

Welcome

EaglePicher Technologies, LLC

EaglePicher Technologies, LLC is a privately owned by Vectra Co. and has facilities in Missouri, Kansas, Rhode Island, California and Canada. EaglePicher Technologies operates five divisions, Defense, Space, Commercial Power Solutions, Aviation, and Medical. The operating group develops and markets advanced high-reliability power systems and associated electronics for government, space and commercial applications. Areas of global focus include telecommunications, medical, nuclear power plants, space, defense, environmental, and semiconductors.

Defense

- Batteries
- Chargers
- Electronics
- Energetic Devices

Applications

Fuses
Infantry Support Systems
Launch Vehicles
Missiles
Satellites

"C" and Porter Streets
Joplin, MO 64801

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Energetic Devices

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Joplin, MO 64802

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Commercial Power Solutions

- Batteries
- Chargers
- Electronics

Applications

Emergency Lighting
Medical Devices
Motive Power
Robotics

Joplin, MO (Range Line)

Building 102
3220 Industrial Rd
Joplin, MO 64801

Distributive products:

Tel: 1-800-201-0215 or 417-659-9635

Fax: 417-626-2078

Vancouver, BC, Canada

13136 82A Avenue
Surrey, BC
Canada V3W 9Y6

Tel: 1-800-201-0215 or 604-543-4350

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EaglePicher Corporate Headquarters

EaglePicher Technologies, founded in 1843 and headquartered in St. Louis, Missouri, is a diversified manufacturer and marketer of innovative, advanced technology and industrial products and services for space, defense, environmental, medical, semiconductor and commercial applications worldwide. The company has 850 employees and operates 9 plants in the United States, and Canada.

EaglePicher Defense

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Welcome

EAGLEPICHER⁺
TECHNOLOGIES

Energetic Devices

EaglePicher Technologies, LLC became involved in the study of pyrotechnic devices in 1984 with the institution of a small research and development lab designed to characterize the numerous devices being used in the production of thermal batteries. By the end of 1984, the personnel dedicated to this lab began manufacturing prototype 1-amp/1-watt devices. Numerous prototypes were manufactured during the following two-year time period. In November 1987, EaglePicher began qualification testing of a 1-amp/1-watt igniter to the requirements of MIL-I-23659, with successful completion of this testing in June of 1988. In, 1989, EaglePicher successfully completed testing to the requirements of MIL STD 1512 of another EaglePicher developed, designed, and manufactured igniter.

During the proceeding years, EaglePicher continued its pyrotechnic advances with numerous contracted ventures ranging from explosive leads, detonators, bellows, igniters and burst assemblies to fully assembled lanyard start assemblies and bottle cutters. In June 1995, EaglePicher acquired a licensing agreement and exclusive production rights to a line of specialized explosive devices developed by ICI Americas Inc., Valley Forge, Pennsylvania. Existing structures at EaglePicher's Joplin,

Missouri site were remodeled during the summer of 1995 with qualification and production efforts beginning in July of that year.

In 2003, production demands and the limitations imposed on explosive quantity capacity necessitated an expansion of the Energetic Devices operation. It was moved to the current location in Seneca, Missouri where explosives capacity has been increased to more than 20 times the previous site. EaglePicher Energetic Devices now has the capacity to deliver high volume, high quality products to our customers as their schedules require.

EaglePicher Energetic Devices is committed to continuously improving its manufacturing processes. This is exhibited by the rigorous application of Six Sigma methodologies, and achievement of ISO 9001:2009 and AS9100C certification.

Welcome

Explosive and Pyrotechnic Devices and Their Applications

How They Work

Explosive and pyrotechnic devices transform a small input of mechanical or electrical energy into a higher level of mechanical or thermal energy that is applied to do practical work on a one-time basis.

This is accomplished by releasing the stored energy in an explosive or pyrotechnic mixture through a precisely controlled reaction. The amount of energy released and the way it is used can vary widely based on design and application.

The inherent advantages of these devices include high power-to-weight ratio, compact size, low input energy requirements and extreme reliability.

Types of Devices

Explosive devices, such as detonators and boosters, use secondary explosives for their output charge. They are used in artillery, mortar, cannon and bomb fuzing, as well as in detonation of main warheads. An overview of explosives technology is included in this manual.

Pyrotechnic devices are actuated by small quantities of less powerful primary explosives. They take many forms and are used to provide motion, perform work, ignite materials, generate gas and to accomplish many other tasks.

Applications

EaglePicher Technologies, LLC manufactures a wide variety of explosive and pyrotechnic devices. Each product category is listed here along with a general description and some typical applications. Many devices are available

with built in time delay and/or one-amp/one-watt firing characteristics. Variations also include size, power, input requirements, environmental resistance, material composition, and configuration. Please contact an EaglePicher representative for more information.

Actuators/Motors

These devices transform pyrotechnic generated energy into motion to perform work against an external load.

Bellows actuators produce linear or rotary motion with a relatively long stroke. When actuated, the bellows expands following any straight or curved path established by surrounding surfaces, and will retain its extended position under load.

Applications include:

- rotating a shaft
- pushing a mechanical load
- disconnecting a plug
- adjusting a camera
- arming a projectile

Piston actuators produce a pushing linear motion. They are available in microminiature and miniature sizes with a variety of stroke lengths, piston sizes and shapes.

Applications include:

- puncturing a container
- uncaging a gyroscope
- indicating the presence of unwanted electrical impulses
- firing a primer or stab detonator
- arming a projectile

Dimple actuators produce short linear motion by inverting a dimpled cup. They hold their position under load.

Applications include:

- operating a switch, latch or relay
- pushing a mechanical load
- arming a projectile
- locking, unlocking or releasing

Retractable actuators produce a pulling or withdrawing type of linear motion. When actuated, a piston partially retracts into the casing and locks into place.

Applications include:

- pulling mechanical loads
- locking, unlocking or releasing
- operating a switch, latch or relay

Cutters

These devices use pyrotechnic generated energy to power a wide variety of cutting mechanisms.

Applications include:

- severing control or communication wires
- cutting tubes to release coolant
- puncturing diaphragms
- severing mooring cables
- cutting reefing lines
- breaking glass vials to release chemicals

Gas Generators

These devices use a precisely controlled chemical reaction to produce a specified volume of gas. The resulting gas pressure is used to do mechanical work.

Applications include:

- displacing a liquid
- pressurizing a container
- operating a cartridge-actuated device (CAD)
- inflating air bags
- actuating expelling bladders and other ejecting devices
- dispensing powder from a corked vial

Igniters

These devices use a precisely controlled pyrotechnic reaction to produce a specified output of gas, flame or hot particles.

Applications include igniting:

- safety fuse
- propellants, heat powders
- thermal batteries
- metal/oxidant mixes
- other deflagrating materials

Switches

These small, lightweight devices use pyrotechnic-generated gas pressure to open or close one or more electrical circuits — instantaneously or with delays of up to 6 seconds. Each switch is hermetically sealed, preventing any leakage of pyrotechnic reaction products.

Applications include:

- emergency power cut-off
- delay arming of fuses
- sequencing a series of events from a single initiation
- aborting ignition/detonation
- triggering an alarm

Detonators and Explosive Leads

As part of an explosive train, these devices are transfer elements which lead to detonation of a larger high explosive charge.

EaglePicher manufactures a complete line of military detonators, explosive leads and other components for fuzing applications. They cover a wide range of requirements for size, sensitivity, output, and environmental resistance.

Detonator types include:

- electrically initiated – wirebridge, 1-amp/1-watt no-fire
- mechanically initiated – percussion, stab
- hermetically sealed
- ruggedized
- miniature

Quick-Acting Valves

These pyrotechnic-powered, instant operating spool valves are for starting or stopping the flow of liquids. They can be reset for future use without removing them from the line.

Applications include:

- operating fire extinguishing systems
- terminating flow of flammable gas or liquid
- emergency activation or shutdown of fluid systems

Other Devices

EaglePicher Technologies, LLC can design and manufacture customized explosive and pyrotechnic devices, or modify existing designs to meet customer requirements. Please contact an EaglePicher representative early in the design stage for assistance.

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Actuators / Motors

These devices transform pyrotechnic-generated energy into motion to perform work against an external load. EaglePicher, LLC manufactures several different types of actuators including piston, bellows, dimple and retractable.

Applications include:

- Puncturing a pressurized container or diaphragm
- Operating a switch or relay
- Locking, unlocking or releasing
- Rotating a shaft
- Pushing or pulling mechanical load

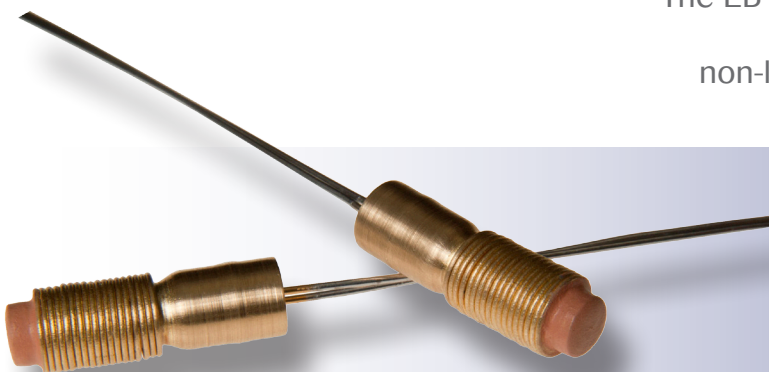
Bellows Actuators

These devices transform pyrotechnic energy into motion to perform work against an external load. Bellows actuators produce linear or rotary motion with a relatively long stroke. When actuated, the bellows expands following any straight or curved path established by surrounding surfaces, and will retain its extended position under load.

Applications include:

- Rotating a shaft
- Pushing a mechanical load
- Disconnecting a plug
- Adjusting a camera
- Arming a projectile.

EB-401-2 Bellows Actuator



The EB-401-2 Bellows Actuator is a pyrotechnic-actuated device that produces linear or non-linear motion with a relatively long stroke.

When actuated, the bellows expands following any straight, arcuate, or other path established by surrounding surfaces. It is hermetically sealed and holds its extended position under load.

Variations

Variations are possible in stroke, length, radius of curvature, force, shape of the bellows nose, firing characteristics and environmental resistance.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

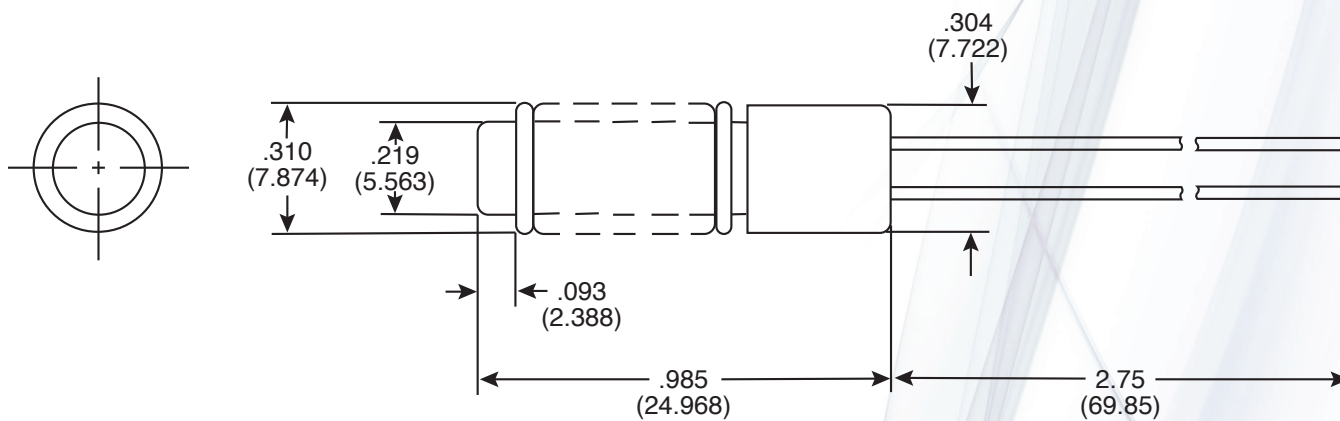
Specifications

Electrical	
Bridge Resistance @ 70°F (21°C)	7.0±2.0 ohm
All-fire Current	0.68 microfarad capacitor charged to 38.5 ± 0.5 Vdc (5000 erg minimum).
Insulation Resistance @ 500 Vdc, Shunted Leads to Case, Before Firing	100 megohms

Specifications Continued

Mechanical	
Size	See drawing
Weight	5 gm Max.
Stroke Length	5/8"
Output	4 in-lb torque @ 55° (900-1900 RPM)
Function Time	25.0 ms Max.
Environmental	
Temperature	Operating range: -65°F to +160°F (-54°C to +70°C) Temperature and humidity: 28 days per MIL-STD-331, Test No. 105.1
High Frequency Vibration	10-2000-10Hz, d.a. 0.15" (3.81 mm), 30 min/cycle, 1 cycle/plane, 3 mutually perpendicular planes.
Low-Frequency Vibration	MIL-STD-331, Test B1, para. B1.6.12
Jolt	MIL-STD-331, Test A1 para. A 1.2
Drop	40-ft-drop test, 3 axes
Chemical	
Energetic Compounds	Lead Styphnate LMNR/Black Powder
Freight Classification	
Shipping Name	Bellows Actuator
Hazard Classification	Unregulated

EB-401-2



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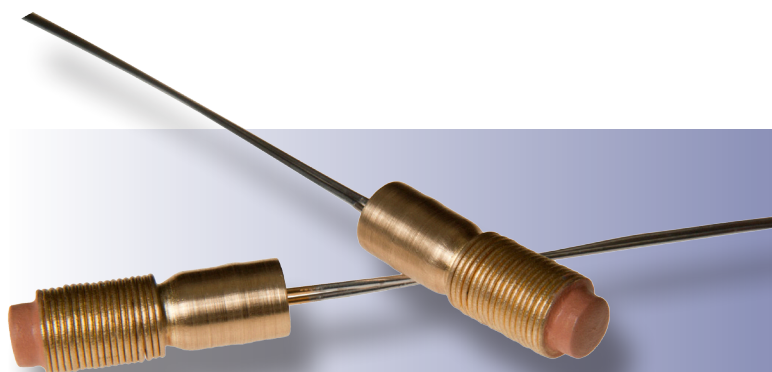


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EB-401-3 Bellows Actuator



The EB-401-3 Bellows Actuator is a pyrotechnic-actuated device.

The EB-401-3 produces linear or non-linear motion with a relatively long stroke. When actuated, the bellows expand following any straight, arcuate, or other path established by surrounding surfaces. It is hermetically sealed and holds its extended position under load.

Variations

Variations are possible in stroke, length, radius of curvature, force, shape of the bellows nose, firing characteristics and environmental resistance.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical	
Bridge Resistance @ 70°F (21°C)	7.0±2.0 ohm
All-fire Current	0.68 ± 1% microfarad capacitor charged to 38.5 ± 0.5 Vdc (5000 erg Max.)
Insulation Resistance @ 500 Vdc, Shunted Leads to Case Before Firing	100 megohms Min.

Specifications Continued

Mechanical	
Size	See Drawing
Weight	5 gm Max.
Stroke Length	1.0" (25.4 mm)
Output	30 in-lb (34 N-m) torque @ 15° 4 in-lb (17 N-m) torque @ 70°
Function Time	25.0 ms Max.
Environmental	
Temperature	Operating range: -65°F to +160°F (-54°C to +70°C) Temperature and humidity: 28 days per MIL-STD-331, Test No. C1
High Frequency Vibration	10-2000-10Hz, d.a. 0.06" 20 min/cycle, 3 cycles/plane 3 mutually perpendicular planes
Low-Frequency Vibration	MIL-STD-331, Test B1 at room temperature in the vertical and horizontal planes.
Jolt	MIL-STD-331, Test A1
Drop	MIL-STD-331, Test A3
Chemical	
Energetic Compounds	Lead Styphnate LMNR/Black Powder
Freight Classification	
Shipping Name	Bellows Actuator
Hazard Classification	Unregulated

EB-401-3

Safety

Maximum pyrotechnic weight:

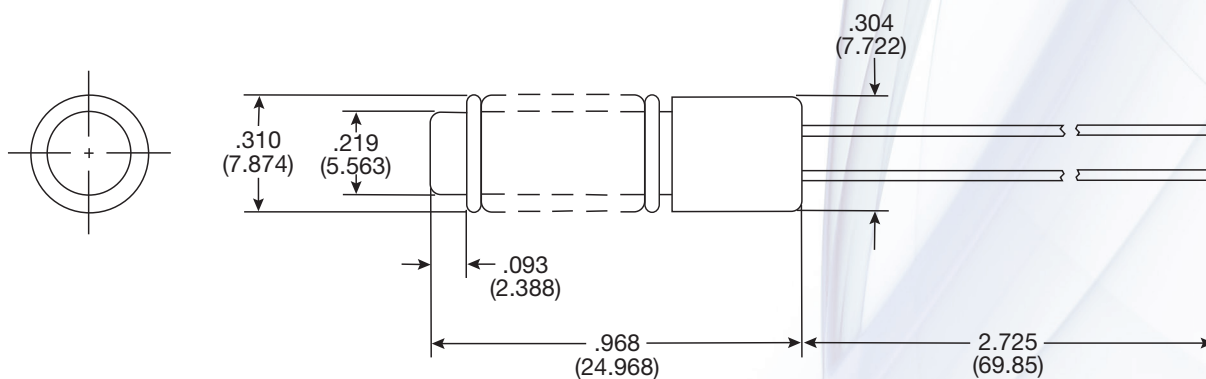
75mg

Warning:

The EB-401-3 Bellows Actuator is hermetically sealed and will not rupture when fired under normal test conditions. It may fire if exposed to temperatures above 200°F (93°C), or an electrical charge exceeding the specified no-fire current.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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1MT1106 Bellows Actuator

The 1MT1106 Bellows Actuator is a pyrotechnic-actuated device that produces linear or non-linear motion with a relatively long stroke.

It is larger and more powerful than most bellows actuators. When actuated, the bellows expands following a straight line, arcuate, or other path established by surrounding surfaces. It holds its extended position under load.

Variations

Variations are possible in firing characteristics, environmental resistance, length of stroke, force, radius of curvature and shape of bellows nose.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C)	4.5 ± 0.5 ohm
All-fire Current @ -65°F (-54°C)	1.0 amp, 10 ms
No-Fire Current @ 160°F (71°C)	0.050 amp, 30 sec
Insulation Resistance @ 500 Vdc, Shunted Leads to Case, Before Firing	30 megohms Min.

Mechanical

Bellows Material	Brass
Size	See drawing
Weight	16 gm
Output and Function Time	Will overcome a 50 lb (224 N) detent and extend 1 1/2" (38.1 mm) against a 5 lb spring in 20 ms Max.

Environmental

Temperature	Operating range: -65°F to +160°F (-54°C to +71°C) Temperature and humidity: MIL-STD-331, Test No. C1
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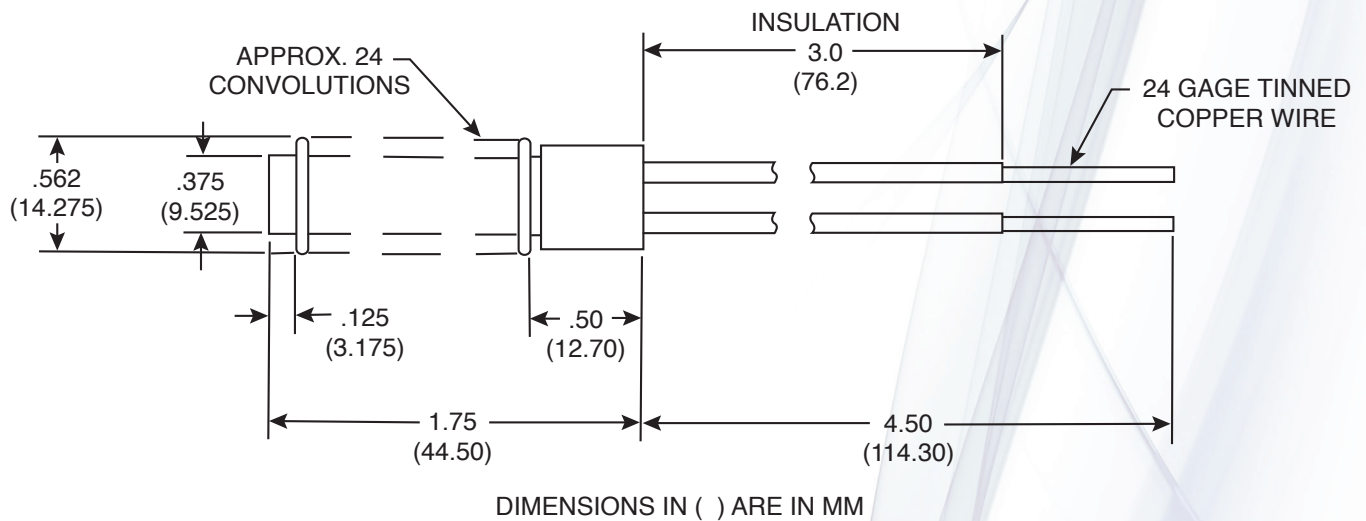
Chemical

Ignition Compound	LMNR/KClO ₃
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Freight Classification

Shipping Name	Release Devices, Explosive
Hazard Classification	1.4S

1MT1106



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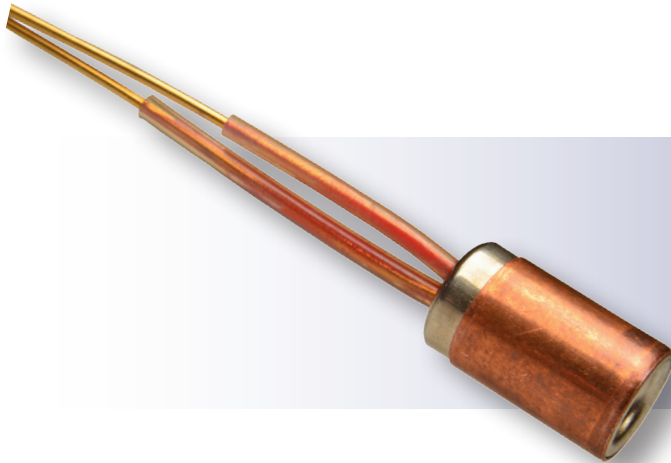
Dimple Actuators

These devices produce a short linear motion by inverting a dimpled cup. They hold their position under load.

Applications include:

- Operating a switch
- Latch or relay
- Pushing a mechanical load
- Arming a projectile
- Locking, unlocking, or releasing.

1MT117 Dimple Actuator



Dimple actuators are pyrotechnic-actuated devices that produce short linear motion.

Their compact size, light weight, simplicity of design, high reliability and environmental resistance make them ideal for aerospace applications. They hold their extended position under load.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C)	5.0 - 7.3 ohm
All-Fire Current @ -45°F (-43°C)	0.3 amp, 10 ms
No-Fire Current @ 135°F (57°C)	0.03 amp, 5 min
Insulation Resistance, Shunted Leads to Case, Before Firing	10 megohm, 100 Vdc
Insulation Resistance, Shunted Leads to Case, After Firing	50 kilohm, 10 ma

Specifications Continued

Mechanical

Size	See drawing
Stroke	0.10" (2.5 mm)
Load	15 lb (35 N)
Function Time	10 ms
Weight	3 gm Max.

Environmental

Temperature	Operating range: -45°F to +135°F (-43°C to +57°C)
Vibration	.04 G ² /Hz, 20-2000 Hz at 20 minutes/axis
Thermal Shock	-45°F (-43°C) to +135°F (+57°C)
Handling Shock	50 g's for 11 ms, 1/2 sine

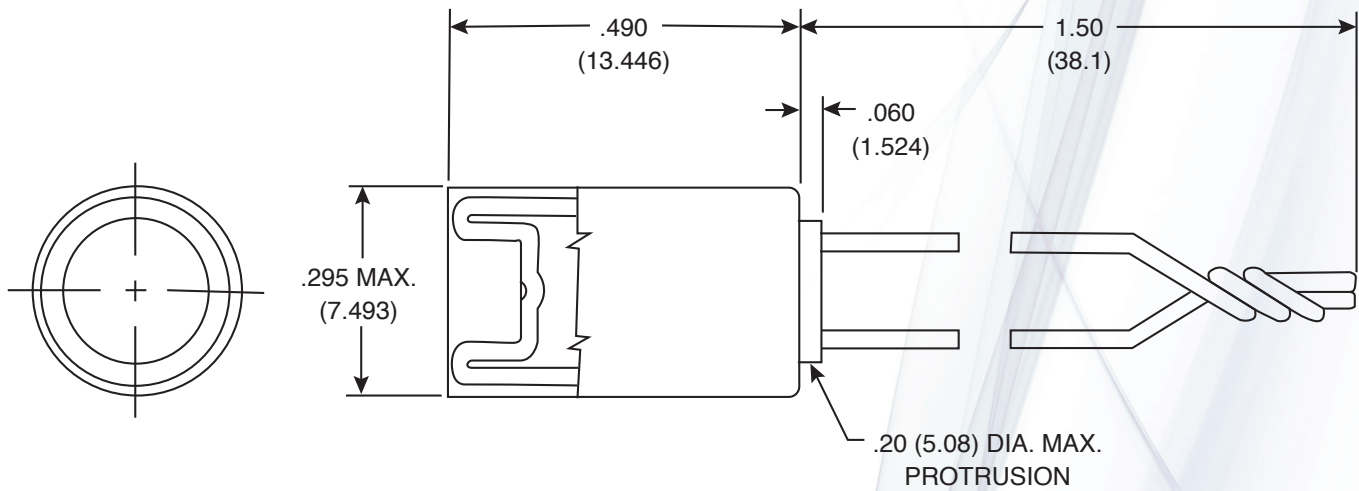
Chemical

Ignition Material	KDNBF
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Freight Classification

Shipping Name	Dimple Motor
Hazard Classification	1.4S

1MT117



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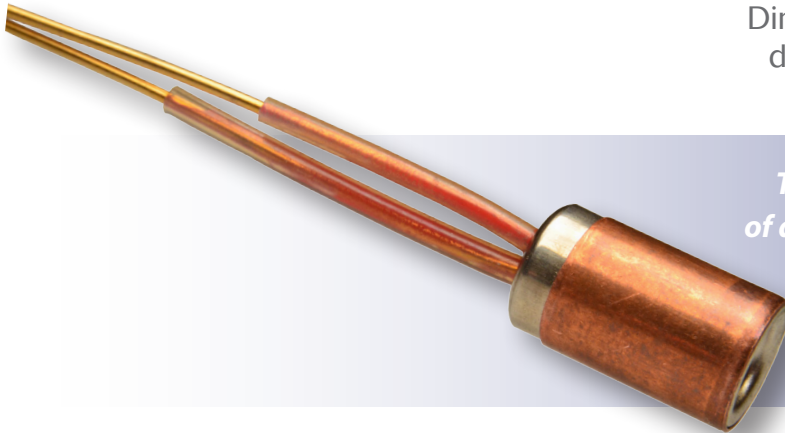
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1MT1130 Dimple Actuator



Dimple actuators are pyrotechnic-actuated devices that produce short linear motion.

Their compact size, light weight, simplicity of design, high reliability and environmental resistance make them ideal for aerospace applications. They hold their extended position under load.

Similar in size and external configuration to the 1MT117, the 1MT1130 provides greater static resistance and better insulation resistance after functioning.

Variations

Modifications can be made in lead lengths, firing characteristics, force and environmental resistance.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

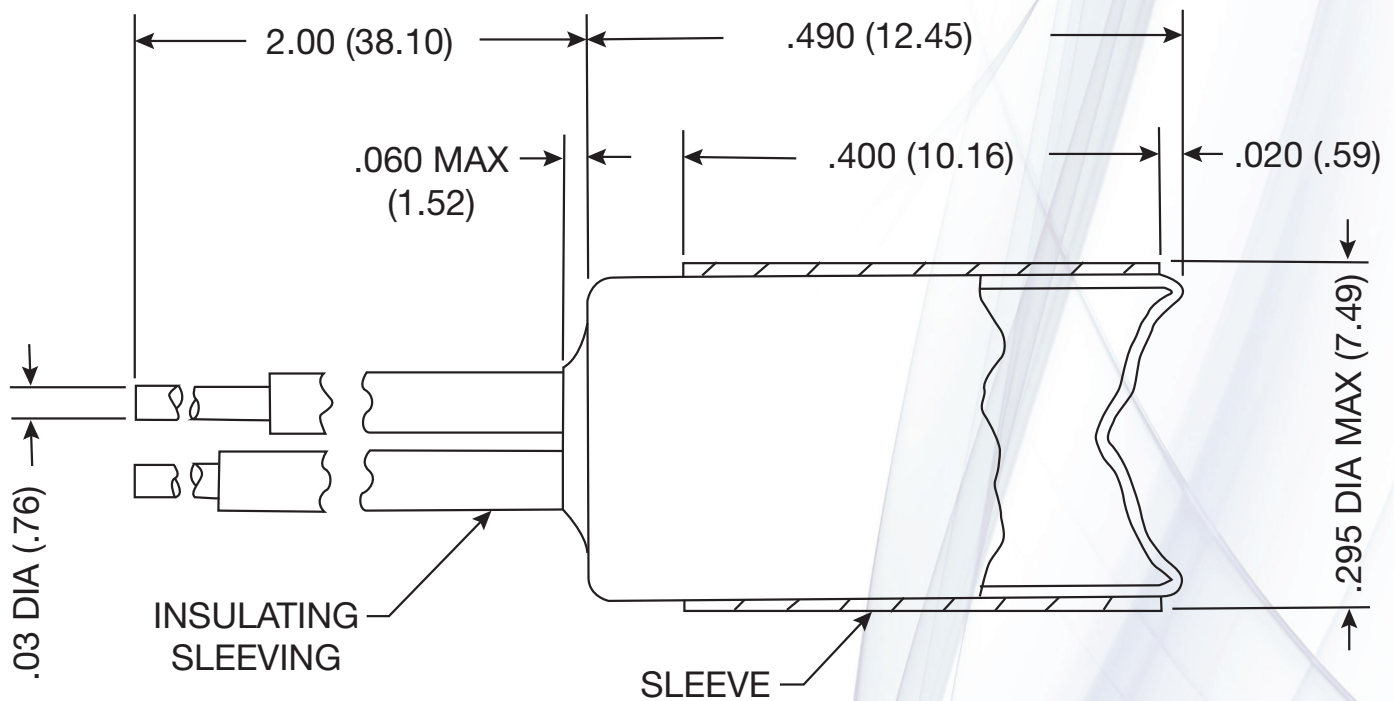
Specifications

Electrical	
Bridge Resistance @ 70°F (21°C)	.80 - 1.10 ohm (test current limited to 0.010 amp)
All-Fire Current @ -65°F (-54°C)	4.0 amp, 20 ms
No-Fire Current @ 185°F (85°C)	1.0 amp, 5 min
Insulation Resistance, Shunted Leads to Case	Before firing: 10 megohm @ 100 Vdc After firing: 50 kilohm, 10 ma
Static Resistance	25,000 V discharge from a 500 pF capacitor through a 5000 ohm series resistor.

Specifications Continued

Mechanical	
Size	See drawing
Stroke	0.1" (2.5 mm)
Load at -65°F (-54°C)	15 lb (78 N)
Function Time	10 ms
Weight	3 gm Max.
Environmental	
Temperature	Operating range: -65°F to +185°F (-54°C to +85°C) Temperature shock: Functions after 1 hr at +185°F (85°C) followed by 1 hr at -65°F (-54°C).
Shock	40 g's for 40 ms, 1/2 sine any direction
Vibration, Random	.14 G ² /Hz Min. to 2000 Hz, 10 min per axis
Chemical	
Ignition Material	Barium Styphnate
Freight Classification	
Shipping Name	Dimple Motor
Identification Number	UN0255
Hazard Classification	1.4S

1MT1130



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Indicators

Electrical Characteristics of Igniters

Device	Bridge Resistance	Number of Bridges	All-Fire Current (A)	All-Fire Time (ms)	No-Fire Current (A)	No-Fire Time	Temp Range (°F)	Potting Color
EP-200-2	4.5±0.5	1	0.58	20	0.1	2 min	-40 to +140	Blue
EP-200-4	1.0±0.1	1	3.5	20	1.0	5 min	-40 to +165	Red
EP-210-1	1.5±0.2	1	0.55	50	0.1	5 min	-10 to +140	Blue
EP-210-2	1.5±0.14	1	**	**	0.1	5 min	-66 to +160	Black
EP-210-3	1.5±0.2	1	0.55	3	0.1	5 min	-10 to +140	Red
EP-250-1	1.0±0.2	1	3.5	20	1	5 min	-25 to +140	Blue
EP-250-1X	1.0±0.2	1	3.5	20	1	5 min	-25 to +140	Red
EP-250-3	1.0±0.1	2	3.5	20	1	5 min	-65 to +225	Blue
EP-250-3X	1.0±0.1	2	3.5	20	1	5 min	-65 to +225	Red
EP-250-6	4.5±0.5	1	0.58	10	0.1	2 min	-60 to +160	Black
EP-250-6X	4.5±0.5	1	0.58	10	0.1	2 min	-60 to +160	Red
EP-250-7	6.0±0.5	2	0.60	30	0.05	1 min	-40 to +162	Yellow
EP-250-9	0.6±0.2	1	2.0	25	0.50	30 sec	-65 to +160	Black
EP-250-12	1.1±0.1	2	3.5	20	1	5 min	-65 to +225	Blue
EP-250-13	0.785±0.050	1	2.0	25	0.25	5 min	-65 to +160	Yellow
EP-250-14	1.0±0.1	1	3.5	10	1	5 min	-65 to +160	Blue
EP-250-15	1.125±0.375	1	4.0	25	1	5 min	-67 to +185	Black
EP-250-16	1.0±0.2	1	3.5	20	1	5 min	-25 to +140	Black
EP-1300-1	2.05±0.1	1	2.0v	15	0.025	1 min	+20 to +100	Yellow
EP-360-1	1.0±0.1	1	3.5	20	1	5 min	-65 to +225	Black
EP-360-1X	1.0±0.1	1	3.5	20	0.025	1 min	-65 to +225	Red
EP-360-3	1.0±0.1	2	3.5	20	1	5 min	-65 to +225	Black
EP-360-3X	1.0±0.1	2	3.5	20	1	5 min	-65 to +225	Red
EP-360-4	1.0±0.1	2	3.5	20	1	5 min	-65 to +225	Black

200 Series

210 Series

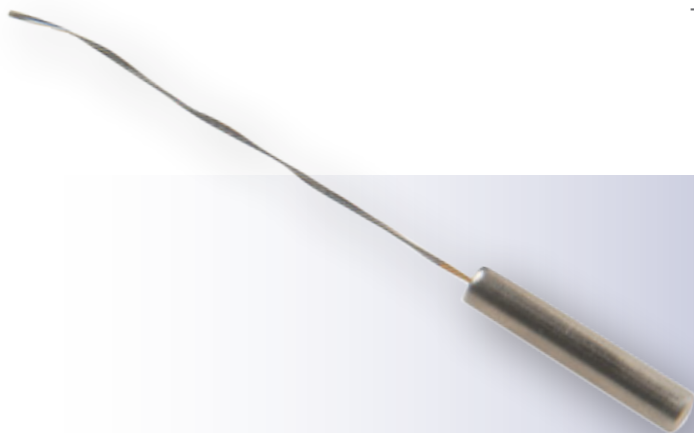
250 Series

360 Series

* Single bridge No-Fire

** 47 microfarad capacitor charged to 11.1±0.2 VDC

1MT116 & 1MT163 Indicator



The 1MT116 and 1MT163 Indicator, variations of the 1MT114 Piston Actuator, are designed to do no physical work.

Instead, the piston for each device is used to show that stray current is present, another device has fired, or to indicate system status (armed, safe, etc.). The 1MT116 and 1MT 163 should not be fired under load because its piston extends with minimal force.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Insulation Resistance, Shunted Leads to Case

Before firing: 50 megohm Min. @ 500 Vdc

After firing: 50,000 ohm Min. @ 50 Vdc

Squib	Bridge Resistance* @ 70°F (21°C)	All-Fire Current @ -65°F (-54°C) 10 ms pulse	No-Fire Current† @ 160°F (71°C) 5 min
1MT163			
Type	Ohm	Amp, Min.	Amp, Max.
A	6.0 ± 1.0	0.30	0.03
B	4.0 ± 1.0	0.55	0.10
C	1.8 ± 0.2	1.00	0.10
F	.40 ± .05	4.50	1.00
G	25.0 ± 5.0	0.10	0.01
1MT116			
A	1.00 ± .10	.4 µF cap @ 50 V	.3 µF cap @ 45 V

*Test current limited to 0.010 amp

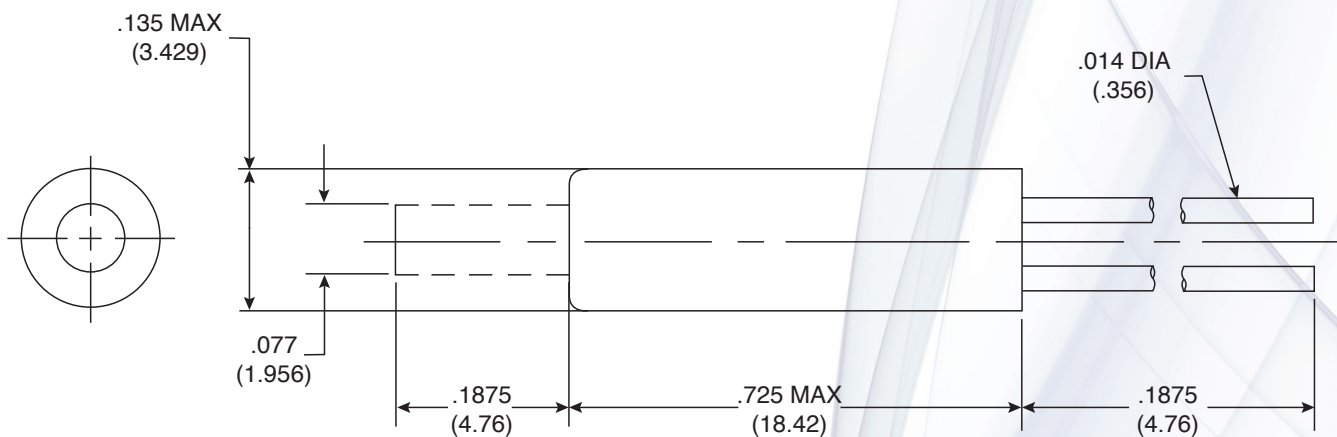
1MT116 & 1MT163

Specifications Continued

Mechanical	
Size	See drawing
Weight	1.0 gm Max.
Stroke	3/16" (4.76 mm)
Function Time	10 ms
<i>*See Firing Characteristics of Pyrotechnic-Actuated Devices for effect of current on ignition time.</i>	
Environmental	
Temperature	Operating range: -65°F to +160°F (-54°C to +71°C)

Specifications Continued

Chemical	
Ignition Compound	KDNBF
Freight Classification	
Shipping Name	Release Devices, Explosive
Identification Number	UN0173
Hazard Classification	1.4S



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1MT173 Indicator



The 1MT173 Indicator is designed to do no physical work.

The indicator's piston is used to show that stray current is present, another device has fired, or to indicate system status (armed, safe, etc.). The 1MT173 Indicator should not be fired under load because its piston extends with minimal force.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical			
Insulation Resistance, Shunted Leads to Case		Before firing: 50 megohm Min. @ 500 Vdc	
Squib	Bridge Resistance* @ 70°F (21°C)	All-Fire Current @ -40°F (-40°C) 10 ms pulse	No-Fire Current @ 160°F (71°C) 5 min
Type	Ohm	Amp, Min.	Amp, Max.
C	1.8 ± 0.2	1.00	0.10

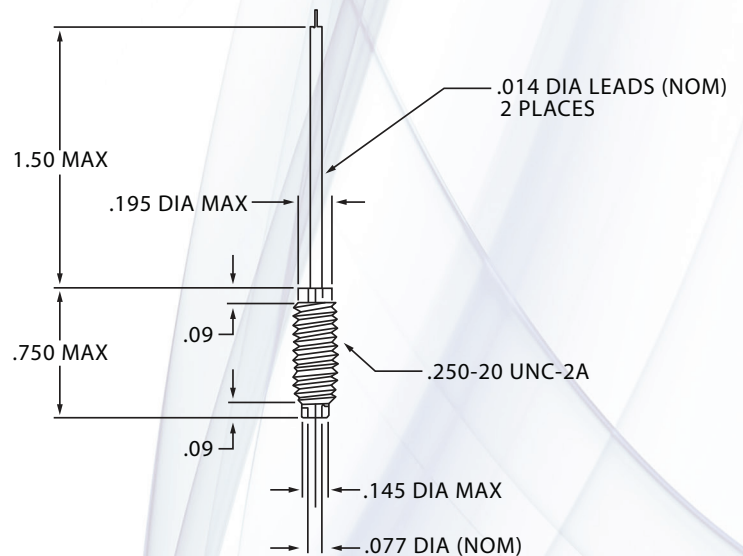
*Test current limited to 0.010 amp

Specifications Continued

Mechanical	
Size	See drawing
Weight	1.0 gm Max.
Stroke	0.190" Min. against zero load
Function Time*	10 ms
*See Firing Characteristics of Pyrotechnic-Actuated Devices for effect of current on ignition time.	
Environmental	
Temperature	Operating range: -40°F to +160°F (-40°C to +71°C)
Cycling	MIL-STD-202, Method 107
Storage	Functions normally when subjected to MIL-STD-331, Test C1. 14 day cycle temperature extremes 120°F and -30°F.
Humidity	Functions normally after 14 day cycle -30°F to +120°F and 95% relative humidity.
Shock	1/2 sine wave pulse of 50 g's for 20 ms in each of 3 mutually perpendicular planes. Perform shock profile twice.
Vibration	Transportation and sinusoidal vibration of 10-60-10 Hz sweep for 15 min per cycle. A total of 16 sweeps in each of the 3 axes. 4 hour test per axis.

Specifications Continued

Chemical	
Ignition Compound	KDNBF
Freight Classification	
Shipping Name	Release Devices, Explosive
Hazard Classification	Class C



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Piston Actuators

Piston actuators produce a pushing linear motion. They are available in micro miniature, miniature, and large sizes with a variety of stroke lengths.

Applications include:

- Puncturing a container
- Uncasing a gyroscope
- Indicating the presence of unwanted electrical impulses
- Firing a primer or stab detonator
- Arming a projectile.

1MT11 Miniature Piston Actuator

The 1MT11 Miniature Piston Actuator is a pyrotechnic-actuated device that produces linear motion



Its compact size, light weight, high reliability and environmental resistance make it ideal for aerospace applications. This actuator is available with a variety of bridges with different firing characteristics.

Variations

Modifications in stroke length, force, shape of piston, type of action and environmental resistance can be made to meet specific requirements.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Insulation Resistance, Shunted Leads to Case

Before firing: 50 megohm Min. @ 500 Vdc

Squib Type	Bridge Resistance* @70°F (21°C) Ohm	All-Fire Current @ -65°F (-54°C) 10 ms Amp, Min.	No-Fire Current @ 160°F (71°C) 5 min Amp, Min.
A	6.0 ± 1.0	0.30	0.03
B	4.0 ± 1.0	0.55	0.10
C	1.8 ± 0.2	1.00	0.10
F	0.33 ± 0.04	4.50	1.00
T	0.70 ± 0.10	2 Amp (15 ms)	0.5

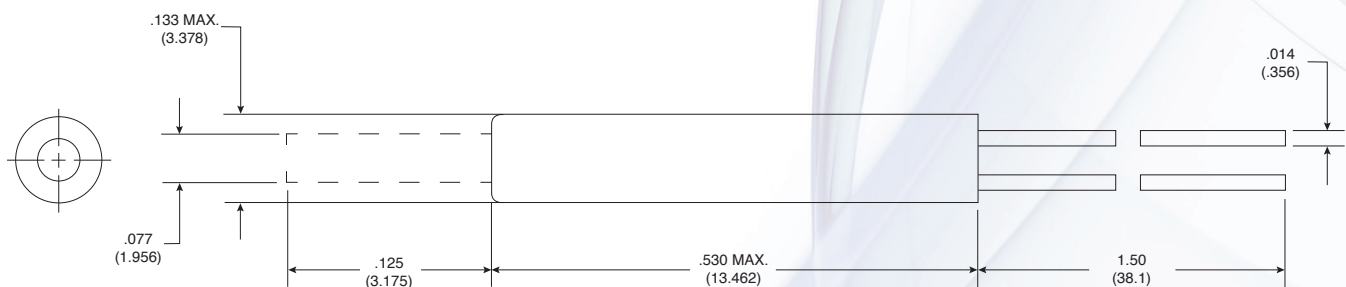
*Test current limited to 0.010 amp

Specifications Continued

Mechanical	
Size	See drawing
Weight	1.0 gm
Stroke	1/8" (3.175 mm)
Load	10 lb (44N)
Function Time*	10 ms
*See Firing Characteristics of Pyrotechnic-Actuated Devices for effect of current on ignition time.	
Environmental	
Temperature	Operating range: -65°F to +160°F (-54°C to +71°C)
Cycling	MIL-STD-202A, Method 107
Storage	Functions normally after 2 hr at -65°F (-54°C) or +160°F (+71°C)
Humidity	Functions normally after 8 hr at 110°F (43°C) and 95% relative humidity.
Shock	(1) 1/2 sine wave pulse of 400 g's for 1.5 ms in each of 3 mutually perpendicular planes. (2) 1/2 sine wave pulse of 100 g's for 11 ms in each of 3 mutually perpendicular planes.

Specifications Continued

Environmental cont.	
Vibration	Transportation and sinusoidal vibration of 5-2000-5 Hz at 30 g's or .34" (8.64 mm) d.a. for 15 min per cycle, 4 cycles per plane and 3 mutually perpendicular planes.
Acceleration	30 g's for 1 min in each of 3 mutually perpendicular planes.
Chemical	
Ignition Compound	KDNBF or LMNR/KCLO ₃
Freight Classification	
Shipping Name	Release Devices, Explosive
Identification Number	UN0173
Hazard Classification	1.4S



FOR 1MT11, BODY LENGTH IS .530 INCH (13.462) AND STROKE LENGTH IS .125 INCH (3.175)

DIMENSIONS IN () ARE IN MM



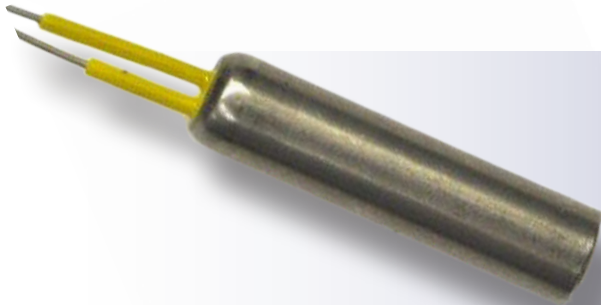
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1MT34 Piston Actuator

The 1MT34 Piston Actuator is a pyrotechnic-actuated device that produces linear motion.



Its compact size, light weight, high reliability and environmental resistance make it ideal for aerospace and ordnance applications.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

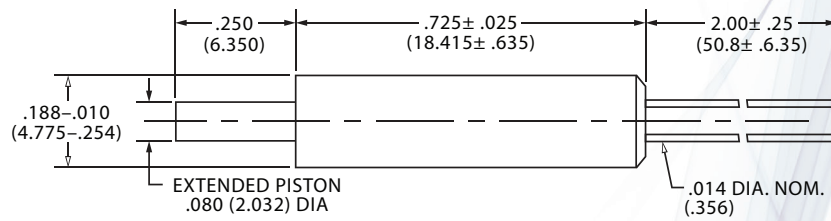
Specifications

Electrical	
Bridge Resistance @ 70°F (21°C)	1.0 ± 0.1 ohm
All-Fire Current	5 amp pulse, 10 ms (see graph)
No-Fire Current @ 225°F (107°C)	1 amp - 1 watt, 5 min
Insulation Resistance	1 megohm minimum @ 500 Vdc
Static Resistance	25,000 V discharge from a 500 pF capacitor through a 5000 ohm series resistor
Mechanical	
Size	See drawing
Weight	2.0 gm Max.
Seal	Hermetically sealed by a glass-to-metal seal electrical feed-thru and solder seals at each end
Piston Motor	Stroke: 1/4" (6.35 mm) Force (air bellows): 20 lbs min. throughout the entire stroke. Force (peak): 200 lbs min. (zero displacement)
Function Time	10 ms Max. with 5.0 amp firing current

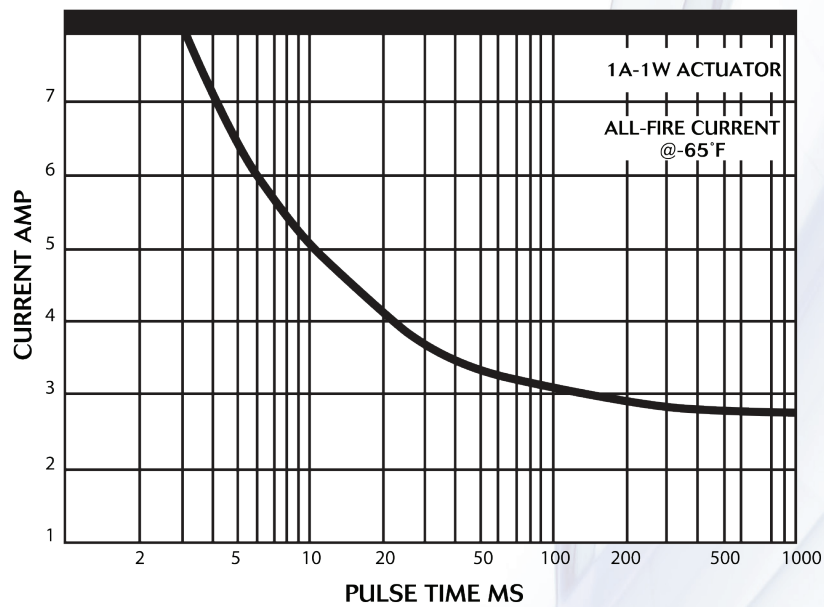
Specifications Continued

Environmental	
Temperature	Operating range: -65° to +160°F (-54° to +71°C)
Storage	-80° to +255°F (-62° to +107°C) (limited time hot)
Shock	1/2 sine wave pulse of 200 g's Min. for 1.5 ms and 65 g's Min. for 9 ms
Vibration	MIL-STD-810, Table 514-1 Aircraft Category, Procedure 1, Parts 1, 2 & 3, Curve H. Each resonant and cycling period divided equally among -65°, +70°, and +200°F (-54°, +21°, and +93°C)
Temperature Shock/Humidity/Altitude	MIL-I-23659
Chemical	
Ignition Compound	Barium Styphnate
Freight Classification	
Shipping Name	Release Devices, Explosive
Identification Number	UN0173
Hazard Classification	1.4S

1MT34



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1MT100 Miniature Piston Actuator



The 1MT100 Miniature Piston Actuator is a pyrotechnic-actuated device that delivers linear force.

Remarkably small and lightweight, it is ideal for high-volume applications such as submunitions. Its co-axial design facilitates automatic insertion into the next assembly.

Variations

Actuator modifications can be made to meet customer requirements. Modifications can be made in lead lengths, firing characteristics, and force. The electrode can be nickel or gold plated, or altered in shape. Quantity and/or type of pyrotechnic charge can be changed to alter output force characteristics.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

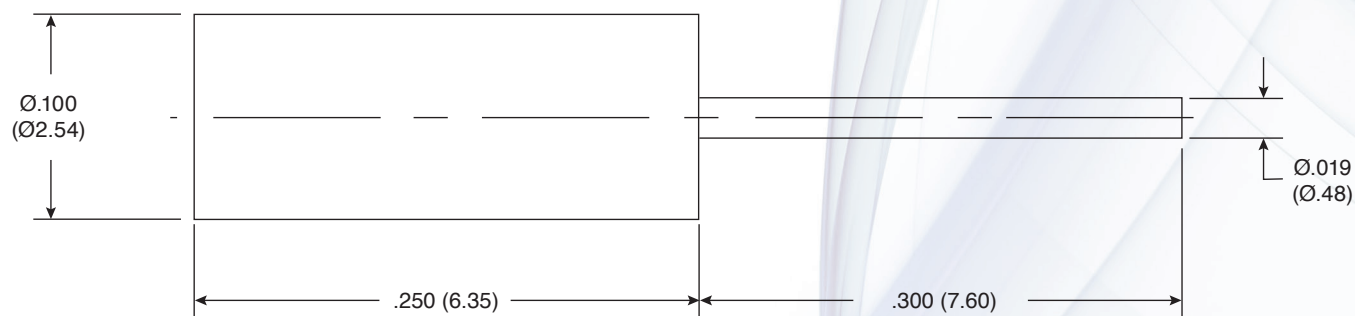
Specifications

Electrical	
Bridge Resistance @ 70°F (21°C)	3.0 - 7.5 ohm
All-Fire Energies @ -65°F (-54°C)	Capacitor discharge: 1.6 V, 100 microfarad (1280 erg)
	Constant current: 0.15 amp, 10 ms
No-Fire Current @ 165°F (74°C)	0.010 amp, 10 sec 0.7 V, 100 microfarad (245 erg)
Mechanical	
Size	See drawing
Weight	0.15 gm
Stroke	0.100" (2.54 mm)
Load	30 lb to 120 lb
Function Time	Ignites in less than 1.0 ms. Function time will be slightly longer depending on load.

1MT100

Specifications Continued	
Environmental	
Temperature	Operating range: -65°F to +165°F (-54°C to +74°C)
Thermal Shock	IAW MIL-STD-202, Method 107, Condition A, except that the temperatures shall be -65°F and +165°F.
Vibration	IAW MIL-STD-202, Method 204, Test condition A.
Gun Launch Shock	60,000 g's peak for 1 ms along any transverse axis.
Jolt	IAW MIL-STD-331, Test no. 101.2. Shall not activate and safe to handle.
Jumble	IAW MIL-STD-331, Test no. 102.1. Shall not activate and safe to handle.
Drop	40' drop: shall not activate and safe to handle. 5' drop: shall not activate and shall function properly.

Specifications Continued	
Chemical	
Ignition Compound	KDNBF
Freight Classification	
Shipping Name	Release Devices, Explosive
Identification Number	UN0173
Hazard Classification	1.4S



DIMENSIONS ARE NOMINAL
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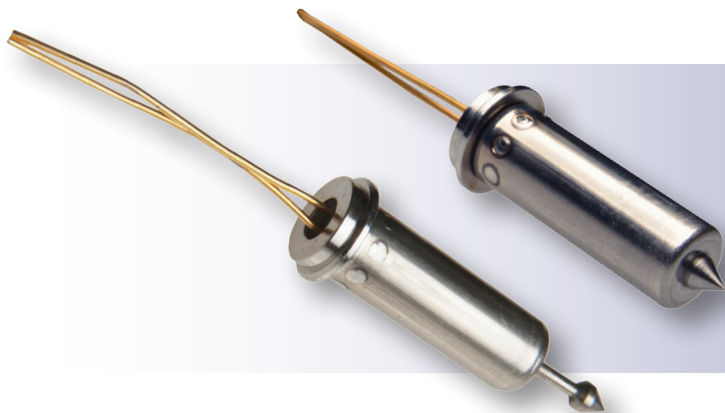
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1MT171 Piston Actuator

The 1MT171 Piston Actuator is a highly reliable electroexplosive device used in ordnance defense systems.



It is used as an electrically activated system to penetrate bursts discs. The 1MT171 Piston Actuator is a completely self-contained, non-sealed electroexplosive device. The hardness of the pointed piston is 220 Bn. The leads are copper cored and gold plated.

Variations

Two models (1MT171-2 and 1MT171-4) are described here. Modifications in bridge resistance can be made to meet specific requirements.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

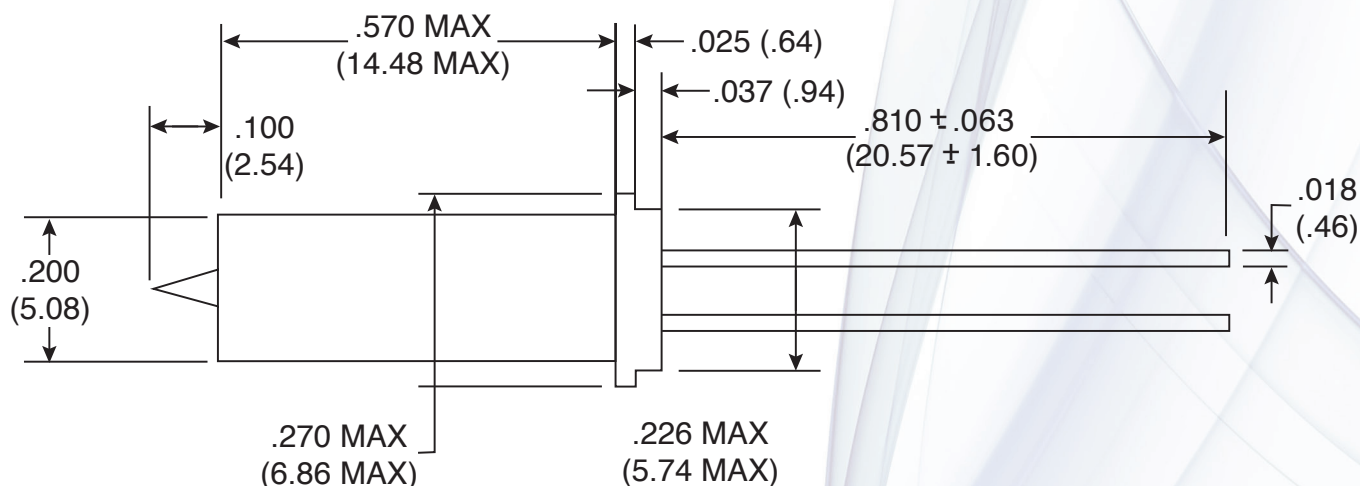
Specifications

Electrical

Actuator	Bridge Resistance @70°F (21°C)	All-Fire Current @ -65°F (-54°C) 10 ms	No-Fire Current @ 160°F (71°C) 1 min	Insulation Resistance @ 500 Vdc
Part No.	Ohm	Amp, Min.	Amp, Min.	MEG, Min.
1MT171-2	0.16 ± 0.10	4.0	1.00	10
1MT171-4	2.25 ± 0.75	0.9 ± 0.1	0.10	10

Specifications Continued	
Mechanical	
Size	See drawing
Weight	2.25 gm Max.
Lead	0.018" (.46 mm) diameter
Piston Extension	0.245" (6.22 mm) approx.
Environmental	
Temperature	Operating range: -65°F to +165°F (-54°C to +73°C)
	Storage range: -80°F to +165°F (-62°C to +73°C)

Specifications Continued	
Chemical	
Ignition Compound	KDNBF
Output Compound	KDNBF
Freight Classification	
Shipping Name	Piston Actuator
Hazard Classification	1.4S



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1MT1118 Piston Actuator



The 1MT1118 Piston Actuator is a pyrotechnic-actuated device that produces linear motion.

Typically, this device is used to release mechanical locking mechanisms, e.g. gag rods. Both case and piston are 303 stainless steel.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C)	4.0 - 6.0 ohm
All-Fire Energy @ -67°F (-55°C)	Capacitor discharge: 36 microfarad capacitor charged to 7.0 V through a 1.575 ohm series resistor. (5200 erg)
No-Fire Level @ 70°F (21°C)	50 milliamp, 30 sec
Insulation Resistance @ 300 Vdc, Leads to Case, Before Firing	20 megohm Min.
Function Time	Less than 5 ms

Mechanical

Case and Pin Material	303 SS
Size	See drawing
Weight	4 gm Max.
Stroke	.310"
Load	Piston restrained, axial force: 125 lb Min. Full stroke with 20 lb load.

Specifications Continued

Environmental

Temperature	Operating range: -67°F to +221°F (-55°C to 105°C)
Vibration	MIL-STD-202, Method 204, Test Condition E (50 g's peak, 10 to 2000 Hz).
Shock	MIL-STD-202, Method 213, Test Condition E (18 shocks, 1,000 g's, 0.5 ms).
Extreme Temperature Storage	MIL-STD-331, Test 112, -67°F (-55°C) for 28 days, followed by +160°F (+71°C) for 28 days.
Temperature Cycling	MIL-STD-202, Method 107, Test Condition A, except temperature extremes are -55°C to +85°C.

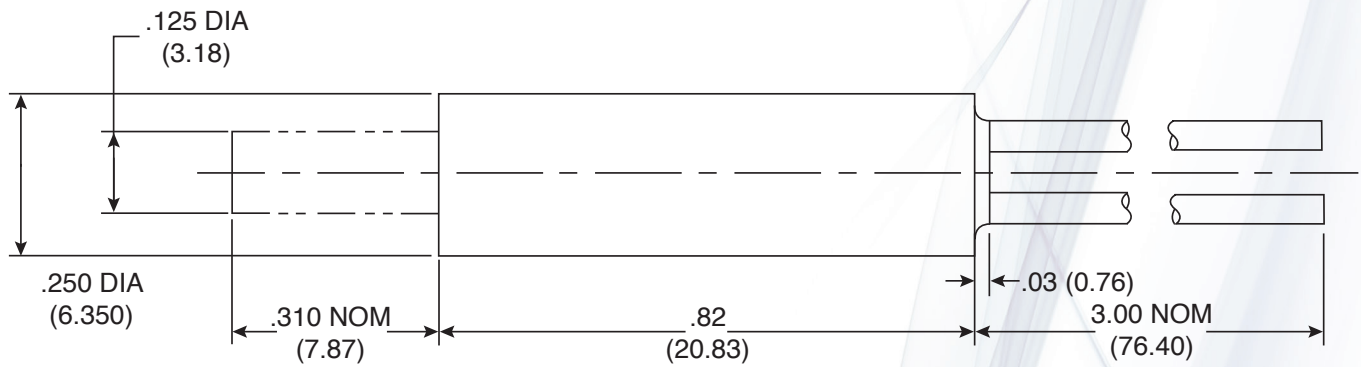
Chemical

Ignition Compound	Lead Styphnate
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Freight Classification

Shipping Name	Release Devices, Explosive
Identification Number	UN0173
Hazard Classification	1.45

1MT1118



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1MT1311 Piston Actuator



The 1MT1311 Piston Actuator is a pyrotechnic-actuated device that produces linear motion.

Larger than miniature piston actuators, it was developed to unlock gag rods. Both case and piston are 303 stainless steel.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

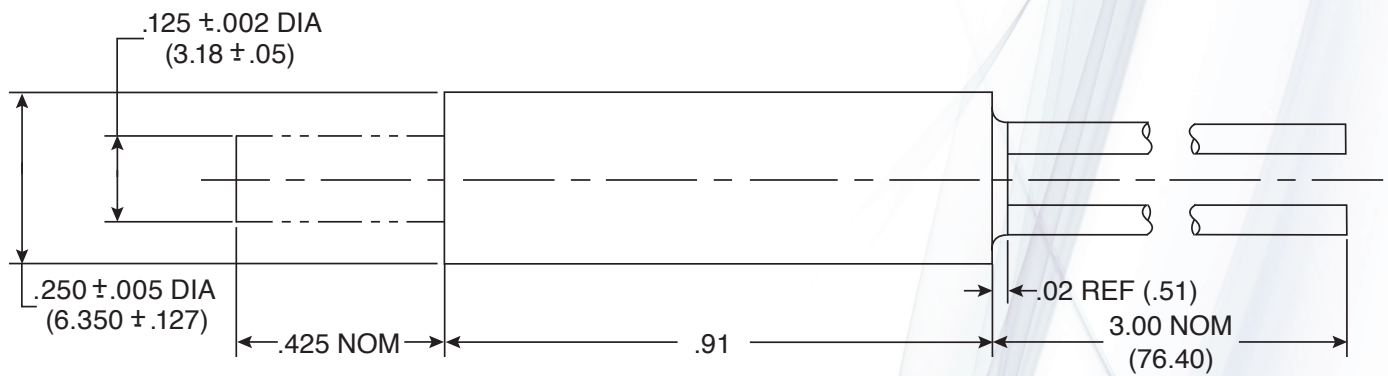
Specifications

Electrical	
Bridge Resistance @ 70°F (21°C)	4.0 - 6.0 ohm
All-Fire Energy @ -67°F (-55°C)	Capacitor discharge: 36 microfarad capacitor charged to 7.0 V through a 1.575 ohm series resistor. (5200 erg)
No-Fire Level @ 221°F (105°C)	50 milliamp, 30 sec
Insulation Resistance @ 300 Vdc, Leads to Case, Before Firing	10 megohm Min.
Function Time	Less than 10 ms
Mechanical	
Case and Piston Material	303 SS
Size	See drawing
Weight	4 gm
Stroke	.425"
Load	250 lbs minimum load with piston restrained in initial position, 20 lbs minimum force throughout stroke length (1311).

Specifications Continued

Environmental	
Temperature	Operating range: -67°F to +221°F (-55°C to +105°C)
Vibration	MIL-STD-202, Method 204, Test Condition E (50 g's peak, 10 to 2000 Hz).
Shock	MIL-STD-202, Method 213, Test Condition E (18 shocks, 1,000 g's, 0.5 ms).
Extreme Temperature Storage	MIL-STD-331, Test 112, -67°F (-55°C) for 28 days, followed by +160°F (+71°C) for 28 days.
Thermal Shock	MIL-STD-202, Method 107, Condition A (except 10 cycles).
Transportation Vibration	MIL-STD-331, Test B1, (10-2000-10 Hz) 1 hr per perpendicular direction (3 axes). Peak 9 g ± 10%.
Chemical	
Energetic Compounds	Lead Styphnate, Barium Styphnate
Freight Classification	
Shipping Name	Release Devices, Explosive
Identification Number	UN0173
Hazard Classification	1.4S

1MT1311



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1MT172

Micro-Miniature Piston Actuator

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TECHNOLOGIES



The 1MT172 Micro-Miniature Piston Actuator is a pyrotechnic-actuated device that delivers linear force.

Extremely small and lightweight, it is ideal for high-volume applications such as submunitions. It's co-axial design facilitates automatic insertion into the next assembly.

Variations

Actuator modifications can be made to meet customer requirements. The electrode can be nickel or gold plated, or altered in shape. Quantity and/or type of pyrotechnic charge can be changed to alter output force characteristics.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

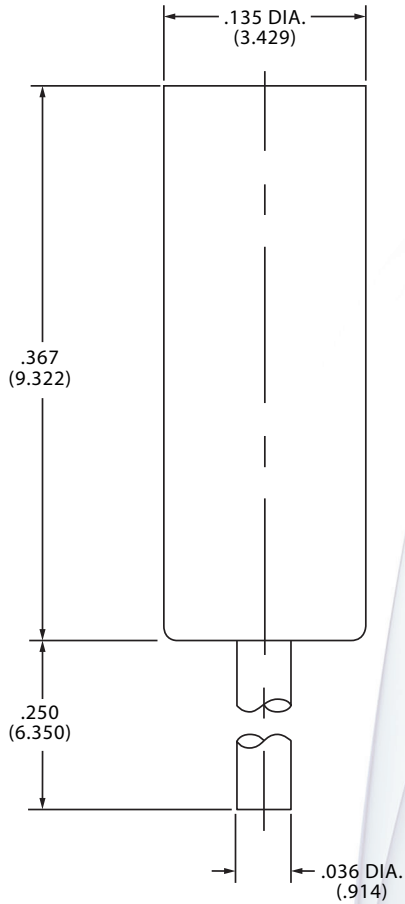
Electrical	
Bridge Resistance @ 70°F (21°C)	4.0 - 9.5 ohm
All-Fire Energies @ -65°F (-54°C)	Capacitor discharge: 1.6 V, 100 microfarad (1280 erg)
	Constant current: 0.15 amp. 10 ms
No-Fire Current @ 160°F (71°C)	0.010 amp, 10 sec

Specifications Continued

Mechanical	
Size	See drawing
Weight	0.40 gm
Stroke	0.150" (3.81 mm) Max.
Load	Will shear a 0.050" (1.27 mm) diameter 6061-T6 aluminum pin*
Function Time	Ignites in less than 1.0 ms. Function time will be slightly longer depending on load
Environmental	
Temperature	Operating Range: -65° to +160°F (-54° to +71°C)
Shock	13,000 g's Min. peak, 1/2 sine wave for 1ms, measured at 10% of peak amplitude
Vibration	MIL-STD-202C, Method 204A, Test Condition C, Modified as follows: 0.08" (2.03 mm) d.a. 5 to 10 Hz, 0.06" (1.52 mm) d.a. 10 to 55 Hz, 10 g's 55 to 500 Hz
Chemical	
Ignition Compound	Barium Styphnate, KDNBF
Freight Classification	
Shipping Name	Release Devices, Explosive
Identification Number	UN0173
Hazard Classification	1.4S

* Output force is 50-300lbs

1MT172



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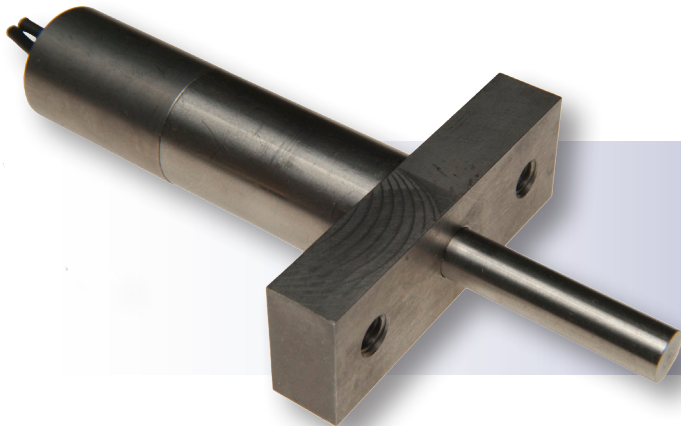
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PA-100 Piston Actuator



The PA-100 Piston Actuator is a pyrotechnic-actuated device that produces linear motion.

Its long stroke and high output energy are well suited to applications requiring both large displacement and sustained high force.

Variations

Modifications in physical interface, output energy (over a range of 15 to 50 ft-lb), and shape of piston can be made to meet specific requirements. Activation energy may be supplied by flying tail leads or with any commercially available connector with at least 2 pins.

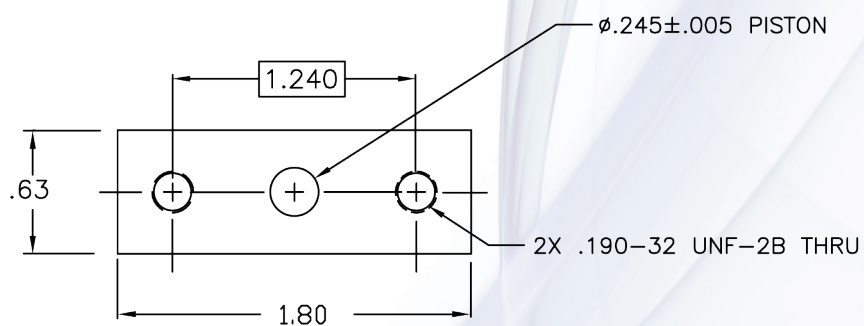
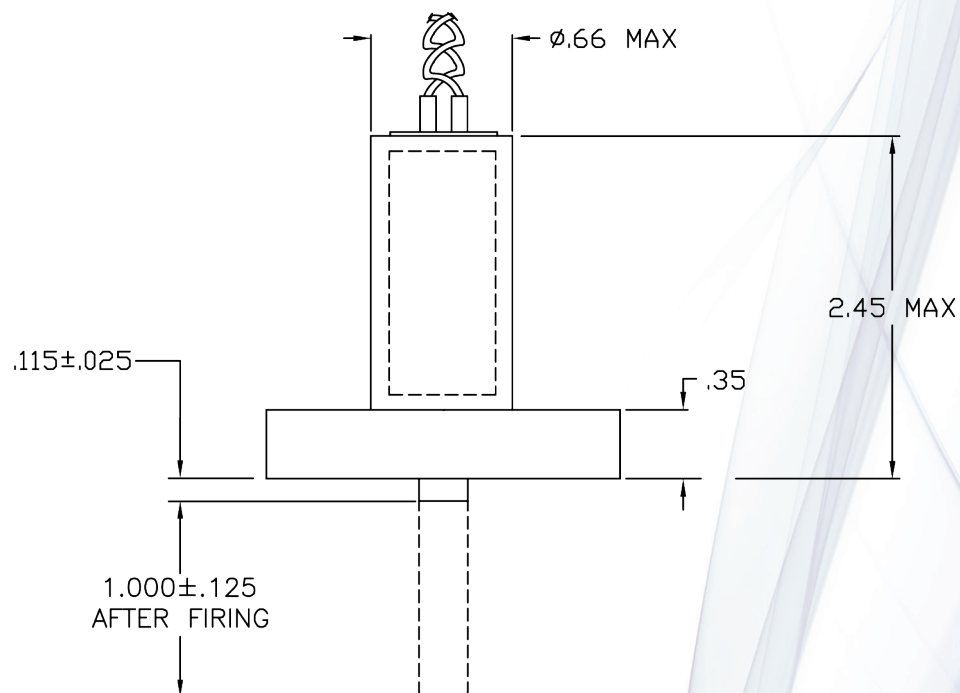
Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical	
Insulation Resistance	Before activation, shunted leads to case: 1 megohm Min. @ 500 Vdc
Bridge Resistance	$1.00\Omega \pm 0.24\Omega$
All-Fire Current	$3.6A \pm 0.1A$, 50 msec
No-Fire Current	1.0A, 5 minutes
Environmental	
Temperature Operating Range	-40°C to +57°C
Thermal Shock	MIL-STD-202, Method 107, Condition A
Humidity	MIL-STD-202, Method 106
Mechanical Shock	MIL-STD-202, Method 213, Condition D
Vibration	MIL-STD-202, Method 204, Condition B

PA-100



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PA-102 Miniature Piston Actuator



The PA-102 Miniature Piston Actuator is a pyrotechnic-actuated device that delivers linear force.

Remarkably small and lightweight, it is ideal for high-volume applications such as submunitions. Its co-axial design facilitates automatic insertion into the next assembly.

Variations

Actuator modifications can be made to meet customer requirements. Modifications can be made in lead lengths, firing characteristics, and force. The electrode can be nickel or gold plated, or altered in shape. Quantity and/or type of pyrotechnic charge can be changed to alter output force characteristics.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C)	3.0 - 7.5 ohm
All-Fire Energies @ -65°F (-54°C)	Capacitor discharge: 1.6 V, 100 microfarad (1280 erg) Constant current: 0.15 amp, 10 ms
No-Fire Current @ 165°F (74°C)	0.010 amp, 10 sec 0.7 V, 100 microfarad (245 erg)

Mechanical

Size	See drawing
Weight	0.15 gm
Stroke	0.125" (3.17 mm)
Load	60 lb to 140 lb
Function Time	Ignites in less than 1.0 ms. Function time will be slightly longer depending on load.

Environmental

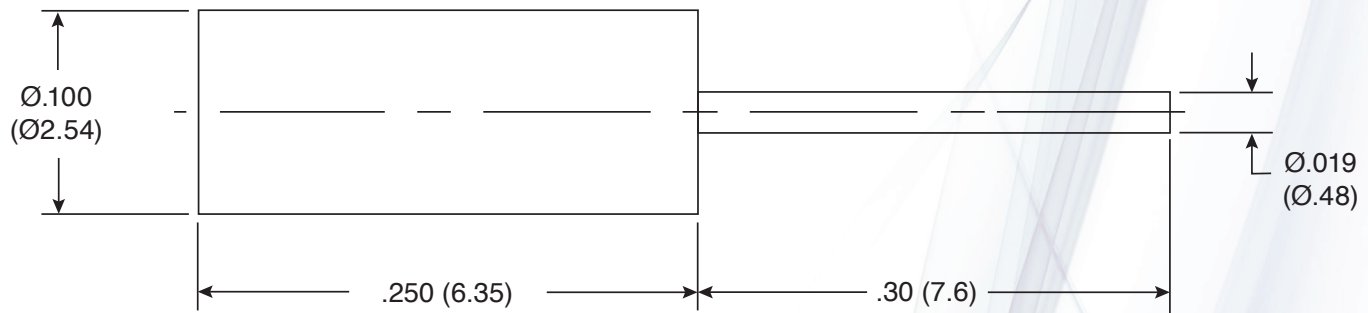
Temperature	Operating range: -65°F to +165°F (-54°C to +74°C)
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Chemical

Ignition Compound	KDNBF
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Freight Classification

Shipping Name	Release Devices, Explosive
Identification Number	UN0173
Hazard Classification	1.4S



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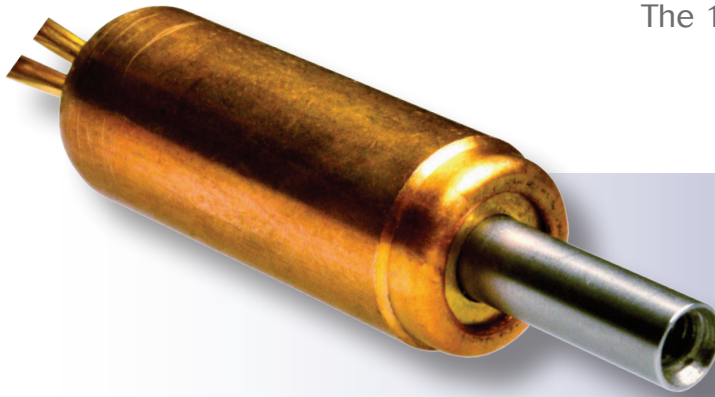
Retractable Actuators

Retractable actuators produce a pulling or withdrawing type of linear motion. When actuated, a piston partially retracts into the casing and locks into place.

Applications include:

- Pulling mechanical loads
- Locking, unlocking or releasing
- Operating a switch, latch, or relay.

1MT18 Retractable Actuators



The 1MT18 Retractable Actuator is a pyrotechnic-actuated device that produces a pulling or withdrawing type of linear motion.

Upon firing, the piston partially retracts into the casing. These devices are extremely small and lightweight with high reliability. For initiation, they require just a fraction of a watt for a few milliseconds.

Variations

The 1MT18 illustrates the wide range of variations that are possible with the retractable actuator design. Modifications can be made in shape, size, mounting features, firing sensitivity, output, post-fire piston extension and pre-fire pushback force.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Squib	Bridge Resistance* @70°F (21°C)	All-Fire Current @ -65°F (-54°C) 10 ms	No-Fire Current @ 160°F (71°C) 5 min
Type	Ohm	Amp, Min.	Amp, Min.
A	6.0 ± 1.0	0.30	0.04
B	4.5 ± 0.5	0.55	0.10
C	1.8 ± 0.2	1.00	0.10
F	0.12 ± 0.03	4.50	1.00
G	25.0 ± 5.0	0.10	0.01
Insulation Resistance, Leads to Case, Before Firing	50 megohm Min. @ 500 Vdc		

*Test current limited to 0.010 amp

All 1MT18 actuators are available with a dual bridge 4-pin variation.

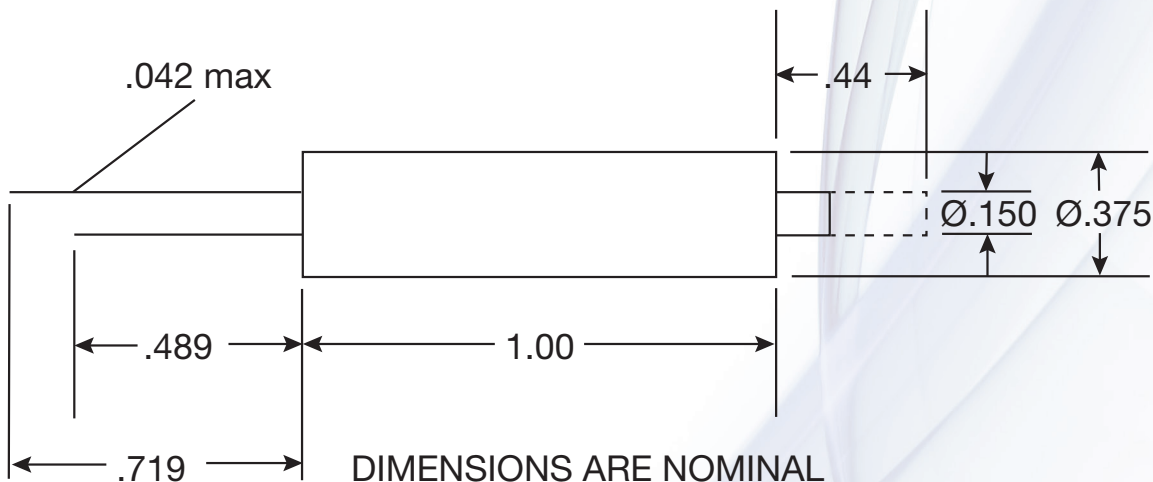
1MT18

Specifications Continued

Mechanical	
Size	See drawing
Weight, Max.	12 gm
Stroke	> .290 (7.54 mm)
Force	20 lb (89 N)
Holding Force	–
Seal, Leads to Case	Solder
Function Time, Max.	10 ms
Environmental	
Temperature	Operating range: -65° to +160°F (-54° to +71°C) Cycle: MIL-STD-202, Method 102A, Test Cond. D
Humidity	Cycle: MIL-STD-202, Method 103A, Test Cond. B
Vibration	Sinusoidal: 0.34" (8.64 mm) d.a. or 30 g's 5-2000-5 Hz, 3 axes Transportation: MIL-STD-303, 3 axes
Shock	300 g's, 3 ms, 1/2 sine wave, 3 axes
Jumble	MIL-STD-331, Test 102.1
Jolt	MIL-STD-331, Test 101.2
Drop	40-ft-drop test, 3 axes

Specifications Continued

Chemical	
Ignition Compound	KDNBF
Base Charge	LMNR/KClO ₃
Freight Classification	
Shipping Name	Release Devices, Explosive
Identification Number	UN0173
Hazard Classification	1.4S



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1MT262M1 Retractable Actuator

The 1MT262M1 Retractable Actuator is a pyrotechnic-actuated device that produces a pulling or withdrawing type of linear motion.



Upon firing, the piston partially retracts into the casing. These devices are extremely small and lightweight with high reliability. For initiation, they require just a fraction of a watt for a few milliseconds.

Variations

The 1MT262M1 illustrates one of the wide ranges of variations that are possible with the retractable actuator design. Modifications can be made in shape, size, mounting features, firing sensitivity, output, post-fire piston extension and pre-fire pushback force.

NOTE: The 1MT262 series devices replace the 1MT165 series.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Actuator	Bridge Resistance* @70°F (21°C)	All-Fire Current @ -65°F (-54°C) 10 ms	No-Fire Current @ 160°F (71°C) 5 min
Part No.	Ohm	Amp, Min.	Amp, Min.
1MT262M1	6.0 ± 1.0	0.30	0.03
Insulation Resistance, Leads to Case, Before Firing	20 megohm Min. @ 300 Vdc		
All-Fire Current	4.7 microfarad capacitor charged to 17.1 ± .5 Vdc (5000 erg minimum)		

*Test current limited to 0.010 amp

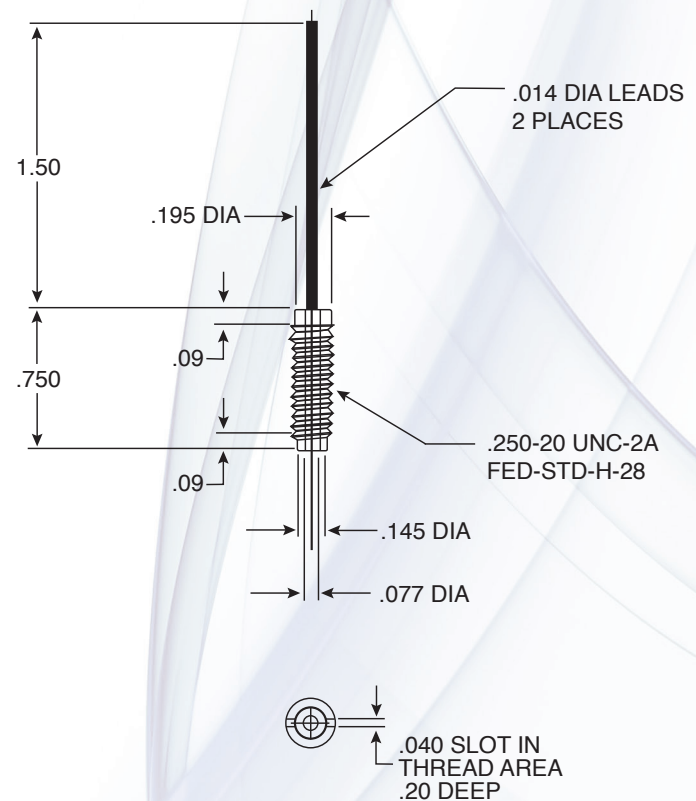
1MT262M1

Specifications Continued

Mechanical	
Size	See drawing
Weight, Max.	1 gm Max.
Stroke	1/8" (3.18 mm) nominal
Side Force	1.0 lb (4.4 N)
Holding Force	2.0 lb (8.9 N) min
Seal, Leads to Case	epoxy
Function Time, Max.	10 ms
Environmental	
Temperature	Operating range: -65° to +160°F (-54° to +71°C) Cycle: MIL-STD-202, Method 102A, Test Cond. D
Humidity	Cycle: MIL-STD-202, Method 103A, Test Cond. B
Vibration	Sinusoidal: 30 g's 5-2000-5 Hz, 3 axes per MIL-STD-202, Method 204 Transportation: MIL-STD-331, Test B
Shock	300 g's, 3 ms, 1/2 sine wave, 3 axes

Specifications Continued

Chemical	
Ignition Compound	Lead Styphnate/ Barium Styphnate
Freight Classification	
Shipping Name	Release Devices, Explosive
Identification Number	UN0173
Hazard Classification	1.45



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1MT262M2 Retractable Actuator

The 1MT262M2 Retractable Actuator is a pyrotechnic-actuated device that produces a pulling or withdrawing type of linear motion.



Upon firing, the piston partially retracts into the casing. These devices are extremely small and lightweight with high reliability. For initiation, they require just a fraction of a watt for a few milliseconds.

Variations

The 1MT262M2 illustrates one of the wide range of variations that are possible with the retractable actuator design. Modifications can be made in shape, size, mounting features, firing sensitivity, output, post-fire piston extension and pre-fire pushback force.

NOTE: The 1MT262 series devices replace the 1MT165 series.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Actuator	Bridge Resistance* @70°F (21°C)	All-Fire Current @ -65°F (-54°C) 10 ms	No-Fire Current @ 160°F (71°C) 5 min
Part No.	Ohm	Amp, Min.	Amp, Min.
1MT262M2	6.0 ± 1.0	0.30	0.03
Insulation Resistance, Leads to Case, Before Firing	20 megohm Min. @ 300 Vdc		
All-Fire Current	4.7 microfarad capacitor charged to 17.1 ± .5 Vdc (5000 erg minimum)		

*Test current limited to 0.010 amp

1MT262M2

Specifications Continued

Mechanical	
Size	See drawing
Weight, Max.	1 gm Max.
Stroke	1/8" (3.18 mm)
Side Force	1.0 lb (4.4 N)
Holding Force	2.0 lb (8.9 N) Min.
Seal, Leads to Case	epoxy
Function Time, Max.	10 ms
Environmental	
Temperature	Operating range: -65° to +160°F (-54° to +71°C) Cycle: MIL-STD-202, Method 102A, Test Cond. D
Humidity	Cycle: MIL-STD-202, Method 103A, Test Cond. B
Vibration	Sinusoidal: 9 G peak, MIL-STD-202, Method 204, Condition E 10-2000-10 Hz, 3 axes Transportation: MIL-STD-303, 3 axes
Shock	18 shocks, 2,000 g's, .5 ms, JAW MIL-STD-202, Method 213, Test condition E

Specifications Continued

Chemical	
Ignition Compound	Lead Styphnate/ Barium Styphnate
Freight Classification	
Shipping Name	Not regulated as a Class 1 explosive
Identification Number	UN0173
Hazard Classification	1.4S



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1MT262M3 Retractable Actuator

The 1MT262M3 Retractable Actuator is a pyrotechnic-actuated device that produces a pulling or withdrawing type of linear motion.



Upon firing, the piston partially retracts into the casing. These devices are extremely small and lightweight with high reliability. For initiation, they require just a fraction of a watt for a few milliseconds.

Variations

The 1MT262M3 illustrates one of the wide range of variations that are possible with the retractable actuator design. Modifications can be made in shape, size, mounting features, firing sensitivity, output, post-fire piston extension and pre-fire pushback force.

NOTE: The 1MT262 series devices replace the 1MT165 series.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Actuator	Bridge Resistance* @70°F (21°C)	All-Fire Current @ -50°F (-45°C) 10 ms	No-Fire Current @ 140°F (60°C) 5 min
Part No.	Ohm	Amp, Min.	Amp, Min.
1MT262M3	4.0 ± 1.0	0.55	0.10
Insulation Resistance, Leads to Case, Before Firing	50 megohm Min. @ 500 Vdc		

*Test current limited to 0.010 amp

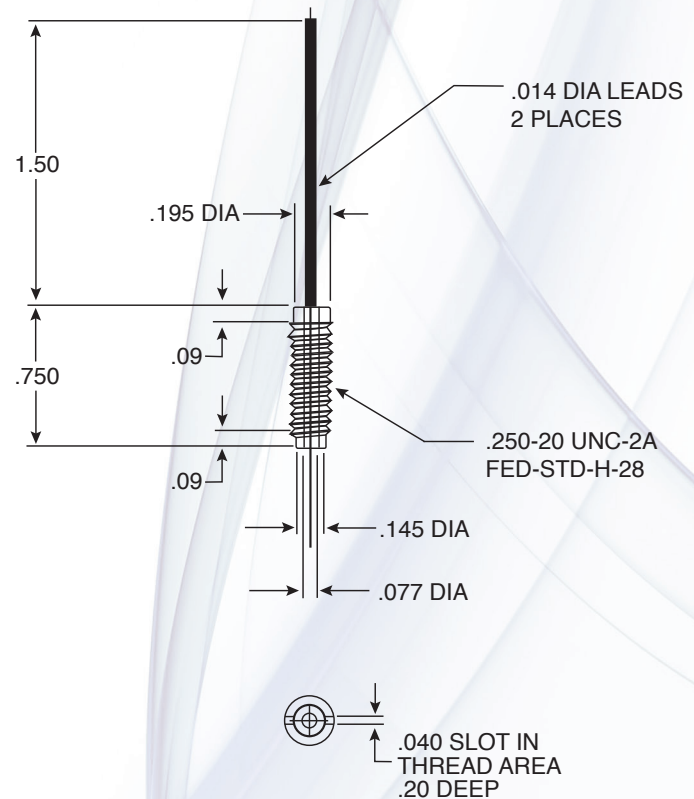
1MT262M3

Specifications Continued

Mechanical	
Size	See drawing
Stroke	1/8" (3.18 mm)
Seal, Leads to Case	epoxy
Function Time, Max.	10 ms
Environmental	
Temperature	Operating range: -50° to +140°F (-54° to +71°C) Cycle: MIL-STD-202, Method 102A, Test Cond. D
Humidity	Cycle: MIL-STD-202, Method 103A, Test Cond. B
Vibration	Sinusoidal: 0.40 ² double amplitude 5 g's 5-500-5 Hz, 3 axes Transportation: MIL-STD-303, 3 axes
Shock	150 g ³ peak IAW MIL-STD-202, Method 213, Condition A
Jumble	MIL-STD-331, Test 102.1
Jolt	MIL-STD-331, Test 101.2

Specifications Continued

Chemical	
Ignition Compound	LMNR/KClO ₃
Freight Classification	
Shipping Name	Release Devices, Explosive
Identification Number	UN0173
Hazard Classification	1.4S



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Cutters

The devices use pyrotechnic generated energy to power a wide variety of cutting mechanisms.

Applications include:

- Severing control or communication wires
- Cutting tubing to release coolant
- Puncturing diaphragms
- Rupturing gas bottle burst disks
- Severing mooring cables
- Cutting reefing lines
- Breaking glass vials to release chemicals.

1SE43 EFC Gas Bottle Cutter



The 1SE43 EFC is a modified piston actuator in which the piston is a cutting blade.

The 1SE43 EFC is used to sever a stainless steel tube and release gas from a storage bottle.

Variations

Although the 1SE43 was designed for a specific application, EaglePicher can adapt it for other uses. The header shape, piston stroke, and output can be modified without losing RF and electrical properties. RF protection can also be eliminated.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Bridge Resistance @ +70°F (21°C)	0.90 - 1.30 ohm
All-Fire Current @ -40°F (-40°C)	4.50 amp, 100 ms
No-Fire Current @ +160°F (71°C)	0.95 amp, 5 min
Insulation Resistance @ 100 Vdc, Leads to Case, Before Firing	1.0 megohm
Static Resistance	25,000 V discharge from a 500 pF capacitor with a 5000 ohm resistor applied between terminals, and terminals to case ground.
RF Attenuation	MIL-STD-1377, minimum insertion loss 50 dB at 100 MHz

Mechanical

Size	See Drawing
Weight	20 gm Max.
Piston Travel	.106" (2.69 mm)
Output	Will shear 1/16" (1.59 mm) O.D. x 0.16" (.406 mm) wall CRS (Type 304) tube

Environmental

Temperature	Operating range: -40°F to +140°F (-40°C to +60°C)
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Chemical

Ignition Compound	Lead Azide
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Freight Classification

Shipping Name	Detonator, Electric
Hazard Classification	1.4B

1SE43 EFC

Safety

Maximum pyrotechnic weight:

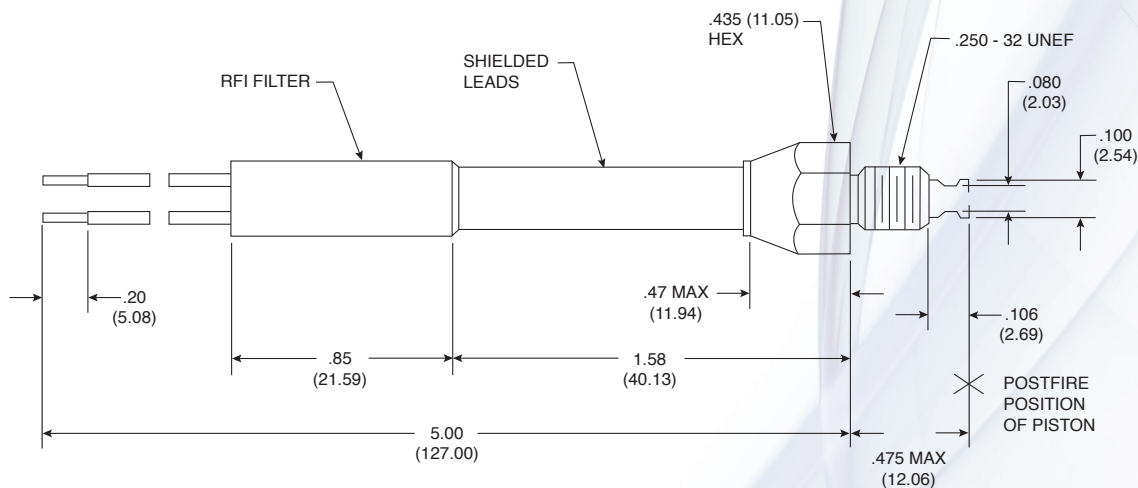
23 mg

Warning:

The 1SE43 EFC cutter may fire or explode if it is exposed to temperatures higher than 200°F (93°C), an electrical charge exceeding the specified no-fire current, or if it is cut open before it has functioned.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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1SE192 Wire Cutter



The 1SE192 Wire Cutter is an electrically initiated pyrotechnic-powered device designed to cut electrical or other small-diameter wire.

The cutter is compact, lightweight, highly reliable and functions in less than 10 milliseconds. It has been used extensively in aerospace applications.

Variations

The 1SE192 has been produced with several ignition systems which fire at different firing energy levels. Other variations are possible in cutting capability, environmental, resistance and firing characteristics.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical	
Insulation Resistance @ 500 Vdc, Shunted Leads to Case, Before Firing	50 megohms
Mechanical	
Size	See Drawing
Weight	2.25 gm
Function Time	10 ms Max.
Cutting Capability	6 strands of .0049" (.1245 mm) dia. wire per MIS-14001 encased in high-temperature nylon sleeving per MIS-13919 or .014" (.355 mm) dia. music wire.

Specifications Continued

Environmental	
Temperature	Operating range: -25°F to +125°F (-32°C to +52°C)
Storage	-80°F to +155°F (-62°C to +68°C)
Storage Time at 30% Relative Humidity	5 years
Accelerated Storage Humidity	48 hr at 95% relative humidity and 155°F (68°C)
Shock	1/2 sine wave with a peak acceleration of 100g's and a duration of 10 ms. Five shocks in each of 2 directions along each of 3 mutually perpendicular axes.
Vibration MIL-STD-202, Method 204 Modified as Follows	Sinusoidal vibration along 3 perpendicular axes with a cycle of: 5-26 Hz @ 1.3 g's 26-52 Hz @ 0.036" (0.914 mm) d.a. 52-500 Hz @ 5.0 g's
Chemical	
Ignition Compound	KDNBF
Freight Classification	
Shipping Name	Wire Cutter
Identification Number	Not regulated as Class 1
Hazard Classification	Not regulated as Class 1

Cutter	Bridge resistance @70°F (21°C)	All-fire current @ -25°F (-32°C) 10 ms	No-fire current @ 125°F (52°C) 5 min
Type	Ohm	Amp, Min.	Amp, Max.
1SE192A	5.0 - 7.0	0.30	0.03
1SE192B	4.0 - 6.0	0.55	0.10
1SE192C	1.6 - 2.0	1.0	0.10
1SE192F	0.09 - 0.29	4.0	1.0 (1 min)

Safety

Maximum pyrotechnic weight:

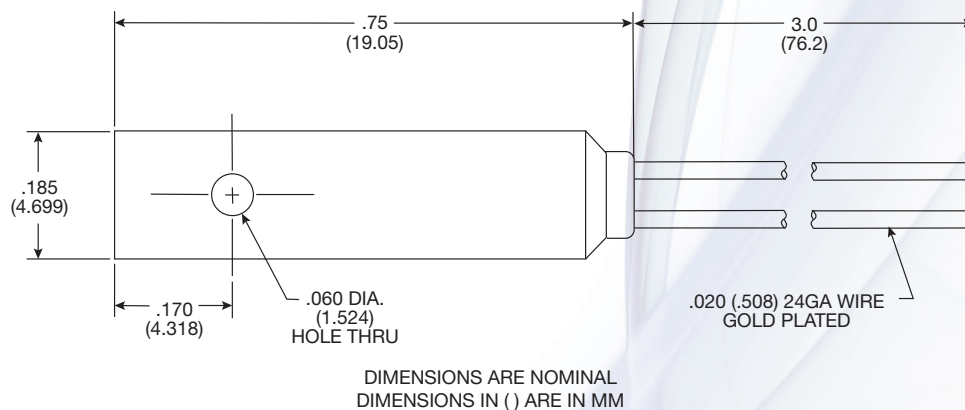
25 mg

Warning:

The cutter is self-contained and will not rupture under normal handling and testing conditions. If the cutter is exposed to temperatures above 200°F (93°C) or an electrical charge exceeding the specified no-fire current, it may rupture. If the unit is cut open before it has functioned, it may fire and emit some shrapnel.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



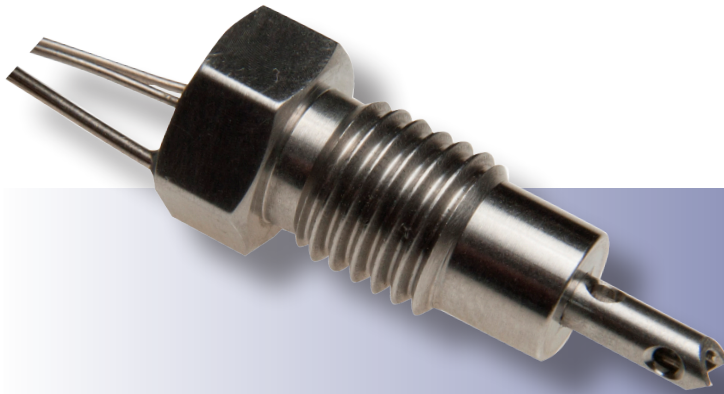
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1SE601

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1SE601 Puncturing Cutter



The 1SE601 is a pyrotechnic actuated cutter specifically designed to puncture a steel disc and release gas from a cylinder through the hollow piston.

Extremely rugged in construction, the cutter can be used in any application where strength and output power are important in providing linear motion.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C)	1.0 ohm
All-Fire Current	4.5 amp, 20ms
No-Fire Current @ 70°F (21°C)	1.0 amp, 5 min
Insulation Resistance	Before fire: Greater than 1 megohm with 500 Vdc leads to case. Per MIL-STD-202, Method 302, Test Conditions B.
Electrostatic Discharge	MIL-DTL-23659 D para 4.4.5.2 25 kW discharge from a 500 pF capacitor applied through a 5000 ohm serried resistor.

Mechanical

Size	See Drawing (<i>other side</i>)
Weight	8 gm
Stroke	Punctures .015 inch thick mild steel disc which is capable of withstanding a gas pressure of 3,000 psig.
Function Time	20 ms
Operating Conditions	-67°F - 130°F
Proof Pressure	6,000 psig
Leakage	5cm ³ per minute after actuation

Specifications Continued

Environmental

Temperature Shock/Humidity/ Altitude	MIL-DTL-23659 D para 4.6.5 (Temperature -65°F to 160°F, Relative Humidity 50% to 95%, Altitude 70,000 ft).
Salt Fog	MIL-STD-810F, Method 509.2, Procedure 1 (5% salt concentration).
Acceleration	MIL-STD-202G, Method 27.2, Test Condition A.
Shock	MIL-DTL-23659 D para 4.6.3 Shock profile is half sine wave with an amplitude of 200g for 1.5 seconds and exceed 65g for 9 ms
Vibration	MIL-DTL-23659D para 4.6.4 (-65°F to 200°F)
Forty Foot Drop	MIL-STD-331, Test Method A3, safe for disposal.
Six Foot Drop	MIL-DTL-23659 D para 4.6.2 Capable of actuation after being subjected to a six foot drop and impacted on a 2 inch thick steel plate.

Freight Classification

Shipping Name	1SE601
Identification Number	UN0173
Hazard Classification	1.4S

1SE601

Variations

EaglePicher can design and manufacture variations of the 1SE601 to meet customer requirements.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Safety

Maximum pyrotechnic weight:

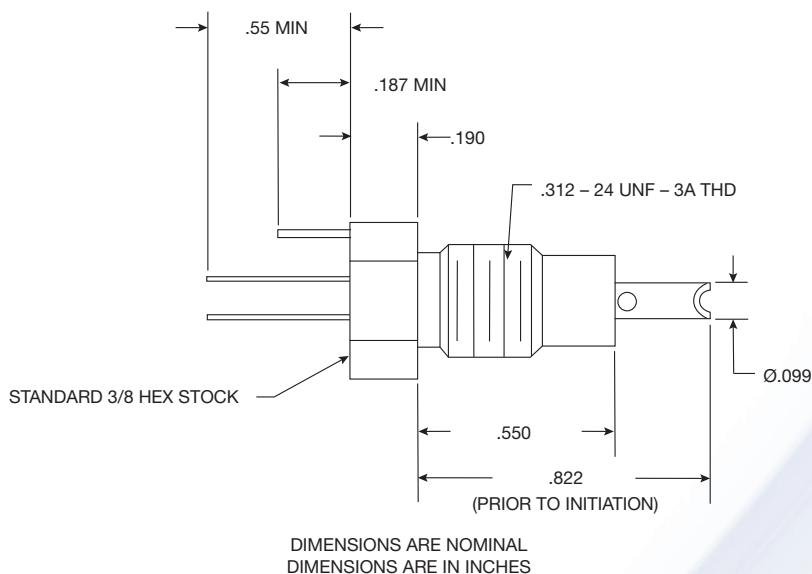
25 mg Barium Styphnate

Warning:

The cutter may fire if exposed to temperatures above 200°F (93°C), an electrical charge exceeding the specified no-fire current, or if it is cut open before functioning.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

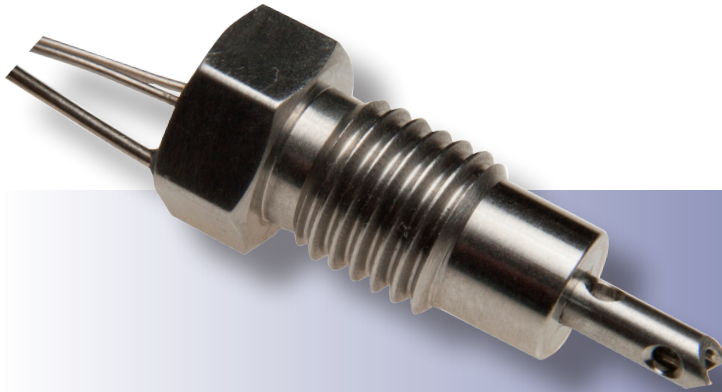
Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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1SE603 Puncturing Cutter



The 1SE603 is a pyrotechnic actuated cutter specifically designed to puncture a steel disc and release gas from a cylinder through the hollow piston.

Extremely rugged in construction, the cutter can be used in any application where strength and output power are important in providing linear motion.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C)	1.0 ohm
All-Fire Current	4.5 amp, 20ms
No-Fire Current @ 70°F (21°C)	1.0 amp, 5 min
Insulation Resistance	Before fire: Greater than 1 megohm with 500 Vdc leads to case. Per MIL-STD-202, Method 302, Test Conditions B.
Electrostatic Discharge	MIL-DTL-23659 D para 4.4.5.2 25 kW discharge from a 500 pF capacitor applied through a 5000 ohm serried resistor.

Mechanical

Size	See Drawing (<i>other side</i>)
Weight	8 gm
Stroke	Punctures .008 inch thick inconel disc which is capable of withstanding a gas pressure of 4,700 psig.
Function Time	20 ms
Operating Conditions	-67°F - 187°F
Proof Pressure	6,000 psig
Leakage	5cm ³ per minute after actuation

Specifications Continued

Environmental

Temperature Shock/Humidity/Altitude	MIL-DTL-23659 D para 4.6.5 (Temperature -65°F to 160°F, Relative Humidity 50% to 95%, Altitude 70,000 ft).
Salt Fog	MIL-STD-810F, Method 509.2, Procedure 1 (5% salt concentration).
Acceleration	MIL-STD-202G, Method 27.2, Test Condition A.
Shock	MIL-DTL-23659 D para 4.6.3 Shock profile is half sine wave with an amplitude of 200 g for 1.5 seconds and exceed 65g for 9 ms
Vibration	MIL-DTL-23659D para 4.6.4 (-65°F to 200°F)
Forty Foot Drop	MIL-STD-331, Test Method A3, safe for disposal.
Six Foot Drop	MIL-DTL-23659 D para 4.6.2 Capable of actuation after being subjected to a six foot drop and impacted on a 2 inch thick steel plate.

Freight Classification

Shipping Name	1SE603
Identification Number	UN0173
Hazard Classification	1.4S

1SE603

Variations

EaglePicher can design and manufacture variations of the 1SE603 to meet customer requirements.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Safety

Maximum pyrotechnic weight:

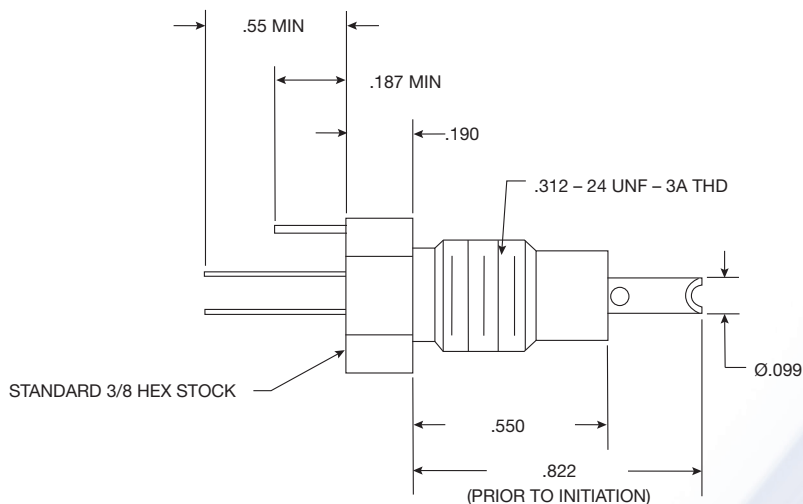
25 mg Barium Styphnate

Warning:

The cutter may fire if exposed to temperatures above 200°F (93°C), an electrical charge exceeding the specified no-fire current, or if it is cut open before functioning.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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1SE606

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1SE606 Puncturing Cutter



The 1SE606 is a pyrotechnic actuated cutter specifically designed to puncture a steel disc and release gas from a cylinder through the hollow piston.

Extremely rugged in construction, the cutter can be used in any application where strength and output power are important in providing linear motion. The design is capable of being used in an oxygen environment.

Variations

EaglePicher can design and manufacture variations of the 1SE606 to meet customer requirements.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C)	1.0 ohm
All-Fire Current	4.5 amp, 20ms
No-Fire Current @ 70°F (21°C)	1.0 amp, 5 min
Insulation Resistance	Before fire: Greater than 1 megohm with 500 Vdc leads to case. Per MIL-STD-202, Method 302, Test Conditions B.
Electrostatic Discharge	MIL-DTL-23659C 25 kW discharge from a 500 pF capacitor applied through a 5,000 ohm serried resistor.

Mechanical

Size	See Drawing
Weight	15 gm
Stroke	Punctures .006 inch thick nickel disc which is capable of withstanding a gas pressure of 3,000 psig.
Function Time	20 ms
Operating Conditions	-67°F - 162°F
Proof Pressure	6,000 psig

Freight Classification

Shipping Name	1SE606A
Identification Number	Not regulated
Hazard Classification	None

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1SE607 Puncturing Cutter



The 1SE607 is a pyrotechnic actuated cutter specifically designed to cut a steel tube.

Extremely rugged in construction, the cutter can be used in any application where strength and output power are important in providing linear motion.

Variations

EaglePicher can design and manufacture variations of the 1SE607 to meet customer requirements.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C)	1.0 ohm
All-Fire Current	4.5 amp, 20ms
No-Fire Current @ 70°F (21°C)	1.0 amp, 5 min
Insulation Resistance	Before fire: Greater than 1 megohm with 500 Vdc leads to case. Per MIL-STD-202, Method 302, Test Conditions B.
Electrostatic Discharge	MIL-DTL-23659C 25 kW discharge from a 500 pF capacitor applied through a 5,000 ohm serried resistor.

Mechanical

Size	See Drawing
Connector	MIL-C-24308/3 part number M24308/3-IF, Lead wires are terminated into pins 1 and 2.

Specifications Continued

Lead Length	7 inches
Weight	20 gm
Stroke	Cut a corrosion resistance steel, type 304 tube with an outside diameter of 0.0625 with a wall thickness of 0.016 which is capable of withstanding a gas pressure of 8,500 psig.
Function Time	20 ms
Operating Conditions	-40°F - 140°F
Proof Pressure	8,500 psig
Leakage	Not greater than 60 cm ³ for a period of 10 min after actuation.

Environmental

Temperature Shock	(-40°F to 85°F)
Humidity	Relative Humidity 50% to 95%, Temperature 68°F to 104°F for 120 hours.
Salt Fog	MIL-STD-810F, Method 509.2, Procedure 1 (5% salt concentration).
Acceleration	MIL-STD-202G, Method 27.2, Test Condition A.
Shock	Shock levels shall be as defined by operating shock response spectrum define by Figure 1.
Random Vibration	Random vibration spectrum shall consist of a frequency: 20 to 5,000 Hz; power spectrum density: 0.01 gravity units squared per hertz.

Freight Classification

Shipping Name	1SE-607
Identification Number	UN0173
Hazard Classification	1.4S

Safety

Maximum pyrotechnic weight:

36 mg Barium Styphnate

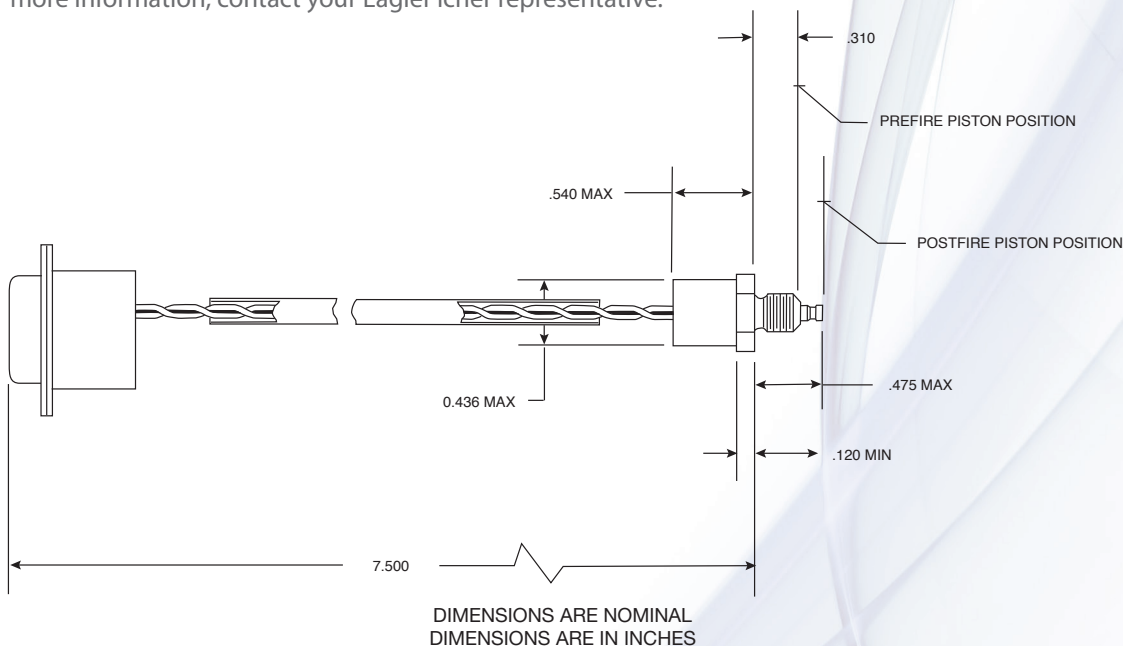
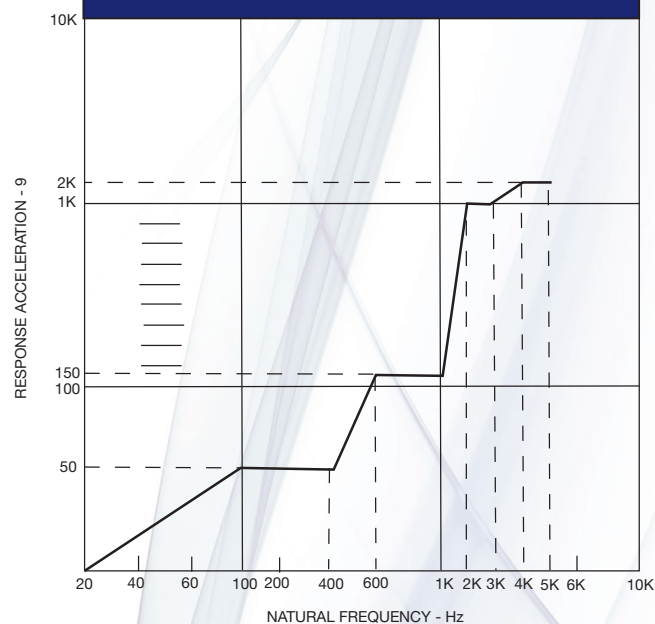
Warning:

The cutter may fire if exposed to temperatures above 200°F (93°C), an electrical charge exceeding the specified no-fire current, or if it is cut open before functioning.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.

Figure 1 x Shock Response Spectrum



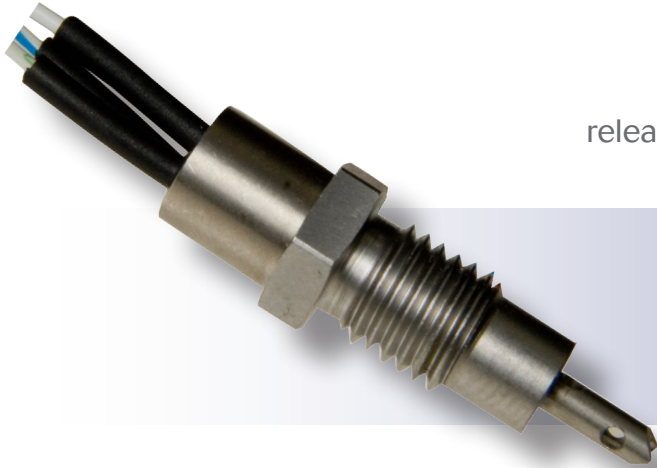
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1SE608 Puncturing Cutter



The 1SE608 is a pyrotechnic actuated cutter specifically designed to puncture a steel disc, lock the piston at the end of its stroke and release gas from a cylinder through the hollow piston.

Extremely rugged in construction, the cutter can be used in any application where strength and output power are important in providing linear motion.

Variations

EaglePicher can design and manufacture variations of the 1SE608 to meet customer requirements.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C)	1.0 ohm
All-Fire Current	3.5 amp, 20ms
No-Fire Current @ 70°F (21°C)	1.0 amp, 5 min
Insulation Resistance	Before fire: Greater than 10 megohm with 500 Vdc leads to case. Per MIL-STD-202, Method 302, Test Conditions B.
Electrostatic Discharge	MIL-DTL-23659F 25 kW discharge from a 500 pF capacitor applied through a 5,000 and 500 ohm serried resistor.

Specifications Continued

Mechanical

Size	See Drawing (other side)
Lead Length	18 inches
Weight	12 gm
Stroke	Punctures .012 inch thick inconel disc which is capable of withstanding a gas pressure of 17,500 psig.
Function Time	20 ms
Operating Conditions	-67°F - 187°F
Push Back Force	Will withstand up to 350 lbs of force for up to one minute after actuation.
Proof Pressure	22,000 psig
Burst Pressure	37,000 psig
Leakage	1.0 cm ³ per min after actuation

1SE608

Specifications Continued

Environmental

High Temperature	MIL-STD-810C, Method 501.1, Procedure 1, except steps 4 & 5 are omitted (187°F).
Low Temperature	MIL-STD-810C, Method 502.1, Procedure 1, except steps 4 & 5 are omitted (-67°F)
Temperature Shock	MIL-STD-810C, Method 503.1, Procedure 1 (-80°F to 187°F)
Humidity	MIL-STD-810F, Method 507.4, Procedure 1 (85-95% relative humidity at -68°F to 140°F)
Salt Fog	MIL-STD-810F, Method 509.1, Procedure 1 (5% salt concentration)
Fungus	MIL-STD-810F, Method 509.1, Procedure 1, except that the test period shall be 90 days.
Temperature–Altitude	MIL-STD-810C, Method 504.1, for equipment category 3 non-operating, except that the temperatures shall be the following: Step 1b: -67°F Steps 2 & 3: -45°F Step 6: 187°F Steps 8 & 11: 145°F
Free Flight Acceleration	MIL-STD-810C, Method 513.2, Procedure 1, The Bottle Cutters shall be exposed to acceleration peak levels as follows for 1.5 seconds in each of the axes. Longitudinal Axis (Forward): 34g Longitudinal Axis (Aft): 14g Vertical Axis (Up): 40g Vertical Axis (Down): 40g Transverse: 40g
Shock	MIL-DTL-23659F
Vibration	MIL-DTL-23659F
Freight Classification	
Shipping Name	1SE608
Identification Number	UN0173
Hazard Classification	1.4S

1SE608

Safety

Maximum pyrotechnic weight:

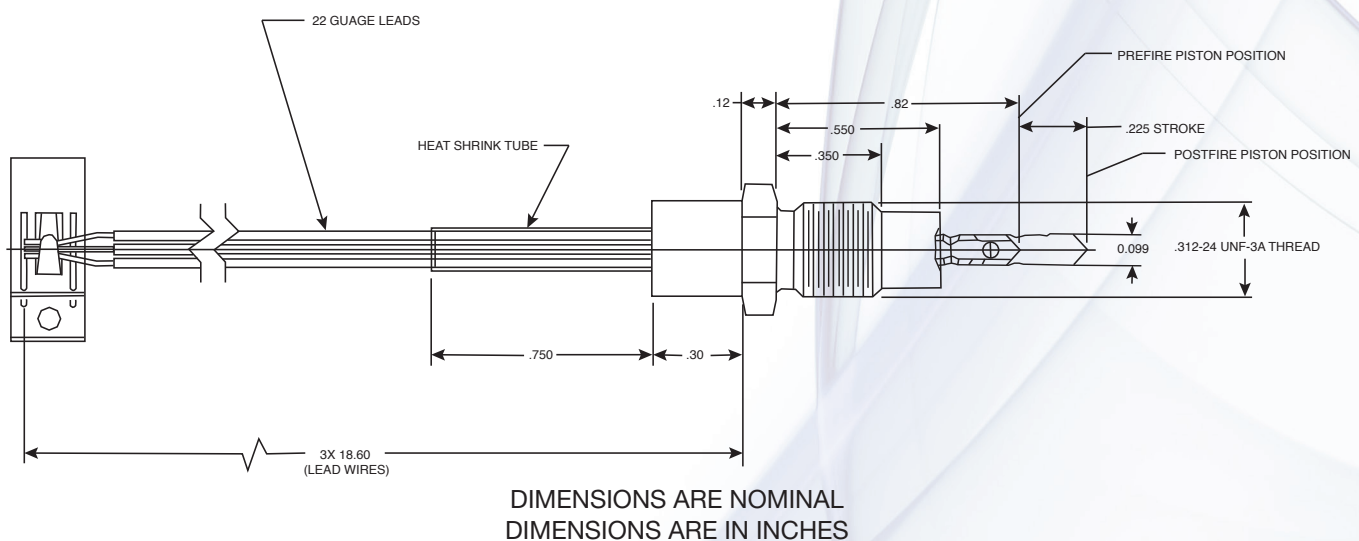
30 mg Barium Styphnate

Warning:

The cutter may fire if exposed to temperatures above 200°F (93°C), an electrical charge exceeding the specified no-fire current, or if it is cut open before functioning.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.

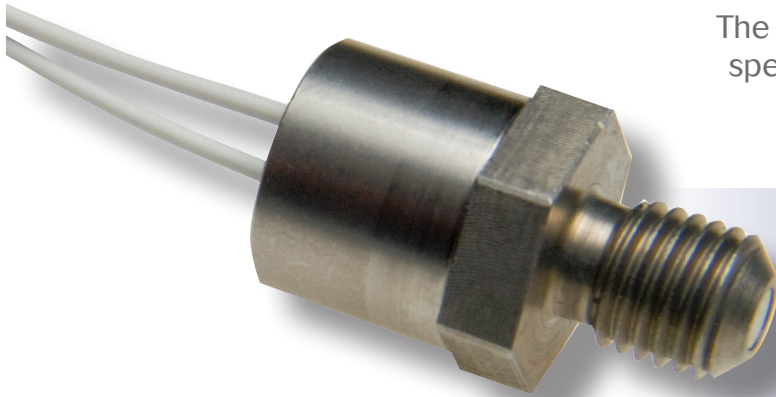


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1SE609 Puncturing Cutter



The 1SE609 is a pyrotechnic actuated cutter specifically designed to cut a steel tube and lock the piston at the end of its stroke.

Extremely rugged in construction, the cutter can be used in any application where strength and output power are important in providing linear motion.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C)	1.0 ohm
All-Fire Current	3.5 amp, 20ms
No-Fire Current @ 70°F (21°C)	1.0 amp, 5 min
Insulation Resistance	Before fire: Greater than 1 megohm with 500 Vdc leads to case. Per MIL-STD-202, Method 302, Test Conditions B.
Electrostatic Discharge	MIL-DTL-23659C 25 kW discharge from a 500 pF capacitor applied through a 5,000 ohm serried resistor.

Mechanical

Size	See Drawing (<i>other side</i>)
Lead Length	2.53 inches
Weight	10 gm
Stroke	Cut a corrosion resistance steel, type 304 tube with an outside diameter of 0.0625 with a wall thickness of 0.016 which is capable of withstanding a gas pressure of 12,200 psig.
Function Time	20 ms
Operating Conditions	-40°F - 150°F
Push Back Force	Will withstand up to 350 lbs of force for up to one minute after actuation.
Proof Pressure	12,200 psig
Leakage	60cc per min after actuation

Specifications Continued

Environmental

Temperature Shock/Humidity/Altitude	MIL-DTL-23659 para 4.6.5 (Temperature -65°F to 160°F, Relative Humidity 50% to 95%, Altitude 70,000 ft).
Salt Fog	MIL-STD-810F, Method 509.2, Procedure 1 (5% salt concentration).
Acceleration	MIL-STD-202G, Method 27.2, Test Condition A.
Triangular Shock	MIL-DTL-23659D para 4.6.4 (Waveform – Triangular, Amplitude – 400g, Rise Time – 2.0 ms, Decay Time 2.0 ms).
Vibration	MIL-DTL-23659D para 4.6.4 (-65°F to 200°F)
Random Vibration	Random vibration spectrum shall consist of a frequency: 20 to 5,000 Hz; power spectrum density: 0.01 gravity units squared per hertz.
Forty Foot Drop	MIL-STD-331, Test Method A3, safe for disposal.
Six Foot Drop	Capable of actuation after being subjected to a six foot drop and impacted on a 2 inch thick steel plate.

Freight Classification

Shipping Name	1SE-609
Identification Number	UN0173
Hazard Classification	1.4S

1SE609

Variations

EaglePicher can design and manufacture variations of the 1SE609 to meet customer requirements.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Safety

Maximum pyrotechnic weight:

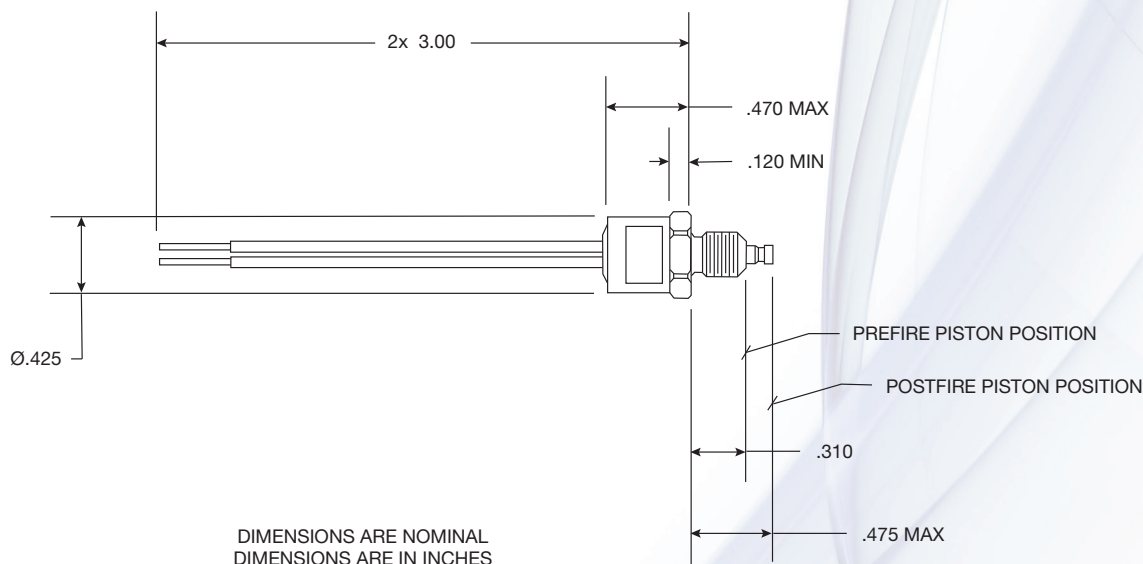
30 mg Barium Styphnate

Warning:

The cutter may fire if exposed to temperatures above 200°F (93°C), an electrical charge exceeding the specified no-fire current, or if it is cut open before functioning.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

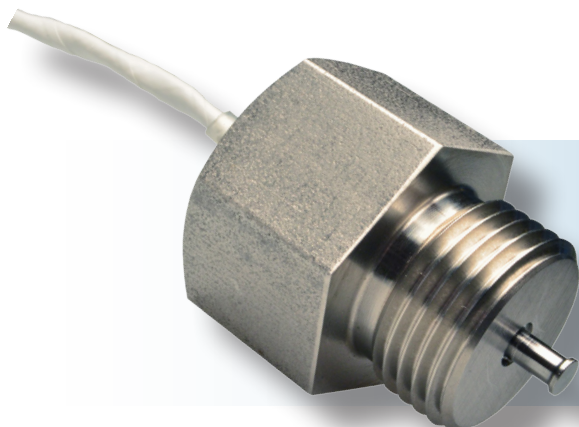
Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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EP-600-1 Puncturing Cutter



The EP-600-1 is a pyrotechnic-actuated cutter specifically designed to puncture a steel disc.

Extremely rugged in construction, the cutter can be used in any application where strength and output power are important in providing linear motion.

Variations

EP-600-1 is extremely rugged in construction and can be used in any application where strength and output power are important in providing linear motion. EaglePicher can design and manufacture variations of the EP-600-1 to meet customer requirements.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical	
Bridge Resistance @ 77°F (25°C)	1.0 ohm
All-Fire Current	4.0 amp, 25 ms
No-Fire Current @ 73°F (23°C)	1.0 amp, 5 min
Insulation Resistance	Before fire: Greater than 10 megohm with 500 Vdc, leads to case.
Mechanical	
Size	See drawing
Lead Length	19" (482 mm)
Weight	0.32 lb (145 gm)
Stroke	Punctures a .010" (.254 mm) thick domed disc of 304L stainless steel with a maximum tensile strength of 18500 PSI which is capable of withstanding a gas pressure of 11,500 psig minimum when clamped on both sides by retainers having a 0.225" diameter.
Function Time	25 ms Max.
Operation Conditions	185°F (85°C) Max. (-55°C) Min.
Push Back Force	Will withstand up to 350 lbs of force for up to five minutes after actuation.
Burst Pressure	17,000 psig

EP-600-1

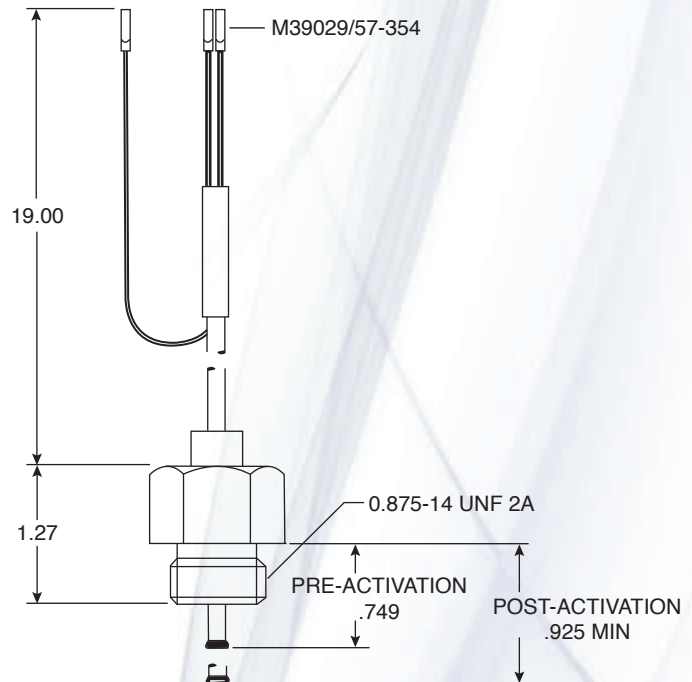
Specifications Continued

Environmental

Temperature Shock	MIL-STD-810, Method 503.1 Procedure I (+85°C to -62°C)
Humidity	MIL-STD-810, Method 507.1, Procedure I (95-100% relative humidity (-170°F (77°C))
Salt Fog	MIL-STD-810, Method 509.1, (5% salt concentration)
Fungus	MIL-STD-810C, Method 508.1, Procedure I.
Vibration	MIL-STD-810, Method 514.2, Fig. 514.2-5 g2/Hz Level to yield 12.3 g RMS, 1 HR. each axis.
Shock	MIL-STD-810C, Method 516.2, Procedure I, Fig. 516.2-2 (40G for 30 ms)
Explosive Atmosphere	MIL-STD-810C, Method 511.1, Procedure I. (Sea level, 20,000 ft. & 40,000 ft.)
Acceleration	MIL-STD-810C, Method 513.2, Procedure II.
High Temperature	MIL-STD-810C, Method 501.1, Procedure I (+85°C)
Low Temperature	MIL-STD-810C, Method 502.1, Procedure I (-52°C).

Freight Classification

Shipping Name	EP-600-1
Identification Number	Not regulated
Hazard Classification	None



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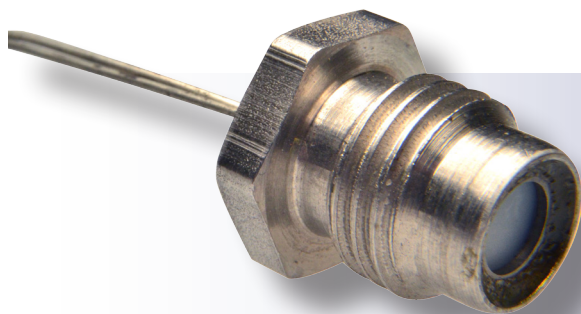
Gas Generators

These devices use a precisely controlled reaction to produce a specified volume of gas. The resulting gas pressure is used to do mechanical work

Applications include:

- Displacing a liquid
- Pressurizing a container
- Operating a cartridge actuated device (CAD)
- Inflating air bags
- Actuating expelling bladders and other ejection devices
- Dispensing powder from a corked vial.

EP-701 Pressure Cartridge



Pressure cartridges, sometimes known as gas generators, use pyrotechnic mixtures to produce gas that is applied to do mechanical work.

The EP-701 is an electrically initiated gas generator which is highly reliable and has a minimum shelf-life of 10 years.

Variations

The EP-701 gas generator was designed and made for a specific application. EaglePicher will modify this part to meet customer requirements. Variations are possible in firing characteristics, peak pressure, and pressure build-up rate.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C) Measured with .010 amp max	1.5 to 7.0 ohms
All-fire Current @ -65°F (-54°C)	5000 ERGS (24µfd cap charged to 6.5 volts)
No-fire Current @ 70°F (21°C)	0.20 amp, 1 min

Specifications Continued

Mechanical

Size	See Drawing
Weight Approximation	5.1 gm
Time-to-Peak Pressure Max	5 ms max
Output Pressure in .061 in ³ (1.0 cm ³) Closed Bomb	4000 to 7000 psi

Environmental

Temperature	Operating range: -65°F to +160°F (-54°C to 71°C)
Temperature Shock	MIL-STD-331, Method 113.1
Shock	MIL-STD-810, Test Method 516, Procedure 1 30g's for 11 ms, 1/2 sine wave pulse
Vibration	MIL-STD-810, Table 514.2 IV, Procedure 11A

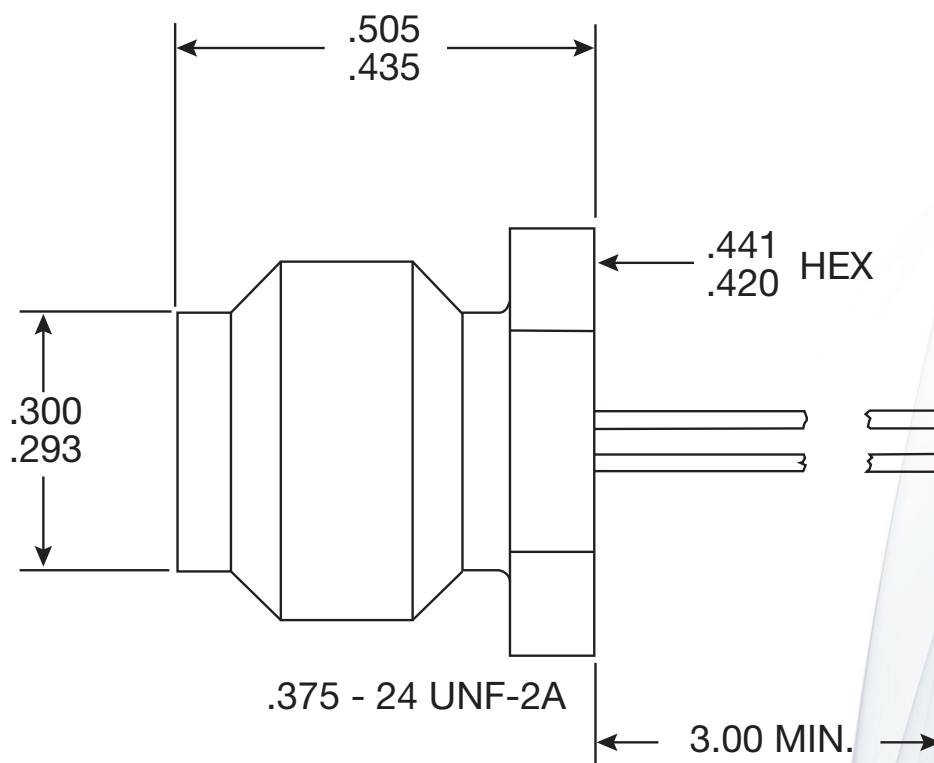
Chemical

Ignition Compound	Lead Styphnate
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Freight Classification

Shipping Name	Cartridges, Power Device
Identification Number	UN0276
Hazard Classification	1.4C

EP-701



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GG-300 Pressure Cartridge



Pressure cartridges, sometimes known as gas generators, use pyrotechnic mixtures to produce gas that is applied to do mechanical work.

The GG-300 is a dual bridge electrically initiated gas generator with a controlled rise and decay pressure profile. It is highly reliable and has a minimum shelf-life of 15 years.

Variations

The GG-300 gas generator was designed and made for a specific application. EaglePicher will modify this part to meet customer requirements. Variations are possible in firing characteristics, peak pressure, pressure build-up rate and pressure decay rate.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C) Measured with .010 amp max	1.1 ohms
All-fire Current @ -31°F (-35°C)	3.5 amps, 60Hz or DC, 50 mS
No-fire Current @ 70°F (21°C)	1.0 amp/1.0 watt, 5 min

Mechanical

Size	See Drawing
Weight Approximation	13.6 gm max
Time-to-Peak Pressure Max	27 ms max
Output Pressure in .61 in ³ (10.0 cm ³) Closed Bomb	550 psi

Specifications Continued

Environmental

Temperature	Operating range: -31°F to 122°F (-35°C to 50°C)
Temperature Shock	MIL-STD-202, Method 107, Condition A
Shock	MIL-STD-202, Test Method 213, Condition D 500 g's 1/2 sine wave pulse
Vibration	MIL-STD-202, Method 204, Condition B
Moisture Resistance	MIL-STD-202, Method 106

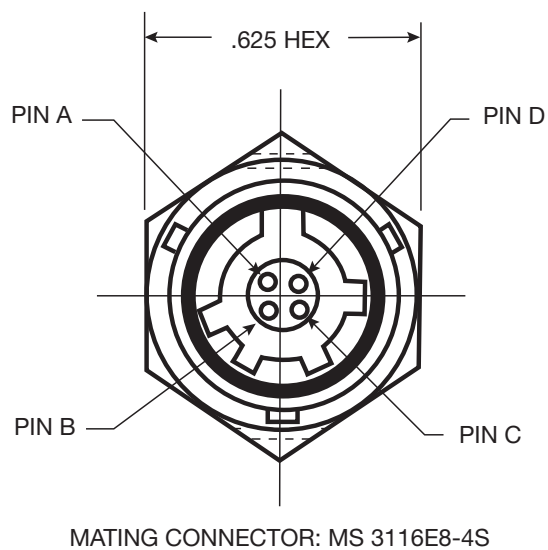
Chemical

Ignition Compound	Barium Styphnate
Output Compound	THPP

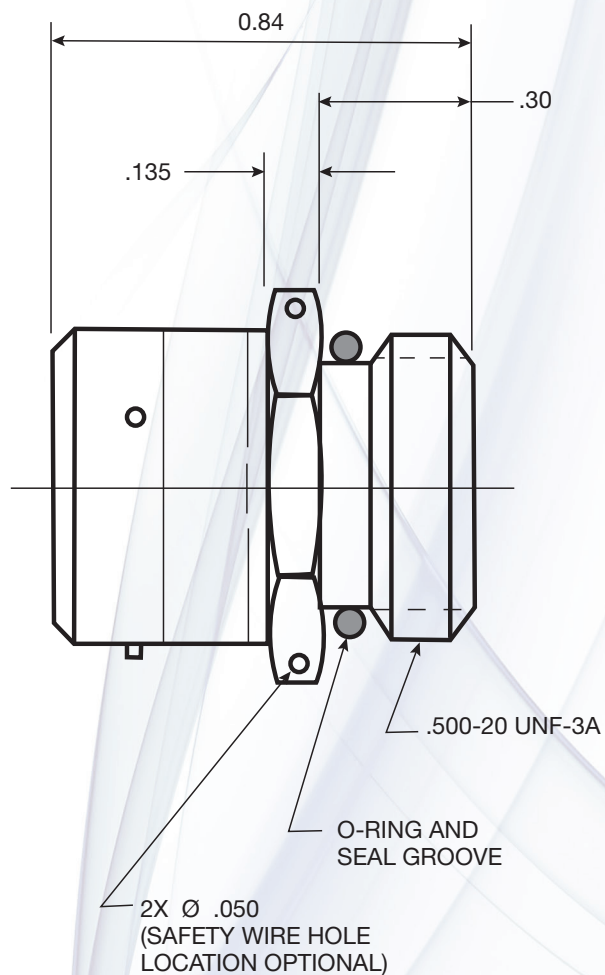
Freight Classification

Shipping Name	Cartridge, Power Device
Identification Number	UN0323
Hazard Classification	1.4S

GG-300



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GG-301 Pressure Cartridge



Pressure cartridges, sometimes known as gas generators, use pyrotechnic mixtures to produce gas that is applied to do mechanical work.

The GG-301 is a dual bridge electrically initiated gas generator with a controlled rise and decay pressure profile. It is highly reliable and has a minimum shelf-life of 15 years.

Variations

The GG-301 gas generator was designed and made for a specific application. EaglePicher will modify this part to meet customer requirements. Variations are possible in firing characteristics, peak pressure, pressure build-up rate and pressure decay rate.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Bridge Resistance @ 70°F (21°C) Measured with .010 amp max	1.1 ohms
All-fire Current @ -31°F (-35°C)	3.5 amps, 60Hz or DC, 50 mS
No-fire Current @ 70°F (21°C)	1.0 amp/1.0 watt, 5 min

Mechanical

Size	See Drawing
Weight Approximation	13.6 gm max
Time-to-Peak Pressure Max	27 ms max
Output Pressure in .61 in ³ (10.0 cm ³) Closed Bomb	550 psi

Specifications Continued

Environmental

Temperature	Operating range: -31°F to 122°F (-35°C to 50°C)
Temperature Shock	MIL-STD-202, Method 107, Condition A
Shock	MIL-STD-202, Test Method 213, Condition D 500 g's 1/2 sine wave pulse
Vibration	MIL-STD-202, Method 204, Condition B
Moisture Resistance	MIL-STD-202, Method 106

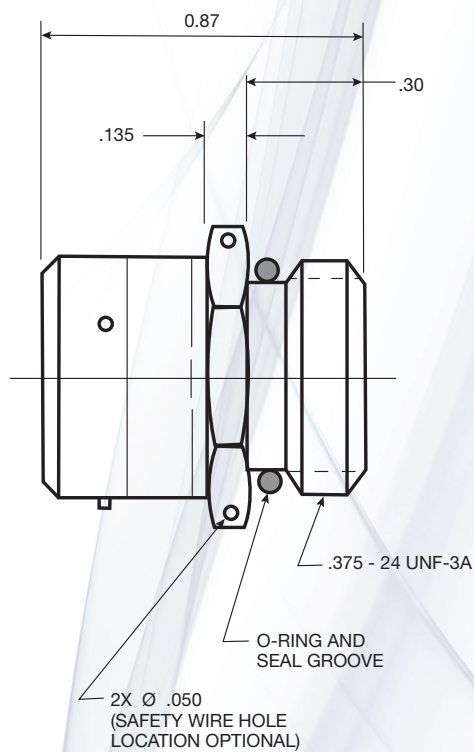
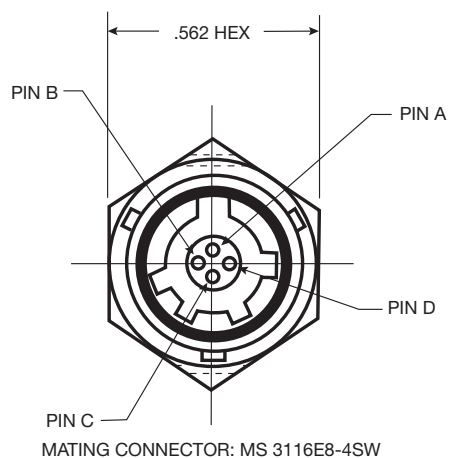
Chemical

Ignition Compound	Barium Styphnate
Output Compound	THPP

Freight Classification

Shipping Name	Cartridge, Power Device
Identification Number	UN0323
Hazard Classification	1.4S

GG-301



DIMENSIONS ARE NOMINAL



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Igniters

These devices use a precisely controlled pyrotechnic reaction to produce a specified output of hot particles.

Applications include:

- Igniting safety fuses
- Propellants or heat powders
- Thermal batteries
- Metal oxidant mixes
- Other deflagrating materials.

EP-200 Igniter



The EP-200 Electric Igniter is a highly reliable electroexplosive device.

A typical function of an electric igniter is to activate thermal batteries, propellants, or other fuels.

Variations

Variations can be made in firing characteristics, output charge and overall configuration to accommodate customer requirements. For these or other possible alterations please consult an EaglePicher representative.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Pre-fire Insulation Resistance	20 megohm minimum at 500 Vdc per MIL-STD-202. Method 302 (between shorted leads and case).
Electrostatic Discharge	25kV from a 500 picofarad capacitor with a 5 kohm resistor in series without firing (between shorted leads and case).
Additional Electrical Characteristics	See chart at end of section

Mechanical

Size	See Drawing
Weight	0.7 gm Max.
Case	Nickel plated gilding metal
Lead	0.030" diameter
Caloric Output	35 calories nominal

Chemical

Ignition Compounds	LMNR/KCLO ₃
Output Compound	Zirconium Ferric Oxide

Freight Classification

Shipping Name	Igniter
Identification Number	UN0325
Hazard Classification	1.4S

Safety

Maximum pyrotechnic weight:

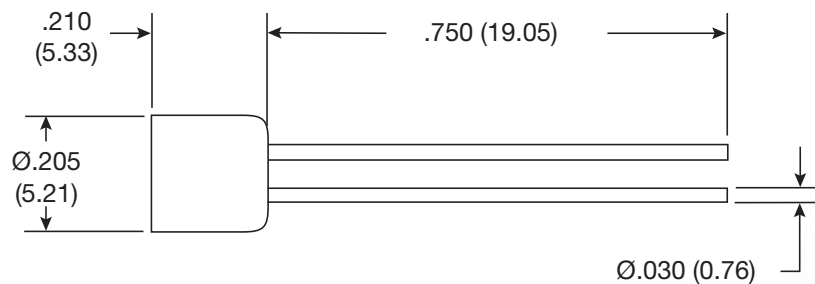
60 mg

Warning:

The igniter may fire if exposed to temperatures above 350°F (176°C), an electrical charge exceeding the specified no-fire current, or if it is cut open before functioning. When the unit fires, hot gases are discharged through the output end.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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EP-210 Igniter

The EP-210 Electric Igniter is a highly reliable electroexplosive device.



A typical function of an electric igniter is to activate thermal batteries, propellants, or other fuels.

Variations

Variations can be made in firing characteristics, output charge and overall configuration to accommodate customer requirements. For these or other possible alterations please consult an EaglePicher representative.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Pre-fire Insulation Resistance	20 megohm minimum at 500 Vdc per MIL-STD-202, Method 302 (between shorted leads and case).
Electrostatic Discharge	25kV from a 500 picofarad capacitor with a 5 kohm resistor in series without firing (between shorted leads and case).
Additional Electrical Characteristics	See chart at end of section

Mechanical

Size	See Drawing
Weight	1.1 gm Max.
Case	Nickel plated gilding metal
Caloric Output	70 calories nominal

Chemical

Ignition Compounds	Boron Calcium Chromate KDNBF
Output Compound	Zirconium Ferric Oxide

Freight Classification

Shipping Name	Igniter
Identification Number	UN0325
Hazard Classification	1.4S

Safety

Maximum pyrotechnic weight:

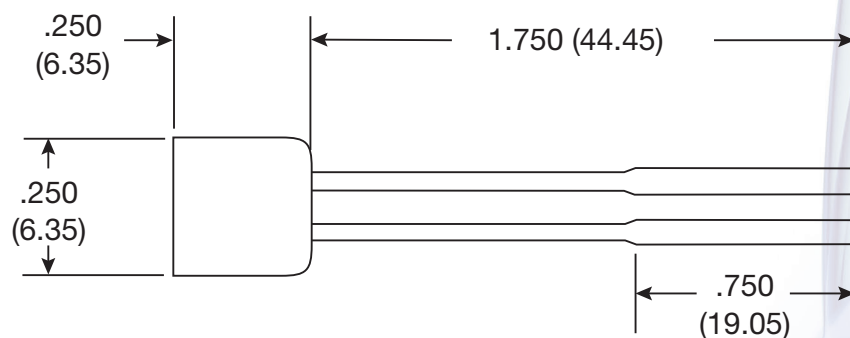
75 mg

Warning:

The igniter may fire if exposed to temperatures above 350°F (176°C), an electrical charge exceeding the specified no-fire current, or if it is cut open before functioning. When the unit fires, hot particles and gases are discharged through the output end.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



DIMENSIONS ARE NOMINAL
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EP-250 Igniter

The EP-250 Electric Igniter is a highly reliable, electroexplosive device.



A typical function of an electric igniter is to activate thermal batteries, propellants, or other fuels.

Variations

Variations can be made in firing characteristics, output charge and overall configuration to accommodate customer requirements. For these or other possible alterations please consult an EaglePicher representative.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Pre-fire Insulation Resistance	20 megohm minimum at 500 Vdc per MIL-STD-202, Method 302 (between shorted leads and case).
Electrostatic Discharge	25kV from a 500 picofarad capacitor with a 5 kohm resistor in series without firing (between shorted leads and case).
Additional Electrical Characteristics	See chart at end of section

Mechanical

Size	See Drawing
Weight	1.1 gm Max.
Case	Nickel plated gilding metal
Caloric Output	85 calories nominal

Chemical

Ignition Compounds	Boron Calcium Chromate Boron Barium Nitrate LMNR/KCLO ₃
Output Compound	Zirconium Ferric Oxide

Freight Classification

Shipping Name	Igniter
Identification Number	UN0454
Hazard Classification	1.4S

EP-250

Safety

Maximum pyrotechnic weight:

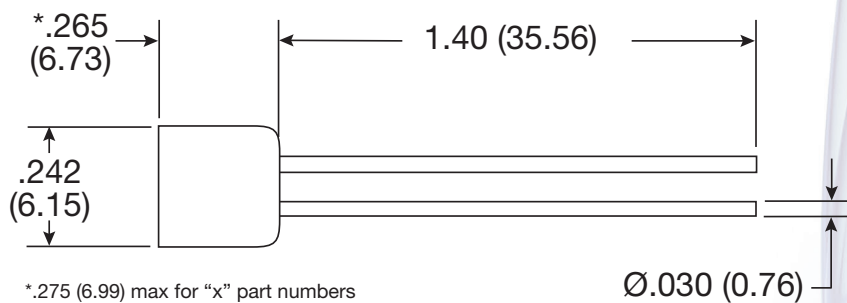
110 mg

Warning:

The igniter may fire if exposed to temperatures above 350°F (176°C), an electrical charge exceeding the specified no-fire current, or if it is cut open before functioning. When the unit fires, hot particles and gases are discharged through the output end.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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DIMENSIONS IN () ARE IN MM



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EP-360 Igniter

The EP-360 Electric Igniter is a highly reliable, electroexplosive device.



A typical function of an electric igniter is to activate thermal batteries, propellants, or other fuels.

Variations

Variations can be made in firing characteristics, output charge and overall configuration to accommodate customer requirements. For these or other possible alterations please consult an EaglePicher representative.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Pre-fire Insulation Resistance	20 megohm minimum at 500 Vdc per MIL-STD-202, Method 302 (between shorted leads and case).
Electrostatic Discharge	25kV from a 500 picofarad capacitor with a 5 kohm resistor in series without firing (between shorted leads and case).
Additional Electrical Characteristics	See chart at end of section

Mechanical

Size	See Drawing
Weight	1.8 gm Max.
Case	Nickel plated gilding metal
Caloric Output	85 calories nominal

Chemical

Ignition Compounds	Boron Calcium Chromate
Output Compound	Zirconium Ferric Oxide

Freight Classification

Shipping Name	Igniter
Identification Number	UN0454
Hazard Classification	1.4S

Safety

Maximum pyrotechnic weight:

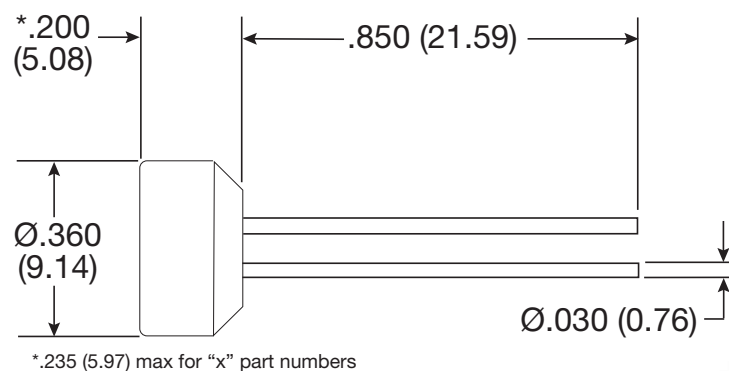
110 mg

Warning:

The igniter may fire if exposed to temperatures above 350°F (176°C), an electrical charge exceeding the specified no-fire current, or if it is cut open before functioning. When the unit fires, hot particles and gases are discharged through the output end.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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Leads and Detonators

1DT100 Electric Detonator



The 1DT100 Electric Detonator is used in fuzing applications.

It is a wire bridge detonator designed for capacitive discharge firing.

Characteristics

EaglePicher's 1DT100 is a form, fit, and function replacement for the M100 detonator. The characteristics listed may be tailored to meet specialized customer requirements. Please consult an EaglePicher representative for additional application data.

Specifications

Electrical

Resistance @ 70°F (21°C)	3.0 -7.5 ohms
All-Fire Current @ 70°F (21°C)	1.6 Vdc max. through a 100 microfarad capacitor
Insulation Resistance	50 megohms minimum at 500 Vdc

Mechanical

Size	See Drawing (next page)
Case Material	Aluminum alloy 1100-0
Lead Material	Glass sealing alloy, 42-6 (Ni-Cr-Fe alloy), gold-plated.
Output	Will produce a minimum of .005 inch (.127 mm) dent when detonator is initiated against a mild steel block of R _b 70-95 hardness.

Specifications Continued

Environmental

Temperature	Operating range: -65°F to +165°F (-54°C to +74°C)
Waterproofness	48 hour immersion at a depth of 2 to 3 inches at a water temperature of 70°F ± 10°F.
Thermal Shock/Vibration	2 hours at -65°F ± 5°F; transfer immediately to chamber at +165°F ± 5°F for 2 hours; immediately transfer to vibration for 15 minute sweep covering the frequency range of 25-500-25 cycles per second parallel to the transverse orthogonal axis with the base charge down and a 2 ± .2 g's peak.

Chemical

Ignition Material	Lead Styphnate
Output Material	Lead Azide and HMX

Freight Classification

Shipping Name	Detonator, Electric
Hazard Classification	1.4S

1DT100

Safety

Maximum explosive weight:

40 mg

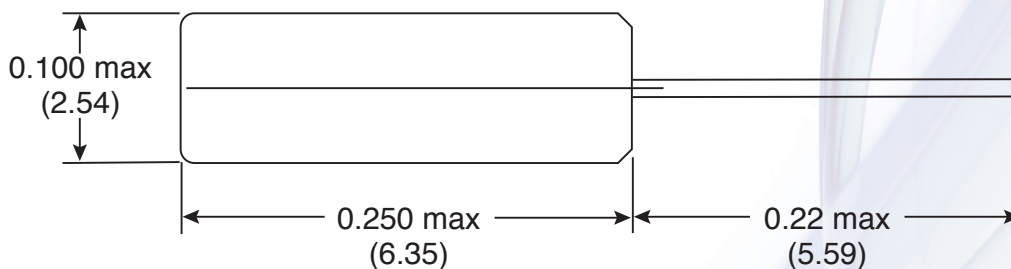
Warning:

Detonators are sensitive to static electricity, electric current, heat, friction and shock. They explode with great force and their accidental firing under unprotected conditions may cause severe injury.

Most companies that buy detonators are already aware of the hazards involved in their handling and use, and have effective safety programs to protect against those hazards.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles, therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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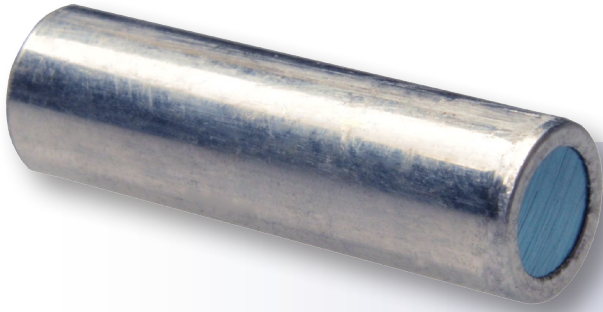
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1DT115 Explosive Lead



Explosive leads are typically used as the moveable part of the detonation train.

Explosive leads achieve the desirable out-of-the-line fuze position for safety.

Lead Function

The lead when properly initiated will produce a minimum dent of .010 inch (0.254 mm) when functioned in accordance with MIL-STD-331, Test 301, using a steel dent block with a Rockwell hardness of B75 to B95.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Resistance	2.0 Ohms to 7.0 Ohms between Pin and Case at 2 MA Max between -65°F and +160°F
All Fire Current	4.7 Microfarad Capacitor Charged to 23 Volts DC
No-Fire	Minimum No-Fire: 20 Milliamps for 5 Minutes

Mechanical

Size	See Drawing
Cup Material	Corrosion Resistance Steel, Type 305 Condition A
Finish	Gold Plate per MIL-G-45204, Type II, .00005 to .00015 Thick over Nickel Plate per QQ-N-290, Class 2 .00010 to .00015 Thick
Output	Will Produce a Minimum Depth of 0.010 Inch when initiated against a mild steel Block of Rb 70-95
Function Time	Detonator Shall Function within 20 Microseconds from initial application of the All-Fire

Specifications Continued

Environmental

Temperature	-65° F to +160°F
Low Pressure	Operating: Atmospheric Pressure Equivalent to 0 to 10,000 ft. (above mean sea level) Non-Operating: Atmospheric Pressure Equivalent of 0 to 40,000 ft. (above mean sea level)
Temperature and Humidity	Subjected to one 14 Day Temperature and Humidity cycle in Accordance with MIL-STD-331 test 105
Shock	Terminal Peak Sawtooth Shock Pulse Peak Value of 50G, 11 Milliseconds Applied in each Direction along each of 3 Mutually Orthogonal Axes, Two Shocks per Direction (12 Shocks)
Vibration	Non Operational: Sinusoidal Cycling with a sweep Time of 12 Minutes from 5 to 200 to 5 Hz and the acceleration Level equal to 1.5G (Peak) applied Along 3 Mutually Orthogonal Axes for 84 Minutes (252 Minutes Total) Operating: Random Vibration Over the Frequency Range of 20 to 2,000 Hz, F1 equals 268 F2 Equals 1268 and Spectral Density Levels of W1 Equals .040 G2/Hz and W2 Equals .10 G2/Hz per MIL-STD-810 Applied Along Each of 3 Mutually Orthogonal Axes for 60 Minutes (180 Minutes Total)
Hermetic Seal	Each Detonator is Hermetically Sealed Using Solder. Leak rate Shall not Exceed 10-6 Atmospheric Cubic Centimeters per Second of Air.
Storage Life	Detonator Shall Meet All requirements After 10 Years

Freight Classification

Shipping Name	Not Yet Determined
Hazard Classification	Not Yet Determined

Safety

Maximum pyrotechnic weight:

480 mg

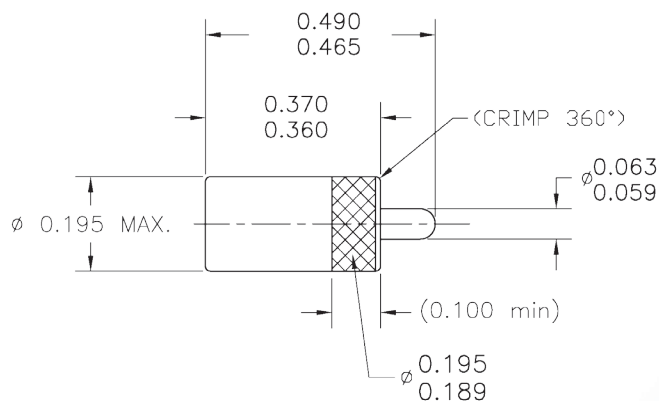
Warning:

Detonators are sensitive to static electricity, electric current, heat, friction and shock. They explode with great force and their accidental firing under unprotected conditions may cause severe injury

Most companies that buy detonators are already aware of the hazards involved in their handling and use, and have effective safety programs to protect against those hazards.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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1DT500 Electric Detonator

The 1DT500 Electric Detonator is used in fuzing applications.

It is a wire bridge detonator designed for capacitive discharge firing.

Characteristics

The characteristics listed describe the response of this detonator to the representative specifications. There are no limits on design capabilities. Please consult an EaglePicher representative for additional application data.

Specifications

Electrical

Resistance @ 70°F (21°C)	2.5 ± 4.0 ohms
All-Fire Current @ 70°F (21°C)	20 Vdc, through a 4.7 microfarad capacitor
Insulation Resistance	22 megohms minimum at 325 Vdc per MIL-STD-202, Method 301 (between shorted leads and case).

Mechanical

Size	See Drawing
Case Material	Aluminum alloy 1100-0
Lead Material	Nickel iron alloy, class 6, 42-6, alloy clad copper 3-1 ratio, spec MIL-1-23011.
Output	Will produce a minimum of .005 inch (.127 mm) dent when detonator is initiated against a mild steel block of R _b 70-95 hardness.

Specifications Continued

Environmental

Temperature	Operating range: -65°F to +165°F (-54°C to +74°C)
Waterproofness	48 hour immersion at a depth of 2 to 3 inches at a water temperature of 75°F ± 5°.
Thermal Shock/Vibration	2 hours at -65°F ± 5°F; transfer immediately to chamber at +165°F ± 5°F for 2 hours; immediately transfer to vibration for 15 minute sweep covering the frequency range of 25-500-25 cycles per second parallel to the transverse orthogonal axis with the base charge down and a 2 ± .2 g's peak.

Chemical

Ignition Material	Lead Styphnate
Output Material	Lead Azide and HMX

Freight Classification

Shipping Name	Detonator, Electric
Hazard Classification	1.4S

1DT500

Safety

Maximum pyrotechnic weight:

40 mg

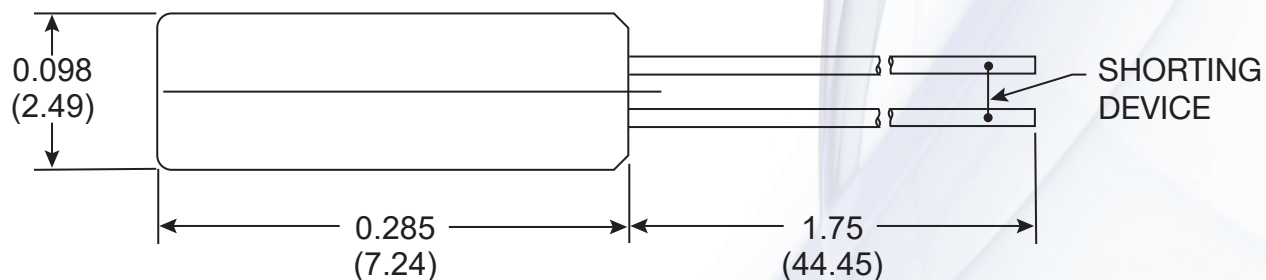
Warning:

Detonators are sensitive to static electricity, electric current, heat, friction and shock. They explode with great force and their accidental firing under unprotected conditions may cause severe injury.

Most companies that buy detonators are already aware of the hazards involved in their handling and use, and have effective safety programs to protect against those hazards.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles, therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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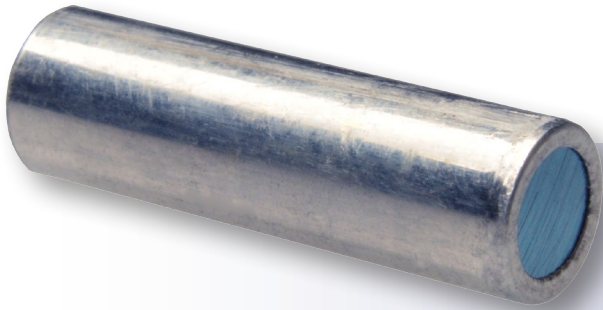
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1DT511 Explosive Lead



Explosive leads are typically used as the moveable part of the detonation train.

Explosive leads achieve the desirable out-of-the-line fuze position for safety.

Lead Function

The lead when properly initiated will produce a minimum dent of .010 inch (0.254 mm) when functioned in accordance with MIL-STD-331, Test 301, using a steel dent block with a Rockwell hardness of B75 to B95.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Mechanical

Size	See Drawing
Case Material	Aluminum alloy 1100-0

Environmental

Temperature	Operating range: -20°F to +140°F (-29°C to +60°C)
-------------	------------------------------------------------------

Chemical

Output Material	Composition PBXN-5, type I, class 2 or 3
-----------------	------------------------------------------

Freight Classification

Shipping Name	Fuzes, Detonating
Hazard Classification	Class 1.4b explosive when contained in shipping packaging

1DT511

Safety

Maximum pyrotechnic weight:

480 mg

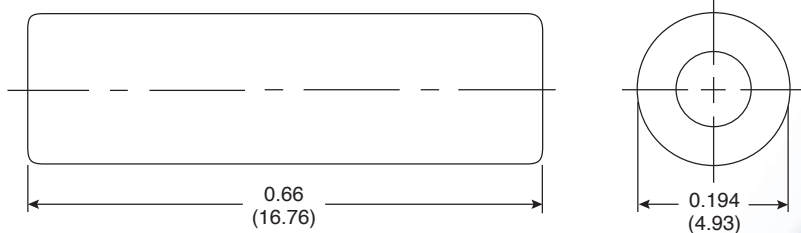
Warning:

Detonators are sensitive to static electricity, electric current, heat, friction and shock. They explode with great force and their accidental firing under unprotected conditions may cause severe injury

Most companies that buy detonators are already aware of the hazards involved in their handling and use, and have effective safety programs to protect against those hazards.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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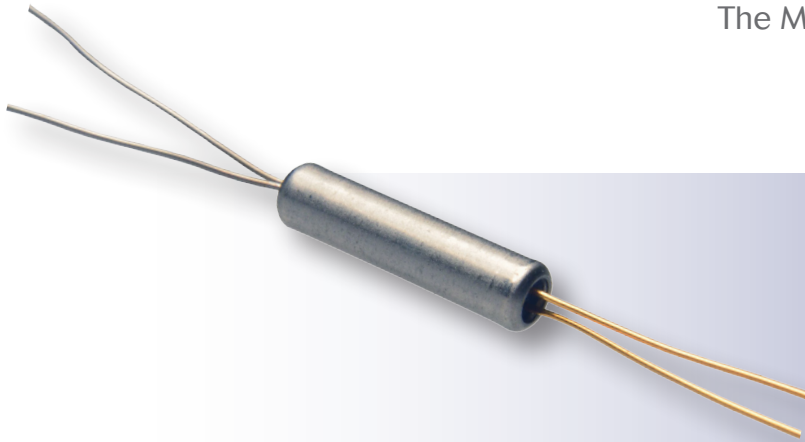
Switches

These small, lightweight devices use pyrotechnic generated gas pressure to open or close one or more electrical circuits instantaneously, or with delays of up to six seconds. Each switch is hermetically sealed, preventing any leakage of pyrotechnic reaction products.

Applications include:

- Emergency power cut off
- Delay arming of fuses
- Sequencing a series of events from a single initiation
- Aborting ignition or detonation
- Triggering an alarm.

MMS Micro-Miniature Switches



The Micro-Miniature Switch (MMS) is a pyrotechnic-actuated device that can close one electrical circuit on a one-time basis.

It is the smallest, lightest, fastest and least expensive device of its type. The normally open switch closes a circuit when gas pressure from the burning pyrotechnic mixture breaks an insert piece in its specially designed shear section.

Variations

The two halves of the switch element telescope tightly together, making excellent electrical contact.

Each MMS is hermetically sealed so that no products of the pyrotechnic reaction can escape from the housing. Several squibs are available for variations in firing characteristics.

MMS have been used in many missile and spacecraft applications because of their light weight, small size, high reliability and low power consumption (as little as 1 amp pulse for 2 milliseconds).

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

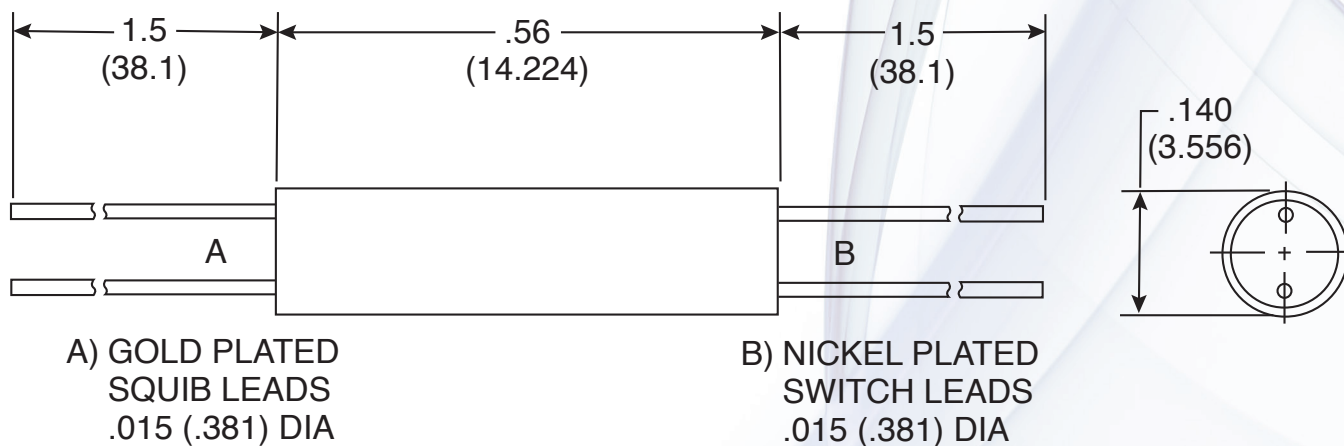
Squib Type	Bridge Resistance* @70°F (21°C) Ohm	All-Fire Current @ -65°F (-54°C) 10 ms Amp	No-Fire Current @ 160°F (71°C) 5 min Amp
A	6.0 ± 1	0.30	0.03
C	1.8 ± 0.2	1.00	0.10
F	0.35 ± 0.06	4.50	1.00
G	25.0 ± 5.0	0.10	0.01
Contact Resistance @ 1.0 amp, Measured 1/8" (3.17 mm) from Case	0.04 ohm Max.		
Insulation Resistance @ 500 Vdc	Before firing, either end, shunted leads to case: 50 megohm min Before firing, contact lead to lead: 50 megohm min		
Contact Current Carrying Capacity @ 160°F (71°C) (worst case)	1.0 amp for 6 hr 1.5 amp for 2 hr 5 amp for 100 msec		

*1/4" (6.35 mm) from ends of leads, with test current limited to 0.010 amp.

MMS Micro-Miniature Switches

Specifications Continued	
Mechanical	
Size	See drawing
Weight, Max.	0.6 gm
Function Time	All units will fire within 10 ms at designated all-fire currents. See Firing Characteristics of Pyrotechnic-Actuated Devices for effect of current on ignition time.
Environmental	
Temperature	Operating range: -65° to +160°F (-54° to + 71°C) Cycling: MIL-STD-202, Method 102A, Condition D
Humidity	MIL-STD-202, Method 103B, Condition D
Vibration	5-2000-5 Hz, 30 g's or 0.34" (8.64 mm) d.a.
Acceleration	200 g's
Shock	2000 g's, 1.5 ms, 1/2 sine wave

Specifications Continued	
Chemical	
Ignition Compound	KDNBF
Freight Classification	
Shipping Name	Release Device, Explosive
Identification Number	UN0173
Hazard Classification	1.4S
Ordering Information	
Order switches by part number as follows:	
Normally Open	MMS-1.0-0-*
*Specify squib type A, C, F or G.	



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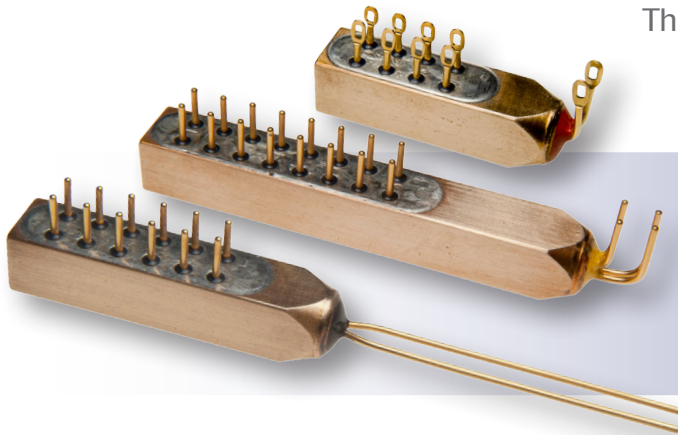


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Miniature Switches



The Miniature Switch (MS Series) is a pyrotechnic-actuated device that can open or close up to eight electrical circuits on a one-time basis.

It is compact, lightweight, highly reliable and consumes very little power. This has led to widespread use of the Miniature Switches in the aerospace industry.

Variations

Each unit is hermetically sealed so that no products of the pyrotechnic actuation can escape from the housing. For more information, see the Micro-Miniature Switches Data Sheet.

Miniature Switches are available with 2 to 8 poles, with 0 to 8 close contacts before firing. They can be set for instantaneous action or for delays of up to 1 second.

Standard round or flattened/pierced end pins can be specified. Several squibs are available for variations in firing characteristics.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical

Squib Type			Bridge Resistance* @70°F (21°C)	All-Fire Current @ -65°F (-54°C)	No-Fire Current @ 160°F (71°C)
2-pin	3-pin	4-pin	Ohm	Amp, Min.	Amp, Max.
A	A3	A4	6.0 ± 1	0.30	0.03
B	B3	B4	4.5 ± 0.5	0.56	0.10
C	C3	C4	1.8 ± 0.2	1.00	0.10
F	F3	F4	0.12 ± 0.03	4.50	1.00
G	G3	G4	25.0 ± 5.0	0.10	0.01
H	H3	H4	0.28 ± 0.12	2.00	0.500
Y	Not available		1.0 ± 0.2	3.50	1.00
Contact Resistance @ 1.0 amp			0.008 ohm max		
Insulation Resistance @ 500 Vdc			Before firing, between shunted squib leads and case: 100 megohm min Before firing, between each contact terminal and case: 100 megohm min Before firing, between each contact terminal and every other isolated terminal: 100 megohm min After firing, between each contact terminal and case: 20 megohm min After firing, between each contact terminal and every other isolated terminal: 20 megohm min		
Contact Current Carrying Capacity @ 70°F (21°C)			6.0 amp for 4 hr		

*1/4" (6.35 mm) from ends of leads, with test current limited to 0.010 amp.

MS Series Miniature Switches

Specifications Continued

Mechanical

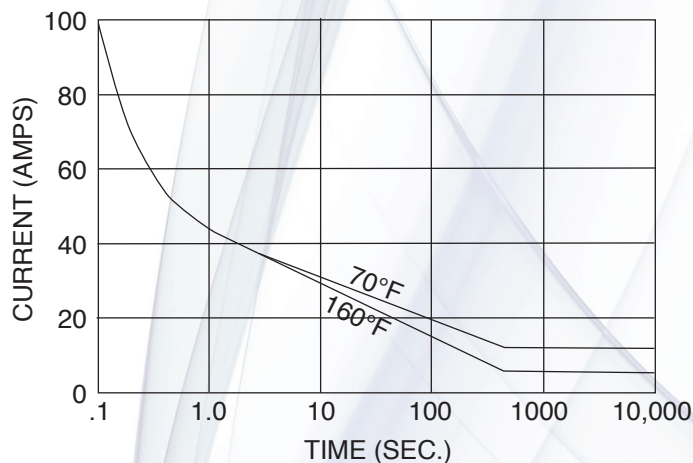
Delay (sec)	No. of Poles			
	2	4	6	8
0	16 g	20 g	24 g	28 g
0.015 - 1.0	24 g	28 g	32 g	36 g
Size	See drawing			
Function Time	2.0 ms to 6.0 sec			

See Firing Characteristics of Pyrotechnic-Actuated Devices for the effect of current on ignition times.

Specifications Continued

Environmental

Temperature	<p>Operating range: -65° to +160°F (-54° to +71°C)</p> <p>MIL-STD-202, Method 102A, Condition D (temperature cycling)</p> <p>MIL-STD-202, Method 103B, Condition D (humidity, steady state)</p> <p>MIL-STD-810B</p>
Vibration	5-2000-5 Hz, 30 g's or 0.34" (8.64 mm) d.a.
Shock	<p>2000 g's, 1.5 ms, 1/2 sine wave 30 g's or 0.34" (8.64 mm) d.a.</p> <p>Sinusoidal: 0-2000 Hz, 30 g's or 0.34" (8.64 mm) d.a.</p> <p>Random: 100-2000 Hz, 1.0 g²/cps; overall 51.0 g's rms</p>
Acoustic Noise	160 dB, 37.5-9600 Hz
Acceleration	200 g's
Chemical	
Ignition Compound	KDNBF
Freight Classification	
Shipping Name	Release Device, Explosive
Identification Number	UN0173
Hazard Classification	Unregulated



MS Series Miniature Switch Current Carrying Capacity

MS Series Miniature Switches

Ordering Information

Order switches by part number as follows

Example:

MS 4.2-0.0-CRT1

MS = Switch series

4 = Number of poles (2 to 8)

2 = Number of closed contacts before firing (0 to 8)

0.0 = Delay time in seconds

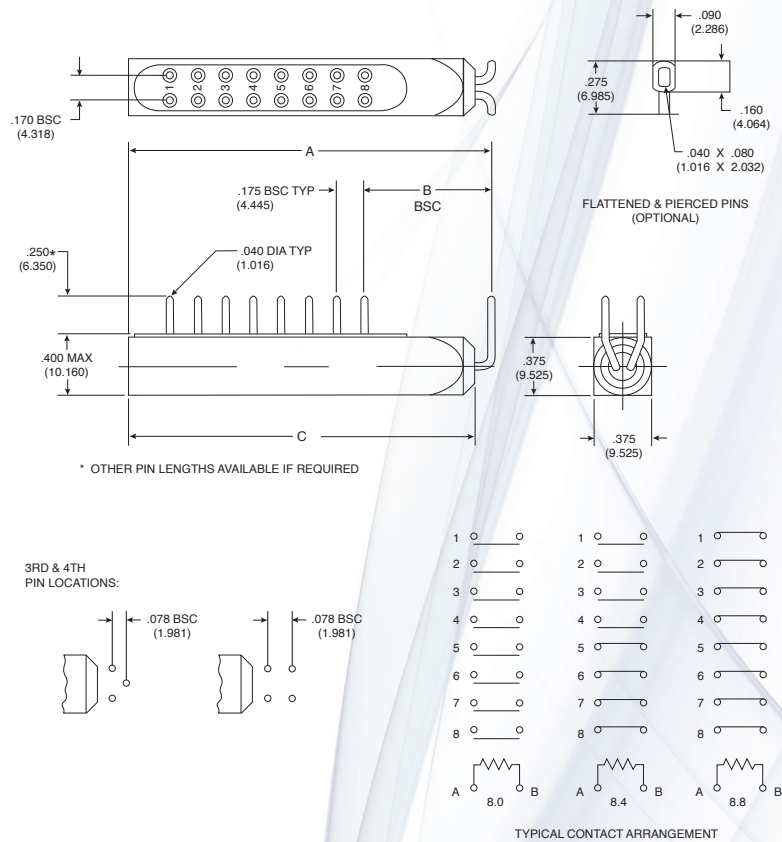
C = Squib type (see table)

R = Contact arrangement*

T1 = Flattened and pierced pins**

*When both open and closed contacts (before firing) are furnished, the closed contacts are nearest the squib. This is indicated by the suffix "R".

**If T1 is not designated, standard rounded end pins will be furnished.



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NOMINAL DIMENSIONS, INCHES AND (MM)									
DELAY (SECONDS)	ALL	2-POLE		4-POLE		6-POLE		8-POLE	
	B	A	C	A	C	A	C	A	C
0	0.723 (18.364)	1.116 (28.346)	1.046 (26.568)	1.466 (37.236)	1.396 (35.458)	1.816 (46.126)	1.746 (44.348)	2.166 (55.016)	2.096 (53.238)
0.015-2.9	1.227 (31.166)	1.622 (41.199)	1.552 (39.421)	1.972 (50.089)	1.902 (48.311)	0.723 (58.979)	2.252 (57.201)	2.672 (67.869)	2.602 (66.091)
3.0-6.0	1.627 (41.326)	2.022 (51.359)	1.952 (49.581)	2.372 (60.249)	2.302 (58.471)	2.722 (69.139)	2.652 (67.361)	3.072 (78.029)	3.002 (76.251)

MS Series Miniature Switches



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Other Devices

This section contains all devices that cannot be classified in other product sections of the catalog.

1 ATG99 Air Turbine Generator



The 1ATG99 Air Turbine Generator is a compact 19V DC generator powered by forced air

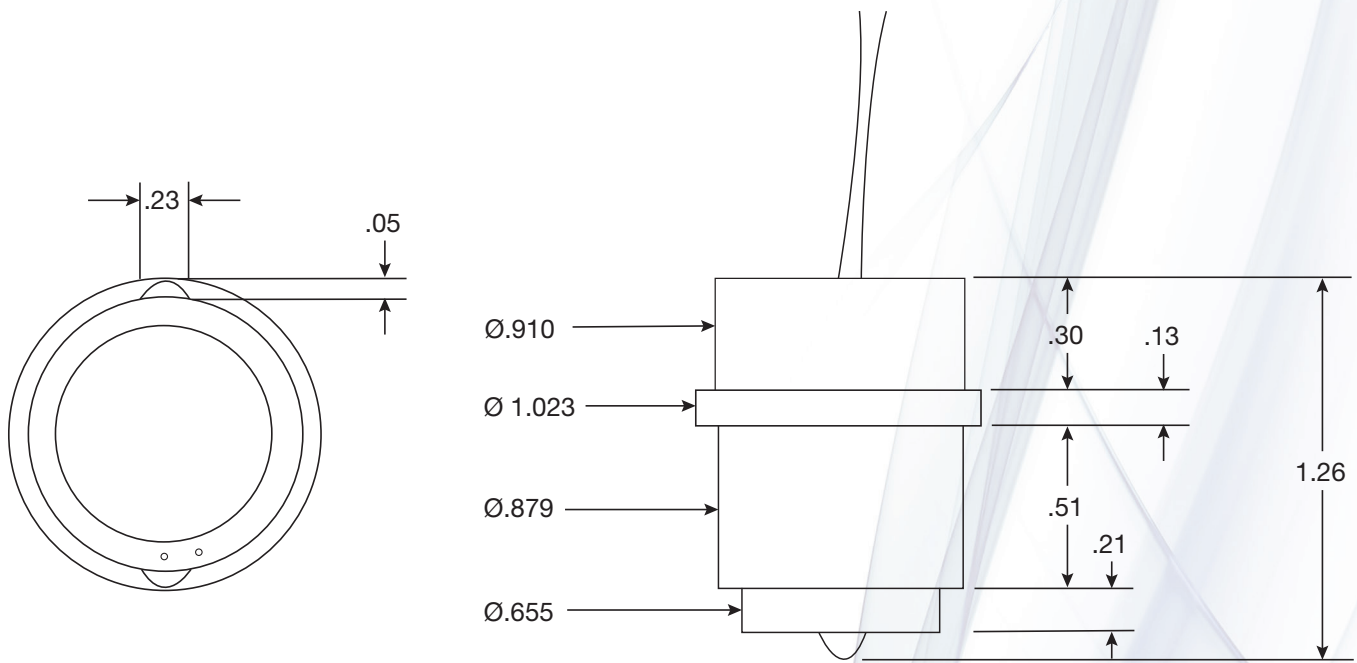
Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical	
Voltage Output	19V DC
Mechanical	
Size	See Drawing
Case	Delrin
Turbine	Delrin
Environmental	
Vibration	MIL-STD-810B, Method 514.1 Procedure 11, parts 1 (H) and 3 (AH) Fig 514.1-4
Mechanical Shock	MIL-STD-810B, Method 516.1 amplitude (a), duration (c) per fig. 516.1
Thermal Shock	MIL-STD-331A, Test 113.1

1ATG99



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EP-405X Lanyard Start Assembly



The EP-4051, EP-4052, and EP-4053 Lanyard Start Assemblies are manually activated current source devices.

A thermal battery with "sea-sense" capability is primer activated upon the release of a firing pin.

Variations

Electrical interface can be tailored to specific applications. MIL-DTL-38999 Series II class Y is standard.

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications

Electrical	
Current Output	3.8 amperes (minimum)
Risetime	150 msec (maximum)
Lifetime	30 msec (minimum)
Resistive Load	$2.1 \pm 0.1 \Omega$
Sea Sense	1.4K Ω (maximum)
Mechanical	
Size	See Drawing
Case	Anodized aluminum alloy
Hermetic Seal	5×10^{-3} std. cc/sec maximum
Lead	0.030" diameter
Caloric Output	20 calories nominal

Specifications Continued

Environmental	
Temperature	Operating Range: -22°F to +130°F (-30°C to +54°C) Storage Range: -40°F to +140°F (-40°C to +60°C)
Temperature Shock	One cycle of +130°F to +28°F to +20°F to +94°F
Shock	60-400 G at 1-50 msec duration
Vibration	Narrow Band Sine; 6-500-6 Hz Broad Band Sine; 6-2000-6 Hz Sine Dwell; 11-44 Hz Random; 15-2000 Hz
Internal Pressure	2.7 psia - 64.7 psia
External Pressure	High; Hydrostatic pressure 2500 psig Low; Hydrostatic pressure 3 psig
Temperature Humidity	95% rel. humidity @ 140°F
Salt Fog	Per MIL-STD-810C, Method 509.1, Procedure 1
Sand & Dust	Per MIL-STD-810C, Method 510.1, Procedure 1 Mod.
Acceleration	20-50g
Chemical	
Thermal Battery	LiAl/FeS ₂
Freight Classification	
Shipping Name	Lanyard Start Assembly
Identification Number	Not regulated as Class 1
Hazard Classification	Not regulated as Class 1

Safety

Warning:

The igniter may fire if exposed to temperatures above 350°F (176°C), an electrical charge exceeding the specified no-fire current, or if it is cut open before functioning. When the unit fires, hot gases are discharged through the output end.

If your company does not have a safety program, it is essential that one is established before explosive items are handled or used. For a brief overview of safety precautions, see the Safety Procedures Data Sheet or contact an EaglePicher representative.

Energetic devices are considered articles; therefore a Material Safety Data Sheet (MSDS) does not apply. However, MSDS may apply to individual components. For more information, contact your EaglePicher representative.



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CAP-12271

Power Module



EaglePicher qualified the CAP-12271 to CAD/PAD Joint Program Office NACES requirements for the MXU-792A/A Battery Pack, MIL-DTL-82909, and is deemed a qualified source of supply.

Functional Description

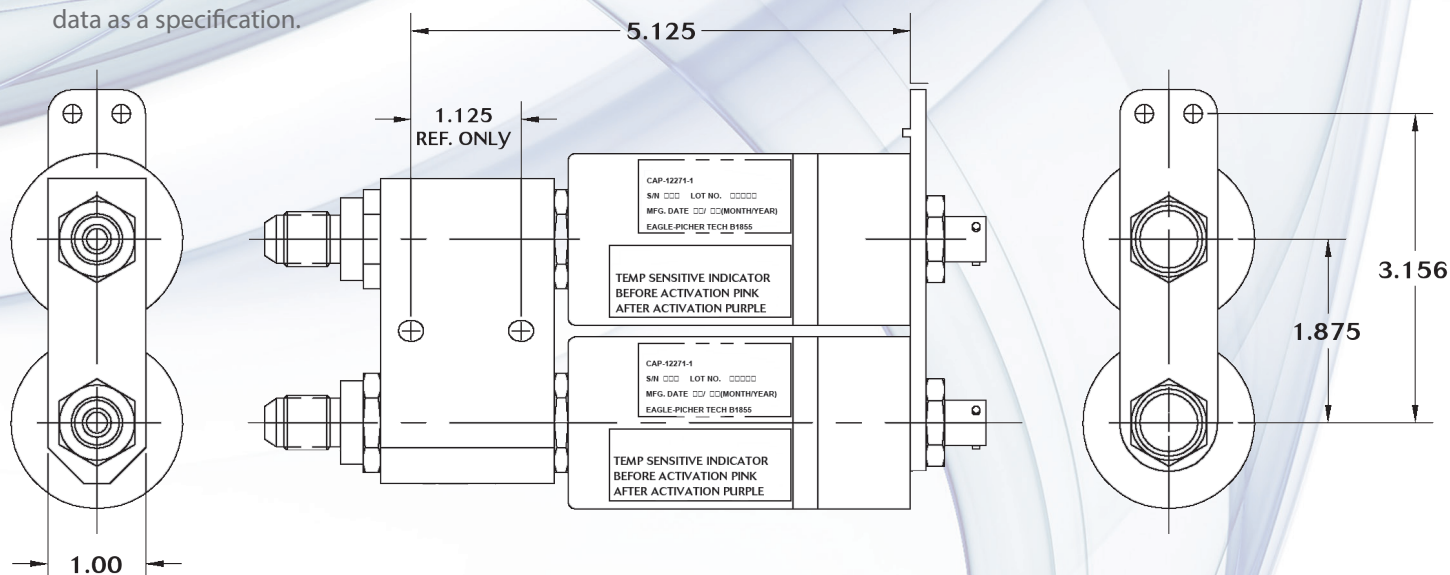
The CAP-12271 Power Module is comprised of a manifold with two internal firing mechanisms that activate two thermal batteries. The power module is activated by pneumatic pressure which drives a firing pin into each thermal battery's primer. Once activated, the thermal batteries provide power to the NACES ejection seat's Digital Recovery Sequencer. Before activation, a temperature sensitive indicator stripe on each thermal battery will be pink, upon activation the indicator stripes will turn purple.

Specifications

Part Number	CAP-12271
NSN	6135-01-393-4746
Operational Environments	-65°F to 200°F
Activation Pressure	400 to 650 psi at an onset rate of 20,000 to 40,000 psig/sec of air pressure
Battery Output Voltage	22 volts minimum/60 volts maximum
Battery Operational Life	225 seconds

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. Please consult an EaglePicher representative before using this data as a specification.



EP-4054

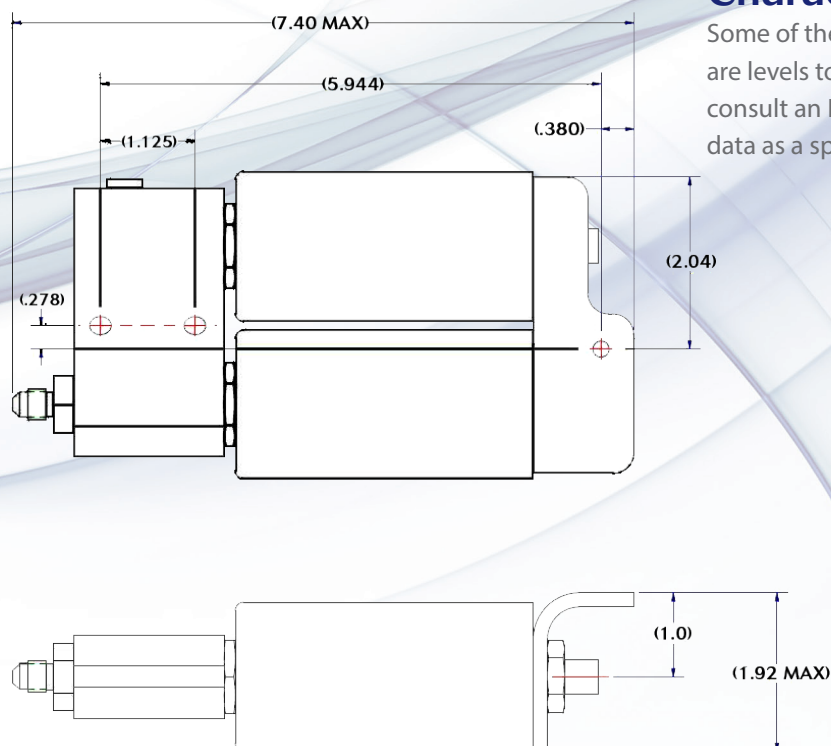
Power Module



EaglePicher qualified the EP-4054 to CAD/PAD Joint Program Office ACES II requirements for the JN25 Power Module and is deemed a qualified source of supply.

Functional Description

The EP-4054 Power Module is comprised of a manifold with two internal firing mechanisms that activate two thermal batteries. The power module is activated by pneumatic pressure which drives a firing pin into each thermal battery's primer. Once activated, the thermal batteries provide power to the ACES II ejection seat's Digital Recovery Sequencer. Before activation, a temperature sensitive indicator stripe on each thermal battery will be pink and upon activation the indicator stripes will turn purple.

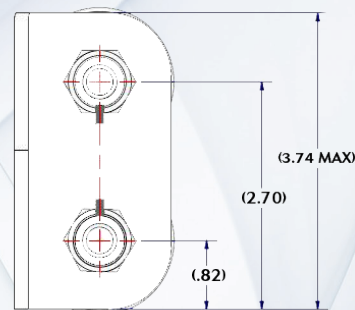


Specifications

Part Number	EP-4054
NSN	1377-01-625-4503ES
Operational Environments	-40°F to 160°F
Activation Pressure	400 to 650 psi at an onset rate of 20,000 to 40,000 psig/sec of air pressure
Battery Rise Time	22 volts within 80 ms at -40°F and 160°F
Battery Output Voltage	22 volts minimum/60 volts maximum
Battery Operational Life	300 seconds

Characteristics

Some of the characteristics listed here are nominal; others are levels to which the EP-4054 has been tested. Please consult an EaglePicher representative before using this data as a specification.



Glossary

of Pyrotechnic and Explosive Terminology

Acceptable Quality Level (AQL)

A nominal value expressed as a percentage defective per hundred units, used to identify a group of sampling plans.

actuator A mechanical device that transforms chemical energy into mechanical motion to perform work against an external load. Types of actuators include bellows, diaphragm, piston and retractable.

all-fire Minimum stimulus which must be applied to a device for it to reliably function.

ambient Surrounding meteorological conditions such as temperature, humidity and pressure.

apparent density The ratio of mass to volume of a finely powdered material, under stated conditions, which is always less than true density. Sometimes called loading density.

arm To prepare an explosive item for imminent use by removing safing mechanisms.

average burning rate The arithmetic mean (statistical average) of the rate at which a pyrotechnic or propellant will burn at specific pressures and temperatures.

ballistic pendulum An instrument used for measuring the velocity of a projectile or the output of a cartridge or explosive charge.

binder Compositions that hold together a charge of finely divided particles and increase the mechanical strength of plugs or pellets of these particles when consolidated under pressure. Binders usually are resins, plastics, asphaltics, or hard waxes used dry or in solution.

black powder A low explosive consisting of an intimate mixture of potassium or sodium nitrate, charcoal, and sulfur. It is easily ignited and burns consistently at low pressures.

blasting caps Detonators specifically designed and produced in high volume for commercial blasting operations. They come in various sizes (strengths) and can incorporate a delay. Initiation can be electric or non-electric.

booster (1) A high explosive device used to transfer the detonation from the detonator to the main explosive charge. (2) An auxiliary propulsion system to aid the early launching phase of a missile.

bridgewire A relatively fine resistance wire incorporated into an ignition element attached to the electrical leads of an electro-explosive device (EED).

brisance The shattering ability of explosives.

Bruceton Analysis A statistical analysis approach to the problem of determining, as economically as possible, the behavior characteristics of explosive components by using a limited number of samples to determine a reliability factor. In this test, the level of variable applied depends on the results of the previous test.

bulk density The mass per unit volume of a bulk material such as grain, cement, coal. Used in connection with packaging, storage or transportation.

Bureau of Mines Test A test for determining the impact sensitivity of an explosive. A small sample of the explosive is placed between two hardened steel plates, and a weight is dropped on the upper plate. The figure representing the lowest height in centimeters at which at least one of ten trials results in explosion is the sensitivity index. The highest drop provided is 100 cm, so sensitivity may be given as 100+, meaning that at 100 cm no explosion resulted.

burning A rapid evolution of energy through chemical reaction between a fuel and an oxidizing agent.

Glossary

ignition dropping A method of loading explosives in which the explosive is mixed with a liquid vehicle and applied to the bridgewire. Also called **primer spotting**.

incendiary A highly exothermic composition or material that is primarily used to start fires.

increment The amount of pyrotechnic composition added to the charge, at one time, during the process of loading.

inert Descriptive of the condition of a device that contains no explosive, pyrotechnic or chemical agent.

inhibited propellant A propellant grain in which a portion of the surface area has been treated to control or prevent burning.

initiation The beginning of the deflagration or detonation of the explosive in an explosive item.

initiator A device used as the primary stimulus component in all explosive or pyrotechnic devices such as a detonator, primer, or squib, which, upon receipt of the proper mechanical or electrical stimulus, produces a burning or detonating action.

input test A test applied to an explosive device to determine if it functions upon receiving proper stimulus.

lead (pronounced "leed") A column of high explosive used as one component of an explosive train.

linear burning rate The distance normal to any burning surface of the pyrotechnic or propellant burned through in unit time.

loading density The quantity of pyrotechnic or propellant composition per unit volume, usually expressed as grams per cubic centimeter.

loose charging Loading an explosive by pouring it into a container without any pressing.

lot acceptance test (LAT) See **production lot sampling test**.

low explosive One that burns or deflagrates rapidly, but does not detonate.

melt loading Process of loading an explosive device by melting the explosive and allowing it to solidify in the device. Also called **casting**.

no-fire current Maximum current which can be applied to a bridgewire circuit without igniting the prime material.

one-amp/one-watt device An EED which will not fire or degrade when one ampere and/or one watt is passed through the bridgewire circuit (usually for a five-minute period).

output test A test applied to an explosive device to determine if it does what it is required to do.

oxidizer A chemical compound which provides the oxygen for combustion.

pellet A free-standing, consolidated increment.

percussion A method of initiating an explosive device by a sudden sharp blow.

piston actuator A relatively small actuator which can receive a stimulus and provide a linear mechanical output to move, puncture, etc.

power The rate of doing work.

pressure cartridge A pyrotechnic device in which a propellant is used to produce pressurized gas for a short duration.

primary high explosive One that detonates if merely ignited.

priming composition A physical mixture of materials that is very sensitive to impact or percussion and, when so exploded, undergoes very rapid autocombustion.

primer A primary initiating device to produce a hot flame. A primary stimulus component generally used to generate a brisant output for initiating detonating compositions.

Glossary

butter charge An increment of explosive material that is applied in a paste form and dried in place.

cable cutter An explosively powered device that cuts a cable upon the receipt of a firing stimulus.

carbon bridge A resistive element consisting of two electrical conductors bridged with a thin spot of colloidal graphite. Used in initiation systems.

cartridge-actuated device (CAD) A mechanical device actuated by a contained or inserted propellant charge.

casting See **melt loading**.

closed bomb A fixed-volume chamber used for testing the pressure-time characteristics of gas generators, cartridges or combustible materials.

column length The length of a propellant for pyrotechnic composition.

combustion A continuous, rapid chemical reaction accompanied by the evolution of energy, commonly caused by the union of a fuel and an oxidizing agent. (see **burning**.)

compatibility Ability of materials to be stored intimately without chemical reaction occurring. Incompatibility may result in a loss of effectiveness, or may be hazardous.

composition, pyrotechnic A physical mixture of finely powdered fuel and oxidant, with or without additives, to produce a desired effect.

confidence level A statistical evaluation of the percentage of statements or tests expected to be correct using a given analytical system.

controlled-burning squib A hot gas/flame producing device in which the output charge is designed to burn within the device.

decomposition The process of breaking down a material into more simple products. Disintegration, dissociation.

deflagration The relatively slow burning or chemical decomposition of a propellant or pyrotechnic mix such that the reaction front advances into the unreacted material at less than sonic velocity.

delay A pyrotechnic or explosive train component that introduces a controlled time delay in the functioning of a device or fuze mechanism.

delay element An explosive train component normally consisting of a primer, a delay column, and a relay detonator or transfer charge assembled in that order in a single housing to provide a controlled time interval.

density of charge The weight of pyrotechnic or propellant charge per unit volume of the chamber, usually expressed in grams per cubic centimeter.

detonate To be changed by exothermic chemical reaction, usually from a solid or liquid to a gas, so quickly that the advancing reaction zone is preceded by a shock wave.

detonation The extremely rapid chemical decomposition of a material such that the reaction front advances into the reacted material at greater than sonic velocity.

detonation velocity See **velocity of detonation**.

detonator An explosive train component which, when initiated, detonates a less sensitive, but larger high explosive. Types of detonators include percussion, stab, electric and flash.

drogue gun An explosive device designed to eject a weight which is attached to a drag parachute or similar device.

dry blend A combination of powders that are mixed in a dry state.

dud An explosive device that has failed to initiate as intended.

Glossary

dwelt time In press-loading powders into cavities, the interval of time that the powder is held at the full loading pressure.

EED (electro-explosive device) Any cartridge, squib, igniter, etc., which is initiated electrically.

explode To be changed in chemical or physical state, usually from a solid or liquid to a gas (as by chemical decomposition or sudden vaporization), so as to suddenly transform considerable energy into the kinetic form. See **explosion**.

exploding bridgewire (EBW) detonator A device that achieves detonation by exploding a bridge element in proximity to, but not in contact with, a secondary high explosive. Special high-power output-firing sources must be used to function these devices.

explosion A chemical reaction or change of state that is effected in an exceedingly short period of time with the generation of a high temperature and generally a large quantity of gas.

explosive A substance or mixture of substances that may be made to undergo a rapid chemical change, without an outside supply of oxygen, with the liberation of large quantities of energy generally accompanied by the evolution of hot gases.

explosive bolt A bolt that is intended to be fractured by a contained or inserted explosive charge.

explosive nut A nut that is intended to be fractured by a contained or inserted explosive charge for the purpose of releasing a load.

explosive train A train of combustible and explosive elements arranged in order of decreasing sensitivity. The explosive train accomplishes the controlled augmentation of a small impulse into one of a suitable energy to actuate a main charge.

flame A chemical reaction or reaction product, partly or entirely gaseous, that yields heat and light.

flash 1) A burst of heat or flame of short duration. 2) A method of initiating an explosive device using elements that are sensitive to flame and/or mild shock.

frangible link A mechanical link that is capable of supporting a tensile load and releasing the load upon the receipt of a firing stimulus.

fuel Any substance used to produce heat by burning.

functioning time Lapsed time between application of the firing stimulus to start of pressure rise.

fuse (Not to be confused with **fuze**.) An igniting or explosive device in the form of a cord, consisting of a flexible fabric tube and a core of low explosive. Used in blasting and demolition work, and in certain munitions.

fuze A device with explosive or pyrotechnic components designed to initiate a projectile, bomb, mine, etc.

fuze, delay Any fuze incorporating a means of delaying its action. Delay fuzes are classified according to the length of time of the delay.

gas generator A device in which a propellant is burned to produce a sustained flow of pressurized gas.

grain A single mass of solid propellant in the final geometric configuration for use in a gas generator or rocket motor.

hermetic seal A seal made impervious to air and fluids. Hermetically sealed devices are generally welded or solder sealed as opposed to being sealed with epoxy resin, etc.

high explosive One that detonates.

hygroscopicity The tendency of a substance to absorb moisture from its surroundings; specifically, the absorption of water vapor from the atmosphere.

igniter A pyrotechnic device used to initiate burning of a fuel mixture or a propellant.

Glossary

ignition dropping A method of loading explosives in which the explosive is mixed with a liquid vehicle and applied to the bridgewire. Also called **primer spotting**.

incendiary A highly exothermic composition or material that is primarily used to start fires.

increment The amount of pyrotechnic composition added to the charge, at one time, during the process of loading.

inert Descriptive of the condition of a device that contains no explosive, pyrotechnic or chemical agent.

inhibited propellant A propellant grain in which a portion of the surface area has been treated to control or prevent burning.

initiation The beginning of the deflagration or detonation of the explosive in an explosive item.

initiator A device used as the primary stimulus component in all explosive or pyrotechnic devices such as a detonator, primer, or squib, which, upon receipt of the proper mechanical or electrical stimulus, produces a burning or detonating action.

input test A test applied to an explosive device to determine if it functions upon receiving proper stimulus.

lead (pronounced "leed") A column of high explosive used as one component of an explosive train.

linear burning rate The distance normal to any burning surface of the pyrotechnic or propellant burned through in unit time.

loading density The quantity of pyrotechnic or propellant composition per unit volume, usually expressed as grams per cubic centimeter.

loose charging Loading an explosive by pouring it into a container without any pressing.

lot acceptance test (LAT) See **production lot sampling test**.

low explosive One that burns or deflagrates rapidly, but does not detonate.

melt loading Process of loading an explosive device by melting the explosive and allowing it to solidify in the device. Also called **casting**.

no-fire current Maximum current which can be applied to a bridgewire circuit without igniting the prime material.

one-amp/one-watt device An EED which will not fire or degrade when one ampere and/or one watt is passed through the bridgewire circuit (usually for a five-minute period).

output test A test applied to an explosive device to determine if it does what it is required to do.

oxidizer A chemical compound which provides the oxygen for combustion.

pellet A free-standing, consolidated increment.

percussion A method of initiating an explosive device by a sudden sharp blow.

piston actuator A relatively small actuator which can receive a stimulus and provide a linear mechanical output to move, puncture, etc.

power The rate of doing work.

pressure cartridge A pyrotechnic device in which a propellant is used to produce pressurized gas for a short duration.

primary high explosive One that detonates if merely ignited.

priming composition A physical mixture of materials that is very sensitive to impact or percussion and, when so exploded, undergoes very rapid autocombustion.

primer A primary initiating device to produce a hot flame. A primary stimulus component generally used to generate a brisant output for initiating detonating compositions.

Glossary

primer mixture An explosive mixture containing sensitive explosive and other ingredients, used in primer.

primer spotting See **ignition dropping**.

production lot sampling test (lot acceptance test) Test conducted on a sample of a production lot to determine that the lot meets the specified dimensional and functional characteristics.

progressive burning The burning of a propellant grain in which the reacting surface area increases during the combustion.

propellant An explosive material whose rate of combustion is low. May be either solid or liquid.

propellant-actuated device (PAD) A mechanical device actuated by a contained or inserted propellant charge.

pyrotechnic composition A mixture of materials consisting essentially of an oxidizing agent (oxidant) and a fuel. It is capable of producing a self-sustaining reaction when heated to its ignition temperature.

qualification test A series of tests conducted on an item or system to determine if it meets the requirements established for the specified use.

recommended firing current The current which must be applied to a bridgewire circuit to cause operation of the device within a specified time.

recommended test current The maximum current that can be applied to a bridgewire circuit for an extended period of time without degrading the prime material.

relay An explosive train component that, when initiated, provides the explosive energy needed to reliably initiate the next element in the train.

reliability A statistical evaluation of the probability of a device performing its designed function.

safe 1) A mechanism that mechanically isolates the primary explosive from the subsequent elements of an explosive train. This keeps the item safe for handling until it is ready for use. 2) To activate a safing mechanism.

safe-arm A mechanical and/or electrical system used to arm and safe explosive devices.

secondary high explosive One that generally must be detonated by a detonating device.

sensitivity Susceptibility of an explosive pyrotechnic component to react to externally applied energy or changes in environment.

spark gap A method of initiating an explosive device using high voltage that arcs across an air gap.

squib Used in a general sense to mean any of various small size pyrotechnic or explosive devices. Specifically, a small explosive device similar in appearance to a detonator, but loaded with low explosive, so that its output is primarily heat (flash). Usually electrically initiated and provided to initiate action of pyrotechnic devices and rocket igniters.

stab A method of initiating an explosive device that uses a small firing pin and friction-sensitive priming mix.

stability Ability of explosive or pyrotechnic materials to withstand long storage under service conditions.

stability test Accelerated test to determine the probable suitability of a pyrotechnic or explosive charge for a long-term storage under a variety of environmental conditions.

Standard Deviation (sigma) The square root of the sum of the squared deviations from the mean. For a given sample this must be divided by the sample size in order to correct for bias and be a proper estimate of the true population. A measure of the variability or dispersion of a number of observations.

Glossary

stoichiometric Relating to components involved in a burning process which are present in exactly the quantities needed for reaction, without an excess of any compound.

thermate An incendiary mixture of various combinations of thermite and barium nitrate, sulfur and flake aluminum.

thermite An incendiary or welding composition consisting of 2.75 parts black iron oxide (ferrosoferric oxide) and 1.0 part aluminum powder.

velocity of detonation The rate at which a detonation front proceeds through a high-explosive charge, generally measured in thousands of feet or meters per second.

wet blend A combination of powders mixed with the aid of a liquid agent which is subsequently evaporated.