Configuration Tool Instructions

R20

TABLE OF CONTENTS

1 GENERAL INFORMATION 5

1.1 Description 5

1.2 Use Of This Manual 5

1.3 Computer Requirements 5

1.4 Hardware Requirements 5

2 GETTING STARTED 6

2.1 Installing The CZone® Configuration Tool 6

2.2 USB to CAN Driver Installation 8

2.2.1 Checking USB to CAN Driver Status 8

2.2.2 Forcing the Czone Config Tool to Reinstall the Driver 9

2.2.3 Manual Driver Install Process 9

3 CONFIGURATION TOOL BASICS 10

3.1 Read From Network 10

3.2 Write To Network 11

3.3 Upgrading Firmware 12

3.3.1 Firmware Update From Package 13

3.4 Commissioning Report 15

4 CONFIGURING A NEW SYSTEM 16

4.1 Initial Setup 16

4.2 Module Setup 17

4.2.1 Initial Settings 18

4.2.2 Settings Specific to all Output Interfaces 19

4.2.3 Backlight Settings Specific to all Digital Switch & Display Interfaces 20

4.2.4 Backlight Settings Sepcific to CZone Keypads 21

4.2.5 Settings Specific to AC Mains Interfaces 22

4.2.6 MasterBus Bridge Interface Specific Settings 23

4.2.7 Wireless Interface Specific Settings 24

4.3 Power Metering 25

4.3.1 DC Meter - Meter Interface/Combination Output Interface/Control 1 26

4.3.2 DC Meter - MasterBus Bridge Interface 32

4.3.3 AC Meter - Meter Interface/AC Mains Interface 33

4.3.4 AC Meter - MasterBus Bridge Interface 36

4.4 Loads 37

4.4.1 DC Loads 38

10. DC Loads Advanced Settings 39

4.4.2 DC Loads Advanced Settings Specific to Combination Output Interface/Control 1 40

4.4.3 AC Loads 41

4.4.4 AC Loads Advanced Settings ... 42
4.4.5 Virtual Signals ... 43
4.4.6 MBI Virtual Signal ... 44
4.5 Signal Inputs ... 45
4.5.1 Initial Settings ... 46
4.5.2 Switch To Positive Alarm/Switch Settings ... 47
4.5.3 Switch To Negative Alarm/Switch Settings ... 47
4.5.4 Fluid Level Calibration ... 48
4.5.5 Temperature Level Calibration ... 52
4.5.6 Pressure Level Calibration ... 53
4.5.7 Trim Level Calibration ... 54
4.6 Circuits ... 56
4.6.1 New Circuit Configuration ... 57
4.6.2 Switch Configuration ... 59
4.6.3 Load Configuration ... 63
4.6.4 Modes Guru ... 65
4.6.5 Circuit Test ... 65
4.7 AC Mains ... 66
4.8 Generator Control ... 69
4.8.1 Hardware Requirements ... 69
4.8.2 Configuring Generator Control: Dual Alternating/Split-Bus Example ... 69
4.9 Mastervolt ... 81
4.9.1 Mastervolt Device Configuration ... 82
4.10 Logic Blocks ... 84
4.10.1 Logic Block Inital Setup ... 84
4.10.2 Logic Block Input Configuration ... 85
4.11 Data Switching ... 87
4.11.1 PGN Switching ... 87
4.11.2 Time Of Day Switching ... 89
4.12 Third Party Devices ... 90
4.12.1 Sea Recovery® Water Makers ... 90
4.12.2 Dometic® HVAC ... 91
4.12.3 Switch Bank PGN Control ... 92
4.13 Settings ... 93
4.13.1 Sleep Mode Settings ... 94
4.13.2 Configuration Password Protection ... 96
5 APPENDIX ... 98
5.1 Alarms ... 98
5.2 Logic Types ... 99
5.2.1 AND ... 99

5.2.2 OR 100
5.2.3 XOR 100
5.2.4 NAND 101
5.2.5 NOR 101
5.2.6 XNOR 102
5.3 Supported Mastervolt (Masterbus) Devices 103
5.4 Supported Mastervolt (CZone Compatible) Devices 105
5.5 NMEA 2000 PGNs Supported for Data Switching 106
5.6 NMEA 2000 PGN's Transmitted From CZone Modules 106
5.6.1 Meter Interface 106
5.6.2 Signal Interface 107
5.6.3 AC Mains Interface 107
5.6.4 Combination Output Interface/Control 1 107
5.6.5 Masterbus Bridge Interface 108
5.6.6 RV1 108
5.6.7 Control X 108

TABLE OF FIGURES

Figure 1 Module Tab Example 17
Figure 2 Power Metering Tab Example 25
Figure 3 Loads Tab Example 37
Figure 4 Signal Inputs Tab Example 45
Figure 5 Circuits Tab Example 56
Figure 6 AC Mains Page Example 66
Figure 7 Auto Changeover Enable Load 68
Figure 8 AC Mains Tab 68
Figure 9 ChargeMaster Example 81
Figure 10 Mass Combi Example 81
Figure 11 PGN Switch 88
Figure 12 Alarm Severities 98
Figure 13 Alarm Severities on Touch Screen 98
Figure 14 AND Logic Example 99
Figure 15 OR Logic Example 100
Figure 16 XOR Logic Example 100
Figure 17 NAND Logic Example 101
Figure 18 NOR Logic Example 101
Figure 19 XNOR Logic Example 102

1 GENERAL INFORMATION

1.1 DESCRIPTION

The CZone® Configuration Tool allows you to create or modify the parameters and settings of a CZone® system. The parameters and settings are saved as a configuration. For a CZone® system to operate correctly, each device must have a copy of this configuration.

The Configuration Tool can:

- read and write configurations from a network
- check and upgrade firmware on all CZone® modules.

1.2 USE OF THIS MANUAL

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1.3 COMPUTER REQUIREMENTS

The following minimum computer specifications are required:

- Operating System: Windows XP, Vista, Windows 7, Windows 8, Windows 10
- .NET Framework: 3.5 Service Pack 1 (for Windows XP)
- Processor: INTEL/AMD single core or higher
- RAM: 1GB
- Hard Drive: 10GB
- USB: 2.0/3.0

1.4 HARDWARE REQUIREMENTS

Additional hardware requirements:

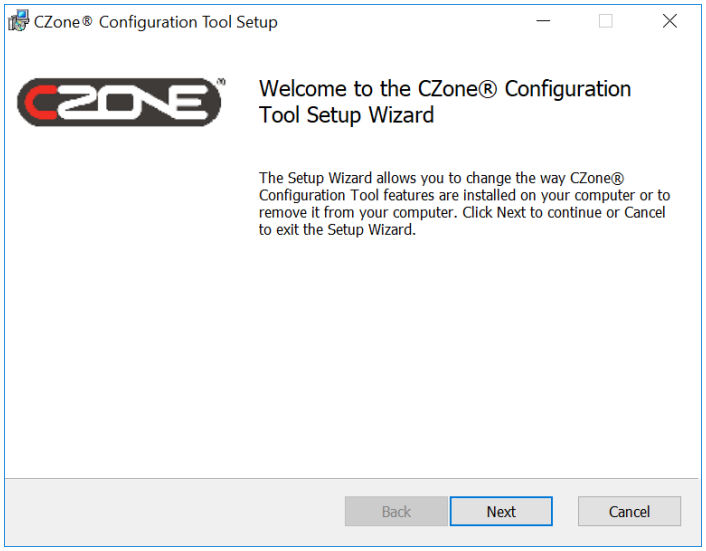
A USB to CAN adapter is required to connect a PC to the CZone system. The following are compatible USB to CAN Adapters:

- USB to CAN Adapter (CZone Part # 80-911-0044-01)
- MasterBus USB Interface (Mastervolt Part # 77030100)
- KVaser USB to CAN Adapter

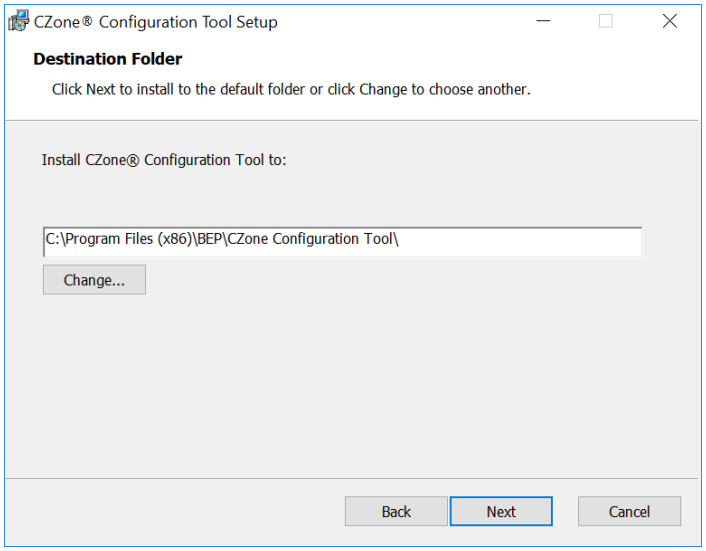
2 GETTING STARTED

2.1 INSTALLING THE CZONE® CONFIGURATION TOOL

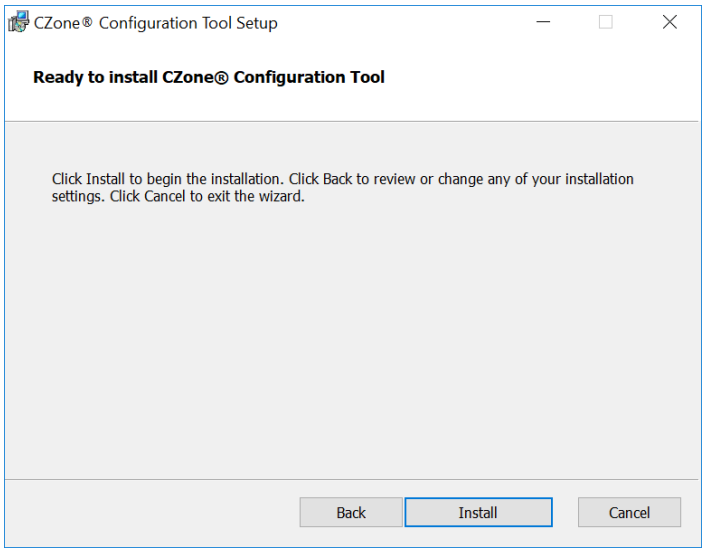
1. Double-click on the 'CZone Config Tool Installer.msi' file and click 'Run'.



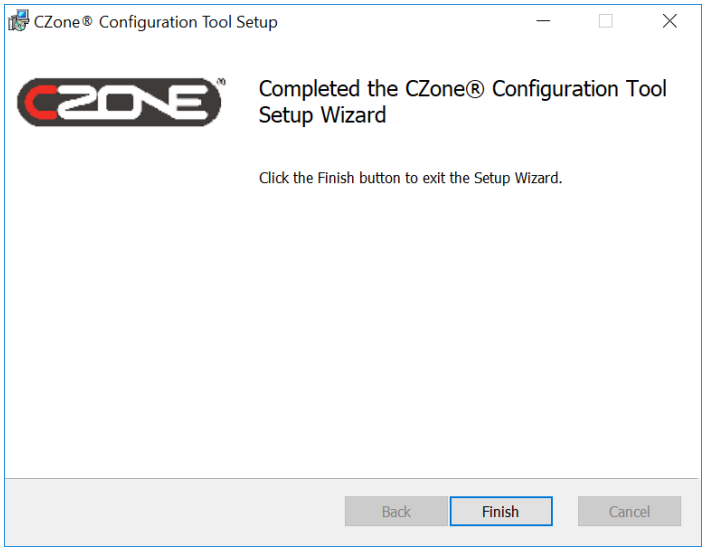
2. Click 'Next'.



3. Select a location for the program to be installed, or click 'Next' for the default location.



4. Click ‘Install’.



5. The above screen will appear, showing that the Configuration Tool has been installed. Click ‘Finish’.

To finish the installation, open the Configuration Tool. A shortcut will be placed on your desktop for quick access. This will install the required USB-to-CAN drivers.

2.2 USB TO CAN DRIVER INSTALLATION

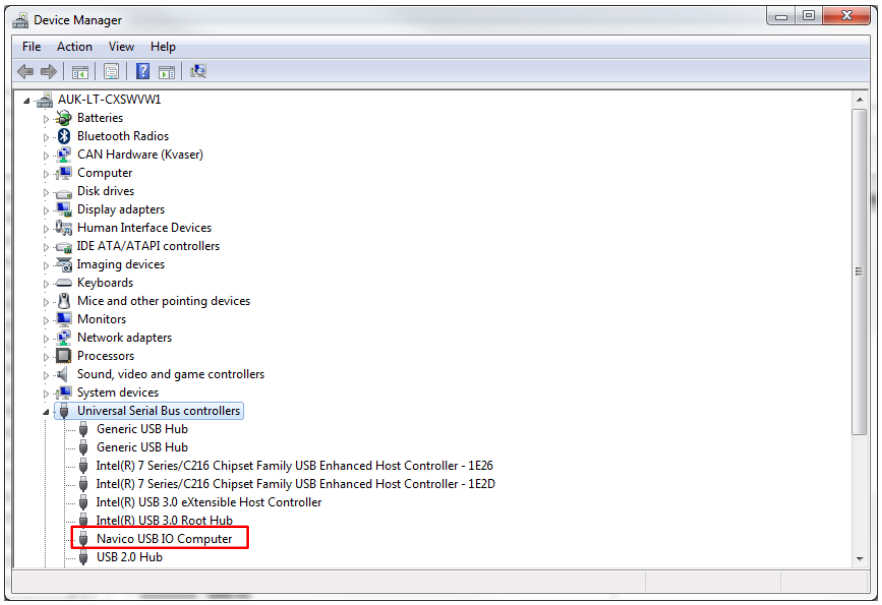
The first time the CZone Configuration tool is opened the necessary drivers for the USB to CAN Interface are installed. On some computers where the user has no admin rights the auto-installation process can not run. In this case a manual driver install is required.

2.2.1 Checking USB to CAN Driver Status

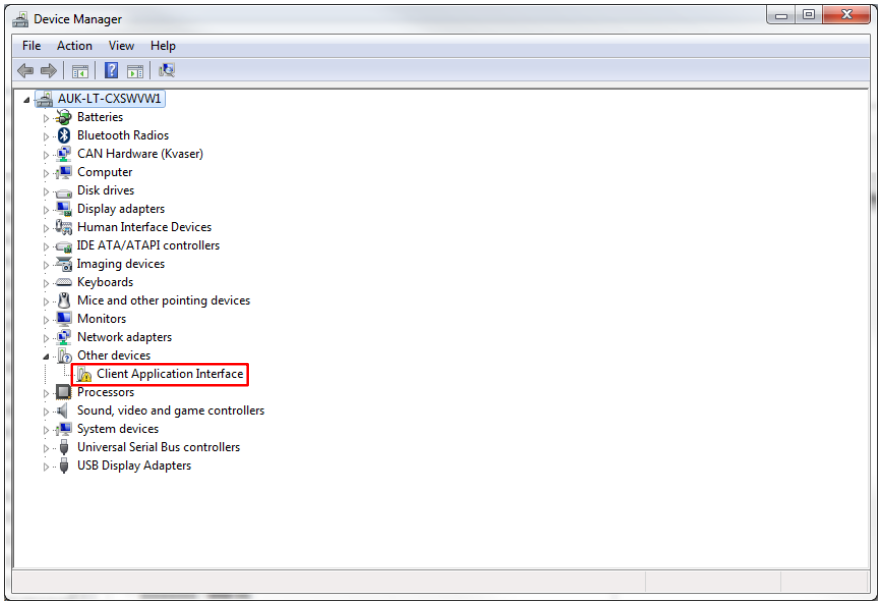
To check the drivers have been installed correctly follow the below steps

1. Disconnect & reconnect the USB to CAN adaptor to a USB port on your PC.

2. Go to Control Panel > Device Manager. Check under Universal Serial Bus Controllers. If there is a device named 'Navico USB IO Computer' the drivers have been installed correctly and you do not need to continue



3. If the Navico USB IO Computer device is not listed go to 'Other Devices' and check for device named 'Client Application Interface'. This indicates the drivers have not installed correctly

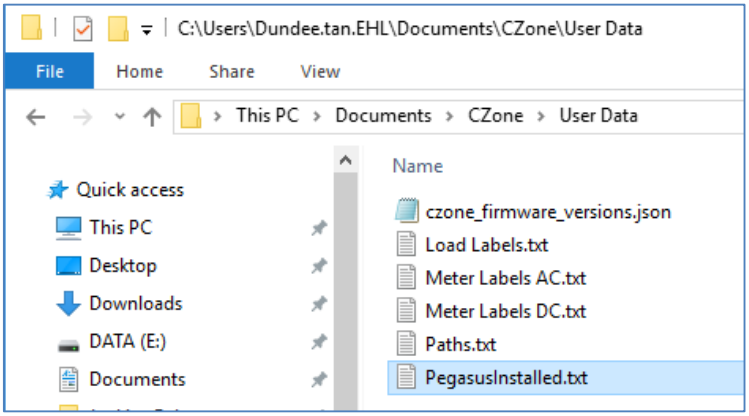


2.2.2 Forcing the Czone Config Tool to Reinstall the Driver

The tool will not reinstall the drivers if it detects that you have already installed it earlier.

To force it to re-install again:

1) Go to Documents>Czone>User Data
2) Delete the file PegasusInstalled.txt
3) Restart the Czone Config Tool, this will reinstall all driver during startup.
4) Disconnect & reconnect the USB to CAN adaptor to a USB port on your PC.
5) Lastly, restart the Czone Config Tool. It should now be able to detect Czone modules connected to the network.

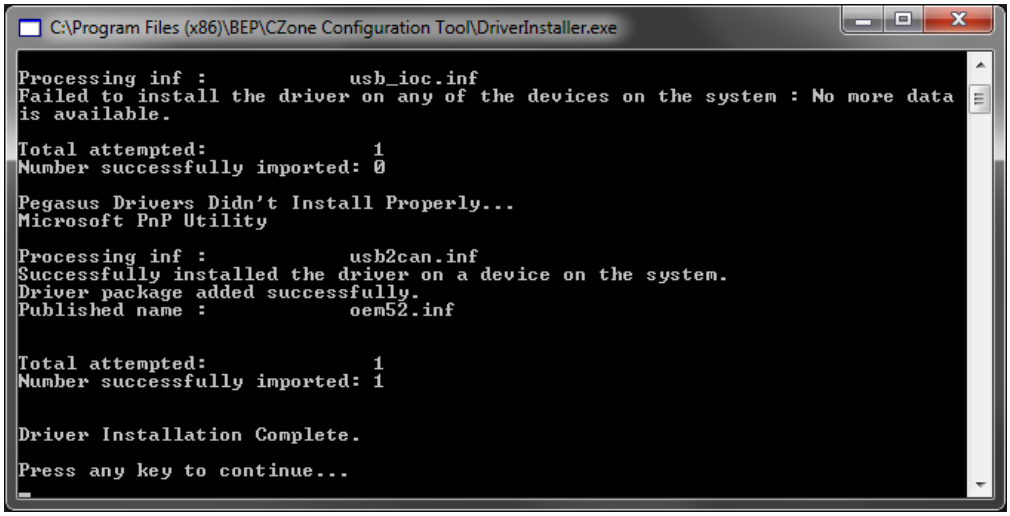


2.2.3 Manual Driver Install Process

If forcing the tool to auto re-install all the drivers doesn't work. Follow the below steps to install USB to CAN drivers manually via the installed auto-run application

1. Navigate to the folder C:\Program Files (x86)\BEP\CZone Configuration Tool

2. Right click on the file 'DriverInstaller.exe' and select 'Run as Administrator'. You will see the following window whilst the appropriate drivers are installed. When Complete Press any key.



3. Go back to Control Panel > Device Manager and ensure the device 'Navico USB IO Computer' device is listed. You may need to disconnect and reconnect the USB to CAN and restart the configuration tool before it is recognized.

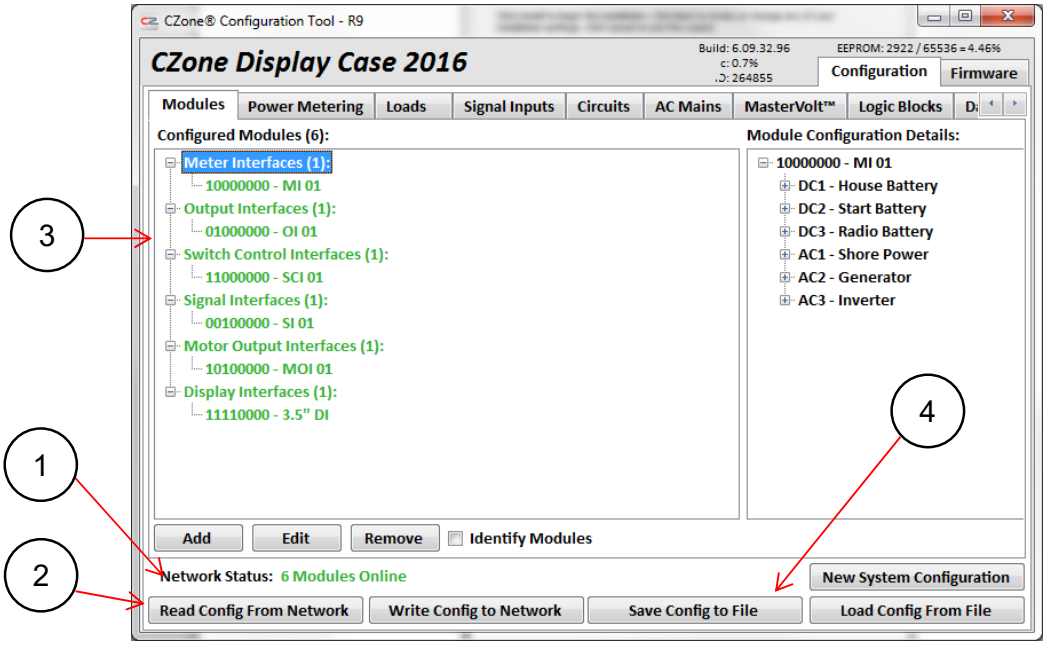
4. The driver installation process is now complete.

3 CONFIGURATION TOOL BASICS

Basic procedures performed with CZone® configuration files are outlined in this section.

3.1 READ FROM NETWORK

Follow the below steps to read a CZone® configuration from an existing CZone® system. When working on a CZone® system, it is always recommended to read the configuration and save a copy before making any changes. The configuration can be modified on-line or off-line; the changes will not take effect until the modified configuration is written back to the network. It is also important, when modifying a CZone system containing devices with older firmware, that they must be updated to match the version of the Configuration Tool. Refer to section 3.3 for this process.



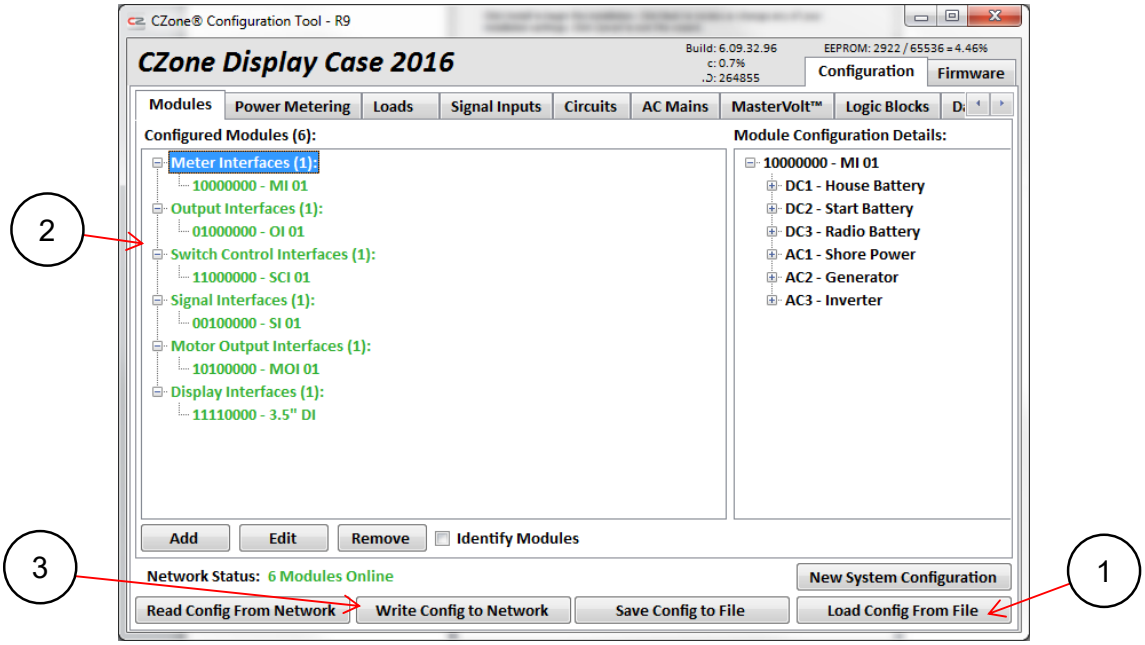
Plug your USB-to-CAN adapter into the powered network and open the CZone® Configuration Tool, then:

1. Check that the 'Network Status' field indicates a connection to the network. The field should show the number of on-line modules.
2. Select 'Read Config From Network'. As the system's configuration is uploaded from the network, the 'Network Status' field will show how the upload is progressing. The upload may take a few seconds, or longer on large systems.
3. Once the configuration has been read successfully you will see a list of all the configured modules. A module shown in green is on-line. A module shown in black is off-line: its dipswitches may not be set, or it may lack a working connection to the network.
4. Select 'Save Config to File' to save the configuration file to your hard drive. The default location is My Documents > CZone® > Config Files.

Note: If Network Status is showing 'No Modules On-line', ensure the network is powered and by a 12V source only (for USB to CAN part number 80-911-0044-01) and each device has its network traffic indicator illuminated green. Also ensure the USB-to-CAN drivers have been installed properly

3.2 WRITE TO NETWORK

Follow the steps below to write a new or modified CZone® configuration to the network.



Plug your USB-to-CAN adapter into the powered network and open the CZone® Configuration Tool, then:

1. Select ‘Load Config From File’, locate the desired configuration file and press ‘Open’
2. Before writing to the network, ensure all interfaces are showing green (on-line)
3. Select ‘Write Config to Network’. The ‘Network Status’ field will change to ‘Transmitting Configuration Data’.

Once transmission is complete, the system will reboot and the devices will show off-line for a few seconds. The system is ready to use with the new configuration when devices have rebooted and are showing on-line.

3.3 UPGRADING FIRMWARE

The CZone® Configuration Tool allows firmware upgrades to be performed on most CZone® modules over the CAN network. Although CAN is the only method to update the majority of CZone modules, the CZone Displays have an additional Direct Updater file for updating firmware via the displays local USB or SD Card port. Because of the large file size it is recommended to use the direct updater which is a much faster method. The Wireless Interface cannot be updated over CAN.

A breakdown of the module types and their update methods are listed below:

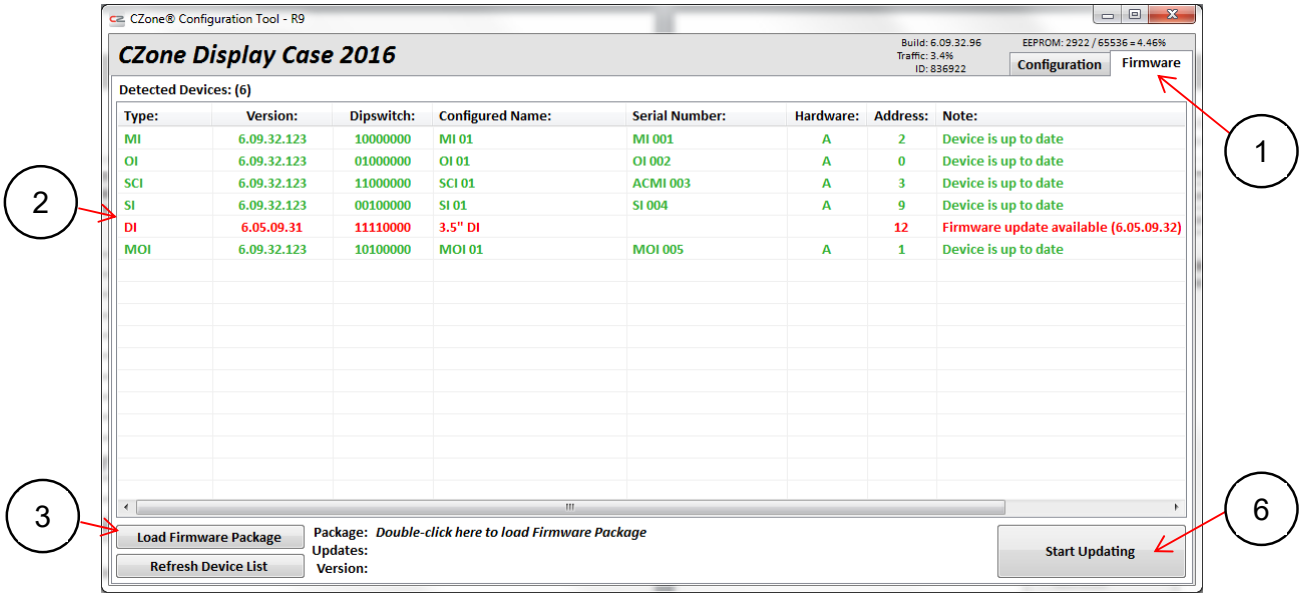
	CAN	USB	SD	ETHERNET
OI/MOI	✓			
COI	✓			
Contact 6	✓			
Contact 6 Plus	✓			
Control 1	✓			
Control X	✓			
RV1	✓			
Keypad	✓			
Switchpad	✓			
SCI	✓			
SI	✓			
MI	✓			
ACOI	✓			
ACMI	✓			
MBI	✓			
DI 3.5”	✓*			✓**
DI TOUCH 8” & 10”	✓	✓		
TOUCH 10		✓		
TOUCH 7				
TOUCH 5		✓	✓	
WIRELESS INTERFACE		✓		

**CAN update only possible on devices with firmware 6.00.01.02 or newer. Older devices must be updated via Ethernet*

***CZone DI ethernet programming cable required : Part number:80-911-0058-00*

3.3.1 Firmware Update From Package

Follow the below steps to update a module or modules with a specific firmware package saved to your PC.

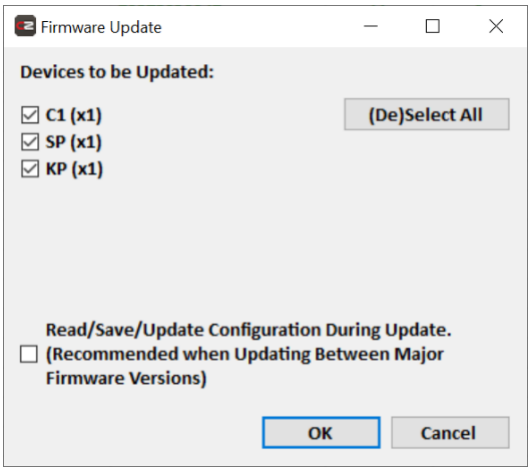


Ensure the CZone® network is powered and the USB-to-CAN adaptor is plugged into the network, then:

1. Click on the 'Firmware' tab
2. Ensure all interfaces appear on this list.
3. Click on 'Load Firmware Package'.
4. Select the firmware package (.czswup file) to be used and click 'Open'.
5. The interface/s will appear in a different colour once the package is loaded. A breakdown of what each colour means is below.

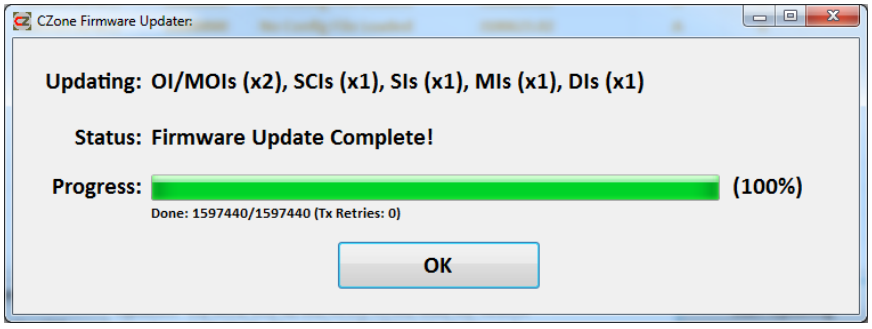
Green	Latest firmware installed, no need to upgrade
Orange	Out-of-date firmware, new firmware must be installed
Red	No firmware installed, new firmware must be installed
Grey	No firmware update available

6. To update the firmware click the 'Start Updating' button. The module types to be updated will be ticked in the next window. If your system is large, it is recommended that you upgrade one module type at a time. Select OK to continue.



7. It is recommended that you save a copy of the configuration file before upgrading firmware. If you have not yet done so, check the 'Read/Save/Update Configuration During Update' box.

8. The firmware upgrade will now begin. The progress bar will be repeated for each module type that is upgraded. Note, some modules may require a bootloader update, in this case the progress bar will run twice for that particular module type.



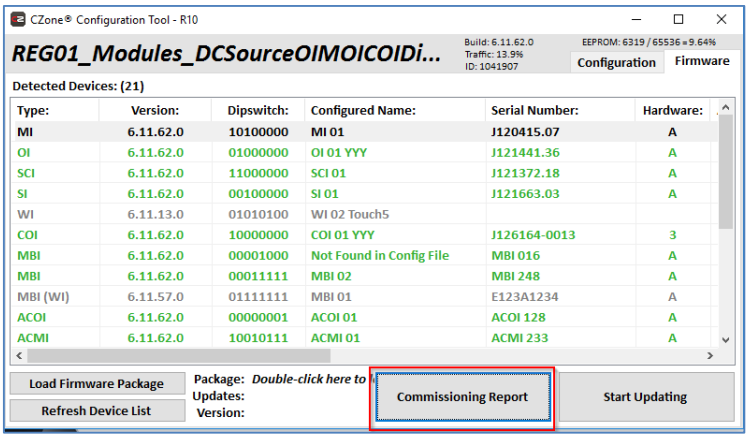
9. Click 'OK' to finish the firmware update.

The upgraded interfaces should now appear in green to indicate that the latest firmware is installed.

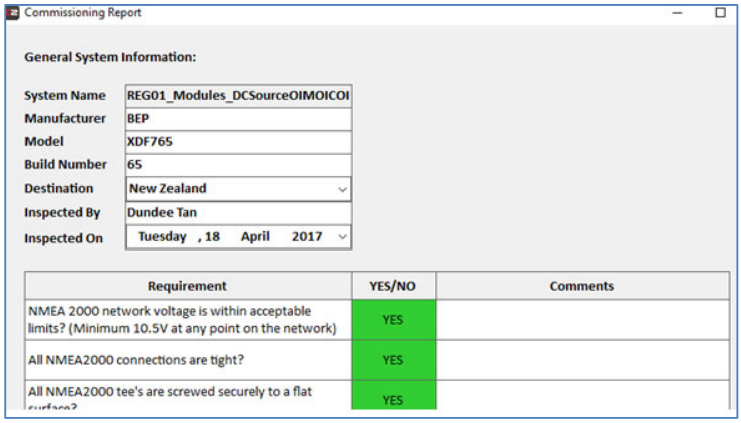
3.4 COMMISSIONING REPORT

The commissioning report provides a checklist of recommended installation requirements and tests to help installers through the commissioning process. It also generates a PDF report with all the detailed information about the system and a copy of the configuration file. This report should be saved for your own records and also sent to report@czone.net for better support from CZone technical support teams.

1. To start the commissioning process, ensure the configuration tool is plugged into a live system. Go to the firmware tab and press the 'Commissioning Report' button.



2. Enter general system details for the vessel/vehicle and complete checklist. Notes and attachments (such as installation diagrams and photos) can be attached if required.

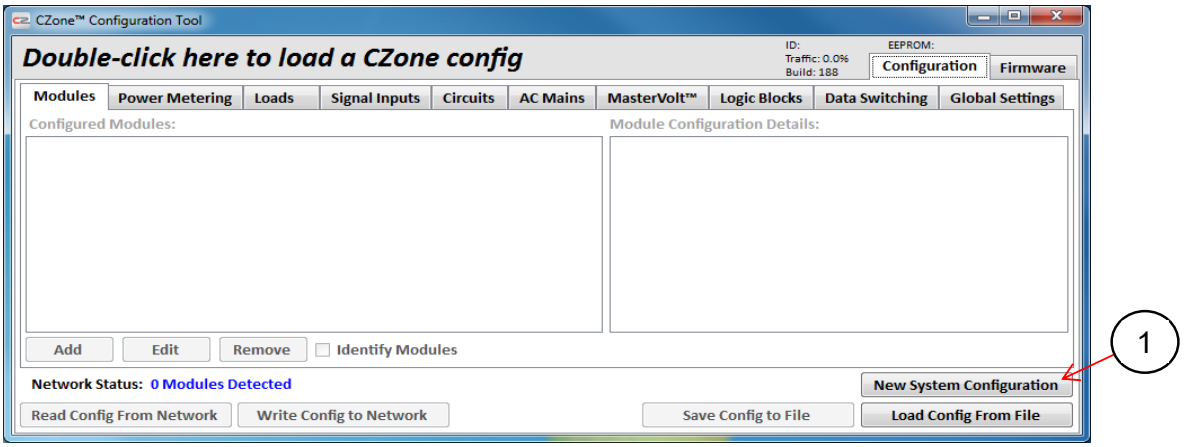


3. Once all fields has been completed, press the 'Generate Report' button. All details and selections made in the checklist along with a snapshot of all networked devices, serial numbers and firmware versions will be populated in a PDF document. All reports will be saved in the My Documents/CZone/Commissioning Reports folder.

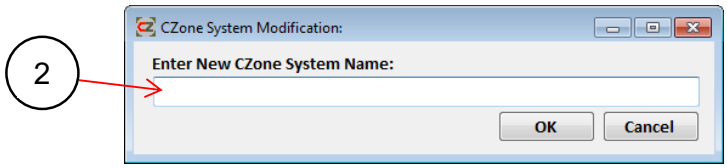
4 CONFIGURING A NEW SYSTEM

A CZone® configuration can be completed off-line, then written to the network at a later date. This chapter will explain how to write a new CZone® Configuration. It will also give definitions for all settings within the CZone® Configuration Tool.

4.1 INITIAL SETUP



1. To begin a new configuration, select ‘New System Configuration’.



2. Enter a name for the configuration and select ‘OK’. This will also be the default filename when the configuration is saved for the first time.

4.2 MODULE SETUP

The first step in building a CZone® configuration is to add the CZone® modules that will make up the system, including:

- new modules that you intend to install
- modules already present on the network, if you are working on an existing system.

See Figure 1 for an example of a configured Modules tab.

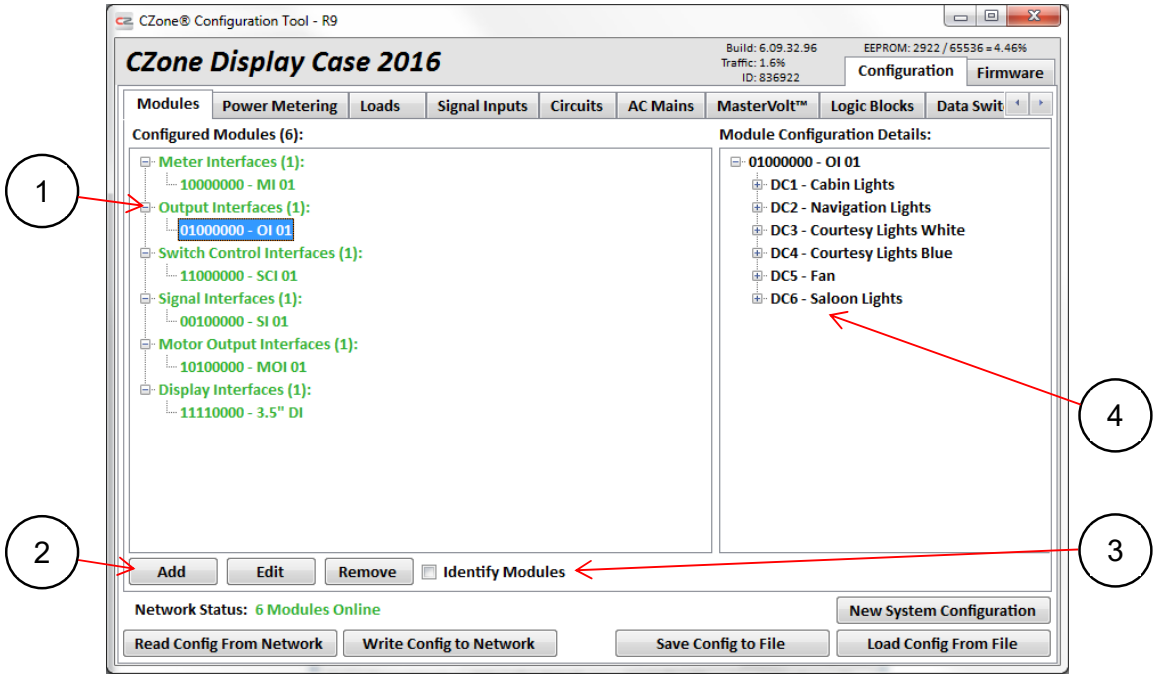
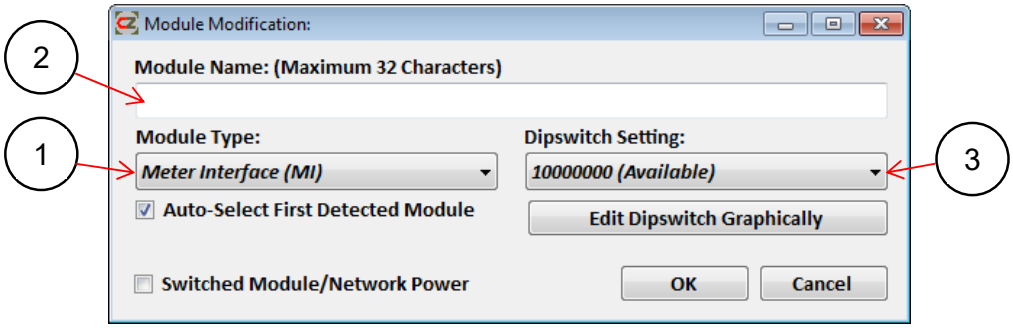


Figure 1 Module Tab Example

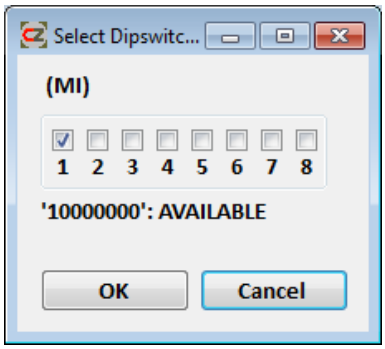
1. The ‘Configured Modules’ section shows a list of module types. Under each module type are one or more such modules, with their dipswitch settings and configured names. The total number of modules is listed at the top.
2. There are buttons for adding, editing, and removing modules from the configuration.
3. To identify a module on a live network without physically checking its dipswitch setting, tick the ‘Identify Modules’ box. Then select the module to be identified, from the ‘Configured Modules’ list. The status LEDs on that device will flash between red and green for a short time.
4. To quickly view a module’s configured settings, select the + symbol next to that module in the ‘Module Configuration Details’ panel. A drop-down list of the inputs or outputs configured for that device will be displayed, together with all its settings. (No editing is available from this panel.)

4.2.1 Initial Settings

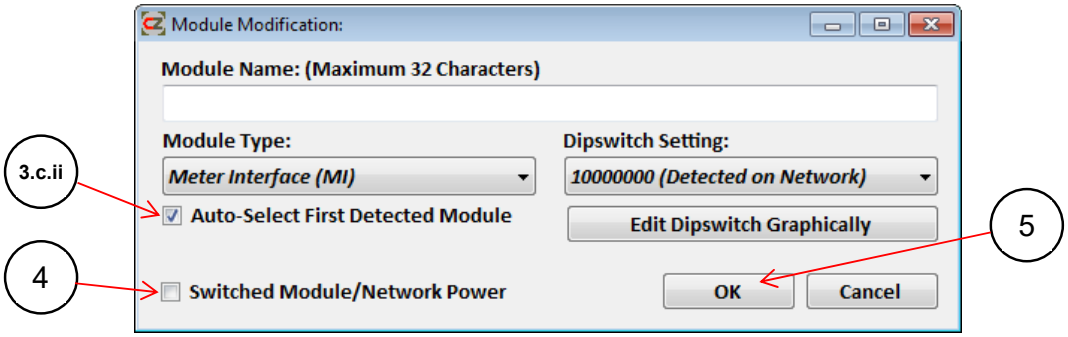
To begin adding modules to the configuration, from the Modules tab select the 'Add' button.



1. Select the type of module you wish to add to the system.
2. Enter a name for the module that you are adding, or enter nothing to accept a default name (In the example shown, MI01 would be assigned.)
3. For each module a dipswitch must be assigned.
    a. These numbers can be assigned manually on the units, before the configuration is generated in the configuration tool. In this case select the dipswitch number from the drop-down list, or use the 'Edit Dipswitch Graphically' box beneath it.



    b. The dipswitch setting can also be assigned automatically by the configuration tool. Sequential numbers will be assigned as the modules are entered. These numbers must then be copied and assigned to the physical dipswitches on the CZone® modules.



    c. Dipswitch settings can also be detected automatically:
        i. Ensure the PC that is running the Configuration Tool is plugged into the network

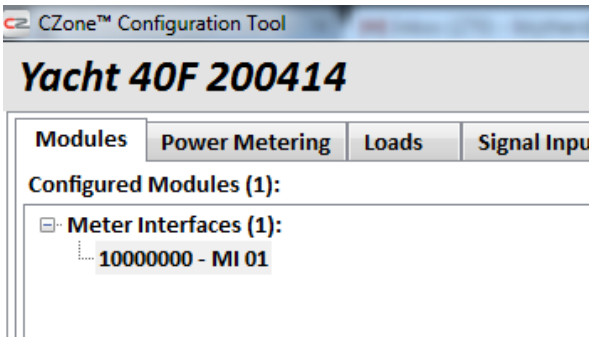
ii. Ensure the ‘Auto-Select First Detected Module’ box is ticked

iii. Choose a module type.

iv. The network will be scanned, for the first module of that type whose dipswitch is set. In the configuration tool, that module’s dipswitch configuration will be made automatically.

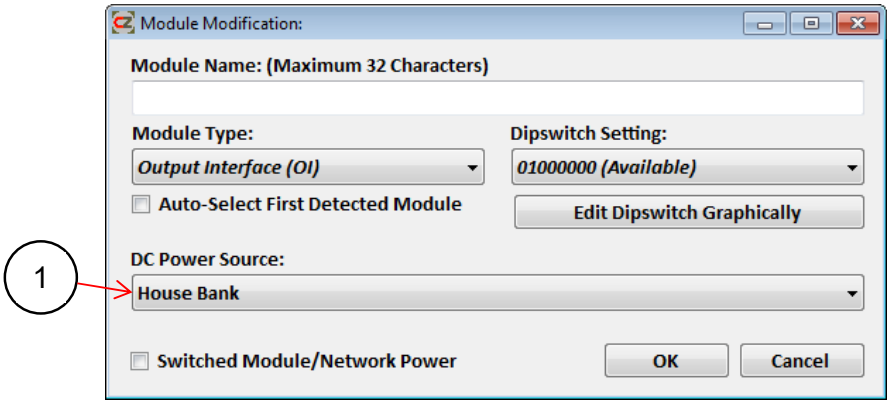
4. If required, the ‘Switched Module/Network Power’ option can be selected. By selecting this option the ‘Missing Module’ alarm will not occur when a module loses power or communication. In standard systems this should remain unticked, but use this option in systems where a display or touch-screen is fed from a switched supply.

5. After the module name has been entered and the dipswitch number assigned, click ‘OK’. The module modification window will close and the program will return to the ‘Modules’ tab.



You will see the module that has just been entered will now show in the ‘Configured Modules’ list, the settings are now complete for this unit. It is recommended that all modules are entered before continuing the configuration process. Follow the same process for all modules. Some processes are unique to each module; these are explained in the subsections below.

4.2.2 Settings Specific to all Output Interfaces

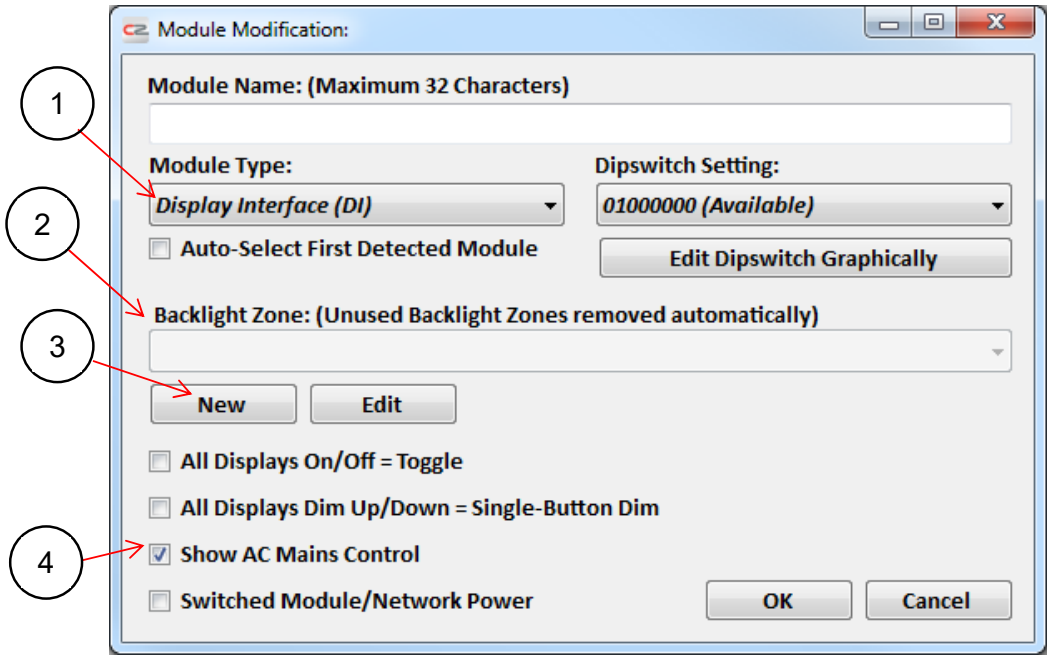


1. For the load shedding functionality to work correctly, the Output Interface must be assigned to a battery bank (power supply). This is done by selecting the battery bank under the ‘DC Power Source’ drop-down list. The factory setting list comprises ‘Unmetered 12V’ and ‘Unmetered 24V’. The purpose of these values is to give the user an indication, on the Display Interface, of the supply voltage that the circuits are connected to. (This list will auto-populate as inputs are configured. The above example shows an Output Interface that has been configured with a House Bank). To add to this list, the Metering Interfaces must be configured in the ‘Power Metering’ Tab. It is recommended that all modules are entered before any of the individual modules are configured. The ‘DC Power Source’ selection can be made at a later time, after all modules have been entered and the Metering interfaces have been configured.

Note: Load shedding and battery monitoring functionality is only available if a Meter Interface is connected to the system.

4.2.3 Backlight Settings Specific to all Digital Switch & Display Interfaces

The backlighting for digital switches are controlled via a Display Interface or a dedicated switch. There may be many locations for both the switches and Display Interfaces, with different lighting intensity requirements. The CZone® system allows each unit to be allocated a backlighting zone, so adjustment to the backlighting can be specific to an area on the vessel without affecting another module.

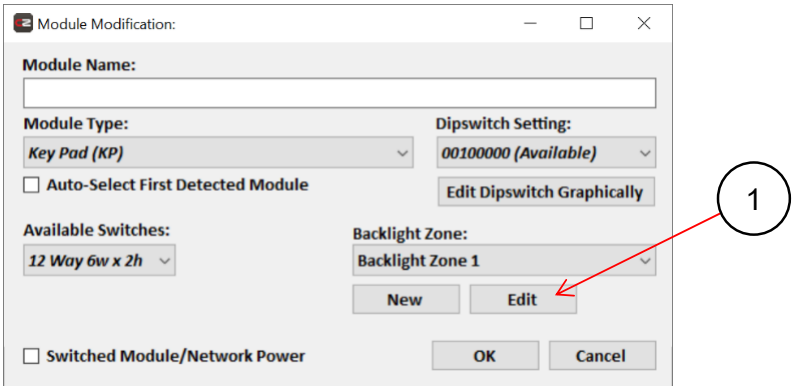


1. Select the Display or Digital Switch module from the module type drop down.
2. Click on the drop-down box under the ‘Backlighting Zone’ section and select the desired backlighting zone for the module.

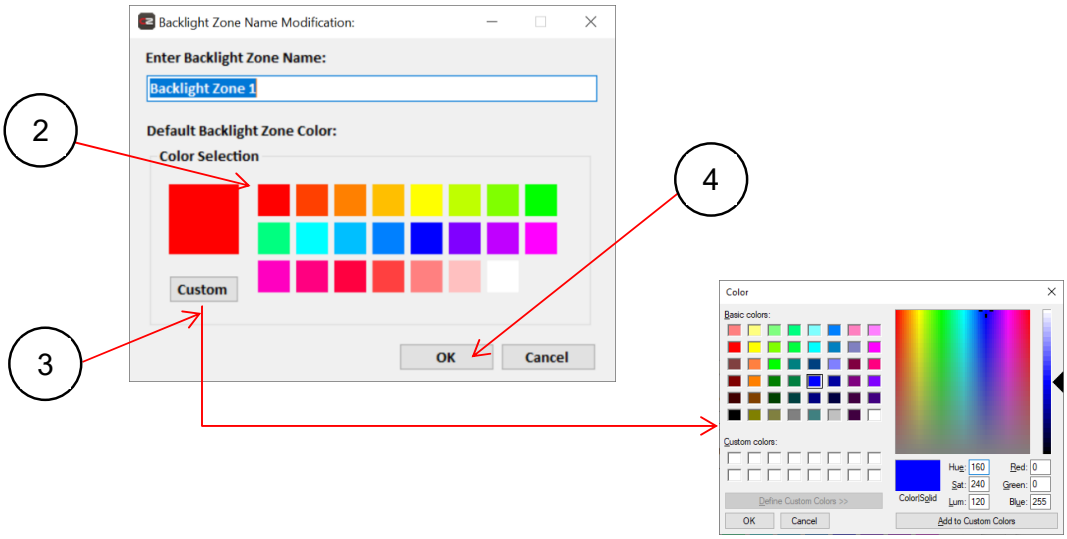
   Note: CZone® touch screens and supported MFDs are each classified as a Display Interface and must be configured accordingly.
3. Alternatively click on ‘New’ under the ‘Backlighting Zone’ section, enter a name for the new backlighting zone and click OK.
4. If the CZone® system has an AC Mains Interface control module, and you would like the ability to select AC sources from a Display Interface, you must select the ‘Show AC Mains Control’ option. This allows only dedicated screens to have control of the AC Mains.

4.2.4 Backlight Settings Sepcific to CZone Keypads

Default backlight colour selection is available for all CZone Keypads. Introdcued in R20 firmware, you can now select a default colour for CZone Keypads. Configured backlight colour will only persist until user changes the colour manually via the Keypad or if config is written back to network.



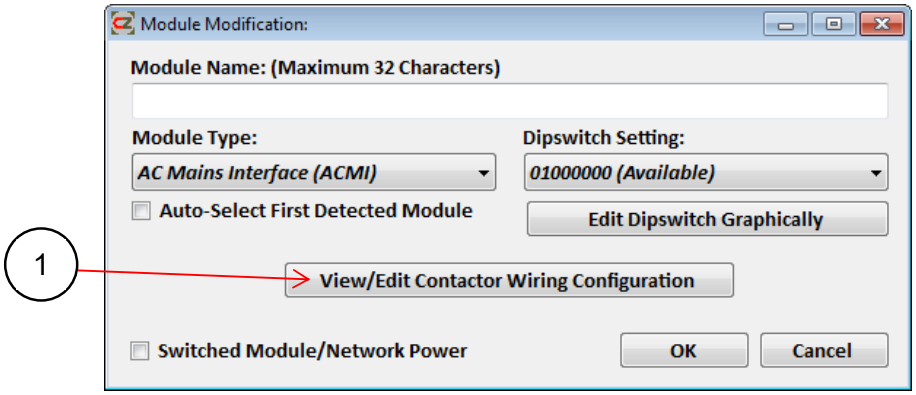
1. When adding a new Keypad to a CZone configuration, a backlighting zone can be edited to have a default colour.



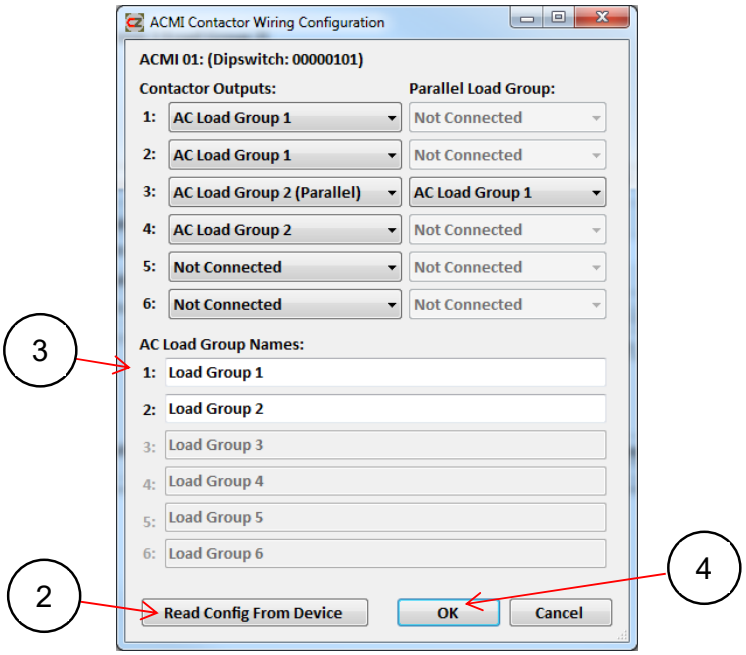
2. Select colour from presets.
3. Or, make a custom colour selection.
4. Select OK to add default colour.

4.2.5 Settings Specific to AC Mains Interfaces

To configure an AC Mains Interface you must be connected to the network with the interface powered and with its dipswitch assigned correctly. If the PC is not connected to the network these specific settings can be made later.



1. Click on the 'View/Edit Contactor Wiring Configuration' option.

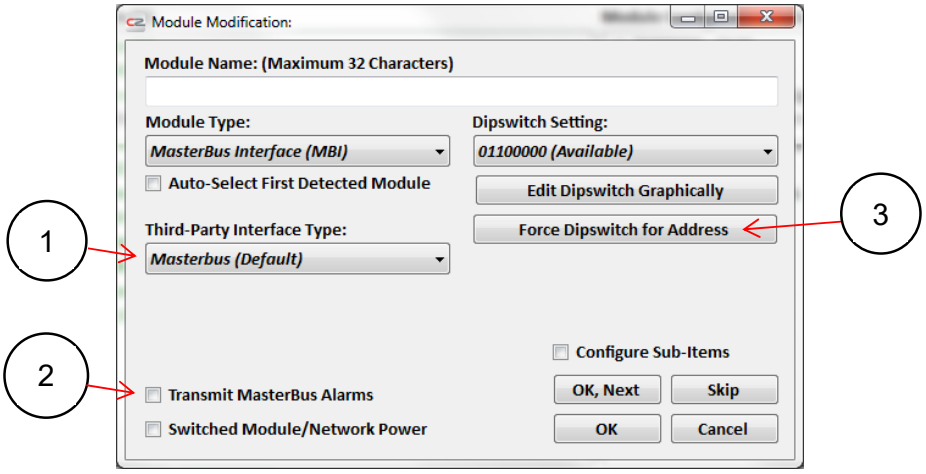


2. Click on 'Read Config From Device'. This will read the hard-coded settings from the ACMI and display them.

   Note: The hard coded software on the ACMI is set at the time of manufacture in accordance with your specifications. If the requirements have changed please contact your Mastervolt representative.

3. Enter the names of the Load Groups (if required) as you would like them to be displayed.
4. Select 'OK'. The final settings of the AC Mains Control will be done in the AC Mains tab in section 4.7.

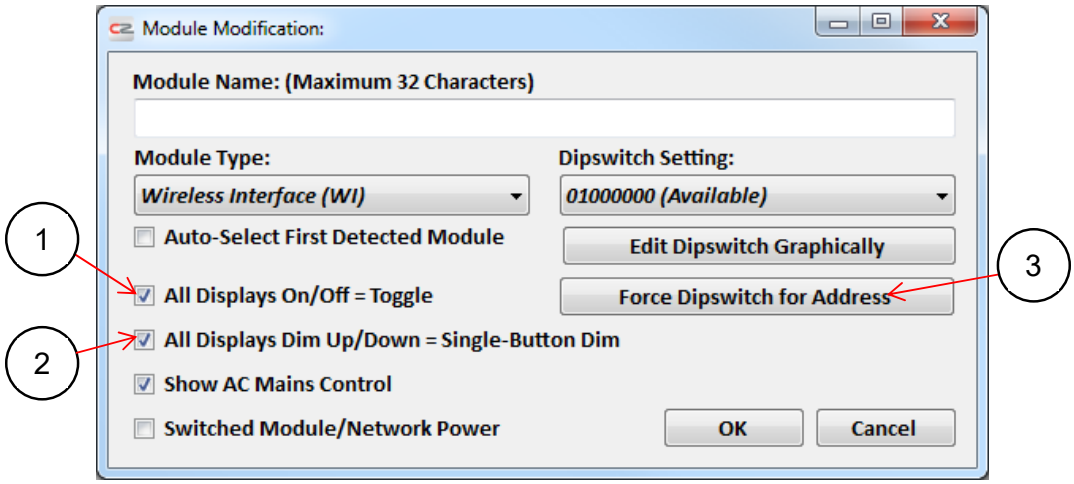
4.2.6 MasterBus Bridge Interface Specific Settings



1. By default the MBI is configured to interface to the Masterbus network. The MBI can also be configured to interface to other 3rd party CAN networks as they are added by BEP Marine, select the required interface from the drop down box.
2. Tick this box if you would like all alarms present on the MasterBus network to be repeated on CZone® Displays and CZone integrated MFD's.
3. There is no physical dipswitch on the MasterBus Bridge Inteface. Instead it has a virtual dipswitch set in the software to identify it on the network. The default dipswitch is 11111111. If this dipswitch is already used in your system you can change it, either graphically or by selecting a new dipswitch in the drop-down box, then press the 'Force Dipswitch for Address' button.

4.2.7 Wireless Interface Specific Settings

The Wireless Interface acts as the server for iPads to connect to and control/monitor the CZone® system with the CZone® App. There are several settings that can be changed to make the app more user-friendly. The first few relate to how switches are displayed on the home page of the CZone® App.



1. Tick this box to change iPad controls for All Displays On/Off switch type to Toggle. This cleans up the controls by having a single button instead of separate On and Off buttons.
2. Tick this box to change iPad controls for All Display Dim Up/Down to Single-Button Dim. This cleans up the controls by having a single button instead of separate On and Off buttons.
3. There is no physical dipswitch on the Wireless Inteface. Instead it has a virtual dipswitch set in the software to identify it on the network. The dipswitch for the WI is set up manually in the WI Configuration Tool. If this dipswitch is already used in your system you can change it, either graphically or by selecting a new dipswitch in the drop-down box, then press the ‘Force Dipswitch for Address’ button.

4.3 POWER METERING

The 'Power Metering' tab is where both AC and DC monitoring is configured. This includes adding meters, adjusting alarms and load shedding while also carrying out final calibration. AC and DC meters can be monitored from the Meter Interface or from MasterBus devices through the MasterBus Bidge. AC meters can also be monitored from the AC Mains Interface. See Figure 2 for an example of a configured Modules tab with all monitoring devices and their associated DC and AC Meters.

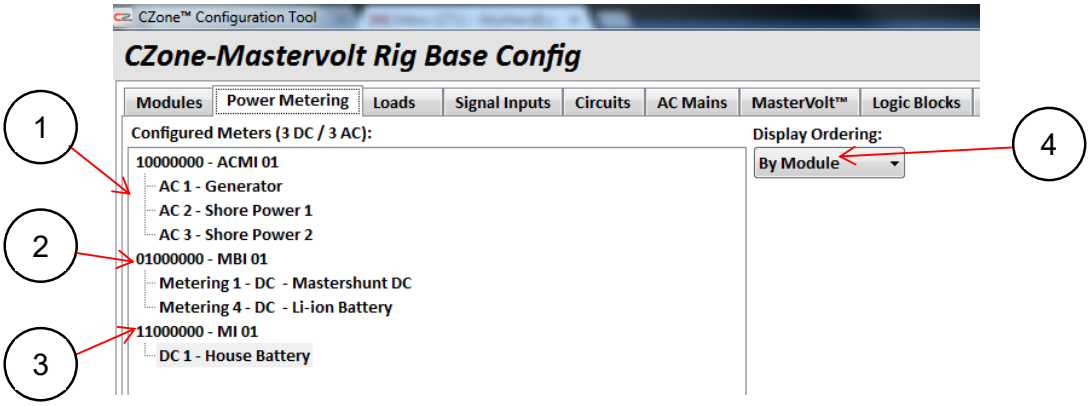


Figure 2 Power Metering Tab Example

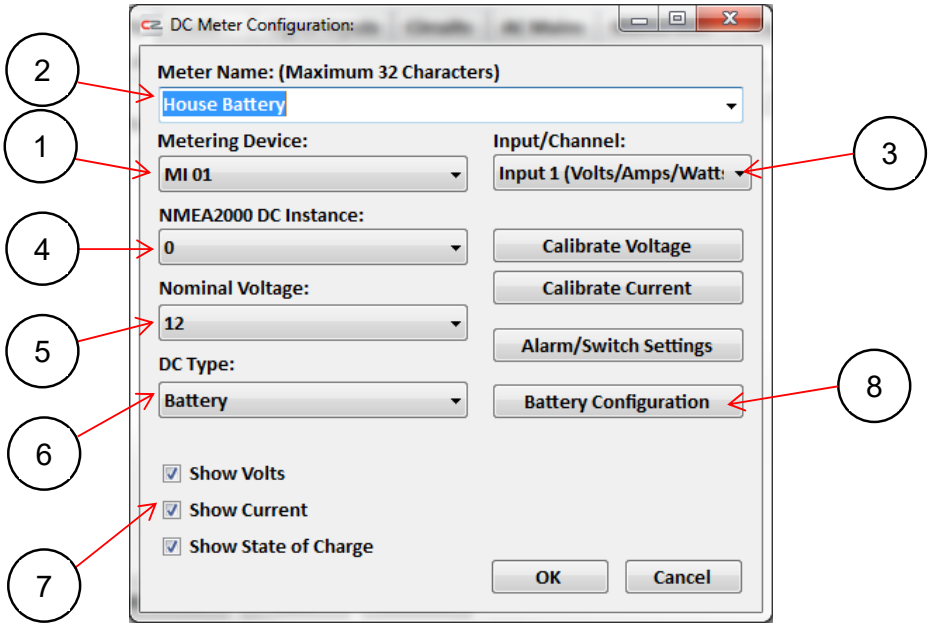
1. ACMI (AC Mains Interface) with AC meters for Generator, Shore Power 1 and Shore Power 2.
2. MBI (MasterBus Bridge Interface) with DC meters repeated from Mastervolt devices (MasterShunt and Li-ion Battery).
3. MI (Meter Interface) with a DC meter for House Battery.
4. The Display Ordering of the configured meters can be changed from this drop-down list. This ordering will be shown on the Power Metering tab of the Configuration Tool and, after the config has been written to the network, on the Monitoring page of any Display Interface. The options are explained below:
    - **By Module** - Default View, shows meters in a tree view starting with Module/Dipswitch then input numbers
    - **Alphabetical** - Shows meters in alphabetical order split, into AC and DC
    - **By Instance/Line** – Shows meters in order of NMEA instance number and then line for multi-phase AC meters.

The following sections explain how to configure each type of AC and DC meter.

4.3.1 DC Meter - Meter Interface/Combination Output Interface/Control 1

4.3.1.1 Initial Settings

To configure a DC Meter connected to a Meter Interface or one of the analogue inputs on the COI or Control 1, from the Power Metering Tab select 'Add DC Meter'.

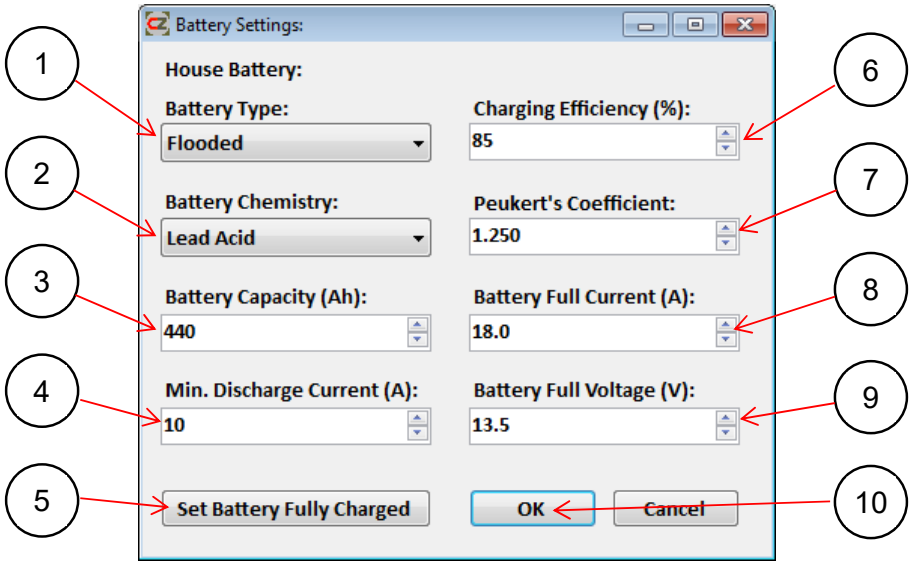


1. Select the 'Metering Device' from the available module which has the input to be configured
2. Enter a name that relates to the physical input to the module. This name will be used on the Display Interface to represent that input.
3. From the 'Input/Channel' drop-down list, select the channel which matches the physical input connections to the Module. Note: the COI/Control 1 has internal voltage sensing on the Main Power Stud and the NMEA2000 bus (COI only) which can be configured to show on CZone Displays.
4. NMEA 2000 Instances are used to differentiate between multiple monitoring sources. These are assigned automatically by the configuration tool, to ensure the instances are unique for each source being monitored.
5. Select the Nominal Voltage of supply from the drop-down list.
6. Select the DC Supply Type that represents the supply type for this input.
7. Tick the appropriate Display Options boxes for the input being configured. This allows you to select what DC monitoring parameters are shown on the Display Interface. In this example the House Bank also has a shunt wired to the Meter Interface, therefore we want to display the current and state of charge as well as the voltage. The COI analogue inputs are voltage sensing only.
8. For Meter Interface inputs with current sensing, click the 'Battery Configuration' button to launch the Battery Settings dialogue.

Note: Calibration settings will need to be done once the entire system is configured and downloaded to the network.

4.3.1.2 Battery Configuration

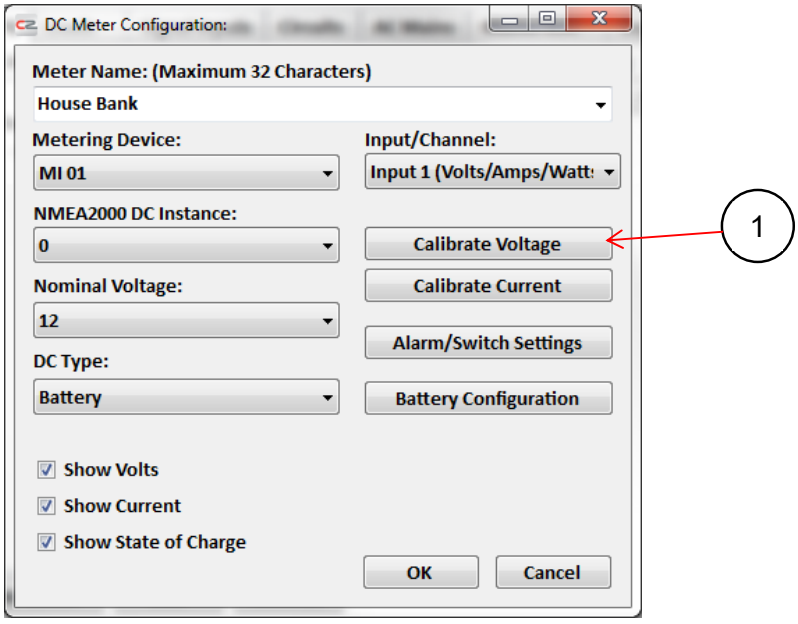
The Battery Configuration options are used in the battery capacity calculations. It is important that these values are entered correctly. Failure to do so will cause the battery monitoring to be inaccurate. If you are unsure of any of these values you can get them from the battery manufacturer.



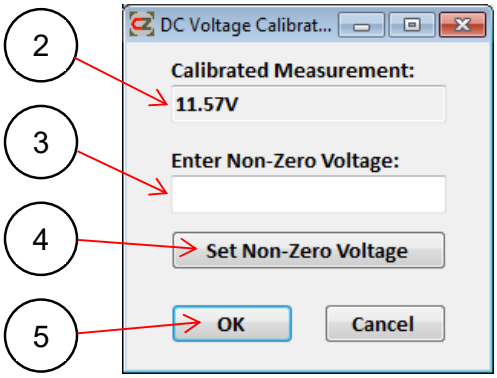
1. Select the 'Battery Type' that represents the battery to be monitored.
2. Select the 'Battery Chemistry' that represents the battery to be monitored.
3. Enter the 'Battery Capacity' of the battery bank in Ah. This will be shown on the Display Interface and used to calculate the State of Charge.
4. Enter the Minimum Discharge Current (A). Any discharge current above this value is when Peukert's calculation is applied.
5. To reset the State Of Charge of the battery to 100%, select the 'Set Battery Fully Charged' button. This should only be done if the battery is full and the PC is connected to the CZone® Network.
6. Enter the Charging Efficiency of the battery to be monitored. Under charging conditions, the measured charge current is multiplied by the charging efficiency and the result added to the State Of Charge. The efficiency can be obtained from the battery manufacturer.
7. Enter the Peukert's Coefficient of the battery to be monitored. This affects the State Of Charge calculation at higher discharge currents. The Peukert's value can be obtained from the battery manufacturer.
8. Enter the Battery Full Current (A). This should be between 2.5% and 4% of Battery Capacity (Ah). Under charging conditions, if the current is below the 'Battery Full Current' setting and voltage is above the 'Battery Full Voltage' setting for five minutes, State of Charge will reset to 100%.
9. Enter the Battery Full Voltage (V). This should be set just lower than the charging sources 'float' voltage. Under charging conditions, if the current is below the 'Battery Full Current' setting and voltage is above the 'Battery Full Voltage' setting for five minutes, State of Charge will reset to 100%.
10. Click OK to save the battery configuration settings.

4.3.1.3 DC Voltage Calibration

To calibrate DC Voltage the PC must be connected to the CZone® Network. It is recommended to do this process during commissioning of the system.



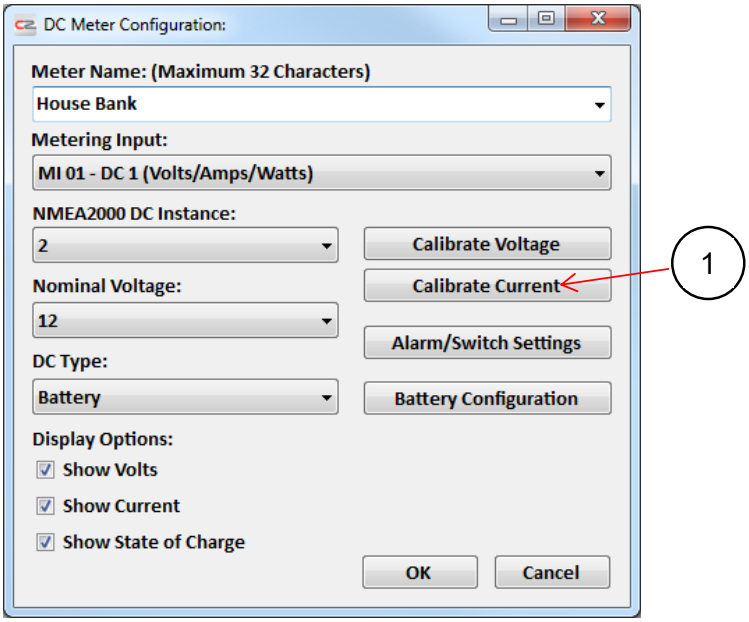
1. To calibrate the voltage for this input, select 'Calibrate Voltage'.



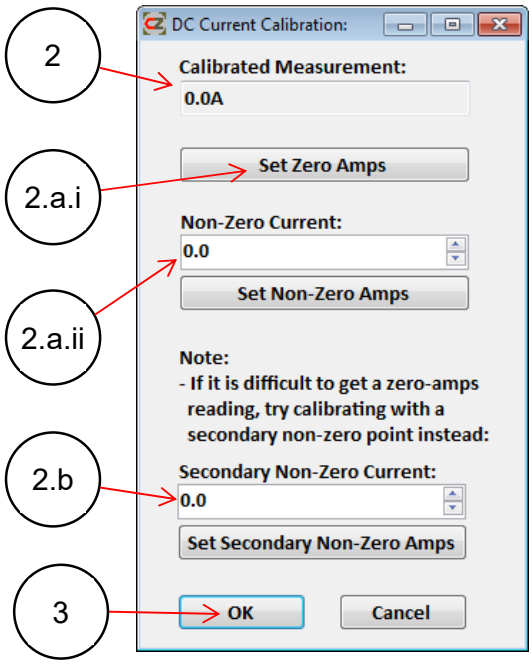
2. With an accurate voltmeter, check the voltage at the battery against the value in the 'Calibrated Measurement' window.
3. If the values are different, enter the measured value in the 'Enter Non-Zero voltage' box.
4. Click on the 'Set Non-Zero Voltage' tab. The voltage in the 'Calibrated Measurement' will now match the value of the entered voltage.
5. Click OK to return to the DC Advanced Configuration page, then write the config to the network for the new settings to take effect.

4.3.1.4 DC Current Calibration

To calibrate DC current the PC must be connected to the CZone® Network. It is recommended to do this process during commissioning of the system.



1. To calibrate the current for this input, click Calibrate Current to launch the DC Current Calibration dialogue.



2. This is the calibrated current for the input that was selected. It is recommended to do a current calibration on a new system. There are two ways to do this calibration:
    a. If you have easy access to the shunt, you can set the zero point first.
        i. Connect both sense wires together under the battery side of the shunt terminal; this means no current can be sensed across the shunt. Click the ‘Set Zero Amps’ tab. Return the load-side sense wire to the load side of the shunt.

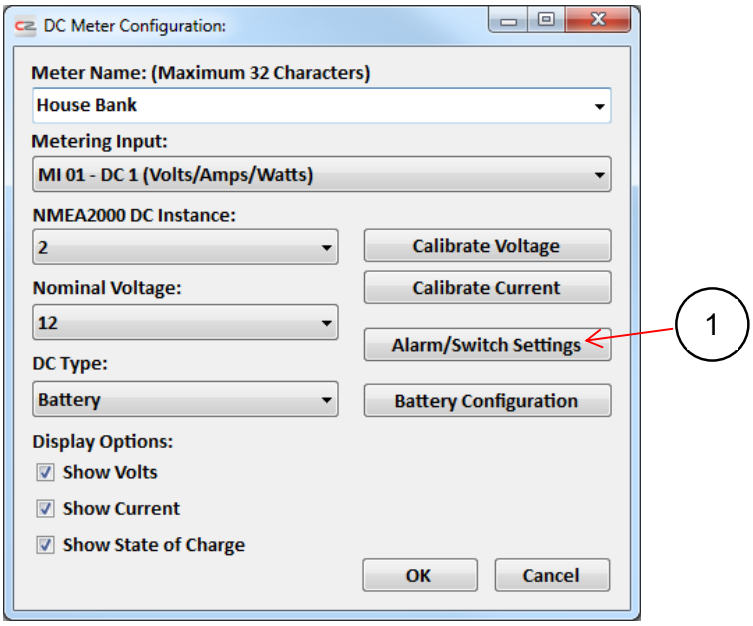
ii. Now that we have a zero-point calibration, we need to set a non-zero point. Turn on a circuit to put a load on the system. (The higher the current, the more accurate the current readings will be. Select loads that do not vary in current draw). With an accurate current meter, check the current draw on the shunt to the battery against the value in the 'Calibrated Measurement' window. If the values are different, enter the measured value in the 'Non-Zero Current" box and click on the 'Set Non-Zero Amps' button. The current in the 'Calibrated Measurement' will now match the value of the entered current.

b. If you don't have easy acess to the shunt to create a zero point, instead you can use two calibration points (non-zero and secondary non-zero).

Start with the non-zero point in step 'a.ii'. The wider the current range between the two points, the more accurate it will be. It is a good idea to use charge current for the non-zero point and discharge current for the secondary non-zero point. Enter this secondary current into the 'Secondary Non-Zero Current' box and then press the 'Set Secondary Non-Zero Amps' button. The current in the 'Calibrated Measurement' will now match the value of the entered curent.

3. Click OK to return back to the DC Advanced Configuration page, then write the config to network for the new settings to take effect.

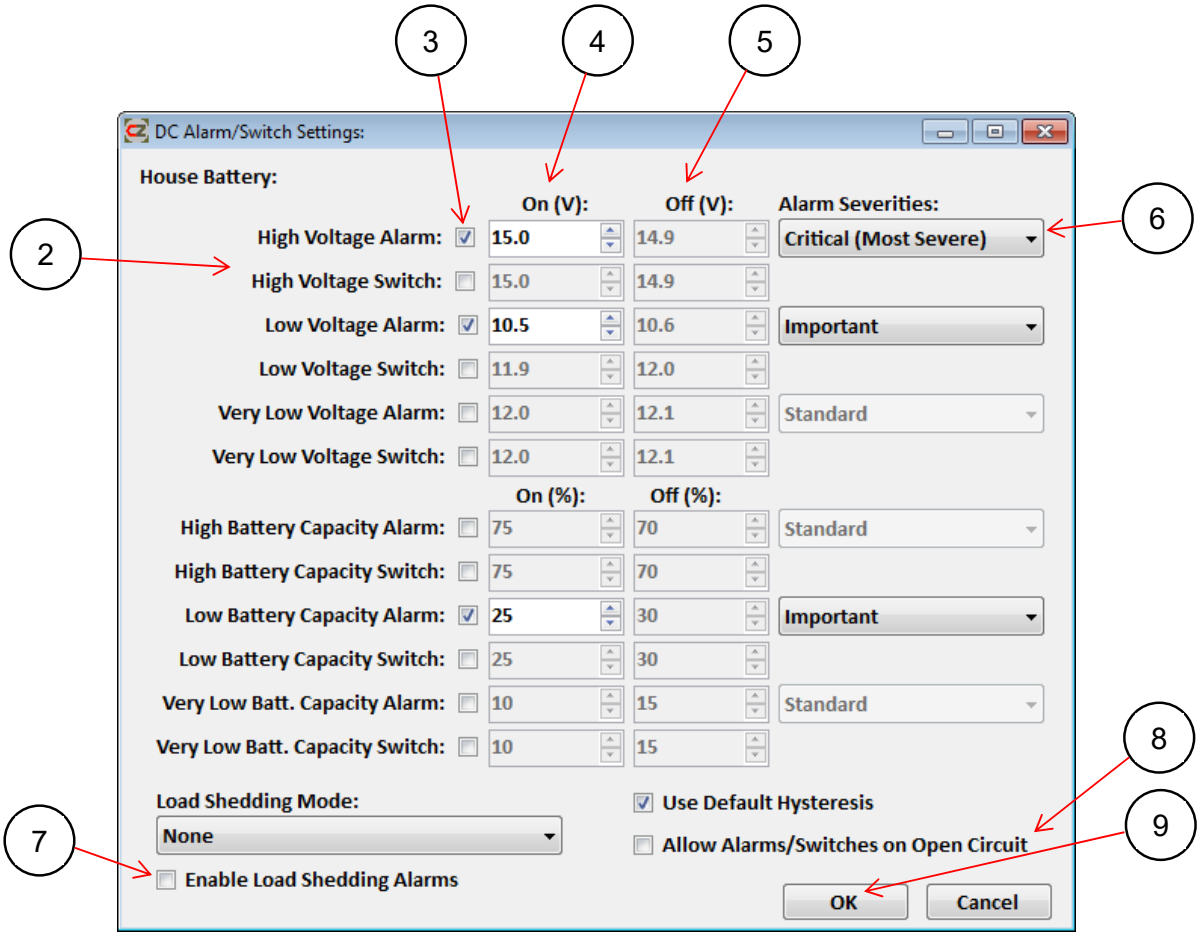
4.3.1.5 DC Alarm and Switch Settings



1. To configure any alarms or switches for the selected DC meter, press 'Alarm/Switch Settings'. (Alarms and Switches can be used as inputs to Logic Blocks (see section 4.10) but not directly as Circuit controllers.)

Note: Preset and non-adjustable delays to the alarms/switches are listed below:

Alarm/Switch Point	Delay
High Voltage	5 seconds
Low Voltage	5 minutes
Very Low Voltage	5 minutes
High Battery Capacity	3 minutes
Low Battery Capacity	3 minutes
Very Low Battery Capacity	3 minutes



2. For every DC Meter there are six levels of alarms/switches that can be enabled for Battery Capacity and Battery Voltage readings. The alarms (visual and audible depending on severity) will be triggered on any Display Interface. The switches can be assigned to control any circuit configured in the Circuits tab (e.g. a low battery capacity switch can be used to start a generator).
3. Tick the box next to the required alarm or switch to enable it.
4. Enter the On value, in volts or % capacity, at which you require the alarm/switch to be activated.
5. The Off value for the alarm/switch is greyed out by default. If you require a different level for this alarm/switch to be deactivated, un-tick the 'Use Default Hysteresis' box at the bottom.
6. If enabling an alarm, select its severity from the drop-down list. (Refer to for section 5.1 for detail on alarm severities.)
7. To enable load shedding of DC loads, first tick the 'Enable Load Shedding Alarms' box. Then use the drop-down list to select the load shedding mode you wish to use. The two options for load shedding are voltage or battery capacity controlled. The switch points at which load shedding occurs are based on the settings adjusted in the above steps. Once load shedding is enabled, each load when added to the configuration will have the option to load-shed at one of these preset levels. This is described in section 4.4.
8. Depending on the supply that is connected to this meter input, you may require an alarm or switch to activate at a zero value (volts or capacity). In that case, click on the 'Allow Alarms/Switches on Open Circuit' box. This functionality is provided because all other low voltage alarms and switches will not operate at zero voltage. (If they did, an alarm could trigger when a master switch or circuit breaker was turned off: it would cause zero volts to appear at the meter interface voltage input.)

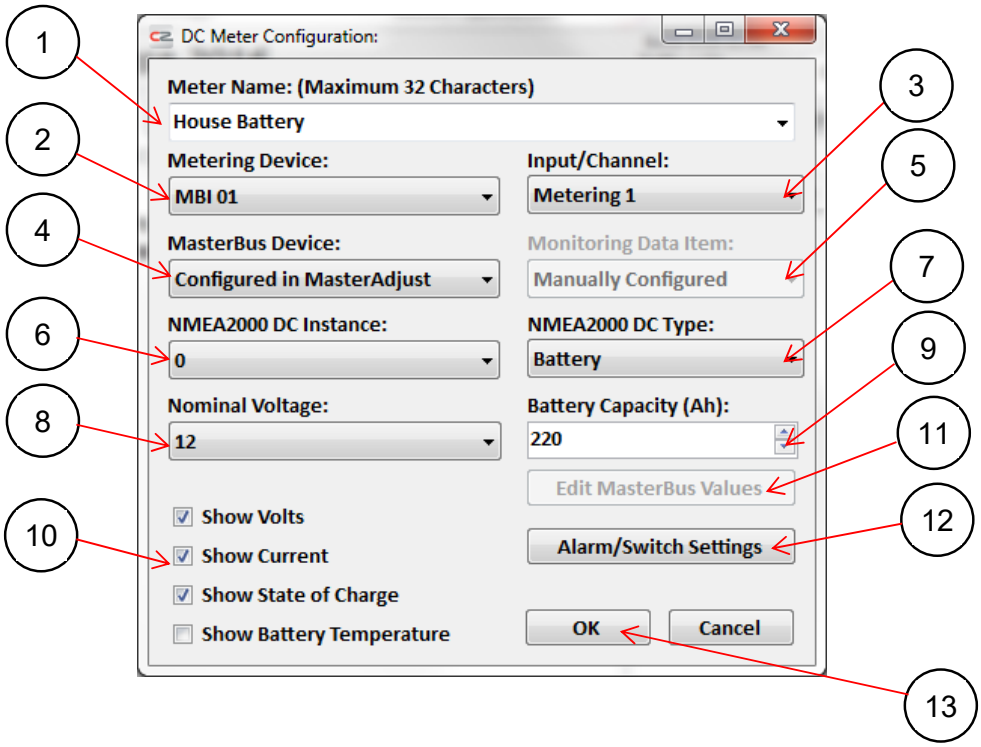
   Note: Low or Very Low Alarms/Switches must be active for Alarm or Switch on Open Circuit to work.
9. Click OK to save settings and return to the 'DC Meter Configuration' box.

Select OK again to return to the 'Power Metering' page.

4.3.2 DC Meter - MasterBus Bridge Interface

4.3.2.1 Initial Settings

To configure a DC Meter connected to an MBI (MasterBus Bridge Interface), from the Power Metering Tab select 'Add DC Meter'.



1. Enter a name for the input that relates to the Mastervolt device or battery the MBI is monitoring. This name will be used on the Display Interface to represent this input.
2. From the 'Metering Device' drop-down list, select the MBI's which has the meter to be configured
3. Select an available MBI Meter Input, from the 'Input/Channel' drop-down list. The MBI has 16 metering channels available.
4. Select the MasterBus Device to be used for DC monitoring from the drop-down list. If the Mastervolt device is powered and on-line it will be shown in this list and configured automatically, If the device is to be configured through MasterAdjust, select the 'Configured in MasterAdjust' option.
5. Select the 'Monitoring Data Item' from the drop-down list for the chosen device. If you would like to edit these values manually, select 'Manually Configured'.
6. NMEA 2000 Instances are used to differentiate between multiple monitoring sources. These are assigned automatically by the configuration tool, to ensure the instances are unique for each source that is monitored.
7. Select the DC Supply Type that represents the supply type for this input.
8. Select the Nominal Voltage of the supply from the drop-down list.
9. Enter the Battery Capacity in Amp-Hours.
10. Tick the appropriate Display Options boxes for the input to be configured. This allows you to select what DC monitoring parameters are shown on the Display Interface. In this example the House Bank is being monitored through a MasterShunt, which has montitoring parameters available for Volts, Amps and State of Charge.
11. When configuring a supported Mastervolt device, the MasterBus index numbers are assigned automatically. If these index numbers need to be edited, select the 'Edit MasterBus Values' box.

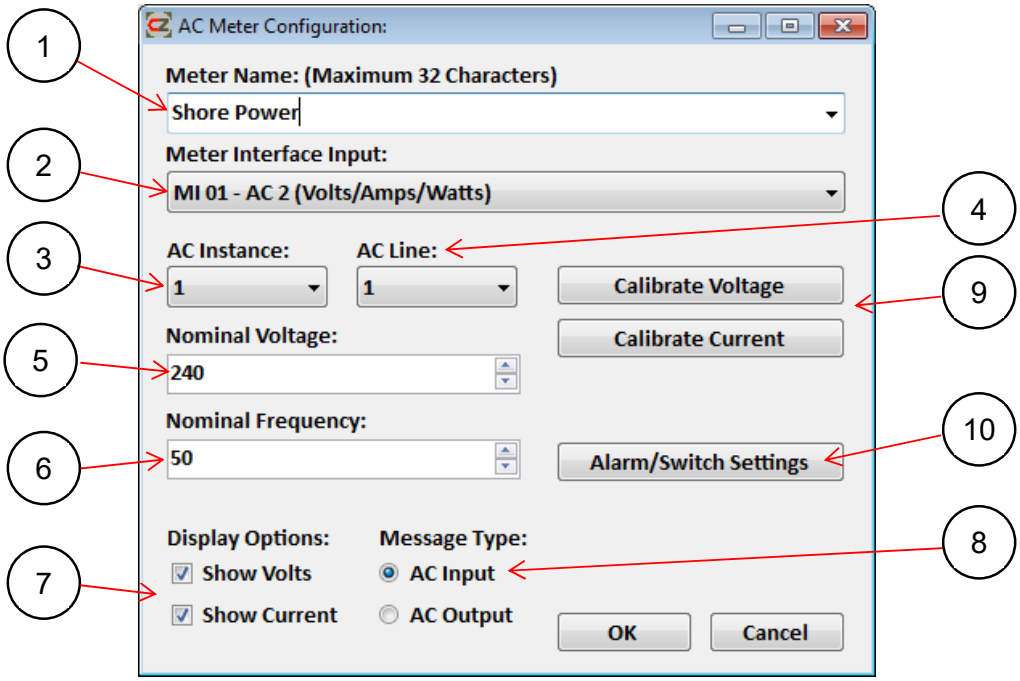
12. DC Alarm and Switch settings can also be configured when metering with a MasterBus Bridge Interface. The method is the same as for a Meter Interface: follow the instructions in section 4.3.1.5.
13. Click OK to complete the DC Meter configuration and return to the 'Power Metering' page.

4.3.3 AC Meter - Meter Interface/AC Mains Interface

This section describes how to configure an AC Meter. AC metering requires either a Meter Interface or an AC Mains Interface.

4.3.3.1 Initial Settings

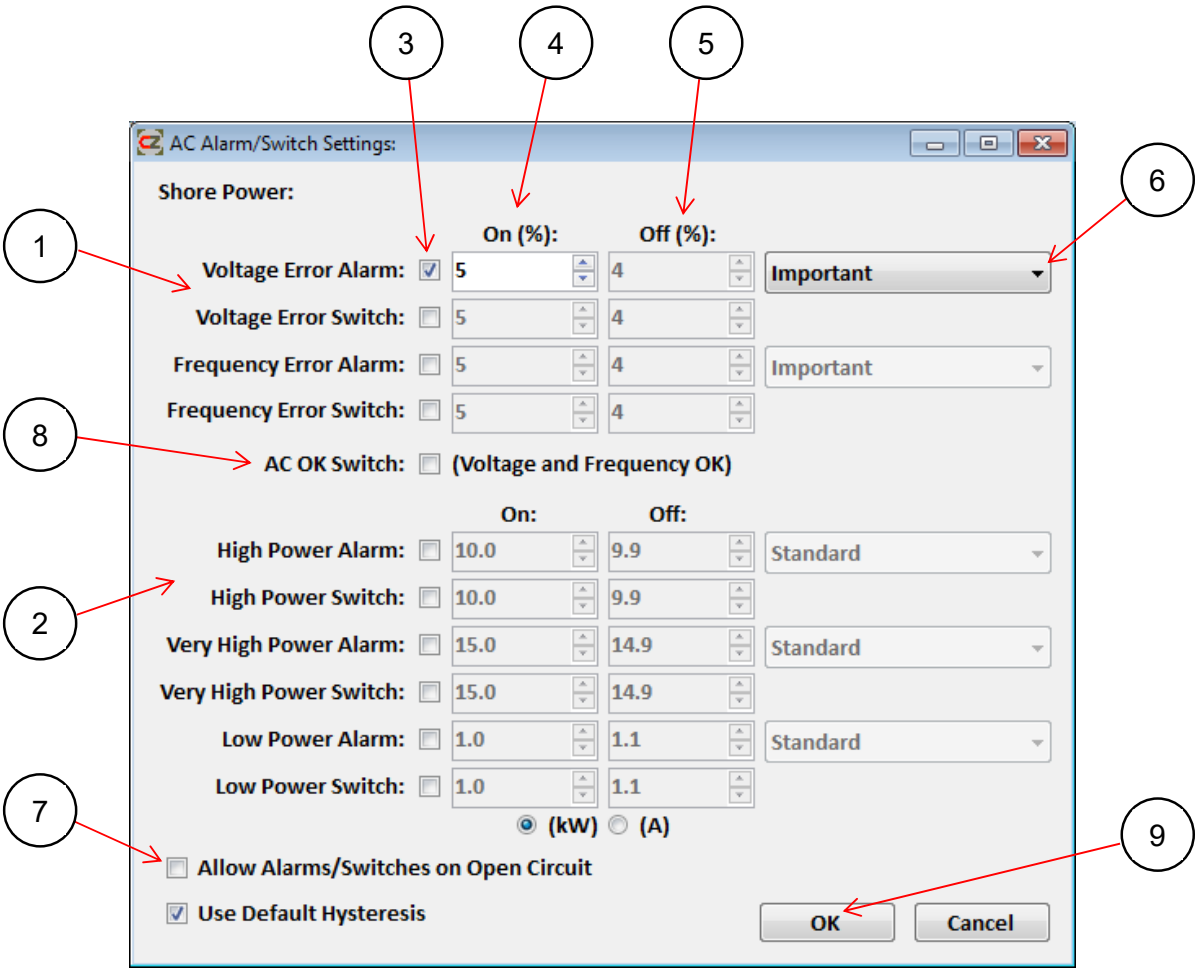
To configure an AC Meter connected to a Meter Interface, from the Power Metering Tab select 'Add AC Meter'.



1. Enter a name for the input that relates to the physical connection into the Meter Interface. This name will be used on the Display Interface to describe this input.
2. Select the Meter Input, from the 'Meter Interface Input' drop-down list, that matches the physical input connections to the Meter Interface. If you are configuring an AC Mains Interface you can use one of the six metering inputs of the ACMI.
3. NMEA 2000 Instances are used to differentiate between multiple monitoring sources. These are assigned automatically by the configuration tool, to ensure the instances are unique for each source being monitored.
4. AC Line is used if you are monitoring two- or three-phase AC sources. If a multiphase source is to be monitored, assign the same NMEA 2000 AC Instance to each phase from that source and then select the the appropriate AC Line for each phase.
5. Enter the nominal voltage of this input.
6. Enter the nominal frequency of this input.
7. Tick the required boxes of the data you would like shown on the Display Interface for this input.
8. Select the Message Type that best represents the type of AC being configured: AC Input or AC Output.
9. Click on the 'Calibrate Voltage' or 'Calibrate Current' tabs to enter calibration pages. Follow the same calibration process as for the DC Settings in section 4.3.1.4. This must be done when the PC is connected to the CZone® network.
10. To configure any alarms or switches for the selected AC Meter, click 'Alarm/Switch Settings'

4.3.3.2 AC Alarm/Switch Settings

Like DC Alarms and Switches, AC Alarms and Switches can be used as inputs to Logic Blocks (see section 4.10) but not directly as Circuit controllers.



1. For every AC Meter there is a Voltage Error or Frequency Error Alarm/Switch that can be enabled. If the voltage or frequency is outside the configured percentage, the alarm/switch will be triggered. The nominal voltage and nominal frequency values configured in the AC Meter Settings (section 4.3.3.1) are used as a reference for these alarms/switches.
2. There are also three levels of Power Alarms/Switches that can be enabled. The alarms (visual and audible depending on severity) will be triggered on any Display Interface. The switch can be assigned to control any circuit configured in the circuits tab.
3. Tick the box next to the required alarm or switch to enable it.
4. Enter the On value, in kW or Amps, at which you require the alarm/switch to be activated. (The appropriate unit can be changed from kW to Amps near the bottom of the window.) The configuration tool will calculate the secondary value once one of the boxes is filled in e.g. a kW value will auto-enter when an Amps value is entered. The values are given in power and in current for situations where only one or the other is known, e.g. typically a dock-side power plinth rating is given in current not power.
5. The Off value for the alarm/switch is greyed out by default. If you require this alarm/switch to be deactivated at a different level, un-tick the 'Use Default Hysteresis' box at the bottom of the window.
6. If enabling an alarm, select its severity from the drop-down list. (Refer to section 5.1 for detail on alarm severities).
7. Tick the 'Allow Alarms/Switches on Open Circuit' check-box to allow alarms and switches to activate at a zero value (volts, frequency, power) for the supply that is connected to this meter input. This functionality is provided because all other low voltage alarms and switches will not operate at zero voltage. (If they did, an alarm could trigger when a

power source was unavailable or a circuit breaker was turned off: it would cause zero volts to appear at the meter interface voltage input.)

Note: Low or Very Low Alarms/Switches must be active for Alarm/Switch on Open Circuit to work.

8. Most switches are activated on error conditions. Conversely if you want a switch to be activated when configured voltage and frequency conditions are met, tick the ‘AC OK Switch’ check-box.
9. Select OK to save settings and return to the ‘AC Meter Configuration’ box.
10. Select OK again to complete AC Meter configuration and return to the ‘Power Metering’ page.

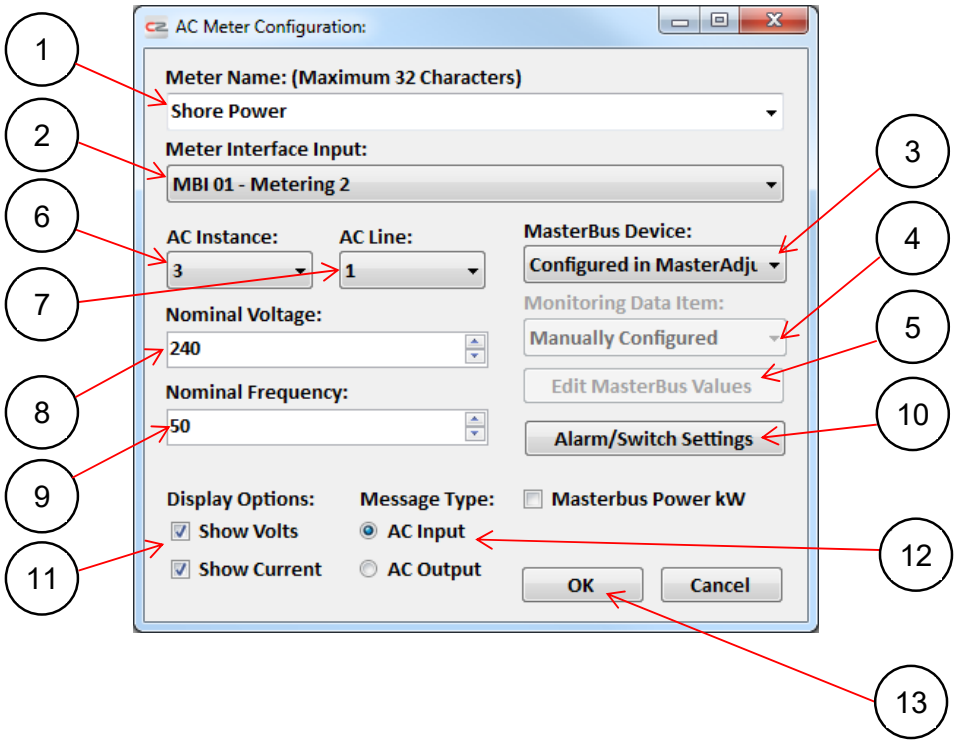
Note: There are preset and non-adjustable delays to the following alarms/switches:

Alarm/Switch Point	**Delay**
Voltage Error	10 seconds
Frequency Error	10 seconds
High Power	10 seconds
Very High Power	10 seconds
Low Power	10 seconds

4.3.4 AC Meter - MasterBus Bridge Interface

4.3.4.1 Initial Settings

To configure an AC Meter connected to an MBI (MasterBus Bridge Interface), from the Power Metering tab select 'Add AC Meter'.



1. Enter a name for the input that relates to the Mastervolt device or AC Meter to be monitored through the MBI. This name will be used on the Display Interface to represent this input.
2. Select an available MBI Meter Input, from the 'Metering Input' drop-down list. The MBI has 16 Metering channels available.
3. Select the MasterBus Device to be used for AC Monitoring from the drop-down list. If the Mastervolt device is powered and on-line it will be shown in this list, If the device is to be configured through MasterAdjust, select the 'Configured in MasterAdjust' option.
4. Select the 'Monitoring Data Item' from the drop-down list for the chosen device. If you would like to edit these values manually, select 'Manually Configured'.
5. Select the 'Edit MasterBus Values' box to edit the index numbers referenced from the Mastervolt device. These will be configured automatically for the chosen device.
6. NMEA 2000 Instances are used to differentiate between multiple monitoring sources. These are assigned automatically by the configuration tool, to ensure the instances are unique for each source being monitored.
7. AC Line is used if you are monitoring two- or three-phase AC sources. If a multiphase source is to be monitored, first assign the same NMEA 2000 AC Instance to each phase from that source. Then select the the appropriate AC Line for each phase.
8. Enter the Nominal Voltage of the supply.
9. Enter the Nominal Frequency of the supply.
10. AC Alarm and Switch settings can also be configured when metering with a MasterBus Bridge Interface. The method is the same as for a Meter Interface: follow the instructions in section 4.3.3.2.
11. Check the required boxes of the data you would like shown on the Display Interface for this input.
12. Select the Message Type that best represents the type of AC being configured: either AC Input or AC Output.
13. Click OK to complete the AC Meter configuration and return to the 'Power Metering' page.

4.4 LOADS

The Loads tab is where the systems loads are created and their parameters set. This includes setting the circuit trip current, trip characteristic and load shedding functionality. See Figure 3 for an example of a configured Loads tab.

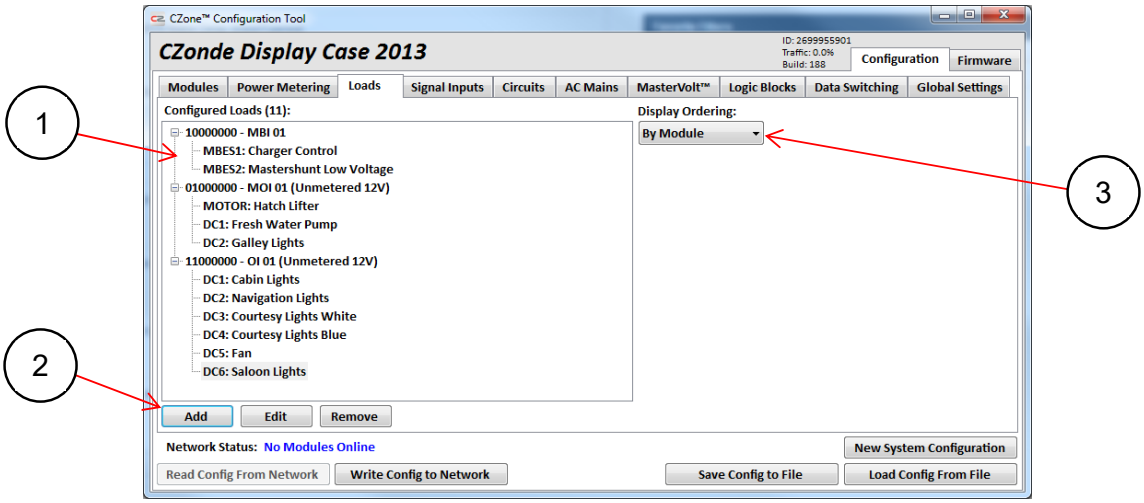


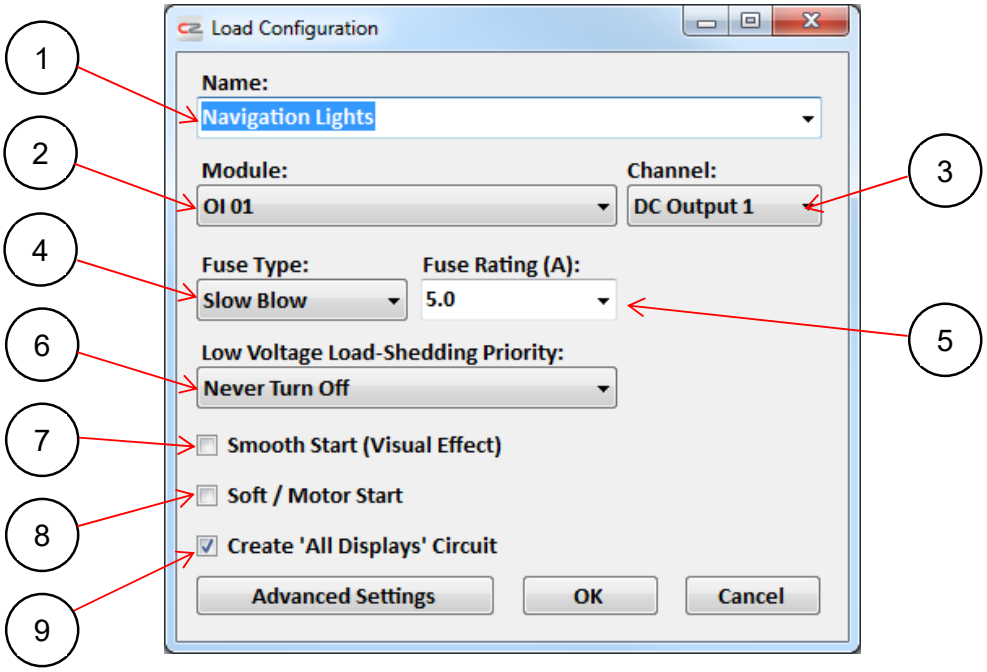
Figure 3 Loads Tab Example

1. By default, configured Loads are listed here by module, dipswitch number and then channel number.
2. There are buttons for adding, editing, and removing modules from the configuration.
3. The Display Ordering of the configured loads can be changed from this drop-down list. The options are explained below:
    - **By Module** – Default View, shows loads in a tree view starting with module, dipswitch then channel number.
    - **Alphabetical** – Shows all loads in alphabetical order by their configured name.
    - **By Power Supply** – Shows loads in a tree view starting with their assigned battery supply then module, dipswitch and channel number.

The following sections will explain how to configure each type of AC and DC load.

4.4.1 DC Loads

To configure a DC Load connected to any Output Module, from the Loads Tab select 'Add DC Meter':

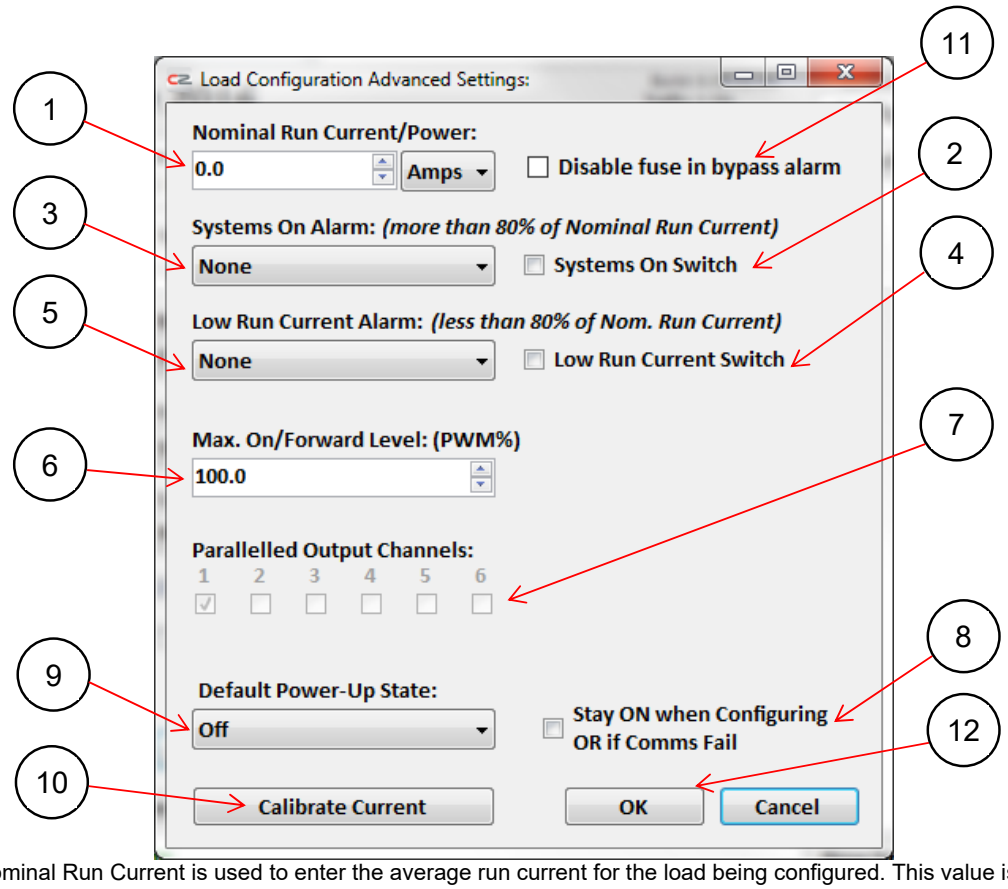


1. Enter the name of the load in this box. Labels will auto-predict as text is entered. This name will only be shown if a fault (e.g. short circuit, low run current etc.) occurs for that channel. The name that will be shown on any CZone® display is entered in the Circuits tab.
2. From the 'Module' drop-down list, select the module that the load is to be configured on.
3. From the 'Channel' drop-down list, select the channel that the load is to be configured on. (This list is dynamic: it will only offer outputs that have not already been configured.) Virtual-Signal is an advanced option for controlling circuits based on the state of a load. For more details refer to section 4.4.5.
4. Select the fuse type for the circuit (Fast, Slow Blow or Motor Start). Motor Start should only be used if high in-rush currents are causing the circuit to enter over-current or short-circuit status with the recommended current setting. *Note, software fusing is not available on the C6, C6+ or Control 1, all outputs are protected by the modules internal or external fuses*
5. Select the software fuse rating for the circuit (either manually or from the drop-down list). This will be in accordance with the equipment manufacturer's specifications. Note that the software fuse should be set lower than the physical fuse in the device, to ensure the software fuse trips first.
   Note, software fusing is not available on the C6, C6+ or Control 1, all outputs are protected by the modules internal or external fuses
6. If load shedding is required for this load, select the load shedding value from the 'Low Voltage Load-Shedding Priority' drop-down list. (Options are: Never Turn Off (default); Turn Off Last (Very Low Voltage/Capacity); and Turn Off First (Low Voltage/Capacity.) For this function to work, the tick-box in the appropriate DC metering advanced options page must also be selected. Switching points for load shedding are based on those assigned in the DC metering set-up.
7. Check 'Smooth Start (Visual Effect)' box to allow the circuit to come on gradually. This functionality is designed to give a gradual visual effect during the turning on and off of lighting circuits. The rate at which the lights turn on/off can be adjusted in the global settings tab. *Note, feature not supported on all modules*
8. Check 'Soft/Motor Start' box to allow soft starting of halogen lights. This functionality prolongs the life of halogen bulbs by inhibiting the shock from inrush current at start up. There is no need to select this box if you have selected the smooth start option above. This function can also be applied to motors for soft starting. If using this function on motors,

check the manufacturer's recommendations for the correct settings. If the motor-start fuse type has been selected, the slowest/lowest setting allowed is 0.10 second. *Note, feature not supported on all modules.*

9. The 'Create All Displays Circuit' option is visible when configuring a load for the first time. It is recommended to enable this option. When the OK button is pressed, a complete circuit will be created including the configured load and an All Displays switch, this drastically reduces configuration time.

10. DC Loads Advanced Settings



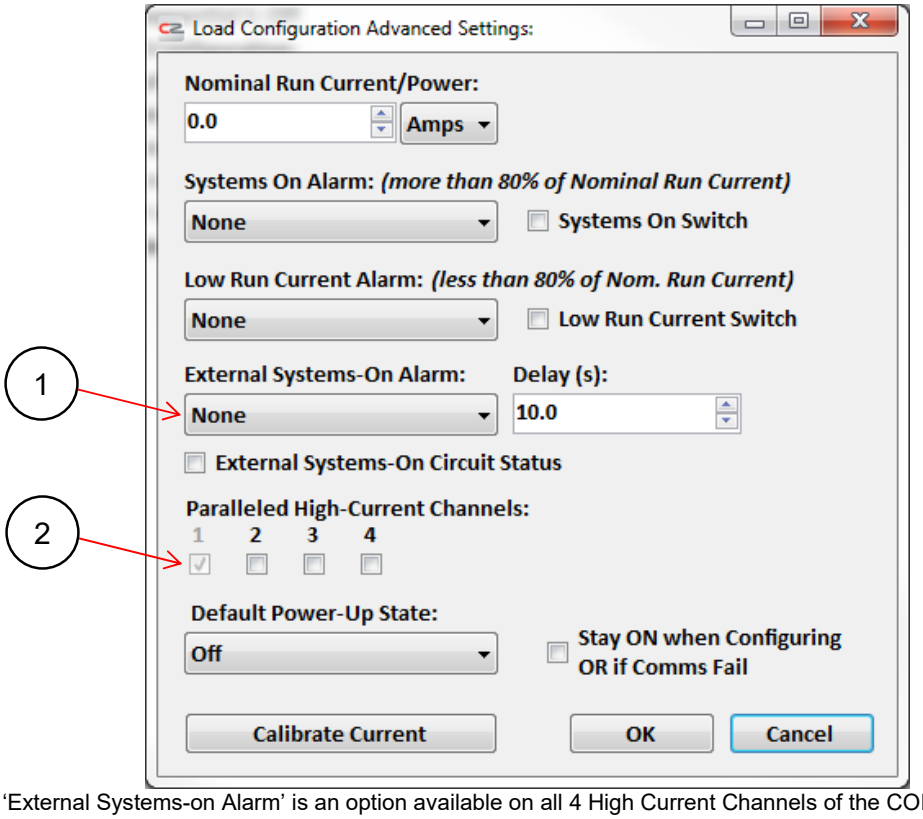
1. Nominal Run Current is used to enter the average run current for the load being configured. This value is used for calculating the Low Run Current or System On alarms and switches. The units can be changed between Amps and Watts if one value is unknown. *Note, feature not supported on all modules.*
2. Check the 'Systems On Switch' box to allow a switch function if the current exceeds 80% of the nominal run current. The switch can be assigned to control any circuit configured in the Circuits tab. *Note, feature not supported on all modules.*
3. If the current exceeds 80% of the nominal run current and a 'Systems On' alarm is needed, select the required Alarm Severity from the drop-down list. *Note, feature not supported on all modules.*
4. Tick the 'Low Run Current Switch' box to allow a switch function if the current falls below 80% of the nominal run current. The switch can be assigned to control any circuit configured in the Circuits tab. *Note, feature not supported on all modules.*
5. If the current falls below 80% of the nominal run current and a 'Low Run Current' alarm is needed, select the required Alarm Severity from the drop-down list. *Note, feature not supported on all modules.*
6. 'Max On/Forward Level' allows the user to set an absolute maximum PWM (Pulse Width Modulation) level that this output will ever reach. For example it may be used to limit a 24V-supplied output module to 50% to supply a 12V halogen light bulb. (Powering 12V electronics from a 24V supply is not recommended.) *Note, feature not supported on all modules.*

7. ‘Paralleled Outputs’ should be ticked when the current of a circuit exceeds the channels limit and it is required to connect a load to two or more output channels. Once each paralleled channel is selected, you will be able to enter a software fuse rating to the total max current of all channels
8. ‘Stay On when Configuring OR if Comms Fail’ should be ticked for critical items that should remain on:
    - if there is a communications failure on the network; or
    - when a configuration is being written to the network. (All other loads will turn off during this process.)

    Note: This will not keep a load on if the module losses network power.
9. Select which state the load must be in when the device or network is powered up. The default is Off.
10. ‘Calibrate Current’ This is a factory setting and should not be modified unless instructed by a CZone® application engineer.
11. Check this box to disable the fuse in bypass alarm (COI only). This can be useful for high capacitive loads where voltage is present on the output 15 seconds or more after turning off the load.
12. Select OK to save the advanced settings and return to the ‘Load Configuration’ page.
13. Select OK on the ‘Load Configuration’ page to save the Load settings and return to the ‘Loads’ page.

The load is now configured and ready to be used in the Circuits tab. Repeat the above steps until all DC loads are configured.

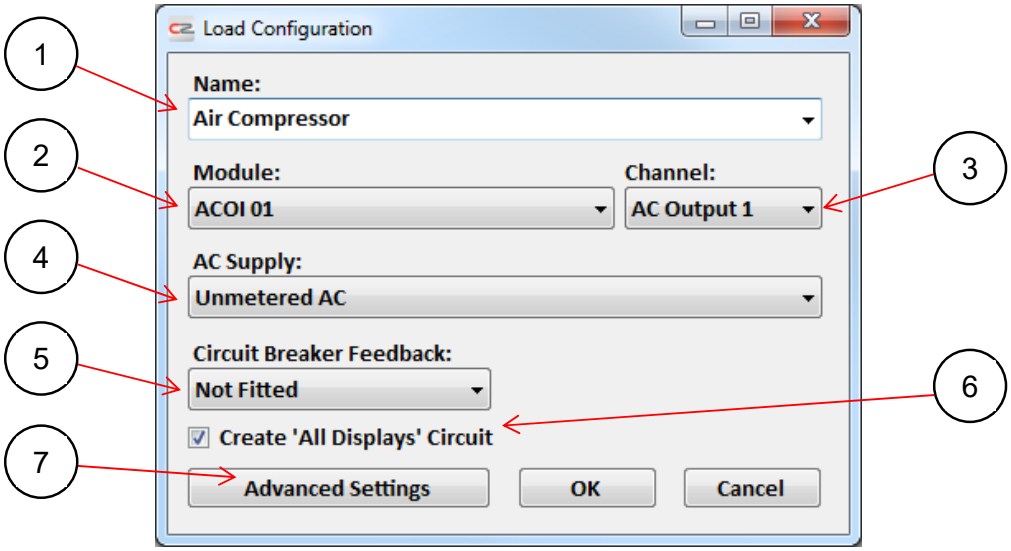
4.4.2 DC Loads Advanced Settings Specific to Combination Output Interface/Control 1



1. ‘External Systems-on Alarm’ is an option available on all 4 High Current Channels of the COI/Control 1. By enabling this option, CZone will activate a ‘Systems On’ alarm if the channel is off and reverse voltage is detected on the output. i.e. usefull for Bilge Pumps that have a direct feed from the battery through a float switch. The ‘External Systems-On Circuit Status’ box should be ticked if systems on feedback is also required on any switches configured to control the load including displays and any CZone connected digital switches.
2. The 4 High Current Channels can be paralleled up to a maximum fuse rating of 100A and the 12 Low Current Channels can be paralleled up to a maximum fuse rating of 120A (Ensure the total load on the does not exceed 150A continuous).

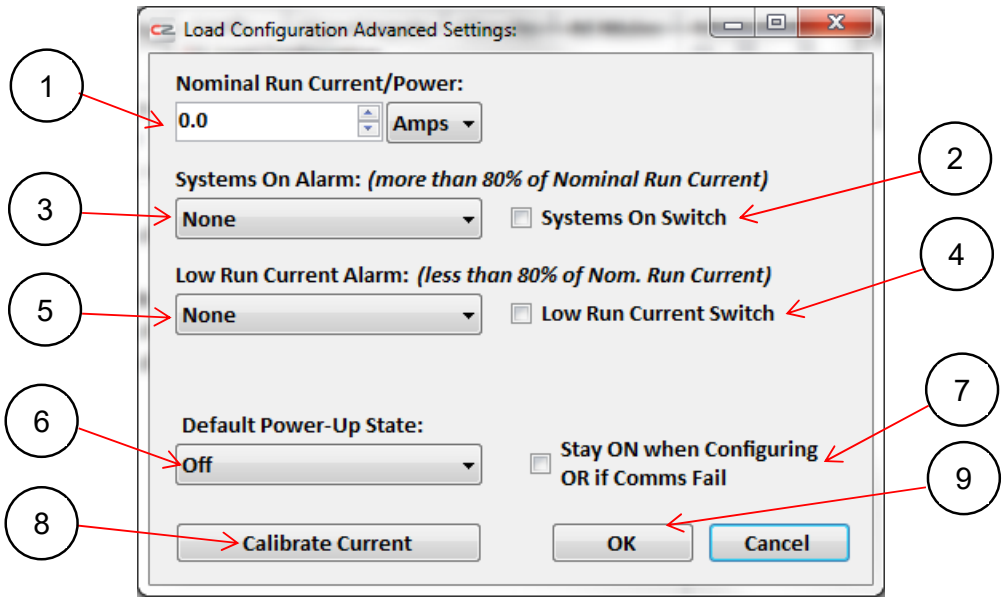
4.4.3 AC Loads

To configure an AC Load connected to an AC Output Interface, from the Loads tab select ‘Add’ to launch the Load Configuration dialogue:



1. Enter the name of the load in this box. Labels will auto-predict as text is entered. This name will only be shown if a fault occurs for that channel. The name that will be shown on any CZone® display is entered in the Circuits tab.
2. From the ‘Module’ drop-down list, select the module that the load is to be configured on.
3. From the ‘Channel’ drop-down list, select the channel that the load is to be configured on. (This list is dynamic: it will only offer outputs that have not already been configured.)
4. Select the ‘AC Supply’ from the drop-down list. This list is based on metering and load groups that have been assigned in the AC Metering and AC Mains setup (section 4.3.3). By selecting the source, the CZone® displays will show if a source is available when the user is trying to turn on an AC circuit. If there is no AC Supply monitoring then select ‘Unmetered AC’.
5. Some circuit breakers are fitted with feedback which can raise an alarm if the breaker is tripped (i.e. goes open-circuit). If the circuit breaker for this channel has that feature, you can select it here with the 'AC Circuit Breaker Feedback’ drop-down list. (All CZone® systems are supplied standard without the feedback option fitted.)
6. It is recommended to check the ’Create All Displays Circuit’ box. When the OK button is pressed, a complete circuit will be created for this load with an All Displays control switch in the Circuits tab. This drastically reduces configuration time.
7. For modifying other load settings click on the ‘Advanced Settings’

4.4.4 AC Loads Advanced Settings



1. Nominal Run Current is used to enter the average run current for the load being configured. This value is used for calculating the Low Run Current or System On alarms and switches. The units can be changed between Amps and Watts if one value is unknown.
2. Check the 'Systems On Switch' box to allow a switch function if the current exceeds 80% of the nominal run current. The switch can be assigned to control any circuit configured in the Circuits tab.
3. If the current exceeds 80% of the nominal run current and a 'Systems On' alarm is needed, select the required Alarm Severity from the drop-down list.
4. Tick the 'Low Run Current Switch' box to allow a switch function if the current falls below 80% of the nominal run current. The switch can be assigned to control any circuit configured in the Circuits tab.
5. If the current falls below 80% of the nominal run current and a 'Low Run Current' alarm is needed, select the required Alarm Severity from the drop-down list.
6. Select the state that the load must be in when the device or network is powered up. The default is Off.
7. 'Stay On when Configuring OR if Comms Fail' should be checked for critical items that must remain on:
    - if there is a communications failure on the network; or
    - when a a configuration is being written to the network. (All other loads will turn off during this process.)

    Note: This will not keep a load on if the module loses network power.
8. 'Calibrate Current' is a factory setting and should not be modified unless instructed by a CZone® application engineer.
9. Click OK to save the advanced settings and return to the 'Load Configuration' page.

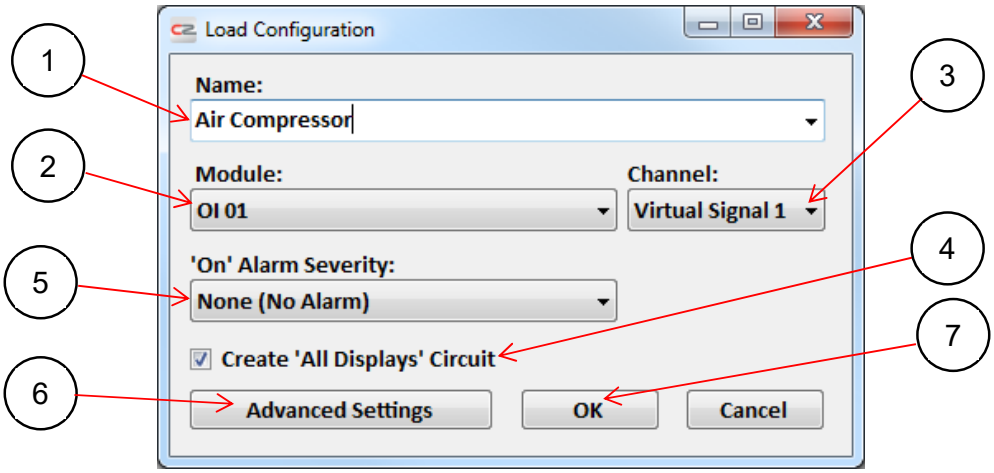
Click OK on the Load Configuration page to save the Load settings and return to the 'Loads' page.

The load is now configured and ready to be used in the Circuits tab. Repeat the above steps until all AC loads are configured.

4.4.5 Virtual Signals

The virtual signal function allows a circuit to be controlled based on the state of a load. For example, you may want a secondary bilge pump to turn on after a primary bilge pump has been running for 30 seconds.

To create a virtual signal function go to the Loads tab and select ‘Add’



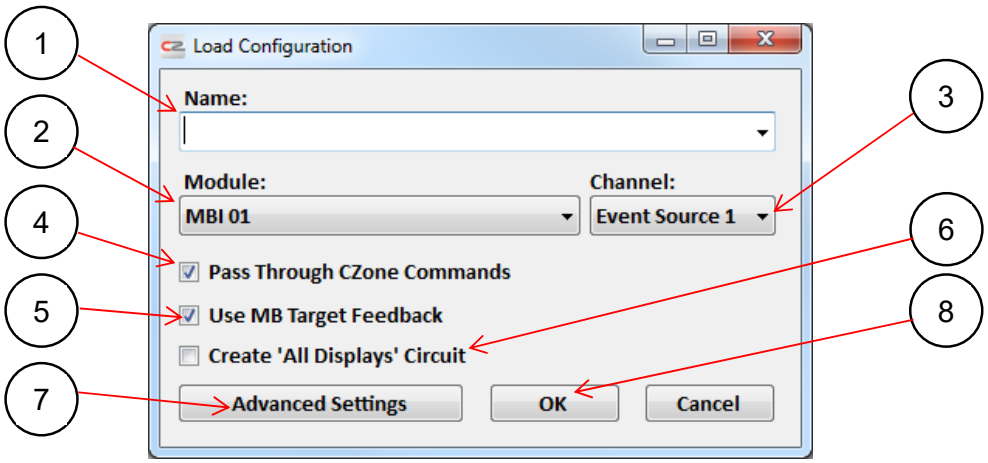
1. Enter a name for the Virtual Signal.
2. Select an Output Interface (OI), Combination Output Interface (COI) or Switch Control Interface (SCI) from the drop-down list. To create a virtual signal, one of these module types must be on the network.
3. Select the Virtual Signal number from the drop-down list. An OI can store up to six Virtual Signals/Logic Blocks; a COI can store up to 32 and an SCI can store up to 16.
4. To create a complete circuit in the Circuits tab, with the configured load and an All Displays On/Off control switch, tick the ‘Create All Displays Circuit’ box.
5. If an alarm is required when the Virtual Signal is turned on, select its severity from the drop-down list.
6. Press the ‘Advanced Settings’ button for further load settings. Refer to section 10 for more information on these.
7. Select OK to save the Virtual Signal and return to the Loads tab.

The Virtual Signal is now configured and ready to be used in the Circuits tab. Repeat the above steps to configure more virtual signals.

4.4.6 MBI Virtual Signal

The control mechanism between CZone® and MasterBus functions by configuring virtual signals (MasterBus Event Sources) within CZone® which subsequently function as virtual switches (Control to MB) within MasterBus. To control one of these virtual switches, a load must first be configured within CZone® and programmed to turn on/off within a CZone® circuit. The corresponding switch within MasterBus will then follow the state (on = closed, off = open) of this virtual signal (MasterBus Event Source). When configuring a supported Mastervolt device (see section 4.9), these MBI loads are configured automatically.

The MasterBus Bridge Interface (MBI) has 16 Event Sources. To configure one of these event sources, go to the Loads tab and select ‘Add DC Meter’.



1. Enter a name for the MasterBus Event Source.
2. Select the MBI module from the ‘Module’ drop-down list.
3. Select one of the 16 available Event Sources from the ‘Channel’ drop-down list.
4. It is recommended to tick this box, to enable CZone® On and Off commands to control MasterBus devices.
5. It is recommended to tick this box, to allow Systems On feedback from MasterBus to be repeated on CZone®.
6. To create a complete circuit in the Circuits tab, with the configured load and an All Displays On/Off control switch, tick the ‘Create All Displays Circuit’ box.
7. Press the ‘Advanced Settings’ button for further load settings. Refer to section 10 for more information on these.
8. Click OK to save the load configuration and return to the Loads tab.

The load is now configured and ready to be used in the Circuits tab. Repeat the above steps until all MBI loads are configured.

4.5 SIGNAL INPUTS

The Signal Inputs tab is where inputs from devices such as tank senders, light switches, float switches and external switches and tank senders are configured. See Figure 4 for an example of a configured Signal Inputs tab.

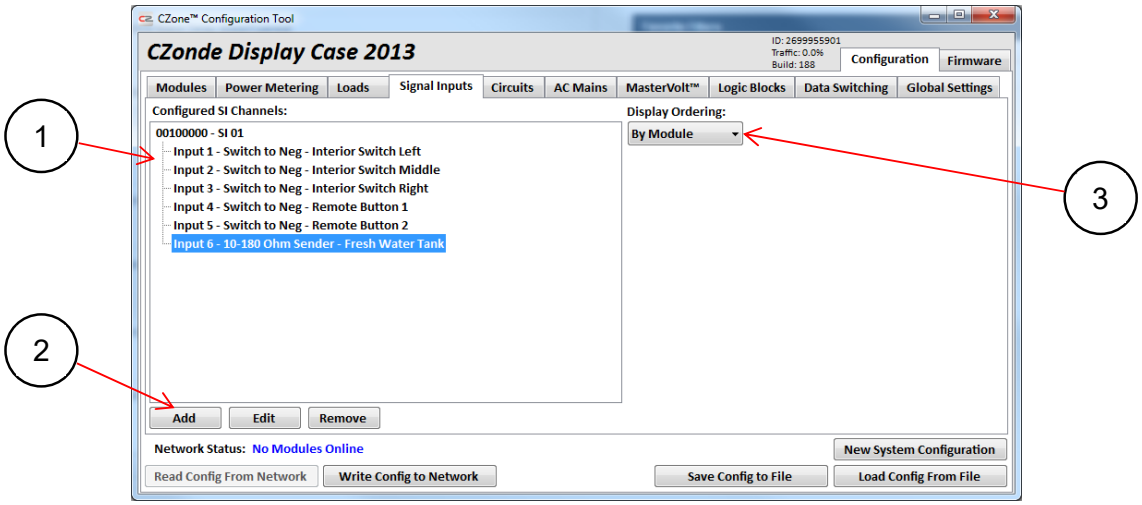


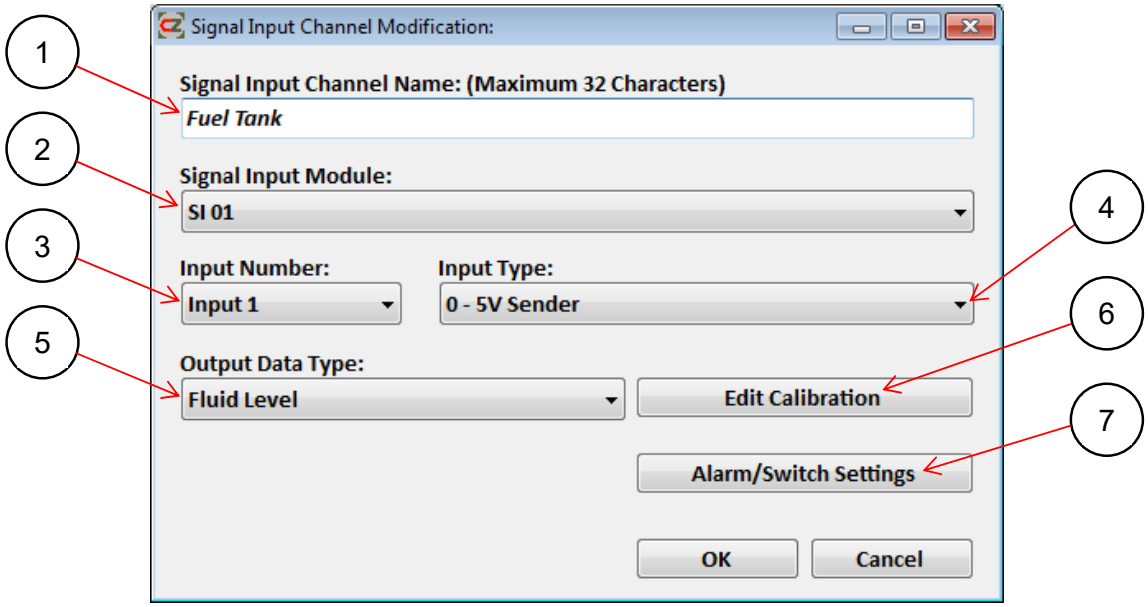
Figure 4 Signal Inputs Tab Example

1. By default, configured Signal Inputs are listed here by module, dipswitch number and then channel number.
2. There are buttons for adding, editing, and removing modules from the configuration.
3. The Display Ordering of the configured loads can be changed using this drop-down list. The options are explained below:
    - **By Module** – Default View, shows loads in a tree view starting with module, dipswitch then channel number.
    - **Alphabetical** – Shows inputs in a tree view, starting with their data type then in alphabetical order.
    - **By Type Then Instance -** Shows inputs in order of data type then NMEA instance number.
    - **By Instance Then Type -** Shows inputs in order of NMEA instance number then data type.

The following sections will explain how to configure each type of Signal Input.

4.5.1 Initial Settings

To begin adding inputs to the configuration, from the Signal Inputs tab select the 'Add' button.



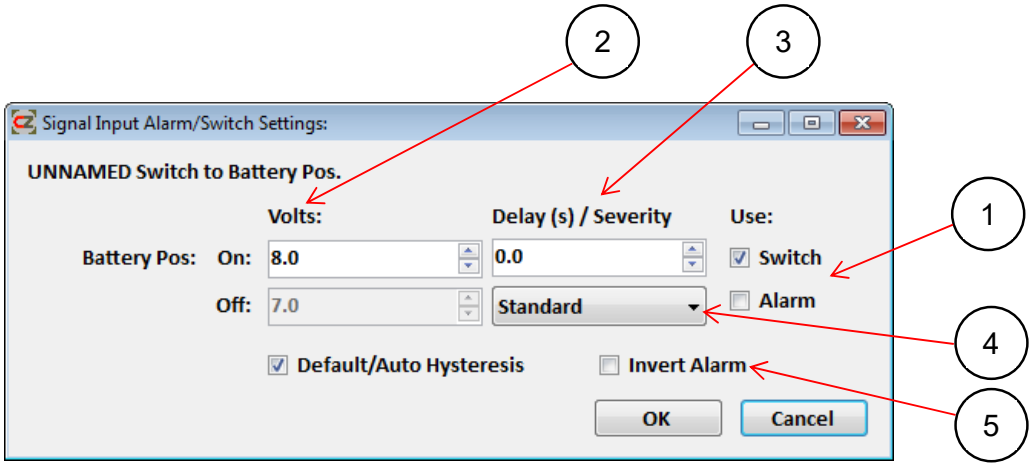
1. Enter the name of the signal device in the 'Signal Input Channel Name' box e.g. Fuel Tank. This name will be used for this input on the Display Interface.
2. From the 'Signal Input Module' drop-down list, select the Signal Interface, Combination Output Interface or Masterbus Bridge Interface that the device is connected to.
3. From the 'Input Number' drop-down list, select the physical input position to which the device is connected.
4. Select the type of input for this position from the 'Input Type' drop-down list:
   - **10-180 Ohm Sender -** For inputs to devices that output 10-180 ohm signals.
   - **240-33 Ohm Sender -** For inputs to devices that output 240-33 ohm signals.
   - **0-5V Sender** - For inputs to devices that output 0-5 volt signals.
   - **4-20mA Sender** – For inputs to devices that output 4-20mA signals (COI Only)
   - **Switch to Battery + -** For utilising a standard mechanical switch which connects positive to the Signal interface input when the switch is closed. This input type can be used to raise an alarm, or it can be configured on the Circuits page to control a circuit output.
   - **Switch to Battery -/Open circuit -** For utilising a standard mechanical switch which connects negative or open circuit to the Signal interface input when the switch is closed. This input type can be used to raise an alarm, or it can be configured on the Circuits page to control a circuit output.

Note: Although we state the above industry-standard inputs, CZone® can accept inputs from 0-1000 ohm, 1000-0 ohm and 0-30 V DC.

5. Select the output type of the device from the 'Output Data Type' drop-down list (Fluid level, Pressure, Temperature or Trim).
6. To calibrate a signal input for a Fluid Level, Pressure, Temperature or Trim input, click the 'Edit Calibration' button.
7. To configure any alarms/switches for this input click 'Alarm/Switch Settings.

4.5.2 Switch To Positive Alarm/Switch Settings

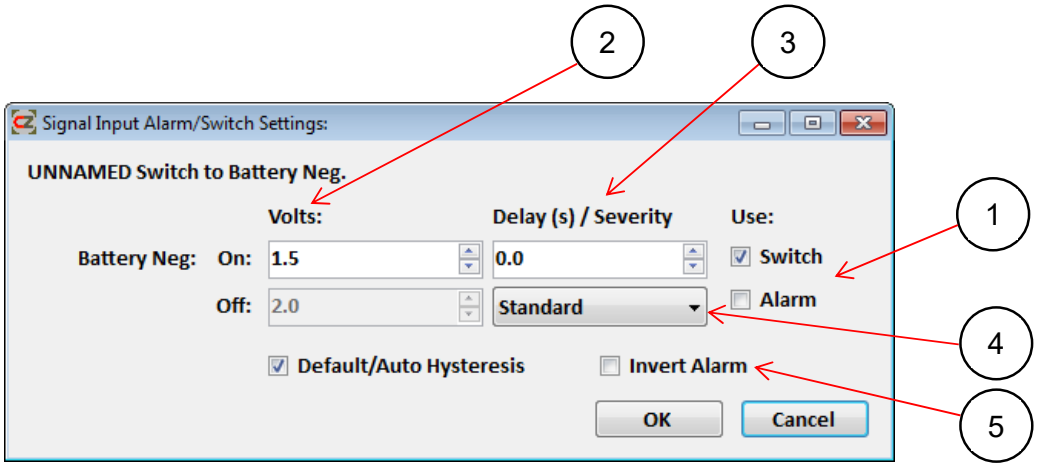
For every switch to positive input you can enable an alarm and a switch. The alarms (visual and audible depending on severity) will be triggered on any Display Interface. The switches can be assigned to control any circuit configured on the Circuits tab. For example, a bilge pump float switch could trigger an alarm for high water level and turn on the bilge pump.



1. Tick the box next to the required alarm and/or switch to enable it.
2. If a custom switching/alarm threshold is needed for the signal enter it here. The default is On at 8V and Off at 7V.
3. If a delay is needed before the alarm/switch is triggered, enter the time in seconds in this box.
4. If enabling an alarm, select the severity of the alarm from the drop-down list. (Refer to section 5.1 for more detail on alarm severities.)
5. Tick this box to invert the alarm. The alarm will then trigger when the switch is in the open position.

4.5.3 Switch To Negative Alarm/Switch Settings

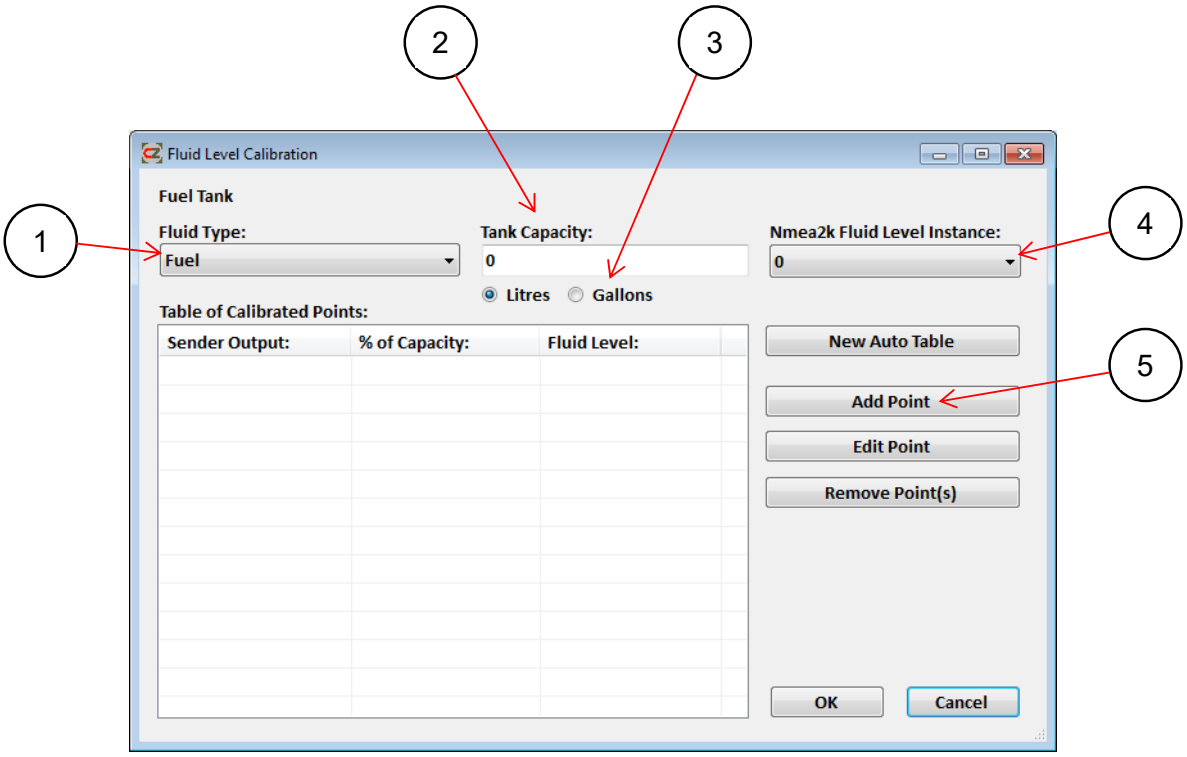
For every switch to negative input you can enable an alarm and a switch. The alarms (visual and audible depending on severity) will be triggered on any Display Interface. The switches can be assigned to control any circuit configured on the Circuits tab. For example, a bilge pump float switch could trigger an alarm for high water level and turn on the bilge pump.



1. Tick the box next to the required alarm and/or switch to enable it.
2. If a custom switching/alarm threshold is needed for the signal, enter it here. The default is On at 1.5V and Off at 2V.

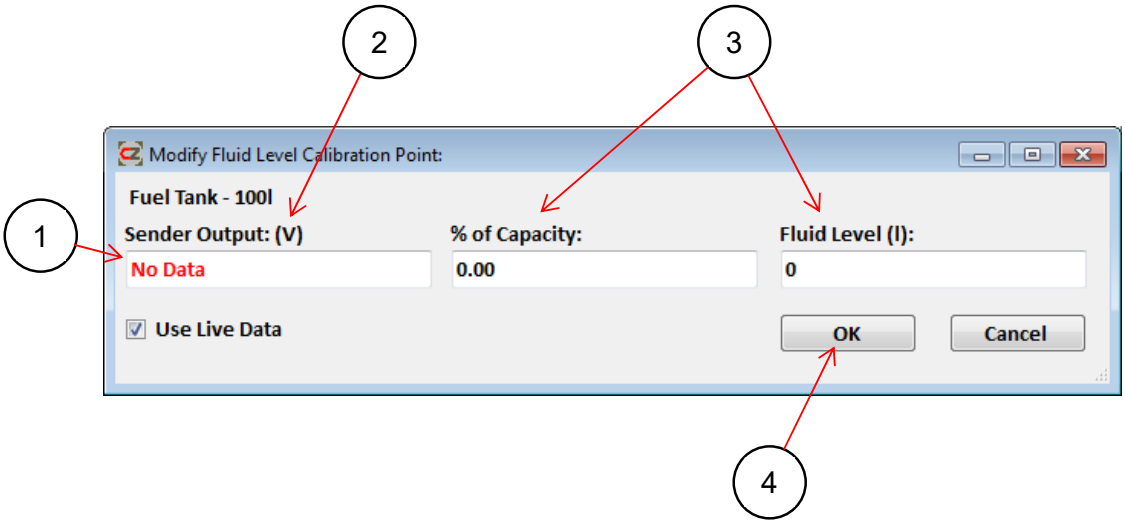
3. If a delay is needed before the alarm/switch is triggered, enter the time in seconds in this box.
4. If enabling an alarm, select the severity of the alarm from the drop-down list. (Refer to section 5.1 for detail on alarm severities.)
5. Tick this box to invert the alarm. The alarm will then trigger when the switch is in the open position.

4.5.4 Fluid Level Calibration



1. Select the type of fluid for the input from the ‘Fluid Type’ drop-down list.
2. Enter the tank capacity in the ‘Tank Capacity’ field.
3. Check the box for the units that are to be used for calibrating. The units shown on a display can be changed through the screen by the customer at any stage.
4. NMEA 2000 Instances are used to differentiate between multiple fluid level sources. Ensure all NMEA 2000 Instances are unique for each source being monitored. If Instances are assigned with the same value, the data may not be displayed or may displayed inaccurately. If monitoring a fluid level from a non-CZone® NMEA sender on the network, ensure the instance number matches the instance number on the sender.
5. There are two ways to calibrate a tank: the Auto Table method, which prompts the user to input a number of tank steps to calibrate to; or the Manual input method, which is more suited to a custom-shape tank where the user has more flexibility on the number of level inputs. Both methods can be used with live data. The PC must be connected for this functionality. To calibrate a signal using the manual table method, click on the ‘Add Point’ tab.

4.5.4.1 *Manual Calibration Method*

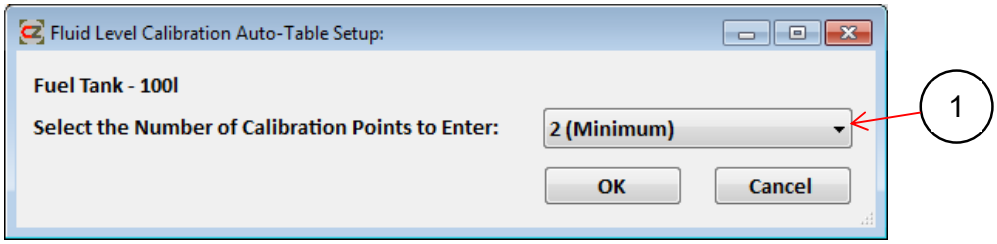


1. Tick the 'Use Live Data' box if the PC is plugged into the CZone® network and the tank is being filled at the time of the calibration.
2. If using live data, the 'Sender Output' field auto-populate. (Check that this value changes as the level increases.) If live data are not being used, and the output value of the sender for each level is known, manually enter those output values in this field.
3. If live data are being used then the '% of Capacity' and 'Fluid Level' fields will auto-populate. If live data are not being used, enter these values manually from the sender outputs at each level.
4. Click OK to save calibration and to return to the 'Fluid Level Calibration' window. Click the 'Add Point' button on the 'Fluid Level Calibration' window to add another level point; repeat the process until full level is reached. (The 'Table of Calibrated Points' will show the set levels as the calibration advances.)
5. Click OK on 'Fluid Level Calibration' page to return to the 'Signal Inputs' window. This input is now configured and will be shown in the 'Configured SI Channels' list.

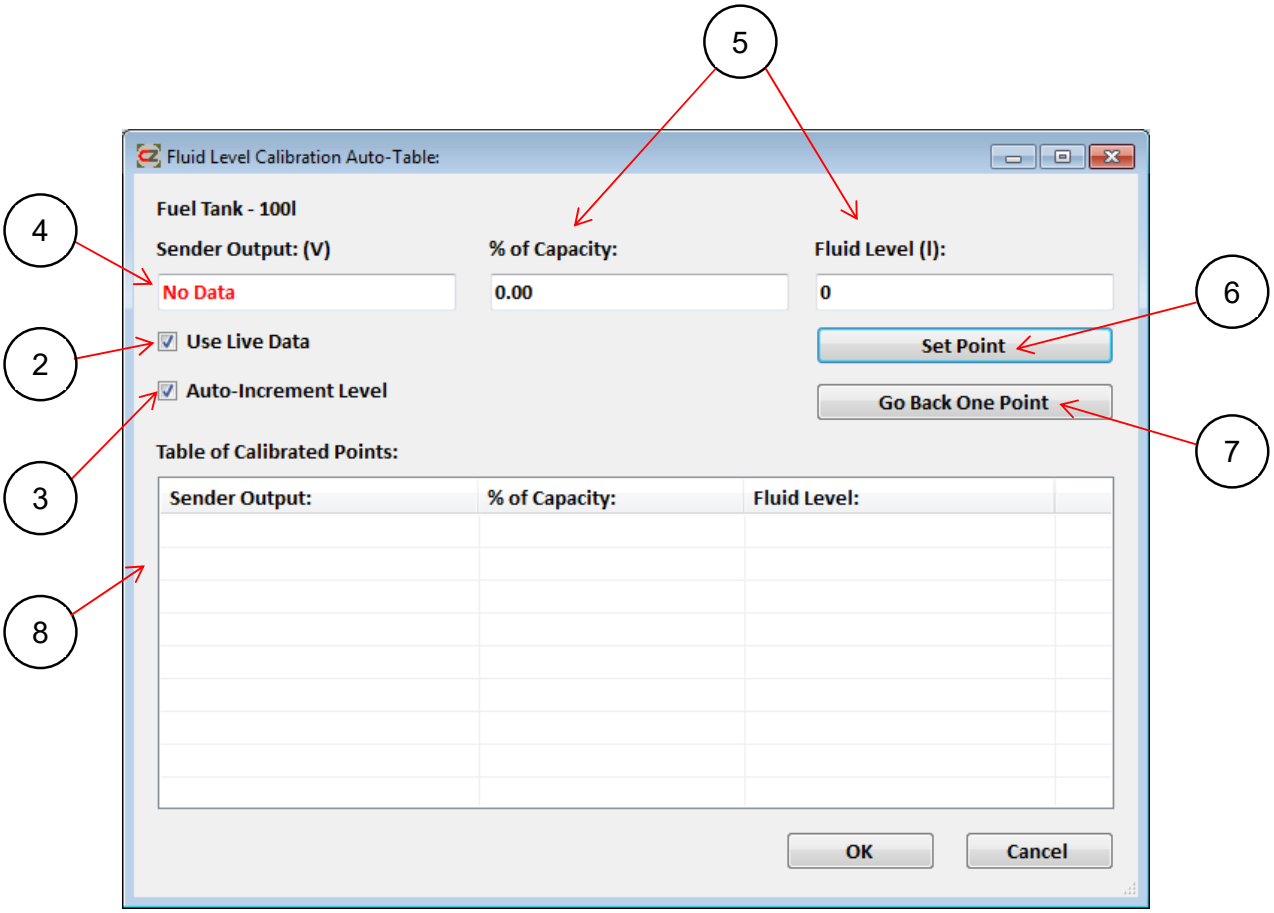
Repeat the above process for further fluid level inputs.

To calibrate a signal using the Auto Table Method click on 'New Auto Table'.

4.5.4.2 *Auto Table Calibration Method*



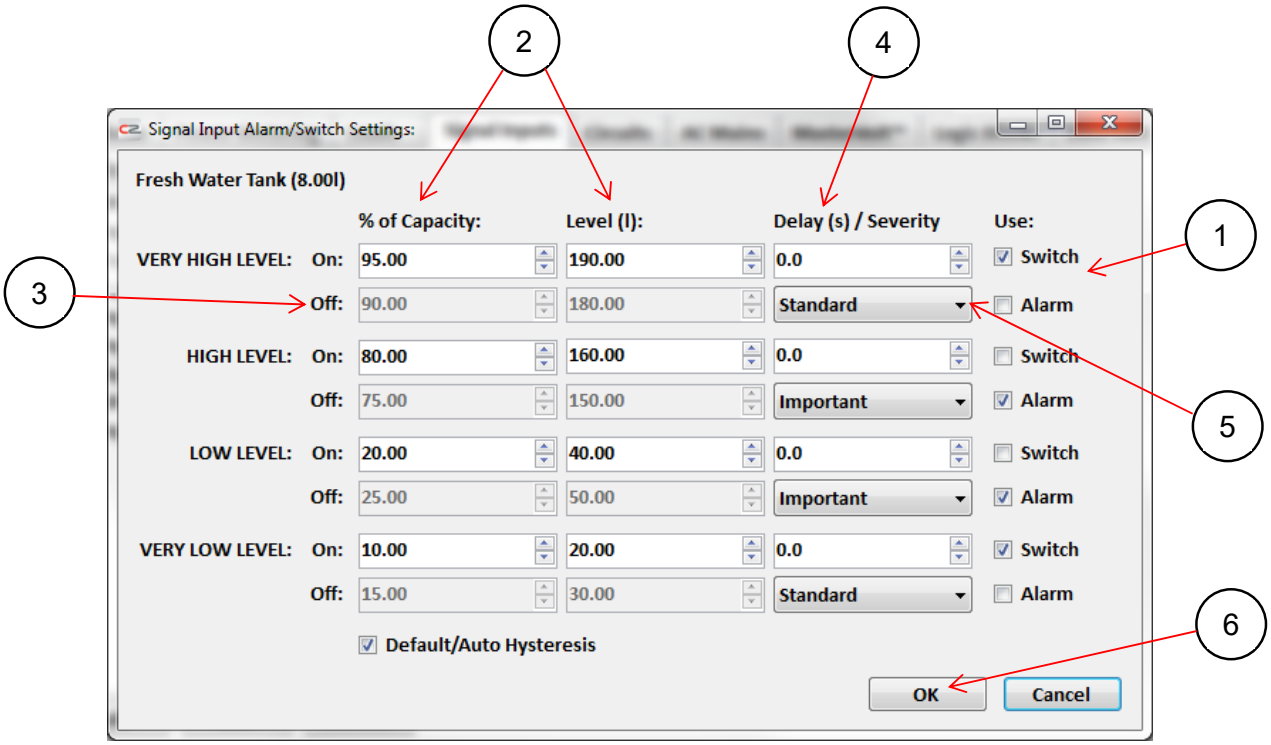
1. Enter the number of calibration points that has been chosen for the tank (minimum 2, maximum 33). Click OK to save the number, the 'Fluid Level Calibration Auto Table' window will open.



2. Tick the 'Use Live Data' box if the PC is plugged into the CZone® network and the tank is being filled at the time of the calibration.
3. Tick 'Auto-Increment Level' if the tank is symmetrical and the levels are all equal.
4. If using live data, the 'Sender Output' field will auto -populate. (Check that this value changes as the level increases.) If live data are not being used, and the output value of the sender for each level is known, manually enter those output values in this field.
5. If live data are being used and 'Auto-Increment Level' is ticked, the '% of Capacity' and 'Fluid Level' fields will auto-populate. If live data are not being used, enter these levels manually from the sender outputs.
6. Use the "Set Point" tab when the output '% Capacity' or 'Fluid Level' reaches a set point. Follow this process until all of the values reach their highest points.
7. Use the 'Go back One Point' button to remove a level set-point.
8. The "Table of Calibrated Points' will show the set levels as the calibration advances.
9. Click OK to save calibration and return to the 'Fluid Level Calibration' window.
10. Click OK to return to the 'Signal Inputs Channel Modification' window. This input is now configured and will be shown in the 'Configured SI Channels' list.
11. Click on the 'Alarm/Switch Settings' box.

4.5.4.3 Alarm/Switch Settings

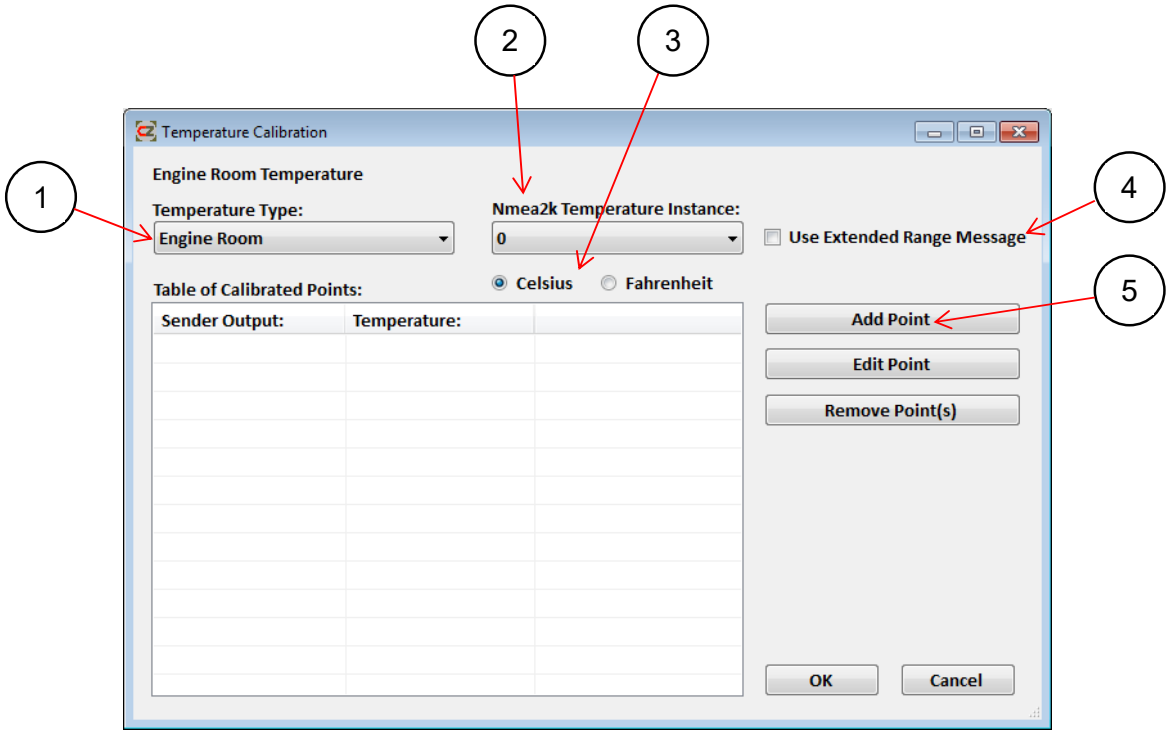
For every Fluid Level input there are four levels of alarms/switches that can be enabled. The alarms (visual and audible depending on severity) will be triggered on any Display Interface. The switches can be assigned to control any circuit configured on the Circuits tab. For example, a low level fresh water tank switch can turn off the fresh water pump.



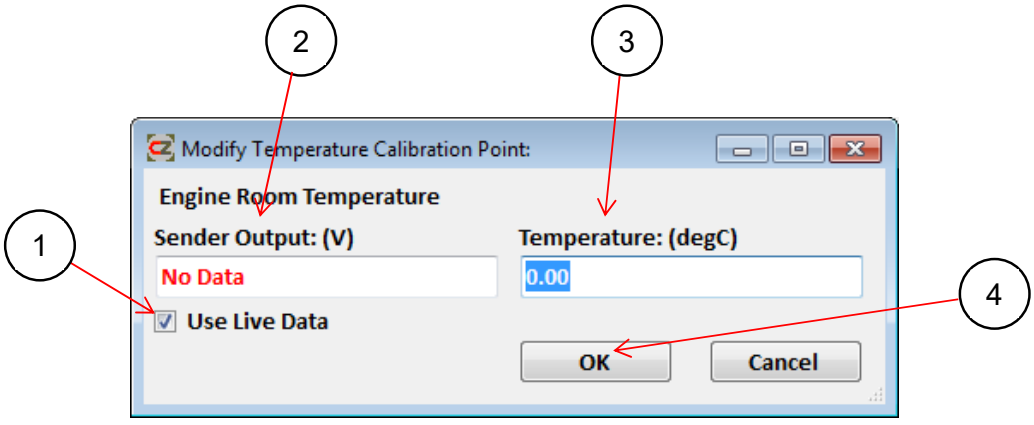
1. Tick the box next to the required alarm or switch to enable it.
2. Enter the On level, in % capacity or litres/gallons, at which you require the alarm/switch to be activated. (The unused field will auto-calculate.)
3. The Off value for the alarm/switch is greyed out by default. If you require this alarm/switch to be deactivated at a different level, un-tick the 'Use Default Hysteresis' box at the bottom and enter a custom value.
4. If a delay is needed before the alarm/switch is triggered, enter the time in seconds.
5. If enabling an alarm, select its severity from the drop-down list. (Refer to section 5.1 for more detail on alarm severities.)
6. Select OK to save settings and return to the 'SI Channel Modification' window.

Select OK again to return to the 'Signal Inputs' page.

4.5.5 Temperature Level Calibration



1. Select the type of temperature for the input from the 'Temperature Type' drop-down list.
2. NMEA 2000 Instances are used to differentiate between multiple temperature level sources. Ensure that all NMEA 2000 Instances are unique for each source being monitored. If Instances are assigned with the same value, the data may not be displayed or may displayed inaccurately.
3. Choose the units that are to be used for calibrating. The units shown on a display can be changed through the screen by the customer at any stage.
4. Tick this box to enable high-temperature messages to be transmitted as a standard NMEA 2000 PGN for other NMEA 2000 displays to read.
5. To calibrate a signal using the manual table method, click the 'Add Point' button.

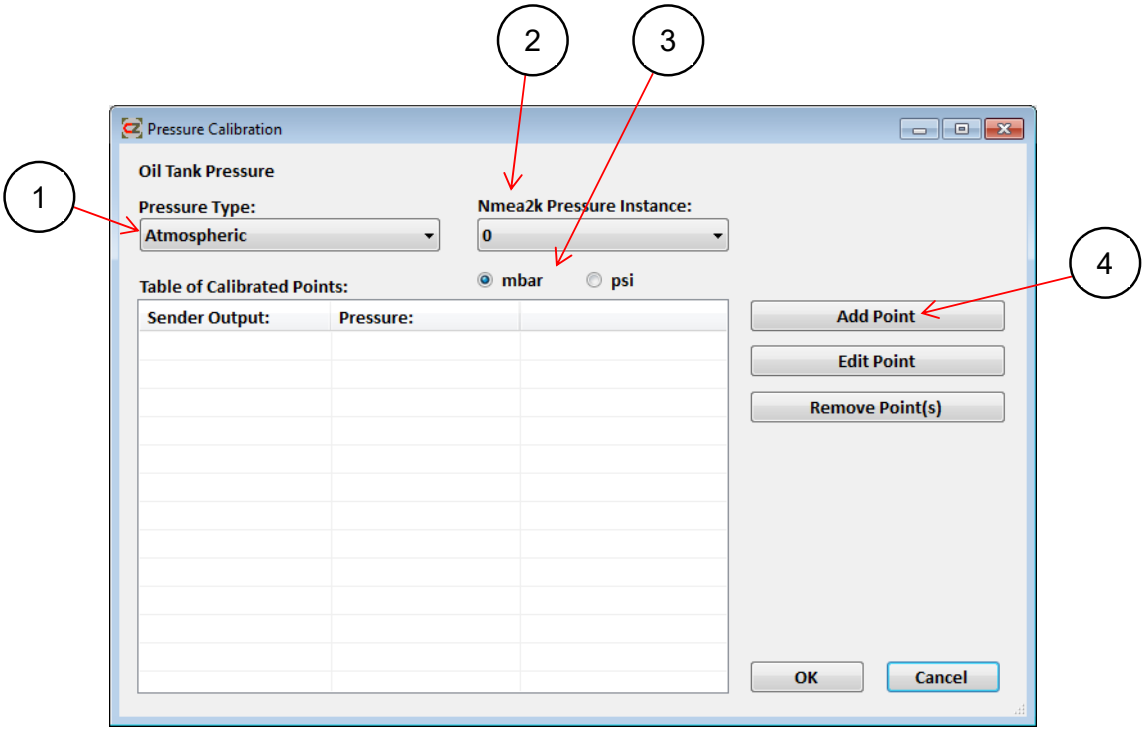


1. Tick 'Use Live Data' if the PC is plugged into the CZone® network and the temperature is able to be monitored at the the time of the calibration.

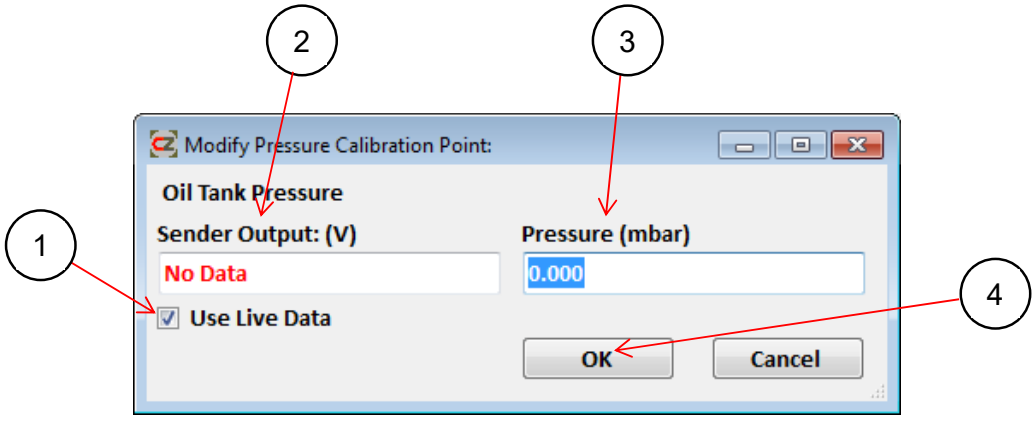
2. If using live data, the ‘Sender Output’ field, will auto-populate. (Check that this value changes as the level increases.) If live data are not being used, and the outputs are known for the sender at each level, manually enter them in this field.
3. Enter the Temperature value for the given input value based on actual readings or the sensor’s output vs. temperature chart.
4. Click OK to save calibration and to return back to the ‘Temperature Level Calibration’ window, Click ‘Add Point’ to add another level point, repeat this process until desired amount of calibration points is entered. It is recommended to enter at least 5 calibration points for a linear output sender and as many as required for a non linear output sender.
5. Click OK on ‘Temperature Calibration’ page to return back to the ‘Signal Inputs’ window, this input is now configured and will be shown in the ‘Configured SI Channels’ list.

For Temperature Alarm/Switch Settings refer to the Fluid Level Alarm/Switch Settings section 0.

4.5.6 Pressure Level Calibration



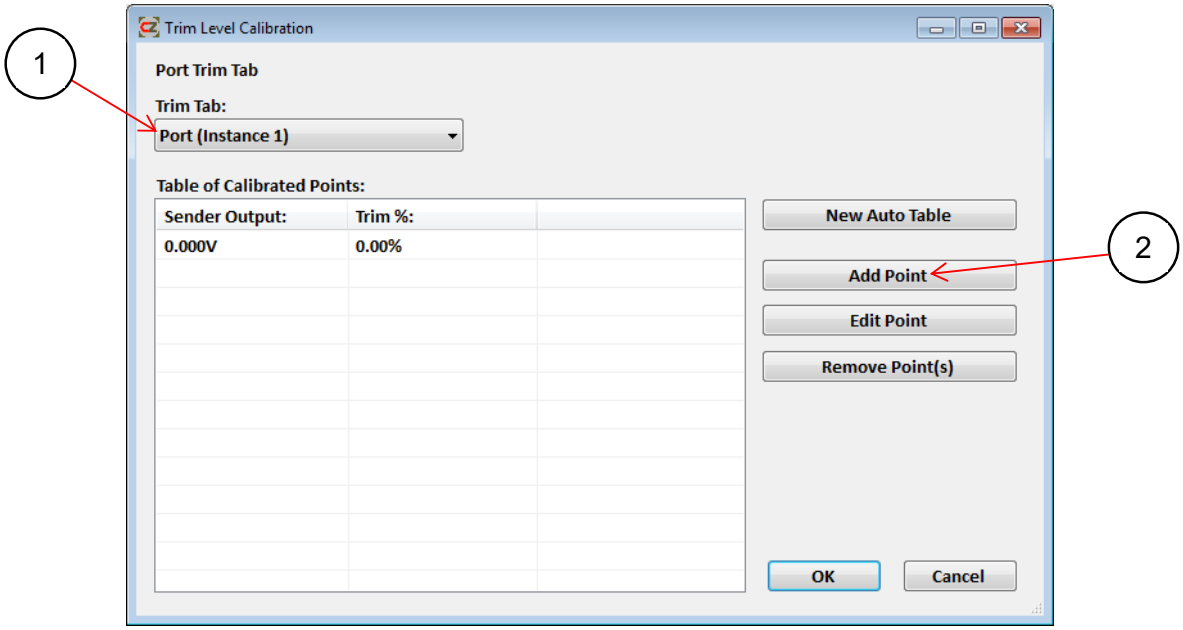
1. Select the type of pressure for the input from the ‘Pressure Type’ drop-down list.
2. NMEA 2000 Instances are used to differentiate between multiple pressure level sources. Ensure that all NMEA 2000 Instances are unique for each source being monitored. If Instances are assigned with the same value, the data may not be displayed or may be displayed inaccurately.
3. Tick the box for the units that are to be used for calibrating. The units shown on a display can be changed through the screen by the customer at any stage.
4. To calibrate a signal using the manual table method, click on the ‘Add Point’ button.



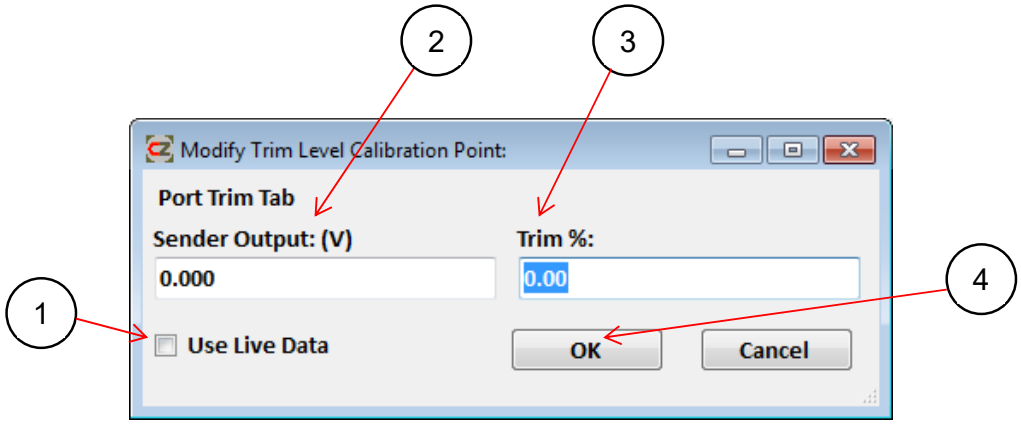
1. Tick ‘Use Live Data’ if the PC is plugged into the CZone® network and the pressure can be monitored at the the time of the calibration.
2. If using live data, the ‘Sender Output’ field will auto-populate. (Check that this value changes as the level increases.) If live data are not being used, and the output is known for the sensor at each level, manually enter the outputs in this field.
3. Enter the Pressure value for the given input, based on actual readings or the pressure sensor’s output vs. pressure chart.
4. Click OK to save the calibration and return to the ‘Pressure Level Calibration’ window. Click ‘Add Point’ to add another level point; repeat the process until the desired number of calibration points is entered. It is recommended to enter at least five calibration points for a linear output sender, or as many as are required for a nonlinear output sender.
5. Click OK on the ‘Pressure Calibration’ page to return to the ‘Signal Inputs’ window. This input is now configured and will be shown in the ‘Configured SI Channels’ list.

For Pressure Alarm/Switch Settings, refer to the Fluid Level Alarm/Switch Settings section.

4.5.7 Trim Level Calibration



1. Select the type of Trim Tab for the input from the ‘Trim Tab’ drop-down list.
2. To calibrate a signal using the manual table method, click on the ‘Add Point’ tab.



1. Tick ‘Use Live Data’ if the PC is plugged into the CZone® network and the trim is able to be monitored at the the time of the calibration.
2. If using live data, the ‘Sender Output’ field will auto-populate. (Check that this value changes as the level increases.) If live data are not being used, and the output is known for the sensor at each level, manually enter the outputs in this field.
3. Enter the Trim % value for the given input, based on actual readings or on the sensor’s output vs. trim chart.
4. Click OK to save the calibration and to return to the ‘Trim Level Calibration’ window. Click ‘Add Point’ to add another level point; repeat the process until the desired number of calibration points is entered.
5. Click OK on the ‘Trim Calibration’ page to return to the ‘Signal Inputs’ window. This input is now configured and will be shown in the ‘Configured SI Channels’ list.
6. For Trim Alarm/Switch Settings, refer to the Fluid Level Alarm/Switch Settings section 0.

4.6 CIRCUITS

The Circuits page is where a circuit is created by adding a circuit switch and a load. A Circuit must be created in order for the load to be controlled by a switch or through a display. The Modes function is also configured on the Circuits page.

See Figure 5 for an example of the Circuits page on a completed system. If the 'Create All Displays Circuit' option was enabled when adding loads to the configuration, his circuits list will be populated.

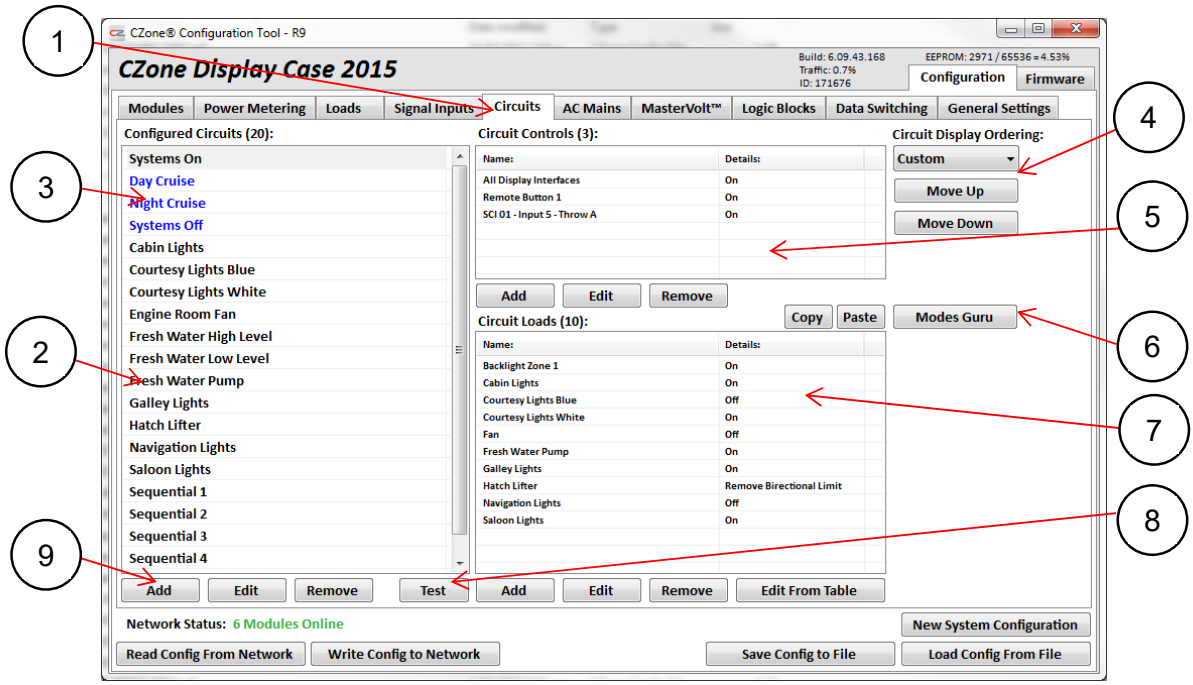
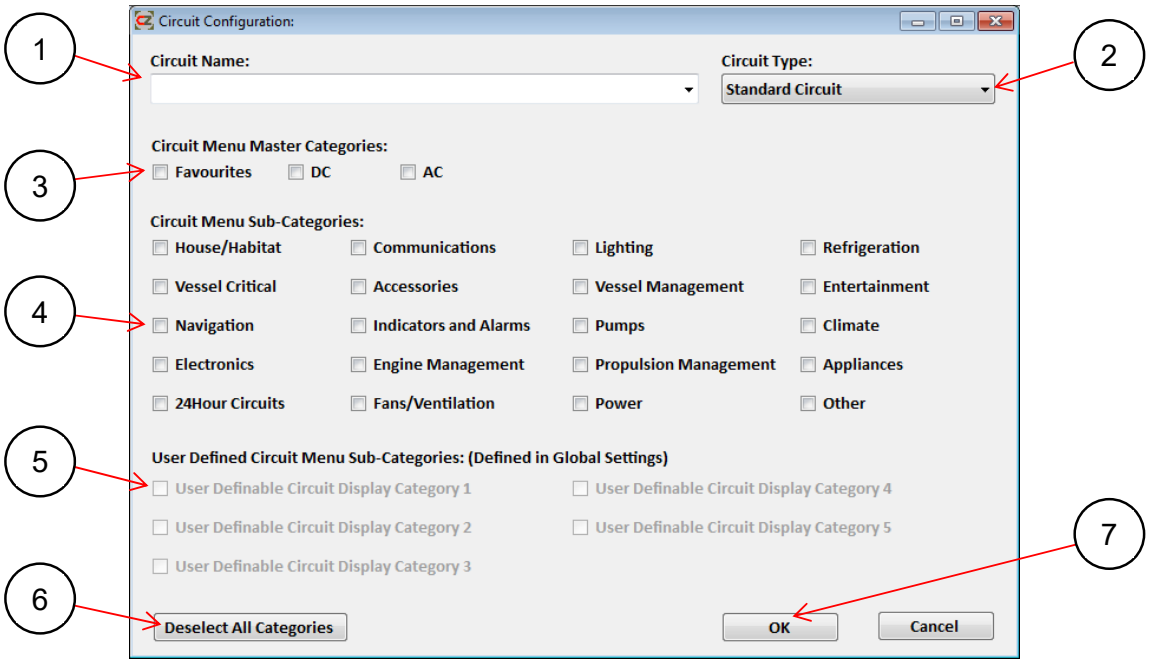


Figure 5 Circuits Tab Example

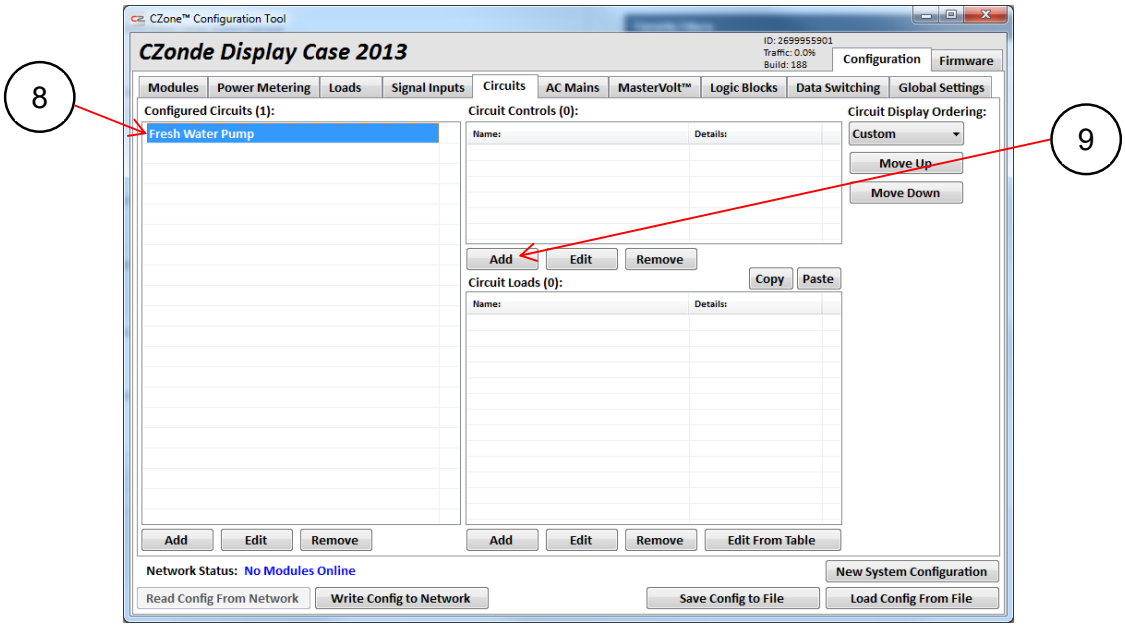
1. Click on the 'Circuits' tab
2. The configured circuit names in black are 'Standard Circuits'. These names will be shown on the Control page of the Display Interface.
3. The configured circuit names in blue are 'Modes of Operation'. These names will be shown on the Modes page of the Display Interface.
4. By default, the circuits are listed on the Display Interface alphabetically. To change the ordering, select 'Custom' from the drop-down list and use the 'Move Up' and 'Move Down' buttons to achieve the desired ordering.
5. The 'Circuit Controls' area is where all the switching devices are configured for the selected circuit. Multiple switches can be added for each circuit e.g. a Cabin Light may have a switch from a Display Interface and also a mechanical switch connected to a Signal Interface.
6. The Modes Guru button opens a window which allows fast creation and editing of modes with the ability to export the configuration to various file formats.
7. The 'Circuit Load' area is where a load is configured for the selected circuit. Multiple loads can be added for each circuit also. e.g. a Navigation Light circuit may turn on the Navigation Light and Anchor Light.
8. The Test Circuit button allows a circuit to be tested on a live system
9. To create a new Circuit, click the 'Add' button.

4.6.1 New Circuit Configuration



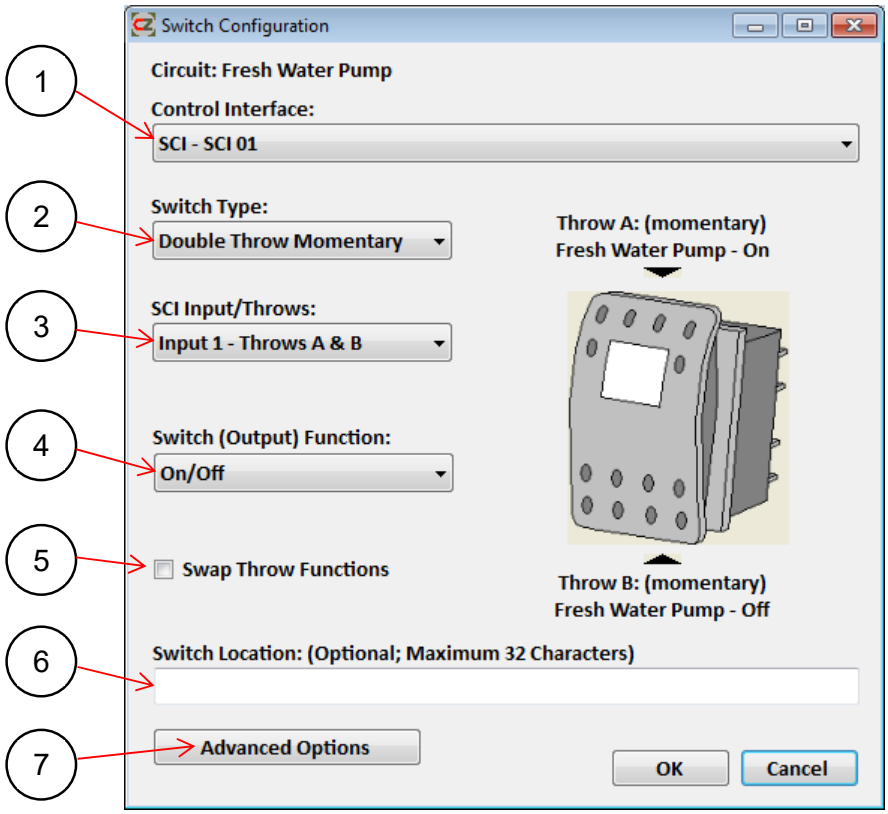
1. Enter the circuit or mode name. This name will be shown on any configured Display Interface.
2. Select the Circuit Type from the drop-down list. The options are:
    - **Standard Circuit** - All circuits that have at least one load or control switch. These standard circuits will appear in the 'Control' menu on any display configured for that circuit.
    - **Mode of Operation** - Controls multiple loads, for example 'Cruise' mode may be configured to activate all loads required to operate the vessel. Modes will appear in the 'Modes' menu on any display configured for that circuit.

    Modes are also grouped into four categories: Group 1, Group 2, Group 3 and Exclusive. If more than one mode is to be used at a time, they need to be distributed among these groups. If only one mode is going to be used at a time, all modes should be put in the same group. When switching between modes, the previously selected mode will be deselected.
3. Select a 'Master Category' to assign the circuit to a top-level category, in which it will appear on any controlling display. This is the first level of control category when going to the Control page in the Display Interface. AC and DC circuits are automatically assigned. Use the 'Favorites' category for any circuits that need to be accessed quickly.
4. Select a 'Sub Category' to assign the circuit to a secondary category, in which it will appear on any controlling display. This is the second level of control category when going to the Control page in the Display Interface. Selecting appropriate categories for the circuit will make it easier to find a particular circuit, especially if many circuits are configured e.g. a Bilge Pump could be categorised under 'Pumps'.
5. Select a 'User Defined Sub-Category' if there are no appropriate sub-categories that aptly describe the circuit. These categories are configured on the Global Settings tab.
6. Click this button to deselect all categories. Note: circuits that don't have any categories selected can still be accessed on the Control page of a Display Interface through the 'All' category.
7. Click OK to save the Circuit Configuration Settings and return to the Circuits tab.



8. The circuit name will be added to the Configured Circuits.
9. Under ‘Circuit Controls’ click the Add button.

4.6.2 Switch Configuration



1. Select the Module that the Controlling Device is connected to.

   Note: To allow all displays to control a circuit, select 'All Display Interfaces'. (It may not be desirable to allow critical circuits to be controlled from all displays. For each such circuit, enter only the display that is required.)

2. From the drop-down list, select the type of switch that is being used. This should match the physical switch that is connected to the SCI, SI or COI. A Display Interface switch is a Double Throw Momentary. Note: If the physical switch is a latching switch and a momentary switch type is selected, this switch will override all other switches controlling the loads in this particular circuit.

3. From the 'Input/Throws' drop-down list, select the Input channel and switching position of the controlling device. This box will either appear as Switch Input (for SCI and SI inputs) or as Control Input (for Display Interfaces).

   - For SCI or SI Inputs, select the physical switch input for that circuit.
   - For Display Interfaces, select where you would like the circuit to be listed in the menu.

   Control Menu – The Circuit will only appear in the Control Page of the selected Display Interface.

   Control Menu & Fuel Tank – Allows the circuit to be listed in the Control menu and assigned to a tank monitoring page. This is useful for pumps. For example a freshwater pump could be controlled from the freshwater tank monitoring page, or a fuel transfer pump from the fuel tank monitoring page. If a tank has been configured, you can select it here as an additional control menu.

4. From the 'Switch (Output) Function' drop-down list, select the operation of the load that this circuit is controlling. Refer to the explanation in section 4.6.2.1 for all available 'Switch (Output) Functions'.

   Note: The image of the controlling device, on the right-hand side of the page, will change to represent the different settings of the above three selection boxes.

5. If a double-throw switch has been selected you can reverse the throw functions by checking this box.

6. Optionally enter the location of the controlling device in the ‘Switch Location’ box.
7. Click ’Advanced Options’ for further settings.

4.6.2.1 Switch Output Functions

Single-Throw Latching

On/Off	The load is turned on when the switch is on and the load is turned off when the switch is off.
Toggle	Every time the switch is turned to the on position the state of the load is changed.
On	The loads will only be turned on when the switch is on and will not turn off when the switch is off.
Off	The loads will only be turned off when the switch is on and will not turn on when the switch is off.
Forward/Off	Will turn a motor channel on in the forward direction whilst the switch is on.
Reverse/Off	Will turn a motor channel on in the reverse direction whilst the switch is on.

Single-Throw Momentary

Toggle On/Off	Every time the switch is pressed the state of the load is changed.
Momentary On/Off	The load will be turned on only whilst the switch is pressed.
Single Button Dim	The output to the load will be increased or decreased when holding the switch down. Short press will turn the load on or off.
Dim Up	The output to the load will be increased when holding the switch down. Short press will turn load on full.
Dim Down	The output to the load will be decreased when holding the switch down. Short press will turn load off.
On(Reverse)/Off	Will turn a motor channel on in the reverse direction whilst switch is pressed.
On/Restore	Will turn a load on and then revert load to its previous state when switch is depressed.
Off/Restore	Will turn a load off and then revert load to its previous state when switch is depressed.
Step Up	Each press of the switch will increase the output to the load by 20%.
Step Down	Each press of the switch will decrease the output to the load by 20%.
On (Off Configured Elsewhere)	The loads will only be turned on when the switch is turned on.
Off (On Configured Elsewhere)	The loads will only be turned off when the switch is turned on.
Sequential	Allows a single switch to be used to scroll through up to five different circuits with each button press.

Double-Throw Latching

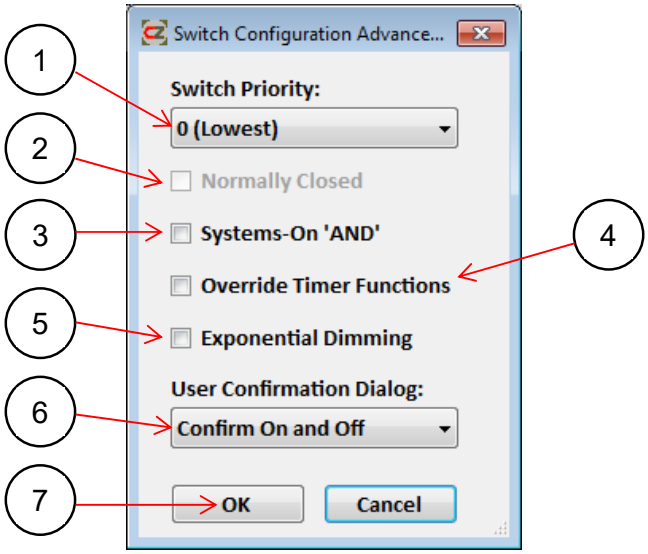
On/Off	Will turn the load on when the switch is in the on position and off when in the off position.

Double-Throw Momentary

On/Off	The load will be turned on when the switch is in one direction and then off when pressed in the opposite direction
Dim Up/Dim Down	The output to the load will be increased when holding the switch down in one direction and a short press will turn load on full. The output to the load will be decreased when holding the switch down in the opposite direction and a short press will turn the load off.

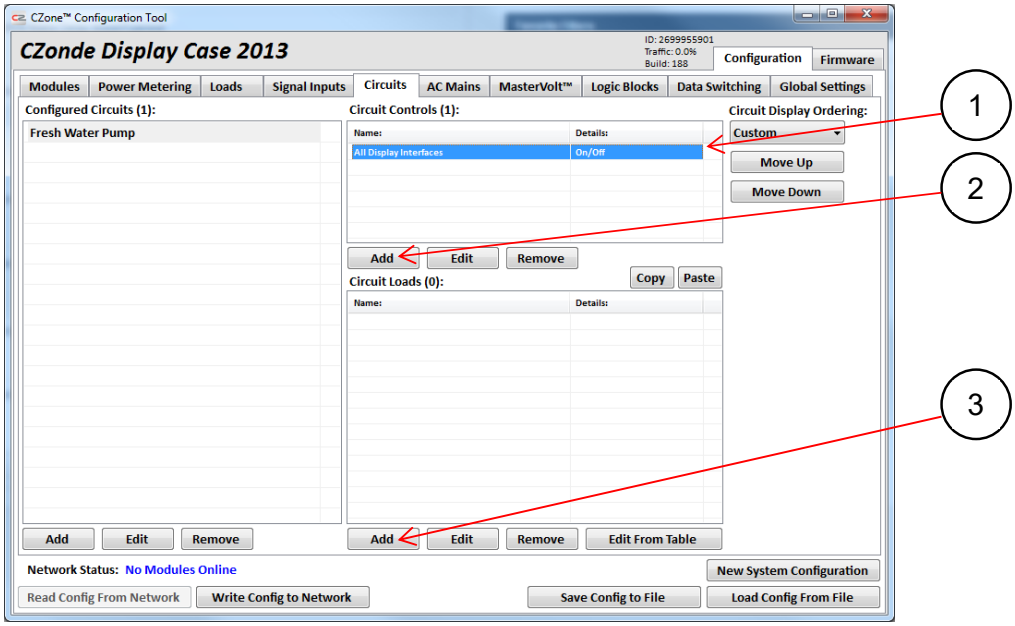
Forward/Reverse	Will turn a motor channel on in the forward direction when pressed in one direction and in reverse when pressed in the opposite direction.
Out/In	Same function as Forward/Reverse but labelled to suit the application.
Up/Down	Same function as Forward/Reverse but labelled to suit the application.
Open/Close	Same function as Forward/Reverse but labelled to suit the application.
Start/Stop	Same function as Forward/Reverse but labelled to suit the application.
On(Fwd)/Off(Rev)	Same function as Forward/Reverse but labelled to suit the application.
Step Up/Step Down	Each press of the switch in one direction will increase the output to the load by 20%. Each press of the switch in the opposite direction will decrease the output to the load by 20%.
Toggle Forward/ Toggle Reverse	Same function as Forward/Reverse but each switch direction is pressed once to turn motor on and once to turn motor off.
Toggle Out/Toggle In	Same function as Toggle Forward/Toggle Reverse but labelled to suit the application.
Toggle Up/Toggle Down	Same function as Toggle Forward/Toggle Reverse but labelled to suit the application.
Toggle Open/ Toggle Close	Same function as Toggle Forward/Toggle Reverse but labelled to suit the application.
Toggle Start/ Toggle Stop	Same function as Toggle Forward/Toggle Reverse but labelled to suit the application.
Toggle On(Fwd)/ Toggle Off(Rev)	Same function as Toggle Forward/Toggle Reverse but labelled to suit the application

4.6.2.2 Switch Modification Advanced Settings



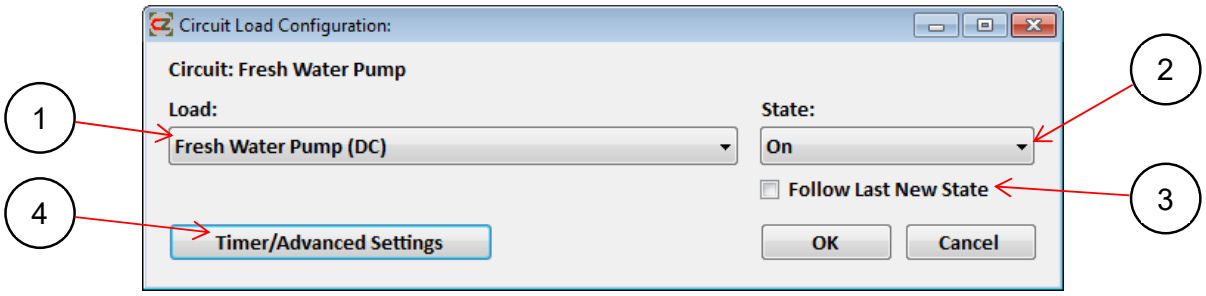
1. Switch Priority allows a hierarchy of controlling devices to be set up, i.e. if a lower priority controlling device is being held on and a higher priority controlling device is switched off then the circuit load will follow the command of the higher priority off command and turn off.
2. Tick the ‘Normally Closed’ box to allow normally closed operation of a controlling device.

3. A switch can control a number of circuits. The ‘Systems On’ indicator shows the on/off state of these outputs. The ‘Systems On’ indicator can be configured as follows:
    - **Systems On OR** – Systems On indication when ANY of the loads in the circuit are on. (This is the default.)
    - **Systems On AND** – Systems On indication when ALL loads in the circuit are on.
4. Tick this box to allow the controlling device to override any Timer delay functionality.
5. When using a dimming switch output, tick this box to enable ‘Exponential Dimming’. This speeds up the dimming process the longer a button is held down.
6. If the switch is on a Display Interface, you can enable a User Confirmation Dialog box. If enabled, when turning the switch ON or OFF a confirmation box will pop up on the screen; the switch state will not be adopted unless confirmation is granted.
7. Click OK to save advanced settings and return to the ‘Switch Configuration ‘ window.
8. Click OK again to return to the Circuits tab.

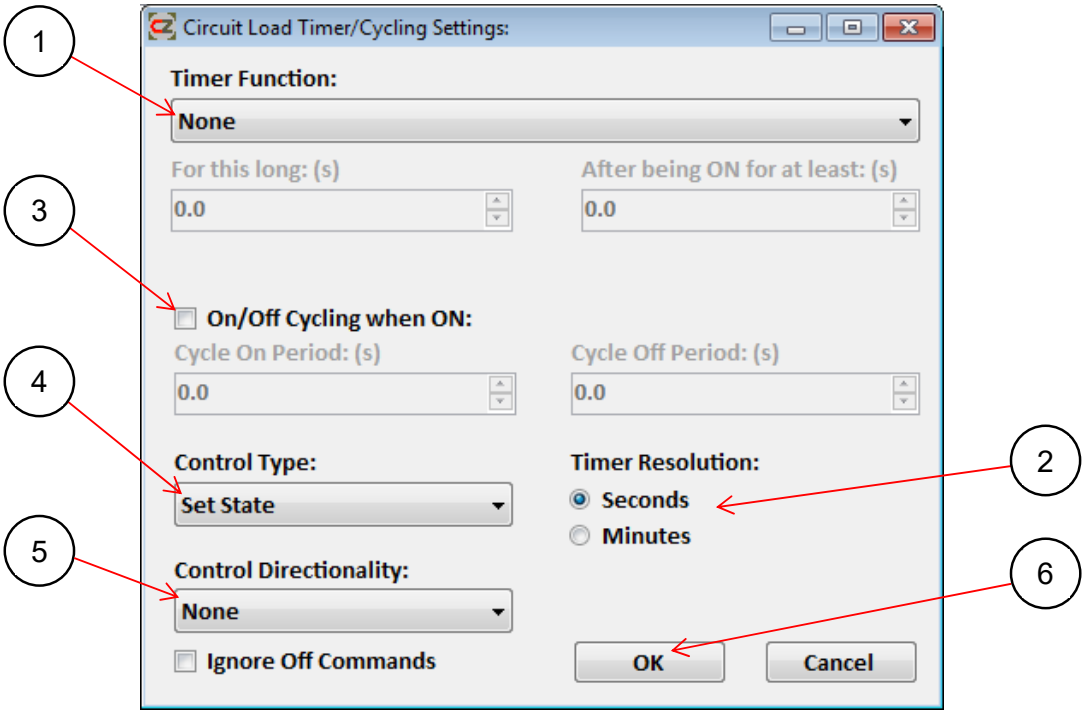


1. The switch just configured will now be shown under the ‘Circuit Controls’ window.
2. Multiple switches can be configured for every circuit: to configure more switches, click ‘Add’ and repeat the above process.
3. When finished adding switches, click ‘Add’ under ‘Circuit Loads’ to begin configuring loads.

4.6.3 Load Configuration



1. From the 'Load' drop-down list, select a load that the circuit will control. The Load list is auto-populated, in alphabetical order, from the loads that are configured on the Loads tab.
2. Select the state that the load is to be in when the circuit is switched on. The choices are On, Off, and % for a standard load. Turning a load off may be necessary in speciality circuits or modes e.g. a Systems Off mode. % allows the load to be turned on at a percentage of the full supply voltage; this can be used for lighting effects etc. For a motor output the states available are Forward, Reverse, Off, Forward % and Reverse %.
3. Tick 'Follow Last New State' if there are multiple loads that will be configured with the same load state. The next time a load is added to the same circuit the state will default to the most-recently used state.
4. Click the 'Timer/Advanced Settings' button to launch the 'Circuit Load Timer/Cycling Settings' dialogue:



1. To enable a timer for the load, select the appropriate timer from the drop-down list. The function of each timer is explained on the next page with a practical example.
2. The timer resolution can be changed from seconds to minutes by clicking the required option-button.
   - **When turned ON: OFF for a period, then ON for a period, then OFF**

     (Example: Keeping the cockpit lights on for a period of time after selecting 'Dock' mode)

     Note if the first OFF period is not required then set it to 0.

- **When turned ON: keep OFF for a period**

  (Example: Delaying a bilge pump from turning on after the float rises)

- **When turned OFF: keep ON for a period**

  (Example: Running engine blowers after ignition is turned off)

- **When turned OFF: keep OFF for a cool-down period**

  (Example: Used for a load that must not be restarted for a period after it is shut down)

- **When turned ON: keep ON for a minimum warm-up period**

  (Example: Used for a load that must not be shut down during a start-up process)

3. Tick this box to enable load cycling. When the circuit is turned on, this load will cycle on and off until the circuit is turned off. The Cycle On and Cycle Off intervals can be adjusted to suit the application.
4. The Control Type for the load can be changed to add limits (or lockouts). For example a hatch can be limited to 0% when in cruise mode and then the limit can be raised to 100% when in dock mode. This would lock the hatch out in cruise mode, so no switch could operate it until dock mode was activated.

   - **Set State -** allows the load to be turned On, Off or at a percentage of the full supply voltage. (This is the default.)
   - **Set Limit** – allows the load to be locked On, Off or at a percentage of the full supply voltage
   - **Set State and Limit** - allows the load to be turned On, Off or at a percentage of the full supply voltage, as well as being locked at the chosen state.
   - **Bidirectional Limit** – allows reversing motor-output loads to be locked On or Off in both directions.

   Important: When locking a load to OFF in a circuit, it is important to have another circuit to release that lock. Otherwise the load will be locked in the OFF state until the network is reset.
5. When two or more loads are added to a circuit, Control Directionality allows the load to be assigned to one direction of a double-throw switch. This can be useful for a motor circuit that is controlling two solenoids instead of a reversing MOI channel e.g. winches. The Up Solenoid Load would use the Forward Control Directionality and the Down Solenoid Load would use the Reverse Control Directionality.
6. Click OK to save settings and return to the ‘Circuit Load Configuration’.
7. Repeat the Load Configuration process if any more loads are required for this circuit.
8. When all loads are configured, press OK again to return to the Circuits tab.

The circuit is now complete. Repeat the New Circuit Configuration process to add more circuits.

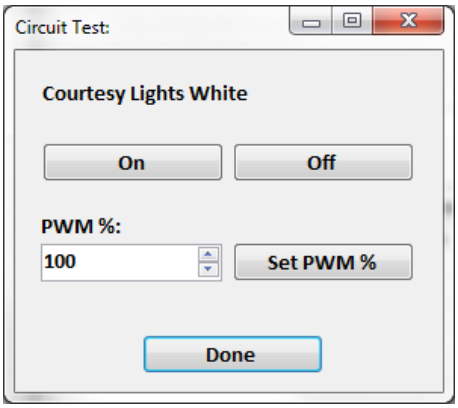
4.6.4 Modes Guru

The Modes Guru is a user friendly and fast way to view, edit and create Modes of Operation. Loads are presented in logical colours to easily identify the state changes between Modes and can be edited directly by toggling the space bar or using the copy and paste functions. When Modes are finalized the configuration can be exported as a CSV or PDF file which can be used in the vessels documentation or printed for the end user to reference.

4.6.5 Circuit Test

The ‘Test’ button on the Circuits tab allows any Circuit (Standard Circuit or Mode of Operation) to be turned On, Off or set to a specific PWM level directly from the Configuration Tool. This can be usefull when testing a circuit on a live system without having to activate the circuit from a display or physical switch.

To control a circuit, ensure the laptop is connected to the network and all modules are online within the config tool. Select the desired circuit on the Circuits tab and then press the ‘Test Circuit’ button. The following window will be shown. Press the ‘On’ or ‘Set PWM%’ buttons to turn the circuit on. Press the ‘Off’ button to turn the circuit off.



4.7 AC MAINS

This area of the configuration will allow you to configure how the AC Mains control page is displayed on CZone® screens, including source names, icons, monitoring parameters and layout. Auto-changeover of contactors can also be configured, by setting priorites for each source. This section only needs to be completed if an ACMI is on the system. It can be completed off-line. See Figure 6 for an example of the AC Mains page on the CZone® Touch Screen.

Important: Before setting up the AC Mains configuration, it is necessary to know how the contactors are wired and which source each one is controlling. This schematic will be supplied with the ACMI. Please contact BEP Marine if you do not have a copy.

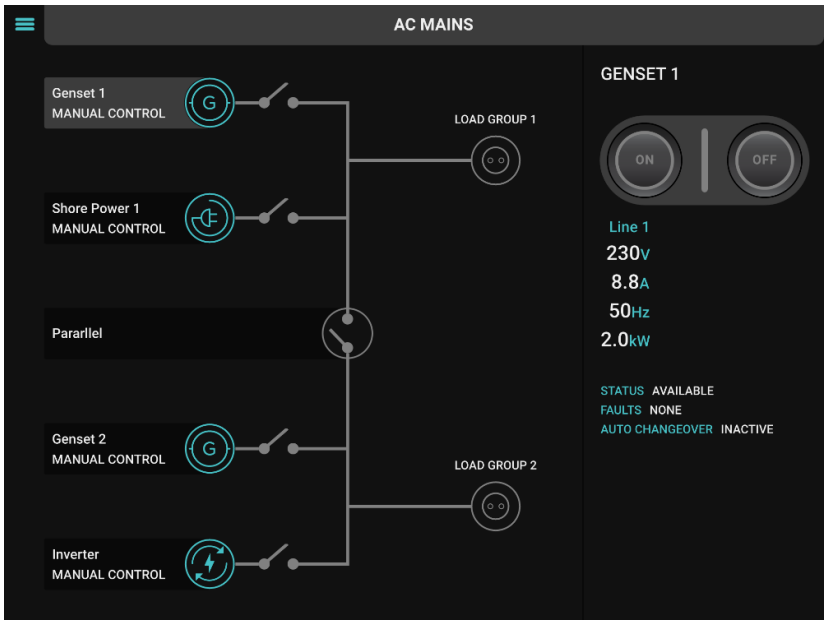
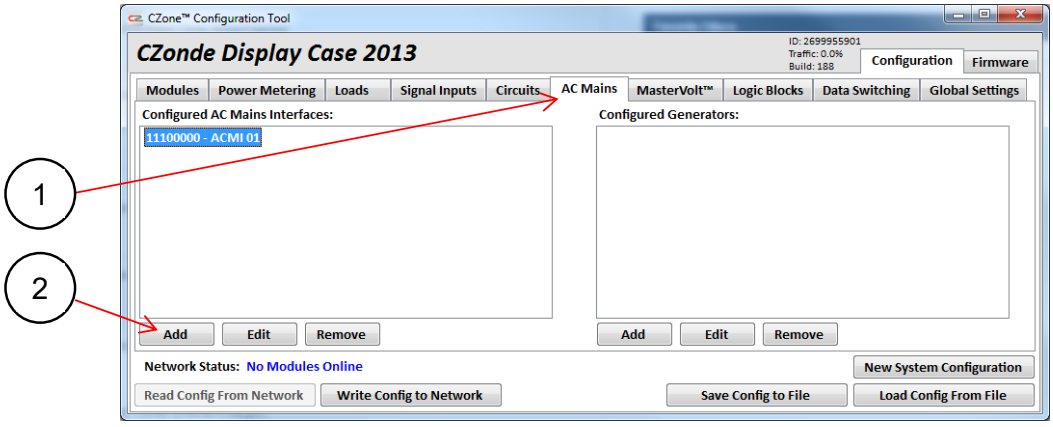
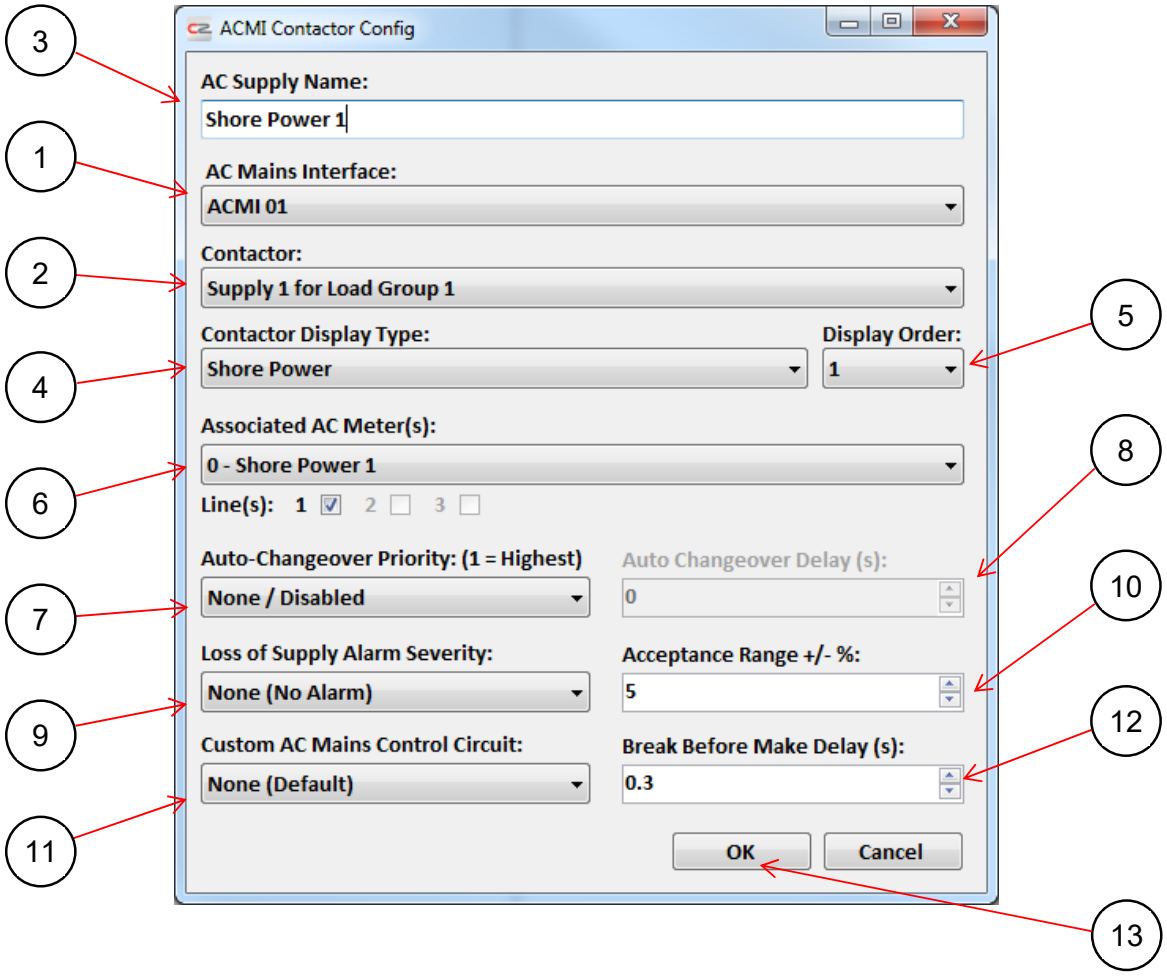


Figure 6 AC Mains Page Example



1. Click on the ‘AC Mains’ tab.
2. Click the ‘Add’ button.



1. From the drop-down list, select the AC Mains Interface to be configured.
2. From the drop-down list, select the Contactor to be configured. In this example it is labelled ‘AC Supply 1 for Load Group 1’. If the contactors are not labelled then the custom ACMI code has not been read from the device. (Refer to section 4.2.4 for this process.)
3. Enter the ‘AC Supply Name’. This name will be shown on the Display Interface. The name should match the physical input that supplies the chosen contactor. Please refer to documentation supplied with the ACMI to ensure the name is correct.
4. Select the Contactor Display Type associated with the input; this will be displayed on the AC Mains page. (See Figure 6 for examples of these icons.)
5. From the drop-down list, select the Display Order in which this input will be displayed on the AC Mains page.
6. Select the AC Meter associated with the input. If the AC Meter has not been configured, select ‘Add New’ and follow the settings from section 4.3.3. If voltage and amps are configured they will be shown next to the contactor on the AC Mains page. If Volts/Amps/Power/Frequency are configured they will be shown for the selected input on the left pane of the AC Mains page (see Figure 6).
7. If auto-changeover of contactors is required, from the drop-down list select the priority (1 - 6) for the chosen input. The contactor with the highest priority on that load group will turn on when power is available, and any other contactors on

that load group will turn off. If the parallel option is selected, the parallel contactor will also be turned on and this input will supply the second load group when power is available.

Important: An 'Auto-Changeover Enable' load is created for any inputs where a priority is set. For safety reasons, these loads must be turned on in a circuit before any automation will take effect. Refer to Figure 7 for an example of an 'Auto-Changeover Enable' load for Ships Power.

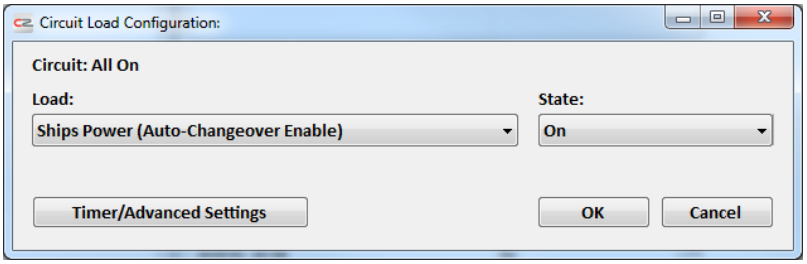


Figure 7 Auto Changeover Enable Load

The state of ACMI auto-changeover is shown on the Auto-Changeover field of the AC Mains page. See Figure 8 for an example of the AC Mains page with auto-changeover active. Auto-changeover can be disabled by turning off the Auto-Changeover Enable loads or by manually controlling one of the contactors. To resume auto-changeover the Auto-Changeover Enable Loads must be turned on again.

8. If a delay is needed between the system detecting that power is available and turning the contactor On, enter an Auto-Changeover Delay in seconds. This could be useful for letting generators come up to speed before loads are connected.
9. If an alarm is needed when AC Supply is lost, select the alarm severity from the drop-down list.
10. The acceptance range is the percentage of the nominal voltage of the AC Meter (set in section 4.3.3). This value is used to determine when power is available. The default value is 5%.
11. A pre-configured circuit can be used to turn on with the contactor. If required, select the circuit from the drop-down list.
12. To ensure a contactor remains open briefly before it is closed, configure a Break Before Make Delay (s).
13. Select OK to save the settings. Repeat the process for any further contactors.

The finished AC Mains tab is shown below:

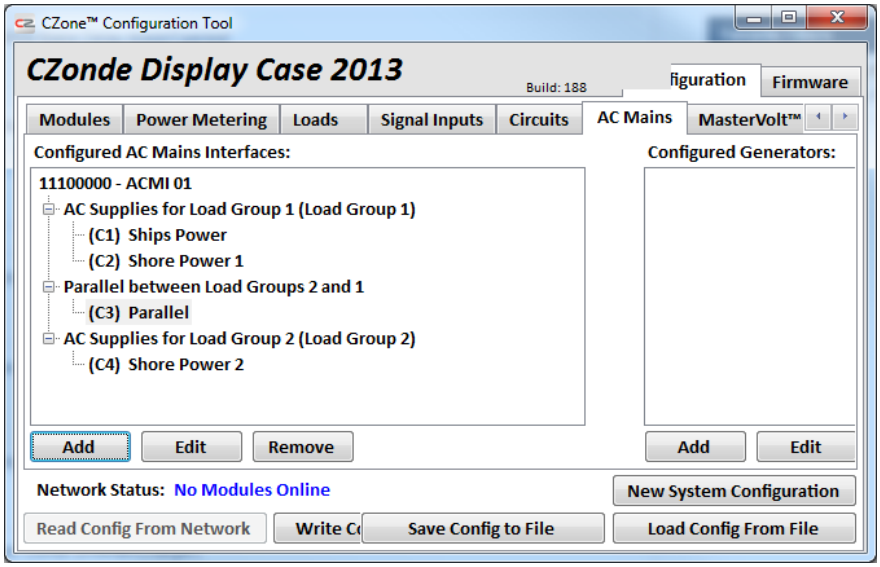


Figure 8 AC Mains Tab

4.8 GENERATOR CONTROL

This section describes a method for controlling ship-board generators automatically. Each AC Mains Interface can control one or two generators, in three possible modes:

1. The ***Single*** configuration is for a vessel with one generator.
2. The ***Dual Independent*** configuration is for a vessel with two generators to be operated independenly of each other.
3. The ***Dual Alternating/Split-Bus*** configuration is for a vessel with two generators to be run one-at-a-time in an alternating fashion, or together over a split AC bus when demand on a single generator exceeds a certain threshold.

All three modes support features such as safety interlocks and warm-up/cool-down intervals. (Safety interlocks are not illustrated here but typically might prevent the generators from running without a coolant supply.)

Generator control was possible in previous CZone releases, but required a complex arrangement of logic blocks and other configured elements. The approach here is both more powerful and less error-prone.

No additional hardware is required for Generator Control, on top of an existing AC Mains (ACMI) installation.

4.8.1 Hardware Requirements

Generator control applies to AC supplies and loads; this presupposes a minimum set of CZone modules. It is only relevant to CZone systems equipped with at least one of each of the following:

- an AC Mains Interface

  The ACMI, with its high-voltage contactors, is a key module for selecting AC supplies and allocating their loads.
- an Output Interface

  Start and Stop generator control circuits require DC signals. These must be available via an OI at critical times.
- a Display Interface

4.8.2 Configuring Generator Control: Dual Alternating/Split-Bus Example

The following example is representative of best-practice CZone configuration. It shows how to configure dual alternating/split-bus generator control, for a vessel with port and starboard generators and one of each of the following modules:

- an AC Mains Interface
- a Display Interface
- a Meter Interface
- an Output Interface.

Other approaches are possible and sometimes necessary, but this will cover a majority of installations.

This is a lengthy and detailed example, deliberately so. Generator control is complicated - it links numerous CZone modules with powerful machines and heavy loads - and must be configured carefully.

The sequence followed in the example here is:

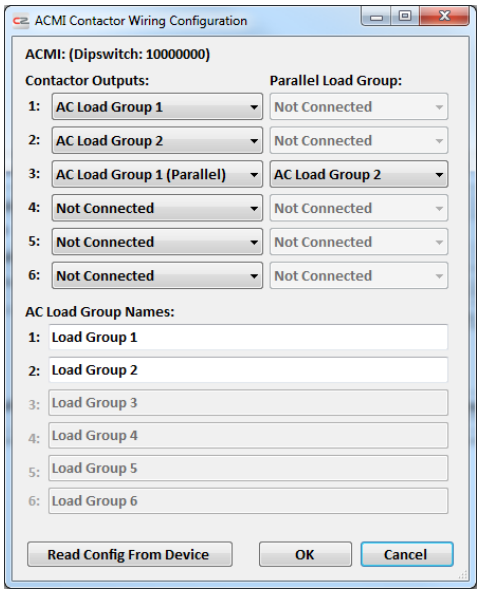
1. Configure the individual CZone modules.
2. Configure metering.
3. Define and configure start and stop circuits for each generator.
4. Create a logic block, at this stage as a placeholder with no inputs. This logic block will specify the conditions for requesting generator control; its inputs will be configured at step 6.
5. Populate the generator control configuration dialogue, including the start and stop circuits from step 3 and the logic block from step 4.
6. Fill in the logic block from step 4, by creating circuits and signals required for its input conditions.

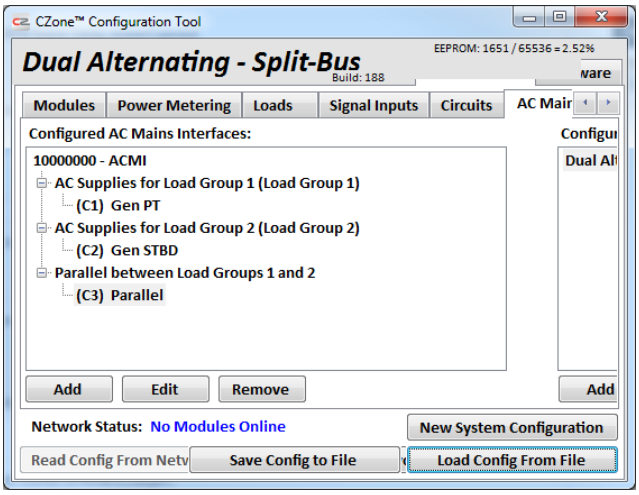
4.8.2.1 Configuring CZone Modules

AC Mains Interface

It is assumed that the ACMI has been configured by following section 4.2.4, and its contactors configured in accordance with section 4.7. This example assumes AC supplies from only a port and a starboard generator, but generator control is still possible where shore power or other sources are available too.

For the example given here, the ACMI Contactor Wiring Configuration, and the upper portion of the corresponding Configured AC Mains Interfaces panel for the ACMI, are shown below:





Display Interface

Follow the instructions in section 4.2.3 to configure the vessel's Display Interfaces. (The example here assumes only one.)

It is generally useful to provide manual overrides, for switching a vessel's AC mains contactors from one or more DIs. When configuring a DI that will have access to this feature, tick the Show AC Mains Control box in the Module Modification dialogue.

Meter Interface

Follow the instructions in section 4.2.1 to add and name the vessel's Meter Interface/s. (The example here assumes only one.) The supply to any MI that meters a critical DC source – such as a starter battery – should be hardwired not switched, so leave its Switched Module/Network Power box unticked.

4.8.2.2 Configuring AC/DC Metering

Generator control logic will be dependent on AC monitoring in order to determine when a Generator has successfully started or stopped. DC usually plays a part on Generator control logic as well, typically with the detection of a low voltge on the primary House battery being used to trigger the generator on.

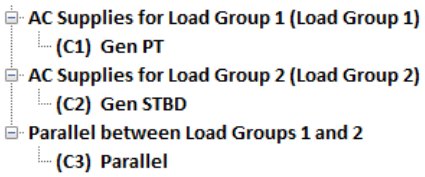
AC Supplies

To review the AC supplies, either:

- on the Modules tab select the ACMI. The Module Configuration Details pane on the right will include the Contactor Wiring Configuration. Expand this and note the AC supplies for all load groups.

  OR

- select the AC Mains tab. The Configured AC Mains Interfaces pane will show the same information as the Contactor Wiring Configuration referred to above.

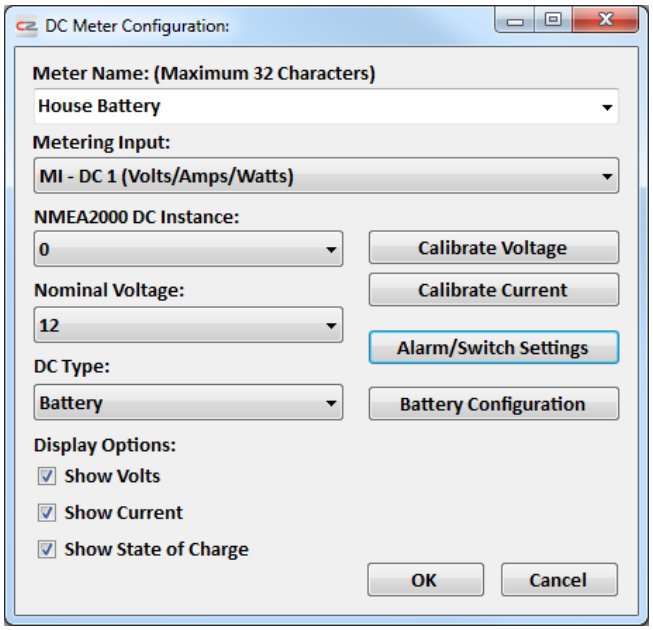


Follow section 4.3.3.1 to ensure an AC meter is defined for each generator that is to be placed under generator control. The ACMI has AC metering channels of its own, or a Meter Interface can be used instead.

DC Supplies

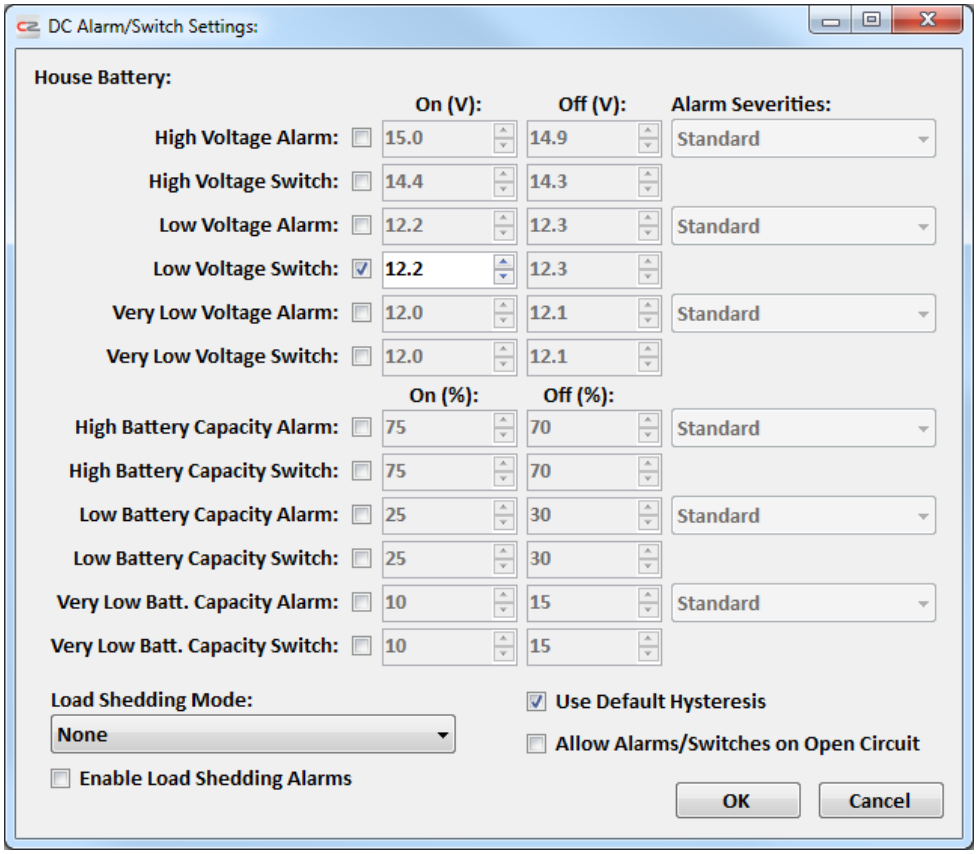
A useful feature of generator control is to run a generator automatically when a battery needs charging; this requires metering the battery. Some generators depend on DC supplies for pre-heat and other functions; to allow automatic generator control, the state of these ancillary supplies must be known.

After identifying the DC sources required for generator control, follow section 0 to ensure a DC meter is configured for each one. In the example here, the 12V house battery will be charged under generator control when necessary (including stopping the generators when they are no longer needed). This battery is metered on channel 1 of the MI as shown below:



To activate battery charging under generator control, a switch is required at a low battery voltage; this switch is provided by the MI that monitors the battery. Battery charging logic can be quite sophisticated but the example here is kept simple: the house battery needs charging if its voltage falls to 12.2V; once charging commences it continues for a two-hour fixed cycle.

In section 4.3.1.5, configure a Low Voltage Switch to come on at 12.2V to signal that the house battery needs charging:

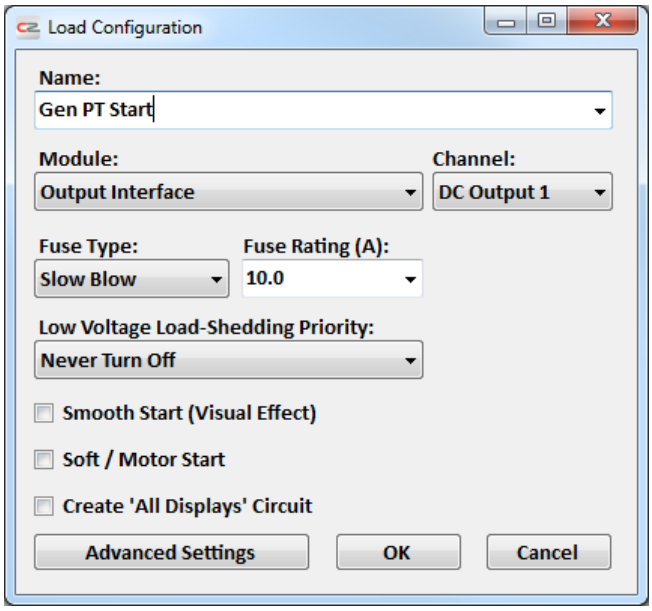


4.8.2.3 Configuring Generator Start/Stop DC Signals and Circuits

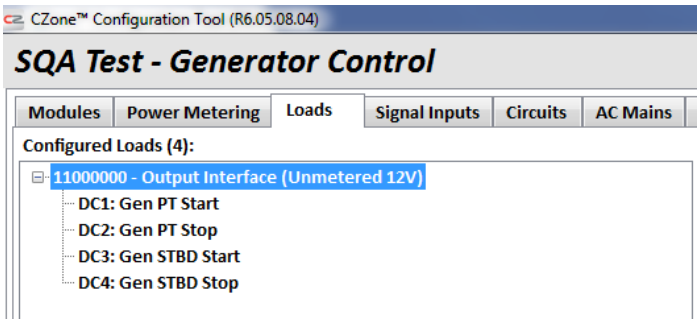
The example here assumes each generator is started or stopped via DC signals from an OI:

1. On the Loads tab, click Add to launch the Load Configuration dialogue.
2. Follow section 4.4.1 to make one of the four generator-start or -stop channels on the OI available as a named load. Give the load a descriptive name (in the example below, Gen PT Start for the channel that is wired to the port generator's startup actuator). For simplicity the example here assumes a single OI, but a real vessel would probably

have more; use the Module and Channel drop-downs to ensure the correct OI and channel are selected. A 10A slow-blow fuse would be typical. Other settings can be left at their defaults.



Repeat steps 1 and 2 above until all four loads have been configured - a start and a stop channel for both the port and starboard generators. The upper portion of the Configured Loads pane on the Loads tab should then resemble the following:

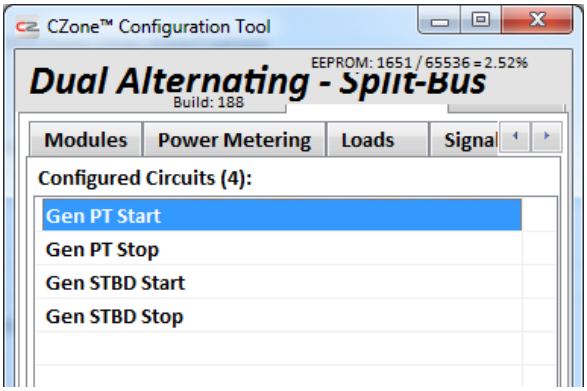


Configuring Start/Stop Circuits., With Additional DI Control:

Follow section 4.6.1 to add a standard circuit for each of the generator start/stop functions. Assign descriptive names: for example, Gen STBD Start or Gen PT Stop. (Long names should be avoided. For example, Port Generator Start will not fit on the switch-description summary in the Switch Configuration dialogue.)

These circuits will typically be activated automatically by the generator control function being configured, but it can be useful to provide a manual override for each one. The simplest way is to ensure the Add ‘All Displays’ Circuit Control box is ticked. (DI switches are double-throw momentary; their switch function should be set to ‘On’, as the signals will be configured to turn off automatilcally after a time.

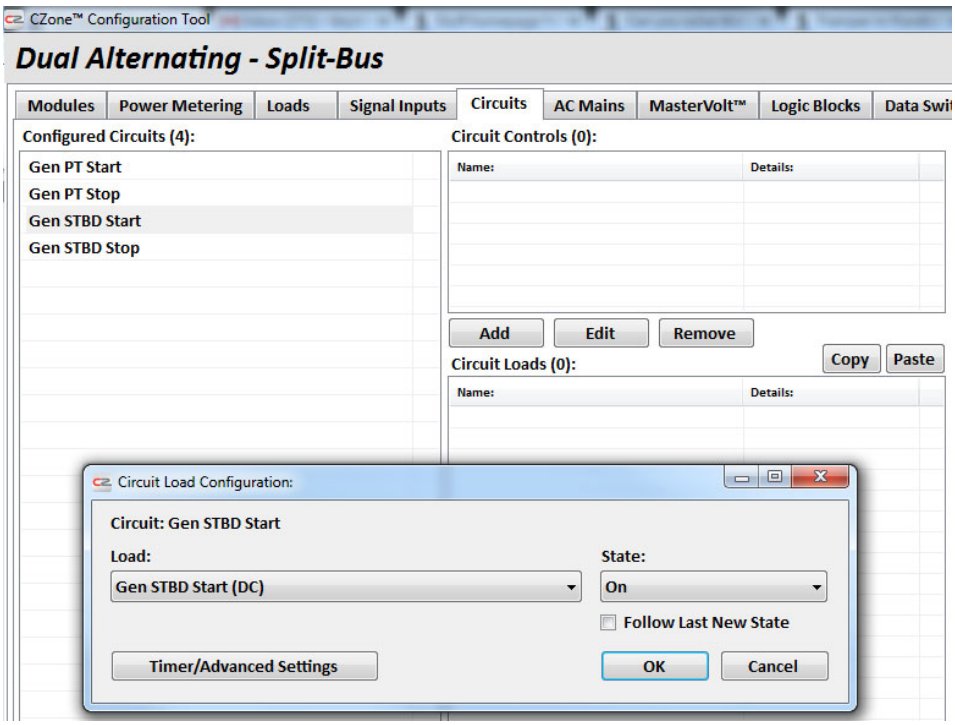
On the Circuits tab, the upper portion of the Configured Circuits pane will now include the following entries:



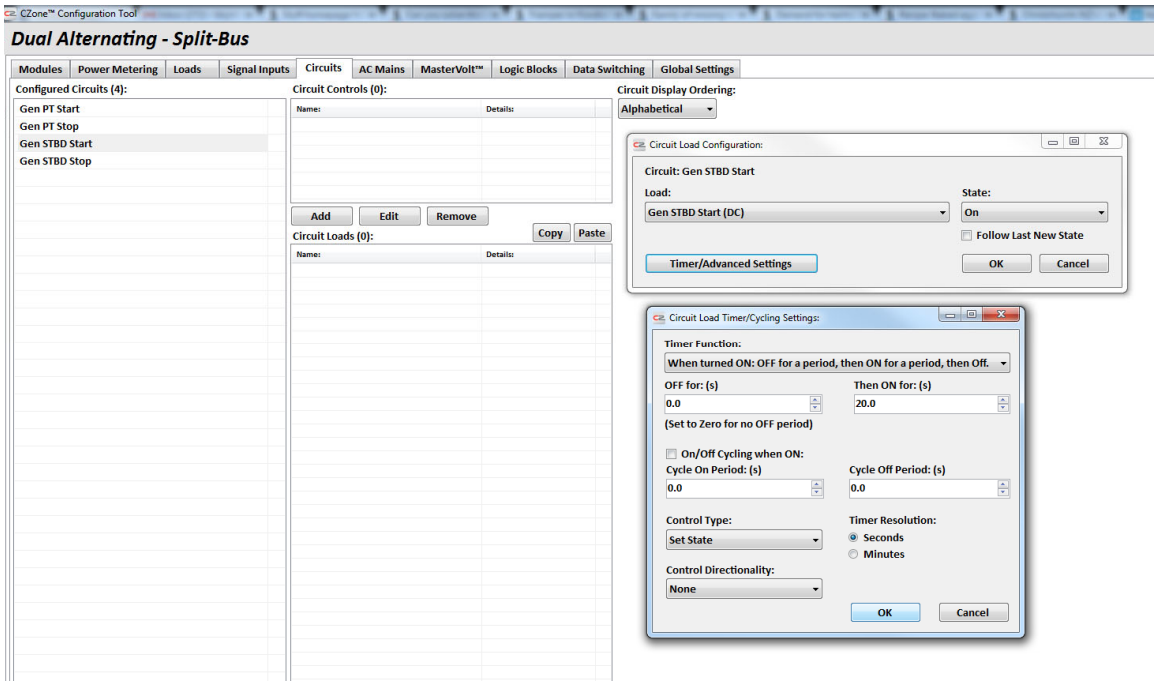
Configure DC Loads for Generator Start and Stop Circuits

A load must be assigned to the start and stop circuit for each generator, so activating it will pulse the appropriate actuator electrics.

1. On the Circuits tab, select one of the generator-start or -stop circuits. In this example they are:
    - Gen PT Start
    - Gen PT Stop
    - Gen STBD Start
    - Gen STBD Stop
2. Below the Circuit Loads pane, click Add to launch the Circuit Load Configuration dialogue. Having earlier configured the Output Interface, its channels will be available as named loads; use the Load drop-down to assign the correct channel (in this example, Gen STBD Start (DC) for the Gen STBD Start circuit):



Leave other settings at their defaults, but click Timer/Advanced Settings to launch the Circuit Load Timer/Cycling Settings dialogue:



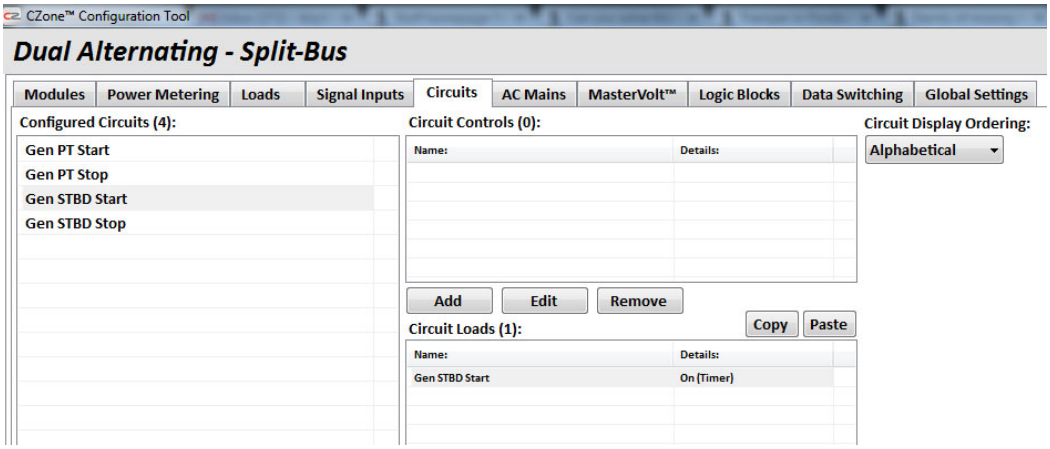
To tailor a pulse for the vessel's start or stop electrics, consult its generator specifications. In this example, each pulse needs no 'front porch' delay – it is sent immediately – and must last for 20s. Accordingly:

- the Timer Function drop-down is changed to 'When turned ON: OFF for a period, then ON for a period, then Off.'
- the 'OFF for: (s)' value is left at its default of 0
- the 'Then ON for: (s)' value is set to 20.0.

Leave other settings at their defaults and click OK to close the Circuit Load Timer/Cycling Settings dialogue.

Click OK on the Circuit Load Configuration dialogue to close it and return to the Circuits tab.

3. Repeat steps 1 and 2 above, until each of the four generator-start and -stop circuits has been assigned the appropriate DC load. As an example, for the Gen STBD Start circuit the upper-left portion of the Circuits tab will then resemble the following:



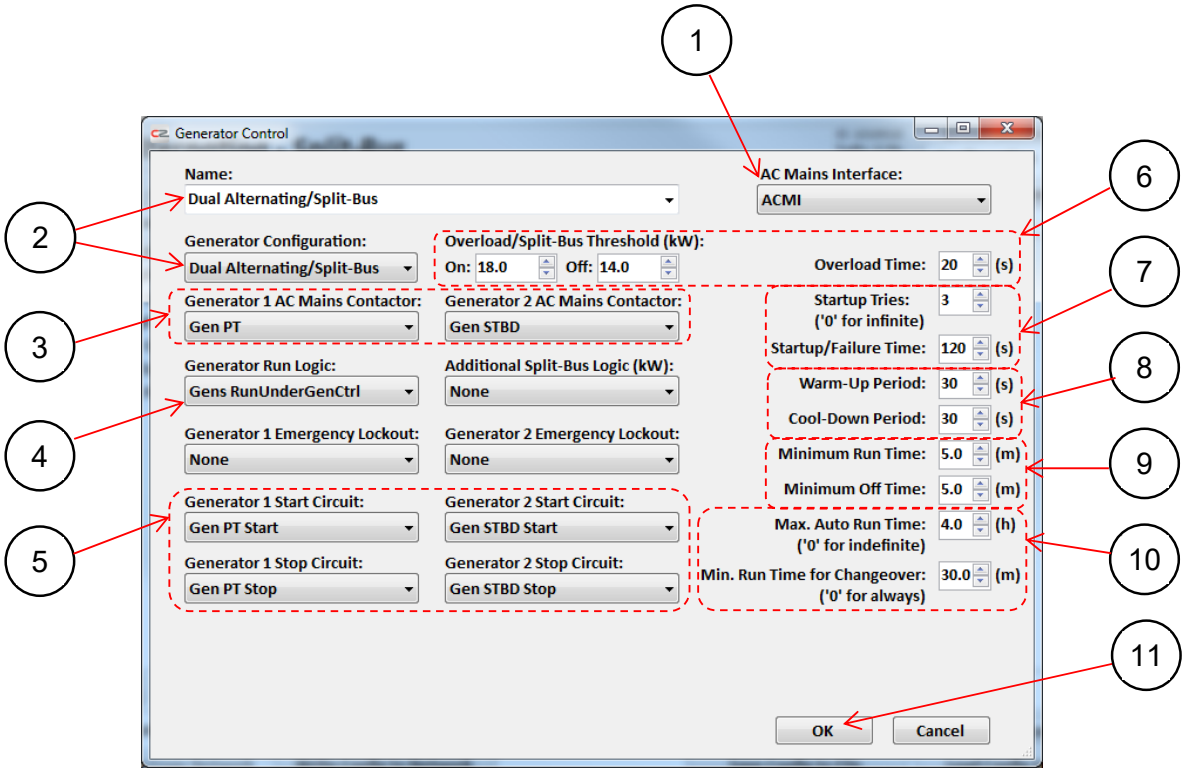
4.8.2.4 Create a Placeholder Logic Block for Requesting Generator Control

Follow the instructions in section 4.10.1 to create a logic block with the function **OR**. The inputs to this logic block will each represent a condition underwhich the generator should be started. These condition will vary per installation and will often represent the most complex part of the Generator Control configuration. We will leave them empty for now in order to move on to the main Generator Configuration block which can now be completed.

A common example of the configuration of these logic inputs is given below in section 4.8.3.6.

4.8.2.5 Configuring Generator Control:

With AC Mains Contactors and their associated AC metering, Generator Start and Stop signals and their associated circuits, and a place-holder Generator Run Condition Logic Block created, the generator configuration item can now be populated. On the AC Mains tab, below the Configured Generators pane click Add to launch the below Generator Control dialog:



1. From the **AC Mains Interface** drop-down, ensure the correct ACMI is selected. (This example is for a vessel with only one.)
2. From the **Generator Configuration** drop-down, ensure the appropriate mode is selected. Use the **Name** field to give the configuration a descriptive name. (In this example, the name is chosen simply to echo the generator-configuration mode.)
3. Each of the supplies available to an ACMI is presented on its designated contactor, which was given a descriptive name when the ACMI was configured in section 4.8.2.1. (Supplies from the generators in this example appear on ACMI contactors 1 and 2, labelled Gen PT and Gen STBD respectively.)

   However, generator control only 'knows' the generators that it manages as Generator 1 and Generator 2. Those internal names must therefore be tied to the physical contactors that will be managed under generator control.

   Using the **Generator 1 AC Mains Contactor** drop-down, assign Generator 1 to the correct ACMI contactor: Gen PT in this example. Do the same with the **Generator 2 AC Mains Contactor** drop-down: in this example, assign the starboard generator. *These assignments must match the contactor designations for which the ACMI was customised, and in turn the vessel's wiring.*
4. Assign the Gens RunUnderGenCtrl logic block using the Generator Run Logic drop-down.

5. Using the appropriate drop-downs, assign the correct generator-start and -stop circuits to Generator 1 and Generator 2.

   Generator specific circuit controls will be automatically added to the selected circuits and visible on returning to the Circuits listing once this configuration task is complete.

6. The Overload/Split-Bus Threshold (kW) and Overload Time deterine the conditions under which both generators will be run when the 'Dual Alternating/Split-Bus' configuration is selected.

   Set the **On threshold** to the kilowatts of load at which both generators should be brought on-line and the supply bus split between them.This should represent a significant percentage of the generator's nomila power rating, e.g. 20kW for a 25kW rated generator.

   Set the **Overload Time** to the duration for which a single generator should carry the overload. When one generator has been overloaded for longer than this it will be relieved, by bringing the second generator on-line and splitting the AC bus. This delay intended to allow for short in-rush currents as larger AC loads are started, in order to not trigger both generators ON when such a load is only temporary.

   The **Off threshold** takes into account the demand on both generators once they are both running, such that when the demand on both falls below a threshold, somewhere below the On threshold, the system will return to single generator operation.

7. Generators do not always start first-time, so set the **Startup Tries** to the maximum number of attempts. (If a generator is needed but fails to start after this number of attempts, generator control will forgo splitting the bus.)

   A startup attempt is considered to have failed if the generator is not on-line within the **Startup/Failure Time**. (This interval is the total time allowed, from when the generator is commanded to start until its metered output should have settled. It must therefore exceed the total of various other intervals: for example, generator pre-heat delay; the duration of the longest timer used to pulse a start circuit; and the no-load settling time of the AC output.)

8. Once a generator has started successfully, before being loaded it can be allowed to run open-circuit for a **Warm-Up Period** with the intention of achieving a better service life.

   Similarly, a generator can be configured to run open-circuit for a **Cool-Down Period** before being stopped.

9. Generators can be started by different methods: automatically under generator control; with panel switches; from a Display Interface; and so on. Regardless of how a generator was started, once started successfully it will be run for at least the **Minimum Run Time** whether it is still needed or not.

   Similarly, once a generator has been stopped it will not be available to be restarted for at least the **Minimum Off Time**.

   These two settings prevent rapid cycling of the generators in the case of inappropriately configured or erroneous start/stop signals.

10. A generator that was started under generator control will be run for at most the **Max. Auto Run Time**; it will then be stopped. This is a safety factor which can reduce wear and the risk of running fuel tanks dry, typically if a generator is run unattended with the 'Generator Run Condition' rmaing true indefinitely.

    In Dual Alternating/Split-Bus mode, before one generator is swapped for the other it will be run for at least the **Min. Run Time for Changeover**. This prevents frequent alternating between the generators to ensure similar run-times for each.

11. Click OK to accept the generator-control configuration. This configuration will now appear in the Configured Generators pane on the AC Mains tab.

4.8.2.6 Configure 'Run Generators Under Generator Control' Logic

Preview: Conditions Which Make Generator Control Active

The system now 'knows' *how* generators are to be managed under generator control. It remains to be told *when* generator control should be active.

1. Once the generator configuration dialog has been completed, automatically created 'Gen (Auto-Start/Stop Enable)' signals, prefixed with the user-configured Generator Configuration name are made available to be added to Modes and Circuits. These signals must be set to ON throught some means after reconfiguring or powering on a system, and are typically added to all modes. They do not trigger the generators to come on or off directly, they simply indicate that

auto-generator control is enabled, thereafter relying on the user-configured run conditions being true for a generator to actually run,

If the master enable signal is active, any of the user-configured conditions can activate generator control; conversely, if it is inactive then generator control is unavailable regardless of any request for it.

2. The inputs to the Generator Run Condition place holder logic block must then be filled in.The below example will provide three conditions to this logic block:

    - The house battery was measured below 12.2V some time in the past two hours

      That is: when the battery voltage goes low, generator control is invoked and remains on for a fixed, two-hour charge cycle.

    - The time of day is between 0700 and 0800

      That is: the generators are run daily for an hour regardless of any other requirement for them.

    - A manual user-controlled ‘Generator Run’ signal has been issued from a DI.

      In this example we will user a circuit called ‘Generator Manual Control’. When turned On the generator control will be requested to turn onactive regardless of the time of day or the state of the house battery.

        - turning it On will request that generator control becomes active
        - turning it Off will, in the absence of either of the other two conditions (low battery or time-of-day) will result in the generator turning off once it has run for its minimum period..

    If any of the three conditons is true then generator control will be requested; if none of them is true, it is not needed. From section 5.2 this is recognizable as OR logic.

Create Loads, Logic and Circuits

Time-of-Day Switch State:

Follow the instructions in section 4.11.2 to create a Time-of-Day switch, on any available channel of the DI.

The example here uses On Time and Off Time of 0700 and 0800 respectively; accordingly it is named ***0700to0800***. The Enabled on Power-Up box, on the Time of Day Switch Configuration dialogue, should be ticked.

Low House Battery Virtual Signal:

Follow the instructions in section 4.4.5 to create a virtual signal which will be activated to charge the house battery under generator control.

The signal is created on a spare Virtual Signal channel of the OI. In the example here it is named ***Batt House Charge***. (This follows a convention of listing the type of controlling device first, then a qualifying identifier for the actual device, then the function that is being controlled.)

Other settings, including those in the Load Configuration Advanced Settings dialogue, can be left at their defaults: there is no associated alarm; and the signal should be Off at power-up.

Now f ollow the instructions in section 4.6 to create a new circuit named ***Low House Battery Signal***.

Do not create an All Displays circuit control. Instead, as the sole circuit control, add the MI Control named
House Battery - Low Voltage; this will have been provided automatically by the MI when the low-voltage switch was configured.

Other settings can be left at their defaults: the **Switch Type** should be Single Throw Momentary and the
Switch (Output) Function should be On.

As the sole circuit load, add the Batt House Charge virtual signal which was created above. When this load is activated it should remain on for the two-hour duration of the battery-charge cycle, so a timer must be configured for it. In section 4.6.3, in the Circuit Load Timer/Cycling Settings dialogue, set the **Timer Function** to
When turned ON: OFF for a period, then ON for a period, then OFF. Set the **Timer Resolution** to Minutes and the value for ‘Then ON for’ to 120.0 (i.e. two hours).

Other settings can remain at their defaults.

Manual-Control Virtual Signal:

Follow the instructions in section 4.4.5 again, to create a virtual signal which will be activated when generator control is requested via the DI.

The signal is created on a spare Virtual Signal channel of the OI. In the example here it is named ***Generator Manual Control***.

Other settings, including those in the Load Configuration Advanced Settings dialogue, can be left at their defaults: there is no associated alarm; and the signal should be Off at power-up.

Follow the instructions in section 4.6 to create a new circuit named ***Generator Manual Control***.

Create an All Displays circuit control; this will be the only one for the circuit.

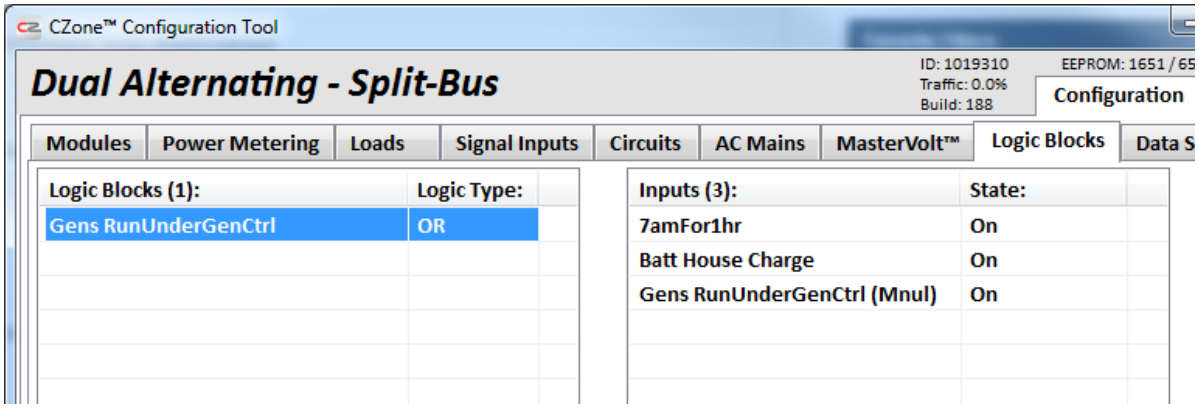
Most settings can be left at their defaults: DI switches are double-throw momentary; the switch function should be set to On/Off; and this circuit would usually be managed from the Control menu. However, in section 4.6.2.2, in the Switch Configuration Advanced Settings dialogue, change the **User Confirmation Dialog** drop-down to Confirm On and Off. This will raise a confirmation dialogue when the user toggles the manual override switch.

Logic Block: Link Conditions to Request Generator Control

Now add the above created conditions/signals to the place-holder logic block:

- Follow the instructions in section 4.10.2 to add, as the first input to the logic block, the load on the Time of Day switch. From the **Logic Input Type** drop-down choose Data Switch; then, from the **Data Switch** drop-down, choose DI - 0700to0800. The state of the input is On.
- Follow the instructions in section 4.10.2 to add, as the second input to the logic block, the Batt House Charge load. From the **Logic Input Type** drop-down choose Circuit Load/Virtual Signal; then, from the **Circuit Load** drop-down, choose Batt House Charge. The state of the input is On.
- Follow the instructions in section 4.10.2 to add, as the final input to the logic block, the Gens RunUnderGenCtrl (Mnul) load. From the **Logic Input Type** drop-down choose Circuit Load/Virtual Signal; then, from the **Data Switch** drop-down, choose Gens RunUnderGenCtrl (Mnul). The state of the input is On.

With the logic block configured, the upper-left portion of the Logic Blocks tab should resemble the following:



Enabling Auto Generator Start/Stop

Follow the instructions in section 4.6 to create a new circuit named ***Gens Auto-start/-stop Enable***.

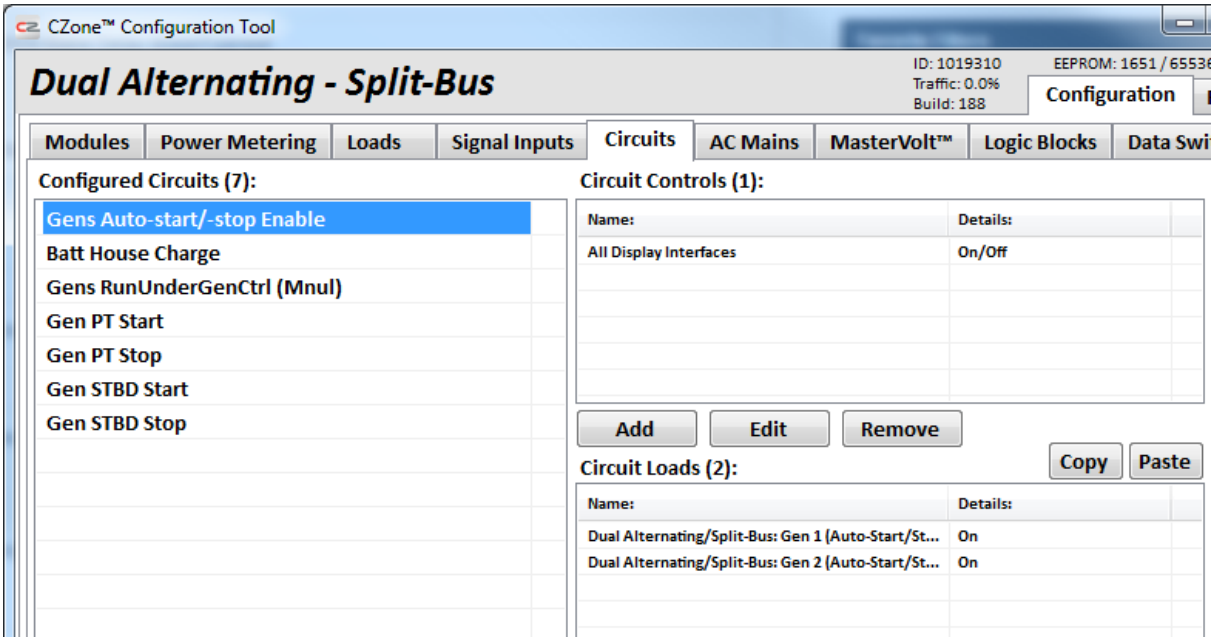
Create an All Displays circuit control; the DI will be the only place from where the master enable can be issued.

(Note: although a standard circuit is used here for illustration, typically the master enable would be more sophisticated. A vessel would be configured for various operating modes, and any suitable mode would activate the master enable as a side-effect. Modes where the generators might have no coolant supply would be excluded.)

Other settings can be left at their defaults: DI switches are double-throw momentary; the switch function should be set to On/Off; and this circuit would usually be managed from the Control menu. However, in section 4.6.2.2, in the Switch Configuration Advanced Settings dialogue, change the **User Confirmation Dialog** drop-down to Confirm On and Off. This will raise a confirmation dialogue when the user toggles the manual override switch.

In section 4.6.3, as Circuit Loads add the low-level activation loads Dual Alternating/Split-Bus Gen 1 (Auto-Start/Stop Enable) and Dual Alternating/Split-Bus Gen 2 (Auto-Start/Stop Enable). The settings for each of these circuit loads can be left at their defaults: the **State** should be On; and there is no associated timer.

With all of the circuits now configured, the upper-left of the Circuits tab should resemble the following:



This completes the configuration. Save and then write this configuration to your systems and you will be ready to test it all out.

Turning On the '**Gens Auto-Start/stop Enable**' Circuit, then waiting for either of the time of day or low battery conditions, or turning on the '**Generator Manual Control**' circuit, will now cause the generator to be run.

This example of generator control configuration is now complete

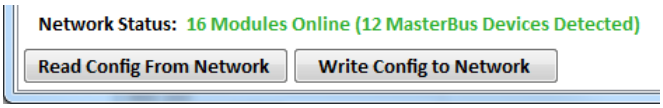
4.9 MASTERVOLT

The Mastervolt configuration page is where Mastervolt Inverters, Chargers and Combis are configured (using Masterbus communication). Once configuration is complete these devices can be accessed from the Control > Inverters/Chargers page from the Display Interface.

Note – DC-DC chargers are not currently displayed on Inverters/Chargers Page on a Display Interface.

In order to setup Mastervolt (Masterbus) devices:

- a MasterBus Bridge Interface (MBI) must be installed and configured on the network; and
- the Mastervolt devices must be powered and showing on-line in the Network Status field of the configuration tool.



Below are example screenshots of what you can expect on a CZone® Touch Screen, for a couple of common Mastervolt devices (ChargeMaster and Mass Combi Inverter/Charger).

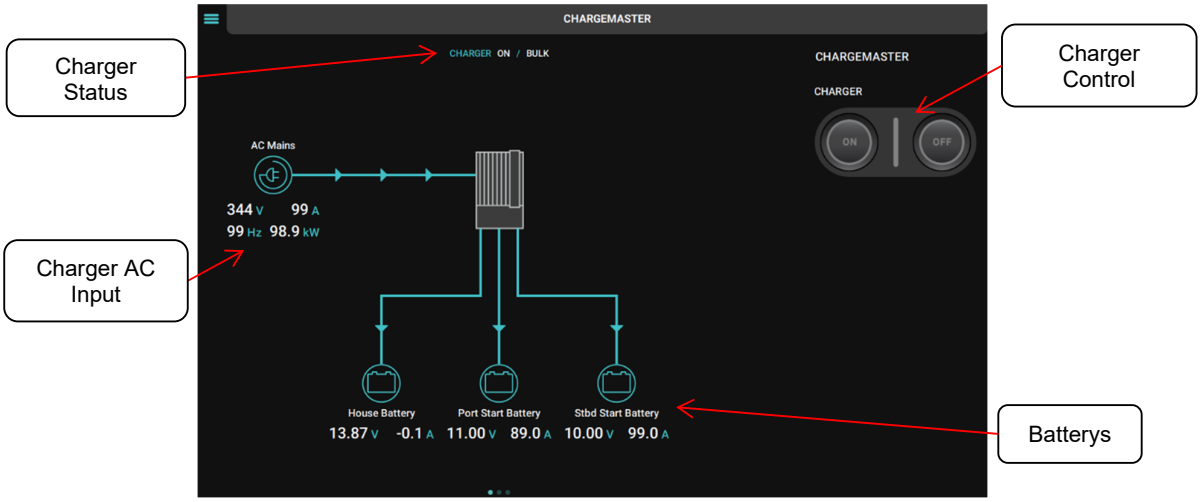


Figure 9 ChargeMaster Example

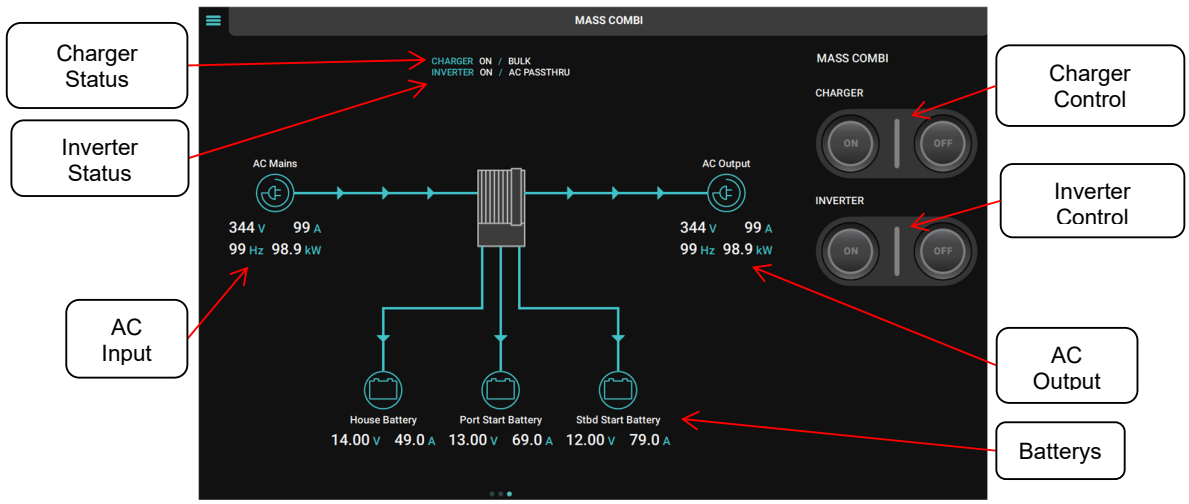
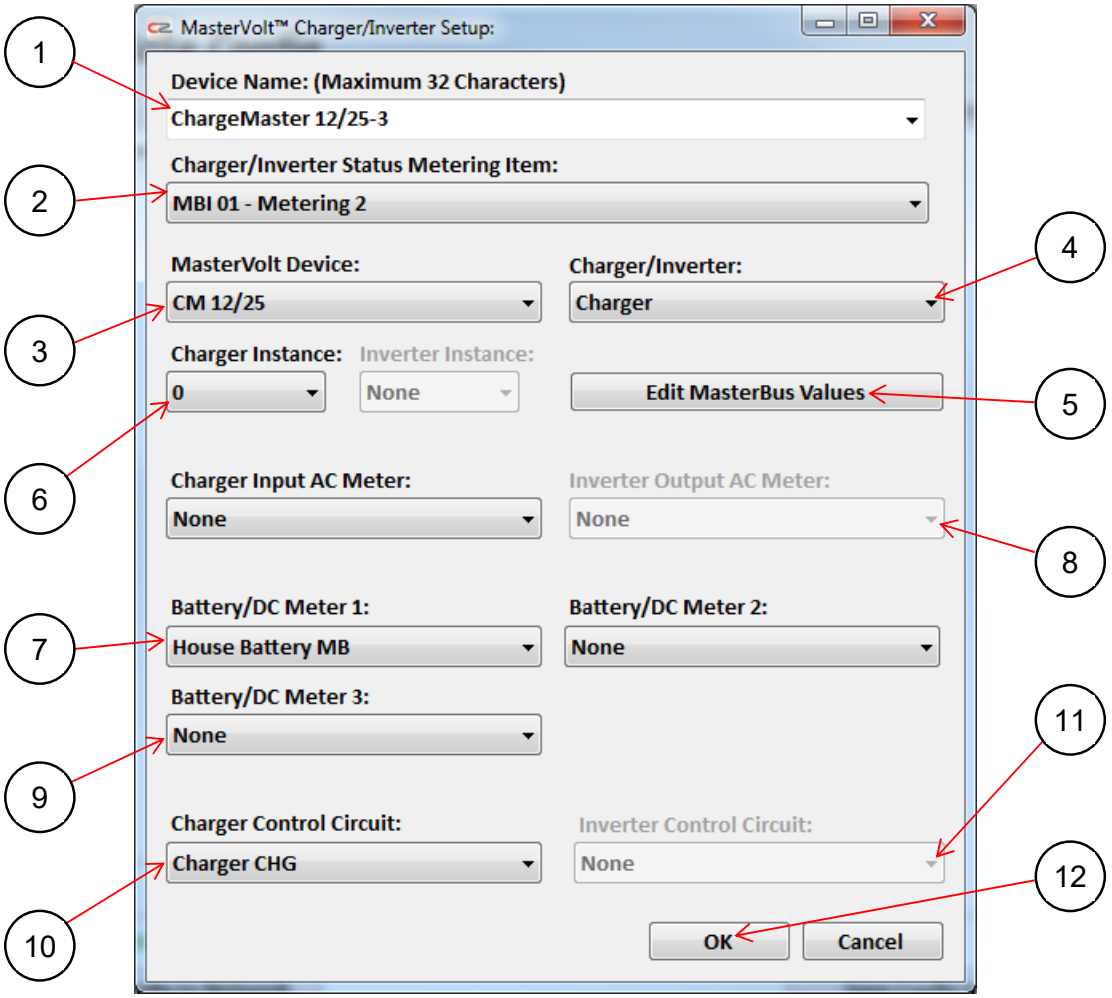


Figure 10 Mass Combi Example

4.9.1 Mastervolt Device Configuration

To begin configuration of a Mastervolt device, from the Mastervolt tab select 'Add' in the Configured Mastervolt Chargers and Inverters section.



1. Enter the Device Name. This name will be shown on the Inverter/Charger control page on all Display Interfaces connected to the system.
2. Select an available metering channel for the Charger/Inverter Status from the MBI (MasterBus Bridge Interface). This monitoring field will repeat from MasterBus the state of the Inverter and/or Charger e.g.Float/Absorption/Bulk. (See Figure 9 and Figure 10 for examples.) The MBI has a total of 16 metering channels.
3. Select the Mastervolt Device from the drop-down list. If the Mastervolt device is powered and on-line it will be shown in this list. If the device is to be configured through MasterAdjust, select the 'Configured in MasterAdjust' option. Refer to section 5.3 for a list of supported devices.
4. Select the device type from the drop-down list. If a Mastervolt Device has already been selected, this field will be configured automatically.
5. The MasterBus Values will automatically populate from the MasterBus Index numbers referenced from the device database. To edit these values press the 'Edit MasterBus Values' button.
6. NMEA 2000 Instances are used to differentiate between multiple monitoring sources. Ensure all NMEA 2000 Instances are unique for each source being monitored. If Instances are assigned with the same value, the data may not be displayed or may be displayed inaccurately.
7. If configuring a Charger or Combi, select the AC Meter that will be used to represent the Charger Input. If the Charger has the ability to monitor AC, select the 'Add New' option and follow section 4.3.4 for configuration steps; otherwise a

pre-configured AC Meter from a Meter Interface or AC Mains Interface can be used. Selecting ‘None’ will leave the Charger Input field on the Display Interface unpopulated.

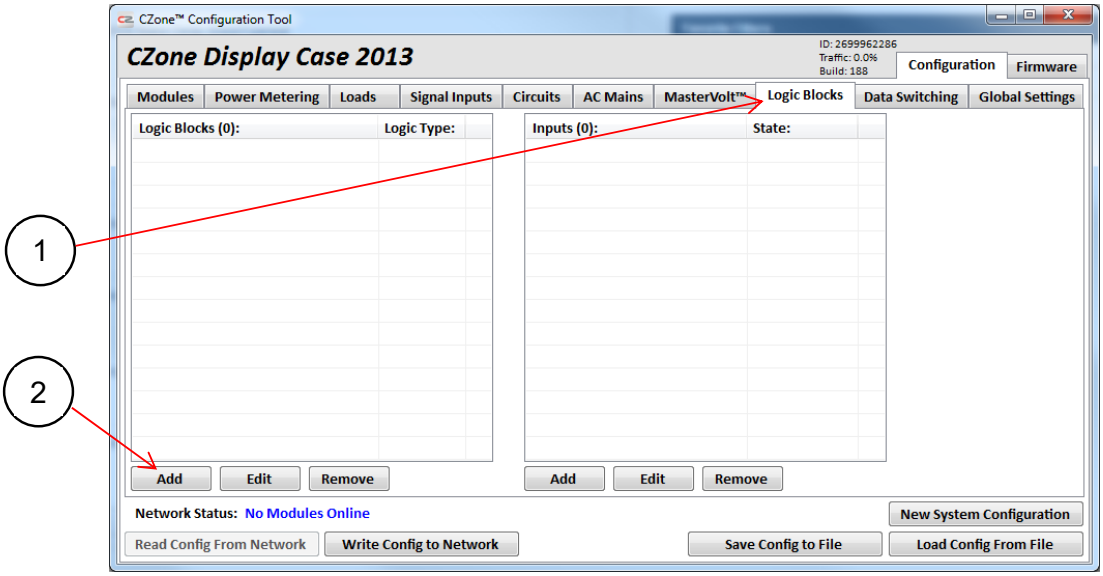
8. If configuring an Inverter or Combi, select the AC Meter that will be used to represent the Inverter Output. If the Inverter or Combi has the ability to monitor AC Output, select the ‘Add New’ option and follow section 4.3.4 for configuration steps; otherwise a pre-configured AC Meter from a Meter Interface or AC Mains Interface can be used. Selecting ‘None’ will leave the AC Output field on the Display Interface unpopulated.
9. Select the DC Meter that will be used to represent battery for the Charger or Inverter. If the Charger or Inverter has the ability to monitor DC, select the ‘Add New’ option and folllow section 4.3.2 for configuration steps; otherwise a pre-configured DC Meter from a Meter Interface can be used. Selecting ‘None’ will leave the Battery field on the Display Interface unpopulated. Repeat the process for second and third batteries if required.
10. If configuring a Charger or Combi, select the circuit that will be used for control of the charger. Selecting ‘Automatically Assigned’ will automatically configure necessary MBI loads and circuits within CZone®, along with events on MasterBus.
11. If configuring an Inverter or Combi, select the circuit that will be used for control of the inverter. Selecting ‘Automatically Assigned’ will automatically configure necessary MBI loads and circuits within CZone®, along with events on MasterBus.
12. Select OK to complete the Mastervolt device configuration and return to the Mastervolt tab.

4.10 LOGIC BLOCKS

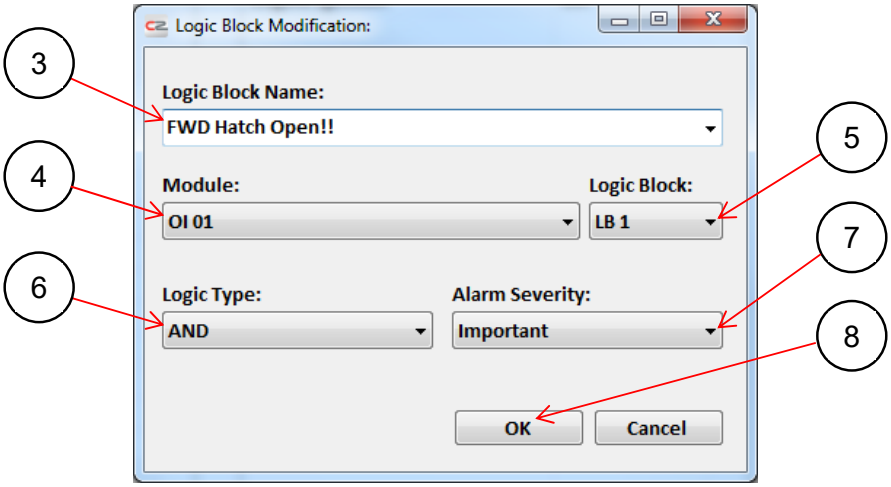
A logic block takes a user-defined set of input/output states, drawn from the complete set of loads and switches already configured within the system, and performs a logic operation (AND, OR, NAND, NOR, XOR, XNOR) on these states. This generates a switch which can be used to control circuits and/or alarm when the condition has occurred.

4.10.1 Logic Block Inital Setup

For the below example we are going to set up a logic block that will activate an alarm when a hatch is open and the engine ignition is on.

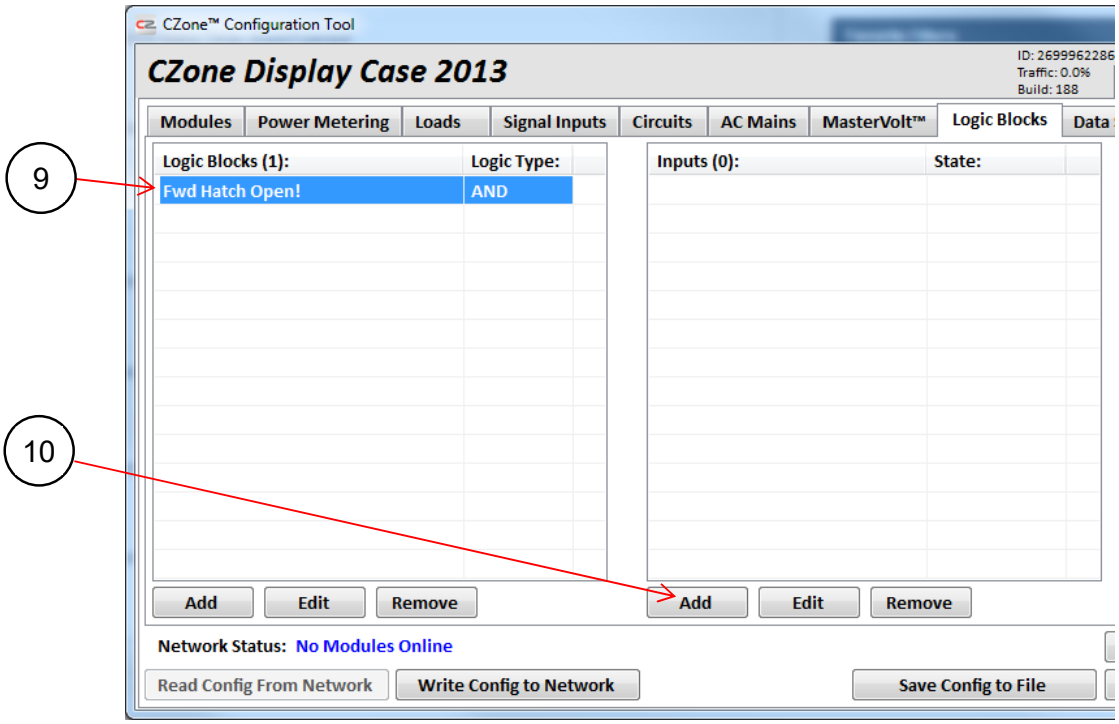


1. Click on the ‘Logic Blocks’ tab.
2. Click the ‘Add’ button.



3. Enter a name for the Logic Block. In this example we are using ‘Fwd Hatch Open!!’. If an alarm is required when the logic block is true, this is the name that will appear on any Display Interface.
4. Select a module (OI, COI or SCI) from the drop-down list. To create a logic block, one of these three module types must be on the network.

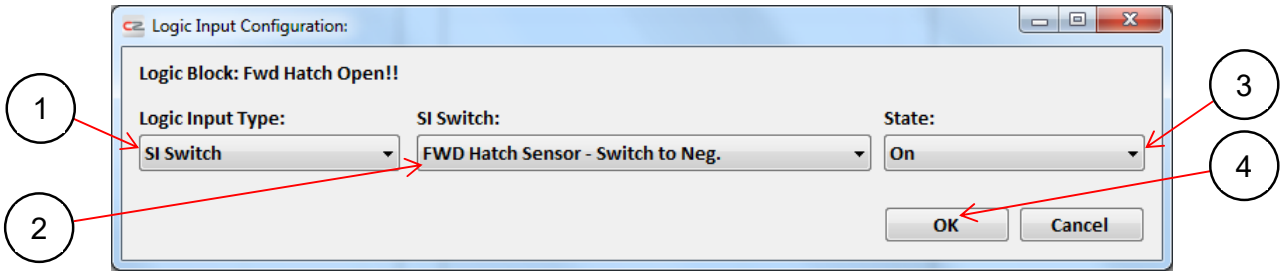
5. Select the Logic Block Number from the drop-down list. An Output Interface (OI) can store up to six Logic Blocks/Virtual Signals; a Combination Output Interface (COI) can store up to 32 and a Switch Control Interface (SCI) can store up to 16.
6. Select the Logic Type from the drop-down list. For a definition of each, refer to section 5.2. In this example we shall use AND logic.
7. To enable an alarm when the logic block is true, select the severity from the drop-down list. Refer to section 5.1 for a definition of alarm severities.
8. Click OK to save the Logic Block and close the Logic Block Modification window.



9. The Logic Block that was just configured will be listed in the Logic Blocks section.
10. The next step is to add the inputs and configure their state. Click the Add button in the Inputs section.

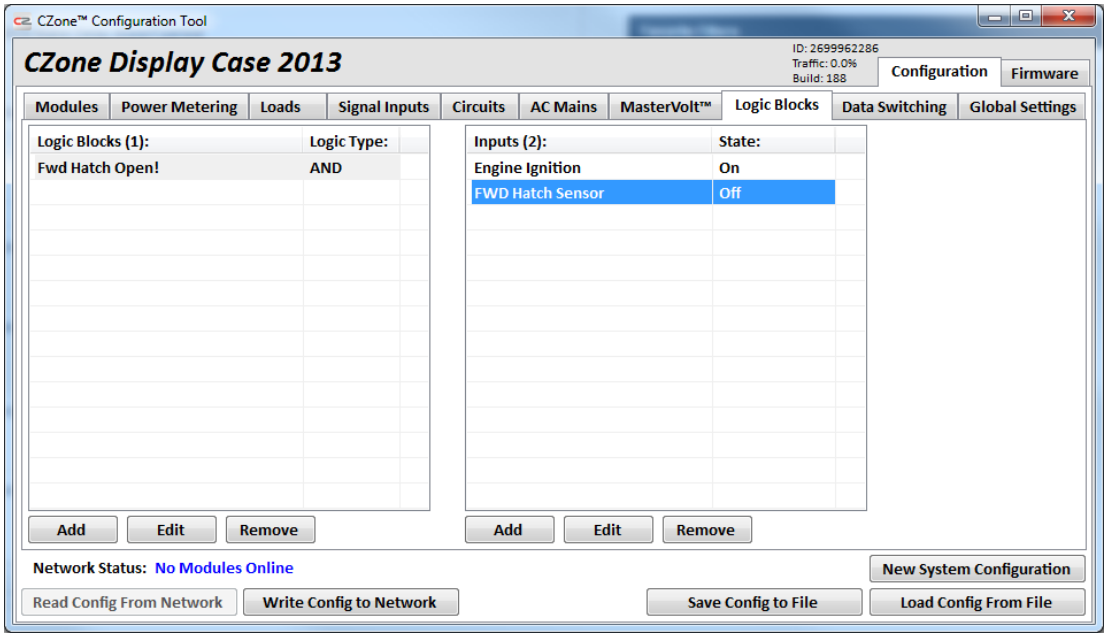
4.10.2 Logic Block Input Configuration

Now that the logic block has been configured we need to add at least one Logic Input, which will form the conditions for making the block's output true or false.



1. Select the Logic Input Type from the drop-down list. The available inputs that can be used for logic are:
   - Circuit Load/Virtual Signal
   - SI Switch
   - SCI Switch
   - Metering Switch
   - Data Switch
   - MasterBus Event Target

   Note: To use a Data Switch (Time Of Day or PGN) as a logic input, the switch must be configured on the Circuits tab first. The circuit does not need to be switching a load for it to be enabled.
2. A full list of configured inputs will be displayed for the chosen input type. Select the required switch or load from the drop-down list.
3. Select the state of this switch or load: ON or OFF. This will form part of the logic check based on the logic type selected earlier.
4. Select OK to save the Logic Input Configuration.
5. Repeat this process to configure further inputs.



The logic block is now complete. In this example we have created a logic block that will activate an important alarm when the engine ignition is On AND the FWD Hatch sensor is Off (i.e. the hatch is open). Once the logic block is created it can also be used as a switch on the Circuits tab. Refer to section 4.6.2 on adding switches to circuits. To find the configured logic block switch, select the module (OI or SCI) that was used to store the logic block.

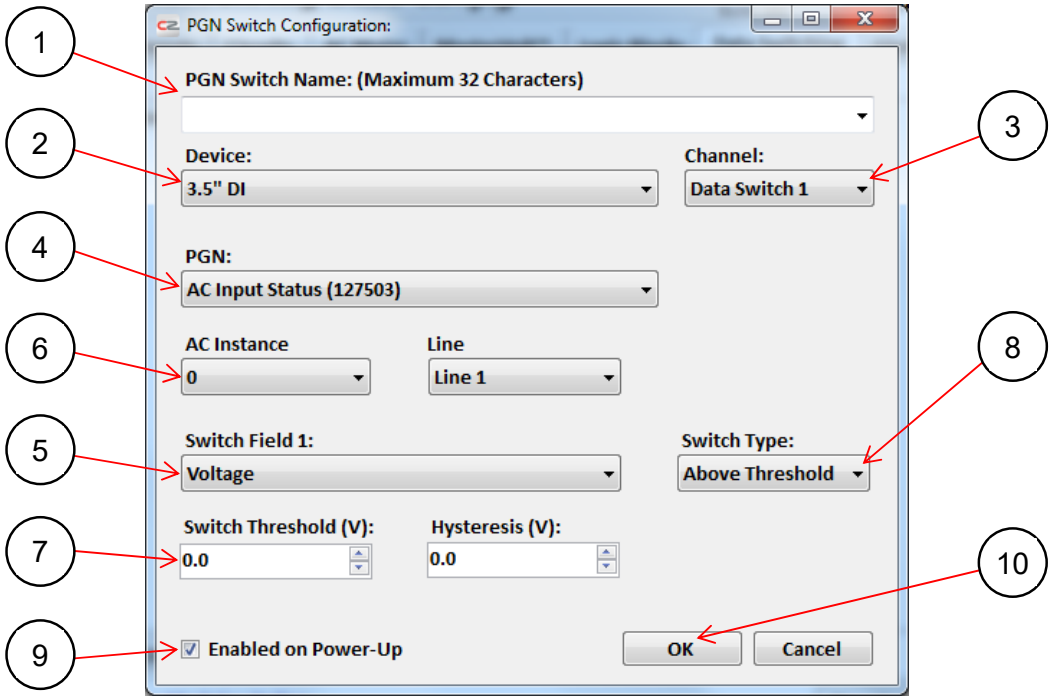
4.11 DATA SWITCHING

There are two types of data switch available within CZone®: PGN switch and Time of Day switch. To use either of these switches a CZone® Display, Wireless Interface, COI or C1 must be on the network.

4.11.1 PGN Switching

All data transmitted on the NMEA 2000 network are organized into groups. These groups are identified by a Parameter Group Number (PGN) which describes the type of data contained in that group. If the CZone® network is connected to other NMEA 2000 devices that transmit a standard NMEA 2000 PGN, it is possible to use the data from these PGNs to switch loads within the CZone® network. See section 5.5 for a list of supported PGNs.

To configure a PGN switch, from the Advance>Data Switching>PGN Switching tab select 'Add' in the PGN switching section.



1. Enter a name for the PGN switch. This is the name that will be displayed under the switching section when adding it to a circuit.
2. Select the Device to use for the PGN switch from the drop-down list. Important: the only devices that can be used for data switching are the CZone® Displays, Wireless Interface, COI/Control 1, Control X and RV1.
3. Select one of 15 available data switching channels per device.
4. From the drop-down list, select the PGN Number that corresponds with the NMEA 2000 device that will be used for switching.
5. Select the Field from the drop-down list for the type of data that will be used for the PGN switch. This list will populate according to the PGN Number selected previously.
6. Select the NMEA 2000 Instance for the device that will be used for the PGN switch. Each NMEA 2000 device will have a unique NMEA 2000 instance, set on the hardware itself or through software, to differentiate it from other NMEA 2000 devices on the network.
7. Enter the required value of the data that will serve as the threshold for the PGN switch. The type of data will change depending on the PGN and field that were selected previously.
8. Select the Switch Type from the drop-down list. The options are Above Threshold, Below Threshold, Within Range or Outside Range.

9. The ‘Enable on Power-Up’ check-box is ticked by default: the PGN switch is enabled. A PGN switch has an associated load which is created automatically. Optionally, this load can be added to a circuit to enable and disable the switch manually.
10. Click OK to complete the PGN switch configuration and return to the Data Switching tab.

Once the PGN switch is complete it can be used as a switch on the Circuits tab. When adding the switch, select the Display Interface that it was configured on and the PGN name from the Control Input drop-down list . See Figure 11 for an example of a PGN switch labelled Battery Temperature configured on DI - Touch Screen.

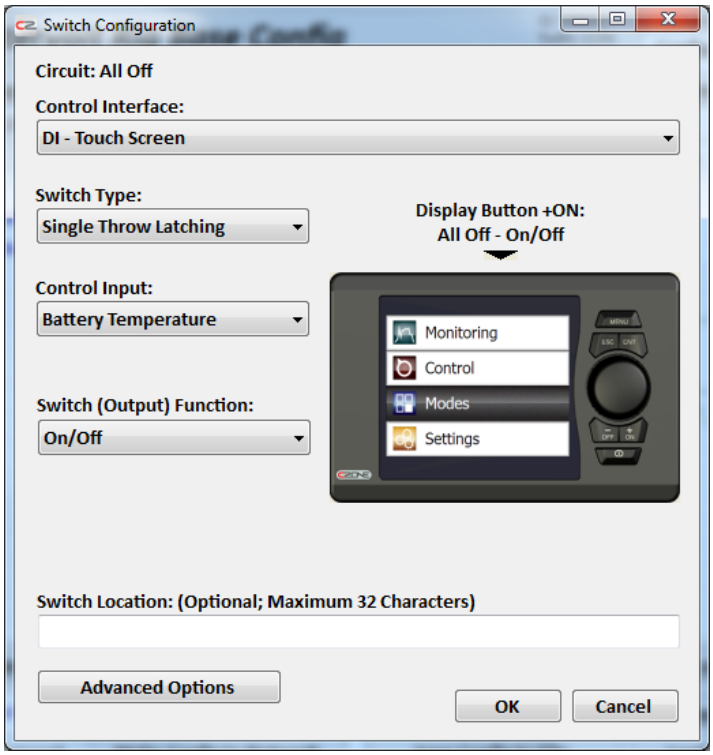
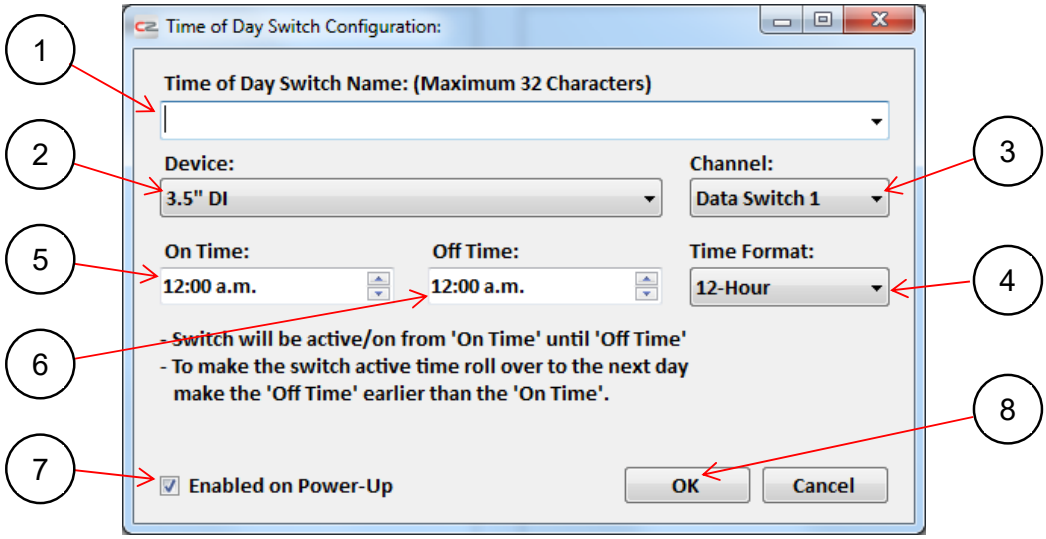


Figure 11 PGN Switch

4.11.2 Time Of Day Switching

A Time Of Day switch allows a circuit or multiple circuits to be turned ON and/or OFF at a particular time of day. In order to use this feature, a CZone module with an internal clock or GPS must be on the network (CZone Displays or Wireless Interface). When using one of these devices, ensure the date/time settings are correct. On the Display Interface, go to Settings > System > Date Time, ensure all fields are correct and then click Save. This will synchronize settings to any other displays on the network.

To configure a Time Of Day switch, from the Data Switching tab select 'Add' in the Time Of Day switching section.



1. Enter a name for the Time Of Day switch. This is the name that will be displayed under the switching section when adding it to a circuit.
2. Select the Device to use for the switch from the drop-down list. Important: the only devices that can be used for time of day switching are CZone® Displays and the Wireless Interface.
3. Select one of 15 available data switching channels per device.
4. Select the Time Format from the drop-down list. The options are 12-Hour or 24-Hour.
5. Enter the On Time for the switch. This can be typed into the box, or adjusted using the up and down arrows.
6. Enter the Off Time for the switch. This can be typed into the box, or adjusted using the up and down arrows.
7. The 'Enable on Power-Up' box is checked by default: the Time Of Day switch is enabled. A Time Of Day switch has an associated load which is created automatically. Optionally, this load can be added to a circuit to enable and disable the switch manually.
8. Click OK to complete the Time Of Day switch configuration and return to the Data Switching tab.

Once the switch is completed it can be used as a switch on the Circuits tab. When adding the switch, select the Display Interface that it was configured on and the Time Of Day name from the Control Input drop-down list.

4.12 THIRD PARTY DEVICES

The Third Party Devices tab allows supported devices to communicate with CZone over the NMEA2000 network. The functionality varies dependent on device type, but control of these systems (such as Airconditioning and Watermakers) from CZone displays is the primary function. The devices may require additional hardware if they are not NMEA2000 compatible.

4.12.1 Sea Recovery® Water Makers

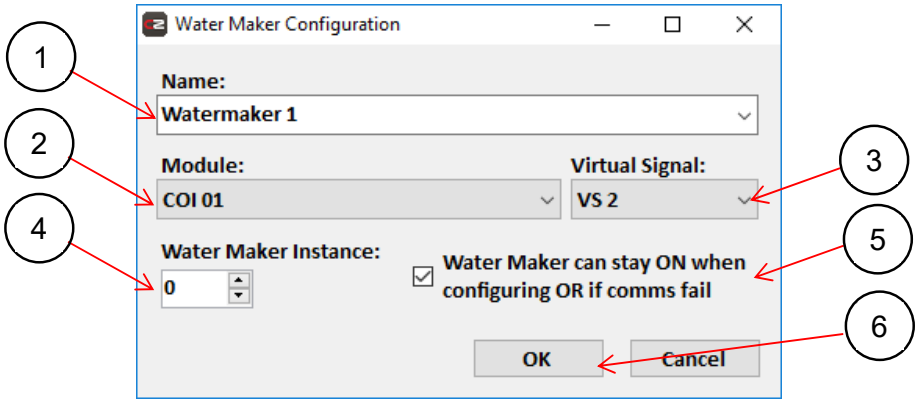
NMEA2000 Sea Recovery Water Makers can be integrated on the CZone network and commands such as Start Production, Start Flush, Start Rinse, Stop and Emergency break can be set using virtual signals built-in on the COI, OI or SCI. No additional hardware is required as they are NMEA 2000 compatible.

Models Supported:

- A14C Aqua matic Compact 450-1800 GPD
- A15M Aqua matic modular 450-1800 GPD
- A300C Aqua matic XL compact 2200-3400 GPD
- A310M Aqua matic XL Modular 2200-3400 GPD
- A93C Aqua whisper DX Compact 450-1800 GPD
- A94M modular Aqua whisper DX 450-1800 GPD

4.12.1.1 Water Maker Set Up

To set up a Sea Recovery Water Maker, from the Third-Party Devics tab select Add

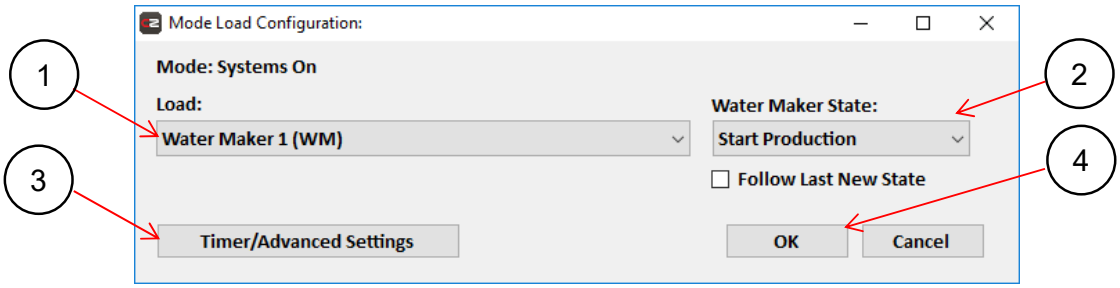


1. Enter a name for the Watermaker or leave it blank for default name.
2. Select the CZone device to use for virtual signal control (COI, OI, SCI) from the drop down list.
3. Select an available Virtual Signal channel from the drop down list.
4. Select or enter the instance of the Water Maker. Default should be 0 for a single Water Maker, if there is more than one than the instance should match what is configured on the Water Maker.
5. Tick this box if you would like Water Maker control to remain on during configuring or comms failure.
6. Press OK to save the configured Water Maker.

The Watermaker is now set up and ready for virtual signals to be controlled from the Circuits tab.

4.12.1.2 Water Maker Control Configuration

To set up Water Maker control, go to the Circuits Tab and add a Load to an existing or new Circuit or Mode of Operation.



1. Select the Water Maker configured in 4.12.1.1 from the drop down box.
2. Select the desired Water Maker command from the drop down box. Options are Stop, Start Production, Start Flush, Start Rinse and Emergency Break.
3. Select ‘Timer/Advanced Settings’ to configure any timer options if required.
4. Select OK to save the Load settings.

The Water Maker control is now configured. To add additional circuits to for other Water Maker commands repeat this process.

4.12.2 Dometic® HVAC

Dometic HVAC (Heating, Ventilation & Air Conditioning) units can be added to the CZone configuration and controlled using the dedicated climate controls on CZone 2.0 Displays. CZone supports marine and RV networked HVAC’s, both require an MBI (Masterbus Bridge Interface) which acts as a gateway between the two networks.

Refer to CZone Dometic Instructions for complete integration instructions

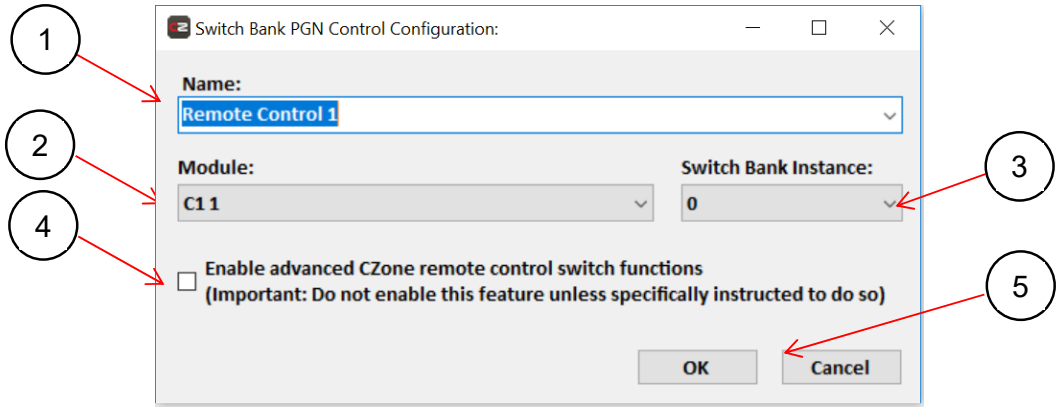
4.12.3 Switch Bank PGN Control

Switch Bank PGN control allows CZone circuits to be controlled from a 3rd party device such as the Sentinel remote control app.

To enable remote control functionality one of the following devices must be used: COI, Control 1, OI, SI, Contact 6 or Contact 6 Plus. Each module allows up to 28 remote switches.

4.12.3.1 Switch Bank Setup

To enable remote switching, from the Third-Party Devices tab select Add from the 'Switch Bank PGN Control'

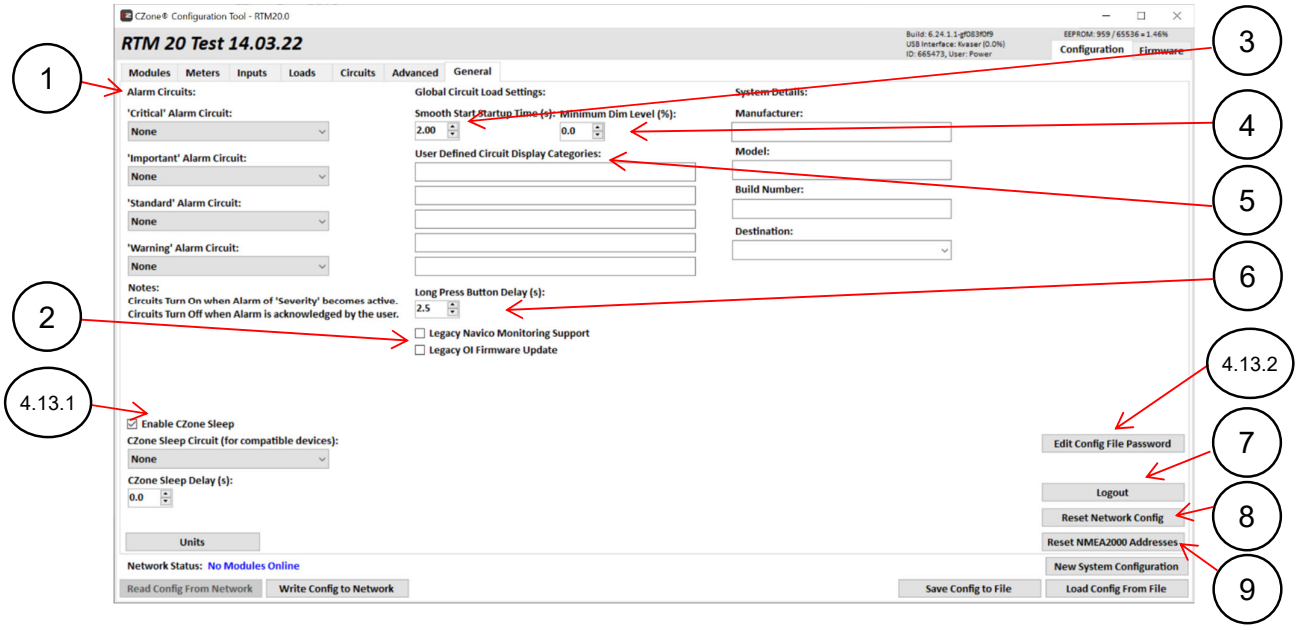


1. Enter a name to describe the first block of 28 remote switches or leave blank for the default name.
2. Select the desired module to enable the block.
3. Select a unique instance for each block from the drop down list (starting with 0).
4. The 'Advanced CZone remote control' box should only be checked if the 3rd party device supports it. By default, the Switch Bank PGN only supports an On/Off switch function. The advanced controls will allow all CZone switch functions (mom, latching, dim up/down etc) to be used.
5. Select OK to enable the first remote control block.
6. Repeat steps above for adding more blocks (if 28 switches is unsufficient).

The Remote Control is now enabled. The next step is to assign remote switches to the desired CZone circuits, go to the Circuits tab, select a circuit and add a remote switch in the 'circuit controls' window. Ensure the module configured above is selected from the drop down.

4.13 SETTINGS

General Settings are used to configure the alarm circuits, and to define custom circuit display categories and various global settings. Select the General Settings tab to access these functions.

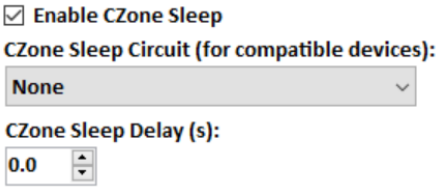


1. The ‘Alarm Circuits’ section allows a preconfigured circuit to be selected, to switch on when any alarm in any of the alarm levels groups is triggered. This functionality allows for external lights and buzzers, to complement the visual and audible alarms on the Display Interface/s.
2. These are advanced options and should not be used without instructions from BEP Marine.
3. ‘Smooth Start’ is a visual effect option available for DC loads: it controls the rate at which these loads are turned on or off. Adjust the ‘Smooth Start Startup Time’ to modify this rate. The default is two seconds.
4. ‘Minimum Dim Level’, sets the minimum dimming level allowable for diming circuits.
5. The ‘User Defined Circuit Display Categories’ allow up to five custom circuit categories to be created. Once a new category is created it will become available for selection from the circuits display catogories option.
6. ‘Long Press Delay’, set the delay time for all configured long button presses.
7. ‘Power User Login’, only accessible for ASG Power Users.
8. The ‘Reset Network Config’ option requests all modules active on the network to erase their configurations. This requires all modules to be repowered for the operation to complete.
9. The ‘Reset NMEA 2000 Addresses’ option resets the NMEA 2000 source address for all modules active on the network and forces them to claim new addresses.

4.13.1 Sleep Mode Settings

The Contact 6 PLUS, Control X, RV1 and Waterproof Keypad range include an ultra low current draw Sleep function. Introduced in RTM20, CZone now supports Sleep Mode on all legacy CZone modues. Legacy modules have reduced current draw in sleep but do not support the Ultra Low Current draw like C6Plus, CX, RV1. Displays are not yet supported.

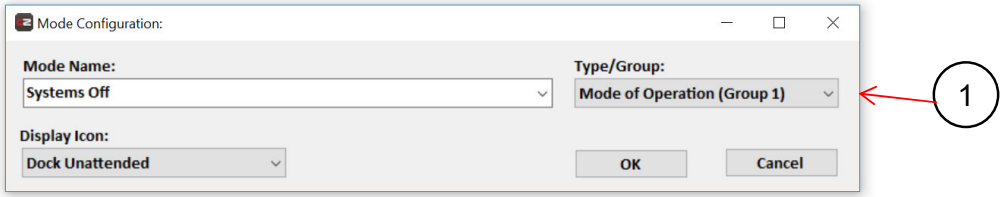
By default, CZone Sleep is enabled. You can turn this off by unticking ‘Enable CZone Sleep’ on the ‘General Settings’ tab. When sleep is disabled, the power button will still function as a back-light controller for the keypad and any other devices on the same backlight group.



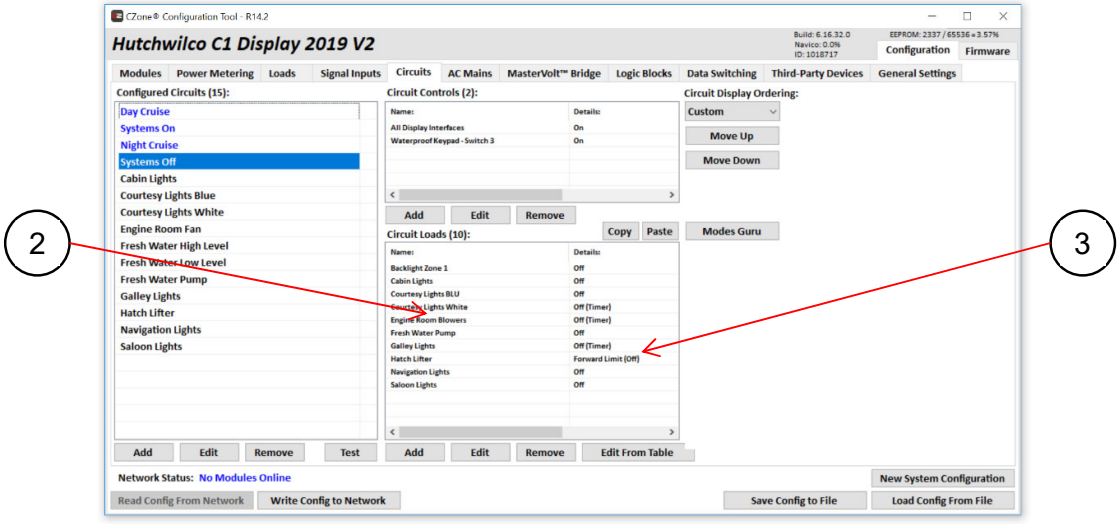
When enabled, a long press of the power button on a CZone Waterproof Keypad you can place all compatable modules on the network to sleep. When asleep, all outputs turn off and the modules enter a low current draw state for conserving battery power. You can wake up the devices via the power button or any button press on a Waterproof Keypad. The Control X and RV1 have dedicated sleep switch inputs to wake the

4.13.1.1 Sleep Mode Circuits/Modes

Alternatively, you can configure the Sleep function to be activated by a Circuit or Mode.

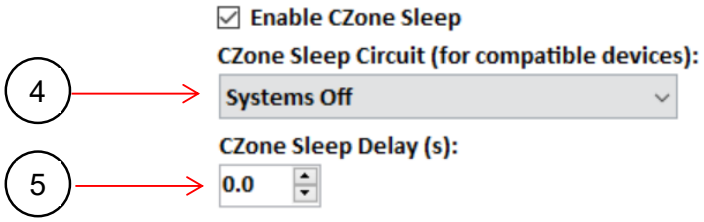


1. Add a new Mode of Operation, for this example we have created a ‘Systems Off’ mode.



2. Add desired Circuit Loads to the mode.

3. Set the desired state of each load.



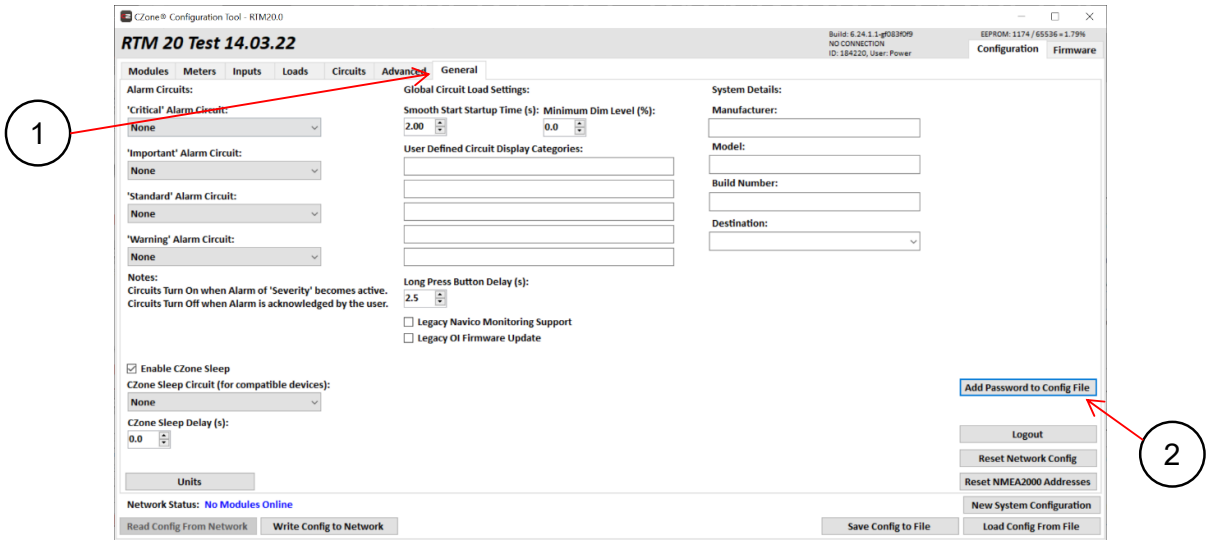
4. Select the Mode or Circuit you want to be triggered in the ‘CZone Sleep Circuit’ drop down on the ‘General Settings’ tab, for our example we will select the ‘Systems Off’ mode we created.

5. Enter a Sleep Delay if you want the system to wait for a defined period before going to sleep after triggering the Sleep Circuit.

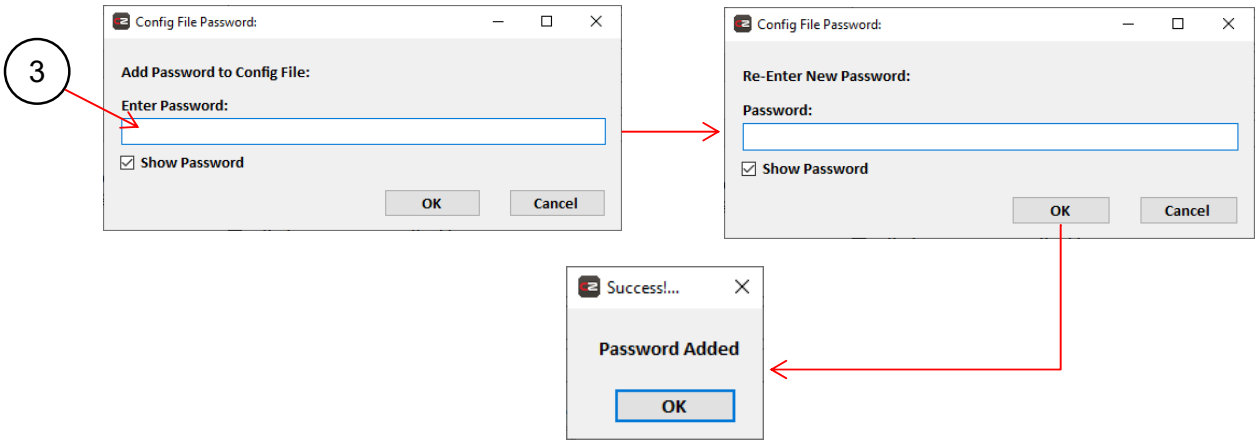
4.13.2 Configuration Password Protection

The Config Tool now has an option to password protect individual configuration files. OEM's can enable password protection to prevent end users from editing configs which may negatively affect the operation or performance of the system.

To add a password:

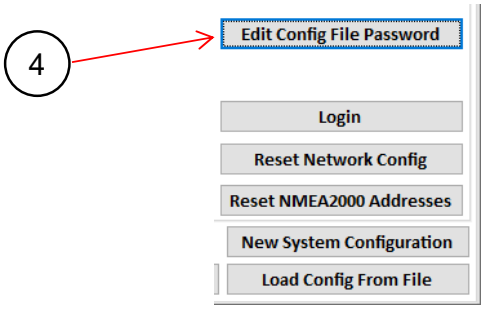


1. Password protection can be added to the configuration in the 'General' tab of the Config Tool.
2. Select 'Add Config File Password'.

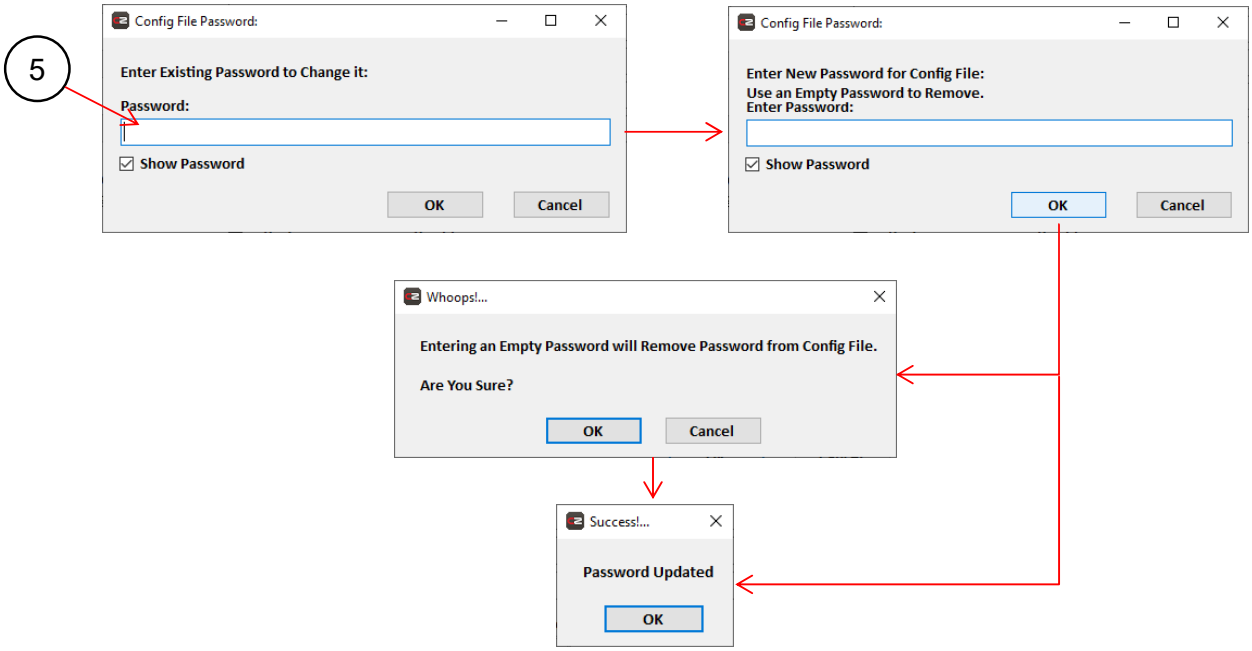


3. Follow prompts to add new passworld, select OK when finished.

Edit/Remove Password:



4. To edit/remove password, select 'Edit Config File Password'



5. Enter existing password and follow prompts to either change or remove password, select OK when finished.

5 APPENDIX

5.1 ALARMS

Alarms are integral to the CZone® system. They are used to alert the user/owner to problems with the system and/or with equipment on board. Alarms must be set up in order to function correctly.

Alarms can be visual, audible or both, depending on severity. Severities range from the basic 'Systems On' indication that a circuit is functioning correctly, to 'Critical' where immediate action must be performed to avoid damage and/or a catastrophic failure. Severity can be selected for each alarm. An overview of the alarm severities is shown in Figure 12, and an example of the Alarms page on a Display Interface is shown in Figure 13.

Alarm Level	Bell Colour	Action on Trigger	Additional Note
Critical	Red	Full-Screen Dialog Audible Tone	Acknowledgement times out after 10 minutes then re-alarms
Important	Orange	Full-Screen Dialog Audible Tone	Acknowledgement times out after 10 minutes
Standard	Yellow	Full-Screen Dialog	Full-screen dialogue disappears once alarm is acknowledged
Warning	Blue	Bell Appears	Bell disappears once alarm is acknowledged
Systems On	N/A	Item Appears in Systems Operation List	Item disappears from list once the load is turned off

Figure 12 Alarm Severities

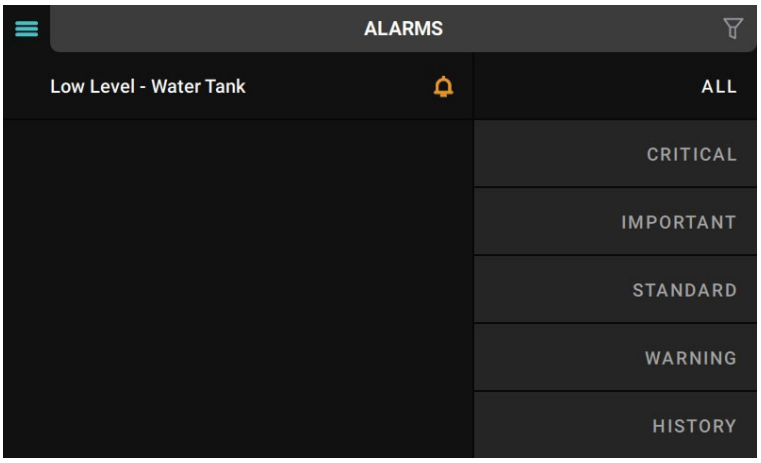


Figure 13 Alarm Severities on Touch Screen

5.2 LOGIC TYPES

This section describes various logical connections that can be made between two inputs, A and B, and an output. Each connection is described in four equivalent ways:

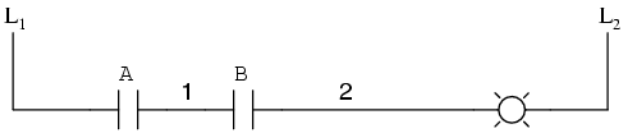
1. in writing.
2. using an electrical circuit in the form of 'ladder logic', comprising:
    - two inputs which together control the output. Each input is represented by a switch (or, in more-complex circuits, two switches). A switch may be in one of two states:
        - closed (or ON):

. In this example the label shows that the switch affects input A.
        - open (or OFF):

. In this example the label shows that the switch affects input B.
    - the output, represented by a light-bulb: . The bulb is lit i.e. the inputs as shown cause the output to be ON.
3. with a schematic symbol. Here the type of logic (e.g. AND or OR) is represented by the symbol's shape. More-complex functions may be represented by a unique symbol or a combination of simpler ones. In all cases the output is on the right and the two inputs are on the left.
4. in a truth table, again with the output on the right and the inputs on the left. The two inputs A and B may be combined in four different ways. One combination is shown in each row of the truth table, together with the resulting output. Truth tables use digits: 0 represents OFF, 1 represents ON.

5.2.1 AND

The output of the AND function is active only when input A AND input B are ON. That is, if any input is OFF then the output also is OFF. The circuit representation, truth table and symbol for the AND function are shown in Figure 14.



A	B	Output
0	0	0
0	1	0
1	0	0
1	1	1

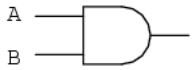
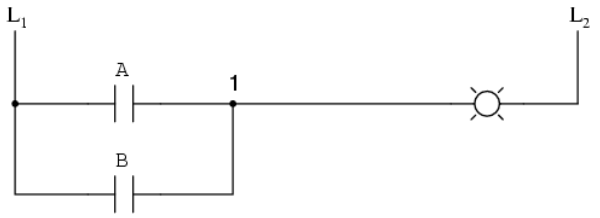


Figure 14 AND Logic Example

5.2.2 OR

The output of the OR function is active whenever input A OR input B is ON. That is, to turn the output OFF all inputs must be OFF. The circuit representation, truth table and symbol for the OR function are shown in Figure 15.



A	B	Output
0	0	0
0	1	1
1	0	1
1	1	1

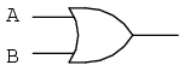
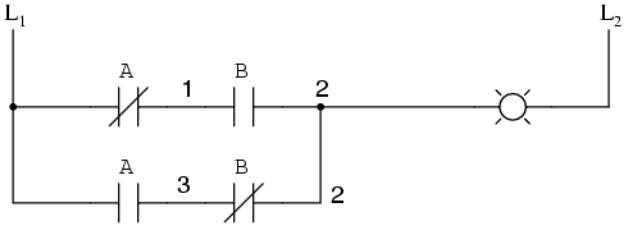


Figure 15 OR Logic Example

5.2.3 XOR

The output of the XOR function is only active when the inputs are different: one input must be OFF and the other ON. That is, if the inputs are the same then the output will be OFF. (The 'X' in XOR is short for 'mutually exclusive'.) The circuit representation, truth table and symbol for the XOR function are shown in Figure 16.



A	B	Output
0	0	0
0	1	1
1	0	1
1	1	0

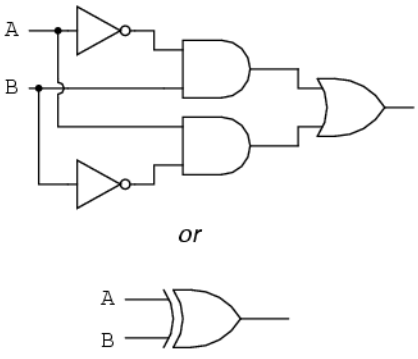
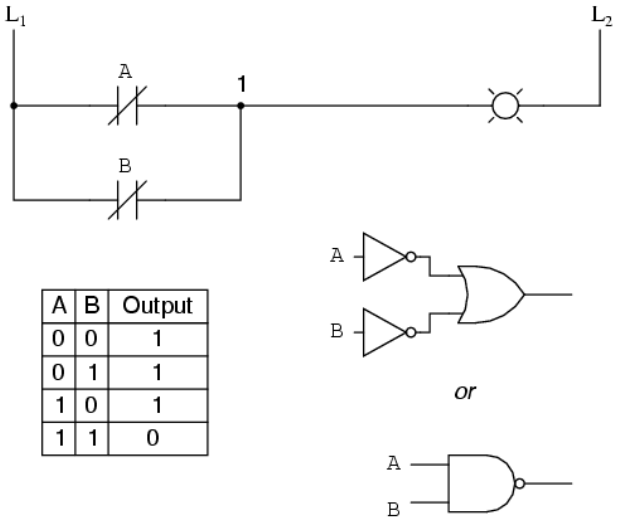


Figure 16 XOR Logic Example

5.2.4 NAND

The NAND function is derived from a Not AND state; it is opposite in logic to the AND function. Its output is active when any input is OFF. That is, to turn the output OFF, both inputs must be ON. The circuit representation, truth table and symbol for the NAND function are shown in Figure 17.

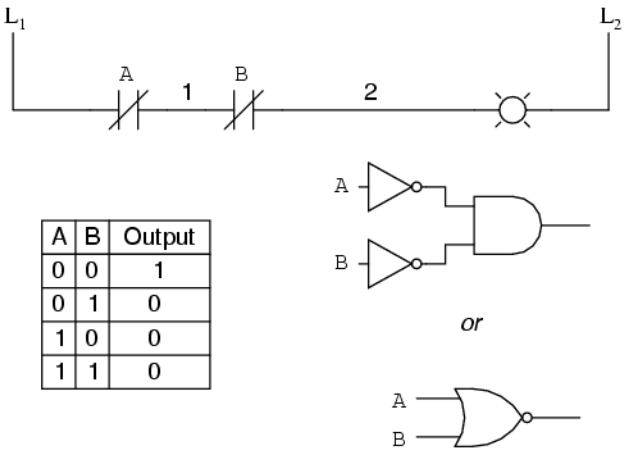


A	B	Output
0	0	1
0	1	1
1	0	1
1	1	0

Figure 17 NAND Logic Example

5.2.5 NOR

The NOR function is derived from a Not OR state; it is opposite in logic to the OR function. Its output is only active when both inputs are OFF. That is, if any input is ON then the output will be OFF. The circuit representation, truth table and symbol for the NOR function are shown in Figure 18.

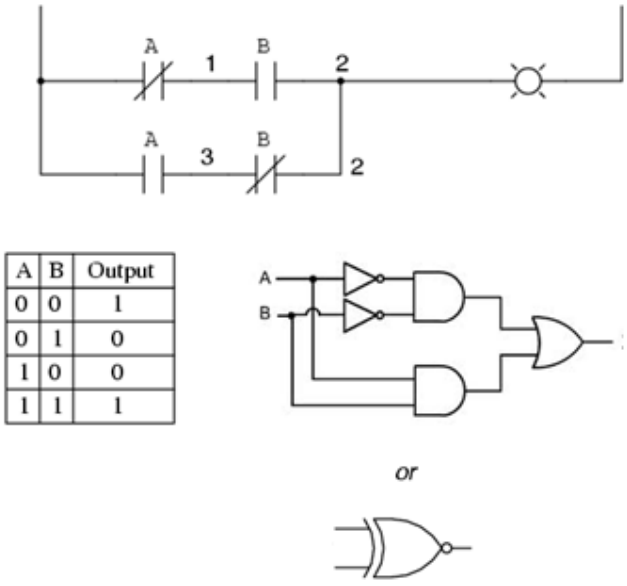


A	B	Output
0	0	1
0	1	0
1	0	0
1	1	0

Figure 18 NOR Logic Example

5.2.6 XNOR

The XNOR function is derived from a Not XOR state; it is opposite in logic to the XOR function. Its output is only active when both inputs are the same. That is, if the inputs are different then the output will be OFF. The circuit representation, truth table and symbol for the XNOR function are shown in Figure 19.



A	B	Output
0	0	1
0	1	0
1	0	0
1	1	1

Figure 19 XNOR Logic Example

5.3 SUPPORTED MASTERVOLT (MASTERBUS) DEVICES

See below for a list of all Mastervolt (Masterbus) devices that can be configured automatically through the CZone® Configuration Tool:

Device Name	Article #	Release
MasterShunt	77020100	
MasterShunt	77020110	R16
MasterShunt	77020115	R16
Alpha Pro MB	45512000	
Alpha Pro MB	45513000	R16
System Switch 6kW	55008005	
System Switch 10kW	55008105	
System Switch 16kW	55008205	
Li-ion Battery	66020160	
Li-ion 12/2500	66012500	
Li-ion 12/5000	66015000	
Li-ion 24/5000	66025000	
MLI Ultra 12/1250	66011250	R20
MLI Ultra 24/1250	66021250	R20
MLI Ultra 12/2750	66012750	R16
MLI Ultra 12/3000	66013000	R20
MLI Ultra 12/5500	66015500	R16
MLI Ultra 12/6000	66016000	R20
MLI Ultra 24/5500	66025500	R16
MLI Ultra 24/6000	66026000	R20
Mass GI 3.5	88000350	
ISO Mass GI 3.5	88000355	
Mass GI 7.0	88000355	
Mass Combi (via Serial Interface)	77030450	
Mac/Magic DC-DC Converter (via Serial Interface)	77030450	
Mass Combi 12/1600-60 / 230V	36011600	
Mass Combi 12/2200-100 / 230V	36012200	
Mass Combi 24/1800-35 / 230V	36021800	

Device Name	Article #	Release
Mass Combi 24/2600-60 / 230V	36022600	
CombiMaster 12/3000-100 (230 V)	35013000	R16
CombiMaster 24/3000-60 (230 V)	35023000	R16
CombiMaster 12/2000-60 (230 V)	35012000	R16
CombiMaster 24/2000-40 (230 V)	35022000	R16
CombiMaster 12/800-40 (230 V)	35010800	R16
CombiMaster 24/800-300 (230 V)	35020800	R16
CombiMaster 12/500-30 (230 V)	35010500	R16
CombiMaster 12/800-40 (120 V)	35510800	R16
CombiMaster 12/1000-40 (120 V)	35511000	R16
CombiMaster 12/1500-60 (120 V)	35511500	R16
CombiMaster 12/2000-100 (120 V)	35512000	R16
CombiMaster 12/3000-160 (120 V)	35513000	R16
CombiMaster 24/2000-60 (120 V)	35522000	R16
CombiMaster 12/3500-200 (120 V)	35513500	R20
CombiMaster 24/3500-100 (120 V)	35523500	R20
CombiMaster 24/4500-120 (120 V)	35524500	R20
CombiMaster 48/5000-200 (120 V)	35545000	R20
ChargeMaster 12/25-3	44010250	
ChargeMaster 12/35-3	44010350	
ChargeMaster 12/50-3	44010500	
ChargeMaster 12/70-3	44010700	
ChargeMaster 12/100-3	44011000	
ChargeMaster 24/12-3	44020120	
ChargeMaster 24/20-3	44020200	
ChargeMaster 24/30-3	44020300	
ChargeMaster 24/40-3	44020400	
ChargeMaster 24/60-3	44020600	

Device Name	Article #	Release
MAC Plus 12/12	81205100	
MAC Plus 24/12	81205200	
MAC Plus 12/24	81205300	
MAC Plus 24/24	81205400	
Mass Charger 24/15-2	40020156	
Mass Charger 24/25-2	40020256	
Mass Charger 24/25-2 DNV	40020266	
Mass Charger 24/50-2	40020506	
Mass Charger 24/75	40020756	
Mass Charger 24/100	40021006	
Mass Charger 24/100 3Ph	40031006	
Mass Charger 48/25	40040256	
Mass Charger 48/50	40040506	
Mass Charger 12/60-2	40010606	
Mass Charger 12/80-2	40010806	
DDC Generator	77031600	
Mass Sine Inverter	77030700	
Mass Sine Ultra 24/4000	26024000	
AC Power Analyser	77031200	
Solar ChargeMaster 60	131906000	
Mass Combi Ultra 48/3500-100	38343500	
Mass Combi Ultra 24/3500-100	38023500	
Mass Combi Ultra 12/3000-100	38013000	
Mass Combi Pro 12/3000-150	38513000	
Mass Combi Pro 24/3500-100	38523500	
Alpha Pro	45513000	
Mastershunt MKIII	77020110	

Device Name	Article #	Release
ChargeMaster 24/80-3	44020800	
ChargeMaster 24/100-3	44021000	
ChargeMaster Plus 12/15-3	44310150	R16
ChargeMaster Plus 12/15-3	44310250	R16
ChargeMaster Plus 12/15-3	44310350	R16
ChargeMaster Plus 12/15-3	44320120	R16
ChargeMaster Plus 12/15-3	44310500	R16
ChargeMaster Plus 12/15-3	44310750	R16
ChargeMaster Plus 12/15-3	44311000	R16
ChargeMaster Plus 12/15-3	44311500	R16
ChargeMaster Plus 12/35	44310355	R20
ChargeMaster Plus 12/50	44310505	R20
ChargeMaster Plus 12/75-3	44310750	
ChargeMaster Plus 12/100-3	44311000	
ChargeMaster Plus 12/150-3	44311500	
ChargeMaster Plus 24/12-3	44320120	
ChargeMaster Plus 24/20-3	44320200	
ChargeMaster Plus 24/40-3	44320400	
ChargeMaster Plus 24/60-3	44320600	
ChargeMaster Plus 24/80-3	44320800	
ChargeMaster Plus 24/110-3	44321100	
ChargeMaster Plus 24/40	44320205	R20
ChargeMaster Plus 24/30	44320305	R20
ChargeMaster Plus 12/15-3	44310150	
ChargeMaster Plus 12/25-3	44310250	
ChargeMaster Plus 12/35-3	44310350	
ChargeMaster Plus 12/50-3	44310500	

5.4 SUPPORTED MASTERVOLT (CZONE COMPATIBLE) DEVICES

See below for a list of all Mastervolt (CZone Compatible) devices that can be configured from the Modules tab in the CZone® Configuration Tool:

Device Name	Article #	Release
Mastershunt 500	77020115	
ChargeMaster Plus 12/35	44310355	R18
ChargeMaster Plus 12/50	44310505	R18
ChargeMaster Plus 12/75	44310755	
ChargeMaster Plus 12/100	44311005	
ChargeMaster Plus 24/20	44320205	R18
ChargeMaster Plus 24/30	44320305	R18
ChargeMaster Plus 24/40	44320405	
ChargeMaster Plus 24/60	44320605	
ChargeMaster Plus 24/110	44321105	
ChargeMaster Plus 24/80	44320805	
CombiMaster 12V/2000 60A	35012000	
CombiMaster 12V/3000 100A	35013000	
CombiMaster 12V/800 40A	35510800	
CombiMaster 12V/1000 40A	35511000	
CombiMaster 12V/1500 60A	35511500	
CombiMaster 12V/2000 100A	35512000	
CombiMaster 12V/3000 160A	35513000	
CombiMaster 24V/2000 40A	35022000	
CombiMaster 24V/3000 60A	35023000	
CombiMaster 24V/2000 60A	35522000	
CombiMaster 24V/3000 70A	35523000	
CombiMaster 24V/4500 120A	35524500	R20
CombiMaster 48V/5000 70A	35545000	R20
MLI Ultra Battery 12/2750	66012750	R16
MLI Ultra Battery 12/5500	66015500	R16
MLI Ultra Battery 24/5500	66025500	R16

Device Name	Article #	Release
MLI Ultra Battery 12/1250	66011250	R18
MLI Ultra Battery 24/1250	66021250	R18
MLI Ultra Battery 12/3000	66013000	R20
MLI Ultra Battery 12/6000	66016000	R20
MLI Ultra Battery 24/6000	66026000	R20

5.5 NMEA 2000 PGNS SUPPORTED FOR DATA SWITCHING

PGN Number	Description	Fields
127503	AC Input Status	Voltage, Current, Frequency, Real Power
127504	AC Output Status	Voltage, Current, Frequency, Real Power
127505	Fluid Level	Fluid Level
127506	DC Detailed Status	State of Charge, State of Health, Time Remaining
127507	Charger Status	Operating State, Charger Mode, Charger Enable/Disable
127508	Battery Status	Battery Voltage, Battery Current, Battery Case Temperature
127509	Inverter Status	Operating State, Inverter Enable/Disable
127488	Engine Parameters	Engine Speed, Boost Pressure, Tilt/Trim
127489	Engine Parameters	Oil Pressure, Oil Temp, Engine Temp, Alternator Potential, Fuel Rate, Total Engine Hours, Coolant Pressure, Fuel Pressure, Engine Load, Engine Torque
129026	SOG	SOG
130312	Temperature	Actual Temperature
130314	Pressure	Pressure
128267	Water Depth	Depth

5.6 NMEA 2000 PGN'S TRANSMITTED FROM CZONE MODULES

5.6.1 Meter Interface

PGN Number	Description	Fields
127503	AC Input Status	Voltage, Current, Frequency, Real Power
127504	AC Output Status	Voltage, Current, Frequency, Real Power
127506	DC Detailed Status	State of Charge
127508	Battery Status	Battery Voltage, Battery Current
127744	AC P&C Phase A	AC Power and Current
127745	AC P&C Phase B	AC Power and Current
127746	AC P&C Phase C	AC Power and Current
127747	AC V&F Phase A	AC Voltage and Frequency
127748	AC V&F Phase B	AC Voltage and Frequency
127749	AC V&F Phase C	AC Voltage and Frequency

5.6.2 Signal Interface

PGN Number	Description	Fields
127505	Fluid Level	Fluid Level
130312	Temperature	Actual Temperature
130314	Pressure	Pressure
130316	Temperature, Extended Range	Actual Temperature

5.6.3 AC Mains Interface

PGN Number	Description	Fields
127503	AC Input Status	Voltage, Current, Frequency, Real Power
127504	AC Output Status	Voltage, Current, Frequency, Real Power
127744	AC P&C Phase A	AC Power and Current
127745	AC P&C Phase B	AC Power and Current
127746	AC P&C Phase C	AC Power and Current
127747	AC V&F Phase A	AC Voltage and Frequency
127748	AC V&F Phase B	AC Voltage and Frequency
127749	AC V&F Phase C	AC Voltage and Frequency

5.6.4 Combination Output Interface/Control 1

PGN Number	Description	Fields
127505	Fluid Level	Fluid Level
127508	Battery Status	Battery Voltage
130312	Temperature	Actual Temperature
130314	Pressure	Pressure
130316	Temperature, Extended Range	Actual Temperature

5.6.5 Masterbus Bridge Interface

PGN Number	Description	Fields
127503	AC Input Status	Voltage, Current, Frequency, Real Power
127504	AC Output Status	Voltage, Current, Frequency, Real Power
127505	Fluid Level	Fluid Level
127506	DC Detailed Status	State of Charge, State of Health, Time Remaining
127507	Charger Status	Operating State, Charger Mode, Charger Enable/Disable
127508	Battery Status	Battery Voltage, Battery Current, Battery Case Temperature
127509	Inverter Status	Operating State, Inverter Enable/Disable
130312	Temperature	Actual Temperature
130314	Pressure	Pressure

5.6.6 RV1

PGN Number	Description	Fields
127508	Battery Status	Battery Voltage, Battery Current
127506	DC Detailed Status	State of Charge, Time Remaining, DC Type
127505	Fluid Level	Fluid Level
130312	Temperature	Actual Temperature
130314	Pressure	Pressure
130316	Temperature, Extended Range	Actual Temperature

5.6.7 Control X

PGN Number	Description	Fields
127508	Battery Status	Battery Voltage, Battery Current
127506	DC Detailed Status	State of Charge, Time Remaining, DC Type
127505	Fluid Level	Fluid Level
130312	Temperature	Actual Temperature
130314	Pressure	Pressure
130316	Temperature, Extended Range	Actual Temperature