FEDERAL SIGNAL
Safety and Security Systems

Spire® 100-200 LED Utility Beacon

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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Federal Signal *www.fedsig.com*

Safety Message to Installers and Service Personnel

⚠ WARNING

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

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

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

- Do not install the light system in an area that would block, impair, or blind the driver's vision. Ensure that the light system is mounted in a position that is outside the driver's field of vision so the driver can safely operate the vehicle.

- A light system is a high current system. For the system to function properly, a separate negative (–) connection and positive (+) connection must be made. All negative connections should be connected to the negative battery terminal, and a suitable fuse should be installed on the positive battery terminal connection as close to the battery as possible. Ensure that all wires and fuses are rated correctly to handle the device and system amperage requirements.

- Never attempt to install aftermarket equipment that connects to the vehicle wiring without reviewing a vehicle wiring diagram available from the vehicle manufacturer. Ensure that your installation will not affect vehicle operation or mandated

safety functions or circuits. Always check the vehicle for proper operation after installation.

• The lighting system components, especially the outer housing, get hot during operation. Be sure to disconnect power to the system and allow the system to cool down before handling any components of the system.

• Do not mount a radio antenna within 18 inches (45.7 cm) of the lighting system. Placing the antenna too close to the lighting system could cause the lighting system to malfunction or be damaged by strong radio fields. Mounting the antenna too close to the lighting system may also cause the radio noise emitted from the lighting system to interfere with the reception of the radio transmitter and reduce radio reception.

• Do not attempt to wash any unsealed electrical device while it is connected to its power source.

• DO NOT connect this system to the vehicle battery until ALL other electrical connections are made, mounting of all components is complete, and you have verified that no shorts exist. If the wiring is shorted to the vehicle body or frame, high current conductors can cause hazardous sparks, resulting in electrical fires or flying molten metal.

• DO NOT install equipment or route wiring (or the plug-in cord) in the deployment path of an airbag.

• Before drilling into a vehicle structure, ensure that both sides of the surface are clear of anything that could be damaged. Remove all burrs from drilled holes. To prevent electrical shorts, grommet all drilled holes through which wiring passes. Also, ensure that the mounting screws do not cause electrical or mechanical damage to the vehicle.

• Because vehicle roof construction and driving conditions vary, do not drive a vehicle with a magnetically mounted warning light installed. The light could fly off the vehicle, causing injury or damage. Repair of damage incurred

because of ignoring this warning shall be the sole responsibility of the user.

- Locate the light system controls so the VEHICLE and CONTROLS can be operated safely under all driving conditions.

- After installation, test the light system to ensure that it is operating properly.

- Test all vehicle functions, including horn operation, vehicle safety functions, and vehicle light systems to ensure proper operation. Ensure that the installation has not affected the vehicle operation or changed any vehicle safety function or circuit.

- Scratched or dull reflectors or lenses will reduce the effectiveness of the lighting system. Avoid heavy pressure and the use of caustic or petroleum-based products when cleaning the lighting system.

- Replace any optical components that may have been scratched or crazed during system installation.

- Do not attempt to activate or deactivate the light system controls while driving in a hazardous situation.

- Frequently inspect the light system to ensure that it is operating properly and that it is securely attached to the vehicle.

- After installation and testing are complete, provide a copy of these instructions to instructional staff and all operating personnel.

- File these instructions in a safe place and refer to them when maintaining and/or reinstalling the product. Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death.

Overview of the Spire® Utility LED Beacons

The beacon uses an LED light source to provide a reliable signal with 25 selectable flash patterns. For the Spire 100, use pattern 10 if you will be utilizing an external flasher. The beacon may be pipe mounted or attached to brackets. The lights come with a dust cover, light cover, and branch guard.

The light can operate on a nominal 12 or 24 Vdc power source. For the Spire 100, a waterproof connector socket is molded into the base. Pre-terminated wires and connector parts are supplied to build the power leads. Installer-supplied wire may be used to neatly extend the power connection to the vehicle's harness without butt splices. For the Spire 200, a five-conductor cable protrudes from the base. This beacon features FSLink™. It can be synchronized with up to three other FSLink products.

Table 1 Product specifications for Spire 100

Input Voltage	12-24 Vdc
Input Current	0.6 A at 12 Vdc 0.3 A at 24 Vdc
Fuse	1.0 A
Flash rate	See Table 7 on page 16 for a description of the patterns.
Height	5.85 inches (14.86 cm)
Diameter	6.54 inches (16.61 cm) with flange
Weight	2.0-2.1 lb (0.90-0.95 kg)
Approvals	Marked on product

Table 2 Product specifications for Spire 200

Input Voltage	11 to 28 Vdc 12.8 or 25.6 Vdc nominal at 1.25 A
Fuse	2.0 A
Height	5.85 inches (14.86 cm)
Diameter	6.54 inches (16.61 cm) with flange
Weight	2.0-2.1 lb (0.90-0.95 kg)
Approvals	Marked on product

Unpacking the Beacon

After unpacking the beacon, inspect it for damage that may have occurred in transit. If there is damage, file a claim immediately with the carrier, stating the extent of the damage. Carefully check all envelopes, shipping labels, and tags before removing or destroying them. If installing a permanently mounted beacon, ensure that the parts listed in Table 3 or 4 are included in the package.

Table 3 Mounting kit hardware for Spire® 100 permanent mounted beacons

Qty.	Description
Basic parts included with permanent mount beacons	
3	#8 Panhead Phillips® Screw
3	#10 Panhead Phillips Screw
1	Terminated Power Wire, 18 AWG, red
1	Terminated Power Wire, 18 AWG, black
2	Terminal Contacts
1	Waterproof Connector Shell
1	Locking Wedge
1	Light Cover (user-installed atop the dust cover)
Additional parts included with mounting flanges	
3	#10 Machine Screws, 1-3/4" long
3	#10 Machine Screws, 7/8" long
3	#10 Machine Nuts

Table 4 Mounting kit hardware for Spire® 200 permanent mounted beacons

Qty.	Description
Basic parts included with permanent mount beacons	
3	#8 Panhead Phillips Screw
3	#10 Panhead Phillips Screw
1	Light Cover (user-installed atop the dust cover)
Additional parts included with mounting flanges	
3	#10 Machine Screws, 1-3/4" long
3	#10 Machine Screws, 7/8" long
3	#10 Machine Nuts

Wiring the Spire 100 Utility Beacon

| NOTICE |

REVERSE POLARITY/MISWIRING: To avoid damage to the light, ensure that the input voltage is the same as the voltage rating of the light. Ensure that correct polarity is observed. Also ensure that the unit is properly fused with a 1.0 A fuse.

Table 5 Wire connections

Color	Description	Connection Point
Black	Ground	Battery Negative
Red	Mode 1	Switched Positive 12-24 Vdc

To wire the beacon:

1. Determine the required length of wires needed. The beacon is supplied with 12-inch pre-terminated wires, which may be butt spliced to longer wires if needed. There are also two loose terminals supplied, which may be crimped to installer-supplied wires of longer length. For lengths up to 15 feet (5 m), use a minimum of 18 AWG (1 mm^2) wire. For lengths over 15 feet, use a minimum of 16 AWG (1.5 mm^2) wire.

2. If using installer-supplied wire for the entire length, terminate the wires with the supplied metal terminals.

3. Assemble either the supplied 12-inch wires or the installer-supplied wires into the connector shell. Refer to Figure 1. Insert the red wire into the location on the connector shell marked with a "1." The terminal will click into place. Repeat for the black wire into the location marked "2."

Figure 1 Wiring

Black Wire Negative - into Location 2

Red Wire Positive + into Location 1
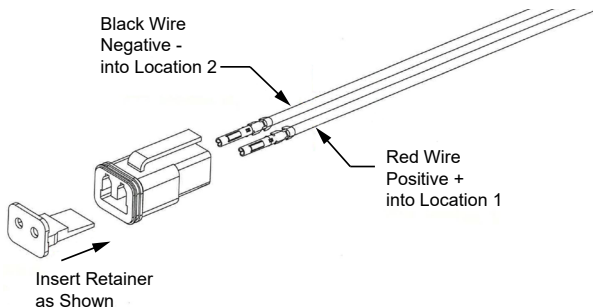
Insert Retainer as Shown

4. Plug the retainer lock into the connector shell as shown to lock the wires into the shell.

5. If the supplied 12-inch wires were used, use insulated butt connectors to connect the wires to the beacon's power cable. Ensure that the connectors are securely crimped and properly insulated.

6. Install a 1 A fuse and fuse holder to the positive (+) terminal at the voltage source. Connect one side of the power switch to this fuse. Connect the beacon's red wire to the switched terminal of the switch.

7. Connect the black (–) wire from the beacon to a known good vehicle ground as close to the beacon as is practical.

If desired, permanently lock the flange to the base using the three #8 screws provided. See Figure 2.

Figure 2 Flange Base

Use #8 screws to retain flange to base if desired.
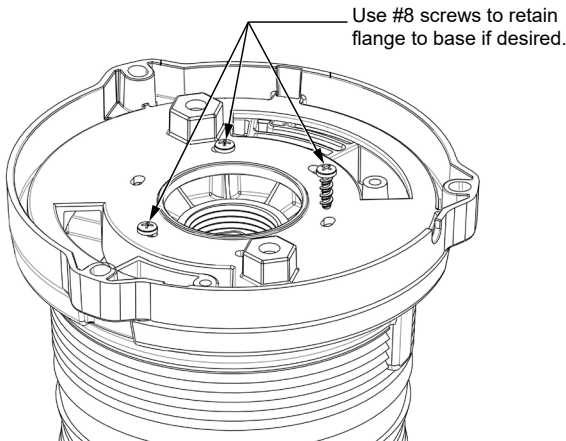
Wiring the Spire 200 Utility Beacon

NOTICE

REVERSE POLARITY/MISWIRING: To avoid damage to the light, ensure that the input voltage is the same as the voltage rating of the light. Ensure that correct polarity is observed. Also ensure that the unit is properly fused with a 2.0 A fuse.

Table 6 Wire connections

Color	Description	Connection Point
Black	Ground	Battery Negative
Red	Mode 1	Switched Positive 12-24 Vdc
White	Mode 2	Switched Positive 12-24 Vdc
Brown	Low Power	Switched Positive 12-24 Vdc
Green	Program/ FSLink	12-24 Vdc

To wire the beacon:

1. Determine the required functions and the length of wires needed to access them. A five-conductor cable can be selected for a full-featured installation. For lengths up to 15 feet (5 m), use a minimum 18 AWG (1 mm) wire. For lengths over 15 feet, use a minimum 16 AWG (1.5 mm) wire. Before wiring the beacon, refer to Table 6 for the function of each wire.

2. Strip 1/4 inch (5 mm) of insulation from the ends of the installer-supplied wires.

3. Use insulated butt connectors to connect the wires to the beacon's power cable. Ensure that the connectors are securely crimped and properly insulated.

4. Connect the end of the fuse holder to the positive (+) terminal of the voltage source.

5. Connect the black (–) wire from the beacon to a known good vehicle ground as close to the beacon as practical.

6. The black wire is ground and must be connected to a suitable chassis ground if it cannot be taken directly to the negative terminal of the battery.

7. The green wire has a dual function: It is the runner wire that synchronizes FSLink-Equipped products, and it serves as the function/pattern programming wire.

8. The red wire powers the beacon in Mode 1 when connected to a fused, positive voltage.

9. The white wire powers the beacon in Mode 2 when connected to a fused, positive voltage.

   NOTE: If Mode 1 is active when Mode 2 is powered up, Mode 2 overrides Mode 1.

10. The brown wire places the beacon (without automatic low power) into low-power mode when the wire is connected to a fused, positive voltage and either mode is activated. For a beacon equipped with the automatic low-power feature, the brown wire prevents the beacon from entering low power when the beacon is connected to positive voltage

Permanently Mounting the Beacon

Selecting a flash pattern is optional and should be completed during the installation. For flash pattern descriptions, see Table 7 on page 16 or Table 8 on page 19.

To mount the beacon:

**1.** Scribe the locations of the three mounting holes in the base.

   There are two sets of evenly spaced holes 120° apart on the bottom of the beacon itself. Holes for the #8 self-tapping screws are on a 2.75-inch diameter (where the lines intersect the inner circle in Figure 3). The holes for the #10 self-tapping screws are on a 4-inch diameter (where the lines intersect the middle circle in Figure 3). The 4-inch pattern is the preferred pattern for permanent mounting.

   If one of the optional mounting flanges is to be used, three #10 screws are on a 6.00-inch circle (where the lines intersect the outer circle in Figure 3).

Drill three 0.177-inch diameter holes for the #8 screws, or three 0.201-inch diameter holes for the #10 screws.

Figure 3 Drilling (not to scale)
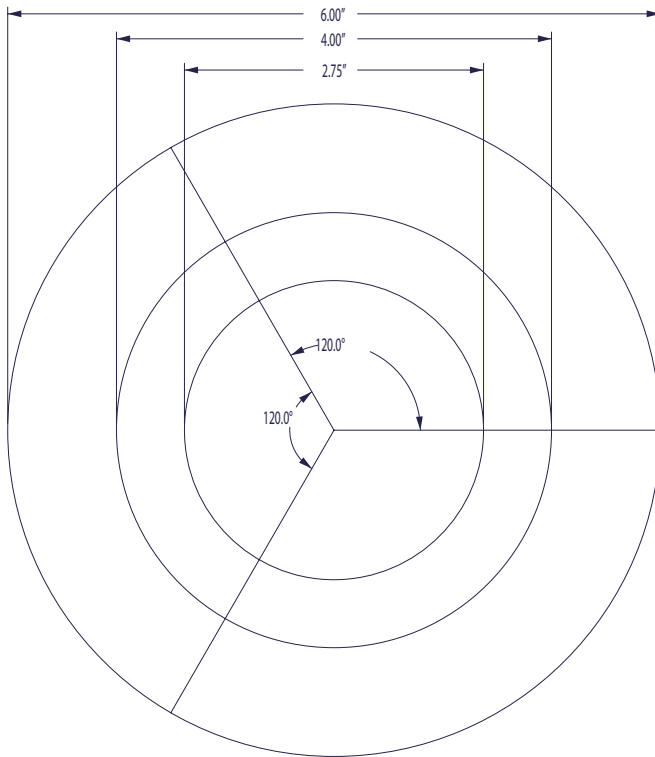
2. Scribe a hole for the wires or an installer-supplied bushing at the center of the screw pattern.

NOTICE

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

3. Drill a suitably sized hole at the scribed position for the bushing and wire routing hole. Otherwise, route the wires through the drain notch in the optional mounting flange. Leave open space for water to drain.

4. Align the beacon over the drilled holes. Route the wires through the wire routing hole. Seal the hole with a bushing or RTV if entering a watertight compartment.

Figure 4 Permanent-mount beacon (exploded view)
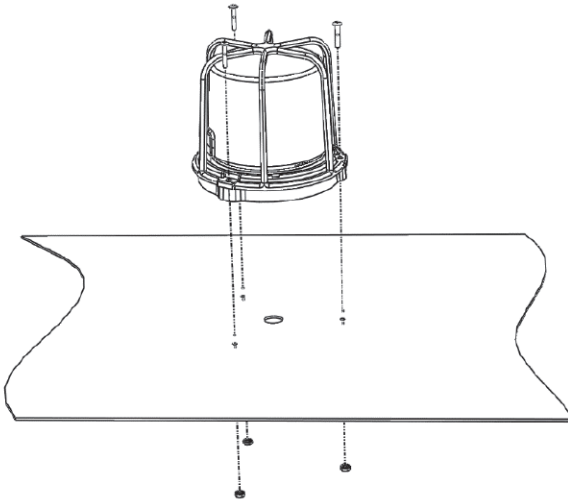
5. Secure the base to the mounting surface with the selected panhead screws.

Configuring the Spire 100 Utility Beacon

If the beacon's operating functions are to be changed from the default, perform the following steps.

Selecting a Flash Pattern

⚠ WARNING

LIGHT HAZARD: This product contains a high-intensity LED device. To prevent permanent eye damage, DO NOT stare into the light beam at close range.

Selecting a flash pattern from the beacon's internal library of flash patterns is optional. It should be done during installation. For the flash patterns, see Table 7 on page 16.

To select a flash pattern:

1. Turn the power from off to on three times, once per second, to enter Programming Mode.

2. To display the next pattern in the sequence, cycle the power switch off and on. Continue to operate the switch until you see the pattern you want.

3. To exit Programming Mode and set the pattern in memory, either turn the beacon off for more than five seconds or allow it to run for 60 seconds or more.

Table 7 Spire 100 Flash Patterns

No.	Description	Flash Rate (FPM)
1*	Double Quad	60
2	Chopped Double	60
3	Double Pulse	80
4	Pulsing Quad	60
5	Triple FedPulse	60
6	Reverse Double Pulse	81
7	Breathing	60
8	Random Full, All Patterns Various	
9	Random, Select Patterns #11-25 Various	
10	Steady	Illuminates at full power for three seconds and then reduces
11	Single Flash Slow	75
12	Single Flash	120
13	Double Flash	80
14	Double Flash Fast	120
15	Triple Flash	80
16	Triple Flash Fast	120
17	Quad Flash Slow	60
18	Quad Flash	75
19	Quad Flash Fast	95
20	Quad FedPulse	75
21	5x Flash	75
22	7x Flash	80
23	Single Flash / Quad	120/60
24	Decelerating	60
25	Accelerating	60

Pattern 1 is the default

Configuring the Spire 200 Utility Beacon

If the beacon's operating functions are to be changed from the default, perform the following steps.

Selecting a Flash Pattern

⚠ WARNING

LIGHT HAZARD: This product contains a high-intensity LED device. To prevent permanent eye damage, DO NOT stare into the light beam at close range.

Selecting a flash pattern from the beacon's internal library of flash patterns is optional. It should be done during installation. For available flash patterns, see Table 8 on page 19.

To select a flash pattern:

1. Select Mode 1 (red wire) or Mode 2 (white wire).

2. Apply power (+12-24 Vdc) to that wire.

3. To activate FSLink™, tap the green wire to + 12-24 Vdc until the desired pattern is reached. For magnetically mounted beacons, you can click the momentary switch instead of tapping the green wire.

NOTE: When tapping the green wire to change patterns, do not hold power for longer than one second, or other features of the beacon will change.

Selecting Sync or Alt

When setting up devices to be synchronized, they must never be operated without a ground connection. If a poor ground connection exists, the unit will operate erratically and the warranty is voided. Routinely inspect all connections to ensure that they are secure.

The beacon can synchronize with other beacons. It will either flash with or alternate the timing of the flashes with other beacons. Select this feature separately for Mode 1 or Mode 2.

To synchronize your selected flash pattern:

1. Activate Mode 1 or 2.

2. Connect and hold the green wire to the positive voltage source until the beacon pulses twice, and then release it. The beacon switches from its initial setting to its opposite. "Flash with" becomes "Alternate," or vice versa.

3. To synchronize, after setup, connect the green wires together.

For this feature to operate, permanently connect all green wires after all beacons in the system are configured.

Selecting Single- or Dual-Color (if equipped)

The beacon can be made to either flash a single color or two colors. This is done separately for Mode 1 or 2.

To select single- or dual-color:

1. Activate the Mode for which this color feature is to be set.

2. Connect and hold the green wire to the power until the beacon pulses three times, and then release it.

3. The beacon switches from its initial setting to its opposite. Single-Color becomes Dual-Color, or Dual-Color becomes Single-Color.

Selecting the Color Order

You can set the order in which a beacon flashes. The order is selected separately for Mode 1 or Mode 2.

To select the color order:

1. Activate the Mode for which this color feature is to be set.

2. Hold the green wire to the positive voltage source until the beacon pulses four times, and then release the wire. The beacon switches color from the initial setting to its opposite. For example, a dual-color, amber-red beacon set to flash amber and then red will change to flashing red and then amber. A dual-color, amber-red beacon set to the single color red will become amber.

Resetting the Beacon to the Default Settings

To reset the beacon mode to the default settings, apply power to the green wire while either Mode 1 or Mode 2 is powered. Hold the wire to the power source until the beacon pulses six times and then remove the power. Repeat this action for each Mode you want to reset.

NOTE: No change occurs if you remove power from the green wire after five pulses and before the sixth pulse finishes.

Table 8 Spire 200 Flash Patterns

No.	Description	Flash Rate (FPM)
1*	Double Quad	60
2	Chopped Double	60
3	Double Pulse	80
4	Pulsing Quad	60
5	Triple FedPulse	60
6	Reverse Double Pulse	81
7	Breathing	60
8	Random Full, All Patterns Various	
9	Random, Select Patterns #11-25 Various	
10**	Steady	N/A
11	Single Flash Slow	75
12	Single Flash	120
13	Double Flash	80
14	Double Flash Fast	120
15	Triple Flash	80
16	Triple Flash Fast	120
17	Quad Flash Slow	60
18	Quad Flash	75
19	Quad Flash Fast	95
20	Quad FedPulse	75
21	5x Flash	75
22	7x Flash	80
23	Single Flash / Quad	120/60
24	Decelerating	60
25	Accelerating	60

*Pattern 1 is the default for Mode 1

**Pattern 10 is the default for Mode 2

Cleaning the Beacon

⚠ WARNING

CRAZING/CRACKING Crazing (fine cracks) of lenses causes reduced effectiveness of the light. Do not use cleaning agents (which causes crazing) such as strong detergents, solvents, or petroleum products. If crazing of the lenses does occur, the reliability of light for emergency signaling purposes may be reduced until the lenses are replaced.

NOTICE

CLEANING the POLYCARBONATE LENSES: To extend the life of this device, periodic cleaning is necessary. Clean the lens with a mild, non-abrasive, neutral-pH cleaning agent and a soft, clean cloth. Rinse the device thoroughly to ensure that no cleaning agent residue remains. To avoid water spots, dry the device with a soft clean cloth. Failure to follow this precaution can cause crazing or cracking of the lens/dome and voids the warranty claims for the light.

Getting Technical Support

For technical support, please contact:
Federal Signal Corporation
Phone: 1-800-433-9132
Email: empserviceinfo@fedsig.com

Getting Repair Service

The Federal Signal factory provides technical assistance with Any units returned to 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. Provided a brief explanation of the service requested or the nature of the malfunction.

Address all communications to the following address:

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