

Models 2001-130, Equinox, and 508-128 Sirens



Description, Specifications, Installation, and Service 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.



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Safety Messages

⚠ WARNING

It is important to follow all instructions shipped with this product. This device is to be installed by trained personnel who are thoroughly familiar with the country electric codes and will follow these guidelines as well as local codes.

Listed below are important safety instructions and precautions you should follow.

Important Notice

Federal Signal reserves the right to make changes to devices and specifications detailed in the manual at any time in order to improve reliability, function or design. The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for any inaccuracies.

Publications

Federal Signal recommends the following publications from the Federal Emergency Management Agency for assistance with planning an outdoor warning system:

- The “Outdoor Warning Guide” (CPG 1-17)
- “Civil Preparedness, Principles of Warning” (CPG 1-14)
- FEMA-REP-1, Appendix 3 (Nuclear Plant Guideline)
- FEMA-REP-10 (Nuclear Plant Guideline).

Planning

- If suitable warning equipment is not selected, the installation site for the siren is not selected properly or the siren is not installed properly, it may not produce the intended optimum audible warning. Follow Federal Emergency Management Agency (FEMA) recommendations.
- If sirens are not activated in a timely manner when an emergency condition exists, they cannot provide the intended audible warning. It is imperative that knowledgeable people, who are provided with the necessary information, are available at all times to authorize the activation of the sirens.
- When sirens are used out of doors, people indoors may not be able to hear the warning signals. Separate warning devices or procedures may be needed to effectively warn people indoors.
- The sound output of sirens is capable of causing permanent hearing damage. To prevent excessive exposure, carefully plan siren placement, post warnings, and restrict access to areas near sirens.
- Activating the sirens may not result in people taking the desired actions if those to be warned are not properly trained about the meaning of siren sounds. Siren users should follow FEMA recommendations and instruct those to be warned of correct actions to be taken.

- After installation, service, or maintenance, test the siren system to confirm that it is operating properly. Test the system regularly to confirm that it will be operational in an emergency.
- If future service and operating personnel do not have these instructions to refer to, the siren system may not provide the intended audible warning and service personnel may be exposed to death, permanent hearing loss, or other bodily injury. File these instructions in a safe place and refer to them periodically. Give a copy of these instructions to new recruits and trainees. Also give a copy to anyone who is going to service or repair the siren.

Installation and Service

- Electrocution or severe personal injury can occur when performing various installation and service functions such as making electrical connections, drilling holes, or lifting equipment. Therefore only experienced electricians should install this product in accordance with national, state and any other electrical codes having jurisdiction. Perform all work under the direction of the installation or service crew safety foreman.
- The sound output of sirens is capable of causing permanent hearing damage. To prevent excessive exposure, carefully plan siren placement, post warnings and restrict access to areas near the sirens. Sirens may be operated from remote control points. Whenever possible, disconnect all siren power including batteries before working near the siren.
- After installation or service, test the siren system to confirm that it is operating properly. Test the system regularly to confirm that it will be operational in an emergency.
- If future service personnel do not have these warnings and all other instructions shipped with the equipment to refer to, the siren system may not provide the intended audible warning and service personnel may be exposed to death, permanent hearing loss, or other bodily injury. File these instructions in a safe place and refer to them periodically. Give a copy of these instructions to new recruits and trainees. Also, give a copy to anyone who is going to service or repair the sirens.

Operation

Failure to understand the capabilities and limitations of your siren system could result in permanent hearing loss, other serious injuries or death to persons too close to the sirens when you activate them or to those you need to warn. Carefully read and thoroughly understand all safety notices in this manual and all operations-related-items in all instruction manuals shipped with equipment. Thoroughly discuss all contingency plans with those responsible for warning people in your community, company, or jurisdiction.

Read and understand the information contained in this manual before attempting to install or service the siren.

Pay careful attention to the notices located on the equipment.

General Description

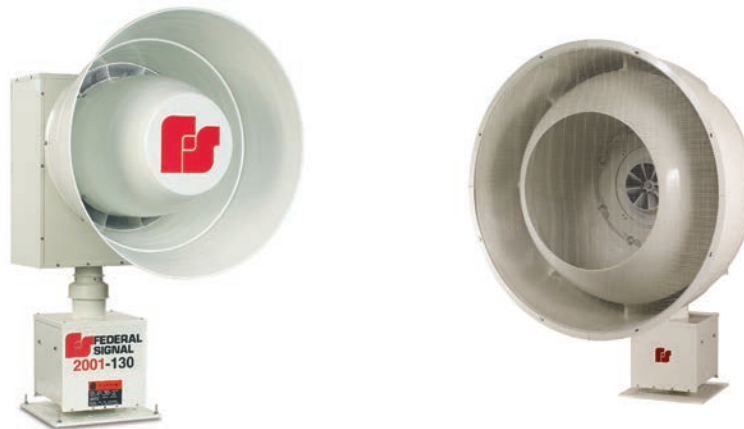
This manual describes the features, specifications, installation, service and maintenance of the Models 2001-130, Equinox, and 508-128 Sirens.

Models 2001-130, Equinox, and 508-128 Sirens are electro-mechanical, DC, rotating sirens that are capable of producing high intensity warning signals over a large area. A highly efficient design enables the siren to produce a high sound level, while making moderate demands on the power source. The Equinox Siren is identical to the Model 2001-130 Siren except the stator is 8 ports instead of 12 ports.

Each siren is available for use with through-the-pole wiring. Through-the-pole wiring is typically used with concrete, steel, or composite type poles where wiring can be managed through the center of the pole. This type of mount allows wiring to be brought from the inside of the pole through the bottom of the siren mounting plate up to the wiring box.

To order models that allow wiring through the center of the pole, use the following part numbers: 2001-130-C, Equinox-C, and 508-128-C. See the Through-the-Pole Mount section for more information.

Figure 1 Models 2001-130 and 508-128 Sirens



Siren Description

Models 2001-130, Equinox, and 508-128 Sirens are single tone sirens capable of producing a 130 dB, 125 dB, and 128 dB sound level respectively at 100 feet for a minimum of 15 minutes, when using the DCB series Control Cabinet and Battery Cabinet with fully charged, standard, deep-cycle, marine batteries. Up to thirty minutes continuous operating time is available with the 2001TRBP option. This option supplies DC current directly to the siren from a 208/220/240 Vac, optionally 480 Vac line.

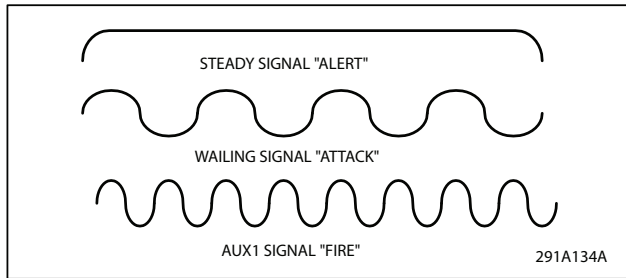
The sirens use two motors. One to create the siren signals, the other one to rotate the siren assembly. The first motor, which produces the sound energy, is attached to a stator with a rotor mounted on the motor shaft concentric to the stator. The rotor and stator each contain one row of ports. As the motor rotates the rotor, air is drawn into the rotor and passes through the rotor and stator ports in pulses. These pulses are produced when the rotor alternately opens and closes the stator ports. The pulses of air produce sound at a

frequency (pitch) that is dependent upon the rotational speed of the motor and the number of ports in the rotor-stator combination.

Signal Description

The sirens are capable of producing a steady single frequency signal, a wailing rising and falling frequency signal and a fast wailing signal. The steady signal is frequently used as a civil defense “Alert” or weather emergency signal. The wailing signal is often used as a civil defense “Attack” signal. The fast wail or fire signal is used as a fire signal to summon the local fire department. You can use any of the signals for any desired application. These signals are shown graphically in the following figure.

Figure 2 Signal Characteristics



Specifications for Model 2001-130

Table 1 Power Requirements*

Siren Motor	48 V (DC or full wave rectified AC) 100 amps (nom.)
Rotator Motor	48 V (DC or full wave rectified AC) 1 amp (nom.)

Table 2 Wiring

Siren Motor	2 AWG minimum, 2 wires
Rotator Motor	14 AWG minimum, 1 wire

Table 3 Motor Type

Siren	Series Wound DC 6.5 Hp (nom.)
Rotator	Permanent Magnet DC 1/8 Hp

Table 4 Signal Information

Signal	Frequency Range	Sweep Rate
STEADY	790 Hz	N.A.
WAIL	470 to 790 Hz	10 seconds
FAST WAIL	600 to 790 Hz	3.6 seconds
Signal Duration	3 min. (programmable)	
Sound Output (SPL)	130 dBc +/-1 dBc (on axis) at 100 ft (30.5 m)	
Rotation	3 RPM	

Specifications for Equinox

Table 5 Dimensions

Height x Width x Depth	62 in x 37 in x 41 in
	1574 mm x 940 mm x 1041 mm

Table 6 Weight

Shipping Weight	490 pounds (204 kg)
Siren Weight	420 pounds (190 kg)

Table 7 Environmental

Operating Temperature	-30°C to +60°C**
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Table 8 Wind Loading

EPA at 40 feet	9.53 ft ²
Wind Load (130 mph, 40 feet above ground)	613 lbf

* Power requirements refer to the power supplied by the batteries or optional AC operation with battery backup.

** The siren can operate throughout this temperature range provided the battery temperature is maintained at -18°C or higher.

Specifications for Equinox

Table 9 Power Requirements*

Siren Motor	48 V (DC or full wave rectified AC) 115 amps (nom.)
Rotator Motor	48 V (DC or full wave rectified AC) 1 amp (nom.)

Table 10 Wiring

Siren Motor	2 AWG minimum, 2 wires
Rotator Motor	14 AWG minimum, 1 wire

Table 11 Motor Type

Siren	Series Wound DC 6.5 Hp (nom.)
Rotator	Permanent Magnet DC 1/8 Hp

Table 12 Signal Information

Signal	Frequency Range	Sweep Rate
STEADY	500 Hz	N.A.
WAIL	180 to 500 Hz	10 seconds
FAST WAIL	300 to 500 Hz	3.6 seconds
Signal Duration	3 min. (programmable)	
Sound Output (SPL)	125 dBc +/-1 dBc (on axis) at 100 ft (30.5 m)	
Rotation	3 RPM	

Table 13 Dimensions

Height x Width x Depth	62 in x 37 in x 41 in
	1574 mm x 940 mm x 1041 mm

Table 14 Weight

Shipping Weight	460 pounds (209 kg) w/mtg. legs
Siren Weight	390 pounds (159 kg)

Table 15 Environmental

Operating Temperature	-30°C to +60°C**
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Table 16 Wind Loading

EPA at 40 feet	9.53 ft ²
Wind Load (130 mph, 40 feet above ground)	613 lbf

* Power requirements refer to the power supplied by the batteries or optional AC operation with battery backup.

** The siren can operate throughout this temperature range provided the battery temperature is maintained at -18°C or higher.

Specifications for Model 508-128

Table 17 Power Requirements*

Siren Motor	48 V (DC or full wave rectified AC) 120 amps (nom.)
Rotator Motor	48 V (DC or full wave rectified AC) 1 amp (nom.)

Table 18 Wiring

Siren Motor	2 AWG minimum, 2 wires
Rotator Motor	14 AWG minimum, 1 wire

Table 19 Motor Type

Siren	Series Wound DC 6.5 Hp (nom.)
Rotator	Permanent Magnet DC 1/8 Hp

Table 20 Signal Information

Signal	Frequency Range	Sweep Rate
STEADY	500 Hz	N.A.
WAIL	180 to 500 Hz	10 seconds
FAST WAIL	300 to 500 Hz	3.6 seconds
Signal Duration	3 min. (programmable)	
Sound Output (SPL)	128 dBc +/-1 dBc (on axis) at 100 ft (30.5 m)	
Rotation	3 RPM	

Installation Instructions

Table 21 Dimensions

Height x Width x Depth	70.1 in x 53.4 in x 43.1 in
	1780.5 mm x 1356.4 mm x 1094.7 mm

Table 22 Weight

Shipping Weight	590 pounds (268 kg) w/mtg. legs
Siren Weight	430 pounds (195 kg)

Table 23 Environmental

Operating Temperature	-30°C to +60°C**
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Table 24 Wind Loading

EPA at 40 feet	17.40 ft ²
Wind Load (130 mph, 40 feet above ground)	1,104 lbf

* Power requirements refer to the power supplied by the batteries or optional AC operation with battery backup.

** The siren can operate throughout this temperature range provided the battery temperature is maintained at -18°C or higher.

Installation Instructions

Determining a Suitable Location

▲ WARNING

The output level of an the sirens are capable of causing permanent hearing damage. To prevent excessive exposure, carefully plan the siren location and post warnings where excessive levels may be encountered. Refer to OSHA 29 CFR 1910.95 for safe exposure limits.

Do not expose personnel to sound levels above 123 dBC.

Careful consideration of the factors affecting the propagation of sound from the siren and the response of the human ear to the sound will optimize the ability of the siren to effectively warn the community. Follow Federal Emergency Management Agency (FEMA) guidelines when designing the warning system.

The reduction of signal intensity as distance from the siren increases and the minimum desired signal level at the fringe of the area to be covered are important considerations when choosing a siren installation site. As the distance from the siren increases, sound level losses accumulate. These losses are a result of weather conditions, the terrain, obstructions in the sound path, and the pitch of the sound and the height of the siren.

Optimum sound propagation conditions occur when no obstructions exist in the sound path, the terrain is hard and flat, and the air is blowing away from the source. Under these conditions, you can expect a 6 dB loss per distance doubled. A loss per distance doubled of 10 dB is typically experienced because atmosphere is rarely calm, terrain may not be flat, and buildings or other obstructions are frequently present in the sound path.

Using a 10 dB per distance doubled loss factor, the following sound levels are predicted for the sirens in the following table.

Table 25 Sound levels predictions

Distance	2001-130	Equinox	508-128
100 feet (30.5 m) the sound level is	130 dB	125 dB	128 dB
200 feet (61 m) the sound level is	120 dB	115 dB	118 dB
400 feet (122 m) the sound level is	110 dB	105 dB	108 dB

FEMA studies indicate typical ambient sound levels vary by location as follows:

- Industrial Areas: 70+ dBC
- Urban Areas: 60 dBC
- Rural Areas: 50 dBC

Assuming a typical 10 dB loss per distance doubled and a 70 dB minimum sound level required to warn a typical urban area, the effective range is as follows:

- Model 2001-130 Siren is approximately 6,400 feet.
- Equinox Siren is approximately 4,525 feet.
- Model 508-128 siren is approximately 5,572 feet.

Optimum warning is obtained when the warning signal is at least 10 dB above ambient. Do not expose personnel to sound levels above 123 dBC.

Wind speed and direction often affects the propagation of sound from the siren. Consequently, the direction of the prevailing wind may be a significant factor to consider when selecting the installation site(s) of a small, one or two site siren system. For example, if the prevailing wind is from the west, it may be desirable to install the siren toward the western edge of the area to be covered.

Other factors to consider when selecting the installation site(s) include the availability of suitable electrical power, the access to and ease of installation and maintenance, the height of surrounding obstructions, and security against vandalism.

Installing the Sirens

⚠ DANGER

Electrocution or severe personal injury can occur when making electrical connections, drilling holes, or lifting equipment. Therefore, installation should be performed by experienced electricians in accordance with national and local codes.

Most siren installations are one of two types: Pole Mount or Flat Surface Mount. These two configurations make it possible to install a siren in almost any situation. If the installations in this manual are not suitable, modification of one of the configurations may be practical.

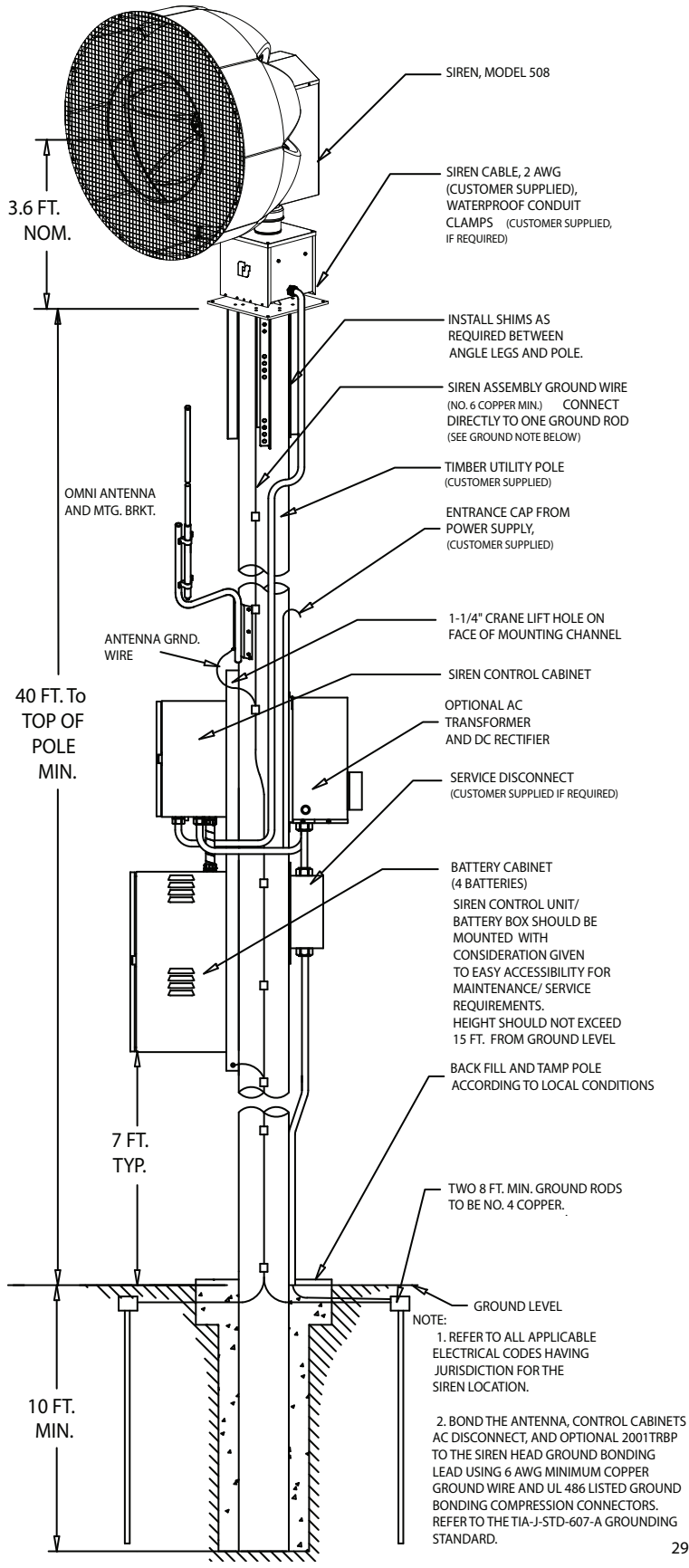
A siren is typically installed 40 to 50 feet above the ground. If the installation is located less than 40 feet above the ground, the sound intensity at close range may increase, but at the same time the effective range of the siren may be reduced. Conversely, if the siren is located more than 50 feet above ground, the effective range of the siren may increase, but the sound may skip over areas closer to the siren. These variables may make it desirable to test the sound coverage of the siren at various heights and locations whenever possible.

Pole Installation

The 2001-130, Equinox, and 508-128 Sirens come standard with mounting hardware for wood pole deployment. Federal Signal also offers models designed for mounting through the center of the pole. Typically, through-the-pole wiring is used with concrete, steel, or composite type poles where wiring can be managed through the center of the pole. To order models that allow wiring through the center of the pole, use the following part numbers: 2001-130-C, Equinox-C, and 508-128-C. See the Through-the-Pole Mount section for more information.

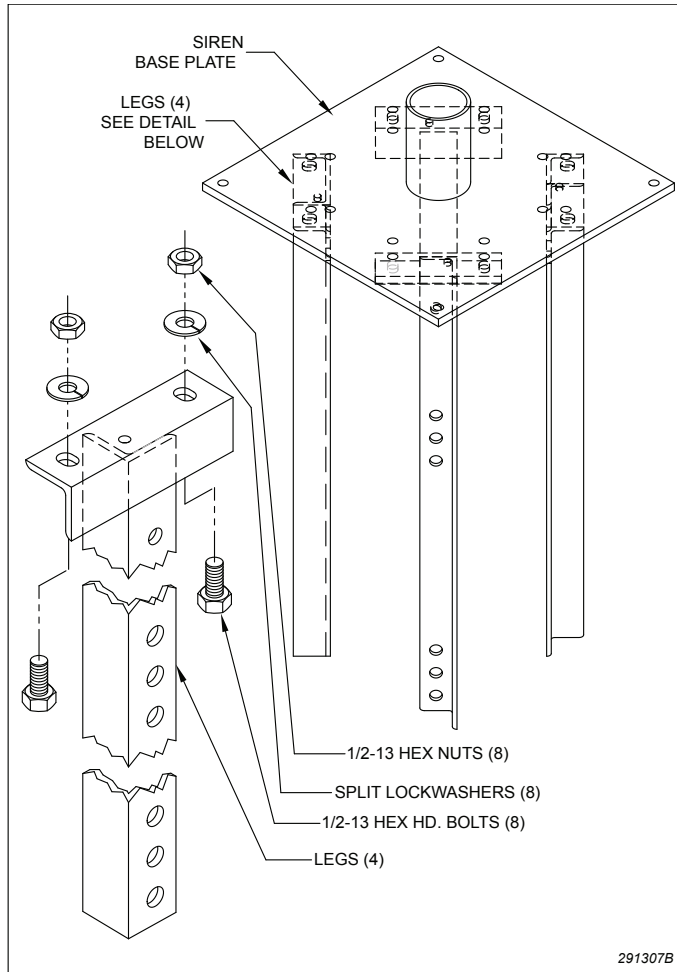
A typical siren pole-mounted installation is shown in Figure 3. The siren is mounted on a Southern Yellow Pine, Douglas Fir or equivalent Class 2 utility pole 40 to 50 feet above the ground. It is attached to the pole by means of legs, as shown in Figure 4.

Figure 3 Typical Pole Installation (Model 508-128 shown)



291364A

Figure 4 Siren Leg Assembly



Using the 3 feet long angle iron legs, the siren is mounted on the Class 2 utility pole as follows:

1. Uncrate the siren and remove the nuts that hold the siren on the shipping base. Lift the siren approximately 3-1/2 feet with a crane or hoist.
2. Install the four legs on the siren mounting plate, as shown in Figure 4. Use two 1/2-inch bolts, nuts and lock washers (provided) for each leg. Do not tighten the bolts completely.

⚠ WARNING

The lifting bracket does NOT have sufficient strength to support the combined weight of the siren and a utility pole. Therefore, do NOT attempt to erect the pole and siren together using the bracket as a lifting point.

3. Erect the utility pole in accordance with accepted practices (refer to warning above). Be sure the pole extends at least 40 feet above the ground.
4. Raise the siren to the necessary height, and lower it over the pole.
5. Adjust the legs and insert shims, if necessary, between the siren legs and pole.

The legs adjust to a diameter between 7.53 in and 12.25 in (Figure 5). Bolt the siren to the pole using two 5/8 in galvanized lag bolts with washers and split lock washers per leg. At least four inches of lag bolt must be screwed into the pole. Tighten all bolts.

Figure 5 Leg Assembly Diameters

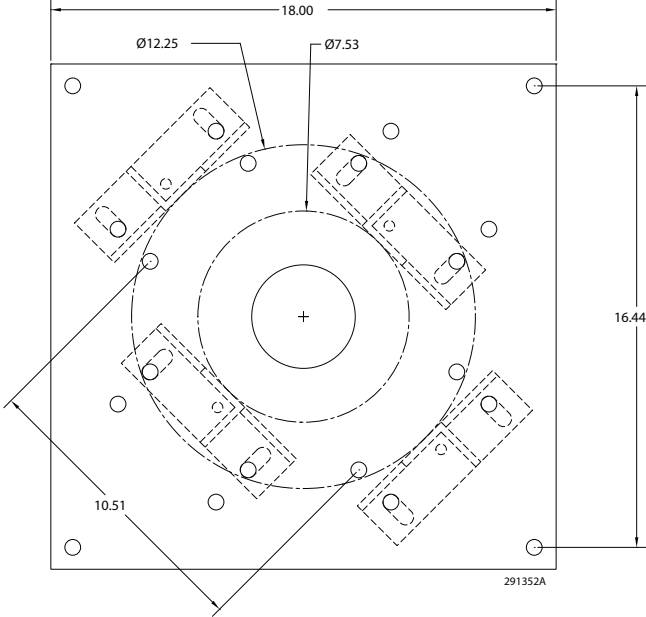
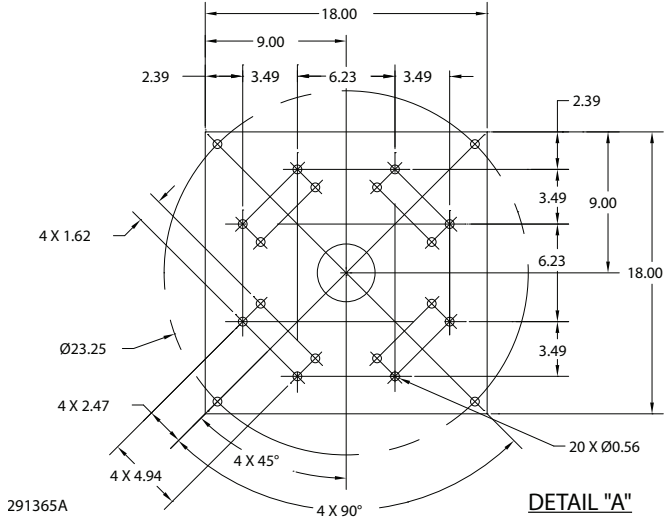


Figure 6 Mounting Plate Dimensions



Through-the-Pole Mount

Through-the-pole mounting allows you to wire through the center of the pole and through the bottom plate of the siren into the lower box. Typically, through-the-pole wiring is used with concrete, steel or composite type poles. These models are the following: 2001-130-C, Equinox-C, and 508-128-C.

NOTE: The siren leg assemblies are not included with the -C version models.

1. Erect the utility pole in accordance with accepted practices and FEMA guidelines.
2. Uncrate the siren. Remove and dispose of any hardware that holds the siren on the shipping base. Lift the siren with a crane or hoist to the necessary height and lower it over the pole. Maintain tension on lifting chain until all bolts are tightened.

NOTE: Siren cable is run through the center of the mounting plate when using the through-the-pole modes. Siren cable can be pre-assembled through the center of the bottom mounting plate for a no conduit installation.

⚠ WARNING

The eyebolt does NOT have sufficient strength to support the combined weight of the siren and a utility pole. Therefore, do NOT attempt to erect the pole and siren together using the eyebolt as a lifting point.

Flat Surface Mount

Flat surface mount installation is practical when the installation site is on a flat roofed building. A weight distribution mat is often required to safely distribute the siren's weight on the roof. A Structural Engineer is required to specify the appropriate mounting method to safely mount the siren on a roof.

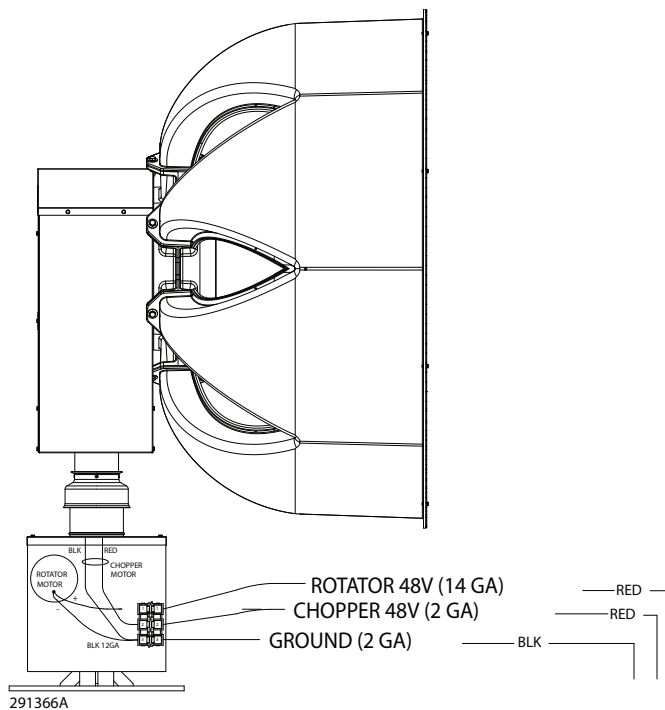
Post high sound level warning signs at all roof entry points and be sure that the siren is not blocked by parapets or other obstructions in the siren's sound path.

Wiring the Siren

Each siren is predrilled on two sides for connecting a 1 inch conduit to either side. The siren enclosure is rain resistant. To maximize the longevity of the siren, rigid watertight conduit connections are recommended between the siren and the controller.

Three wires are required to operate the siren. One #2 AWG red wire from the 48 Vdc chopper control contactor output of the controller provides positive power to the chopper motor. One #14 AWG red wire (minimum) from the rotator control contactor output of the controller provides positive power to the rotator motor. One #2 AWG black wire provides a common 48 Vdc negative ground between the ground plane of the control cabinet and siren motors. See Figure 7 for the wire connections in the siren. Consult the manual for the controller being used to connect the wires from the head.

Figure 7 Wiring for rotator motor



Treat all wire connections with anti-oxidant to prevent corrosion from moisture and natural processes. Take care to insure that all wire connections are firmly tightened. To properly tighten the wire connections in the terminal block, insert the wire, firmly tighten the setscrew, move the wires to loosen and repeat the process until the wires are securely tightened.

Pre-operation Checkout

After the siren has been completely installed, perform the following checks before putting the siren into service.

⚠ WARNING

The output sound level of a siren is capable of causing severe hearing discomfort or permanent hearing damage. Therefore, ALWAYS wear hearing protection when performing tests or maintenance on the siren.

Table 26 Pre-operation checklist

Check	Action Item
	All air intakes and sound outlets are not obstructed.
	All connections in the Control Cabinet Battery Cabinet are correct and properly tightened.
	All people and animals are at least 40 feet away from the siren in every direction to avoid hearing damage.
	Activate all siren tones to verify they are operating properly. The siren should remain rotating during all alert tones
	After the installation is complete and it has been established that the siren is operating properly, Federal Signal recommends that all control devices be padlocked to discourage tampering and vandalism.

Service and Maintenance

⚠ DANGER

Service should be performed by qualified personnel familiar with the siren, associated controls, and power sources being used. The siren has moving parts, high operating currents, explosive gases, and corrosive materials that could cause severe personal injury, electrocution, or death. Before servicing or maintaining, ensure that remote activation cannot occur and disconnect power to the siren and its controls.

⚠ WARNING

The output level of a siren is capable of causing permanent hearing damage. Therefore, ALWAYS wear hearing protection when performing tests or maintenance on the siren.

To prevent the siren from sounding or rotating, always turn off the power to the siren at the disconnect switch and remove the 48 Vdc, 4 AWG red wire in the Battery Cabinet before inspecting or maintaining the siren.

Testing and Inspecting the Siren

Test the siren for proper operation at least once a month. A daily test at noon, curfew, or other selected time is preferred. This not only enhances the usefulness of the siren, but also instills public confidence in the reliability of the warning system.

In order to minimize the possibility of siren failure, annual inspection and maintenance is desirable. Replace batteries approximately every three to five years. This schedule is only a suggested guideline. It may be necessary to vary the schedule if the siren is used frequently or if it is used in an extreme climate. Also, verify that Battery Terminal Protector is on battery terminals.

To inspect the siren, do the following:

1. Verify that the siren is rotating and the chopper motor is operating. Follow your company's safety guidelines (that is, wear hearing protection) when operating siren locally.
2. Turn off the AC power to the siren at the disconnect switch. Disconnect the 48 Vdc battery power to the siren (if applicable) by turning off the disconnect switch in the Battery Cabinet.
3. Inspect the siren installation to be sure that it is vertically oriented. Take corrective action if a pole-mounted installation is more than five degrees from vertical or if a roof or flat surface mount is more than ten degrees from vertical. This will prevent lubrication losses and excessive motor bearing wear.
4. Inspect all electrical and mechanical connections. Make sure that all fasteners are properly tightened.
5. Inspect brushes on the chopper motor for wear and operation. (See Maintaining the Chopper Motor Brush.)
6. Inspect all painted surfaces and repaint as necessary.
7. For Model 508-128 Siren, inspect and repair horn screen as required.
8. For Models 2001-130 and Equinox Sirens, remove back and top housing covers to view collector housing opening (access hole). Replace blue plug or tape with black plug on collector housing opening. (See Replacing the Blue Plug/Tape Over Collector Access Hole procedure.)
9. Perform a pull test on horn assembly. Verify 40 to 45 lb (if unable to achieve a minimum of 40 lb, see the Adjusting the Clutch and Alarm Verification procedure).
10. Replace all covers. Turn on the AC power to the siren at the disconnect switch.
11. Verify siren operation.

NOTE: Both the rotator motor and siren motor have sealed and pre-lubricated bearings. Therefore, neither of these motors requires any additional lubrication.

Servicing the Siren

This section includes procedures and illustrations to adjust, repair, and replace various siren components.

⚠ WARNING

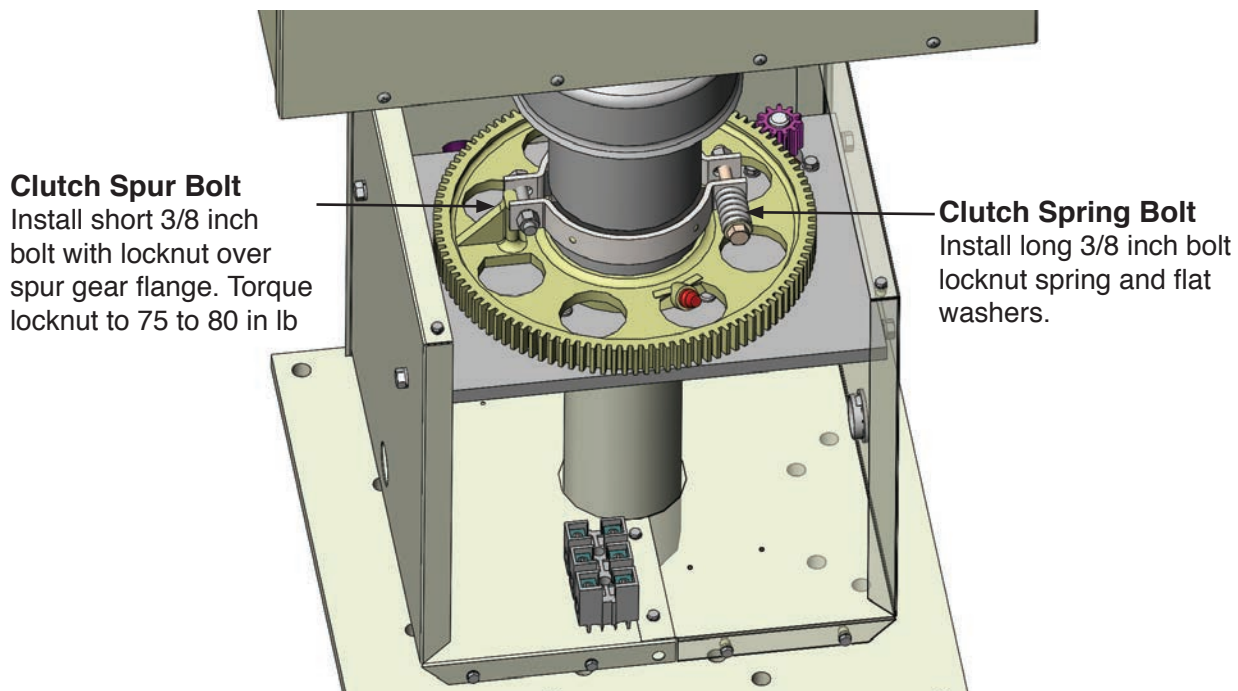
To prevent siren from sounding or rotating, always turn off power at the disconnect switch and disconnect the 48 Vdc, 4 AWG red wire in the Control Cabinet before performing any maintenance on the siren.

Adjusting the Clutch and Alarm Verification

To adjust the rotation clutch assembly, do the following:

1. Turn off power to the siren at the disconnect switch.
2. Turn off battery switch in the Battery Cabinet.
3. Remove the 48 Vdc, 4 AWG red wire in the Control Cabinet (to stop chopper from activating).
4. Remove the panels on the rotator housing.
5. Loosen the clutch using the cross bolt with the spring (Figure 8). This allows the siren to rotate freely. If the siren does not rotate freely, attach a spring scale to measure the rotation force required. The force to rotate the siren is less than 10 pounds. If the force required to rotate the siren is greater than 10 pounds, contact Federal Signal Technical support for additional information.

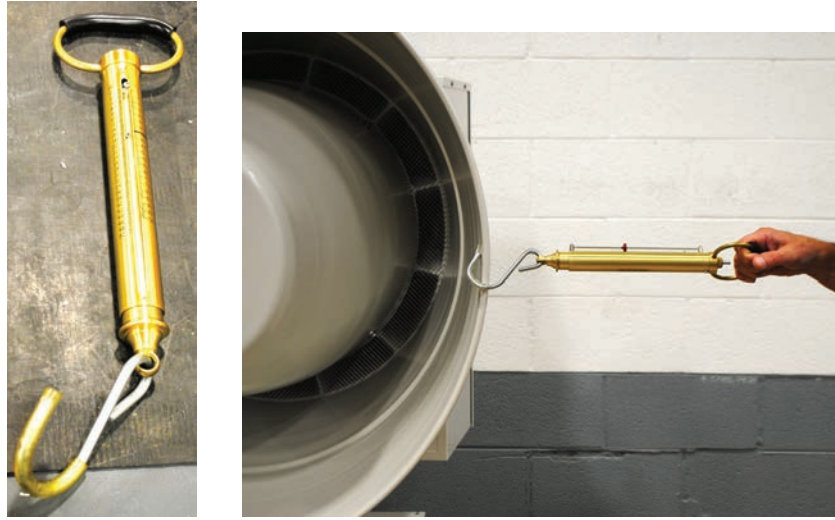
Figure 8 Rotator Assembly Interior



6. Tighten the Clutch Spur Bolt (Figure 8). This requires tightening the Clutch Spur bolt (bolt opposite spring) to 75 to 80 in lb. This secures the clutch bracket to the gear spur.
7. Attach a spring scale having a capacity of at least 50 pounds (22 kg) to the horn of the siren. (Figure 9)

NOTE: The spring scale needs to be perpendicular to the front of the siren's horn when pulling.

Figure 9 Spring Scale Attachment to Siren



8. Tighten the Clutch Spring Bolt (Figure 8) until the pull test in Figure 9 achieves a minimum of 40 pounds (18 kg). If you are unable to tighten the Clutch Spring bolt to reach minimum 40 pounds, contact Federal Signal Technical Support. (Possible cause is grease on clutch bands or clutch may require replacement.)

NOTE: To replace the clutch band, order the Clutch Replacement Kit.

9. Replace the panel(s) on the rotator housing.
10. Turn on power to the siren by re-attaching the 48 Vdc, 4 AWG red wire in the Control Cabinet.
11. Turn on battery switch in the Battery Cabinet.
12. Turn on power to the siren at the disconnect switch.
13. Activate the rotation of the siren and verify that the siren is operating properly. If the siren fails to rotate contact Federal Signal Technical Support.

Optional test to verify non-rotation alarm (requires two-way rotate sensor)

14. While siren is rotating, stop siren horn from rotating by obstructing or holding the siren horn. This causes the clutch to slip, causing the rotate motor to draw current above "normal." Current draw above normal, causes the system to report a rotate failure. If a failure is not reported, contact Federal Signal Technical Support.

Replacing the Blue Plug/Tape Over Collector Access Hole

To replace the blue plug or tape over the collector housing opening, do the following:

1. Remove and discard blue plug or tape.
2. Scrap off blue RTV (if applicable) from collector housing opening (access hole). Degrease surface with dry towel and alcohol, alcohol wipes, or degreaser.
3. Place rubber plug over access hole to ensure sealing against water ingress. Place the word UP at the top and the word DOWN at the bottom. (Figure 10)

Figure 10 Placing rubber plug over access hole



4. Tighten 1/4"-20 Keps nut to 11-14 in lbs using a 7/16" socket wrench. (Figure 11)

Figure 11 Tightening rubber plug



5. Rotate siren head to ensure no noticeable resistance to rotate siren.

Replacing the Collector Ring, Brush Holder Assemblies, and Black Cover

To replace the brush holder assembly, do the following:

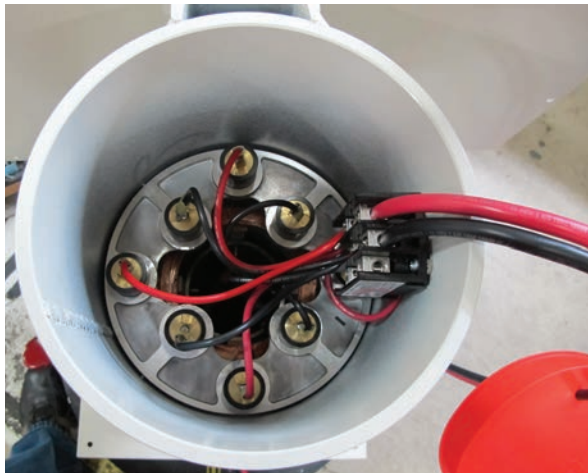
1. Remove the cover (if red, discard) from the top of the collector housing.
2. Note the wiring location before removing the wires. (Figure 12)

Figure 12 Collector Ring Housing



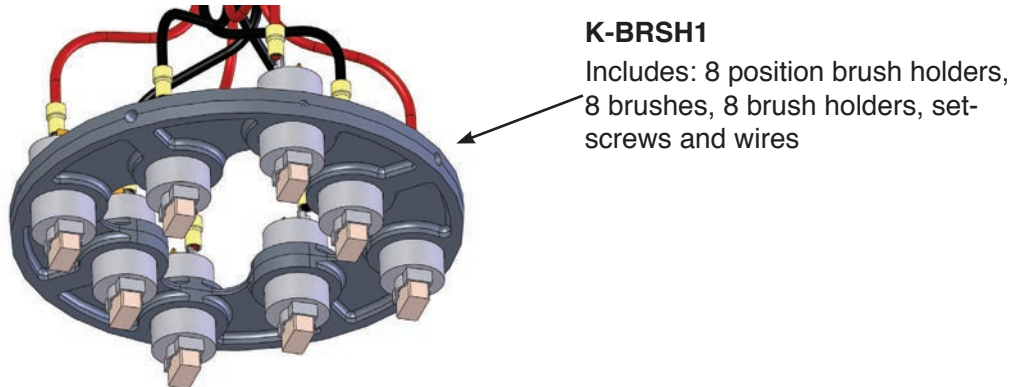
3. Remove the terminal block inside collector ring by removing two Keps nuts using 7/16 inch nut driver.
4. Remove the four bolts on the side of the collector housing assembly (Figure 13) and remove the brush assembly. **NOTE:** Press down on brush assembly while removing the four bolts. Brush assembly is under spring tension while in position.

Figure 13 Installation/Removal Brush Assembly



5. Remove lead wire from brush holder. Remove the worn brush from the brush holder in the brush holder plate. (Figure 14)

Figure 14 Brush Holder Assembly



6. Insert the replacement brush into the brush holder. Connect the lead wires to the brush holder.

Removing the Collector Ring Assembly

To remove the collector ring assembly, do the following:

1. Remove the brush assembly as described above.
2. Disconnect the three wires from the terminal block (TB5) inside the rotator housing and begin feeding wires up into the siren shaft (Figure 8).
3. Loosen the rotator drive band to rotate the siren during removal of the collector ringbolts.

⚠ CAUTION

To prevent damage to the cover assembly, use a piece of wire to secure the cover in an open position before removing the housing's back panel.

4. Remove the back panel to expose the aluminum tape, blue plug, or black plug on the collector housing assembly.
5. Remove the aluminum tape, blue plug, or black plug.

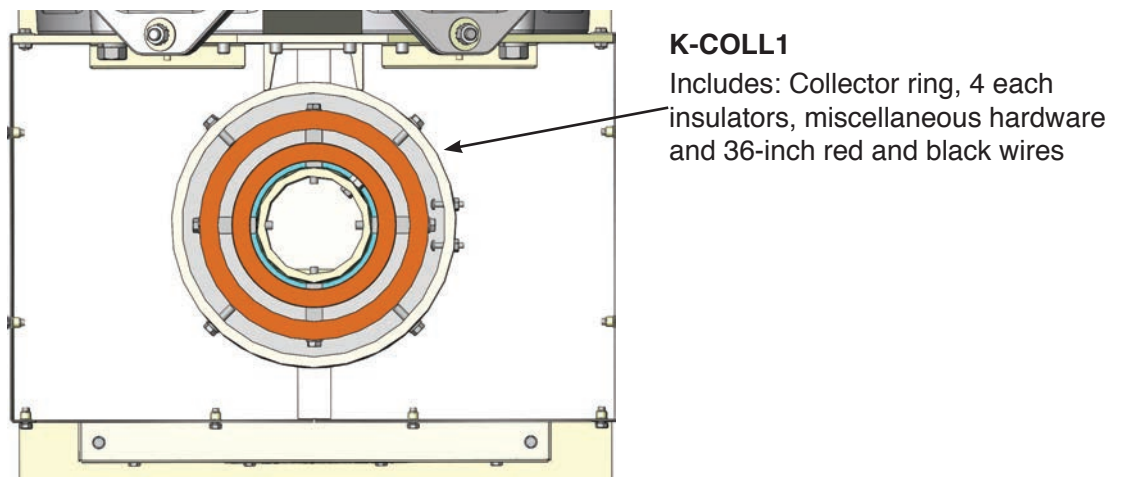
6. Manually rotate the siren and remove each of the four bolts that hold in the collector rings (Figure 15). Access to these bolts can be gained through the access hole.

Figure 15 Collector Housing Opening



7. Remove the collector rings with stand-offs and cables still attached (Figure 16).
8. Reassemble the collector rings, stand-offs, and cables before re-installation.

Figure 16 Collector Rings



9. To replace collector ring assembly, align the stand-offs before replacing the four bolts removed in step seven above.
10. Ensure that collector rings are concentrically aligned before replacing the brush assembly.
11. Replace the brush assembly.
12. Look through the access hole and ensure that brushes are contacting the proper collector rings.

13. Install the black plug. Place rubber plug over access hole to ensure sealing against water ingress. Place the word UP at the top and the word DOWN at the bottom. (Figure 17)

Figure 17 Placing rubber plug over access hole



14. Tighten 1/4"-20 Keps nut to 11-14 in lbs using a 7/16" socket wrench. (Figure 18)

Figure 18 Tightening rubber plug



15. Rotate siren head to ensure no noticeable resistance to rotate siren.

16. Install the black cover by inserting the red and black motor wires through the cover and attaching the wires to the terminal block. Place a 2- to 3-inch bead of RTV Silicone at three locations to secure the black cover to collector housing. Install and gently tap cover to seat on collector housing. (Figure 19)

Figure 19 Installing new black cover



17. Wrap nylon wire ties around each four gauge wire and place firmly against black cap. Remove excess wire ties. Position motor wires with drip configuration as shown. (Figure 20)

Figure 20 Wire ties around four gauge wires



18. Replace the back panel.

Inspecting and Servicing the Chopper Motor Brushes

The chopper motor is designed to be maintenance free. Federal Signal recommends inspection of motor brushes and commutator every three years.

Accessing the Motor

To access the motor on the 2001-130 and Equinox Sirens, do the following:

1. Remove the inner cone by removing the four ¼-20 hex head screws at the back of the cone.
2. Set aside cone and bolts.

To access the motor on the 508-128 Siren, do the following:

1. Remove the rear covers.
2. Set aside covers and screws.

Inspecting the Chopper Motor Brushes

You need the following equipment.

Table 27 Tools/Parts

Description
Compressed Air
5/16 inch Nut driver
Scotch-Brite™ pad
Replacement Brushes (includes 4 brushes) Part Number: K-BRSH2

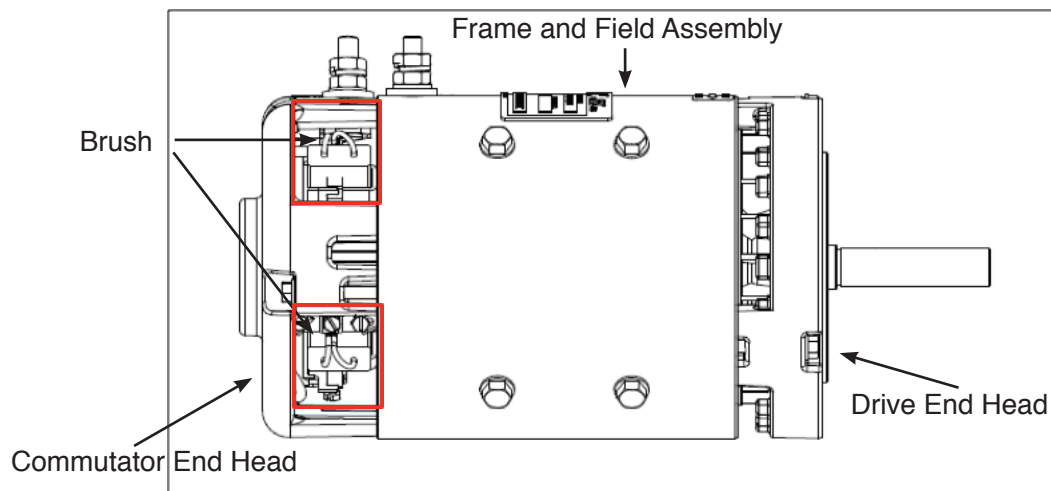
⚠ CAUTION

Wear eye protection during any maintenance operation.

To inspect the chopper motor brushes, do the following:

1. Reference Figure 21 and become acquainted with the labeled motor components.

Figure 21 Motor Components



2. Locate the four openings that expose the brushes at the commutator end head of the motor. Figure 21 outlines two of the four openings in the commutator end head in red.

3. Visually inspect the motor at the commutator end head for excess brush dust. If excess dust is seen, use clean, oil free, compressed air to carefully blow out accumulated brush dust and dirt from the commutator end head and the frame and field assembly.

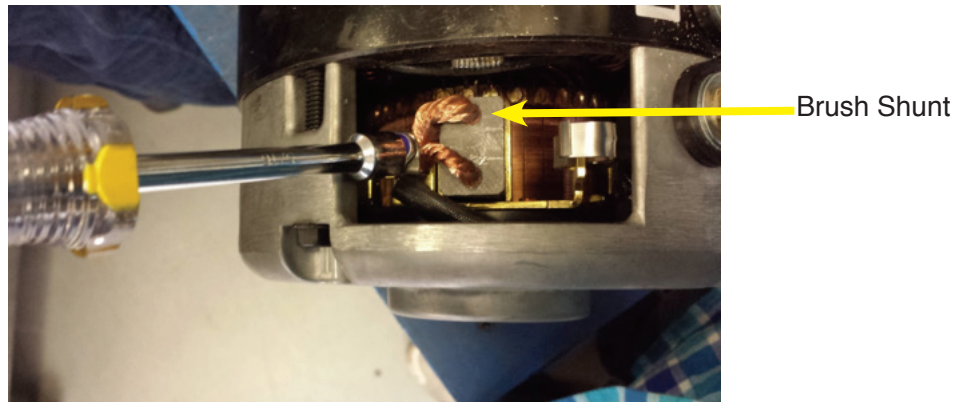
NOTE: Carbon dust inside the motor can be messy when removed with compressed air.

⚠ CAUTION

When using compressed air, follow all safety instructions, including wearing eye and respiratory protection.

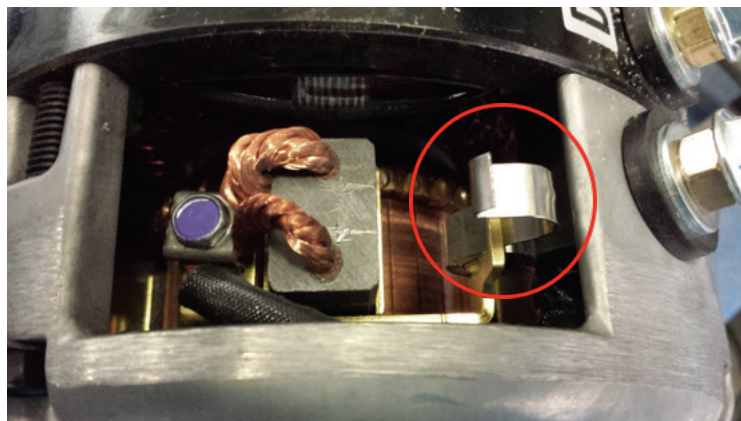
4. Continue using compressed air on the motor at all four openings in the commutator end head until brush dust is no longer visible exiting the motor.
5. After removing dust from the motor, measure brush length by removing the brush from the motor. Remove all four brushes.
6. To remove the brushes, first remove the 8-32 x .50-inch bolt from the back of the brush shunt using a 5/16-inch driver (Figure 22).

Figure 22 Removing Brush Shunt Bolt



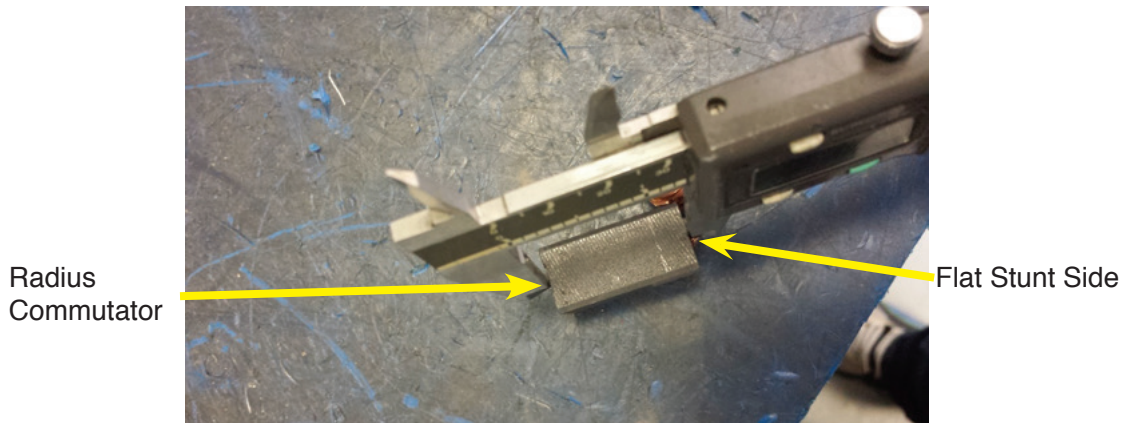
7. After the bolt is removed, pull back the brush spring. Pull the brush spring back and latch it on the post (Figure 23).

Figure 23 Brush Spring Latched on Post



8. Once the brush spring is secured on the post, the brush can be removed and measured.
9. To measure the brush length, using a caliper, measure from the radius of the commutator side of the brush to the flat of the shunt side (Figure 24).

Figure 24 Brush Spring Measurement



11. See minimum brush length in the table below.

Table 28 Brush Length

Maximum Brush Length	1.30 inches/33 mm
Minimum Brush Length	0.62 inches/16 mm

12. If brush lengths are found to be less than the specified minimum length, remove and replace all brushes with new brushes.

NOTE: If brushes are stuck in the brush holder, attempt to remove brushes from brush holder. If you are able to remove brushes, continue to inspect the commutator. Federal Signal recommends replacing of all four brushes. If unable to remove brushes, contact Federal Signal technical support.

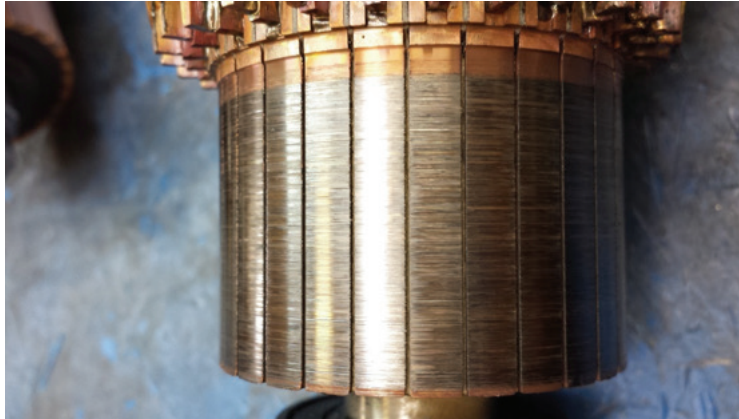
Inspecting the Commutator

To inspect the commutator, do the following:

1. While the brushes are removed from the motor, visually inspect the commutator.
2. The commutator should have a uniform gray/charcoal colored film covering the copper bars where the brushes make contact.

3. The Figure 25 displays an example of an acceptable commutator with uniform wear.

Figure 25 Uniform Brush Film



NOTE: Motors with limited run time in the field may exhibit streaks in the film on the commutator. This is common on newer motors and will eventually become more uniform when the motor has more run time and the brushes become fully seated. The Figure 26 depicts a commutator with streaky film due to limited run time.

Figure 26 Streaky Brush Film



4. Replace commutators that exhibit pitting or excessive wear. Figure 27 shows an example of a commutator with pitting and Figure 28 shows an example of a commutator with excessive wear.

Figure 27 Pitting on Commutator

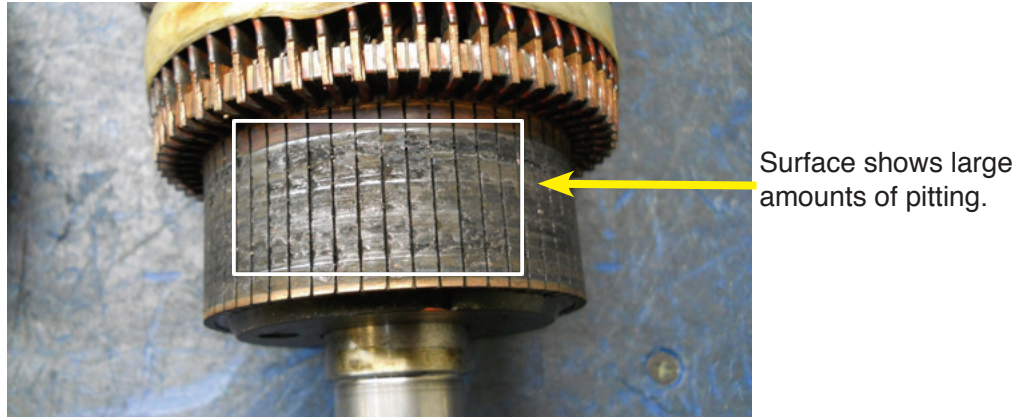
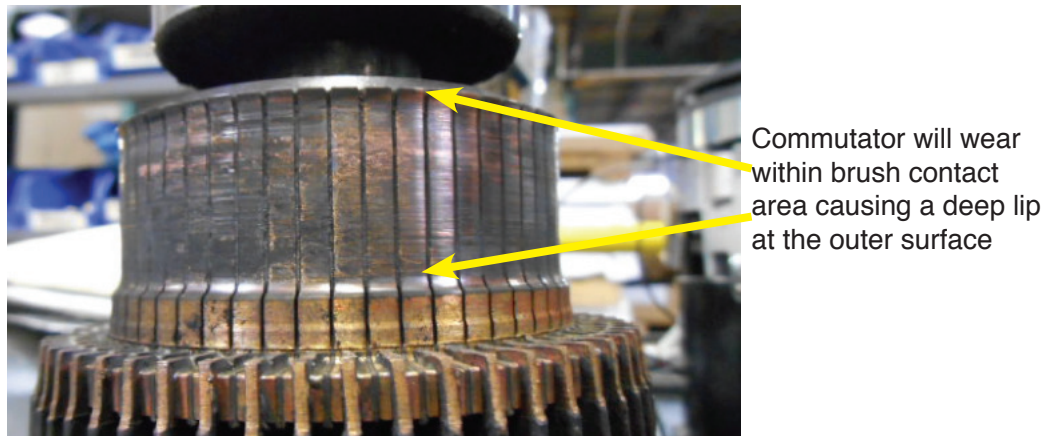


Figure 28 Commutator Wear



NOTE: If pitting or wear on the commutator is found, remove the motor from service and inspect and rebuild by an experienced motor rebuilder or manufacturer.

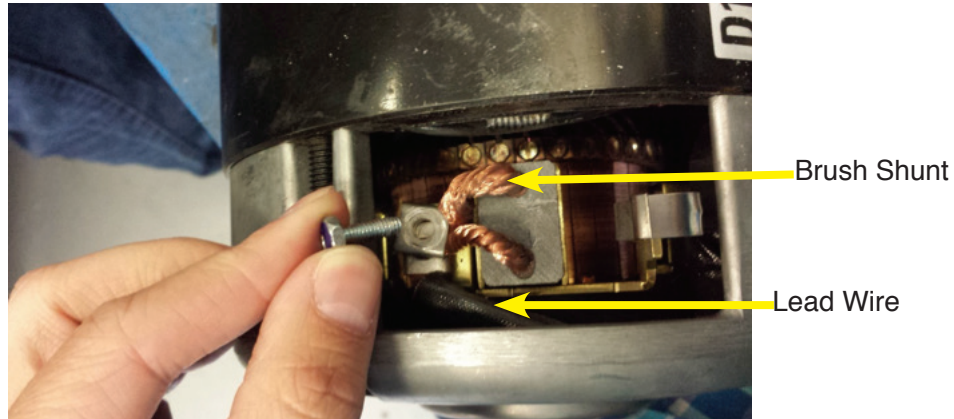
Installing New Brushes

To install new brushes, do the following:

1. After each brush is removed from the motor, carefully blow any remaining brush dust out of the brush holders on the brush box with clean, oil free, compressed air.
2. Inspect the brush holder for any debris or contamination. If the brush holder has contamination, use a Scotch-Brite pad to clean the holder.
3. If re-using existing brushes, inspect brushes for any contamination. Replace brushes if they have any sign of contaminations.
4. Verify all brush holders are clean and dust free. Using a brush, ensure brushes are able to move freely in brush holder.
5. Blow out the remaining contaminates using clean, oil free, compressed air.

6. Once the brush holders are clean, install brushes and the bolts that held the original brushes in place.
7. Place one brush into the brush holder.
8. Place one of the bolts through the hole in the brush shunt, the lead wire (if applicable), and the corresponding hole in the brush box (Figure 29).

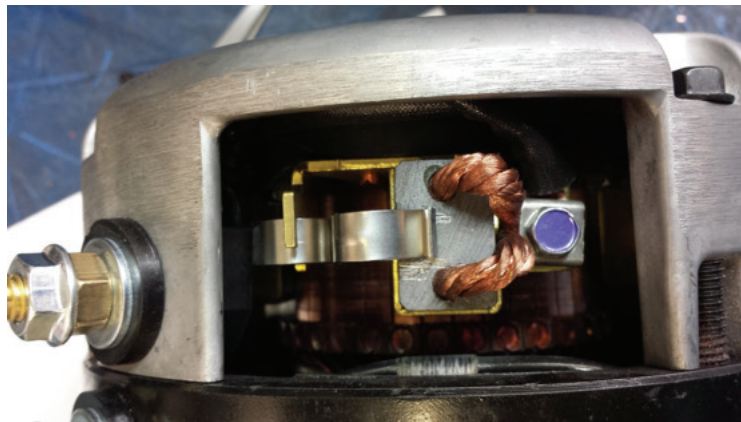
Figure 29 Replacing Brush Shunt Bolt



9. Tighten the bolt down using a 5/16-inch driver.
10. Unlatch the brush spring from the post such that it is resting on the back of the brush.

NOTE: Center brush spring between brush shunts. Do not misalign or contact the shunts. This allows the brush to remain in contact with the commutator and wear consistently throughout the motor's lifespan (Figure 30).

Figure 30 Placing the Brush Spring



11. Repeat steps 7-10 with the remaining brushes.
12. Inspect motor to ensure all brushes are installed, all bolts are present, and all brush springs are engaged.
13. Re-install all covers and test operation of the chopper motor.

Replacing the Rotator Motor

To replace the rotator motor, do the following:

1. Remove the two rotator housing panels (Figure 8).
2. Replace the rotator motor (K-GEAR1). Approximately a 1/64 inch gap between the teeth of the two gears is required to avoid binding. Re-tighten rotator motor bolts to a torque of 45 in. lb.
3. Wire rotator motor and terminal block as shown in Figure 7.
4. Grease all gear surfaces with a lithium based grease.
5. Replace housing panels.

Replacing the Chopper Motor for the Models 2001-130 and Equinox Sirens (K-CHPR1)

To replace the chopper motor, do the following:

1. Remove the inner cone by removing the four 1/4-20 hex head screws at the back of the cone.
2. Remove the top housing.
3. Remove the 3/8 bolt holding rotor to the motor shaft.
4. Remove the rotor using a wheel puller.
5. Remove wires from motor terminals.
6. Replace motor by removing four 1/4-20 bolts. Secure motor.
7. Replace wiring, rotor, and housings.

Replacing the Chopper Motor for the Model 508-128 Siren (K-CHPR1)

To replace the chopper motor, do the following:

1. Remove the horn screen.
2. Remove the top two housings.
3. Remove the 3/8 bolt holding rotor to the motor shaft.
4. Remove the rotor using a wheel puller or two 3/8-16 screws min. 4 inch long.

NOTE: Using the screw method for removal, remove the two short screws from the back of the stator.

5. Remove wires from motor terminals.
6. Replace motor by removing four 1/4-20 bolts. Motor must be secured.
7. Replace wiring, rotor, housings, and short screws on back of stator.

Replacing the Screen/Hardware for the Model 508-128 Siren

In the original Model 508-128 siren head, the brackets holding the screen on the front could become loose or damaged. The initial release had a two-hole design for the brackets that kept the screen attached to the siren head. In February of 2013, Federal Signal began shipping all Model 508-128 siren heads with a new three-hole design.

If you have the two-hole design and the hardware becomes damaged or loose, Federal Signal recommends upgrading the screen and kit. The Q-508SCREEN model consists of the following hardware.

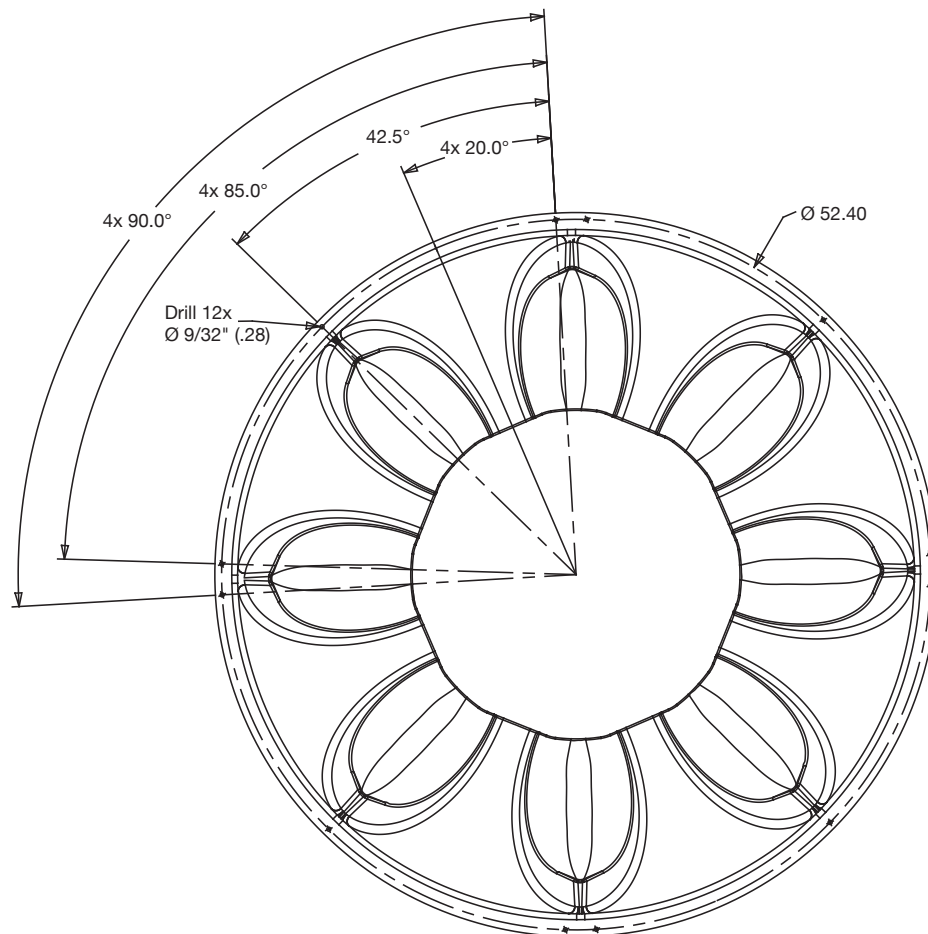
Table 29 Q-508SCREEN Hardware

Qty.	Description	Part Number
4	Brackets	8402224B
12	¼-20 Stainless Steel screws	7000A345-16
12	Flat washers	7072A024
12	¼-20 nylon lock nuts	7058A010

To replace screen and hardware on Model 508-128 siren, do the following:

1. When replacing the two slot pattern retaining bracket with three slot pattern retaining bracket (8402224B), drill the horn flange. (See Figure 31.)

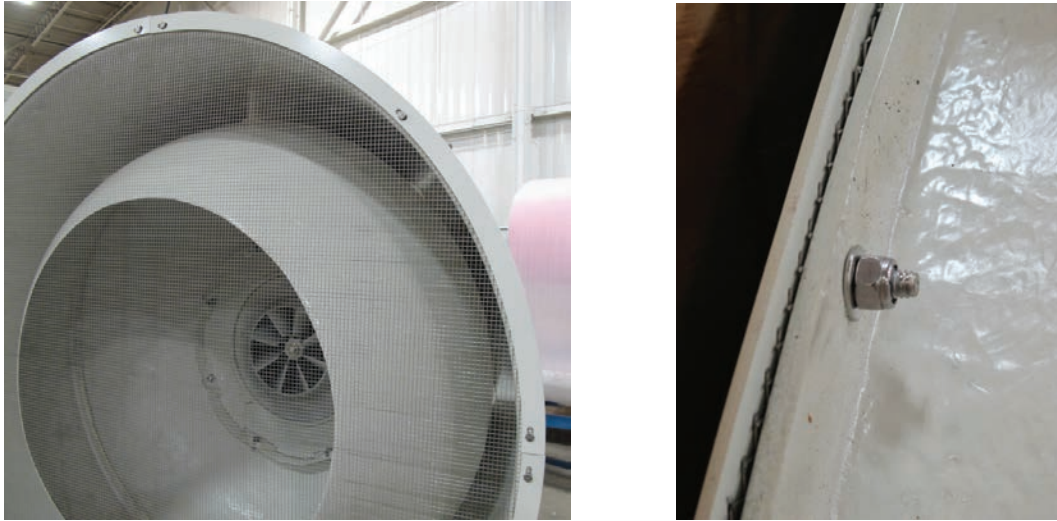
Figure 31 Drill horn flange for Model 508-128 Siren



Service and Maintenance

2. Secure bracket (8402224B) with C-clamps and mark drill pattern.
3. Drill new holes using 9/32 drill bit.
4. Attach each of the four (8402224B) brackets against the back side of fiberglass flange using three supplied 1/4-20 stainless steel screws (7000A345-16), three flat washers (7072A024), and three 1/4-20 nylon lock nuts (7058A010).

Figure 32 New screen installed



Ordering Replacement Parts for Siren Head

To order replacement parts, call Customer Care. See Getting Service.

Table 30 Replacement Parts for Siren Head

Description	Part Number
Clutch Replacement Kit	K-CL1
Brush Holder Assembly	K-BRSH1
Collector Ring Assembly	K-COLL1
Rotator Motor	K-GEAR1
Chopper Motor with key	K-CHPR1
Chopper Motor Brushes (Includes 4 brushes)	K-BRSH2
Black Cover	840200276
Black Plug	840200279

Table 31 Replacement Parts for Model 508-128 Siren Head only

Description	Part Number
Screen and hardware	Q-508SCREEN
Screen only	Q-8402220A

Getting Service

If you are experiencing any difficulties, contact Federal Signal Customer Care at: 800-548-7229 or 708-534-3400 extension 5822 or Technical Support at: 800-524-3021 or 708-534-3400 extension 7329 or through e-mail at: techsupport@fedsig.com. For instruction manuals and information on related products, visit: <http://www.fedsig.com/>



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