MALLORY

MALLORY SONALERT PRODUCTS, INC.

FAQ's- 30mm Alarms with LED Lights

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General Alarm Technology

Q: What is an electronic audible alarm?

A: An electronic audible alarm produces an audible warning sound using electronic means. This is in contrast to electro-mechanical alarms that produce sound by mechanical means. Examples of electro-mechanical alarms include the old clapper type alarm clocks, school bells, and car horns. Examples of applications that use electronic audible alarms include smoke detectors and microwave ovens.

Q: What else are audible alarms called?

A: Buzzers, beepers, audible signals, piezo's, sounders, alerts, audio alarms, indicators, transducers, and various combinations of these terms (audio alerts, piezo indicators, etc.).

Q: How do electronic audible alarms work?

A: Audible alarms work by using electronic components to convert the user's input voltage into an appropriate oscillating signal that drives a metal sounder diaphragm. This metal sounder diaphragm then physically flexes up and down producing air pressure waves that the human ear interprets as sound. For a more detailed description, please read the Article titled, "Audible Alarm Basics" and see Technical Application Guide, "Piezoelectric Alarm Operation".

Q: How does a piezoelectric transducer work? How does an electro-magnetic buzzer work?

A: Piezoelectric type alarms utilize a piezoelectric transducer which consists of a metal disc that has a ceramic material bonded to it. When voltage is applied to the ceramic material, it causes the metal disc to physically flex. If the piezoelectric transducer is physically flexed at an appropriate frequency, the air pressure waves are produced that are heard as an audible sound.

Electro-magnetic type alarms utilize an electro-magnet and a nearby bare metal disc that is mounted to the housing. When the electro-magnet is energized, the resulting magnetic field physically deflects the bare metal disc. If the bare metal disc is flexed at an appropriate frequency, an audible sound is produced.

Q: Why are both piezoelectric and electro-magnetic technologies used for audible alarms?

A: Alarms that use piezoelectric technology draw less current, are capable of louder sound levels, and do not generate magnetic fields (possible EMI/EMC concerns). Alarms that use electro-magnetic technology excel at producing low frequency pitch sounds in small packages. This is why many miniature board mount or surface mount audible alarms use electro-magnetic technology.

Q: How are electronic audible alarms constructed?

A: Electronic audible alarms are considered components by equipment designers, but in actuality, they are a complex electromechanical assembly. See Technical Application Guide, "Piezoelectric Alarm Construction".

Q: Why is a brass metal diaphragm superior to a stainless steel metal diaphragm for an audible alarm application?

A: In order to solder wires to a stainless steel metal diaphragm, very hot temperatures and aggressive acid fluxes are required. The process is very sensitive to many different parameters, so if the soldering process slips out of control, weak solder joints can result. The soldering process needed to solder to a brass transducer does not need aggressive fluxes and extra hot temperatures, so the process is more reliable. In addition, the brass metal diaphragms are lower in cost, so the customer gets more value for their money whereas the stainless steel diaphragms are higher cost with no value added to the user.

The claim that stainless steel diaphragms are more corrosion resistant is false. In only the most severe salt water applications will a slight difference in the corrosion resistance be noticed. For these rare severe salt water applications, a conformal coating can be applied to the exposed brass surface (at a cost still less than stainless steel) that will provide equal or better corrosion resistance than the exposed stainless steel surface.

Q: What is the difference between an indicator and a transducer?

A: An indicator is an electronic alarm that has internal circuitry. The user only needs to apply an input voltage, and the alarm will automatically sound.

A transducer does not contain any internal circuitry. The user has to supply the complex AC signal that will make the sounder diaphragm flex at the appropriate rate and amplitude.

Q: When should I use an indicator and when should I use a transducer?

A: Indicators are always appropriate to use. Mallory's design engineering (which holds over a dozen active patents) has already designed the most efficient circuit needed to produce the required sound and has tested that circuit against a wide variety of environmental conditions.

Transducers may be justified to use when there is sufficient volume to the application to justify the time and expense required to design, de-bug, test, re-design, and validate the circuit design needed to drive the transducer under the environmental extremes that will be seen in the application. While the operation of the transducer may seem simple from the outside, there are many potential application problems that can arise unexpectedly.

Electrical Application Issues

Q: Getting an annoying low volume sound output when alarm is supposed to be off?

A: You are experiencing a leakage voltage with your power supply or controller. Mallory alarms are designed to operate with very little current and it takes only a small amount of voltage to make the alarm sound. Three possible fixes:

1. Put a 30 Volt zener transient voltage suppressor diode in series with the Sonalert alarm such as ON Semiconductor P/N's: P6KE33AG or P6KE36AG or P6KE30AG. These should be readily available at many electronic distributors. You can also use: www.eem.com to find distributors who have these in stock.

2. Parallel a 12 to 20 watt wire-wound resistor across the alarm's terminals. For 120 Vac, try a 2,000 ohm resistor such as Ohmite P/N B20J2K0. For 250 Vac, try a 5,000 ohm resistor such as Ohmite P/N B20J5k0. If these resistor values do not solve the problem, or if you are experiencing the problem with a lower AC or DC voltage, then try a 1,000 ohm resistor. Make sure that the resistor is not touching the alarm housing or other components that may be affected by the heat being dissipated by the resistor.

3. Parallel an incandescent (tungsten filament) pilot light across the alarm terminals. For 120 Vac, use a 6 or 7 watt bulb. For 250 Vac, use a 10 watt bulb. Possible sources:

   McMaster-Carr: P/N 1628k34 (120 Vac; 6 watt incandescent lamp)
   McMaster-Carr: P/N 8358k11 (250 Vac; 10 watt incandescent lamp)
   Sylvania P/N 13609 (120 Vac; 7 watt incandescent lamp)
   Sylvania P/N 16938 (120 Vac; 6 watt incandescent lamp)
   Sylvania P/N 16717 (250 Vac; 10 watt incandescent lamp)

   Remember that when the alarm is activated, the full supply voltage will be seen at the lamp causing it to brighten.

Q: Do Mallory AC/DC Alarms work with 50 Hz and 60 Hz systems?

A: Yes. Mallory Sonalert AC/DC alarms work with both 50 Hz and 60 Hz systems.

Q: Can you adjust the volume of an audible alarm?

A: To adjust the volume level, change the voltage going to the alarm. The sound level of the alarm is directly related to the voltage applied across the sounder element. For a fixed supply voltage, you can use resistors or a potentiometer (analog or digital) to adjust the voltage being applied to the alarm. It does take a fairly wide voltage swing to get a significant change in sound level, so there will be little sound level change with electromagnetic type buzzers because their voltage ranges are already too small to begin with. See Technical Application Guide, "Controlling Sound Level Electronically".

Q: How fast can I turn an audible alarm on and off (i.e. short duration pulse width)?

A: A piezoelectric or electromagnetic alarm generates sound by physically deflecting a metal disc. It does take a small amount of time once the voltage signal is applied to the part before the metal disc is flexing to its fullest potential. Our recommended minimum pulse duration is 50 msec. but some customers have reported being able to use even shorter durations without affecting the sound level. At some point as the pulse duration continues to decrease, the "beep" sound will become a "click" sound and the sound level will decrease.

Q: What does the input impedance of a piezoelectric transducer type device look like?

A: The input impedance of a piezoelectric transducer looks like pure capacitance. The current and voltage waveforms across the transducer can be predicted from the source voltage impedance and the transducer capacitance.

Q: For a piezoelectric transducer type device, what effect does the source impedance have on the resulting sound level?

A: For Mallory Sonalert piezoelectric transducer type alarms, the sound level curves are generated with a square-wave with a 50-Ohm source impedance. You can increase the source impedance to a few hundred Ohms with negligible effect on the resulting sound output.

Q: Are your alarms affected by EMC/EMI?

A: For Mallory Alarms and buzzers that use piezoelectric transducers, we have never had a report of these devices being affected by EMC/EMI. However, there have been a few reports of electromagnetic type buzzers being effected. If you are worried about the alarm being affected by EMC/EMI, you can consider using an EMC protective product such as 3M EMC tape or fabric that could be wrapped around the alarm. Google "3M EMC Products" to find 3M's website with information on these products.

Mechanical Application Issues

Q: What size hole do I need for my panel mount alarm?

A: Here are the recommended hole sizes:

1. LSC Series: 1.25” (these series will fit through a 30mm hole).

Q: How do I connect to your panel mount alarms?

A: The standard termination for our SC & LSC series is screw terminals using #6-32 screws. You can ignore the screws and solder directly to the terminal. You can strip your wire and simply wrap it around the screws. A more popular choice is to crimp a spade or ring terminal to your wires to connect to the screw terminal. The terminals are also suitable for use with ¼” disconnect female terminal that have a 3/16” opening. One source for a female quick disconnect terminal is:

3000H 219A-6
Ark-less Corp
781-297-6000 (ph)

For our SNP Series, you can solder to the part’s terminals or use a 1/8” quick disconnect terminal.

Q: How much torque is recommended to tighten the knurled nut?

A: For the plastic knurled nut, a maximum of 10 in-lbs is recommended. If your panel is not very thick, then it is likely that the nut will not strip until 20+ in-lbs is reached. For the metal knurled nuts, a maximum of 20 in-lbs is recommended.

Q: How much torque is recommended to tighten the screws?

A: For the LSC series, the recommended torque is 4 to 6 in-lbs, and the maximum torque is 8 to 10 in-lbs.

Q: What are the Locking Flats used for and where are they located?

A:

As the picture to the left shows, the locking flats are only located at the base of the nose ring. The locking flats do not extend up the side of the nose threads.

For a vast majority of applications, the locking flats do not need to be used. If the knurled nut (not shown) is properly tightened, the alarm will not move in the application. However, for some high end applications with a lot of vibration (such as aerospace), the locking flats would help to ensure that the alarm will not rotate within the panel which could end up putting pressure on the

wiring connections to the terminals of the alarm.

Q: Can I bury the alarm inside my equipment?

A: Yes, but the alarm will be attenuated 15-20 decibels. This means that the sound level will be about ½ to ¼ as loud as it would be if it was mounted externally or if there were openings made in the enclosure so that the sound could radiate out. For a full discussion on mounting alarms inside of equipment, read the article titled, "Audible Alarm Use and Equipment Integrity Issues."

Q: Can Mallory provide custom terminations?

A: Yes! Visit our contact page on the website or email info@mallory-sonalert.com or call 317-612-1000

Soldering & Washing Issues

Q: What is the recommended hand soldering temperature for Mallory audible alarms?

A: 330ºC for 1.5 seconds or 270ºC for 4 seconds.

Sound Issues

Q: How is sound level measured?

A: Sound level is measured in decibels (abbreviated dB). The dB scale is an arbitrary scale that reflects the loudness of the sound that is being measured. It ranges from 0 dB (threshold of hearing) to 130 dB (threshold of pain). For a better understanding of the decibel sound level scale, see Technical Application Guide, "Decibel Sound Level Scale".

Q: How loud does my audible alarm need to be?

A: The audible alarm should be at least 10 dB louder than the ambient back ground noise so that it can be easily heard. You can estimate the ambient background noise by using the chart found in the Technical Application Guide, "Decibel Sound Level Scale" or you can use a sound level meter to measure the actual ambient noise level.

Q: When is a sound level twice as loud as another?

A: Every time the sound level increases by 10 dB, it will sound twice as loud to the human ear. For example, an alarm specified as 90 dB at 2 feet will sound half as loud as one specified as 100 dB at 2 feet.

Q: What does distance have to do with sound level?

A: Sound level falls off over distance. We intuitively know this because we have to talk louder (or even shout) when people are farther away. The rule of thumb is that every time the distance doubles, the sound level drops off by 6 dB. For example, if an audible alarm measures 60 dB at 2 feet, by the time it reaches 4 feet, it will only be 54 dB. By the time it reaches 8 feet, it will only be 48 dB, and so on.

Q: How come some audible alarms are specified at 2 feet and some are specified at 10cm? How do I compare alarms at various distances?

A: Unfortunately, there is no one standard distance for specifying the sound level for audible alarms. However, there are some common distances such as 2 feet (60 cm), 1 foot (30 cm), and 10 cm (4 in). An excel spreadsheet has been developed to convert among the most common distances used. The link for the spreadsheet is in our TECHINCAL RESOURCES webpage.

For example, if you want to compare an alarm that is specified as 100 dB at 10 cm and one specified as 88 dB at 2 feet, you must choose one distance that you want to use to compare the parts. Using the distance conversion spreadsheet, you would find that 88 dB at 2 feet equates to 103 dB at 10 cm, so the alarm specified as 88 dB at 2 feet is actually louder than the other one when they are compared apples to apples.

Q: How sensitive is the human ear to sound level changes?

A: Most people can only distinguish a sound level change only when it increases or decreases by 3 decibels. For example if a person was listening to an audible alarm that changed from 90 to 92 dB,

that person would most likely say that the alarm did not get louder. If the sound level changed from 90 dB to 93 dB, the person would say that the sound level is slightly louder. If the sound level changed from 90 to 96 dB, the person would say that the sound level is significantly louder. If the sound level changed from 90 to 100 dB, the person would say that the sound level is twice as loud as before.

Q: When should I use a constant tone and when should I use a pulsing tone?

A: Pulsing tones are more easily distinguished than constant tones. Also, pulsing tones convey typically convey more urgency to a person than a constant tone. On the other hand, it takes more electronic circuitry to make a tone pulse, so pulsing audible alarms are usually more expensive than constant tone alarms. If a more pleasant sounding tone is needed, a chime sound may be preferred.

You can listen to the various sounds that Mallory audible alarms make on our SOUNDS webpage.

Q: What does dBa (A-Weighting) mean?

A: dB is the abbreviation for decibels which is how the sound level of audible alarms is measured. The “a” in dBa means that the sound level was measured on an A-Weighting scale. The A-Weighting scale was developed to compensate for the fact that the human ear is not a perfect microphone. By applying the A-Weighting scale to sound level measurements, you put the different frequencies (pitches) that the audible alarms produce on an even basis (i.e. comparing apples to apples). Mallory always uses A-Weighting for their sound level measurements, but not all audible alarm manufacturers are this diligent.

Q: Can I control the sound level of the audible alarms?

A: Yes. See Technical Application Guide, "Controlling Sound Level Electronically".

Q: Can I model the acoustic sound chamber using Helmholtz equations?

A: Mallory Sonalert has worked with Professors at Rose Hulman University in an attempt to model the sound chamber using Helmholtz equations, but these equations do not work well in predicting the resulting sound characteristics of the alarm. When Mallory Sonalert engineering designs new audible alarms, we rely on past designs and experience to give guidance on a starting point. However, the final design of the sound chamber is based on careful process of building prototype after prototype in order to find that sweet spot in sound performance."

Q: What is the acoustic sound chamber and how does it work?

A: The acoustic sound chamber of audible alarms includes the area inside the housing that is in front of the sounder element and includes the front hole opening.

The sound chamber does not work like organ pipes. In organ pipes, there are standing waves of different size depending on the frequency generated. This is why the organ pipes are different lengths. If the standing wave principle was used for electronic audible alarms, the alarms would have to be many inches or feet in length.

Perhaps the best way to explain how the acoustic sound chamber works is to think of it using a more visceral medium. If you think of the air sound waves being replaced by water, the sound chamber would work by providing an efficient shape for the water to move out of the housing without being obstructed by eddies, reverse currents, and dead spots. Essentially, the acoustic sound chamber provides a low impedance path for the air pressure wave to escape the housing with maximum intensity.

Q: Can Mallory provide a custom sound?

A: Yes! Visit our CONTACT US webpage or email info@mallory-sonalert.com or call 317-612-1000

Environmental Issues

Q: Can your panel mount models be used outdoors?

A: Yes, LSC series alarms are sealed to ensure no rain, splashing water or dust will penetrate inside of the unit. When used in an outdoor application, the alarm should be mounted facing downward or no greater than horizontal. This will ensure that the nose cone of the alarm will not collect and/or hold water. To prevent water from penetrating behind the panel, use our ACC03 accessory.

Q: Are your alarms CE Marked?

A: The alarms, buzzers, transducers, speakers, and other products & accessories sold by Mallory Sonalert Products, Inc. are individual components that must be incorporated into final equipment in order to be useful. Since their safety and use depends to a very large extent on how they are incorporated, they are not covered by the various European Directives, and need not be CE marked. In fact, per the Low Voltage Directive, components must **not** be CE Marked.

Q: Do you have FAA Certification on your alarms?

A: While a vast majority of Mallory's alarms are used in industrial and non-aerospace applications, Mallory's alarms have been used by the aerospace industry for over 30 years, and end customers include nearly all major and minor jet, airplane, and helicopter manufacturers. All the various alarm models used in these applications have been certified with the FAA by the alarm user. While Mallory has not been directly involved with the FAA during the PMA (Parts Manufacturer Approval) process, Mallory has (and will) supply all needed information for any certification and/or approvals that are required by the application to the alarm user. It is up to the alarm user to work with the FAA to gain approval.

Q: What is the shelf life of an audible alarm?

A: Mallory is not aware of anyone who has ever had a shelf life issue with our alarms. That being said, some alarm models contain aluminum electrolytic capacitors. The recommended shelf life for these capacitors is 5 to 10 years depending on how they are used. Our application of these capacitors is not especially sensitive to the shelf life issues of these components, so we would expect that they would last 8-10 years or longer in our alarms just sitting on the shelf (no voltage applied during that time).

Q: What is the dielectric rating of Mallory alarms (Hi-Pot Test)?

A: For the SC/SNP/SBM series, many of these models are approved to UL-464 which uses the following Hi-Pot test: 1240 Vac for 60 seconds with the part wrapped in aluminum foil.

The electrical connection for the test is between the terminals and the foil. The models in these series that are not UL approved would also pass this test as they are similarly constructed. For the other board and flange mount parts that we offer, no dielectric/hi-pot testing has been done to date (please contact us if this test is required for your application).

Q: What is the Mean Time Between Failure (MTBF) for Mallory Alarms?

A: MTBF data has only been generated for the SC, SNP, and SBM Series. Historical life test data at maximum temperature and voltage has resulted in the following failure rates for a majority of the models in these series that we sell when calculated per Mil-Handbook-217:

F.R. = 0.08% per 1000 hrs @ 60% confidence level

MTBF = 1,250,000 hrs @ 60% confidence level.

Q: Are These Products Subject to ITAR?

A: No. Mallory Sonalert's audible and visual products are used in a variety of consumer, industrial, military, and aerospace applications. However, these products do not meet the criteria of a defense article on the U.S. Munitions List nor do they have the equivalent performance or capabilities of a defense article on the U.S. Munitions List. Therefore, Mallory Sonalert products are not subject to ITAR regulations or restrictions.

Q: What is the ECCN Number for Mallory Alarms, Buzzers, & Speakers?

A: Mallory Sonalert Products alarms, buzzers, and speakers do not require an ECCN Number. However, if you absolutely need to assign an ECCN Number, use EAR99 (which means that our product is not regulated).

Q: What are the typical failure modes for piezoelectric audible alarms?

A: Customer returns of Mallory audible alarms for failure to operate are very rare. Of the few parts returned each year, the vast majority of the root cause of failure is an over-voltage or voltage spike condition caused by the customer's application. For more details, see Technical Application Guide, "Typical Failure Modes".

Q: I need a colder temperature rating. Can you provide one?

A: For our Rugged/Military panel mount models, these alarms are already at the limits of the technology (-55 C). However, it is likely that our other alarms will work at colder temperatures. Visit our CONTACT US webpage, email info@mallory-sonalert.com or call 317-612-1000

Q: What environmental tests do your alarms meet?

A: Design Engineering uses a variety of tests during the verification and validation design phases. These tests can include: surge voltage, reverse voltage, hot & cold life tests, room temperature life test, humidity, vibration, shock, salt spray, and terminal strength. The Environmental Tests for each alarm are listed in that alarm's Environmental Durability PDF available on the website.

Q: What is the Moisture Sensitivity Level (MSL) of Mallory alarms?

A: MSL 1 (Unlimited)

Q: I have a special environmental requirement, can Mallory help me?

A: Yes! Use our CONTACT US webpage, email info@mallory-sonalert.com or call 317-612-1000

Warranty

The seller warrants the goods to be supplied hereunder will conform to the pertinent specifications, drawings and approved samples, if furnished, and that such goods will be of good materials and workmanship and free of defects if properly installed and used as sold by Seller. If within one-year period from the date of shipment to Purchaser such goods, not having been subject to misuse, alteration, modification, neglect. Improper installation or unauthorized repairs not exposed to an abnormal environment, are shown not to be in conformity or are shown to be defective in workmanship or materials, Seller's sole and exclusive obligation under this warranty is to repair or replace such goods, provided return is made prepaid to Seller or its designated representative with the following tagged information: (i) date of shipment of such goods to Purchaser; (ii) date such goods are determined to be non-conforming or defective; and (iii) specifying the apparent non-conformity or defect. No claim will be allowed under this warranty unless Purchaser notifies Seller of such claim within 30 days after Purchaser learns of facts giving rise to such claim. Purchaser's failure to test, inspect and make claim within such one-year period shall be conclusive evidence that the goods shipped were satisfactory in all respects. The liability of Seller under the forgoing warranty shall not exceed the price charged by Seller for the goods which give rise to the Purchaser's claim. THE AFORESAID WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE), EXCEPT OF TITLE. SELLER ASSUMES NO LIABILITY FOR ANY SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR OTHER DAMAGES OF ANY TYPE (INCLUDING, BUT NOT LIMITED TO, DAMAGES RELATED TO LOST SALES AND PROFITS, EXCESSIVE OR INCREASED COSTS AND EXPENSES, FIELD RECALL AND RETROFIT, COSTS AND EXPENSES , DOWNTIME COSTS AND CLAIMS OF CUSTOMERS OR PURCHASER FOR SUCH DAMAGES) RESULTING FROM NON-CONFORMING OR DEFECTIVE CONDITION OF ANY GOODS SOLD BY SELLER TO PURCHASER HEREUNDER, AND PURCHASER ASSUMES ALL LIABILITY FOR ALL CONSEQUENCES ARISING OUT OF ITS USE OR SALES OF SUCH GOODS. THE AFORESAID REMEDY OF PURCHASER IS EXCLUSIVE AND THIS LIMITATION OF LIABILITY PROVISION SHALL APPLY TO ANY AND ALL CLAIMS OR SUITS BASED UPON NEGLIGENCE, BREACH OF CONTRACT, BREACH OF WARRANTY, STRICT LIABILITY, OR ANY OTHER LEGAL THEORY UPON WHICH LIABILITY MAY BE ASSERTED AGAINST SELLER BY PURCHASER OF OTHERS.