**PRODUCT MANUAL**

# Pulsar Plus Controller Family







Product Manual
CC848815341

Pulsar Plus_MAN          Rev. 9.6

**Notice:**

The information, specifications, and procedures in this manual are subject to change without notice. OmniOn Power assumes no responsibility for any errors that may appear in this document.

Pulsar Plus_MAN

PRODUCT MANUAL

# Pulsar Plus Controller Family

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# Introduction

## Pulsar Plus Family Controllers

### Overview

This manual covers the Pulsar Plus and Phoenix controllers.

These controllers were developed for both indoor and outdoor cabinet power applications.

Modular hardware and software design of the controllers allow for easy customization for specific applications.

Controllers provide control and alarm monitoring functions over several communication interfaces including a standard RS-485 digital serial interface that interconnects system rectifiers, converters, and other peripherals. Compatible rectifiers include NE, CP, NP, EP, IP, and 59X series.

Local and remote access is provided.

Features are factory configured to industry standard defaults to minimize the setup process in the field. Customer specified factory default configuration is also available

## Key Features

- Modular design allows different packaging alternatives: a single power slot positions of the rectifier shelf, mounting to a cabinet or distribution door, and 1U rack-mount option

- Easily field replaceable

- Standard or customer specific factory defaults supported

  - Support of more than one factory default

- Supports dual voltage plants, with rectifiers and converters

  - Auto-sensing dual voltage (both voltages and both currents displayed on front panel)

- Power Unit control and management

  - Centralized settings for converter and rectifier output set-point voltages.

  - Up to 60 NE power modules (Rectifiers and converters)

  - Up to 32 CP rectifiers

- Extensive Battery Management features

  - Management of four independent Low Voltage Disconnects (LVDs)

    - Up to eight contactors can be assigned to contactor interface IDs

    - Load disconnects operated by low voltage, low voltage and/or time delay, remote command, or external control signal

    - Battery disconnect operated by voltage threshold, voltage threshold and/or time, remote command, high battery temperature, or Emergency Power Off (EPO) signal

  - Battery recharge current limit feature

  - Low and high temperature voltage compensation

    - Independent adjustable slopes

    - Step function

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- Manual and automatic Boost charging
- Manual, remote test, and periodic discharge test capability
  - Reserve time calculations with configurable threshold
  - Manual time threshold for pass/fail criteria
- 1-Wire monitoring
- Up to six ES771 Mid-string voltage monitors (configurable mid-string imbalance alarm)
- Up to sixteen battery thermal probes (configurable temperature alarm)
- Alarm management of 24V and 48V DC distribution
  - User defined thresholds
- Front accessible 64x128 LCD with control pad and intuitive menu navigation system
  - Available front panel PIN (password) access feature
  - Alarm severity sensitive display back-light
  - Voltage Test Jacks for both DC busses
  - Three separate configurable assignable LED indicators
- Built-in audible alarm and test feature
- 10 configurable alarm outputs with manual alarm test features
- 10 configurable binary inputs
- Integrated 10/100Base-T Ethernet for local port or for Network remote monitoring
  - SNMP, TCP/IP, SMTP, HTTP, Telnet, FTP, and utilizes Dynamic Host Configuration Protocol (DHCP)
  - Compatible with standard browsers
- Event history log
- Rectifier Group Standby/ Hold-off mapping (generator/AC load minimization)

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# Applications

The Pulsar Plus controller family has applications in Infinity NE, Infinity P2, the Compact Power (CP) Line, EPS, and previous generation power systems. Following are product depictions utilizing the various configurations of the controller. These applications utilize the NE843A slot controller and the NE843C, NE843E, and NE843P door/panel mounted controllers. Consult appropriate system manuals, technical field support or your local sales representative for more details on these or other power systems.

## Infinity NE Systems
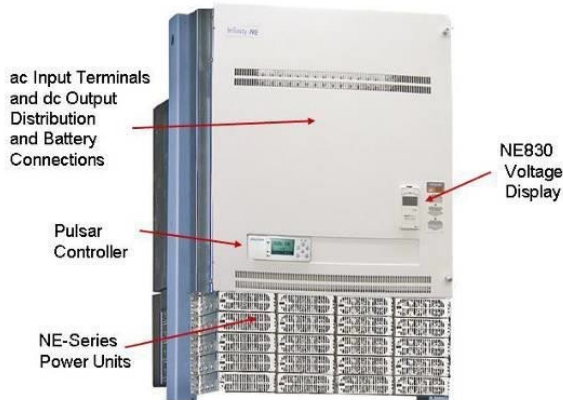


**Infinity NE-M Selectable Power System**

**(Pulsar Plus NE843E)**



**Infinity NE-S Power System**

**(Pulsar Plus NE843E)**



**Infinity NE-D Distributed Power System**

**(Pulsar Plus NE843E)**



**Infinity NE - B Bulk Power System**

**(Pulsar Plus NE843A)**

**Figure 1: Infinity NE Power Systems**

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The Pulsar Plus NE843A slot controller is inserted into the left-most position of the rectifier shelf. This position in the shelf allows access to all I/O. The panel/door-mounted Pulsar Plus NE843C controllers are typically installed at the factory, but can also be ordered separately for spares or integrated into custom systems.

The following pictures depict the Pulsar Plus controller in the EPS and Compact Power systems. These include two slot controllers, EP843D and the CP843A, and the 1U rack-mount controller applicable in 19" and 23" frames. The Pulsar Plus controllers provide a front panel DB9 or RJ45 Craft port for local terminal access using RS-232. A front panel position is reserved for a second RJ45 Ethernet connection in the near future.



**EPS2400 Power System**
**(Pulsar Plus EP843D)**



**Compact Power Shelf**
**(Pulsar Plus NE843G)**





**Compact Power Shelf**
**(Pulsar Plus CP843A)**

**Figure 2: Compact Power Systems**

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# Product Description

## Overview

### Introduction

OmniOn Power System rectifiers accept alternating current (ac) power and rectify it to produce direct current (dc) power for powering external equipment (loads). Converters accept the dc output from rectifiers or other sources and convert it to various regulated output dc levels also needed for powering external equipment (loads). Batteries, generators, and UPS are used to provide backup power when ac is lost. When batteries are used, they are connected in parallel for additional capacity along with the rectifier outputs through appropriate breakers and contactor disconnects. DC power is distributed through distribution panels with various protectors and contactors. These rectifiers, converters, backup systems, and distribution are all managed by the controller. The following figure depicts a generic representation of the system controller and its relationship in a power system. The components depicted and their associated features as they relate to the system controller will be discussed in this manual.
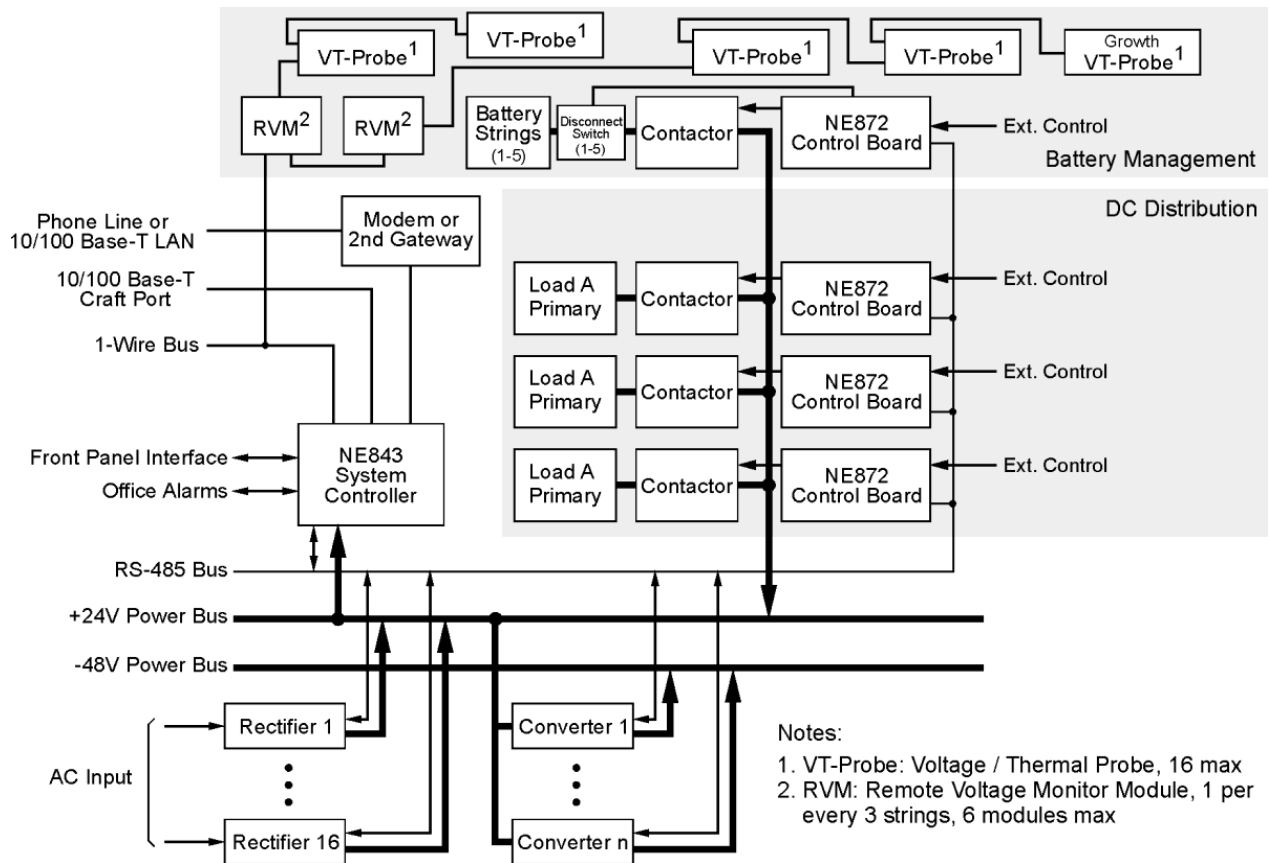


**Figure 3: General Power System Block Diagram**

# Configurations

The main "843" microprocessor board comprises the Pulsar Plus family controllers. These controllers are designed to fit a variety of systems and applications. Input and output wiring is connectorized to allow swift disconnect and attachment to and from the unit. There are several different configuration options for the controllers. The "843" board is designed to fit in NE and CP power slots can be quickly installed or removed entirely from a power position with the use of an integrated latch. Controllers can also be ordered as a direct door or panel mount controller. Within these different physical configurations there are available integrated options that include items such as a modem or a second Ethernet port. For slot controllers, these options must be ordered and pre-installed at the factory. Options for door/panel mount controllers can be added in the field.

The following figure is a block diagram of the basic components of the Pulsar Plus NE843A slot controller. Controller options that mount directly to a door or panel do not require the small internal connection board used to interface with the backplane. As an example, the NE843_CONA shown below is the interconnect board used in the Pulsar Plus NE843A slot controller for interfacing to the NE shelf's backplane.
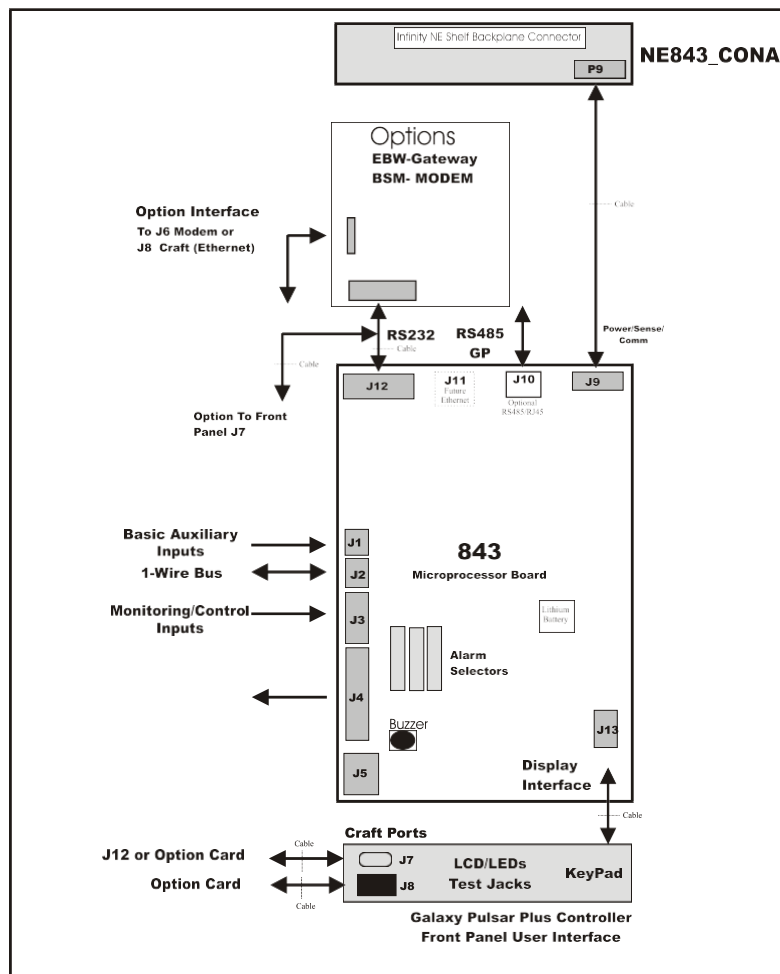


**Figure 4: Generic Block Diagram of Pulsar Plus NE843A Controller**

A listing of the controller options is defined in this section. A brief description is provided for each configuration. These are the basic configurations that are available from the factory. Always consult the controller ordering guide (PULSAR-AD) and respective sales contacts to ensure the most complete and up to date listing. The naming convention used for the Pulsar Plus product family and its options are factory orderable is:

**ZZ 843 A D - XXX - YYY**

**Where;**

| ZZ | This identifies the product family of Pulsar Plus 843 controller.(Valid IDs are NE, CP, and EP ) |
|---|---|
| A | This identifies the controller form factor option<br>(A=Shelf/Slot packaging, C=NE Millennium Door-Mount, D= DTAG Front Access, E=Standard Door-Mount, G=1U 19"/23" Frame, |
| D | This identifies a controller of the same form factor but manufactured with adifferent component configuration or board options<br>(Blank = Standard ) |
| XXX | These characters identify which Craft port option is installed<br>(RJC=Cisco RJ45 serial craft port with no board options, RJ5= Standard TIA RJ45 with no board options installed, Blank= DB9 serial craft port no board options installed) |
| YYY | This identifies a customer or application specific software configuration version of the controller<br>(Blank = Standard).<br>These codes are specifically assigned to a customer or an application that defaults can clearly be predefined to minimize field configuration. Consult appropriate sales personnel for additional information. |

The following table identifies the configurations presently available or near availability for the controller product family. The slot controllers provide input/output connections at the side of the chassis. An RJ11 port for an optional modem connection is also provided. If the modem function is not included in the configuration, this port will be covered. The NE843A also provides access to an RJ45 receptacle for a additional Ethernet connection in the future as well as a standard DB-9 interface for a serial connection. Depending on the controller configuration and product availability, these ports may or may not be covered and made unavailable. The information included in the "Description" column provides a brief description about the availability of these ports for each particular configuration.

| Configuration[2] | Ordering Code[1] | Description |
|---|---|---|
| NE843A NE843A_S | CC109128402 150042935 | NE Slot controller with no options<br>• Front panel has:<br>  • RS-232 available (not covered)<br>  • RJ45 not present (covered)<br>• RJ11 for phone on side not present (covered) |
| NE843A_M3 | CC109140522 | NE Slot controller with BSM3 internal modem<br>• Front panel has:<br>  • RS-232 available (not covered)<br>  • RJ45 not present (covered)<br>• RJ11 for phone on side available (not covered)<br>• BSM3 internally powered from NE843A |
| CP843A | CC109129895 | CP Slot controller with no options<br>• Front panel has no I/O.<br>• RS-232 craft port made available on the side, No second RJ45 (dual Ethernet)<br>• RJ11 for phone on side not present (covered) |
| NE843E NE843E_S | CC109142056 150042937 | Door/panel mount controller with no options<br>• Front panel has RS-232 available through DB9 (not covered); Second RJ45 not present (covered)<br>• RJ11 for phone on side not present (covered) |
| EP843D | CC109133427 | DTAG (PSU4815) system controller - Front Access, 300mm<br>• Front panel has RS-232 available through DB9 (not covered); Second RJ45 notpresent (covered)<br>• Front Access to all I/O |
| NE843G NE843G_S | CC109139358 150042938 | 19" 1U Rack-mount controller - DB-9<br>• Front panel has RS-232 available through DB-9 (not covered);Second RJ45 not present (covered)<br>• Rear Access to all I/O |
| NE843G2_S | 150047240 | 19" 1U Rack-mount controller - DB-9<br>• Front panel has RS-232 available through RJ45 connector (not covered); Second RJ45 not present (covered)<br>• Front Access to all I/O |
| NE843G_RJC | CC109142064 | 19" 1U Rack-mount controller - RJ45<br>• Front panel has RS-232 available through RJ45 connector (not covered); Second RJ45 not present (covered)<br>• Rear Access to all I/O |

**Table 1 Pulsar Plus Controller Family Product Options**

[1] Some options may still be under development. Please consult sales and technical field support for further inquiry.
[2] S suffix denotes controllers with the same features but updated to the current "Secure" hardware & software features.

# Getting Started – Installation, Start-Up, and Basic Configuration

| | |
|---|---|
| **Warning** | Review and follow the entire **Safety** Section before beginning the  installation process. Observe all warnings and labels on the equipment.<br><br>Install, service, and operate this equipment only by professional, skilled and qualified personnel who have the necessary knowledge and practical experience  with electrical equipment and who understand the hazards that can arise when working on this type of equipment.<br>Hazardous energy and voltages may be present in the system, system components, and on the interface cables that may shock or cause serious injury or death if safety precautions are ignored. |
| **Caution** | All tools and test equipment must be insulated in an approved manner.<br> Proper ESD protection is required in order to prevent ESD damage to the equipment. |

## Preparation

This section outlines the sequence for installing and quickly configuring the slot-controllers into a power system like the Infinity NE-S as well as connecting up the NE843G rack-mount controller to a Compact Power system. Infinity NE-M, NE-D, Infinity P2 and other similar systems shipped from the factory utilize the NE843C, NE843E, and NE843P door/panel-mounted controllers which are typically installed at the factory. Installation of these units will not be discussed in detail. Information will be provided on the input and output of the controllers to help aid in customization or replacement in the field.

### Installation Tools

You will need the following tools to install and test the System:

- Wire cutters and strippers
- Heat shrink gun
- 5/16-inch (8 mm) hex driver
- 1/4-inch hex driver
- Digital meter with an accuracy of ±0.02%
- Screw drivers (flat-blade and Phillips)
- ESD wrist strap
- Assortment of socket wrenches and drivers
- Test cable
- Protective canvas
- Insulating rubber mat
- Windows-based personal computer laptop (PC) and cable to connect the PC communications port to the local port of the controller OR a CAT5 LAN cable.

### Wiring Guidelines

- All electrical connections must be made using the proper crimping tools and dies and must be torqued to standard or specified values.

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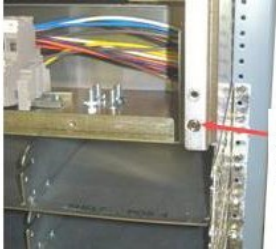
## Packaging

- All packages must be opened with a box cutter with the blade minimally exposed so that only the sealing tape is cut.

- Save all packaging material until the system has been powered up and all parts are operating within specifications. The shipping package may be used to return defective parts.
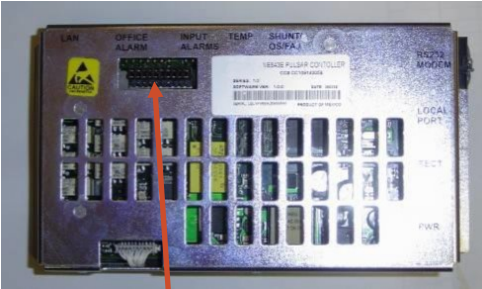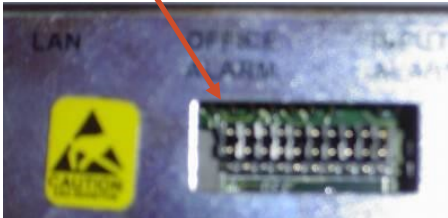
## Install and Configure Slot/Door-Mount Controllers

The controller is available factory installed into a door/panel of a power system, supplied as a removable slot controller, or provided as 1U frame mount controller. All these controllers utilize the same main microprocessor board. All functions, inputs, and outputs described are applicable to all controller configurations. The differences in the controllers are due the nuances of the front panel and physical packaging. The NE843A, CP843A, and EP843D Slot controllers are very similar. The NE843E, will be described. Information for the NE843G will also be provided since its package is the most different.

Before power is applied, some basic configuration may be required that is applicable to all configurations.

| Install and Configure Slot/Door-Mount Controllers | |
|---|---|
| **Step** | **Action** |
| | **Connect for ESD Prevention** |
| 1 | **NE843E**<br>Attach an ESD wrist strap or equivalent to the ESD grounding connector on right hand side of the inside of the frame in the medium system. Visible after door isopened.<br><br><br>ESD Grounding Connector (Medium Systems) | **NE843A/CP843A/EP843D**<br>Attach an ESD wrist strap or equivalent to the ESD grounding connector inside the distribution panel in front of the battery landings or another convenient location.<br><br><br>ESD Jack |
| 2 | **Configuring Individual Alarm Output Contact Type– "Close" on or "Open" on alarm**<br>The factory default configuration for all alarm outputs is "Open" on alarm. If this acceptable go to Step 4 otherwise continue. | |
| | Locate configuration jumpers for alarm relays on door-mounted controller. Each of the 10 output alarm jumpers is visible. | Locate configuration jumpers for alarm relays on slot-mounted controller. Lift the sliding cover onthe top to access each of the 10 output alarm jumpers. |

| Install and Configure Slot/Door-Mount Controllers | |
|---|---|
| **Step** | **Action** |
| 2 | **Configuring Individual Alarm Output Contact Type– "Close" on or "Open" on alarm**<br>The factory default configuration for all alarm outputs is "Open" on alarm. If this acceptable go to Step 4 otherwise continue. |

| | |
|---|---|
| Locate configuration jumpers for alarm relays on door-mounted controller. Each of the 10 output alarm jumpers is visible.<br><br><br><br>**Alarm Relay Jumpers**<br><br> | Locate configuration jumpers for alarm relays on slot-mounted controller. Lift the sliding cover on the top to access each of the 10 output alarm jumpers.<br><br><br><br> |

If an NE-872 Contactor Control Module is mounted on back of a Door Mounted Controller, remove it to gain access to the jumpers. After removing the mounting screws carefully position the NE-872 so that it is not in contact with electrically live components and is supported by the cables connected to it. Otherwise continue.



**NE-872 Contactor Control Module**

## Install and Configure Slot/Door-Mount Controllers

| Step | Action |
|------|--------|
| 3 | **Configure alarm relays to "Open" or "Close" on alarm as required:**<br><br>Jumpers 1-10 select the contact type provided at alarm connector J4 for each of the ten alarms. Carefully move and verify each of respective configuration jumpers to achieve the desired contact type: "Open On Alarm" or "Closed On Alarm" position. Use of an insulated tool is suggested. Return the sliding cover on the slot-controller when configuration is complete. Note: the same control board is utilized in all controller applications. However, the appearance of the jumpers may seem different because of its orientation in the different packages. Use the following along with labeling on the controller to assist in setting the jumpers.<br><br><br>**Slot Controllers - NE843A/ CP843A/ ED843D**<br><br><br>**Door Mount Controllers - NE843E**<br><br><br>**Microprocessor Board - Integrated into all controllers**<br><br>Each jumper corresponds to one alarm relay and each relay output can be configured independently. The following table contains the alarms along with the factory default alarm assignments to user relays R1-R7. Utilize the web or EasyView interface to reassign any of the alarm outputs to specific alarm events or to change the severity of the alarms. |
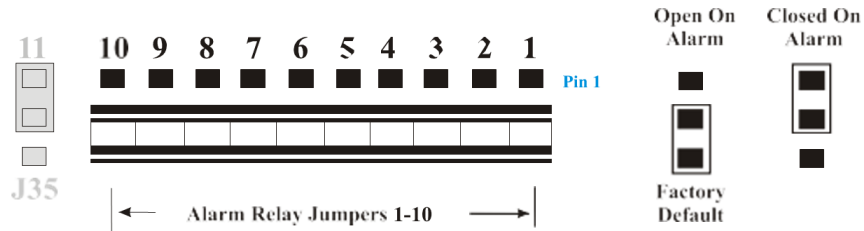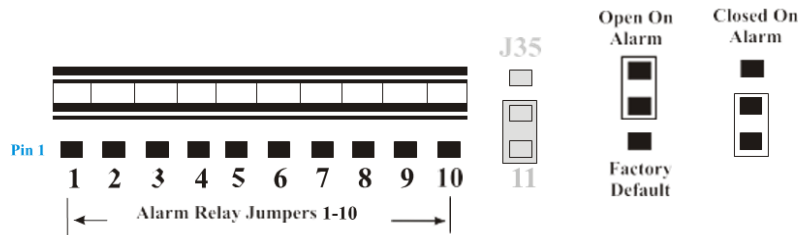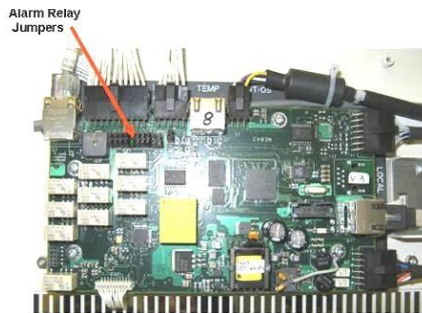
## Install and Configure Slot/Door-Mount Controllers

| Step | Action |
|------|--------|

| Jumper Number | Signal Name | Controller Standard Defaults Door Mounted |
|---------------|-------------|--------------------------------------------|
| 1 | PCR | Power Critical Alarm |
| 2 | PMJ | Power Major Alarm |
| 3 | PMN | Power Minor Alarm |
| 4 | R1 | Battery on Discharge (BD) |
| 5 | R2 | Very Low Voltage (VLV) |
| 6 | R3 | Fuse Alarm (FAJ1/2/FAN1/2) |
| 7 | R4 | AC Fail (ACF) |
| 8 | R5 | Rectifier/Converter Fail (RFA/CFA) |
| 9 | R6 | Multiple Fail - Rectifier/Converter/AC (MACF/MRFA/MCFA) |
| 10 | R7 | High Voltage - Rectifier/Converter (HVA/HFV/CHVA/CHFV |

**Table 2 Controller Standard Defaults Door Mounted**

If your system using the **optional ES771 Mid-String Voltage Modules** continue with Step 4. Otherwise go to step 5.

| Install and Configure Slot/Door-Mount Controllers | |
|---|---|
| **Step** | **Action** |
| 4 | Configure the 1-Wire serial bus reference: |
| | The ES771 modules must be referenced to the most negative potential of the DC bus. This reference is achieved by the proper setting of Jumper 11 (board reference J35) that is located next to the alarm relay configuration jumpers. The jumper is set in the factory for Positive Grounded systems (-48V) unless the controller is shipped with an assembled system that has a pre-determined primary output bus. An insulated tool must be used to set the jumpers. |
| | For systems with Positive Grounded batteries **(-48V/-24V)**, move 1-Wire Reference jumper 11 (J35) to the Positive Grounded position. For systems with Negative Grounded batteries **(+24V)**, move jumper 11 (J35) to the Negative Grounded position as shown: Again, the appearance ofthe jumpers may seem different when the controller is a    slot-controller or a door-mount controller because of the orientation of the circuit board. |
| |  |
| | **Slot Controllers - NE843A/CP843A/ED843D** |
| |  |
| | **Door Mount Controllers - NE843C/NE843E/NE843P** |
| | Make sure the jumper cover is returned in slot-mount controllers. |
| | **Securing The NE-872 Contactor Control Module** |
| | If the NE-872 Contactor Control Module unit was removed from the back of the door mounted controller replace it and tighten its mounting screws. |
| | **Securing the Slot-Mounted Controller** |
| | For NE843C/NE843E based systems go to next section on connecting the controller. Thefollowing is for the NE843A/CP843A/EP843D slot-controllers. |
| 5 | Place the NE843A/CP843A slot-mounted Controllers into a left-most power. The EP843D goes into the right-most power slot. Open the latch on right-hand side of the front panel by pushing down on the edge of the "blue" latch tab.  |
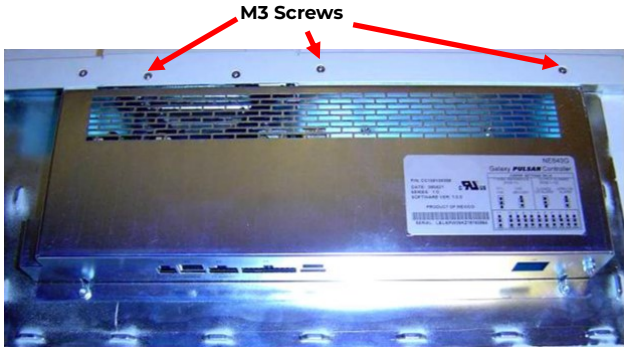
## Install and Configure Slot/Door-Mount Controllers

| Step | Action |
|------|--------|
| 6 | Push the controller firmly into the shelf until seated. Attach or reattach all cable connections to the appropriate connections located on the side of the controller.  |
| 7 | Close the latch.  The controller is now installed. |
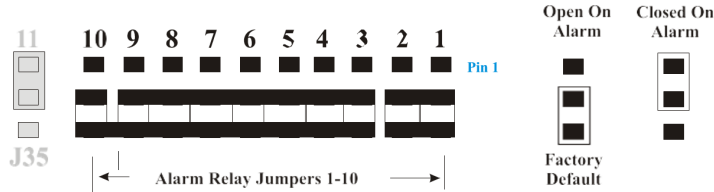
## Install and Configure Pulsar Plus NE843G Controller

Although the NE843G frame-mount controller is very similar to the NE843A, CP843A, and EP843D Slot controllers and NE843E door/panel-mount controllers a separate section is provided since its packaging is the most different. However, the basic steps are very similar.

### Install and Configure Pulsar Plus NE843G Controller

| Step | Action |
|------|--------|
| 1 | **Connect for ESD Prevention**<br>The NE843G is typically mounted into a customer premise frame. If the output alarm contacts need to be changed from "Open On Alarm" to "Close On Alarm" or the 1-Wire bus needs to be referenced for a +24V power system then the cover will need to be removed to change jumper settings. Jumper configuration can be performed with the unit installed in the frame or not.<br><br>Depending on the available space in a frame it may be easier to change the jumper settings when the unit is not mounted into the frame. Use appropriate ESD techniques when removing the cover and changing the jumpers.<br><br>Remove the three M3 Phillips head screws and #4-40 hex nuts with lock washers shown in the following figure. Do not remove other screws. Gently pull up on the rear side of the cover as youslide the cover towards the back to remove the cover. (Note: reverse these steps to put the cover back on the unit).<br><br>**M3 Screws**<br> |

| Install and Configure Pulsar Plus NE843G Controller | |
|---|---|
| **Step** | **Action** |
| 2 | **Frame Mounting**<br>The NE843G is designed to flush-fit into standard 19" frame rails. Extension brackets are available to mount the unit into standard 23" frame rails. Use the #12 paint piercing ground washers (12NWGRO/T2) along with the six 12-24 self-tapping screws (CC408577571) to mount the NE843G to the frame. Use at least two screws per side. The controller is typically mounted over the top of a J85480S1 L1 or L4 rectifier shelf but can also be mounted below.<br><br><br><br>Note: Return to this section if changing the jumper settings with the unit not installed in the frame. |
| 3 | **Configure Individual Alarm Output Contact Type– "Close" on or "Open" on alarm**<br>The factory default configuration for all alarm outputs is "Open" on alarm. If this acceptable go to Step 8. Otherwise continue. |
| 4 | If the controller is slot mounted remove it to gain access to the jumpers. Otherwise continue. |
| 5 | **Configure alarm relays to "Open" or "Close" on alarm as required**:<br>Jumpers 1-10 select the contact type to provide at alarm connector J4 of each respective Form-C output for each alarm. Carefully move each of respective configuration jumpers to the desired contact type: "Open On Alarm" or "Closed On Alarm" position as required per site instructions. Use of an insulated tool is suggested. Return the cover on the controller if finished configuring alarm relays and 1-Wire reference adjustment is not required. Note: the same control board is utilized in all controller applications. However, the appearance of the jumpers may seem different because of its orientation in the different packages. Use the following along with labeling on the controller to assist in setting the jumpers.<br><br><br><br>Each jumper corresponds to one output alarm relay contact that can be independently configured. The alarm table shown in Step 3 previously is also applicable for this controller but repeated below for convenience. Utilize the web or EasyView interface to change any of the alarm user relay alarm assignments if needed.<br><br>**See table below** |

| Jumper Number | Signal Name | Table 3  Controller Standard Defaults NE843G |
|---|---|---|
| 1 | PCR | Power Critical Alarm severity |
| 2 | PMJ | Power Major Alarm severity |
| 3 | PMN | Power Minor Alarm severity |
| 4 | R1 | Battery on Discharge alarm(BD) |
| 5 | R2 | Very Low Voltage (VLV) |
| 6 | R3 | Fuse Alarm (FAJ1/2/FAN1/2) |
| 7 | R4 | AC Fail (ACF) |
| 8 | R5 | Rectifier / Converter Fail (RFA/CFA) |
| 9 | R6 | Multiple Fail - Rectifier/Converter/AC (MACF/MRFA/MCFA) |
| 10 | R7 | High Voltage - Rectifier/Converter (HVA/HFV/CHVA/CHFV) |

**Table 3  Controller Standard Defaults NE843G**

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| Install and Configure Pulsar Plus NE843G Controller | |
|---|---|
| **Step** | **Action** |
| 6 | If your system **using optional ES771 Mid-String Voltage Modules** continue. Otherwise go to step 8. |
| 7 | **Configure The 1-Wire Serial Bus Reference:**<br>The ES771 modules must be referenced to the most negative potential of the DC bus. This reference is achieved by the proper setting of Jumper 11 (board reference J35) that is located next to the alarm relay configuration jumpers. The jumper is set in the factory for Positive Grounded systems (-48V) unless the controller is shipped with an assembled system that has a pre-determined primary output bus. An insulated tool must be used to set the jumpers.<br>For systems with Positive Grounded batteries **(-48V/-24V)**, move 1-Wire Reference jumper 11 (J35) to the Positive Grounded position. For systems with Negative Grounded batteries **(+24V)**, move jumper 11 (J35) to the Negative Grounded position as shown: Again, the appearance ofthe jumpers may seem different when the controller is a frame-mount controller because of the orientation of the circuit board.<br><br>**Frame-Mount Controller - NE843G**<br><br><br><br>Return the cover to the unit. |
| 8 | **Securing The Frame-Mounted Controller**<br>If the unit was not mounted into the frame see Step 2. Otherwise this portion is complete. |

## Connect To the Controller

Connections to the controller are made through appropriate cable assemblies either directly to the main board or automatically for direct backplane interconnects. The controller is designed with individual connectors for outputs, inputs, communication, and other specific system related items. Primary system interconnects are oriented at the top and right side edges of the NE843E door-mounted units, on the left side of the unit's NE843A/CP843A slot-mounted controllers, at the rear of the NE843G, and at the front of the EP843D. The following information is valid for all configurations since the same main microprocessor board is utilized in the different controller packages. Slight differences due to packaging will be noted.
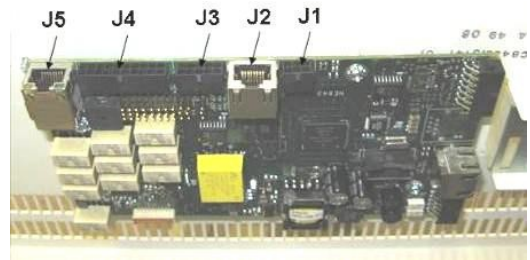
| NE843E |
|---|
|  |

| NE843A/CP843A |
|---|
|  |

| NE843G |
|---|
|  |
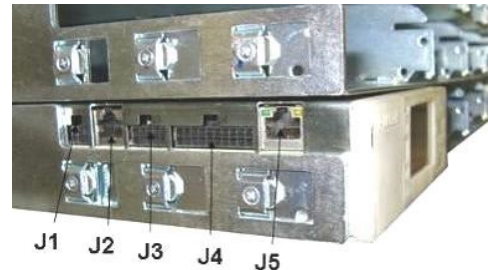
Many systems are shipped with the controller pre-wired in the factory. The following steps provides a brief description of how and what to connect to the controller if these connections are to be made in the field. Use only those that apply to the system configuration.

**Connect to the Controller**

| Step | Action |
|---|---|
| 1 | **Plant Interface Connector**<br><br>**J1** is a 6-pin connector provided for interfacing inputs required for basic plant operation in specific system configurations. These inputs include a single plant shunt, (2) distribution alarms, and open battery string alarm. J1 connections are typically made in the factory with a specific wire harness for a given system. Following is a brief description of the inputs. |

| Pin | Signal Name | Description |
|---|---|---|
| 1 | Shunt+ | Shunt + is the more positive lead from a system battery or load shunt. For battery shunts, this is the most positive lead of shunt during a discharge. The shunt may reside in the grounded or non-grounded side of the DC bus (±24V/-48V) as long as the Shunt Reference lead is connected correctly. This lead must comply with Class II wiring standards. |
| 2 | Shunt Reference | This signal is used to reference the shunt analog measurement circuits to either the battery or ground side of a system. The reference must be attached to the same potential or side that the monitored shunt resides. This lead must comply with Class II wiring standards. |
| 3 | Shunt- | Shunt - is the more negative lead from a system battery or load shunt. For battery shunts, this is the most negative lead of shunt during a discharge. The shunt may reside in the grounded or non-grounded side of the DC bus (±24V/-48V). This lead must comply with class II wiring. |
| 4 | Fuse Alarm Major - 24V | FAJ1 is the input monitor for distribution that accepts a contact to Battery for ±24V DC systems as an alarm. Factory default for FAJ1 is to alarm on application of DC bus voltage. Can be reconfigured as needed through the web interface. |
| 5 | Open String | OS1 is the input monitor that accepts a contact to Battery for ±24V/-48V DC systems to identify an open battery string. Factory default for OS1 is to alarm on application of DC bus voltage. Can be reconfigured as needed through the web interface. |
| 6 | Fuse Alarm Major -48V | FAJ2 is the input monitor for that accepts a contact to Battery for -48V DC systems as an alarm. Factory default for FAJ2 is to alarm on application of DC bus voltage. Can be reconfigured as needed through the web interface. |

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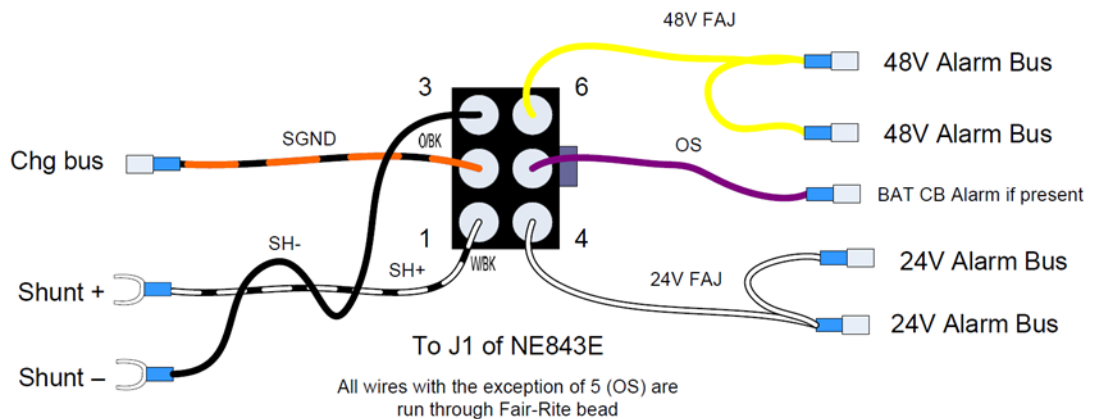
**Connect to the Controller**

| Step | Action |
|---|---|
| 2 | **One-Wire Battery Peripheral Connector**<br>**J2** is a standard shielded RJ-45 receptacle provided for making connections to "1-Wire" devices such as QS873 VT-Probes (up to 16) and ES771A Remote Mid-string Voltage Monitors (up to six). Standard cable assemblies have been designed and must be used for applications involving the QS873 VT-Probes or ES771 Remote Mid-string Voltage monitors. These cables provide simple plug-n-play from the controller to a QS873A probe, from the controller to an ES771A,  and between QS873A probes and ES771 modules. Consult the section on "1-Wire" peripherals for further information. Following are the present pin assignments for J2. |

| Pin # | Signal Name | Description |
|---|---|---|
| 1 | reserved | |
| 2 | reserved | |
| 3 | SIG_RTN | Protected signal return for 1-wire |
| 4 | reserved | |
| 5 | 1-Wire | 1-wire communication signal |
| 6 | +5V | Protected  +5V Power utilized by ES771 modules |
| 7 | reserved | |
| 8 | reserved | |

Note: J2 does not contain the RS485 rectifier control bus

| Step | Action |
|---|---|
| 3 | **Auxiliary Input Connector**<br>**J3** is 10-pin right angle header that provides a separate connection for auxiliary inputs. Standard color coded cable assemblies are available. Part numbers for the 50' and 150'  24AWG input cables are CC848817651 and CC848817668, respectively. Contact technical field support for additional cable options or needs. Utilize the appropriate cable to obtain the desired connections to the inputs shown below. |

Auxiliary Input



EPO — EPO RTN
PBT or GSTR — PBT / GSTR RTN
AUX MAJ — AUX RTN
AUX2 — AUX4
AUX1 — AUX3
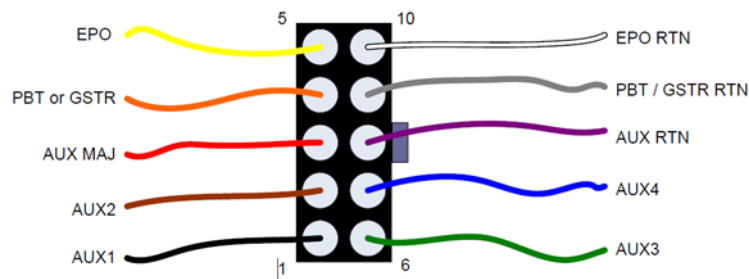
Plug to J3 on NE843

Aux inputs can be defined as a open or closure to pin8. Default is closure

Pin 7 can defined as Group Standby or Plant Battery Test.  Default is GRST

CC848890153  5'
CC848865980  15'
CC848817651  50'
CC848817668  150'

**Connect to the Controller**

| Step | Action |
|---|---|

| Pin #<br>Wire<br>Color | Signal Name | Description |
|---|---|---|
| 1 (BK) | Aux Input 1 (Aux1) | Auxiliary input to monitor a contact closure or open to its respective return on pin 8, Auxiliary Input Return. See Appendix E for alarm assignments |
| 2 (BR) | Aux Input 2 (Aux2) | Auxiliary input to monitor a contact closure or open to its respective return on pin 8, Auxiliary Input Return. See Appendix E for alarm assignments |
| 3 (R) | Aux Power Major Input (AMJ) | Auxiliary input to monitor a contact closure to the non- grounded side of a dc bus (±24V/-48V) to create the standard Auxiliary Power Major alarm. See Appendix E for alarm assignments |
| 4 (O) | Plant Battery Test/ Group Standby/TR (GSTR) | Dedicated input to be monitored for a contact closure to its respective return on pin 9. Used for Plant Battery Test and Group Standby Feature. Factory default as the Group Standby feature upon a contact closure. |
| 5 (Y) | Emergency Power Off (EPO) | Dedicated EPO input to be monitored for a contact closure to its respective return on pin 10, Emergency Power Off Return. |
| 6 (G) | Aux Input 3 (Aux3) | Auxiliary input to monitor a contact closure or open to its respective return on pin 8. See Appendix E for alarm assignments. |
| 7 (BL) | Aux Input 4 (Aux4) | Auxiliary input to monitor a contact closure or open to its respective return on pin 8. See Appendix E for alarm assignments. |
| 8 (V) | Aux Input Return (Aux_R) | Return for Auxiliary Inputs 1-4. |
| 9 (S) | Plant Battery Test/ Group Standby (TR) Ret.(GSTR_R) | Return for Plant Battery Test and Group Standby. |
| 10 (W) | Emergency Power Off Ret. (EPO_R) | Return for EPO input. |

**Table 4 Auxiliary Input Connector**

| 4 | **Output Alarm Connector**<br>All controller customer output alarm contacts are available at the **J4** output connector interface. J4 is a 20-pin right angle header with latching capability. Standard color coded alarm cable assemblies are available. Part numbers for the 50' and 150' 24AWG solid twisted pair output cables are CC848817635 and CC848817643, respectively. Contact technical field support for additional cable options. Utilize the appropriate cable to obtain the desired connections to the outputs shown below. |
|---|---|

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| Step | Action |
|---|---|
| | **Output Alarm Connector** |

All controller customer output alarm contacts are available at the **J4** output connector interface. J4 is a 20-pin right angle header with latching capability. Standard color coded alarm cable assemblies are available. Part numbers for the 50' and 150' 24AWG solid twisted pair output cables are CC848817635 and CC848817643, respectively. Contact technical field support for additional cable options. Utilize the appropriate cable to obtain the desired connections to the outputs shown below.



CC848890137 = 5'
CC109157442 = 15'
CC848817635 = 50'
CC848817643 = 150'

Plug to J4 on NE843

⚠️ Alarm pairs are set by DIP SW on the NE843 to be either open or closed. Default is open on alarm.

**Step 4**

| Pin #Wire Color | Signal Name | Pin #Wire Color | Signal Name | Pulsar Plus DisplayDefaults |
|---|---|---|---|---|
| 1 (BL) | PCR | 11 (BL-BK) | PCR_C | Power Critical Alarm(PCR) |
| 2 (O) | PMJ | 12 (O-BK) | PMJ_C | Power Major Alarm(PMJ) |
| 3 (G) | PMN | 13 (G-BK) | PMN_C | Power Minor Alarm(PMN) |
| 4 (W) | R1 | 14 (W-BK) | R1_C | Battery on Discharge(BD) |
| 5 (BK) | R2 | 15 (BK-W) | R2_C | Very Low Voltage (VLV) |
| 6 (BL-W) | R3 | 16 (BL-R) | R3_C | Fuse Alarm (FAJ1/2/FAN1/2) |
| 7 (O-R) | R4 | 17(R) | R4_C | AC Fail (ACF) |
| 8 (G-W) | R5 | 18 (R-G) | R5_C | Rectifier/Converter Fail (RFA/CFA) |
| 9 (W-R) | R6 | 19 (R-W) | R6_C | Multiple Fail - Rectifier/Converter/AC (MACF/MRFA/MCFA) |
| 10 (BK-R) | R7 | 20 (R-BK) | R7_C | High Voltage (HV) |

**Table 5 Output Alarm Connector**

Configuration jumpers for the alarm outputs have been set to provide an "Open" on alarm from the factory. See previous sections for changing the alarm contact type at J4.

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| Connect to the Controller | |
|---|---|
| **Step** | **Action** |
| 5 | **Network (LAN) Connection (Optional)**<br>The controller provides a standard 10/100Base-T Ethernet connection for a LAN or direct Craft port connection. Connector **J5** is a standard RJ45 shielded receptacle connection for standard Cat-5 cable connection between the controller and the LAN. This port has two main modes of operation: Server mode and LAN mode (Static and DCHP Client). The factory default configuration for the port is operation as a DHCP Client.<br>In DHCP Server mode the port can be used as a local Craft interface. In this mode, a laptop can be directly connected to J5 with standard straight-through Cat-5 cable. A standard web browser can then be used to access the controller by typing in network address http://192.168.2.1. All controller's in DHCP Server mode use this same address. A connection must never be made between the controller and LAN while the controller is in Server mode.<br><br>In DHCP Static or DHCP Client modes of operation the controller is to be configured with an IP addressas well as other network parameters. In these modes of operation the power system can be remotely monitored and accessed over the network. Permanent connections between the controller and LAN must use a Shielded Cat-5 cable and be routed according to appropriate building code. Following is the pin assignment for the connection:<br><br><table><tr><th>Pin #</th><th>Signal Name</th></tr><tr><td>1</td><td>TX+</td></tr><tr><td>2</td><td>TX-</td></tr><tr><td>3</td><td>RX+</td></tr><tr><td>4</td><td></td></tr><tr><td>5</td><td></td></tr><tr><td>6</td><td>RX-</td></tr><tr><td>7</td><td></td></tr></table><br>Note: A position for an additional RJ45 port is provided on the front panel for a future controller upgrade that will provide access to a second independent Ethernet connection. This connectorhas been designated J8. |

**Connect to the Controller**

| Step | Action |
|------|--------|
| 6 | **Telephone Line Connection (Optional)** Skip this section if the controller is not equipped with the Modem option.<br>**Slot-Controllers**<br>A standard RJ11, **J6**, provides a directconnect to a POTS line.<br>**Door-Mount controllers**<br>Modem provides an RJ11 connection for the POTS connection. Modem should be mounted according to respective system drawing.<br>Use routing techniques per code to connect from the controller to the POTS line. Note: Use of the modem does require a dedicated connection to the controller's local RS-232 Craft port. | <br>J6 Connector |
| 7 | **Local RS-232 Serial Port Connector**<br>Standard RS-232 serial connection (DB-9 or RJ45) provided at the front panel for local Craft port or Modem. A PC using EasyView or a standard terminal emulator can be connected for local access. The port can also be configured to support an external/Internal modem. (step 6)<br>The local port pin assignments take the assignment as a Data Circuit-terminating Equipment (DCE).<br>When the RS-232 port is configured for a Modem, Craft port connectivity is temporarily lost. The Modem will have to be disconnected to use the port as a Craft port. This port is factory defaulted to operate as local Craft port. | <br>RS-232<br>Ethernet<br><br>RS-232(RJ-45) |

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# Connect to the Controller

| Step | Action |
|---|---|

|  | Pin# | Signal Name |
|---|---|---|
|  | 1 | 232DCD (RS-232 Data Carrier Detect) |
|  | 2 | 232RXD (RS-232 Receive ) |
|  | 3 | 232TXD (RS-232 Transmit) |
|  | 4 | 232DTR (RS-232 Data Terminal Ready) |
|  | 5 | Ground (Current Limited Ground) |
|  | 6 | 232DSR (RS-232 Data Set Ready) |
|  | 7 | 232RTS (RS-232 Request To Send) |
|  | 8 | 232CTS (RS-232 Clear To Send) |
|  | 9 | NC (No Connect) |

**Table 5 Local RS-232 Serial Port Signals**

Note: an RS-232 to USB adapter (dongle) may be used to connect the RS-232 port to the USB port of a PC. Adapters may require a specific manually set baud rate to operate properly. See Figure 10: Configuration Menu (part 2) and Table 29 Communication Ports Configuration.

**Note: before connecting the USB or RS-232 port to your PC, be sure that the power system and its output are properly grounded. Discharge Ground (DG) bus must be bonded (connected) to earth ground.**

**CAUTION: damage to the controller may occur if the USB or RS-232 port is connected to a PC when Discharge Ground (DG) bus is not bonded (connected) to earth ground.**

---

**8**

**NE843E/ NE843G Controllers Only**
The connections described in Steps 8 and 9 are automatically performed internally through the backplane connection for NE843A/CP843A/EP843D Slot-Controllers**.** Although the Infinity NE-M, NE-D, NE-S systems have the NE843E, and pre-wired in the factory, the connections are valid.

**Power And Sense Connector**
**Skip if (NE843E/NE843G pre-wired in factory)**
Basic power and sense to connector **J9** must be made in order for the controllers to function. The pin assignments for **J9** are listed below.

**Connect to the Controller**

| Step | Action | | | |
|---|---|---|---|---|

| Pin # | Signal Name | Description |
|---|---|---|
| 1 | RS485+ | "B" side of the RS485 differential pair. |
| 2 | GP_REF | Reference lead for the RS485 rectifier GP bus. Must be connected to the reference side of internal communication circuitry in the rectifier.<br>• DC Return bus (DG/Ground) in **Infinity NE**<br>• Negative 48V DC bus (BAT) in **CP/EPS** |
| 3 | V2SNS_BAT | Second Sense Voltage connected to appropriate non-grounded sideof the second DC bus (BAT) to provide voltage sense.<br>In **NE** Power Systems this connection is connected to negative DC bus of a -48V system. |
| 4 | V2SNS_DG | Second Sense Voltage connected to appropriate return/ groundedside of the second DC bus (DG) to provide voltage sense.<br>In **NE** Power Systems this connection is connected to positive DC bus of a -48V system which is also return/DG. |
| 5 | V1SNS_DG | Primary Sense Voltage connected to appropriate return/ groundedside of the primary DC bus (DG) to provide voltage sense.<br>In **NE** Power Systems this connection is connected to negative DC bus of a +24V system which is also return/DG. |
| 6 | V1SNS_BAT | Primary Sense Voltage connected to appropriate non-grounded sideof the primary DC bus (BAT) to provide voltage sense.<br>In **NE** Power Systems this connection is connected to positive DC bus of a +24V system (BAT). |
| 7 | RS485- | "A" side of the RS485 differential pair. |
| 8 | DG | Reference connection to the Grounded/return side of the DC bus foralarms. |
| 9 | V2- | Connection to the negative potential of the secondary DC bus for secondary input power. |
| 10 | V2+ | Connection to the positive potential of the secondary DC bus for secondary input power. |
| 11 | V1- | Connection to the negative potential of the primary DC bus for themain input power. |
| 12 | V1+ | Connection to the positive potential of the primary DC bus for main input power. |

**Table 6 Power And Sense Connector**

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| Connect to the Controller | |
|---|---|
| **Step** | **Action** |
| | Note: V1 and V2 sense and power inputs can be used for 48V or 24V, vice versa. Systems from the factory will be wired such that V1 is for +24V connections and V2 is for -48V connections when possible for product consistency. If connecting the system up for single voltage plant application, regardless of the system DC potential, it is recommended that signals associatedwith V1 sense and power inputs be utilized. Thus, connections must be made to GP_REF, V1SNS_DG, V1SNS_BAT, DG, V1-, and V1+ in order to get the appropriate voltage at the front panel test jacks. If it is desired only to hook up the V2 sense and power inputs then the V1SNS_DG(pin 5) and the V2SNS_DG (pin 4) signals must be tied together at J9. **Power For The NE843G** The NE843G is primarily applied with the CP (Compact Power) family of rectifiers. Kit CC109144820 provides all the components necessary to connect to a J85480S1 L1 or L4 CP shelf. CC848845058 is the power cable provided with the kit. Attach one end of the cable assembly to the power connector J9 located on the side of the controller and the other end with the ring terminals to the DC output of the shelf. The red wire is the Positive (+) DC bus connection and the black wire is the Negative (DC) bus connection. Use the lances designed into the controller shelf to secure the cable in place.  Note: the NE843G is a versatile controller that can be used with a variety of rectifier families. Consult technical field support or sales for the availability of other kits or application needs. |

| Connect to the Controller | |
|---|---|
| **Step** | **Action** |
| 9 | **RS-485 Serial Connection (Skip if factory installed in the system)**<br><br>In addition to being available at connector J9, the RS-485 rectifier communication bus is also accessible at connector **J10**. J10 is a standard shielded RJ45 connector on the controller that provides quick connections between the controller and serial system rectifiers and components. J10 is not available on slot-controllers since these units obtain their RS485 connections internally through a backplane connection through J9. J10 is used to directly connect to power shelves and distribution control boards such as the QS871, NE82, and ES772. Following is the pin assignments for connector J10:<br><br>_table below_<br><br>Note: when using J10, the GP_Ref signal must still be referenced properly in the system.<br><br>**Communication For The NE843G And CP843A**<br>with the Compact Power (CP) Line of systems<br><br>**NE843G**<br><br>Kit CC109144820 provides all the components necessary to connect the serial communication of the NE843G to a J85480S1 L1 or L4 CP shelf. These components include a CC848833475 communication cable (ribbon cable to RJ45 adapter on rear of CP shelf), a CC848833384 RJ45 bracket (for adapter cable), CC408574131 M5 screw (to secure bracket to CP shelf), a 555052-1 RJ45 Coupler, and a CC848791500 a 4' RJ45 Serial Cable (Controller to 1st CP Shelf).<br><br>• Use the M5 screw to secure the RJ45 bracket to the **first** CP shelf at the ground screw location located at the rear of the shelf.<br>• Attach the RJ45 coupler to the adapter bracket.<br>• Connect IDC end of the communication cable to J1 on the rear of the CP power shelf and the other end to the coupler.<br>• Attach the RJ45 serial cable between the shelf adapter and J10 of the controller. Note a standard RJ45 Cat-5 cable can be used to make the connection between the CP shelf and the NE843G.<br>• Strain relief the communication cable to the shelf and controller as necessary. |

| Pin# | Signal Name | Description |
|---|---|---|
| 1 | RS485+ | "B" side of the RS485 differential pair. |
| 2 | RS485- | "A" side of the RS485 differential pair. |
| 3 | GP_REF | Reference lead for the RS485 rectifier GP bus. Must be connected to the reference side of internal communication circuitry in the rectifier.<br>• DC Return bus (DG/Ground) in **Infinity NE**<br>• Negative 48V DC bus (BAT) in **CP/EPS** |
| 4 -8 | No Connection | |

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| Connect to the Controller | |
|---|---|
| **Step** | **Action** |
| | **Ground Screw**<br><br>Once connected the CP communication will resembled that depicted below.<br><br>The RJ45 communication bracket must not interfere or be interfered with by the multi-shelf cable interconnections. Ribbon cable assembly 848738253 must be used to connect from J2 of the first CP shelf to J1 on the second CP shelf as shown. |
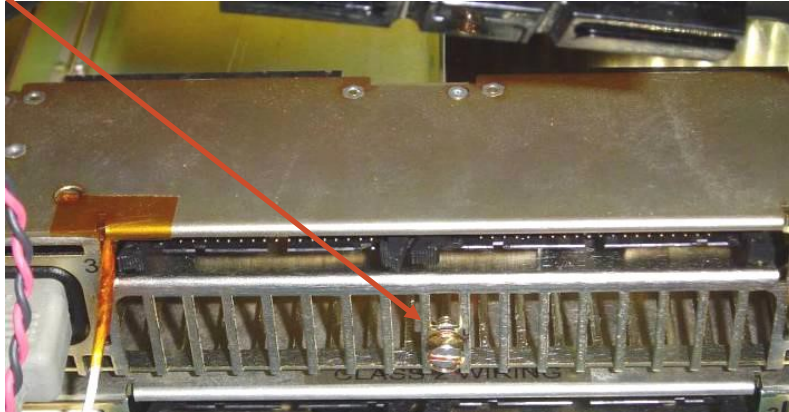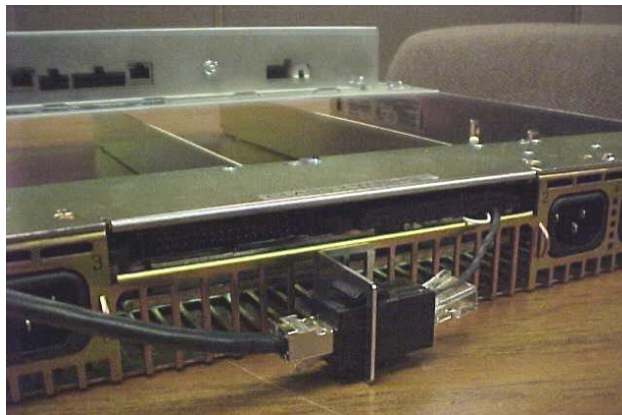
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| Connect to the Controller | |
|---|---|
| **Step** | **Action** |
| | **CP843A**<br>The CP843A controller is slot controller and automatically connects up to the RS485 rectifier control bus once inserted into a power slot. However, the CP shelf must still be configured to operate in RS485 mode. This is done by using cable assembly CC848838284 which enables the RS485 mode of the shelf. The addition of other CP shelves utilizes the same inter-shelf cable 848738253 previously described.<br><br>• Plug CC848838284 cable assembly into J1 of the first CP shelf.<br><br>Note: the NE843G can be used to communicate with a variety of other Protocol based serial rectifier families. Consult technical field support or sales for the availability of other kits orapplication needs. |
| 10 | **RS-232 Serial Connection For Local Port And MODEM**<br>Connector **J12** is a 14-pin right angle Molex connector used to make connection to an optional MODEM or is brought to the front panel DB9 or RJ45 for serial Craft port access. J12 access is not available on the NE843A/CP843A/EP843D slot-controllers or the NE843G.<br>Use the provided cable assembly to connect to the BSM modem. Note: the connection to thefront panel serial port will have to be removed and secured appropriately. Once the MODEM is installed the front panel serial port will not be active. |

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## Initial Startup of the Controller

Once all relevant installation procedures are performed as defined in respective system product manualsand documentation, the system is ready to be powered up.

| Initial Startup of controller | |
|---|---|
| **Step** | **Action** |
| 1 | Verify all connections are as described previously before applying power. Leave all rectifier and converter modules disconnected initially. |
| 2 | If equipped with batteries, verify their connections are made with the proper polarity, then, place all external battery disconnect switches into their ON positions. Use an external meter to verify again proper polarity. |
| 3 | Plug in a single rectifier module to the power system and turn on its AC input service. Verify the Pulsar turns on and shows the correct voltage and polarity before continuing. Only if both the voltage and polarity are shown correctly, plug in and apply AC power for the remaing rectifiers, then the converters (if equipped), |
| 4 | After approximately one minute, all LEDs on all components including rectifiers and converters, the controller, LVD control boards, aux displays, and remote voltage monitor modules should be green. If this is not the case, initiate the "Clear Events" and "Uninstall Equipment" operations found under **Menu Control/Operations** menu. Alarm conditions should clear. If all LEDs still aren't green, review the installation procedure and refer to the troubleshooting section. The controller display will indicate "NO ALARMS", system float voltage, total load current, and system operating mode. LEDs and back-light will be green for no alarms.  Contrast can be adjusted for the site's ambient condition by using the up and down arrow keys at the default menu shown. Contrast adjust is also available at : **Menu→Configuration→System Settings→Display Contrast** **\***The display may have a protective transparent covering over the LCD portion. Make sure thiscovering has been removed for optimum viewing before adjusting the contrast. |

| Initial Startup of the Controller | |
|---|---|
| **Step** | **Action** |
| 5 | Check the voltage reading on the controller display to verify that it complies with the system float voltage setting. The controller is factory configured with a rectifier Float voltage set-point of - 54.48V for -48V rectifier systems and ±27.24V for ±24V rectifier systems. If converters are present, the display shows their voltage and current in smaller font. The Controller is factory configured with a converter output voltage set-point of -52.0V for -48V converters and +26.0V for +24V converters.<br><br>Note: If Slope Thermal Compensation (STC) is active or if the connected batteries are not fully charged, the bus voltage may be different than the set-point. If possible, open the external battery disconnect prior to making measurements to eliminate these effects. If QS873 VT probes are installed in the system. STC may be active. This will be indicated by the Plant Mode "FLOAT – TEMP COMP".<br><br>STC can be manually turned off **at:**<br>**Menu→Configuration→Batteries→Batt Temp Management→Temp Comp.**<br>If this is done, **be sure** to **Enable** the feature before leaving. |
| 6 | **Verifying a simple alarm**<br>Remove a rectifier from its slot. The controller will illuminate its back-light or status LED amber indicating a missing rectifier condition.<br><br>When the controller prompts to remove equipment press enter ∎. This is a short cut that initiates the "Uninstall Equipment" operation found under the **Menu→Control/Operations** menu. The alarm condition will clear and correct rectifier status will be displayed in **Menu→Status→**Rectifiers.<br><br>Return the rectifier to its slot. The controller will update the rectifier status. If the above conditions did not yield the proper results, refer to the troubleshooting section. |

## Basic Controller Configuration

The Pulsar Plus family of controllers are a multiple micro-processor based unit with volatile and non-volatile memory. These units have been factory preconfigured with standard or customer specific configuration default settings for all features and thresholds. Many systems shipped from the factory all ready have the controller installed, configured, and tested for the system it resides. Installation and much of the configuration of the system controller may not be required. The date and time is generally set at factory test to Central Standard Time zone.

Controllers with customer specific configuration defaults are also available. These units will be assigned a unique apparatus code for ordering and management. A configuration template is available to facilitate this process. OmniOn Power Systems predefined industry standard factory defaults are utilized for the Pulsar Plus family standard controllers. Although the configuration default files are permanently stored until they are replaced, all configurable parameters and thresholds can also be reconfigured or modified as needed in the field. These items are then stored in non-volatile memory. However, a user can always return to factory programmed configuration by initiating the "Loading Defaults" operation for a specific battery type.

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The **Basic** items to configure for basic system operation are:

- Float Set-Point (And associated alarms described in next section)

- Battery Type and number of strings

- Date

- Time

The controller is designed to support multiple battery technologies. These **Generic** technologies include:

- Valve-Regulated Lead Acid (Valve-Reg)

- Flooded Lead Acid (Flooded)

- Lithium Metal Polymer (Li-LMP)

- Lithium ELiTE (Li-ELiTE)

- Nickel-Cadmium (Ni-Cd)

Standard float values, alarm thresholds, and other functions are set as defaults for each of these battery types that can be modified in the field as desired. The controller also provides a list of industry standard batteries that are linked to these technologies and share the standard defaults. Batteries can be added or deleted from this list as required through the use of the controller's remote interfaces.

The controller has been factory pre-configured with the generic Valve-Regulated Lead Acid (Valve-Reg) battery as the standard configured battery model. All associated configuration items for the "Valve-Reg" battery type are utilized. Thus, the default system float voltage setting and alarm thresholds are configured assuming the power system contains VRLA batteries that require an uncompensated float voltage of 54.48V (-48V) or +27.24V (+24V) as observed during the power-up procedure.

Basic configuration items such as the battery type, float set-point, date, and time, and site ID can be reconfigured in the field from the front panel or through remote means. To change these items do the following:

.

| Basic Controller Configuration | |
|---|---|
| **Step** | **Action** |
| 1 | **Change the battery type to another battery type or specific model.**<br><br>From the front panel go to **Menu→Configuration→Batteries→Type** and select a battery model from the list. If the battery model is unique, select a generic technology class for the installed battery or use the Craft port to enter a specific battery model. A new model can be entered into the controller through the use of the web pages at **Settings→Battery Types**. Note: the present controller can store 20 specific batteries. One may have to be deleted before adding.<br><br>**Specific battery models stored in the standard controller:**<br>• 12A100FT<br>• 12A150FT<br>• 12IR150/150LP<br>• 3A125-33L<br>• 3A95-21L<br>• 3A95-27L<br>• 3A95-33L<br>• 6A95-13L<br>• 6A95-15L<br>• IR30EC<br>• IR40EC<br>• L54V63FTX<br>• NCX-125<br>• NCX-80<br>• NSB110FT<br>• NSB170FT<br>• NSB60FT<br>• SE48S63<br>• SE48S80<br>• TEL12-105F<br><br>**Generic Battery technologies:**<br>• Valve-Regulated Lead Acid (Valve-Reg)<br>• Flooded Lead Acid (Flooded)<br>• Lithium Metal Polymer (Li-LMP)<br>• Lithium ELiTE (Li-ELiTE)<br>• Nickel-Cadmium (Ni-Cd)<br><br> |

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| Basic Controller Configuration | |
|---|---|
| Step | Action |
| | Press "save" once the correct battery is selected. If a generic battery type is selected select "Yes" to load the standard defaults. Note the controller will ask if the standard defaults are desired selecting yes will select the standard defaults for the selected battery. Selecting no, will leave settings at the default settings for the generic VRLAs. The float set-point value is one of these items. <br> Note: Slope Thermal Compensation has been factory defaulted to be enabled with all VRLAbatteries. If a VRLA battery is selected and there is no QS873A battery temperature probe attached to the controller a "Thermal Probe Fail" alarm will be generated. The alarm can be removed by connecting a probe to the system or by disabling the feature. The feature can be disabled at **Menu→Configuration→Batteries→Batt Temp Management→Temp Comp.** <br> Select the Temp Comp and change the feature to be "Disabled". Save. |
| 2 | To change the system rectifier Float-set-point go to **Menu→Configuration→Float Settings→Set-Point** <br> Set the desired system bus voltage. Save. |
| 3 | Set system date by going to: **Menu→Configuration→System Settings→Date** <br> Set to current date. <br> Set system time by going to: **Menu→Configuration→System Settings→Time** <br> Set to present time. |

## Web Interface

The controller has an integrated 10/100Base-T port that supports standard protocols over TCP/IP like SNMP, TCP/IP, FTP and Telnet. It also has an integrated HTTP web server that serves up web pages to remote PCs using standard web browsers. Once properly connected to the network, simply typing the IP address assigned to the controller in the browser will serve up the log-in screen. The web pages support the majority of the functionality supported by EasyView and the T1.317 interface. The best way to learn the operation and content of these interfaces is through use. The basic operations performed at the front panel previously described are available through the web interface as well as all front panel configuration items. Following are few sample screens. Note: web pages are updated for functionally and aesthetics. Thus, some of the screens shown may be slightly different than those served up by your controller.

### Craft Port

The web interface can be accessed remotely over the LAN or with a direct connection from a local PC. Once logged in the interface is the same. The following describes configuring the port as a local Craft port. This mode of operation allows a user to connect an external craft PC directly to the port and use the PC's standard Web browser to locally access the system. This Craft port is supported by the controller operating in DHCP (Dynamic Host Configuration Protocol) server mode. While the Craft port is operating as a DHCP server, it must **never** be plugged into the building or surrounding LAN.

To access the system using the Craft Port follow the following basic procedure:

| Web Interface Configuration | |
|---|---|
| **Step** | **Action** |
| 1 | Find and take note of the controller's Working IP (WIP) on the front panel display by going to **Menu→Status→Network Settings→Port 1**<br><br>**Note: If the Port is not configured as a Server it will not have the correct IP address.** To use the Ethernet port locally as a Craft port it needs to be configured as a DHCP Server. DHCP Server operation can be validated at **Menu→Status→Network Settings.** Scroll down to view the port'spresent configuration.<br><br>If it is not in DHCP Server mode, make sure the Craft port is not plugged into a LAN connection and re-configure the DHCP setting from the front panel to be Server. This is parameter is found **In Menu→Configuration→Communication Ports→Network Settings→DHCP.**<br>Note: Changing a Network parameter like this will generate and alarm for: Controller Reboot Required. Before rebooting however, it is necessary to live with this alarm for approximately 2 minutes, to permit the change to be saved in memory. Then, from the front panel, the controller may be rebooted by either Menu path: Menu → Control/Oper →Reboot Controller or by removing and reapplying power to the unit so that it can start using this new Ethernet port configuration. Repowering can be done by removing and re-inserting the slot controller or by removing and reattaching the power connection at J9 on the door-mounted or shelf controller. The rebooting process takes approximately two minutes. Validate the change to server mode at Menu → Status →Network Settings. |
| 2 | Attach the LAN cable between the RJ45 (P2) on the main board to the appropriate Ethernet porton the Craft PC. |
| 3 | Open the PC's browser and enter the controller's WIP as the destination address. This address is http://192.168.2.1 by default. The controller has HTTP capabilities and will begin to return appropriate system representative web pages. |
| 4 | With a standard browser, a login page similar to that depicted below will be served up by the controller. There are three levels of access through the port; Read-Only, Read/Write, and Read/Write with password management privileges. Passwords defaults for the Craft port as well as other remote access means default as follows:<br><br>**Access**  **Default Password**<br>User (Read-Only)  OmniOn Power<br>Super-User (Read/Write)  super-user Administrator<br>(Read/Write/Password Administration)  administrator<br><br>**Enter Password**<br><br>Password:[＿＿＿＿＿] [Submit] [Reset] |

## Security Levels/Passwords

- The controller supports three levels of access: (User, Super-User, and Administrator). Password defaults can be changed only by a user of administrator privileges.

## User security level:

- Can view almost every parameter in the system
- Can change only a few parameters considered to be of standard maintenance practices
- Default password: **OmniOn Power**

## Super-User security level:

- Can do everything the user can do
- Can change any configuration parameter in the system (except passwords)
- Default password: **super-user**

## Administrator security level:

- Can do everything the super-user can do
- Can change passwords
- Can upgrade controller software
- Default password: **administrator**

After the controller has granted access through the port, the controller serves up a Home page similar to that shown below. Front panel access and capabilities are a super-set of the functions and features available through the Craft port. Configuration of individual parameters and features can be performed by using the items located in the Settings tab or a general quick configuration of the system can be performed through the Installation tab. The Home Page has tabs that are partitioned as the following:

| Web Interface Tabs | |
|---|---|
| Home | High-level summary for the Power Units, Batteries, Distribution, Alarms present, and Controller summary are shown. There are also quick link tabs that take you to the other web pages. These tabs are the Home, Reports, Maintenance, Settings, Installation, Software, and Logout:<br><br><br><br>Note that the Home page includes a representative graphic of the power components that make up the power system.  These include the number of shelves, rectifiers in place with their appropriate outputs, converters and outputs, empty slots, and indications of which rectifiers/converters are in alarm. In order to depict these properly, this layout may need to be adjusted on the **Settings → System → Shelves web page** |
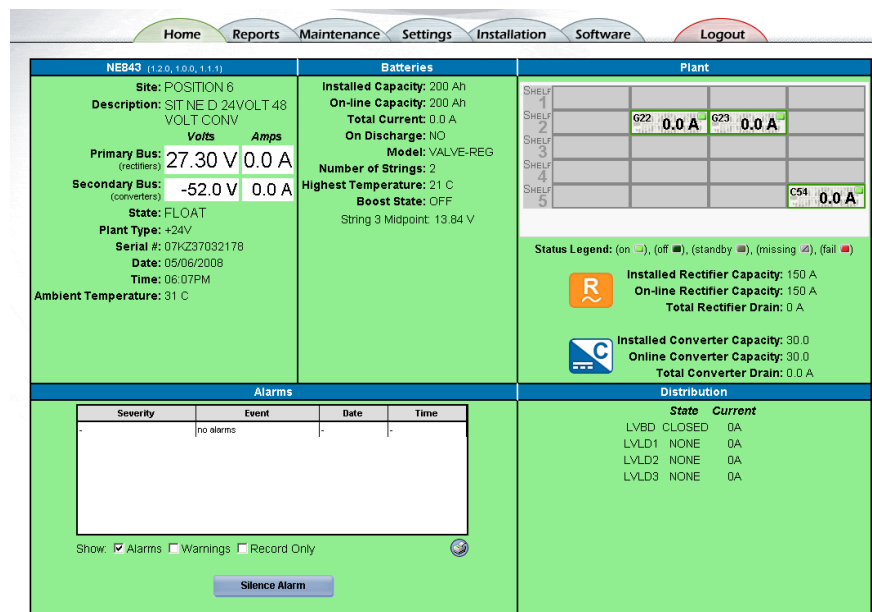
## Web Interface Tabs

| | |
|---|---|
| Reports | The reports tab displays reports that the system controller can display through web pages. These reports include Event History, Inventory, Statistics, Trends, and Battery on Discharge.Individual history groups like Alarm History, Boost History, Login History, and Rectifier history are also available.<br><br>Home   Reports   Maintenance   Settings   Installation   Software   Logout<br><br>Please select which report you would like to view:<br><br>Inventory       Alarm History<br>Battery Discharge       Boost History<br>Statistics       Login History<br>Trends       Rectifier History<br>      Converter History |
| Maintenance | Allows remote access to Control/Operation commands that are available through the front panel. These include restarting rectifiers/converters, starting alarm or battery tests, asserting boost, clearing history and statistics, clearing latched events and missing equipment, placing rectifiers/converters in and out of Standby, cutting of the audible alarm. A controller reboot may also be initiated here.<br><br>Home   Reports   Maintenance   Settings   Installation   Software   Logout<br><br>**System**: lamp test, cutoff audible alarm, restart rectifiers, restart converters, boost, start battery test, start alarm test, start local audio test, (remote standby), load defaults [Factory]<br>**Clear Data**: clear missing devices, clear latched events, clear history [All History], clear statistics [All Statistics]<br>**Disconnects**: open LVBD, no LVLD1 contactors, no LVLD2 contactors, no LVLD3 contactors<br>**Start Equipment**: Rectifiers - No rectifiers in standby. Converters - No converters in standby.<br>**Stop Equipment**: Rectifiers - G22 G23, Converters - C54<br>T1.317 Terminal... |
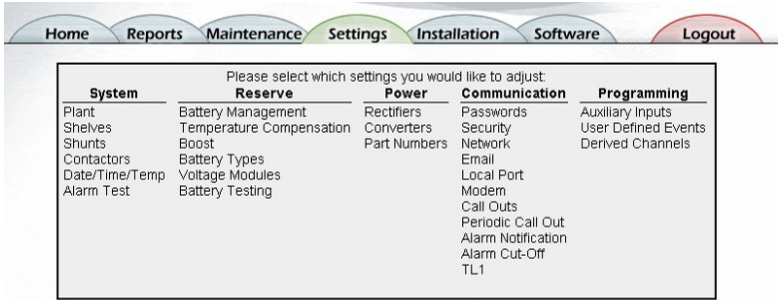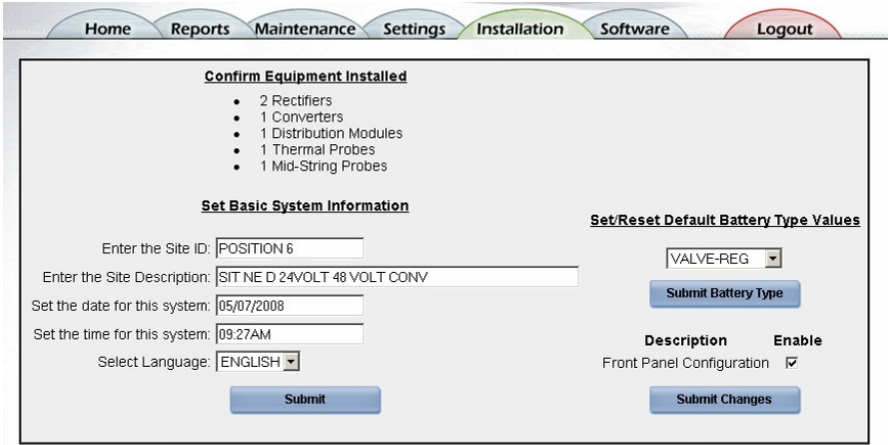
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## Web Interface Tabs

| | |
|---|---|
| Settings | Items in this menu are used to configure all the individual system parameters, features, andthresholds. These fields are arranged by System, Reserve, Communication and Programming.<br><br> |
| Installation | This tab provides access to quickly configure the primary items typically needed for a site. These configurations are the minimum for basic system operation. These items include selecting the battery type, date, time, and the site ID mentioned during the front panel configuration start-up section.<br><br> |

## Web Interface Tabs

| | |
|---|---|
| Software | This tab provides access to the Backup, Restore, and Upgrade features. Backup allows a user to store the controller's entire configuration to a "config.gal" file. This file can be used to configure other controllers with the same exact configuration or to "restore" the configuration of a controller that was modified in the field. The "Restore" tab provides this configuration upload ability. The "Upgrade Software" tab allows a user to upgrade specific portions of the controller's code: web pages, application code, configuration factory defaults, and language file. The controller supports two front panel languages. English, Spanish, French, and German are a few languages supported by the controller. Language support for web pages will be available in the future. Consult appropriate sales or technical support for Language file availability.<br><br> |

Web pages will continuously be improved. A good method to use to understand the functions and features of the controller is by accessing the controller through the network or Craft port and click on the individual items to become more familiar with the items. More details on the front panel capabilities and Craft port web pages are found in the controller section.

# Controller Operation

## Overview

The Pulsar Plus family of controllers provides system monitoring and control features for Infinity NE, CP, and other OmniOn Power rectifier based power systems. These controllers monitor and control system components including rectifiers, converters, and distribution modules via a
multi-drop RS485 digital communications bus. System status, parameters, settings, and alarm thresholds can be viewed and configured from the controller's front panel display. Assignment and configuration of alarm inputs and output relays can be performed from a laptop computer connected to a local RS-232 or Ethernet port, or by remote access is through a network connection to the World Wide Web (internet) or your enterprise network (intranet). An optional modem is also available.

This section describes the controller features, functions and alarms from perspective of a user utilizing the front panel display. All these features are available through the remote interfaces including EasyView2™ and Web pages served by the controller. EasyView2™ is the graphic user interface (GUI) OmniOn Power provides for local serial port or remote MODEM access available on the web site. The web interface and front panel will be the interfaces of choice. This section focuses on describing the controller from the front panel perspective since it is the most available interface and requires no PC or computer hardware. The items contained in the front panel are applicable to respective feature implementations in the web pages.
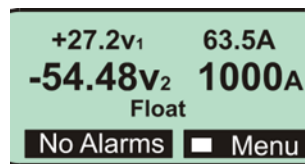


**Figure 5: Front Panel Display**

The Pulsar Front Panel display in Figure 5 shows the front panel display for a system with both rectifiers and converters. The display (V1 versus V2) correlates with test jacks. The large font indicates the "Primary" or rectifier dc bus; the smaller font shows the "Secondary" or converter dc bus. The controller will automatically determine the appropriate fonts and test jack designations.

For systems with no converters only a single voltage/current pair will be displayed on the front panel along with the correct test jack association. The other test jack will be unused and will have near zero voltage.

# Front Panel Controls and Status Display Pulsar

## Controls

Pulsar controllers have six tactile buttons for navigation through a structured menu system. The buttons serve multiple purposes depending on the active screen. These functions are summarized below.

| Navigation Controls - Pulsar | | |
|---|---|---|
| **Buttons** | | **Description** |
| △ ▽ | Display Contrast | In the Main Display, the ▲▼ buttons increase or decrease the display contrast. Contrast adjustment is also available through the menus at **Menu→Configuration→System Settings.** |
| | Parameter Change | When changing a system parameter, the ▲▼ buttons increase or decrease the value of the parameter. |
| △◁▷▽ | Direction Buttons | In the Menus, the ◻▲▼◻ direction buttons navigate to make a selection. A black box highlighting a menu item indicates that the item has sub-menus. |
| ◻ | Enter Button | Enters a sub-menu or confirms a parameter change. From the Home Page only, goes to the top level Main menu. |
| ◁ | ESC Button | Goes up one menu level or exits a parameter change without saving. |

**Pulsar**



Status LEDs

RS-232 and Ethernet Ports to plug in a PC to use Web Pages

Voltage Test Jacks

LCD Display

Menu Navigation

*Galaxy Pulsar*

+27.2v₁    63.5A
-54.48v₂  1000A
Float
No Alarms  ◻ Menu
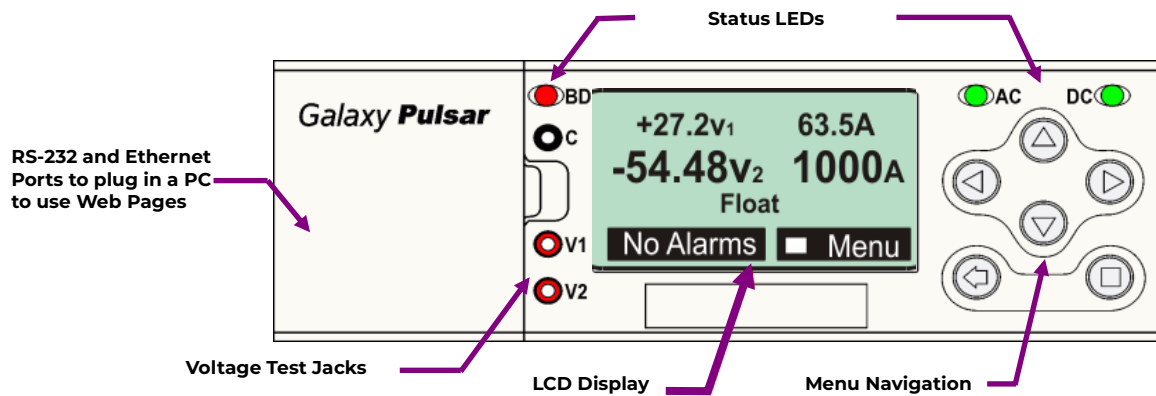
**Figure 6: front Panel**

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## LCD Back-light

Pulsar controllers incorporate an alarm severity back-light indicator. Severities of alarms can be configured through the remote interfaces. Following is a basic description of the back-light functionality.

| System Status Display – Pulsar | |
|---|---|
|  | The incorporated display technology can support a wide range of back-light colors. Present implementation supports three basic colorsto indicate the alarm severity present in the system: **Green, Amber, and Red**<br><br>The highest severity in the system will take precedence. |

| Status | Function | Condition |
|---|---|---|
| green | Normal | Normal operation, no alarms, inputs and outputsare in their normal range. |
| red | Critical Alarm | Highest severity. Generally assigned to alarm to indicate a Power affecting condition. Immediate attention required. |
| red | Major Alarm | High severity. Generally assigned to alarm to indicate a Power affecting condition. Immediate attention required. |
| amber | Minor Alarm | Medium severity. Generally assigned to alarm to indicate a non-power affecting condition. Attention eventually required. |

## Status LEDs

Pulsar controller displays provides three LED indicators to provide more specific indications of the system status. These LEDs provide specific indication concerning the AC and DC system status and Battery on Discharge state. These LEDs have factory assigned defaults as indicated in the table below. However, the assignments to alarms can be customized in the field using the remote interfaces.
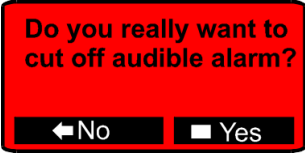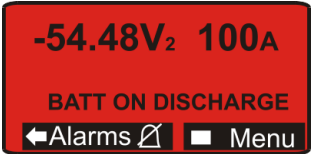
| LED | Status | Condition |
|-----|--------|-----------|
| **AC** | green | AC input to all rectifiers is in range. |
| | amber | AC input to one rectifier is missing or out of range. |
| | red | AC input to two or more rectifiers is missing or out of range. |
| **DC** | green | DC output to all loads is normal. |
| | amber | One or more of the following alarms are present: Fuse Minor 48, Fuse Minor 24 |
| | red | One or more of the following alarms are present: Open String, LVBD Open, FuseMajor 48, Fuse Major 24 |
| **BD** | green | System above configured Battery on Discharge (BD) threshold. |
| | amber | Not used |
| | red | System equal to or below configured Battery on Discharge (BD) threshold. |

**Table 7 Status LEDs - Pulsar**

## Audible Alarms

The controller has an integrated audible alarm located in its display assembly. This alarm will sound when any Critical, Major, or Minor alarm is detected by the controller. Upon assertion of the audible alarm the default front panel will provide and indicator of the alarm as well as a quick link to temporary cut-off the alarm.

**-54.48V₂ 100A**

**BATT ON DISCHARGE**

⬅Alarms 🔔  ■ Menu

Pressing the arrow key on a Pulsar controller or the ACO pushbutton on a Phoenix controller provides a quickly temporarily sliences the audible alarm.

**Do you really want to cut off audible alarm?**

⬅No  ■ Yes

Once the audible cut-off is selected the alarms present in the system are listed. An indicator on the default front panel screen is provided to inform that the audible alarm cutoff is active. The audible alarm can also be turned-back on following similar procedures.

**-54.48V₂ 100A**

**BATT ON DISCHARGE**

⬅Alarms ⌀  ■ Menu

The audible alarm may be disabled altogether through configuration at the front panel menu path: **Menu → Configuration → System Settings → ACO → Local Buzzer** or through the web pages.
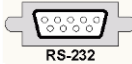
## Voltage Test Jacks

The controller front panel display has three test jacks that allow you to measure the system output voltage with a hand-held meter. The jacks are referenced with C (Common), V1 (Voltage One), and V2 (Voltage Two) or Common, Plant, and Converter. The voltage references correspond to the voltage referenced on the default front panel screen. For product consistency, factory built systems connect the controller in a manner such that V1 provides access to the +24V DC bus and V2 provides access to the -48V DC bus.

| | |
|---|---|
| ⭘ C<br><br>⬤ V1<br>⭘ V2 | Thus, one system voltage can be measured between C and V1 anda second output voltage can be measured between C and V2. A voltage will not be present on one of the voltage test jacks if the controller resides in only a single voltage system without converters. |

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# Local and Remote Access Ports

The controller provides communication ports for both local and remote access. Access to these ports depends on the specific controller configuration. Standard configurations of the Pulsar all have a front panel hatch located to the left of the test jacks that provide access to a local RS232 port.

| Local and Remote Access Ports | |
|---|---|
| **Port** | **Description** |
| Front Panel<br><br>J7<br><br><br><br>J8 | A laptop PC can be connected to standard DB9 connector J7 to provide a ground-referenced RS-232 serial connection using EasyView ™ for local access. The port can also be configured to be used with an external modem.<br><br>A position (as shown below) is reserved for a second RJ45 Ethernet connection in the future. It is covered for now.<br><br> |
| Side /Top<br><br>J5<br><br><br><br><br><br>J6 | An RJ-45 Ethernet connector, Connector J5, on side (slot-mounted) or top (door- mounted) of the pulsar to provide for the integrated 10/100 Base-T network. Connection. This connection can be used for remote monitoring or as a local Craft port. In the remote monitoring mode, this port is compatible with OmniOn Power Manager or other SNMP based programs used for web-based remote access and network management.<br><br>Controllers equipped with an optional modem provide a standard RJ11 (J6) for a telephone line connection. |

Pulsar Plus_MAN

# Front Panel Menu Structure

Feature content at the front panel is functionally divided at the Main Menu into the following categories:

**Alarms**
**Warnings**
**Status**
**Control/Operations**
**History**
**Configuration**

Access to the main menu starts at the default front panel screen shown below.

| **Front Panel Default Screen** | The front panel default screen displays the primary(Rectifier) and secondary (Converter when present) system bus voltages along with their respective total load in two different fonts. The larger font represents the rectifier output. Converter output voltages are also shown  withone decimal extension and rectifier outputs have two decimal points. V1 represents +24V and V2 represents - 48V systems. Test Jacks V1 and V2 provide access to these output voltages, respectively. |
|---|---|
|  | The operating mode of the system is also displayed. Possible operating modes are: Float, Battery On Discharge,Boost, etc.<br><br>An alarm soft-key  as well as the back-light or status LED will indicate when alarms are present. Pressing the ï will access the alarm cut-off as well as the alarms and warningspresent in the system.<br><br>Pressing the ▫ button accesses the main menu and the feature categories previously listed. |

| **Main Menu** | Access to alarms, warnings, equipment status detail, basic control and operations for maintenance purposes, and system configuration can be obtained. |
|---|---|
|  | Note: the controller has the ability to have a front Panel PIN that limits configuration as well as some operations. A person with administrator level access can enable this feature through the remote interfaces. Standard controllers are shipped from the factory with this feature disabled. |

## Front Panel Pin

Controllers have the ability to restrict certain types of access from the front panel of the unit. It has the ability to enforce a four-digit Power Identification Number (PIN) requirement for users of the front panel for certain control/operations and configurable items. These control/operations and configurations are generally considered the items that will only be done during initial install or by specific personnel. This feature is shipped disabled from the factory in the standard controller offering and must be enabled by a remote user with administrator level privileges. When the front panel PIN feature is enabled, the factory default for the PIN is **0000.** Each position of the password is configurable between 0-9. A sample screen like that following is required for PIN access.
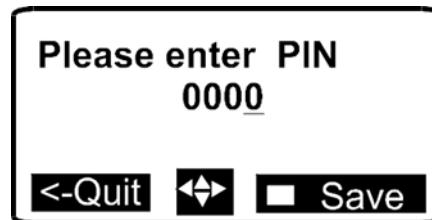


The up, down, left and right arrows are used to enter the appropriate PIN Upon entering a correct PIN the following momentary screen shows up and then disappears leaving the user at the menu location prior to entering the PIN.



When the front panel PIN feature is enable , A user must enter the PIN for items that generally are not deemed as functions of a typical maintenance routine. It is assumed that the majority of the configured thresholds and system operational features will not be changed through a maintenance routine. Thus, entering the correct PIN will be required in order for these specific types of parameters or features to be modified in the field. These same rules are implemented when accessing through the Craft port. In addition to Configuration items, there are some Control/Operations that also require the PIN. These are shown below.

**Control/Operations that require PIN**

1. Clear History
2. Clear Statistics
3. Disconnects – Manual disconnect/reconnect of any LVLD/LVBD
4. Enter Boost

**Control/Operations that do not require PIN**

1. Lamp Test
2. Restart Rectifiers
3. Uninstall Equipment
4. Start Battery Test
5. Start Alarm Test
6. Load Factory Defaults
7. Cut-off Audible Alarm

**Configuration -** Most configuration items from the front panel require PIN access.

**Configuration not requiring PIN**

1. Battery Type
2. String Battery Capacity (AH)
3. Number Of Battery Strings
4. Manual Discharge Test Type
5. Manual Test Duration
6. Manual Test Check Battery Alarm Voltage Threshold
7. Battery Test Rectifier Voltage
8. System Date Format
9. System Date
10. System Time Format
11. System Time
12. Automatic Daylight Savings Feature
13. Display Contrast
14. Temperature Display Units
15. Alarm Test Feature
16. Alarm Test Relay Duration and Relay

Once a user enters the PIN, total front panel access is allowed for:

- As long as the user remains in menus other than the default menu and/or

- The default display has remained on the front panel for more than user configurable time-out value. Controllers have a factory configured default of 120 minutes. This time is adjustable between 1-120 minutes in 1 minute increments. 120 minutes is the factory default.

- An internal counter is kept and reset if the user leaves the default menu and returns to others menus before the time-out period is reached.

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# Front Panel Menu Flow

The following figures provide a menu flow map for each primary category. This information is followed up with brief descriptions of each of the menu items. **Alarms** and **Warnings** are not hierarchal mapped and are presented in chronological order of occurrence when they are present. No Active Alarms or No Active Warnings will be displayed when they are no alarms or warnings detected by the controller.
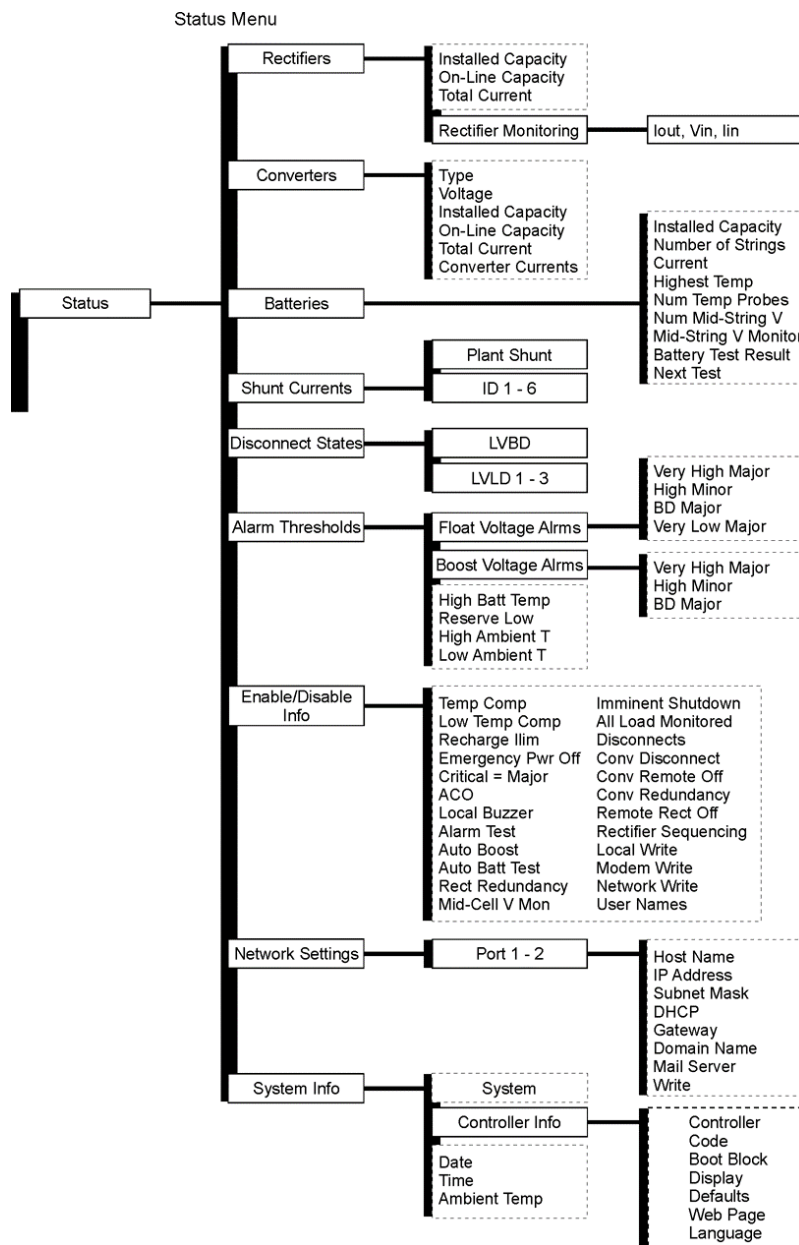


**Figure 7 : Status Menu**

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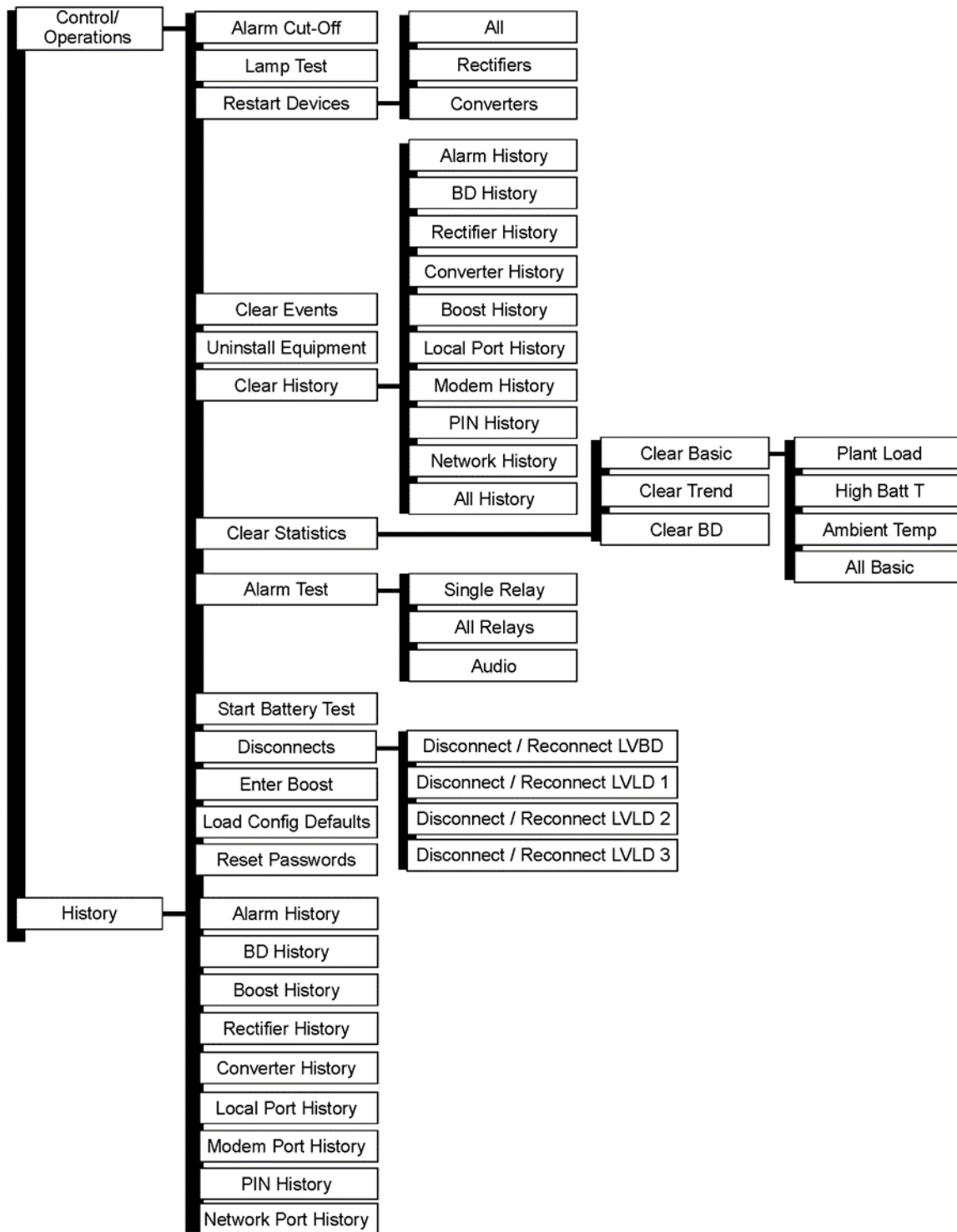
**Figure 8 : Control / Operations and History Menus**

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Configuration Menu



**Figure 9 : Configuration Menu (part 1)**
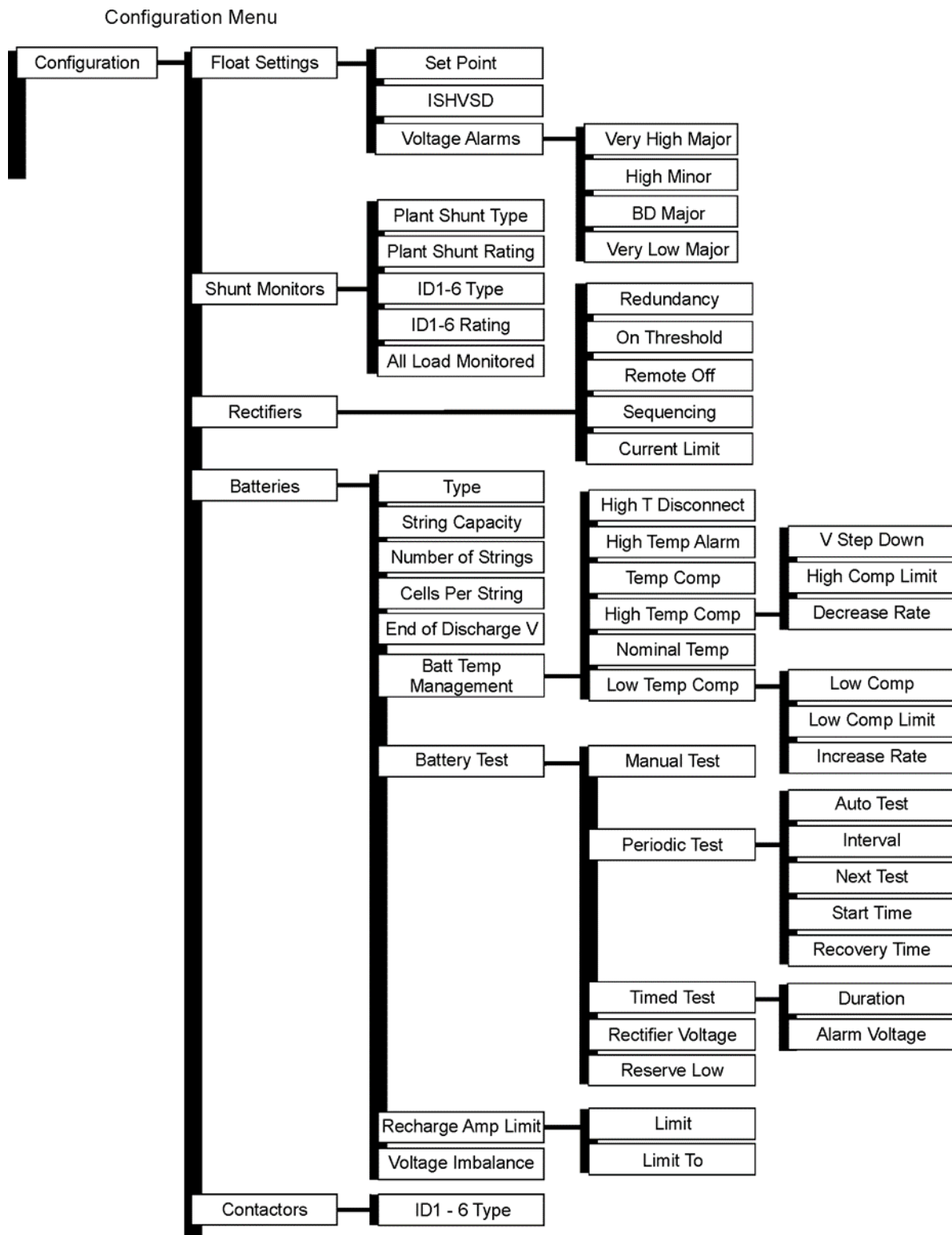
Continued on
Next Page

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**Figure 10: Configuration Menu (part 2)**

Pulsar Plus_MAN
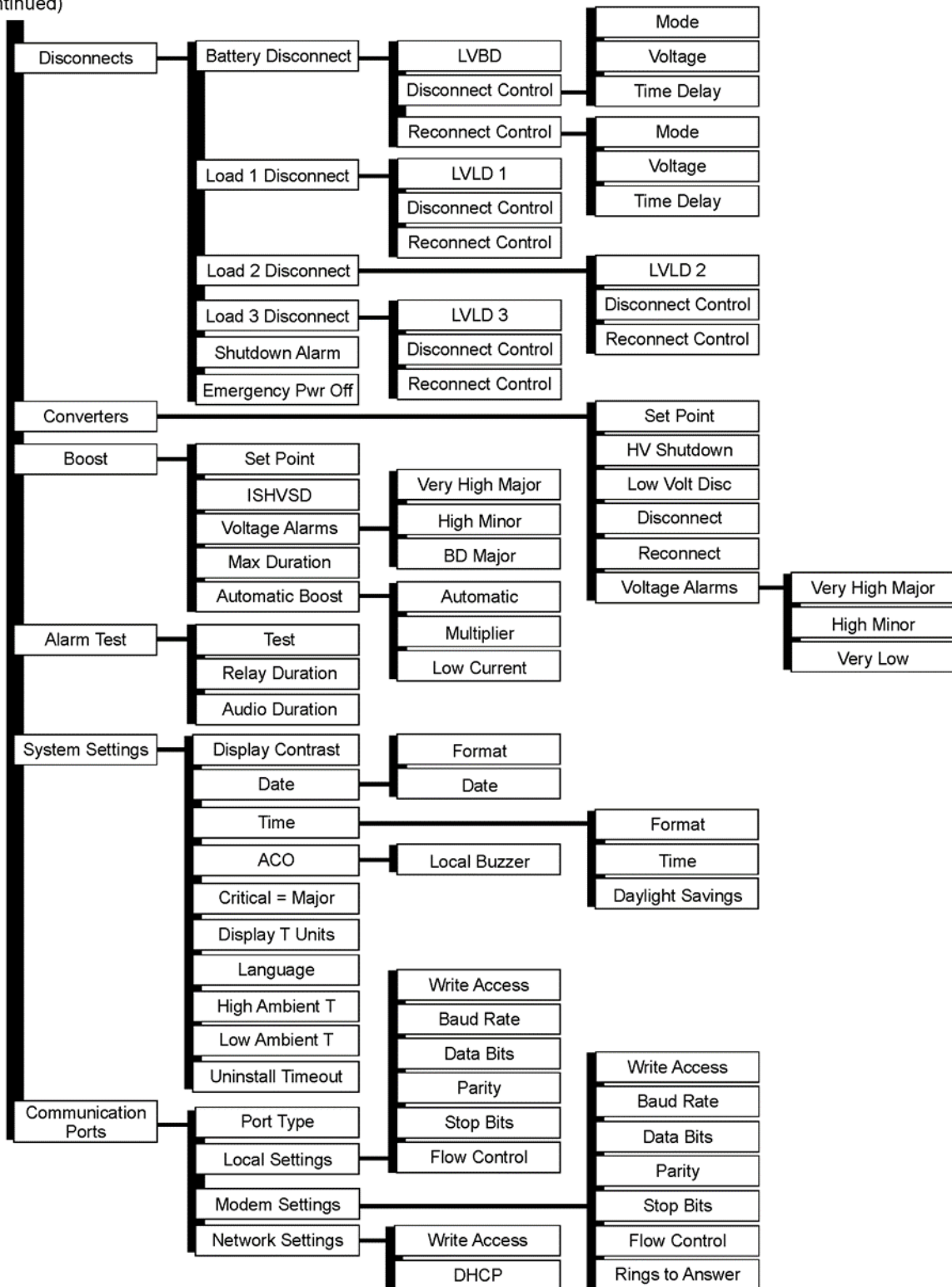
## Status

Status menus provide an overview of system components, threshold settings, and feature configuration. Configuration is not possible from here. Status items are also available through the remote port connections such as the web interface or local craft port using EasyView.

## Rectifiers

| | |
|---|---|
| Installed Capacity | The total installed rectifier capacity in the system. These rectifiers may or maynot have AC applied or be outputting power. |
| On-line Capacity | The total rectifier capacity of rectifiers On-line in the system and able to produce power. Rectifiers that are running or in Standby are considered to be On-line. Rectifiers that are in RFA, ACF, etc. are not counted in the On-line capacity. |
| Total Output Current | The total output current of all rectifiers. This value is also displayed on thedefault front panel screen. |
| Rectifier Monitoring | Each individual rectifier's DC output current, AC input current, and AC input voltage by rectifier number Gmn () is available. "m" represents the shelf number and "n" represents the rectifier position number in that shelf. The stateof the rectifier is also identified in the () when current is not shown. These states could be<br>• **OFF:** Rectifier has been shutdown due to hardware failure (ex RFA, Temp,HV).<br>• **STANDBY:** User has inhibited the rectifier's output voltage.<br>• **MISSING:** An acknowledged rectifier has been removed.<br>• **VACANT:** Rectifier has not been installed in that position. |

**Table 8 Rectifier Status**

## Converters

| | |
|---|---|
| Type | Provides generic description of the type of converter installed in the system.<br>The information is of the format "24 to 48"or "48 to 24". |
| Voltage | Displays the measured value of the secondary (converter) DC output bus. Thisvalue is also displayed on the default front panel screen. |
| Installed Capacity | Provides the total installed converter capacity in the system. |
| On-line Capacity | The total converter capacity of rectifiers On-line in the system and able toproduce power. Converters that have failed are not counted. |
| Total Output Current | The total output current of all converters. This value is also displayed on thedefault front panel screen. |
| Converter Currents | The individual converter output currents by converter number (Cmn) are available. "m" represents the shelf number and "n" represents the rectifier position number in that shelf. |

**Table 9 Converter Status**

## Batteries

| | |
|---|---|
| Installed Capacity | Total installed battery capacity based upon the number of strings in the system and the Amp-Hour (AH) rating of the strings installed. This data is automatically entered for specific battery models included in the standard controller configuration. These values can be modified in the field. AH rates are 8-hour rates. |
| Number Of Strings | The total number of battery strings installed in the system. |
| Current | Measured value of the current flowing into or out of the batteries. |
| Highest Temp | Highest battery temperature being measured by the QS873A thermal probes attached in the system. |
| Num Temp Probes | Total number of installed QS873A thermal probes. Up to sixteen QS873A probes can be monitored by the controller. |
| Num Mid-String V | Total number of installed ES771 Mid-String voltage measurement modules. Upto six ES771 modules can be monitored |
| Mid-String VMonitor | Measured values of ES771 Mid-string voltages attached in the system. Up tothree mid-string voltage readings per module. |
| Battery Test Result | Shows whether the most recent battery test was completed, and the last calculated reserve time. |
| Next Test | The date of the next automatic battery discharge test. The automatic discharge test feature must be enabled for this to work. |

**Table 10 Batteries Status**

## Shunt Currents

| | |
|---|---|
| Plant Shunt | Displays the value of current measured by the shunt monitor on-board the controller. The plant shunt type must be set to Load or Battery and its current rating must be configured. Shunts are assumed to have a 50mV rating. |
| ID1-8 | Displays the individual shunt monitor currents measured by attached and properly configured Distribution Control and Monitoring modules. Values may be specific load or battery currents. Distribution Control and Monitoring modules include the NE872 and QS871. Up to eight values can be displayed. |

**Table 11 Shunt Currents Status**

## Disconnect States

| | |
|---|---|
| LVBD(1) | Provides LVBD (Low Voltage Battery Disconnect) status. "None" is displayed for each non-configured contactor. "Closed" is shown for normal contactor state. "Open" shown for contactors that have opened and disconnected the battery. |
| LVLD(1-3) | Provides status of the three LVLDs (Low Voltage Load Disconnects 1-3). "None" is displayed for each non- configured contactor. "Closed" is shown for normal contactor state. "Open" will be shown for contactors that have opened ordisconnected each respective load. |

**Table 12 Disconnect States Status**

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## Alarm Thresholds

| | |
|---|---|
| Float Voltage  Alarms | Shows the configured settings for the Float Settings: Very High Major (HVSD), High Minor, Battery on Discharge (BD) and Very Low Voltage (VLV) alarms. Values are shown in (xx.xxV) format. |
| Boost Voltage Alarms | Shows the configured settings for the Boost Settings: Very High Major (HVSD), High Minor, and Battery on Discharge (BD) alarms. Values are shown in (xx.xxV)format. |
| High Batt Temp | Shows measured value of the highest battery temperature of all attached QS873 battery thermal probes. |
| Reserve Low | Shows configured value for the Low battery reserve time alarm. |
| High Ambient Temp | Shows configured value for the High Ambient Temperature alarm. This temperature is from the temperature sensor located on the controller itself. |
| Low Ambient Temp | Shows configured value for the Low Ambient Temperature alarm. This temperature is from the temperature sensor located on the controller itself. |

**Table 13 Alarm Thresholds Status**

## Enabled/Disabled Info
This section of the menu provides a location to determine the Enable/Disable status of most controller features.

| | |
|---|---|
| Temp Comp | Shows whether Battery Temperature Compensation is Enabled or Disabled. |
| Low Temp Comp | Shows if the Low Temperature compensation features is Enabled or Disabled. Note: General temperature compensation must be Enabled to use Low Temperature compensation. |
| Recharge Ilim | Shows if the Recharge Current Limit feature is Enabled or Disabled. |
| Emergency Pwr Off | Displays whether or not the Emergency Power Off (Remote Emergency Battery Disconnect) feature is Enabled or Disabled. If Enabled, EPO is asserted when contact closure is applied to the EPO input. The controller will keep battery contactors open until this contact closure has been removed. The feature assumes that AC has been removed to the system. |
| Critical=Major | Shows if the assertion of the Critical alarm severity with all Major alarms feature is Enabled or Disabled. |
| ACO | Shows if Audible Alarm Cut-off feature is Enabled or Disabled. |
| Local Buzzer | Shows if the on-board local audible buzzer is Enabled or Disabled. |
| Alarm Test | Shows if the Form-C Alarm Test Feature is Enabled or Disabled. |
| Auto Boost | Shows if the automatic boost charge mode of operation is Enabled or Disabled. |
| Auto Batt Test | Shows if the automatic battery test feature is Enabled or Disabled. |
| Rect Redundancy | Shows if the Rectifier redundancy feature is Enabled or Disabled. |
| Mid-Cell V Mon | Shows if the Mid-String Voltage imbalance detection feature is Enabled orDisabled. |
| Imminent Shut dn | Shows if the Imminent system shutdown alarm (LVBD) feature is Enabled or Disabled. |

**Table 14 Enabled/Disabled Info Status**

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| | |
|---|---|
| All Load Monitored | Shows if the All Loads Monitored feature is Enabled or Disabled. This assumes that every load distribution is being monitored so the sum of the load currents can be used to equal the total load of the system. |
| Disconnects | Shows if the LVBD (Low Voltage Battery Disconnect) and LVLD1-3 (Low VoltageLoad Disconnects) features are Enabled or Disabled. |
| Conv Disconnect | Shows if the low voltage Converter Disconnect feature is Enabled or Disabled. |
| Conv Remote Off | Shows if the Remote Converter Off – Individual Remote Converter Standbyfeature is Enabled or Disabled. |
| Conv Redundancy | Shows if the Converter redundancy feature is Enabled or Disabled. |
| Remote Rect Off | Shows if the Remote Rectifier Off – Individual Remote Rectifier Standby isEnabled or Disabled. |
| Rectifier Sequencing | Shows if the Rectifier Sequencing is Enabled or Disabled. |
| Local Write | Whether or not the system can be configured through the local port. |
| Modem Write | Whether or not the system can be configured through the modem port. |
| Network Write | Whether or not the system can be configured through the network. |
| Usernames | Whether or not usernames and password identification have been enabled |

**Table 14 Enabled/Disabled Info Status**

## Network Settings

This section of the menu displays the settings of the Network parameters for the two Ports. Controllers presently only utilizes Port 1. Port 2 is reserved for a second Ethernet port in the future.

| | |
|---|---|
| Host Name | Network name assigned and configured for the controller since it acts as a repository for data and services such as e-mail, FTP, HTTP, etc that are accessed remotely by other equipment or users on the network. |
| IP Address [*] | Internet Protocol address assigned to the controller that identifies the unit on the network. The format for the IP address field is a 32-bit numeric address written as four numbers separated by periods (ddd.ddd.ddd.ddd).  Each number, ddd, can be 0 to 255. In the server mode, 192.168.2.1 is used |
| Subnet Mask [*] | Internal network address assigned for identifying an internal network mask that the controller has been assigned to by a network administrator. The mask selectively includes or excludes certain equipment on a Host. The format for the Subnet Mask field is a 32-bit numeric address written as four numbers separated by periods (ddd.ddd.ddd.ddd). Each number, ddd, can be 0 to 255. |
| DHCP | This field indicates the operational mode of the integrated Ethernet port. The port can be set to DHCP Client, DHCP Static, or a DHCP Server. DHCP Server is required for use as a Craft port. DHCP Client is the default for the LAN port. |
| Gateway [*] | This address is for the address of the Gateway or node on the network that will serve as the entrance to another network for the controller. This address is the address of the equipment or computer that routes the traffic from and to the controller to the outside network. It is generally the proxy server. The format for the Gateway address field is a 32-bit numeric address written as four numbers separated by periods (ddd.ddd.ddd.ddd). Each number, ddd, can be 0to 255. |
| DNS [*] | Address of the Domain Name Server that translates domain names into IPaddresses. This field is of the format ddd.ddd.ddd.ddd. |
| Mail Server | The address for the computer or equipment within the network that will manage the controller e-mails. The format for the Gateway address field is a 32- bit numeric address written as four numbers separated by periods (ddd.ddd.ddd.ddd). Each number, ddd, can be 0 to 255. If configured as 0.0.0.0, the controller will use the hostname mail host. |
| Write Access | This field shows whether the port has bee configured to allow Read/Write access or Read Only access. Read/Write access is available when the feature has been enabled. |

**Table 15 Network Settings Status**

* These fields are automatically assigned when using the DHCP server or Client mode of operation.

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## System Info

| | |
|---|---|
| System | Up to 55 characters used to describe the system in which the controller resides. For example: Infinity NE. Note: The front panel will display only the first 22 characters. |
| Controller Info | Provides software versions running on the controller. These versions includethe versions for the application code, the boot block, the display, the defaults file, and the web pages. |
| Date | Present Date of the controller on-board real-time clock using the configuredDate format. |
| Time | Present time of the controller on-board real-time clock using the configuredtime format. |
| Ambient Temperature | Present temperature of the controller on-board temperature sensor displayedin the configured temperature format. |

<div align="center">Table 16  System Info Status</div>

## Control/Operations

The following are the system control and operation functions that can be performed from the front panel. These operations are generally used in post installation and maintenance modes.

| | |
|---|---|
| Alarm Cut-Off | Temporarily cuts-off (Turns off) the on-bard audible alarm. |
| Start Lamp Test | Temporarily illuminates all status indicators of attached rectifiers, distribution monitoring and control modules and the system controller. |
| Restart Devices | Provides the ability to restart All system serial controlled rectifiers and/or converters at once. Provides the ability to individually reset only rectifiers or converters at a time. This operation does not affect rectifiers, converters, and other system devices that are already functioning. |
| Clear Events | Used to clear momentary events or alarms. It clears the following system alarms: Check Battery, Reserve Time Low, Battery Voltage Imbalance |
| Uninstall Equipment | Clears alarms related to the removal of a system component such as a rectifier, converter, thermal probe, or voltage monitoring module. Running this command allows the system controller to retake inventory of using equipment. |
| Clear History | This area of the menus system can be used to clear the various items that the controller maintains history records. Once cleared the controller begins to keep history of new events.<br><br>**Alarm History** Clears only alarm event history.<br>**BD History** Clear only BD network access history.<br>**Rectifier History** Clears only rectifier event history.<br>**Converter History** Clears only converter event history.<br>**Boost History** Clears only Boost event history.<br>**Local Port History** Clears only local port access event history.<br>**Modem History** Clears only Modem port access event history.<br>**Network History** Clears only network access history.<br>**All History** Single command to clear all history. |
| Clear Statistics | This area of the menus system can be used to clear the various items that the controller maintains statistical records. Once cleared the controller begins to keep new statistical data.<br><br>**Clear Basic** Clears individually or as a group the Basic statistical data kept on Plant Load, the highest battery temperature, and ambient.<br>**Clear Trend** Clears the trend data kept on the plant load.<br>**Clear BD** Clears the Battery on Discharge (BD) statistics kept on the plant load and voltage during discharge. |
| Alarm Test | Provides ability to initiate an alarm test on a specific user selected output relayor all output relays. Alarm relays are asserted at the configured alarm interval. |

<div align="center">**Table 17 Control/Operations**</div>

| | |
|---|---|
| Start Battery Test | Initiates the manual battery test feature. A stop battery test operation is displayed to interrupt the testing and return the unit to normal operation. The manual battery test utilizes the configured test duration and a system bus voltage threshold to represent the end of reserve. |
| Disconnects | Provides individual manual control of up to four Low Voltage Disconnects (LVBD, LVLD1-3) for maintenance purposes. |
| Enter Boost | Initiates the manual battery Boost feature. A stop battery Boost operation is displayed to interrupt the Boost operation mode and return the unit to normal operation. |
| Load Config Defaults | This operation allows a user to bring back all factory defaults with a single operation. Factory defaults are also custom configuration defaults that are available. Custom configurations may support multiple factory defaults. Use caution when applying this command. Previous configuration changes will be overwritten. |
| Reset Passwords | Resets user, super-user and administrator passwords back to standard defaults. |

**Table 17 Control/Operations**

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# History

This area of the menu system contains event history information. The controller works on a first record in first record out once the record size of a specific field is reached. The following system history logs are available:

| | |
|---|---|
| Alarm History | Chronological view of the last 256 alarms and events that have occurred since the last time the history log was cleared. |
| BD History | Chronological view of the last 16 battery on discharge (BD) events since the last time the history log was cleared. |
| Boost History | Chronological view of the last 16 times the system entered boost mode since the last time the history log was cleared. |
| Rectifier History | Chronological view of the last 256 rectifier alarms and events that have occurred since the last time the history log was cleared. |
| Local Port History | Chronological view of the last local terminal logins that have occurred since the last time the history log was cleared. The number of these events counts towards the total number of Modem, Network, PIN, and Local port events which can be up to 48 events. |
| Modem Port History | Chronological view of the last Modem port logins that have occurred since the last time the history log was cleared. The number of these events counts towards the total number of Modem, Network, PIN, and Local port events which can be up to 48 events. |
| PIN History | Chronological view of the last Front Panel access that required password entry.The number of these events counts towards the total number of Modem, Network, PIN, and Local port events which can be up to 48 events. |
| Network Port History | Chronological view of the last Network access events that have occurred since the last time the history log was cleared. The number of these events counts towards the total number of Modem, Network, PIN, and Local port events which can be up to 48 events. |

**Table 18 History**

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# Configuration

The Configuration section of the menu system is where system operational parameters, system device information, and alarm thresholds are set-up and modified. Factory defaults are provided for the standard controller. Some defaults are dependent on the battery type. Consult Appendix E for default settings of different battery. Valve-Regulated Lead Acid (VRLA) batteries and default settings defined for the Standard configuration are assumed in this section. Customer specific configurations may be different. When there is doubt, contact OmniOn Power technical support.

All items are field configurable. Modified settings are stored in non-volatile memory. Controllers require time to update sectors in flash memory for changes. Allow approximately a minute for the controller to accept and store modifications in non-volatile memory before removing power to the unit.

## Float Settings

| | |
|---|---|
| Set Point | Parameter sets the value that primary (rectifier) DC bus will be set and regulated.<br><br>System Float Voltage set-point adjustable from -42.00V to -56.50V and +22.00V to +28.00V with a factory default of -54.48V and +27.24V for 48V and 24V VRLA power systems, respectively. |
| ISHVSD | This is an Independent High Voltage Shutdown threshold during the Float mode of operation that is sent to and stored in the rectifiers that is used by each rectifier for independent high voltage monitoring.<br><br>The threshold can be set from -50.00V to -60.00V or +25.00 to +30.00V with a factory default setting of -58.50 and +29.25V for 48V and 24V systems, respectively. |
| Very High Voltage Major | This is the High Voltage Shutdown Alarm (HVSD) threshold for the primary DC bus that when it is reached the controller will send out the HV shutdown command to the serial rectifiers so that the offending rectifier will shut itself down.<br><br>The threshold can be set from -50.00V to -60.00V or +25.74 to +31.75V with a factory default setting of -57.00 and +28.24V for 48V and 24V systems, respectively. |
| High Voltage Minor | This alarm indicates an abnormally high float output voltage (HFV) on the primary DC bus but the controller does not attempt to shut the offending unit down.<br><br>The threshold can be set from -50.00V to -60.00V or +24.75 to +29.75V with a factory default setting of -56.00 and +27.74V for 48V and 24V systems, respectively. |
| BD<br>(Battery on Discharge)<br>Major | Primary DC bus threshold setting that determines when the system is determined to be operating either completely or partially on battery reserve.<br><br>The threshold is set from -46.00V to - 55.00V or +23.00 to +28.00V. Has a factory default of -51.00V and +25.54V for 48V and 24V systems. |
| Very Low Voltage Major | Primary DC bus alarm threshold used to indicate an imminent system shutdown due to discharging batteries or a very low output voltage (VLV).<br><br>Threshold is set from -40.00V to- 51.00V or +20.00 to +25.50V. Has a factory default of -46.00V and +23.00V for 48V and 24V systems. |

**Table 19 Float Settings Configuration**

Pulsar Plus_MAN

# Shunt Monitors

The Pulsar Plus family of controllers utilize an RS485 serial communication link to external distribution monitoring and control boards for shunt measurements and contactor control. Up to eight external boards can be managed by the controller for shunt monitoring and contactor control. Thus, eight contactors can be assigned to one of four independent controls: LVBD, LVLD1, LVLD2, and LVLD3. These distribution monitoring and control boards are identified by setting an address ID at the board and then assigning appropriate operation Type at the controller. The available Types are: Battery, Load, and None. Shunt sizes for each assigned battery or load type must also be configured. All shunts are assumed to have a voltage rating of 50mV. The current rating of each shunt is programmable between 0 to 9999A. Systems shipped with the controllers are appropriately pre-configured in the factory for the right shunt values and assignments.

| | |
|---|---|
| **Plant Shunt Type** | Definition type for the on-board shunt used for systems that are designed with a single shunt to monitor load or battery current. The on-board shunt monitor may be configured as "NONE", "BATTERY", or "LOAD".<br><br>The factory default is BATTERY. |
| **Plant Shunt Rating** | Current rating of the shunt being measured by the on-board shunt circuitry  Shunts are assumed to have a 50mV rating.<br><br>The rating can be set from 0A to 9999A with a factory default setting of 600A. |
| **ID1-8** | The operation Type of each shunt monitoring circuit on system distribution boards 1-8 must be assigned based upon actual system implementation.<br><br>The operational Type may be: None (For no shunt), Battery (Monitoring battery currents), and Load (for load currents). |
| **ID1-8 Rating** | The current rating of each shunt being monitored by the system distribution boards 1-8 must be configured based upon actual system implementation. All shunts are assumed to be 50mV. The current rating may be from 0-9999 Amps.<br><br>The factory default is 600A for load shunts and 800A for the battery. |

**Table 20 Shunt Monitors Configuration**

| Defaults |
|---|
| The controller is factory configured with: |

| | | |
|---|---|---|
| ID1 | Type: Battery | Shunt: 300A |
| ID2 | Type: None | Shunt: 300A |
| ID3 | Type: None | Shunt: 600A |
| ID4 | Type: None | Shunt: 600A |
| ID5 | Type: None | Shunt: 600A |
| ID6 | Type: None | Shunt: 600A |
| ID7 | Type: None | Shunt: 600A |
| ID8 | Type: None | Shunt: 600A |

IDs defined as **None** will have no currents displayed and shunt configuration has no affect.

Note: Depending on the system and controller configuration for that system the values of the total load current (Iload) are calculated differently. The following table describes the different calculations for total load current.

| **All Loads Monitored** | When Enabled, the All Load Monitor feature automatically links all Shunt Monitors configured as "Load" monitors to the system total load. This feature isoperational only when the Plant Shunt Type is configured as NONE.<br>The factory default is Disabled. |
|---|---|

**Table 20 Shunt Monitors Configuration**

| Shunt Type | System Configuration | Controller Operation |
|---|---|---|
| Battery | Shunt input is connected to a centralizedbattery shunt located in the system. All battery current flows through this shunt to and from the system batteries. Systemmay or may not have Shunt Monitors configured. | Controller reports the following:<br>$$I_{Load} = \Sigma\ I_{Rect} + I_{plantshunt}$$<br>$$I_{battery} = I_{plantshunt}$$<br>Where $I_{plantshunt}$ is negative for current into the battery and positive for current out of the battery.<br>If there are shunt monitor cards also installed:<br>1  Cards configured as monitoring a "Load" shunt do not affect the total $I_{Load}$ but havetheir values individually displayed.<br>2  Cards configured as monitoring a "Battery"shunt do not contribute to total battery current ( $I_{battery}$ ) but have their values individually displayed.<br>All battery management functions remain available. |

**Table 21 Shunt Type Configuration**

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| Shunt Type | System Configuration | Controller Operation |
|---|---|---|
| LOAD | Shunt input is connected to a centralized load shunt located in the system. The total system Load current flows through this shunt to the load equipment. System may or may not have Shunt Monitors configured. | Controller reports the following:<br><br>$I_{Load}$ = $I_{plantshunt}$<br>$I_{battery}$ = **Unavailable**<br><br>If there are shunt monitor cards also installed:<br>1. Cards configured as monitoring a "Load" shunt do not affect the total ILoad but have their value individually displayed.<br>2. If there are cards configured as monitoring a "Battery" shunt it is assumed that all battery current flows through these shunts to and from the system batteries. These values are summed to the total battery current ( $I_{battery}$ ) and override the previous equation for $I_{battery}$. Thus, the new $I_{battery}$ is<br>$I_{battery}$ = **Σ $I_{battery\ shunt\ monitors}$**<br>All battery management features are be available. |
| NONE | Shunt input may or may not be connected to a shunt located in the system. System has Shunt Monitors configured in the system. | Controller reports the following:<br><br>$I_{Load}$ = **Σ $I_{Rect}$**<br>$I_{battery}$ = **Unavailable**<br>1. If cards are configured to monitor "Battery" shunts, it is assumed that all battery current flows through these shunts to and from the system batteries and is summed to be the total battery current ( $I_{battery}$ ).<br>2. Cards configured as monitoring a "Load" shunt do not affect the total $I_{Load}$ but have their values individually displayed.<br>Thus, the controller reports the following:<br>$I_{battery}$ = **Σ $I_{battery}$ shunt monitors**<br>$I_{Load}$ = **Σ $I_{Rect}$ + Σ $I_{battery}$ shunt monitors**<br>Where $I_{battery\ shunt\ monitors}$ is negative for current into the battery and positive for current out of the battery.<br>**Note:** If there are no Shunt Monitors configured as battery then:<br>$I_{battery}$ = **Unavailable**<br>$I_{Load}$ = **Σ $I_{Rect}$** |
| | Shunt input may or may not be connected to a shunt located in the system. System has Shunt Monitors configured in the system and all system loads are monitored.<br>And<br>The new "All Load Monitored" feature has been "Enabled". | 1. Cards configured to monitor "Battery" shunts are assumed to monitor all battery current to and from the system batteries and are summed to the total battery current ( $I_{battery}$ ). In addition, all individual battery monitor values are displayed<br>2. Cards configured as monitoring a "Load" shunt are summed to calculate the total $I_{Load}$ and also have their individual values displayed.<br>Thus, the controller reports the following:<br>$I_{battery}$ = Σ $I_{battery\ shunt\ monitors}$<br>$I_{Load}$ = Σ $I_{Load\ shunt\ monitors}$<br>Note: If there are no Battery Shunt Monitors configured but the total load monitored is enabled, then the total battery current is calculated as follows:<br>$I_{battery}$ = Unavailable<br>$I_{Load}$ = Σ $I_{Load\ shunt\ monitors}$<br>Recharge current feature is unavailable. |

**Table 21 Shunt Type Configuration**

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# Rectifiers

| | |
|---|---|
| **Redundancy** | An alarm is automatically generated when the rectifier capacity On-line in the system falls below N+X based on the present system load. X is the desired number of rectifiers to check for redundancy. <br> The factory default for this feature is Enabled and X=1. |
| **Rectifier OnThreshold** | The system DC bus threshold that rectifiers placed into Standby will automatically be turned on. <br> This value can be set between -40.00V and -51.00V and +20.00V to +25.00V with factory defaults set to -44.0V and +22.00V for 48V and 24V rectifiers, respectively. |
| **Remote Off** | Provides the ability to disable or enable the capability of placing a rectifier into Standby operation through remote means such as the network, modem, or local terminal. <br> The factory default for this feature is Disabled. |
| **Sequencing** | When enabled, provides the ability to hold off a user configured group ofrectifiers when appropriate contact closure is received, The feature is also called Group Standby. <br> The factory default for this feature is Disabled. |
| **Current Limit** | Adjustable from 30-100%. At 100% the rectifier will output its nameplate rating and truly act as constant power rectifiers. Settings below 100% will be current limited to that percentage of the rectifier's name plate current rating. |

**Table 22 Rectifiers Configuration**

# Batteries

| | |
|---|---|
| Battery Type | The type of batteries used in the system can be selected from the following battery types loaded in the Standard controller: <br><br> <table><tr><td>• 12A100FT</td><td>• 12A150FT</td></tr><tr><td>• 12IR150/150LP</td><td>• 3A125-33L</td></tr><tr><td>• 3A95-21L</td><td>• 3A95-27L</td></tr><tr><td>• 3A95-33L</td><td>• 6A95-13L</td></tr><tr><td>• 6A95-15L</td><td>• IR30EC</td></tr><tr><td>• IR40EC</td><td>• L54V63FTX</td></tr><tr><td>• NCX-125</td><td>• NCX-80</td></tr><tr><td>• NSB110FT</td><td>• NSB170FT</td></tr><tr><td>• NSB60FT</td><td>• SE48S63</td></tr><tr><td>• SE48S80</td><td>• TEL12-105F</td></tr><tr><td>• Generic VRLA (Valve Regulated acid)<br>• Generic Li-LMP (Lithium Metal Polymer)</td><td>• Generic FLOODED (flooded lead Lead Acid) Generic NiCd (Nickel Cadmium)</td></tr></table> <br> Once selected the user has the opportunity to automatically accept the standard defaults for all battery Type related features. Parameters such as float voltage, float alarms, thermal compensation parameters, etc. are automatically adjusted if defaults are accepted. <br> The system factory default is Valve-Reg. |
| String Capacity | Capacity of an individual battery string in the system which is used to derive thetotal installed system battery capacity. This value has to be entered for Generic battery types but is automatically configured for specific battery models. The value configured should be the rating to 1.75V at an 8-hr discharge rate. <br> The available range is 0-9999 AH. The system factory default is 0 AH corresponding to the Generic Valve-Reg. |
| Battery Strings | The total number of battery string installed in the system entered by the user for inventory purposes and initial reserve time calculations. This value is automatically configured when using smart lithium batteries. Available range is 0-16. The Infinity NE system factory default is four strings of CSL-12100 batteries. |
| Cells Per String | The number of basic battery cells that make up a battery string. <br> The available range is 1-75 cells with a factory default of 24 and 12 cells for -48Vand +24V systems, <br> respectively. |

**Table 26 Batteries Configuration**

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| | |
|---|---|
| **End of Dchrg** | The user defined system bus voltage at which the batteries are considered to beat the end of their reserve capability for manual battery testing (End of Discharge). This end-of-discharge voltage is used for automatic and opportunistic reserve time calculations.<br><br>This setting has a range of -40.25V to -48.75V and 19.25V to +25.35V +21.00with factory default of -42.00V and +21.00V for 48V and 24V systems, respectively. |
| **Battery Temp Management\*** | This section includes all the parameters required for thermal management of the batteries. Parameters include the ability to enable/disable thermal compensation for high and low temperatures and set the slope decrease and increase rates, respectively. There is also a High Temperature alarm threshold, High Temperature Disconnect feature.<br><br>Thermal compensation features are factory defaulted Enabled for Valve-Reg batteries. |
| **Batt Test\*** | This section includes all the parameters required for battery testing through manual or automatic means. Configuration for manual test duration and the system test end-voltage for manual battery test are here along with the interval, start date, start time, time from last battery on discharge BD, and enable/disable for periodic battery test. The rectifier voltage during battery discharge testing and system reserve time low alarm threshold are also available.<br><br>Automatic battery testing is factory disabled. |
| **Recharge Amp Limit** | Enable or disable battery recharge limiting and set recharge current limit. Whenenabled, the controller will regulate the current into the batteries to be below the setting.<br><br>Recharge current limit is factory Disabled. The current limit range is 5 to 1000A and has a factory default of 50A for Valve-Reg batteries. |
| **Voltage Imbal** | User defined voltage threshold for a mid-string voltage imbalance alarm.<br><br>Range 1.4 - 3.0 Volts. The factory default is 1.7V for Valve-Reg batteries. Thisalarm is only generated after batteries have been sitting on float for a minimum<br>of 12 hours and the total battery current is less than 3A. |

**Table 23 Batteries Configuration**

\* \*See Appendix C for detailed descriptions of the Thermal Compensation and Battery Test features and parameters.

## Contactors

The Pulsar Plus family of controllers utilize distribution monitoring and control boards to control contactors. These boards include the ES772, QS871, and the NE872 modules. Each of the boards in the system must be assigned to LVD contactor control by appropriately configuring a unique board ID on the board and associating it to a specific contactor function at the controller.

| | |
|---|---|
| **ID1-6** | Associates the ID numbers set on the distribution monitoring boards (NE872/QS871) to one of four independent set of contactor controls.<br>These contactor controls are: LVBD (Low Voltage Battery Disconnect), LVLD1 (Low Voltage Load Disconnect 1), LVLD2 (Low Voltage Load Disconnect 2), and LVLD3 (Low Voltage Load Disconnect 3). |

**Table 24 Contactors Configuration**

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The controller has assigned each unique board ID number as follows: ID1 to LVBD, ID2 to LVLD1, ID3 to LVLD2, and ID4 to LVLD3. Note: the text description used for the disconnect such as "LVLD1" can be renamed using the remote interfaces. Each of these assignments has its own unique programmable parameters described next. ID5-ID8 have been assigned to NONE. Selecting NONE removes the ability of that particular distribution control board to control and external LVD.

## Disconnects

This section of the configuration menu contains the parameters associated with the individual function assignments made in the previous section. Each LVD type (LVBD and LVLD1-3) can individually be enabled or disabled. Only the LVBD and LVLD1 are Enabled from the factory. The LVD's disconnect and reconnect method of operation used by the controller can be configured for each assignment. The method of disconnect or reconnect can be based on the traditional means of reaching a system bus voltage threshold **(Voltage)** or based on both reaching the system bus voltage threshold and an elapsed time from once the system has been placed on discharge (BD) and at least two or more rectifiers are reporting AC failures **(Voltage/Time).** The same Voltage and Voltage/Time mode of operation can also be selected for reconnecting LVDs. In this case the elapsed time configured is the time from once the reconnect voltage threshold has been reached. Note: selecting None for a reconnect mode will require manual intervention to shut the contactor. Selecting None for the disconnect mode will not allow a LVD to open. The controller has factory defaults of the following:

| | |
|---|---|
| LVBD (Enabled) | Disconnect Mode **(Voltage)**; Range: Voltage, Voltage/Time, None<br>Disconnect Voltage **(-42.0V/+21.0V)**; Range:-39.0 to -50.0V/+19.5 to +25.0V<br>Time Delay **(0 min);** Range: 0-300min<br>Reconnect Mode **(Voltage);** Range: Voltage, Voltage/Time, None<br>Reconnect Voltage **(-48.0V/+22.2V);** Range:-39.0 to -55.0V/+19.5 to +27.0V<br>Time Delay **(0 sec);** Range: 0-300sec |
| LVLD1 (Enabled) | Disconnect Mode **(Voltage);** Range: Voltage, Voltage/Time, None<br>Disconnect Voltage **(-42.0V/+21.0V);** Range:-39.0 to -50.0V/+19.5 to +25.0V<br>Time Delay **(0 min);** Range: 0-300min<br>Reconnect Mode **(Voltage);** Range: Voltage, Voltage/Time, None<br>Reconnect Voltage **(-44.0V/+22.0V);** Range: 39.0 to -55.0V/+19.5 to +27.0V<br>Time Delay **(0 sec);** Range: 0-300sec |
| LVLD2 (Disabled) | Disconnect Mode **(Voltage);** Range: Voltage, Voltage/Time, None<br>Disconnect Voltage **(-42.0V/+21.0V);** Range:-39.0 to -50.0V/+19.5 to +25.0V<br>Time Delay **(0 min);** Range: 0-300min<br>Reconnect Mode **(Voltage/Time);** Range: Voltage, Voltage/Time, None<br>Reconnect Voltage **(-44.0V/+22.0V);** Range: 39.0 to -55.0V/+19.5 to +27.0V<br>Time Delay **(30 sec);** Range: 0-300sec |
| LVLD3 (Disabled) | Disconnect Mode **(Voltage);** Range: Voltage, Voltage/Time, None<br>Disconnect Voltage **(-42.0V/+21.0V);** Range:-39.0 to -50.0V/+19.5 to +25.0V<br>Time Delay **(0 min);** Range: 0-300min<br>Reconnect Mode **(Voltage);** Range: Voltage, Voltage/Time, None<br>Reconnect Voltage **(-44.0V/+22.0V);** Range: 39.0 to -55.0V/+19.5 to +27.0V<br>Time Delay **(0 sec);** Range: 0-300sec |

**Table 25 Disconnects Configuration**

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| | |
|---|---|
| Imminent Shutdown Alarm | When enabled, the Imminent Shutdown Alarm is generated prior to opening the LVBD. Once the LVBD threshold has been reached, the alarm is generated. The alarm is issued 15 seconds prior to opening the contactor to provide an indication that system shutdown is imminent due to a system battery disconnect. The alarm is based on the configured LVBD battery disconnect threshold.<br><br>The factory default for this feature is Disabled. |
| Remote Emergency Power Off (EPO) | If enabled, the remote Emergency Power Off (EPO) feature allows the controller to detect the occurrence of a contact closure between J3.5 and J.10 and force open all battery contactors in the system. The battery contactor will open five seconds after the contact has been asserted. Once the contact is removed, the battery contactor will be re-asserted to its previous operational state.<br><br>The factory default for this feature is Enabled. |

**Table 25 Disconnects Configuration**

## Converters

| | |
|---|---|
| Set-Point | Parameter sets the value that secondary (converter) DC bus voltage will be set and regulated. The converter output voltage set-point is adjustable from -46.00V to -54.5V and +23.0V to +27.2V with a factory default of -52.0V and +26.0V for 48V and 24V converter outputs, respectively. |
| HV Shutdown | This is an Independent High Voltage Shutdown threshold that is sent to and stored in the converters that is used by each converter for independent high voltage monitoring.<br>The threshold can be set from -50.0V to -60.0V or +25.0 to +30.0V with a factory default setting of -58.0V and +29.0V for 48V and 24V converter outputs, respectively. |
| Low Voltage Disconnect | Enable or Disable for a feature that allows attached converters to be placedinto Standby once an input voltage threshold is reached.<br>The factory default for this feature is Disabled. |

**Table 26 Converters Configuration**

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| Disconnect | Converter input voltage threshold to be used to place all converters into Standby. The converter disconnect threshold is adjustable from -40.0V to -50.0V and +20.0V to +25.0V with a factory default of -46.0V and +23.0V for 24V and 48Voutput converters, respectively. |
|---|---|
| Reconnect | Converter input voltage threshold to be used to return all converters from Standby to On. The converter reconnect threshold is adjustable from -44.0V to -54.0V and +22.0V to +27.0V with a factory default of -52.0V and +26.0V for 24V and 48V output converters, respectively. |
| Voltage Alarms | Has the ability to set similar secondary DC bus level alarms as found with the rectifiers and the primary DC bus. This includes Very High Major, High Minor, and Very Low voltage. **Very High Major** This is the High Voltage Shutdown Alarm (HVSD) threshold for the secondary DC bus that when it is reached the controller will send out the HV shutdown command to the serial converters so that the offending converter will shut itself down. The threshold can be set from -50.0V to -60.0V or +25.0 to +30.0V with a factory default setting of -56.00 and +28.5V for 48V and 24V converter outputs, respectively. **High Major** This alarm indicates an abnormally high output voltage on the secondary DC bus. The controller does not attempt to shut the offending unit down. The threshold can be set from -48.0V to -60.0V or +24.0 to +30.0V with a factory default setting of -54.00 and +27.0V for 48V and 24V for converter outputs, respectively. **Very Low** Secondary DC bus alarm threshold used to indicate something  dragging the bus to an undesired voltage level or an incorrect setting. The threshold can be set from -40.0V to -54.0V or +20.0 to +27.0V with a factory default setting of - 46.0V and +23.0V for 48V and 24V for converter outputs, respectively. |

**Table 26 Converters Configuration**

## Boost

The Boost function allows battery charging to be expedited by raising the system voltage to Boost level for a set time. The following boost mode parameters are set in this area of the menu system:

| Set Point | Primary DC bus voltage set-point during the Boost mode of operation. Boost (set point) is adjustable from -48.00V to -58.00V and 22.00 to 30.00V in0.1V increments. The factory default setting is -55.20V and 27.24V. |
|---|---|
| ISHVSD | This is an Independent High Voltage Shutdown threshold during the Boost mode of operation that is sent to and stored in the rectifiers that is used by each rectifier for independent high voltage monitoring. The threshold can be set from -52.00V to -60.00V or +26.00 to +30.00V with a factory default setting of -58.50 and +29.25V for 48V and 24V systems, respectively. |

**Table 27 Boost Configuration**

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| | |
|---|---|
| Voltage Alarms | Has the ability to set similar DC bus level alarms during Boost as found with theFloat mode of operation. This includes Very High Major, High Minor, and BD.

**Very High Major**
This is the High Voltage Shutdown Alarm (HVSD) threshold for the primary DC bus during Boost that when it is reached the controller will send out the HV shutdown command to the serial rectifiers so that the offending rectifier will shut itself down. The threshold can be set from -50.00V to -60.00V or +25.75to +31.75V with a factory default setting of -57.00 and +28.24V for 48V and 24V systems, respectively.

**High Minor**
This alarm indicates an abnormally high output voltage on the secondary DC bus during Boost. The controller does not attempt to shut the offending unit down. The threshold can be set from -50.00V to -60.00V or +25.75 to +31.75V with a factory default setting of -56.00 and +27.74V for 48V and 24V forsystems, respectively.

**BD**
Primary DC bus threshold setting used during the Boost mode of operationthat determines when the system is determined to be operating either completely or partially on battery reserve.
The threshold can be set from -46.00V to- 55.00V or +23.00 to +28.00V with a factory default setting of -51.00V and +25.54V for 48V and 24V systems, respectively. |
| Max Duration | Defines the maximum time duration the system can remain in the Boost mode of operation.

Value set from 1 to 80 hours. The factory default setting is 5 hours. |
| Automatic | Enables or Disables the automatic boost feature. Boost may be configured to use a "Timed" or "Current" based algorithm. When set to Time, Boost will utilize a multiplication factor of the actual time of the last BD. When set to Current, Boost will end once the monitored battery current reaches the programmed threshold. These values can be modified through the remote interfaces.
The factory default setting for Automatic Boost is Disabled. |

**Table 28 Boost Configuration (continued)**

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## System Settings

| | |
|---|---|
| Display Contrast | Allows display back-light intensity to be adjusted for contrast in local ambientlight. Factory default is 50%. |
| Date | Sets system date and format. The format for date can be selected from: mm/dd/yyyy, dd/mm/yyyy, yyyy/mm/dd, mm-dd-yyyy, yyyy-mm-dd, dd-mm- yyyy, mm/dd/yy, yy/mm/dd, dd/mm/yy, mm-dd-yy, yy-mm-dd, or dd-mm-yy and the format for time can be 12HR/24HR format. The factory default is Date:mm/dd/yyyy and Time: 24HR. |
| Time | Sets system date and format. The format for date can be selected from: mm/dd/yyyy, dd/mm/yyyy, yyyy/mm/dd, mm-dd-yyyy, yyyy-mm-dd, dd-mm- yyyy, mm/dd/yy, yy/mm/dd, dd/mm/yy, mm-dd-yy, yy-mm-dd, or dd-mm-yy and the format for time can be 12HR/24HR format. The factory default is Date:mm/dd/yyyy and Time: 24HR. |
| Daylight Savings | Enable or disable. The factory default is Enabled. |
| Display T Units | °C or °F. The factory default is °C. |
| Languages | Allows the language support to be set between English and Other. Other is asecondary language such as Spanish or French. |
| High Ambient T | High ambient temperature alarm threshold that can be set from 30°C to 75°C. This temperature is measured on-board the controller. The factory default setting is 75°C. |
| Low Ambient T | Low ambient temperature alarm threshold that can be set from -40°C to 10°C. This temperature is measured on-board the controller. The factory default setting is -40°C. |

**Table 28 System Settings Configuration**

## Communication Ports

Menus for configuring the following communication parameters:

| | |
|---|---|
| Port Type | Sets the RS-232 asynchronous serial communication port for either Localterminal or Modem application.<br>Factory default is Local. |
| Local Port Settings | Provides the ability to Enable or Disable Write access to the controller, the ability to change system settings through the SNMP management or local port.<br>The factory default setting is enabled.<br>The baud rate, number of data bits, parity, number of stop bits, and flow control parameters for the port is also configurable. These parameters have been factory set to 9600, 8, none, 1, none, respectively. |

**Table 29 Communication Ports Configuration**

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| | |
|---|---|
| Modem Port Settings | Provides the ability to Enable or disable Write access, the ability to change system settings through the Modem.<br>The factory default setting is Enabled.<br>The baud rate, number of data bits, parity, number of stop bits, and flow control parameters for the port is also configurable. Note: the initialization string of the external MODEM must be set in the controller. Factory default forthe string is AT&FEV&C1S0=0H. This string can be modified by utilizing EasyView or T1.317 commands through a local terminal connection. Consult technical field support if further assistance is required.<br>Thee number of rings to be detected by the modem before it answers (Rings toAnswer) can be set from 1 to 9.<br>The factory default setting is 1. |
| Network Settings | The access type and the Dynamic IP addressing mode are set in this section. The Dynamic IP address mode sets the IP address operation mode of the Ethernet port on the controller.<br>This port has been set to act in DHCP (Dynamic Host Configuration Protocol) Client mode. This mode of operation assumes that the network will automatically provide an IP address to the controller. The port may also be configured to use a "Static" IP address which is configured by the user. The Static and Client modes of operation allow the controller's port to be configured to operate plugged into the network. It can also be used in a "Server" mode to provide Craft port functionality. In this Server mode the controller default IP address is **192.168.2.1** (destination address in a browser). Note: Once any Network parameters are changed, a Reboot Required alarm will activate. The user must then wait 2 minutes for the changes to be saved, then the controller must be re-booted via Menu path: **Menu →Control/ Oper →Reboot** Controller or by removing & restoring power.<br>In addition, there is the ability to Enable or disable Write access for someone who is attached to the Craft port. The factory default setting is Enabled. |

**Table 29 Communication Ports Configuration (Continued)**

## 10/100 Base-T Port

An introduction to the main screens of the web interface is provided in Section 4. The Pulsar Plus family of controllers support network access to almost all controller functions including all voltage and temperature readings, current alarms, and alarm history. It supports a web-based user interface using standard browsers It can provide plant alarm and control information to a distributed or centralized Network Operation Center (NOC) using the Simple Network Management Protocol (SNMP) or the Transaction Machine Language (TL1), which allow the controller to provide alarm information to the NOC for integrated network management. The controller provides network access and control capability for users under the HTTP, HTTPS, Telnet, FTP, SMTP, SNMP, SHH and TL1 protocols. The typical protocol functions are as follows:

# HTTP

HTTP (hypertext transfer protocol) is the foundation protocol of the World Wide Web (www) and can be used in any client-server application involving hypertext. HTTP makes use of TCP (transmission control protocol) for client to server connection and IP (internet protocol) for internetworking. The controller's standard HTTP protocol web pages provide integrated site information with an enhanced graphical user interface. The on-board HTTP web pages server is password protected for read/write privilege as mention in Section 4. Further access restrictions can be implemented using the software read/write disable capabilities configured through the front panel. The controller has a configurable timeout for connections that remain idle more than a user-programmed time period.

The best way to learn the web pages is to go through each tab and look at the features. The high level tabs were described in Section 4. There is much user friendly information and configuration available within these tabs.

Selecting **Inventory** in the **Reports** tab produces a screen similar to the following:

| Inventory | | |
|---|---|---|
| **Plant** | **Controller** | **Battery** |
| Site ID: Nada | Board Code: NE843A | Battery: 2 strings of unknown type |
| Description: Mucho Loco Gringo | Serial Number: | Capacity: 0 Ah installed, 0 Ah online |
| Plant Type: +24V | Boot Block: 1.1.0 | Monitoring: 2 thermal, 2 voltage |
| Volts: 27.25 V | Application: 0.0.20a | Reserve Time: NOT AVAILABLE |
| Amps: 86.8 A | Web Pages: 0.67 | Test Results: NOT RUN,, |
| | Defaults: STD-1.0 | String 1 Midpoint: PRESENT 13.77 V |
| | | String 2 Midpoint: PRESENT 13.79 V |
| | | String 3 Midpoint: AVAILABLE |
| | | String 4 Midpoint: AVAILABLE |
| | | String 5 Midpoint: AVAILABLE |
| | | String 6 Midpoint: AVAILABLE |

| Converter | Type | Serial Number | Capacity | Part Number | State | Current | Alarms |
|---|---|---|---|---|---|---|---|
| C41 | NE030DC48A | LBTYCO07KZ08233026 | 30.0 | see me | ON | 5.7 A | |
| C42 | NE030DC48A | LBTYCO07KZ08232982 | 30.0 | see me | ON | 5.5 A | |
| C43 | NE030DC48A | LBTYCO07KZ08233034 | 30.0 | see me | ON | 5.7 A | |
| C44 | NE030DC48A | LBTYCO07KZ08233068 | 30.0 | see me | ON | 5.9 A | |
| C51 | NE030DC48A | LBTYCO07KZ08233015 | 30.0 | see me | STANDBY-REM | 0.0 A | |
| C52 | NE030DC48A | LBTYCO07KZ08232996 | 30.0 | see me | ON | 5.8 A | |
| C53 | NE030DC48A | LBTYCO07KZ08233000 | 30.0 | see me | ON | 6.3 A | |
| C54 | NE030DC48A | LBTYCO07KZ08233010 | 30.0 | see me | ON | 5.3 A | |

| Rectifier | Type | Serial Number | Capacity | Part Number | State | DC Voltage | DC Current | AC Voltage | AC Current | Temperature | Alarms |
|---|---|---|---|---|---|---|---|---|---|---|---|
| G11 | NE075AC24A | LBTYCO07LD01000446 | 75.0 A | hello part | ON | 27.27 V | 9.2 A | 212 V | 1.8 A | 43.0 C | |
| G12 | NE075AC24A | LBTYCO07LD01000417 | 75.0 A | hello part | ON | 27.21 V | 8.8 A | 212 V | 1.7 A | 43.0 C | |
| G13 | NE075AC24A | LBTYCO07LD01000433 | 75.0 A | hello part | ON | 27.23 V | 8.7 A | 212 V | 1.7 A | 43.0 C | |
| G14 | NE075AC24A | LBTYCO07LD01000448 | 75.0 A | hello part | ON | 27.15 V | 8.9 A | 212 V | 1.9 A | 43.0 C | |
| G21 | NE075AC24A | LBTYCO07LD01000406 | 75.0 A | hello part | ON | 27.06 V | 7.7 A | 213 V | 1.5 A | 43.0 C | |
| G22 | NE075AC24A | LBTYCO07LD01000452 | 75.0 A | hello part | ON | 27.32 V | 8.8 A | 213 V | 1.7 A | 42.0 C | |

Obtaining a chronological view of the alarm events is also available by selecting **Alarm History** from the reports screen produces the following page.

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**Alarm History**

| Events | Before | 2007 (months) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec | After |
|---|---|---|---|
| Processor Halt | 0 | | 0 |
| Password At Default | 0 | | 1 |
| Configuration Changed | 0 | | 1 |
| Incompatible Converter | 0 | | 0 |
| Minor Communication Fail Alarm | 0 | | 1 |
| Major Communication Fail Alarm | 0 | | 0 |
| Sense/Control Fuse | 0 | | 0 |
| Converter High Voltage Minor | 0 | | 0 |
| Converter Very Low Voltage | 0 | | 0 |
| Rectifier Current Limit | 0 | | 0 |
| Battery On Discharge | 0 | | 0 |
| Very Low Voltage | 0 | | 0 |
| AC Fail | 0 | | 0 |
| High Voltage | 0 | | 0 |
| Rectifier Fail | 0 | | 0 |

Major | Minor | Warning | Record Only

| Description | Date | Time | Alarm |
|---|---|---|---|
| Major Communication Fail Alarm | 04/30/2007 | 04:15PM | Retired |
| Major Communication Fail Alarm | 04/30/2007 | 04:14PM | Major |
| Minor Communication Fail Alarm | 04/30/2007 | 04:14PM | Minor |
| Configuration Changed | 04/30/2007 | 04:14PM | RO |
| Password At Default | 04/30/2007 | 04:14PM | RO |
| Processor Halt | 04/30/2007 | 04:14PM | Retired |

Selecting the Settings tab produces the web page from which configuration for all individual items can be performed as mentioned in Section 4. Selecting **Battery** in the **Settings** screen produces the following web page:



**Battery**

Number of Strings    2

Battery Type    VALVE-REG    **Load Defaults**

String Capacity    1    AH

Enable Recharge Current Limit ☑

Recharge Current Limit    10    A

Imbalance Threshold    1.7

String End of Discharge Voltage    21.00

High Temperature Disconnect    75.0    C

| Alarm | Severity | Relay | Threshold | Float | Boost |
|---|---|---|---|---|---|
| Battery On Discharge | MAJ | R1 | | 25.54 | 25.54 |
| Very Low Voltage | MAJ | R2 | 23.00 V | | |
| High Battery Temperature | MIN | | 55 C | | |
| Check Battery | MIN | | | | |
| Open String | MIN | | | | |
| Voltage Imbalance | MIN | | | | |
| Thermal Probe Fail | MIN | | | | |

**Submit**

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## TELNET

Telnet provides remote log-on capability to a computer or server. The terminal to terminal connection with Telnet is based on a TCP connection for traffic between user and server. Once login is established; the controller will support this session until the "exit" command is received or the idle timeout limit is reached. A command line interface is used to view and configure the controller's features and thresholds. Backup, restore, and upgrade procedures may also be performed.

## SNMP

SNMP (simple network management protocol) is the most dominant network management standard. It allows communication and control via open standards host systems for centralized management of multiple plants. A standard MIB for the controller is available by contacting OmniOn Power Technical Support at **omnionpower.com** Up to four SNMP alarm trap destinations can be programmed using the Network Settings link found in Settings Tab of the web pages. Alarms then can be assigned under Alarm Notification also found in the Settings tab of the web pages. SNMP is more fully described in the Appendix.

## SMTP

SMTP (simple mail transfer protocol) provides a basic electronic email facility. It provides a mechanism for transferring messages among separate hosts and browser applications. The protocol is used in Gateway for sending alarm messages and alerts through email.

## FTP

FTP (file transfer protocol) is used to send files from one system to another under user commands. The protocol is used with the controller for downloading files and upgrades through a TCP connection. Application software, default configuration file, and web pages are uploaded to the controller using FTP.

## TL1

TL1 is the transaction language command interface that allows direct communication with a central monitoring system and is defined by Telcordia for various equipment. It allows communication and control via open standards host systems for centralized management of multiple plants. The protocol is typically used over a X.25 network for alarm reporting.

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# Optional Devices and Modules

## One-Wire Peripheral Devices

### QS873A Voltage/Thermal Probes

The QS873A Voltage/Thermal Probes (VT-Probes) are used to measure battery temperatures for slope thermal compensation, and to provide mid-string voltages to the ES771 for battery voltage imbalance detection. Each of these weatherized assemblies monitor their respective contact temperature and converts the measurements into serial data which is then read by the system controller using Maxim's industry standard 1-Wire® bus. Several QS873A probes can be connected in a serial fashion since the data is received through digital means. The Pulsar Plus family of controllers can handle up to 16 QS873A VT-probes. This allows multiple strings and or multiple batteries within a string to be monitored for temperature. As mentioned, these probes are required for the battery string voltage imbalance feature since they route the mid-string voltage to the system controller via the ES771A remote mid-string voltage monitoring modules. All probes are provided with a PTC device to protect against accidental short circuit during voltage measurements.
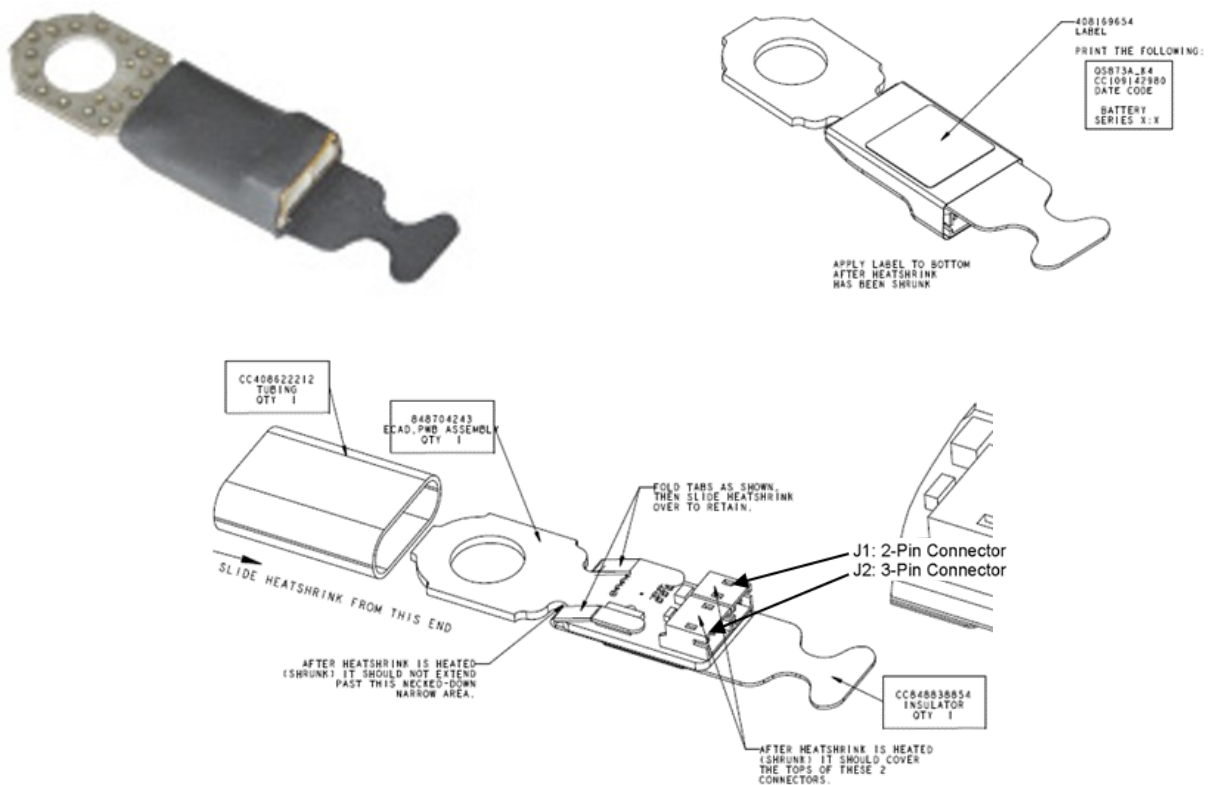


**Figure 11: QS873A Voltage/Thermal Probe (CC109142980 VT-Probe)**

Following is a brief description of the interfaces on the QS873A VT-Probe depicted above.

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**J2**

3-position connector connects the VT-Probe to the 1-Wire interface through cable 848719795. It may also connect directly to the ES771A with (CC848791517, 2.5') or (848719829, 10') or other VT-Probes in daisy chain fashion using either the (848719803, 5') or the (848719811, 10') cable.

**J1**

position connector serves to connect the VT-Probe to J2 on other VT-Probes in a daisy-chain fashion described above.

## Application of QS873 VT Probes

QS873 VT Probes can be used with or without mid-string voltage monitoring. Only one probe is required to allow the battery slope thermal compensation function to be utilized. Additional probes for individual battery or multiple string monitoring can be added as desired. The highest temperature measured from all the probes is utilized by the controller. Although many systems come with the probes factory installed, probes can be added or replaced in the field. The following figure depicts monitoring all batteries in a single string without the use mid-string voltage monitors. Actual cables and connectivity may depend on true system Layout.
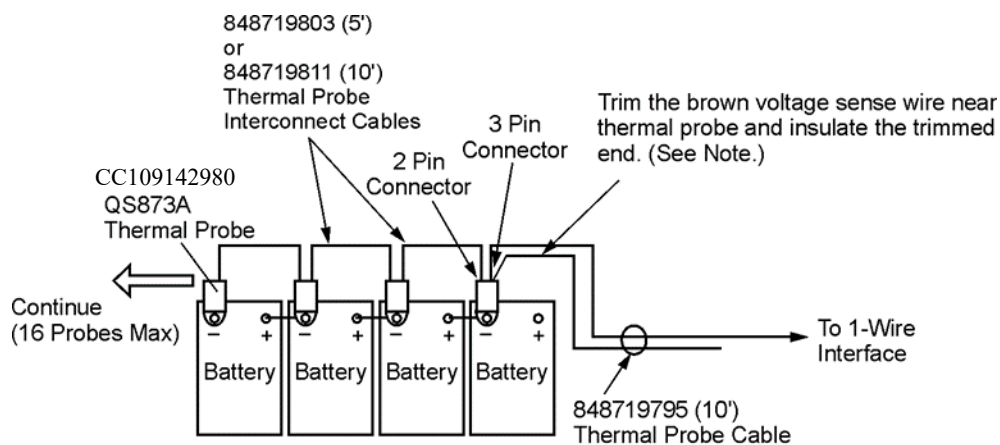


**Figure 12: VT-Probe Connections To Infinity NE**

Following are basic steps when installing the temperature probes for Thermal Compensation without Voltage Monitoring.

| VT-Probe Connect to Controller | |
|---|---|
| **Step** | **Action** |
| 1 | The QS873A weatherized VT-Probe is provided with 2-pin and 3-pin receptacles and a 1/4-inch ring terminal. Insert the RJ-45 end of the 848719795 wire set into the P5- SYS AUX PORT on the controller |
| 2 | Using voltage monitoring now or in the future?<br>**No** - Cut the brown voltage sense wire on the 848719795 at the 3-pin connector.<br>**Yes** - Insulate the end of the wire and secure it in the system for future use. |

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| VT-Probe Connect to Controller | |
|---|---|
| **Step** | **Action** |
| 3 | Insert the 3-pin connector end of the cable into the receptacle on the VT-Probe closest to the controller. |
| 4 | Place the first probe to the negative battery post as shown in figure.<br> |
| 5 | The controller automatically recognizes the VT-probes. The number of registered temperature probes and the highest battery temperature monitored may be checked from the front panel by scrolling down the menu at **Menu→Status→Batteries**. The fields are "Num Temp Probes ()" and Highest Temp () where () contains the number of devices communicating in the system as well as the highest battery temperature. |
| 6 | Connect either the 848719803 (5-ft) or the 848719811 (10-ft) cable to the 2-position receptacle of the first probe and to the 3-position receptacle of another probe.<br>Verify the number of probes (2) registered with the controller with command:<br>**Menu→Status→Batteries→NUM TEMP PROBES (2)** |
| 7 | Repeat Step 7 until all probes are installed. |
| 8 | The controller is now able to make thermal measurements in performing Slope ThermalCompensation (STC). To enable or verify that STC is active go to **Menu→Configuration→Batteries→Battery Temp Management** and select **TEMP COMP** andverify that the feature Temperature Comp is Enabled. If not, configure and save it appropriately. Additional parameters associated with slope thermal compensation may be set<br>on the controller to customize this feature. |

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# ES771A Remote Mid-String Voltage Monitor Module

The ES771A remote mid-string voltage monitoring module is used to measure the mid-string voltages of up to three strings of batteries. This unit utilizes an appropriate QS873A VT-Probe connection to obtain the voltage for measurement. It then serially transmits the appropriate information to the system controller which performs the voltage imbalance detection feature. It also serves as interface that transmits the thermal data from the VT-Probes for slope-thermal compensation and other battery management features. As with the QS873A VT probes, ES771A units also utilize Maxim's industry standard 1-Wire® bus. Thus, multiple ES771A devices can be used and placed in a daisy chain fashion along with the QS873A VT probes. The number of Mid-string voltage modules actively hooked to batteries and being monitored by the system controller to batteries is displayed under Batteries in the Status menu. Note: VT-Probes must be connected to the batteries in order for the ES771 to be recognized.

The Pulsar Plus family of controllers can monitor up to six ES771A modules. Each ES771A module is individually addressed so that specific mid-string voltages can be displayed and identified. A                seven-position rotary ID switch located on the unit must be set to a unique address number otherwise an ID conflict alarm will be generated. Units are shipped out of the factory with a default ID setting of "one". If additional units are to be in the system the ID must be reconfigured. Note: there are systems that are shipped with ES771A units installed and with proper configuration.
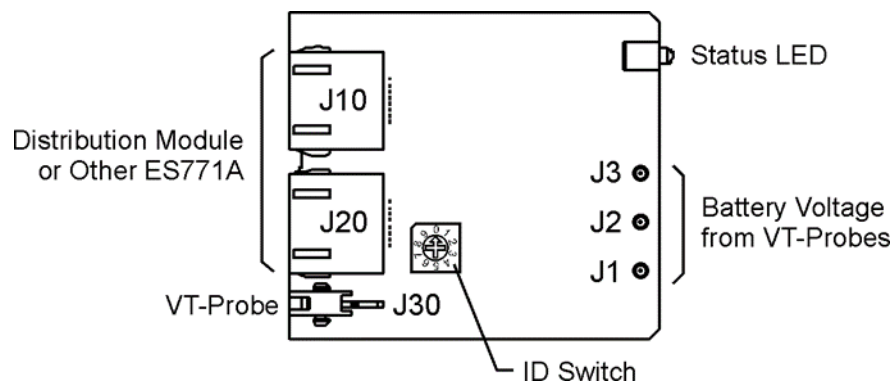


**Figure 13: ES771A Remote Voltage Monitor Module**

Following is a brief description of the interfaces on the ES771A Mid-String Voltage Monitor depicted above.

### J10, J20

RJ-45 receptacles that connect the ES771A to other ES771As or the 1-Wire interface port of the controller or system provided 1-wire interface. Typical cables utilized are the (CC848791500, 4") or (848652947, 10') cable.

### J30

Connects the ES771A to the first QS873A VT-Probes using either the (CC848791517, 2.5') or the (848719829', 10') cables.

### J1, J2, J3

Snap-fit connectors for the mid-string voltage signal wire (Brown) from the VT-Probes. Note that the Brown lead of only QS873A probes connected to the electrical center of a monitored battery string can be connected here.

## ID Switch

A seven-position rotary ID switch used by the controller to uniquely identify each ES771A in the system. A setting of "0" produces and invalid ID alarm. Valid ID settings are from 1 through 6. Units shipped from the factory have a factory default ID setting of "one".

## Status LED

The module illuminates its green LED when plugged into the 1-wire network and with the VT-probe attached to negative battery terminal of the mid-string voltage. The LED will illuminate red when the controller determines that one or more of the strings from the unit has exceeded the Mid-String Voltage threshold and time considerations.

# Application of ES771A Modules with QS873 VT Probes

ES771A modules require the use of QS873 VT Probes in order to activate the mid-string voltage monitoring feature in the controller. One VT probe is required for each mid-string voltage being monitored. Additional VT probes can be added for individual battery temperature measurement. It is up to the end-user to determine the number of battery temperature probes or voltage modules other applications may require. The highest temperature measured from all installed VT probes is utilized by the controller for slope thermal compensation. Many factory built systems come with the ES771A modules and QS873A VT probes factory installed, ES771A modules can be added or replaced in the field as necessary. The following depicts a typical configuration where four battery strings are being monitored with the required minimum VT probes. The middle battery in each string must be used when both the voltage imbalance and thermal compensation features are desired. This is one configuration using the ES771A. Systems may be configured differently. Consult technical field support if questions or concern arise

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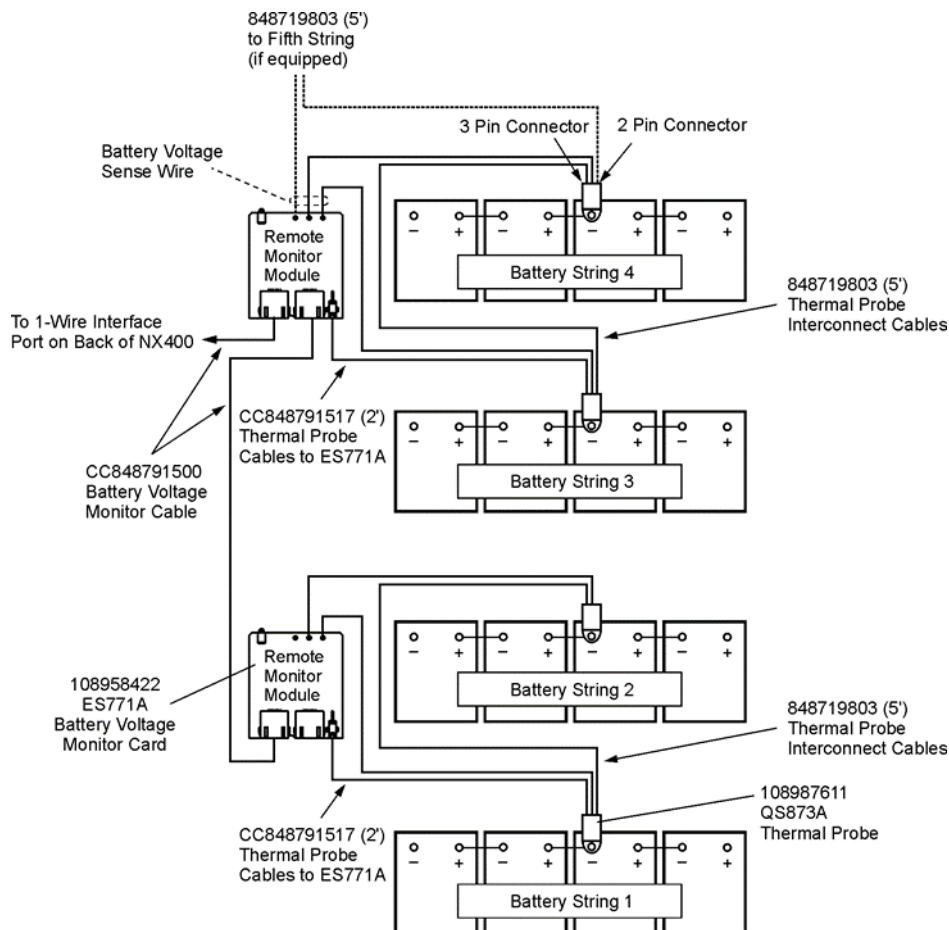
**Figure 14: Four-String System Monitored For Imbalance With One VT Probe Per String**

## Voltage Imbalance Mid-String Monitoring

| Step | Action for Voltage Imbalance Mid-String Monitoring |
|---|---|
| 1 | Insert one RJ-45 end of the 848652947 wire set into the P5-SYS AUX PORT on the controller and the other end to the first ES771A Remote Voltage Monitor module. |
| 2 | Follow the steps for installing a probe described in the previous section to attach a VT probe tothe negative post located at the center of the string as depicted in 14. Do not cut the brown wire. |
| 3 | Dress and attach the snap fit connector on the brown wire to the appropriate snap fit pin on the ES771A (J1-J3). Note: exercise care when attaching the battery voltage sense wire onto the J1, J2, and J3 pins of the ES771A pins. These push-on clips can be deformed if excessive force at an incorrect angle of insertion resulting in a non-optimum connection. The contact must not be bent more than 10 degrees. |
| 4 | Verify that the controller automatically registers the number of ES771A modules (1) at the front panel location: **Menu→Status→Batteries→Num Mid-String V** Note: Modules will only be recognized when there is actual potential applied through the VT probe to the ES771 module. |

| Step | Action for Voltage Imbalance Mid-String Monitoring |
|------|---------------------------------------------------|
| 5 | Connect another ES771A to the controller by connecting an additional 848652947 wire set from the first module to the RJ45 receptacle on the second module.<br>Verify the number of modules (2) registered with the controller with command:<br>Menu→Status→Batteries→Num Mid-String V |
| 6 | Repeat Step 5 until all modules are installed. Verify that all probes are also automatically detected by the controller at the front panel at: **Menu→Status→Batteries→Num Temp Probes** |
| 7 | If the LEDs on the module(s) are not illuminated green on or are red or if the number of registered modules does not agree with the number used: Check integrity of all  cable connections |
| 8 | Issue the Clear Events command: **Menu→Control/Operations→Clear Events**. If the LEDs are still not lit green or if the number of registered modules still does not agree, contact our technical support team. |

The system is now set to monitor both voltage and temperatures to support the batter string voltage imbalance and slope thermal compensation features. Figure 15 depicts a reserve system where every battery in the string being monitored for temperature. Again, the highest temperature measured will be used for battery thermal management. Only one temperature probe is required for thermal compensation features
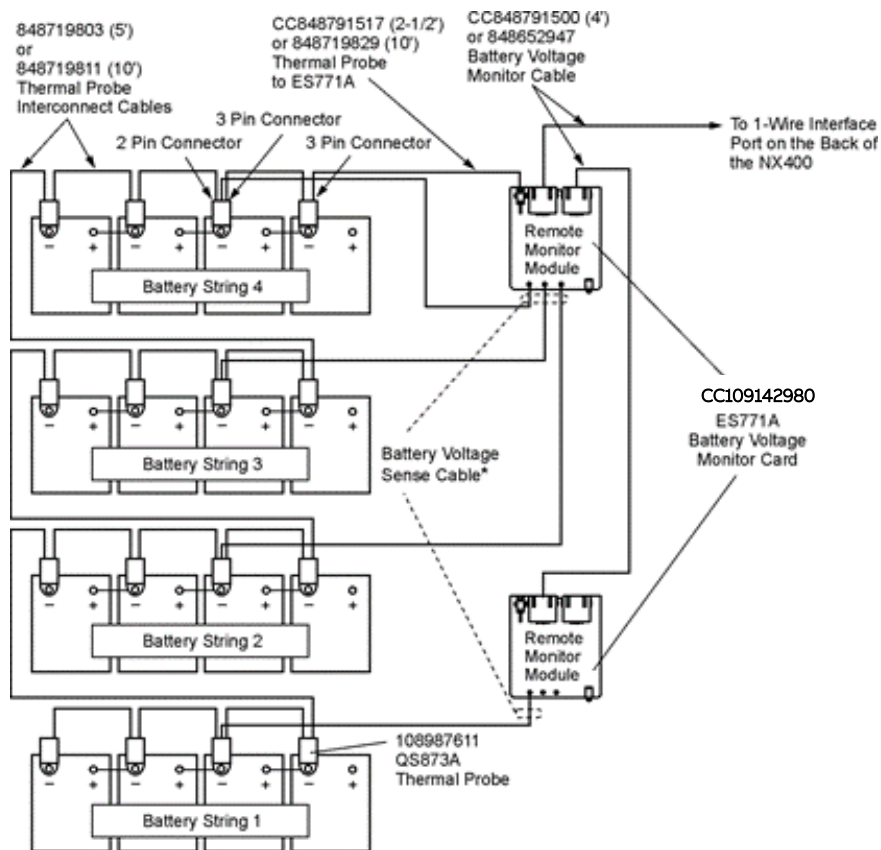


**Figure 15 : Same System Monitored For Imbalance With VT Probe On Every  Battery**

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Following is a summary of the parts utilized in the 1-Wire management system

| ORDERING CODE | DESCRIPTION | | PHOTO |
|---|---|---|---|
| CC109142980 | QS873A Thermal Probe (A) | | |
| CC848817024 | 10 ft wire set | (B: thermal probe to controller) | |
| CC109157434 | 20 ft wire set | (B:thermal probe to controller) | |
| CC848822560 | 1 ft wire set | (C: thermal probe to thermal probe) | |
| 848719803 | 5 ft wire set | (C: thermal probe to thermal probe) | |
| CC848822321 | 10 ft wire set | (C: thermal probe to thermal probe) | |
| 850027334 | 20 ft wire set | (C: thermal probe to thermal probe) | |
| 108958422 | ES771A Battery Voltage Monitor Card | | |
| CC848791517 | 2-1/2 ft wire set | (D: ES771A to thermal probe) | |
| CC848797290 | 6 ft wire set | (D: ES771A to thermal probe) | |
| 848719829 | 10 ft wire set | (D: ES771A to thermal probe) | |
| CC848791500 | 4 ft wire set | (G: ES771A to ES771A or controller) | |
| 848652947 | 10 ft wire set | (G: ES771A to ES771A or controller) | |
| 555052-1 | In-Line Coupler | | |

Temperature/Voltage probes are needed for battery monitoring. They are connected to each battery or battery string to provide slope thermal compensation, temperature alarms and voltage imbalance alarms.



Temperature Measurement

Temperature and Voltage Measurement
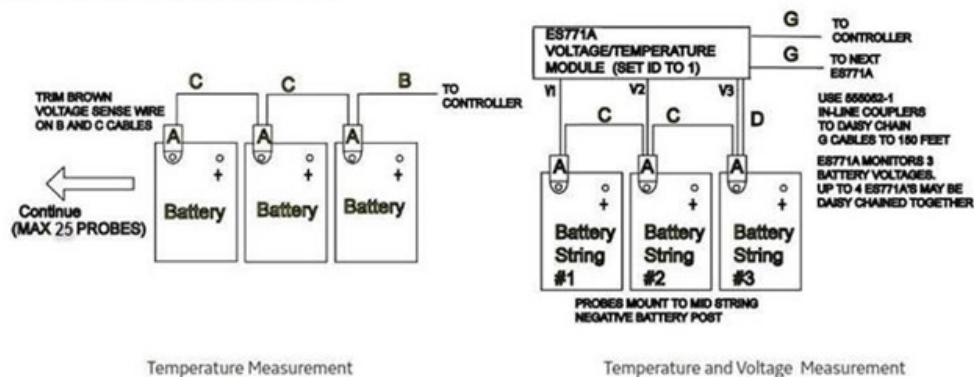
# NE872A Distribution Monitor and Control Module

## Overview

The NE872A (CC109124780) allows the Pulsar Plus family of controllers to manage various distributions through serial communications in rectifier and converter based systems. The system controller will communicate over the GP RS485 bus to the NE872A and monitor associated alarms for open load or battery protectors, measure a single shunt configured as a load or battery shunt, monitor the DC bus voltage for back-up LVD functionality, and control and monitor a single load or battery latching LVD contactor. The board allows addressing for up to eight NE872As being installed in a system. Figure 17 shows the connections and interfaces for the NE872A.
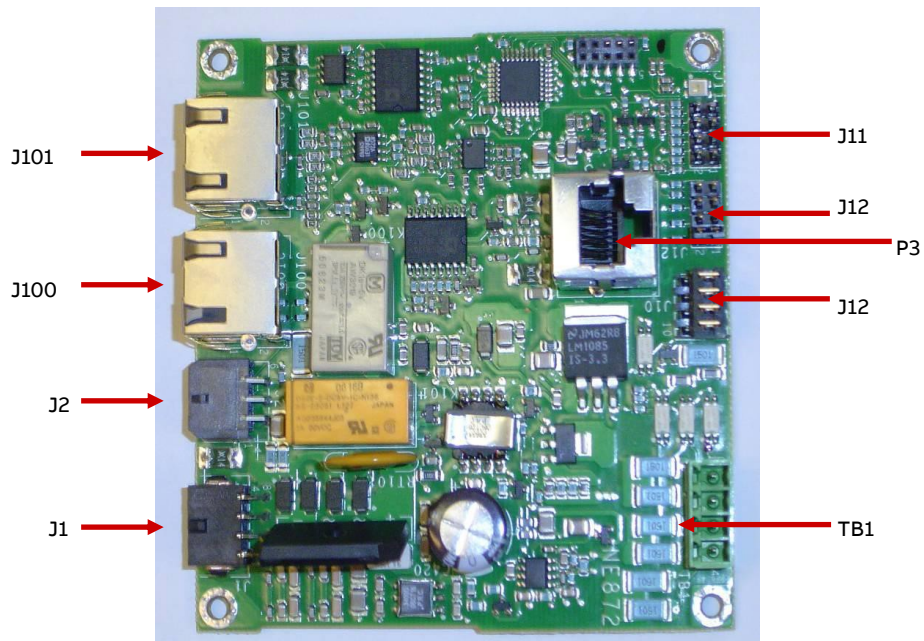
**Figure 16: NE872A Remote Distribution Module**

## Module Features

The NE872A module has the following features:

- Status LED: Tri-colored LED that illuminates according to following conditions:

| LEDs (☀ = On) | | | |
|---|---|---|---|
| **Green** | **Amber** | **Red** | **Condition** |
| ☀ | | | Normal |
| | ☀ | | Minor Alarm |
| | | ☀ | Major Alarm |
| | | Flashing | Communication Loss with Controller |
| Flash (5s) | | ☀ | Manual Reconnect Command Accepting |

In addition, the following conditions will illuminate the LEDs as described below. This assumes the external disconnect switch is used to open and close the battery charging path to the batteries.

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| Tri-Color LVD Status | | | |
|---|---|---|---|
| **Condition** | **Red** | **Green** | **Amber** |
| Contactor Closed (Normal) | | X | |
| Contactor Open (Normal)<br>(Flash between –Each~1/2 sec on) | X | X | |
| Contactor Open Due To Remote LVD<br>(Flash between –Each~1/2 sec on) | X | | X |
| ID not configured | | | Flashing |
| Alarm Inputs<br>•    Open String<br>•    FAJ alarms | | | X |
| Fault Alarms<br>•    Board Fault<br>•    Contactor FAIL | X | | |
| Lamp Test operation activated<br>(10 second operation) | Red 3 seconds On, Green 3 seconds On,<br>Amber 3 seconds On, All off for 1 second | | |

## Alarm Inputs:

The NE872A has been designed to allow it to be referenced to either VBus(-) or Vbus(+) so it can be used in both positive and negative grounded systems. All alarm or control inputs are either alarmed on an open or a closure to VBus (-) or provide its own signal return as described below:

- **Remote LVD Open:** The NE872 has the ability to accept a dry contact closure that will allow an external controller to force open the LVD independently from the system controller. The contactor will remain disconnected as long as the input is asserted. Upon de-asserting the input contactor closure, the NE872 will return the LVD to the a state dictated by the controller.

- **Fuse Alarm Major:** A contact closure to the non-grounded "Battery" side of the DC bus (- 48V/±24V) applied to this respective input, by default, produces an "Fuse Alarm Major" alarm by the controller.

- **Open String:** A contact closure to the non-grounded "Battery" side of the DC bus (-48V/±24V) applied to this respective input, by default, produces an "Open String" alarm by the controller.

## External Shunt Monitoring Input:

The NE872 has the ability to monitor a single shunt mounted in the grounded or non-grounded side of the DC bus in a ±24V or -48V power system. The shunt must have a 50mV rating. Its current rating as well as its assignment to load or battery is configured at the controller. Three leads are used to monitor the shunt: Shunt+, Shunt-, and Shuntref. Shunt+ is the most positive side of the shunt input voltage as defined during a battery discharge. Shunt- is the most negative side of the shunt input voltage as defined during a battery discharge. Shuntref is the reference lead which must be attached to the DC side of the bus in which the shunt resides to properly reference the circuitry.

## Contactor Management:

Controls and monitors one load or battery contactor. The contactor is of the magnetic latching type equipped with an auxiliary switch for status. The board is designed to drive both 24V and 48V rated contactors.

## Reverse Battery Protection:

The NE872A will prevent the closure of the battery contactor when it senses batteries have been connected in reverse polarity. A Major alarm "Reversed Battery" is generated by the system controller.

Note: when a battery disconnect breaker is used to take battery strings off-line for servicing, care must be taken to ensure battery connections are correct at the disconnect switch.

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## Autonomous Backup LVD Function:

The NE872 monitors the system bus voltage to provide a backup for the Low Voltage Disconnect (LVD) function. In the event of a loss of communication between the NE872A due to a failed or removed controller, communication cable disconnect, etc. the configured disconnect and reconnect values assigned to a particular LVD function at the controller are used along with the boards internal measurement capability to control the LVD. These disconnect and reconnect threshold values are sent from the controller to each respective QS871A upon establishing initial communication.

## 8-Position Jumper: (J12; J11)

8-position jumper arrangement that uniquely identifies up to eight NE872 remote distribution monitor and control modules. Placing no jumper, ID position 0, is an invalid configuration. The Pulsar Plus family of controllers can address up to eight unique NE872s. Note: factory ordered systems are generally pre-configured and will have the jumpers appropriately set. Jumpers are arranged as shown
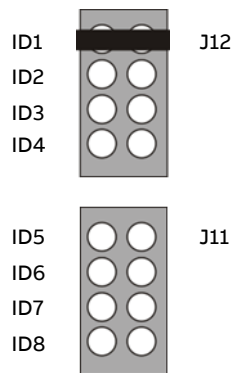


**Figure 17 : NE872A ID Jumper Settings**

## 12-Position Jumper:

12-position jumper arrangement that configures the NES872 operate in a positive of negative battery plant. The jumper is selected so that all polarity sensitive items are selected at once by configuring one header.

Note: factory ordered systems are generally pre- configured and will have the jumpers appropriately set. The block jumper is arranged as shown.
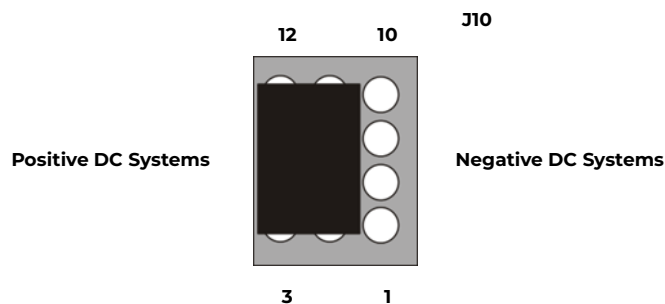


**Figure 18 : NE872A ID Jumper Settings**

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## Module Connector Definitions

The NE872 module has six connectors used for board power, measurement, alarm inputs and various serial communications.

### J1

Provides the connections to external distribution module's bus voltage and power, shunt inputs and reference, Fuse Alarm Major And Open String Inputs.

| Pin # | Signal Name | Signal Description |
|---|---|---|
| **Table 33 NE872 J1 Signal Description** |
| 1 | FAJ | General purpose Fuse Alarm Major (FAJ) alarm input; Major alarm on closure to the non-grounded "Battery" side of the DC bus (-48V/±24V). Optional connection at terminal block TB1. |
| 2 | | |
| 3 | SHREF | Shunt Reference signal to be placed in the DC potential of which the shunt resides to reference the shunt measurement |
| 4 | SHUNT+ | Positive Battery Shunt input signal whose signal polarity is defined by the voltage on the shunt during battery discharge. |
| 5 | OS | Open String (OS) alarm input for external battery disconnect switch; Alarms onclosure to the non-grounded "Battery" side of the DC bus (-48V/±24V). Optional connection at terminal block TB1. |
| 6 | NE_CM | Infinity NE Common or Discharge Ground (DG) connection used for power and voltage monitoring. Connection made to NEcommon in the Infinity system. |
| 7 | DB | Discharge Battery (BAT) power input connected to the Non-Grounded or "Battery" side of the DC bus. Also used as sense voltage for backup monitoring. |
| 8 | SHUNT- | Negative Battery Shunt input signal whose signal polarity is defined by the voltage on the shunt during battery discharge |

**Table 30 NE872 J1 Signal Description**

### J2

Provides the contactor management interface for control and LVD status.

| Pin # | Signal Name | Signal Description |
|---|---|---|
| 1 | LVD_COILA | Low Voltage Disconnect Coil Voltage A. "A" positive with respect to "B" to close contactor. Signal connected to one side of contactor coil. |
| 2 | LVD_C | Common of contactor status indicator. Connect signal to Common of themicro-switch of contactor. Return reference for LVD auxiliary alarm status detection. |
| 3 | LVD_NO | Normally Open contactor status monitor indicator. Closed to LVD_C when contactor is closed. Connect signal to NO pin of micro-switch of contactor. |
| 4 | LVD_COILB | Low Voltage Disconnect Coil Voltage B. "B" positive with respect to "A" to open contactor. Signal connected to other side of contactor coil. |
| 5 | BATT_SNS | Reserve Battery Sense Voltage input signal. Battery bus voltage used forreverse battery detection. Connection made to battery side of the battery contactor. Signal connection must not be used for Load contactors. |
| 6 | LVD _NC | Normally Closed contactor status monitor. Closed to LVD_C when contactor is open. Connect signal to NC pin of micro- switch of Contactor. |

**Table 31 NE872 J2 Signal Description**

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## TB1

Terminal Block connection that provides field access to Fuse Alarm Major, Open String, and the Remote LVD input

| Pin # | Signal Name | Signal Description |
|---|---|---|
| 1 | Remote LVD Return | Protective (PTC or resistive) return to NE common for External Remote LVD contact closure input signal. |
| 2 | Remote LVD | External contact closure for remote disconnecting attached LVD; Disconnects LVD on a dry contact closure to Remote LVD Return when feature is enabled. |
| 3 | FAJ | General purpose Fuse Alarm Major (FAJ) alarm input; Major alarm on closureto the non-grounded "Battery" side of the DC bus (-48V/±24V). Optional connection at connector J1. |
| 4 | OS | Open String (OS) alarm input for external battery disconnect switch; Alarms onclosure to the non-grounded "Battery" side of the DC bus (-48V/±24V). Optional connection at connector J1. |

**Table 32 NE872 TB1 Signal Description**

## J100 and J101

Provides connectivity to the RS485 GP rectifier/converter bus as well as a pass through to the next RS485 connected device.

| Pin # | Signal | Signal Description |
|---|---|---|
| 1 | RS485+ | B Inverting Driver Output / Inverting Receiver Input |
| 2 | RS485- | A Non-inverting Receiver Input/ Non-inverting Driver Output |
| 3 | RS485REF | RS485 Reference/return. Pass-through on this board. |
| 4-8 | | No Connection |

**Table 33 NE872 J100 and J101 Signal Description**

# QS871A Distribution Monitor and Control Module

## Overview

The QS871A (CC109103371) allows the Pulsar Plus family of controllers to obtain distribution data through serial communications. The system controller monitor alarms for open load or battery protectors, measures load or battery shunts, monitors the bus voltage, and controls and monitors a single load or battery LVD contactor. Figure 19 shows the connections and interfaces for the QS871A.
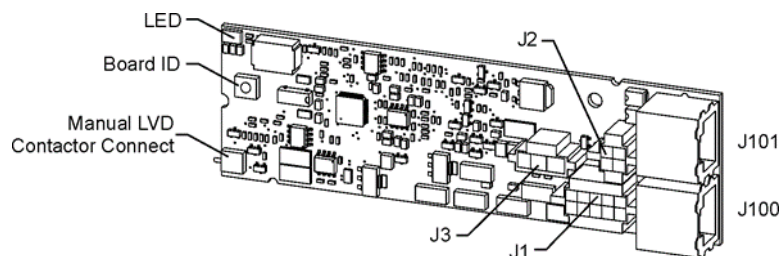


**Figure 19: QS871A Remote Distribution Module**

## Module Features

The QS871A module has the following features:

- **Status LED:** This is a tri-colored LED and will illuminate accordingly for the conditions shown below.

| LEDs (☀ = On) | | | |
|---|---|---|---|
| **Green** | **Amber** | **Red** | **Condition** |
| ☀ | | | Normal |
| | ☀ | | Minor Alarm |
| | | ☀ | Major Alarm |
| | | Flashing | Communication Loss with Controller |
| Flash (5s) | | ☀ | Manual Reconnect Command Accepting |

In addition, the following alarms will be issued for the conditions noted. This assumes the external disconnect switch is used to open and close the battery charging path to the batteries.

| Condition | Contactor Fail Alarm | Contactor Open Alarm | Open String Alarm | Controller LED | QS871 LED |
|---|---|---|---|---|---|
| Open Integral QS871A Disconnect Switch | | | X | RED | Blinking AMBER |
| Battery reconnected in reverse polarity | X | X | | RED | RED |
| System started w/ reverse battery polarity | X | X | | RED | RED |

## Alarm Inputs:

The QS871A is referenced to VBus(-), therefore, all alarm inputs are either alarmed on an open or a closure to VBus(-) as described below.

- One input closure to VBus(-) for **Remote LVD Open** (RO) from external source (J3 pins 1 and 2)

- One input to **Fuse Input Major** alarm upon closure to VBus(-), for distribution protector open alarms (J1 pin 7)

- One input to Open String alarm upon closure to VBus(-) for battery circuit breaker open alarms (J1 pin8)

## Reverse Battery Protection:

The QS871A will prevent the closure of the battery contactor when it senses batteries have been connected in reverse polarity. The QS871A will keep the contactor disconnected and generate an appropriate alarm. When a battery disconnect breaker is used to take battery strings off-line for servicing, care must be taken to ensure battery connections are correct at the disconnect switch.

## Manual LVD Contactor Connect:

This feature allows the Infinity NE or any other power system to resume powering the load after low voltage disconnect of batteries. Fully depleted battery strings can be replaced with fully charged strings. Once the strings have been installed, depressing the Manual LVD Contactor switch on the front of the QS871A module will result in the LVBD contactor closing. Continue to depress the switch until the Green LED stops flashing and displays a continuous green color. This indicates acceptance of the command and permanent closure of the contactor. Releasing the switch prior to the continuous green LED will result in the contactor opening and removing power to the load.

## External Shunt Monitoring Input (J1 pins 4 and 5):

The shunt must be in the VBus(-) leg to maintain proper reference with the QS871A module. These inputs are for the system controller to read battery or load currents. The polarity of the connections must be positive during battery discharge.

## Contactor Management:

Controls and monitors one load or battery non-latching contactor.

## Autonomous Backup LVD Function:

Monitor system bus voltage for backup LVD function (in case of loss of communication to the QS871As or failed or removed controller ). The configured disconnect and reconnect values assigned to a particular LVD function are sent from the controller to each respective QS871A. In the advent of a controller failure the QS871As will utilize their individual voltage monitoring and these thresholds to disconnect and reconnect the contactor.

## 7-Position ID Switch:

Rotary 8-position switch that uniquely identifies up to seven remote distribution monitor and control modules. ID position 0 is invalid. The controller can address up to eight unique distribution monitor and control modules.

Note: The majority of applications that utilize the QS871 utilize the QS871A. There are versions of the QS871 that are used in special applications where components have been removed because the feature was not required. These versions and the feature set are high-lighted below.

| | Feature | QS871A | QS871B | QS871C |
|---|---|:---:|:---:|:---:|
| **Inputs** | Open String input | X | X | X |
| | Fuse Alarm Major input | X | | X |
| | Remote LVD Input | X | | |
| | Auxiliary Alarm Input | X | | |
| | Shelf ID Input | | X | X |
| **Misc** | Status LED | X | X | X |
| | Rotary ID Switch (7-position) | X | | |
| **Contactor Drive And Monitor** | Momentary Forced Closed LVD switch | X | | X |
| | Reverse Battery Detection feature | X | | X |
| | Backup Contactor | X | | X |
| | Disconnect/Reconnect features | | | |
| **Analog Monitoring** | Shunt Monitoring Circuitry | X | X | X |
| | DC Bus Monitoring Circuitry | X | X | X |
| **Connectors** | Power/Shunt/OS/FAJ connector | X | X | X |
| | Shielded RJ-45 connectors | X | | |
| | Remote LVD and Aux alarm connector | X | | |
| | Contactor Control Connector | X | | X |

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## Module Connector Definitions

The QS871A module has five connectors: two RJ-45 connectors used for serial communication to ES773A VT- Probes, ES771A Remote Voltage Monitoring Modules, and a Pulsar Plus family controller and three connectors for monitoring circuit breakers, contactors and shunts. The connectors are defined as follows.

### J1

Provides the connections to external distribution module's bus voltage and power, shunt inputs and reference, Fuse Alarm Major And Open String Inputs, and shunt.

| Pin # | Signal Name | Signal Description |
|---|---|---|
| 1 | VPWR- | VBUS(-) or BATT- Power. Power and board reference for QS871, connect to Non-Grounded side of the DC bus (-48V). |
| 2 | VPWR+ | VBUS (+) Power and Positive Sense voltage for backup monitoring. |
| 3 | BATT- | Discharge Battery (BAT) input connected to the Non-Grounded side of the DC bus (-48V). Used as sense voltage for backup monitoring, reverse voltagedetection, and force contactor closed. |
| 4 | SHUNT+ | Positive Battery Shunt input signal whose signal polarity is defined by the voltage on the shunt during battery discharge. |
| 5 | SHUNT- | Negative Battery Shunt input signal whose signal polarity is defined by the voltage on the shunt during battery discharge |
| 6 | OS | Open String (OS) alarm input for external battery disconnect switch; Alarms on closure to the non-grounded "Battery" side of the DC bus (-48V). |
| 7 | FAJ | General purpose Fuse Alarm Major (FAJ) alarm input; Major alarm on closure to the non-grounded "Battery" side of the DC bus (-48V). |
| 8 | SHLF_ID3 | Signal used for identifying the board. Pulled up or down on board accordingly in the factory. |
| 9 | RS485+ | B Inverting Driver Output / Inverting Receiver Input |
| 10 | RS485- | A Non-inverting Receiver Input/ Non-inverting Driver Output |

**Table 34 QS871 J1 Signal Description**

### J2

Provides the contactor management interface for control and LVD status.

| Pin # | Signal Name | Signal Description |
|---|---|---|
| 1 | LVD_COIL | Positive voltage applied to Low Voltage Disconnect Coil. Connect to positive side of contactor coil. |
| 2 | LVD_COILRTN | Contactor coil return to VBUS- potential through circuitry. Connect to most negative side of Contactor coil, other side of coil connected to VBus(+). |
| 3 | LVD _NC | Normally Closed contactor status monitor. Closed to LVD_C when contactor is open. Connect signal to NC pin of micro- switch of Contactor. |
| 4 | LVD_NO | Normally Open contactor status monitor indicator. Closed to LVD_C when contactor is closed. Connect signal to NO pin of micro-switch of contactor. |

**Table 35 QS871 J2 Signal Description**

Note: The common or return of the micro switch for these signals must be attached to Vbus- in the system outside of this board.

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## J3

Connection that provides field access to External Auxiliary Fuse Alarm Major and the Remote LVD input.

| Pin # | Signal Name | Signal Description |
|---|---|---|
| 1 | Remote LVD | External contact closure for remote disconnecting attached LVD; Disconnects LVD on a dry contact closure to Remote LVD Return when feature is enabled. |
| 2 | Remote LVD Return | Protective (PTC or resistive) return to NE common for External Remote LVD contact closure input signal. |
| 3 | Aux_Alarm | General purpose Fuse Alarm Major (FAJ) alarm input; Major alarm on closure to the non-grounded "Battery" side of the DC bus Battery (-48V). |

**Table 36 QS871 J3 Signal Description**

## J100 and J101

Provides connectivity to the RS485 GP rectifier/converter bus as well as a pass through to the next RS485 connected device.

| Pin # | Signal Name | Signal Description |
|---|---|---|
| 1 | RS485+ | B Inverting Driver Output / Inverting Receiver Input |
| 2 | RS485- | A Non-inverting Receiver Input/ Non-inverting Driver Output |
| 3 | RS485REF | RS485 Reference/return. Pass-through on this board. |
| 4 | | No Connection |
| 5 | - | Connects between J101.5 and J100.5. Connection reserved for1-Wire communication signal in the system. |
| 6 | - | Connects between J101.6 and J100.6. Connection reserved for1-Wire +5V signal in the system. |
| 7 | | No Connection |
| 8 | | No Connection |

**Table 37 QS871 J100 and J101 Signal Description**

**Figure 15 Footprint of Cabinets**

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# ES772A Remote Distribution Module

## Overview

The ES772A allows the controller to communicate with devices in TEPS or OEM distribution panels. It will allow the controller to alarm for open load and battery protectors, read battery current from an external shunt, and control a non-latching contactor. The contacts can be assigned as a load-disconnect or as a battery disconnect.
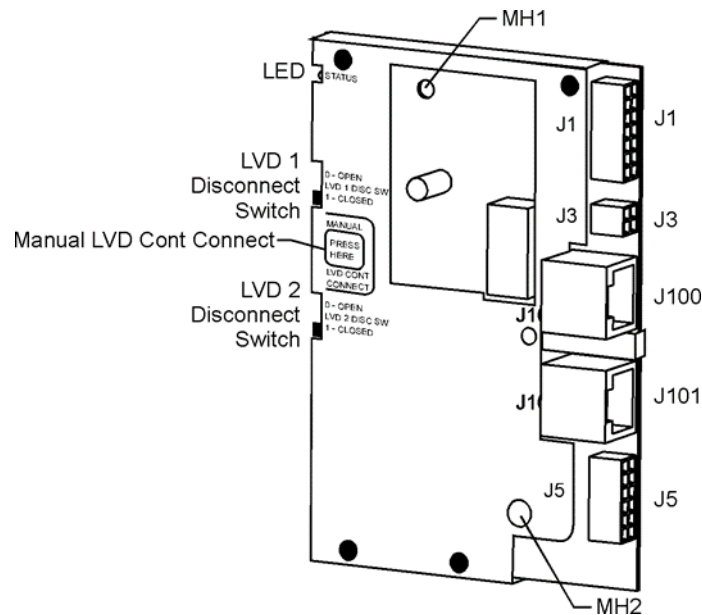


**Figure 20: ES772A Remote Distribution Module**

**Controls, LED and Connectors**

**Receptacle J1:** User connections to external distribution module.

**Receptacle J3:** User connections to external distribution module.

**J100/J101:** User connections to the controller J10, other devices such as the QS873A VT-Probe and the ES771A Remote Voltage Monitor Module, and other RJ45 connections carrying the RS485 rectifier communication bus.

**Receptacle J5:** User connections to external distribution module.

**Mounting Hole MH1:** Mounting hole to mount module in user application.

**Mounting Hole MH2:** Mounting hole to mount module in user application.

**LVD2 Disc SW:** Disconnect switch for external contactor 2

**Manual LVD Cont Connect:** Switches for forced reconnect function.

**LVD1 Disc SW:** Disconnect switch for external contactor 1, when wired as described in installation section.

**LED:** This is a tri-colored LED and will illuminate accordingly for the conditions shown below.

| LEDs: *= On | | | |
|---|---|---|---|
| **Green** | **Amber** | **Red** | **Condition** |
| * | | | Normal |
| | * | | Minor Alarm |
| | | * | Major Alarm |
| | Flashing | | External Contactor(s) Manually Opened witheither LVD1 or LVD2 DISC SW |
| | | Flashing | Communication Loss with System Controller |
| Flash (5 sec) | | * | Manual Reconnect Command Accepting |

The ES772A is referenced to VBus(-), therefore, all alarm inputs are either alarmed on an open or a closure to VBus(-) as described in the following.

## Module Features

The ES772A module has the following features:

- **16 Alarm inputs**. These inputs may be used to monitor for distribution circuit breakers with micro- switch closures for protector opening, GMT style fuses with or DIN style circuit breakers. Furthermore, the two Auxiliary Major alarms may be used to monitor micro-switch closures from other devices such as a fan or a door, etc.

The alarming states for the different inputs are as stated below:

- 10 inputs to alarm or an open to VBus(-) for DIN style circuit breakers (J5 pins 1-10)

- 2 inputs to alarm on closure to VBus(-) for Auxiliary Major alarming from external source (J5 pins 11 and 12)

- 2 inputs to alarm upon closure to VBus(-), for distribution protector open alarms (J1 pins 6 and 13)

- 2 inputs to alarm upon closure to VBus(-) for battery circuit breaker open alarms (J1 pins 7 and 14)

- (**2) LVBD or LVLD Contactor Manual Disconnect Switches are provided.** These switches allows users to manually open up to two external contactors to disconnect a battery string from the V(-) bus and allow the user to perform maintenance on the battery. The switches can also disconnect a load from the V(-) bus if the contactor is configured for load disconnect. The contactors are treated as one type of contactor. That is both contactors are either LVBD or LVLD type.

- **Reverse Battery Protection.** If wired as instructed in Fig. 9-2 or 9-3, the ES772A will prevent the closure of contactors with batteries that are wired in reverse polarity. It will be active during initial start-up and also during servicing if the integral battery disconnect switches are used to connect and disconnect the battery strings from the V(-) bus. If the battery strings are wired in reverse polarity and an attempt was made to close the contactor, the ES772A will disconnect all contactors and appropriate alarms will be transmitted.
  If an external disconnect switch is used to take battery strings off-line for servicing, care must be taken to ensure battery connections are correct at the disconnect switch. This is because the contactors remain closed when an external disconnect switch is used to disconnect the batteries from the bus. If the batteries are reconnected in reverse polarity, closing the switch will result in the batteries being connected to the bus in reverse polarity. If the external disconnect switch is connected as shown in Fig 3, then the reverse battery protection feature will be provided. Read all warning statements prior to making any connections.

- **Manual LVD Cont Connect** - **Manual LVD Contactor Connect**. This feature allows the CPS6000 system to resume powering the load after low voltage disconnect of batteries following a battery on discharge event. The fully depleted battery strings are to be replaced with fully charged strings. Once the strings have been replaced, depressing the Manual LVD Cont switches on the front of the ES772A module will result in the LVD contactors closing and the LED blinking in green color. Continue to depress the switches until the LED stops flashing and displays a continuous green color. This indicates acceptance of command and continued closure of contactors. Note that releasing the switches prior to the LED displaying a continuous green color will result in the contactor opening and removing power to the load.

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- **External battery shunt input**, (J1, pins 4 and 11). The battery shunt must be in the VBatt(-) leg to maintain proper reference with the ES772A module. These inputs are for the system controller to read battery current. The polarity of the connections must be positive during battery discharge.

- Monitor plant voltage for **backup LVD function** (in case of failure of controller during battery discharge)

## Module Connector Definitions

The ES772A module has five connectors. Two are RJ-45 connectors used for RS485 serial communication to **ES773A VT-Probes**, the ES771A Remote Voltage Monitoring Module, and to the controller. The remaining connectors are used for monitoring circuit breakers, contactors and shunts and are defined in the following tables.

Connector J1 Pin-out Definitions

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| Pin | Name | Definition | Comments/Connections |
|---|---|---|---|
| 1 | VPWR + | V(+) Power | Power for ES772A, connect to VBus(+) |
| 2 | N/A | Reserved | |
| 3 | N/A | Reserved | |
| 4 | SHUNT- | Neg Batt Shunt Input | Polarity is during battery discharge |
| 5 | BATT1_SENSE | Polarity Sense for String 1 | Connect to battery negative, V(-) of String 1 |
| 6 | DIST_ALM_1 | Trip-Indicator Input-1 for US Style CB or GMT Fuse. Alarmon closure to VBus(-). | Connect to NC terminal of breaker micro switch or to indicator lead of GMT fuse, other end (C) referenced toVBus(-). |
| 7 | EXT BAT SW1 | Alarm input for external battery disconnect switch; alarm on closure to VBus(-). | Connect to NC micro switch of US Style CB, other end (C) referenced to VBus(-), micro switch must close upon manual opening of CB. |
| 8 | VPWR - | V(-) Power | Power for ES772A, connect to VBus(-) |
| 9 | STATUS1_RTN | Reference for STATUS1 | Connect to C pin of micro switch of Contactor 1. |
| 10 | STATUS1 | Contactor 1 Status Monitor | Connect to NO pin of micro switch of Contactor 1. |
| 11 | SHUNT+ | Positive Battery Shunt Input | Polarity is during battery discharge |
| 12 | LVD1_COIL | Contactor 1 coil input | Connect to one side of Contactor 1 coil, other side ofcoil connected to VBus(+). |
| 13 | DIST_ALM_2 | Trip-Indicator Input-2 for USStyle CB or GMT Fuse. Alarmon closure to VBus(-). | Connect to NC terminal of breaker micro switch or to indicator lead of GMT fuse, other end (C) referenced toVBus(-). |
| 14 | EXT BAT SW2 | Alarm input for external battery disconnect switch; alarms on closure to VBus(-). | Connect to NC micro switch of US Style CB, other end (C) referenced to VBus(-), micro switch must close upon manual opening of CB. |

**Table 38 ES772 Connector J1 Pinout Definitions**

| Pin | Name | Definition | Comments |
|---|---|---|---|
| 1 | BATT2_SENSE | Polarity Sense for String 2. | Connect to battery negative VBus(-) of string 2. |
| 2 | STATUS2_RTN | Reference for STATUS2. | Connect to C pin of micro switch of Contactor 2. |
| 3 | STATUS2 | Contactor 2 Status Monitor. | Connect to NO pin of micro switch of Contactor 2. |
| 4 | LVD2_COIL | Contactor 2 coil input. | Connect to one side of Contactor 2 coil, other side ofcoil connected to VBus(+). |

**Table 39 ES772 Connector J3 Pin Definitions**
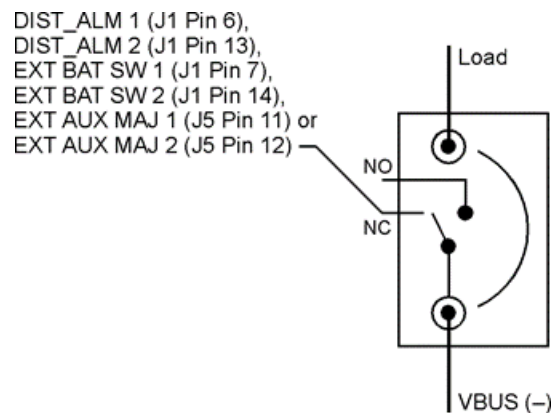


**Figure 21 : Typical Alarm Connections**

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The DIST_ALM(1, 2) EXT BAT SW(1, 2), and the EXT AUX MAJ(1, 2) alarm inputs are to be connected as shown in Figure 21. All of these inputs alarm on a closure to VBus(-). The DIST_ALM(1, 2) alarm inputs are to be used for monitoring US Style CBs and GMT style fuses. The EXT BAT SW(1, 2), alarm inputs are to be used for monitoring battery disconnect switches or circuit breakers with a micro switch that closes on manual opening of switch. The EXT AUX MAJ(1, 2) alarms may be connected to external devices with a micro switch that closes on an alarmed state. Examples of this might be a Door Open alarm, or a Fan Fail alarm.

Since these devices all alarm on a contact closure, the protectors of the same type may have the indicating NC terminal connected together and the C terminals connected together and connected as shown above. This is not the case for DIN style circuit breakers, which must be individually monitored via different alarm inputs as shown in Figure 24.
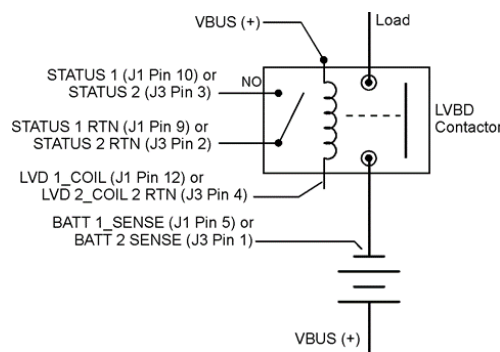


**Figure 22 : Alarm Connections with Reverse Polarity Protection**

Figure 22 shows the connection required if Reverse Polarity Protection is to be used with the integral battery disconnect switches LVD1_DISC or LVD2_DISC. Note that the sense lead BATT1 or BATT2 must be connected as shown in order for the reverse polarity protection feature to work. If two strings are being used, connect one string to STATUS1, LVD1, LVD1_COILRTN, STATUS1_RTN, BATCB1, and BATT1_SENSE connections and the other to the "-2" connections. When more than two strings are being used, divide the strings among the two inputs.

## WARNING

When two battery strings are connected to the same battery terminal, care must be taken to ensure the polarity of the two strings is correct to each other. Improper connection will result in one string being shorted to the other string and the system can not protect against this.

With the above connections, the following alarms will be issued for the conditions noted.

| | Contactor Fail Alarm | Contactor Open Alarm | Open String Alarm | Controller LED | ES772 LED |
|---|---|---|---|---|---|
| Open Integral ES772A Disconnect Switch | | X | | RED | Blinking AMBER |
| Battery reconnected in reverse polarity | X | X | | RED | RED |
| System started w/ reverse battery polarity | X | X | | RED | RED |

**Figure 23: Reverse Polarity Protected Alarm Connections with an External Battery Disconnect Switch External Battery Disconnect Switch**

Figure 23 shows the connections required if Reverse Polarity Protection is to be used with an external disconnect switch. Note that the sense lead BATT1_SENSE or BATT2_SENSE must be connected as shown in order for the reverse polarity protection feature to work. If two strings are being used, connect one string to STATUS1, LVD1_COIL, STATUS1_RTN, BATCB1, and BATT1_SENSE connections and the other to the "-2" connections. When more than two strings are being used, divide the strings among the two inputs.

## WARNING

When two battery strings are connected to the same battery terminal, care must be taken to ensure the polarity of the two strings is correct to each other. Improper connection will result in one string being shorted to the other string and the system can not protect against this. With the above connections, the following alarms will be issued for the conditions noted. This assumes the external disconnect switch is used to open ans close the battery charging path to the batteries.

|  | Contactor Fail Alarm | Contactor Open Alarm | Open String Alarm | Controller LED | ES772 LED |
|---|---|---|---|---|---|
| Open Integral ES772A Disconnect Switch |  |  | X | RED | Blinking AMBER |
| Battery reconnected in reverse polarity | X | X |  | RED | RED |
| System started w/ reverse battery polarity | X | X |  | RED | RED |

## Auxiliary Port Connector

| Pin | Function | Pin | Function |
|-----|----------|-----|----------|
| 1 | DIN CB-1 | 2 | DIN CB-2 |
| 3 | DIN CB-3 | 4 | DIN CB-4 |
| 5 | DIN CB-5 | 6 | DIN CB-6 |
| 7 | DIN CB-7 | 8 | DIN CB-8 |
| 9 | DIN CB-9 | 10 | DIN CB-10 |
| 11 | EXT AUX MAJ-1 | 12 | EXT AUX MAJ-2 |

**Table 40 Auxiliary Port Connector Signals**
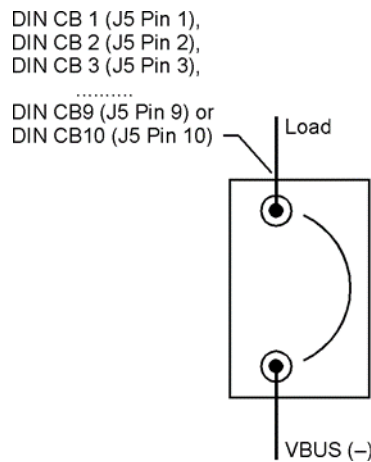


**Figure 24: Alarm Connections for DIN Style Load Protectors**

Figure 24 shows the connections required if load protectors are the DIN style circuit breakers. Note that 10 alarm inputs are provided for monitoring up to 10 DIN breakers because these breakers must be monitored individually. The DIN CB(1-10) inputs are alarmed on an open to VBus(-)

### J100 and J101 Serial Ports

J100 and J101 are used to connect the ES772A to the controller. Note that if QS873A VT-Probes are to be used in conjunction with the ES772A, connect J100 or J101 on the ES772A to the controller via the Auxiliary Port connector on the controller, and then connect the QS873A to the unused RJ-45 jack on the ES772A.

If the ES772A is being used with both the QS873A and the ES771A Remote Voltage Monitoring Module, connect either the ES771A or the QS873A to the controller as both have two RJ-45 jacks for serial communication purposes. Then connect the two-jack device not connected to the controller to the unused serial port of the two-jack device connected to the controller, and connect the QS873A to its second serial port.

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## ES772A Module Mounting

Use the template in Figure 26 as a guide to mount the ES772A in your application. The location of the mounting holes MH1 and MH2 are outlined.
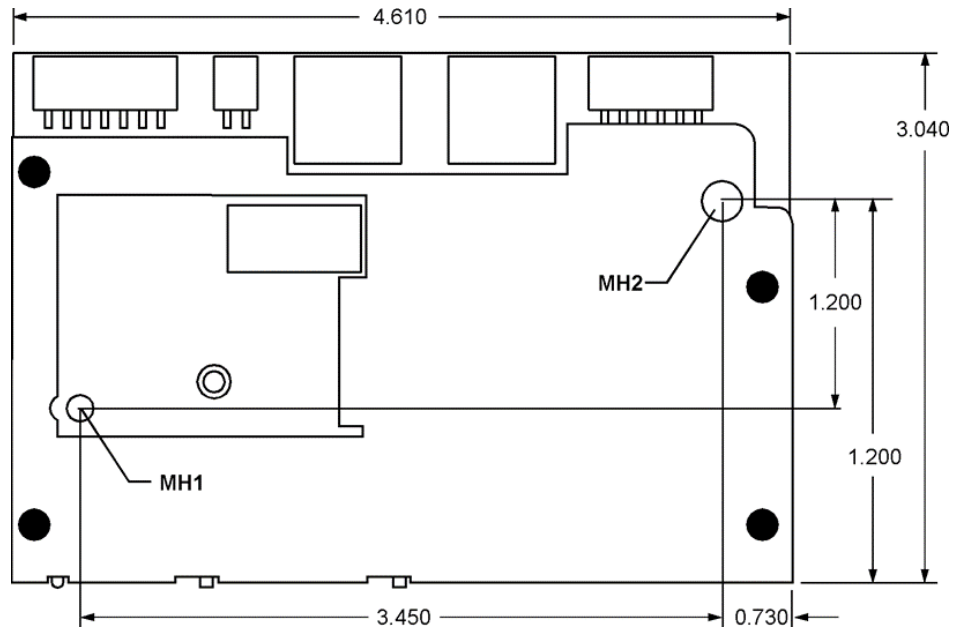


**Figure 25: ES772A Mounting Hole Locations**

## 22-position external distribution panel

### Overview

The J5694722 external distribution accepts up to 22 bullet-breakers for DC loads and occupies 3U of vertical rack space in a 23" rack. The panel has a total output capacity of 400A and is front accessible. The following configurations are available in 3 distinct distribution modules:

• Without contactor

• With 400A LVLD and 500A shunt

• With 400A LVBD and 500A shunt

### Features
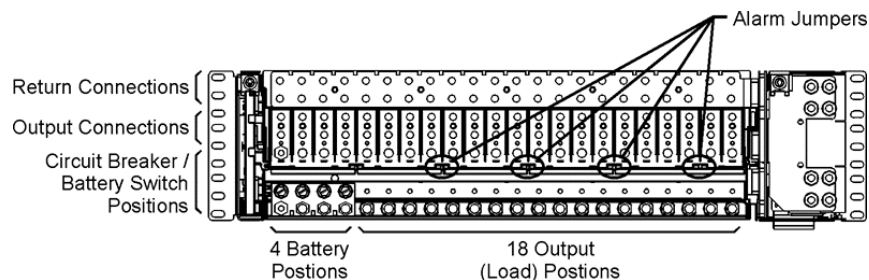


**Figure 26: J5694722 External Distribution**

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- Up to 22 flexible battery positions that can be configured either with the battery bus or the load bus using an adapter plate

- All lug connections accept double-holed lugs.

- Staggered vertical arrangement of up to three distributions directly stacked with wiring access.

- Contactor control, measurements and alarms with the Pulsar Plus family compatible ES772 module

- CO ground connection

- Contactor options None, LVBD, LVLD

- 500A shunt

- Accommodates single, double and triple pole breakers with lug adapter for multi-pole breakers

- English hardware (1/4-20) for all customer connections

- TPS fuses in place of bullet-breakers

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# Troubleshooting

| Alarm Severity Indicator[2] | User Interface Display | Rectifier LED | Distribution Module Board LED | Possible Problem(s) | Possible Solution(s) |
|---|---|---|---|---|---|
| PMN<br><br>AMBER | MIN, AC Fail | None | GREEN | Single Rectifier not receiving ac power.<br>• AC input circuit breaker has opened.<br>• AC input voltage is out of range. | 1. Verify ac power to rectifier is available.<br>2. Verify rectifier input circuit breaker is closed.<br>3. If problem not corrected, replace rectifier. |
| PMJ<br><br>RED | MIN, AC Fail MAJ, Multiple<br><br>AC Fail MAJ, Battery on Discharge | None | GREEN | Multiple rectifiers not receiving ac power, batteries are powering load.<br>• AC input circuit breakers have opened.<br>• AC input voltage is out of range.<br>• Internal rectifier fault. | 1. Verify ac power to rectifiers is available.<br>2. Verify rectifier input circuit breakers are closed.<br>3. If problem not corrected, replace rectifier. |
| PMJ or PMN<br><br>AMBER or RED | MIN, AC Fail<br><br>MAJ, Multiple AC Fail | None | GREEN | A rectifier, multiple rectifiers, or the entire system has lost AC and one or more rectifiers have been removed from the system while under this condition. | 1. Verify that ac power to all rectifiers is available.<br>2. Verify that rectifiers all report good AC<br>3. Issue the uninstall equipment under the operations menu for any rectifier that may have been removed during the AC fail. |
| PMJ<br><br>RED | MAJ, Battery on Discharge | AC OK DC OK | GREEN | Rectifier output voltage has fallen below the battery on discharge threshold set by the user. | 1. If commercial ac power is present but the system voltage remains low, call your local field representative.<br>2. Investigate other alarms that may be present such as rectifier related problems. |
| PMN<br><br>AMBER | MIN, Rectifier Fail | AC OK ALARM (Note 1) | GREEN | Rectifier output has dropped below 36V, rectifier has entered hiccup mode. | Replace rectifier. |
| PMJ<br><br>RED | MAJ, Rectifier Fail | AC OK ALARM (Note 1) | GREEN | All rectifier outputs have dropped below 36V, all rectifiers have entered hiccup mode.<br>Defective controller. | Remove controller; if output voltage does not go to set-point previously set by user, call your local field representative. |

**Table 41  Pulsar Power System Troubleshooting**

[2] **Pulsar Displays** – Alarm Severity indicated by back-light color of the display: Red = Critical or Major, Amber = Minor, Green = Normal.

| Alarm Severity Indicator[2] | User Interface Display | Rectifier LED | Distribution Module Board LED | Possible Problem(s) | Possible Solution(s) |
|---|---|---|---|---|---|
| PMJ<br><br>RED | MAJ, Rectifier Fail (Note 1) | AC OK DC OK | AMBER (Blinking) | One or both of the LVD contactors is open; someone may have manually opened LVD contactor. | Place disconnect switch in ON position. |
| PMN AMBER | MAJ, Contactor 1 Open | AC OK DC OK | GREEN | Batteries have exceeded temperature threshold set by user. | Call your local field representative. |
| None | No response. | RED (Blinking) | RED (Blinking) | Controller failure, all devices on the communication bus reporting loss of communication with controller. | Check controller to ensure it is properly inserted into its slot. If so, perform the following steps:<br>1. Remove the controller board for 1 minute and then reset.<br>2. If problem persists, replace controller with new controller board.<br>3. If problem still persists, call your local field representative. |
| PMN<br><br>AMBER | MIN, Thermal Probe Fail | AC OK DC OK | GREEN | Battery thermal probe failed. | 1. Ensure thermal probe is properly connected to thermal probe cable and controller<br>2. Ensure cable is properly connected to the rear of the Distribution Module.<br>3. If problem persists, replace thermal probe per ensuing instructions.<br>4. If no thermal probe is desired make sure the Slope Thermal Compensation feature is disabled.<br>5. If problem still persists, call your local field representative. |
| PMJ<br><br>RED | MAJ, Fuse Major | AC OK DC OK | RED | One or more of the output circuit breakers or fuses have opened. | Reset circuit breakers or replace fuse. |
| PMN<br><br>AMBER | MIN, Rectifier Fail | AC OK ALARM | Normal | Single rectifier thermal alarm: Excessive ambient temperature<br>Multiple rectifier failure | 1. Verify that there is no obstruction of the vertical airflow path.<br>2. Reset the rectifier by removing the rectifier, waiting approximately 30 seconds, and replacing the rectifier.<br>3. If problem persists, replace the rectifier.<br>4. If problem still persists, call your local field representative. |

**Table 41  Pulsar Power System Troubleshooting**

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| Alarm Severity Indicator[2] | User Interface Display | Rectifier LED | Distribution Module Board LED | Possible Problem (s) | Possible Solution s) |
|---|---|---|---|---|---|
| PMJ RED | MIN, Rectifier Fail MAJ, Multiple Rectifier Fail MAJ, Battery on Discharge | AC OK ALARM | Normal | Multiple rectifier thermal alarm: Excessive ambient temperature Multiple rectifier failure | 1. Verify that there is no obstruction of the vertical airflow path. 2. Reset rectifies by removing them, waiting approximately30s and replacing them. 3. If problem persists, replace the rectifiers. 4. If problem still persists, call your local field representative. |
| PMJ RED | MAJ, High Voltage | AC OK ALARM | Normal | High output voltage from Rectifier(s) Rectifier(s) high voltage shutdown Internal rectifier(s) failure | 1. Reset the rectifier(s) by removing the rectifier(s), waiting approximately 30s and replacing the rectifier(s). 2. If problem persists, replace the rectifier. 3. If problem still persists, call your local field representative. |
| PMN Amber | MIN, Clock Battery Low | AC OKDC OK | Normal | Internal Lithium Battery IsLow | 1. The battery is not designed to be easily field replaced. The controller unit needs to be replaced. 2. Obtain all desired information such as alarm history, statistics, and any field configuration that is different than the standard. |
| PMN Amber | MIN, Minor Communication Fail | RED Blinking Single rectifier | GREEN | Rectifier lost communication with controller. | 1. If a rectifier has been removed from an installed/operational system, go to the Control/ Operations menu andexecute Uninstall Equipment. 2. Reset the rectifier by removing the rectifier, waiting approximately 30 seconds, and replacing. 3. If problem persists, replace the rectifier. 4. If problem still persists, call your local field representative. |
| PMJ RED | MAJ, Major Communication Fail | GREEN | RED (Blinking) | LVD Board lost communication with the controller. | 1. Replace Distribution Module Board. (Note 2) 2. If problem persists, call your local field representative. |

**Table 41  Pulsar Power System Troubleshooting**

**Note 1**: While in hiccup mode, the rectifier will attempt to restart every 10 seconds for a maximum of 3 times.

**Note 2**: Refer to Section 5, LVD board Removal for removal details. Note that the power system will continue to power the load while the LVD board is out of the system; however, there will be no possibility of battery backup until the LVD board is replaced.

## Checking for Defective VT-Probes

1. Disconnect the first probe from its RJ-45 terminal block.

2. Run the CLE function. If the system controller illuminates its LED in green color, the probe is defective. Alternatively, the number of registered probes may be known from the terminal interface (TI) by running the Number of Temperatures present command, see Appendix B. If the registered number of probes is equal to the total number of probes connected, remember you've removed a probe, so the total number will be one less than that during installation, and then the first probe is defective. Replace the probe with a different probe and follow the above procedure to ensure it is operational.

3. If the system controller LED remains green or the number of registered probes is still incorrect, replace the first probe and remove the second probe and repeat Step 2. Continue this procedure until the defective probe has been found.

## Clock Battery Replacement in a Pulsar Controller (408533541 Replacement Clock Chip)

1. Note the position of the cable connections on the rear of the Pulsar controller and disconnect them. Remove the Pulsar controller from the door by removing the four 5/16" nuts that hold it on the door. There are two on each side.



2. Place the assembly on a bench. Remove the 5 phillips screws that hold the Pulsar rear cover to the front display assembly.

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3.  Open the two parts to expose the Pulsar circuit board. Remove the four Phillips screws that hold the board to the rear cover.
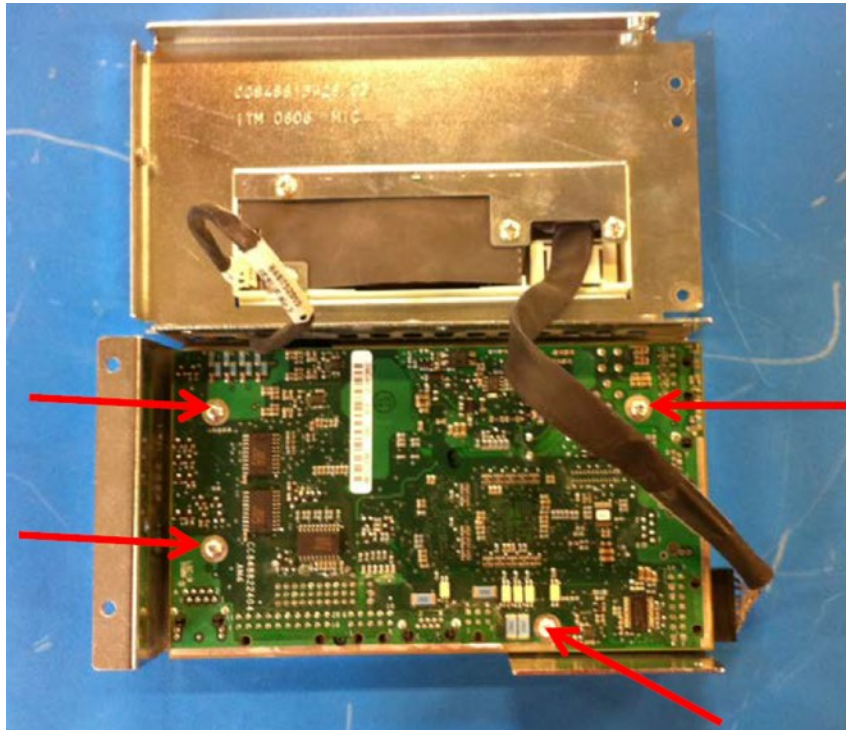


4.  Fold out the board from the cover to expose the yellow clock battery. Remove the old battery from the socket and install the new battery. Reassemble the Pulsar in reverse order from the previous steps.



Clock Battery
408533541

Pulsar Plus_MAN
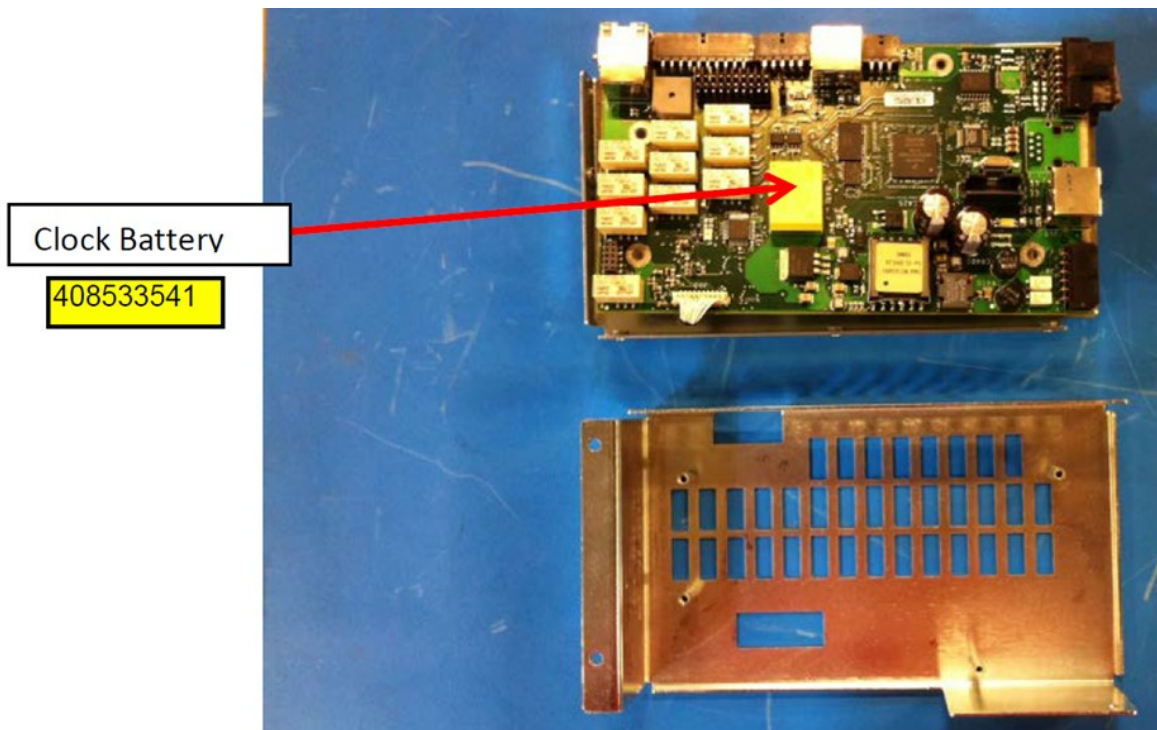
# Specifications

| General Specifications | |
|---|---|
| **Item** | **Specification** |
| Input Voltage Ranges (power) | +/-24 volts:  from +/-18 volts to +/-30 volts;<br>-48 volts:  from -36.5 volts to -60 volts SELV |
| Input Power | 6.0 watts maximum |
| Input Power Connections | NE843A/CP843A/EP843D, No external connection required;NE843C/NE843E/NE843G/NE843P, (J9)12-pin connector |
| Bonding Network | Suitable for installation as part of either<br>• Common Bonding Network (CBN)<br>• an Isolated Bonding Network (IBN) |
| Facilities | Suitable for installation in<br>• Network Telecommunication Facilities<br>• Locations where the NEC applies |
| DC Return | • Isolated DC Return (DC-I)  or<br>• Common DC Return (DC-C) |
| Front Panel User Interface | • 4 or 8-line by 40-character LCD<br>• Severity sensitive backlit LCD(LEDs on NE 843P);<br>• Three status LEDs (20 on NE843P)<br>• Voltage test jacks;<br>• Six Push Buttons (Rotary Control + 2 Push Buttons on NE843P) |
| System Configuration Methods | • Front panel LCD display and menu keys<br>(J5) and (J8) 10/100 Base-T port/s<br>(J7) DB9 for RS-232 port: T1.317 or EasyView<br>(J6) RJ11 for phone line connection –MODEM option |
| Maximum Power Units | • 60 NE Power Units<br>• 32 CP Power Units |
| Low-Voltage Disconnects | Manage up to eight LVD contactors using up to 3 independent configurable Load disconnect thresholds (LVLDs) and 1 configurableBattery disconnect threshold (LVBD). |
| Temperature Monitoring | Up to 16 One-Wire Battery Temperatures; One on-board internal ambient temperature |

**Table 42 Specification**

**System Inputs/Outputs Specifications**

| Item | Specification |
|---|---|
| SELV | All input and output connections comply with SELV requirements. |
| Connections - Ports | **CAUTION**<br>Intra-building ports of the equipment or subassembly<br>• are suitable for connection only to shielded intra-building or un exposed wiring or cabling grounded at both ends.<br>• MUST NOT be metallically connected to interfaces which connect to the OSP or its wiring.<br>These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 5) and require isolation from the exposed OSP cabling.<br>The addition of Primary Protectors is not sufficient protection.<br>All controller ports are intra-building except the phone port of the BSM6 Modem. |
| Alarm and Control Inputs | (J3) 10-pin connect or 2 control and 5 alarm inputs and returns;<br>(J1) 6-pin connect or for 4 basic plant inputs |
| Alarm Contact Outputs | 10 User configurable Form-C Outputs;<br>(J4) 20-pin connector for 10 individual alarm output contacts; Wire size: 28-16 AWG stranded or solid |
| Alarm Contact Ratings | 60 $V_{DC}$, 0.5A |
| Plant Voltage Measurement<br>Accuracy<br>          0 to 50°C<br><br>      -40 to 85°C<br><br>Resolution | ±0.05% of full scale + 1 count<br>      48V Systems: ±40 mV; 24V Systems ±25 mV<br>±0.1% of full scale + 1 count)<br>      48V Systems: ±70 mV; 24V Systems ±40 mV<br>0.01V |
| Plant Current Measurement<br>Accuracy    0 to 50°C<br>         -40 to 85°C<br>Resolution | ±0.5% of full scale<br>±1.25% of full scale<br>1A |
| Temperature Measurement<br>One-Wire Probe<br>Accuracy -5 to +55°C<br>         -40 to +85°C<br>Resolution | ±1°C<br>±3°C<br>0.1°C |

**Environmental Specifications**

| Item | Specification |
|---|---|
| Operating Temperature | -40 to 75°C (-40 to 167°F) |
| Storage Temperature | -40 to 85°C (-40 to 185°F) |
| Altitude | -200 to 13,000 feet (-61 to 3962 meters)[3] |
| Humidity | 10% to 95% non-condensing |
| Audible Noise | < 60 dBA |
| Earthquake Rating | Zone 4, upper floors |
| Controlled Environment | Use this equipment in a controlled environment (an area where the humidity is maintained at levels that cannot cause condensation on the equipment, the contaminating dust is controlled, and the steady-state ambient temperature is within the range specified). |

[3] For altitudes above 5000 feet (1524 meters), derate the temperature by 3.6 °F per 1000 feet (0.656 °C per 100 meters).

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**Installation Area Specifications**

| Item | Specification |
|---|---|
| Installation Area Limitations | Store and operate this equipment in a controlled environment, an area where the humidity is maintained at levels that cannot cause condensation on the equipment, the contaminating dust is controlled,and the steady-state ambient temperature is within the range specified. |

**Operation Without Batteries**

| Item | Specification |
|---|---|
| Suitability without Batteries | Suitable for use in power plants with or without batteries. |
| Loss of AC Power without Batteries | Loss of ac power causes<br>• Controller DC power is lost<br>• Controller alarm relays are activated (unpowered) |
| Recovery from Loss of AC Power without Batteries | Restoration of AC power causes<br>• Rectifiers return to their configured voltage set point<br>• Controller DC power is restored<br>• Controller automatically return to its last configuration Alarm relays reflect actual alarm states |

**Safety / Standards Compliance Specifications**

| Item | Specification |
|---|---|
| Safety Agency Approvals | UL Recognized to UL Subject 1801, Power Distribution Center for Communications Equipment and CAN/CSA C22.2No. 60950-1-03, UL 60950-1, Standard for Safety of Information Technology Equipment. |
| European Economic Community (EEC)Directives | EMC Directive 89/336/EEC, Low Voltage Directive 73/23/EEC as amended by Marking Directive 93/68/EEC |
| Radiated and Conducted Emissions | FCC Part 15, Class A<br>EN55022 (CISPR22) Class A |
| Electromagnetic Immunity | Telcordia GR-1089-CORE<br>EN55022 (CISPR22) Class A |
| Electrostatic Discharge | EN61000-4-2 Level 1-4 |
| RF Immunity | IEC61000-4-3 Level 3, 10 V/m |
| Conducted Immunity | IEC 61000-4-6 Level 3 Input Power Ports<br>IEC 61000-4-6 Level 2 Telecom Ports |
| Voltage Dips, Interruptions, and Variations | IEC 61000-4-11, EN55024 (CISPR24) |

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# Safety

## Safety Statements
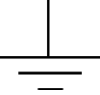
Please read and follow all safety instructions and warnings before installing, maintaining, or repairing the equipment. Refer to individual equipment product manuals for additional safety statements specific to other equipment being installed, removed, or replaced.

See the Specifications section for equipment specific

- Safety Compliance information

- Installation Area Limitations

- Environmental Limitations

- Do not install this equipment over combustible surfaces.

- For installations in the U. S. or Canada, use Listed/Certified compression connectors to terminate Listed/Certified field-wire conductors where required. For all installations, apply the appropriate connector to the correct size conductor as specified by the connector manufacturer, using only the connector manufacturer's recommended tooling or tooling approved for that connector.

- If the proper connector for the country of installation is not provided, obtain appropriate connectors and follow manufacturer's requirements and all local requirements for proper connections.

- Follow all national and local rules and regulations when making field connections.

- Torque electrical connections to the values specified on labels or in the product documentation.

- DC output cables must be dressed to avoid damage to the conductors (caused by routing around sharp edges or routing in areas where wires could get pinched) and undue stress on the connectors.

- Either external fuses or external circuit breakers must be sized as required by the National Electric Code (NEC) and/or local codes. Refer to the equipment ratings to assure rating of equipment will not exceed 80% of the value of the protector chosen.

- Insulation on field-wired conductors must be rated no less than 90° Celsius. Size conductors based on listed recommendations. Wiring internal to enclosed equipment cabinets must be rated at 105° Celsius (minimum).

- Provide an accessible AC disconnect/protection device to remove AC power from the equipment in the event of an emergency. This device must open all poles and be connected together.

- Alarm contacts are not fused within the equipment. Current limiting protection for these contacts must be provided by external circuits. Exceeding these maximum ratings could result in fire or damage to the unit. See Specifications section for alarm contacts ratings.

- In enclosed equipment cabinets, the equipment chassis must be connected directly to the cabinet ac service ground bus. For applications in huts, vaults, and central offices, the equipment chassis must be connected to the system bonding network.

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# Warning Statements and Safety Symbols

The symbols may sometimes be accompanied by some type of statement; e.g., "Hazardous voltage/energy inside. Risk of injury. This unit must be accessed only by qualified personnel." Signal words as described below may also be used to indicate the level of hazard.

| | |
|---|---|
| **DANGER** | Indicates the presence of a hazard that will cause death or severe personal injuryif the hazard is not avoided. |
| **WARNING** | Indicates the presence of a hazard that can cause death or severe personal injuryif the hazard is not avoided. |
| **CAUTION** | Indicates the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided. |
|  | This symbol identifies the need to refer to the equipment instructions for important information. |
|  | These symbols (or equivalent) are used to identify the presence of hazardous acmains voltage. |
|  | This symbol is used to identify the presence of hazardous ac or dc voltages. It may also be used to warn of hazardous energy levels. |
|  | One of these two symbols (or equivalent) may be used to identify the presence of rectifier and battery voltages. The symbol may sometimes be accompanied by some type of statement, for example: "Battery voltage present. Risk of injury dueto high current. Avoid contacting conductors with non-insulated metal objects. Follow safety precautions." |
|  | One of these two symbols may be used to identify the presence of a hot surface. It may also be accompanied by a statement explaining the hazard. A symbol like this with a lightning bolt through the hand also means that the part is or could be at hazardous voltage levels. |
|  | This symbol is used to identify the protective safety earth ground for the equipment. |
|  | This symbol is used to identify other bonding points within the equipment. |
|  | This symbol is used to identify the need for safety glasses and may sometimes be accompanied by some type of statement, for example: "Fuses can cause arcing and sparks. Risk of eye injury. Always wear safety glasses." |

## Precautions

- Install, service, and operate this equipment only by professional, skilled and qualified personnel who have the necessary knowledge and practical experience with electrical equipment and who understand the hazards that can arise when working on this type of equipment.

- The equipment may be powered by multiple ac inputs. Ensure that the appropriate circuit protection device for each ac input being serviced is disconnected before servicing the equipment.

- Do not disconnect permanent bonding provisions unless all AC inputs are disconnected.

- Batteries may be connected in parallel with the output of the rectifiers. Turning off the rectifiers will not necessarily remove power from the bus. Make sure the battery power is also disconnected and/or follow safety procedures while working on any equipment that contains hazardous energy/voltage.

- High leakage currents may be possible on this type of equipment. Make sure the equipment is properly safety earth grounded before connecting power.

- Exercise care and follow all safety warnings and practices when servicing this equipment. Hazardous energy and voltages are present in the unit and on the interface cables that can shock or cause serious injury. When equipped with ringer modules, hazardous voltages will be present on the ringer output connectors.

- Use the following precautions in addition to proper job training and safety procedures:

  - Use only properly insulated tools.

  - Remove all metallic objects (key chains, glasses, rings, watches, or other jewelry).

  - Wear safety glasses. Fuses can produce sparks. High energy levels on buses and distribution components can produce severe arcing.

  - Test circuits before touching.

  - Lock out and tag circuit breakers/fuses when possible to prevent accidental turn on.

  - Be aware of potential hazards before servicing equipment.

  - Identify exposed hazardous electrical potentials on connectors, wiring, etc. (note the condition of these circuits, especially wiring).

  - Use care when removing or replacing covers; avoid contacting circuits.

- Electricity produces magnetic fields that can affect implanted medical electronic devices, such as pacemakers. The strength of the magnetic field depends on the amount of current in the circuit, as well as other conditions (such as number of conductors, placement, and distance from the conductor). DC power and distribution systems, including batteries, which are typically used in telecommunications utility rooms, can operate at high current levels. Personnel with electronic medical devices need to be aware of their restrictions when working around electricity.

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# Contacts and Warranty

## Customer Service Contacts

**Customer Service, Customer Training, Technical Support, Product Repair and Return, and Warranty Service**

For customers in the United States, Canada, Puerto Rico, and the US Virgin Islands,

please dial +1 877 546 3243 (877 OmniOn Power ) or for all other countries, please call +1 972 244 9288.

This number is staffed from 7:00 am to 5:00 pm USA Central Time Zone (GMT -6), Monday through Friday, on normal business days. At other times, this number is still available, but for emergencies only. Services provided include initiating the spare parts procurement process, ordering documents, product warranty administration, and providing other product and service information.

For other customers worldwide the 800 number may be accessed after first dialing the OmniOn Power Direct country code for the country where the call is originating, or you may contact your local field support center or your sales representative to discuss your specific needs.

**On-Line Power Systems Product Manuals and Software**

Power Systems on-line product manuals and software are available on-line. Software includes Easy View and SNMP MIB.

## Product Warranty

A. Seller warrants to Customer only, that:

1. As of the date title to Products passes, Seller will have the right to sell, transfer, and assign such Products and the title conveyed by Seller shall be good;

2. During the warranty period stated in Sub-Article B below, Seller's Manufactured Products (products manufactured by Seller), which have been paid for by Customer, will conform to industry standards and Seller's specifications and shall be free from material defects;

3. With respect to Vendor items (items not manufactured by Seller), Seller warrants that such Vendor items, which have been paid for by Customer, will be free from material defects for a period of sixty (60) days commencing from the date of shipment from Seller's facility

B. The Warranty Period listed below is applicable to Seller's Manufactured Products furnished pursuant to this Agreement, commencing from date of shipment from Seller's facility, unless otherwise agreed to in writing:

| Warranty Period | | |
|---|---|---|
| Product Type | New Product | Repaired Product* |
| Central Office Power Equipment** | 24 Months | 6 Months |

\* The Warranty Period for a repaired Product or part thereof is six (6) months or, the remainder of the unexpired term of the new Product Warranty Period, whichever islonger.

C. If, under normal and proper use during the applicable Warranty Period, a defect or nonconformity is identified in a Product and Customer notifies Seller in writing of such defect or nonconformity promptly after Customer discovers such defect or nonconformity, and follows Seller's instructions regarding return of defective or nonconforming Products, Seller shall, at its option attempt first to repair or replace such Product without charge at its facility or, if not feasible, provide a refund or credit based on the original purchase price and installation charges if installed by Seller. Where Seller has elected to repair a Seller's Manufactured Product (other than Cable and Wire Products) which has been installed by Seller and Seller ascertains that the Product is not readily returnable for repair, Seller will repair the Product at Customer's site.

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With respect to Cable and Wire Products manufactured by Seller which Seller elects to repair but which are not readily returnable for repair, whether or not installed by Seller, Seller at its option, may repair the cable and Wire Products at Customer's site.

D.  If Seller has elected to repair or replace a defective Product, Customer shall have the option of removing and reinstalling or having Seller remove and reinstall the defective or nonconforming Product. The cost of the removal and the reinstallation shall be borne by Customer. With respect to Cable and Wire Products, Customer has the further responsibility, at its expense, to make the Cable and Wire Products accessible for repair or replacement and to restore the site. Products returned for repair or replacement will be accepted by Seller only in accordance with its instructions and procedures for such returns. The transportation expense associated with returning such Product to Seller shall be borne by Customer. Seller shall pay the cost of transportation of the repaired or replacing Product to the destination designated by Customer.

E.  Except for batteries, the defective or nonconforming Products or parts which are replaced shall become Seller's property. Customer shall be solely responsible for the disposition of any batteries.

F.  If Seller determines that a Product for which warranty service is claimed is not defective or nonconforming, Customer shall pay Seller all costs of handling, inspecting, testing, and transportation and, if applicable, traveling and related expenses.

G.  Seller makes no warranty with respect to defective conditions or nonconformities resulting from actions of anyone other than Seller or its subcontractors, caused by any of the following: modifications, misuse, neglect, accident, or abuse; improper wiring, repairing, splicing, alteration, installation, storage, or maintenance; use in a manner not in accordance with Seller's or Vendor's specifications or operating instructions, or failure of Customer to apply previously applicable Seller modifications and corrections. In addition, Seller makes no warranty with respect to Products which have had their serial numbers or month and year of manufacture removed, altered, or experimental products or prototypes or with respect to expendable items, including, without limitation, fuses, light bulbs, motor brushes, and the like. Seller's warranty does not extend to any system into which the Product is incorporated. This warranty applies to Customer only and may not be assigned or extended by Customer to any of its customers or other users of the Product.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. CUSTOMER'S SOLE AND EXCLUSIVE REMEDY SHALL BE SELLER'S OBLIGATION TO REPAIR, REPLACE, CREDIT, OR REFUND AS SET FORTH ABOVE IN THIS WARRANTY.

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# Appendix A: Software Upgrades through Craft Port

Software can be upgraded through the 10/100Base-T connection either over the network or when configured as the Ethernet Craft Port. There are four program files that can be upgraded on the Pulsar Plus family of controllers: The boot block, the factory defaults, application, and web pages. The present application does not have a factory defaults file. Hard coded defaults are utilized. In any case, each of these items has a specific file name. FTP is used for upgrading controller software. Each file goes in a certain directory on the controller:

| Item | File | Directory |
|---|---|---|
| Boot Block | NE843-boot.bin | / |
| Defaults | NE843-dflts.bin | dflts |
| Application | NE843-app.bin | code |
| Web pages | NE843-pages.web | web |
| Backup Configuration | config.gal | config |
| Language file | alt.lang | custom |

These files must be uploaded to the controller using FTP either through the web page interface or through a direct Telnet session. To use FTP, the user must first initiate a Telnet session through the Craft port or network connection. To use the Ethernet port locally as a Craft port it needs to be configured as a DHCP Server. DHCP Server operation can be validated at Menu→Status→Network Settings. Scroll down to view the port's present configuration.

If it is not in DHCP Server mode, make sure the Craft port is not plugged into a LAN connection and re- configure the DHCP setting from the front panel to be Server. This is parameter is found in Menu→Configuration→Communication Ports→Network Settings→DHCP. Note: the controller will need to be rebooted in order to accept the new Ethernet port configuration. This is done by temporarily removing power to the unit. This process takes approximately two minutes.

**Upgrade using FTP Client:**

Common FTP commands used when performing file operations are:

- **ftp** – Initiate the ftp session.

- **cd** – Change directories in the controller.

- **put** – Copy files from the PC running FTP to the controller (The present working directory of the PC will be the source directory for the file being copied.)

- **get** – Copy files from the controller to the PC running FTP (The present working directory of the PC will be the destination directory for the file being copied.)

- **bye** – Exit the FTP session

- **pwd** – Display the path of the current directory

- **rm** – Remove a file from a directory

- l**s** – List all files in a directory

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Note: The controller has a file/directory structure as shown below: Where "/" is the root directory. Each subdirectory contains files that are necessary for the Application Software and web pages. Thus, using an FTP client, shown previously, files may be transferred to/from these controller directories. The exact path to the upgrade file may be used in the "put" command to update the software. Note: software upgrades require administrator level privilege. Thus, the password required is administrator. Similar responses are seen when opening a Telnet session remotely over the LAN connection. Note: you have to give the path of to the file in conjunction with the put commands.

```
/ ──┬── Code
    ├── Web
    ├── Defaults
    └── Config
```
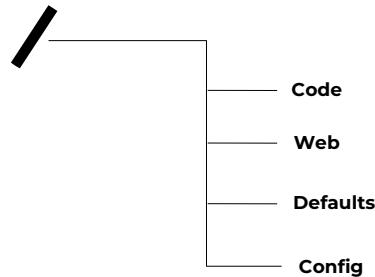
## Boot Block Software

Using any FTP client, perform the following steps to load Application Software:

1.  Change your directory to the PC directory where the Application code is stored.

2.  Type: FTP x.x.x.x ( The controller Working IP Address is 192.168.2.1).

    **ftp 192.168.2.1**

    Connected to 192.168.2.1

    220 NE843 FTP Ready

3. Login as guest using the network administrator password (administrator).

    User (192.168.2.1:(none)): **guest**

    331 User name okay, need password
    Password: **administrator**

    230 Logged in

4. Change directory (cd) to the main **boot block** directory by typing: cd /.

    ftp> **cd /**

    250 CWD command successful

5. Use the put command to copy the application software to the controller.

    ftp> put **NE843-boot.bin**

    200 Port command okay

    150 Opening data connection for STOR (192.168.2.1,1576)

6. Wait until the message indicating a successful file transfer is displayed.

    226 File sent OK

    ftp: 917504 bytes sent in 2.31Seconds 396.50Kbytes/sec.

7. Type bye to exit/logout of the FTP session.

    ftp> **bye**

    221 Goodbye!

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## Factory Defaults

Using any FTP client, perform the following steps to load default web pages:

1. Change your directory to the PC directory where the factory default file is stored.

2. Type: FTP x.x.x.x ( The controller Working IP Address is 192.168.2.1).

    **ftp 192.168.2.1**

    Connected to 192.168.2.1
    220 NE843 FTP Ready

3. Login as guest using the network administrator password (administrator).

    User (192.168.2.1:(none)): **guest**

    331 User name okay, need password
    Password: **administrator**

    230 Logged in

4. Change directory (cd) to the **dflts** directory by typing: cd dflts.

    ftp> **cd dflts**

    250 CWD command successful

5. Use the put command to copy the web pages to the controller.

    ftp> put **NE843-dflts.bin**

    200 Port command okay

    150 Opening data connection for STOR (192.168.2.1,1576)

6. Verify the transfer by a message displayed indicating a successful file transfer.

    226 File sent OK

    ftp: 917504 bytes sent in 2.31Seconds 396.50Kbytes/sec.

7. Type bye to exit the FTP session.

    ftp> **bye**

    221 Goodbye!


## Application Software

Using any FTP client, perform the following steps to load Application Software:

1. Change your directory to the PC directory where the Application code is stored.

2. Type: FTP x.x.x.x ( The controller Working IP Address is 192.168.2.1).

    ftp **192.168.2.1**

    Connected to 192.168.2.1 220 NE843 FTP Ready

3. Login as guest using the network administrator password (administrator).

    User (192.168.2.1:(none)): **guest**

    331 User name okay, need password
    Password: administrator

    230 Logged in

4. Change directory (cd) to the code directory by typing: cd code.

    ftp> **cd code**

    250 CWD command successful

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5. Use the put command to copy the application software to the controller.

        ftp> **put NE843-app.bin**

        200 Port command okay

        150 Opening data connection for STOR (192.168.2.1,1576)

6. Wait until the message indicating a successful file transfer is displayed.

        226 File sent OK

        ftp: 917504 bytes sent in 2.31Seconds 396.50Kbytes/sec.

7. Type bye to exit/logout of the FTP session.

        ftp> **bye**

        221 Goodbye!


## Web Pages

Using any FTP client, perform the following steps to load default web pages:

1. Change your directory to the PC directory where the factory default file is stored.

2. Type: FTP x.x.x.x ( The controller Working IP Address is 192.168.2.1).

        **ftp 192.168.2.1**

        Connected to 192.168.2.1
        220 NE843 FTP Ready

3. Login as guest using the network administrator password (administrator).

        User (192.168.2.1:(none)): **guest**

        331 User name okay, need password
        Password: **administrator**

        230 Logged in

4. Change directory (cd) to the web directory by typing: cd web.

        ftp> **cd web**

        250 CWD command successful

5. Use the put command to copy the web pages to the controller.

        ftp> put **NE843-pages.web**

        200 Port command okay

        150 Opening data connection for STOR (192.168.2.1,1576)

6. Verify the transfer by a message displayed indicating a successful file transfer.

        226 File sent OK

        ftp: 917504 bytes sent in 2.31Seconds 396.50Kbytes/sec.

7. Type bye to exit the FTP session.

        ftp> **bye**

        221 Goodbye!

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## Backup/Restore Configuration File

Using any FTP client, perform **the following steps to load default web pages:**

1.  Change your directory to the PC directory where the factory default file is stored.

2.  Type: FTP x.x.x.x ( The controller Working IP Address is 192.168.2.1).

    **ftp 192.168.2.1**

    Connected to 192.168.2.1
    220 NE843 FTP Ready

3. Login as guest using the network administrator password (administrator).

    User (192.168.2.1:(none)): **guest**

    331 User name okay, need password
    Password: **administrator**

    230 Logged in

4. Change directory (cd) to the config directory by typing: cd config.

    ftp> cd config

    250 CWD command successful

## Backup/Retrieve

5. To retrieve a backup of a site's configuration use the get command to get a copy of the configuration file (config.gal).

    ftp> get **config.gal**

    200 Port command okay

    150 Opening data connection for STOR (192.168.2.1,1576)

    226 File sent OK

## Restore

5. To restore a backup of a site's configuration use the put command to load a copy of the configuration file (config.gal) to the site

    ftp> put filename **config.gal**

    Note: The full path of to the file with the filename must be provided. It is OK just to use the same name with a command like the following:

    ftp> put **config.gal**

    200 Port command okay

    150 Opening data connection for STOR (192.168.2.1,1576)

6. Verify the transfer by a message displayed indicating a successful file transfer.

    226 File sent OK

    ftp: 917504 bytes sent in 2.31Seconds 396.50Kbytes/sec.

7. Type bye to exit the FTP session.

    ftp> **bye**

    221 Goodbye!

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## Language Files

Using any FTP client, perform the following steps to load default web pages:

1. Change your directory to the PC directory where the factory default file is stored.

2. Type: FTP x.x.x.x ( The controller Working IP Address is 192.168.2.1).

   **ftp 192.168.2.1**

   Connected to 192.168.2.1
   220 NE843 FTP Ready

3. Login as guest using the network administrator password (administrator).

   User (192.168.2.1:(none)): **guest**

   331 User name okay, need password
   Password: **administrator**

   230 Logged in

4. Change directory (cd) to the **custom** directory by typing: cd web.

   ftp> **cd custom**

   250 CWD command successful

5. Use the put command to copy the web pages to the controller.

   ftp> put **alt.lang**

   200 Port command okay

   150 Opening data connection for STOR (192.168.2.1,1576)

6. Verify the transfer by a message displayed indicating a successful file transfer.

   226 File sent OK

   ftp: 917504 bytes sent in 2.31Seconds 396.50Kbytes/sec.

7. Type bye to exit the FTP session.

   ftp> **bye**

   221 Goodbye!

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# Upgrade using Pulse Web pages

The software can also be uploaded through the web pages. Login into through the web pages as "administrator" and go to the "Software" tab and use the **"Upgrade Software"** tab feature button located at the bottom of the page.  The sample screen is shown below.
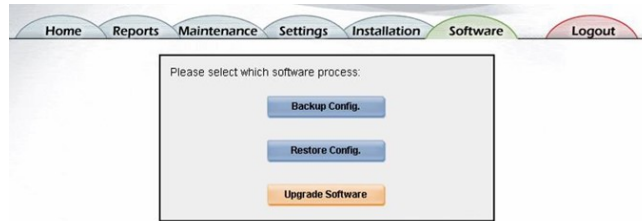


Clicking the "**Upgrade Software**" button provides an interface to select which file is to be upgraded as well as a tool to help select the location of the file to FTP. Following is a sample screen.
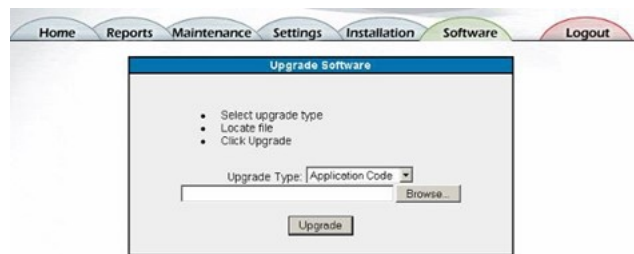


When upgrading application code and web pages, the web pages should always be upgraded first, followed then by the application code after logging in a 2nd time after the automatic reboot that will occur. The following are some sample screens:



After upgrades of both the Web Pages and Application Code are complete, verify that both new codes now show on the top of each web page and on the Reports Tab -> Inventory page for the Controller.

# Appendix B: T1.317 Command Language

## Initializing Controllers

The Pulsar Plus family of controllers are highly flexible with many features. This section outlines programming the controller using the Hyper Terminal program that is shipped with most IBM compatible PC's. Connect the cable between the computer RS-232 port, and the controller RS-232 port, J3. After Hyper Terminal has started and the programming cable is connected to the controller and the PC, you will see the login screen that allows access to the controller programming features.

## RS-232 Terminal/Modem Port

This interface provides a T1.317 interface for local or dial-out access. The local port DTR signal switches the port personality from modem to terminal. This interface provides access to all status, configuration, and operations. It also provides call-out on alarm capability.

The controller communicates with the modem using the following settings

Baud Rate:          9600

Data Bits:          8

Stop Bits:1

Parity:             None

Three levels of security protect incoming access: user, super-user, and administrator. A user has read ability and can only get status information from the controller. A super-user can change configurations and perform control operations. An administrator has all the abilities of a
super-user but can also change passwords. All access to the controller is via the T1.317 command set, to be discussed later.

This section describes how to log into the system via an RS-232 local port. The first step to logging in is to get to an "ENTER PASSWORD:" prompt. From a terminal connected to the RS-232 port, simply press ENTER until you see the log-in prompt. The number of ENTER keys required will depend on the baud rate you are trying to connect at. The controller will adjust its baud rate automatically until it recognizes the carriage return character (ASCII 13) sent by pressing ENTER.

At the "ENTER PASSWORD:" prompt, type the user or super-user password. The default password for each level of security is listed below.

Default User password                    OmniOn Power

Default Super-user password              super-user

Default Administrator password           administrator

After receiving the correct password, the controller will respond with one of the following command line prompts:

User command-line prompt:           *

Super-user command-line prompt:     **

Administrator command-line prompt:      ***

When these prompts appear the controller is ready to accept commands. Note that the session will be terminated if the port is idle for 15 minutes.

# T1.317 Command Language

The Pulsar Plus controller command language is based on the T1.317 standard. This section describes the commands, objects and attributes used to access measurements, configuration, and control parameters in the controller.

## Objects and Attributes

The T1.317 standard organizes system parameters called attributes into groups called objects. All commands, objects, attributes and ranges for their respective parameters for the controllers are given in the following tables.

An object-attribute pair uniquely identifies a measurement, configuration, or control parameter. For example, the object-attribute pair "dc1,vdc" identifies the plant voltage while the object-attribute pair "dc1,adc" identifies the plant load current. In each of these examples "dc1" identifies the plant object and "vdc" and "adc" identify DC voltage and DC current, respectively.

There are three main commands involved with plant operations in the system controller command set. The command "sta" is used to get the status of the plant, the command "cha" is used to change a plant parameter, and the command "ope" is used to initiate a plant function. A person at the "user" level can only perform the sta operations. A person at the "super-user" and "administrator" level can also perform the "cha" and "ope" operations.

Instructions in the T1.317 command set take the following form:

>   command object,attribute[=parameter].

Certain commands do not require a value for parameter, while others do. Note that text parameters are to be enclosed in quotation marks while numeric parameters are not to be enclosed in quotation marks.

For example, to obtain the plant voltage, type in the following command:

>   sta dc1,vdc

To enable low-temperature slope thermal compensation, type in the following command:

>   cha sc1,rve=1

To change the voltage at which the LVD contactor disconnects the batteries from the load to 40V, type the following:

>   cha cn1,dth=40

To initiate a manual boost charging, i.e., place the plant into boost charging mode, type in the following command:

>   ope dc1,stt="boost"

The tables below summarize the object-attribute pairs in the system along with the commands that can be used with the pair and the valid range that the attribute may have. The values in bold text are the default settings for the attributes. Attributes with an * are once that it requires administrator privileges  to change .

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| obj,attr | description | sta | cha | ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| ps1,ide | Identifier | √ | | | text | PS1 |
| ps1,des | Power system description | √ | | | text | "NE843" |
| ps1,sid | Site ID | √ | √[1] | | text | Up to 20 characters |
| ps1,sde | Site Description | √ | √[1] | | text | Up to 55 characters |
| ps1,sys | System Description | √ | | | text | Up to 55 characters |
| ps1,swv | Software version | √ | | | text | d.d |
| ps1,verw | Web pages version | √ | | | text | d.d |
| ps1,verb | Boot block version | √ | | | text | d.d |
| ps1,verd | Display version | √ | | | text | d.d |
| ps1,dflt | Defaults version | √ | | | text | d.d |
| ps1,brc | Board code | √ | | | text | "" |
| ps1,sn | Serial number | √ | | | text | YYLLdddddddd |
| ps1,cc | Ordering Code | √ | | | text | 11 characters long |
| ps1,clei | Clei Code | √ | | | text | |
| ps1,ser | Series | √ | | | text | |
| ps1,dow | Day of week | √ | | | Text | Sunday…Saturday |
| ps1,dat | Date | √ | √[1] | | date | format matching ps1,dtf |
| ps1,dtf | Date format | √ | √[1] | | text | mm-dd-yyyy, dd-mm-yyyy, yyyy-mm-dd |
| ps1,tim | Time | √ | √[1] | | time | hh:mm |
| ps1,tmf | Time format | √ | √[1] | | number | 12, 24 |
| ps1,dls | Daylight savings enable | √ | √[1] | | number | 0=disabled 1=enabled |
| ps1,tzo | Time Zone Offset in Minutes | √ | √ | | number | |
| ps1,lng | Language | √ | √ | √ | text | ENGLISH, OTHER OPE changes the descriptions |
| ps1,lngl | Language list | √ | | | text | Comma deliminated list of languages |
| ps1,tun | Temperature units | √ | √[1] | | text | C, F |
| Ps1,cem | Critical equals major | √ | √ | | number | 0=disable, 1=enable |
| ps1,fpc | Front panel configuration | √ | √ | | number | 0=disable, 1=enable |
| ps1,rrf | Remote rectifier off | √ | √ | | number | 0=disable, 1=enable |
| ps1,poe | Power off enable | √ | √ | | number | 0=disable, 1=enable |
| ps1,usl | Uninstall missing equipment | √ | | √ | number | 1 |
| ps1,usr | Username enable | √ | √[2] | | number | 0=disable, 1=enable |
| ps1,dct | Display contrast | √ | √[1] | | number | 0 – 100 % |
| ps1,ptt | Communication port type | √ | √ | | text | "LOCAL","MODEM", "MODBUS" |
| ps1,amt | System ambient temperature | √ | | | number | dd °C |
| ps1,nhat | System next highest ambient temperature | √ | | | number | dd °C |
| ps1,lamt | System lowest ambient temperature | √ | | | number | dd °C |

**Table B-1 T1.317 Power System Related Commands (PS)**

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| obj,attr | description | sta | cha | ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| ps1,nat | Number of ambient temperatureprobes | √ | | | number | 0-16 |
| ps1,fst | Factory defaults | √ | | √[1] | text | See ps1,fstl |
| ps1,fstl | Factory defaults list | √ | | | text | Comma deliminated list of defaults |
| ps1,pwr | Password rules | √ | √ | | text | |
| ps1,rap | Reset Passwords | √ | | √ | number | 1 = reset passwords (OPE only valid from local display) will restore passwords.gal |
| ps1,fpe | Front Panel Pin enable | √ | √[2] | | number | 0=disable, 1=enable |
| ps1,fpt | Front Panel Pin Time-out | √ | √[2] | | Number | 1-120 minutes |
| Ps1,fpp | Front Panel Pin | √ | √[2] | | Number | 4 digit Pin (only viewable as admin) |
| ps1,rss | Restart all | √ | | √ | number | 1=restart rectifiers and ringers |
| ps1,blr | Lamp test/bay lamp relay | √ | √ | | text | "", "R1","R2", "R3", "R4", "R5","R6", "R7" |
| ps1,ltt | Lamp test | √ | | √ | number | 1 = do lamp test |
| ps1,ast | System alarm state | √ | | | Text | "NORM, "RO", "WRN", "MIN","MAJ", "CRIT" |
| ps1,slv | Port security level | √ | | | text | |
| Ps1,dss | Daylight saving start | √ | √ | | d:d:d:d | mon:wk:dow:minmon:-1:dom:min |
| Ps1,dse | Daylight saving end | √ | √ | | d:d:d:d | mon:wk:dow:minmon:-1:dom:min |
| Ps1,uet | Uninstall Timeout | √ | √ | | Number | 0-60 seconds |
| ps1,ledl | List for LED alarm attribute | √ | | | text | Comma deliminated list of LEDs |
| ps1,intl | List for input types attribute | √ | | | text | Comma deliminated list of input types |
| ps1,accl | List for ACC alarm attribute | √ | | | text | Comma deliminated list of Relays |
| ps1,cid | Controller assigns IDs | √ | √ | | number | 0=disable, 1=enable |
| ps1,pla | Port lockout max attempts | √ | √ | | text | 3-10 |
| ps1,plt | Port lockout time in minutes | √ | √ | | text | |
| ps1,ere | Enhanced Relays enable | √ | √ | | number | 0=disable, 1=enable |
| ps1,nal | Total Number of alarms active | √ | | | Number | |
| ps1,ncr | Number of Critical alarms active | √ | | | Number | |
| ps1,nmj | Number of Major alarms active | √ | | | Number | |
| ps1,nmn | Number of Minor alarms active | √ | | | Number | |
| ps1,nwa | Number of Warnings active | √ | | | Number | |

**Table B-1 T1.317 Power System Related Commands (PS) (continued)**

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| obj,attr | description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| ps1,nre | Number of Record-only eventsactive | √ | | | Number | |
| ps1,ind | Industrial Controller | √ | | | Number | 0 = not industrial controller, 1 = industrial controller |
| ps1,npv | Nominal plant voltage | √ | | | Number | 125 when 125 volt controller. 0 otherwise |
| ps1,ftr | Feature Vector | √ | | √ | number | Bitfield represented as any combination below:<br>A is for all items or always, displayed as blank, internally =0x80000000<br>R = Rectifiers =0x00000001<br>C = Converters =0x00000002<br>G = Ringers =0x00000004<br>N = Inverters =0x00000008<br>M = Modem =0x00000010<br>I = Inputs(MSV) =0x00000020<br>V = VIM=0x00000040<br>D = DAS =0x00000080<br>F = FTTN =0x00000100<br>L = PowerShift =0x00000200<br>T=Telecom/Datacenter=0x00000400 |
| ps1,dfv | Discovered Feature Vector | √ | | √ | number | Bitfield represented as any combination below:<br>A is for all items or always, displayed as blank, internally =0x80000000<br>R = Rectifiers=0x00000001<br>C = Converters=0x00000002<br>G = Ringers=0x00000004<br>N = Inverters=0x00000008<br>M = Modem =0x00000010<br>I = Inputs(MSV)=0x00000020<br>V = VIM=0x00000040<br>D = DAS=0x00000080<br>F = FTTN=0x00000100<br>L = PowerShift=0x00000200<br>T=Telecom/Datacenter=0x00000400 |

**Table B-1 T1.317 Power System Related Commands (PS) (continued)**

\* Must have administrator privileges to change.

[1] User for craft port only

[2] Administrators only

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| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| x,ide | Identifier | √ | | | text | USR01-USR14, ADM1 |
| x,des | Description | √ | √ | | text | User Account 1-14 Administrator Account |
| x,pwd | Password | √[1] | √[1] | | text | 15 characters |
| x,usr | User name | √[1] | √[1] | | text | 15 characters |
| x,lvl | Security level | √[1] | √[1] | | text | "USER", "SUPER-USER", "ADMINISTRATOR" |

**Table B-2 T1.317 User Login Related commands (USR)**

[1] Administrator only

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| Acd1,ide | Identifier | √ | | | text | ACD1 |
| Acd1,des | Description | √ | √ | | text | AC Distribution |
| Acd1,brc | Board code | √ | | | text | "" |
| acd1,sn | Serial number | √ | | | text | YYLLddddddd |
| Acd1,prd | Phase R description | √ | √ | | text | Up to 20 characters |
| Acd1,psd | Phase S description | √ | √ | | text | Up to 20 characters |
| Acd1,ptd | Phase T description | √ | √ | | text | Up to 20 characters |
| Acd1,prv | Phase R voltage | √ | | | number | ddd.d V |
| Acd1,psv | Phase S voltage | √ | | | number | ddd.d V |
| Acd1,ptv | Phase T voltage | √ | | | number | ddd.d V |
| Acd1,pra | Phase R current | √ | | | number | dd.d A |
| Acd1,psa | Phase S current | √ | | | number | dd.d A |
| Acd1,pta | Phase T current | √ | | | number | dd.d A |
| Acd1,prx | Phase R current transformer ratio | √ | √ | | number | Ratio P:S, P 1-5000, S 1-5 |
| Acd1,psx | Phase S current transformer ratio | √ | √ | | number | Ratio P:S, P 1-5000, S 1-5 |
| Acd1,ptx | Phase T current transformer ratio | √ | √ | | number | Ratio P:S, P 1-5000, S 1-5 |
| Acd1,prf | Phase R frequency | √ | | | number | dd.d Hz |
| Acd1,psf | Phase S frequency | √ | | | number | dd.d Hz |
| Acd1,ptf | Phase T frequency | √ | | | number | dd.d Hz |
| Acd1,prk | Phase R power | √ | | | number | dd.dd kW |
| Acd1,psk | Phase S power | √ | | | number | dd.dd kW |
| Acd1,ptk | Phase T power | √ | | | number | dd.dd kW |
| Acd1,syk | System power | √ | | | number | dd.dd kW |

**Table B-3 T1.317 AC Distribution Related Commands (ACD)**

| obj,attr | description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| dc1,ide | Identifier | √ | | | text | DC1 |
| dc1,des | Description | √ | √ | | text | DC Plant 1 |
| dc1,typ | Plant Type | √ | √ | √[1] | number | 48V, 24V |
| dc1,vdc | Plant voltage | √ | | √ | number | dd.dd V |
| dc1,adc | Plant load current | √ | | √ | number | ddd.d A |
| dc1,cap | Total installed rectifier capacity | √ | | | number | ddd.d A |
| dc1,olcap | Total on-line rectifier capacity | √ | | | number | ddd.d A |
| dc1,trd | Plant total rectifier drain | √ | | | number | ddd.d A |
| dc1,sht | Centralized plant shunt type | √ | √ | | Text | "NONE", "BATTERY", "LOAD" |
| dc1,sha | Centralized plant shunt size | √ | √ | | Number | 0=disabled  1-9999 |
| dc1,stt | Plant state | √ | | √[2] | text | "FLOAT", "BOOST" |
| dc1,bod | Battery on discharge | √ | | | number | 0=on discharge 1=not on discharge |
| dc1,bdt | Time on discharge | √ | | | Time | Duration hh:mm:ss |
| dc1,rss | Rectifier restart | √ | | √ | number | 0=no action 1=restart |
| dc1,rsq | Rectifier sequencing | √ | √ | | number | 0=disable 1=enable |
| dc1,aseq | Automatic Sequencing Enable | √ | √ | | number | 0=disable 1=enable |
| dc1,ron | User Group TR request | √ | | √[2] | Number | 0-3  LSB = User, MSB=PBT |
| dc1,bofe | BOF Enable | √ | √ | | number | 0=disable 1=enable |
| dc1,rot | All Rectifier On Threshold | √ | √ | | number | 20-25or 40-50 volts |
| dc1,nst | Number of battery strings | √ | √[1] | | number | 1-70 |
| dc1,cps | Number of Cells per String | √ | √ | | number | 1-75 (24V plant) or 24 (48V plant) |
| dc1,bty | Battery type | √ | √[1] | √[1] | Text | See battery type definitions default (OPE causes battery    defaults to be loaded) |
| dc1,isd | Imminent shutdown enable | √ | √ | | number | 0=disable 1=enable |
| dc1,isy | Imminent shutdown delay | √ | √ | | number | 2-300 seconds, **default:15** |
| dc1,rtm | Actual reserve time | √ | | | text | Low Current-Batt current too low High Current-Batt current too high dd.d (in hours) |
| dc1,poc | State of charge | √ | | | number | Percentage 0 – 100% |
| dc1,scap | String capacity | √ | | | number | |
| dc1,mls | All load shunts monitored | √ | √ | | number | 0=disable 1=enable |
| dc1,ems | Efficiency management status | √ | | | Number | 0=off, 1=on |
| dc1,eme | Efficiency management enable | √ | √ | | Number | 0=disable, 1=enable |
| dc1,emt | Efficiency target | √ | √ | | Number | 20 to 95 % |
| dc1,emo | Efficiency turn on rectifierthreshold | √ | √ | | Number | 25 to 100 % |
| dc1,emi | Efficiency initial delay | √ | √ | | Number | 1 to 30 minutes |
| dc1,emw | Efficiency delay | √ | √ | | Number | 1 to 30 minutes |

**Table B-4 T1.317 DC Plant Related Commands (DC)**

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| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| objid,ide | Identifier | √ | | | text | see below |
| objid,des | Description | √ | √ | | text | see below |
| objid,fds | Front Panel Description | √ | √ | | text | see below |
| objid,ast | Alarm state | √ | | | number | 0=not active 1=active |
| objid,led | LED | √ | √ | | text | BD, AC, DC, "" |
| objid,sev | Alarm severity | √ | √ | | text | CRIT, MAJ, MIN, WRN, RO |
| objid,fth | Alarm boost threshold | √ | √ | | number | see below |
| objid,bth | Alarm float threshold | √ | √ | | number | see below |
| objid,acc | Contact Closure | √ | √ | | text | R1, R2, R3, R4, R5 ,R6, R7, "" |
| objid,dly | Notify Delay | √ | √ | | number | 0-540 seconds |
| objid,noo | Notify On Occur | √ | √ | | number | 0=no 1=yes |
| objid,nor | Notify On Retire | √ | √ | | number | 0=no 1=yes |
| objid,nag | NAG On Occur | √ | √ | | number | 0=no 1=yes |
| objid,dst | Notify Destination | √ | √ | | text | "", P1, P2, P3, P4, E1, E2, E3, E4,S1, S2, S3, S4 |

**Table B-5 T1.317 Alarms with Two Thresholds Related Commands (DTH)**

| objid | Description | Float Threshold | Boost Threshold |
|---|---|---|---|
| bda1 | Battery On Discharge | 23-28 V or 46-55 V | 23-28 V or 46-55 V |
| hfv1 | High voltage | 24.75-29.75 V or 50-60 V | 25.75-31.75 V or 52-60 V |
| hva1 | Very high voltage | 24.75-29.75 V or 50-60 V | 25.75-31.75 V or 52-60 V |

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| objid,ide | Identifier | √ | | | text | see below |
| objid,des | Description | √ | √ | | text | see below |
| objid,fds | Front Panel Description | √ | √ | | text | see below |
| objid,ast | Alarm state | √ | | | number | 0=not active 1=active |
| objid,sev | Alarm severity | √ | √ | | text | CRIT, MAJ, MIN, WRN, RO |
| objid,thr | Alarm threshold | √ | √ | | number | number |
| objid,led | LED | √ | √ | | text | BD, AC, DC, "" |
| objid,acc | Contact Closure | √ | √ | | text | R1, R2, R3, R4, R5, R6, R7, "" |
| objid,dly | Notify Delay | √ | √ | | number | **0**-540 seconds |
| objid,noo | Notify On Occur | √ | √ | | number | **0=no** 1=yes |
| objid,nor | Notify On Retire | √ | √ | | number | **0=no** 1=yes |
| objid,nag | NAG On Occur | √ | √ | | number | **0=no** 1=yes |
| objid,dst | Notify Destination | √ | √ | | text | "", P1, P2, P3, P4, E1, E2, E3, E4,S1, S2, S3, S4 |

**Table B-6 T1.317 Alarms With One Threshold Related Command (STH)**

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| objid | Description | Threshold |
|-------|-------------|-----------|
| amth1 | High ambient temp | 30-75C |
| amtl1 | Low ambient temp | -40-10C |
| btvh1 | Very high battery temperature | 30-85C |
| btha1 | High battery temperature | 30-85C |
| btla1 | Low battery temperature | -40-10C |
| btvl1 | Very low battery temperature | -40-10C |
| cmfa1 | Multiple Converter Fail | 2-16 |
| chva1 | Converter Very High Output Voltage | 25-30V<br>50-60V |
| chfv1 | Converter High Output Voltage | 24-30V<br>48-60V |
| cvla1 | Converter Very Low Output Voltage | 20 - 27V<br>40 - 54V |
| crl1 | Converter redundancy loss | 1-16 |
| gnm1 | Generator Requires Maintenance | 0-8544 hours (1 year)<br>0 =disabled |
| ICF1 | Inverter High Crest Factor | 0-3.2 |
| IIPK1 | Inverter High Peak Current | 0-28A |
| IIRM1 | Inverter High RMS Current | 0-15A |
| macf1 | Multiple AC Fail | 2-88 |
| mfa1 | Multiple Rectifier Fail | 2-88 |
| mman1 | Multiple Manual Off | 2-88 |
| rrtl1 | Real-time reserve low | 0-100hrs |
| rtl1 | Reserve time low | 0-100hrs |
| rls1 | Redundancy Loss | 1-87 |
| vla1 | Very low voltage | 20-25.5 V<br>40-51 V |

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| objid,ide | Identifier | √ | | | text | see below |
| objid,des | Description | √ | √ | | text | see below |
| objid,fds | Front Panel Description | √ | √ | | text | see below |
| objid,ast | Alarm state | √ | | | number | 0=not active 1=active |
| objid,sev | Alarm severity | √ | √ | | text | CRIT, MAJ, MIN, WRN, RO |
| objid,led | LED | √ | √ | | text | BD, AC, DC, "" |
| objid,acc | Contact Closure | √ | √ | | text | R1, R2, R3, R4, R5, R6, R7, "" |
| objid,dly | Notify Delay | √ | √ | | number | 0-540 seconds |
| objid,noo | Notify On Occur | √ | √ | | number | 0=no 1=yes |
| objid,nor | Notify On Retire | √ | √ | | number | 0=no 1=yes |
| objid,nag | NAG On Occur | √ | √ | | number | 0=no 1=yes |
| objid,dst | Notify Destination | √ | √ | | text | "", P1, P2, P3, P4, E1, E2, E3, E4,S1, S2, S3, S4 |

**Table B-7 T1.317 Alarms with No Threshold Related Commands (NTH)**

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| obj | Description |
|---|---|
| AAC1 | ACO Active |
| ACF1 | AC Fail |
| AMJ1 | Auxiliary Major |
| ATA1 | Alarm Test Active |
| ATB1 | Alarm Test Aborted |
| AUX1 | Air Conditioner Fail |
| AUX2 | Door Open |
| AUX3 | High External Ambient |
| AUX4 | Low External Ambient |
| AUX5 | Fan Fail |
| AUX6 | Hydrogen present |
| AUX7 | Auxiliary 7 |
| AUX8 | Auxiliary 8 |
| AUX9 | Auxiliary 9 |
| AUX10 | Auxiliary 10 |
| AUX11 | Auxiliary 11 |
| AUX12 | Auxiliary 12 |
| BBL1 | Real Time Clock Battery Low |
| BOF1 | Backup ORing FET fail |
| BFA1 | Check Battery |
| BTA1 | Battery Test Active |
| CCH1 | Configuration Changed |
| CDFA1 | Converter Distribution Fuse |
| CDID1 | Converter ID Conflict |
| CFA1 | Converter Fail |
| CFN1 | Converter Fan Minor |
| CLC1 | Clock Changed |
| CLM1 | Rectifier Current Limit |
| CMA1 | Minor Communication Fail Alarm |
| CNF1 | LVBD 1 Failed |
| CNF2 | LVLD 1 Failed |
| CNF3 | LVLD 2 Failed |
| CNF4 | LVLD 3 Failed |
| CNO1 | LVBD 1 Open |
| CNO2 | LVLD 1 Open |

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| obj | Description |
|---|---|
| CNO3 | LVLD 2 Open |
| CNO4 | LVLD 3 Open |
| COF1 | Queue Overflow |
| COR1 | No Call-Out Response |
| DER1 | Rectifier Under Voltage |
| DID1 | ID Conflict |
| EMD1 | Energy Management Disabled |
| EPO1 | Emergency Power Off |
| EPR1 | External Password Reset |
| EXL1 | Excessive Login Attempts |
| FAJ1 | External Fuse Major 24V |
| FAJ2 | External Fuse Major 48V |
| FAN1 | External Fuse Minor 24V |
| FAN2 | External Fuse Minor 48V |
| GNR1 | Generator Running |
| GNF1 | Generator Fail |
| HCL1 | History Cleared |
| ICC1 | Incompatible Converter |
| ICR1 | Incompatible Rectifier |
| IDA1 | Inverter Distribution Alarm |
| IF1 | Inverter Fail |
| IFA1 | Inverter Freq Lock |
| IHV1 | Inverter High Output |
| IHVI1 | Inverter High Input |
| ILV1 | Inverter Low Output |
| ILVI1 | Inverter Low Input |
| IMAN1 | Inverter Manual Off |
| IOF1 | Inverter Output Fuse |
| ISD1 | Imminent Low V Shutdown |
| ITA1 | Inverter High Temperature |
| LSF1 | Load Share Fail |
| MAN1 | Manual Off |
| MCM1 | Major Communication Fail Alarm |
| MDP1 | Voltage Duplicate ID |
| MZD1 | Voltage ID Not Configured |

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| obj | Description |
|---|---|
| NNC1 | Unconfigured Alarm Destination |
| OSA1 | Open String |
| PFD1 | Password At Default |
| PFS1 | Thermal Probe Fail Safe |
| PGI1 | Program Line Invalid |
| PHT1 | Processor Halt |
| POR1 | No Dial-Out Response |
| RBA1 | Reverse Battery |
| RCDP1 | Ringer ID Conflict |
| RF1 | Ringer Fail |
| RFA1 | Rectifier Fail |
| RFN1 | Rectifier Fan Fail |
| RIF1 | Rectifier Internal Fault |
| RPFF1 | Ringer Fan Fail |
| RPFJ1 | Ringer Fail Major |
| RPRL1 | Ringer Redundancy Loss |
| RPXJ1 | Ringer Major External Fault |
| RPXN1 | Ringer Minor External Fault |
| SCD1 | Battery Voltage Imbalance |
| SOF1 | Shorted ORing FET |
| STF1 | Self Test Failed |
| TPA1 | Thermal Probe Failure |
| VMF1 | Voltage Channel Failure |
| VSF1 | Sense/Control Fuse |
| ZID1 | ID Not Configured |
| VID1 | DBY ID Not Configured |
| PMF1 | Probe Minimum fail |
| FAJA1 | Fuse Alarm A |
| FAJB1 | Fuse Alarm B |
| VLVA1 | Power Loss A |
| VLVB1 | Power Loss B |
| OVLA1 | Overload A |
| OVLB1 | Overload B |
| SMW1 | Shunt Miswired |
| CCA1 | Circuit Assignment |

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| obj | Description |
|---|---|
| DOOR1 | Door Open |
| SMO1 | Smoke Detect |
| HYD1 | Hydrogen Detect |
| ASPD1 | AC SPD |
| DSPD1 | DC SPD |
| PGND1 | Positive Ground Fault |
| NEG1 | Negative Ground Fault |
| DIF1 | DAS Internal Circuit Fail |
| OPS1 | DAS Over Power Shutdown |
| OCS1 | DAS Over Current Shutdown |
| SCS1 | DAS Short Circuit  Shutdown |
| IOR1 | DAS Input Out of Range |
| PEID1 | DAS ID Conflict |
| OTS1 | DAS Over Temperature Shutdown |
| LDR1 | DAS Load Dropped |
| DFAN1 | DAS Fan Failure |
| REV1 | DAS Input Reversed 1 |
| REV2 | DAS Input Reversed 2 |
| IVOR1 | DAS Input out of range 1 |
| IVOR2 | DAS Input out of range 2 |
| RSF1 | PowerShift Single Fan Fail |
| RMF1 | PowerShift Multiple Fan Fail |
| RMT1 | PowerShift Module Over Temperature |
| RFF1 | PowerShift Fuse Fail |
| RIO1 | PowerShift Interlock Open |
| LUV1 | PowerShift Upper Voltage |
| LRES1 | PowerShift High Resistance |
| LVNL1 | PowerShift Voltage Not Linked |
| LPRI1 | PowerShift Primary fault |
| RRID1 | PowerShift ID Conflict |
| ARF1 | PowerShift Auto Resistance Fail |
| RCO1 | PowerShift Circuit Over Temperature |
| ROL1 | PowerShift Overload |
| ROV1 | PowerShift Output out of range |
| LRLS1 | PowerShift Redundancy Loss |

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| obj | Description |
|---|---|
| ICLD | Incompatible PowerShift Module |
| TPT1 | PowerShift Packet Timeout |
| TH2O1 | PowerShift H2O |
| TINT1 | PowerShift Intruder |
| LPT1 | PowerShift Power |
| TBC1 | PowerShift Upper to Lower Communication Error |
| DIF1 | PE Internal Circuit Fail |
| OPS1 | PE Over Power Shutdown |
| OCS1 | PE Over Current Shutdown |
| SCS1 | PE Short Circuit Shutdown |
| IOR1 | PE Input Out of Range |
| PEID1 | PE ID Conflict |
| OTS1 | PE Over Temperature Shutdown |
| LDR1 | PE Load Dropped |
| DFAN1 | PE Fan Failure |
| REV1 | PE Input Reversed 1 |
| REV2 | PE Input Reversed 2 |
| IVOR1 | PE Input out of range 1 |
| IVOR2 | PE Input out of range 2 |
| BFAN | BMIC Fan |
| BHIO | BMIC Hi Output Exceeded |
| BMXT | BMIC Max Temp Exceeded |
| BMNT | BMIC Min Temp Exceeded |
| BFAN | BMIC Fan |
| BMF | BMIC Fail |
| BMIL | BMIC Interlock Fail |
| BMOT | BMIC Over Temperature |
| BMLF | BMIC Life |
| BMOC | BMIC Over Current |
| BMDL | BMIC Discharge Cycle Limit |
| BMDE | BMIC Discharge Cycles Exceeded 120% |
| BMLV | BMIC Low Internal String Voltage |
| ATFT | BMIC Anti-Theft |
| BMCB | BMIC Circuit Breaker |

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| obj | Description |
|---|---|
| BMUV | BMIC Under Voltage |
| BMOV | BMIC Over Voltage |
| BCUB | BMIC Current Blocked |
| BMSC | BMIC Short Circuit |
| BMUT | BMIC Under Temperature |

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| gm1,ide | Identifier | √ | | | Text | GM1 |
| gm1,des | Description | √ | √ | | Text | Rectifier Manager 1 |
| gm1,lse | Load Share Enable | √ | √ | | number | 0=disable 1=enable |
| gm1,nro | Total number of rectifiers on | √ | | | number | |
| gm1,lst | Load share target percentage | √ | | | number | 0-100% |
| gm1,rme | Redundancy monitor enable | √ | √ | | number | 0=disable,1=enable |
| gm1,fsd | Float High Voltage Shutdown | √ | √ | | number | 25-30 or 50-60 V |
| gm1,bsd | Boost High Voltage Shutdown | √ | √ | | number | 26-30 or 52-60 V |
| gm1,fsp | Float Set-Point | √ | √ | | number | 21-28 or 42-56.5 V |
| gm1,bsp | Boost Set-Point | √ | √ | | number | 21-30 or 48-60 V |
| gm1,fcl | Float Current Limit | √ | √ | | number | 30-110% |
| gm1,bcl | Boost Current Limit | √ | √ | | number | 30-110% |
| gm1,oft | Oring FET test enable | √ | √ | | number | 0=disable,1=enable |
| gm1,wie | Walk-in enable | √ | √ | | number | 0=disable,1=enable |
| gm1,lsfe | Load share fail enable | √ | √ | | number | 0=disable,1=enable |
| gm1,sof | Shorted Oring Fet Test state/cmd | √ | | √ | number | 0=disable,1=enable |

**Table B-8 T1.317 Rectifier Management Related Commands (GM)**

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| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| gsr,des | Description | √ | √ | | text | Rectifier sr |
| gsr,typ | Rectifier Type | √ | √ | | text | 12 char |
| gsr,sn | Serial number | √ | | | text | Up to 18 characters |
| gsr,cc | Ordering code | √ | | | text | 11 characters long |
| gsr,clei | Clei Code | √ | | | text | |
| gsr,ser | Series | √ | | | text | |
| gsr,verp | Primary software version | √ | | | text | |
| gsr,vers | Secondary software version | √ | | | text | |
| gsr,adc | DC Current (VI, VIR) | √ | | | number | number A |
| gsr,vdc | DC Voltage | √ | | | number | number V |
| gsr,stt | Individual rectifier state | √ | | √[1] | text | ON, OFF, STANDBY, VACANT, MISSING |
| gsr,cap | Capacity | √ | | | number | number A |
| gsr,vac | AC Voltage | √ | | | number | number V |
| gsr,aac | AC Current | √ | | | number | number A |
| gsr,tmp | Temperature | √ | | | number | number F or C |
| gsr,rtm | Run time in hours | √ | | | number | |
| gsr,van | Anode Voltage | √ | | | number | number V |
| gsr,als | Analog Loadshare Debug | √ | | | text | |
| gsr,seq | Use In Sequence Enable | √ | √ | | number | 0=no 1=yes |
| gsr,rfa | Rectifier Fail | √ | | | number | 0=inactive 1=active |
| gsr,acf | AC Fail | √ | | | number | 0=inactive 1=active |
| gsr,man | Standby or Manual Off | √ | | | number | 0=inactive 1=active |
| gsr,did | ID Conflict | √ | | | number | 0=inactive 1=active |
| gsr,bof | Backup ORing FET | √ | | | number | 0=inactive 1=active |
| gsr,sof | Shorted ORing FET | √ | | | number | 0=inactive 1=active |
| gsr,der | Under Voltage | √ | | | number | 0=inactive 1=active |
| gsr,clm | Current Limit | √ | | | number | 0=inactive 1=active |
| gsr,rif | Internal fault | √ | | | number | 0=inactive 1=active |
| gsr,rcf | Communication Fail | √ | | | number | 0=inactive 1=active |
| gsr,rfn | Fan fail | √ | | | number | 0=inactive 1=active |
| gsr,lsf | Load share fail | √ | | | number | 0=inactive 1=active |
| gsr,ecap | ECO Capacity | √ | | | number | number A |
| gsr,emod | ECO Mode | √ | | | text | |
| gsr,mppt | MPPT state | √ | | | number | 0=no MPPT, 1= in MPPT |
| gsr,eofs | ECO Offset | √ | | | number | |
| gsr,hin | High input | √ | | | number | |
| gsr,lin | Low input | √ | | | number | |

**Table B-9 T1.317 Rectifier Related Commands (G)**

[1] Super-user login required to place in standby. User login can turn on.

s stands for shelf number (1 to 6)

r stands for rectifier number (1 to 7)

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| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| eco1,des | Description | √ | √ | | text | Rectifier sr |
| eco1,sofs | Solar Offset | √ | | √ | number | 0.5 V |
| eco1,ncap | Normal Rectifier Capacity | √ | | | number | Number A |
| eco1,nocap | Normal Online RectifierCapacity | √ | | | number | Number A |
| eco1,ntrd | Normal Total Rectifier Drain | √ | | | number | Number A |
| eco1,strd | Solar Total Rectifier Drain | √ | | | number | Number A |
| eco1,nkwh | Normal kWh | √ | | | number | Number kWh |
| eco1,skwh | Solar kWh | √ | | | number | Number kWh |

**Table B-10 T1.317 ECO Priority Related Commands (ECO)**

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| gn1,des | Description | √ | √ | | text | Backup Generator |
| gn1,mod | Generator Mode | √ | √ | | text | OFF, ON |
| gn1,stt | | √ | | | text | OFF(AUTO, ON(AUTO),OFF(MAN), ON(MAN) |
| gn1,aue | Auto mode enabled | √ | √ | | number | 0=disable,1=enable |
| gn1,rt | Run time | √ | | √ | number | hhhh:mm (OPE to 0) |
| gn1,trt | Run time of this run | √ | | √ | number | hhhh:mm |
| gn1,tv | Start Voltage | √ | √ | | number | 19.25 - 28.25,40.25 - 56.50 |
| gn1,tve | Start Voltage Enabled | √ | √ | | number | 0=disable,1=enable |
| gn1,tvd | Start Voltage Delay | √ | √ | | time | |
| gn1,tp | Start Percent of Charge | √ | √ | | number | 10-100% |
| gn1,tpe | Start Percent of Charge Enabled | √ | √ | | number | 0=disable,1=enable |
| gn1,tpd | Start Percent of Charge Delay | √ | √ | | time | |
| gn1,cte | Cold Temperature Enabled | √ | √ | | number | 0=disable,1=enable |
| gn1,tct | Start Cold Temperature | √ | √ | | number | 10-75 Degrees C |
| gn1,tctd | Start Cold Temperature Delay | √ | √ | | time | |
| gn1,hte | Hot Temperature Enabled | √ | √ | | number | 0=disable,1=enable |
| gn1,tht | Start Hot Temperature | √ | √ | | number | 0-50 Degrees C |
| gn1,thtd | Start Hot Temperature Delay | √ | √ | | time | |
| gn1,pv | Stop Voltage | √ | √ | | number | 21 - 30, 46 – 60 |
| gn1,pve | Stop Voltage Enabled | √ | √ | | number | 0=disable,1=enable |

**Table B-11 T1.317 Generator Related Commands (GN)**

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| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| gn1,pvd | Stop Voltage Delay | √ | √ | | time | |
| gn1,pi | Stop Current | √ | √ | | number | 2-1000 AA |
| gn1,pie | Stop Current Enabled | √ | √ | | number | 0=disable,1=enable |
| gn1,pid | Stop Current Delay | √ | √ | | time | |
| gn1,pp | Stop Percent of Charge | √ | √ | | number | 10-100% |
| gn1,ppe | Stop Percent of Charge Enabled | √ | √ | | number | 0=disable,1=enable |
| gn1,ppd | Stop Percent of Charge Delay | √ | √ | | time | |
| gn1,pct | Stop Cold Temperature | √ | √ | | number | 10-75 Degrees C |
| gn1,pctd | Stop Cold Temperature Delay | √ | √ | | time | |
| gn1,pht | Stop Hot Temperature | √ | √ | | number | 0-50 Degrees C |
| gn1,phtd | Stop Hot Temperature Delay | √ | √ | | time | |
| gn1,mrt | Minimum Run Time | √ | √ | | time | |
| gn1,clt | Current Limit Threshold | √ | √ | | number | 5-1000 A |
| gn1,nv | Nominal Output Voltage | √ | √ | | number | 0-999 V |
| gn1,nva | Nominal Output Power | √ | √ | | number | 0-999000 |
| gn1,ode | Manual On Duration Enabled | √ | √ | | number | 0=disable,1=enable |
| gn1,odr | Manual On Duration | √ | √ | | time | |
| gn1,ocd | Manual On Remaining Time | √ | | | time | |

**Table B-11 T1.317 Generator Related Commands (GN)**

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| cp1,des | Description | √ | √ | | Text | Converter Plant 1 |
| cp1,typ | Converter output type | √ | | | Text | 24V or 48V |
| cp1,vdc | DC Voltage | √ | | √ | Number | Number in volts |
| cp1,adc | DC Current | √ | | | Number | Number in amps |
| cp1,cap | Installed capacity | √ | | | Number | Number in amps |
| cp1,olcap | Online capacity | √ | | | Number | Number in amps |
| cp1,vsp | Voltage Set-Point | √ | √ | | Number | 23-27.2V or 46-54.5V |
| cp1,vsd | Internal high voltage shutdown | √ | √ | | Number | 25-30V or 50-60V |
| Cp1,clm | Current Limit | √ | √ | | Number | 30% to 100% |
| cp1,dth | Low Voltage Discon Threshold | √ | √ | | Number | 20-25V or 40-50V |
| cp1,rth | Low Voltage Recon Threshold | √ | √ | | Number | 22-27V or 44-54V |
| cp1,lvd | Low Voltage Disconnect Enable | √ | √ | | Number | 0=disabled 1=enabled |
| Cp1,rof | Remote standby enable | √ | √ | | number | 0=disable,1=enable |
| cp1,rme | Redundancy monitor enable | √ | √ | | number | 0=disable,1=enable |
| cp1,rss | Converter restart | √ | | √ | number | 1=restart |

**Table B-12 T1.317 Converter Plant Related Commands (CP)**

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| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| csr,des | Description | √ | √ | | Text | DC Converter sr |
| csr,typ | Type | √ | √ | | Text | 14 chars |
| csr,sn | Serial number | √ | | | Text | Serial number |
| csr,adc | DC Current | √ | | | Number | Number in amps |
| csr,cap | Capacity | √ | | | Number | Number in amps |
| csr,stt | State | √ | | √1 | Text | ON, OFF, STANDBY, MISSING, VACANT ON qualifiers –LIM OFF qualifiers –LVD, -INF,  - TA, - HVSD, -FAN |
| csr,cfa | Converter Fail | √ | | | Number | 0=inactive 1=active |
| csr,dfa | Distribution fuse fail | √ | | | Number | 0=inactive 1=active |
| csr,did | ID Conflict | √ | | | Number | 0=inactive 1=active |
| csr,ccf | Communication Fail | √ | | | Number | 0=inactive 1=active |
| csr,cfn | Fan fail | √ | | | Number | 0=inactive 1=active |

**Table B-13 T1.317 DC Converter Related Commands (C)**

[1] Super-user login required to place in standby. User login can turn on.

s stands for shelf number (0 to 1)

r stands for rectifier number (1 to 6)

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| ip1,des | Description | √ | √ | | Text | Inverter Plant 1 |
| ip1,cap | Installed capacity | √ | | | Number | Number in amps |
| ip1,irm | RMS current | √ | | | Number | Number in amps |
| ip1,vac | AC output voltage | √ | | | Number | Number in volts |
| ip1,adc | Input DC current | √ | | | Number | Number in amps |
| ip1,vdc | Input DC voltage | √ | | | Number | Number in volts |
| ip1,frq | Output frequency | √ | | | Number | Number in Hertz |
| ip1,lst | Load share target percentage | √ | | | Number | 0-100% |
| ip1,dth | Disconnect input voltage threshold | √ | | | Number | 20.00 - 25.00, 40.00 - 50.00 |
| ip1,rth | Reconnect input voltage threshold | √ | | | Number | 22.00 - 27.00, 44.00 - 54.00 |
| ip1,lvd | LVD enabled | √ | √ | | Number | 0=DISABLED, 1=ENABLED |
| ip1,hce | High Crest Factor enabled | √ | √ | | Number | 0=DISABLED, 1=ENABLED |
| ip1,hipe | High Ipeak enabled | √ | √ | | Number | 0=DISABLED, 1=ENABLED |
| ip1,hrme | High RMS enabled | √ | √ | | Number | 0=DISABLED, 1=ENABLED |
| ip1,ste | Standby enabled | √ | √ | | Number | 0=DISABLED, 1=ENABLED |
| ip1,rlse | Redundancy Loss enabled | √ | √ | | Number | 0=DISABLED, 1=ENABLED |

**Table B-14 T1.317 Inverter Plant Related Commands (IP)**

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| nsr,des | Description | √ | √ | | Text | Inverter sr |
| nsr,stt | State | √ | | | Text | ON, OFF, STANDBY, MISSING, VACANT |
| nsr,sn | Serial number | √ | | | Text | Serial number |
| nsr,ipk | Peak current | √ | | | Number | Number in amps |
| nsr,irm | RMS current | √ | | | Number | Number in amps |
| nsr,frq | Output frequency | √ | | | Number | Number in Hertz |
| nsr,cf | Crest factor | √ | | | Number | Number |
| nsr,pwr | Output power | √ | | | Number | Number in volt amps |
| nsr,vnom | Nominal output voltage | √ | | | Number | Number in volts |
| nsr,cap | Capacity | √ | | | Number | Number in amps |
| nsr,cva | Capacity in VA | √ | | | Number | Number in volt amps |
| nsr,vac | Output voltage | √ | | | Number | Number in volts |
| nsr,adc | Input DC current | √ | | | Number | Number in amps |
| nsr,vdc | Input DC voltage | √ | | | Number | Number in volts |
| nsr,ncl | Non-critical load for LVD | √ | √ | | Number | 0=not placed in standby 1=place in standby |
| nsr,ilvi | Low Voltage Input | √ | | | Number | 0=inactive 1=active |
| nsr,ita | Temperature alarm | √ | | | number | 0=inactive,1=active |
| nsr,if | Inverter fail | √ | | | number | 0=inactive,1=active |
| nsr,ilv | Low output voltage | √ | | | number | 0=inactive,1=active |
| nsr,ifa | Inverter frequency lock fail | √ | | | number | 0=inactive,1=active |
| nsr,ihvi | High input DC | √ | | | number | 0=inactive,1=active |
| nsr,ihv | High output | √ | | | number | 0=inactive,1=active |
| nsr,iirm | High Irms | √ | | | number | 0=inactive,1=active |
| nsr,iipk | High Ipeak | √ | | | number | 0=inactive,1=active |
| nsr,icf | High crest factor | √ | | | number | 0=inactive,1=active |
| nsr,ida | Distribution alarm | √ | | | number | 0=inactive,1=active |
| nsr,iof | Output fuse | √ | | | number | 0=inactive,1=active |
| nsr,did | Duplicate Id | √ | | | number | 0=inactive,1=active |
| nsr,icmf | Communication Failure | √ | | | number | 0=inactive,1=active |
| nsr,vera | Module Software Version | √ | | | text | Format: xxxxxxxx |
| nsr,verb | Bridge board Software Version | √ | | | text | Format x.y |

**Table B-15 T1.317 Inverter Related Commands (N)**

s stands for shelf number (1 to 4)

r stands for rectifier number (1 to 7)

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| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| rp1,ide | Identifier | √ | | | number | RP1 |
| rp 1,des | Description | √ | √ | | number | Ringer Plant 1 |
| rp 1,frq | Ringer output frequency | √ | √ | | number | 15-50Hz |
| rp 1,vsp | Ringer voltage setpoint | √ | √ | | number | 65-100V |
| rp 1,ofe | Ringer offset enable | √ | √ | | number | 0=disable,1=enable |
| rp 1,rme | Redundancy monitor enable | √ | √ | | number | 0=disable,1=enable |
| rp 1,rss | Ringer restart | √ | | √ | number | 1=restart |
| rp 1,va | Ringer plant va | √ | | | number | |
| rp 1,cap | Ringer capacity | √ | | | number | Number A |
| rp 1,olcap | Ringer online capacity | √ | | | number | Number A |
| rp 1,rrf | Standby enable | √ | | √ | number | 0=disable,1=enable |

**Table B-16 T1.317 Ringer Plant Related Commands (RP)**

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| rcn,ide | Identifier | √ | | | number | RC1-RC8 |
| rcn,des | Description | √ | √ | | number | Ringer Chassis 1-8 |
| rcn, ptyp | Primary Ringer Type | √ | | | text | 12 char |
| rcn, psn | Primary Ringer Serial Number | √ | | | text | Up to 18 characters |
| rcn, pstt | Primary Ringer State | √ | | | number | ON –FAN, <br> OFF –FAIL, -EXT, -TA, -RET, <br> -FAN, STANDBY, MISSING |
| rcn, styp | Secondary Ringer Type | √ | | | text | 12 char |
| rcn, ssn | Secondary Ringer Serial Number | √ | | | text | Up to 18 characters |
| rcn, sstt | Secondary Ringer State | √ | | | number | ON –FAN, <br> OFF –FAIL, -EXT, -TA, -RET, <br> -FAN, STANDBY, MISSING |
| rcn,stt | Ringer group state | √ | | √ | number | ON –FAN, -REDUN <br> OFF –FAIL, -EXT, -TA, -RET, -FAN, STANDBY, MISSING <br> The ope command supports the ON and STANDBY states |
| rcn,va | Ringer output va | √ | | | number | dd.d VA |
| rcn,cap | Ringer capacity | √ | | | number | Chassis capacity - Set to100 VA if primary or secondary is present |
| rcn,pri | Primary ringer | √ | | | text | *sr* <br> where *s* is the shelf number <br> *r* is the ringer position <br> 1=first primary ringer <br> 3=second primary ringer <br> First ringers are in the odd shelf slot.Second ringers are in the even shelf slot. |

**Table B-17 T1.317 Ringer Chassis Related Commands (RC)**

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| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| rcn,sec | Secondary ringer | √ | | | text | *sr*<br>where *s* is the shelf number<br>*r* is the ringer position<br>2=first secondary ringer<br>4=second secondary ringer<br>First ringers are in the odd shelf slot.<br>Second ringers are in the even shelfslot |
| rcn,rf | Ringer Fail | √ | | | | 0=inactive 1=active |
| rcn,rpff | Ringer Fan Fail | √ | | | | 0=inactive 1=active |
| rcn,rpxj | Ringer External Minor Fault | √ | | | | 0=inactive 1=active |
| rcn,rpxn | Ringer External Major Fault | √ | | | | 0=inactive 1=active |
| rcn,rprl | Ringer Redundancy Loss | √ | | | | 0=inactive 1=active |
| rcn,rpfj | Ringer major Fail | √ | | | | 0=inactive 1=active |
| rcn,rcdp | Ringer ID Conflict | √ | | | | 0=inactive 1=active |

**Table B-17 T1.317 Ringer Chassis Related Commands (RC)**

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| br1,des | Description | √ | √ | | Text | Battery Reserve 1 |
| br1,adc | Total battery current | √ | | | number | d A  (+ for discharge, - for charge) |
| br1,hbt | Highest battery temperature | √ | | | number | dd °C |
| br1,lbt | Lowest battery temperature | √ | | | number | dd °C |
| br1,cap | Installed battery capacity | √ | | | number | ddddd AH |
| br1,olcap | On-line battery capacity | √ | | | number | ddddd AH |
| br1,btr | Discharge test results | √ | | | text | result, reserve, load<br>result is one of the following:<br>COMPLETED<br>CHECK BATTERY INTERRUPTED ACTIVE<br>NOT RUN<br>reserve is hours calculate by lastcomplete test<br>load is load at beginning of test |
| br1,tth | High Temperature Threshold | √ | √ | | Number | 30-90°C or 86-194°C |
| br1,cle | Current Limit Enable | √ | √ | | number | 0=disable 1=enable |
| br1,clt | Current Limit Threshold | √ | √ | | number | 5-1000A |
| br1,cev | Battery string end of discharge V | √ | √[1] | | Number | 19.25-25.35V<br>or 40.25-48.75V |

**Table B-18 T1.317 Battery Reserve Management Related Commands (BR)**

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| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| br1,cev | Battery string end of discharge V | √ | √[1] | | Number | 19.25-25.35V or 40.25-48.75V |
| br1,bts | Battery Test State | √ | | √[1] | number | 0=inactive 1=active |
| br1,mtt | Manual test type | √ | √[1] | | text | DISABLED, 20%, TIMED |
| br1,tev | Manual test alarm voltage | √ | √[1] | | number | 21-27V or 36-48 V |
| br1,tmd | Manual test duration | √ | √[1] | | time | 00:00:00 to 23:59:59 (hh:mm:ss) |
| br1,bte | Auto test type | √ | √ | | text | DISABLED, 20%, TIMED |
| br1,btv | Battery test rectifier voltage | √ | √[1] | | number | 21-26 V or 42-52 V |
| br1,ath | Auto test start hour | √ | √ | | number | 0-23 |
| br1,tin | Auto test interval | √ | √ | | number | 1-18 months |
| br1,atw | Auto test min hours after BD | √ | √ | | number | 0-240 hours |
| br1,atd | Auto test date | √ | √ | | date | dd-mmm-yy |
| br1,nvm | Number of mid-cell V present | √ | | | | d |
| br1,ntm | Number of temperatures present | √ | | | | d |
| br1,scd | Battery voltage imbalancedetection enable | √ | | | number | 0=disable, 1=enable (Automatically enabled when midcell V monitor present) |
| br1,scv | Battery imbalance threshold | √ | √ | | number | 1.5-3.0V |

**Table B-18 T1.317 Battery Reserve Management Related Commands (BR)**

[1] User Level for craft por t only

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| btnn,des | Description | √ | √ | | Text | Battery Configuration 1 to 25 |
| btnn,bty | Battery Type | √ | √ | | Text | Up to 14 characters |
| btnn,btc | Battery Class | √ | √ | | Text | FLOODED, SEALED, NICD,LI_LMP, SODIUM |
| btnn,cap | Capacity | √ | √ | | Number | dddd |

**Table B-19 T1.317 Battery Type Definition Related Commands (BT)**

Where n stands for battery type number(1 thru 25)

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| Bnn,des | Description | √ | √ | | Text | Battery  String 1 to 70 |
| Bnn,con | Battery Contactor | √ | √ | | Text | DCN01 to DCN08 |
| bnn,stt | State | √ | | | text | NONE MISSINGOPEN CLOSED |
| bnn,nst | Number of strings | √ | √ | | number | 1 to 70 |
| bnn,bty | Battery type | √ | √ | | text | See battery type definitions |
| bnn,cap | Capacity | √ | | | number | dddd |
| bnn,dat | Installed date | √ | √ | | date | Defined by date format |

**Table B-20 T1.317 Battery String Related Commands (B)**

Battery string are addable

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| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| bs1,ide | Identifier | √ | | | Text | BS1 |
| bs1,des | Description | √ | √ | | Text | Boost Control 1 |
| bs1,stt | State | √ | √ | | Text | QRCT, MANUAL, BTP, TIMEDAU-TO, OFF |
| bs1,atm | Auto Mode | √ | √ | | Text | OFF, QRCT, TIMED |
| bs1,tmd | Timed Manual Duration | √ | √ | | Number | 1-80 hours |
| bs1,amf | Auto Multiplication Factor | √ | √ | | Number | 0.1-9 |
| bs1,cta | Current Term Current Thresh | √ | √ | | Number | 1-999A |

**Table B-21 T1.317 Boost Management Related Commands (BS)**

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| cnx,ide | Identifier | √ | | | number | CN1, CN2, CN3, CN4 |
| cnx,des | Description | √ | √ | | number | Contactor 1 |
| cnx,stt | Status | √ | | √1 | text | NONE, DISCON, CONNECT,FAILED |
| cnx,ena | Control enable | √ | √ | | | 0=disable,1=enable |
| cnx,dth | Disconnect threshold | √ | √ | | number | 19-25V or 39-50V |
| cnx,dvx | Vmax in adaptive mode | √ | √ | | number | 39V to 50V |
| cnx,dvt | Calculated disconnect voltage | √ | | | number | Vmin to Vmax |
| cnx,din | Imin in adaptive mode | √ | √ | | number | 0A to 9999A |
| cnx,dix | Imax in adaptive mode | √ | √ | | number | 0A to 9999A |
| cnx,ddy | Disconnect delay | √ | √ | | number | 0-300 minutes |
| cnx,dtd | Temperature discon-nect delay | √ | √ | | time | |
| cnx,dtp | Temperature discon-nectthreshold | √ | √ | | number | 15 – 75 degrees C |
| cnx,dam | Disconnect automode | √ | √ | | text | 0=NONE<br>1=VOLTAGE<br>2=VOLTAGE/TIME<br>3=ADAPTIVE<br>4=TEMPERATURE<br>5=VOLTAGE/TEMP<br>6=VOLTAGE/TIME/TEMP<br> 7=ADAPTIVE/TEMP |
| cnx,dtm | Disconnect remaining time | √ | | | number | > 0 means going to disconnect |
| cnx,rth | Reconnect threshold | √ | √ | | number | 19.5-25V or 39-55V |
| cnx,rdy | Reconnect delay | √ | √ | | number | 0-300 seconds |

**Table B-22 T1.317 Disconnect Contactor Control Related Commands (CN)**

Pulsar Plus_MAN

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| cnx,ram | Reconnect automode | √ | √ | | text | 0=NONE<br>1=VOLTAGE<br>2=VOLTAGE/TIME<br>3=ADAPTIVE<br>4=TEMPERATURE<br>5=VOLTAGE/TEMP<br>6=VOLTAGE/TIME/TEMP<br>7=ADAPTIVE/TEMP |
| cnx,rtd | Temperature reconnect delay | √ | √ | | time | |
| cnx,rtp | Temperature reconnectthreshold | √ | √ | | number | 15 – 75 degrees C |
| cnx 4,rtm | Reconnect remaining time | √ | | | number | > 0 means going to reconnect |

**Table B-22 T1.317 Disconnect Contactor Control Related Commands (CN)**

1 Super-user login only

Contactors are identified as follows:

CN1 = Battery Disconnect (LVBD1)

CN2 = Load 1 Disconnect (LVLD1)

CN3 = Load 2 Disconnect (LVLD2)

CN4 = Load 3 Disconnect (LVLD3)

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| sc1,ide | Identifier | √ | | | Text | SC1 |
| sc1,des | Description | √ | √ | | Text | Slope Thermal Comp |
| sc1,stt | State | √ | √ | | number | 0=disable 1=enable |
| sc1,rve | Raise Voltage Enable | √ | √ | | number | 0=disable 1=enable |
| Sc1,fse | Fail safe enable | √ | √ | | number | 0=disable 1=enable |
| sc1,ltt | Lower Temperature Threshold | √ | √ | | number | -5-20°C or 23-68°F |
| sc1,ntt | Nominal Temperature Threshold | √ | √ | | number | 15-30°C or 59-86°F |
| sc1,utt | Upper Temperature Threshold | √ | √ | | number | 30-55°C or 86-131°F |
| sc1,spt | Step Temperature | √ | √ | | number | 45-85°C or 113-185°F |
| sc1,lsp | Low temperature slope | √ | √ | | number | 1-10mV/°C per cell |
| sc1,usp | Upper temperature slope | √ | √ | | number | 1-10mV/°C per cell |

**Table B-23 T1.317 Slope Thermal Compensation Related Commands (SC)**

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| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| msnc,des | Description | √ | √ | | text | 30 char (Mid-String Voltage Module n Channel c) |
| msnc,stt | State | √ | | √ | text | None, Present, Missing |
| msnc,val | Value | √ | | | Number | Mid-String voltage |
| msnc,did | Duplicate Id | √ | | | Number | 0=no 1=yes |

**Table B-24 T1.317 Mid-String Voltage Related Commands (MS)**

Where n is the Mid-String module number from 1 to 7, and

   c is the Mid-String channel number from 1 to 3

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| dcmxx,ide | Identifier | √ | | | number | DCMC1 is the plant shuntDCM01-DCM08 |
| dcmxx,des | Description | √ | √ | | number | Contactor 1 |
| dcmxx,sn | Serial Number | √ | | | text | Serial number |
| dcmxx,brc | Board Code | √ | | | text | Board code |
| dcmxx,stt | State | √ | | | text | NONE MISSING PRESENT |
| dcmxx,typ | Shunt Type | √ | √ | | text | NONE LOAD BATTERY |
| dcmxx,val | Reading | √ | | | number | ddd.d Amps |
| dcmxx,sha | Shunt amp rating | √ | √ | | number | 0-9999 Amps |
| dcmxx,kwh | Total kWh | √ | | √ | number | dd.d kWh |

**Table B-25 T1.317 Distribution Current Monitor Related Commands (DCM)**

The shunt type defaults are as follows:

DCMC1 = Battery

DCM01 = Battery

DCM02-DCM08 = Load

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| dcnxx,ide | Identifier | √ | | | number | DCN01-DCN06 |
| dcnxx,des | Description | √ | √ | | number | Contactor 1 |
| dcnxx,sn | Serial Number | √ | | | text | Serial number |
| dcnxx,brc | Board Code | √ | | | text | Board code |
| dcnxx,stt | State | √ | | √[1] | text | NONE MISSING OPEN CLOSED |
| dcnxx,typ | Contactor interface type | √ | √ | | text | NONE, CN1, CN2, CN3,  or CN4 |

**Table B-26 T1.317 Distribution Contactor Interface Related Commands (DCN)**

[1] Super-user login required

The contactor interface type defaults are as follows:

DCN01 = CN1

DCN02 = CN2

DCN03 = CN3

DCN04-DCN08 = CN4

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| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| inmnn,ide | Identifier | √ | | | number | m=module nn=input number Examples:<br>IN001=input 1 on controller IN103=input 3 on module with ID 1 |
| inmnn,des | Description | √ | | | text | See table below |
| inmnn,,sn | Serial Number | √ | | | text | Serial number |
| inmnn,,brc | Board Code | √ | | | text | Board code |
| inmnn,typ | Input alarm type | √ | √ | | text | "" – no alarm, for in006, this value allows the input to be used foreither group standby or PBT. Polarity is ignored.<br>"FAN1" - drives FAN1 alarm<br>"FAN2" – drives FAN2 alarm "FAJ1" – drives FAJ1 alarm "FAJ2" – drives FAJ2 alarm "OSA1" – drives OSA1 alarm "AMJ1" – drives AMJ1 alarm,<br>(not valid for NE872 or other LVDcard inputs)<br>"GNR1"- drives GNR1 alarm "GNF1"- drives GNF1 alarm "AUX1" – drives AUX1 alarm "AUX2" – drives AUX2 alarm "AUX3" – drives AUX3 alarm "AUX4" – drives AUX4 alarm "AUX5" – drives AUX5 alarm "AUX6" – drives AUX6 alarm "REMLVD" – Active signal opens battery contactors for built-in plant input, or for LVD inputs, it opens the contactor on the card where the signal is active. |
| inmnn,stt | Alarming State | √ | | | | 0=inactive,1=active |
| inmnn,pol | Input alarming condition | √ | √ | | text | CLOSED, OPEN |

**Table B-27 T1.317 Input Management Related Commands (IN)**

Where: m is the distribution interface module ID from 1 to 4

nn is the input number from 01 to the number of inputs supported by the distribution interface module

| Object | Signal Name | Default Description |
|---|---|---|
| In001 | FAJ1 | Fuse Alarm Major 24V |
| In002 | FAJ2 | Fuse Alarm Major 48V |
| In003 | AUX_PMJ | Auxiliary Major Alarm |
| In004 | OS_BATT | Open String |
| In005 | EPO_IN | Emergency Power Off |
| In006 | PBT_IN | Group Standby/PBT |
| In007 | AUX1_IN | Air Conditioner Fail |
| In008 | AUX2_IN | Door Open |
| In009 | AUX3_IN | High External Ambient |
| In010 | AUX4_IN | Low External Ambient |

**Built-in plant inputs**

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| obj,attr | Description | sta | cha | ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| cm1,des | Description | √ | √ | | text | 30 char (Call-Out Manager) |
| cm1,ngi | NAG Interval | √ | √ | | Number | **15** to 60 minutes |

**Table B-28 T1.317 Call-Out Manager Related Commands (CM)**

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| x,des | Description | √ | √ | | text | (Alternate) Call-Out Number |
| x,typ | Type | √ | √ | | text | DATA, PAGER |
| x,phn | Phone Number | √ | √ | | text | Digit ( ) * # - , up to 25 characters |
| x,bdr | Connect Baudrate | √ | √ | | Number | 300, 1200, 2400, 4800, 9600, 14400 |
| x,dbt | Data Bits | √ | √ | | Number | 7, 8 |
| x,pry | Parity | √ | √ | | Text | O,E,N |
| x,sbt | Stop Bits | √ | √ | | Number | 1, 2 |
| x,dly | Pager ID Delay | √ | √ | | Number | 0-9 seconds |
| x,pgr | Pager ID (Pin #) | √ | √ | | Text | Digit ( ) * # - , up to 25 characters |
| x,msg | Pager Message | √ | √ | | Text | up to 25 characters |

**Table B-29 T1.317 Call-Out Phone Number Related Commands (P)**

Where x is p1, p2, p3, p4, a1

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| x,ide | Identifier | √ | | | text | E1, E2, E3, E4 |
| x,des | Description | √ | √ | | text | Email Address |
| x,adr | Address | √ | √ | | text | 40 characters |
| x,typ | Type | √ | √ | | text | **NORMAL**, PAGER |

**Table B-30 T1.317 Call-Out Email Address Related Commands (E)**

Where x is E1 – E4

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| po1,des | Description | √ | √ | | text | Periodic Call-Out 1 |
| po1,phn | Phone Number | √ | √ | | text | Digit ( ) * # - , up to 25 characters |
| po1,bdr | Connect Baudrate | √ | √ | | Number | 300, 1200, 2400, 4800, 9600, 14400 |
| po1,dbt | Data Bits | √ | √ | | Number | 7, 8 |
| po1,pry | Parity | √ | √ | | Text | O,E,N |
| po1,sbt | Stop Bits | √ | √ | | Number | 1, 2 |
| po1,int | Interval | √ | √ | | Text | Sunday...Saturday, Daily, Monthly, Quarterly, Never |
| po1,tim | Time | √ | √ | | Time | Hh:mm |
| po1, cl01-10 | Command Line 1-10 | √ | | | Text | X Up to 40 characters each |

**Table B-31 T1.317 Periodic Call-Out Related Commands (PO)**

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| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| lp1,des | Description | √ | √ | | text | Local Port 1 |
| lp1,stt | State | √ | | | text | USER, SUPER-USER, ADMINISTRATOR, TL1, LOGOUT |
| lp1,bdr | Baud Rate | √ | √ | | text | AUTO, 300, 1200, 2400, 4800, 9600, 19200 |
| lp1,dbt | Data Bits | √ | √ | | Number | 7, 8 |
| lp1,pry | Parity | √ | √ | | text | O, E, N |
| lp1,sbt | Stop Bits | √ | √ | | Number | 1, 2 |
| lp1,tmo | Time-Out | √ | √ | | Number | 0(disabled) – 45 minutes |
| lp1,hsh | Handshaking | √ | √ | | text | NO, HW, SW |
| lp1,app | Application | √ | √ | | Text | TERMINAL, EVENT LOG, TL1, POLARIUM MASTER, MODBUS MASTER, MODBUS SLAVE |
| lp1,wre | Write Enable | √ | √ | | Number | 0=disable 1=enable |

Table B-32 T1.317 Local RS-232 Port Related Commands (LP)

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| mp1,des | Description | √ | √ | | Text | Modem Port 1 |
| mp1,stt | State | √ | | | Text | USER, SUPER-USER, ADMINISTRATOR, TL1, LOGOUT |
| mp1,bdr | Modem baud rate | √ | √ | | text | 2400,4800,9600 |
| mp1,dbt | Data Bits | √ | √ | | Number | 7, 8 |
| mp1,pry | Parity | √ | √ | | text | O, E, N |
| mp1,sbt | Stop Bits | √ | √ | | Number | 1, 2 |
| mp1,tmo | Time-Out | √ | √ | | Number | 0(disabled) – 45 minutes |
| mp1,hsh | Handshaking | √ | √ | | text | NO, SW |
| mp1,nrg | Number of Rings Before Answer | √ | √ | | number | 2-15 |
| mp1,wre | Write Enable | √ | √ | | Number | 0=disable 1=enable (HW,SW) |
| mp1,ins | Modem Initialization String | √ | √ | | text | Up to 40 characters "" assigns the default string |

**Table B-33 T1.317 Modem Related Commands (MP)**

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| cb1,des | Description | √ | √ | | text | Call-Back Security 1 |
| cb1,stt | State | √ | √ | | number | 0=off 1=on |
| cb1,ph1-5 | Call-Back Phone Number | √ | √ | | Text | Digit () * # - , space |
| cb1,br1-5 | Connect Baudrate | √ | √ | | number | 300, 1200, 2400, 4800, 9600, 14400 |

**Table B-34 T1.317 Call-Back Security Related Commands (CB)**

Pulsar Plus_MAN

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| net1,des | Description | √ | √ | | text | 30 char |
| net1,ead | Ethernet (MAC) Address | √ | | | text | hh:hh:hh:hh:hh:hh |
| net1,dhcp | DHCP | √ | √ | √1 | number | 0=static IP, 1=DHCP Client, 2=DHCP Server (OPE causes systemreboot) |
| net1,ip | Static IP address | √ | √ | | IP address | xxx.xxx.xxx.xxx (not used if DHCP enabled) |
| net1,sub | Static Subnet Mask | √ | √ | | IP address | xxx.xxx.xxx.xxx (not used if DHCP enabled) |
| net1,gtwy | Static Gateway (Router) IP | √ | √ | | IP address | xxx.xxx.xxx.xxx (not used if DHCP enabled) |
| net1,host | Hostname | √ | √ | | text | |
| net1,wip | Working IP address | √ | | | | xxx.xxx.xxx.xxx (shows DHCP assigned or static IP address) |
| net1,dom | Static Domain Name | √ | √ | | text | (not used if DHCP enabled) |
| net1,dns | Static DNS IP | √ | √ | | IP address | xxx.xxx.xxx.xxx (not used if DHCP enabled) |
| net1,ntp | NTP server | √ | √ | | IP address | xxx.xxx.xxx.xxx |
| net1,wre | Write Enable | √ | √ | | | 0=disabled, 1=enabled |
| net1,tmo | Session Timeout | √ | √ | | | Minutes |
| net1,msrv | Mailhost IP | √ | √ | | IP address | xxx.xxx.xxx.xxx (0.0.0.0 will force a DNS lookup of "mailhost") |
| net1,sma | Send Mail As | √ | √ | | text | E-mail address |
| net1,sid | SNMPv3 Engine ID | √ | | | number | |
| net1,fpe | FTP enable | √ | √ | | number | 0=disable 1=enable |
| net1,hpe | HTTP enable | √ | √ | | number | 0=disable 1=enable |
| net1,hse | HTTPS enable | √ | √ | | number | |
| net1,she | SSH enable | √ | √ | | number | |
| net1,sne | SNMP enable | √ | √ | | number | |
| net1,tle | Telnet enable | √ | √ | | number | |
| net1,ip6 | IPv6 Address | √ | √ | | text | |
| net1,gtwy6 | IPv6 Gateway | √ | √ | | text | |
| net1,wip6 | Working IPv6 Address | √ | | | number | |
| net1,ll6 | Link local address | √ | | | number | |
| net1,pl6 | Prefix length | √ | √ | | number | |
| net1,wgtwy6 | IPv6 Router Address | √ | | | number | |

**Table B-35 T1.317 Network Settings Related Commands (NET)**

[1] Super-user login required

Pulsar Plus_MAN

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| x,ide | Identifier | √ | | | text | S1, S2, S3, S4 |
| x,des | Description | √ | √ | | text | SNMP Trap Destination |
| x,ip | IP Address | √ | √ | | text | d.d.d.d |
| x,cs | Community string | √ | √ | | text | cs1 – cs4 |
| ~~x,prt~~ | ~~UDP port~~ | √ | √ | | number | ~~UDP port number~~ |
| ~~x,vit~~ | ~~Send V1 SNMP traps~~ | √ | √ | | | ~~0=disable,1=enable~~ |
| x,sot | Send the same trap for occur andretire | √ | √ | | Number | 0=disable,1=enable |
| x,snt | Trap destination test | √ | √ | √ | Number | 0=disable,1=enable |

**Table B-36 T1.317 SNMP Destination Related Commands (S)**

Where x is S1 – S4 and obj is SND

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| csn,des | Description | √ | √ | | text | 30 char |
| csn,str | Community string | √ | √ | | text | 20 characters |
| csn,lvl | Access level | √ | √ | | text | user, super-user, administrator |
| csn,spt | SNMP protocol | √ | √ | | text | SNMP_V1, SNMP_V2C, SNMP_V3 |
| csn,apt | SNMPv3 authentication protocol | √ | √ | | text | none, MD5, SHA |
| csn,aps | SNMPv3 authentication password | √ | √ | | text | max 20 characters |
| csn,ppt | SNMPv3 privacy protocol | √ | √ | | text | none, DES |
| csn,pps | SNMPv3 privacy password | √ | √ | | text | max 20 characters |
| csn,ip | IP address to match | √ | √ | | IP address | xxx.xxx.xxx.xxx |
| csn,ipm | IP address mask | √ | √ | | IP address | xxx.xxx.xxx.xxx (255.255.255.255 → compare entire IP address) |
| ~~csn,wre~~ | ~~Write enable~~ | √ | √ | - | ~~number~~ | ~~0=disable 1=enable SETs~~ |

**Table B-37 T1.317 SNMP Community Strings Commands (CS)**

Where n is 1 - 4

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| mod1,ide | Identifier | √ | | | Text | MOD1 |
| mod1,des | Description | √ | √ | | Text | 30 char |
| mod1,id | Modbus Address | √ | √ | | Number | 1 to 255 |
| mod1,typ | Type | √ | √ | | Text | "RTU", SLAVE TCP", "NONE" |
| mod1,tmo | timeout | √ | √ | | Number | 0 – 20000 milliseconds |
| mod1,ver | Modbus Register version | √ | | | Text | |
| mod1,err | Communication errors | √ | | √ | Number | Num Error Packets/Total Packets |

**Table B-38 T1.317 MODBus Slave Related Commands (MOD)**

Pulsar Plus_MAN

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| obj,ide | Identifier | √ | | | Text | D01,D02,D03,D04,D05 |
| obj,des | Description | √ | √ | | Text | 30 char |
| obj,bdr | Baudrate | √ | √ | | Text | 2400, 4800, 9600, 19200,38400 |
| obj,dbt | Data bits | √ | √ | | Number | 7, 8 |
| obj,pry | Parity | √ | √ | | Text | o, e, n |
| obj,sbt | Stop bits | √ | √ | | Number | 1, 2 |
| obj,tmo | Round-trip timeout | √ | √ | | Number | 1 to 20000 milliseconds |
| obj,id | Modbus Address | √ | √ | | Number | 1 to 255 |
| obj,err | Communication errors | √ | | √ | Number | Num Error Packets/Total Packets |

**Table B-39 T1.317 Remote Polled Slave MODBus Devices Commands (MOD-D)**

obj = d01 – d05

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| obj,ide | Identifier | √ | | | Text | D01,D02,D03,D04,D05 |
| obj,des | Description | √ | √ | | text | 30 char |
| obj,dev | Device Object Number | √ | √ | | Number | 1-5 |
| obj,reg | Remote MODbus Register | √ | √ | | Number | 0-65536 (0x10000) |
| obj,num | Number of Registers to poll | √ | √ | | Number | 1-4 |
| obj,typ | Command Type | √ | √ | | Number | 0=(Read/Write) Coil, 1=(Read/Write) Discrete Input, 2=(Read/Write) Holding Register,3= (Read/Write) Input Register |
| obj,wre | Write Access | √ | √ | | Number | 0,1 |
| obj,val | Value | √ | | √ | Number | Value Read/to be written |
| obj,uni | Units | √ | √ | | Text | Units |
| obj,stt | Status | √ | √ | | Number | Bit field 0x01 Ready 0x02 Timeout 0x04 Received message |
| obj,ofs | Offset | √ | √ | | Number | Offset Applied to value read |
| obj,scf | Scale factor | √ | √ | | Number | Scale Factor Applied to value read |
| obj,dft | Display Format | √ | √ | | Number | 0=hex, 1=decimal,  2=float |
| obj,tft | Transfer Format via Modbus | √ | √ | | Number | 0=signed, 1=unsigned,  2=float |
| obj,int | Poll interval | √ | √ | | Number | 1-60 seconds |
| obj,err | Communication errors | √ | | √ | Number | Num Error Packets/Total Packets |

**Table B-40 T1.317 Polled MODBus Registers Related Commands (MOD-R)**

Pulsar Plus_MAN          Rev. 9.6

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| at1,des | Description | √ | √ | | Text | Alarm Test 1 |
| at1,stt | Alarm Test State | √ | | √1 | Number | 0=inactive 1=active |
| at1,stg | Alarm Test Stage | √ | | | text | PCR,PMJ,PMN,R1,R2,R3,R4,R5,R6,R7 |
| at1,lte | Alarm Test Enable | √ | √1 | | Number | 0=disable 1=enable (HW,SW) |
| at1,dur | Duration | √ | √1 | | Number | 5-300 seconds |
| at1,pcr | Test Power Critical | √ | √1 | | Number | 0=no 1=yes |
| at1,pmj | Test Power Major | √ | √1 | | Number | 0=no 1=yes |
| at1,pmn | Test Power Minor | √ | √1 | | Number | 0=no 1=yes |
| at1,r1 | Test Relay 1 | √ | √1 | | Number | 0=no 1=yes |
| at1,r2 | Test Relay 2 | √ | √1 | | Number | 0=no 1=yes |
| at1,r3 | Test Relay 3 | √ | √1 | | Number | 0=no 1=yes |
| at1,r4 | Test Relay 4 | √ | √1 | | Number | 0=no 1=yes |
| at1,r5 | Test Relay 5 | √ | √1 | | Number | 0=no 1=yes |
| at1,r6 | Test Relay 6 | √ | √1 | | Number | 0=no 1=yes |
| at1,r7 | Test Relay 7 | √ | √1 | | Number | 0=no 1=yes |
| at1,ets | Email Test | √ | | √ | number | 1=do test (sets and clears ATA1) |
| at1,ems | Email Results | √ | | | text | |
| at1,irt | Individual Relay Test State | √ | | √ | Number | ""=Stop Test, PCR,PMJ,PMN,R1,R2,R3,R4,R5,R6,R7 |
| at1,snt | SNMP Test | √ | | √ | Number | 1=do test |
| at1,bzi | Audio Test Duration | √ | √1 | | Number | 5-300 seconds |
| at1,bzt | Audio Test State | √ | | √ | Number | ""=Stop Test, Local=local buzzer |

**Table B-41 T1.317 Alarm Test Related Commands (AT)**

obj = r001 – r200

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| aco1,des | Description | √ | √ | | Text | Alarm Cut-off 1 |
| aco1,stt | Alarm Cut-off State | √ | | √ | Number | 0=inactive 1=active |
| aco1,cst | Critical Alarm Cut-off State | √ | | | Number | 0=inactive 1=active |
| aco1,cae | Critical Alarm Cut-off Enable | √ | √ | | Number | 0=disable 1=enable |
| aco1,cto | Critical Alarm Cut-off Time-Out | √ | √ | | Number | 1 to 8 hours |
| aco1,jst | Major Alarm Cut-off State | √ | | | Number | 0=inactive 1=active |
| aco1,jae | Major Alarm Cut-off Enable | √ | √ | | Number | 0=disable 1=enable |
| aco1,jto | Major Alarm Cut-off Time-Out | √ | √ | | Number | 1 to 8 hours |
| aco1,nst | Minor Alarm Cut-off State | √ | | | Number | 0=inactive 1=active |
| aco1,nae | Minor Alarm Cut-off Enable | √ | √ | | Number | 0=disable 1=enable |
| aco1,nto | Minor Alarm Cut-off Time-Out | √ | √ | | Number | 1 to 72 hours |
| aco1,lbe | Local Buzzer Enable | √ | √ | | Number | 0=disable 1=enable |

**Table B-42 T1.317 Alarm Cut-off Related Commands (ACO)**

Pulsar Plus_MAN

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| unnnn,des | Description | √ | √ | | Text | 30 char |
| unnnn,fds | Front Panel Description | √ | √ | | text | see below |
| unnnn,ast | Alarm State | √ | | | Number | 0=inactive 1=active |
| unnnn,sev | Severity | √ | √ | | Text | CRIT, MAJ, MIN, WRN, RO |
| unnnn,prg | Program Line | √ | √ | | Text | 60 char |
| unnnn,dur | Minimum Duration | √ | √ | | Number | > 0 seconds |
| unnnn,lat | Latched | √ | √ | | Number | 0=no 1=yes |
| unnnn,led | LED | √ | √ | | text | BD,AC,DC,"" |
| unnnn,acc | Contact Closure | √ | √ | | text | R1,R2,R3,R4,R5,R6,R7,"" |
| unnnn,dly | Notify Delay | √ | √ | | Number | 0-540 seconds |
| unnnn,noo | Notify On Occur | √ | √ | | Number | 0=no 1=yes |
| unnnn,nor | Notify On Retire | √ | √ | | Number | 0=no 1=yes |
| unnnn,nag | NAG On Occur | √ | √ | | Number | 0=no 1=yes |
| unnnn,dst | Notify Destination | √ | √ | | text | "", P1, P2, P3, P4, E1, E2, E3, E4, S1, S2, S3, S4 |

**Table B-43 T1.317 User Defined Events Related Commands (UDE)**

Where nnnn = 1 thru 128

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| DRnn,des | Description | √ | √ | | Text | 30 char (Derived Chan nn) |
| DRnn,val | Value | √ | | | Number | Number units |
| DRnn,prg | Program line | √ | √ | | Text | 60 char |
| DRnn,uni | Unit | √ | √ | | Text | 5 chars |

**Table B-44 T1.317 Derived Channels Related Commands (DR)**

Where nn is from 01 thru 8

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| Obj,ide | Identifier | √ | | | | DCT1 for DC plant load |
| dct1,des | Description | √ | √ | | Text | DC1 Trend Statistics |
| dct1,src | Source | √ | √ | | Text | DC1 ADC; CP1 ADC |

**Table B-45 T1.317 Trend Related Commands (DCT/CPT)**

　　　　　Pulsar Plus_MAN　　　　　Rev. 9.6

| obj,attr | Description | sta | cha | ope | type | range |
|---|---|---|---|---|---|---|
| tlm1,des | Description | √ | √ | | text | 30 char (TL1 Manager) |
| tlm1,aue | Activate-User Enable | √ | √ | | number | 0=disable 1=enable |
| tlm1,cts | CTS Connect Detection | √ | √ | | number | 0=disable 1=enable |
| tlm1,dsr | DSR Connect Detection | √ | √ | | number | 0=disable 1=enable |
| Tlm1,prt | Port | √ | √ | | number | 2020 |
| Tlm1,tmo | Timeout | √ | √ | | number | 0-60 minutes |

**Table B-46 T1.317 TL1 Manager Related commands (TL1-M)**

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| tln,des | Description | √ | √ | | text | 30 char (TL1 Object n) |
| tln,cds | Condition Description | √ | √ | | text | 60 char |
| tln,aid | Aid | √ | √ | | text | 20 char |
| tln,cnd | Condition Type | √ | √ | | text | 20 char |
| tln,saf | Service Affecting | √ | √ | | Number | 0=no 1=yes |
| tln,rpt | Reporting | √ | √ | | text | EQUIPMENT, ENVIRONMENT, PRESENCE |

**Table B-47 T1.317 TL1 Object Related Commands (TL1-O)**

Where n is the TL object number from 001 thru 256 128

| obj,attr | Description | sta | cha | ope | type | Range of Values |
|---|---|---|---|---|---|---|
| net2,des | Description | √ | √ | | text | 30 char |
| net2,ena | Enable | √ | √ | | number | 0=disable 1=enable |
| net2,ip | Static IP address | √ | √ | | IP address | xxx.xxx.xxx.xxx (not used if DHCP enabled) |
| net2,sub | Static Subnet Mask | √ | √ | | IP address | xxx.xxx.xxx.xxx (not used if DHCP enabled) |
| net2,gtwy | Static Gateway (Router) IP | √ | √ | | IP address | xxx.xxx.xxx.xxx (not used if DHCP enabled) |
| net2,host | Hostname | √ | √ | | Text | |
| net2,dom | Static Domain Name | √ | √ | | Text | (not used if DHCP enabled) |
| net2,msrv | Mailhost IP | √ | √ | | IP address | xxx.xxx.xxx.xxx (0.0.0.0 will force a DNS lookup of "mailhost") |

**Table B-48 T1.317 Auxiliary Network Settings Related Commands (NET-2)**

net2 is currently only used by an attached Gateway Card.

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| rpt1,ide | Identifier | √ | | | Text | RPT1 |
| rpt1,des | Description | √ | √ | | Text | Report |
| rpt1,ena | Enable | √ | √ | | number | 0=disable 1=enable |
| rpt1,dun | Display Units Enable | √ | √ | | number | 0=disable 1=enable |
| rpt1,int | Interval | √ | √ | | number | 1-60 in minutes, default 5 |
| rpt1,dxxx[1] | Data line # for object, attribute | √ | √ | | Text | Configurable t1317 object, attribute |

**Table B-49 T1.317 Bulk Data Report Related Commands (RPT)**

[1] Where the data lines are from d001 to d150

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| dbnn,des | Description | √ | √ | | text | 30 char |
| dbnn,sn | Serial number | √ | | | text | 18 characters |
| dbnn,stt | State | √ | | | text | Missing, Present |
| dbnn,sha | Shunt Capacity | √ | √ | | Number | 0 – 4000 Amps |
| dbnn,npl | Number of Panels | √ | √ | | Number | 1 - 8 |
| dbnn,pmt | Measurement Type | √ | √ | | text | I, IV, V<br>(Current, Current and Voltage, Voltage) |
| dbnn,ids | Identification Style | √ | √ | | text | AN (A1,B1 ... A4,B4),<br>A   (A...H),<br>N    (1...8) |
| dbnn,bze | Buzzer Enable | √ | √ | | Number | 0=disable 1=enale |
| dbnn,ole | Overload Latch Enable | √ | √ | | Number | 0=disable 1=enable |
| dbnn,ori | Panel Orientation | √ | √ | | Text | TL  (Top Left),<br>BL (BottomLeft),<br>TR (Top Right),<br>BR (Bottom Right) |
| dbnn,cmb | Combine Panels | √ | √ | | Number | 0=disable 1=enable |
| dbnn,smw | Shunt Mis-wired | √ | | | Number | 0=no shunt mis-wired,<br>1=shunt mis-wired |
| dbnn,cca | Circuit Assignment | √ | | | Number | 0=no circuit assignment,<br>1=circuitassignment |
| dbnn,vid | BDFB/BDCBB ID conflict | √ | | | Number | 0=no id conflict,1=id conflict |
| dbnn,ovl | Clear Latched Overload | √ | | √ | Number | 0=do not clear,1=clear latched alarm |

**Table B-50 T1.317 Distribution Bay Related Commands (DB)**

Where nn is distribution bay 01 – 16

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| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| dpbbp,des | Description | √ | √ | | text | 30 char |
| dpbbp,adc | Current | √ | | | text | Measured current |
| dpbbp,vdc | Voltage | √ | | | text | Measured voltage |
| dpbbp,stt | State | √ | | | Number | Missing, Present |
| dpbbp,pid | Panel ID | √ | | | Number | 1 - 8 |
| dpbbp,ena | Enable | √ | √ | | Number | 0=disable 1=enable |
| dpbbp,old | Overload Delay | √ | √ | | Number | 0 – 300 seconds |
| dpbbp,olt | Overload Threshold | √ | √ | | Number | 0 – 4000 Amps |
| dpbbp,olr | Redundant Overload | √ | √ | | Number | 0=disable 1=enable |
| dpbbp,plt | Power Loss Threshold | √ | √ | | Number | 40 – 60 Volts |
| dpbbp,cct | Input Circuit | √ | √ | | Number | 1 - 8 |
| dpbbp,vlv | Power Loss | √ | | | Number | 0=power ok,1=power loss |
| dpbbp,ovl | Overload | √ | | | Number | 0=no overload,1=overload |
| dpbbp,faja | Distribution fuse A | √ | | | Number | 0=no fuse fail,1=fuse fail |
| dpbbp,fajb | Distribution fuse B | √ | | | Number | 0=no fuse fail,1=fuse fail |

**Table B-51 T1.317 Distribution Panel Related Commands (DP)**

Where bb is distribution bay 01 – 16, p is panel 1 - 8

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| peg*nnn*,des | Description | √ | √ | | text | 30 char |
| peg*nnn*,pwr | Power | √ | | | Number | Power in Watts |
| peg*nnn*,olcap | Online Capacity | √ | | | Number | In Watts |
| peg*nnn*,ops | Capacity | √ | | | Number | In Watts |
| peg*nnn*,ton | Turn on Circuits in Group | √ | | √ | Number | 0 = no turn on 1 = turn on |
| peg*nnn*,toff | Turn off Circuits in Group | √ | | √ | Number | 0 = no turn off 1 = turn off |

**Table B-52 T1.317 Power Express Group Related Commands (PEG)**

Where nnn is 1-512

Pulsar Plus_MAN

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| pesnn,des | Description | √ | √ | | text | 30 char |
| pesnn,stt | State | √ | | | Number | Missing, Present |
| pesnn,sn | Serial number | √ | | | text | YYLLdddddddd |
| pesnn,cc | Ordering Code | √ | | | text | 11 characters long |
| pesnn,ser | Series | √ | | | text | |
| pesnn,clei | Clei Code | √ | | | text | |
| pesnn,typ | Shelf type | √ | | | text | |
| pesnn,ver | Version | √ | | | text | |
| pesnn,osp | Output setpoint | √ | √ | | Number | 57 – 59 Volts |
| pesnn,iv1 | Input voltage 1 | √ | | | Number | Measured voltage 1 |
| pesnn,iv2 | Input voltage 2 | √ | | | Number | Measured voltage 2 |
| pesnn,ram | Relay alarming | √ | | | Number | 0 = no relay alarming<br>1= relayalarming |
| pesnn,rev1 | Reverse Polarity 1 | √ | | | Number | 0 = not reversed 1 = reversed |
| pesnn,rev2 | Reverse Polarity 2 | √ | | | Number | 0 = not reversed 1 = reversed |
| pesnn,ivor1 | Input voltage 1 out of range | √ | | | Number | 0 = normal 1 = out of range |
| pesnn,ivor2 | Input voltage 2 out of range | √ | | | Number | 0 = normal 1 = out of range |
| pesnn,das2 | Is Power Express 2 | √ | | | Number | 0= Power Express<br>1 = Power Express 2 |
| pesnn,peid | ID Conflict | √ | | | Number | 0= No ID conflict<br>1 = ID conflict |

**Table B-54 T1.317 Power Express Shelf Related Commands (PES)**

Where nn is shelf 01 – 16

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| pemnnd,des | Description | √ | √ | | text | 30 char |
| pemnnd,stt | State | √ | | | Number | Missing, Present |
| pemnnd,vdc | Input voltage | √ | | | Number | Measured voltage |
| pemnnd,adc | Input current | √ | | | Number | Measured current |
| pemnnd,tmp | Input temperature | √ | | | Number | Measured temperature in F or C |
| pemnnd,lth | Load Threshold | √ | √ | | Number | 0.025 – 0.500 A |
| pemnnd,sn | Serial number | √ | | | text | YYLLdddddddd |
| pemnnd,cc | Ordering code | √ | | | text | 11 characters long |
| pemnnd,ser | Series | √ | | | text | |
| pemnnd,clei | Clei Code | √ | | | text | |
| pemnnd,typ | Module type | √ | | | text | |
| pemnnd,ver | Version | √ | | | text | |
| pemnnd,dif | Internal Circuit Fail | √ | | | Number | 0= no fail 1 = fail |
| pemnnd,ops | Over power shutdown | √ | | | Number | 0 = no shutdown 1= shutdown |
| pemnnd,ocs | Over current shutdown | √ | | | Number | 0 = no shutdown 1 = shutdown |

**Table B-55 T1.317 Power Express Module Related Commands (PEM)**

Pulsar Plus_MAN                                Rev. 9.6

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| pemnnd,scs | Short circuit shutdown | √ | | | Number | 0 = no shutdown 1 = shutdown |
| pemnnd,ior | Input out of range shutdown | √ | | | Number | 0 = no shutdown 1 = shutdown |
| pemnnd,ots | Over temperature shutdown | √ | | | Number | 0 = no shutdown 1 = shutdown |
| pemnnd,ldr | Load dropped | √ | | | Number | 0 = normal 1 = load dropped |
| pemnnd,dfan | Fan fail | √ | | | Number | 0 = no fail 1 = fail |
| pemnnd,msn | Module Scan | √ | | √ | Number | 0 = No request 1 = Start Scan |

**Table B-55 T1.317 Power Express Module Related Commands (PEM) (continued)**

Where nn is shelf 01 – 16, d is module 1-4

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| pecnndt,des | Description | √ | √ | | text | 30 char |
| pecnndt,stt | State | √ | | √ | Number | Missing, On, Off |
| pecnndt,vdc | Output voltage | √ | | | Number | Measured voltage in Volts |
| pecnndt,adc | Output current | √ | | | Number | Measured current in Amps |
| pecnndt,pwr | Power | √ | | | Number | Power in Watts |
| pecnndt,dif | Internal Circuit Fail | √ | | | Number | 0= no fail 1 = fail |
| pecnndt,ops | Over power shutdown | √ | | | Number | 0 = no shutdown 1= shutdown |
| pecnndt,ocs | Over current shutdown | √ | | | Number | 0 = no shutdown 1 = shutdown |
| pecnndt,scs | Short circuit shutdown | √ | | | Number | 0 = no shutdown 1 = shutdown |
| pecnndt,ior | Input out of range shutdown | √ | | | Number | 0 = no shutdown 1 = shutdown |
| pecnndt,ots | Over temperature shutdown | √ | | | Number | 0 = no shutdown 1 = shutdown |
| pecnndt,ldr | Load dropped | √ | | | Number | 0 = normal 1 = load dropped |
| pecnndt,dfan | Fan fail | √ | | | Number | 0 = no fail 1 = fail |

**Table B-56 T1.317 Power Express Circuit Related Commands (PEC)**

Where nn is shelf 01 – 16, d is module 1-4, and t is circuit 1-

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| rhmnd,des | Description | √ | √ | | text | 30 char |
| rhmnd,stt | State | √ | | | Text | Missing, Normal, Alarmed |
| rhmnd,sn | Serial number | √ | | | text | YYLLddddddddd |
| rhmnd,cc | Ordering Code | √ | | | text | 11 characters long |
| rhmnd,ser | Series | √ | | | text | |
| rhmnd,clei | Clei Code | √ | | | text | |
| rhmnd,typ | Module type | √ | | | text | |
| rhmnd,ver | Version | √ | | | text | |
| rhmnd,sfan | Single Fan Failure | √ | | | number | 0 = no fail 1 = fail |
| rhmnd,mfan | Multiple Fan Failure | √ | | | number | 0 = no fail 1= fail |

**Table B-57 T1.317 PowerShift Module Related Commands (RHM)**

Pulsar Plus_MAN          Rev. 9.6

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| rhmnd,tmf | Over temperature | √ | | | number | 0 = no shutdown 1 = shutdown |
| rhmnd,fua | Fuse alarm | √ | | | number | 0 = no shutdown 1 = shutdown |
| rhmnd,intl | Interlock open | √ | | | number | 0 = no shutdown 1 = shutdown |
| rhmnd,lmis | Module Mismatch alarmstatus | √ | | | number | 0= no alarm 1= alarm<br>only used for LDC2 |
| rhmnd,rrid | ID Conflict | √ | | | number | 0 = no ID conflict 1 = ID conflict |

**Table B-57 T1.317 PowerShift Module Related Commands (RHM) (continued)**

Where n is shelf 1 – 2, d is module D, B, C or A for version 1

and nd = 01 to 12 for version 2

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| Rhcn,des | Description | √ | √ | | text | 30 char |
| rhcn,stt | State | √ | | | Text | Missing, Normal, Alarmed |
| rhcn,are | Actual resistance value inohms | √ | | | number | Resistance in Ohms |
| rhcn,cre | Calculated resistance value inohms | √ | | | number | Resistance in Ohms |
| rhcn,mre | Manual resistance value inohms | √ | | | number | Resistance in Ohms |
| rhcn,crm | Configured resistance mode | √ | √ | | text | Auto or Manual |
| rhcn,vsp | Target "upper" set point inVolts | √ | √ | | number | In Volts |
| rhcn,vcl | Clamp set point in Volts | √ | √ | | number | In Volts |
| rhcn,pri | Primary Boost id | √ | | | text | |
| rhcn,sec | Secondary Boost id | √ | | | text | |
| rhcn,src | ID of sourced Boost | √ | | | text | |
| rhcn,ovprm | OVP number and port number | √ | √ | | number | Format XYY – where<br>X is OVP 0-4, and<br>YY is port 1-12 of OVP |
| rhcn,sct | Sector | √ | √ | | text | |
| rhcn,clr | Color | √ | √ | | text | |
| rhcn,tec | Technology | √ | √ | | text | |
| rhcn,frq | Frequencies | √ | √ | | text | |
| rhcn,cbn | DC CB Number | √ | √ | | text | |
| rhcn,ena | Enable channel | √ | √ | | number | 0 or 1 |
| rhcn,rlse | Redundancy Loss Enable | √ | √ | | Number | 0 = enable 1 = disable<br>(automatically set each<br>connection to controller) |
| rhcn,rls | Redundancy Loss Status | √ | | | Number | 0 = redundancy loss not active<br>1 =Redundancy loss active |
| rhcn,luv | Upper Resistance AlarmStatus | √ | | | number | 0= no alarm 1= alarm |
| rhcn,lres | High Resistance Alarm Status | √ | | | number | 0= no alarm 1= alarm |
| rhcn,lvnl | Voltage not linked alarmstatus | √ | | | number | 0= no alarm 1= alarm |
| rhcn,lpri | Primary Fault alarm status | √ | | | number | 0= no alarm 1= alarm |
| rhcn,ldcp | Disabled Circuit but Poweredstatus | √ | | | number | 0= no alarm 1= alarm |
| rhcn,puvl | Upper Voltage Low | √ | | | number | 0= no alarm 1= alarm |

**Table B-58 T1.317 Power Shift Circuit Related Commands (RHC)**

Where *n* is circuit number from 01 - 12

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| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|:---:|:---:|:---:|:---:|---|
| rhbndt,des | Description | √ | √ | | text | 30 char |
| rhbndt,stt | State | √ | | √ | Text | Missing, On, Off, Pending On, Pending Off |
| rhbndt,vout | Output voltage | √ | | | Number | Measured voltage in Volts |
| rhbndt,iout | Output current | √ | | | Number | Measured current in Amps |
| rhbndt,vin | Input voltage | √ | | | Number | Measured voltage in Volts |
| rhbndt,are | Auto resistance | √ | | | Number | Auto resistance value in Ohms |
| rhbndt,mre | Manual resistance | √ | √ | | Number | Manual resistance value in Ohms – only used LDC1 |
| rhbndt,crm | Configured resistance mode | √ | √ | | Text | Configured resistance mode: Auto or Manual<br>– only used for LDC1 |
| rhbndt,vsp | Configured Output voltagesetpoint | √ | √ | | Number | Configured Output voltage setpoint in Volts<br>– only used for LDC1 |
| rhbndt,vcl | Configured Output voltagelimit setpoint | √ | √ | | Number | Configured Output voltage limit setpoint in Volts<br>- only used forLDC1 |
| rhbndt,vera | Algorithm Software Version | √ | | | Text | x.y |
| rhbndt,verb | Boost Software Version | √ | | | Text | x.y |
| rhbndt,arf | Auto Resistance Fail | √ | | | Number | 0= no fail 1 = fail<br>– used for LDC1 |
| rhbndt,tmf | Over temperature shutdown | √ | | | Number | 0 = no shutdown 1= shutdown |
| rhbndt,ifa | Input Fail | √ | | | Number | 0 = no shutdown 1 = shutdown |
| rhbndt,ovl | Output Current Overload | √ | | | Number | 0 = no shutdown 1 = shutdown |
| rhbndt,rlse | Redundnacy Loss Enable | √ | √ | | Number | 0 = enable 1 = disable<br>– only used for LDC2 (automatically set eachconnection to controller) |
| rhbndt,rls | Redundancy Loss Status | √ | | | Number | 0 = redundancy loss not active 1 = Redundancy loss active<br>– used onlyfor LDC2 |
| rhbndt,vor | Output voltage out of range | √ | | | Number | 0 = no shutdown 1 = shutdown |
| rhbndt,pgd | Power Good | √ | | | Number | 0 = not active source of power 1 = active source of power<br>– used only for LDC2 |
| rhbndt,clf | Clear Faults | √ | | √ | Number | 0 = do not clear faults |

**Table B-59 T1.317 PowerShift Boost Related Commands (RHB)**

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| rht1,des | Description | √ | √ | | text | 30 char |
| rht1,stt | State | √ | | | text | Missing, Present |
| rht1,arch | Architecture | √ | √ | | number | 1=LDC1, 2= LDC2 |
| rht1,sn | Serial number | √ | | | text | YYLLdddddddd |
| rht1,cc | Ordering Code | √ | | | text | 11 characters long |
| rht1,ser | Series | √ | | | text | |
| rht1,clei | Clei Code | √ | | | text | |
| rht1,typ | Board type | √ | | | text | |
| rht1,vera | Version | √ | | | text | |

**Table B-60 T1.317 PowerShift Translator Related Commands (RHT)**

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| rhop,des | Description | √ | √ | | text | 30 char |
| rhop,v01 | Voltage from port 1 | √ | | | number | Number in volts |
| rhop,v02 | Voltage from port 2 | √ | | | number | Number in volts |
| rhop,v03 | Voltage from port 3 | √ | | | number | Number in volts |
| rhop,v04 | Voltage from port 4 | √ | | | number | Number in volts |
| rhop,v05 | Voltage from port 5 | √ | | | number | Number in volts |
| rhop,v06 | Voltage from port 6 | √ | | | number | Number in volts |
| rhop,v07 | Voltage from port 7 | √ | | | number | Number in volts |
| rhop,v08 | Voltage from port 8 | √ | | | number | Number in volts |
| rhop,v09 | Voltage from port 9 | √ | | | number | Number in volts |
| rhop,v10 | Voltage from port 10 | √ | | | number | Number in volts |
| rhop,v11 | Voltage from port 11 | √ | | | number | Number in volts |
| rhop,v12 | Voltage from port 12 | √ | | | number | Number in volts |
| rhop,sa | System alarms | √ | | | number | Bit 4 = H2O Alarm<br>Bit 5 = Intrusion Alarm<br>Bit 6 = Power Alarm<br>(Reverse V orShorted Cir.)<br>Bit 7 = Tower to Base communication error |
| rhop,a01 | Alarms from port 1 | √ | | | number | Bit 12 = Reverse Voltage<br>Bit 13 = -48Vd.c. breaker open or only RTN connected<br>Bit 14 = Short circuit |
| rhop,a02 | Alarms from port 2 | √ | | | number | Bit 12 = Reverse Voltage<br>Bit 13 = -48Vd.c. breaker open or only RTN connected<br>Bit 14 = Short circuit |

**Table B-61 T1.317 PowerShift Packet Related Commands (RHO)**

Pulsar Plus_MAN Rev. 9.6

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| rhop,a04 | Alarms from port 4 | √ | | | number | Bit 12 = Reverse Voltage<br>Bit 13 = -48Vd.c. breaker open or only RTN connected<br>Bit 14 = Short circuit |
| rhop,a05 | Alarms from port 5 | √ | | | number | Bit 12 = Reverse Voltage<br>Bit 13 = -48Vd.c. breaker open or only RTN connected<br>Bit 14 = Short circuit |
| rhop,a06 | Alarms from port 6 | √ | | | number | Bit 12 = Reverse Voltage<br>Bit 13 = -48Vd.c. breaker open or only RTN connected<br>Bit 14 = Short circuit |
| rhop,a07 | Alarms from port 7 | √ | | | number | Bit 12 = Reverse Voltage<br>Bit 13 = -48Vd.c. breaker open or only RTN connected<br>Bit 14 = Short circuit |
| rhop,a08 | Alarms from port 8 | √ | | | number | Bit 12 = Reverse Voltage<br>Bit 13 = -48Vd.c. breaker open or only RTN connected<br>Bit 14 = Short circuit |
| rhop,a09 | Alarms from port 9 | √ | | | number | Bit 12 = Reverse Voltage<br>Bit 13 = -48Vd.c. breaker open or only RTN connected<br>Bit 14 = Short circuit |
| rhop,a10 | Alarms from port 10 | √ | | | number | Bit 12 = Reverse Voltage<br>Bit 13 = -48Vd.c. breaker open or only RTN connected<br>Bit 14 = Short circuit |
| rhop,a11 | Alarms from port 11 | √ | | | number | Bit 12 = Reverse Voltage<br>Bit 13 = -48Vd.c. breaker open or only RTN connected<br>Bit 14 = Short circuit |
| rhop,a12 | Alarms from port 12 | √ | | | number | Bit 12 = Reverse Voltage<br>Bit 13 = -48Vd.c. breaker open or only RTN connected<br>Bit 14 = Short circuit |
| rhop,tpt | Packet Timeout | √ | | | number | |

**Table B-61 T1.317 PowerShift Packet Related Commands (RHO) (continued)**

Where p is packet ID from 0 to 4

Pulsar Plus_MAN                    Rev. 9.6

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| picnn,ide | Identifier | √ | | | Text | PICnn |
| picnn,des | Description | √ | √ | | text | 30 char |
| picnn,stt | State | √ | | | text | |
| picnn,sn | Serial number | √ | | | text | |
| picnn,ncc | No Cable Connected | √ | √ | | Number | 0=Cable returning status connected,1= no cable connected returning status |
| picnn,trp | Shunt Trip Disconnect | √ | √ | | Number | 0=normal disconnect 1=shunt trip disconnect |
| picnn,vera | Application software version | √ | | | text | |
| picnn,pid | Duplicate ID | √ | | | Number | 0=no 1=yes |
| picnn,pcf | Communication fail | √ | | | Number | 0=no 1=yes |

**Table B-62 T1.317 Panel Interface Card Related Commands (PIC)**

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| pcmccnn,ide | Identifier | √ | | | Text | PCMccnn |
| pcmccnn,des | Description | √ | √ | | text | 30 char |
| pcmccnn,val | Current | √ | | | Number | |
| pcmccnn,sha | Shunt current rating | √ | √ | | Number | |
| pcmccnn,shv | Shunt mV | √ | √ | | Number | |
| pcmccnn,sht | Shunt type | √ | √ | | Text | "NONE", "BATTERY", "LOAD" |

**Table B-63 T1.317 Panel Current Monitor Related Commands (PCM)**

Where nn is PIC 01 – 32 and cc is channel 01 – 02

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| pvmccnn,ide | Identifier | √ | | | Text | PVMccnn |
| pvmccnn,des | Description | √ | √ | | text | 30 char |
| pvmccnn,val | Voltage | √ | | | Number | |

**Table B-64 T1.317 Panel Voltage Monitor Related Commands (PVM)**

Where nn is PIC 01 – 32 and cc is channel 01 – 02

Pulsar Plus_MAN

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| ptm01nn,ide | Identifier | √ | | | Text | PTM01nn |
| ptm01nn,des | Description | √ | √ | | text | 30 char |
| ptm01nn,bamt | Board Ambient Temperature | √ | | | Number | |
| ptm01nn,nat | Number of Ambient Temperature Probes | √ | | | Number | |
| ptm01nn,hamt | Highest Ambient Temperature (Probe) | √ | | | Number | |
| ptm01nn,lamt | Lowest Ambient Temperature (Probe) | √ | | | Number | |
| ptm01nn,ntm | Number of Battery Probes | √ | | | Number | |
| ptm01nn,hbt | Highest Battery Temperature | √ | | | Number | |
| ptm01nn,lbt | Lowest Battery Temperature | √ | | | Number | |
| ptm01nn,nbut | Number of Bus Temperature Probes | √ | | | Number | |
| ptm01nn,hbut | Highest Bus Temperature | √ | | | Number | |
| ptm01nn,lbut | Lowest Bus Temperature | √ | | | Number | |

**Table B-65 T1.317 Panel Temperature Monitor Related Commands (PTM)**

Where nn is PIC 01 – 32

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| bmicxxyy,des | Description | √ | √ | | text | BMIC sr |
| bmicxxyy,stt | Individual bmic state | √ | | | text | NORMAL, MISSING, ALARMED |
| bmicxxyy,typ | Battery Type | √ | | | text | 30 char |
| bmicxxyy,cap | Ampere Hour Capacity | √ | | | number | number Ah |
| bmicxxyy,kwh | Kilo Watt Hour Capacity | √ | | | number | number kWh |
| bmicxxyy,soh | State of Health | √ | | | number | 0-100% |
| bmicxxyy,sn | Serial number | √ | | | text | Up to 18 characters |
| bmicxxyy,brc | Board Code | √ | | | text | |
| bmicxxyy,cc | Ordering Code | √ | | | text | 11 characters long |
| bmicxxyy,clei | Clei Code | √ | | | text | |
| bmicxxyy,ser | Series | √ | | | text | |
| bmicxxyy,verp | Software version | √ | | | text | |
| bmicxxyy,bdt | Build date | √ | | | text | In configured date format |
| bmicxxyy,sdt | Installed date | √ | | | text | In configured date format |
| bmicxxyy,d01 | Date on Monobloc 1 | √ | | | text | In configured date format |
| bmicxxyy,d02 | Date on Monobloc 2 | √ | | | text | In configured date format |
| bmicxxyy,d03 | Date on Monobloc 3 | √ | | | text | In configured date format |

**Table B-66 T1.317 Battery Module Interface Card Related Commands (BMIC)**

Pulsar Plus_MAN

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|:---:|:---:|:---:|---|---|
| bmicxxyy,d04 | Date on Monobloc 4 | √ | | | text | In configured date format |
| bmicxxyy,d05 | Date on Monobloc 5 | √ | | | text | In configured date format |
| bmicxxyy,d06 | Date on Monobloc 6 | √ | | | text | In configured date format |
| bmicxxyy,d07 | Date on Monobloc 7 | √ | | | text | In configured date format |
| bmicxxyy,d08 | Date on Monobloc 8 | √ | | | text | In configured date format |
| bmicxxyy,lds | Last Recharge Date | √ | | | text | In configured date format |
| bmicxxyy,ncl | Discharge/Charge Cycles | √ | | | number | Number |
| bmicxxyy,man | Manufacturer | √ | | | text | |
| bmicxxyy,ev | End Voltage | √ | | | number | Number V |
| bmicxxyy,ofs | Optimum Float Voltage | √ | | | number | Number V |
| bmicxxyy,moc | Maximum Output Current | √ | | | number | Number A |
| bmicxxyy,mnt | Minimum Operating Temperature | √ | | | number | Number C/F |
| bmicxxyy,mxt | Maximum Operating Temperature | √ | | | number | Number C/F |
| bmicxxyy,tmp | Nominal Temperature | √ | | | number | Number C/F |
| bmicxxyy,tec | Battery Technology | √ | | | text | Flooded, Valve-Reg ... |
| bmicxxyy,vbat | Battery Voltage | √ | | | number | number V |
| bmicxxyy,vbus | Bus Voltage | √ | | | number | number V |
| bmicxxyy,v01 | String Voltage 1 | √ | | | number | number V |
| bmicxxyy,v02 | String Voltage 2 | √ | | | number | number V |
| bmicxxyy,v03 | String Voltage 3 | √ | | | number | number V |
| bmicxxyy,v04 | String Voltage 4 | √ | | | number | number V |
| bmicxxyy,v05 | String Voltage 5 | √ | | | number | number V |
| bmicxxyy,v06 | String Voltage 6 | √ | | | number | number V |
| bmicxxyy,v07 | String Voltage 7 | √ | | | number | number V |
| bmicxxyy,v08 | String Voltage 8 | √ | | | number | number V |
| bmicxxyy,adc | Current | √ | | | number | number A |
| bmicxxyy,hbt | Highest battery temperature | √ | | | number | dd °C or °F |
| bmicxxyy,lbt | Lowest battery temperature | √ | | | number | dd °C or °F |
| bmicxxyy,t01 | Battery temperature 1 | √ | | | number | dd °C or °F |
| bmicxxyy,t02 | Battery temperature 2 | √ | | | number | dd °C or °F |
| bmicxxyy,t03 | Battery temperature 3 | √ | | | number | dd °C or °F |
| bmicxxyy,t04 | Battery temperature 4 | √ | | | number | dd °C or °F |
| bmicxxyy,t05 | Battery temperature 5 | √ | | | number | dd °C or °F |
| bmicxxyy,t06 | Battery temperature 6 | √ | | | number | dd °C or °F |

**Table B-66 T1.317 Battery Module Interface Card Related Commands (BMIC) (continued)**

Pulsar Plus_MAN

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|----------|-------------|-----|-----|-----|------|-----------------|
| bmicxxyy,t07 | Battery temperature 7 | √ | | | number | dd °C or °F |
| bmicxxyy,t08 | Battery temperature 8 | √ | | | number | dd °C or °F |
| bmicxxyy,tin | Ambient inlet temperature | √ | | | number | dd °C or °F |
| bmicxxyy,tot | Ambient outlet temperature | √ | | | number | dd °C or °F |
| bmicxxyy,rtm | Reserve Time | √ | | | number | Time in seconds |
| bmicxxyy,res | Reserve Time Error | √ | | | text | |
| bmicxxyy,poc | Battery charge percentage | √ | | | text | 0 to 100 % (with percent character) |
| bmicxxyy,all | Alarm LED indicator | √ | | | text | |
| bmicxxyy,dcl | DC Led indicator | √ | | | text | |
| bmicxxyy,epo | Emergency Power Off | √ | | | number | 0 or 1 |
| bmicxxyy,scd | Shorted Cell | √ | | | number | 0 or 1 |
| bmicxxyy,bmf | Fail Status | √ | | | number | 0 or 1 |
| bmicxxyy,bmot | Over Temperature Status | √ | | | number | 0 or 1 |
| bmicxxyy,bmil | Interlock Status | √ | | | number | 0 or 1 |
| bmicxxyy,bmoc | Over Current Status | √ | | | number | 0 or 1 |
| bmicxxyy,bmlf | Life Exceeded Status | √ | | | number | 0 or 1 |
| bmicxxyy,bmdl | Discharge Cycle Limit Status | √ | | | number | 0 or 1 |
| bmicxxyy,bmde | High Discharge Cycle Limit Status | √ | | | number | 0 or 1 |
| bmicxxyy,bmlv | Low internal string voltageStatus | √ | | | number | 0 or 1 |
| bmicxxyy,cno | Contactor Open Status | √ | | | number | 0 or 1 |
| bmicxxyy,cnf | Contactor Failed Status | √ | | | number | 0 or 1 |
| bmicxxyy,bfan | Fan Status | √ | | | number | 0 or 1 |
| bmicxxyy,bhio | Hi Output Exceeded Status | √ | | | number | 0 or 1 |
| bmicxxyy,bmxt | Max Temp Exceeded Status | √ | | | number | 0 or 1 |
| bmicxxyy,bmnt | Min Temp Exceeded Status | √ | | | number | 0 or 1 |
| bmicxxyy,bmdu | Duplicate ID status | √ | | | number | 0 or 1 |
| bmicxxyy,vmod | Modbus Version | √ | | | number | |
| bmicxxyy,vmin | Minimum Cell Voltage | √ | | | number | Volts |
| bmicxxyy,vmax | Maximum Cell Voltage | √ | | | number | Volts |
| bmicxxyy,lif | Run Time | √ | | | time | Run Time in seconds |
| bmicxxyy,atft | Anti-theft status | √ | | | number | 0 or 1 |
| bmicxxyy,bmcb | Circuit Breaker status | √ | | | number | 0 or 1 |
| bmicxxyy,bmuv | Under Voltage status | √ | | | number | 0 or 1 |

**Table B-66 T1.317 Battery Module Interface Card Related Commands (BMIC) (continued)**

Pulsar Plus_MAN

| obj,attr | Description | sta | cha | Ope | type | Range of Values |
|---|---|---|---|---|---|---|
| bmicxxyy,bmov | Over Voltage status | √ | | | number | 0 or 1 |
| bmicxxyy,bcub | Current Blocked status | √ | | | number | 0 or 1 |
| bmicxxyy,bmsc | Short Circuit status | √ | | | number | 0 or 1 |
| bmicxxyy,bmut | Under Temperature status | √ | | | number | 0 or 1 |
| bmicxxyy,mod | Modbus Id | √ | | | number | |

**Table B-66 T1.317 Battery Module Interface Card Related Commands (BMIC) (continued)**

Where xx is bmic ID from 01 to 44 and yy is the station number from 01 to 04

# Additional T1.317 Commands And Samples

| ala | Report Active Alarms |
|---|---|
| Syntax: | ala |

**Description**

This command reports all the active alarm conditions in the plant. One alarm message is listedper line in the report. The table below lists the default alarm messages. Note that if user changes the severity of the alarm, the corresponding change will show up in the alarm message. However, alarm conditions with the RO severity will not be displayed, the rec command, discussed later, must be used.

**Alarm Message**
MAJ, Multiple Rectifier Fail
MAJ, Multiple AC Fail
MAJ, Battery On Discharge
MAJ, High Voltage
MAJ, Sense Fuse
MAJ, Fuse Major
MAJ, Auxiliary Major
MAJ, Contactor 1 Open
MAJ, Contactor 1 Fail
MAJ, Major Communication Fail
MAJ, High Battery Current Shutdown
MAJ, Shorted Cell Detected
MAJ, Imminent Low V Shutdown
MAJ, Open String

MIN, Rectifier Fail
MIN, AC Fail
MIN, Thermal Probe Fail
MIN, Battery High Temp
MIN, Rect Redundancy Loss
MIN, High Battery Current
MIN, Minor Communication Fail
MIN, Circuit Pack Failure
MIN, Mid-cell V Monitor Fail

If no alarms are active "NO ACTIVE ALARMS" is reported.

| bye | Log-off |
|---|---|
| Syntax: | bye |

**Description**
This command is used to terminate the session.

| cha | Change Value |
|---|---|
| Syntax: | cha obj,attr=value<br>where: obj,attr is an object-attribute pair. For example, ps1,sid. |

**Description**
This command is used to change system configuration parameters. Examples are listed belowto illustrate how this command works.
cha ps1,sid="My Plant"Change the site id to My Plant
cha p1,phn="123456789"Change the primary phone number to 123456789
You must be logged in as a super-user to use this command.

| cle | Clear All Latched Events |
|---|---|
| Syntax: | cle |

**Description**

This command is used to clear latched events. These events include communication failures,missing rectifiers, missing thermal probes, missing voltage monitoring module, distribution fuses, and loss of redundancy alarm.
You must be logged in as a super-user to use this command.

| his | Report Alarm History |
|---|---|
| Syntax: | his |

**Description**

Syntaxhis
where: obj,attr is an object-attribute pair as defined in the following:sum dc1,adc- report plant load current statistics
sum br1,hbt- report highest battery temperature statistics

| his | Report Boost History |
|---|---|
| Syntax: | his bs1,stt |

**Description**

This command reports the boost history in the following format:
sum bs1,stt
30-MAY-03,15:11:12,RESUMED,COMPLETED,78
30-MAY-03,12:03:34,AUTO,DISCHARGE,14
**
This report gives the start date, start time, start reason, stop reason, and boost duration inminutes.
The start reasons are:
MANUALBoost initiated by user
AUTOBoost started automatically after a battery discharge RESUMEDBoost resumed after being suspended by a discharge
The stop reasons are:
COMPLETEDBoost completed normally
TIMEOUTBoost timed out before completing
DISCHARGEBoost suspended because of a battery discharge
CANCELEDBoost canceled by user
ALARMBoost cancelled by an alarm condition
DISABLEDAuto boost cancelled by being disabled

| his | Report BD History |
|---|---|
| Syntax: | dc1,bod |

**Description**

This command reports the battery discharge history in the following format:
his dc1,bod
30-MAY-03,15:11:12,MANUAL,COMPLETED,118.3,23,
01-APR-03,03:11:12,BD,COMPLETED,118.3,26,130
12-FEB-03,12:00:02,PERIODIC,COMPLETED,120.9,27,135
.
**
This report gives the start date, start time, start reason, current at start of discharge, durationin minutes, and, if calcu-lated, a reserve time prediction. The start reasons are:

MANUALDischarge test initiated by user
PERIODICPeriodic discharge test
BDNatural battery discharge

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The stop reasons are:
COMPLETEDDischarge completed normally
TIMEOUTAuto discharge test timed out
DISABLEDAuto discharge test disabled
ENDVDischarge test hit end voltage
CANCELEDDischarge test canceled by user

| lis | List Rectifiers |
|-----|-----------------|
| Syntax: | lis rec |

**Description**

This command is used to list all the rectifiers in the system. The command will list all presentand missing rectifiers. Missing rectifiers are rectifiers that have been removed from a shelf. The cle will clear missing rectifiers from the controller's memory and they will no longer be listed by this command. Return value for a system with 3 rectifiers on shelf 1 would look like the following:

* lis
rec
G11
G12
G13
.
* _

| login | Log-in |
|-------|--------|
| Syntax: | login "password" |

where password is either the user, super-user or administrator password

**Description**

This command is used to log-in as a user, super-user or administrator. For example, if you are currently logged into the controller as a user but would like to change the site id you must first use this command to log-in as a super-user. You must be logged in as an administrator in order to upgrade the software and change passwords

| ope | Operate a Control |
|-----|-------------------|
| Syntax: | ope obj,attr=value<br>where: obj,attr is an object-attribute pair. For example, dc1,pbt. |

**Description**

This command is used to operate a system control parameter. Examples are listed below toillustrate how this command works.
ope ps1,usl=1Update serial link
ope dc1,stt="boost" Place plant into boost mode

You must be logged in as a super-user to use this command.

| pas | Change Passwords |
|-----|------------------|
| Syntax: | pas t,"password","password"<br>where "t" is to change the user password, "s" to change the super-user password,and "a" to change the administrator password. password is the new password |

**Description**

This command changes either the user or super-user password. You must be logged in as a super-user to use this command. The password is sent twice in order to avoid mistakes. Thepassword must have at least 6 characters but no more than 15 characters.
You must be logged in as a super-user to use this command.

| sta | Report Status |
|---|---|
| Syntax: | sta obj,attr<br>where: obj,attr is an object-attribute pair. For example, ps1,sid. |

**Description**

This command reports the value of the measurement, configuration, or control parameters inthe system.  A couple examples are listed below to illustrate how this command works.

sta dc1,vdcReport plant voltage
sta dc1,adcReport plant load current

The command line would respond as follows for first command listed above.

* sta dc1,vdc
:DC1
VDC=-52.48
.
* _

The "* " in the example above is the user command line prompt.  The line ":DC1" indicates that the information that follows is for the plant object.  The line starting with "VDC" identifies the DC voltage. The "." line is the end-of-command identifier.

| sum | Report Statistics |
|---|---|
| Syntax: | sum obj,attr<br>where: obj,attr is an object-attribute pair defined by the following:sum dc1,adcReport plant load current statistics<br>sum br1,hbtReport highest battery temperature statistics<br>sum br1,amtReport ambient temperature statistics |

**Description**

This command reports the highest hourly a averages, highest hourly maximum, and thehighest hourly minimum statistics for plant load and highest battery temperature. The following is an example of a command response:

* sum dc1,adc
:DC1 ADCHHI=
30-MAY-03,12:03:00,127.3
14-FEB-03,11:15:37,126.9
24-DEC-03,02:30:13,126.2 LHI=
29-MAR-03,10:43:00,120.0
04-APR-03,11:15:53,121.1
21-SEP-03,07:13:10,124.3 HHA=
03-JAN-03,12:00:00,127.0
18-APR-03,11:00:00,126.5
21-OCT-03,02:00:00,126.1
.
*

The line ":DC1 ADC" indicates that the information that follows is for the plant load current.The "HHI=" indicates highest hourly instantaneous reading. The "LHI=" indicates highest hourly instantaneous reading. The "HHA=" indicates highest hourly average reading. The "." line is the end-of-command identifier. The "* " in the example above is the user command line prompt.

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| sum | Report Plant Load Trend Statistics |
|---|---|
| Syntax: | sum dct1 |

**Description**

This command reports the plant trend statistics, which includes up to 16 daily highest hourly and lowest hourly instantaneous readings, up to 32 daily maximum hourly averages, and up to13 monthly averages of the daily maximum hourly averages. The following is an example of a command response:

```
* sum dct1
:DCT1 SRC=DC1 ADC
CLR=01-JAN-2001,12:00:00DHI=
29-JAN-2002,02:00;00,123.2
30-JAN-2003,05:00:00,120.1
31-JAN-2003,14:00:00,122.8 DLI=
29-JAN-2002,12:00;00,120.9
30-JAN-2003,08:00:00,118.7
31-JAN-2003,01:00:00,119.2 DHH=
29-JAN-2002,02:00;00,122.1
30-JAN-2003,05:00:00,119.7
31-JAN-2003,14:00:00,121.6 MAV=
31-JAN-2003,23:00:00,121.3
.
*
```

The "DHI=" indicates daily highest hourly instantaneous reading. The "DLI=" indicates daily highest hourly instantaneous reading. The "DHH=" indicates daily highest hourly average reading. The "MAV=" indicates monthly average of daily highest hourly average reading. The "." line is the end-of-command identifier. The "* " in the example above is the user command line prompt.

| sum | Report Battery Discharge Statistics (Profile) |
|---|---|
| Syntax: | sum dc1,bod |

**Description**

This command reports the last battery discharge profile report. The report includes cleared date and time, start date and time, end date and time, duration in seconds, and up to 50 sample points. Each sample is time stamped in seconds. We compress the samples to derive aminimum set of data required to reconstruct the curve while retaining important coup de fouet minimum and maximum voltages and lowest voltage at end of discharge. The following is an example of a command response:

```
* sum dc1,bod
:DC1 BOD
CLR=29-JUN-04,10:27:11  BEG=30-JUN-04,10:38:36 END=30-
JUN-04,10:42:53DUR=256
VAL= 0,51.08
8,50.18
18,49.24
20,48.87
248,48.36
252,49.76
254,50.84
256,51.13
.
*
```

The "." line is the end-of-command identifier. The "* " in the example above is the user command line prompt.

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| GUI | Report GUI Compatibility |
|---|---|
| Syntax: | GUI |
| **Description** | |
| This command is for internal use only. It reports an EasyView compatibility number. The command response is: NE843GUI=1.0 | |

| ali | Special Internet Command |
|---|---|
| Syntax: | ali |
| **Description** | |
| This command is for internal use only. It exists for EasyView compatibility purposes only and does nothing. | |

## Error Messages

While logging into the controller or while entering commands, you may encounter one or more of the following error messages:

| Error Message | Description |
|---|---|
| !-112, SYNTAX ERROR | Unrecognizable command was entered. |
| !-220, SECURITY | Super-user command was entered by someone with user status. |
| !-221, EXCESSIVE LOGIN ATTEMPTS | Too many attempts were made to login with an unrecognized password. |
| !-223, INVALID PASSWORD | New password contains an illegal character. |
| !-224, NEW PASSWORD MISMATCH | First and second copy of new passwords don't match |
| !-304, INVALID PARAMETER | An attempt was made to change a parameter to an illegal value. |
| !-319, INVALID ATTRIBUTE | An invalid object id was specified in the command or, a command referred to an attribute that doesn't support it. |
| !-320, INVALID OBJECT | An invalid object id was specified in the command |
| !328, FEATURE DISABLED | An attempt was made to initiate a feature that is disabled. |
| !335, COULD NOT EXECUTE | Command could not execute because of active alarms or a conflicting operation. |

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# Appendix C: Battery Functions

## Float Mode

Float mode is the default operation mode of the power system. The system voltage, while in float mode, is determined by the configuration parameter Rectifier Float Set point (fsp) and may be adjusted by the Battery Thermal Compensation circuit, if active. No individual adjustment of plant rectifiers is necessary and load sharing among plant rectifiers is automatic in all plant modes and will take effect within several seconds of a new rectifier being added to the system.

The Rectifier Float Set point should be set per the battery manufacturer's recommendations. Note that the actual Rectifier Float Set point measured on the plant may differ from the value set by the user if battery thermal compensation (STC) is enabled.

## Slope Thermal Compensation

The following is a list of slope thermal compensation parameters that can be configured in the controller.

### High Temperature Alarm

Alarm threshold can be set from 30°C to 85°C. The alarm retires when the temperature drops to 10°C below the set threshold. The factory default setting is 55°C.

### High Temperature Compensation

The system controller automatically enables high temperature compensation if a VT thermal probe is detected. The feature can be disabled by disconnecting all thermal probes and updating the serial links using the Lamp Test function. Settings for this feature are as follows.

**V Step Down:** Battery step temperature can be set from 45°C to 85°C. The factory default setting is 75°C.

**High Comp Limit:** The upper temperature thermal limit can be set from 30°C to 55°C. The factory default setting is 45°C.

**Decrease:** The upper temperature slope setting (rate of decrease) can be set from -1mV to -10mV       in -.1mV steps. The factory default is -3mV.

**Nominal Temperature:** Temperature above or below which Slope Thermal Compensation is enabled. The stable range is 15 to 30°C. The factory default setting is 25°C.

The controller has a flexible Thermal Compensation feature which provides voltage compensation from that level established by the Plant Float Set-Point (fsp) or Boost Set-Point (bsp), dependent on the highest temperature monitored by the QS873A VT-Probes attached to the system batteries. Thermal Compensation should be used in a plant containing sealed or valve regulated maintenance free batteries. Note that Thermal Compensation is automatically enabled from the factory when
Valve-Regulated Lead Acid batteries are the system battery type. The feature is not automatically enabled upon detection of a VT-Probe. Refer to the Installation Instructions for more details on wiring and configuring this feature.

Thermal Compensation lowers plant voltage from the fsp for monitored battery temperatures which are above the ideal temperature established during configuration as the Battery Thermal Slope Nominal Temperature (ntt). (The items in parenthesis are the user configurable points referred to in the graph shown below.) Lowering the plant voltage helps to keep the batteries at their optimum state of charge while protecting them from thermal runaway.

Thermal runaway is a complex sealed battery phenomenon where, for one or more of a number of reasons, one or more cells in a string are unable to dissipate the internal heat generated by their charging current and experience an increase in internal temperature. By lowering the float voltage as cell temperature increases, the float current is lowered to a point where this destructive behavior can be avoided. If a cell failure is imminent and the cell temperature continues to rise above the threshold configured for Battery Thermal Step Temperature (stp), plant voltage drops in a single step to a level which keeps the remaining cells in the string from overcharging and being damaged. Refer to Figure C-1 for a graphical view of Battery Thermal Compensation and the relationship of its various set points.
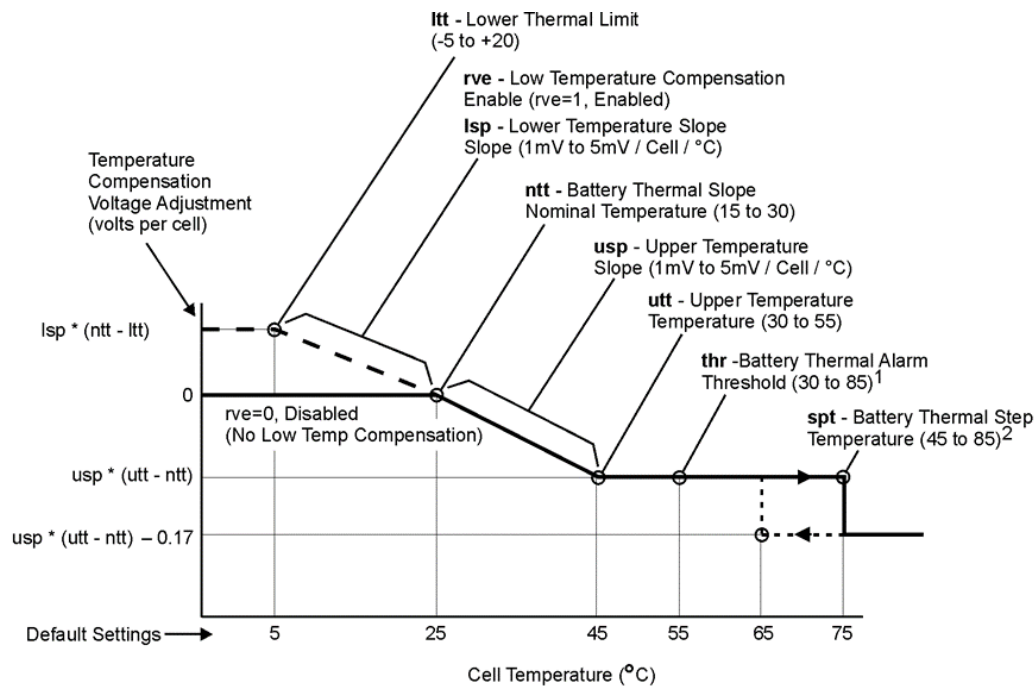


1. The Battery Thermal Alarm occurs when the temperature rises above the thr set point. It retires when the temperature decreases to 10°C below the thr set point (45°C default).

2. Plant voltage decreases an additional 0.17 volts per cell when the temperature increases above the spt set point. It is increased 0.17 volts per cell when the temperature decreases to 10°C below the spt set point, as indicated by the dashed line (65°C default).

**Figure C-1: Slope Thermal Compensation**

The following describes the configuration parameters which may be activated or altered by the user. Referto Appendix D for the ranges of values the parameters may take and their factory default settings.

**Lower Thermal Limit (ltt):** The lower temperature where, if Low Temperature Compensation is enabled, the controller will increase plant voltage to a level corresponding to (lsp * (ntt - ltt)* 24)V above the fsp. Plant voltage will be increased proportionally at any temperature between this point and the Battery Thermal Slope Nominal Temperature (ntt).

**Low Temperature Compensation Enable (rve):** A 0 disables and 1 enables the Low Temperature Thermal Compensation feature. Since rve increases plant voltage rather than decreasing it based on temperature,the option is provided to disable it separately from the entire feature so that equipment loads sensitive to high voltages can be protected.

**Lower Temperature Slope (lsp):** The slope rate for the voltage increase per cell when the battery temperature is below the ntt (Battery Thermal Slope Nominal Temperature).

**Battery Thermal Slope Nominal Temperature (ntt):** The zero compensation temperature point. Temperatures monitored between this point and the Upper Temperature Limit (utt) will result in a proportional decrease of plant voltage to a level corresponding to (usp*(utt-ntt)*24)V below the fsp at the utt. If Low Temperature Compensation is enabled, temperatures monitored between this point and the Lower Thermal Limit (ltt) will result in a proportional increase of plant voltage to a level corresponding to (lsp*(ntt-ltt)*24)V above the fsp at the ltt.

**Upper Temperature Slope (usp):** The slope rate for the voltage decrease per cell when the battery temperature is above the ntt (Battery Thermal Slope Nominal Temperature).

**Upper Temperature Limit (utt):** The upper temperature where Battery Thermal Compensation will have reduced plant voltage to a level corresponding to (usp*(utt-ntt)*24)V below the fsp. Plant voltage will be reduced proportionally at any temperature between this point and the Battery Thermal Slope Nominal Temperature (ntt).

**Battery Thermal Alarm Threshold (thr):** A monitored battery temperature above this threshold results in a Battery Thermal alarm with a PMN severity.

**Battery Thermal Step Temperature (spt):** A monitored battery temperature above this threshold results in an additional 4.08V step decrease in plant voltage

## Plant Battery Test

The following is a list of plant battery test parameters that can be configured in the controller. The result of the Plant Battery Test is available in the Batteries sub-menu of the Status menu.

**Manual Test:** Permits manually starting a battery discharge test. The test can be set to end on either of the following two parameters.

**Duration:** The duration of the test can be set from 0.1 hours to 99.9 hours.

**Cutoff Cell V:** The test can be set to end when battery cell voltage reaches this cutoff voltage. **Cutoff** voltage can be set from 1.5V to 2.0V.

**Automatic Test:** This utility offers the flexibility of running pre-programmed battery tests at specific times and days, and for specific durations.

**Automatic Test:** Enable or disable automatic periodic running of the battery test. The factory default setting is disabled.

**Interval:** The test interval (time between tests) can be set from 1 to 18 months in 1 month increments. The factory default setting is 12 months.

**Next Test**: Enter a particular day in dd-mm-yy format to automatically run the battery test on that day.

**Start Time:** Enter a particular time in hh-mm format to automatically run the battery test at that time. The setting can be configured from 0 to 23 hours. 00:00 is midnight.

**Hours from BD:** Time interval needed to elapse since the last Battery on Discharge alarm before a battery test can be performed. This can be set from 0 to 240 hours in 1 hour increments. The factory default setting is 72 hours.

**Recharge Amp Limit:** This section contains the settings for battery recharge current limit.

**Limit:** Enable or disable battery discharge current limiting.

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**Limit To:** Current limit setting, from 5A to 1000A. The factory default setting is 50A.

During this test, the controller lowers the rectifier voltage to 44V. (This value was chosen to be higher than 1.2V plus the highest possible LVD contactor disconnect threshold so as not to accidentally open the LVD contactor.) Lowering the rectifier output voltage to 44V creates a battery on discharge condition. If the batteries are present and healthy, the plant voltage will remain above 48V and the batteries will support the load. If the batteries are not present or are not able to support the load, the plant voltage will immediately drop to approximately 44V without any consequence to the load. The Battery on Discharge alarm is masked during this test.

The test is terminated by the occurrence of any of the following conditions:

- Initiating another Plant Battery Test. That is, once the test has been initiated, the test may be stopped by initiating another test either through the controller or by shorting pins 19 and 20 of the host interface connector.

- An alarm condition occurring. Any alarm condition that occurs during this test will result in the test being aborted regardless of whether the contact-closure exists between pins 19 and 20 of the host interface connector.

- The test has continued for over 100 minutes.

- The plant voltage has dropped below 44V. In this case, the system will abort the test and resume rectifier operation.

After the test has stopped, the plant will revert to the float mode. It may go to boost mode if the auto-boost feature has been enabled.

# Boost Mode

Boost charging is a feature of the controller, which allows the user to temporarily raise the plant voltage to a higher, predetermined level, thus, reducing the time needed to charge batteries. The system may manually be placed in the boost-mode through the front panel.

Note that the measured boost voltage may not exactly match the value chosen by the user if the thermal compensation feature is enabled. This is because the controller performs thermal compensated boost charging and will adjust the boost value based on the battery temperature per the slope chosen by the user.

The plant will exit the boost mode and enter the float mode if any of the following occurs:

- The current flowing into the battery string(s) is less than 5A

- The duration of boost mode charging has reached the configured duration time (1-80) hours

- The controller receives either a High-Voltage, Rectifier Fail alarm, or High-Battery Temperature alarms

- User sets the plant state to Float via the TI.

Once initiated, the boost mode may be exited by placing the Plant State to Float.

**Auto-Boost Charge**

This feature may be enabled from the TI. See Appendix B for details. When enabled, the plant enters the boost-charging mode of operation following a battery discharge once the BD alarm has been retired, provided the duration of the discharge was greater than 4 minutes. The controller will not enter the auto- boost-charging mode if the discharge duration was less than 4 minutes.

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When in auto-boost mode, the controller raises the plant voltage to the value selected by the user. The controller keeps the plant in this mode of operation for a minimum of 5 minutes.The exit conditions for the Auto-Boost Charge are the same as those for Boost Charge.

## Redundancy Loss Function

This feature must be enabled from the front panel. The controller determines the number of rectifiers present and compares the actual currents being drawn by the load to that produced by the total number of rectifiers less one. If the measured load current exceeds the N rectifier's capacity for over 1 min, the alarm condition is activated. The alarm condition is latched on until the Clear Events command is activated from the front panel.

This feature may be used by customers to determine if the load being served is greater than N rectifiers worth, in an N+1 system. That is, the load requirements have changed such that the power system is no longer operating as a redundant power system. An additional rectifier may be required to ensure continuous redundant operation.

If enabled, this feature will be disabled during battery discharge and recharge conditions. It will be enabled when the battery charging current falls below 5A.

## Battery Voltage Imbalance Detection

This feature requires the use of the ES771A Remote Voltage Monitoring Module. Note that this feature is automatically enabled if the controller detects the presence of the ES771A module. This module is to be placed in the electronics cabinet and utilizes the QS873A VT-Probes to measure the voltage of the battery string being monitored. The VT-Probe is to be placed on the negative battery terminal located in the middle of the battery string. The controller has data on the plant voltage; the half-string voltage measured from each monitored battery string is compared to the plant voltage minus the measured half-string voltage. If the comparison results in a difference of greater than 1.7V (or the configured value) for longer than 12 hours, the alarm is asserted. The alarm may be retired by initiating the Clear Events command from the front panel.

After this feature has been enabled, the system waits for 12 hours to ensure the battery strings are stable. A battery string is considered to be stable if the charging current is less than 3A. If a stable battery string yields a difference measurement greater than 1.7V (or the configured value) for over 12 continuous hours, a Battery Voltage Imbalance alarm is generated.

When the alarm is issued, the Float Set-Point (fsp) and the Battery On Discharge (BD) threshold values are reduced by fsp/Number of Cells per string. Once the alarm has been cleared by the Clear Events (CLE) command, the plant reverts to its normal Float Set-Point (fsp); however, the BD threshold is maintained at the new threshold for up to four minutes before reverting back to the old threshold. This is done to ensure the batteries have had enough time to charge up to the nominal fsp and to prevent any spurious BD alarm conditions.

This feature may be used by customers as part of their overall battery maintenance program in determining the health of battery strings. A voltage imbalance of 1.7V between half-string voltages may mean a shorted- cell, loose connection, or some other abnormality somewhere in the string. A service person should be sent out to the site and determine if the string should be replaced.

## Battery Recharge Current Limit

The battery recharge current limit feature enables the controller to limit the recharge current flowing into a battery section during the charge cycle. The recharge current flowing into the battery section can be limited to any value between 5A and 1000A.

Note that this feature will not have any impact on the current being delivered to the load. Further, there will be no effect on the discharge current flowing from the battery strings to the load during an ac fail condition. The controller will maintain the recharge current within 10% of the set level.

## Battery Parameter Defaults

The controller has been configured with battery specific defaults. These battery types are shown in the top portion of Table C-1 Supported Battery Types. The generic Valve –Regulated Lead Acid battery is the default battery type for this controller configuration. Battery models and their parameters can be added or adjusted in the field.

| Vendor | Battery Type | | String Or Battery Capacity 8hr rate(AH) |
|---|---|---|---|
| Generic | Valve-Reg | (VRLA) | 0 |
| Generic | Flooded | Flooded | 0 |
| Generic | Ni-Cd | | 0 |
| Generic | Li-LMP | | 0 |
| Generic | Li-ELiTE | | 63 |
| OmniOn Power | 12A100FT | (VRLA) | 96 |
| OmniOn Power | 12A150FT | (VRLA) | 145 |
| OmniOn Power | 12IR150/150LP | (VRLA) | 145 |
| Unigy | 3A125-33L | (VRLA) | 2000 |
| Unigy | 3A95-21L | (VRLA) | 950 |
| Unigy | 3A95-27L | (VRLA) | 1235 |
| Unigy | 3A95-33L | (VRLA) | 1520 |
| Unigy | 6A95-13L | (VRLA) | 570 |
| Unigy | 6A95-15L | (VRLA) | 665 |
| OmniOn Power | IR30EC | (VRLA) | 27 |
| OmniOn Power | IR40EC | (VRLA) | 35 |
| OmniOn Power | L54V63FTX | (Li-ELiTE) | 63 |
| Saft | NCX-125 | (NiCad) | 125 |
| Saft | NCX-80 | (NiCad) | 80 |
| North Star | NSB110FT | (VRLA) | 110 |
| North Star | NSB170FT | (VRLA) | 170 |
| North Star | NSB60FT | (VRLA) | 60 |
| Avestor | SE48S63 | (Li-LMP) | 63 |
| Avestor | SE48S80 | (Li-LMP) | 80 |
| C&D | TEL12-105F | (VRLA) | 100 |
| NA | None | | NA |

**Table C-1 Supported Battery Types**

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# Appendix D: Default Configurations

Table D-1 Standard Configuration Item Defaults provides the default settings for the configurable parameters and features that are associated in the controller. Also listed are the battery technologies and specific battery models included in the configuration file. Specific battery models assume the configuration defaults for their generic technology class except for a specific capacity and model name. The generic Valve Regulated Lead Acid battery type will be the factory default Battery Type selected and configured for the controller configuration. Changes to individual features, parameters, and thresholds for each battery type will be allowed in the field. These changes will be stored in non-volatile memory. However, if the Load Factory Defaults control/operation command is initiated, all assigned values shown in Table D-1 Standard Configuration Item Defaults and Table C-1 Supported Battery Types will be restored. The configurations made in the field will be lost.

There are four sections for determining the defaults for the standard configuration program file. These sections are Standard, 24V Battery, 48V Battery, and Alarms. This document will show four separate tables for these categories. In addition, the Excel spreadsheet is also attached.

The Standard section includes settings and thresholds independent of the primary output voltage of the system. Generally, these items are set using information that does not depend on the battery reserve system.

The 24V Battery section includes settings and thresholds that are generally dependent of the primary 24V output voltage of the system. Generally, these items are set using information that depends on the battery reserve system configured.

The 48V Battery section includes settings and thresholds that are generally dependent of the primary 48V output voltage of the system. Generally, these items are set using information that depends on the battery reserve system configured.

The Alarms section provides the assigned severities, alarm output relays, and LED assignments for the standard configuration.

This document will continue to be revised and updated as feedback and additional requirements come in from the field or as new configurable features and thresholds are added to the standard controller. Features, thresholds, and other configurable items not addressed in the list will remain at the factory default set for each respective item as defined in the standard product offering.   Note: Custom configurations can be made available through configuration of application or customer preferred defaults for the information in the following tables for certain application.

| Category | Description | Range | Factory | Factory 24V | Factory 48V | obj,attr |
|---|---|---|---|---|---|---|
| | | | **Factory Default** | **Factory 24V Rectifier Default** | **Factory 48V Rectifier Default** | |
| Controller | Site ID | ≤ 20 characters | "" | | | PS1,SID |
| | Site Description | ≤ 55 characters | "" | | | PS1,SDE |
| | Controller Description | Plant Description | "NE843A" | | | PS1,DES |
| | System Description | ≤ 55 characters | "Infinity NE" | | | PS1,SYS |
| | Plant Description | Plant Description | "H569-2448" | | | DC1,DES |
| | Plant Voltage Type | 24V or 48V | | "24V" | "48V" | DC1,TYP |
| | Automatic Daylight Savings Feature | 1=Enabled 0=Disabled | 1 | | | PS1,DLS |
| | Display Contrast | 0 to 100% | 50 | | | PS1,DCT |
| | Temperature Display Units | C or F | "C" | | | PS1,TUN |
| | Date Format | | "MM/DD/YYYY" | | | PS1,DTF |
| | Time Format | 12 or 24 | 12 | | | PS1,TMF |
| | Front Panel Configuration | 1=Enabled 0=Disabled | 1 | | | PS1,FPC |
| | Remote rectifier Off | 1=Enabled 0=Disabled | 0 | | | PS1,RRF |
| | Emergency Power-off Enable | 1=Enabled 0=Disabled | 1 | | | PS1,POE |
| | User Name Login Enable | 1=Enabled 0=Disabled | 0 | | | PS1,USR |
| | Front Panel PIN enable | 1=Enabled 0=Disabled | 0 | | | PS1,FPE |
| | Front Panel Pin Default | Four digits 0-9 | "0000" | | | PS1,FPP |
| | Front Panel PIN timeout | 1 to 120 minutes | 30 | | | PS1,FPT |
| | Daylight Saving Start | mon:wk:dow:min mon:-1:dom:min | "3:2:0:120" | | | PS1,DSS |
| | Daylight Saving End | mon:wk:dow:min mon:-1:dom:min | "11:1:0:120" | | | PS1,DSE |
| | Uninstall Equipment Timeout | 0 to 60s | 15 | | | PS1,UET |
| | Controller Ambient Temperature High | 35 to 75 ℃ | 75 | | | AMTH1,THR |
| | Controller Ambient Temperature Low | -40 to 10 C | -40 | | | AMTL1,THR |
| | Critical Equals Major | 1=Enabled 0=Disabled | 1 | | | PS1,CEM |
| | User Password | | "OmniOn Power" | | | PAS U, |
| | Super-user Password | | "super-user" | | | PAS S, |
| | Administrator Password | | "administrator" | | | PAS A, |
| Low Voltage Disconnects  Battery Disconnect1 | Battery Disconnect Control Mode | 0=none, 1=voltage 2=voltage/time | 1 | | | CN1,DAM |
| | Battery Disconnect Time Delay | 0 to 300 minutes | 0 | | | CN1,DDY |
| | Battery Reconnect Control Mode | 0=none, 1=voltage 2=voltage/time | 1 | | | CN1,RAM |
| | Battery Reconnect Time Delay | 0 to 300 sec | 0 | | | CN1,RDY |
| | Battery  Disconnect Description | <=32 Chars | "LVBD1" | | | CN1,DES |
| | Battery Disconnect Open Description | <=32 Chars | "LVBD1 Open" | | | CNO1,DES |
| | Battery Disconnect Open Front Panel Description | <=32 Chars | "LVBD1 Open" | | | CNO1,FDS |
| | Battery Disconnect Failed Description | <=32 Chars | "LVBD1 Failed" | | | CNF1,DES |
| | Battery Disconnect Failed Front Panel Description | <=32 Chars | "LVBD1 Failed" | | | CNF1,FDS |
| Load Disconnect 1 | Load 1 Disconnect | 1=Enabled 0=Disabled | 1 | | | CN2,ENA |

**Table D-1 Standard Configuration Item Defaults**

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| | Description | Range | Factory Default / Factory | Factory 24V Rectifier Default / Factory 24V | Factory 48V Rectifier Default / Factory48V | obj,attr |
|---|---|---|---|---|---|---|
| | Load 1 Disconnect Control Mode | 0=none, 1=voltage 2=voltage/time | 1 | | | CN2,DAM |
| | Load 1 Disconnect Voltage | 19.5 to 25V -39.0 to -50V | | 21.00 | 42.00 | CN2,DTH |
| | Load 1 Disconnect Time Delay | 0 to 300 minutes | 0 | | | CN2,DDY |
| | Load 1 Reconnect Control Mode | 0=none, 1=voltage 2=voltage/time | 1 | | | CN2,RAM |
| | Load 1 Reconnect Voltage | 19.5 to 27 -39.0 to -55.0V | | 22.00 | 44.00 | CN2,RTH |
| | Load 1 Reconnect Time Delay | 0 to 300 sec | 0 | | | CN2,RDY |
| | Load 1 Disconnect Description | <=32 Chars | "LVLD1" | | | CN2,DES |
| | Load 1 Disconnect Open Description | <=32 Chars | "LVLD1 Open" | | | CNO2,DES |
| | Load 1 Disconnect Open Front Panel Description | <=32 Chars | "LVLD1 Open" | | | CNO2,FDS |
| | Load 1 Disconnect Failed Description | <=32 Chars | "LVLD1 Failed" | | | CNF2,DES |
| | Load 1 Disconnect Failed Front Panel Description | <=32 Chars | "LVLD1 Failed" | | | CNF2,FDS |
| Load Disconnect 2 | LV Load 2 Disconnect | 1=Enabled 0=Disabled | 0 | | | CN3,ENA |
| | LV Load 2 Disconnect Control Mode | 0=none, 1=voltage 2=voltage/time | 1 | | | CN3,DAM |
| | LV Load 2 Disconnect Voltage | 19.5 to 25V -39.0 to -50V | | 21.00 | 42.00 | CN3,DTH |
| | LV Load 2 Disconnect Time Delay | 0 to 300 minutes | 0 | | | CN3,DDY |
| | LV Load 2 Reconnect Control Mode | 0=none, 1=voltage 2=voltage/time | 1 | | | CN3,RAM |
| | LV Load 2 Reconnect Voltage | 19.5 to 27 -39.0 to -55.0V | | 22.00 | 44.00 | CN3,RTH |
| | LV Load 2 Reconnect Time Delay | 0 to 300 sec | 0 | | | CN3,RDY |
| | Load 2 Disconnect Description | <=32 Chars | "LVLD2" | | | CN3,DES |
| | Load 2 Disconnect Open Description | <=32 Chars | "LVLD2 Open" | | | CNO3,DES |
| | Load 2 Disconnect Open Front Panel Description | <=32 Chars | "LVLD2 Open" | | | CNO3,FDS |
| | Load 2 Disconnect Failed Description | <=32 Chars | "LVLD2 Failed" | | | CNF3,DES |
| | Load 2 Disconnect Failed Front Panel Description | <=32 Chars | "LVLD2 Failed" | | | CNF3,FDS |
| Load Disconnect 3 | Load 3 Disconnect | 1=Enabled 0=Disabled | 0 | | | CN4,ENA |
| | Load 3 Disconnect Control Mode | 0=none, 1=voltage 2=voltage/time | 1 | | | CN4,DAM |
| | Load 3 Disconnect Voltage | 19.5 to 25V -39.0 to -50V | | 21.00 | 42.00 | CN4,DTH |
| | Load 3 Disconnect Time Delay | 0 to 300 minutes | 0 | | | CN4,DDY |
| | Load 3 Reconnect Control Mode | 0=none, 1=voltage 2=voltage/time | 1 | | | CN4,RAM |
| | Load 3 Reconnect Voltage | 19.5 to 27 -39.0 to -55.0V | | 22.00 | 44.00 | CN4,RTH |
| | Load 3 Reconnect Time Delay | 0 to 300 sec | 0 | | | CN4,RDY |
| | Load 3 Disconnect Description | <=32 Chars | "LVLD3" | | | CN4,DES |
| | Load 3 Disconnect Open Description | <=32 Chars | "LVLD3 Open" | | | CNO4,DES |
| | Load 3 Disconnect Open Front Panel Description | <=32 Chars | "LVLD3 Open" | | | CNO4,FDS |
| | Load 3 Disconnect Failed Description | <=32 Chars | "LVLD3 Failed" | | | CNF4,DES |
| | Load 3 Disconnect Failed Front Panel Description | <=32 Chars | "LVLD3 Failed" | | | CNF4,FDS |

| Category | Description | Range | Factory Default | Factory 24V Rectifier Default | Factory 48V Rectifier Default | |
|---|---|---|---|---|---|---|
| | | | Factory | Factory 24V | Factory 48V | obj,attr |
| Contactor Interfaces | ID1 Type | None/CN1/ CN2/CN3/CN4 | "CN1" | | | DCN01,TYP |
| | ID2 Type | None/CN1/ CN2/CN3/CN4 | "CN2" | | | DCN02,TYP |
| | ID3 Type | None/CN1/ CN2/CN3/CN4 | "CN3" | | | DCN03,TYP |
| | ID4 Type | None/CN1/CN2/CN3/CN4 | "CN4" | | | DCN04,TYP |
| | ID5 Type | None/CN1/ CN2/CN3/CN4 | "None" | | | DCN05,TYP |
| | ID6 Type | None/CN1/ CN2/CN3/CN4 | "None" | | | DCN06,TYP |
| | ID7 Type | None/CN1/CN2/CN3/CN4 | "None" | | | DCN07,TYP |
| | ID8 Type | None/CN1/ CN2/CN3/CN4 | "None" | | | DCN08,TYP |
| | Imminent LVBD Shutdown | 1=Enabled 0=Disabled | 0 | | | DC1,ISD |
| Rectifiers | Rectifier Redundancy Loss Enable | 1=Enabled 0=Disabled | 0 | | | GM1,RME |
| | Rectifier Loadshare Enable | 1=Enabled 0=Disabled | 1 | | | GM1,LSE |
| | Rectifier Float Current Limit | 30 to 100% | 100 | | | GM1,FCL |
| | Rectifier Boost Current Limit | 30 to 100% | 100 | | | GM1,BCL |
| | Group Standby/Sequencing Enable | 1=Enabled 0=Disabled | 0 | | | DC1,RSQ |
| | Remote rectifier Off Enable | 1=Enabled 0=Disabled | 0 | | | PS1,RRF |
| | Rectifier Redundancy Threshold | 1 to 80 | 1 | | | RLS1,THR |
| | Multiple Rectifier Fail | 2 to 88 | 2 | | | MFA1,THR |
| | Oring FET test enable | 1=Enabled 0=Disabled | 1 | | | GM1.OFT |
| | Efficiency Enable | 1=Enabled 0=Disabled | 1 | | | DC!,EME |
| | Efficiency Target | 20% to 95% | 70 | | | DC1,EMT |
| | Efficiency Rectifier Turn On Threshold | 25% to 100% | 76 | | | DC1,EMO |
| Converters | Converter Internal Selective High Output Voltage Shutdown | 25.0 to 30.0V 50.0 to 60.0V | | 58.0 | 29.0 | CP1,VSD |
| | High Output Voltage Major Alarm | 25.0 to 30.0V 50.0 to 60.0V | | 56.0 | 28.5 | CHVA1, THR |
| | High Output Voltage Minor Alarm | 24.0 to 30.0V 48.0 to 60.0V | | 54.0 | 27.0 | CHFV1,THR |
| | Output Voltage Set-Point | 23.0 to 27.2V 46.0 to 54.5V | | 52.0 | 26.0 | CP1,VSP |
| | Low Voltage Alarm | 20.0 to 27.0V 40.0 to 54.0V | | 46.0 | 23.0 | CVLA1,THR |
| | Converter Current Limit | 30 to 100% | 100 | | | CP1,CLM |
| | Converter Redundancy Loss Enable | 1=Enabled 0=Disabled | 0 | | | CP1,RME |
| | Remote converter Off Enable | 1=Enabled 0=Disabled | 0 | | | CP1,ROF |
| | Low Voltage Disconnect Input Threshold | 20.0 to 25.0V 40.0 to 50.0V | | 23.0 | 46.0 | CP1,DTH |
| | Low Voltage Reconnect Input Threshold | 22.0 to 27.0V 44.0 to 54.0V | | 25.0 | 50.0 | CP1,RTH |
| | Low Voltage Disconnect Enable | 1=Enabled 0=Disabled | 0 | | | CP1,LVD |
| | Converter Redundancy Threshold | 1 to 32 | 1 | | | CRL1,THR |
| | Multiple Converter Fail | 2 to 30 | 2 | | | CMFA1,THR |

**Table D-1 Standard Configuration Item Defaults**

Pulsar Plus_MAN

| | | | Factory Default | Factory 24V Rectifier Default | Factory 48V Rectifier Default | |
|---|---|---|---|---|---|---|
| Category | Description | Range | Factory | Factory 24V | Factory 48V | obj,attr |
| Battery Type Definitions | Battery 1 Type Description | <=32 chars | "Generic Valve-Reg Battery" | | | BT01,DES |
| | Battery 1 Type | | "Valve-Reg" | | | BT01,BTY |
| | Battery 1 Class | | "VALVE-REG" | | | BT01,BTC |
| | Battery 1 Capacity | | 0 | | | BT01,CAP |
| | Battery 2 Type Description | <=32 chars | "Generic Flooded Battery" | | | BT02,DES |

**Table D-1 Standard Configuration Item Defaults**

| | | | Factory Defaul | Factory 24V Rectifier Default | Factory 48V Rectifier Default | |
|---|---|---|---|---|---|---|
| Category | Description | Range | Factory | Factory 24V | Factory 48V | obj,attr |
| | Battery 2 Type | | "Flooded" | | | BT02,BTY |
| | Battery 2 Class | | "FLOODED" | | | BT02,BTC |
| | Battery 2 Capacity | | 0 | | | BT02,CAP |
| | Battery 3 Type Description | <=32 chars | "Generic NiCd Battery" | | | BT03,DES |
| | Battery 3 Type | | "NiCd" | | | BT03,BTY |
| | Battery3 Class | | "NICD" | | | BT03,BTC |
| | Battery 3 Capacity | | 0 | | | BT03,CAP |
| | Battery 4 Type Description | <=32 chars | "Generic Li-LMP Battery" | | | BT04,DES |
| | Battery 4 Type | | "Li-LMP" | | | BT04,BTY |
| | Battery 4 Class | | "LI-LMP" | | | BT04,BTC |
| | Battery 4 Capacity | | 63 | | | BT04,CAP |
| | Battery 5 Type Description | <=32 chars | "Generic Li-ELiTE Battery" | | | BT05,DES |
| | Battery 5 Type | | "Li-ELiTE" | | | BT05,BTY |
| | Battery 5 Class | | "LI-ELITE" | | | BT05,BTC |
| | Battery 5 Capacity | | 63 | | | BT05,CAP |
| | Battery 6 Type Description | <=32 chars | "OmniOn Power (408014140)" | | | BT06,DES |
| | Battery 6 Type | | "12A100FT" | | | BT06,BTY |
| | Battery 6 Class | | "VALVE-REG" | | | BT06,BTC |
| | Battery 6 Capacity | | 96 | | | BT06,CAP |
| | Battery 7 Type Description | <=32 chars | " OmniOn Power (408520655)" | | | BT07,DES |
| | Battery 7 Type | | "12A150FT" | | | BT07,BTY |
| | Battery 7 Class | | "VALVE-REG" | | | BT07,BTC |
| | Battery 7 Capacity | | 145 | | | BT07,CAP |

**Table D-1 Standard Configuration Item Defaults**

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| Category | Description | Range | Factory Default | | Factory 24V Rectifier Default | Factory 48V Rectifier Default | |
| | | | Factory | | Factory 24V | Factory 48V | obj,attr |
|---|---|---|---|---|---|---|---|
| | Battery 8 Type Description | <=32 chars | "OmniOn Power (408520663)" | | | | BT08,DES |
| | Battery 8 Type | | "12IR150/150LP" | | | | BT08,BTY |
| | Battery 8 Class | | "VALVE-REG" | | | | BT08,BTC |
| | Battery 8 Capacity | | 145 | | | | BT08,CAP |
| | Battery 9 Type Description | <=32 chars | "Unigy (408567044)" | | | | BT09,DES |
| | Battery 9 Type | | "3A125-33L" | | | | BT09,BTY |
| | Battery 9 Class | | "VALVE-REG" | | | | BT09,BTC |
| | Battery 9 Capacity | | 2000 | | | | BT09,CAP |
| | Battery 10 Type Description | <=32 chars | "Unigy (408545495)" | | | | BT10,DES |
| | Battery 10 Type | | "3A95-21L" | | | | BT10,BTY |
| | Battery 10 Class | | "VALVE-REG" | | | | BT10,BTC |
| | Battery 10 Capacity | | 950 | | | | BT10,CAP |
| | Battery 11 Type Description | <=32 chars | "Unigy (408545553)" | | | | BT11,DES |
| | Battery 11 Type | | "3A95-27L" | | | | BT11,BTY |
| | Battery 11 Class | | "VALVE-REG" | | | | BT11,BTC |
| | Battery 11 Capacity | | 1235 | | | | BT11,CAP |
| | Battery 12 Type Description | <=32 chars | "unigy (408545611)" | | | | BT12,DES |
| | Battery 12 Type | | "3A95-33L" | | | | BT12,BTY |
| | Battery 12 Class | | "VALVE-REG" | | | | BT12,BTC |
| | Battery 12 Capacity | | 1520 | | | | BT12,CAP |
| | Battery 13 Type Description | <=32 chars | "Unigy (408545693)" | | | | BT13,DES |
| | Battery 13 Type | | "6A95-13L" | | | | BT13,BTY |
| | Battery 13 Class | | "VALVE-REG" | | | | BT13,BTC |

**Table D-1 Standard Configuration Item Defaults**

| Category | Description | Range | Factory Default | | Factory 24V Rectifier Default | Factory 48V Rectifier Default | |
| | | | Factory | | Factory 24V | Factory 48V | obj,attr |
|---|---|---|---|---|---|---|---|
| | Battery 13 Capacity | | 570 | | | | BT13,CAP |
| | Battery 14 Type Description | <=32 chars | "Unigy (408545710)" | | | | BT14,DES |
| | Battery 14 Type | | "6A95-15L" | | | | BT14,BTY |
| | Battery 14 Class | | "VALVE-REG" | | | | BT14,BTC |
| | Battery 14 Capacity | | 665 | | | | BT14,CAP |
| | Battery 15 Type Description | <=32 chars | "OmniOn Power(407928761)" | | | | BT15,DES |
| | Battery 15 Type | | "IR30EC" | | | | BT15,BTY |
| | Battery 15 Class | | "VALVE-REG" | | | | BT15,BTC |
| | Battery 15 Capacity | | 27 | | | | BT15,CAP |

**Table D-1 Standard Configuration Item Defaults**

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| Category | Description | Range | Factory | Factory 24V | Factory 48V | obj,attr |
|---|---|---|---|---|---|---|
| | | | **Factory Default** | **Factory 24V Rectifier Default** | **Factory 48V Rectifier Default** | |
| | Battery 16 Type Description | <=32 chars | "OmniOn Power (407928753)" | | | BT16,DES |
| | Battery 16 Type | | "IR40EC" | | | BT16,BTY |
| | Battery 16 Class | | "VALVE-REG" | | | BT16,BTC |
| | Battery 16 Capacity | | 35 | | | BT16,CAP |
| | Battery 17 Type Description | <=32 chars | "OmniOn Power (CC408612792)" | | | BT17,DES |
| | Battery 17 Type | | "L54V63FTX" | | | BT17,BTY |
| | Battery 17 Class | | "LI-ELITE" | | | BT17,BTC |
| | Battery 17 Capacity | | 63 | | | BT17,CAP |
| | Battery 18 Type Description | <=32 chars | "Saft ()" | | | BT18,DES |
| | Battery 18 Type | | "NCX-125" | | | BT18,BTY |
| | Battery 18 Class | | "NICD" | | | BT18,BTC |
| | Battery 18 Capacity | | 125 | | | BT18,CAP |
| | Battery 19 Type Description | <=32 chars | "Saft (408539365)" | | | BT19,DES |
| | Battery 19 Type | | "NCX-80" | | | BT19,BTY |
| | Battery 19 Class | | "NICD" | | | BT19,BTC |
| | Battery 19 Capacity | | 80 | | | BT19,CAP |
| | Battery 20 Type Description | <=32 chars | "North Star (408508752)" | | | BT20,DES |
| | Battery 20 Type | | "NSB110FT" | | | BT20,BTY |
| | Battery 20 Class | | "VALVE-REG" | | | BT20,BTC |
| | Battery 20 Capacity | | 110 | | | BT20,CAP |
| | Battery 21 Type Description | <=32 chars | "North Star (408508760)" | | | BT21,DES |
| | Battery 21 Type | | "NSB170FT" | | | BT21,BTY |
| | Battery 21 Class | | "VALVE-REG" | | | BT21,BTC |
| | Battery 21 Capacity | | 170 | | | BT21,CAP |
| | Battery 22 Type Description | <=32 chars | "North Star (408503910)" | | | BT22,DES |
| | Battery 22 Type | | "NSB60FT" | | | BT22,BTY |
| | Battery 22 Class | | "VALVE-REG" | | | BT22,BTC |
| | Battery 22 Capacity | | 60 | | | BT22,CAP |
| | Battery 23 Type Description | <=32 chars | "Avestor (408531611)" | | | BT23,DES |
| | Battery 23 Type | | "SE48S63" | | | BT23,BTY |
| | Battery 23 Class | | "LI-LMP" | | | BT23,BTC |
| | Battery 23 Capacity | | 60 | | | BT23,CAP |
| | Battery 24 Type Description | <=32 chars | "Avestor (CC408574065)" | | | BT24,DES |
| | Battery 24 Type | | "SE48S80" | | | BT24,BTY |
| | Battery 24 Class | | "LI-LMP" | | | BT24,BTC |
| | Battery 24 Capacity | | 80 | | | BT24,CAP |
| | Battery 25 Type Description | <=32 chars | "C&D (408530167)" | | | BT25,DES |

**Table D-1 Standard Configuration Item Defaults**

Pulsar Plus_MAN                    Rev. 9.6

| Category | Description | Range | Factory Default — Factory | Factory 24V Rectifier — Factory 24V | Factory 48V Rectifier — Factory 48V | obj,attr |
|---|---|---|---|---|---|---|
| | Battery 25 Type | | "TEL12-105F" | | | BT25,BTY |
| | Battery 25 Class | | "VALVE-REG" | | | BT25,BTC |
| | Battery 25 Capacity | | 100 | | | BT25,CAP |
| Batteries | Number Of Battery Strings | 0 to 16 Strings | 0 | | | DC1,NST |
| | Battery Model | ≤ 14 Characters | "Valve-Reg" | | | DC1,BTY |
| Battery Discharge Test | Timed Test Duration | 0:0:0 to 23:59:59 | 4:00:00 | | | BR1,TMD |
| | Automatic Battery Test Feature | disabled, 20%, timed | "disabled" | | | BR1,BTE |
| | Automatic Test (AT) Interval | 1 to 18 Months | 12 | | | BR1,TIN |
| | Date For Next Automatic Test | yyyy-mm-dd | 1/1/2099 | | | BR1,ATD |
| | Start Time For Automatic Test | 0 to 23 | 0 | | | BR1,ATH |
| | Hours To Wait From Last BD Before AT | 0 to 240 hours | 72 | | | BR1,ATW |
| | Manual Test Type | disabled, 20%, timed | "disabled" | | | BR1,MTT |
| | Reserve Time Low (Full Capacity) | 0.0 to 99.9 hours | 0 | | | RTL1,THR |
| | Real-time Reserve Low (During BD) | 0.0 to 99.9 hours | 0 | | | RRTL1,THR |
| Battery Sections | String 1 contactor | CN1 to CN4 | "DCN01" | | | B01,CON |
| | String 1 Number of strings | 1 to 70 | 0 | | | B01,NST |
| | String 1 Battery type | | "VALVE-REG" | | | B01,BTY |
| | String 2 contactor | CN1 to CN4 | "DCN01" | | | B02,CON |
| | String 2 Number of strings | 1 to 70 | 0 | | | B02,NST |
| | String 2 Battery type | | "VALVE-REG" | | | B02,BTY |
| | String 3 contactor | CN1 to CN4 | "DCN01" | | | B03,CON |
| | String 3 Number of strings | 1 to 70 | 0 | | | B03,NST |
| | String 3 Battery type | | "VALVE-REG" | | | B03,BTY |
| Battery Boost | Boost Maximum Duration | 1 to 80 Hours | 1 | | | BS1,TMD |
| | Automatic Boost Feature | disabled, timed, or current | "disabled" | | | BS1,ATM |
| | Auto Boost BD Multiplication Factor | 0.1 to 9.0 | 0.5 | | | BS1,AMF |
| | Auto Boost Termination Current Threshold | 1 to 999A | 5 | | | BS1,CTA |
| Shunt Monitors | Plant Shunt Type | Battery/None /Load | "BATTERY" | | | DCMC1,TYP |
| | Plant Shunt Current Rating | 0 to 9999 Amps | 600 | | | DCMC1,SHA |
| | ID1 Type | Battery/None /Load | "BATTERY" | | | DCM01,TYP |
| | ID1 Shunt Current Rating | 0 to 9999 Amps | 300 | | | DCM01,SHA |
| | ID2 Type | Battery/None /Load | "NONE" | | | DCM02,TYP |
| | ID2 Shunt Current Rating | 0 to 9999 Amps | 300 | | | DCM02,SHA |
| | ID3 Type | Battery/None /Load | "NONE" | | | DCM03,TYP |
| | ID3 Shunt Current Rating | 0 to 9999 Amps | 600 | | | DCM03,SHA |
| | ID4 Type | Battery/None /Load | "NONE" | | | DCM04,TYP |
| | ID4 Shunt Current Rating | 0 to 9999 Amps | 600 | | | DCM04,SHA |
| | ID5 Type | Battery/None /Load | "NONE" | | | DCM05,TYP |
| | ID5 Shunt Current Rating | 0 to 9999 Amps | 600 | | | DCM05,SHA |
| | ID6 Type | Battery/None /Load | "NONE" | | | DCM06,TYP |
| | ID6 Shunt Current Rating | 0 to 9999 Amps | 600 | | | DCM06,SHA |

**Table D-1 Standard Configuration Item Defaults**

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| Category | Description | Range | Factory | Factory 24V | Factory 48V | obj,attr |
|---|---|---|---|---|---|---|
| | ID7 Type | Battery/None /Load | "NONE" | | | DCM07,TYP |
| | ID7 Shunt Current Rating | 0 to 9999 Amps | 600 | | | DCM07,SHA |
| | ID8 Type | Battery/None /Load | "NONE" | | | DCM08,TYP |
| | ID8 Shunt Current Rating | 0 to 9999 Amps | 600 | | | DCM08,SHA |
| | All Load Shunts Monitored | 1=Enabled 0=Disabled | 0 | | | DC1,MLS |
| Built-in Inputs | Input 1 Description | <=32 chars | "Fuse Alarm Major 24V" | | | IN001,DES |
| | Input 1 Type | | "FAJ1" | | | IN001,TYP |
| | Input 1 Active State | CLOSED=Battery,OPEN=No BAT | "CLOSED" | | | IN001,POL |
| | Input 2 Description | <=32 chars | "Fuse Alarm Major 48V" | | | IN002,DES |
| | Input 2 Type | | "FAJ2" | | | IN002,TYP |
| | Input 2 Active State | CLOSED=Battery,OPEN=No BAT | "CLOSED" | | | IN002,POL |
| | Input 3 Description | <=32 chars | "Auxiliary Major Alarm" | | | IN003,DES |
| | Input 3 Type | | "AMJ1" | | | IN003,TYP |
| | Input 3 Active State | CLOSED=Battery,OPEN=No BAT | "CLOSED" | | | IN003,POL |
| | Input 4 Description | <=32 chars | "Open String" | | | IN004,DES |
| | Input 4 Type | | "OSA1" | | | IN004,TYP |
| | Input 4 Active State | CLOSED=Battery OPEN=No BAT | "CLOSED" | | | IN004,POL |
| | Input 5 Description | <=32 chars | "Emergency Power Off" | | | IN005,DES |
| | Input 5 Type | | "REMLVD" | | | IN005,TYP |
| | Input 5 Active State | CLOSED=Closed to RTN, OPEN=Open to RTN | "CLOSED" | | | IN005,POL |
| | Input 6 Description | <=32 chars | "Group Standby/PBT" | | | IN006,DES |
| | Input 6 Type | | "" | | | IN006,TYP |
| | Input 6 Active State | CLOSED=Closed to RTN, OPEN=Open to RTN | "CLOSED" | | | IN006,POL |
| | Input 7 Description | <=32 chars | "Air Conditioner Fail" | | | IN007,DES |
| | Input 7 Type | | "AUX1" | | | IN007,TYP |
| | Input 7 Active State | CLOSED=Closed to RTN, OPEN=Open to RTN | "CLOSED" | | | IN007,POL |
| | Input 8 Description | <=32 chars | "Door Open" | | | IN008,DES |
| | Input 8 Type | | "AUX2" | | | IN008,TYP |
| | Input 8 Active State | CLOSED=Closed to RTN, OPEN=Open to RTN | "CLOSED" | | | IN008,POL |
| | Input 9 Description | <=32 chars | "High External Ambient" | | | IN009,DES |
| | Input 9 Type | | "AUX3" | | | IN009,TYP |
| | Input 9 Active State | CLOSED=Closed to RTN, OPEN=Open to RTN | "CLOSED" | | | IN009,POL |
| | Input 10 Description | <=32 chars | "Low External Ambient" | | | IN010,DES |
| | Input 10 Type | | "AUX4" | | | IN010,TYP |
| | Input 10 Active State | CLOSED=Closed to RTN, OPEN=Open to RTN | "CLOSED" | | | IN010,POL |

**Table D-1 Standard Configuration Item Defaults**

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| Category | Description | Range | Factory Default<br>Factory | Factory 24V Rectifier Default<br>Factory 24V | Factory 48V Rectifier Default<br>Factory 48V | obj,attr |
|---|---|---|---|---|---|---|
| Auxiliary Alarms | Auxiliary Alarm 1 Description | <=32 chars | "Air Conditioner Fail" | | | AUX1,DES |
| | Auxiliary Alarm 1 Front Panel Desc | <=24 chars | "Air Conditioner Fail" | | | AUX1,FDS |
| | Auxiliary Alarm 2 Description | <=32 chars | "Door Open" | | | AUX2,DES |
| | Auxiliary Alarm 2 Front Panel Desc | <=24 chars | "Door Open" | | | AUX2,FDS |
| | Auxiliary Alarm 3 Description | <=32 chars | "High External Ambient" | | | AUX3,DES |
| | Auxiliary Alarm 3 Front Panel Desc | <=24 chars | "High External Ambient" | | | AUX3,FDS |
| | Auxiliary Alarm 4 Description | <=32 chars | "Low External Ambient" | | | AUX4,DES |
| | Auxiliary Alarm 4 Front Panel Desc | <=24 chars | "Low External Ambient" | | | AUX4,FDS |
| | Auxiliary Alarm 5 Description | <=32 chars | "Fan Fail" | | | AUX5,DES |
| | Auxiliary Alarm 5 Front Panel Desc | <=24 chars | "Fan Fail" | | | AUX5,FDS |
| | Auxiliary Alarm 6 Description | <=32 chars | "Hydrogen Present" | | | AUX6,DES |
| | Auxiliary Alarm 6 Front Panel Desc | <=24 chars | "Hydrogen Present" | | | AUX6,FDS |
| Ringers | Ringer Output Voltage Set-Point | 65-100 VAC | 100 | | | RP1,VSP |
| | Ringer Output Frequency | 15-50Hz | 20 | | | RP1,FRQ |
| | Ringer DC Output Offset Feature | 1=Enabled/0=Disabled | 1 | | | RP1,OFE |
| | Ringer Redundancy Loss Feature | 1=Enabled/0=Disabled | 1 | | | RP1,RME |
| Alarm Test | Alarm Test Enable | 1=Enabled 0=Disabled | 1 | | | AT1,LTE |
| | Duration of Each Relay Closure | 5 to 300 sec | 30 | | | AT1,DUR |
| | PCR Relay Test Enable | 1=Enabled 0=Disabled | 1 | | | AT1,PCR |
| | PMJ Relay Test Enable | 1=Enabled 0=Disabled | 1 | | | AT1,PMJ |
| | PMN Relay Test Enable | 1=Enabled 0=Disabled | 1 | | | AT1,PMN |
| | R1 Relay Test Enable | 1=Enabled 0=Disabled | 1 | | | AT1,R1 |
| | R2 Relay Test Enable | 1=Enabled0=Disabled | 1 | | | AT1,R2 |
| | R3 Relay Test Enable | 1=Enabled 0=Disabled | 1 | | | AT1,R3 |
| | R4 Relay Test Enable | 1=Enabled 0=Disabled | 1 | | | AT1,R4 |
| | R5 Relay Test Enable | 1=Enabled 0=Disabled | 1 | | | AT1,R5 |
| | R6 Relay Test Enable | 1=Enabled 0=Disabled | 1 | | | AT1,R6 |
| | R7 Relay Test Enable | 1=Enabled 0=Disabled | 1 | | | AT1,R7 |
| | Buzzer Test Interval | 5-300sec | 10 | | | AT1,BZI |
| Alarm Cut-Off | Critical Alarm Cut-off Enable | 1=Enabled 0=Disabled | 1 | | | ACO1,CAE |
| | Critical Alarm Cut-off Timeout | 1 to 4 hours | 1 | | | ACO1,CTO |
| | Major Alarm Cut-off Enable | 1=Enabled 0=Disabled | 1 | | | ACO1,JAE |
| | Major Alarm Cut-off Timeout | 1 to 4 hours | 1 | | | ACO1,JTO |
| | Minor Alarm Cut-off Enable | 1=Enabled 0=Disabled | 1 | | | ACO1,NAE |
| | Minor Alarm Cut-off Timeout | 1 to 72 hours | 8 | | | ACO1,NTO |
| | Local Buzzer Enable | 1=Enabled 0=Disabled | 1 | | | ACO1,LBE |
| Communication Ports | Communication Port Type | LOCAL or MODEM | "LOCAL" | | | PS1,PTT |
| | Local Port Write Access | 1=Enabled 0=Disabled | 1 | | | LP1,WRE |
| | Local RS-232 baud rate | 2400/4800/9600/Auto | "AUTO" | | | LP1,BDR |

**Table D-1 Standard Configuration Item Defaults**

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| Category | Description | Range | Factory Default<br>Factory | Factory 24V Rectifier Default<br>Factory 24V | Factory 48V Rectifier Default<br>Factory 48V | obj,attr |
|---|---|---|---|---|---|---|
| | Local RS-232 handshaking (Flow Control) | No/SW/HW | "NO" | | | LP1,HSH |
| | Number of Local RS-232 data bits | 7,8 | 8 | | | LP1,DBT |
| | Local RS-232 parity | n,e,o | N | | | LP1,PRY |
| | Number of Local RS-232 stop bits | 1,2 | 1 | | | LP1,SBT |
| | Local RS-232 Time-out | 0-45 minutes | 5 | | | LP1,TMO |
| | Local RS-232 Application | TERMINAL, EVENT LOG | "TERMINAL" | | | LP1,APP |
| | Modem Port Write Access | 1=Enabled 0=Disabled | 1 | | | MP1,WRE |
| | Modem baud rate | 2400/4800/ 9600 | "2400" | | | MP1,BDR |
| | Number Of Modem data bits | 7,8 | 8 | | | MP1,DBT |
| | Modem parity | n,e,o | N | | | MP1,PRY |
| | Number Of Modem stop bits | 1,2 | 1 | | | MP1,SBT |
| | Modem Time-out | 0-45 minutes | 5 | | | MP1,TMO |
| | Modem initialization string | ≤ 20 Characters | "AT&FEV&C1S0=0H" | | | MP1,INS |
| | Modem number of rings before answering | 1 to 9 | 1 | | | MP1,NRG |
| | Modem handshaking (Flow Control) | No/SW/HW | "NO" | | | MP1,HSH |
| Network Port | DHCP | 0=static 1=client 2=server | 1 | | | NET1,DHCP |
| | Timeout | 0 to 45 minutes | 10 | | | NET1,TMO |
| | Network Port Write Access | 1=Enabled 0=Disabled | 1 | | | NET1,WRE |
| Standard Alarms | Alarm Delay | 0 to 9 minutes | 0 | | | SDA,DLY |
| | Notify On Occur | 1=Enabled 0=Disabled | 0 | | | SDA,NOO |
| | Notify On Retire | 1=Enabled 0=Disabled | 0 | | | SDA,NOR |
| | Nag On Occur | 1=Enabled 0=Disabled | 0 | | | SDA,NAG |
| | Notify Destination | | "" | | | SDA,DST |
| Single Threshold Alarms | Alarm Delay | 0 to 9 minutes | 0 | | | THA,DLY |
| | Notify On Occur | 1=Enabled 0=Disabled | 0 | | | THA,NOO |
| | Notify On Retire | 1=Enabled 0=Disabled | 0 | | | THA,NOR |
| | Nag On Occur | 1=Enabled 0=Disabled | 0 | | | THA,NAG |
| | Notify Destination | | "" | | | THA,DST |
| Dual Threshold Alarms | Alarm Delay | 0 to 9 minutes | 0 | | | DTA,DLY |
| | Notify On Occur | 1=Enabled 0=Disabled | 0 | | | DTA,NOO |
| | Notify On Retire | 1=Enabled 0=Disabled | 0 | | | DTA,NOR |
| | Nag On Occur | 1=Enabled 0=Disabled | 0 | | | DTA,NAG |
| | Notify Destination | | "" | | | DTA,DST |
| Alarm Call-Out | Nag Interval | 15 to 60 minutes | 15 | | | CM1,NGI |
| | Call-Out Destination Type | data or pager | "DATA" | | | COP,TYP |
| | Call-Out Phone Number | up to 25 Characters | "" | | | COP,PHN |
| | Call-Out Baudrate | 300, 1200, 2400, 4800, 9600, 19200 | 2400 | | | COP,BDR |
| | Call-out Data Bits | 7 or 8 | 8 | | | COP,DBT |

**Table D-1 Standard Configuration Item Defaults**

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| Category | Description | Range | Factory Default<br>Factory | Factory 24V Rectifier Default<br>Factory 24V | Factory 48V Rectifier Default<br>Factory 48V | obj,attr |
|---|---|---|---|---|---|---|
| | Call-Out Parity | n,e,o | N | | | COP,PRY |
| | Call-Out Stop Bits | 1 or 2 | 1 | | | COP,SBT |
| | Pager ID Delay | 0 to 9 seconds | 0 | | | COP,DLY |
| | Pager ID | up to 25 Characters | "" | | | COP,PGR |
| | Pager Message | up to 25 Characters | "" | | | COP,MSG |
| Periodic Dial-Out | Phone Number | up to 25 Characters | "" | | | PSO,PHN |
| | Baudrate | 300, 1200, 2400, 4800, 9600, 19200 | 2400 | | | PSO,BDR |
| | Data Bits | 7 or 8 | 8 | | | PSO,DBT |
| | Parity | n,e,o | N | | | PSO,PRY |
| | Stop Bits | 1 or 2 | 1 | | | PSO,SBT |
| | Interval | Sunday-Saturday, Daily, Monthly, Quarterly, Never | "Never" | | | PO1,INT |
| | Time | hh:mm | 6:00 | | | PSO,TIM |
| | Command Line 1 | <=40 characters | "" | | | PSO,CL01 |
| | Command Line 2 | <=40 characters | "" | | | PSO,CL02 |
| | Command Line 3 | <=40 characters | "" | | | PSO,CL03 |
| | Command Line 4 | <=40 characters | "" | | | PSO,CL04 |
| | Command Line 5 | <=40 characters | "" | | | PSO,CL05 |
| | Command Line 6 | <=40 characters | "" | | | PSO,CL06 |
| | Command Line 7 | <=40 characters | "" | | | PSO,CL07 |
| | Command Line 8 | <=40 characters | "" | | | PSO,CL08 |
| | Command Line 9 | <=40 characters | "" | | | PSO,CL09 |
| | Command Line 10 | <=40 characters | "" | | | PSO,CL10 |
| Alarm Email Notification | IP Address | | "" | | | COE,ADR |
| | Email Type | normal or pager | "NORMAL" | | | COE,TYP |
| Call-Back Security | Call-Back Security Enable | 1=Enabled 0=Disabled | 0 | | | CBS,STT |
| | Phone Number 1 | up to 25 Characters | "" | | | CBS,PH1 |
| | Baudrate 1 | 300, 1200, 2400, 4800, 9600, 19200 | 2400 | | | CBS,BR1 |
| | Phone Number 2 | up to 25 Characters | "" | | | CBS,PH2 |
| | Baudrate 2 | 300, 1200, 2400, 4800, 9600, 19200 | 2400 | | | CBS,BR2 |
| | Phone Number 3 | up to 25 Characters | "" | | | CBS,PH3 |
| | Baudrate 3 | 300, 1200, 2400, 4800, 9600, 19200 | 2400 | | | CBS,BR3 |
| | Phone Number 4 | up to 25 Characters | "" | | | CBS,PH4 |
| | Baudrate 4 | 300, 1200, 2400, 4800, 9600, 19200 | 2400 | | | CBS,BR4 |
| | Phone Number 5 | up to 25 Characters | "" | | | CBS,PH5 |
| | Baudrate 5 | 300, 1200, 2400, 4800, 9600, 19200 | 2400 | | | CBS,BR5 |
| SNMP Destination | IP Address | | "0.0.0.0" | | | SND,IP |

**Table D-1 Standard Configuration Item Defaults**

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| Category | Description | Range | Factory Default | Factory 24V Rectifier Default | Factory 48V Rectifier Default | obj,attr |
|---|---|---|---|---|---|---|
| | | | Factory | Factory 24V | Factory 48V | |
| TL1 Manager | Activate User Enable | 1=Enabled 0=Disabled | 0 | | | TLM,AUE |
| | CTS Detection Enable | 1=Enabled 0=Disabled | 0 | | | TLM,CTS |
| | DSR Detection Enable | 1=Enabled 0=Disabled | 0 | | | TLM,DSR |
| | Timeout | 0 to 60 minutes | 0 | | | TLM,TMO |
| | Port | 0 to 65535 | 2020 | | | TLM,PRT |

**Table D-1 Standard Configuration Item Defaults**

Pulsar Plus_MAN

**Table D-2 24V Battery Related Items Defaults**

| Category | Description | Range | Valve-Reg | Flooded | Li_ELiTE | NiCd | Li-LMP | obj,attr |
|---|---|---|---|---|---|---|---|---|
| Voltage Settings | Float Rectifier High Voltage Shutdown | 25 to 30V | 29.25 | 29.25 | 29.25 | 29.25 | 29.25 | GM1,FSD |
| | Float High Voltage Major Alarm | 25.74 to 31.75V | 28.24 | 28.24 | 28.24 | 28.24 | 28.24 | HVA1,FTH |
| | Float High Voltage Minor Alarm | 24.75 to 29.75V | 27.74 | 27.74 | 27.74 | 27.74 | 27.74 | HFV1,FTH |
| | Float Voltage | 21 to 28V | 27.24 | 26.04 | 27.24 | 27.20 | 27.24 | GM1,FSP |
| | Float Battery on Discharge Alarm | 23 to 28V | 25.54 | 25.00 | 26.50 | 25.54 | 25.54 | BDA1,FTH |
| | Very Low Voltage Alarm | 20 to 25.5V | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 | VLA1,THR |
| | Rectifier On Threshold | 20 to 25V | 22.00 | 22.00 | 22.00 | 22.00 | 22.00 | DC1,ROT |
| Battery Disconnect | LV Battery Disconnect | 1=Enabled 0=Disabled | 1 | 1 | 0 | 1 | 0 | CN1,ENA |
| | LV Battery Disconnect Voltage | 19.5 to 25V | 21.00 | 21.00 | 21.00 | 21.00 | 21.00 | CN1,DTH |
| | LV Battery Reconnect Voltage | 19.5 to 25V | 22.20 | 22.20 | 22.20 | 22.20 | 22.20 | CN1,RTH |
| Batteries | Cells Per String | 0-75 | 12 | 12 | 12 | 12 | 12 | DC1,CPS |
| | String End Of Discharge Voltage | 19.25 to 25.35 | 21.00 | 21.00 | 21.00 | 21.00 | 21.00 | BR1,CEV |
| | Recharge Current Limit Feature | 1=Enabled 0=Disabled | 0 | 0 | 0 | 0 | 0 | BR1,CLE |
| | Recharge Current Limit Value | 5 to 1000A | 50 | 50 | 25 | 25 | 25 | BR1,CLT |
| | Boost Maximum Duration | 1 to 80 Hours | 1 | 1 | 1 | 1 | 1 | BS1,TMD |
| | Voltage Imbalance Detect | 1.5V to 3.0V | 1.7 | 1.7 | 1.7 | 2.0 | 1.7 | BR1,SCV |
| | High Temperature Disconnect | 30 to 90°C | 75 | 75 | 75 | 75 | 75 | BR1,TTH |
| | High Battery Temperature | 30 to 85°C | 55 | 55 | 55 | 55 | 85 | BTHA1,THR |
| Battery Slope Compensation | Slope Thermal Compensation (STC) | 1=Enabled 0=Disabled | 1 | 0 | 0 | 0 | 0 | SC1,STT |
| | High Temperature Voltage Step Down | 45 to 85°C | 75 | 75 | 75 | 75 | 75 | SC1,SPT |
| | High Temperature Compensation Stop | 30 to 55°C | 55 | 55 | 55 | 55 | 55 | SC1,UTT |
| | High Temperature Decrease Rate | 1-10mV/°C per cell | 3 | 3 | 3 | 3 | 3 | SC1,USP |
| | Nominal Temperature (No Temp Comp) | 15 to 30 °C | 25 | 25 | 25 | 25 | 25 | SC1,NTT |
| | Low Temperature Compensation Feature | 1=Enabled 0=Disabled | 0 | 0 | 0 | 0 | 0 | SC1,RVE |
| | Low Temperature Compensation Stop | -5 to 20°C | 0 | 0 | 0 | 0 | 0 | SC1,LTT |
| | Low Temperature Decrease Rate | 1-10mV/°C per cell | 3 | 3 | 3 | 3 | 3 | SC1,LSP |
| Battery Discharge Test | Timed Test Alarm Voltage Threshold | 21 to 27V | 22.00 | 22.00 | 23.00 | 22.00 | 22.00 | BR1,TEV |
| | Rectifier Voltage During Battery Test | 21 to 26V | 21.00 | 21.00 | 21.00 | 21.00 | 21.00 | BR1,BTV |
| Battery Boost | Boost Rectifier High Voltage Shutdown | 26 to 30V | 29.25 | 29.25 | 29.25 | 29.25 | 29.25 | GM1,BSD |
| | Boost High Voltage Major Alarm | 25.75 to 31.75V | 28.24 | 29.00 | 28.24 | 28.24 | 28.24 | HVA1,BTH |
| | Boost High Voltage Minor Alarm | 25.75 to 31.75V | 27.74 | 28.00 | 27.74 | 27.74 | 27.74 | HFV1,BTH |
| | Boost Voltage | 22 to 30V | 27.24 | 26.04 | 27.24 | 27.20 | 27.24 | GM1,BSP |
| | Boost Battery on Discharge Alarm | 23 to 28V | 25.54 | 25.00 | 26.50 | 25.54 | 25.54 | BDA1,BTH |

**Table D-2 24V Battery Related Items Defaults**

Pulsar Plus_MAN Rev. 9.6

| Category | Description | Range | Valve-Reg | Flooded | Li_ELiTE | NiCd | Li-LMP | obj,attr |
|---|---|---|---|---|---|---|---|---|
| Voltage Settings | Rectifier Float Selective High Voltage Shutdown | -50 to -60V | 58.50 | 58.50 | 58.50 | 58.50 | 58.50 | GM1,FSD |
| | High Float Voltage Major Alarm | -50 to -60V | 57.00 | 57.00 | 57.00 | 57.00 | 57.00 | HVA1,FTH |
| | High Float Voltage Minor Alarm | -50 to -60V | 56.00 | 56.00 | 56.00 | 56.00 | 56.00 | HFV1,FTH |
| | Rectifier/System Float Voltage | -42 to -56.5V | 54.48 | 52.08 | 54.48 | 54.40 | 54.48 | GM1,FSP |
| | Battery on Discharge Float Alarm | -46 to -55V | 51.00 | 50.00 | 53.00 | 51.00 | 51.00 | BDA1,FTH |
| | Very Low Float Voltage Alarm | -40 to -51V | 46.00 | 46.00 | 46.00 | 46.00 | 46.00 | VLA1,THR |
| | Rectifier On Threshold | -40 to -51V | 44.00 | 44.00 | 44.00 | 44.00 | 44.00 | DC1,ROT |
| Battery Disconnect | LV Battery Disconnect | 1=Enabled 0=Disabled | 1 | 1 | 0 | 1 | 0 | CN1,ENA |
| | LV Battery Disconnect Voltage | -39.0 to -50V | 42.00 | 42.00 | 42.00 | 42.00 | 42.00 | CN1,DTH |
| | LV Battery Reconnect Voltage | -39.0 to -55V | 48.00 | 48.00 | 48.00 | 48.00 | 48.00 | CN1,RTH |
| Batteries | Cells Per String | 0 to 75 | 24 | 24 | 24 | 24 | 24 | DC1,CPS |
| | String End Of Discharge Voltage | -40.25 to -48.75V | 42.00 | 42.00 | 42.00 | 42.00 | 42.00 | BR1,CEV |
| | Recharge Current Limit Feature | 1=Enabled 0=Disabled | 0 | 0 | 0 | 0 | 0 | BR1,CLE |
| | Recharge Current Limit Value | 5 to 1000A | 50 | 50 | 25 | 25 | 25 | BR1,CLT |
| | Boost Maximum Duration | 1 to 80 Hours | 1 | 1 | 1 | 1 | 1 | BS1,TMD |
| | Voltage Imbalance Detect | 1.5V to 3.0V | 1.7 | 1.7 | 1.7 | 2.0 | 1.7 | BR1,SCV |
| | High Temperature Battery Disconnect | 30 to 90°C | 75 | 75 | 75 | 75 | 75 | BR1,TTH |
| | High Battery Temperature | 30 to 85°C | 55 | 55 | 55 | 55 | 85 | BTHA1,THR |
| Battery Slope Compensation | Slope Thermal Compensation (STC) | 1=Enabled 0=Disabled | 1 | 0 | 0 | 0 | 0 | SC1,STT |
| | High Temperature Voltage Step Down | 45 to 85°C | 75 | 75 | 75 | 75 | 75 | SC1,SPT |
| | High Temperature Compensation Stop | 30 to 55°C | 55 | 55 | 55 | 55 | 55 | SC1,UTT |
| | High Temperature Decrease Rate | 1-10mV/°C per cell | 3 | 3 | 3 | 3 | 3 | SC1,USP |
| | Nominal Temperature (No Temp Comp) | 15 to 30 °C | 25 | 25 | 25 | 25 | 25 | SC1,NTT |
| | Low Temperature Compensation Feature | 1=Enabled 0=Disabled | 0 | 0 | 0 | 0 | 0 | SC1,RVE |
| | Low Temperature Compensation Stop | -5 to 20°C | 0 | 0 | 0 | 0 | 0 | SC1,LTT |
| | Low Temperature Decrease Rate | 1-10mV/°C per cell | 3 | 3 | 3 | 3 | 3 | SC1,LSP |
| Battery Discharge Test | Timed Test Alarm Voltage Threshold | -36 to -48V | 44.00 | 44.00 | 46.00 | 44.00 | 44.00 | BR1,TEV |
| | Rectifier Voltage During Battery Test | -42.00 to -52V | 42.00 | 42.00 | 42.00 | 42.00 | 42.00 | BR1,BTV |
| Battery Boost | Boost Rectifier High Voltage Shutdown | -52 to -60V | 58.50 | 58.50 | 58.50 | 58.50 | 58.50 | GM1,BSD |
| | Boost High Voltage Major Alarm | -50 to -60V | 57.0 | 58.5 | 57.0 | 57.0 | 57.0 | HVA1,BTH |
| | Boost High Voltage Minor Alarm | -50 to -60V | 56.0 | 58.0 | 56.0 | 56.0 | 56.0 | HFV1,BTH |
| | Boost Voltage | -48 to -58V | 55.2 | 57.0 | 54.5 | 54.4 | 54.5 | GM1,BSP |
| | Boost Battery on Discharge Alarm | -46 to -55V | 51.0 | 50.0 | 53.0 | 51.0 | 51.0 | BDA1,BTH |

**Table D-3 48V Battery Related Items Defaults**

Pulsar Plus_MAN    Rev. 9.6

# Appendix E: Alarms and Relays

## Alarm Relays

The control unit is provided with ten alarm relays; seven to provide the actual alarm condition, and three to provide the severity associated with the alarm. The severity relays transmit Power Critical (PCR), Power Major (PMJ), or Power Minor (PMN). Each alarm is factory assigned a severity based on industry practices. However, they may be reassigned to PCR, MAJ, MIN, or RO (Record Only). An alarm condition with the RO severity results in the system controller transmitting the alarm without the severity but is stored in the history log. PCR, PMJ nor PMN are transmitted with the alarm.

The seven selectable alarm relays are called User Alarm Relay 1 (R1) through User Alarm Relay 7 (R7). Relays are user definable in that the user may assign any combination of alarms from a given set of alarms. The following table shows which alarms may be assigned along with their factory default settings.

## Alarms

Table E-1 shows a list of all alarms along with their descriptions, default settings, ranges and/or severity, and affected alarm relays and LEDs

| Description | Severity - Relay and Display | | | | | Additional Relay | | | | | | | LED | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | CRIT | PMJ | PMN | WRN | RO | R1 | R2 | R3 | R4 | R5 | R6 | R7 | AC | DC | BD | Object ID |
| AC Fail | | | MIN | | | | | | R4 | | | | AC | | | ACF1 |
| Alarm Cut-off Active | | | | | RO | | | | | | | | | | | AAC1 |
| Alarm Test Aborted | | | | | RO | | | | | | | | | | | ATB1 |
| Alarm Test Active | | | | | RO | | | | | | | | | | | ATA1 |
| Auxiliary 1 | | MAJ | | | | | | | | | | | | | | AUX1 |
| Auxiliary 2 | | MAJ | | | | | | | | | | | | | | AUX2 |
| Auxiliary 3 | | MAJ | | | | | | | | | | | | | | AUX3 |
| Auxiliary 4 | | MAJ | | | | | | | | | | | | | | AUX4 |
| Auxiliary 5 | | MAJ | | | | | | | | | | | | | | AUX5 |
| Auxiliary 6 | | MAJ | | | | | | | | | | | | | | AUX6 |
| Auxiliary 7 | | MAJ | | | | | | | | | | | | | | AUX7 |
| Auxiliary 8 | | MAJ | | | | | | | | | | | | | | AUX8 |
| Auxiliary 9 | | MAJ | | | | | | | | | | | | | | AUX9 |
| Auxiliary 10 | | MAJ | | | | | | | | | | | | | | AUX10 |
| Auxiliary 11 | | MAJ | | | | | | | | | | | | | | AUX11 |
| Auxiliary 12 | | MAJ | | | | | | | | | | | | | | AUX12 |
| Auxiliary Major Alarm | | MAJ | | | | | | | | | | | | | | AMJ1 |
| Battery Test Active | | | | | RO | | | | | | | | | | BD | BTA1 |
| Battery on Discharge (Float and Boost) | | MAJ | | | | R1 | | | | | | | | | BD | BDA1 |
| Battery Thermal alarm | | | MIN | | | | | | | | | | | | | BTHA1 |
| Check Battery | | | MIN | | | | | | | | | | | | | BFA1 |
| Clock Battery Low | | | MIN | | | | | | | | | | | | | BBL1 |
| Clock Changed | | | | | RO | | | | | | | | | | | CLC1 |
| Communication Loss Major | | MAJ | | | | | | | | | | | | | | MCM1 |
| Communication Loss Minor | | | MIN | | | | | | | | | | | | | CMA1 |
| Configuration Changed | | | | | RO | | | | | | | | | | | CCH1 |

**Table E-1 Alarms, Alarm Relays and LEDs Assignments – Pulsar Display**

| Description | Severity - Relay and Display | | | | | Additional Relay | | | | | | | LED | | | Object ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CRIT | PMJ | PMN | WRN | RO | R1 | R2 | R3 | R4 | R5 | R6 | R7 | AC | DC | BD | |
| Controller Ambient Temperature High | | | MIN | | | | | | | | | | | | | AMTH1 |
| Controller Ambient Temperature Low | | | MIN | | | | | | | | | | | | | AMTL1 |
| Controller Fail (Not user mappable) | x | x | | x | | | | | | | | | | | | |
| Converter Distribution Fuse | | MAJ | | | | | | | | | | | | DC | | CDFA1 |
| Converter Fail | | | MIN | | | | | | | R5 | | | | | | CFA1 |
| Converter Fan Major | | MAJ | | | | | | | | R5 | | | | | | CFJ1 |
| Converter Fan Minor | | | MIN | | | | | | | R5 | | | | | | CFN1 |
| Converter Low Voltage | CRIT | | | | | | R2 | | | | | | | | | CVLA1 |
| Converter High Voltage Major | | MAJ | | | | | | | | | | R7 | | | | CHVA1 |
| Converter High Voltage Minor | | | MIN | | | | | | | | | R7 | | | | CHFV1 |
| Converter ID Conflict | | MAJ | | | | | | | | | | | | | | CDID1 |
| Converter Redundancy Loss | | | MIN | | | | | | | R5 | | | | | | CRL1 |
| Defective Temp Probe | | | MIN | | | | | | | | | | | | | TPA1 |
| Emergency Power Off (EPO) | | MAJ | | | | | | | | | | | | | | EPO1 |
| Energy Management Disabled | | | | WRN | | | | | | | | | | | | EMD1 |
| Excessive Login Attempts | | | | WRN | | | | | | | | | | | | EXL1 |
| External Password Reset | | | | WRN | | | | | | | | | | | | EPR1 |
| Fuse Major 24 | | MAJ | | | | | | R3 | | | | | | DC | | FAJ1 |
| Fuse Major 48 | | MAJ | | | | | | R3 | | | | | | DC | | FAJ2 |
| Fuse Minor 24 | | | MIN | | | | | R3 | | | | | | DC | | FAN1 |
| Fuse Minor 48 | | | MIN | | | | | R3 | | | | | | DC | | FAN2 |
| Generator Requires Maintenance | | MAJ | | | | | | | | | | | | | | GNM1 |
| Generator Running | | | MIN | | | | | | | | | | | | | GNR1 |
| High Voltage Major | | MAJ | | | | | | | | | | R7 | | | | HVA1 |
| High Voltage Minor | | | MIN | | | | | | | | | R7 | | | | HFV1 |
| History Cleared | | | | | RO | | | | | | | | | | | HCL1 |
| ID Conflict | | MAJ | | | | | | | | | | | | | | DID1 |
| ID Not Configured | | MAJ | | | | | | | | | | | | | | ZID1 |
| Imminent LVBD Shutdown | | MAJ | | | | | | | | | | | | DC | | ISD1 |
| Incompatible Converter | | | MIN | | | | | | | | | | | | | ICC1 |
| Incompatible Rectifier | | | MIN | | | | | | | | | | | | | ICR1 |
| Low Battery Temperature | | | | | RO | | | | | | | | | | | BTLA1 |
| LV Disconnect Contactor 1 Fail | | MAJ | | | | | | | | | | | | | | CNF1 |
| LV Disconnect Contactor 1 Open | | MAJ | | | | | | | | | | | | DC | | CNO1 |
| LV Disconnect Contactor 2 Fail | | MAJ | | | | | | | | | | | | | | CNF2 |
| LV Disconnect Contactor 2 Open | | MAJ | | | | | | | | | | | | | | CNO2 |
| LV Disconnect Contactor 3 Fail | | MAJ | | | | | | | | | | | | | | CNF3 |
| LV Disconnect Contactor 3 Open | | MAJ | | | | | | | | | | | | | | CNO3 |
| LV Disconnect Contactor 4 Fail | | MAJ | | | | | | | | | | | | | | CNF4 |
| LV Disconnect Contactor 4 Open | | MAJ | | | | | | | | | | | | | | CNO4 |
| Manual Off | | | MIN | | | | | | | R5 | | | | | | MAN1 |
| Multiple AC Fail | | MAJ | | | | | | | | | R6 | | AC | | | MACF1 |
| Multiple Converter Fail | | MAJ | | | | | | | | | R6 | | | | | CMFA1 |
| Multiple Manual Off | | MAJ | | | | | | | | | R6 | | | | | MMAN1 |
| Multiple Rectifier Fail | | MAJ | | | | | | | | | R6 | | | | | MFA1 |
| No Call-Out Response | | | | WRN | | | | | | | | | | | | COR1 |

**Table E-1 Alarms, Alarm Relays and LEDs Assignments – Pulsar Display**

| Description | Severity - Relay and Display | | | | | Additional Relay | | | | | | | LED | | | Object ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CRIT | PMJ | PMN | WRN | RO | R1 | R2 | R3 | R4 | R5 | R6 | R7 | AC | DC | BD | |
| No Dial-Out Response | | | | WRN | | | | | | | | | | | | POR1 |
| Open String | | MAJ | | | | | | | | | | | | DC | | OSA1 |
| Password At Default | | | | | RO | | | | | | | | | | | PFD1 |
| Processor Halt | | | | | RO | | | | | | | | | | | PHT1 |
| Program Line Invalid | | MAJ | | | | | | | | | | | | | | PGI1 |
| Queue Overflow | | | | WRN | | | | | | | | | | | | COF1 |
| Real-Time Reserve Time Low | | | | | RO | | | | | | | | | | | RRTL1 |
| Rectifier Current Limit | | | | | RO | | | | | | | | | | | CLM1 |
| Rectifier Fail | | | MIN | | | | | | | R5 | | | | | | RFA1 |
| Rectifier Fan Fail | | | MIN | | | | | | | R5 | | | | | | RFN1 |
| Rectifier Redundancy Loss | | | MIN | | | | | | | R5 | | | | | | RLS1 |
| Reserve Time Low | | | | | RO | | | | | | | | | | | RTL1 |
| Ringer External Failure Major | | MAJ | | | | | | | | | | | | | | RPXJ1 |
| Ringer External Failure Minor | | | MIN | | | | | | | | | | | | | RPXN1 |
| Ringer Fail Major | | MAJ | | | | | | | | | | | | | | RPFJ1 |
| Ringer Fail Minor | | | MIN | | | | | | | | | | | | | RF1 |
| Ringer Fan Fail | | | MIN | | | | | | | | | | | | | RPFF1 |
| Ringer ID Conflict | | MAJ | | | | | | | | | | | | | | RCDP1 |
| Ringer Redundancy Loss | | | MIN | | | | | | | | | | | | | RPRL1 |
| Self Test Failed | | | MIN | | | | | | | | | | | | | STF1 |
| Sense Fuse | | | MIN | | | | | | | | | | | | | VSF1 |
| Thermal Probe Failure | | | MIN | | | | | | | | | | | | | TPA1 |
| Unconfigured Alarm Destination | | | | WRN | | | | | | | | | | | | NNC1 |
| Un-powered Controller (Not configurable) | x | x | | | x | x | x | x | | | | x | | | | |
| Very High Battery Temperature | | | | | RO | | | | | | | | | | | BTVH1 |
| Very Low Battery Temperature | | | | | RO | | | | | | | | | | | BTVL1 |
| Very Low Voltage | CRIT | | | | | | R2 | | | | | | | | | VLA1 |
| Voltage Duplicate ID | | MAJ | | | | | | | | | | | | | | MDP1 |
| Voltage ID Not Configured | | MAJ | | | | | | | | | | | | | | MZD1 |
| Voltage Imbalance Detect | | | MIN | | | | | | | | | | | | | SCD1 |
| Voltage Monitoring Module Failure | | | MIN | | | | | | | | | | | | | VMF1 |

**Table E-1 Alarms, Alarm Relays and LEDs Assignments – Pulsar Display**

| Description | Severity - Relay and Display | | | | | Additional Relay | | | | | | | LED | Object ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CRIT | PMJ | PMN | WRN | RO | R1 | R2 | R3 | R4 | R5 | R6 | R7 | | |
| AC Fail | | | PMN | | | R1 | | | | | | | ACF | ACF1 |
| Alarm Cut-off Active | | | | | RO | | | | | | | | ACO | AAC1 |
| Alarm Test Aborted | | | | | RO | | | | | | | | | ATB1 |
| Alarm Test Active | | | | | RO | | | | | | | | | ATA1 |
| Auxiliary 1 | | MAJ | | | | | | | | | | | | AUX1 |
| Auxiliary 2 | | MAJ | | | | | | | | | | | | AUX2 |
| Auxiliary 3 | | MAJ | | | | | | | | | | | | AUX3 |
| Auxiliary 4 | | MAJ | | | | | | | | | | | | AUX4 |
| Auxiliary 5 | | MAJ | | | | | | | | | | | | AUX5 |

**Table E-2 Alarms, Alarm Relays and LEDs Assignments – Phoenix Display**

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| Description | Severity - Relay and Display | | | | | Additional Relay | | | | | | | LED | Object ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CRIT | PMJ | PMN | WRN | RO | R1 | R2 | R3 | R4 | R5 | R6 | R7 | | |
| Auxiliary 6 | | MAJ | | | | | | | | | | | | AUX6 |
| Auxiliary 7 | | MAJ | | | | | | | | | | | | AUX7 |
| Auxiliary 8 | | MAJ | | | | | | | | | | | | AUX8 |
| Auxiliary 9 | | MAJ | | | | | | | | | | | | AUX9 |
| Auxiliary 10 | | MAJ | | | | | | | | | | | | AUX10 |
| Auxiliary 11 | | MAJ | | | | | | | | | | | | AUX11 |
| Auxiliary 12 | | MAJ | | | | | | | | | | | | AUX12 |
| Auxiliary Major Alarm | | MAJ | | | | | | R3 | | | | | DFA | AMJ1 |
| Battery Test Active | | | | | RO | | R2 | | | | | | BOD | BTA1 |
| Battery on Discharge (Float and Boost) | | MAJ | | | | | R2 | | | | | | BOD | BDA1 |
| Check Battery | | | MIN | | | | | | | | | | | BFA1 |
| Real Time Clock Battery Low | | | MIN | | | | | | | | | | | BBL1 |
| Clock Changed | | | | | RO | | | | | | | | | CLC1 |
| Communication Loss Major | | MAJ | | | | | | | | | | | | MCM1 |
| Communication Loss Minor | | | MIN | | | | | | | | | | | CMA1 |
| Configuration Changed | | | | | RO | | | | | | | | | CCH1 |
| Controller Ambient Temperature High | | | MIN | | | | | | | | | | TEMP | AMTH1 |
| Controller Ambient Temperature Low | | | MIN | | | | | | | | | | TEMP | AMTL1 |
| Controller Fail (Not user mappable) | | x | x | | x | | | | | | | | | |
| Converter Distribution Fuse | | MAJ | | | | | | R3 | | | | | DFA | CDFA1 |
| Converter Fail | | MAJ | | | | | | | | | | R7 | CFA | CFA1 |
| Converter Fan Minor | | | MIN | | | | | | | | | R7 | CFA | CFN1 |
| Converter Low Voltage | CRIT | | | | | | | | | | | R7 | CFA | CVLA1 |
| Converter High Voltage Major | | MAJ | | | | | | | | | | R7 | CFA | CHVA1 |
| Converter High Voltage Minor | | | MIN | | | | | | | | | R7 | CFA | CHFV1 |
| Converter ID Conflict | | MAJ | | | | | | | | | | R7 | | CDID1 |
| Converter Redundancy Loss | | MAJ | | | | | | | | | | R7 | CFA | CRL1 |
| Defective Temp Probe | | | MIN | | | | | | | | | | | TPA1 |
| Emergency Power Off (EPO) | | MAJ | | | | | | | | | | | | EPO1 |
| Energy Management Disabled | | | | WRN | | | | | | | | | | EMD1 |
| Excessive Login Attempts | | | | WRN | | | | | | | | | | EXL1 |
| External Password Reset | | | | WRN | | | | | | | | | | EPR1 |
| Fuse Major 24 | | MAJ | | | | | | R3 | | | | | DFA | FAJ1 |
| Fuse Major 48 | | MAJ | | | | | | R3 | | | | | DFA | FAJ2 |
| Fuse Minor 24 | | | MIN | | | | | R3 | | | | | DFA | FAN1 |
| Fuse Minor 48 | | | MIN | | | | | R3 | | | | | DFA | FAN2 |
| Generator Requires Maintenance | | MAJ | | | | | | | | | | | | GNM1 |
| Generator Running | | | MIN | | | | | | | | | | | GNR1 |
| High Battery Thermal alarm | | | MIN | | | | | | | | | | BAT | BTHA1 |
| High Voltage Major | | MAJ | | | | | | | R4 | | | | HVSD | HVA1 |
| High Voltage Minor | | | MIN | | | | | | R4 | | | | HVA | HFV1 |
| History Cleared | | | | | RO | | | | | | | | | HCL1 |
| ID Conflict | | MAJ | | | | | | | | | | | | DID1 |
| ID Not Configured | | MAJ | | | | | | | | | | | | ZID1 |
| Imminent LVBD Shutdown | | MAJ | | | | | | | | | | | | ISD1 |

**Table E-2 Alarms, Alarm Relays and LEDs Assignments – Phoenix Display**

| Description | Severity - Relay and Display | | | | | Additional Relay | | | | | | | LED | Object ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CRIT | PMJ | PMN | WRN | RO | R1 | R2 | R3 | R4 | R5 | R6 | R7 | | |
| Incompatible Converter | | | MIN | | | | | | | | | | CFA | ICC1 |
| Incompatible Rectifier | | | MIN | | | | | | | R5 | | | RFA | ICR1 |
| Low Battery Temperature | | | | | RO | | | | | | | | | BTLA1 |
| LV Disconnect Contactor 1 Fail | CRIT | MAJ | | | | | | | | | | | LVD | CNF1 |
| LV Disconnect Contactor 1 Open | CRIT | MAJ | | | | | | | | | | | LVD | CNO1 |
| LV Disconnect Contactor 2 Fail | CRIT | | | | | | | | | | | | LVD | CNF2 |
| LV Disconnect Contactor 2 Open | CRIT | | | | | | | | | | | | LVD | CNO2 |
| LV Disconnect Contactor 3 Fail | | MAJ | | | | | | | | | | | LVD | CNF3 |
| LV Disconnect Contactor 3 Open | | MAJ | | | | | | | | | | | LVD | CNO3 |
| LV Disconnect Contactor 4 Fail | | MAJ | | | | | | | | | | | LVD | CNF4 |
| LV Disconnect Contactor 4 Open | | MAJ | | | | | | | | | | | LVD | CNO4 |
| Manual Off | | | MIN | | | | | | | | | | | MAN1 |
| Multiple AC Fail | | MAJ | | | | R1 | | | | | | | ACF | MACF1 |
| Multiple Converter Fail | | MAJ | | | | | | | | | | R7 | CFA | CMFA1 |
| Multiple Manual Off | | MAJ | | | | | | | | | | | | MMAN1 |
| Multiple Rectifier Fail | | MAJ | | | | | | | | | R6 | | RFAM | MFA1 |
| No Call-Out Response | | | | WRN | | | | | | | | | | COR1 |
| No Dial-Out Response | | | | WRN | | | | | | | | | | POR1 |
| Open String | | MAJ | | | | | | R3 | | | | | DFA | OSA1 |
| Password At Default | | | | | RO | | | | | | | | | PFD1 |
| Processor Halt | | | | | RO | | | | | | | | | PHT1 |
| Program Line Invalid | | MAJ | | | | | | | | | | | | PGI1 |
| Queue Overflow | | | | WRN | | | | | | | | | | COF1 |
| Real-Time Reserve Time Low | | | | | RO | | | | | | | | | RRTL1 |
| Rectifier Current Limit | | | | | RO | | | | | | | | | CLM1 |
| Rectifier Fail | | MAJ | | | | | | | | R5 | | | RFA | RFA1 |
| Rectifier Fan Fail | | | MIN | | | | | | | R5 | | | RFA | RFN1 |
| Rectifier Redundancy Loss | | | MIN | | | | | | | | | | LMR | RLS1 |
| Reserve Time Low | | | | | RO | | | | | | | | | RTL1 |
| Ringer External Failure Major | | MAJ | | | | | | | | | | | | RPXJ1 |
| Ringer External Failure Minor | | | MIN | | | | | | | | | | | RPXN1 |
| Ringer Fail Major | | MAJ | | | | | | | | | | | | RPFJ1 |
| Ringer Fail Minor | | | MIN | | | | | | | | | | | RF1 |
| Ringer Fan Fail | | | MIN | | | | | | | | | | | RPFF1 |
| Ringer ID Conflict | | MAJ | | | | | | | | | | | | RCDP1 |
| Ringer Redundancy Loss | | | MIN | | | | | | | | | | | RPRL1 |
| Self Test Failed | | | MIN | | | | | | | | | | | STF1 |
| Sense Fuse | | | MIN | | | | | | | | | | | VSF1 |
| Unconfigured Alarm Destination | | | | WRN | | | | | | | | | | NNC1 |
| Un-powered Controller (Not configurable) | x | x | x | | x | x | x | x | x | x | x | x | | |
| Very High Battery Temperature | | MAJ | | | | | | | | | | | BAT | BTVH1 |
| Very Low Battery Temperature | | | | | RO | | | | | | | | | BTVL1 |
| Very Low Voltage | | MAJ | | | | | | | | | | | BOD, VLV | VLA1 |
| Voltage Duplicate ID | | MAJ | | | | | | | | | | | | MDP1 |

**Table E-2 Alarms, Alarm Relays and LEDs Assignments – Phoenix Display**

| Description | Severity - Relay and Display | | | | | Additional Relay | | | | | | | LED | Object ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CRIT | PMJ | PMN | WRN | RO | R1 | R2 | R3 | R4 | R5 | R6 | R7 | | |
| Voltage ID Not Configured | | MAJ | | | | | | | | | | | | MZD1 |
| Voltage Imbalance Detect | | | MIN | | | | | | | | | | | SCD1 |
| Voltage Monitoring Module Failure | | | MIN | | | | | | | | | | | VMF1 |

**Table E-2 Alarms, Alarm Relays and LEDs Assignments – Phoenix Display**

| Description | Severity - Relay and Display | | | | | Additional Relay | | | | | | | LED | Object ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CRIT | PMJ | PMN | WRN | RO | R1 | R2 | R3 | R4 | R5 | R6 | R7 | | |
| Total Current Alarm Plant | | | MIN | | | | | | | | | | TCA | |
| Total Current Alarm Converter | | | MIN | | | | | | | | | | TCA | |
| Distribution Current Side A | | | MIN | | | | | | | | | | DCA | |
| Distribution Current Side B | | | MIN | | | | | | | | | | DCA | |

**Table E-3 Alarms, Alarm Relays and LEDs Assignments – Phoenix Display – Default**

**UDEs**

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# Appendix F: SNMP

## SNMP Overview

In addition to supporting the basic protocols (Telnet, HTTP, FTP, and SMTP) on TCP/IP, the Pulsar Plus family of controllers support conveying system alarm and control information to a Network Operation Center (NOC) using the Simple Network Management Protocol (SNMP). SNMP is the most popular protocol for managing diverse networks. Using SNMP to access management information data and retrieve alarm information can allow company personnel to more easily manage system performance and remotely find and solve system problems. A controller serves as an SNMP Agent. A SNMP Host system is used to communicate to a multitude of SNMP Agents. A number of SNMP Host packages are available such as HP OpenView, Castle Rock Computing SNMPc, IBM NetView, Lucent OneVision, and Sun Micro's NetManager. OmniOn Power Systems also provides a SNMP Host focused on the needs of the power engineer with its Manager product.
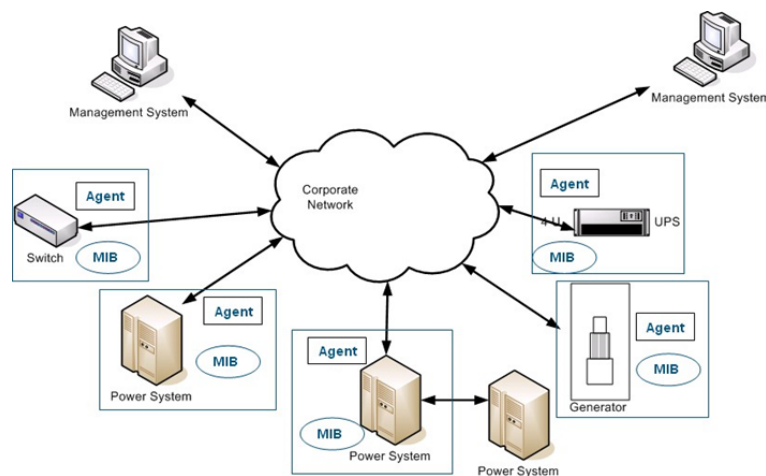


Simple Network Management Protocol is an application-layer protocol designed to facilitate the exchange of management information between network devices. There have been several releases of SNMP in its history and the controller implements an SNMPv2C Agent. SNMPv2C is backwards compatible with SNMPv1.

A key part of the SNMP protocol is the detailed Management Information Base (MIB) that describes all Agent variables that can be accessed. For the controller, this includes all the objects controlled or monitored in the system such as: rectifiers, converters, distribution monitoring cards, alarms, etc. Essentially, all elements described in the T1.317 protocol (see Appendix B) are available in SNMP. The MIB will be needed by any SNMP Host that wishes to communicate with the controller and can be retrieved at the "Design Tools and Download" link located at **omnionpower.com**

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## SNMP Operations

Interactions between the SNMP Host and the SNMP Agent can be any of four different types of commands: Reads, Writes, Traversal operations, and Traps. SNMP utilizes six operations to respond to the various SNMP Hosts: Get, GetNext, GetBulk, Set, Trap, and Inform. The controller implements the Get, GetNext, Set, and Trap operations.

Get - Allows the SNMP Host to retrieve a value from the SNMP Agent.

GetNext - Allows the SNMP Host to retrieve the next value in sequence from a table or list of variables in the SNMP Agent.
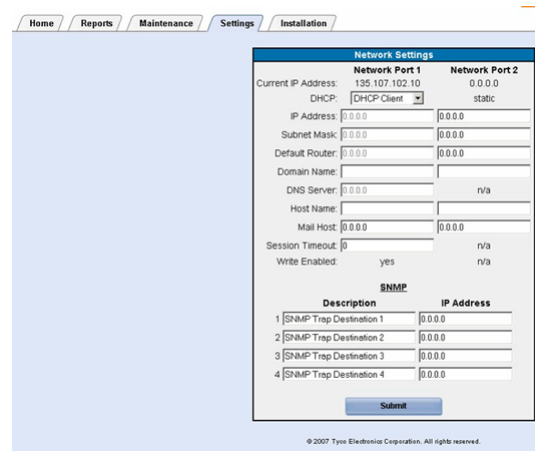
Set - Allows the SNMP Host to set a value within the SNMP Agent.

Trap - Used by the SNMP Agent (the power system controller) to asynchronously inform the SNMP Host of an event such as an alarm notification. Unlike the other operations, the trap does not require a response from the host. The SNMP Agent must be configured with appropriate addresses of the SNMP Host.

## SNMP Configuration

SNMP functionality is always available. No enabling or disabling of the feature is required. Appropriate trap destinations and assignments of specific alarms must be configured for SNMP to properly send out Traps. Users can configure these SNMP parameters from the browser interface. They may also be configured from a Telnet command line interface.

Configuration of the IP addresses for Trap destinations is performed under the "Network" link under the main configuration "Settings" tab. The controller supports up to four different destinations for SNMP messages. Each destination (1 through 4) is configured with an IP address. The sample screen for this configuration follows.

Individual alarms or events are assigned as Traps to one of the four specific SNMP destinations. Assignment of the alarm and events is performed under the "Alarm Notification" link under the main configuration "Settings" tab. The sample screen for this configuration follows.

| Home | Reports | Maintenance | Settings | Installation |
|---|---|---|---|---|

**Notify Settings**

*Click on a description to edit alarm settings.*

| System Alarms | Severity | Relay | LED | Email 1 2 3 4 | SNMP 1 2 3 4 | Phone 1 2 3 4 O R N | delay |
|---|---|---|---|---|---|---|---|
| High Ambient Temperature | MIN | | | - - - - | - - - - | - - - - - - - | 0s |
| Low Ambient Temperature | MIN | | | - - - - | - - - - | - - - - - - - | 0s |
| Auxiliary Major | MAJ | | | - - - - | - - - - | - - - - - - - | 0s |
| *No data for AMN1* | | | | | | | |
| Alarm Test Active | RO | | | - - - - | - - - - | - - - - - - - | 0s |
| Alarm Test Aborted | RO | | | - - - - | - - - - | - - - - - - - | 0s |
| Real Time Clock Battery Low | MIN | | | - - - - | - - - - | - - - - - - - | 0s |
| Configuration Changed | RO | | | - - - - | - - - - | - - - - - - - | 0s |
| Clock Changed | RO | | | 1 - - - | - - - - | - - - - - - - | 0s |
| ID Conflict | MAJ | | | - - - - | - - - - | - - - - - - - | 0s |
| Emergency Power Off | MAJ | | | - - - - | - - - - | - - - - - - - | 0s |
| Excessive Login Attempts | WRN | | | - - - - | - - - - | - - - - - - - | 0s |
| External Fuse Major 24V | MAJ | R7 | DC | - - - - | - - - - | - - - - - - - | 0s |
| External Fuse Minor 24V | MIN | R7 | DC | - - - - | - - - - | - - - - - - - | 0s |
| History Cleared | RO | | | - - - - | - - - - | - - - - - - - | 0s |
| Imminent Low V Shutdown | MAJ | | | - - - - | - - - - | - - - - - - - | 0s |
| Password At Default | RO | | | - - - - | - - - - | - - - - - - - | 0s |
| Processor Halt | RO | | | - - - - | - - - - | - - - - - - - | 0s |
| Self Test Failed | MIN | | | - - - - | - - - - | - - - - - - - | 0s |
| Sense/Control Fuse | MIN | | | - - - - | - - - - | - - - - - - - | 0s |
| ID Not Configured | MAJ | | | - - - - | - - - - | - - - - - - - | 0s |

## Community Strings

SNMP Community Strings can serve as passwords or user IDs for network elements. The community name assigns an access environment for a set of SNMP Hosts or Agents using that community name. An SNMP Host or Agent within the community can be said to exist within the same administrative domain. Because devices that do not know the proper community name are precluded from SNMP operations, network management personnel can use the community name as a weak form of authentication. Community strings can be either read only or read/write. Having this capability provides further security by restricting the ability to alter the configuration of the managed device.

Presently the controller defaults the value of the community string to "public" with read/write access. These SNMP parameters are not configurable at this time.

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# Appendix G: Secure Protocols

## Overview

Secured protocols are only supported by controllers identified with the Secured Protocols "S" in their model number - see Table 1.

Secured protocols include support for the SNMPv3, IPv6, HTTPS/SSL, SSH, and SFTP protocols.

## Configuration
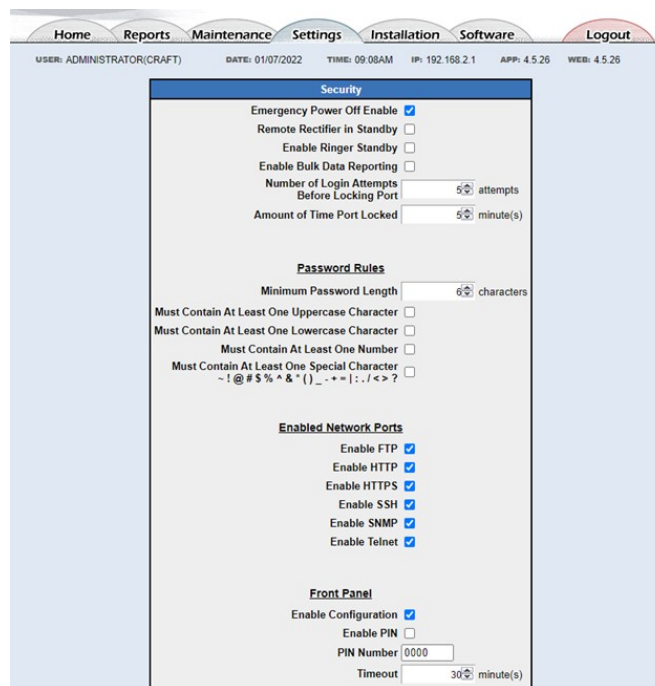
### Reboot Required

Configuration changes involving IP addresses and protocol operational mode variable items require a reboot. Allow the controller to run for at least 2 minutes following a saved change to ensure the change has been saved to non-volatile memory before powering the unit down or any rebooting operation.

### Security

Security related settings are found in Settings ▸ Communication ▸ Security. Administrative level log-in is required to edit these settings. The network related items are:

- Port behavior on failed login attempts (number of failed attempts allowed value of 3-10 attempts, time to lock the port value 0 to 5 minutes 1 minute increments).

- Password rules to encourage the use of strong passwords. These include minimum password length (3 to 15 characters) and requirements for the inclusion of different types of characters (≥ one upper case, ≥ one lower case, ≥ one number, and ≥ one special character).

- Individual protocol (network ports) enables to allow the blocking of non-secure protocols



**Figure G-1: Security Configuration**

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## Internet Protocols (IPv4 And IPv6)

Configuration settings for IPv4 and IPv6 are found on Network Settings: Settings ▯Network Settings. The screen provides for IPv6 and IPv4 related settings.

Figure G-2 shows Static DHCP selected in the IPv4 section of the given example and the basic required parameter settings for IPv4 (Static IP address, Subnet Mask, and Default Gateway Router IP address) are configured.



**Figure G-2: Network Settings for IPv4 and IPv6**

## IPv4

The controller is capable of simultaneous operation using IPv4 and IPv6 protocols. Using IPv4, the controller will utilize a single IPv4 address. This address will be assigned in one of 3 ways depending on the DHCP mode:

1.  DHCP mode Static: In this configured mode, the controller uses a static IPv4 address assigned by the user. The user must supply a subnet mask and a router address.

2.  DHCP mode Client: In this configured mode, the controller uses a dynamic IPv4 address assigned by a DHCP server on the network.

3.  DHCP mode Server: In this configured mode, the controller will automatically assign a predefined IPv4 address of 192.168.2.11 to a PC plugged directly into its network port connection. For this reason, the controller MUST NOT be connected to a network while operating in this mode.

## IPv6

The controller supports IPv6. Operating with IPv6, the controller can have multiple IPv6 addresses. It can have Link Local Address and multiple Global Unicast Addresses. These items are shown in the top section of the Network Settings screen.

The controller will have a single Link Local address. This Link Local address is automatically generated by the controller based on its MAC address. It is displayed in the Network Settings screen. The link local address can only be used on the local link (subnet) and will not be routed through the network. Browsers will not accept a link local address in a URL.

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The controller may also have one or more Global Unicast Address. One of these addresses can be manually entered by the user. Entry of this IPv6 address is in the "Static IPv6 Address" field shown. Another Global address can be automatically generated by the controller using the SLAAC protocol. The SLAAC protocol allows routers to send a router advertisement messages. These messages will supply the router address, the link prefix (subnet) and network options. One of these network options, the autonomous address-configuration flag, will instruct the controller to generate a Global Unicast Address based on the router prefix and the controller's MAC address. This IPv6 address is displayed as the "Current IPv6 Address".

## HTTPS (SSL)

The controller supports the Hyper-Text Transfer Protocol with SSL Encryption. It is capable of supporting browser access using HTTP and HTTPS. The standard controller is shipped with HTTP enabled and HTTPS disabled. However, specific customer configurations requiring only secured protocols will have HTTP access disabled and HTTPS access enabled. The desired HTTP protocol access is selected by prepending the URL address with the respective "http://" or "https://" to in the browser. If the controller is accessed using its IPv4 address with HTTPS, the browser will issue a screen indicating a problem with the website's security certificate as shown below.



**Figure G-3: Security Problem Screen Using Explorer**

In this case, select "Continue to this website (not recommended)" and the controller login screen will be presented. Continue to Login into the controller using the appropriate passwords (OmniOn Power super-user, and administrator by default). The browser will complain about a mismatched address in the certificate if the controller is accessed using its IPv4 address for HTTPS. Clicking on the Certificate error screen shows the error as seen below. The controller will be fully accessible using IPv4 and HTTPS with this mismatched address.
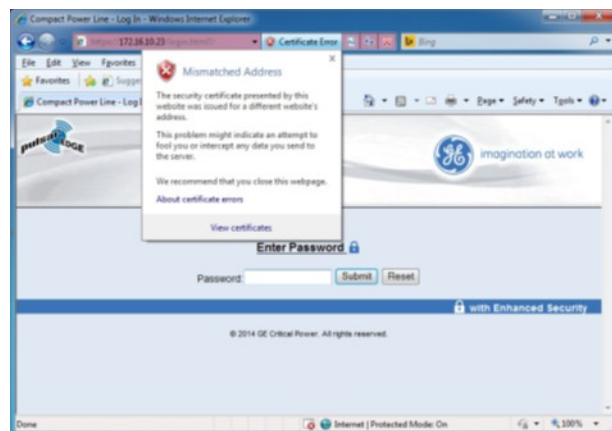


**Figure G-4: Mismatched Address Certificate Error Screen**

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To enable HTTPS connectivity to the controller without browser warnings in IPv6 the following procedures must be followed:

1. Contact OmniOn Power Technical Support at either TechSupport@elpc.omnionpower.com, or 877-OmniOn Power for the certificate file.

2. Change the file extension to ".crt"

3. Right click on the certificate file ASDC_2048.crt and select: "Install Certificate"

4. When prompted select: "Place all certificates in the following store"

5. Browse to select: "Trusted root certification authorities"

The device certificate created by the controller identifies the controller by its IPv6 address. Whenever the IP address of a controller is changed, it is necessary to reboot the controller. Allow 2 minutes for all the changes to be stored prior to rebooting. Upon reboot, the controller will create a device certificate for the new IP address. This process may take several minutes. Now the "https:" prepended URL can be used to access error free connection. Note: an IPv6 address must be enclosed in [ ] when in a URL. Sample web screen follows.
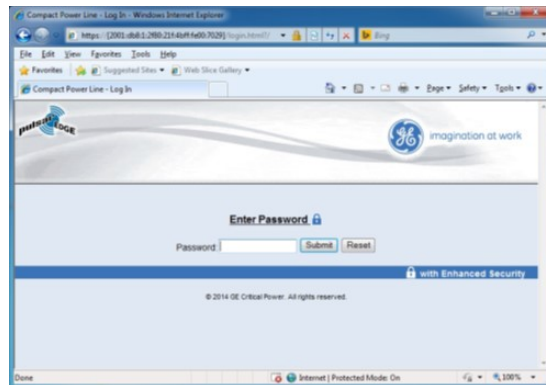


**Figure G-5: HTTPS Connectivity Over IPv6 Controller Login Screen**

## SNMP

In addition to supporting the basic protocols on TCP/IP, the controller supports conveying system alarm and control information to a Network Operation Center (NOC) using the Simple Network Management Protocol (SNMP). The controller implements the secured SNMPv3 as well as the SNMPv2C agent that is backwards compatible with SNMPv1. The various configuration items for the protocols can be found in the Settings ► Communication ► SNMP web screen depicted below.



**Figure G-6: SNMP Settings Screen**

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For security reasons the SNMPv1/v2c community string and SNMPv3 user information can only be modified when logged in as administrator.

The controller has four SET/GET profiles that can be used as either SNMPv1/v2c community strings or SNMPv3 users. The Community String/User field is the value of community string or username that will be accepted by the controller. Each one of these values must be unique (or blank). The SNMP Protocol field determines how each is used. The Access Level (User, Super-User, and Administrator) field determines which SNMP operations are valid and the scope for each.

The choices are:

- USER – has read-only access (SNMP GET operation) to data (OIDs) within the controller MIB

- SUPER-USER – has read and write access (SNMP SET and GET operations) to OIDs within the controller MIB

- ADMINISTRATOR – has read and write access to all OIDs supported by the controller

SNMPv3 users have additional protocol and password fields to support authentication and privacy. (These fields are only accessible if the SNMPv3 protocol is selected).

Authentication protocols are NONE, MD5 and SHA. Privacy protocols are NONE, DES and AES 128-bit.

Whenever the SET/GET profiles are modified the controller will require about 15 seconds before the changes take effect. This allows the controller type to perform the calculations necessary to create new crypto keys.

Four Trap Community String entries allow the user to specify a target IP address (IPv4 or IPv6) for alarm notifications (Traps) and one of the SET/GET Profiles to be used with the trap.

## SFTP

The controller implements the SSH File Transfer Protocol (also Secure File Transfer Protocol, or SFTP) to provide file access, file transfer, and file management functionalities over any reliable data stream. WinSCP, an open source free SFTP client, FTP client, WebDAV client and SCP client for Windows, was used to test the file transfer capability between the controller and a remote computer. This software can be downloaded at http://winscp.net/eng/download.php.

By default WinSCP attempts to use a temporary file to allow file transfers to be interrupted and resumed. The controller's file system does not allow the creation of temporary files, so the feature must be disabled in WinSCP. Disable this feature by going to Options ▸ Preferences ▸ Endurance in WinSCP and check the disable for the "transfer resume/transfer to temporary file". Sample WinSCP screen shots follow.
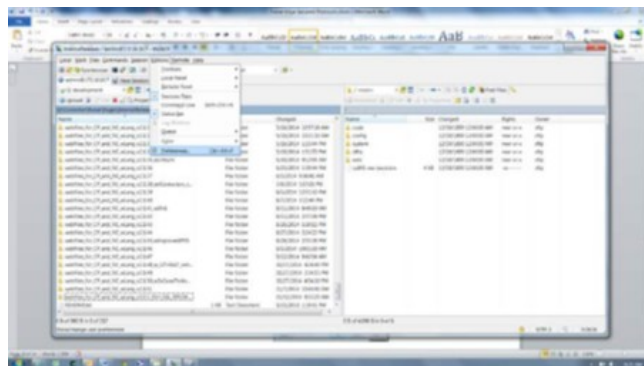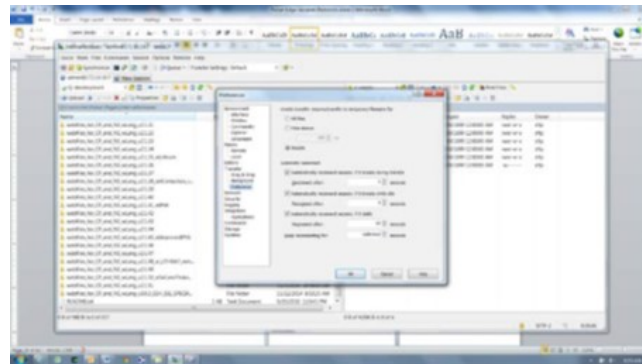
**Figure G-7: Sample WinSCP Configuration Screens for Disable**

When logging into the controller using WinSCP, as with FTP, the username is not validated unless the controller has the "User Name and Password" login method enabled (Settings ▸ Passwords).
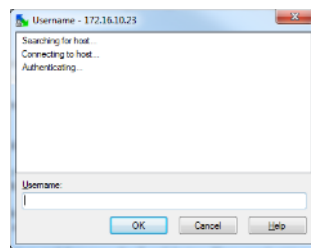

**Figure G-8: WinSCP Login Screen**

When connecting to a controller for the first time WinSCP will alert the user to store the controller's security key in the key cache. Press Yes. This key will remain valid until the controller's IP address is modified.


**Figure G-9: WInSCP Security Key Warning Screen**

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Following is a sample screen of using a WinSCP SFTP connection to a Galaxy Pulsar Edge controller
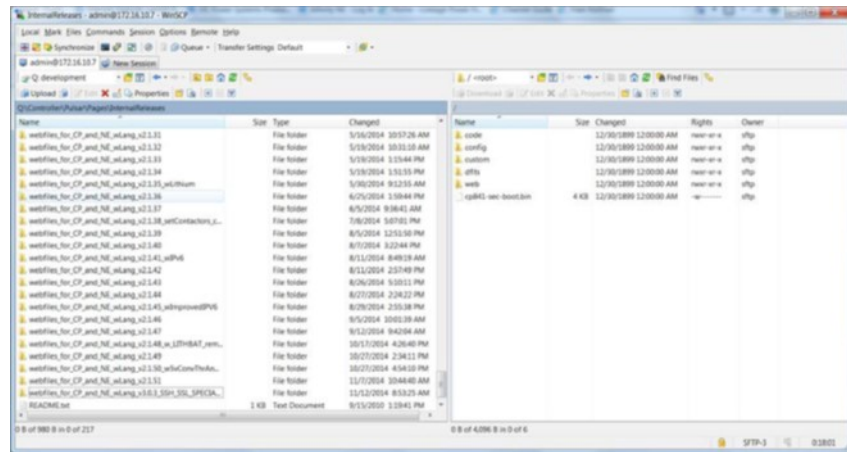


**Figure G-10: WInSCP SFTP Connection**

## SSH

The controller supports the Secure Shell (SSH) cryptographic network protocol for secure data communication, remote command-line login, remote command execution, and other secure network services between itself and a networked computer. It is a replacement for Telnet that offers encryption. The controller's SSH implementation has been tested using PuTTY. PuTTY is an SSH and telnet client, developed originally by Simon Tatham for the Windows platform. It is open source software that is available with source code and is developed and supported by a group of volunteers. Putty can be downloaded at http://www.putty.org/ . A typical download is the "putty.exe" executable that covers the Telnet and SSH client.

When connecting to the controller for the first time, PuTTY will alert the user to store the controller's security key in the key cache (sample screen below). Select "Yes", enter a login, and the controller password, to access the SSH server (the controller). This key will remain valid until the controller's IP address is modified.



**Figure G-11: PuTTY Security Key Warning Screen**

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Below is a sample controller's screen once the controller's SSH Server has been accessed. Standard T1.317 commands can be used.
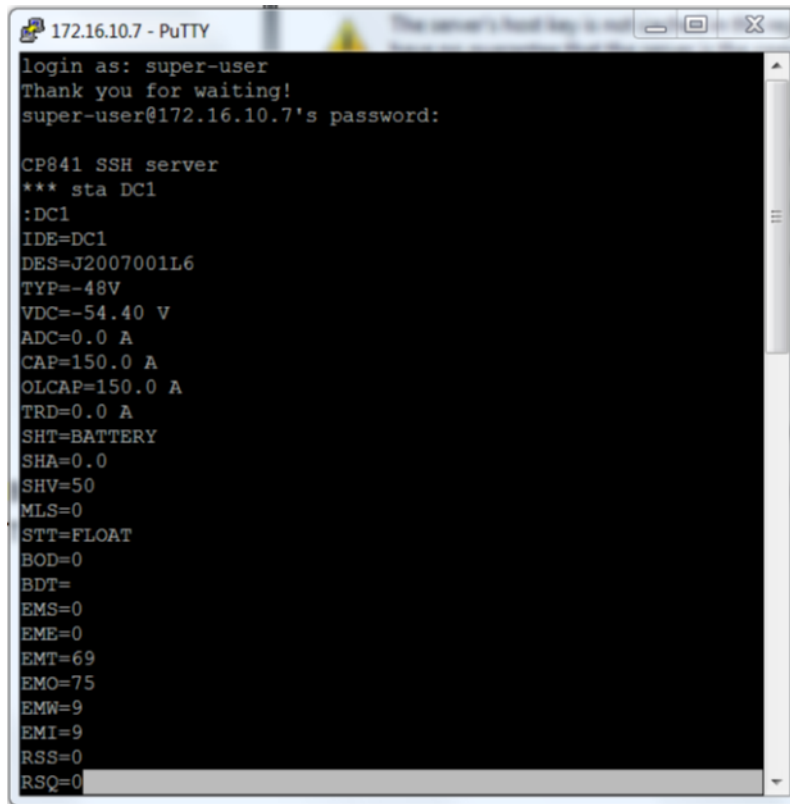


**Figure G-12: PuTTY SSH Login Example Screen**

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# Revision

| Revision | Description | Date Dept./ |
|---|---|---|
| 0.1 | Released for review and comment. | |
| 1.0 | Initial Product Release. | |
| 2.0 | Corrected page header on pages 143-162; corrected items to Pulsar Plus; added 24V accuracy; corrected various spelling; change Table D: float range of 24V to (21 to 28), removed DC1,SCAP, BR1,TMD format changed from number to hh:mm:ss, 2nd (BT07,DES) changed to (BT08,DES), RL1 changed to RLS1 (rectifier redundancy loss alarm), corrected J4 output alarm default descriptions in Connection Pulsar section, added note to step 8 of the connecting to pulsar section. | June/2006 |
| 3.0 | Enhanced power cable connection J9 descriptions in Step 8 of Connecting to Pulsar Plus. | Sept/2006 |
| 4.0 | Rebranding | March/2007 |
| 5.0 | Added NE843G, Added ES772 section | December/2007 |
| 6.0 | Not issued | January/2008 |
| 7.0 | Integrated NE843P Phoenix III controller | July/2013 |
| 9 | Fixed Table 5 Wire Colors | December/2013 |
| 9.4 | Updated as per template | 04/18/2022 |
| 9.5 | Updated page footer | 4/5/2023 |
| 9.6 | Updated as per OmniOn template | 10/27/2023 |

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