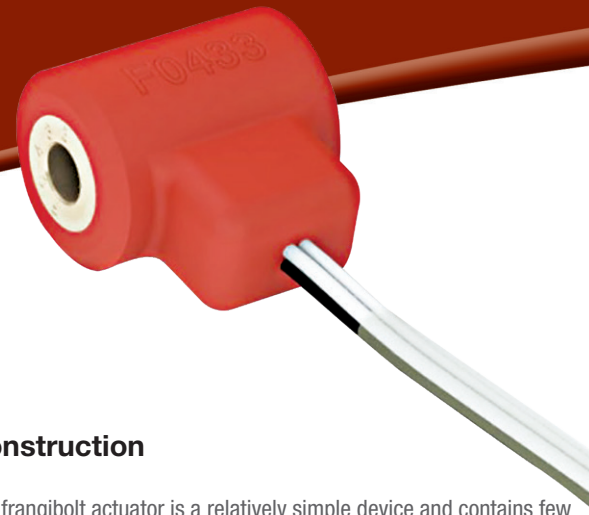


Mission Success
Ensign-Bickford Aerospace & Defense Company (EBAD) is dedicated to supporting our customers in the aerospace and defense industry through on-time delivery of innovative products that exceed expectations and assure mission success.



TiNi™ MINI Frangibolt® FD04

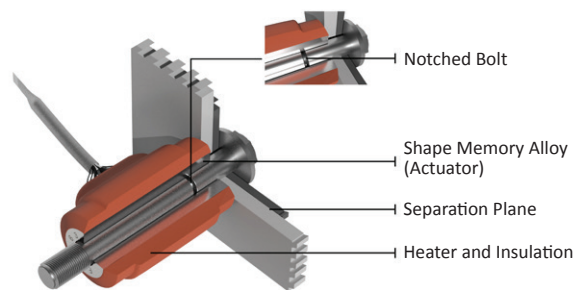
EBAD's Mini-Frangibolt® Actuators are utilized in satellite applications to provide a simple and effective non-pyro separation system between two components. With the ability to customize the #4 Titanium (Ti) fastener to meet the applications joint design, the mini-frangibolt offers design flexibility in one of our most compact packages.

Easy to use, resetting the device is straightforward with our compression reset fixture and replacement of the notched #4 Titanium (Ti) fastener.

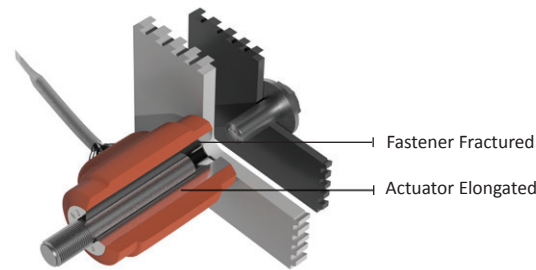
Principle of Operation

EBAD's Mini-Frangibolt® Actuator is a simple and effective way to support and release loads up to 150 lbf. The principle of operation is simple, in which actuation occurs by applying power to the internal heaters to raise the temperature of the Single Crystal Shape Memory Alloy "SCSMA" cylinder, until it reaches its transition temperature. As the SCSMA cylinder heats up, it expands to ~6% of its elongated length to produce strain on the EBAD provided #4 Titanium (Ti) fastener and breaks at the predetermined notch.

EBAD's Mini-Frangibolt® Actuators must be ordered with custom Titanium (Ti) notched #4 fasteners that are manufactured per strict tolerances. Accessory hardware such as G10/Ti washer, lock nuts, enclosures are available. For cold operation, EBAD recommends utilizing our G10 washers to assist in thermal isolation. In addition, switch washers, when wired in series can be used as an automatic shut-off switch to the frangibolt actuator once tension is released and the Titanium (Ti) fastener is broken.



Frangibolt before actuation



Frangibolt after actuation

Construction

The frangibolt actuator is a relatively simple device and contains few components that increase its reliability. The device is comprised of a machined SCSMA cylinder, encapsulated with redundant resistive heaters and embedded RTD's. The whole assembly is then wrapped in a silicone rubber compound to provide both thermal and electrical isolation.

Applications

Since 1994, the frangibolt has extensive heritage in space applications. Such applications include solar array and instrument deployment, instrument launch locks, optic covers and other space applications where a small form factor is needed between two interfaces. In addition, EBAD manufactures larger frangibolts for space and subsea applications.

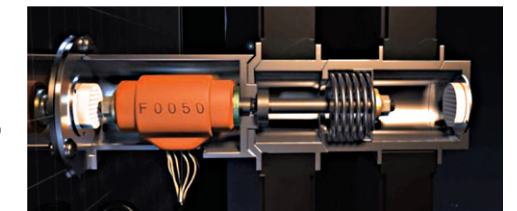
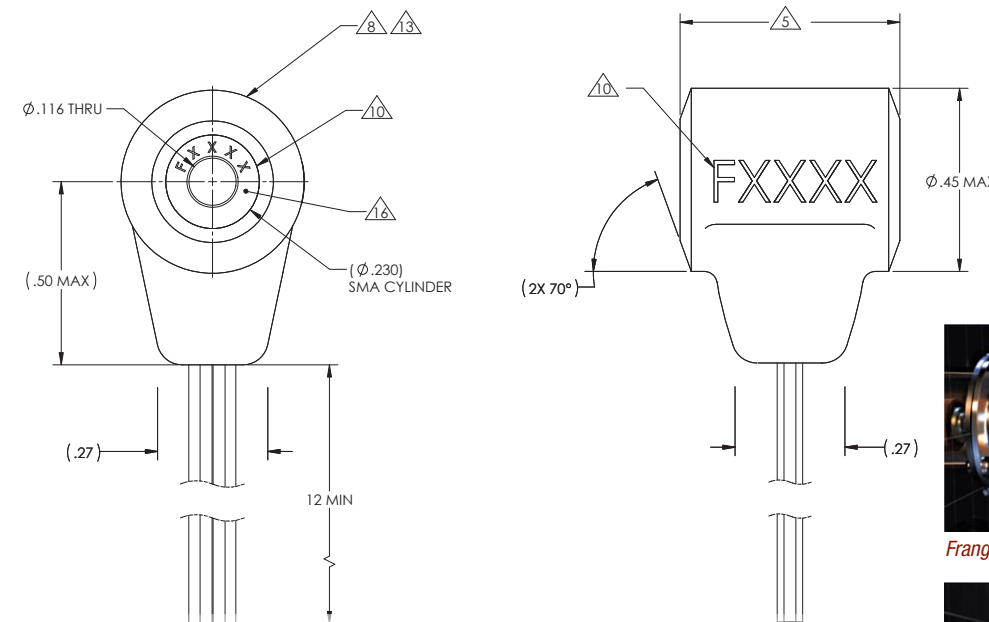
Key Features

- Nonpyrotechnic
- Easy to reset and simple to use
- Redundant firing circuit
- Maximum reliability thru design simplicity
- Flight pedigree and testability

TiNi™ MINI Frangibolt® FD04 Technical Specifications

Actuator Family	FD04	
Ti Fastener Size	#4	
Mass	10g	
Power	9W @ 7V	9W @ 12V
Operational Voltage	6V-8V	10.5V-13.5V
Current Draw	1.25A @ 7V	.75A @ 12V
Resistance	5.5±.5 Ω	16±1.6 Ω
Max Load Support	150lbf (667N)	
Function Time	30s @ 7V (23°C)	30s @ 12V (23°C)
Life	50 cycles min	
Operating Temperature	-50°C + 70°C	
Compressed Length (X")	.500"	
Diameter (Y")	.450"	
Thruhole (Z")	.116"	

TiNi™ MINI Frangibolt® FD04 Mechanical Interface Drawing



Frangibolt before actuation



Frangibolt after actuation

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