PRODUCT MANUAL

Integritas Battery Charger

With Pulsar XL and Nebula Controllers

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Introduction

This manual is intended as a guide in assisting equipment understanding, installation, testing, and troubleshooting.

For additional assistance contact Technical Support or access additional information on-line.

Reference Documents

Document	Title
0001258890	OmniOn Integritas Industrial Battery Charger Ordering Guide
8600092588P	Pulsar XL Product Manual
850049786	Pulsar Plus Controller Family Troubleshooting

Contact Information

Phone:	1-877-546-3243 (US)
	1-972-244-9288 (Int'l)
Email:	techsupport@elpc.omnionpower.com
Web site:	**omnionpower.com**

Product Description

The Integritas™ industrial battery charger is a high reliable, highly efficient charger designed for wall-mount or rack-mount applications. It boasts true built-in redundancy, a state of the art controller with monitoring, supports NERC compliance, and is NEMA PE5 rated.

Battery Connections

- Direct connection to Integritas system bus
- Reverse polarity indicator
- Two battery string landings with DC breakers

DC Distribution

- DC output terminal blocks
- DC output surge protection
- DC output breaker

Ordering Guide Information

Group	1	2	3	4	5	6	7	8	9	10	11	12	13
Item	Cabinet	Connection	Nominal DC Out	AC In Type	AC Input	AC Surge	DC Out Type	Breaker Rating	DC Surge	Control	Comm Type	Protocol	Ground Fault
Model Code	3	TR	125	S	AC	Y	S	10	Y	N	0	D	0

Model numbers are defined by selecting the appropriate code from each of the thirteen group types as noted, based on specific application needs of the battery charger.
Example: 3TR125-SACY-S10Y-N0D0

Group 1: Cabinet	**Code**	**Description**	**Note**
	3	Type I	Nominal 19 in. wide
	6	Type II	Nominal 23 in. wide
Group 2: Connection Type	**Code**	**Description**	**Note**
	BR	Bottom	Location for input and output connections
	TR	Top	Location for input and output connections
Group 3: Nominal DC Output	**Code**	**Description**	**Note**
	024	24 V	
	048	48 V	
	125	125 V	
Group 4: AC In Type	**Code**	**Description**	**Note**
	S	Single	
	D	Dual	Code 6, Type II, 23 in. models only
Group 5: AC Input	**Code**	**Description**	**Note**
	AC	110/120, 230/240 VAC	Single phase
	L3	208 Delta (208 - 240 VAC)	Three phase
	HW	480Y/277 VAC	Three phase, 4-wire (L - N) + PE
	H3	480 Delta (380 - 520 VAC)	Three phase, 3-wire (L - L) + PE
Group 6: AC Surge	**Code**	**Description**	**Note**
	Y	AC Surge Protection Included	MOV (metal-oxide varistor) type protector
Group 7: DC Out Type	**Code**	**Description**	**Note**
	S	Single Load	One (1) load breaker
	D	Dual Load	Two (2) independent load breakers
	B	One Load, One Battery	One (1) load breaker, One (1) battery breaker
Group 8: Breaker Rating	**Code**	**Description**	**Note**
	10	10 kAIC minimum	
Group 9: DC Surge	**Code**	**Description**	**Note**
	Y	DC Surge Protection Included	MOV (metal-oxide varistor) type protector
Group 10: Control	**Code**	**Description**	**Note**
	P	Pulsar XL	See Controllers section for more details
	N	Nebula	See Controllers section for more details

Ordering Guide Information (continued)

Group 11: Comm Type	**Code**	**Description**	**Note**
	0	Standard TCP	
Group 12: Protocol	**Code**	**Description**	**Note**
	0	Default/SNMP/Modbus TCP	
	D	DNP3 Outstation	TCP/IP only
Group 13: Ground Fault Indication	**Code**	**Description**	**Note**
	0	DC ground fault indicator Included	Standard configuration
	E	Excluded	Another means for detecting DC ground fault must be provided when choosing this option

LIST OF MATCHING RECTIFIERS BASED ON MODEL AND DC OUTPUT CURRENT REQUIREMENTS [2]

Type I cabinet can hold up to 3 rectifiers Type II cabinet can hold up to 6 rectifiers					**Max current output (amps) per cabinet configuration and (x) number of rectifiers installed (Group 1)**					
Part number	**Rectifier Model Number**	**AC Input Code (Group 5)**	**DC Output Code (Group 3)**	**Current output per rectifier (A)**	**Type I /II (x=1)**	**Type I/II (x=2)**	**Type I/II (x=3)**	**Type II (x=4)**	**Type II (x=5)**	**Type II (x=6)**
150052773	IP100ACR024ATEZ	AC, L3, HW	024	100	100	150	150	150	150	150
150050530	IP050ACR048ATEZ	AC, L3, HW	048	50	50	100	150	150	150	150
150050531	IP020ACR125ATEZ	AC, L3, HW	125	20	20	40	60	80	100	120
150052737	IP040H3R125ATEZ	H3	125	40[1]	40	80	120	150	150	150

[1]Rectifier Io: 50 amps out @ 90-125 VDC; 40 amps out @ 142 VDC; 32 amps out @ 160 VDC. All outputs based on operating temp up to 55 deg. C.

[2]Max DC current outputs shown are based on each respective rectifier Io high-line output ratings, as listed in the specifications table.

Table 1 Ordering Guide Information

Features

Figure 1 - Charger Cabinet Features

AC Feeds

- Front accessible terminal blocks with optional top or bottom feed connections
- Single phase or three phase options

Controller

The controller monitors and controls system operation

- Pulsar XL (IP843G)
- Nebula (Battery Charger 943)

Framework

- Wall mounting
- 19 inch or 23 inch frame mounting

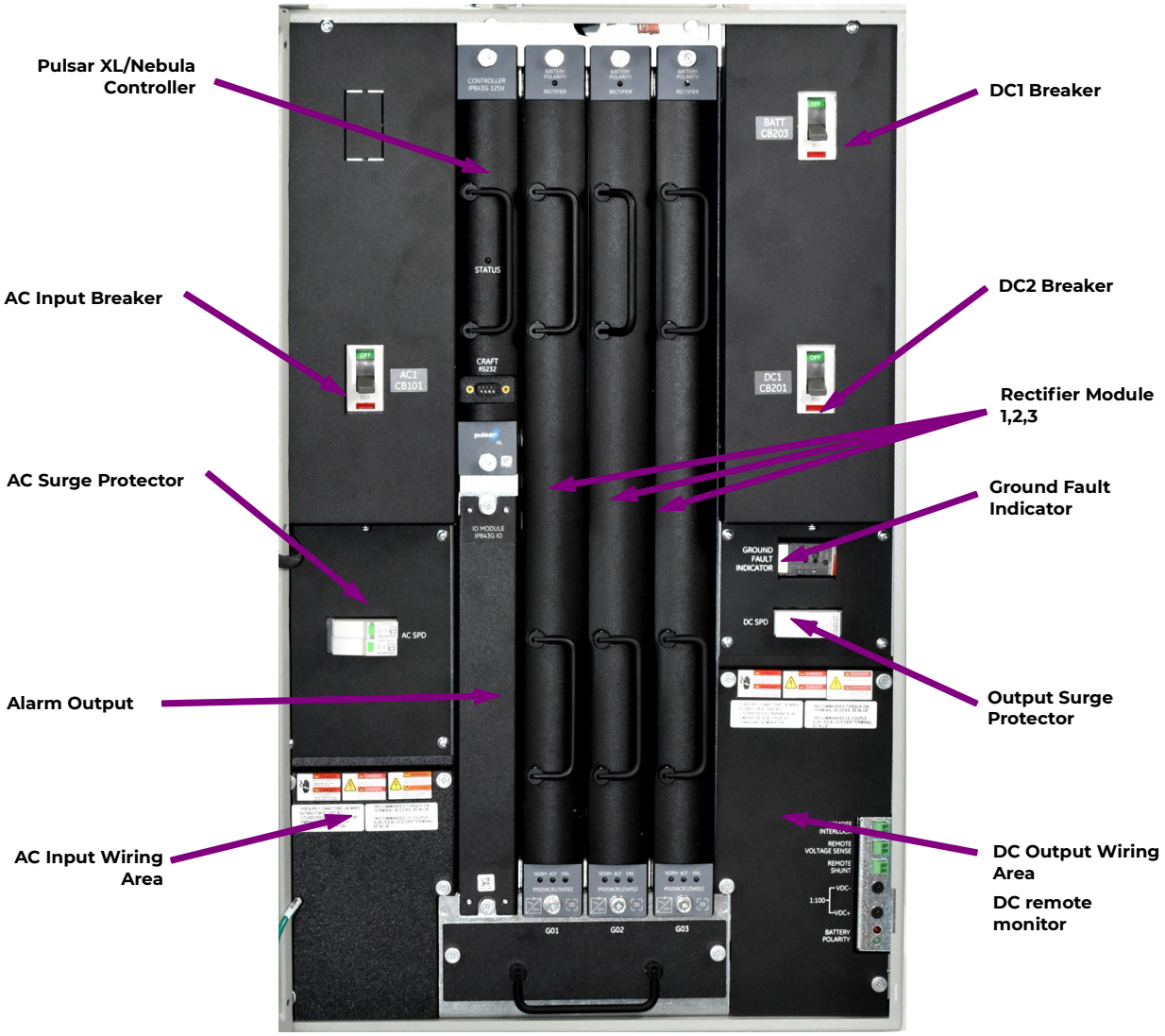

Figure 2 - Charger Front View

Overview

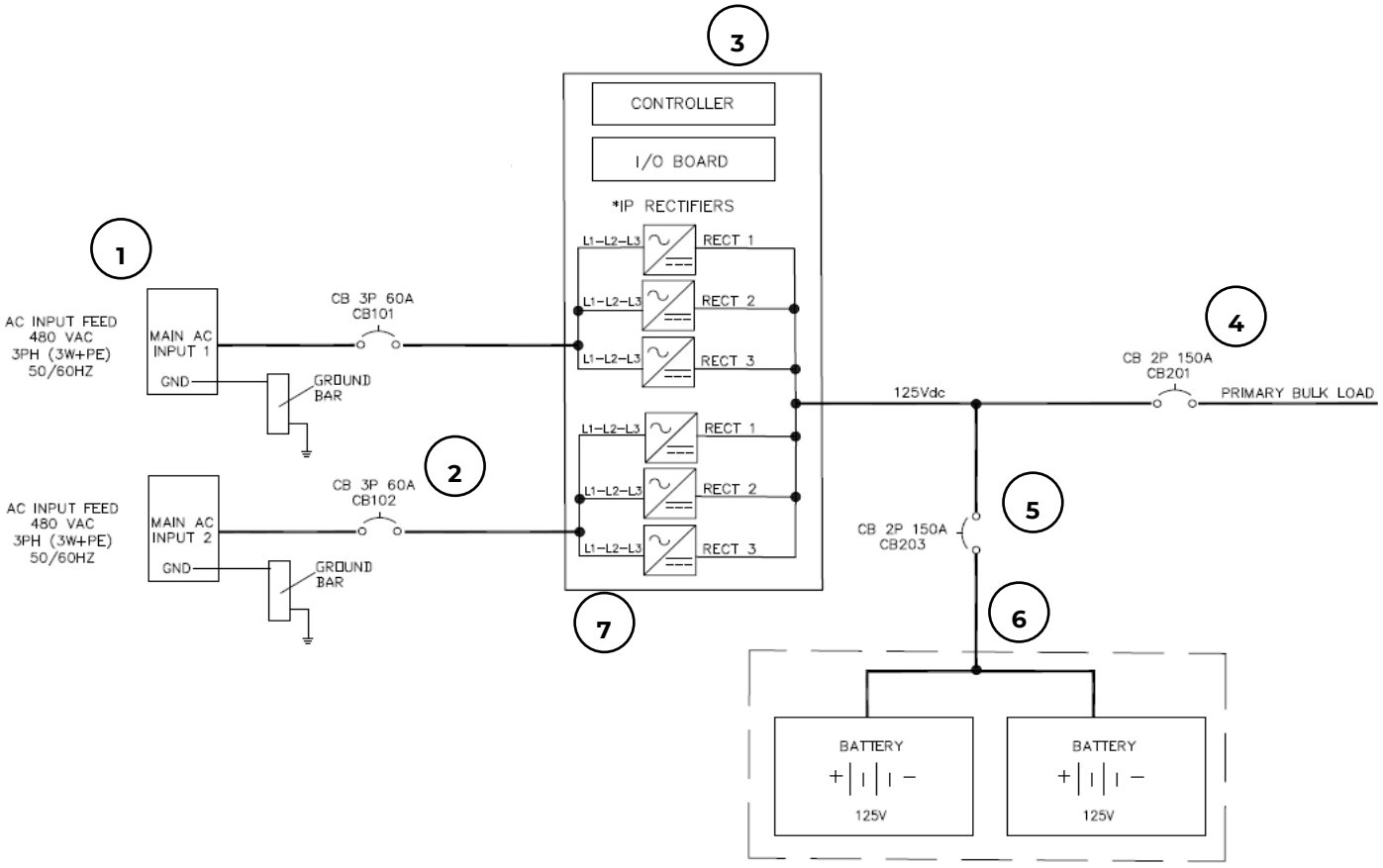

Figure 3 Schematic Diagram ("DH3Y-B10Y" variation shown)

The Integritas battery charger product family is based on a modular design that uses basic building blocks in the main chassis resulting in multiple configuration options. The block diagram above provides a simplified illustration of these system components. Different configurations utilize different variations of these core components. See document 0001258890 OmniOn Integritas Industrial Battery Charger ordering guide for details on the configuration options.

The standard design comes in either a 19" or 23" high chassis. Size is based on the amount of power needed for the application.

Overview

1. Terminal block connections for AC input wiring. Dual independent inputs on 23" models only
2. Compatible AC input breaker: single input for 19" models, single or dual input for 23" models
3. Intelligent controller for system monitoring, alarms, charge profiles, and remote connectivity
4. Compatible DC output load breaker
5. Compatible DC output battery breaker
6. Connection points for up to (2) battery strings
7. High efficient, switchmode, modular AC/DC power rectifiers

Customer Service and Technical Support Contact Information

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Safety Agency Compliance and Certifications

Equipment Safety is Approved to UL1012, ANSI/UL60950-1-2014 and CAN/CSA C22.2 No. 60950-1-07, Second Edition + A2:2014 (MOD), dated October 14, 2014

Rohs Compliant to RoHS EU Directive 2002/95/EC RoHS 5/6

EMC per European Directive 2004/108/EC; EN44022, Class A; En44024; FCC, Class A; GR1089=CORE, Issue 5 ESD per EN6100-4-2, Level 4

External Surge Protective Device (SPD) is required on all AC inputs.

Models using IP020ACR125ATEZ rectifiers:

For input voltages above 266V, the maximum output current and power are de-rated by 2.8% per °C for operating ambient above 40°C.

Equipment and subassembly ports:

Are suitable for connection to intra-building or unexposed wiring or cabling. Can be connected to shielded intra-building cabling grounded at both ends.

Grounding / Bonding Network – Connect to an Isolated Ground Plane (Isolated Bonding Network) or an Integrated Ground Plane (Mesh-Bonding Network or Common Bonding Network).

Installation Environment - Install where NEC applies.

Safety Instructions

- SAVE THESE INSTRUCTIONS-This document contains important safety and operating instructions for the Integritas battery charger.
- Before using battery charger, read all instructions and cautionary markings on battery charger, battery, and all connected equipment.
- Rules and Regulations-Follow all national and local rules and regulations when making field connections.
- Field-wired Conductors-Follow all National Electric Code (NEC) and local rules and regulations.
- Insulation rating: 90°C minimum; 105°C (minimum) if internal to enclosed equipment cabinets.
- Size AC field-wired conductors with 75°C ampacity (NEC) equal to or greater than their panel board circuit breaker rating.
- Size DC field-wired conductors with 90°C ampacity (NEC) equal to or greater than circuit breaker/fuse rating.
- AC and DC input disconnect/protection-Provide accessible devices to remove input power in an emergency.
- Compression Connectors
- U. S. or Canada installations-use Listed/Certified compression connectors to terminate Listed/Certified field-wire conductors.
- All installations-apply the appropriate connector to the correct size conductor as specified by the connector manufacturer, using only the connector manufacturer’s recommended or approved tooling for that connector.
- Electrical Connection Securing: Torque to the values specified on labels or in the product documentation.
- Cable Dress-dress to avoid damage to the conductors and undue stress on the connectors.
- Alarm Signals-Provide external current limiting protection. Rating - 60V (125V for 125V charger), 0.5A unless otherwise noted.
- Grounding-Connect the equipment chassis directly to ground.
- WARNING: Equipment does not provide battery discharge control and protection. To be provided by external battery source.
- WARNING: A battery can present a risk of electrical shock, burn from high short circuit current, fire or explosion from vented gases. Observe proper precautions.

Precautions

- Install, service, and operate 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.
- Disconnect batteries from outputs and/or follow safety procedures while working on equipment. Batteries may be connected in parallel with the output of the rectifiers. Turning off the rectifiers will not necessarily remove power from the bus.
- Batteries may produce explosive gas. Do not create arcs, smoke, or use an open flame in the vicinity.
- Do not disconnect permanent bonding connections unless all power inputs are disconnected.
- Verify that equipment is properly safety earth grounded before connecting power. High leakage currents may be possible.
- 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 and connectors that can shock or cause serious injury.
- Use safe lifting practices. The equipment is heavy. Lifting devices are recommended.
- 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).
    - Follow Lock Out Tag Out (LOTO) procedures: customer specified, site specific, or general as appropriate.
    - Disconnect all power input before servicing the equipment. Check for multiple power inputs.
    - Wear safety glasses.
    - Follow Personal Protective Equipment requirements: customer specified, site specific, or general as appropriate.
    - Test circuits before touching.
    - Be aware of potential hazards before servicing equipment.
    - Identify exposed hazardous electrical potentials on connectors, wiring, etc.
    - Avoid contacting circuits when removing or replacing covers.
    - Use a personal ESD strap when accessing or removing electronic components.
- Follow all warning and precautionary battery instructions, including proper replacement and disposal procedures, to minimize risk of injury. External batteries, if applicable, are to be installed in accordance with all national and local rules and regulations, including CEC, part 1.
- Personnel with electronic medical devices need to be aware that proximity to DC power and distribution systems, including batteries and cables, typically found in telecommunications utility rooms, can affect medical electronic devices, such as pacemakers. Effects decrease with distance.

Conformité et certifications de l'Agence de sécurité

La sécurité de l'équipement est approuvée à UL1012, ANSI/UL60950-1-2014 et CAN/CSAC 22.2 n ° 60950-1- 07, deuxième édition + a2:2014 (MOD), datée du 14 octobre 2014

RoHS conforme à RoHS directive UE 2002/95/EC RoHS 5/6

CEM par directive européenne 2004/108/ce; EN44022, classe A; En44024; FCC, classe A; GR1089 = CORE, numéro 5

ESD par EN6100-4-2, niveau 4

Un dispositif de protection contre les surtensions externes (SPD) est requis sur toutes les entrées AC. Modèles utilisant des redresseurs IP020ACR125ATEZ:

Pour les tensions d'entrée supérieures à 266V, le courant de sortie maximal et la puissance sont détaxés de 2,8% par ° C pour une température ambiante supérieure à 40°C.

Ports d'équipement et de sous-assemblage:

Conviennent pour la connexion à des câbles ou câblages intra-bâtiment ou non exposés. Peut être relié au câblage intra-bâtiment blindé à la terre aux deux extrémités.

Réseau de mise à la terre/collage – se connecter à un plan de masse isolé (réseau de collage isolé) ou à un plan de masse intégré (réseau à liaison maillée ou réseau de liaison commun).

Environnement d'installation-installation où NEC s'applique.

Consignes de sécurité

- Conservez ces INSTRUCTIONS – ce document contient des consignes de sécurité et d'utilisation importantes pour le chargeur de batterie INTEGRITAS.
- Avant d'utiliser le chargeur de batterie, lisez toutes les instructions et les marquages de mise en garde sur le chargeur de batterie, la batterie et tous les équipements raccordés.
- Règles et règlements-respectez toutes les règles et réglementations nationales et locales lors de la réalisation de connexions sur le terrain.
- Conducteurs câblés-suivez tout le code national de l'électricité (NEC) et les règles et réglementations locales.
- Indice d'isolation: 90°C minimum; 105°C (minimum) si interne aux armoires d'équipement fermées.
- Les conducteurs câblés de champ C.A. de taille avec une ampacité de 75°C (NEC) égale ou supérieure à leur cote de disjoncteur de carte de panneau.
- Conducteurs à câble de champ de taille CC avec une ampacité de 90°C (NEC) égale ou supérieure à la puissance nominale du disjoncteur/fusible.
- Déconnexion/protection d'entrée AC et DC-fournissez des dispositifs accessibles pour enlever la puissance d'entrée en cas d'urgence.
- Connecteurs de compression
- Installations américaines ou canadiennes-utilisez des connecteurs de compression répertoriés/certifiés pour mettre fin aux conducteurs de fil de champ répertoriés/certifiés.
- Toutes les installations-appliquer le connecteur approprié au conducteur de taille correct tel que spécifié par le fabricant du connecteur, en utilisant uniquement l'outillage recommandé ou approuvé par le fabricant du connecteur pour ce connecteur.
- Fixation de la connexion électrique: Serrez les valeurs spécifiées sur les étiquettes ou dans la documentation du produit.
- Signaux d'alarme-fournir une protection de limitation de courant externe. Rating - 60V (125V pour le chargeur 125V), 0.5 A sauf indication contraire.
- Mise à la terre-raccorder le châssis de l'équipement directement à la terre.
- AVERTISSEMENT: l'équipement ne fournit pas de contrôle de décharge et de protection de la batterie. À fournir par la source de la batterie externe.
- AVERTISSEMENT: une batterie peut présenter un risque de choc électrique, brûler du courant de court-circuit élevé, le feu ou l'explosion des gaz ventilés. Respectez les précautions appropriées.

Précautions

- Installer, mettre en service et utiliser l'équipement uniquement par du personnel professionnel, compétent et qualifié possédant les connaissances et l'expérience pratique nécessaires en matière d'équipement électrique et qui comprennent les dangers qui peuvent survenir lors de l'utilisation de ce type de équipement.
- Débranchez les piles des sorties et/ou suivez les procédures de sécurité tout en travaillant sur l'équipement. Les batteries peuvent être connectées parallèlement à la sortie des redresseurs. Éteindre les redresseurs n'enlèva pas forcément l'alimentation du bus.
- Les piles peuvent produire des gaz explosifs. Ne pas créer d'arcs, de fumée ou utiliser une flamme nue dans le voisinage.
- Ne débranchez pas les raccords de liaison permanents à moins que toutes les entrées d'alimentation ne soient déconnectées.
- Vérifiez que l'équipement est correctement mis à la terre avant de brancher l'appareil. Des courants de fuite élevés peuvent être possibles.
- Exercez des soins et respectez tous les avertissements et pratiques de sécurité lors de l'entretien de cet équipement. L'énergie et les tensions dangereuses sont présentes dans l'appareil et sur les câbles d'interface et les connecteurs qui peuvent choquer ou causer des blessures graves.
- Utiliser des pratiques de levage sûres. L'équipement est lourd. Les dispositifs de levage sont recommandés.
- Utiliser les précautions suivantes en plus des procédures appropriées de formation et de sécurité d'emploi:
    - n'utiliser que des outils correctement isolés.
    - Enlevez tous les objets métalliques (porte-clés, lunettes, bagues, montres ou autres bijoux).
    - suivez les procédures de lock out tag out (LOTO): client spécifié, spécifique au site ou général selon le cas.
    - Débranchez toutes les entrées d'alimentation avant d'entretenir l'équipement. Vérifiez l'alimentation de plusieurs entrées.
    - Portez des lunettes de sécurité.
    - respectez les exigences relatives aux équipements de protection individuelle: client spécifié, spécifique au site ou général selon le cas.
    - tester les circuits avant de les toucher.
    - être conscient des dangers potentiels avant d'entretenir l'équipement.
    - identifier les potentiels électriques dangereux exposés sur les connecteurs, le câblage, etc.
    - Évitez de contacter les circuits lors du démontage ou du remplacement des couvercles.
    - utilisez une sangle ESD personnelle lors de l'accès ou de la suppression de composants électroniques.
- Suivez toutes les instructions d'avertissement et de précaution, y compris les procédures de remplacement et d'élimination appropriées, afin de minimiser les risques de blessure. Les batteries externes, le cas échéant, doivent être installées conformément à toutes les règles et réglementations nationales et locales, y compris la CEC, partie 1.
- Le personnel équipé de dispositifs médicaux électroniques doit être conscient que la proximité des systèmes de distribution et d'alimentation en courant continu, y compris les piles et les câbles, généralement dans les salles de télécommunication, peut affecter les appareils électroniques médicaux, tels que les stimulateurs cardiaques. Les effets diminuent avec la distance.

Unpacking the Charger

- Inspect the shipping pallet and container for any damage prior to accepting receipt of the system.
- If any damages are noted, make photo copies of all shipping records before reporting this to the carrier.
- If any damage or missing items are noted after accepting delivery, notify the deliverer and request an inspection. Upon leaving our facility, OmniOn is not liable for any damage that occurs during shipping and handling.
- If a unit requires repair, please contact our customer support line for information on repair and return information.

Parts Checklist

- When first opening the Integritas Battery Charger, confirm the contents of your shipment matches with the shippers packing list as some items will arrive as 'Ship Loose Items'.
- Retain the original packaging until the system has been installed and fully tested.
- Visually inspect the contents for any damage or missing items. If any damage is discovered, follow the same procedure noted when receiving the unit.

Storing the Unit

- The unit should be stored in its original packaging.
- The area should be dry with the ambient temperature between -40°C and +85°C (-40°F and +185°F).

System Weight and Dimensions

Cabinet	Height		Width		Depth		Door Swing	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm
19" Type I	30.5	775	17.35	441	14.11	358	30.8	782
23 Type II	30.5	775	23	584	14.11	358	36.7	925

Cabinet		Min. Weight		Max Weight	
Size	Fill	Lbs.	KG	Lbs.	KG
19" Type I	Empty	60	27.2	68	30.9
	Loaded	96.3	43.7	104.3	47.4
23 Type II	Empty	71	32.2	87	39.5
	Loaded	143.6	65.2	159.6	72.5

Table 2 Cabinet Weights and Dimensions

For material availability, order status, shipping info, missing or damaged materials, please contact Customer Service. 1-877-OmniOn (546-3243) Prompt 3 for Customer Service

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Unpacking Rectifiers

- The rectifier modules are shipped in separate packages from the Integritas Battery Charger. Inspect the shipping container for any damage prior to accepting receipt of the rectifiers.
- If any damages are noted, make photo copies of all shipping records before reporting this to the carrier.
- If any damage or missing items are noted after accepting delivery, notify the deliverer and request an inspection. Upon leaving our facility, OmniOn is not liable for any damage that occurs during shipping and handling.
- If any units require repair, please contact our customer support line for information on repair and return information.

Charger		Output Current		Output Voltage				Thermal
Label	Model	Low Line	High Line	Setpoint (Factory)	Range (Vdc)	Regulation	Ripple (mVrms)	Max BTU/ Hr
	IP020ACR125ATEZ	10	20	125	90-160	±0.5%	150	544
	IP050ACR048ATEZ	22	50	54.5	42-58	±0.5%	100	510
	IP100ACR024ATEZ	44	100	27.25	21-29	±0.5%	100	620
	IP040H3R125ATEZ	N/A	40[1]	125	90-160	±0.5%	150	853

[1] Rectifier Io: 50 amps out @ 90-125 VDC; 40 amps out @ 142 VDC; 32 amps out @ 160 VDC. All outputs based on operating temp up to 55 deg. C.

Table 3 Rectifier Specifications

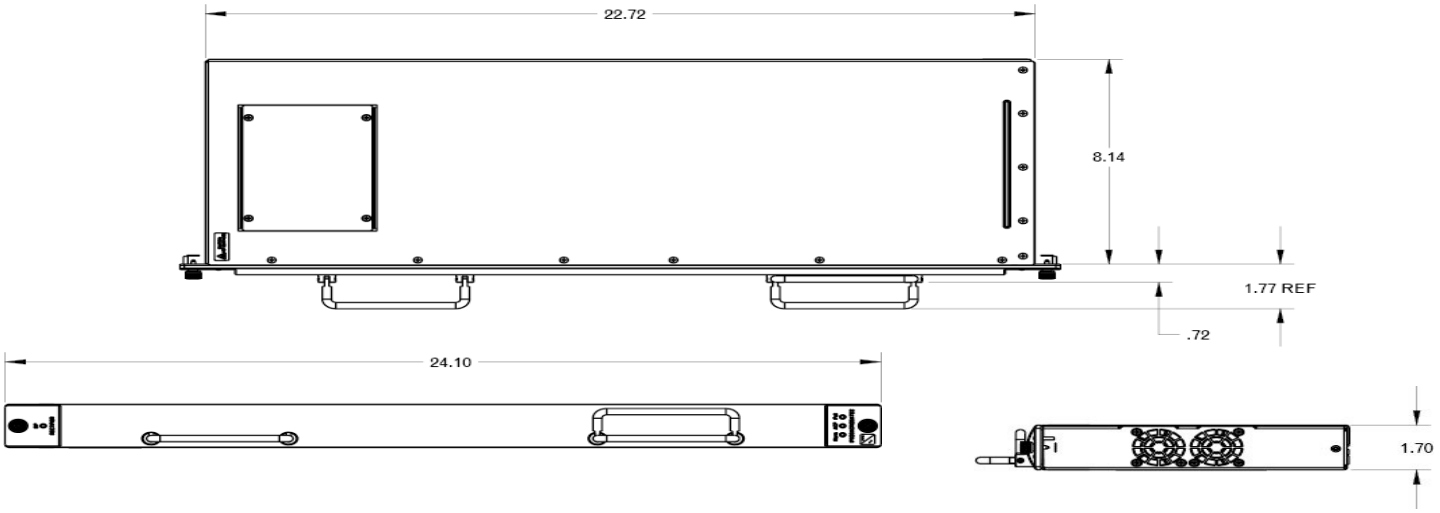

Figure 4 Rectifier Module Dimensions

Installation

Installation Tools Required

You will need the following tools.

- Wire cutters and strippers
- Heat shrink gun
- Digital meter with an accuracy of ±0.02%
- Screw drivers (flat-blade and Phillips)
- ESD wrist strap
- 24 or 48V or 125V test load
- Calibrated clamp-on dc current meter (0.1 ADC sensitivity)
- Torque wrench
- Sockets -: SAE and metric 5/16”, 7/16”, 9/16”, 19 mm, etc.
- 12" extension for socket
- Masonry drill kit as required
- Compression tool for installation of various compression lugs
- Protective canvas
- Insulating rubber mat
- Standard insulated installation tools, screwdrivers, etc.
- 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. (Optional. See the controller manual for more information).

(Note: Use properly insulated tools when working on or near high power circuits)

Equipment Identification

Identify the equipment you have received. Follow procedural steps which match the equipment being installed.

Mechanical

The battery charger is designed to be mounted either on a wall or in a rack, in an area free of flammable/explosive materials. Hot air exits out of the top of the cabinet. We recommend not mounting temperature sensitive equipment above the cabinet.

Recommended Clearance:

- Above and Below the charger: 2 inches (5 cm)
- In Front of the charger: 36.7” (925 mm) to allow for maximum door swing

CAUTION: Health Hazard

Follow safe wall drilling procedures to prevent possible asbestos exposure.

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Prior to Installation

Optional External Shunt Jumper

If the charger is to be wall mounted this jumper option must be set prior to mounting, since it will be inaccessible once installed.

Set External Shunt Jumper-Option

The charger is factory configured for an internal shunt.

Set the Shunt Jumper to External if an external shunt is to be used:

- Remove charger rear panel - 8 screws: 4 each top and bottom.
- Move both Shunt Jumpers HDR11 and HDR12 to RMT (External) position - pins 2- 3.
- Replace charger rear panel.
- Secure with 8 screws.

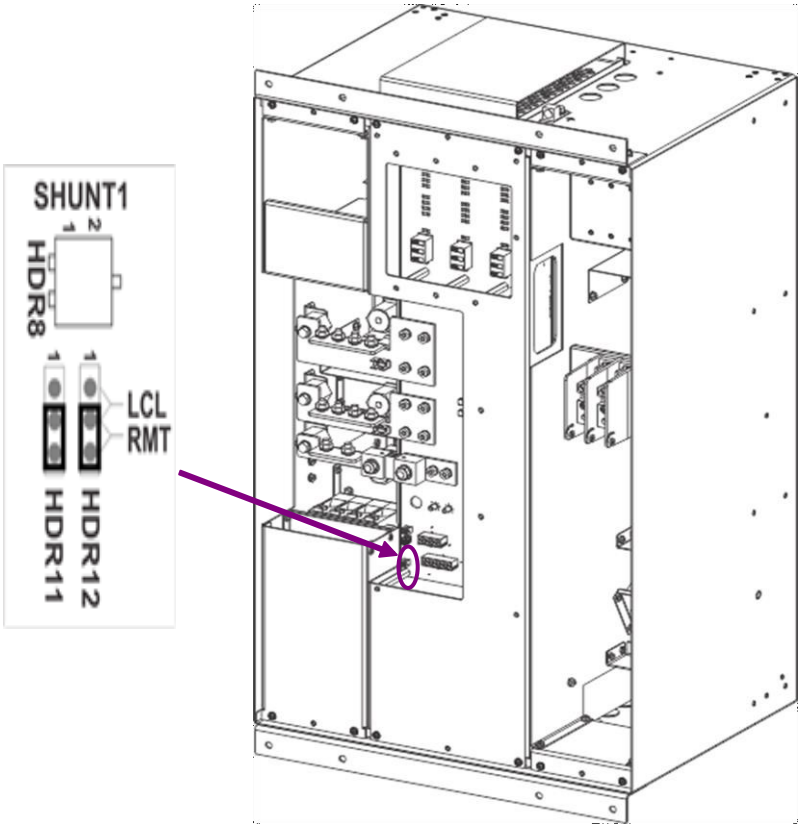


Figure 5 External / Internal Shunt setting

Mounting the Charger to a Wall

Caution Use safe lifting practices. The charger is heavy. Lifting devices are recommended. The wall and fasteners must safely support 470 lbs. (3 times the charger weight). Use the correct fasteners and the proper torque required for the wall material and thickness where the charger will be installed.

Locate the appropriate location for mounting the charger ensuring that proper clearances and environmental impacts are taken into consideration. Do not mount on heat generating surfaces or exposed to external environment without providing adequate protection from heat and moisture.

Mount with 8 sets of mounting hardware rated for at least 60 lbs. each.

1. Locate appropriate place for the charger.
2. Secure the bottom wall mount bracket to the wall.
   a. Remove the bottom wall mount bracket from the charger (4) screws.
   b. Drill (4) holes in the wall to mount the bottom bracket. Use the bottom bracket as a template.
   c. Secure the bottom bracket to the wall with mounting hardware.
3. Prepare to secure the top wall mount bracket to the wall.
   a. Place the charger against the wall, resting on the wall mounted bottom bracket.
   b. Temporarily install one screw through the bottom bracket into the charger.
   c. Mark (4) holes in the wall for top bracket mounting hardware. Use the top bracket as a template.
   d. Remove the charger, first removing the screw installed in step b.
   e. Drill (4) holes in the wall to mount the top bracket.
4. Secure the charger to the wall.
   a. Place the charger against the wall, resting on the bottom secured bracket.
   b. Secure the top bottom bracket to the wall with mounting hardware.
   c. Secure the cabinet to the bottom bracket with the 4 screws removed in step 2a.

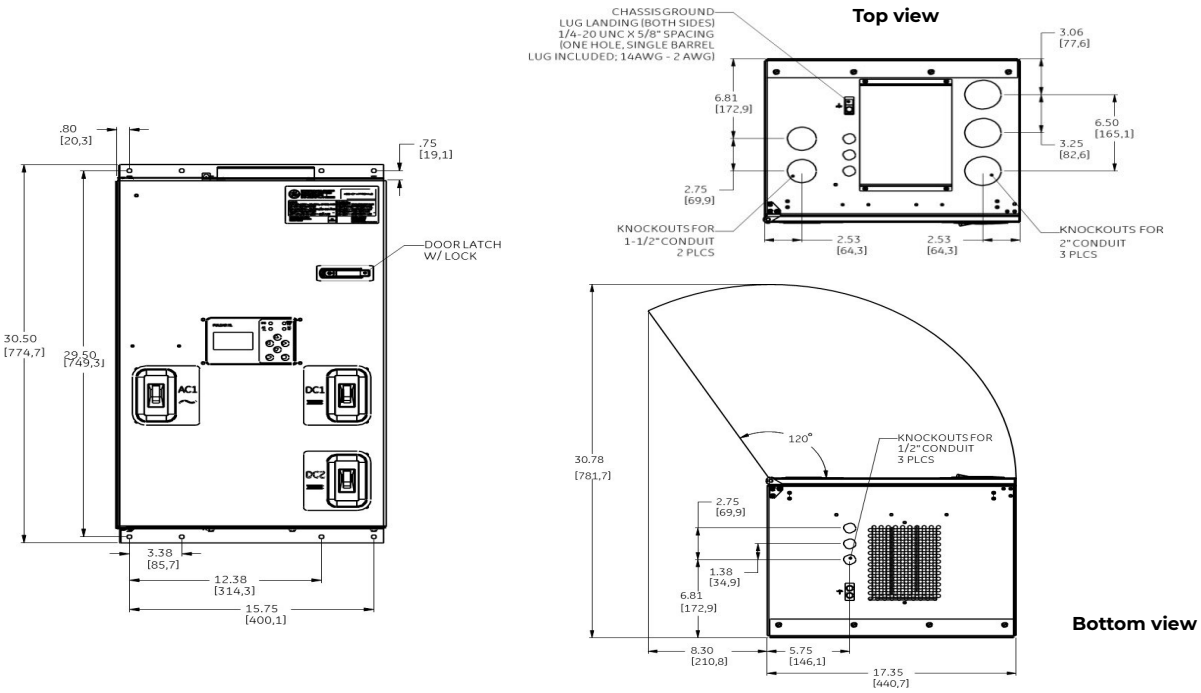


Figure 6 Battery charger Installation details – Top Feed

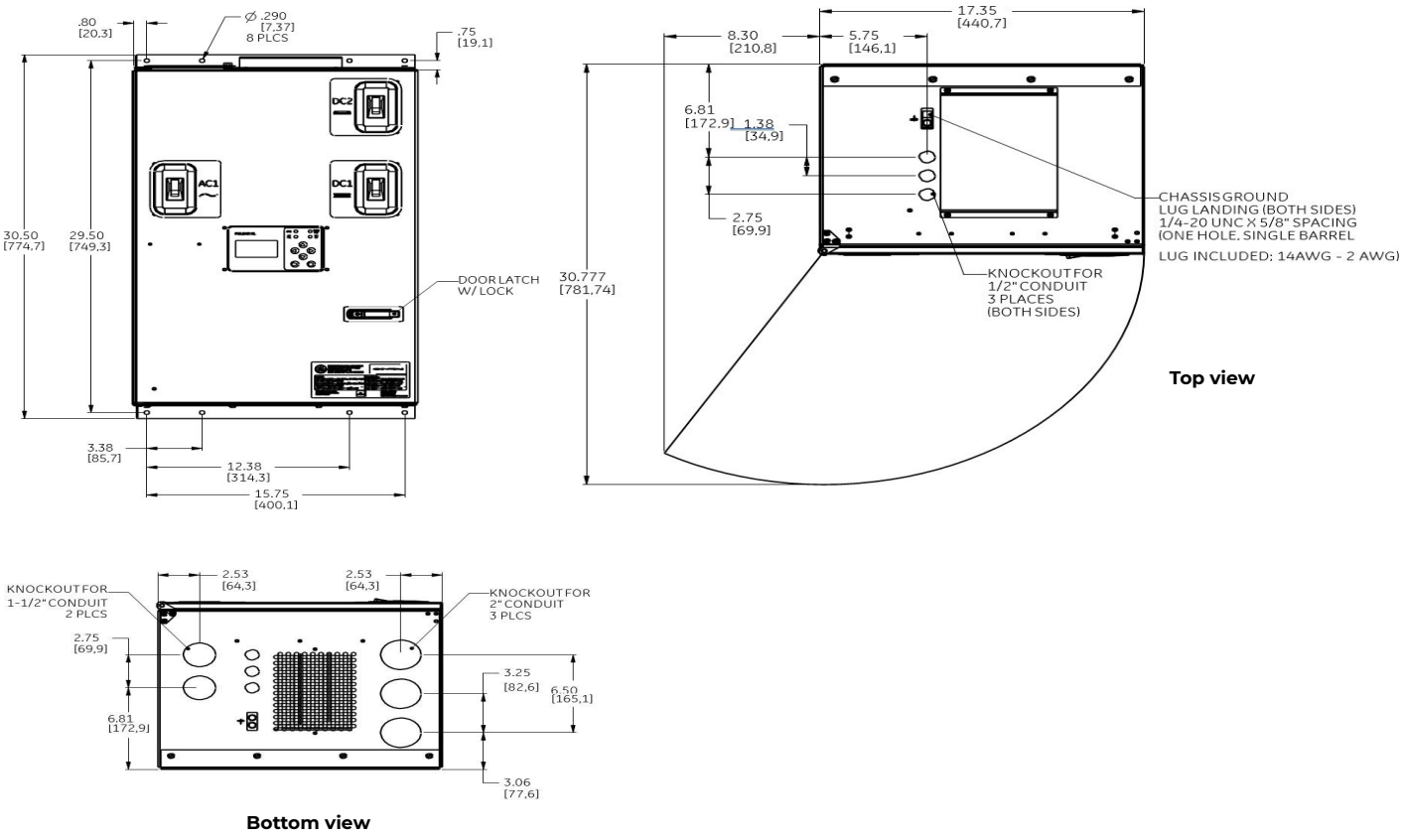


Figure 7 Battery charger Installation details – Bottom Feed

Mounting the Charger to a Rack

Optional rack mount hardware is available for purchase, for mounting the battery chargers into or onto relay racks. To ensure proper support it's important to select the appropriate kit for the rack you are installing the charger into (19" or 23"). Brackets can be flipped (see Fig. 9) to modify rack mounting depth as necessary for 19" installations. The 23" installation is available as a Flush Mount with mounting brackets to be attached to the side walls at the rear of the charger.

Orient optional rack mount brackets for the proper mounting to the charger cabinet. Each bracket uses 8 screws to attach to the charger cabinet. Torque each screw to 25 in-lb (2.8 Nm).

Attach the entire system to the rack using a minimum of twelve (six on each side) 12-24 screws (provided). Using a 5/16" socket, torque each screw to 35 in-lb (4.0 Nm).

Caution It is critical for ongoing installation safety that the mounting rack is properly fixed to the floor, to prevent tipping and resulting damage or injury. Consult the manufacturer of the rack for appropriate guidance.

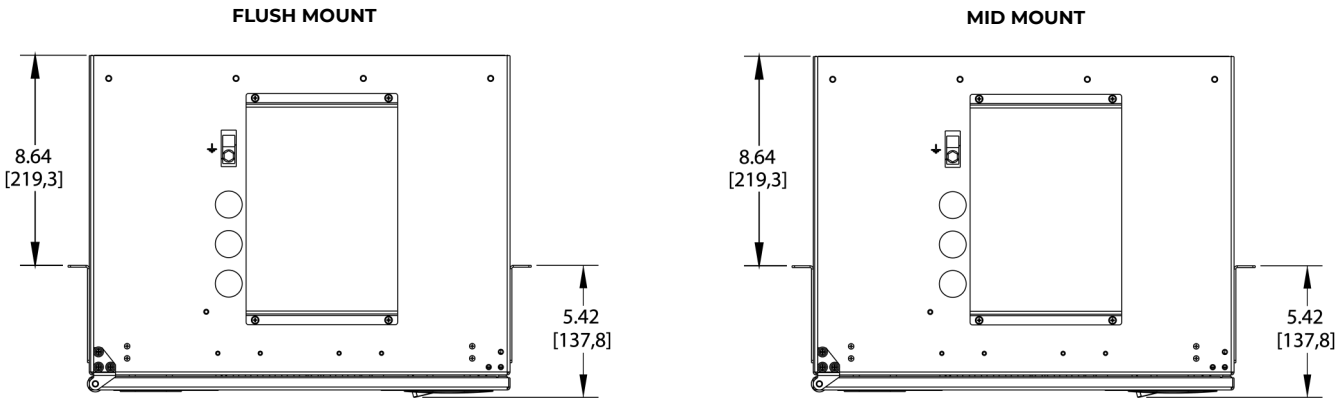


Figure 8 Rack Mount Charger Installation details – Flush and Mid-mount

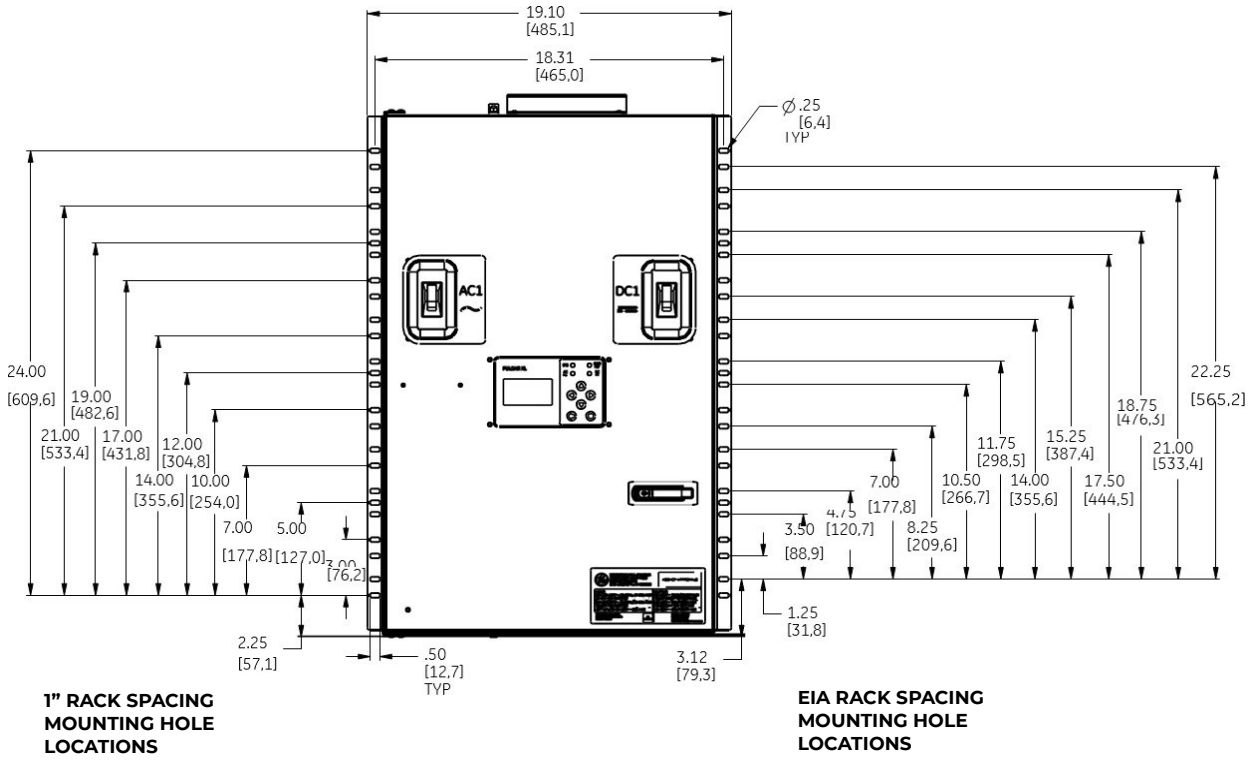


Figure 9 Rack Mount Charger Installation details – hole positions

Input and Output Locations and Dimensions

Input and output locations are pre-configured in the base model prior to purchase. AC and DC I/O's can be optioned to enter and exit out of the top of the Battery Charger or the bottom. Controller I/O's can be sent out of the top or the bottom of any Battery Charger no matter the configuration.

AC input for the Battery Charger is always located on the left side of the cabinet, whereas the DC output is always located on the right. Whether the input & output locations are on the top or bottom of the cabinet conduit knockouts are provided with the following sizes:

Quantity	Size	Location	Purpose
2	1 - 1/2"	AC Input	AC Input and safety ground cables
3 x 3	1/2"	Controller	Controller I/O's; 3 on top and 3 on bottom
3	2"	DC Output	DC Output cables and remote disconnect
1 x 1	1/4-20 x 5/8"	Chassis	Chassis grounds on top and bottom

Table 4 Input / Output Conduit Sizing

Electrical - AC Input Connections

DANGER Shock Hazard: Turn OFF and lock-out tag-out the AC source before making AC connections. Disconnect all input branch circuits prior to making input connections to the system. When connecting to any source, ensure compliance to all local and national wiring rules.

Caution Ensure that wires do not come in contact with sharp or rough surfaces that may damage insulation and cause a short circuit.

Attention Input wire sizing and circuit breaker recommendations listed within this section are provided as a general guide. To ensure a safe installation, always follow NEC sizing practices, proper conduit sizing, and/or local wiring codes and practices as applicable.

1. Locate the AC Input box location depending on the configuration of the charger
   - Bottom fed arrangements are located on the bottom LEFT
   - Top fed arrangements are located on the top LEFT
2. Verify all AC breakers are off-Charger AC1 and external AC feed breaker.
3. Choose the next step to match AC input voltage marked on the charger ratings label.

AC Input Service	See AC Input Section
120/240 single phase	120/240 Single Phase AC Input
380-480 3-phase 3-wire	380-480V Three (3) Phase, 3W+PE AC Input
240 3-phase 3-wire	240V Three (3) Phase, 3W+PE AC Input
480Y/277 3-phase 4-wire	480Y/277V Three (3) Phase, 3W+N+PE AC Input

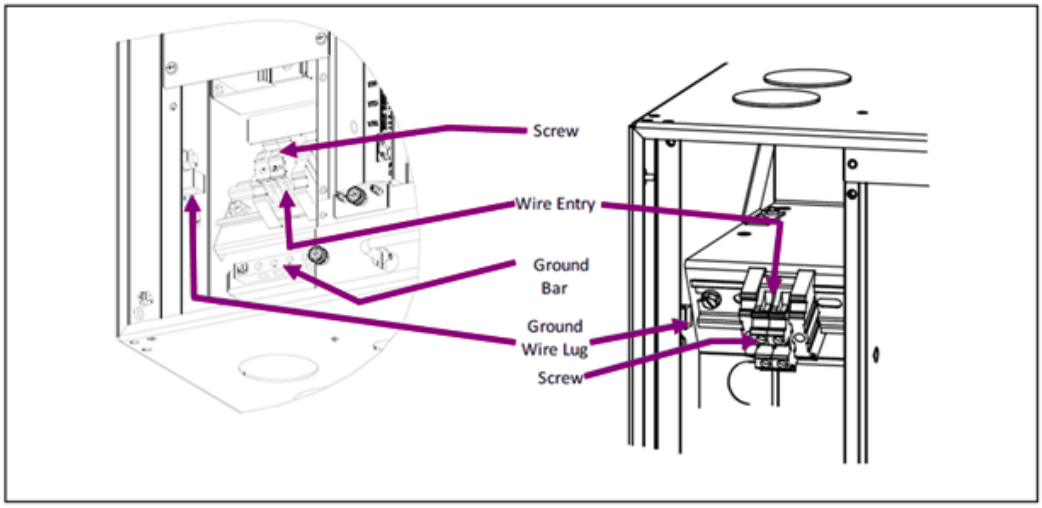


Figure 10 AC Input Connection points – Top Feed and Bottom Feed versions ("SACY" variation shown)

Connect 120/240 Single Phase AC Input Section

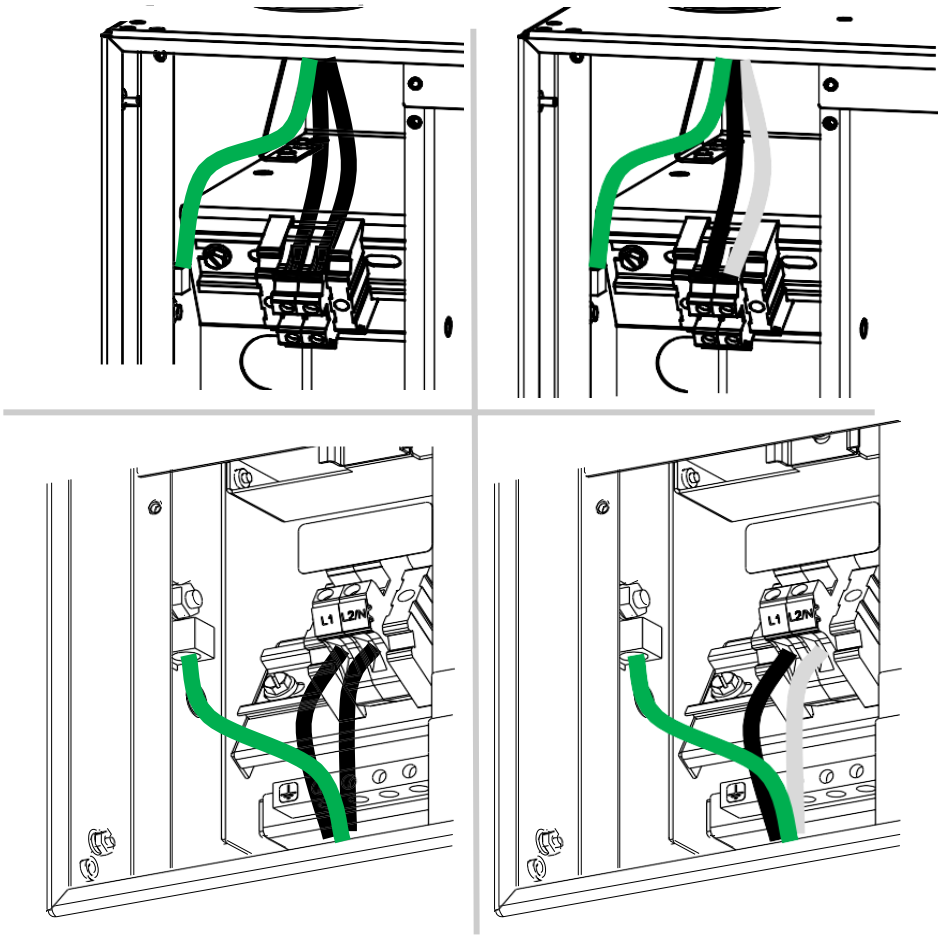
Recommended External Protection and Minimum Wire Size[1]							
				100-120VAC, L-N		200-240VAC, L-N or L-L	
Cabinet Size	**Configuration**	**Rectifier Positions Powered**	**Maximum Rectifiers per Feed**	**External Feed Protector**	**Minimum Wire**	**External Feed Protector**	**Minimum Wire**
19	SACY	3	3	60A	6 AWG[3]	60A	6 AWG[3]
23	SACY	6	6	125A	1 AWG[2]	125A	1 AWG[2]
23	DACY	6	3	60A	6 AWG[3]	60A	6 AWG[3]

[1]Sizing values based on full population of all rectifier positions (3 or 6) to ensure full power all rectifiers.
[2]Terminal blocks are sized to fit between 6 - 2/0 AWG.
[3]Terminal blocks are sized to fit between 20 - 6 AWG.

Connect 120/240 Single Phase AC Input Section (cont.)

1. Verify the charger AC breaker (AC1) is OFF.
2. Verify AC voltage matches AC Input per Charger Label with a meter.
3. Bring AC wires into the AC Input Box in conduit through one of the 2” knockouts.
4. Connect Ground wire (green /green-yellow) to lug.
    a. Strip 1/2” (13mm).
    b. Insert into ground lug.
    c. Tighten lug screw securely.
    d. Pull wire to verify.
5. Connect each AC wire to the terminal block in the AC Input Box.
    a. The AC terminal connections are labeled at each position - Gnd, L, N, L1, and L2.
    b. Strip 1/4” (10mm).
    c. Insert into terminal block.
    d. Torque screw to 13 in-lb (1.5 Nm).
    e. Pull wire to verify.

Top Feed



Bottom Feed

Figure 11 AC Input Connections (1-Φ)

Connect 380-480V Three (3) Phase, 3W+PE AC Input Section

Recommended External Protection and Minimum Wire Size[1]					
				380-480V~ Phase to Phase	
Cabinet Size	**Configuration**	**Rectifier Positions Powered**	**Maximum Rectifiers per Feed**	**External Feed Protector**	**Minimum Wire**
19	SH3Y	3	3	40A	8 AWG[3]
23	SH3Y	6	6	70A	4 AWG[2]
23	DH3Y	6	3	40A	8 AWG[3]

Connect 240V Three (3) Phase, 3W+PE AC Input Section

Recommended External Protection and Minimum Wire Size[1]					
				240V~ Phase to Phase	
Cabinet Size	**Configuration**	**Rectifier Positions Powered**	**Maximum Rectifiers per Feed**	**External Feed Protector**	**Minimum Wire**
19	SL3Y	3	3	40A	8 AWG[3]
23	SL3Y	6	6	80A	4 AWG[2]
23	DL3Y	6	3	40A	8 AWG[3]

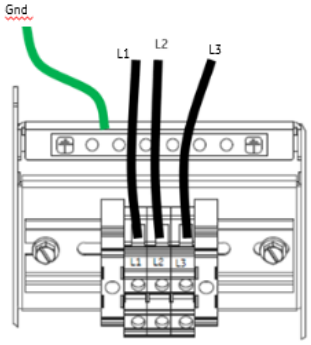
[1]Sizing values based on full population of all rectifier positions (3 or 6) to ensure full power all rectifiers.

[2]Terminal blocks are sized to fit between 6 - 2/0 AWG.

[3]Terminal blocks are sized to fit between 20 - 6 AWG.

1. Verify the charger AC breaker (AC1) is OFF.
2. Verify AC voltage matches AC Input per Charger Label with a meter.
3. Bring AC wires into the AC Input Box in conduit through one of the 2” knockouts.
4. Connect Ground wire (green /green-yellow) to lug.
   a. Strip 1/2” (13mm).
   b. Insert into ground lug.
   c. Tighten lug screw securely.
   d. Pull wire to verify.
5. Connect each AC wire to the terminal block in the AC Input Box.
   a. The AC terminal connections are labeled at each position - Gnd, L, N, L1, and L2.
   b. Strip 1/4” (10mm).
   c. Insert into terminal block.
   d. Torque screw to 13 in-lb (1.5 Nm).
   e. Pull wire to verify.

Top Feed



Bottom Feed

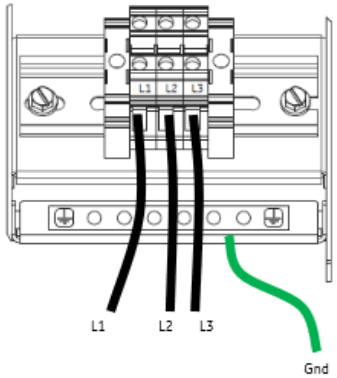


Figure 12 AC Input Connections (3-Φ, 240 V) Without Neutral

Connect 480Y/277V Three (3) Phase, 3W+N+PE AC Input Section

Recommended External Protection and Minimum Wire Size[1]					
				277V~ Phase to Neutral	
Cabinet Size	**Configuration**	**Rectifier Positions Powered**	**Maximum Rectifiers per Feed**	**External Feed Protector**	**Minimum Wire**
19	SHWY	3	3	20A	10 AWG[3]
23	SHWY	6	6	40A	6 AWG[2]
23	DHWY	6	3	20A	10 AWG[3]

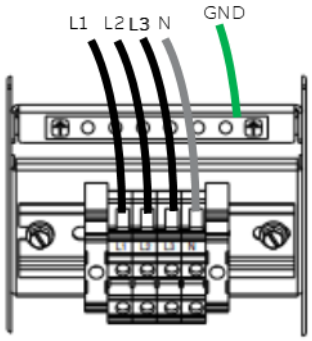
[1]Sizing values based on full population of all rectifier positions (3 or 6) to ensure full power all rectifiers.

[2]Terminal blocks are sized to fit between 6 - 2/0 AWG.

[3]Terminal blocks are sized to fit between 20 - 6 AWG.

1. Verify the charger AC breaker (AC1) is OFF.
2. Verify AC voltage matches AC Input per Charger Label with a meter.
3. Bring AC wires into the AC Input Box in conduit through one of the 2" knockouts
4. Connect Ground wire (green /green-yellow) to lug.
   a. Strip 1/2" (13mm).
   b. Insert into ground lug.
   c. Tighten lug screw securely.
   d. Pull wire to verify.
5. Connect each AC wire to the terminal block in the AC Input Box. AC terminal connections are labeled at each position - Gnd, L, N, L1, and L2.
   a. Strip 1/4" (10mm).
   b. Insert into terminal block.
   c. Torque screw to 13 in-lb (1.5 Nm).
   d. Pull wire to verify.

Top Feed



Bottom Feed

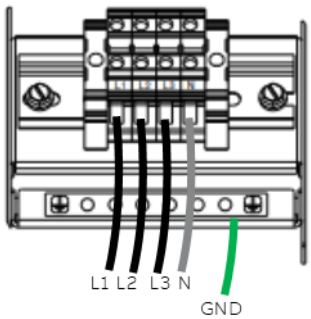


Figure 13 AC Input Connections (3-Φ, 277 V) with Neutral

DC Output Load Connections

- Connect Loads (equipment to be powered)
- Load voltage is marked on the charger ratings label.
- Load connections are to the terminal blocks in the DC Output Box.
- Load terminal block, (TB) is behind the Battery terminal block.
- Each TB position is marked with its connection: BAT1+, BAT1-, BAT2+, BAT2-, 125VDC+, 125VDC-, 24VDC+, 24VDC-, 48VDC+, 48VDC-.

1. Verify that equipment being powered accepts the charger output voltage.
2. Verify all DC breakers (DC1, DC2) are OFF.
3. Remove the DC Output Box cover-4 thumbscrews.
4. Connect Load 1 Positive cable to the Positive terminal block position marked Load 1.
5. Connect Load 1 Negative cable to the Negative terminal block position behind the positive position marked Load
6. If DC2 Breaker is labeled “Load”, Repeat from 4. for Load 2.
7. Replace the DC Output Box cover-4 thumbscrews.

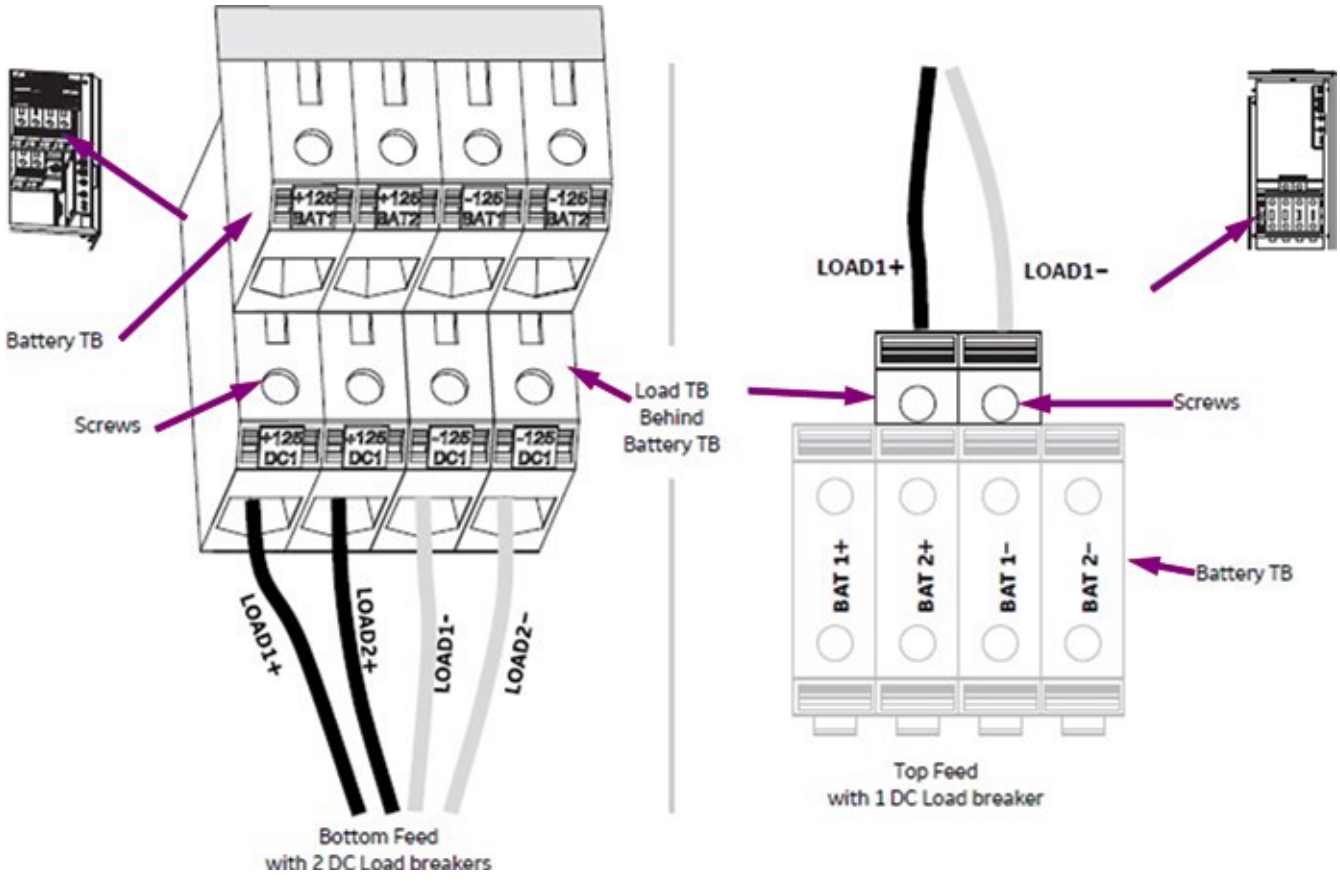


Figure 14 DC Output Connections (shown for 125VDC)

Battery Connections

DANGER Batteries present an energy hazard.
DO NOT short battery wires to ground or to each other.

WARNING Remove all rectifier modules and the controller prior to proceeding.

Caution Ensure that wires do not contact sharp or rough surfaces that may damage the insulation and cause a short circuit. Battery voltage is marked on the charger ratings label.

DC Output Box	Bottom Feed	Top Feed	
DC knockouts:	for 2" conduit		
Wire Gauge:	6AWG to 1/0	Strip Length:1"(24 mm)	Torque Screw to 70 in-lb (8 Nm)

1. Measure battery voltage and polarity with a meter.
2. Verify all DC breakers (DC1 and DC2 / BATT if present) are OFF.
3. Remove the DC Output Box cover-4 thumbscrews.
4. Connect Battery Positive cable to the terminal block position marked **BAT1+ (BAT2+** for second battery).
5. Connect Battery Negative cable to the terminal block position marked **BAT1– (BAT2–** for second battery).
6. Repeat from 1 for second battery if present.

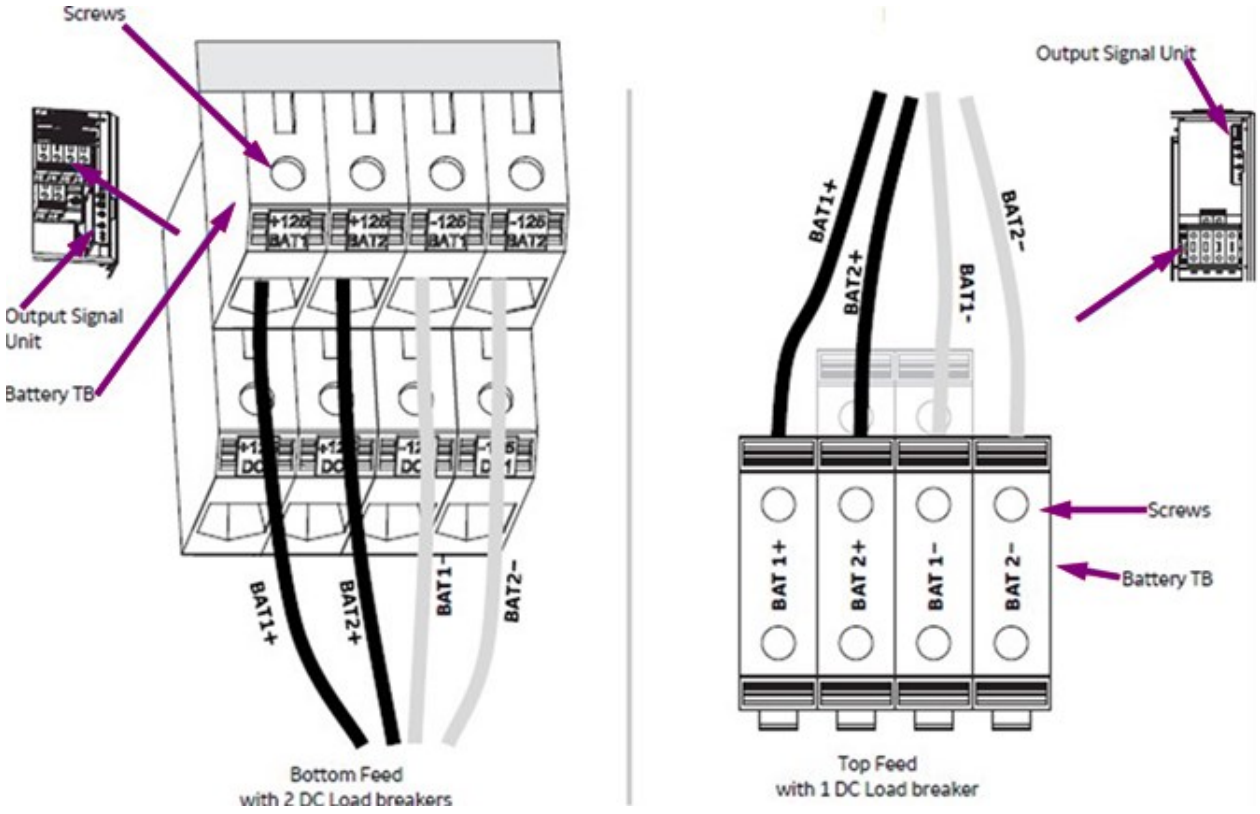


Figure 15 Battery Connections (shown with +/- 125VDC)

Confirm Battery Polarity

1. Turn BATT breaker ON if present.
2. Observe the Battery Polarity LEDs on the Output Signal Unit and confirm that green LED is on.
3. If Ready (green) LED is not on, turn off the BATT breaker and make wiring corrections as needed.

STOP RED LED indicates reverse polarity. Reverse battery cable connections before proceeding.

If Green LED is not on, verify voltage on the battery wires.

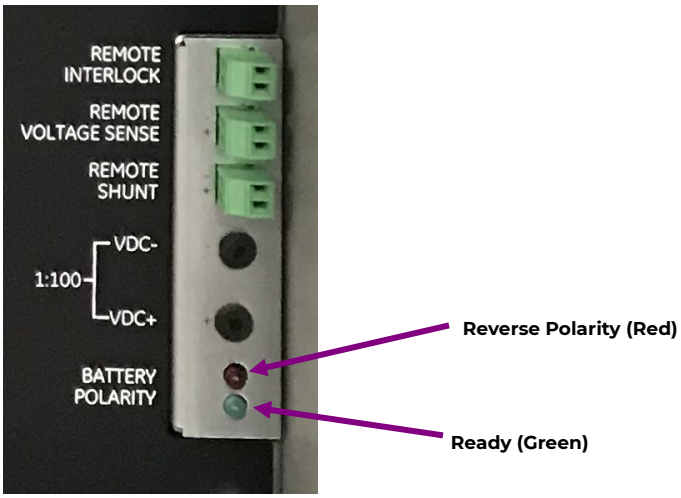


Figure 16 Output Signal Unit

Grounding Connections

Grounding the Chassis

- Chassis Ground lug-1/4" on 5/8" centers (lug provided). Minimum 6 AWG recommended.
- Connect ground wire to chassis on top or bottom of cabinet. Two 1/4-20 screws provided.
- Torque to 65 in-lb (7.3 Nm) using a 7/16" socket.

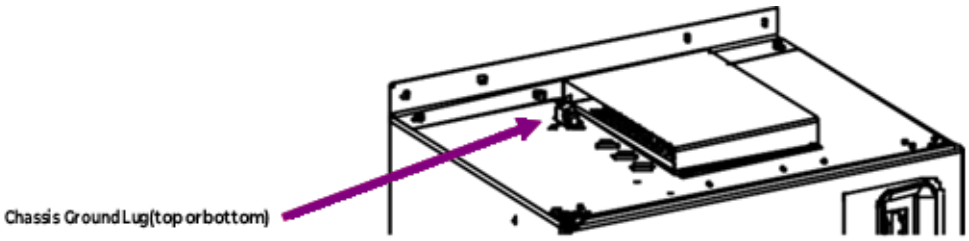


Figure 17 Chassis ground connection point

Output Signals and Controls

Connect per site engineering instructions.

- Connections are on the front of the Output Wiring Area in the front of the charger.
- Detachable blocks-16 AWG max, Strip-0.35” (9 mm), Torque-2 in-lb (0.25 Nm)
- Route wires through routing bend tab and tie wires to wire tie points and wire as desired.

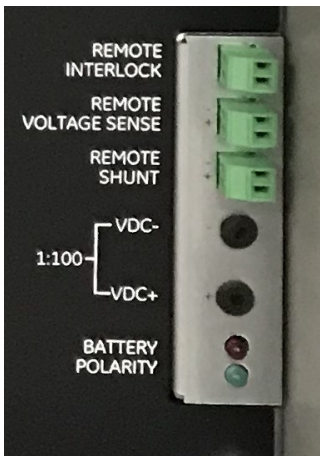


Figure 18 Output Signal Unit

Remote Shunt (optional)

The system includes a pre-configured internal 300Adc shunt for monitoring battery current. For customers with system distributions that include an existing shunt on their sites, the Integritas system allows monitoring of an existing shunt via the Remote Shunt. Prior to wiring your shunt monitor voltage, the jumper on rear of charger must have been moved prior to installation. Connect your shunt monitor leads to the Output Signal Unit assembly. Connect with proper polarity as marked.

For shunt settings on the Pulsar XL controller see Appendix B. For shunt settings on the Nebula controller see Appendix C.

Remote Voltage Sense (optional)

The system allows for the user to regulate their output voltage directly at the output bus of the charger or at a remote load location via the use of the “Remote Voltage Sense” option. This feature can compensate for I^2R cable losses of up to 2.0 Vdc, (1Vdc per + / - output load cable).

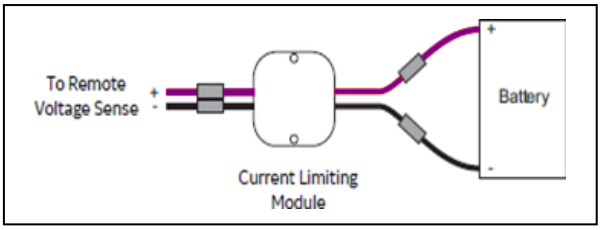


Figure 19 Remote Voltage Sense Module

1. Install current limiting module at the battery.

Battery	Module
125V	847540424
24/48V	848738278

2. Extend wires with butt-splices, (not provided).
3. Connect to battery + and-posts (terminals not provided). Stack up: Battery Post, Power terminal, Remote Voltage Sense terminal.
4. Torque per battery specification.
5. Connect current limiting module to the signal unit Remote Voltage Sense detachable block with polarity as marked. Extend wires with butt splices (not provided).

Remote Interlock (optional)

The use of the Remote Interlock allows the user remote accessible control of the output voltage of the charger without needing to removing AC power from the system.

A factory installed jumper initially enables the rectifiers without an external signal.

Interlock enables rectifier output. Enable rectifier output with a control contact between pins of Remote Interlock connector.

Open Circuit voltage-7Vdc. Short circuit current-1mA per shelf. Max enable voltage - 0.7Vdc.

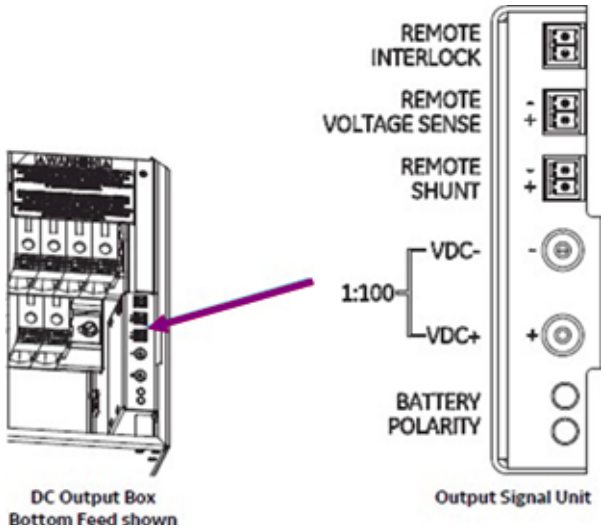


Figure 20 Remote Interlock and Interlock Cable Recommendations.

Cables not provided-see Information

1. Remove factory installed jumper from Remote Interlock connector.
2. Insert interlock signal cable into Remote Interlock connector. Voltage Sense.

Thermal Probes

- Temperature/voltage probes (up to 16) used in Battery Management options
- Slope Thermal Compensation-High and Low Temperature

Battery Monitoring is accomplished with a “Daisy Chained” series of probes, enabling multiple battery strings to be monitored with a single cable back to the charger. The Probes monitor battery temperature. Bolt the Probe under the “–“terminal connector hardware; NOT under the connecting lug. The monitoring connections are the same for NiCad and Lead acid (VRLA, Flooded) battery technologies.

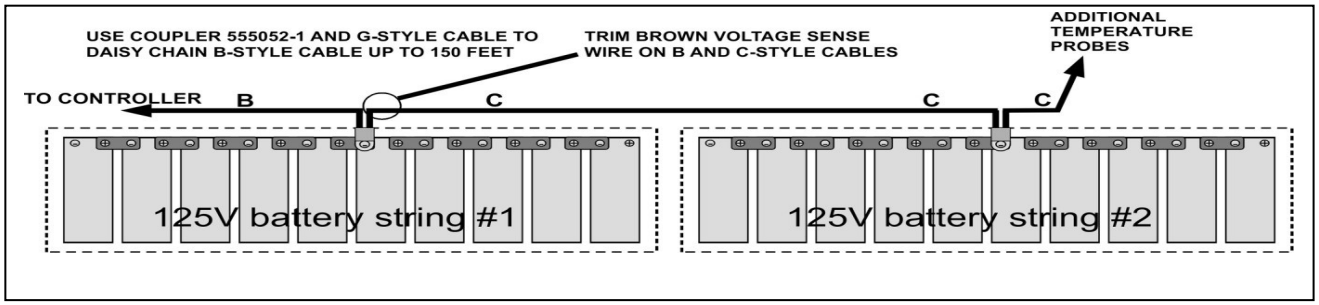


Figure 21 Battery thermal probe placement (1 per string)

Start-Up

Rectifier Installation

Note: the rectifiers are keyed for input and output voltage, only allowing their installation into compatible chargers.

WARNING Equipment Damage-DO NOT install rectifiers if Battery Polarity LED is RED.

- Verify the battery polarity LED is not RED, and the Ready LED is Green.
- If the Ready LED is not Green, verify the voltage on the battery wires.
- Slide the Rectifier firmly into a Rectifier position. Oriented as shown.
- Secure rectifier captive panel screws-Top and Bottom.
- Repeat for the remaining rectifiers.
- Secure empty slot fillers in each vacant rectifier position. Tighten captive panel screws top and bottom.

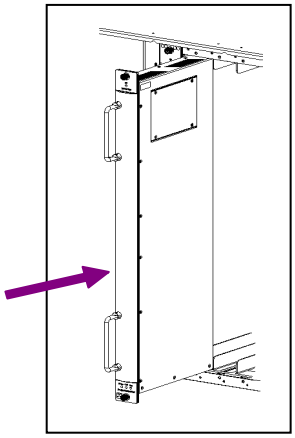


Figure 22 Rectifier Insertion

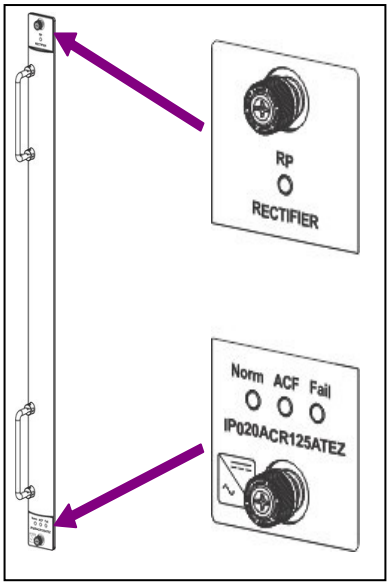


Figure 23 Rectifier LEDs and thumb screws

Power Unit LEDs (See Troubleshooting for details)	
LED	**Description**
Norm	Normal-Green
ACF	AC Input Failure-Red
Fail	Rectifier Failure-Red
RP	Reverse Polarity Failure-Red

Table 5 Rectifier LEDs

Breaker Sequence

- Verify all AC and DC connections have been completed and are secure.
- The Integritas system is protected by an upstream AC mains commercial line rated AC circuit breaker and an external feed breaker. Verify these AC input breakers are turned ON.
- Turn on the charger AC breaker AC1 (AC2 if present).
- The rectifiers will start-up, then the Controller will start-up.
- Verify each Rectifier and Controller has started.
- All rectifiers should be indicating green AC and DC LEDs with no red LEDs.
- The Controller should be indicating no Alarms-display background should be green and no red LEDs. If alarms are present, see Troubleshooting section. If there are no alarms, make the required adjustments to the default settings on the controller for this installation.

Verify Load and Battery Polarity

Note: Rectifiers are keyed, only allowing their installation into chargers of the same voltage.

- Turn on BATT breaker if present)
- Verify DC output voltage with a meter on VDC+ and VDC– jacks on the Output Signal Unit.

Note: Terminals voltage is output voltage ÷ 100.

- Turn on load breaker DC1 (DC2 if present)

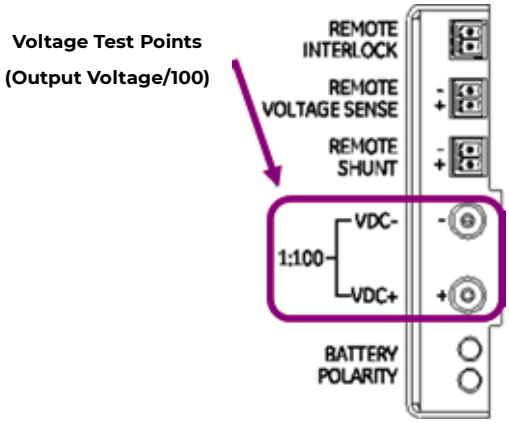


Figure 24 DC Output Test Points

Ground Fault Detection

The DC output section is equipped with a ground fault detection circuit. The detection circuit is designed to monitor the insulation resistance and system leakage capacitance between each polarity and system earth. If at any time the resistance falls below the user assign threshold (1-100 kΩ) an alarm indicator on the detector is lit and an alarm is sent to the system controller.

The detector includes a Test/Reset button. It is only functional when there is NO fault. By pressing the front-face combined test/rest button, a system test routine is executed.

The output relay remains de-energized as long as the test/reset button remains pressed.

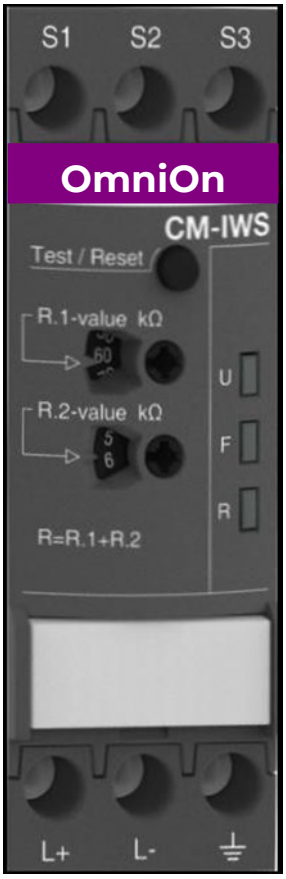


Figure 25 Ground Fault Detector Module

Alarms (Visual and Alarm Contacts, SNMP Traps)

FRONT PANEL CONTROLLER DISPLAY – The front panel controllers' display has the following four (4) Tri-Colored LEDs" to indicate the severity level of each alarm. RED-CRITICAL, AMBER-CAUTION, GREEN-OK.

- SYS
- AC
- GND FLT
- DC

Verify No Ground Fault Alarm

- Verify no ground fault alarm-Ground fault unit U LED is green and F LED is not red.
- If F LED is red, adjust values of resistance threshold down (R1 + R2).
- Operate Test/Reset button after each adjustment.
- If alarm continues, trouble shoot load and battery wiring accordingly.

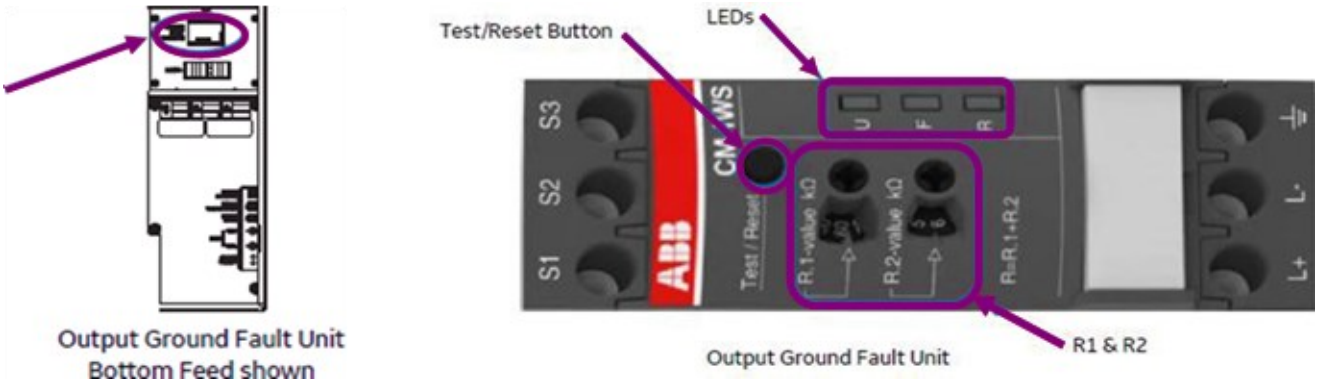


Figure 26 DC Output Ground Fault Detector

IP843G PULSAR XL CONTROLLER-The Controller includes a single “STATUS” LED. GREEN-GOOD, RED-FAILURE.

Battery Charger 943 NEBULA CONTROLLER-The Controller includes a “SYS” LED (GREEN-GOOD, RED-FAILURE), “ACO” LED, AC LED (GREEN-GOOD, RED-FAILURE), DC LED(GREEN-GOOD, RED-FAILURE) and GFI LED (GREEN-GOOD, RED -FAILURE).

RECTIFIER MODULE-Each individual Rectifier module includes four (4) LEDS.

- NORM
- AC
- FAIL
- BATTERY POLARITY

GROUND FAULT INDICATOR-The GF Indicator includes three LED’s

- U: GREEN LED for control supply voltage present
- F: RED LED for fault message (current exceeds preset value)
- R: YELLOW LED for relay status

LEDs, status information and fault messages			
Operational state	**LED U (green)**	**LED F (red)**	**LED R (yellow)**
Start-up		OFF	OFF
No fault		OFF	
Insulation fault (below threshold value)			OFF
KE/ wire interruption			OFF
System leakage capacitance during operation too high/ invalid measurement result			OFF

Table 6 GFI Status indications

Input AC SPD

Each SPD is provided with a visual GREEN-GOOD, RED-FAILED indicator window. See replacement ordering information in the Spares section of this document.

Output DC SPD

The DC output SPD is provided with an LED to indicate the health of the device. GREEN-GOOD, RED-FAILED LED Indicator. See replacement ordering information in the Spares section of this document.

SNMP Traps

Simple Network Management Protocol is an application-layer protocol designed to facilitate the exchange of management information between network devices. The Integritas system features SNMP V2c, SNMPV3, IPV6. SNMP utilizes six operations to respond to the various SNMP Hosts: Get, GetNext, GetBulk, Set, Trap, and Inform.

Verify Installation

Perform the following verification checklist after installation of batteries and wiring:

Step	Action
1	Verify cabinet is properly grounded (using Digital Multimeter (DMM)).
2	Verify the AC equipment ground is properly connected.
3	Verify the correct ground cable gauge is used. Use the standard grounding principles for the site.
4	Verify the AC voltage supplied matches the AC input voltage of the rectifiers.
5	Verify all DC cables are properly installed for the distribution.
6	Examine to assure no sharp corners are in contact with dressed wires. Modify to correct any problems found.
7	Check for conductor clearance within the frame associated with high power.
8	Check that all breakers are OFF, and all fuses not inserted.
9	Verify the battery breakers are open, if equipped. Manually operate them to the open position, if necessary.
10	Verify the polarity of all battery cables (using DMM).
11	Verify no shorts are present between frame ground and the AC service. Measure resistance from each AC input line terminal block position to frame ground.

Table 7 Installation verification checklist

The Integritas Pulsar XL and Nebula Controllers provide an inventory of installed equipment via the with EasyView2 software or directly to the second local Ethernet port, respectively. Navigate to this screen by selecting (> Reports > Inventory >)

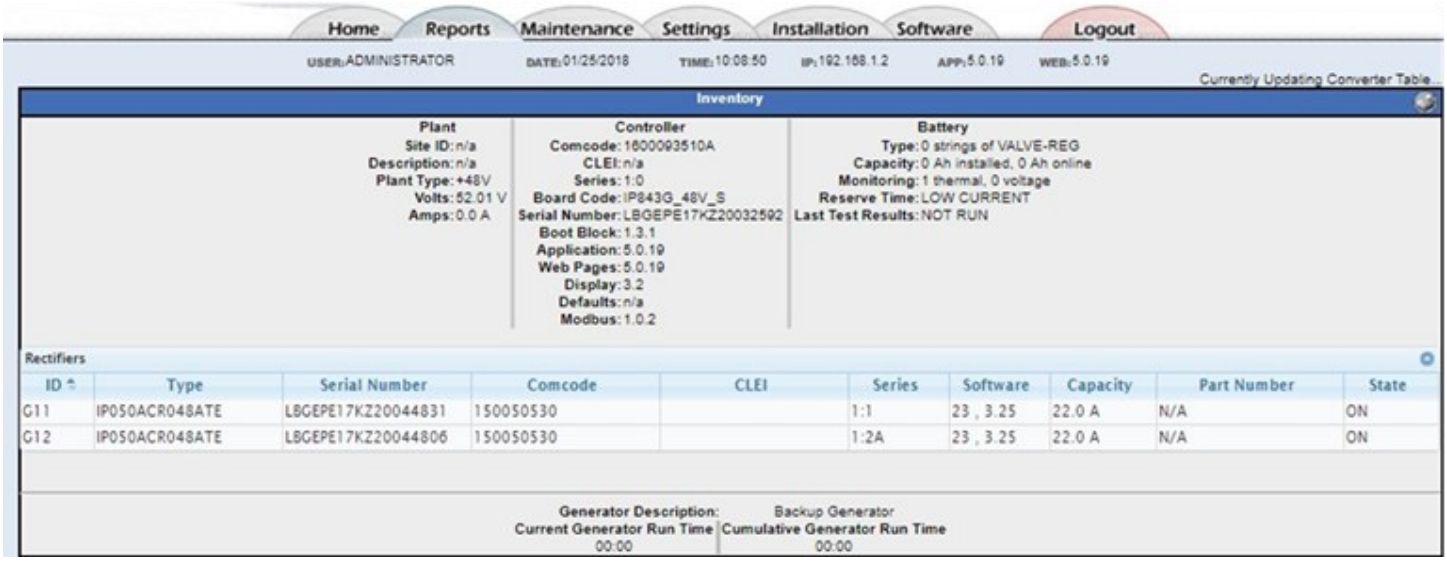


Figure 27 Inventory Report on GUI

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.

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.

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.

Verify Connectivity

The Integritas System

Step	Action
1	Place external battery disconnect switches in the ON (connected) position if equipped.
2	Turn on all AC circuit breakers supplying rectifiers.
3	Wait 30 seconds. Are all lit LEDs on all components including rectifiers, the controller, LVD control boards, and Aux Displays green?
	Yes – Go to Step 7. No – go to Step 4.
4	Initiate the **Clear Events** and **Uninstall Equipment** operations (in **Menu > Control /Operations)**. Non-existent alarm conditions should clear. Refer to the controller manual as needed.
5	If the controller appears not to be powered or not responsive, remove and reseat the controller.
6	If all lit LEDs still aren't green, review the installation procedure or refer to the **Troubleshooting** section in this manual. The controller display should indicate "NO ALARMS". The system float voltage, total load current, and system operating mode should be observable as indicated and the controller's back-light shall be illuminated green for no alarms and the system rectifier voltage should be displayed.
7	If Slope Thermal Compensation (STC) is active disable STC: (**Menu > Configuration > Batteries > Batt Temp Management > Temperature Comp**)
8	Check the voltage readings on the controller display. The controller is factory configured with a rectifier Float voltage set-point of 52.0V for -48V rectifier systems and ±27.25V for +24V and 125V for the 125V rectifier systems. **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. IfQS873 VT probes are installed in the system. STC may be active. This will be indicated bythe Plant Mode "FLOAT – TEMP COMP".
9	Enable Slope Thermal Compensation (STC) **if it was disabled in Step 7:** **Menu > Configuration > Batteries > Batt Temp Management > Temperature Comp**)
Remove and Replace Rectifier and Verify Results:	
10	Remove a rectifier from its slot.
11	Verify the controller LED and display are light amber which indicates a missing rectifier condition.
12	When the controller prompts to remove equipment press enter
13	Verify the controller LED and display are light green.
14	Replace the removed rectifier in its original slot.
15	Verify the controller LED and displays remain green.

Table 8 Verify Connectivity

Verify Thermal Probes

Checking for Defective VT-Probes

(If a Voltage Channel Failure and/or Thermal Probe Failure alarm occurs)

Step	Action	
1	Disconnect the first probe from its terminal block.	
2	Run the command: **Menu > Control / Operations > Uninstall Equipment**.	
	Is the system controller green Normal LED lit?	
3	Yes – Install new probe. Finished.	No – Reinstall the removed probe. go to Step 4.
4	Remove the next probe.	
5	Go to Step 2. Repeat steps for all probes.	

Table 9 Verify Thermal Probes

Verify Remote Monitoring

The Integritas Systems output voltage is available on the remote monitoring board located on the control board located behind the output terminal blocks access panel at the bottom right of the system. This signal will allow access to the output voltage at voltage test points. This voltage represents a 1:100 relationship of the output voltage. ie: A voltage measured here of 1.25Vdc references an output voltage of 125Vdc.

Test / Verify Ground-fault

The Integritas System includes an output ground fault indicator. This feature is defined in Section xx. The device includes a Test / Reset button on the devices front panel. Depressing this button sends a signal to the Integritas' controller and an alarm is prompted on the system controllers' Front Panel Display.

"POS Ground Fault MJ" and "Charger Common Alarm MJ" will be displayed and the background color will change to RED. These alarms are default severity is preset as MAJOR-MJ.

Removing pressure from the Ground-Fault Indicators' Test/Reset button will automatically reset the device and retire the ground fault alarm.

Save Configuration File

The Software 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 on the PC. This file can be used to configure File access other controllers with the same exact configuration or to "restor " 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 dual 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.

Bottom Feed (19” version)

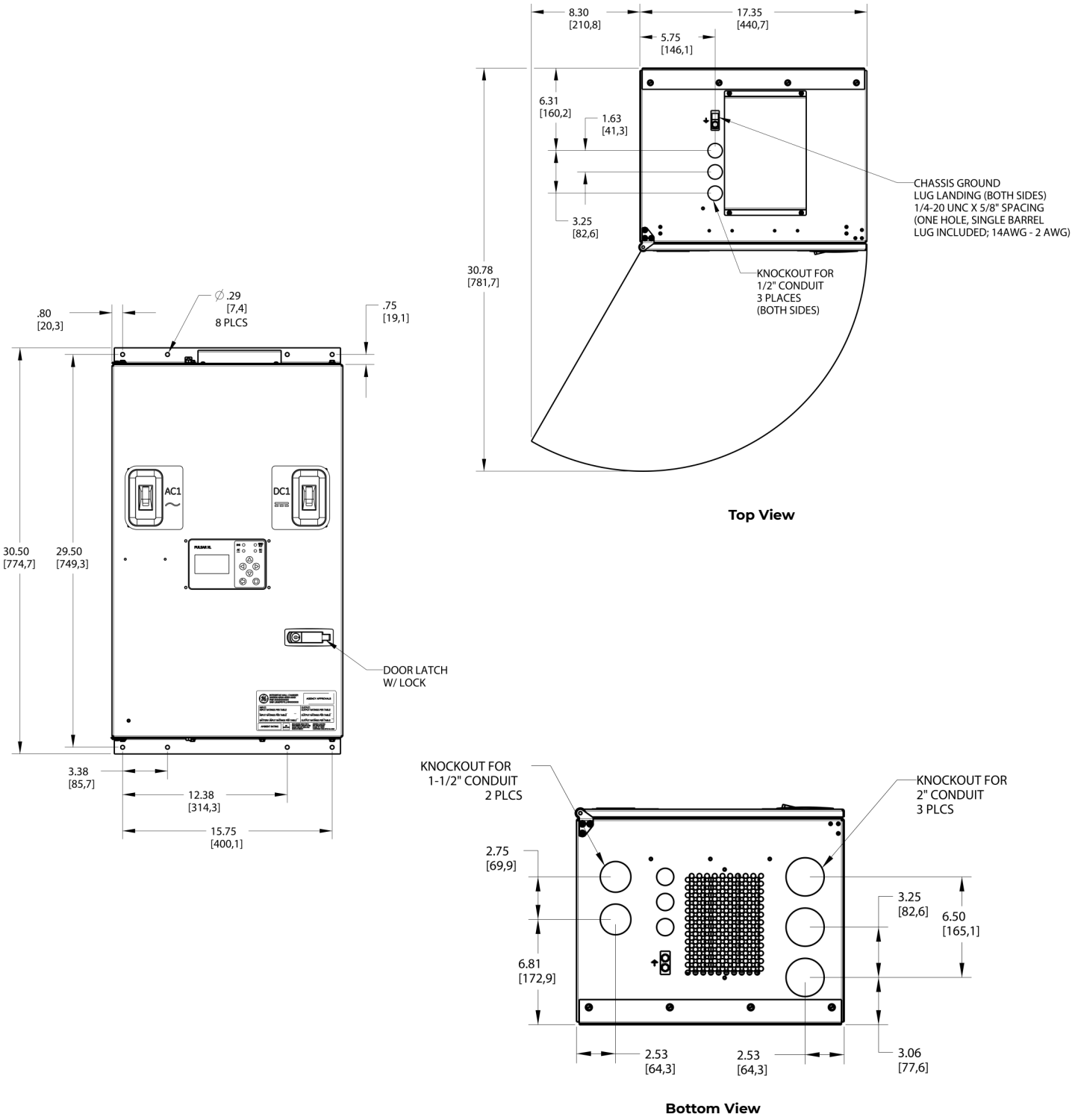


Figure 28 Mechanical Drawing-Bottom Feed Cabinet (19” version)

Top Feed (19” version)

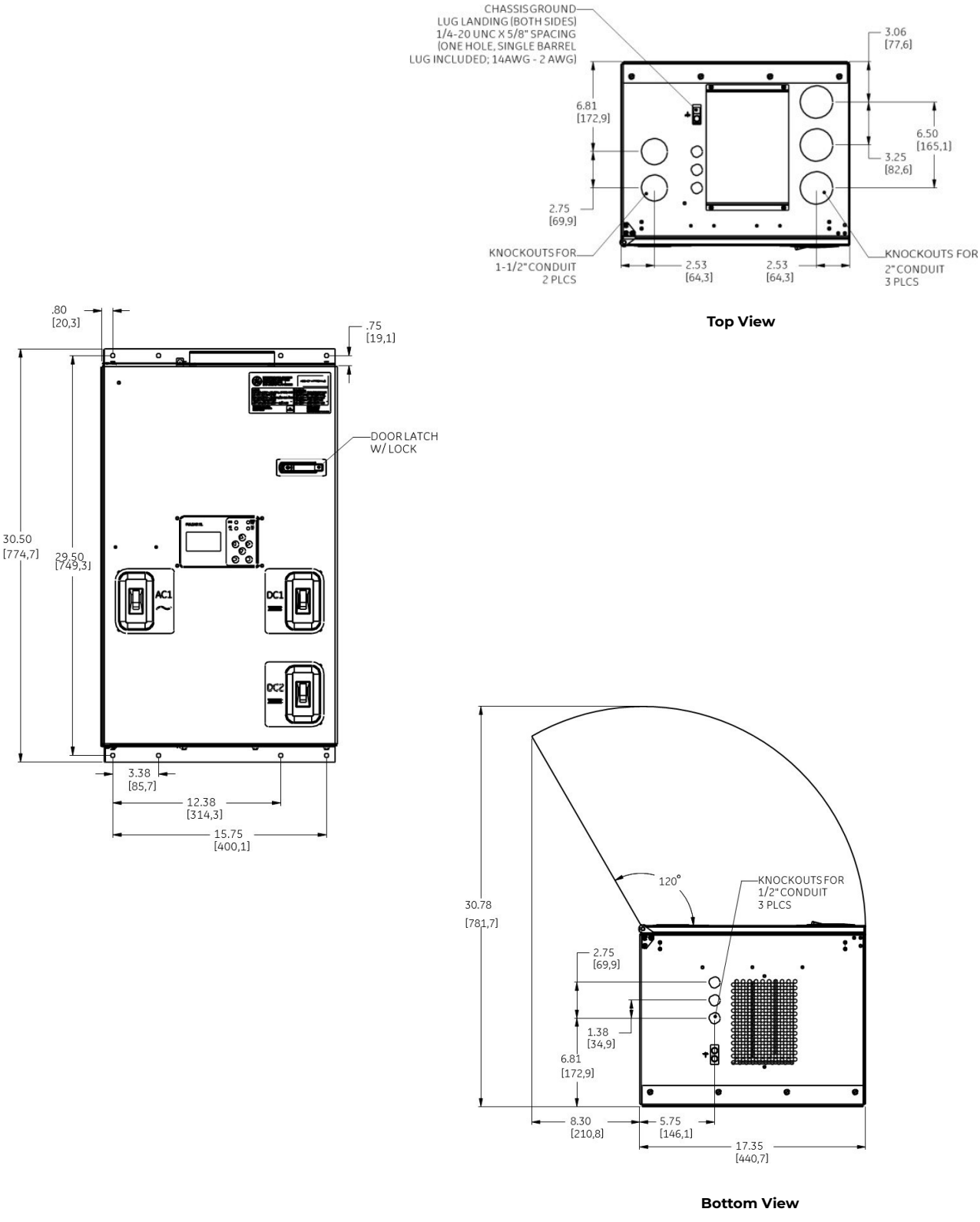


Figure 29 Mechanical Drawing-Top Feed Cabinet (19” version)

Bottom Feed (23” version)

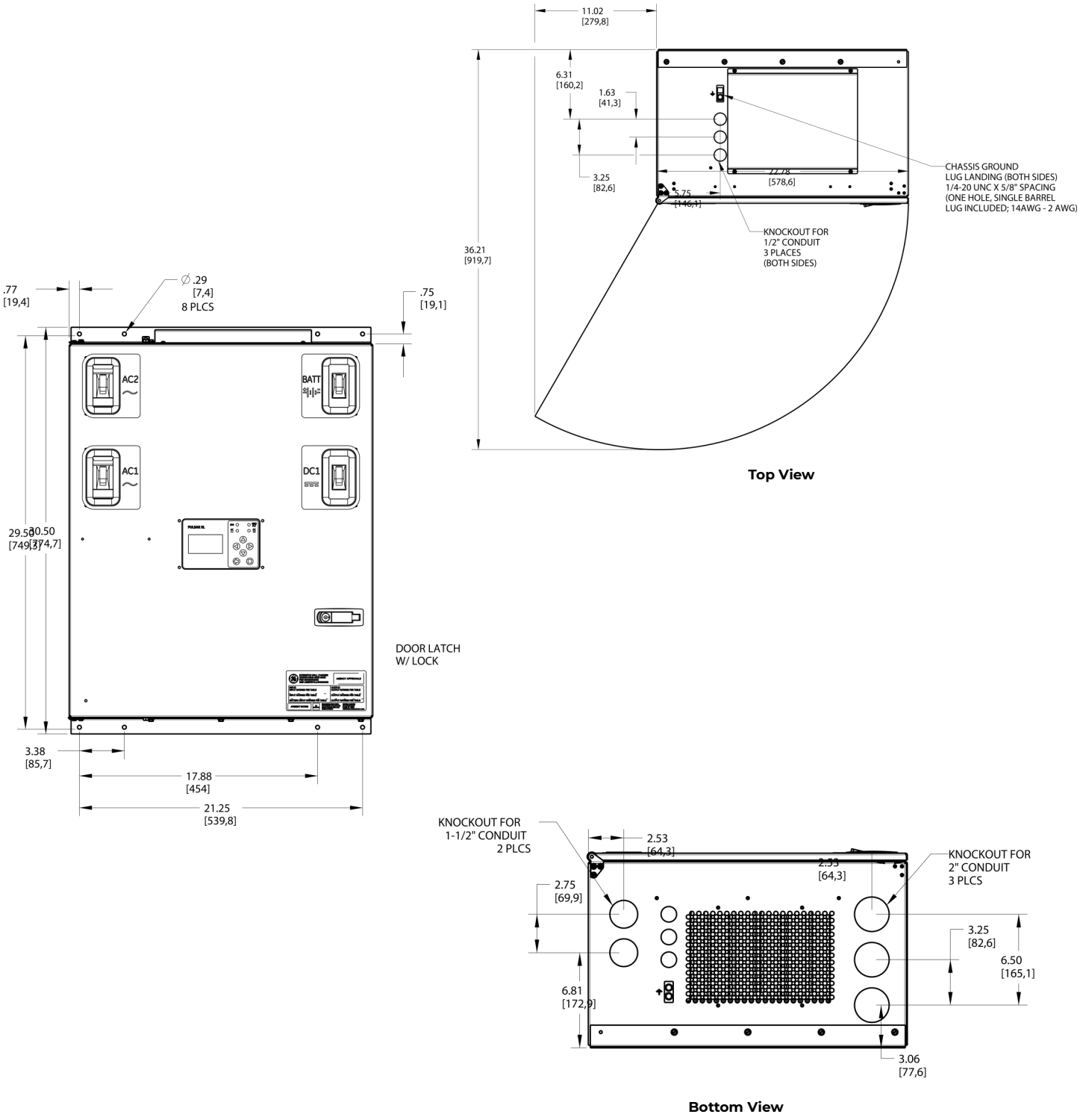


Figure 30 Mechanical Drawing-Bottom Feed Cabinet (23” version)

Maintenance and Troubleshooting

Filter Screen Maintenance

Maintenance-Air Filters

Air Filters should be washed or replaced at intervals determined by the installation environment-dusty environments require more frequent service.

Air filters may be washed and reused.

1. Remove air filter carrier-2 thumb screws.
2. Remove and replace air filter. Air filter slides out to the rear of the air filter carrier.
3. Replace air filter carrier with filter-secure with 2 thumb screws.

Filter Washing

1. Wash filter in soap water.
2. Gently wring out by hand.
3. Air dry for at least 24 hours before installing into filter carrier.

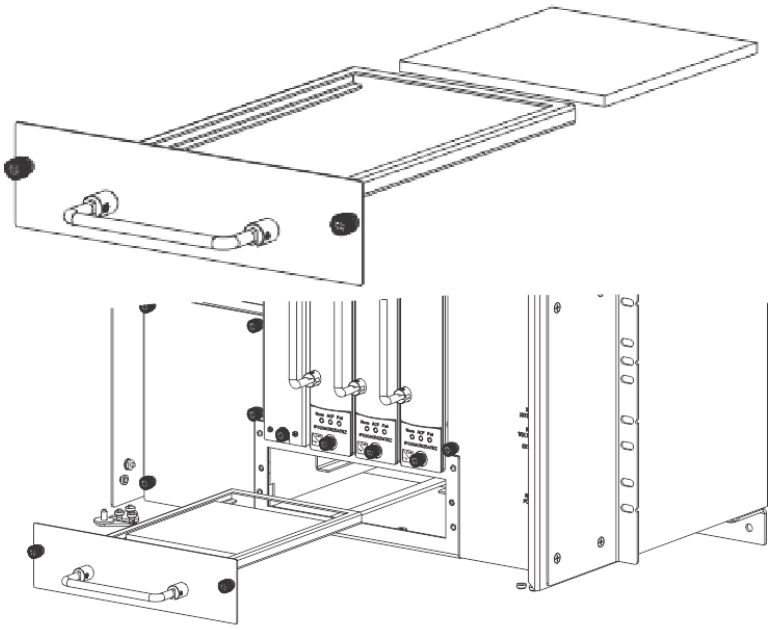


Figure 31 Air Filter Access and maintenance

Alarm Indicators

Rectifier LEDs	
LEDs	**Condition**
Norm green ACF off Fail off	**Normal operation:** No alarms, inputs and outputs are in their normal range, communicating with the system controller.
Norm off ACF off Fail off	**Unpowered:** No input or output voltage present. 1.Remove and reinsert unit. 2.Check input voltage with a voltmeter; if input voltage is present, replace unit. 3.Check output bus voltage with a voltmeter; if output bus voltage is present, replace unit.
Norm green blink ACF off Fail off	**Standby:** The unit is okay but has been placed in Standby by the controller and is not delivering power. **Note:** If a unit in standby loses communications with the controller it will exit Standby mode and deliver power.
Norm amber ACF off Fail off or red blink	**Output Limit:** The unit is okay and delivering maximum output: • At max rated output • At configured current limit • At thermal limit 1. If rectifiers/converters are equipped with optional air filters and reporting thermal limiting,check air filters. Clean or replace all filters if necessary. 2. View rectifier currents via display.
Norm off ACF off or amber Fail red	**Shutdown**[1]**:** The unit cannot deliver output. • High Voltage Shutdown • Thermal Shutdown • Under Voltage Protect • Component failure 1. Check rectifier or converter status on controller display to determine cause of shutdown. 2. Correct system output short, high temp, etc. 3. Remove and reinsert unit. If fault remains and other units are functioning correctly, replace unit.

[1] When a rectifier senses an over-or under-voltage condition, it will shut down, wait 4 seconds, and then attempt to restart. If the over-or under-voltage condition remains it will cycle again. If the over- or under-voltage condition remains after 3 restart attempts the unit will lock out. User intervention is required to restart.

Alarm Indicators (Continued)

Rectifier LEDs	
Norm any ACF off or amber Fail red blink	**Communication Fail:** Blinks to indicate the rectifier is not communicating with a system controller. Remove and reinsert unit. If fault remains and other units are communicating correctly, replace unit.

Battery Polarity

Polarity Is Reversed	**CAUTION:** **If the polarity LED is RED, check battery wiring before engaging breakers**

Ground Fault Indicator LEDs

U-GREEN LED Control Supply Voltage
F-RED LED Fault Message
R–YELLOW LED Relay Status

Figure 32 Ground Fault Detector LEDs

LED's status information and fault messages			
Operational state	**U: green LED**	**F: red LED**	**R: yellow LED**
Start-up	⎍⎍	OFF	OFF
No fault	⎍	OFF	⎍
Insulation fault (below threshold value)	⎍	⎍	OFF
⏚ /KE wire interruption	⎍	⎍⎍	OFF
System leakage capacitance during start-up too high [1]	⎍⎍	⎍⎍	OFF
System leakage capacitance during operation too high/invalid measurement result	⎍	⎍⎍	OFF
Internal system fault	OFF	⎍⎍	OFF
Test function	⎍⎍	OFF	OFF
No fault after fault storage [1]	⎍	Note 2	⎍⎍

[1]The device has triggered after an insulation fault. The fault has been stored and the insulation resistance has returned to a higher value than the threshold value plus hysteresis.

[2]Depending on the fault.

Table 10 Ground Fault Detector LEDs

DC and AC Surge Protection Indicators (SPD)

Both the DC SPD and AC SPD devices have a visual indicator representing the health of the device. Operating devices show GREEN. The indicator changes to RED to indicate need for replacement. When a DC or AC surge is sensed, the device reports to the Integritas controller, a visual indication appears, and an alarm log is generated.

Contact technical support for replacement modules.

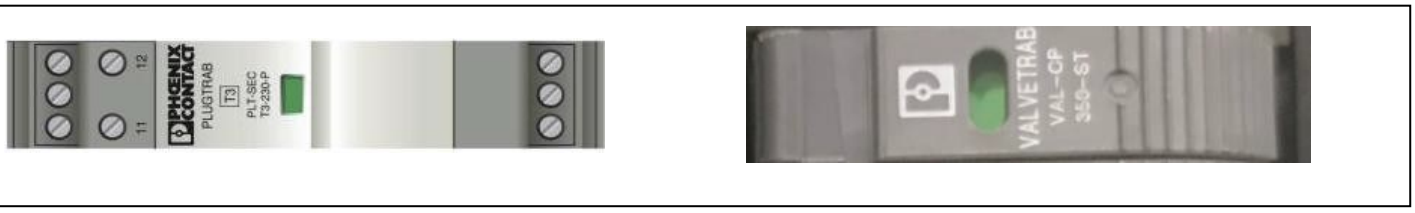


Figure 33 Surge Protectors

Ground Fault Protection (GFI) - Dual Chargers in Parallel

When two chargers are connected together in this manner, a measurement (ground fault) conflict occurs, resulting in a “phantom” ground fault alarm. For these applications, one of the two charger should be purchased without the ground fault option. If it is necessary to use chargers where both are equipped with ground fault detectors, one of the ground fault protection circuits must be disabled in a charger, leaving one operational. To do this, remove L+ and L– connections of one of the GFI units and properly insulate and secure the wires. This prevents spurious alarms. The ground fault protection in the second charger will detect ground faults to either system when the chargers are connected in parallel.

Figure 34 Ground Fault Indicator

Appendices

Appendix A-Standard Factory Configurations

24Vdc Plant Configurations

Rectifier Settings		Plant Settings	Severity	Relay	LED	Threshold
Float Voltage:	28Vdc	Site ID				
Boost Voltage:	28Vdc	Site Description				
Float Internal HV Shutdown:	30.0Vdc	High Ambient Temperature	RO		SYS	75C
Boost Internal HV Shutdown:	30.0Vdc	Low Ambient Temperature	RO		SYS	-40C
Float Current Limit:	100%	Auxiliary Major	MAJ		DC	
Boost Current Limit:	100%	Imminent Low VShutdown	MAJ		DC	
Rectifier ON Threshold:	25Vdc	Configuration Changed	RO			
Efficiency Target Capacity	70%	Excessive Login Attempts	RO			
Efficiency Turn ON Capacity	76%	History Cleared	RO			
Inter-Rectifier Delay	1 minute	Password AT Default	RO			
Initial Delay	1 minute					
Very Low Voltage Alarm	23V					
Float HV Alarm	29.25V					
Boost HV Alarm	29.25V					
VHV Alarm Float	29.75V					
VHV Alarm Boost	30.00V					
Multiple AC Fail # Rectifiers	2					
Redundancy Alarm	1					
Battery on Discharge	25.4V					
Multiple Manual Off #Rectifiers	2					
Multiple Rectifier Fail #Rectifiers	2					
Enable Redundancy Check	O					
Remote Rectifier in Standby	X					
Enable Group Standby	X					
Enable Group Standby	X					
Remote Group Standby Rectifiers	O					
Energy Efficiency Enable	O					

Table 11 Factory Default configuration for 24V Systems

48Vdc Plant Configurations

Rectifier Settings		Plant Settings	Severity	Relay	LED	Threshold
Float Voltage:	54Vdc	Site ID				
Boost Voltage:	54Vdc	Site Description				
Float Internal HV Shutdown:	58.5Vdc	High Ambient Temperature	RO		SYS	75C
Boost Internal HV Shutdown:	58.5Vdc	Low Ambient Temperature	RO		SYS	-40C
Float Current Limit:	100%	Auxiliary Major	MAJ		DC	
Boost Current Limit:	100%	Imminent Low V Shutdown	MAJ		DC	
Rectifier On Threshold:	44Vdc	Configuration Changed	RO			
Efficiency Target Capacity	70%	Excessive Login Attempts	RO			
Efficiency Turn On Capacity	76%	History Cleared	RO			
Inter-Rectifier Delay	1 minute	Password At Default	RO			
Initial Delay	1 minute					
Very Low Voltage Alarm	45V					
Float HV Alarm	56V					
Boost HV Alarm	56V					
VHV Alarm Float	57V					
VHV Alarm Boost	57V					
Multiple AC Fail # Rectifiers	2					
Redundancy Alarm	1					
Battery on Discharge	51.0V					
Multiple Manual Off #Rectifiers	2					
Multiple Rectifier Fail #Rectifiers	2					
Enable Redundancy Check	O					
Remote Rectifier in Standby	X					
Enable Group Standby	X					
Enable Group Standby	X					
Remote Group Standby Rectifiers	O					
Energy Efficiency Enable	O					

Table 12 Factory Default configuration for 48V Systems

125Vdc Plant Configurations

Rectifier Settings		Plant Settings	Severity	Relay	LED	Threshold
Float Voltage: (FSP)	132.3Vdc	Site ID				
Boost Voltage: (BSP)	142.6Vdc	Site Description				
Float Internal HV Shutdown:	150.0Vdc	High Ambient Temperature	RO		SYS	75C
Boost Internal HV Shutdown:	150.0Vdc	Low AmbientTemperature	RO		SYS	-40C
Float Current Limit:	100%	Auxiliary Major	MAJ		DC	
Boost Current Limit:	100%	Imminent Low VShutdown	MAJ		DC	
Rectifier On Threshold:	120.9Vdc	Configuration Changed	RO			
Efficiency Target Capacity	70%	Excessive LoginAttempts	RO			
Efficiency Turn On Capacity	76%	History Cleared	RO			
Inter-Rectifier Delay	1 minute	Password At Default	RO			
Initial Delay	1 minute					
Very Low Voltage VLV	116.8					
Float HV Alarm	138.8V					
Boost HV Alarm	147.6V					
VHV Alarm Float	116.8V					
VHV Alarm Boost	147.6V					
Multiple AC Fail # Rectifiers	2					
Redundancy Loss Alarm	1					
Battery on Discharge	116.80V					
Multiple Manual Off #Rectifiers	2					
Multiple Rectifier Fail #Rectifiers	2					
Enable Redundancy Check	O					
Remote Rectifier in Standby	X					
Enable Group Standby	X					
Enable Group Standby	X					
Remote Group Standby Rectifiers	O					
Energy Efficiency Enable	O					

Table 13 Factory Default configuration for 125V Systems

Appendix B-Pulsar XL Controller

Figure 35 Pulsar XL Controller

Connect IO Module Signals and Bias

Pulsar XL controller (IP843G)

NOTE: To optimize cable lead dress, the Controller and Alarm I/O unit's mounting locations have been made inter-changeable.

- Connect per site engineering instructions.
- Connections are on the front of the IO Module connections unit.
- Route wires through routing bend tab and tie wires to wire tie points and wire for proper lead dress.

TB1-TB21 detachable block-Strip-0.35" (9 mm) Torque-2 in-lb (0.25 Nm)

Note: Pin 2 is Common for TB1-TB2 Alarm Outputs

Alarm relays can be configured for "Open on Alarm" or "Closed on Alarm" by moving the jumpers accessed through the controller cover, as illustrated in Figure 17. Note: The controller must be removed from the Battery charger to access the alarm relay configuration jumpers.

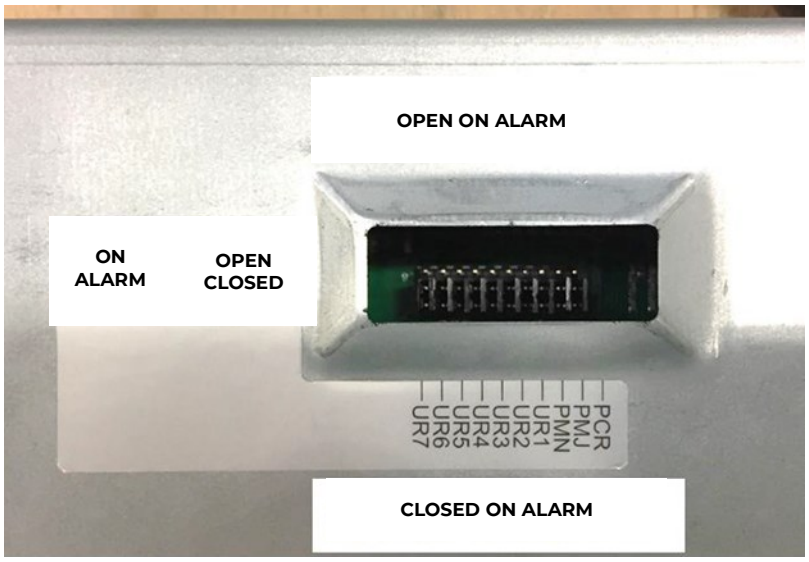


Figure 36 Alarm Jumper Settings

Alarm Outputs and Inputs

TB1-TB10 Alarms Outputs-Wire to office alarms. See Information: Signal Connections.

TB11-TB20 Inputs-Wire to signal sources. See Information: Signal connections.

Alt Bias

TB21 Alternative 24V external bias supply

LAN

LAN Ethernet LAN or local PC connection

1-Wire Battery Temp and Voltage Monitor (Optional)

1-WIRE DATA See Information: Battery Monitoring Connections.

Alarm I/O

ALARM OUTPUTS RATED 125VDC @ 0.5A	
REF	FACTORY DEFAULT ASSIGNMENT (SIGNAL-PIN#1; COMMON-PIN2)
TB1	CRITICAL ALARM
TB2	MAJOR ALARM (CHARGER SUMMARY)
TB3	MINOR ALARM
TB4	R1 (RECTIFIER FAIL-RFA/MRFA)
TB5	R2 (AC FAIL-ACF/MACF)
TB6	R3 (LOW VOLTAGE-BD/VLV)
TB7	R4 (GROUND FAULT-GFI)
TB8	R5 (SURGE PROTECTOR-SPD)
TB9	R6 (HIGH VOLTAGE-HVSD/HV)
TB10	R7 (CHECK BATTERY)
ALARM INPUTS (“DRY”, NO VOLTAGE, BINARY CONTACT MONITORS)	
TB11	AUX1 (AIR CONDITIONER FAIL)
TB12	AUX2 (DOOR OPEN)
TB13	AUX3 (HIGH EXTERNAL AMBIENT)
TB14	AUX4 (LOW EXTERNAL AMBIENT)
TB15	CHARGER/PLANT BATTERY TEST (PBT)
TB16	REMOTE RECTIFIER STANDBY (GSTBY)
TB17	AUX9 (AUXILIARY 9)
TB18	AUX8 (AUXILIARY 8)
TB19	OSA1-(OPENSRING)
TB20	AUX6 (HYDROGEN PRESENT)
DIGITAL PORTS	
TB21	RESERVED FOR FUTURE USE
TB22	1-WIRE TEMP PROBES; 1-WIRE SIGNAL ON PIN1; RETURN ON PIN2
TB24	OPTIONAL 24VDC CONTROLLER BACK-BIAS INPUT ALT-BIAS 24VDC-IN PIN 4; ALT-BIAS 24VDC-IN RTN PIN 5
RECT DATA	RS485 / GALAXY PROTOCOL RECTIFIER SERIAL BUS
LAN	10/100 BASE-T ETHERNET

Table 14 Alarm I/O

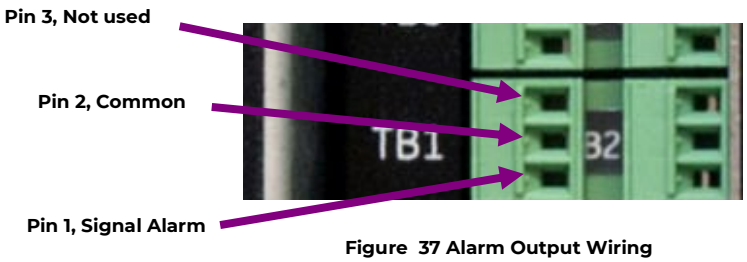


Figure 37 Alarm Output Wiring

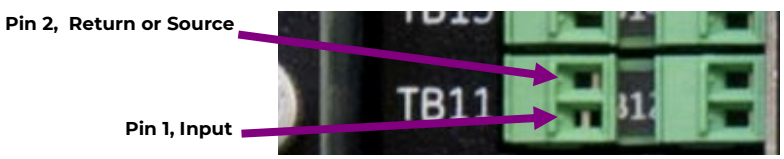


Figure 38 Alarm Input Wiring

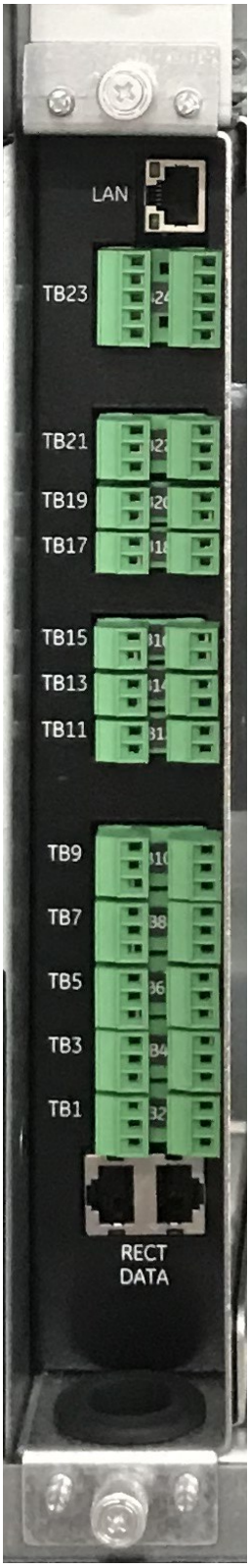


Figure 39 IP843G IO Module

Alarm Setpoints (N/O, N/C, battery voltage, equalize, ground fault)

Information: Signal Connections.

Alarm Relays Factory set to Open On Alarm. Rated 125V (60V for 24V and 48V chargers), 0.5A.

“Dry” No Voltage Binary Inputs require a contact closure to Common (pin 2).

“Dry” 24V Biased Binary inputs require a contact closure to 24V Source (pin 2).

Pulsar XL controller

Pulsar XL Alarm Outputs		
Connector	**Description - Signal on Pin 1**	**Pin 2**
TB1	Power Critical Alarm	Common
TB2	Power Major Alarm	Common
TB3	Power Minor Alarm	Common
TB4	Alarm R1 (default is RFA/MRFA)	Common
TB5	Alarm R2 (default is ACFMACF)	Common
TB6	Alarm R3 (default is BD/VLV)	Common
TB7	Alarm R4 (default is GFI)	Common
TB8	Alarm R5 (default is SPD, DC, and AC)	Common
TB9	Alarm R6 (default is BTA “Battery Test Active”)	Common
TB10	Alarm R7 (default is “Check Battery”)	Common

Pulsar XL Alarm Inputs		
Connector	**Description - Signal on Pin 1**	**Pin 2**
TB11 (IN007)	“Dry” No Voltage Binary contact input (default is AUX1 “Air Conditioner Fail”)	No Voltage Return
TB12 (IN008)	“Dry” No Voltage Binary contact input (default is AUX2 “Door Open”)	No Voltage Return
TB13 (IN009)	“Dry” No Voltage Binary contact input (default AUX3 “High External Ambient”)	No Voltage Return
TB14 (IN010)	“Dry” No Voltage Binary contact input (default AUX4 “Low External Ambient”)	No Voltage Return
TB15 (IN006)	“Dry” No Voltage Binary contact input (default “Plant Battery Test (PBT)”)	No Voltage Return
TB16 (IN005)	“Dry” No Voltage Binary contact input (default “Remote Rectifier Standby/ Emergency Power Off”)	No Voltage Return
TB17 (IN001)	“Dry” 24V Biased Binary contact input 24V Source (default “AUX9 Auxiliary 9”)	24V Source
TB18 (IN002)	“Dry” 24V Biased Binary contact input (default AUX8, “Auxiliary 8”)	24V Source
TB19 (IN004)	“Dry” 24V Biased Binary contact input 24V Source (default OSA1, “Open String”)	24V Source
TB20 (IN003)	“Dry” 24V Biased Binary contact input (default AUX6, “Hydrogen Present”)	24V Source
TB21	+24V Alternative external 24VDC back bias input for controller.	+24V DC Return
Pulsar XL System Communications Ports		
Connector	**Description - Signal on Pin 1**	**Pin 2**
RECT DATA	Connection to isolated rectifier RS485 Galaxy protocol serial bus.	not applicable
1-WIRE DATA	Connection to 1-Wire temperature probes. 1-Wire signal on pin 1.	1-Wire Return

Table 15 Pulsar XL Controller Alarm I/O

Navigating the Controller Screens via Front Panel Display

The system settings can be changed from their default settings via the front panel display and via a remote Ethernet connection through a collection of GUI screens. Remote GUI screens are accesses using a web browser and are setup for adjusting output voltage and current settings, battery float and temperature compensation voltages, alarm settings, shutdown conditions. A summary of the pathways for some basic settings are shown below. Review through the available selection by depressing the navigation arrows and square Enter key.

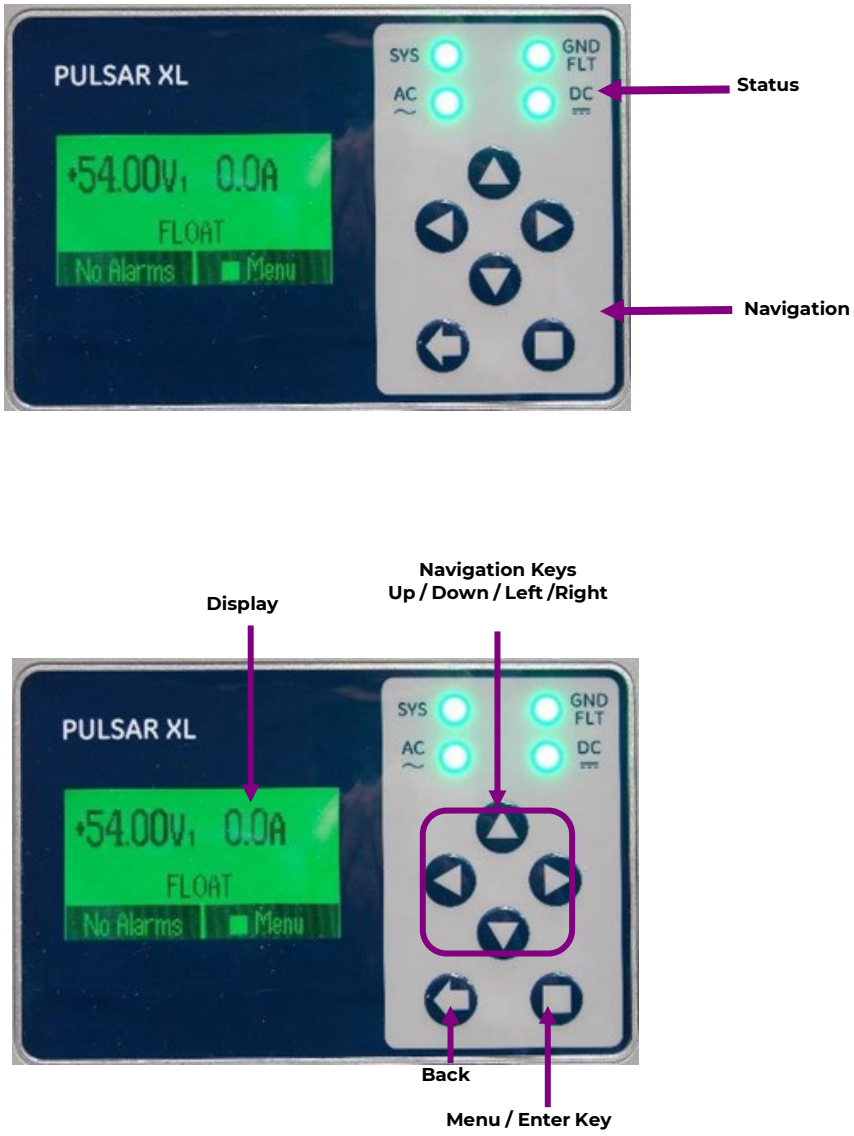


Figure 40 Pulsar XL Controller Front Panel Display

Front Panel –Main Menu (Pulser XL Controller)

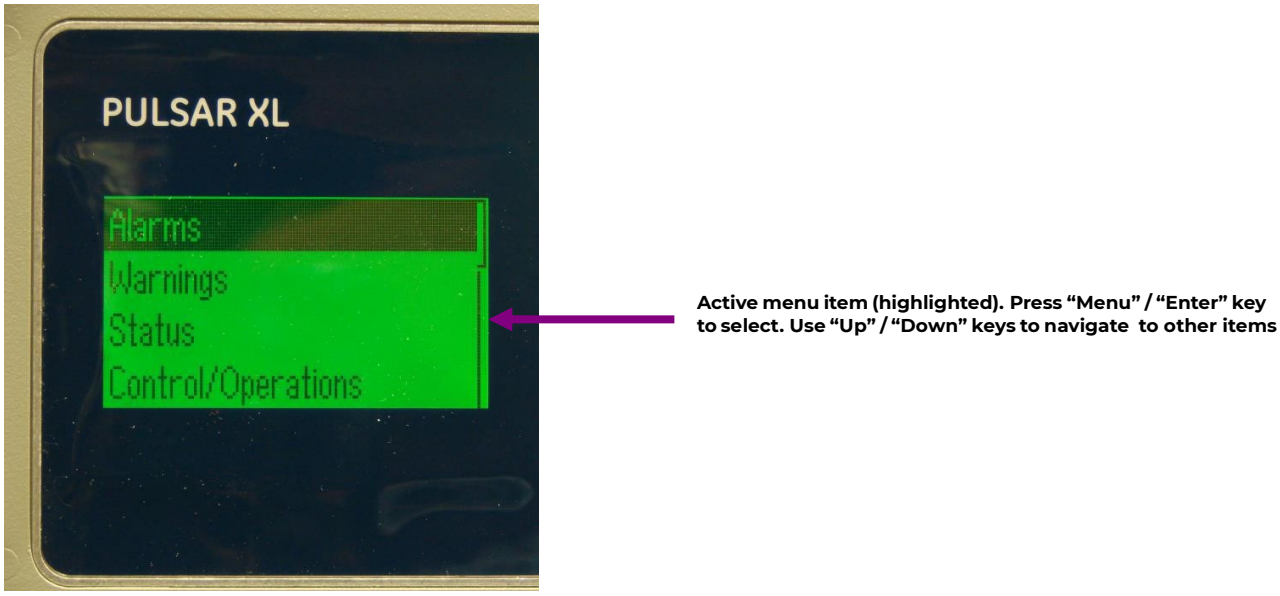


Figure 41 Front Panel Display-Main Menu

Front Panel-Control/ Operations Menu (Pulser XL Controller)

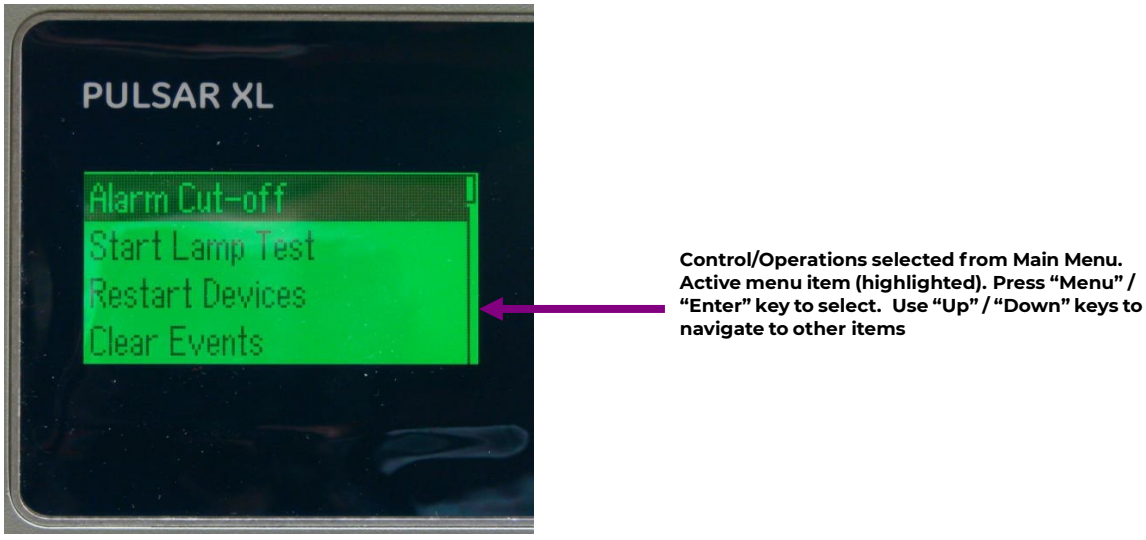


Figure 42 Front Panel Display-control/operations Menu

Below is a menu map showing all of the selectable menu options in the Pulsar XL controller front panel display. Use this as a guide to determine how to navigate within the menus to find which setting to review and/or adjust as needed.

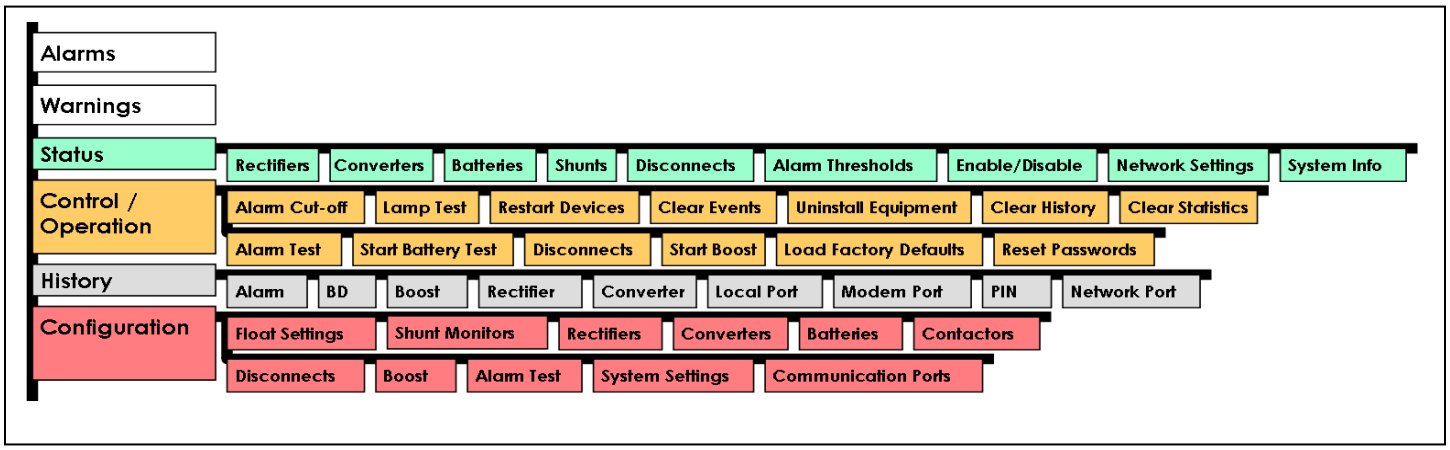


Figure 43 Front panel display-menu map

IP843G XL Controller LED Indicator

The IP843G Pulsar XL controller has a LED “STATUS” indicator on the front of the controller module. During normal operation the LED is green. When an alarm is present the LED will change to amber to signify a “warning” or “minor” alarm condition. It will change to red to signify a “major” or “critical” alarm condition.

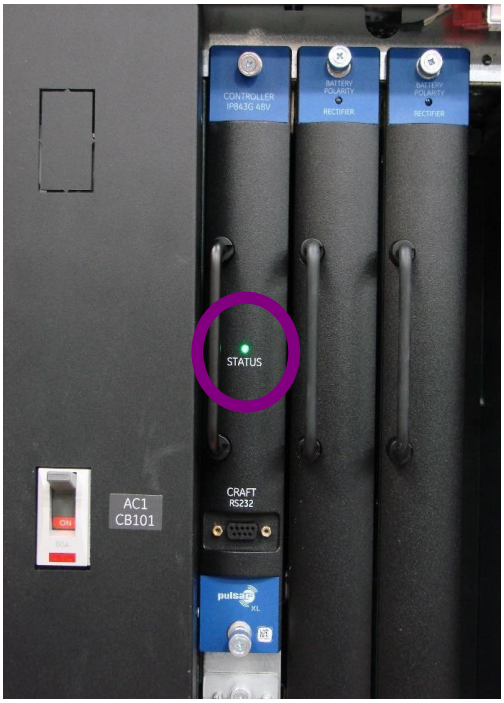


Figure 44 IP843G Controller Status LED (shown)

Local Event/Alarm

The Integritas IP843G XL controller has a front panel display providing information on output voltage, current, and other system status information. It also provides a view of the current system Alarm Status.

The display background color changes depending on alarm status. During normal operation it shows a green background. When an alarm is present the display will change to amber to signify a “warning” or “minor” alarm condition. It will change to red to signify a “major” or “critical” alarm condition. The display will return to the normal state when the alarm clears.

Figure 45 IP843G XL Front Panel Controller Display (shown)

Configuration (Local and Web)

You can view and change the system parameters and alarm severity from the factory defaults via:

- Controllers front display
- LAN port web pages using a laptop with browser. LAN port Server mode is for local laptop connection. Using the front display set the LAN port to Server. With the controller set to Server enter the default IP address 192.168.2.1 (default) in a web browser address field.

CAUTION Do not connect LAN port to a network when set to Server (Local). Set the controller to Client or Static before connecting to the network. Static is the factory default setting and the typical setting for most networks.

Controller Alarm Status

The display changes colors:

- Green = Normal
- Amber = Minor Alarm
- Red = Critical/ Major Alarm

Some alarms may occur during initial installations. Example: Thermal probe fail, or Major/Minor communications fail. Clear these alarms via the local controller display or using the web page interface.

Local controller display menu path:

Menu > Control/Operation > Clear Events or Uninstall Equipment.

Web page interface

Select the Maintenance tab. Listed underneath the “Clear Data” column select, “clear latched events” and “clear missing devices”.

LAN Port Configuration

The LAN port can be configured as Local or Network The controller display menu path is as follows:

Configuration > Communication Ports > Network Settings > DHCP > mode, CLIENT or SERVER

- **SERVER** (Local): LAN connects to a laptop. Local (Server) is a temporary setting. When the configuration is complete, return LAN port to Network (Client) mode.
- **CLIENT** (Network): LAN connects to a network. (Default).

Navigating the Controller Screens via Ethernet GUI Screens

The Integritas system can be customized for a sites individual location. These can be configured for Vendor ID, rectifier and battery configuration settings as well as site specific alarm setpoints and monitoring functions. Individual site-specific details are gathered thru customer input, site surveys and vendor information. The Integritas controller has the ability to monitor and provide action upon a wide array of system parameters required the site. These site-specific details are input through a set of various control screens. When the system is operating, connect an Ethernet cable from the craft port jack to your laptop.

- Through your internet browser, log onto the site via the following link, http://192.168.1.2
- For the password, enter “administrator” to access the start-up screen.

The “Home” screen will appear after entering the password. This screen provides a summarized listing of the plant configurations and includes the rectifiers voltages, load and battery currents as well as alarm status. The information displayed is retrieved from both the individual rectifiers and plant, as well as the data inputted on the data gathering screens. There are six (6) screens available for editing.

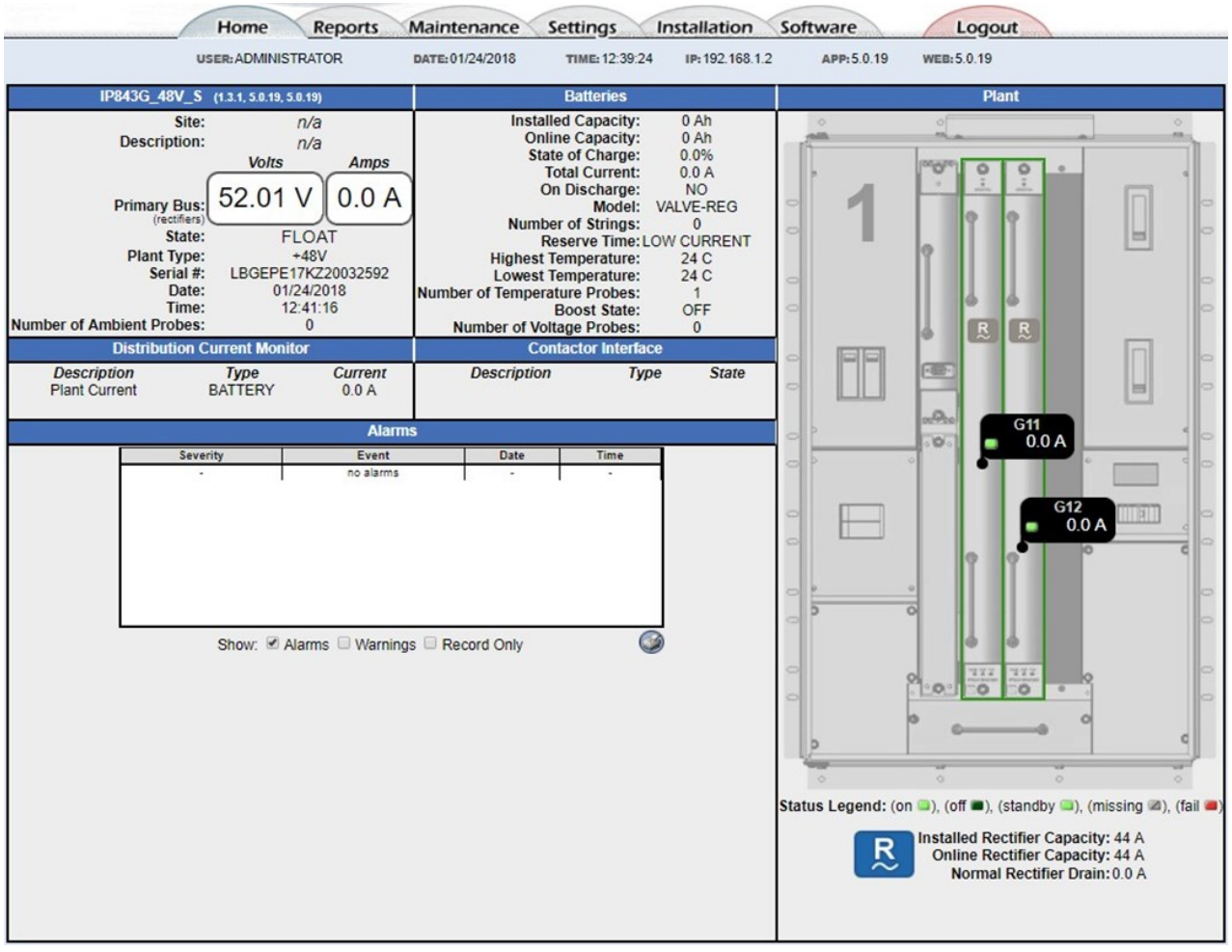


Figure 46 Web / GUI -Home Page

Setup Network Address

The Pulsar XL controller provides a standard 10/100Base-T Ethernet connection for a LAN or direct Craft port connection. Connector LAN is a standard RJ45 shielded receptacle connection for standard Cat- 5 cable connection between the controller and the LAN. On the Pulsar XL, this port has two main modes of operation: Server mode and Client mode (Static and DCHP Client). The factory default configuration for this port is Dynamic Host Configuration Protocol (DHCP) Client. In DHCP Server mode the port can be used as a local Craft interface. In this mode, a laptop can be directly connected to LAN with a 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 controllers 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.

In Static or DHCP Client modes of operation the controller is to be configured with an IP address as 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. The following is the pin assignment for this connection:

Pin #	SignalName
1	TX+
2	TX-
3	RX+
4	
5	
6	RX-
7	
8	

Table 16 J5 Pin assignment

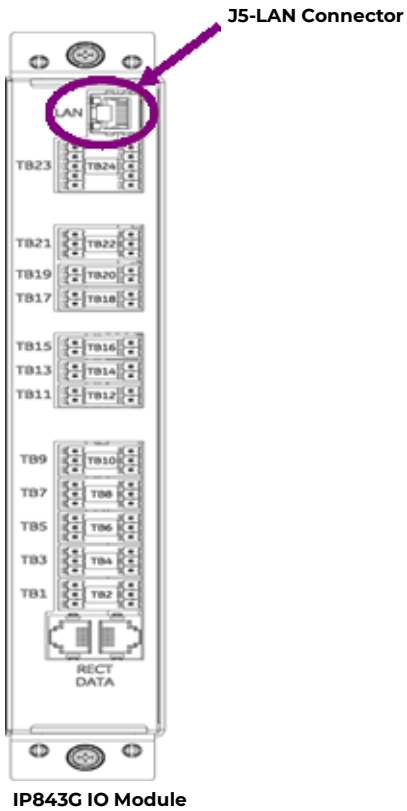


Figure 47 Network Connector J5 Location

Rectifier Query

The Integritas system allows interrogation of the individual rectifier modules for a variety of key parameters. By “Clicking” on the ID label for each individual rectifier position, a new pop-up window will open providing detailed information for that rectifier, as shown in Figure 40.

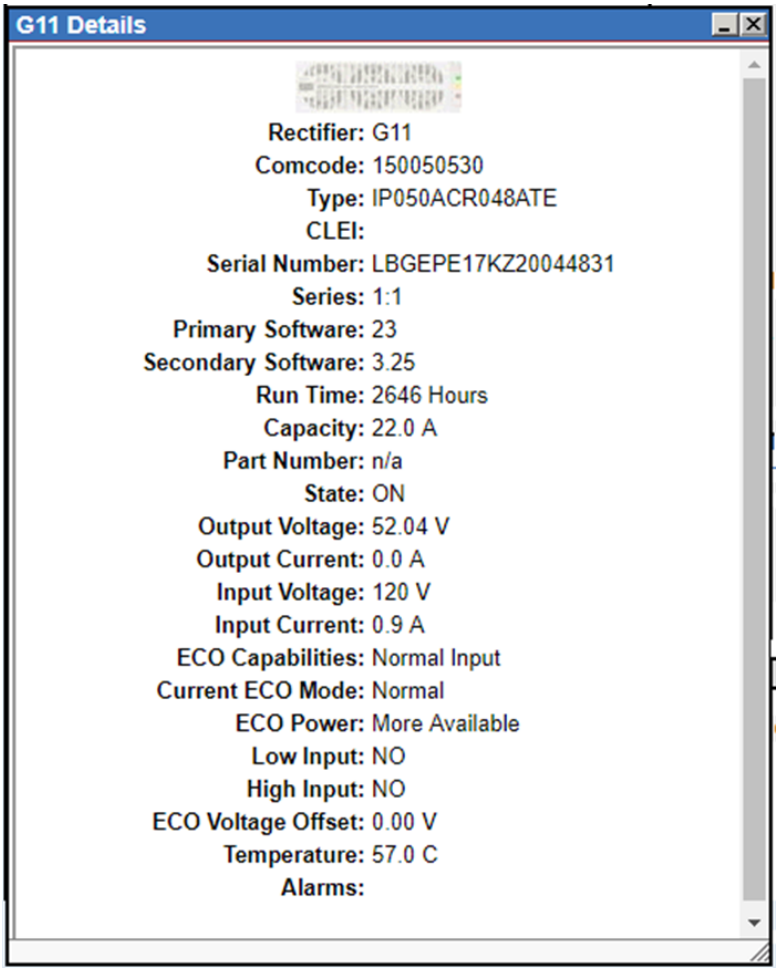


Figure 48 Rectifier information from GUI interrogation

System Communications Ports		
Connector	**Description-Signal on Pin 1.**	**Pin 2**
RECT DATA	Connection to isolated rectifier RS485 Galaxy protocol serial bus.	not applicable
1-WIRE DATA	Connection to 1-Wire temperature probes. 1-Wire signal on pin 1.	1-Wire Return

Table 17 System Communications Ports

Battery Boost / Equalize

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 disabled 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.

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.

These features can be pre-set via the EasyView2 (GUI) software by navigating to the “SETTINGS” Tab and selecting the “Rectifiers” selection underneath the “Power” column. The screen to edit these features is shown below.

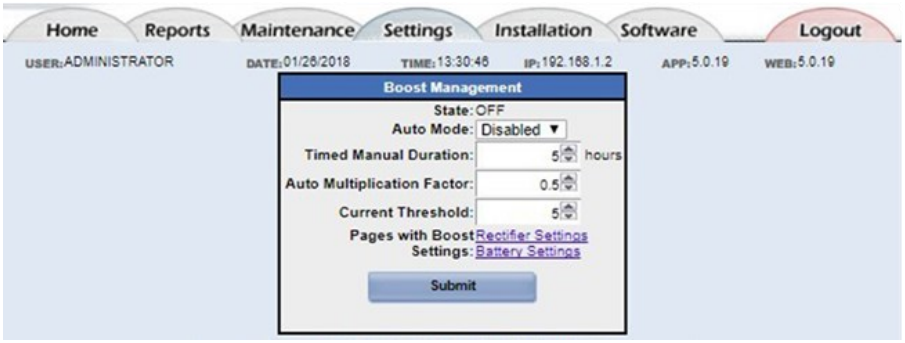


Figure 49 Boost Management

Rectifier Alarm Settings

In addition to setting output float and boost feature settings, the flexibility is also provided to set additional rectifier related alarms for the Integritas system. These are shown in

Set the adjust points using the UP or DOWN arrows or by entering the value in the window. Press “Submit” to enter all new settings.

Select “Boost” to enter the Boost Management screen. This enables selection of the boost mode of operation: “Timed” or “Current”.

The Boost Duration and Current Threshold determine the conditions for boost to be completed. Refer to the Controller User Manual for more detailed information regarding these functions.

The following alarm setpoints shown here can be preset and their “Severity Level” can be selected for either “MAJ”-Major, “MIN”-Minor, “CRIT”-Critical, “WRN”-Warning, or “RO”-Record Only. These can be extended to relays R1 through R7. They can also be extended to the LEDS as “DC, AC, BD, SYS or GNDFLT.

Once selections have been made, pressing “Submit Alarm Setting” will complete the updates.

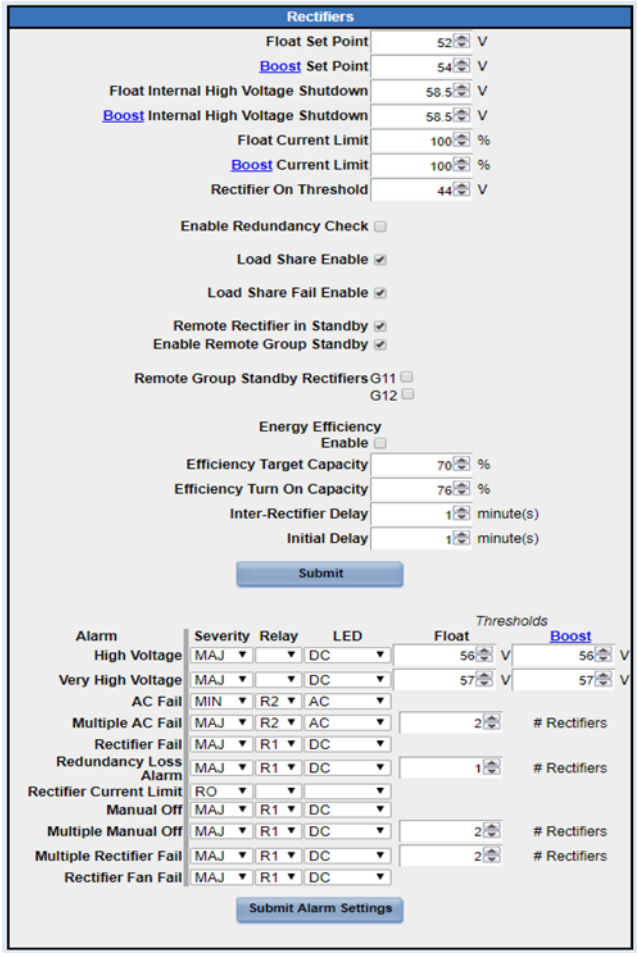


Figure 50 Rectifier Alarm settings

Create / Load Configuration File

The Integritas system is pre-configured with a set of default system settings. As your individual site settings may vary, you will need to refer to your “Site Installation Instructions” for the correct system settings for your plants location. You can edit these parameters via the front panel controller’s display or through a remote LAN connection via your laptop. Once these individual settings have been made, a global settings file can be generated to provide a convenient means to setup additional Integritas Systems.

To save via Ethernet connection, from the main menu select the “SOFTWARE” tab.

- Three selections will appear, “SAVE CONFIG”, “RESTORE CONFIG” and “UPGRADE SOFTWARE” .
- Choose “SAFE CONFIG”
- You’ll be required to select a file name, FILENAME.GAL”. Do not change the files “suffix”.

Figure 51 Save Configuration

Remote (Event/Alarm Log)

The Integritas controller retains a log of events that are available via the remote monitoring interface. alarms. Navigate to the “Reports” tab. Then choose from one of several report options: Inventory, Battery Discharge, Statistics, Trends, Bulk Data, Alarm History, Boost History, Login History and Rectifier History.

The event log holds a maximum of 1000 events. The controller uses a FIFO (First In, First Out) format to automatically clear the first event and log the next. In addition, a manual process for clearing the events log exists through the front panel display, or the GUI web pages.

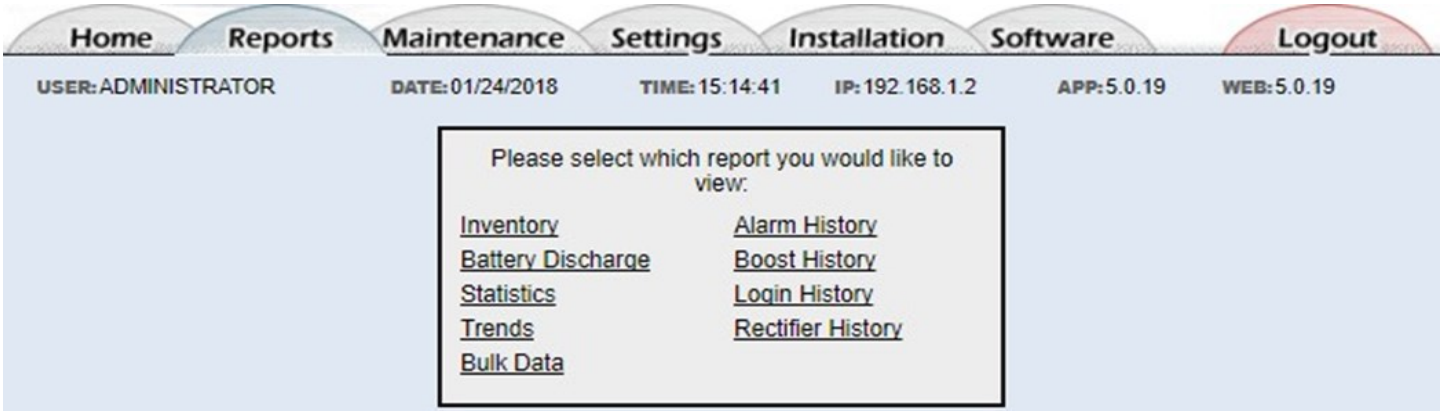


Figure 52 Remote access to Events and Alarms

A sample “Boost History” report is shown below:

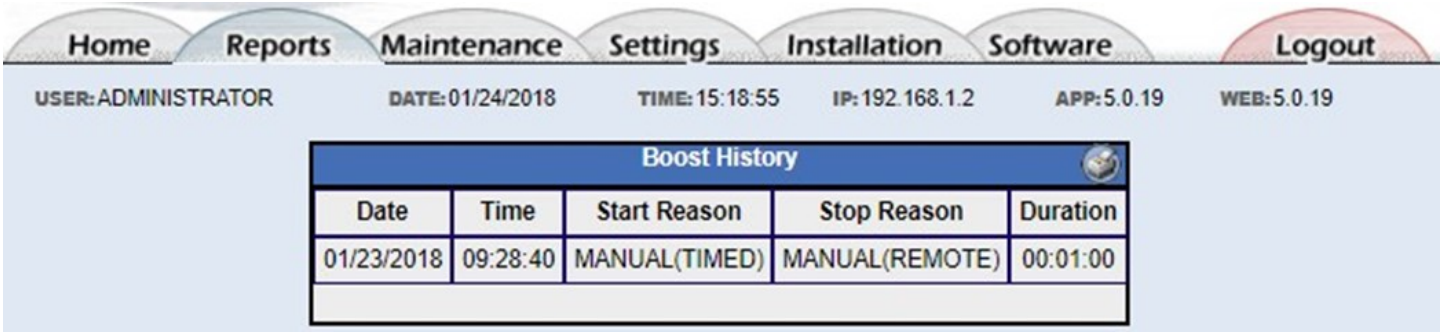


Figure 53 Remote access – Boost History Log

Remove Alarm Log or Uninstall Equipment

Step	Action
1	Via the controller display, follow the menu pathway, (Menu > Control/Operation > Clear Events or Un-Install Equipment)

Table 18 Operations and Maintenance

The Alarm History provides a comprehensive report of the state of the system. A sample “Alarm History” report is shown below:

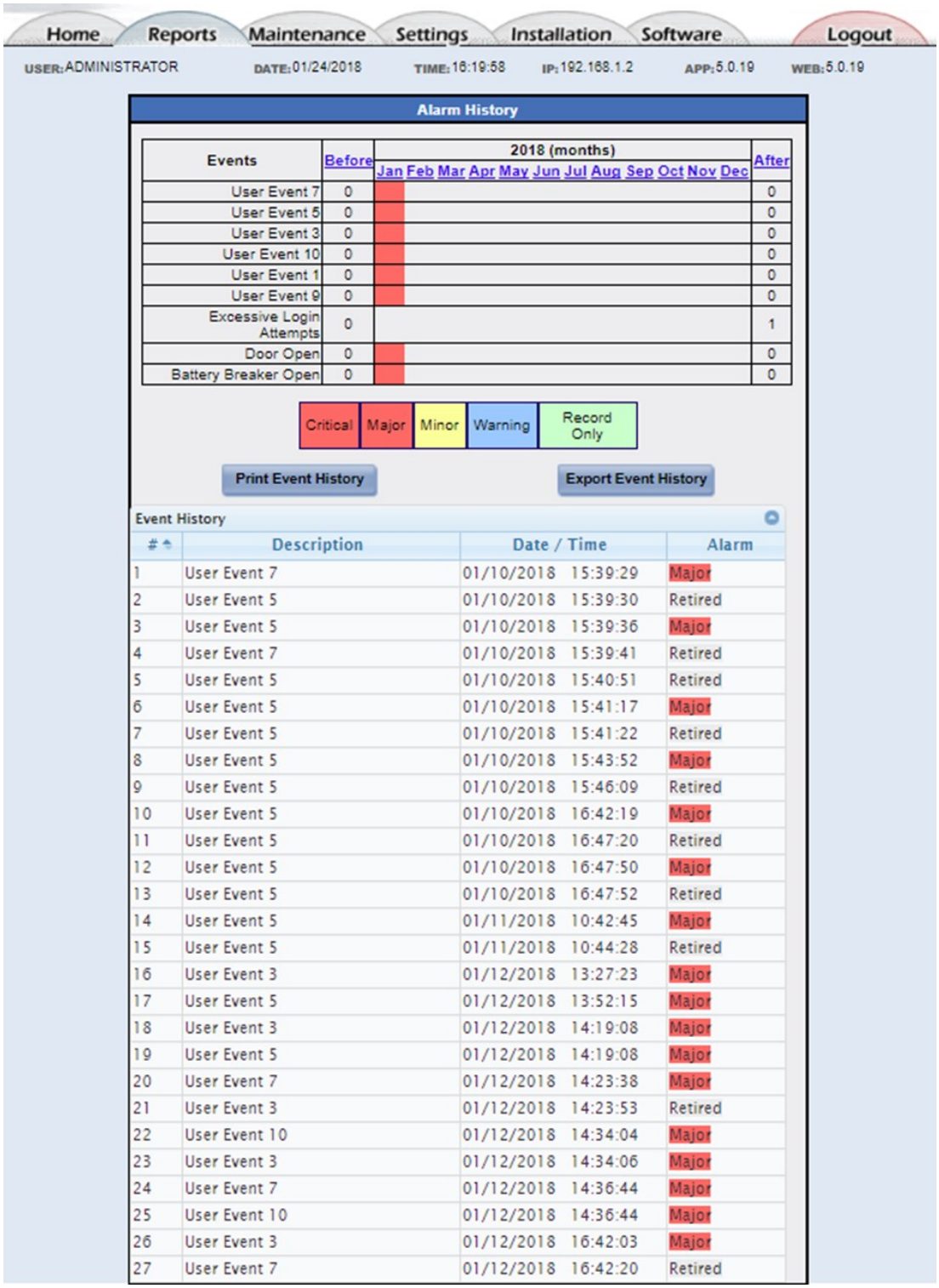


Figure 54 Remote access-Alarm History Log

External Shunt Settings

External Shunt-optional

The system includes a pre-configured internal 300Adc shunt for monitoring battery current. For customers with system distributions that include an existing shunt on their sites, the Integritas system allows monitoring of an existing shunt via the Output Signal Unit Assembly. Prior to wiring your shunt monitor voltage, the jumper on rear of charger must have been moved prior to installation. Connect your shunt monitor leads to the Output Signal Unit assembly. Connect with proper polarity as marked.

Pulsar XL

To configure the external shunt use the front panel display and navigate to Configuration>Shunt Monitors and update the Plant Shunt Rating to match your existing shunt. Please note, all external battery shunts to be deployed are assumed to be 50mVdc and can be setup with values from 0A up to 9999A.

Operation and Maintenance

Float Settings Adjust

Step	Action
1	Confirm the system is in “Float Mode” by viewing the Front Panel Status Indicator displaying, “Float Mode’’
2	Adjust the Float Voltage setpoint (Menu > Configuration > Float Settings > Float Set Point). (52Vdc)
3	Use the “RIGHT” and “LEFT” ARROW keys move to edit window. Use the “UP” or “DOWN” arrow o raise or lower each digit of the “Float Voltage”, “XX.XX”
4	Save the new Float Voltage by pressing the “SQUARE” key
5	Return to the Front Panel Status Screen to confirm the new Float Voltage is being displayed.

High Voltage Shutdown

Step	Action
1	Confirm the HV alarm threshold (**Menu > Configuration > ISHVSD >)**.
2	Adjust the Float Setpoint voltage to a value greater than this threshold **(Menu > Configuration > Float Settings > Set Point).**
3	Verify an HV alarm is reported by the controller and the RED status screen is illuminated.
4	Restore the float voltage back to its original setting.
5	Restore the HV setting back to its original setting.
6	Verify the alarms clear and the controller returns to Normal.

Equalize Sequence

Step	Action
1	Confirm the system is in "Float Mode" by Front Panel Status Indicator "Float Mode" (Menu>Control/Operations>Enter Boost Mode> Do you really want to enter boost mode?>(Y/N)
2	Confirm the Boost Voltage setpoint (**Menu > Configuration > Boost Settings > Boost Set Point)**.(54Vdc)
3	Enter Manual Boost Mode **(Menu > Control/Operations > Enter Boost Mode > Do you really want to enter boost mode? > (Y/N)**
4	Confirm the system is in "Boost Mode" by Viewing the Front Panel Status Indicator "Boost Mode"
5	Restore the System back to “Float Mode”

Discharge Test

Step	Action
1	Confirm the testing parameters for the Batteries being used in the Battery Test Routine are properly loaded: **(Menu > Status > Battery > Installed Capacity > Number of Strings > Current > Highest Temp > Num Temp Probes > Num Mid-String V > Mid-String V Monitor > Battery Test Result > Next Test >).**
2	Proceed to the Battery Test **(Menu > Control/Operations > Start Battery Test >).**
3	Proceed to the Battery Test **(Menu > Configuration > Batteries > Battery Test > Manual Test >). Enter**

Appendix C-Nebula Controller

Figure 55 Nebula Controller

Alarm I/O's

Nebula controller (IP943G)

Connect per site engineering instructions.

Connections are on the front of the IO Module connections unit.

Route wires through routing bend tab and tie wires to wire tie points and wire as desired.

TB1-TB21 Detachable block - Strip-0.35" (9 mm) Torque-2 in-lb (0.25 Nm)

Alarm Outputs and Inputs

TB1-TB10 Alarms Outputs-wire to office alarms. See alarm setpoint table.

TB11-TB20 Inputs-wire to signal sources. See alarm setpoint table.

Alt Bias

TB21 Alternative 24V external bias supply

1-Wire Battery Temp and Voltage Monitor - Optional

1-WIRE DATA See Information: Battery Monitoring Connections.

Figure 56 Alarm Output Wiring

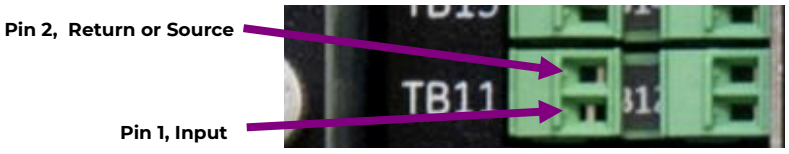


Figure 57 Alarm Input Wiring

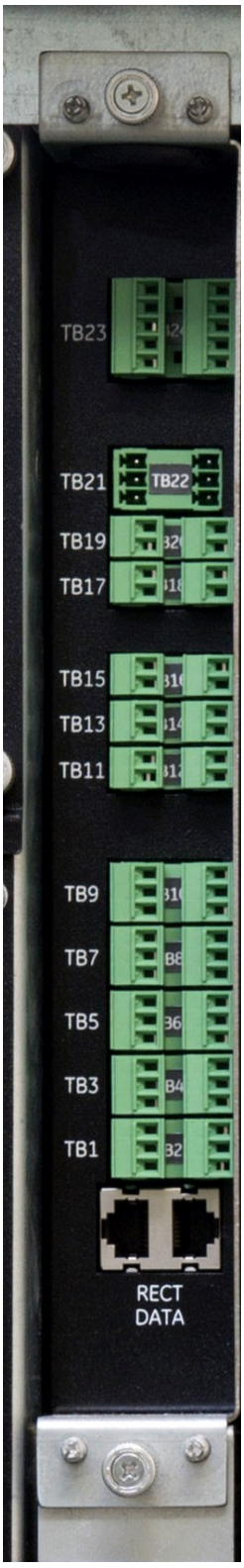


Figure 58 IP943G IO Module

Alarm Setpoints

Nebula controller

Nebula Alarm Outputs				
Connector	**Description**	**Pin 1**	**Pin 2**	**Pin 3**
TB1	Power Critical Alarm	Signal (NC)	Common	Signal (NO)
TB2	Power Major Alarm	Signal (NC)	Common	Signal (NO)
TB3	Power Minor Alarm	Signal (NC)	Common	Signal (NO)
TB4	Alarm R1 (default is RFA/MRFA)	Signal (NC)	Common	Signal (NO)
TB5	Alarm R2 (default is ACFMACF)	Signal (NC)	Common	Signal (NO)
TB6	Alarm R3 (default is BD/VLV)	Signal (NC)	Common	Signal (NO)
TB7	Alarm R4 (default is GFI)	Signal (NC)	Common	Signal (NO)
TB8	Alarm R5 (default is HVSD/HV)	Signal (NC)	Common	Signal (NO)
TB9	Alarm R6 (default is multiple rectifier fail MRFA/MFA)	Signal (NC)	Common	Signal (NO)
TB10	Alarm R7 (default is “Check Battery”)	Signal (NC)	Common	Signal (NO)

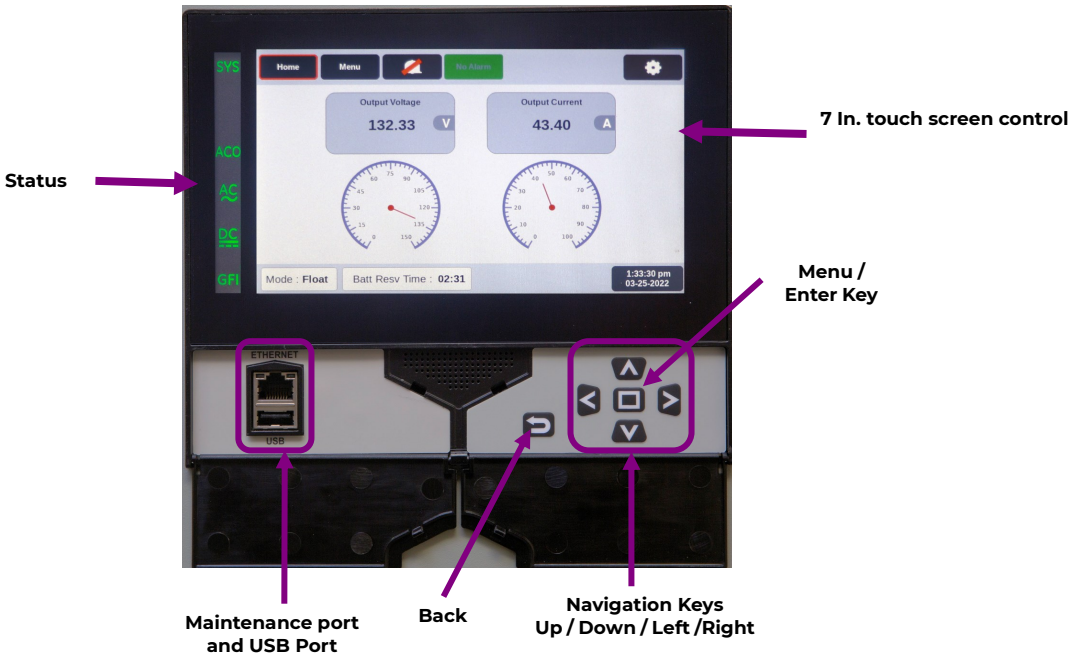
Note: Alarm outputs are form-C style with normally closed (NC) signal on pin 1, common on pin 2, and normally open (NO) on pin 3.

Nebula Alarm Inputs		
Connector	**Description—Signal on Pin 1**	**Pin 2**
TB11 (IN007)	“Dry” No Voltage Binary contact input (default is AUX1 “Air Conditioner Fail”)	No Voltage Return
TB12 (IN008)	“Dry” No Voltage Binary contact input (default is AUX2 “Door Open”)	No Voltage Return
TB13 (IN009)	“Dry” No Voltage Binary contact input (default AUX3 “High External Ambient”)	No Voltage Return
TB14 (IN010)	“Dry” No Voltage Binary contact input (default AUX4 “Low External Ambient”)	No Voltage Return
TB15 (IN006)	“Dry” No Voltage Binary contact input (default “Plant Battery Test (PBT)”)	No Voltage Return
TB16 (IN005)	“Dry” No Voltage Binary contact input (default “Remote Rectifier Standby/ Emergency Power Off”)	No Voltage Return
TB17 (IN001)	“Dry” 24V Biased Binary contact input 24V Source (default “AUX9 Auxiliary 9”)	24V Source
TB18 (IN002)	“Dry” 24V Biased Binary contact input (default AUX8, “Auxiliary 8”)	24V Source
TB19 (IN004)	“Dry” 24V Biased Binary contact input 24V Source (default OSA1, “Open String”)	24V Source
TB20 (IN003)	“Dry” 24V Biased Binary contact input (default AUX6, “Hydrogen Present”)	24V Source
TB21	+24V Alternative external 24VDC back bias input for controller.	+24V DC Return
Nebula System Communications Ports		
Connector	**Description-Signal on Pin 1**	**Pin 2**
RECT DATA	Connection to isolated rectifier RS485 Galaxy protocol serial bus.	not applicable
1-WIRE DATA	Connection to 1-Wire temperature probes. 1-Wire signal on pin 1.	1-Wire Return

Table 19 Nebula controller I/O

Navigating the Controller Screens via Front Panel Display

Key system settings can be changed from their default settings via the front panel display. Use a web browser to access the complete set of all available configuration parameters. See section “Configuration (Web)” for more details. The front panel displays a collection of GUI screens setup for viewing the output voltage and current settings, battery float and battery reserve time, alarm settings, shutdown conditions, and so forth. A view of the basic settings are shown below. The display is touch screen functional. Provided as an alternative is a keypad option to review through the available selection by using a combination of the navigation arrows and the square “Enter” key.



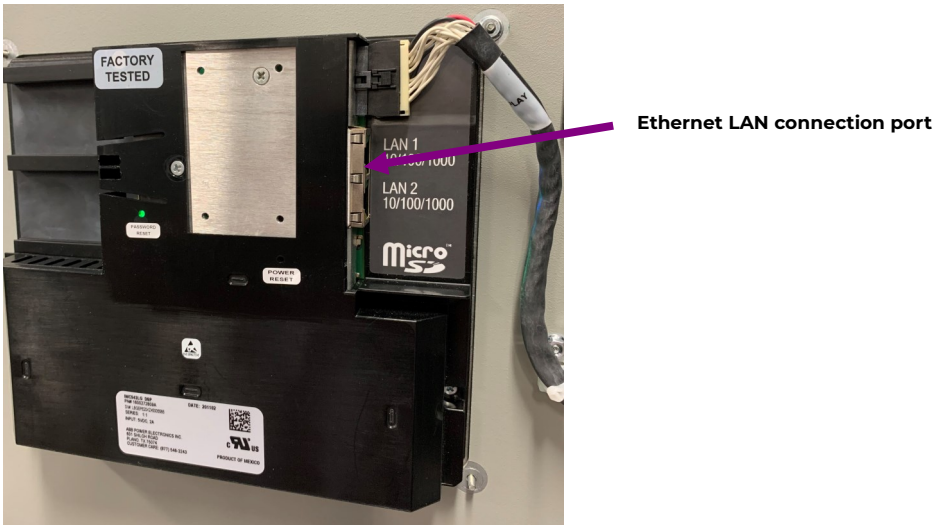


Figure 59 Nebula Controller Front Panel Display

Front Panel-Front View

This is the main menu screen. Use the “Home” button to navigate back to this screen from anywhere within the controller’s page views.

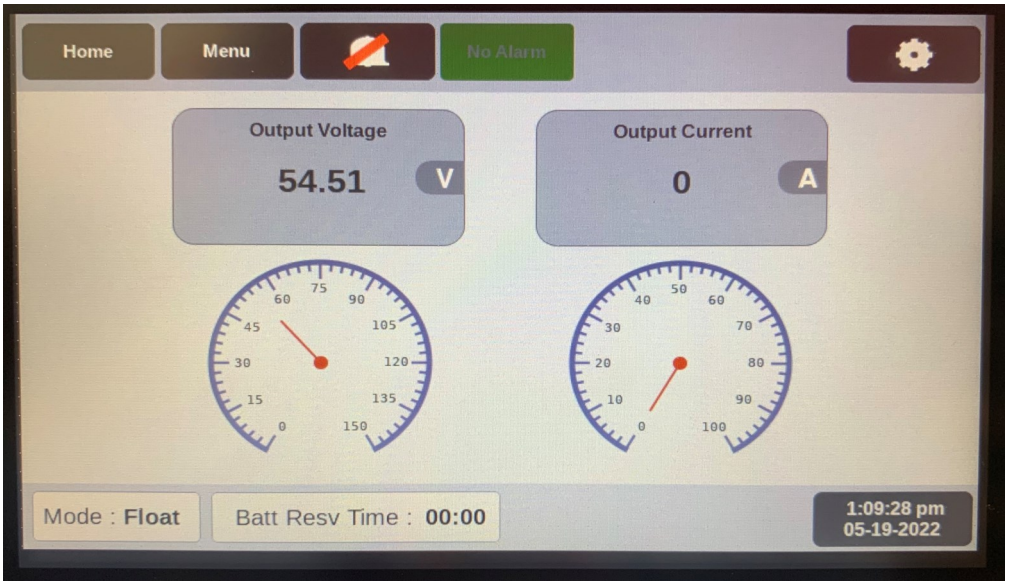


Figure 60 Nebula Controller Front Panel Display (Front View)

Front Panel-Menu

The “Menu” button displays additional views available with the front panel display.

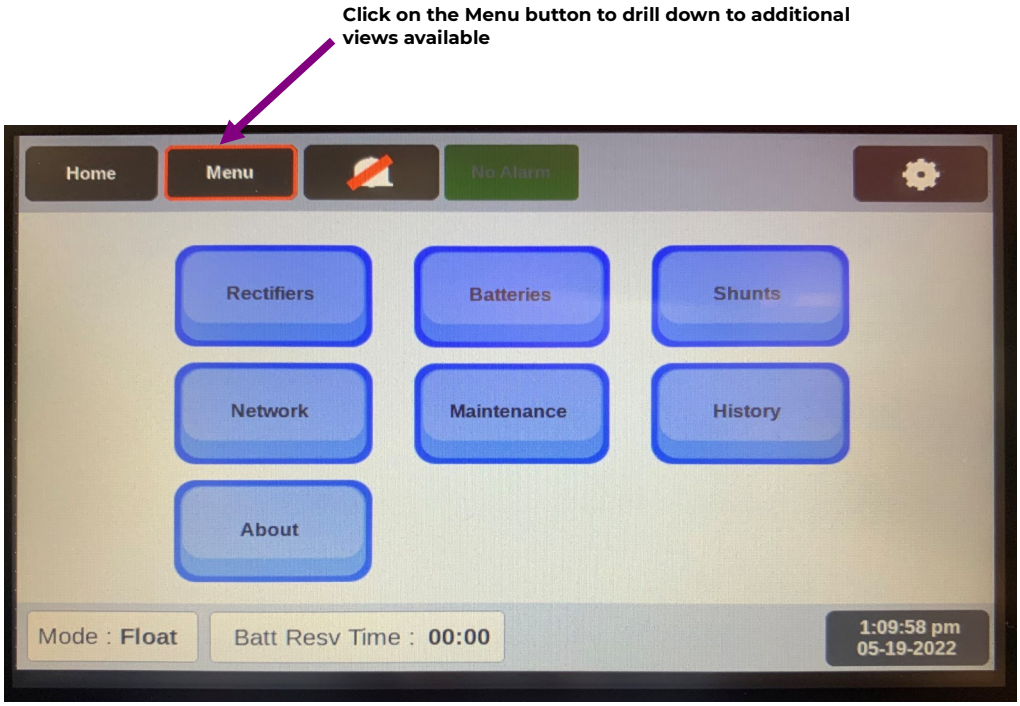


Figure 61 Nebula Controller Front Panel Display (Menu)

Front Panel-Rectifiers View

The “Rectifiers” page displays additional details associated to each rectifier installed in the charger based on the individual identifier ID.

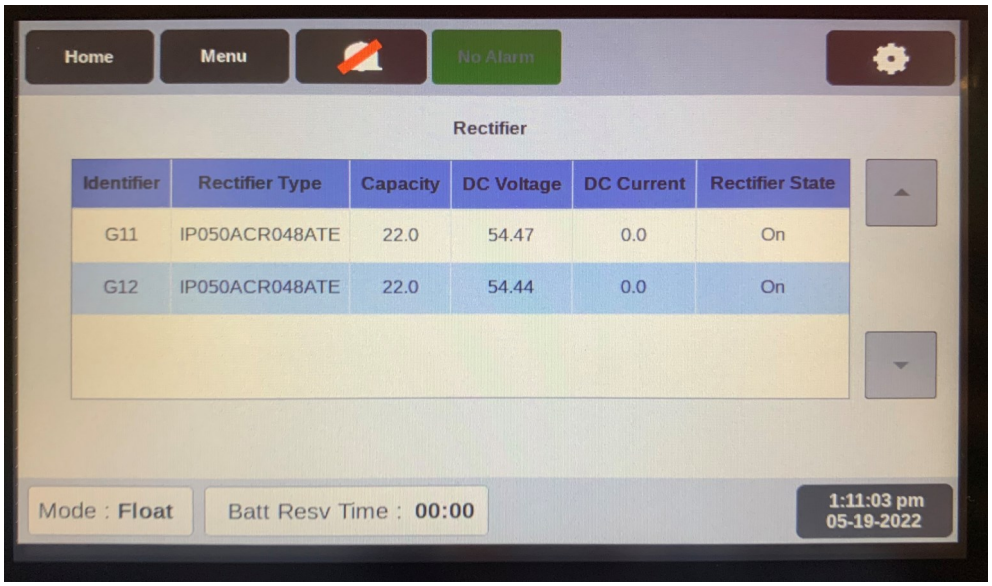


Figure 62 Nebula Controller Front Panel Display (Rectifiers View)

Front Panel-Batteries View

The “Batteries” page displays additional details associated to the battery string attached to the charger.

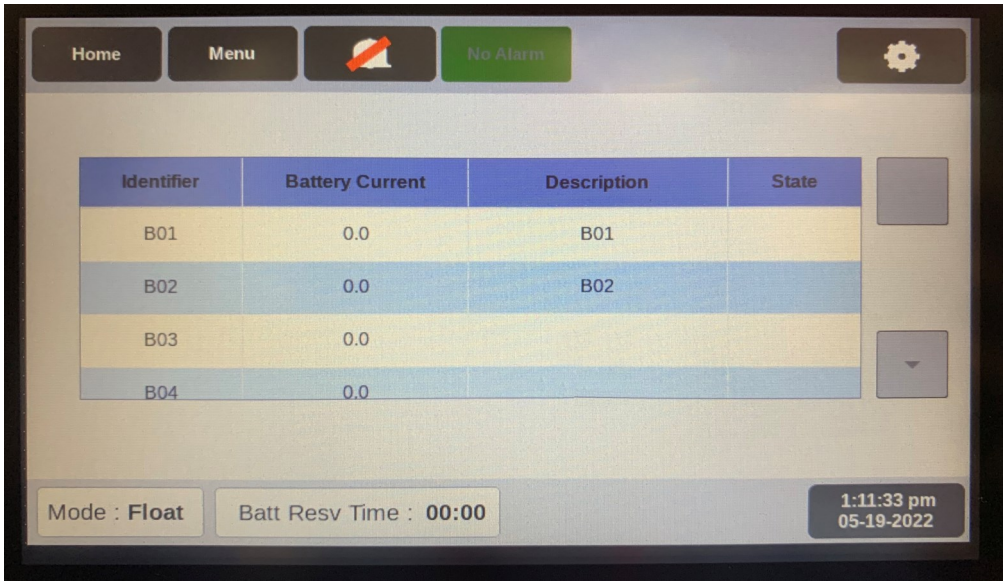


Figure 63 Nebula Controller Front Panel Display (Batteries View)

Front Panel-Shunts View

The “Shunts” page displays additional details associated to shunts set up within the charger. This shows both internal shunt, and optional external shunt if connected.

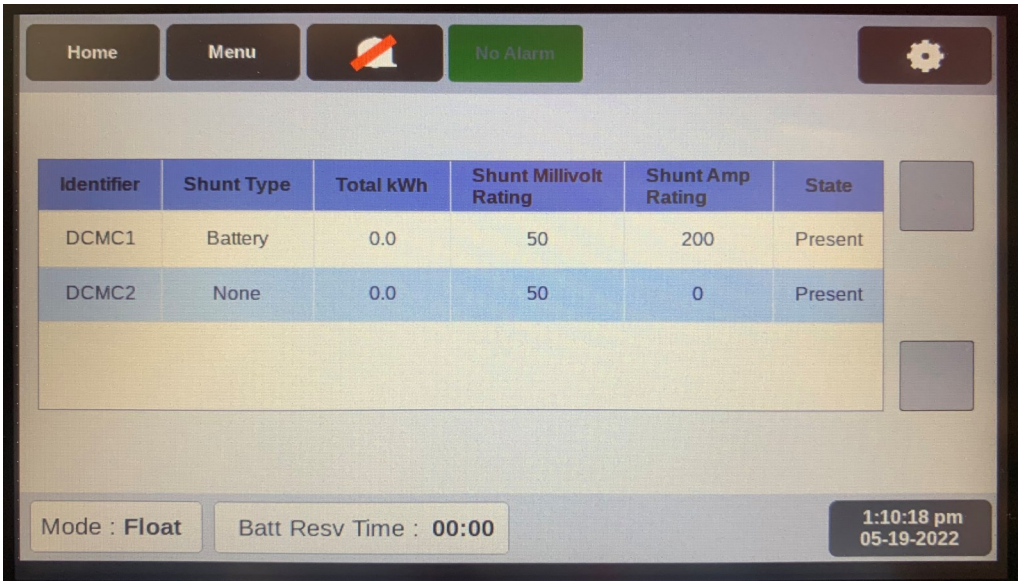


Figure 64 Nebula Controller Front Panel Display (Shunts View)

Front Panel-Maintenance View

The “Maintenance” page displays system tests that can be performed from the front panel display. This view also allows for clearing of inventory devices (missing devices) along with clearing latched alarm events.

Figure 65 Nebula Controller Front Panel Display (Maintenance View)

Front Panel-History View

The “History” page displays the alarm history events. Alarm history events are sorted by date/time stamp based on the most recent event. Use the built-in scroll buttons to see additional alarm events within the list.

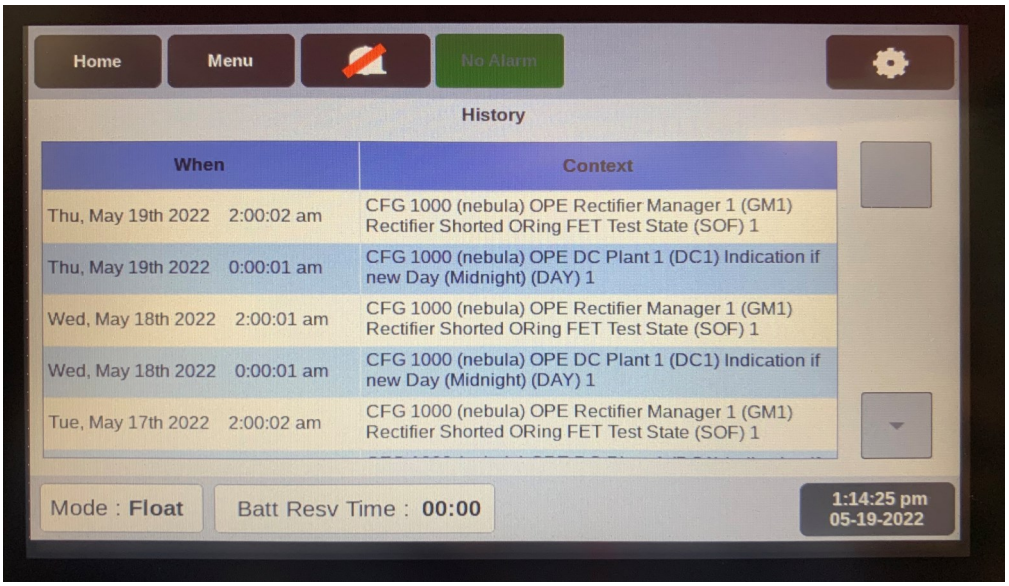


Figure 66 Nebula Controller Front Panel Display (History View)

Front Panel-Network View

The “Network” page displays the network settings for the controller.

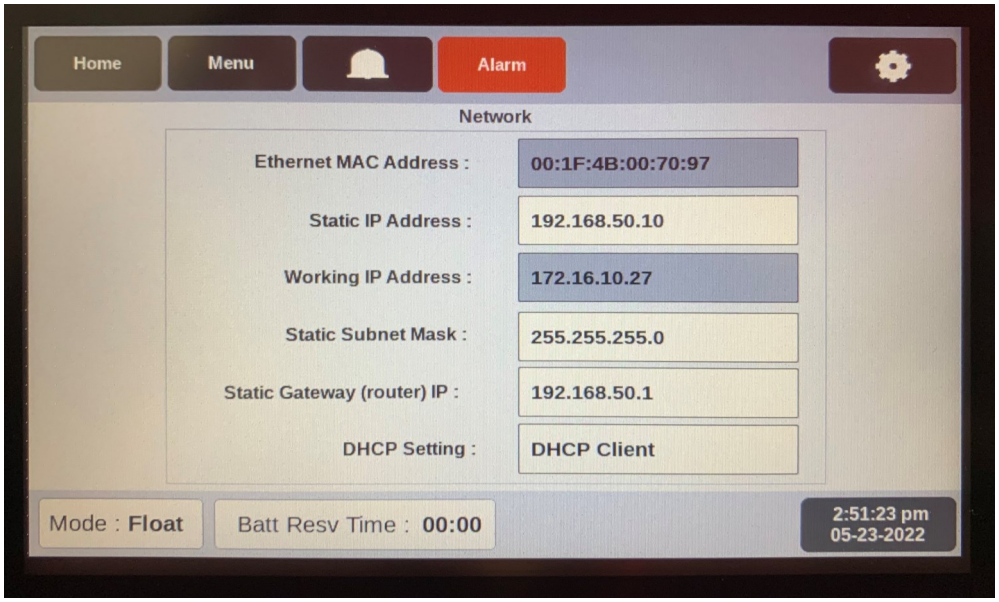


Figure 67 Nebula Controller Front Panel Display (Network View)

Front Panel-Quick Plant Configuration View (A)

Click on the “gear” icon to see the quick plant configuration view. These are the settings that can be quickly modified from the front panel. All other setting are done from web browser interface.

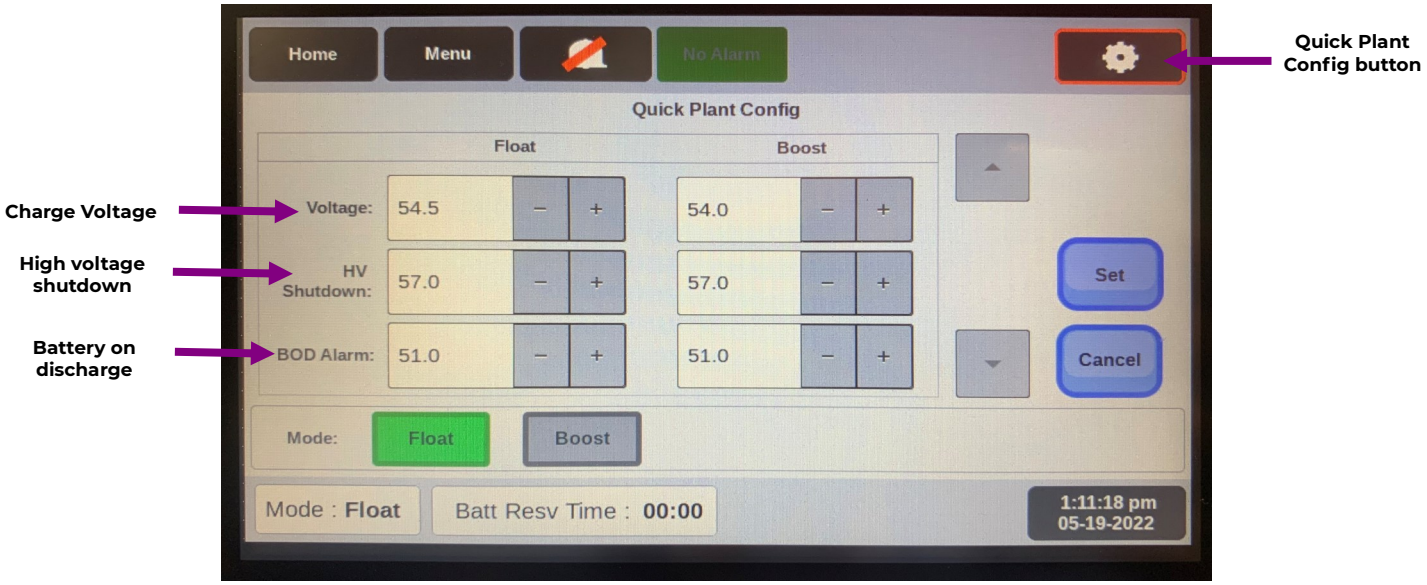


Figure 68 (A) Nebula Controller Front Panel Display (Quick Plant Configuration View)

Front Panel-Quick Plant Configuration View (B)

Use the scroll buttons on the right to scroll down and see additional settings that can be modified from the quick panel config view.

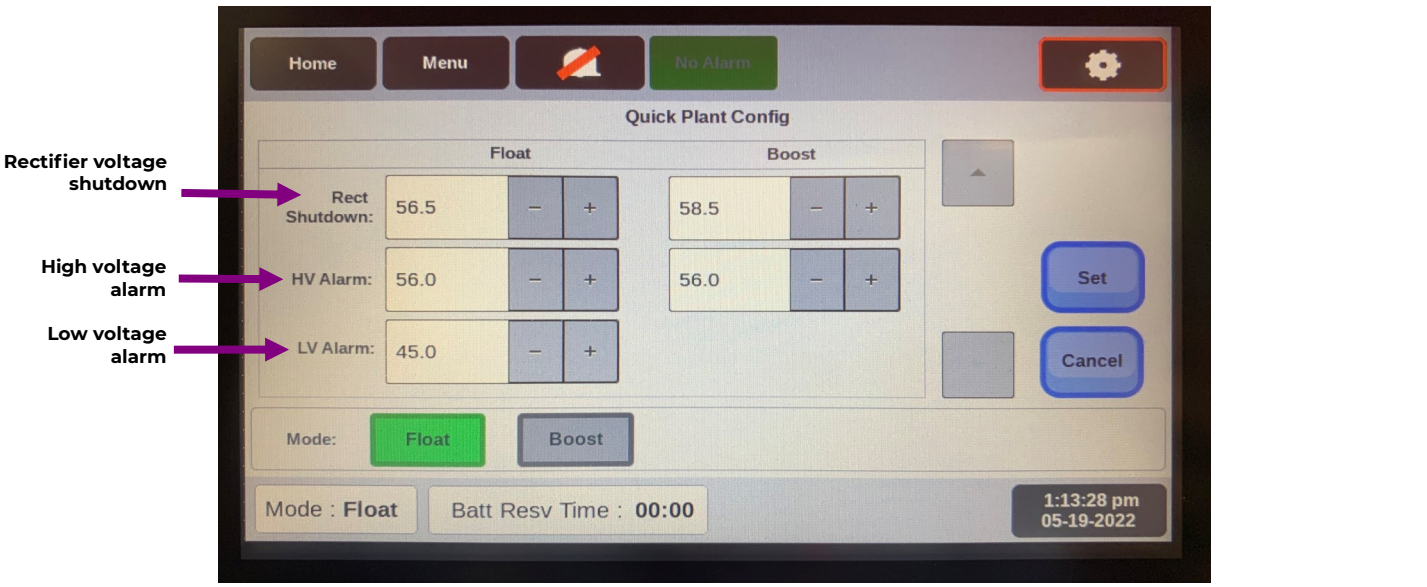


Figure 68 (B) Nebula Controller Front Panel Display (Quick Plant Configuration View)

IWC943 Controller LED Indicator

The IWC943 Nebula controller has a LED “STATUS” indicator on the front of the controller module. During normal operation the LED is green. When an alarm is present the LED will change to amber to signify a “warning” or “minor” alarm condition. It will change to red to signify a “major” or “critical” alarm condition.

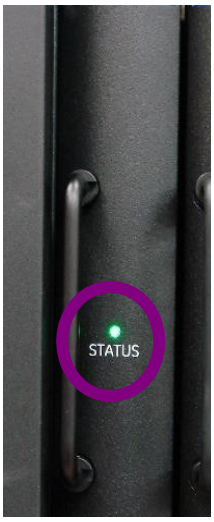


Figure 69 IWC943G Controller Status LED (shown)

Local Event/Alarm

The Integritas IWC943 Nebula controller has local indications of alarms located along the side of the display.

The indicators display green during normal operation. When an alarm condition occurs the display indicator changes color and the Alarms menu button changes color. When the alarm condition is cleared, the display indication returns to the green state.

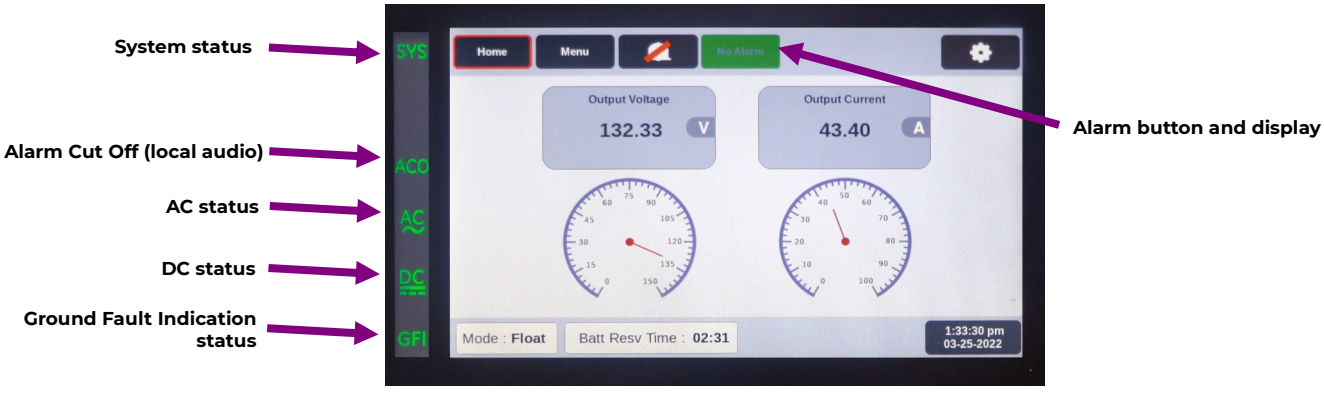


Figure 70 Nebula alarm events

Configuration (Web)

Change all system configurable parameters using a web browser interface with a computer connected to the Maintenance port (RJ45 jack) on the front of the controller.

- Using the connected computer open a web browser and enter the IP address 192.168.1.1 (default) in the web browser address field.
- Default user name/password is “admin/admin”

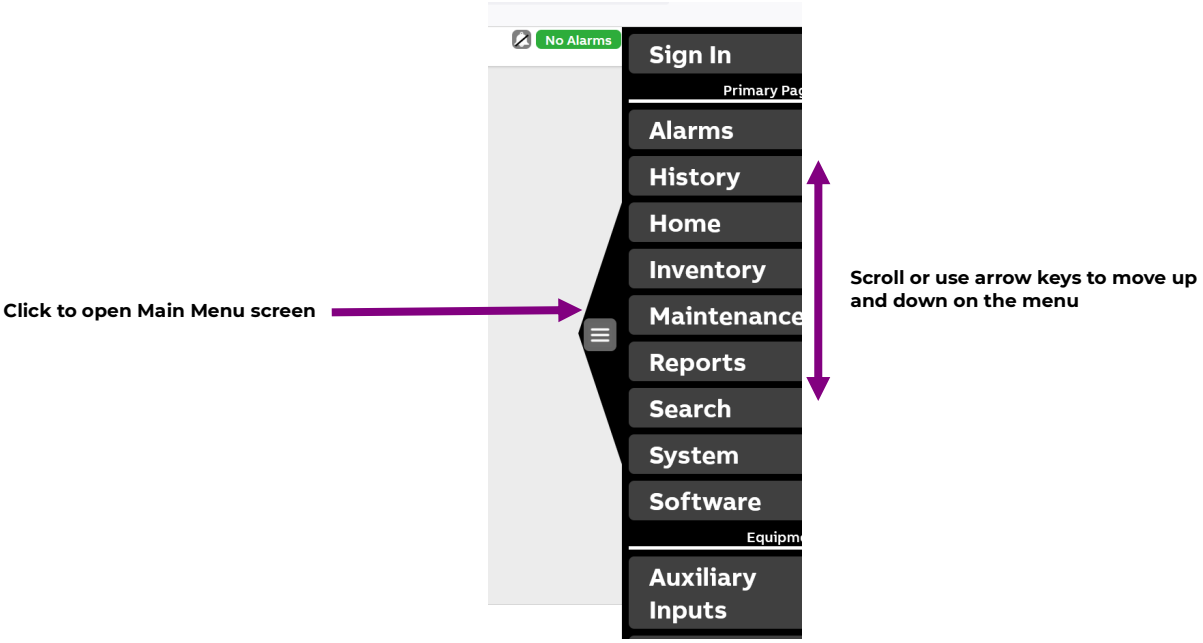


Figure 71 Nebula Web Page View

External Shunt Settings

External Shunt - optional

The system includes a pre-configured internal 300Adc shunt for monitoring battery current. For customers with system distributions that include an existing shunt on their sites, the Integritas system allows monitoring of an existing shunt via the Output Signal Unit Assembly. Prior to wiring your shunt monitor voltage, the jumper on rear of charger must have been moved prior to installation. Connect your shunt monitor leads to the Output Signal Unit assembly. Connect with proper polarity as marked.

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To configure the external shunt, log onto the unit using a web browser and a computer connected to the Ethernet port. Select <Main Menu> <Shunts>. Then enter the new shunt values on the shunt screen. Please note, all external battery shunts to be deployed are assumed to be 50mVdc and can be setup with values from 0A up to 9999A.

There are many different screens and configurable parameters within the Nebula web browser view. Complete details associated with the web browser functionality are not covered in this manual.

Change History (excludes grammer & clarifications)

Revision	Date	Description of the change
10.0	08/24/2022	Updated as per abb template, Added nebula controller details.
10.1	12/16/2023	Updated as per OmniOn template.

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