FEDERAL SIGNAL

IMPAXX™

Installation Manual

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Safety Message to Installers and Service Personnel of Warning Light Equipment

⚠ WARNING

People's lives depend on your proper installation and servicing of Federal Signal products. It is important to read and follow all instructions shipped with this product. In addition, listed below are some other important safety instructions and precautions you should follow:

Before Installation or Service

Qualifications

- To properly install or service this equipment, you must have a good understanding of automotive mechanical and electrical procedures and systems, along with proficiency in the installation and service of safety warning equipment. Always refer to the vehicle service manuals when performing equipment installations on a vehicle.

Light Hazards

- To be an effective warning device, this product produces bright light that can be hazardous to your eyesight when viewed at a close range. Do not stare directly into this lighting product at a close range or permanent damage to your eyesight may occur.
- Do not install the light system in an area that would block, impair or blind the driver's vision. Ensure that the light system is mounted in a position that is outside of the driver's field of vision, so the driver can safely operate the vehicle.
- Federal Signal power supplies and light heads are designed to work together as a system. Combining light heads and a power supply from different manufacturers may reduce the warning effectiveness of the lighting system and may damage the components. You should verify or test your combination to ensure the system works together and meets federal, state and local standards or guidelines.

Electrical Hazards

- Strobe systems present a shock hazard because they use high voltage to operate. Do not handle strobe cables, the power supply or bulbs or remove the lens while the equipment is connected. Strobe systems can also hold their charge even after they have been turned off. After disconnecting power to the unit, wait five minutes before handling any parts of the strobe system.
- A light system is a high current system. For the system to function properly, a separate negative (–) connection and positive (+) connection must be made. All negative connections should be connected to the negative battery terminal and a suitable fuse should be installed on the positive battery

terminal connection as close to the battery as possible. Ensure that all wires and fuses are rated correctly to handle the device and system amperage requirements.

- Never attempt to install aftermarket equipment that connects to the vehicle wiring without reviewing a vehicle wiring diagram available from the vehicle manufacturer. Ensure that your installation will not affect vehicle operation or mandated safety functions or circuits. Always check the vehicle for proper operation after installation.
- The lighting system components, especially light bulbs, strobe tubes, LEDs, and the outer housing, get hot during operation. Be sure to disconnect power to the system and allow the system to cool down before handling any components of the system.
- Halogen light bulbs and strobe tubes are pressurized and if broken, can burst and result in flying glass. Always wear gloves and eye protection when handling these components.
- Do not mount a radio antenna within 18 inches (45.7 cm) of the lighting system. Placing the antenna too close to the lighting system could cause the lighting system to malfunction or be damaged by strong radio fields. Mounting the antenna too close to the lighting system may also cause the radio noise emitted from the lighting system to interfere with the reception of the radio transmitter and reduce radio reception.
- Do not attempt to wash any unsealed electrical device while it is connected to its power source.

During Installation and Service

- DO NOT get metal shavings inside the product. Metal shavings in the product can cause the system to fail. If drilling must be done near the unit, place an ESD-approved cover over the unit. Inspect the unit after mounting to be sure there are no shavings present in or near the unit.
- DO NOT connect this system to the vehicle battery until ALL other electrical connections are made, mounting of all components is complete, and you have verified that no shorts exist. If the wiring is shorted to the vehicle body or frame, high current conductors can cause hazardous sparks resulting in electrical fires or flying molten metal.
- DO NOT install equipment or route wiring (or the plug-in cord) in the deployment path of an air bag.
- Before mounting any components, check the manual to be sure that the component you are installing is suitable for use in that area of the vehicle. Many components are not suitable for use in the engine compartment or other extreme environmental exposure areas.

- The service life of light bulbs and strobes tubes will be shortened if the glass portion is touched during installation. Use gloves when handling these components. If the glass portion has been touched, clean the glass carefully with isopropyl alcohol.
- Before drilling into a vehicle structure, be sure that both sides of the surface are clear of anything that could be damaged. Remove all burrs from drilled holes. To prevent electrical shorts, grommet all drilled holes through which wiring passes. Also, ensure that the mounting screws do not cause electrical or mechanical damage to the vehicle.
- Refer to the manual packed with the lighting system for proper electrical connections, additional precautions and information.
- Because vehicle roof construction and driving conditions vary, do not drive a vehicle with a magnetically mounted warning light installed. The light could fly off the vehicle causing injury or damage. Repair of damage incurred because of ignoring this warning shall be the sole responsibility of the user.
- To avoid denting the roof of the vehicle, place the lightbar mounting feet as close to outer edge of the roof as possible.
- Roof damage can occur if the hook adjustment bolts are over-tightened. Tighten adjustment bolts 10 to 11 ft-lb to prevent the lightbar from sliding front-to-back when pulling on the mounting bracket.
- Locate the light system controls so the VEHICLE and CONTROLS can be operated safely under all driving conditions.

After Installation or Service

- After installation, test the light system to ensure that it is operating properly.
- Test all vehicle functions, including horn operation, vehicle safety functions and vehicle light systems, to ensure proper operation. Ensure that the installation has not affected the vehicle operation or changed any vehicle safety function or circuit.
- Scratched or dull reflectors, mirrors or lenses will reduce the effectiveness of the lighting system. Avoid heavy pressure and use of caustic or petroleum based products when cleaning the lighting system. Replace any optical components that may have been scratched or crazed during system installation.
- Do not attempt to activate or de-activate the light system controls while driving in a hazardous situation.
- You should frequently inspect the light system to ensure that it is operating properly and that it is securely attached to the vehicle.

- After installation and testing are complete, provide a copy of these instructions to instructional staff and all operating personnel.
- File these instructions in a safe place and refer to them when maintaining and/or re-installing the product.

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death to you or others.

RETAIN AND REFER TO THIS MESSAGE

Safety Message to Operators of Warning Light Equipment

⚠ WARNING

People's lives depend on your safe use of our products. Listed below are some important safety instructions and precautions you should follow:

- Do not attempt to activate or de-activate the light system control while driving in a hazardous situation.
- Although your warning system is operating properly, it may not be completely effective. People may not see or heed your warning signal. You must recognize this fact and continue driving cautiously.
- Also, situations may occur which obstruct your warning signal when natural and man-made objects are between your vehicle and others, such as raising your hood or trunk lid. If these situations occur, be especially careful.
- All effective sirens and horns produce loud sounds which may cause, in certain situations permanent hearing loss. You and your passengers should consider taking appropriate safety precautions such as wearing hearing protection.
- To be an effective warning device, this product produces bright light that can be hazardous to your eyesight when viewed at a close range. Do not stare directly into this lighting product at a close range or permanent damage to your eyesight may occur.
- It is important that you fully understand how to safely operate this warning system before use.
- You should only operate your vehicle and its light/sound system in accordance with your department's Standard Operating Procedures.
- If a selected function does not perform properly or if any of the lamps remain illuminated when the control is off, disconnect the power connector from the control unit and contact the nearest service center.
- At the start of your shift, you should ensure that the entire warning light system and the siren system is securely attached and operating properly.

- Suction cup mounting is for temporary applications only. The unit should be removed from the window and stored securely when not in use. Temperature changes and sunlight can cause suction cups to lose holding power. Periodically check the unit to be sure the suction cups have a firm grip on the mounting surface. An improperly secured light could fall off of the vehicle causing injury and damage.
- Holding power of magnetic mounting systems is dependent upon surface finish, surface flatness, and thickness of the steel mounting surface. Therefore, to promote proper magnetic mounting:
  - ✓ Mounting surface and magnets must be kept clean, dry, and free of foreign particles that prevent good surface contact.
  - ✓ Ensure that mounting surface is flat.
  - ✓ A magnet mounting system should not be used on vehicles with vinyl tops.
  - ✓ To prevent sliding of light assembly on mounting surface, quick acceleration and hard stops should be avoided.

Failure to follow these safety instructions and precautions may result in property damage, serious injury, or death to you, to passengers, and to others.

RETAIN AND REFER TO THIS MESSAGE

Unpacking the Your Shipment

Each IMPAXX™ comes with the mounting hardware shown in *Figure 1* on page 9. After unpacking the IMPAXX Series LED Lights and mounting hardware, inspect them for damage that may have occurred in transit. If a product has been damaged, do not attempt to install or operate it. File a claim immediately with the carrier, describing the extent of damage. Carefully check all envelopes, shipping labels, and tags before removing or destroying them.

An Overview of the IMPAXX Series LED Light Heads

The IMPAXX Series LED Light Heads are fully-sealed, low-current warning lights that can be mounted on the inside or outside of the vehicle. IMPAXX uses SOLARIS® LED reflector technology to provide a bright and effective secondary warning signal. IMPAXX models have three LEDs that are either amber, blue, green, red, or white with a clear lens. The IMPAXX can also be ordered with colored lenses matching the LED color.

LEDs are available in enhanced off-axis or focused configurations. IMPAXX has an internal flashing circuit with 23 selected flash patterns, including a Steady Burn pattern for use with an external flasher. Patterns are selected by touching a pattern-selection wire to ground (–GND).

Light heads can be set to synchronize, synchro-shift, or both. The synchronize/synchro-shift feature is fully compatible with the Federal Signal VIPER S2 warning lights. IMPAXX also has several floating-synch pattern sets that are within one flash per minute of each other (*Table 1* on page 12). If one light is set at 74 FPM and another at 75 FPM, for example, the lights appear to migrate in and out of synchronization.

All IMPAXX models are designed for use with all Federal Signal switch controllers. The IMPAXX light head is supplied with a black polycarbonate bezel, a rubberized gasket, and mounting hardware for surface mounting. The IMPAXX has an operating temperature of –22 ˚F to +176 ˚F (–30 ˚C to +80 ˚C).

Installing the IMPAXX Series LED Light Heads

⚠ WARNING

LIGHT HAZARDS

To be an effective warning device, this product produces bright light that can be hazardous to your eyesight when viewed at a close range. Do not stare directly into this lighting product at a close range or permanent damage to your eyesight may occur.

Before installing the IMPAXX, read all instructions and plan all wiring and cable routing. Use grommets, wire ties, looms, and cable mounts (installer supplied) as needed to secure and protect the wiring.

The steps in the installation are:

1. Optional: Set a light head to control the flash patterns of one or more light heads in the IMPAXX system (see next section).
2. Mount the IMPAXX system to the vehicle.
3. Wire the IMPAXX system to the vehicle.
4. Select a flash pattern for the controller light head.

Converting a Light Head from Controller to Follower and Follower to Controller

Several IMPAXX light heads can be controlled through the selected flash pattern of one controller light head. All IMPAXX Series light heads are shipped as controllers. Before the start of your installation, determine which light head will be the controller and which light head or heads will be followers.

⚠ WARNING

LEDS AND LENS COLORS

The LED color and the lens color must match. Either use a clear lens or match the color of the lens with the LED. Using a lens colored differently

than the LED color will greatly reduce the light output and reduce the effectiveness of the light for emergency signaling purposes.

Failure to follow this warning may result in personal injury or death to you or others.

NOTICE

SET ONLY ONE CONTROLLER

When putting together systems of IMPAXX light heads, ensure there is only one controller light head. If more than one light head in a system is a controller, the follower light heads will malfunction.

To convert a light head from controller to follower:

1. Connect the black wire from the light head to negative ground power (–GND).

2. Apply 12 Vdc (+BAT) to the red wire from the light head.

3. Hold the green pattern-selection wire to negative ground power (-GND) until the light head goes out then flashes once. This procedure will take approximately 3 seconds to complete. While still holding the green wire to negative ground power (-GND), wait one second, and then remove the green wire from –GND. The light head will go to a full-power steady burn for about (2) seconds and then to a low-power steady burn. This low-power mode continues until the light head is connected to a controlling light head. The patterns for the light head are now ready to be controlled by another "controller" light head.

To convert a light head from follower to controller:

1. Connect the black wire from the light head to negative ground power (–GND).

2. Apply 12 Vdc (+BAT) to the red wire from the light head.

3. Hold the green pattern-selection wire to negative ground power (–GND) until the light head goes out then flashes once. This procedure will take approximately 3 seconds to complete. While still holding the green wire to negative ground power (–GND), wait one second, and then remove the green wire from –GND. The light head has now been placed into pattern #1, which is Null (off). Subsequent flash patterns can be achieved by tapping the green pattern-selection wire to negative ground power (–GND).

For information about available flash patterns, see "Selecting a Flash Pattern" on page 12.

Mounting the Impaxx to a Vehicle

⚠ WARNING

ROOF SUPPORT STRUCTURE
There is a roof support member that spans the distance between the driver's and passenger's side. DO NOT DRILL THROUGH THIS MEMBER! Adjust any hole locations until the holes can be drilled without going through this support.

Failure to follow this warning will weaken the roof of the vehicle and may lead to an increased chance of bodily injury or death in a roll over accident.

⚠ WARNING

LOCATING OPERATOR CONTROLS
Locate the light system controls so the VEHICLE and CONTROLS can be operates safely under all driving conditions.

Failure to heed this warning could result in driver distraction or driver error while operating the vehicle.

⚠ WARNING

AIRBAG DEPLOYMENT
Do not install equipment or route wiring in the deployment path of an airbag.

Failure to observe this warning will reduce the effectiveness of the air bag, or potentially dislodge the equipment, causing serious injury to you or others.

⚠ WARNING

DRIVER VISION
Do not install the light in a location that will obstruct or impair the driver's vision. Always locate the light out of direct view of the driver and test the system to make sure excessive stray light from this light does not impair the driver's vision. Make sure you minimize both direct light and reflected light from the driver's vision.

Failure to follow this warning could result in injury or death.

NOTICE

DRILLING PRECAUTIONS
Before drilling holes, check the area into which you plan to drill to ensure you do not damage vehicle components while drilling. All drilled holes should be deburred and all sharp edges should be smoothed. All wires going through drilled holes should be protected by a grommet or convolute/split-loom tubing.

To mount the IMPAXX LED module to the vehicle:

1. Determine the mounting location for the IMPAXX module.
2. Using the bezel as a template, scribe the mounting-hole locations on the mounting surface.
3. Scribe a wire-routing hole location on the mounting surface in the center of the bezel.
4. Use a #34 drill bit to drill two 0.111-inch holes at the scribed mounting-hole locations.
5. Drill a 0.500-inch hole at the wire-routing location.
6. Prepare the hole for the wires by removing all burrs and sharp edges, and inserting grommets.
7. Route the wires from the module through the holes in the gasket and mounting surface (*Figure 1*). Use grommets, wire ties, looms, and cable mounts (not supplied) as needed to secure and protect the wiring.
8. Place the mounting bezel over the module and secure it to the mounting surface with the #6 sheet-metal screws provided.

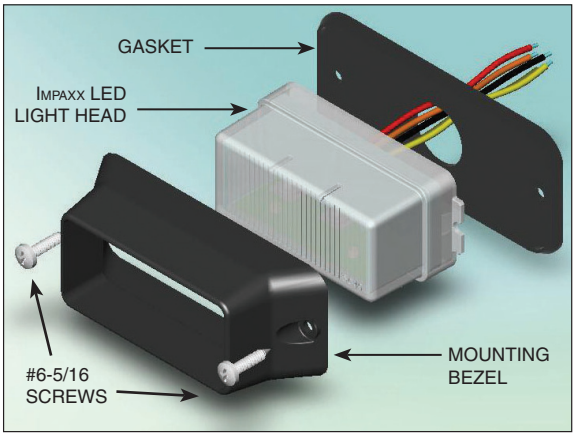

Figure 1: IMPAXX with mounting hardware

Wiring the IMPAXX in the Vehicle

NOTICE

WIRING PRECAUTION

Never attach both the orange wire AND the yellow wire from the CONTROLLER light head to the same FOLLOWER light head. Connecting both signal wires to the same FOLLOWER will cause the light heads to malfunction.

NOTICE

REVERSE POLARITY / MISWIRING

Reverse polarity or incorrect voltage may damage the light. To avoid damage to the light, ensure that the battery voltage is the same as the voltage rating of the light and that the correct polarity is observed. If you are connecting to a cigarette lighter plug, connect the positive wire to the center terminal and connect the negative wire to the outer terminal.

Make the connections shown in *Figure 2* on page 11. For single light-head applications and applications using alternative flashing control, such as a Federal Signal INTELLI-FLASH™, cut and seal the orange and yellow IMPAXX wires.

NOTICE

FUSE ELECTRICAL SOURCES

Always fuse current/voltage sources with a fuse connected near the power source. Be sure that the fuse is properly rated to protect the electrical load, the wiring and the connectors used in the circuit.

Failure to follow this notice could result in vehicle or equipment damage.

IMPORTANT: You must place a fuse in line with the power connection. See *Figure 2* for the fuse recommendations.

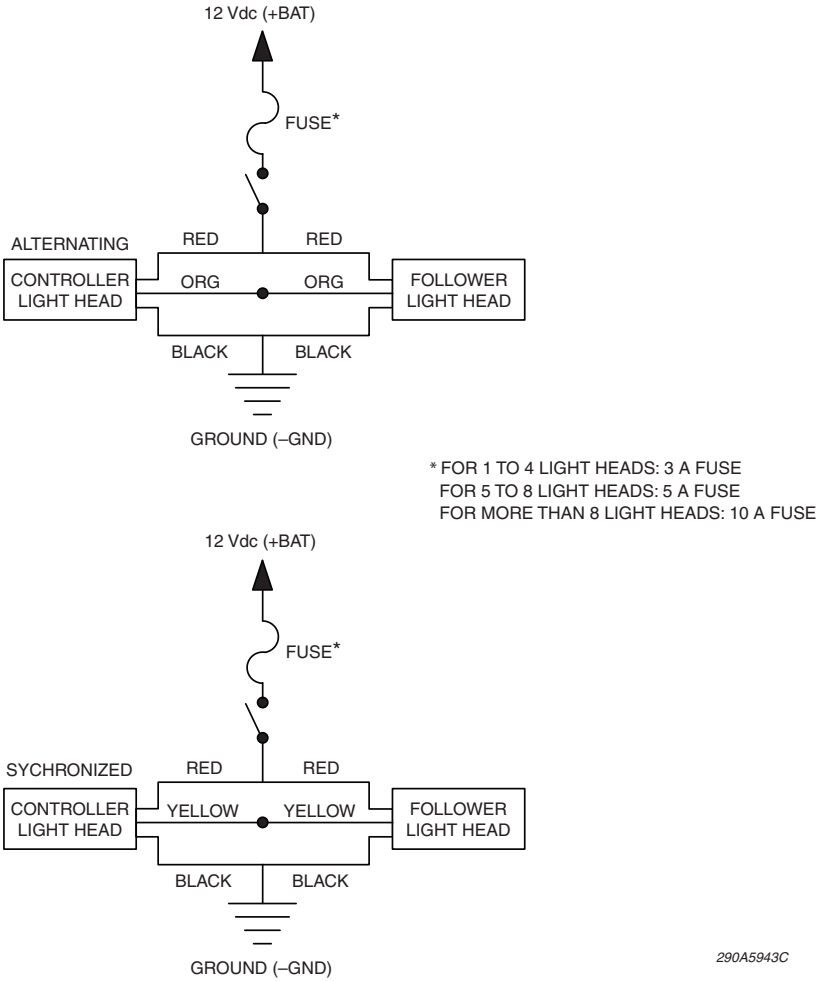

Figure 2: Wiring from one controller to one follower

Selecting a Flash Pattern

When the light heads are connected in a configuration, the controller LED light head can be used to control the flash pattern of the entire system.

To select a flash pattern:

1. Tap and remove the green pattern-selection wire from the controller light head to negative ground power (–GND) as many times as needed to display the pattern you want.

2. To reverse the direction of pattern selection, hold the green wire to negative ground power (–GND) for slightly longer than one second, but less than three seconds.

3. When finished, cut and seal the green wire.

Table1: Flash patterns for IMPAXX Series LED Light Heads

Flash Pattern	Description	Flash Pattern	Description
1	Null (off)	14	75 FPM Double
2	79 FPM Power Quad*	15	150 FPM Triple
3	150 FPM Single	16	75 FPM Triple
4	151 FPM Single	17	5 Single @ 680 FPM 4 Single @ 216 FPM
5	74 FPM Single*	18	4 Single @ 570 FPM 3 Single @ 246 FPM
6	75 FPM Single	19	3 Single @ 460 FPM 2 Quad @ 75 FPM
7	240 FPM Single	20	Progressive (flashes start slow and increase in speed)
8	241 FPM Single	21	4 Single @ 154 FPM 2 Quad @ 75 FPM
9	240 FPM Double*	22	Random
10	241 FPM Double	23	3 quick flashes, then stays in Steady Burn
11	150 FPM Double	24	FedPulse 75
12	151 FPM Double	25	Steady Burn
13	74 FPM Double		

**Conforms to CCR Title 13*

Note: Single, Double, and Quad refer to the number of flashing intervals.

Maintaining the IMPAXX Series LED Light Heads

Periodically cleaning the IMPAXX lenses using proper procedures and compatible cleaners will prolong their service life.

There are no user serviceable parts contained within the light module; however you can order replacements for mounting hardware.

Cleaning the Light Heads

⚠ WARNING

CRAZING/CHEMICALS
Crazed, cracked or faded domes or reflectors reduce the light output and the effectiveness of the lighting system. Domes or lenses showing this type of aging must be replaced.

Failure to follow this warning may result in bodily injury or death to you or others.

⚠ WARNING

USE PROPER CLEANING AGENTS
Do not use cleaning agents that cause crazing such as strong detergents, solvents, or petroleum products. If crazing of lenses does occur, reliability of the light for emergency signaling may be reduced until lenses are replaced

Failure to follow this warning may result in bodily injury or death to you or others.

1. Rinse the mounting bezel and lenses with lukewarm water to loosen dirt and debris.

2. Use a mild soap, lukewarm water, and a soft cloth to gently clean the plastic surfaces. To avoid damaging the lenses, do not use heavy pressure or cleaners that are caustic, abrasive, or petroleum-based.

3. Rinse and dry the plastic surfaces with a soft cloth to prevent water spotting.

4. To remove fine scratches and haze, use a specialty plastic cleaner/polish and a soft cloth. You can also use a high quality automotive paste cleaner/wax that is non-abrasive.

The most effective product you can use for cleaning, protecting, and polishing clear and colored plastics is Plexus® Plastic Cleaner, Protectant & Polish. Plexus is available in cases of twelve 13-ounce cans (PX13) from Federal Signal Corporation. Over time, exposure to heat, sunlight, and smog causes plastic to fade, discolor, scratch, or become brittle. Plexus seals the pores of the plastic,

making the domes easier to clean, improving scratch resistance, and increasing product longevity. Plexus is available in cases of twelve 13-ounce cans (PX13) from Federal Signal Corporation.

Replacing the Mounting Hardware

For replacement parts, contact the Federal Signal Service Department at empserviceinfo@fedsig.com or call 1-800-433-9132, 7 AM to 5 PM, Monday through Friday (CT).

Table 2: IMPAXX replacement parts

Description	Part Number
Mounting Bezel, IMPAXX	8613137
Mounting Gasket, IMPAXX	8613138

Testing the System

⚠ WARNING

SOUND HAZARD

All effective sirens and horns produce loud sounds (120 dB) that may cause permanent hearing loss. Always minimize your exposure to siren sound and wear hearing protection. Do not sound the siren indoors or in enclosed areas where you and others will be exposed to the sound.

⚠ WARNING

LIGHT HAZARDS

To be an effective warning device, this product produces bright light that can be hazardous to your eyesight when viewed at a close range. Do not stare directly into this lighting product at a close range or permanent damage to your eyesight may occur.

After the installation, test the emergency warning system to ensure that it is operating properly. Also test all vehicle functions, including horn operation, vehicle safety functions, and vehicle lighting systems to ensure proper operation. Ensure that the installation has not affected the vehicle operation or changed any vehicle safety functions or circuits. After testing is complete, provide a copy of these instructions to the instructional staff and all operating personnel.

Do not test the sound and light system of the vehicle while driving. Operating the vehicle warning systems may pose a hazard to the operator and other drivers if the systems do not function as expected. Test the vehicle only in a controlled environment.

Getting Technical Support and Service

If you are experiencing problems or need service for the IMPAXX, please contact:

Service Department
Federal Signal Corporation
Phone: 1-800-433-9132
Fax: 1-800-343-9706
Email: empserviceinfo@fedsig.com

Returning a Product to Federal Signal

Before returning a product to Federal Signal, call 800-264-3578, 800-433-9132, or 800-824-0254 to obtain a Returned Merchandise Authorization number (RMA number). To expedite the process please be prepared with the following information:

- Your Federal Signal customer or account number.
- The purchase order number under which the items were purchased.
- The shipping method.
- The model or part number of the product being returned.
- The quantity of products being returned.
- Drop ship information as needed.
- Any estimate required.

When you receive your RMA Number:

- Write the RMA number on the outside of the box of returned items.
- Reference the RMA number on your paperwork inside of the box.
- Write the RMA number down, so that you can easily check on status of the returned equipment.

Send all material with the issued RMA Number to:

Federal Signal Corporation
2645 Federal Signal Drive
University Park, IL 60484
Attn: Service Department
RMA: #_____

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