

# Static Pressure Alarm For Hazardous Location Fume Hoods

Models:	XPA1-0715	Class 1, Division 1, Group C, D - 120V/15A/60Hz Pressure range 0.07 to 0.15 in-wg
	XPA1-1550	Class 1, Division 1, Group C, D - 120V/15A/60Hz Pressure range 0.15 to 0.50 in-wg
	XPA1B-0715	Class 1, Division 1, Group B, C, D - 120V/15A/60Hz Pressure range 0.07 to 0.15 in-wg
	XPA1B-1550	Class 1, Division 1, Group B, C, D - 120V/15A/60Hz Pressure range 0.15 to 0.50 in-wg
	XPA2-0715	Class 1, Division 2, Group A, B, C, D - 120V/15A/60Hz Pressure range 0.07 to 0.15 in-wg
	XPA2-1550	Class 1, Division 2, Group A, B, C, D - 120V/15A/60Hz Pressure range 0.15 to 0.50 in-wg

## Contents:

General Description  
Contents of box  
Installation  
Adjustment  
Operation  
Safety  
Specifications  
Warranty statement  
Components



Represented By:

**Holland Safety Equipment**  
726 McKinley Ave., Libertyville, IL 60048  
Phone: 847-680-9930  
[www.hollandsafety.com](http://www.hollandsafety.com)

## **General Description**

Intended for use in laboratories that are classified as a hazardous location, the explosion-proof low-pressure alarm provides continuous monitoring of the negative static pressure in the fume hood exhaust duct. During normal negative static pressure conditions, the alarm illuminates a green indicator LED. When static pressure in the exhaust duct is insufficient, an audible alarm sounds and a red LED indicator illuminates. To maintain the integrity of the certified explosion proof instrument enclosure, the functionality of the test/reset button is performed using a light sensor. Covering the light sensor momentarily acknowledges the alarm and silences the horn for 10 minutes. During periods of darkness, the alarm functions normally but the test/reset function is unavailable. An output relay is provided to signal a remote alarm if needed.

An additional output relay is provided with normally closed and normally open contacts which may be used for connection to the building systems. This relay activates in the event of a loss of static pressure.

Additionally, an input is provided which may be used by the building system to mute the alarm during periods of intentional exhaust shutdown or slow down. Alternately, a light-based night setback function may be enabled through jumper configuration on the circuit board - if enabled; the audible alarm will be muted during periods of darkness.

All electrical housings as well as pressure switch are UL or FM approved for Class 1, Div 1, Groups B, C and D.

XPA1 models are provided with a Class 1, Division 1, Group C and D buzzer.  
XPA1B models are provided with a Class 1, Division 1, Group B, C, D buzzer.  
XPA2 models are provided with a Class 1, Division 2, Group A, B, C and D.

## **Box Contents:**

The box contains the following items:

- Control Box including main circuit board
- Operator Display unit
- Dwyer 1950G-00-B-120-NA pressure switch for -0715 models or 1950G-0-B-120-NA pressure switch for -1550 models
- Static pressure duct probe tube
- 15 feet of ¼" polyethylene tubing
- For XPA2 models, a Federal Signal 350WBX-120 horn is provided
- For XPA1 models, a Federal Signal 31X-120-3 horn is provided
- For XPA1B models, a E2S D1xS1R or Edwards 878EX-N5 horn is provided

## **Installation**

Installation consists of the following general steps:

- Mount the control box
- Mount the pressure switch

- Mount the operator display unit
- Mount the buzzer
- Wire the control box to the operator display panel
- Wire the control box to the pressure switch
- Wire the control box to the buzzer
- Wire 120v mains supply to control box

The following steps must be completed after the hood has been installed and the exhaust system is operational and both exhaust and supply airflow for the laboratory has been properly balanced.

- Install the static pressure probe in the duct above the fume hood
- Connect tubing from the low-pressure port on the pressure switch to the static pressure port
- Verify hood flow and adjust the pressure switch to the minimum setting which maintains a green indication

#### Detailed Installation Instructions:

In most cases it will be expedient to pre-assemble some or all of the wiring on the bench before mounting the enclosures to the fume hood therefore the sequence of work listed below may be modified as needed.

All items must be mounted such that moving parts like the sash, sash counterbalance, chain or cable do not rub against them. Generally speaking it is not acceptable to penetrate the fume hood liner when mounting these items – consult the fume hood manufacturer if in doubt. All items must be accessible for servicing in the future.

#### Mount the control box

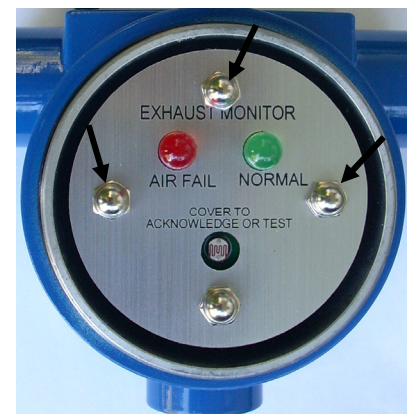
The control box should be securely mounted on the roof of the fume hood using suitable fasteners.

#### Mount the Pressure Switch

The pressure switch should be securely mounted in a **VERTICAL POSITION** using suitable fasteners in accordance with the included instruction sheet (also available as Appendix A in this manual)

#### Mount the Operator Display Unit

The operator control panel is designed to be mounted to the face of the fume hood and should be accessible to the operator of the fume hood at all times. A moderate amount of ambient light is needed to provide access to the test/reset function. A bracket is provided for the installation of two, #8 sheet metal screws which should be oriented at the top. The conduit entry should be at the bottom and normally an elbow is used to allow the explosion proof cable to enter the hood side wall for routing to the main control panel. The



circuit board may be removed for electrical connection by unscrewing the nuts located at 9 o'clock, 12 o'clock and 3 o'clock. See illustration at right indicating screws that must be removed. Take care not to damage the ambient light sensor. Should it be necessary to install the unit with the conduit entry at another position, the circuit board and face plate may be re-configured to whatever position is needed.

#### Mount the Buzzer

The buzzer should be securely mounted to the roof of the fume hood using suitable fasteners. Details on the buzzer are available in Appendix B.

#### Wiring

All Wiring must be performed by a licensed electrician in a manner acceptable to the local authorities and in accordance with the most recent edition of the National Electrical Code. In general type MC-HL cable and glands listed for a hazardous location can be used, but in some cases rigid conduit and listed sealing fittings will be required.

14 gauge wire is recommended (12 gauge may also be used) for connection between the control box and the buzzer and the pressure switch. The connection between the Control Box and the Operator Display Unit is low voltage and lighter gauge wire should be used if available

The alarm system should be permanently connected to a 15A or 20A/120V circuit.

Figure 1 shows connections that must be made for the XPA2 Class 1, Division 2 models. Connection for XPA1 and XPA1B Class 1, Division 1 models is the same with a slightly different buzzer which has two wires - white for neutral and black for live. Ground wires are not shown - note that ALL BOXES must be grounded in accordance with the NEC and local codes.

For alarm installations making use of the remote alarm output or optional night setback mute input, it is necessary to connect the main control box to another junction box using a short length of multi-conductor cable or conduit with appropriate seals. This will allow for the connection of the additional cables needed to implement the remote alarm feature. Alternately, the alarm may be special ordered with additional ½" NPT threaded openings in the control box.

At this time, determine if the light based night setback feature will be used. If so install jumper on J1 on the circuit board. If J1 is installed, the audible alarm will automatically be muted after the room is dark for 1 minute. As soon as light is restored, the audible alarm will be restored automatically.

After wiring, each housing, including circuit boards must be re-assembled exactly as they were and covers must be installed and tightened.



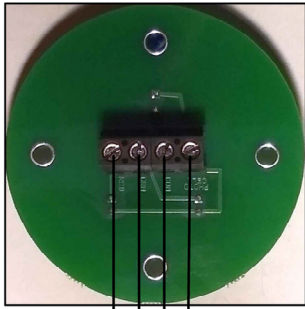
### Heartbeat LED indicator

The main control board includes an indicator LED which can be used to verify that the microcontroller is booted up and operational. This also provides an indication of the alarm status. This may be useful during wiring and troubleshooting. The LED flashes at different rates depending on the status of the system:

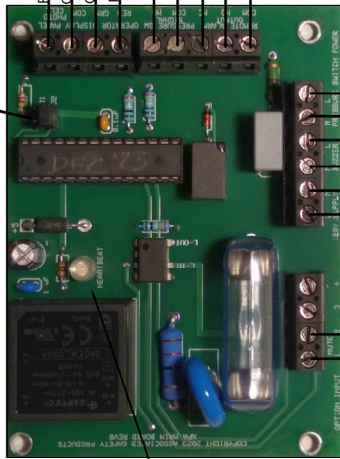
- 2 seconds on, 2 seconds off, indicates the system is on and pressure switch input is closed. Control panel indication should be green and audible alarm should be off.
- 0.5 seconds on, 0.5 seconds off, indicates the system is on and pressure switch input is open. Control panel indication should be red and audible alarm should be on if the alarm has not been muted.
- Rapidly flashing (0.1 seconds on, 0.1 seconds off) indicates the system is on and the light sensor is covered. This indication takes precedence over the above flash rates. If the light sensor is not covered and exposed to light and the LED is rapidly flashing, then it is likely there is a wiring error between the control panel and the main control board.

If the heartbeat LED indicator is dark, then it is likely there is no power or the main control board has been damaged. Check the fuse and replace if faulty. Confirm there is 120V AC power on both sides of the fuse. If the fuse is repaired, power is confirmed, and the LED remains dark or is continuously on, then the main control board has been damaged.

# DISPLAY BOARD



# MAIN BOARD

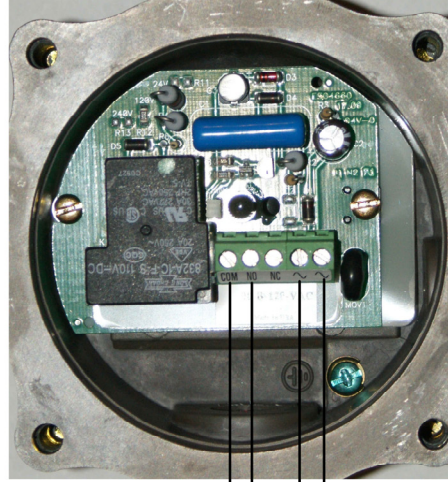


NORMALLY CLOSED  
NORMALLY OPEN  
COMMON

OPTIONAL NIGHT SETBACK  
ALARM SILENCE INPUT

120v SUPPLY  
LIVE  
NEUTRAL

# PRESSURE SWITCH



# BUZZER



CL1/DIV2 BUZZER SHOWN  
ACTUAL BUZZER MAY NOT  
BE EXACTLY AS SHOWN

FIGURE 1

### Install the Static Pressure Probe

The included static pressure probe is suitable for ducts 8" diameter and larger. It should be located at least one duct diameter above the fume hood in a straight section of ducting.

Drill a 5/16" diameter hole in the duct above the fume hood. Install the static pressure probe in the duct using the included foam rubber gasket and self-drilling sheet metal screws.

Attach the ¼" polyethylene hose from the fitting on the static pressure probe to the **LOW PORT** on the pressure switch using the included adapter.

Ensure that the hose is not allowed to chafe on any moving parts including the sash, counterweight and cables or chains.

Leave the high port open. If the pressure switch is located in a space that is not at the same pressure as the laboratory, then connect suitable hose to the HIGH port and run this hose into the laboratory space.

### Adjusting the alarm set point

The Airflow Monitor must be calibrated before first use and checked regularly thereafter. Fume hoods vary in design and performance. Because each hood installation and its airflow pattern is unique, this monitor must be calibrated in the field on the fume hood in which it is installed.

### **WARNING**

Calibration of this instrument should only be performed by qualified personnel. Proper guidelines for monitoring any ventilation apparatus are established on the basis of toxicity or hazards of the materials used, or the operation conducted within the ventilation apparatus. Personnel calibrating the alarm must be completely aware of the regulations and guidelines specific to its application. If you need a reference on performing traverses on fume hoods, please consult the latest edition of ASHRAE 110 *Method of Testing Performance of Laboratory Fume Hoods*, section 6.2 Face Velocity Measurements.

### **Tools Required**

1. Calibrated thermo-anemometer rated for hazardous environments.
2. Small slotted screwdriver.

### **Procedure**

1. Double check installation to verify that the monitor, power supply, and any ancillary equipment are properly installed.

2. Allow at least 10 minutes for the pressure switch to warm up.

3. Determine the alarm set point. This is the condition where the monitor will indicate a low flow condition. The red LED on the Operator Panel will light at this point. Consult the facility's Industrial Hygiene Officer for the proper set point.

**NOTE:** This device senses the duct static pressure. Different hoods may require different duct static pressure to generate the same face velocity.

4. Set the sash at the working height and adjust the fume hood airflow to the low alarm set point (as determined in step 3, above). One method is to close the volume damper (if available) in the ductwork. This damper must be downstream of the static pressure probe.

### **WARNING**

This method is only used as a temporary means of setting the low flow set point. Make certain that airflow is restored to the proper level after calibration.

5. Using a properly calibrated thermo-anemometer, determine the velocity through the face of the hood by taking a detailed velocity traverse. Divide the face area of the hood into equal partitions. One reading per square foot of face area is recommended for an accurate traverse. Compute the average velocity for this area. Temporarily adjust the airflow of the fume hood as in step 4 above until the average face velocity is near the desired low flow alarm set point.

**NOTE:** The pressure switch response time may be as long as 10 to 25 seconds when the applied pressures are near the set point.

6. If the red LED is initially lit, slowly turn the adjustment screw on the pressure switch clockwise until the green LED lights and then slowly turn the adjustment screw counter-clockwise until the red LED again lights. If the green LED is initially lit, slowly turn the adjustment screw on the pressure switch counter clockwise until the red LED lights.

**IMPORTANT:** To allow for the delayed reaction of the pressure switch, these adjustments must be made in small increments, at intervals up to 25 seconds each.

7. Restore normal airflow to the fume hood.

**NOTE:** Due to the hysteresis of the pressure switch, the sash of the fume hood may need to be nearly closed to generate sufficient duct static pressure to reset the pressure switch to a “good” flow (green LED lit) condition. Upon restoring the airflow to the normal level, drop the sash down to reset the alarm to a non-alarm status and then return the sash to the working height. The green LED should remain lit.

8. Verify the alarm setting by establishing a low flow condition (as in step 4). If the alarm does not activate, repeat steps 5 through 8.

### Adjusting Alarm Volume

It is recommended that the volume of the horn be adjusted to suit the ambient noise level in the laboratory. Details on volume adjustment are contained in the buzzer manufacturer’s literature at the end of this manual. It is essential to use hearing protection while working on these buzzers.

### Operation

During normal operation, the static pressure alarm operator display panel should give a green indication. This indicates that the pressure switch is sensing negative pressure in the fume hood exhaust duct in the normal range as established by the calibration procedure. While the unit is indicating in the green, the audible and visible alarm may be tested by momentarily covering and uncovering the light sensor three times (within three seconds). The indicator lights will flash and the audible alarm will sound twice. In order

to provide access to other functions, this test may be performed only once every 60 seconds. The alarm buzzer must be tested monthly.

In the event that the alarm sounds, it is generally because a loss of static pressure has been detected in the fume hood exhaust. At this time, the fume hood sash should be lowered to re-establish adequate static pressure. If the alarm does not reset, it is likely that the exhaust system has failed. Stop using the fume hood for active experiments, close the sash and evacuate the laboratory if the chemicals or fumes pose an immediate hazard.

If the low flow condition is expected and no hazard is present in the hood (such as during experiment set-up or tear-down) then the alarm may be temporarily silenced by momentarily covering and uncovering the light sensor. The temporary muting of the alarm will last for approximately 10 minutes after which time normal operation will resume.

In the event that the fume hood will be decommissioned for an extended period of time, the alarm can be permanently muted by covering and uncovering the light sensor seven to eight times within a 30 second period. Successful completion of this procedure will result in both red and green LED's flashing three times. While the audible alarm is muted, the green or red led will be flashing as opposed to solid. The same procedure will re-enable the audible alarm. If the power supply to the alarm is interrupted, then it will reset to normal operation.

## **Testing**

In order to ensure that the alarm system as a whole is functional, it must be fully tested at least yearly by turning off the exhaust system to ensure that the alarm will sound when a loss of airflow occurs. Ensure that there are no hazards in the fume hood during this test.

## **Safety**

Before opening unit for servicing, ensure no hazardous or explosive fumes are present, disconnect power and lock-out.

## Specifications

Voltage:	120VAC
Frequency:	60 Hz
Current:	1A
Mains Breaker:	Switch/Breaker 15A
Mounting:	Surface Mount
Alarm Pressure Range:	0.07 to 0.15 inches water for -0715 model 0.15 to 0.50 inches water for -1550 model
Alarm relay output:	Normally open and normally closed volt-free contacts Contacts rated 0.5A at 125 VAC / 1A at 24 VDC
Visual Indicators:	Green LED - static pressure OK Red LED - static pressure FAIL
Audible Indicator:	Intermittent Buzzer - 94 dB at 10 feet
Horn Silence:	Temporary with 10 minute self-reset Permanent until re-enabled or power-cycle Optional darkness based automatic alarm mute Optional night setback input connections
User Input:	Alarm is silenced and tested through the use of an ambient light sensor located behind sealed window in explosion proof housing
Wiring method:	Installer supplies explosion proof wiring materials and glands.
Calibration:	Single point pressure setting
Agency Listings:	All housings FM or UL listed

Specifications subject to change without notice

## Warranty

### **LIMITATION OF WARRANTY AND LIABILITY**

The Manufacturer warrants the goods sold hereunder, under normal use and service as described in the operator's manual, shall be free from defects in workmanship and material for TWELVE (12) months, or the length of time specified in the operator's manual, from the date of shipment to the customer. This warranty period is inclusive of any statutory warranty. This limited warranty is subject to the following exclusions:

- The manufacturer does not provide additional warranty on major components manufactured by others - only the original manufacturer's warranty applies.
- Unless specifically authorized in a separate writing by manufacturer, the manufacturer makes no warranty with respect to, and shall have no liability in connection with, goods which are incorporated into other products or equipment, or which are modified by any person other than the manufacturer.

The foregoing is IN LIEU OF all other warranties and is subject to the LIMITATIONS stated herein. **NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE.**

TO THE EXTENT PERMITTED BY LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF THE MANUFACTURER'S LIABILITY FOR ANY AND ALL LOSSES, INJURIES, OR DAMAGES CONCERNING THE GOODS (INCLUDING CLAIMS BASED ON CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) SHALL BE THE RETURN OF GOODS TO THE MANUFACTURER AND THE REFUND OF THE PURCHASE PRICE, OR, AT THE OPTION OF THE MANUFACTURER, THE REPAIR OR REPLACEMENT OF THE GOODS. IN NO EVENT SHALL THE MANUFACTURER BE LIABLE FOR ANY SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES. THE MANUFACTURER SHALL NOT BE RESPONSIBLE FOR INSTALLATION, DISMANTLING OR REINSTALLATION COSTS OR CHARGES. No Action, regardless of form, may be brought against the manufacturer more than 12 months after a cause of action has accrued. The goods returned under warranty to the manufacturer's factory shall be at Buyer's risk of loss, and will be returned, if at all, at the manufacturer's risk of loss.

Buyer and all users are deemed to have accepted this LIMITATION OF WARRANTY AND LIABILITY, which contains the complete and exclusive limited warranty of MANUFACTURER. This LIMITATION OF WARRANTY AND LIABILITY may not be amended, modified or its terms waived, except by writing signed by an Officer of MANUFACTURER.

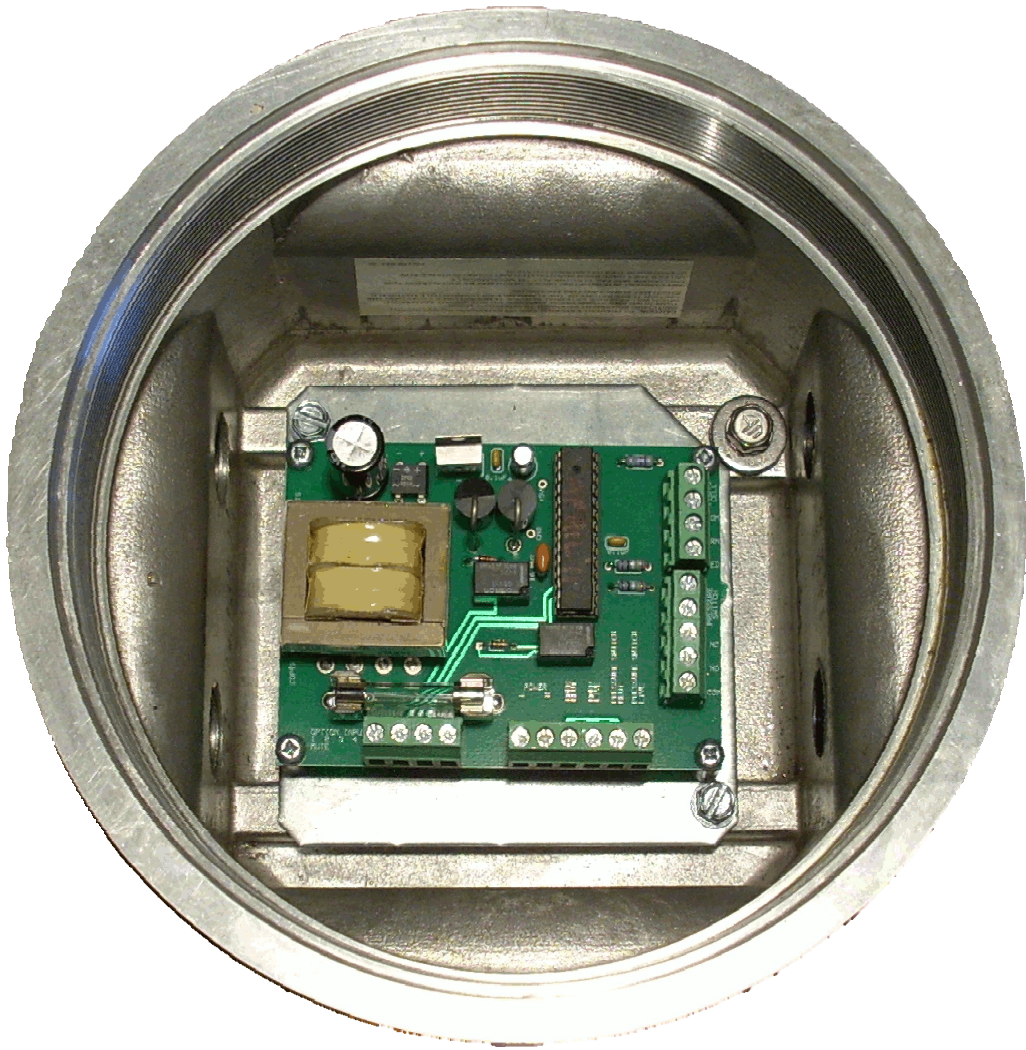
Components:

Operator Panel

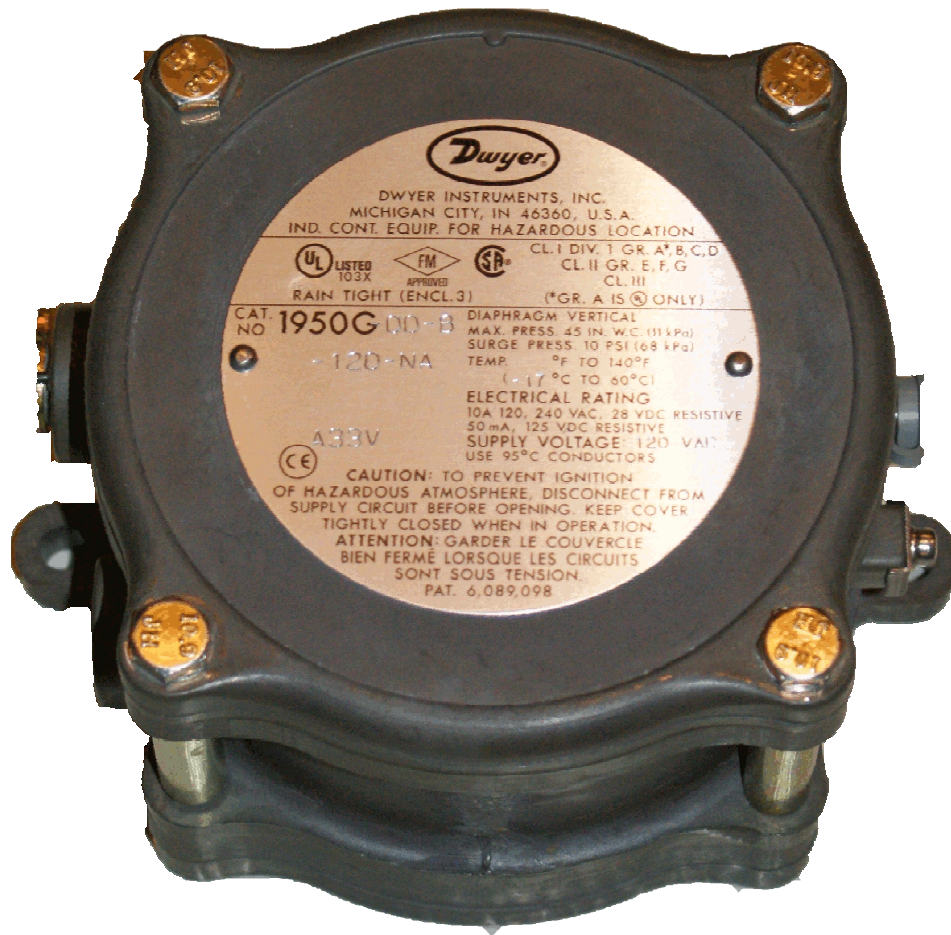




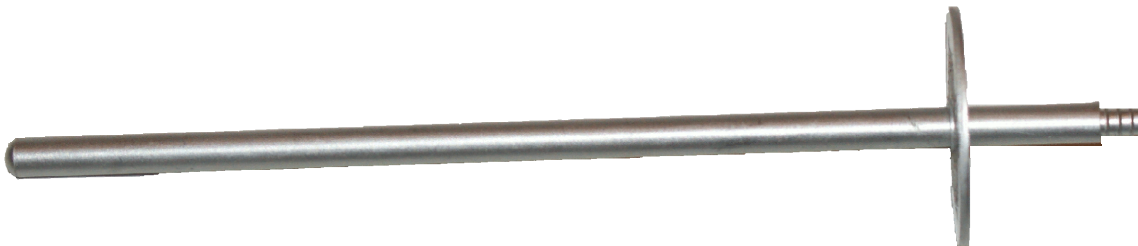
## Main Control Box



## Static Pressure Switch



## Static Pressure Probe



Class 1, Division 2, Group A,B,C,D Buzzer



Class 1, Division 1, Group C,D Buzzer



Class 1, Division 1, Group B,C,D Buzzer



# Appendix A

Bulletin E-57G



## Series 1950G – Integral Explosion-Proof Pressure Switches

### Specifications - Installation and Operating Instructions



The **Model 1950G Explosion-Proof Switch** combines the best features of the popular Series 1900 Pressure Switch with a compact explosion-proof housing.

This unit is UL, CSA, FM listed for use in Class I, Groups A\*, B, C, D, Class II, Groups E, F, & G and Class III atmospheres and Directive 94/9/EC (ATEX) Compliant for **CE** II 2G Ex d IIB + H<sub>2</sub> T6. IECEx certified Ex d IIB + H<sub>2</sub> T6 (-40°C < Ta < +60°C) units are available. It is also totally rain-tight for outdoor installations. Six models allow set-points from 0.07 to 20 inches W.C. (1.78 mm to 508.0 mm W.C.).

Easy access to the SPDT relay for electrical hook-up is provided by removing the top plate of the aluminum housing. A captive screw allows the cover to swing aside while remaining attached to the unit. Adjustment to the set point of the switch can be made without disassembly of the housing. The unit is very compact, about half the weight and bulk of equivalent conventional explosion-proof switches.

**Attention:** Units with the "NA" and "IEC" suffixes are not Directive 94/9/EC (ATEX) compliant. These units are not intended for use in potentially explosive atmospheres in the EU. These units may be CE marked for other Directives of the EU.

\*GR. A is Only.

#### UL, CSA, FM Listed For

CL, I GR. A\*, B, C, D - CL. II GR. E, F, G - CL. III

#### Directive 94/9/EC (ATEX) Compliant For

**CE** 0344 II 2G Ex d IIB + H<sub>2</sub> T6

#### EC-Type Certificate Number: KEMA 03ATEX2402 X

ATEX Standards:

EN60079-0: 2006

EN60079-1: 2007

IECEx Certified for:

Ex d IIB + H<sub>2</sub> IP54 T6 (-40°C < Ta < +60°C)

IECEx Certificate of Conformity:

IECEx TSA 08.0020X

IECEx Standards:

IEC 60079-0: 2004

IEC 60079-1: 2003

#### Model 1950G Switches:

Operating ranges and deadbands

To order specify Model Number*	Operating Range Inches, W.C.	Approximate Dead Band	
		At Min. Set Point	At Max. Set Point
1950G-00-B-__	0.07 to 0.15	0.04	0.06
1950G-0-B-__	0.15 to 0.5	0.06	0.11
1950G-1-B-__	0.4 to 1.6	0.11	0.29
1950G-5-B-__	1.4 to 5.5	0.4	0.9
1950G-10-B-__	3.0 to 11.0	0.9	1.8
1950G-20-B-__	4.0 to 20.0	1.2	3.0

\* Specify either 24 for 24 VDC, 120 for 120 VAC or 240 for 240 VAC when ordering. Example: 1950G-00-B-120

\* Add "NA" suffix for models with UL, CSA, and FM approvals only. Example: 1950G-00-B-120-NA

\* Add "IEC" suffix for models which are IECEx certified. Units with "IEC" suffix feature no other approvals.

#### SPECIFICATIONS

**Service:** Air and compatible combustible gases.

**Wetted Materials:** Contact Factory.

**Temperature Limits:** 0 to 140°F (-17 to 60°C). Note: Set point drift may occur with ambient temperature changes.

**Pressure Limits:** 45" w.c. (11.2 kPa) continuous; 10 psig (68.95 kPa) surge.

**Enclosure Rating:** IP54, NEMA 3, 7 and 9.

**Switch Type:** 1 Form C relay (SPDT).

**Electrical Rating:** 10A, 120/240 VAC, 28 VDC. Resistive 50mA, 125 VDC.

**Power Requirements:** 24 VDC ±10%. 120 or 240 VAC ±10% optional.

**Electrical Connections:** Internal Terminal Block.

**Process Connections:** 1/8" female NPT.

**Mounting Orientation:** Diaphragm in vertical position. Consult factory for other position orientations.

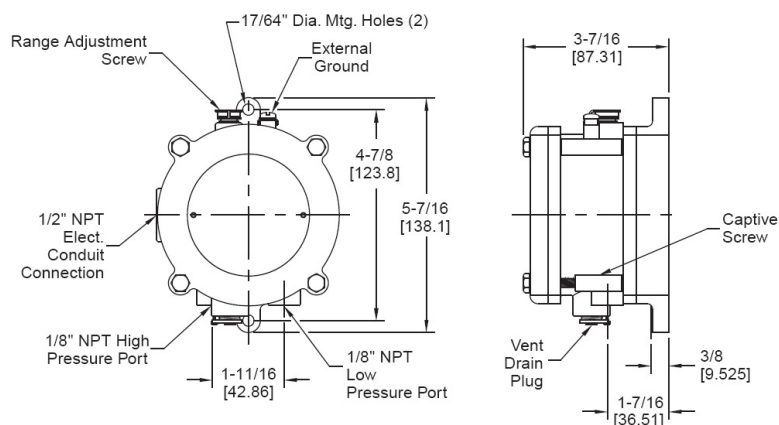
**Set Point Adjustment:** Screw type on top of housing.

**Weight:** 2 lb, 15.7 oz (1.35 kg).

**DWYER INSTRUMENTS, INC.**  
P.O. Box 373 • Michigan City, IN 46361-0373, U.S.A.

Phone: 219/879-8000  
Fax: 219/872-9057

www.dwyer-inst.com  
e-mail: info@dwyer-inst.com



1950G Switch Outline Dimensions

## INSTALLATION

1. Select a location free from excess vibration and corrosive atmospheres where temperatures will be within the limits noted under Physical Data on page 1. Switch may be installed outdoors or in areas where the hazard of explosion exists. See page 1 for specific types of hazardous service.

2. Mount standard switches with the diaphragm in a vertical plane and with switch lettering and nameplate in an upright position. Some switches are position sensitive and may not reset properly unless they are mounted with the diaphragm vertical.

3. Connect switch to source of pressure, vacuum or differential pressure. Metal tubing with 1/4" O.D. is recommended, but any tubing which will not restrict the air flow can be used. Connect to the two 1/8" female NPT pressure ports as noted below.

A. Differential pressures - connect pipes or tubes from source of greater pressure to high pressure port marked HIGH PRESS, and from source of lower pressure to low pressure port marked LOW PRESS.

B. Pressure only (above atmospheric pressure) - connect tube from source of pressure to high pressure port. The low pressure port is left open to atmosphere.

C. Vacuum only (below atmospheric pressure) - connect tube from source of vacuum to low pressure port. The high pressure port is left open to atmosphere.

4. To make electrical connections, remove the three hex head screws from the cover and after loosening the fourth captive screw, swing the cover aside. Electrical connections to the standard single pole, double throw relay and AC supply voltage connections to the unit, are provided by means of terminals marked "COM", "NO", "NC", "~" and "~" (See Fig. A). Electrical connections to the standard single pole, double throw relay and DC supply voltage connections to the unit, are provided by means of terminals marked "COM", "NO", "NC", "+", and "-" (See Fig. B). The normally open contacts close and the normally closed contacts open when pressure increases beyond the setpoint. Switch loads for standard models should not exceed the maximum specified current ratings as stated on page 1. For ATEX and IECEx compliance, cables and cable glands suitable for temperature of at least 95°C shall be used. The cable entry device shall be of certified flameproof type, suitable for the conditions of use and be correctly installed. Refer to Certificate No.: IECEx TSA 08.0020X for conditions of safe use for IECEx Compliant units. Switch capabilities

decrease with an increase in ambient temperature, load inductance, or cycling rate.

## ADJUSTMENT

To change setpoint:

A. Remove the plastic cap and turn the slotted Adjustment Screw at the top of the housing clockwise to raise the setpoint pressure and counter-clockwise to lower the setpoint. After calibration, replace the plastic cap and re-check the setpoint.

B. The recommended procedure for calibrating or checking calibration is to use a "T" assembly with three rubber tubing leads, all as short as possible and the entire assembly offering minimum flow restriction. Run one lead to the pressure switch, another to a manometer of known accuracy and appropriate range, and apply pressure through the third tube. Make final approach to the setpoint very slowly. Note that manometer and pressure switch will have different response times due to different internal volumes, lengths of tubing, fluid drainage, etc. Be certain the switch is checked in the position it will assume in use, (i.e. with diaphragm in a vertical plane) and switch lettering and Dwyer nameplate in an upright position.

C. For highly critical applications check the setpoint adjustment and if necessary, reset it as noted in step A.

## MAINTENANCE

The moving parts of these switches need no maintenance or lubrication. The only adjustment is that of the setpoint. Care should be taken to keep the switch reasonably clean. Periodically the vent drain plug should be rotated then returned to its original position. This will dislodge deposits which could accumulate in applications where there is excessive condensation within the switch. Repairs to be conducted by Dwyer Instruments, Inc. Cover bolts are Class 10.9 35mm long.

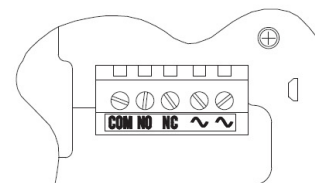


Fig. A

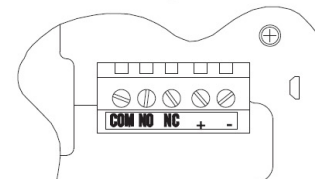


Fig. B

## Appendix B

### **MODEL 350WBX**

**INSTALLATION INSTRUCTIONS FOR VIBRATONE HORN  
MODEL 350WBX**

### **MODELO 350WBX**

**INSTRUCCIONES DE INSTALACIÓN PARA LA BOCINA VIBRATONE  
MODELO 350WBX**

### **MODELE 350WBX**

**INSTRUCTIONS D'INSTALLATION POUR LE KLAXON VIBRATONE,  
MODELE 350WBX**

Address all communications and shipments to:  
Dirija todas la correspondencia y envíos a:  
Adressez toutes les communiations et expéditions à:



**FEDERAL SIGNAL CORPORATION**  
**Electrical Products Division**  
2645 Federal Signal Drive  
University Park, IL 60466-3195

## INSTALLATION INSTRUCTIONS FOR VIBRATONE HORN MODEL 350WBX

### SAFETY MESSAGE TO INSTALLERS

#### NOTE

#### **INSTALLATION, MAINTENANCE AND DISPOSAL OF THIS PRODUCT MUST BE CARRIED OUT IN ACCORDANCE WITH NATIONAL CODES AND STANDARDS.**

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 and will follow all applicable national and local codes in the country of use.

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 when power is on.
- Optimum sound distribution will be severely reduced if any objects are in front of the speaker. You should ensure that the front of the speaker is clear of any obstructions.
- All effective warning horns 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. National Noise Standards, such as The OSHA Code of Federal Regulations 1910.95 in the United States, provide guidelines which may be used regarding permissible noise exposure levels.
- After installation, ensure that all mounting screws have been tightened.
- Establish a procedure to routinely check the sound system for proper activation and operation.
- Provide a copy of these instructions to the Safety Engineer, operator(s) and maintenance personnel.
- File these instructions in a safe place and refer to them when maintaining and/or reinstalling the device.

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

#### **A. Introduction.**

In all installations, it is recommended that the electrical wiring to the installation site be completed before the horn is mounted. Installations are subject to national and local electrical and fire codes and standards.

#### **B. Installation.**

#### **WARNING**

Do not connect wires when power is on.

The 350WBX is gasketed and has two 3/4-14 NPT and one 1/2-14 NPT tapped openings to accommodate supply connections.

1. Use the rear enclosure of the 350WBX as a template and mark the location of the mounting ears on the mounting surface. Secure the 350WBX to the mounting surface with user-supplied fasteners suitable for the mounting surface.
2. See figure 1. Remove and retain the four screws which secure the horn to the rear enclosure. Remove the horn from the rear enclosure.



3. Attach the supply wires to the terminal block as shown in figures 2 and 3. The terminal block is capable of accepting both solid and stranded wire within the range of 10 AWG (5.27 mm sq.) to 20 AWG (0.52 mm sq.). When using stranded wire, ensure that the strands of the wire are twisted together prior to inserting them into the terminal block.
4. Reassemble the horn to the rear enclosure using the previously removed screws.

#### **WARNING**

The device must be kept tightly closed while the circuits are energized.

#### **SAFETY MESSAGE TO MAINTENANCE PERSONNEL**

- Read and understand all instructions before performing any maintenance to this unit.
- To reduce the risk of electrical shock or ignition of hazardous atmospheres, do not perform maintenance/service on this device when circuits are energized.
- Optimum sound distribution will be reduced if the speaker becomes clogged with a foreign substance. Periodic checks should be performed to ensure foreign substances are not packed into the speaker.
- Any maintenance to the warning system must be performed by a trained electrician in accordance with all applicable national and local codes and standards in the country of use.
- Never alter the unit in any manner. Safety in hazardous locations may be endangered if additional openings or alterations are made in units specifically designed for use in these locations.
- The nameplate, which may contain cautionary or other information of importance to maintenance personnel, should not be obscured if the exterior of housings are painted.

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

#### **C. Audibility and Electrical Ratings.**

<u>VOLTAGE</u>	<u>CURRENT (AMPS)</u>	<u>Hz</u>	<u>dB*</u>	<u>dB**</u>
120	0.18/0.22	50/60	100	94
230-240	0.09	50/60	100	94

\* MEASURED ON-AXIS AT TEN FEET/3 METERS IN AN ANECHOIC CHAMBER.

\*\* UNDERWRITERS LABORATORIES OMNIDIRECTIONAL SOUND PRESSURE LEVEL RATING AT TEN FEET.

#### **D. Agency Approvals.**

This product has been evaluated and approved by Underwriters Laboratories, Inc for the use in the following classified (hazardous) locations:

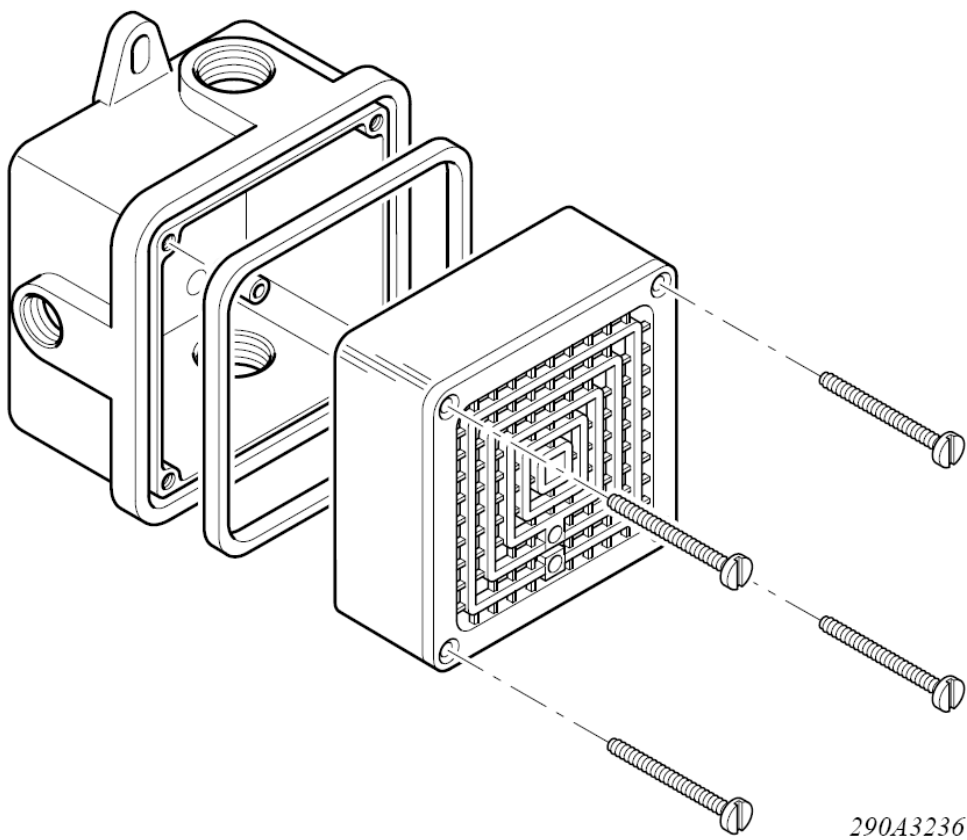
Class I, Division 2, Groups A, B, C, D

Class I, Zone 2, Group IIC

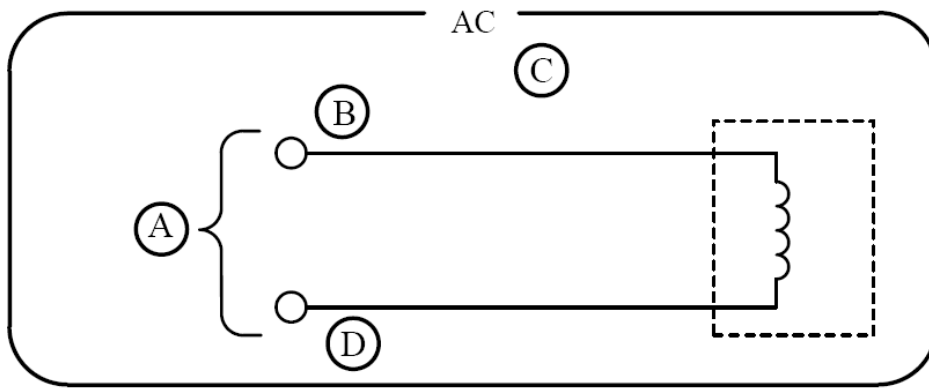
Class II, Division 2, Groups F, G

Class III

1



2



290A3235B

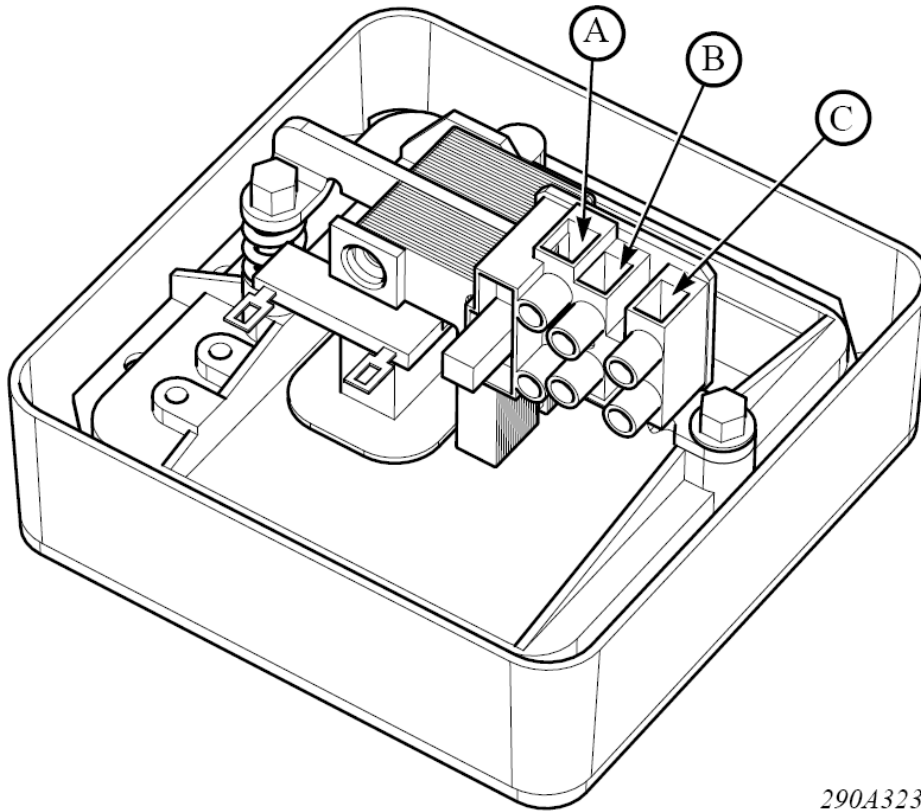
**English**

- A. AC input power
- B. Standard AC horn wiring
- C. L, phase
- D. N, neutral

**Español**

- A. Potencia de entrada CA
- B. Cableado estandar CA la bocina
- C. L, fase
- D. N, neutral

**3**



290A3237B

**English**

- A. Phase, L
- B. Ground
- C. Neutral, N

**Español**

- A. Fase, L
- B. Tierra
- C. Neutral, N

**Français**

- A. Phase, L
- B. Terre
- C. Neutre, N



**FEDERAL SIGNAL CORPORATION**

Electrical Products Division

8435A536E

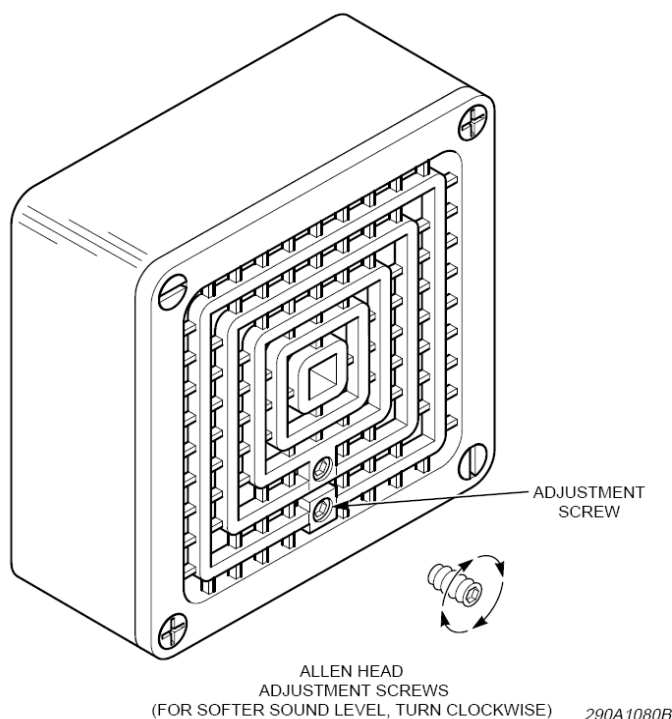
Rev. E Printed 6/04

Printed in U.S.A.

**EXTERNAL VOLUME ADJUSTMENT FOR  
THE MODEL 350 VIBRATORY HORN  
(NOT FOR USE WITH THE 450 VIBRATORY HORN)**

Vibratory horns are shipped with the volume set for maximum sound output. However, the sound level can be reduced to any desired level with the 3/32" hex socket set screw provided. If the horn is a Model 350, install the screw at the location shown in the figure.

Before installing the set screw, thread hex washer head thread forming screw into the appropriate hole on the front of the horn. Remove the thread forming screw, and thread the set screw into the threaded hole. Use a 3/32 hex key wrench to rotate the set screw clockwise until the desired sound level is reached.



# **MODEL 31X**

**INSTALLATION AND SERVICE INSTRUCTIONS FOR MODEL 31X  
EXPLOSION-PROOF HORN FOR USE IN HAZARDOUS LOCATIONS**

# **MODELO 31X**

**INSTRUCCIONES DE INSTALACION Y SERVICIO PARA LA CORNETA  
A PRUEBA DE EXPLOSION MODELO 31X PARA USO EN  
AREAS PELIGROSAS**

# **MODELE 31X**

**INSTRUCTIONS D'INSTALLATION ET DE SERVICE POUR LE KLAXON  
ANTI-DEFLAGRANT MODELE 31X POUR UTILISATION DANS DES  
ENDROITS DANGEREUX**

Address all communications and shipments to:  
Dirija todas la correspondencia y envíos a:  
Adressez toutes les communiations et expéditions à:



**FEDERAL SIGNAL CORPORATION**  
**Electrical Products Division**  
2645 Federal Signal Drive

# **INSTALLATION AND SERVICE INSTRUCTIONS FOR MODEL 31X EXPLOSION-PROOF HORN FOR USE IN HAZARDOUS LOCATIONS**

## **SAFETY MESSAGE TO INSTALLERS**

People's lives depend on your safe installation of our products. It is important to follow all instructions shipped with the products. This device is to be installed by a trained electrician who is thoroughly familiar with the National Electrical Code and will follow the NEC Guidelines as well as 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:

- 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. The OSHA Code of Federal Regulations 1910.95 Noise Standard provides guidelines which may be used regarding permissible noise exposure levels.
- Read and understand all instructions before installing or operating this equipment.
- Do not connect this unit to the system when power is on.
- Optimum sound distribution will be severely reduced if any objects are in front of the speaker. You should ensure that the front of the speaker is clear of any obstructions.
- 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.
- After installation, ensure that all bolts and threaded joints are tightened.
- Establish a procedure to routinely check the sound system for proper activation and operation.
- Provide a copy of these instructions to the Safety Engineer, operator(s) and maintenance personnel.
- File these instructions in a safe place and refer to them when maintaining and/or reinstalling the device.

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

## **I. GENERAL.**

The Model 31X Horn is an explosion-proof audible signaling device for hazardous locations and provides a 100dB tone measured at 10-feet on axis.

## **II. INSTALLATION.**

### **A. Unpacking.**

After unpacking the Model 31X, examine it for damage that may have occurred in transit.

If the equipment has been damaged, do not attempt to install or operate it, 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.

### **B. Mounting.**

The horn has provisions (mounting lugs) for mounting on a rigid surface. Mount the unit on the rigid surface with user-supplied hardware.

Ensure mating threads are clean and thread 3/4" pipe into the horn outlet box.

### **C. Electrical Connections.**

#### **WARNING**

To avoid electrical shock hazards, do not connect wires when power is applied.

Wiring must comply with Article 500 of the National Electrical Code and the local authority having jurisdiction.



To complete the electrical connections, proceed as follows:

#### **CAUTION**

Do NOT loosen or remove the clamp ring or any of the six screws on the front of the horn housing. Loosening or removing any of the screws may disturb the factory adjustment of the horn mechanism and cause a horn malfunction. In addition, the horn mechanism may be damaged.

1. Remove the set screw from the collar using a 1/8" hex wrench.
2. Using a large screwdriver and mallet, or similar tools, rotate the collar counterclockwise as shown in figure 1. Tap the screwdriver until the collar can be rotated by hand. Remove the collar from the housing.
3. Lift the horn mechanism from the housing.
4. Use a method approved by local building codes and connect fixture wires to supply wires. If required by local building codes, provisions for attaching an earth ground are included.
5. Replace the horn mechanism in the housing.
6. Replace the collar on the housing and hand-tighten.
7. Tighten the collar using a screwdriver and mallet. Secure the collar with the set screw.

### **III. MAINTENANCE.**

#### **WARNING**

To prevent ignition of hazardous atmospheres, disconnect the unit from the supply circuit before opening. Keep tightly closed when in operation.

#### **SAFETY MESSAGE TO MAINTENANCE PERSONNEL**

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

- Read and understand all instructions before operating this system.
- Any maintenance to the horn system must be done with the power turned off.
- Any maintenance to the horn system must be performed by a trained electrician in accordance with NEC Guidelines and local codes.
- Never alter the unit in any manner. Safety in hazardous locations may be endangered if additional openings or other alterations are made in units specifically designed for use in these locations.
- The nameplate, which may contain cautionary or other information of importance to maintenance personnel, should not be obscured if exterior of housings used in hazardous locations are painted.
- The only electrical component to be replaced by the customer is the horn mechanism.

#### **A. Volume Adjustment.**

Explosion-proof horns are shipped with the volume set for maximum sound output. However the sound level from the horn can be reduced to any desired level.

#### **NOTE**

To prevent the horn from producing a rough or "rasping" tone and repeated readjustment of the adjusting screw, do NOT turn the screw counterclockwise from the factory setting.

To adjust the volume, proceed as follows:

1. Remove the horn mechanism from the housing as described in paragraph II.C.1., 2., and 3.
2. Using a 1/4" wrench, turn the adjusting screw clockwise as shown in figure 2, until the desired volume is reached.
3. Replace the horn mechanism in the housing as described in paragraph II.C.5., 6., and 7.

#### **B. Lubrication.**

Threaded covers should be well lubricated with an anti-seize compound. If corrosive products have accumulated on explosion-proof joints and cannot readily be removed with solvents, the parts should be discarded and replaced.

### WARNING

Never use an abrasive material or file to remove corrosive products from threaded surfaces. In extremely corrosive locations, equipment should be periodically inspected to guard against unusual deterioration and possible porosity, since this may weaken the enclosure structurally.

### SAFETY MESSAGE TO OPERATORS

Listed below are some important safety instructions you should follow:

- Read and understand all instructions before operating this unit.
- All effective warning speakers produce loud sounds which may cause, in certain situations, permanent hearing loss. You should take appropriate precautions such as ensuring that the recommendations in OSHA Sound Level Standard (29CFR 1910) 1910.95 are not exceeded.
- Although your warning system is operating properly, it may not be completely effective. People may not hear or heed your warning signal. You must recognize this fact and ensure that your warning signal is achieving the desired effect.

### IV. SERVICE.

The Federal factory will service your equipment or provide technical assistance with any problems that cannot be handled locally.

Any units returned to Federal Signal for service, inspection, or repair must be accompanied by a Return Material Authorization. This R.M.A. can be obtained from the local Distributor or Manufacturer's Representative.

At this time a brief explanation of the service requested, or the nature of the malfunction, should be provided.

Address all communications and shipments to:

#### FEDERAL SIGNAL CORPORATION

Electrical Products Division  
Service Department  
2645 Federal Signal Drive  
University Park, IL 60466-3195

### V. EC DECLARATION OF CONFORMITY.

Manufacturer's Name:	Federal Signal Corporation
Manufacturer's Address:	2645 Federal Signal Drive University Park, IL 60466-3195 U.S.A.

declares that the Product

Type of Equipment:	Explosion-Proof Horn
--------------------	----------------------

Brand Name (if any):	
----------------------	--

Model Number(s):	31X
------------------	-----

conforms to the following Standards:

EMC:	EN 55014: 1993 EN 55104: 1995
------	----------------------------------

Supplementary Information:

This statement confirms that the product fulfills the EMC requirements of the Council Directives 89/336/EEC and 92/31/EEC.

Manufacturer's Signature:

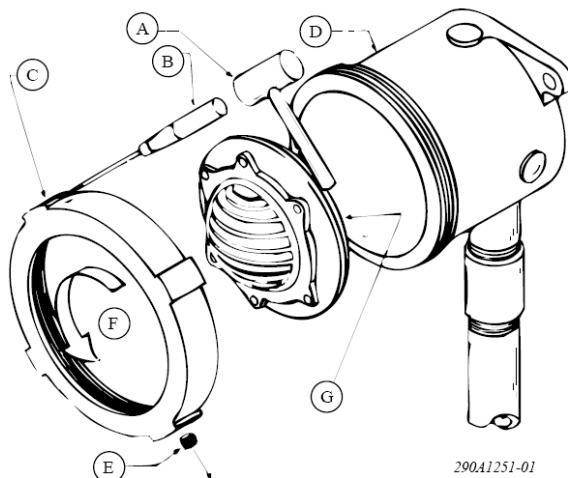


Position: Engineering Manager

Location: Illinois

Date: 09/25/96

**1**



290A1251-01

English

- A. Mallet
- B. Large screw driver
- C. Collar
- D. Housing

- E. Set screw
- F. Collar removal
- G. Adjustment screw is located on the back of mechanism

Español

- A. Mazo
- B. Destornillador grande
- C. Collar
- D. Caja

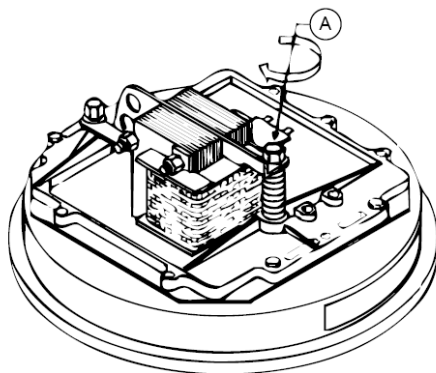
- E. Tornillo fijador
- F. Retirada del collar
- G. El tornillo de ajuste está ubicado en la parte trasera del mecanismo

Francais

- A. Maillet
- B. Gros tournevis
- C. Collier
- D. Enceinte

- E. Vis d'ajustage
- F. Retrait du collier
- G. La vis de réglage est située à l'arrière du mécanisme

**2**



290A1251-02

English

- A. Adjustment screw (softer turn clockwise)

Español

- A. Tornillo de ajuste (giro suave en sentido de las agujas del reloj)

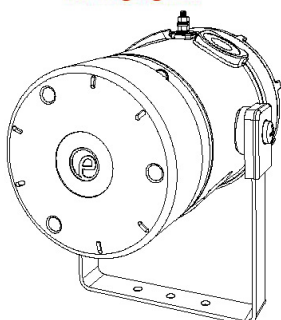
Francais

- A. Vis de réglage (rotation plus douce dans le sens horaire)

256920D  
Rev. D 5/01  
Made in U.S.A.  
Fabricado en USA  
Fabriqué aux Etats-Unis



**FEDERAL SIGNAL CORPORATION**  
**Electrical Products Division**



The D1xS1 & D1xS2 alarm horns are classified by UL as Audible Signaling Appliances for General Signaling and Public Mode Fire Alarm use in Hazardous Locations

## 1) Introduction

The D1xS1 & D1xS2 range are UL Classified alarm horns which produce a loud warning signal in a hazardous area. Sixty-Four first stage alarm sounds can be selected by internal switches and each one can be externally changed to a second, third or fourth stage alarm sound. The alarm horn may be used for Gas applications in Class I Division 1 & 2 as well as Class I Zone 1 & 2. The D1xS1 variants are also ATEX / IECEx certified and can be used for gas applications in Zones 1 & 2. D1xC1 & D1xC2 combined alarm horn & strobe units and D1xL1 & D1xL2 Loudspeakers are also available as well as variants for Explosive Dust Atmospheres.

## 2) Cautions and Warnings

### CAUTION

TO REDUCE THE RISK OF IGNITION OF HAZARDOUS ATMOSPHERES:

DISCONNECT FROM SUPPLY BEFORE OPENING.

KEEP TIGHTLY CLOSED WHEN IN OPERATION.

### WARNING

FIT SEALING FITTING IN CONDUIT RUNS WITHIN 18 INCHES FROM ENCLOSURE.

DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT

DO NOT OPEN WHEN ENERGISED

POTENTIAL ELECTROSTATIC CHARGING HAZARD -

CLEAN ONLY WITH A DAMP CLOTH

### ATTENTION

POUR REDUIRE LE RISQUE D'INFLAMMATION DES ATMOSPHERES DANGEREUSES:

COUPER L'ALIMENTATION AVANT OUVERTURE.

CONSERVER FERMÉ PENDANT LE FONCTIONNEMENT.

### AVERTISSEMENT

CONDUITS DOIVENT ÊTRE SCELLÉS EN MOINS DE 18 POUCES.

NE PAS OUVRIR UN PRESENCE D'ATMOSPHERE EXPLOSIVE

NE PAS OUVRIR ENERGIE

DANGER POTENTIEL CHARGE ÉLECTROSTATIQUE -

NETTOYER UNIQUEMENT AVEC UN CHIFFON HUMIDE

# INSTRUCTION & SERVICE MANUAL

## D1xS1 & D1xS2 RADIAL ALARM HORNS

### For Use In Hazardous Locations - Gas

## 3) Ratings and Markings

The D1xS1 and D1xS2 Alarm Horns comply with the following standards for hazardous locations:

UL 1203

CSA C22.2 NO. 30-M1986

The D1xS1 and D1xS2 Alarm Horns also comply with the following standards for signaling equipment:

UL464

CSA C22.2 NO. 205-12

### 3.1 Class / Division Ratings for US & Canada

Class I Div 1 ABCD T6 Ta -40°C to +70°C

Installation must be carried out in compliance with the National Electric Code / Canadian Electric Code

### 3.2 Class / Zone ratings US & Canada

Class I Zone 1 IIC T6 Ta -40°C to +70°C

Installation must be carried out in compliance with the National Electric Code / Canadian Electric Code

### 3.3 Fire Alarm Rating

The following models are approved for use as audible signal appliances for fire alarm use – public mode and produce a sound pressure level above 75dB(A) at 10 feet:

D1xS1-DC024 / D1xS2-DC024

For public mode fire alarm use the temporal pattern tone No. 12 as per the tone table provided in these instructions must be selected. For Fire Alarm use, units must be supplied 18-30Vdc.

### 3.4 Ambient Temperature Range:

D1xS1-DC024 / D1xS2-DC024 / D1xS2-AC230:

-40°C to +70°C

D1xS1-AC230:

-40°C to +70°C for 110-120Vac 50/60Hz

-40°C to +55°C for 120-240Vac 50/60Hz

### 3.5 Ingress Protection Ratings

The product is rated for ingress protection as follows:

IP rating per EN60529:

IP66

Type rating per UL50E / NEMA250: 4 / 4X / 3R / 13

### 3.6 Electrical Ratings per UL Listing

Model No.	Nom. Voltage	Nom. rms current <sup>2</sup>	Voltage Range	Max. rms current <sup>3</sup>
D1xS1-DC024	24Vdc	217mA	10-30Vdc <sup>1</sup>	270mA @ 18Vdc
D1xS1-AC230	115Vac 60Hz 230Vac 50Hz	77mA 53mA	110-240Vac 50/60Hz	82mA @ 110Vac 60Hz
D1xS2-DC024	24Vdc	924mA	10-30Vdc <sup>1</sup>	1217mA @ 18Vdc
D1xS2-AC230	115Vac 60Hz 230Vac 50Hz	268mA 159mA	110-240Vac 50/60Hz	293mA @ 110Vac 60Hz

- 1) 18-30Vdc for Fire Alarm Use
- 2) Nom. rms current draw at nom. voltage and worst case tone
- 3) Max. rms current draw at worst case voltage and tone

### 3.7 Surge Current for Fire Alarm use per UL Listing

Part No.	Voltage	Peak Surge Current	RMS surge Current
D1xS1-DC024	30Vdc	8.36A @ 1.44ms	966mA
D1xS2-DC024	30Vdc	9.92A @ 1.02ms	1.09A

Surge current given at worst case voltage and tone

### 3.8 ATEX / IECEx certification

The D1xS1 Alarm Horns comply with the following standards for hazardous locations:

EN60079-0:2018/ IEC60079-0: ed. 7.0 (2017)  
EN60079-1:2014 / IEC60079-1: ed. 7.0 (2014-06)

The D1xS1 Alarm Horns are rated as follows:

Ex db IIC T5 Gb Ta -40°C to +75°C  
Ex db IIC T6 Gb Ta -40°C to +70°C

Model No.: D1xS1

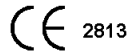
Input Voltage: DC Units 24V  
AC Units 115V or 230V

Certificate No. DEMKO 19 ATEX 2141X  
IECEX ULD 19.0008X

Epsilon x  
Equipment Group and  
Category:



CE Marking  
Notified Body No.



The units can be installed in locations with the following conditions:

### Area Classification Gas:

Zone 1	Explosive gas air mixture likely to occur in normal operation.
Zone 2	Explosive gas air mixture not likely to occur in normal operation, and if it does, it will only exist for a short time.

### Gas Groupings:

Group IIA	Propane
Group IIB	Ethylene
Group IIC	Hydrogen and Acetylene

### Temperature Classification:

T1	450°C
T2	300°C
T3	200°C
T4	135°C
T5	100°C
T6	85°C

Equipment Category: 2G

Equipment Protection Level: Gb, Gc

Ambient Temperature Range: -40°C to +75°C

Installation must be carried out in compliance with the latest issue of the following standards:

EN60079-14 / IEC60079-14: Explosive atmospheres -  
Electrical installations design, selection and erection  
EN60079-10-1 / IEC60079-10-1: Explosive atmospheres -  
Classification of areas. Explosive gas atmospheres

## 4) Installation

### 4.1 Safe Installation Requirements

The product must only be installed by suitably qualified personnel in accordance with the latest issues of the relevant standards.

The installation of the units must also be in accordance with the NEC / CEC and any local regulations and should only be carried out by a competent electrical engineer who has the necessary training.

### 4.2 Specific Conditions of Use

To maintain the ingress protection rating and mode of protection, the cable entries must be fitted with suitably rated cable entry and/or blanking devices during installation. If conduit is used for installation, seal conduit within 18 inches from the enclosure.

If entries are fitted with adaptors they must be suitably rated for the application. Fitting of blanking elements into adaptors is not permitted.

If a high IP (Ingress Protection) rating is required then a suitable sealing washer or O-ring must be fitted under any cable gland or blanking device with metric threads.

Only the explosionproof cover is to be used for access to the enclosure for installation, service and maintenance.

Connections are to be made into the terminal blocks using solid or stranded wire, sizes 0.5-2.5mm<sup>2</sup> / AWG 20-14. Wire insulation needs to be stripped 6-7mm. Wires may be fitted securely with crimped ferrules. Terminal screws need to be tightened down with a tightening torque of 0.4 Nm / 3.5 Lb-in.

Earthing connections should be made to the Internal Earth terminal in the explosionproof chamber or the external earth stud.

Check that the 'O' ring seal is in place before replacing the explosionproof cover.

If temperature exceeds 70°C at entry or 80°C at branching point use suitable rated cable and cable glands:

Max. ambient temperature	75°C
Req. Cable / Cable Gland Rating: (D1xS1DC024 Only)	85°C

### 4.3 Mounting

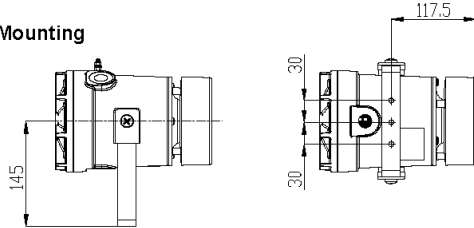


Fig. 1 Fixing locations.

The D1x Alarm Horn may be secured to any flat surface using the three 7mm fixing holes. The enclosure provides IP66 protection and is suitable for installation in exterior locations providing the cable entry is sealed.

### 4.4 Installation procedure

- Secure the D1x alarm horn to a flat surface via the three 7mm fixing holes in the mounting bracket.
- Remove the explosionproof cover of the alarm horn by unscrewing it, taking care not to damage the explosionproof threads in the process (Refer to section 5).
- Fit an M20/NPT suitably rated cable gland or conduit entry into the hole in the enclosure and connect the field wiring to the appropriate alarm horn terminals as shown in fig. 6 (AC) or fig 8. (DC). The power supply terminals are duplicated so that units may be connected in parallel. An end of line monitoring resistor may be fitted to DC units only (see section 12). If the second and third M20/NPT entries are not used, suitably rated stopping plugs must always be fitted.
- Replace the explosionproof cover of the loudspeaker, taking care not to damage the explosionproof threads. Tighten fully.

### 4.5 Hornless Variants

The D1x Sounder is also available as a variant with no horn fitted in the factory. The Horn threaded nose portion has a fitment thread of 1-3/8" – 18 UNF (to BS1580 or ANSI B1.1). The customer is responsible for sourcing and correctly fitting a suitable horn that meets all of the relevant safety requirements.

## 5) Access to the Explosionproof Enclosure

In order to connect the electrical supply cables to the alarm horn it is necessary to remove the explosionproof cover to gain access to the explosionproof chamber. This can be achieved by unscrewing the explosionproof cover (counter-clockwise), taking extreme care not to damage the explosionproof threads in the process.

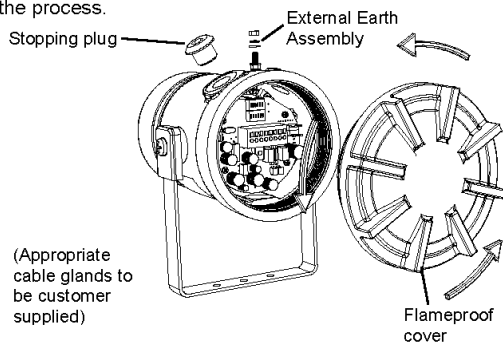


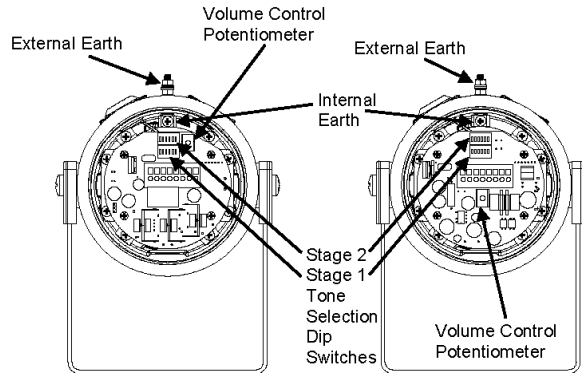
Fig. 2 Accessing the Explosionproof Enclosure.

On completion of the cable wiring installation the explosionproof threads should be inspected to ensure that they are clean and that they have not been damaged during installation. Also check that the 'O' ring seal is in place, on the

thread diameter in contact with the flat face of the explosionproof cover. When replacing the explosionproof cover ensure that it is tightened fully.

## 6) Volume Control

The output level of the D1x alarm horn can be set by adjusting the volume control potentiometer (see Fig 3). For maximum output, set the potentiometer fully clockwise.



D1xS2AC / D1xS2DC / D1xS1DC / D1xS1AC

Fig. 3 Location of field controls

## 7) Tone Selection

The D1xS1 & D1xS2 units have 64 different tones that can be selected independently for the first and second stage alarms. The tones are selected by operation of the tone setting DIP switches 1 & 2 (see Fig. 3) on the PCB. The alarm horns can also be switched to sound the third and fourth stage alarm tones. The tone table (Table 1) shows the switch positions for the 64 tones on first and second stages and which tones are available for the third and fourth stages dependent on the Stage 1 DIP switch setting.

## 8) Stage Switching Polarity (DC Units Only)

The D1xS2 and D1xS1 DC alarm horns have the facility to use either +ve or -ve switching to change the tone to the second, third and fourth stages. For -ve switching connect the two headers on the pcb to the left-hand (marked -ve) and centre pins. For +ve switching connect the headers to the right hand (marked +ve) and the centre pins. (Refer to Fig. 4)

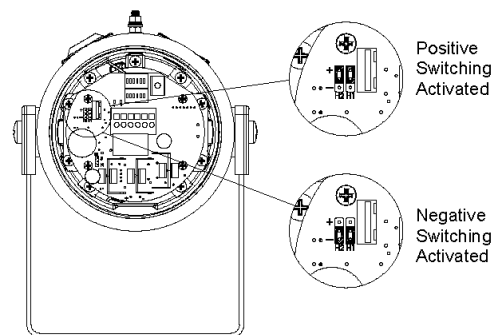


Fig. 4 Stage Switching Polarity

## 9) AC Wiring

### 9.1 Wiring Diagrams

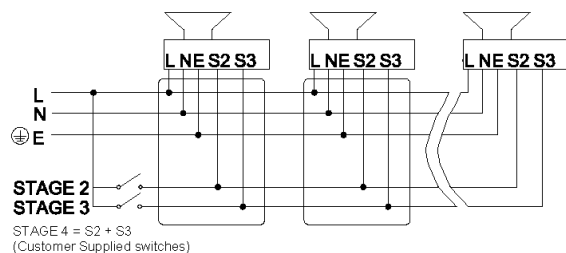


Fig 5a. D1xS1AC Simplified Block Diagram

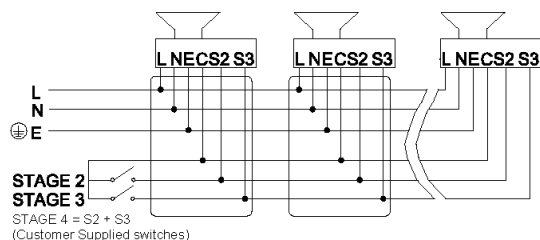


Fig 5b. D1xS2AC Simplified Block Diagram

### 9.2 Units First Stage Tones

Stage one (S1) operation: Simply connect the supply voltage to the L and N supply terminals, (see fig. 6).

### 9.3 AC Units Second, Third and Fourth Stage Tone Selection

To select the second, third and fourth stage tones on the D1x AC alarm horns.

Stage two (S2) operation: Power L and N, link the Common-C (D1xS2) or the Live-L (D1xS1) and S2 terminal.

Stage three (S3) operation: Power L and N, link the Common-C (D1xS2) or the Live-L (D1xS1) and S3 terminals.

Stage four (S4) operation: Power L and N, link the Common-C (D1xS2) or the Live-L (D1xS1) and both the S2 and S3 terminals.

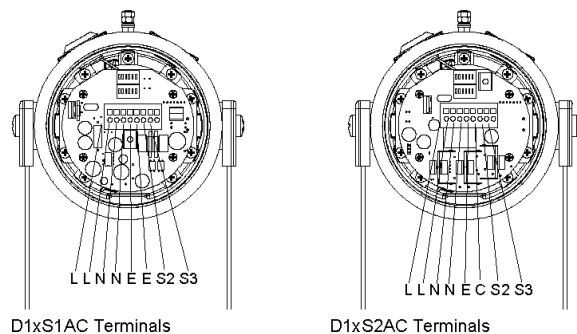


Fig. 6 AC Terminals

## 10) DC Wiring

### 10.1 Wiring Diagrams

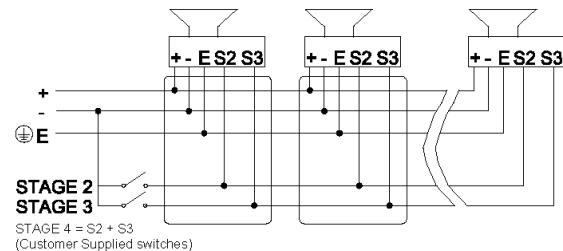


Fig. 7a DC Simplified Block Diagram (negative switching)

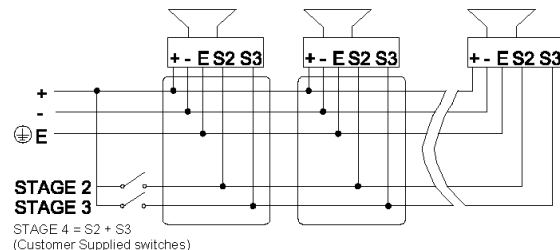


Fig. 7b DC Simplified Block Diagram (positive switching)

### 10.2 Units First Stage Tones

Stage one (S1) operation: Simply connect the supply voltage to the + and - supply terminals, (see fig. 8).

### 10.3 DC Units Second, Third and Fourth Stage Tone Selection

For units set up for -ve switching (default setting):

Stage two (S2) operation: Power +ve and -ve, link a -ve supply line to the S2 terminal. Dip switch 2 alters stage 2 tone.

Stage three (S3) operation: Power +ve and -ve, link a -ve supply line to the S3 terminal. Dip switch 1 alters stage 3 tone.

Stage four (S4) operation: Power +ve and -ve, link a -ve supply line to both the S2 & S3 terminals. Dip switch 1 alters stage 4 tone.

For units set up for +ve switching (refer to 9.1):

Stage two (S2) operation: Power +ve and -ve, link a +ve supply line to the S2 terminal. Dip switch 2 alters stage 2 tone.

Stage three (S3) operation: Power +ve and -ve, link a +ve supply line to the S3 terminal. Dip switch 1 alters stage 3 tone.

Stage four (S4) operation: Power +ve and -ve, link a +ve supply line to both the S2 & S3 terminals. Dip switch 1 alters stage 4 tone.

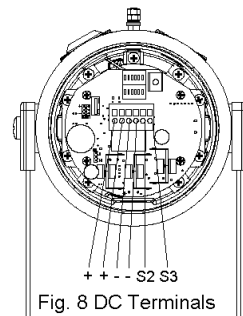


Fig. 8 DC Terminals



## 11) Earthing

The unit has both a primary internal and secondary external earth fixing point.

Internal earth connections should be made to the internal Earth terminal (see Fig. 3 and 4). It should be fitted to the internal earth point using a ring crimp terminal to secure the earth conductor.

In addition, external earth connections can be made to the M5 earth stud (see Fig. 2), using a ring crimp terminal to secure the earth conductor to the earth stud. The external earth crimp ring should be located between the two M5 plain washers provided and securely locked down with the M5 spring washer and M5 nut.

The earth conductor should be at least equal in size and rating to the incoming power conductors but at least a minimum of  $0.82\text{mm}^2$  / 18AWG in size.

## 12) End Of Line Monitoring (DC Units Only)

On D1xS1DC & D1xS2DC units, dc reverse line monitoring can be used if required. All DC alarm horns have a blocking diode fitted in their supply input lines. An end of line monitoring diode or an end of line monitoring resistor can be connected across the +ve and -ve terminals. If an end of line resistor is used it must have a minimum resistance value of 3k3 ohms and a minimum power rating of 0.5 watts or a minimum resistance value of 500 ohms and a minimum power rating of 2 watts.

The resistor must be connected directly across the +ve and -ve terminals as shown in the following drawing. The resistor leads should be kept as short as possible.

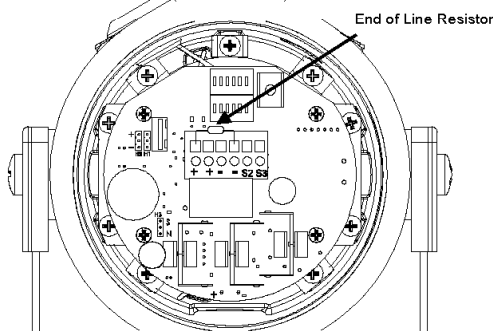


Fig. 9 End Of Line Resistor Placement

## 13) Maintenance, Repair and Overhaul

Maintenance, repair and overhaul of the equipment should only be carried out by suitably qualified personnel in accordance with the current relevant standards and regulations.

Units must not be opened while an explosive atmosphere is present.

If opening the unit during maintenance operations a clean environment must be maintained and any dust layer removed prior to opening the unit.

The threaded flamepath joints are not intended to be repaired.

**Tone Selection** – To select the required first stage tone set the tone Set DIP switch 1 (6 way DIP see Fig 3) to the required tone setting shown in the table below. The table also shows the second stage tone can be set independently with the Stage 2 DIP switch to select the required tone. The 3<sup>rd</sup> and 4<sup>th</sup> stage tones are available if more than two tone output stages are required, they are set/linked via the first stage tone selection.

Stage 1 Set DIP Switch 1 Tone No	Tone Description	Tone Visual	Stage 1 & 2 DIP Switch Settings 1 2 3 4 5 6	Stage 2 Set DIP Switch 2 Tone (S2)	Stage 3 Set DIP Switch 1 Tone (S3)	Stage 4 Set DIP Switch 1 Tone (S2 + S3)
1	1000Hz PFEER Toxic Gas	1000Hz	000000	1	2	44
2	1200/500Hz @ 1Hz DIN / PFEER P.T.A.P.	1200Hz 500Hz 1s	100000	2	3	44
3	1000Hz @ 0.5Hz (1s on, 1s off) PFEER Gen. Alarm	1000Hz 1s 1s	010000	3	2	44
4	1.4KHz-1.6KHz 1s, 1.6KHz-1.4KHz 0.5s NF C 48-265	1600Hz 1400Hz 1s 0.5s	110000	4	24	1
5	544Hz (100mS)/440Hz (400mS) NF S 32-001	544Hz 0.1s 440Hz 0.4s	001000	5	19	1
6	1500/500Hz - (0.5s on, 0.5s off) x3 + 1s gap AS4428	1500Hz 0.5s 500Hz 0.5s 0.5s 0.5s 1.5s	101000	6	44	1
7	500-1500Hz Sweeping 2 sec on 1 sec off AS4428	1500Hz 500Hz 2s 1s	011000	7	44	1
8	500/1200Hz @ 0.26Hz (3.3s on, 0.5s off) Netherlands - NEN 2575	1200Hz 500Hz 3.3s 0.5s	111000	8	24	35
9	1000Hz (1s on, 1s off)x7 + (7s on, 1s off) IMO Code 1a	1000Hz 1s 1s 1s 1s 1s 1s 1s 7s	000100	9	34	1
10	1000Hz (1s on, 1s off)x7 + (7s on, 1s off) IMO Code 1a	1000Hz 1s 1s 1s 1s 1s 1s 1s 7s	100100	10	34	1
11	420Hz (0.5s on, 0.5s off)x3 + 1s gap ISO 8201 Temporal Pattern	420Hz 0.5s 0.5s 0.5s 1.5s	010100	11	1	8
12	1000Hz (0.5s on, 0.5s off)x3 + 1s gap ISO 8201 Temporal Pattern	1000Hz 0.5s 0.5s 0.5s 1.5s	110100	12	1	8
13	422/775Hz - (0.85s on, 0.5s off) x3 + 1s gap NFPA - Temporal Coded	775Hz 422Hz 0.85s 0.5s 0.85s 0.5s 0.85s 1.5s	001100	13	1	8
14	1000/2000Hz @ 1Hz Singapore	2000Hz 1000Hz 1s	101100	14	3	35
15	300Hz Continuous	300Hz	011100	15	24	35
16	440Hz Continuous	440Hz	111100	16	24	35
17	470Hz Continuous	470Hz	000010	17	24	35
18	500Hz Continuous IMO code 2 (Low)	500Hz	100010	18	24	35
19	554Hz Continuous	554Hz	010010	19	24	35
20	660Hz Continuous	660Hz	110010	20	24	35
21	800Hz IMO code 2 (High)	800Hz	001010	21	24	35
22	1200Hz Continuous	1200Hz	101010	22	24	35
23	2000Hz Continuous	2000Hz	011010	23	3	35
24	2400Hz Continuous	2400Hz	111010	24	20	35
25	440 @ 0.83Hz (50 cycles/minute) Intermittent	440Hz 0.6s 0.6s	000110	25	44	8
26	470 @ 0.9Hz - 1.1s Intermittent	470Hz 0.55s 0.55s	100110	26	44	8
27	470Hz @ 5Hz - (5 cycles/second) Intermittent	470Hz 0.1s 0.1s	010110	27	44	8
28	544Hz @ 1.14Hz - 0.875s Intermittent	470Hz 0.43s 0.44s	110110	28	24	8
29	655Hz @ 0.875Hz Intermittent	655Hz 0.57s 0.57s	001110	29	44	8
30	660Hz @ 0.28Hz - 1.8sec on, 1.8sec off Intermittent	660Hz 1.8s 1.8s	101110	30	24	8
31	660Hz @ 3.34Hz - 150mS on, 150mS off Intermittent	660Hz 0.15s 0.15s	011110	31	24	8

32	745Hz @ 1Hz Intermittent		1 1 1 1 1 0	32	24	8
33	800Hz - 0.25sec on, 1 sec off Intermittent		0 0 0 0 0 1	33	24	8
34	800Hz @ 2Hz IMO code 3.a (High) Intermittent		1 0 0 0 0 1	34	24	8
35	1000Hz @ 1Hz Intermittent		0 1 0 0 0 1	35	24	8
36	2400Hz @ 1Hz Intermittent		1 1 0 0 0 1	36	24	8
37	2900Hz @ 5Hz Intermittent		0 0 1 0 0 1	37	24	8
38	363/518Hz @ 1Hz Alternating		1 0 1 0 0 1	38	8	19
39	450/500Hz @ 2Hz Alternating		0 1 1 0 0 1	39	8	19
40	554/440Hz @ 1Hz Alternating		1 1 1 0 0 1	40	24	19
41	554/440Hz @ 0.625Hz Alternating		0 0 0 1 0 1	41	8	19
42	561/760Hz @ 0.83Hz (50 cycles/minute) Alternating		1 0 0 1 0 1	42	8	19
43	780/600Hz @ 0.96Hz Alternating		0 1 0 1 0 1	43	8	19
44	800/1000Hz @ 2Hz Alternating		1 1 0 1 0 1	44	24	19
45	970/800Hz @ 2Hz Alternating		0 0 1 1 0 1	45	8	19
46	800/1000Hz @ 0.875Hz Alternating		1 0 1 1 0 1	46	24	19
47	2400/2900Hz @ 2Hz Alternating		0 1 1 1 0 1	47	24	19
48	500/1200Hz @ 0.3Hz Sweeping		1 1 1 1 0 1	48	24	12
49	560/1055Hz @ 0.18Hz Sweeping		0 0 0 0 1 1	49	24	12
50	560/1055Hz @ 3.3Hz Sweeping		1 0 0 0 1 1	50	24	12
51	600/1250Hz @ 0.125Hz Sweeping		0 1 0 0 1 1	51	24	12
52	660/1200Hz @ 1Hz Sweeping		1 1 0 0 1 1	52	24	12
53	800/1000Hz @ 1Hz Sweeping		0 0 1 0 1 1	53	24	12
54	800/1000Hz @ 7Hz Sweeping		1 0 1 0 1 1	54	24	12
55	800/1000Hz @ 50Hz Sweeping		0 1 1 0 1 1	55	24	12
56	2400/2900Hz @ 7Hz Sweeping		1 1 1 0 1 1	56	24	12
57	2400/2900Hz @ 1Hz Sweeping		0 0 0 1 1 1	57	24	12
58	2400/2900Hz @ 50Hz Sweeping		1 0 0 1 1 1	58	24	12
59	2500/3000Hz @ 2Hz Sweeping		0 1 0 1 1 1	59	24	12
60	2500/3000Hz @ 7.7Hz Sweeping		1 1 0 1 1 1	60	24	12
61	800Hz Motor Siren		0 0 1 1 1 1	61	24	12
62	1200Hz Motor Siren		1 0 1 1 1 1	62	24	12
63	2400Hz Motor Siren		0 1 1 1 1 1	63	24	12
64	Simulated Bell		1 1 1 1 1 1	64	21	12



Cheshire, CT 06410 203-699-3300 (Ph)  
203-699-3365 (Cust. Serv. Fax)  
203-699-3078 (Tech. Serv. Fax)

## Installation Instructions for Explosion-Proof Adaptahorn Catalog Series 878EX and 879EX

### Description and Operation

Edwards explosion-proof Adaptahorn is a heavy-duty high decibel vibrating horn intended for use where a distinctive audible signal is required in a hazardous location. It is UL and cUL listed and is designed for use in Class I, Division 1 and 2, Groups B, C, and D; and Class II, Division 1 and 2, Groups F and G, Class II, Division 1, Group E, and Class III, Division 1 and 2 hazardous locations. The horns are in an Outdoor Type 4X rated enclosure (Outdoor Type 4X applies to general signaling use in non-fire alarm applications). The Adaptahorn may be mounted to any solid surface.

### Electrical Specifications

Cat. Number	Input Power	Current	dB Rating at 10 ft.
878EX-R5	240VAC	0.065A	97
878EX-N5	120VAC	0.13A	97
878EX-G5	24VAC	0.625A	97
878EX-E5	12VAC	1.25A	97
879EX-P1	125VDC	0.025A	97
879EX-K1	48VDC	0.07A	97
879EX-J1	32VDC	0.13A	97
879EX-G1	24VDC	0.16A	97
879EX-E1	12VDC	0.27A	97
879EX-C1	6VDC	0.7A	97

#### Ambient Temperature:

The UL Hazardous Locations Listing is "only for use under normal atmospheric conditions in an ambient temperature within the range of -25C (-13F) to +40C (+104F)"; and within these ambient temperatures, Edwards recommends -4C (+25F) and higher for its function as an audible signal appliance.

### Installation

For power connections in a hazardous location, the following external parts will be required:

- 3/4 inch conduit of sufficient length to contain power source wires within hazardous location

- One explosion-proof outlet box suitable to the hazardous location
- Two 3/4-14 National Pipe Taper (NPT) nipple connectors.

1. Mark two mounting holes per dimensions in Figure 1. Secure Adaptahorn to solid surface using the furnished mounting brackets and hard ware suitable for the mounting location. The 3/8" diameter fasteners and washers are not supplied.
2. See Figure 1. Power source connections are made in the explosion-proof outlet box. Remove outlet box cover.



### CAUTION

Do not apply power to the unit until installation is completed and cover is secured.

3. Feed external power wires through the 3/4 inch conduit which is attached to the outlet box with one of the 3/4-14 NPT connectors.
4. Feed Adaptahorn power connection wires through the other 3/4-14 NPT connector which connects the Adaptahorn to the outlet box.
5. Connect power source wires to Adaptahorn power connection wires. Connect ground lead to earth ground.
6. Replace outlet box cover and tighten securely.

### Maintenance and Test

Examine the unit periodically for accumulation of dirt. Clean if necessary.

The Adaptahorn should be tested monthly to ensure continuous service.

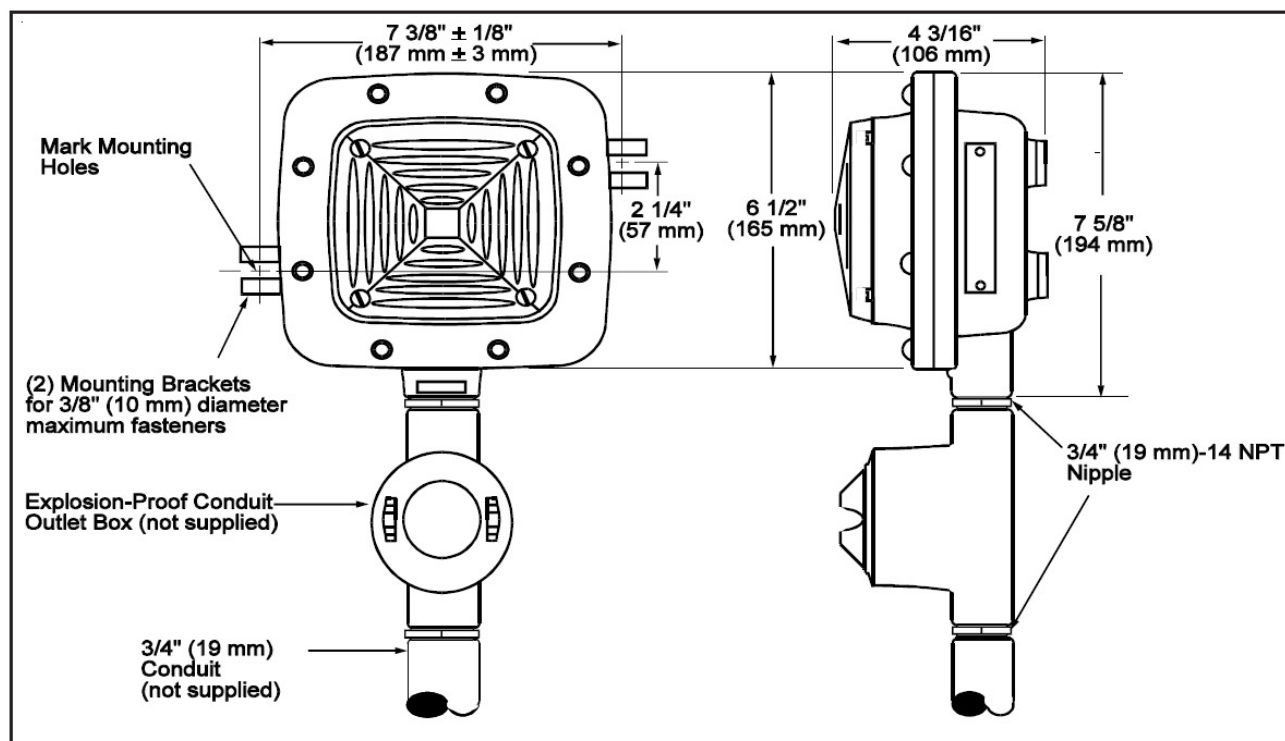


Figure 1. Signal Mounting Details

#### Contacting Edwards:

Phone: (203) 699-3000

E-Mail: [techsupport@edwards-signals.com](mailto:techsupport@edwards-signals.com)  
[customerservice@edwards-signals.com](mailto:customerservice@edwards-signals.com)

Website: <http://www.edwards-signals.com>

P/N P-047550-0304 ISSUE 5

PAGE 2