UNIPOWER
Powering Technology

INSTALLATION & OPERATING MANUAL
X75 SERIES
DC POWER POWER SYSTEM
Mk3 Controller

www.unipowerco.com

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NORTH AMERICA • 3900 Coral Ridge Drive, Coral Springs, Florida 33065, USA • Tel: +1 954-346-2442 • Fax: +1 954-340-7901 • sales-northamerica@unipoweco.com
EUROPE • Parkland Business Centre, Chartwell Road, Lancing BN15 8UE, ENGLAND • Tel: +44(0)1903 768200 • sales-europe@unipoweco.com

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FIGURES

1.0 INTRODUCTION

Gravitas X75 is an ultra-compact, integrated DC power system. The base system is a 1RU shelf holding up to three hot-swap rectifier modules. This system produces up to 1950 watts output at -54.4, +27.2 or +13.6VDC. It can also be operated as a 2+1 redundant system with up to 1300 watts output. The expanded system consists of a base shelf plus an expander shelf with a 2RU total height. This system holds up to six rectifier modules with up to 3900 watts output; it can be operated as a 5+1 redundant system with up to 3250 watts output. Each rectifier module is cooled by a fan that operates at a speed which is a function of load and temperature.

There are up to five circuit-breaker protected DC outputs or up to 10 GMT fuse protected outputs on the base system. A battery string breaker and a low-voltage battery disconnect are standard features. The expander shelf comes with a ribbon cable and connectors to link the signals between the two units at their rear panels. It also comes with bus bar links to parallel the rectifier output bus bars.

The base and expander shelves can also be operated as a battery backup, single feed power system (without load circuit breakers or fuses).

The remote access controller has LED visual indicators and Form C relay alarms. It is programmed by means of a remote PC web page display with communication by Ethernet LAN. Temperature compensated rectifier output is provided by means of an accessory TC probe. The X75 can be quickly installed by a qualified technician.

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Figure 1 - X75 Compact Integrated DC Power System

2.0 FEATURES & OPTIONS

2.1 Standard Features

- 1RU High Base System
- 1RU High Expander Shelf
- Remote Control & Monitoring via TPC/IP Ethernet LAN
- Fully Integrated System
- Up to 72A at -54.4VDC
- Up to 75A at +27.2VDC or +13.6VDC
- Wide Range AC Input
- Up to 10 DC Load Circuits
- Circuit Breakers or GMT Fuses
- Quick and Easy Installation
- Universal 19/23-Inch Mounting Brackets
- SNMPv3 reporting and Error Trapping

2.2 Options & Accessories

- Additional Probe for External Temperature Measurement (‘T’ Option)
- Various AC Line cords and DC cable sets

3.0 SAFETY WARNINGS

3.1 The X75 Compact DC Power System operates at voltages that could potentially be hazardous. Furthermore, inadvertent short circuiting of the system battery and/or rectifier by mis-connection or other error could be harmful. This product should be handled, tested and installed only by qualified technical persons who are trained in the use of power systems and are well aware of the hazards involved.

3.2 All connections to the X75 should be carefully checked for errors before applying power to it.

3.3 Specific Considerations for Rack Mounted Equipment

3.3.1 Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the X75 in an environment compatible with the maximum ambient temperature of 50°C at full rated load, and at 70°C at derated load at a derating factor of 2.5%/°C from 50°C to 70°C.

3.3.2 Reduced Air Flow - Installation of the X75 in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

3.3.3 Mechanical Loading - Mounting of the X75 in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

3.3.4 Circuit Overloading - Consideration should be given to the connection of the X75 to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of the X75 nameplate ratings should be used when addressing this concern.

3.3.5 Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips)."

3.4 The X75 is intended only for installation in a "RESTRICTED ACCESS LOCATION".

3.5 Input/output short circuit ratings are 5KA AC for terminals connected to breakers and 450A AC for terminals connected to GMT type fuses.

3.6 The controller unit integral to the X75 is fitted with a replaceable battery.

CAUTION: RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.

4.0 WARRANTY (summary)

X75 Series DC power systems are warranted for two (2) years from date of shipment against defects in material and workmanship. This warranty does not extend to products which have been opened, altered or repaired by persons other than persons authorized by the manufacturer or to products which become defective due to acts of God, negligence or the failure of customer to fully follow instructions with respect to installation, application or maintenance.

For a complete text of UNIPOWER's warranty conditions please request a copy from your local Sales Office.

5.0 UNPACKING AND INSPECTION

5.1 This X75 DC power system was carefully tested, inspected and packaged for shipment from our factory. Upon receipt the unit should be carefully unpacked and inspected for any damage in shipment.

5.2 If there is evidence of damage, **do not attempt to install the unit**. The freight carrier should be notified immediately and a claim for the cost of the X75 should be filed with the carrier for direct reimbursement. Be sure to include the model and serial number of the damaged unit in all correspondence with the freight carrier. Also save the shipping carton and packing material as evidence of damage for the freight carrier's inspection.

5.3 UNIPOWER will cooperate fully in case of any shipping damage investigation.

5.4 Always save the packing materials for later use in shipping the unit. Never ship the system or the rectifier modules without proper packing.

6.0 GENERAL SPECIFICATIONS

6.1 Inputs

Supply Voltage:	85-264VAC Single Phase Each rectifier position is supplied via an individual IEC60320 C14 Inlet Socket.

A 3-phase supply may be connected provided that the voltage presented to each individual rectifier position does not exceed 264VAC.

Supply Current:	Max 9A input @ 85-264VAC per inlet socket.
Battery Input:	Direct connection to DC output bus or via protection breakers.
Digital alarm inputs:	Volts free contact input*

*Volts free contacts are internally pulled up to 5V with reference to rectifier negative sense, these lines should not be tied to anything other than volts free contacts or floating opto-coupler outputs.

Temperature probes:	Sensor with output current proportional to temperature.

6.2 Outputs

Pluggable Breakers:	Up to 5 circuits, 30A max. per circuit.
GMT Fuses:	10 circuits, 12A max. per circuit.
Alarm Relay Contacts:	Form C, 1A max at 30VDC.
Ethernet:	10/100 Base T

6.3 Protection

Supply Input:	Each rectifier is individual fused internally.
Battery:	100A Magnetic Circuit Breaker.
Output Distribution:	According to installed circuit breakers or fuses.
Bulk DC Bus:	Rectifier Current Limiting / Battery Breaker.

6.4 Safety

The X75 system is compliant with UL60950-1, EN60950-1, CSA22.2-60950-1 and all other derivatives of the core IEC60950-1 standard 2nd Edition when installed correctly within a restricted access environment.

The X75 system is CE marked to indicate conformance to the European Union's Low Voltage and EMC Directives.

6.5 EMC

The X75 complies with the following Norms when correctly installed.

Conducted Emissions:	EN55022, level A
Radiated Emissions:	EN55022, level A
ESD:	EN61000-4-2, level 4, criterion A - 8kV contact, 15kV air.
Radiated Immunity:	EN61000-4-3, level 3, criterion A - 10V/m.
Surges (power ports):	EN61000-4-5, level 1, criterion A - 500V

6.6 Environmental

Operating Temperature:	-20°C to 70°C, derating 2.5%/°C from 50°C to 70°C
Storage Temperature:	-40°C to 75°C
Humidity:	0% to 95% Non-Condensing

6.7 Physical Specification

Case Material:	Steel
Finish:	Clear Passivated
Dimensions:	1.72H (43.7) x 17.2W(437) x 14.47D(368)
Rack Width:	19" or 23" using dual purpose kit supplied. NOTE: Mid-mount is recommended when used in free space.

7.0 PRINCIPAL OF OPERATION

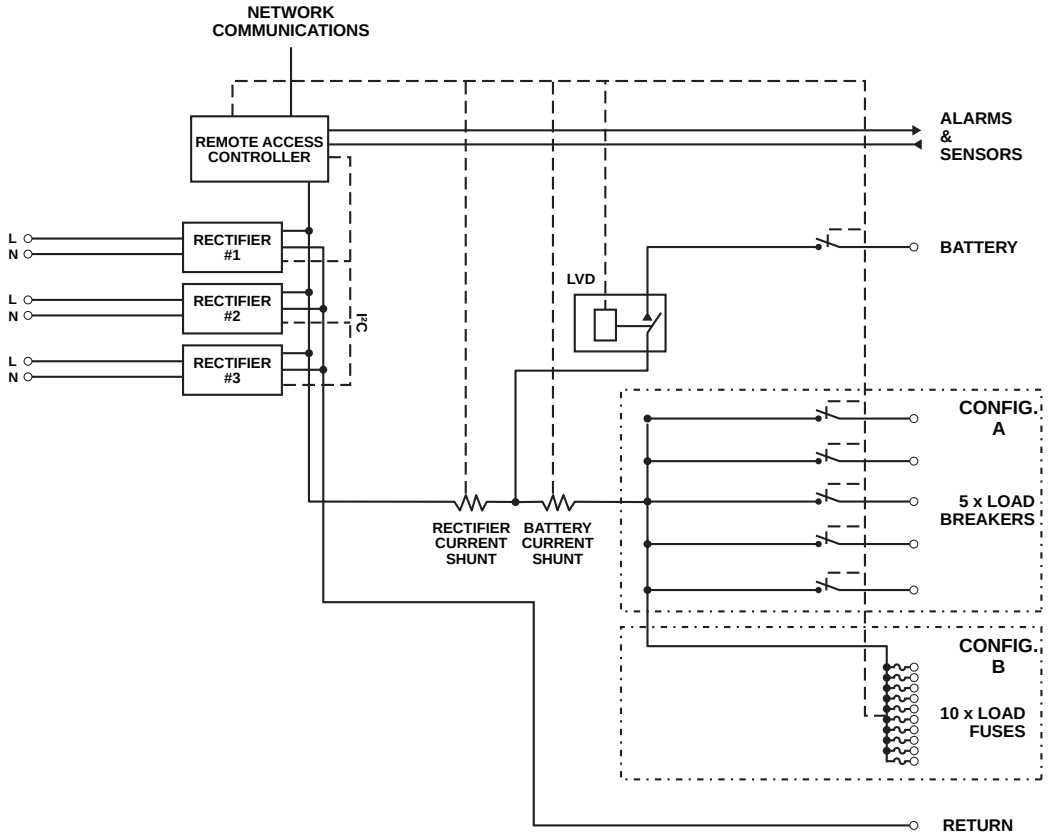


Figure 2 - Block Schematic

7.1 85-264VAC is supplied directly to each of the rectifiers which produce a nominal -48VDC, +24VDC or +12VDC output.

7.2 Following a current shunt to measure the rectifier current, the rectifier DC output is fed to the battery terminals via the LVD (Low Voltage Disconnect, current shunt and a 100A circuit breaker.

7.3 The rectifier DC output is also fed to the loads via up to 5 circuit breakers (configuration A) or 10 fused circuits (configuration B).

7.4 The management unit monitors and controls the rectifiers via an I²C interface and also checks the status of the DC load and battery breakers/fuses.

7.5 The management unit monitors external sensors and provides alarms.

8.0 FRONT PANEL DESCRIPTION

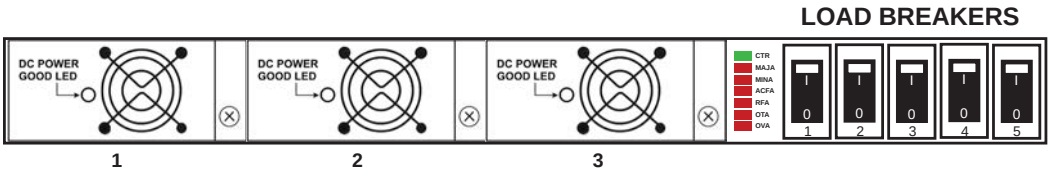


Figure 3a - Front View with Breakers (configuration A)

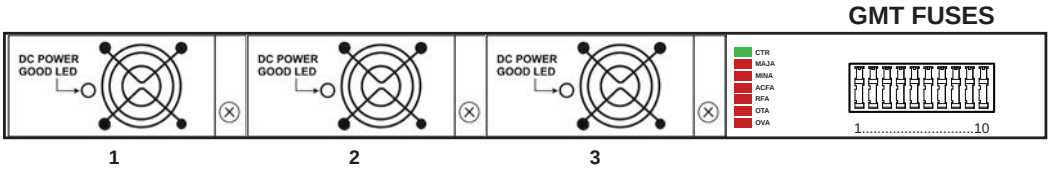


Figure 3b - Front View with GMT Fuses (configuration B)

Figures 3a and 3b show the two system configurations as viewed from the front with breakers and fuses respectively. Following is a description of each section.

8.1 From left to right there are 3 rectifier slots. Each slot can accept one rectifier from the Sigma Series rated up to 650W output power. Only identical model rectifiers of appropriate output voltage may be installed at the same time. For example, a nominal -48V system may contain between 1 and 3 model RSG48/10-Z OR between 1 and 3 model RSG48/12-Z but not a mixture of the two types.

8.2 To the right of the rectifiers are 7 LED indicators which display various status and alarm conditions. These are described in more detail in section 10.

8.3 On the right hand side of the unit is the DC distribution section which may contain between 1 and 5 circuit breakers (configuration A) or a 10-way GMT fuse block (configuration B).

9.0 REAR PANEL DESCRIPTION

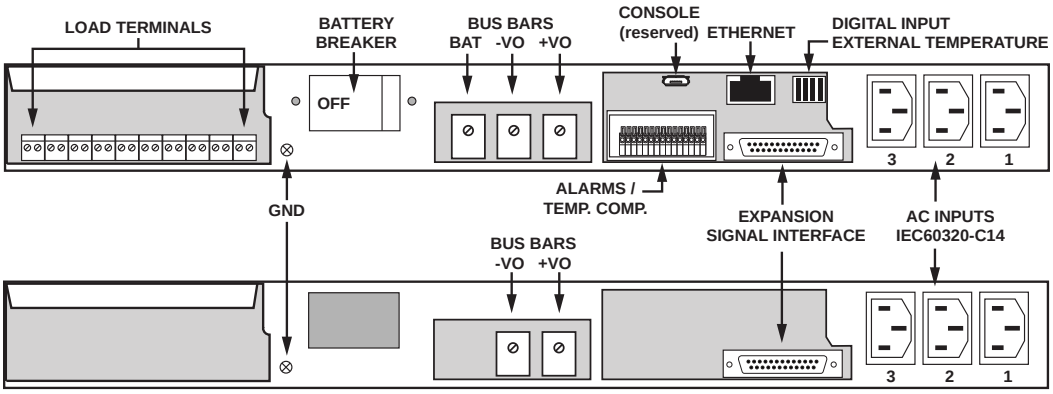


Figure 4 - Rear Views of Base and Expansion Units

Figures 4 shows the base and expansion unit as viewed from the rear. Following is a description of each section.

9.1 On the left hand side of the Base Unit, viewed from the rear, is a bank of screw terminal blocks for the DC load connections.

When the Circuit Breaker option has been specified two connections are provided for Load and Return for each breaker position.

When the GMT Fuse option has been specified one connection is provided for Load and Return for each fuse position.

9.2 To the right of the Load connection terminals is the Battery Breaker. This is a magnetic circuit breaker rated at 100A. This circuit breaker provides two functions.

9.2.1 In the first instance it enables the user to disconnect the batteries from the system for maintenance, replacement or other purposed.

9.2.2 The second function is to protect the batteries against excessive charge or discharge currents.

9.3 To the right and below the battery breaker there is a 9-way D sub connector marked RS232.

This connector provides a 'console' only function to UNIPOWER service personnel and should not be connected to for any other purpose.

9.4 In the center of the unit are three bus bar terminals.

9.4.1 To the left side is the VB or BAT terminal. This is connected to the 'hot' or 'feed' side of the battery.

9.4.2 In the middle is the –V or –VO terminal. This is the 'negative' output of the rectifier bus.

9.4.3 To the right side is the +V or +VO terminal. This is the 'positive' output of the rectifier bus.

9.4.4 Battery connection for -48VDC systems is as follows:
+Ve battery terminal connects to the +V terminal.
–Ve battery terminal connects to the VB terminal.

Note that in -48VDC systems the +V terminal is internally connected to chassis ground.

9.4.5 Battery connection for +24VDC and +12VDC systems is as follows:
+Ve battery terminal connects to the VB terminal.
-Ve battery terminal connects to the –V terminal.

Note that in +24VDC and +12VDC systems the -V terminal is internally connected to chassis ground.

9.4.6 When the system is required to provide a bulk feed output without using the internal distribution the +V and –V terminals are used to provide this feed to the load.

9.4.7 When an expansion shelf is used to increase the overall capacity of the system the +V and –V terminals of the expansion unit should be bussed together with the +V and –V terminals of the system unit respectively using the supplied link bars.

9.5 Immediately to the right of the bus bar terminals is a bank of 15 Spring Clamp Terminals designated J4. These terminals provide connections for the battery temperature compensation probe and the relay alarm outputs. They are described in detail in section 11.

9.6 Next to J4 is a 25-way Sub-miniature D-Type connector, designated J1, which is used to connect various signal and control lines between a base unit and an expansion shelf.

Expansion shelves are supplied with a short cable to link the J1 connectors between the base unit and the expansion shelf.

9.7 Above J1 is a 4-way Spring Clamp Terminal connector. This connector, designated J2, provides terminations for the auxiliary digital alarm input and the optional external temperature probe. The pin-out for this connector is described in section 11.

9.8 To the left of J2 is the Ethernet TCP/IP connector (J3). This connection uses a standard RJ45 Network connector. It is used to connect either to a Local Area Network or directly to a PC with network connection, the latter using a standard cross-over cable.

The primary means of setting up the X75 unit is via it's built-in WEB server, which is accessed using a WEB browser via this Ethernet TCP/IP connection.

9.9 At the right hand side of the base unit and also the expansion shelf are three IEC60320 C14 inlets. These provide individual AC input feeds to each of the 3 rectifier slots.

The X75 employs UNIPOWER Sigma Series rectifiers which operate from a Universal 85-264VAC 50-60Hz single phase supply. The system is designed so that various single and 3-phase supply connections can be made. For example, in the U.S. it might be desirable to connect each rectifier between two 120VAC phases; in which case each rectifier is operating at 208VAC.

IMPORTANT NOTE: DO NOT CONNECT THE UNIT SUCH THAT MORE THAN 264VAC WILL BE PRESENT BETWEEN THE LIVE AND NEUTRAL TERMINALS OF ANY ONE INLET SOCKET. SUCH CONNECTION MAY BE HAZARDOUS, WILL DAMAGE THE UNIT AND INVALIDATE THE WARRANTY.

10.0 LED Indicators

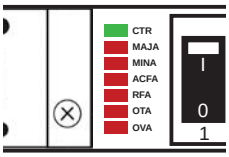


Figure 5 - LED Indicators

During normal operation there will be one green LEDs displayed as shown in figure 5 above.

The LED indicators provide visual indication of both status and alarm conditions as described below:

CTR – GREEN – Indicates that the unit has power and is functioning normally.
MAJA – RED – Indicates a 'Major' (Immediate Response) alarm condition.
MINA – RED – Indicates a 'Minor' (Scheduled response) alarm condition.
ACFA – RED – Indicates an AC supply failure.
RFA – RED – Indicates a Rectifier module failure.
OTA – RED – Indicates that one or more of the monitored temperatures is too high.
OVA – RED – Indicated that the system Bus Voltage is too high.

11.0 MAKING CONNECTIONS TO THE X75

11.1 DC Load Connections

The DC load distribution connections at the rear left of the unit are clearly marked as follows:

11.1.1 Circuit breaker option.
For each load circuit there are two terminals marked V1, V2, V3, V4 and V5 respectively for the DC 'feed' and two marked RTN for the DC 'return'.

11.1.2 GMT Fuse option.
For each load circuit there is one terminal marked V1 through to V10 respectively for the DC 'feed' and one marked RTN for the DC 'return'.

Note that in the case of -48VDC system the 'feed' terminals are at a negative potential with respect to the 'return' terminals. In the case of +24VDC and +12VDC systems the 'feed' terminals are at a positive potential with respect to the 'return' terminals.

When connecting to the DC load terminals it is important to ensure that the cables used are adequately sized to carry the expected load current for the circuit in question.

The maximum current rating for the individual load terminals is 32A, but where long cable runs to the load are expected care should be taken to avoid unacceptable cable voltage drop; this is most likely to occur at currents in excess of 20A if only a single feed and return cable are employed. It is recommended that for circuits where a 20A or greater breaker is fitted pairs of feed and return cables are installed.

The terminals can accommodate wire sizes in the range #24AWG to #12AWG. The table below gives recommended cable sizes for the available circuit capacities assuming semi-confined conditions.

Circuit Rating	Minimum Cable Size
½A , ¾A, 1A, 1⅓A, 2A, 2½A	24AWG
3A, 5A	22AWG
10A. 12A	18AWG
15A	16AWG
20A	14AWG or 2 x 18AWG
25A, 30A	12AWG or 2 x 16AWG

Figure 6 - Recommended Load Circuit Wire Sizes

11.2 Alarm Relay and Battery Temperature Probe Connections – J4

Connection to the Form-C alarm relay outputs is made through a 15-way spring clamp terminal connector. There are a total of 4 relay outputs with Normally Open, Normally Closed and Common Contacts available for connection. The individual relays contact sets are fully isolated and may be floated from GROUND by up to 100V. Maximum contact current and voltage are 1A and 30V (DC or AC) respectively.

This connector accommodates wire sizes in the range #28 to #20AWG.

The alarm relays are designated K1 to K4. K1 and K2 are pre-programmed for MAJOR and MINOR alarm conditions by default. K3 and K4 are not programmed for any alarm function.

The function of each alarm may be programmed using the Alarm Configuration WEB page described later in section 13.

Connection of the supplied battery temperature probe, if required, is made using terminals 1 and 3 of this same spring clamp terminal connector.

J4 CONNECTIONS	
TERMINAL	FUNCTION
1	BATT. TEMP. PROBE -
2	Not Used
3	BATT. TEMP. PROBE +
4	K1 - MAJ ALARM – N/C
5	K1 - MAJ ALARM – COM
6	K1 - MAJ ALARM – N/O
7	K2 - MIN ALARM – N/C
8	K2 - MIN ALARM – COM
9	K2 - MIN ALARM – N/O
10	K3 – FREE ALARM – N/C
11	K3 – FREE ALARM – COM
12	K3 – FREE ALARM – N/O
13	K4 – FREE ALARM – N/C
14	K4 – FREE ALARM – COM
15	K4 – FREE ALARM – N/O

Note that terminal 1 is to the left when viewed from the rear of the system.

Figure 7 - Battery Temp. Probe & Alarm Relay Connector Pin-Out

11.3 Ethernet Connection – J3

The X75 is connected to a TCP/IP LAN (Local Area Network) or directly to a PC using connector J3. This is a standard RJ45 network connector allowing connection of any generally available Ethernet cable. Note that if the X75 is to be connected directly to a PC rather than a LAN then a cross-over Ethernet cable will be required.

J3 CONNECTIONS	
TERMINAL	FUNCTION
1	TX +
2	TX -
3	RX +
4	Not Used
5	Not Used
6	RX -
7	Not Used
8	Not Used

Figure 8 - Ethernet Connector Pin-Out

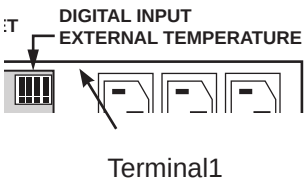
11.4 Auxiliary Connections – J2

Auxiliary connector J2 provides connections for an external temperature probe which can be supplied optionally with the system and for a single volt free contact closure input. This connector accommodates wire sizes in the range #28 to #20AWG.

NOTE: Any sensor, such as a switch or relay, that is connected to the digital input MUST be galvanically isolated.

The optional temperature probe is identical to the battery temperature probe that is supplied as standard, so there is no risk of mixing the two up on receipt.

J2 CONNECTIONS	
TERMINAL	FUNCTION
1	Contact Closure Input
2	
3	Ext. Temp. Probe +
4	Ext. Temp. Probe -



Note that terminal 1 is to the right when viewed from the rear of the system.

Figure 9 - Auxiliary Connector Pin-Out

11.5 Expansion shelf connector – J1

This connector is used to jumper the necessary signal and control functions for the rectifiers that are installed in an optional expansion shelf back to the base unit. The functions and pin-out are not described in detail as these are internal to the general operation of the unit. A link cable if supplied with the EX75 chassis.

11.6 USB Console

This connector is reserved for UNIPOWER factory use.

12.0 INSTALLATION

The X75 can be mounted in either 19” or 23” racks by using the supplied brackets. Mount it from the front of the rack using the correct offsets to align with existing rack-mounted equipment. Once mounted in the rack the following connections must be made with the unit switched off.

CAUTION: Re-read the Safety Warnings and Precautions in Section 3. All power should be OFF for the input and output loads before making connections. Connection of the X75 chassis to frame ground should be made first. If the X75 has been turned on before installation connections, it should be turned off and given a 5-minute waiting period for all internal energy storage capacitors to be discharged.

12.1 Input AC Power Connection

A 3-wire AC power line should be connected to the input IEC connectors but not plugged into the AC power source. The line, neutral and ground connections should be carefully observed when making the AC connections. The AC line cord should be sized to safely carry 15 amperes AC each, minimum.

MODEL	Vin AC	Vout DC	WATTS	A @ 120Vac	A @ 240Vac
RSJ48/12-Z	85-264	54.4	653	6.5	3.2
RSG48/10-Z	85-264	54.4	550	5.4	2.7
RSF48/7-Z	85-264	54.4	400	4.0	2.0
RSG24/18-Z	85-264	27.2	500	5.0	2.5
RSF24/13-Z	85-264	27.2	350	3.5	1.7
RSG12/33-Z	85-264	13.6	450	4.4	2.2
RSF12/22-Z	85-264	13.6	300	3.0	1.5

Note: ratings given are at nominal voltage for sizing breakers. Label rating may be greater.

Figure 10 - Input Current Ratings

12.2 Checking Outputs

Turn all output circuit breakers to the OFF position and/or remove all fuses from the GMT fuse-holder. With no loads connected and without the battery connected, plug in or connect the AC input cords one at a time to the AC power source. Be sure to use the correct AC voltage for the rectifier inputs.

Using a volt meter measure the DC voltage reading across the –VO and +VO bus bars at the rear of the unit. The voltage should be approximately 54.4, 27.2, or 13.6VDC (depending on model), which is the factory setting.

One by one, turn each output circuit breaker to the ON position and/or insert a GMT fuse and measure the DC voltage across the corresponding output terminals. The voltage should again read approximately 54.4, 27.2, or 13.6 volts. After each output is measured, turn OFF that circuit breaker and/or remove the GMT fuse and turn ON and/or insert a fuse in the next one. After measuring the last circuit, turn off that breaker and/or remove the GMT fuse and make sure that all output breakers are in the OFF position and/or all fuses are removed.

Unplug or disconnect the AC input power source. Before touching any terminals wait 5 minutes for the internal storage capacitors to discharge.

12.3 Controller Section Operation and Settings

At this point, before the final installation connections, read section 13 covering Controller setup. Next, make any required signal connections, controller adjustments, temperature compensation adjustment and alarm enabling settings.

WARNING: Remember to take precautions each time the system is turned on and also when connecting or disconnecting the battery. Remember that the battery presents an energy hazard at its terminals. Also remember to allow 5 minutes for internal capacitors to discharge after disconnecting the AC input power and the battery.

12.4 Connection to Loads

With input AC power unplugged, the battery disconnected and no other power sources connected to the loads, make sure that all load circuit breakers are set to the OFF position and/or all GMT fuses are removed.

Connect load wires to each set of output terminals, one at a time. Note that the front panel breaker and fuse numbers directly correspond to the output terminal numbers.

Be sure to connect the polarities correctly.

12.5 Connection to Battery

WARNING: Improper polarity of the battery connection may damage the power system. Take precautions when installing the battery and note that the battery cables are “hot” (live) and present an energy hazard.

With AC input unplugged, remove the three rectifier modules from the system chassis. Make sure all load circuit breakers are in the OFF position and/or all GMT fuses removed. Set the battery circuit breaker to the OFF position. Carefully connect the battery cables to the battery terminals shown in Figure 4 while observing the correct polarity as described in section 9.4.

Note that until AC power is applied to the system the controller will not activate the LVD contactor.

12.6 System Turn-On

Perform the following operations:

1. Set the battery and all load circuit breakers to the OFF position.
   For systems with GMT fuse distribution remove all fuses if already installed.
2. Plug in the rectifier modules.
3. Connect the AC power cables to the AC source.
4. Check that the green LED on the front panel has lit. After approximately 20 seconds for initialization the MAJA LED at least will light. The RFA LED may also light, dependent on the number of rectifiers installed at the time.
5. Set the battery circuit breaker to the ON position. Then set the load breakers to the ON position and/or insert the GMT fuses.
   After approximately 5 seconds the status of various alarm LEDs will change, dependent on the number of rectifiers installed.

Using the WEB browser interface described in section 13 it is now possible to check overall system status for correct operation.

In particular, it is important to ensure that the load current reading does not exceed the maximum capacity of the installed rectifiers or, where N+1 operation is required, the maximum capacity of one less than the total number of rectifiers installed. Note also, that the system should have been sized so that a proportion of the available rectifier capacity is allocated for battery charging. Where N+1 redundant operation is used the additional 'spare' rectifier will normally provide this current.

IMPORTANT NOTES:

a) It is not possible to start the system by connecting the batteries alone.

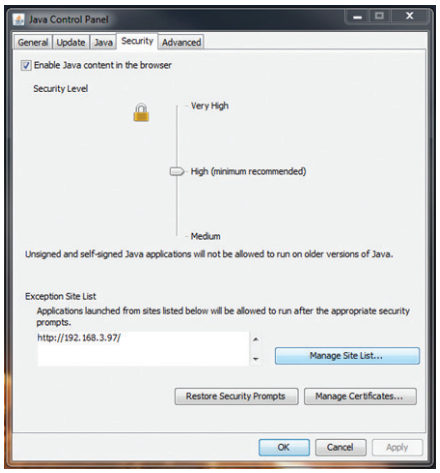
b) During the 30 seconds initialization period the system bus voltage will be at the factory preset level of the rectifiers; nominally 54.4V, 27.2V or 13.6V depending on system voltage. After this period the internal controller will lower the output voltage by approximately 15% in order to limit current flowing to the batteries. During a following period of approximately 30 minutes the controller will ramp the system voltage up to the correct float voltage as determined by the temperature compensation algorithm.

This 'walk-in' function can be disabled via the controller WEB interface if it not required.

13.0 USING THE CONTROLLER WEB BROWSER INTERFACE

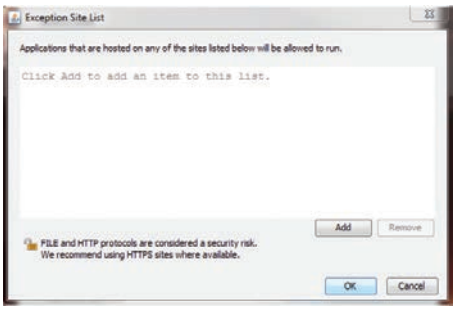
The web pages can be accessed using a browser. Type the IP address of the controller into the address bar to access the index page. Recommended browsers are Internet Explorer or Firefox. NOTE THAT THE CONTROLLER DOES NOT WORK WITH CHROME.

The web pages use Java™ applets for their enhanced functionality. The Java™ applets communicate data to and from the controller using port 8888. If a firewall is used on the computer accessing the controller you must make sure this port is open otherwise the applets will not function correctly.
In order for the applets to be loaded correctly, you must add the IP address of the controller to the list of site exceptions in the Java control panel. This can be found in the computer's control panel. This function is only available for Java 7u60 and above. The applets should also work with Java 7u45 and below. Note that Java 7u51 will not work as it will block the controller applets without allowing exceptions.
Once the Java control panel is open, select the Security tab. Click on the Manage Site List button.

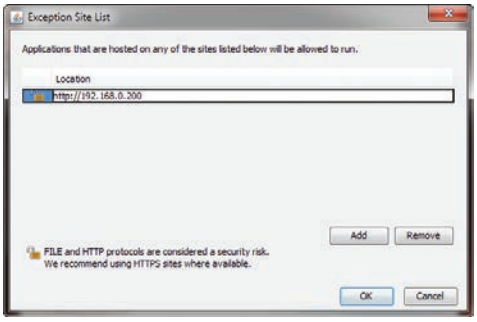


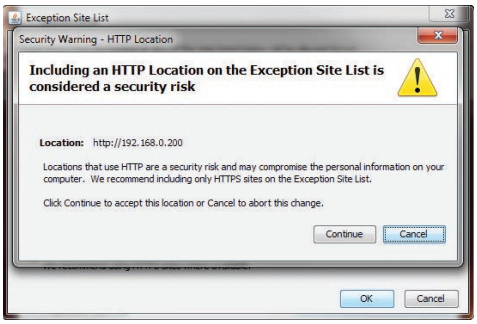
Ensure that 'Enable Java content in the browser' is checked and leave the "Security Level" set to "High (minimum recommended)"

Click on the Manage Site List button and the following will appear.



Click the Add button and type in the IP address of the controller in the format 'http://xxx.xxx.xxx.xxx' (substitute the IP address set in the controller). A warning will appear indicating that this is a security risk. Press Continue to allow the site to be added.

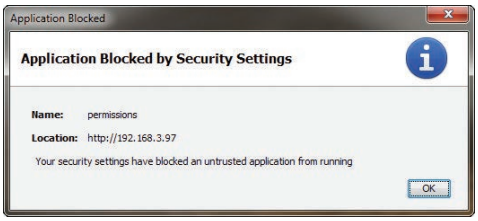




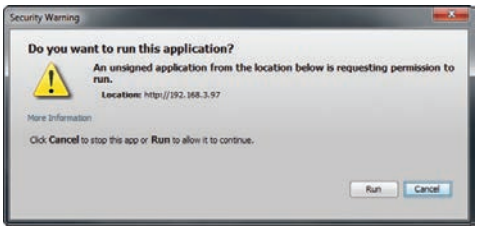
Now press OK and then OK again to close the Java control panel.

You should now be able to access the controller web pages and see the applets running.

Note that if you try to access a controller that has not been added to the exception list as above using a Browser with Java 7u60 or later installed you will get the following:



Note also that when accessing an allowed controller the following will appear at the start of each Browser session. Click OK to proceed. It will not appear again unless the Browser is closed and re-opened.



The controller has various network programming capabilities which allow it to be connected to almost any configuration of IP network.

The default network settings that the controller is shipped with are:

IP Address – 192.168.000.200
Subnet Mask – 255.255.255.000
Gateway – 000.000.000.000

All pages served by the controller's built-in WEB server consist of two frames; a 'navigation' frame on the left hand side and an 'information/programming' frame which occupies the majority of the browser window.

The menu items in the 'navigation' frame can be used at all times to jump between the various pages. Clicking on the UNIPOWER logo at the top will navigate directly to the UNIPOWER web site www.unipowerco.com.

Each of the blocks of information in the 'information/programming' frame is a Java applet. In some cases these applets simply collect information from the controller and presents it on-screen, in other cases the applets contain data entry fields for uploading programming information to the unit.

Note that a PC screen resolution of 1024 x 768 or higher is recommended to avoid excessive amounts of page scrolling.

The following sections describe the various WEB pages that can be viewed with the browser and give details of programming parameters that may be entered and sent to the unit.

IMPORTANT NOTE: The screen shots shown throughout this section are 'typical' examples. The exact data content will differ dependent on the system voltage and whether alterations from the default settings have been made. Settings can be returned to the factory defaults at any time by clicking on the 'DEFAULT' then 'UPLOAD' buttons on the relevant setup page. This action requires the level 1 pass code.

The factory default passwords are:

User - 1234
Admin - 9876

13.1 Status

When the X75 is first accessed using a WEB browser the Controller Status page shown below is displayed.

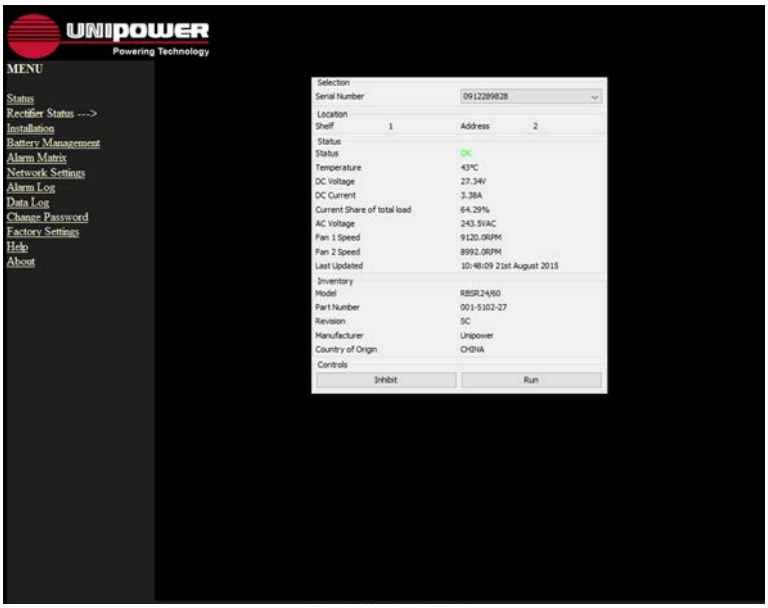


Figure 11 - Status WEB Page (typical)

The following describes the function of the different parts of the applet with the exception of FACTORY SETTINGS which is reserved for UNIPOWER use.

At the top is the site name. This can be changed in the installation applet.

Next is the main system bus voltage. Note that this will always show as an unsigned value even in systems that have a negative voltage with respect to chassis ground.

Next to the system voltage is an indicator of the state of the system. The various possible indicators are as follows:

FLT Indicates that the system is in float mode without any temperature compensation.

TC Indicates that the system is in float mode with temperature compensation applied.

CHG The system is bulk charging the batteries.

EQ The system is equalizing or boosting the battery voltage.

BD The system is in battery discharge.

TST The system is performing a battery test.

The next section shows the various system parameters.

Rectifier current – The total current being delivered by all the rectifiers in the system. This is always a positive value.

Load current – The total current being delivered to the system loads. This is always a positive value.

Battery current – The total current being delivered or drawn from the battery strings attached to the system. For charging, this current is positive. For discharge this current is negative.

Note that some systems may not be configured to use batteries. In those systems the unused current(s) will read zero and should be ignored.

Battery Temperature 1 – The temperature reported by the probe attached to the battery temperature 1 input. If the probe is not attached the display will change to 'Disconnected'. If a fault occurs and the probe is shorted, the display will show 'Shorted'.

Battery Temperature 2 – The temperature reported by the probe attached to the battery temperature 2 input. If the probe is not attached the display will change to 'Disconnected'. If a fault occurs and the probe is shorted, the display will show 'Shorted'.

External Temperature – The temperature reported by the probe attached to the external temperature input. If the probe is not attached the display will change to 'Disconnected'. If a fault occurs and the probe is shorted, the display will show 'Shorted'.

Controller Temperature – The temperature of the controller board set. This gives an indication of the temperature of the local environment around the controller.

Number of rectifiers – This indicates the number of rectifiers that the controller can see in the system. For some types of rectifier, the controller will not be able to see them if they are not powered.

The next four items are user definable analog inputs. The names, scaling factors and units can be changed in the installation applet.

The next section shows two LEDs. These are the major and minor alarm indicators. These reflect the state of the alarm LEDs on the front of the controller. When active the LEDs are red. When not active they are black. To configure what constitutes a major or minor alarm, use the Alarm matrix applet.

The final section shows which alarms are active in the system. If no alarms are detected then the text will show 'OK'. There are 51 different alarm conditions which can be displayed here. If the alarms are not set up (have no check boxes checked in the alarm matrix) then the alarm will be disabled and will not show up in this area.

13.2 Rectifier Status

The ***Rectifier Status*** page presents detailed information about an individual rectifier module. Two types of data are included; 'live' status information and 'static' inventory information. In addition the controller returns the I²C address as confirmation that the unit has responded.

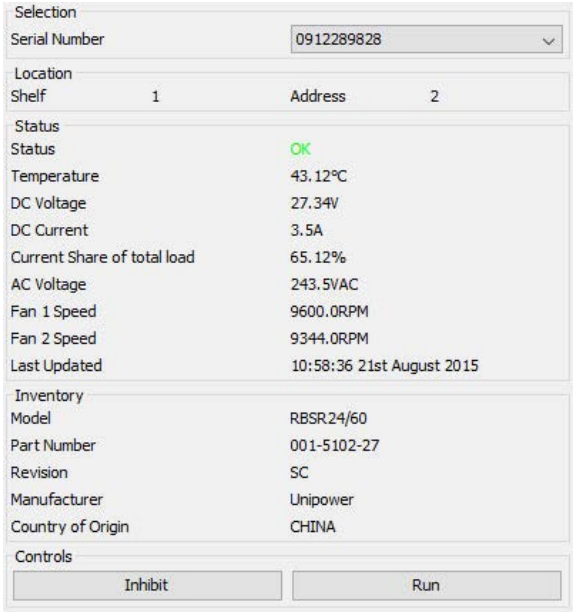


Figure 12 - Rectifier Status WEB Applet (typical)

In order to obtain status information about a particular rectifier module select it by using the serial number drop down at the top right where a list of all installed rectifiers can be seen.

'Live' data includes the following and is presented in the form of 8 colored indicator blocks to the left. A green block indicates a 'good' condition and a red block indicates a 'bad' condition. In addition the unit's internal temperature is presented on the right. Note that Sigma Series rectifiers include a single fan only and that two of the status indicator blocks will always be grayed out.

'Inventory' data, presented on the right below the temperature measurement includes, among other items, rectifier model number Serial Number and Revision Number.

13.2.1 Rectifier Inhibit (Shutdown)

The X75 includes a facility that enables the user to manually inhibit or shutdown individual rectifiers. This may be desirable when a particular rectifier is to be removed from the system for maintenance, although all UNIPOWER rectifiers are Hot-Swap, or for some other reason.

To inhibit a rectifier first select it as previously described and then click on INHIBIT. A password entry box will appear where it will be necessary to enter either the administrator (default 9876) or the user password (default 1234).

To restart a rectifier that has been inhibited select the desired rectifier and click on RUN and enter the password as directed.

Note that any rectifiers which have been inhibited will remain in this state until they are either restarted using the above method or the AC power is recycled.

13.3 Installation

The installation page contains several tabs which are described in detail below.

13.3.1 - System Settings

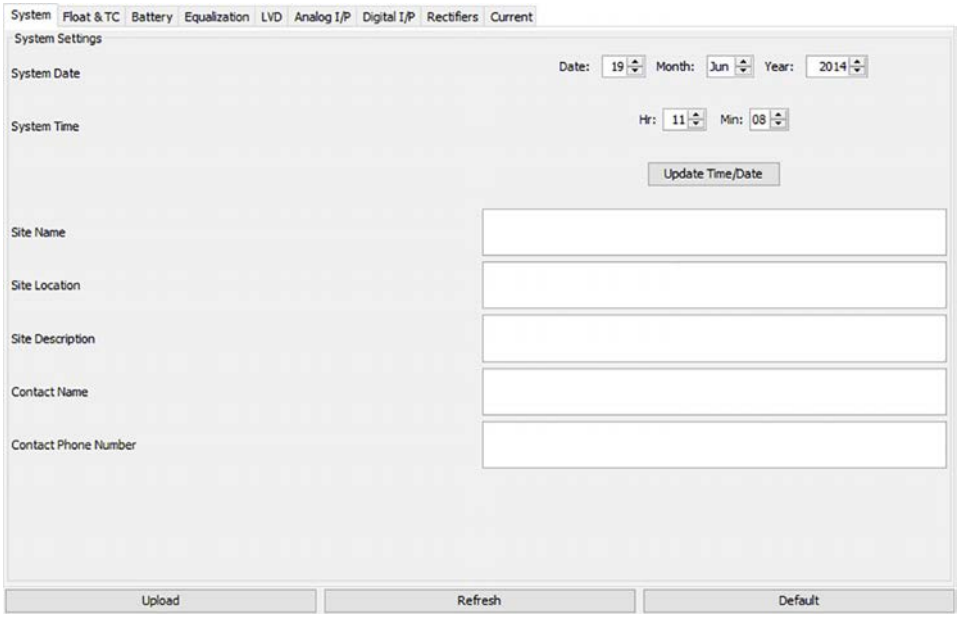


Figure 13 - Installation WEB Applet - system tab (typical)

The System Settings tab allows some basic reference information to be entered about the site. The controller date and time can also be updated by adjusting the date/time spinner at the top. Once changes are made, click on UPLOAD.

Note that changes can be made to all the tabs before clicking on UPLOAD just once.

The site name appears at the top of the status applet. It is also used when sending alert emails.

The following applies to all tabs.

To upload any changes, click on UPLOAD. An administrator level password is required.

To get default values for the parameters, click on DEFAULT. These will not be applied unless UPLOAD is clicked.

To restore parameters that have been changed and not yet uploaded click on REFRESH.

13.3.2 - Float & TC

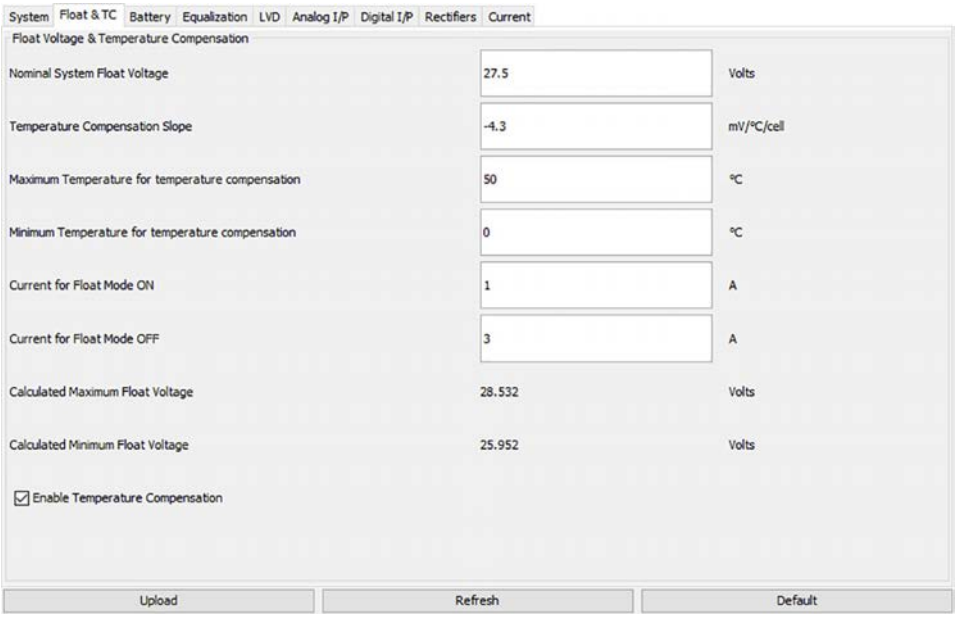


Figure 14 - Installation WEB Applet - float & tc tab (typical)

The Float & TC tab is used to set up the voltage and temperature compensation of the system as below:

Nominal System Float Voltage is the voltage that the system will output in the absence of any current limiting, equalizing or temperature compensation. This should be set to match the system battery requirements.

Temperature Compensation Slope. The controller applies straight line temperature compensation to the system voltage in order to maintain the batteries at their optimal charge state. Enter a figure here to match the requirements of the batteries.

Maximum Temperature for temperature compensation. If the battery temperature rises above this setting, no further temperature compensation will be applied.

Minimum Temperature for temperature compensation. If the battery temperature falls below this setting, no further temperature compensation will be applied.

Current for Float Mode ON. If the battery charging current falls below this level, the system will be considered to be in float charging mode (with or without temperature compensation).

Current for Float Mode OFF. If the battery charging current rises above this level the system will be considered to be in bulk charging mode.

Calculated Maximum Float Voltage. This is the maximum voltage that the system can adjust to given the temperature compensation slope, nominal float voltage and temperature compensation temperature limits.

Calculated Minimum Float Voltage. This is the minimum voltage that the system can adjust to given the temperature compensation slope, nominal float voltage and temperature compensation temperature limits.

Enable Temperature Compensation check box. If this box is checked, the system will apply temperature compensation to the float voltage. If not, the system will always output the nominal float voltage unless equalization, testing or charge current limit is active.

13.3.3 - Battery

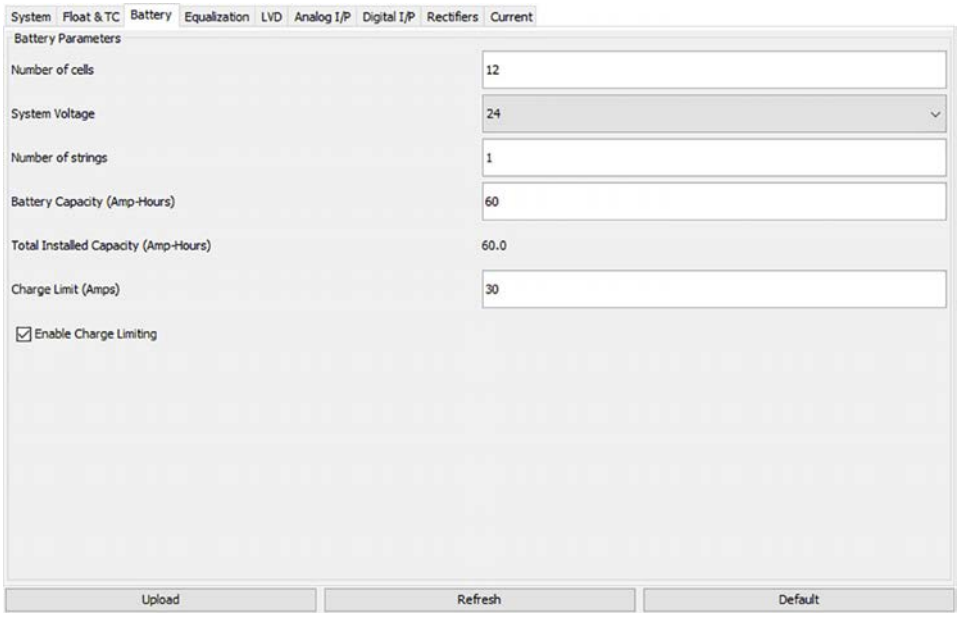


Figure 15 - Installation WEB Applet - battery tab (typical)

The Battery tab allows data about the batteries attached to the system to be entered as below:

Number of cells. This is used in the calculation of temperature compensation. It is the total number of cells in one battery string (e.g. normally 24 cells for a 48V system with 2V per cell lead acid cells)

System voltage. Choose from 12, 24 or 48V.

Number of Strings. Number of strings of batteries attached to the system. Note that X75 only allows connection of a single battery string and that this setting should therefore be 1 or 0 (if no batteries are connected).

Battery Capacity (Amp-Hours). This is the capacity of one battery string.

Total Installed Capacity. This is simply the number of strings multiplied by the battery capacity. This figure is only for reference, it is not currently used for any active functions.

Charge Limit (Amps). This is used to limit the battery charging current. Battery charge limiting is done by reducing the rectifier voltage to maintain the battery charging current at the set level.

Enable Charge Limiting Check box. Check this box if you wish to enable the battery charge limit feature.

13.3.4 - Equalization

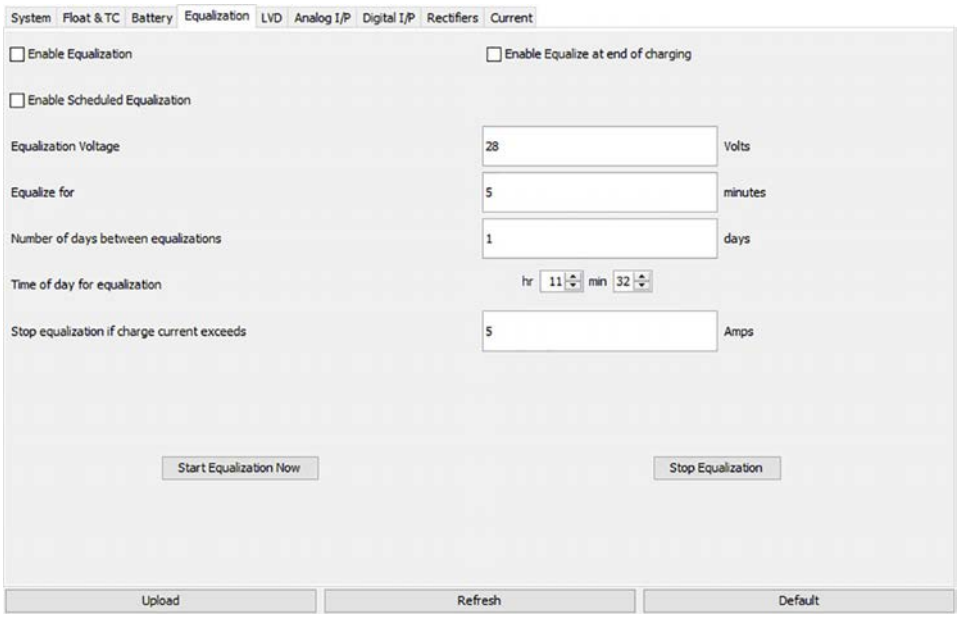


Figure 16 - Installation WEB Applet - float & tc tab (typical)

The Equalization tab deals with battery equalization. Some types of batteries must not be equalized or boosted. Please consult the datasheet of the batteries being used before using these features. Incorrectly applied equalization can damage the batteries. The settings are as follows:

Enable Equalization checkbox. This enables the equalization functions. If not checked, no equalization or boost functions may be done.

Enable Equalize at end of charging checkbox. To provide a boost to charging the batteries more quickly, the voltage applied to the batteries may be boosted for a short time to the higher voltage. Check this box to enable this feature.

Enable Scheduled Equalization checkbox. Some batteries require equalization to be applied periodically. Check this check box to enable this feature. Further parameters must be set up to use this feature correctly.

Equalization Voltage. The voltage to which the rectifiers will be raised to achieve the boost/equalize function.

Equalize for. The equalization will operate for this length of time (in minutes) before dropping back to the float voltage (with temperature compensation if enabled).

Number of days between equalizations. Set this parameter to determine how often the equalization function will operate (in days).

Time of day for equalization. Use the spinners to set the time of day that the equalization function will begin. This is usually chosen to be an off peak time.

Stop Equalization if charge current exceeds. The equalization or boost will be terminated if the battery charge current exceeds this value. Equalization will also stop if the battery temperature exceeds 38°C. (Fixed threshold).

Buttons **Start Equalization** and **Stop Equalization** may be used to manually start and stop the equalization process. Once started, the equalization will stop automatically if any of the above parameters are exceeded (equalization time, equalization maximum current, battery temperature above 38°C).

Note that it is necessary to enter the administrator or user password to manual start or stop equalization.

13.3.5 - LVD

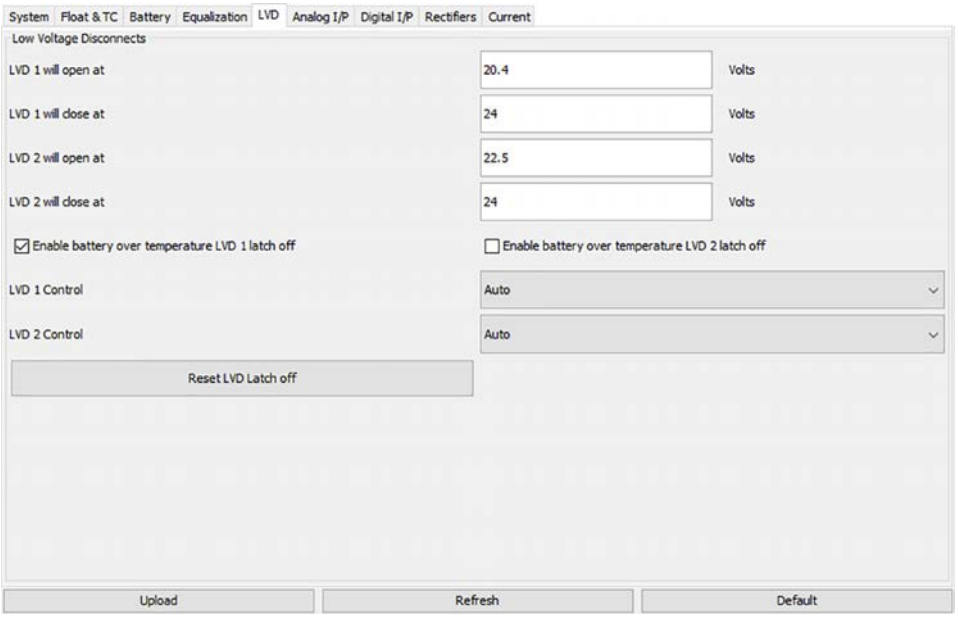


Figure 17 - Installation WEB Applet - lvd tab (typical)

The LVD tab is the set up and control for the system low voltage disconnect contactors. The controller can control up to two contactors, but in X75 only LVD 1 is installed.

The controls are as follows:

LVD 1 will open at. This is the system voltage which will cause the controller open LVD 1. Typically this is used to disconnect batteries at the end of discharge to avoid damaging them.

LVD 1 will close at. This is the system voltage above which the controller will close LVD 1.

Enable battery over temperature LVD1 latch off checkbox. If this box is checked then LVD1 will latch off if a battery over temperature alarm condition occurs (set up is in the alarm matrix applet). LVD1 will remain off even if the temperature falls below the alarm off level. This helps to prevent battery thermal runaway.

LVD1 Control. Select from Auto , On, Off. This will normally be set to Auto to allow the controller to control the LVD using the On and Off voltage thresholds. Selecting On will permanently turn on the LVD. Selecting Off will permanently turn off the LVD. Note that the On setting is overridden by the over temperature latch off function.

Reset LVD Latch off. This button can be used to reset a system that has latched off the LVD in the event of an over temperature condition. An administrator password is required for this function. Be sure that it is safe to carry out this function before doing so.

13.3.6 - Analog I/P - the X75 has no analog input connections.

13.3.7 - Digital I/P

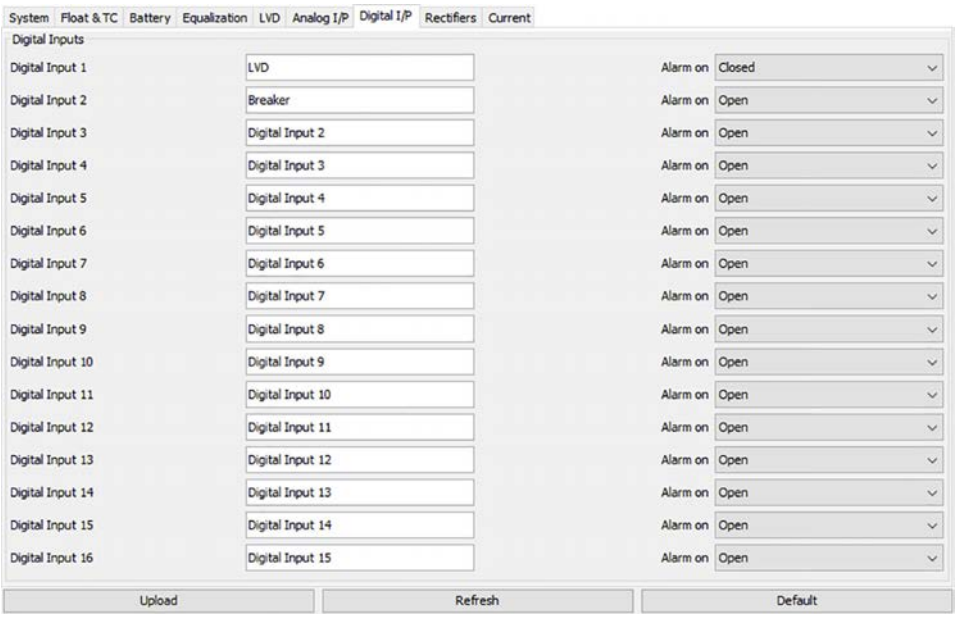


Figure 18 - Installation WEB Applet - digital i/p tab (typical)

The Digital I/P tab allows the user to set up the functions of the 16 digital inputs. Each input may be given a name and can be configured to alarm on open or closed contact. X75 provides one digital input only and is Digital Input 1 on this tab.

13.3.8 - Rectifiers

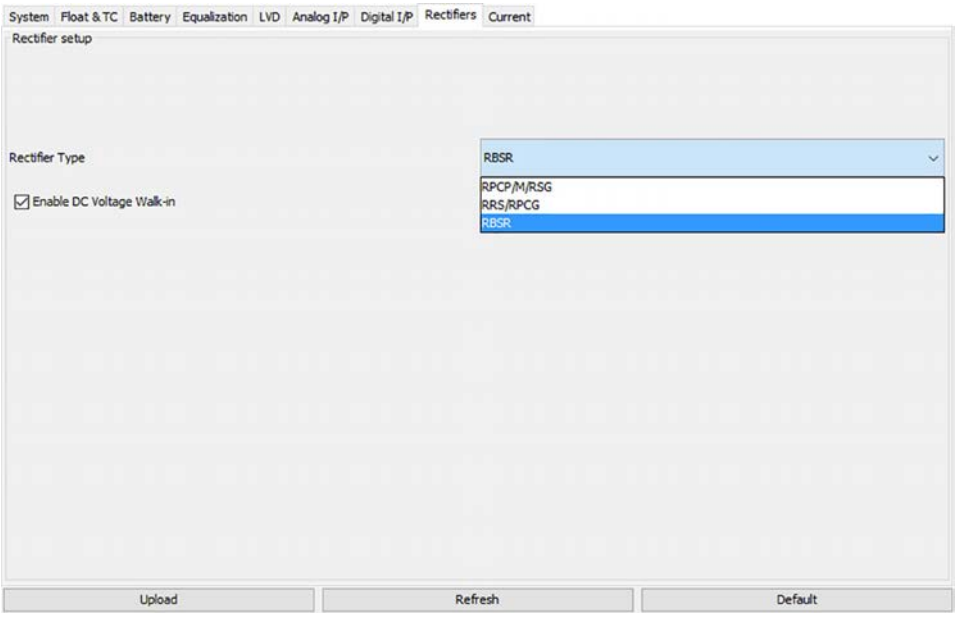


Figure 19 - Installation WEB Applet - rectifiers tab (typical)

The Rectifiers tab is used to set up the rectifier type to use with the system. There are currently three options:

RPCP/M/RSG (I²C based communications)
RRS/RPCG (I²C based communications)
RBSR (PMBus™ based communications)

Enable DC Voltage walk-in checkbox. This allows the system to slowly raise the system voltage (generated from the rectifiers) in about 30 seconds up to the nominal voltage. This can be useful to limit load on a generator or slowly increase the battery charging current. Note that the rectifiers will operate at their default voltage setting for around 20 seconds before the controller has booted up when a system is first powered up.

X75 supports RSG type rectifiers, so RPCP/M/RSG is set by default. This setting should not be changed.

13.3.9 - Current

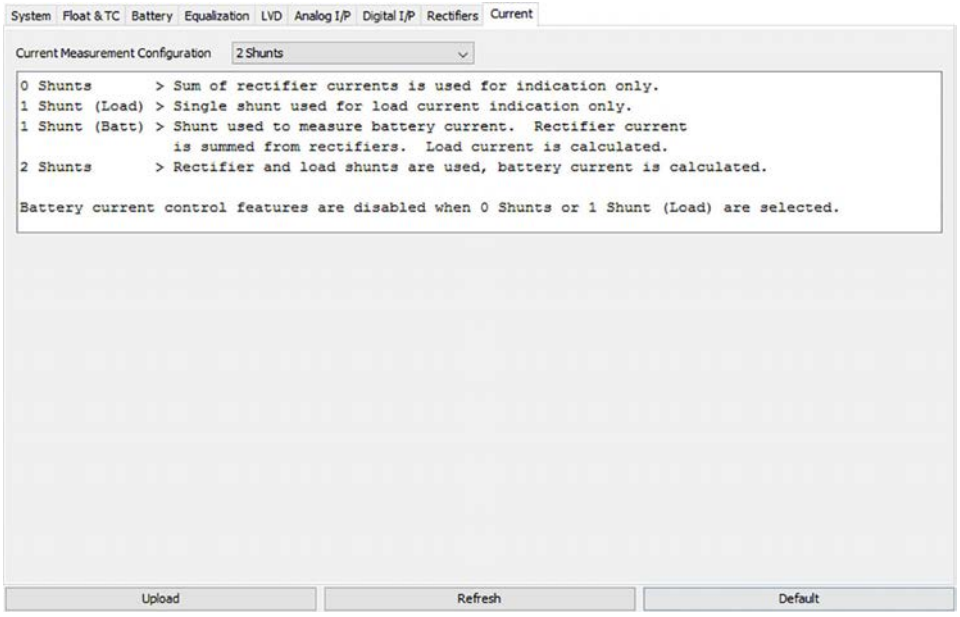


Figure 20 - Installation WEB Applet - shunts tab (typical)

The Current tab allows a system to be configured to use zero, one or two shunts.

X75 uses a 2 shunt configuration and this is set by default. This setting should not be changed.

13.4 Battery Management

The Battery Management page is used to configure, run and review the results of battery testing.

The testing performed verifies that the battery voltage holds up above a specified voltage for the duration of the test.

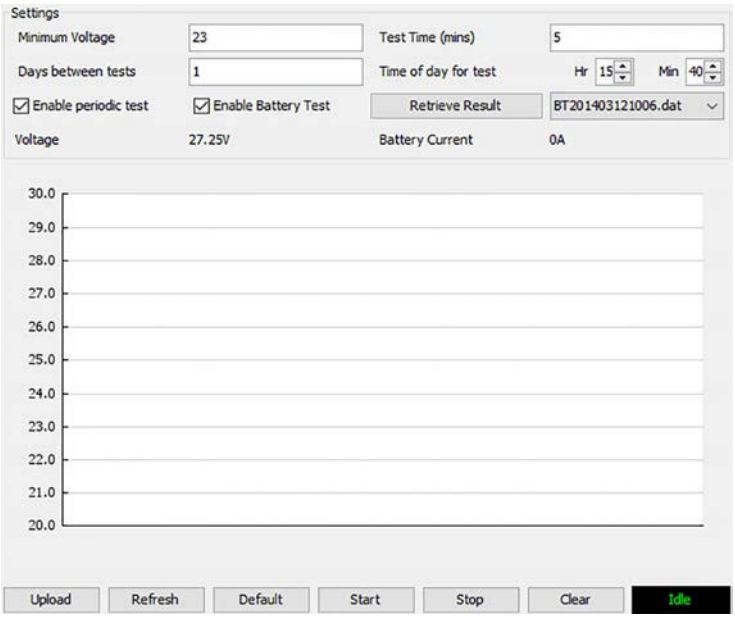


Figure 21 - Battery Management WEB Applet (typical)

The controls are as follows:

Minimum Voltage. This is the voltage that will be applied to the rectifiers for the duration of the test. The battery voltage will be monitored and if it falls to within 2% above the minimum voltage, the test will be terminated and be considered to have failed.

Test Time (mins). The duration that the test should be run for (in minutes).

Days between tests. The number of days between subsequent periodic tests.

Time of day for test. The hour and minute to start the testing. This is usually set to be an off peak time.

Enable periodic Test checkbox. Check this box to enable automatic periodic testing to run.

Enable battery test. Check this box to enable any form of battery testing. This control acts as a lock to prevent inadvertent testing.

Retrieve Result and associated combo-box of result names. To retrieve a battery test result, select the file name in the combo-box. Note that the name has the date and time encoded in it in the format YYYYMMDDhhmm. To retrieve the selected result and display it on the graph press the retrieve result button.

The voltage and battery current labels indicate what the system is doing during the test. The graph area updates in real time during the test.

UPLOAD To upload revised test parameters, click this button. An administrator password is needed.

REFRESH To refresh a displayed graph and the test configuration, click this button.

DEFAULT Click this button this to configure to factory default settings.

START Manually starts a battery test.

STOP Manually stops a battery test.

CLEAR Clears the graph area.

The **IDLE** indicator (green text) changes to TESTING (red text) when a battery test is running.

13.5 Alarm Matrix

When the Alarm Matrix menu item is selected the following two section page will be displayed.

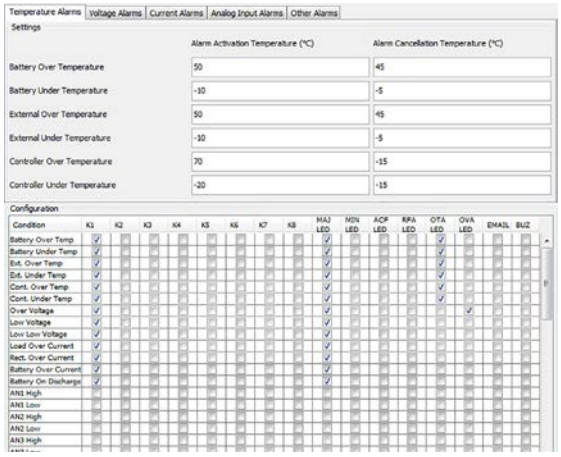


Figure 22 - Alarm Matrix WEB Applet (typical)

The top section presents 5 tabs where limits relating to temperature, voltage, current and minimum number of rectifiers (Other Alarms tab) can be defined. Note that as the X75 has no Analog inputs the Analog Input Alarm tab, while displayed when selected, should be left as default.

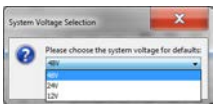
The bottom section is used to route the various alarms to alarm relays, front panel LEDs, Email targets and an audible buzzer. Alarms may be routed to single or multiple destinations by selecting the desired check boxes.

The following applies to all tabs and matrix configuration.

To upload any changes, click on UPLOAD. An administrator level password is required.

To get default values for the parameters, click on DEFAULT. These will not be applied unless UPLOAD is clicked.

When resetting to default it is important that the correct system voltage is selected when asked.



To restore parameters that have been changed and not yet uploaded click on REFRESH.

13.5.1 - Matrix

The below show the full extent of the alarm matrix. Down the left hand side are the different system 'inputs' that may trigger an alarm. Across the top are the various 'outputs' which an alarm may trigger.

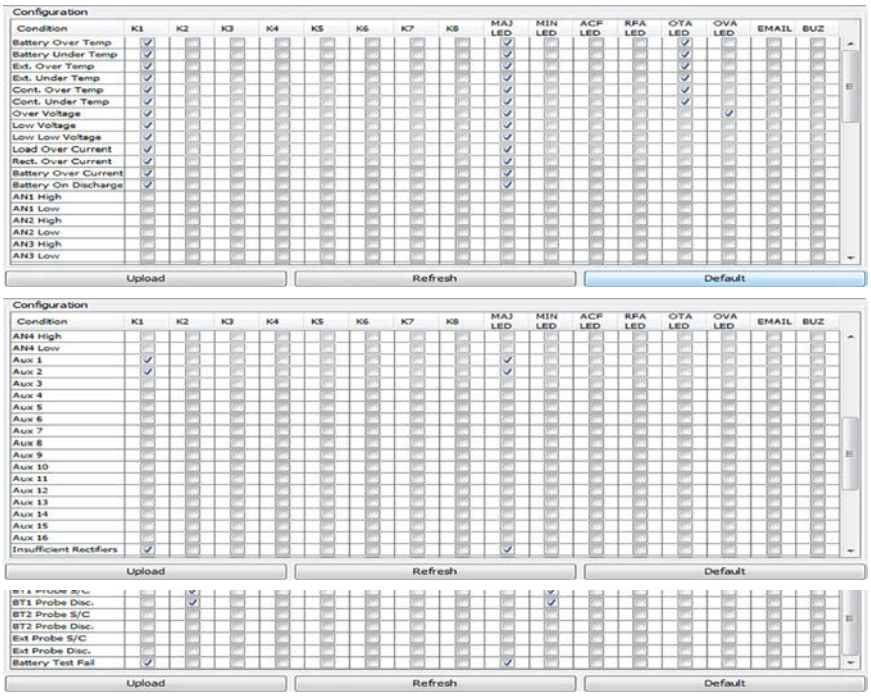


Figure 23 - Alarm Matrix WEB Applet - matrix options (typical)

As stated earlier, X75 does not support all alarm conditions so only those that are supported are listed.

Inputs

Battery Over Temp – An over temperature condition on the battery temperature probe.

Battery Under Temp – An under temperature condition on the battery temperature probe.

Ext. Over Temp – An over temperature condition on the external temperature probe.

Ext. Under Temp – An under temperature condition on the external temperature probe.

Cont. Over Temp – An over temperature condition internal to the controller.

Cont. Under Temp – An under temperature condition internal to the controller.

Over Voltage – The system voltage has exceeded the over voltage threshold.

Low Voltage – The system voltage has fallen below the low voltage threshold.

Low Low Voltage – The system voltage has fallen below the low low voltage threshold.

Load Over Current – The load current has exceeded the load over current threshold.

Rect. Over Current – The rectifier current has exceeded the rectifier over current threshold.

Battery Over Current – The battery current has exceeded the battery over current threshold (either charging or discharging).

Battery On Discharge – The battery current has exceeded the battery on discharge threshold. (Negative battery current).

Aux 1-16 – The digital input in question is in an alarm state (open or closed depending on configuration). The digital input on X75 is connected to Aux 1.

Insufficient Rectifiers – The number of rectifiers detected by the controller has fallen below this threshold.

Rectifier ACF – A rectifier is indicating an AC Failure Alarm.

Rect. Thermal A – A rectifier is indicating a thermal alarm.

Rectifier Fan A – A rectifier is indicating a fan fault.

Single RFA – A single rectifier is indicating an output fault which is making its output drop to less than its PWOK threshold.

Multi RFA – More than one rectifier is indicating an output fault which is making its output drop to less than is PWOK threshold.

Equalize Active – An equalize function has been initiated.

Battery Test Active – A battery test has been initiated.

BT1 Probe S/C – Battery temperature probe has been detected as having a short circuit.

BT1 Probe Disc. – Battery temperature probe has been disconnected.

Ext Probe S/C – External Temperature probe has been detected as having a short circuit.

Ext Probe Disc. – External Temperature probe has been disconnected.

Battery Test Fail – A battery test failed.

Outputs

K1-8 – Dry contact relays with changeover contacts. X75 uses K1-4 only.

MAJ LED – LED indicating a major alarm. This is the red LED on the front panel display.

MIN LED – LED indicating a minor alarm. This is the yellow LED on the front panel display.

ACF LED – LED indicating an AC Failure. This LED is not present on the controller.

RFA LED – LED indicating the failure of one or more rectifiers. This LED is not present on the controller.

OTA LED – LED indicating an out of range temperature condition. This LED is not present on the controller.

OVA LED – LED indicating an over voltage condition. This LED is not present on the controller.

EMAIL – Any alarms connected to this output will generate an alert email message when this facility has been set up (see section 13.6 - Network Settings).

BUZ – Any alarms connected to this output will cause the internal audible alarm to sound.

13.5.2 - Temperature Alarms

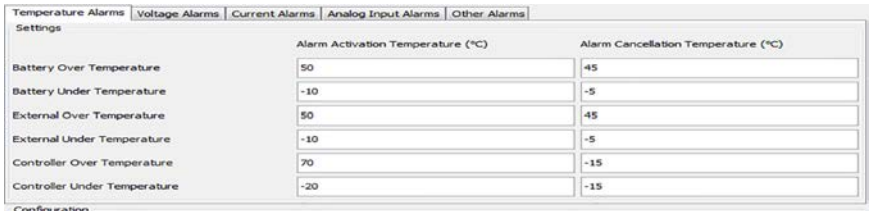


Figure 24 - Alarm Matrix WEB Applet - temperature alarm settings (typical)

Battery Over Temperature – This alarm will be active when the battery temperature exceeds the activation temperature. It will not deactivate until the temperature falls below the cancellation temperature.

Battery Under Temperature – This alarm will be active when the battery temperature falls below the activation temperature. It will not deactivate until the temperature rises above the cancellation temperature.

External Over Temperature – The alarm will be active when the external temperature exceeds the activation temperature. It will not deactivate until the temperature falls below the cancellation temperature.

External Under Temperature – This alarm will be active when the external temperature falls below the activation temperature. It will not deactivate until the temperature rises above the cancellation temperature.

Controller Over Temperature – This alarm will be active when the internal temperature exceeds the activation temperature. It will not deactivate until the temperature falls below the cancellation temperature.

Controller Under Temperature – This alarm will be active when the internal temperature falls below the activation temperature. It will not deactivate until the temperature rises above the cancellation temperature.

13.5.3 - Voltage Alarms

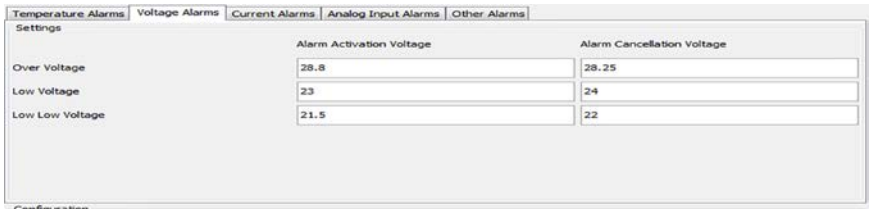


Figure 25 - Alarm Matrix WEB Applet - voltage alarm settings (typical)

Over Voltage – This alarm will activate if the system voltage exceeds this threshold. When the voltage falls below the cancellation threshold the alarm will be canceled.

Low Voltage – This alarm will activate if the system voltage falls below this threshold. When the voltage rises above the cancellation threshold the alarm will be canceled.

Low Low Voltage – This alarm will activate if the system voltage falls below this threshold. When the voltage rises above the cancellation threshold the alarm will be canceled.

13.5.4 - Current Alarms

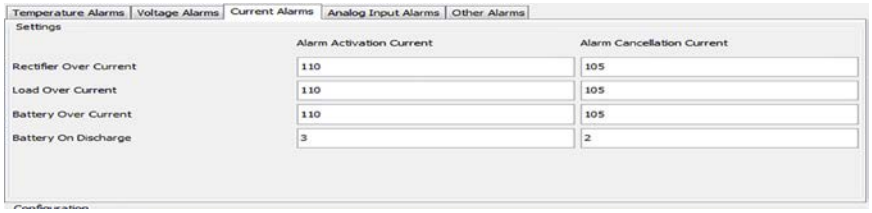


Figure 26 - Alarm Matrix WEB Applet - voltage alarm settings (typical)

Rectifier Over Current – This alarm will activate if the rectifier current rises above this threshold. The alarm will be canceled when the current falls below the cancellation threshold.

Load Over Current – This alarm will activate if the load current rises above this threshold. The alarm will be canceled when the current falls below the cancellation threshold.

Battery Over Current – This alarm will activate if the magnitude of the battery current rises above this threshold. Thus the alarm will activate either during charge or discharge if the threshold is exceeded. The alarm will be canceled when the current falls below the cancellation threshold.

Battery On Discharge – This alarm will activate if the discharge current from the battery rises above this threshold. When the discharge current falls below this level (or the current becomes a charging current) the alarm will be canceled.

13.5.5 - Analog Input Alarms

These are not used in X75.

13.5.6 - Other Alarms

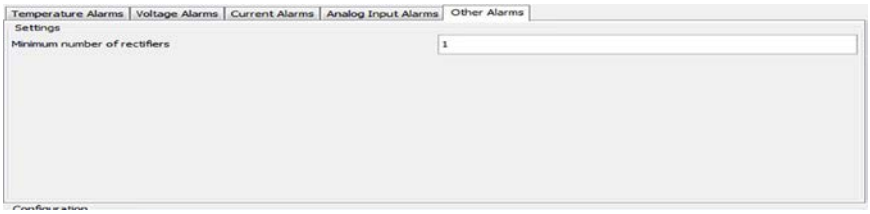


Figure 27 - Alarm Matrix WEB Applet - other alarm settings (typical)

Minimum number of rectifiers – If the number of rectifiers detected in the system falls below this value then an alarm will be activated. If the number of rectifiers increases so that it is equal to or above this value then the alarm will be cleared.

13.6 Network Settings

Clicking on ***Network Settings*** loads to Controller Network Settings page. This page is used to setup the Ethernet and E-Mail communications settings.

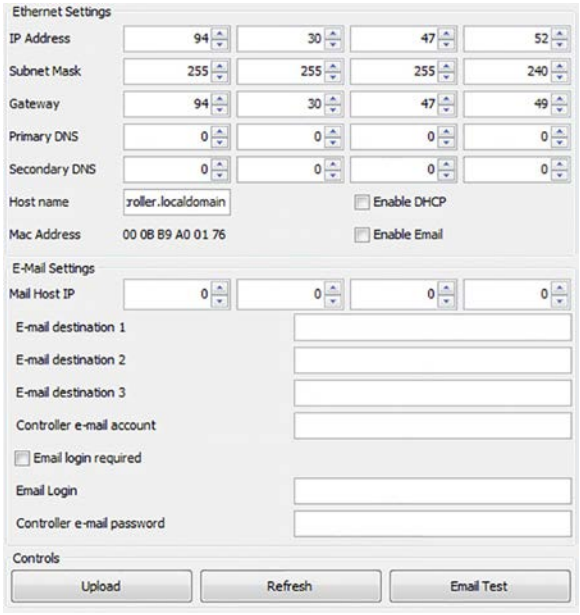


Figure 28 - Network Settings WEB Applet (typical)

13.6.1 - Ethernet settings

The following settings set up the Ethernet interface.

IP Address – Use the spinner controls or directly enter values into the boxes to configure the controller IP address. Default is 192.168.0.200

Subnet Mask – Use the spinner controls or directly enter values into the boxes to configure the controller subnet mask. Default is 255.255.255.0

Gateway IP Address – Use the spinner controls or directly enter values into the boxes to configure the controller Gateway IP address. Default is 0.0.0.0

Primary DNS – Use the spinner controls or directly enter values into the boxes to configure the controller primary DNS. Default is 0.0.0.0

Secondary DNS – Use the spinner controls or directly enter values into the boxes to configure the controller secondary DNS. Default is 0.0.0.0

Host Name – Enter the host name into this box. Default is blank.

Mac address – Displays the MAC address of the controller.

Enable DHCP – If checked, the controller will communicate with a DHCP server to obtain the network settings.

Enable email – If enabled, the controller will send out alert emails. The email function needs to be configured in the email settings section of this applet. Additionally each alarm required to send an email must be configured to do so in the alarm matrix.

13.6.2 Email Settings

Mail Host IP – Set the IP address of the mail server to use.

Email destination (1-3) – Enter a valid email address for the email alerts to be sent to.

Controller email account – This will be the address in the 'from' field of the email alert message.

Email Login Required – Some mail servers require a login in order to send emails. Check this box and then fill in the required fields below.

Email login – The login name for the mail host (if required)

Controller email password – The login password for the mail host (if required)

Once all changes are made, click the UPLOAD button to send the settings to the controller. An administrator password is needed to make the changes.

To refresh the fields with the values from the controller, click the REFRESH button.

To test the email function, click the EMAIL TEST button. This will send a test email to each of the specified destinations. An administrator password is required for this function.

13.7 Alarm Log

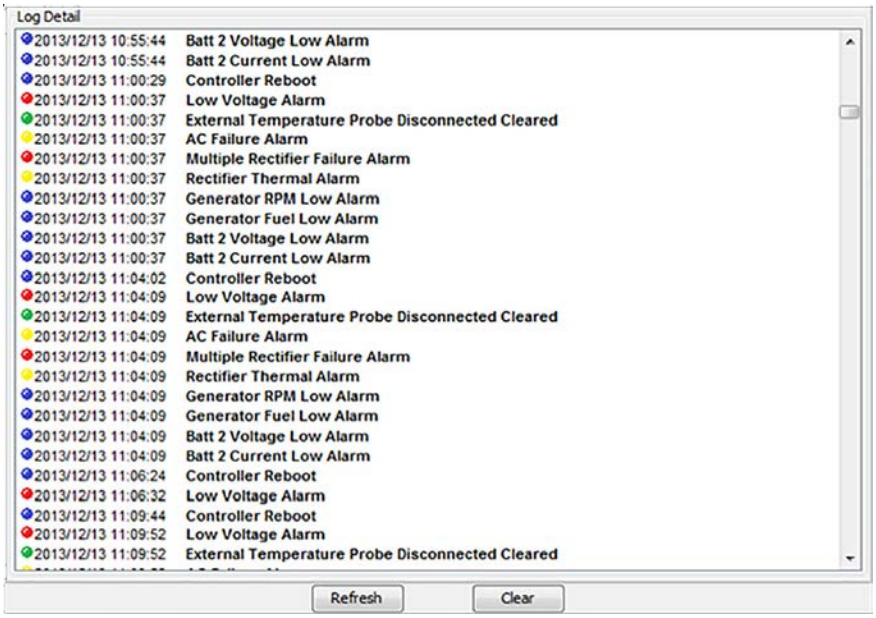


Figure 29 - Alarm Log WEB Applet (typical)

The alarm log page shows details of historical alarms detected by the controller. The colored indicators denote the following alarm levels:

Green – Alarm cleared

Yellow –Minor alarm condition

Red – Major alarm condition

Blue – Alarm condition but not configured as major or minor alarm.

A major or minor condition is configured by the alarm matrix outputs setting the major or minor LEDs. If neither of these are configured for an alarm state but there are other outputs (other LEDs, relays, emails, buzzer) then the indicator in the alarm log will be blue.
Most of the alarm conditions should be self explanatory and are matched to the inputs of the alarm matrix. The alarm log will also show an entry when the controller enters a reboot.

To refresh the display click the REFRESH button. The applet automatically loads the alarm history when it is first run. This takes a couple of seconds to load from the controller.

To clear the alarm log entirely from the controller, click the CLEAR button. This requires an administrator level password.

13.8 Data Log

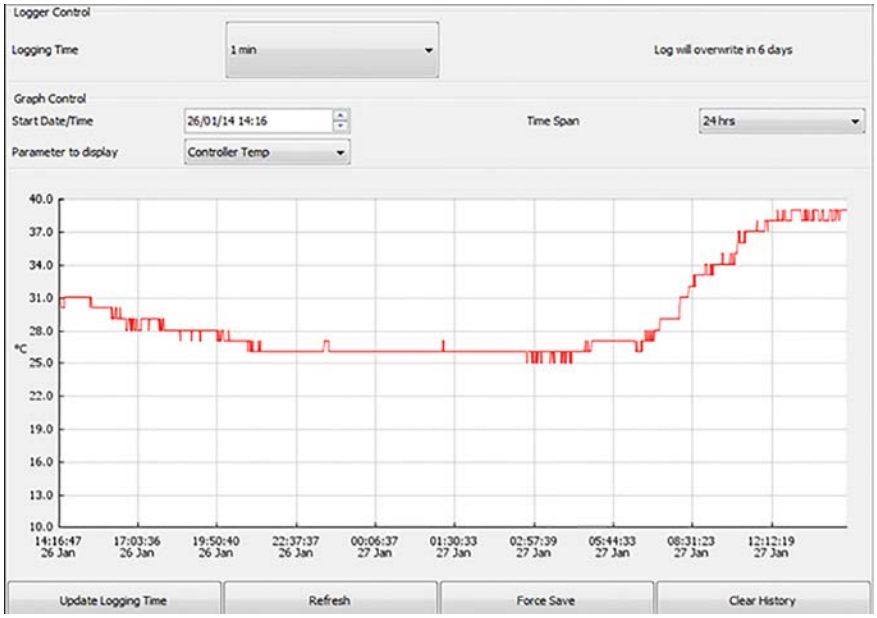


Figure 30 - Data Log WEB Applet (typical)

The controller normally logs data once every 5 minutes (default). It logs the following parameters:

- Voltage
- Rectifier Current
- Load Current
- Battery Current
- Battery Temperature 1
- Battery Temperature 2 (not used on X75)
- External Temperature
- Controller Temperature
- Number of rectifiers
- Analog 1-4 (not used on X75)
- Digital inputs (only digital input 1 is used on X75)
- Free RAM.

The log is able to hold 8640 records which allows for 30 days of continuous data recording at 5 minute intervals.

The logging time can be adjusted to suit the application. The choices are: 1 minute, 5 minutes, 10 minutes, 30 minutes or 1 hour. This can be adjusted using the Logging Time combo-box at the top of the applet. To send the updated selection to the controller click the UPDATE LOGGING TIME button at the bottom. An

administrator password is necessary for this change.
The label on the top right will update to show how long the log will run before beginning to overwrite the earliest entry.

To display stored data, choose the start date/time of the period of interest using the date spinner box (upper left in the graph control section). Then select a time span from the upper right (choices are 1hr, 12 hrs, 24hr, 7 days, 30 days).

Next choose which parameter you would like to examine using the parameter combo-box.

Finally, to display the data, click the REFRESH button at the bottom. This will also load the latest data from the controller at this time. If no data is available the graph will be blank.

The data in the controller is only saved to permanent memory once every hour. This is because the permanent store is based on flash memory. Saving more often would shorten the flash memory's life, particularly for the more frequent logging times.

This means that under some circumstances (e.g. loss of power) recent data can be lost as it is only in volatile memory. To force a save of the data to the permanent store, click the FORCE SAVE button.

The controller will take steps to save data if it is aware of a pending power down. It will also save the data in the permanent store before it opens the LVD, which is the most common way that the controller will lose power.

A log entry always overwrites the oldest data.

The controller scans the data log at start up to work out the correct place in the log to start writing.

If desired the data log can be completely erased. This might be useful after commissioning or testing where the data is no longer needed. This can be accomplished by clicking the CLEAR HISTORY button.

Log data is stored in 10 files in the file system in the html directory. The files are named dataLogN.dat where N is a digit from 0 to 9. These files can be retrieved using FTP. It is not recommended to delete these files using FTP. The file is formatted in 32 byte blocks. The format of each block is as follows:

Parameter	Size (bytes)	Format	Range
Time stamp	8	Long integer	Milliseconds since midnight, 1st Jan 1970
Voltage	2	Short integer	-327.68V to +327.68V stored as 1/100ths of a volt
Rectifier Current	2	Short integer	-32768A to +32768A (Systems will only report positive currents)
Load Current	2	Short integer	-32768A to +32768A (Systems will only report positive currents)
Battery current	2	Short integer	-32768A to +32768A
Battery Temperature 1	1	Byte	-127 to +128°C
Battery Temperature 2	1	Byte	-127 to +128°C
External Temperature	1	Byte	-127 to +128°C
Controller Temperature	1	Byte	-127 to +128°C
Number of rectifiers	1	Byte	0 to 128
Analog 1	2	Short Integer	-32768 to +32768
Analog 2	2	Short Integer	-32768 to +32768
Analog 3	2	Short Integer	-32768 to +32768
Analog 4	2	Short Integer	-32768 to +32768
Digital Inputs 1 - 8	1	Byte	0=ON, 1=OFF for each digital input position.*
Digital Inputs 9-16	1	Byte	0=ON, 1=OFF for each digital input position. *
Free RAM	1	Byte	Free RAM in 100kB *

*These parameters are not displayable on the data log applet.

13.9 Change Password

The three password levels are FACTORY, ADMIN and USER. FACTORY is reserved for UNIPOWER use. USER provides access certain parameter updates while ADMIN provides access to all parameter updates with the exception of those related to factory setup.

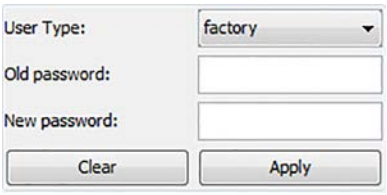


Figure 31 - Change Password WEB Applet

To change a password select the user level to change (ADMIN or USER).

Enter the current password into the OLD PASSWORD field and the new desired new password in the NEW PASSWORD field and then click on APPLY to save the new password.

If the wrong password is entered in the OLD PASSWORD field then the following will be displayed.

If the change is carried out successfully, the following will be displayed.

The factory default passwords for the ADMIN and USER levels are as follows:

Admin:	9876
User:	1234

13.10 Help & About

Clicking on ***Help*** will display a link to the controller manual on the UNIPOWER web site.

Figure 32 - Help WEB Page

Clicking on ***About*** will display various inventory information, total and free RAM and flash memory and the time the system has been powered up since the last boot.

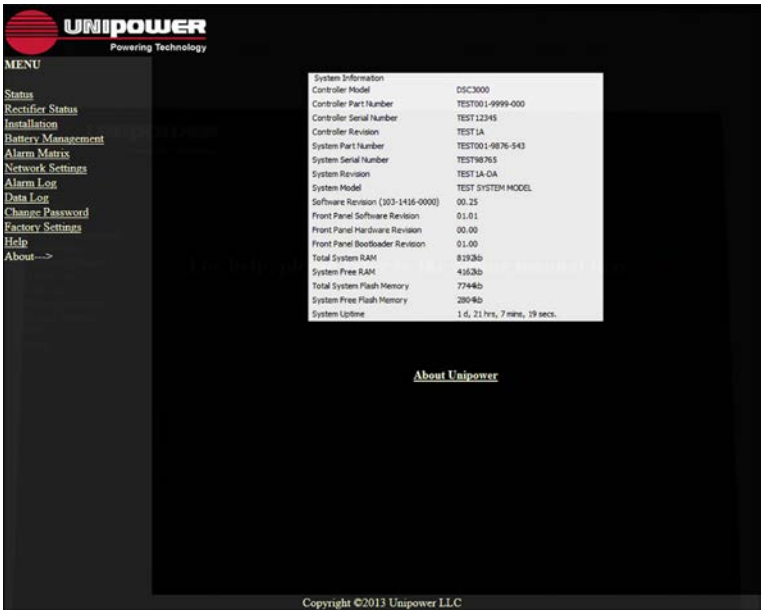


Figure 33 - About WEB Page (typical)

Appendix 1 – SNMPv3 MIB Information

The SNMP feature provides status read-out and alarm trapping only. All parameters described in this appendix are therefore read-only.

Parameters for X75 Remote Access Controller MIB are organized into groups and are briefly described as follows. For complete details please view the MIB in a text viewed such as Windows Notepad.

1. Logic Groups - Number of rectifiers, Alarm State Table, Digital Input State Table, Relay Output State Table, LED Output State Table, LVD Output State Table.

Parameter Name	Function
numberOfRectifiers	The number of rectifiers that are detected as being present.
kx (x = 1 to 8)	Relay Kx is OFF (0) or ON (1). [1-4 only in X75]
majLED	Major Alarm LED is OFF (0) or ON (1).
minLED	Minor Alarm LED is OFF (0) or ON (1).
acfLED	AC Fail LED is OFF (0) or ON (1).
rfaLED	Rectifier Failure LED is OFF (0) or ON (1).
otaLED	Over temperature alarm LED is OFF (0) or ON (1).
lvdx (x = 1 or 2)	Driver for LVDx is OFF (0) or ON (1). [1 only in X75]
buzzer	Alarm sounder is OFF (0) or ON (1).
batteryOTA	Battery over temperature alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
batteryUTA	Battery under temperature alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
externalOTA	External over temperature alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
externalUTA	External under temperature alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
controllerOTA	Controller over temperature alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
controllerUTA	Controller under temperature alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
overVoltageAlarm	Over voltage alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
lowVoltageAlarm	Low voltage alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
lowlowVoltageAlarm	Low low voltage alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.

Parameter Name	Function
rectifierOCA	Rectifier over current alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
loadOCA	Load over current alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
batteryOCA	Battery over current alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
batteryODA	Battery on discharge alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
digitalAlarmx (x = 1 to 16)	Digital input x alarm. [1 only in X75] (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
nRectAlarm	Insufficient rectifiers alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
acfAlarm	AC Failure alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
rectThermalAlarm	Rectifier thermal alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
rectFanAlarm	Rectifier fan alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
singleRFA	Single rectifier failure alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
multiRFA	Multiple rectifier failure alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
eqAlarm	Equalization active alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
bTestAlarm	Battery test active alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
bProbexDisAlarm (x = 1 or 2)	Battery temperature probe x disconnected alarm. [1 only in X75] (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
bProbexShortAlarm (x = 1 or 2)	Battery temperature probe x shorted alarm. [1 only in X75] (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
extProbeDisAlarm	External temperature probe disconnected alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
extProbeShortAlarm	External temperature probe shorted alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
bTestFailAlarm	Battery test failure alarm. (0) CLEAR, (1) OTHER, (2) MINOR, (3) MAJOR.
digitalInputx (x = 1 to 16)	Digital input is Closed (0) or Open (1). [1 only in X75]

2. Measurement Groups - Voltage, Current, Temperature

Parameter Name	Function
busVoltage	Live bus voltage.
rectifierCurrent	Live rectifier current.
loadCurrent	Live load current.
batteryCurrent	Live battery current.
batteryTemperaturex (x = 1 or 2)	Live battery x temperature. [1 only in X75]
externalTemperature	Live external temperature.
controllerTemperature	Live controller temperature.
analogx (x = 1 to 4)	Live controller analog input x. [not used in X75]

3. Configuration Groups - All settings

Parameter Name	Function
floatVoltage	Battery float voltage level setting.
temperatureCompensationSlope	Battery voltage temperature compensation setting.
temperatureCompensationMaximumTemperature	Battery voltage compensation maximum temperature setting.
temperatureCompensationMinimumTemperature	Battery voltage compensation minimum temperature setting.
temperatureCompensationEnabled	Battery temperature compensation status. ENABLED (1) or DISABLED (0)
numberOfCells	Number of cells in a battery string.
systemVoltage	Nominal system voltage. Values 12, 24 or 48.
numberOfStrings	Number of battery strings. [1 only in X75]
stringCapacity	Capacity of one battery string.
totalCapacity	Capacity of all battery strings. [same as stringCapacity in X75]
chargeLimit	Battery charge current limit.
chargeLimitEnabled	Battery charge current limiting status. ENABLED (1) or DISABLED (0)
equalizeVoltage	Battery equalize/boost charge voltage level setting.
equalizeRunTime	Time in minutes to run the system voltage at the equalize/boost level.
equalizePeriod	Number of days between scheduled equalizations.
equalizeTimerHours	Hour of the day that scheduled equalization will start. (Combined with equalizeTimerMinutes).
equalizeTimerMinutes	Minute of the hour (see equalizeTimerHours) that scheduled equalization will start.

Parameter Name	Function
equalizeCurrentLimit	Current above which equalization/boosting will be terminated.
equalizeEnabled	Equalize status. ENABLED (1) or DISABLED (0)
equalizeAfterChargeEnabled	Equalize extension after bulk charge status. ENABLED (1) or DISABLED (0)
periodicEqualizeEnabled	Periodic automatic equalization status. ENABLED (1) or DISABLED (0)
lvdxOn (x = 1 or 2)	Voltage at which LVDx will turn on. [1 only in X75]
lvdxOff (x = 1 or 2)	Voltage at which LVDx will turn off. [1 only in X75]
lvdxLatchOffEnable (x = 1 or 2)	LVDx latch off if a battery over temperature condition occurs status. ENABLED (1) or DISABLED (0)
lvdxMode (x = 1 or 2)	LVDx mode. AUTO (0), ON (1), OFF(2).
analogxName (x = 1 to 4)	Name given to analog input x. [not used in X75]
analogxScale (x = 1 to 4)	Scaling factor for analog input x. [not used in X75]
analogxUnits (x = 1 to 4)	Units for analog input x. [not used in X75]
digitalxName (x = 1 to 16)	Name given to digital input x. [1 only in X75]
digitalxAlarm (x = 1 to 16)	Alarm status for the digital input x. [1 only in X75] Alarm On Open (0), Alarm On Close (1).
rectifierType	Type of rectifiers installed in the system. [I2C in X75] PMBus (0), I2C (1), CAN(2).
dcWalkinEnabled	DC walkin status. DISABLED (0), ENABLED (1).
batteryOTAOn	Temperature at which Battery Over Temperature Alarm activates.
batteryOTAOff	Temperature at which Battery Over Temperature Alarm clears.
batteryUTAOn	Temperature at which Battery Under Temperature Alarm activates.
batteryUTAOff	Temperature at which Battery Under Temperature Alarm clears.
externalOTAOn	Temperature at which External Over Temperature Alarm activates.
externalOTAOff	Temperature at which External Over Temperature Alarm clears.

Parameter Name	Function
externalUTAOn	Temperature at which External Under Temperature Alarm activates.
externalUTAOff	Temperature at which External Under Temperature Alarm clears.
controllerOTAOn	Temperature at which Controller Over Temperature Alarm activates.
controllerOTAOff	Temperature at which Controller Over Temperature Alarm clears.
controllerUTAOn	Temperature at which Controller Under Temperature Alarm activates.
controllerUTAOff	Temperature at which Controller Under Temperature Alarm clears.
overVoltageOn	Voltage at which Over Voltage Alarm activates.
overVoltageOff	Voltage at which Over Voltage Alarm clears.
lowVoltageOn	Voltage at which Low Voltage Alarm activates.
lowVoltageOff	Voltage at which Low Voltage Alarm clears.
lowLowVoltageOn	Voltage at which Low Low Voltage Alarm activates.
lowLowVoltageOff	Voltage at which Low Low Voltage Alarm clears.
rectOverCurrentOn	Current at which Rectifier Over Current Alarm activates.
rectOverCurrentOff	Current at which Rectifier Over Current Alarm clears.
loadOverCurrentOn	Current at which Load Over Current Alarm activates.
loadOverCurrentOff	Current at which Load Over Current Alarm clears.
battOverCurrentOn	Current at which Battery Over Current Alarm activates.
battOverCurrentOff	Current at which Battery Over Current Alarm clears.
battOnDischargeOn	Current at which Battery On Discharge Alarm activates.
battOnDischargeOff	Current at which Battery On Discharge Alarm clears.
anxHighOn (x = 1 to 4)	Level at which ANx High Alarm activates. [not used in X75]
anxHighOff (x = 1 to 4)	Level at which ANx High Alarm clears. [not used in X75]
anxLowOn (x = 1 to 4)	Level at which ANx Low Alarm activates. [not used in X75]
anxLowOff (x = 1 to 4)	Level at which ANx Low Alarm clears. [not used in X75]
minimumRectifiers	Activated if number of rectifiers detected is less than this value.

4. Controller - Identity, System, Compliance

Parameter Name	Function
controllerPartNumber	Controller part number.
controllerSerialNumber	Controller serial number.
controllerRevision	Controller revision level.
systemPartNumber	System part number.
systemModelNumber	System model number.
systemRevision	System revision level.
systemSerialNumber	System serial number.
controllerFreeRAM	Amount of free RAM in the controller.
controllerFreeFlash	Amount of free Flash Memory in the controller
controllerTotalRAM	Total amount of RAM fitted in the controller.
controllerTotalFlash	Total amount of flash memory fitted in the controller.
controllerState	Status of the main program running in the Java Virtual Machine. 0=Stopped, 1=Starting, 2=Running, 3=Failed.
controllerReboot	Writing a 1 to this register will reboot the controller.
mibCompliance	Compliance statement for the UNIPOWER Controller 2 agent that implements this enterprise MIB module.
mibGroup	Objects in this enterprise MIB module for the UNIPOWER Controller 2.

5. Traps

Parameter Name	Function
batteryOTATrapOn	One of the battery temperatures has exceeded the battery over temperature ON threshold. [1 only in X75]
batteryOTATrapOff	One of the battery temperatures has fallen below the battery over temperature OFF threshold. [1 only in X75]
batteryUTATrapOn	One of the battery temperatures has fallen below the battery under temperature ON threshold. [1 only in X75]
batteryUTATrapOff	One of the battery temperatures has exceeded the battery under temperature OFF threshold. [1 only in X75]
externalOTATrapOn	The external temperature has exceeded the external over temperature ON threshold.
externalOTATrapOff	The external temperature has fallen below the external over temperature OFF threshold.
externalUTATrapOn	The external temperature has fallen below the external under temperature ON threshold.

Parameter Name	Function
externalUTATrapOff	The external temperature has exceeded the external under temperature OFF threshold.
controllerOTATrapOn	The controller internal temperature has exceeded the controller over temperature ON threshold.
controllerOTATrapOff	The controller internal temperature has fallen below the controller over temperature OFF threshold.
controllerUTATrapOn	The controller internal temperature has fallen below the controller under temperature ON threshold.
controllerUTATrapOff	The controller internal temperature has exceeded the controller under temperature OFF threshold.
overVoltageTrapOn	The system voltage has exceeded the overvoltage ON threshold.
overVoltageTrapOff	The system voltage has fallen below the overvoltage OFF threshold.
lowVoltageTrapOn	The system voltage has fallen below the low voltage ON threshold.
lowVoltageTrapOff	The system voltage has exceeded the low voltage OFF threshold.
lowLowVoltageTrapOn	The system voltage has fallen below the low low voltage ON threshold.
lowLowVoltageTrapOff	The system voltage has exceeded the low low voltage OFF threshold.
rectOverCurrentTrapOn	The rectifier current has exceeded the rectifier over current ON threshold.
rectOverCurrentTrapOff	The rectifier current has fallen below the rectifier over current OFF threshold.
loadOverCurrentTrapOn	The load current has exceeded the load over current ON threshold.
loadOverCurrentTrapOff	The load current has fallen below the load over current OFF threshold.
battOverCurrentTrapOn	The battery current has exceeded the battery over current ON threshold. This could be either charging or discharging.
battOverCurrentTrapOff	The battery current has fallen below the battery over current OFF threshold. This could be either charging or discharging.
battOnDischargeTrapOn	The battery discharge current has exceeded the battery on discharge ON threshold.
battOnDischargeTrapOff	The battery discharge current has fallen below the battery on discharge OFF threshold.
anxHighTrapOn	The analog x input signal has exceeded the analog x high ON threshold. [not used in X75]
anxHighTrapOff	The analog x input signal has fallen below the analog x high OFF threshold. [not used in X75]
anxLowTrapOn	The analog x input signal has fallen below the analog x low ON threshold. [not used in X75]
anxLowTrapOff	The analog x input signal has exceeded the analog x low OFF threshold. [not used in X75]

Parameter Name	Function
digitalxTrapOn	Digital Input x is in an alarm state. [1 only in X75]
digitalxTrapOff	Digital Input x alarm has cleared. [1 only in X75]
nRectTrapOn	There are insufficient rectifiers in the system.
nRectTrapOff	There are sufficient rectifiers in the system.
acfTrapOn	An AC Failure has been detected.
acfTrapOff	An AC Failure alarm has cleared.
rectTHATrapOn	A Rectifier Thermal Alarm has been detected.
rectTHATrapOff	A Rectifier Thermal Alarm has cleared.
rectFANTrapOn	A Rectifier Fan Failure Alarm has been detected.
rectFANTrapOff	A Rectifier Fan Failure Alarm has cleared.
singleRFATrapOn	A single rectifier failure alarm has been detected.
singleRFATrapOff	A single rectifier failure alarm has cleared.
multiRFATrapOn	A multiple rectifier failure alarm has been detected.
multiRFATrapOff	A multiple rectifier failure alarm has cleared.
eqTrapOn	An equalization has been activated.
eqTrapOff	An equalization has stopped.
bTestTrapOn	A battery test has been activated.
bTestTrapOff	A battery test has ended.
bProbexDisTrapOn	Battery Temperature Probe x has been disconnected. [1 only in X75]
bProbexDisTrapOff	Battery Temperature Probe x has been reconnected. [1 only in X75]
bProbexShortTrapOn	Battery Temperature Probe x has become shorted. [1 only in X75]
bProbexShortTrapOff	Battery Temperature Probe x is no longer shorted. [1 only in X75]
eProbeDisTrapOn	External Temperature Probe has been disconnected.
eProbeDisTrapOff	External Temperature Probe has been reconnected.
eProbeShortTrapOn	External Temperature Probe has become shorted.
eProbeShortTrapOff	External Temperature Probe is no longer shorted.
battTestFailTrapOn	A battery test has failed.
battTestFailTrapOff	A battery test failure alarm has been cleared.
coldStart	The SNMP agent has restarted.

The X75 will issue a trap for any of the conditions mentioned above.

To obtain a copy of the latest X75 MIB download it from:

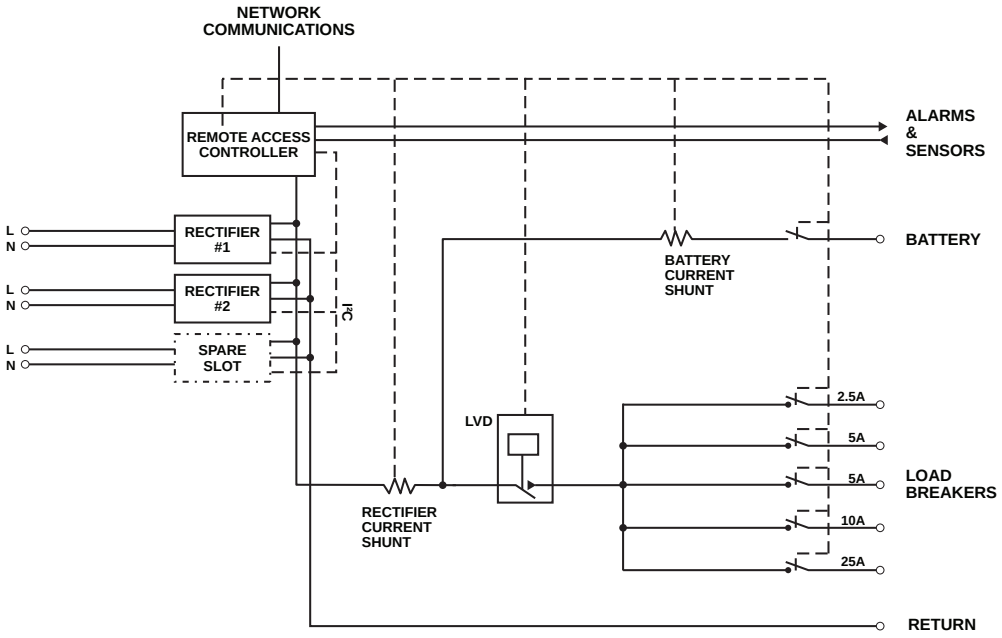
http://unipowerco.com/MIB_files/Unipower-Controller2-MIB.txt

Configuring a trap destination in the controller using the iReasoning MIBBrowser.

1. In the SNMP tree on the left, go to snmpV2>snmpTargetMIB>snmpTargetAddrTable.
2. Right click this entry and choose table view.
3. Use Create Row to create a new entry. Up to 4 entries are allowed.
4. Give the entry a name in the snmpTargetAddrName e.g. ‘test’
5. Fill in the snmpTargetAddrTDomain: ‘.1.3.6.1.6.1.1’
6. Fill in the required target IP address.
   THIS MUST BE DONE IN THE CORRECT FORMAT OR IT WILL NOT WORK.
   Example:
   We want to use 192.168.3.40.
   We put in ‘0xC0 0xA8 0x03 0x28 0x00 0xA2’
7. Fill in the snmpTargetAddrTimeout. Usually 1500 is a good value.
8. Fill in the snmpTargetAddrRetryCount. Usually 3 is a good value.
9. Fill in the snmpTargetAddrTagList. Example group-v2.
10. Fill in the snmpTargetAddrParams. Example v2-params. (This is another table that specifies what parameters are sent with a trap).
11. Fill in the snmpTargetAddrStorageType. This is 2.
12. Press OK. A message ‘SET succeeded’ should appear. The entry should be added to the table. Traps will now be sent to this destination with the configuration required.

Appendix 2 – Load LVD (special order)

This appendix replaces section 7 on page 10 of this manual



A 85-264VAC is supplied directly to each of the rectifiers which produce a nominal +12VDC output.

B Following a current shunt to measure the rectifier current, the rectifier DC output is fed to the battery terminals via a current battery current shunt and a 100A circuit breaker.

C The rectifier DC output is also fed to the loads via the LVD (Low Voltage Disconnect, and 5 circuit breakers.

D The management unit monitors and controls the rectifiers via an I²C interface and also checks the status of the DC load and battery breakers.

E The management unit monitors external sensors and provides alarms.

F This unit incorporates an external temperature shutdown feature which is enabled on the controller site installation web page (see section 13.4).

If the temperature at the external temperature sense point goes below -10°C or above +65°C a shutdown sequence is initiated. Once the external temperature returns to within these limits the system initiates an automatic restart sequence.

Appendix 3 – Revision History

Rev. #	Date	Detail	Page
11	08/15	First Release Mk3 version	

This document is believed to be correct at time of publication and UNIPOWER LLC accepts no responsibility for consequences from printing errors or inaccuracies. Specifications are subject to change without notice.