



129BD

MODULAR -48 VDC, 1200 AMP

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FACTORY DEFAULT SETPOINTS AND SETPOINT LIMITS

Description	Default	Range	Resolution
Battery on Discharge	52.0 VDC	40-60 VDC	100mV
Plant High Voltage Alarm	56.5 VDC	40-60 VDC	100mV
Low Voltage Alarm	52.0 VDC	40-60 VDC	100mV
Plant Low Low Voltage Alarm	46.0 VDC	40-60 VDC	100mV
Low Voltage Load Disconnect (A B C)	42.0 VDC	40-60 VDC	100mV
Low Voltage Reconnect (A B C)	49.0 VDC	40-60 VDC	100mV
Low Voltage Disconnect Time	4 h	.1-10h	.1h
Total Current Alarm (% Applied Globally)	100%	0-100%	1%
Ambient Temperature Alarm (Threshold 1)	10°C	0°C to 100°C	1°C
Ambient Temperature Alarm (Threshold 2)	40°C	0°C to 100°C	1°C
Plant Float*	54.0 VDC	50.0-60.0 VDC	100 mV
Plant Equalize*	55.0 VDC	50.0-60.0 VDC	100mV
Rectifier Max Current	50 ADC	25-55 ADC	0.1 ADC
Rectifier HVSD	58.0 VDC	55.0-65.0 VDC	100mVDC
Temperature Compensation Slope	72mV per °C	0-240 mV per °C	1mV per °C
Distribution Current Alarm	80%	0-120%	1%
Battery Temperature Alarm (Threshold 1)	10°C	-40°C to 100°C	1°C
Battery Temperature Alarm (Threshold 2)	50°C	-40°C to 100°C	1°C
Low Voltage Battery Disconnect	42.0 VDC	40-60 VDC	100mV
Low Voltage Battery Reconnect	49.0 VDC	40-60 VDC	100mV
Rectifier Current Imbalance	.25	.10 – 1.0	1%
Rectifier Temp Max	80°C	0-100°C	1°C
Limited Recharge Setting	80%	50-100%	1%
Max Alarm Test Time	15 Min.	1-255 Min.	1 Min.
Float Current Limit	750mADC	0-10000mADC	1mADC
Float Current Alarm Delay	12h	1-24h	1h
Plant Equalize Time Setting	24 hours	0-36 hours	.1 Hr
Plant High Voltage Shutdown	59.0 VDC	40-60 VDC	100mV
Recharge Rate Factor	.20	.02 - .25	.01
Battery Current Variance	.20	0 - 1.0	.01
Variance Inhibit Minimum	.10	.05 – .25	.01
High Float Current Factor	.05	.05 – .25	.01
Midpoint Variance Major	1000 mVDC	300-1000 mVDC	1 mVDC
Midpoint Variance Minor	500 mVDC	300-1000 mVDC	1 mVDC

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REFERENCE DOCUMENTATION (Separately bound manual)

Phoenix Digital Plant Controller Manual.....4380400PD

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CONTACT INFORMATION

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Email: PE.TechSupport@ge.com

Web site: www.gecriticalpower.com

PRODUCT INFORMATION

Please take a moment when the product is new to fill in this information.

First, locate the product information label. This is typically located on the upper front of the equipment frame, or on the rear of the frame. Fill in the part number, as it appears on the label, in the space below.

PART NUMBER	DATE CODE:
SERIAL NUMBER	ECN LEVEL: 860 ____ P

WARNINGS

1. Electrical shock hazard. Do not attempt to remove, maintain, or install this equipment with power applied. Personnel that attempt to work on this equipment with the power applied may subject themselves or others to electrical shock that may cause serious injury or death.

Le danger électrique de choc. Pas la tentative pour enlever, maintenir, ou installer cet équipement avec le pouvoir appliqué. Le personnel qui tente traiter cet équipement avec le pouvoir appliqué peut s'exposer ou les autres au choc électrique qui peut causer la blessure ou la mort sérieuse

2. The use of this equipment by unauthorized or untrained personnel should not be attempted. Personnel that work on this equipment without the proper training may subject themselves or others to electrical shock that may cause serious injury or death.

L'usage de cet équipement par le personnel inautorisé ou sans formation ne devrait pas être tenté. Le personnel qui traite cet équipement sans l'entraînement correct peut s'exposer ou les autres au choc électrique qui peut causer la blessure ou la mort sérieuse

3. Do not attempt to work on this equipment if it is, or has been, exposed to a high moisture condition. It is recommended the equipment be returned to GE to be properly tested. Working on this equipment during a high moisture condition subjects the user to electrical shock that may cause serious injury or death.

Pas la tentative pour traiter cet équipement si c'est, ou a été, exposé à une haute condition d'humidité. Il est recommandé l'équipement s'est retourné à GE deux être convenablement essayé. Traiter cet équipement pendant une haute condition d'humidité expose l'utilisateur au choc électrique qui peut causer la blessure ou la mort sérieuse.

CAUTIONS

1. Follow proper grounding instructions.

Suivre fonder correctes les instructions.

2. If connecting batteries, remove the battery-box-fuse or trip the circuit breaker. Check batteries and connections for proper polarity and power before connecting the batteries to the plant.

Si connectant des piles, enlever la pile-boîte-le fusible ou trébuche le disjoncteur. Vérifier des piles et des connexions pour la polarité et le pouvoir correcte avant de connecter les piles au système.

3. To remove the circuit breakers or fuses, the DC and/or AC input to the plant will need to be disconnected, thereby disabling the plant output to the load(s). Take the necessary precautions and inform the plant engineer that the plant output power to the loads will be disabled.

Pour enlever les disjoncteurs ou les fusibles, les données de courant alternatif de et/ou de DC au système auront besoin d'être débranché, de cette façon rendant infirme la production de système au chargement (les chargements). Prendre les précautions nécessaires et informer l'ingénieur de plante que le pouvoir de production de système aux chargements seront rendus infirme. .

4. Before performing any maintenance, ensure AC or DC power is not applied to the plant.

Avant d'exécuter n'importe quel entretien, assurer que le pouvoir de courant alternatif ou DC n'est pas appliqué au système.

5. Fuse holders, fuses, and circuit breakers are not to be loaded to more than 80 percent of their ampere rating.

Fondez les supports, fusibles, et des disjoncteurs ne doivent pas être chargés à plus de 80 pour cent de leur estimation d'ampère.

4. Use of an attachment other than one approved by GE will void any and all warranties, implied or other, and will increase risk of fire, or may possibly cause electrical shock, injury, or death to personnel.

L'usage d'un attachement autrement qu'un approuvé par GE annulera n'importe quel et toutes garanties, implicites ou autres, et augmentera le risque de feu, ou probablement peut causer le choc électrique, la blessure, ou la mort au personnel.

5. Do not operate this equipment if it has been dropped or otherwise damaged. Trying to operate this equipment if it has been damaged subjects yourself or others to electrical shock that may cause serious injury or death.

L'usage d'un attachement autrement qu'un approuvé par GE annulera n'importe quel et toutes garanties, implicites ou autres, et augmentera le risque de feu, ou probablement peut causer le choc électrique, la blessure, ou la mort au personnel.

6. Before you proceed, ensure the input source is not live and the input circuit breaker(s)/fuse(s) has been tripped or removed. If these procedures have not been followed and the input/output power is live, serious personnel injury or death may occur.

Avant que vous procédiez, assurez que la source d'entrée n'est pas en vie et le circuit d'entrée breaker(s)/fuse(s) a été trébuché ou a été enlevé. Si ces procédures n'ont pas été suivies et le pouvoir input-output est la blessure de personnel ou la mort en vie et sérieux peut arriver

7. A rack/shelf may contain several operating plants. If there is another plant in the general area you want to install this plant, be cautious of any exposed connectors or wires and, with permission, remove power to the other plants. Failure to take the necessary safety precautions subjects the installer or maintenance personnel to severe electrical shock that may cause serious injury or death.

Une étagère/étagère peut contenir plusieurs systèmes d'exploitation. S'il y a un autre système dans le secteur général que vous voulez installer ce système, êtes prudent de connecteurs ou de fils exposés et, avec la permission, enlevez le pouvoir aux autres systèmes. L'échec pour prendre les précautions de sûreté nécessaires exposent le personnel d'installateur ou entretien au choc électrique sévère qui peut causer la blessure ou la mort sérieuse

8. This equipment may connect to lead-acid batteries. Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and birth defects or other reproductive harm. **Wash hands after touching batteries.**

Cet équipement peut connecter des piles mener-acides. Les postes de pile, les terminaux, et les accessoires apparentés contient l'avance et les premiers composés, les produits chimiques connus à l'état de Californie pour causer les défauts de cancer et naissance ou l'autre mal reproducteur. Laver des mains après avoir touché des piles.

SECTION 1: GENERAL

1.1 GENERAL

The 129BD plant is designed to provide a bulk output up to 1200 Amps at -48VDC when fully equipped with six 23-inch rectifier shelves or eight 19-inch shelves, and a total of twenty-four rectifier modules. The plant accepts 184V~264V at 45Hz-65Hz, as an input source. The rectifiers will operate at lower voltages with reduced output. The voltage is applied to the individual rectifier modules through AC wiring located at the rear of each rectifier shelf. The plant controller is interfaced with the output and alarms of the rectifier modules via factory-installed wiring.

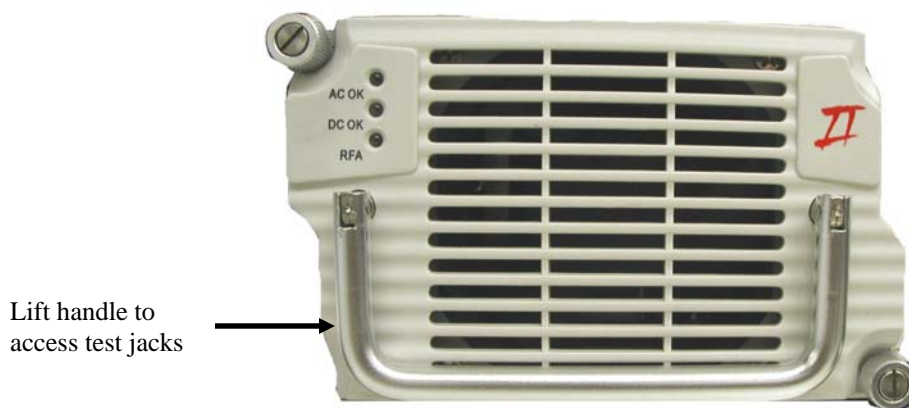
Each modular rectifier may be hot inserted, meaning the rectifiers may be removed or installed without shutting down the entire plant.

In the event of a commercial AC failure, the plant seamlessly powers the load from the batteries. When the commercial AC returns, the plant automatically returns the load to the rectifiers and recharges the batteries in preparation for the next commercial AC power failure.

The plant is fully automatic and provides float and recharge capacity. Alarms are given whenever any plant circuit breaker trips, a fuse fails, a rectifier fails, or the plant output voltage goes out of prescribed limits. The plant can interface with a LAN/WAN. The basic controller offers web browser based monitoring and plant setpoints to be accessed and/or changed. Refer to the controller manual (4380400PD) for complete details.

1.2 RECTIFIER

The compact SM50H48D rectifier provides 50 Amps at -48VDC (220VAC input) and 25 Amps at -48VDC (110 VAC input). Up to 4 rectifier modules can be equipped in a 23-inch rack-mounted shelf, for a total of 200 Amps per shelf. Up to 3 rectifier modules can be equipped in a 19-inch rack mount shelf, for a total of 150A per shelf. For rectifier module details, refer to the rectifier product manual (4380421PD) attached at the rear of this manual. Test jacks are located on the bottom left front of each rectifier module to read individual rectifier current.



Front View

FIGURE 1-1: SM50H48D Rectifier Module

1.2.1 RECTIFIER BLANK PANEL

Each rectifier shelf may accommodate up to three or four rectifier modules. All unused rectifier positions must be covered with a rectifier blank panel (GE part number 4361179P).

1.3 RECTIFIER SHELF

The 23-inch rectifier shelf provides 200 Amps at -48VDC when fully equipped with four (4) SM50H48D rectifiers. Six fully loaded shelves may be equipped in the plant to provide a total of 1200 Amps of -48VDC.

The 19-inch rectifier shelf provides 150 Amps at -48VDC when fully equipped with three (3) SM50H48D rectifiers. Eight fully loaded shelves may be equipped in the plant to provide a total of 1200 Amps of -48VDC

1.4 DISTRIBUTION

The 129BD provides a bulk output bus providing three (3) 3/8" on 1" two-hole lug landings and one (1) 3/8" on 1" two-hole location (through-hole for back to back connections). A total of five distribution points are provided utilizing this setup.

1.5 DIGITAL PLANT CONTROLLER

The digital plant controller monitors and/or controls voltages, currents, temperatures, and other parameters within the 129BD and displays this data via the LCD screen. The digital plant controller consolidates all data and provides all interface functions for the power plant, including both local and remote capabilities for monitoring and providing setpoint information.

For complete details, refer to the digital plant controller manual (4380400PD).

1.6 OPTIONAL BATTERY / SHUNT MONITORING MODULE (ADAC)

The system supports one internal ADAC (optional List-69) and up to 20 external ADACs (optional see chart below for part number and type of ADAC). The battery/shunt monitor module (also referred to as the ADAC monitoring module) is an optional factory/field configurable device used to monitor load shunts and/or battery measurements. Using a combination of known module types and the battery/shunt monitor module dials, the end user can configure each monitored point as one of five (5) basic measurement types:

- Branch shunt current (30 max per system)
- Battery current (24 strings max per system)
- Battery temperature (24 strings max per system)
- Battery midpoint (24 strings max per system)
- Battery sense (6 max per system)

For more information about the optional ADAC module refer to the digital plant controller manual (4380400PD). For ordering information, refer to the J-Drawing attached to the rear of this manual.

BATTERY/SHUNT MONITOR	BAT STRINGS MONITORED	SHUNT CURRENT	BAT SENSE	PART NUMBER REQUIRED
List-68	3	6	1	6421829P (Up to 5)
List-66	5	0	1	6421827P (Up to 5)
List-67	0	16	0	6421828P (Up to 5)

1.7 ACRONYMS

ABS	Alarm Battery Supply
ACO	(Audible) Alarm Cut Off
ALM	Alarm
AO	Analog Output
AWG	American Wire Gauge
BAT	Battery
BC	Battery Current
BCX	Battery Current (x represents any number)
BD	Battery Disconnect
BS	Branch Shunt
BTC	Battery Temperature Compensation
CBS	Control Battery Supply
CFA	Converter Fail Alarm
COF	Charger Off (GND Signal)
COM	Common
CON	Charger On (GND Signal)
DFA	Distribution Fuse Alarm
DFAR	Distribution Fuse Alarm (Return)
DO	Digital Output
EBD	Emergency Battery Disconnect
ECS	End Cell Switch
EPO	Emergency Power Off
EQ	Equalize
FA	Fuse Alarm
GND	Ground
HHVA	High High Voltage Alarm
HVA	High Voltage Alarm
HVS	High Voltage Shutdown
LCA	Low Current Alarm
LLV	Low Low Voltage
LOA	Low Output Alarm
LOAR	Low Output Alarm return
LSO	Load Share Out
LV	Low Voltage

LVD	Low Voltage (Load) Disconnect
MJ	Major
MN	Minor
MP	Mid Point
MON	Monitor
NC	Normally Closed
NO	Normally Open
OC	Over Current
PE	Power Earth (Earth Ground)
PL	Partial Load
PMJ	Power Major
PMN	Power Minor
PMNR	Power Major Return
PMJR	Power Minor Return
PNL	Panel
RCC	Remote Charger Control
REMEQ	Remote Equalize
RFA	Rectifier Fail Alarm
RFA J	Rectifier Fail Alarm Major
RFA N	Rectifier Fail Alarm Minor
RFAR	Rectifier Fail Alarm Return
RS	Rectifier Restart
RSR	Rectifier Restart Return
RXD	Receive
SG	Signal Ground
SH	Shunt
SHG	Shield Ground
TB	Terminal Block
TR	Rectifier Turn On/Off
TRR	Rectifier Turn On/Off Return
TS	Terminal Strip
TXD	Transmit
VM	Volt Meter
WD	Watch Dog

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SECTION 2: INSTALLATION

2.1 PLANT PRE-INSTALLATION CHECKS

- A. Remove the plant from the shipping container and ensure all items are intact. If the contents are damaged, notify the delivery personnel and GE immediately.
- B. Several options are available for the plant and should have been determined when the order was placed. Ensure the plant configuration matches the order.
- C. Ensure required single-phase 184 - 264VAC, 45-63 Hz. is available at the selected plant location. Each rectifier position requires a 25A circuit. 4 circuits per 1 ¼" conduit per rectifier shelf.

2.2 INSTALLER MECHANICAL AND POWER ELECTRICAL CONNECTIONS

Installer's information notes: Power Plant torque requirements will comply with data outlined in the following charts except when otherwise specified by drawing or customer requirements. Floor anchors, AC wireways, overhead structural materials, and batteries should be chosen and torqued to meet customer / manufacturer recommendations.

Note 1: Equipment grounding conductor size (Frame or Chassis) is based on the recommendations of the National Electric Code for copper wire. #6 AWG is minimum size recommended.

Note 2: Fuse or circuit breaker protection external to the plant for commercial AC is to be provided by the customer or contractor and should meet National Electrical Code standards.

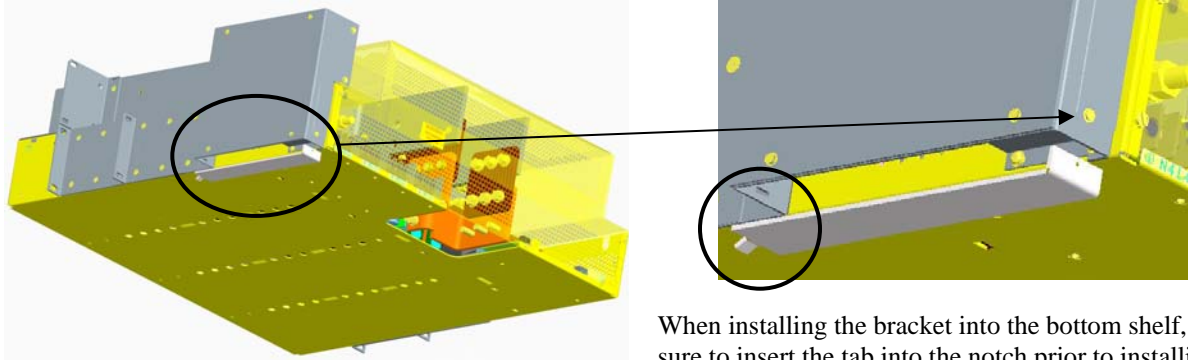
Note 3: DC wire sizes are based on the voltage drop considerations and the National Electric Code Table 310-16 for copper wire.

Note 4: Installation of the plant should be in an area that is accessible to qualified personnel only.

2.3 RECTIFIER SHELF INSTALLATION (SINGLE AND MULTIPLE)

A. Install the plant as follows:

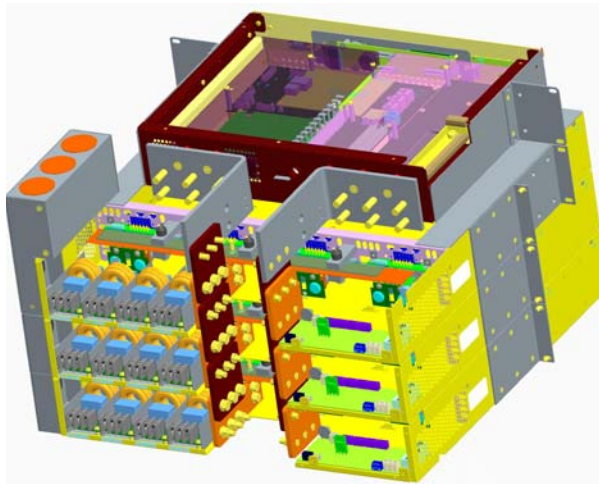
1. Install the main shelf (with the Phoenix digital plant controller on the top) into the customer rack (leave ample room for up to five supplemental shelves to be installed directly below the main shelf). Secure each of the four corners with a screw.
2. If additional shelves are to be installed, the bottom bracket on the main shelf wireway must be removed and installed on the bottom most shelf. Remove the screw on the rear of the shelf, as shown in Figure 2-1.



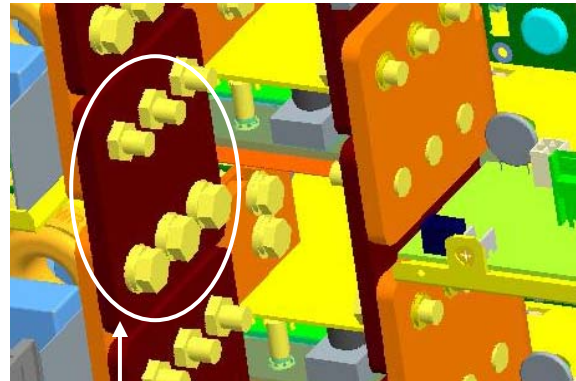
When installing the bracket into the bottom shelf, be sure to insert the tab into the notch prior to installing the screw.

Figure 2-1: Location of wireway bottom bracket on main shelf

3. Position the first supplemental rectifier shelf directly below the main shelf and secure each of the four corners with a screw. Repeat this process for the remaining supplemental rectifier shelves, as required. On the bottom rectifier shelf, install the wireway bottom bracket (refer to Figure 2-1).
4. Once all rectifier shelves have been installed, the rectifier splice bus bars must be installed. All hardware is included with the shipment of each supplemental rectifier shelf.



Finished Splice Bus Bar Installation



Splice Bus Bar

Detailed Splice Bus Bar Installation

Figure 2-2: Splice Bus Bar Installation

- Once all splice bus bars have been installed, the load share cables and CAN cables must be connected between shelves. All load share cables and CAN cables are supplied. Daisy chain each of the load share cables between rectifier shelves. Daisy chain the CAN cable between rectifier shelves (refer to 4380229PD for the location of the load share connections and the CAN connections). Remove the CAN terminator plug from the main rectifier shelf and install it into the last rectifier shelf at the end of the CAN cable chain.
- If equipped, an RFA (rectifier fail alarm) cable must be installed from each of the rectifier shelves to the digital plant controller. Refer to the rectifier shelf manual (4380229PD) for the location of the RFA output on the shelf control board. Refer to Figure 2-3 for the location to connect the RFA cable within the digital plant controller.

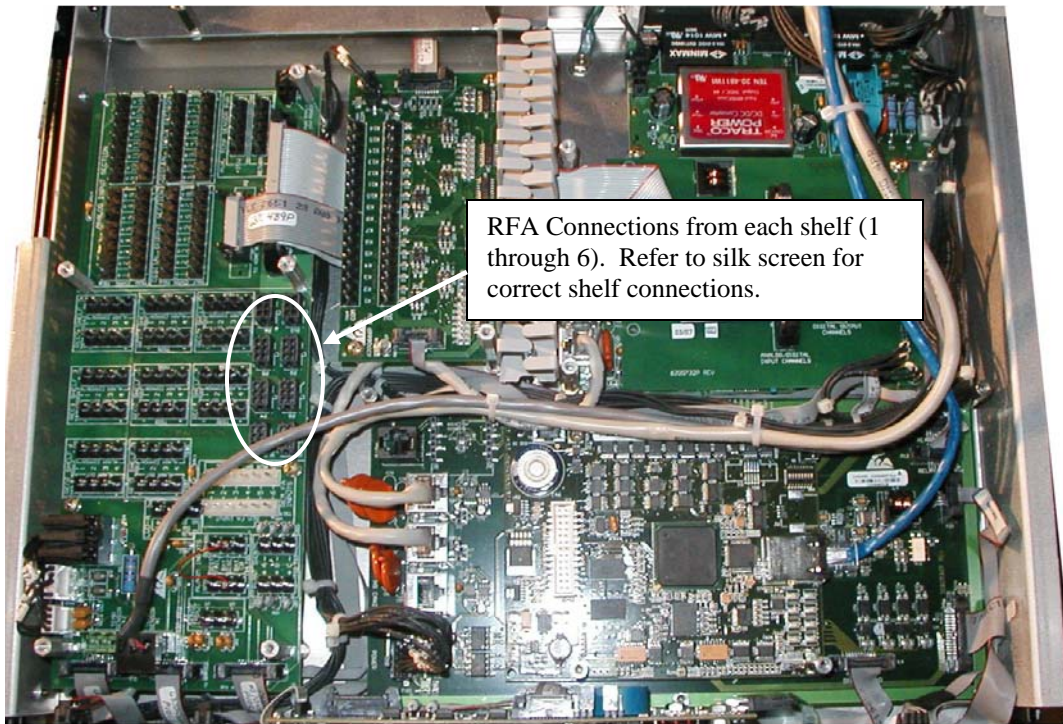


Figure 2-3: RFA Location within digital plant controller

- Refer to 4380229PD to correctly set each of the installed rectifier shelves dipswitch settings. The main shelf must be number one (1), followed by shelf two (2), shelf three (3), and so forth.

2.4 FRAME GROUND

Install frame grounding as required to ensure personal and equipment safety. **NOTE:** Frame ground must be connected on the customer supplied frame.

2.5 AC CONNECTIONS

NOTE: No AC connections should be made until after the plant has been secured to the structure and frame ground is connected.

AC wiring is supplied and terminated on each rectifier shelf input terminal block. The installer is to route each of the shelves AC wiring to the top of the wireway, and provide conduit (as required) to the customer AC panel. Refer to Figure 2-4 for the location.

Table 2-1: AC INPUT (for individual feed at the rear of the rectifier shelf)

Connection	Recommended Feeder Breaker Size
AC Input at Rectifier	25 Amp per rectifier module

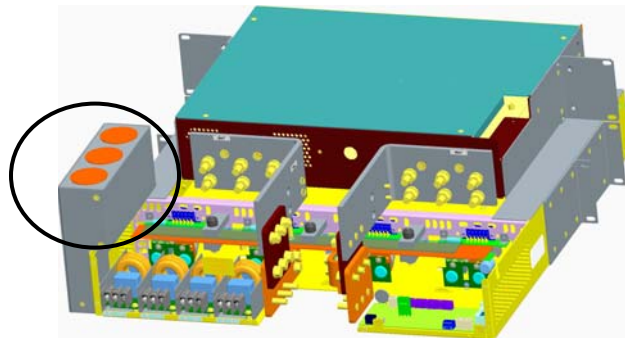


Figure 2-4: AC Input At Rear Of Rectifier Shelf (Shown with lexan cover removed)

2.6 -48VDC LOAD CONNECTIONS

Connect the -48VDC load(s) as required. The 129BD plant provides a total of three (3) 2 hole lug connections (3/8" on 1" centers) enabled with studs and two (2) through hole connections (back to back). Refer to Figure 2-5.

Table 2-2: -48 VDC LOADS

Connection	Terminal Type	Number of Terminal Types Provided	Torque
-48VDC Load	2-hole lug 3/8" studs on 1" centers	3	27.0 ft/lbs
-48VDC Load	2-hole through hole 3/8" on 1" centers (for back to back connections)	1	27.0 ft/lbs

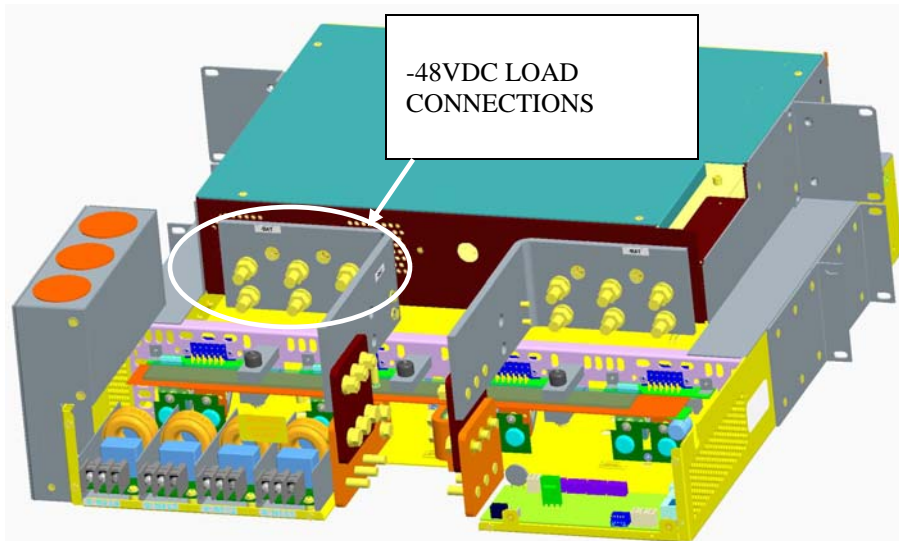


Figure 2-5: Location of -48VDC Load Connections

2.7 LOAD RETURN CONNECTIONS

Load returns are to be connected to the plant return bus. Refer to Figure 2-6 and Table 2-3.

Table 2-3: LOAD RETURN

Connection	Terminal Type	Number of Terminal Types Provided	Torque
Load Return	2-hole lug 3/8" studs on 1" centers	3	27.0 ft/lbs
Load Return	2-hole through hole 3/8" on 1" centers (for back to back connections)	1	27.0 ft/lbs

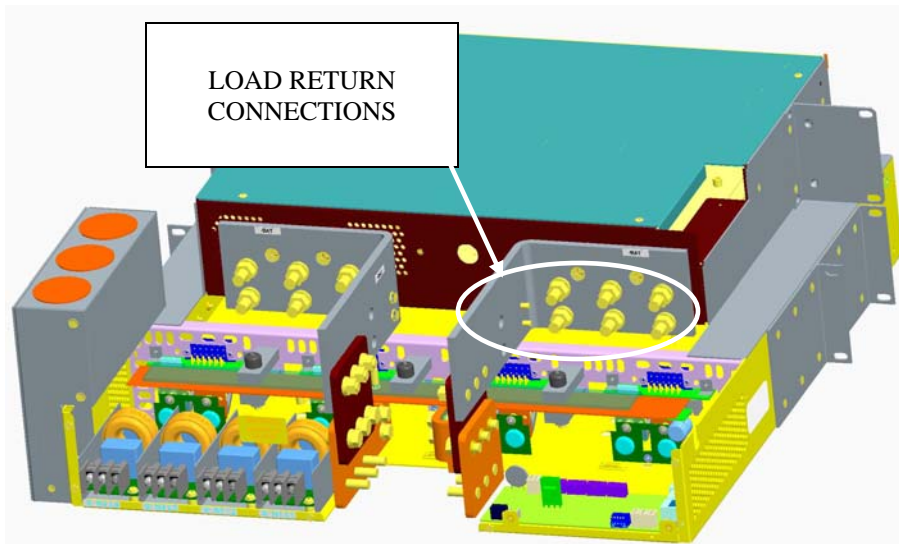


Figure 2-6: Location of Load Returns

2.8 PLANT ALARM AND ADAC CONNECTIONS

Located within the Phoenix digital plant controller (toward rear, center), as shown in Figure 2-7, is where the PWB containing installer connections for the plant alarms is located. This PWB is referred to as the Alarm Extension Board. All installer alarm connections are terminated via wire wrap. To access this board, loosen the two captive fasteners found on the front of the plant controller’s front door, and slide the controller shelf out. Refer to silkscreen on alarm board and 439129BDT (located as an attachment to this manual) for alarm pin outs. Refer to the Phoenix digital plant controller manual (4380400PD) for complete alarm details. The ADAC connections are located within the digital plant controller, as shown in Figure 2-7. Refer to T-439129BDT and 4380400PD for ADAC wiring and operating instructions.

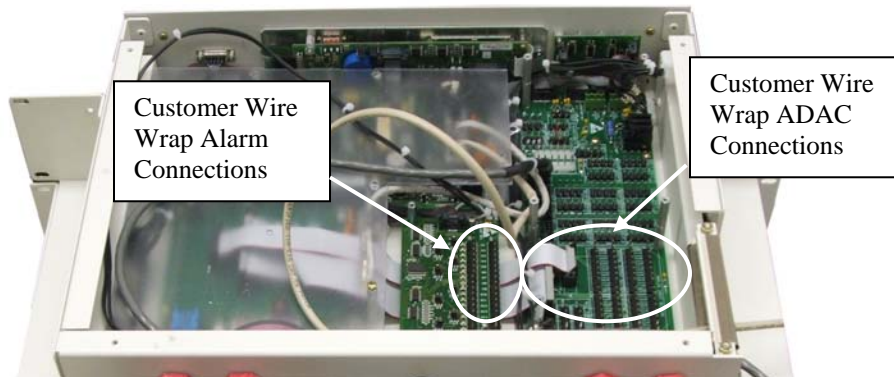


Figure 2-7: Alarm and ADAC Interface (Rear top view of controller shown)

NOTE: Each of the 16 extended alarms is factory set to “Open On Alarm”. Refer to the plant digital controller manual (4380400PD) for details on how to change the factory alarm settings.

2.9 LOCATION AND FUNCTION OF THE 3 FUSES (F1, F2, F3)

The plant interconnect card is equipped with three GMT fuses. Refer to Figure 2-3 for the GMT locations.

Fuse Position Number	Fuse Size	
F1	3A GMT	Primary Controller Fuse
F2	0.5A GMT	Backup Controller Fuse
F3	3A GMT	LVD-A Coil

2.10 PLANT MAIN SHUNT INPUT

A connection from the plant main shunt must be cabled into the plant digital controller for proper controller function. Connect the cables from the plant main shunt to the + and – of **(Plant Shunt A)** wire wrap location. Refer to figure 2-8 for the proper location. Refer to the T-Drawing (439129BDT) for details.

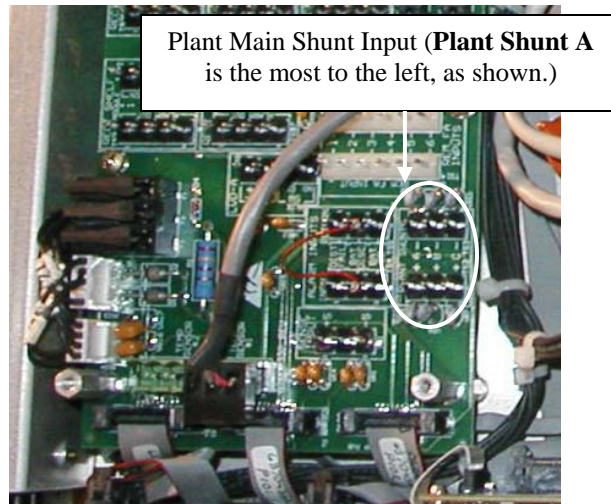


Figure 2-8: Location of Plant Shunt A Input

2.11 PLANT INTERCONNECT POINTS

The plant interconnect card contains all of the plant digital controller input connections provided for the customer. Refer to the following sections for connection details.

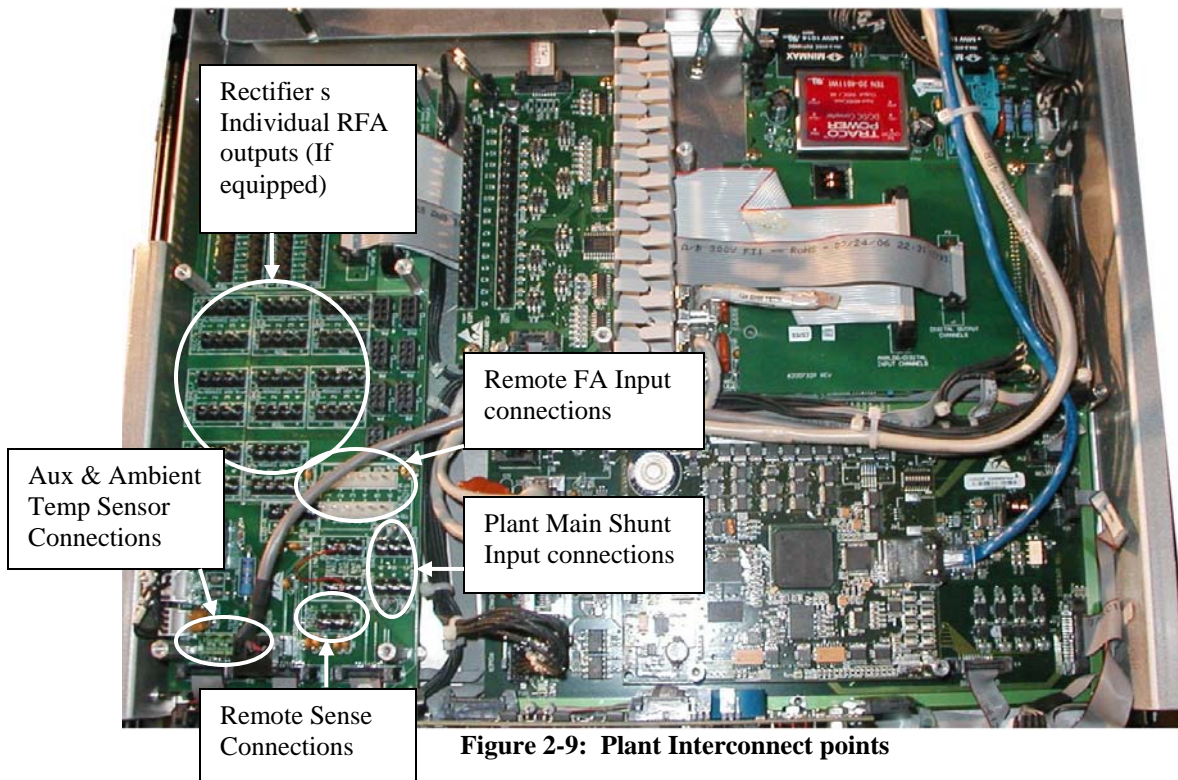


Figure 2-9: Plant Interconnect points

2.11.1 TEMPERATURE SENSOR INPUTS

Two (2) temperature sensor inputs are provided on the plant interconnect card. The temperature sensor 1 position is factory equipped with an ambient temperature probe. Refer to the J-Drawing to order an additional temperature sensor probe.

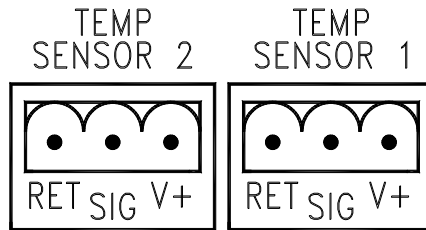


Figure 2-10: Temp Sensor Inputs

2.11.2 REMOTE SENSES

Remote sense is provided to sense a remote voltage. If the remote sense connection is not used, the plant digital controller will default to local sense.

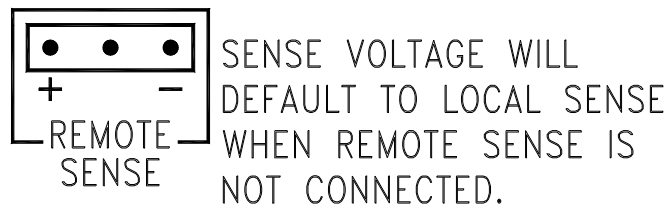


Figure 2-11: Remote Sense

2.11.3 REMOTE FA INPUT

The plant interconnect card provides six (6) remote FA input connections. Wire as required.

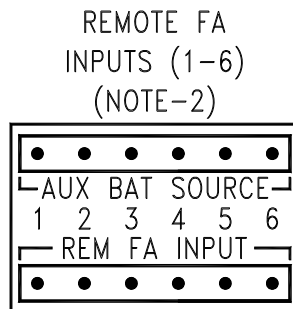


Figure 2-12: Remote FA Inputs

2.11.4 LVD CONNECTION

The plant interconnect card provides an LVD connection for external low voltage disconnects contactor. If the LVD feature is to be used, connect the correct polarity from the coil on the contactor to the + and - of the coil input and coil auxiliary switch as shown in figure 2-13. Refer to 439129BDT for wiring of the external LVD contactor.

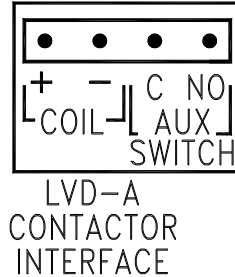


Figure 2-13: LVD Connection

2.11.5 INDIVIDUAL RFA OUTPUT CONNECTIONS

Individual rectifier failure alarm (RFA) outputs are optional for the 129BD plant.

If equipped, wire the RFA outputs per Figure 2-14 and the T-Drawing. The factory setting is ground on alarm (the RFA COM connections are not to be connected). Refer to 4380229PD for details regarding the RFA settings.

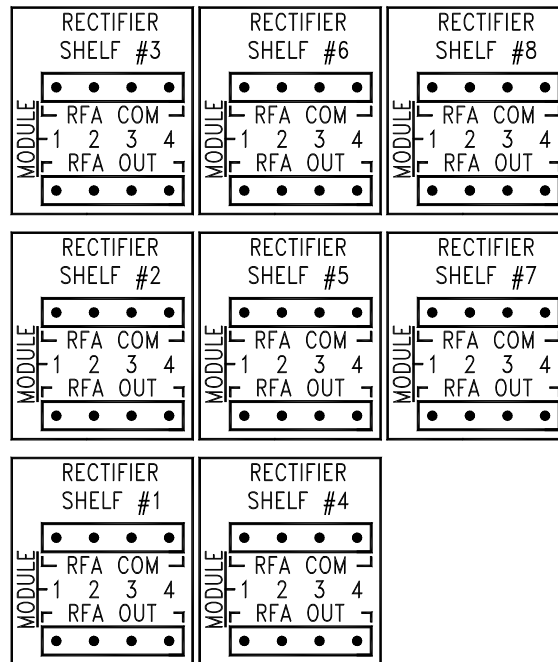


Figure 2-14: Individual Rectifier Fail Alarm Connections

2.12 RECTIFIER INSTALLATION

- A. Remove the blank filler panel where the rectifier module will be inserted.
- B. Ensure the AC circuit breaker in the AC power service cabinet is set to the off position.
- C. Insert the rectifier into the rectifier shelf. The module should slide in easily. Do not force it into the shelf or damage to the module or plant backplane could occur.
- D. Push lightly on the front of the module until the module is against the face of the shelf. Secure the module to the cage with the module retaining screws (Refer to Figure 2-15).



Figure 2-15: Retaining screw locations on the rectifier module

NOTE: If ordered as part of a complete plant, the rectifiers will come installed in the shelves from the factory.

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SECTION 3: OPERATIONAL CHECKOUT

3.1 GENERAL

The following procedure should be followed after installation. After performing any maintenance to the plant, follow the procedure detailed in section 3.3.

It is assumed that the plant is installed in the plant, input power is available, outputs are tied to the applicable loads, and all other plant interfaces have been made.

NOTE: Alarms will be sent. Notify alarm surveillance personnel.

3.2 INITIAL PHOENIX DIGITAL CONTROLLER START UP ROUTINE

1. Remove F1 (CONTRL fuse) from the plant interconnect card 6200733P located within the Phoenix digital plant controller. F1 is a 3 Amp GMT fuse.
2. Remove all rectifier modules from the plant.
3. If equipped, turn each battery string breaker “ON” (one string at a time). This will apply battery potential to the power plant.
4. Once all battery string disconnect breakers are “ON”, replace F1 (CONTRL fuse) into the plant interconnect card 6200733P, located within the Phoenix digital plant controller. F1 is a 3 Amp GMT fuse. This will start the digital controller initialization / self-test process.
5. The plant digital controller initialization / self-test will start within 30 seconds. During the start up, the LCD screen will flash “SELF TESTS PASSED”. Each LED on the front of the digital controller will cycle in order from the top left position to the bottom right position. Refer to Figure 3-1 for a visual representation of what the digital controller LCD screen will display once the plant digital controller self test is complete.

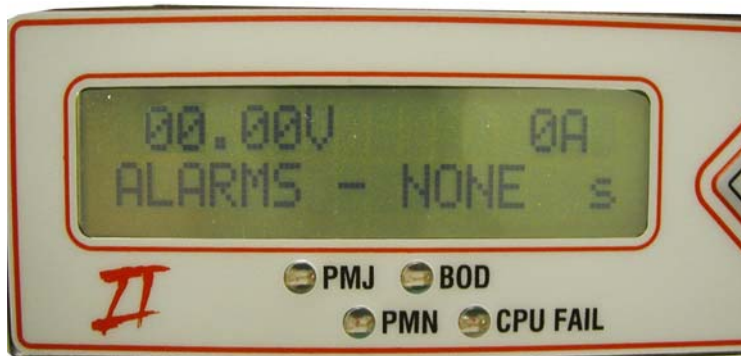


Figure 3-1: Digital Controller LCD Screen

NOTE: Figure 3-1 represents a typical digital controller LCD screen.

3.3 INITIAL TURN-ON AND PLANT OUTPUT VOLTAGE VERIFICATION

1. Install each rectifier module.
2. Apply “AC Power” to each rectifier, one at a time. Each rectifier will start up and begin communications with the plant digital controller. Once “AC Power” has been applied to all of the installed rectifier modules, visually verify that the green LED “AC OK” and the green LED “DC OK” are illuminated on each rectifier module. Verify that the RECTIFIER MAJOR (or RECTIFIER MINOR) LED and the AC FAIL LED on the plant digital controller are extinguished.
3. The plant digital controller OK LED (green) and FLOAT MODE (green) should be the only two LEDs illuminated on the front of the plant digital controller panel. If any alarms are still showing on the plant digital controller, refer to Controller manual 4380400PD.
 - a. Verify that the only front panel LEDs illuminated are SYSOK and FLOAT MODE.
 - b. Verify the controller reports no alarms.
 - c. Verify communications to the rectifier by looking at status of all rectifiers.
 - d.
 - e. Verify plant voltage displayed on controller is $\pm 0.05V$ of voltage measured between -48V bus, and GND bus using an external calibrated meter.
 - f. Verify Plant Voltage is equal to the Float Voltage Setpoint $\pm 0.05V$.

NOTE: Before performing the following tests, verify that the plant is operating normal (showing no alarms). The only two LEDs illuminated on the front of the plant digital controller should be the Green SYSOK LED and the Green FLOAT LED.

3.4 ALARM EXTENSION VERIFICATION

Each of the sixteen extended alarms can be tested (one at a time) for proper function. Refer to the plant digital controller manual (4380400PD) for details regarding alarm testing.

3.5 LOAD SHARING

Refer to the plant digital controller manual (4380400PD) for details. Each rectifier should be sharing the load at ± 5 Amp.

CAUTION: Batteries must be connected to plant, or an external source applied to bus for HVSD testing. This is to keep bus voltage present for powering the controller, as the rectifiers will shut down during test. Testing without a bus voltage source could result in a lockout condition of the rectifiers. This is of particular concern with Rectifier HVSD testing. If an external supply is used to maintain bus power, it must have a current capability of 5 amps for the controller, plus current requirements of any load on plant that must be maintained as well as additional load that is added to obtain the 15% load on the rectifier modules.

3.6 PLANT HVSD TEST

- A. Notify alarm reporting center of site of potential alarm activity.
- B. Verify plant is powered on, and operating normally with proper float voltage, and batteries connected, or other bus supply source.
- C. Verify each of the rectifier modules are loaded to a minimum of 15%.
- D. Set plant hvsd setpoint, located in plant/setp menu, to 0.5v below the float voltage setpoint of the plant (53.5v for a 54.0v float setting).
 1. Observe all rectifiers shutdown. The green dc ok indicator on the face of each rectifier will flash intermittently indicating shutdown of rectifier output.
- E. If additional load was applied in step-c above, it may be removed at this time.
- F. Restore plant hvsd setpoint, located in plant/setp menu, to 59.0vdc, or customer defined setpoint value.
 1. The rectifiers will remain in the shutdown condition.
- G. Turn off ac power input to all of the rectifiers, and leave off until all front panel indicators on the rectifiers extinguish.
- H. Turn ac power back on to all rectifier modules.
 1. Verify all rectifier modules return to normal operation. The dc ok indicator on each module face should be steady on.
- I. Plant hvsd test complete.

3.7 RECTIFIER HVSD TEST

- A. Notify alarm reporting center of site of potential alarm activity.
- B. Verify plant is powered on, and operating normally with proper float voltage, and batteries connected, or other bus supply source.
- C. Load is not required for this test.
- D. Set rect hvsd setpoint, located in plant/setp menu, to 55.0v.
- E. Set plant float voltage setpoint, located in plant/setp menu, to 55.2v.
 - 1. Observe all rectifiers shutdown. All rectifiers will try to restart one time after a few seconds, and will then shutdown, and lockout. The red RFA indicator on the face of each rectifier will turn on steady indicating internal shutdown of rectifier output.
- F. Restore rectifier hvsd setpoint, located in plant/setp menu, to 58.0vdc, or customer defined setpoint value.
- G. Restore plant float voltage setpoint, located in plant/setp menu, to 54.0v, or customer defined setpoint value.
 - 1. The rectifiers will remain in the shutdown condition.
- H. Turn off ac power input to all of the rectifiers, and leave off for a period of (2) minutes.
- I. Turn ac power back on to all rectifier modules.
 - 1. Verify all rectifier modules return to normal operation. The dc ok indicator on each module face should be steady on.
- J. Rectifier hvsd test is complete.

3.8 MISCELLANEOUS ADJUSTMENTS

Refer to page 3 for factory settings. If the site engineer wants any of the setting verified (or changed) refer to the plant digital controller manual (4380400PD) for details.

3.9 COMPLETION OF TESTS

If the initial turn-on and operational checks are complete and the plant is operating properly, the tests are complete. Perform normal clean up, collect all tools, and close all access doors, etc. If there was a problem with the test and acceptance procedures, it is advisable to call GE Field Service (refer to the FORWARD section of this manual for telephone number).

SECTION 4: SPECIFICATIONS

4.1 PLANT RATINGS

A. INPUT RATINGS (per rectifier module)

Voltage	Current	Frequency
176-275 VAC single phase, 220VAC Nominal	20 Amps at 100% load	45-65HZ
90-175 VAC single phase, 120VAC Nominal	20 Amps at 50% load	45-65HZ

B. OUTPUT RATINGS-RECTIFIER

Each rectifier supplies 50 Amps at -48VDC with an input voltage of 176 – 275 VAC.

Each rectifier supplies 25 Amps at -48VDC with an input voltage of 90 – 175 VAC.

C. MISCELLANEOUS RATINGS

Regulation: < 0.1% line
(At 0 - 100% load) < 0.1% load

Noise: <32 dBrc (Voice Band).
<100 mV rms (Wideband, 10Hz-20Mhz)
<250 mV Peak to Peak (Wideband, 0 - 100 MHZ)
<50 mV Peak to Peak Ripple

Filtering: 32 dBrc when connected to batteries with an AH rating of four (4) times the load current

Temperature: Operating: 0 to +50°C (+32°F to +122°F)
Storage: -40 to +85°C (-40°F to +185°F)

Altitude: Sea Level to 4800 feet: 0°C to +50°C (+32°F to +122°F)
4800 feet to 7000 feet: 0°C to +45°C (+32°F to +113°F)
7000 feet to 10000 feet: 0°C to +40°C (+32°F to +104°F)

Humidity: <95% Non-condensing

Shock: This equipment, in its shipping container, withstands shock developed during shipping without physical damage or degradation of the electrical performance.

Vibration: This equipment, in its shipping container, withstands vibration encountered in shipping without physical damage or degradation of the electrical performance.

Ventilation: Plant Ventilation openings should not be blocked and the ambient temperature of the air entering the plant should not exceed 50°C (122°F)

4.2 FACTORY SETTINGS

For factory settings, refer to page 3.