Product Manual



genZ Z-Data Controller Product Manual

Model Number GZ-MX-ZDC-2

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1 Introduction

Thank you for purchasing this genZ Z-Data Controller (ZDC). It has been designed and manufactured to provide many years of trouble free service.

The ZDC has been customised to interface with the genZ range of battery modules fitted with Battery Management Systems that support RS485 and CANbus communications.

Hardware – Refer genZ Z-Data Controller Product Manual

For hardware installation and operation related to the ZDC, please refer to the "genZ Z-Data Controller Product Manual" Please read the genZ Z-Data Controller Product Manual prior to installing and using the genZ ZDC Software.

The genZ Z-Data Controller Product Manual provides information that must be followed during installation, commissioning and maintenance. Failure to follow these instructions may lead to damaging the ZDC, the system it is being installed into and/or voiding your warranty.

Software

genZ software running on the ZDC has been written and tested in Australia by the genZ technical team. This to provide the best user experience while ensuring a high level of confidence with respect to overall security and functionality.

It should be noted that the version of software running on your ZDC may be a custom solution so appear different from what is described within this document. If you are in any doubt, please contact *service@genz.com.au*

2 General Information

Life Support Policy

We do not recommend the use of any of our products in 'life support' applications where failure or malfunction of the product can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness.

genZ Energy Pty Ltd

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3 Safety Guidelines



Operational Voltage

ZDC MUST NOT be directly connected to any DC supply greater than 48V DC.

If using a DC-DC convertor to buck from a higher DC voltage, use of an **isolated** DC-DC convertor is highly recommended. This can be provided by genZ as a part of your ZDC system.



Qualified Service Personnel Only

There are no user serviceable parts contained within this ZDC. Any repairs must be performed by genZ authorised service personnel only.

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4 Specifications

Specification	Details
CPU	Arm Cortex-A53 quad-core 1.6 GHz
Memory	4 GB LPDDR4
Storage	16GB eMMC 128GB High Endurance MicroSD card
Wireless (Optional)	802.11a/b/g/n/ac/ax (requires purchase of optional Wi-Fi accessory) 2.4 GHz / 5 GHz
Interfaces	2x RJ45 ethernet port support 10/100M/1000M 1x USB 2.0 Port 2x UC-4414/UC-4434/UC-4454 models: CAN 2.0 4x DI (24V DC for logical high) 4x DO (Clean relay contacts, 100mA, 36VDC switching maximum) 4x RS-232/422/485 ports (software-selectable, DB9 male connector) 1x microSD port Dual-Band 802.11ac Wi-Fi (optional) LTE (optional) Wide Range of Supported Power Supply Voltages 9-48V DC
Dimensions / Mounting	141.5mm x 120mm x 41mm
Operating Temperature	With Wi-Fi: -30 to 70°C With Cellular: -40 to 70°C Non-wireless Operation: -40 to 75°C
EMI	FCC Part 15B Class A ICES-003 Class A EN 55032 Class A EN 61000-6-4 Class A
ESD Protection	IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV
Certifications	FCC, CE, ISED, UKCA, RCM, KC
MTBF	813,255 hours

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5 ZDC Setup

Physical Interface

NOTE: DO NOT CONNECT the network connections to the battery modules

1. Ensure the ZDC is powered by an isolated DC power supply of 24V
2. The RJ45 Network port 'LAN1' should be connected to the desired reachable network in order to continue the setup procedure. Typically an Ethernet hub, switch, or router.
3. For configuration, the ZDC may be temporarily connected directly to the Ethernet port on a computer by using a standard Ethernet cable (crossover cable not necessary) into 'LAN2'.

ZDC Network Connection

1. ZDC IP Address

Description	Factory Default
LAN 1	DHCP
LAN 2	192.168.4.127

2. Once connectivity to the network is established/confirmed the ZDC dashboard will be accessible from the below TCP Ports

Service	TCP Port
Dashboard:	4001
Graphing Package:	4000

Example connecting to the dashboard using the default IP: http://192.168.4.127:4001

3. To start the ZDC configuration, open the computers browser such as Chrome and enter the dashboard URL

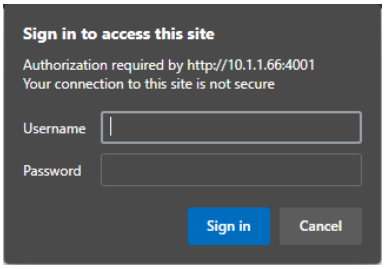
Once this has been entered, the ZDC Dashboard UI will appear.

NOTE: You may receive a security warning, proceed to the site anyway

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ZDC Dashboard User Interface (UI)

When you first log in, you will be presented with the following sign in page.



The default login details are shown in the table below:

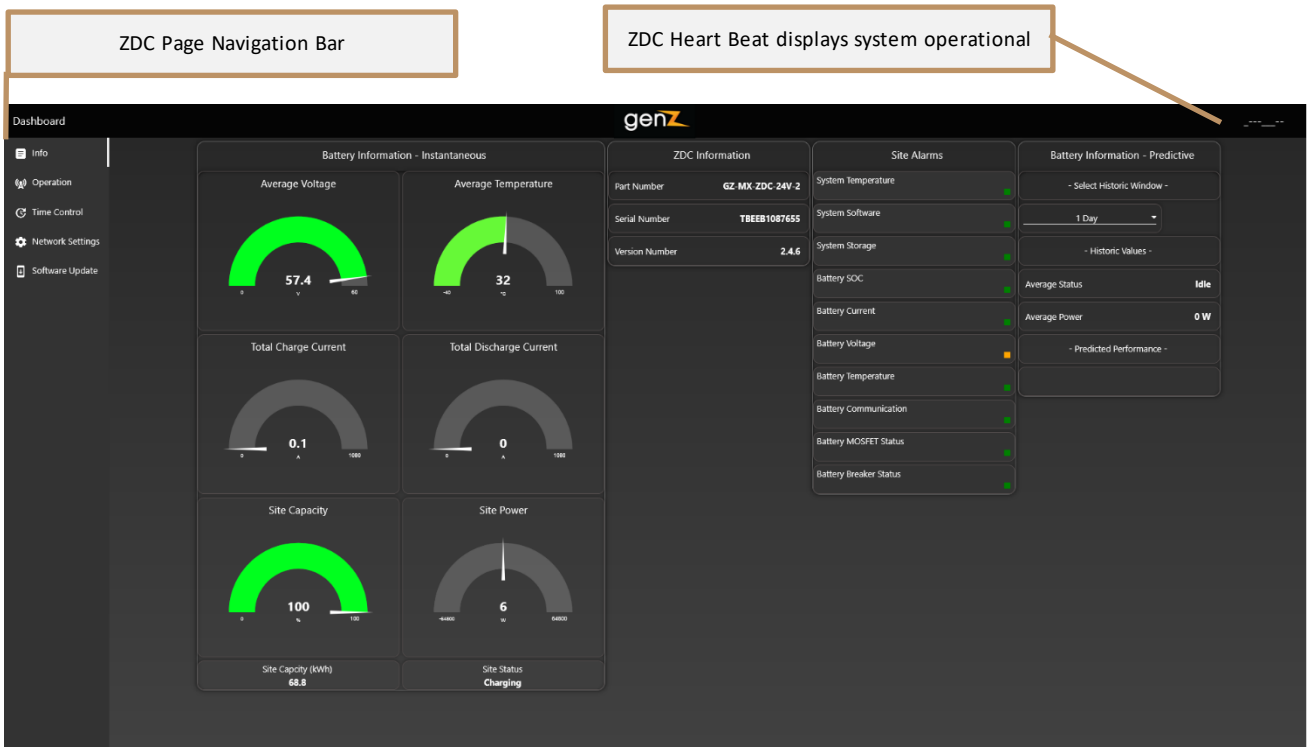
Username	admin
Password	admin

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5.1.1 ZDC UI Configuration

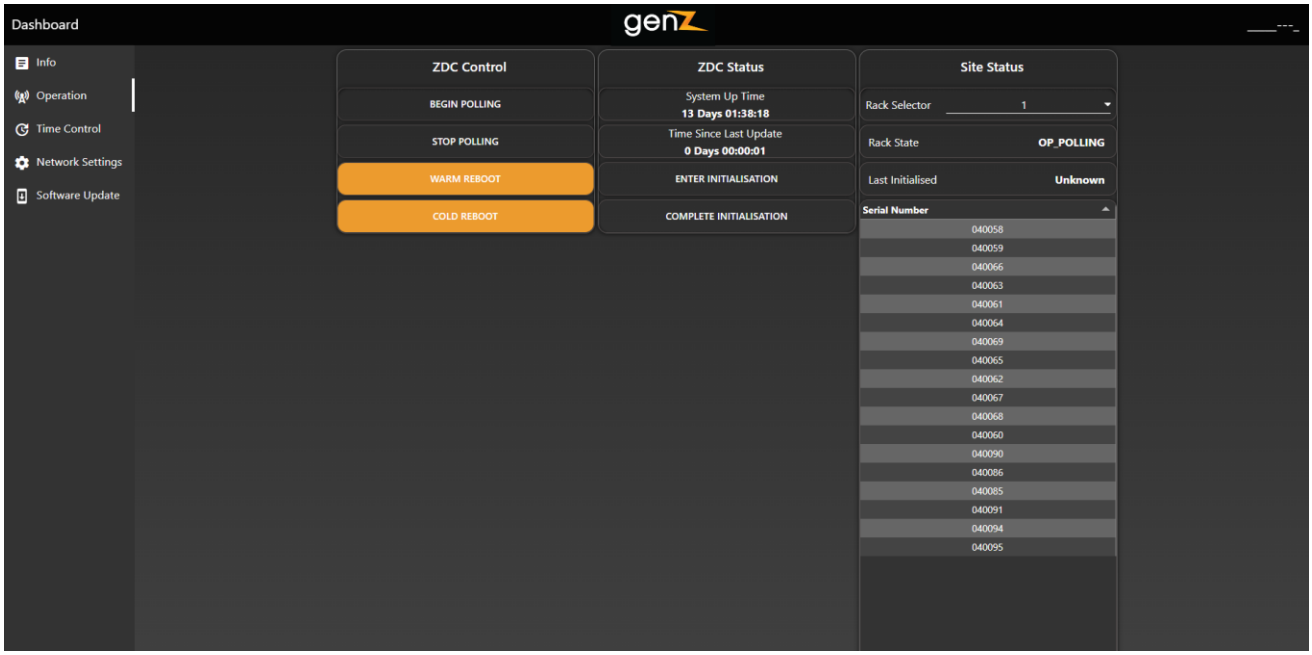
Upon first connection to the ZDC, you should see a UI dashboard like the below image.

NOTE: If this is a **NEW** installation where **NO** batteries are being polled, the below information panels will not yet be populated with data. These panels will become populated after the ZDC has completed the battery initialisation process.



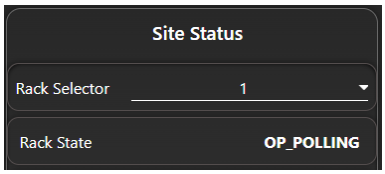
5.1.2 Adding batteries – New or existing site

1) Navigate to the “Operation” tab. The below page will be shown.



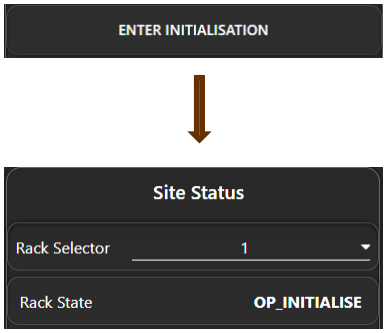
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2) Under the "Site Status" panel select the desired rack in the Rack selector:



Under standard operation the selected rack will be in the polling state

3) **IMPORTANT:** If this is a new site ensure no batteries are connected before completing this step. Select the "Enter Initialisation" button to put the selected rack into initialisation mode.



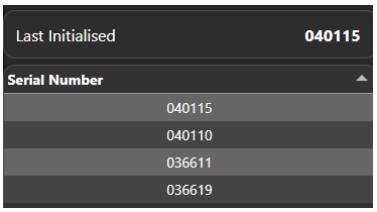
4) Connect the first of the batteries (or the newly added battery) to the communications bus.

   NOTE: Refer to the "**genZ LFP Battery Module Product Manual SBMS"** for coms bus connection methodology.

   a) If this is the first battery being connected in a NEW bank, then no other batteries within the bank should be connected to the communication bus.

   b) If this is an additional battery being connected to an EXISITNG bank, ensure all, already initialised batteries remain connected to the communication bus, and appended the new battery to the end of the line.

5) The ZDC will now automatically add the new battery to the system. The serial number of the last battery to undergo initialisation will be updated in the "last initialised" field and the "Serial Number" list will be updated .



6) The ZDC will remain in "initialising" mode and will continue to look for new batteries on **ALL** battery bank.

7) Repeat step 4 until all batteries have been added to the current bank.

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8) Once all new batteries have been added to the current battery bank select “Complete Initialisation” to return the rack into the polling state:



To initialise new batteries in another bank, repeat from step 2.

5.1.3 Verifying Installation

Once the batteries have been initialised and the racks status has returned to polling, battery data will begin to populate the dashboard. Refer to section 6 UI setup/overview. Additionally, the graphing package listed in section 7 will begin to plot the time series data from the batteries.

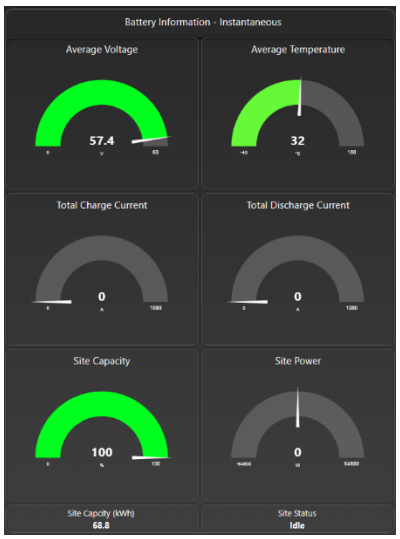
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6 UI Setup / Overview



6.1.1.1 Battery Information – Instantaneous

This panel displays the current data being polled from the batteries connected to the overall energy storage system.



Average Voltage / Temperature – Computed from the average of the most recent voltage / temperature value of all batteries in the system.

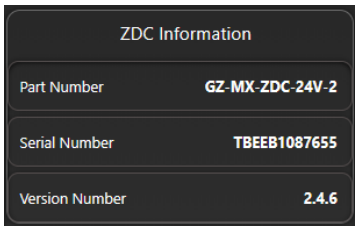
Total Charge / Discharge Current – Computed from the sum of the most recent current output value of all batteries in the system.

Current System Capacity – Computed by using the sum of the Amp Hours reported by each battery multiplied by the nominal Voltage of the batteries (51.2V DC).

System Power – Computed by taking the Total Charge (or Dis-Charge) current multiplied by the Average Voltage.

6.1.1.2 ZDC Information

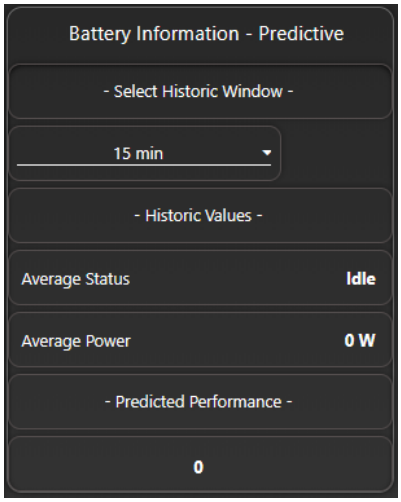
This panel displays the manufacture information of the ZDC.



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Battery Information – Predictive

This panel provides the user with predictive and historic data analysis of the overall energy storage system.



Historic Window – This is the time window, upon which analysis will be performed e.g., if 1 day is selected, data from the **LAST** 24 hours will be used.

Historic Values – These two fields show the energy storage systems average performance and status during the selected time window.

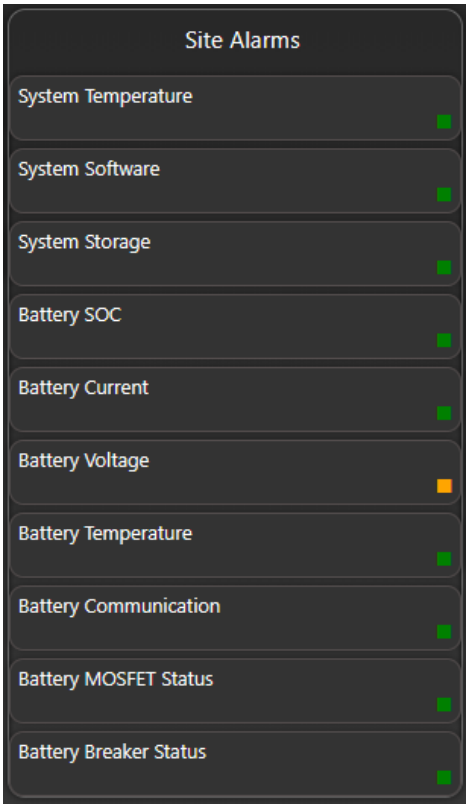
Predicted performance – This value returns either the time until fully charged, or the time until fully depleted based on the site's performance during the selected time window.

Both the historic values and predicted performance are updated every 20 seconds.

NOTE: Most battery energy storage systems are subject to varying loads and as such, time until depleted can only be used as a general indication.

6.1.1.3 Site Alarms

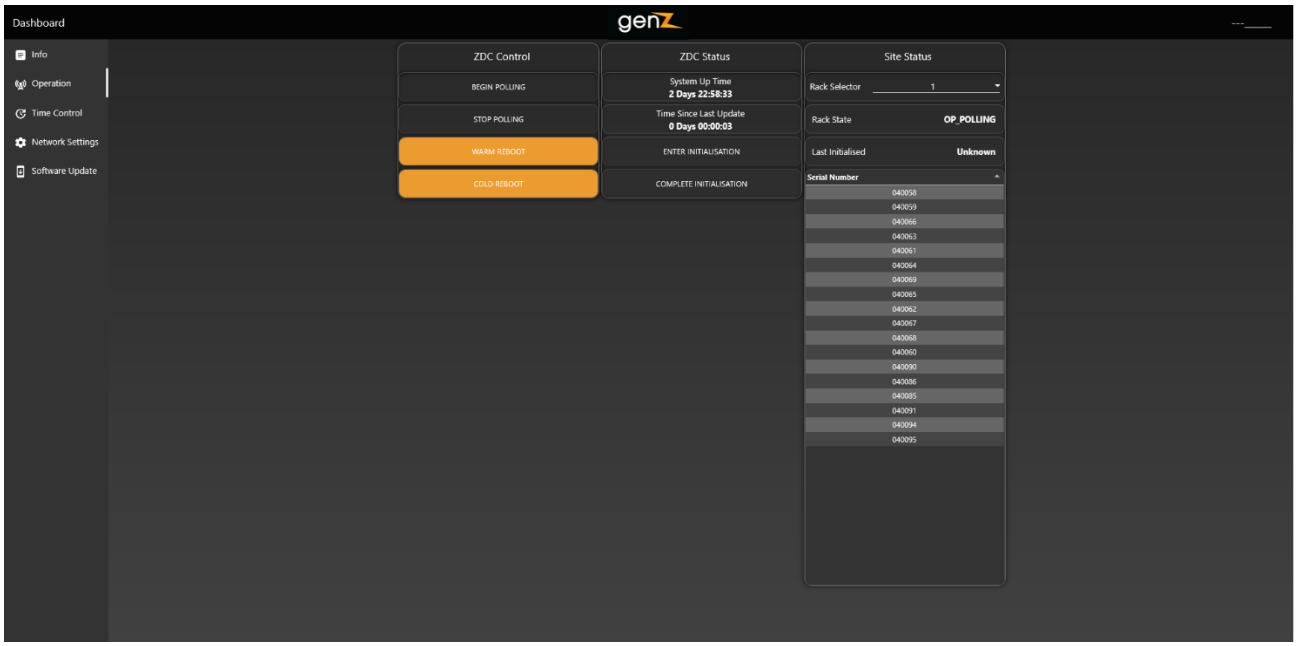
This panel displays the current alarm status of both the ZDC and the overall energy storage system it is monitoring. Hovering over alarm text, and alarm status provides additional information.



Alarm	Description
System Temperature	Advise genZ if persistent alarm. Internal ZDC temperature
System Software	Advise genZ in event of persistent alarm
System Storage	Advise genZ in event the of a System Storage alarm
Battery SOC	Low state of charge for any connected battery
Battery Current	Over current event experienced for any connected battery
Battery Voltage	Low or high voltage present on any connected battery
Battery Temperature	Low or high temperature present on any connected battery
Battery Communication	Loss of Communication to any battery
Battery MOSFET Status	MOSFET (charge or discharge) is in the OFF state for any connected battery
Battery Breaker Status	Circuit breaker in the OFF state for any connected battery

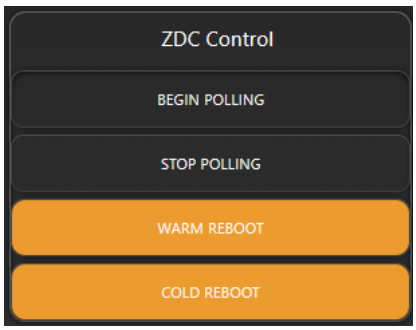
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6.1.2 Operation UI – Overview



6.1.2.1 ZDC Control

This panel allows the user to control the general function of the ZDC. Yellow buttons represent commands that are available to the user given the current operation mode, greyed out buttons are unavailable.

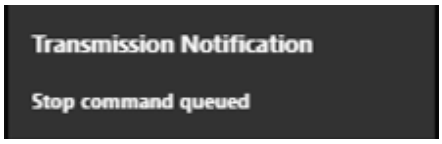


Begin Polling - Begins the polling on all RS-485/CAN bus(es)

Stop Polling - Stops the polling on all RS-485/CAN bus(es)

Warm Reboot - Restarts the ZDC software

Cold Reboot - Restarts the ZDC Hardware

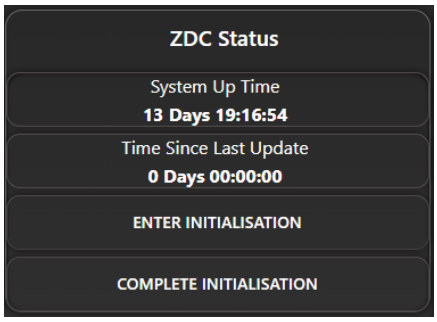


To increase the user's confidence that a command has been queued for execution, a small window will appear in the bottom right-hand side of the dashboard showing the status.

NOTE: The control offered by this panel is not an 'interrupt'. As such commands may take 5-10 seconds to execute as the ZDC

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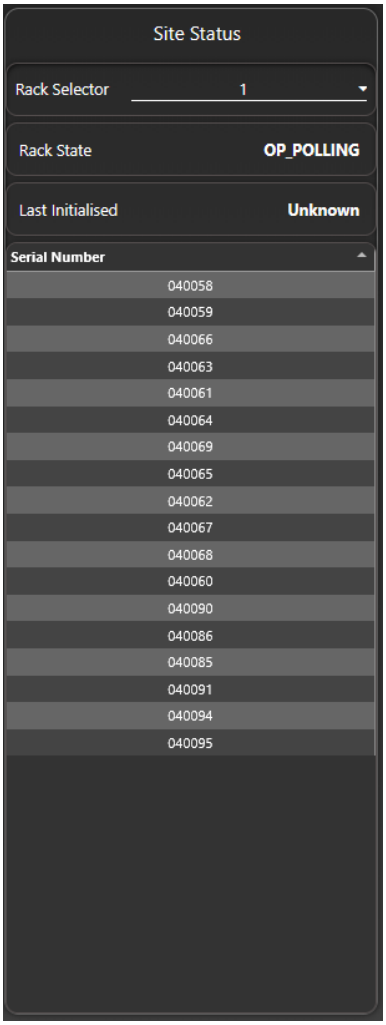
6.1.2.2 ZDC Status



System Up Time– The period of time that the ZDC has been on and running

Time Since Last Update – The amount of time since data has last been received from the polling sequence

6.1.2.3 Site Status



Rack Selector – Which rack state is to be shown below

Rack State – The current state the rack communications bus is in. The different states can be seen below:

State	Description
Polling	Sequentially polls each battery under the "Serial Number" list for alarm and operation values
Stop	No action is being performed, and the rack is sitting idle
Start up	Identifies all connected batteries to be polled
Initialisation	Detects newly added batteries on the communication bus with a default address and appends to the current list of initialised batteries

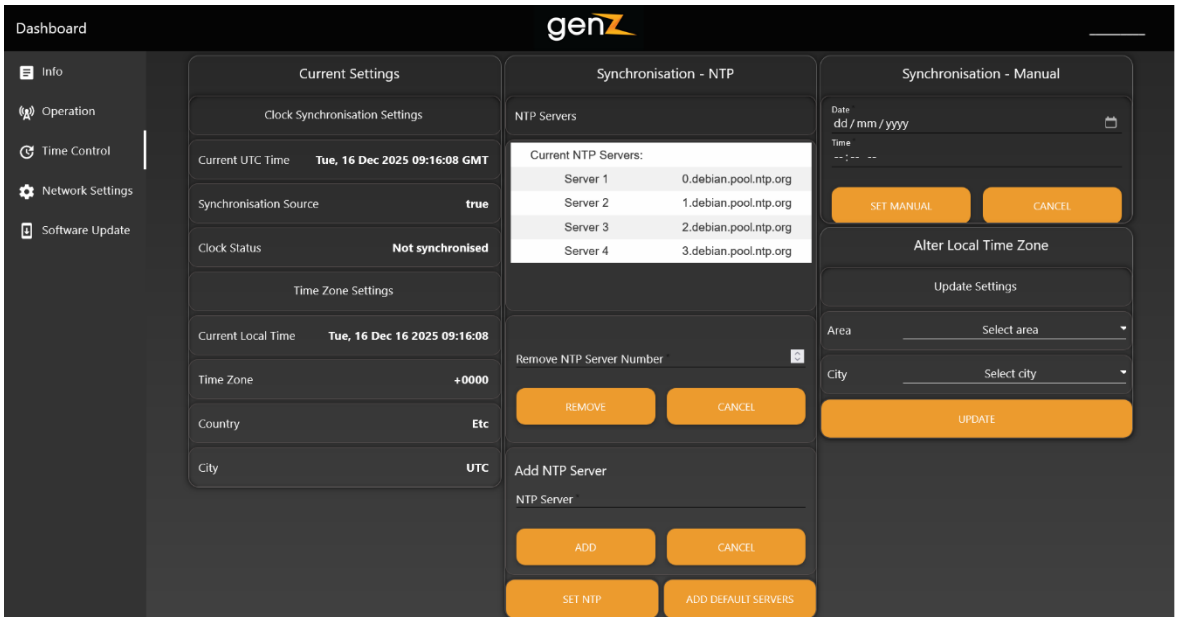
Last Initialised – During initialisation, this will show the serial number of the battery that was most recently initialised into the communications bus

Serial Number – List of serial numbers that are on the communication bus in view.

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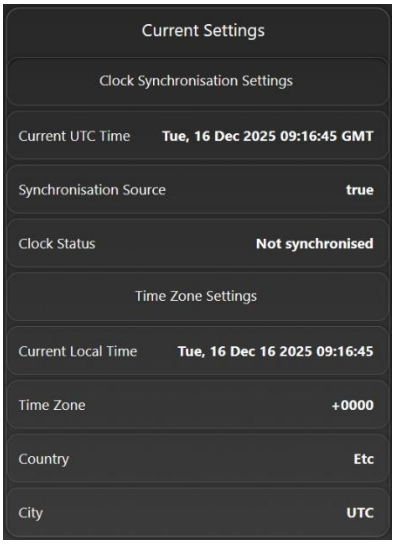
6.1.3 Time Control UI

This page is used to manage the internal Universal Time Coordinated (UTC) and local time of the ZDC. The internal time of the ZDC is relied upon heavily for data logging and alarm logging purposes so it is important that the time is set appropriately. This page has two synchronisation methods that can be used to set the internal time of the ZDC, Manual and Network Time Protocol (NTP).



6.1.3.1 Current Settings

This panel displays the current time control settings that are being used by the ZDC. It also displays the current UTC and local time of the ZDC.



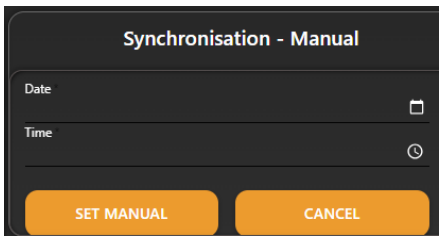
Synchronisation source – This field does not display the 'desired' synchronisation source but rather the 'active' synchronisation source.

If NTP clock synchronisation mode was last selected but the provided NTP servers are inaccessible by the ZDC, the ZDC will default back to MANUAL time synchronisation until it detects a stable connection to one of the provided servers.

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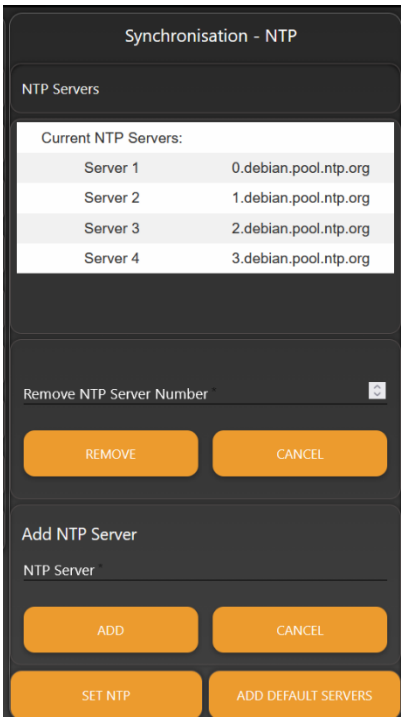
6.1.3.2 Synchronisation – Manual UTC

This panel allows the user to manual set the ZDC UTC time to a specific value.



6.1.3.3 Synchronisation – NTP

This panel allows the user to add new NTP servers and set the ZDC synchronisation source to NTP.



NTP Servers Table – This table displays the list of user defined NTP servers that the ZDC will attempt to access. The ZDC's NTP protocol processes the accessible servers to determine the most accurate candidate from the server list to synchronise its internal clock with.

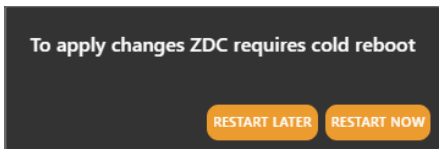
NOTE: Changes to this list will not be applied until SET NTP is pressed.

Remove NTP Server – Enter a server number (e.g. 1 for Server 1) and then click "Remove", that server will be removed from the list.

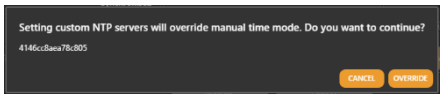
Add NTP Server – Enter a NTP server IP address or URL (e.g. 0.au.pool.ntp.org) and click "Add" that server will be added to the list and the ADD NTP Prompt will appear.

Add Default Servers – Adds the 4 Debian default NTP pools to the current servers list.

Set NTP – This button updates the ZDC's internal NTP list with the users list displayed in the NTP Servers Table, the SET NTP prompt will also appear.



To Apply changes…. – This reboot enables the ZDC to validate the NTP servers list BEFORE it gets applied. It DOES NOT apply the NTP servers list. The list can be applied directly without this reboot.



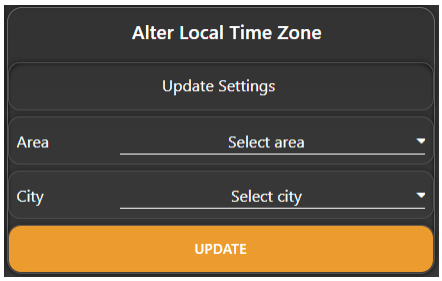
Setting custom NTP….. – Clicking OVERIDE will result in the use of the NTP servers listed and deactivate MANUAL TIME.

Note: When syncing to a new NTP server the devices local time will move toward NTP time. The time taken for the NTP synchronisation process to complete is directly proportional to the differential between the initial local time and the given NTP time. Large changes will take much longer to synchronise.

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6.1.3.4 Alter Local Time Zone

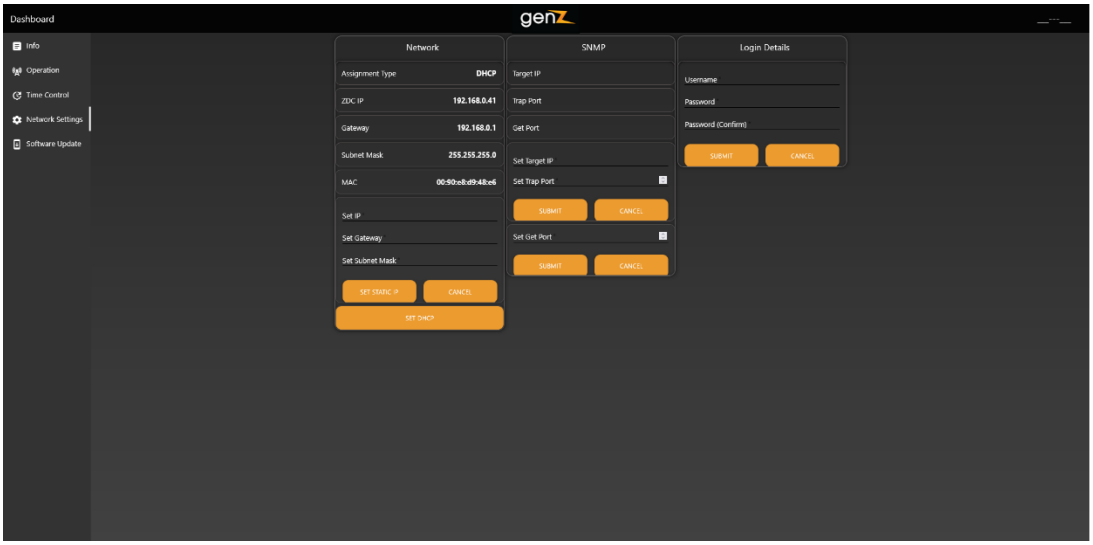
This panel allows the user to update the local time zone of the ZDC. The default time zone value of the ZDC is UTC +0000.



NOTE: Changes to local time zone requires a COLD REBOOT. For a COLD REBOOT refer to 'Operation' panel instructions.

6.1.4 Networks Settings

This UI page manages the ZDC's connection to the network. Both the ZDC's device network configuration and Simple Network Management Protocol (SNMP) configuration are managed via this panel.

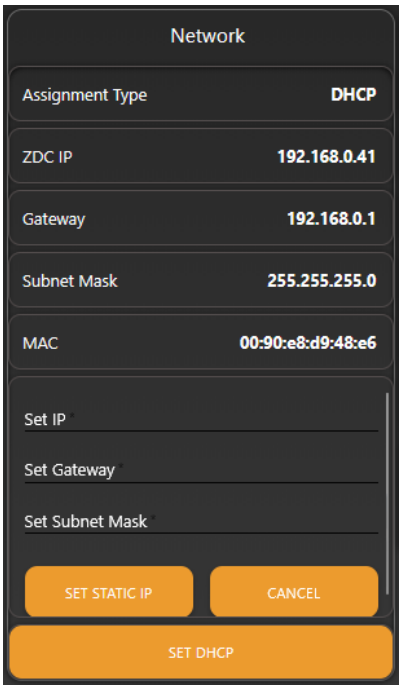


The IP being changed by this panel is for LAN1 of the ZDC, as LAN2 is static and used only for configuration. Once changed, the ZDC will now be discoverable at the newly set IP address, this can be confirmed by using the same dashboard port :4001, alternatively the graphing package will also be available on port :4000.

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6.1.4.1 Network (Static IP and DHCP)

This panel allows the user to configure the local network IP address of the ZDC. The current IP address assignment type, and other network connection settings are displayed at the top of this panel.



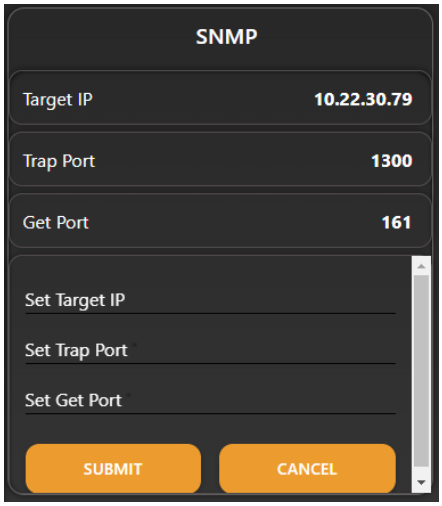
To configure for a statically assigned Internet Protocol V4 (IP) address, the following fields must be filled out, and then "Set Static IP" must be pressed.

Set IP – Enter the Desired IP address (e.g. 10.22.230.77)
Set Gateway – Enter the Default gateway address (e.g. 10.22.230.77)
Set Subnet Mask – Enter the desired Subnet Mask (e.g. 255.255.255.0)
Set Static IP – This button will configure the ZDC to operate using the static IP defined above.

Set DHCP – This button will configure the ZDC For Dynamic Host Configuration Protocol (DHCP).

6.1.4.2 Simple Network Management Protocol (SNMP)

This panel allows the user to configure the SNMP trap target for the ZDC and configure the SNMP Get receival port for the ZDC. The Current SNMP settings are listed at the top of this panel.



To configure the ZDC's SNMP settings, the following fields must be filled out, and then "submit" must be pressed.

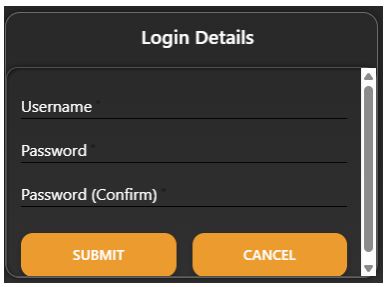
Target IP – This is the IP Address that the ZDC will send SNMP Traps to.
Trap Port – This is the port number that the ZDC will send SNMP traps to.
Get port – This is the port number the ZDC will receive, and process SNMP Get requests from.

Submit – This button will configure the ZDC to operate using the above settings.

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6.1.4.3 Login Details

The Login details for the dashboard can be modified to the user's preference:



If the username or password has been forgotten please contact the genZ technical team to have this reset.

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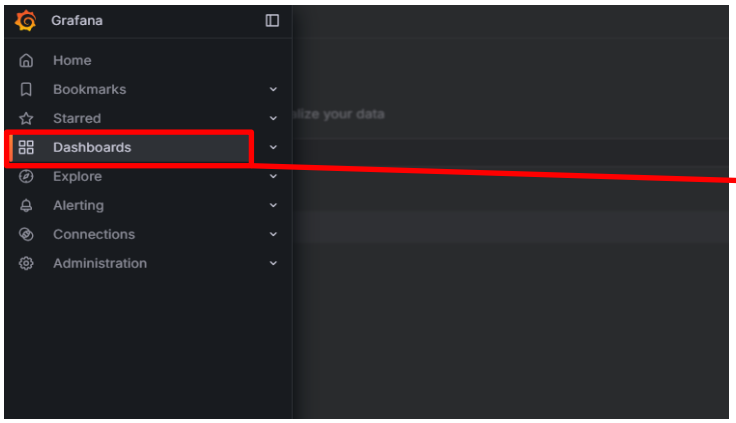
7 ZDC Graphing Package

7.1.1 Logging into the package

Access the graphing package on port: 4000. Eg. 10.22.230.77:4000
The default login credentials are as follows:

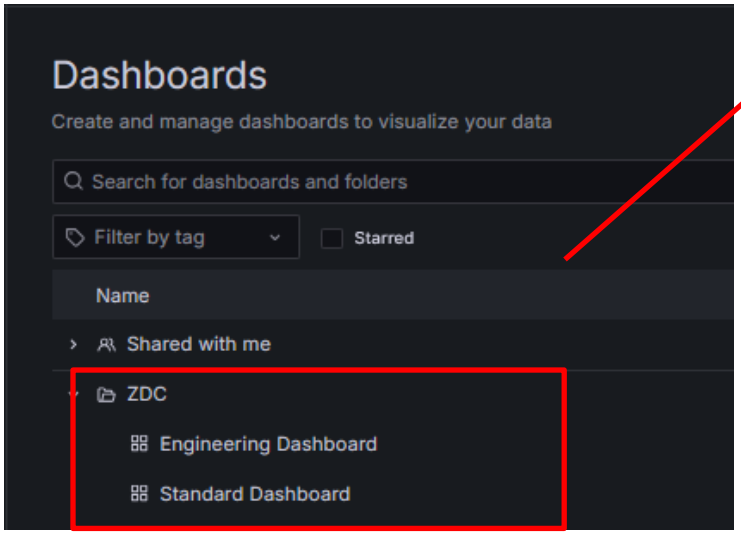
Username:	admin
Password:	admin

7.1.2 Dashboards



By navigating to the “Dashboards” tab, a list of the available dashboards relating to the installed racks can be found.

As shown Below:



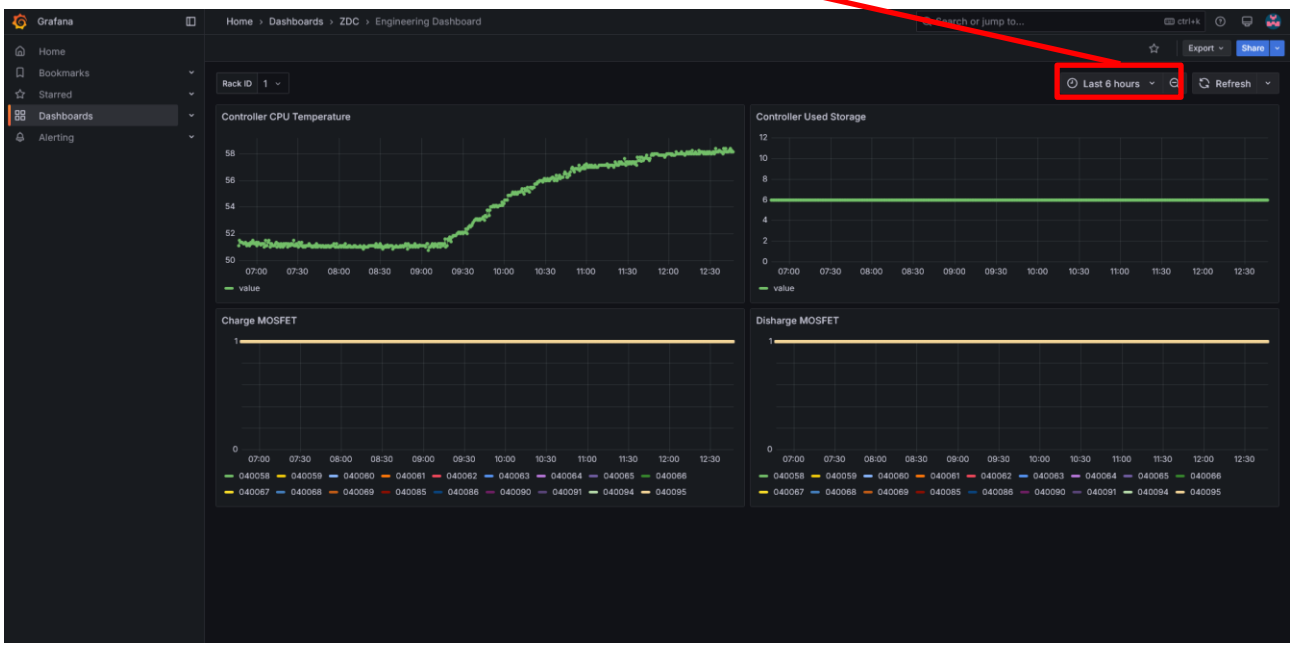
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7.1.3 Engineering Dashboard

The below shows the data that can be obtained from the engineering dashboard.

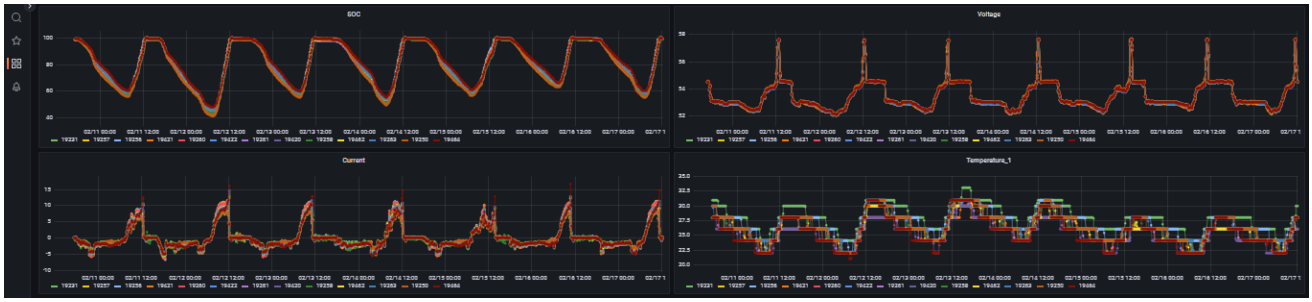
This includes the ZDC CPU Temperature, Used Storage, and the Charge and Discharge Mosfet States.

To see various historical events, use the time drop down



7.1.4 Standard Dashboard

Displays State of Charge, Voltage, Current and Temperatures



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8 Warranty & Service Information

General Information

Refer to the genZ website at www.genz.com.au for full details of the warranty on this product.

Registration

It is important that you maintain a record of your purchase details relating to the ZDC.

Warranty or Service

In the unlikely event that you believe the ZDC is faulty, contact the place of purchase or dealer/distributor first. If you cannot reach your dealer, or if they cannot resolve the issue please visit the genZ web site at www.genz.com.au for contact details for technical support.

Please ensure that you have the following information available:

a) Where and when the unit was purchased.
b) The model number.
c) Serial number of your module.
d) Information on the nature of the failure.

http://www.genz.com.au

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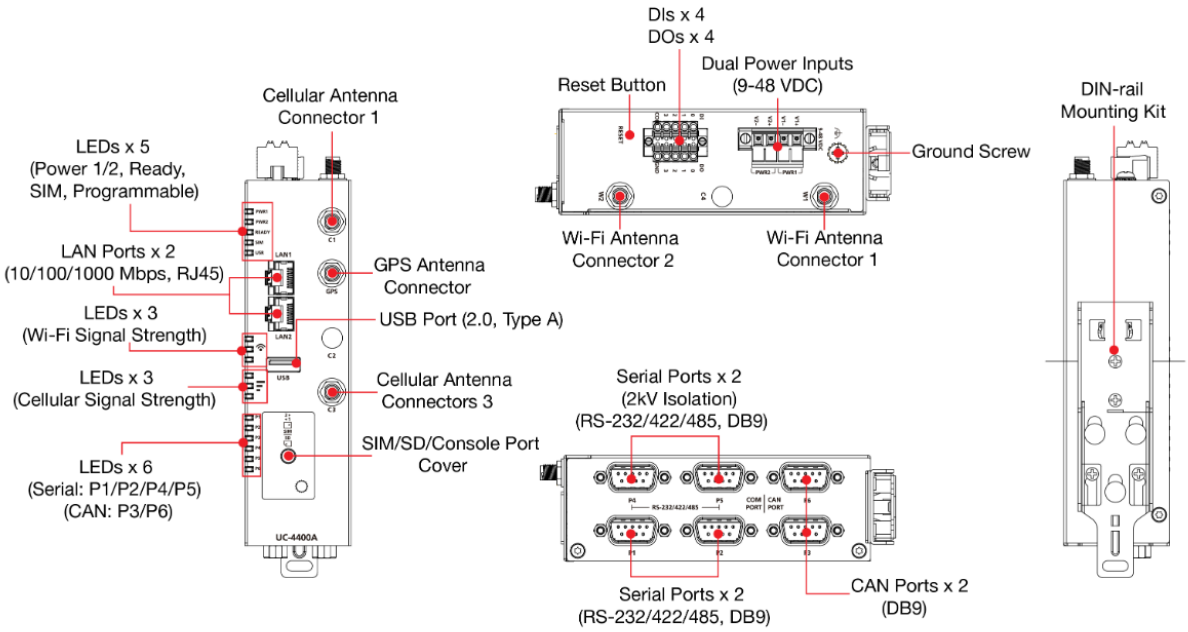
Notes:

Serial Number:
Model Number:
Place of Purchase:
Date of Purchase:
Owner:

9 Appendix 1: Dimension/Layout of DIN Mount ZDC

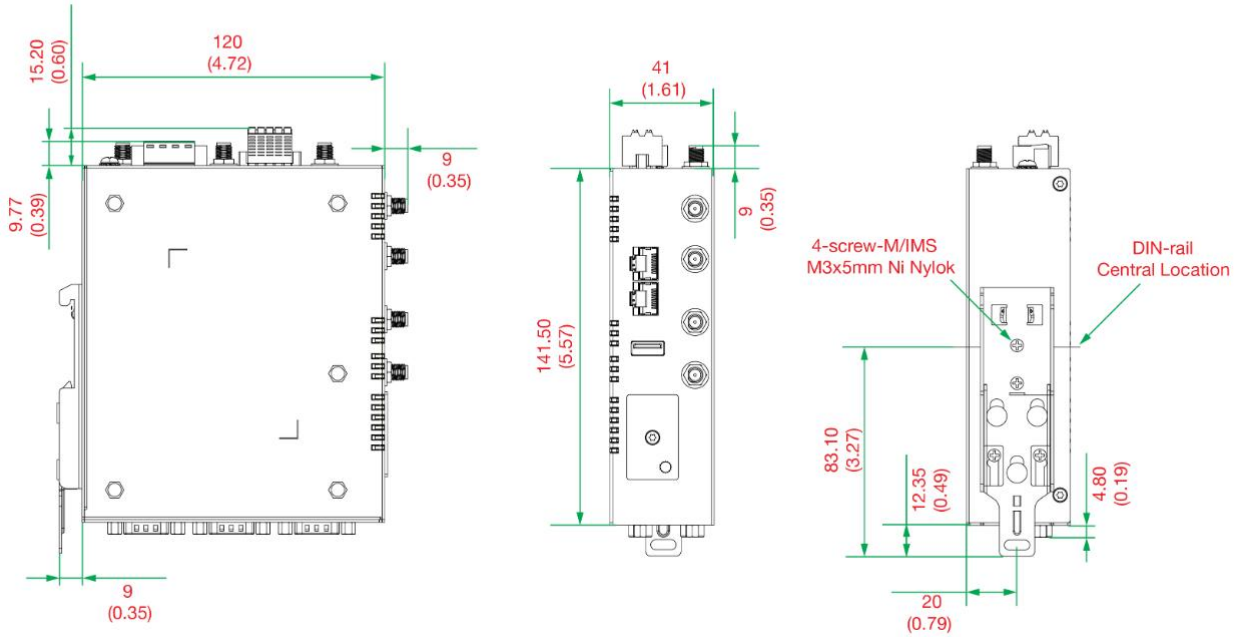
Extracted from: https://cdn-cms-frontdoor-dfc8ebanh6bkb3hs.a02.azurefd.net/getmedia/6901624b-58be-4eff-abdb-8d6cbbb147a2/moxa-uc-4400a-series-datasheet-v1.2.pdf

UC-4434A Models



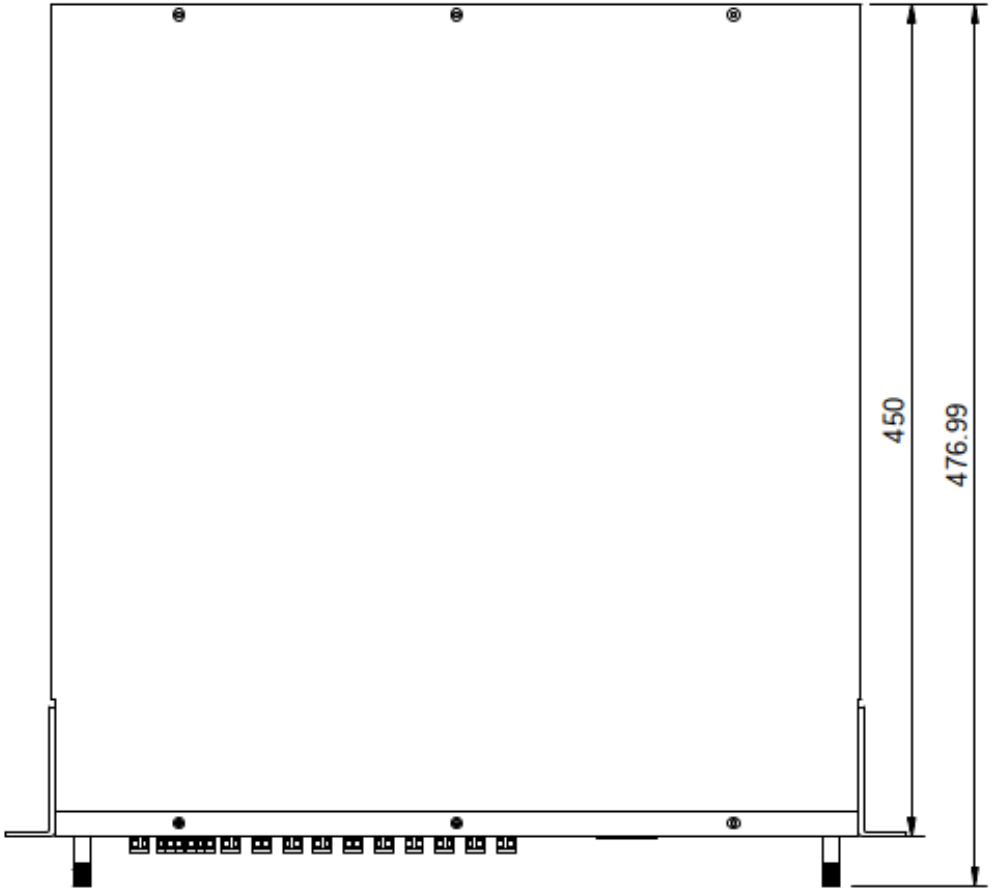
Dimensions

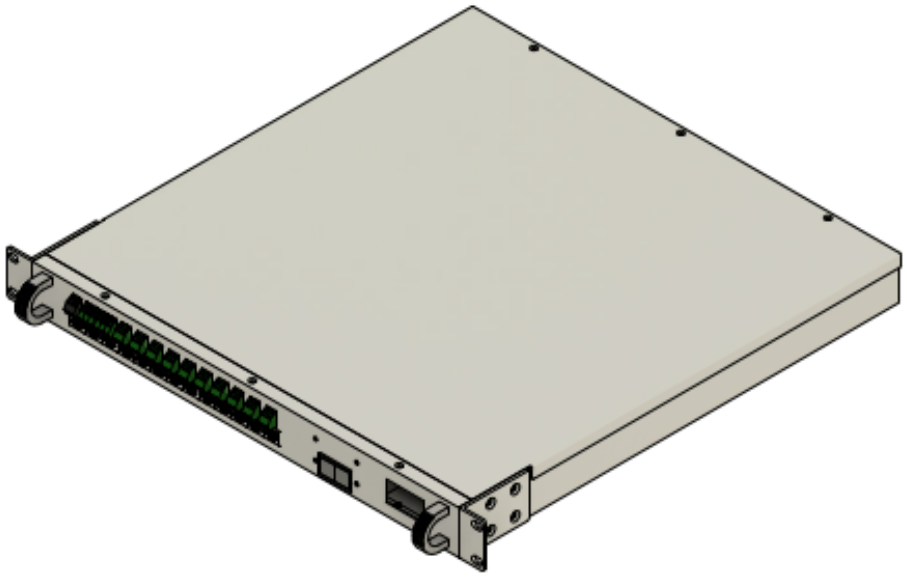
Unit: mm (inch)

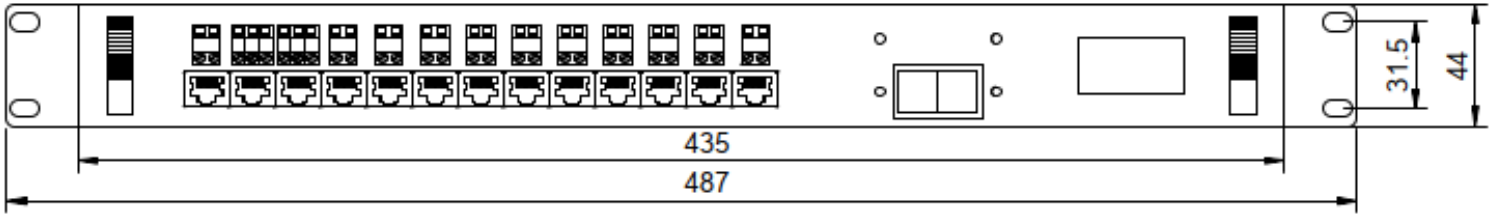


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10 Appendix 2: Dimension/Layout of 1RU ZDC







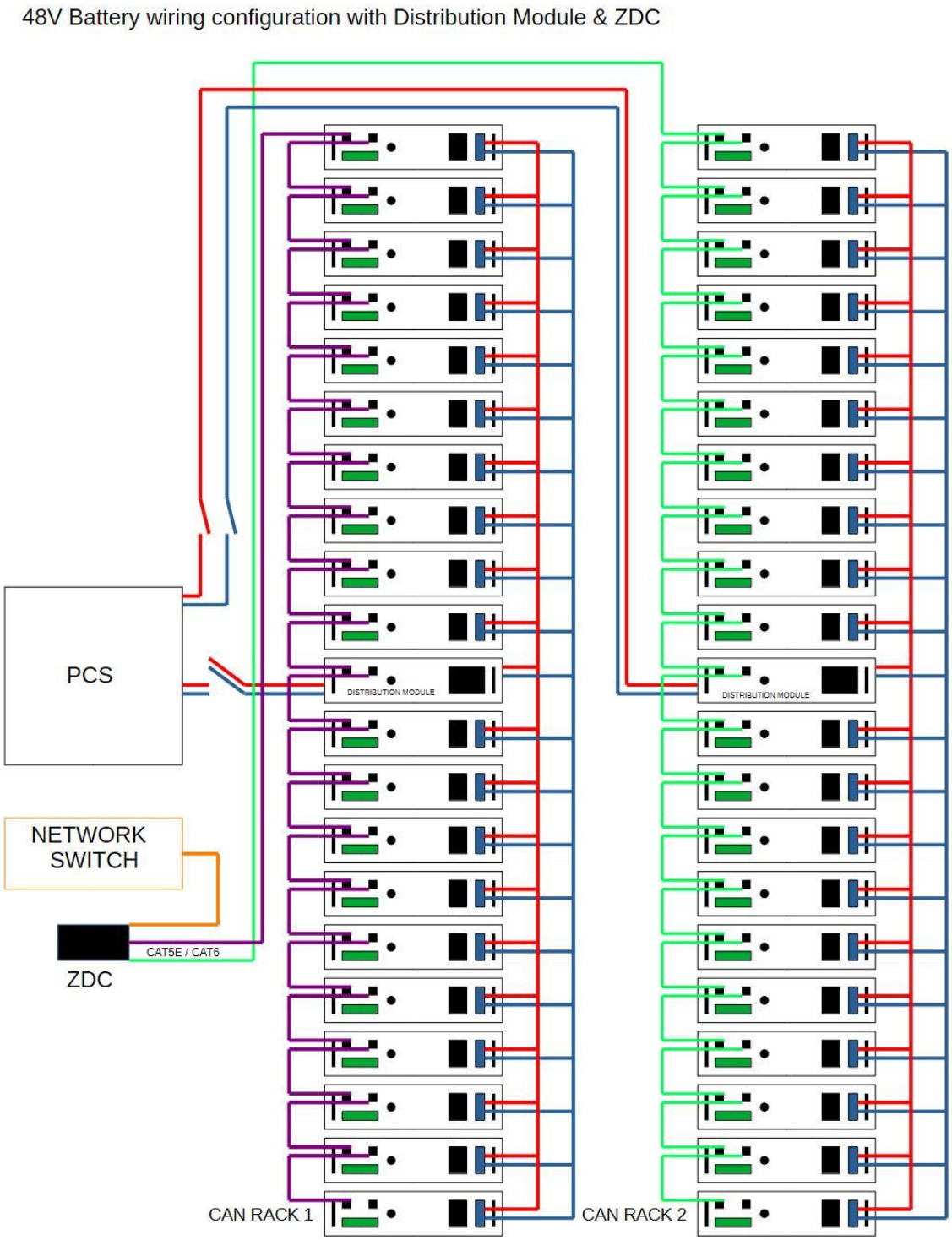
11 Appendix 3: Available Alarms

DTC Code	Alarm Description	Trigger Value
0x82	Storage capacity warning	≥ 75% Storage Used
0x83	Storage failure	≥ 90% Storage Used
0x84	High controller temperature (warning)	≥ 55°C
0x85	High controller temperature (error)	≥ 65°C
0x86	Low controller temperature (warning)	≤ -20°C
0x87	Low controller temperature (error)	≤ -30°C
0x88	Digital input abnormal (warning)	Event-driven (unexpected DI state)
0x89	Digital input abnormal (error)	Event-driven (persistent/critical DI fault)
0x8A	Software fault (warning)	Event-driven (minor instability or restart)
0x8B	Software fault (error)	Event-driven (critical crash or failure)
0xC0	High state of charge (warning)	SOC ≥ 100%
0xC1	High state of charge (error)	SOC ≥ 102%
0xC2	Low state of charge (warning)	SOC ≤ 10%
0xC3	Low state of charge (error)	SOC ≤ 5%
0xC4	High charging current (warning)	Refer to Product Manual
0xC5	High charging current (error)	Refer to Product Manual
0xC6	High discharging current (warning)	Refer to Product Manual
0xC7	High discharging current (error)	Refer to Product Manual
0xC8	High pack voltage (warning)	Refer to Product Manual
0xC9	High pack voltage (error)	Refer to Product Manual
0xCA	Low pack voltage (warning)	Refer to Product Manual
0xCB	Low pack voltage (error)	Refer to Product Manual
0xCC	High charging temperature (warning)	≥ 40 °C
0xCD	High charging temperature (error)	≥ 55 °C
0xCE	Low charging temperature (warning)	≤ 10 °C
0xCF	Low charging temperature (error)	≤ 0 °C
0xD0	High discharging temperature (warning)	≥ 40 °C
0xD1	High discharging temperature (error)	≥ 60 °C
0xD2	Low discharging temperature (warning)	≤ 0 °C

0xD3	Low discharging temperature (error)	≤ –23 °C
0xD4	Breaker tripped	Hardware event
0xD5	Communication fault	Loss of BMS comms
0xD6	Charging MOSFET fault	Hardware event
0xD7	Discharging MOSFET fault	Hardware event
0xD8	Low cell voltage (warning)	≤ 2.8 V
0xD9	Low cell voltage (error)	≤ 2.3 V
0xDA	High cell voltage (warning)	≥ 3.63 V
0xDB	High cell voltage (error)	≥ 3.80 V
0xDC	Cell voltage imbalance (warning)	ΔV ≥ 0.6 V
0xDD	Cell voltage imbalance (error)	ΔV ≥ 0.8 V
0xDE	Temperature imbalance (warning)	ΔT ≥ 20 °C
0xDF	Temperature imbalance (error)	ΔT ≥ 30 °C
0xE0	BMS Failure	Event-driven (device fault)
0xF0	High-voltage detection failure	Hardware event
0xF1	Short-circuit protection failure	Hardware event
0xF2	Charging not allowed (low voltage)	Pack too low to charge
0xF3	MOSFETs opened by switch	Manual/external event
0xF4	Relay drive failure	Hardware event

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12 Appendix 4: 48V ZDC Wiring Diagram with Distribution Module



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