



Permitting and Inspections Department

Fire Alarm Permit Application

Construction Address: 8 ALDER STREET PORTLAND MAINE		
Total Square Footage of Proposed Structure: 4745		
Tax Assessor's Chart, Block & Lot Chart# Block# Lot# 033 J017 001		Applicant Name: PROTECTION PROFESSIONALS
Cost of Work: \$ 8981.44		Address: 325 US ROUTE ONE FALMOUTH MAINE 04105
Lessee/Owner Name (if different): AHAB INVESTMENTS LLC		Phone: 207-775-5755
Address: 45 PAGE STREET BRUNSWICK MAINE 04011		Email: JEREMY@PROTECTIONPROFESSIONALS.NET
Phone: _____		Contractor Name (if different): SOUTHERN MAINE RENTALS LLC
Email: _____		Address: 142 HIGH STREET PORTLAND MAINE 04101
Current use (i.e. single family): MULTI-FAMILY APARTMENT BUILDING		Phone: 207-776-4598
If vacant, what was the previous use? NA		Email: RYAN@SOUTHERNMAINERENTALS.COM
Proposed specific use: NA		
Is property part of a subdivision? If yes, name: NA		
Project description: NEW ADDRESSABLE FIRE ALARM SYSTEM		
Life Safety Code Occupancy Classification: EXISTING APARTMENT BUILDING		
Is this new work or a renovation to an existing system? NEW		
Is the top occupiable floor of the building greater than 75 feet above the lowest level of Fire Department access (high-rise)? NO		
Name of company providing programming and certification of system*: PROTECTION PROFESSIONALS		
Electrical permit #: TBD		
Will a master box be installed? <input checked="" type="radio"/> Yes <input type="radio"/> No If yes, complete all items for approval):		
AES approved installing contractor: PROTECTION PROFESSIONALS		
Documentation of AES approval: YES		
Property Owner: AHAB INVESTMENTS LLC/ CO SOUTHERN MAINE RENTALS LLC		
Property Owner Billing Address: 142 HIGH STREET PORTLAND MAINE 04101		
Property common name: 8 ALDER STREET APARTMENTS		
E-911 address for protected premises: 8 ALDER STREET PORTLAND MAINE 04101		
Emergency contact phone: 207-776-4598		Additional emergency contact phone: 207-776-9799
Number of stories protected: 5		
Is the building protected by a supervised, automatic sprinkler system?		<input type="radio"/> Yes <input checked="" type="radio"/> No
Name of person to contact when the permit is ready: JEREMY LAMBERT		
Address: 325 US ROUTE ONE		
City, State & Zip: FALMOUTH MAINE 04105		
Email Address: JEREMY@PROTECTIONPROFESSIONALS.NET		Phone: 207-899-7717

*For a list of approved fire alarm companies, see www.portlandmaine.gov/1486/Approved-Fire-Alarm-Companies

389 Congress Street, Room 315/Portland Maine 04101/www.portlandmaine.gov/tel: 207-874-8703/fax: 207-874-8716



IPA-60
Battery & Voltage Drop
Calculations

Project Name: **8 ALDER STREET** Standby Hours: **24**
 Alarm Mins: **5**
 Installed By: _____ Efficiency Factor: **20%**
 Designed By: **PROTECTION PROFESSIONALS** SLC Type: **Class B**
 Date: **3/26/2020** NAC Source Voltage: **20.4**



Reviewed for Code Compliance
 Permitting and Inspections
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05/21/2020

Model #: IPA-60

Max Panel Current (amps): 5

Panel ID: _____

User assumes all responsibility to ensure the quantities and current draw values in this worksheet are accurate prior to submittal.

Location: _____

Qty	FACP Part #	Description	Standby (amps)		Alarm (amps)	
			Each	Total	Each	Total
1	IPA-60	Analog Addressable FACP	0.130	0.130	0.220	0.220
			Panel Standby:	0.130	Panel Alarm:	0.220

P-LINK (RS-485)			Standby		Alarm	
1	UD-2000 / UD-1000	DACT Card	0.016	0.016	0.023	0.023
	RA-6075R	LCD Annunciator	0.020		0.025	
	RA-6500R(F)	Flush Mount LCD Annunciator	0.020		0.025	
	LED-16(F)	Flush Mount LED Annunciator	0.025		0.025	
	LED-16	LED Annunciator LED Power*	0.015		0.210	
	CA-6075	Class A Module	0.012		0.044	
	PSN-1000(E)	Power Expander	0.015		0.015	
	PAD100-SLCE-127	SLC Expander	0.060		0.060	
	NOHMI-SLCE-127**	SLC Expander	0.060		0.060	
	IDC-6	Initiating Zone Expander	0.020		0.020	
	IDC-6	Initiating Zone Expander Power*	0.030		0.270	
	RLY-5	Relay Expander	0.025		0.035	
	RLY-5	Relay Expander Power*	0.010		0.135	
	DRV-50	LED Driver Module	0.025		0.025	
	DRV-50	LED Driver Module LED Power*	0.010		0.215	
	FCB-1000	Fire Communications Bridge	0.025		0.025	
	FIB-1000	Fiber Interface Board	0.030		0.030	
	MC-1000	Multi-Connect Expander	0.010		0.010	
	SPG-1000	Serial Parallel Gateway	0.040		0.040	

** REQUIRED IF USING NOHMI PROTOCOL SLC DEVICES

(Maximum current draw on P-Link limited to 1 Amp)

P-LINK Standby: **0.016** P-LINK Alarm: **0.023**

*Only enter quantity if PLINK power is being used to power devices

SLC Devices			Standby		Alarm	
AFC / ARC / IPA Series						
	PAD100-PD	Analog Photo Smoke	0.000300		0.000300	
1	PAD100-PHD	Analog Photo Smoke/Heat	0.000300	0.000300	0.000300	0.000300
33	PAD100-HD	Analog Fixed Temp Heat	0.000300	0.009900	0.000300	0.009900
	PAD100-CD	Analog Carbon Monoxide Detector	0.000300		0.000300	
	PAD100-DUCT	Addressable Duct Detector	0.000300		0.000300	
	PAD100-DRTS	Duct Remote Test Switch	0.010000		0.015000	
	PAD100-DUCTR*	Addressable Duct Detector w/Relay	0.000500		0.000500	
1	PAD100-PSSA/PSDA	Addressable Pull Station Single/Dual Action	0.000200	0.000200	0.000200	0.000200
	PAD100-MIM	Micro Input Module	0.000200		0.000200	
	PAD100-SIM	Single Input Module	0.000240		0.000240	
	PAD100-DIM	Dual Input Module	0.000240		0.000240	
	PAD100-RM	Relay Module	0.000240		0.000240	
	PAD100-OROI	One Relay One Input Module	0.000240		0.000240	
	PAD100-TRTI	Two Relay Two Input Module	0.000240		0.000240	
	PAD100-ZM*	Conventional Zone Module	0.000240		0.000240	
	PAD100-NAC*	Notification Appliance Circuit	0.000200		0.000200	
	PAD100-SM	Speaker Module	0.000240		0.000240	
	PAD100-IM	Isolator Module	0.000150		0.000150	
	PAD100-LED	LED Module	0.000240		0.000240	
	PAD100-LEDK	Addressable LED w/ Key Switch	0.000200		0.000200	
10	PAD100-SB*	Addressable Sounder Base	0.000200	0.002000	0.000200	0.002000
11	PAD100-LFSB*	Addressable Low Frequency Sounder Base	0.000200	0.002200	0.000200	0.002200
	PAD100-RB*	Addressable Relay Base	0.000200		0.000200	
	PAD100-IB	Addressable Isolator Base	0.000150		0.000150	

PFC-6000 / P Series			Standby		Alarm	
	PSA	Analog Photo Smoke	0.000325		0.000325	
	PSHA	Analog Photo Smoke/Heat	0.000325		0.000325	
	RHA	Analog Rate of Rise Heat	0.000325		0.000325	
	FHA	Analog Fixed Temp Heat	0.000325		0.000325	
	DDA	Addressable Duct Detector	0.000325		0.000325	
	APS-SA/APS-DA	Addressable Pull Station Single/Dual Action	0.000325		0.000325	
	MCM	Mini Contact Input Module	0.000325		0.000325	
	SCM-4	Single Contact Input Module	0.000325		0.001000	
	DCM-4	Dual Contact Input Module	0.000325		0.001000	
	TRM-4	Twin Relay Output Module	0.000325		0.001000	
	CIZM-4 *	Conventional Zone Input Mod	0.000325		0.001000	
	MOM-4 *	Monitored Output Module	0.000325		0.001000	
	ARB *	Detector Base w/Relay	0.000325		0.000325	
	ASB *	Detector Base w/Sounder	0.000325		0.000325	
	SCI **	Short Circuit Isolator (Class A)	0.000325		0.002340	
	AIB **	Detector Base w/Isolator (Class A)	0.000325		0.002340	



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	SLC Loop Alarm LED Current	0.000000	0.000000	0.036000	0.036000
*	Requires Aux Power (Configure Below)	SLC Standby:	0.014600	SLC Alarm:	0.050600
**	See the installation manual for special considerations when installing AIB, SCI devices on Class B loops.				



NAC Circuits (See NAC Configuration below)			Standby (amps)	Alarm (amps)
Ckt	Use	Description	Total	Total
1	Notification	LOW FREQUENCY SOUNDERS	0.04510	1.72260
2	Notification	SOUNDER BASES	0.20000	1.90000
			NAC Standby:	NAC Alarm:
			0.24510	3.62260

I/O Circuits (See I/O Configuration below)			Standby (amps)	Alarm (amps)
Ckt	Use	Description	Total	Total
1	Notification		0.00000	0.24000
2	Aux Power	AES POWER	0.04000	0.30000
			I/O Standby:	I/O Alarm:
			0.04000	0.54000

Battery Calculation Summary			Standby (amps)	Alarm (amps)
Panel Current:			0.13000	0.22000
P-Link Current:			0.01600	0.02300
SLC Device Current:			0.01460	0.05060
NAC Circuit Current:			0.24510	3.62260
I/O Circuit Current:			0.04000	0.54000
Total Standby:			0.445700	Total Alarm: 4.45620
Standby Hours:			24	Alarm Mins: 5
AH Required:			10.70	AH Required: 0.38
Total Combined Standby & Alarm AmpHours Required:			11.08	
Efficiency Factor:			20%	
Required Battery AmpHours:			13.30	
Battery AmpHours Provided:			18	

Note: The cabinet will house two 8 AH or 18 AH batteries. The charging circuit is rated for up to two 55 AH batteries.

SLC Loop Type: Class B
 Device Addresses Used: 35
 Device Addresses Available: 60

5

Features

- 60 addresses available on this analog addressable system
- Additional system capacity achieved via multi-point SLC modules
- 99 software zones
- NFPA 72 Compliant Smoke Sensitivity Test Built-In
- System Operates as Class A or Class B for SLC, P-Link and NACs
- 5 Amp Power Supply, Expandable to 310 amps
- 2 NACS, Regulated, Rated at 3 Amps each, expandable to 188
- 2 Input/Output (I/O) Circuits for system flexibility rated at 1 Amp each, ideal for manual release and abort
- Strobe Synchronization and System Wide Sync for Potter/AMSECO®, Gentex®, Cooper Wheelock® and System Sensor® strobes
- Dedicated Alarm, Supervisory and Trouble Relays
- 4,000 Event History Buffer
- Cabinet will house up to 18 AH batteries
- Optional two line DACT with UD-2000 that can report General, Zone or Point Information
- Built in IP Communicator
- Ethernet Port for Programming and Network Connectivity
- E-Mail System Status, Reports and Event Information
- Product includes 5 year warranty.
- UUKL Listed for Smoke Control



Description

The IPA-60 is an analog/addressable releasing fire alarm system with a total system capacity of 60 addresses. Additional capacity on the system is achieved using multi-point SLC modules. The control panel utilizes the exclusive Potter protocol that includes a complete line of sensors and modules. Each SLC may be comprised of any combination of smoke sensor, heat detectors or modules and allows for a total of 50 ohms of impedance and may use any wire compliant with the National Electrical Code (NEC).

The IPA-60 has a 5 Amp power supply with two Notification Appliance Circuits (NACs) and two Input/Output (I/O) circuits. The NACs are rated at 3 Amps each and the I/Os are rated at 1 Amp each. Each output is regulated and power limited. In addition, each output is uniquely programmable and may be configured for steady signal, strobe synchronization, constant power, door holder power, or releasing. The strobe synchronization includes Potter/AMSECO, Gentex, System Sensor and Cooper/Wheelock and with the exclusive Quadrasync each output may have a unique brand and all strobes will flash together. The I/Os are designed for inputs such as manual release stations and abort switches that will not require polling and react nearly instantaneously.

The IPA-60 is listed for releasing of fire suppression systems. The software allows cross zones, counting zones, and timers for suppression. The system is capable of multiple release outputs across multiple hazards. In addition, the PSN-1000 may be used to extend releasing capability. The NACs may be expanded using the PSN-1000 series intelligent power supplies. Each PSN-1000 adds another 10 Amps of power, 2 additional input circuits and the IPA-60 will support up to 31 power supplies. The system will synchronize the strobes system wide. In addition, the PSN-1000E has space to allow the installation of up to six expansion cards. The cards mount on a stacker bracket that allows access to all SLC circuit connections.

Technical Specifications

Dimensions	16"W x 17"H x 3 7/8"D
AC Mains	3.0 Amps @ 120 VAC 50/60 HZ 2.0 Amps @ 240 VAC 50/60 HZ
Enclosure	16 gauge cold rolled steel with removable locked door with Lexan viewing window
Battery	Standby Current-130 mA Alarm Current-200 mA <ul style="list-style-type: none"> • 5 Amps power for NACs, I/O, and P-Link • 3 Amps per NAC, regulated • 1 Amp per I/O circuit, regulated • Battery Charger range 8-55 Ah • Battery Charger voltage 27.3 VDC • P-Link maximum current of 1 Amp
Temperature and Humidity Range	32° to 120° (0°C to 49°C) with a maximum humidity of 93% non-condensing.
Standards	<ul style="list-style-type: none"> • NFPA 12, 12A, 13, 15, 16, 17, 17A, 70, 72, 750, and 2001 • ANSI/UL 864 - Local (L), Remote Station (RS), Central Station (CS), Propriety (PPU), Auxiliary (AUX). Type of Service: Automatic (A), Manual (M), Water flow (WF) Sprinkler Supervisory (SS) Type of Signaling: Digital Alarm Communicator (DAC), March Time (March), Non Coded (NC), Reverse Polarity (Rev Pol), Other Technologies (OT) • IBC 2000, 2003, 2006, 2009, 2012

SLC Loop Accessories

The control panel may be connected with up to 60 addressable devices or modules in any combination. The SLC is not restricted by any special wire requirements and may be wired with any wire that complies with the NEC.

SLC Loop Devices

Device	Description
PAD100-PD	Analog Photo Electric Smoke Detector is a smoke detector with a listed obscuration of 1.02 to 3.83 percent per foot.
PAD100-PHD	Combination Analog Photo Electric Smoke/Heat Detector – a smoke detector with a listed obscuration of 1.02 to 3.83 percent obscuration and a fixed temperature 135° Fahrenheit heat detector.
PAD100-HD	Analog Fixed Temperature Heat Detector that is selectable from 135° F to 185°F.
PAD100-DUCTR	Addressable Duct Smoke Detector with Form C Relay.
PAD100-DUCT	Addressable Duct Smoke Detector.
PAD100-6B	6” round base that is mounted to an electrical box and wired for connection of one of the above sensors.
PAD100-4B	4” round base that may be mounted to an electrical box and wired for connection to the above sensors.
PAD100-IB	Isolator base that interrupts a short in a SLC and prevents the short from affecting protected devices on the loop.
PAD100-RB	Addressable Relay Base that contains one relay controlled by the SLC. Relay is rated at rated at 2 amps at 30 VDC or 0.5A at 125VAC.
PAD100-SB	Addressable Sounder Base that contains an addressable sounder module that may be configured for local, group and all call.
PAD100-CD	Addressable CO gas detector.
PAD100-DD	Addressable photo electric smoke detector for use in DUCT/DUCTR enclosure.
PAD100-LFSB	Addressable Low Frequency Sounder Base that contains an addressable sounder module that may be configured for local, group and all call. The LFSB complies with the Low Frequency Signal Requirements (520 Hz)
PAD100-SPKB	Speaker base is a wall or ceiling mount speaker capable of 25 or 70.7 VRMS and is field selectable from 1/8W to 4W.

Modules

Device	Description
PAD100-MIM	Micro Input Module provides a small foot print contact module for mounting inside an enclosure.
PAD100-PSSA	Single Action Addressable Pull Station.
PAD100-PSDA	Dual Action Addressable Pull Station.
PAD100-SIM	Single Input Module is a standard contact module with an LED that mounts into a 4” square electrical box.
PAD100-DIM	Dual Input Module is a device that can monitor two distinct inputs with a single device or in a Class A mode.
PAD100-TRTI	Two Relay Two Input module provides two form C relays that are individually controlled by the control panel. Each relay is rated for 2 amps at 30VDC or 0.5 amps at 125VAC. Also provides two contact inputs.
PAD100-NAC	Notification Appliance Circuit module is an addressable remote appliance circuit controlled by the panel.
PAD100-ZM	Zone Module is used to connect conventional 2-wire smoke detectors to the system.
PAD100-IM	Module interrupts a short on the SLC and prevents the short from affecting protected devices on the loop.
PAD100-RM	Relay Module that provides one form C relay controlled by the control panel. Relay is rated for 2 amps at 30VDC or 0.5 amps at 125VAC.
PAD100-LED	Module provides a single addressable LED that is controlled by the control panel.
PAD100-SM	Speaker Module provides switching for two audio channels.
PAD100-LEDK	Addressable LED and key switch that mounts in a single gang box.
PAD100-DRTS	DUCTR Remote Test Switch that mounts in a single gang box and optionally supervised.
PAD100-OROI	One Relay One Input Module provides one form C relay and one input. The relay is rated at 2 amps at 30VDC or 0.5 amps at 125VAC.

SLC Features

The Potter protocol is a digital protocol with a proven design for reliability and noise immunity. The system does not require special cable or conductors for connection of the Signaling Line Circuit as long as the cable is compliant with NFPA 70 and NFPA 72. The system allows for Class A or Class B installations as well as “T-Taps”, with a max wiring distance of 10,000 Ft.

Sensor Features

The sensors through the fire alarm control panel provide a real time status as to the condition of the system. The smoke detector sensitivity, heat detector temperature level and drift compensation are all programmable options. The system also allows for a day/night mode where the panel automatically adjusts the sensitivity depending on the time of day. To assist in the reduction of false alarms, the smoke detectors also have a maintenance warning that sends a trouble signal when a detector is dirty to the point that it can no longer maintain the programmed sensitivity.

User Interface

The fire alarm control panel has a 2 x 16 LCD display to provide information to the system status. The keypad has navigation keys to allow manipulation of the Menu on board the panel. The panel is shipped standard with the following LEDs:

- AC Power - Green
- Alarm - Red
- Earth Fault - Amber
- Supervisory - Amber
- Silenced - Amber
- Trouble - Amber
- Pre-Release - Amber
- Release - Red

The common buttons include a Silence, Reset, Acknowledge, and Drill. All of the buttons are accessible once the locked door is opened.

P-Link

The IPA-60 has a proprietary communication protocol that communicates through a RS-485 connection to field devices. Up to 64 devices may be connected to a single P-Link connection. The P-Link includes the communication terminals and regulated 24 VDC connection for the field devices. The field devices may be any of the following:

RA-6075R – 2 x 16 LCD annunciator with a key pad in a locked metal enclosure.

RA-6500R(F) – 4 x 40 LCD annunciator with a key pad in a locked metal enclosure. Flush mount version available.

LED-16(F) – 16 LED annunciator with common indicators in a locked metal enclosure. Flush mount version available.

PSN-1000(E) – 10 amp, remote intelligent power supply with 6 NACs, 2 Inputs and a P-Link repeater. This panel is listed in conjunction with the IPA-60 as releasing circuits.

CA-6075 – Class A convertor that converts the SLC, NACs and P-Link connection

UD-2000 – UL listed, Dual line telephone alarm communicator

DRV-50 – LED driver expander, used to connect up to 50 LEDs in a graphic display

FCB-1000 – Fire communication bridge, provides remote mounting of the Ethernet connection

FIB-1000 – Fiber interface module, used to extend P-Link to multi-mode fiber (2 required)

RLY-5 – Relay module, provides 5 form C relay contacts rated at 3.0 amps 24VDC/125AC

SPG-1000 – Serial parallel gateway, allows for the connection to a serial or parallel printer

The **FIB-1000**, **FCB-1000** and the **SPG-1000** may be installed in the stacker bracket or ordered with the optional rack mount enclosure.

MC-1000 Multi-Connect allows up to sixty-three IPA series panels to share a single reporting technology.

IDC-6 – Initiating device circuit provides 6 programmable inputs

AE-2 – Two card expansion cabinet

AE-8 – Eight card expansion cabinet

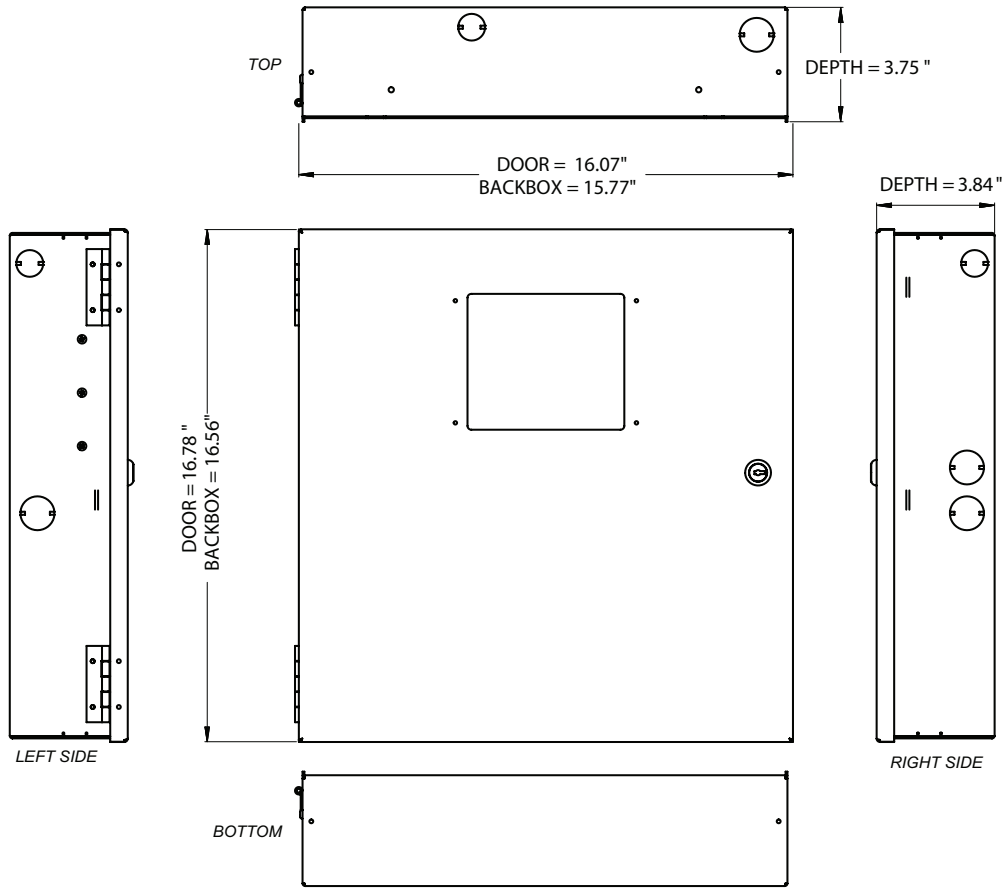
AE-14 – Fourteen card expansion cabinet

Ethernet/I.P. Connection

The IPA-60 is shipped standard with an Ethernet connection. This connection is the programming port and may be connected to a building Wide Area Network (WAN) or Local Area Network (LAN). Once connected to the Internet, the panel may be selectively programmed to e-mail alarm conditions, trouble conditions, supervisory conditions, test, Event History and detector status. An e-mail may be sent to the panel and the panel will e-mail the event history, detector status, configuration file or server status to an authorized E-mail account. In addition, reminders may be set to send an e-mail for service, testing or other conditions.

In addition, the Ethernet connection is UL listed as an IP communicator. The IP communicator is listed to report to the UL listed Sur-Gard III IP receiver. The IP communicator replaces the traditional less reliable alarm communicator transmitter that utilized telephone lines. The IP communicator is an active method of connection and communication to the monitoring station.

Dimensions



DWG #593-1

Ordering Information

Model	Description	Stock No.
IPA-60	Fire Alarm Releasing Control Panel	3992714
	Replacement Board IPA-60	3992738

Compatible Releasing Devices

Note: For releasing applications please order the Potter EOLD (3005012) for circuits connected to a releasing solenoid or actuator.

Brand	Description
Skinner	73218BN4UNLVN0C112CZ 73212BN4TNLVN0C322C2
Victaulic	753-E Series
Mini Max	MX123 & MX200 w/ 8876677 & 889323
Viking	11591, 11601, 11602, 13843, & 13844
TLX	PA0036

Features

- 24VDC units have field selectable candela options of 15, 30, 60, 75 & 110
- Super-Slide® Bracket - Ease of Supervision Testing
- Checkmate® - Instant Voltage Verification
- Synchronize strobe and/or horn with AVSM Control Module
- Prewire entire system, install mounting bracket, then install signals
- Documented lower installation and operating costs
- Switch selection for high or low dBA
- Switch for chime, whoop, mechanical and 2400Hz tone
- Tamperproof re-entrant style grill
- Switch for continuous or temporal 3 tone (not available on whoop tone)
- Silence audible while visual appliance will remain flashing (for use in accepted jurisdictions)
- Faceplate available in red or off-white



Description

The S-24/HS-24 Series is a low profile strobe and horn/strobe combination that offers dependable audible and visual alarms and the absolute lowest current available. The S-24 & HS-24 Series 24VDC offers tamperproof field selectable candela options of 15, 30, 60, 75, and 110 candela. The Strobe and Horn/Strobe offers a continuous or sync temporal three in 2400Hz and mechanical tone, a chime and whoop tone. All tones are easy for the professional to change in the field by the use of switches. The S-24 & HS-24 Series has a minimal operating current and has a minimum flash rate of 1Hz regardless of input voltage.

This Series is shipped with a standard 4” metal mounting plate which incorporates the popular Super-Slide® feature that allows the installer to easily test for supervision. The product also features a locking mechanism which secures the product to the bracket without any screws showing.

The S-24/HS-24 also features the patented Checkmate® - Instant Voltage Verification feature which allows the installer to check the voltage drop draw and match it to the blueprint.

The S-24 & HS-24 Series appliances are ANSI/UL 464 and ANSI/UL 1971, listed for use with fire protective systems and are warranted for three years from date of purchase.

Technical Specifications

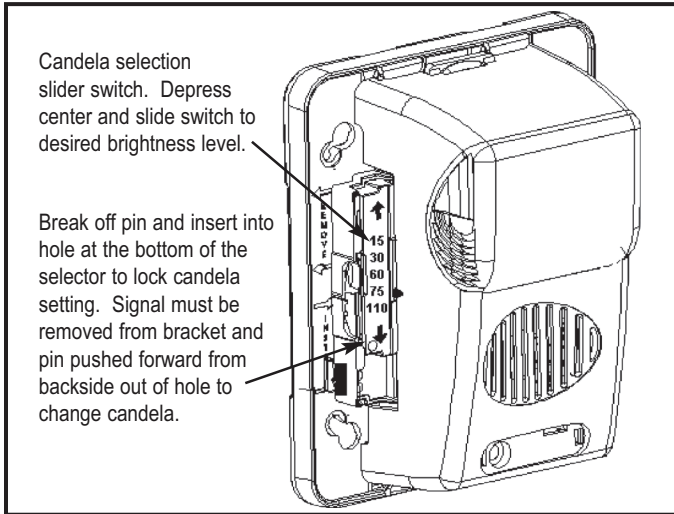
Mounting Options	Single or Double gang, 4” square box, and AVBB surface mount back box
Terminals	Screw-Clamp Type
Wire Gauge	18 – 12 AWG
Operating Temp	32°F – 120°F (0° – 49°C)
Dimensions	Height – 5” Width – 4.5” Depth – 2.5”
Shipping Weight	1.05 lbs

TONE	SWITCH POSITION		
	3	4	5
Mechanical Temporal 3	ON	ON	ON
Mechanical Continuous	OFF	ON	ON
2400 Hz Temporal 3	ON	OFF	ON
2400 Hz Continuous	OFF	OFF	ON
Chime Temporal 3	ON	ON	OFF
Chime Continuous	OFF	ON	OFF
Whoop	ON	OFF	OFF
Whoop	OFF	OFF	OFF

NOTE:

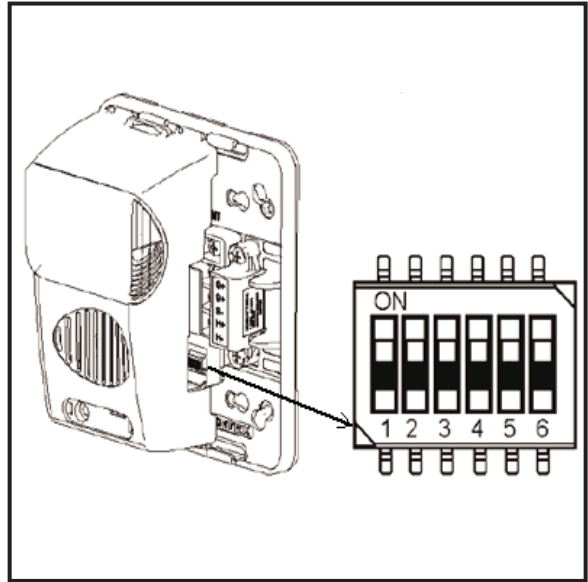
- Switch Positions 1 The and 2 in the OFF position to select isolated horn and strobe power inputs
- Switch Position 6 ON = HIGH dBA
- Switch Position 6 OFF = LOW dBA

Candela Selection

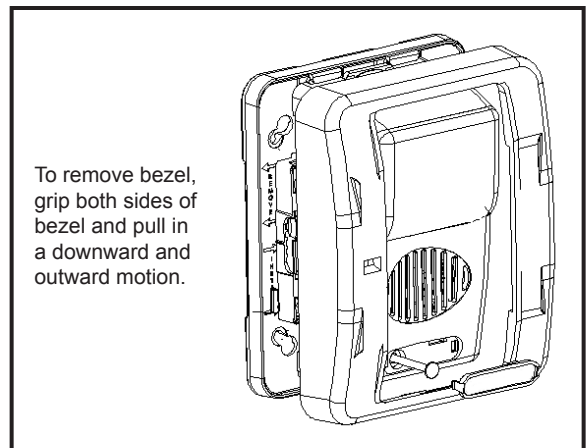
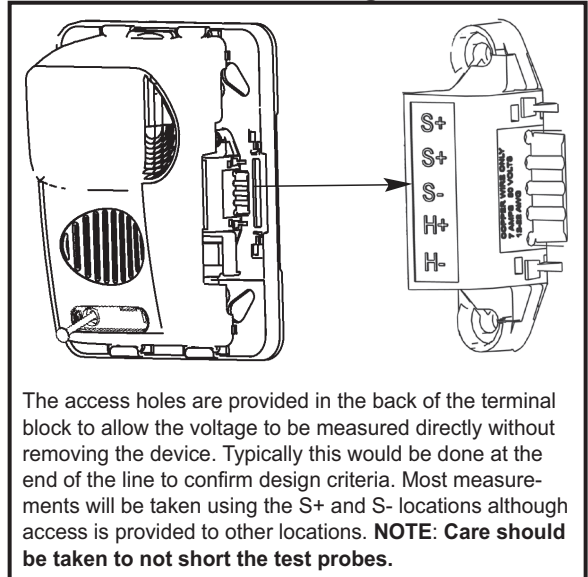


Super Slide® Mounting Bracket
Allows the installer to pre-wire the system, test for system supervision, remove the signal head until occupancy, switch out signals without changing mounting brackets and has locking edge connector for snap-in-place installation.

Switch Locations



Checkmate™ - Instant Voltage Verification



S-24 24 VDC Selectable Candela, Low Profile Evacuation Strobe

Model Number	Part Number	Nominal Voltage	Candela (ANSI/UL 1971)
S-24WR	4890010	24 VDC	15, 30, 60, 75, 110
S-24WW	4890011	24 VDC	15, 30, 60, 75, 110

HS-24 24 VDC Selectable Candela, Low Profile Evacuation Strobe

Model Number	Part Number	Nominal Voltage	Candela (ANSI/UL 1971)	Reverberant dBA at 10 ft, per ANSI/UL 464	In Anechoic Room at 10 ft
HS-24WR	4890030	24 VDC	15, 30, 60, 75, 110	62-82	100
HS-24WW	4890031	24 VDC	15, 30, 60, 75, 110	62-82	100

S-24 & HS 24 Strobe Current Ratings

24 VDC (16 - 33 Volts)		
Candela	24 VDC	UL Max
15 cd	30 mA	42 mA
30 cd	35 mA	58 mA
60 cd	66 mA	97 mA
75 cd	80 mA	116 mA
110 cd	103 mA	161 mA

Model Designations:

W = Wall mount
R = Red Faceplate W=White Faceplate

All units are available in plain (no lettering)
Plain units are non-returnable.

“ALERT” bezel available for order.

“AGENT” bezel available for order.

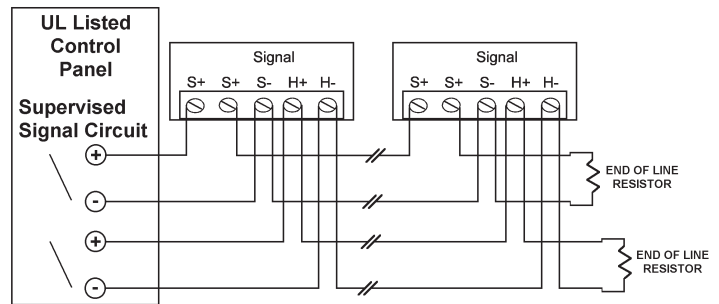
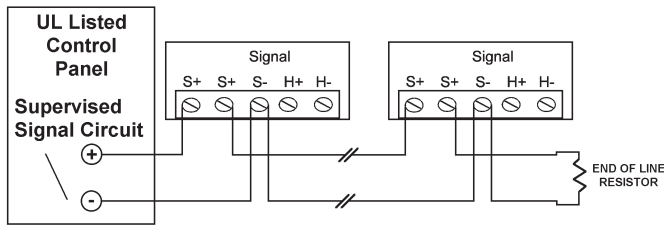
S-24 & HS-24 Horn Ratings

Horn Mode	Horn Decibel Levels		Horn Current Ratings
	Minimum SPL at 10 ft, per ANSI/UL 464 (HIGH)	Minimum SPL at 10 ft, per ANSI/UL 464 (LOW)	Regulated 24 VDC Max Operating @ High Setting (mA)
Temp 3 (2400 Hz)	78 dBA	71* dBA	28 mA
Temp 3 (Mechanical)	76 dBA	70* dBA	25 mA
Temp 3 (Chime)	70* dBA	66* dBA	15 mA
Continuous (2400 Hz)	81 dBA	74* dBA	28 mA
Continuous (Mechanical)	80 dBA	72* dBA	25 mA
Continuous (Chime)	70* dBA	66* dBA	15 mA
Whoop	82 dBA	69* dBA	56 mA

NOTES:

- For nominal and peak current across ANSI/UL regulated voltage range for filtered DC power and unfiltered (FWR [Full Wave Rectified]) power see installation manual.
- Potter does not recommend using a coded or pulsing signaling circuit with any of our strobe products.
- The sound output for the temporal 3 tone is rated lower since the time the horn is off is averaged into the sound output rating. While the horn is producing a tone in the temporal 3 mode its sound pressure is the same as the continuous mode.
- * Operating the horn in this mode at this voltage will result in not meeting the minimum ANSI/UL 464 reverberant sound level required for public mode fire protection service. These settings are acceptable only for private mode fire alarm use. Use the high dBA setting for public mode application (not applicable when using the chime tone. The chime tone is always private mode).

S-24 & HS-24 Series Wiring Diagram



Notes:

All strobes are designed to flash as specified with continuous applied voltage. Strobes should not be used on coded or pulsing signaling circuits. However, use of the Potter AVSM control module or Gentex synchronization protocol is permitted to synchronize the strobe, horn, and/or mute the horn.

- FOR SYNCHRONIZATION WIRING INFORMATION, REFERENCE AVSM CONTROL MODULE DATA SHEET (8830050) AND/OR AVSM CONTROL MODULE MANUAL FOR SYNCHRONIZATION MODULE WIRING DIAGRAMS. AVSM CONTROL MODULE DATA SHEET AND MANUAL CAN BE OBTAINED AT <http://pottersignal.com> OR CALL POTTER ELECTRIC TECHNICAL SUPPORT AT 1-866-956-1211

Architect & Engineering Specifications

The audible and/or visible signal shall be Potter S-24 strobe and Potter HS-24 horn/strobe Series or approved equal and shall be listed by Underwriters Laboratories, Inc. per ANSI/UL 1971 and/or ANSI/UL 464. The notification appliance shall also be listed with Factory Mutual Listing Service (FM) and the California State Fire Marshal (CSFM).

The notification appliance (combination audible/visible) shall produce a peak sound output of 100dBA or greater at 24VDC as measured in an anechoic chamber. The signaling appliance shall also have the capability to silence the audible signal while leaving the visible signal energized with the use of a single pair of power wires. Additionally, the user shall be able to select either continuous or temporal tone output with the temporal signal having the ability to be synchronized.

Unit shall be capable of being installed so that any unauthorized attempt to change the candela setting will result in a trouble signal at the fire alarm control panel.

The audible/visible and visible signaling appliance shall also maintain a minimum flash rate of 1Hz or up to 2Hz regardless of power input voltage. The strobe appliance shall have an operating current of 42mA or less at 24VDC for the 15Cd strobe circuit.

The appliance shall be polarized to allow for electrical supervision of the system wiring. The unit shall be provided with a mounting bracket with terminals and barriers for input/output wiring and be able to mount to a single gang or double gang box or double workbox without the use of an adapter plate. The unit shall have an input voltage range of 16-33 volts with either direct current or full wave rectified power for 24VDC models.

The appliance shall be capable of testing supervision without disconnecting wires, verify voltage without removing unit and be capable of mounting to a surface back box.

Features

- Fixed 75cd strobe
- Includes the WPBB surface-mount (standard) or WPLPBB Low Profile (LP) enclosure
- WPBB/LP made of clear Lexan® - provides maximum visibility and reliability, allowing full 75cd output
- Super-Slide® Bracket – Ease of supervision testing
- Checkmate® - Instant voltage verification
- Synchronize strobe and/or horn with AVSM module
- Switch selection for high/low dBA
- Switch for chime, whoop, mechanical, and 2400Hz tone
- Input terminals accept 18 to 12 AWG
- Switch for continuous or temporal 3 tone (not available on whoop)
- Tamperproof re-entrant grill
- 5 year warranty



LP Version

Standard



Application

The S/HS-WP Series Outdoor Signals are wall mount, low profile strobes and horn/strobes that offer dependable audible and visual alarms for warning and emergency notification in outdoor locations.

Description

The S/HS-WP Series Outdoor Signals are 24VDC strobes and horn/strobes equipped with a fixed 75 candela strobe.

This series of outdoor signals are available in two different versions. The standard version includes a surface-mount back box (WPBB) to install directly on a wall. The Low Profile (LP) versions includes a low profile back box (WPLPBB) designed to be installed on a flush-mounted electrical box. The weatherproof enclosure is made of clear Lexan® which provides maximum visibility and reliability for effective visible signaling, allowing full 75cd output.

The S/HS-WP series strobe has a minimal operating current and a minimum flash rate of 1Hz regardless of input voltage. The strobe is synchronized using Gentex sync. protocol or the AVSM Sync. Module.

The S/HS-WP Series is equipped with a universal 4” mounting bracket which incorporates the popular Super-Slide® feature that allows the installer to easily pre-wire the system and test for supervision. The product also features a locking mechanism that secures the signal to the bracket without showing any screws and the Checkmate® - Instant Voltage Verification Feature which allows the installer to check the voltage drop, current draw, and match against the blue print.

Product Listings

- ANSI/UL 464 and 1638
- Complies with American with Disabilities Act (ADA)
- Complies with IBC / IFC / IRC

Technical Specifications

Operating Voltage	Nominal 24VDC (16-33VDC)
Operating Temperature	-31°F - 150°F (-35° - 66°C)
Dimensions	LP Version - 5.75” H x 4.75” W x 3.25” D Standard - 5.75” H x 4.75” W x 4.18”D
Wiring Connections	Terminals accept 18 - 12 AWG
Mounting	LP Version – Single gang, double gang, or 4” square back box Standard Version - Surface mount back box included
Shipping Weight	2.05 lbs.



S-24-WP, 75 Candela, Outdoor Strobe Includes Standard or LP Enclosure			
Model Number	Stock Number	Body Color	WP Enclosure
S-24WR-WP	4890050	Red	Standard
S-24WW-WP	4890051	Off-White	Standard
S-24PWR-WP	4890052	Red-Plain	Standard
S-24PWW-WP	4890053	Off-White-Plain	Standard
SLP-24WR-WP	4890054	Red	Low Profile
SLP-24WW-WP	4890055	Off-White	Low Profile
SLP-24PWR-WP	4890056	Red-Plain	Low Profile
SLP-24PWW-WP	4890057	Off-White-Plain	Low Profile

Model Designations

- “W” = Wall Mount
- “R” = Red Face Plate
- “W”=Off - White Face Plate
- “P”= Plain (Note: Plain units are non-returnable)
- “LP”= Low Profile (WPLPBB Enclosure)

Strobe Current Ratings	
Candela	75 cd
24 VDC	112 mA
UL Max	170 mA

NOTE: For unfiltered FWR ratings, see installation manual.

HS-24-WP Series, 75 Candela, Outdoor Horn /Strobe Includes Standard or LP Enclosure					
Model Number	Stock Number	Body Color	Reverberant dBA at 10', per ANSI/UL 464	In Anechoic Room dBA at 10'	WP Enclosure
HS-24WR-WP	4890060	Red	70-82	100	Standard
HS-24WW-WP	4890061	Off-White	70-82	100	Standard
HS-24PWR-WP	4890062	Red-Plain	70-82	100	Standard
HS-24PWW-WP	4890063	Off-White-Plain	70-82	100	Standard
HSLP-24WR	4890064	Red	70-82	100	Low Profile
HSLP-24WW	4890065	Off-White	70-82	100	Low Profile
HSLP-24PWR	4890066	Red-Plain	70-82	100	Low Profile
HSLP-24PWW	4890067	Off-White-Plain	70-82	100	Low Profile

Horn Decibel and Current Ratings			
Horn Setting	Minimum dBA at 10', Per UL 464 (HIGH)	Minimum dBA at 10', Per UL 464 (LOW)	Regulated 24VDC Max. Operating Current, at High Setting (mA)
Temporal 3 2400Hz	78	71*	28
Temporal 3 Mechanical	76	70*	25
Temporal 3 Chime	70*	66*	15
Continuous 2400Hz	81	74*	28
Continuous Mechanical	80	72*	25
Continuous Chime	70*	66*	15
Whoop	82	69*	56

*Operating the horn in this mode at this voltage will result in not meeting the minimum ANSI/UL 464 reverberant sound level required for public mode fire protection service. These settings are acceptable only for private mode fire alarm use. Use the high dBA setting for public mode application (not applicable when using the chime tone. The chime tone is always private mode).

Tone Switch Locations

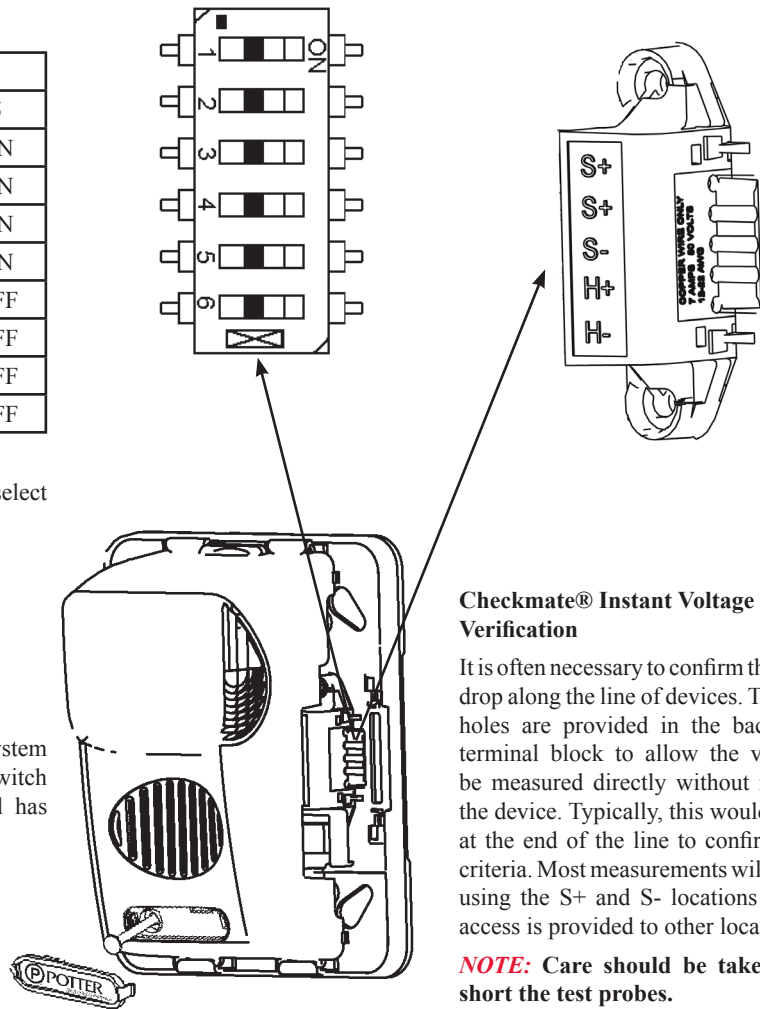
Tone	Switch Position		
	3	4	5
Mechanical Temporal 3	ON	ON	ON
Mechanical - Continuous	OFF	ON	ON
2400Hz - Temporal 3	ON	OFF	ON
2400Hz - Continuous	OFF	OFF	ON
Chime - Temporal 3	ON	ON	OFF
Chime - Continuous	OFF	ON	OFF
Whoop	ON	OFF	OFF
Whoop	OFF	OFF	OFF

NOTES:

- Switch Positions 1 and 2 in the OFF position to select isolated horn and strobe power inputs
- Switch Position 6 ON = HIGH dBA
- Switch Position 6 OFF = LOW dBA

Super Slide® Mounting Bracket

Allows the installer to pre-wire the system, test for system supervision, remove the signal head until occupancy, switch out signals without changing mounting brackets and has locking edge connector for snap-in-place installation.



Checkmate® Instant Voltage Verification

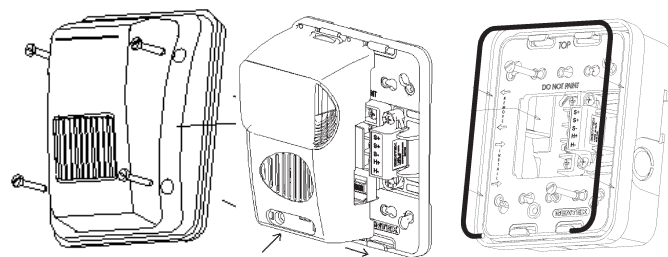
It is often necessary to confirm the voltage drop along the line of devices. The access holes are provided in the back of the terminal block to allow the voltage to be measured directly without removing the device. Typically, this would be done at the end of the line to confirm design criteria. Most measurements will be taken using the S+ and S- locations although access is provided to other locations.

NOTE: Care should be taken to not short the test probes.

Mounting Outdoor Enclosure

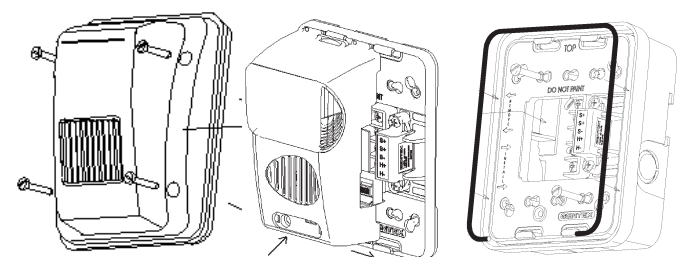
Super Slide® Mounting Plate:

Mounts to WPBB Outdoor Enclosure

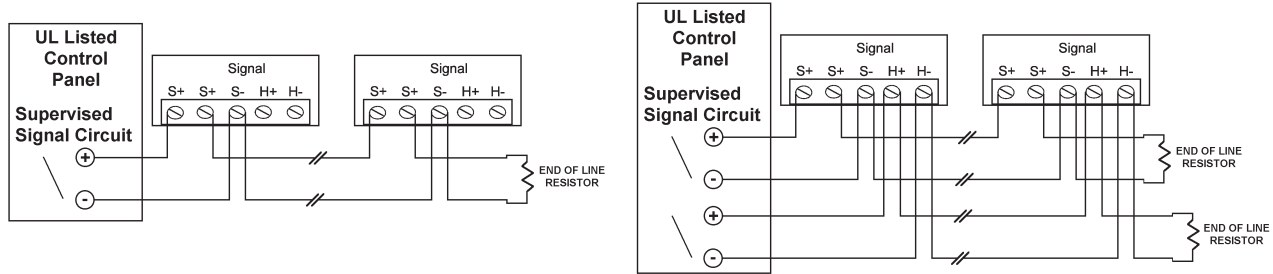


Super Slide® Mounting Plate:

Mounts to WLPBB Outdoor Enclosure



Wiring Diagrams



NOTES:

- All strobes are designed to flash as specified with continuous applied voltage. Strobes should not be used on coded or pulsing signaling circuits. However, use of the AVSM control module or Gentex synchronization protocol is permitted to synchronize the strobe, horn and/or mute the horn.
- FOR SYNCHRONIZATION WIRING INFORMATION, REFERENCE AVSM CONTROL MODULE DATA SHEET (8830050) AND/OR AVSM CONTROL MODULE MANUAL FOR SYNCHRONIZATION MODULE WIRING DIAGRAMS. AVSM CONTROL MODULE DATA SHEET AND MANUAL CAN BE OBTAINED AT <http://pottersignal.com> OR CALL POTTER ELECTRIC AT 1-800-325-3936.**

Architect and Engineering Specifications

The audible and/or visible signal shall be Potter S/HS-WP Outdoor Series or approved equal and shall be listed by Underwriters Laboratories Inc. per ANSI/UL 1638 and/or ANSI/UL 464.

The notification appliance (combination audible/visible) shall produce a peak sound output of 100dBA or greater at as measured in an anechoic chamber. The signaling appliance shall also have the capability to silence the audible signal while leaving the visible signal energized with the use of a single pair of power wires. Additionally, the user shall be able to select either continuous or temporal tone output with the temporal signal having the ability to be synchronized.

The audible/visible and visible signaling appliance shall also maintain a minimum flash rate of 1Hz or up to 2 Hz regardless of power input voltage. The appliance shall have an operating current of 112mA or less for the 75Cd strobe circuit. The appliance shall also be capable of meeting the candela requirements of the ADA (75cd).

The appliance shall be polarized to allow for electrical supervision of the system wiring. The unit shall be provided with a mounting bracket with terminals with barriers for input/output wiring and be able to mount to a single gang or double gang box or double workbox without the use of an adapter plate. The unit shall have an input voltage range of 16-33 volts with either direct current or full wave rectified power for 24 volt models.

The appliance shall be capable of testing supervision without disconnecting wires. Also the appliance shall be capable of mounting to a surface back box. The unit shall also be able to verify voltage at the unit without removing unit.

The appliance has extended temperature range of -31° to 150°F (-35° to 66° C). The appliance shall satisfy virtually all outdoor and severe environment applications. The WPBB enclosure includes a gasket that must be inserted between the box and mounting bracket. There are drain holes in the back box to allow for drainage, the seal on the WPBB enclosure is not water tight. The WPLPBB enclosure includes a weather seal for mounting to wall and intended for use with universal electrical box. To allow for drainage, bottom edge of enclosure is not water tight.

Features

- Single module with dual contact monitoring inputs
- Two (2) Class B or one (1) Class A monitoring inputs
- Two (2) Form C relay contacts
- SLC Class A, Class X & Class B
- Mounts in a standard 4" or double gang box
- Wiring terminals accessible when mounted in box
- All wiring terminals accept 22 to 12 AWG
- Product includes a 5 year warranty
- UUKL Listed for Smoke Control

NOTE: This addressable module does not support 2-wire smoke detectors.



Description

The PAD100-TRTI uses one (1) SLC loop address when monitoring two (2) Class B circuits or one (1) Class A circuit. The PAD100-TRTI also provides two (2) Form C relay contacts. The module mounts on either a 4" square or double gang box. The module is capable of monitoring two (2) separate Class B circuits making it ideal for monitoring sprinkler waterflow and valve tamper switches when they are located in the same proximity. The PAD100-TRTI includes one red LED to indicate the module's status. In normal condition, the LED flashes when the device is being polled by the control panel. When an input is activated, the LED will flash at a fast rate.

Application

The PAD100-TRTI is compatible with Potter's IPA and AFC/ARC series addressable fire alarm control panels. The PAD100-TRTI is an interface module used to monitor dry contact devices such as sprinkler waterflow, valve tamper switches, or conventional pull stations. The module is capable of monitoring two separate Class B or one Class A circuits. The PAD100-TRTI also provides two (2) form C relay contacts.

Setting the Address

Each addressable SLC device must be assigned an address. The address is set using the DIP switch located on the PAD100-TRTI. The PAD100-TRTI is assigned a single device address, each input and relay is identified as a sub-point of that single module address. For example, if the address number is assigned as "8", the RLY1 relay will be "8.1", the RLY2 relay will be "8.2, the B1 input will be "8.3" and the B2 input will be "8.4".

Before connecting a device to the SLC loop, take the following precautions to prevent potential damage to the panel or device:

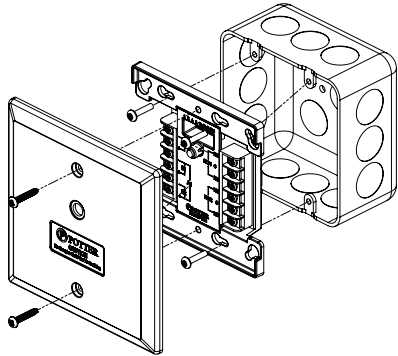
1. Power to the device is removed.
2. Field wiring is correctly installed.
3. Field wiring has no open or short circuits.

Technical Specifications

Operating Voltage	24.0V
Max SLC Standby Current	240µA
Max SLC Alarm Current	240µA
Relay Contacts	2A @30VDC, 0.5A @125VAC
Max Wiring Resistance of IDC	100 Ω
Max Wiring Capacitance of IDC	1µF
EOL Resistor	5.1K Ω
Operating Temperature Range	32 to 120°F (0 to 49°C)
Operating Humidity Range	0 to 93% (non-condensing)
Max no. of Module Per Loop	127 units
Dimensions	4.17" (106mm)L × 4.17" (106mm)W × 1.14" (29mm)D
Mounting Options	Standard 4" Square or Double Gang Box
Shipping Weight	0.6 lbs

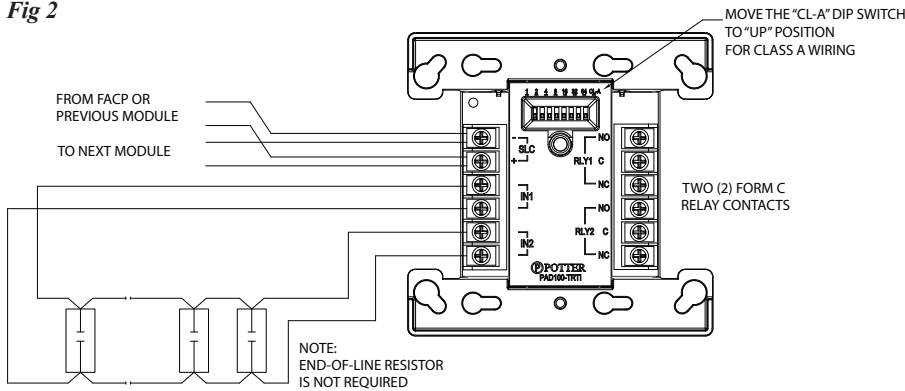
Installation Using Compatible Electrical Box

Fig 1

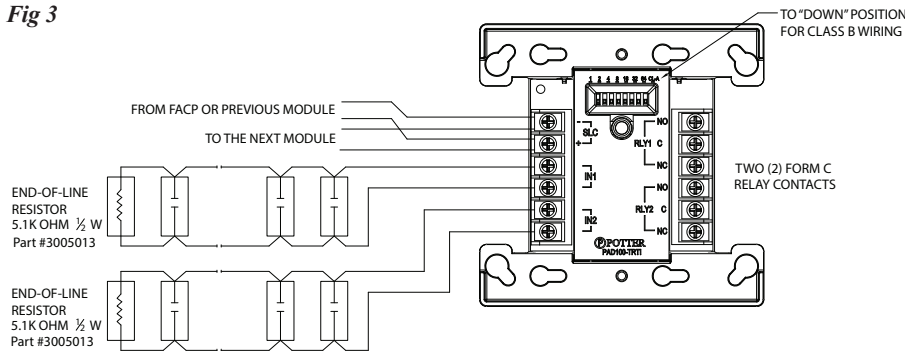


Wiring Diagrams

PAD100-TRTI With One Class A Circuit
Fig 2



PAD100-TRTI With Two Class B Circuits
Fig 3



NOTICE

It is possible that the internal relay in the PAD100-TRTI may be shipped in the non-normal / activated state. To ensure that the internal relay is set to the normal state, connect the module to the SLC loop and reset the control panel before terminating the wiring to the modules output.

Ordering Information

Model	Description	Stock No.
PAD100-TRTI	Two Relay Two Input Input Module	3992701

Features

- Isolates short circuits within the SLC loop.
- SLC Class A, Class X & Class B
- Mounts in a standard 4” or double gang box
- Wire terminals accessible when mounted in box
- All wiring terminals accept 22 to 12 AWG
- Product includes a 5 year warranty
- UUKL Listed for Smoke Control



Description

The PAD100-IM module does not require an SLC loop address but does consume power from the SLC loop. The module provides protection against short circuits by limiting the number of affected devices. When the PAD100-IM detects a short circuit on the SLC loop, it disconnects the outgoing side of the module to prevent the short from affecting the rest of the SLC loop. The PAD100-IM includes one red LED to indicate the modules status. When the module is shorted, the LED will light continuously. Once the short is removed, the PAD100-IM will automatically restore to a cleared condition.

Application

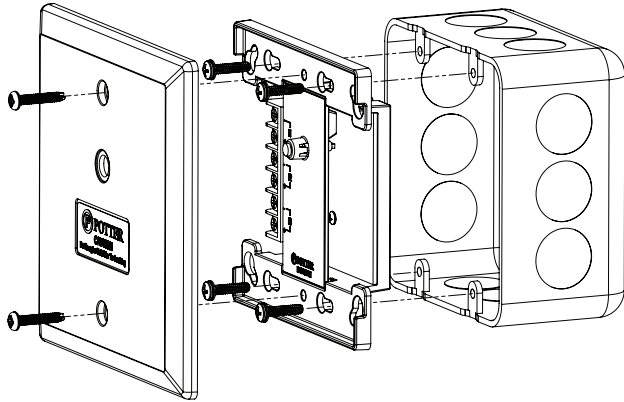
The PAD100-IM is compatible with Potter’s IPA series addressable fire alarm control panels. The PAD100-IM is used to provide additional reliability by isolating a segment of the SLC loop where a short circuit has occurred.

Technical Specifications

Operating Voltage	24.0V
Max SLC Standby Current	100µA
Max SLC Short Circuit Current	2.75mA
Max no. of PAD100-IM on SLC loop	254 Units
Operating Temperature Range	32 to 120°F (0 to 49°C)
Operating Humidity Range	0 to 93% (non-condensing)
Dimensions	4.17” (106mm)L × 4.17” (106mm)W × 1.14” (29mm)D
Mounting Options	Standard 4” Square or Double Gang Box
Shipping Weight	0.6 lbs

Installation Using Compatible Electrical Box

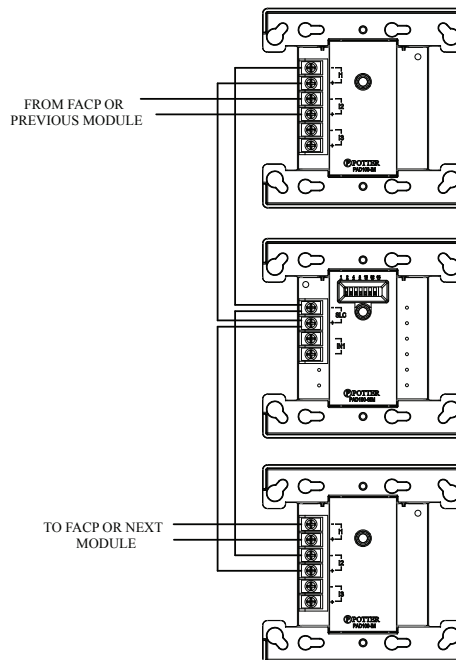
Fig 1



Wiring Diagrams

PAD100-IM Class X Example

Fig 2



Ordering Information

Model	Description	Stock No.
PAD100-IM	Isolator Module	3992708

Features

- Single or Dual Action versions
- Durable die-cast construction
- Reset key matches the fire alarm control panels
- Compatible with IPA Series panels
- SLC Class A, Class X & Class B
- Product includes a 5 year warranty
- UUKL Listed for Smoke Control



Description

The PAD100-PSSA (Single Action) is activated by simply pulling the white “T” bar handle down. The PAD100-PSDA (Dual Action) is activated by lifting the front cover and then pulling the white “T” bar handle down. Once activated, the “T” bar cannot be reset without opening the front cover. Opening the front cover will also activate the pull station. To reset the PAD100-PS Series, use the Potter WS-93 key to unlock and open the front cover. Once the cover is open, push the “T” bar back into the normal position and re-secure the front cover.

Application

The PAD100-PSSA/PSDA is compatible with Potter’s IPA and AFC/ARC series addressable fire alarm control panels. It is a non-coded addressable pull station available in either a single or dual action model and installs on a single gang box or surface mounts using the P32-BB or P32-DBB (deep) back box.

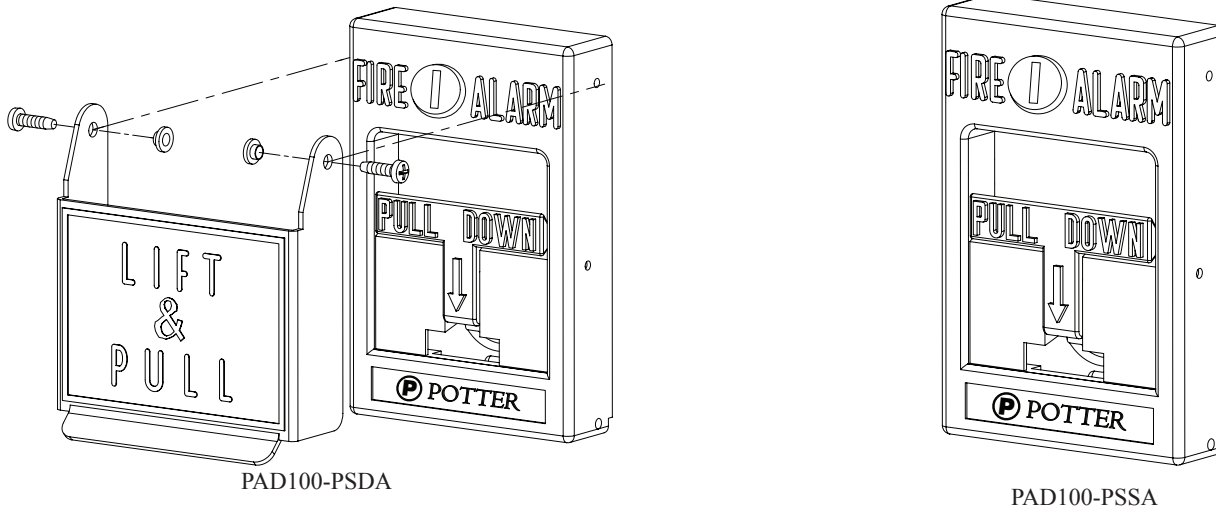
Technical Specifications

Operating Voltage	24.0 VDC
Max SLC Standby Current	200uA
Max SLC Alarm Current	200uA
Environmental Limitations	32°F - 120°F (0° - 49°C) Indoor Only
Dimensions	4.75” H x 3.25” W x 1.75” D
Relative Humidity Range	0 - 93% (non-condensing)
Mounting Options	Single gang box or Potter P32-BB/DBB
Shipping Weight	APS-SA - 1.22 lbs. APS-DA - 1.46 lbs.

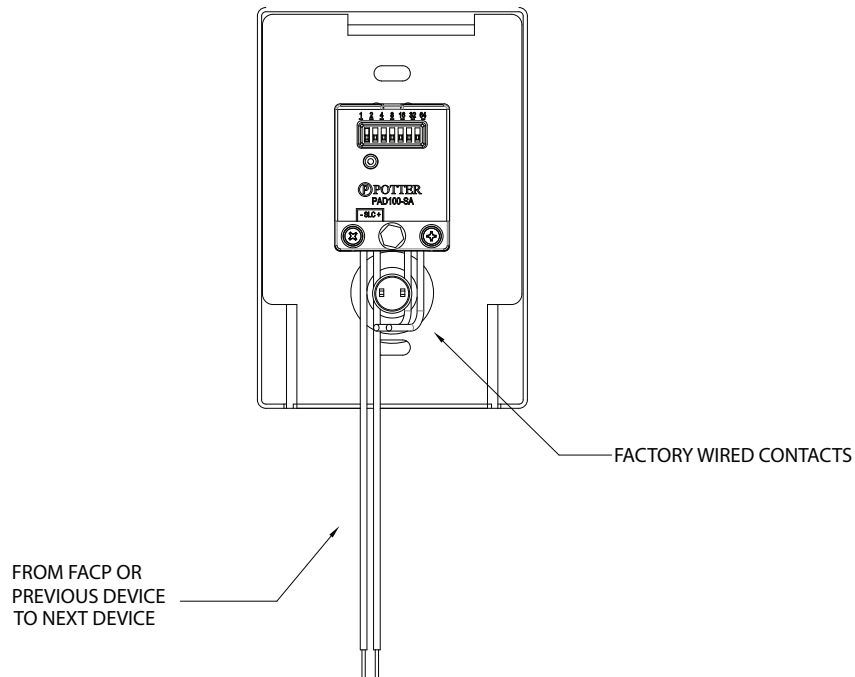
Setting the Address

The PAD100-PS Series uses one SLC address assigned to the device. The address is set using the DIP switch located on the back of the PAD100-PS device.

Pull Station Front View
Fig 1



Pull Station Back View and Wiring
Fig 2



Ordering Information

Model	Description	Stock No.
PAD100-PSSA	Addressable Pull Station, Single Action	3992721
PAD100-PSDA	Addressable Pull Station, Dual Action	3992720

Features

- Integrated Sounder in base
- 75 dB (UL 464 Listed) sounder output
- Sounder independent of sensor, allows for a single station, grouped or all-call
- May be mapped to any device connected to the control panel
- Terminals accept 22 to 12 AWG wire sizes
- Supports Class A, Class X and Class B wiring
- Does not require SLC Loop address
- UUKL Listed for Smoke Control



Description

The Addressable Sounder Base 6" (PAD100-SB) is a sounder base that may be utilized in a variety of applications. The base has a locking feature for the sensor that may be used or removed in the field. Once the head is removed, the sounder is accessible in the bottom of the unit.

The base has an independent sounder module that may be programmed as a single station, zone or all call sounder. The PAD100-SB passes through the sound pattern sent to the sounder, therefore it may reproduce in any pattern the power supply provides.

The panel will support any combination of sensors or modules on the SLC. The PAD100-SB does not consume an address on the loop and is fully programmable to operate with any input. Once activated the sounder will also follow the input from the power source and deactivate accordingly.

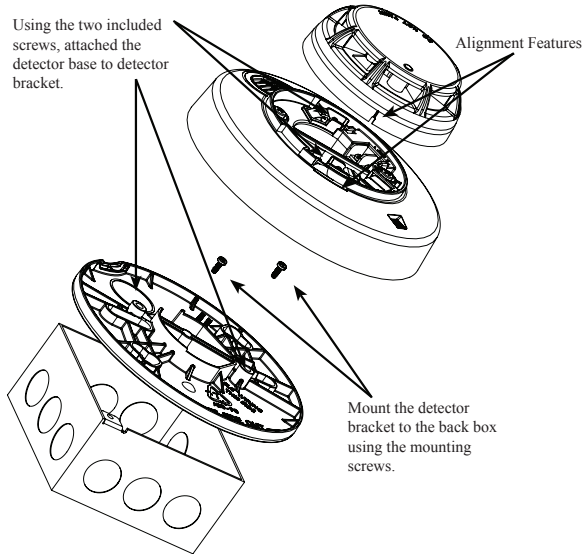
Technical Specifications

Working Range for SLC	24 VDC
Working voltage range for PWR	16 - 33 VDC
Active current for PWR	30 ma
Sound pressure level	75dB/10ft (min.) as per UL464
Installation temperature range	32°F to 120°F (0°C to 49°C)
Operating relative humidity range	0% to 93% (Non-condensing)
Start-up time	Max. 1 sec.
Maximum number of devices per zone	127
Color	Eggshell White
Dimensions (without detector)	Height: 0.75 in (19mm) Diameter: 6.3 in (166 mm)

Detector Base Mounting

PAD100-SB should be mounted directly on the electrical box. The mounting holes are configured for a single gang, double gang, octagon or 4” square box. See Fig. 1.

Fig. 1



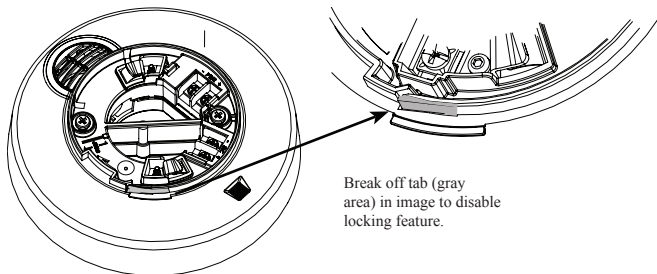
Locking Feature

Eliminate the Locking Feature

PAD100-SB include a locking feature that prevents removal of the detector and removal of the base cover without using a tool.

1. To eliminate this feature, break off the locking tab and then install the detector. See Fig. 2.

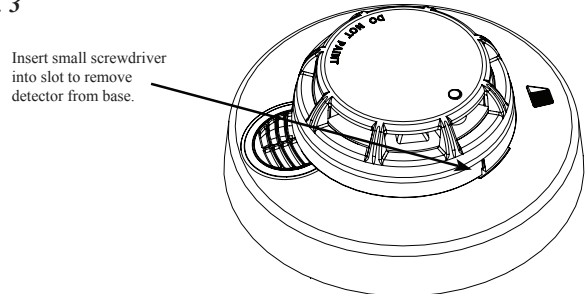
Fig. 2



Removing of Detector Head from Base

2. To remove the detector from the base once the locking feature has been activated, insert a small screwdriver into the slot on the base to push the plastic tab while simultaneously turning the detector head counter-clockwise. See Fig. 3.

Fig. 3



3. To remove the base cover from the lower enclosure once the locking feature has been activated, insert a small screwdriver into the slot on the on the base to push the plastic tab while simultaneously turning the detector head counter-clockwise.

Ordering Information

Model	Description	Stock No.
PAD100-SB	Addressable Sounder Base	3992729

Features

- Terminals Marked with Polarity to assist with installation
- Duplicate terminals for in and out SLC wiring
- Terminals accept 22 to 12 AWG wire sizes
- Installs on single gang, double gang, octagon or 4” square box
- Locking tab prevents unauthorized detector removal
- Product includes 5 year warranty



Application

The Potter PAD100-6DB and PAD100-4DB detector bases are used to install Potter’s addressable smoke and heat detectors. The PAD100-6DB will mount on a single gang, double gang, octagon or 4” square electrical box.

Description

The PAD100-6DB and PAD100-4DB are low-profile, surface mount bases used with Potter’s addressable detectors. The base uses screw-clamp terminals that accept wire ranging from 22 to 14 AWG. When installed on recessed electrical boxes the PAD100-6DB is wide enough to completely cover the back box and the immediate surrounding area. The base is equipped with a locking tab to deter unauthorized removal of the attached detector.

Technical Specifications

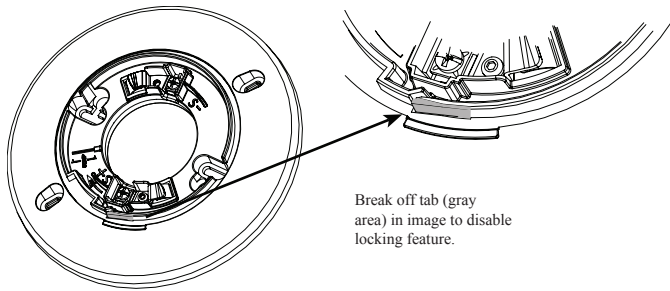
Mounting Options	Single gang, double gang, octagon, and 4” square box
Terminals	Screw-Clamp Type
Wire Gauge	22 to 12 AWG
Dimensions	Diameter: 6.3 in (166 mm) Height 0.72 in (18 mm)
Shipping Weight	87g (3.07 oz)
Material	Durable Plastic

Locking Feature

The PAD100-6DB and PAD100-4DB include a locking feature that prevents removal of the detector without using a tool.

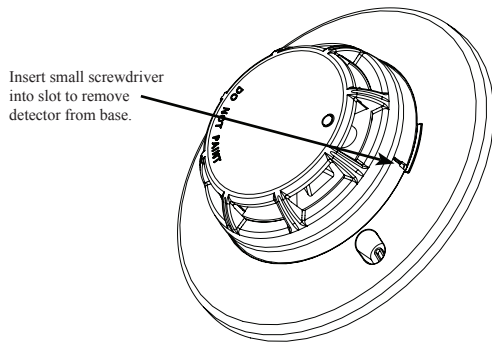
1. To eliminate this feature, break off the locking tab (refer to Figure 1), and then install the detector.

Fig. 1



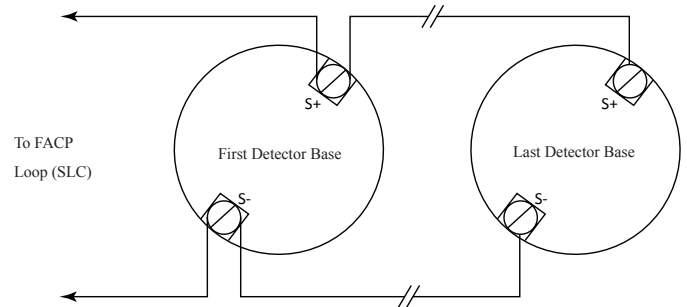
2. To remove the detector from the base when the locking feature has been enabled, insert a small screw driver into the slot on the base to push the plastic tab while simultaneously turning the detector head counter-clockwise.

Fig. 2



Wiring Diagram

Fig. 3



Ordering Information

Model	Description	Stock No.
PAD100-6DB	6" Sensor Base	3992732
PAD100-4DB	4" Sensor Base	3992731

Features

- Selectable Rate of Rise and/or Fixed Heat Detector
- Reliable detection technology
- Wide selectable smoke sensitivity range of 1.0 to 3.5%/foot
- Sensor communicates sensitivity to control panel
- UL listed smoke calibration and sensitivity
- Ambient temperature listing of 32 ° F to 150 ° F
- Optional locking tab to prevent unwanted removal
- Simple DIP switch address setting, no programming tool required
- LED alarm indicator
- Product includes a 5 year warranty
- UUKL Listed for Smoke Control



Description

The PAD100-PHD is a listed Analog Addressable smoke sensor and a rate of rise and/or fixed temperature heat sensor compatible with fire alarm control panels that utilize the Potter Addressable Device (PAD) protocol. The PAD100-PHD is a low profile smoke/heat sensor with a wide sensitivity range. The heat sensing portion utilizes a proven thermistor for accurate and reliable heat detection. The sensor and base (not included) are made of a durable plastic in an off-white color to blend in with the ceiling.

The PAD100-PHD is UL listed and has a sensitivity range of 1.0 to 3.5% per foot with a fix temperature alarm threshold of 135°F and can be used for rate of rise applications. See detector spacing limitations below. The PAD100-PHD features drift compensation and has built in dirty detector warning. The PAD100-PHD and the control panel communicate over a proven and robust digital communication path and the system analyzes the information at the particular device. The total polling speed is less than five (5) seconds, well under the UL requirements.

The sensor is compatible with any of the PAD series sensor bases and simply twists on. The PAD100-PHD is addressed using DIP switches in the rear of the sensor and can be easily programmed in the field without special tools.

Setting the Address

Each addressable device on the SLC loop must have a unique address from 1 to 127 to function properly. The address is set using DIP switches.

Before connecting a device to the SLC loop, take the following precautions to prevent potential damage to SLC or device. Verify the following:

1. Power to the device is removed
2. Field wiring is correctly installed.
3. Field wiring has no open or short circuits.

Technical Specifications

Operating Voltage	24 VDC
Detector Current Draw	300 μ A
Alarm indicator	1 LED
Alarm set-point range for Smoke	1.1% - 3.5%
Alarm set-point for Heat	135°F
Installation temperature range	32°F to 120°F (0°C to 49°C)
Operating relative humidity range	0% to 93% (Non-condensing)
Start-up time	Max. 1 sec.
Maximum number of addresses per loop	127
Maximum number of lighted indicators in alarm per loop.	30
Color	Eggshell White
Weight (without base)	3.6 oz
Dimensions (without base)	Height: 1.94 in (49mm) Diameter 3.93 in (100mm)

Air Velocity Ratings

The PAD100-PHD has an Open Area of Protection air velocity rating of 0 to 300 feet per minute.

The system has a maximum of 30 LEDs that can be turned on simultaneously. If the system already has 30 LEDs on, the PAD100-PHD will operate even though the LED may not illuminate.

Operation

The PAD100-PHD is an analog addressable sensor that uses one address on the Signaling Line Circuit (SLC) of a compatible fire alarm control panel. The unit communicates with the control panel as it is polled. The LEDs flash every time the unit is polled and they will flash rapidly if the unit is in an active status. The polling LED can be turned off if desired for less conspicuous operation.

The PAD100-PHD with the PAD100-4DB or PAD100-6DB has a low profile to blend into the surrounding environment. The sensor includes an insect screen to prevent foreign objects from reaching the chamber and the can be cleaned to restore operation of a dirty detector.

The system has a maximum of 30 LEDs that can be turned on simultaneously. If the system already has 30 LEDs on, the PAD100-PHD will operate even though the LED will not illuminate.

Sensor Sensitivity

The PAD100-PHD and the compatible control panel work in tandem to keep the sensitivity consistent. As the sensor is installed over time, the sensor compensates for the dirt in the unit until it is out of range. At that time, the panel will indicate a dirty sensor. The sensor will then have to be cleaned or replaced.

The PAD100-PHD can be programmed to provide a maintenance alert prior to reaching the dirty sensor level which will allow for intervention prior to the sensor going into trouble. This allows for sensor replacement or cleaning prior to a nuisance trouble occurs.

NOTE: As required by NFPA, do not install the sensors until all construction is complete and the work area has been thoroughly cleaned. If the sensors have been installed in a construction environment, they should be cleaned or replaced before the system is placed into service.

Spacing

The PAD100-PHD is UL listed with a recommended maximum spacing of 30 feet. Refer to NFPA 72 for specific information regarding detector spacing, placement and special applications.

Compatible Bases

All bases will mount on a single gang, double gang, octagon, 4" square or mud ring electrical box.

Device	Description	Stock No.
PAD100-4DB	4" Standard Base	3992731
PAD100-6DB	6" Standard Base	3992732
PAD100-IB	6" base with an isolator module included.	3992730
PAD100-RB	6" base with one Form-C relay contact. 2A @ 30VDC, 0.5A @ 125VAC	3992728
PAD100-SB	6" base with sounder module included. Sound pattern is provided from external source.	3992729
PAD100-SPKB	6" base with speaker included	3992762

Ordering Information

Model	Description	Stock No.
PAD100-PHD	Photoelectric Smoke/Heat Sensor	3992734

Features

- Selectable Rate of Rise and/or Fixed Heat Detector
- Low profile
- Reliable detection technology
- LED Alarm Indicator
- Ambient temperature listing of 32° F to 150° F
- Simple DIP switch address setting, no programming tool required
- Product includes a 5 year warranty
- UUKL Listed for Smoke Control



Description

The PAD100-HD is a listed Analog Addressable rate of rise and/or fixed temperature heat sensor compatible with any fire alarm control panel that has the Potter Addressable Device (PAD) protocol. The heat sensing portion utilizes a proven thermistor for accurate and reliable heat detection. The sensor and base (not included) are made of a durable plastic in an off white to blend in with the ceiling.

The PAD100-HD is UL listed with a selectable fixed temperature point from 135° to 185° Fahrenheit and can be used for rate of rise applications. See detector spacing limitations below. This flexibility allows the installer to cover a wide variety of applications with a single unit.

The PAD100-HD and the control panel communicate over a proven and robust digital communication path and the system analyzes the information at the particular device. The total polling speed is less than five (5) seconds, well under the UL requirements.

The sensor is compatible with any of the PAD series sensor bases and simply twists on. The PAD100-HD is addressed using DIP switches in the rear of the sensor and can be easily programmed in the field without special tools.

Setting the Address

Each addressable device on the SLC loop must have a unique address from 1 to 127 to function properly. The address is set using DIP switches.

Before connecting a device to the SLC loop, take the following precautions to prevent potential damage to SLC or device. Verify the following:

1. Power to the device is removed
2. Field wiring is correctly installed.
3. Field wiring has no open or short circuits.

Technical Specifications

Operating Voltage	24 VDC
Detector Current Draw	300 μ A
Alarm indicator	1 LED
Alarm set-point range	135 to 185 °F/ 57 to 85 °C
Installation temperature range	32 to 150 °F / 0 to 66 °C
Operating relative humidity range	0% to 93% (Non-condensing)
Start-up time	Max. 1 sec.
Maximum number of addresses per loop	127
Maximum number of lighted indicators in alarm per loop	30
Color	Eggshell White
Weight (without base)	82g (2.89 oz)
Dimensions (without base)	Height: 1.94 in (49mm) Diameter 3.93 in (100mm)

Operation

The PAD100-HD is an analog addressable sensor that uses one address on the Signaling Line Circuit (SLC) of a compatible fire alarm control panel. The unit communicates with the control panel as it is polled. The LED flashes every time the unit is polled and will flash at a fast rate if the unit is in an active status. The polling LED can be turned off if desired for less conspicuous operation.

The PAD100-HD with the PAD100-4DB or PAD100-6DB has a low profile to blend into the surrounding environment. The system has a maximum of 30 LEDs that can be turned on simultaneously. If the system already has 30 LEDs on, the PAD100-HD will operate even though the LED will not illuminate.

Spacing

The ANSI/UL listed spacing limitations of PAD100-HD smooth ceiling are dependent on alarm set point.

Alarm Set-Point	Rate of Rise Spacing	Fixed Temperature Spacing
135°F to 160°F (57°C to 71°C)	Max. 70 ft.	Max. 70 ft.
161°F to 174°F (72°C to 79°C)	Max. 60 ft.	Max. 60 ft.
175°F to 185°F (80°C to 85°C)	Max. 15 ft.	Max. 15 ft.

Compatible Bases

All bases will mount on a single gang, double gang, octagon, 4" square or mud ring electrical box.

Device	Description	Stock No.
PAD100-4DB	4" Standard Base	3992731
PAD100-6DB	6" Standard Base	3992732
PAD100-IB	6" base with an isolator module included.	3992730
PAD100-RB	6" base with one Form-C relay contact. 2A @ 30VDC, 0.5A @ 125VAC	3992728
PAD100-SB	6" base with sounder module included. Sound pattern is provided from external source.	3992729
PAD100-SPKB	6" base with speaker included	3992762

Ordering Information

Model	Description	Stock No.
PAD100-HD	Fixed Temperature Heat Sensor	3992735



Features

- Addressable low frequency sounder base, allows for single station, grouped or all call activation
- May be mapped to any device connected to the control panel
- Terminals accept 18 to 12 AWG wire sizes
- Supports Class A, Class X and Class B wiring
- Does not require SLC Loop address, uses PAD sub point addressing feature
- Complies with the Low Frequency Signal Requirements (520 Hz)



Description

The Addressable Low Frequency Sounder Base (PAD100-LFSB) is a sounder base that may be utilized in a variety of applications. The base has a locking feature for the sensor that may be used or removed in the field. Once the head is removed, the sounder is accessible in the bottom of the unit.

The base has an independent sounder module that may be programmed as a single station, zone or all call sounder. The PAD100-LFSB passes through the sound pattern sent to the sounder, therefore it may reproduce in any pattern the power supply provides.

The PAD100-LFSB does not consume an address on the loop and is fully programmable to operate with any input. Once activated the sounder will also follow the input from the power source and deactivate accordingly.

Technical Specifications

External PWR Voltage	16-33 VDC
External PWR Standby Current	4.1 mA
External PWR Active Current	33 VDC - 86.7 mA 24 VDC - 96.5 mA 16 VDC - 156.6 mA
SLC Operating Voltage	24 VDC
SLC Standby Current	200 μ A
Installation temperature range	32°F to 120°F (0°C to 49°C)
Operating relative humidity range	0% to 93% (Non-condensing)
Sound Pressure Level	85 DBA minimum
Start-up time	Max. 1 sec.
Maximum number of devices per zone	127
Color	Eggshell White
Dimensions (without detector)	Height: 2.75 in (70mm) Diameter: 6 in (153 mm)
Mounting	Ceiling or wall

Detector Base Mounting

PAD100-LFSB can be mounted directly on an electrical box or the LFSBBB-W back box. The mounting holes are configured for a 4" x 2-1/8" deep square box. See Fig. 1 for electrical box mounting and Fig. 2 for back box mounting.

Fig. 1

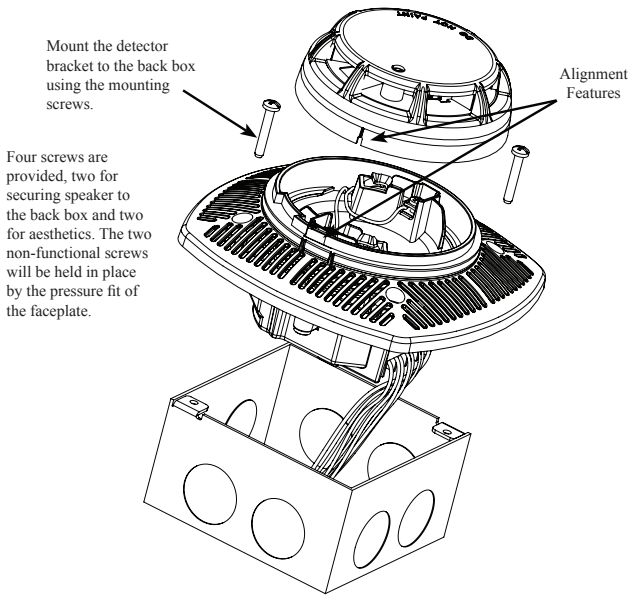
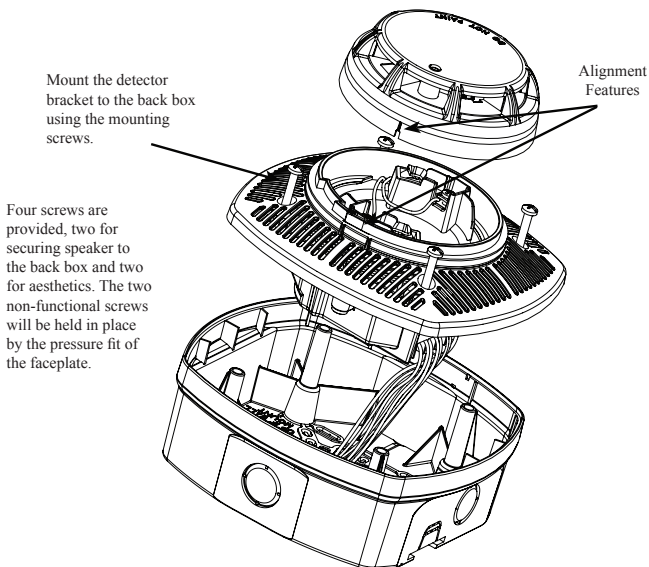


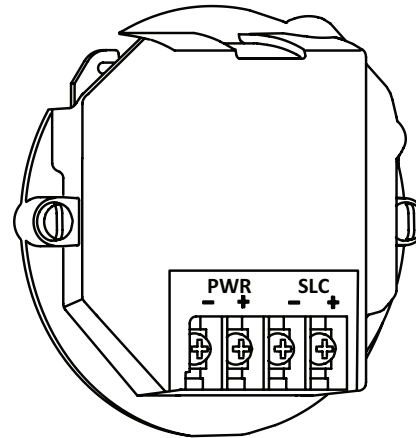
Fig. 2



Detector Base Wiring

The SLC supports NFPA wiring Class B, A and X. (See device installation sheet for wiring details). The device also requires 24VDC power. 12 to 18 AWG conductors can be used.

Fig. 3



Ordering Information

Model	Description	Stock No.
PAD100-LFSB	Addressable Low Frequency Sounder Base	3992760
LFSBBB-W	Back Box	3992761

Full Data Modules for Fire Subscribers

AES-IntelliPro Fire™ Series



Reviewed for Code Compliance
Permitting and Inspections
Department
Approved 05/21/2020

About AES Corporation

Established in 1974, AES Corporation empowers companies to grow profitable alarm monitoring businesses, and government agencies to enhance security anywhere in the world. By providing the industry's only patented operator-owned and controlled private wireless mesh networks, AES ensures superior reliability, low TCO and optimal RMR while reducing dependence on service provider infrastructures. The company's flagship AES-IntelliNet systems are deployed in over a half million locations worldwide.

Features

Meets UL 864
Commercial Fire Alarm requirements for primary standalone communication

Drop-in full function replacement for phone lines in commercial fire alarm systems

Transmits full alarm event data from FACP digital dialer to AES-MultiNet receiver

AES Subscribers are the ideal universal wireless alarm transmitters supporting all new and legacy FACPs

AES-IntelliPro Fire modules easily install in AES Subscriber

Minimal programming needed converting phone line connections to AES-IntelliPro Fire



7795

UL 864 Listed for Primary Standalone Alarm Communication from Fire Subscriber



7794

UL 864 Listed for Supplemental Alarm Communication with Fire Subscriber

Ideal Replacement for Phone Lines

AES-IntelliPro Fire™ Series full data modules with AES Fire Subscribers provide the ideal drop-in full-function replacement for phone lines to communicate signals from UL commercial fire alarm systems. AES-IntelliNet network owner-operators retain virtually 100% of the Recurring Monthly Revenue (RMR) generated from network services. Replacing phone lines with AES-IntelliNet technology maximizes RMR profit because, unlike with AlarmNet-A or cellular technologies, there are no service charges paid to a third-party network provider. In addition, with AES-IntelliNet there is zero risk of fire alarm communication technology sunset as with all past, present, and future cellular technologies.

Primary Standalone Communication for Fire Alarm

The AES-IntelliPro 7795 product meets UL 864 and NFPA-72 requirements for primary standalone alarm communication by simply moving the Fire Alarm Control Panel (FACP) phone line output connections to the AES-IntelliPro Fire Series module installed in a Fire Subscriber. No other connections are needed between the FACP and the Subscriber. The AES 7794 product meets UL requirements for supplemental communication when used with consolidated alarm, trouble, and supervisory signals triggered by FACP outputs connected to Subscriber zone inputs.

Technical Specifications

7794

- Transmits full data to AES-*MultiNet* receiver using Contact ID or Pulse formats
- Formats Supported: Contact ID, Pulse 3+1, Pulse 4+1, Pulse 4+2, and Modem IIe

I/O CONNECTIONS

- AES subscriber – data and power
- Handheld/PC programming port
- Plain Old Telephone Service (POTS) incoming phone line
- Phone output connection from alarm panel
- Trouble output (form C relay)

SIZE

- 4 7/8 in. x 5 in. (12.3 cm x 12.7 cm) Power Requirements
- 12 VDC nominal, primary and backup power provided by the AES RF Transceiver Unit

Current Consumption 350 mA nominal

7795

The 7795 AES-*IntelliPro* is a kit that includes the 7794 module and 7762 Hardware Supervisory module. *For model 7794, please see Technical Specifications above

The 7762 is a Hardware Supervisory Module.

I/O CONNECTIONS

- J1 - AES 7794 (J2) or Subscriber (J1)- data and power
- Input for Subscriber J4 Output
- Input for AES 7740 Local Annunciator - data and power
- AES 7740/AES 7794 Trouble Output to Subscriber input zone

SIZE:

- 2 1/2 in. x 4 15/16 in. (6.3 cm x 12.5 cm)

WEIGHT:

- 0.25 pounds (0.11 kilograms)

POWER INPUT:

- 12VDC nominal, power supplied from AES 7794 module or AES 7744F/7788F Subscribers

CURRENT CONSUMPTION

- 40 mA average; 100 mA peak

Full Alarm Signal Data

No alarm data is lost converting fire alarm signals from over Public Switched Telephone Network (PSTN) to transmission over AES-*IntelliNet* alarm communications. AES *IntelliPro* Fire™ Series modules transmit full alarm data captured off the FACP's digital communicator including alarm zone identification and event codes. AES-*IntelliPro* Fire will work in new fire alarm system installations to substitute phone line connections as well as retrofit existing installed fire alarm systems. AES-*IntelliPro* Fire supports most alarm communication protocols including Contact ID, Pulse, and Bosch Modem IIe.

Flexible Installation Options

Existing installed Subscribers can easily be upgraded to communicate full alarm data from a FACP's digital dialer over AES-*IntelliNet* networks. For these applications, models 7794 and 7795 are available as field installed modules that come with all needed hardware to upgrade an existing AES Subscriber. For new installations, AES Fire Subscribers are available equipped with the right AES-*IntelliPro* Fire module for the application.



Reviewed for Code Compliance
Permitting and Inspections
Department
Approved for Installations
05/21/2020

Add-on AES-*IntelliPro* Fire Modules

- | | |
|-------------|--|
| 7794 | AES- <i>IntelliPro</i> Fire Full Data Module. UL listed for supplemental communication with fire radios |
| 7795 | AES- <i>IntelliPro</i> Fire Full Data Module (7794) with 7762 Hardware Supervisory Module. UL listed for primary standalone communication with fire radios |

AES Fire Subscribers equipped with AES-*IntelliPro* Fire

- | | |
|--------------------|--|
| 7744F-ULP | 4x4 Zone Fire Subscriber, 4 Reversing Polarity, 4 Supervised, includes 7794 AES- <i>IntelliPro</i> Fire, Red Enclosure |
| 7788F-ULP | 8 Zone Fire Subscriber, 8 Supervised Zones, includes 7794 AES- <i>IntelliPro</i> Fire, Red Enclosure |
| 7744F-ULP-P | 4x4 Zone Fire Subscriber, 4 Reversing Polarity, 4 Supervised, includes 7795 AES- <i>IntelliPro</i> Fire, Red Enclosure |
| 7788F-ULP-P | 8 Zone Fire Subscriber, 8 Supervised Zones, includes 7795 AES- <i>IntelliPro</i> Fire, Red Enclosure |
| 7788F-C-ULP | 8 Zone Fire Subscriber with 7794 AES- <i>IntelliPro</i> Fire, Red Enclosure (ULC) Canada |

Hardware Supervisory Module

- | | |
|-------------|---|
| 7762 | Add-on module provides power/supervision for 7794 AES- <i>IntelliPro</i> Fire module and AES 7740 local trouble annunciator. Included with 7795 AES- <i>IntelliPro</i> Fire and AES 7742 local annunciator kit for Subscriber |
|-------------|---|

Specifications Subject to Change Without Notice



For more information, go to www.aes-corp.com or call (800) 237-6387 or contact us at sales@aes-corp.com

Full Data Modules for Fire Subscribers

AES-IntelliPro Fire™ Series



Reviewed for Code Compliance
Permitting and Inspections
Department
Approved for Conditions
05/21/2020

About AES Corporation

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AES-IntelliPro Fire modules easily install in AES Subscriber

Minimal programming needed converting phone line connections to AES-IntelliPro Fire



7795

UL 864 Listed for Primary Standalone Alarm Communication from Fire Subscriber



7794

UL 864 Listed for Supplemental Alarm Communication with Fire Subscriber

Ideal Replacement for Phone Lines

AES-IntelliPro Fire™ Series full data modules with AES Fire Subscribers provide the ideal drop-in full-function replacement for phone lines to communicate signals from UL commercial fire alarm systems. AES-IntelliNet network owner-operators retain virtually 100% of the Recurring Monthly Revenue (RMR) generated from network services. Replacing phone lines with AES-IntelliNet technology maximizes RMR profit because, unlike with AlarmNet-A or cellular technologies, there are no service charges paid to a third-party network provider. In addition, with AES-IntelliNet there is zero risk of fire alarm communication technology sunset as with all past, present, and future cellular technologies.

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The AES-IntelliPro 7795 product meets UL 864 and NFPA-72 requirements for primary standalone alarm communication by simply moving the Fire Alarm Control Panel (FACP) phone line output connections to the AES-IntelliPro Fire Series module installed in a Fire Subscriber. No other connections are needed between the FACP and the Subscriber. The AES 7794 product meets UL requirements for supplemental communication when used with consolidated alarm, trouble, and supervisory signals triggered by FACP outputs connected to Subscriber zone inputs.

Technical Specifications

7794

- Transmits full data to AES-*MultiNet* receiver using Contact ID or Pulse formats
- Formats Supported: Contact ID, Pulse 3+1, Pulse 4+1, Pulse 4+2, and Modem IIe

I/O CONNECTIONS

- AES subscriber – data and power
- Handheld/PC programming port
- Plain Old Telephone Service (POTS) incoming phone line
- Phone output connection from alarm panel
- Trouble output (form C relay)

SIZE

- 4 7/8 in. x 5 in. (12.3 cm x 12.7 cm) Power Requirements
- 12 VDC nominal, primary and backup power provided by the AES RF Transceiver Unit

Current Consumption 350 mA nominal

7795

The 7795 AES-*IntelliPro* is a kit that includes the 7794 module and 7762 Hardware Supervisory module. *For model 7794, please see Technical Specifications above

The 7762 is a Hardware Supervisory Module.

I/O CONNECTIONS

- J1 - AES 7794 (J2) or Subscriber (J1)- data and power
- Input for Subscriber J4 Output
- Input for AES 7740 Local Annunciator - data and power
- AES 7740/AES 7794 Trouble Output to Subscriber input zone

SIZE:

- 2 1/2 in. x 4 15/16 in. (6.3 cm x 12.5 cm)

WEIGHT:

- 0.25 pounds (0.11 kilograms)

POWER INPUT:

- 12VDC nominal, power supplied from AES 7794 module or AES 7744F/7788F Subscribers

CURRENT CONSUMPTION

- 40 mA average; 100 mA peak

Full Alarm Signal Data

No alarm data is lost converting fire alarm signals from over Public Switched Telephone Network (PSTN) to transmission over AES-*IntelliNet* alarm communications. AES *IntelliPro* Fire™ Series modules transmit full alarm data captured off the FACP's digital communicator including alarm zone identification and event codes. AES-*IntelliPro* Fire will work in new fire alarm system installations to substitute phone line connections as well as retrofit existing installed fire alarm systems. AES-*IntelliPro* Fire supports most alarm communication protocols including Contact ID, Pulse, and Bosch Modem IIe.

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Reviewed for Code Compliance
Permitting and Inspections
Department
Approved for Applications
05/21/2020



Add-on AES-*IntelliPro* Fire Modules

- | | |
|-------------|--|
| 7794 | AES- <i>IntelliPro</i> Fire Full Data Module. UL listed for supplemental communication with fire radios |
| 7795 | AES- <i>IntelliPro</i> Fire Full Data Module (7794) with 7762 Hardware Supervisory Module. UL listed for primary standalone communication with fire radios |

AES Fire Subscribers equipped with AES-*IntelliPro* Fire

- | | |
|--------------------|--|
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| 7788F-ULP | 8 Zone Fire Subscriber, 8 Supervised Zones, includes 7794 AES- <i>IntelliPro</i> Fire, Red Enclosure |
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| 7788F-ULP-P | 8 Zone Fire Subscriber, 8 Supervised Zones, includes 7795 AES- <i>IntelliPro</i> Fire, Red Enclosure |
| 7788F-C-ULP | 8 Zone Fire Subscriber with 7794 AES- <i>IntelliPro</i> Fire, Red Enclosure (ULC) Canada |

Hardware Supervisory Module

- | | |
|-------------|---|
| 7762 | Add-on module provides power/supervision for 7794 AES- <i>IntelliPro</i> Fire module and AES 7740 local trouble annunciator. Included with 7795 AES- <i>IntelliPro</i> Fire and AES 7742 local annunciator kit for Subscriber |
|-------------|---|

Specifications Subject to Change Without Notice



For more information, go to www.aes-corp.com or call (800) 237-6387 or contact us at sales@aes-corp.com



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05/21/2020



Accessories Guide

2019

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Fire 2.0 Add-Ons



75-7177-1

Replacement Antenna Supervision Module (ASM) for the 7177 Hybrid 2.0 Fire Subscriber only (not intended for use on 7707 2.0 Fire or 7788/7744 Legacy models)



7794A

Standalone AES-*IntelliPro* Fire full data module add-on accessory board with firmware for new *IntelliNet* 2.0 units only, cannot be used in legacy units



77-WiFi

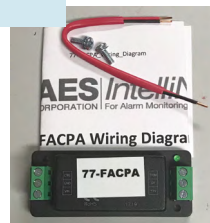
AES certified WiFi adapter



77-FACPA

AES Certified FACP Adapter, includes 1 cable and 2 screws for internal mount

Kit



77-FACPA-KIT

Installation hardware for 2-way Junction box, includes mounting plate and 4 screws for external mount in gang box (external mounting kit ONLY)

Fire Add-Ons



Please contact your local AES Sales Representative for pricing and availability.





Legacy Fire Add-Ons



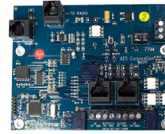
7740

Standalone Local Annunciator for fire radios, UL Listed



7770

FireTap Full Data Module with serial connection to specific FACP's



7794

AES-*IntelliPro* Fire Full Data Module with built-in phone line simulator, UL listed for Fire radios

10-Pack



7794-10 Pack

Pack of 10 AES-*IntelliPros* Fire



7795

AES-*IntelliPro* Fire Full Data Module (7794) with 7762 Hardware Supervisory Module and 7740 AES Local Annunciator. UL listed for primary standalone communication with fire radios

10-Pack



7795-10 Pack

Pack of 10 — 7795 (see description to the left)



7742

Bundles 7740 Annunciator with 7762 add-on module



Burglary 2.0 Add-Ons



7094A

Standalone AES-IntelliPro Fire full data module add-on accessory board with firmware for new IntelliNet 2.0 units only, cannot be used in Legacy units



77-WiFi*

AES certified WiFi adapter
*Refer to same Model Number for Burglary as for Fire

Legacy Burglary Add-Ons



7067

AES-IntelliTap II Full Data Module with built-in phone line simulator, UL listed for Burglary or Fire Radios



7094

AES-IntelliPro Full Data Module with built-in phone line simulator, remote Account administration for specific burglary panels

10-Pack



7094-10 Pack

Pack of 10 AES-IntelliPros



7041E

Legacy Handheld Programmer, cannot be used with IntelliNet 2.0 units

Kit



09-2015-4M (Kit)

AES-IntelliPro Stand-off Kit (Set of 4)

Burglary Add-Ons





Transformers & Batteries



16.5 Volt AC 40 VA Class 2 Transformer



16.5 Volt AC 40 VA Class 2 Transformer (10 Pack)



Enclosure for Class 2 Transformer



12 Volt 4 Amp Hour Gel Cell Battery



12 Volt 7.5 Amp Hour Gel Cell Battery



Please contact your local AES Sales Representative for pricing and availability.





Standard Antennas & Mounts



7214

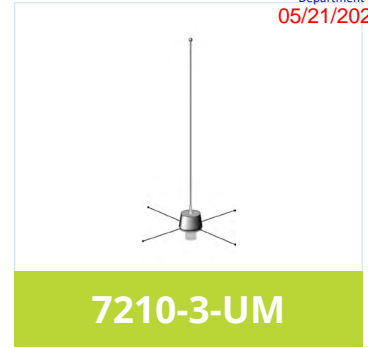
2.5dB Tamper Resistant Rubber Duck Antenna Kit (including cable)



Kit

7214-EMK

External Antenna Mounting Kit (1 Antenna Mounting Bracket, 1 TNC male inline, 1 TNC female bulkhead, 6' RG58 coax cable)



7210-3-UM

3dB Omni Directional UHF Antenna (includes 52-0057 Mounting Kit)



7210-5-UM

5dB Omni Directional UHF Antenna (includes 52-0057 Mounting Kit)



7210-6-UC

6dB Omni Directional UHF Antenna



7210-7-US

7dB Omni Directional UHF Antenna (for 460-470MHz range only)



7210-9-UC

9dB Omni Directional UHF Antenna



7211

Stealth Antenna (for 450-470MHz range only)



7260-EMM

Eave Mount Mast



For VHF frequencies, appropriate model with closest match to customer frequency will be supplied. For frequencies outside the 450-470MHz range, please call Order Processing for availability.



Offset Bracket



Tripod Mount 3'



Universal Antenna Mount



Phantom Antenna including
52-0057 Mounting Kit



Mounting Kit for 3dB, 5dB, and
Phantom Antenna



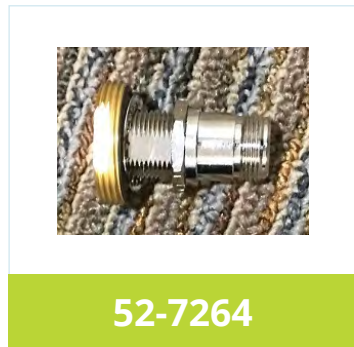
Phantom Antenna, Adapter, and
NMO Mount



TNC to N-Type Adapter and NMO
Mount for Retrofit



TNC(F) to N-Type(M) Adapter Only



NMO Antenna Mount Only



13-0345-3

Cable Assembly
(3 Ft, RG-8, N male ↔ N male)



13-0345-6

Cable Assembly
(6 Ft, RG-8, N male ↔ N male)



13-0345-10

Cable Assembly
(10 Ft, RG-8, N male ↔ N male)



13-0345-25

Cable Assembly
(25 Ft, RG-8, N male ↔ N male)
**Custom, requires extended lead time*



13-0345-50

Cable Assembly
(50 Ft, RG-8, N male ↔ N male)
**Custom, requires extended lead time*



13-0345-100

Cable Assembly
(100 Ft, RG-8, W/1 N male ↔ X) on spool
**Custom, requires extended lead time*



Note: 13-0345-100 only available in 100' length. Shorter lengths can be User cut from the 100' spool. At least 1 separately ordered loose connector required to complete assembly (see below). 7244 crimp tool required for 12-0101.

Coaxial Cable Assemblies





7220-10-N

Cable Assembly
(10 Ft, RG-58, BNC male ↔ N male)



7220-15-N

Cable Assembly
(15 Ft, RG-58, BNC male ↔ N male)



7220-20-N

Cable Assembly
(20 Ft, RG-58, BNC male ↔ N male)



7220-25-N

Cable Assembly
(25 Ft, RG-58, BNC male ↔ N male)



13-0346

Cable Assembly
(18 In, RG-58, N female bulkhead ↔
BNC male)

**Used to connect RG-8 with N male to
enclosure body*



*Please contact your local AES Sales
Representative for pricing and availability.*

Loose Coaxial Connectors & Adapters



Reviewed for Code Compliance
Permitting and Inspections
Department

05/21/2020



7244

Crimp Tool for RG-8 Coaxial Connectors



7240

7058E J4 Output Connector and Cable (10 Pack)



12-0101

N-Type Plug (Male), Crimp Style for RG-8 Coax (9913)



12-0102

BNC Plug (Male), Crimp Style for RG-58 Coax



12-1026

TNC Crimp Connector (Male), for RG-58 Coax



12-1027

TNC Crimp Connector (Male), for RG-8 Coax



Please contact your local AES Sales Representative for pricing and availability.



Spare/Replacement Radio Transceiver



2 Watt Radio Transceiver



Replacement radios will be tuned to authorized AES Dealer's frequency only.



Surge Protectors & Band Pass Filters



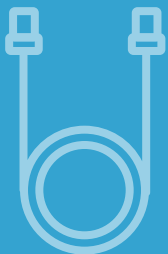
UHF Band Pass Filter
*(please contact your local
AES Sales Rep for availability)*



Standard Coaxial Surge Protector,
N female ↔ N female



Programmers, Cords, & PC or Laptop Programming Cables



Reviewed for Code Compliance
Permitting and Inspections
Department

05/21/2020



7041E

Handheld Programmer with RJ-11 Cable allows for programming Fire Subscribers, Burglary Subscribers (without 7094 AES-IntelliPro module)



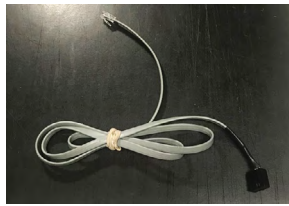
7043

Programming Cable for PC or Laptop to 7094 AES-IntelliPro with 5x2 Plug



7043E

Programming Cable for PC or Laptop allows for programming Fire Subscribers, Burglary Subscribers (without 7094 AES-IntelliPro module), with RJ-11 Jack



13-7094

Handheld Programmer Programming Cable for 7094 AES-IntelliPro



7241

Replacement Handheld Programmer Cord, with 5x2 Plug, to program 7094 AES-IntelliPro



7241E

Replacement Handheld Programmer Cord, allows for programming Fire Subscribers, Burglary Subscribers (without 7094 AES-IntelliPro module), with RJ-11 Plug



8600-BWM

Bird Wattmeter 43 includes 8600-E400 Element



8600-E400

400-1000 MHz Plug-In Elements (E Series)



Please contact your local AES Sales Representative for pricing and availability.

Accessories Order Form



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Permitting and Inspections
Department
Approved 05/21/2020



AES SALES REPRESENTATIVE		DATE	
COMPANY NAME		DLR #	
PURCHASER NAME		PO #	
SEND TO ATTENTION OF		ORDER TYPE Standard <input type="checkbox"/> Blanket <input type="checkbox"/> Change <input type="checkbox"/>	
SHIP TO ADDRESS <i>(Street, not PO Box)</i>		BILL TO ADDRESS <i>(only if different than Ship To)</i>	
CITY, STATE, ZIP		CITY, STATE, ZIP	
COUNTRY		COUNTRY	
PHONE		FAX	
EMAIL			
QUANTITY	MODEL NUMBER	DESCRIPTION	SPECIAL REQUIREMENTS
CUSTOMER RADIO FREQUENCY <i>(Required)</i>		REQUESTED DELIVERY DATE Overnight <input type="checkbox"/> 2-Day <input type="checkbox"/> 3-Day <input type="checkbox"/> Ground <input type="checkbox"/>	
SPECIAL INSTRUCTIONS			



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05/21/2020

ORDER PROCESSING

order@aes-corp.com

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Peabody, MA 01960 USA

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(978) 535-7310 *main*

www.aes-corp.com

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D8004 Transformer Enclosure

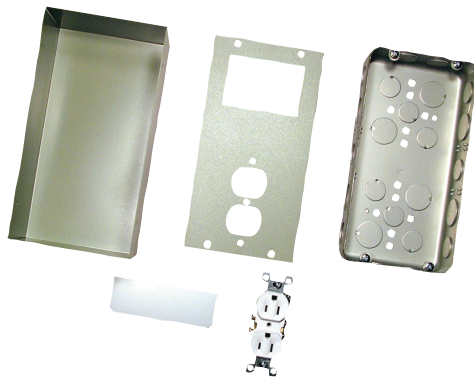
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April 05/21/2020



The D8004 Transformer Enclosure protects the AC plug-in transformer and ensures that it remains securely fixed to the AC wall outlet. The D8004 Transformer Enclosure may be required for certain applications; the most common being fire alarm.

Certifications and approvals

Region	Certification	
USA	UL	AMCX: Central Station Alarm Units (UL1610, UL1635), AOTX: Local Alarm Units (UL464, UL609), APAW: Police Station Alarm Units (UL365, UL464), NBSX: Household Burglar Alarm System Units (UL1023), UOXX: Control Unit Accessories, System (UL864, 9th edition), UTOU: Control Units and Accessories - Household System Type (UL985)
	FM	D8004
	CSFM	see our website
	FDNY-CoA	#6174 UL 864 9th Edition
	NYC-MEA	12-92-E, Vol. 12
NYC-MEA	12-92-E, Vol. XV	

Technical specifications

Environmental Considerations

Environment:	Indoor, dry
--------------	-------------

Mechanical Properties

Cover	
Color:	Light gray
Dimensions:	8.8 in. x 4.7 in. x 3.0 in. (22.4 cm x 11.9 cm x 7.6 cm)
Material:	Cold-rolled steel, 18 gauge (1.2 mm)
Outlet Box	
Dimensions:	8.7 in. x 4.6 in. x 1.7 in. (22.1 cm x 11.7 cm x 4.3 cm)
Material:	Galvanized steel, 18 gauge (1.2 mm)

Power Requirements

Voltage (supply):	120 VAC
-------------------	---------



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Department
Approved for Construction
05/21/2020

Ordering information

D8004 Transformer Enclosure

For applications such as fire alarm that might require a transformer enclosure.

Order number **D8004**

Represented by:

Americas:

Bosch Security Systems, Inc.
130 Perinton Parkway
Fairport, New York, 14450, USA
Phone: +1 800 289 0096
Fax: +1 585 223 9180
security.sales@us.bosch.com
www.boschsecurity.us

Europe, Middle East, Africa:

Bosch Security Systems B.V.
P.O. Box 80002
5617 BA Eindhoven, The Netherlands
Phone: + 31 40 2577 284
Fax: +31 40 2577 330
emea.securitysystems@bosch.com
www.boschsecurity.com

Asia-Pacific:

Robert Bosch (SEA) Pte Ltd, Security Systems
11 Bishan Street 21
Singapore 573943
Phone: +65 6571 2808
Fax: +65 6571 2699
apr.securitysystems@bosch.com
www.boschsecurity.asia

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North IBP
Changning District, Shanghai
200335 China
Phone +86 21 22181111
Fax: +86 21 22182398
www.boschsecurity.com.cn

America Latina:

Robert Bosch Ltda Security Systems Division
Via Anhanguera, Km 98
CEP 13065-900
Campinas, Sao Paulo, Brazil
Phone: +55 19 2103 2860
Fax: +55 19 2103 2862
latam.boschsecurity@bosch.com
www.boschsecurity.com



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05/21/2020



Accessories Guide

2019

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www.aes-corp.com

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(978) 535-7310 main
(978) 535-7313 fax



Fire 2.0 Add-Ons



75-7177-1

Replacement Antenna Supervision Module (ASM) for the 7177 Hybrid 2.0 Fire Subscriber only (not intended for use on 7707 2.0 Fire or 7788/7744 Legacy models)



7794A

Standalone AES-*IntelliPro* Fire full data module add-on accessory board with firmware for new *IntelliNet* 2.0 units only, cannot be used in legacy units



77-WiFi

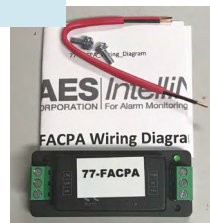
AES certified WiFi adapter



77-FACPA

AES Certified FACP Adapter, includes 1 cable and 2 screws for internal mount

Kit



77-FACPA-KIT

Installation hardware for 2-way Junction box, includes mounting plate and 4 screws for external mount in gang box (external mounting kit ONLY)

Fire Add-Ons



Please contact your local AES Sales Representative for pricing and availability.





Legacy Fire Add-Ons



7740

Standalone Local Annunciator for fire radios, UL Listed



7770

FireTap Full Data Module with serial connection to specific FACP's



7794

AES-*IntelliPro* Fire Full Data Module with built-in phone line simulator, UL listed for Fire radios

10-Pack



7794-10 Pack

Pack of 10 AES-*IntelliPro*s Fire



7795

AES-*IntelliPro* Fire Full Data Module (7794) with 7762 Hardware Supervisory Module and 7740 AES Local Annunciator. UL listed for primary standalone communication with fire radios

10-Pack



7795-10 Pack

Pack of 10 — 7795 (see description to the left)



7742

Bundles 7740 Annunciator with 7762 add-on module



Burglary 2.0 Add-Ons



7094A

Standalone AES-IntelliPro Fire full data module add-on accessory board with firmware for new IntelliNet 2.0 units only, cannot be used in Legacy units



77-WiFi*

AES certified WiFi adapter
*Refer to same Model Number for Burglary as for Fire

Legacy Burglary Add-Ons



7067

AES-IntelliTap II Full Data Module with built-in phone line simulator, UL listed for Burglary or Fire Radios



7094

AES-IntelliPro Full Data Module with built-in phone line simulator, remote Account administration for specific burglary panels

10-Pack



7094-10 Pack

Pack of 10 AES-IntelliPros



7041E

Legacy Handheld Programmer, cannot be used with IntelliNet 2.0 units

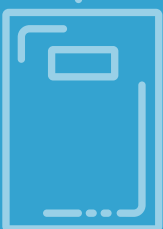
Kit



09-2015-4M (Kit)

AES-IntelliPro Stand-off Kit (Set of 4)

Burglary Add-Ons





Transformers & Batteries



1640

16.5 Volt AC 40 VA Class 2
Transformer



10-Pack

1640-10 Pack

16.5 Volt AC 40 VA Class 2
Transformer (10 Pack)



1640-ENCL

Enclosure for Class 2 Transformer



8124

12 Volt 4 Amp Hour Gel
Cell Battery



8127

12 Volt 7.5 Amp Hour Gel
Cell Battery



Please contact your local AES Sales
Representative for pricing and availability.





Standard Antennas & Mounts



7214

2.5dB Tamper Resistant Rubber Duck Antenna Kit (including cable)



Kit

7214-EMK

External Antenna Mounting Kit (1 Antenna Mounting Bracket, 1 TNC male inline, 1 TNC female bulkhead, 6' RG58 coax cable)



7210-3-UM

3dB Omni Directional UHF Antenna (includes 52-0057 Mounting Kit)



7210-5-UM

5dB Omni Directional UHF Antenna (includes 52-0057 Mounting Kit)



7210-6-UC

6dB Omni Directional UHF Antenna



7210-7-US

7dB Omni Directional UHF Antenna (for 460-470MHz range only)



7210-9-UC

9dB Omni Directional UHF Antenna



7211

Stealth Antenna (for 450-470MHz range only)



7260-EMM

Eave Mount Mast



For VHF frequencies, appropriate model with closest match to customer frequency will be supplied. For frequencies outside the 450-470MHz range, please call Order Processing for availability.



Offset Bracket



Tripod Mount 3'



Universal Antenna Mount



Phantom Antenna including
52-0057 Mounting Kit



Mounting Kit for 3dB, 5dB, and
Phantom Antenna



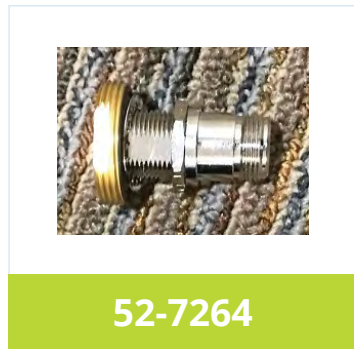
Phantom Antenna, Adapter, and
NMO Mount



TNC to N-Type Adapter and NMO
Mount for Retrofit



TNC(F) to N-Type(M) Adapter Only



NMO Antenna Mount Only



13-0345-3

Cable Assembly
(3 Ft, RG-8, N male ↔ N male)



13-0345-6

Cable Assembly
(6 Ft, RG-8, N male ↔ N male)



13-0345-10

Cable Assembly
(10 Ft, RG-8, N male ↔ N male)



13-0345-25

Cable Assembly
(25 Ft, RG-8, N male ↔ N male)
**Custom, requires extended lead time*



13-0345-50

Cable Assembly
(50 Ft, RG-8, N male ↔ N male)
**Custom, requires extended lead time*



13-0345-100

Cable Assembly
(100 Ft, RG-8, W/1 N male ↔ X)
on spool
**Custom, requires extended lead time*



Note: 13-0345-100 only available in 100' length. Shorter lengths can be User cut from the 100' spool. At least 1 separately ordered loose connector required to complete assembly (see below). 7244 crimp tool required for 12-0101.

Coaxial Cable Assemblies





7220-10-N

Cable Assembly
(10 Ft, RG-58, BNC male ↔ N male)



7220-15-N

Cable Assembly
(15 Ft, RG-58, BNC male ↔ N male)



7220-20-N

Cable Assembly
(20 Ft, RG-58, BNC male ↔ N male)



7220-25-N

Cable Assembly
(25 Ft, RG-58, BNC male ↔ N male)



13-0346

Cable Assembly
(18 In, RG-58, N female bulkhead ↔ BNC male)

**Used to connect RG-8 with N male to enclosure body*



Please contact your local AES Sales Representative for pricing and availability.

Loose Coaxial Connectors & Adapters



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05/21/2020



7244

Crimp Tool for RG-8 Coaxial Connectors



7240

7058E J4 Output Connector and Cable (10 Pack)



12-0101

N-Type Plug (Male), Crimp Style for RG-8 Coax (9913)



12-0102

BNC Plug (Male), Crimp Style for RG-58 Coax



12-1026

TNC Crimp Connector (Male), for RG-58 Coax



12-1027

TNC Crimp Connector (Male), for RG-8 Coax



Please contact your local AES Sales Representative for pricing and availability.



Spare/Replacement Radio Transceiver



2 Watt Radio Transceiver



Replacement radios will be tuned to authorized AES Dealer's frequency only.



Surge Protectors & Band Pass Filters

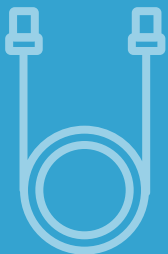


UHF Band Pass Filter
*(please contact your local
AES Sales Rep for availability)*



Standard Coaxial Surge Protector,
N female ↔ N female

Programmers, Cords, & PC or Laptop Programming Cables



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05/21/2020



7041E

Handheld Programmer with RJ-11 Cable allows for programming Fire Subscribers, Burglary Subscribers (without 7094 AES-IntelliPro module)



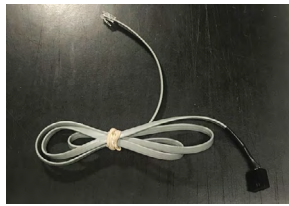
7043

Programming Cable for PC or Laptop to 7094 AES-IntelliPro with 5x2 Plug



7043E

Programming Cable for PC or Laptop allows for programming Fire Subscribers, Burglary Subscribers (without 7094 AES-IntelliPro module), with RJ-11 Jack



13-7094

Handheld Programmer Programming Cable for 7094 AES-IntelliPro



7241

Replacement Handheld Programmer Cord, with 5x2 Plug, to program 7094 AES-IntelliPro



7241E

Replacement Handheld Programmer Cord, allows for programming Fire Subscribers, Burglary Subscribers (without 7094 AES-IntelliPro module), with RJ-11 Plug



8600-BWM

Bird Wattmeter 43 includes 8600-E400 Element



8600-E400

400-1000 MHz Plug-In Elements (E Series)



Please contact your local AES Sales Representative for pricing and availability.

Accessories Order Form



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05/21/2020



AES SALES REPRESENTATIVE		DATE	
COMPANY NAME		DLR #	
PURCHASER NAME		PO #	
SEND TO ATTENTION OF		ORDER TYPE Standard <input type="checkbox"/> Blanket <input type="checkbox"/> Change <input type="checkbox"/>	
SHIP TO ADDRESS <i>(Street, not PO Box)</i>		BILL TO ADDRESS <i>(only if different than Ship To)</i>	
CITY, STATE, ZIP		CITY, STATE, ZIP	
COUNTRY		COUNTRY	
PHONE		FAX	
EMAIL			
QUANTITY	MODEL NUMBER	DESCRIPTION	SPECIAL REQUIREMENTS
CUSTOMER RADIO FREQUENCY <i>(Required)</i>		REQUESTED DELIVERY DATE Overnight <input type="checkbox"/> 2-Day <input type="checkbox"/> 3-Day <input type="checkbox"/> Ground <input type="checkbox"/>	
SPECIAL INSTRUCTIONS			



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D8004 Transformer Enclosure

www.boschsecurity.com



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Department
Approved for Installation
05/21/2020



The D8004 Transformer Enclosure protects the AC plug-in transformer and ensures that it remains securely fixed to the AC wall outlet. The D8004 Transformer Enclosure may be required for certain applications; the most common being fire alarm.

Certifications and approvals

Region	Certification	
USA	UL	AMCX: Central Station Alarm Units (UL1610, UL1635), AOTX: Local Alarm Units (UL464, UL609), APAW: Police Station Alarm Units (UL365, UL464), NBSX: Household Burglar Alarm System Units (UL1023), UOXX: Control Unit Accessories, System (UL864, 9th edition), UTOU: Control Units and Accessories - Household System Type (UL985)
	FM	D8004
	CSFM	see our website
	FDNY-CoA	#6174 UL 864 9th Edition
	NYC-MEA	12-92-E, Vol. 12
NYC-MEA	12-92-E, Vol. XV	

Technical specifications

Environmental Considerations

Environment:	Indoor, dry
--------------	-------------

Mechanical Properties

Cover	
Color:	Light gray
Dimensions:	8.8 in. x 4.7 in. x 3.0 in. (22.4 cm x 11.9 cm x 7.6 cm)
Material:	Cold-rolled steel, 18 gauge (1.2 mm)
Outlet Box	
Dimensions:	8.7 in. x 4.6 in. x 1.7 in. (22.1 cm x 11.7 cm x 4.3 cm)
Material:	Galvanized steel, 18 gauge (1.2 mm)

Power Requirements

Voltage (supply):	120 VAC
-------------------	---------



Reviewed for Code Compliance
Permitting and Inspections
Department
April 14, 2020
05/21/2020

Ordering information

D8004 Transformer Enclosure

For applications such as fire alarm that might require a transformer enclosure.

Order number **D8004**

Represented by:

Americas:

Bosch Security Systems, Inc.
130 Perinton Parkway
Fairport, New York, 14450, USA
Phone: +1 800 289 0096
Fax: +1 585 223 9180
security.sales@us.bosch.com
www.boschsecurity.us

Europe, Middle East, Africa:

Bosch Security Systems B.V.
P.O. Box 80002
5617 BA Eindhoven, The Netherlands
Phone: + 31 40 2577 284
Fax: +31 40 2577 330
emea.securitysystems@bosch.com
www.boschsecurity.com

Asia-Pacific:

Robert Bosch (SEA) Pte Ltd, Security Systems
11 Bishan Street 21
Singapore 573943
Phone: +65 6571 2808
Fax: +65 6571 2699
apr.securitysystems@bosch.com
www.boschsecurity.asia

China:

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North IBP
Changning District, Shanghai
200335 China
Phone +86 21 22181111
Fax: +86 21 22182398
www.boschsecurity.com.cn

America Latina:

Robert Bosch Ltda Security Systems Division
Via Anhanguera, Km 98
CEP 13065-900
Campinas, Sao Paulo, Brazil
Phone: +55 19 2103 2860
Fax: +55 19 2103 2862
latam.boschsecurity@bosch.com
www.boschsecurity.com



ACERBOX

BY SPACE AGE ELECTRONICS

SRD ACE-11

System Record Documents



Store important system documents in a secure location with a cabinet built specifically to meet the requirements of NFPA 72 7.7.2.4.

The number one goal at Space Age is to manufacture code compliant solutions, and the SRD is just that. NFPA 72 7.7.2.1 states, "With every new system, a documentation cabinet shall be installed at the system control unit or other approved location at the protected premises."

The SRD includes our innovative 8GB flash drive slide tab that allows the user to select a USB-C or Micro USB connector to access records electronically (See NFPA 72 7.5.6.7).



FEATURES

- 18 gauge cold rolled steel construction with red powder coat and white lettering
- Dimensions are 12" wide x 13" tall and 2 1/4" deep
- Stainless steel piano hinge
- Two key ring hooks to hold system keys
- Business card holder for key contacts
- Slide tab allows user to select USB-C or Micro USB connector to download from 8GB digital flash memory
- DCD Computer Desk Kit (sold separately) holds enclosure door open at a 90 degree angle with a snap on cable for a convenient working surface in the field. Includes velcro strap for securing your laptop.



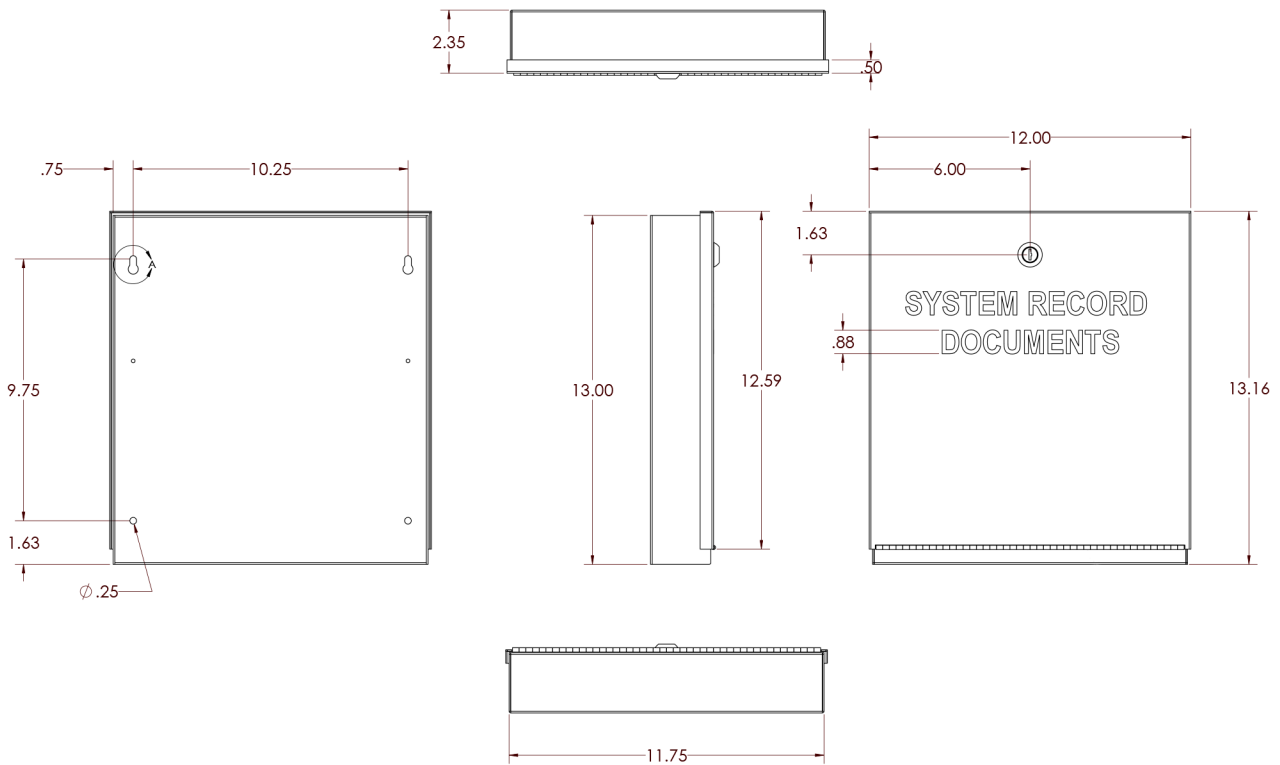
SPECIFICATIONS

The SRD System Record Documents Box shall be UL Listed, constructed of 18 gauge cold rolled steel. It shall have a powder coat finish. The cover shall be permanently screed with 1" high lettering "SYSTEM RECORD DOCUMENTS" with white indelible ink. The access door shall be locked with a 3/4" barrel lock and there will be a 12" stainless steel piano hinge. The SRD will have a minimum of 8 gigabyte digital flash memory drive with a slide tab that allows user to select USB-C or Micro USB connector for uploading and downloading information. The enclosure will supply 4 mounting holes. Inside will accommodate standard 8 1/2" x 11" manuals and document records. A legend sheet will be attached to the door for system required documentation, key contacts and system information. The enclosure shall also provide 2 key ring holders with a location to mount standard business cards for key contact personnel.

CUSTOM COLORS AND BRANDING AVAILABLE



DIMENSIONS



ORDERING INFORMATION

P/N# SSU00689

SRD System Record Documents Box - Red

P/N# SSU00690

SRD System Record Documents Box - Red with your custom screened logo

P/N# SSU01689

SRD System Record Documents Box - Black

P/N# SSU01690

SRD System Record Documents Box - Black with your custom screened logo

P/N# SSU00616

DCD Computer Desk Kit



Features

- 120 VAC
- 10KA Short Circuit Current Rating
- ANSI/UL Listed 1449 4th Edition, Type 2
- CSA C22.2 No. 269.2-17 2nd edition, Type 2
- Acerbox ELOCK Circuit Lockout Kit included per NFPA 72 2013 10.6.5.2
- Surface or conduit mounting
- Diagnostic indicator light
- Self restoring
- 3 Wire device (18" length)

An ideal choice for your 120VAC applications, the E120V-GT maintains system integrity and protects against transients introduced into electrical lines via poor atmospheric and utility conditions as well as internally generated inductive loads.

Not only is the E-120V-GT robust enough to absorb a spike, but to also clamp long enough to trip the branch circuit breaker and still be functional for additional surges. Reduce downtime associated with power surges and lightning strikes, prevent interruption of recurring monthly revenue based systems, and eliminate non-billable service calls and expensive repairs by protecting your equipment with this invaluable device.

Applications

- Fire alarm control panels
- Mass notification systems
- Dedicated branch circuits
- Amplifiers, motors, pumps, and power boosters

Specifications

All 120 VAC equipment will have Transient Voltage Surge Suppression (TVSS) protection manufactured by Space Age Electronics, Inc., part number E120V-GT. The unit shall be ANSI/UL listed to standard 1449, 4th edition and will be labeled clearly with indelible ink. Can be attached via the 3/4" rigid coupling, or surface mounted via the 2 external mounting holes. The unit shall have thermal fuses to protect against fire in short circuit conditions and will have 18" long, 14 gauge wires (3x) with a green ground wire. The enclosure will be a non dielectric material UL94 QMFZ2/8 grade material providing UV protection. The unit shall provide visual indication (LED) that unit is protecting and functioning.

Performance Specifications

Short Circuit Current Rating (SCCR): 10kA
Enclosure Material: UL94 QMFZ2/8 (green)
VPR=700 (L-N) 700 (L-G) 600 (N-G) Capacitance: < 2,000 pf
Clamping Response Time: < 5 nanoseconds
Current: Non-Load Bearing
Max Operating Voltage (MCOV): 140VAC, 50/60 Hz
Design: Thermally Fused Hybrid
Operation Indicators: LED
Max Surge Current: 25kA
Energy Dissipation: 500J
Clamping Voltage: 230V RMS

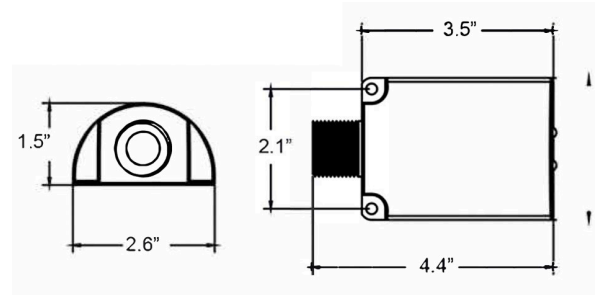
Operating Specifications

Service Voltage: 120VAC Single Phase
Circuits Protected: L-N L-G N-G
Connection Type: Hardwired
Installation Configuration: Parallel

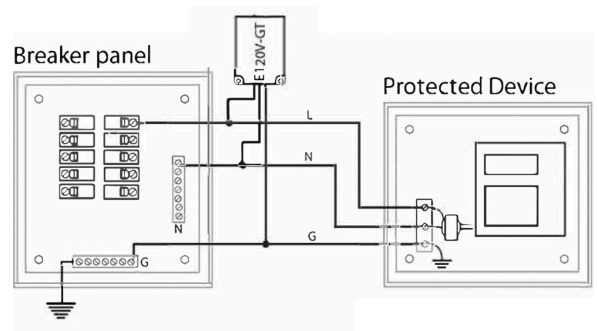
Compliance Specifications

UL Listed: 1449 4th Edition - VZCA
File Number: E319370 Vol. 1 Sec. 1

Dimensions



Wiring Diagram



Ordering Information

P/N# E120V-GT
120V Hybrid Surge Protection Device (ELOCK Circuit Lockout Kit included)

P/N# ELOCK-FA
Acerbox ELOCK Circuit Lockout Kit

The KnoxBox 3200 is the number one high-security key lock box trusted by first responders and property owners. Store up to 10 keys to quickly gain rapid access to commercial properties.



Available in 3 colors:



Recessed Mount

Surface Mount

FEATURES

- ✓ Stores maximum 10 keys. Access cards and small entry items may also fit in interior compartment but will reduce max key quantity.
- ✓ Built Knox-Rugged and secure: UL 1037, UL 1610, UL 1332, UL 437
- ✓ Finished with Knox-Coat® to protect four times better than standard powder coat
- ✓ Weather-resistant door gasket
- ✓ Hinged door

BENEFITS

- ✓ Allows rapid property access
- ✓ Reduces property damage
- ✓ Prevents forced entry into buildings
- ✓ Minimizes first responder injury
- ✓ Compliant to National Fire Code (NFPA, IFC, IBC)

OPTIONS

- ✓ Knox Tamper Alert connects to building's alarm system for extra security
- ✓ Mount types: Recessed and Surface
- ✓ 3 color options: Black, Aluminum, Dark Bronze

ACCESSORIES

- ✓ Multi-Purpose Switch for use on electrical doors, gates and other electrical equipment
- ✓ Recess Mounting Kit for new concrete or masonry construction
- ✓ Public Safety Labels
- ✓ Tag-Out Tamper Seals
- ✓ Key Tags
- ✓ Key Rings

ORDERING SPECIFICATIONS

To insure procurement and delivery of the KnoxBox 3200, it is suggested that following specification paragraph is used:

KnoxBox surface/recessed mount with hinged door, with/without UL Listed Knox Tamper Alert. 1/4" plate steel housing, 1/2" thick steel door with interior gasket seal and stainless steel door hinge. Box and lock UL Listed. Lock has 1/8" thick stainless steel dust cover with tamper seal mounting capability.

Exterior Dimensions: Surface Mount Body - 4"H x 5"W x 3-7/8"D
Recessed Mount Flange - 7"H x 7"W

Lock: UL Listed. Double-action rotating tumblers and hardened steel pins accessed by a biased cut key.

Finish: Knox-Coat proprietary finishing process

Color: Black, Dark Bronze or Aluminum

P/N: KnoxBox 3200 (mfr's cat. ID)

Mfr's Name: KNOX COMPANY



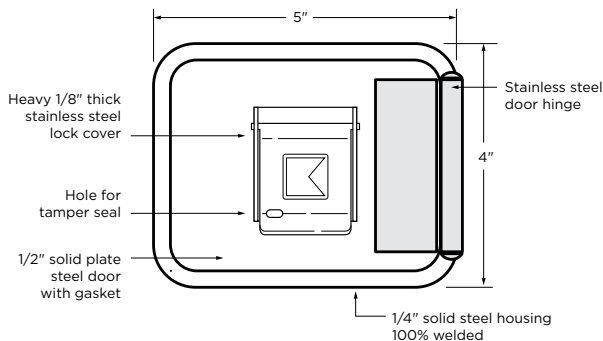
WEIGHT:

Surface Mount - 8 lbs
Recessed Mount - 9 lbs

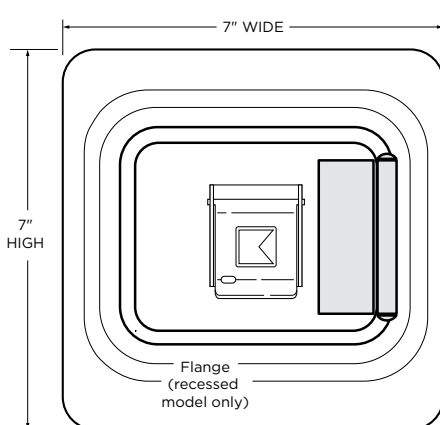
DIMENSIONS:

Surface Mount Body - 4"H x 5"W x 3-7/8"D
Recessed Mount Flange - 7"H x 7"W

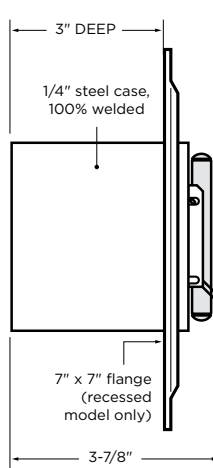
SURFACE MOUNT - FRONT VIEW



RECESS MOUNT - FRONT VIEW



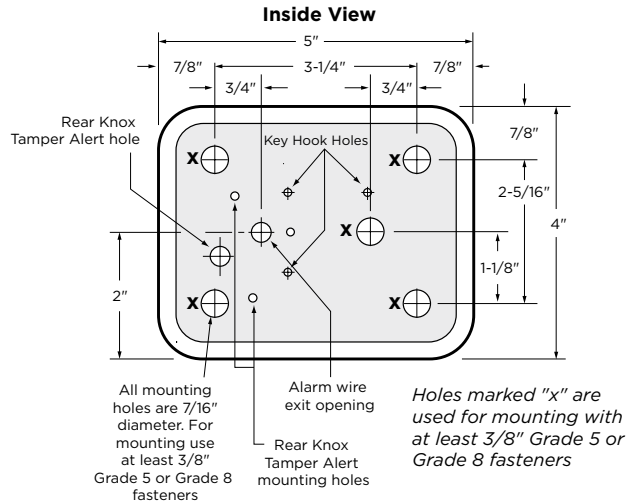
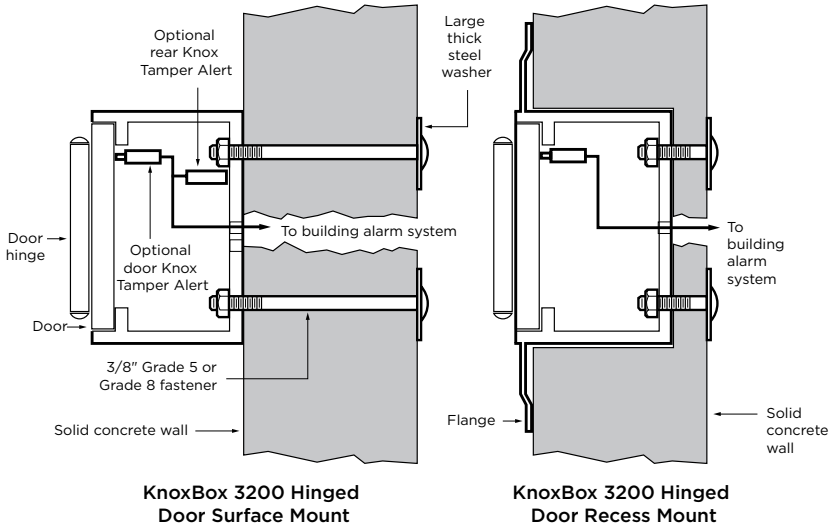
SIDE VIEW



GENERAL MOUNTING INSTRUCTIONS

Suggested minimum mounting height, 6 feet above ground.

ATTENTION: KnoxBox is a very strong device that **MUST** be mounted properly to ensure maximum security and resist physical attack.



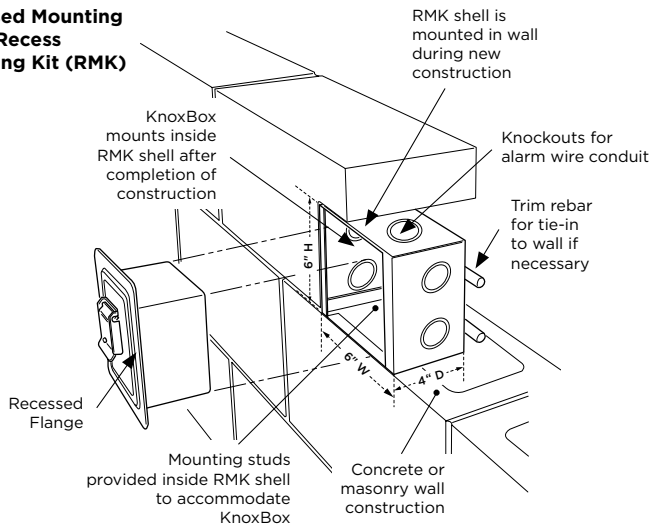
RECESS MOUNTING KIT AND INSTALLATION INSTRUCTIONS

The Recess Mounting Kit (RMK) includes shell housing and mounting hardware, which may only be used for recessed models to cast-in-place within new concrete or masonry construction. The KnoxBox is mounted into the shell housing after construction is completed.

RECESS MOUNTING KIT DIMENSIONS

Rough-in Dimensions:
6-1/2"H x 6-1/2"W x 5"D

Recessed Mounting Using Recess Mounting Kit (RMK)



IMPORTANT:
Care should be taken to ensure the front of the Recess Mounting Kit (RMK) shell housing, including the cover plate and screw heads, is flush with the wall. The RMK must be plumbed to ensure vertical alignment of the box.

ABOUT KNOX COMPANY

Over forty years ago, a unique concept in rapid access for emergency response was born. The KnoxBox®, a high-security key lock box, was designed to provide rapid access for emergency responders to reduce response times, minimize injuries and protect property from forced entry.

Today, one revolutionary lock box has grown into a complete system providing rapid access for public safety agencies, industries, military, and property owners across the world. The Knox Company is trusted by over 14,000 fire departments, law enforcement agencies, and governmental entities.

KNOX COMPANY
1601 W. DEER VALLEY RD
PHOENIX, AZ 85027

T. 800.552.5669
F. 623.687.2290

KNOXBOX.COM
INFO@KNOXBOX.COM



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05/21/2020

TECHNICAL MANUAL

SEALED LEAD-ACID BATTERIES



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Features of Power-Sonic Sealed Lead Acid Batteries

Sealed/Maintenance-Free

The valve regulated spill proof construction allows trouble-free safe operation in any position. There is no need to add electrolyte, as gases generated during the charge phase are recombined in a unique “oxygen cycle”.

Power-Sonic sealed lead acid batteries can be operated in virtually any orientation without the loss of capacity or electrolyte leakage. However, upside down operation is not recommended.

Long Shelf Life

A low self-discharge rate, up to approximately 3% per month, may allow storage of fully charged batteries for up to a year, depending on storage temperatures, before charging becomes critical. *However, we strongly recommend that all batteries should be recharged within six months of receipt as it will enhance their long term life.*

Please refer to this Technical Manual and individual battery specification sheets for more details.

Design Flexibility

Same model batteries may be used in series and/or parallel to obtain choice of voltage and capacity. The same battery may be used in either cyclic or standby applications. Over 80 models available to choose from.

Deep Discharge Recovery

Special separators, advanced plate composition and a carefully balanced electrolyte system ensure that the battery has the ability to recover from excessively deep discharge.

Economical

The high watt-hour per dollar value is made possible by the materials used in a sealed lead-acid battery; they are readily available and low in cost.

Easy Handling

No special handling precautions or shipping containers, surface or air, are required due to the leak-proof construction. Please refer to the declaration of non restricted status for D.O.T. and I.A.T.A. as listed in the Literature section of our website: www.power-sonic.com.

Compact

Power-Sonic batteries utilize state of the art design, high grade materials, and a carefully controlled plate-making process to provide excellent output per cell. The high energy density results in superior power/volume and power/weight ratios.

Low Pressure Valve Regulators

All batteries feature a series of low pressure one-way relief valves. These valves safely release any excessive accumulation of gas inside the battery and then reseal.

High Discharge Rate

Low internal resistance allows discharge currents of up to ten times the rated capacity of the battery. Relatively small batteries may thus be specified in applications requiring high peak currents.

Wide Operating Temperature Range

Power-Sonic batteries may be discharged over a temperature range of -40°C to +60°C (-40°F to +140°F) and charged at temperatures ranging from -20°C to +50°C (-4°F to +122°F).

Rugged Construction

The high impact resistant battery case is made of non-conductive ABS plastic. The case materials impart great resistance to shock, vibration, chemicals and heat. Flame Retardant (FR) battery cases and lids are available where the end application dictates.

Long Service Life

PS/PSH and PSG Series: Have a design life of up to five years in standby applications. In cyclical applications up to 1,000 charge/discharge cycles can be expected depending on average depth of discharge.

PG Series: Have a design life of up to 10 years in float applications.

Please consult this Technical Manual and product specifications to become aware of the many factors that effect product life.



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The information contained within is provided as a service to our customers and is for their information only. The information and recommendations set forth herein are made in good faith and are believed to be accurate at the date compiled. Power-Sonic Corporation makes no warranty expressed or implied.

Battery Construction



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05/24/2020

Terminals

Depending on the model, batteries come either with AMP Faston type terminals made of tin plated brass, post type terminals of the same composition with threaded nut and bolt hardware, or heavy duty flag terminals made of lead alloy.

A special epoxy is used as sealing material surrounding the terminals.

Relief valve

In case of excessive gas pressure build-up inside the battery, the relief valve will open and relieve the pressure. The one-way valve not only ensures that no air gets into the battery where the oxygen would react with the plates causing internal discharge, but also represents an important safety device in the event of excessive overcharge.

Vent release pressure is between 2-6 psi; the seal ring material is neoprene rubber.

Plates (electrodes)

Power-Sonic utilizes the latest technology and equipment to cast grids from a lead-calcium alloy free of antimony. The small amount of calcium and tin in the grid alloy imparts strength to the plate and guarantees durability even in extensive cycle service. Lead dioxide paste is added to the grid to form the electrically active material.

In the charged state, the negative plate paste is pure lead and that of the positive lead dioxide. Both of these are in a porous or spongy form to optimize surface area and thereby maximize capacity. The heavy duty lead calcium alloy grids provide an extra margin of performance and life in both cyclic and float applications and give unparalleled recovery from deep discharge.

Separators

Power-Sonic separators are made of non-woven glass fiber cloth with high heat and oxidation resistance. The material further offers superior electrolyte absorption and retaining ability, as well as excellent ion conductivity.

Case Sealing

Depending on the model the case sealing is ultrasonic, epoxy or heat seal.

Container

Case and lid material is ABS, high impact, resin with high resistance to chemicals and flammability. Case and cover are made of non-conductive ABS plastic to UL94-HB or UL94 V-0.

This case has molded-in dividers for each 2 volt cell.

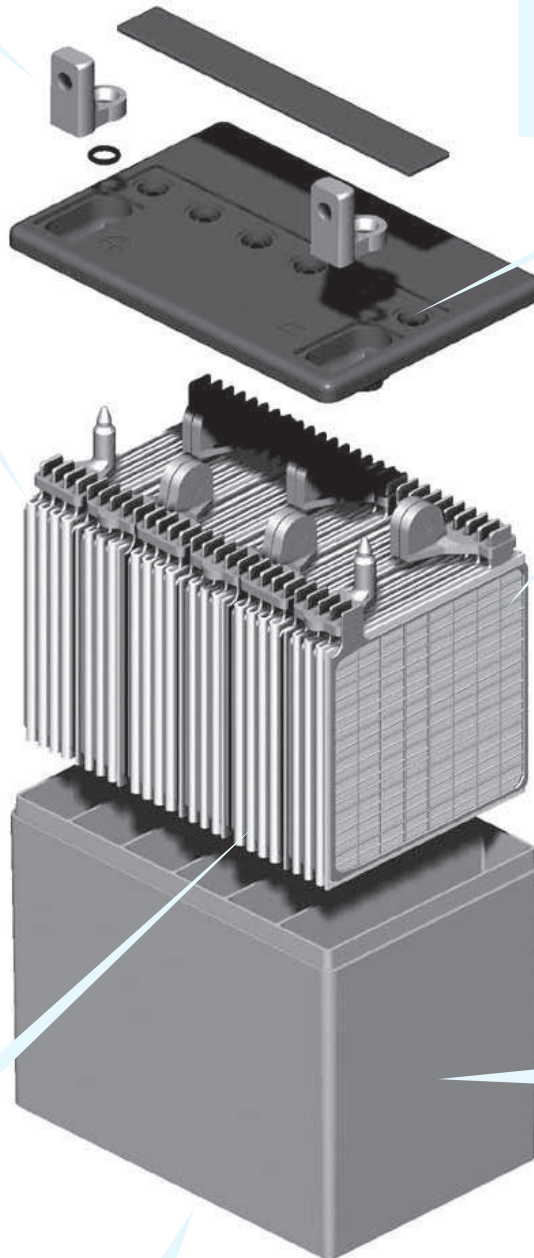
Electrolyte

Immobilized dilute sulfuric acid: H_2SO_4 .

Leakproof Design & Operational Safety

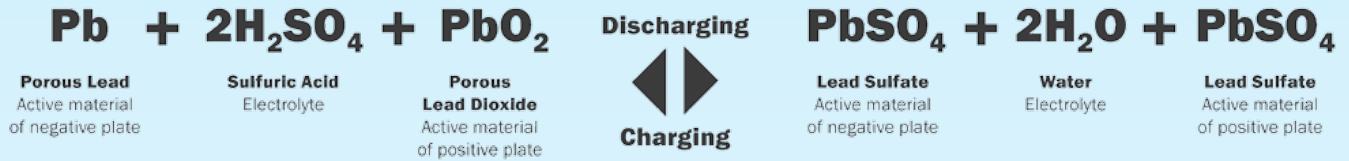
The leak proof construction of Power-Sonic batteries has ensured that our batteries have been approved for shipment by air, both by D.O.T. and I.A.T.A. Copies of these approvals are available on our website: www.power-sonic.com.

U.L.'s component recognition program for emergency lighting and power batteries lists Power-Sonic under file number MH20845



Theory of Operation

The basic electrochemical reaction equation in a lead acid battery can be written as:



Discharge

During the discharge portion of the reaction, lead dioxide (PbO₂) is converted into lead sulfate (PbSO₄) at the positive plate. At the negative plate sponge lead (Pb) is converted to lead sulfate (PbSO₄). This causes the sulfuric acid (2H₂SO₄) in the electrolyte to be consumed.

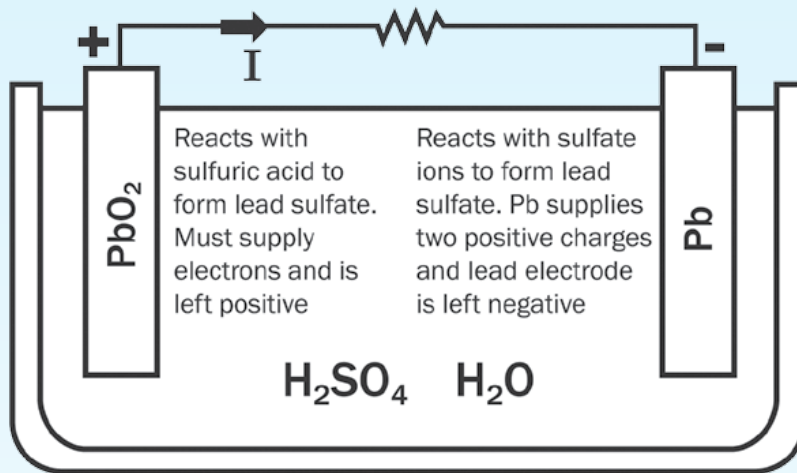


Figure 1: Chemical reaction when a battery is being discharged

Charge

During the recharge phase of the reaction, the cycle is reversed. The lead sulfate (PbSO₄) and water are electrochemically converted to lead (Pb), lead dioxide (PbO₄) and sulfuric acid (2H₂SO₄) by an external electrical charging source.

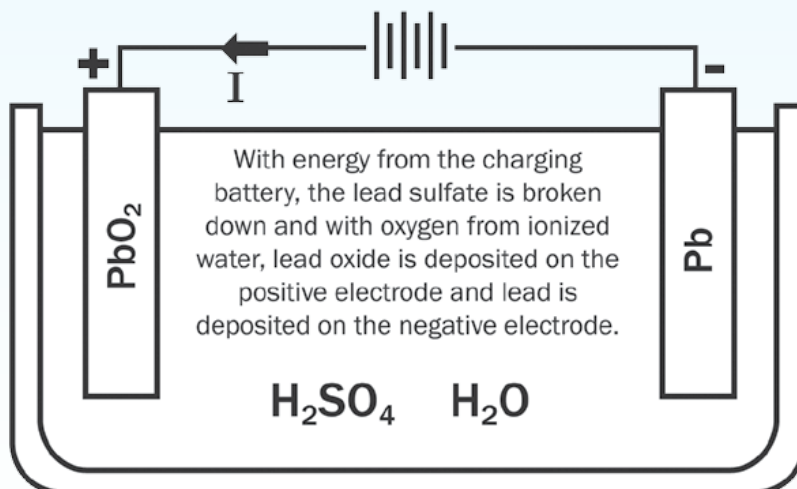


Figure 2: Chemical reaction when a battery is being charged



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Theory of Operation

Oxygen Recombination

To produce a truly maintenance-free battery, it is necessary that gases generated during overcharge are recombined in a so-called “oxygen cycle”. Should oxygen and hydrogen escape, a gradual drying out would occur, eventually affecting capacity and battery life.

During charge, oxygen is generated at the positive and reacts with and partially discharges the sponge lead of the negative. As charging continues the oxygen recombines with the hydrogen being generated by the negative, forming water. The water content of the electrolyte thus remains unchanged unless the charging rate is too high.

In case of rapid generation of oxygen exceeding the absorbing capacity of the negative plate, the pressure relief valve will open to release excessive gas.

Deep Discharge

Power-Sonic batteries are protected against cell shorting by the addition of a buffering agent that ensures the presence of acid ions even in a fully discharged state.

Power-Sonic defines “deep discharge” as one that allows the battery voltage under load to go below the cut-off (or “final”) voltage of a full discharge. The recommended cutoff voltage varies with the discharge rate. Table 1 shows the final discharge voltages per cell.

It is important to note that deep discharging a battery at high rates for short periods is not nearly as severe as discharging a battery at low rates for long periods of time. To clarify, let’s analyze two examples:

- **Battery A** – Discharged at the 1C rate to zero volts.
“C” for a 4 AH battery, for example, is 4 amps. Full discharge is reached after about 30 minutes when the battery voltage drops to 1.5V/cell. At this point, only 50% of rated capacity has been discharged (1 C amps x 0.5 hrs = 0.5C Amp. Hrs). Continuing the discharge to zero volts will bring the total amount of discharged ampere-hours to approximately 75% because the rapidly declining voltage quickly reduces current flow to a trickle. The battery will recover easily from this type of deep discharge.
- **Battery B** – Discharged at the 0.01 C rate to zero volts.
0.01C for a 4 AH battery is 40mA. Full discharge is reached after 100+ hours when the terminal voltage drops to 1.75 V/cell. At this point, the battery has already delivered 100% of its rated capacity (0.01 x 100 hrs = 1C Amp. Hrs.). Continuing the discharge to zero volts will keep the battery under load for a further period of time, squeezing out every bit of stored energy.

This type of “deep” discharge is severe and is likely to damage the battery. The sooner a severely discharged battery is recharged, the better its chances to fully recover.



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Discharge Current	Final Discharge Voltage Per Cell
0.1C or below, or intermittent discharge	1.75
0.17C or current close to it	1.75
0.6C or current close to it	1.70
From 1C to 2C or current close to it	1.50
3C or current close to it and above	1.37

Table 1: Final discharge voltage per cell



Capacity

The capacity of a battery is the total amount of electrical energy available from a fully charged cell or cells. Its value depends on the discharge current, the temperature during discharge, the final (cut-off) voltage and the general history of the battery.

Table 2 shows capacities for various multiples of the 20-hour discharge current for PS, PSH and PSG models.

Rated Capacity	20 Hour Rate		10 Hour Rate		5 Hour Rate		1 Hour Rate	
	Amps	AH	Amps	AH	Amps	AH	Amps	AH
0.5 AH	0.025	0.50	0.045	0.45	0.08	0.40	0.30	0.30
0.8 AH	0.04	0.80	0.072	0.72	0.13	0.65	0.48	0.48
1.1 AH	0.055	1.10	0.10	1.00	0.19	0.95	0.68	0.68
1.4 AH	0.07	1.40	0.13	1.30	0.24	1.20	0.85	0.85
2.0 AH	0.10	2.00	0.19	1.90	0.34	1.70	1.24	1.24
2.3 AH	0.115	2.30	0.225	2.25	0.39	1.95	1.38	1.38
2.5 AH	0.125	2.50	0.22	2.20	0.40	2.00	1.50	1.50
2.8 AH	0.14	2.80	0.25	2.50	0.48	2.40	1.70	1.70
2.9 AH	0.145	2.90	0.26	2.60	0.49	2.45	1.80	1.80
3.2 AH	0.16	3.20	0.30	3.00	0.54	2.70	2.00	2.00
3.4 AH	0.17	3.40	0.33	3.30	0.58	2.90	2.20	2.20
3.5 AH	0.175	3.50	0.33	3.40	0.59	2.95	2.17	2.17
3.8 AH	0.19	3.80	0.35	3.50	0.64	3.20	2.40	2.40
4.5 AH	0.225	4.50	0.41	4.10	0.64	3.20	2.75	2.75
5.0 AH	0.25	5.00	0.43	4.30	0.80	4.00	3.00	3.00
5.4 AH	0.27	5.40	0.50	5.00	0.90	4.50	3.60	3.60
5.5 AH	0.275	5.50	0.54	5.40	0.95	4.75	3.70	3.70
6.0 AH	0.30	6.00	0.56	5.60	0.98	4.90	3.60	3.60
6.5 AH	0.325	6.50	0.61	6.10	1.10	5.50	4.03	4.03
7.0 AH	0.35	7.00	0.63	6.30	1.19	5.95	4.34	4.34
7.2 AH	0.36	7.20	0.70	7.00	1.30	6.50	4.60	4.60
8.0 AH	0.40	8.00	0.78	7.75	1.40	7.00	4.80	4.80
8.5 AH	0.425	8.50	0.81	8.10	1.50	7.50	6.50	6.50
9.0 AH	0.45	9.00	0.83	8.30	1.54	7.70	5.60	5.60
10.0 AH	0.50	10.00	0.93	9.30	1.70	8.50	6.20	6.20
10.5 AH	0.53	10.50	0.98	9.80	1.87	9.35	6.82	6.82
12.0 AH	0.60	12.00	1.15	11.50	2.10	10.50	7.30	7.30
13.0 AH	0.65	13.00	1.22	12.20	2.30	11.50	8.00	8.00
14.0 AH	0.70	14.00	1.30	13.00	2.50	12.50	8.45	8.45
18.0 AH	0.90	18.00	1.70	17.00	3.20	16.00	11.10	11.10
20.0 AH	1.00	20.00	1.85	18.50	3.40	17.00	12.40	12.40
21.0 AH	1.05	21.00	2.00	20.00	3.70	18.50	13.00	13.00
26.0 AH	1.30	26.00	2.40	24.00	4.40	22.00	16.10	16.10
28.0 AH	1.40	28.00	2.62	26.20	5.00	25.00	18.60	18.60
35.0 AH	1.75	35.00	3.30	33.00	6.20	31.00	25.00	25.00
36.0 AH	1.80	36.00	3.35	33.50	6.12	30.60	22.30	22.30
40.0 AH	2.00	40.00	3.80	38.00	6.70	33.50	24.00	24.00
55.0 AH	2.75	55.00	5.10	51.00	8.80	44.00	30.60	30.60
75.0 AH	3.75	75.00	7.20	72.00	13.60	68.00	47.00	47.00
100.0 AH	5.00	100.00	9.20	92.00	15.80	79.00	55.20	55.20
110.0 AH	5.50	110.00	10.30	103.00	17.70	88.50	61.80	61.80
140.0 AH	7.00	140.00	13.50	135.00	24.00	120.00	84.00	84.00
210.0 AH	10.50	210.00	20.00	200.00	36.00	180.00	168.00	168.00

Table 2: Capacities for various multiples of the 20-hour discharge current - PS, PSH and PSG models.

Capacity

Table 3 shows capacities for various multiples of the 20-hour discharge current for PG models.

Rated Capacity	20 Hour Rate		10 Hour Rate		5 Hour Rate		1 Hour Rate	
	Amps	AH	Amps	AH	Amps	AH	Amps	AH
28.0 AH	1.50	30.00	2.80	28.00	5.10	25.50	18.60	18.60
35.0 AH	1.80	36.00	3.50	35.00	6.50	32.50	27.00	27.00
42.0 AH	2.25	45.00	4.20	42.00	7.20	36.00	25.20	25.20
56.0 AH	3.00	60.00	5.60	56.00	9.50	47.50	33.00	33.00
65.0 AH	3.53	70.60	6.50	65.00	11.20	56.00	39.00	39.00
75.0 AH	4.00	80.00	7.50	75.00	12.90	64.50	45.00	45.00
92.0 AH	4.90	98.00	9.20	92.00	15.80	79.00	55.20	55.20
103.0 AH	5.55	111.00	10.30	103.00	17.70	88.50	61.80	61.80
124.0 AH	6.45	129.00	12.40	124.00	21.30	106.50	74.40	74.40
144.0 AH	7.70	154.00	14.40	144.00	24.08	120.40	84.00	84.00
153.0 AH	8.30	166.00	15.30	153.00	26.30	131.50	91.80	91.80
210.0 AH	11.30	226.00	21.00	210.00	36.10	180.50	126.00	126.00

Table 3: PG-Series batteries, by industry convention, are rated at their 10 hour rate.

Capacity, expressed in ampere-hours (AH), is the product of the current discharged and the length of discharge time. The rated capacity (C) of a Power-Sonic battery (PS, PSH and PSG-Series) is measured by its performance over 20 hours of constant current discharge at a temperature of 20 °C (68 °F) to a cut off voltage of 1.75 volts/cell.

As an example, model PS-610, with a rated capacity of 1.1 AH will deliver 55mA (1/20 of 1.1 AH, or 0.05C) for 20 hours before the voltage reaches an end voltage of 5.25 volts.

By cycling the battery a few times or float charging it for a month or two, the highest level of capacity development is achieved. Power-Sonic batteries are fully charged before leaving the factory, but full capacity is realized only after the battery has been cycled a few times or been on float charge for some time.

When a battery discharges at a constant rate, its capacity changes according to the amperage load. Capacity increases when the discharge current is less than the 20 hour rate and decreases when the current is higher.



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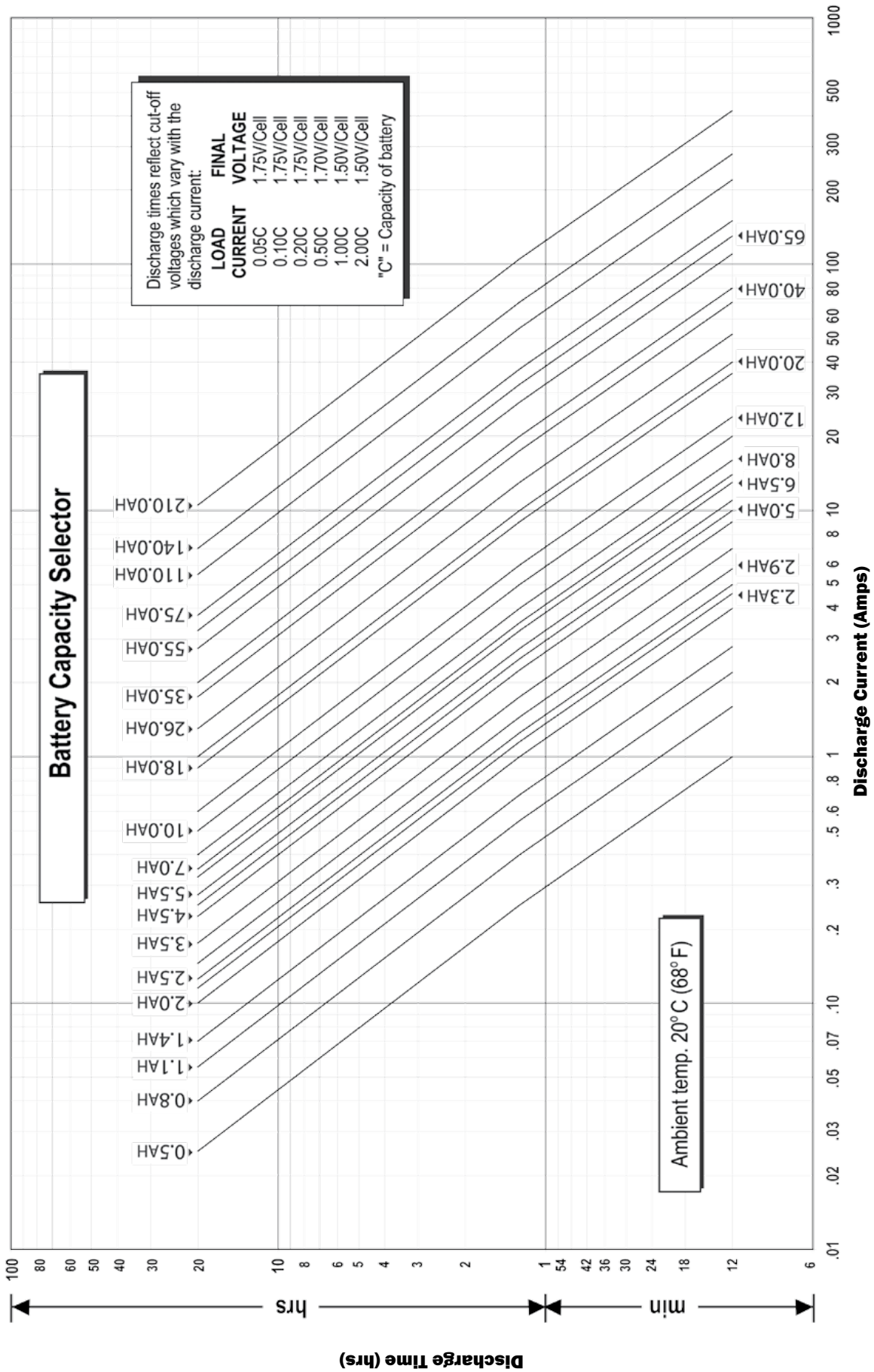


Figure 3: Capacity lines for Power-Sonic batteries

Figure 3 shows capacity lines for major Power-Sonic battery models with different ampere-hour ratings. Amperage is on the horizontal scale and the time elapsed is on the vertical scale; the product of these values is the capacity.

Proper battery selection for a specific application can be made from this graph if the required time and current are known. For example, to determine the proper capacity of a battery providing 3 amps for 20 minutes, locate the intersection of these values on the graph. The line immediately above that point represents the battery which will meet the requirement.

Performance Data

Discharge

During discharge the voltage will decrease. The graphs in Figure 4 illustrate this for different discharge rates and ambient temperatures. "C" is the rated capacity of a battery: "C" for model PS-610 (6V - 1.1 AH) is 1.1AH. By convention the rating of nearly all sealed-lead acid batteries, is based on a 20-hour (0.05C) discharge rate. For larger batteries used for telecom and large UPS systems (our PG-Series) the convention is to use a 10-hour rate (0.1C).

An important feature of Power-Sonic batteries is shown in the discharge curves; namely, the voltage tends to remain high and almost constant for a relatively long period before declining to an end voltage.

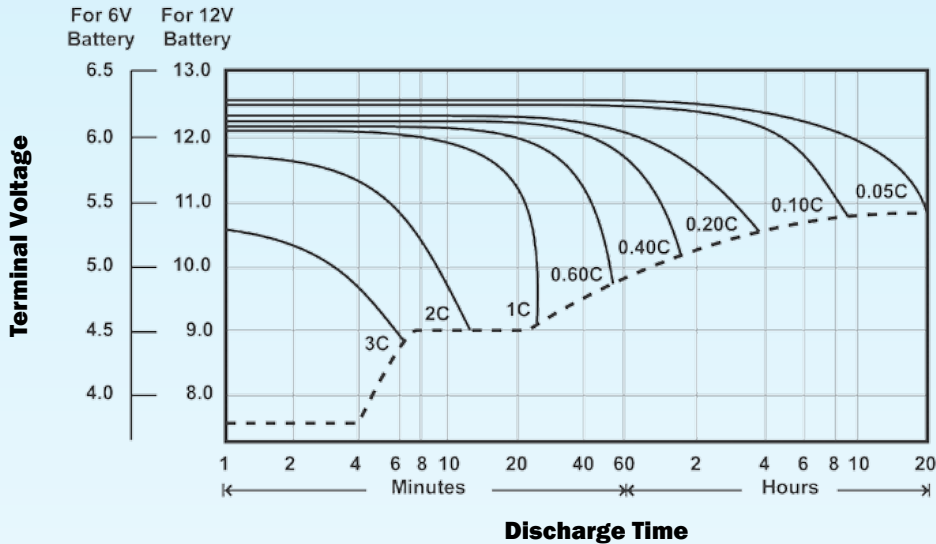


Figure 4: Discharge Characteristic Curves at 20°C (68°F)

Open-Circuit Voltage

Open circuit voltage varies according to ambient temperature and the remaining capacity of the battery. Generally, open circuit voltage is determined by the specific gravity of the electrolyte. Discharging a battery lowers the specific gravity. The open circuit voltage of a Power-Sonic battery is 2.16 V/cell when fully charged and 1.94 V/cell when completely discharged.

As seen in Figure 4, under load, the battery can deliver useful energy at less than 1.94 V/cell, but after the load is removed the open circuit voltage will "bounce back" to voltages shown in Figure 5, dependent upon residual capacity.

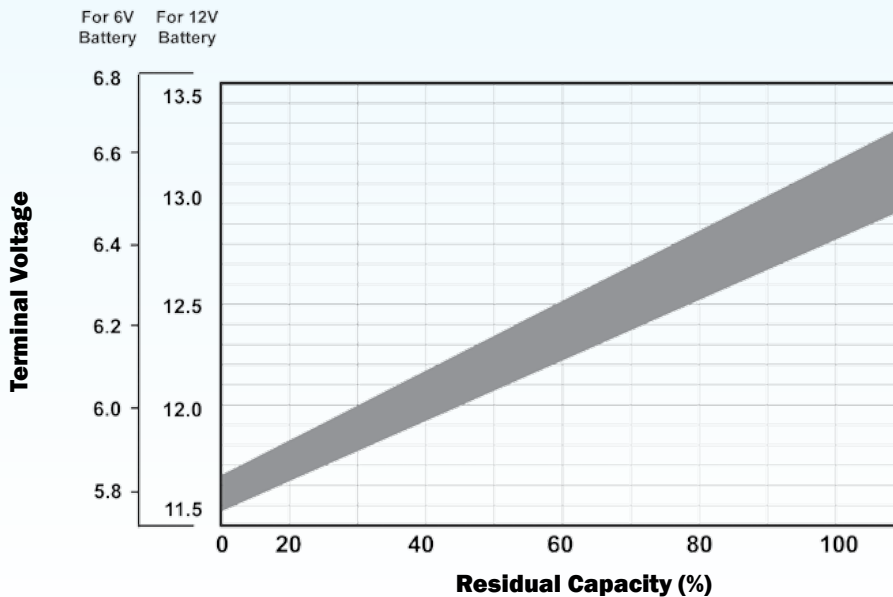


Figure 5: Open-Circuit Voltage Characteristics



Performance Data

Temperature

Actual capacity is a function of ambient temperature and rate of discharge. At 20°C (68°F) rated capacity is 100%. The capacity increases slowly above this temperature and decreases as the temperature falls. Even at -40°C (-40°F), however, the Power-Sonic battery will still function at better than 30% of its rated capacity when discharged at the 20-hour rate (0.05C). At any ambient temperature, the higher the rate of discharge, the lower the available capacity. This relationship is shown in Figure 6.

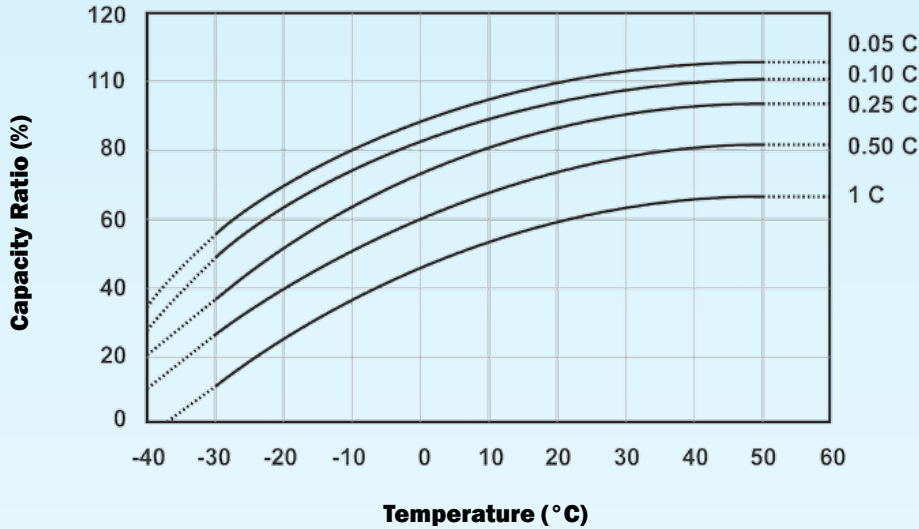


Figure 6: Effect of Temperature on Capacity

Power-Sonic batteries may be discharged at temperatures ranging from -40°C to 60°C (-40°F to 140°F) and charged at temperatures from -20°C to 50°C (-4°F to 122°F).

While raising ambient temperature increases capacity, it also decreases useful service life. It is estimated that battery life is halved for each 10°C (18°F) above normal room temperature.

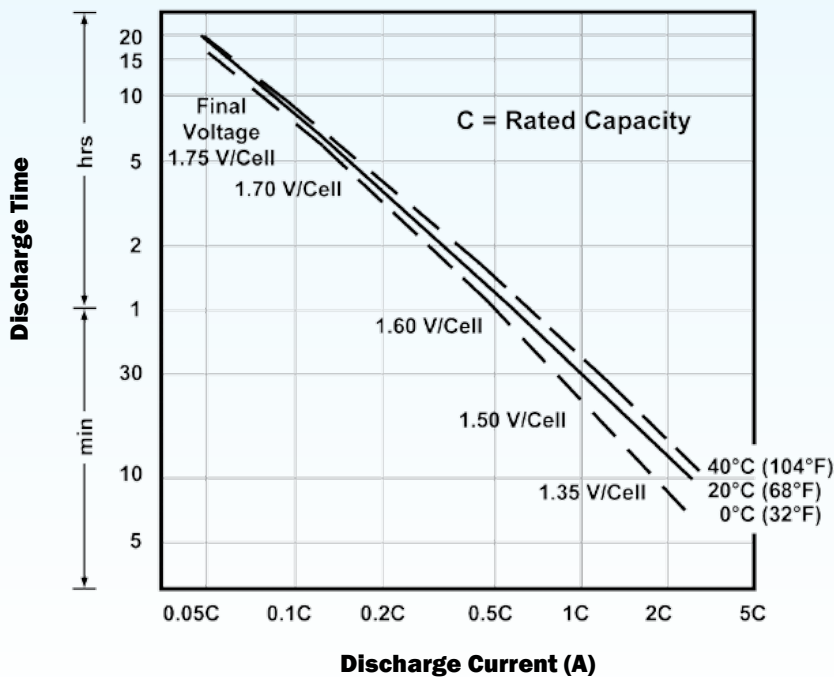


Figure 7: Relationship between current and discharge time for different ambient temperatures



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Performance Data

Shelf Life & Storage

Low internal resistance and special alloys in the electrodes assure a low self discharge rate and, consequently, a long shelf life. If kept at 20 °C (68 °F), about 60-70% of the nominal capacity remains after one year of storage. Due to the self-discharge characteristics of this type of battery, it is imperative that they be charged within 6 months of storage, otherwise permanent loss of capacity might occur as a result of sulfation.

The rate of self discharge varies with the ambient temperature. At room temperature (20 °C (68 °F)) it is about 3% per month. At low temperatures it is nearly negligible; at higher ambient temperatures self discharge increases. To obtain maximum battery life and performance, batteries should be recharged as soon as possible after each use and not stored in a discharged state. If possible batteries should be stored at 20 °C (68 °F) or lower, and recharged every six months when not in use.

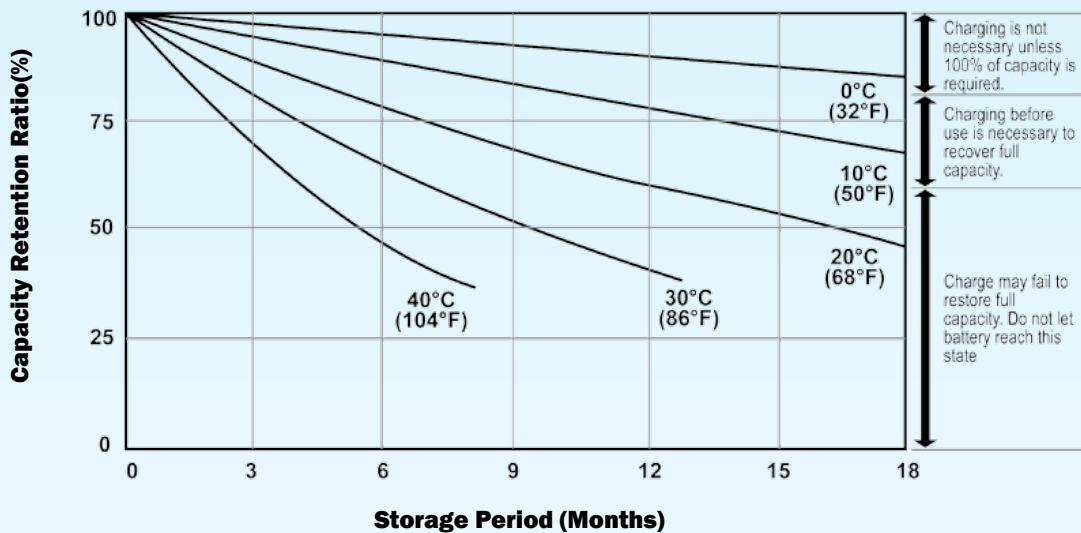


Figure 8: Self Discharge Characteristics

Battery Life

Cyclic Use: The number of charge/discharge cycles depends on the capacity taken from the battery (a function of discharge rate and depth of discharge), operating temperature and the charging method.

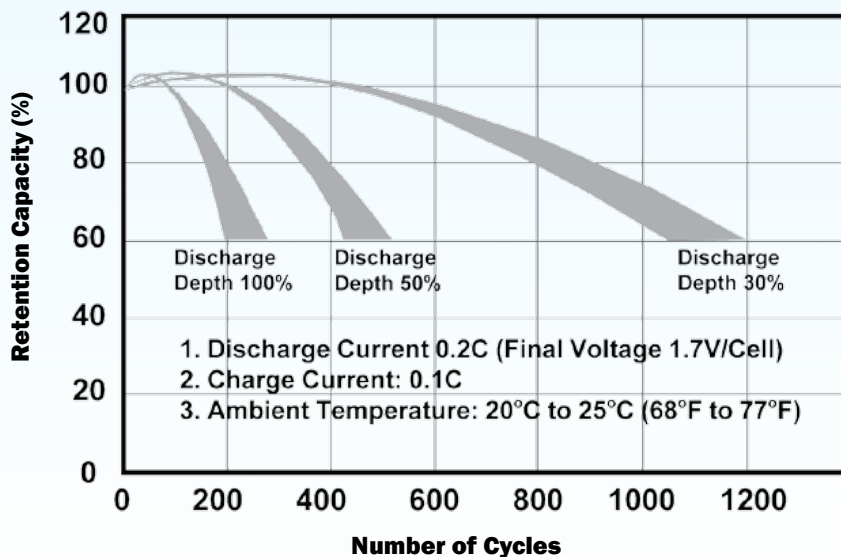


Figure 9: Relationship between depth of discharge and number of cycles as well as increases of capacity during the early cycles.



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Performance Data

Battery Life (continued)

Standby Use: The float service life, or life expectancy under continuous charge, depends on the frequency and depth of discharge, the charge voltage, and the ambient temperature. At a float voltage of 2.25V to 2.30V/cell and an ambient temperature of 20°C to 25°C (60°F to 77°F) Power-Sonic batteries should last four to five years before the capacity drops to 60% of its original rating.

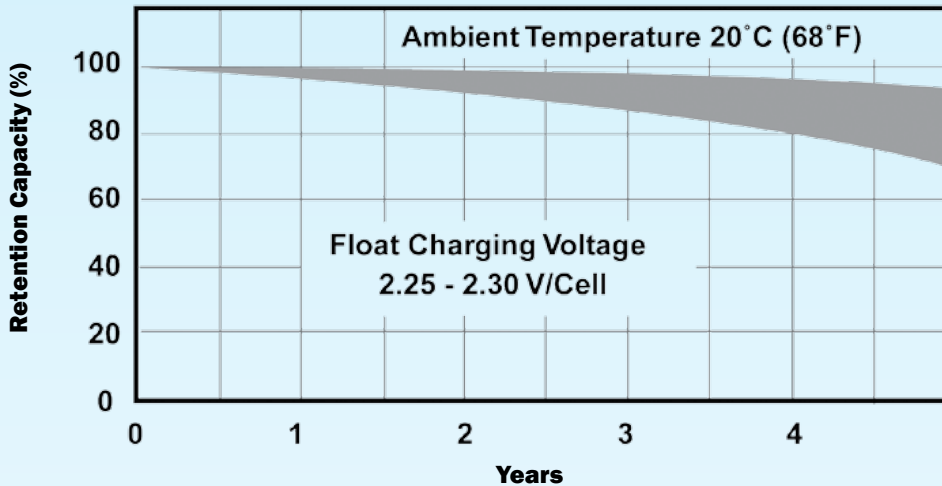


Figure 10: Indicates how capacity changes over time.

The graph in Figure 11 shows life characteristics in float (standby) service for ambient temperatures ranging from 15°C to 55°C (60°F to 130°F). If prevailing ambient temperatures are well above 20°C to 25°C (68°F to 77°F) the life expectancy of this type of battery in float service depends greatly on temperature compensated charging. The typical temperature coefficient is 2mV/cell/20°C and under.

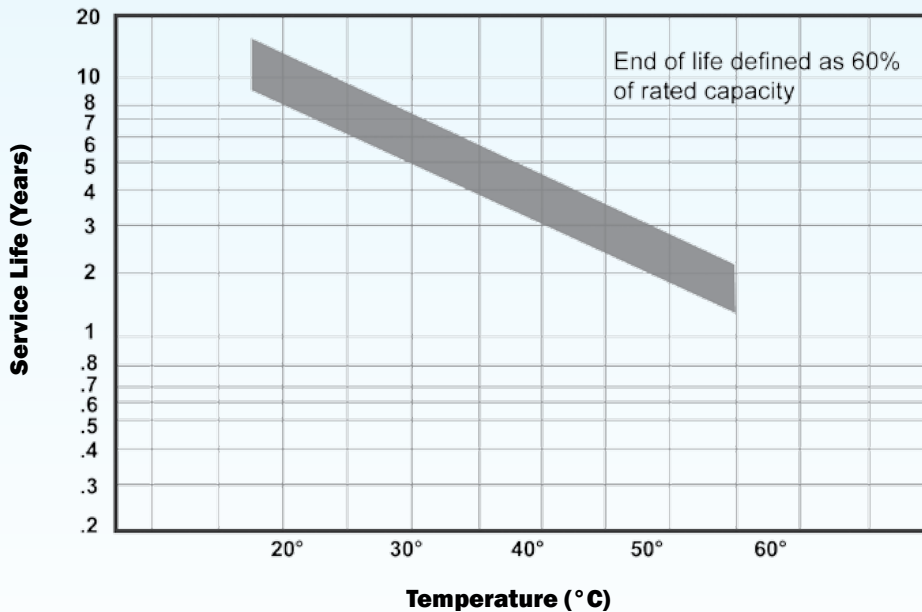


Figure 11: Service life at various ambient temperatures



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Performance Data

Over Discharge

To optimize battery life, it is recommended that the battery be disconnected from the load (either electronically or manually) when the end voltage - a function of the discharge rate - is reached. It is the voltage point at which 100% of the usable capacity of the battery has been consumed or continuation of the discharge is useless because of the voltage dropping below useful levels. The final discharge voltages per cell are shown in Table 1 (Page 4).

Discharging a sealed lead-acid battery below this voltage or leaving a battery connected to a load will impair the battery's ability to accept a charge. To prevent potential over discharge problems, voltage cut off circuits as shown in Figure 12 may be used.

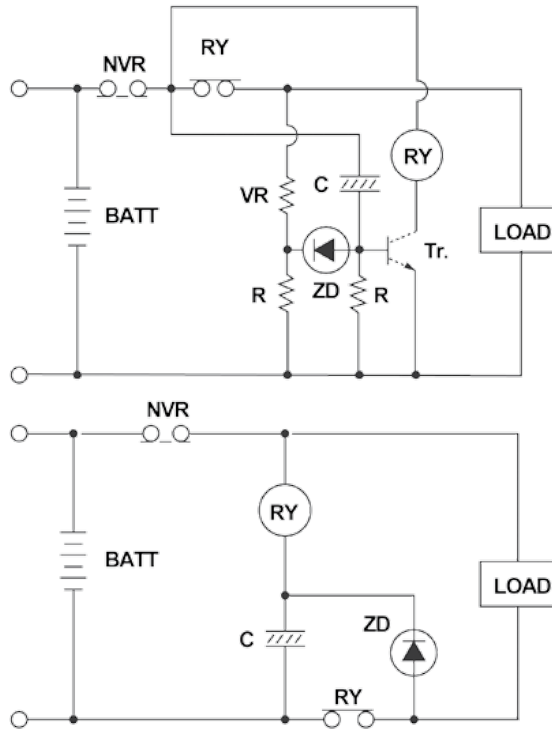


Figure 12: Circuits of Over-Discharge Preventative Device



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Charging

Dependable performance and long service life depend upon correct charging. Faulty procedures or inadequate charging equipment result in decreased battery life and/or unsatisfactory performance. The selection of suitable charging circuits and methods is as important as choosing the right battery for the application.

Power-Sonic batteries may be charged by using any of the conventional charging techniques:

- Constant Voltage
- Constant Current
- Taper-Current
- Two Step Constant Voltage

To obtain maximum service life and capacity, along with acceptable recharge time and economy, constant voltage-current limited charging is recommended.

To charge a Power-Sonic SLA battery, a DC voltage between 2.30 volts per cell (float) and 2.45 volts per cell (fast) is applied to the terminals of the battery. Depending on the state of charge, the cell may temporarily be lower after discharge than the applied voltage. After some time, however, it should level off.

During charge, the lead sulfate of the positive plate becomes lead dioxide. As the battery reaches full charge, the positive plate begins generating dioxide causing a sudden rise in voltage due to decreasing internal resistance. A constant voltage charge, therefore, allows detection of this voltage increase and thus control of the current charge amount.

Additional information regarding charging methods can be found on pages 13 through 19.

Charging

Charging Characteristics

During constant voltage or taper charging, the battery's current acceptance decreases as voltage and state of charge increase. The battery is fully charged once the current stabilizes at a low level for a few hours. There are two criteria for determining when a battery is fully charged: (1) the final current level and (2) the peak charging voltage while this current flows.

Charging Methods

Selecting the appropriate charging method depends on the intended use (cyclic or float service), economic considerations, recharge time, anticipated frequency and depth of discharge, and expected service life. The key goal of any charging method is to control the charge current at the end of the charge.

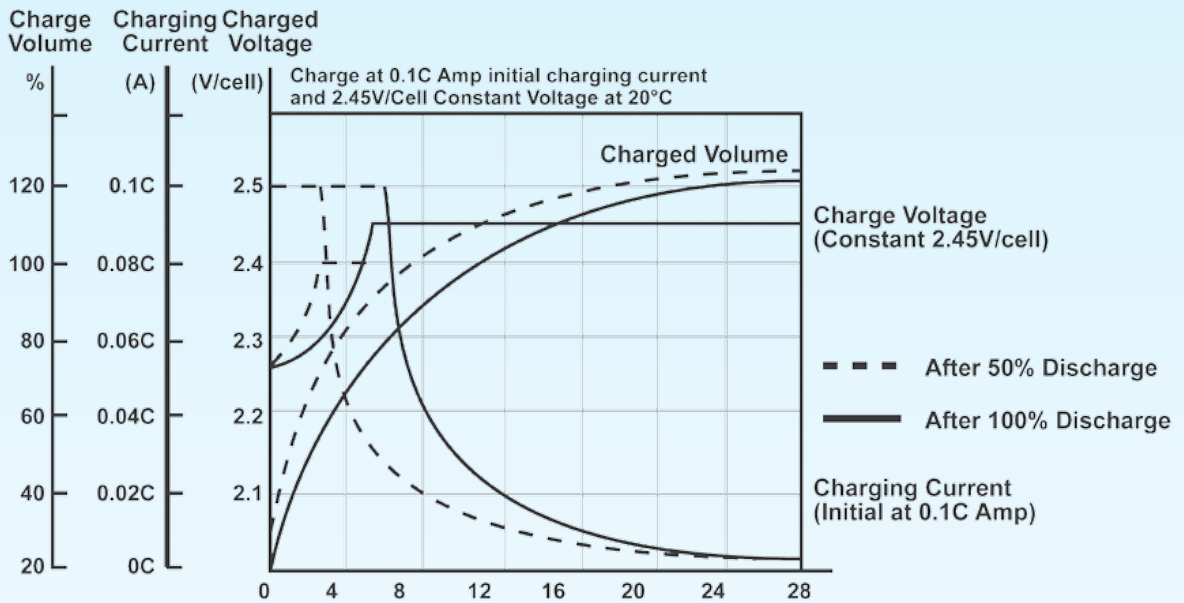


Figure 13: Typical charge characteristics for cycle service where charging is non-continuous and peak voltage can be higher.

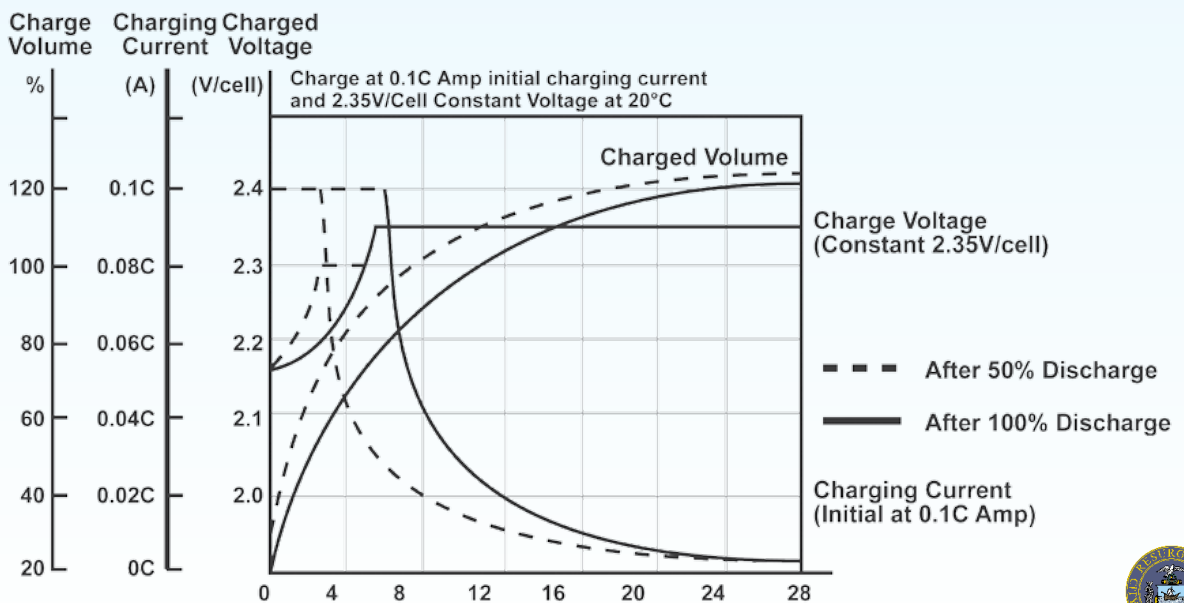


Figure 14: Typical characteristics for standby service type charge. Here, charging is continuous and the peak charge voltage must be lower.



Charging

Constant Voltage Charging

Constant voltage charging is the best method to charge Power-Sonic batteries. Depending on the application, batteries may be charged either on a continuous or non-continuous basis. In applications where standby power is required to operate when the AC power has been interrupted, continuous float charging is recommended. Non-continuous cyclic charging is used primarily with portable equipment where charging on an intermittent basis is appropriate.

The constant voltage charge method applies a constant voltage to the battery and limits the initial charge current. It is necessary to set the charge voltage according to specified charge and temperature characteristics. Inaccurate voltage settings cause over- or under-charge. This charging method can be used for both cyclic and standby applications.

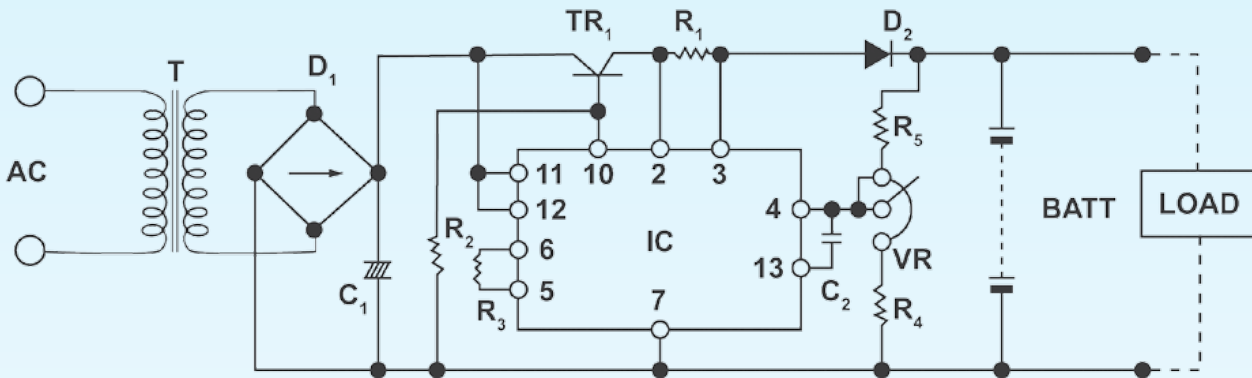


Figure 15: Constant voltage charging circuit

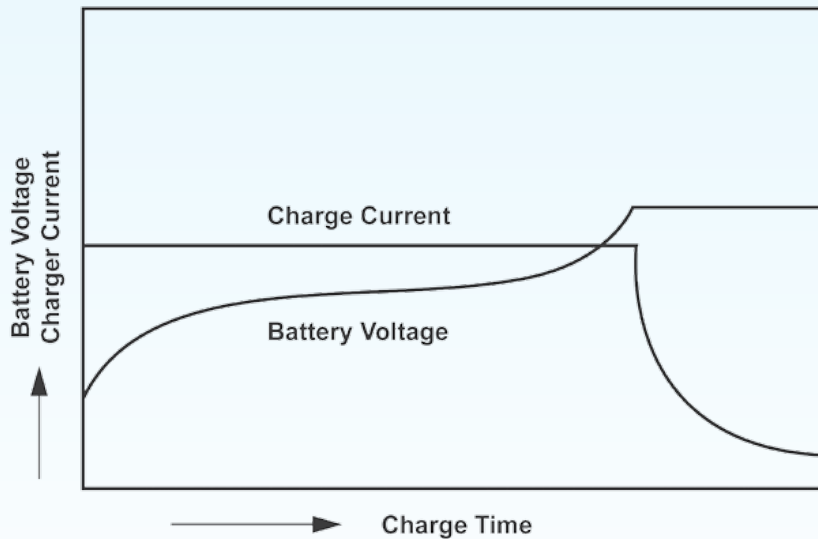


Figure 16: Constant voltage charging characteristics



Charging

Constant Current Charging

Constant current charging is suited for applications where discharged ampere-hours of the preceding discharge cycle are known. Charge time and charge quantity can easily be calculated, however an expensive circuit is necessary to obtain a highly accurate constant current. Monitoring of charge voltage or limiting of charge time is necessary to avoid excessive overcharge.

While this charging method is very effective for recovering the capacity of a battery that has been stored for an extended period of time, or for occasional overcharging to equalize cell capacities, it lacks specific properties required in today's electronic environment.

Taper-Current Charging

This method is not recommended as it is somewhat abusive of sealed lead acid batteries and can shorten service life. However, because of the simplicity of the circuit and low cost, taper-current charging is extensively used to charge multiple numbers and/or for cyclic charging.

When using a taper-current charger the charger time should be limited or a charging cut-off circuit be incorporated to prevent overcharge. Please contact our technical department if you need assistance with this.

In a taper-current charging circuit, the current decreases in proportion to the voltage rise. When designing a taper charger always consider power voltage fluctuations. In this event the internal resistance drop will convert to heat. Heat generated by the circuit should be measured and if required a heat sink should be incorporated in the design.

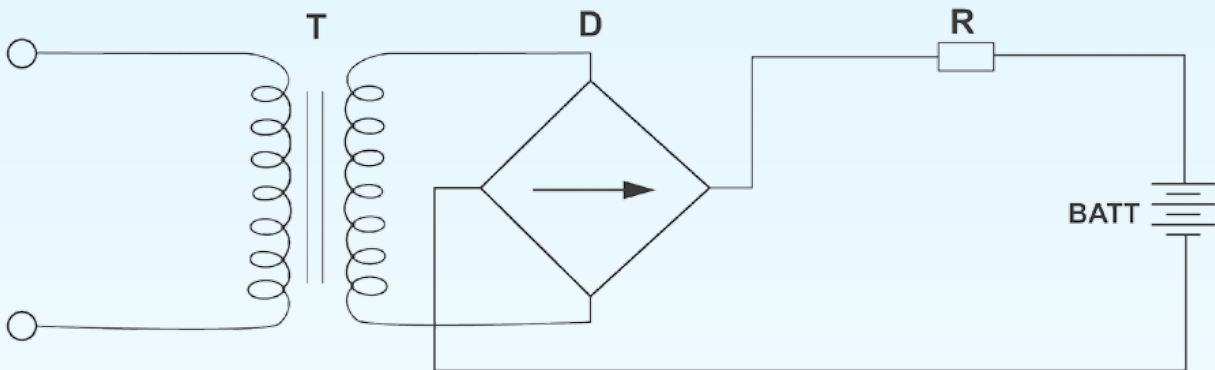


Figure 17: Taper-current charging circuit

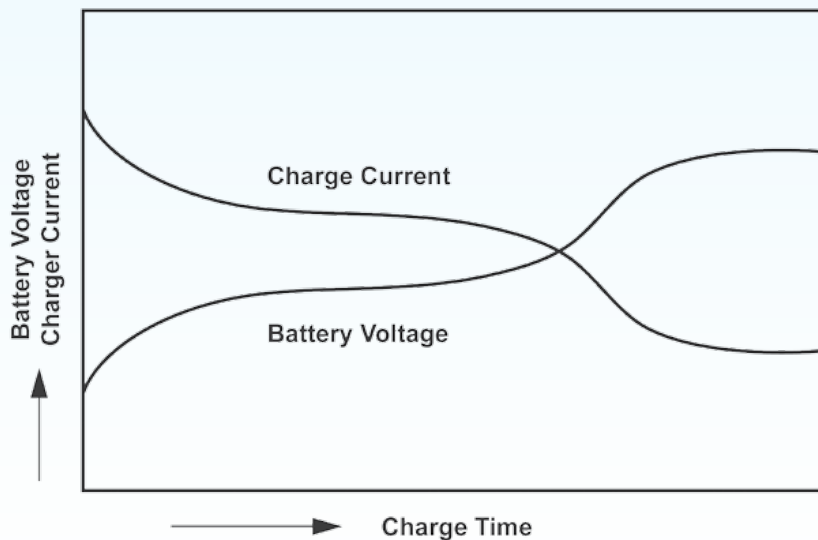


Figure 18: Taper-current charging characteristics for this type of basically unregulated charger.



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Charging

Overcharging

As a result of too high a charge voltage excessive current will flow into the battery, after reaching full charge, causing decomposition of water in the electrolyte and premature aging.

At high rates of overcharge a battery will progressively heat up. As it gets hotter, it will accept more current, heating up even further. This is called thermal runaway and it can destroy a battery in as little as a few hours.

Undercharging

If too low a charge voltage is applied, the current flow will essentially stop before the battery is fully charged. This allows some of the lead sulfate to remain on the electrodes, which will eventually reduce capacity.

Batteries which are stored in a discharged state, or left on the shelf for too long, may initially appear to be “open circuited” or will accept far less current than normal. This is caused by a phenomenon called “sulfation”. When this occurs, leave the charger connected to the battery. Usually, the battery will start to accept increasing amounts of current until a normal current level is reached. If there is no response, even to charge voltages above recommended levels, the battery may have been in a discharged state for too long to recover.

Caution! Never charge or discharge a battery in a hermetically sealed enclosure. Batteries generate a mixture of gases internally. Given the right set of circumstances, such as extreme overcharging or shorting of the battery, these gases might vent into the enclosure and create the potential for an explosion when ignited by a spark.

If in any doubt, or if concepts of proper use and care are unclear, please ensure that you contact Power-Sonic's technical department.

Charging for Cycle Operation

Cyclic applications generally require that recharging be done in a relatively short time. The initial charge current, however, must not exceed $0.30 \times C$ amps. Just as battery voltage drops during discharge, it slowly rises during charge. Full charge is determined by voltage and inflowing current. When, at a charge voltage of 2.45 ± 0.05 volts/cell, the current accepted by the battery drops to less than $0.01 \times C$ amps (1% of rated capacity), the battery is fully charged and the charger should be disconnected or switched to a float voltage of 2.25 to 2.30 volts/cell. The voltage should not be allowed to rise above 2.45 ± 0.05 volts/cell.

Charging for Standby Operation

Standby applications generally do not require that the battery be charged as fast or as frequently as in cycle operation. However, the battery must be kept constantly charged to replace the energy that is expended due to internal loss and deterioration of the battery itself. Although these losses are very low in Power-Sonic batteries, they must be replaced at the rate the battery self discharges; at the same time the battery must not be given more than these losses or it will be overcharged. To accomplish this, a constant voltage method of charging called “float charging” is used.

The recommended constant float voltage is 2.25 - 2.30 volts per cell. Maintaining this float voltage will allow the battery to define its own current level and remain fully charged without having to disconnect the charger from the battery. The trickle current for a fully charged battery floating at the recommended charge voltage will typically hover around the 0.001C rate (10mA for a 10AH battery, for example.)

The float charger is basically a constant voltage power supply. As in cycle chargers, care must be exercised not to exceed the initial charge current of $0.30 \times C$ amperes.



Charging

Two-Step Constant Voltage Charging

This method uses two constant voltage devices. In the initial charge phase the high voltage setting is used. When charging is nearly complete and the charge voltage has risen to a specified value (with the charge current decreased), the charger switches the voltage to the lower setting. This method allows rapid charging in cycle or float service without the possibility of overcharging, even after extended charging periods.

Temperature compensated

Select R_s to give correct float voltage at desired min. current: $0.6/R_3 = I_{max}$.

Select R_{isw} to turn on Q2 at desired current $I_{sw} = R_{isw}/0.6$

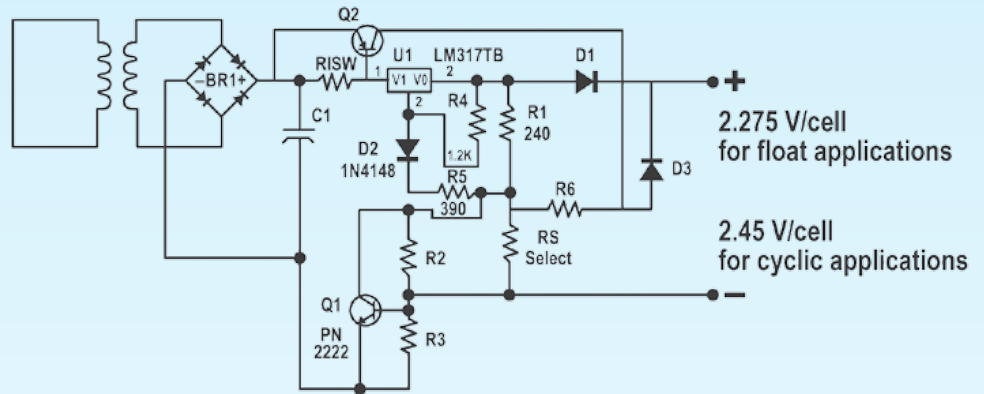


Figure 19: Dual stage current limited battery charger.

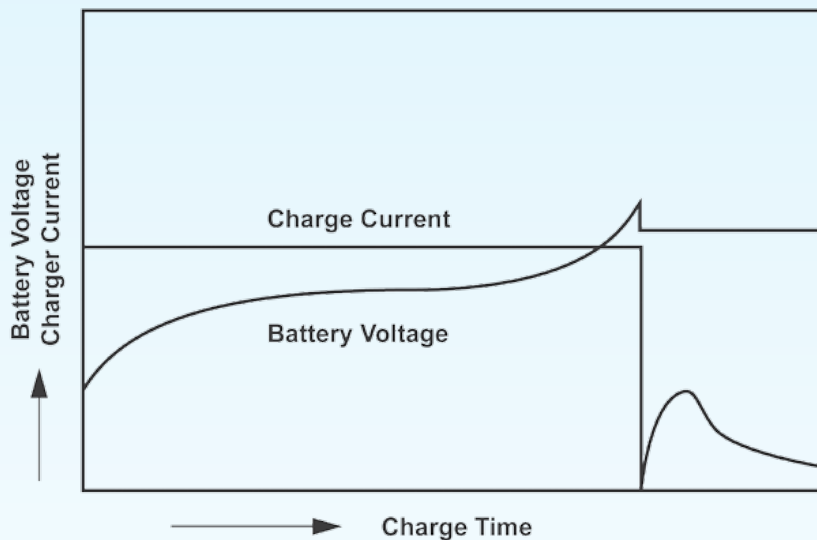


Figure 20: Two-step constant voltage charging characteristics.



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Charging in Series

Lead-acid batteries are strings of 2 volt cells connected in series, commonly 2, 3, 4 or 6 cells per battery. Strings of Power-Sonic batteries, up to 48 volts and higher, may be charged in series safely and efficiently. However, as the number of batteries in series increases, so does the possibility of slight differences in capacity. These differences can result from age, storage history, temperature variations or abuse.

Fully charged batteries should never be mixed with discharged batteries when charging in series. The discharged batteries should be charged before connection.

When a single constant voltage charger is connected across an entire high voltage string, the same current flows through all cells in the string. Depending on the characteristics of the individual batteries, some may overcharge while others remain in a slightly undercharged condition.

To minimize the effects of individual battery differences, use batteries of the same age, amp hour, and history and, if possible, charge in strings of no greater than 24 or 48 volts.

Charging

Charging in Parallel

Power-Sonic batteries may be used in parallel with one or more batteries of equal voltage.

When connected in parallel, the current from a charger will tend to divide almost equally between the batteries. No special matching of batteries is required. If the batteries of unequal capacity are connected in parallel, the current will tend to divide between the batteries in the ratio of capacities (actually, internal resistances).

When charging batteries in parallel, where different ratios of charge are to be expected, it is best to make provisions to assure that the currents will not vary too much between batteries.

Temperature Compensation

Power-Sonic batteries perform well both at low and high temperatures. At low temperatures, however, charge efficiency is reduced; at temperatures above 45 °C (113 °F), charge efficiency increases so rapidly that there is a danger of thermal runaway if temperature compensation is not precise.

The effect of temperature on charge voltage is less critical in float applications than in cyclic use, where relatively high charge currents are applied for the purpose of short recharge times.

Temperature effects should definitely be considered when designing or selecting a charging system. Temperature compensation is desirable in the charging circuit, especially when operating outside the range of 5 °C to 35 °C (41 °F to 95 °F). The temperature coefficient is -2mV/cell/°C below 20 °C (68 °F) in float use and -6mV/cell/ °C below 20 °C in cyclic use. For higher temperatures the charge voltage should be correspondingly decreased.

Ambient Charge Voltage Per Cell

Temperature	Cyclic Use (V)	Float Use (V)
-40 °C (-40 °F)	2.85 - 2.95	2.38 - 2.43
-20 °C (-4 °F)	2.67 - 2.77	2.34 - 2.39
-10 °C (14 °F)	2.61 - 2.71	2.32 - 2.37
0 °C (32 °F)	2.55 - 2.65	2.30 - 2.35
10 °C (50 °F)	2.49 - 2.59	2.28 - 2.33
20 °C (68 °F)	2.43 - 2.53	2.26 - 2.31
25 °C (77 °F)	2.40 - 2.50	2.25 - 2.30
30 °C (86 °F)	2.37 - 2.47	2.24 - 2.29
40 °C (104 °F)	2.31 - 2.41	2.22 - 2.27
50 °C (122 °F)	2.25 - 2.35	2.20 - 2.25

Table 4: Recommended charge voltages for different temperatures.

Top Charging

All battery lose capacity through self-discharge, it is recommended that a “top up charge” be applied to any battery that has been stored for a long period of time, prior to putting the battery into service.

To successfully top charge a battery stored for more than 12 months, the open circuit voltage must be higher than 2.0 volts per cell, in this case, always confirm open circuit voltage prior to attempting top up charging.



Charging

Charging Efficiency

The charging efficiency (η) of a battery is expressed by the following formula:

$$\eta = \frac{\text{AH Discharged After Fully Charged}}{\text{AH Delivered to Battery During Charge}}$$

The charging efficiency varies depending upon the state of charge of the battery, temperatures, and charging rates. Figure 21 illustrates the concept of the state of charge and charging efficiency. As shown in Figure 22. Power-Sonic batteries exhibit very high charging efficiency, even when charged at low charging rates.

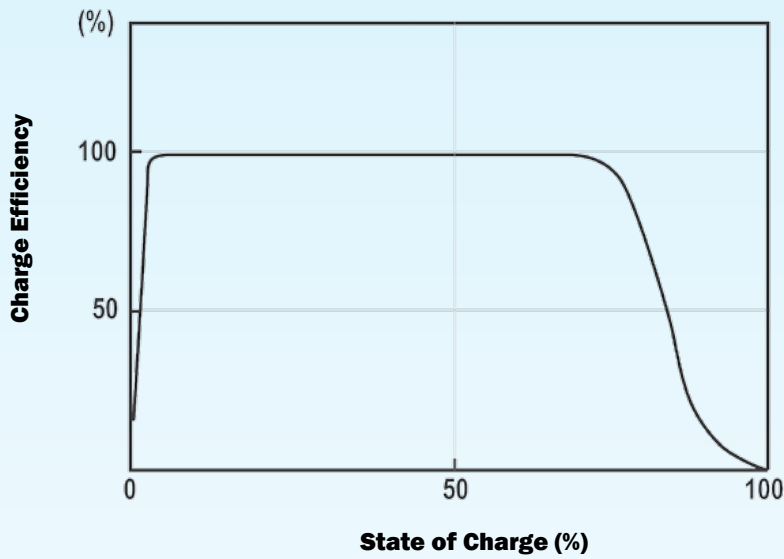


Figure 21: Charge efficiency vs. state of charge.

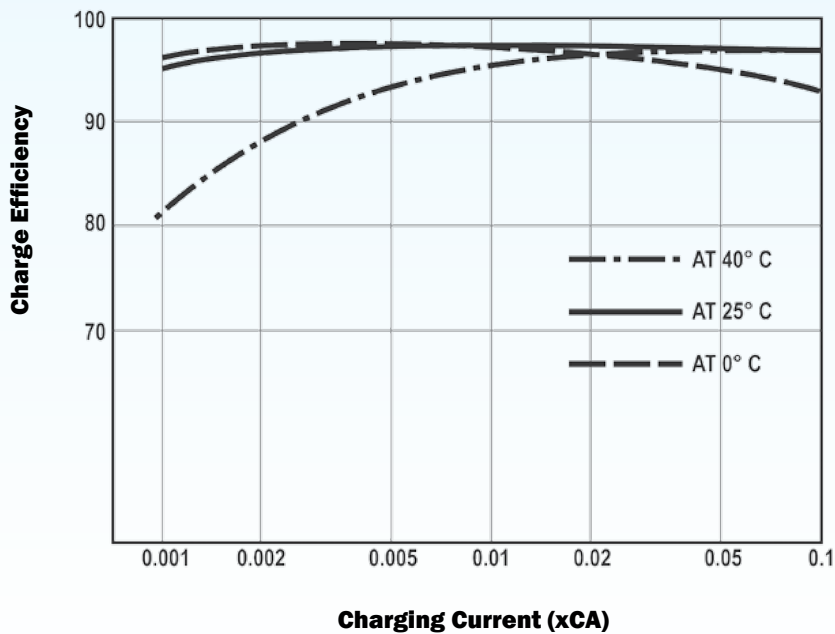


Figure 22: Charge efficiency vs. charging current.



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Important Do's and Don'ts

Power-Sonic rechargeable sealed lead-acid batteries are designed to provide years of dependable service. Adherence to the following guidelines will ensure that battery life is maximized and operation is trouble-free.

Material Safety Data Sheets (MSDS)

- It is important that you familiarize yourself with these prior to handling, installing and disposing of all batteries. If there are any questions raised from these please contact Power-Sonic's technical department.

Handling

- Always wear insulated gloves when handling batteries; especially when connecting series and parallel groups of batteries.
- Follow all precautions as described in our Materials Safety Data Sheets (MSDS). This information is subject to change depending upon government legislation. Visit our website: www.power-sonic.com for up-to-date copies of these.
- If equipment is to be stored for a long period of time the batteries should be disconnected to avoid undue drain on the batteries and any potential for damage to the equipment.

Installation

- Fasten batteries tightly and make provisions for shock absorption if exposure to shock or vibration is likely.
- When installing the battery within a piece of equipment, fix it securely at the lowest practicable point.
- The battery should not be attached to any piece of equipment during "burn-in" testing.
- Do not apply undue force to the terminals or bend them. Avoid applying heat to the terminals through processes such as soldering.
- If soldering to the battery terminals is unavoidable it must be accomplished within 3 seconds, using a soldering iron no greater than 100 watts.
- Do not place batteries in close proximity to objects which can produce sparks or flames, and do not charge batteries in an inverted position.
- Avoid exposing batteries to heat! Care should be taken to place batteries away from heat-emitting components. If close proximity is unavoidable, provide ventilation. Service life is shortened considerably' at ambient temperatures above 30°C (86°F).
- To prevent problems arising from heat exchange between batteries connected in series or parallel, it is advisable to provide air space of at least 0.4" (10mm) between batteries.
- Do not mix batteries with different capacities, different ages or of different makes. The difference in characteristics will cause damage to the batteries and possibly to the attached equipment.
- Battery cases and lids made of ABS plastic can sustain damage if exposed to organic solvents or adhesives.
- For best results and generally acceptable performance and longevity, keep operating temperature range between -40°C (-40°F) and 60°C (140°F).
- It is good practice to ensure that the connections are re-torqued and the batteries are cleaned periodically.
- Do not attempt to disassemble batteries. Contact with sulfuric acid may cause harm. Should it occur, wash skin or clothes with liberal amounts of water. Do not throw batteries into a fire; batteries so disposed may rupture or explode. Disassembled batteries are hazardous waste and must be treated accordingly.



Important Do's and Don'ts

Charging

- Batteries should not be stored in a discharged state or at elevated temperatures. If a battery has been discharged for some time, or the load was left on indefinitely, it may not readily take a charge. To overcome this, leave the charger connected and the battery should eventually begin to accept charge.
- Continuous over- or undercharging is the single worst enemy of a lead-acid battery. Caution should be exercised to ensure that the charger is disconnected after cycle charging, or that the float voltage is set correctly.
- Although Power-Sonic batteries have a low self-discharge rate which permits storage of a fully charged battery for up to a year, it is important that a battery be charged within 6 months after receipt to account for storage from the date of manufacture to the date of purchase. Otherwise, permanent loss of capacity might occur as a result of sulfation. To prolong shelf life without charging, store batteries at 10 °C (50 °F) or less.
- Although it is possible to charge Power-Sonic batteries rapidly, i.e. in 6-7 hrs. it is not normally recommended. Unlimited current charging can cause increased off-gassing and premature drying. It can also produce internal heating and hot spots resulting in shortened service life. Too high a charge current will cause a battery to get progressively hotter. This can lead to “thermal runaway” and can destroy a battery in as little as a few hours.
- Caution: Never charge or discharge a battery in an airtight enclosure. Batteries generate a mixture of gases internally. Given the right set of circumstances, such as extreme overcharging or shorting of the battery, these gases might vent into the enclosure and create the potential for an explosion when ignited by a spark. Generally, ventilation inherent in most enclosures is sufficient to avoid problems.
- When charging batteries in series (positive terminal of one battery is connected to the negative terminal of another) the interconnecting cables must all be of equal length and resistance to insure equalization of the load. All batteries in the string will receive the same amount of charge current, though individual battery voltages may vary.
- When charging batteries in parallel (positive terminals are connected to the positive terminal and negative terminals to the negative), all batteries in the string will receive the same charge voltage, but the charge current each battery receives will vary until equalization is reached.
- High voltage strings of batteries in series should be limited to twenty 6 volt or ten 12 volt batteries when a single constant voltage charger is connected across the entire string. Differences in capacity can cause some batteries to overcharge while others remain undercharged thus causing premature aging of batteries. It is, therefore, not advisable to mix batteries of different capacities, make, or age in a series string.
- To minimize the effects of cell or battery differences, charge the string in 24 volt battery groups through a constant current source with zener diode regulation across individual batteries or battery groups.
- Recharge time depends on the depth of the preceding discharge and the output current of the charger. To determine the approximate recharge time of a fully discharged battery, divide the battery's capacity (amp. hrs) by the rated output of the charger current (amps) and multiply the resulting number of hours by a factor of 1.75 to compensate for the declining output current during charge. If the amount of amp. hrs. discharged from the battery is known, use it instead of the battery's capacity to make the calculation.



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Notes



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Glossary

Active Material

The active electro-chemical materials used in the manufacture of positive and negative electrodes.

Ambient Temperature

The prevailing surface temperature to which a battery is exposed.

Ampere

Unit of measurement for electric current.

Ampere-Hour

The product of current (amperes) multiplied by time (hours). Used to indicate the capacity of a battery. Also Amp. Hr. or A.H.

Battery

Two or more cells connected together, most typically in series.

C

Used to signify a charge or discharge rate equal to the capacity of a battery divided by one hour. Thus C for a 1600 mAh battery would be 1.6 A. C/5 for the same battery would be 320 mA and C/10 would be 160 mA.

Capacity

The electrical energy available from a cell or battery expressed in ampere-hours.

- **Available capacity:** ampere-hours that can be discharged from a battery based on its state of charge, rate of discharge, ambient temperature, and specified cut-off voltage.
- **Rated capacity ("C"):** the discharge capacity the manufacturer states may be obtained at a given discharge rate and temperature.
- **Capacity fade:** the loss of capacity due to inadequate recharging.

Cell

The basic building block of a battery. The nominal voltage of a lead-acid cell is 2 volts.

- **Cell reversal:** the act of driving a cell into reverse polarity by excessive discharge.
- **Primary cell:** cell or battery that can be discharged only once.
- **Secondary cell:** the process is reversible so that charging and discharging may be repeated over and over.

Charge

The conversion of electrical energy to chemical energy; the process which restores electrical energy to a cell or battery.

- **Charge retention:** a battery's ability to hold a charge. It diminishes during storage.
- **Charge acceptance:** quantifies the amount of electric charge that accumulates in a battery.
- **Float charge:** maintains the capacity of a cell or battery by applying a constant voltage.

Charge (Continued)

- **Trickle charge:** maintains the capacity of a cell or battery by applying a small constant current.
- **Charge equalization:** brings all of the cells in a battery or string to the same state of charge.

Closed Circuit Voltage Test

A test method in which the battery is briefly discharged at a constant current while the voltage is measured.

Cutoff Voltage

The final voltage of a cell or battery at the end of charge or discharge.

Cycle

A single charge and discharge of a cell or battery.

Deep Cycle

A cycle in which the discharge continues until the battery reaches its cut-off voltage, usually 80% of discharge.

Direct Current (DC)

The type of electrical current that a battery can supply. One terminal is always positive and the other always negative.

Discharge

The process of drawing current from a battery.

- **Deep Discharge:** the discharge of a cell or battery to between 80% and 100% of rated capacity.
- **Depth of Discharge:** the amount of capacity - typically expressed as a percentage - removed during discharge.
- **Self Discharge:** the loss of capacity while stored or while the battery is not in use.
- **Self Discharge Rate:** the percent of capacity lost on open circuit over a specified period of time.

Drain

The withdrawal of current from a battery.

Electrode

Positive or negative plate containing materials capable of reacting with electrolyte to produce or accept current.

Electrolyte

Conducts ions in a cell. Lead acid batteries use a sulfuric acid solution.

End of Charge Voltage

The voltage reached by the cell or battery at the end of charge, while the charger is still attached.

Energy Density

Ratio of battery energy to volume or weight expressed in watt-hours per cubic inch or pound.



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Glossary

Gas Recombination

The process by which oxygen gas generated from the positive plate during the final stage of charge is absorbed into the negative plate, preventing loss of water.

High Rate Discharge

A very rapid discharge of the battery. Normally in multiples of C (the rating of the battery expressed in amperes).

Impedance

The resistive value of a battery to an AC current expressed in ohms (Ω). Generally measured at 1000 Hz at full charge.

Internal Resistance

The resistance inside a battery which creates a voltage drop in proportion to the current draw.

Negative Terminal

The terminal of a battery from which electrons flow in the external circuit when a battery discharges. See Positive Terminal

Nominal Voltage / Nominal Capacity

The nominal value of rated voltage / the nominal value of rated capacity. The nominal voltage of a lead-acid battery is 2 volts per cell.

Open Circuit Voltage

The voltage of a battery or cell when measured in a no load condition.

Overcharge

The continuous charging of a cell after it achieves 100% of capacity. Battery life is reduced by prolonged overcharging.

Parallel Connection

Connecting a group of batteries or cells by linking all terminals of the same polarity. This increases the capacity of the battery group.

Polarity

The charges residing at the terminals of the battery.

Positive Terminal

The terminal of a battery toward which electrons flow through the external circuit when the cell discharges. See Negative Terminal.

Rated Capacity

The capacity of the cell expressed in amperes. Commonly, a constant current for a designated number of hours to a specified depth of discharge at room temperature.

Recombination

The state in which the gasses normally formed within the battery cell during its operation are recombined to form water.

Series Connection

The connection of a group of cells or batteries by linking terminals of opposite polarity. This increases the voltage of the battery group.

Self Discharge

The loss of capacity of a battery while in stored or unused condition without external drain.

Separator

Material isolating positive from negative plates. In sealed lead acid batteries it normally is absorbent glass fiber to hold the electrolyte in suspension.

SLA Battery

Sealed lead-acid battery, generally having the following characteristics: Maintenance-free, leak-proof, position-insensitive. Batteries of this type have a safety vent to release gas in case of excessive internal pressure build-up. Hence also the term: Valve regulated battery.

“Gel Cells” are SLA batteries whose dilute sulfuric acid electrolyte is immobilized by way of additives which turn the electrolyte into a gel.

Service Life

The expected life of a battery expressed in the number of total cycles or years of standby service to a designated remaining percentage of original capacity.

Shelf Life

The maximum period of time a battery can be stored without supplementary charging.

Standby Service

An application in which the battery is maintained in a fully charged condition by trickle or float charging.

State of Charge

The available capacity of a battery at a given time expressed as a percentage of rated capacity.

Sulfation

The formation or deposit of lead sulfate on the surface and in the pores of the active material of the batteries' lead plates. If the sulfation becomes excessive and forms large crystals on the plates the battery will not operate efficiently and may not work at all.

Thermal Runaway

A condition in which a cell or battery on constant potential charge can destroy itself through internal heat generation.

Valve Regulated Lead Acid Battery (VRLA)

See “SLA Battery” listed above.





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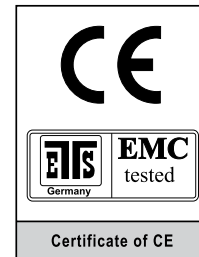


Quality is always #1

We employ IQC, PQC and ISO 9001 Quality Management Systems to test materials, monitor manufacturing processes and evaluate finished products prior to shipment. All our batteries are 100% tested with advanced computer equipment prior to being released for sale.

Power-Sonic management and staff are committed to providing the best possible service to satisfy our customer's needs, and fulfill our undertaking to deliver top grade products on time and at a competitive price.

Our batteries are manufactured to international standards including JIS, DIN and IEC and have UL and CE certification.



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