

DELTA POWER SYSTEM



User manual



ES48/22-HFT Series System IOM

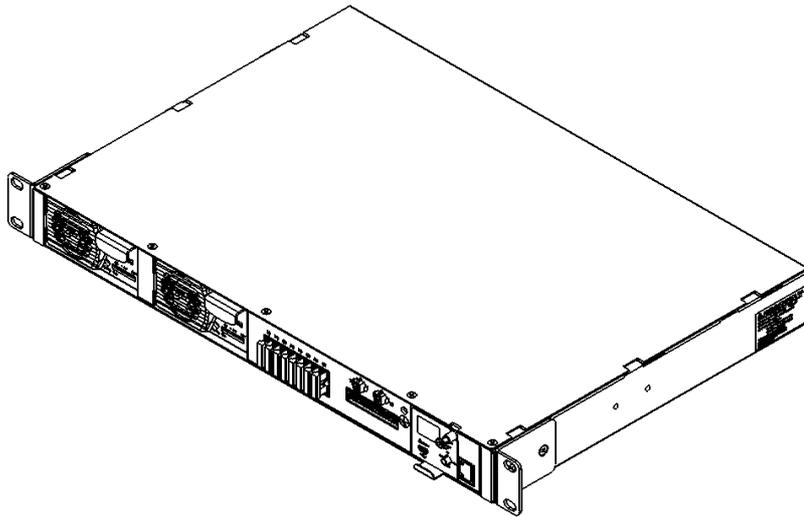




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1 GENERAL

1.1 Using This Manual

This manual contains specifications and instructions to properly install and maintain the power system. Component specifications and drawings are contained in this manual.

Included in this manual is the operation and maintenance of the Alarm Control Unit (ACU), DPR-600 Switch Mode Rectifier (SMR), DC Distribution Shelf, and Low Voltage Disconnect Switch (LVDS), system status and alarms, troubleshooting and system maintenance.

Step by step procedures required for installation and turn-up are detailed. All equipment parameter settings, adjustments and confirmation as well as system monitoring, operations and maintenance procedures are included.

Warnings are printed in bold lettering and alert the installation or maintenance craftsman of a potential hazard to either or the craftsman if the warning advisement is not followed.

1.2 Safety Notice

Products are not liable for any hazards incurred by not following proper safety procedures. Installation, Operation and maintenance personnel should always follow these safety rules:

1. Caution - Do not install or remove any SMR with the AC Breaker On. The AC Breakers must be switched to the off position prior to inserting a module into a shelf.
2. Before the shelf is operational, the AC input frequency and voltage must be verified, AC break rating and type is adequate, and other environmental conditions as noted in the specifications are met.
3. The shelf has passed stringent system testing prior to shipment. To avoid electrical shock, the DPR-600 shelf requires a single ground point permanently connected to earth ground.
4. An AC Breaker must provide adequate isolation between the shelf input and Commercial AC Main.
5. The environment should be dust free and controlled by an air condition system. The area must be free of any flammable vapors or fluids.
6. To avoid electrical hazard, the covers must not be removed on any component including the ACU and Rectifier.
7. Circuit breakers must be replaced with approved replacement circuit breakers meeting the original design specification.
8. All AC connections must be made per the latest issue of the National Electrical Code and must also conform to all local codes.
9. For ventilation and maintenance purpose, remain enough space when installation.
Recommended space:

Front: 12 inch

Rear: 12 inch

1.3 Environmental

1. Input Voltage: 220V, single phase 3 wires
2. Input Frequency: 50/60 Hz $\pm 5\%$
3. Operating Temperature: $-25^{\circ}\text{C}\sim+65^{\circ}\text{C}$ ($-13^{\circ}\text{F}\sim+149^{\circ}\text{F}$)
 - $-25^{\circ}\text{C}\sim+55^{\circ}\text{C}$: 100% Load Output
 - $55^{\circ}\text{C}\sim+65^{\circ}\text{C}$: De-rating, 100%~70% Load Output
4. Humidity: 10 ~ 95% RH (non-Condensing)
5. Floor Load Density: 600 Kg/M²



2 PRODUCT DESCRIPTION

2.1 Product Description

The DPR-600 Power shelf consists of modular DPR-600 rectifiers, a Alarm Control Unit (ACU) and a DC Distribution shelf. Up to 2 rectifiers can be equipped in a shelf (22A), which can mount an ACU. The shelf requires a nominal input of 220 Vac (single phase) and provide an output of -54 VDC to power the load and also maintain fully charged batteries.

2.2 Product Main Features

- -54 VDC/22A Output
- Hot Swappable 600 Watts rectifiers, wide range PFC input (90~275Vac good for unstable utility environment)
- Light Weight Plug-in Modules for Simple Installation and Maintenance
- High Power Density Saves Valuable Floor space
- All rectifier modules are front accessible
- Active Power Factor Correction (> .99 PF)
- High efficiency, > 91.5%
- Temperature compensation float voltage control for VRLA batteries from Control Supervisory Unit 502 LCD version (CSU502+)
- Front Access for Simplified Operation and Maintenance
- Intelligent Remote Monitoring and Control (Remote Monitoring System) for Centralized
- Battery temperature compensation voltage control
- Battery and Load breakers
- Equalize charge timer
- Safety: CE mark

2.3 Configuration

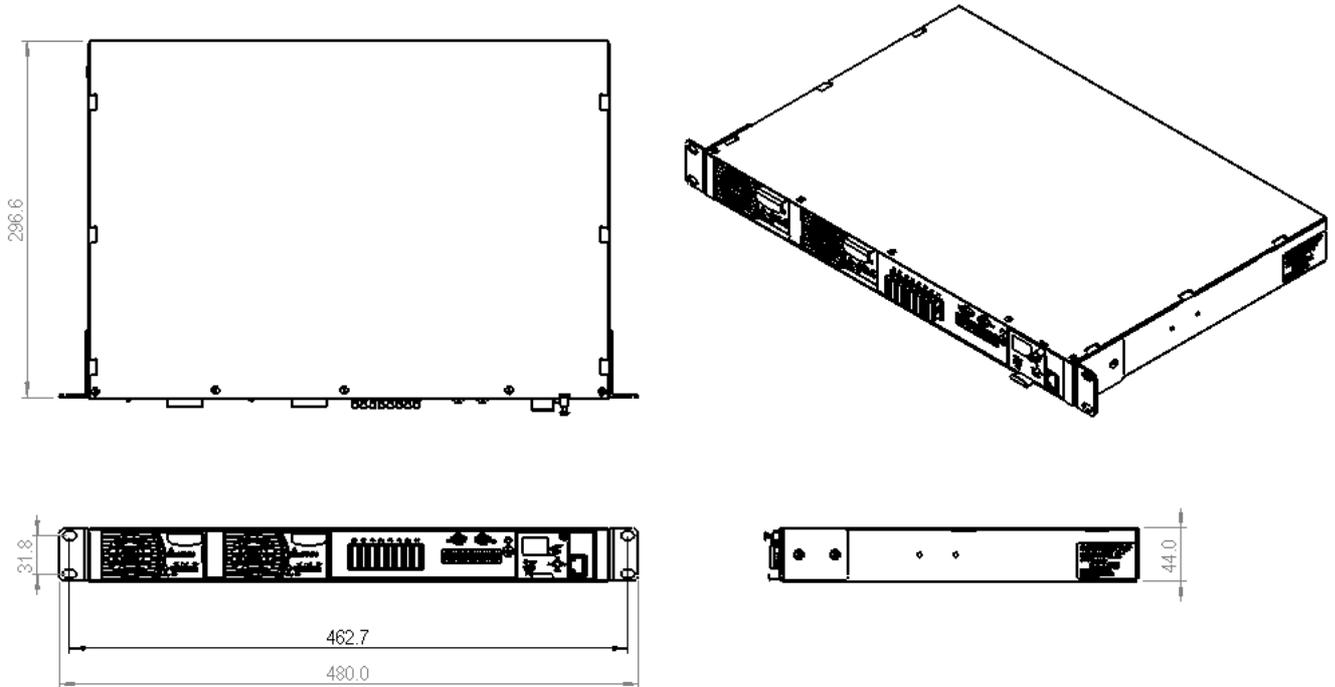
AC Input:	220V, single phase 3 wires
System Capacity:	-54VDC/22A Max.
Rectifier:	-54/600W * 2 Max.
ACU :	Delta Alarm Control Unit (ACU)



2.4 System General Specification

Item	Specification/Function
AC Input	220V, Single Phase
System Capacity vs AC Input	1,200W @ 185~276Vac (with 2 rectifiers @ -25~65°C)
System Capacity vs Operating Temperature	1,200W @ -20~65°C (with 2 rectifiers @ 185~276Vac)
Rectifier (54V/11A)	600W / fixed
Shelf (54V/22A)	600W x 2 fixed
Communication	Analogue for each rectifier and control unit
Operating Temperature	-25°C~+65°C (-13°F~+149°F)
Storage Temperature	-25°C ~+65°C (-13°F~+149°F)
Humidity	0~95% Relative Humidity, Non-Condensing
Altitude	< 4000m above mean sea level 2000 m - 3000 m: 1% power derating per 100m. At 3000m altitude, the output power can be 90% of the nominal power rating at maximum temperature. 3000 m - 4000 m: 2% power derating per 100m. At 4000m altitude, the output power can be 70% of the nominal power rating at maximum temperature.
Acoustic	55 dB @ 1 meter, Ambient temperature 25°C at full load

2.5 System Outlook & Dimensions



Item	Specification/Function
Shelf Dimensions (WxDxH)	433 x 296.6 x 44 mm /17.04 x11.7 x1.73inch

3 INSTALLATION

3.1 Tools Required

The following tools are recommended for the DPR-600 installation:

- Phillips No. 3 screw driver
- Insulated slotted screw driver - blade size 1/4"
- Insulated slotted screw driver - blade size 1/8"
- Tweaker - Slotted screw driver blade size .09"x .02"
- Insulated side cutters
- Metric Socket Wrenches with Extensions

3.2 Preliminary Inspection

Prior to removing the system from the crate, note any damage to the crate. Remove the shelf from the crate and inspect the shelf for any dents or damage. If any damage is noted, contact the carrier immediately.

3.3 System Mounting

The shelf comes fully assembled with the DC Distribution Shelf, rectifiers mounted in a 19" shelf. The AC connections from the AC switch to the rectifier shelf are made at the factory. All CSU communication and signal leads are connected via the modular plugs and communicate with the rectifiers.

Mount the shelf with a distance no less than 12 inches from the rear of the rectifier shelf to a wall. This will provide adequate ventilation for the rectifiers. The front of the shelf should be clear of all obstruction and allow room for proper ventilation, installation and maintenance. The shelf should be mounted to the superstructure and floor per customer provided equipment engineering drawings.

3.4 Module Installation

In order to minimize the weight of system, all rectifier modules can be removed from the shelf and re-installed.

3.4.1 Rectifier Installation

- 1) Install the rectifier modules into the shelf

Warning! Do not force the module into the slot. If it does not slide in and connect easily, remove and re-seat the unit.

- 2) Push the locker to lock position to lock the rectifier.

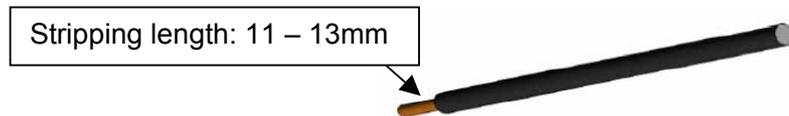
3.5 System Wiring

The shelf comes fully assembled and all the connections are made at the factory. There is no internal, shelf or module wiring required.

3.5.1 Wiring Tooling & Method

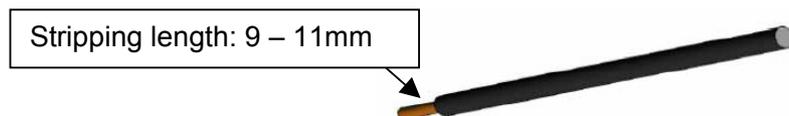
3.5.1.1 AC Input

1. Use a screw driver ($\Phi 3\text{mm}$, – type) to release the screw inside the terminal.
2. Push the stripped wire (AWG# 22 – 12) into the terminal.
3. Rotate the screw to tight the wire.
4. Try to pull out the wire to check whether the wire is connecting tight or not.



3.5.1.2 DC Output and Battery

1. Push the screw driver ($\Phi 3\text{mm}$, – type) into the top hole (square hole) and push upward to release the wire clamber..
2. Push the stripped wire (AWG# 10) into the terminal.
3. Pull out the screw driver to tight the wire.
4. Try to pull out the wire to check whether the wire is connecting tight or not.



3.5.2 Schematics

Refer to the system schematics P/N: 50122094xx

3.6 AC Input Connections

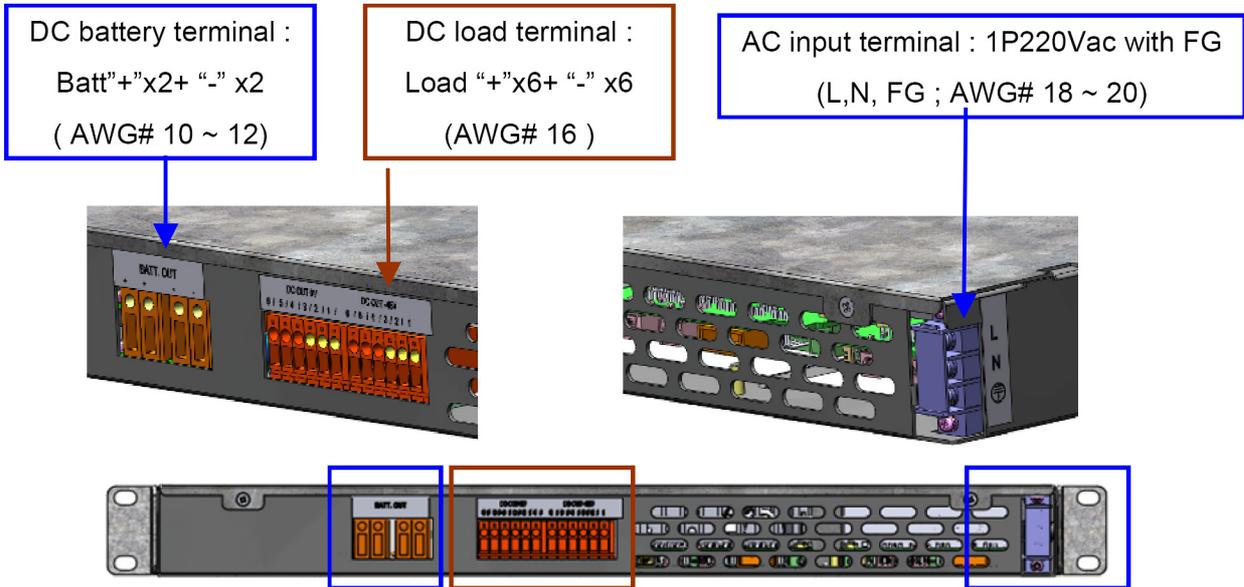
All the AC cables can be connected to the AC terminal on the rear of the shelf.

Recommended wire: AWG #18-20

Warning! *The shelf operates at AC voltages that can produce fatal electrical shock. Installation and maintenance personnel must observe all safety precautions.*

Warning! *Confirm the operating voltage before proceeding.*

Warning! The input feeder circuit breaker at the AC panel must be in the Off position before attempting to wire the shelf.



3.7 DC Distribution Connections

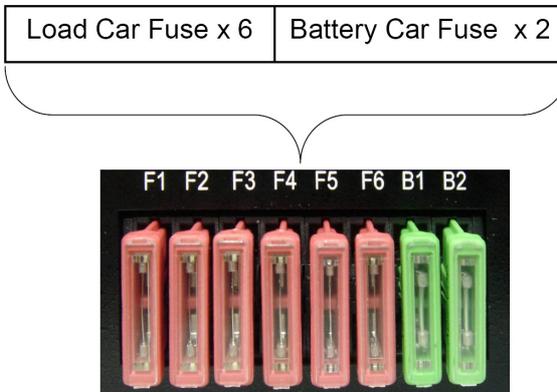
Load Fuse: Car fuse size max. 6 positions (max. 15A for each position)
 Recommended Wire: AWG#16

3.8 Battery String Connections

Battery Fuse: Car fuse size max. 2 positions (max. 30A for each position)
 Recommended Wire: AWG#10-12

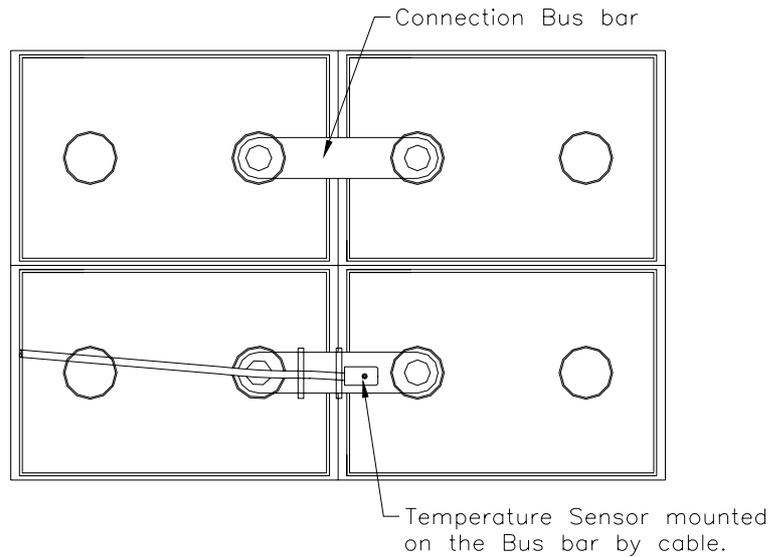
Warning! Verify the polarity of the battery leads prior to connecting the battery cables to the system. Failure to connect the battery cables correctly to the system can cause damage to batteries and the shelf.

Amp.	Description	Color
1A	FUSE F AUTO 1A 58V H CLIP	Black
2A	FUSE F AUTO 2A 58V H CLIP	Gray
3A	FUSE F AUTO 3A 58V H CLIP	Violet
4A	FUSE F AUTO 4A 58V H CLIP	Pink
5A	FUSE F AUTO 5A 58V H CLIP	Peru
7.5A	FUSE F AUTO 7.5A 58V H CLIP	Brown
10A	FUSE F AUTO 10A 58VDC	Red
15A	FUSE F AUTO 15A 58VDC H	Cyan
20A	FUSE AUTO 20A 58V UL CUL Y YELLOW	Yellow
25A	FUSE F AUTO 25A 58V H CLIP	White
30A	FUSE F AUTO 30A 58VDC	Green



3.9 The Battery Temperature Sensors

One battery sensor cable is provided with each shelf. The cable is labeled TB terminate on connector TB on the Detection Module. The positive bus on the inter-cell connections of the battery strings for -54 VDC, or in between the battery cells depending on whether the batteries are exiting or being installed with the power shelf.





4 START - UP PROCEDURE

4.1 Initial Startup Preparation

Verify all connections prior to starting this section.

Warning! *Ensure the input AC circuit breaker located at the AC service panel is switched to the "Off" position.*

Warning! *Confirm the operating voltage before proceeding.*

Warning! *Ensure the frame ground is properly connected to a permanent earth ground connection.*

Warning! *Ensure all the Load DC Circuit breakers located in the DC Distribution Cabinet are switched to the "Off" position.*

4.2 No Load Start-up

The shelf can be turned up without a load. The start-up procedure is as follows:

1. Switch all DC circuit breakers (load) to the "Off" position.
2. Make sure battery is not connected to the system Battery Bus.

4.3 Basic Functional Verification

After shelf start-up, basic functional verification as check the monitor of CSU display should proceed.

4.4 Parameter Settings

Most parameters are pre-set at the factory and are listed on the shelf Test Report included with each shelf. This section provides a general explanation for some parameter may need changing.

4.4.1 Float/Equalize Voltage

Both Float and Equalize voltages are preset at factory and listed on the shelf Test Report. The CSU controls the system settings and overrides the settings made on each rectifier. If a different value is required, both SMR and CSU settings must be identical.

4.4.2 Maximum Battery Capacity

Battery capacity must reflect the rating of the installed battery. Refer the battery manufacture specification for the rated capacity.



4.5 DC Load Connections

Warning! *Basic Functional Testing should be completed prior to the load being applied.*

Warning! *Switch all DC circuit breakers to the "OFF" position.*

- Connect the positive load cable to the Ground Bus.
- Connect the negative load cable to the DC breaker lug.
- Switch the DC circuit breakers or Load Fuse to the "ON" position.

Warning! *Tighten the DC Circuit Breaker lugs to ensure proper contact is made with the load cable and the trip sense wire. Failure to properly torque the DC circuit breaker lugs may cause heat damage.*

4.6 Functionality Check

Control and supervisory functional testing can be performed at the CSU after the Basic Functional Testing is completed and the DC Load is connected.

Check the status of the equipment by viewing the Main Page and by pressing button. Verify voltages, current and temperature for normal operation.

Verify the Alarm display at the CSU to ensure that all alarm conditions are resolved.

5 CSU & PARAMETER ADJUSTMENT

5.1 Description



5.1.1 Software Interface

Power system controller CSU502 CSU

Language English

LED Indicator

LED1	Definition
Normal ●	Dark → System in float charge operating.
EQU ●	Yellow → System is in equalize charge operating.
Main F ● ↔ ●	Blinking → System mains fail status.

LED2	Definition
Normal ●	Dark → System in normal operating.
Major ●	Red → System in Major alarm.
Minor ● ↔ ●	Blinking → System in Minor alarm.

LCD

96 * 64 dot LCD

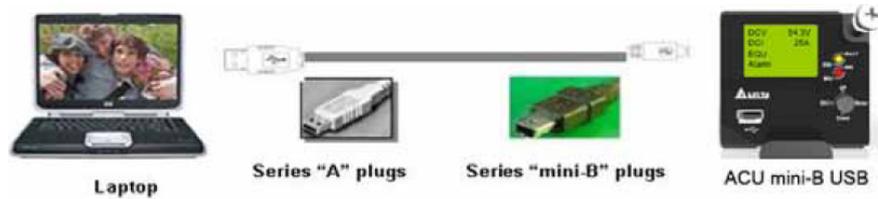
Control Button



UP : Choose upwards
Down : Choose downwards
Enter : Choose to enter (Enter the next table)
ESC : Choose to leave (Go back to parent menu screen)

USB port: Refer to the figure below for the connection method, the function of the connector is OPTIONAL.

The Connection of USB



5.1.2 System Function Management

Monitoring:

- AC input information
- DC information
- Rectifier Status
- Battery Information
- Environment detection

Parameter Setting:

- System parameters
- Alarm threshold settings
- Alarm configuration settings
- Dry contact (Relay) configuration
- Battery management

Others:

- Remote management
- Event logs (Optional)
- Efficiency management (Energy saving function, Digital series only)
- Firmware version & System time

5.2 Interface

3 LED:

- MAJ --- major alarm (red)
- MIN --- minor alarm (yellow)
- EQU --- equalize charge (yellow)

LCD:

96 * 64 LCD

Control Button:

- UP --- upward
- DOWN --- downward
- ENTER --- enter
- ESC --- back to previous screen



5.3.1.3 AlarmDefinition

5.3.1.3.1 Major Alarm

Alarm	Alarm Event	Alarm Event Description
1	Main F	AC input fail alarm
2	B FusT	Battery fuse / breaker trip alarm
3	L FusT	Load fuse / breaker trip alarm
4	LVDT	Battery LVDS trip alarm
5	EQU	Equalize charge alarm

5.3.1.3.2 Minor Alarm

Alarm	Alarm Event	Alarm Event Description
1	TBH	Battery high temperature alarm
2	TBL	Battery low temperature alarm
3	RFA=1	Rectifier failure quantity is equal to 1.
4	DCH	System output DC high voltage alarm
5	DCL	System output DC low voltage alarm

5.4 Parameter Setting

The lists below are parameter preset in factory for the system.

Note! In all battery related parameters refer to the battery manufacturer specifications.

Item	Description/Definition	Default Setting
Battery		
Battery - Parameters		
Floating V	System Floating Charging Voltage	54V
Equalizing V	System Equalize Charging Voltage	56.4V
Capacity	Battery Capacity	50AH
Max. Charge I	Battery maximum charging current	0.2C
Battery - Battery Test		
Failure V	Testing End of Voltage for battery test	45V
Discharge I	Constant current for battery test	0.1C
Lost Capacity	Lost battery capacity for battery test	0.1C
Period	Period / Time	30 day
Battery - Temp. Compensation		
Coefficient		3mV / Cell
Reference Temp.		25°C
Deep Discharge Voltage		46V

Reminding battery capacity		0.95C
Mini. Charge I		0.05C
Duration time		600 Min.
Alarm		Default Setting
Alarm - DC Alarm		
DC High (V)	System output DC high voltage alarm	58V
DC Low (V)	System output DC low voltage alarm	48V
Alarm - Battery Temperature Alarm		
Temp. High (C)	Battery high temperature alarm	40°C
Temp. Low (C)	Battery low temperature alarm	-15°C
Alarm - Ambient Temperature Alarm		
Temp. High (C)	Ambient high temperature alarm	40°C
Temp. Low (C)	Ambient low temperature alarm	-15°C
LVDS1 Function (V Mode) - Battery	LVDS1 is defined for batteries - Voltage Mode	Enable
LVDS1 Function (T Mode) - Battery	LVDS1 is defined for batteries – Temperature Mode	Enable
LVDS1 Trip Voltage	Voltage setting threshold to trip LVDS1 for all batteries	44V
LVDS1 Trip Temperature	Temperature setting threshold to trip LVDS1 for all batteries	50°C
LCD Constrast		12

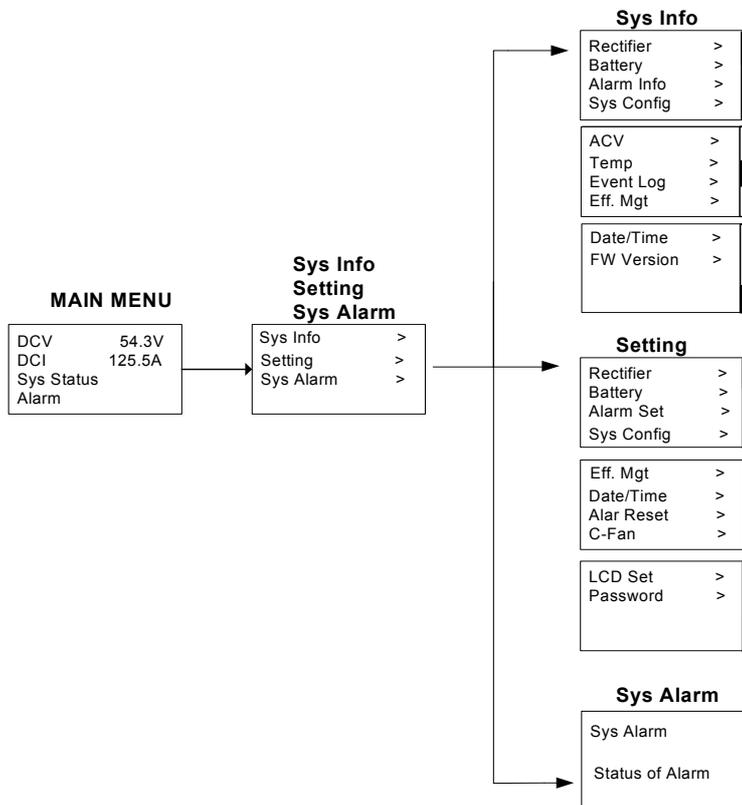
5.5 User Instruction

To use the “Control Button” to monitor or control the system:

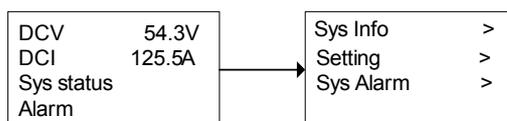
1. Click “Enter” button the main screen (Level 0) to enter the next screen (Level 1)
2. Use “Up” or “Down” button to select a desire function on the screen, than, click “Enter” to enter the next screen (Level 2) and next...
3. Use “Enter” button to check the function of the system or to change the parameter setting of the system.
4. Use the “Esc” button to back to previous screen.

5.5.1 Menu Tree

5.5.1.1 The Structure of the Menu Tree



5.5.1.2 Main Menu



Four columns on the main menu screen:

DCV: System output DC Voltage

DCI: Load current = (sum of the rectifiers current) – (battery current)

Sys Status: System status information.

Alarm: “Alarm” will display if alarm was triggered

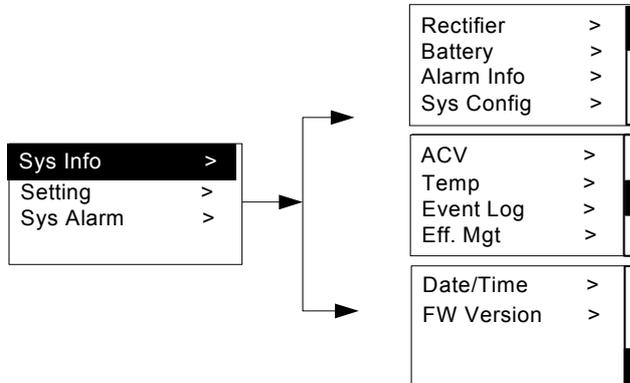
When press “Enter” on the main menu (Level 0), the next level menu (Level 1) will shows on the display. Three columns on the menu screen:

Sys Info: System information

Setting: To set the parameter of the system

Sys Alarm: To present the system alarm status

5.5.1.3 System information



When press “Enter” on the level 1 menu, the next level menu (Level 2) will shows on the display. Total 6 columns are on the menu screen:

Rectifier: Rectifier information up to 24 sets (Depend on system capacity)

Battery: Battery information up to 1 battery strings

Alarm Info: Alarm settings information

Sys Config: System Configuration

ACV (Mains voltage measured): ACV (Mains voltage) value is for user to monitoring the system input voltage. This function is just presenting when the rectifier series selection is “**Digital series**” or function enabled.

Temp: Ambient / Battery temperature information.

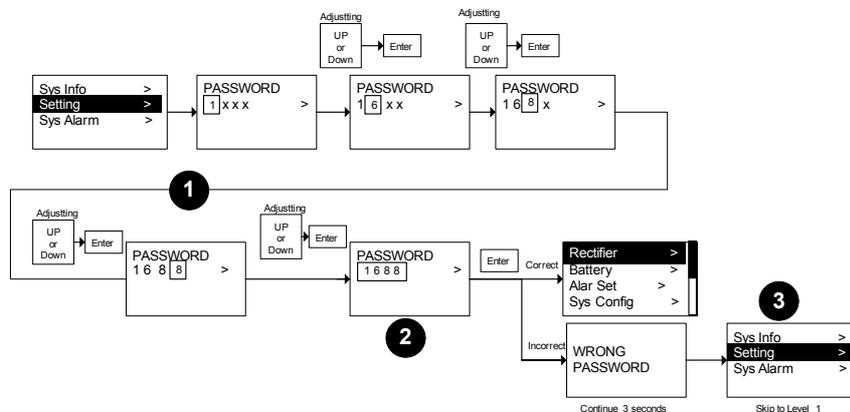
Event Log: System alarm event logs, (up to 500 event logs, optional). Alarm information and time register

Eff. Mgt (Efficiency management): Energy Saving status information (Digital series only)

Date/Time: System time information. year, month, date, hour, minute and a second. (optinal)

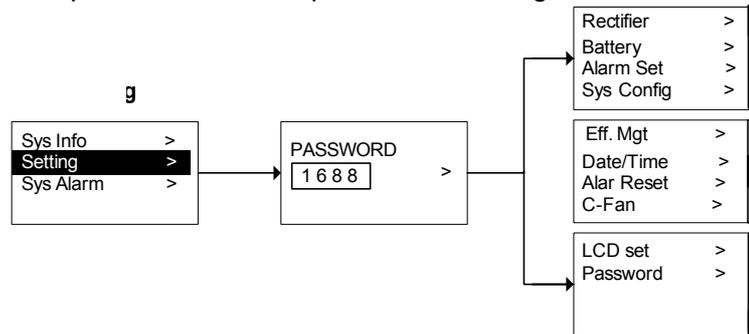
FW Version: Firmware version information.

5.5.1.4 Setting



Password: Security Passwords function is defend the system setting parameters, to prevent non-technician improper operation.

1. Use “UP” or “DOWN” to adjust item values and press “ENTER” to adjust next password item.
2. Press “ENTER” to select all when individual item already adjust and press ”ENTER” again to exit the password menu.
3. It's need to set the password when entry the setting function. The screen will skip the label 1 when password is wrong.



Rectifier: Rectifier information up to 16 sets (Depend on system capacity). Includes CL and HVSD threshold setting.

Battery: Includes parameter, Battery Test, temperature compensation and Boost charge.

Alarm Set: System alarm configuration. To define all of the system alarm setting thresholds.

Sys Config: system configuration.

Eff. Mgt: In order to system works to more efficiency and extend rectifier’s life. So CSU control rectifiers on or off to improve system efficiency. This function is just supporting for Digital series rectifier only.

Date/Time: System time configuration setting. This function is for optional. Present the Date/Time function when “RTC” board is available and function enable.

Alarm Reset: Reset or clear alarm information in “Alarm Reset” menu. Includes Buzzer, Com-Fail, and B Test F reset setting.

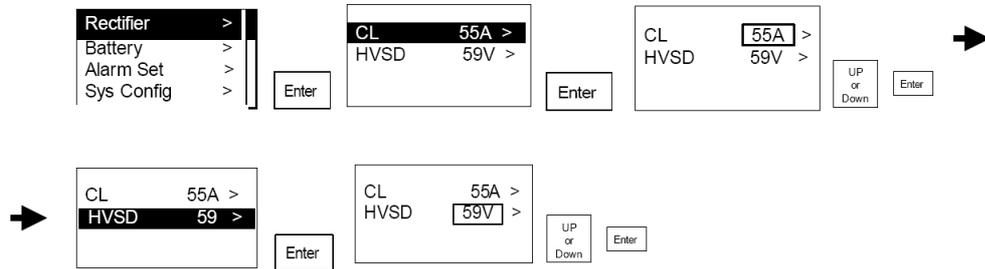
C-Fan (Cooling Fan control): To control the cooling equipment fan speed, detect the cooling equipment status. It is for outdoor system cooling application. The external Fan control board is for OPTIONAL.

LCD Set: Setting the LCD display contrast. (light and shade)

Password: Security Passwords function is defend the system setting parameters, to prevent non-technician improper operation. Security protection can be function Enable and change the password at the same time.

5.5.1.4.1 The Operation of Default Setting

The setting example and process to setting the parameter of the system will shows in the following figure and statement:



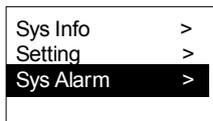
Process:

1. Select items by “UP” or “DOWN”.
2. Press ‘ENTER’ to enter the setting item.
3. Use “UP” or “DOWN” to adjust the item values
4. Press ‘ENTER’ to exit the setting item or to next item to setting.

NOTE:

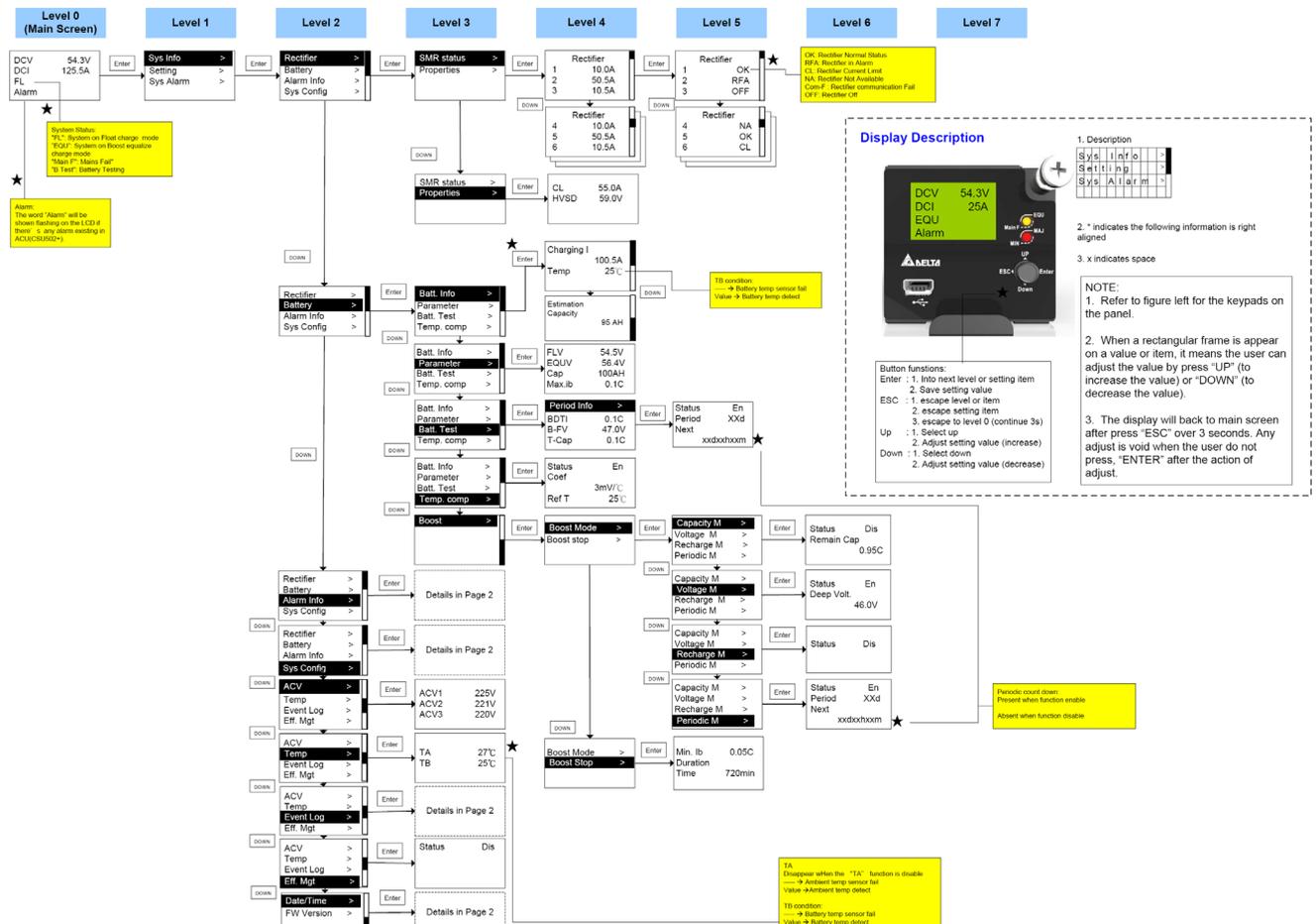
The default value of “CL” in the factory is 40A (for the rectifier model of DPR2000).
When changing the rectifier model to DPR2700, the value of “CL” must change to 56A.

5.5.1.5 System Alarm



Sys Alarm: System alarm information.

5.5.1.6 System Information (Page 1)



CL: To limited the individual rectifier's maximum output current.

NOTE:
 The default value of "CL" in the factory is 40A (for the rectifier model of DPR2000).
 When changing the rectifier model to DPR2700, the value of "CL" must change to 56A.

HVSD (High voltage shutdown): Controller provides a reference HVSD value to rectifiers.

Parameter: Summary parameter configuration

FLV: Floating voltage setting

EQUV: Equalize voltage setting

Cap (Battery Capacity): Battery Capacity setting

Max. Ib (Max. Charge current percentage) : Maximum battery charge current setting.

Battery Test: Battery Test parameter setting

Periodic Set: Battery Test by Periodic

Manu-Test: Manual Battery Test

BDTI: Battery test discharging current setting

B-FV: Battery Failed Voltage default setting.

T-Cap: Test Lost Capacity setting

Temp. Compensation: Temperature compensation information default setting.

Coef: Temperature compensation coefficient of threshold setting.

Ref T: Battery reference temperature default setting

Boost: Boost management includes Boost Mode, Boost Stop and Manu-Charge

Boost Mode: Boost charge Mode setting

Capacity Mode: In battery Capacity Mode can be function configurable
“Enable/Disable” and adjustable “Remain Cap” parameter.

Voltage Mode: In Voltage Mode can be function configurable “Enable/disable” and
adjustable “Deep Volt.” parameter.

Recharge Mode: Ever system is in main fail, and the battery discharge duration time
more than 5 minutes, start boost charge process.

Periodic Mode: In Periodic Mode can be function configurable “Enable/Disable” and
adjustable “Periodic” parameter.

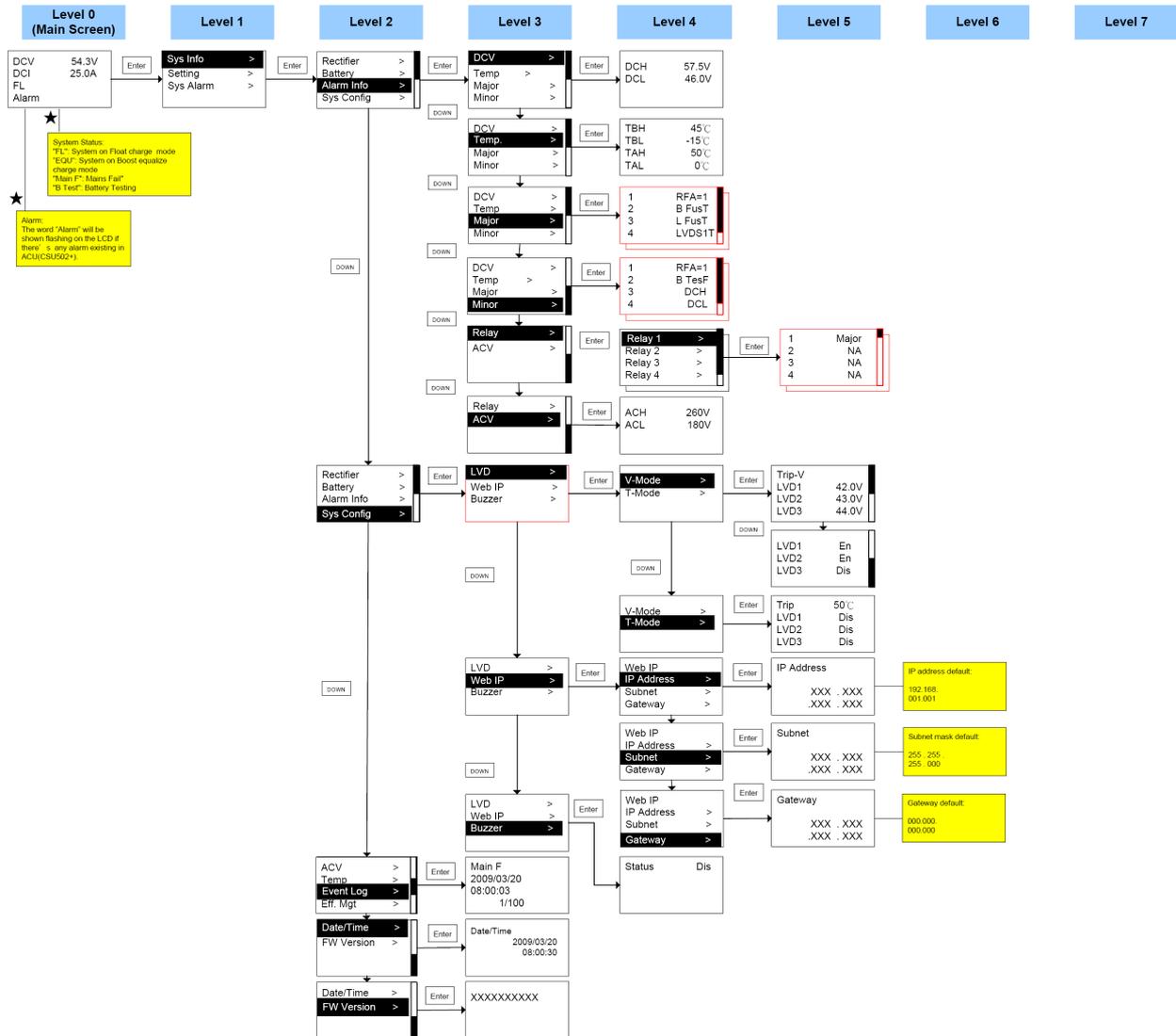
Boost Stop: Boost Stop default setting

Min. Ib (Min. Charge current percentage): Minimum battery charge current setting.

Manu-Charge (Manual Charge): User can be manual switches the system into boost
charge mode through this function.



5.5.1.7 System Information (Page 2)



DCV: DC Voltage alarm settings

DCH: DC high voltage alarm value threshold setting

DCL: DC low voltage alarm value threshold setting

Temp: Battery/Ambient temperature alarm setting

TBH: High battery temperature alarm value threshold setting.

TBL: Low battery temperature alarm value threshold setting

TAH: High ambient temperature alarm value threshold setting.

TAL: Low ambient temperature alarm value threshold setting.

ACV: AC voltage alarm settings

ACH: AC high voltage alarm value of threshold setting

ACL: AC Low voltage alarm value of threshold setting.

LVD (Low Voltage Disconnects): To control the LVD. Standard 1, up to 3 LVD controllable, for the battery/load power separated with system. (Number 2 and 3 LVD functions need the extend board addition).



V-Mode: Low voltage disconnect Mode configuration.

T-Mode: High temperature disconnect Mode

Trip temp: High temperature trip value of threshold setting.

Web IP: User can be remote access the system controller through TCP/IP or SNMP via Delta Web interface card.

The Web access board is OPTIONAL.

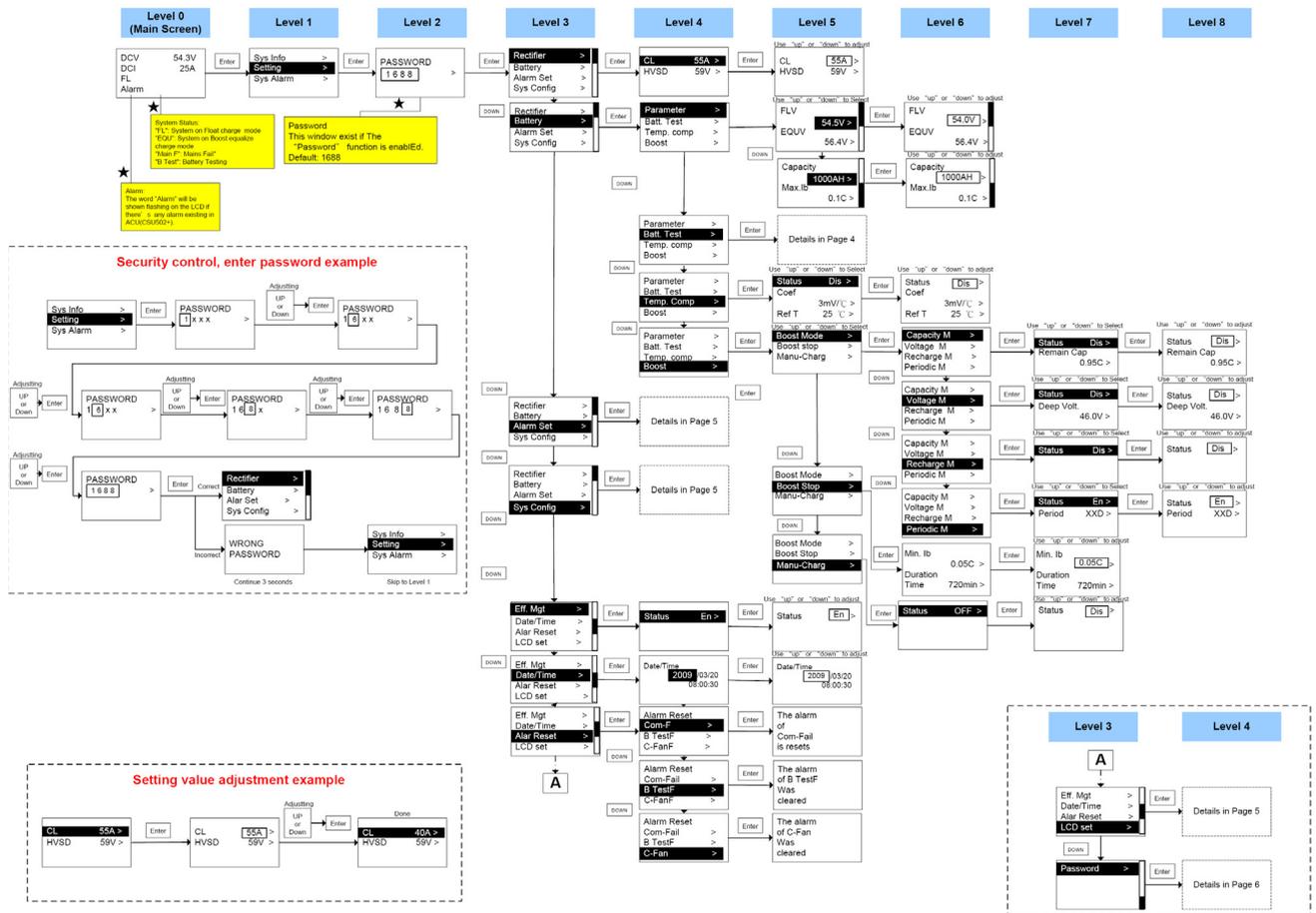
IP Address: Internet Protocol Address.

Subnet Mask: The sub-network hides a cover

Gateway: A kind of network system link together of power system.

Buzzer: To controlled an external alarm buzzer. The Buzzer is option. Controller is going to active the external alarm buzzer when system has any alarms happened.

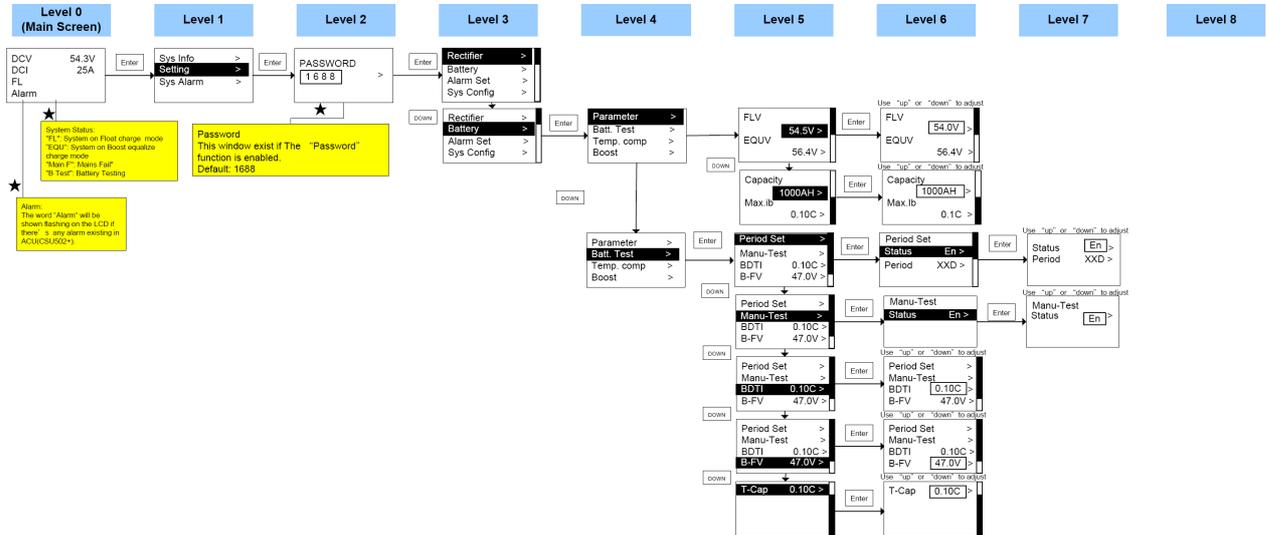
5.5.1.8 System setting (Page 3)



NOTE:

The default value of "CL" in the factory is 40A (for the rectifier model of DPR2000). When changing the rectifier model to DPR2700, the value of "CL" must change to 56A.

5.5.1.9 System setting & System Alarm information (Page 4)



Buzzer: To controlled an external alarm buzzer. The Buzzer is option. Controller is going to active the external alarm buzzer when system has any alarms happened.

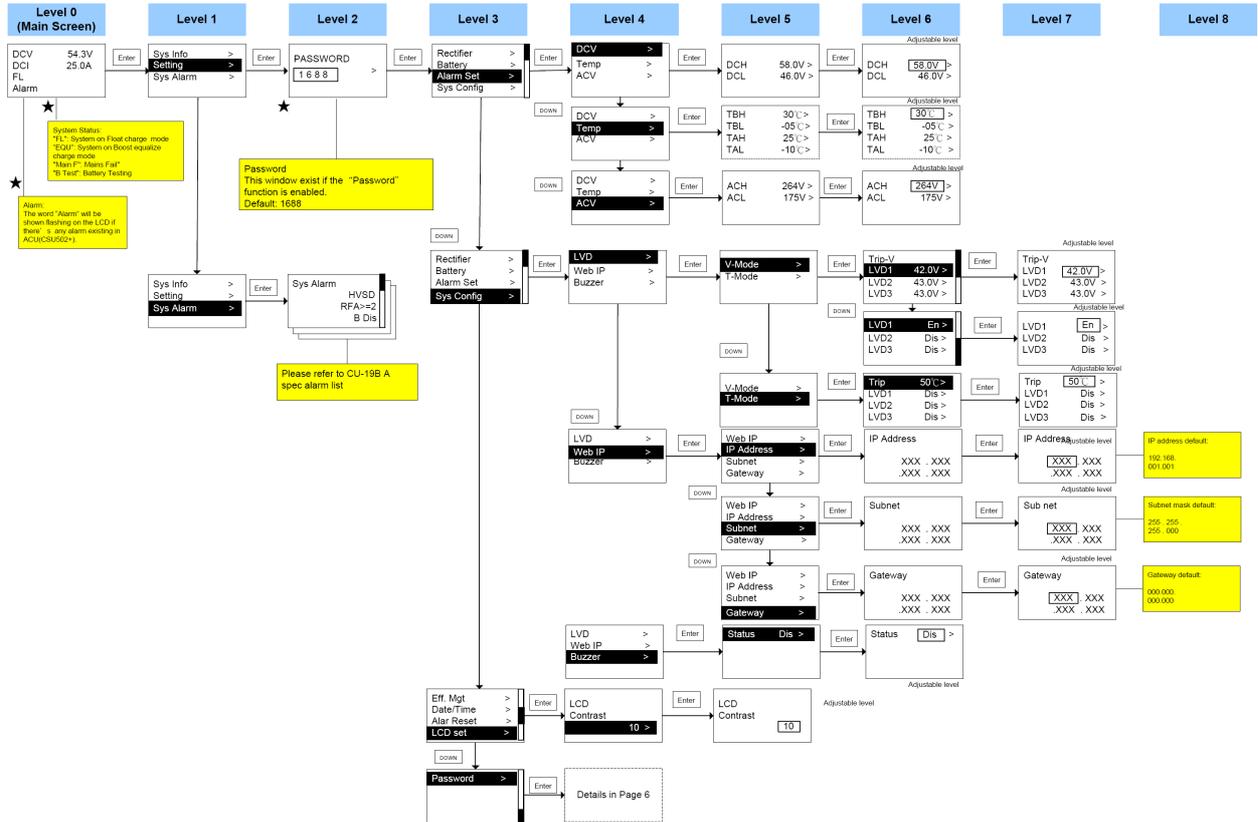
Com-##F: To reset the rectifier communication fail alarm event. When the message “Com##F” appears, press “ENTER” to clear alarm event.
Note: “##” = 01~16 rectifier position.

B Test F: To reset the battery test fail alarm event. When the message “B TesF” appears, press “ENTER” to clear alarm event.

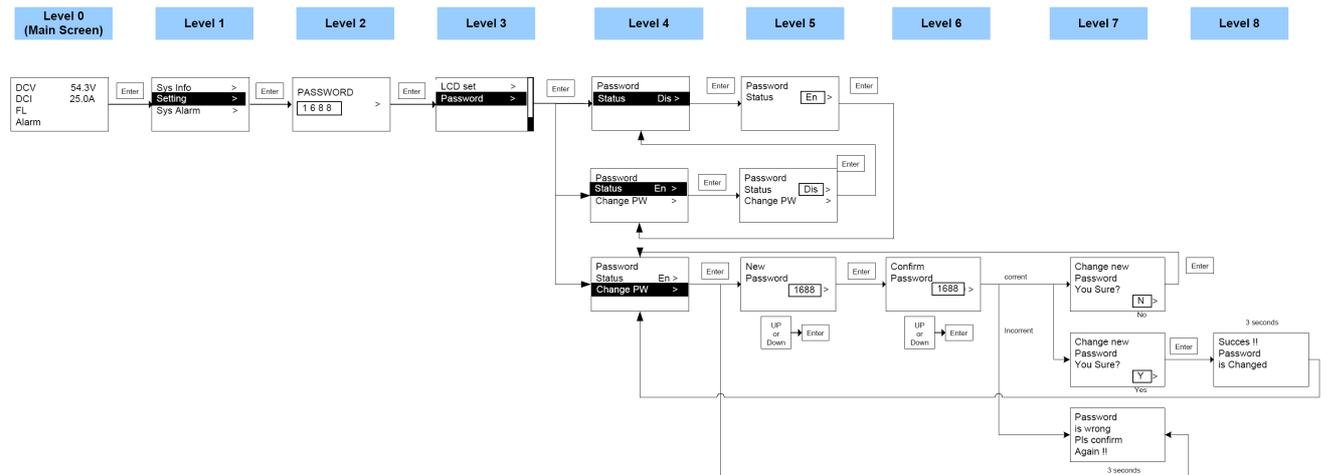
Fan ON/OFF: The controller is able to control the external Fan when the ambient temperature value higher than a setting threshold, and control the PWB CU-19A-16 Fan control relay to trigger the external Fan tray.

Fan Speed: The Controller through PWM signal to control the external Fan speed, to control the external Fan speed from low speed to full speed, for Fan noise reduce and lifetime extension.

5.5.1.10 System setting (Page 5)



5.5.1.11 System setting (Page 6)



6 RECTIFIER

6.1 Description

Delta's DPR600B-48 series is a compact and very reliable family of front-end rectifier offering 600W constant power output (From 43Vdc to 58Vdc, under 43Vdc is constant current output). The modular design provides the flexibility to configure and expand the system as the load demand increases. Each rectifier is hot swappable with front access for ease of maintenance without system shutdown providing uninterrupted service.

DPR600B-48 series is active power factor corrected to great than 0.99 PF (THD<5%) for maximum AC utilization.

For detailed rectifier specifications, please refer to separate rectifier specifications.(SPEC_DPR600B-48_en).



6.2 Specifications

6.2.1 Input

Input voltage:	230 Vac, single phase 130Vac~276Vac: full load operation
Line Frequency:	45Hz~66Hz
True Power Factor:	> 0.99 at full load, nominal line
Efficiency:	>91.5% at nominal line input
Protection:	Fuse

6.2.2 Output

DC Output Voltage	-42V~-58V
Output Power	600W/ fixed

Regulation:	
Load:	$\leq \pm 250\text{mV}$ (load 0~100%)
Line:	$\leq \pm 50\text{mV}$
Acoustic:	<50dBA @ 1Meter
Current Sharing	$\pm 1\text{A}$ typical

6.2.3 Status/Alarm Indicators

Only one green LED called "OK" displays the status of the rectifier. It is the first LED in the LED bar.

LED permanently on	Rectifier OK
LED permanently off	Rectifier not working
LED blinking (200ms on / 200ms off)	Output voltage / current not ok
LED flashing (20ms on / 1000ms off)	Rectifier in standby mode

A rough signalization of the rectifier output current will be indicated by a yellow LED bar graph. The LED bar graph will have 6 positions, that means:
DPR 600B-48 \approx 2.3A per LED.

The yellow LED called "COM" displays the status of the communication interface.

LED permanently on	IMBUS interface enabled
LED permanently off	Analogue interface enabled
LED blinking	Configuration process

6.2.4 Environmental

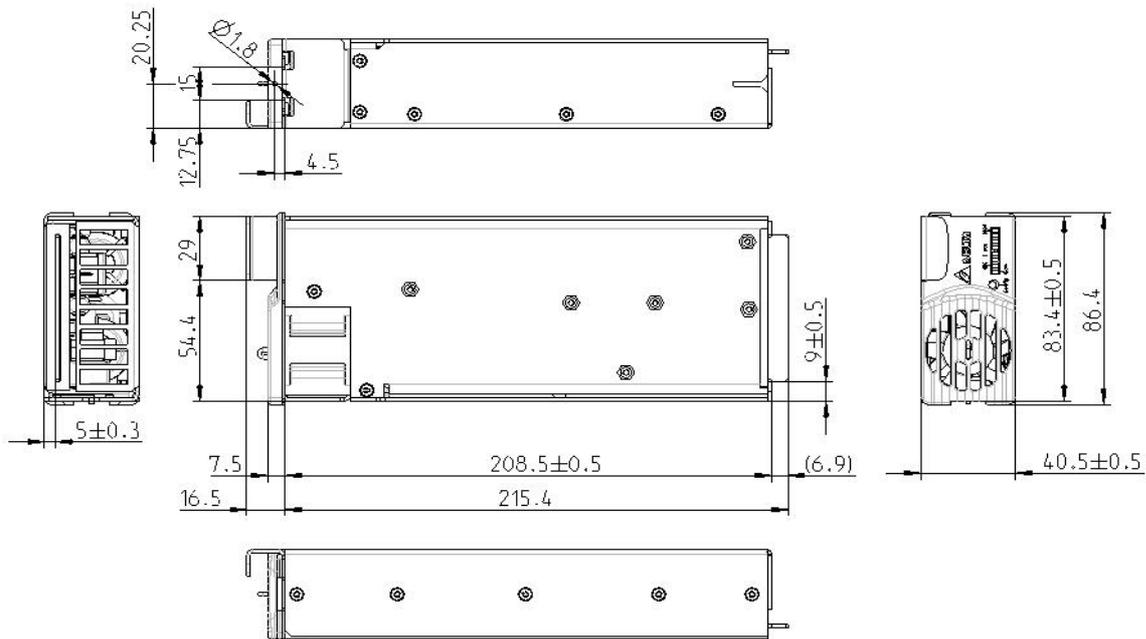
EMI Suppression:	Enclosure : EN 55022, class B
EMC Immunity:	Enclosure : EN 61000-4-3
Lightning/Surge:	EN61000-4-5 level 1, 2, 4KV
ESD	EN 61000-4-2 Contact Discharge → 6, 8KV

	Air Discharge → 8, 15KV
Safety	IEC 60950, CB certificate, CB scheme, UL/cUL 60950, CSA-C22.2, CE mark, GS mark
MTBF	>150.000 hours 85% of life with 85% of nominal load at 32 deg. C 5% of life with 100% of nominal load at 32 deg. C 10% of life with 100% of nominal load at 45 deg. C

6.2.5 Physical

Dimensions (W x H x D)	41 x 86.4 x 231.9 mm
Weight	0.9Kg

6.3 Outline & Dimensions



7 DC DISTRIBUTION CABINET

7.1 Distribution

Maximum capacity of the system: -54V/22A

Load Fuse: Car fuse size max. 6 positions (max. 15A for each position)

7.2 LVDS (low voltage disconnect switch)

LVDS * 1, 44.0V tripped

The contact is installed in front of battery. When LVDS open, it will disconnect the batteries from the system. Because the system avoids over discharge for batteries, the ACU controls LVDS open or close.

7.3 Battery Connections

Battery Fuse: Car fuse size max. 2 positions (max. 30A for each position)

Warning! *Verify the polarity of the battery leads prior to connecting the battery cables to the system. Fail to connect the battery cables to the system can cause damage to batteries and system.*

The system voltage (rectifier output voltage) is -54 VDC, connect the positive battery cable(s) to the 0V DC O/P terminal block and connect the negative battery cable(s) to the -54 VDC battery O/P terminal block.



8 ALARMS AND TROUBLE SHOOTING

8.1 Main Fail Description

Main fail occurs when AC current is not present at the AC Distribution box, or the AC voltage over/under than rectifier normal operating range. This alarms result in the system shutting down rectifiers until either AC is restored (AC is restored, or the AC voltage returns to levels within the rectifier normal operating voltage).

8.1.1 Main Fail Trouble Shooting

During an AC Fail condition, the ACU is powered by reserve batteries and the rectifiers and the rectifiers are shut down. When AC is restored, observe the battery charge current. It may be necessary to decrease the current limit to the charge current range during equalize if a deep discharge situation has occurred.

8.2 DC Output Voltage High/Low (HV/LV)

8.2.1 DC Output Voltage High Alarm-DCH

This alarm condition exists when the DC output voltage is higher than the parameter alarm setting. The alarm will re-set to the normal condition when the voltage is decreased below the threshold parameter setting. The output voltage can be adjusted via the ACU and at the rectifier. Reference the ACU float voltage parameter rectifier setting and the rectifier equalize Voltage rectifier setting.

8.2.2 DC Output Low Alarm-DCL

This alarm condition exists when the DC output voltage is lower than the parameter alarm setting. The alarm will clear when the DC output voltage increases. The output voltage can be adjusted via the ACU and at the rectifier.

8.2.3 DC Voltage High/Low Trouble Shooting

Verify the output of each rectifier. If the rectifier output is not within tolerance, swap the rectifier with a spare module, and return the faulty unit to Delta Products for repair. If the output of each rectifier is within tolerance, check the parameters to ensure the correct settings.

8.3 DC Circuit Breaker/Fuse Tripped Alarm

8.3.1 DC Circuit Breaker/Fuse Tripped Alarm

When a DC load circuit breaker/fuse is tripped, the ACU will go into alarm.

Re-set the tripped circuit breaker, or replace a new fuse to failed position, the ACU alarm should clear.

8.3.2 Circuit Breaker Fail Condition Trouble Shooting

If the circuit breaker/fuse continues to fail:



Check the DC Branch load (fed by the DC circuit breaker) to ensure the circuit breaker/fuse is the correct size.

If the branch load exceeds the circuit breaker/fuse rating, the circuit breaker/fuse must be changed to a higher rating.

Swap with a spare circuit breaker with a higher rating.

8.4 Battery Temperature Fail Alarm

8.4.1 High/Low Battery Temperature – HBT/LBT

This alarm is generated when the threshold temperature set in parameter TB is exceeded or no battery temp sensor present. The ACU senses the temperature via sensor TB and generates a Battery Temperature Fail Alarm.

8.4.2 High/Low Battery Temperature-Battery Troubleshooting

Check the battery temperature and verify it is within the TB parameter threshold.

If the TB threshold is not exceeded, check the thermostat reading in the hut or equipment room and comparing the reading to the ACU reading. If the TB sensor is defective, contact Delta Products for a replacement sensor.

It is recommended that if the system is in the equalize mode, switch the status to float to reduce the battery temperature.

8.5 Rectifier Fail Alarm

When a rectifier fails, the alarm information is sent to the ACU and the rectifier is shut down. The rectifier should be swapped out with a spare unit and the faulty unit returned to Delta Products for repair.

Warning! *Do not open the rectifier module. There are no serviceable parts. Call Delta Customer Service for an RMA number for repair and return.*

9 MAINTENANCE

9.1 Cleaning and Maintenance

9.1.1 General

Special maintenance is not necessary for this shelf, unless the shelf is being operated in a severely harsh environment (dusty environment). The front panels and the cover of the shelf were treated with a special coating, do not use organic cleanser or volatile solvent or corrosion damage may occur. For daily cleaning, brush the dust from the cover and panel. If necessary, use a gentle cleanser or a lightly dampened lint free cloth to remove any dirt or smudges.

9.1.2 Periodic Maintenance

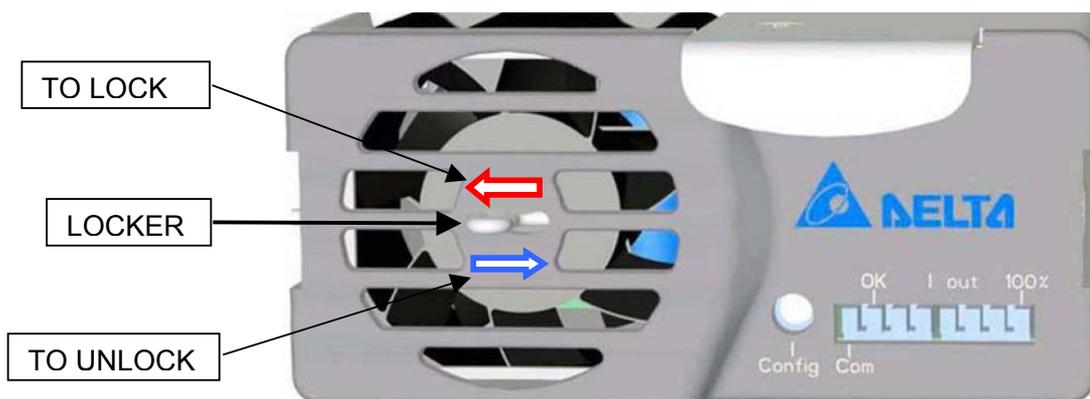
Periodic maintenance is not required for normal operation. If necessary, wipe remove dust from the front of the DPR-2700 shelf using a lint free, soft cloth an gently wipe the front of the shelf, the CSU and rectifiers. Use a gentle detergent to clean is acceptable.

Warning! Do not use spray cleanser to clean the equipment. Using a spray cleanser directly on the equipment can result in serious equipment damage.

Check the DC Bus for heat discoloration. If the bus has any heat discoloration, notify Delta Customer Service.

9.2 Removing and Replacing a Rectifier Module

9.2.1 Removing a Rectifier



Warning! Do not touch the DC output Bus when pulling out the SMR module.

Warning! The rectifiers are equipped with a safety locker.

Push the locker (on the center of the fan) to unlock direction to un-lock the rectifier.

Pull out the SMR module slowly from the shelf, using one hand to support the rear half of the SMR and remove the rectifier from the shelf.

9.2.2 Replacing a Rectifier

Install the rectifier module, holding the handle with one hand and using the other to support the rear half of the rectifier module. Place the rectifier in the shelf and push into the shelf.

Warning! Do not force the module into the slot. If it does not slide in and connect easily, remove and re-set the unit.

Lock the rectifier by push the locker to the lock direction to lock the rectifier.

9.2.3 Adding a Rectifier

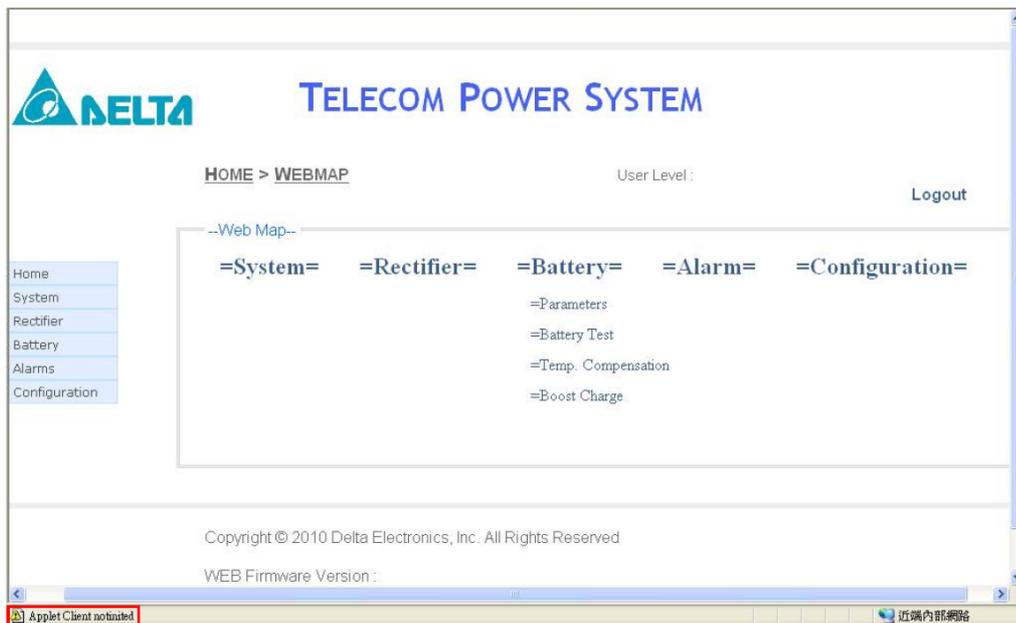
Refer to the procedures in section 9.2.2.

9.3 Environment requirement for WEB:

1. JavaVM(Java Virtual Machine) version is compatible with the version v1.6.0_10
2. IE 6.0
3. Disabled javascript filter in antivirus software.
4. Enable port 3001 for the purpose of HTTP protocol access.

If JavaVM not installed properly with right version or javascript filter active, then there would be the message at the bottom left corner of the WEB page as

 Applet Client notinited





If connecting to the target IP address, but nothing output, please make sure the port 3001 in your computer available for HTTP protocol access.

Here we suggest not to install multiple version javaVM in your computer. Please remove other javaVM but version v1.6.0_10.

9.3.1 Q & A

Problem : WEB values can't be displayed properly on WEB page after any setting process. Or browser hung after your settings.

Answer : Usually, this condition is caused by antivirus software. There are some functions implemented by javascript language for WEB, so user's WEB interface is required to support javascript function. Hereunder, please follow the following process to guarantee parameter setting works properly :

Step 1. Disable javascript filter function(*note1**) in antivirus software.

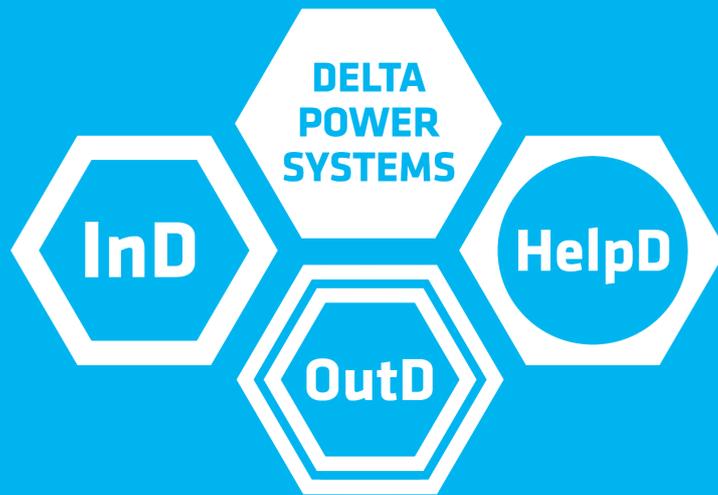
Step 2. Go to reconfigure system parameter once more.

Step 3. Verify parameter correct or not.

Note1 : Please try to get some information/help about javascript filter functions from antivirus software company or MIS. Maybe javascript filter is combined with other WEB filter function in the antivirus software or inside the firewall.

Problem : WEB values can't be displayed properly on web page while connecting to power system's IP address.

Answer : please check the JavaVM(Java Virtual Machine) version is compatible with the version v1.6.0_10, or you can download JavaVM at <http://www.java.com>.



Our InD, OutD and HelpD series are designed to complement each other. InD stands for indoor power systems, while OutD solutions are created for demanding outdoor use. HelpD is our global support team; its task is to make everything easy for you. The full range of Delta Power Systems keeps you powered and allows you to concentrate on what is most important for you - your business.