

ACTIVEMETAL™ SWITCHES  
*BEYOND DURABLE.™*

## *ULTRA-RUGGED TOUCH SENSORS*



ACTIVEMETAL™  
ULTRA-RUGGED TOUCH SENSORS

800.544.3354  
[www.ActiveMetal.com](http://www.ActiveMetal.com)



## How ACTIVEMETAL WORKS

# Step 2

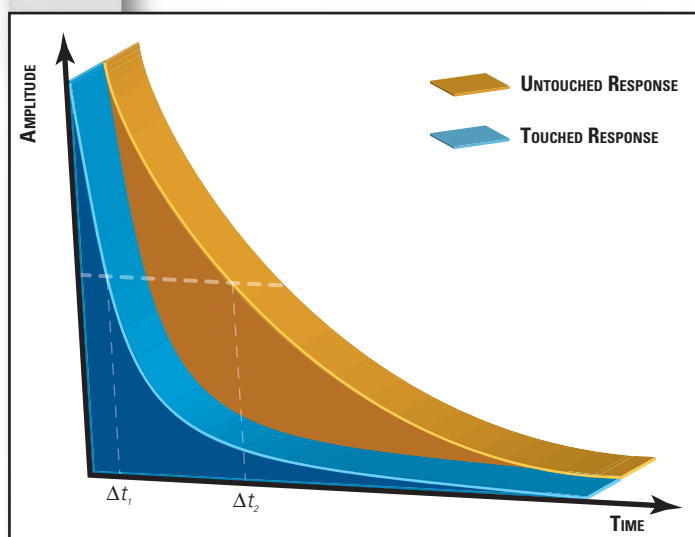
The basic principle is that a material capable of supporting shear and torsional mechanical waves at ultrasonic frequencies can have those waves trapped or localized by contouring its surface. These trapped energy regions are set into motion with transducers and act as high quality resonators.



ActiveMetal Products

# Step 1

When the time to a threshold value is lower than the preset value, the microcontroller is programmed to indicate switch actuation. This is a continuous process occurring every few milliseconds.



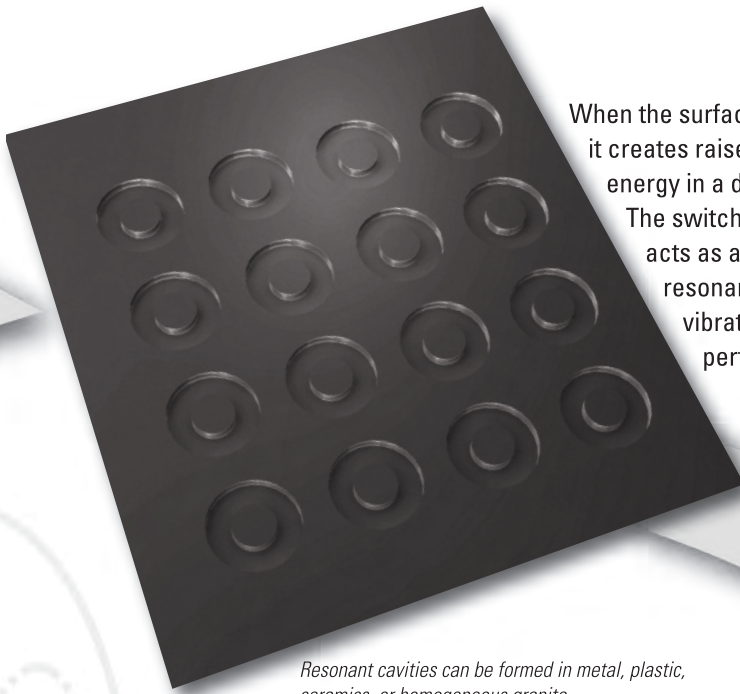
*The decay rate has changed. Actuation is triggered*



# Step 5

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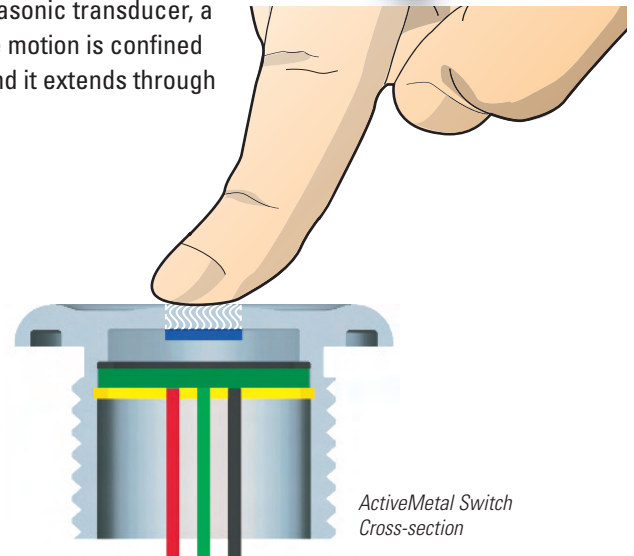
When the surface of a switch plate is contoured as depicted here, it creates raised regions or Resonant Cavities that trap ultrasonic energy in a defined area or column within the material.

The switch operates with ultrasonic energy, and the metal plate acts as a very effective shield. Despite the use of acoustic resonance, vibration in these sensors and mechanical vibrations from external sources do not influence sensor performance.

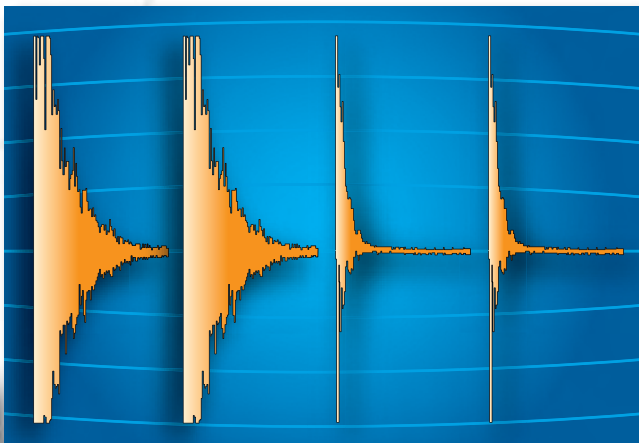
*Resonant cavities can be formed in metal, plastic, ceramics, or homogeneous granite*

Step 3

When a resonator is set into vibration in the MHz range by a properly positioned ultrasonic transducer, a wave motion is induced. The motion is confined to the shape of a cylinder, and it extends through the thickness of the metal.



Motion is initiated by an electrical impulse to the transducer, then the vibration decays or "rings down", like a bell that has been struck. A finger or gloved hand touching the front surface of the resonant cavity dampens the vibration and reduces the region's ring-down time. This reduction in ring-down time (decay rate) is detected with a microcontroller which can be multiplexed for multiple switch positions.

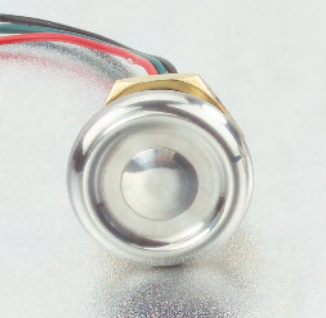
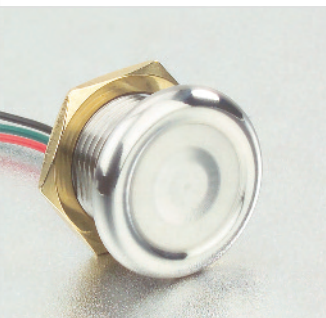
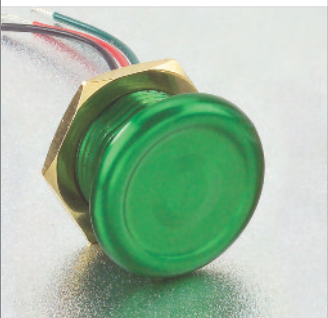
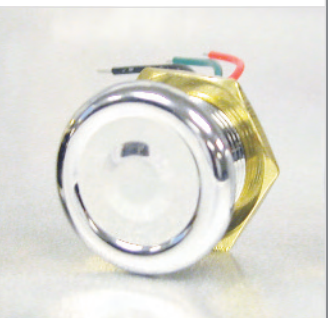


*Resonant ring-down reduction waveform —  
Dampened ring-down reduction waveform*

Step 4

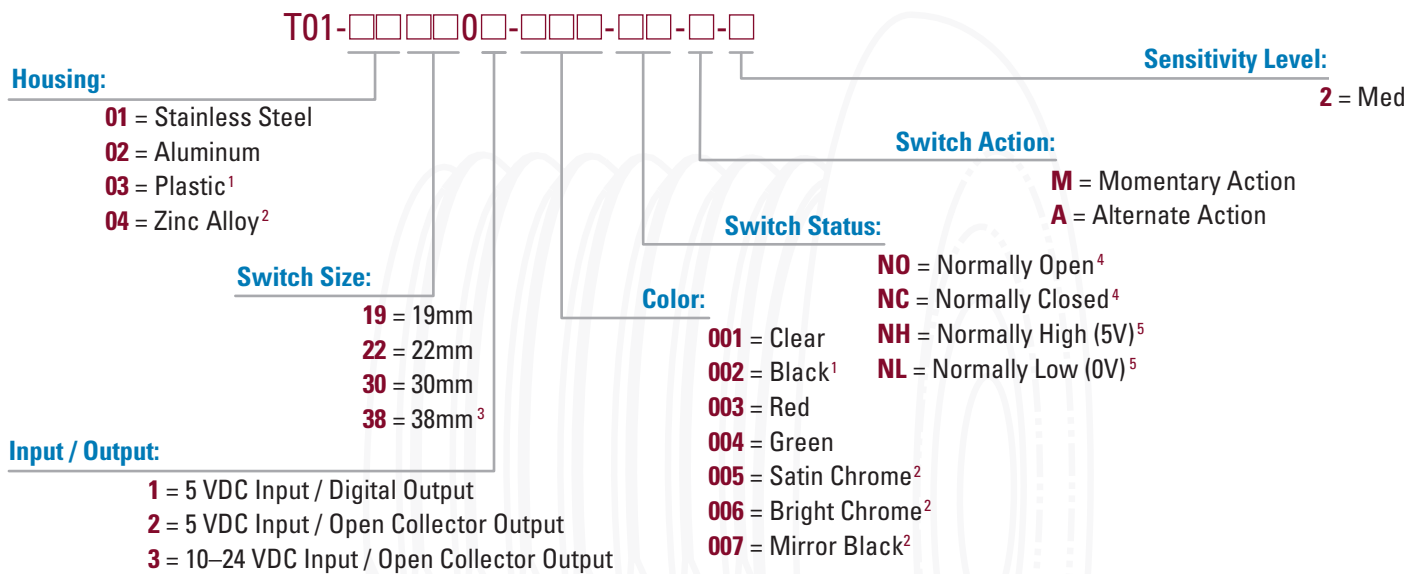
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| Size  | Stainless Steel (316)                                                               | Aluminum (6061)                                                                     | Plastic (PPS)                                                                       | Zinc Alloy (Die Cast)                                                                |
|-------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 19 mm | ✓                                                                                   | ✓                                                                                   | —                                                                                   | —                                                                                    |
|       |    |    |                                                                                     |                                                                                      |
| 22 mm | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                    |
|       |   |   |  |  |
| 30 mm | ✓                                                                                   | ✓                                                                                   | —                                                                                   | —                                                                                    |
|       |  |  |                                                                                     |                                                                                      |
| 38 mm | ✓                                                                                   | —                                                                                   | —                                                                                   | —                                                                                    |
|       |  |                                                                                     |                                                                                     |                                                                                      |

The ActiveMetal product line has many configurable options and over 600 part numbers. Please use the Matrix below and the Specifications pages that follow to configure the ActiveMetal product that is right for your application. Not all options and configurations are possible, please contact an authorized distributor or the factory for help configuring your part.

### PART NUMBER MATRIX



<sup>1</sup> Plastic housings are available in the 22mm size (Black 002) only.

<sup>2</sup> Diecast Zinc Alloy housings are available in Chrome colors (005, 006, 007) only.

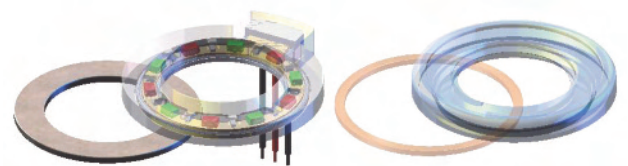
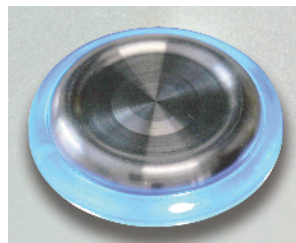
<sup>3</sup> The 38mm switch is only available in Stainless Steel with 5VDC Input and Digital Output.

<sup>4</sup> Normally Open or Normally Closed can only be used with Open Collector Output.

<sup>5</sup> Normally High or Normally Low can only be used with Digital Output.

### ACTIVEMETAL ACCESSORIES

The Halo Illumination kit is comprised of a translucent diffuser, a seal, and lighted mounting nut. You will need to retain and use the original black o-ring that comes with the ActiveMetal switch to seal the switch to the diffuser, the seal is used between the diffuser and the panel, followed by the lighted mounting nut.



**Halo Illumination Kit**

ActiveMetal Switches sold separately.

Follow separate mounting instructions included with each Halo Illumination kit.

Mounting holes and panel thickness will differ from the standard ActiveMetal Switches.

Accessories are not currently available for use with the 38 mm Switch.

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*Design and specifications subject to change without notice due to continuing product improvements*

Contact an Authorized Distributor or Factory for Pricing



## Ultra-Rugged Touch Sensors

BEYOND DURABLE.™

## MECHANICAL SPECIFICATIONS

- Maximum Actuation Force:  
Level 2 Sensitivity: < 5 lbs. (22.2 N)  
ADA Compliant
- Materials: Stainless Steel (316),  
Aluminum (6061) with Type II Anodization  
Zinc Alloy (Die Cast)
- Mechanism: 100% Solid-state, No Moving Parts
- Operational Life: +20MM cycles,  
-40°C to 85°C (Typ)

## 22MM MECHANICAL SPECIFICATIONS

- Materials: Also available in Plastic (PPS)

## 38MM MECHANICAL SPECIFICATIONS

- Materials: Stainless Steel (only)

## ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature Range: -40° C to +85° C (Typ)
- Storage Temperature Range: -55° C to +125° C (Typ)
- Relative Humidity: No Effect
- Ingress Protection: IP68 (submerged in 1 m without  
a panel for 96 hours)
- Shock: Tested to 30g in each Axis  
(drop test from 20 ft to concrete)
- Vibration: Tested at 4 hours each Axis  
(actuated during vibration)
- Impact: 2 ft-lb impact from 1.7ft (per UL 294)



## ELECTRICAL SPECIFICATIONS

- Current Handling: 100mA (Max)
- Current Draw: < 5mA
- ESD: Meets IEC 61000-4-2 spec to Level 4 Immunity
- Contact Resistance: None
- Contact Bounce: None

## 19MM, 22MM, 30MM ELECTRICAL SPECIFICATIONS

- Voltage: +5 VDC  $\pm$  5%, or  
+10–24 VDC
- Wire Leads: 24 AWG,  
12" long,  
105C Insulation

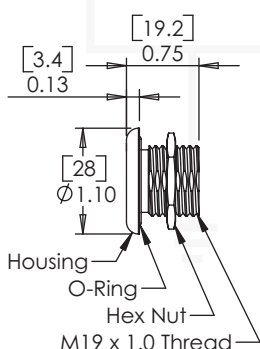
## 38MM ELECTRICAL SPECIFICATIONS

- Voltage: +5 VDC  $\pm$  5%
- Termination: Molex 3-position (female)  
connector, 22 AWG, 2.77" long,  
105C Insulated wire leads  
(mates with Molex #03-06-2032)

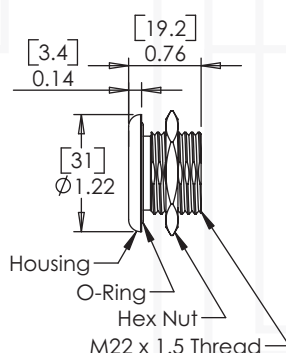
## FUNCTIONAL OPERATION SPECIFICATIONS

- Momentary / Alternate
- Normally Open / Normally Closed  
(Open Collector Output)
- Normally High, 5V / Normally Low, 0V (Digital Output)
- Make / Break via Transistor

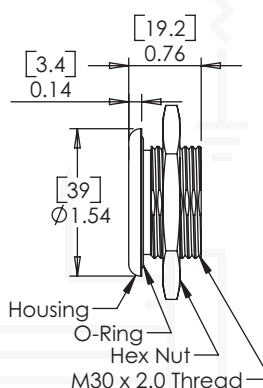
## 19MM SWITCH



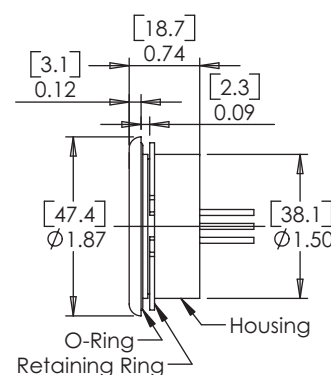
## 22MM SWITCH



## 30MM SWITCH



## 38MM SWITCH



800.544.3354

## Ultra-Rugged Touch Sensors

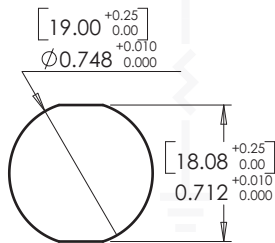
**BEYOND DURABLE.™**

The ActiveMetal products featured here are designed to be panel mounted. The 19mm, 22mm and 30mm are threaded and have two D-flats to prevent rotation, each is supplied with an O-ring and mounting nut for installation. The 38mm is non-threaded and is supplied with an O-ring and retaining ring for installation.

### 19MM MOUNTING SPECIFICATIONS

- Mounting Panel Thickness: 0.0625" (1.58mm) to 0.500" (12.7mm)
- Mounting Panel Thickness with oriented Double "D" Flats: 0.090" (2.3mm) to 0.500" (12.7mm)
- Mounting: Brass Nut (15 Inch Pounds — Max), AS568A-019 Butyl Rubber O-ring

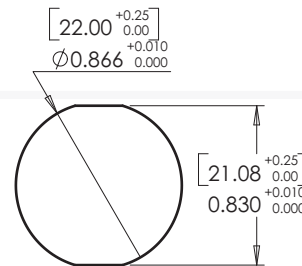
### 19MM PANEL CUTOUTS:



### 22MM MOUNTING SPECIFICATIONS

- Mounting Panel Thickness: 0.050" (1.27mm) to 0.500" (12.7mm)
- Mounting Panel Thickness with oriented Double "D" Flats: 0.090" (2.3mm) to 0.500" (12.7mm)
- Mounting: Brass Nut (15 Inch Pounds — Max), AS568A-019 Butyl Rubber O-ring

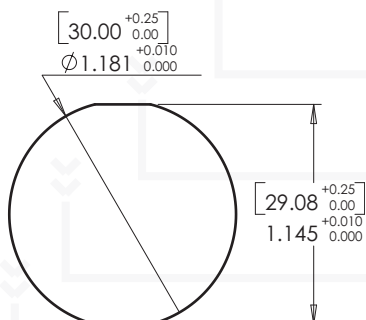
### 22MM PANEL CUTOUTS:



### 30MM MOUNTING SPECIFICATIONS

- Mounting Panel Thickness: 0.0312" (0.97mm) to 0.469" (11.9mm)
- Mounting Panel Thickness with oriented Double "D" Flats: 0.090" (2.3mm) to 0.469" (11.9mm)
- Mounting: Brass Nut (15 Inch Pounds — Max), AS568A-019 Butyl Rubber O-ring

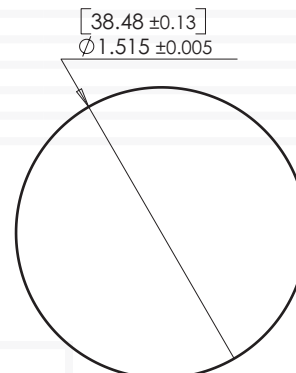
### 30MM PANEL CUTOUTS:



### 38MM MOUNTING SPECIFICATIONS

- Mounting Panel Thickness: 2mm (0.079")
- Mounting: 1.5" (38.1mm) External / Spiral Retaining Ring with an AS568A-030 Buna-N O-ring

### 38MM PANEL CUTOUTS:



### INPUT / OUTPUT:

- **5VDC Input / Digital Output** — 5VDC Input (red wire) and Digital Output (green wire) is output either at 5V or 0V level relative to input voltage supply's ground (black wire).
- **5VDC Input / Open Collector Output** — 5VDC Input (red wire) and Open Collector Output (green wire) is output that is open or closed relative to input voltage supply's ground (black wire).
- **10 – 24VDC Input / Open Collector Output** — Will work with any input operating voltage between 10 – 24VDC (red wire) and Open Collector Output (green wire) is output that is open or closed relative to input voltage supply's ground (black wire).

### SWITCH STATUS:

- **Normally Open** — An unactivated condition, output is open relative to input voltage supply's ground (sinking output).
- **Normally Closed** — An unactivated condition, output is closed relative to input voltage supply's ground (sinking output).
- **Normally High, 5V** — An unactivated condition, output at 5V level relative to input voltage supply's ground.
- **Normally Low, 0V** — An unactivated condition, output at 0V level relative to input voltage supply's ground.

### COLOR:

All ActiveMetal switches are available in stainless steel to give you the utmost in durability no matter what the application or working environment. 19mm, 22mm and 30 mm switches are available in anodized aluminum versions and are offered in Clear, Black, Red and Green colors. The 22 mm switch is also available in a Black PPS Plastic version. We also offer Diecast Zinc Alloy versions which are available in Satin and Bright Chrome and Mirror Black finishes.

### SWITCH ACTION:

- **Momentary Action** — Output reverts to its previous status as the switch is released.
- **Alternate Action** — Output changes to its opposite status and latches as a result of the switch activation.

### SWITCH SENSITIVITY LEVELS:

- **Level 1\*** — Designed for indoor use with or without a gloved hand; may be susceptible to false activations caused by water or an accidental touch.
- **Level 2** — Designed for indoor / outdoor use with or without a gloved hand; impervious to false activations caused by water.
- **Level 3\*** — Designed for indoor / outdoor use without a gloved hand (heavy force required); impervious to false activations.

*\* Ask about alternate sensitivity levels.*

**ACTIVEMETAL™**  
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**ITW Switches**  
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800.544.3354  
[www.itwswitches.com](http://www.itwswitches.com)

### ITW SWITCHES OFFICE LOCATIONS

|                                                         |                                    |
|---------------------------------------------------------|------------------------------------|
| <b>Buffalo Grove, Illinois</b> — Worldwide Headquarters |                                    |
| <b>Round Rock, Texas</b> — R&D                          | <b>Milan, Italy</b> — Appliance    |
| <b>Des Plaines, Illinois</b> — Appliance                | <b>Kaohsiung, Taiwan</b> — Sales   |
| <b>Glenview, Illinois</b> — R&D and Automotive          | <b>Portsmouth, England</b> — Sales |