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Introduction

The MM-R remote allows you to turn the inverter on and off (ON/OFF), and provides three LED indicators for: inverter status (INVERT), status of any external AC power (AC IN), and to alert you of any faults (FAULT).

The MM-RC remote includes the remote ON/OFF switch and the same three LED indicators that the MM-R has, as well as three additional LED indicators for charger status (BULK, ABSORB, FLOAT).

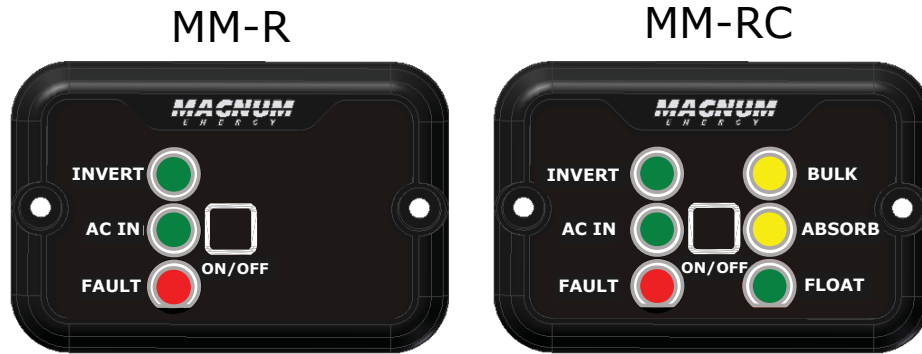


Figure 1, MM-R and MM-RC Remotes

Installation

Before proceeding, read the entire Installation section to determine how best to install your remote. The more thorough you plan in the beginning, the better your inverter needs will be met.

Installation Guidelines

- Before connecting any wires determine the remote's cable route throughout the home or vehicle/boat, both to and from the inverter.
- Always check for existing electrical, plumbing, or other areas of potential damage BEFORE drilling or cutting into walls to mount the remote.
- Make sure all wires have a smooth bend radius and do not become kinked.
- If installing this remote in a boat, RV, or truck ensure the conductors passing through walls, bulkheads, or other structural members are protected. This minimizes insulation damage (such as chafing) which can be caused by vibration or constant rubbing.

Unpacking and Inspection

Carefully remove the MM-R or MM-RC remote from its shipping container and inspect all contents. Verify the following items are included:

- MM-R or MM-RC remote display
- 25' Communication cable
- MM-R/MM-RC Instruction Sheet
- Bezel
- Two Phillips screws

If items appear to be missing or damaged, contact your authorized Magnum dealer or Sensata Technologies. Save your proof-of-purchase as a record of ownership; it is needed if the unit requires in-warranty service.

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Tools Required

Installing the remote control is simple and requires the following tools:

- Phillips screwdriver
- Level
- Drill
- Cut-out tool (knife/saw)
- Pencil
- Drill bit (7/64")

Locating the Remote

Find a location to mount the MM-R/MM-RC remote that is clean, dry, and protected. Allow ample room to access the remote's ON/OFF switch and to view the LEDs—which help to determine operational status and assist with troubleshooting. The MM-R/MM-RC remote control can either be flush mounted (through an opening in the wall), or surface mounted.

Remote and Bezel Dimensions

Use Figure 2 below in preparation for mounting the remote and the supplied bezel (if applicable). **Note:** Dimensions listed are approximates.

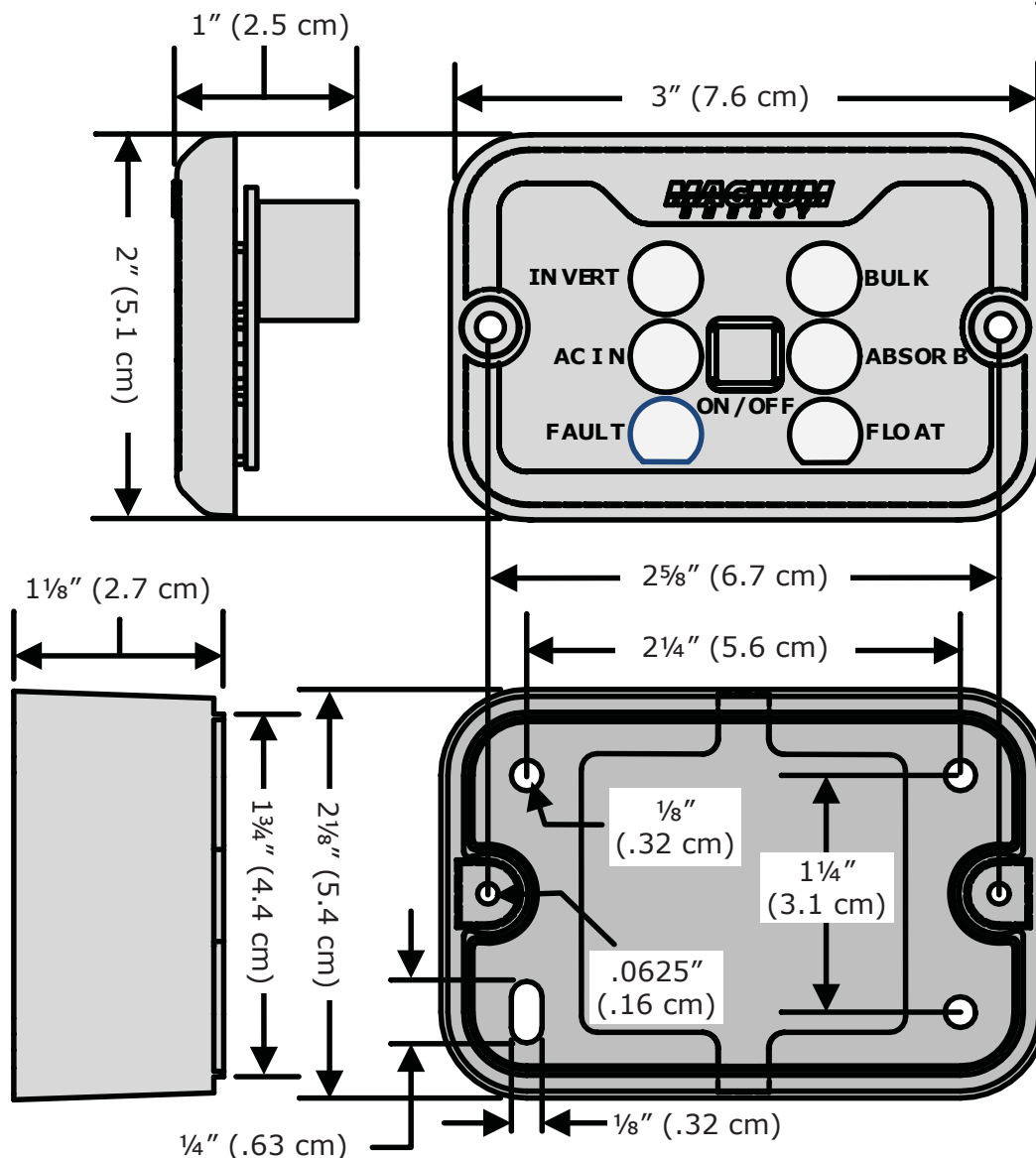


Figure 2, MM-R/MM-RC Remote Dimensions

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Connecting the Communication Cable

The MM-R and MM-RC each come with a cable to enable communication between the inverter and the remote. The communication cable is a flat 25' telephony standard with 6P4C (6-position, 4-conductor) connectors on each end. When the 6P4C connectors are held as shown in Figure 3 below, the color of the conductors in each connector is the same from top to bottom.



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

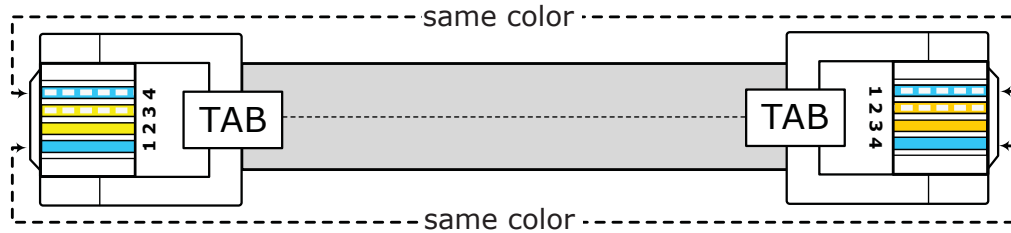


Figure 3, Communication Cable

Connecting the MM-R/MM-RC to a Magnum Inverter

One end of the remote cable is connected to the RJ11 jack on the rear of the MM-R/MM-RC remote panel, and the other end is connected to the Remote port (blue) on the Magnum inverter (see Figure 4).

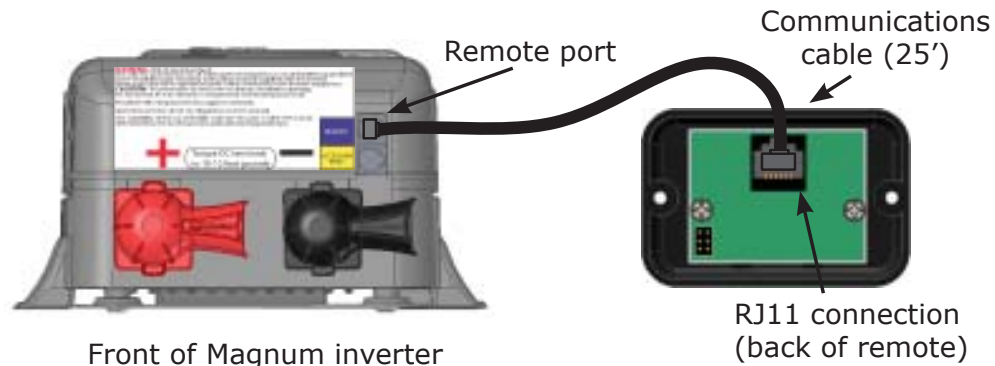


Figure 4, Communication Cable Connections

Flush Mounting the MM-R and MM-RC Remotes

To flush mount, the remote's display panel needs to be placed into an opening. This opening must have a depth of at least 2" (5 cm) to allow adequate room for the remote's circuit board and cables. Refer to Figure 5 before you begin.

- DO NOT cut the opening too big—ensure there is enough material for the screws to secure the display. Remove any wall insulation (if applicable).
- Route the communications cable from the inverter up into the opening in the wall.
- Connect the communications cable to the remote (see Figure 4).
- Secure the remote to the wall with the 2 Phillips screws provided.
- After ensuring the inverter is OFF, plug the communications cable into the Remote port (blue) on the inverter.

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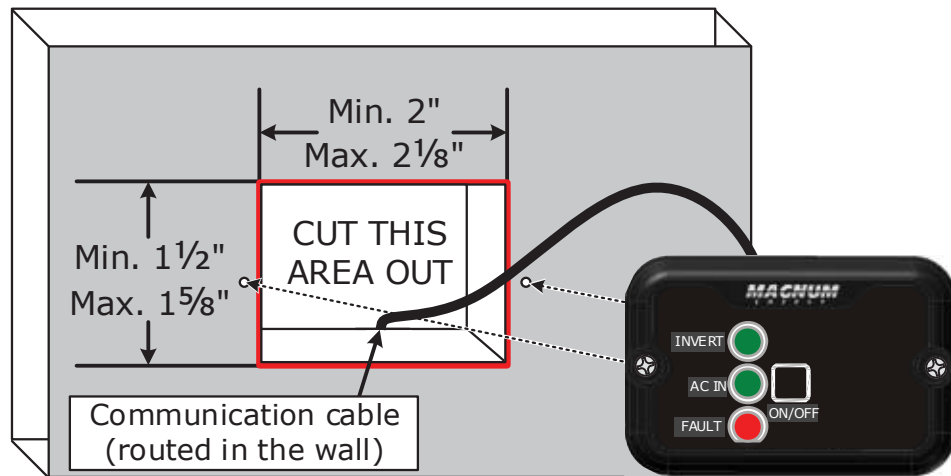


Figure 5, Flush Mounting

Surface Mounting the MM-R and MM-RC Remotes

The remote control can be mounted on the surface of a wall by using the supplied bezel. Refer to Figure 6 before you begin.



Info: The bezel has tabs at the top & bottom that are made with a thinner material. The tabs can be cut or broken out to allow the communication cable to be routed up or down the wall.

- Use bezel as a template to mark the four mounting screws.
- Drill appropriately sized mounting holes (screws are not supplied).
- Cut/break the appropriate tab on the bezel.
- Pull the cable through the bezel and place the ring side with the removed tab over the communication cable against the wall.
- Position the bezel over the drilled holes and screw to the wall.
- Connect the communications cable to the remote (see Figure 4).
- Secure the remote display to the bezel with the 2 Phillips screws provided.
- After ensuring the inverter is OFF, route the communications cable exiting from the bezel to the Remote port (blue) on the inverter.

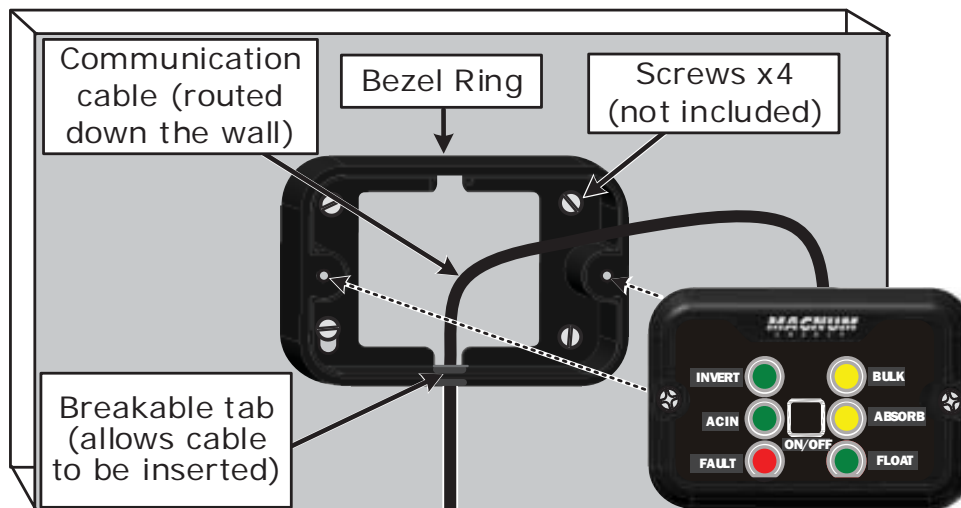


Figure 6, Surface Mounting

Operation

This section explains how to use the MM-R/MM-RC remotes when operating an inverter/charger. It provides information on the ON/OFF button and the LED indicators—that are used to show the operational status of the inverter/charger and to assist you with troubleshooting.

MM-R/MM-RC Remotes

ON/OFF Power Switch

The remote's ON/OFF power switch is a momentary pushbutton that duplicates the ON/OFF switch on an inverter. This switch also allows additional changes to be made while in Invert mode or while charging.

When the inverter is first connected to the batteries, the inverter and remote go through an internal 10-second start-up test. After this test is completed, the remote's ON/OFF switch can be pressed to turn on the inverter. Once the inverter has been turned on, momentarily pressing the remote's ON/OFF switch alternately turns the inverter off and on. The remote's ON/OFF switch can be used to enable or disable Search mode. While in Invert mode, pressing and holding this switch for three seconds causes Search mode to alternate between disabled (inverter always on—INVERT LED always on) and 5W (inverter looking for at least a 5-watt load to turn on and start inverting—indicated by the INVERT LED blinking x1/sec).

MM-RC only: The MM-RC remote's ON/OFF 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 put the inverter into Charger Standby, wait until the charger comes on [indicated by one of the charge indicators (BULK, ABSORB, FLOAT)being on], then press and hold the remote's ON/OFF switch for three seconds. When this happens, the charging indicators on the MM-RC remote will go off. To come out of Charger Standby and activate the charger, press and hold the remote's ON/OFF switch for three seconds again. When the charger is again activated, one of the MM-RC remote's charging indicators comes 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 remote's ON/OFF switch will not remove this AC power on the inverter's output.

INVERT LED (green)

- *On (solid)*
 - and the AC IN LED 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 the AC IN LED is on (solid). The inverter is in Standby mode. The external AC power (utility/shorepower or generator) connected to the inverter's input is passing through the inverter to power the AC loads. The inverter automatically turns on to power the AC loads if the external AC power is lost or disconnected.
- *Blinks On (once every second)* – inverter is in Search mode. The AC load is below the remote's *Search Watts* default setting.
- *Off* – inverter is disabled. The inverter is not on, or will not come on if AC power is lost or disconnected.

AC IN LED (green)

- *On (solid)* – external AC power (utility/shorepower or generator) is connected to the inverter's input and passing through the inverter to power the AC loads connected to the inverter's output.

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- *Blinking On (once every second)* – external AC power is detected on the inverter’s input, 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 >80 volts (*VAC Dropout* default).
- *Off* – no external AC power is detected on the inverter’s input.

FAULT LED (red)

Under normal operating conditions, the remote’s FAULT indicator will be off. If there is a fault condition, this LED will blink differently for each specific fault to help troubleshoot the inverter. Monitor the FAULT LED 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 identified and cleared the fault, the inverter can be turned on. Refer also to the Troubleshooting section of your inverter owner’s manual.

- *Blinks On (1 time every 4 seconds)* – **Low Battery Voltage**; the battery voltage level has dropped below the *LBCO* default setting. Your batteries need to be charged—this fault condition automatically clears when the battery voltage is >12.5 VDC, or the inverter begins charging.
- *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. This may be 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 automatically resets and resumes operation.
- *Blinks On (4 times every 4 seconds)* – **AC Overload**; the inverter has turned off because the connected loads are larger than the 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 either the inverter or the 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) Pressing and holding the inverter’s ON/OFF switch for 15 seconds (the INV 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 inverter’s ON/OFF switch and verify the fault has cleared. If the internal fault remains, the inverter requires service at an authorized repair facility.

MM-RC Remotes Only

BULK LED (yellow)

- *On (solid)* – **Bulk Charging**; the charger is delivering maximum current to the batteries. The charger will remain in bulk charge until the absorb voltage (14.5 VDC) is reached—see Table 1-1.
- *Blinks On (1 time every 4 seconds)* – **Charger Back-off** (while in Bulk mode); charger current is reduced. This occurs if: 1) The internal temperature is very hot (charger reduces charge rate to maintain temperature) or, 2) The AC input voltage has fallen below 85 VAC (charger reduces charge rate to help stabilize the incoming AC voltage).
- *Off* – the charger is not in Bulk Charge mode.

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ABSORB LED (yellow)

- *On (solid)* – **Absorb Charging**; the charger is in the Constant Voltage stage and begins after the bulk voltage has been reached. The DC charging current will start to taper down to maintain the *Bulk* voltage setting. The Absorb Charging time is based on the inverter’s default AHr size.
- *Blinks On (1 time every 4 seconds)* – **Charger Back-off** (while in Absorb mode); the charger current is reduced. This occurs if: 1) The internal temperature is very hot (charger reduces the charge rate to maintain temperature) or, 2) The AC input voltage has fallen below 85 VAC (charger reduces the charge rate to help stabilize the incoming AC voltage).
- *Off* – the charger is not in Absorption Charge mode.

FLOAT LED (green)

- *On (solid)* – **Float Charging**; at the end of the Absorb Charging time, the charger reduces the charge voltage to maintain the batteries at the float voltage (13.5 VDC)—see Table 1-1.
- *Blinks On (1 time every 4 seconds)* – **Charger Back-off** (while in Float mode); charger current is reduced. Occurs if: 1) The internal temperature is very hot (charger reduces the charge rate to maintain temperature) or, 2) The AC input voltage has fallen below 85 VAC (charger reduces the charge rate to help stabilize the incoming AC voltage).
- *Blinks On (2 times every 4 seconds)* – **Full Charge**; 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 12.7 VDC, the charger automatically initiates another float charge.
- *Off* – the charger is not in Float Charge mode.

Factory Default Settings

Refer to Table 1 below for the each remote’s default settings. When connected to an inverter, the remote’s settings override the 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.

Table 1-1, Remote Default Settings

	Remote Model	MM-R	MM-RC	MM-RC1	MM-RC2
	Firmware Version	≥3.7	≥3.7	≥4.0	≥4.0
Remote Function	Shore/AC Input Amps	30 amps	30 amps	15 amps	30 amps
	Search Watts	5W		OFF	
	LowBatCutOut	10 VDC		10.5 VDC	11.0 VDC
	Battery AHrs	Based on inverter’s default Ahrs size*.			
	Battery Type**	AGM2 (Absorb = 14.5 VDC, Float = 13.5 VDC)			
	Charge Rate	100%			
	VAC Dropout	80 VAC			

* Typically MM/MMS models = 200 AHrs (60 min.) and ME/MS models= 600 AHrs (120 min.).

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

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Limited Warranty

This remote is part of the Magnum products manufactured by Sensata Technologies. Sensata Technologies warrants this remote to be free from defects in material and workmanship that results in product failure during normal usage, according to the following terms and conditions:

1. The limited warranty for the product extends for 12 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, Sensata will repair or replace (with factory new or rebuilt replacement items) at Sensata's option any defective parts, or any parts that will not properly operate for their intended use—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 or decorative), or any structural or non-operative parts. Sensata'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. Sensata shall not be liable for any other losses or damages.
4. Upon request from Sensata Technologies, the original purchaser must prove the product's original date of purchase by providing a dated bill of sale or itemized receipt.
5. This limited warranty is voided if:
 - the product has been modified without authorization
 - the product has been damaged through abuse, neglect, accident, high voltage, or corrosion
 - the product was not installed and operated per this instruction sheet

How to Receive Repair Service

If your product requires warranty service or repair, contact:

- Sensata Technologies at:
Telephone: 425-353-8833
Fax: 425-353-8390
Email: MagnumWarranty@Sensata.com

If returning your product directly to Sensata for repair, you must:

1. Return the unit in the original, or equivalent, shipping container.
2. Receive a Return Materials Authorization (RMA) number from the factory prior to the return of the product to Sensata for repair.
3. Place RMA numbers clearly on the shipping container or on the packing slip.

When sending your product for service, please ensure it is properly packaged.

Damage due to inadequate packaging is not covered under warranty.

We recommend sending the product by traceable or insured service.

**A RETURN MATERIAL AUTHORIZATION (RMA) NUMBER IS
REQUIRED BEFORE RETURNING ANY PRODUCT**