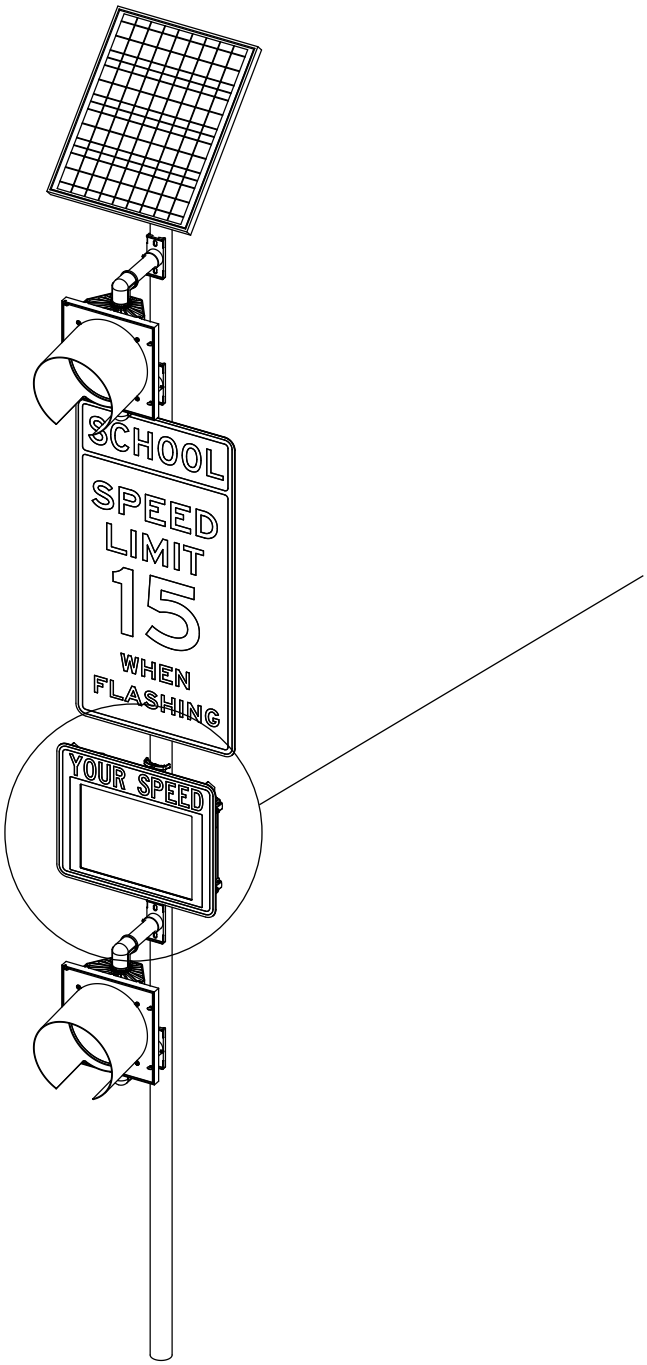
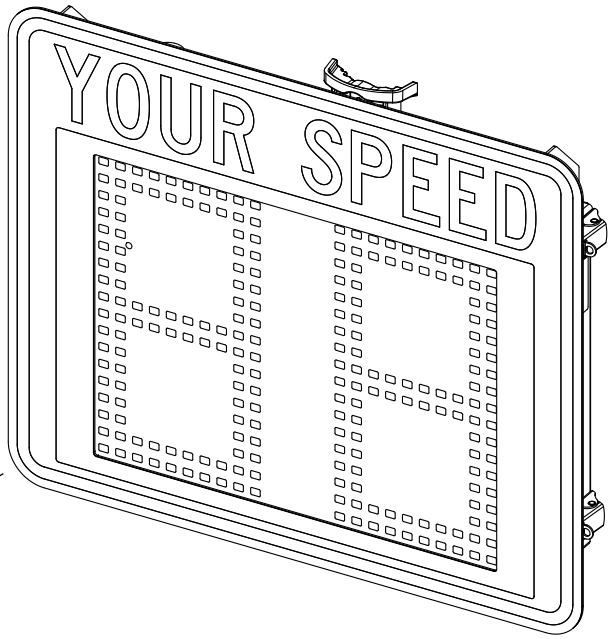
carmanah®
MX Series

MX SPEEDCHECK® MODULE

INSTALL GUIDE

LEVEL 2

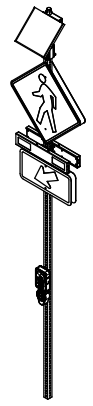
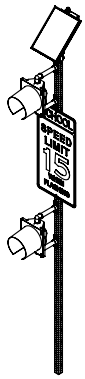
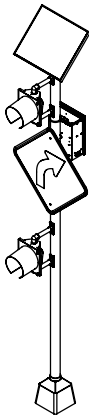
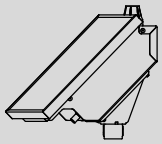
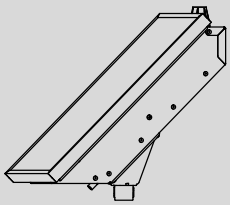
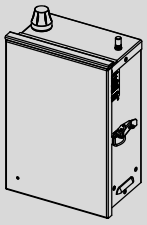
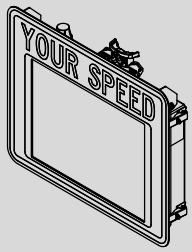
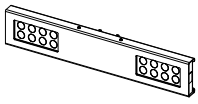
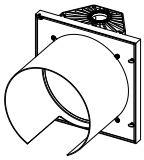
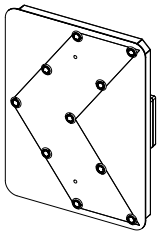
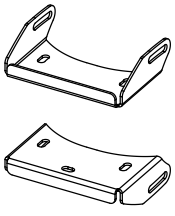
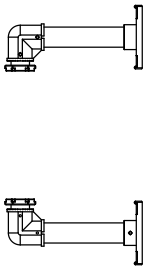
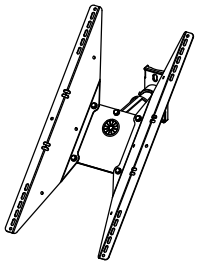
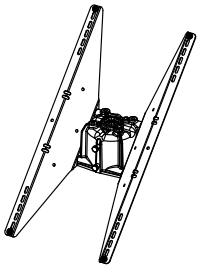




MX SPEEDCHECK MODULE

90695REVA

MX Series Product Level Document Overview

LEVEL 1 System Planner	R920-MX 	R829-MX 	R247-MX 	SPEEDCHECK-MX 
LEVEL 2 Power or SpeedCheck Modules	MX 100 	MX 200 	MX 300/400 	MX SpeedCheck 
LEVEL 3 Flasher Modules	MX RRFB Module 	MX Beacon Module 	MX LED Sign Module 	MX Chevron Sign Module 
LEVEL 4 Kits* *Not all kits shown	Tilt and Pan Bracket Kit 	Beacon Mount Kit 	Solar Panel Side of Pole Mount Kit 	Solar Panel Top of Pole Mount Kit 

1.1 Introduction – READ THIS FIRST

The SPEEDCHECK-MX radar speed sign is available in Solar and AC versions with either 12" or 15" tall digits. Solar versions use one or two batteries, while AC versions contain an AC-DC power supply. All versions feature a schedule function, day/night determination, radio for wireless synchronization, remote connectivity hardware and system-level settings.

Before installation, thoroughly review the MX Series **LEVEL 1** System Planner which will familiarize you with the features, operation standards and installation procedures of Carmanah's MX Series systems. Failure to comply with the use, storage, maintenance, installation or placement instructions detailed in that document could void the warranty. MX Series documentation is available online at support.carmanah.com.

After reviewing the **LEVEL 1** System Planner, this document is the next step to installing your MX Series system.

Carmanah MX SpeedCheck Modules provide the following functions and features, including:

- Integrated radar, vehicle speed display with optional "SLOW DOWN" message and optional rapid flashing strobes.
- Power for optional connected devices such as MX Beacon Module or external radar.
- Schedule programming.
- Remote connectivity hardware.

Install the MX SpeedCheck Module using this guide before installing other modules or kits using the guides supplied with them.

Once the system is installed and energized, it will operate according to its factory default settings.

TO COMPLETE SETUP: Use MX Field App to program modules and change default settings. Download: carmanah.com/app

FOR REMOTE ACCESS: Log into MX Cloud: MXcloud.live

Batteries are shipped fully charged. Use extreme caution when handling batteries as they can generate hazardous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, etc.) before handling batteries.

Electrical shock hazard. Do not let battery terminals contact any exposed metal. Do not connect battery and solar panel harnesses until all system wiring is completed.

Exposed circuit boards in product are sensitive to static electricity. Always ground yourself by touching enclosure metal before touching or handling circuit boards.

Product warranty begins on the earlier of in-field commissioning or 6 months after the original ship date. (If the system is powered up prior to being installed in the field, the warranty will start.)

1.2 Installation Notes

For solar versions, ensure the solar panel installation location has an unobstructed view of the sun's path. Obstructions such as trees or buildings could significantly reduce the amount of energy collected by the solar panel. All solar panels should face approximately the same direction and be pointed south (in North America). Shade analysis is highly recommended to understand how shadows will change according to the time of year. Contact Carmanah for a detailed solar site assessment and Solar Power Report (SPR) that demonstrates expected system performance over a 12-month period.

Pole Preparation:

- Mark positions of MX SpeedCheck Module and any accessories or other modules on pole.
- Drill cable exit/entry points as required.
- Fish harness between SpeedCheck and any optional module, daisy-chain modules together (distributed approach) if more than one is installed.
- As much as possible, ensure solar panel is pointing south (if you are in North America).

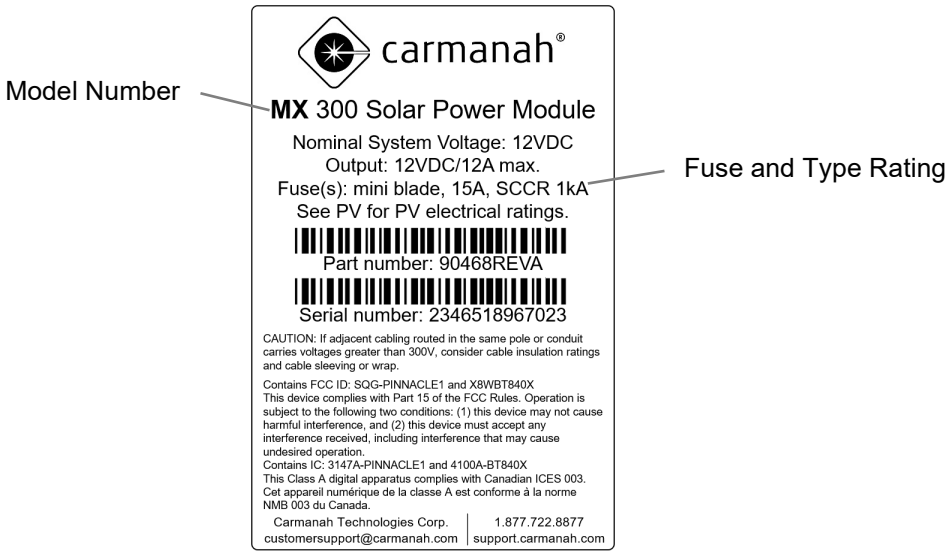
1.3 Tools and Materials Required

The following tools and materials may be required to mount your MX Series system depending on the model and configuration:

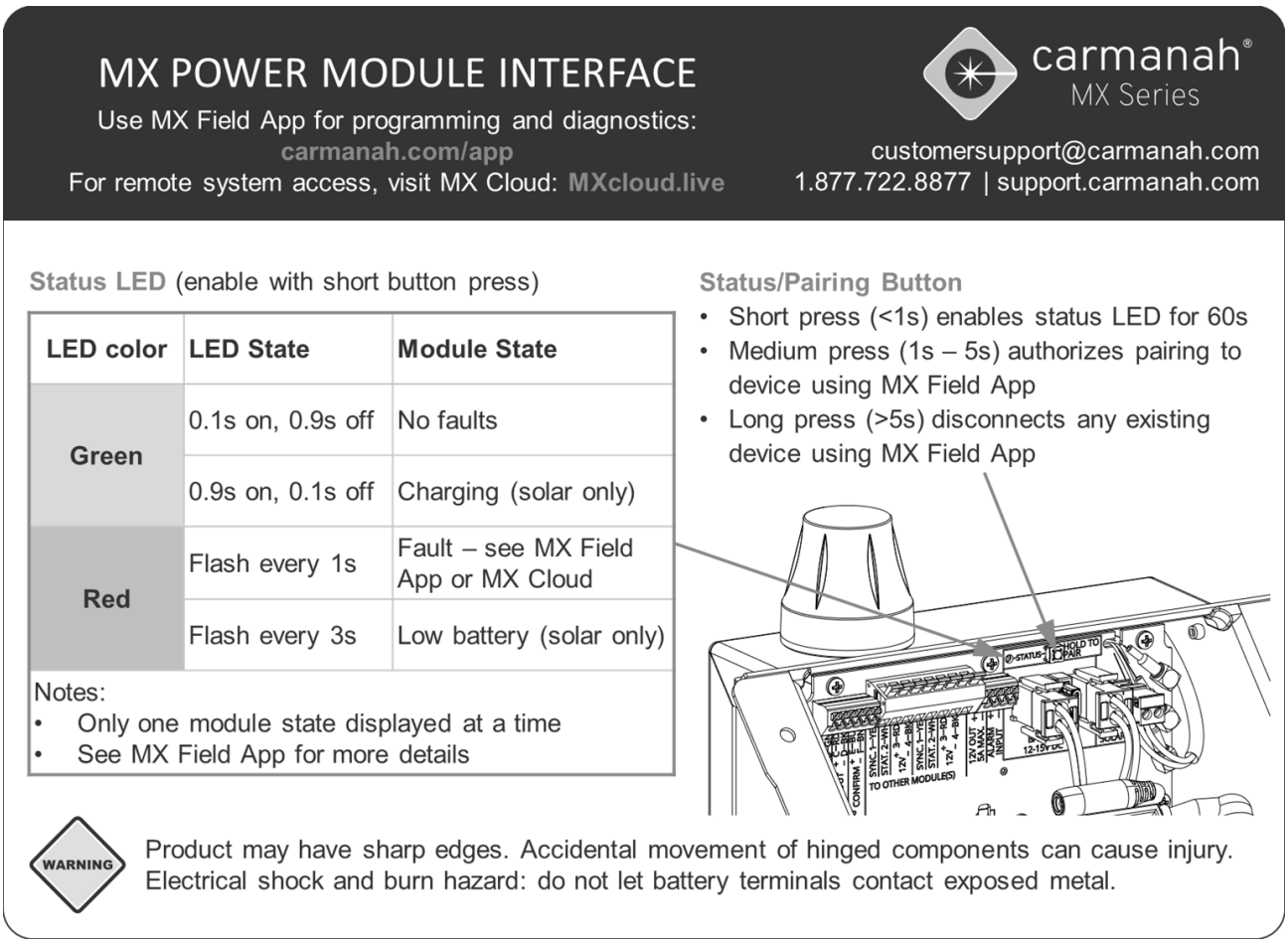
1. Imperial socket set 2. Crescent wrench 3. Tap set 4. Imperial hex key set 5. Fish tape 6. Level 7. Compass or pre-determined equatorial direction 8. Drill, drill bits and hole saws	9. Fine tip felt marker 10. Multi-bit screwdriver 11. 0.138" slotted screwdriver 12. Pelco Roger wrench (optional) 13. Hook spanner wrench, 1.5" trade size 14. Ladder or lift device 15. Lithium grease 16. Electrical multimeter (optional)

2.1 Product Labels

The information appearing on the MX Series identification labels is described below:

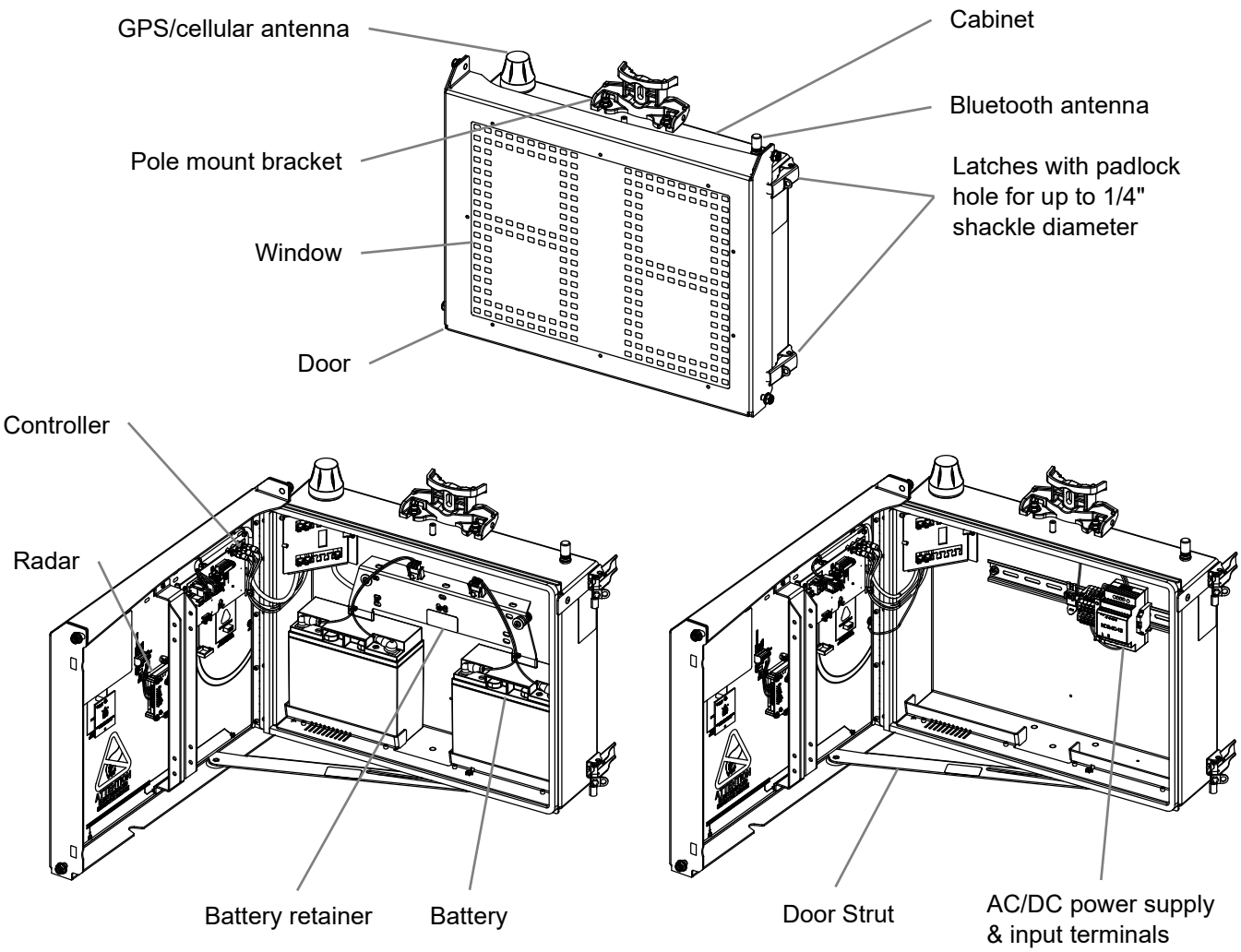


The MX SpeedCheck Module Controller status LED and button operation are described on the label below:



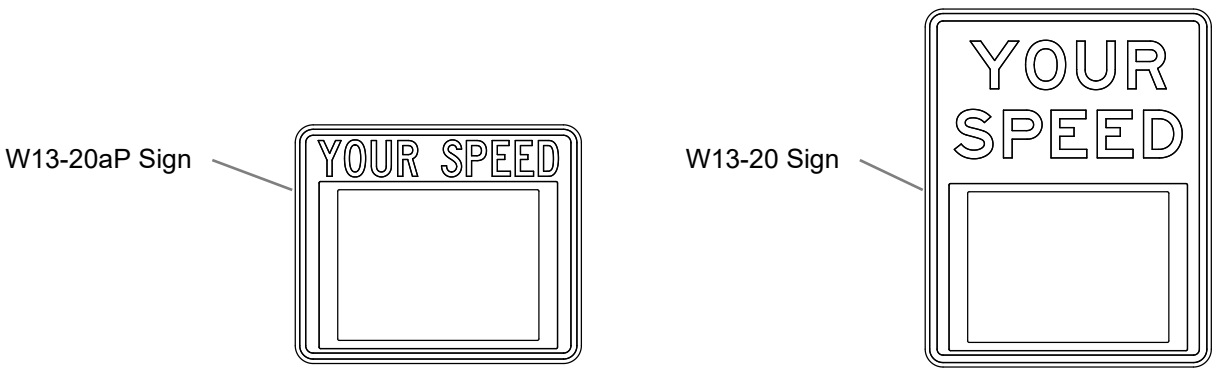
3.1 MX SpeedCheck Module Overview

Each Carmanah MX SpeedCheck Module has the following parts:

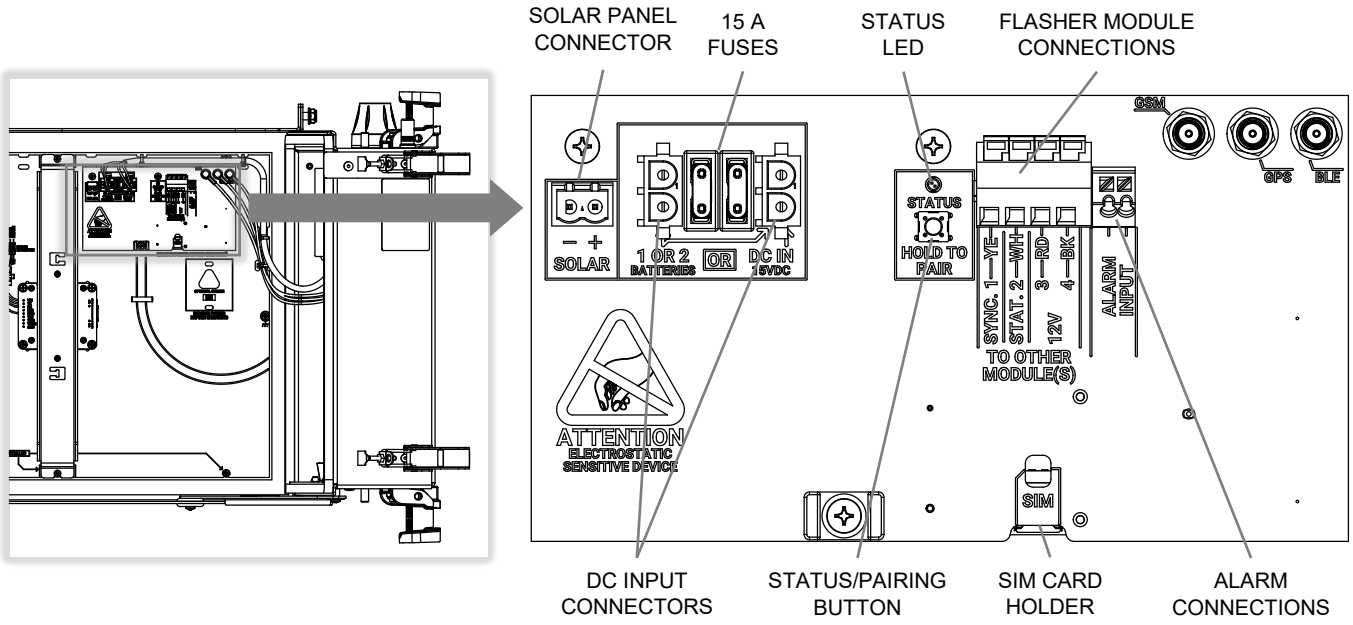


NOTE Door strut locks automatically when door is fully opened. Push strut back to release.

Various signs are available for the MX SpeedCheck Module, including MUTCD compliant W13-20aP and W13-20 in 24", 30" and 36" width:



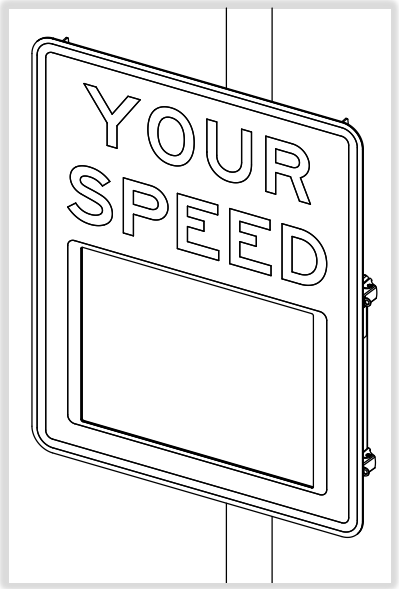
3.2 MX SpeedCheck Module Controller Overview



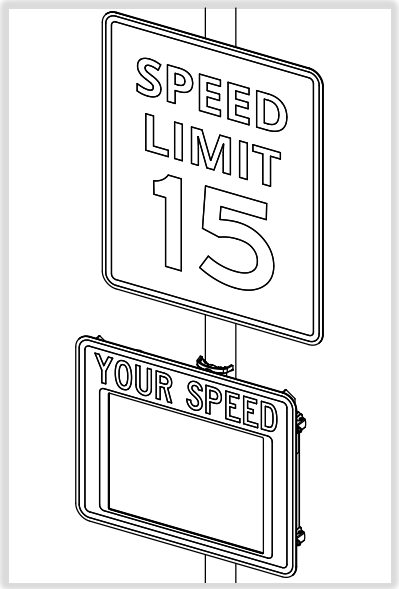
Group	Terminal	Description
Flasher Module Connections	**SYNC**	Provides synchronization and communication data between power and flasher modules. Can be daisy-chained between flasher modules to simplify wiring.
	STAT	
	12V+	Provides 12-15 VDC to power connected flasher modules. Can be daisy-chained between flasher modules to simplify wiring.
	12V –	
Alarm Connections	**ALARM +**	A normally-closed switch (such as a door switch) can be wired to these terminals to trigger an alarm.
	ALARM –	
Power Source Connections	**SOLAR +**	Solar panel connections for battery charging.
	SOLAR –	
	BATTERIES or DC IN	Connected to battery harness in solar systems and to 15 VDC power supply harness in AC systems.

3.3 SPEEDCHECK-MX Radar Speed Sign Typical Systems and Placement

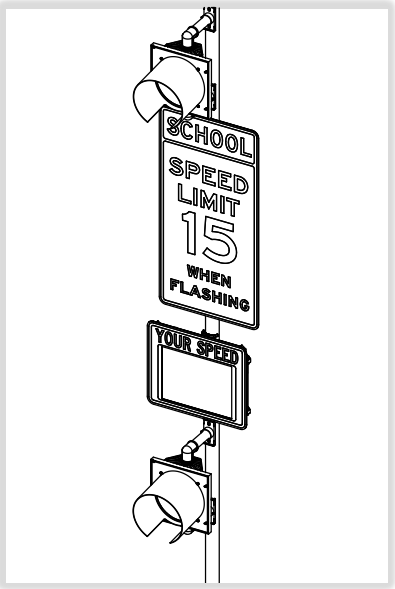
W13-20 supplementing a nearby horizontal alignment warning advisory speed



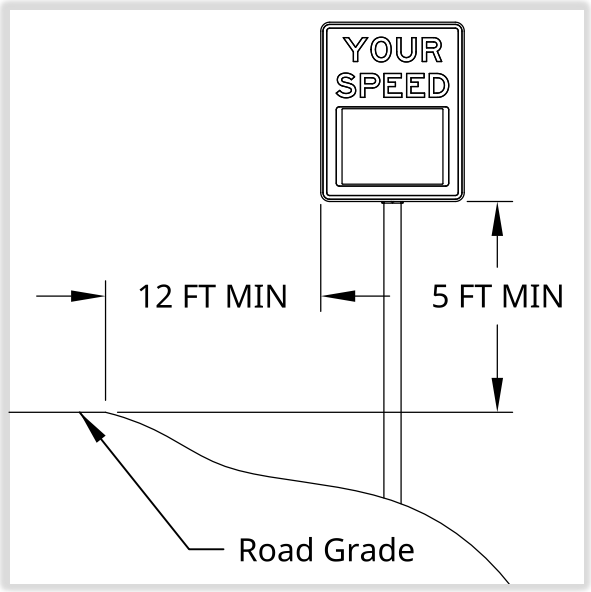
W13-20aP with R2-1 sign



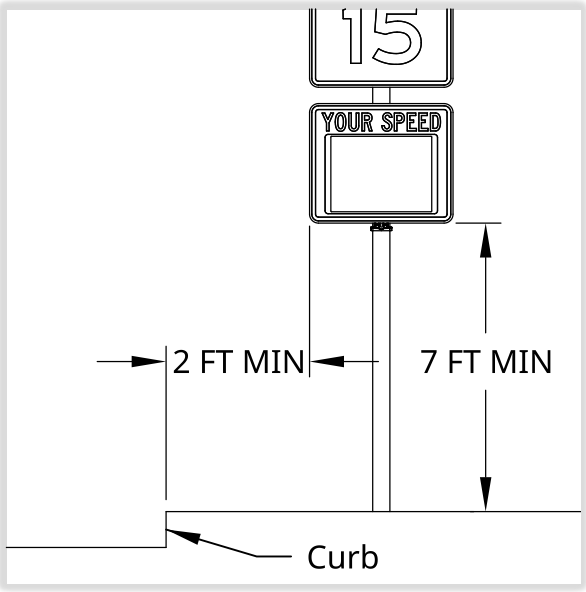
W13-20aP with S5-1 sign and flashing beacons



Typical Rural Positioning



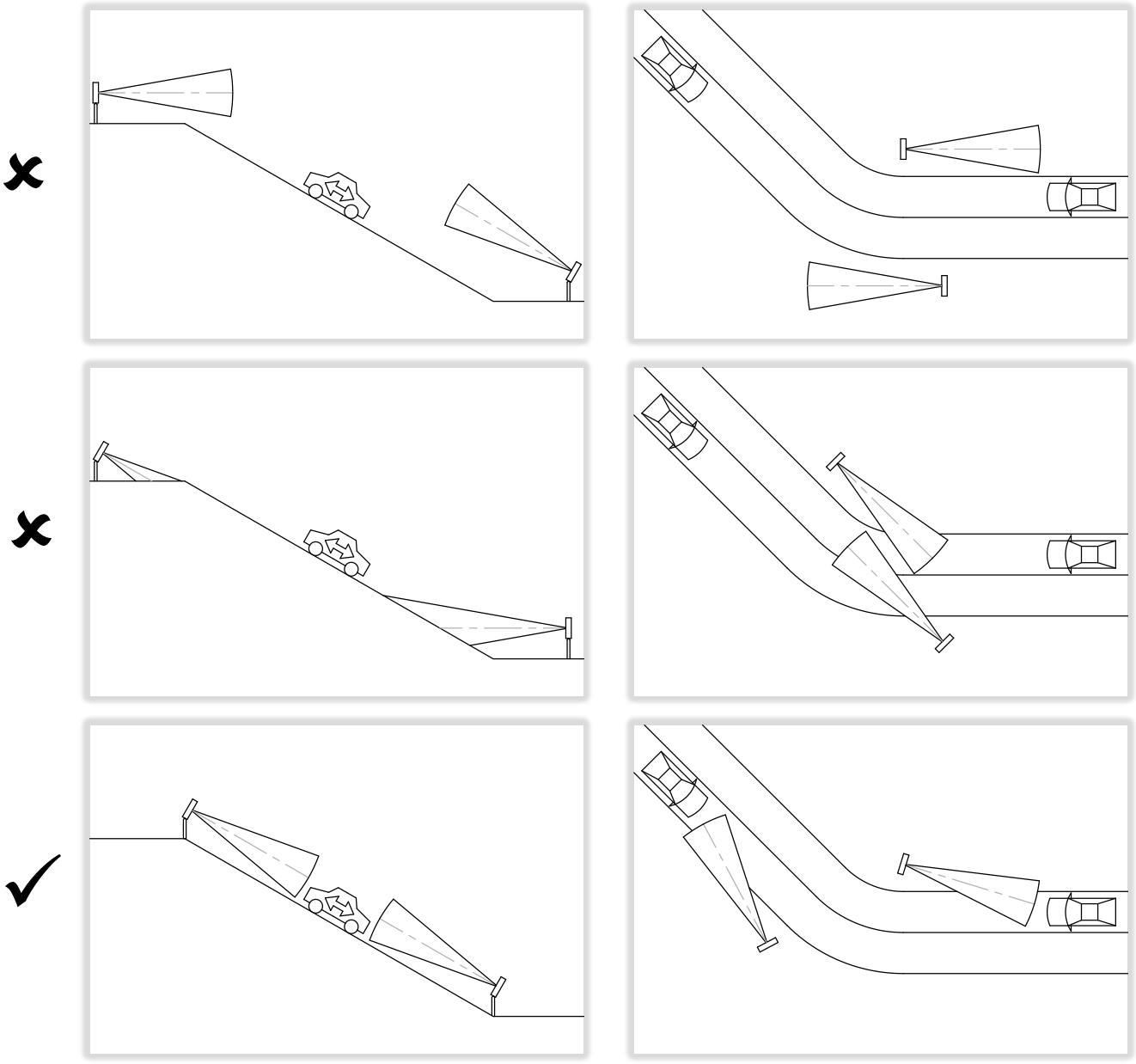
Typical Urban Positioning



NOTE Ensure system layout and installation complies with local rules and regulations.

3.4 MX SpeedCheck Module Alignment Considerations

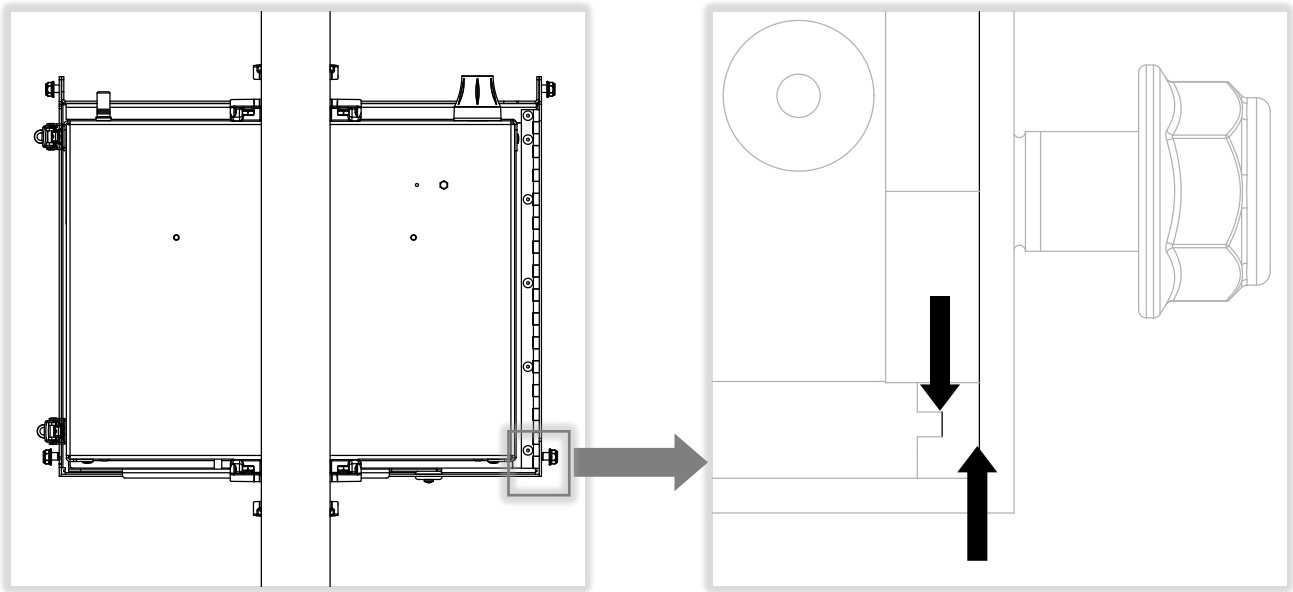
Local road elevation and curvature must be taken into account when installing a SPEEDCHECK-MX radar speed sign. The radar beam (aligned with module front face) must be aimed at the target traffic to ensure proper operation.

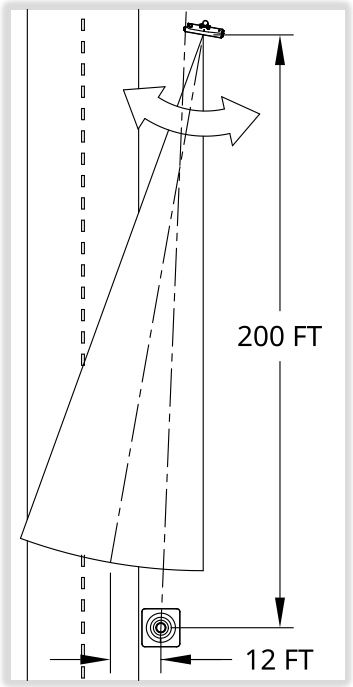


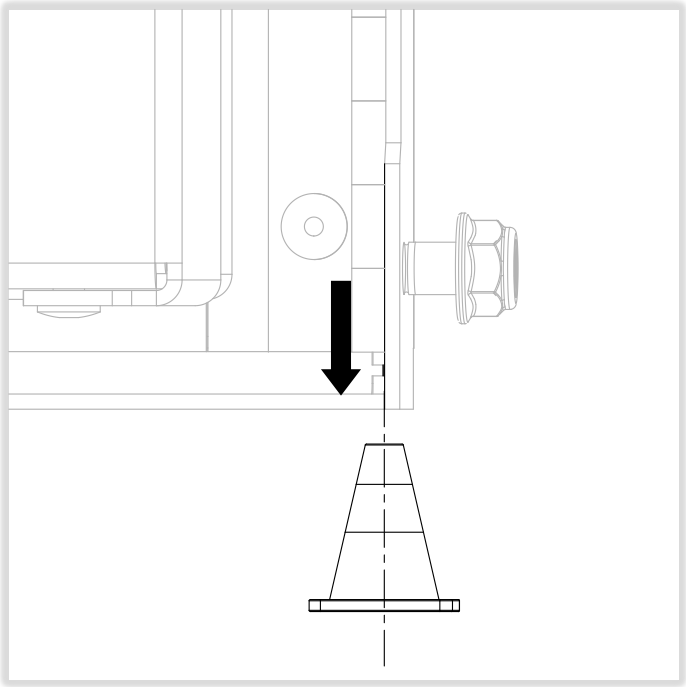
NOTE The nominal radar beam is 18 degrees horizontally and 9 degrees vertically, but the best sensitivity is achieved at the center of the beam.

3.5 MX SpeedCheck Module Alignment Feature

To use the alignment feature, place a traffic cone or other suitable object at the edge of the road 200 feet (approximately 80 paces) from the sign. Adjust sign aim until the cone and the two alignment helper edges are all visually aligned. The sign will be aimed at a point approximately 12 ft from the edge of the road and 200 ft away.







NOTE Right side of road example shown. Use feature on other side of housing for left side of road installations.

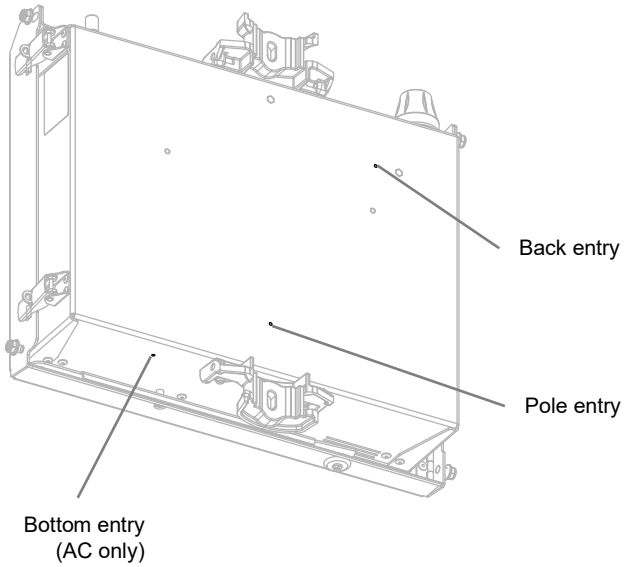
NOTE Alignment feature only available when static is sign isn't installed.

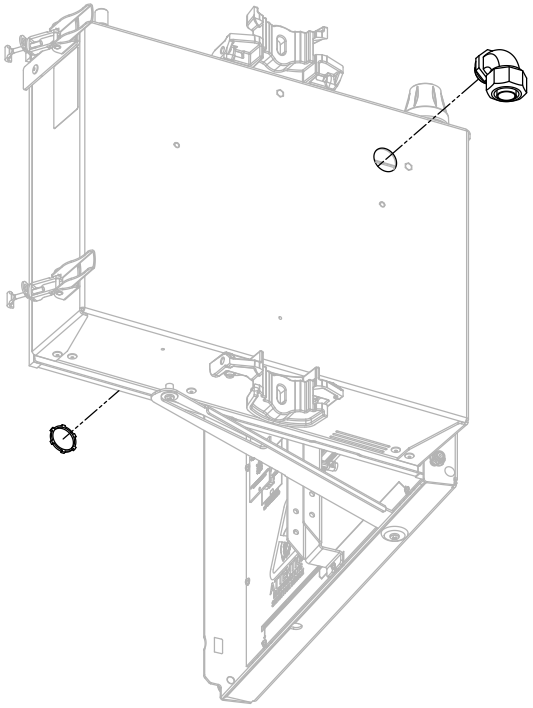
3.6 Installing Conduit Fitting

The MX SpeedCheck Module cabinet ships without openings for cable routing or conduit fittings. Three drill point indentations are provided on the external rear and bottom surfaces of the cabinet to facilitate drilling in the desired location. Included with the system is a 3/4" trade size right-angle flexible conduit adapter (1.09").

If desired, the cables can be run inside the pole by installing a suitable fitting at the location marked on the back of the cabinet.

1. Locate desired drill point indentation on cabinet.
2. Drill hole to size needed for fitting.
3. Deburr hole and remove chips.
4. Install fitting.





3.7 Preparing Pole

Mark locations of top and bottom brackets on pole.

If through-bolting to a non-perforated channel, drill clearance holes for 5/16" bolts at required spacing (see reference dimensions below).

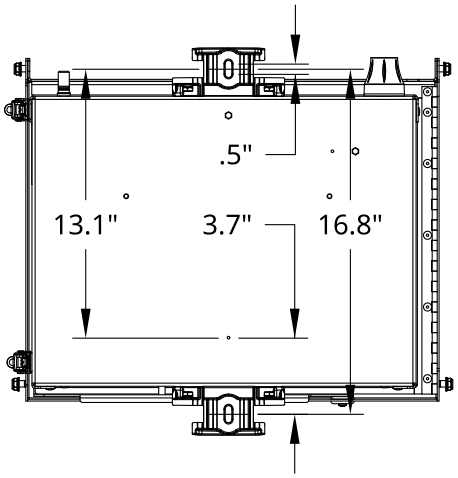
If routing cable inside pole:

1. Drill suitable hole in pole for nipple (see reference dimensions below).
2. Deburr hole and fish cables.
3. Bring cabinet against pole and secure in place with chosen mounting method.
4. Apply suitable sealant around nipple.

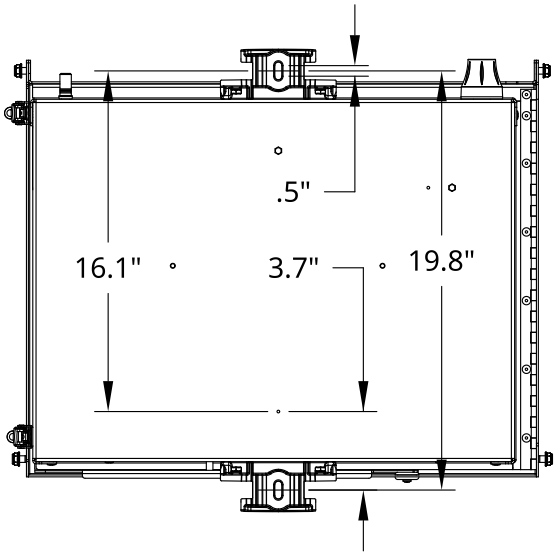
CAUTION

Take care not to damage internal components or cabling when drilling holes. Not all hole locations are suitable for all product versions.

MX SpeedCheck Module 12"



MX SpeedCheck Module 15"



NOTE Mounting bracket includes 0.5" long bolt slots to ensure alignment with perforated channel.

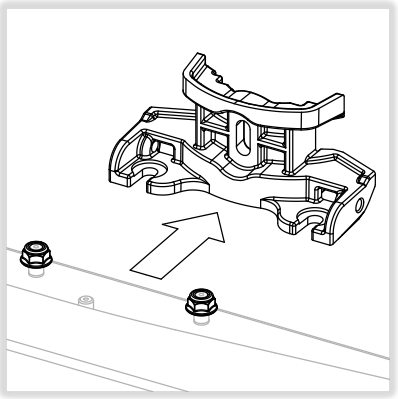
3.8 Mounting the Cabinet

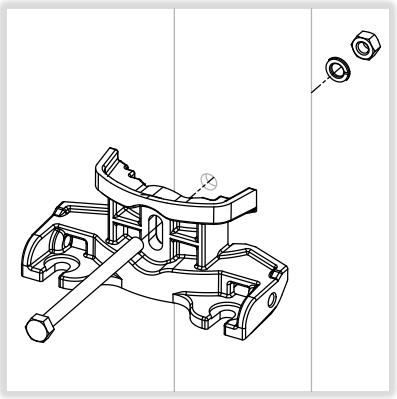
The universal mounting bracket can be installed on a variety of poles including 2" - 2.5" square channels and round poles 2.38" and larger using a variety of hardware including 5/16" bolts, banding, and U-bolts.

NOTE

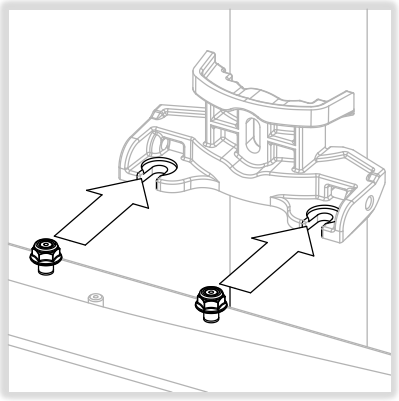
Mounts should be fastened temporarily as side-to-side adjustment may be required to ensure the MX SpeedCheck Module detects the targeted traffic.
An additional tilt/aim bracket kit is available to adjust the vertical tilt and horizontal aim of the display.
U-bolts require U-bolts with plates, hardware kits are available.

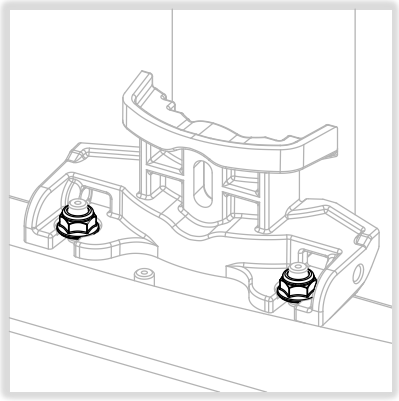
1. Loosen top bracket nuts and remove mounting bracket from cabinet.
2. Secure bracket to pole at desired height using one of the mounting methods described on the next page.

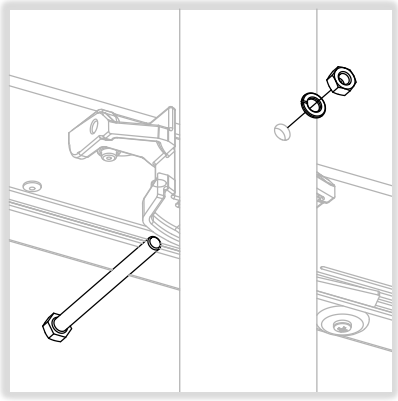




3. Hang cabinet on top bracket and tighten nuts.
4. Secure bottom bracket to pole.
5. Check that all mounting hardware is tightened properly.





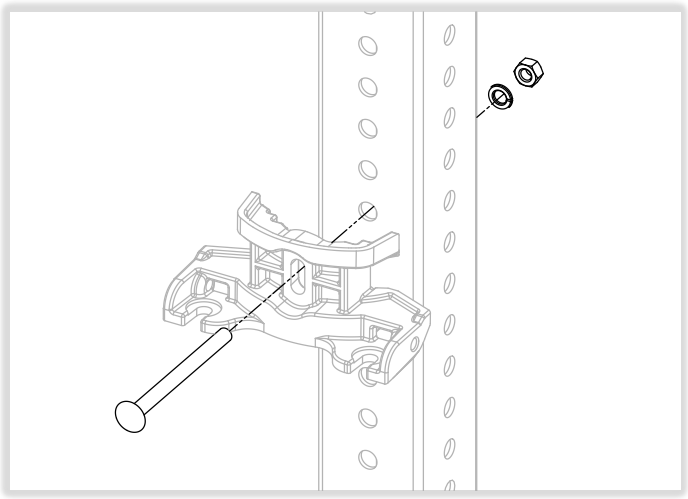


WARNING

Tighten nuts immediately after hanging cabinet on top bracket to ensure cabinet cannot fall off.

2.a Through bolting bracket:

i. If required, drill holes in pole at desired location.
ii. Fastened bracket using appropriate length 5/16" bolt centered vertically on slot.
iii. Continue to step 3 on previous page.

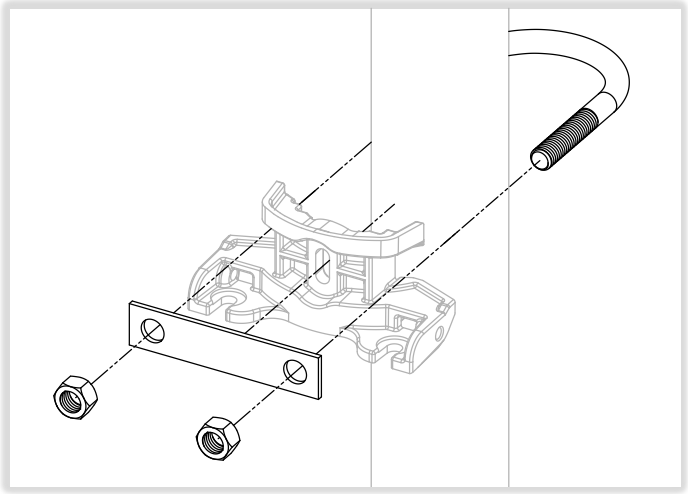


NOTE

Top bracket may need to be adjusted vertically so that bottom bracket slot aligns with pole mounting hole.

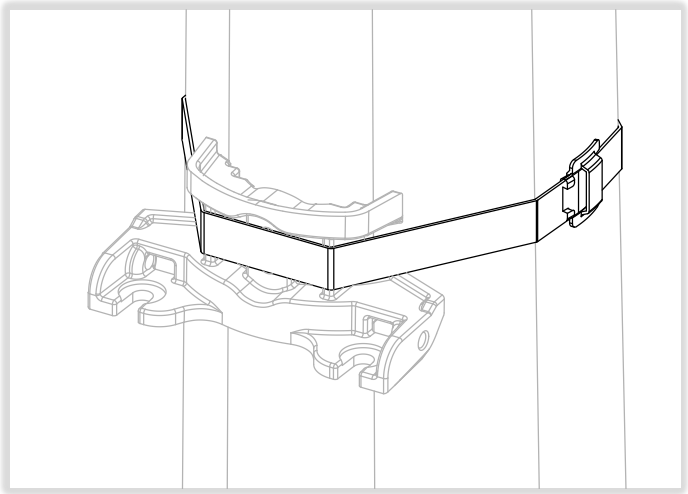
2.b U-bolting bracket:

i. Install U-bolt around pole and bracket, ensuring U-bolt plate is properly seated on bracket.
ii. Tighten U-bolt nuts to secure bracket at desired height.
iii. Continue to step 3 on previous page.



2.c Banding bracket:

i. Follow banding manufacturer's instructions to band bracket to pole as shown.
ii. Continue to step 3 on previous page.

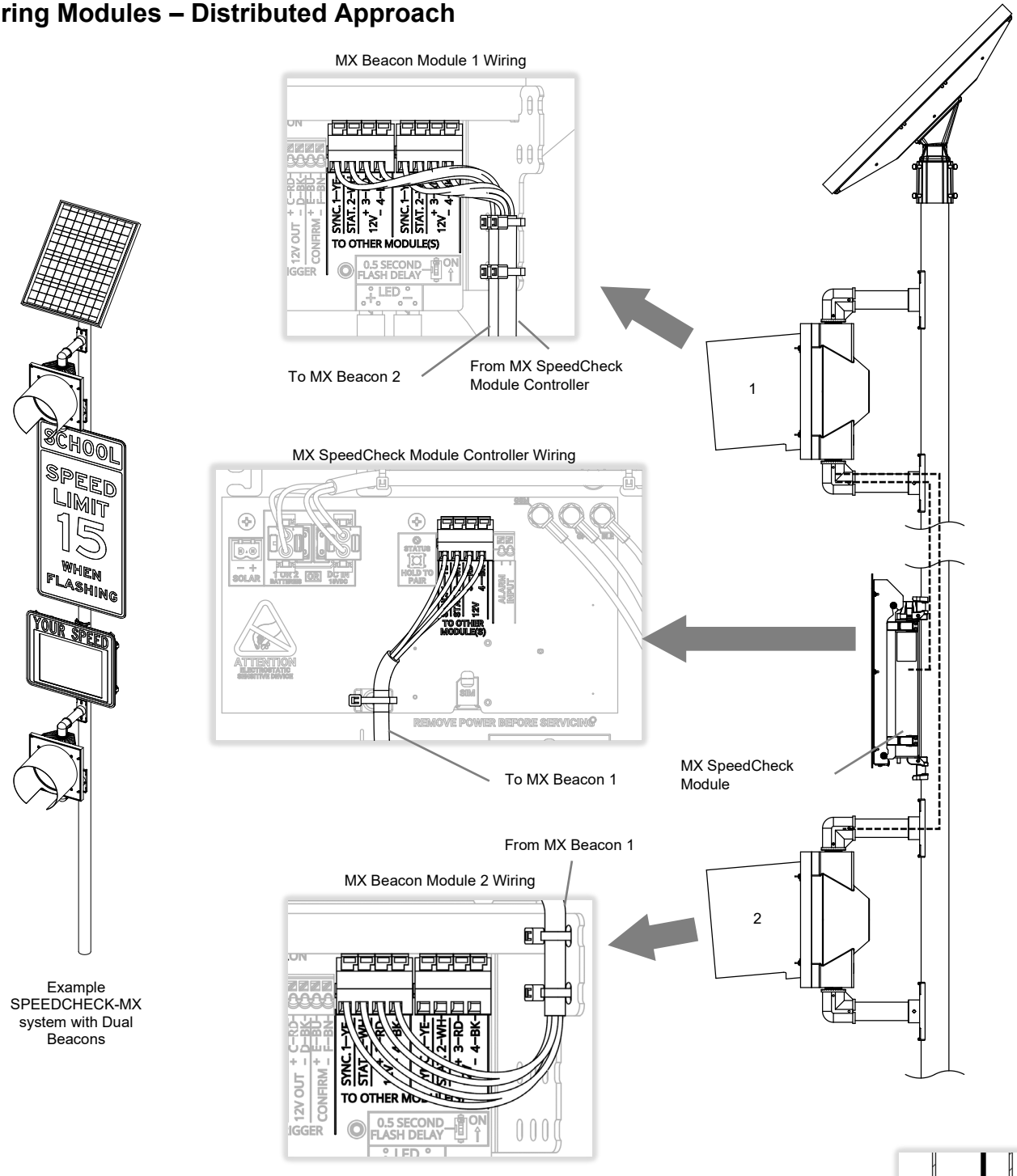


WARNING

Ensure banding is of sufficient strength for the required wind loading with the size of sign used. Worm drive type clamps should only be used if sized appropriately for wind loading requirements based on sign size.

3.9 SPEEDCHECK-MX System Wiring

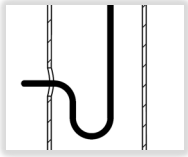
Wiring Modules – Distributed Approach



Example SPEEDCHECK-MX system with Dual Beacons

NOTE

System view simplified for illustration. For any point where water may collect on a cable and drip onto module electronics, a drip loop should be used.



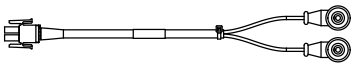
Drip Loop Example

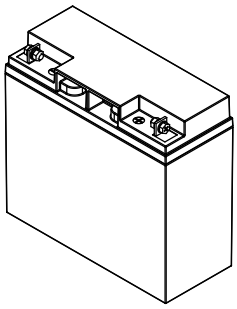
3.10 Battery and Solar Panel Connections

WARNING

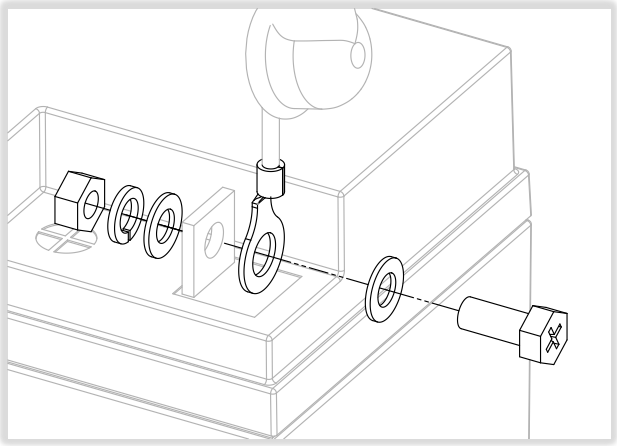
Batteries are shipped fully charged. Use extreme caution when handling the batteries as they can generate hazardous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, etc.) before handling the batteries.

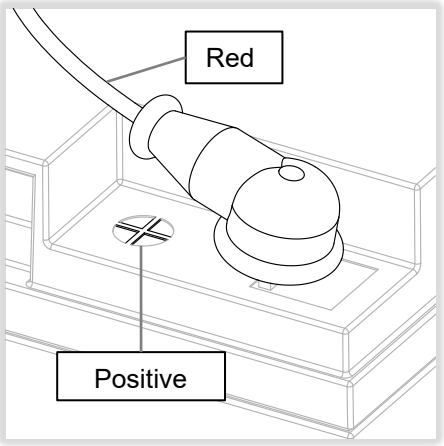
1. Unpack batteries and terminal hardware (packaged separately) and battery harnesses (packaged with MX SpeedCheck Module).





2. Fasten ring terminals to battery terminals as shown:
   a. Red wire to positive battery terminal, black wire to negative battery terminal.
   b. Install screws, flat washers, lock washers and nuts in order shown below and tighten firmly.
   c. Bend ring terminal over battery terminal and pull boot over bolt. Stretch boot over terminal screw so it fully covers terminal and hardware.

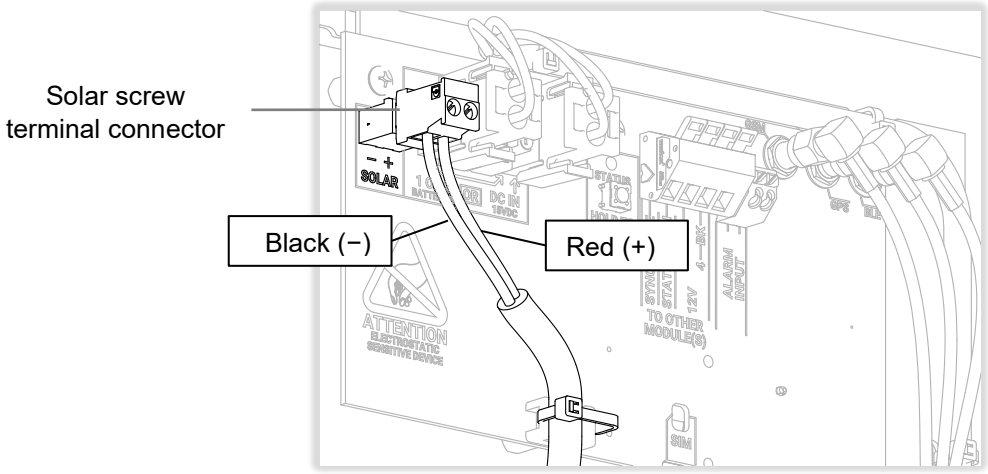




WARNING

Personal injury and product damage may result from improper battery boot installation and resulting battery short-circuit events.

3. Install solar panel and mount kit following instructions provided with kit. Route solar cable into cabinet. Do not mate MC4 connectors to solar panel yet.
4. Remove solar screw terminal connector from circuit board. Ensure MC4 solar connectors are disconnected. Insert red and black wires into connector and tighten screws. Reinstall screw terminal connector onto circuit board connector.

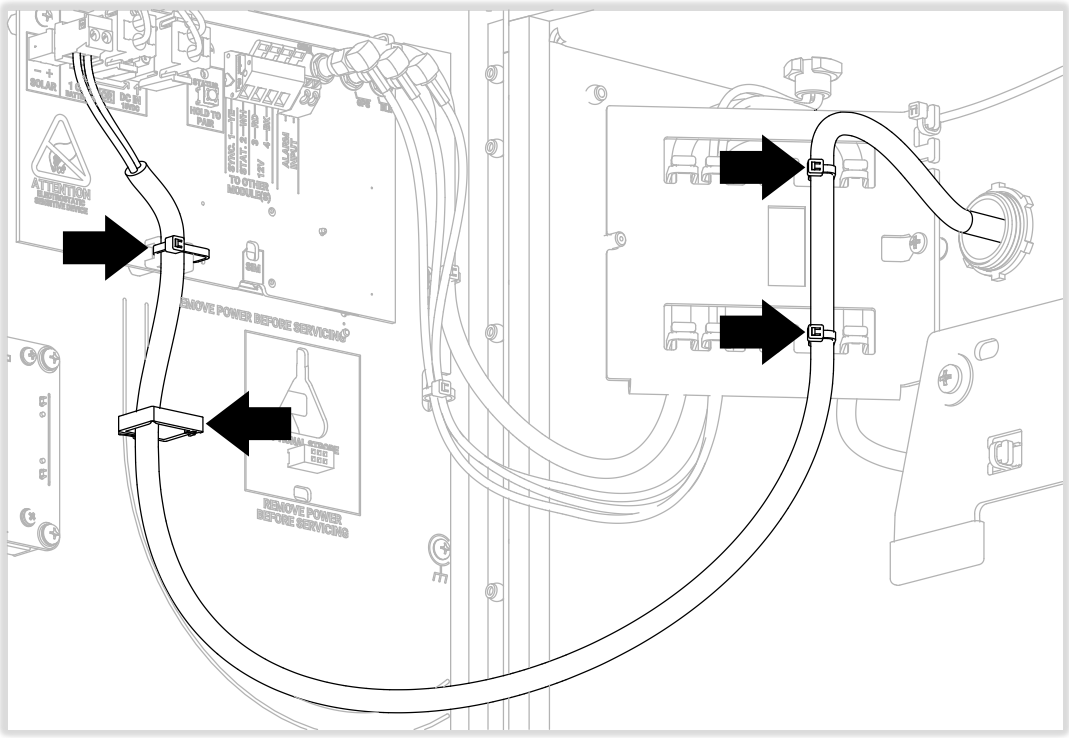


NOTE

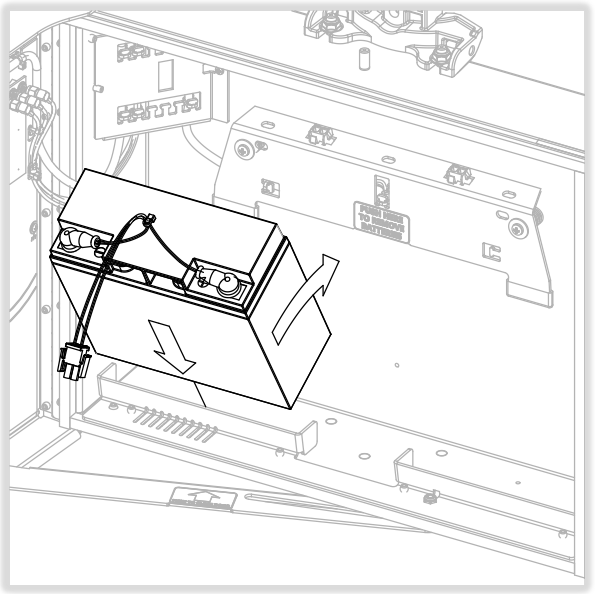
Ensure solar wires are installed into correct positions on solar screw terminal connector:

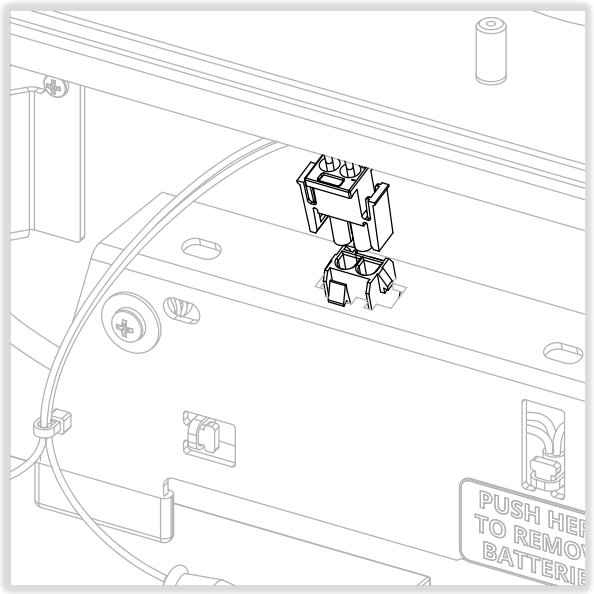
- Red wire to terminal marked +
- Black wire to terminal marked –

5. Route and secure cable as shown to ensure smooth door operation.



6. Install batteries into cabinet and connect as shown.





NOTE Finish installation of all modules and kits prior to powering up the system.

7. System will energize and operate according to its factory default settings.
8. Follow solar kit instructions to complete solar panel installation and mate the solar panel connectors.

3.11 AC Connections

WARNING

Ensure all equipment and wiring is de-energized during installation and wiring of the system.

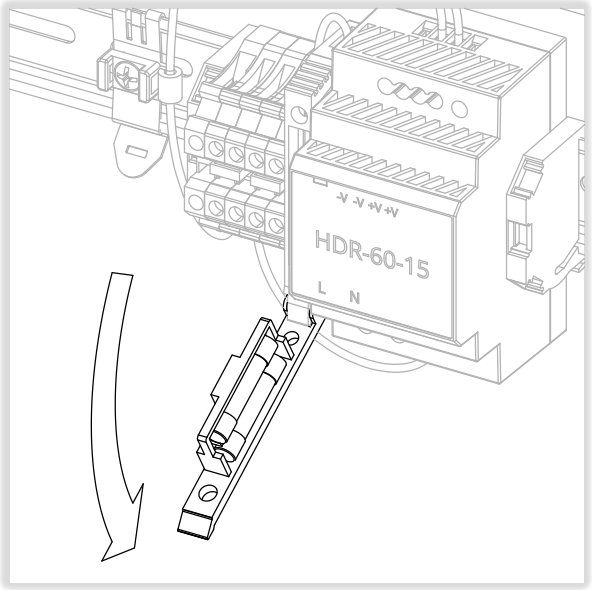
CAUTION

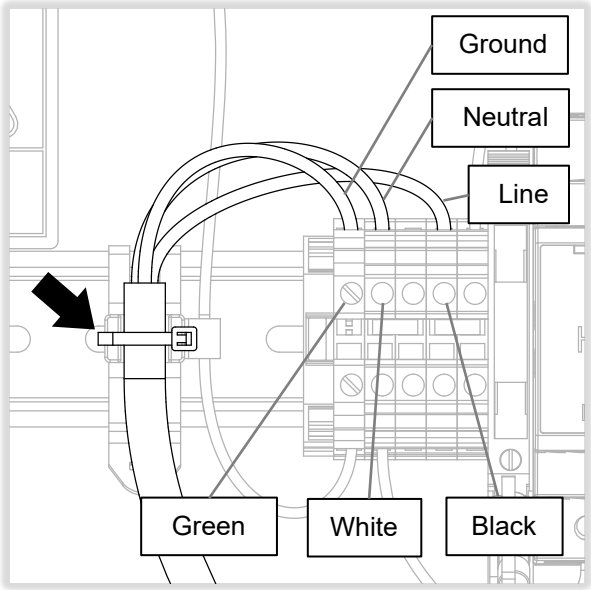
The MX SpeedCheck Module AC provides supplementary overcurrent protection only. Ensure branch-rated overcurrent protection is provided when installing.

NOTE

The MX SpeedCheck Module AC accepts nominal input voltages of 120 V or 240 V and is equipped with a 4 A input fuse.

1. Open fuse holder as shown below.
2. Strip jacket of incoming AC cable 5 – 6". Strip each wire insulation 0.35 – 0.40".
3. Loosen terminal block screws and insert wires into correct terminals as shown. Tighten to 6 in-lb. Pull test wires to ensure they are secure. Secure incoming cable jacket with cable tie as shown.





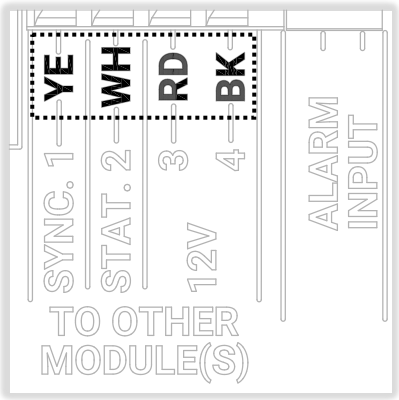
4. Finish other system wiring.
5. When incoming AC cable is powered and fuse holder is closed, system will energize and operate according to its factory default settings.

NOTE

Finish installation of all modules and accessory kits prior to powering up the system.

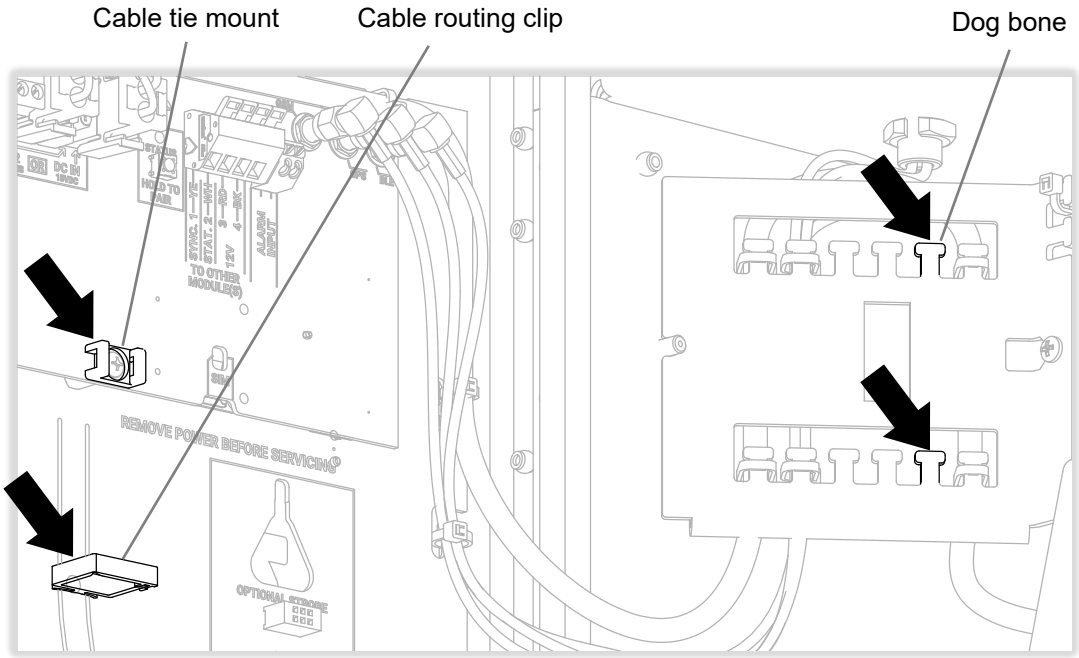
3.12 Wiring Notes

1. MX-specific color-coded harnesses are available from Carmanah with appropriate gauges and ratings for ease of install (recommended approach).
2. Due to the variety of devices that can be connected, color assignments shown may not be correct in all cases. Confirm correct connectivity and polarity for each fixture or device type.
3. Secure cables to "dog bone" and other provided features with cable ties.



Module Wire Color Assignments

Abbreviation	Color
YE	YELLOW
WH	WHITE
RD	RED
BK	BLACK



Dog Bone and Other Cable Management Features

NOTE Refer to the **LEVEL 1** System Planner for more details on the wire types, colors and in-depth wiring information for different MX Modules.

3.13 Commissioning Checklist

After installing and configuring an MX Series product, the following commissioning verification checklist helps ensure that the system is working as intended. Check all that apply:

General

- ☐ All mounting hardware tightened securely.
- ☐ All wires and connectors secured with strain relief inside MX SpeedCheck Module.
- ☐ Wires routed to other modules contain drip loops and are strain-relieved with cable ties.
- ☐ Power module indicator flashing green after status button pressed.
- ☐ For scheduled systems (e.g., for school zones), confirm that schedule is correct and enabled. (Set up schedule using MX Field App.)
- ☐ No fault messages are present (via MX Field App).

MX SpeedCheck Module

Solar Systems only:

- ☐ Solar panel pointed south (or per specific instructions provided by Carmanah).
- ☐ Note possibility for nearby foliage to grow and eventually shade solar panel at a different time of year; if so, set reminder to inspect later.
- ☐ Battery voltage is above 12 V (use either a multimeter or MX Field App).
- ☐ Solar panel is producing voltage in sunlight (use MX Field App to confirm).

AC Systems only:

- ☐ AC power connected to mains with appropriate isolation hardware.

All Systems:

- ☐ Sign is correctly aimed at target traffic.
- ☐ Vents are clear.
- ☐ Sealing gaskets on door are intact.
- ☐ Door is properly latched and locked.
- ☐ Sign installed correctly and securely.
- ☐ Speed limit correctly set.
- ☐ Other system settings set correctly.

Flasher Modules

- ☐ Flasher Modules are secured and pointed in correct direction toward oncoming traffic lanes.
- ☐ Flasher Modules flash when energized.
- ☐ Confirm desired MX Beacon Module alternating flash behavior.

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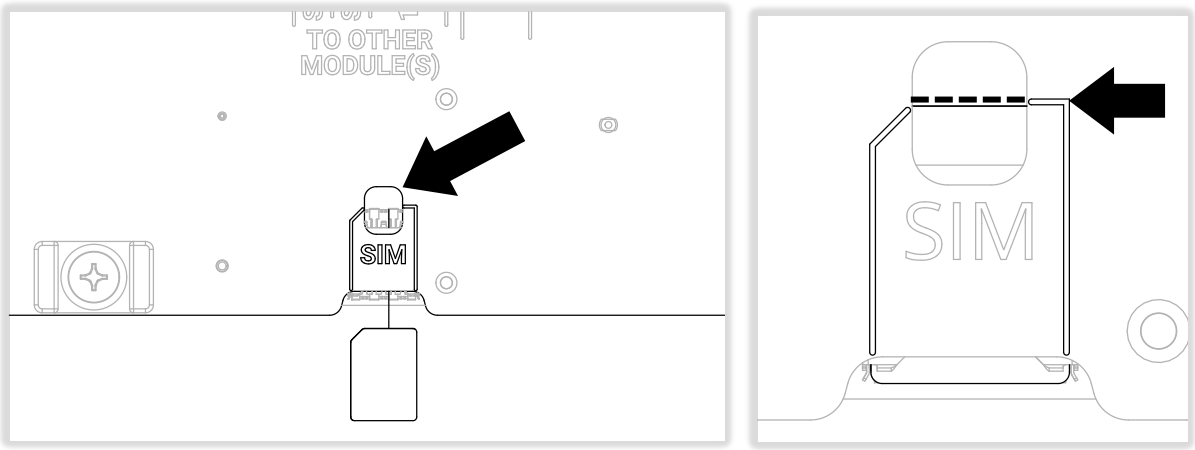
4.1 Replacing SIM Card

1. Though unlikely, if SIM card must be replaced, note its location on circuit board.
2. Disconnect solar panel and batteries to power down system before changing SIM card.
3. Place a rag under SIM card location to catch SIM card to avoid losing it.
4. Using a small spudger, toothpick or similar non-metallic tool inserted into square opening shown, gently slide SIM card down and out of its holder.
5. SIM card should now be sticking out enough to pull it out with your thumb and index finger.
6. Open new SIM card package. Snap out smallest SIM card form (nano SIM).
7. New SIM card installation is opposite of steps above with the exception that new SIM card should only be inserted far enough to line up with silkscreen SIM card profile. Confirm orientation of new SIM card.

NOTE Only Carmanah-supplied SIM cards can be used with this product.



CAUTION

Use extreme care when inserting the new SIM card. Applying too much force will damage the SIM card holder and prevent network connectivity. The SIM card is fully inserted when its top edge aligns with the white outline printed on the circuit board.

5.1 Troubleshooting

For additional troubleshooting information, visit Carmanah's Product Support Center at support.carmanah.com.

Symptom	Possible Cause and What to Check Check for faults via MX Field App or on-board product Status LED.
The circuit board does not activate or have LED status.	• Check if battery voltage is above 12 V. Charge or replace batteries if low. • Check all fuses and breakers. • Check connections of batteries and solar panel. • Ensure solar panel is clean, clear of debris and not shaded by buildings or vegetation to allow proper battery charging. • AC systems only: Check Power supply output voltage is about 15 V.
Not all vehicle speeds displayed.	• Verify the display has correct alignment with the roadway. • Check the High Speed Cutoff setting. It may be set too low for the prevailing traffic speed. • Check the Minimum Display Speed setting. It may be set too high for the prevailing traffic speed. • Note that the SpeedCheck display signs are designed to detect moving vehicles, including trucks and golf carts, but will ignore people or small targets. • The display may be angled slightly towards the center line of the road to focus on vehicles closer to the display. Detection range may vary depending on target size, such as a truck versus a compact car.
Sign does not display speed.	• Display set to stealth mode, check operating mode. • Timer or schedule has been set to collect data but not display speeds. Set the program as desired. • Radar is not sending data. Contact Carmanah for further diagnostics.
No test sequence and no speeds displayed.	• Power to display is OFF. • Operating Modes settings set for "Display OFF". • Timer or schedule has scheduled the sign to be off.
Numbers displayed with no vehicles passing.	• Display picking up radar frequency noise. Eliminate the source of the noise. Contact Carmanah for further information.
Speed readings higher or lower than expected.	• Display may be set to read KPH instead of MPH or vice versa. Ensure the correct unit of speed is set.

Detection range too short.	• Sign alignment is incorrect. • Sign has metallic or plant obstructions between display and the vehicles. • Sign is aligned properly but road curve or grade is affecting detection zone. • The display may be angled slightly towards the center line of the road to focus on vehicles closer to the display. • The range is affected by target size such as a truck versus a compact car. • Contact Carmanah for more information.
Flasher modules do not flash properly.	• Ensure wire colors and polarities are correct. Check that electrical connections are secure.
The system does not appear in the MX Field App.	• Check MX SpeedCheck Module controller status LED. • Attempt to pair to system again. • Another user or mobile device may be currently connected to system via MX Field App. Press and hold button in power module for >5s to terminate existing connections. • System may have local access restricted from MX Cloud. Contact system owner for access. • Refer to MX Field App guide through link in Support section of App.
Flasher modules are too dim or too bright when flashing.	• Check settings via MX Field App. • Refer to the **LEVEL 1** System Planner for more details on product settings.
Flasher modules flash continuously.	• Flasher modules may be operating in factory default mode. • Check settings via MX Field App.
Power module will not turn on when batteries are connected or power is applied.	• Check all fuses and/or breakers. • If required, replace with equivalent fuse.

NOTE Read all other included installation guides prior to product installation.

carmanah®
MX Series

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