

# MEDIUM HALL EFFECT JOYSTICK

UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS



Handle Style 32 with  
2 Pushbuttons



Handle Style 61  
with Rocker and  
5 Switches

The JHM series Medium Hall Effect Joystick is a full function operator control that will fit in an armrest, on a panel, or any other location where a shallow behind panel depth joystick is needed. It utilizes Hall effect technology for long life and reliability. Electronics are sealed up to IP68S with an operational life of ten million cycles in all directions.

The standard JHM offers 19 handle styles, 18 output configuration choices and 9 gating options.

Output options include CANopen, J1939, PWM, USB, analog and digital control outputs, and redundant sensors. The JHM offers a variety of switches and handle styles such as a ball handle, a lockout handle, a G3-D grip and handles with pushbuttons, rockers and 5-button keypads.

Gating options include single axis, dual axis, friction y-axis, and various omnidirectional selections that include omnidirectional round smooth feel, omnidirectional on-axis and off-axis guided feel and omnidirectional square on-axis guided feel.

## Features:

- **Designed for armrest & panel mounting**
- **Shorter behind panel depth**
- **Contactless analog output Hall effect technology**
- **Electronics sealed up to IP68S**
- **Up to 10 million operational cycles in all directions**
- **Available with a variety of grip & switch options**
- **Redundant sensors available**
- **Various output configurations**
  - CANopen
  - J1939
  - USB
  - PWM
  - Serial
  - Analog
- **Variety of gating options**
- **RoHS compliant**

### Standard Characteristics/Ratings:

**Sensor Type:** Hall effect analog, factory programmed with temperature compensation, ground and supply line break detection, and over voltage and reverse voltage protection options.

**Design:** Contactless sensing using dual bar permanent magnet

#### ELECTRICAL RATINGS: Joystick Rated at 5V @ 20°C, Load = 1ma (4.7kΩ)

Electrical	Units	Min	Typ	Max
Supply Voltage, Vcc	VDC	4.5	5.0	5.5
Output Voltage Tolerance at Center AA, BB, CC, DD, EE, FF, GG & HH	5V Vcc	-0.25	N/A	+0.25
Output Voltage Tolerance at Center AT, BT, CT, DT, ET & FT	5V Vcc	-0.15	N/A	+0.15
Output Voltage Tolerance Full Travel	5V Vcc	-0.25	N/A	+0.25
Supply Current Per Sensor	mA	N/A	N/A	10.00
Output Source Current Limit	mA	-1.00	N/A	1.00

#### ELECTRICAL RATINGS: U2 Rated at Vcc = 5V @ 25°C, Load = 1ma (4.7kΩ)

Electrical	Units	Min	Typ	Max
Supply Voltage, Vcc	VDC	4.5	5.0	5.5
Output Voltage +, - 0° Deflection	5V Vcc	2.25	2.50	2.75
Output at Full Travel Direction -Z	5V Vcc	0.45	0.50	0.75
Output at Full Travel Direction +Z	5V Vcc	4.25	4.50	4.55
Supply Current B-0, Vcc=5V, I <sub>o</sub> =0	mA	N/A	N/A	10.00

#### ELECTRICAL RATINGS: P9 Switches Rated at 10mA Resistive Load at 5VDC

**Electrical Life:** 1,000,000 cycles

#### MECHANICAL (JOYSTICK):

**Mechanical Life:** 5 Million Cycles, High Force  
10 Million Cycles, Low Force  
2.5 Million Cycles, Outputs JJ, KK,MM, Rear Mount  
250,000 Cycles, Friction Held, High Force  
Boot Life up to 1 Million Cycles

Mechanical (Operating Force w/Boot) Travel Angle	Units	Min	Typ	Max
	Degrees	18°	20°	22°
High Force @ 2" GRP (Return to Center)	Lbs.	0.5	1.25	2.0
Low Force @ 2" GRP (Return to Center)	Lbs.	0.5	1.0	1.5
High Force @ 3" GRP (Return to Center)	Lbs.	0.5	1.0	1.5
Low Force @ 3" GRP (Return to Center)	Lbs.	0.4	0.7	1.0
High Force @ 4" GRP (Return to Center) Handle Styles 51, 52, 53	Lbs.	1.2	2.5	3.8
Low Force @ 4" GRP (Return to Center) Handle Styles 51, 52, 53	Lbs.	0.4	0.8	1.2
High Force (w/Boot) Y Direction @ 2" GRP (Friction)	Lbs.	1.5	4.5	7.5
High Force (w/Boot) Friction @ 3" GRP, Y Direction	Lbs.	1.0	3.5	6.0
High Force (w/Boot) Friction @ 4" GRP (Handle Styles 51, 52, 53), Y Direction	Lbs.	0.8	2.4	4.0

#### MECHANICAL (U2 SWITCH): 2,500,000 Cycle Mechanical Life

Mechanical Operating Force	Units	Min	Typ	Max
	Oz.	3.5	6.5	9.5

#### MECHANICAL (P9 SWITCH): 1,250,000 Cycle Mechanical Life

Mechanical Operating Force	Units	Min	Typ	Max
	Oz.	8	12	16

#### MECHANICAL (KEYPAD PUSHBUTTONS): 3,000,000 Cycle Mechanical Life

Mechanical Operating Force	Units	Min	Typ	Max
	Oz.	2	8	10

#### ENVIRONMENTAL

<b>Electronics (Handles 11, 12, 21, 35, 41, 53, 71, 72)</b>	IP68S
<b>Seal</b>	Handle styles 34 and 35 panel sealed to IP68S
<b>RFI / EMI</b>	Withstand per SAE J1113

HALL EFFECT TECHNOLOGY JOYSTICK

## JHM PART NUMBER CODE

<p><b>JHM - XX</b></p> <p><b>Handle Style*</b></p> <ol style="list-style-type: none"> <li>11. No Handle ①</li> <li>12. Standard - Blank ①</li> <li>21. With Hall effect Rocker</li> <li>31. With Pushbutton-Top Handle, Half Boot</li> <li>32. With 2 Pushbuttons - Handle</li> <li>33. With 3 Pushbuttons</li> <li>34. With Pushbutton - Top Handle, Full Boot ②</li> <li>35. No Pushbutton - Top Handle, Full Boot ①②</li> <li>41. Lockout ①</li> <li>51. G3-D, Rocker and Operator Presence ②</li> <li>52. G3-D, Rocker ③</li> <li>53. G3-D, Blank ①③</li> <li>54. G3-D, Operator Presence</li> <li>61. 5-Button Keypad &amp; Hall Rocker Right ③⑤</li> <li>62. 5-Button Keypad &amp; Hall Rocker Left ③⑤</li> <li>63. 7-Button Keypad &amp; Hall Rocker Right ⑤</li> <li>64. 7-Button Keypad &amp; Hall Rocker Left ⑤</li> <li>71. Ball Handle, Large, Thermoset ①</li> <li>72. Ball Handle, Small, Rubber ①</li> </ol>	<p><b>X</b></p> <p><b>Gating</b></p> <ol style="list-style-type: none"> <li>1. Gated; Single axis – Return to Center</li> <li>2. Gated; Dual axis – Return to Center</li> <li>3. Omni-directional; Round Smooth Feel</li> <li>4. Omni-directional; On-Axis and Off-Axis Guided Feel</li> <li>5. Omni-directional; Round On-Axis Guided Feel</li> <li>6. Friction - Single axis ①④</li> <li>7. Friction Y-axis; Return to Center X-axis ①④</li> <li>8. Omni-directional; Square Smooth Feel</li> <li>9. Omni-directional; Square On-axis Guided Feel</li> </ol>	<p><b>X</b></p> <p><b>Force</b></p> <ol style="list-style-type: none"> <li>1. Low ④</li> <li>2. High</li> </ol>	<p><b>XX</b></p> <table border="0"> <tr> <td style="vertical-align: top;"> <p><b>Output 1**</b></p> <ol style="list-style-type: none"> <li>AA. 2.5 +/- 2.0VDC</li> <li>BB. 2.5 +/- 2.0VDC</li> <li>CC. 2.5 +/- 2.0VDC</li> <li>DD. 2.5 +/- 1.5VDC</li> <li>EE. 2.5 +/- 1.5VDC</li> <li>FF. 2.5 +/- 1.5VDC</li> <li>GG. 0.5 - 4.5VDC</li> <li>HH. 1.0 - 4.0VDC</li> <li>AT. 2.5 +/- 2.0VDC</li> <li>BT. 2.5 +/- 2.0VDC</li> <li>CT. 2.5 +/- 2.0VDC</li> <li>DT. 2.5 +/- 1.5VDC</li> <li>ET. 2.5 +/- 1.5VDC</li> <li>FT. 2.5 +/- 1.5VDC</li> <li>JJ. CANbus J1939</li> <li>KK. CANopen</li> <li>LL. PWM</li> <li>MM. USB</li> </ol> </td> <td style="vertical-align: top; padding-left: 20px;"> <p><b>Output 2</b></p> <ol style="list-style-type: none"> <li>NONE</li> <li>2.5 +/- 2.0VDC</li> <li>2.5 +/- 2.0VDC</li> <li>NONE</li> <li>2.5 +/- 1.5VDC</li> <li>2.5 +/- 1.5VDC</li> <li>0.5 - 4.5VDC</li> <li>1.0 - 4.0VDC</li> <li>NONE</li> <li>2.5 +/- 2.0VDC</li> <li>2.5 +/- 2.0VDC</li> <li>NONE</li> <li>2.5 +/- 1.5VDC</li> <li>2.5 +/- 1.5VDC</li> <li>NONE<sup>⑤</sup></li> <li>NONE<sup>⑤</sup></li> <li>NONE</li> <li>NONE<sup>⑤</sup></li> </ol> </td> </tr> </table>	<p><b>Output 1**</b></p> <ol style="list-style-type: none"> <li>AA. 2.5 +/- 2.0VDC</li> <li>BB. 2.5 +/- 2.0VDC</li> <li>CC. 2.5 +/- 2.0VDC</li> <li>DD. 2.5 +/- 1.5VDC</li> <li>EE. 2.5 +/- 1.5VDC</li> <li>FF. 2.5 +/- 1.5VDC</li> <li>GG. 0.5 - 4.5VDC</li> <li>HH. 1.0 - 4.0VDC</li> <li>AT. 2.5 +/- 2.0VDC</li> <li>BT. 2.5 +/- 2.0VDC</li> <li>CT. 2.5 +/- 2.0VDC</li> <li>DT. 2.5 +/- 1.5VDC</li> <li>ET. 2.5 +/- 1.5VDC</li> <li>FT. 2.5 +/- 1.5VDC</li> <li>JJ. CANbus J1939</li> <li>KK. CANopen</li> <li>LL. PWM</li> <li>MM. USB</li> </ol>	<p><b>Output 2</b></p> <ol style="list-style-type: none"> <li>NONE</li> <li>2.5 +/- 2.0VDC</li> <li>2.5 +/- 2.0VDC</li> <li>NONE</li> <li>2.5 +/- 1.5VDC</li> <li>2.5 +/- 1.5VDC</li> <li>0.5 - 4.5VDC</li> <li>1.0 - 4.0VDC</li> <li>NONE</li> <li>2.5 +/- 2.0VDC</li> <li>2.5 +/- 2.0VDC</li> <li>NONE</li> <li>2.5 +/- 1.5VDC</li> <li>2.5 +/- 1.5VDC</li> <li>NONE<sup>⑤</sup></li> <li>NONE<sup>⑤</sup></li> <li>NONE</li> <li>NONE<sup>⑤</sup></li> </ol>	<p><b>X</b></p> <p><b>Termination***</b></p> <ol style="list-style-type: none"> <li>1. Wire Leads 24 AWG SAE AS22759 ③</li> <li>2. Cable, 22AWG (19/34), PVC/Polyurethane Outer Jacket</li> <li>3. USB 2.0 HID Joystick USB Mini B</li> </ol>
<p><b>Output 1**</b></p> <ol style="list-style-type: none"> <li>AA. 2.5 +/- 2.0VDC</li> <li>BB. 2.5 +/- 2.0VDC</li> <li>CC. 2.5 +/- 2.0VDC</li> <li>DD. 2.5 +/- 1.5VDC</li> <li>EE. 2.5 +/- 1.5VDC</li> <li>FF. 2.5 +/- 1.5VDC</li> <li>GG. 0.5 - 4.5VDC</li> <li>HH. 1.0 - 4.0VDC</li> <li>AT. 2.5 +/- 2.0VDC</li> <li>BT. 2.5 +/- 2.0VDC</li> <li>CT. 2.5 +/- 2.0VDC</li> <li>DT. 2.5 +/- 1.5VDC</li> <li>ET. 2.5 +/- 1.5VDC</li> <li>FT. 2.5 +/- 1.5VDC</li> <li>JJ. CANbus J1939</li> <li>KK. CANopen</li> <li>LL. PWM</li> <li>MM. USB</li> </ol>	<p><b>Output 2</b></p> <ol style="list-style-type: none"> <li>NONE</li> <li>2.5 +/- 2.0VDC</li> <li>2.5 +/- 2.0VDC</li> <li>NONE</li> <li>2.5 +/- 1.5VDC</li> <li>2.5 +/- 1.5VDC</li> <li>0.5 - 4.5VDC</li> <li>1.0 - 4.0VDC</li> <li>NONE</li> <li>2.5 +/- 2.0VDC</li> <li>2.5 +/- 2.0VDC</li> <li>NONE</li> <li>2.5 +/- 1.5VDC</li> <li>2.5 +/- 1.5VDC</li> <li>NONE<sup>⑤</sup></li> <li>NONE<sup>⑤</sup></li> <li>NONE</li> <li>NONE<sup>⑤</sup></li> </ol>					

\* Wire loop not in handle style 11, 12, 35, 41, 53 and 71.

\*\*Outputs are from the center to the full travel position in each direction. Options "AA", "BB", "CC", "DD", "EE", "FF", "AT", "BT", "CT", "DT", "ET" and "FT" provide increased voltage in +x, +y; and decreasing voltage in -x, -y for output 1. Options "GG" and "HH" provide increasing voltages in all directions (+x, +y, -x, -y) for output 1 and output 2.

Options "BB", "EE", "BT", "ET" provide redundant output 2 which duplicates output 1.

Options "CC", "FF", "CT", "FT" provide redundant output 2 which is inverse of output 1.

Options "AT", "BT", "CT", "DT", "ET" and "FT" are identical to options "AA", "BB", "CC", "DD", "EE", and "FF" respectively except with a tighter center tolerance.

\*\*\*Outputs "AA" through "FT" and "LL" utilize termination 1, outputs "JJ" and "KK" utilize termination 2, and output "MM" utilizes termination 3.

① Friction hold only available with handle styles 11, 12, 35, 41, 53, 71 and 72.

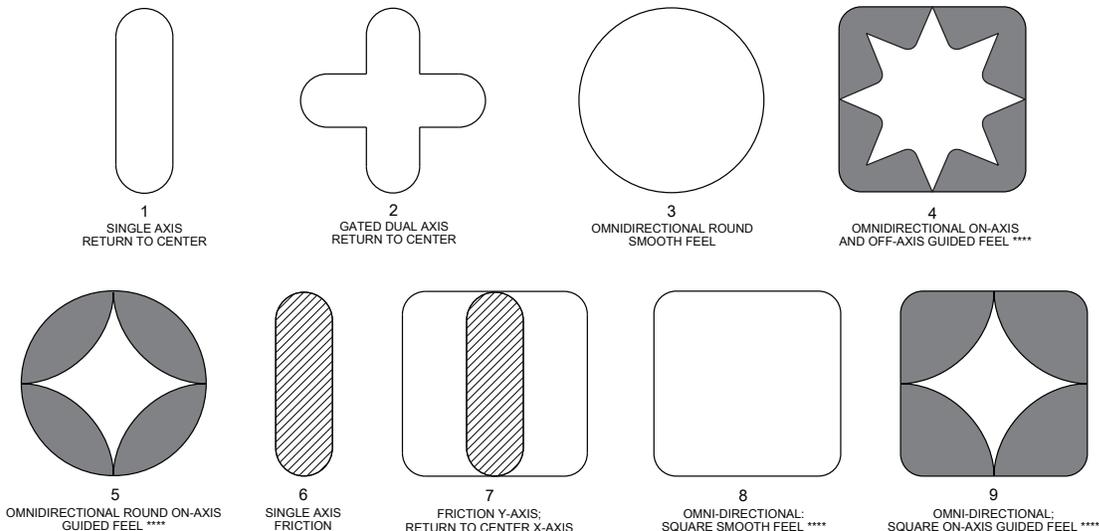
② Watertight panel seal applies to handle style 34 and 35.

③ Handle styles 61, 62 have the following wires for the 5-button switch array: 26 AWG, MIL-W-22759/33. Handle styles 52, 53 have the following wires for the handle wires: 22 AWG, UL1569.

④ Low force not available with gating options 6 and 7.

⑤ Outputs "JJ", "KK" and "MM" not available with handle styles 61, 62, 63 and 64.

### JHM GATING ICONS

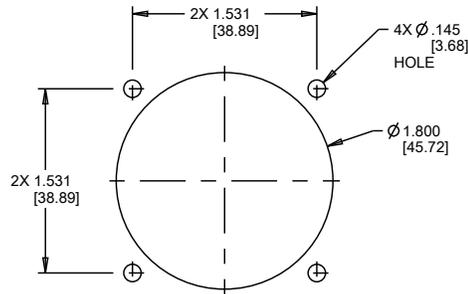


\*\*\*\* FEEL DEFINED BY SHADING

# MEDIUM HALL EFFECT JOYSTICK

UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

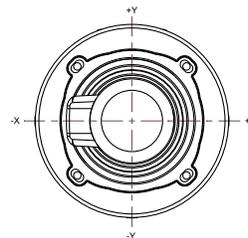
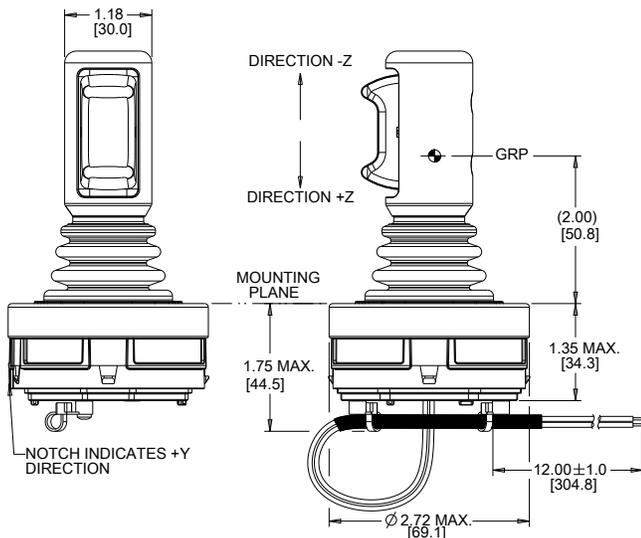
## JHM Suggested Panel Opening



SUGGESTED PANEL OPENING  
REAR MOUNT  
(ALL HANDLE STYLES EXCEPT HANDLE 51)  
PANEL THICKNESS .06

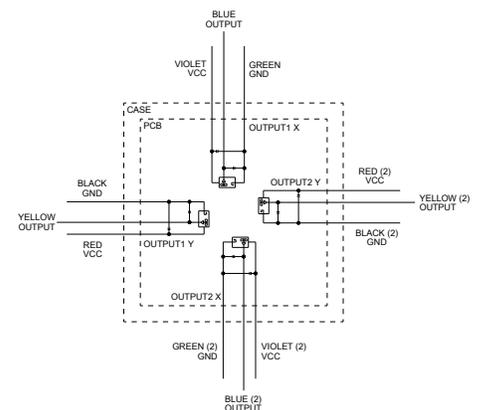
## Mounting Hardware Information

MOUNTING HARDWARE INFORMATION	
MATERIAL:	
MOUNTING HARDWARE (EXCEPT HANDLE STYLE 51)	4X M3X0.5X14MM



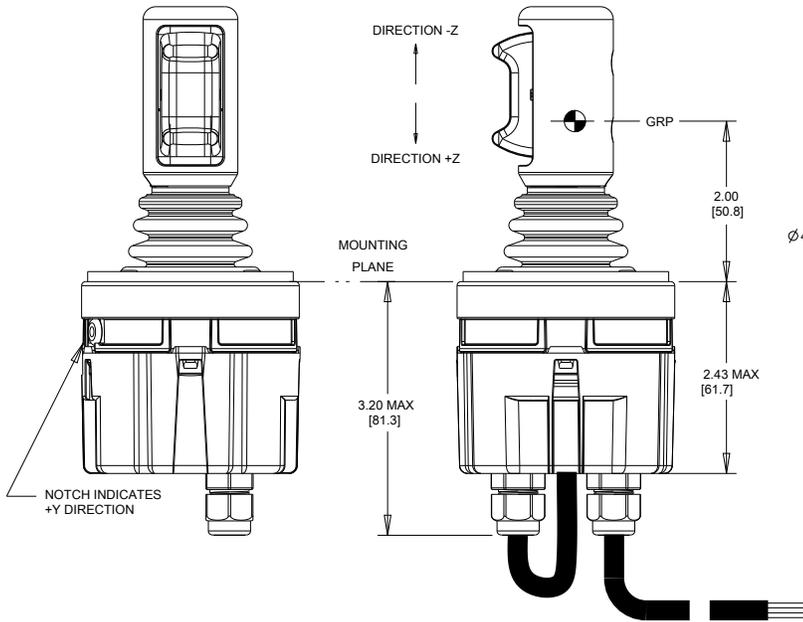
## JHM Outputs AA-FT and LL (Output Graph at end of JHM section)

PWM PRODUCT SPECIFICATIONS				
ELECTRICAL:				
PWM INTERFACE				
SUPPLY VOLTAGE, Vcc	VDC	4.5	N/A	18.0
OUTPUT FREQUENCY	Hz	460	500	540
AMPLITUDE LOW	A	0.0	N/A	.020
AMPLITUDE HIGH PULLUP REQUIRED	VDC	3.0	N/A	12.0
PWM OUTPUT @ +X AND +Y FULL TRAVEL	%	80.0	90.0	92.0
PWM OUTPUT @ ZERO TRAVEL	%	42.0	50.0	58.0
PWM OUTPUT @ -X AND -Y FULL TRAVEL	%	8.0	10.0	20.0



## HALL EFFECT TECHNOLOGY JOYSTICK

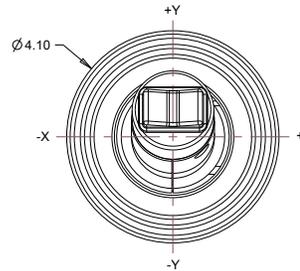
### Rear Mount Style



### JHM Outputs JJ and KK

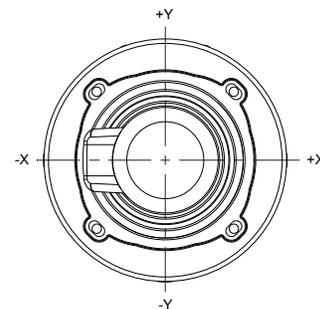
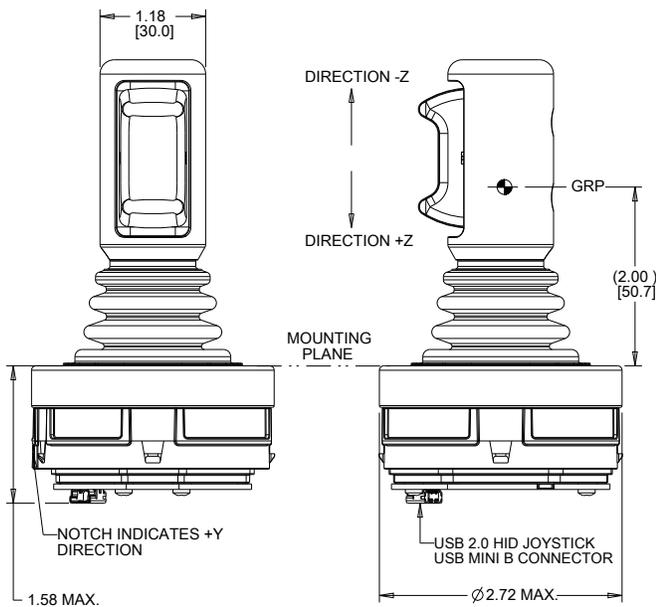
FUNCTION	COLOR
CAN HIGH	YELLOW
-SUPPLY	BLACK
+SUPPLY	RED
CAN LOW	GREEN
SHIELD	DRAIN

PRODUCT SPECIFICATIONS				
ELECTRICAL:				
JOYSTICK CAN OPEN				
	UNITS	MIN	TYP	MAX
SUPPLY VOLTAGE	VDC	9	N/A	32
NODE IDENTIFIER		10 DECIMAL		
BAUD RATE		125K bits/s		
TRANSMISSION REPETITION RATE		100 ms		
JOYSTICK J1939				
	UNITS	MIN	TYP	MAX
SUPPLY VOLTAGE	VDC	9	N/A	32
SOURCE ADDRESS		51 DECIMAL		
BAUD RATE		250K bits/s		
TRANSMISSION REPETITION RATE		100 ms		



### JHM Output MM

PRODUCT SPECIFICATIONS	
ELECTRICAL:	
JOYSTICK POWERED BY STANDARD USB INTERFACE	

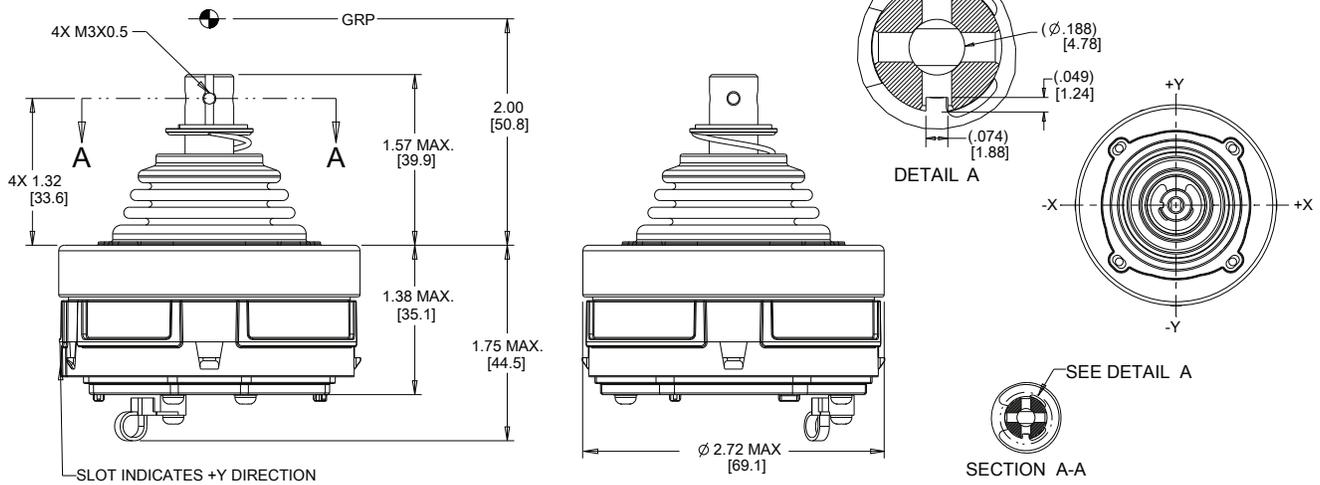


Wires and Strain Relief not shown in all views for clarity.

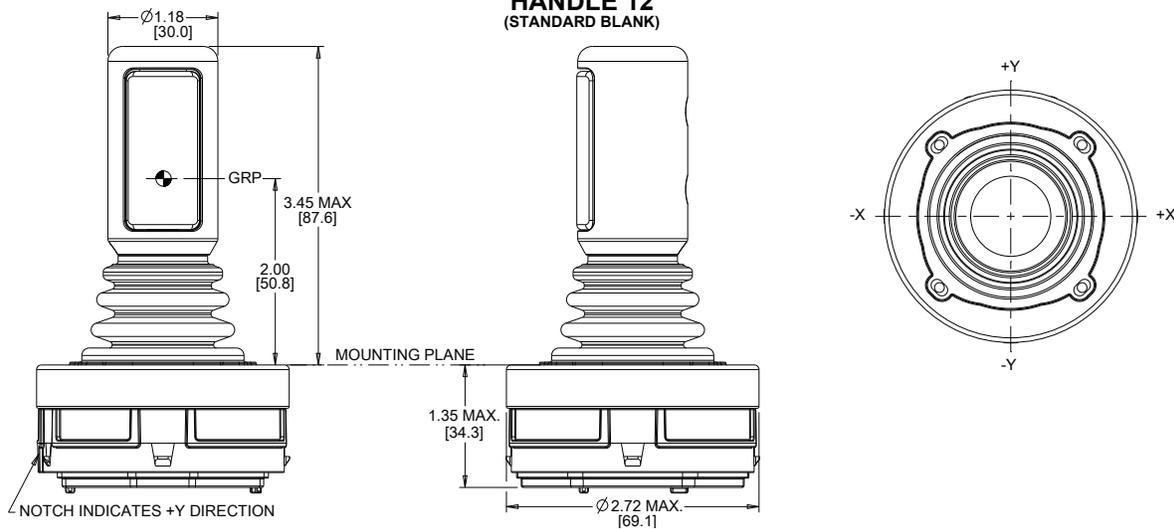
# MEDIUM HALL EFFECT JOYSTICK

UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

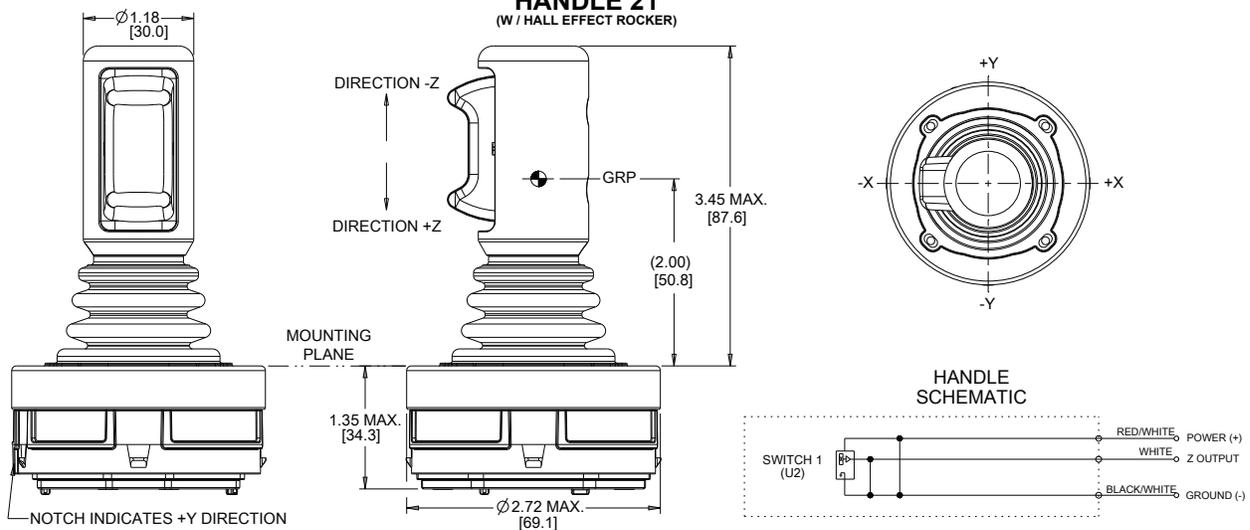
## HANDLE 11 (No Handle)



## HANDLE 12 (STANDARD BLANK)



## HANDLE 21 (W / HALL EFFECT ROCKER)

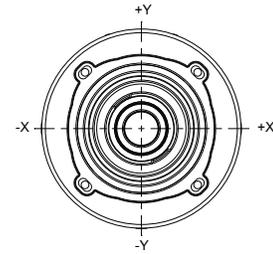
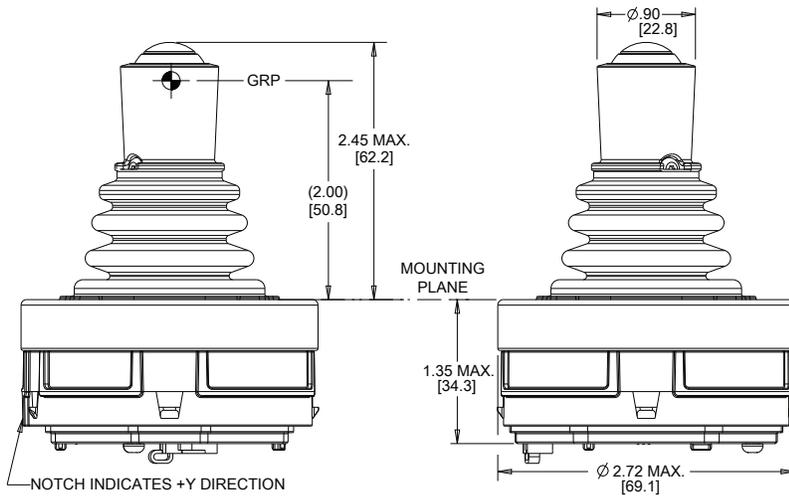


Wires and Strain Relief not shown in all views for clarity.

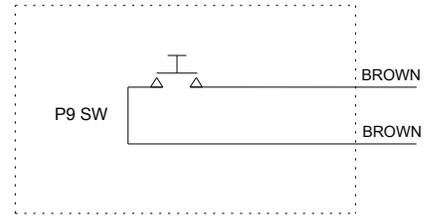
## HALL EFFECT TECHNOLOGY JOYSTICK

### HANDLE 31

(W / PUSHBUTTON, TOP HANDLE, HALF BOOT)

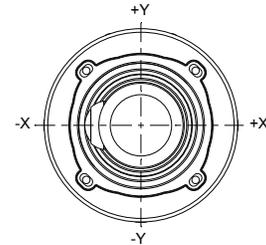
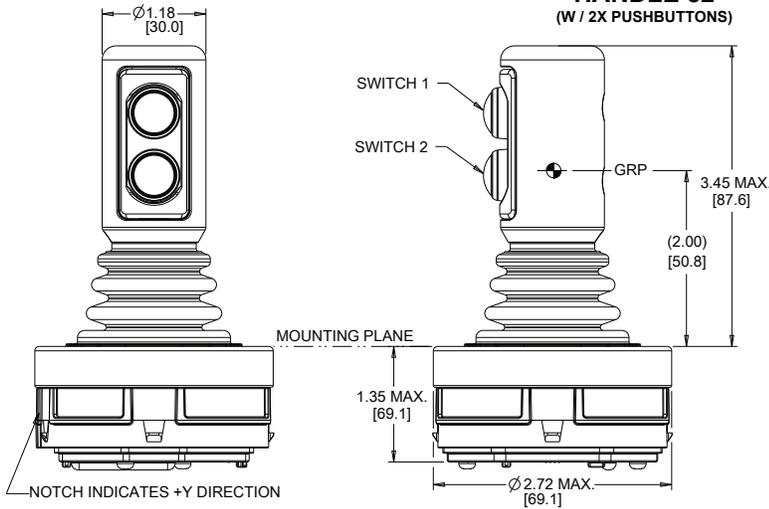


HANDLE SCHEMATIC

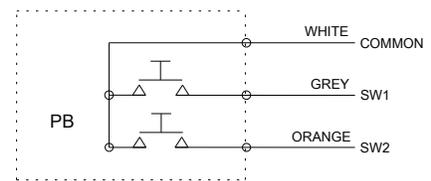


### HANDLE 32

(W / 2X PUSHBUTTONS)

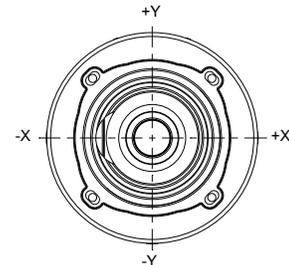
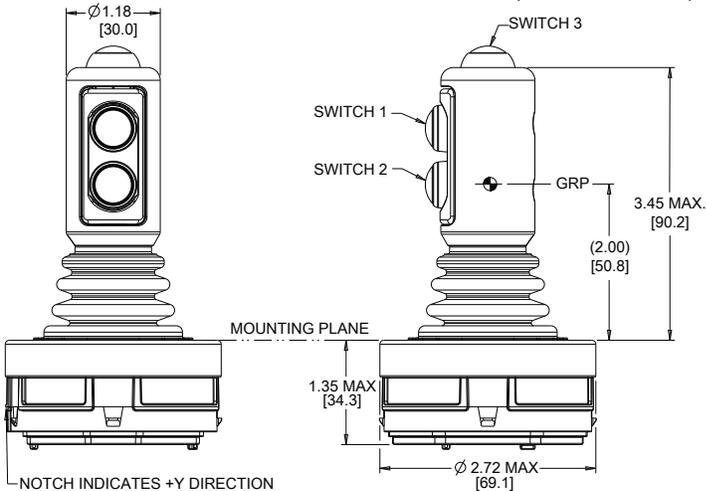


HANDLE SCHEMATIC

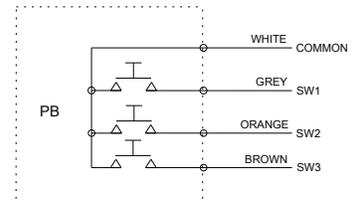


### HANDLE 33

(W / 3X PUSHBUTTONS)



HANDLE SCHEMATIC

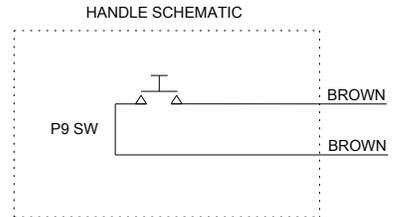
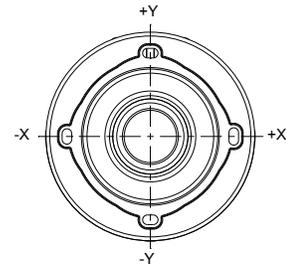
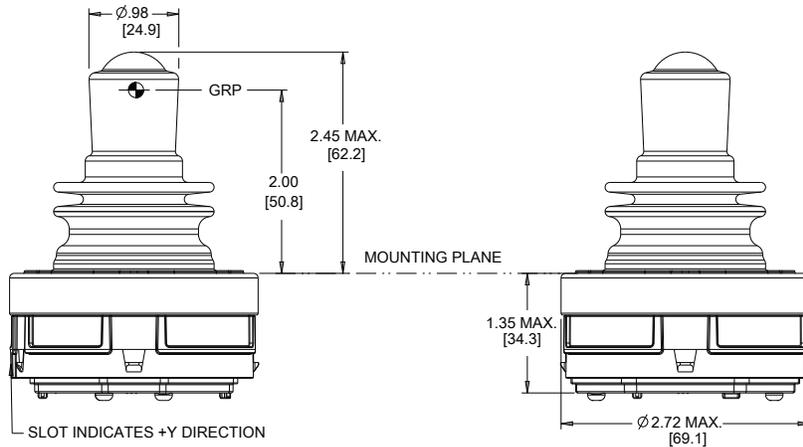


Wires and Strain Relief not shown in all views for clarity.

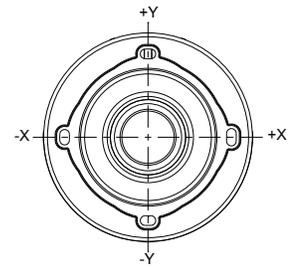
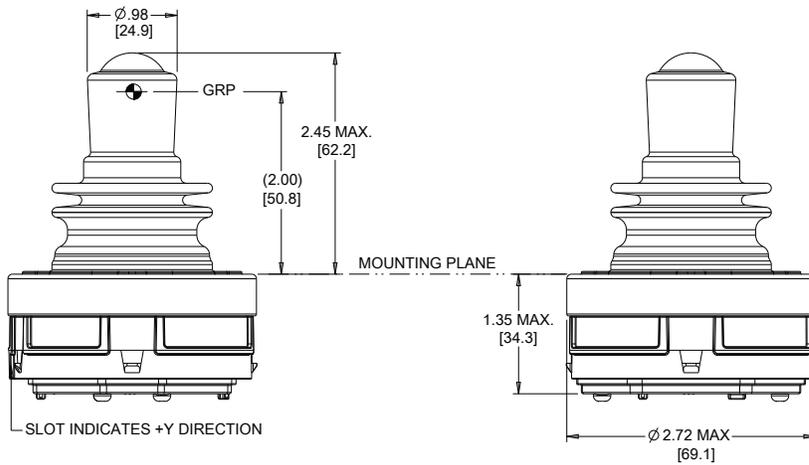
# MEDIUM HALL EFFECT JOYSTICK

UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

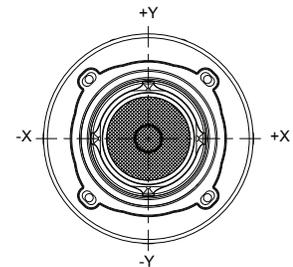
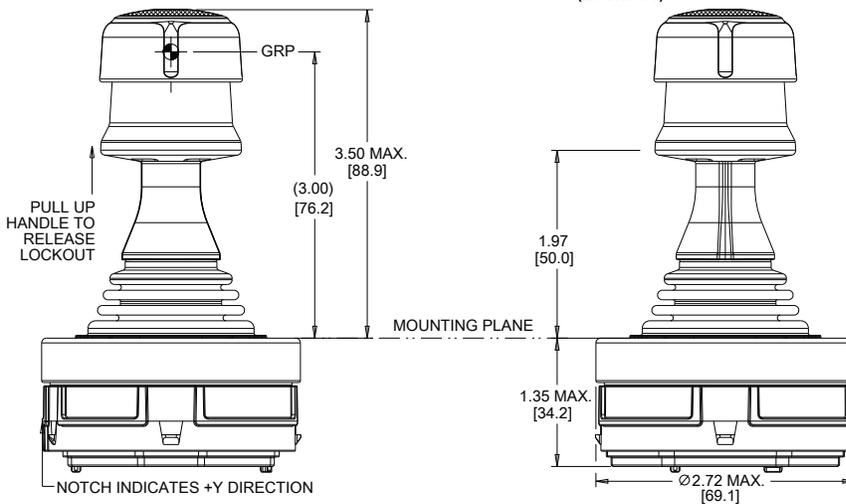
## HANDLE 34 (W / PUSHBUTTON, TOP HANDLE, FULL BOOT)



## HANDLE 35 (NO PUSHBUTTON, TOP HANDLE, FULL BOOT)



## HANDLE 41 (LOCKOUT)

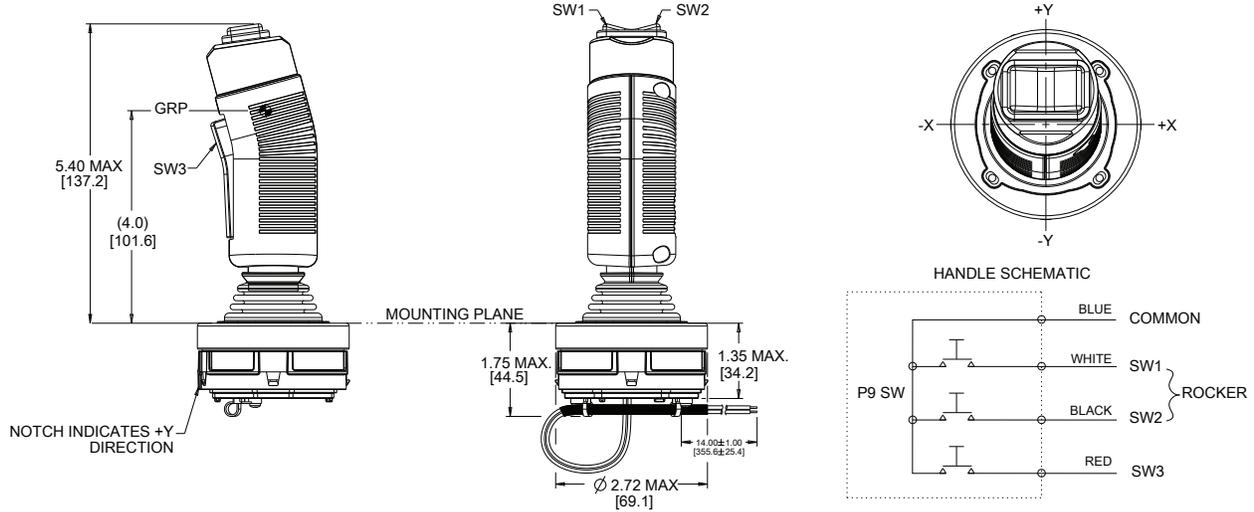


Wires and Strain Relief not shown in all views for clarity.

## HALL EFFECT TECHNOLOGY JOYSTICK

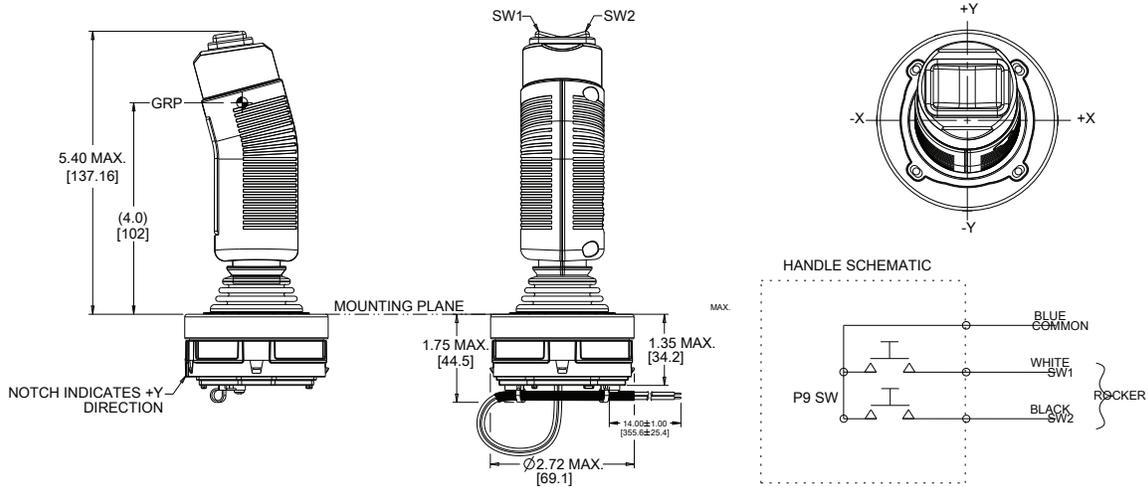
### HANDLE 51

(G3-D WITH ROCKER AND OPERATOR PRESENCE)



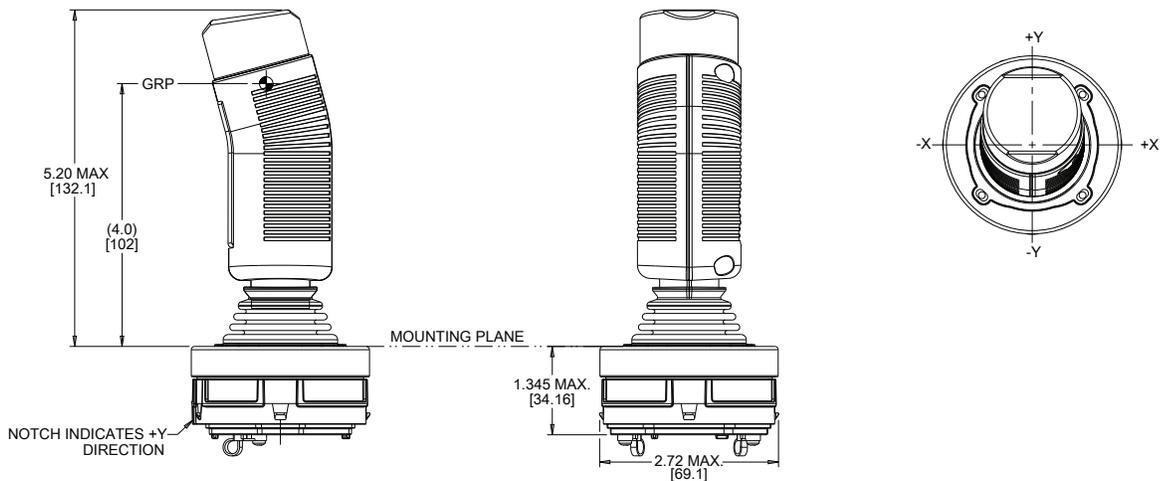
### HANDLE 52

(G3-D WITH ROCKER)



### HANDLE 53

(G3-D)

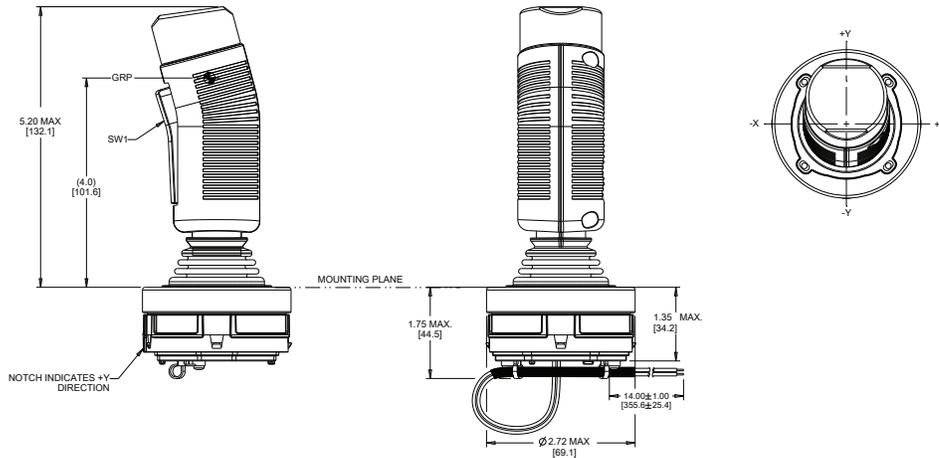


Wires and Strain Relief not shown in all views for clarity.

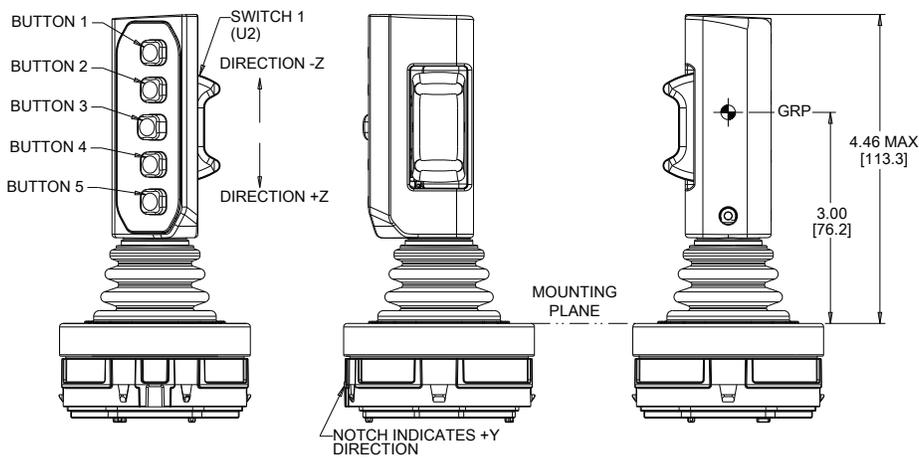
# MEDIUM HALL EFFECT JOYSTICK

## HALL EFFECT TECHNOLOGY JOYSTICK

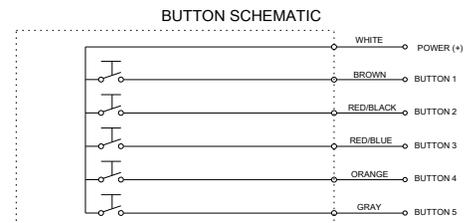
### HANDLE 54 (G3-D WITH OPERATOR PRESENCE)



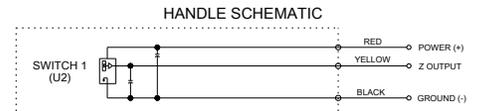
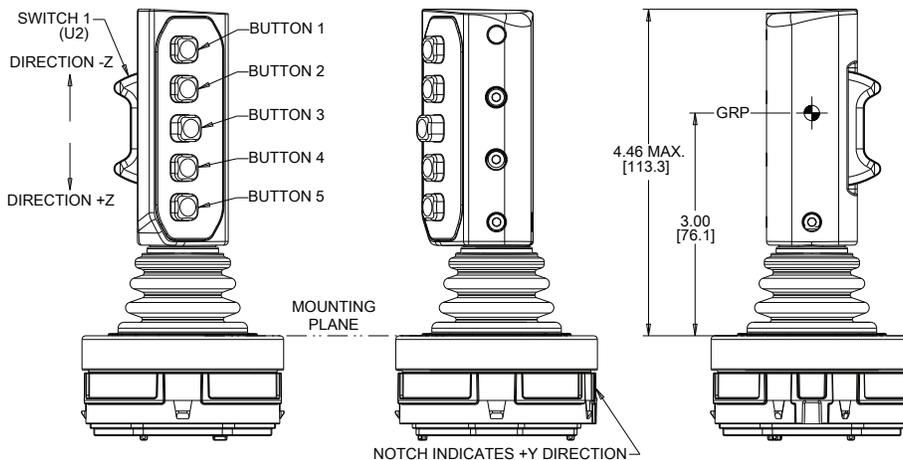
### HANDLE 61 (5-BUTTON KEYPAD & HALL ROCKER RIGHT)



#### Right-Handed Version



### HANDLE 62 (5-BUTTON KEYPAD & HALL ROCKER LEFT)



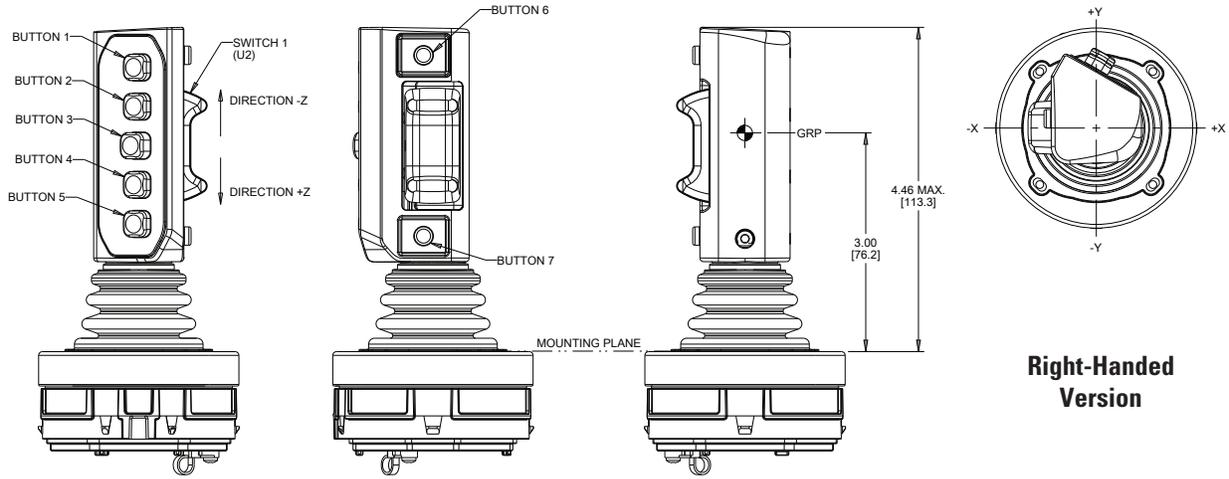
#### Left-Handed Version

**Wires and Strain Relief not shown in all views for clarity.**

UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

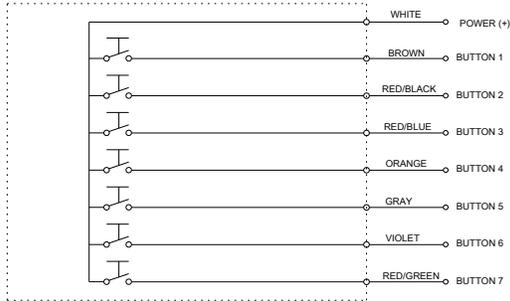
## HANDLE 63

(7-BUTTON KEYPAD & HALL ROCKER RIGHT)

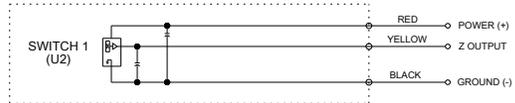


**Right-Handed  
Version**

### BUTTON SCHEMATIC

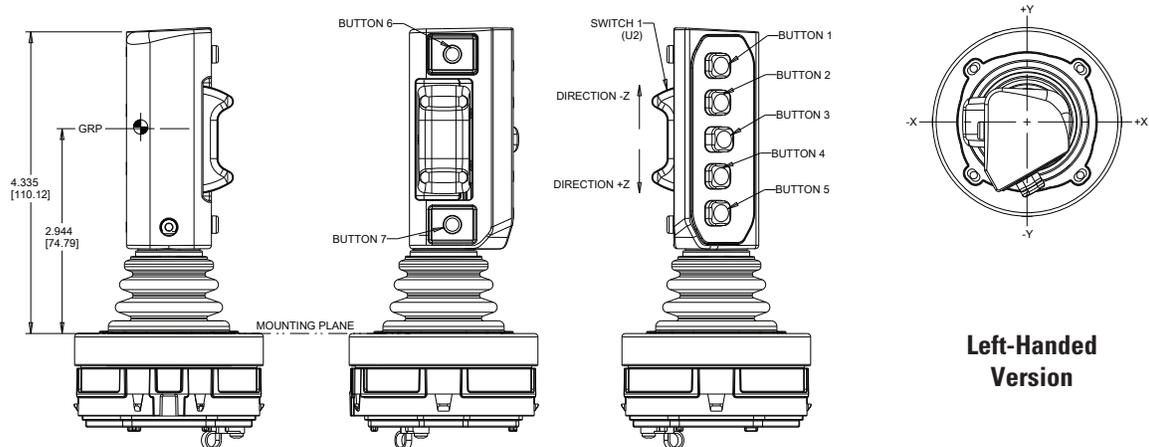


### HANDLE SCHEMATIC



## HANDLE 64

(7-BUTTON KEYPAD & HALL ROCKER LEFT)



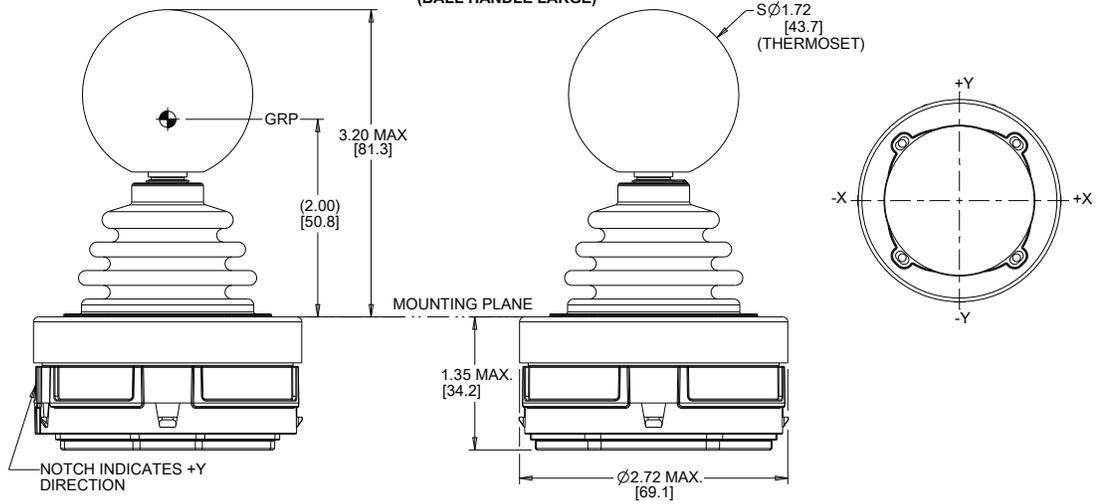
**Left-Handed  
Version**

**Wires and Strain Relief not shown in all views for clarity.**

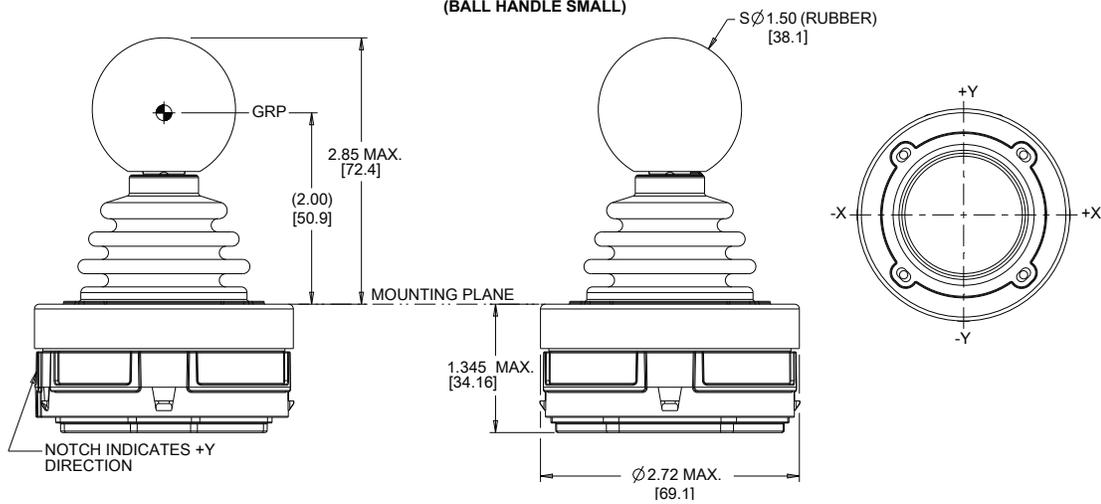
# MEDIUM HALL EFFECT JOYSTICK

UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

## HANDLE 71 (BALL HANDLE LARGE)



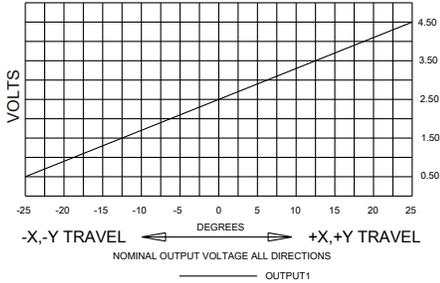
## HANDLE 72 (BALL HANDLE SMALL)



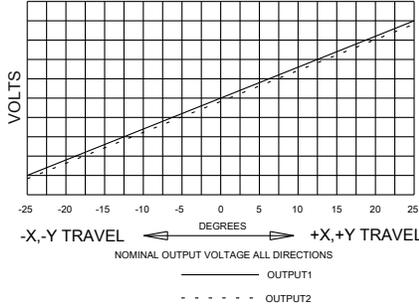
UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

## JHM OUTPUTS

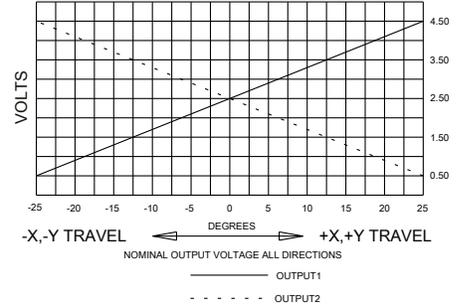
**OPTION AA & AT**



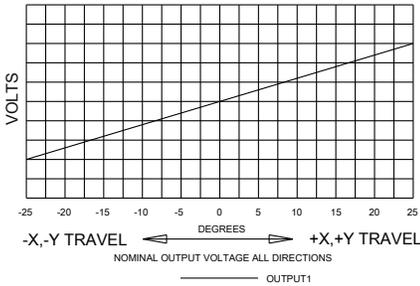
**OPTION BB & BT**



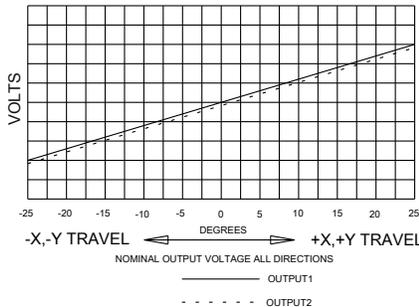
**OPTION CC & CT**



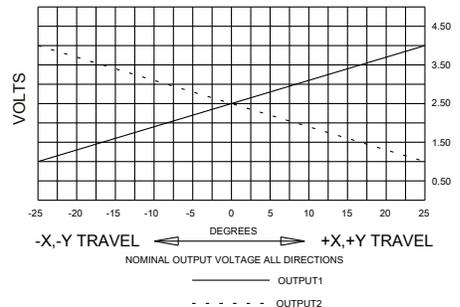
**OPTION DD & DT**



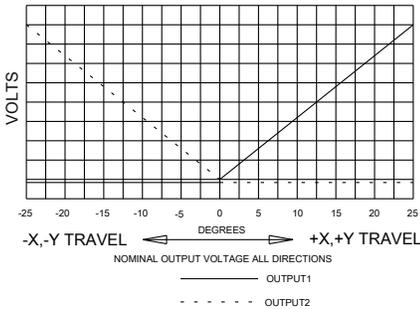
**OPTION EE & ET**



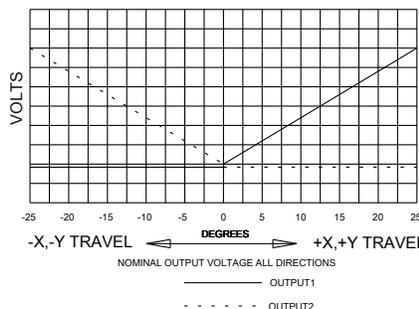
**OPTION FF & FT**



**OPTION GG**



**OPTION HH**



**OPTION LL**

