

MEDIUM HALL EFFECT JOYSTICK

JHM
MEDIUM
JOYSTICK

UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS



The JHM is a medium, bottom mount, full-function joystick that fits in an armrest, on a panel or other locations with a shallow behind-panel depth. It utilizes Hall effect technology for long life and reliability. Electronics are sealed up to IP68S with an operational life of 10 million cycles in all directions.

The standard JHM offers 19 handle styles such as a ball handle, a lockout handle, a G3-D Control Grip and handles with pushbuttons, rockers and 5-button keypads. It can also be paired with any OTTO Universal Series grip.

Output options include CANopen, J1939, PWM, USB, analog and digital control outputs, and redundant sensors.

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 and panel mounting
- Shorter behind panel depth, bottom mount
- 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 and switch options
- Redundant sensors available
- Various output configurations include:
 - 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, Io=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, NN, Rear Mount
250,000 Cycles, Friction Held, High Force
Boot Life up to 1 Million Cycles

Mechanical (Operating Force w/Boot)	Units	Min	Typ	Max
Travel Angle	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)	Lbs.	1.2	2.5	3.8
Handle Styles 51, 52, 53				
Low Force @ 4" GRP (Return to Center)	Lbs.	0.4	0.8	1.2
Handle Styles 51, 52, 53				
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	Units	Min	Typ	Max
Operating Force	Oz.	3.5	6.5	9.5

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

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

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

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

ENVIRONMENTAL

Operating Temperature (except below)	°C	-40	20	85
Operating Temperature (Handles 61, 62)	°C	-25	20	70
Storage Temperature (Handles 61, 62)	°C	-40	20	85
Electronics (Handles 11, 12, 21, 35, 41, 53, 71, 72)	IP68S			
Seal	Handle styles 34 and 35 panel sealed to IP68S			
RFI / EMI	Withstand per SAE J1113			

HALL EFFECT TECHNOLOGY JOYSTICK

JHM PART NUMBER CODE

JHM - XX	X	X	XX	X
Handle Style*	Gating	Force	Output 1**	Output 2
11. No Handle ①	1. Gated; Single axis – Return to Center	1. Low ④	AA. 2.5 +/- 2.0VDC	NONE
12. Standard - Blank ①	2. Gated; Dual axis – Return to Center	2. High	BB. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC
21. With Hall effect Rocker	3. Omni-directional; Round Smooth Feel		CC. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC
31. With Pushbutton-Top Handle, Half Boot	4. Omni-directional; On-Axis and Off-Axis Guided Feel		DD. 2.5 +/- 1.5VDC	NONE
32. With 2 Pushbuttons - Handle	5. Omni-directional; Round On-Axis Guided Feel		EE. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC
33. With 3 Pushbuttons	6. Friction - Single axis ① ④		FF. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC
34. With Pushbutton - Top Handle, Full Boot ②	7. Friction Y-axis; Return to Center X-axis ① ④		GG. 0.5 - 4.5VDC	0.5 - 4.5VDC
35. No Pushbutton - Top Handle, Full Boot ① ②	8. Omni-directional; Square Smooth Feel		HH. 1.0 - 4.0VDC	1.0 - 4.0VDC
41. Lockout ① ⑥	9. Omni-directional; Square On-axis Guided Feel		AT. 2.5 +/- 2.0VDC	NONE
51. G3-D, Rocker and Operator Presence ②			BT. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC
52. G3-D, Rocker ③			CT. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC
53. G3-D, Blank ① ③			DT. 2.5 +/- 1.5VDC	NONE
54. G3-D, Operator Presence			ET. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC
61. 5-Button Keypad & Hall Rocker Right ③ ⑤			FT. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC
62. 5-Button Keypad & Hall Rocker Left ③ ⑤			JJ. CANbus J1939 ⑤	NONE
63. 7-Button Keypad & Hall Rocker Right ⑤			KK. CANopen ⑤	NONE
64. 7-Button Keypad & Hall Rocker Left ⑤			LL. PWM	NONE
71. Ball Handle, Large, Thermoset ①			MM. USB, Inverted Y ⑤ ⑦	NONE
72. Ball Handle, Small, Rubber ①			NN. USB, Standard Y ⑦	NONE

* 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.

For pricing on PWM output, please contact factory at 847-428-7171.

***Outputs "AA" through "FT" and "LL" utilize termination 1, outputs "JJ" and "KK" utilize termination 2, and outputs "MM" and "NN" utilize 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.

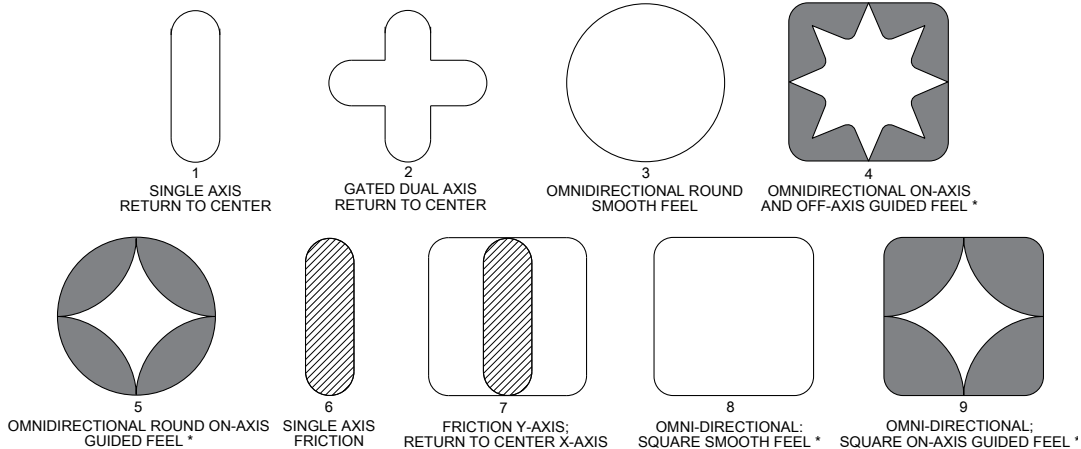
④ Low force not available with gating options 6 and 7.

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

⑥ Only available with gating options 1, 3 and 6.

⑦ For outputs MM and NN, the reported values for the x direction increase as the joystick moves from left to right. For option MM (inverted y), the reported values for the y direction decrease as the joystick moves from far to near. For output NN (standard y), the reported values for the y-direction increase as the joystick moves from far to near.

JHM GATING ICONS



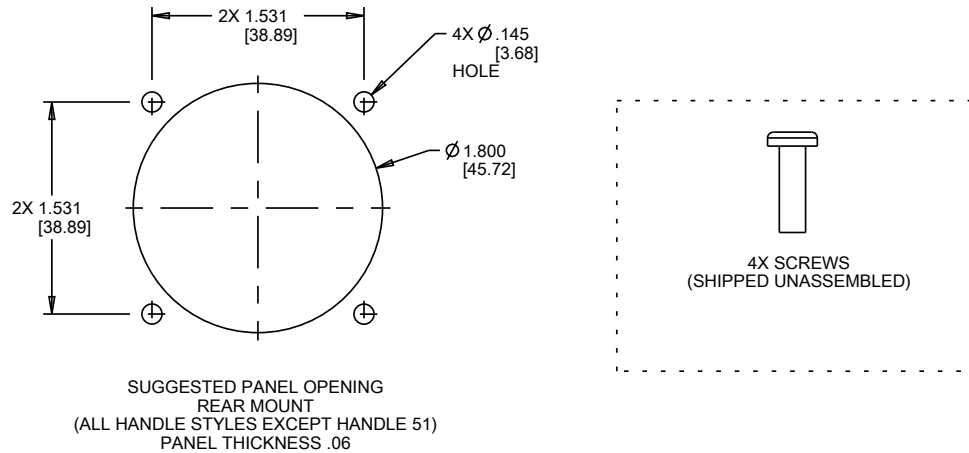
* FEEL DEFINED BY SHADING

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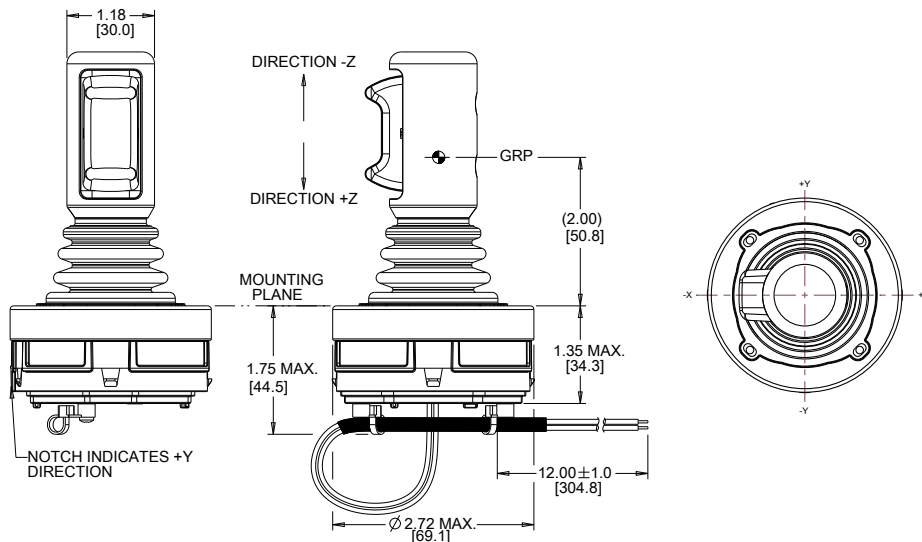
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JHM Suggested Panel Opening



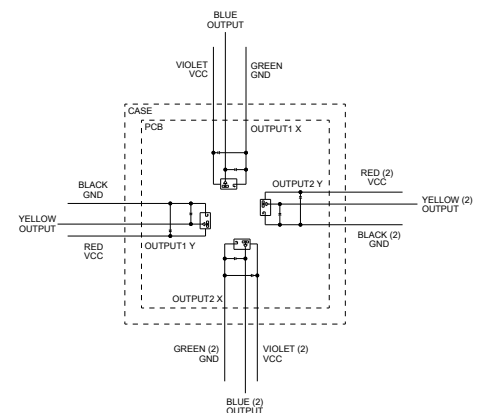
Mounting Hardware Information

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



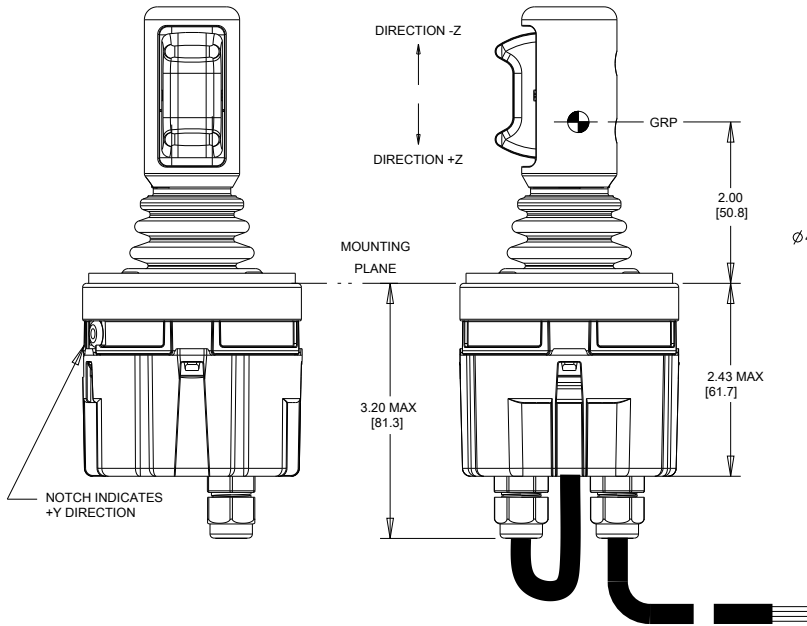
JHM Outputs AA-FT and LL (Output Graph at end of JHM section)

PWM PRODUCT SPECIFICATIONS				
ELECTRICAL:		PWM INTERFACE		
SUPPLY VOLTAGE, V _{CC}	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



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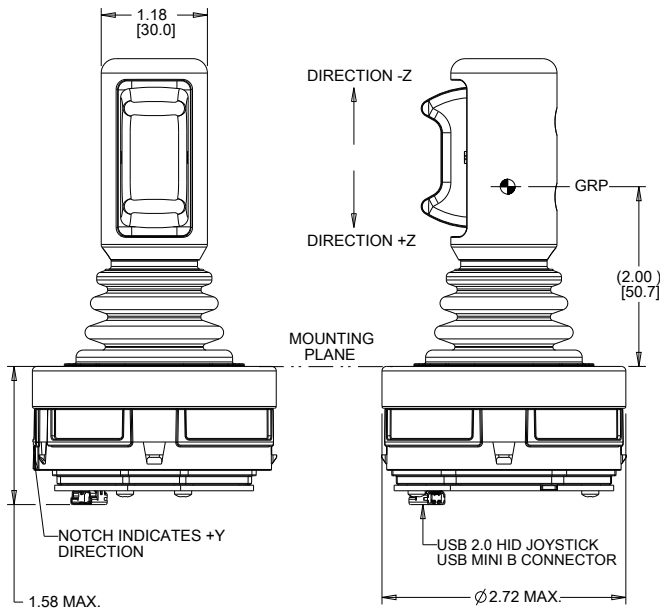
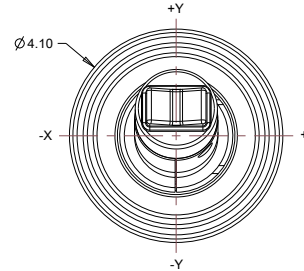
Rear Mount Style



JHM Outputs JJ and KK

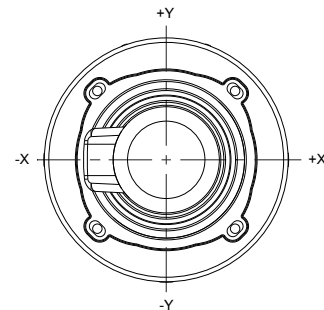
FUNCTION	COLOR
CAN HIGH	YELLOW
-SUPPLY	BLACK
+SUPPLY	RED
CAN LOW	GREEN
SHIELD	DRAIN

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 Outputs MM and NN

PRODUCT SPECIFICATIONS	
ELECTRICAL:	
JOYSTICK POWERED BY STANDARD USB INTERFACE	



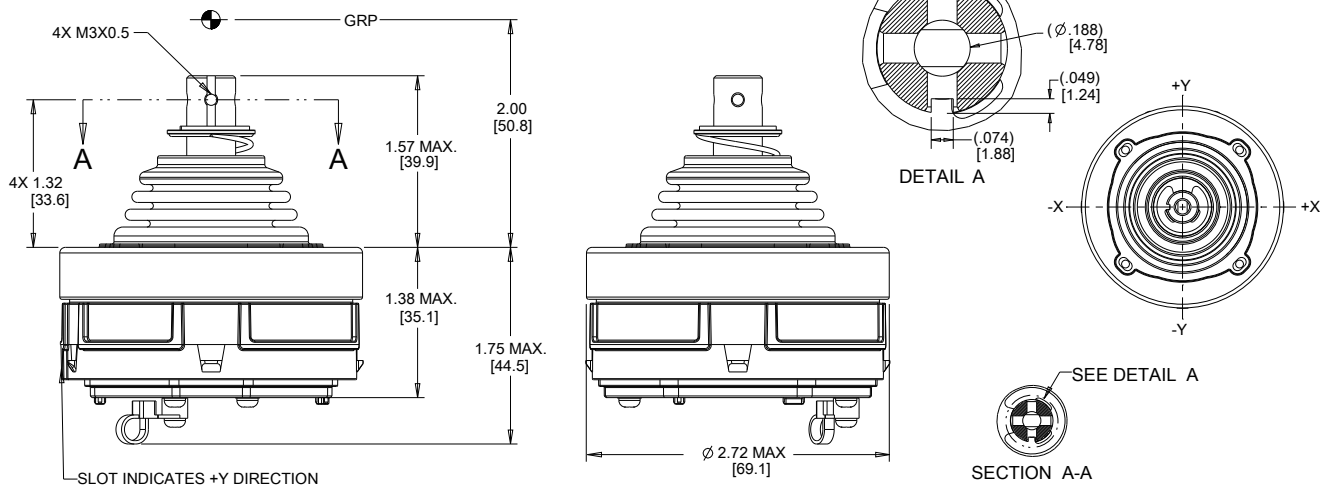
Wires and Strain Relief not shown in all views for clarity.

MEDIUM HALL EFFECT JOYSTICK

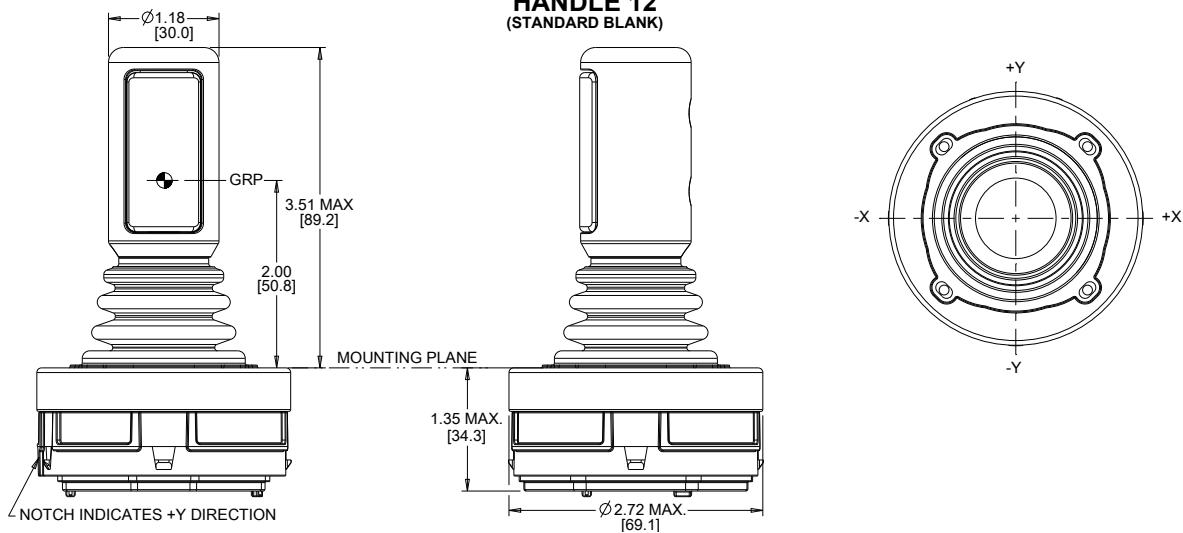
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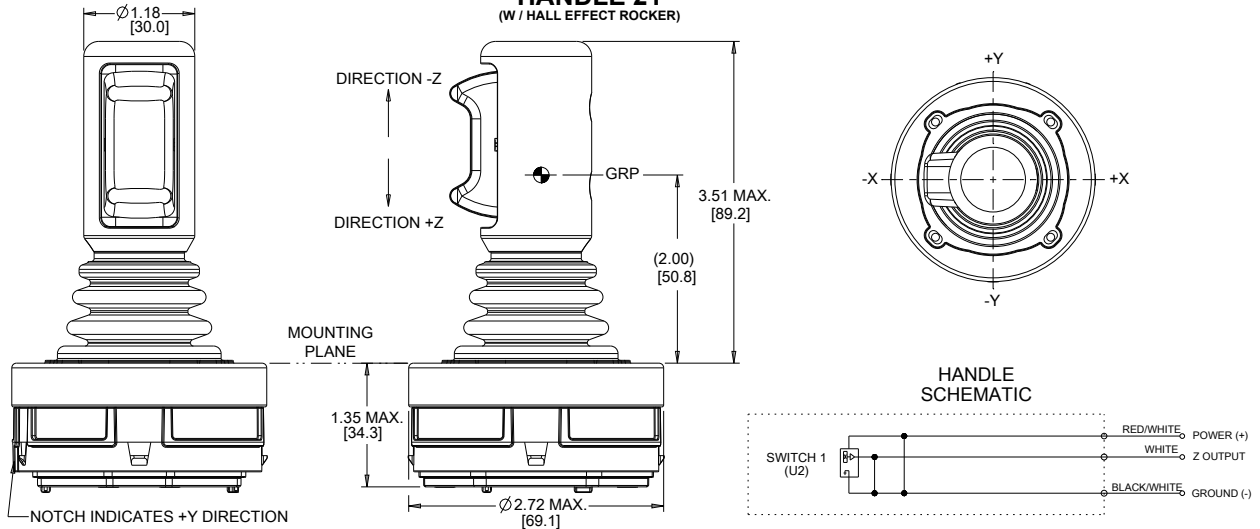
HANDLE 11 (No Handle)



HANDLE 12 (STANDARD BLANK)



HANDLE 21 (W / HALL EFFECT ROCKER)

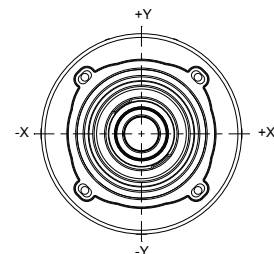
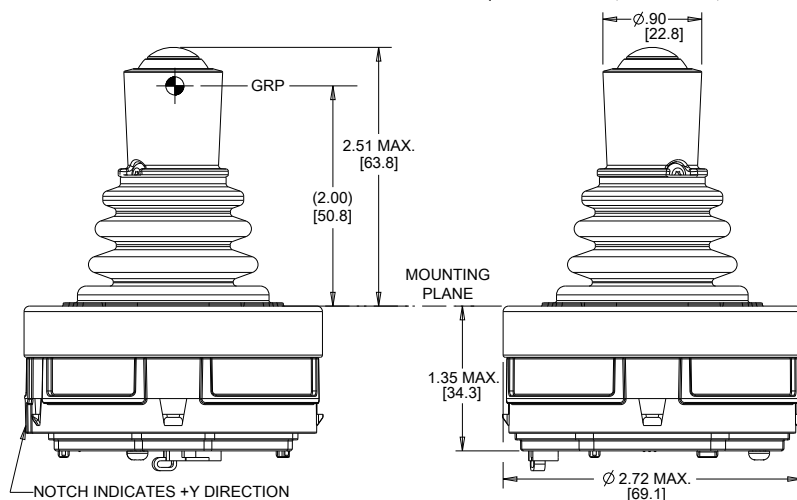


Wires and Strain Relief not shown in all views for clarity.

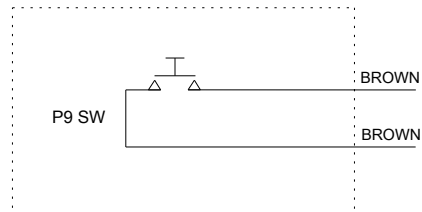
HALL EFFECT TECHNOLOGY JOYSTICK

HANDLE 31

(W / PUSHBUTTON, TOP HANDLE, HALF BOOT)

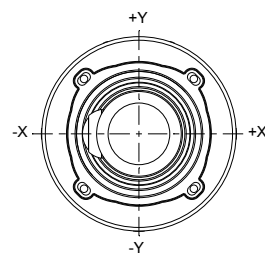
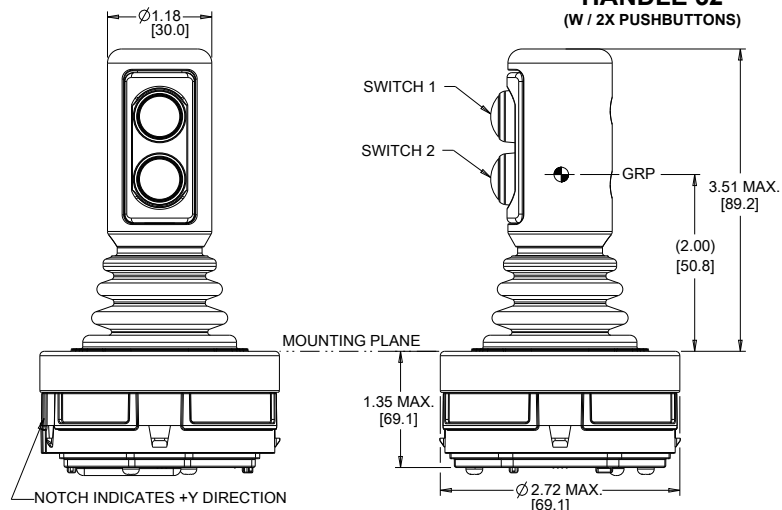


HANDLE SCHEMATIC

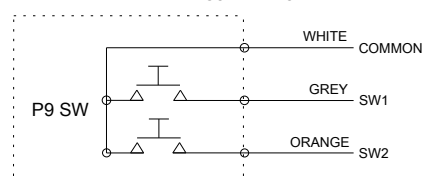


HANDLE 32

(W / 2X PUSHBUTTONS)

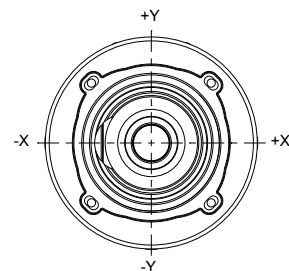
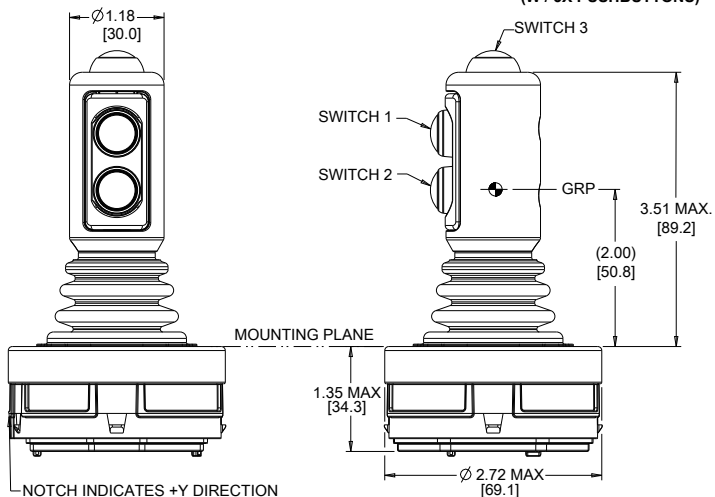


HANDLE SCHEMATIC

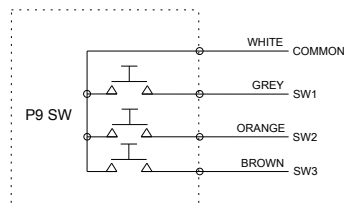


HANDLE 33

(W / 3X PUSHBUTTONS)



HANDLE SCHEMATIC



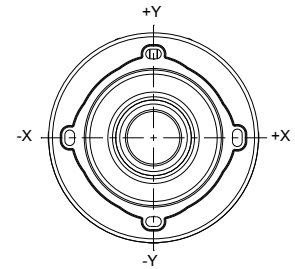
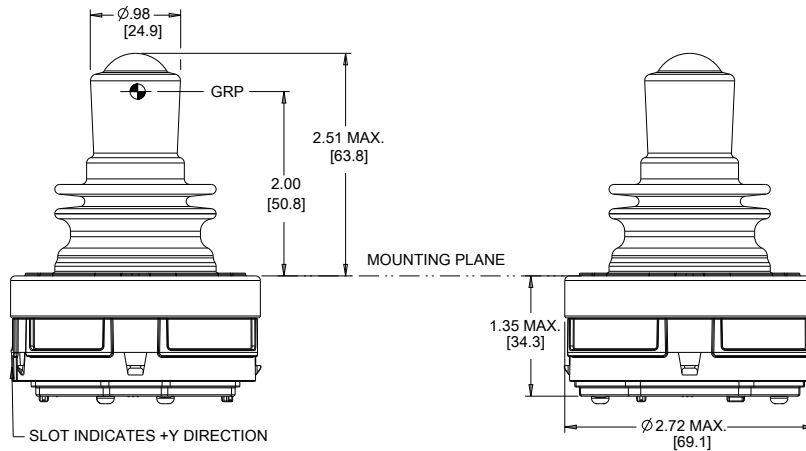
Wires and Strain Relief not shown in all views for clarity.

MEDIUM HALL EFFECT JOYSTICK

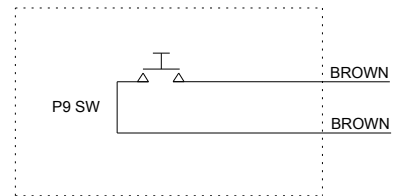
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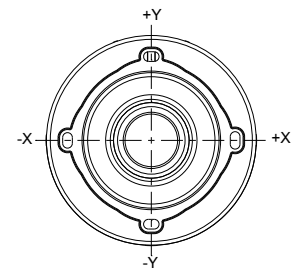
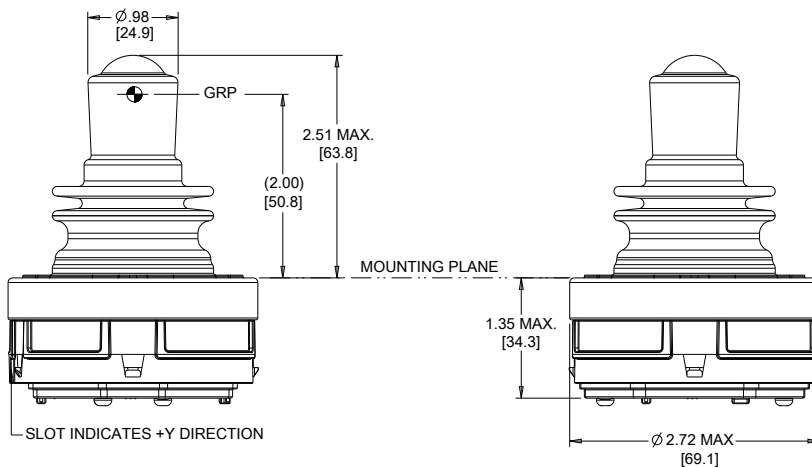
HANDLE 34 (W / PUSHBUTTON, TOP HANDLE, FULL BOOT)



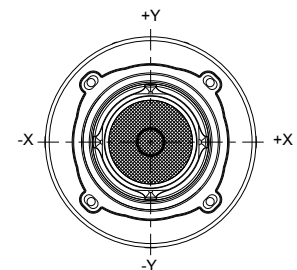
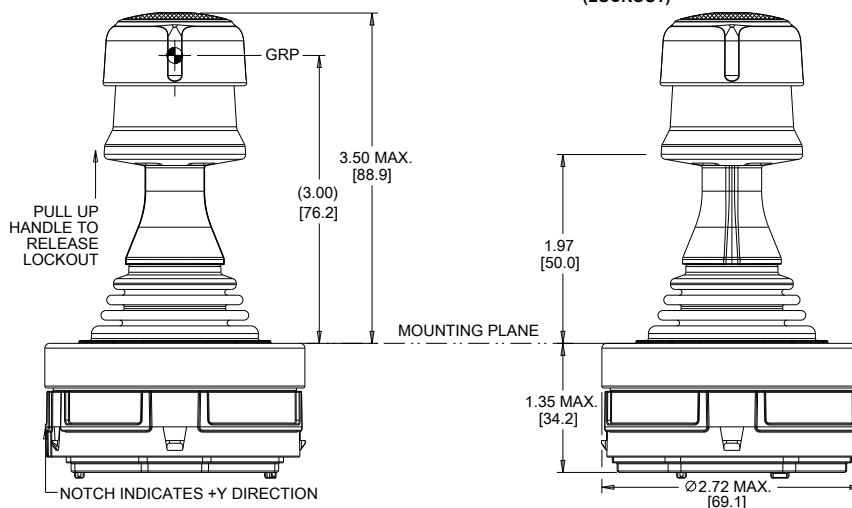
HANDLE SCHEMATIC



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



HANDLE 41 (LOCKOUT)



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

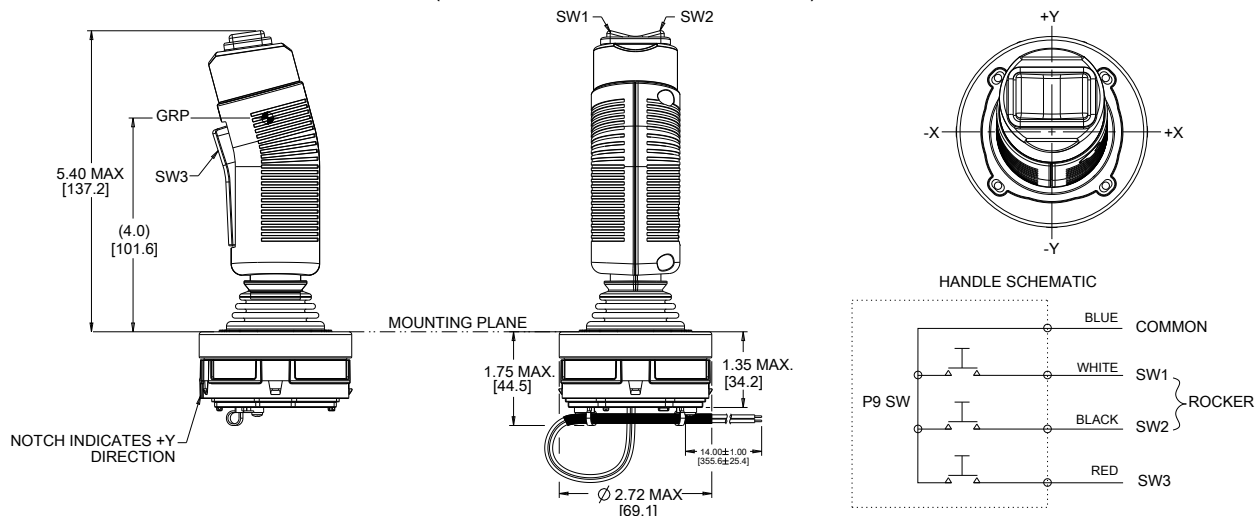
Specifications Subject To Change Without Notice

www.otto-controls.com 147

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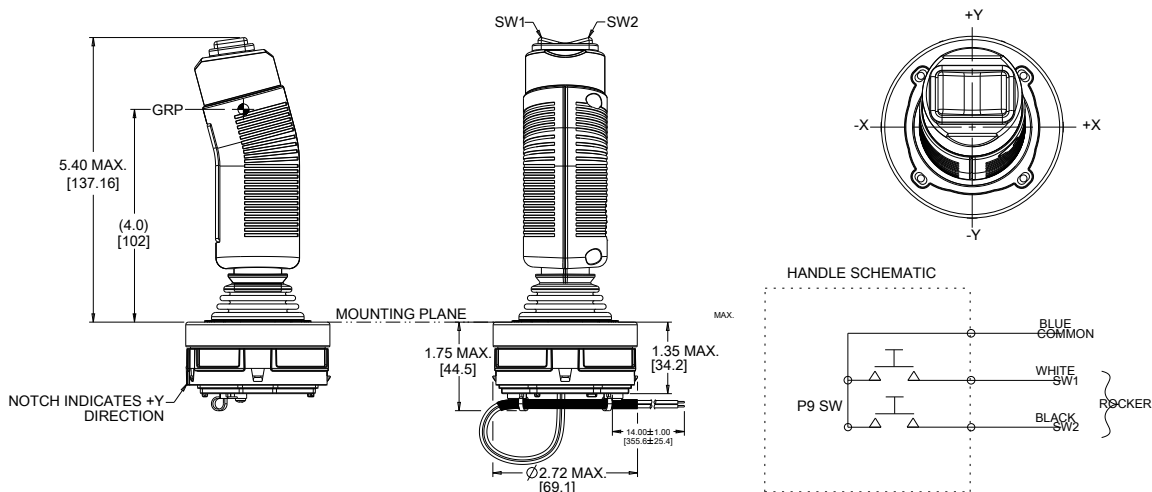
HANDLE 51

(G3-D WITH ROCKER AND OPERATOR PRESENCE)



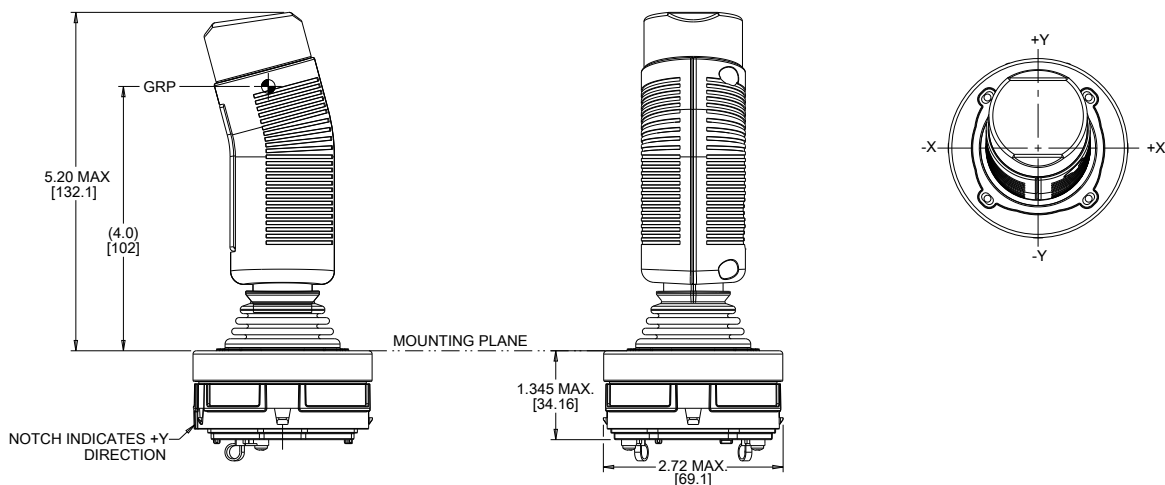
HANDLE 52

(G3-D WITH ROCKER)



HANDLE 53

(G3-D)



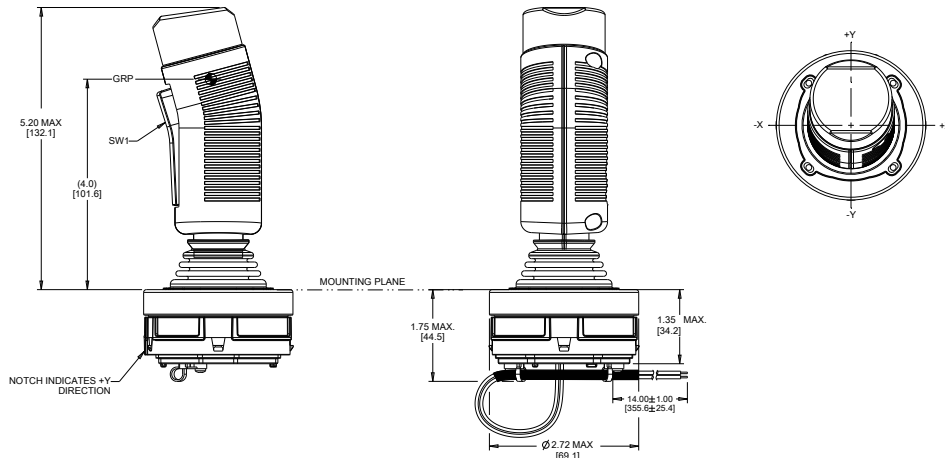
Wires and Strain Relief not shown in all views for clarity.

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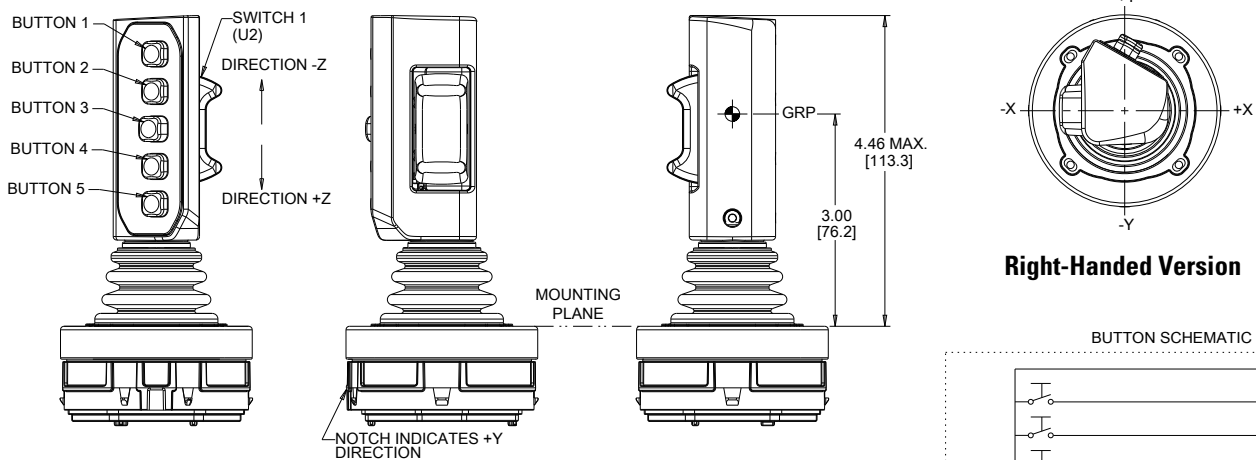
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HANDLE 54
(G3-D WITH OPERATOR PRESENCE)

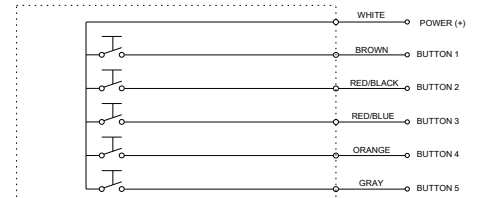


HANDLE 61
(5-BUTTON KEYPAD & HALL ROCKER RIGHT)

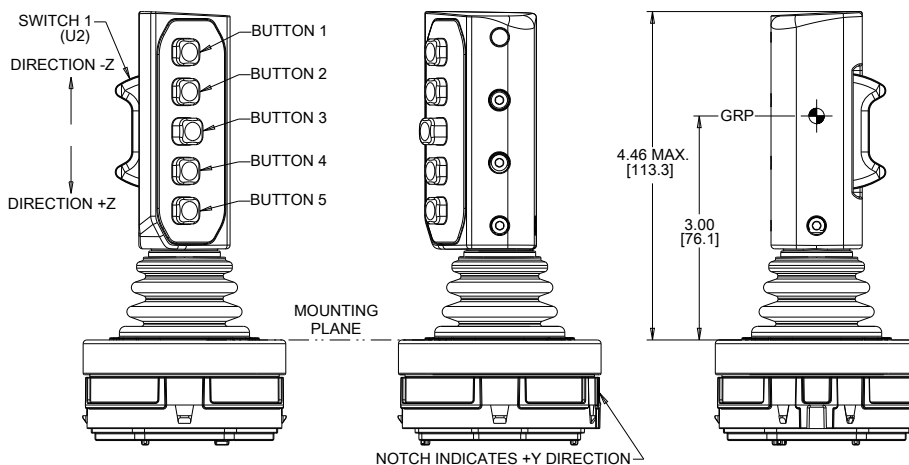


Right-Handed Version

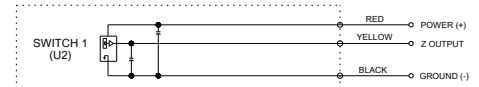
BUTTON SCHEMATIC



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



HANDLE SCHEMATIC



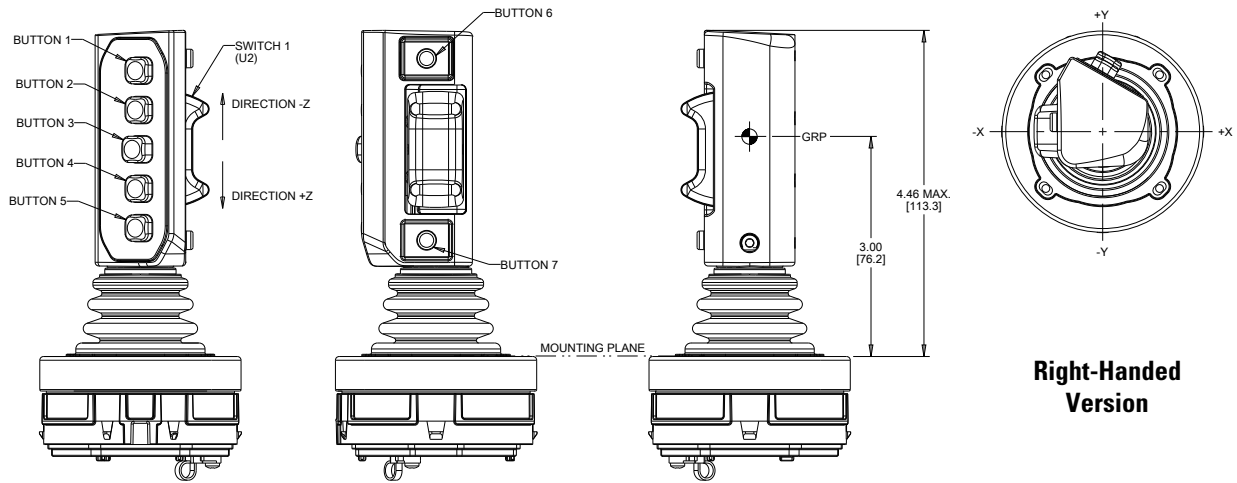
Left-Handed Version

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

UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

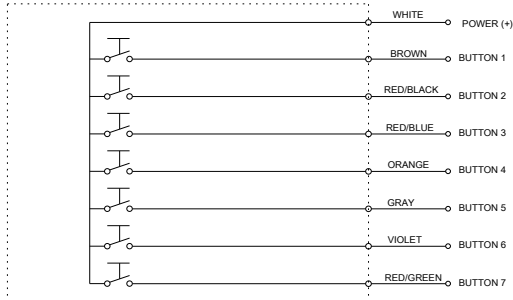
HANDLE 63

(7-BUTTON KEYPAD & HALL ROCKER RIGHT)

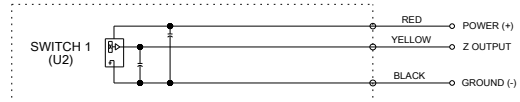


**Right-Handed
Version**

BUTTON SCHEMATIC

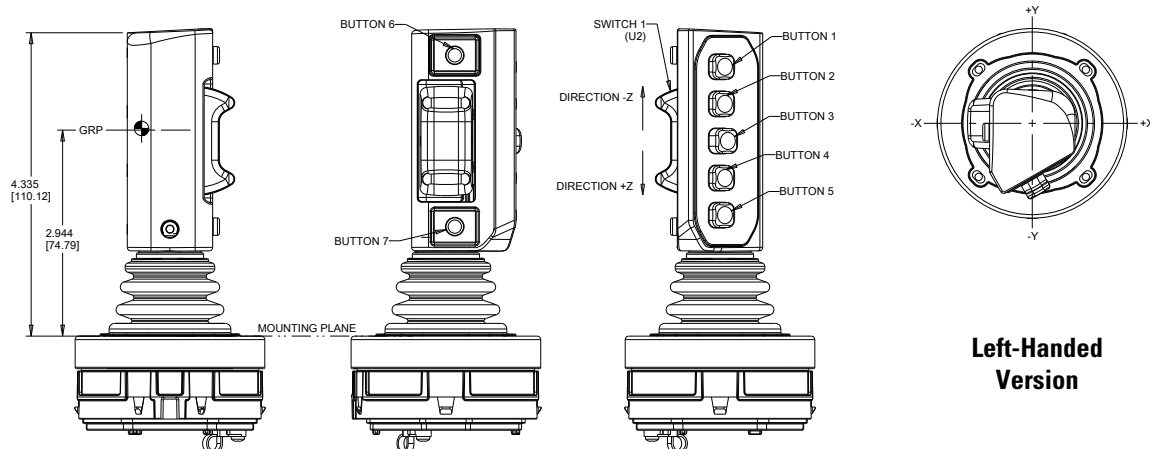


HANDLE SCHEMATIC



HANDLE 64

(7-BUTTON KEYPAD & HALL ROCKER LEFT)



**Left-Handed
Version**

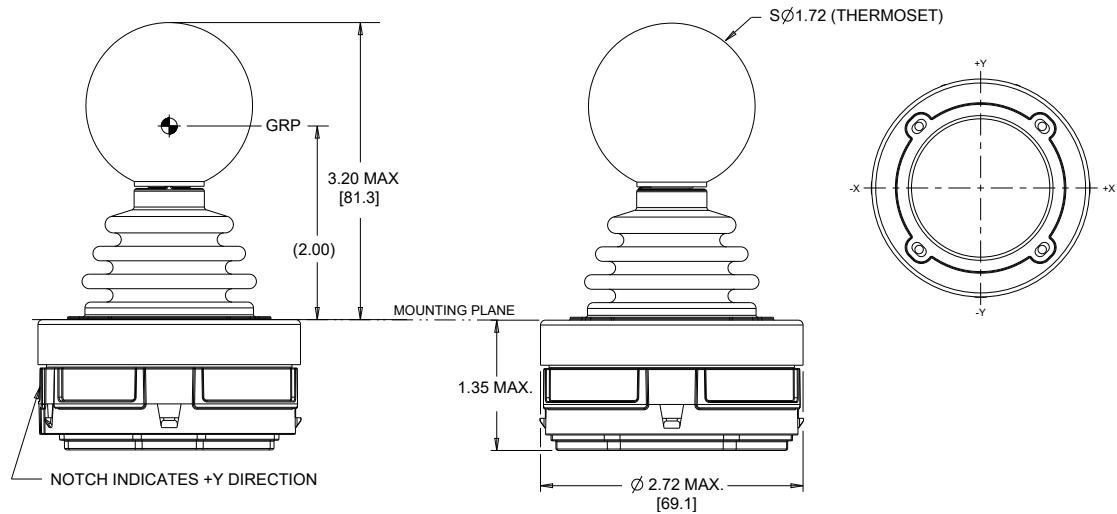
Wires and Strain Relief not shown in all views for clarity.

MEDIUM HALL EFFECT JOYSTICK

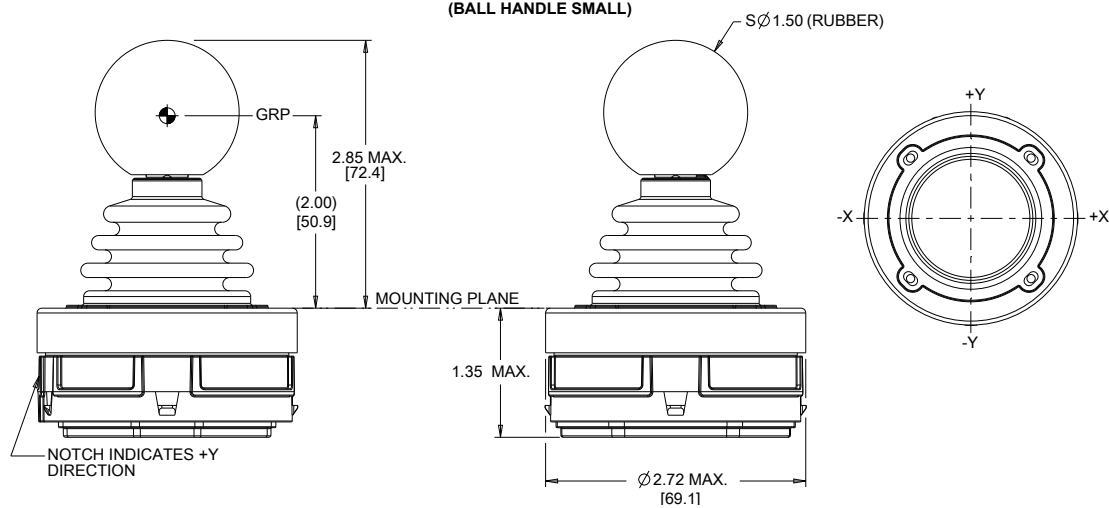
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HANDLE 71 (BALL HANDLE LARGE)



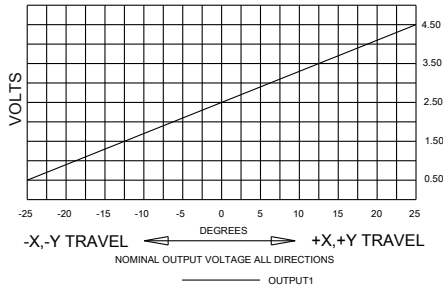
HANDLE 72 (BALL HANDLE SMALL)



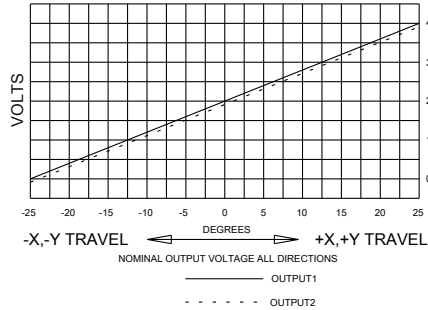
UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

JHM OUTPUTS

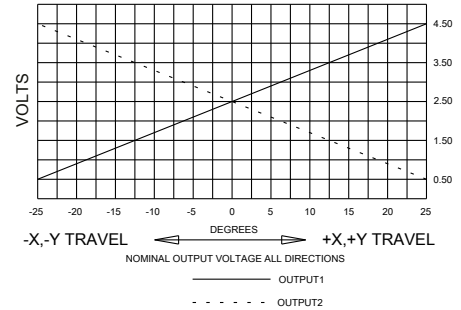
OPTION AA & AT



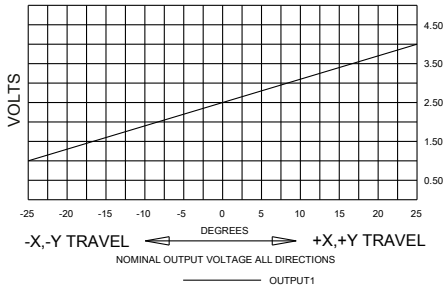
OPTION BB & BT



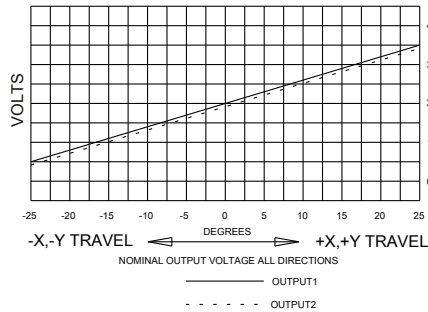
OPTION CC & CT



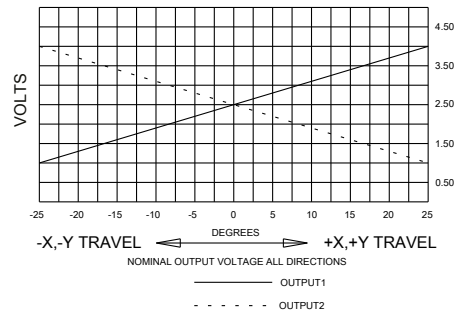
OPTION DD & DT



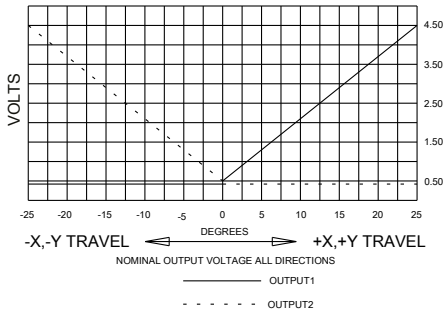
OPTION EE & ET



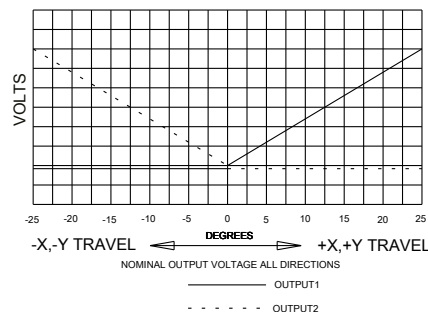
OPTION FF & FT



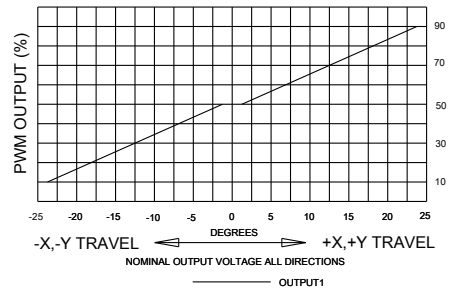
OPTION GG



OPTION HH



OPTION LL



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