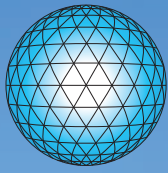


# CH Products

Industrial joysticks



an **APEM** Group Company



**CH**  
Products



## INDUSTRY LEADER

CH Products is a leading manufacturer of industrial joysticks and hall effect control devices including fingertip joysticks, industrial trackballs and handgrip controllers. Joysticks from CH Products are used around the globe in many applications including: camera controls, medical instrumentation, agricultural vehicles, mining machinery, military robots, industrial automation, electric wheelchairs, and material handling equipment.

### Manufacturing Excellence

CH Products' joysticks are produced in a vertically integrated operation with injection molding, screw machining and final assembly performed in over 100,000 square feet of manufacturing space in two facilities: in Vista, California and in Winchester, England in the UK.

### Design Innovation

CH Products is a pioneer in the joystick industry and one of the first manufacturers to incorporate Hall effect sensing into motion control devices. Our American and European design teams use state of the art design tools to develop innovative products for demanding applications. Our electrical, mechanical and industrial engineers use advanced software programs including: Solid Works 3D modeling, AUTOCAD, Mastercam, Cadence OrCAD and Moldflow, all designed to help produce reliable and cost effective products that will meet stringent design requirements.

### Product Reliability

Product quality is a constant commitment at CH Products. From design concept through production build, every detail of a product is analyzed to ensure that customers' expectations are met. Both facilities have quality systems certified to ISO9001:2008 and a strong commitment to continuous improvement.



CH Products is a member of the APEM Group. APEM is a global manufacturer of human-machine interface products with 13 manufacturing facilities on 4 continents. APEM was a pioneer in the design of electro-mechanical switches and has been manufacturing switches and switch panel products since 1952.

## CUSTOM ENGINEERED SOLUTIONS

This catalog contains over 100,000 possible combinations of joystick products suitable for many applications. We also offer full design services to help produce a joystick product to your unique specifications.

Whether your requirements call for a custom design or a joystick modified for your application, our technical staff will work with you to fit a device to your particular needs. Customization features offered: cables, connectors, unique packaging, pushbutton switches, proportional thumbwheels, rocker switches, proximity sensors, custom colors, special marking, and custom handles.

Contact the factory for assistance.



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## FINGER OPERATED JOYSTICKS



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# Contents

## HAND OPERATED JOYSTICKS



### MULTI-AXES HALL EFFECT JOYSTICKS

		Print	Web
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### SINGLE AXIS THROTTLE JOYSTICKS

TH Series	Single axis throttle joysticks	135	137
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The M Series miniature joystick is a low profile potentiometric controller providing precision multi-axes finger-positioning control. Available with up to three axes and two pushbuttons, the M Series joystick is ideal for applications requiring a compact low operating force controller. Featuring 17 ergonomically designed handles, typical applications include CCTV, robotics, electric wheelchairs, and measurement systems. The M Series is the de facto standard industrial joystick for the CCTV professional.



## KEY FEATURES

- World's #1 selling joystick for CCTV applications
- Potentiometric sensing
- One, two or three axes
- Low profile design with 17 handle options



# M series

## Miniature resistive joysticks

### OPTION SELECTION



**SERIES**

**MOUNTING BEZEL**  
**C** Split Bezel  
**F** Square Bezel  
**L** Rubber Boot Kit

**MODEL**

1	2 Axes
2	2 Axes with Pushbuttons
3	3 Axes
4	3 Axes with Pushbuttons

**CENTERING**

0	Spring Centering
6	Torque Set (Friction)

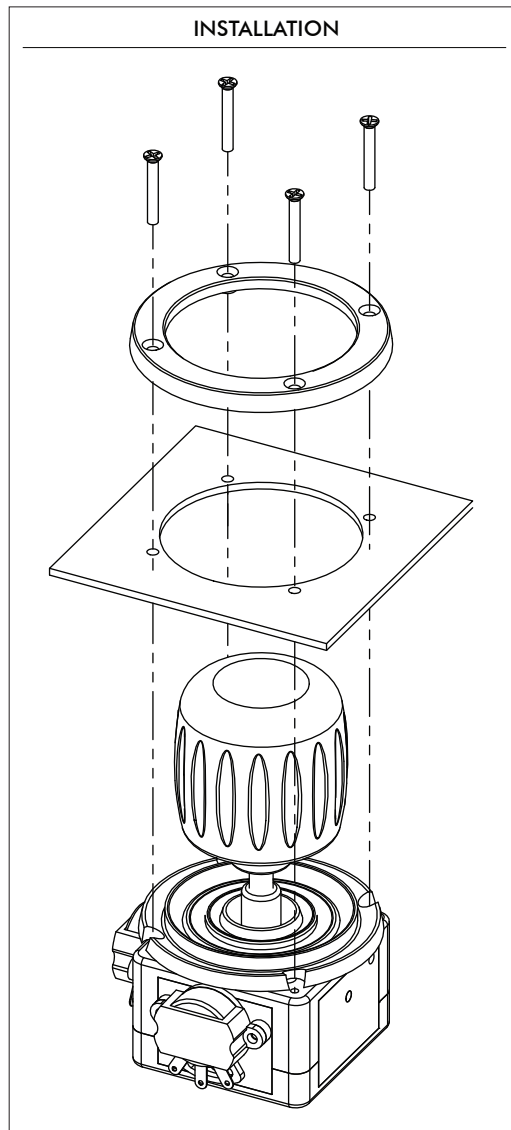
**HANDLE**

0	Tapered Convex
1	Concave Tip
2	Flat Tipped
3	Concave Tip - Long
5	Pushbutton
6	Straight Tip - Short
8	3 Axes
9	3 Axes with Pushbutton
A	Straight Tip - Mid
B	Straight Tip - Long
C	Ball Tip
E	Pushbutton
G	Pushbutton
H	Pushbutton
M	3 Axes No Button
N	3 Axes with 1 Button
Q	3 Axes with 2 Buttons

**OUTPUT OPTIONS**

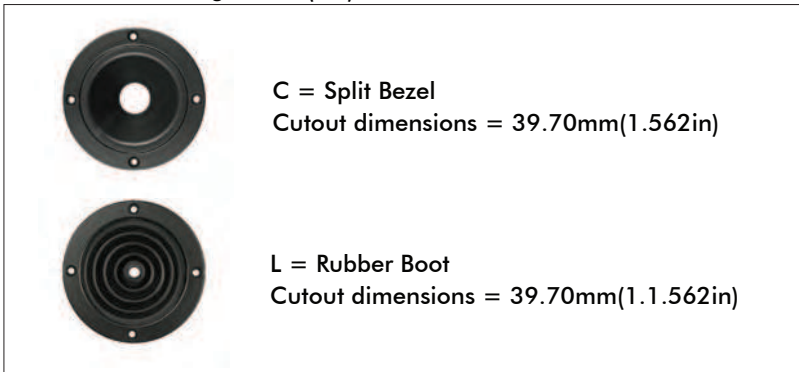
Potentiometers<sup>3</sup> :

P	5K $\Omega$ , 220°
M	5K $\Omega$ , 56°
R	5K $\Omega$ , 50°



### NOTES

1. Front Mounting Bezels (FM)



2. Rear mounting bezels (RM)



3. Potentiometer specifications are located on the next page.



Mounting accessories. Standard hardware includes:

- C = Ring, cup, and 4 black screws 2-56x1/2in
- L = Ring and 4 black screws 2-56x1/2in
- F = Square bezel, 4 screws 2-56x1/2in, and 4 screws 2-56x1/4in

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



# M series

## Miniature resistive joysticks

### SPECIFICATIONS

#### MECHANICAL (FOR X AND Y AXES)

Break Out Force	–	0.7N (0.16lbf)
Operating Force	–	1.3N (0.29lbf)
Maximum Applied Force	–	100N (22.48lbf)
Mechanical Angle of Movement	–	56°
Expected Life	–	See potentiometer options
Mass/weight	–	Varies
Package Size (mm) (L x W x H) or (Dia x H)	–	Varies
Lever Action (Centering)	–	Spring or Friction

#### MECHANICAL (FOR Z AXIS)

Break Out Torque	–	0.022N·m (0.19lbf·in)
Operating Torque	–	0.040N·m (0.35lbf·in)
Maximum Allowable Torque	–	0.049N·m (0.43lbf·in)
Mechanical Angle	–	90°
Handle Action	–	Spring

#### ENVIRONMENTAL

Operating Temperature	–	-25°C to 70°C (-13°F to 158°F)
Storage Temperature	–	-40°C to 70°C (-40°F to 158°F)

#### POTENTIOMETER OPTIONS

Potentiometer	P	M	R
Electrical Element	Conductive Plastic	Conductive Plastic	Conductive Plastic
Track Resistance	5K	5K	5K
Linearity	±1.0%	±5.0%	±1.0%
Track Operating Angle	220°	56°	50°
CRV	±1.5%	±1.5%	±1.0%
Power Dissipation	0.25W @ 40°C	0.5W @ 70°C	1W
Rotational Life	1,000,000	1,000,000	10,000,000

#### CENTERING OPTIONS

- **SPRING CENTERING**  
The joystick returns to center when the handle is released.
- **TORQUE SET**  
Torque set provides absolute positioning with uniform friction applied to "X" and "Y" axes.

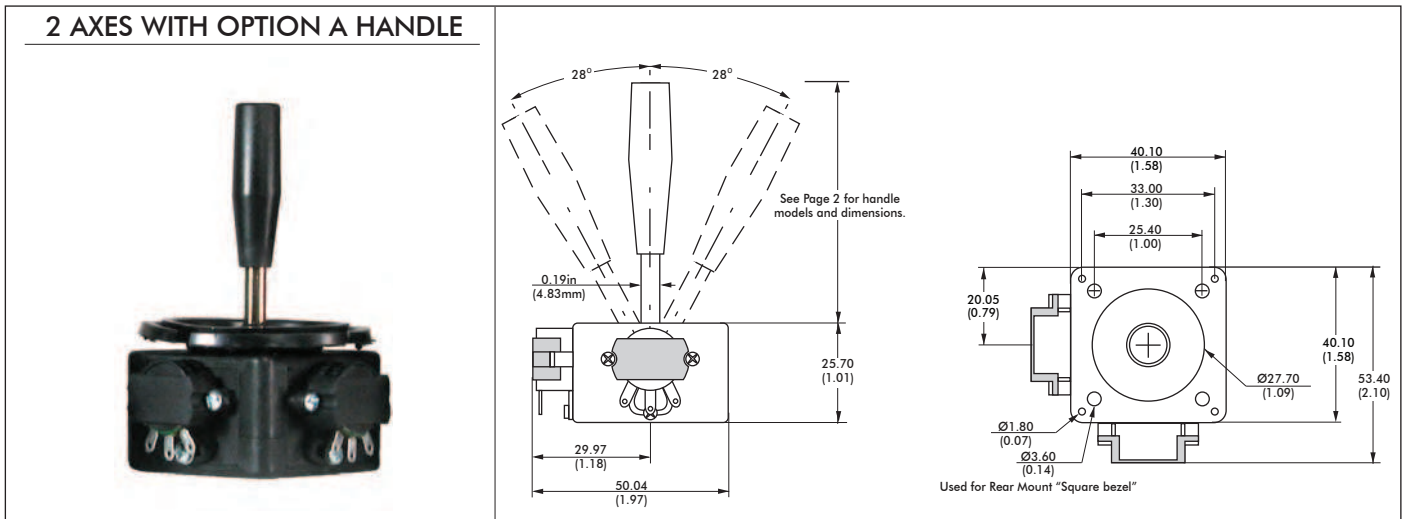
#### NOTES:

- All values are nominal
- Specifications are subject to the joystick configuration. Contact Technical Support for the performance of your specific configuration
- The M Series is intended for internal applications

# M series

## Miniature resistive joysticks

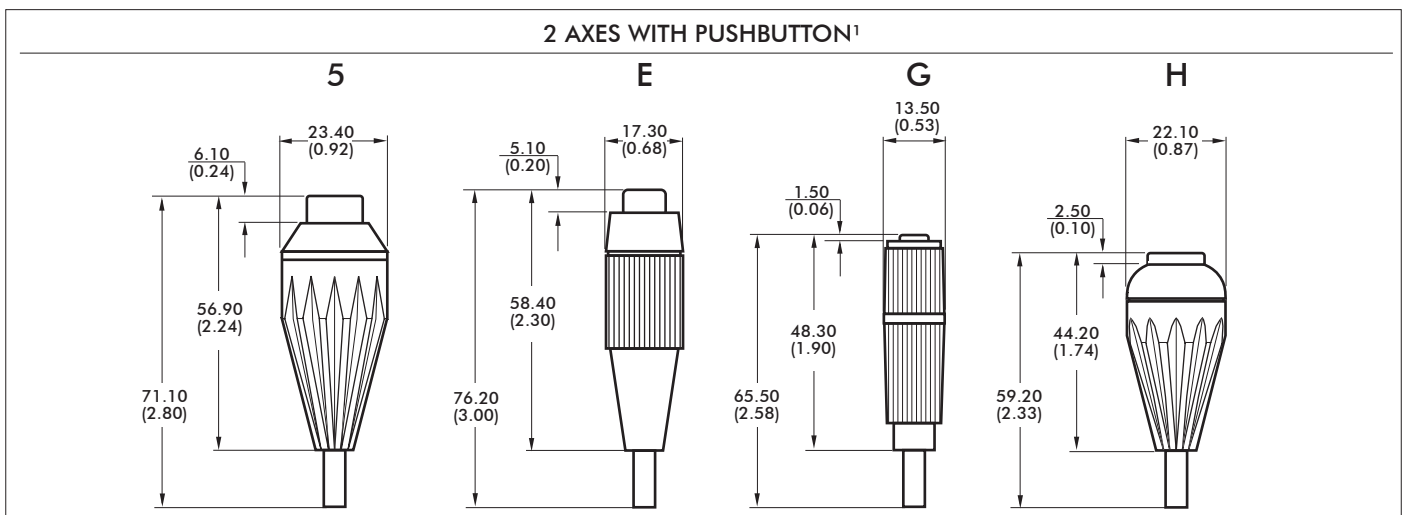
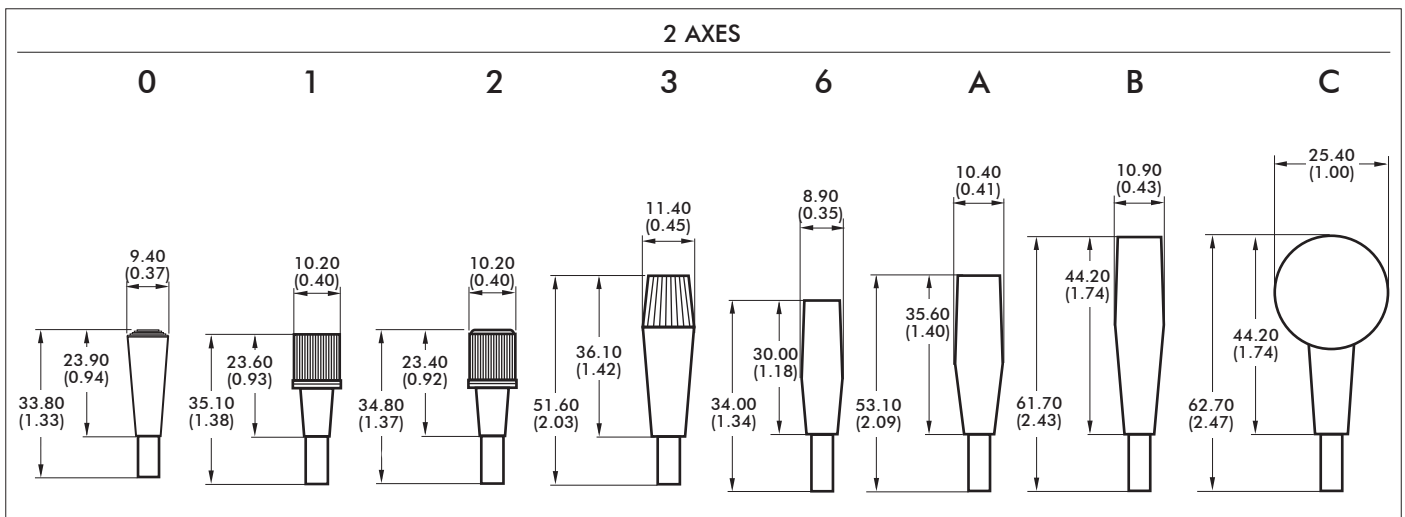
### DIMENSIONAL DRAWINGS



**NOTES:**

1. Mechanical dimensions represent a joystick with the largest potentiometer option.
2. Potentiometer size will vary according to selected option.

### HANDLES



**NOTES:**

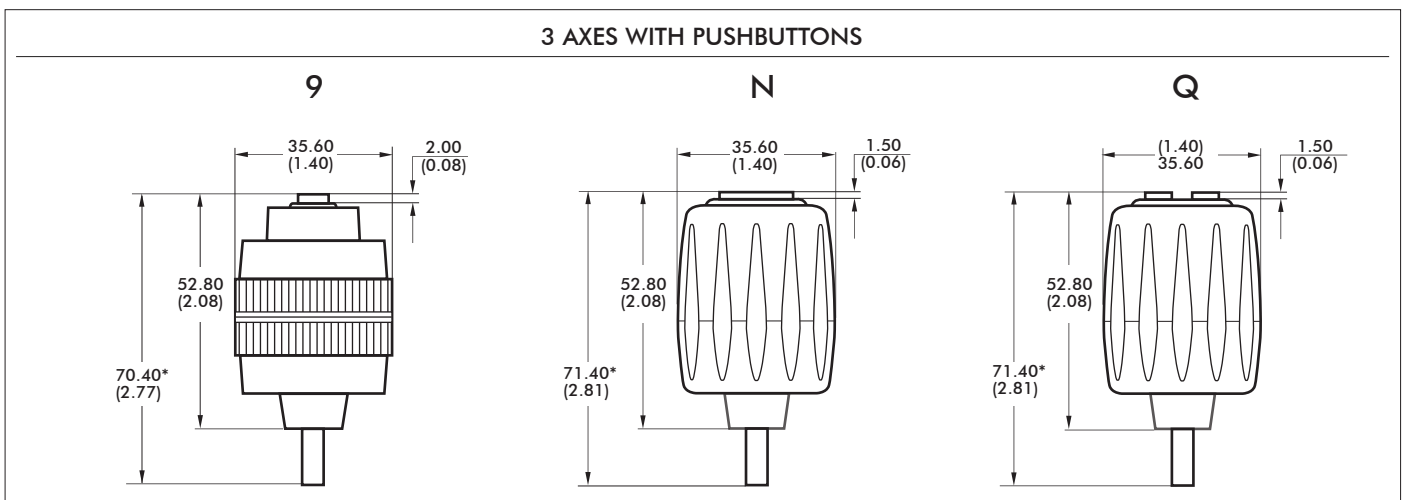
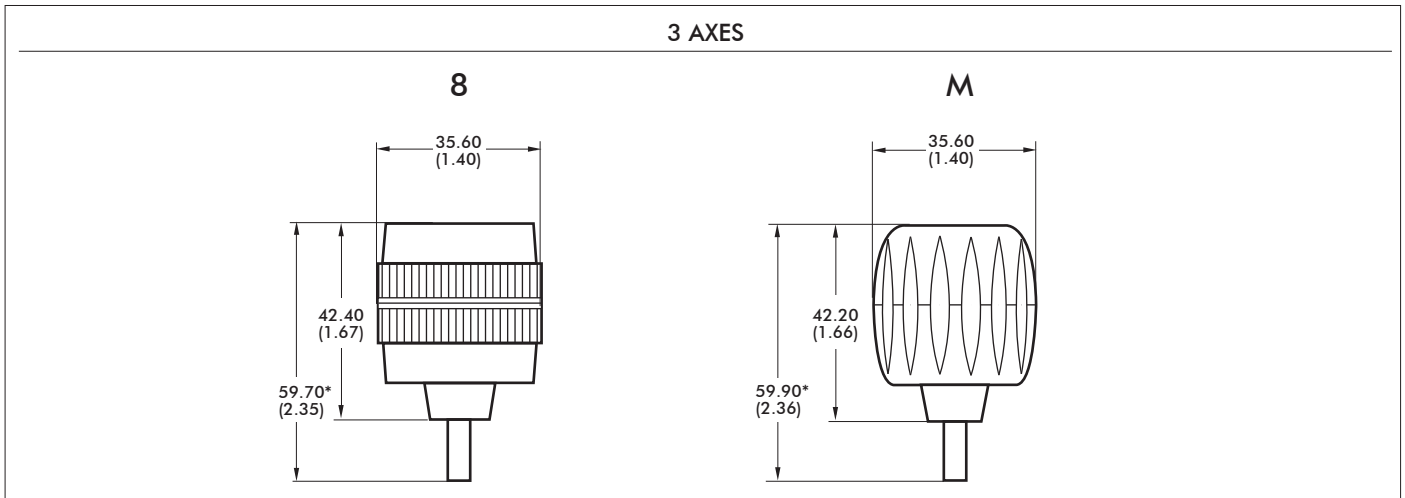
1. Pushbuttons are not sealed. Joysticks are intended for internal applications only.

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

# M series

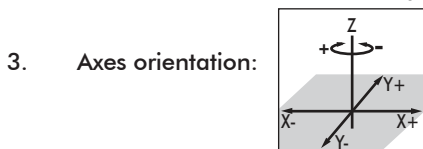
## Miniature resistive joysticks

### DIMENSIONAL DRAWINGS - continued



**NOTES:**

1. Dimensions are in mm/(inch)
2. Pushbuttons are not sealed. Joysticks are intended for internal applications only.

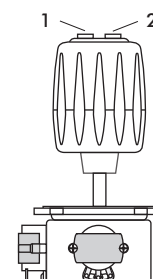


4. Wiring information: -Cables are provided for pushbuttons and the Z axis.  
-Cables are not supplied for the potentiometers (axes X and Y).

DEFAULT WIRE COLOR CODE*		
COLOR	FUNCTION	AWG
<b>2 OR 3 AXES JOYSTICK WITH 1 PUSHBUTTON - OPTIONS 5,E,G,H,9,N</b>		
ORANGE	Switch 1	28
ORANGE	Switch Common	
<b>3 AXES JOYSTICK WITH 2 PUSHBUTTONS - Option Q**</b>		
ORANGE	Switch 1	28
BROWN	Switch 2	
GREEN	Switch Common	
<b>Z AXIS IN A 3 AXES JOYSTICK - OPTIONS 8,9,M,N,Q</b>		
RED	Supply	28
WHITE	Signal	
BLUE	Return	

**NOTES:**

- \* Wires for the Z axis and for the pushbuttons are 292mm (11.5in) and stripped.
- \*\* Handle "Q" pushbuttons are shown in the following drawing:





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

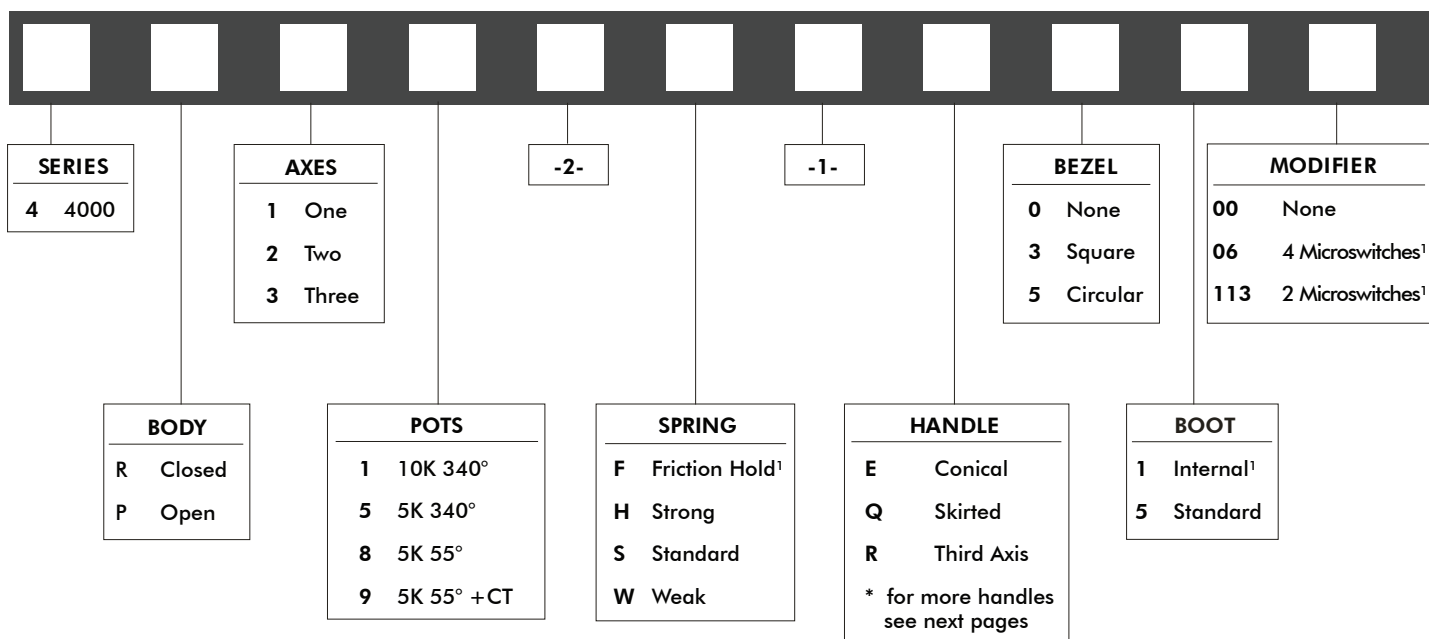
- Two standard mounting options
- Low current drain
- Variety of potentiometer options
- Robust
- All metal mechanism
- IP65 above panel
- Inherently immune to RFI
- Optional centre-detect micro-switching
- Available in two body variants



# 4000 series

## Industrial resistive joysticks

### OPTION SELECTION



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:

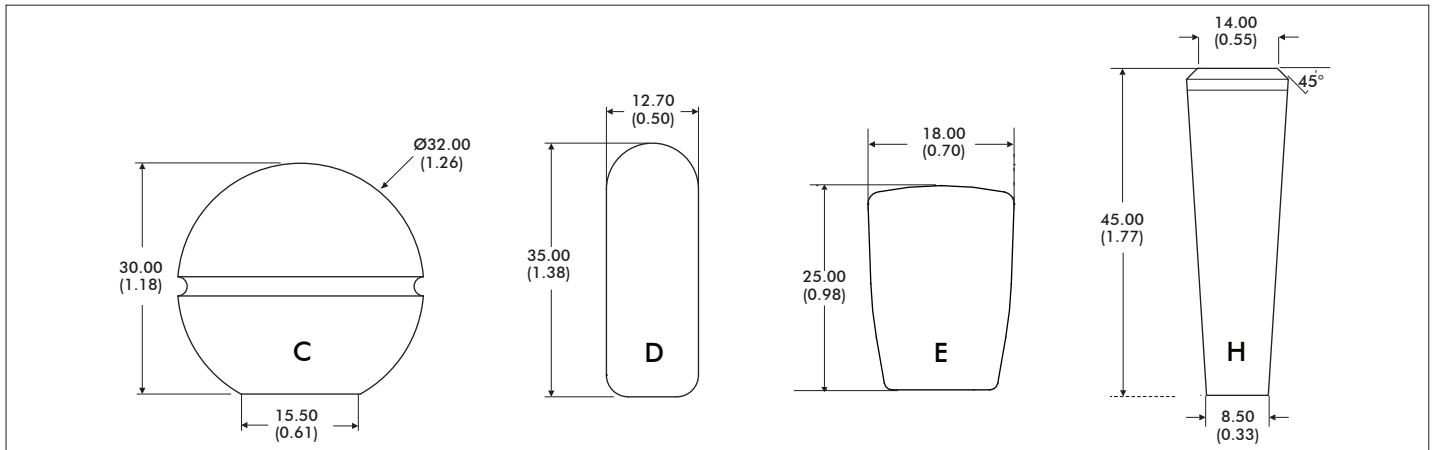
- All values are nominal
- All specifications shown are based on a standard configuration and are provided for guidance only.
- Please refer to Apem for assistance on how to achieve the best performance from your chosen configuration.

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

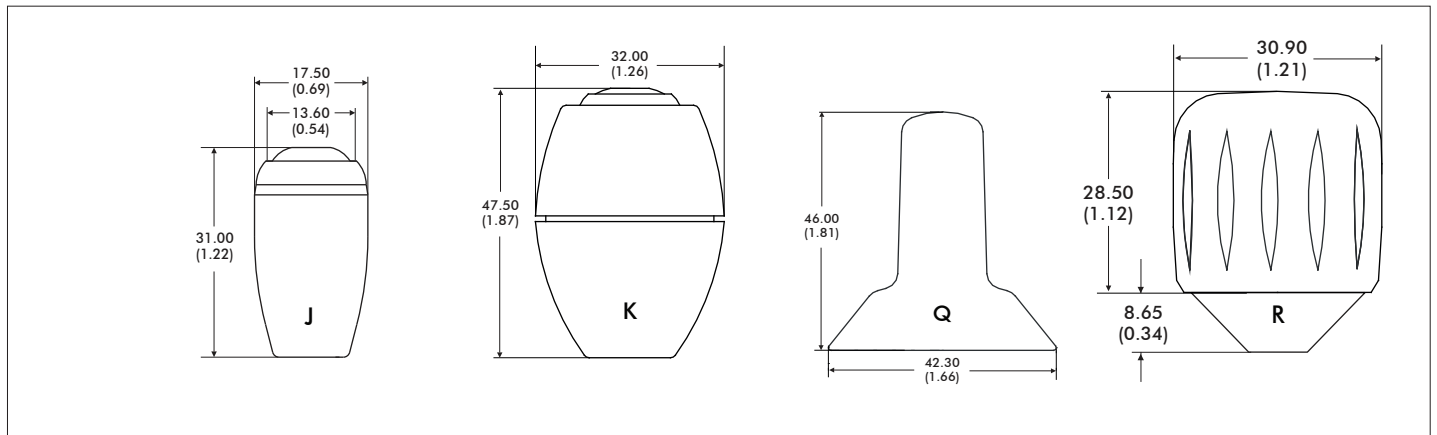
# 4000 series

## Industrial resistive joysticks

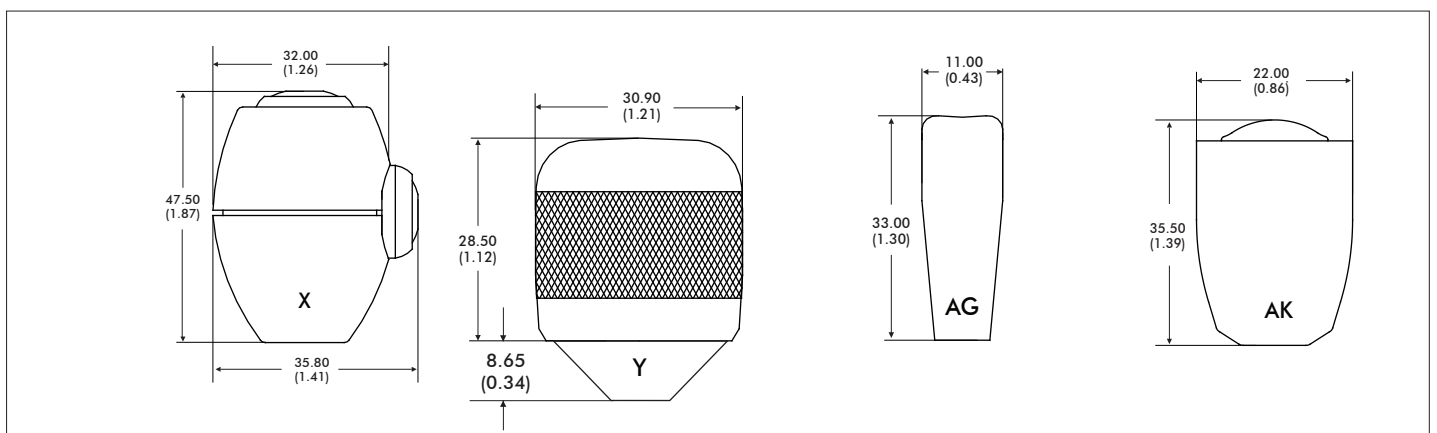
### DIMENSIONAL DRAWINGS - HANDLES



MATERIAL	Phenolic	Aluminium	Nylon	Stainless Steel
FINISH	Gloss	Anodised	Sparked Matt	Natural
STANDARD COLOR	Black	Black	Black	Stainless Steel
OTHER COLORS	Not Available	Not Available	Upon Request	Not Available
NOTES:				



MATERIAL	ABS	ABS	Nylon	Aluminium
FINISH	Sparked Matt	Sparked Matt	Sparked Matt	Anodised
STANDARD COLOR	Black	Black	Black	Black
OTHER COLORS	Upon Request	Not Available	Not Available	Not Available
NOTES:	Uses APEM IS Switch	Uses APEM IS Switch		Third Axis function



MATERIAL	ABS	Aluminium	Stainless Steel	Aluminium
FINISH	Sparked Matt	Anodised	Polished	Anodised
STANDARD COLOR	Black	Black	Stainless	Black
OTHER COLORS	Upon Request	Not Available	Not Available	Not Available
NOTES:	Uses APEM IS Switches	Third Axis function		Uses APEM IA Switch

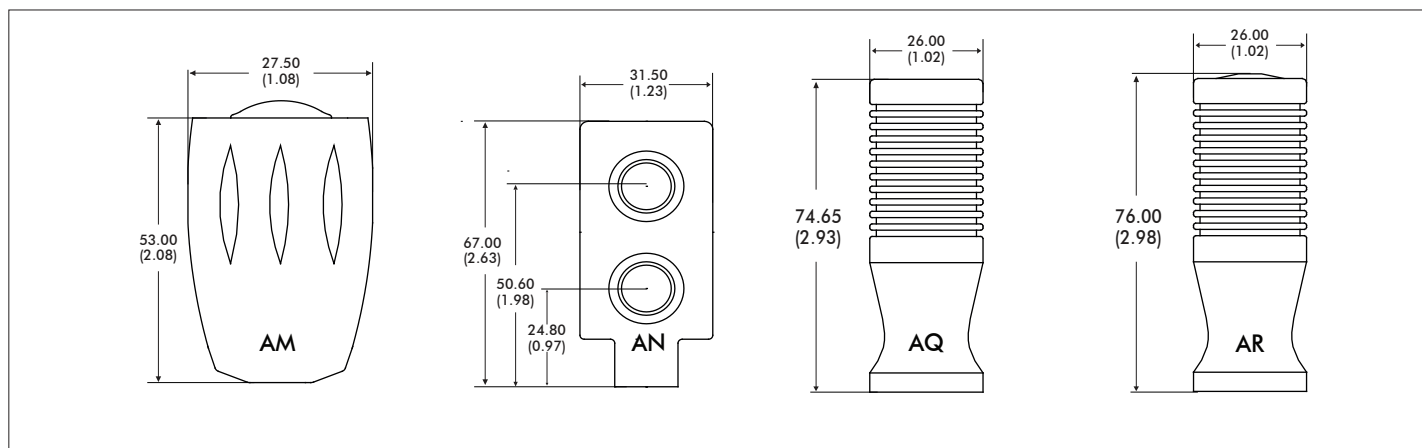
1. Dimensions are in mm/(inch)

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

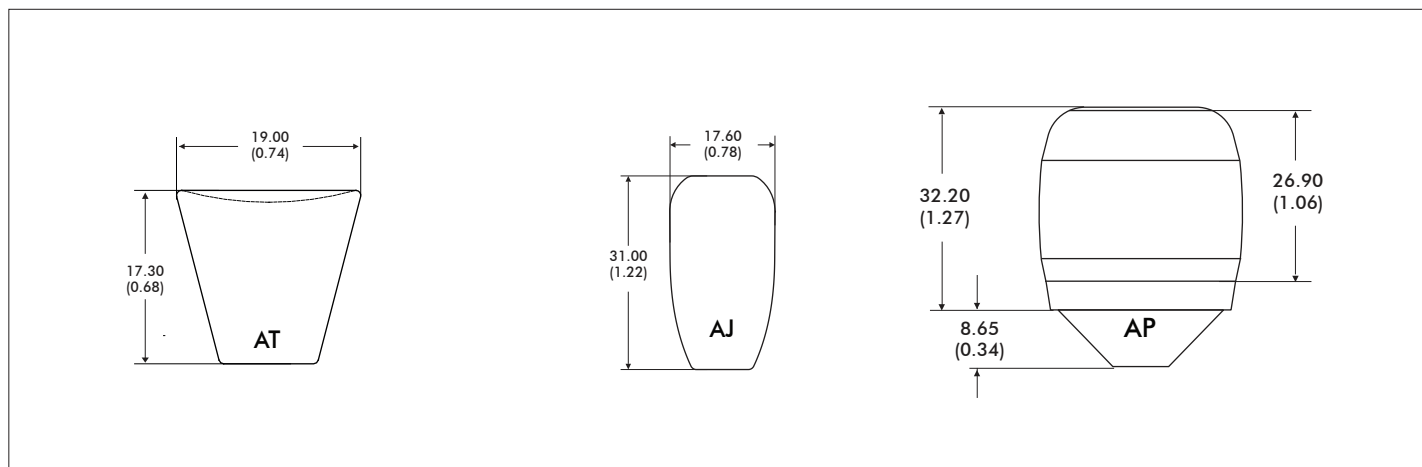
# 4000 series

## Industrial resistive joysticks

### 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

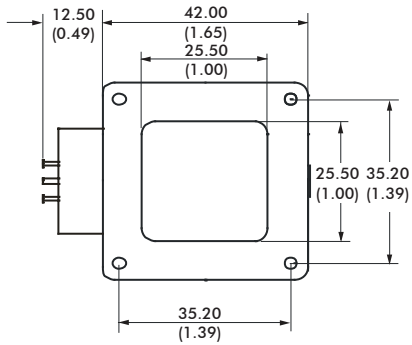
1. Dimensions are in mm/(inch)

# 4000 series

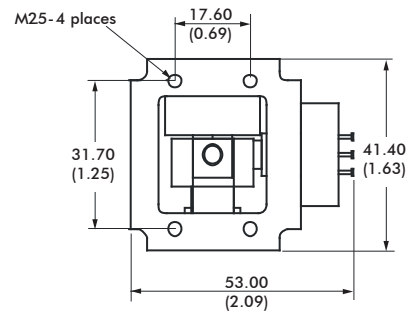
Industrial resistive joysticks

DIMENSIONAL DRAWINGS - continued

## CLOSED BODY

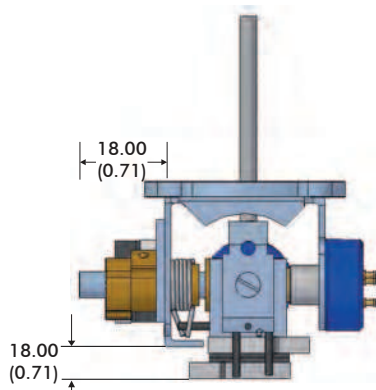


## OPEN BODY

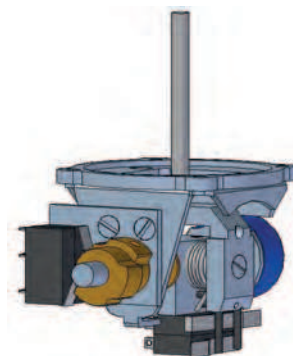


**NOTE:** The dimensions shown are for a generic two axes 4000 Series open body with the E type handle, and a generic two axes 4000 Series closed body also with the two axes E type handle. For specific dimensions of this or any other configuration please refer to Apem.

## MICROSWITCHES



## MICROSWITCHES



**NOTE:**

1. Dimensions are in mm/(inch)

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

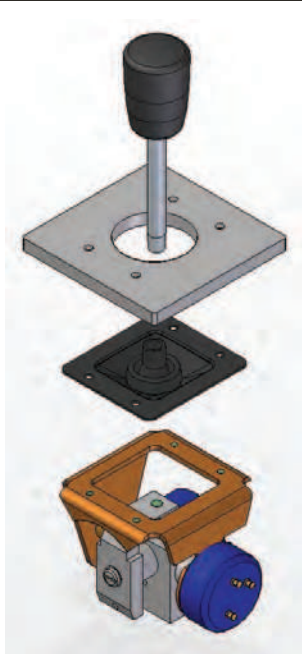


# 4000 series

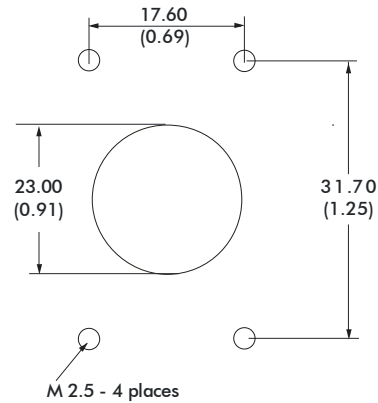
## Industrial resistive joysticks

### MOUNTING INSTALLATION

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

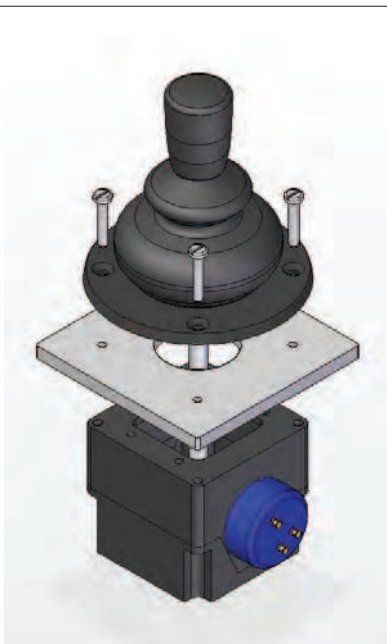


#### MOUNTING CUT-OUT

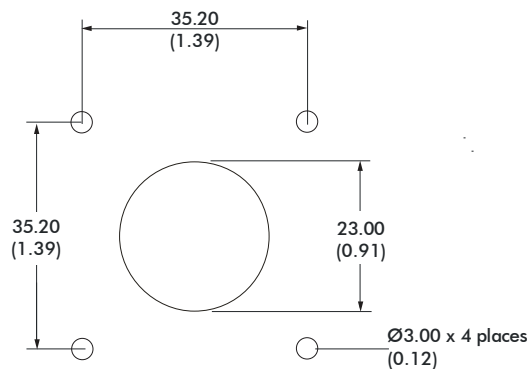


The joystick mounts from beneath the panel and the boot is trapped between the joystick and the panel. No bezel is necessary for this installation, since the panel acts as the bezel. The frame has M2.5 tapped holes and as such M2.5 machine screws are recommended for this mounting.

#### 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.

# 4000 series

Industrial resistive joysticks

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.



The HF joystick is a contactless, multi-axes controller providing long life finger positioning control. Featuring non-contact Hall effect technology while utilizing minimal mounting depth, the HF joystick is designed for applications requiring enduring accuracy and precision. Available with several ergonomic handles and in single, dual or triple axes configurations, ideal applications include CCTV control, robotics, medical devices, and audio video production consoles.



## KEY FEATURES

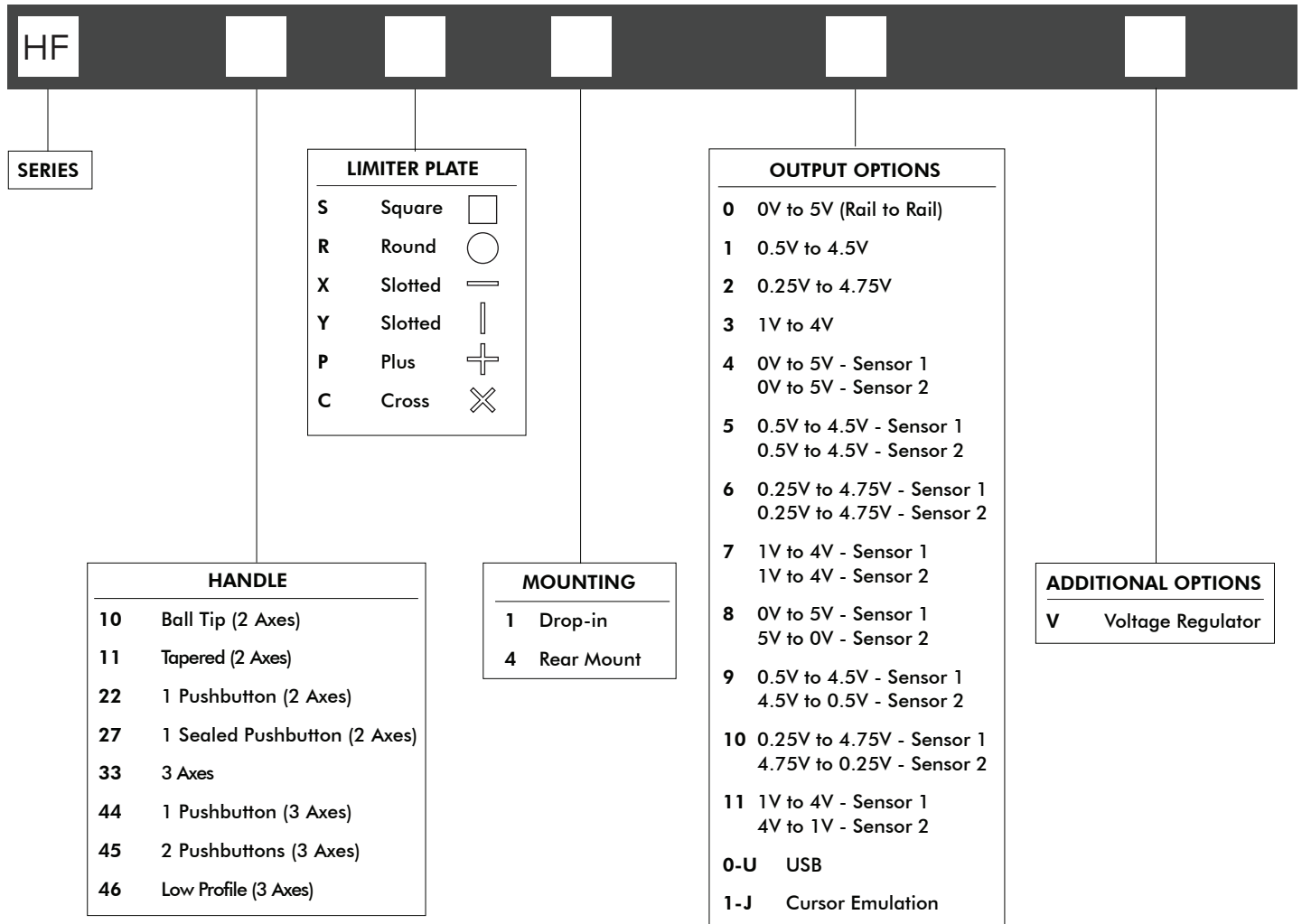
- Connectorized housing
- High voltage, 24V supply option
- Shallow mounting depth <math>< 1.00''</math>
- USB 1.1 HID interface option
- 1, 2 and 3 axes configurations



# HF series

Hall effect joysticks

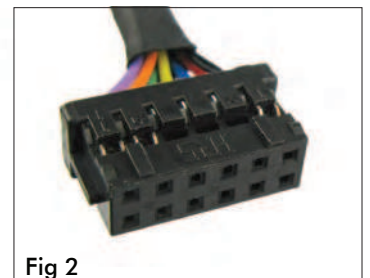
OPTION SELECTION



## NOTES

- The HF Series joysticks are supplied with a Hirose DF11-12DP-2DS9(24) connector (male receptacle). (Fig 1) Standard cable available. Please request at order entry. Cable connector (female socket) is Hirose DF11-12DS-2C. (Fig 2) Connector specifications: 12 position 2mm pitch dual row (2x6) pin header.

WIRE COLOR	DESCRIPTION
Black	Ground
Red	Power
Blue/White	X-Axis (Dual Output)
Blue	X-Axis
Yellow/Black	Y-Axis (Dual Output)
Yellow	Y-Axis
Green/Black	Z-Axis (Dual Output)
Green	Z-Axis
Orange	Button 1
White	Button Common
Violet	Button 2



- Dual Decode cannot be used with USB or Voltage Regulator.



Up to IP68 available.



Mounting accessories. Standard hardware includes: gasket, clamping ring, and four 40-3/4Phil Ph MS SS screws.

# HF series

Hall effect joysticks

## SPECIFICATIONS

### MECHANICAL (FOR X, Y AXES)

Break Out Force	–	1.3N (0.3lbf)
Operating Force	–	2.8N (0.63lbf)
Maximum Applied Force	–	200N (45.00lbf)
Mechanical Angle of Movement	–	36° (18° from center)
Expected Life	–	5 million
Material	–	Glass filled nylon
Package Size	–	5.75" x 4.50" x 3.25"
Lever Action	–	Single spring, omnidirectional
Material	–	Glassfilled nylon

### MECHANICAL (FOR Z AXIS)

Break Out Torque	–	0.09N·m (0.80lbf·in)
Operating Torque	–	0.121N·m(1.07lbf·in)
Maximum Allowable Torque	–	0.150N·m(1.33lbf·in)
Hand Mechanical Angle	–	60° (30° from center)
Handle Action	–	Spring centering, rotational
Expected Life	–	5 million

### ENVIRONMENTAL

Operating Temperature	–	0°C to 85°C (-13°F to 158°F)
Storage Temperature	–	Up to 85°C (-40°F to 158°F)
Sealing (IP)	–	Up to IP68*
EMC Immunity Level (V/M)	–	EN61000-4-3
EMC Emissions Level	–	EN61000-6-3:2001
ESD	–	EN61000-4-2

### ELECTRICAL

Sensor	–	Hall effect
Resolution	–	1.22mV
Supply Voltage Operating	–	5VDC±0.01VDC
Reverse Polarity Max	–	-10VDC
Overvoltage Max	–	20VDC
Output Voltage	–	See options
Output Impedance	–	2Ω
Return to Center Voltage (No Load)	–	±200mV
Error signal	–	1.0%

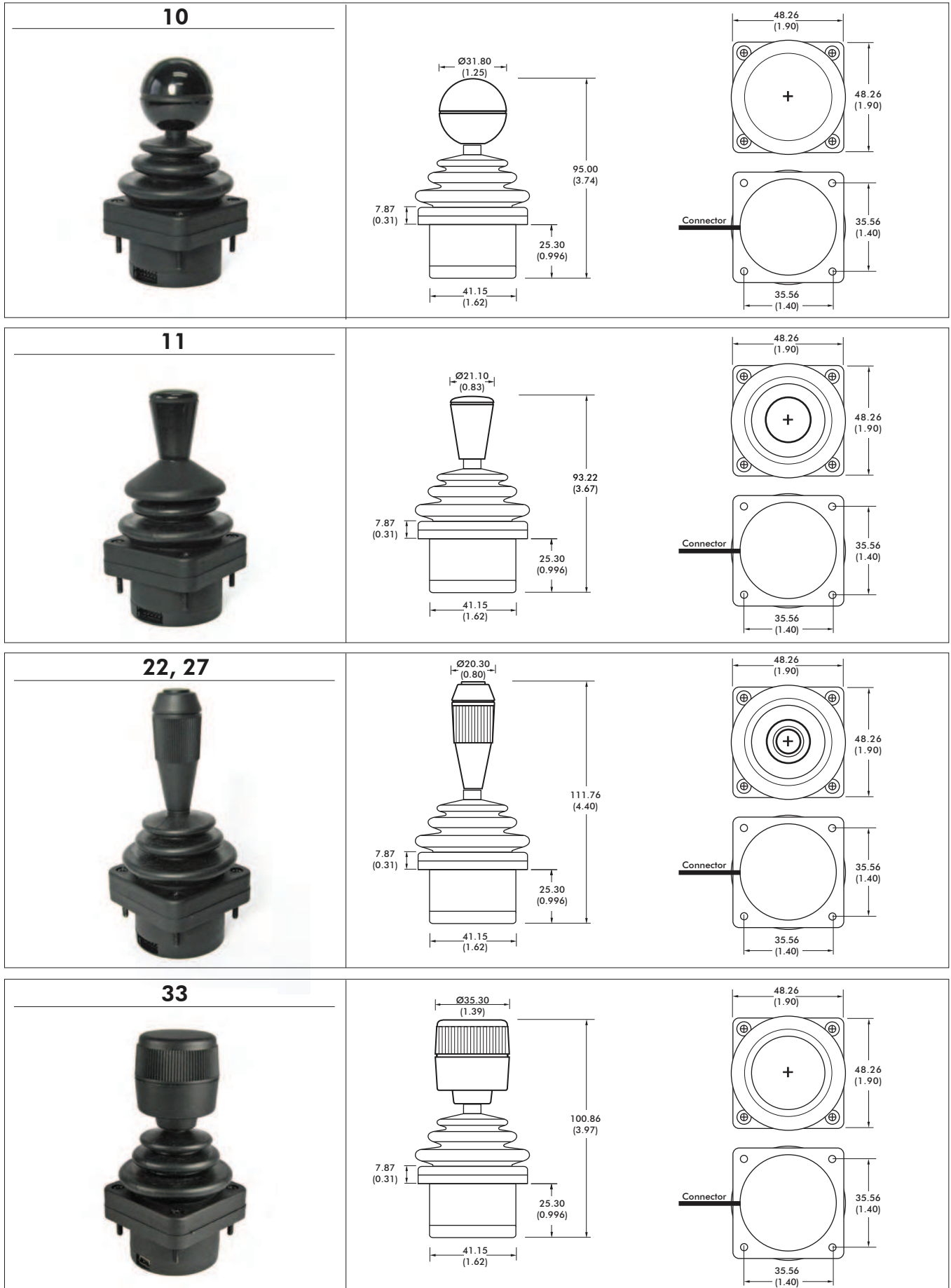
#### NOTES:

- All values are nominal
- Exact specifications may be subject to configuration. Contact Technical Support for the performance of your specific configuration
- \* Excludes some handle options

# HF series

## Hall effect joysticks

### DIMENSIONAL DRAWINGS

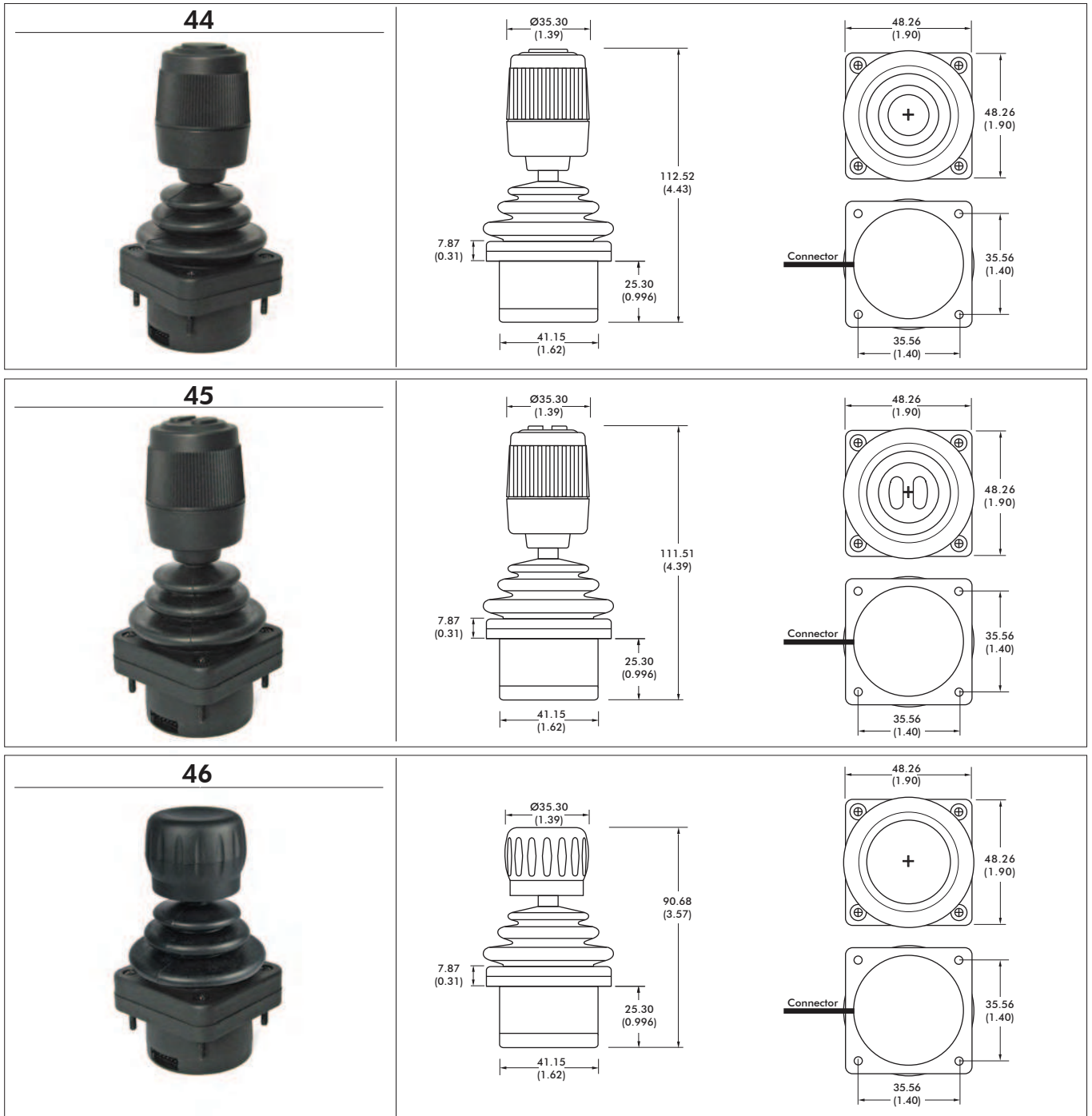


Note: The company reserves the right to change specifications without notice.

# HF series

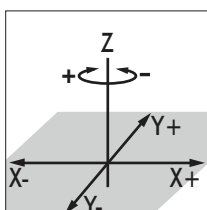
## Hall effect joysticks

### DIMENSIONAL DRAWINGS



#### NOTES:

1. Dimensions are in mm/(inch)
2. Axes orientation:

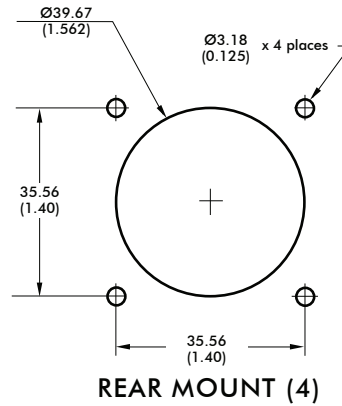
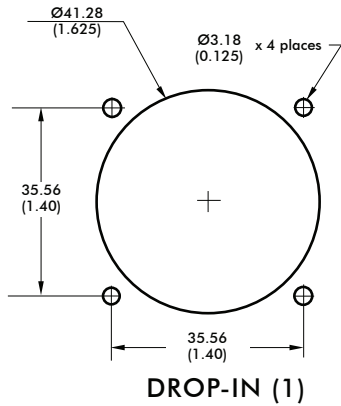


# HF series

## Hall effect joysticks

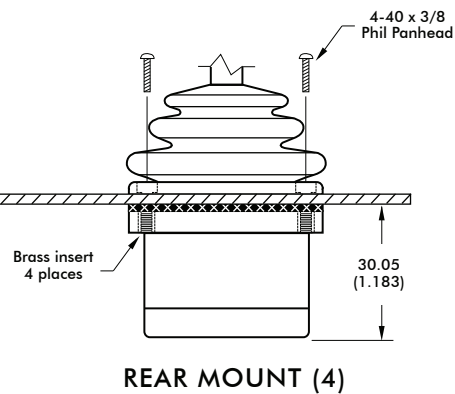
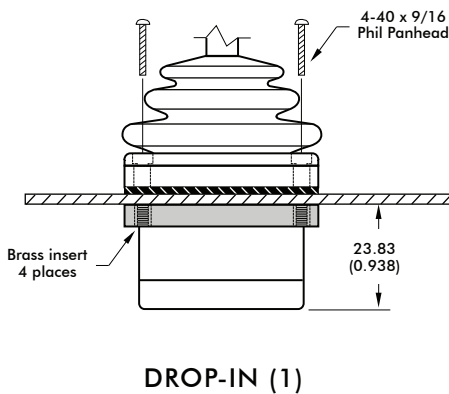
### DIMENSIONAL DRAWINGS - continued

#### PANEL CUTOUT DIMENSIONS

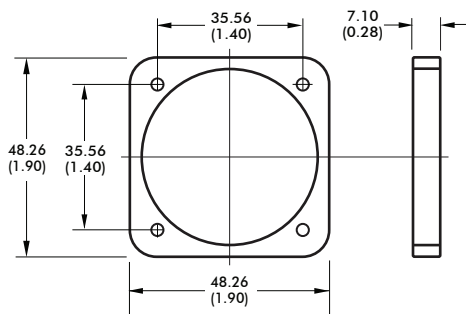


\* Not available for Option 11 Handle

#### MOUNTING OPTIONS



#### CLAMPING RING



#### NOTES:

- For DROP-IN mounting, the panel thickness can be 1.17mm to 3.17mm (0.046in to 0.125in).
- For REAR MOUNT the maximum panel thickness is 1.6mm (0.063in).
- A panel thickness of 1/16" (1.6mm/0.063in) was considered for all the below-panel depth values.
- The below-panel depth is extended by 7.11 mm (0.28in) with the Joyball, USB, CANbus, Voltage Regulator, dual Decode, Center Detect, Discrete Board, Analog Deadband, and Dual Sensor options.

- - Panel
- - Gasket
- - Rear Mount Gasket

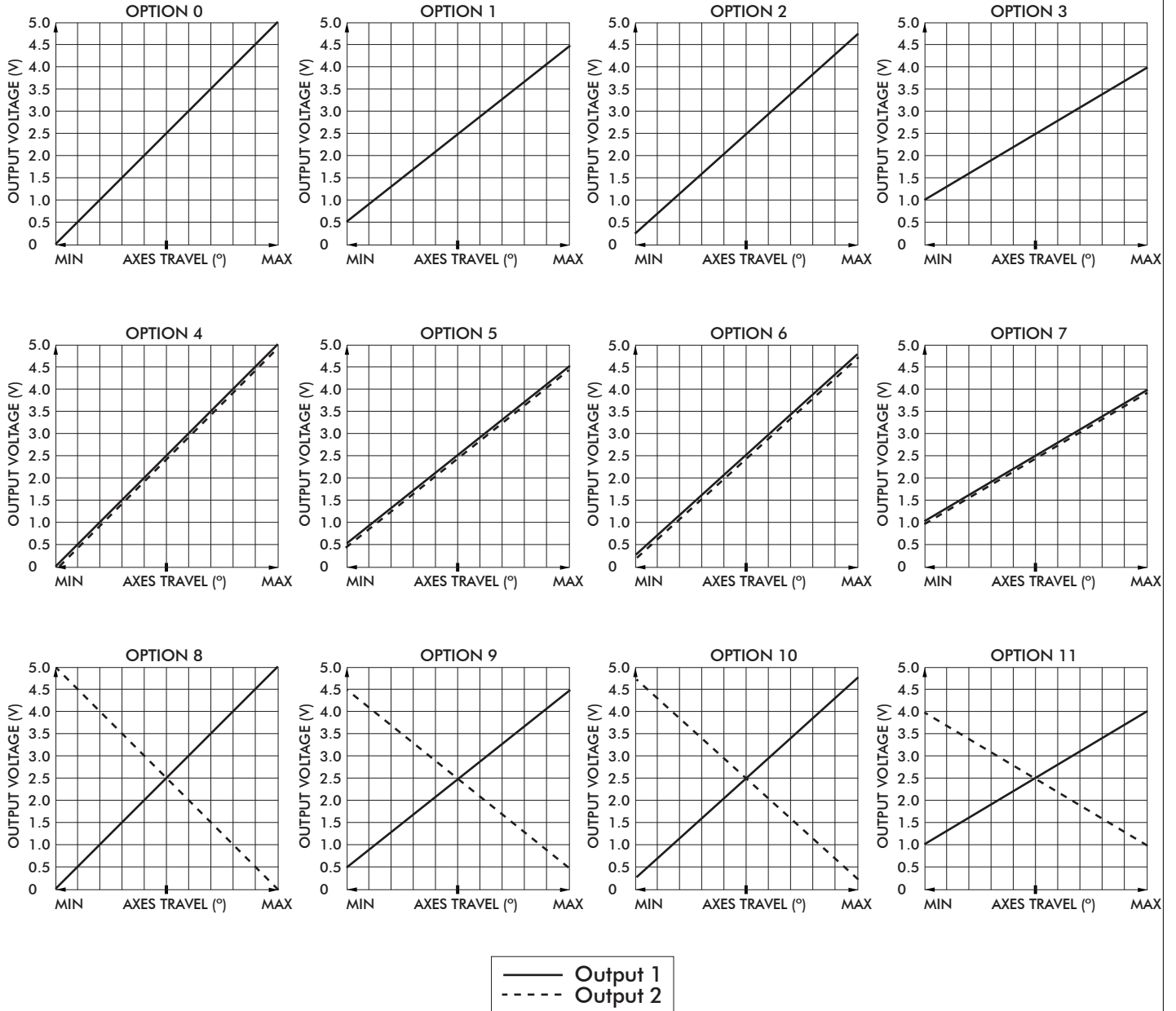


# HF series

## Hall effect joysticks

### CONFIGURATION OPTIONS

#### LINEAR OUTPUT OPTIONS



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

# HF series

## Hall effect joysticks

### CONFIGURATION OPTIONS - continued

#### ADDITIONAL OUTPUT OPTIONS

#### PLUG-AND-PLAY SOLUTIONS:

#### USB

Featuring USB 1.1 HID compliant interface, CH Products' USB joysticks are recognized as standard HID "game controller" devices. Adhering to the HID specification, CH Products' USB joysticks are plug-and-play with most versions of Windows and Linux. Joystick button and axes assignments are dependent upon the controlled application.

#### FEATURES

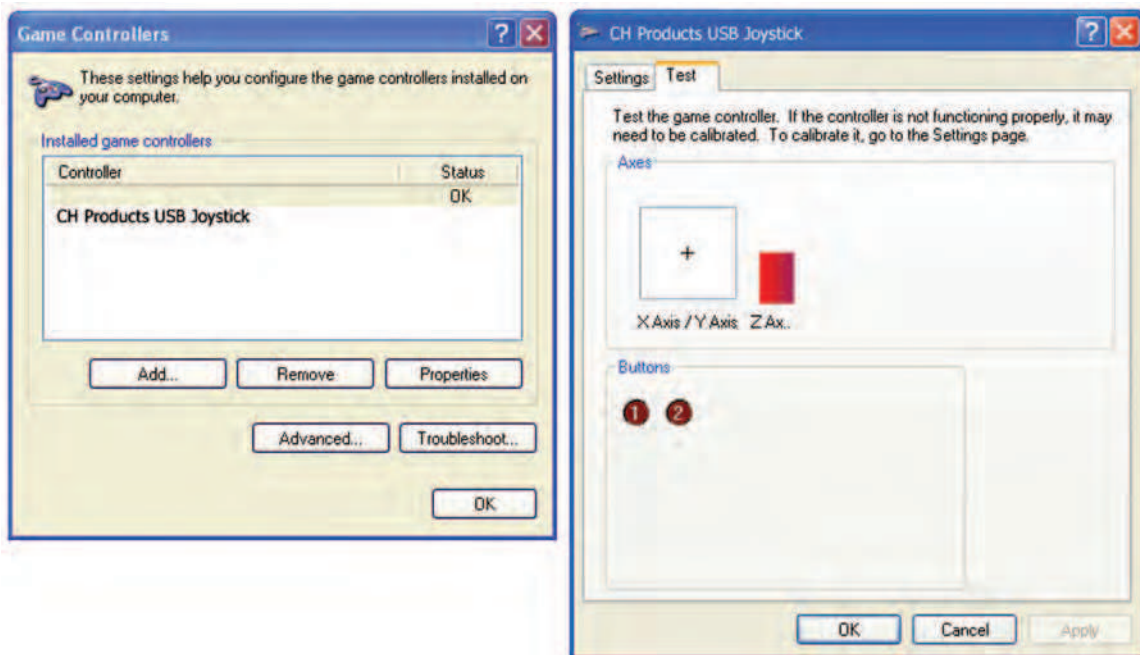
- USB 1.1 HID compliant "game controller" device
- Easy to install and operate
- Functions determined by controlled application
- Standard Male Type A Connector



USB Male Type A Connector

#### SUPPLIED WIRING

USB: USB Male Type A Connector with overmolded cable  
(Optional ruggedized military connectors are available.)



#### ADDITIONAL OUTPUT OPTIONS

#### PLUG-AND-PLAY SOLUTIONS:

#### JOYBALL (CURSOR EMULATION)

The Joyball option converts multi-axis joystick output into a mouse, trackball, or cursor control device. The joystick's internal microprocessor converts absolute axis position into a cursor velocity, which is translated as a relative trackball or mouse position. Supported protocols include Sun Microsystems (mouse systems 5vdc serial) and USB.

#### APPLICATIONS

The Joyball option is ideal for vehicle applications subjected to dirt and high vibration which makes operating a traditional cursor control device difficult. The Joyball option is widely used in marine and military applications.

#### FEATURES

- HID compliant "pointing device"
- Plug-and-play with USB option
- Ideal for marine GPS and navigation
- Environmental sealing up to IP68

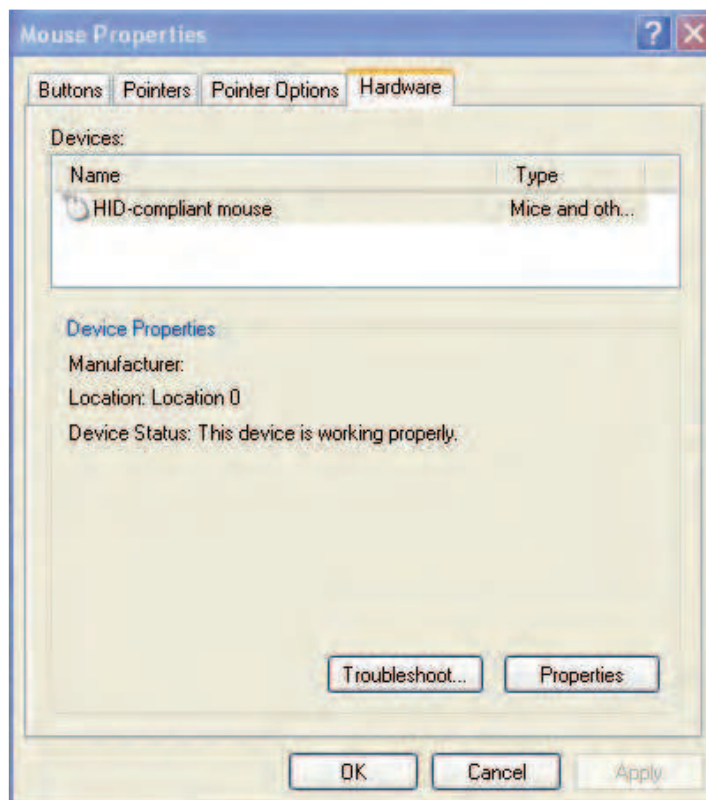
#### SUPPLIED WIRING

USB: USB Male Type A Connector with overmolded cable

SUN: SUN mini-DIN plug with overmolded cable and strain relief

#### I/O COMPLEMENT/ USER SPECIFIED PARAMETERS:

- USB 4 pushbuttons 2 or 3 axes (X, Y, and Z "scroll")
- SUN 2 pushbuttons and 2 axes (X, Y)



# HF series

Hall effect joysticks

CONFIGURATION OPTIONS - continued

## ADDITIONAL OUTPUT OPTIONS

### VOLTAGE REGULATOR

The Voltage Regulator is a multi-wired analog option used to mate to a variety of industrial control voltages. The Voltage Regulator may be used when the supply or output voltage is greater than 5V or when bipolar output is required.

User Specified Supply Voltage:

- 5 VDC
- 10 VDC
- 12 VDC
- 24 – 30 VDC
- Custom supply options available.

User Specified Output Voltage:

- 0-5 VDC
- 0-10 VDC
- +/-5 VDC
- +/-10 VDC
- Custom outputs available.

#### ELECTRICAL SPECIFICATIONS

Supply Power	-	5VDC to 30VDC
Supply Current	-	90mA max

#### WIRING SPECIFICATION

Red wire	-	Supply power 5-30VDC
Black wire	-	Ground
Blue wire	-	X axis output
Yellow wire	-	Y axis output
Green wire	-	Z axis output
White wire	-	Pushbutton common wire
Orange,violet,gre,y,brown,pink,bl/wt/y/bk,gn/bk,gy/w wire	-	Pushbutton outputs





The 3000 Series is the very latest generation in high precision contactless joysticks. With a class leading installed depth of <math><20\text{mm}</math>, it is available in 1, 2 or 3 axes formats. Long trouble-free life is assured with the latest hall effect technology, providing a range of analog signals or custom PWM output options. The 3000 Series also delivers a radically improved mechanism construction that is specifically designed for increased robustness, strength and performance.



## KEY FEATURES

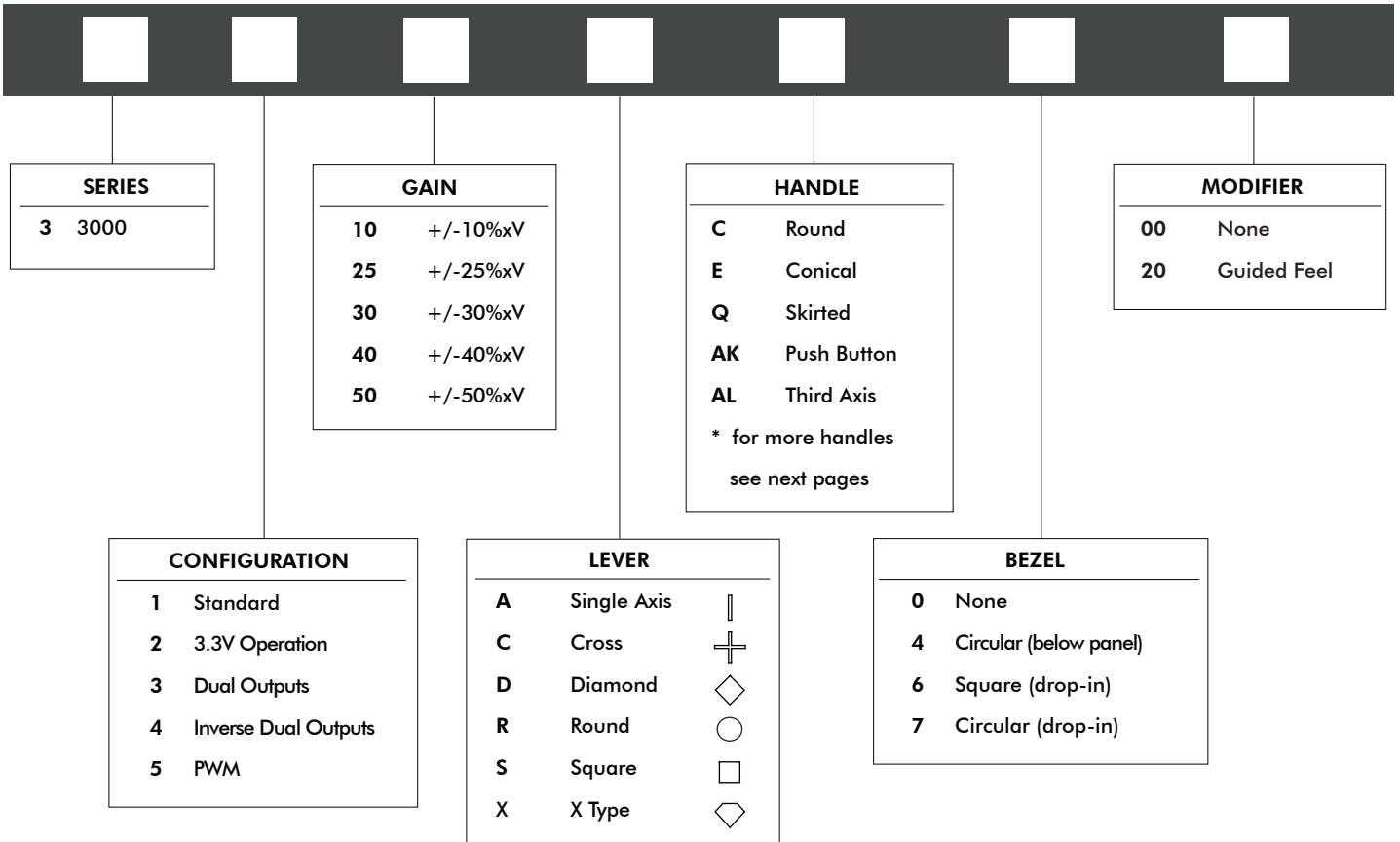
- Class leading installed depth <math><20\text{ mm}</math>
- Hall effect sensing
- 1, 2 or 3 axes
- 5V or 3.3V operation
- EMC shielded
- Analog or PWM outputs
- Next generation metal mechanisms
- Dual outputs available



# 3000 series

## Premium Hall effect joysticks

### OPTION SELECTION



- **CONFIGURATION 1** provides one proportional output per axis, a center tap reference and a separate center detect output.
- **CONFIGURATION 2** is offered as standard with +/-50% gain, yielding a voltage span from 0V (South) to 3.3V (North).
- **CONFIGURATION 3** joystick operates on 5V and provides two outputs per axis of the same polarity for example Y, Y & X, X. The second set of outputs are accurate to the first within +/-5% of the power supply. The power supply and center tap for the secondary outputs are also completely independent.
- **CONFIGURATION 4** The secondary outputs are of inverse polarity to the primary wipers for example X, -X & Y, -Y. The first and second outputs can be summed and compared to Center Tap to verify that the joystick is operating correctly.
- **CONFIGURATION 5** Operating on a 5V supply the 3000 Series may be selected with a variety of PWM output options. For more details on the type of outputs available please refer to Apem.

Note: The 3.3V supply is created by additional DC/DC conversion within the joystick and therefore the power consumption is greater than a 5V supplied product.

#### STANDARD OPTION AVAILABILITY

The following table shows which permutations of options are possible.

CONFIGURATION	CT	CD	AXES			SUPPLY		GAIN					LIMITERS					ALL HANDLES	ALL BEZELS			
			X	Y	Z	3.3	5V	10	25	30	40	50	A	C	D	R	S			X		
1	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✗	✗	✓	✓	✓	✓	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✗	✗	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✗	✗	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	✗	✗	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

#### HANDLE AND BEZEL OPTIONS

For drop in mounting, please specify bezel option 6 or 7. For sub-panel mounting, no bezel is necessary, unless the boot is required to seal to the face of the panel in which case bezel option 4 should be specified. Further mounting information including panel cutouts are shown on the following pages.

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

# 3000 series

Premium Hall effect joysticks

## SPECIFICATIONS

### MECHANICAL

Materials Employed	-	Shaft - Stainless Steel Boot - Neoprene Others - Brass, Nylon, ABS
Weight	-	100g (0.20lb) nominal
Breakout Force	-	1.3N (2.86lbf)
Mechanical Angle of Movement	-	36° for X and Y axes (subject to limiter) 50° for Z axis (subject to handle)
Max Load to Mechanism	-	400N (881.85lbf)

### ENVIRONMENTAL

Storage	-	-40C to +70C
Operating Temperature	-	-25C to +70C
Seal Above Panel	-	IP65 - Neoprene boot fitted as standard
EMC Emission	-	Complies with EN 61000-6-3:200, CISPR 22:2005 Class B 30MHz-11GHz
Life Cycles	-	10,000,000 cycles (5,000,000 for 3 axes joysticks)
ESD	-	Complies with EN61000-4-2 (extended) +/-8KV (20 contacts) & +/-15KV (20 air discharges)
EMC Immunity	-	100V/m, 80MHz-2.7GHz, 1KHz 80% sine wave modulation, EN 61000-4-3 (extended)
Vibration	-	100Hz - 200Hz @ 0.13g /Hz, total 3.6gRMS (1 Hour in each of the three mutually perpendicular axes)

### ELECTRICAL

Gain (Output Voltage Span)	-	+/-10% x V to +/-50% x V
Output at Center	-	V/2 +/- (5% x Gain)
Power Supply	-	5V +/-0.5V Transient free (Configs 1, 2, 3, 4 & 5) or 3.3V +/-0.1V (Config 2)
Center Tap Impedance	-	1K1
Center Detect Output	-	Pulled high within joystick via 2K2 to +V, and smoothed to 0V with 100nF
Sensor Type	-	Hall effect
Current Consumption	-	5V - <13mA (Two axes) - <20mA (Three axes) 3.3V - <24mA (Two axes) - <40mA (Three axes)
Loads	-	Minimum 10K, preferred 100K+

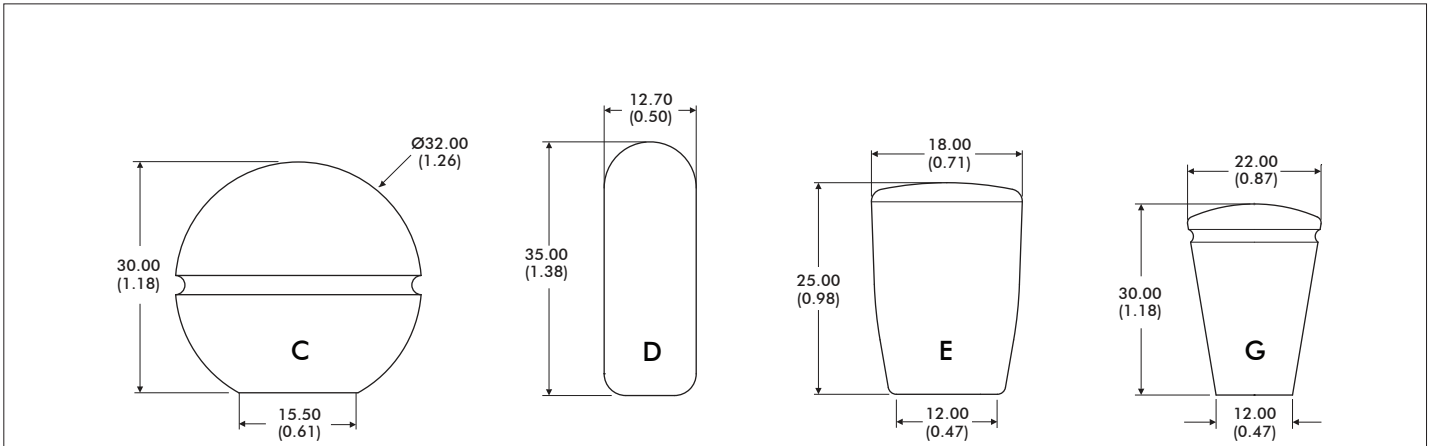
#### NOTES:

- 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.
- Current consumption may be greater for dual output configurations.

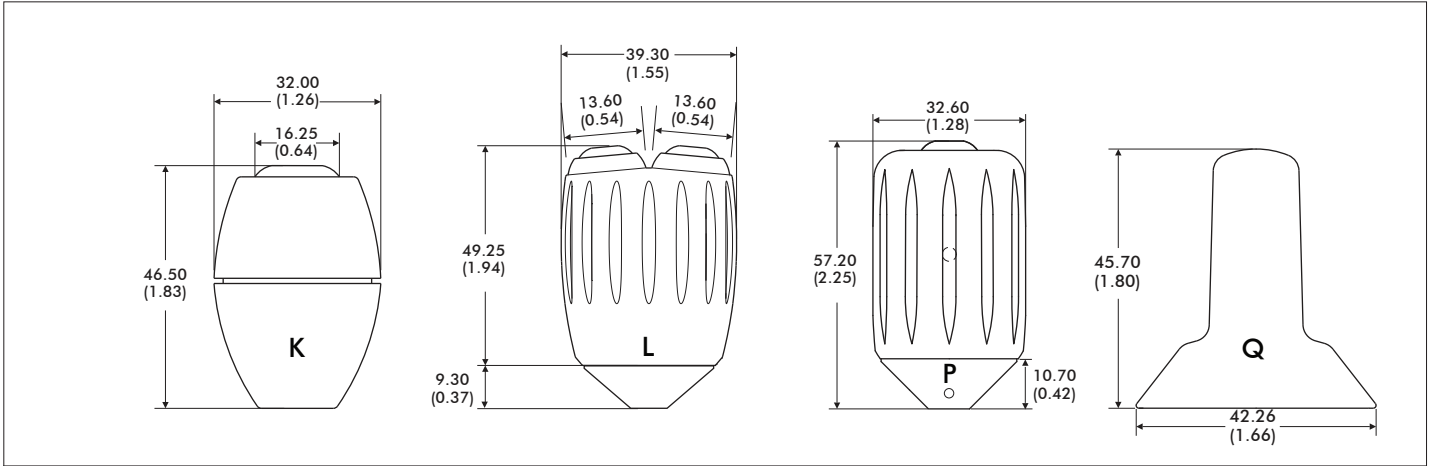
# 3000 series

## Premium Hall effect joysticks

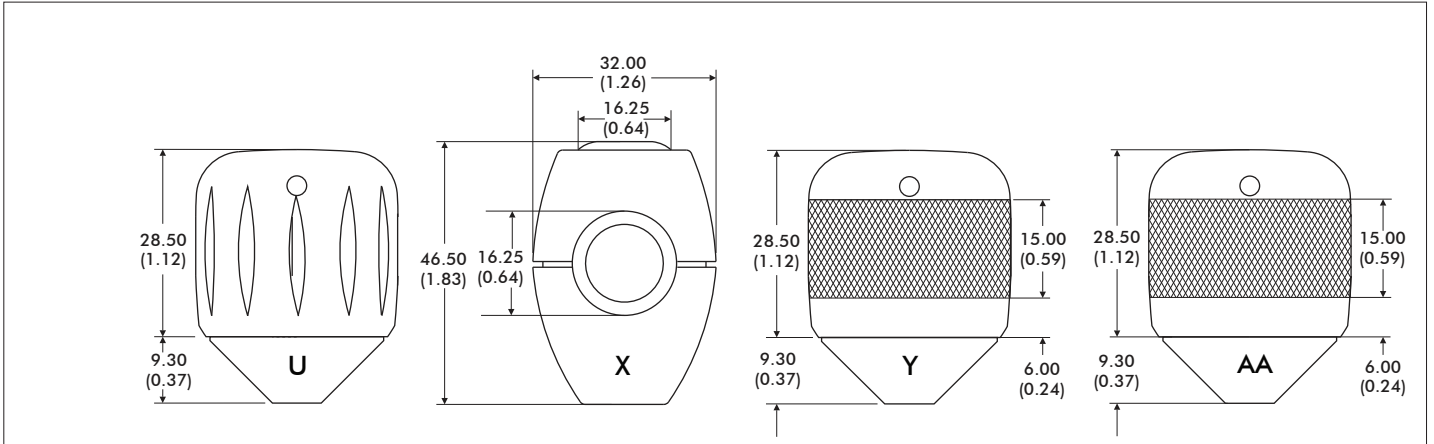
### DIMENSIONAL DRAWINGS - HANDLES



<b>MATERIAL</b>	Phenolic	Aluminum	Nylon	Phenolic
<b>FINISH</b>	Gloss	Anodised	Sparked Matt	Gloss
<b>STANDARD COLOR</b>	Black	Black	Black	Black
<b>OTHER COLORS</b>	Not Available	Not Available	Upon Request	Not Available
<b>NOTES:</b>				



<b>MATERIAL</b>	ABS	Aluminum	Aluminum	Nylon
<b>FINISH</b>	Sparked Matt	Anodised	Anodised	Sparked Matt
<b>STANDARD COLOR</b>	Black	Black	Black	Black
<b>OTHER COLORS</b>	Upon Request	Not Available	Not Available	Upon Request
<b>NOTES:</b>	Uses APEM IS Switch	Uses APEM IS Switch Z axis functionality	Uses APEM IS Switch Z axis functionality	



<b>MATERIAL</b>	Aluminium	ABS	Aluminium	Aluminium
<b>FINISH</b>	Anodised	Sparked Matt	Anodised with Diamond Knurl	Anodised with Diamond Knurl
<b>STANDARD COLOR</b>	Black	Black	Black	Black
<b>OTHER COLORS</b>	Not available	Upon Request	Not Available	Not Available
<b>NOTES:</b>		Uses APEM IS Switches	Z axis functionality	

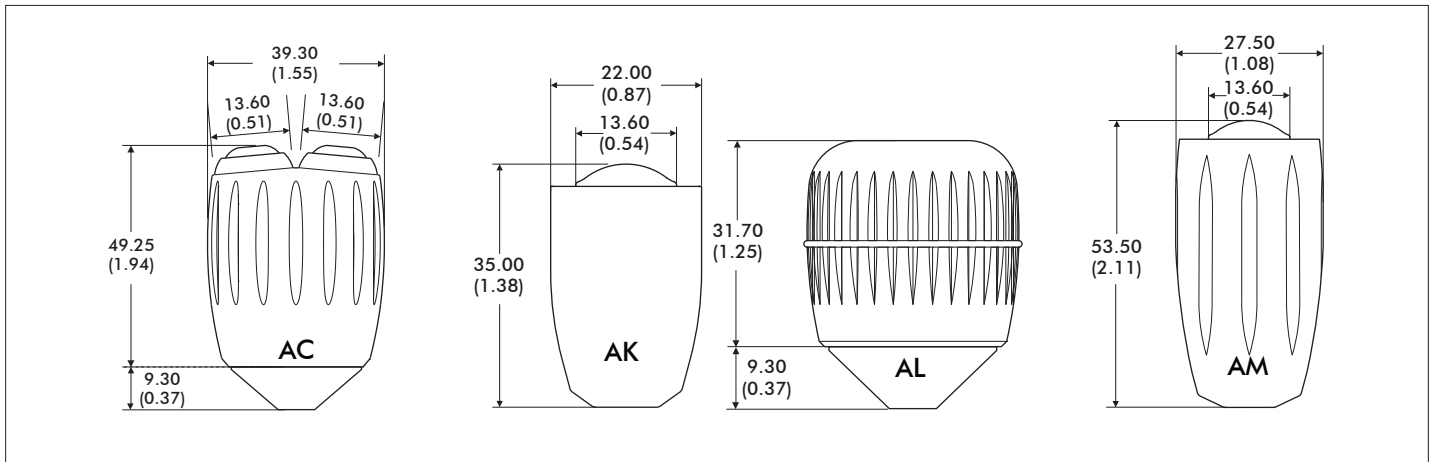
Note: The company reserves the right to change specifications without notice.



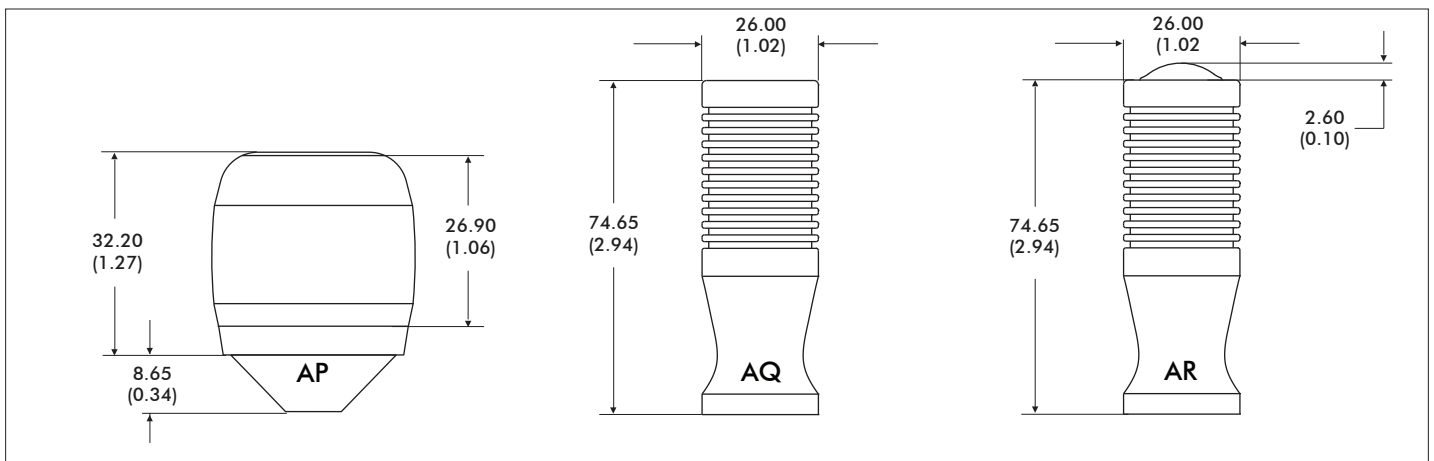
# 3000 series

Premium Hall effect joysticks

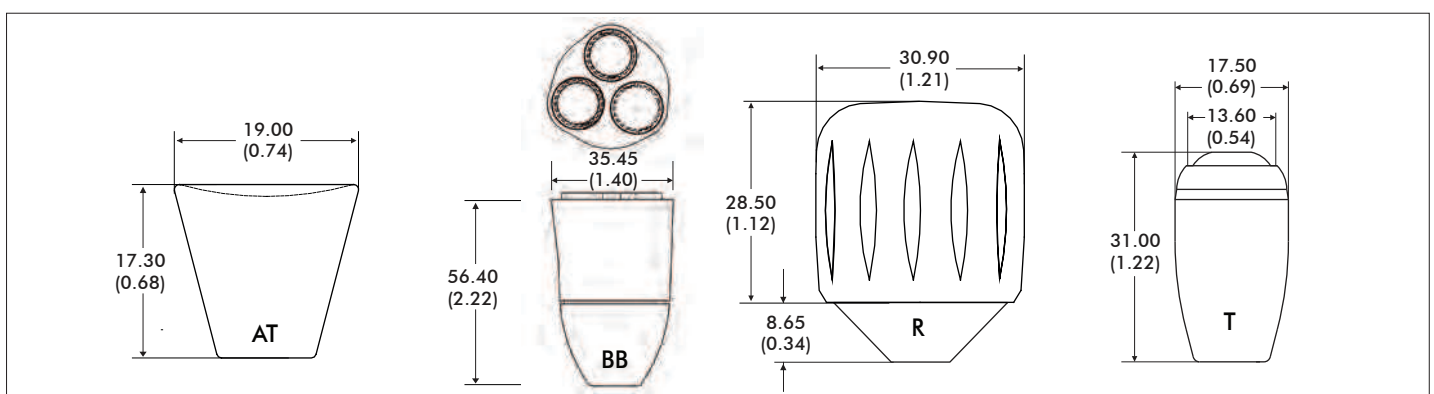
## DIMENSIONAL DRAWINGS - HANDLES - continued



MATERIAL	Aluminum	Aluminum	Nylon	Aluminum
FINISH	Anodised	Anodised	Sparked Matt	Anodised
STANDARD COLOR	Black	Black	Black	Black
OTHER COLORS	Not Available	Not Available	Upon Request	Not Available
NOTES:	Uses APEM IS Switches	Uses APEM IA Switch	Z axis functionality	Uses APEM IA Switch



MATERIAL	Santoprene over Nylon	Aluminum	Aluminum
FINISH	Soft Touch	Anodised	Anodised
STANDARD COLOR	Black	Black	Black
OTHER COLORS	Upon Request	Not Available	Not Available
NOTES:	Z axis functionality		Uses APEM IA Switch



MATERIAL	Nylon	Nylon	Aluminum	Stainless Steel
FINISH	Sparked Matt	Sparked Matt	Anodised	Natural
STANDARD COLOR	Black	Black	Black	Stainless Steel
OTHER COLORS	Upon Request	Not Available	Not Available	Not Available
NOTES:		Uses APEM IL switch	Z axis functionality	Uses APEM IS switch

1. Dimensions are in mm/(inch)

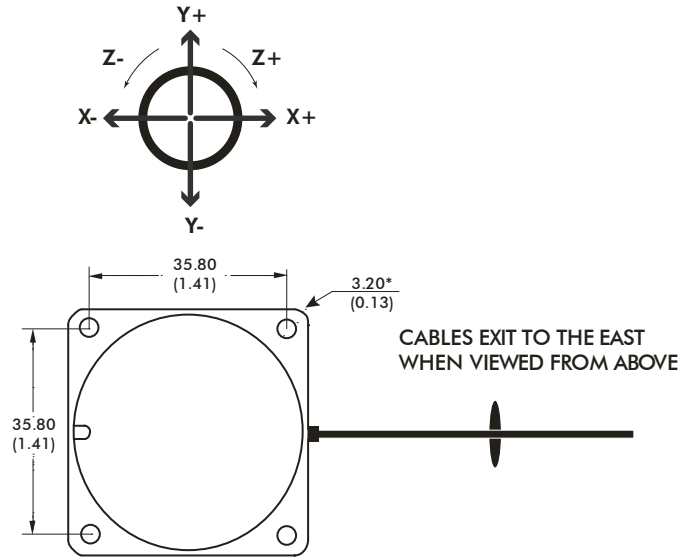
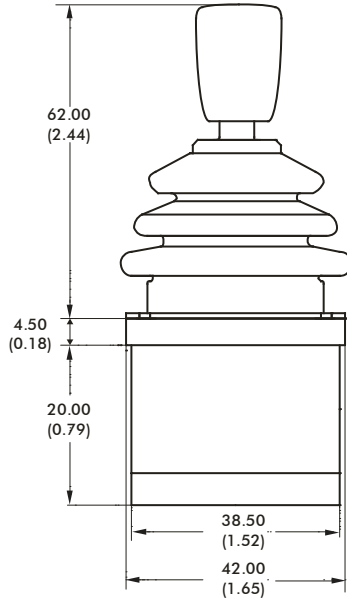
Note: The company reserves the right to change specifications without notice.

# 3000 series

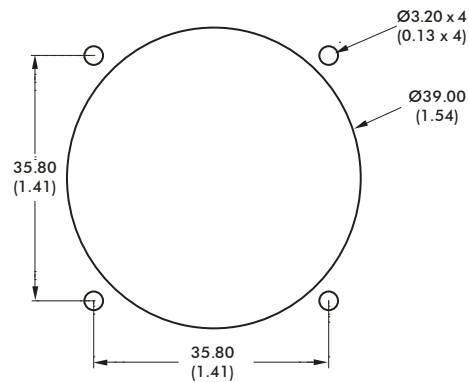
## Premium Hall effect joysticks

### DIMENSIONAL DRAWINGS - continued

#### GENERAL DIMENSIONS



#### DROP IN MOUNTING - PANEL CUT-OUT & MOUNTING INSTALLATION



The joystick is dropped into the panel cut-out. For panel thickness of <3mm, M3 x 16 countersunk machine screws are recommended. Please note: Image (left) shows a square bezel, a circular bezel is also available for this option.

#### NOTES:

1. Dimensions are in mm/(inch)
2. The dimensions shown are for generic 3000 series with E type handle. For specific dimensions of this or any other configuration please refer to Apem.

\*3000 Series has slotted mounting holes - allows compatibility with mounting pitches of 32.25mm to 35.80mm

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