

Pathfinder® PF400 and PF400Q



Installation and Maintenance Instructions

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 PF400 siren amplifier/relay module. The safety messages presented in this chapter and throughout the manual are reminders to exercise extreme care at all times. Read and understand the safety instructions to installers, and keep it close at hand for reference.

To download copies of this manual, go to www.fedsig.com/resource-library 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. 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 ensure that 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, 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, 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. 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.
- 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 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, ensure that the entire warning light system and the siren system is 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.
- 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.

- The 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:
 - Keep the mounting surface and magnets clean, dry, and free of foreign particles that prevent good surface contact.
 - Ensure that the mounting surface is flat.
 - Do not use a magnet mounting system on vehicles with vinyl tops.
 - To prevent the light assembly from sliding on mounting surface, avoid quick acceleration and hard stops.

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® PF400 and PF400Q

The Pathfinder PF400/PF400Q siren is a full-featured, programmable, electronic siren and light control system. State-of-the-art microprocessor technology is used to create a system with a small, compact siren system that can be installed inside a console, in the trunk, or under the seat of any vehicle with a 12 V or 24 V negative ground system. The PF400 siren uses class D amplifier technology without the need for a large and heavy transformer. It provides four independent 100 W channels of audio, for a total of 400 W.

The module provides the automatic, simultaneous light and siren activation required by some jurisdictions. A security gun timer can be programmed to minimize the possibility of unauthorized shotgun release. The module has four easily accessible Convergence Network serial ports that can connect a remote mounted control head and/or any serially-controlled Federal Signal product. The siren also has FS Vehicle Integration to allow for various vehicle events to integrate with siren/lighting control. A variety of system features can be programmed with the Convergence Network Configuration Software (available at <https://www.fedsig.com/software-downloads>) from a computer via a USB cable that connects the siren amplifier. System features include flash patterns, siren tones, and momentary, push-on/push-off, timed relay operation, as well as vehicle events. Programming does not require disassembling or removing any hardware from the vehicle.

The PF400 comes with either a 17-button controller with a slide switch or a 14-button handheld controller. The PF400Q comes with your choice of a 17-button controller with a slide switch, an e-Q2B four-button controller with a rotary knob, or a 14-button handheld controller. The PF400/PF400Q is available with a variety of controllers.

Siren, PA, and Speakers

The Pathfinder PF400/PF400Q produces wail, yelp, priority, and an air horn sound by default. The horn-ring transfer feature enables the driver to control siren tones by pressing the horn button. Public address is available with the Federal Signal microphone, which is included with the system. Radio rebroadcast is also available. The PF400 can drive one to four 11-ohm impedance, 100-watt speakers. The PF400/PF400Q is capable of multiple speaker and tone configurations. Dual tones with a Rumbler® can be accomplished without the need for an external Rumbler amplifier.

NOTE: The PA volume is programmed at the factory to a nominal volume. Its level can be raised or lowered when programming the siren using Federal Signal's Convergence Network Configuration Software.

Light Bars and SignalMaster® Control

Compatible light bars include full featured, serially-controlled Federal Signal Legend®, Valor®, Allegiant®, Navigator®, Vision® SLR and Integrity®, as well as the CN SignalMaster™ and SpectraLux® ILS Series of interior-mounted light bars. It is compatible with legacy light bars before FSJoin™ and with those that have FSJoin technology. In addition, flash rates and patterns, light bar dimming, and other options can be programmed with the Convergence Network Configuration Software.

FS Vehicle Integration

The Pathfinder® PF400/PF400Q siren includes the capability to integrate with the existing vehicle CAN bus. The FS Vehicle Integration uses a vehicle-specific cable (not included) to seamlessly integrate with the vehicle. Vehicle events can be programmed with the Convergence Network Configuration Software to interface with the lighting/siren control. The Convergence Network Configuration Software contains the latest list of events supported based on model, make and year of the vehicle.

Programmable Solid-State Auxiliary Relays

The PF400/PF400Q has sixteen solid-state relays: six ten-ampere high, six five-ampere high, and four 500 mA maximum low side outputs. The maximum output current for each relay can be set with the Convergence Network Configuration Software. The total current draw of the four low side outputs should not exceed 500 mA total.

Programmable Input Circuits

The PF400 has connections for four general purpose input circuits, plus dedicated inputs for park, horn and ign. Ignition is an active-high only input, while all other inputs are programmable for active-high or active-low. The inputs are most commonly used for switches that send a signal to the siren when a condition in the vehicle changes.

LED Indicators and Visual Diagnostics

All buttons on the control head glow when the system is on. Pressed buttons turn bright to indicate that the function they control is active.

On the 17-button controller, the buttons are programmable for backlighting in nine colors. LEDs on the keypad mimic active SignalMaster patterns. An LED glows over the position in which the slide switch is placed. Diagnostic LEDs for speaker fault detection are also available and are programmable.

System Specifications

Table 1 System Specifications

Input Voltage	11 Vdc to 28 Vdc
Polarity	Negative ground only
Operating Temperature Range	-40°C to +80°C (-40°F to +176°F) (all relays at 50% power)
Standby Current	Less than 0.1 A
Max Input Current	90 A (siren and relays)
PF400	
Dimensions (H x W x L)	2.5 x 6.0 x 11.0 in (6.4 x 15.2 x 27.9 cm)
Net Weight	4.2 lb (1.9 kg)

Siren Specifications

Table 2 Siren Specifications

Speakers	Up to four siren or Rumbler® speakers
Operating Current	36 A
Frequency Range	182 to 1600 Hz
Nominal Cycle Rate	Wail 12 CPM, Yelp 180 CPM, Priority 370 CPM
Nominal Voltage Output	11-28 Vdc
Audio Response	300-3,00 Hz ±3 dB
Siren Tone Compliances	SAE J1849 JUL89

NOTE: “CPM” refers to cycles per minute.

Relay Specifications

Table 3 Relay Specifications

Relays 1-6	10 A (active high)
Relays 7-12	5 A (active high)
Relays 13-16	500 mA (active low)

Kit Contents

The Kit Contents tables list the parts included with each kit. Note that each kit contains only one kind of controller. 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. Carefully check all envelopes, shipping labels, and tags before removing or destroying them. Ensure 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 4 PF400Q, PF400QS17B, PF400R, and PF400S17B Kit Contents

Qty	Description	Part No. PF400Q	Part No. PF400QS17B	Part No. PF400R	Part No. PF400S17B	Part No. PF400QFM
1	400-Watt Siren Amplifier*	862303915-Q	862303915-Q	862303915	862303915	862303915
1	Remote Control Head	8616026	862303172	862302151	862303172	8616042-02
1	Keypad Legend Stickers	8572294	8572294	8572294	8572294	8572294
2	PF400 Mounting Bracket	862304026	862304026	862304026	862304026	862304026
2	Control Head Mounting Bracket	85361065	85361065	85361065	85361065	
1	Dynamic Microphone	258B577-03	258B577-03	258B577-03	258B577-03	258B577-03
1	RS485 25 ft (7.62 m) Cable Assembly	1751357-02	1751357-02	1751357-02	1751357-02	1751357-02
1	Pathfinder Relay Wire Assembly	17501359	17501359	17501359	17501359	17501359
1	Pathfinder I/O Wire Assembly	17501360	17501360	17501360	17501360	17501360
1	PF400 Audio Out Wire Assembly	17502532	17502532	17502532	17502532	17502532
Siren Hardware Kit (77701562)						
4	1/4-20 x 5/8-inch Carriage Bolt	7004A020-10	7004A020-10	7004A020-10	7004A020-10	7004A020-10
4	1/4-20 Elastic Stop Nut	7058A010	7058A010	7058A010	7058A010	7058A010
4	1/4-inch Flat Washer	7072A024	7072A024	7072A024	7072A024	7072A024
Control Head Hardware Kit (77700992)						
2	Phillips® Pan Head 6-32 Screw	7000A404-05	7000A404-05	7000A404-05	7000A404-05	
2	Steel 1/4-20 Cap Bolt	7002A000-12	7002A000-12	7002A000-12	7002A000-12	
2	Zinc Steel #10 Type B Pan Head Torx Screw	7011246-08	7011246-08	7011246-08	7011246-08	
2	Split Steel #6 Screw Lockwasher	7074A001	7074A001	7074A001	7074A001	
2	1/4-inch External Tooth Lockwasher	7075A007	7075A007	7075A007	7075A007	
Flush Mount Control Head Hardware Kit (791A120-08)						
4	1/4-20 x 5/8-inch Carriage Bolt					7004A020-10
4	#6B Phillips Pan Head Thread Forming Screw					7011A120-08
4	1/4-20 Elastic Stop Nut					7058A010
4	1/4-inch Flat Washer					7072A024
1	3x5 Ind. Poly Bag					8291A028A-01

* Item is configured at factory for tones and default configurations based on control head

Table 5 PF400QAMP Kit Contents

Qty	Description	Part Number
1	400-Watt Siren Amplifier*	862303915-Q
2	PF400 Mounting Bracket	862304026
1	RS485 25 ft (7.62 m) Cable Assembly	1751357-02
1	Pathfinder Relay Wire Assembly	17501359
1	Pathfinder I/O Wire Assembly	17501360
1	PF400 Audio Out Wire Assembly	17502532
Siren Hardware Kit (77701562)		
4	1/4-20 x 5/8-inch Carriage Bolt	7004A020-10
4	1/4-20 Elastic Stop Nut	7058A010
4	1/4-inch Flat Washer	7072A024

* Item is configured at factory for tones and default configuration

Table 6 PF400QH and PF400H Kit Contents

Qty	Description	Part No. PF400QH	Part No. PF400H
1	400-Watt Siren Amplifier*	862303915-Q	862303915
1	Hand Held Controller	862302765	862302765
1	Keypad Legend Stickers	8572294	8572294
2	PF400 Mounting Bracket	862304026	862304026
1	RS485 25 ft (7.62 m) Cable Assembly	1751357-02	1751357-02
1	RJ45 Coil Cord	17501849	17501849
1	Straight, Black Straight RJ45 8x8K Coupler	13901850	13901850
1	Pathfinder Relay Wire Assembly	17501359	17501359
1	Pathfinder I/O Wire Assembly	17501360	17501360
1	PF400 Audio Out Wire Assembly	17502532	17502532
1	Swivel Mount Kit	8623129	8623129
1	Handheld Mounting Bracket	862302763	862302763
1	Handheld Swivel Clamp Bracket	862302764	862302764
Siren Hardware Kit (77701562)			
4	1/4-20 x 5/8-inch Carriage Bolt	7004A020-10	7004A020-10
4	1/4-20 Elastic Stop Nut,	7058A010	7058A010
4	1/4-inch Flat Washer	7072A024	7072A024
Handheld Mount Hardware Kit (77701058)			
3	Black Zinc Steel #10 Type B Pan Head Torx Screw	7011246-08	7011246-08
2	#4-40 x 1/2 inch Screw	7000444-06	7000444-06
2	Steel 4-40 Hex External Keps® Nut	7058A001	7058A001

* Item is configured at factory for tones and default configuration

Wiring the Siren

General Guidelines for Wiring the PF400/PF400Q 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: Before drilling holes, check the area into which you plan to drill to ensure that you do not damage vehicle components. All drilled holes should be deburred and all sharp edges should be smoothed. 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 PF400 system, plan all wire routings and select the mounting locations for the siren amplifier/relay 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 a lesser gauge than its original mating wire. Make sure that connections are easily accessible for assembly and service.

The PF400/PF400Q siren comes from the factory with four wire assemblies. There is a twelve-conductor cable for the relay outputs, a 14-conductor cable for the siren inputs and outputs, an eight-conductor speaker output cable, and a three-conductor power cable.

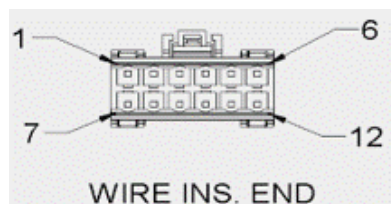
Twelve-Conductor Wire Assembly for the Relay Outputs

The cable is FS# 17501359. Each conductor is 16 AWG; its construction is described below.

NOTE: Cable tie the wires 6 inches from the connector.

Component	Qty	Vendor	Vendor Part #	Description
Connector	1	Molex	1722583112	Conn Rcpt Hsg 12 POS 3.50 mm
Terminal	12	Molex	1722537023	Socket Contact Tin 16-18 AWG
TPA	2	Molex	1722644006	Terminal Position Assurance (TPA)
Cable Tie	1	Tyton	T30R	Cable Tie, 5.62 inches long

NOTES: 16 AWG Conductors: Alpha Wire 6827 (No UL), MOD PPE, 19/29, 0.076 NOM OD OR, Alpha Wire 6716 (UL11028), MOD PPE, 19/29, 0.081 NOM OD.



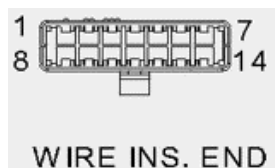
Position	Color	Function
1	Black	Relay 1
2	Green	Relay 2
3	White	Relay 3
4	Yellow	Relay 4
5	Gray	Relay 5
6	Orange	Relay 6
7	Violet	Relay 7
8	Red	Relay 8
9	Blue	Relay 9
10	Brown	Relay 10
11	Pink	Relay 11
12	Tan	Relay 12

14-Conductor Wire Assembly for the Relay Outputs

The cable is FS# 17501360. Each conductor is 18AWG; its construction is described below.

Component	Qty	Vendor	Vendor Part #	Description
Connector	1	Molex	1729521401	Conn Rcpt Hsg 14 POS 3.00 mm
Terminal	14	Molex	1729531401	Socket Contact Tin 16-18 AWG
TPA	2	Molex	1729531401	Terminal Position Assurance (TPA)
Ferrite	1	Fair-Rite Products	0431167281 or 2631626402	Ferrite Core 225 Ohm at 100mhz
Cable Tie	2	Tyton	T30R	Cable Tie, 5.62 inches long

NOTES: 1) Ferrite is to be held in place 5 inches away from the connector with cable ties.
2) Conductors 18 GA, to meet SAE J1128, TXL OR, Alpha Wire 7025 (UL3266), XLPE, 19/32, 0.072 NOM OD OR, Alpha Wire 3053 (UL1569), PVC 10/30, 0.069 NOM OD OR



Position	Color	Function
1	Green	Radio(+)
2	Wht/Grn	Radio(-)
3	Blue	Relay 16 Low Sd 4
4	Brown	Relay 15 Low Sd 3
5	Wht/Blu	Relay 14 Low Sd 2
6	Wht/Brn	Relay 13 Low Sd 1
7	White	Horn
8	Yellow	Ign
9	Gray	Park
10	Orange	Input 1
11	Violet	Input 2
12	Wht/Red	Input 3
13	Wht/Orn	Input 4
14	Wht/Yel	Horn Ring

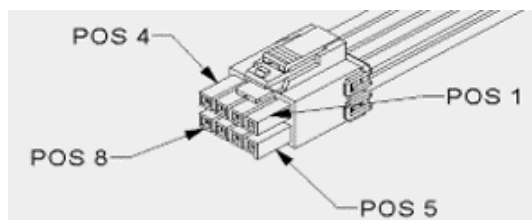
Eight-Conductor Wire Assembly for the Speaker Outputs

The cable is FS# 17502532. Each conductor is 18 AWG; its construction is described below.

Component	Qty	Vendor	Vendor Part #	Description
Connector	1	Molex	1722583108	Conn Rcpt Hsg 8 POS 3.50 mm
Terminal	8	Molex	1722537023	Socket Contact Tin 16-18 AWG
TPA	2	Molex	1722644004	Terminal Position Assurance (TPA)
Ferrite	1	Fair-Rite Products	0431167281 or 2631626402	Ferrite Core 225 Ohm at 100 mHz
Cable Tie	2	Tyton	T30r	Cable Tie, 5.62 inches long

NOTES: 1) The Ferrite is to be held in place 5 inches away from the connector with cable ties.
2) conductors 18GA, to meet SAE J1128, TXL. Alpha Wire 7026 permitted.

Position	Color	Function
1	Brown	Speaker 1-
2	Wht/Brn	Speaker 2-
3	Orange	Speaker 3-
4	Wht/Orn	Speaker 4-
5	Blue	Speaker 1+
6	Wht/Blu	Speaker 2+
7	Green	Speaker 3+
8	Wht/Grn	Speaker 4+



Three-Conductor Wire Assembly for the Power Connections

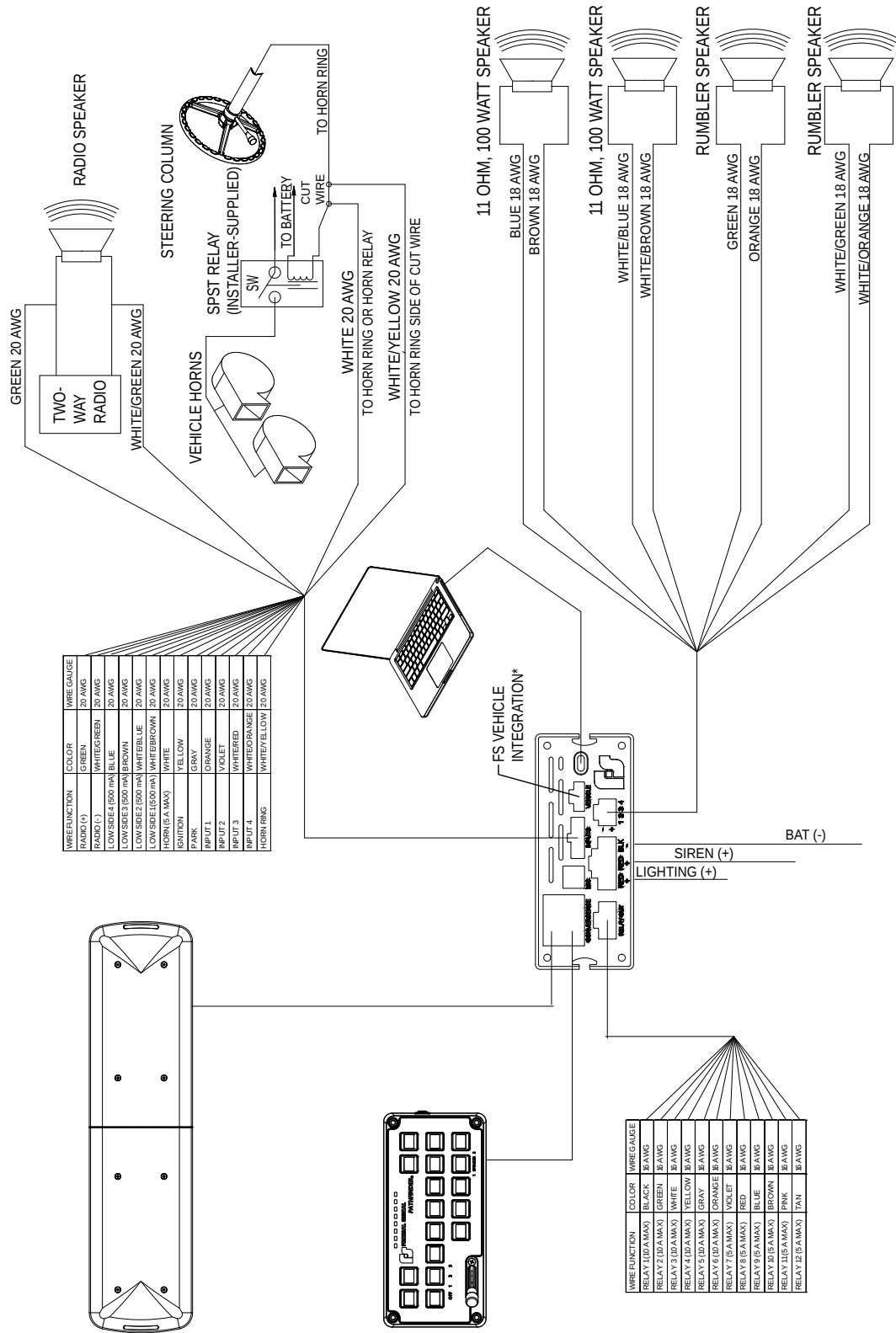
The cable is FS# 17502785B. Each conductor is 8 AWG SAE J1128, GXL3 or GXL4 rated. 17502785-5 has 5-foot conductors. 1750278-20 has 20-foot conductors.

Component	Qty	Vendor	Vendor Part #	Description
Connector	1	Molex	428160312	Recpt, Minifit Sr,
Terminal	3	Molex	428150032	Conn Socket 8 AWG Crimp Gold
Heat Shrink	2	Tyco	Polyoefin	Red, 1/4-inch ID, Heatshrink
Heat Shrink	1	Tyco	Polyoefin	Black, 1/4-inch ID, Heatshrink
Ferrite	1	Tyco	0431176451	Ferrite 380 ohm, Hinged, 18.34 mm

Position	Color	Function
1	Black	Bat -
2	Red	Siren +
3	Red	Lighting (+)



Figure 1 Siren Connections



Overview of the PF400 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.

The next sections describe how to connect and wire each system component to the siren amplifier/relay module.

Convergence Network Ports

There are four plug-and-play serial ports that communicate on the Federal Signal Convergence Network. Federal Signal Network devices include exterior mount light bar, interior mount ILS systems, and remote keypads. For instructions on mounting network devices, refer to the instructions included with the products. For instructions on configuring the operation of the devices connected through the Convergence Network ports, see the Help menu in the Convergence Network Configuration Software.

Relay Outputs

The PF400 has a total of sixteen solid-state relay outputs available. Relays 1-6 can each provide up to 10 A switched from the battery terminal on the PF400. Relays 7-12 can each provide up to 5 A switched from the battery terminal on the PF400. Relays 13-16 can provide 500 mA total current switched to the ground. Relays 1-12 have a software-programmable current limit that can be set. By default, the current limit setting is disabled. Relays 1-12 can also be programmed to flash various patterns and dim levels. See the Convergence Network Configuration Software for all available programming options available for the PF400 relay outputs.

General Purpose Inputs

The PF400 has a total of four general purpose inputs available. These inputs are set to detect active-low (ground) by default. Each input can be programmed individually to detect an active-high (battery) or active-low (ground). All inputs are software-configurable options that include siren activation or siren mute, timer settings, and switch operation. See the Convergence Network Configuration Software for all available programming options available for the PF400 inputs.

Park Input

The park input circuit sends a signal to the siren amplifier/relay module to mute all siren functions except Air Horn and Manual and shut off any flashing white light in the light bar when the vehicle transmission is shifted into park. By default, this input is set to detect active-low (ground). The park input can be programmed to detect an active-high (battery) or active-low (ground). The functionality of the park wire

(as well as the input polarity) can be configured with the Convergence Network Configuration Software. If using FS Vehicle Integration to detect the park event, this wire is not used. Fold and seal.

Horn Ring Transfer

NOTICE

DETERMINE CURRENT FOR HORN: *The horn ring transfer circuit of the siren can switch a maximum of 5 A. Some vehicles do not have a horn relay and consequently will draw more than 5 A when the vehicle horn is activated. Consult your vehicle service manual or a qualified mechanic to determine the current required to activate the horn. If it is less than 5 A, perform step 3. If it is greater than 5 A, perform steps 4 through 9.*

The horn input circuit is designed to allow siren and lighting control from the vehicle horn. This input is set to detect active-low (ground) by default. The horn input can be programmed to detect an active-high (battery) or active-low (ground). The horn signal event may be available using FS Vehicle Integration, if so, fold and seal the unused leads.

NOTE: To enable horn-ring control of siren tones, obtain a SPST relay of enough contact-current capacity to activate the vehicle horn:

1. Cut the wire that connects the switch for the vehicle horn ring to the horn or horn relay. See Figure 1 on page 18.
2. Splice the white/yellow wire from the power cable to the horn ring side of the wire that you cut in step 1.
3. Splice the white wire from the power cable to the horn side of the cut wire.
4. Mount the SPST relay in a suitable location.
5. Connect the horn side of the wire cut in step 1 to the relay-contact terminal.
6. Determine the “sense” of the vehicle’s horn ring activation circuit. Does the horn circuit require a switched positive (active-high) voltage or switched ground (active-low) for activation?
7. Connect the switched relay-contact terminal to the positive or negative potential you determined in step 6.
8. Connect the white wire from the power cable to one end of the relay coil.
9. Connect the other end of the relay coil to the opposite potential of that connected to the switched relay contact terminal in step 7.

Speaker Connections

The Pathfinder® PF400/PF400Q is designed to operate with different speaker configurations. It can operate one to four 11-ohm impedance, 100 W speakers. If using more than one 11-ohm impedance, 100 W speakers, each must be wired on a separate channel of the amplifier and in phase for proper operation. See Figure 1 on page 18. The PF400/PF400Q is capable of multiple speaker and tone configurations. Dual tones with a Rumbler® can be accomplished without the need for an external Rumbler amplifier. See the Convergence Network Configuration Software for all available programming options available for the PF400 tones.

NOTE: Low frequency Siren Output in the table below refers to the Rumbler® speaker. The BP200, AS100, and ES100C speakers are high frequency.

Table 7 Channels and Output

Application		Channel 1	Channel 2	Channel 3	Channel 4	Siren Output
Fire Apparatus/ Ambulance	PF400Q	BP200		RBKIT2-COMPACT (one on each channel)		Single Tone High, Single Tone Low
		BP200		ES100C or AS124	RBKIT2- COMPACT	Dual Tone High, Single Tone Low
		BP200		BP200		Dual Tone High

If playing a Q Tone, BP200 or AS124 speakers are recommended

Fire Chief	PF400Q	AS124	AS124	RBKIT2-COMPACT or (2) RBKIT-SOLO (one on each channel)		Dual Tone High, Dual Tone Low
Police	PF400	ES100C	ES100C	RBKIT2-COMPACT or (2) RBKIT-SOLO (one on each channel)		Dual Tone High, Dual Tone Low
		ES100C	ES100C	ES100C	RBKIT- COMPACT or RBKIT2-SOLO	Tri Tone High, Single Tone Low
		ES100C	ES100C	ES100C	ES100C	Quad Tone High

Table 8 Speaker Wire Colors

Speaker Wire Colors	
1+	Blue
1-	Brown
2+	White/Blue
2-	White/Brown
3+	Green
3-	Orange
4+	White/Green
4-	White/Orange

Speaker Diagnostics

The Pathfinder PF400 siren is designed to detect speaker faults. Diagnostic LEDs available on the front of the keypad can provide the operating status of channels 1 and 2. The LEDs are fully programmable and can be set to steady burn or flash when the siren detects a fault or normal operation for each individual speaker. By default, the diagnostic LEDs are disabled but can be programmed with the Convergence Network Configuration Software.

Radio Re-Broadcast

The Radio Re-Broadcast inputs allow incoming two-way radio messages to be amplified by the siren amplifier/relay module and rebroadcast over the siren speakers. The Radio Re-Broadcast gain is set in the Convergence Network Configuration Software.

FS Vehicle Integration

The PF400 can interface with the vehicle's OBDII port or up-fitter CAN bus using a separately available cable harness. Common signals that can be obtained are transmission, door, headlight, brake, and speed status. Many other signals may be available, depending on the make and model of vehicle. See the Convergence Network Configuration Software for programming options. If using FS Vehicle Integration, discrete wiring inputs may not be required for park, horn ring, and/or ignition. By default, the PF400 has the FS Vehicle Integration port disabled.

Ignition Input

The ignition input is a programmable active high input that can be used to turn on and off the PF400 system. The ignition input should be hooked up to the vehicle-supplied ignition only. Using other sources (e.g., relays, aftermarket modules) may cause damage to the PF400 ignition input. This input can be programmed to keep the system alive for a set time after ignition is removed. By default, this input is set to turn off the system immediately when ignition is removed. The functionality of the ignition wire can be configured with the Convergence Network Configuration Software. If using FS Vehicle Integration to detect the ignition event or key position, this wire is not used. Fold and seal.

System Power

The PF400 system includes a three-wire pigtail assembly for connecting the battery. The red (positive) and black (negative ground) power leads from the siren to the vehicle battery should be as short and direct as possible. A separate power lead is supplied to power the relay outputs. Connect the siren and relay red wires independently through in-line fuses to the positive battery terminal. The fuse must be of an amperage capacity sufficient to handle the total vehicle electrical loads plus siren. Connect the black lead to the negative battery terminal.

Mounting the PF400

The next step in the installation after wiring and connecting the system 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.*

NOTICE

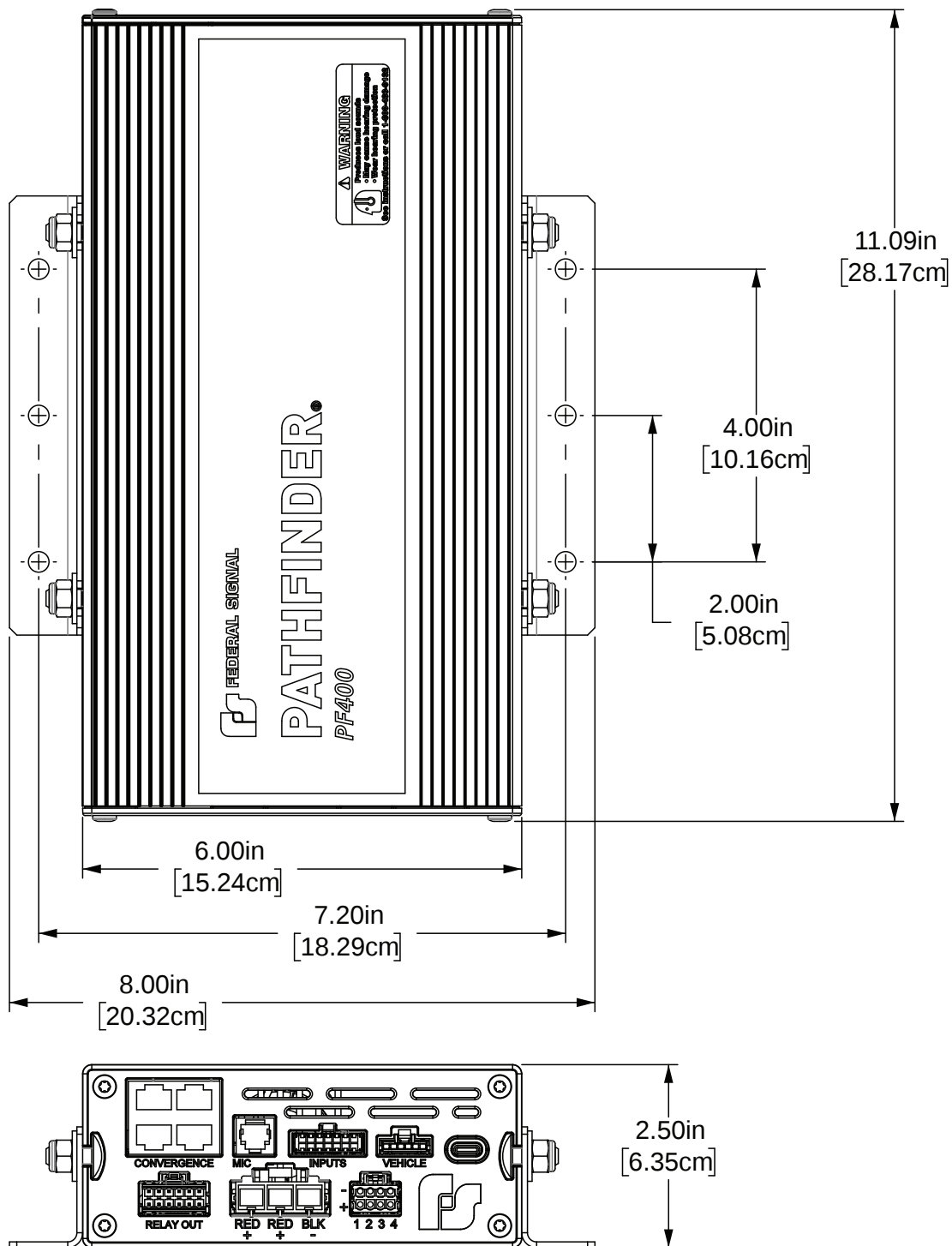
UNIT REQUIRES AIR FLOW: *Do not install the siren in areas where the air flow is restricted. Do not mount the unit near a heater duct or under the hood.*

⚠ WARNING

MODULE IS NOT WATERPROOF: *The housing of the siren is NOT waterproof.*

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. Installer-supplied mounting hardware is required to mount the siren.

Figure 2 PF400 Dimensions



Mounting the Siren

To mount the siren:

1. Use the bracket as a template to mark the centers of the two mounting holes.

NOTICE

DRILLING PRECAUTIONS: *Before drilling holes, check the area into which you plan to drill to ensure that you do not damage vehicle components. All drilled holes should be deburred and all sharp edges should be smoothed. 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.*

2. Choose a bit appropriate for the installer-supplied mounting hardware and drill the center of the two mounting holes.
3. Mount the bracket with the installer-supplied mounting hardware.
4. Insert the 1/4-20 carriage bolts into the bracket and loosely install the 1/4-inch washers and Keps® nuts.
5. Slide the siren onto the bracket assembly and tighten the 1/4-inch nuts. Do not overtighten.

Mounting the Control Head

The control head comes with a mounting bracket and mounting hardware.

⚠ WARNING

LOCATING OPERATOR CONTROLS: *The controls for the light system must be located so that the VEHICLE and CONTROLS can be operated safely under all driving conditions.*

To mount the control head:

1. Secure a bracket to the control head with user-supplied 6-32 by 1/4-inch Phillips® screws and #6 lock washers.
2. Using a 7/16-inch nut driver, secure the other bracket to the control head/ bracket assembly with the 1/4-20 by 3/4-inch hex head screws and 1/4-inch lock washers.
3. Use the mounting bracket as a template and scribe two drill position marks at the selected mounting location.

NOTICE

DRILLING PRECAUTIONS: Before drilling holes, check the area into which you plan to drill to ensure that you do not damage vehicle components. All drilled holes should be deburred and all sharp edges should be smoothed. 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.

4. With an 11/64-inch bit, drill two mounting holes at the drill position marks.
5. Secure the mounting bracket to the mounting surface with user-supplied #10 thread-forming screws.

Figure 3 Bracket Attached to Back of PF400 Control Head

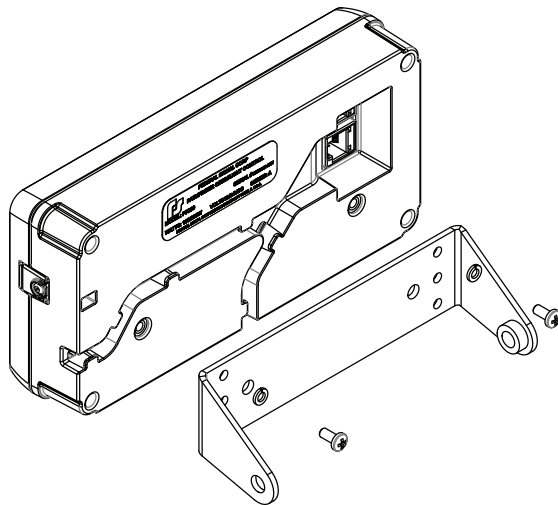
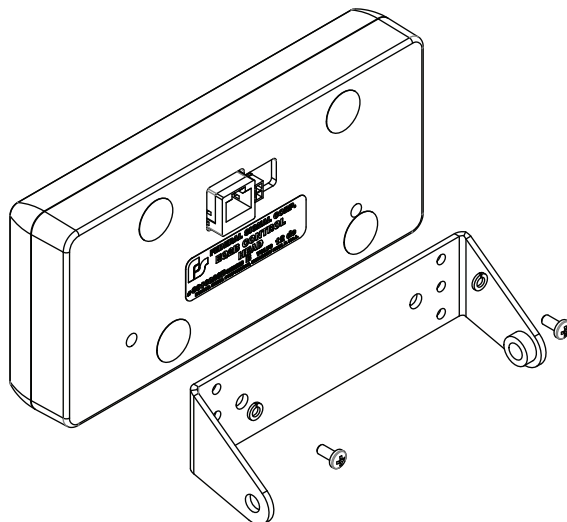


Figure 4 Bracket Attached to Back of PF400Q Control Head



6. To adjust the angle of the control head, loosen the hinge screws, tilt the control head forward or backward, and then securely tighten the screws

Mounting the Flush-Mount Control Head

For directions on mounting the standard control head, see page 25. the flush-mount control head comes with mounting hardware.

Tools needed:

- Drill with #37 drill bit
- Template
- Phillips® screwdriver
- Pencil
- Sabre saw

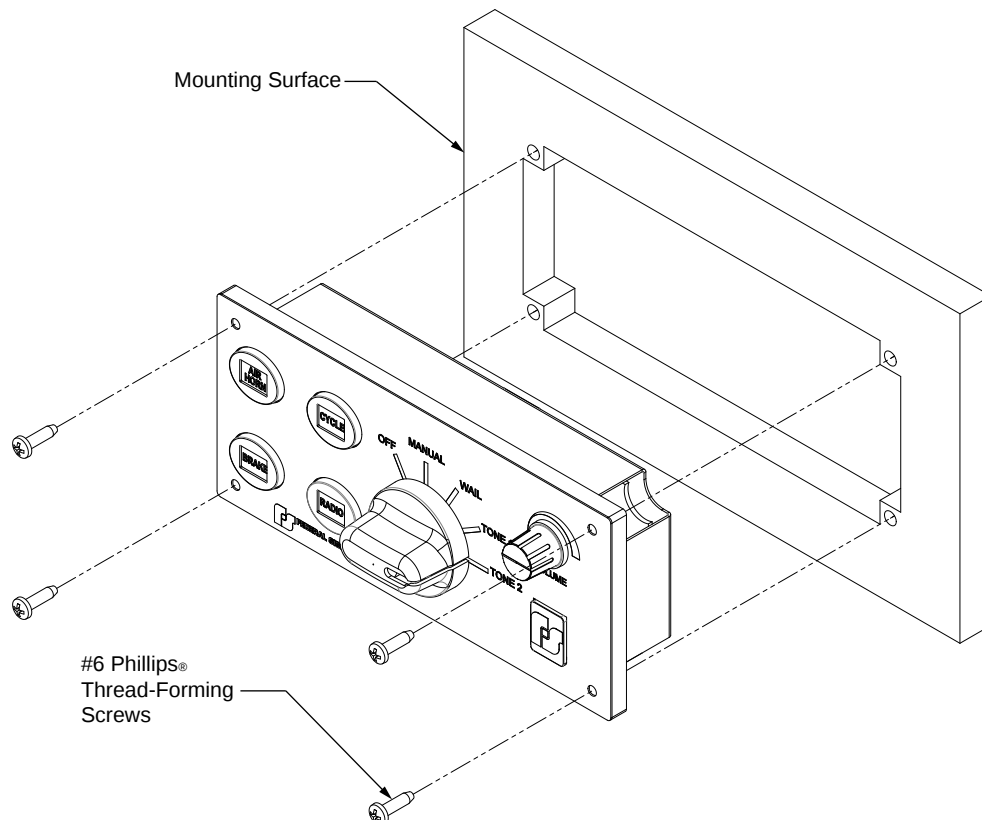
⚠ WARNING

LOCATING OPERATOR CONTROLS: *The controls for the light system must be located so that the VEHICLE and CONTROLS can be operated safely under all driving conditions.*

To mount the control head:

1. Select a mounting location for the control head. See Figure 5. The control head must be mounted within convenient reach of the operator, typically in the vehicle console.

Figure 5 Flush-mount control head



NOTICE

VERIFY TEMPLATE DIMENSIONS: Before using the mounting template, verify that the template is to size and all dimensions are correct.

NOTICE

DRILLING PRECAUTIONS: Before drilling holes, check the area into which you plan to drill to ensure that you do not damage vehicle components. All drilled holes should be deburred and all sharp edges should be smoothed. 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.

2. Use the template on page 50 as a guide to scribe the four mounting holes and the cutout in the mounting surface.
3. Drill a mounting hole 0.10-inch in diameter at each of the four scribed marks.
4. Use a sabre saw to cut out the scribed opening for the light.
5. After completing the system wiring, insert the control head into the cutout and secure it with the four supplied #6B screws.

Testing the PF400 Installation

The PF400 is programmed with a default configuration that you can use to quickly check your initial installation system before you configure the system. 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.

Table 9 PF400Q Amp Only Input Default Programming

Button	Default Function	Polarity
Ignition	System Enable, Immediate system shutdown (no delay) ignition OFF, Horn Ring Transfer Active	BAT
Park	- Siren Mute - Flashing Takedown Cutoff (LB)	GND
Input 1	Air Horn	GND
Input 2	Q Siren Momentary Cycle	GND
Input 3	Q Siren Momentary Brake	GND
Input 4	Lightbar- Pattern 27, Flashing Takedowns	GND
Horn Ring	- When no tone is Active and Park is OFF, Steps through Q Wail, Q Yelp, and Q Priority with Rumbler® - Long Press, Air Horn	GND

Figure 6 PF400Q, PF400Q-SPEC1, and PF400QFM Controllers

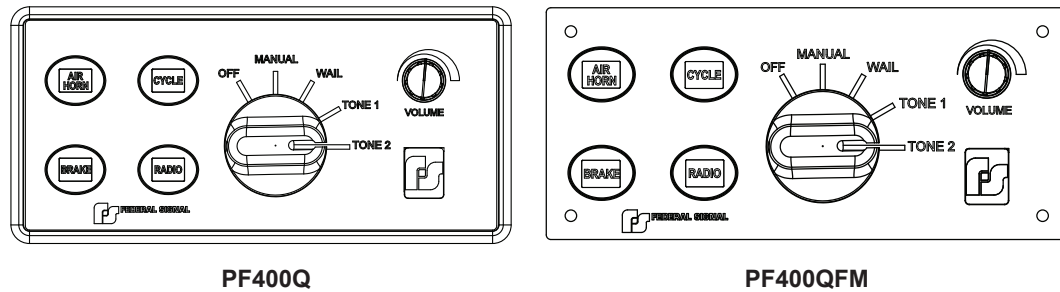


Table 10 PF400Q, PF400Q-SPEC1 and PF400QFM Default Programming

Button	Default Function
Button 1	Air Horn
Button 2	Q Siren Momentary Cycle (MANUAL Dependent)
Button 3	Q Siren Momentary Brake (MANUAL Dependent)
Button 4	Radio Re-Broadcast
Rotary - Off	No Active Tone, Buttons and Inputs inop.
Rotary - Manual	No Active Tone, Horn Ring Transfer Active
Rotary - Wail	Q Siren Wail, Horn Ring Transfer Active
Rotary - 1	Q Siren Yelp, Horn Ring Transfer Active
Rotary - 2	Q Siren Priority, Horn Ring Transfer Active

Table 11 PF400Q, PF400Q-SPEC1 and PF400QFM Input Default Programming

Button	Default Function	Polarity
Ignition	System Enable, Immediate system shutdown (no delay) ignition OFF	BAT
Park	Siren Mute	GND
Input 1	Air Horn	GND
Input 2	Q Siren Momentary Cycle	GND
Input 3	Q Siren Momentary Brake	GND
Input 4	Rumbler Activation	GND
Horn Ring	- When MANUAL is Active, Air Horn - When a tone is Active and PARK is ON, Air Horn - When SS3 and Wail are Active and PARK is OFF, Toggles between Q Yelp and Q Wail with Rumbler® - When SS3 and Tone are is Active and PARK is OFF, Toggles between Q Priority and Q Yelp with Rumbler - When SS3 and Tone 2 are Active and PARK is OFF, Toggles between Q Wail and Q Priority with Rumbler - Long Press when tone is Active and PARK is OFF, Air Horn	GND

Figure 7 PF400R/PF400QR Controller

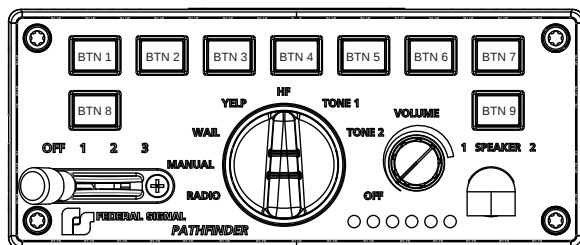


Table 12 PF400QR Remote Default Programming

Button	Default Function
Slide Switch 1	• Light Bar — Pattern 10, Front Cutoff • ILS — Rear Pattern 10 • CNSM— Rear Pattern 10 • Relays 1 and 13 ON
Slide Switch 2	• Light Bar — Pattern 17 • ILS — Front and Rear Pattern 17 • CNSM — Front and Rear Pattern 17 • Horn Ring Transfer Active • Relays 1, 2, 3, and 13 ON
Slide Switch 3	• Light Bar — Pattern 27, Flashing Takedowns • ILS — Front and Rear Pattern 27, Flashing Takedowns • CNSM — Front and Rear Pattern 27, Flashing Takedowns • Horn Ring Transfer Active • Relays 1, 2, 3, 4, 5, 13, and 14 ON
Button 1	Q Siren Momentary Cycle (Slide Switch 3 Dependent)
Button 2	Q Siren Momentary Brake
Button 3	• Step 1 — Left Alley (LB), Relay 7 ON • Step 2 — Left Scene (LB/ILS/CNSM), Relay 7 ON
Button 4	• Step 1 — Takedown (LB/ILS/CNSM), Relays 11 and 12 ON • Step 2 — Front Scene (LB/ILS/CNSM), Relays 11 and 12 ON
Button 5	• Step 1 — Right Alley (LB), Relay 8 ON • Step 2 — Right Scene (LB/ILS/CNSM), Relay 8 ON
Button 6	Dimming (LB/ILS/CNSM)
Button 7	Cruise II (LB/ILS/CNSM)
Button 8	Air Horn
Button 9	• Step 1 — SignalMaster® Left (LB/ILS/CNSM) • Step 2 — SignalMaster Right (LB/ILS/CNSM) • Step 3 — SignalMaster Center-Out (LB/ILS/CNSM) • Step 4 — SignalMaster Warn 4 (LB/ILS/CNSM)
Rotary - Radio	Radio Re-Broadcast
Rotary - Standby	No Active Tone
Rotary - Wail	Q Siren Wail (Slide Switch 3 Dependent)
Rotary - Yelp	Q Siren Yelp (Slide Switch 3 Dependent)
Rotary - HF	Hand-Free Horn ring control active (Slide Switch 3 Dependent)
Rotary - Tone 1	Q Siren Priority (Slide Switch 3 Dependent)
Rotary - Tone 2	Powercall (Slide Switch 3 Dependent)

Table 13 PF400QR Remote Input Default Programming

Button	Default Function	Polarity
Ignition	System Enable, Immediate system shutdown (no delay) ignition OFF	BAT
Park	- Siren Mute - Relay 14 OFF - Flashing Takedown Cutoff (LB/ILS/CNSM)	GND
Input 1	Remote SS1 Activation	GND
Input 2	Remote SS2 Activation	GND
Input 3	Remote SS3 Activation	GND
Input 4	Rumbler Activation	GND
Horn Ring	- When SS2 is Active, SSP Air Horn - When SS3 is Active and PARK is ON, SSP Air Horn - When SS3 and Wail are Active and PARK is OFF, Toggles between Q Yelp and Q Wail with Rumbler® - When SS3 and Yelp are Active and PARK is OFF, Toggles between Q Priority and Q Yelp with Rumbler - When SS3 and Tone 1 are Active and PARK is OFF, Toggles between Q Powercall and Q Priority with Rumbler - When SS3 and Tone 2 are Active and PARK is OFF, Toggles between Q Wail and Q Powercall with Rumbler - When SS3 and HF are Active and PARK is OFF, Three-Step Q Wail, Yelp, and Priority with Rumbler	GND

Table 14 PF400R Remote Default Programming

Button	Default Function
Slide Switch 1	• Light Bar — Pattern 10, Front Cutoff • ILS — Rear Pattern 10 • CNSM- Rear Pattern 10 • Relays 1 and 13 ON
Slide Switch 2	• Light Bar — Pattern 17 • ILS — Front and Rear Pattern 17 • CNSM — Front and Rear Pattern 17 • Horn Ring Transfer Active • Relays 1, 2, 3, and 13 ON
Slide Switch 3	• Light Bar — Pattern 27, Flashing Takedowns • ILS — Front and Rear Pattern 27, Flashing Takedowns • CNSM — Front and Rear Pattern 27, Flashing Takedowns • Horn Ring Transfer Active • Relays 1, 2, 3, 4, 5, 13, and 14 ON
Button 1	SSP Manual Peak n Hold
Button 2	• Step 1 — Left Alley (LB), Relay 7 ON • Step 2 — Left Scene (LB/ILS/CNSM), Relay 7 ON
Button 3	• Step 1 — Takedown (LB/ILS/CNSM), Relays 11 and 12 ON • Step 2 — Front Scene (LB/ILS/CNSM), Relays 11 and 12 ON
Button 4	• Step 1 — Right Alley (LB), Relay 8 ON • Step 2 — Right Scene (LB/ILS/CNSM), Relay 8 ON
Button 5	Dimming (LB/ILS/CNSM)
Button 6	Cruise II (LB/ILS/CNSM)
Button 7	• Step 1 — SignalMaster® Left (LB/ILS/CNSM) • Step 2 — SignalMaster Right (LB/ILS/CNSM) • Step 3 — SignalMaster Center-Out (LB/ILS/CNSM) • Step 4 — SignalMaster Warn 4 (LB/ILS/CNSM)
Button 8	SSP Air Horn
Button 9	Relay 6 ON (8-Second Timer)
Rotary - Radio	Radio Re-Broadcast
Rotary - Standby	No Active Tone
Rotary - Wail	SSP Wail (Slide Switch 3 Dependent)
Rotary - Yelp	SSP Yelp (Slide Switch 3 Dependent)
Rotary - HF	Hand-Free Horn ring control active (Slide Switch 3 Dependent)
Rotary - Tone 1	SSP Priority (Slide Switch 3 Dependent)
Rotary - Tone 2	Dual Tone; SSP Wail and SSP Yelp (Slide Switch 3 Dependent)

Table 15 PF400R Remote Input Default Programming

Button	Default Function	Polarity
Ignition	System Enable, Immediate system shutdown (no delay) ignition OFF	BAT
Park	- Siren Mute - Relay 14 OFF - Flashing Takedown Cutoff (LB/ILS/CNSM)	GND
Input 1	Remote SS1 Activation	GND
Input 2	Remote SS2 Activation	GND
Input 3	Remote SS3 Activation	GND
Input 4	No Function	GND
Horn Ring	- When SS2 is Active, SSP Air Horn - When SS3 is Active, no tone selected, and PARK is OFF, Q Siren Cycle - When SS3 is Active and PARK is ON, Air Horn - When SS3 and Q Wail are Active and PARK is OFF, advances to Q Yelp with Rumbler® - When SS3 and Q Priority are Active and PARK is OFF, advances to Q Wail with Rumbler - When SS3 and Q Yelp are Active and PARK is OFF, advances to Q Priority with Rumbler	GND

Figure 8 PF400S6 Remote Input Default Programming

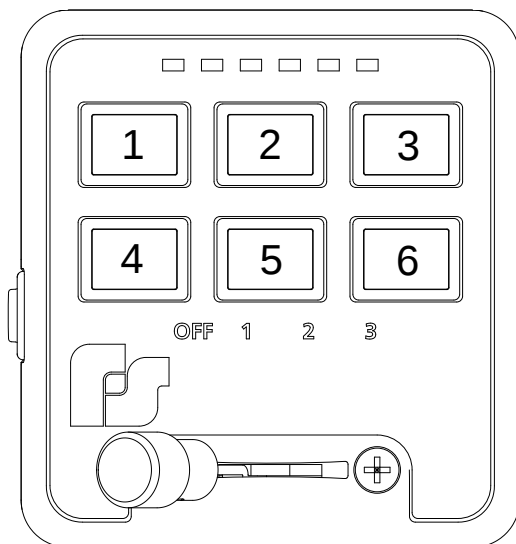


Table 16 PF400S6 Remote Default Programming

Button	Default Function
Slide Switch 1	• Light Bar - Pattern 10, Front Cutoff • ILS - Rear Pattern 10 • CNSM - Rear Pattern 10 • Relays 1 and 13 ON
Slide Switch 2	• Light Bar - Pattern 17 • ILS - Front and Rear Pattern 17 • CNSM - Front and Rear Pattern 17 • Relays 1, 2, 3 and 13 ON
Slide Switch 3	• Light Bar - Pattern 27, Flashing Takedowns • ILS - Front and Rear Pattern 27, Flashing Takedowns • CNSM - Front and Rear Pattern 27, Flashing Takedowns • Horn Ring Transfer Active • Relays 1, 2, 3, 4, 5, 13, and 14 ON
Button 1	Wail
Button 2	Yelp
Button 3	Priority
Button 4	Take Down/ Alley
Button 5	Scene Left / Scene Right/ Full Scene Step
Button 6	Sm Left / Right / Center / Warn 4 / Step

Table 17 PF400S6 Remote Input Default Programming

Button	Default Function	Polarity
Ignition	- System Enable, Immediate system shutdown (no delay) - Ignition OFF	BAT
Park	- Suren Mute - Relay 14 OFF - Flashing Takedown Cutoff (LB/ILS/CNSM)	GND
Input 1	Remote SS1 Activation	GND
Input 2	Remote SS2 Activation	GND
Input 3	Remote SS3 Activation	GND
Input 4	Button 5 - Moves to Full Scene	GND
Horn Ring	- When Slide Switch 3 is on AND Button 1 is on OR Button 3 is on OR Button 2 is on AND PARK is off - When Slide Switch 2 is on OR IN2 is on, Air Horn - When Slide Switch 3 is on OR IN3 is on AND PARK is on, Air Horn - When Slide Switch 3 is on OR IN3 is on Button 1 is off AND Button 2 is off AND Button 3 is off AND PARK is off, Air Horn - When Button 3 is on AND Slide Switch 3 is on OR IN3 is on AND Park is off, Button 1 Toggles - When Button 2 is on AND Slide Switch 3 is on OR IN3 is on AND PARK is off, Button 3 Toggles - When Slide Switch 3 is on OR IN3 is on AND Button 1 is on AND PARK is off, Button 2 Toggles On	GND

Figure 9 PF400/PF400Q 17-Button Controller

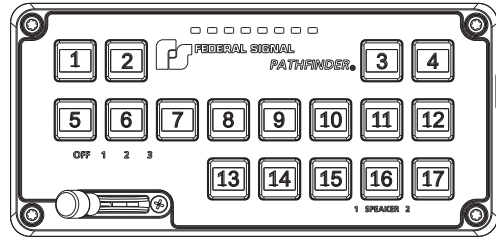


Table 18 PF400QS17B Switch Default Programming

Switch	Default Function
Slide Switch 1	- Light Bar — Pattern 10, Front Cutoff - ILS — Rear Pattern 10 - CNSM- Rear Pattern 10 - Relays 1 and 13 ON
Slide Switch 2	- Light Bar — Pattern 17 - ILS — Front and Rear Pattern 17 - CNSM — Front and Rear Pattern 17 - Horn Ring Transfer Active - Relays 1, 2, 3, and 13 ON
Slide Switch 3	- Light Bar — Pattern 27, Flashing Takedowns - ILS — Front and Rear Pattern 27, Flashing Takedowns - CNSM — Front and Rear Pattern 27, Flashing Takedowns - Horn Ring Transfer Active - Button 17 ON - Relays 1, 2, 3, 4, 5, 13, and 14 ON
Button 1	- Step 1 — SignalMaster® Left (LB/ILS/CNSM) - Step 2 — SignalMaster Right (LB/ILS/CNSM) - Step 3 — SignalMaster Center-Out (LB/ILS/CNSM)
Button 2	- Step 1 — SignalMaster Warn 1 (LB/ILS/CNSM) - Step 2 — SignalMaster Warn 2 (LB/ILS/CNSM) - Step 3 — SignalMaster Warn 3 (LB/ILS/CNSM) - Step 4 — SignalMaster Warn 4 (LB/ILS/CNSM)
Button 3	Dimming (LB/ILS/CNSM)
Button 4	Cruise (LB/ILS/CNSM)
Button 5	Standby- No Active Tone
Button 6	Radio Re-Broadcast
Button 7	Q Siren Wail (Slide Switch 3 Dependent)
Button 8	Q Siren Yelp (Slide Switch 3 Dependent)
Button 9	Q Siren Priority (Slide Switch 3 Dependent)
Button 10	Q Siren Momentary Cycle (Slide Switch 3 Dependent)
Button 11	Q Siren Momentary Brake
Button 12	Air Horn Mix
Button 13	- Step 1 — Left Alley (LB), Relay 7 ON - Step 2 — Left Scene (LB/ILS/CNSM), Relay 7 ON
Button 14	- Step 1 — Takedown (LB/ILS/CNSM), Relays 11 and 12 ON - Step 2 — Front Scene (LB/ILS/CNSM), Relays 11 and 12 ON
Button 15	- Step 1 — Right Alley (LB), Relay 8 ON - Step 2 — Right Scene (LB/ILS/CNSM), Relay 8 ON
Button 16	Pattern 22, Flashing Takedowns/Alleys (LB/ILS/CNSM) 8-Second momentary intersection
Button 17	Relay 10 ON

Table 19 PF400QS17B Input Switch Default Programming

Button	Default Function	Polarity
Ignition	System Enable, Immediate system shutdown (no delay) ignition OFF	BAT
Park	- Siren Mute - Relay 14 OFF - Button 17 OFF - Flashing Takedown Cutoff (LB/ILS/CNSM)	GND
Input 1	Remote SS1 Activation	GND
Input 2	Remote SS2 Activation	GND
Input 3	Remote SS3 Activation	GND
Input 4	No Function	GND
Horn Ring	- When SS2 is Active, Air Horn - When SS3 is Active and PARK is ON, SSP Air Horn - When SS3 and Wail are Active and PARK is OFF, Toggles between SSP Yelp and Wail with Rumbler® - When SS3 and Yelp are Active and PARK is OFF, Toggles between SSP Priority and Yelp with Rumbler - When SS3 and Tone 1 are Active and PARK is OFF, SSP Air Horn - When SS3 and Tone 2 are Active and PARK is OFF, SSP Air Horn - When SS3 and HF are Active and PARK is OFF, Four-Step SSP Wail/Yelp, and Priority with Rumbler	GND

Table 20 PF400S17B Switch Default Programming

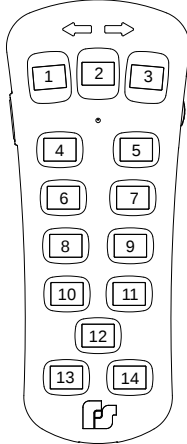
Switch	Default Function
Slide Switch 1	• Light Bar — Pattern 10, Front Cutoff • ILS — Rear Pattern 10 • CNSM- Rear Pattern 10 • Relays 1 and 13 ON
Slide Switch 2	• Light Bar — Pattern 17 • ILS — Front and Rear Pattern 17 • CNSM — Front and Rear Pattern 17 • Horn Ring Transfer Active • Relays 1, 2, 3, and 13 ON
Slide Switch 3	• Light Bar — Pattern 27, Flashing Takedowns • ILS — Front and Rear Pattern 27, Flashing Takedowns • CNSM — Front and Rear Pattern 27, Flashing Takedowns • Horn Ring Transfer Active • Relays 1, 2, 3, 4, 5, 13, and 14 ON
Button 1	• Step 1 — SignalMaster® Left (LB/ILS/CNSM) • Step 2 — SignalMaster Right (LB/ILS/CNSM) • Step 3 — SignalMaster Center-Out (LB/ILS/CNSM)
Button 2	• Step 1 — SignalMaster Warn 1 (LB/ILS/CNSM) • Step 2 — SignalMaster Warn 2 (LB/ILS/CNSM) • Step 3 — SignalMaster Warn 3 (LB/ILS/CNSM) • Step 4 — SignalMaster Warn 4 (LB/ILS/CNSM)
Button 3	Dimming (LB/ILS/CNSM)
Button 4	Rear Cutoff (LB/ILS/CNSM)
Button 5	Standby- No Active Tone
Button 6	Radio Re-Broadcast
Button 7	Relay 9 ON
Button 8	SSP Wail (Slide Switch 3 Dependent)
Button 9	SSP Yelp (Slide Switch 3 Dependent)
Button 10	SSP Priority (Slide Switch 3 Dependent)
Button 11	SSP Manual Peak n Hold
Button 12	SSP Air Horn
Button 13	• Step 1 — Left Alley (LB), Relay 7 ON • Step 2 — Left Scene (LB/ILS/CNSM), Relay 7 ON
Button 14	• Step 1 — Takedown (LB/ILS/CNSM), Relays 11 and 12 ON • Step 2 — Front Scene (LB/ILS/CNSM), Relays 11 and 12 ON
Button 15	• Step 1 — Right Alley (LB), Relay 8 ON • Step 2 — Right Scene (LB/ILS/CNSM), Relay 8 ON
Button 16	Pattern 22, Flashing Takedowns/Alleys (LB/ILS/CNSM) 8-Second momentary intersection
Button 17	Relay 6 ON (8-Second Timer)

Table 21 PF400QS-LACOFD Remote Default Programming

Switch	Default Function
Slide Switch 1	- Slide Switch 1 10 A Relay On - Black Wire - FSJoin™ Light Bar - Rear Amber Alternate Flash
Slide Switch 2	- Slide Switch 1 10 A Relay On - Black Wire - Slide Switch 2 10 A Relay On - Green Wire - Steady Red 5 A Relay On - Blue Wire - Horn Ring Transfer Active - FSJoin Light Bar - Rear Red/Amber Alternate Flash and SBR
Slide Switch 3	- Slide Switch 1 10 A Relay On - Black Wire - Slide Switch 2 10 A Relay On - Green Wire - Slide Switch 3 10 A Relay On - White Wire - Steady Red 5 A Relay On - Blue Wire - Horn Ring Transfer Active - FSJoin Light Bar - Full Red/Amber/White Alternate Flash
Button 1	Q Siren Momentary Cycle
Button 2	Q Siren Momentary Brake
Button 3	Light Bar Front Light Cut - FSJoin Lightbar Only
Button 4	Light Bar Rear Light Cut - FSJoin Lightbar Only
Button 5	Standby - No Active Tone
Button 6	Q Siren Wail
Button 7	Q Siren Yelp
Button 8	PA Low
Button 9	PA High
Button 10	Radio Rebroadcast
Button 11	SignalMaster™ Left/Right/Center Out
Button 12	Air Horn
Button 13	Left Alley - Left Alley 5 A Relay On - Violet Wire
Button 14	TakeDown (SS 2 and 3 Dependent) - 10 A Relay On - Yellow Wire
Button 15	Right Alley - Right Alley 5 A Relay On - Red Wire
Button 16	Rear Scene - 10 A Relay On - Gray Wire
Button 17	Amber

Table 22 PF400S17B Input Switch Default Programming

Button	Default Function	Polarity
Ignition	System Enable, Immediate system shutdown (no delay) ignition OFF	BAT
Park	• Siren Mute • Relay 14 OFF • Flashing Takedown Cutoff (LB/ILS/CNSM)	GND
Input 1	Remote SS1 Activation	GND
Input 2	Remote SS2 Activation	GND
Input 3	Remote SS3 Activation	GND
Input 4	No Function	GND
Horn Ring	• When SS2 is Active, SSP Air Horn • When SS3 is Active and PARK is ON, SSP Air Horn • When SS3 and Wail are Active and PARK is OFF, advances to SSP Yelp with Rumbler® • When SS3 and Priority are Active and PARK is OFF, advances to SSP Wail with Rumbler • When SS3 and Yelp are Active and PARK is OFF, advances to SSP Priority with Rumbler	GND

Figure 10 PF400H/PF400QH Handheld Controller**Table 23 PF400QH Hand-Held Default Programming**

Button	Default Function
Button 1	• Light Bar — Pattern 10, Front Cutoff • ILS — Rear Pattern 10 • CNSM — Rear Pattern 10 • Relays 1 and 13 ON
Button 2	• Light Bar — Pattern 17 • ILS — Front and Rear Pattern 17 • CNSM — Front and Rear Pattern 17 • Horn Ring Transfer Active • Relays 1, 2, 3, and 13 ON
Button 3	• Light Bar — Pattern 27, Flashing Takedowns • ILS — Front and Rear Pattern 27, Flashing Takedowns • CNSM — Front and Rear Pattern 27, Flashing Takedowns • Horn Ring Transfer Active • Q Wail Active • Button 8 Active • Relays 1, 2, 3, 4, 5, 13, and 14 ON
Button 4	Q Wail (Button 3 Dependent)
Button 5	Q Yelp (Button 3 Dependent)
Button 6	Air horn
Button 7	Q Priority (Button 3 Dependent)
Button 8	Relay 6 ON
Button 9	Dimming (LB/ILS/CNSM)
Button 10	• Step 1 — Left Alley (LB), Relay 7 ON • Step 2 — Left Scene (LB/ILS/CNSM), Relay 7 ON
Button 11	• Step 1 — Right Alley (LB), Relay 8 ON • Step 2 — Right Scene (LB/ILS/CNSM), Relay 8 ON
Button 12	• Step 1 — Takedown (LB/ILS/CNSM), Relays 11 and 12 ON • Step 2 — Front Scene (LB/ILS/CNSM), Relays 11 and 12 ON
Button 13	• Step 1 — SignalMaster® Left (LB/ILS/CNSM) • Step 2 — SignalMaster Right (LB/ILS/CNSM) • Step 3 — SignalMaster Center-Out (LB/ILS/CNSM) • Step 4 — SignalMaster Warn 4 (LB/ILS/CNSM)
Button 14	Cruise (LB/ILS/CNSM)

Table 24 PF400QH Hand-Held Input Default Programming

Button	Default Function	Polarity
Ignition	System Enable, Immediate system shutdown (no delay) ignition OFF	BAT
Park	• Siren Mute • Relay 14 OFF • Flashing Takedown Cutoff (LB/ILS/CNSM)	GND
Input 1	Remote Button1 Activation	GND
Input 2	Remote Button 2 Activation	GND
Input 3	Remote Button 3 Activation	GND
Input 4	No Function	GND
Horn Ring	• When Button 2 is Active, Air Horn • When Button 3 is Active and PARK is ON, Air Horn • When Button 3 and Q Wail are Active and PARK is OFF, advances to Q Yelp with Rumbler® • When Button 3 and Q Yelp are Active and PARK is OFF, advances to Q Priority with Rumbler • When Button 3 and Q Priority are Active and PARK is OFF, advances to Q Wail with Rumbler	GND

Table 25 PF400H Hand-Held Default Programming

Button	Default Function
Button 1	• Light Bar — Pattern 10, Front Cutoff • ILS — Rear Pattern 10 • CNSM — Rear Pattern 10 • Relays 1 and 13 ON
Button 2	• Light Bar — Pattern 17 • ILS — Front and Rear Pattern 17 • CNSM — Front and Rear Pattern 17 • Horn Ring Transfer Active • Relays 1, 2, 3, and 13 ON
Button 3	• Light Bar — Pattern 27, Flashing Takedowns • ILS — Front and Rear Pattern 27, Flashing Takedowns • CNSM — Front and Rear Pattern 27, Flashing Takedowns • Horn Ring Transfer Active • SSP Wail Active • Relays 1, 2, 3, 4, 5, 13, and 14 ON
Button 4	SSP Manual Peak n Hold
Button 5	SSP Air Horn
Button 6	Dual Tone SSP Wail and SSP Yelp (Button 3 Dependent)
Button 7	SSP Priority (Button 3 Dependent)
Button 8	Cruise (LB/ILS/CNSM)
Button 9	Dimming (LB/ILS/CNSM)
Button 10	• Step 1 — Left Alley (LB), Relay 7 ON • Step 2 — Left Scene (LB/ILS/CNSM), Relay 7 ON
Button 11	• Step 1 — Right Alley (LB), Relay 8 ON • Step 2 — Right Scene (LB/ILS/CNSM), Relay 8 ON
Button 12	• Step 1 — Takedown (LB/ILS/CNSM), Relays 11 and 12 ON • Step 2 — Front Scene (LB/ILS/CNSM), Relays 11 and 12 ON
Button 13	• Step 1 — SignalMaster® Left (LB/ILS/CNSM) • Step 2 — SignalMaster Right (LB/ILS/CNSM) • Step 3 — SignalMaster Center-Out (LB/ILS/CNSM) • Step 4 — SignalMaster Warn 4 (LB/ILS/CNSM)
Button 14	Relay 6 ON (8-Second Timer)

Table 26 PF400H Hand-Held Input Default Programming

Button	Default Function	Polarity
Ignition	System Enable, Immediate system shutdown (no delay) ignition OFF	BAT
Park	• Siren Mute • Relay 14 OFF • Flashing Takedown Cutoff (LB/ILS/CNSM)	GND
Input 1	Remote Button 1 Activation	GND
Input 2	Remote Button 2 Activation	GND
Input 3	Remote Button 3 Activation	GND
Input 4	No Function	GND
Horn Ring	• When Button 2 is Active, SSP Air Horn • When Button 3 is Active and PARK is ON, SSP Air Horn • When Button 3 and Wail are Active and PARK is OFF, steps through SSP Yelp, Wail/Yelp, and Priority with Rumbler • When Button 3 and Priority are Active and PARK is OFF, SSP Air Horn • When Button 3 and Dual Tone Wail/Yelp are Active and PARK is OFF, SSP Air Horn	GND

Control Head Legends and Safety Messages

To complete the installation, the kit includes:

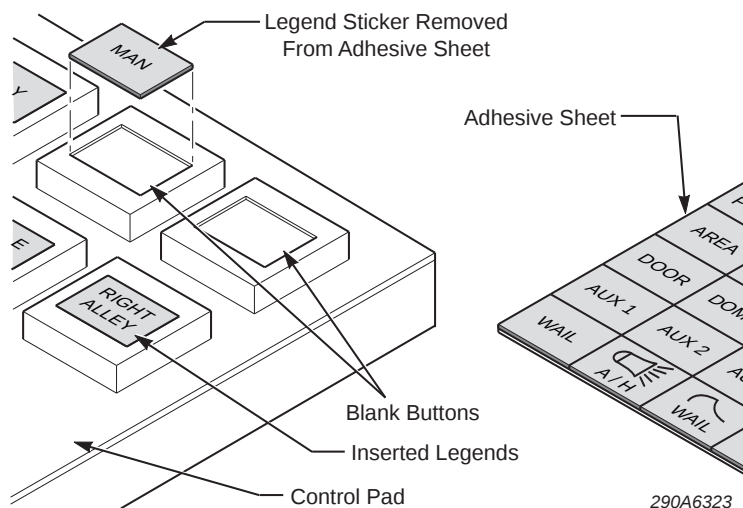
- A scored sheet of replaceable keypad legends that identify the functions of the control head buttons. Before installing the legends, configure the operation of the control head with the Convergence Configuration Software. (See the Convergence Network Software Configuration Manual, part no. 2562418.)
- A scored sheet of two labels with precautions to guard against hearing loss when operating the siren (part no. 1612339).
- A safety message card for operators of Federal Signal Sound and Light System (part no. 256B691).

Applying the Replaceable Control Head Legends

To apply the legends:

1. Peel the appropriate legends from the sheet and apply them to the control head buttons.
2. Verify that the label is properly tucked under the retaining ridge on the button.

Figure 11 Installing the Control Head Labels



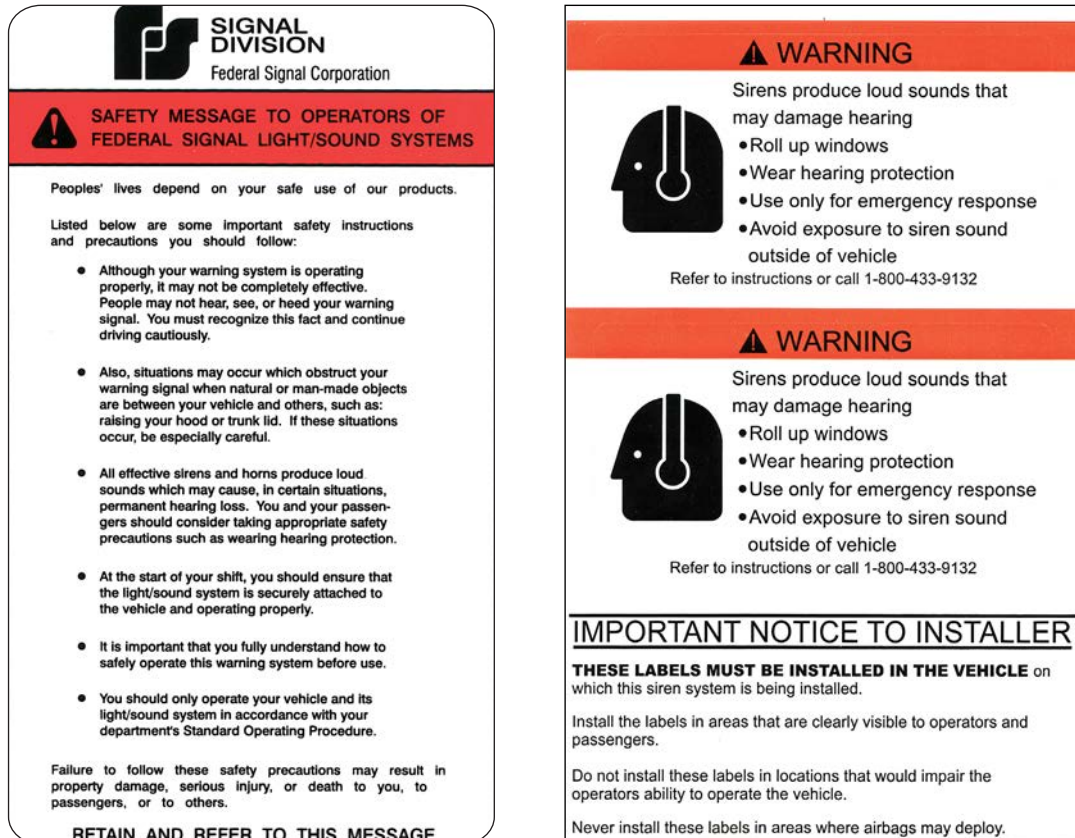
Distributing the Safety Message Card

Give the operator of the system the card entitled “Safety Message to Operators of Federal Signal Light/Sound Systems” (part no. 256B691). See Figure 11. The operator must read and understand the safety instructions and keep the card in the vehicle for reference.

Applying the Siren Safety Labels in the Vehicle

The kit includes a sheet of two labels with siren safety messages (part no. 1612339). See Figure 11. These labels must be installed in the vehicle in which the system is installed. Install these labels in areas that are clearly visible to operators and passengers. Do not install the labels in locations that would impair the operators' ability to operate the vehicle. Never install the labels in areas where airbags may deploy.

Figure 12 Safety Message Card (left) and Siren Safety Labels (right)



Safety Messages

Safety Messages to Personnel Servicing Federal Electronic Sirens

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

- Read and understand all instructions in this manual before servicing the electronic siren or control head.
- To properly service an electronic siren or control head, 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 service manuals when performing service on a vehicle.
- Electronic repairs must be performed by a qualified and competent electronics technician.
- 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.
- Do NOT connect this system to the positive terminal of the battery until servicing is complete and you have verified that there are no short circuits to ground.
- For the electronic siren to function properly, the ground connection must be made to the NEGATIVE battery terminal.
- After repair, test the electronic siren and speaker system to ensure that it is operating properly.
- Federal Signal siren amplifiers 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. Verify or test your combination to make sure the system works together properly and meets both federal, state and local standards or guidelines. Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death.

Servicing the PF400

Federal Signal recommends that the siren be returned to your local distributor or Federal Signal for service. External components, such as cabling, are available as replacement parts. See Table 23 on page 49. Other than the slide switch in the siren, there are no other user-serviceable parts within the unit. After servicing the system, test it to ensure that it is operating properly.

Replacing the Slide Switch on the 17-Button Controller

The slide switch can be removed from the siren without removing the siren from the vehicle in most installations.

NOTICE

STATIC-SENSITIVE DEVICE: The light bar circuitry can be damaged by electrostatic discharge (ESD). Follow anti-static procedures when removing the slide switch.

To replace the slide switch:

1. Use a T20 Torx driver to remove the four 8-32 shoulder screws securing the keypad.
2. Disconnect the ribbon cable and microphone lead from the control head PCBA.
3. Gently unsnap the siren bezel from the keypad.
4. Note the orientation of the slide switch knob. Use a 1/64-inch hex key wrench to loosen the set screw securing the knob to the shaft.
5. Remove the two #4-40 by 5/16-inch Phillips head screws securing the slide switch bezel to the control head assembly. Unplug and remove the old switch.
6. Place the new switch assembly in position with the knob in the same orientation as the old switch.
7. Secure the switch bezel to the control head assembly with the two #4-40 by 5/16-inch Phillips head screws.
8. Reinstall the knob and tighten the set screw. Do not overtighten.
9. Plug the slide switch connector into the four-pin connector on the control head assembly.
10. Snap the siren bezel to the keypad, connect the ribbon cable and microphone lead to the control head PCBA, and secure the assembly with the four 8-32 shoulder screws. Do not overtighten the screws.

Table 27 Service Parts

Description	Part Number - PF400Q	Part Number - PF400
PF400Q with e-Q2B Controller	PF400Q	---
PF400 or PF400Q with 17-Button Controller	PF400QS17B	PF400S17B
PF400 and PF400Q with Handheld Controller	PF400QH	PF400H
Amplifier (amplifier only)	PF400QAMP	
Remote Controller	---	PF400R
Keypad Legends	8572294	8572294
Cable Assy, RS485, 25ft	1751357-02	1751357-02
Wire Assembly, Relay, Pathfinder	17501359	17501359
Wire Assembly, I/O, Pathfinder	17501360	17501360
Wire Assembly, Audio	17502532	17502532
Slide Switch Assy	122290	122290
Bezel, Slide Switch	8573060	8573060
Knob, Aluminum, Slide Switch	85361185	85361185
Screw, #4-40 Flat Head, Phillips	7000259-06	7000259-06
Knob, Volume (PF400Q)	141134	141134
Keypad Assembly (PF400 and PF400Q)	862302143	862302143
Keypad Assembly (PF400 and PF400Q)	862302143-03	862302143-03
Screw, 8-32 Shoulder, Fillister HD, 6 Lobe	70000738-10	70000738-10

Getting Technical Support and Service

For technical support and service, please contact:

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

Getting Repair Service

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

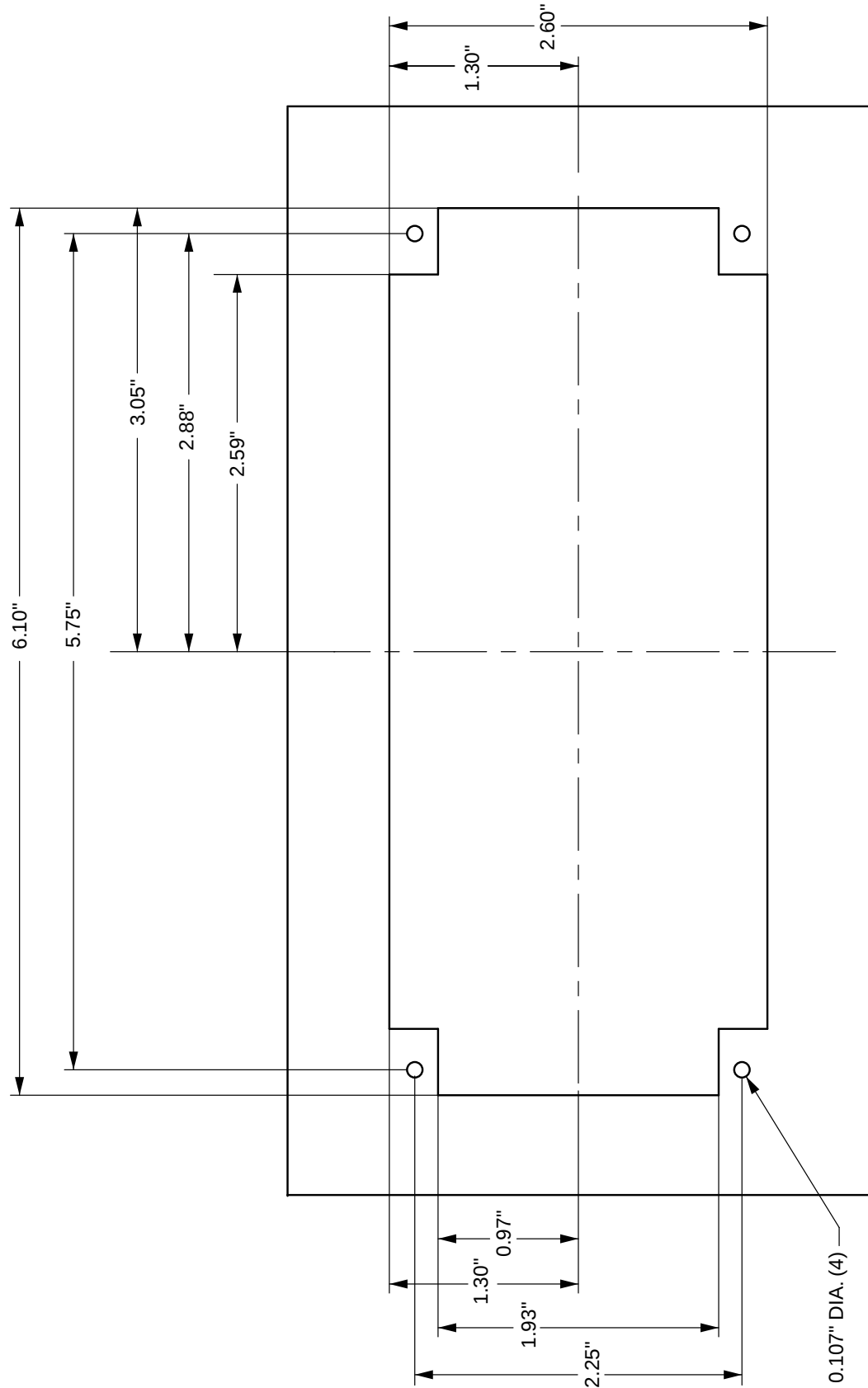
Any units returned to Federal Signal for service, inspection, or repair must be accompanied by a Return Material Authorization (RMA). Obtain an RMA from a local Distributor or Manufacturer's Representative.

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

Figure 13 Mounting Template for Flush-Mount Control Head (Not to scale)



290A6797

NOTE: VERIFY THAT THE TEMPLATE IS TO SIZE AND THAT ALL DIMENSIONS ARE CORRECT.



FEDERAL SIGNAL
Safety and Security Systems

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Customer Support

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Work Truck: 800-824-0254 • +1 708 534-3400

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