge or absolute), compressor size in kW and enabling of the Comp ICP lock reset function for that particular Modbus module.

The values page shown below shows all the current real time inputs, outputs and control state from a single Modbus Bitzer Compressor module.



Input	Value	Unit
MB01 Setpoint	0.0	%
MB01 Actual Value	0.0	%
MB01 Control Word	1079	
MB01 Status Word	7	
MB01 SerCtrl Word	1079	
MB01 SerSetpoint	0.0	%
MB01 Num Active Alm	0	
MB01 Num Uncleared Alm	1	
MB01 Alm Status	Inactive	
MB01 Alm Severity	0	
MB01 Alm Locked	No	
MB01 Alm Reset	NA	
MB01 Alm Rank 1	99	
MB01 Alm Rank 2	0	
MB01 Alm Rank 3	0	
MB01 Alm Rank 4	0	
MB01 Alm Rank 5	0	
MB01 Alm Rank 6	0	
MB01 Alm Rank 7	0	
MB01 Alm Rank 8	0	
MB01 Alm Rank 9	0	
MB01 Alm Rank 10	0	
MB01 Suction Press	0.8	bar
MB01 Disch. Press	4.8	bar
MB01 SST Temp	-13.2	°C
MB01 SDT Temp	20.5	°C
MB01 Env Status	Stopped	
MB01 Env Zone	Inside	
MB01 Disch. Temp	38.6	°C
MB01 Aux Temp	23.3	°C
MB01 HP Switch	On	
MB01 Oil Heater	On	
MB01 Oil Sensor 1	On	
MB01 Oil Sensor 2	On	
MB01 Motor Start Req	Off	
MB01 Head Cool Fan	Off	
MB01 Liq Inj Cool	Off	
MB01 Comp Unload	Off	
MB01 Comp CR 1	Off	
MB01 Comp CR 2	Off	
MB01 Comp CR 3	Off	
MB01 Motor Therm	320	Ohm
MB01 Motor Start 1	Off	
MB01 Motor Start 2	Off	
MB01 Sys State	Ready	
MB01 Ctrl Current	4	Amp
MB01 Op State	On	
MB01 Warning State	Off	
MB01 Fault State	Off	
MB01 Comm State	On	
MB01 Ctrl Source	Modbus	
MB01 Ctrl TimeFunc	None	
MB01 Ctrl TimeTm	60	
MB01 Operating Hrs	4116	
MB01 CompRun Hrs	510	
MB01 Comp Starts	9372	
MB01 Power Up Cnts	89	

Output	Value	Unit
MB01 Ctrl: Enable	Off	
MB01 Ctrl: Start	Off	
MB01 Ctrl: Reset	Off	
MB01 Ctrl: Valid	On	
MB01 Status: Ctrl	On	
MB01 Status: OpReady	On	
MB01 Status: OpEnabled	On	
MB01 Status: Fault	No	
MB01 Status: Disabled	No	
MB01 Status: Warning	No	
MB01 Status: Ref	Ramp/NoRun	
MB01 Status: Running	No	
MB01 Status: Active	No	
MB01 Status: Critical	No	
MB01 Comp	6GE-30Y	
MB01 Refrigerant	R134a	

State	Value	Unit
MB01 State	Normal	

Bitzer CM-RC-01 Modbus Alarms

Each Bitzer CM-RC-01 compressor control unit can generate a number of alarms, examples are "Motor Phase Loss", "Too Many Compressor Starts" and "Discharge Temperature High".
Some alarms are arranged into groups, for example if an "Oil Alarm" is generated by the controller this can be caused by any one of five individual sub alarms, these are:

Oil Level Low
Oil Flow
Oil Pressure Low
Oil Stop Valve
Oil Injection Has No Effect

To establish which sub alarm caused the general "Oil Alarm" the Modbus menu for the relevant CM-RC-01 module will show the last 10 alarm code numbers (on the previous page alarm code 1 & 2 are shown as 99 and 100 respectively).
A full list of alarms and code numbers are shown in the table below.

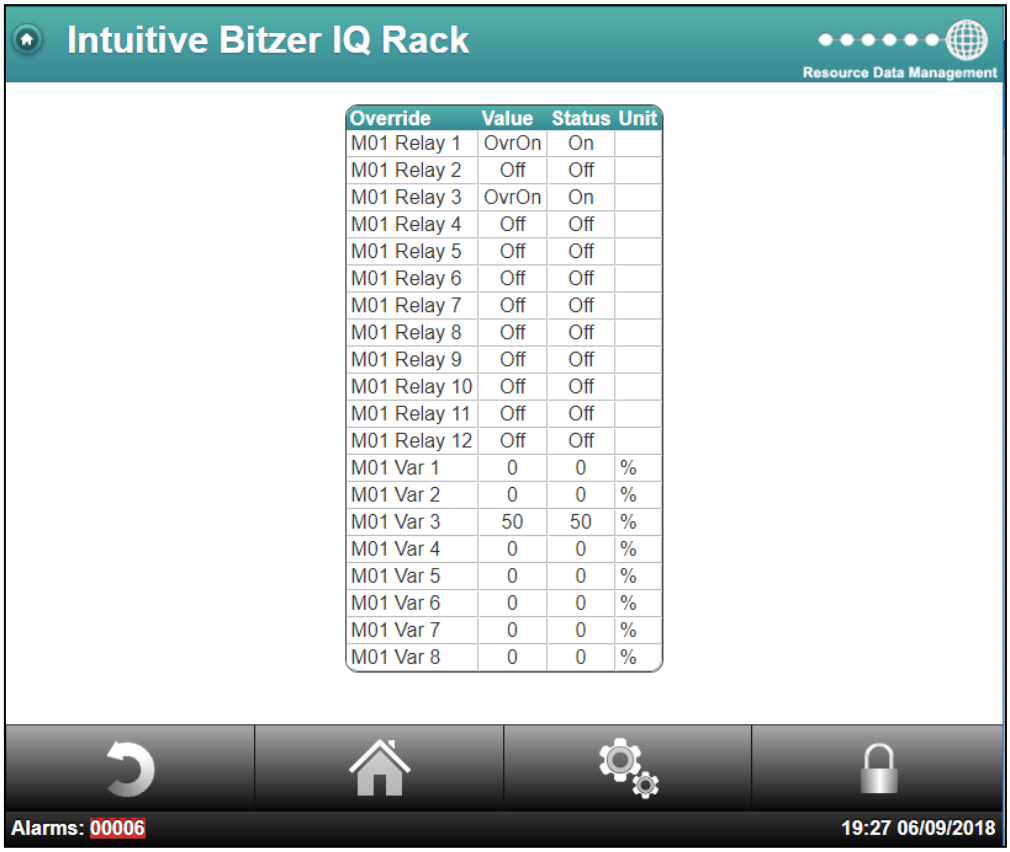
Type	Name	Details	Code Number
Main Alarm	Modbus Dev OffLine	The Modbus device is offline and not communicating.	
Main Alarm	Modbus Addr Clash	More than one device has the same Modbus address.	
Main Alarm	Modbus Dev Clash	More than one device is mapped to the same compressor stage.	
Main Alarm	Modbus Dev Locked	The compressor is locked out due to a fault.	
Main Alarm	Modbus Ctrl Source	Control source is not set to Modbus in the CM-RC-01.	
Main Alarm	Modbus Uncleared Alm	There is still an active alarm.	
Group Alarm	Group Failure Alarm	Caused by one or more of the four sub alarms below.	
Sub Alarm	Mains Failure		2
Sub Alarm	Locked		72
Sub Alarm	Setup Fault		73
Sub Alarm	Locked Rotor		16
Group Alarm	Timer Alarm	Caused by one or more of the three sub alarms below.	
Sub Alarm	Serial Control Timeout		1
Sub Alarm	Too many identical timer resets in 24 hours		119
Sub Alarm	Too many timed resets in 1 hour		120
Group Alarm	Compressor Run Alarm	Caused by one or more of the four sub alarms below.	
Sub Alarm	Too Many Compressor Starts		74
Sub Alarm	Minimum Compressor Stop Time Not Respected		98
Sub Alarm	Minimum Compressor Run Time Not Respected		99
Sub Alarm	Minimum Compressor Start to Start Time Not Respected		100
Sub Alarm	Compressor Start without being fully unloaded		71
Group Alarm	Oil Alarm	Caused by one or more of the five sub alarms below.	
Sub Alarm	Oil Level Low		15
Sub Alarm	Oil Flow		133
Sub Alarm	Oil Pressure Low		134
Sub Alarm	Oil Stop Valve		137
Sub Alarm	Oil Injection Has No effect		102

Group Alarm	Config Data Alarm	Caused by one or more of the five sub alarms below.	
Sub Alarm	No File		49
Sub Alarm	CRC Error		50
Sub Alarm	Wrong Version		51
Sub Alarm	Memory Read Only		52
Sub Alarm	Datalog Error		91
Group Alarm	Motor Alarm	Caused by one or more of the six sub alarms below.	
Sub Alarm	Motor phase Loss		18
Sub Alarm	Motor phase Sequence		19
Sub Alarm	Motor Low Frequency		135
Sub Alarm	Motor High Frequency		136
Sub Alarm	Motor Temperature High		20
Sub Alarm	Motor Temperature Cooldown		84
Group Alarm	Hardware Alarm	Caused by one or more of the four sub alarms below.	
Sub Alarm	HW 24v		39
Sub Alarm	HW 3.3v		54
Sub Alarm	HW User 5v		55
Sub Alarm	HW 24v		70
Group Alarm	Envelope Alarm	Caused by one or more of the ten sub alarms below.	
Sub Alarm	SST Low, SDT Low		3
Sub Alarm	SST Low		4
Sub Alarm	SST Low, SDT High		5
Sub Alarm	SDT High		6
Sub Alarm	SST High, SDT High		7
Sub Alarm	SST High		8
Sub Alarm	SST High, SDT Low		9
Sub Alarm	SDT Low		10
Sub Alarm	Startup Timeout		11
Sub Alarm	Configuration Failure		12
Group Alarm	Sensor Alarm	Caused by one or more of the fifteen sub alarms below.	
Sub Alarm	Discharge Temperature High		78
Sub Alarm	Suction Pressure Low		68
Sub Alarm	Discharge Pressure High		69
Sub Alarm	High Pressure Switch		90
Sub Alarm	Sensor Fault Motor Thermistor		62
Sub Alarm	Sensor Fault Discharge Temperature		85
Sub Alarm	Sensor Fault Aux Temperature		86
Sub Alarm	Sensor Fault Suction Pressure		87
Sub Alarm	Sensor Fault Discharge Pressure		88
Sub Alarm	Sensor Fault Suction Pressure Signal Low		94
Sub Alarm	Sensor Fault Suction Pressure Signal High		95
Sub Alarm	Sensor Fault Discharge Pressure Signal Low		96
Sub Alarm	Sensor Fault Discharge Pressure Signal High		97
Sub Alarm	Sensor Fault Oil Protection		89
Sub Alarm	Sensor Fault Oil Protection 2		80
Group Alarm	Output Current Alarm	Caused by one or more of the nineteen sub alarms below.	
Sub Alarm	Output Current: Total Value Low		92
Sub Alarm	Output Current: Total Value High		93
Sub Alarm	Output Current: Oil Heater Low		103
Sub Alarm	Output Current: Oil Heater High		104
Sub Alarm	Output Current: Additional Fan (Head Fan) Low		105
Sub Alarm	Output Current: Head Fan High		106
Sub Alarm	Output Current: CR-1 Low		107
Sub Alarm	Output Current: CR-1 High		108

Sub Alarm	Output Current: CR-2 Low		109
Sub Alarm	Output Current: CR-2 High		110
Sub Alarm	Output Current: CR-3 Low		111
Sub Alarm	Output Current: CR-3 High		112
Sub Alarm	Output Current: Unloader Low		113
Sub Alarm	Output Current: Unloader High		114
Sub Alarm	Output Current: Oil Inj Low		115
Sub Alarm	Output Current: Oil Inj High		116
Sub Alarm	Output Current: Liquid Inj Low		117
Sub Alarm	Output Current: Liquid Inj High		118
Sub Alarm	Output Current: HW Trip		140

Override Summary

On the Intuitive Bitzer IQ Rack controller, all relays and variable outputs can be manually forced on and off for commissioning and testing purposes using the inbuilt LCD display (if fitted). The override summary menu gives an overview of any outputs that are currently overridden on the controller. If one or more Canbus expansion boards are being used then an override summary page is available for each of these as well.

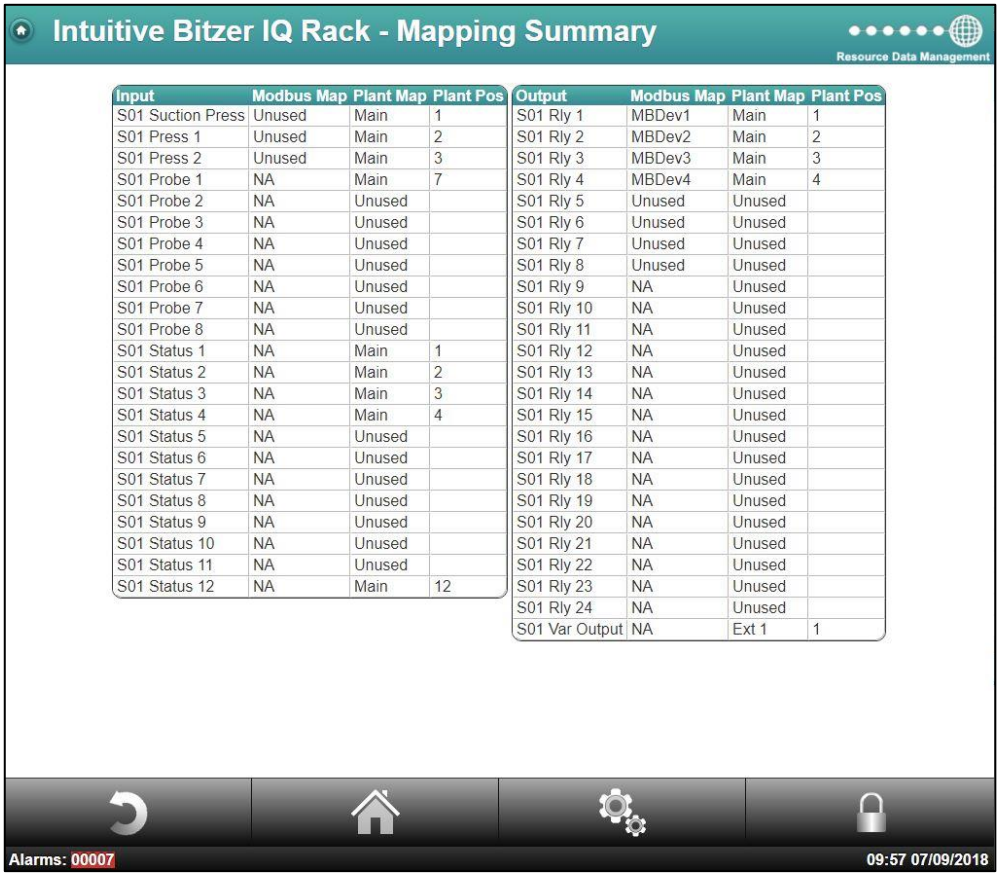


In the above example, relays 1 and 3 on the main controller are overridden On and the variable output on Universal IO 3 is overridden to 50%.

Mapping Summary

This menu provides an overview for each section's mapping configuration. The example below shows mapping values for a typical pack section.

Section 1 (Pack)



Input	Modbus Map	Plant Map	Plant Pos
S01 Suction Press	Unused	Main	1
S01 Press 1	Unused	Main	2
S01 Press 2	Unused	Main	3
S01 Probe 1	NA	Main	7
S01 Probe 2	NA	Unused	
S01 Probe 3	NA	Unused	
S01 Probe 4	NA	Unused	
S01 Probe 5	NA	Unused	
S01 Probe 6	NA	Unused	
S01 Probe 7	NA	Unused	
S01 Probe 8	NA	Unused	
S01 Status 1	NA	Main	1
S01 Status 2	NA	Main	2
S01 Status 3	NA	Main	3
S01 Status 4	NA	Main	4
S01 Status 5	NA	Unused	
S01 Status 6	NA	Unused	
S01 Status 7	NA	Unused	
S01 Status 8	NA	Unused	
S01 Status 9	NA	Unused	
S01 Status 10	NA	Unused	
S01 Status 11	NA	Unused	
S01 Status 12	NA	Main	12

Output	Modbus Map	Plant Map	Plant Pos
S01 Rly 1	MBDev1	Main	1
S01 Rly 2	MBDev2	Main	2
S01 Rly 3	MBDev3	Main	3
S01 Rly 4	MBDev4	Main	4
S01 Rly 5	Unused	Unused	
S01 Rly 6	Unused	Unused	
S01 Rly 7	Unused	Unused	
S01 Rly 8	Unused	Unused	
S01 Rly 9	NA	Unused	
S01 Rly 10	NA	Unused	
S01 Rly 11	NA	Unused	
S01 Rly 12	NA	Unused	
S01 Rly 13	NA	Unused	
S01 Rly 14	NA	Unused	
S01 Rly 15	NA	Unused	
S01 Rly 16	NA	Unused	
S01 Rly 17	NA	Unused	
S01 Rly 18	NA	Unused	
S01 Rly 19	NA	Unused	
S01 Rly 20	NA	Unused	
S01 Rly 21	NA	Unused	
S01 Rly 22	NA	Unused	
S01 Rly 23	NA	Unused	
S01 Rly 24	NA	Unused	
S01 Var Output	NA	Ext 1	1

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 7 (Value = 7. 1st Probe input in set up)
Sect 1 Status Positions 1 to 4 are mapped to Main Board Status Inputs 1 to 4 (Value 1 to 4, 1st to 4th Status Inputs in set up)
Sect 1 Relay Positions 1 to 4 are mapped to Modbus devices 1 to 4 (Value 1 to 4)
Sect 1 Variable Output is mapped to Extension board 1 position 1

A similar page is shown for sections 2 & 3 (if used)

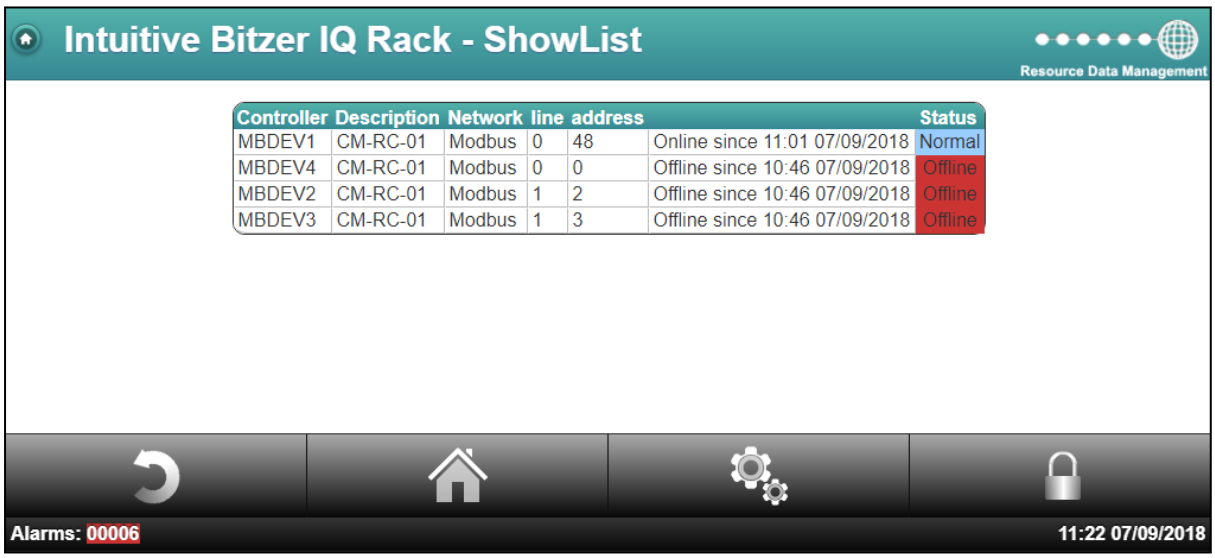
Note: Main Board has 12 status Inputs but Expansion Boards only have 8 each therefore only the first 8 can be used on expansion boards.

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 (Not currently used)
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

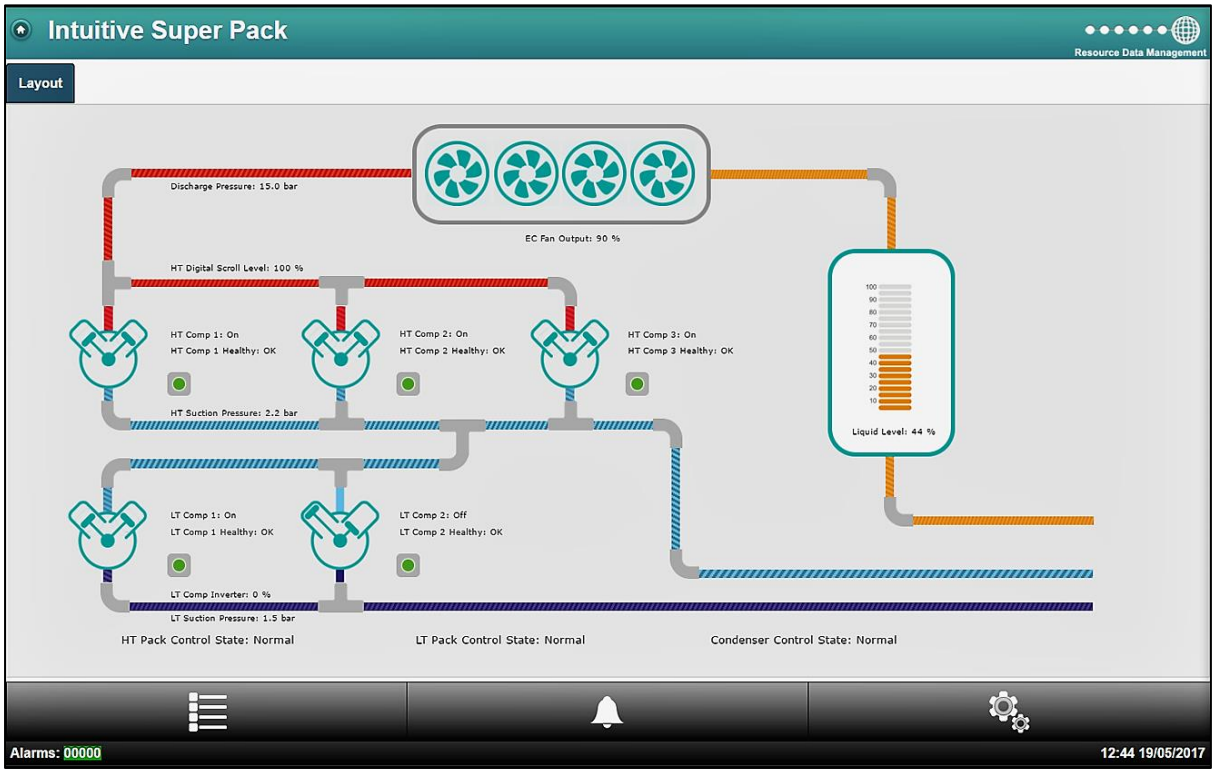
Shows a list of all Modbus network devices currently logged onto the controller.



Layout

Manage Layouts

The Bitzer IQ Rack 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 Sales for more details on the Layout Editor. The below shows an example of such a layout;

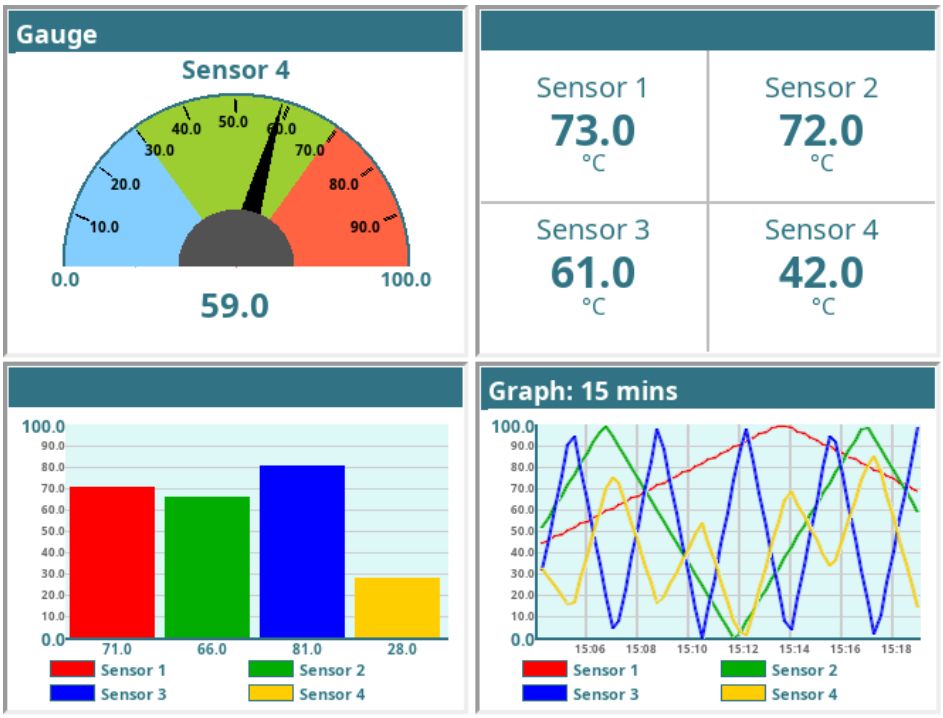


Link	Operation
Configure	Allows the user to provide a description of the Layout
Set Default	Not used in this variant.
Get	This option allows the layout to be download to the user's PC.
Remove	Select this option to permanently remove the layout from the Bitzer IQ Rack. **Note**: Once removed the layout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

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

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.

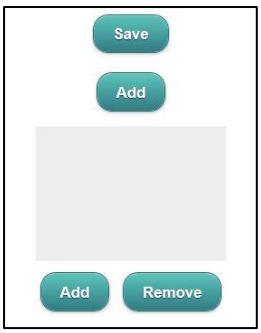


LCD Display Setup

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



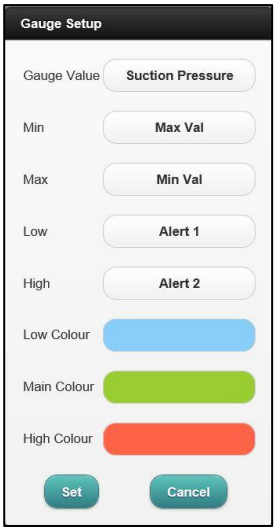
From the service menu select "system" followed by "LCD Display Layout", here the display layout can be customised, a maximum of 6 different screens can be set up.

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.



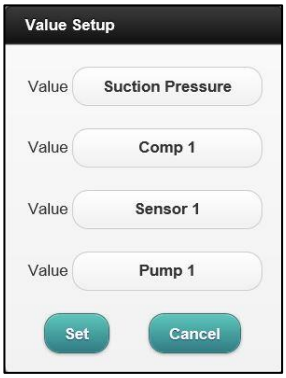
Min: Selects the minimum value that the gauge can display.
This needs to be an analogue value within the controller's parameter list, for example if suction pressure is being displayed then "S01 Offset 1" could be selected which is typically -1 Bar and would become the low limit of the scale on the gauge.

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.

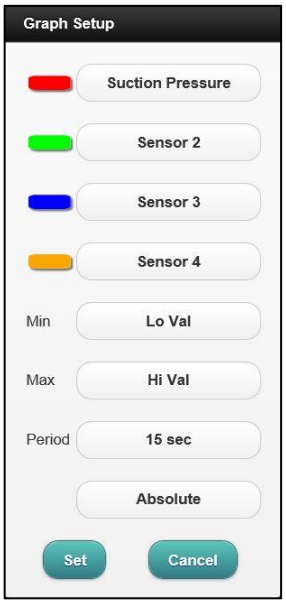
High: This selects a region on the gauge where the colour changes, for example a high pressure region. The area between the max value and the high value will then be the colour selected in the "High Colour" parameter. For example, if displaying suction pressure then "S01 HP Alm" could be used.

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.

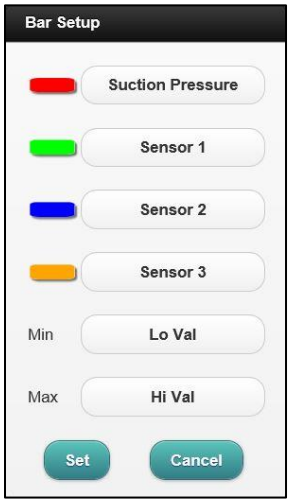
Min: Selects the minimum value that the graph can display.
This needs to be an analogue value within the controller's parameter list, for example if suction pressure is being displayed then "S01 Offset 1" could be selected which is typically -1 Bar and would become the low limit of the scale on the graph.

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.

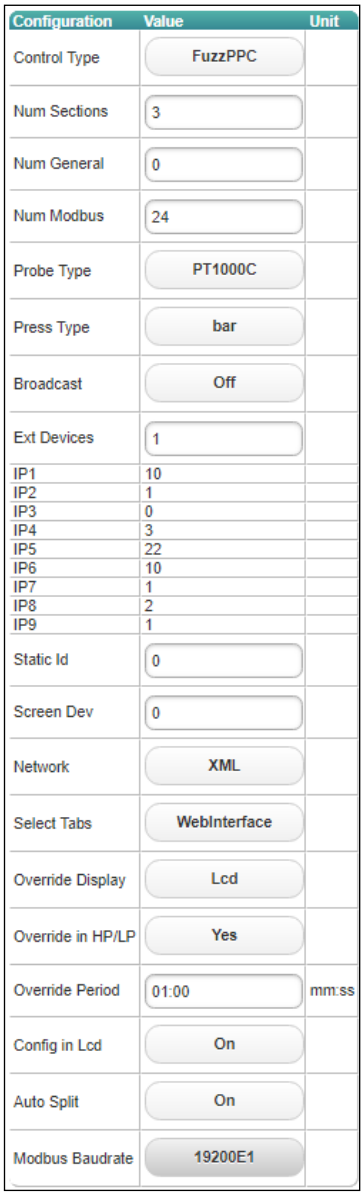
Min: Selects the minimum value that the graph can display.
This needs to be an analogue value within the controller's parameter list, for example if suction pressure is being displayed then "S01 Offset 1" could be selected which is typically -1 Bar and would become the low limit of the scale on the bar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

Maintenance

Link	Operation
Main Config	Allows the configuration of the controller setup. (See information below)
Save Config	Use this option to save the Bitzer IQ configuration to a file
Load Config	Use this option to load the Bitzer IQ configuration to a file
View Config Info	Provides information on the last loaded configuration file and any mismatches
Add Feature	Not currently in use
Upgrade	Allows controller firmware to be updated.
Reset	This allows the user to reset the controller.

Main configuration screen



Control Type: Select the configuration required.
Num Sections: Sets how many sections are displayed.
Num General: Not currently used, leave at 0.
Num Modbus: Number of Modbus devices in use.
Probe Type: Sets probe type being used.
Press Type: Sets how pressure is to be displayed.
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.
Ext Devices: This allows the number of Canbus 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: Not currently used, only XML is supported.

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: In development, do not use.

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.Configuration of inputs and outputs

Note 1 : - The Auto Split parameter MUST be the same, if connecting more than one Bitzer IQ 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

Modbus Baudrate: Sets the Modbus Baud Rate. Do not change leave at 19200E1

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

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 instead of Section 1/2/3 Day/Night Target Pressure 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 Day/Night Target to Ext Target.
- When the input is de-activated the Target Pressure will revert back to Day/Night Target.

Condenser Controller Heat Reclaim

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

To use Sect 1/2 Ext Target instead of the normal Day/Night Target Pressure a Status Input must be set to "Heat 1/2 N/O or N/C".

With Heat Reclaim parameter set to "On" the following will occur: -

- When the input is activated the Target Pressure will change from normal Day/Night Target Pressure to Ext Target Pressure
- When the input is de-activated the Target Pressure will revert back to normal Day/Night Target Pressure.

Or

With Heat Reclaim parameter 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, 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 to either "On" or "On/Rly".
- When input is activated the Target Pressure will change from 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 the normal Day/Night target pressure.

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 relay or a Modbus Compressor control module	
4	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.	

Operation using Bitzer CM-RC-01 Control Modules

Once the suction pressure rises above the target pressure plus the target above (diff above) the first compressor will be switched on. The compressor selected will depend on which are available due to their anti short cycle timers and the number of run hours against each compressor (to even out compressor run times). The controller will send a run command to the relevant Modbus control module and a varying capacity signal from 0-100%. The control overview page will show which compressor is currently being controlled next to "Lead Comp" and the current control value in % next to "Var Outout", the Modbus control module will modulate the compressor capacity accordingly. If the suction pressure drops to the Target pressure within the Target Above and Target Below settings (diff above and below setpoint) then the percentage output to the control module will stay steady state and the compressor will stay at it's current capacity value.

If the capacity signal reaches 100% and stays there for the Stage On Delay period then the current compressor will remain at full capacity, the next compressor will be started and the capacity signal will modulate upwards from the compressor minimum value percentage (10% for example).
The reverse process will happen as the suction pressure drops below the Target pressure minus the target below (diff below), the current compressor will modulate down to the compressor minimum value percentage and after the Stage Off Delay will switch off and move control onto the next compressor.

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 to "Floating".

Set Float Select to Probe 1 to 8 or Remote whichever is monitoring the temperature.

Select the refrigerant being used in the system.

Set Pressure Type to Gauge or Absolute.

Condenser Offset.

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" as the target pressure and 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 parameter. 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 float select 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 to "Drop Leg" (or Drop Leg / Floating Head)

Set Drop Select to Probe 1 -8 or 'remote'.

Select the refrigerant being used.

Set Pressure Type to Gauge or Absolute.

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. 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 Drop Leg Select 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" and "Ext Brd" sections screen on web page. Choose the relay(s) you wish to invert and set them to on.

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 is set to 2:**

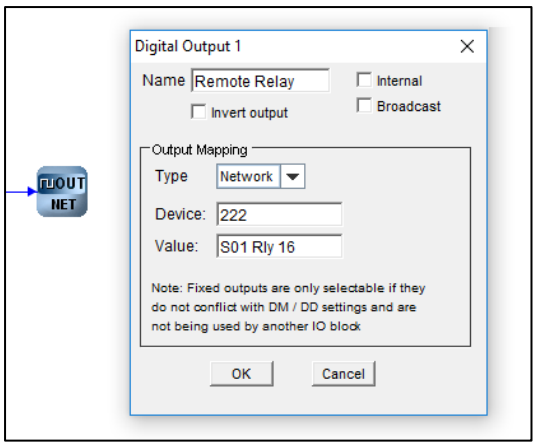
	Fan1	Fan2	Fan3	Fan4	Fan5	Fan6
On Sequence	1st	2nd	3rd	4th	5th	6th
Relay #	Relay 5	Relay 6	Relay 7	Relay 8	Relay 9	Relay 10
Off Sequence	6th	5th	1st	2nd	3rd	4th

Remote Relay

The Bitzer IQ 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 Bitzer IQ 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 Bitzer IQ device name is 222 on the Data Manager and Section 1 relay 16 is set to remote in the Bitzer IQ controller.

Fixed Remote Relay: Virtual relay 21 on each section on the Bitzer IQ Rack 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.

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 standby delay 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.

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
General Faults	20
Stage Faults	3
Inverter Fault	3
Board Offline	20
Dropleg Probe Fault	6
Input Stat Fault	6
Stat High Alarm	4
Modbus Address Clash	7
Modbus Control Source	7
Modbus Event Alarm	7
Modbus Warning Alarm	7
Modbus Fault Alarm	7
Modbus Timer Alarm	1
Modbus Oil Alarm	18
Modbus Motor Alarm	17
Modbus Envelope Alarm	20
Modbus Output Current Alarm	17

Alarm text	Type #
Float Probe Fault	6
Liquid Level Fault	6
Liquid Level High	4
Liquid Level Low	5
Controller in standby	20
Superheat High	4
Superheat Low	5
Superheat Fault	6
Discharge Temperature	6
Board Configuration Fault	20
Stat Low Alarm	5
Modbus Device Offline	20
Modbus Device Locked	7
Modbus Log Alarm	7
Modbus Info Alarm	7
Modbus Critical Alarm	7
Modbus Failure Alarm	14
Modbus Comp Run Alarm	15
Modbus Config Data Alarm	7
Modbus HW Alarm	16
Modbus Sensor Alarm	6

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	0.3 Amp
Class 2 Insulation	**No** protective Earth is required. A functional earth can be connected if the equipment is located in an electrically noisy environment.

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

Insulation and Fuse Requirements

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

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

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

General

Operating temperature range	Without Internal LCD Display : -40°C to +65°C (-40°F to +149°F) With Internal LCD Display or SRR fitted: -20°C to +65°C (-4°F to +149°F)
Operating Humidity	80% maximum
Storage temperature range	Without Internal LCD Display : -40°C to +65°C (-40°F to +149°F) With Internal LCD Display or SSR fitted : -30°C to +65°C (-22°F to +149°F)
Environmental	Indoor use at altitudes up to 2000m, Pollution Degree 1, Installation Category II. Voltage fluctuations not to exceed ±10% of nominal voltage
Dimensions	Intuitive Plant Controller 280mm (L) x 122mm (W) x 67mm (H)
Weight	Intuitive Plant Controller 750 Grams
Safety	EN 61010-1:2010
EMC	EN 61326-1:2013 FCC CFR 47 Parts 15.107 & 15.109 and ICES-003 Issue 6
UL Compliance	UL 60950-1 and CAN/CSA C22.2 No. 60950-1-07 Information Technology Equipment - Safety - Part 1: General Requirements.
Ventilation	There is no requirement for forced cooling ventilation

Inputs

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

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. The cathode should connect to the output terminal and the Anode to GND/Return terminal. The maximum load current that can be supplied from these outputs is 38mA. The mercury plant cannot be used to drive a relay coil.
Relay Ratings, Intuitive Bitzer IQ Rack Controller	
Mechanical Relay	10A/250 Vac/AC1 (Resistive load)
	10A/30 Vdc (Resistive load)
	5A/250 Vac cosφ=0.4

Internal Display

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

Comms

Comms	Ethernet
Inter-board Comms	CABbus (see specification below)

Software, Software drivers and software features and function licences

RDM product Software Licences and drivers are non-transferable. They are purchased with hardware or separately and once added to hardware for use on that hardware only. If hardware is returned and deemed out of warranty all software driver licences terminate with the hardware.

CANbus cable specification

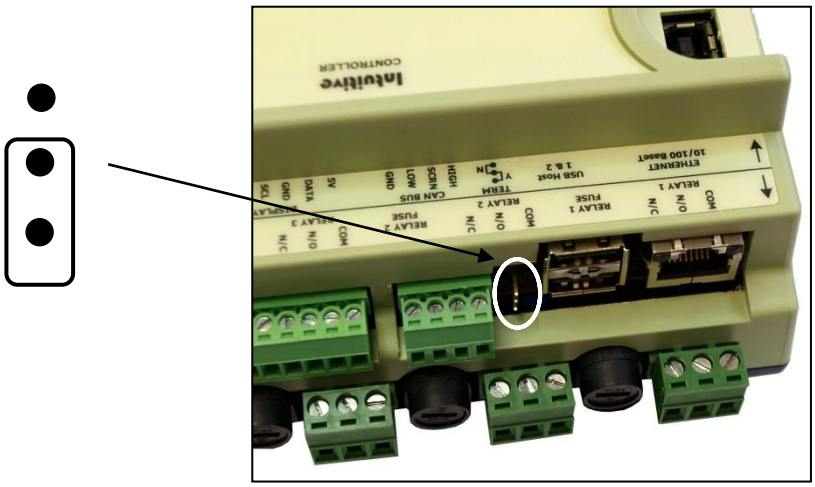
CANbus communication cable **must** be of a standard to meet ISO11898 or equivalent and the screen cable **must** be connected.

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

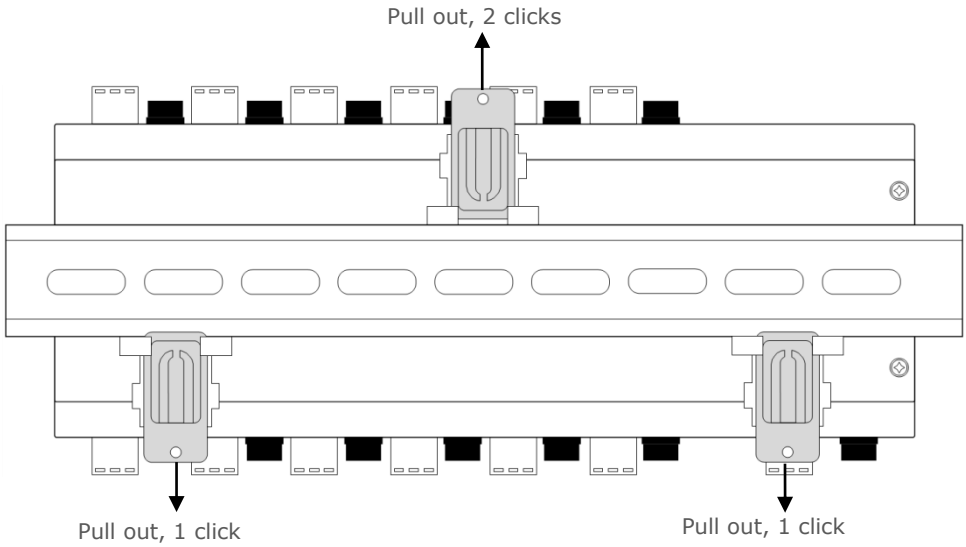
End of line termination resistor



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.

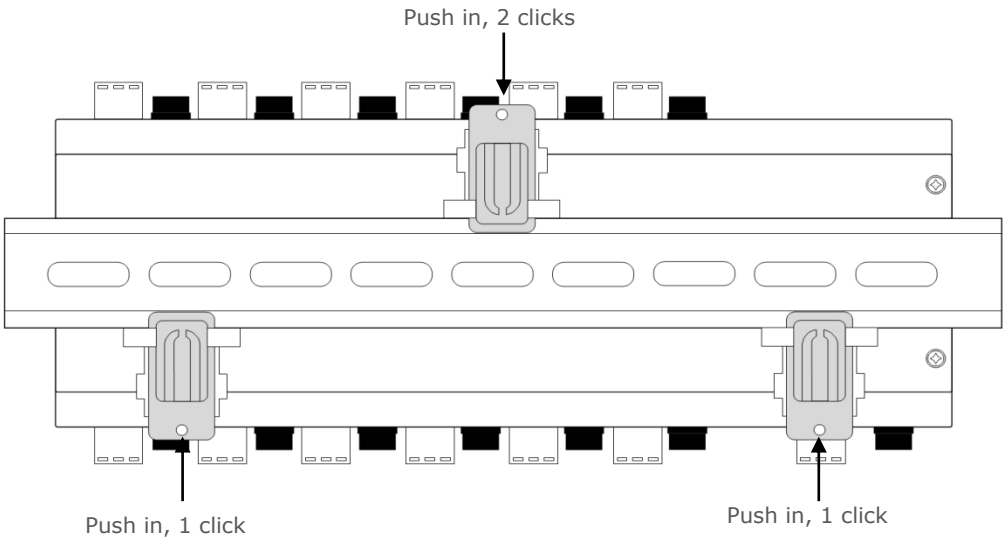
Installation

Mounting on to a DIN rail, Intuitive Plant Controller



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

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

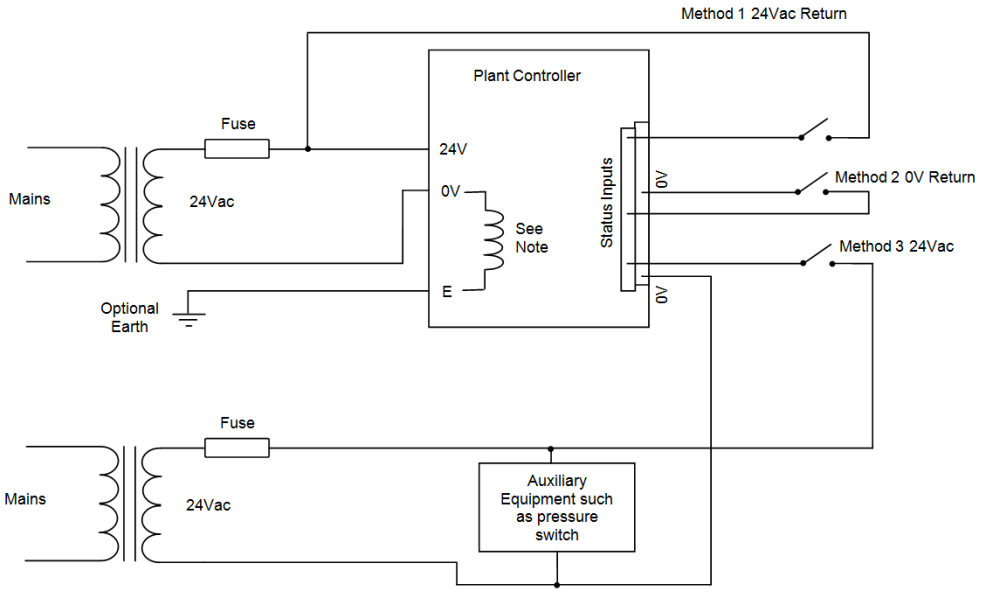
Please note: The specifications of the product detailed on this set up guide may change without notice. RDM Ltd shall not be liable for errors or for incidental or consequential damages, directly or indirectly, in connection with the furnishing, performance or misuse of this product or document.

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 Bitzer IQ 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

Disclaimer

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

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

Revision History

Date	Revision	Update No	Changes
13/12/2018	3.0	00	First Issue
16/04/2019	3.1	00	Default install password “1234” removed and replaced with “PleaseChangeBxxxxxx”. Added Parameters “Max Ramp On”, “Max Ramp Off”, and “In Band Control”

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Resource Data Management