

# 4000 series

Proportional metal fingertip controllers •  
potentiometer technology



## DISTINCTIVE FEATURES

- One or two axis
- All metal mechanism
- Two standard mounting options
- Variety of potentiometer options
- Optional center detect microswitching



## ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -20°C to +55°C
- Power Rating: 1W at 70°C - Derate to 0W at 125°C
- Sealing: IP65 (above panel, subject to handle)



## ELECTRICAL SPECIFICATIONS

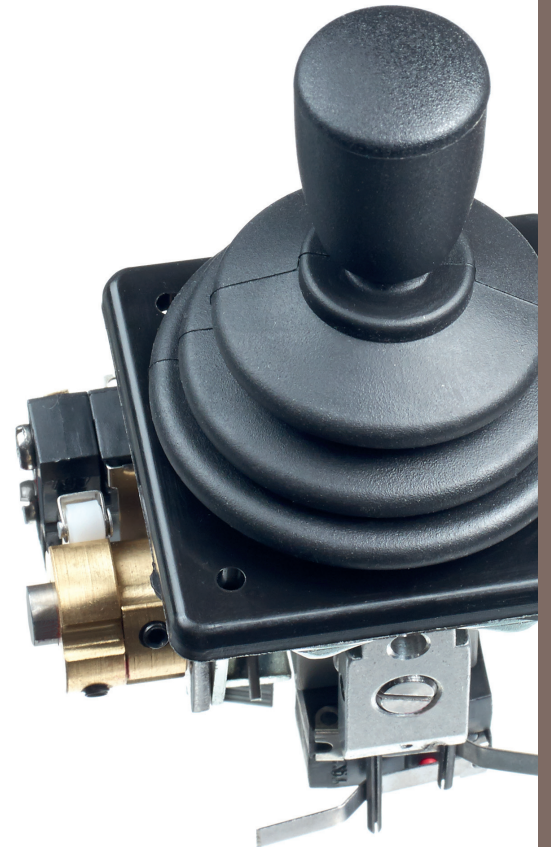
- Maximum Voltage: 24VDC
- Reverse Polarity Max: -24VDC
- Overvoltage Max: 70V
- Output Impedance: 0 to 5K  $\Omega$  or 0 to 10K  $\Omega$  (subject to potentiometer)
- Return to Center Voltage Tolerance:  $V/2 \pm (V*2\%)$



## MECHANICAL SPECIFICATIONS

- Operating Force: 1.3N (0.29lbf) (Dependant on configuration)
- Resistance Tolerance:  $\pm 20\%$
- Mechanical angle of movement: Subject to handle and body type\*
- Expected Mechanical Life: >5 million lifecycles
- Mass/weight: 110g (3.88oz) (Dependant on configuration)

\* For specific angle of movement please contact the APEM with the full reference  
The company reserves the right to change specifications without notice.



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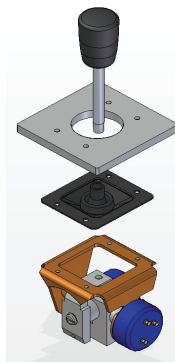
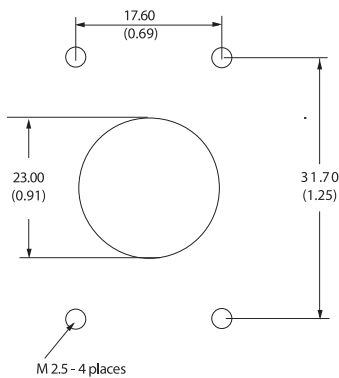
## MATERIALS

- Shaft: Stainless steel
- Boot: Neoprene
- Handles:  
**BL, E, Q, AT** - Nylon  
**D, AK** - Aluminum  
**J, X** - ABS



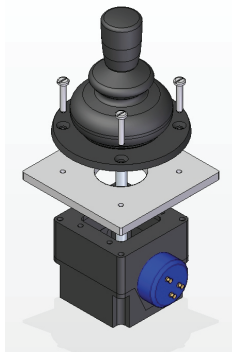
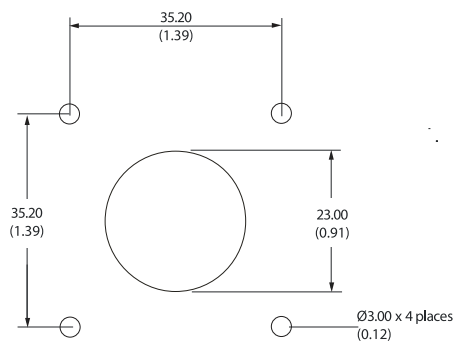
## MOUNTING

### OPEN FRAME CUT-OUT AND INSTALLATION



- The joystick mounts from beneath the panel and the boot is trapped between the joystick and the panel.
- No bezel is necessary for this installation, since the panel acts as the bezel.
- The frame has M2.5 tapped holes and as such M2.5 machine screws are recommended for this mounting.

### CLOSED FRAME CUT-OUT AND INSTALLATION



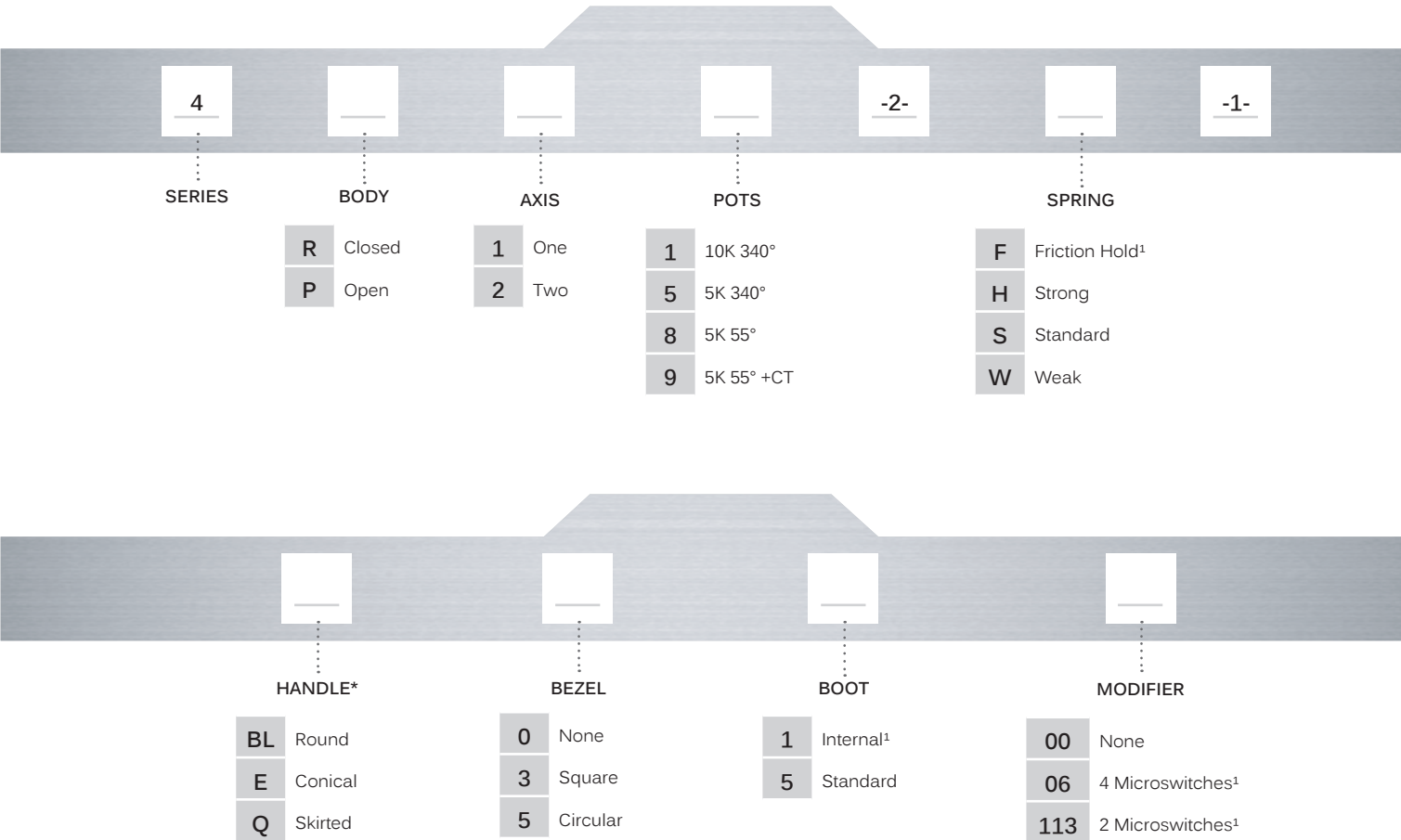
- The body of the joystick is mounted from beneath the panel. The boot is passed through the panel cut-out and is held onto the front face of the panel by the mounting bezel.
- The square bezel has a gloss finish and is designed for use with No. 4 x 3/8" pan head self tapping screws whereas the circular bezel has a matt finish and is designed for countersunk screws. recommended for this mounting.

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## BUILD YOUR PART NUMBER



\*For more handles see [www.apem.com](http://www.apem.com)

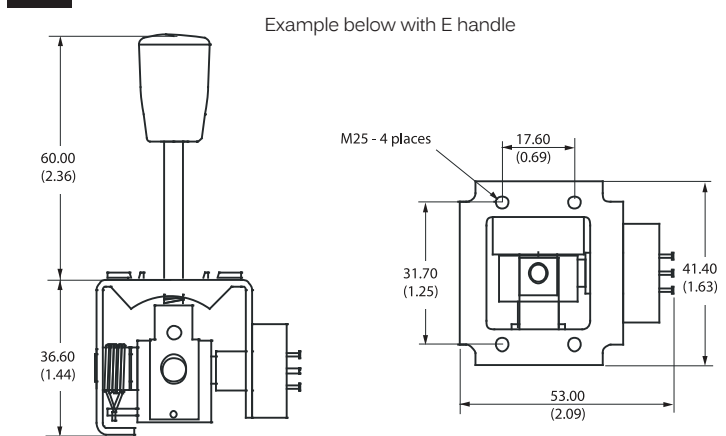
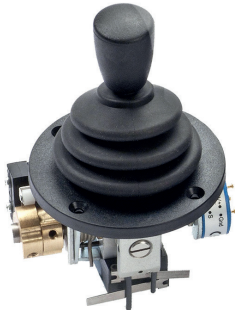
**NOTE:**

<sup>1</sup> Only available on 4P types.

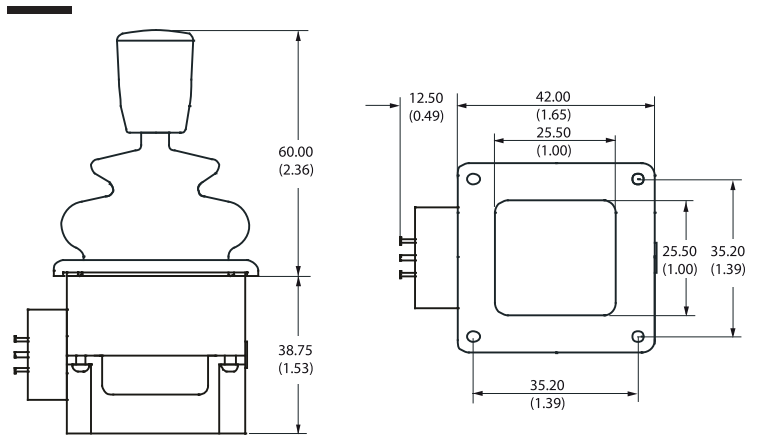
# 4000 series

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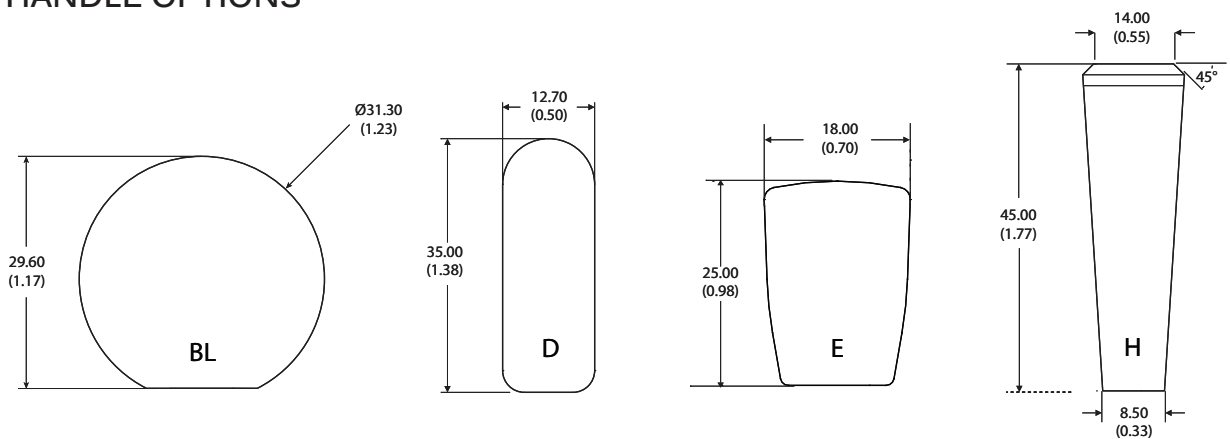
## OPEN BODY



## CLOSED BODY



## HANDLE OPTIONS



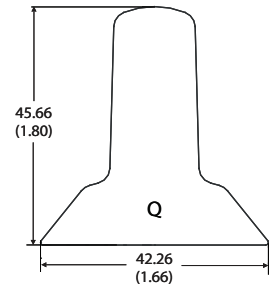
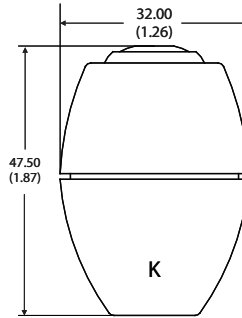
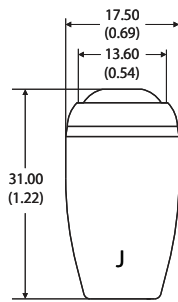
MATERIAL	Nylon	Aluminum	Nylon	Stainless Steel
FINISH	Sparked Matt	Anodised	Sparked Matt	Natural
STANDARD COLOR	Black	Black	Black	Stainless Steel
NOTES				

# 4000 series

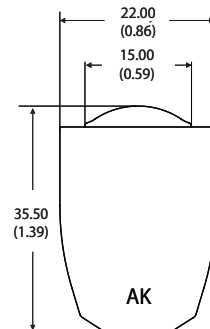
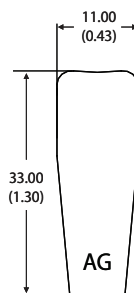
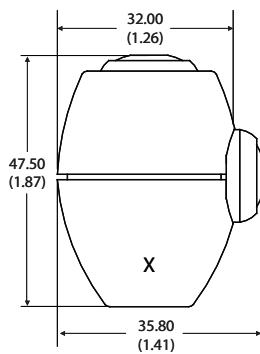
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## HANDLE OPTIONS (CONTINUED)



MATERIAL	ABS	ABS	Nylon
FINISH	Sparked Matt	Sparked Matt	Sparked Matt
STANDARD COLOR	Black	Black	Black
NOTES	Uses APEM IS Switches	Uses APEM IS Switches	



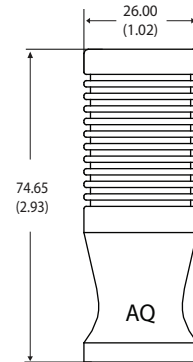
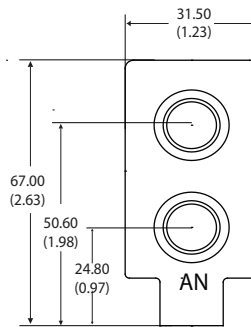
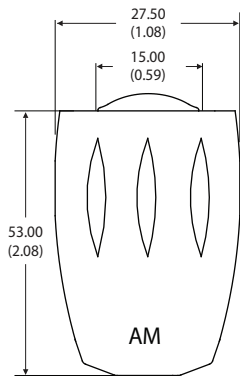
MATERIAL	ABS	Stainless Steel	Aluminum
FINISH	Sparked Matt	Polished	Anodised
STANDARD COLOR	Black	Stainless	Black
NOTES	Uses APEM IS Switches		Uses APEM IA Switches

# 4000 series

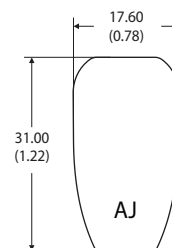
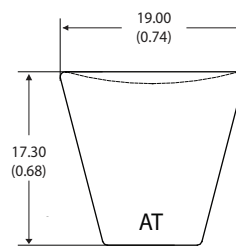
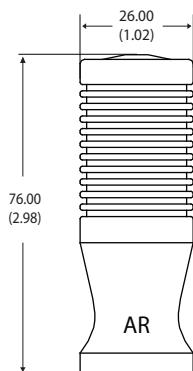
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## HANDLE OPTIONS (CONTINUED)



MATERIAL	Aluminium	Delrin	Aluminum
FINISH	Anodised	Gloss	Anodised
STANDARD COLOR	Black	Black	Black
NOTES	Uses APEM IA Switches	Uses APEM IS switches	



MATERIAL	Aluminum	Nylon	Stainless Steel
FINISH	Anodised	Sparked Matt	Polished
STANDARD COLOR	Black	Black	Stainless Steel
NOTES	Uses APEM IA Switches		

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## CONFIGURATION

### MECHANISM

Unlike most other products in its class the 4000 series employs an all-metal mechanism, providing the finest feel. It delivers consistent return to center performance over life, across a broad range of applications and operating environments.

The 4000 series is offered in two body styles; the more standard closed body type should be selected for those applications requiring standard single or dual axis functionality. The open frame variant may be specified for those applications requiring friction hold functionality, additional center detect microswitches or where the above the panel height must be kept to a minimum.

In case an open frame joystick is specified with a standard (5) boot, a bezel must be also used. Both body styles employ the same mechanism and therefore provide the same performance and feel.

### POTENTIOMETERS

The high-quality plastic film potentiometers employed as standard in the 4000 series have 340° tracks.

With a shaft deflection angle of 45° ( $\pm 22.5^\circ$ ) in the Y Axis, a typical 12 V supply would therefore result in a nominal deflection from 5.2V to 6.8V, operating about a nominal 6V centre.

The 4000 series is available with alternative potentiometers, including the option of the 5K-55° track variant, providing a wider voltage range for applications where this is desirable and additional amplification is not practical.

With a shaft deflection angle of 45° ( $\pm 22.5^\circ$ ) in the Y Axis, a typical 12 V supply would therefore result in a nominal deflection from 1.1V to 10.9V, operating about a nominal 6V centre.

The potentiometers on the 4000 series are designed for use as a variable potential divider rather than a two pin variable resistor. Noise generated by the contact resistance of the wiper to the track dictates that for optimum performance the output signals should be fed into a load of greater than 100 K.

Please note potentiometers used have a tolerance of  $\pm 10\%$ .

### PANEL CUT-OUT

Being a sub-panel mount joystick the panel cut-out may be used to limit the deflection of the joystick. The maximum allowable panel cut-out dimensions are shown on the following page. Where some handles may be larger than the specified panel cut-out please refer to the APEM sales team. Subsequently the joystick may be supplied without the handle fitted, or with an additional mounting plate.

### SPRINGING

As standard 4000 series are offered sprung to center. The standard spring force requires 1.3N (nominally) to off-center the joystick. The 4000 series may be specified with a lighter spring (1N), or a stronger spring (1.6N). N.B. Forces quoted are subject to exact joystick configuration and are provided as a guide only. The 4000 series also offers a friction hold configuration, whereby the handle will remain in the position it is left when no operator is present. The amount of friction may be varied prior to installation by adjusting the torque setting of the friction clutches.

### SEALING

As standard, the 4000 series is sealed to IP65 above the panel. This may be subject to exact configuration selected. Some configurations will yield an IP67 seal. Please refer to APEM for details of your chosen mounting, handle and boot options and for guidance as to the best level of panel seal achievable.