INSTALLATION & OPERATING MANUAL

ACX Advanced Controller

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System Controller ACX Advanced

1. Description

The ACX Advanced Controller is a pluggable microprocessor controller that provides monitoring and control for a broad range of DC Power Systems. The Controller monitors all system parameters including DC voltage, rectifier current, rectifier temperature, system capacity, battery parameters, and circuit breaker status.

Alarm and warning notifications are indicated by front panel LEDs, and through potential free alarm contacts that allow remote signaling. External monitoring of alarms and the system is accomplished through a USB or RS232 port using PC-based PowCom™ software. The Controller also has an Ethernet port allowing control over a TCP/IP network and has web based support. Alarms can be mapped via SNMP traps to customer OSS (Operation Support System) platforms such as Castle Rock Computing SNMPc Network Manager™.

To meet individual site requirements, the controller contains a Programmable Logic Unit that can be used to monitor and control specified requirements. This allows individual alarm routing and logic operations to be set as actions, alarms to be triggered, and outputs to be activated based on internal or external signal monitoring, comparing, and processing.

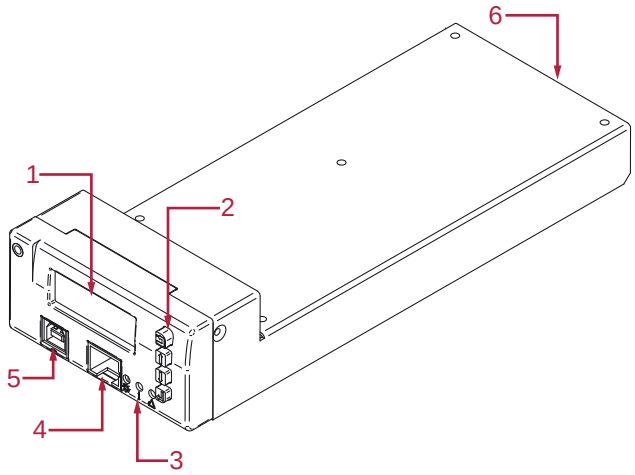


Figure 1 - Controller Features

1. Display (LCD)
2. Push-Buttons (CANCEL, UP, DOWN, ENTER)
3. Signal LEDs (Green, Yellow, Red)
4. Ethernet Port
5. USB Port
6. Rear Interface Connector

The controller consists of the following elements:

1.1 Main Unit

This is the master unit of the system, communicating with all the modules (rectifiers, converters) and units (Alarm Relay Board). It is fully hot-pluggable.

Features include: visual alarm indication, USB and RS232 communication circuit for remote operation, web interface and RS485 for internal communication with up to 64* rectifier nodes and extended units (up to 4x extension boards and 1x alarm relay board).

* The number of rectifiers that are support can be increase to 256 when using a 4x64 Multiplexer board. See 1.5 below.

1.2 Internal Connection Board

The internal connection board is used as an interface between the main unit and the system.

It contains: input for reading current, battery and load breaker monitoring, outputs for operating two individual contactors LVD and PLD, (further PLDs can be used with the Controller Alarm Relay Board), RS232, RS485, CAN communication connector and system Vout connector.

1.3 External Connection Board

The external connection board is connected to the internal connection board and is used for signal connection.

It contains: 4 potential free alarm contacts (additional 6 alarms with Extension Alarm Relay Board), 12 multi purpose contacts (setup by default for symmetry measurements or general use with input voltage up to 100VDC), inputs for 2 temperature probes, 2x digital inputs and outputs, +5VDC and System voltage output.

1.4 Extended Boards

A variety of extended boards or units may be added to the system. These units are used for extended measurements or signal outputs or for extended system communication.

1.5 4x64 Multiplexer Board

Extends the capacity of RS485 communication. It increases the maximum number of rectifiers in the system supported by the controller to 256 by adding three additional RS485 channels for communication with rectifiers where each channel can serve up to 64 rectifiers.

2. Specifications

2.1 INPUT

Voltage	18-60VDC
Current	<200mA at 48V
Power Consumption	12W max.

2.2 INTERFACE

Signal LED's	Green - Power ON, Yellow - System warning, Red - System alarm
Internal Communications	RS485 Data Bus (up to 64 modules + extended units)
MicroSD Card	up to 4Gb
External communications	USB for direct communication with a PC using the PowCom™ software RS232 interface for remote control via a modem Ethernet port allowing monitoring and control via TCP/IP network Web server interface + SNMPv1,v2,v3
Signal Inputs	Battery current reading (via shunt) System voltage reading Analog inputs for battery symmetry reading or general use Battery temperature sensors Load fuse failure Battery fuse failure 2 x Digital inputs Signal Outputs LVD/PLD disconnection LVD/PLD reconnection 2 x Digital outputs 4x alarm relays (additional 6 alarms with Alarm Relay Board)
Software	Configuration file upgradeable via PowCom™ with appropriate license via USB/Ethernet.

2.2 BASIC FUNCTIONS

Simple menu-guided operation
1000 event alarm log
User-selectable alarm parameters
Web interface for remote operation via a PC
Temperature compensated charging
Boost charging (manual and automatic)
Limited battery charging current

LVD control (voltage controlled)
PLD control (voltage and time controlled)
Battery test, manual or automatic with symmetry measurement
Additional Short interval battery test
Alarm relay test
Software controlled start up after mains outage and battery test
Inventory, Peak load, Site, Maintenance and service
Statistical data log
Real time clock with battery backup
MicroSD card with data logging function (option)

2.3 ALARMS

Alarm Contacts 4 potential free alarm contacts (additional 6 alarms with Alarm Relay Board)
Low system voltage
High system voltage
Load/Battery disconnection
Mains Error
Distribution fuse failure
AC low voltage
Battery failure
Module failure
High battery temperature
Symmetry fault
Battery fuse failure
High load
AC high voltage
Urgent module failure
Communication failure
Partial load disconnection 1
Temp. probe failure
High distribution load
Battery is discharging
Overvoltage shutdown
Low Battery temperature
Partial load disconnection 2
Partial load disconnection 3
Alarms are blocked
16 x Additional User Definable Alarms

2.4 BATTERY MANAGEMENT

Battery Disconnection	Allows voltage controlled disconnection of batteries.
Boost Charge	Manual, time controlled or automatic boost charging with adjustable time and voltage levels.
Battery Tests	Automatic or manual testing of batteries up to six times per year with a 10 test memory. Variables include test duration and end voltage battery discontinuance test to ensure battery connection.
Enhanced Battery Monitor	Monthly logging of essential battery parameters including temperature, temperature hours, current, charging voltage and symmetry voltage, data logged for 5 years.
Site Logs	System tools developed to assist site management. Daily peak load and statistic logs available.
Symmetry Measurement	Optional tool that measures batteries for early detection of thermal runaway.
Temperature Compensation	Allows continuous adjustment of output voltage according to battery temperature. Features include adjustable compensation factor and separate thresholds for high temperature alarms.
Load Shedding (PLD)	Optional feature that allows voltage or time controlled disconnection of non-essential load.

2.5 GENERAL

Dimensions, in. (mm)	3.4 (85) W x 1.6 (40) mm x 8.9 (225) H
Weight	0.44 lbs.(0.2kg)
Operating Temperature	-40°C to +70°C
Storage Temperature	-40°C to +85°C
Safety	IEC60950-1, UL60950-1 & CSA22.2 No. 60950-1-03
EMC	EN61000-6-2, EN61000-6-3, EN300 386-2
Environment	Storage: ETS 300 019-2-1 Transport: ETS 300 019-2-2 Operation: ETS 300 019-2-3

NOTE: A specific power system setup may limit the availability of some controller functions.

3. Operation

This section contains a basic description of the Controller functions.

3.1 Starting the Controller

When the controller is turned ON it takes approximately 5 seconds to analyze the system and test all addresses for connected modules and units. The green LED on the display starts blinking. No alarm signals are given during this period.

When the Controller identifies a module or a unit, it is automatically added to its inventory. Modules and units remain in the system memory until a master reset or reconfiguration is performed.

3.2 Adding / Removing Modules and Units

Adding Modules and Units

The Controller constantly scans for new modules and units. When, for example, a rectifier is added to the system it remains invisible until detected by the Controller.

It takes some time for the rectifier to reach the value of the system voltage and share current with other rectifiers. Until then the rectifier current value is 0A.

Removing Modules and Units

When a module or a unit is removed from the system a communication error alarm is generated.

To remove the error message press the “Reconfigure” button in the Inventory window in the PowCom™ software (see the PowCom Instruction Manual). It can be also done via the front panel, see section 4.7.14 - Accept Removed Parts.

Reconfiguration removes all non-communicating modules and units from the inventory.

NOTE: Make sure there are no communication faults caused by any other failure before doing this. It makes all communication faults disappear, but it will not fix any problems so it must only be used if the communication fault is caused by the module or unit being intentionally removed.

3.3 Controller Failure

If the controller fails to operate, all 4 alarm relays will be activated (in alarm position.)

3.4 Control Buttons

To browse the controller menu, 4 push-buttons are used to scroll and select.

- **CANCEL** - is used to cancel the current selection on the menu hierarchy. When pressed the menu returns one step back.
- **UP ARROW** - is used to move up in the menu hierarchy, to select options or adjust limits.
- **DOWN ARROW** - is used to move down in the menu hierarchy, to select options or adjust limits
- **ENTER** - is used to select and confirm an option or to move forward one level in the menu hierarchy.

If the controller is left unattended the display returns to the Main menu automatically after 2 minutes.

3.5 Display Icons

The controller icons are displayed at the top of LCD screen, indicating the status of various system parameters.

Battery Current, Distribution Current and Rectifier Current are displayed below the icons after controller start-up.

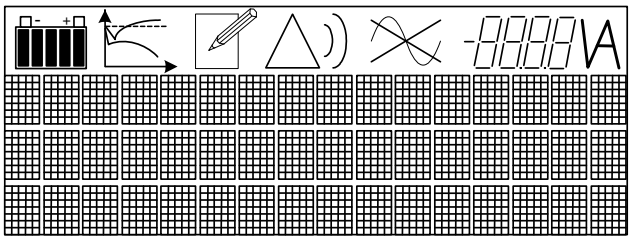


Figure 2 - Display Icons

Battery Icon

The battery icon displays the battery charge status in 20% increments. To predict the remaining capacity, immediate load current and voltage are also taken into account.

During battery charging the icon pulses. Once the battery is fully charged only the rightmost segment blinks.

When starting the system for the first time it takes some time before the battery icon is fully operational and displays correctly. The battery capacity must be set correctly (Adjust Limits → Battery settings → Battery Capacity). If the Battery capacity is set to 0 (zero) the icon is not shown.

NOTE: The battery charge status may be incorrect if the battery is malfunctioning.

Graph Icon

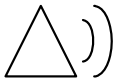
Boost Test

The graph icons indicate charging mode as either Boost or Battery Test. The graph showing an up-going curve is the Boost icon, while Battery Test is indicated with a down-going curve on the graph.

Update Mode

This icon is displayed in editing mode when editable parameters in the Menu tree are accessed. The value can be updated by pressing the ENTER button when the desired value is shown.

Warning and Alarm Icons

Warning  Alarm

The Warning icon appears when a warning is present. The alarm icon indicates an alarm situation.

Mains Failure Icon

This icon indicates mains failure.

System Voltage Measurement

The system voltage with 2 decimal points is displayed.

4. Menu

The controller display is configured into a set of scrollable menus that provide an easy way to find the information or settings required. The information below describes how to navigate through the controller display and explains various menu options and system behavior.

NOTE: See full Controller Menu Tree on pages 31 & 32..

4.1 Main Menu

The Main menu is divided into seven sections which are further divided into sub-menus, see Figure 3. The functions of the sub-menus are explained in the following sections.

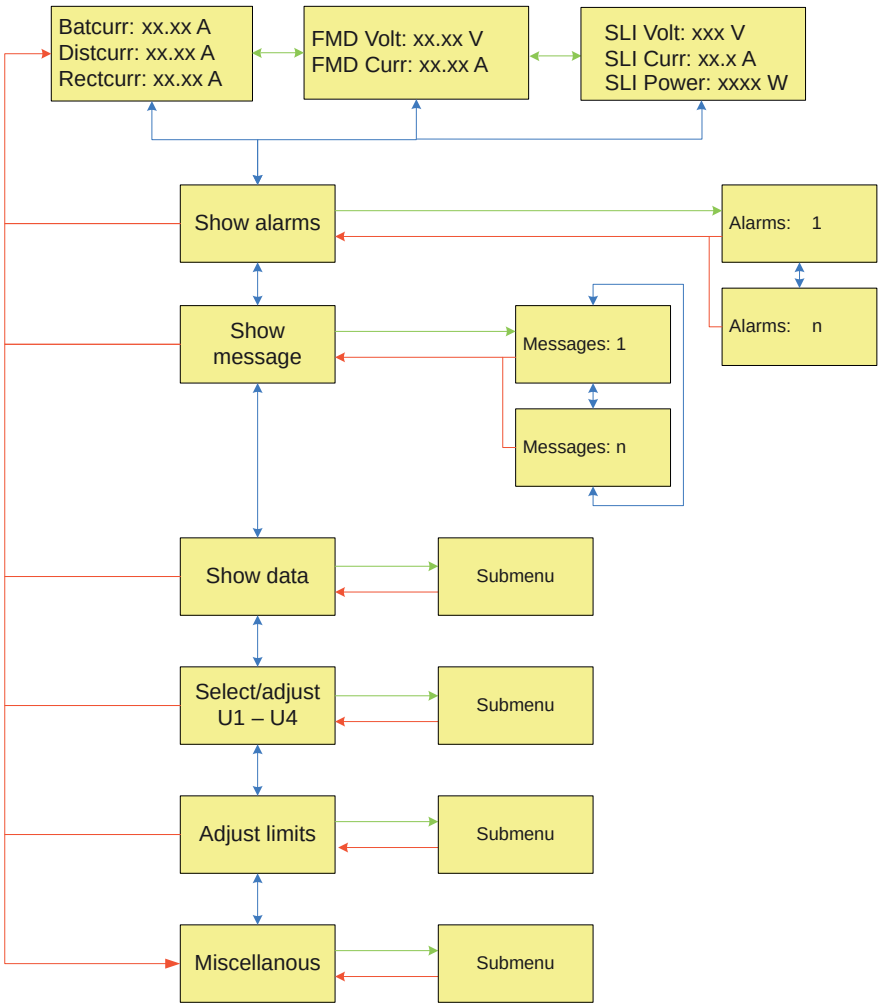


Figure 3 - Main Menu

4.2 Show Alarms

This window displays the current alarm status. If there are several concurrent alarms 2 small triangles (▼▲) appear in the upper right corner. Use the arrow keys to scroll through the alarms. Any removed alarm disappears from the alarm list automatically while any new one is added to the alarm menu immediately. Battery failure and symmetry failure alarms need to be reset manually by pressing and holding ENTER for a short time.

4.3 Show Messages

This item displays any messages. If there are multiple concurrent messages, scroll down to view all of them. New or removed messages are updated on the menu immediately.

4.4 Show Data

This menu displays information about: modules, units, temperature, and symmetry voltage.

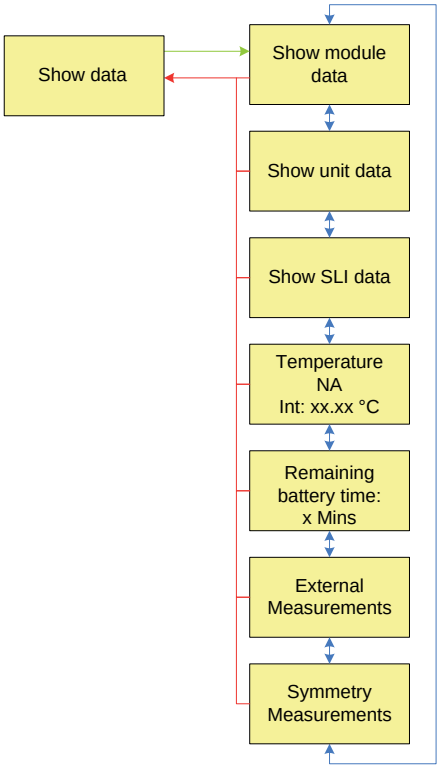


Figure 4 - Show Data

4.4.1 Show Module Data

This menu displays information from each rectifier and consists of four levels, each containing different rectifier information:

ENTER/CANCEL to get to the information wanted, and UP/DOWN to scroll between the rectifier numbers, see Figure 5.

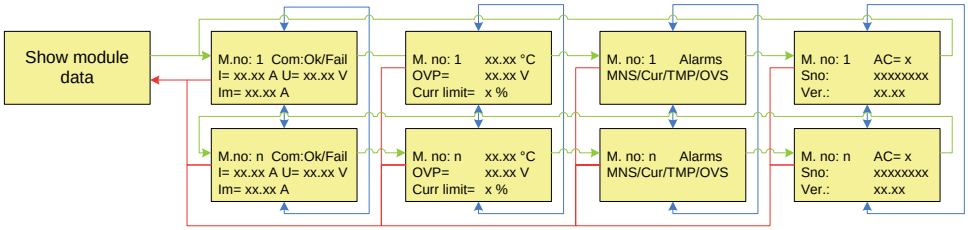


Figure 5a - Show Module Data

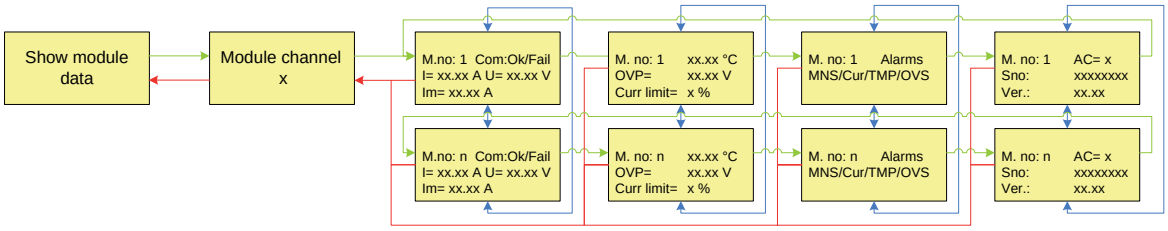


Figure 5b - Show Module Data with 4x64 Multiplexer

NOTE: Rectifier modules are numbered from left to right and top to bottom when the system is viewed from the front..

NOTE: Rectifiers that are not communicating may not have correct or updated information.

The first sub-level displays Communication status (Com), Rectifier Current (I), Rectifier Output Voltage (U), and the Current Share input (Im).

The second sub-level includes information about Internal rectifier temperature (internal), Rectifier Over-voltage limit (OVP) and the Current Limit. Once the rectifier is selected on the display, press ENTER and a new menu with the alarm information is shown.

Module alarms are indicated by 3 letter flags;

- MNS - No mains input.

- LOW - Output voltage low (depends on rectifier type).
- OFF - No operation, caused by mains failure, other failure or when module is turned off manually or automatically.
- OVS - Overvoltage shutdown.
- FAN - Fan failure. The consequences of a fan failure depend on the type of rectifier. Please see the rectifier chapter of your system manual for details.
- CUR - Current sharing fault. Rectifier output current deviates too much from the average value.
- TMP - Temperature is high. This alarm must be reset manually.

The fourth sub-level displays AC input voltage (if available), Rectifier serial number (if available) and rectifier software version (if available).

4.4.2 Show Unit Data

This menu option is displayed in two levels.

First sub-level - shows Unit Number, Communication status (Com), and Unit current (I).

Second sub-level - shows Unit number, Serial number, and Software version. (Controller Alarm Relay Board or Controller Extension Board are examples of communication unit.)

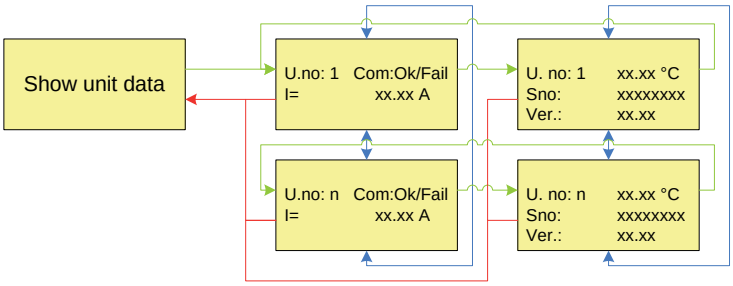


Figure 6 - Show Unit Data

4.4.3 Show SLI Data

If SLI inverters and the SLI translation board are installed, this menu displays basic information regarding SLI units.

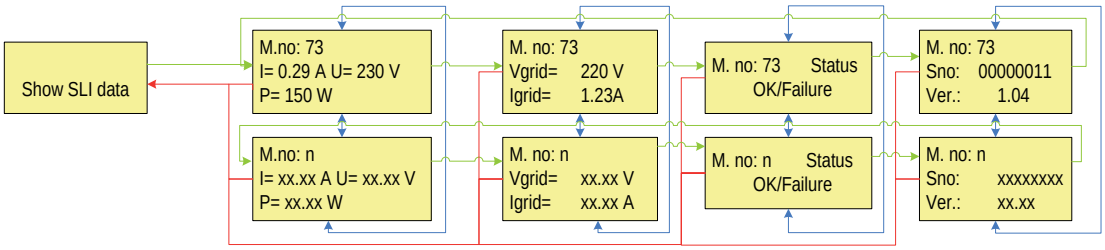


Figure 7 - Show SLI Data

4.4.4 Temperature

This menu shows the battery temperature in degrees Celsius, measured by the temperature sensor (if installed) and the temperature measured by controller's internal temperature sensor.

4.4.5 Remaining Battery Time

The immediate remaining battery time calculated by the controller is displayed here.

Battery icon on the display shows the remaining battery capacity (see Battery Icon on page 11).

4.4.6 External Measurements

If configured, external measurements can be read here. Use the arrow keys to scroll down the measurements, see Figure 8.

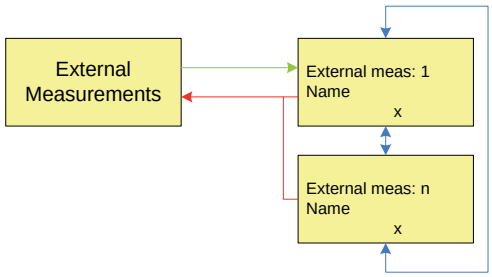


Figure 8 - External Measurements

4.4.7 Symmetry Measurements

If symmetry measurement is set up for the system, the symmetry voltage for each battery branch is displayed here. Use the arrow keys to scroll through the measurements.

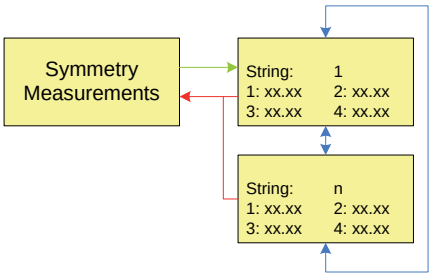


Figure 9 - Symmetry Measurements

4.5 Select / Adjust U1 - U4

This menu is used for selecting one of the references for four operating modes; U1 - float voltage, U2 - boost voltage, U3 - battery test voltage, U4 - spare, and for adjusting these references. Use the arrow keys to adjust the required voltage.

CAUTION: Always check the battery user guide or the battery datasheet before attempting to boost charge. Improper settings can damage the batteries.

The voltage references can be adjusted in steps of 0.1V.

U1 Normal - adjust or change U1 (The float charge voltage).

U2 Boost - adjust or change U2 (The boost charge voltage).

U3 Test - adjust or change U3 (The battery test voltage).

U4 Spare - adjust or change U4 (The spare voltage).
The U4 setting is normally not used in this system.

Reference shows which of U1-U4 is set.

NOTE: Voltages U1 and U2 should be set to values recommended for battery temperature 20°C (optionally 25°C). For more details see section 4.6.5 - Temperature Compensation.

NOTE: If the Temperature compensation or Battery current limit is active, the output voltage may differ from the set value.

4.6 Adjust Limits

The Adjust Limits menu allows the user to set or change the system parameters and alarm limits.

It has ten menu options, each with their own sub-menus. Parameters can be set and adjusted by selecting the different sub-menus, see Figure 10.

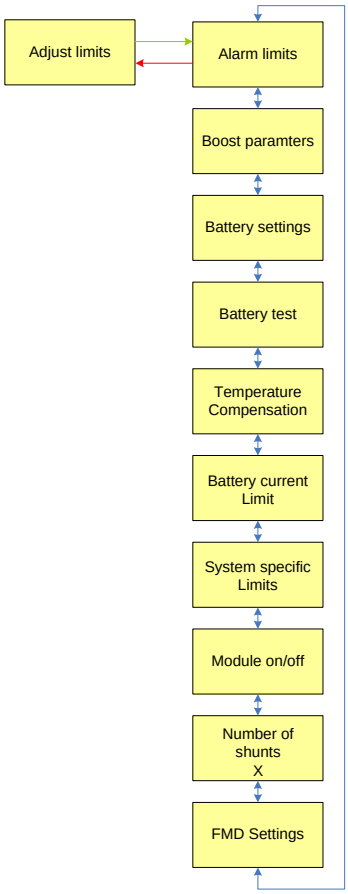


Figure 10 - Adjust Limits

4.6.1 Alarm limits

This menu allows changing the limits for following alarms:

- Low voltage alarm (V)
- High voltage alarm (V)
- Over voltage shutdown (V)
- Load/Battery disconnection (V)
- Partial load disconnection 1 (V)*
- Partial load disconnection 2 (V)*
- Partial load disconnection 3 (V)*

- Load/Battery reconnection (V)
- High load (%)
- High temperature alarm (°C)
- Low temperature alarm (°C)
- Low AC voltage (V)
- High AC voltage (V)

*Partial load disconnection, if configured in the Config Wizard, can also be controlled by time. The time counter starts counting after AC mains failure. Then the value appears in minutes [min] instead of Volts [V].

NOTE: The High Load alarm is activated when the load current exceeds the capacity of the installed modules multiplied by the high load limit. This is an indication that the system requires increased rectifier capacity.

CAUTION: Adjusting the controller alarm and limit settings may have serious impact on system behavior. Only qualified installers should adjust these limits.

To change these limits use the arrow keys and press ENTER to select. See Appendix B, Configuration of your system manual for the default settings.

4.6.2 Boost Parameters

This menu contains the limits for boost charging control. The following parameters can be set:

- Boost time (Hours)
- Boost interval (Weeks)
- Boost factor (-)
- Boost t1 (V)
- Boost t2 (V)
- Autoboost Enable (On/Off)

Boost charging can be activated by three methods:

1. Manual boost charging - can be activated manually by selecting U2 via the controller front panel (Select/Adjust U1-U4 > Reference > U2) or via PowCom™ software (Adjust limits window).

Return to float charge manually by choosing U1, or automatically, after a pre-set time.

2. Periodic boost charging - after a pre-set period boost charging will be automatically activated for a pre-set time. The interval and boost time should be programmed (for example 4 hours every 3rd week).

3. Automatic boost charging - when the battery voltage drops below LEVEL t1 during a mains failure, timer t1 is started. When the mains is restored, timer t1 is stopped and the system starts automatic boost charging for time t2 = k x t1 (k is an adjustable constant). Timer t2 starts counting when the battery voltage reaches LEVEL t2, see Figure 11.

NOTE: Periodic or Automatic boost charging must be enabled via the controller front panel (Adjust limits → Boost parameters → Autoboost Enable → On/Off) or in two different ways via PowCom™ software:
1. (Supervision → Set parameters → Battery settings → toggle Automatic boost) or
2. (Utilities → Config Wizard → Battery settings → toggle Automatic boost).

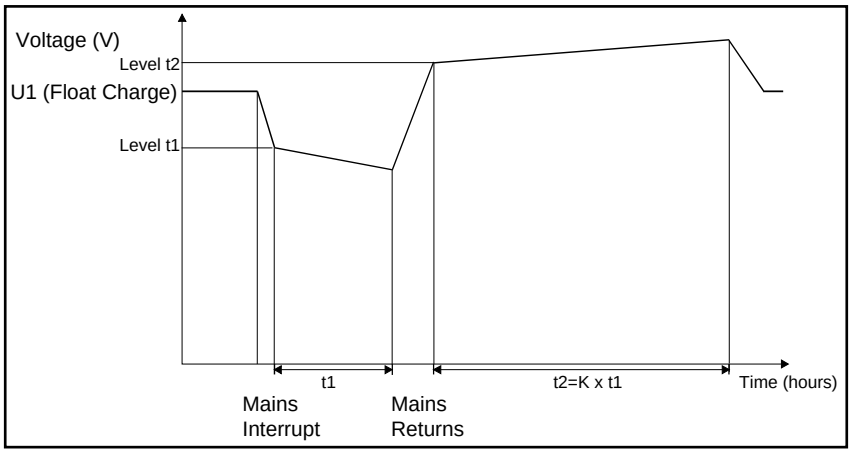


Figure 11 - Boost charging

The following values are adjustable for boost charging:

Boost voltage	40 - 60 V
Boost time	0 - 200 hrs
Boost interval	3 - 16 weeks
Boost factor	1.0 - 16
Boost t1	40 - 60 V
Boost t2	40 - 60 V
Automatic boost	Enable/Disable

NOTE: If the battery type does not allow boost charging the boost function should be disabled and the U2 value set equal to the U1 value.

4.6.3 Battery Settings

This menu contains settings for the following battery parameters and limits:

- Symmetry limit (V)
- Number of batteries (Branches)
- Battery type (Blocks)
- Battery capacity (Ah)
- Controller Symmetry inputs (-)
- Unit 1 - Unit 4 Symmetry inputs (-)

4.6.4 Battery Test and Short Interval Battery Test

This menu contains the following limits and parameters for Battery Test and Short Interval Battery Test:

- Test end voltage (V)
- Test end Ah (Ah)
- Test duration (Min)
- Time of test (-)
- Number of tests per year (-)
- Short interval Enable (On/Off)
- Short interval period (Days)
- Short interval length (Min)
- Short interval deviation (%)

Battery Test

Battery test is used for checking the condition and capacity of installed batteries. The test can be activated Manually or Automatically.

Manual Start-up

Battery testing is activated manually by selecting U3 via the controller front panel (Select/ Adjust U1-U4 > Reference > U3) or via PowCom™ software in the Adjust Limits window.

Automatic Start-up

Battery test can be also activated automatically 1-6 times a year via the controller front panel (Adjust Limits > Battery Test > No. of tests per Year) or via PowCom™ software in the Adjust Limits window (Auto Test). The test date is calculated from the installation date of the system defined in PowCom™ software (Supervision > Set installation data).

The day-time (24-hour format) of the battery test is set in ‘Time for Test’.

Test Performance

Once the battery test starts, the rectifier voltage decreases to a pre-set value U3 (check the rectifier datasheet for minimum voltage) and is stopped when the set value is reached. Reasons for the test stopping could be:

- battery voltage reaches the End voltage [V]
- battery test reaches the Test duration time [min].
- discharged capacity reaches the set Ah limit value.

Battery voltage, battery current and Ah are logged during the test. The recommended minimum duration of the test is 5 minutes.

PASS

The battery parameters meet requirements and the voltage reference is set back to U1 when:

- the battery voltage is higher then set End Voltage b. test [V] after expiration of Batt. test time [min].
- the battery voltage is higher then set End Voltage b. test [V] after discharged capacity reaches the set value [Ah].

FAIL

The test is interrupted and the battery is considered as faulty when:

- the set voltage value [V] is reached before time [min].
- the set voltage value [V] is reached before “Ah limit for test” [Ah].
- the symmetry limit is exceeded. SYMMETRY FAULT alarm is activated, battery test is ended and BATTERY FAILURE alarm is generated.

The battery failure alarm is indicated and further automatically activated battery tests will not be performed while the battery failure alarm is active.

Voltage reference is set to U1 again.

Parameter Settings

The parameter settings feature allows a partial discharge of the batteries (approximately 30-40% of their capacity) in order to test the batteries for errors. The settings should be done according to the battery manufacturer’s requirements.

The following setting can be used as an example for standard value-regulated lead batteries:

U3	= 1.9V/cell
End voltage	= 1.94V/cell
Time	= 40% of expected backup time
Ah	= 40% of nominal battery capacity.

Parameters that can be set or adjusted in the battery test:

Battery test voltage U3:	0-100V (Check Rectifier datasheet for min. voltage.)
Symmetry limit:	0.0-4.0V
Test end voltage:	0-100V
Test duration:	0-20 hours
Ah limit:	0-50,000Ah
Time of test:	0-23 (0=midnight)
No of test/year:	0-6

Short interval battery test

This is used to test for a permanent break or interruption in the battery strings when more than one shunt with extension board is used.

Once this test is Enabled, it is performed in the time interval set in the 'Short interval period'. The system voltage is decreased to U3 for the time duration set in 'Short interval length' and the current through all used shunts is measured. If the current deviation through the shunts exceeds the value set in the 'Short interval deviation" or if one of the currents is equal to 0 (zero), a 'Battery Failure" alarm is generated.

The test can be Enabled via the controller front panel (Adjust limits > Battery test > Short Interval Enable > On/Off) or in one of two ways via PowCom™ software:

1. (Supervision > Set parameters > Battery settings > toggle Short interval Battery Test)

or

2. (Utilities > Config Wizard > Battery settings window > toggle Short interval Battery Test).

4.6.5 Temperature Compensation

This menu allows setting of the following parameters for temperature compensation:

- Enable temperature compensation (On/Off)
- Compensation factor (V/10°C)
- Turn temperature compensation On/Off.

When the battery temperature is higher or lower than 20°C, temperature compensation regulates the set float or boost battery voltage based on battery temperature and temperature compensation factor. (This value can be changed to 25°C.)

If the temperature rises by 10 degrees, the voltage decreases according to the adjusted compensation factor, if the temperature drops the voltage is adjusted correspondingly. If the temperature changes by 1 degree, the voltage changes by 1/10 of the compensation factor.

CAUTION: Non-compensating or improper setting shortens battery life by either over- or under-charging.

NOTE: The output voltage is not changed by temp. compensation at a battery temperature 20°C. (This setting can be changed to 25°C)

Example:

A system includes 4 x 12 V battery blocks - 6 cells in each battery block.

The value of 1 cell defined in the battery datasheet:

- *2.28V/20°C*
- *2.24V/30°C*

The difference between values at 20°C and 30°C is 0.04V/cell

6 x 0.04V = 0.24V/10°C - 6 cells in each battery block

The compensation factor value is set for a full battery string which in this case contains 4 x 12V battery blocks. So, the correct compensation factor is:

4 x 0.24V = 0.96V/10°C

NOTE: The example is general. The temperature compensation factor may differ depending on the installed battery. Check the battery datasheet for correct setting.

4.6.6 Battery Current Limit

This menu allows settings for:

- Battery current limit Enable (On/Off)
- Battery current limit (A)

This function limits the maximum current flowing into the batteries during charging. (It does not limit discharge current!) The minimum charging current is 5A. The maximum charging current value can be set via PowCom™ software to 1000A, via the controller front display it can be higher.

The charging current limit for lead-acid batteries is usually 0.1 of rated capacity. (Check the battery datasheet in case a different value is required.)

If the current limit is not required or batteries are not installed, keep the function disabled.

CAUTION: Non-limited charge current or improper setting may shorten battery life.

NOTE: Current limiting is not available for all systems that use the ACX Advanced controller. This is the factory default setting.

4.6.7 System Specific Limits (also External Limits)

These limits are used only in specific systems.

- External Limit 1 Name of limit
- External Limit n Name of limit

There are eight user adjustable limits for PLS logic. If these limits are enabled they can be adjusted via the controller front panel (Adjust limits → System specific limits → Ext. limit 1-n) or via PowCom™ software (Supervision → Set Parameters → System specific limits).

4.6.8 Module On/Off

Module On/Off is used for switching individual rectifier modules on or off. This function needs to be enabled in Config Wizard.

- Module No.: 1 (On/Off)
- Module No.: n (On/Off)

NOTE: The configuration also allows an Energy Saving Mode function where the rectifiers are turned On or Off automatically based on the delivered power. This function needs to be enabled and configured in the Config Wizard. The automatic function, when active, overrides the manual setting. For more details contact UNIPOWER customer support. **(Not available when 4x64 Multiplexer installed)**

4.6.9 No. of Shunts

The number of battery shunts for the power system is set here. The default number is 1 and this value should not be changed unless extension boards with additional shunts are connected to the system.

4.6.10 FMD settings

This sub-menu allows the following settings:

- FMD Voltage (V)
- FMD OVP (V)

This menu sets the reference voltage (FMD voltage) and OVP limit for secondary voltage units if these are available in the system.

4.7 Miscellaneous

The miscellaneous menu is used for setting and checking various system parameters.

- Set Time
- Relay Test
- Alarm Blocking On/Off
- Version
- SD Card Info
- Set New Password
- Shunt Current (A)
- Shunt Voltage (mV)
- Current Offset (A)
- Voltage Offset (V)
- Audible Alarm On/Off
- Network Address
- Baud Rate
- Init Modem
- Accept Remove Parts
- Reset to Defaults
- Master Reset

4.7.1 Set Time

The time and date are displayed and can be set using the buttons on the controller front panel. They can also be set via PowCom™ software (Supervision → Set date/time). The clock has a battery back-up and keeps the correct time even if the Controller is turned off.

4.7.2 Relay Test

This function switches alarm relays On/Off manually regardless of any system alarms. It is mainly used for testing of alarm relays and related devices.

4.7.3 Alarm Blocking

This function disables all system alarms and alarm relays. The only active and visible alarm is “Alarms are blocked”.

4.7.4 Version

Shows the controller software version, configuration number and serial number.

4.7.5 SD Card Info

Provides the following information about the microSD card status:

- OK - card is working properly
- NA - not installed (cannot be detected)
- FAIL - file system error (identifies hardware, but can’t be used for reading or writing)

4.7.6 Set New Password

When selected, first enter the old password. Set a new password and confirm it by entering the new password again.

NOTE: Make sure the new password is remembered or written down. If the password is forgotten or access is denied, contact UNIPOWER technical support for assistance.

4.7.7 Shunt Current

Displays the current rating of the battery shunt, in Amperes [A]. This parameter shows the value of current in the current/voltage ratio of the shunt.

4.7.8 Shunt Voltage

Displays the voltage drop of the battery shunt at rated current, in millivolt [mV]. This parameter shows the value of voltage in the current/voltage ratio of the shunt.

Example

A shunt with rating 400A/60mV is set as follows: 400A is set as Shunt current and 60mV as Shunt voltage.

4.7.9 Current Offset

Current offset is used for calibration of the current measurement in order to avoid measurement offset. To calibrate, turn all battery breakers OFF and adjust the Current Offset to zero.

4.7.10 Voltage Offset

This function sets the output DC voltage measurements offset. Measure the voltage on the DC busbars with a calibrated voltmeter and enter the measured value in the Voltage Offset menu.

4.7.11 Audible Alarm

An audible alarm can be switched On/Off in this menu option. When switched On and an alarm occurs the controller makes a sound until any key is pressed.

4.7.12 Network Address

For systems with more than one controller installed in the network setup, this network address must be set to be able to communicate with the PowCom™ software. This setting must not be confused with the controller IP address setting.

The default setting is 2 and it should not be changed for most applications.

4.7.13 Baudrate

The speed of communication for RS232 interface can be set here. There are two options 38400 bps or 9600 bps.

4.7.14 SNMP Version

The ACX Advanced supports SNMP in version v1/v2c or v3. The prefered option can be selected here.

4.7.15 Init modem

When selected, the controller sends a message to initiate a modem. The initiation message sets the modem to auto-answer after two rings. See the instructions specific to your modem if it requires additional initialization to operate.

4.7.16 Accept removed parts

A unit or module removed from the system generates the Communication failure alarm. Select YES to remove all non-communicating units or modules from the inventory and clear the alarm.

NOTE: Make sure there are no communication faults caused by any other failure before doing this. It makes all communication faults disappear; but it will not fix any problems, so it must only be used if the communication fault is caused by the module or unit being intentionally removed.

4.7.17 Reset to defaults

This command returns all settings of the system to default values without deleting logged data or system information. It is recommended to try this instead of Master Reset if a reset is needed. After reset always check all limits and adjust them to the required levels.

4.7.18 Master reset

A master reset completely resets the controller and deletes all stored data including the password. If possible, perform a backup of the controller data to a PC before doing a master reset. After a master reset always check all limits and adjust them to the desired levels.

CAUTION: A Master Reset deletes all information from the system.
Use the master reset feature only as a last resort.

4.8 Energy Saving Mode

In this mode the ACX Advanced controller is able to turn off redundant rectifiers automatically depending on the load. At least 2 rectifiers remain active and rotate in a set time periods on every address position.

NOTE: This function can only be enabled/disabled using the PowCom software. See page 28 in the PowCom manual for more details.

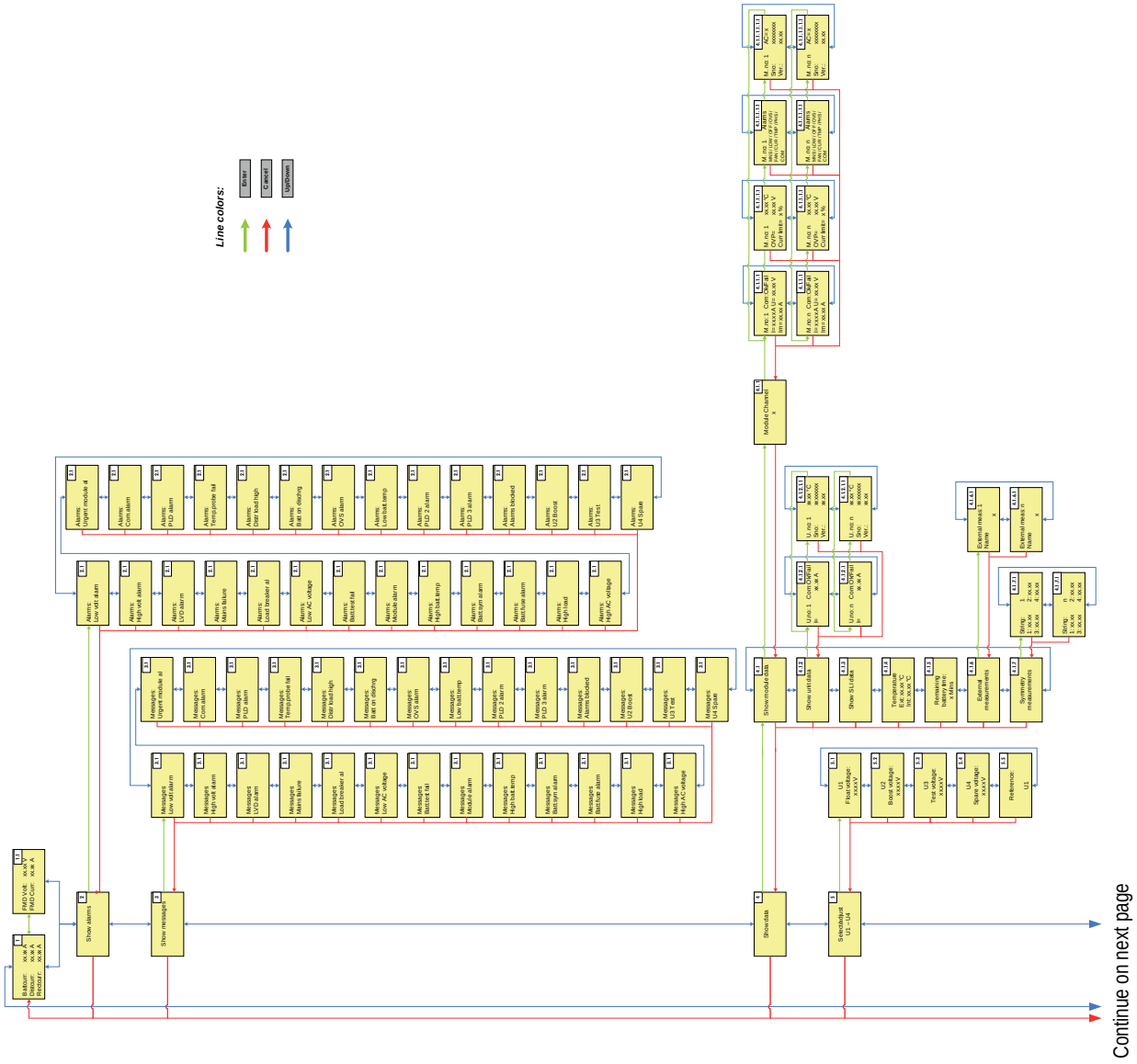


Figure 12a - Menu Tree part 1

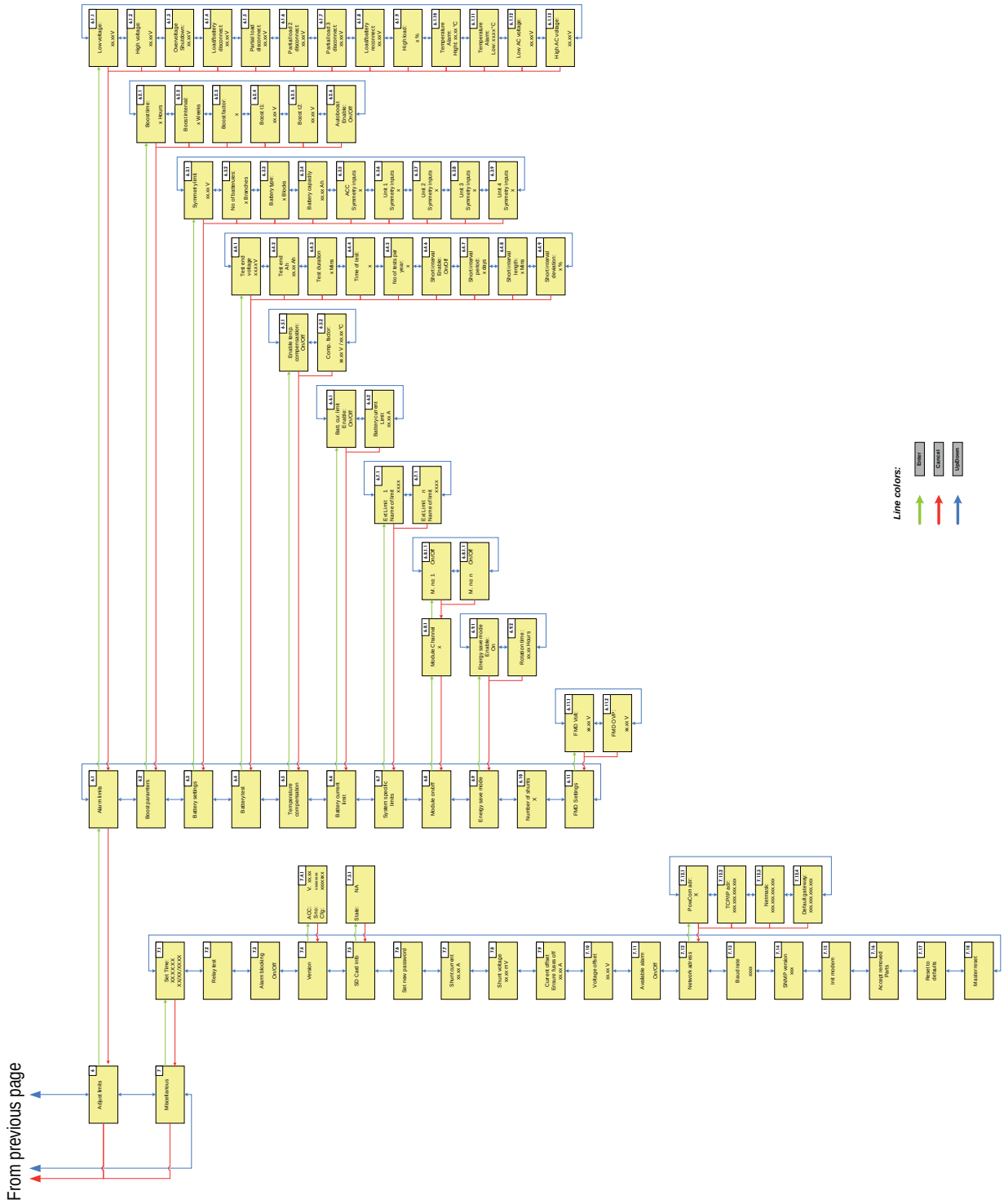


Figure 12b - Menu Tree part 2

5. Controller Alarms / Messages

This chapter describes the controller alarms in standard system operation and configuration:

Low system voltage
This alarm is generated when the system voltage drops below the limit set in 4.6.1 - *Low voltage alarm.*

High system voltage
This alarm occurs when the system voltage exceeds the limit set in 4.6.1 - *High voltage alarm.*

Load/Battery disconnection
This alarm is generated when the system voltage drops below the limit set in 4.6.1 - *Load/ Battery disconnection* for more than 30s. Load/Battery disconnection must be allowed in the configuration.

Mains Error
This alarm is activated when AC mains is Off for two or more rectifiers except for systems with one rectifier only.

Distribution fuse failure
This alarm occurs when a distribution circuit breaker is switched Off. A load needs to be connected to the breaker as the alarm does not occur if there no load connected.

AC low voltage
This alarm is generated when the AC Mains voltage drops below the limit set in 4.6.1 - *Low AC voltage.*

This alarm is available only when rectifiers with an AC mains voltage reading are used in the system.

Battery failure
This alarm occurs when either a Battery test or a Short interval Battery Test Fails. This alarm needs to be reset manually. For details see 4.6.4.

Module failure
This alarm occurs when one of the installed modules indicates a failure alarm.

High battery temperature
This alarm occurs when the battery temperature exceeds the limit set in 4.6.1 - *High temperature alarm.*

Symmetry fault
This alarm is generated when the voltage between battery blocks differs from the value set in 4.6.3 - *Battery Settings.*

This value is calculated from the system voltage based on the battery settings, number of batteries and battery type.

If Automatic Reset is not enabled in the configuration, the alarm needs to be reset manually.

Battery fuse failure
This alarm occurs when a battery circuit breaker is switched Off and the system voltage is 0.65V higher than the battery voltage. The alarm does not occur when a battery is not connected. (In firmware older than 1.13 is the value 1.4V.)

High load
This alarm is activated when the load current exceeds the capacity of the installed rectifiers multiplied by the limit set in 4.6.1 - *High load.*

AC High Voltage
This alarm occurs when the AC Mains voltage exceeds the limit set in 4.6.1 - *High AC voltage.*

This alarm is activated only when rectifiers with AC mains voltage reading are used in the system.

Urgent module failure
This alarm occurs when two or more installed modules send a failure alarm.

Communication failure
This alarm occurs when installed modules or units are not communicating or are removed from the system. For detail see section 3.2.

PLD Disconnection
This alarm occurs either when the system voltage drops below the set limit, or when the time reaches the value set in 4.6.1 - *Partial load disconnect.*

Voltage disconnection needs to be allowed in the configuration.

Temp. probe failure
This alarm always appears when:

- The temperature probe is disconnected and temperature compensation is enabled.
- Battery temperature is above +80°C or below -20°C, temperature compensation can be enabled or disabled. (If disabled and temperature is below -40°C the alarm does not appear.)
- Battery temperature is 10°C higher than the temperature of the controller's internal temperature sensor.
- Battery temperature is 30°C lower than the temperature of the controller's internal temperature sensor.

This alarm does not appear when:

- The temperature probe is disconnected and temperature compensation is disabled.
- Temperature compensation is disabled and the temperature drops below -40°C.

High distribution load
Is not used in controller managed systems.

Battery is discharging
This alarm appears when the battery is discharging with current higher than 2% of the current rating of the shunt and the system voltage drops 1V below the voltage reference (U1 or U2).

Overvoltage shutdown
This alarm appears when the system voltage exceeds the rectifier overvoltage shut down limit and the rectifiers are switched Off. The rectifiers usually need to be restarted after such an event.

Low battery temperature
This alarm is activated when the battery temperature drops below the temperature set in 4.6.1 - *Low temperature alarm*

PLD2 Disconnection
This alarm occurs either when the system voltage drops below the set limit, or when the time reaches the value set in 4.6.1 - *Partial load 2 disconnect.*

Voltage disconnection needs to be allowed in the configuration.

PLD3 Disconnection
This alarm occurs either when the system voltage drops below the set limit, or when the time reaches the value set in 4.6.1 - *Partial load 3 disconnect.*

Voltage disconnection needs to be allowed in the configuration.

Alarms are blocked
This alarm occurs when the Alarms are blocked function is used, see 4.7.3.

16 x Additional User Definable Alarms
These alarms are triggered when user defined alarms meet the alarm condition. The alarm text is defined by the user.

6. Connection to Controller via PowCom™ software

6.1 Connecting to the Controller via USB - Direct Communication

For controller connection a USB cable with Standard A plug to Standard B plug is required.

The Controller requires PowCom™ software version 4.25 or later. (Contact UNIPOWER sales if a PowCom™ software upgrade is needed or download it from the web site at: http://www.unipowerco.com/pdf/powcom-ds.pdf.)

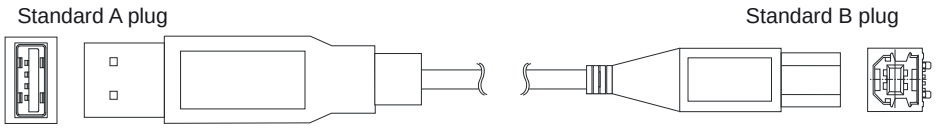


Figure 13 - USB Cable

1. Connect the B plug of the USB cable to USB interface on the controller front panel.

2. Connect the A plug of USB cable to the USB port on the PC.

3. Start the PowCom™ software.

4. Choose Communication from the PowCom™ software menu, and select USB Communication, see Figure 14. If present, the controller will be connected automatically through the USB interface.

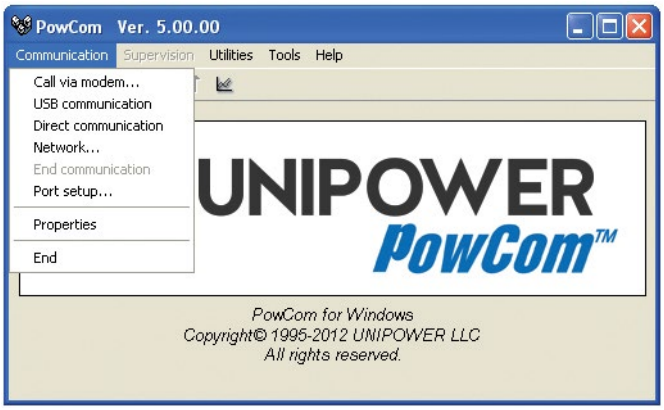


Figure 14 - Communication

5. Enter Password (1234 by default).

NEED MORE INFORMATION? The PowCom™ software package available from UNIPOWER is delivered with a manual and available on the web site at http://unipowerco.com/powcom/PowCom_5-00-04_RC_setup.zip. See this manual for more information.

6.2 Connecting to Controller via a Network

1. Connect an appropriate patch cable to the Ethernet port on the controller front panel and to the network interface.
2. If the IP address is not set in the controller, it has to be done manually. The TCP/IP address, Net mask and Default gateway can be entered in 2 ways: via the front panel (Miscellaneous > Network Address) or via PowCom™ software (Supervision > TCP / IP address) using Direct Communication.

NOTE: Every controller should have a unique IP address by which it is recognized in the network. Ask your network administrator for TCP/IP address, Net mask and Default gateway details.

3. Start the PowCom™ software.
4. Choose Communication from the PowCom software menu, and select Network.
5. Insert the IP address into the "Server:port" text box or select one from the list as shown in Figure 15 and press the "Get list" button.
6. Then press the "Connect" button.
7. Enter the password (1234 by default) and press OK, Figure 16.
8. Check the PowCom™ software documentation for further information about the interface.

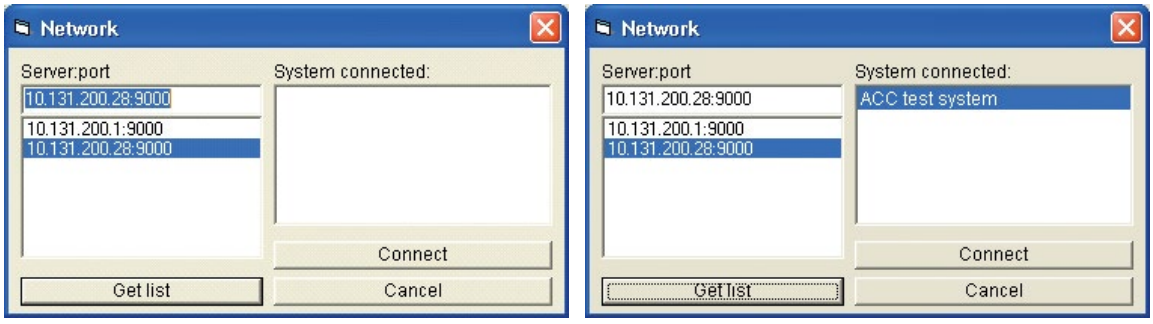


Figure 15 - Network

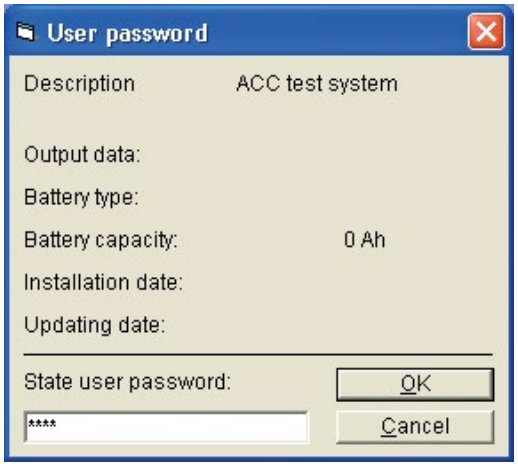


Figure 16 - Password

NOTE: The only one remote PowerCom connection is allowed at a time, whether by Ethernet or USB. Any additional connection attempts will fail.

7. Connecting to the Controller via the Web Interface

The controller can be also monitored via an Ethernet 100 BASE-T network using the built-in Web Interface software application.

The Web Interface allows monitoring and setting of the main system parameters and alarms. The browser is automatically refreshed approximately every half-minute.

The Web Interface requires an up to date graphical Internet browser (MS Internet Explorer, Mozilla Firefox or other).

UNIPOWER does not guarantee compatibility with older browser software versions.

NOTE: For connectivity verification in the network between the PC and the controller, it is possible to use ICMP (Internet Control Message Protocol). It is chiefly used by the operating systems of networked computers to send error messages—indicating, for instance, that a requested service is not available or that a host or router could not be reached.
The **ping** tool is used directly by user network applications. It sends an "Echo request" and expects an "Echo replay". The controller can work with max. 1024 Bytes only (Windows ping default).

7.1 Connection

For Ethernet connection via the Web Interface, follow the instructions below:

1. Connect an appropriate patch cable to the Ethernet Connection on the controller front panel and to the network interface.

2. If the IP address is not set in the controller it has to be done manually. The TCP/IP address, Net mask and Default gateway can be entered in 2 ways: via the front panel (Miscellaneous > Network Address) or via PowCom™ software (Direct communication > Supervision > TCP / IP address).

NOTE: Every controller should have a unique IP address by which is recognized in the network. Ask your network administrator for TCP/IP address, Net mask and Default gateway details.

3. Start the Internet browser on the computer and enter the IP address in the Address bar after HTTP and you should get a connection box, see Figure 17 on page 40.

4. When logging in for the first time, enter 'admin' as Username and leave the Password field blank. If a User Account already exists, enter the appropriate Username and Password.

NOTE: the Password can be edited after login using the Configuration - Admin menu on the left side. See Admin Configuration 7.2.8.1 for further information regarding login, user levels and password editing.

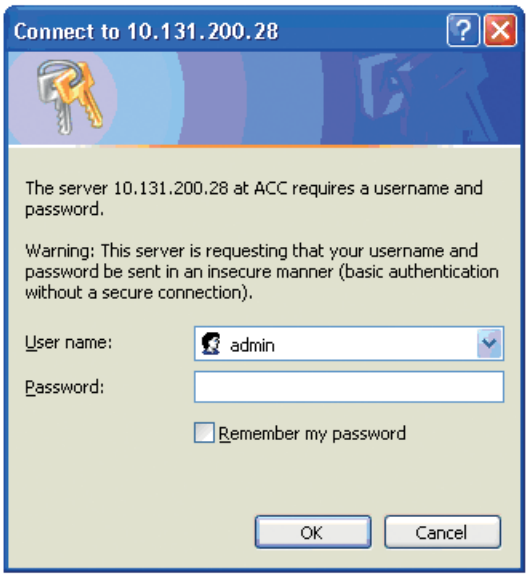


Figure 17 - Connect

7.2 Web Interface Menu

After logging in, the web interface is displayed with the system overview as shown in Figure 18 on page 41 with the Menu on the left, System parameters and settings in the middle and Alarms on the right side of the window.

NOTE: Alarms are displayed with red triangles whilst messages have yellow ones.

The first six menu options are used for system monitoring and to display system parameters, measurements and other details.

The configuration menu is used for setting the system parameters and limits.

The log menu displays a variety of system logs; some of which are updated automatically while others are user updated.

NEED MORE INFORMATION? The information displayed in the Web Interface corresponds to the settings available in the controller display menu described in detail earlier in this manual.

7.2.1 Overview

After login, an overview with the basic system measurements is displayed in the interface:

- System Voltage (V)
- Load Current (A)
- Total Battery Current (A)
- Battery Current 1 (A) - the current measured by the controller. (If extension boards are used currents measured by these boards are displayed as Battery Current 2 and higher.)
- Rectifier current (A)
- Temperature 1 (°C) - Battery temperature measured by the controller. (If extension boards are used, battery temperatures measured by these boards are displayed as Temperature 2 and higher.)
- Charge mode (Normal (U1), Boost (U2), Test (U3), Spare (U4))
- Remaining Battery Time (min)

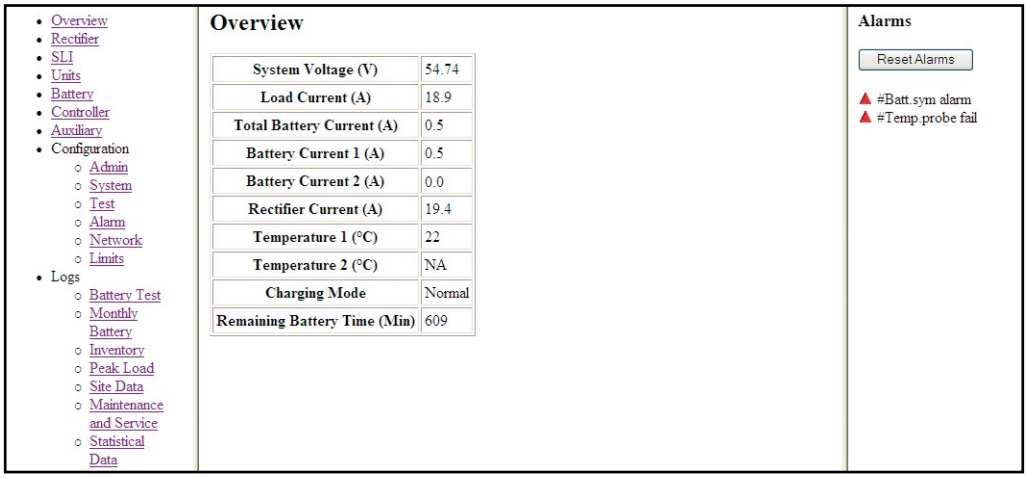


Figure 18 - Web Interface Overview

7.2.2 Rectifier

The rectifier window displays Rectifier data, Rectifier Status and Rectifier Alarm Status. To select the required rectifier scroll down the menu. All logged rectifiers are listed here.

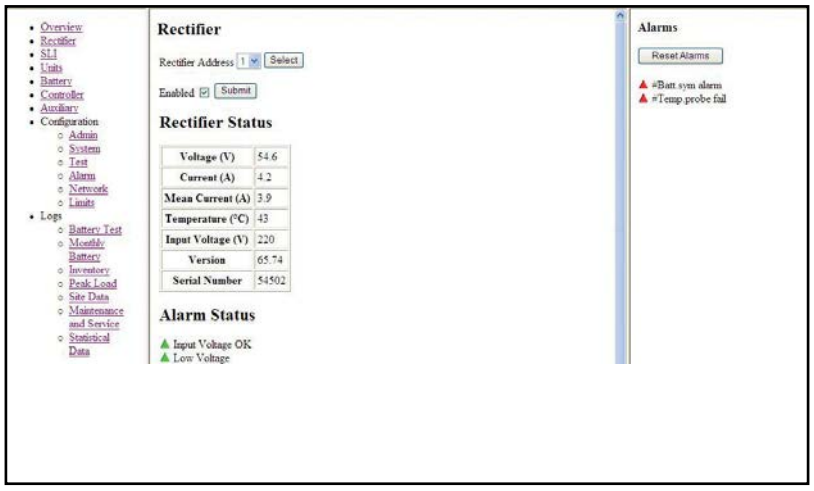


Figure 19a - Web Interface Rectifier

If a 4x64 multiplexer board is used in the system, the rectifier page also includes rectifier channel selection. When the channel number is changed the related Select button must be used to make the change effective.

Figure 19b - Web Interface Rectifier with 4x64 Multiplexer Board

7.2.3 SLI

This menu shows basic information about SLI units, if SLI inverters and an SLI translation board are installed.

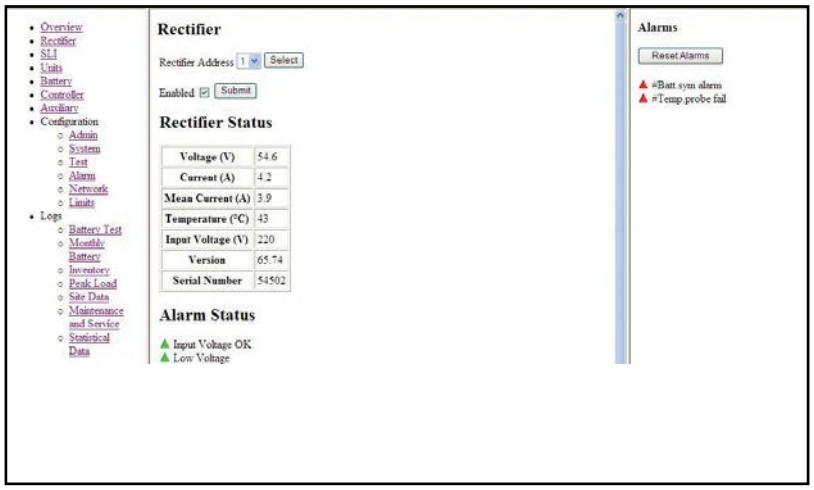


Figure 20 - Web Interface SLI

7.2.4 Units

This menu shows basic information about extension units.

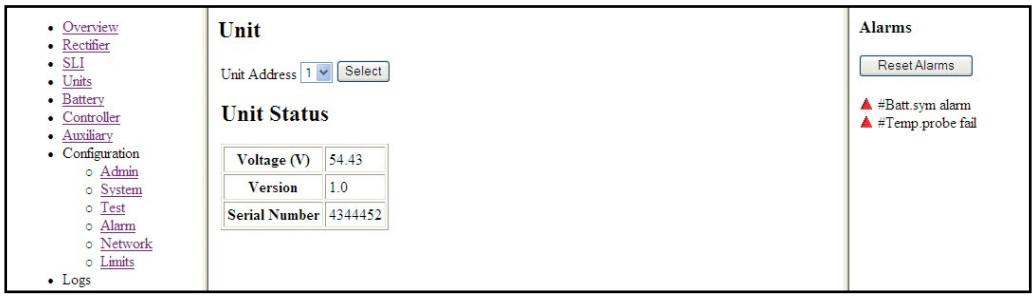


Figure 21 - Web Interface Units

7.2.5 Battery

This menu shows battery symmetry measurements.

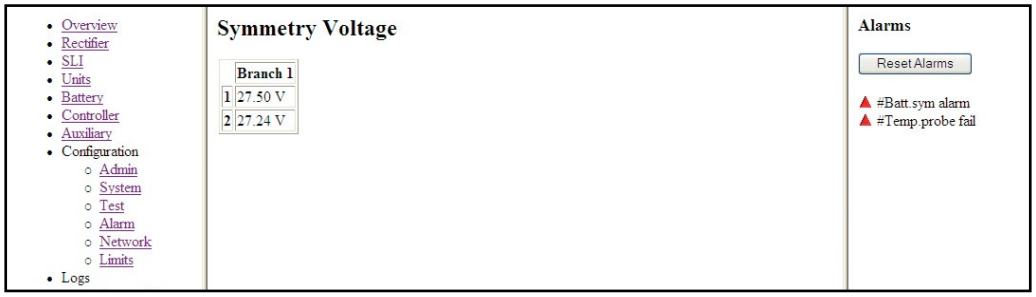


Figure 22 - Web Interface Battery

7.2.6 Controller

This menu shows various controller information (type, serial number, software version and configuration number).

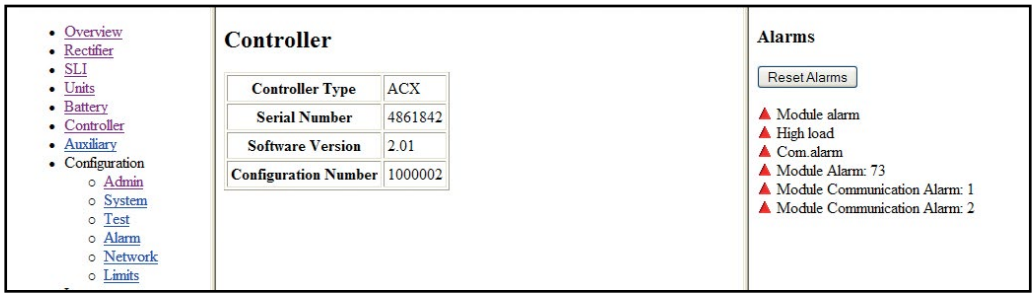


Figure 23 - Web Interface Controller

7.2.7 External

This menu shows any external measurements that have been programmed into the configuration.

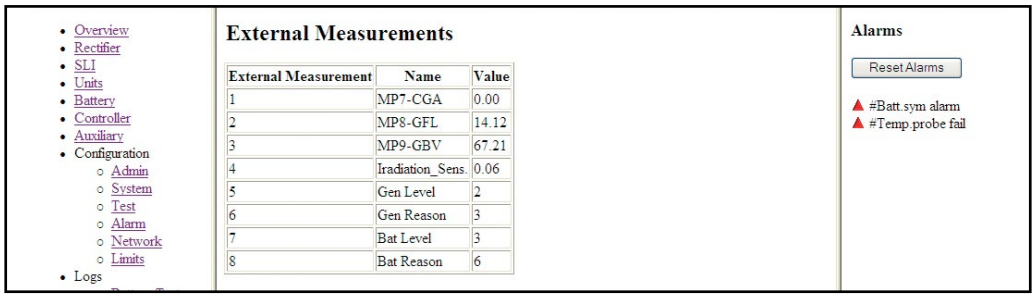


Figure 24 - Web Interface External Measurements

7.2.8 Configuration

7.2.8.1 - Admin

System information, Date/Time and Login information can be set or viewed in this menu.

The Web Interface has three access levels:

- Read-Only access allows the user to view but not to edit the system settings.
- Standard access allows the user to change the system settings.
- Administrative rights include the ability to change user names and passwords and set SNMP parameters.

Change the required settings and press the Submit or Update buttons to save changes.

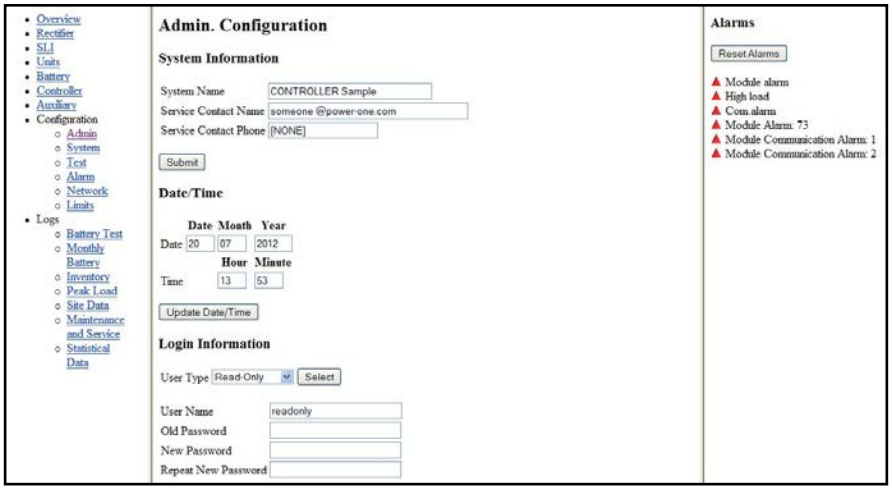


Figure 25 - Web Interface Admin. Configuration

7.2.8.2 - System

This menu allows the selection and adjustment of charging modes U1 – U4, Boost parameters and Battery information.

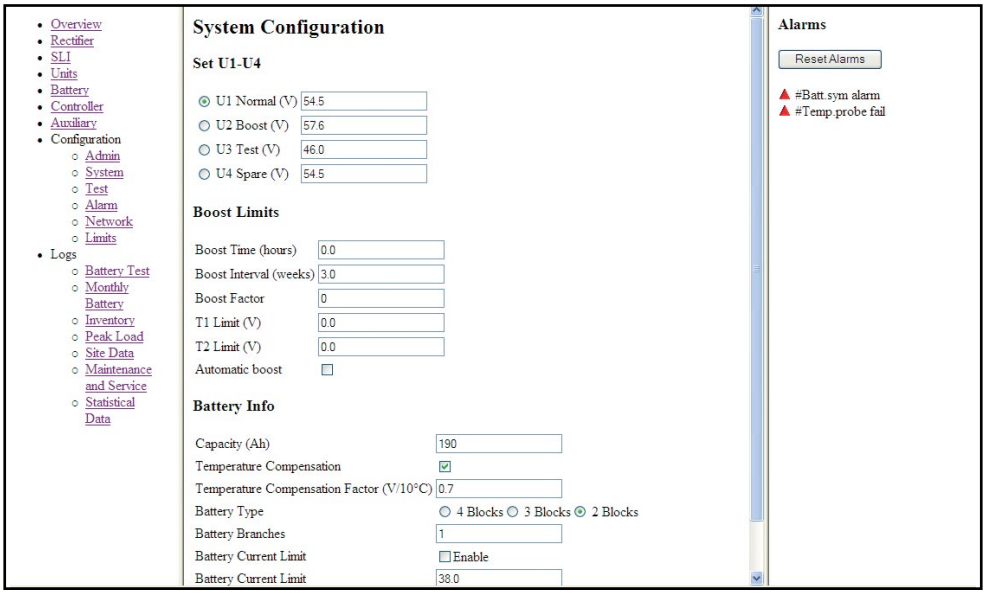


Figure 26 - Web Interface Configuration | System

7.2.8.3 - Test

This menu allows setting the Battery Test and Short Interval Battery Test Parameters, 7.2.9.1.

The outputs of the tests are visible in the log menu described below.

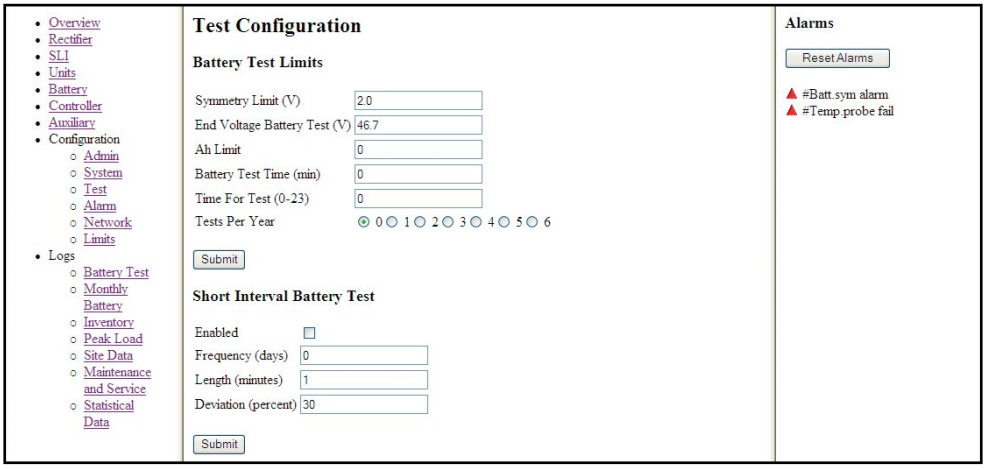


Figure 27 - Web Interface Configuration | Test

7.2.8.4 - Alarm

This menu allows setting of Alarm limits. The limits depend on system requirements, typical values are shown below.

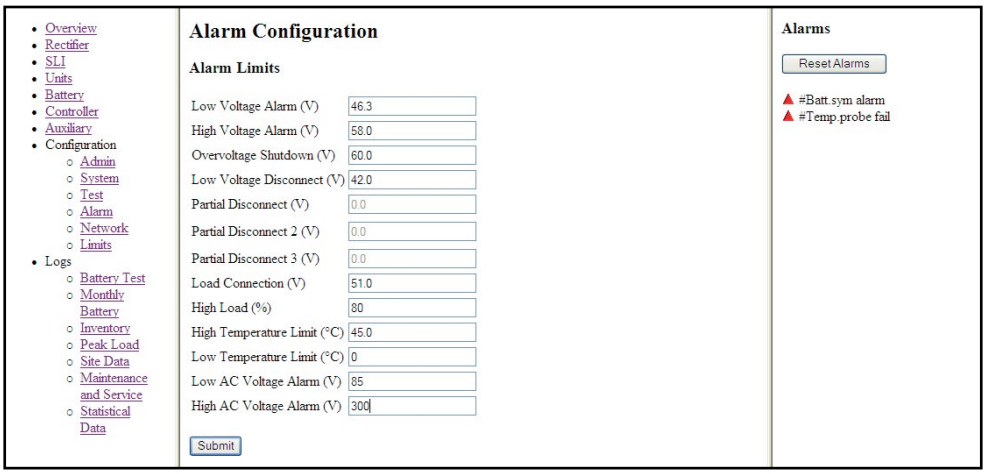


Figure 28 - Web Interface Configuration | Alarm

7.2.8.5 - Network

The system IP-address, Netmask, Gateway and Host name can be set here. In this window it is also possible to set up the trap recipients for SNMP traps as well as community names.

NOTE: Do not change IP address, netmask or gateway unless you are sure that you can reach the new address otherwise connection will be lost.

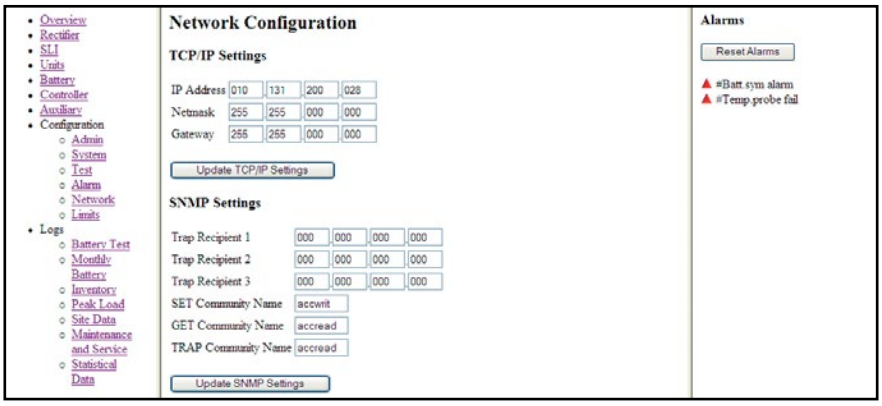


Figure 29 - Web Interface Configuration | Network

7.2.8.6 - Limits

This menu allows the user to see and change values of programmable External limits that have been assigned in the configuration of the system.

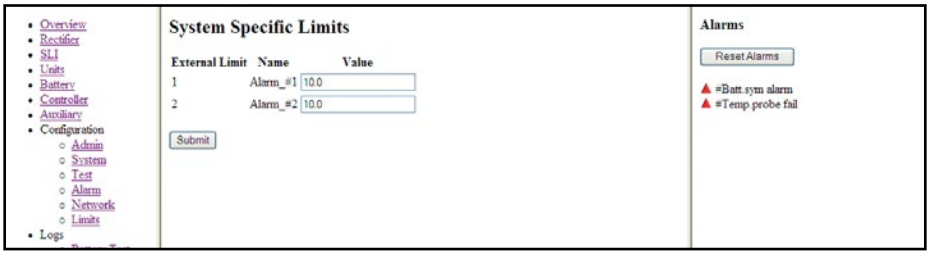


Figure 30 - Web Interface Configuration | Limits

7.2.9 Logs

7.2.9.1 - Battery Test

Battery test log menu displays start and end results of the last ten Battery Tests.

7.2.9.2 - Monthly Battery

Monthly battery log results can be found in this menu.

7.2.9.3 - Inventory

This menu shows logged modules/units added to or removed from the system inventory.

Logged data are: Date and Time, Status (Installed or Removed), Type and serial number.

7.2.9.4 - Peak Load

Daily Peak Load statistics are displayed here.

7.2.9.5 - Site Data

Details about the breaker configuration for the system with size and description can be added here by the user. The first entry is listed as Fuse 1, then consecutively for each entry.

7.2.9.6 - Maintenance and Service

Maintenance personnel can enter details about each maintenance job performed on the system in this menu. When the date, time and maintenance details have been entered, click Add to save it and display it on the log below.

7.2.9.7 - Statistical Data

The statistical data for key system values (Battery Temperature, Load Current and Rectifier Current) are displayed. The data are displayed in percentage and Time.

NOTE: The total percentage may not always be 100 as the values are rounded down to the nearest integer.

NOTE: The maximum allowable number of concurrent web connections is three.

8. SNMP

Simple Network Management Protocol (SNMP) is an Internet standard protocol for management of network devices. SNMP Management systems can supervise a variety of networked equipment simply by importing a file with definitions of the Management Information Base (MIB). The SNMP Manager program can access and control the UNIPOWER power systems by adding the MIB describing the controller manageable objects to its collection of MIB files.

The controller implements SNMPv3 as well SNMPv1/2c. The user can select which SNMP protocol will be used, SNMPv1/SNMPv2c or SNMPv3. The available MIB objects are common for both SNMP versions with the exception of security parameters for SNMPv3. If SNMPv3 is selected, the controller does not respond to SNMPv1/2c commands and vice-versa.

SNMPv1/2c uses security parameters called community name. The controller recognizes three community names:

- SET community name (default value is accwrit)
- GET community name (default value is accread)
- TRAP community name (default value is accread)

Values for the community name can be changed via the web interface. Additionally the TRAP community name can also be changed via SNMP. The maximum length allowed for community names is 15 characters.

8.1 MIB

The MIB for the power system is a private, enterprise specific MIB. It defines a number of manageable objects including:

Basic System Information

- System Name
- Controller Type
- Controller Software Version
- Controller Serial Number

Operational State

- System Voltage
- Load Current
- Battery Current
- Rectifier Current
- Battery Temperature
- AC Input Phase Voltage

- Remaining Battery Time
- Alarms
- Tables with Power Module Information (AC/DC, DC/DC and SLI)

NOTE: If the 4x64 multiplexer board is used, the rectifier table displays data only for the selected channel. Channel selection can be changed by setting value of the selectChannel MIB variable. Refreshing data of the newly selected channel requires some time (2 - 3 seconds). This has to be considered when automatic pooling of rectifier table is performed.

- Battery Symmetry Table

System Parameters Setting

- Voltage References
- Battery Current Limiting
- Temperature Compensation
- Alarms Limits
- Battery Test

SNMP Agent Setting

- Community Names
- Trap Recipients (Up to 8 recipients can be defined)
- SNMPv3 User Parameters

NOTE: For full list of available objects see ACX-MIB.mib file. You can download the latest ACX-MIB.mib file from https://www.unipowerco.com/MIB_files/ACX-MIB.mib. (save as text file without .txt extension once opened in browser.)

Tip: Alarm data 1-3, Ext Alarm data 1-2 and Status bytes 1-4 objects in the ACX MIB are bit patterns that contain the current alarm status etc. See the following table for details.

Table 1 - Alarm Data

Bit	Description	Comment
	Alarm data 1	
0	Low voltage alarm	
1	High voltage alarm	
2	Low voltage disconnect	Ref: Battery/Load disconnected alarm
3	Mains failure	
4	Distribution fuse failure	Ref: Load breaker failure
5	Low AC Voltage	
6	Battery failure	
7	Rectifier module alarm	
	Alarm data 2	
0	High temperature alarm	
1	Symmetry failure	

Bit	Description	Comment
2	Battery fuse failure	
3	High Load alarm	
4	High AC Voltage	
5	Urgent module alarm	
6	Communication fault	
7	Partial load disconnect 1	
	Alarm data 3	
0	Temp probe failure	
1	Reserved	
2	Batteries on discharge	
3	Output overvoltage shut down alarm	
4	Low battery temperature alarm	
5	Partial load disconnect 2	
6	Partial load disconnect 3	
7	Alarms blocked	Other alarms disabled during maint.
	Extra Alarms 1 (Alarm data 4)	Ext alarm 1-8 (user defined alarms)
0	Ext alarm 1	
1	Ext alarm 2	
2	Ext alarm 3	
3	Ext alarm 4	
4	Ext Alarm 5	
5	Ext Alarm 6	
6	Ext Alarm 7	
7	Ext Alarm 8	
	Extra Alarms 2 (Alarm data 5)	Ext alarm 9-16 (user defined alarms)
0	Ext alarm 9	
1	Ext alarm 10	
2	Ext alarm 11	
3	Ext alarm 12	
4	Ext alarm 13	
5	Ext alarm 14	
6	Ext alarm 15	
7	Ext alarm 16	
	Status 1	
0-1	U1 Normal	Bit 0 and 1 = 0
0-1	U2 Boost	Bit 0 and 1 = 1
0-1	U3 Test	Bit 0 and 1 = 2
0-1	U4 Spare	Bit 0 and 1 = 3
2	Reserved	
3	Reserved	
4	Partial load disconnect extst	
5	Time controlled partial disconnect	
6	Battery current limit enabled	
7	Reserved	
	Status 2	
0	Battery current measured	

Bit	Description	Comment
1	Load current measured	
2	Rectifier current measured	
3	3 block symmetry	
4	2 block symmetry	
5	Reserved	
6	Reserved	
7	Reserved	
	Status 3	
0	Reserved	
1	Reserved	
2	Dial back available	
3	Reserved	
4	Reserved	
5	Reserved	
6	Ethernet available	
7	Reserved	
	Status 4	
0	PLD2 exists	
1	PLD2 Time controlled	
2	PLD3 exists	
3	PLD3 Time controlled	

8.2 SNMP Notifications

An SNMP notification (Trap) is sent from the controller when an alarm event occurs. By default, all 23 standard alarms and 16 programmable alarms can send trap individually with a variable showing if the alarm is set or cleared. Sending of traps for a particular alarm can be disabled in the SNMP alarmTable object by setting of the respective alarmTrapDisable value to 1.

A Trap is also sent when the charge mode changes. There are 4 different traps for four charging modes (U1-U4).

Traps are sent to all defined trap recipients (up to 8) that can be set up from the web interface or by SNMP itself.

8.3 SNMPv3

Enabling of SNMPv3 is performed via the LCD and buttons on controller front panel in menu Miscellaneous → SNMP version. For security reason, it is the only place where SNMPv3 can be enabled or disabled.

SNMPv3 uses five security parameters - user name, authentication protocol, authentication key, privacy protocol and privacy key.

- User name - is text string up to 31 characters

- Authentication protocol - can be one value of following {0=MD5, 1=SHA1, 2=no authentication}
- Authentication key - is text string up to 47 characters
- Privacy protocol - can be one value of following {1=AES (128bit), 2=no privacy}
- Privacy key - is text string up to 47 characters

These security parameters are defined as manageable table row object in the ACX MIB under the SNMPv3 USM group and can be changed by SNMPv3 protocol.

NOTE: The UsmUserTable MIB object contains only one row, only one user is available. It is not possible to define more users.

Rotate Refresh Export Poll SNMP SET Create Row Delete Row

	usmIndex	usmSecurityN...	usmAuthProtocol	usmAuthKey	usmPrivProtocol	usmPrivKey	usmStorage	usmStatus	Index Value
1	0	unipowerACX	hmacSHAAuth	unipower12345	aesPrivProtocol	unipower98765	permanent	active	0

Figure 31 - SNMPv3 security parameters values in table view

Factory default values for security parameters are:

- User name: unipowerACX
- Authentication protocol: SHA1
- Authentication key: unipower12345
- Privacy protocol: AES
- Privacy key: unipower98765

When any of the security parameters is set by the SNMP SET command, a 1 minute delay timer is started in the controller. If there is not another SNMP SET command for one of the security parameters during the 1 minute period, reinitialization of the SNMPv3 engine is started. If an additional SNMP SET command for a security parameter is issued during the 1 minute period, the period counter is restarted and the Controller waits for another 1 minute before it starts reinitialization. This mechanism avoids SNMPv3 reinitialization after each security parameter change when more than one security parameter has to be altered.

NOTE: Because of limited numerical power in the controller, the SNMPv3 engine initialization needs a longer time than SNMPv1/v2c. For this reason, initialization is performed in the background of normal controller operation which means that SNMP functionality is not available immediately after controller start-up or after security parameters change. The SNMPv3 initialization state is indicated on the controller front panel by blinking of the yellow LED, on the web page (see Figure 32) and additionally, when initialization is finished an SNMPv3 ReadyTrap is sent if at least one trap recipient is defined. SNMPv3 initialization can take up to 3 minutes, depending on the security parameters values.

NOTE: Reset to defaults and Master reset functions cause a return of security parameters to factory default settings.

Security parameters settings for SNMPv3 Notifications (Traps) are the same as for the main SNMPv3 communication.

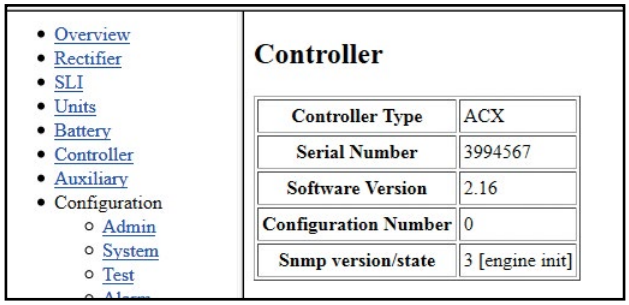


Figure 32 - SNMPv3 initialization displayed on the web page

NOTE: Special care has to be taken when SNMPv3 security parameters are going to be changed because if only part of a parameter is updated and a 1 minute delay timer expires, this can result in inconsistent security parameters (part of values is new and another part is old) which can make SNMPv3 unusable. In such case, a reset to defaults must be performed (on the controller front panel, menu Miscellaneous → Reset to Defaults) and SNMPv3 must be configured again.

NOTE: ACX-MIB.mib file version 1.09 is needed for SNMPv3. This can be obtained from the web site at http://www.unipowerco.com/MIB_files/ACX-MIB.mib. (save as text file without .txt extension once opened in browser.)

9. Controller Data Logging - microSD Card

This section applies only to controllers with a microSD card fitted.

The data logging function collects system data which can be later used for analysis or statistical calculations.

The controller logs the data at regular 1 minute intervals with the date and time stamp. The data is saved in separate files for each day in comma separated values file format (e.g.:20100518.csv).

The data can be downloaded via PowCom™ software (requires PowCom™ version 4.20 or greater). Choose Tools in PowCom™ software menu and select Download SD card.

NEED MORE INFORMATION? The PowCom™ software package available from UNIPOWER is delivered with a manual and available on the web site. See this manual for more information.

The controller supports max 4GB microSD card, sufficient for more than 20 years of data logging. The file format is standard "comma separated values /.csv/" which can be processed by spreadsheets or imported into diverse databases.

The logged data comprises:

Time:	The date and time in format YYYYMMDD.HH.MM
Bat_Volt:	Battery/System Voltage
Bat_Curr:	Battery Current
Bat_Temp:	Battery Temperature
REC_Curr:	Rectifier Current
Load_Curr:	Load/Distribution Current

ACC_Temp: Controller Internal Temperature
ACC_Alarms: Standard System Alarms
USR_Alarms: User Defined Alarms

NOTE: Controller and USR Alarms are recorded in decimal format and need to be converted to binary code for proper alarm identification. Each bit of the string represents a specific alarm, see Table 2.
The Alarms.bit0 is the rightmost digit.

Table 2 - Alarm Data

Bit	Description	Comment
	Standard System Alarms	
0	Low System Voltage	
1	High System Voltage	
2	Load/Battery Disconnected	
3	Mains Error	
4	Distribution Fuse Failure	
5	AC Low Voltage	
6	Battery Failure	
7	Module Failure	
8	High Battery Temperature	
9	Symmetry Fault	
10	Battery Fuse Failure	
11	High Load	
12	AC High Voltage	
13	Urgent Module Failure	
14	Communication Failure	
15	PLD 1 Disconnection	
16	Temp. Probe Failure	
17	High Distribution Load	
18	Battery is Discharging	
19	Overvoltage Shutdown	
20	Low Battery Temperature	
21	PLD 2 Disconnection	
22	PLD 3 Disconnection	
23	Alarms are Blocked	
	User Defined Alarms	
0-15	User Alarm 0-15	

APPENDIX A1 - Upgrading the firmware

Introduction

The controller firmware can be upgraded via the Ethernet port on the controller. This appendix describes the controller upgrade procedure during operation.

Equipment needed:

- PC with CtrlBurn tool (can be found here https://unipowerco.com/resources/software-downloads/)
- ACX firmware (.ACX file) (the latest version is here https://unipowerco.com/resources/software-downloads/)
- These upgrade instruction.

Prerequisites

- The system with the ACX to be programmed is running and is connected to a network.
- The IP address of the ACX must be known.

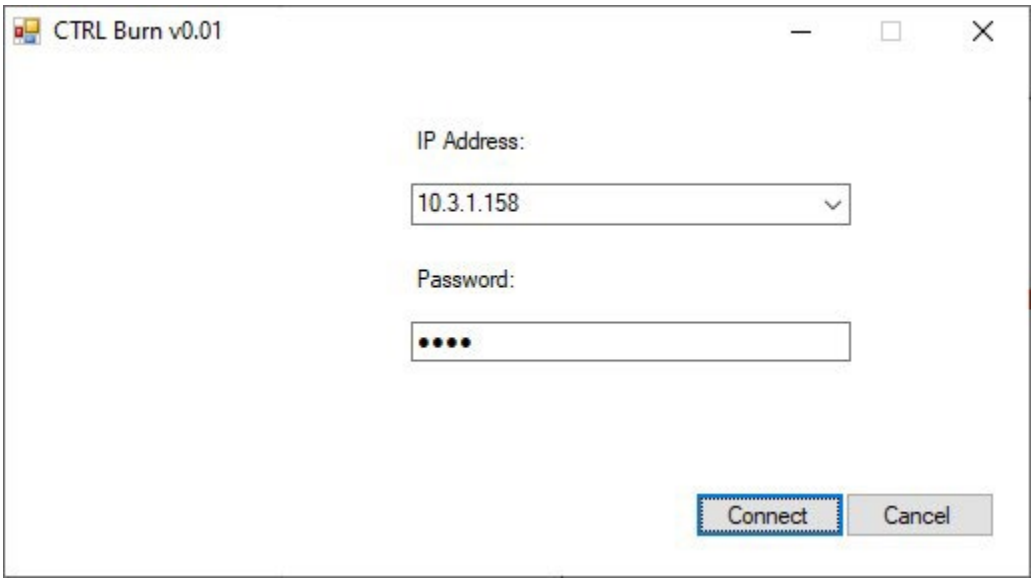
As an alternative, direct connection between the PC and the ACX via a crossed Ethernet cable can be used. In this case correct address setting must be done on both sides.

Procedure

Start the CtrlBurn software tool.

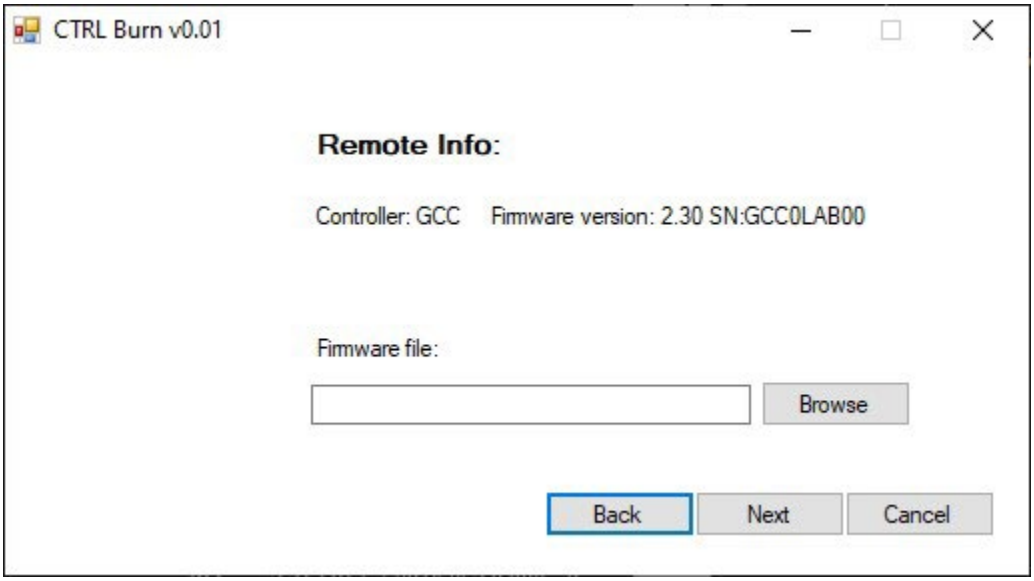
Press the ***Start*** button.

Fill-in the IP address of the ACX and controller password (the same as used for PowCom or front panel settings).

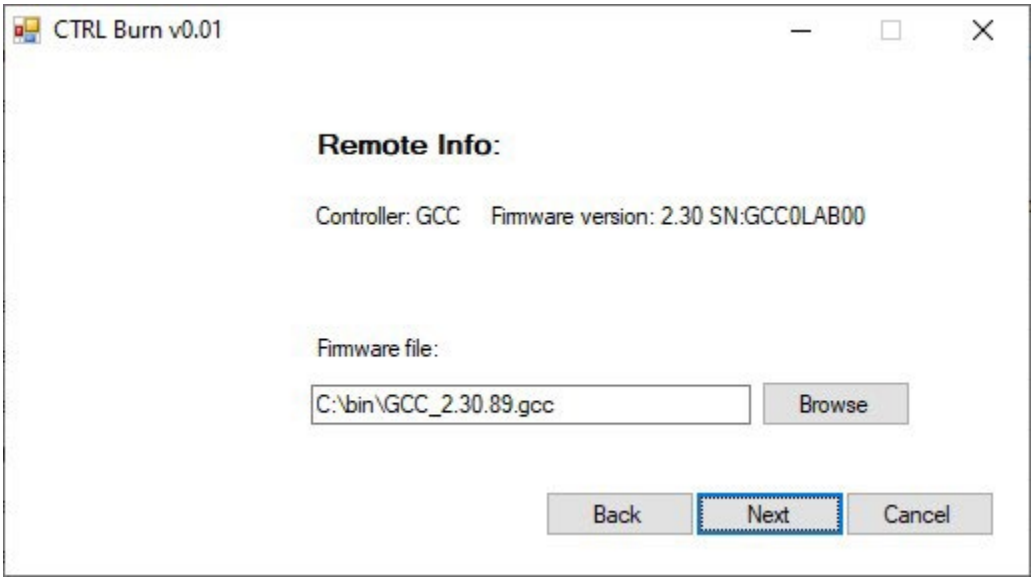


Press the ***Connect*** button.

The Firmware file selection page is shown.

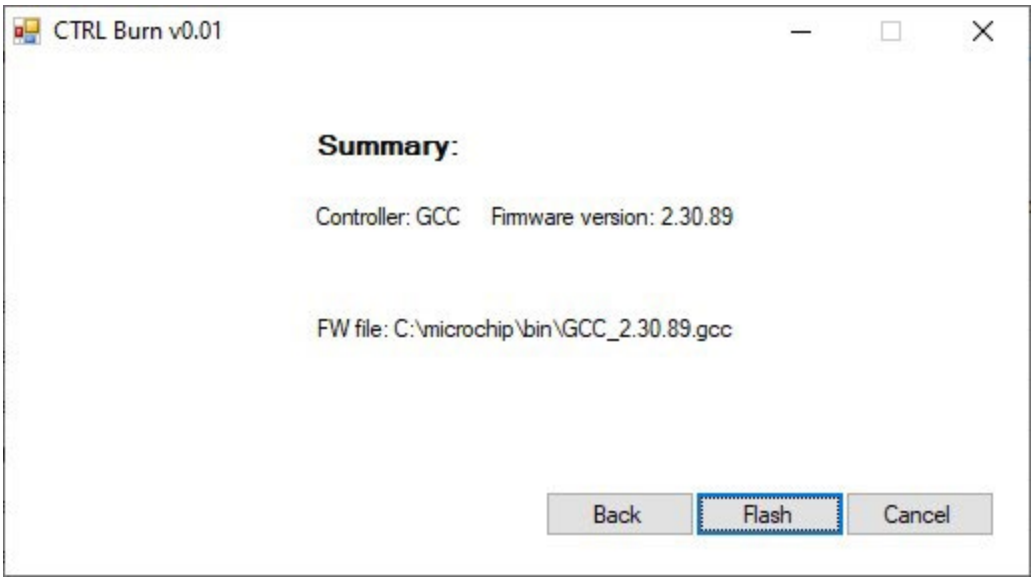


Press the ***Browse*** button to locate and select the required firmware file.



When done, press the ***Next*** button.

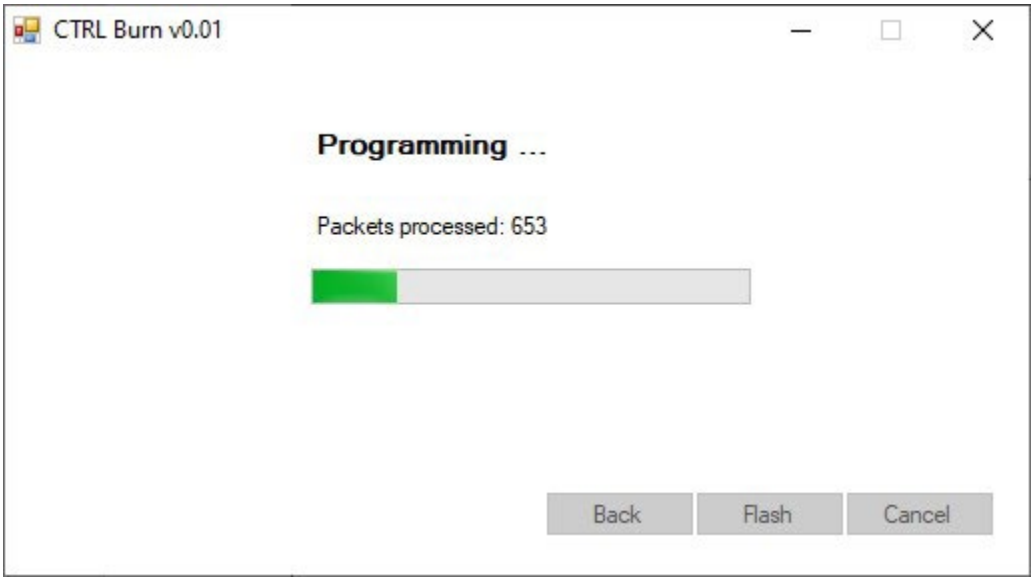
Summary information is shown.



Press the ***Flash*** button to start the update.

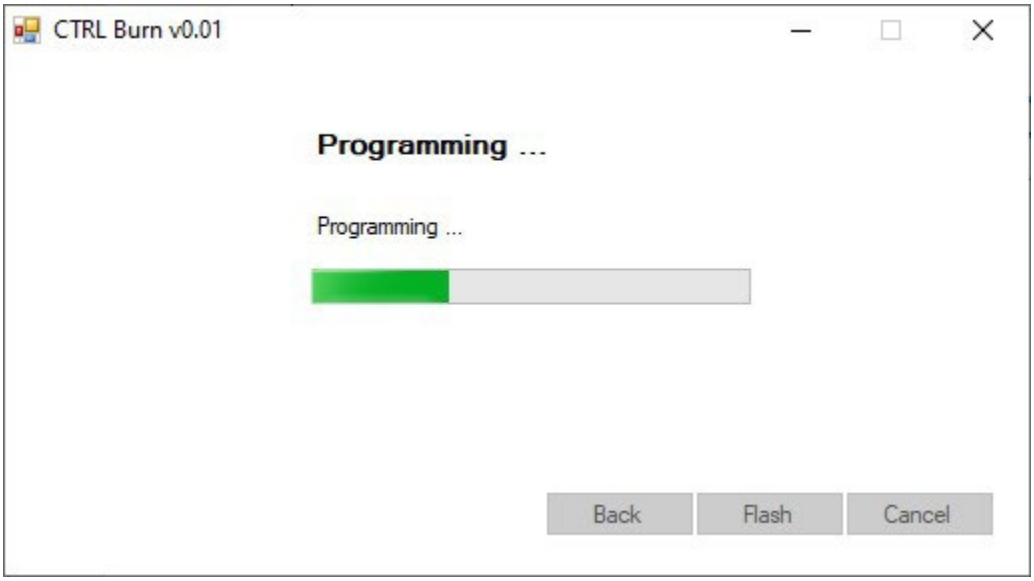
Progress of the update process is shown.

The first phase is the file upload to the ACX.

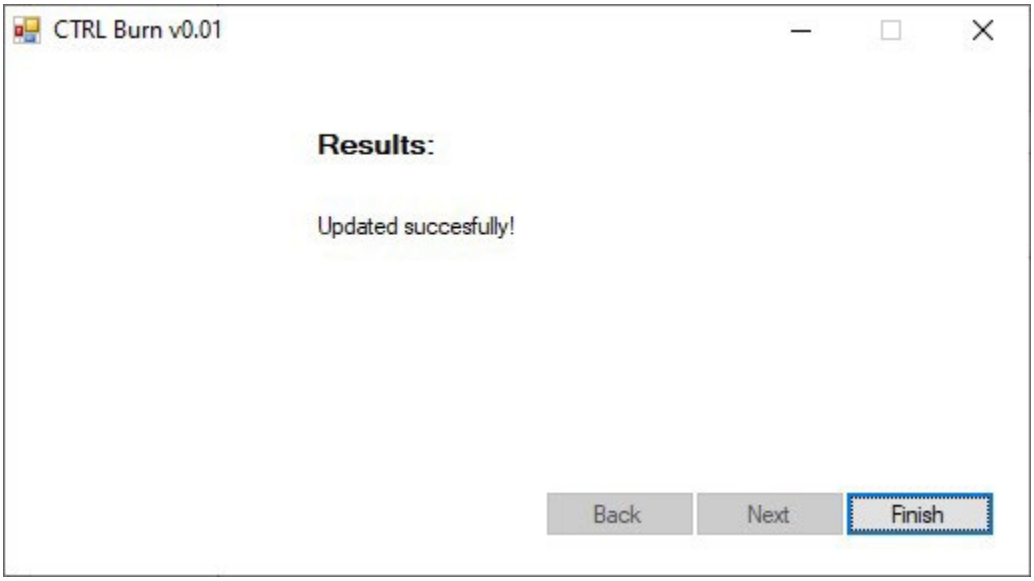


The second phase is the firmware burn to flash memory.

CAUTION: Do not turn off the ACX during this phase! It can cause unpredictable behavior of the controller and it will not be possible to re-program the firmware later.



When finished, result information is shown.



Press the ***Finish*** button to complete the update process.

APPENDIX A2 - Downloading data from the SD card

Introduction

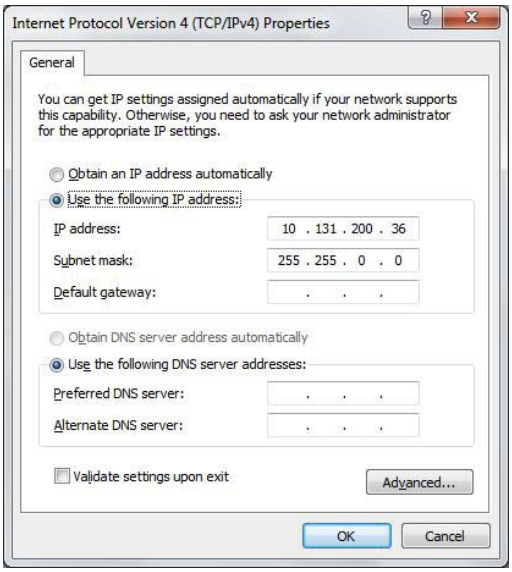
Data can be downloaded from the SD card via the Ethernet port on the controller. This appendix describes the download procedure.

Equipment needed:

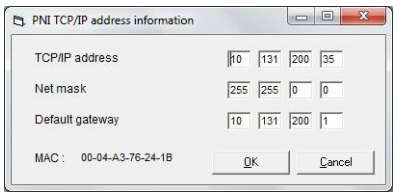
- PC with an Ethernet port and installed Site Tool software, version 1.xx.
- These download instruction.
- One cross-Ethernet cable for direct connection between the controller and the computer (or standard Ethernet cable for remote connection between the controller and the computer).

Procedure

1. Start the system with the controller.
2. Connect the controller to the computer with an Ethernet cable.
3. If you use a cross-Ethernet cable, set-up the computer's IP address within the same range as the controller. Go to **Network and Sharing centre | Local Area Connection | Properties | Internet protocol version 4 (TCP/IP v4) | Properties**. Check the radio button **Use the following IP address:** and define an IP address.

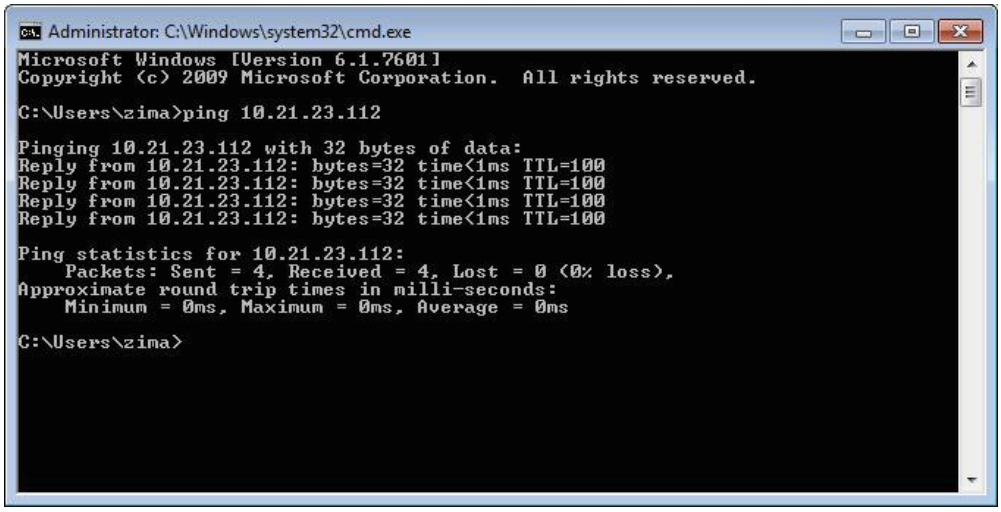


Example of computer IP address

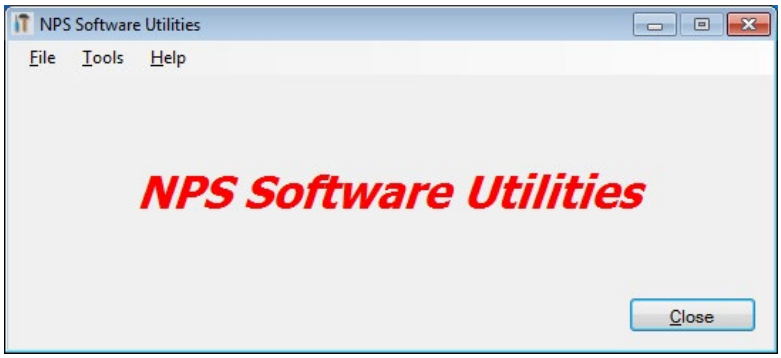


Example of Controller IP address

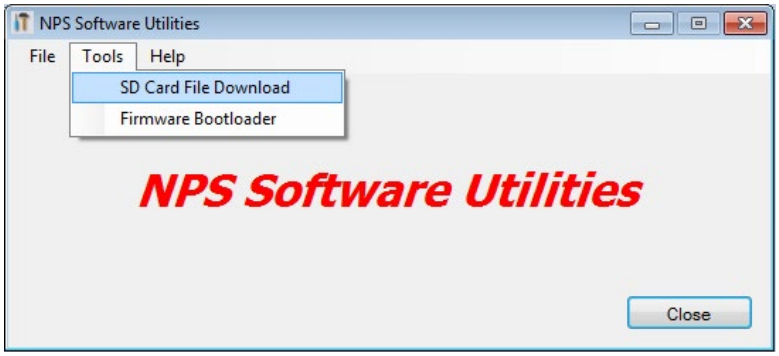
4. Test connectivity between the computer and the controller. Open a Command prompt line and “ping” the controller’s IP address.



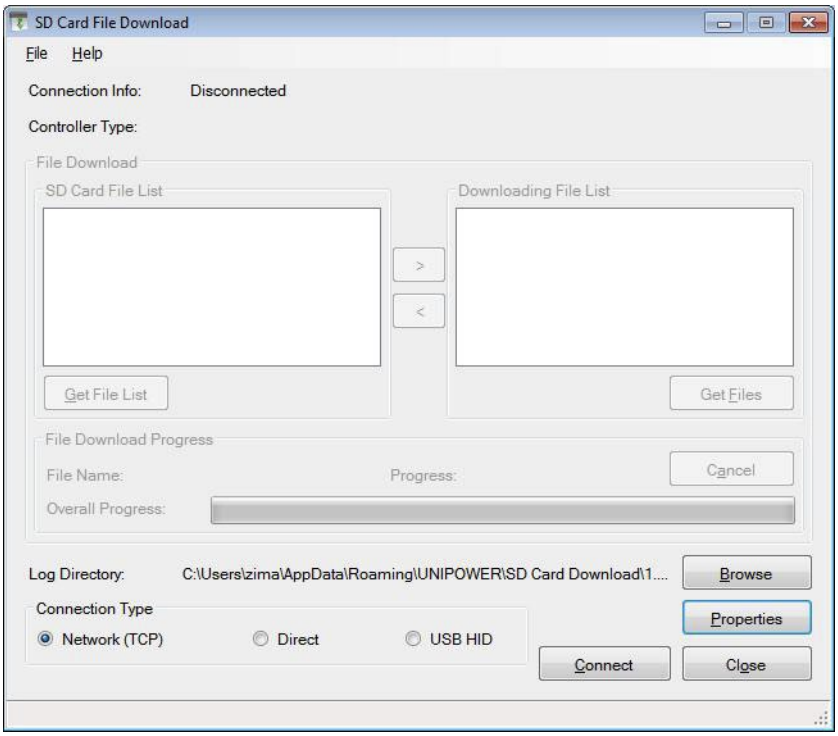
5. Open the NPS Software Utilities application on the computer.



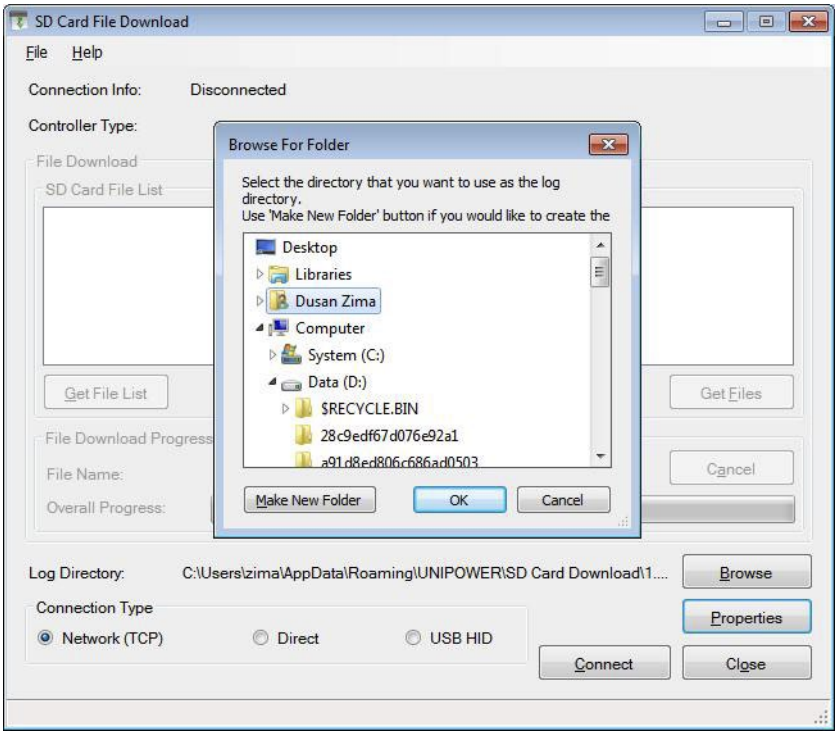
6. Choose menu item **Tools** and then select **SD Card File Download**.



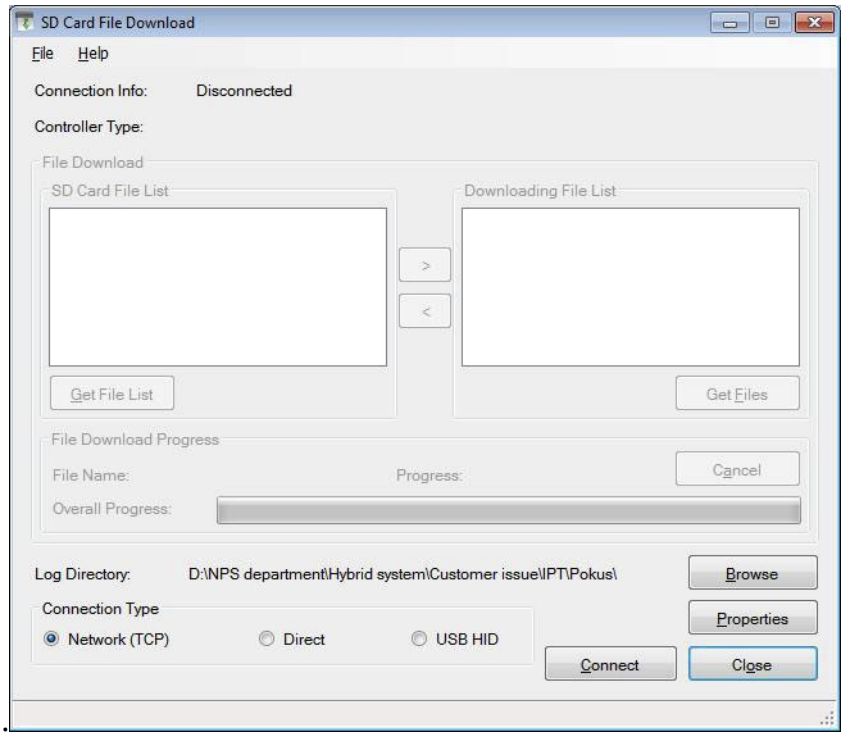
7. Click on the **Browse** button to choose the download location.



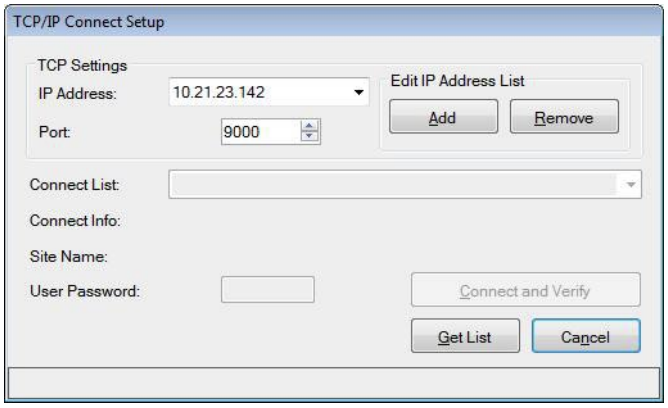
8. Choose or create the location where you want to store the file and click on the **OK** button.



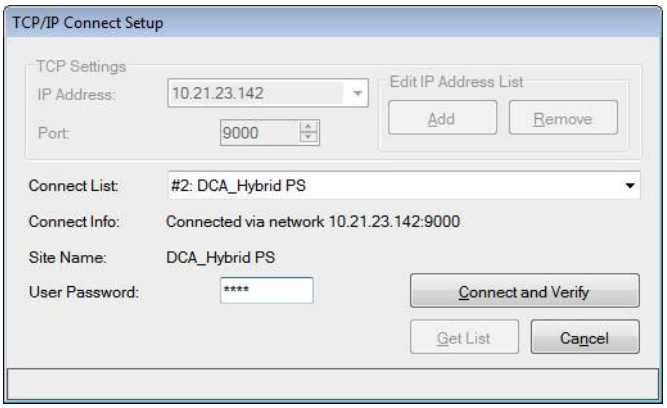
9. Click on the **Connect** button.



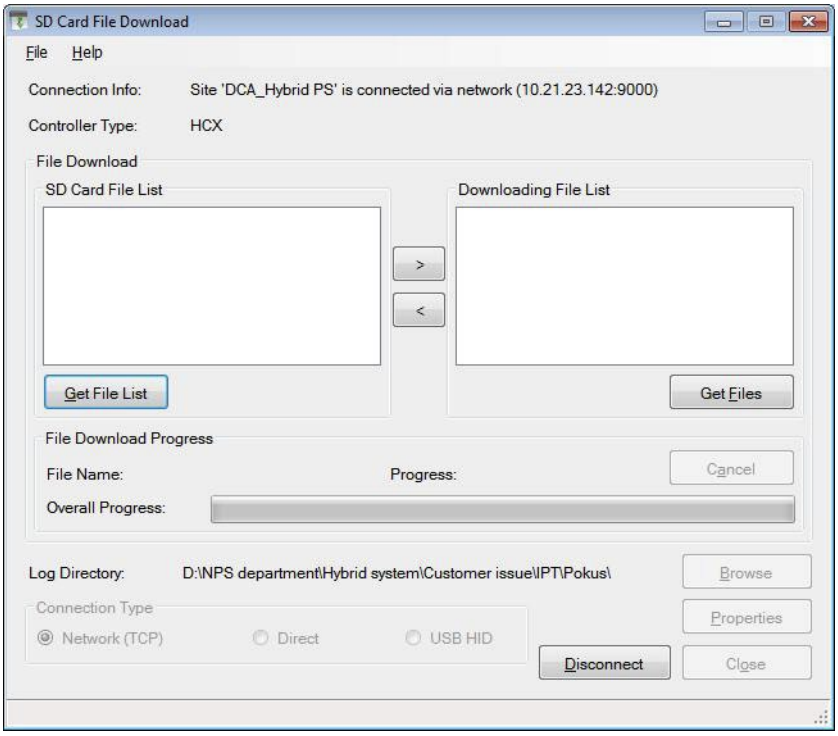
10. Select the controller IP address from the dropdown list or type in a new address and click on the **Add** button then click on the **Get List** button.



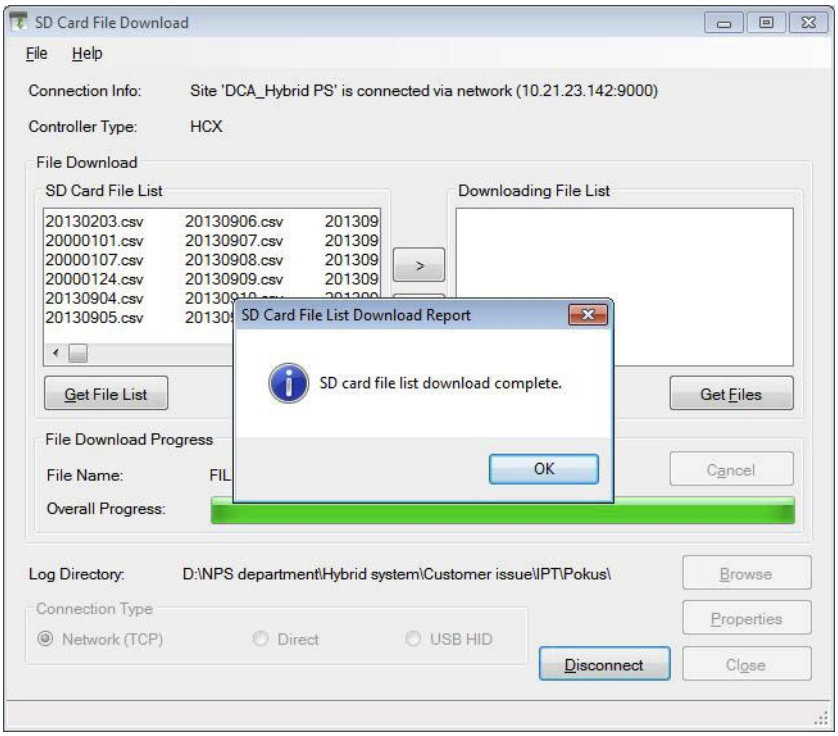
11. Enter the password in **User Password:** (1234 is the default), then click on the **Connect and Verify** button.



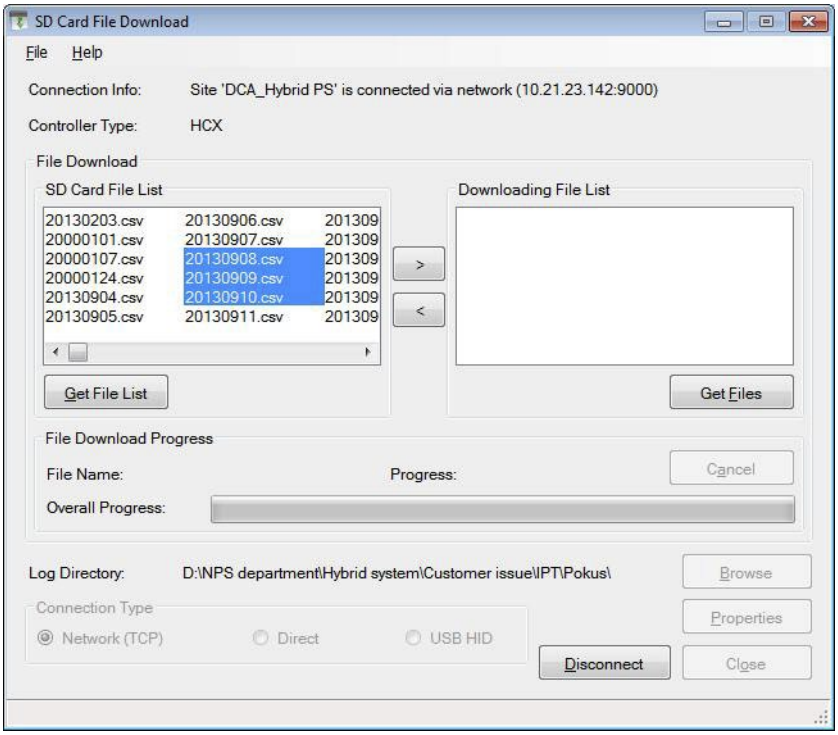
12. Click on the **Get File List** button.



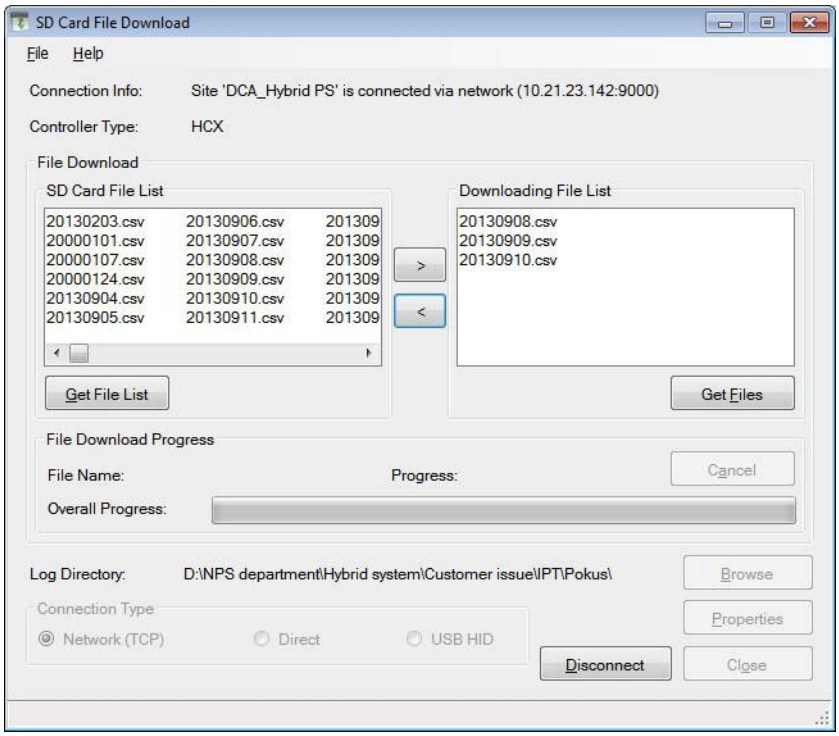
13. When the list is downloaded click on **OK** button



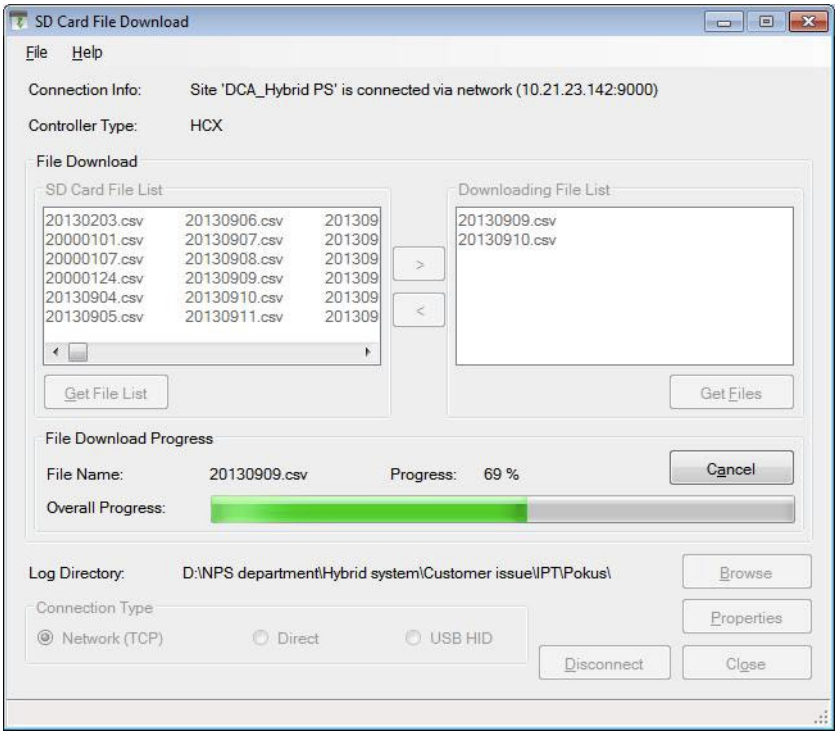
14. Choose the file/files which you want to download to the computer. Use the CTRL or SHIFT keys on the keyboard if needed.



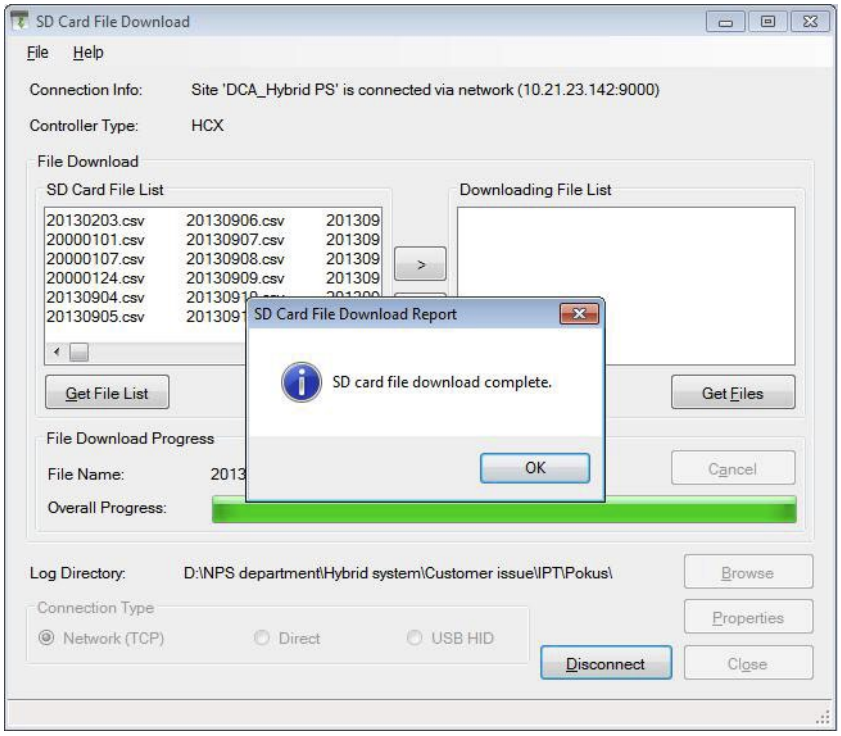
15. Move the selected file/files to the window “Downloding File List” using the > button.



16. Click on **Get Files** button to start to download the selected file/files to the computer.

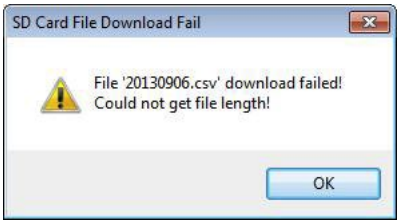


17. A pop-up window appears after successful downloading. Click on the **OK** button and the click on the **Disconnect** button in the underlying window and then click on the **Close** button.



18. Click on the **Close** button to end the programme.

NOTE: If the downloading failed, run download once more by clicking on **Get Files** button to try again.



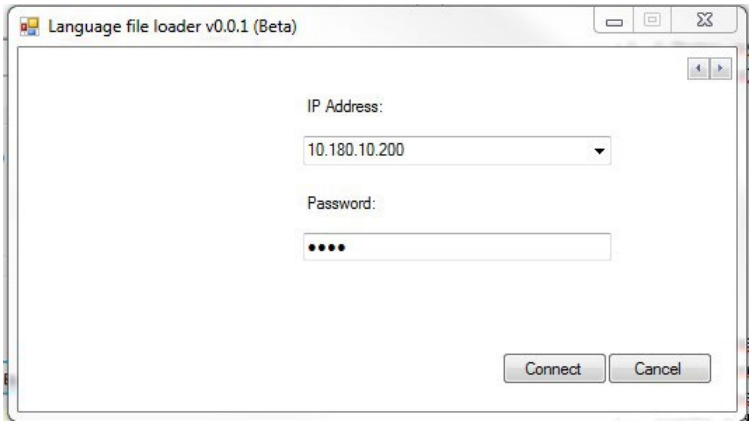
APPENDIX B - Adding a new language to the Controller

1. Steps to add new a language to the controller.

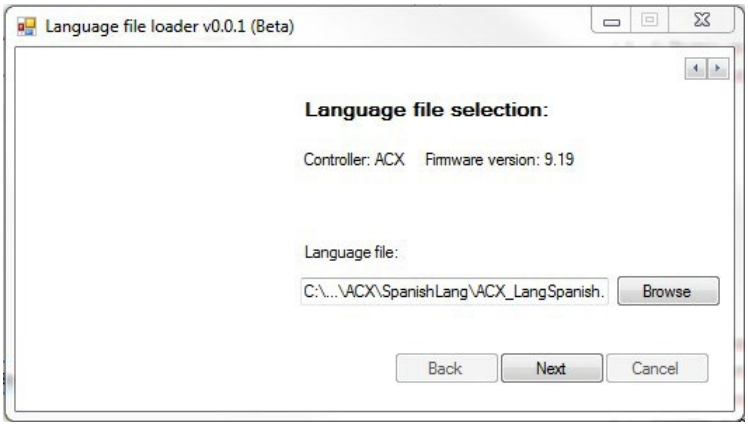
   1.1. Connect to the controller via the Ethernet port (RJ45). Note: Use a Crossover cable if you are connected directly with the PC or Laptop, or straight through cable if connecting via a Switch or router.

   1.2. Open app “LngUpload” which is included in the software package -> Click on the “Start >>” button.

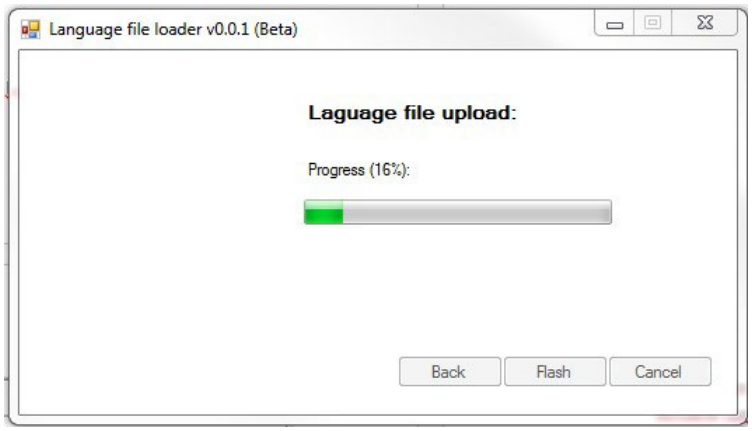
   1.3. Type the controller’s IP address: -> Type Password: 1234 (default) -> Click on the “Connect” button.



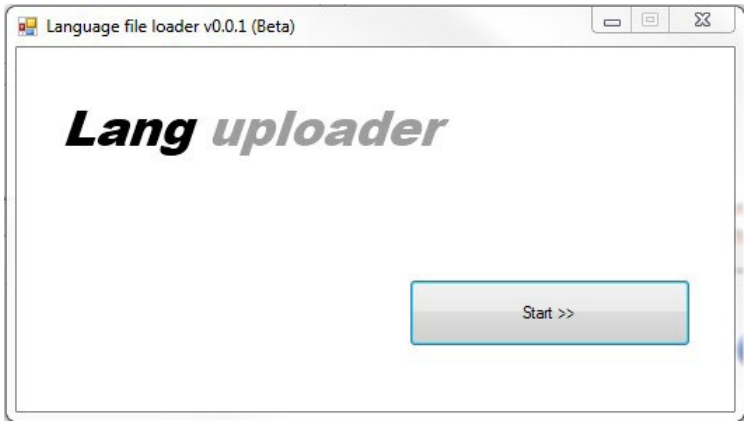
   1.4. Click on the “Browser” button -> and then find, select and open the file (.e.g. for Spanish) “ACX_LangSpanish.LNG”.



   1.5. Click on the “Next” button to begin the installation process.



1.6. When it's done the start window appears, click on the "X" button located on right-top corner to close the program.



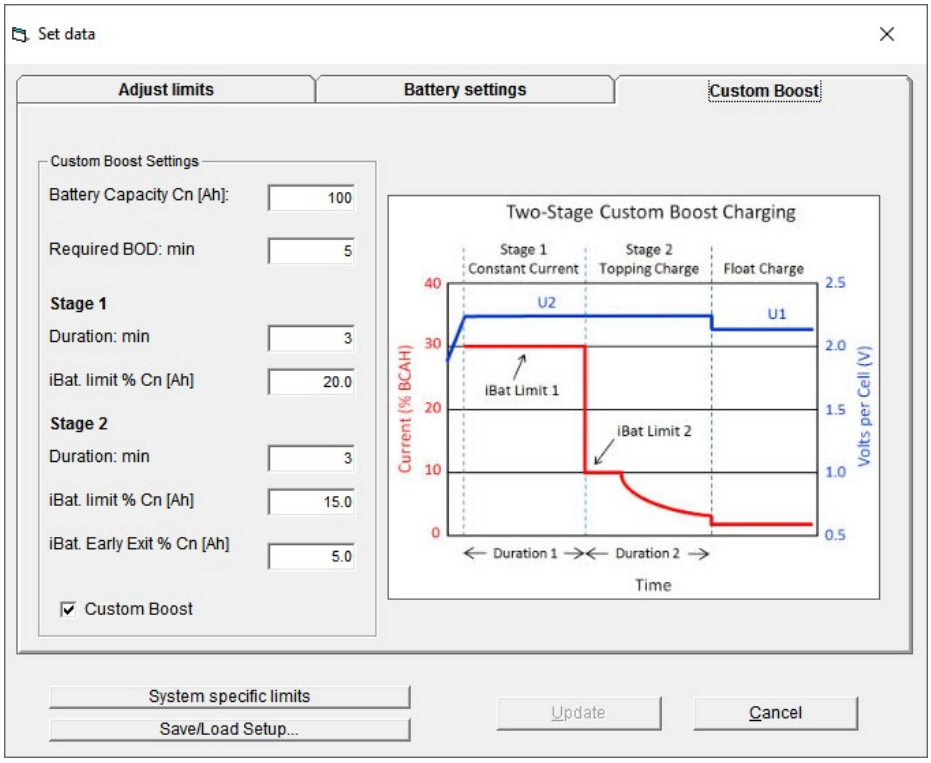
1.7 The upgrade is now completed.

APPENDIX C - Two-Stage Customizable Charging Algorithm

Designed for Ni-Cd batteries, ACX v2.20 firmware includes a customizable two-stage boost algorithm to regulate battery recharge current after extended discharges. Like the automatic boost, the custom boost charges at the U2 voltage setting. However, the recharge current settings are programmable and are specified as a percentage of the battery capacity; note the units are designated as Cn [Ah] for the engineered rating (e.g. C5) since it depends on the application. Also note that custom boost can only be enabled when the Automatic boost is not selected. PowCom™ automatically alerts and disables one boost mode if the other is enabled.

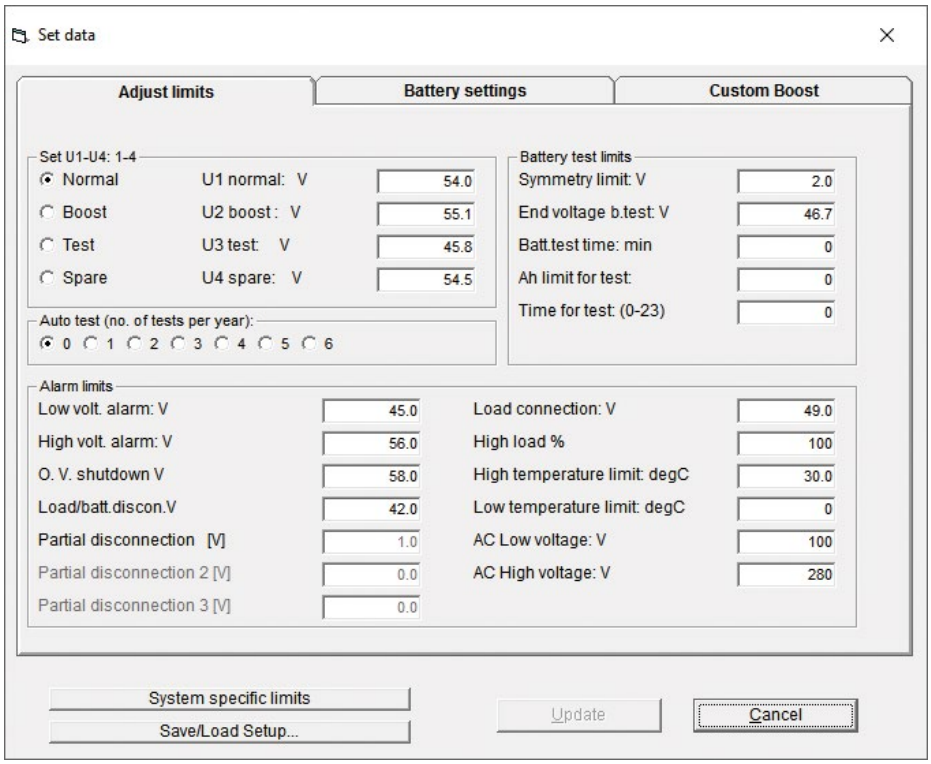
The algorithm only kicks in after a discharge of a preset duration, with 30 minutes being the default. Custom Boost stage 1 defaults to a current limit of 30% Cn [Ah] for a period 1 hour, while stage 2 defaults to a current limit of 10% Cn [Ah] for 17 hours. Stage 2 also terminates if the current falls below the early-exit setting of 3% Cn [Ah] at which time the voltage returns to the U1 (Vfloat) settings.

The Custom Boost settings can be set using the PowCom™ Configuration Wizard, or via the Set Parameters page, shown below:



Supervision→Set Parameters Dialog Box→Custom Boost (or Config Wizard Page 2)

To manually start the Custom Boost charging algorithm, use the same dialog box as when manually setting Automatic boost. First select the Boost radio button and then click Update.



Supervision→Set Parameters Dialog Box→Adjust Limits

PRODUCT SUPPORT

Product support can be obtained using the following address and telephone numbers.

Manufacturing facility:
UNIPOWER, LLC
65 Industrial Park Rd
Dunlap, TN 37327
United States

Phone: +1-954-346-2442
Toll Free: 1-800-440-3504
Web site – www.unipowerco.com

When contacting UNIPOWER, please be prepared to provide:

1. The product model number, spec number, S build number, and serial number - see the equipment nameplate on the front panel
2. Your company's name and address
3. Your name and title
4. The reason for the contact
5. If there is a problem with product operation:
   - Is the problem intermittent or continuous?
   - What revision is the firmware?
   - What actions were being performed prior to the appearance of the problem?
   - What actions have been taken since the problem occurred?