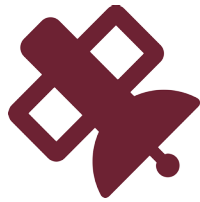


MS3000X Worker Safety System

CONNECTED GATEWAY

User Information



MS3000X Worker Safety System (MS3000X) is a wireless bridge that manages the data signaling between Grace Lone Worker safety Pendants and the Grace Connected Safety™ Cloud Monitoring Portal. MS3000X contains a wireless signaling link to a Worker's safety Pendant such as WorkForce®, SuperCELL®, and TPASS® and contains a satellite and/or cellular connection for data signaling with the Cloud Monitoring Portal.

IMPORTANT: Please Read All User Information Before Use

- Always test MS3000X prior to use in accordance with the user information.
- MS3000X requires a cellular and/or satellite connection plus an active Grace Connected Safety™ account. Set up your account at www.GraceConnectedSafety.com.
- MS3000X is powered by an externally connected power source and can be equipped with an optional internal, rechargeable battery backup.

Grace Connected Safety™ System Overview

MS3000X is part of the **Grace Connected Safety™** system which includes worker-worn **Pendants**, fixed or mobile **Gateways**, and **Grace Cloud Connect™** Portal dashboard.



Grace Cloud Connect™

Cloud-based Monitoring and Alerting portal

- Send worker-safety alerts by SMS-text message and/or email.
- Configurable for customer specific standard operating procedures (SOP), customer-defined Worker Check-in schedule.
- Accessible from any device (PC, tablet, smartphone) having an internet connection and web browser.
- Locate and verify worker safety status, send and receive user-defined messages.
- Event data-logging and Pendant location mapping supported.

Gateway Models

Fixed MS3000X Connected Gateway Features

- Connects to the **Grace Cloud Connect™** Portal dashboard using satellite and/or cellular connection; incorporates 128-bit AES security.
- LED status indicators provide for operational verification and system integrity
- Bright strobe light and loud alarm siren alert when a Pendant is in Alarm.
- Equipped for AC power connection; available with optional internal, rechargeable battery back-up.
- Other Grace Gateways include Grace Mobile Gateway, Grace Fixed Gateway, and Portable Worksite Alarm.


Pendant Models

Grace Pendants are designed to operate with MS3000X and other Grace Gateways WorkForce® WF1 and WF2, SuperCELL® SC500, TPASS®3

- Worker-worn safety Pendant with 2-way RF signaling to Gateway, incorporates motion-sensing, fall-detection, and various signaling modes depending on model.
- Audible, visual, and optional vibrating alerts.
- WorkForce® WF2, SuperCELL® SC500 include alphanumeric graphic display.
- Rechargeable lithium battery powered, **intrinsically-safe** models available.
- Interoperable with legacy Grace RadioH products and systems.

SALTi™

- SALTi™ is the System Access Loop Test indicator, a feature that verifies the connection integrity of a user's Pendant and the cloud Monitoring and Alerting Portal, as part of the Grace Industries cloud-based Grace Connected Safety system. This feature provides Pendant users with a piece-of-mind and confidence in the system.

MS3000X Connected Gateway Specifications	
Model	MS3000X
Enclosure	Rugged fiberglass, flame rated UL-94 5VA
Size	15" High, 9-3/4" Wide, 6-1/2" Deep (38.1 x 24.8 x 16.5 cm)
Weight	12 lb. (5.4 kg) with battery backup and light-siren
Power Input Requirement	AC: 85-264 VAC 50/60 Hz Single Phase 1Amp DC: 12-15 VDC, 0.5 Amp
Battery Backup (Option)	12 VDC 8.4 Amp. Hr. Provides emergency backup power for up to 24 hrs.
Active Pendants Monitoring	Alarm Detection (Gateway Alarm Flag): up to 500 Pendants. Pendant Tracking, SALTi operation: up to 40
SALTi™	System Access Loop Test indicator, a feature that verifies the connection integrity of a user's Pendant and the cloud Monitoring and Alerting Portal
Low Battery Alert	Power Indicator LED flashing Red. (NO AC Power).
Battery Backup Life	3 to 5 years
Alarm Siren and Strobe Light (Optional Equipment)	Audible siren and strobe light activated as alarm signals are received from Pendants
Alarm Siren Audio Output	Adjustable volume. Maximum audio output of 92 dBA at 3 meters.
Radio Frequency	902-928 MHz license-free FHSS North America ISM, other freq./countries supported
Compatibility	Grace Telemetry Systems using RadioH platform including - WorkForce®, SuperCell®, TPASS®, Micro TPASS® Repeater, T3 Repeater, and others.
Relay Closure	Four Form-C contact ratings 6A @ 28VDC, 6A @ 125VAC
Environment	-40°F to +131°F (-40°C to +55°C) Heated system option is recommended for environments below 32°F / 0°C.
Complies with	UL 60950-1, CSA C22.2 No. 60950-1
Radio Certifications	FCC ID: J5XMXHEM; Q639603N; MCQ-XB3M1 - Meets FCC Part 15 IC: 5916A-MXHEM; 4629A-9603N; 1846A-XB3M1 - Complies with Canadian ICES-003 Australia / New Zealand: Compliant to ACMA AS/NZS CISPR22:2006, Class A Digital Apparatus AS/NZS 4268:2017 for Intentional Radiators EMC93142C-ACMA EMC93142C-AS/NZS 4268 
Cleaning / Decontamination	Units contaminated by chemical or radioactive materials must be disposed of or decontaminated in accordance with all applicable regulatory standards. DO NOT mark or apply paint to MS3000X.

MS3000X BASE PACKAGE

MS3000X-H-X-SL1:

- Cellular 4G modem equipped.
- Duplex Transceiver System, signaling.
- Indoor coverage of approximately 200k square feet. Performance is subject to effects of building construction and electrical/RF interference.
- Outdoor coverage of approximately 1/2 mile clear, unobstructed line of sight.
- Four Opto-Isolated 12VDC inputs (See Page 10 for default configuration)
- Four Form-C Relays (See pg. 10 for default configuration)

MS3000X OPTIONS LIST:

- B** Battery Backup.
- CA** Certified for use in Canada.
- DC** 12-15VDC model (0.5 Amps).
- AC** 85-264VAC 50/60Hz (1 Amps).
- LS** Includes enclosure-mounted adjustable Strobe with Siren (See page 12 for LS setting).
- HT** Heated system for use in environments below 32°F / 0°C. *Not Available on DC models.*
- SP** Custom I/O programming as requested at time of order.
- SL2** Satellite modem equipped.

MS3000X COMPONENTS

Do Not Cover or Paint Top Surface
Satellite Antenna Located in this Area



Alarm Siren and Strobe Light

Power Input
Conduit Connector

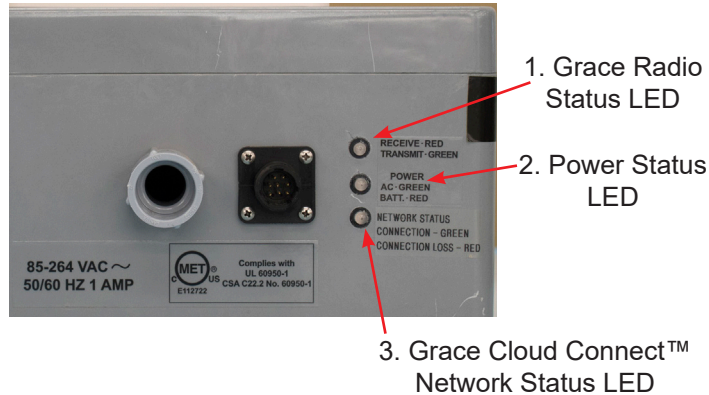
MS3000 Status
LED Indicators



Phone Dialer
Connector

Optional I/O Cable
Connection is Available

MS3000X Status LED Indicators



1. Grace Radio Status LED - MS3000X to Pendant Transmit/Receive

	Flashing Red: MS3000X receiving RF signal from Pendant
	Flashing Green: MS3000X transmitting RF signal to Pendant

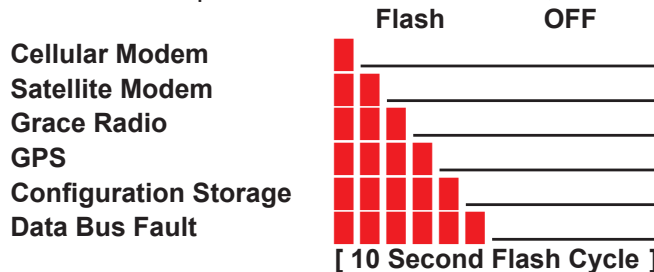
2. Power Status LED

	Solid Green: Connected to external Power
	Solid Red: Operating on battery backup
	Flashing Red: Operating on Low Battery
	Flashing Red and Green: Battery fault detected. Battery is either extremely discharged, open or shorted. If fault occurs at power-up, the indicators should clear in 4-6 hours. If fault continues after 12 hours, the battery has failed.

3. Grace Cloud Connect™ Network Status LED

	Solid Green: MS3000X connected to Grace Cloud Connect™ Network
	Solid Green with: Red Flash Weak MS3000X connection to Grace Cloud Connect™ Network; potential for signaling delays
	Solid Red: No MS3000X connection to Grace Cloud Connect™ Network

	Red Flash Cycle: 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.
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MS3000X Installation Instructions

STEP 1: Grace Cloud Connect™ Portal Access:

- Access the website link Grace Industries has provided (by email) to your Master Administrator.
- Login using the provided credentials.
- Continue with configuration and setup of Pendant Monitoring and Alerting.

STEP 2: MS3000X Location Setup:

Satellite Connectivity

- For optimal performance using the satellite connection, place the MS3000X in an upright position with the top surface facing an unobstructed view of the open sky.
- Tall urban structures have the potential to obstruct the connection of MS3000X to satellites. MS3000X utilizing satellite connectivity should always be located outside and, when possible, away from shadows cast by tall structures.

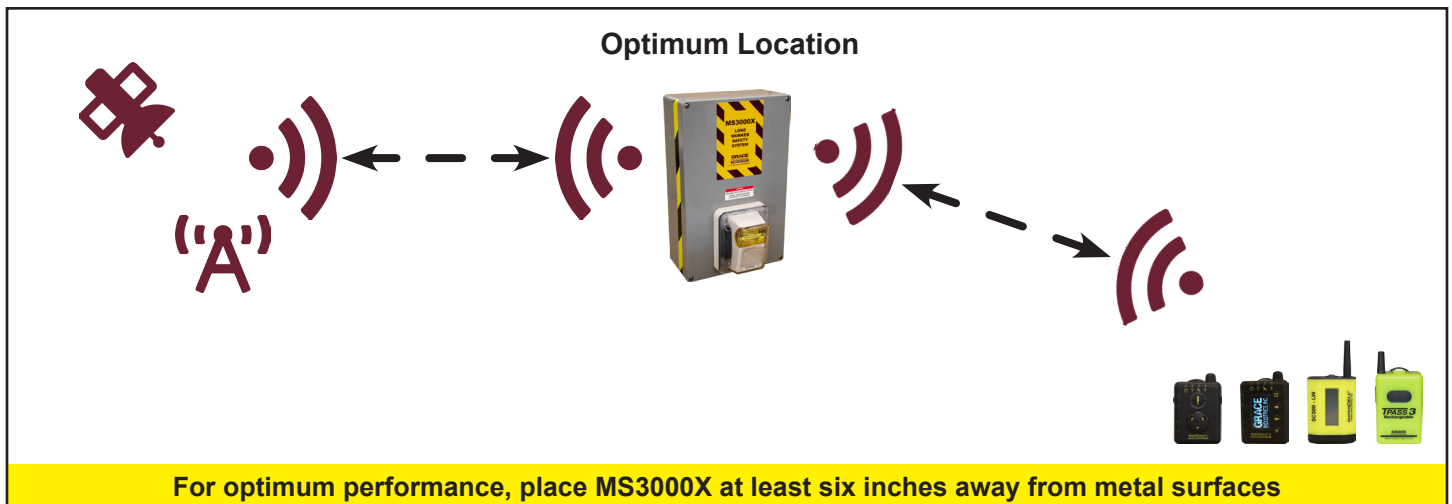
Cellular Connectivity

- MS3000X models include cellular connectivity and can be used wherever cellular service is available. Performance similar to consumer cellular products can be expected.
- Highest performance of Pendant-to-MS3000X and MS3000X-to-Pendant signal coverage occurs when the MS3000X is positioned at a high elevation above ground to provide a clear view of Pendant users.
- MS3000X-to-Pendant signaling range varies depending on the environment where the system is used.
- For optimum performance, place the MS3000X a minimum of 6 feet above ground level and away from any object which might shield RF signal.

IMPORTANT Note for Indoor Locations

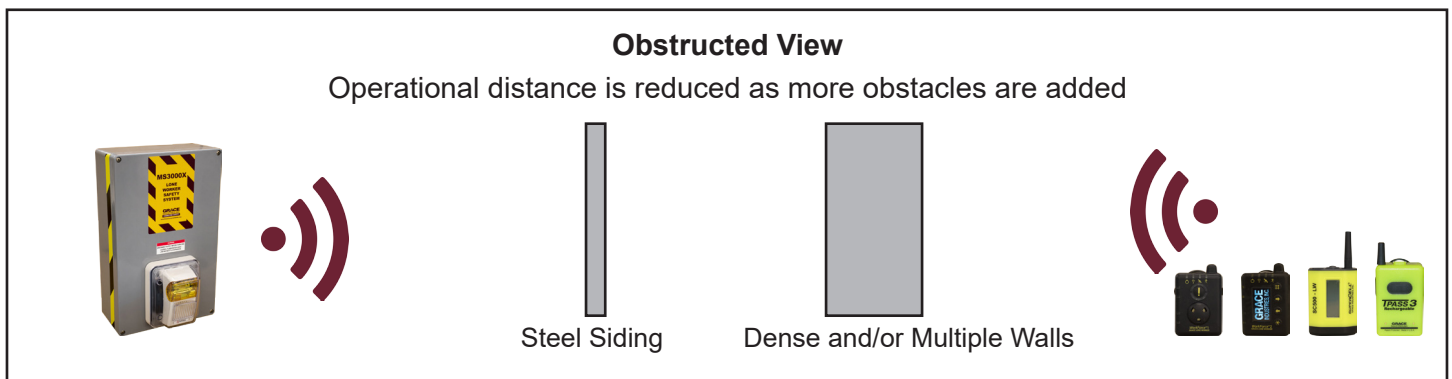
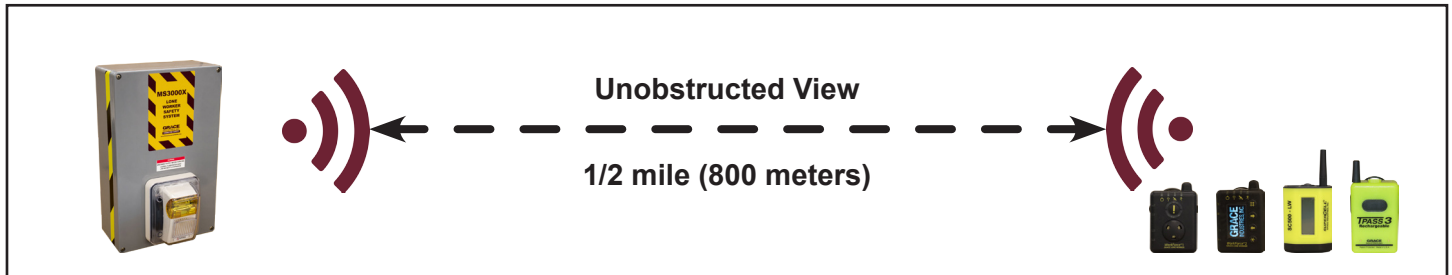
A typical indoor location for the MS3000X would be near an unobstructed office window or mounted just outside an office. For optimum performance, MS3000X should be located as far away as possible from other radio equipment antennas to minimize any potential interference. This includes cell phone boosters, wifi, and other radio equipment antennas. It is also recommended to keep the MS3000X a minimum of six inches away from metal surfaces.

MS3000X Location Setup

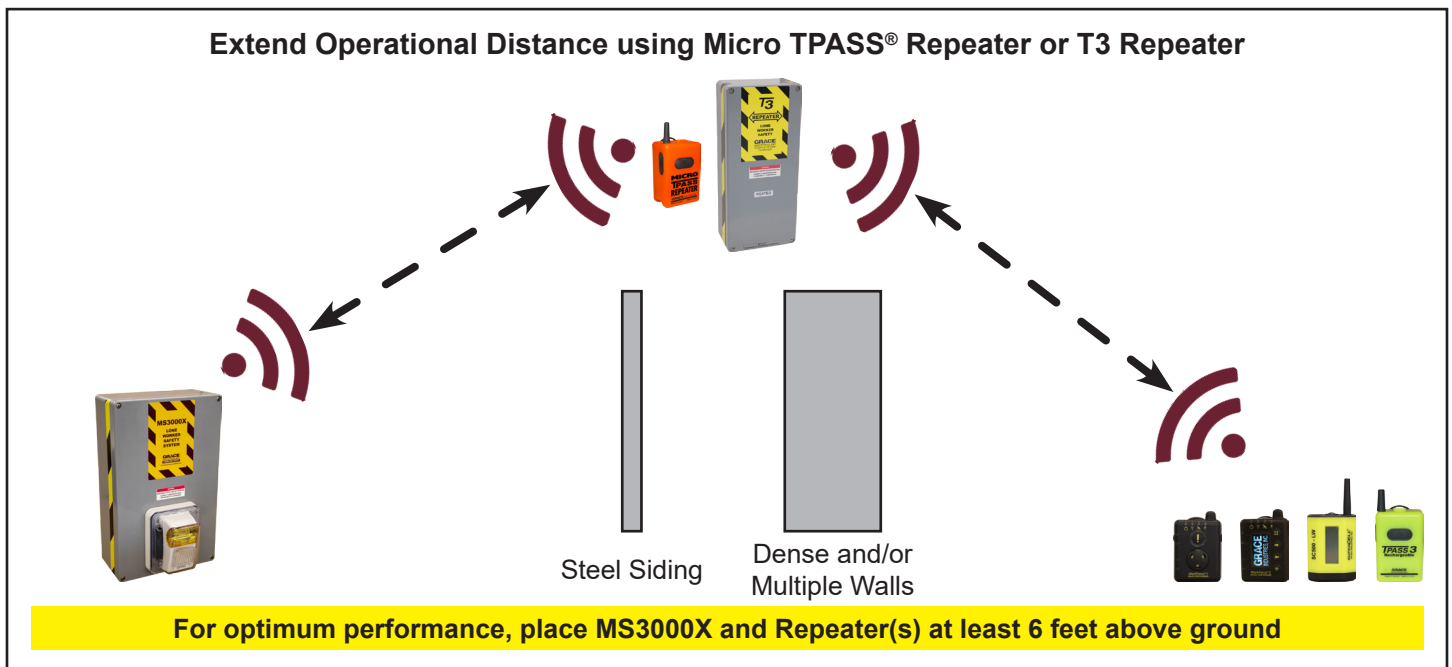


MS3000X Location Setup

- Unobstructed line-of-sight operational distance between MS3000X and Pendant is a key factor in system performance.
- The system operates best over flat areas with minimal obstructions up to a minimum of 1/2 mile (800 meters).
- For optimum performance, mount the MS3000X a minimum of 6 feet above ground level and away from any object which might shield RF signal.



- An optional, portable Micro TPASS® Repeater or fixed T3 Repeater can be used to extend operational distance. Locating a Repeater at the first loss of line-of-sight area will extend coverage.
- For optimum performance, place the Repeater at least 6 feet above ground.



MS3000X Operating Instructions

STEP 1: MS3000X - Confirm Power ON

IMPORTANT: DO NOT Power ON or activate any Pendant device before Powering ON and activating the MS3000X. Verify all Pendants are powered OFF.

- MS3000X is designed and intended to be hard-wired to an appropriate power source and operate continuously.
- **Verify Power Status:** Solid Green LED indicates MS3000X has external AC power. If LED is solid Red, the MS3000X is operating on battery backup.
- **Verify Grace Cloud Connect Status:** Solid Green LED indicates MS3000X is connected to Grace Cloud Connect™ Network. If LED is solid Red, the MS3000X is not connected to Grace Cloud Connect™ Network.
- **Test Grace Radio Status:** Use a WorkForce® or SuperCELL® SC500 Pendant to conduct a System Loop Test. Consult Pendant user manual for instruction on conducting this test.
- **NOTE:** *Status LED table on page 5 includes additional information.*

MS3000X is designed and intended to operate continuously

- In the event it is necessary to shutdown or restart the MS3000X, ensure all Pendants are powered OFF before doing so. If Pendants are left/powered ON, the Grace Cloud Connect™ web Portal will go into Signal-Loss shortly after turning OFF MS3000X which will cause alerts to be sent from the Grace Cloud Connect™ monitoring portal.
- MS3000X is Powered OFF by disconnecting it from the external power source and the internal battery backup (if equipped).

STEP 2: Pendants - Power ON

IMPORTANT: DO NOT Power ON or activate any Pendant device before Powering ON and activating the MS3000X.

- **Power ON:** Consult Pendant user manual for instruction to Power ON or Power OFF.
- **Grace Pendants are configured to automatically connect to the MS3000X when Powered ON. Always ensure the MS3000X is Powered ON first, then Power ON the Pendant.**

MS3000X Alarm Siren and Strobe Light (Optional Equipment)

- When an Alarm Signal from a Pendant is received by the MS3000X, this activates the Alarm Siren and Strobe Light. The Alarm Siren and Strobe Light will continue until the Pendant Alarm condition is cleared. This Alarm Signal is also transmitted from the MS3000X to the Grace Cloud Connect™ monitoring portal.
- **IMPORTANT NOTE:** When a Gateway receives an Alarm signal from a Pendant, the Gateway will sound its local alarm immediately, however to avoid excessive data usage and nuisance, or unintentional Alarms activating the Grace Cloud Connect™ Alerts, the Gateway uses a purposeful delay before relaying this Alarm to the Grace Cloud Connect™ Portal. If the Pendant's Alarm is cleared or reset before the purposeful delay time, the Alarm will not be transmitted to Grace Cloud Connect™ and the Alerts for this Alarm will not be generated. The default delay time is 10 seconds and can be adjusted. Consult Grace technical support for more options.

MS3000X Status Information

A feature of MS3000X allows Pendants with an alphanumeric screen (**WorkForce® WF2** or **SuperCell® SC500**) to request the MS3000X 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 MS3000X Gateway will transmit updated status information to the Pendant's alphanumeric screen.

MS3000X Gateway status information contains the data shown below on these Pendant display screens:

SuperCELL® SC500 Pendant Screen Showing the MS3000X Status From Preprogrammed Message #71

C:5 I:5 G:2 N:c
Sender S:20 U:099

WorkForce® WF2 Pendant Screen Showing the MS3000X Status From Preprogrammed Message #71

C:5 I:5 G:2 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 MS3000X 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 MS3000X

B: Battery status of the gateway device.
Example **B:4+** indicates the MS3000X has 4 bars of battery power remaining and is charging.
4 = Full Battery, 4 bars
0 = Low Battery, 0 bars
+ = Charging
- = Discharging

MS3000X Terminal Block Labeling and Configuration

A. Inputs and Power:

- 1- 12-15VDC – In
- 2- +12VDC – Out
- 3- GND
- 4- GND
- 5- INPUT#1
- 6- Input Common
- 7- INPUT#2
- 8- Input Common
- 9- INPUT#3
- 10- Input Common
- 11- INPUT#4
- 12- Input Common

MS3000X Factory Default Input Setting

Input #	Trigger	Repeat Time
1	Transmit Alarm	6 Seconds
2	Transmit Evac	6 Seconds
3	Transmit Pre-programmed Message (Message#) **	1 Hour
4	Transmit Free Form Message ("Input#4-MS3000X") **	1 Hour
Loss of AC	Transmit Free Form Message ("AC LOSS-MS3000X") **	1 Hour
Low Battery	Transmit Free Form Message ("Low Bat-MS3000X") **	1 Hour

MS3000X Factory Default Relay Setting

Relay #	Trigger	Hold/Activation Time*
1	Pendant Alarm or Input #1 Active (Transmit Alarm)	20 Seconds
2	Global Evac or Input #2 Active (Transmit Global Evac)	20 Seconds
3	Input #3 Active (Transmit Pre-programmed Message) **	3 Seconds
4	Loss of AC Detected	3 Seconds

B. Power Terminals:

Line 85-264 VAC
Neutral
GND

C. Relay Terminals:

(4 Sets; Numbered 1 - 4)
Normally Open
Common
Normally Closed

* **Hold/Activation Time:** Time relay contact will be maintained after last trigger message is received.

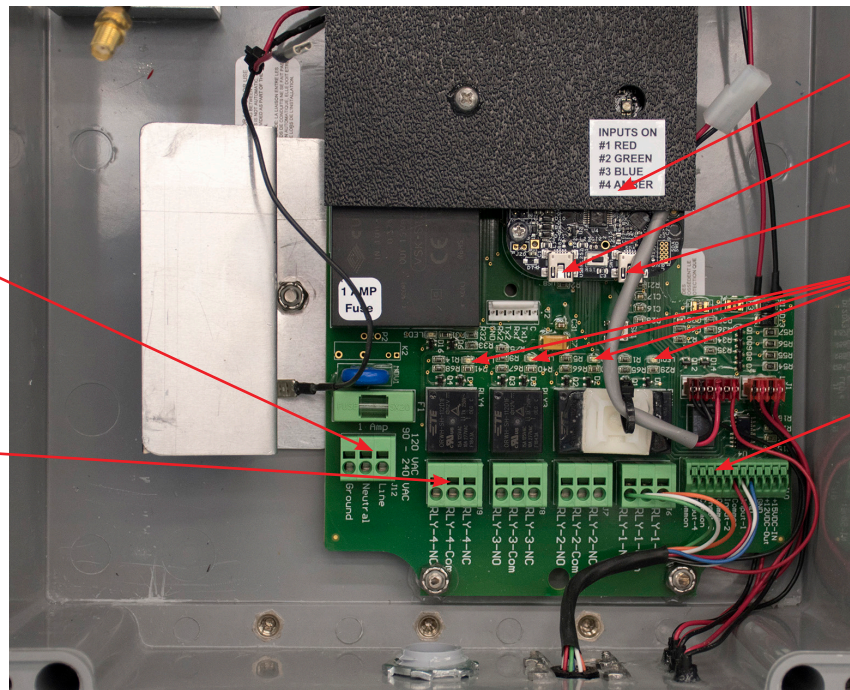
** **Pre-programmed and Free Form Messages will only be displayed on Grace-Watch®, SuperCELL® SC500, and WorkForce® WF2.**

B. Power Terminals

Terminal rated for solid or stranded wire 14-22AWG. Wire should be stripped at 1/2".

C. Relay Terminals

Terminal rated for solid or stranded wire 14-22AWG. Wire should be stripped at 3/8".

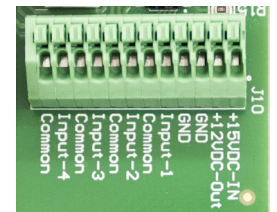


Inside View of MS3000X with -AC, -B, and -LS Options Installed

State of Inputs
Configuration Port
Upgrade Port
Red LED Indicates Relay is Active

A. Inputs and Power

Terminal rated for solid or stranded wire 20-24AWG. Wire should be stripped at 5/16".

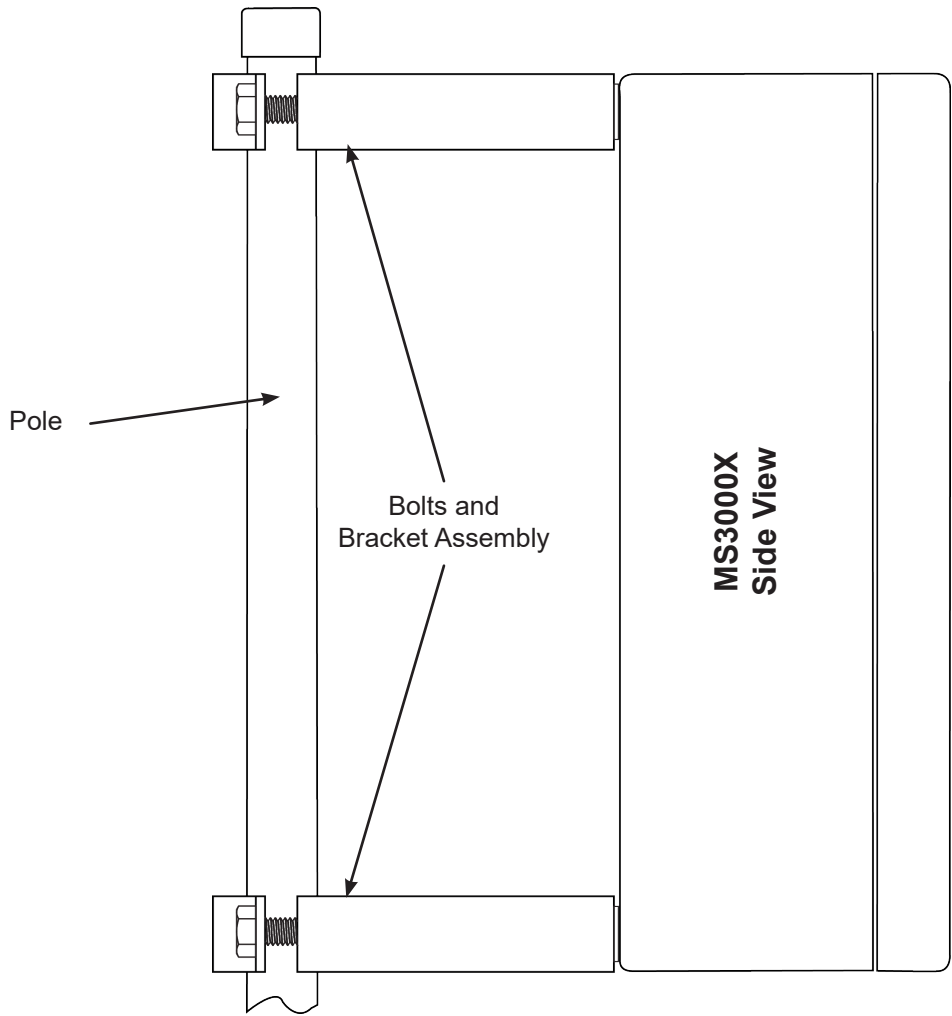
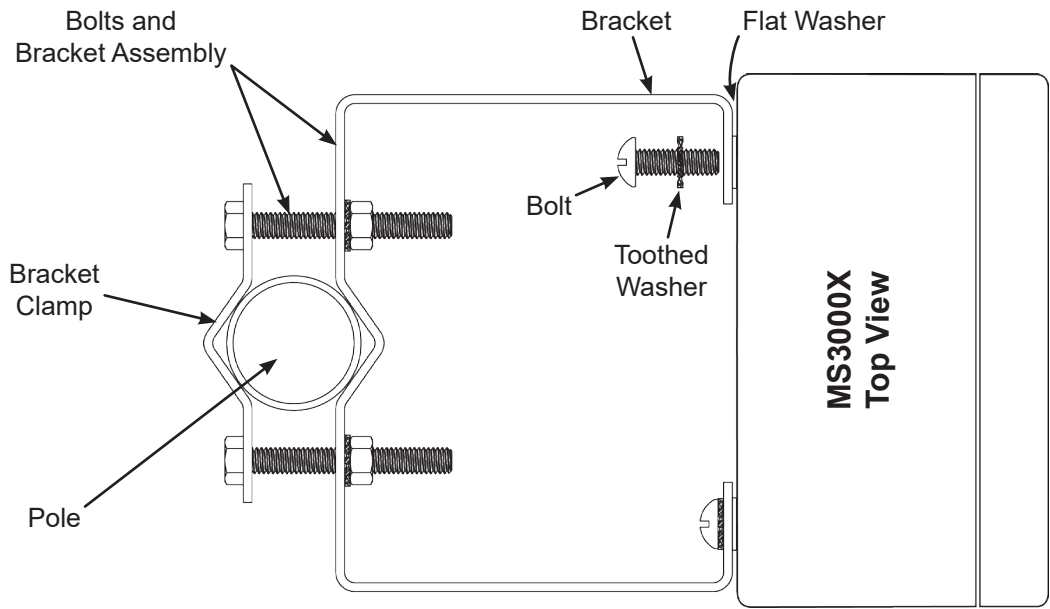


Additional Notes:

- Except for the battery, all parts of the MS3000X are attached to the printed circuit boards.
- Connect the AC Power cable to the Line, Neutral, and Ground positions.
- When setting MS3000X lid in place, make sure the light siren cable is NOT pinched. To securely seal MS3000X from intrusion of contaminants, secure the case lid by tightening all four (4) lid bolts until snug.
- Once Installation and Field Testing is complete, the MS3000X is ready for use.

OPTIONAL EQUIPMENT

- PM### Mounting Assembly - Pole Mounted with 'C' Brackets -



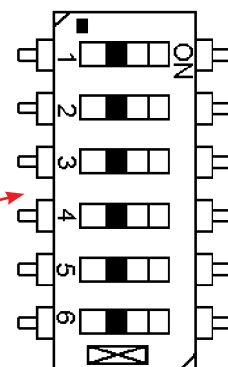
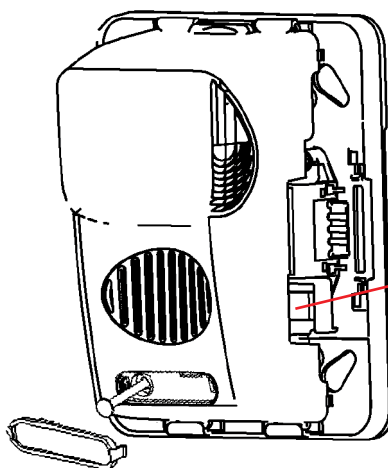
Improper Installation May Degrade Performance

Siren Settings - Tone Selection and Volume Level

(-LS Option)



Clear Bezel



6 Position Switch

The Siren alarm tone and alarm volume can be selected via the 6 position switch found under the clear bezel. To adjust the settings, remove the bezel by loosening the four screws and lifting the bezel off of the Light Siren. To select an Alarm Tone and volume level, set the switch positions as defined by the tables below.

To DISABLE the Siren and only enable the Strobe: set Switch Position 1-OFF and 2-OFF.

To Enable the Siren and Strobe, ensure switch positions 1 and 2 are both in the ON position.

Volume Level

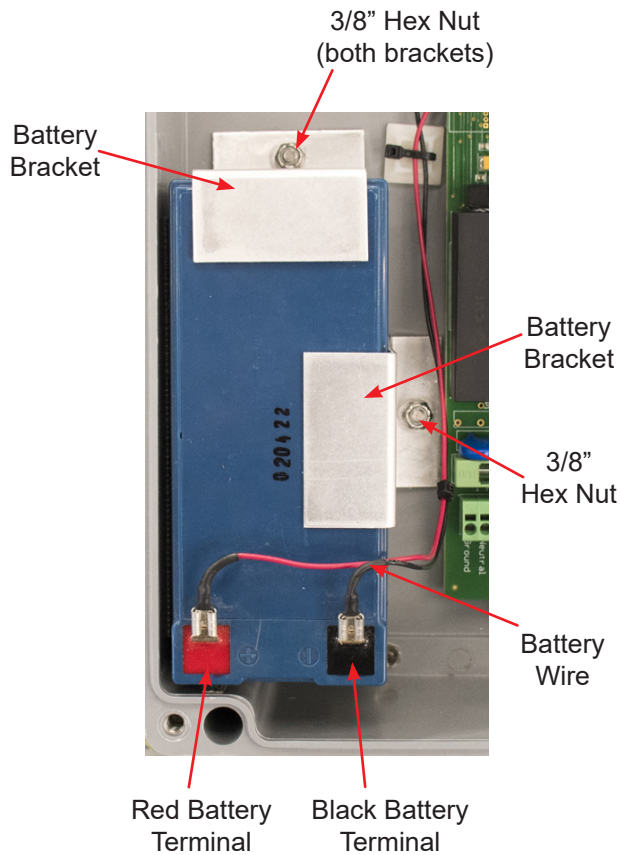
High dBa	Switch Position 6-ON
Low dBa	Switch Position 6-OFF

Tone Selection

Tone	Switch Position		
Mechanical - Temporal 3	3-ON	4-ON	5-ON
Mechanical - Continuous	3-OFF	4-ON	5-ON
2400Hz - Temporal 3	3-ON	4-OFF	5-ON
2400Hz- Continuous	3-OFF	4-OFF	5-ON
Chime - Temporal 3	3-ON	4-ON	5-OFF
Chime - Continuous	3-OFF	4-ON	5-OFF
Whoop	3-ON	4-OFF	5-OFF
Whoop	3-OFF	4-OFF	5-OFF

BATTERY REPLACEMENT

WARNING: Disconnect Power Supply Before Servicing MS3000X.



1. **Disconnect the external AC power supply.**
2. Loosen the four lid screws and remove the cover.
3. Unhook battery wire from both battery terminals.
4. Use a 3/8" nut driver to remove both hex nuts and battery brackets.
5. Remove the expired battery.
6. Carefully set the new battery in place.
7. Replace battery brackets over the new battery and the mounting bolt. Tighten hex nuts down until snug.
8. Connect the red wire to red battery terminal.
9. Connect the black wire to black battery terminal.
10. Replace the MS3000X cover and tighten all four screws until snug.
11. **Reconnect power supply and test system for proper operation before field use.**

OPTIONS:

10 Foot Cable with Connector

p/n: MS-CA-10



Wiring

Pin 1	GREEN	Normally Open
Pin 2	WHITE	Contact Com.
Pin 3	RED	+12VDC
Pin 4	Blue	Input #1
Pin 5	ORANGE	Normally Closed
Pin 6	White/Black	Input Common
Pin 7	BLACK	GND
Pin 8	Red/Black	Input #2

PHONE DIALER

p/n: ATD

MS3000X with phone dialer with connector supplies relay contact trigger and power to the external phone dialer.



CAUTION: To avoid damaging mating pins, carefully match up connector keyways when attaching phone dialer connector.

GRACE One (1) Year WARRANTY

Grace Industries Incorporated, of Fredonia PA 16124 USA, warrants products that it manufactures to be free from defects in workmanship and materials for a period of one (1) year from the original date of purchase. This warranty does not apply to third party products sold by Grace Industries. Grace Industries will repair or replace, at their sole discretion, defective products free of charge. This warranty applies to products that Grace Industries deems defective in its sole discretion due to defects in material or workmanship under normal use and maintenance and where a defect was not caused by accident, misuse or abuse of the product and that no disassembly, repairs or parts replacement were made or attempted by other than Grace Industries' personnel. **GRACE INDUSTRIES, INCORPORATED SHALL NOT BE LIABLE FOR ANY DIRECT, INCIDENTAL OR CONSEQUENTIAL LOSS OR DAMAGE ARISING OUT OF THE USE OF THE PRODUCT OR FAILURE OF THE PRODUCT TO OPERATE.**

The sole and exclusive remedy under all guarantees or warranties, expressed or implied, is strictly limited to repair or replacement as herein provided. **ALL IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTIES OF FITNESS AND MERCHANTABILITY, ARE HEREBY LIMITED IN DURATION TO A PERIOD OF ONE (1) YEAR FROM THE DATE OF ORIGINAL PURCHASE.** The warranty and liability set forth here are in lieu of all other warranties, expressed or implied, in law or in fact, including warranties of merchantability and fitness for a particular purpose.

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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