Supervisory Module
Installation / Operation Manual

Model:
C2C-32

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M-C2C-32
Oct 2010

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Receiving Instructions

Please Note: For your protection, the following information and the product manual should be read and thoroughly understood before unpacking, installing and using the equipment.

We present all equipment to the delivering carrier securely packed and in perfect condition. Upon acceptance of the package from us, the delivering carrier assumes responsibility for its safe arrival to you. Once you receive the equipment, it is your responsibility to document any damage the carrier may have inflicted, and to file your claim promptly and accurately.

Package Inspection

- Examine the shipping crate or carton for any visible damage: punctures, dents and any other signs of possible internal damage.
- Describe any damage or shortage on the receiving documents and have the carrier sign their full name.

Equipment Inspection

- Within fifteen days, open crate or carton and inspect the contents for damages. While unpacking, be careful not to discard any equipment, parts or manuals. If any damage is detected, call the delivering carrier to determine the appropriate action. They may require an inspection.

  Save all the shipping materials for the inspector to see!

- After the inspection has been made, if damage has been found, call us. We will determine if the equipment should be returned to our plant for repair or if some other method would be more expeditious. If it is determined that the equipment should be returned to us, ask the delivering carrier to send the packages back at the delivering carrier's expense.
- If repair is necessary, we will invoice you for the repair so that you may submit the bill to the delivering carrier with your claim forms.
- It is your responsibility to file a claim with the delivering carrier. Failure to properly file a claim for shipping damages may void warranty service for any physical damages later reported for repair.

Handling

Handle the equipment with care. Do not drop or lean on front panel or connector. Keep away from moisture.

Identification Labels

Model number and serial number are clearly marked on all equipment. Please refer to these numbers in all correspondence with Newmar.

Installation CD

You may have received a CD with your Power System and SM31/SM32. This contains the user manuals relevant to the System you have purchased, plus the SM3x Configuration Software. This software enables direct communication from your computer to the SM3x via the USB port.

Note: You will require Administrator rights on your computer to install this software.

If this is the first time you have used the SM3x Config. Software, then the installation process will guide you through the installation of:

- the USB drivers,
- the Microsoft .Net Framework
- the SM3x Configuration Software itself.

Upon inserting the CD, open the file directory. In the root directory there is a file called Setup_sm3xconf_4.2.exe. Double click on this and you will be guided through the installation process. Normally, you should only be required to click "next" on all prompts.

The number "…4.2" denotes the release issue of the Configuration Software (the file you receive may be 4.3, 4.4 or greater). If you already have an earlier version installed than the number denoted there, then you can automatically update your existing software by double-clicking on this .exe file (it will not re-install your USB drivers or the .Net Framework).

The first time you connect your computer to an SM3x via the USB, Windows will "find new hardware". Proceed to install the drivers "automatically".

If, during this process you get a message from Windows stating that the driver is unsigned, it is not a problem. You must continue with the driver installation.

1 Features

1.1 Introduction

The SM31 and SM32 system monitors are designed for integration into DC power systems using Newmar C2R range of rectifiers, Newmar CM range of DC/DC converters and Newmar IM range of inverters. These monitors will display system parameters for the user. They control the system float voltage as temperature varies to ensure the batteries are kept at optimum charge. They also collect alarms from system components, display alarm status and provide a relay interface to allow for remote monitoring of alarms.

The SM31 and SM32 also incorporate the following features:

- System voltage metering for primary system DC supply. (e.g. 48V primary DC output)
- Two sets of four voltage alarm thresholds as standard, for use with primary and secondary DC outputs.
- Support for DC-DC converters (12V, 24V, 48V, 60V Outputs).
- Support for Inverters (110Vac and 240Vac Outputs)
- Automatic system voltage control
- Load, rectifier and battery current metering and alarms
- Individual rectifier and converter current indication
- Active rectifier/converter current share
- Rectifier system current limit
- Battery current limit
- Battery and room temperature metering and alarms (when fitted with optional temperature sensors)
- Temperature compensation of float voltage (when fitted with optional temperature sensors)
- Manual equalise charging to prolong the life of the batteries
- Periodic equalise charging to prolong the life of the batteries
- Fast charging after battery discharge
- Battery capacity remaining indication
- Battery testing facility
- Low voltage disconnect (triple standard or dual magnetically-latched contactors)
- Up to six user defined digital inputs
- I/O Expansion board capability.
  The addition of an I/O Expansion board to the monitor increases the number of analogue inputs, digital inputs and relay outputs available. The monitor allows for these new inputs/outputs to be logically combined allowing a degree of control of peripheral functions. E.g. Temperature triggered room fan or humidity detection.
- USB Serial communications interface
- Network connectivity (Web access) SM32 Only
- Facility for AC supply metering and alarms with optional Mains Monitor
- Optional battery mid -point monitoring

1.2 Front Panel Display and Keys

The front panel of the monitor has a LCD display, alarm LED's, USB interface and keypad. These are used to:

- display metered values
- display active alarms
- access the menu for setting up the system parameters
- One-to-one communication (USB) with the monitor

1.3 Alarms and Status Indicators

LED Indictors

The following LED indicators are provided on the monitor front panel:

This green LED indicates the monitor has power and is operating correctly.

This yellow LED indicates an alarm is active. The actual alarm that is active will depend on the alarm mapping and can be read from the LCD display. This LED would usually be used to indicate a Non-Urgent Alarm state has occurred.

This red LED indicates an alarm is active. The actual alarm that is active will depend on the alarm mapping and can be read from the LCD display. This LED would usually be used to indicate an Urgent Alarm has occurred.

The monitors are fitted with an audible buzzer which can be configured to alert to any alarm depending on the alarm mapping. To disable the buzzer when it becomes active, press any key.

Relay Outputs

The monitors are fitted with 3 alarm relays as standard. However, further relays are available with the addition of I/O boards. These relays are activated by alarms or control functions.

A relay can be configured to activate on any logical combination of alarm states. The combination is defined in the configuration file for each monitor.

1.4 Front Panel Serial Interface

The front panel serial port (USB) is used for local PC connection to a monitor. The control parameters of the monitor are set using a configuration file that can be loaded through this interface.

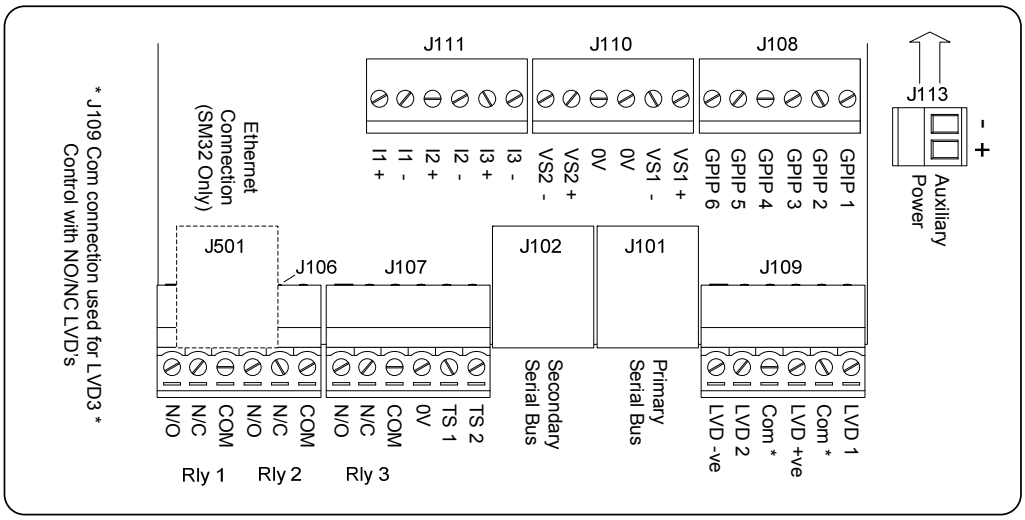
2 Installing the Monitor

The SM31 and SM32 monitors are have three mounting options:

- Package for 1U (44.45mm) x 22E (111.76mm) slot.
- Package for 1U (44.45mm) x 84E (Full rack width) slot.
- Package for panel mounting with large display.

All mounting options perform and offer the same features.

2.1 Terminations to Monitor Main PCB



Monitor Connector Layout

2.1.1 General

The terminal blocks used on the monitor will accommodate up to 1.5mm² wire.

2.1.2 Supply Voltage

The monitors may be used in systems with nominal voltages 12V, 24V, 48V or 60V. A monitor can operate with input supply from 18V to 75V. It is not necessary to make physical adjustments to a monitor when used in different voltage systems. It will, however, be necessary to alter the configuration parameters to suit the system voltage by loading a suitable configuration file.

2.1.3 Rectifier/Converter Comms

A monitor communicates to the rectifier, converter, inverter and auxiliary system modules using serial communications over RJ45 patch cables. The monitor has two separate serial communication connections: Primary Serial Bus connector (BUS 1) which is on RJ45 connector J101 and Secondary Serial Bus Connector (BUS 2) which is on RJ45 connector J102. In smaller system all serial communications are generally done using BUS1 only. However, in larger systems the capacity of BUS1 may be exceeded. In these cases the guide for use of each bus is as follows:

- Rectifier modules should be connected to BUS1, but if there is insufficient capacity on this bus to accommodate them all, then the balance can be placed on BUS2.
- DC-DC converters can be placed on either BUS1 or BUS2.
- Inverters should be placed on BUS1.

- System auxiliary modules which require supply voltage from the rectifier bus (BCM ACM, etc) can only be connected to BUS1.
- SM3x I/O expansion boards can only be connected to BUS1.

The monitor serial bus capacities are is as follows:

BUS1 Up to:

63 combined Rectifier Modules, Inverters and DC-DC Converters
4 SM3x I/O Expansion Boards
2 AC Metering Modules (ACM)
4 Battery Condition Monitors (BCM)
1 Static Transfer Switch (SBM)

BUS 2 Up to

63 combined Rectifier Modules and DC-DC Converters

Note: *When a monitor is used outside a rack it must be powered through V+ and V- Power (Pins 1 and 2 or Pins 7 and 8) to the Primary Serial Bus connector (J101) or through the auxiliary power connector J113. For connection to J101, the connected cable should be divided from the RJ45 connector to separate wires. The pin allocation on the RJ45 is as follows:*

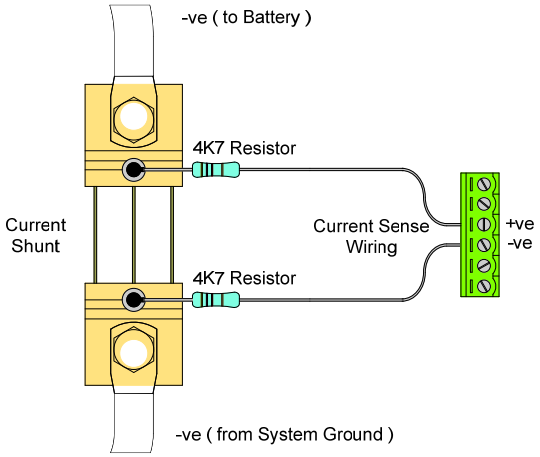
Pin 1	*V- Power*	
Pin 2	*V+ Power*	
Pin 3	*Rectifier Serial Bus*	
Pin 4	*Not Assigned*	
Pin 5	*Voltage Sense -*	*(See note below)*
Pin 6	*Voltage Sense +*	*(See note below)*
Pin 7	*V+ Power*	
Pin 8	*V- Power*	

Note: Voltage sense requires 4K7 resistors fitted in series in both + and – lead, to protect the monitor, cable and maintain calibration.

2.1.4 Current measurements

The SM31 and SM32 monitors have three current inputs (I1, I2, I3), each configured to take a bipolar input within the range ±50mV.

The current sensors must be placed in the negative of the DC system. When the current sensors are wired to a monitor a 4k7 resistor should be placed in series with each sense wire at source. This protects the sense wire and provides the required input resistance to a monitor to maintain the calibration. Current shunts are available from Newmar which already have these resistors fitted.



Connection of a shunt to the monitor

2.1.5 Voltage Sense

The SM31 and SM32 can operate both rectifiers and DC/DC converters, so they are able to sense two bus voltages. These two inputs are VS1 and VS2, where VS1 is used for the rectifier output voltage sensing and VS2 is used for sensing the converter output voltage.

Monitor voltage sense can be fed into the monitor in either of two ways.

The Primary Serial Bus connector allows for sense voltage (VS1) to come direct from the rectifier and shelves. Sensing direct from the shelf via the Serial Bus Connector requires the correct jumpers to be fitted on the shelf backplane, no other external hardware is required (See Rectifier Shelf Manual).

The Secondary Bus connector does not allow for voltage sense, so the converter output voltage must be connected to VS2 terminals in J110 as described below.

If separate voltage sense is desired, there are also connection points on connector J110 for both VS1 and VS2. When separate voltage sense wires are used, for protection of the sense wiring and to maintain the calibration of a monitor, a 4k7 resistor is required in series with both the positive and negative leads of the voltage sense. The resistors should be placed as close to the source as possible to protect the cable.

2.1.6 Temperature Sensor (Optional)

C2TS-2 Temperature sensor and cable assembly (length 2 metre)
C2TS-7 Temperature sensor and cable assembly (length 7 metre)

When connecting the temperature sensor to the monitor, the brown wire should be connected to terminal 0V and the blue wire to terminal TS1 (or TS2) on connector J107.

The temperature sensors can be configured to measure any temperature. However, TS1 is normally designated as Battery Temperature. It should be placed in a position that represents the ambient battery temperature and is required for temperature compensation of float voltage.
TS2 is normally designated as Room Temperature.

2.1.7 Ethernet Connection (SM32 only)

An SM32 monitor supports Ethernet and the network port is provided on the PCB above the main monitor PCB. The network connection should be made using the RJ45 connector (J105).

Settings for network addresses should be done using the SM3X Configuration Utility.

2.1.8 General Purpose Digital Inputs (GPIP)

A monitor can be configured to accept up to 6 digital inputs (GPIP1 - –PIP6).

The inputs are activated by connecting the system positive (usually system common) to the input.

These inputs may be assigned to contribute to alarm states within a monitor. This state mapping is defined in a monitor configuration file.

2.1.9 Relays 1 to 3

The monitors have 3 relay outputs for remote indication of alarms (if more relay outputs are required, the optional SM3x I/O PCB can be fitted, which has 8 more alarm relays – see Section 2.2). The function of each relay is defined in the configuration file.

The connections are on the rear of a monitor with one set of voltage free contacts for each relay. The labelling refers to the contact state when the relay is not energised.

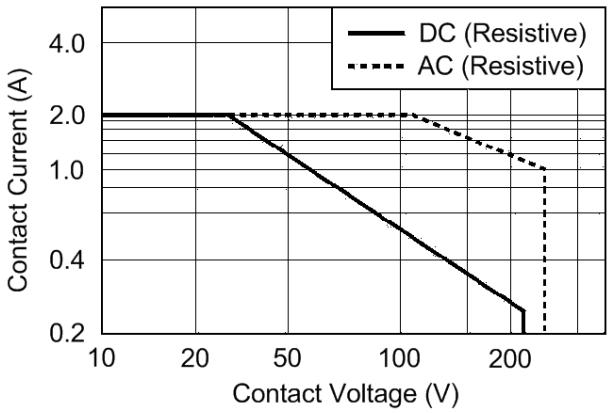
NC = normally closed contacts
NO = normally open contact
COM = common

Relay 1 is permanently configured as Monitor OK, and as such is in a Normally Energised state.

Relays 2 and 3 can be configured to represent any alarm or combination of alarms. However, Relay 2 is normally configured as an Urgent Alarm and Relay 3 as a Non-Urgent Alarm. Once again, these are normally programmed as “no alarm = normally energised”. This is because if the system was to totally lose power, then it would be desirable for these summary alarms to change state due to the fact that the Urgent and Non-urgent events will have taken place to cause such an alarm. To check the actual state of the alarm contacts, simply measure the relay output terminals with a multi-meter (for continuity).

Note: The relays fitted are not suitable for use with inductive type loads. A suitably rated interface relay should be used for inductive load applications.

Relay Contact Ratings



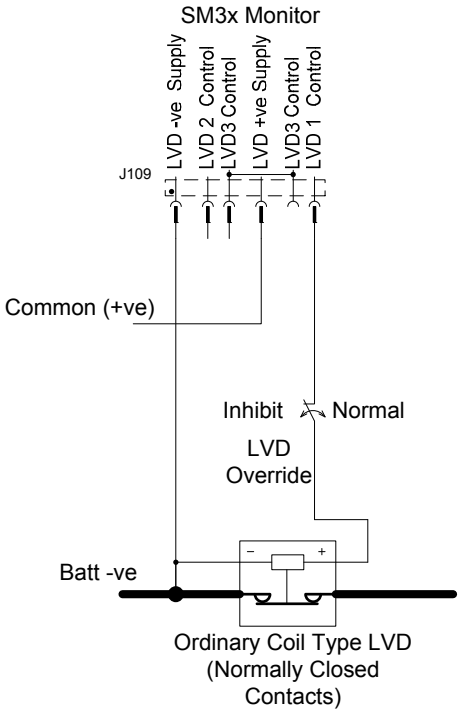
2.1.10 Low Voltage Disconnect (LVD)

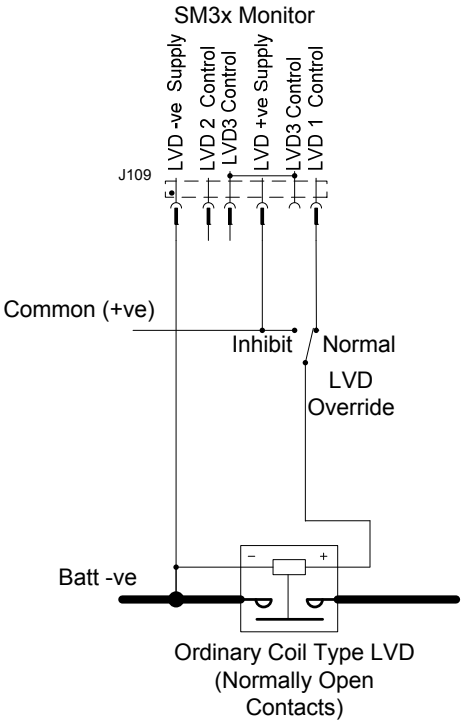
The Low Voltage Disconnect (LVD) function in the monitors can be used for load disconnect or battery disconnect. The monitor is also capable of being used with either standard coil type or magnetically-latched type contactors.

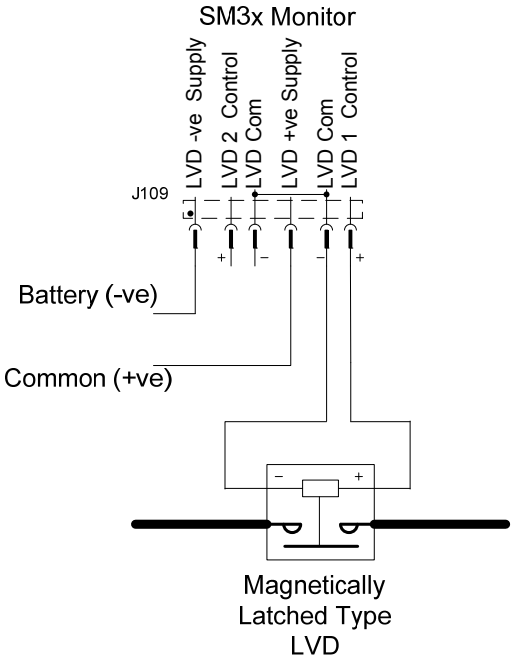
The monitors have a dedicated FET drive circuit for powering contactors. This drive circuit has a rating of 3A per LVD output.

The monitors will control up to 3 ordinary coil type contactors but only 2 magnetically latched type contactors. The method of connection is different for each type of contactor.

The following figures give examples of how the different types of LVD are to be connected to a monitor. (For simplicity only one LVD is shown in each diagram, but the same principles apply to subsequent LVDs connected.)





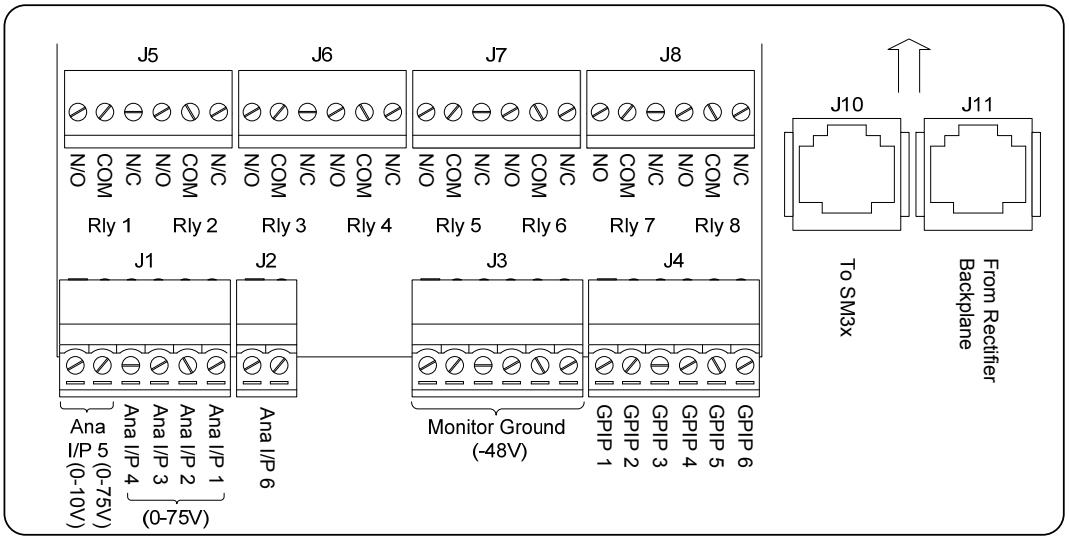


Examples of different types of LVD connection

2.2 Terminations to the SM3x I/O Expansion Board (I/O PCB)

2.2.1 General

The I/O PCB provides additional input and outputs to the monitor. One board can be mounted inside the monitor enclosure. Any board may also be separately elsewhere in the DC system.



Each I/O PCB is fitted with:

- 8 Relay outputs (refer sections 2.1.8 above for contact ratings)
- 6 Digital inputs GPIB1 – 6
- 6 Analogue inputs Ana I/P 1 – 6

The terminal blocks used on the I/O PCB will accommodate up to 1.5mm² wire.

2.2.2 Connection to the monitor

The I/O PCB must be connected to BUS1 of the monitor.

When the I/O PCB is mounted in the monitor case, this is done by connecting a short RJ45 cable between J10 on the I/O PCB and J101 on the monitor. In this case BUS1 is then extended to other modules via connector J11 on the I/O PCB.

When the I/O PCB is mounted elsewhere in the DC system, it can be connected into BUS1 at any point. The monitor side of the bus should be connected to J10 and the other side to J11.

The I/O PCB is powered from the auxiliary power provided on the RJ45 connection.

2.2.3 Using the Digital Inputs

The inputs are activated by connecting the system positive (usually system common) to the input.

These inputs may be assigned to contribute to alarm states within a monitor. This state mapping is defined in a monitor configuration file.

2.2.4 Using the Analogue Inputs

The I/O PCB has a total of 6 Analogue inputs:

- Ana I/P1, Ana I/P2, Ana I/P3, Ana I/P4
  These are 0-75V voltage inputs referenced to the system negative (normally live).
- Ana I/P5
  This input has two options: 0-10V or 0-75V Voltage input. There are separate terminals provided for each option. Appropriate scaling to these inputs can be provided in the monitor configuration.
- Ana I/P6
  This is a +/-50mV differential voltage input referenced to system live and designed for a shunt type input for measuring current.
- Commons
  These commons are provided for use with the analogue inputs. All common terminals are linked and connected to the system negative bus (normally system live).

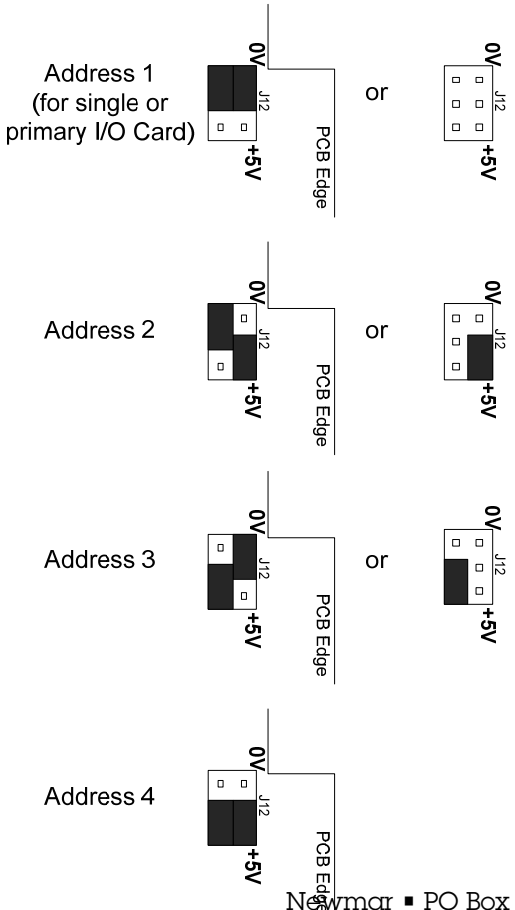
These inputs may be assigned to contribute to states within the monitor. This state mapping is defined in the monitor configuration file.

2.2.5 Connecting Multiple I/O PCBs

The SM3x can have up to 4x I/O Expansion PCBs attached to it.

These are simply linked in a daisy-chain with RJ45/CAT5 cables, jumping from J10 to J11 (all of the RJ45 pins on the PCBs are simply connected in parallel.

The PCB addresses (i.e., I/O PCB #1, #2, #3 or #4) are set by jumper settings on header J12. So the order of connection of the RJ45 cables does not matter. The Header connections are shown here:



3 Description of Monitor Processes and Functions

3.1 Introduction

The SM31 and SM32 monitors gather information from the DC system and run processes that control the function of the system. These processes are described below.

3.2 Voltage Control

The SM31 and SM32 monitors have the capability to actively control the output voltage of any rectifier modules or DC/DC converters in the DC system they monitor.

The output voltage of a rectifier/converter will, if unadjusted, drop as the load current from that module increases. This is due to the resistance of the output circuit. The voltage drop (droop) from no-load to full-load can be up to 0.5V.

The Voltage Control process in a monitor will, if enabled, detects the output voltage of the rectifiers and re-adjusts the rectifier/converter voltage set point to compensate for the voltage droop that occurs as load current increases.

3.3 Current Share

Current share is essential to prevent premature aging of rectifiers/converters due to having to provide a disproportionate share of the output current.

The rectifiers and DC/DC converters produced by Newmar will current share without monitor Current Share enabled. However, if Current Share is enabled in the monitor, the current share performance will be enhanced.

3.4 Temperature Compensation

Battery manufacturers recommend that batteries are charged at different voltages depending on the temperature of the batteries. The monitor will automatically adjust the float voltage of the rectifiers with temperature when the temperature compensation function is enabled.

Temperature compensation works only on the float voltage of the rectifiers connected to the monitor. Any converters within the system are not affected by temperature compensation. Nor are equalise, fast charge or other process settings.

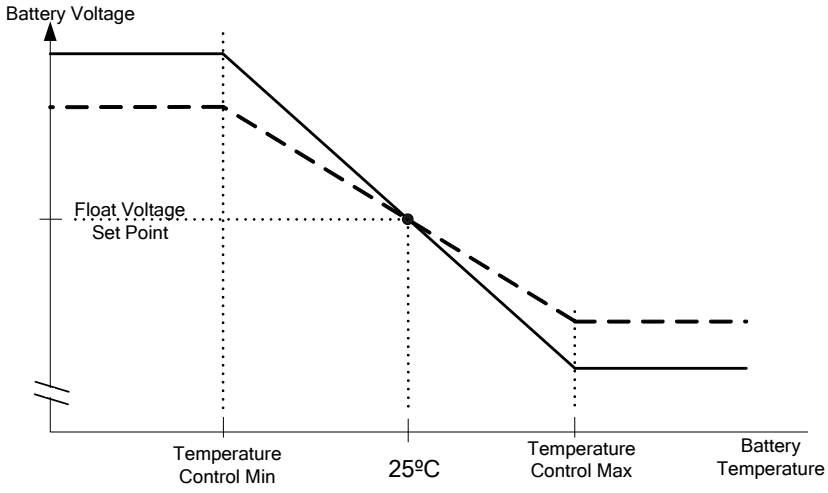
When temperature compensation is enabled, the two alarm states, High Float Alarm Bus 1and Low Float Alarm Bus 1, are automatically varied with temperature along with the float voltage. This prevents false activation of these alarms under high and low temperature conditions.

The rate of change of the float voltage with temperature (slope), the number of battery cells, and the minimum and maximum temperatures are adjustable in the monitor. Only the slope is adjustable from the front panel. The slope setting is in mV / ºC/cell.

The temperature compensation function will vary the float voltage of the system based on the float voltage set point, the slope and the measured battery temperature.

The float voltage should be set to the recommended float voltage for the batteries used at 25ºC. The optional temperature sensor should be placed by the batteries in a position that reflects the average temperature of the batteries.

At battery temperatures greater than the maximum Control Temperature (typically 50ºC) and less than the minimum Control Temperature (typically 0ºC) the system voltage will no longer change. Between the two control temperatures the voltage relates linearly to the temperature (see diagram below).



3.5 Low Voltage Disconnect (LVD)

The batteries connected in the DC system are designed to maintain DC supply when the AC supply has failed. The batteries have a finite capacity and are designed to support the DC system for a period of time. When the battery discharges below certain levels, permanent damage can occur to the battery. The LVD function is designed to detect the end of battery discharge and disconnect the battery from the system to prevent damage. It will reconnect the battery again when the system can recover (e.g. AC power restored). The LVD function can operate in two modes:

Voltage Mode
The LVD process detects the battery voltage and when it drops below the set threshold, the LVD contactor is switched off, disconnecting the battery from the system. DC power will be lost to the load equipment at this moment, but the battery is preserved to recharge when the AC supply becomes active.
This mode is the default mode of LVD operation.

Timer Mode
The LVD process detects when a battery discharge starts and allows the battery to discharge for a set period of time. When the time had expired the LVD contactor is switched off, disconnecting the battery from the system. DC power will be lost to the load equipment at this moment, but the battery is preserved to recharge when the AC supply becomes active.
This mode is enabled by setting the “LVD x Timeout” to a value greater than 0. In this case LVD switches from voltage mode to Timer mode.

Note: Each LVD can be independently configured for Voltage or Timer modes.

The monitor has three LVD outputs if used with standard contactors, but only two outputs when magnetically latched contactors are used. When using magnetically latched contactors, the monitor will deliver an energizing pulse at regular intervals to ensure the contactor remains in the state desired.

The monitor LVD outputs for may be configured to provide differing control scenarios:

1. One or multiple LVD contactors may be placed in the battery line of one or multiple battery strings. These can work together to disconnect all the batteries at the same time.

2. An LVD contactor may be placed in a load circuit and set to disconnect at a higher voltage than another connected in the battery line. When the load LVD disconnects, only those loads connected to this point lose power. When the LVD in the battery line disconnects, all loads lose power. This system can work as a load priority switch, where low priority loads are switched off early to preserve battery capacity for use by high priority loads.

If magnetically latched contactors are used, it is also possible to have three levels of priority.

3.6 Battery Current Limit

It is important to prevent batteries being charged faster than the recommendations of the manufacturer. Charging too fast can cause excessive gassing in the battery, which can affect Valve regulated battery performance.

The monitor allows for the maximum battery charge current to be limited to a percentage of the battery capacity. The rectifiers will, if this function is enabled, reduce their output voltage so that the load current is supplied as per normal, but the battery current is limited.

3.7 Rectifier Current Limit

In specific system scenarios it is desirable to limit the rectifier output to a setting lower than their maximum. This is usually when the installed rectifier capacity of the system is higher than the present load requirements. E.g. When load will be added at some future time, the DC system is sized to cater for the future load but the initial DC load is much smaller.

3.8 Fast Charge

The monitor has an optional Fast Charge feature. This feature aims to reinstate the batteries to the fully charged state as quickly as possible after a discharge, without damaging the batteries.

When Fast Charge is enabled the monitor measures any battery discharge, recording the amp hours. When the recharge begins it raises the float voltage to a higher level until the total discharged amp hours has been returned to the batteries plus a percentage.

Fast Charge, once activated, will remain active until the Recharge capacity has been returned to the battery or the Fast Charge time limit expires.

3.9 Periodic Equalise

The Periodic Equalise function allows the batteries to be charged on-line at an elevated voltage for a set period of time. This charge function will repeat automatically at the specified interval. The initial interval begins from when the Periodic Equalise function is enabled or the interval changed.

A periodic equalise will not occur if a battery test or manual equalise is active. It will cancel that instance and try again after the next interval.

3.10 Manual Equalise

The Manual Equalise function allows the batteries to be charged on-line at an elevated voltage for a set period of time. This function must be manually enabled each time this charging is to occur. It will be disabled when the charge cycle is complete.

A manual equalise cannot be instigated if a battery test or periodic equalise is currently active.

3.11 Battery Test

The Battery Test process allows for the battery to be discharged on-line using the system load. When a battery test begins, the rectifier modules will be turned down to a voltage just below the specified termination voltage. (This ensures that if the battery does not perform, the rectifiers will automatically re-assume the load.) The battery test continues for either the test time specified or the termination voltage is reached, whichever comes first. If the test ends due to the time expiring then the test is a pass. If the test ends due to the termination voltage being reached, this is a fail and a battery test fail alarm is generated.

***Note**: This type of battery test is designed to give an indication only of battery state of health.*

The battery test time must be considered carefully. If the AC power should fail during the test or the subsequent recharge cycle, there should be enough capacity remaining in the battery to ensure security of the DC supply.

Battery tests may be activated manually or set to run periodically. The Periodic test will be performed using all the manual test criteria.

The Battery test Lockout period may be set to ensure that battery tests are not attempted too soon after a previous discharge event, whether that event was a battery test or a real discharge. This ensures the battery is fully recovered before further tests are allowed.

A test will not occur if another system process such as an Equalise or Fast Charge is active.

If a battery symmetry alarm is encountered during the test, the monitor can be configured to cancel the test.

The failure of a battery test will produce a Battery Test Fail alarm. This alarm will remain active until the next test or until reset via the front panel, configurator or web interfaces. To reset the alarm using the front panel:

- Access the “Alarms” menu
- Select the “Battery Test Fail” item
- Press “Set” to reset the alarm.

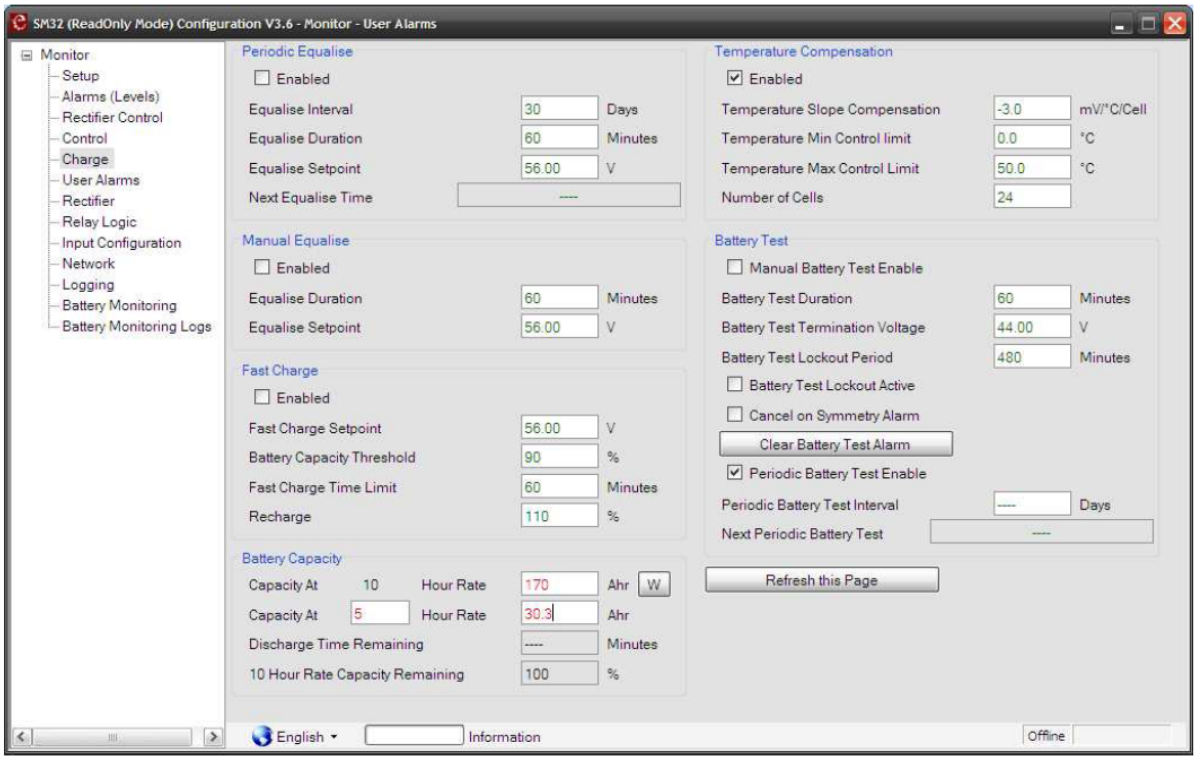
3.12 Battery Capacity and Discharge Time Remaining

The monitor has two battery capacity functions that operate together.

10hr Rate Capacity

This is a simple capacity estimation using the 10hour discharge capacity rate of the battery and assumes that the battery will perform with this capacity on all discharges. It is used to provide a basis for thresholds used in functions such as Fast Charge, etc. This calculated capacity is only approximate, but suffices for the functions that it is used for.

Battery Discharge Time Remaining



This is an estimate of the time remaining until end of discharge, based on the system load current or the discharge current. As system load current varies, the estimate is continuously revised. This time estimate is calculated using Peukert’s equation and requires the 10hr battery capacity and another rated capacity (e.g. 5hour capacity) to function correctly.

The Peukert's equation is as follows:

$$T = \frac{R(Ip)^n}{I^n}$$

Where:

T = time in hours
Ip = current at the specified capacity of the battery (for example If the Battery is rated at 10 discharge rate, then "Ip" is the current at C10 rate of discharge)
I = the discharge current
n = Peukert's'exponent
R = the hour rating (i.e. 20 hours, or 10 hours etc)

Note:

The results are more accurate with new batteries as the Peukert's exponent, n, changes as the battery ages. This exponent is unique to each battery type.

This is an estimate of the time remaining until end of discharge, based on the system load current. As system load varies, the estimate is continuously revised. This time estimate is formed using Peukert's equation and requires the 10hr battery capacity and another rated capacity (e.g. 3 hour capacity) to function correctly.

If multiple battery strings are connected to the system, all settings should be based on the total capacity of all the connected battery strings.

3.13 Power Saving Mode

The monitor is capable of controlling a DC system in a mode that will reduce power consumption. This Power Saving Mode is selected using the Configuration software only and is not selectable from the front panel.

The Power Saving Mode works by progressively shutting down rectifiers that are not required to meet the load demands of the system. The mode becomes active when enabled and none of the cancellation conditions (see below) are active. When active it waits 60seconds then will turn one rectifier module off if the load current is below the "Turn Off" percentage (eg.50%). If the load is still lower than the "Turn Off" percentage for the remaining rectifiers, it will wait 60 seconds then shut down a further rectifier. This process will continue until the load current is greater than the "Turn Off" percentage for remaining rectifiers. There will always be a minimum of two rectifiers that remain active regardless of how small the load is.

If the load current increases so that it is above the "Turn On" percentage, one rectifier will turn on again. If the load is still greater than the "Turn On" percentage of the rectifiers on, a further rectifier will turn on after 60 seconds. This process will continue until the load current is less that the "Turn On" percentage.

Power Saving Mode will immediately cancel if any one of the following occurs:

- a rectifier fails
- a mains fail occurs
- any rectifier goes into current limit
- a Battery Test occurs

Power mode will become active again when all these events have been cleared.

After the defined Auto Rotate Period the rectifier module that has been shutdown the longest will turn on and the next rectifier module in sequence will be shut down in its place. This rotation can ensure that all rectifiers get even usage.

This mode can only be used in concert with rectifiers having serial numbers beginning 0819xxxxxx or greater. If used with earlier rectifier, these rectifiers will not respond to power saving commands.

3.14 Logging

The monitor has the provision to record system parameters in two logs:

Periodic Log — The monitor will record a group of system parameters periodically at the end of a set period. The parameters recorded may be selected from available system parameters. The log will continue until the allocated space for the log is full, and then begins overwriting starting with the oldest record.

Event Log — The monitor will not record anything in the Event log until an alarm occurs. At that time the monitor will record all the parameters that have been selected. When the log is full the next alarm event will cause the oldest record to be overwritten.

The logging may be configured using the configuration editor or web interface. These interfaces allow the selection of parameters and the sampling interval for the Periodic Log.

The capacity of the Periodic log and the Event log in the SM3X Controllers is **10240** events each, based on logging of the following conditions (note, the maximum logging capacity is 16,384, so this figure reduces as more log items are selected).

Rectifier Alarms	Monitor Alarms
Load Current	Battery Current
Battery Temperature	Ambient Temperature
Monitor Generated Device Alarms	Voltage Alarms
Current/ Temperature Alarms	AC Alarms

The monitor has a fixed allocation of memory for logging and these interfaces will indicate the number of records that can be stored for each combination of parameters in a particular system. I.e. the more parameters selected, the lower number of records held before overwriting occurs.

Note: *If the log file in the monitor is large and you wish to delete it, the monitor can take up to 5 minutes to complete this task. This will affect monitor response times until the log file is deleted.*

4 Using the Monitor Front Panel Interface

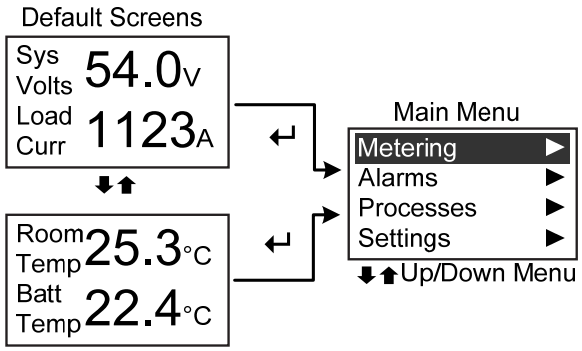
4.1 Introduction

The SM31 and SM32 monitors have an LCD display on their front panel that allows system parameters to be observed or modified. The display menu is navigated using the three keys next to the display: ⬆ ↵ ⬇

The display will show the default screen when operating normally and no key has been pressed for about 60 seconds.

If you wish to exit the menu from any point, then press and hold any key until the display returns to the default screen (about 4 seconds). If you are editing a parameter when you do this, changes will not be stored.

4.2 Default Screen



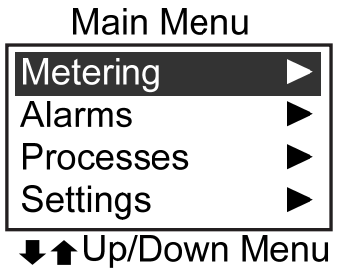
When the SM31 or SM32 monitor front panel interface is in an idle state, it shows the Default Screen and the backlight will be at minimum.

If any key is pressed, the backlight will increase to maximum. The user interface is now active and any key press will have an effect.

Pressing either of the ⬆ or ⬇ will toggle the display between the two pairs of metered values that comprise the default screen.

Press the ↵key to bring up the main menu.

4.3 Main Menu



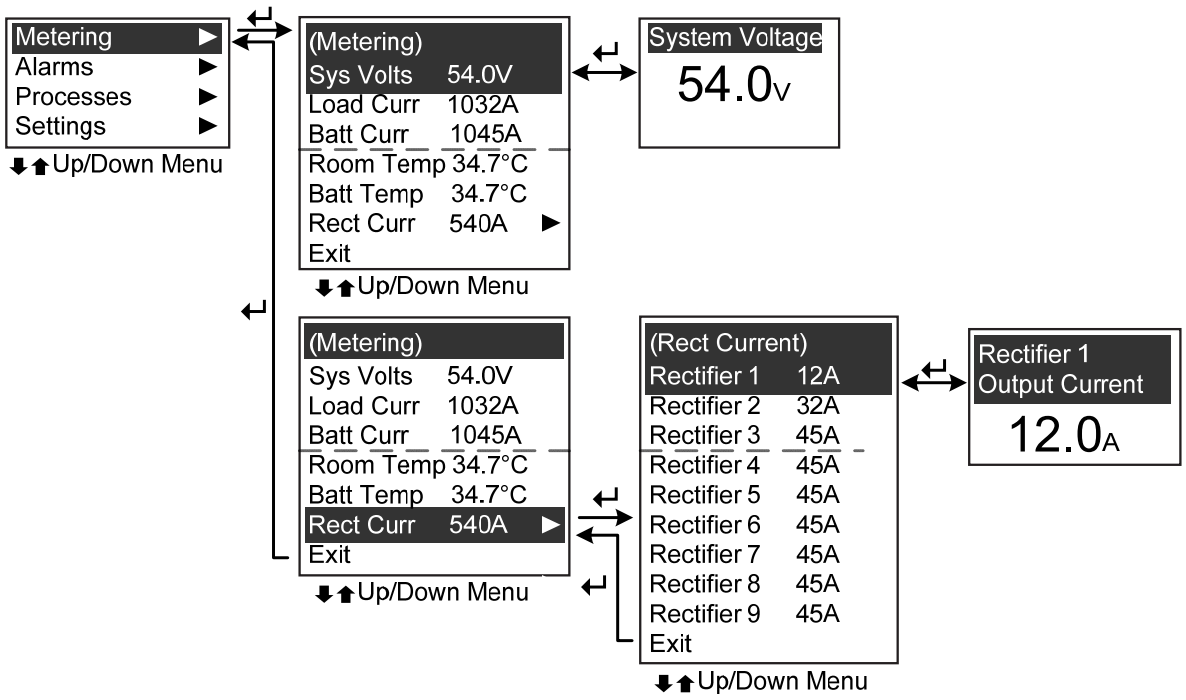
The Main menu has four items:

Metering	This contains all metered values that are available.
Alarms	All active alarms can be viewed under this menu. If there are no active alarms, this menu will contain an item “No Alarms”.
Processes	The menu provides a view of all processes that are Active, Idle or Disabled in the monitor. From this menu the state of processes may be changed. E.g. Activating a Manual Equalise.

Settings The menu provides access to all parameters within the monitor that can be changed from the front panel user interface.Menu Navigation Principles:

- Use the ⬇ ⬆ keys to move up and down a menu.
- Use ↵ key to select an item.
- A ►symbol at the end of a menu line indicates there is a sub menu below this item.
- When entering a sub menu, the title of the sub menu is displayed on the top line between two vertical bar symbols.
- To move from a sub menu to the menu above, use the ⬆⬇ keys to select “Exit” then ↵ to step up one level in the menu structure. The “Exit” item is always the last item in a menu list and can be reached by pressing the ⬆ key from the top item. I.e. if you inadvertently enter a sub menu, press the ⬆ key to select “Exit”, then ↵ to get out.
- Pressing and holding any key for about 4 seconds will jump you out of the menu back to the default screen. If you were editing a parameter at the time this happens, that parameter will not be stored/changed.
- When a sub-menu is entered, the title of that menu is placed at the top of the display between brackets. E.g. (*Menu Title*)

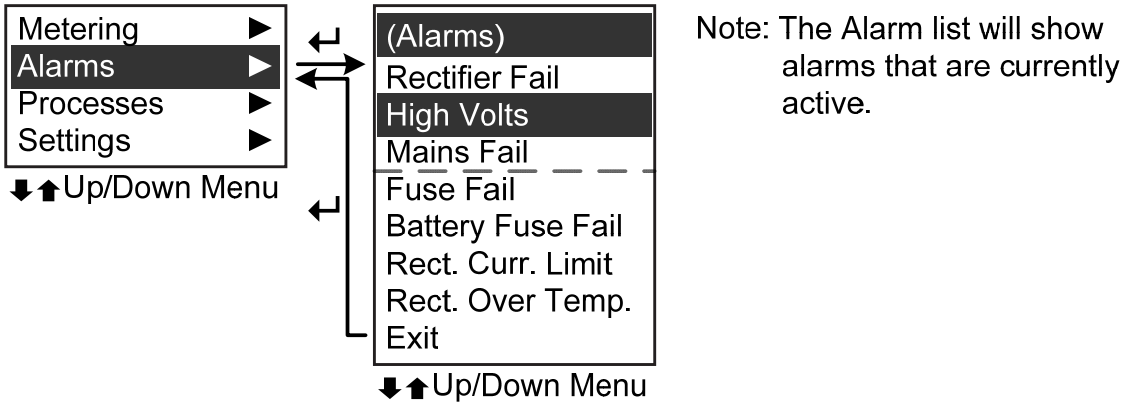
4.3.1 Metering



The metering menu allows the user to view metered items that do not appear in the default screens. The metered items and their current value are displayed in a list. Additionally, each item can be displayed in larger format by selecting that item.

Metered items (e.g. rectifier current) that can be broken down into separate sub items are denoted with a ► symbol. Select this item to see a list of these sub items.

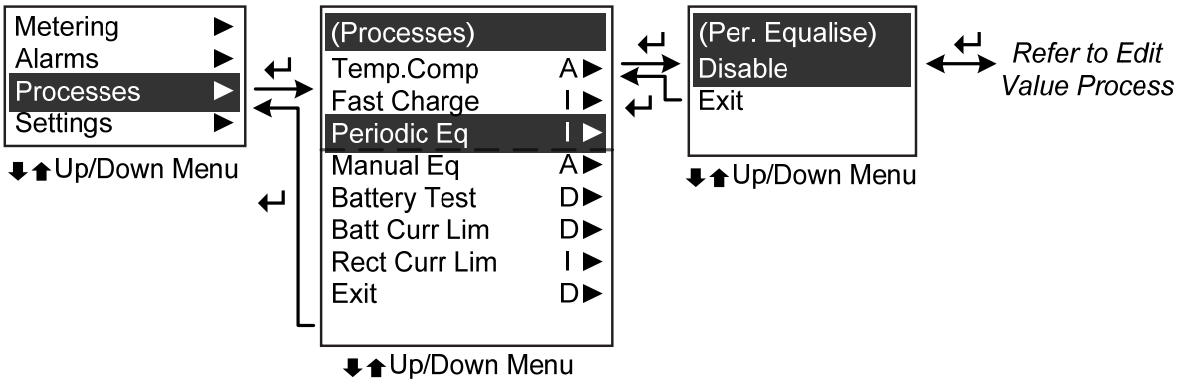
4.3.2 Alarms



The Alarms menu will contain alarm states that are currently active. It is a dynamic list and will update whenever an alarm state activates or deactivates.

Note: If no active alarms exist, the list will contain one item "No Alarms".

4.3.3 Processes



The Processes menu contains a status indication of all the control processes that are active in the monitor. Each process is displayed on one line giving the process name and the current status of that process. The status can be: "A"="Enabled" and active, "I"="Enabled" but currently in-active, and "D"="Disabled".

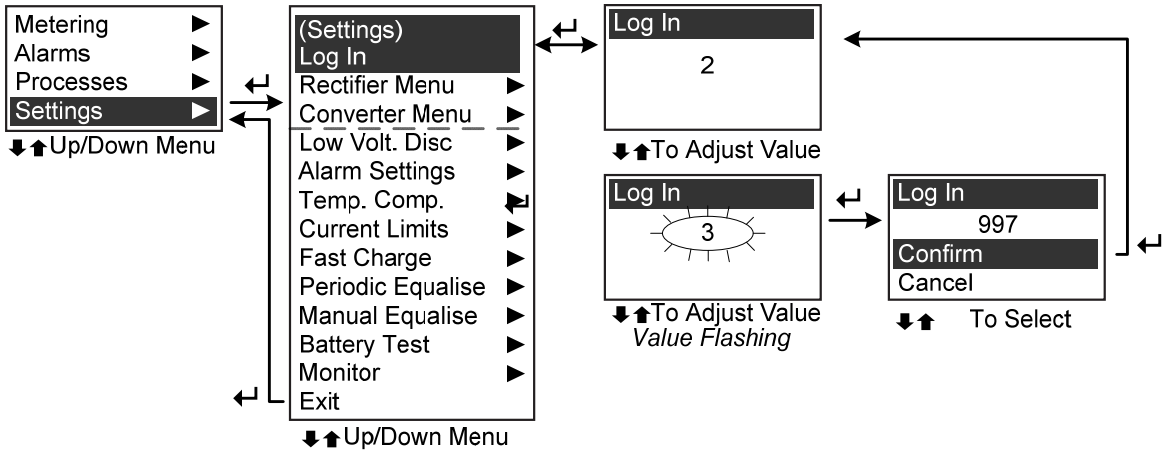
If the status of a process needs to be changed (e.g. to run a manual equalise), then select that process and use the ⬇ ⬆ keys to enable or disable it.

Note: Most processes have parameters that need to be set to appropriate values before that process is enabled. These parameters must be defined in the Settings menu, and then the process enabled through the Process menu.

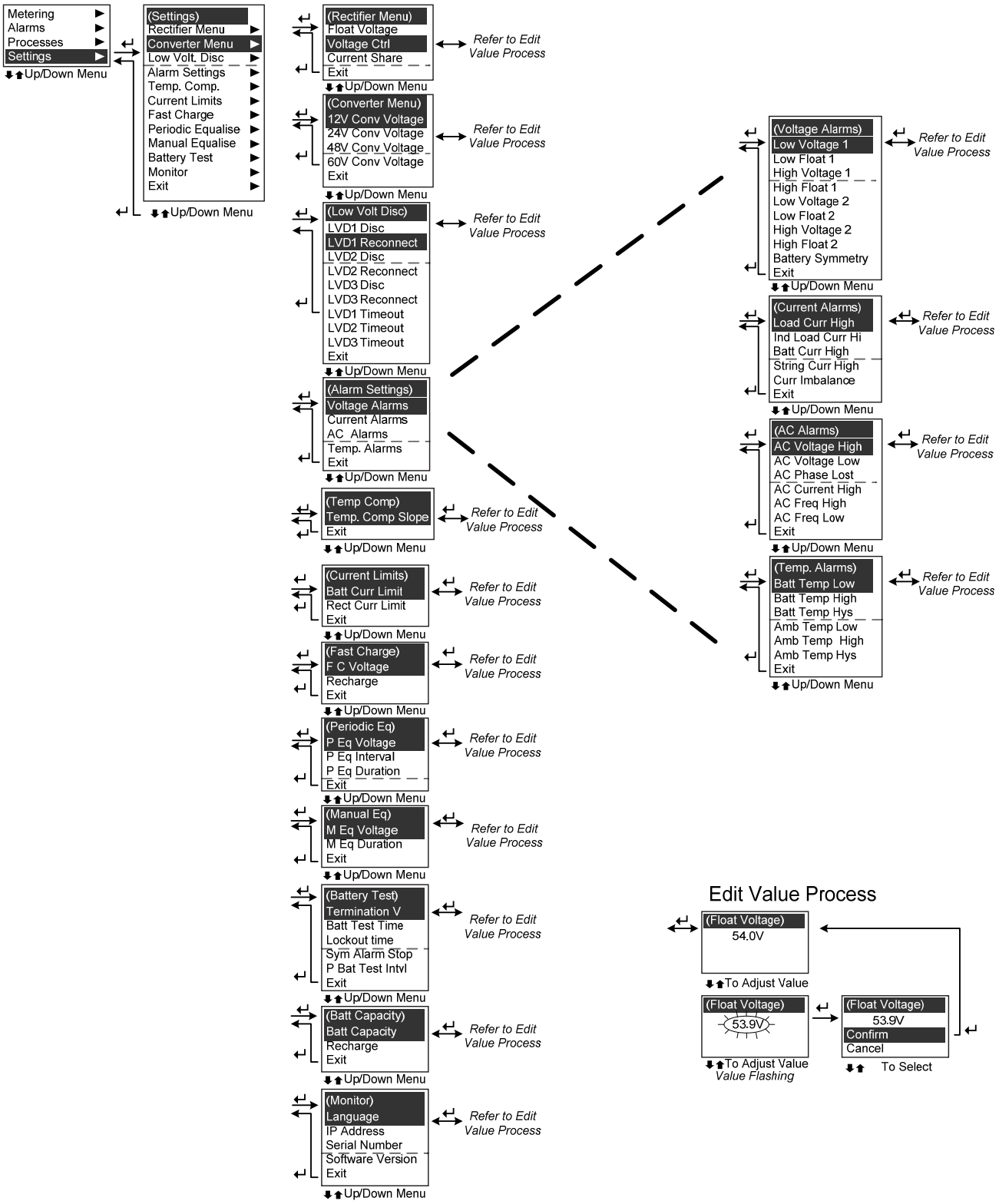
4.3.4 Settings

The Settings menu allows access to system control parameters that can be adjusted through the front panel interface.

Access to the Settings menu can be limited by using the optional PIN code. When this PIN code security is active, the correct code must be entered before any parameters in the Settings menu can be altered. When a correct code entry is not entered, the parameters in the Settings menu are viewable by cannot be altered. The procedure for entering the PIN code is shown in the diagram below. Activation of the PIN code security feature must be done using the SM3x Configuration software.



The Settings menu layout can be seen in the diagram below. All parameters that can be accessed through this menu are described in Section 7 below.

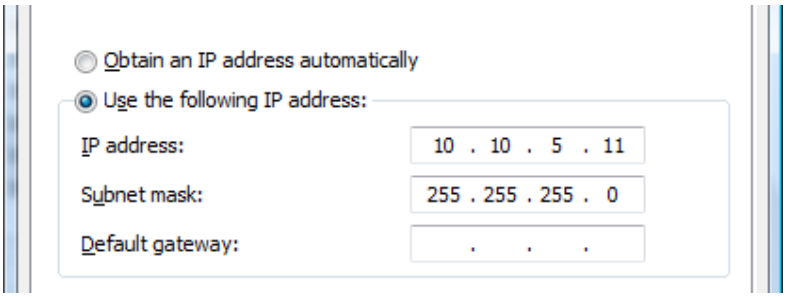

Metering
Alarms
Processes
Settings
Up/Down Menu
(Settings)
Rectifier Menu
Converter Menu
Low Volt. Disc
Alarm Settings
Temp. Comp.
Current Limits
Fast Charge
Periodic Equalise
Manual Equalise
Battery Test
Monitor
Exit
Up/Down Menu
(Rectifier Menu)
Float Voltage
Voltage Ctrl
Current Share
Exit
Refer to Edit Value Process
(Converter Menu)
12V Conv Voltage
24V Conv Voltage
48V Conv Voltage
60V Conv Voltage
(Low Volt Disc)
LVD1 Disc
LVD1 Reconnect
LVD2 Disc
LVD2 Reconnect
LVD3 Disc
LVD3 Reconnect
LVD1 Timeout
LVD2 Timeout
LVD3 Timeout
(Alarm Settings)
Voltage Alarms
Current Alarms
AC Alarms
Temp. Alarms
(Temp Comp)
Temp. Comp Slope
(Current Limits)
Batt Curr Limit
Rect Curr Limit
(Fast Charge)
F C Voltage
Recharge
(Periodic Eq)
P Eq Voltage
P Eq Interval
P Eq Duration
(Manual Eq)
M Eq Voltage
M Eq Duration
(Battery Test)
Termination V
Batt Test Time
Lockout time
Sym Alarm Stop
P Bat Test Intvl
(Batt Capacity)
Batt Capacity
(Monitor)
Language
IP Address
Serial Number
Software Version
(Voltage Alarms)
Low Voltage 1
Low Float 1
High Voltage 1
High Float 1
Low Voltage 2
Low Float 2
High Voltage 2
High Float 2
Battery Symmetry
(Current Alarms)
Load Curr High
Ind Load Curr Hi
Batt Curr High
String Curr High
Curr Imbalance
(AC Alarms)
AC Voltage High
AC Voltage Low
AC Phase Lost
AC Current High
AC Freq High
AC Freq Low
(Temp. Alarms)
Batt Temp Low
Batt Temp High
Batt Temp Hys
Amb Temp Low
Amb Temp High
Amb Temp Hys
Edit Value Process
(Float Voltage)
54.0V
To Adjust Value
53.9V
Value Flashing
Confirm
Cancel
To Select

5 Using the Monitor Web Interface (SM32 Only)

5.1.1 Connection

The web interface is accessed via the Ethernet port at the rear and by typing the IP address of the monitor into the address bar of a web browser. The browser will then display the web pages as described below.

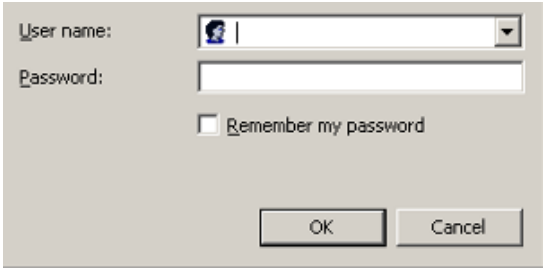
Note: The Monitor IP address must be set initially using the SM3x Configuration software. The default IP address is 10.10.5.10. For direct connection (from your computer to the SM32, an Ethernet cross-over cable must be used). For direct connection you must enter your TCP/IP set-up area on your computer and enter:



As the SM32 IP address is ….5.10, you need to enter a different address in the last address field (i.e, …5.11). Now open your web browser and enter http://10.10.5.10 to view the SM32 via the web browser.

5.1.2 Log In

It is recommended that the monitor be set up to have a password for web access. This can be done in the "Network Settings" section.



When the monitor is initially accessed over the web interface the above screen appears.

To access the monitor web interface you must enter the approved username and password. The monitor has two access levels:

- Monitoring Access
  This access allows viewing of parameters only.

  Default
  Username: User
  Password: User1

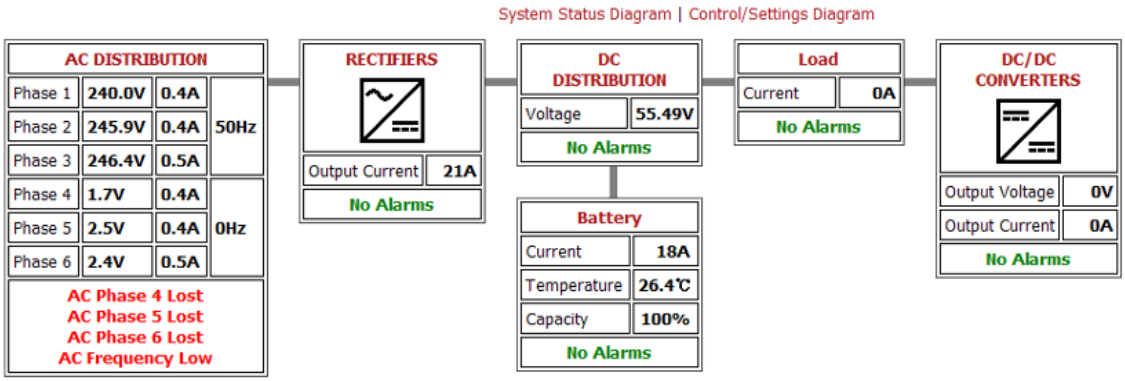
- Administrator Access
  This access allows complete viewing and editing of settings.

  Default
  Username: Admin
  Password: Admin1

5.1.3 System Status Diagram

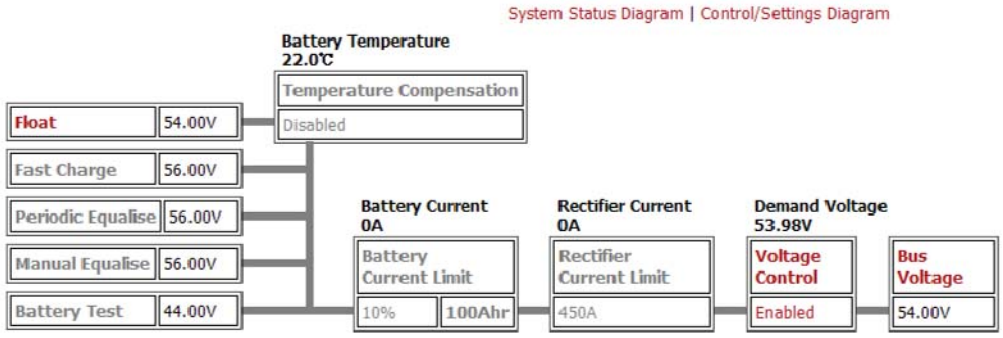
The system diagram is an overview of all measurements taken by the monitor in the system and active alarms.

The diagram is displayed as a logical layout of the system including AC Input monitoring, Rectifiers, DC/DC Converters, Load and Battery status.



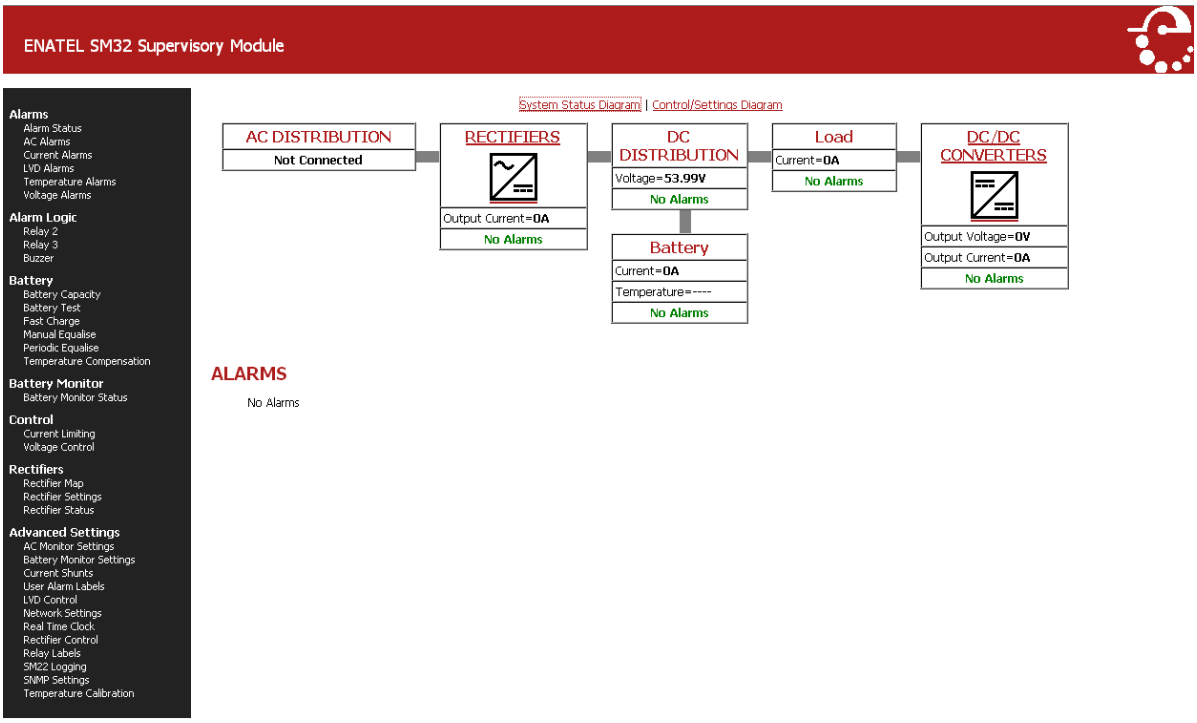
5.1.4 Control/Settings Diagram

The control diagram displays the active processes and their effect on the output voltage of the system.



The active processes are highlighted red. As each active process manipulates the output voltage of the system the resulting voltage is displayed, culminating in the system bus voltage.

5.1.5 Menu Options



The menu options along the left side of the browser page allow the user to access the parameters that modify the functions of the monitor. A detailed description of these menu options is not included in this manual. However, all parameters that can be accessed through this menu are described in Section 7 below.

6 Configuration File Guide

6.1 General

The monitor can be used in DC systems of all shapes, and sizes. To allow the monitor to be adapted for use in all these differing applications, it has a Configuration file. This file, when loaded into any monitor, tailors a monitor for a particular DC system design. The configuration file defines how the monitor will operate in a DC system. The configuration file defines:

- Parameter values – alarm level, process, charge and control settings
- Output relay mapping
- Input (analogue and digital) location, scaling and mapping
- Logging definitions and parameters

A monitor must have a configuration file, even if this file is only the simple default supplied from the factory.

The use of a configuration file has numerous advantages:

- When DC systems are supplied for a project. The configuration file can be defined at the start of the project and copied into all DC system monitors to ensure each system operates identically.
- For field maintenance, one monitor can be used as a spare for many different DC system types, the applicable configuration file being loaded before replacement on site.
- Parameters can easily be adjusted in an operating monitor.
- If there are performance issues with a DC system, the configuration file can be sent to Newmar for their engineers to analyse, and then provide assistance.

The configuration file is an integral part of a DC system and how it functions. It is recommended that a copy of this file is kept along with records of the hardware installed by the network maintenance operator.

General use of the Configuration Editor software is provided below in this Section and advice for advanced users can be found in Appendix 2.

6.2 Using the Monitor Configuration Editor

6.2.1 Connection

The Configuration Editor software must be installed on the PC that will be connected to the monitor. After the software has been installed, connect an USB interface cable from the monitor USB port to the computer USB port.

Launch the configuration software and choose the type of monitor you are connecting to. The software should automatically start communicating with the monitor. If this does not happen, follow the following procedure.

1. *Proceed to the "Setup" page in the configuration editor.*
2. *Set the Serial Port Interface – COM Port to the correct port.*
   Note: if this is not known, then select Scan to scan for a monitor on all ports.

6.2.2 Access Levels

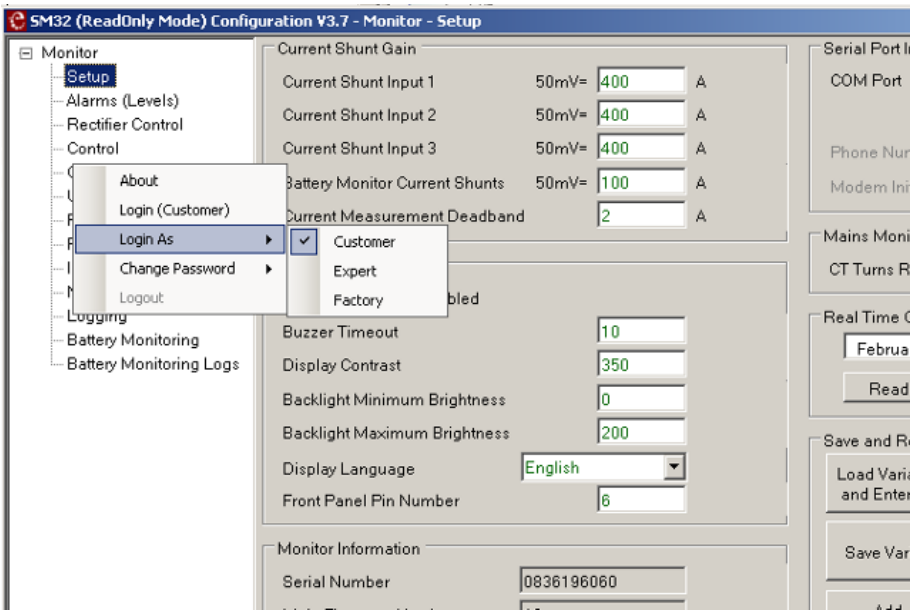
The Configuration Editor is configured to allow different levels of access to the monitor configuration. The levels are as follows:

- Customer
  This level allows visibility of configuration parameters but no charges are possible.

  Default Password: customer

- Expert
  This advanced level allows full change access to configuration parameters and allows access to the Bootloader, Rectifier Logging and Voltage Mode Switching.

  Default Password: expert

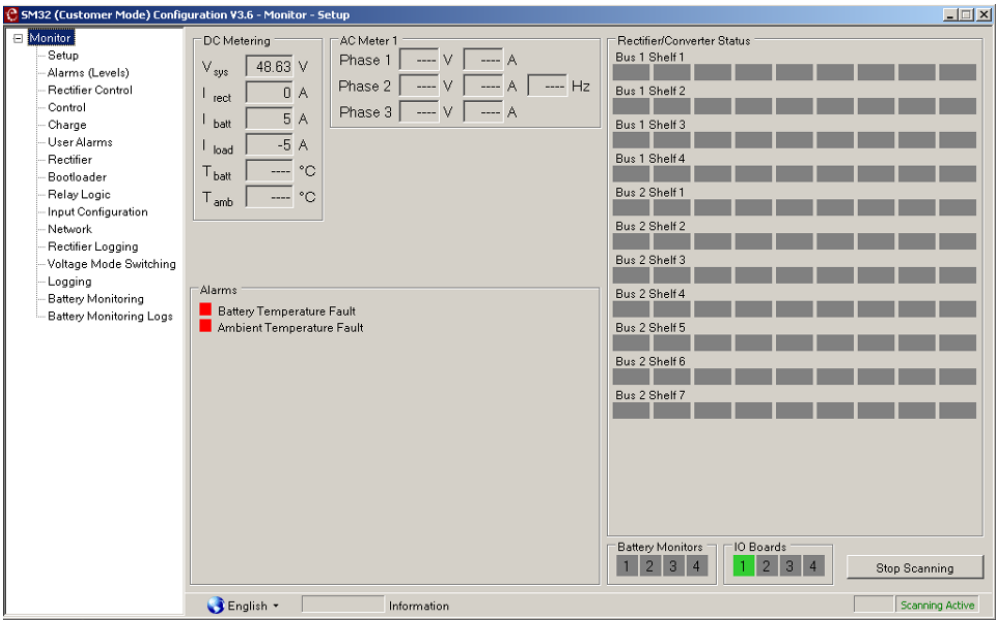


The Configuration Editor will connect to the monitor using the Normal (default) access level.

To change the access level, use the mouse to right-click on the menu area. This will bring up a menu as shown below. To change the access level you will be required to enter the password for the level you require.

Note: It is recommended that these passwords be changed by the user to their own preferred values at installation to ensure security.

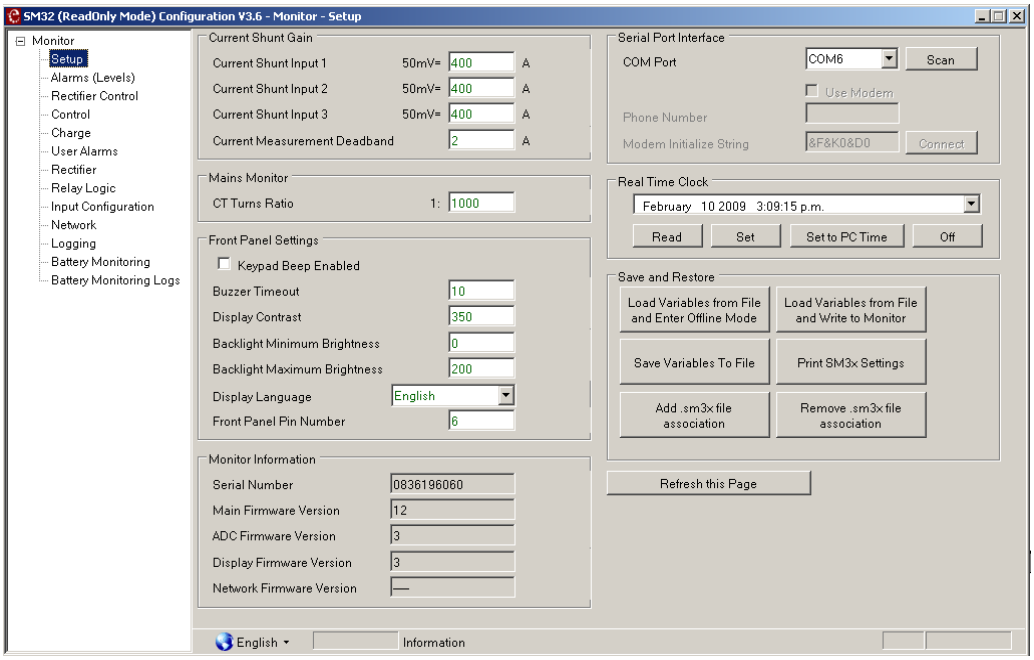
6.2.3 Menu Options



The menu options along the left side of the screen allow the user to access the parameters that modify the functions of the monitor. A detailed description of these menu options is not included in this manual. However, all parameters that can be accessed through this menu are described in Section 7 below.

Save and Restore

The configuration file for a monitor can be manually created using the configuration software or it can be loaded into a monitor from the connected computer. The file management tools are found on the "Setup" tab of the menu, as shown below.



6.2.4 Using SM3x Configuration Editor with not Monitor

It is possible to use the SM3x Configuration software and edit a configuration file without being connected to a monitor. If the new file is saved to disk, it can be loaded into a monitor at some future date.

To access "offline" mode, double-click on the box (marked below) at the base of the window.

When the Config software is in 'offline" mode it will show in the box as below. Double-click again to return to normal mode.

7 Monitor Features by Model

The following tables detail the differences between models of the SM31 and SM32 monitors.

SM31 Models	SM31-00	SM31-10	SM31-00-1U	SM31-10-1U	SM31-00-PM	SM31-10-PM
1U Modular	✓	✓	✖	✖	✖	✖
1U x 19” Mount	✖	✖	✓	✓	✖	✖
Panel/Door Mount	✖	✖	✖	✖	✓	✓
General Purpose Inputs (GPIP) (excl. I/O Exp Bd)	6	6	6	6	6	6
Output Relays (excl. I/O Exp Bd)	3	3	3	3	3	3
Standard Display	✓	✓	✓	✓	✖	✖
Large Display (panel mount)	✖	✖	✖	✖	✓	✓
I/O Expansion Board	✖	✓	✖	✓	✖	✓
USB Front Panel Port	✓	✓	✓	✓	✓	✓
Ethernet Network Port	✖	✖	✖	✖	✖	✖

SM32 Models	SM32-00	SM32-10	SM32-00-1U	SM32-10-1U	SM32-00-PM	SM32-10-PM
1U Modular	✓	✓	✖	✖	✖	✖
1U x 19” Mount	✖	✖	✓	✓	✖	✖
Panel/Door Mount	✖	✖	✖	✖	✓	✓
General Purpose Inputs (GPIP) (excl. I/O Exp Bd)	6	6	6	6	6	6
Output Relays (excl. I/O Exp Bd)	3	3	3	3	3	3
Standard Display	✓	✓	✓	✓	✖	✖
Large Display (panel mount)	✖	✖	✖	✖	✓	✓
I/O Expansion Board	✖	✓	✖	✓	✖	✓
USB Front Panel Port	✓	✓	✓	✓	✓	✓
Ethernet Network Port	✓	✓	✓	✓	✓	✓

8 Monitor Parameter List

List Alphabetical by Long Label

Long Label (Web and PC software)	Short Label (Front Panel) No label=Not Accessible from FP	Description	Typical Values[1]			Units
			-48V	-60V	+24V	
10 Hour Rate Capacity Remaining		The monitor calculates and can display the remaining battery capacity during discharge. This parameter is estimated using the battery 10 hour rate and the battery discharge current.				%
12V Converter Voltage	12V Conv Voltage	The output voltage setting for the nominal 12V output converters in the system.				V
24V Converter Voltage	24V Conv Voltage	The output voltage setting for the nominal 24V output converters in the system.				V
48V Converter Voltage	48V Conv Voltage	The output voltage setting for the nominal 48V output converters in the system.				V
60V Converter Voltage	60V Conv Voltage	The output voltage setting for the nominal 60V output converters in the system.				V
AC Current High Alarm	AC Current High	With ACM Fitted: Activates if the AC supply current is higher than the set threshold.	100			A
AC Frequency High Alarm	AC Freq High	With ACM Fitted: Activates if the AC supply frequency is higher than the set threshold.	55			Hz
AC Frequency Low Alarm	AC Freq Low	With ACM Fitted: Activates if the AC supply frequency is lower than the set threshold.	45			Hz
AC Phase Lost Alarm	AC Phase Lost	With ACM Fitted: Activates if the AC supply voltage is lower than the set threshold. This alarm is usually set at a low level so as to detect complete AC supply loss. Without ACM Fitted: *In this case there is no threshold setting and the alarm is derived from the rectifiers.*	90			V
AC Voltage High Alarm	AC Voltage High	With ACM Fitted: Activates if the AC supply voltage is higher than the set threshold.	275			V
AC Voltage Low Alarm	AC Voltage Low	With ACM Fitted: Activates if the AC supply voltage is lower than the set threshold. This alarm is usually set just below the nominal AC voltage, and detects “brown-outs”.	190			V

[1] The typical parameter values are based on a 48V, 60V and 24V system with all auxiliary boards attached.

ADC Firmware Version		Firmware version of the metering microprocessor in the monitor.				
Ambient Temperature High Alarm	Amb. Temp High	With Ambient Temp Sensor fitted: Activates if the Room Temperature is higher than the set threshold.		40		°C
Ambient Temperature Hysteresis	Amb. Temp Hys	With Ambient Temp Sensor fitted: Allows the hysteresis for the Room temperature alarms to be set.		1		°C
Ambient Temperature Low Alarm	Amb. Temp Low	With Ambient Temp Sensor fitted: Activates if the Room Temperature is lower than the set threshold.		5		°C
Auto Rotate Period		When using Power Save Mode: To ensure that the installed rectifier modules are all used evenly, the monitor will turn on the next rectifier in sequence and turn off the rectifier that has been on longest at the end of this specified period.		30		days
Backlight Maximum Brightness		Defines the maximum brightness for the backlight of the LCD display on the monitor front panel. The display will operate at this setting whenever the display is active.		200		
Backlight Minimum Brightness		Defines the minimum brightness for the backlight of the LCD display on the monitor front panel. The display will operate at this setting whenever the display is inactive.		20		
Battery Capacity	Batt Capacity	The total battery capacity at the 10 hour rate (C_{10}), as well as the capacity at another rate (e.g. 3 hour) are required. The monitor uses this information to predict battery discharge time remaining using Peukerts Equation.				A Hrs
Battery Capacity Threshold		The battery must discharge below this capacity level before a Fast Charge will be triggered on recharge. This setting prevents Fast Charge becoming active when there has only been a small battery discharge.		90		%
Battery Charge Current Limit	Batt Curr Limit	In some circumstances it is desirable for the battery current to be limited in recharge. This can avoid over-gassing of sealed battery cells. The monitor allows for the maximum battery charge current to be set as a percentage of the battery capacity. The rectifiers will, if the function is enabled, reduce their output voltage so that the load current is supplied as per normal, but the battery current is limited.		10		%
Battery Discharge Threshold		The battery current required for a discharge to be registered. Often a battery draws a small current while on float charge. This is not considered a discharge.		-5		A
Battery Current High Alarm	Batt Curr High	The DC battery recharge current is monitored and will cause an alarm to activate when the threshold is exceeded. It is an indicator only and will not adjust the system parameters to prevent this occurrence.				A

Battery String Current Imbalance	Curr Imbalance	With BCM Fitted: When a battery monitor is connected to the monitor, individual battery string currents can be monitored and compared and will cause an alarm to activate when the difference between the string currents exceeds the threshold. It is an indicator only and will not adjust the system parameters to prevent this occurrence.		10		A
Battery String Open		With BCM Fitted: The system voltage is compared to the voltage computed from adding the sensed battery mono-block/cell voltages. If the difference is greater than this setting, the battery is assumed to be open circuit. E.g. fuse blown.		0.5		V
Battery String Current High Alarm	String Curr High	With BCM Fitted: When a battery monitor is connected to the monitor, individual battery string recharge currents can be monitored and will cause an alarm to activate when the threshold is exceeded. It is an indicator only and will not adjust the system parameters to prevent this occurrence.				A
Battery Symmetry	Battery Symmetry	With BCM Fitted: The battery midpoint voltage may be monitored and the voltage of the two battery halves compared. This threshold defines the allowed voltage difference between the two halves before this alarm activates. If this feature is not used, the setting should be 10V to avoid unwanted activation.		0.5		V
Battery Temperature High Alarm	Batt Temp High	With Battery Temp Sensor fitted: Activates if the Battery Temperature is higher than the set threshold.		50		°C
Battery Temperature Hysteresis	Batt Temp Hys	With Battery Temp Sensor fitted: Allows the hysteresis for the battery temperature alarms to be set.		0		°C
Battery Temperature Low Alarm	Batt Temp Low	With Battery Temp Sensor fitted: Activates if the Battery Temperature is lower than the set threshold		-10		°C
Battery Test Duration	B T Duration	The period of time that the battery voltage must remain above the Termination Voltage for the test to register a pass.		60		Mins
Battery Test Lockout		Activates the Battery Test Lockout feature.		Disabled		
Battery Test Lockout Period	B T Lockout	The period of time during which further battery tests cannot occur. This gives the battery a chance to recover from the battery test before another test occurs		480		Mins
Battery Test Termination Voltage	B T Term V	If the battery voltage decreases below this Termination Voltage, the battery test will cease and a Battery Test Fail alarm will activate. The voltage that the rectifier output will be set to for the period the Manual Equalise is active.	44	55	22	V

Bus 1 Rectifiers/ Converters per shelf		Up to 7 shelves of either converters or rectifiers may be connected to serial bus 1. This setting allows the layout of the rectifiers to be specified for each shelf. The number is each box is the total number of modules, rectifier or converter, fitted in each shelf.				
Bus 2 Rectifiers/ Converters per shelf		Up to 7 shelves of either converters or rectifiers may be connected to serial bus 2. This setting allows the layout of the rectifiers to be specified for each shelf. The number is each box is the total number of modules, rectifier or converter, fitted in each shelf.				
Buzzer Timeout		When the alarm buzzer is activated, the buzzer will sound for this time then stop. The buzzer will reactivate if another alarm occurs. Set this parameter to =0 if to give no timeout for the buzzer.	10			sec
Cancel on Symmetry Alarm	Sym Alrm Cancel	If this is enabled, a battery test will terminate if a Battery Symmetry Alarm becomes active.	Disabled			
Clear Battery Test Alarm		If a battery test has been attempted but has failed, a battery test fail alarm will be generated. This alarm can be reset/cleared using this setting.				
COM Port		The PC COM port that the monitor is connected to.				
Converter Monitor Current Share	Conv Curr Share	The monitor can control the converter voltage to ensure they actively share current. The converters will share current when this feature is disabled; however, this feature improves the performance of the current share.	Disabled			
Converter Voltage Control	Conv Voltage Ctrl	The monitor incorporates a Voltage Control function that will adjust the converter output voltage as the load varies to ensure that it remains at the desired setting. When this feature is disabled the system voltage will be correct at no load, but the system voltage will decrease slightly as load increases (usually about 500mV less at full load). This is due to resistance in the output of the converters and system cabling. The Voltage Control function will compensate for this lost voltage if it is enabled.	Disabled			
CT Turns Ratio		With ACM Fitted: This is the turns ratio of the current transformers connected to the ACM that sense the AC current.	1:1000			
Current Measurement Deadband		The metered value will register 0A if the absolute value of the sensor reading is smaller than this amount.	2			A
Current Shunt 1 Gain		The scaling factor for this current shunt input based on full scale at 50mV.				A
Current Shunt 2 Gain		The scaling factor for this current shunt input based on full scale at 50mV.				A
Current Shunt 3 Gain		The scaling factor for this current shunt input based on full scale at 50mV.				A
Default Default Gateway		This Default address will become the monitor network Default Gateway address if DHCP is disabled.	169.254.1.1			
Default Gateway		This is the network address of the Default Gateway for the monitor. If DHCP is enabled, this is set by the DHCP server. If DHCP is disabled, this is set to the Default Default Gateway address.				

Default IP Address		This Default address will become the monitor network IP Address if DHCP is disabled.	10.10.5.10			
Default Primary DNS Server		This Default address will become the monitor network Primary DNS Server address if DHCP is disabled.	169.254.1.1			
Default Secondary DNS Server		This Default address will become the monitor network Secondary DNS Server address if DHCP is disabled.	169.254.1.1			
Default Subnet Mask		This Default address will become the monitor network Subnet Mask if DHCP is disabled.	255.255.0.0			
DHCP Enable		This setting enables the network addresses of the monitor to be set by a DHCP server. If it is disabled the monitor network addresses are set to the default values.	Disabled			
Discharge Time Remaining		The monitor calculates and can display the time remaining for battery discharge. This parameter is estimated using Peukerts Equation.				Min
Display Contrast		Defines the contrast ratio of the LCD display on the monitor front panel.	350			
Display Firmware Version		The firmware version of the microprocessor in the monitor front panel.				
Display Language	Language	Choose which language the front panel display uses.	English			
Domain Name		This is the monitor network domain name.	Newmar-SM32			
Fast Charge Recharge	F C Recharge	The percentage by which discharged ampere-hours are returned before the Fast Charge process ceases. This setting is usually greater than 100% to allow for loses in the battery discharge/charge cycle.	110			%
Fast Charge Time Limit		The Fast Charge process will cease after this time, even if the discharged ampere hours have not yet been returned to the battery	60			Mins
Fast Charge Voltage	F C Voltage	The voltage that the rectifier outputs will be set to for the period it is recharging in Fast Charge.	56	70	28	V
Front Panel PIN Number		The front panel PIN is used to limit access to settings in the front panel menu. The PIN may be set by entering a number 1 to 9999. If the PIN is set the access on the front panel is read-only. To deactivate set value to 0.	Disabled			
High Float Alarm Bus 1	High Float 1	A voltage threshold alarm. This alarm is usually used to detect overcharging of the battery due to a fault.	55.6	70.2	27.8	V
High Float Alarm Bus 2	High Float 2	A voltage threshold alarm.				V
High Volts Alarm Bus 1	High Voltage 1	A voltage threshold alarm. This alarm is usually used to detect overcharging of the battery due to a fault.	57.6	72.5	28.8	V
High Volts Alarm Bus 2	High Voltage 2	A voltage threshold alarm.				V
Inverter System AC HVSD Threshold		If the output AC voltage of the inverters rises above this threshold they will shutdown.	264			V
Inverter System AC LVSD Threshold		If the output AC voltage of the inverters drops below this threshold they will shutdown.	185			V

Inverter System DC HVSD Threshold		If the input DC voltage of the inverters rises above this threshold they will shutdown. There is 1V hysteresis on this setting.	60			V
Inverter System DC LVSD Threshold		If the input DC voltage of the inverters drops below this threshold they will shutdown. There is 0.5V hysteresis on this setting.	40			V
Inverter Output Frequency		The frequency setting for the output AC supply of the inverter module.	50 or 60			Hz
Inverter Output Voltage		The inverter output voltage setting.	240			V
Inverter Power Limit		The percentage of maximum output power that the inverter module will provide.	100			%
IP Address		This is the network IP address of the monitor. If DHCP is enabled, this is set by the DHCP server. If DHCP is disabled, this is set to the Default IP Address.				
Keypad Beep		Activates the monitor beeper to give a short click whenever a key is pressed.	Enabled			
Load Current High Alarm	Load Curr High	With BCM Fitted: The DC load current is monitored and will cause an alarm to activate when the threshold is exceeded. It is an indicator only and will not adjust the system parameters to prevent this occurrence.				A
Location		This is the monitor network location.				
Low Float Alarm Bus 1	Low Float 1	A voltage threshold alarm. This alarm is usually used to detect the end of a battery discharge and is set just above the terminal battery voltage or the LVD disconnect voltage.	52.8	57	26.4	V
Low Float Alarm Bus 2	Low Float 2	A voltage threshold alarm.				V
Low Volts Alarm Bus 1	Low Voltage 1	A voltage threshold alarm. This alarm is usually used to detect the start of a battery discharge and is set just below the battery float voltage.	47	54.7	23.5	V
Low Volts Alarm Bus 2	Low Voltage 2	A voltage threshold alarm.				V
LVD 1 Disconnect	LVD 1 Disc	The disconnect threshold is the system voltage at which the LVD unit should disconnect the battery or load from the system. This voltage is chosen so as to allow the batteries to discharge fully but not so much as to be permanently damaged.	43	53.7	21.5	V
LVD 1 Reconnect	LVD 1 Recon	The reconnect threshold is the voltage at which the LVD will reconnect the battery or load after it has been disconnected. When the LVD is used as a load disconnect, this item can be used to allow the batteries to recharge almost fully before the load is reconnected.	48	60	24	V
LVD 1 Timeout		If this parameter is set to 0 (zero) the LVD timer function is disabled and the LVD operates on voltage. If this parameter is set >0, then the LVD will operate after the time set and the voltage settings will not apply.				Min
LVD 2 Disconnect	LVD 2 Disc	The disconnect threshold is the system voltage at which the LVD unit should disconnect the battery or load from the system. This voltage is chosen so as to allow the batteries to discharge fully but not so much as to be permanently damaged.	43.2	54	21.6	V

LVD 2 Reconnect	LVD 2 Recon	The reconnect threshold is the voltage at which the LVD will reconnect the battery or load after it has been disconnected. When the LVD is used as a load disconnect, this item can be used to allow the batteries to recharge almost fully before the load is reconnected.	45.2	56.5	22.6	V
LVD 2 Timeout		If this parameter is set to 0 (zero) the LVD timer function is disabled and the LVD operates on voltage. If this parameter is set >0, then the LVD will operate after the time set and the voltage settings will not apply.				Min
LVD 3 Disconnect	LVD 3 Disc	The disconnect threshold is the system voltage at which the LVD unit should disconnect the battery or load from the system. This voltage is chosen so as to allow the batteries to discharge fully but not so much as to be permanently damaged.				V
LVD 3 Reconnect	LVD 3 Recon	The reconnect threshold is the voltage at which the LVD will reconnect the battery or load after it has been disconnected. When the LVD is used as a load disconnect, this item can be used to allow the batteries to recharge almost fully before the load is reconnected.				V
LVD 3 Timeout		If this parameter is set to 0 (zero) the LVD timer function is disabled and the LVD operates on voltage. If this parameter is set >0, then the LVD will operate after the time set and the voltage settings will not apply.				Min
LVD Pulse Control		Activates Pulse control type drive for the LVD contactors. This type of drive suits magnetically latched contactors. If this is not enabled, the LVD will be assumed to use a conventional contactor that requires continuous control power.		Enabled		
LVD Pulse Width		The duration of the drive pulse for energising magnetically latched LVD contactors.		0.5		Sec
MAC Address		This is the MAC address for the monitor and cannot be changed by the user.				
Main Firmware Version		The firmware version of the main monitor microprocessor.				
Manual Battery Test		One manual battery test may be initiated using this setting.				
Manual Equalise Duration	M Eq Duration	The period for which the Manual Equalise process remains active		60		Min
Manual Equalise Voltage	M Eq Voltage	The voltage that the rectifier output will be set to for the period the Manual Equalise is active.	56	70	28	V
Maximum Number of Converters (BUS1)		The maximum number of converter shelf positions in the system that are connected to the monitor through the Primary Serial Bus connector J101. These positions may not all be filled, but could be filled at some time in the future				
Maximum Number of Converters (BUS2)		The maximum number of converter shelf positions in the system that are connected to the monitor through the Secondary Serial Bus connector J102. These positions may not all be filled, but could be filled at some time in the future				
Maximum Number of Rectifiers (BUS1)		The maximum number of rectifier shelf positions in the system that are connected to the monitor through the Primary Serial Bus connector J101. These positions may not all be filled, but could be filled at some time in the future				

Maximum Number of Rectifiers (BUS2)		The maximum number of rectifier shelf positions in the system that are connected to the monitor through the Secondary Serial Bus connector J102. These positions may not all be filled, but could be filled at some time in the future				
Maximum Rectifier Voltage		This is the maximum voltage that the monitor will allow the rectifier output voltage to be set to in any internal processes. E.g. Equalise	60	75	30	V
Minimum Rectifier Voltage		This is the minimum voltage that the monitor will allow the rectifier output voltage to be set to in any internal processes.	43	53.7	21.5	V
Modem Initialise String		The data string that will be sent to the modem to initialise it.				
Monitor Load Share	Rect Curr Share	The monitor can control the rectifier voltage to ensure they actively share current. The rectifiers will share current when this feature is disabled; however, this feature improves the performance of the current share.	Enabled			
Network Firmware Version		The version of the firmware of the microprocessor in the monitor network card.				
Next Equalise Time		The time and date that the next Periodic Equalise is due to take place.				
Next Periodic Battery Test		The time and date that the next Battery Test is due to take place.				
Number of Cells		The number of cells placed in series to form the battery. A 12V battery is 6 cells, 24V 12 cells and 48V 24 cells.	24	30	12	
Periodic Battery Test		A battery test will be instigated on a regular interval.	Disabled			
Periodic Battery Test Interval	P Bat Test Intvl	The interval between periodic battery tests.	30			Days
Periodic Equalise Duration	P Eq Duration	The period for which the Periodic Equalise process remains active	60			Min
Periodic Equalise Interval	P Eq Interval	The period between successive activations of the Periodic Equalise process.	30			Days
Periodic Equalise Voltage	P Eq Voltage	The voltage that the rectifier output will be set to for the period the Periodic Equalise is active.	56	70	28	V
Phone Number		The number the monitor will dial using the modem to report an alarm.				
Primary DNS Server		This is the network address of the Primary DNS Server. If DHCP is enabled, this is set by the DHCP server. If DHCP is disabled, this is set to the Default Primary DNS Server address.				
Real Time Clock		The date and time setting held within the monitor.				
Recharge		Refer Fast Charge Recharge				
Rectifier Float Voltage	Rect Float V	The output voltage set point of the rectifiers. The float voltage should be set to the recommended float voltage for the batteries used at 25ºC. This ensures that the temperature compensation operates correctly.	54	67.5	27	V
Rectifier Power Save		Activates the Power Save process.	Disabled			
Rectifier Rated Current		The rated output current of the model of rectifier installed in the system.				A

Rectifier System Current Limit	Rect Curr limit	If the rectifier current is required to be limited to less than the maximum rating of the rectifiers, then the Rectifier Current Limit can be set.	System Capacity	A
Rectifier Voltage Control	Rect V Ctrl	The monitor incorporates a Voltage Control function that will adjust the rectifier output voltage as the load varies to ensure that it remains at the desired setting. When this feature is disabled the system voltage will be correct at no load, but the system voltage will decrease slightly as load increases (usually about 500mV less at full load). This is due to resistance in the output of the rectifiers and system cabling. The Voltage Control function will compensate for this lost voltage if it is enabled.	Enabled	
Relay Operating Delay		The delay between the monitor registering that the LVD disconnect voltage has been reached and the activation of the LVD contactor.	3	Sec
Reset Network Microcontroller		This allows the network microcontroller to be reset whenever changes have been made to any of the network addresses. Any address changes do not take place until the microcontroller has been reset.		
Reset Web Passwords		This allows the web access passwords to be reset if the user is logged into the SM3x Configuration Utility at Expert level or above.		
SBM Fan Speed		The speed setting for the SBM fan		
SBM Mains High Loss Voltage		If the Mains supply voltage to the SBM rises above this voltage an alarm will activate and the SBM will not use the mains supply until the voltage returns to normal.	264	V
SBM Mains Low Loss Voltage		If the Mains supply voltage to the SBM falls below this voltage an alarm will activate and the SBM will not use the mains supply until the voltage returns to normal.	185	V
SBM Inverter High Loss Voltage		If the Inverter output voltage to the SBM rises above this voltage an alarm will activate and the SBM will not use the mains supply until the voltage returns to normal.	264	V
SBM Inverter Low Loss Voltage		If the Inverter Output voltage to the SBM falls below this voltage an alarm will activate and the SBM will not use the mains supply until the voltage returns to normal.	185	V
SBM No Bypass Alarm		The “No Bypass Alarm” will activate if the mains supply is not present at the SBM input. The alarm warns that there is no supply to bypass to if the inverter supply fails. This parameter allows the user to enable or disable this alarm.	Enabled	
SBM Output Priority		The SBM has two operational modes: Inverter Priority: The Inverter supplies the AC load, with the mains on stand-by. Mains Priority: The AC load is supplied from the Mains, with the inverter supply on stand-by.	Inverter Priority	
Secondary DNS Server		This is the network address of the Secondary Network Server. If DHCP is enabled, this is set by the DHCP server. If DHCP is disabled, this is set to the Default Secondary DNS Server address.		
Serial Number	Serial Number	Unique monitor serial number		
SNMP Agent Port		This is the SNMP Agent port number.	161	

SNMP Trap Community		This is the SNMP Community.	162	
SNMP Trap Port		This is the SNMP Trap port number.	Public	
SNMP Trap 1 IP Address		This is the SNMP Trap 1 IP address.	0.0.0.0	
SNMP Trap 2 IP Address		This is the SNMP Trap 2 IP address	0.0.0.0	
SNMP Trap 3 IP Address		This is the SNMP Trap 3 IP address	0.0.0.0	
SNMP Trap 4 IP Address		This is the SNMP Trap 4 IP address	0.0.0.0	
SNMP Trap 5 IP Address		This is the SNMP Trap 5 IP address	0.0.0.0	
Subnet Mask		This is the network Subnet Mask for the monitor. If DHCP is enabled, this is set by the DHCP server. If DHCP is disabled, this is set to the Default Subnet Mask.		
Temperature Compensation Slope	Temp Comp Slope	The Rate of change of the float voltage with temperature. The slope is defined on a “per cell” basis to allow for different system voltages (12/24/48V).	-3	mV/°C /Cell
Temperature Max Control Limit		At and above this temperature the float voltage is no longer adjusted for temperature.	50	°C
Temperature Min Control Limit		At and below this temperature the float voltage is no longer adjusted for temperature.	0	°C
Turn Off Rectifier when less than		The monitor compares the actual current load of the rectifiers with their rated output. If the actual load is less than this percentage, then the monitor will shut down another rectifier and repeat the comparison.	50	%
Turn On Rectifier when greater than		The monitor compares the actual current load of the rectifiers and their rated output. If the actual load is greater than this percentage, then the monitor will turn on one more rectifier and repeat the comparison.	80	%
Urgent Converter Fail		If the number of converters reporting failure to the monitor is equal or greater than this parameter, an Urgent Converter Fail Alarm occurs.	2	
Urgent Inverter Fail		If the number of inverters reporting failure to the monitor is equal or greater than this parameter, an Urgent Converter Fail Alarm occurs.	2	
Urgent Rectifier Fail		If the number of rectifiers reporting failure to the monitor is equal or greater than this parameter, an Urgent Rectifier Fail Alarm occurs.	2	
Use Modem		Activates the use of a modem as the means of communication with the monitor.	Disabled	
Web Administrator Username		This is the username for logging in to the monitor, with administrator level rights, when using the web interface. *Note: This setting should be changed by the user immediately after installation to ensure security is maintained.*	Admin	

Web Administrator Password		This is the password for logging in to the monitor, with administrator level rights, when using the web interface. *Note: This setting should be changed by the user immediately after installation to ensure security is maintained.*	Admin1	
Web User Level Username		This is the username for logging in to the monitor, with user level rights, when using the web interface. This level of rights will only allow viewing of settings, but no settings may be altered. *Note: This setting should be changed by the user immediately after installation to ensure security is maintained.*	User	
Web User Level Password		This is the password for logging in to the monitor, with user level rights, when using the web interface. This level of rights will only allow viewing of settings, but no settings may be altered. *Note: This setting should be changed by the user immediately after installation to ensure security is maintained.*	User1	

9 Trouble Shooting

Problem	Possible Cause	Remedy
Front panel ⏻ LED not on	• No power connection to the monitor	• The cable interface with the rectifier shelf must be installed.
	• Internal fuse within monitor blown.	• Remove monitor and return for service.
System Voltage lower than expected	• Float Voltage setting not correct.	• Set float voltage correctly using display menu.
	• Temperature reading incorrect.	• Check temperature sensor and cable are connected correctly and not damaged.
System Voltage higher than expected	• Float Voltage setting not correct.	• Set float voltage correctly using display menu.
	• Temperature reading incorrect.	• Check temperature sensor and cable are connected correctly and not damaged.
	• Periodic or Manual Equalise process active.	• This is a normal function but can be turned off through the display menu.
Temperature reading inaccurate	• Temperature sensor disconnected, open circuit or short circuit.	• Check temperature sensor and cable are connected correctly and not damaged.
	• Temperature sensor not calibrated.	• Calibrate the temperature sensors using the procedure in this manual.
Rectifier modules turn themselves off.	• “Power Saving Mode” is enabled.	• Check to see if “Power Saving Mode” is enabled.

10 Service and Warranty

10.1 Service

If the monitor unit should require service it should be removed from the system by an Approved Service Agent and returned to the manufacturer for Servicing.

The monitor should not be removed from the system by unauthorised personnel as this may lead to malfunctions of the DC system.

10.2 Warranty

Newmar warrants that this product is free from defects in material and workmanship and agrees to remedy any defect (or at its option replace the product) for a period of one year from the date of purchase. This warranty covers both parts and labour. Parts may be replaced under this warranty with new or remanufactured parts.

This warranty will not apply to any product that has been improperly installed (as described in the installation manual), misused, abused, used in ways the product was not designed, altered or repaired in any way which may affect the performance or reliability of operation, sustained damage by power surges or electrical storms, or sustained shipping damage, or repaired by any unauthorised repair centre.

Please contact Newmar Customer Service to obtain a Returned Materials Authorisation (RMA), by calling 714-751-0488, prior to shipping any products for repair. All shipments must be shipped prepaid and include proof of the date of your original purchase. Please include your name, address, phone number, email address and a brief description of the problem.

Newmar's shipping address:
2911 W. Garry Ave., Santa Ana, CA 92704.

Newmar makes no other warranties, express or implied, including any warranty of fitness for a particular purpose. In no event shall Newmar be responsible for indirect or consequential damages or lost profits even if Newmar Ltd has been advised of the possibility of such damages. Newmar's sole obligation to you shall be the repair or replacement of a non-conforming product.

11 Appendix 1 - Using DC/DC Converters with an SM3x Monitor

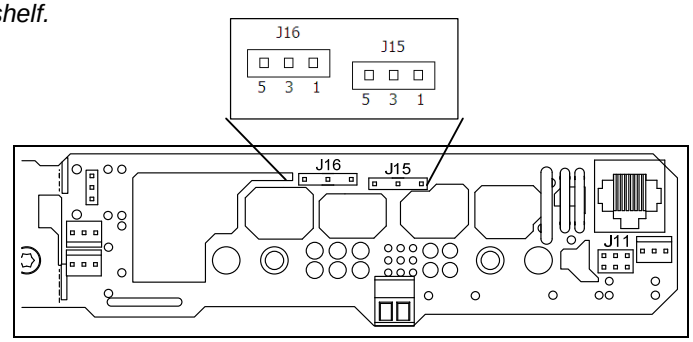
All instructions below should be read in conjunction with the DC-DC Converter Manual.

11.1 Shelf Installation and Setup

Install the AC-4T shelf as specified in the DC-DC Converter manual.

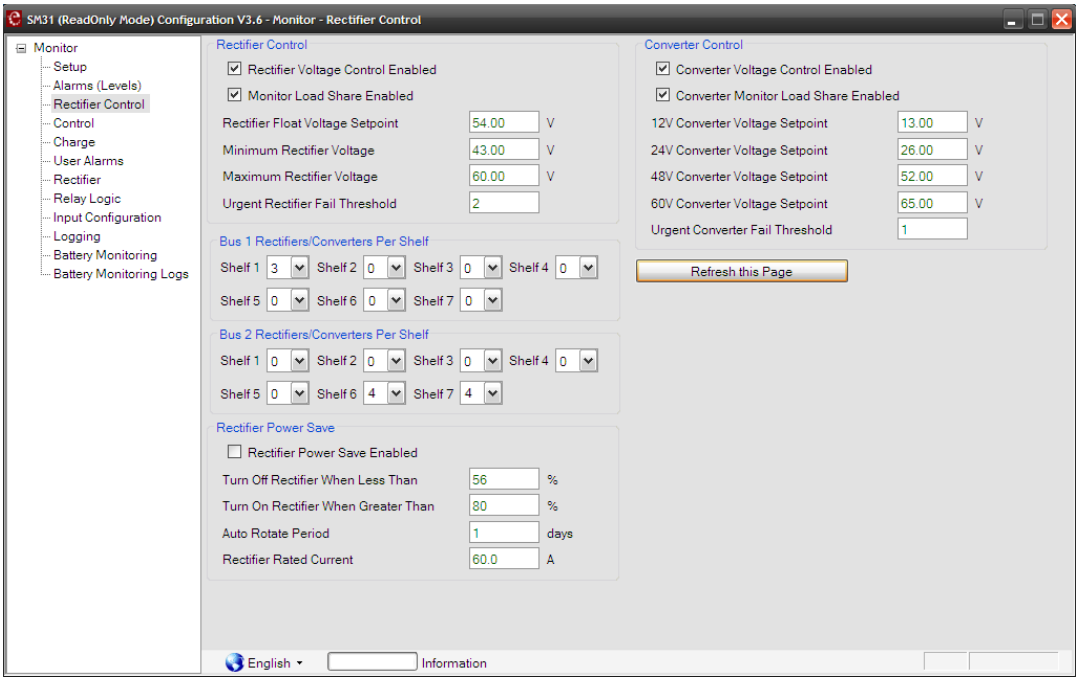
The SM31 and SM32 monitors have two serial bus connections; BUS1 and BUS2 (see Section 2). The rectifier shelf and auxiliary modules (BCM ACM, etc) connect to the Primary Serial Bus connector (J101). The DC-DC converter shelf is connected to the Secondary Serial Bus Connector (J102) except in situations where multiple converter types are to be installed in the one system or the converters are being powered by a source other than Newmar rectifiers. In these situations the DC/DC converter shelf connects to the Primary Serial Bus.

Note: *The communications bus needs to be powered by at least 20V. To power the bus off the converter output fit jumpers between pins 1 - 3 of J15 and J16 (see Fig. 3.1) on the first converter shelf. To power the bus off the converter input fit the jumpers between pins 3 – 5 of J15 and J16 on the first converter shelf.*



11.2 Shelf Configuration

To set up the monitor for DC-DC converters, run the software supplied with the monitor (SM3x Configuration) and select the 'Rectifier Control' tab (Fig. 3.2). To allow rectifier and converter shelves



to operate on the same communications bus, the rectifiers begin at Shelf 1 and increment whereas the converters begin at Shelf 7 and decrement. The number of converters present in each shelf needs to be selected in the corresponding drop-down box on the 'Rectifier Control' tab to enable real-time monitoring of the converters' status.

11.2.1 Voltage Control

The monitors have the capability to actively control the output voltage of any rectifier modules or DC-DC converters in the DC system they monitor. The Voltage Control process in a monitor will, if enabled, detect the output voltage of the rectifiers/converters and re-adjust the voltage set point to compensate for the voltage droop that occurs as load current increases.

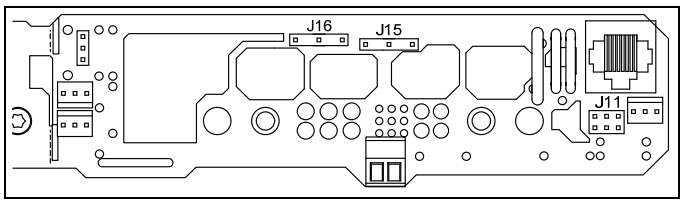
11.2.2 Current Share

Current share prevents the premature aging of rectifiers/converters due to having to provide a disproportionate share of the output current. The DC-DC converters produced by Newmar will current share without monitor Current Share enabled. However, if Current Share is enabled in the monitor, the current share performance will be enhanced.

11.2.3 Multiple Converter Voltages

If an SM31 or SM32 monitor is used to control the DC Power System, the option of running converters of differing output voltages on the same bus is available. A 7-socket RJ45 hub (ASM-RJ45X7) is required to permit communication between the shelves, monitor and any ancillary devices. The hub connects to BUS1 at (and is powered through) J101 of the monitor (or J11 of the SM3x I/O Expansion Board). At which socket devices connect to the hub is immaterial as all the connections are paralleled

Excepting the situation where the system is powered by a source other than Newmar rectifiers (see note in section 9.1), all converter shelves in a multiple voltage converter system need to have headers J11, J15 and J16 not connected (see diagram below).



Appendix 2 – Advanced Configuration File Guide

This section is aimed at users who already have experience in basic configuration file usage: parameter adjustment, save/restore, etc.

This section provides some guidance for the use of extended I/O: advanced variable mapping and manipulation. For more information on the construction of Configuration Files, please consult with Newmar.

11.3 General

The monitor can to be used to gather additional digital and analogue inputs from the DC system or peripheral areas and can process these parameters, forming alarms and allowing these inputs to be remotely monitored.

For example: the DC system can monitor inputs from air conditioning, site security, AC supply, avoiding the need for other data transport systems at a site.

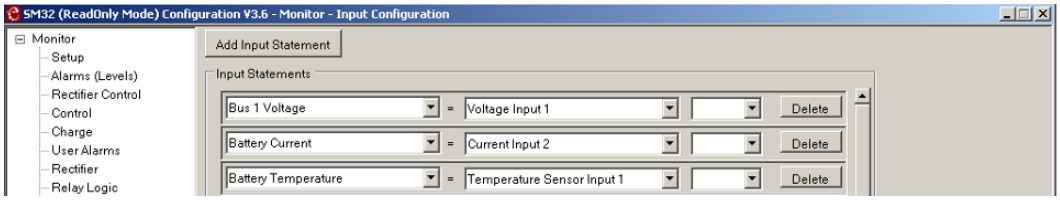
These additional functions can be built into the monitor configuration file using the Configuration Editor software.

The monitor has four areas within the configuration that allow custom functions to be added:

- Input Configuration
- Relay/Output Logic
- User Alarms

11.4 Input Configuration

The monitor can have inputs direct and through I/O Expansion boards, battery monitors and AC supply monitors. The “Input Configuration” area in the SM3x Configuration Editor allows any of these inputs to be scaled and mapped to a monitor state (either standard or user defined). This area should be regarded as a sequence of logical statements that execute from top to bottom every 1-2 seconds. Each statement takes the form of a logical, arithmetic or combined expression, as shown below.



In the above example: the physical input “Voltage Input 1” is being mapped to the internal monitor variable “Bus 1 Voltage”, the physical input “Current Input 2” is being mapped to internal monitor variable “Battery Current” and the physical input “Temperature Sensor Input 1” is being mapped to internal monitor variable “Battery Temperature”.

If an input is to be used within the monitor, it must first be mapped from its physical input to an internal monitor variable e.g. the physical input “Voltage Input 1” is mapped to the internal monitor variable “Bus 1 Voltage”.

The following internal variables must be mapped to allow basic monitor function:

- Bus 1 Voltage
- Battery Current
- Load Current

It is also recommended that the following variables also be mapped:

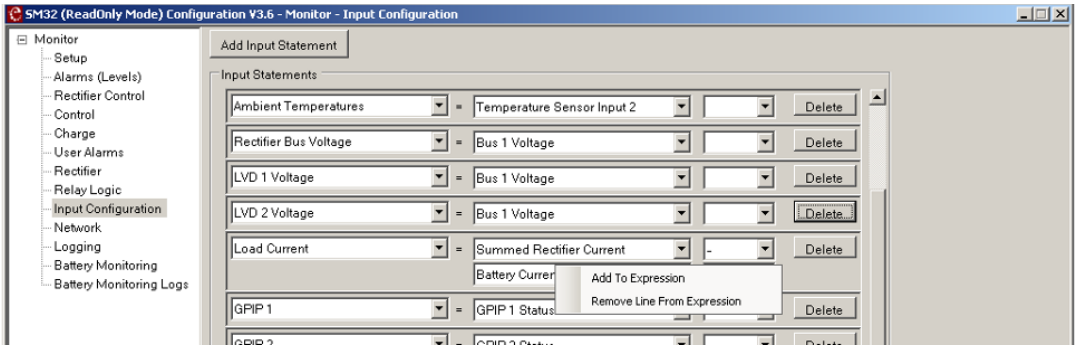
- Battery Temperature
- Ambient Temperature
- LVD Voltages (1,2 and 3)

Statements

Statements are mapping equations with the Input Configuration area.

A statement is comprised of a result (left hand variable) that equates to a combined expression (formed on the right hand side).

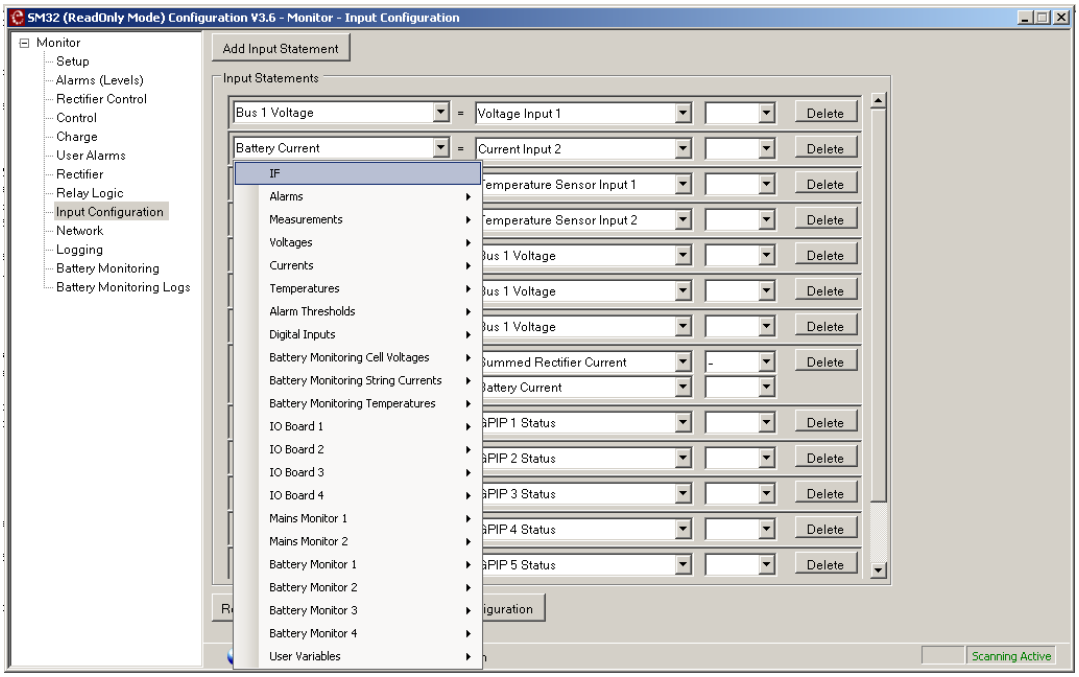
A new statement can be added by selecting “Add Input Statement”. This inserts a blank line at the bottom of the list of statements. An expression can be added to or deleted from a statement by right-clicking on the existing expression. See example below.



Variables

The variables in the statement are chosen from the pick lists. These lists contain all the possible inputs and internal states of the monitor and peripheral modules.

Note: this will include some variables for modules that may not be connected to your monitor.



IF
Special instruction that if following expression is true then the next statement below is executed. If the following expression is false the next statement below is not executed

Alarms
Contains predefined monitor alarm states and user defined alarms.

Measurements
Contains physical inputs to the monitor main board and inputs from rectifiers and converters

Voltages
Contains internal monitor voltage values that are used for monitor control and processes.

Currents
Contains internal monitor current values that are used for monitor control and processes.

Temperatures
Contains internal monitor temperature values that are used for monitor control and processes.

Alarm Thresholds
Contains all alarm threshold values that are set elsewhere in the configuration editor.

Digital Inputs
Contains the status values for the monitor digital inputs (On/Off).

Battery Monitoring Cell Voltages / Battery Monitoring String Currents / Battery Monitoring Temperatures
Contain all monitor internal variables associated with battery monitoring.

IO Board 1, 2, 3, 4
Contain the physical inputs (digital and analogue) from the IO Expansion Boards connected to the monitor.
Note: The digital inputs are mapped in a specific way. See instructions below.

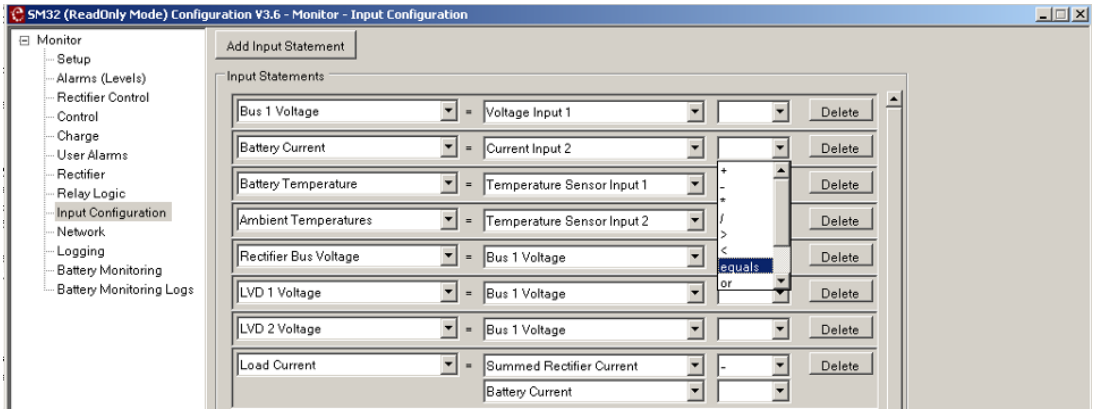
Mains Monitor 1, 2
Contain the physical inputs from the AC monitoring modules connected to the monitor.

Battery Monitor1, 2, 3, 4
Contain the physical inputs from the battery monitoring modules connected to the monitor.

User Variables
These are internal monitor variables that can be user assigned. They are generally used as intermediate variables in statements. User Variable 1 is usually reserved for use with digital inputs from IO Expansion boards. See instructions below. These variables can be reassigned as required.

Operator

The operator can be chosen from the pick list and can be arithmetic or Boolean.



+ - * /
These are simple arithmetic operators and return a value in the range ±32000.

> < Equals
The operators do a comparison and return a value of either true (=1) or false (=0).

Or And Nor Nand
These are simple Boolean operators and return a value of either 1 or 0.

Tips for use

1. Always ensure you know the full range of inputs possible for an input. Polarity is important as well as the maximum possible value.

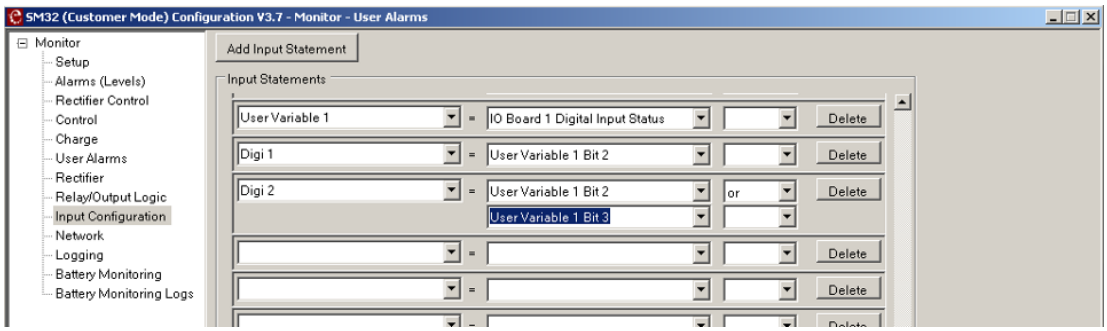
2. Scaling numbers can be typed directly into expression field. Values must be positive integers.

3. When scaling inputs, remember that no variable can be larger than ±32000.

4. When using Digital inputs, the input is regarded as "active" (logic 1) when the input is connected to the positive bus. In this case input can be mapped normally.
   In the case where the input is normally connected to the positive bus and when active is disconnected, the following mapping is suggested.
   Example using "Battery MCB Trip"
   "Battery MCB Trip" = GPIP x Status "equals" 0
   (gives a value of 1 or True if the input is no longer connected to the positive bus i.e. is active)

Using digital inputs from an IO Expansion board

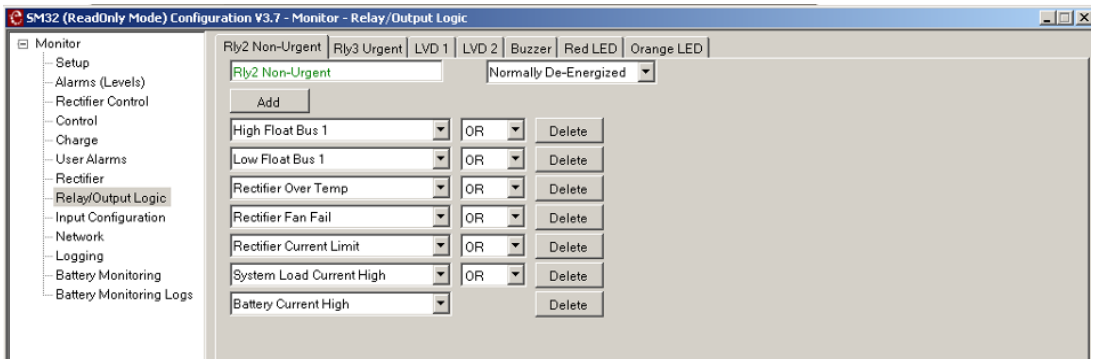
The 6 digital inputs from an IO Expansion board are not available directly as separate inputs. These inputs are combined as one variable, "IO Board x Digital Input Status". This variable must be mapped to User Variable 1, and then each bit (1-6) must be mapped from there to other variables. An example is shown below



User Variable 1 temporarily stores the IO board digital Input status. Two internal states (Digi 1 and Digi 2) are defined, one from IO board Digital Input 1 and the other from a combination of IO Board Digital Inputs 1 and 2.

11.5 Relay/Output Logic

The Relay/Output Logic area allows the user to map internal states onto relays, indicator LEDs, SNMP Traps, the buzzer and LVDs. Relay 1 is fixed as Monitor Fail, but all other outputs are mapped using this function, including LVD controls.



A Tab can be created to each relay/output in the monitor or attached peripherals. Right-click on the tab bar to create a new tab.

The label of the relay/output may be changed. However, when you re-label a relay/output, append the physical location to the end of the name. E.g. Door Security – IO2 Rly1. Once a label has been changed, then this new label will appear in all relay/output lists.

The relays/outputs can be Normally Energised or Normally De-energised. This refers to the state of the relay/output when the control state is active. When the control state is inactive, the status of the relay/output will change from Energised to Non-energised or vice versa.

The control state of the output can be defined by the combination of alarm states in the specified function. Additional lines can be added to or deleted from the function by using the “Add” or “Delete” features respectively.

Tips for use

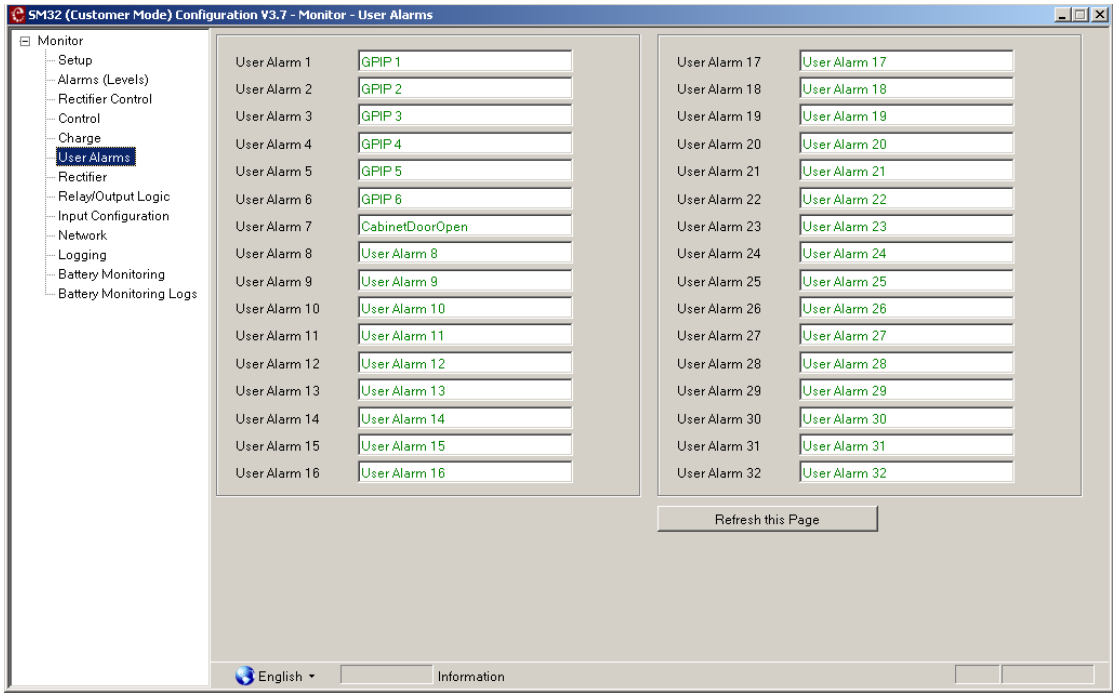
1. When configuring an LVD output, ensure that the internal LVD state e.g. “LVD1Operate” is mapped to this output in the relay logic.

11.6 User Alarms

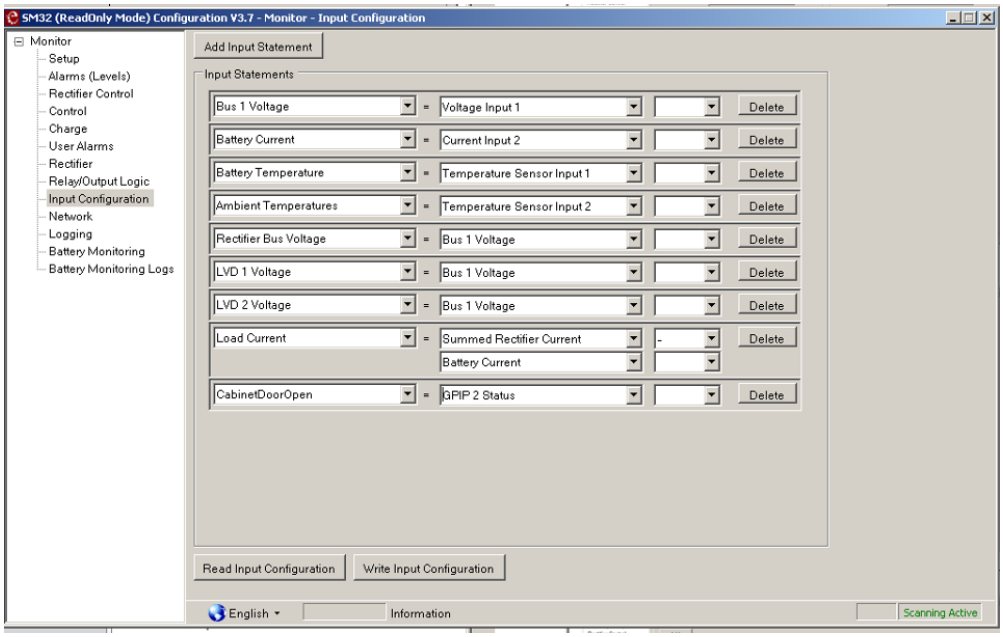
The User Alarms are variables that can be defined by the user. They have a custom label and can be configured using a function in the Input Configuration. They behave like all other monitor alarms, are viewable from the front panel or remote interface and can be mapped to a relay in the Relay/Output Logic.

For Example: A DC system in a small cabinet beside the road. A switch is mounted on the door and connected to digital input 2 of the monitor. It is required that when the door opens, an alarm is generated through the SNMP trap and that the internal light is turned on.

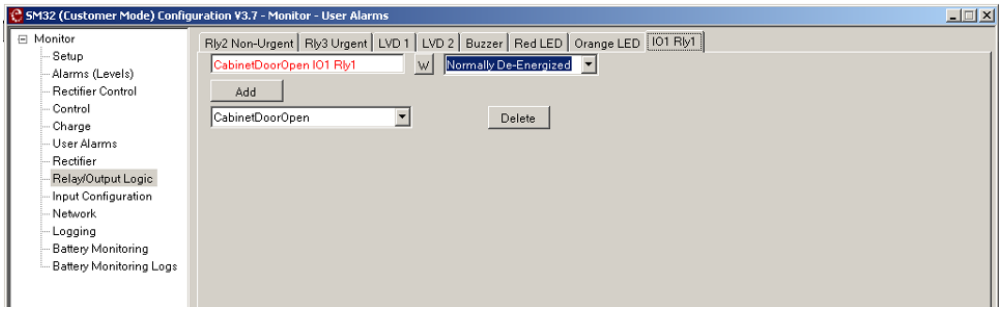
1. User Alarm 7 is assigned as “Cabinet Door Open”.



2. Digital Input 2(GPIP2) is mapped to UserAlarm7(“CabinetDoorOpen”)



3. Relay 1 of IO Board 1 is assigned to operate is User Alarm 7 (“Cabinet Door Open”) is active. This relay will be wired to the internal light.



4. SNMP Trap 1 is assigned to be activated when either the Urgent Relay operates or CabinetDoorOpen is active.