



Remote Controls for MM Series Inverters

Installation and
Operation Guide

Disclaimer of Liability

Since the use of this manual and the conditions or methods of installation, operation, use and maintenance of the MM Series Remote Control are beyond the control of Magnum Energy Inc., this company does not assume responsibility and expressly disclaims liability for loss, damage or expense, whether direct, indirect, consequential or incidental, arising out of or anyway connected with such installation, operation, use, or maintenance.

Due to continuous improvements and product updates, the images shown in this manual may not exactly match the unit purchased.

Restrictions on Use

The MM Series Remote Control shall not be used in connection with life support systems, life saving or other medical equipment or devices. Use of this particular equipment is at your own risk.

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Product Safety Instructions

Read and follow all instructions and safety information contained in this manual before installing or using this product.

- All electrical work must be performed in accordance with local, state and federal electrical codes.
- This product is designed for indoor / compartment installation. It must not be exposed to rain, snow, moisture or liquids of any type.
- Use insulated tools to reduce the chance of electrical shock or accidental short circuits.
- Always verify proper wiring prior to connecting the remote.

Safety Symbols

To reduce the risk of electrical shock, fire, or other safety hazard, the following safety symbols have been placed throughout this manual to indicate dangerous and important safety instructions.



Warning - Indicates a dangerous voltage or condition exists.



Caution - Indicates a critical step necessary for the safe installation and operation of the unit.



Note - Indicates an important statement.

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1.0 Introduction

Congratulations on your purchase! The MM Series remote control from Magnum Energy, Inc. is designed to be simple to install and use, allow easy control and quick indication of the inverter's (and charger) status.

Remotes Available

The MM-R and the MM-RC are the two MM remote controls available to use with the MM Series inverter. The appropriate remote to use depends on whether your inverter includes the battery charger feature. For MM Series inverters that do not have the battery charger, the **MM-R** is the recommended remote; for MM Series inverters that do have the battery charger, the **MM-RC** is the recommended remote.

Depending on your inverter model, you can select one of the following remotes:

MM-R - Provides three LED indicators for inverter status and includes a remote ON/OFF switch; comes with 25' cable. This remote is for MM Series inverters without the battery charger feature; such as the MM612 (requires serial number L1-201 or higher) or MM612G models.

MM-RC - Provides six LED indicators for inverter and charger status, includes a remote ON/OFF switch; comes with 25' cable. This remote is for MM Series inverters with the battery charger feature; such as the MM612AE, MM1212 or MM1212AE models.

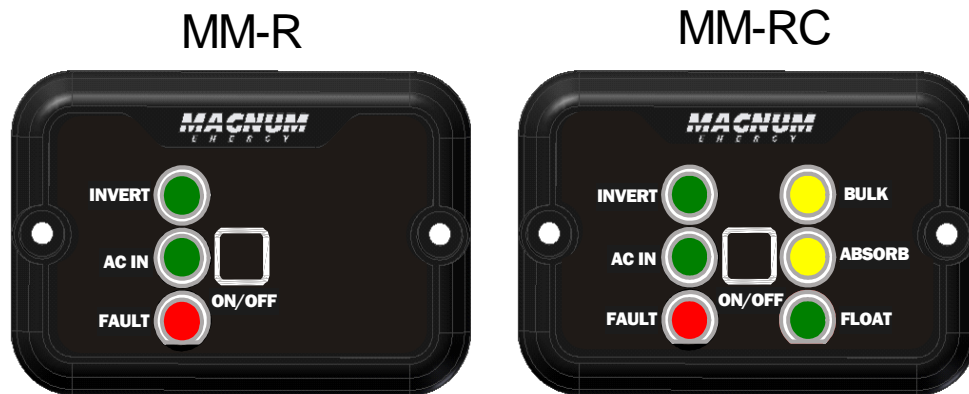


Figure 1, MM Remotes

Basic Features

- Colored LED's (Light Emitting Diodes) located on the front panel for easy viewing of system status.
- RJ11 phone jack connection on remote for easy connection to inverter.
- Status and information indicators used to determine system performance and operating conditions including: inverter operation, charger operation and any faults that occur.
- ON/OFF push-button for easy control of inverter and charger operation.
- Easy installation and included mounting ring to give installers a choice for mounting.

2.0 Installation

2.0 Installation


Before installing the inverter, read the entire installation section to determine how you are going to install your remote control. The more thorough you plan in the beginning, the better your inverter needs will be met.

Pre-installation

- Carefully remove the MM Series remote from its shipping container and inspect all contents. Verify the following items are included:
 - The correct MM remote panel display (MM-R or MM-RC)
 - Mounting Ring (used for surface mounting)
 - 25' communication cable (RJ11 connectors on each end)
 - Two #6 Phillips head screws (to secure the display panel)
 - MM Series Remotes Installation and Operation Guide.
- Determine a suitable location to mount the remote control. It must be located in a clean, dry and protected place.
- Plan the cable route from the remote to the inverter to ensure there are no obstructions that can't be overcome before you do any cutting or drilling.
- Allow ample room to access the ON/OFF switch and to view the LEDs for the inverters operational status and for troubleshooting.

Connecting the Communications Cable

The communications cable is 25', 4-conductor cable (wired like a normal telephone-type cable). This cable is connected to the RJ11 jack on the rear of the remote display panel and to the REMOTE port located on the front of the MM Series inverter.

 **Note:** The 25' cable should be long enough for most applications. If additional cable length is needed, the cable can be extended up to 50 feet using standard phone cable and a female-to-female connector.

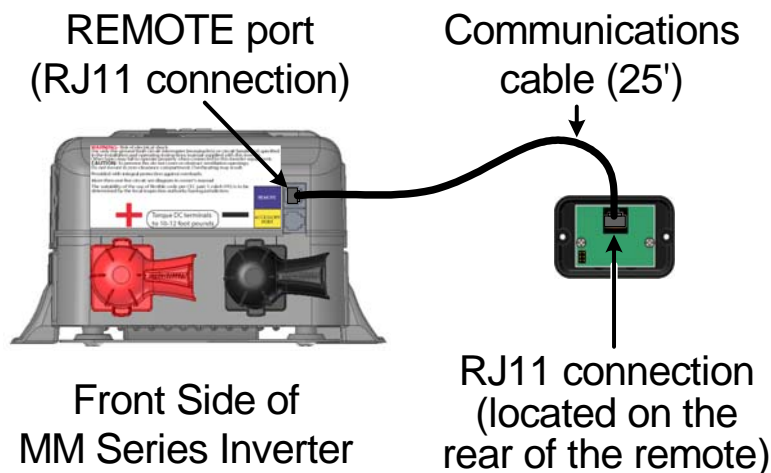


Figure 2, Communications Cable Connections

Mounting

The remote control panel can be flush mounted thru an opening in a wall; or if there is insufficient room behind the wall or no desire to cut into the wall, the remote can be surface mounted.



Caution: Always check for hidden electrical wires, pipes and cables BEFORE drilling or cutting or screwing into walls or cabinets.

Flush Mounting

To flush mount the remote, the remote display panel will need to be placed into an opening. This opening must have at least a 2" depth to allow room for the remote's rear circuit board and cables.

1. Cut an opening in a wall, see figure 2 to determine the correct opening dimensions. DO NOT cut the opening too big - to ensure there are no cracks around the display and that there is enough material for the screws to secure the display. Remove any wall insulation (if applicable) that may contact the back of the remote.
2. Route the communications cable from the inverter up into the opening in the wall.
3. Connect the communications cable to the RJ11 jack at the rear of the remote control (see figure 2).
4. Position the remote into the opening in the wall.
5. Secure the remote to the wall with the 2 screws provided.
6. After ensuring the inverter is off; plug the communications cable into the REMOTE port on the front of the inverter.

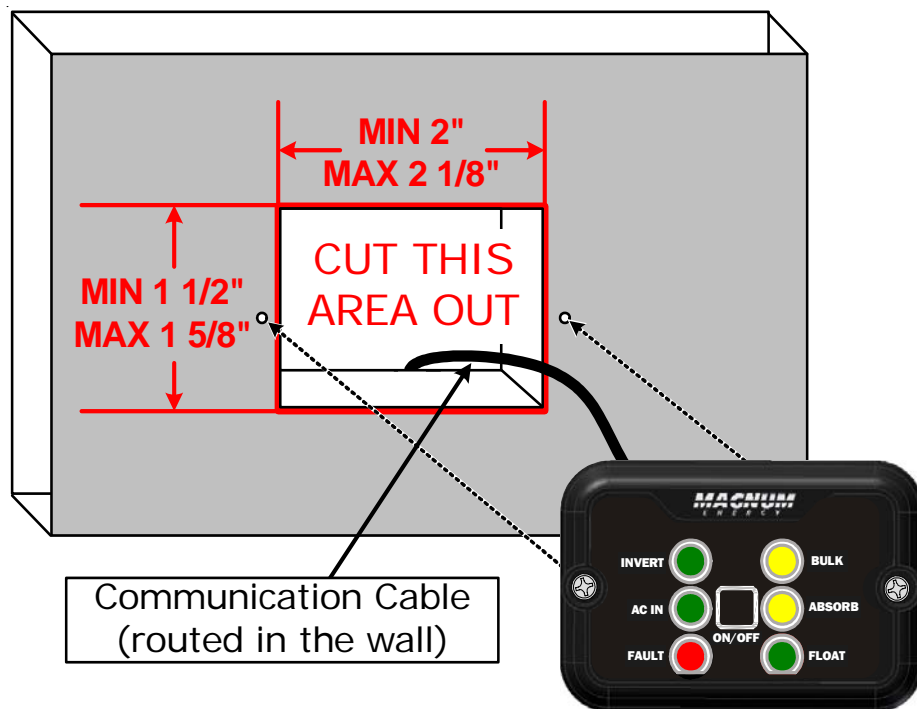


Figure 3, Flush Mounting

2.0 Installation

Surface Mounting

The remote control can be mounted on the surface of a wall by using the mounting ring.



Note: The mounting ring has a tabs at the top and bottom that are made with a thinner material. This allows these tabs to be cut or broken out to allow the communication cable to be routed up or down the wall.

1. Using the mounting ring as a template, mark on the wall the location of the four mounting screws.
2. Drill appropriate sized holes (depending on the screws that will be used - these are not supplied) in the four screw locations that were marked.
3. Determine if the communication cable is running up or down the wall and cut/break the appropriate tab on the mounting ring.
4. Pull the cable through the mounting ring and place the ring with the removed tab over the communication cable against the wall.
5. Position the mounting ring over the drilled holes and screw the mounting ring to the wall
6. Connect the communications cable - routed thru the mounting ring opening - to the RJ11 connector on the rear of the remote display
6. Secure the remote display to the mounting ring with the 2 Phillips screws provided.
7. After ensuring the inverter is off; route the communications cable exiting from the mounting ring into the REMOTE port on the front of the inverter.

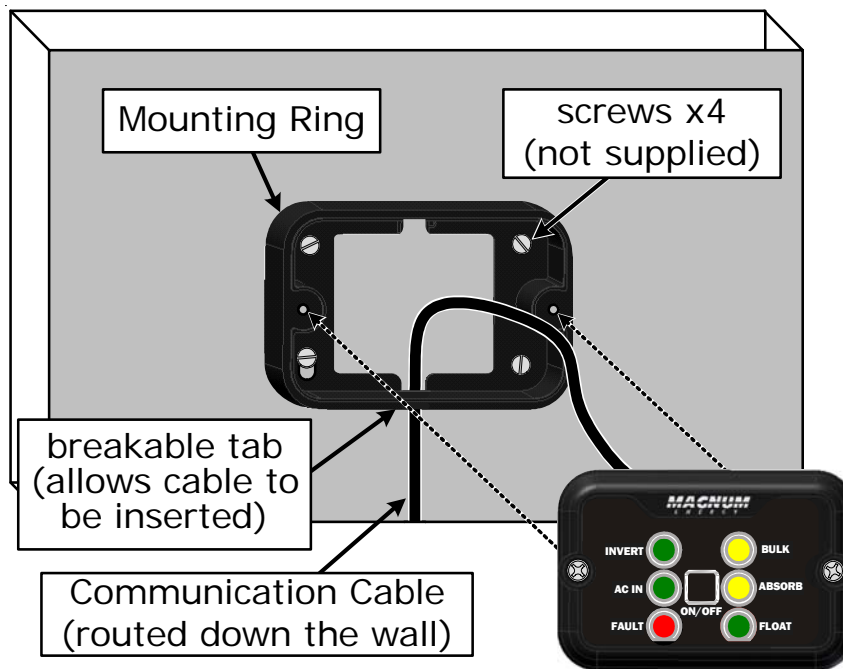


Figure 4, Surface Mounting

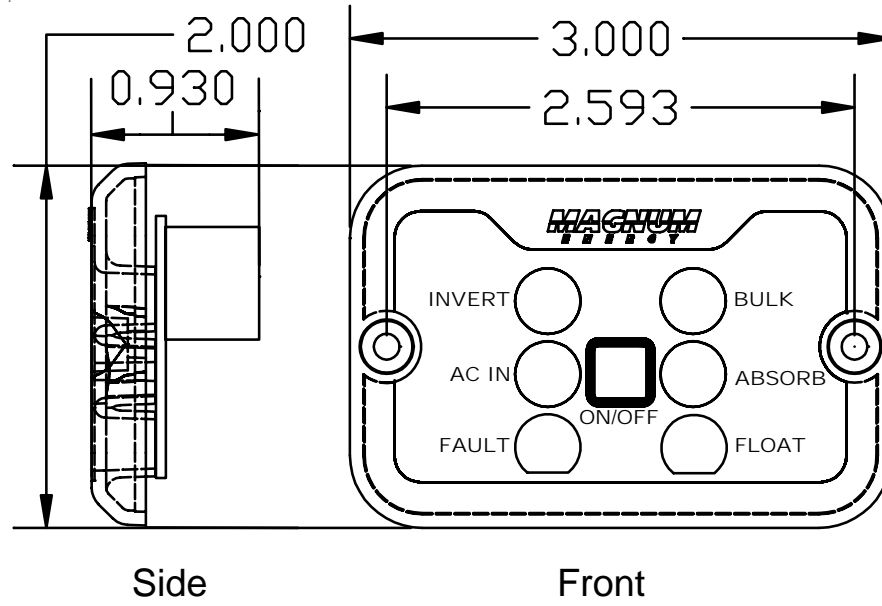


Figure 5, Remote Display Dimensions

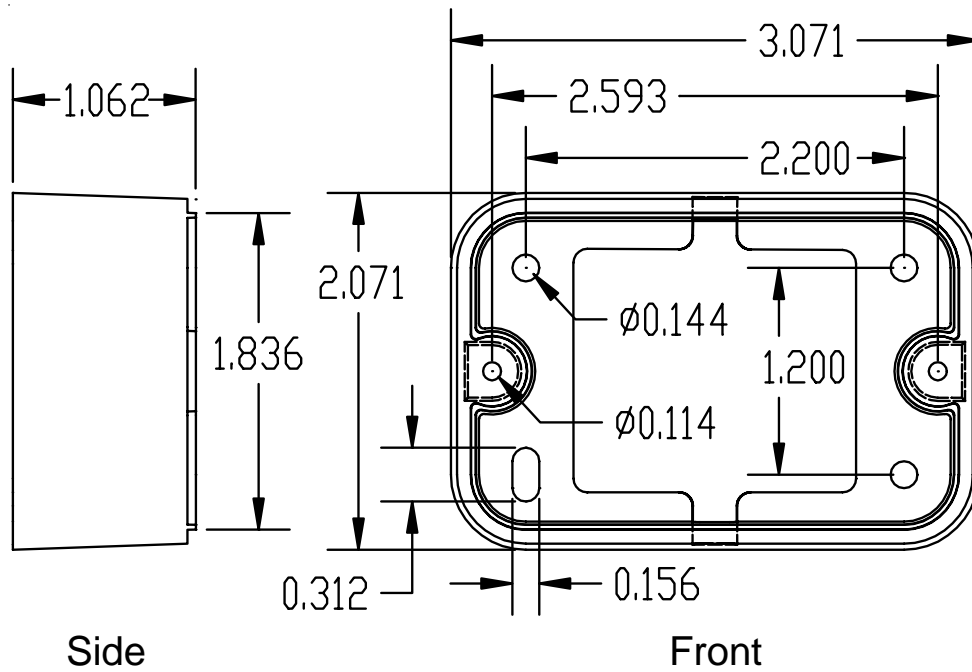


Figure 6, Mounting Ring Dimensions

3.0 Operation

Start-up

After Installing and connecting the MM Series remote control, the remote should be tested to ensure it is functional.

1. Press the ON/OFF push-button located on the display panel.



Note: The ON/OFF control switch is a push-button switch which functions by momentary pressing and releasing.

2. After pressing the ON/OFF switch, verify the INVERT indicator (green LED) is on (solid or blinking) and the status indicator on the MM Series inverter is also on.

3. Press the ON/OFF switch again to turn the inverter off and verify the INVERT indicator on the remote and the status indicator on the inverter both go off.

If the remote passes all the steps, the inverter is ready for use.

If the remote fails any of the steps, check all the connections at both ends of the communications cable and ensure the inverter is operational. If the FAULT indicator comes on, refer to the Troubleshooting section in the *MM Series Inverters, Installation and Operation Guide* to help clear the fault condition.

Factory Default Settings

Your MM Series inverter has many functions that have changeable settings. These settings are preset and loaded by the inverter when turned on. However, if the MM remote control is connected to the inverter, the settings from the remote over-ride any default settings in the inverter. The settings in the remote are saved in the remote's non-volatile memory and will be used - even if DC power to the inverter is lost - as long as the remote is connected. See Table 1 for the inverter's default settings and the settings that are changed when connected to the MM remote.

Table 1, Inverter and Remote Settings

Function	Inverter Settings	Remote Settings
Search Watts	NA (MM612 / MM612G), 5W (all other MM Series)	NA (MM612 / MM612G), 5W (all other MM Series)
LowBatCutOut	10.0 VDC	10.0 VDC
Battery AmpHrs	400 AmpHrs (Absorb Time = 120 minutes)	400 AmpHrs (Absorb Time = 120 minutes)
Battery Type	Flooded - Liquid Lead Acid (Bulk = 14.6 VDC, Float = 13.4 VDC)	Flooded - Liquid Lead Acid (Bulk = 14.6 VDC, Float = 13.4 VDC)
Charge Rate	100%	100%
VAC dropout	80VAC	90VAC



Note: For more information on these settings, refer to the *MM Series Inverters, Installation and Operation Guide*.

Operation

The MM Series remote controls have an ON/OFF switch that performs the same function as the ON/OFF switch on the front of the MM Series inverter. This remote control also has LED indicators to show the current operating mode of the inverter and charger (MM-RC only) and to help troubleshoot your system if you have a fault.

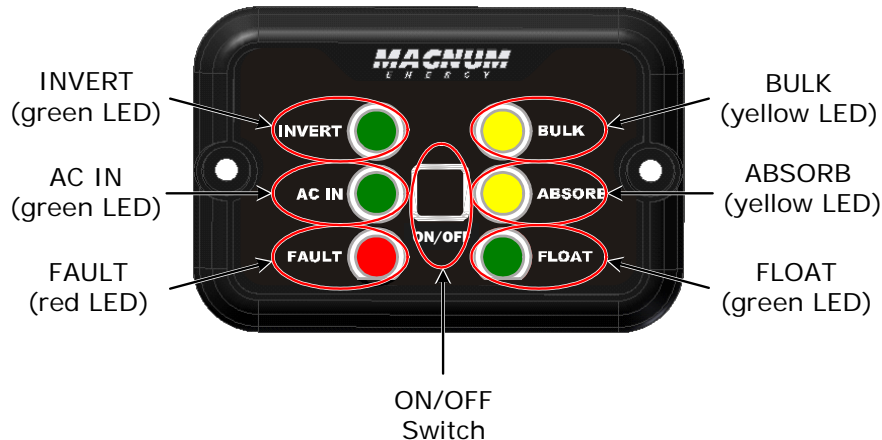


Figure 7, LED Indicators and ON/OFF Switch

ON/OFF Switch

The ON/OFF Switch is a momentary push-button switch that duplicates the ON/OFF switch on the inverter. This switch also allows additional changes to be made while in the Invert or Charge Mode.

When the inverter is first connected to the batteries, the inverter and remote go through an internal 10 seconds start-up test. After this test is completed, the ON/OFF switch can be pressed to turn on the inverter. Once the inverter has been turned on, momentarily pressing the ON/OFF switch alternately turns the inverter On/Standby and Off.

On models with the search mode function, the ON/OFF switch can be used to enable or disable the search mode. While in the INVERT Mode, pressing and holding this switch for three seconds will allow the search mode to alternate between Disabled (Inverter always on - indicated by the INVERT LED always on) and 5W (the inverter is looking for at least a 5 watt load to turn on and start inverting - indicated by the INVERT LED Blinking once a second).

On models with the battery charger feature, this switch can also be used to disable the charger (Charger Standby) so that all the incoming power can be used exclusively for the AC loads. To turn the charger off, press and hold the ON/OFF switch for three seconds (you must be in the Charge Mode). When this happens, the charging indicators (BULK, ABSORB and FLOAT) will go off. To turn the charger back on, press and hold the ON/OFF switch for three seconds again. When the charger is again enabled, one of the charging indicators will come on to show the current charge stage.



Warning - When any external AC power is passing through the inverter and present on the output. Pressing the ON/OFF switch will not remove this AC power on the inverter's output.

3.0 Operation

Monitoring the LED Indicators

The remote front panel uses LED indicators to show the status of the inverter system. These LED indicators automatically switch between the inverter or charger mode (MM-RC only) as the operation of the inverter system changes.

The LED status indicators show four modes of system operation:

- INVERT - Invert Mode status
- AC IN - Transfer Mode status
- FAULT - Fault Mode status
- BULK, ABSORB or FLOAT (MM-RC only) - Charge Mode status



Note: To understand more about the operating modes of the inverter or charger, refer to the *MM Series Inverters, Installation and Operation Guide*.

MM-R and MM-RC Remotes

The three LED indicators on the left side of both the MM-R and MM-RC remotes (see figure 7) will show you the operating status of the MM Series inverter. Monitor these indicators to determine the inverter's mode of operation:

INVERT (green) -

- On (solid)
 - and **AC IN** LED indicator is Off - The inverter is On. It is using energy from the battery to supply AC power to the loads connected to the inverter.
 - and **AC IN** LED indicator is On (solid) - The inverter is in Standby. The external AC power (Utility or generator) connected to the inverters input is passing through the inverter to power the AC loads. The inverter will automatically turn on to power the AC loads if the external AC power is lost or disconnected.
- Blinks On (once every second) - The inverter is in search mode. The AC load is below 5 watts (Search Watts default setting).
- Off - The inverter is disabled. The inverter is not on or will not come on if AC power is lost or disconnected.

AC IN (green) -

- On (solid) - the external AC power (Utility or generator) is connected to the inverters input and passing through the inverter to power the AC loads connected to the inverter's output.
- Blinking On (once every second) - the external AC power is present but not actively being used. Either 1. The AC input is being qualified (takes approximately 15 seconds); or 2. The input AC voltage is low. Ensure the incoming AC voltage is above 90 volts (VAC dropout setting with the MM remote connected).
- Off - No external AC power is detected on the inverter's input.

FAULT (red) - Under normal operating conditions, the FAULT indicator will be off. If there is a fault condition, this indicator will blink differently for each specific fault to help troubleshoot the inverter. Monitor this indicator for at least 10 seconds and count the number of blinks that occur every four seconds to determine the particular reason for the shutdown. Once you have determined and cleared the fault the inverter can be turned on. To help clear the fault condition, refer to the Troubleshooting section in the *MM Series Inverters, Installation and Operation Guide*.

- Blinks On 1 time every 4 seconds - Low Battery Voltage; the battery voltage level has dropped below 10.0 VDC (LBCO default setting**). Your batteries need to be charged, this fault condition will automatically clear when the battery voltage exceeds 12.5 VDC.
- Blinks On 2 times every 4 seconds - High Battery Voltage; the battery voltage is above 15.5 VDC. Reduce or turn off the external charging source to bring the battery voltage down.
- Blinks On 3 times every 4 seconds - Over-temperature condition; The internal temperature of the inverter has risen above acceptable limits; caused by loads too great for the inverter to operate continuously, or by lack of ventilation to the inverter. When the unit has cooled, it will automatically reset and resume operation.
- Blinks On 4 times every 4 seconds - AC Overload; the inverter has turned off because the connected loads are larger than inverter's output capacity or there is a short on the output wiring. The inverter can be restarted after the AC loads are reduced or the wiring short has been removed. To restart the inverter, momentarily press the ON/OFF button on the inverter or remote.
- Blinks On 5 times every 4 seconds - Internal Fault; the inverter has turned off because it has detected an internal problem. To clear this fault, the inverter will need to be reset by: 1. Press and hold the ON/OFF switch on the inverter for 15 seconds (the status LED must begin to rapidly flash); or 2. Disconnect all DC power to the inverter for at least 15 seconds and then reconnect. After resetting the inverter, momentarily press the inverters ON/OFF switch and verify the fault has cleared. If the Internal Fault remains, the inverter requires service at an authorized repair facility.

3.0 Operation

MM-RC Remote Only

The MM-RC provides three additional charging LED indicators to provide information on the operation of the battery charger. Monitor these indicators for at least 10 seconds to determine the charger status.

BULK (yellow) -

- On (solid) - Bulk Charging; the charger is delivering maximum current to the batteries. The charger will remain in Bulk charge until 14.6 VDC* is achieved (determined by the Battery Type selection**).
- Blinks On (1 time every 4 seconds) - Charger Back-off; charger current is reduced. This occurs if: 1. The internal temperature is very hot (the charger reduces the charge rate to maintain temperature); or 2. The AC input voltage has fallen below 85 VAC (the charger reduces the charge rate to help stabilize the incoming AC voltage).
- Off - charger is not in Bulk charge mode.

ABSORB (yellow) -

- On (solid) - Absorb Charging; the charger is in constant voltage stage and begins after the bulk voltage has been reached. The DC charging current will start to taper down in order to maintain the Bulk voltage setting. The Absorb Charging time is 120 minutes (determined by the Battery AmpHrs selection**).
- Blinks On (1 time every 4 seconds) - Charger Back-off; charger current is reduced. This occurs if: 1. The internal temperature is very hot (the charger reduces the charge rate to maintain temperature); or 2. The AC input voltage has fallen below 85 VAC (the charger reduces the charge rate to help stabilize the incoming AC voltage).
- Off - charger is not in Absorption charge mode.

FLOAT (green) -

- On (solid) - Float Charging; at the end of the Absorb Charging time, the charger reduces the charge voltage to maintain the batteries at 13.4* VDC (determined by the Battery Type selection**).
- Blinks On (1 time every 4 seconds) - Charger Back-off; charger current is reduced. This occurs if: 1. The internal temperature is very hot (the charger reduces the charge rate to maintain temperature); or 2. The AC input voltage has fallen below 85 VAC (the charger reduces the charge rate to help stabilize the incoming AC voltage).
- Blinks On (2 times every 4 seconds) - Full Charge; this mode monitors the battery voltage to determine when to continue charging. After four hours in the Float Charge mode, the charger turns off and goes to Full Charge mode. If the battery voltage drops to 12.9 VDC, the charger will automatically initiate another Float Charge.
- Off - charger is not in Float Charge mode.

* These voltage settings are based on the BTS being disconnected; if connected, these voltage settings will increase or decrease depending on temperature around the BTS - this ensures correct charging.

** These settings are preset by the inverter or the connected remote (see Table 1, Inverter and Remote Settings), but can be changed by the ME-RC50 remote.

4.0 Warranty and Service Information

24 Month Limited Warranty

Magnum Energy, Inc., warrants the MM Series Inverter to be free from defects in material and workmanship that result in product failure during normal usage, according to the following terms and conditions:

1. The limited warranty for the product extends for 24 months beginning from the product's original date of purchase.
2. The limited warranty extends to the original purchaser of the product and is not assignable or transferable to any subsequent purchaser.
3. During the limited warranty period, Magnum Energy will repair, or replace at Magnum Energy's option, any defective parts, or any parts that will not properly operate for their intended use with factory new or rebuilt replacement items if such repair or replacement is needed because of product malfunction or failure during normal usage. The limited warranty does not cover defects in appearance, cosmetic, decorative or structural parts or any non-operative parts. Magnum Energy's limit of liability under the limited warranty shall be the actual cash value of the product at the time the original purchaser returns the product for repair, determined by the price paid by the original purchaser. Magnum Energy shall not be liable for any other losses or damages.
4. Upon request from Magnum Energy, the original purchaser must prove the product's original date of purchase by a dated bill of sale, itemized receipt.
5. The original purchaser shall return the product prepaid to Magnum Energy in Everett, WA. After the completion of service under this limited warranty, Magnum Energy will return the product prepaid to the original purchaser via a Magnum-selected non-expedited surface freight within the contiguous United States and Canada; this excludes Alaska and Hawaii.
6. If Magnum repairs or replaces a product, its warranty continues for the remaining portion of the original warranty period or 90 days from the date of the return shipment to the original purchaser, whichever is greater. All replaced products and parts removed from repaired products become the property of Magnum Energy.
7. This limited warranty is voided if:
 - the product has been modified without authorization,
 - the serial number has been altered or removed,
 - the product has been damaged through abuse, neglect, accident, high voltage or corrosion.
 - the product was not installed and operated according to the owner's manual.

**BEFORE RETURNING ANY UNIT, CONTACT MAGNUM ENERGY FOR
A RETURN MATERIAL AUTHORIZATION (RMA) NUMBER.**



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