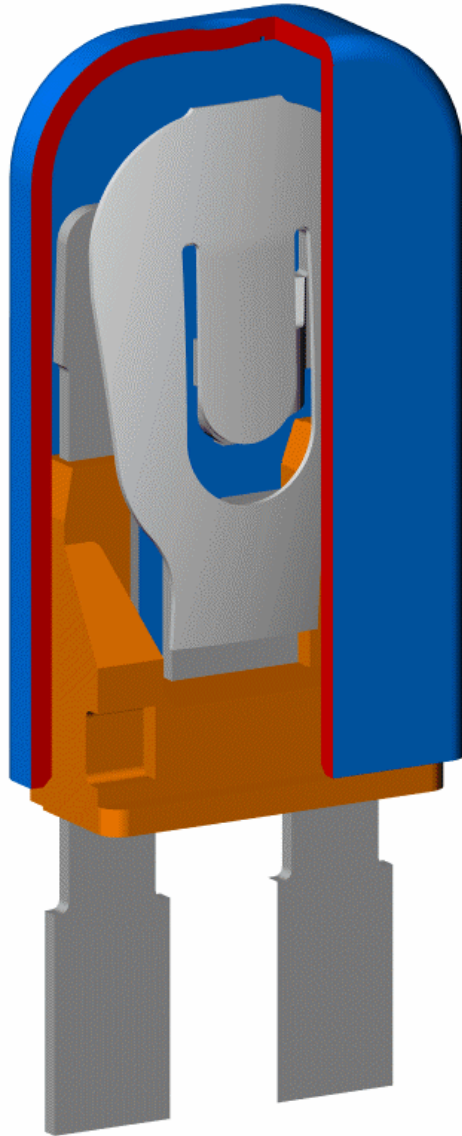


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# DA series

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mini bimetal cut-out

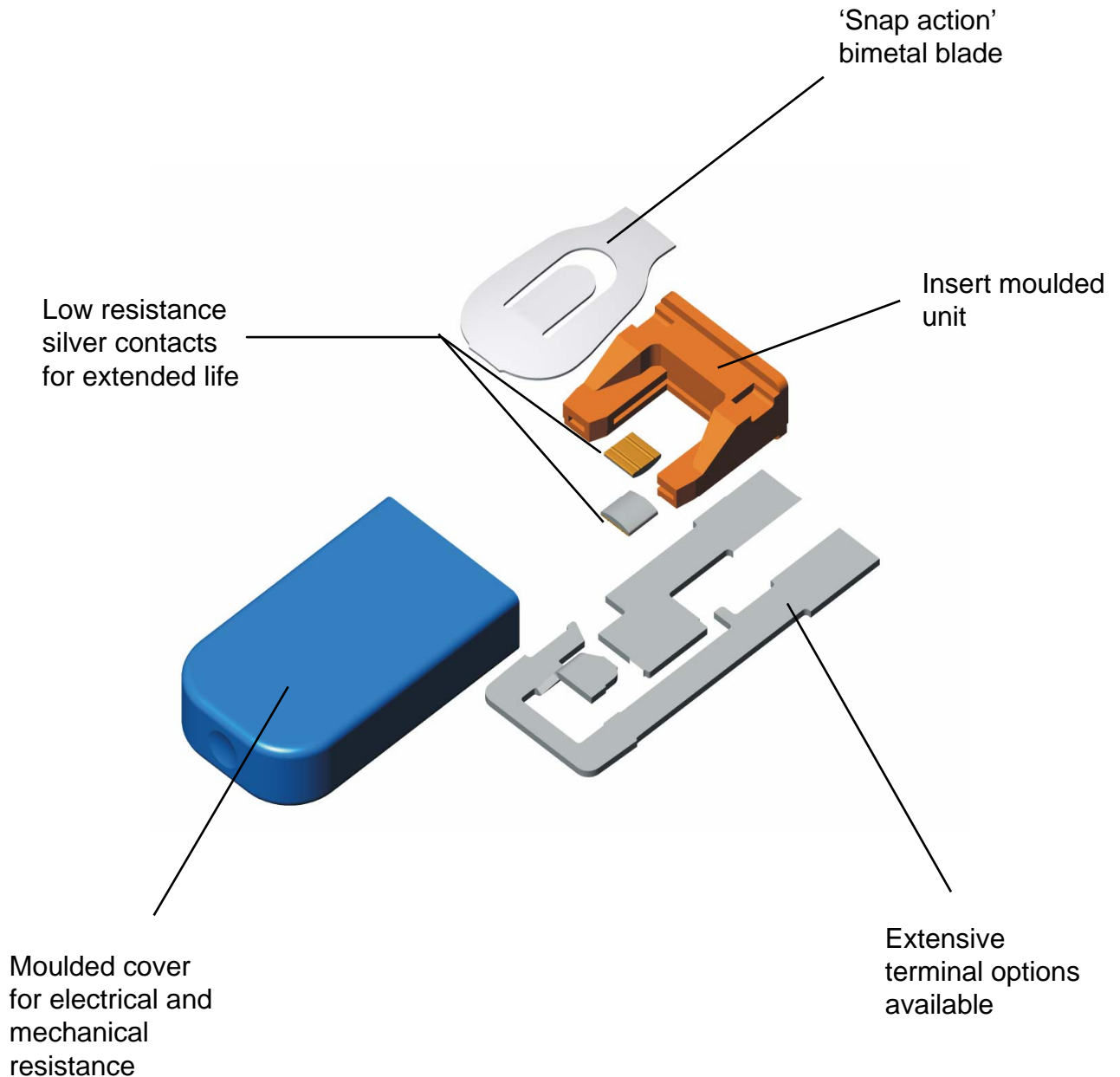
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# DA design



The DA is an evolution of the well proven Otter "Q" Series offering the same excellent overcurrent and temperature protection for a wide range of 12 and 24 volt application in a reduced package size.



By altering the bimetal type DA series offers extended operating characteristics within a single compact package. This is achieved by selecting a combination of unit material and bimetal grade to match the characteristics of each application.

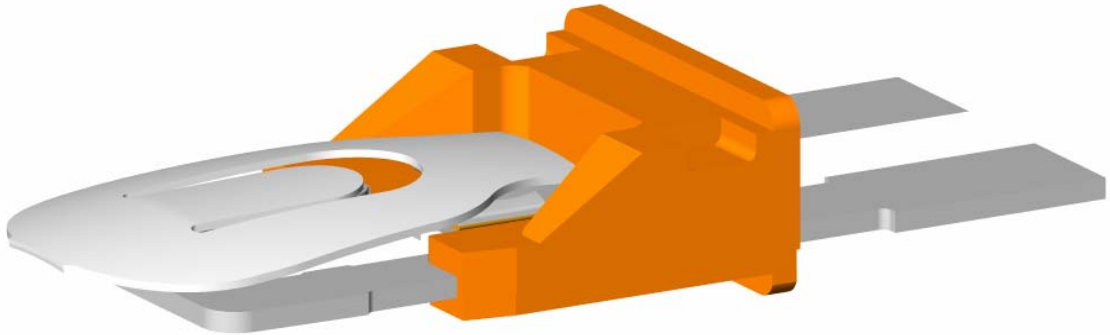


# DA series operation



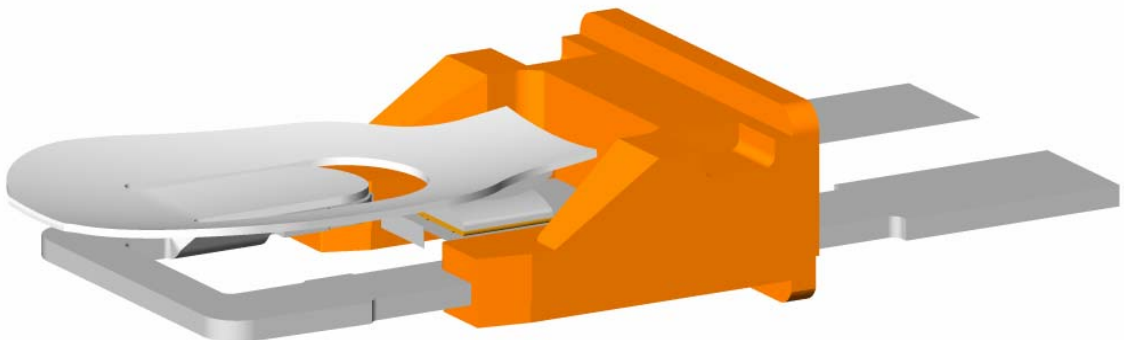
## DA contacts closed

In normal operation current flows through the bimetal blade. When a fault condition occurs, the increased current flow through the blade raises the temperature, which snaps open breaking the circuit.



## DA contacts open

Circuit is broken, allowing motor winding temperature to cool to a safe level before the blade snaps back and the contacts close.





# DA engineering specification



The following data gives a brief overview of the specification/capabilities of the DA series.

1. Normal Operating Voltage: 12V (9 - 15V)  
24V (18 - 30V)
2. Operating current: 5 - 25 amps (inductive) @ 12V  
up to 8 amps (inductive) @ 30V
3. Operating ambient temperature range: -40 to +80°C
4. Operating characteristics at 20+/-3°C: See attached T/C curves for full operating range. Continuous rated current up to 15 amps.
5. Remake characteristics: above 85°C (less than 10 seconds)
6. Voltage drop:  
(DA181U0000) max 0.2V at 3 amps load current  
(DA141C0000) max 0.2V at 10 amps load current
7. Insulation resistance: 1M $\Omega$  min at 500V
8. Terminal materials:  
DA-8 Nickel Silver NS107  
(55% Cu/18% Ni/rem Zn)  
  
DA-4 Brass CZ108  
(64% Cu/36% Zn)
9. Unit Material: 28% glass filled reinforced PA6,6  
(Zytel FR70G28 V1)
10. Cover Material: 33% glass filled PA6,6  
(Zytel 74G33CL)  
30% glass filled PA6,6  
(TECHNYL A216 V30)
11. Contact material: 90% Ag 10% Ni (surface)  
CuNi30Fe (backing)
12. Endurance:
  - 1) 48 hour stall test in motor
  - 2) Capable of 30000 cycles at rated current (d.c.)

All testing has been carried out in accordance with standard Otter production polarity.

Full material content IMDS data is held at [www.mdsystem.com](http://www.mdsystem.com). Please contact [imds@ottercontrols.com](mailto:imds@ottercontrols.com) for details.



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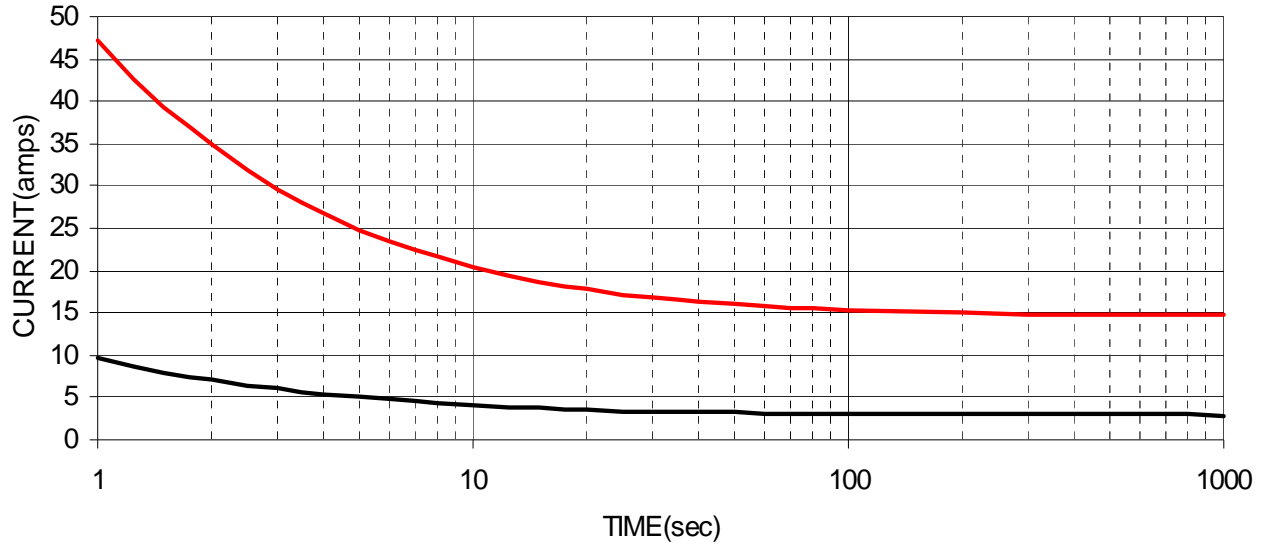
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# DA T/C performance



## DA series performance range @ 20°C



## production specifications

A selection of typical production specifications are listed to the side. Additional specifications are available dependent upon application. Please contact Sales Office for details.

| Type   | Current (Amps) | Break (Sec) |
|--------|----------------|-------------|
| DA141F | 16             | 2.6 - 4.6   |
| DA141C | 25             | 2.3 - 4.6   |
| DA181C | 20             | 2.3 - 4.3   |
| DA181F | 14             | 2.5 - 5.5   |
| DA181J | 12             | 2.3 - 4.9   |
| DA181U | 8.5            | 2.2 - 5.0   |
| DA181P | 6              | 2.1 - 5.5   |

## DA nomenclature

| 1            | 2         | 3          | 4               | 5             | 6               | 7                     | 8                               | 9               | 10         |
|--------------|-----------|------------|-----------------|---------------|-----------------|-----------------------|---------------------------------|-----------------|------------|
| Switch Range | Unit Type | Unit metal | Cover Type      | Bimetal Grade | Special Bimetal | Terminal Arrangement† | Special Feature                 | Special Feature |            |
| D            | A         | 1 No holes | 4 Brass         | 1 Standard    | C               | 0 Any                 | 0 No fold or crop               | 0 Not used      | 0 Not used |
|              |           |            | 8 Nickel Silver |               | J               | + Chace               | A Both legs 90° fold            |                 |            |
|              |           |            |                 |               | P               | ) Kanthal             | B One leg 90° fold              |                 |            |
|              |           |            |                 |               | U               | # Hood                | C Both legs 90° fold and V crop |                 |            |

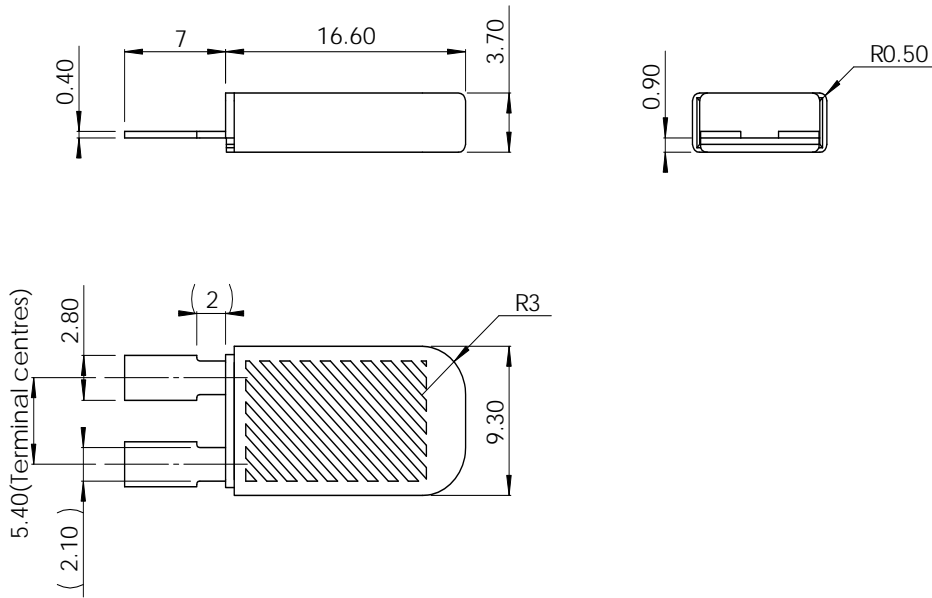




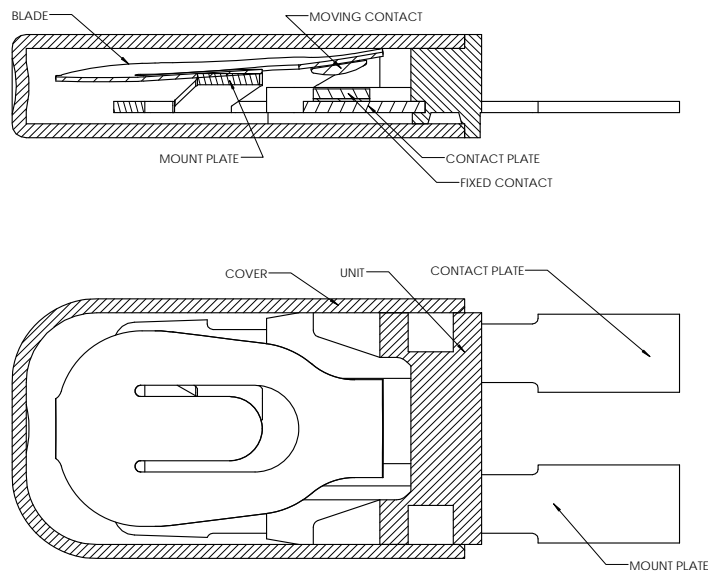
# DA outline



The DA cut-out can be supplied with a range of terminal options to optimise the installation.



## Sectional Views showing Otter terminology for main parts/features for DA cut-out

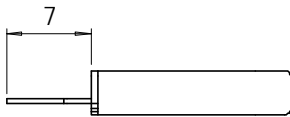
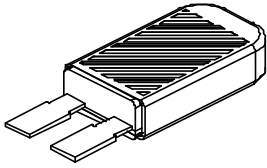




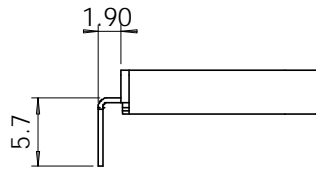
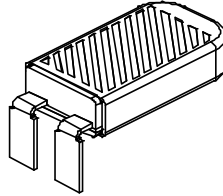
# terminal variations



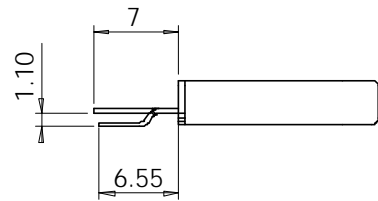
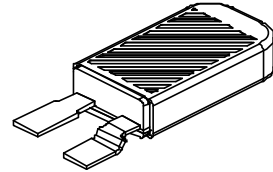
The DA series can be produced with a range of folded and cropped terminal options. Contact Sales Office to confirm availability.



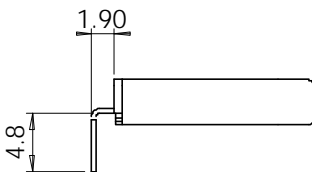
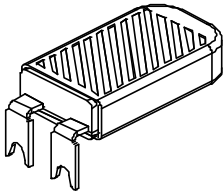
DA1-1-0000



DA1-1-0A00



DA1-1-0B00



DA1-1-0C00



# Measuring time/current response of DA series cut-out using a constant current power supply



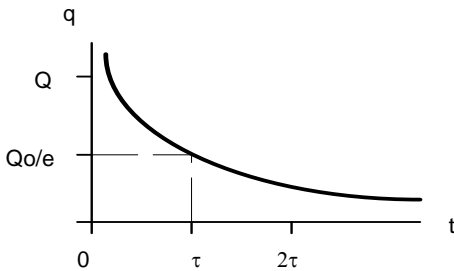
## Introduction

Most Power supplies feature an additional smoothing circuit on the output. When used in switching applications the discharge of these reservoir capacitors used in the smoothing circuit can result in critical damage to the cut-out.

## Effect of Power Supply Characteristics

We recommend the use of a resistive load to dissipate the energy present in the power supply's smoothing capacitors (Ref. Graph 1 + note). Without this additional circuit resistance the rapid discharge of these capacitors, as the contacts close results in a very high intensity arc, which can weld or permanently damage the cut-out contacts.

**Graph 1: Power Supply Capacitor Discharging**



Where,  $\tau=RC$

Therefore, for a fixed Capacitance (C), if the Resistance (R) is small then the discharge is extremely rapid, which is the condition created with just a cut-out across the supply. Including a resistance lengthens this Time, effectively smoothing the output.

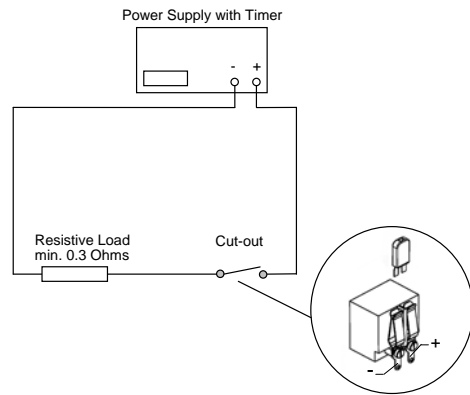
**If a motor, or load is connected in series with the supply, this energy (both on Break/ and Remake) is effectively absorbed/ dissipated and does not create an arc of such high intensity or time period.** This minimises any potential damage and is closer to the conditions seen within an application.

## Measuring T/C performance with additional Circuit Resistance

In order to correctly measure the Time/Current response of a DA series cut-out using a Constant Current power supply it is essential to ensure the inclusion of resistive load in series: **min: 0.3Ω** (Ref. Figure 1).

Note: DC motor resistance's are typically between 0.3-0.5Ω.

**Fig 1: Testing Cut-out with additional circuit resistance**



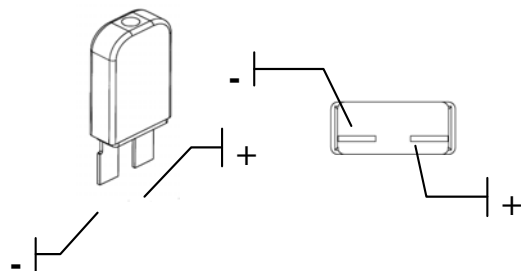
By including a load resistance in series with the cut-out (Ref. figure 1) the rate at which the power supply capacitors discharge is extended, and will ensure more consistent and repeatable Time/Current readings by avoiding damage to contact surface.

## Additional factors:

### Ensure correct orientation of cut-out.

Due to the phenomena associated with current flow through junctions of dissimilar metals slight variations in cut-out break times can occur. To avoid this it is necessary to ensure consistent orientation of the cut-out (Ref. Figure 2).

**Fig 2: Correct Orientation of DA for T/C testing**



## Use a suitable low resistance connection method.

To reduce T/C variation it is also necessary to ensure consistent low resistance connection (avoid the use of crocodile clips or other none repeatable method). We would recommend a typical connection method as Otter Drg: P971005

**Completion of the above will minimise any error resulting from the measurement procedure, ensuring T/C break times which closely correspond to Otter Production specification.**



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