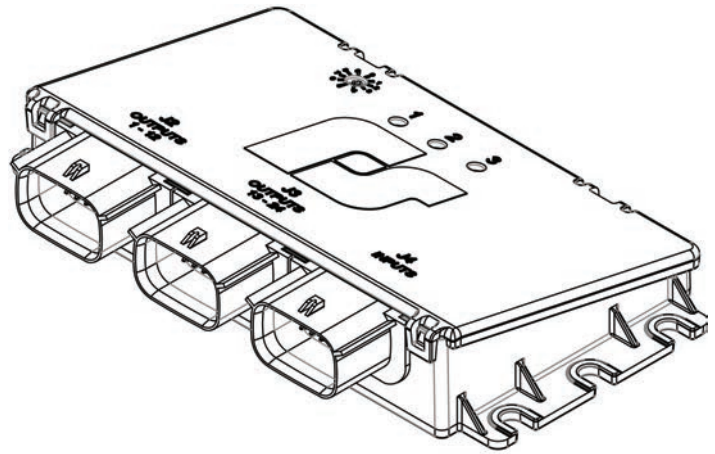


EXPMOD24 Pathfinder® Expansion Module



24-Channel Expansion Module Pathfinder® Siren Series Installation and Maintenance Manual

Limited Warranty

This product is subject to and covered by a limited warranty, a copy of which can be found at www.fedsig.com/SSG-Warranty. A copy of this limited warranty can also be obtained by written request to Federal Signal Corporation, 2645 Federal Signal Drive, University Park, IL 60484, email to info@fedsig.com or call +1 708-534-3400.

This limited warranty is in lieu of all other warranties, express or implied, contractual or statutory, including, but not limited to the warranty of merchantability, warranty of fitness for a particular purpose and any warranty against failure of its essential purpose.



FEDERAL SIGNAL

Safety and Security Systems

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Safety Messages for Installers and Operators

For your safety, read and understand this manual thoroughly before installing, operating, and servicing the Pathfinder siren amplifier/relay module. The safety messages presented in this chapter and throughout the manual are reminders to exercise extreme care at all times. In addition, read and understand the safety instructions to installers (doc. no. 256A692), and keep it close at hand for reference.

To download copies of this manual, go to www.fedsig.com or call the Federal Signal Service Department at 1-800-433-9132 (708-534-3400) 7 a.m. to 5 p.m., Monday through Friday (CT).

Safety Messages to Installers of Sound/Light Systems

▲ 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. Listed below are some other important safety instructions and precautions you should follow:

Before Installation

Qualifications

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

Sound Hazards

- Your hearing and the hearing of others, in or close to your emergency vehicle, could be damaged by loud sounds. This can occur from short exposures to very loud sounds, or from longer exposures to moderately loud sounds. For hearing conservation guidance, refer to federal, state, or local recommendations. OSHA Standard 1910.95 offers guidance on "Permissible Noise Exposure."
- 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.
- Federal Signal siren amplifier/relay modules and speakers are designed to work together as a system. Combining a siren and speaker from different manufacturers may reduce the warning effectiveness of the siren system and may damage the components. You should verify or test your combination to make sure the system works together properly and meets federal, state and local standards or guidelines.

During Installation

- 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 to prevent metal shavings from entering 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 wiring is shorted to vehicle frame, high current conductors can cause hazardous sparks, resulting in electrical fires or flying molten metal.
- Ensure that the siren amplifier/relay module and speaker(s) in your installation have compatible wattage ratings.
- In order for the electronic siren to function properly, the ground connection must be made to the NEGATIVE battery terminal.
- Sound output will be severely reduced if any objects are in front of the speaker. If maximum sound output is required for your application, you should ensure that the front of the speaker is clear of any obstructions.
- Install the speaker(s) as far forward on the vehicle as possible, in a location that provides maximum signaling effectiveness and minimizes the sound reaching the vehicle's occupants. Refer to the National Institute of Justice guide 500-00 for further information.
- Mounting the speakers behind the grille will reduce the sound output and warning effectiveness of the siren system. Before mounting speakers behind the grille, make sure the vehicle operators are trained and understand that this type of installation is less effective for warning others.
- Sound propagation and warning effectiveness will be severely reduced if the speaker is not facing forward. Carefully follow the installation instructions and always install the speaker with the projector facing forward.
- Do NOT install the speaker(s) or route the speaker wires where they may interfere with the operation of airbag sensors.
- Installation of two speakers requires wiring speakers in phase.
- Never attempt to install aftermarket equipment, which 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 and safety functions or circuits. Always check vehicle for proper operation after installation.
- Do NOT install equipment or route wiring or cord in the deployment path of an airbag.
- If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.

- Locate the control head so the vehicle, controls, and microphone can be operated safely.
- When drilling into a vehicle structure, be sure that both sides of the surface are clear of anything that could be damaged. 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. Additionally, all exterior drilled holes must be sealed with Motorcraft seam sealer T-A-2-B or equivalent to prevent the potential exposure to carbon monoxide or other potentially harmful fumes. Failure to observe this warning could cause serious injury or death.

After Installation

- After installation, test the siren and 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 installation has not affected vehicle operation or changed any vehicle safety function or circuit.
- After testing is complete, provide a copy of these instructions to the instructional staff and all operating personnel.
- File these instructions in a safe place and refer to them when maintaining or reinstalling the product.

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

RETAIN AND REFER TO THESE MESSAGES

Safety Messages to Operators of Sound/Light Systems

▲ WARNING

People's lives depend on your safe operation of Federal Signal products. It is important to read and follow all instructions shipped with the products. Listed below are some other important safety instructions and precautions you should follow:

- Do not attempt to activate or deactivate 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 to drive cautiously.
- Situations may occur that 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 that may cause, in certain situations, permanent hearing loss. You and your passengers should consider taking appropriate safety precautions, such as wearing hearing protection.

Safety Messages for Installers and Operators

- In order 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.
- Operate your vehicle and its light/sound system only 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 are securely attached and operating properly.
- The effectiveness of an interior mounted warning light depends on the clarity, the tinting, and the angle of the glass it is being placed behind. Tinting, dirt, defects, and steeply angled glass reduce the light output of the warning light. This may reduce the effectiveness of the light as a warning signal. If your vehicle has dirty, tinted, or steeply angled glass, use extra caution when driving your vehicle or blocking the right of way with your vehicle.

Failure to follow these precautions may result in property damage, serious injury, or death.

RETAIN AND REFER TO THESE MESSAGES

An Overview of the Pathfinder Expansion Module

The Pathfinder siren is a full-featured, programmable, electronic siren and light control system. The Pathfinder Expansion Module provides an additional 24 flashing outputs to a Pathfinder System. The maximum output current for each relay can be set with the Pathfinder Configuration Software.

A dial on the product allows up to four expansion modules in the system if necessary. Normally the expansion module powers up when the Pathfinder Siren supplies power to the network.

The module is potted to help protect the unit from unfavorable weather conditions. It has been designed to work in an operating temperatures of -40° to 120°C (-40°F to 248°F).

Additional Expansion Module in a System

There can be up to four 24-Channel Expansion Modules in a system. Each Expansion Module has its own MID (Module Identifier). The Expansion Module is shipped from the factory as a Module #1.

Use a small, flat head screwdriver to move the dial to the desired number.

Setting the dial to position 9 puts the module in a test mode. In test mode, all the outputs flash together. LED 2 alternate flashed with LED 3.

Figure 1 Dial

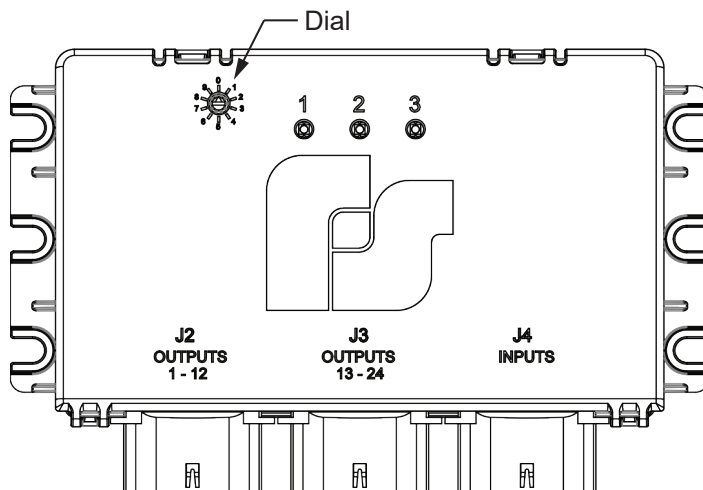


Table 1 Dial Positions

Dial Position	Description
0	Module #1
1	Module #2
2	Module #3
3	Module #4
4-8	Not in use
9	Relay output test pattern

LED Indicators

There are three LED indicators that are used for simple diagnostics.

- L1: Power - Solid ON
- L2 and L3: Module # indicator

L2	L3	Module #
OFF	OFF	Module 1
OFF	ON	Module 2
ON	OFF	Module 3
ON	ON	Module 4
FLASHING		Module in test pattern flashing

Specifications

Table 2 Specifications

System Specifications	
Input Voltage	11 Vdc to 16.0 Vdc
Polarity	Negative ground only
Operating Temperature Range	-40°C to 120°C (-40°F to 248°F) - all relays at 50 percent power
Standby Current	Less than 0.1 A
Max Input Current	30 A
EXPMOD24 - Dimensions	
Height x Width x Length	1.2 x 4 x 6.3 in (3.05 x 10.16 x 16 cm)
Net Weight	0.75 lb (0.45 kg)
Relay Specifications	
Relays 1-24	2.5 A max (active high), 30 A maximum total

Expansion Module Kit Contents

Table 3 lists the parts included with the Expansion Module kit. After unpacking the kit, examine it for damage that may have occurred in transit. If the product has been damaged, file a claim immediately with the carrier stating the extent of damage. Ensure that all parts in the packing list are included in the shipment. If any parts are missing, call Federal Signal Customer Support at 1-800-264-3578, 7 a.m. to 5 p.m., Monday through Friday, Central Time.

Table 3 Expansion Module

Qty.	Description	Part Number
1	EXPMOD24 Flasher	855403220
2	12-Conductor Output Cable	17502048
1	12-Conductor Input Cable	17502052

Wiring the Pathfinder Expansion Module

General Guidelines for Wiring the Expansion Module on a Vehicle

⚠ WARNING

HIGH CURRENT ARCING: Do not connect this system to the vehicle battery until ALL other electrical connections are made and you have verified that no shorts exist. High current conductors can cause hazardous sparks or burning wire, resulting in electrical fires.

NOTICE

DRILLING PRECAUTIONS: When drilling into a vehicle structure, ensure that both sides of the surface are clear of anything that could be damaged. 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. Additionally, all exterior drilled holes must be sealed with Motorcraft seam sealer T-A-2-B or equivalent to prevent the potential exposure to carbon monoxide or other potentially harmful fumes. Failure to observe this warning could cause serious injury or death.

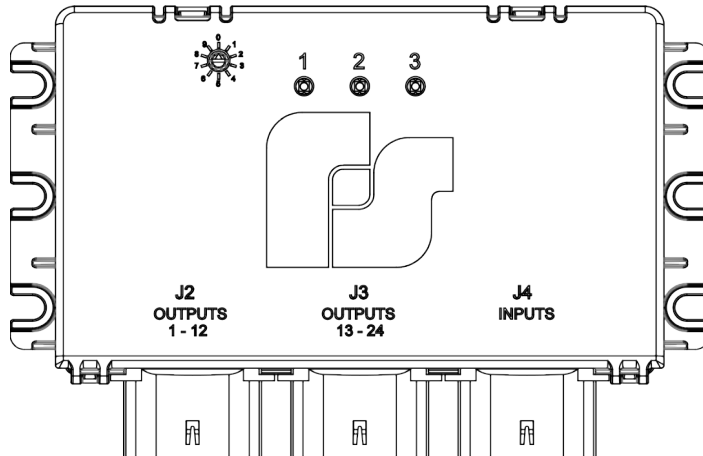
Before permanently installing the Pathfinder Siren and Expansion Module system, plan all wire routings and select the mounting locations for the siren amplifier and Expansion module. Read and understand all instructions included with related equipment before installing it. Ensure that all wiring is protected from damage during normal operation of the vehicle and away from any sharp edges and screws. Splice joints should be soldered or crimped with butt connectors, and properly insulated. Splice joints that will be exposed to the elements should be adequately sealed and insulated. All wires that are extended should not be lesser gauges than their original mating wires. Make sure that connections are easily accessible for assembly and service.

Overview of the Pathfinder Connections

To prepare the vehicle for connecting the Convergence Network system:

1. After planning where to route the wires and cables for the system components — such as Federal Signal warning lights, directional lights, and speakers — drill the holes for the wiring. Smooth, deburr, and insert a grommet in the holes.
2. Mount the system components according to the instructions included with each product.

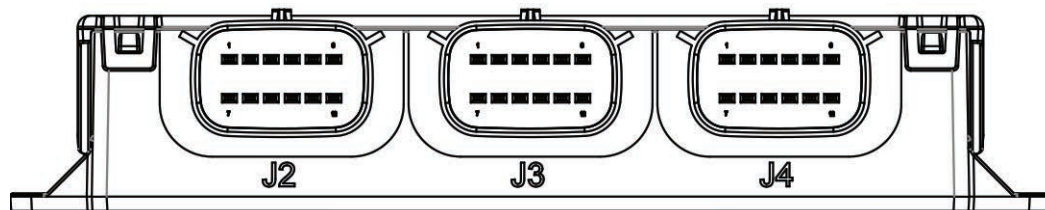
Figure 2 Expansion Module



Programmable Solid-State Relay Outputs

The Pathfinder Expansion Modules has a total of 24 solid-state relay outputs intended for flashing lights and can each provide up to 2.5 A switched from the battery terminal. These relays can be programmed to flash various patterns and dim levels.

Figure 3 Relays



All of the relays have a software-programmable current limit that can be enabled. The module is rated to switch a maximum of 30 A.

See the Pathfinder Configuration Software for all available programming options available for the Pathfinder relay outputs.

System Power

Fusing of the Expansion Module is required and left for the installer to complete. The fuse must be of an amperage capacity sufficient to handle the electrical loads of the Expansion Module. There are six individual power leads, each powering four channels. Refer to Table 6 on page 15 for a complete fusing diagram.

Convergence Network Connections

Figure 4 J2 Wiring Pinout Description

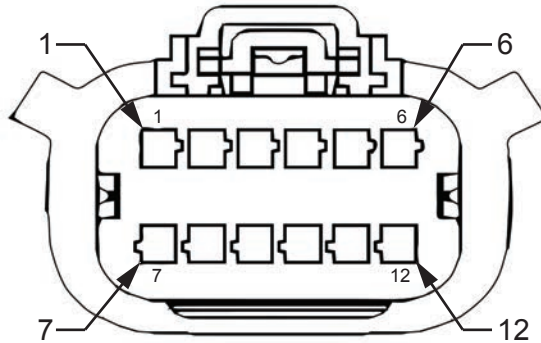


Table 4 J2 Flashing Outputs 1-12

Wire Color	Relay Output	Connector Pin
Blue	1	J2-1
Red	2	J2-2
Violet	3	J2-3
Brown	4	J2-4
Pink	5	J2-5
Tan	6	J2-6
Gray	7	J2-7
Black	8	J2-8
Green	9	J2-9
White	10	J2-10
Yellow	11	J2-11
Orange	12	J2-12

Connector: Manufactured by Molex: Part # 367921201

Terminals: Molex Part # 367990001

Wire: 18 AWG TXL Wire, XLPE

Figure 5 J3 Wiring Pinout Description

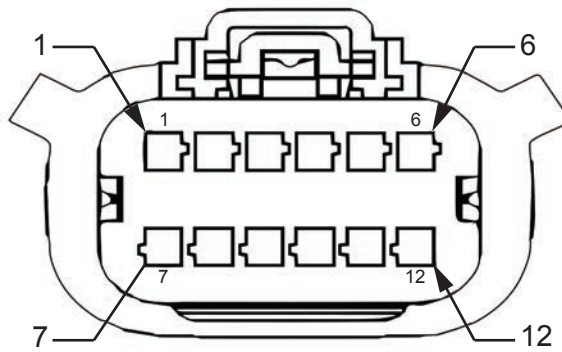


Table 5 J3 Flashing Outputs 13-24

Wire Color	Relay Output	Connector Pin
Blue	13	J3-1
Red	14	J3-2
Violet	15	J3-3
Brown	16	J3-4
Pink	17	J3-5
Tan	18 "OR" Inp1	J3-6
Gray	19	J3-7
Black	20	J3-8
Green	21	J3-9
White	22	J3-10
Yellow	23	J3-11
Orange	24 "OR" Inp2	J3-12

Connector: Manufactured by Molex: Part # 367921201

Terminals: Molex part # 367990001

Wire: 18 AWG TXL wire, XLPE

Outputs 18 and 24 have their output "Diode OR" with an associated input.

Figure 6 Outputs 18 and 24: "Diode OR" Inputs

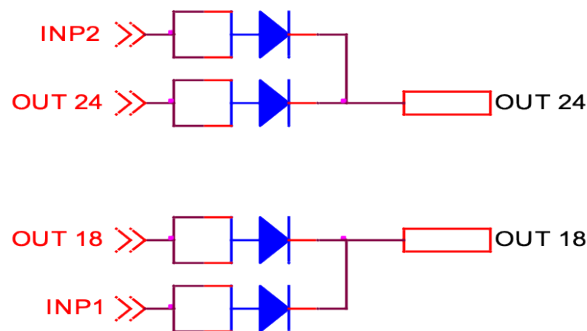


Figure 7 J4 Wiring Pinout Description

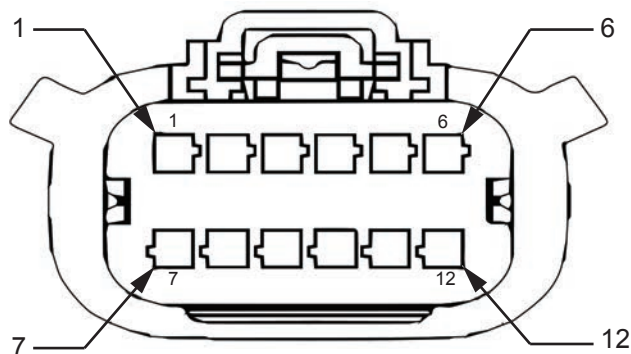


Table 6 J4 Power and Network Connections

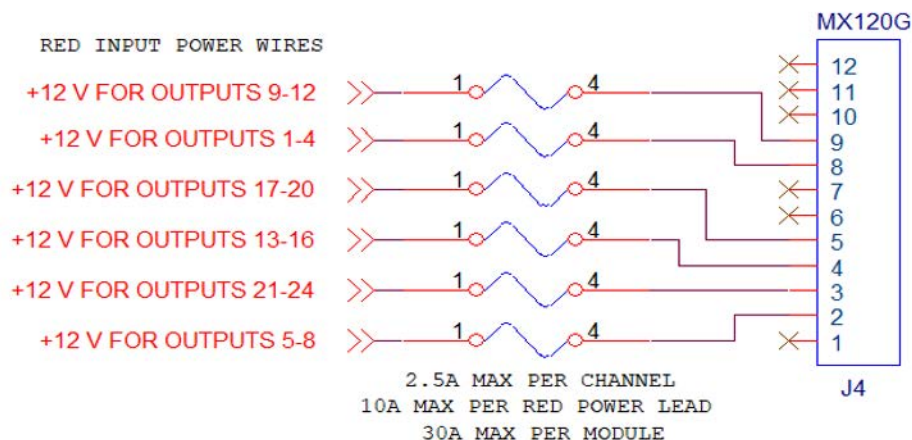
Wire Color	Function	Connector Pin
Blue	Input 1	J4-1
Red	+12 V For Outputs 5-8	J4-2
Red	+12 V For Outputs 21-24	J4-3
Red	+12 V For Outputs 13-16	J4-4
Red	+12 V For Outputs 17-20	J4-5
RJ45 (Pos 3)	Convergence Data A	J4-6
Gray	Input 2	J4-7
Red	+12 V For Outputs 1-4	J4-8
Red	+12 V For Outputs 9-12	J4-9
RJ45 (Pos 6)	Convergence Data B	J4-10
RJ45 (Pos 8)	Convergence Net Power	J4-11
RJ45 (Pos 1)	Convergence Net Gnd	J4-12

Connector: Manufactured by Molex: Part # 367921201

Terminals: Molex Part # 367990001

Wire: 18 AWG TXL wire, XLPE

Figure 8 Fusing Input Power Leads



Mounting the Pathfinder Expansion Module

After wiring and connecting the system, the next step is to permanently mount the siren in the vehicle. Verify that the mounting locations you selected earlier are safe for installing these components. Review the following precautions before mounting the equipment.

⚠ WARNING

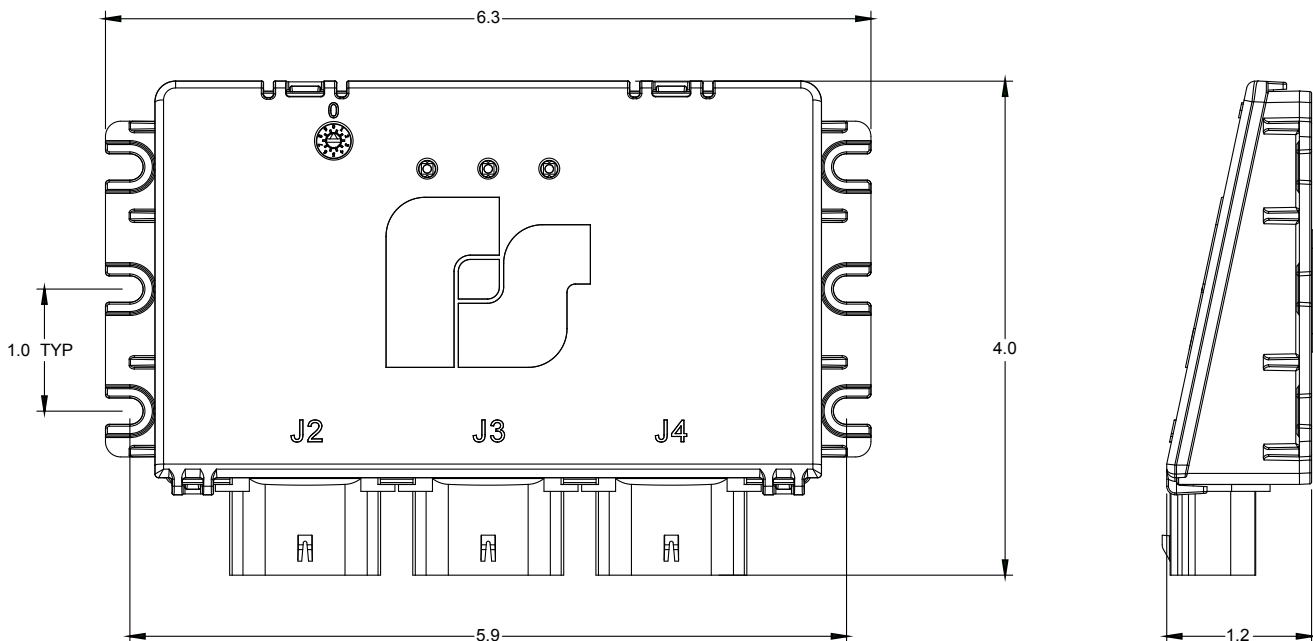
AIRBAG DEPLOYMENT: Do not install equipment or route wiring in the deployment path of an airbag. Failure to observe this warning will reduce the effectiveness of the airbag or potentially dislodge the equipment, causing serious injury or death.

NOTICE

SEAT REMOVAL PRECAUTION: If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.

Select a mounting location that allows the vehicle, controls, and microphone to be operated safely under all driving conditions. To identify safe mounting areas for equipment inside the vehicle, consult the vehicle manufacturer's guidelines. To avoid driver distraction and unreliable switch activation, the mounting location must not allow any movement of the unit.

Figure 9 Expansion Module Dimensions in Inches



Mounting the Expansion Module

To mount the Expansion Module:

1. Use the unit as a template or the dimensions shown in Figure 5 to mark the centers of the mounting holes. Choose the holes most suitable for the location. Four screws are provided.
2. Use a #21 (0.159-inch) bit and drill the center of the mounting holes.
3. Mount the flasher with the #10 Type B screws.

Testing the Expansion Module Installation

⚠ WARNING

SOUND HAZARD: *The output level of high-powered speakers is capable of causing permanent hearing damage. To prevent excessive exposure, carefully plan placement of the siren and post warnings. To prevent excessive exposure to installers and service personnel, take adequate measures to ensure that the sirens are not activated while they are within 150 feet of the speaker array, or provide proper ear protection.*

⚠ WARNING

LIGHT HAZARD: *To be an effective warning device, an emergency warning system 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.*

The Expansion Module is programmed with a default configuration that you can use to quickly check your initial installation system before you configure it. Test all vehicle functions, including horn operation, vehicle safety functions, and vehicle lighting systems for proper operation. Ensure that the installation has not affected the vehicle operation or changed any vehicle safety functions or circuits. Do not test the sound and light system of the vehicle while driving. Operating the vehicle warning system may pose a hazard to the operator and other drivers if the system does not function as expected. Test the vehicle only in a controlled environment. After testing is complete, provide a copy of this manual to the instructional staff and all operating personnel.

Programming the Pathfinder Expansion Module

The Expansion Module can be programmed through the Pathfinder Configuration program. Download the software at <https://www.fedsig.com/software-downloads>.

Getting Technical Support

For technical support, please contact:

Federal Signal Corporation

Phone: 1-800-443-9132

Email: empserviceinfo@fedsig.com

Getting Repair Service

The Federal Signal factory provides technical assistance with any problems that cannot be handled locally.

Any units returned to Federal Signal for service, inspection, or repair must be accompanied by a Return Material Authorization (RMA). Obtain a RMA from a local Distributor or Manufacturer's Representative.

Provide a brief explanation of the service requested, or the nature of the malfunction.

Address all communications and shipments to the following:

Federal Signal Corporation
Service Department
2645 Federal Signal Drive
University Park, IL 60484-3167

Ordering Replacement Parts

To order replacement parts, call Customer Support at 1-800-264-3578, 7 a.m. to 5 p.m., Monday through Friday (CT) or contact your nearest distributor.

Downloading Pathfinder Configuration Software

To download the Pathfinder Configuration software, access <https://www.fedsig.com/software-downloads> and click the Download Pathfinder Configuration Software Now link.



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