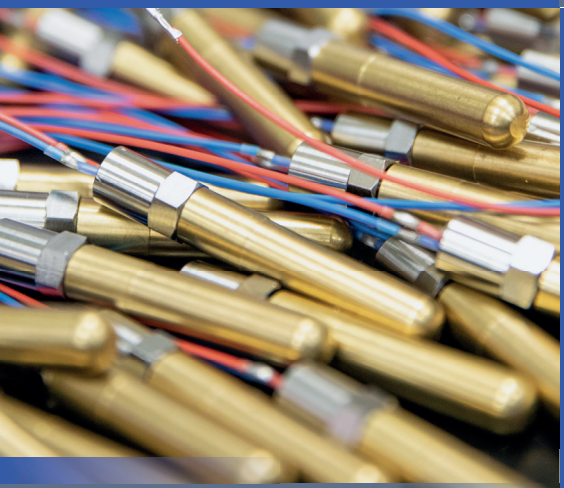
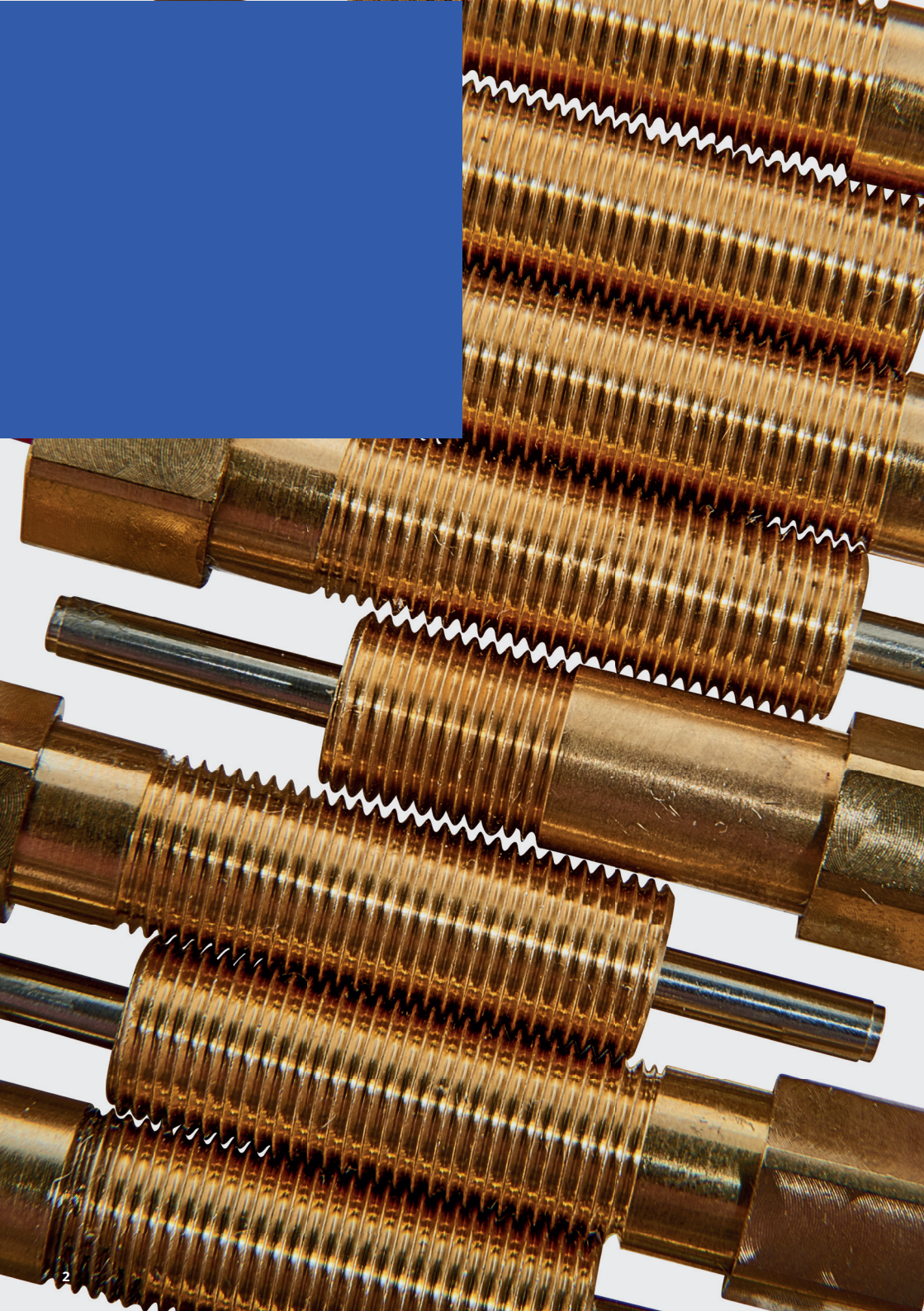
Chemring
Energetics UK



Metron Actuators

Compact, fast, reliable



Contents

What are Metron Actuators?

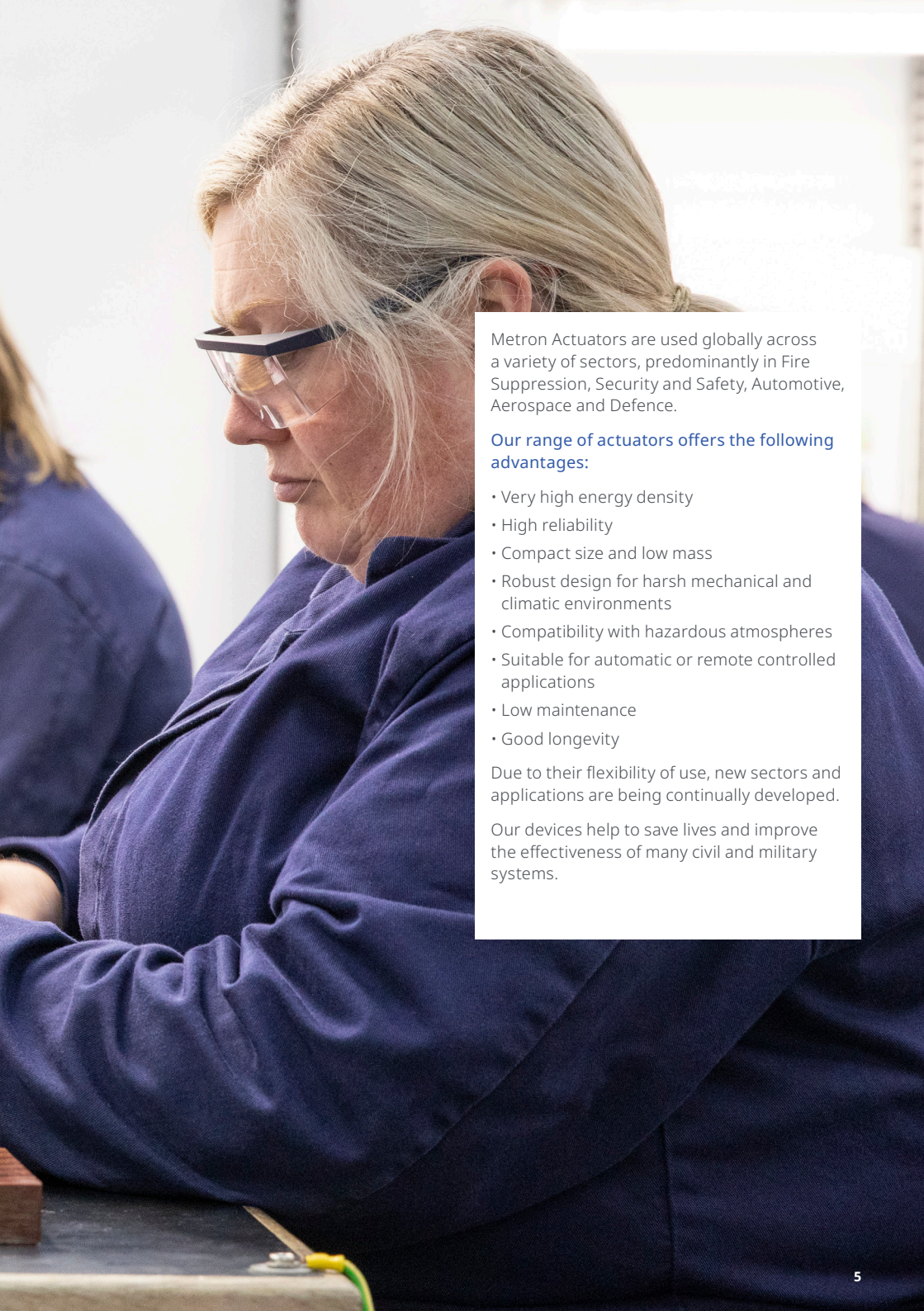
Metron Actuators are highly reliable, light, compact, single shot, pyro-mechanical devices which can be used to perform a variety of functions. They are employed primarily to provide a linear protracting motion but can be adapted to pull, cut, shear or release when installed in a suitable mechanism.

They operate within milliseconds of receiving an appropriate electrical impulse, a rate which is almost impossible to achieve with a mechanical source of energy.

Each device uses the rapid expansion of hot gas evolved from the combustion of a small pyrotechnic charge to drive a piston with very high thrust.

This action can be used to perform mechanical work and applications include valve operation, compressed gas bottle opening and sprinkler activation to name but a few.

All pyrotechnic effects are contained within the body of the device and there is no external gas or flame resulting from ignition of the charge. As such these devices are excluded from UN Hazard Class I Explosives and, in the approved pack, can be transported by normal parcel post. No special provision is required for storage.



Metron Actuators are used globally across a variety of sectors, predominantly in Fire Suppression, Security and Safety, Automotive, Aerospace and Defence.

Our range of actuators offers the following advantages:

- Very high energy density
- High reliability
- Compact size and low mass
- Robust design for harsh mechanical and climatic environments
- Compatibility with hazardous atmospheres
- Suitable for automatic or remote controlled applications
- Low maintenance
- Good longevity

Due to their flexibility of use, new sectors and applications are being continually developed.

Our devices help to save lives and improve the effectiveness of many civil and military systems.

Applications

1 Fire Suppression/ Vehicle Fire Suppression

Chemring Energetics UK has been supplying pyro-mechanical actuation devices to the fire and explosion suppression market for over 40 years. With a long-standing reputation for product excellence, our Metron Actuator range is the preferred choice of many industry leaders in the fire suppression sector.

Due to their unique performance characteristics, reliability and ability to operate in demanding environments many fire suppression systems utilise our Metron Actuators as their sole means of system initiation.

With an astonishingly quick function time, within 20milliseconds of activation, it is understandable why so many systems manufacturers opt to use our Metron Actuators for safety-critical systems.

They are often used to open cylinder valves by operating directly on to the stem valve. Further adopted methods of activation include destruction of frangible bulbs in sprinkler systems, destruction of frangible links, piercing of metal diaphragms and the opening/closing of vents.

Their compact size coupled with a staggering power-to-weight ratio means they are frequently used in conjunction with CO_2 canisters to pressurise fire suppression cylinders. This makes them a popular choice among many of the vehicle fire suppression systems manufacturers across the world.

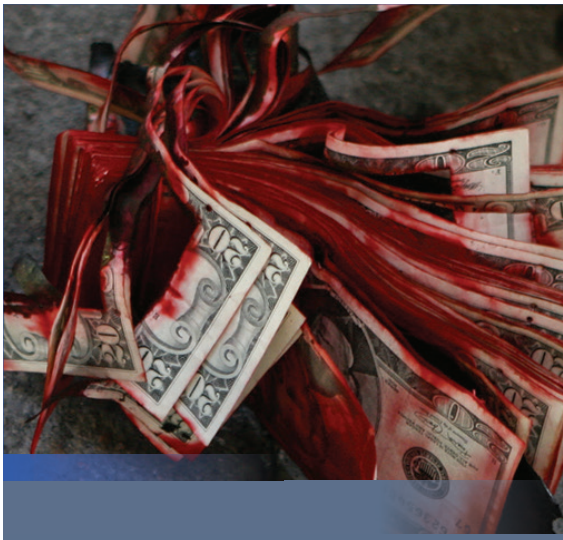
> *Our devices are not only tasked with protecting critical systems and equipment but more importantly, human life.*

2 Security and Safety

With response time being of critical importance in the security sector, Chemring Energetics Metron Actuator range of devices are often utilised in cash protection systems due to their compact size and rapid function time. The Metron Actuator is typically used in conjunction with a CO_2 canister which when activated, rapidly disperses coloured dye or fast acting adhesive, rendering bank notes unusable in the event of a robbery. With relatively low firing current required to function the device and compact size; Chemring Energetics' Metron Actuators are an ideal candidate for integration in to cash-in-transit devices.

In marine safety systems, the hermetic sealing of the Metron Actuator makes it inherently suitable for a number of diverse applications in both surface and sub-sea environments.

Our actuators can be used to provide lifebuoy or life raft release from parent vessels where again their rapid response time and ease of activation are second to none.



3 Automotive

Pyrotechnic devices have been an integral part of automotive safety design since the 1970s, when the first airbags were installed. Innovations in car safety continue to be a significant focus for global manufacturers in order to ensure they meet increasingly stringent standards.

At Chemring Energetics UK, we have the technical expertise, knowledge and know-how to provide manufacturers with design solutions to ensure they continue to develop safer cars and save lives.

4 Aerospace

Through its long association with the Aerospace sectors, Chemring Energetics UK's products meet the required high levels of qualification, tolerances and reliability. Metron Actuators are found in civil aircraft around the world, for example the Boeing 787 Dreamliner, where they play an integral role in emergency oxygen systems. Whilst many products are designed and customised specifically for its customers, Chemring Energetics UK is also able to offer cost effective off the shelf solutions.

5 Defence

Metron Actuators are also utilised widely in Military applications. These include missile fin deployment, release mechanisms, component retention / ejection and safety & arming units.

Further use of Metron Actuators includes Military Aircraft and Helicopter systems.

The DR2000 Series

The Chemring Energetics UK Ltd DR2000 series of Metrons has been used on a global scale since the early 1970's.

The range has been developed to meet demanding customer requirements and can be found in a wide range of applications.

Metron Actuators are a key component in many safety critical systems.

All of our actuators are hermetically sealed and have been comprehensively tested in harsh mechanical and climatic environments.

They are available in a variety of stroke lengths and different levels of energy output. There are also options on the electrical firing characteristics ranging from low threshold (0.145Amps All Fire) through to the EMC safe 1A1W-5minute No Fire standard (5 Amp All Fire).

Metrons can also be supplied with a range of cable finishes from simple flying leads to over-moulded ends with flame resistant sheathing.

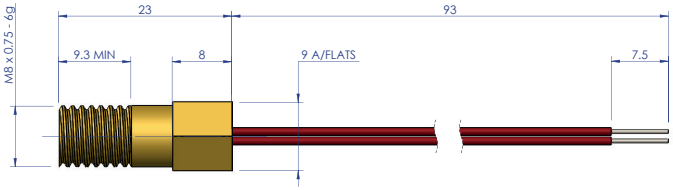
A special form of the Metron has been developed specifically for gas bottle penetrating applications. This has a unique profile in the piston which allows the bottle to be opened and gas to subsequently flow through the aperture.

The following pages provide the key characteristics of the Metron Actuators and associated cable finishes with stroke sizes ranging from 3.5mm to 20mm.

Please contact Chemring Energetics if the combination you are looking for is not listed and we will check to see if we can meet your requirements.

Technical Details

DR2003



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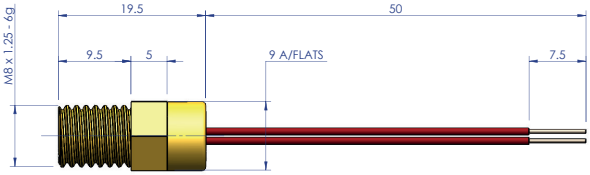

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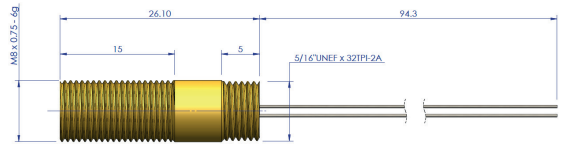

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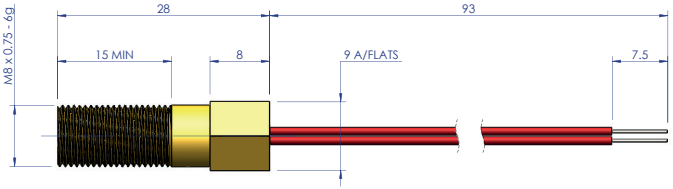

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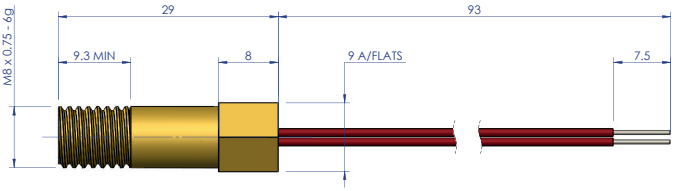

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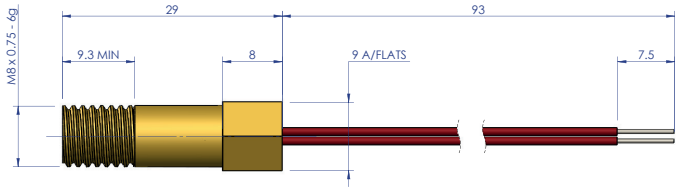

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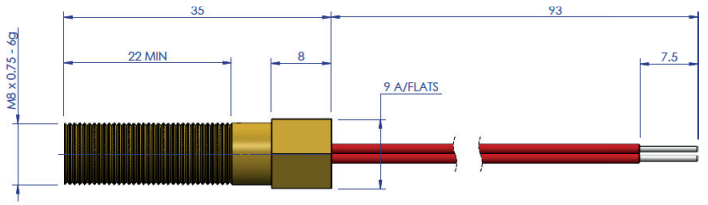

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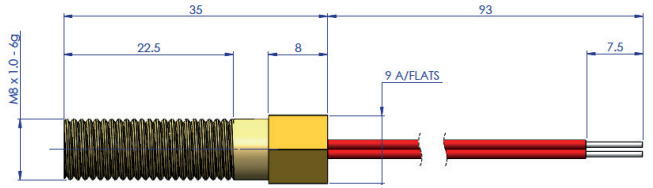

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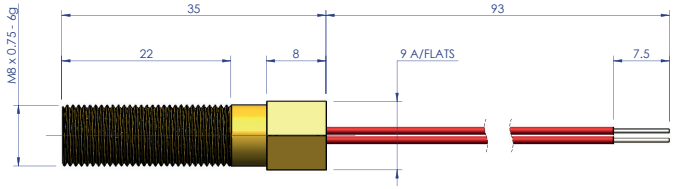

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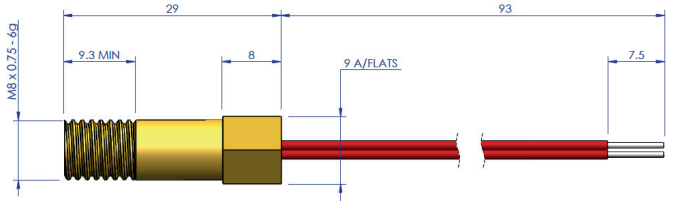

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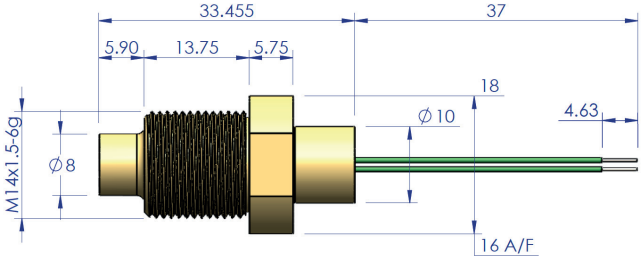

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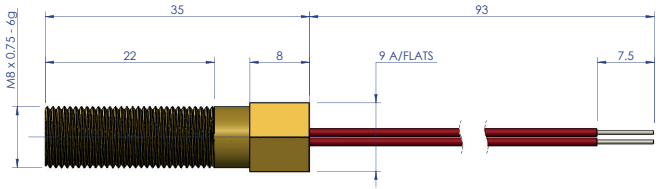

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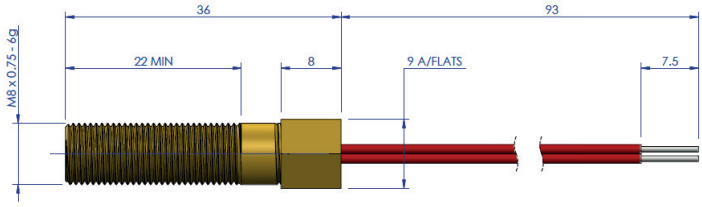

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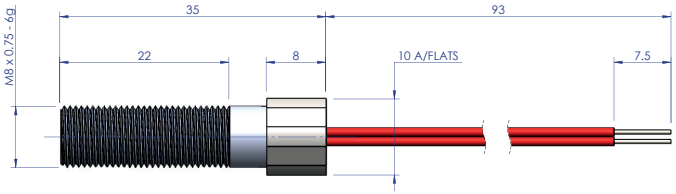

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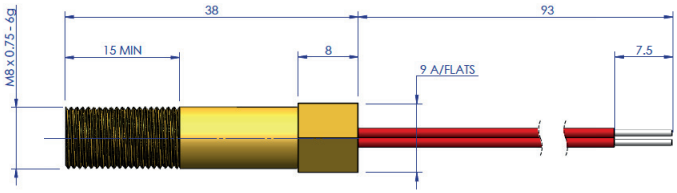

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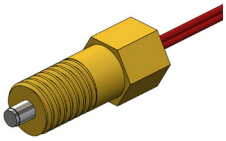

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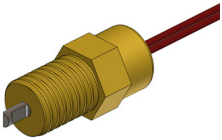
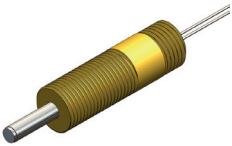
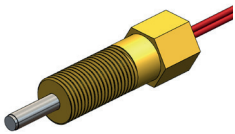
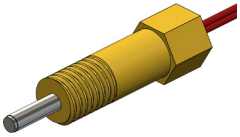


Specifications		3.5mm Stroke	Bottle Punch
Minimum Piston Stroke Length (mm)		3.40	3.50
Available Cable Finishes		C1, C2, C3	C1
Minimum Work Output (Joules)		1.18	N/A
Typical Peak Thrust (Newtons)		1100	N/A
Service Life (Ambient) (Yrs)		10	10
Operating Temperature (°C)		-40 to +70	-40 to +70
Electrical Resistance Range (Ohms)		0.9 - 1.6	1.30 - 2.20
Maximum No Fire Current (Amps)	30 sec pulse	0.15	
	5 sec pulse	0.30	0.25 (0.5 sec pulse)
Minimum Single Fire Current (Amps)	0.01 sec pulse	0.90	1.00
	0.05 sec pulse	0.60	
Recommended Series Firing Current (Amps)		3.00	3.00

	DR2078	DR2085
		

Specifications		**10mm Stroke**	**10mm Stroke**
Minimum Piston Stroke Length (mm)		9.00	9.50
Available Cable Finishes		C78	C1
Minimum Work Output (Joules)		3.00	3.00
Typical Peak Thrust (Newtons)			2000
Service Life (Ambient) (Yrs)		10	10
Operating Temperature (°C)		-40 to +70	-40 to +70
Electrical Resistance Range (Ohms)		0.8 - 1.1	0.65 - 1.90
Maximum No Fire Current (Amps)	5 sec pulse		
	5 mins pulse	1A1W	1A1W
Minimum Single Fire Current (Amps)	0.01 sec pulse		
	0.05 sec pulse	5	3.50
Recommended Series Firing Current (Amps)			

DR2005



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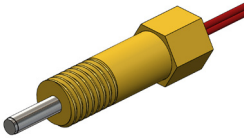
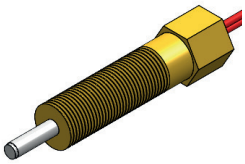


Specifications		10mm Stroke	10mm Stroke
Minimum Piston Stroke Length (mm)		9.50	9.50
Available Cable Finishes		C1, C2, C3	C1
Minimum Work Output (Joules)		3.43	3.43
Typical Peak Thrust (Newtons)		2300	2300
Service Life (Ambient) (Yrs)		10	10
Operating Temperature (°C)		-40 to +70	-40 to +70
Electrical Resistance Range (Ohms)		0.9 - 1.6	10.0 - 16.0
Maximum No Fire Current (Amps)	30 sec pulse	0.15	0.03
	5 sec pulse	0.30	0.05
Minimum Single Fire Current (Amps)	0.01 sec pulse	0.90	0.16
	0.05 sec pulse	0.60	
Recommended Series Firing Current (Amps)		3.00	0.70

DR2074



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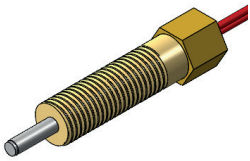
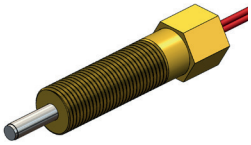


Specifications		10mm Stroke	10mm Stroke
Minimum Piston Stroke Length (mm)		9.50	9.50
Available Cable Finishes		C68	C68, C106
Minimum Work Output (Joules)		4.90	10.00
Typical Peak Thrust (Newtons)			1600
Service Life (Ambient) (Yrs)		10	10
Operating Temperature (°C)		-40 to +70	-40 to +70
Electrical Resistance Range (Ohms)		0.9 - 1.6	0.9 - 1.6
Maximum No Fire Current (Amps)	30 sec pulse		
	5 sec pulse	0.30	0.30
Minimum Single Fire Current (Amps)	0.01 sec pulse	0.90	0.90
	0.05 sec pulse	0.60	0.60
Recommended Series Firing Current (Amps)		3.00	3.00

DR2014



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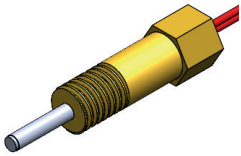
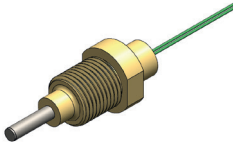
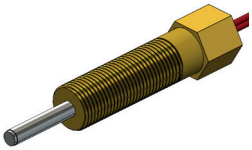
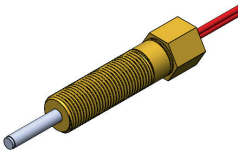


Specifications		10mm Stroke	13mm Stroke
Minimum Piston Stroke Length (mm)		9.50	12.50
Available Cable Finishes		C1	C57
Minimum Work Output (Joules)		4.90	4.00
Typical Peak Thrust (Newtons)		1800	
Service Life (Ambient) (Yrs)		10	10
Operating Temperature (°C)		-40 to +70	-40 to +70
Electrical Resistance Range (Ohms)		0.9 - 1.6	1.3 - 2.2
Maximum No Fire Current (Amps)	0.5 sec pulse		0.23
	5 sec pulse	0.30	
Minimum Single Fire Current (Amps)	0.01 sec pulse	0.90	0.75
	0.05 sec pulse	0.60	
Recommended Series Firing Current (Amps)		3.00	3.00

	DR2039	DR2006
		

Specifications		**14mm Stroke**	**14mm Stroke**
Minimum Piston Stroke Length (mm)		14.00	13.50
Available Cable Finishes		C64	C1, C2, C101
Minimum Work Output (Joules)		6.86	4.90
Typical Peak Thrust (Newtons)		1600	2300
Service Life (Ambient) (Yrs)		10	10
Operating Temperature (°C)		-40 to +80	-40 to +70
Electrical Resistance Range (Ohms)		0.65 - 1.3	0.9 - 1.6
Maximum No Fire Current (Amps)	5 sec pulse		0.30
	5 mins pulse	1A1W	
Minimum Single Fire Current (Amps)	0.01 sec pulse		0.90
	0.05 sec pulse		0.60
Recommended Series Firing Current (Amps)		5.00	3.00

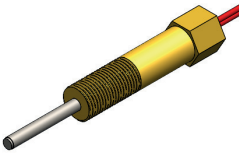
DR2082



DR2094

Specifications		14mm Stroke	14mm Stroke
Minimum Piston Stroke Length (mm)		13.50	13.60
Available Cable Finishes		C72, C88	C67, C89
Minimum Work Output (Joules)		4.90	10.00
Typical Peak Thrust (Newtons)			2275
Service Life (Ambient) (Yrs)		10	10
Operating Temperature (°C)		-40 to +70	-40 to +84
Electrical Resistance Range (Ohms)		0.5 - 1.1	0.9 - 1.6
Maximum No Fire Current (Amps)	30 sec pulse		0.15
	5 sec pulse	0.30	0.30
Minimum Single Fire Current (Amps)	0.01 sec pulse	1.00	0.90
	0.05 sec pulse	0.70	0.60
Recommended Series Firing Current (Amps)		3.00	3.00

DR2037



Specifications		20mm Stroke
Minimum Piston Stroke Length (mm)		20.00
Available Cable Finishes		C64
Minimum Work Output (Joules)		6.86
Typical Peak Thrust (Newtons)		1600
Service Life (Ambient) (Yrs)		10
Operating Temperature (°C)		-40 to +80
Electrical Resistance Range (Ohms)		0.65 - 1.3
Maximum No Fire Current (Amps)	30 sec pulse	
	5 mins pulse	1A1W
Minimum Single Fire Current (Amps)	0.01 sec pulse	
	0.05 sec pulse	5.00
Recommended Series Firing Current (Amps)		5.00

Cable Finishes

The cable finish is defined by C(x) where x is a number corresponding to the type of finish e.g. DR2003/C1 corresponds to a Metron Actuator defined as DR2003 with cable finish C1.

The Technical details show the specific Metron/Cable finish combinations available.

Above: Example of C1 finishes

C1	Hexagonal end cap. PTFE sleeves. 95mm long (Red)
C2	Hexagonal end cap. Multistrand leads. 1000mm long (Red)
C3	Hexagonal end cap. Plastic overmould. Multistrand leads. 1000mm long (Red)
C57	Hexagonal end cap. Multistrand leads. 137mm long (Black)
C64	Hexagonal end cap. PTFE sleeves. 37mm long (Green)
C67	Plastic Overmould with oil and heat resistant sheathing. 207mm long (Black)
C68	Plastic Overmould with oil and heat resistant sheathing. 359mm long (Black)
C72	Hexagonal end cap. PTFE sleeves. 118mm long (Red)
C78	Spigot end cap (round cap), 6/2 heat shrink sleeving, cable length approx. 215mm DCDM 9-way pin connector flying lead
C88	PTFE sleeve fitted to GMS lead wires with two crimped terminals & plastic connector. 83mm long (Red)
C89	Hexagonal end cap. PTFE Sleeves. 93mm long (Red)
C101	Plastic overmould 1/4 blade (0.8mm) terminals
C106	Plastic overmould & heat shrink sleeving with receptacle, contact pins & lock wedge 364mm long (Black)

Cable Finish Matrix

The table below shows the combinations of Actuator and cable finishes available.

Metron	Part No.	C1	C2	C3	C57	C64	C67	C68	C72	C78	C88	C89	C101	C106
DR2003	035191	■												
	06855x		■											
	036213			■										
DR2005	035269	■												
	042055		■											
	035270			■										
DR2006	036316	■												
	042080		■											
	0100313												■	
DR2014	042286	■												
DR2027	092629	■												
DR2075	091674	■												
DR2085	092922	■												
DR2094	093114						■							
	093123											■		
DR2037	092617					■								
DR2039	092587					■								
DR2057	068767				■									
DR2074	069966							■						
DR2078	092791									■				
DR2082	092538								■					
	093085										■			
DR2089	0100266							■						
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Installation and Safe Use

1. Instruction Scope

1.1. This section provides information on the product characteristics, handling and installation of Metron Actuators.

1.2. All information is intended for guidance only. Recipients should satisfy themselves with the suitability of the Metron Actuator for their particular purpose.

2. Actuator Characteristics

2.1. Metron Actuators are category P1 pyrotechnic articles.

2.2. These Actuators are available with varying electrical sensitivity and performance characteristics such as force, energy, function time and piston stroke length.

2.3. Initiation of a Metron Actuator will result in a forceful movement of a piston to perform mechanical work.

2.4. During the process this will result in a small metal septum being ejected from the front of the device, and a piston will project at a high velocity up to a maximum of 20mm in length. The septum will decelerate quickly due to its weight and will typically travel up to 30cm if unobstructed.

3. Linking and Arrays of Metron Actuators

3.1. Metron Actuators may be linked to form an array for some applications.

3.2. CEUK recommend series firing as being the simplest and most reliable method to fire multiple Metron Actuators simultaneously. It is critical that only Metron Actuators of the same electrical sensitivity are linked in a multiple firing circuit.

3.3. It is recommended that users contact CEUK if planning on using a multiple firing circuit.

4. Installation Guidelines

4.1. Metron Actuators are used in a wide range of applications and, as such, installation procedures are largely governed by customers systems.

4.2. Some actuators are fitted with a hexagonal end cap and care must be taken to ensure that no movement occurs at the end cap relative to the body. Actuators should be installed tight by hand force and use of a wrench avoided during installation/ removal. Movement of the end cap relative to the body may render the actuator inoperable.

4.3. Care must be taken to ensure that the actuator cable/ lead wires do not twist or flex relative to the actuator during installation. The lead wires are fragile and can be easily damaged due to twisting/ flexing. N.B. this does not refer to Metron Actuators which are supplied with twisted cables as part of the cable finish.

4.4. Electrical test meters and monitoring circuits must be limited to 0.01 Amps short circuit current to prevent inadvertent operation of the Metron Actuator. Unless otherwise stated by CEUK this monitoring level must not be exceeded.

5. Product Safety, Storage & Disposal

5.1. Users should refer to the Product Safety Data Sheet, PSDS-67, for relevant information on hazards, toxicity, storage and disposal of Metron Actuators.

5.2. The actuator should be replaced before the end of it's life and this may depend on it's service and conditions. Metron Actuators have a shelf life, 10 years, at standard ambient conditions. More arduous environments may require more frequent replacement. The date of manufacture can be found on the article and/ or packing label.

6. Additional Information

Additional information on performance and safety can be sought from the relevant Product Specifications Data Sheet, Product Safety Data Sheet and other technical guidance documents.

Chemring Energetics UK Ltd should be contacted if additional information is required.

Approvals

Metron Actuators are approved and certified to international standards including:

CE Marking
The following devices conform to the requirements of Directive 2013/29/EU, are categorised as type "Pyromechanical Devices, Actuator", are categorised as PI and are marked with the CE Mark: DR2003, DR2005, DR2006, DR2014, DR2027, DR2057, DR2074, DR2075, DR2082, DR2085, DR2089, DR2094 Directive 2013/29/EU on the harmonisation of the laws of the Member States relates to making available on the market of pyrotechnic articles.

Loss Prevention Certification Board (LPCB)
The Loss Prevention Certification Board (LPCB) has been working with industry and government for more than 100 years to set the standards needed to ensure that fire and security products and services perform effectively. LPCB offers third party approval confirming that products and services have met and will continue to meet these standards.

Underwriters Laboratories (UL)
UL is a global independent safety science company with more than a century of expertise innovating safety solutions from the public adoption of electricity to new breakthroughs in sustainability, renewable energy and nanotechnology. Dedicated to promoting safe living and working environments, UL helps safeguard people, products and places in important ways, facilitating trade and providing peace of mind.

ISO certification

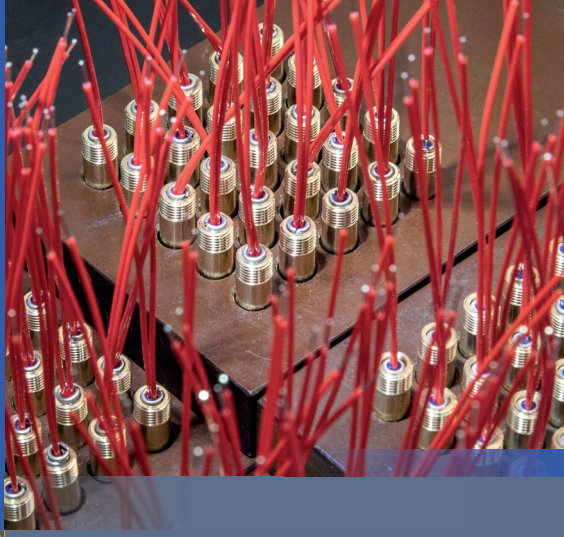
Chemring Energetics UK is approved to the following quality and environmental standards.

BS EN ISO 9001
ISO 9001 is a quality management system that can be integrated into any business. It is focused on ensuring the business delivers a consistent level of quality to its customers by having well defined and regularly reviewed processes and procedures.

BS EN ISO 14001
ISO 14001 sets out the criteria for an Environmental Management System (EMS).

It does not state requirements for environmental performance, but maps out a framework that a company or organization can follow to set up an effective EMS.

It can be used by any organisation that wants to improve resource efficiency, reduce waste, and drive down costs. Using ISO 14001 can provide assurance to company management and employees as well as external stakeholders that environmental impact is being measured and improved. ISO 14001 can also be integrated with other management functions and assists companies in meeting their environmental and economic goals.



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