

# HF series

## Hall effect joysticks

Distinctive features and specifications



- Connectorized housing
- Shallow mounting depth <1.00"
- 1, 2 and 3 axis configurations
- Voltage regulator, 24V supply option
- USB 2.0 HID interface options
- CAN bus J1939 and CANopen options

MECHANICAL (FOR X, Y AXIS)
<ul style="list-style-type: none"> <li>• Break Out Force: 1.3N (0.3lbf)</li> <li>• Operating Force: 2.8N (0.63lbf)</li> <li>• Maximum Applied Force: 200N (45.00lbf)</li> <li>• Mechanical Angle of Movement: 36° (18° from center)</li> <li>• Expected Life: 5 million</li> <li>• Material: Glass filled nylon</li> <li>• Package Size: 5.75" x 4.50" x 3.25"</li> <li>• Lever Action: Single spring, omnidirectional</li> </ul>

ENVIRONMENTAL
<ul style="list-style-type: none"> <li>• Operating Temperature: -40°C to 85°C (-40°F to 185°F)</li> <li>• Storage Temperature: -40°C to 85°C (-40°F to 185°F)</li> <li>• Sealing (IP): Up to IP68*</li> <li>• EMC Immunity Level (V/M): EN61000-4-3</li> <li>• EMC Emissions Level: EN61000-6-3:2001</li> <li>• ESD: EN61000-4-2</li> <li>• Output linearity: ±200mV</li> <li>• Dual output interlinearity (X/Y): ±400mV</li> <li>• Dual output interlinearity (Z): ±600mV</li> </ul>

MECHANICAL (FOR Z AXIS)
<ul style="list-style-type: none"> <li>• Break Out Torque: 0.09Nm (0.80lbf in)</li> <li>• Operating Torque: 0.121Nm(1.07lbf in)</li> <li>• Maximum Allowable Torque: 2.50Nm(22.13lbf in)</li> <li>• Hand Mechanical Angle: 60° (30° from center)</li> <li>• Handle Action: Spring centering, rotational</li> <li>• Expected Life: 5 million</li> </ul>

SENSOR SPECIFICATIONS
<ul style="list-style-type: none"> <li>• Sensor: Hall effect, single or dual</li> <li>• Supply Voltage Range: 5VDC ±0.01VDC</li> <li>• Reverse Polarity Max: -10VDC</li> <li>• Transient Overvoltage Max: 16VDC</li> <li>• Ratiometric Output Voltage: See options</li> <li>• Output Impedance: 2Ω</li> </ul>

**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.

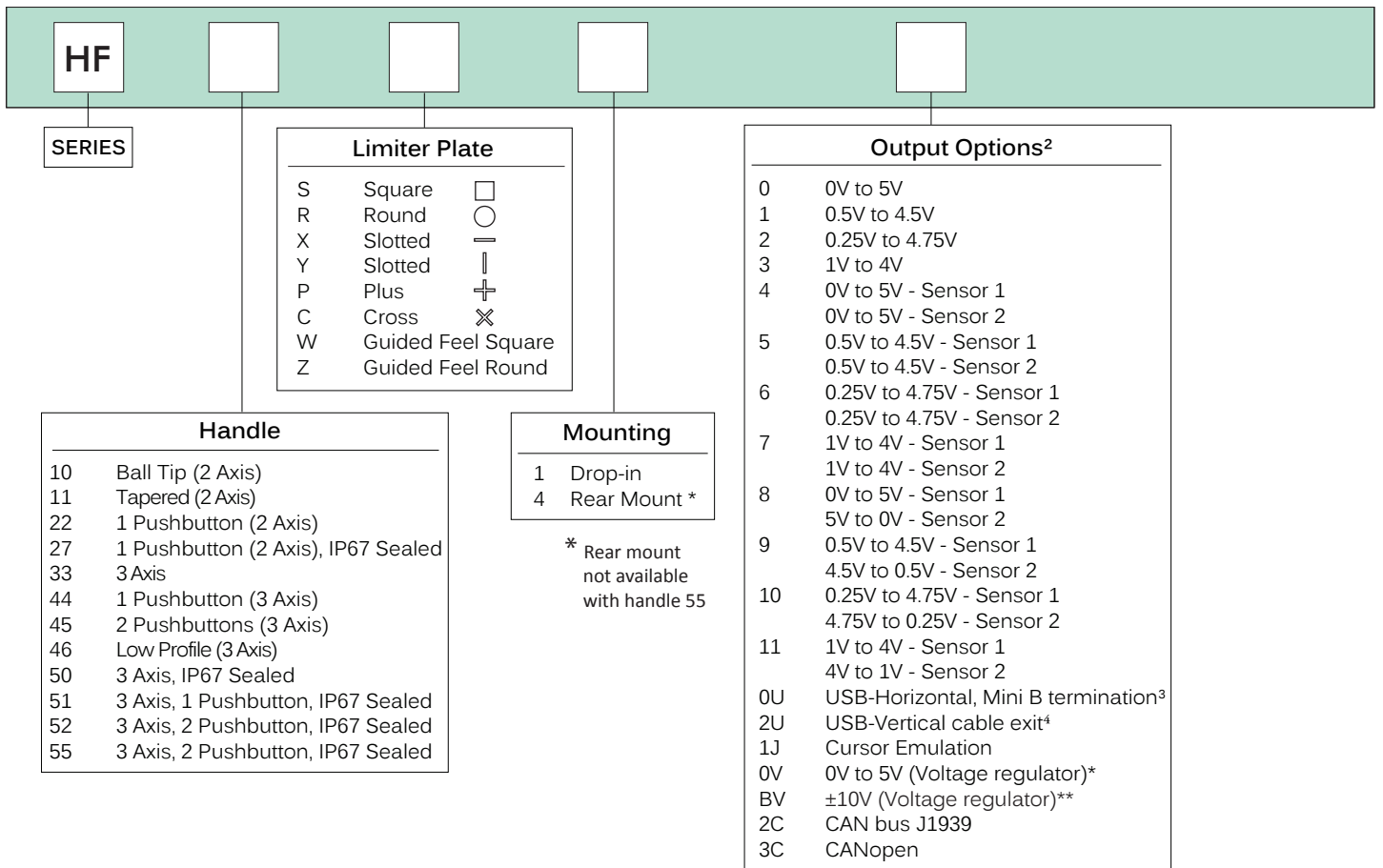


Note: The company reserves the right to change specifications without notice.

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### Overview



#### NOTES

- The HF Series joysticks are supplied with a Hirose DF11-12DP-2DS9(24) connector (male receptacle). (Fig 1) Cable not included. 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

- \* Requires operating voltage  $6V \geq 35V$
- \*\* Requires operating voltage  $11V \geq 35V$



Up to IP67 available.



Mounting accessories. Standard hardware includes: gasket, clamping ring, and four #4-40x3/4 Phil Ph MS SS screws.

- Output voltage is ratiometric to supply voltage
- Cable length is 6' from side of joystick to USB connector
- Cable length is 7' from side of joystick to USB connector


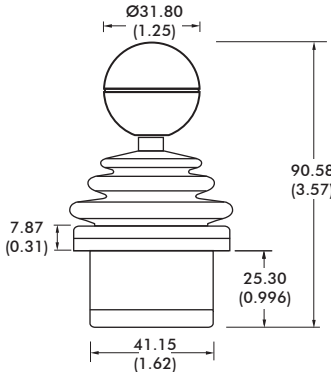
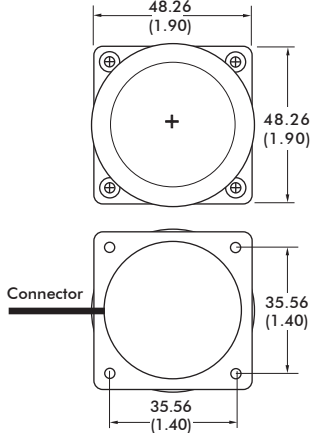

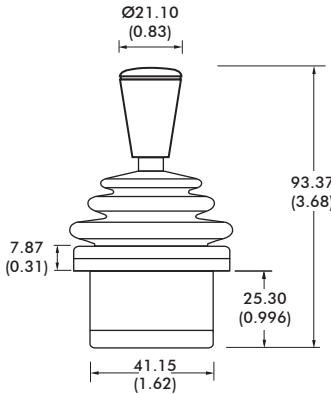
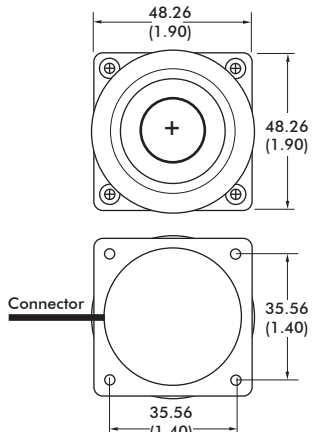

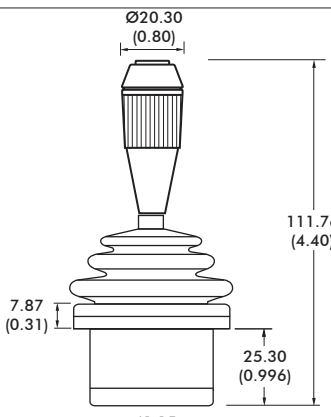
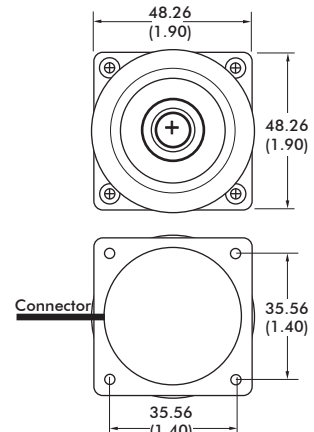

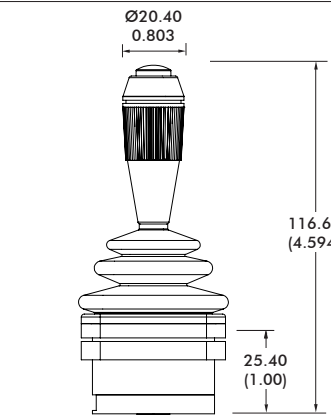
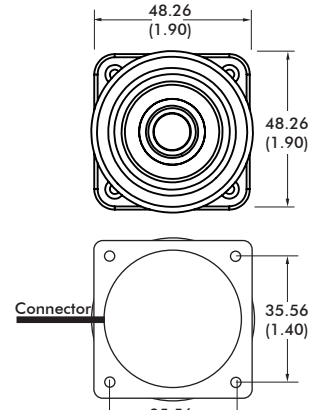


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<p style="text-align: center;"><b>11</b></p> 		
<p style="text-align: center;"><b>22</b></p> 		
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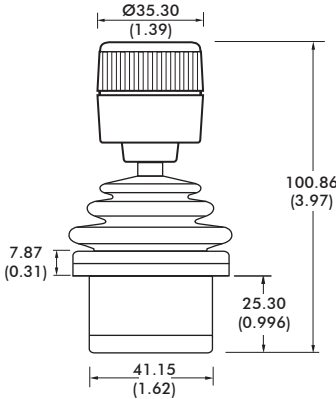
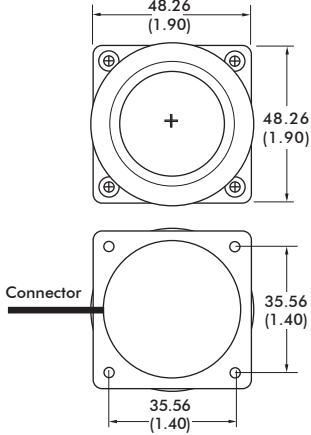

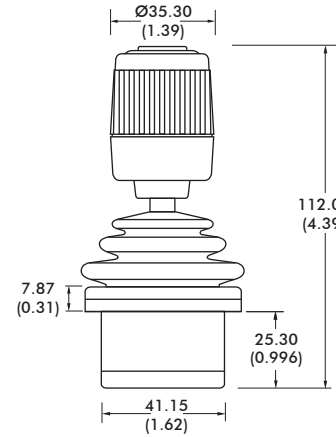
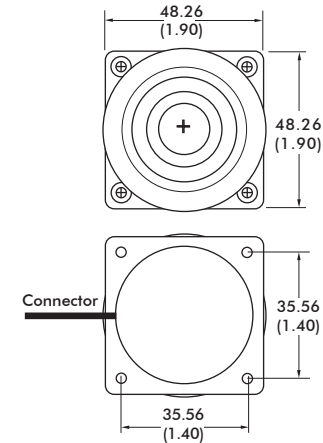

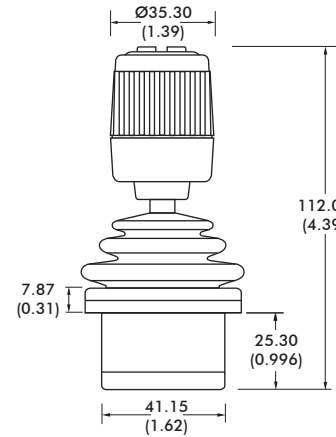
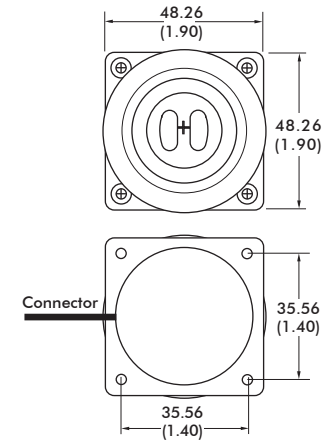

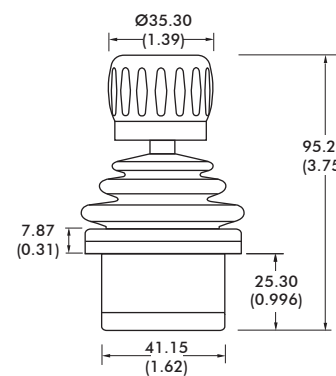
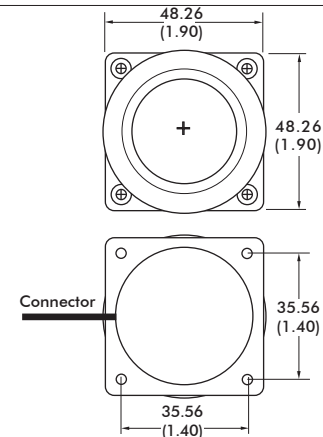
APEM

[www.apem.com](http://www.apem.com)

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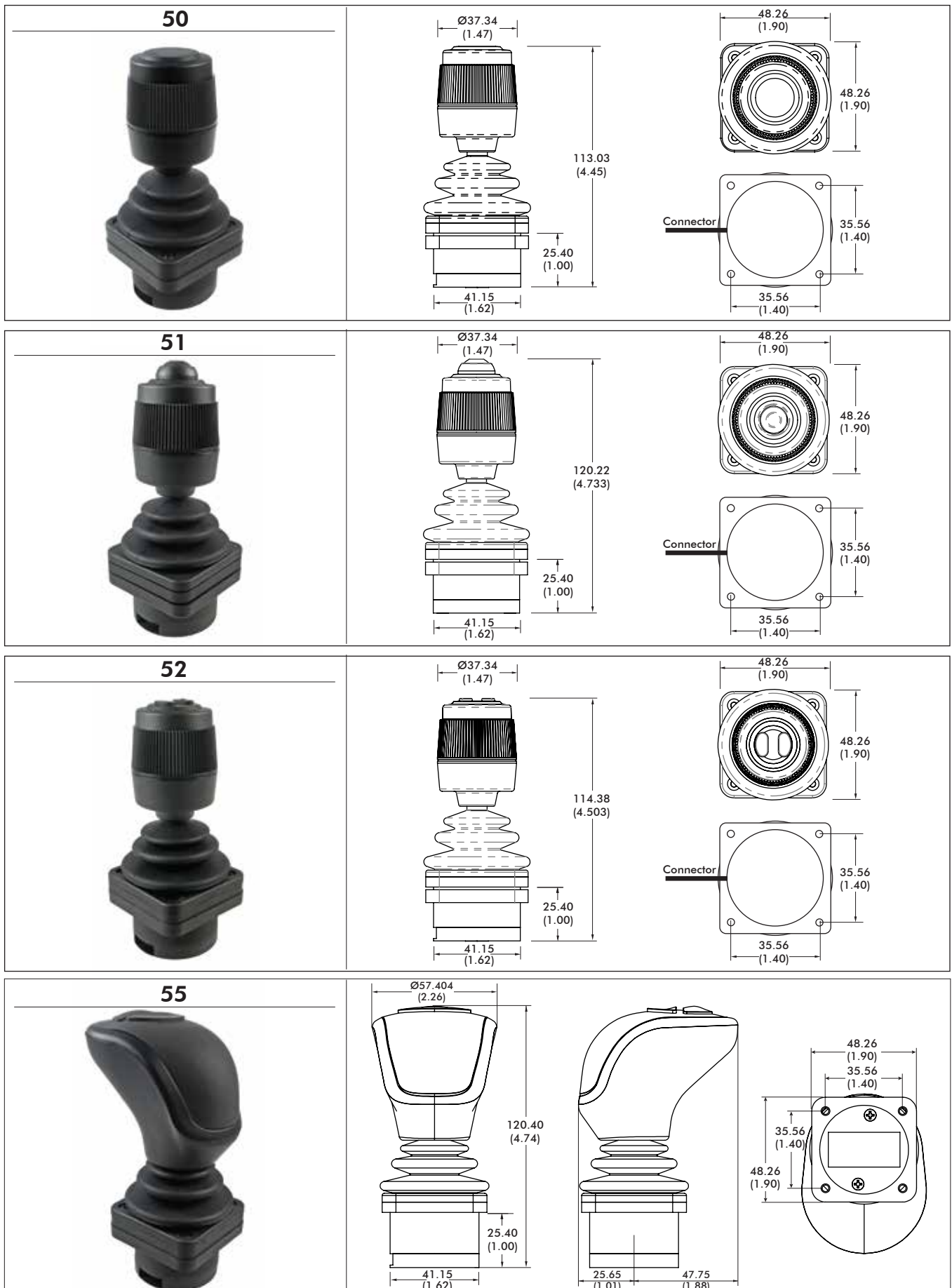
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<p style="text-align: center;"><b>45</b></p> 		
<p style="text-align: center;"><b>46</b></p> 		

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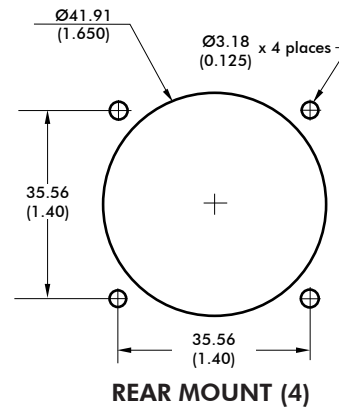
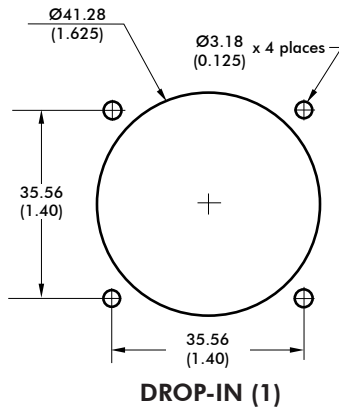
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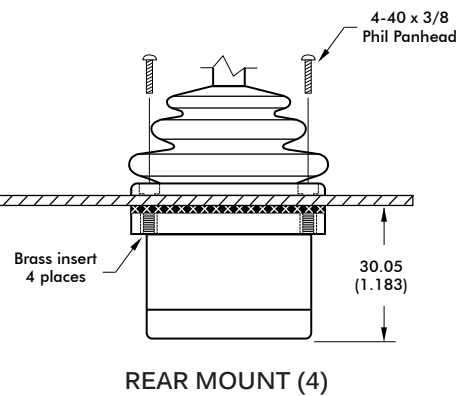
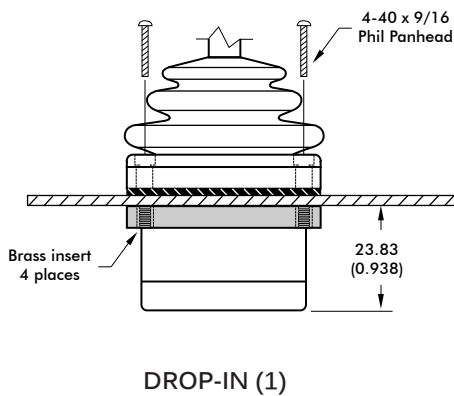
### Overview

#### PANEL CUT-OUT DIMENSIONS

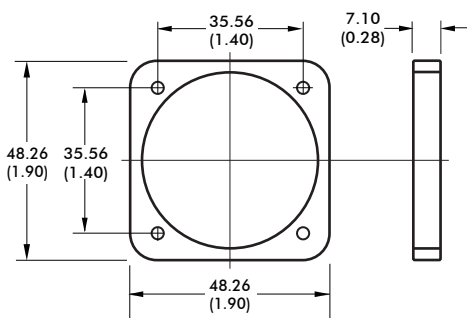


\* Not available for Option 11 and 55 Handles

#### MOUNTING OPTIONS



#### CLAMPING RING



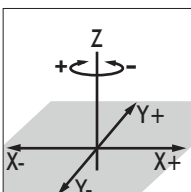
#### NOTES:

- 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 7.11mm (0.28in) with the USB, Cursor Emulation, Voltage Regulator options.

-  - Panel
-  - Gasket
-  - Rear Mount Gasket

#### NOTES:

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

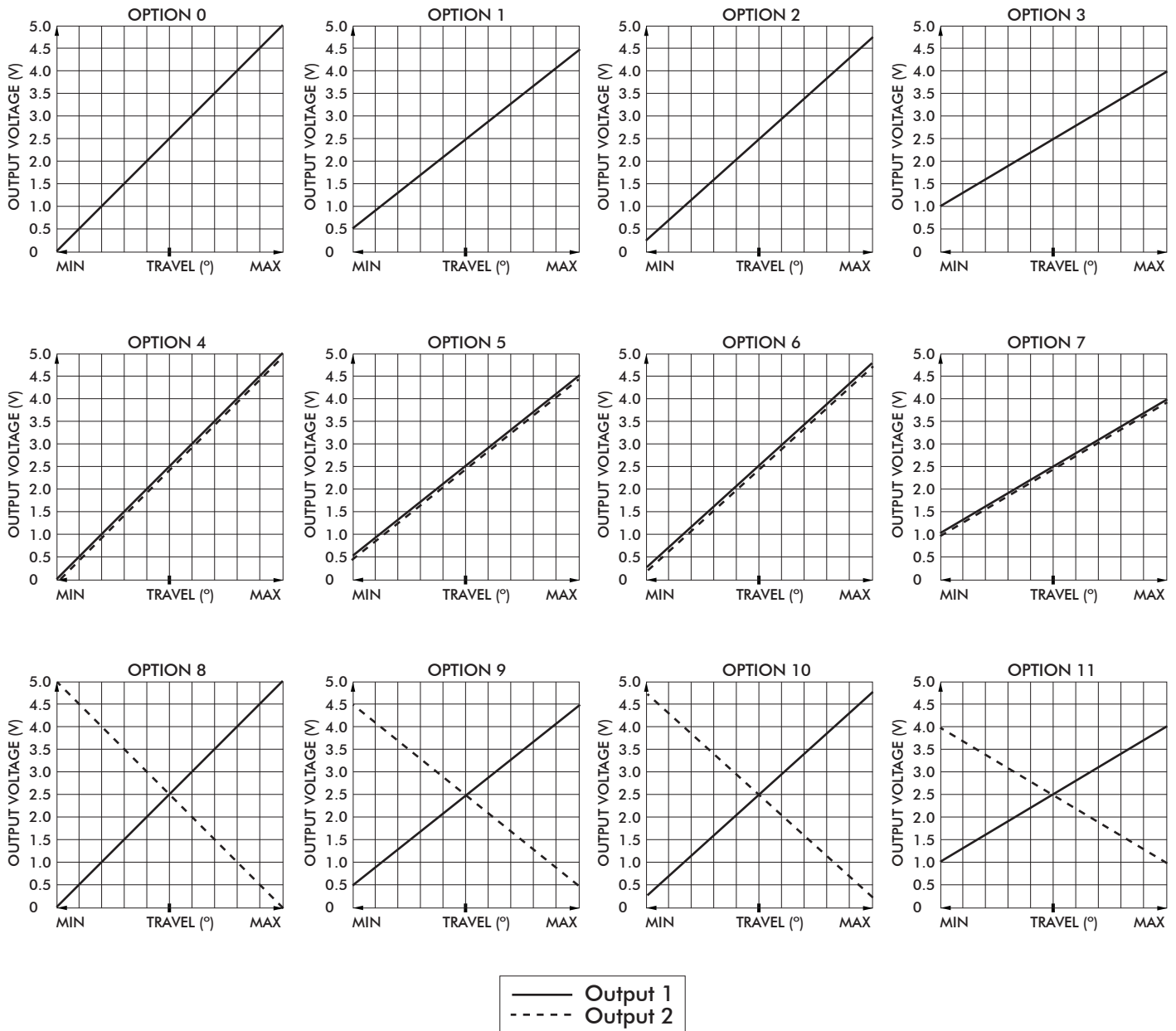


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### VOLTAGE OUTPUT OPTIONS<sup>1</sup>



<sup>1</sup> Voltage outputs are ratiometric to supply voltage

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### USB

#### USB

Featuring USB 2.0 HID compliant interface, APEM's USB joysticks are recognized as standard HID "game controller" devices. Adhering to the HID specification, APEM's USB joysticks are plug-and-play with most versions of Windows. Joystick button and axis assignments are dependent upon the controlled application.

#### FEATURES

- USB 2.0 HID compliant "game controller" device
- Easy to install and operate
- Functions determined by controlled application
- Standard Male Type A Connector

#### CURSOR EMULATION

The Cursor Emulation option converts a multi-axis joystick into a mouse, trackball, or cursor control device.

#### APPLICATIONS

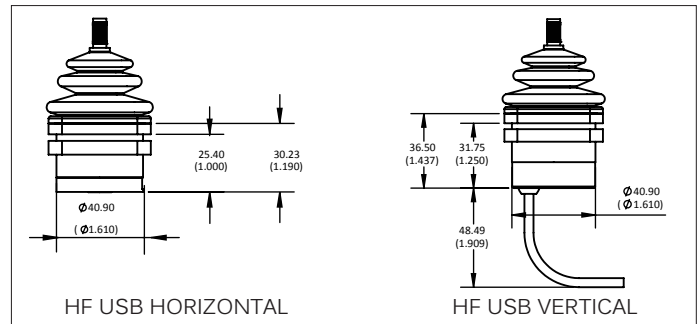
The Cursor Emulation option is ideal for vehicle applications subjected to dirt and high vibration which makes operating a traditional cursor control device difficult. The Cursor Emulation option is widely used in marine and military applications.

#### FEATURES

- HID compliant "pointing device"
- Plug-and-play with USB option
- Ideal for marine GPS and navigation

#### TERMINATION OPTIONS

- 0-U USB Male Type A to mini B  
Cable length is 6' from side of joystick to USB connector
- 2-U USB Male Type A to vertical cable termination  
Cable length is 7' from side of joystick to USB connector



### ADDITIONAL OUTPUT OPTIONS

#### VOLTAGE REGULATOR

The Voltage Regulator option may be used when the operating supply voltage is 11V to 35V..

User Specified Output Voltage:

- 0-5VDC
- ±10VDC

#### ELECTRICAL SPECIFICATIONS

- Supply Voltage: 11V to 35V
- Supply Current: 90mA max

#### WIRING SPECIFICATION

- Red wire: Supply (+35V max.)
- 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, grey,brown,pink,bl/wt/y/bk, gn/bk,gy/w wire: Pushbutton outputs

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### CAN bus

#### CAN bus ELECTRICAL SPECIFICATIONS

- Operating voltage: 6V to 35V
  - Current consumption: TBD  
(typical: 35mA @ 12V, 18mA @ 24V, 15mA @ 30V)
  - Output signal: CAN bus
  - Reverse connection protected: Yes
  - Short-circuit protected against + UB max: Yes
  - Short-circuit protected against GND: Yes
  - CAN: ISO 11898, CAN specification 2.0A/ 2.0B
  - Protocol: CANJ1939, CANJ1939-71, CANopen
  - Baud rate: 125kbit/s, 250kbit/s, 500kbit/s, 1Mbit/s
  - CAN ID: 11/29 bit/s as requested
  - BJM/EJM cycle time: 50ms (standard)/15ms (optional)
  - Terminating resistor: Not included. Available upon request
- 
- Operating temperature: -40<sup>o</sup> to +85<sup>o</sup>C (-40<sup>o</sup>F to 185<sup>o</sup>F)
  - Storage temperature: -40<sup>o</sup> to +85<sup>o</sup>C (-40<sup>o</sup>F to 185<sup>o</sup>F)
  - Wiring specifications: 22AWG, PTFE, 22" ±.125"
    - Red: Supply power
    - Black: Ground
    - Green: CAN High data
    - White: CAN Low data
    - Blue: Identifier Select LSB
    - Orange: Identifier Select MSB

#### MOUNTING

Below panel dimensions for CAN bus configurations

