Part #: GDS

Issue: 1

Rev: C

4/19/2014

100-4000 Amp Generator Docking Stations

Installation, Operation, and Maintenance Manual

IMPORTANT:

Save this instruction sheet for future use of the product

Warning

Electrical potentials hazardous to human life can exist within this equipment when energized. Disconnect all input power before opening case or touching internal parts. Use proper lock-out/tag-out procedures.

The Information contained herein may not cover all variations in equipment or provide for all contingencies. Failure to follow instructions may result in death or serious injury.

Introduction

This manual covers up to 600 Volt, 4000 Amp three phase and 120/240 Volt, 4000 Amp single phase Generator Docking Station cabinets. These instructions set out the limiting factors for satisfactory performance of the cabinets. The information contained herein outlines and describes the proper inspection, installation and maintenance of the cabinets.

Inspection upon Receiving

Cabinets should be carefully inspected upon receipt to ensure that no damage has occurred during shipment. Any damage should be reported at once and a claim should be placed against the transportation company. If any problems are found or parts are missing please contact Trystar at 1-866.TRYSTAR.

Installation and operating safety

The cabinets are provided with access panels to facilitate installation and should never be operated without these access covers securely mounted in place. A safety program must be established, verified and followed by all personnel involved with the cabinets.

Cabinet Mounting

Make sure cabinet is mounted at all anchor points. Pad mount units or units with legs are designed to be mounted to a concrete pad at least 3 inches thick. There must be at least 36 inch clearance in front of panel. (Some pad-mounted units may require 46 inches of clearance in the front of the cabinet to accommodate a large swinging door.)

Grounding

The cabinet should be grounded securely and effectively as a safety precaution. Grounding must be in accordance with NEC and local electrical codes.

Wire Selection

Connection cables must be rated for at least 90 degrees C insulation. Connection cables must meet NEC and local electrical codes.

Current	Camlock Inlet Wire Size Cu	Hardwire Inlet Size Cu (P-Pad Mounted Only)	Line/Load Connection Size Cu or AL	Grounding Size Cu or AL
100A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
200A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
300A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
400A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
600A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
800A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
1000A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
1200A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
1600A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
2000A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
2400A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
2800A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
3000A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
3200A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil
4000A	1/0 Awg-4/0 Awg	#6 Awg-800 KCMil	#6 Awg-800KCMil	#6 Awg-800KCMil

-Standard Mechanical Lug for Commercial Grade (27"x19"x9") Enclosure is 2S350 (#6 Awg-350KCMil)

-Standard Mechanical Lug for Hardwire Access in Pad Mount (84"x48"x40") Enclosure is 350L2 (#6 Awg-350KCMil)

-Standard Mechanical Lug for all Other Connections in any Enclosure is a 2S600 (#4-600KCMil)

-Customer has the option to supply their own listed Compression Type Lug

Inspection during Installation

The cabinet should be carefully inspected for any damage due to handling after receipt. The nameplate rating on the unit should be checked against the job specifications to ensure installation of the correct cabinet. The cabinet should be connected only as described on its nameplate to match the available line voltage. All bolted electrical connection should be

checked and tightened since fasteners may have loosened during shipment.

Technical Specifications

Generator Docking Stations are Nema 3R Rated when of Aluminum Construction, and Nema 4X Rated when of Stainless Steel Construction. All units have a Short Circuit Current Rating of 65KA at a maximum of 600 volts. Ideal operating climate of this unit is: 5%-95% Humidity and a Temperature of 0-40°C

⚠ Warning

⚠ Only qualified personnel should install, inspect, or maintain cabinets since the normal operating voltages can be hazardous.

Installation Procedures

Warning! If the unit has Cam Lock/quick connect type inlets built in, it is NOT suitable for indoor use. Carbon monoxide could enter a facility through unsealed temporary wire entry points. Cam Lock docking stations need to be mounted outdoor, with in close proximity to where the back-up generator will be parked.

Attention! If the Docking Station is Service Entrance Rated and used as service equipment, NEC Article 230.91 states, overcurrent protection must be provided immediately adjacent to the Docking Station. The size of the overcurrent protection should not be over the current rating of the Docking Station.

1. Ensure the area is well ventilated and free from explosive or corrosive gas or vapors. Ensure area will be easily accessible to allow for easy connection of an appropriately sized back-up generator.
2. Check the cabinet nameplate and verify that it is the correct line and load voltage for the application.
3. Mount the cabinet securely using the provided holes to mount to a wall, or use the holes in the stainless steel legs to mount to a pad.
4. Shut off primary voltage using approved lock-out/tag-out procedures
5. Remove the cover over the wiring compartment.
6. Route conduits into enclosure by creating holes as needed.
7. Connect the Line and/or Load wires to the appropriate terminals. (see figure 1)
8. Use properly sized conductors determined by the NEC
9. Ground the cabinet in accordance with NEC and local electrical codes.
10. All three phase units come standard with a phase rotation monitor. Follow “Initial Installation Setup Procedure for Phase Rotation Monitor”. Instructions located at the end of this manual and on the inside door of the docking station unit.
11. Before energizing the unit, check all terminations for loose connections and proper torque values.

Note: After installation of cables and connectors, a minimum of 1” clearance should be maintained between the enclosure and any energized parts, unless insolated by another means.

12. Replace all covers and access panels.
13. If for any reason you suspect the unit has been exposed to moisture during transit or storage, it should be dried out before being energized.

14. Energize the unit.

Attention! The input badge on the Generator Docking Station may say “When used to power a structure this inlet must be used in conjunction with a transfer switch.” If the unit was sent with an optional (K) Kirk Key System built in, then this does not apply. The built in Kirk Key System acts as the transfer switch needed to separate the Utility/Permanent Generator from the Back-up Power source.

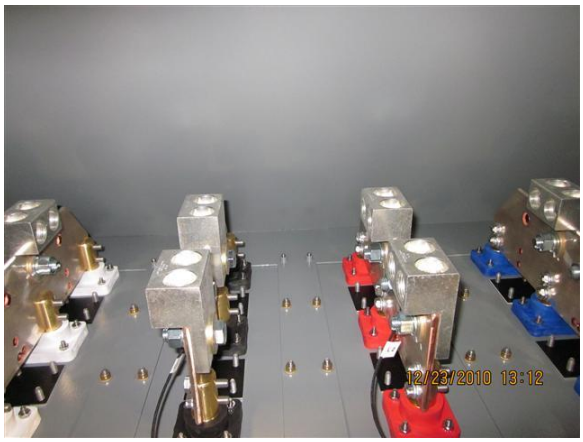


Figure 1 Permanent Connection Mechanical Lugs

Installation Outdoors

- Select appropriate location, cable, installation, and mounting hardware to meet applicable codes.
- Use water tight couplings on all electrical connections.

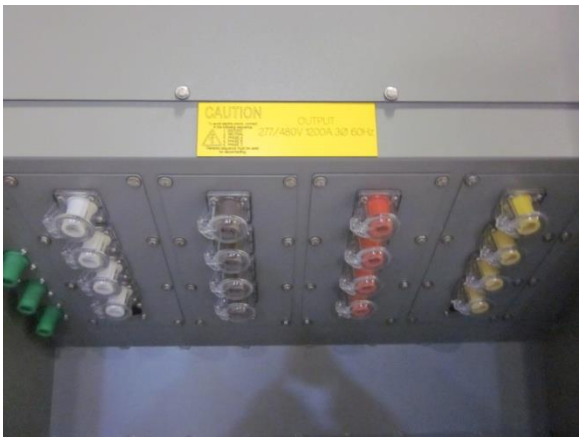


Fig 2- Inlet – Backup Generator Single Pin Connections

Torque Values for Screws and Bolts

When attaching the wires to the terminals use the recommended bolts for the wiring lugs. It is recommended to use two wrenches “where applicable” when tightening or loosening bolted connections to prevent damage. Torque 2S350 lugs to 375 IN. LBS and 2S600 to lugs to 500 IN. LBS. The chart below shows recommended torque values for standard size bolts.

Torque Values for Screws and Bolts	
Screw/bolt Size (SAE Grade 5)	Torque Value (+/-5%)
1/4	8 ft-lbs
5/16	17 ft-lbs
3/8	30 ft-lbs
7/16	50 ft-lbs
1/2	75 ft-lbs

Operation

To Use a Generator

1. Ensure Main Power source/ Utility is turned off and locked out. The manual transfer switch (or Kirk Key System) must be in the generator position.

2. Pick an outdoor location for the back-up generator that is well ventilated and free from explosive or corrosive gas or vapors. Ensure that the generator is installed away from doors, windows, and ventilation systems that can cause potential carbon monoxide hazards.

3. Connect the back-up generator to the Docking Station Inlet Cam Locks (Hardwire Lugs) located behind front door of the Docking Station. Inlet connections should be made in the order of Ground, Neutral, A Phase, B Phase and C Phase. Make sure that the connections are fully inserted and turned clockwise to full stop position. Make sure mechanical connections are tightened to proper torque spec.

4. All portable power cabling must be lashed together or braced in accordance with the short circuit current rating of your system.

5. Return all doors and access panels to their closed position (except portable wire entry door).

6. Turn on back-up generator. Test for correct voltage at the generator. If voltage is correct, turn the back-up generator circuit breaker to the on position, allowing voltage to power the Docking Station.

7. Your facility should now be running on back-up generator power.

Please note if the grounding (green) conductor and the grounded (neutral) conductor are bonded together in the **DOCKING STATION**, the generator should **NOT** be bonded. Unless otherwise required by authorities having jurisdiction.

If the grounding (green) conductor and the grounded (neutral) conductor are bonded together in the **GENERATOR**, the docking station should **NOT** be bonded. Unless otherwise required by authorities having jurisdiction.

NEVER BOND THE GROUND AND NEUTRAL IN BOTH THE DOCKING STATION AND THE GENERATOR!

NEC Article 702.7 (C) states:

Where a power inlet is used for a temporary generator, a warning sign shall be place near the inlet to indicate what type of derived system it is. The sign shall display one of the following warnings:

⚠ Warning:
FOR CONNECTION OF A SEPARATELY DERIVED (BONDED NEUTRAL) SYSTEM ONLY
OR
⚠ Warning:
FOR CONNECTION OF A NONSEPARATELY DERIVED (FLOATING NEUTRAL) SYSTEM ONLY

To Return to Utility Power

1. Turn off the breaker on the back-up generator if provided.

2. Turn off the back-up generator

3. Unplug generator cables from the Cam Lock (Hardwire Lug) connections.

4. Close and lock out all Docking Station doors, and access panels.

5. Check voltage to make sure utility power is available and correct.

6. Place manual transfer switch back into Utility Mode, or if Kirk Key System is installed, use Kirk Key to turn on the Main Utility breaker.

7. Your facility should now be running on utility power.

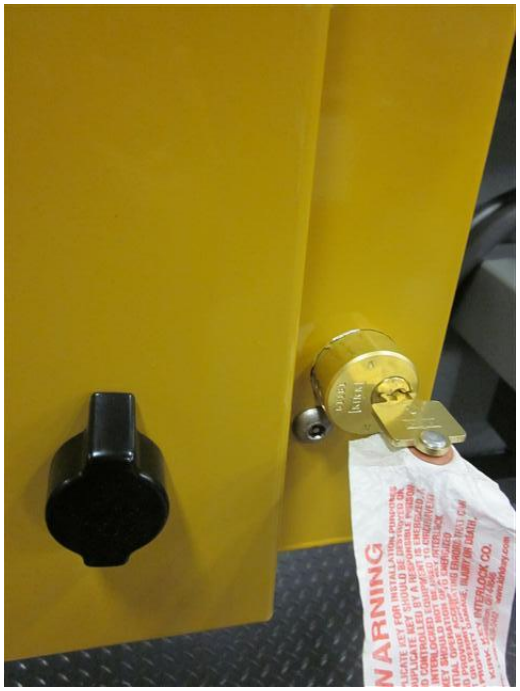
To Load Bank a Standby Generator (if equipped)

1. Ensure power source (standby generator) is turned off and locked out.
2. Pick an outdoor location for the load bank equipment that is well ventilated free from explosive or corrosive gas or vapors. The load bank test machine may exhaust great amounts of heat, so choose a safe location where the equipment will not endanger the surrounding environment or personnel.
3. Connect the load bank equipment to the Docking Station Cam Lock output panel (Female Camlocks or Mechanical Lugs) located behind the front door of the docking station. Connect Cam Locks in the order of Ground first, then the three phases. Make sure that the Cam Locks are fully inserted and turned clockwise to full stop position. Make sure mechanical connections are tightened to proper torque spec.
4. All portable power cabling must be lashed together or braced in accordance with the short circuit current rating of your system.
5. Return all doors and access panels to their closed position. (Bottom cable entry rake door must remain open for load bank machine cables to enter the Docking Station).
6. Start the standby generator and check for correct voltage at the Docking Station.
7. If voltage is correct, then follow Load Bank Manufacturer's Instructions and initiate the load bank test.
8. When load bank test is complete, turn off the stand by generator. Verify no voltage is present with a voltage meter. Then disconnect all portable power cables from the Docking Station and return all doors and access panels to the closed and/or locked position.

Optional Items

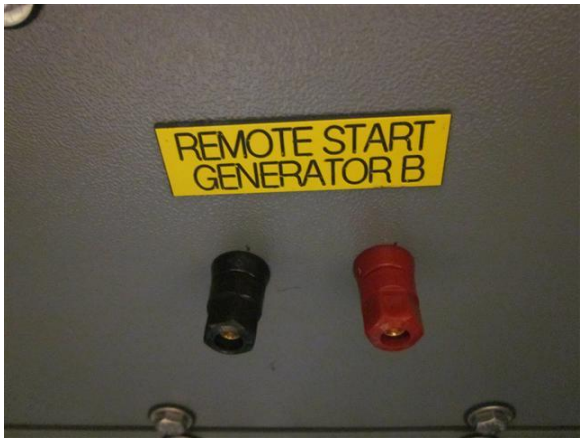
If optional outlets for items such as Block Heaters or Battery Chargers have been provided they must be connected to utility power so they are operational only when main power is on to operate correctly.

Example of Kirk Key Interlock System:



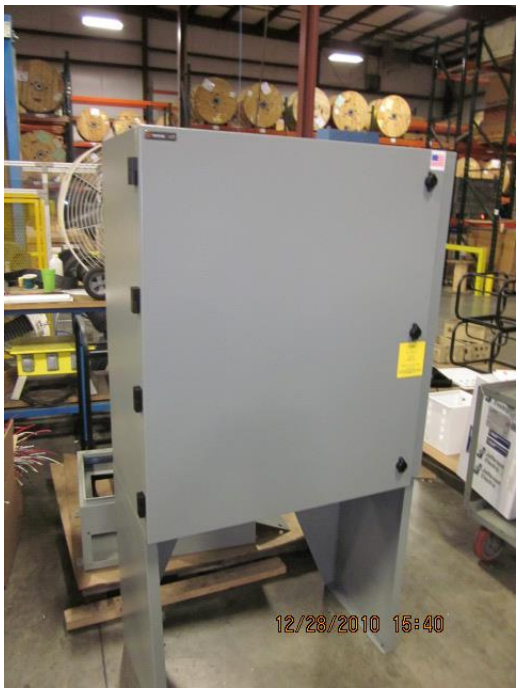
If Cabinet comes with optional Kirk Key Interlock make sure that only one key is provided and that only the Main utility or the docking station, never both can be energized at any given time.

Generator Auto Start Connections:



Use optional Auto start terminals to send a signal to start the generator when main power is interrupted.

Leg Kit:



Example of a Docking Station shown with leg Kit

Maintenance and Periodic Testing

Docking station shall only be maintained, serviced, tested and inspected by qualified personnel.

All power to the docking station must be disconnected and tested to confirm that the box is safe to work on.

Check Integrity of the enclosure by visually inspecting it for any defects.

Check all badges

1. Make sure all badges are clean and legible.
2. If badges are losing adhesion, replace.

Check door latches and cams

1. Make sure that the door latches turn freely.
2. Make sure that when latched the door is firmly closed so that the gasket creates a good seal.

Check door hinges

1. Make sure door hinges swing freely and do not bind.
2. Make sure the fasteners for door hinges are tight.

Check bottom access panel (rake system)

1. Make sure panel opens and closes without binding.
2. Make sure that the latches on panel are tight.

Periodic Testing

1. Remove access panel to the main wiring compartment of enclosure.
2. Visually inspect the compartment to ensure there are no loose pieces that could cause improper connections.

Also check for cracked, or broken, or disfigured parts.

3. Make sure all connection points are properly torqued.
4. Preform a continuity test to ensure all energized parts are not touching any grounded parts.

Optional Items

If optional Kirk Key system is installed, make sure it operates correctly and lube the locking mechanism with a graphite based lubricant.

TRYSTAR

866.TRYSTAR – 507.333.3990 -- fax: 507.333.3991 -- trystar.com
2917 Industrial Drive, Faribault, MN 55021

TRYSTAR GENERATOR DOCKING STATION SPECIFICATION

Make selections from the listed options. Bold text in the shaded boxes may be used as an example.

	Amperage	Voltage	Mount Style		Permanent Bus Connection	Generator Connection		(Other Options - List all after dash)	
GDS	- **16**	**3**	**W**	-	**L**	**M**	(-	**AC2H**	)
	01 - 100A	1 - 120/240 (2H + N + G)	F - Flush (Front Flange)		C - Compression Lug (600 MCM)	A - Appleton style pin and sleeve		A - Auto Start - 5-Way Binding Posts	
	02 - 200A	2 - 120/240 Delta (3H + N + G)	L- Leg Kit (Wall Units)		L - Mechanical Lugs (std)	F - Female Camloks		B - 1Φ 120V 20A Duplex Outlet	
	03 - 300A	3 - 208/120V (3H + N + G)	P - Pad (Free Standing)		Qty of terminals and size	L - Mechanical Lugs		C - 1Φ 120V 20A Duplex GFCI Outlet	
	04 - 400A	4 - 480V (3H + G)	W - Wall Mount		per phase	M - Male Camloks		D - 1Φ 120V 30A NEMA L5-30 Outlet	
	06 - 600A	5 - 480/277 (3H + N + G)	M - Modular Box		100 - 300A -- 2 x 600 MCM	P - Cooper Posi-Loc		F - 1Φ 125/250V 50A Twist-Lock Outlet (CS6369)	
	08 - 800A	6 - 600V (3H + N + G)			400A -- 2 x 600 MCM	V- Veam Power Locks		(Add number after letter if requesting	
	10 - 1000A				600A -- 4 x 600 MCM	LM - Mechanical Lugs & Male Camloks		more than one)	
	12 - 1200A				800A -- 4 x 600 MCM	LF - Mechanical Lugs & Female Camloks		G - 100% Ground Bus	
	16 - 1600A				1000A -- 4 x 600 MCM	MF - Male & Female Camloks		H - Generator Signal Terminal Wiring Block/ SCADA	
	20 - 2000A				1200A -- 6 x 600 MCM	LMF - Mechanical Lugs, Male Camloks,		I - Stainless Steel construction	
	24 - 2400A				1600A -- 6 x 600 MCM	& Female Camloks		J - Bottom conduit access (increased panel	
	25 - 2500A				2000A -- 8 x 600 MCM			depth - contact factory for details)	
	28 - 2800A				2400A -- 8 x 600 MCM			K# - Kirk-Key door interlock	
	30 - 3000A				2500A -- 10 x 600 MCM			(# - number of key cylinders in panel)	
	32 - 3200A				2800A -- 10 x 600 MCM			L - Custom Lug Size or Compresison Type	
	40 - 4000A				3000A -- 12 x 600 MCM			M - Any listed monitoring device rated for	
					3200A -- 12 x 600 MCM			correct voltage and amperage	
					4000A -- 14 x 600 MCM			N - Strip Heater & Thermostat	
	Voltage	1 - Black, Red, White & Green						O - Any other Listed Receptacles 50A and below	
	Colors for	2 - Black, Orange, Blue, White &Green						P - Surge Protection Device	
	Camloks	3 - Black, Red, Blue, White &Green			O - Other (Specify)			Q - Load Dump Receptacle	
		4 - Brown, Orange, Yellow & Green			S - 1/2" x 13 Threaded Stud			S - Special (explain)	
		5 - Brown, Orange, Yellow, White & Green			(300A and below)			U - Utility Light/ Alarm	
		6 - Black, Black, Black, White & Green							
					Wire Range:			**Notes:**	
		**These colors represent Standard			600 MCM: #4 - 600 MCM			For 400-800A choose up to 2 from B-F	
		colors associated with each voltage.			350 MCM: #6 - 350 MCM			For 1200-4000A choose up to 3 from B-F	
		Different color schemes available						Phase Rotation Monitor Standard on all 3-Phase	
		upon request**						Finger Safe Fuse Holder and Fuses Standard	
								Aluminum Construction Standard	

Enclosure (HxWxD):	Amperages
Commercial Grade (27"x19"x9"):	100A-200A - Camlok Only
Small GDS (36"26"x14"):	100A-800A - Camlok Only / 100A-800A - Hardwire Only
Large GDS (48"x38"x21"):	1000A-2000A - Camlok Only / 1000A-2500A - Hardwire Only
Connection Cabinet (60"x38"x36"):	2800A-4000A - Hardwire Only
Pad Mount (84"48"x40"):	2000A-4000A - Camlok and Hardwire

All ETL 1008 Units are Service Entrance Rated

All C ETL Units are NOT Service Entrance Rated

Sample Construction:
1600A, 208/120V, Wall Mount
Mechanical Lug permanent busbar connection
Male Camlok generator connection
Auto-start terminals, 2x Duplex GFCI,
Generator Signal Terminal Block
GDS-163W-LM-AC2H

4/10/2014

One-Time Only Set Up Procedure for Phase Rotation Monitor. If Signed Below, Disregard These Instructions

WARNING! This procedure is to be performed by a qualified electrician. All appropriate PPE must be worn at all times and NFPA 70E must be followed when working on energized equipment.

The set-up of the docking station phase rotation monitor will require the use of a hand held phase rotation meter!

The phase rotation monitor provided in the Generator Docking Station is factory configured with a green light for clockwise rotation, solid red light when phase loss is sensed, and a blinking red light when incorrect phase rotation is sensed.

1. With facility running on normal utility power, one must use a hand held phase rotation monitor to test the existing load at the point where this unit will be tied in. The test will determine clockwise or counter-clockwise direction.
2. If the test concludes that the facility has a clockwise rotation, and the docking station phases are wired correctly (A, B, C left to right) you can then skip down to step 8 and sign off at the bottom of this page.
3. However, if the test concludes that the facility has a counter-clockwise rotation, then we will need to change the GDS phase rotation monitor so that it will indicate (light up green) when a counter-clockwise direction is sensed.
4. Locate the phase colored wires that feed into the back of the phase rotation monitor. Follow these wires until you come across a male/female connector set .

5.
6. Unplug the B-phase male connector from the female connector, and unplug the C-phase male connector from the female connector. (Connectors could be on A and C or A and B phase on some units, follow same procedure)

7.
8. Next plug the B-phase male connector into the C-phase female connector, and the C-phase male connector into the B-phase female connector.

9.
10. The GDS phase rotation monitor is now set up to indicate (light up) when a counter-clockwise direction is sensed.
11. Sign and date at the bottom of this page. Then if another person hooks up a temporary generator, they can be sure that the phase rotation monitor is set up correctly.

I, _____ , hereby certify the phase rotation monitor in this unit has been set in accordance with the instructions.

X_____ / /_____

Installation Electrician Company Name Date