

# MS3000-OTG User Information



**Off-the-Grid Gateway Solar Power Package**

## MS3000-OTG Specifications



Specifications	
Model	MS3000-OTG
Solar Panel	100 watt 21" high x 42" wide x 1.4" deep. (53.1 x 106.2 x 3.6 cm) 14.1 lb. (6.4 kg)
Battery Backup	21 amp hours (AH), sealed lead-acid/absorbed glass mat (AGM) Provides backup power for up to 100 hours
Battery Life Expectancy	Approximately 5 years
Solar Exposure (to charge)	Requires minimum of 4+ hours of full sun exposure Recommended exposure: 6+ hours daily
Battery Pack Enclosure	Rugged fiberglass, flame rated UL-94 5VA 10.04" High, 9.87" Wide, 4.73" Deep (25.4 x 25 x 12 cm) 24 lb. (10.9 kg)
Environment/Operating Temp.	-4°F to 140°F. (-20°C to +60°C)
Recommended Mounting Pole	A53 Schedule Pipe 3 inch (Customer Supplied)

## Recommended Installation Safety Guidelines

- Avoid mounting near power lines, lighting, or power circuits.
- Battery Pack and Solar Panels are of substantial weight. It is recommended to use a high lift or scissor lift to mount these components. If this is not feasible, it is recommended to have two people available to mount the Battery Pack and Solar Panel.
- Ensure area below installation site is clear of debris.
- Only install when weather is clear. Rain or snow can create a dangerous installation environment.

# MS3000-OTG Components



MS3000-OTG

Solar Panel

Customer Supplied Mounting Pole



U-Clamps

Battery Pack Enclosure

Battery Power Cable

Solar Panel Cables

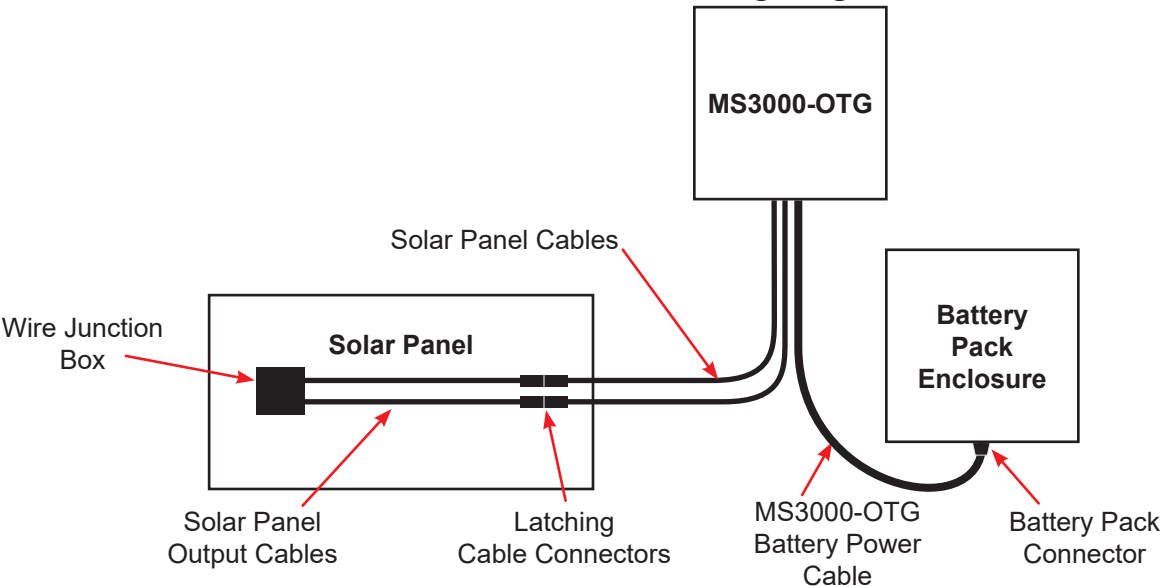
U-Clamp



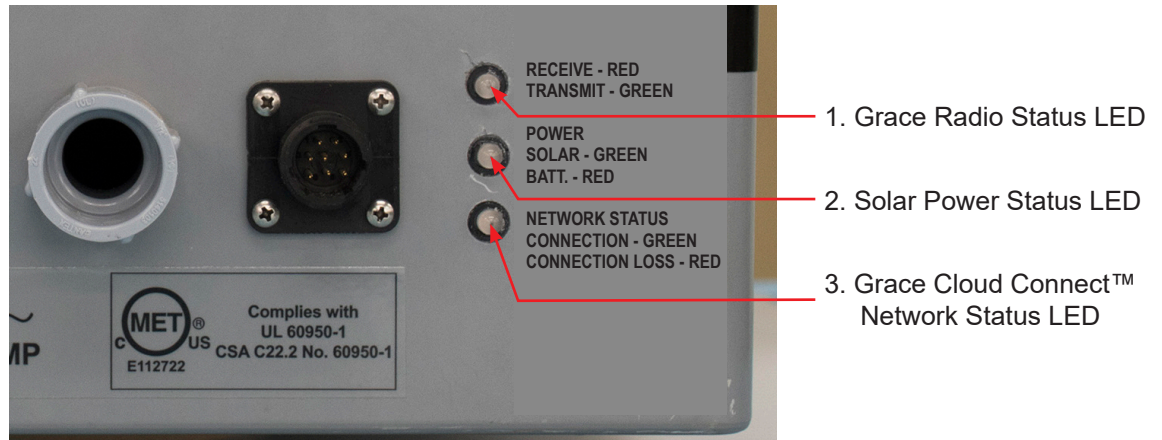
Battery Pack Enclosure

Latching Cable Connectors

## Wiring Diagram



# MS3000-OTG Status LED Indicators



## 1. Grace Radio Status LED - MS3000 to Pendant Transmit/Receive

	<b>Flashing Red:</b>	MS3000 receiving RF signal from Pendant
	<b>Flashing Green:</b>	MS3000 transmitting RF signal to Pendant

## 2. Solar Power Status LED

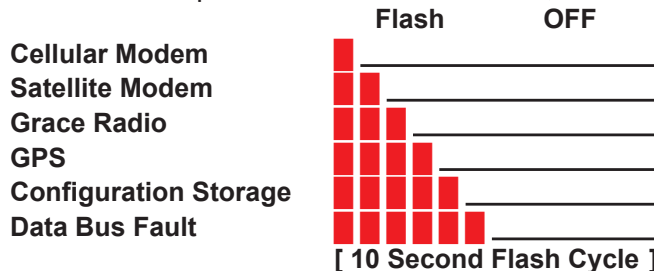
	<b>Solid Green:</b>	Operating on Solar Power. Battery Backup is charging.
	<b>Solid Red:</b>	Operating on Battery Backup
	<b>Flashing Red:</b>	Operating on Low Battery

## 3. Grace Cloud Connect™ Network Status LED

	<b>Solid Green:</b>	MS3000 connected to Grace Cloud Connect™ Network
	<b>Solid Green with: Red Flash</b>	Weak MS3000 connection to Grace Cloud Connect™ Network; potential for signaling delays
	<b>Solid Red:</b>	No MS3000 connection to Grace Cloud Connect™ Network
	<b>Red Flash Cycle:</b>	Gateway fault detected.

Gateway Fault Codes are indicated by the Grace Cloud Connect™ LED with a distinct 10-second flash cycle. Every 10 seconds, the LED flashes from 1 - 6 times as defined below. The flash cycle repeats.

If Fault Codes persist and do not self-clear, consult factory for assistance.





## MS3000-OTG Installation

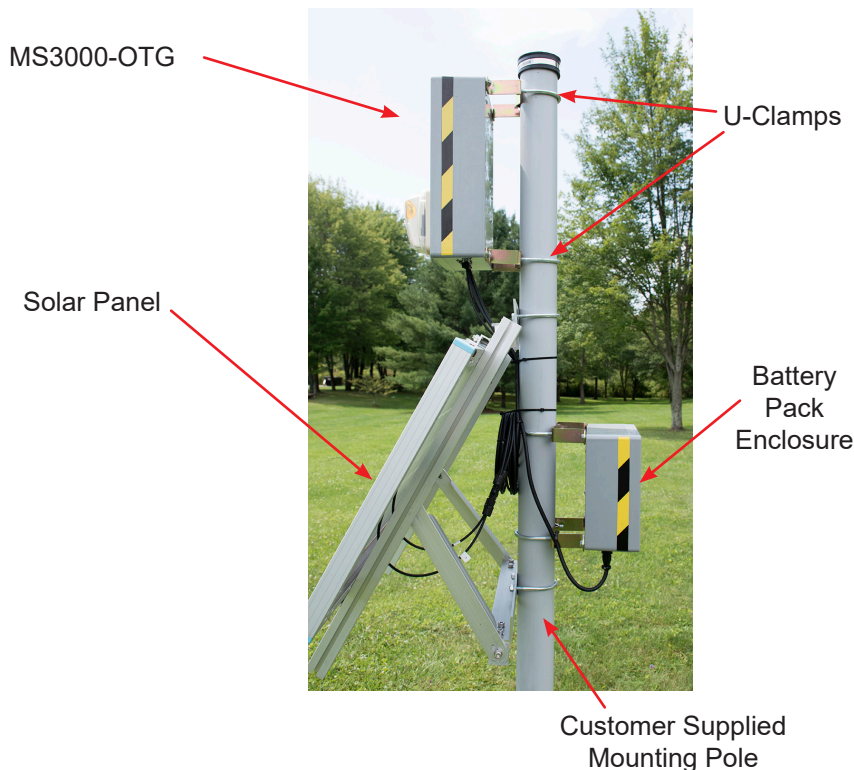
**WARNING! TO PREVENT BATTERY PACK DAMAGE, IT IS EXTREMELY IMPORTANT TO CONNECT THE BATTERY PACK TO THE MS3000 BEFORE THE SOLAR PANEL IS CONNECTED.**

**1. Determine the optimal placement for the MS3000-OTG system.**

- A. The top of the MS3000-OTG must have a 360-degree clear, unobstructed view of the sky.
- B. Solar Panel must be mounted so it has unobstructed southern exposure when installed in the Northern Hemisphere for a minimum of 4 hours per day (6 or more hours is recommended for optimal performance).
- C. Recommend mounting pole: 3 inch diameter A53 schedule pipe. (Customer supplied).
- D. MS3000-OTG to Pendant range is enhanced by mounting the MS3000-OTG 10 feet (3 meters) or more above ground level.

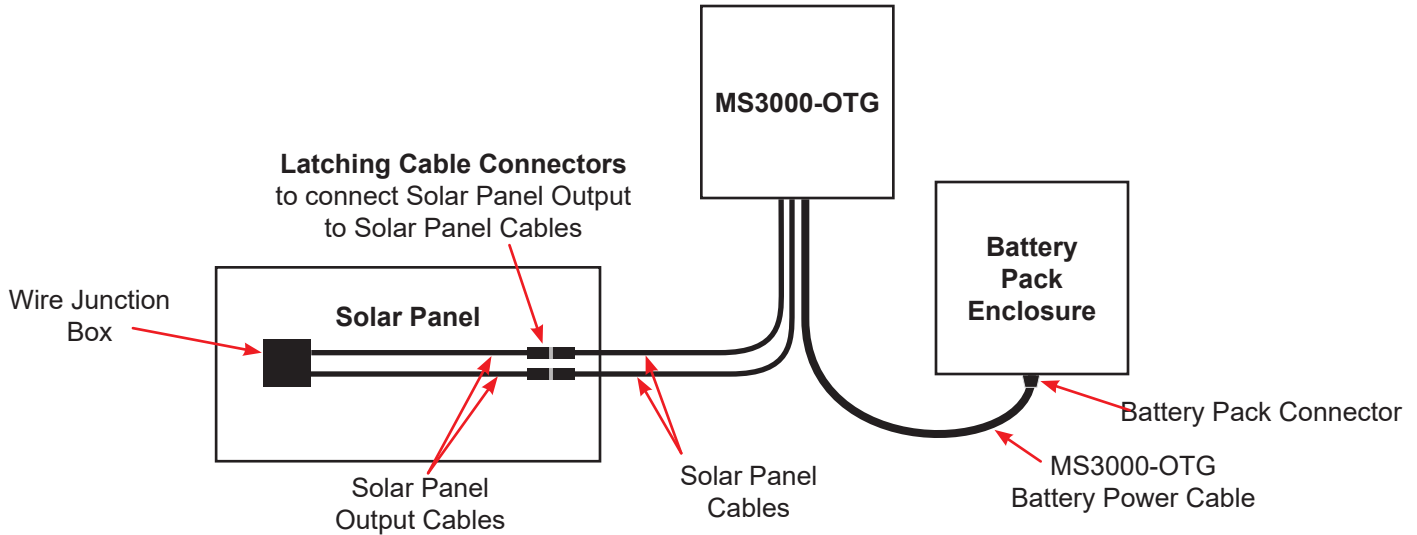
**2. Plan the Equipment Placement.**

- A. MS3000-OTG must be mounted above the Solar Panel. See photo below.
  - B. Mount the Battery Pack Enclosure below the MS3000-OTG
  - C. For optimum weight distribution, mount the Battery Pack Enclosure and Solar Panel on opposite sides of the pole.**
- 3. Assemble the Solar Panel Mounting Bracket (see provided Renogy MTS-SP100 manual) and set to the proper angle for your geographical location. It is recommended to angle the Solar Panel, for maximum winter solar exposure. This will offset the short solar days of winter. To calculate best angle for winter, use this formula:  $(\text{Site Latitude} \times 0.9) + 30$  degrees.
  - 4. Mount the MS3000-OTG with the provided U-clamps.
  - 5. Attach the Solar Panel Mounting Bracket to the mounting pole at the desired height with provided U-clamps.
  - 6. Attach Solar Panel to the mounting bracket. Note: wire junction box of the Solar Panel can be on either side.
  - 7. Mount the Battery Pack Enclosure to the pole at the desired height with provided U-clamps.

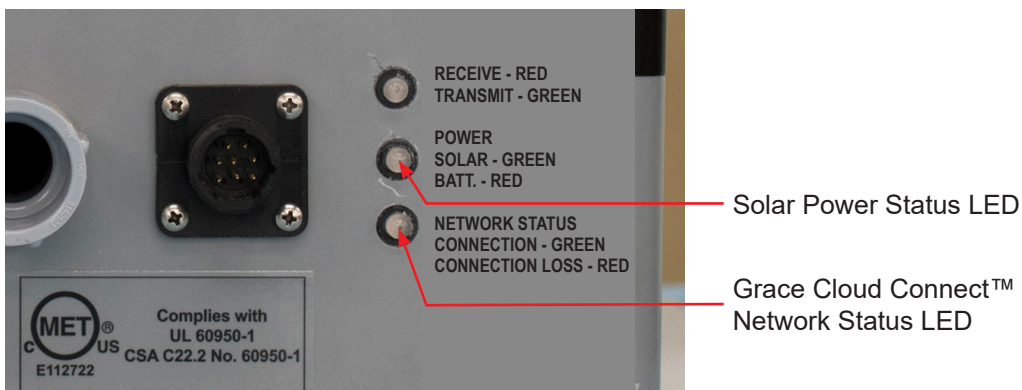


## MS3000-OTG Installation

8. Power on a **WorkForce® WF2** or **SuperCell® SC500** Pendant. The Pendant screen will display “Signal Loss/ Out of Range”, however, after the MS3000-OTG is powered on, you will be able to verify connection and status.
9. Connect the MS3000-OTG Battery Power Cable to the Battery Pack Connector. Before inserting, align the connector with the pins of the Battery Pack Connector. After inserting, twist the locking connector to secure the cable to the Battery Pack Enclosure. See diagram.
10. Connect the Solar Panel Output Cables to the MS3000-OTG Solar Panel Cables. **Note: The latching cable connectors are polarized.** Verify connections are completely/securely latched.



11. After the Battery Pack and Solar Panel are connected, the MS3000-OTG will power on and send a startup message to the **WF2** or **SC500** Pendants. For example, the message “MS#M0014 v0.6.5” indicates the MS3000-OTG Device ID is M0014 and firmware version is 0.6.5
12. The Solar Power Status LED on the bottom of the MS3000-OTG will be on. LED color will depend on the charge status of the Battery Pack and if the Solar Panel is currently charging the battery.
13. After the MS3000-OTG has an active Grace Cloud Connect™ Network link, the Pendant will exit “Signal Loss/ Out of Range” state. The Grace Cloud Connect™ Network Status LED on the MS3000-OTG will be Green.



14. To verify signal strength at the current location, use the **WorkForce® WF2** or **SuperCell® SC500** Pendant to send Preprogrammed-Message #71 (System Status Request). Refer to Pendant user information for instruction on sending preprogrammed messages. The MS3000-OTG will respond to the Pendant with system status details. See next page.
15. **It is important to install the system in a location and position to achieve a minimum signal strength of 2 and a GPS location signal detected and locked.** See next page.
16. To initiate a system loop response test with a **WF1**, **WF2**, or **SC500** Pendant, refer to Pendant user manual for details on sending System Test messages.

# MS3000-OTG Status Information

A feature of MS3000 allows Pendants with an alphanumeric screen (**WorkForce® WF2** or **SuperCell® SC500**) to request the MS3000 status by transmitting special Preprogrammed-Message #71 (System Status Request). Refer to Pendant user information for instruction on sending preprogrammed messages.

Upon receiving this message, the MS3000 Gateway will transmit updated status information to the Pendant's alphanumeric screen.

MS3000 Gateway status information contains the data shown below on these Pendant display screens:

## SuperCELL® SC500 Pendant Screen Showing the MS3000 Status From Preprogrammed Message #71

C:5 I:0 G:0 N:c  
Sender S:20 U:099

## WorkForce® WF2 Pendant Screen Showing the MS3000 Status From Preprogrammed Message #71

C:5 I:0 G:0 N:c  
M1012 D:01 B:4+  
Sender S:20 U:099

Gateway Radio  
Details

### C:0-5 Cellular signal strength in # of bars

C:0 = No signal  
C:5 = Full signal

### I:0-5 Satellite signal strength in # of bars

I:0 = No signal  
I:5 = Full signal

### G:0-3 GPS connection status

G:0 = Fault detected  
G:1 = No GPS Location Lock  
G:2 = GPS Location Lock

### N:c,I,- Grace Connected Network Status

N:c = Connected through Cellular  
N:I = Connected with Satellite,  
N:- = No network connection.

### C:0-5 Cellular signal strength in # of bars

C:0 = No signal  
C:5 = Full signal

### I:0-5 Satellite signal strength in # of bars

I:0 = No signal  
I:5 = Full signal

### G:0-3 GPS connection status

G:0 = Fault detected  
G:1 = No GPS Location Lock  
G:2 = GPS Location Lock

### N:c,I,- Grace Connected Network Status

N:c = Connected through Cellular  
N:I = Connected with Satellite,  
N:- = No network connection.

### M: Gateway Network ID.

Example ID **M1012** shown above indicates an MS3000 with ID of 1012

### D: Displays the number of Pendants currently connected to the Gateway

Example **D:01** shown above indicates one Pendant is connected to the MS3000

### B: Battery status of the gateway device.

Example **B:4+** indicates the MS3000 has 4 bars of battery power remaining and is charging.

4 = Full Battery, 4 bars

0 = Low Battery, 0 bars

+ = Charging

- = Discharging

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**Warranty claims process:** 1) Obtain a Return Authorization Number from Grace Industries corporate headquarters by calling phone number 724-962-9231, or by email correspondence to sales@graceindustries.com. 2) The product name, serial number, date and proof of purchase must be provided and 3) Return products including Return Authorization Number, prepaid and accompanied by original proof of purchase that states the date and location of purchase to: Grace Industries, Inc., Service Department, 305 Bend Hill Road, Fredonia, PA 16124, USA. Customer is responsible for all shipping costs, return shipping costs, handling, or any other fees associated with a warranty claim.

### FCC Statements

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### Industry Canada Statements

This Class A digital apparatus complies with Canadian ICES-003. This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada. (select the class for your device). Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.



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