

# APEM

## 4000 series

Industrial resistive joysticks

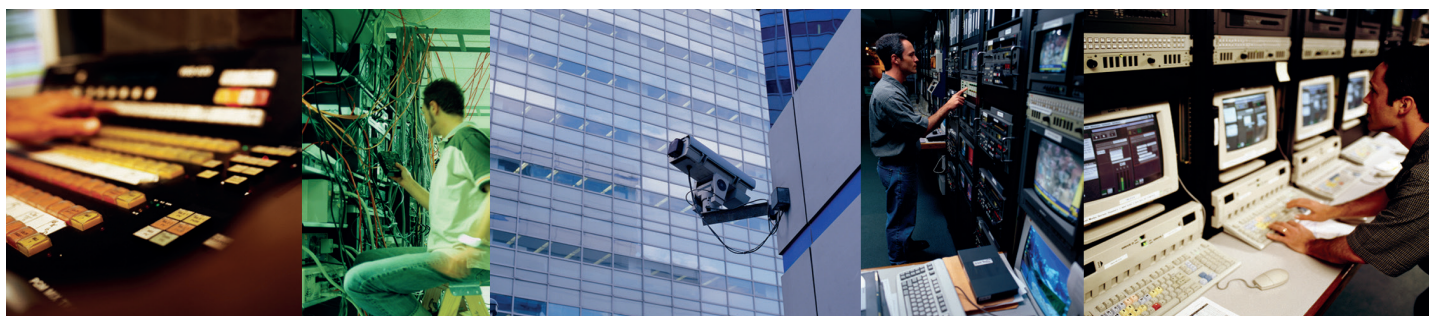


The 4000 Series is a range of robust, industrial quality potentiometer joysticks for internal and external applications. All 4000 Series share the same, all metal mechanism to provide the finest performance and service life over a wide range of temperatures and loads. All 4000 Series employ high quality plastic film potentiometers, yielding a service life of many millions of cycles.



### KEY FEATURES

- ☐ Two standard mounting options
- ☐ Low current drain
- ☐ Variety of potentiometer options
- ☐ Robust
- ☐ All metal mechanism
- ☐ IP65 above panel
- ☐ Inherently immune to RFI
- ☐ Optional centre-detect micro-switching
- ☐ Available in two body variants



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### OPTION SELECTION

| SERIES             | AXES                                                | -2-                                                              | -1-                                                                                | BEZEL                                 | MODIFIER                                                                       |
|--------------------|-----------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------|--------------------------------------------------------------------------------|
| 4 4000             | 1 One<br>2 Two<br>3 Three                           |                                                                  |                                                                                    | 0 None<br>3 Square<br>5 Circular      | 00 None<br>06 4 Microswitches <sup>1</sup><br>113 2 Microswitches <sup>1</sup> |
|                    |                                                     |                                                                  |                                                                                    |                                       |                                                                                |
| BODY               | POTS                                                | SPRING                                                           | HANDLE                                                                             | BOOT                                  |                                                                                |
| R Closed<br>P Open | 1 10K 340°<br>5 5K 340°<br>8 5K 55°<br>9 5K 55° +CT | F Friction Hold <sup>1</sup><br>H Strong<br>S Standard<br>W Weak | E Conical<br>Q Skirted<br>R Third Axis<br><br>* for more handles<br>see next pages | 1 Internal <sup>1</sup><br>5 Standard |                                                                                |

Note:

1 Only available on 4P types

### CABLE SPECIFICATIONS

|                                                                                                                   |                           |
|-------------------------------------------------------------------------------------------------------------------|---------------------------|
| 14/0.12 - Fourteen strands of 0.12mm diameter tinned annealed copper wire PVC insulated, to a nominal OD of 1mm   |                           |
| Red : +Vcc for X & Y Axes                                                                                         | Black : 0V for X & Y Axes |
| Blue : X Axis Wiper                                                                                               | Yellow : Y Axis Wiper     |
| Green : Center Tap                                                                                                |                           |
| 7/0.127 - Seven strands of 0.127mm diameter tinned copper wire ETFE insulated, to a nominal OD of 0.7mm           |                           |
| Orange : Pushbutton                                                                                               |                           |
| Red : +Vcc for Z Axis                                                                                             | Blue : 0V for Z Axis      |
| Green : Z Axis Wiper                                                                                              |                           |
| All 4000 Series are supplied with 150mm of twisted cable harness, with tinned ends.                               |                           |
| Connectors fitted upon request.                                                                                   |                           |
| If supplied, microswitches are rated for up to 5A and are not wired, allowing the user flexibility of connection. |                           |

### TECHNICAL SPECIFICATION

|                                                   |                                                      |
|---------------------------------------------------|------------------------------------------------------|
| Life Cycles : >5 Million Operations               | Lever Travel : +/-27.50 Degrees                      |
| Lever Material : Stainless Steel                  | Body Material : Glass Filled ABS or Steel            |
| Handle Material : See guide                       | Boot Material : Neoprene or Santoprene               |
| Pivot Blocks : HE30 Alloy                         | Other Materials : Brass                              |
| Temperature Range : -20°C to +55°C                | Resistance Tolerance : +/-20%                        |
| Linearity : +/-2%                                 | Output Smoothness : 0.1% max                         |
| Power Rating : 1W at 70°C - Derate to 0W at 125°C | Insulation Resistance : 1000MOhms, 500VDC            |
| Preferred Load : >100K                            | Potentiometer Alignment : To Center of Track (+/-1%) |
| Weight : 110 Grams                                | Above Panel Seal : IP65 (subject to handle)          |

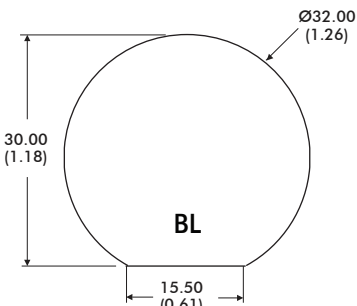
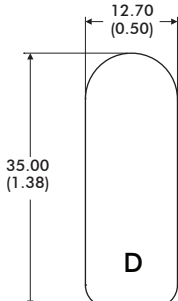
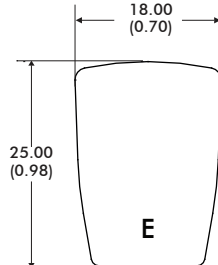
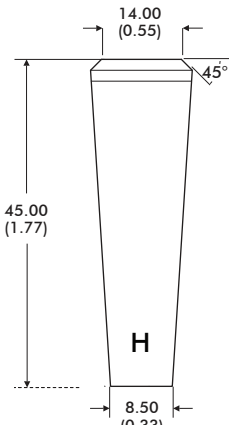
#### NOTES:

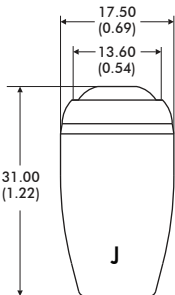
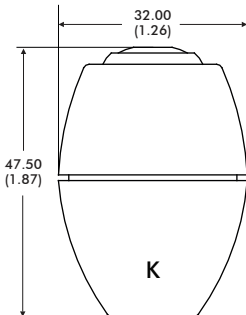
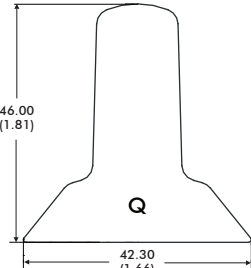
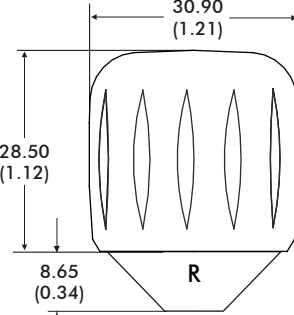
- All values are nominal
- All specifications shown are based on a standard configuration and are provided for guidance only.
- Please refer to Apem for assistance on how to achieve the best performance from your chosen configuration.

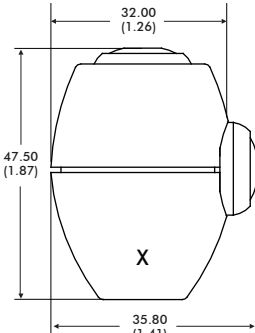
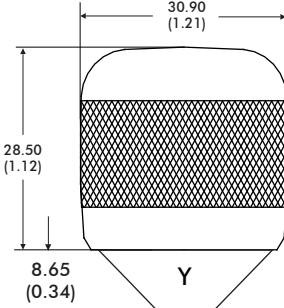
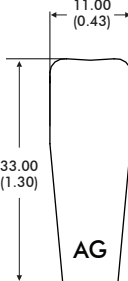
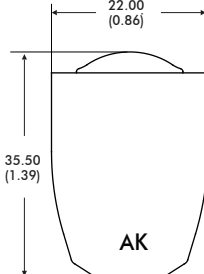
# 4000 series

## Industrial resistive joysticks

### DIMENSIONAL DRAWINGS - HANDLES

|                                                                                                    |                                                                                                   |                                                                                                    |                                                                                                     |                                                                |
|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
|  <p><b>BL</b></p> |  <p><b>D</b></p> |  <p><b>E</b></p> |  <p><b>H</b></p> |                                                                |
| <b>MATERIAL</b><br><b>FINISH</b><br><b>STANDARD COLOR</b><br><b>OTHER COLORS</b><br><b>NOTES:</b>  | Nylon<br>Sparked Matt<br>Black<br>Not Available                                                   | Aluminium<br>Anodised<br>Black<br>Not Available                                                    | Nylon<br>Sparked Matt<br>Black<br>Upon Request                                                      | Stainless Steel<br>Natural<br>Stainless Steel<br>Not Available |

|                                                                                                    |                                                                                                    |                                                                                                     |                                                                                                      |                                                                        |
|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
|  <p><b>J</b></p> |  <p><b>K</b></p> |  <p><b>Q</b></p> |  <p><b>R</b></p> |                                                                        |
| <b>MATERIAL</b><br><b>FINISH</b><br><b>STANDARD COLOR</b><br><b>OTHER COLORS</b><br><b>NOTES:</b>  | ABS<br>Sparked Matt<br>Black<br>Upon Request<br>Uses APEM IS Switch                                | ABS<br>Sparked Matt<br>Black<br>Not Available<br>Uses APEM IS Switch                                | Nylon<br>Sparked Matt<br>Black<br>Not Available                                                      | Aluminium<br>Anodised<br>Black<br>Not Available<br>Third Axis function |

|                                                                                                     |                                                                                                     |                                                                                                       |                                                                                                        |                                                                        |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
|  <p><b>X</b></p> |  <p><b>Y</b></p> |  <p><b>AG</b></p> |  <p><b>AK</b></p> |                                                                        |
| <b>MATERIAL</b><br><b>FINISH</b><br><b>STANDARD COLOR</b><br><b>OTHER COLORS</b><br><b>NOTES:</b>   | ABS<br>Sparked Matt<br>Black<br>Upon Request<br>Uses APEM IS Switches                               | Aluminium<br>Anodised<br>Black<br>Not Available<br>Third Axis function                                | Stainless Steel<br>Polished<br>Stainless<br>Not Available                                              | Aluminium<br>Anodised<br>Black<br>Not Available<br>Uses APEM IA Switch |

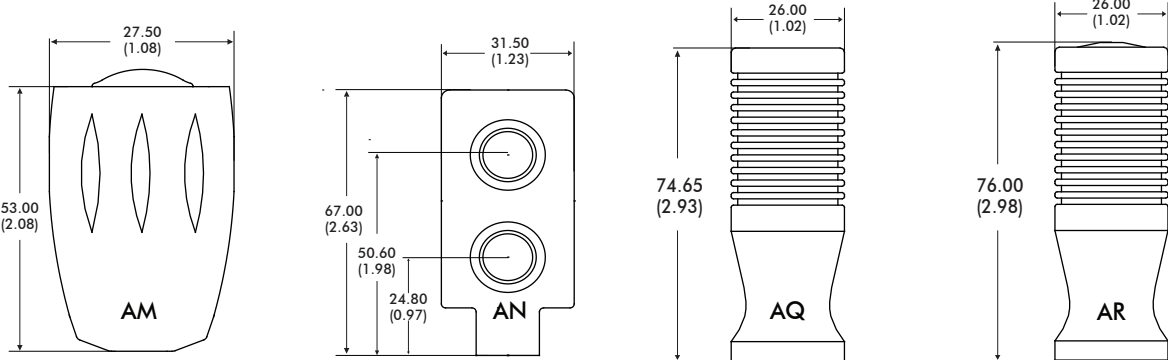
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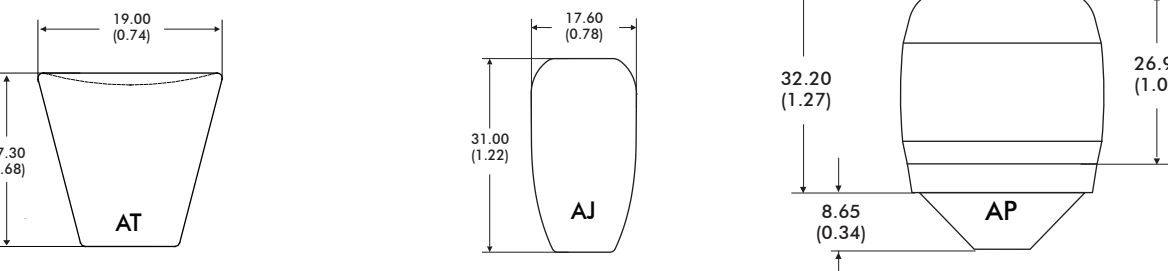
Note: The company reserves the right to change specifications without notice.

# 4000 series

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### DIMENSIONAL DRAWINGS - HANDLES - continued

|                                                                                    |                     |                     |               |                     |
|------------------------------------------------------------------------------------|---------------------|---------------------|---------------|---------------------|
|  |                     |                     |               |                     |
| MATERIAL                                                                           | Aluminium           | Delrin              | Aluminium     | Aluminium           |
| FINISH                                                                             | Anodised            | Gloss               | Anodised      | Anodised            |
| STANDARD COLOR                                                                     | Black               | Black               | Black         | Black               |
| OTHER COLORS                                                                       | Upon Request        | Not Available       | Not Available | Not Available       |
| NOTES:                                                                             | Uses APEM IA switch | Uses APEM IS switch |               | Uses Apem IA Switch |

|                                                                                      |              |                 |                       |
|--------------------------------------------------------------------------------------|--------------|-----------------|-----------------------|
|  |              |                 |                       |
| MATERIAL                                                                             | Nylon        | Stainless Steel | Santoprene over Nylon |
| FINISH                                                                               | Sparked Matt | Polished        | Soft Touch            |
| STANDARD COLOR                                                                       | Black        | Stainless Steel | Black                 |
| OTHER COLORS                                                                         | Upon Request | Not Available   | Upon Request          |
| NOTES:                                                                               |              |                 | Z Axis functionality  |

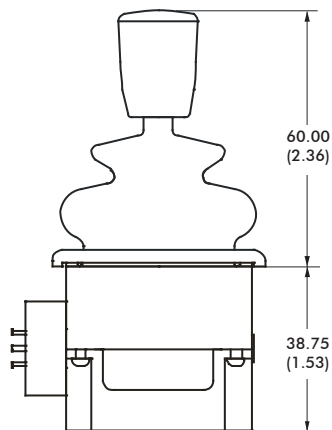
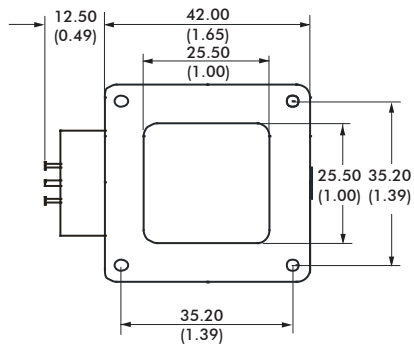
1. Dimensions are in mm/(inch)

# 4000 series

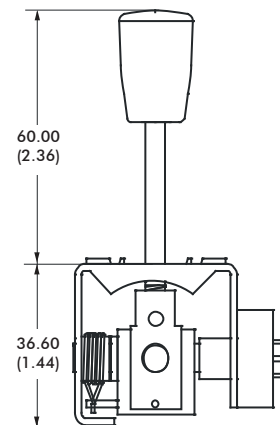
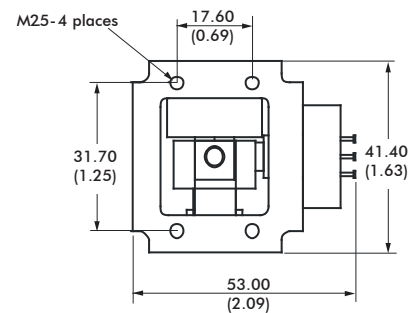
Industrial resistive joysticks

DIMENSIONAL DRAWINGS - continued

## CLOSED BODY

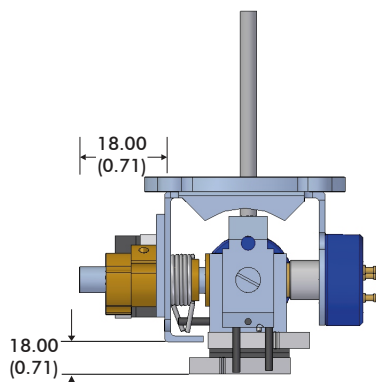


## OPEN BODY

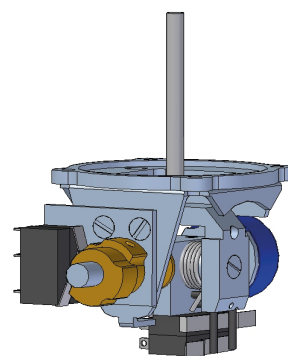


**NOTE:** The dimensions shown are for a generic two axes 4000 Series open body with the E type handle, and a generic two axes 4000 Series closed body also with the two axes E type handle. For specific dimensions of this or any other configuration please refer to Apem.

## MICROSWITCHES



## MICROSWITCHES



**NOTE:**

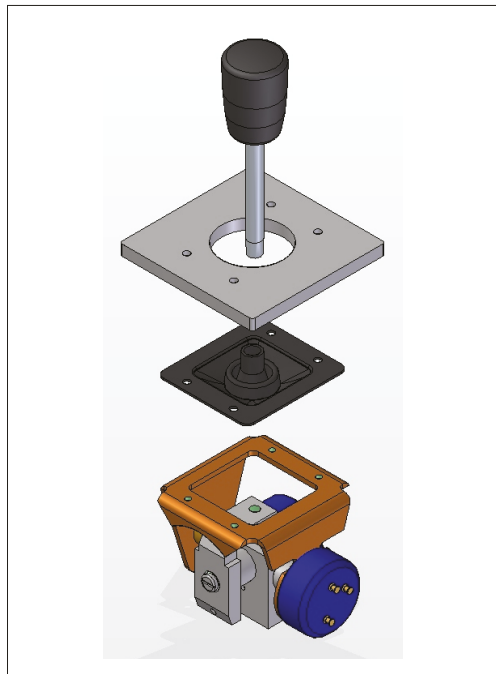
1. Dimensions are in mm/(inch)

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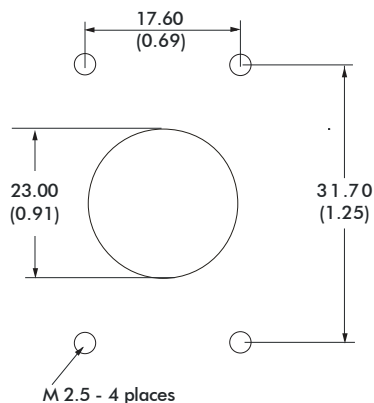
## Industrial resistive joysticks

### MOUNTING INSTALLATION

#### OPEN FRAME - PANEL CUT-OUT AND MOUNTING INSTALLATION

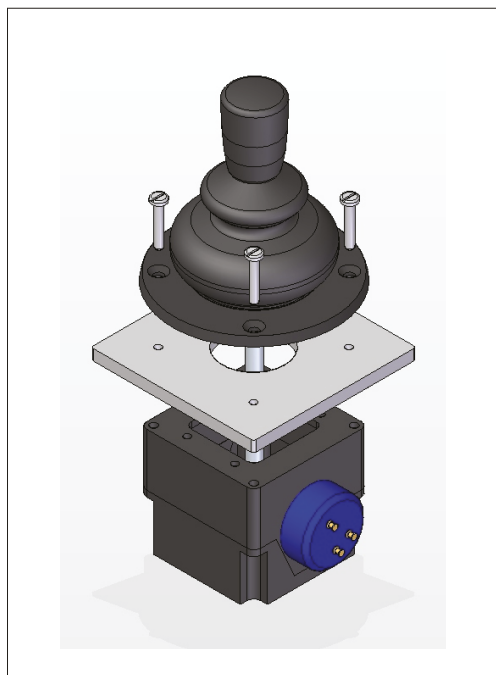


##### MOUNTING CUT-OUT

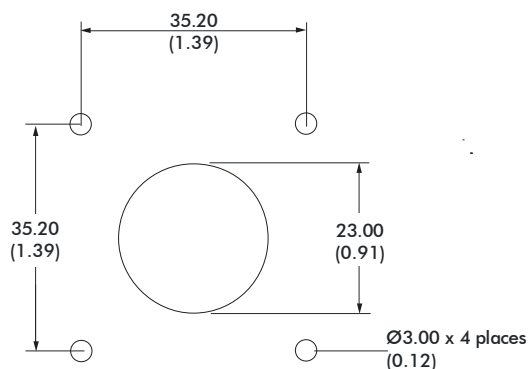


The joystick mounts from beneath the panel and the boot is trapped between the joystick and the panel. No bezel is necessary for this installation, since the panel acts as the bezel. The frame has M2.5 tapped holes and as such M2.5 machine screws are recommended for this mounting.

#### CLOSED FRAME - PANEL CUT-OUT AND MOUNTING INSTALLATION



##### MOUNTING CUT-OUT



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.

NOTES: Dimensions are in mm/(inch)

During the mounting process, great care should be taken not to damage the boot. All panel cut-outs should be free from sharp edges and swarf that may damage the boot.

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### CONFIGURATION OPTIONS

#### 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 axes functionality. The open frame variant may be specified for those applications requiring friction hold functionality, additional centre detect microswitches or where the above the panel height must be kept to a minimum. 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 55° (+/-27.5°), a typical 12V supply would therefore result in a full-scale nominal deflection from 5V to 7V, operating about a nominal 6V center. The 4000 Series is available with alternative potentiometers, including the option of the 5K-55° track variant, providing rail-to-rail signal swings for applications where these are necessary and additional amplification is not practical. 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 100K. Potentiometer option 9 is to special order only, and may be subject to longer than standard lead times.

#### PANEL CUTOUT

Being a sub-panel mount joystick the panel cut-out may be used to limit the deflection of the joystick. The maximum allowable panel cutout 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.