FEDERAL SIGNAL

110 Series

Loudspeaker, Powered Loudspeaker, and Sounder

Includes 112 and 114 Versions
8 and 15 Watts
(Model Type ES1/MS1)

Installation, Operation, and Maintenance

2562191C
REV. C 1209
Printed in U.S.A.

LIMITED WARRANTY

Federal Signal Corporation warrants each new product to be free from defects in material and workmanship, under normal use and service, for a period of two years on parts replacement and one year on labor from the date of delivery to the first user-purchaser.

During this warranty period, the obligation of Federal Signal is limited to repairing or replacing, as Federal Signal may elect, any part or parts of such product which after examination by Federal Signal discloses to be defective in material and/or workmanship.

Federal Signal will provide warranty for any unit which is delivered, transported prepaid, to the Federal Signal factory or designated authorized warranty service center for examination and such examination reveals a defect in material and/or workmanship.

This warranty does not cover travel expenses, the cost of specialized equipment for gaining access to the product, or labor charges for removal and re-installation of the product.

This warranty does not extend to any unit which has been subjected to abuse, misuse, improper installation or which has been inadequately maintained, nor to units which have problems relating to service or modification at any facility other than the Federal factory or authorized warranty service centers.

THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL FEDERAL BE LIABLE FOR ANY LOSS OF PROFITS OR ANY INDIRECT OR CONSEQUENTIAL DAMAGES ARISING OUT OF ANY SUCH DEFECT IN MATERIAL OR WORKMANSHIP.

Federal Signal Corporation
Integrated Systems
2645 Federal Signal Drive
University Park, IL 60484-3167, U.S.A.

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Safety Message to Installers, Operators, and Maintenance Personnel

It is important to follow all instructions shipped with this product. This device is to be installed by a trained electrician who is thoroughly familiar with local codes.

The selection of the mounting location for the device, its controls and the routing of the wiring is to be accomplished under the direction of the facilities engineer and the safety engineer. In addition, listed below are some other important safety instructions and precautions you should follow:

- Read and understand all instructions before installing or operating this equipment.
- Do not connect this unit to the system while the power is on.
- All effective warning speakers produce loud sounds, which may cause in certain situations, permanent hearing loss. You should take appropriate precautions such as wearing hearing protection.
- All effective warning speakers produce loud sounds, which may cause, in certain situations, permanent hearing loss. The device should be installed far enough away from potential listeners to limit their exposure while still maintaining its effectiveness.
- After installation, test the sound system to ensure that it operates properly.
- After testing is complete, provide a copy of these instructions to all operating personnel.
- Establish a procedure to routinely check the speaker installation for integrity and proper operation. Any maintenance must be performed by a trained electrician in accordance with NEC guidelines and local codes.

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

An Overview of the 110 Series

The Federal Signal 110 Series Loudpeaker complies with the ATEX Directive for operation in gaseous hazardous areas classified as Zone 1 with a temperature classification of –20 °C to +70 °C T4, –20 °C to +55 °C T5, and –20 °C to +40 °C T6.

The loudspeakers are designed for use in industrial public address and general alarm applications where ATEX certification is required. They are available in either an ATEX Zone 1 flameproof version or a CE compliant, marine-grade industrial version.

The Model 110 Series Loudspeaker, including the marine versions (loudspeaker and MS1), has a main enclosure with dual gland entries and an FLP end cap. The model is fitted with a nose cone, outer and inner horn, driver, and an adjustable mounting bracket. The components within the main enclosure—transformer, transformer and PCB Assembly, PCB—vary depending on the model.

The loudspeakers are available in 8-watt and 15-watt configurations to provide an appropriate amount of sound for the ambient environment. Each speaker is transformer-coupled to fine tune the sound output for each application and balance the audio load. Available audio inputs are 100 Vrms, 70 Vrms, and 8 ohms.

A stainless-steel ratcheted mounting bracket locks the sounder in position at a specific angle without slipping. The bottom surface of the mounting bracket also contains three mounting holes, to adapt to a variety of surfaces.

The loudspeaker is rated for IP66/67 through the use of a neoprene O-ring seal. All exterior cast aluminum surfaces are finished in powder coat paint and external hardware is manufactured from stainless steel to resist corrosion.

Product Detail

Frequency Range:

8-Watt Flameproof
600–4000 Hz

8-Watt Marine
500–8000 Hz

15-Watt Flameproof
390–4500 Hz

15-Watt Marine
390–8500 Hz

Ambient Temperature Range:

T4 Flameproof and Marine
–20 °C to +70 °C

T5 Flameproof
–20 °C to +55 °C

T6 Flameproof
–20 °C to +40 °C

Flameproof Rated:

Sound Pressure Level at 1 kHz (full power at 1 meter)

8 W-IIB:	8 W-IIC:	15 W-IIB:	15 W-IIC:
110 dBa	106 dBa	116 dBa	112 dBa

Sound Pressure Level at 1 kHz (1 watt at 1 meter)

8W-IIB:	8W-IIC:	15W-IIB:	15W-IIC:
110 dBa	106 dBa	116 dBa	112 dBa

Marine Rated Power:

Sound Pressure Level at 1 kHz (full power at 1 meter)

8 W:	15 W:
114 dBa	118 dBa

Sound Pressure Level at 1 kHz (1 watt at 1 meter)

8 W:	15 W:
104 dBa	106 dBa

Certifications and Approvals:

8 and 15 W:

Baseefa 03ATEX0688X ⟨Ex⟩ II2G ExdIIBT4 (T6)

Baseefa 03ATEX0689X ⟨Ex⟩ II2G ExdIICT4 (T6)

Marine:

Electromagnetic compatibility to EN 61000-6-1, 2, 3, 4: 2001

Standards:

EN50014:1997 + A1:1999 + A2:1999
EN50018:2000 + A1, EN500019:2000

CE:
EMC to EN 61000-6-1,2,3,4:2001
LVD to EN 60065

Ingress Protection:

Flameproof	IP66 and IP67-EN60529
Marine	IP66 and IP67-EN60529

Specifications:

Net Weight	
8 W Short Horn Series	3.0 kg (6.6 lb)
15 W Standard Horn Series	3.2 kg (7.1 lb)
Shipping Dimensions	29 cm x 29 cm x 30 cm (11.42 in x 11.42 in x 11.81 in)
Dispersion Angle	
8 W Short Horn Series	180°
15 W Standard Horn Series	120°
Type	Dual entry
Gland Entries	2 x M20 x 1.5 mm
Cable Terminations	6A, 1.5 mm conductors
Mounting	Unpainted stainless steel bracket
Body and Horn Material	Marine grade aluminum alloy
Audio Input	100 volt, 70 volt, and 8 ohm

⚠ WARNING

FIRE/EXPLOSION HAZARD

Do not use the 110 Series in flammable atmospheres containing carbon disulphide (CS_2). All units are not certified for use in flammable atmospheres containing carbon disulphide.

Failure to observe this warning could result in serious injury or death.

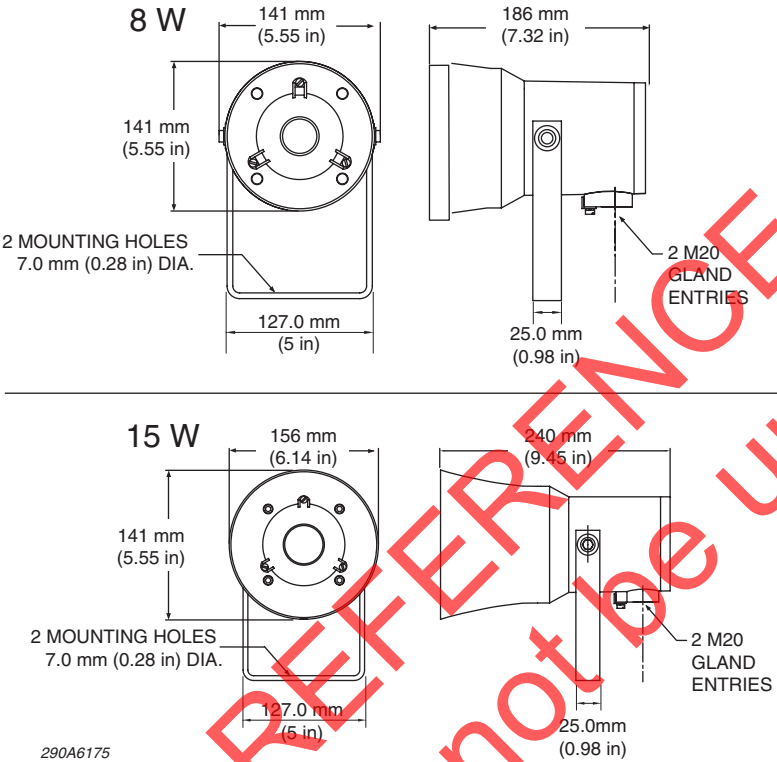


Figure 1: Loudspeaker dimensions

⚠ WARNING

SHOCK HAZARD

Do not connect this unit to the system while the power is on.

Special Conditions for Safe Use

To maintain the loudspeaker certification, do not attempt to repair the flameproof enclosure. Units requiring repair to the flameproof enclosure must be returned to Federal Signal for service.

The maximum flame path gap for the IIB variants is the same as for gas group IIC.

All terminal screws, used or unused, must be tightened 0.5 N • m to 0.7 N • m.

Installing the Product

This product must be installed and maintained only by qualified personnel who have received the relevant training. During installation ensure that all external screw threads and flameproof faces are suitably greased. Recommended torque on all external fixings is 5 N • m. Check details on the label to ensure the unit is of the correct electrical rating and hazardous area classification.

Ensure the unit is securely mounted using the supplied bracket. Use M12 for the center hole and/or 2 x M6 in the outer holes (*Figure 2*). You can adjust the angle of the loudspeaker by using the external ratcheted brackets on each side of the body (*Figure 3* on page 7).

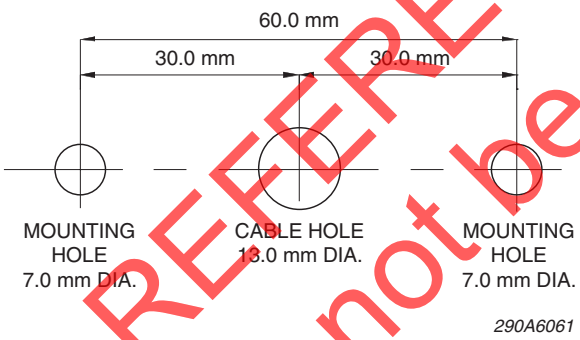


Figure 2: Dimensions of mounting bracket

Accessing the Terminals and Glands

To access the cable terminals:

1. Remove the end cap (*Figure 3* on page 7) by first removing the four M5 socket-head cap screws.
2. The purpose of the jack screws, if equipped, is to aid in the removal of the end cap. Tighten the two M4 jack screws crosswise until the cover can be pried or lifted off.

The M20 gland entries are located in the main enclosure. Ensure the cable is terminated in accordance with the gland manufacturer's instructions using approved cable glands. Any unused entry must be sealed with a suitably certified stopper plug.

NOTE: Loudspeakers in close proximity must be connected in the same phase.

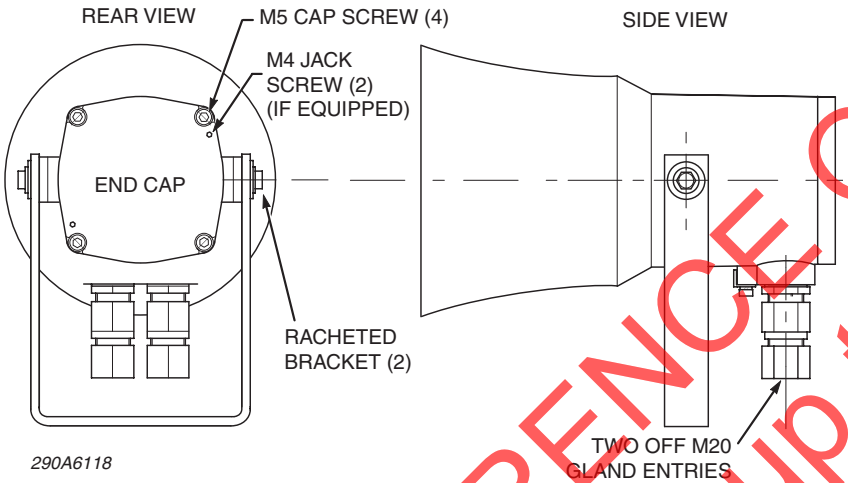


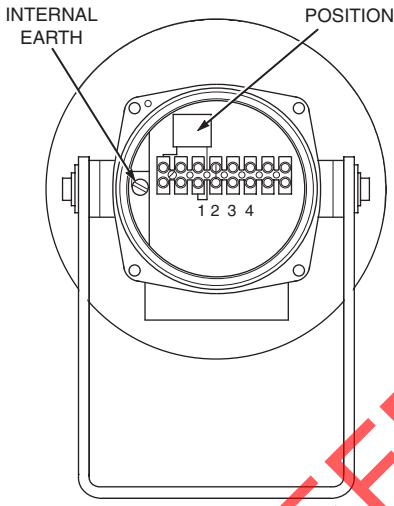
Figure 3: Side and rear views of 15 W loudspeaker

Earthing

The unit must be correctly connected to earth. Both internal and external earth terminals are provided.

Greasing the Holes for the Mounting Face and Screws

Before the installation you must grease all holes for the O-ring mounting face and screws. On the end caps with jack screws, be sure that the jack screws do not protrude past the inner face of the end cap so that the cover can seat completely. When you are finished with the installation, reinstall the O-ring and end cap, ensuring that there are no trapped wires. Tighten the end cap using all four stainless-steel screws to 5 to 7 N • m.



TRANSFORMER TAPPINGS		
	STD	LOW
TERMINALS	INTERNAL 5	BLACK ON 6
1 AND 2	15.0 W	1.0 W
1 AND 3	10.0 W	0.7 W
3 AND 4	7.0 W	0.5 W
2 AND 4	5.0 W	0.3 W
1 AND 4	2.0 W	0.1 W

TRANSFORMER TAPPINGS		
	STD	LOW
TERMINALS	INTERNAL 5	BLACK ON 6
1 AND 2	8.0 W	0.5 W
1 AND 3	5.0 W	0.3 W
3 AND 4	3.0 W	0.2 W
2 AND 4	2.0 W	0.1 W
1 AND 4	1.0 W	0.05 W

TRANSFORMER TAPPINGS		
	STD	LOW
TERMINALS	INTERNAL 5	BLACK ON 6
1 AND 2	2.0 W	0.10 W
1 AND 3	1.0 W	0.07 W
3 AND 4	0.7 W	0.05 W
2 AND 4	0.5 W	0.03 W
1 AND 4	0.2 W	0.01 W

290A6062B

Figure 4: Tapping

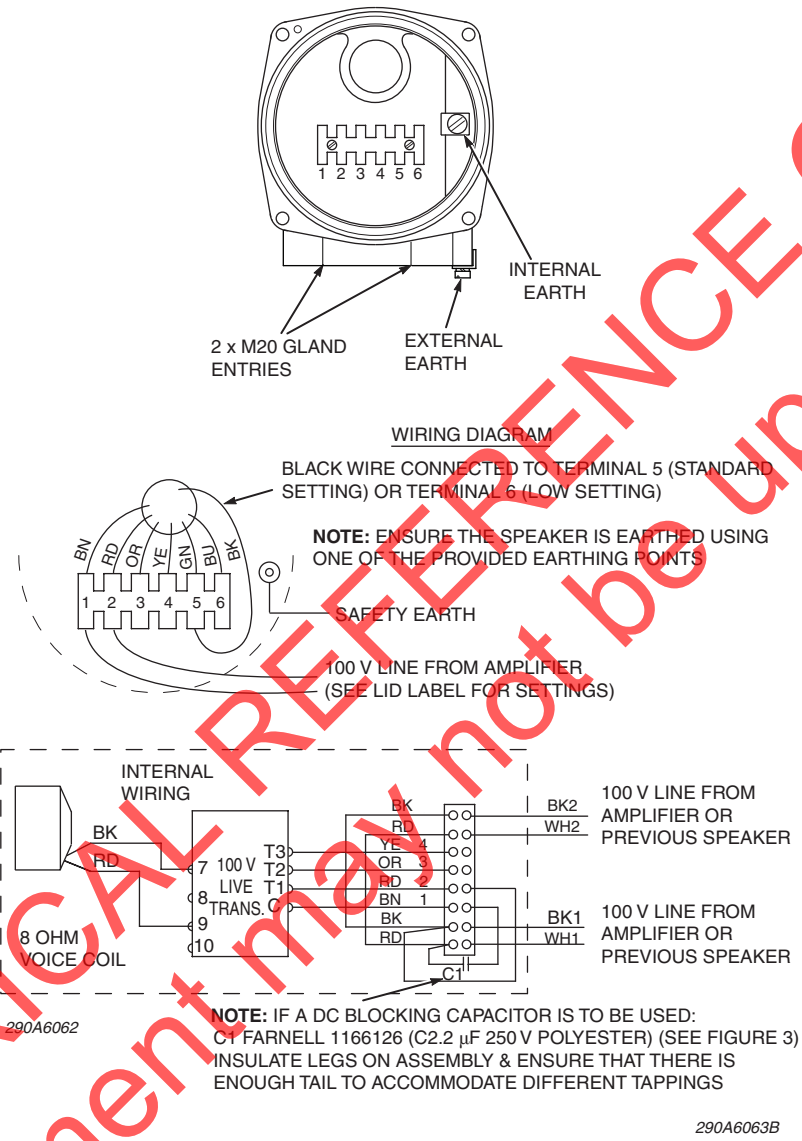


Figure 5: Wiring diagram and double-gland tapping

Wiring the Powered Loudspeaker

This section provides instructions for operating the powered loudspeaker at 240 Vac, 110 Vac, and 24 Vdc, It also includes the signal input. See *Figure 6* and *Figure 7* on page 11.

For 240 Vac Operation

1. Set the Voltage Selector to 230 V.
2. Insert the 250 mA fuse.
3. Connect the Live wire to the LIVE In terminal.
4. Connect the Neutral wire to the NEUTRAL IN terminal.
5. Connect the Internal Earth wire to the INTERNAL EARTH terminal.
6. Connect the Signal Output wire to the SIG GND IN and SIG IN terminals.

For 110 Vac Operation

1. Set the Voltage Selector switch to the 110 Vac position.
2. Insert the 500 mA fuse.
3. Connect the Live wire to the LIVE IN terminal.
4. Connect the Neutral wire to the NEUTRAL IN terminal.
5. Connect the Internal Earth wire to the INTERNAL EARTH terminal.
6. Connect the Signal Output wire to the SIG GND IN and SIG IN terminals.

For 24 Vdc Operation

1. Connect to the 0V common terminal.
2. Connect +24 Vdc wire to the +24V IN terminal.
3. Connect the Internal Earth wire to the INTERNAL EARTH terminal.
4. Connect the Signal Output wire to the SIG GND IN and SIG IN terminals.

NOTE: Input sensitivity of 2.8 Vrms should be used with the Federal Signal ECHO Intercom System.

Settings for the Signal Input Gain

- No jumper is fitted to 8 Vrms IP for 0 dB.
- Fit jumper to L1 2.8 Vrms for 0 dB.
- Fit jumper to L2 1.5 Vrms for 0 dB.
- Fit jumper to L3 0.8 Vrms for 0 dB.

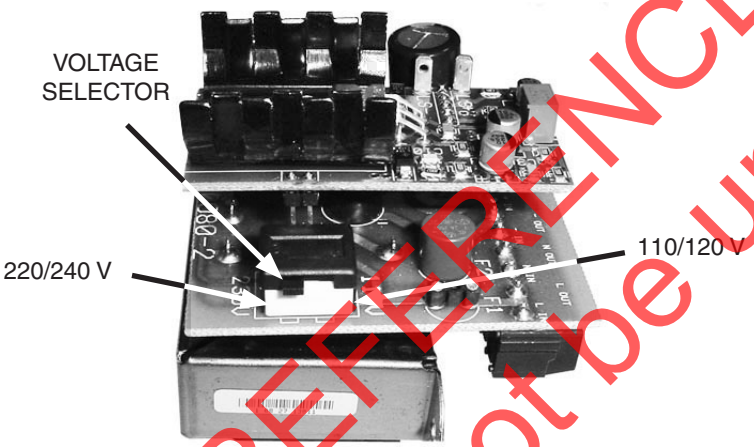


Figure 6: Voltage selector for powered loudspeaker

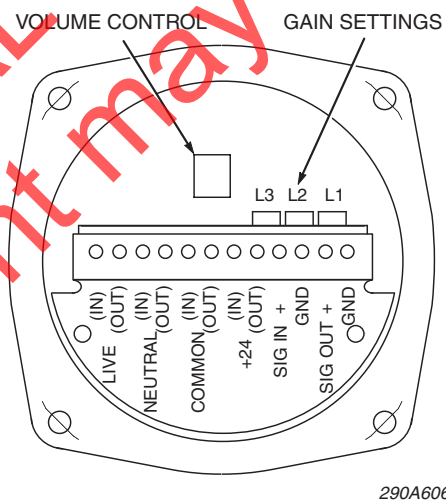


Figure 7: Terminals for powered loudspeaker

Wiring the ES1/MS1 Multi-Tone Sounder

This section provides instructions for operating the Multi-Tone Sounder at 240 Vac, 110 Vac, and 24 Vdc. See *Table 1* on page 13.

Also included are instructions for 24 Vdc 2-wire operation, 24 Vdc 3-to-5-wire operation, and AC 4-to-6-wire operation. See *Figures 8* and *9* on page 15.

For 240 Vac Operation

1. Set the Voltage Selector to 230 V.
2. Insert the 250 mA fuse.
3. Turn the tone selector to the position of the tone you want.
4. Connect the Live wire to the LIVE IN terminal.
5. Connect the Neutral wire to the NEUTRAL IN terminal.
6. Connect the Internal Earth wire to the INTERNAL EARTH terminal.

For 110 Vac Operation

1. Set the Voltage Selector to 110 Vac.
2. Insert the 500 mA fuse.
3. Turn the tone selector to the position of the tone you want.
4. Connect the Live wire to the LIVE IN terminal.
5. Connect the Neutral wire to the NEUTRAL IN terminal.
6. Connect the Internal Earth wire to the INTERNAL EARTH terminal.

For 24 Vdc 2-Wire Operation

1. Turn the tone selector to the position of the tone you want.
2. Connect to the 0V common terminal.
3. Connect the +24 Vdc wire to the +24V IN terminal.
4. Connect the Internal Earth wire to the INTERNAL EARTH terminal.

Table 1: Tone chart for 240V, 110V, and 24 Vdc two-wire operation

Position	Tone
0	OFF
1	Two tones: 588 Hz for 0.25 second, 714 Hz for 0.25 second
2	Swept 600 Hz > 700 Hz in 0.5 second
3	Telephone warble
4	Constant 700 Hz
5	Simulated bell, three rings per second
6	Swept 1.2 kHz > 1.6 kHz, swept 1.6 kHz > 1.2 Hz, six cycles per second
7	Two tones: 1 kHz for 0.4 second, 700 Hz for 0.4 sec.
8	700 Hz for 0.25 second, silence for 0.25 second
9	Swept 400 Hz > 1.6 Hz in 1 second, constant 1.2 Hz for 2 second
A (10)	Swept 500 Hz 770 Hz in 0.5 second.
B (11)	1 kHz for 1 second, silence for 1 second
C (12)	Constant 1 kHz
D (13)	Two tones: 700 Hz for 0.5 second, 500 Hz for 0.5 second
E (14)	Warble between 1 kHz and 1.4 kHz approx. 10 cycles per second
F (15)	Swept 1.2 kHz > 400 Hz in 1 second

For 24 Vdc 3-to-5-Wire Operation

See the tone chart and illustrations on page 15.

1. Turn the tone selector to 0.
2. Connect to the 0 V common terminal.
3. Connect the +24 Vdc supply/select wires to the T1, T2, T3, T4 terminals. These connections enable you to select the four basic tones remotely.
4. Connect the Internal Earth wire to the INTERNAL EARTH terminal.

For AC 4-to-6-Wire Operation

See the tone chart and illustrations on page 15.

240 Vac Operation:

1. Set the Voltage Selector to 230 V.
2. Insert the 250 mA fuse,
3. Turn the Tone Selector to the 0 position.
4. Connect the Live wire to the LIVE IN terminal.
5. Connect the Neutral wire to the NEUTRAL IN terminal.
6. Connect the Internal Earth wire to the INTERNAL EARTH terminal.
7. Connect a link between the NEUTRAL OUT and +24V OUT terminals.
8. In the control panel connect from Neutral return through SELECT LINES. These connections enable you to remotely select the four basic tones.
9. Connect wires to the T1, T2, T3, and T4 terminals as needed

110 Vac Operation:

1. Set the Voltage Selector to 110 V.
2. Insert the 500 mA fuse,
3. Turn the Tone Selector to the 0 position.
4. Connect the Live wire to the LIVE IN terminal.
5. Connect the Neutral wire to the NEUTRAL IN terminal.
6. Connect the Internal Earth wire to the INTERNAL EARTH terminal.
7. Connect a link between the NEUTRAL OUT and +24V OUT terminals.
8. In the control panel connect from Neutral return through SELECT LINES. These connections enable you to remotely select the four basic tones.
9. Connect wires to the T1, T2, T3, and T4 terminals as needed.

Table 2:
Tone chart for 24 Vdc 3-to-5 wire and AC 4-to-6 wire operation

Terminal	Tone
T1	Two tones: 588 Hz for 0.25 second, 714 Hz for 0.25 second
T2	Swept 600 Hz > 700 Hz in 0.5 second
T3	Constant 700 Hz
T4	700 Hz for 0.25 second, silence for 0.25 second

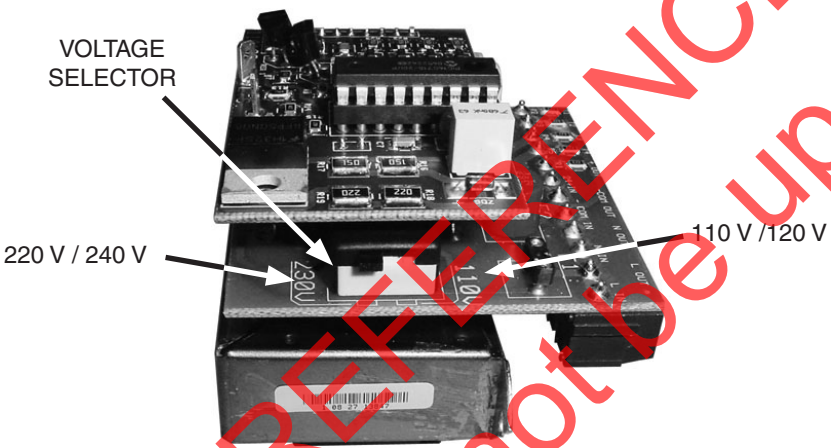


Figure 8: Voltage selector for multi-tone sounder

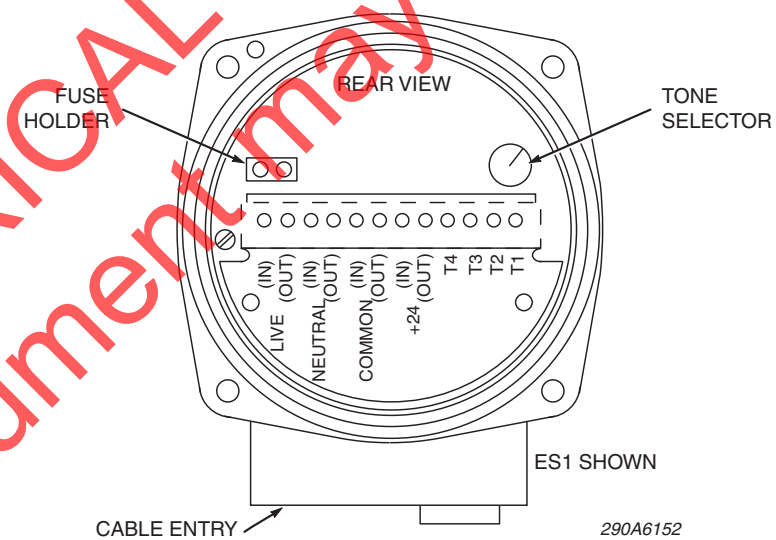


Figure 9: Terminals for multi-tone sounder

Routine Maintenance

⚠ WARNING

FIRE/EXPLOSION HAZARD
Do not open the loudspeaker and/or sounder, even they are isolated, when a flammable-gas atmosphere is present.

Failure to observe this warning could result in serious injury or death.

Ensure that the unit is maintained in line with the regulations in force and at least once per year.

- ✓ Check for external damage and corrosion and repair and replace as required.
- ✓ Check for water ingress and replace the O-rings if necessary.
- ✓ Check all earth connections.
- ✓ Check flameproof paths and fixing screws for damage and corrosion.
- ✓ Grease all threads, O-rings, and flameproof paths.

Technical Service and Support

For technical service and support, please contact:

Federal Signal Corporation
Integrated Systems
Service Department
2645 Federal Signal Drive
University Park, IL 60484-3167, U.S.A.
Phone: +1 877 289 3246
Fax: +1 708 534 4887
E-Mail: systems@fedsig.com

Ordering Replacement Parts

To order the replacement parts listed in *Table 3* on page 17, please contact the Service Department.

Table 3: Replacement parts

Description	Part Number
Mounting Bracket	K8597134
Ratchet Fixing Kit	K8597198
Cap Screw	K7002086-16
Jack Screw	K7008048-10
O-Ring Kit	K8597201
PCB, 100 V ISMT Module, 8 W	K2001971
PCB, 100 V ISMT Module, 15 W	K2001973
PCB, Sounder Module, 8 W & 15 W	K2005360
PCB, Powered Speaker, 8 W & 15 W	K2005366
Transformer, 100 V	K1461680
Transformer, 70 V	K1461734
Driver Assembly, 8 W & 15 W	K8597165

FEDERAL SIGNAL CORPORATION
Electrical Products

CE

EC Declaration of Conformity
Issued: December 1, 2009

We (manufacturer): Federal Signal Corporation
Signal Division
2645 Federal Signal Drive
University Park, IL 60466-3195 U.S.A

declare under our sole responsibility that the following

Model: 110 Series Loudspeakers and Sounders
Type of Equipment: Flameproof Loudspeakers and Sounders

To which this declaration is in conformity with the following standard(s)

ATEX	
EN50014:1997+A1+A2	Electrical apparatus for potentially explosive atmospheres – General
EN50018:2000+A1	Electrical apparatus for potentially explosive atmospheres – Flameproof 'd'
EN50019:2000	Electrical apparatus for potentially explosive atmospheres – Increased safety 'e'
LVD	
EN60065:2002	Audio, Video, and Similar Electronic Apparatus Safety Requirements
EMC	
EN61000-6-1:2001	Generic Immunity for Residential, Commercial, and Light Industrial.
EN61000-6-2:2001	Generic Immunity Standard for Industrial Environments
EN61000-6-3:2001	Generic Emissions for Residential, Commercial, and Light Industrial
EN61000-6-4:2001	Generic Emissions Standard for Industrial Environments

and therefore conforms with EC Directive requirements
of
94/9/EC relating to equipment and protective systems intended for use in explosive atmospheres (ATEX)
and,
73/23/EEC (as amended) relating to electrical safety (LVD)
and,
89/336/EEC (as amended) relating to the electromagnetic compatibility (EMC)

Certified by: Baseefa Ltd, Buxton, Derbyshire, SK17 9BJ, UK
Certificate Number 03ATEX0688X, 03ATEX0689X

Technical File maintained at: Federal Signal Corporation
Signal Division
2645 Federal Signal Drive
University Park, IL 60466-3195 U.S.A

I, the undersigned, hereby declare that the products(s) specified above conform to the listed directive(s) and standard(s).

Paul Weber
Paul Weber
Engineering Section Manager
Industrial Systems Group

Date: 12/01/2009
(month/date/year)

2645 Federal Signal Drive • University Park, Illinois 60466-3195 • Phone: (708) 534-3400 • www.federalsignal-indust.com

Federal Signal Corporation
Integrated Systems
2645 Federal Signal Drive
University Park, IL 60484-3167, U.S.A.