

MEDIUM HALL EFFECT JOYSTICK

JHM
MEDIUM
JOYSTICK

UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS



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, 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, 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				
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			

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JHM PART NUMBER CODE

JHM – XX	X Gating	X Force	XX Output 1**	XX Output 2	X Termination***
Handle Style*					
11. No Handle ①		1. Gated; Single axis – Return to Center	AA. 2.5 +/- 2.0VDC	NONE	1. Wire Leads 24 AWG SAE AS22759 ③
12. Standard - Blank ①		2. Gated; Dual axis – Return to Center	BB. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC	2. Cable, 22AWG (19/34), PVC/Polyurethane Outer Jacket
21. With Hall effect Rocker		3. Omni-directional; Round Smooth Feel	CC. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC	3. USB 2.0 HID Joystick USB Mini B
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 ①④	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 ①④	GG. 0.5 - 4.5VDC	0.5 - 4.5VDC	
35. No Pushbutton - Top Handle, Full Boot ①②		8. Omni-directional; Square Smooth Feel	HH. 1.0 - 4.0VDC	1.0 - 4.0VDC	
41. Lockout ①		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 ①③			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 ③⑤			FT. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC	
62. 5-Button Keypad & Hall Rocker Left ③⑤			JJ. CANbus J1939	NONE ^⑤	
63. 7-Button Keypad & Hall Rocker Right ⑤			KK. CANopen	NONE ^⑤	
64. 7-Button Keypad & Hall Rocker Left ⑤			LL. PWM	NONE	
71. Ball Handle, Large, Thermoset ①			MM. USB	NONE ^⑤	
72. Ball Handle, Small, Rubber ①					

* 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.

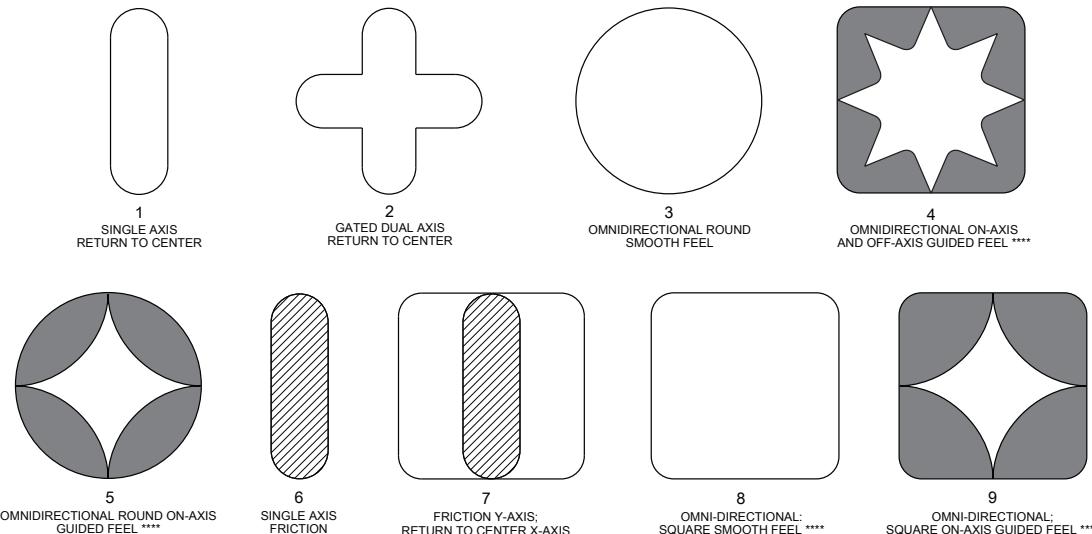
③ Handle styles 61, 62 have the following wires for the 5-button switch array: 26 AWG, MIL-W-22759/33.

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



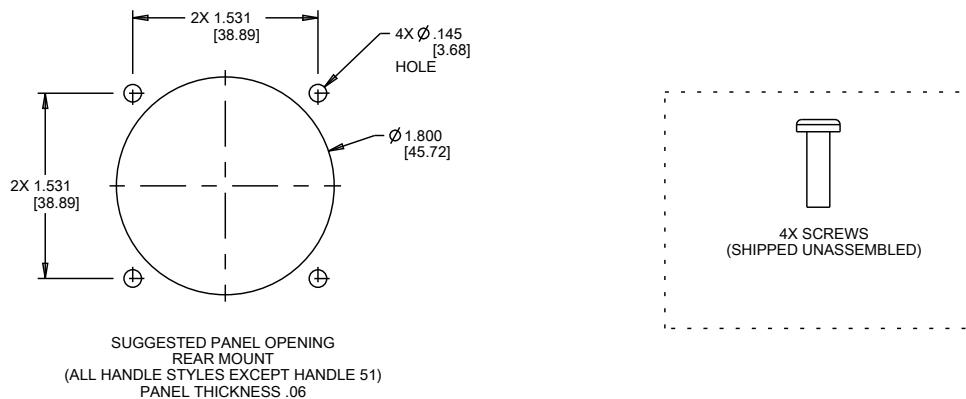
**** FEEL DEFINED BY SHADING

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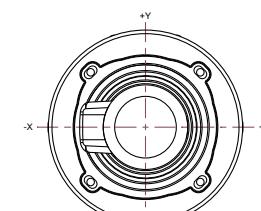
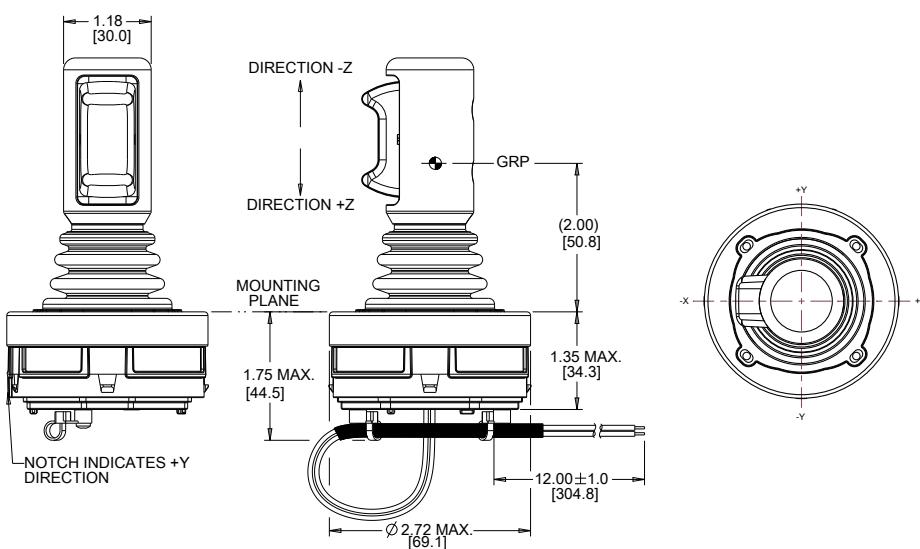
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JHM Suggested Panel Opening



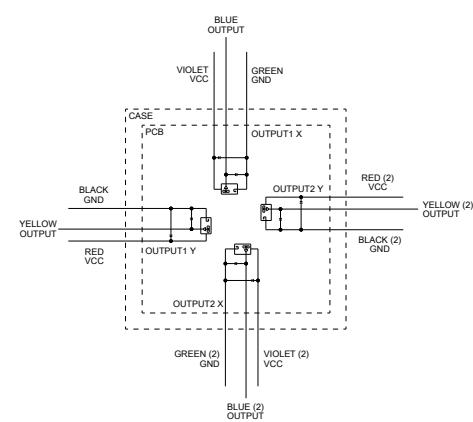
Mounting Hardware Information

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



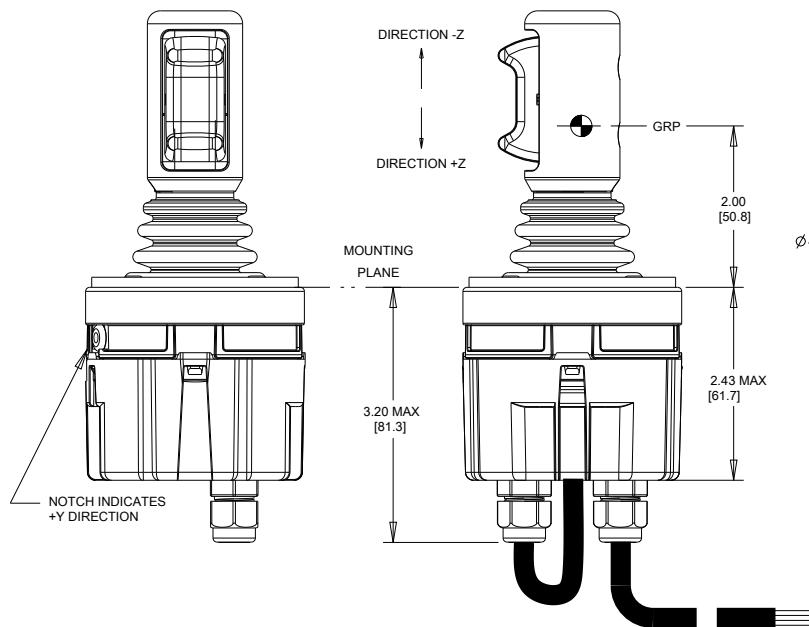
JHM Outputs AA-FT and LL (Output Graph at end of JHM section)

PWM PRODUCT SPECIFICATIONS				
ELECTRICAL:				
PWM INTERFACE				
SUPPLY VOLTAGE, 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



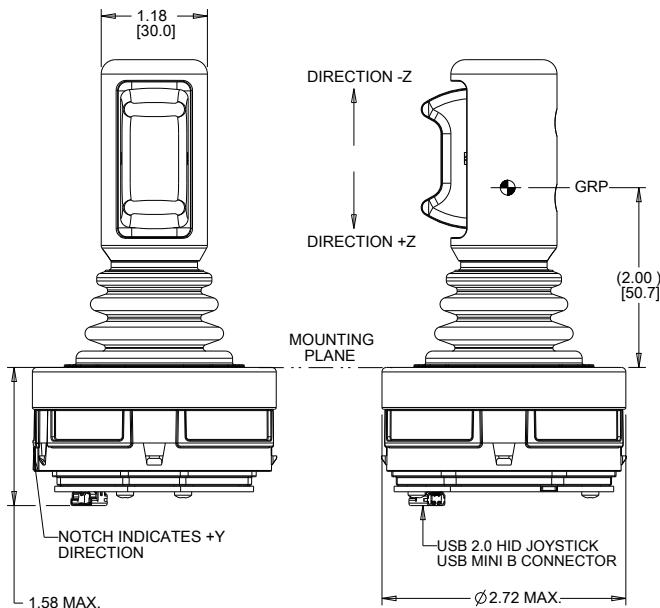
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Rear Mount Style



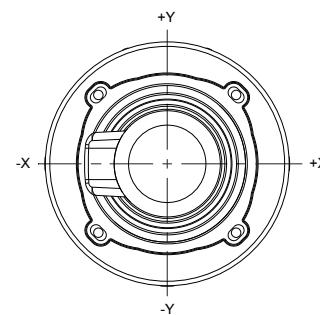
JHM Outputs JJ and KK

FUNCTION	COLOR	PRODUCT SPECIFICATIONS			
CAN HIGH	YELLOW	ELECTRICAL:			
-SUPPLY	BLACK	JOYSTICK CAN OPEN			
+SUPPLY	RED				
CAN LOW	GREEN	SUPPLY VOLTAGE	UNITS	MIN	TYP
SHIELD	DRAIN	VDC		9	N/A
		NODE IDENTIFIER		10	DECIMAL
		BAUD RATE		125K	bits/s
		TRANSMISSION REPETITION RATE		100	ms
		JOYSTICK J1939			
		SUPPLY VOLTAGE	UNITS	MIN	TYP
		VDC		9	N/A
		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



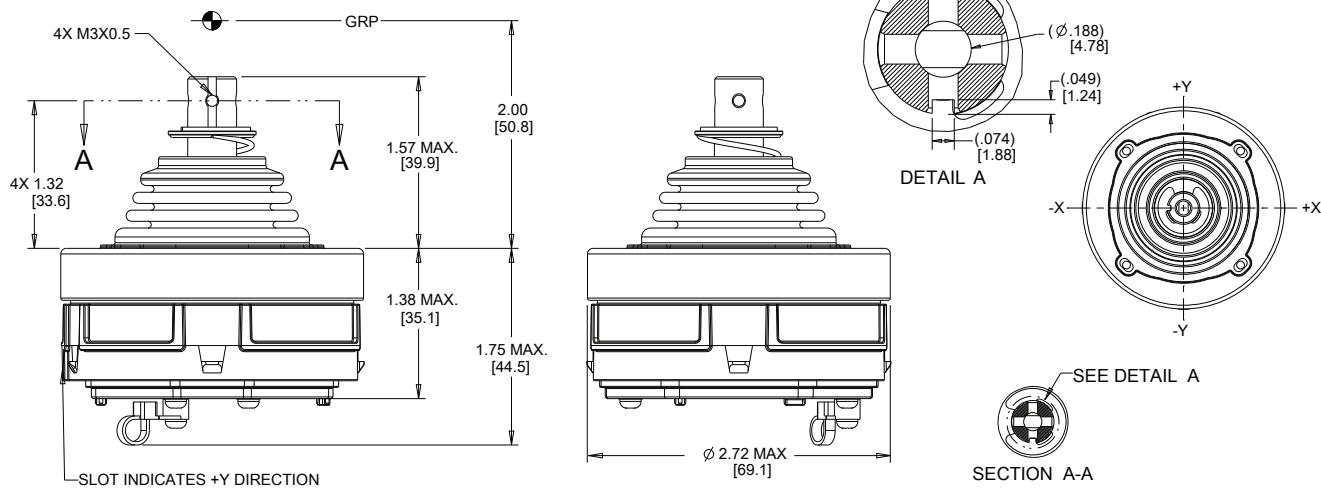
Wires and Strain Relief not shown in all views for clarity.

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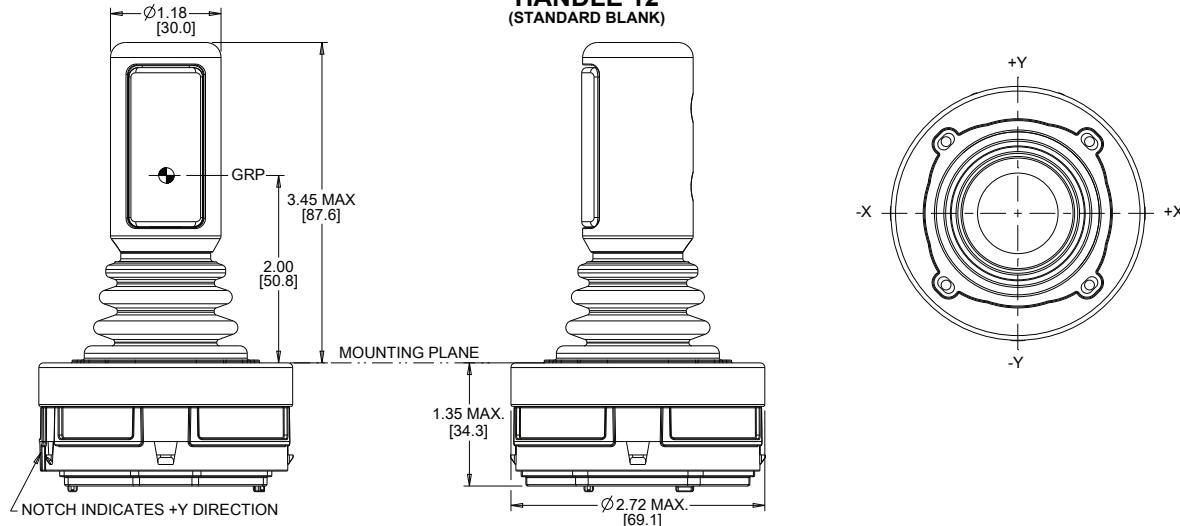
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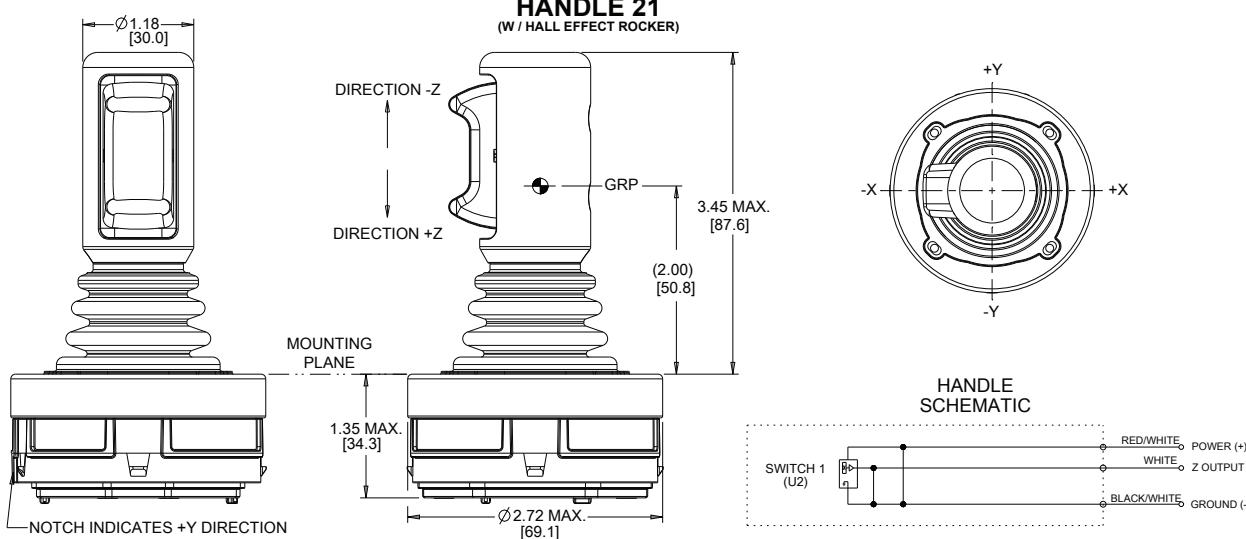
HANDLE 11 (No Handle)



HANDLE 12 (STANDARD BLANK)



HANDLE 21 (W/ HALL EFFECT ROCKER)

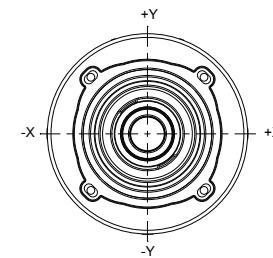
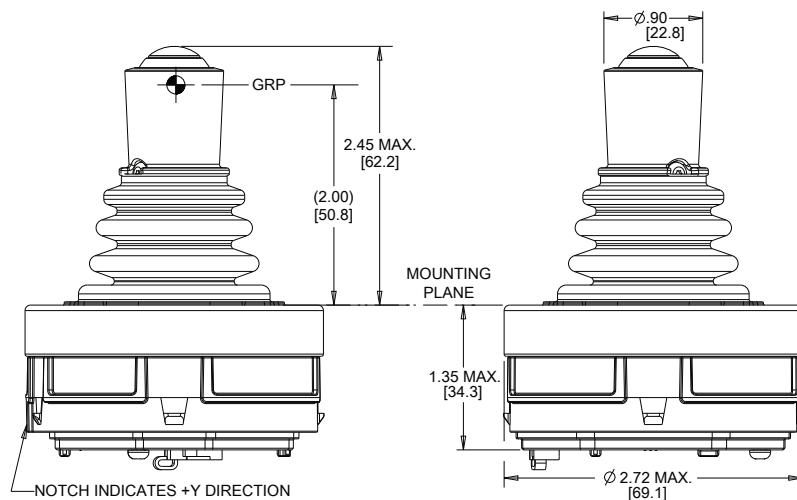


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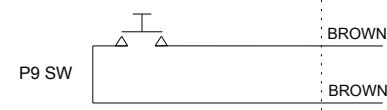
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HANDLE 31

(W / PUSHBUTTON, TOP HANDLE, HALF BOOT)

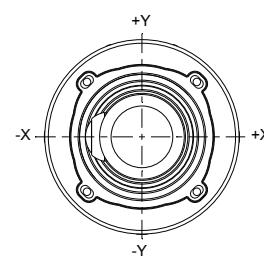
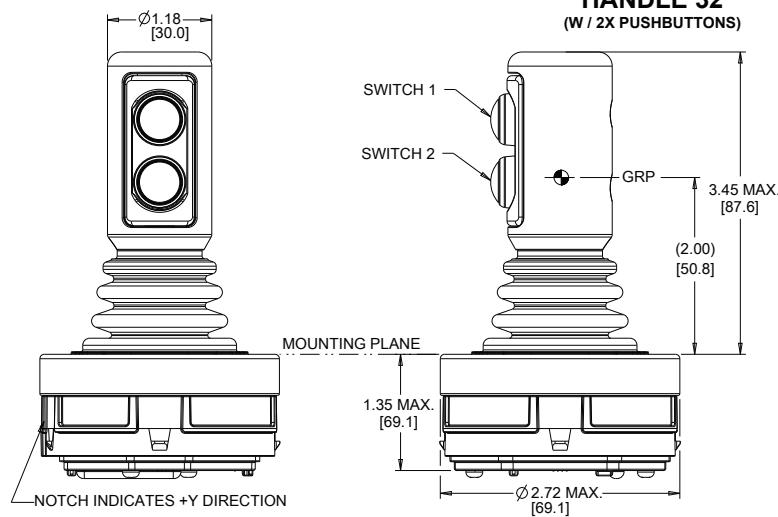


HANDLE SCHEMATIC

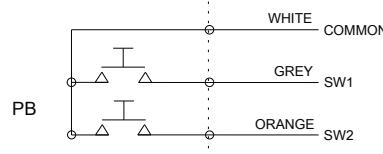


HANDLE 32

(W / 2X PUSHBUTTONS)

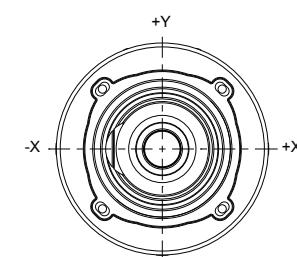
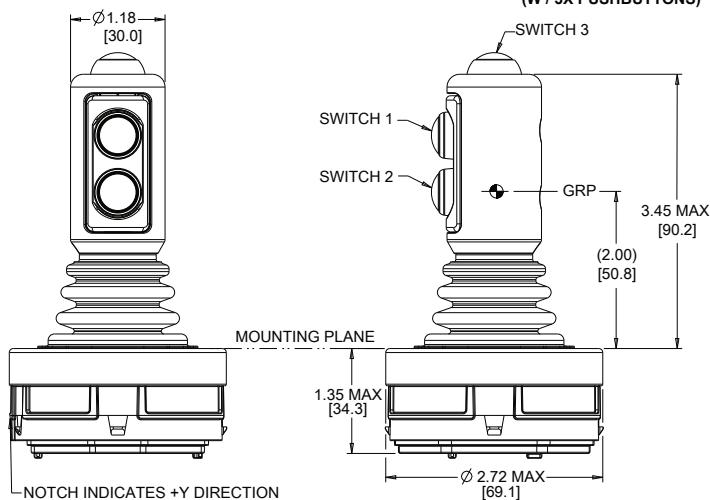


HANDLE SCHEMATIC

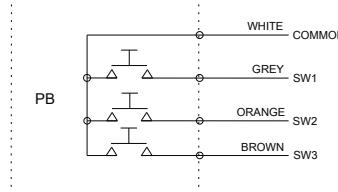


HANDLE 33

(W / 3X PUSHBUTTONS)



HANDLE SCHEMATIC



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

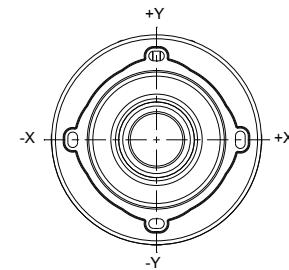
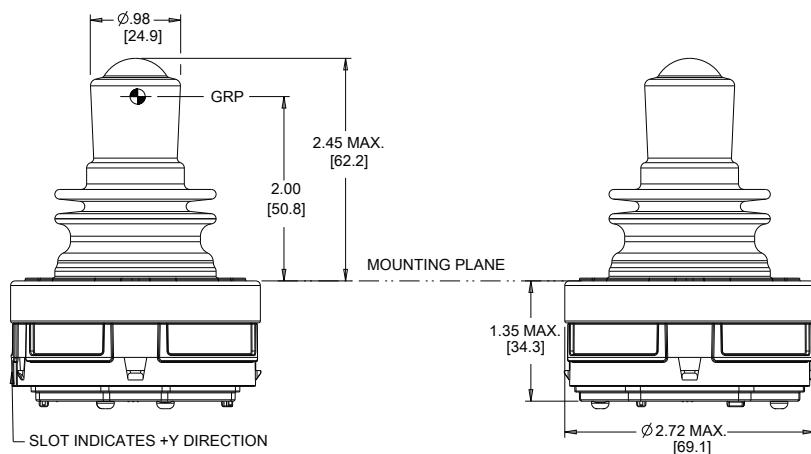
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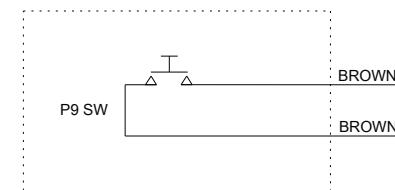
UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

HANDLE 34

(W / PUSHBUTTON, TOP HANDLE, FULL BOOT)

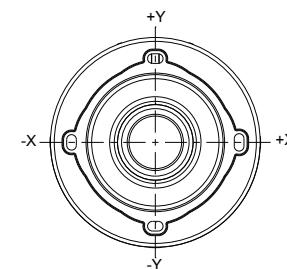
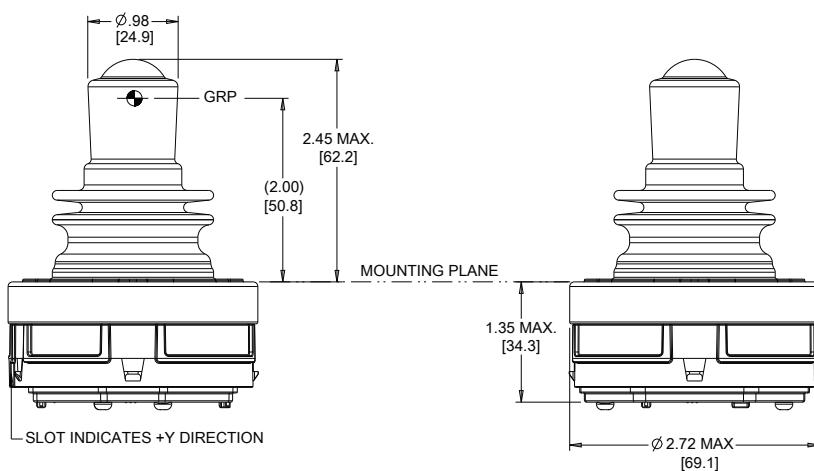


HANDLE SCHEMATIC

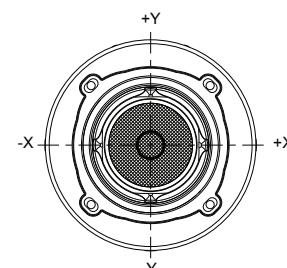
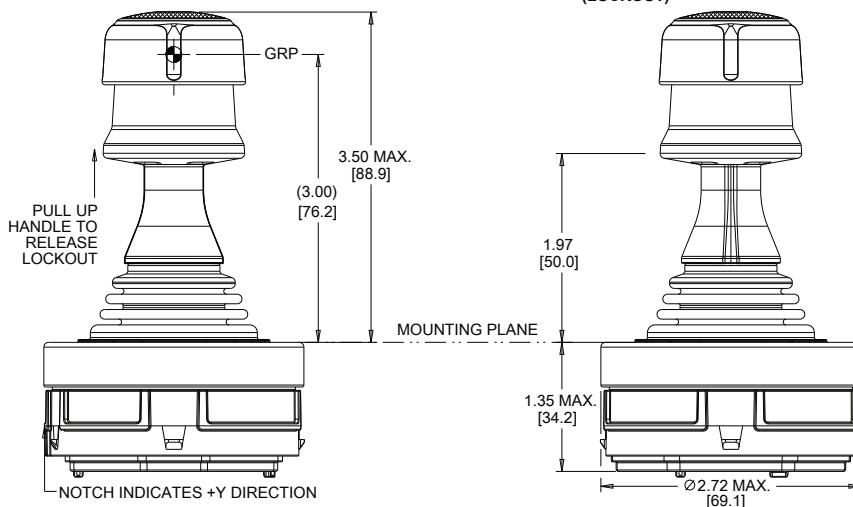


HANDLE 35

(NO PUSHBUTTON, TOP HANDLE, FULL BOOT)



HANDLE 41 (LOCKOUT)



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

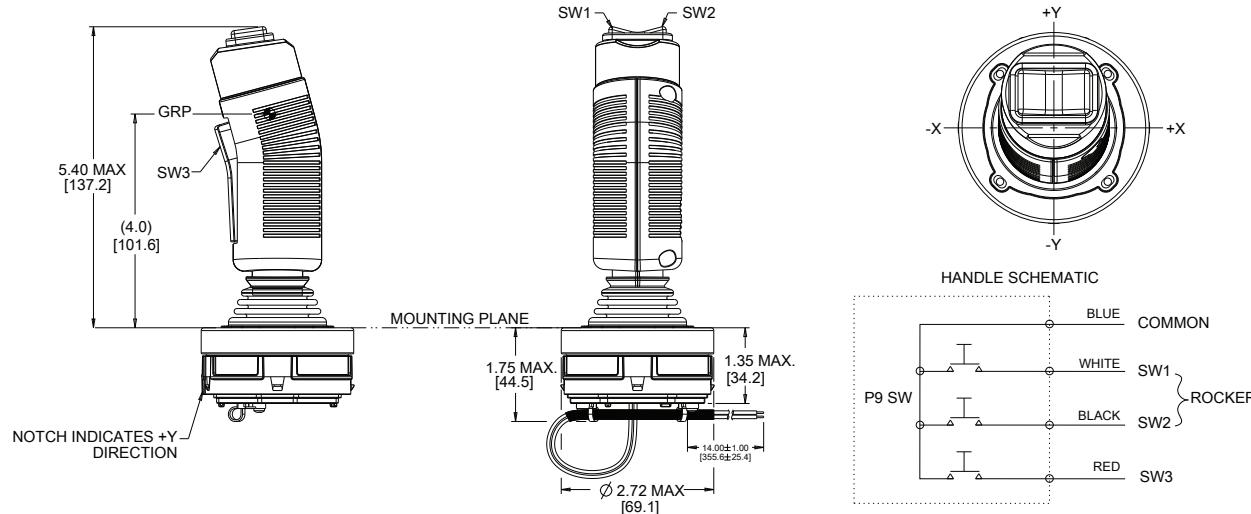
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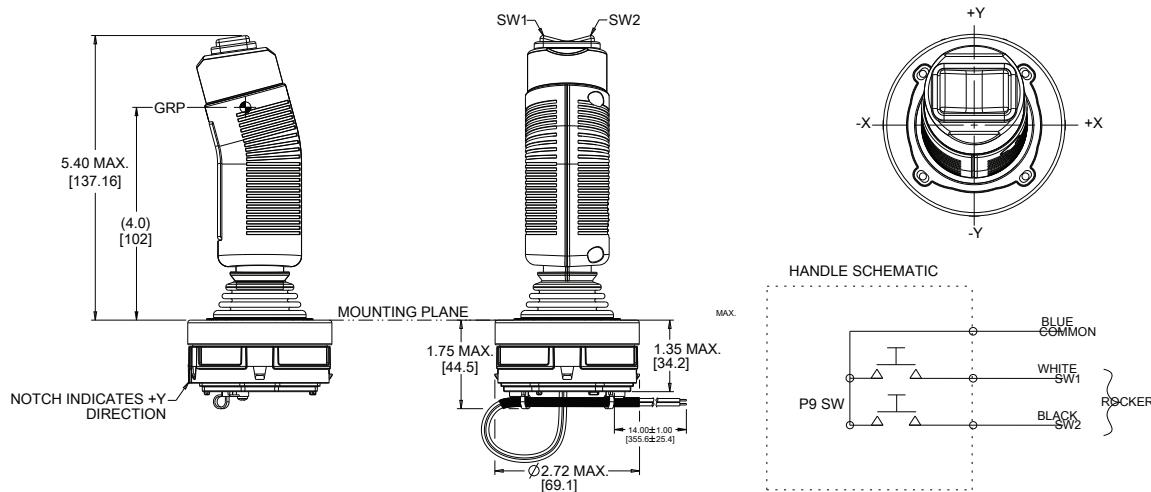
HANDLE 51

(G3-D WITH ROCKER AND OPERATOR PRESENCE)



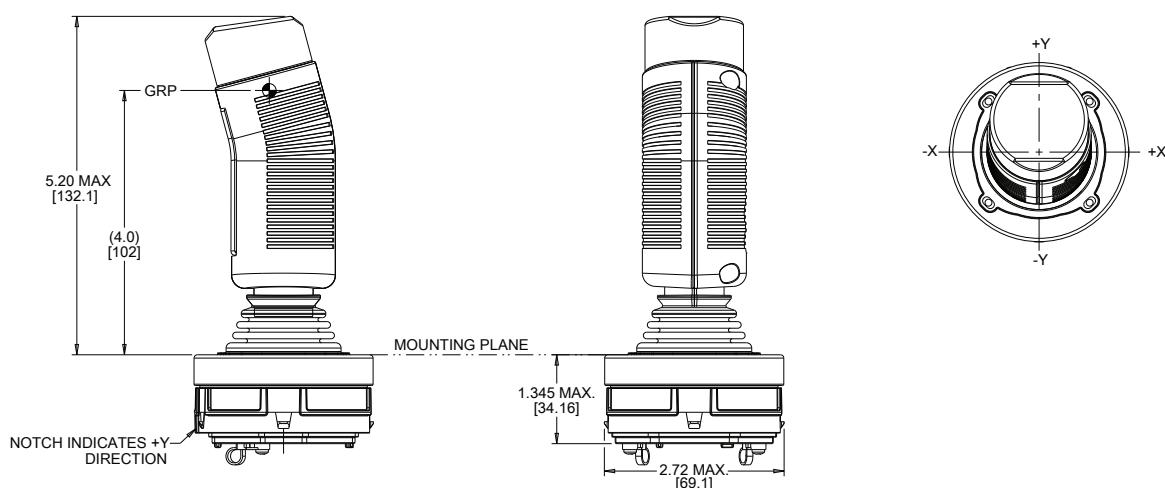
HANDLE 52

(G3-D WITH ROCKER)



HANDLE 53

(G3-D)



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

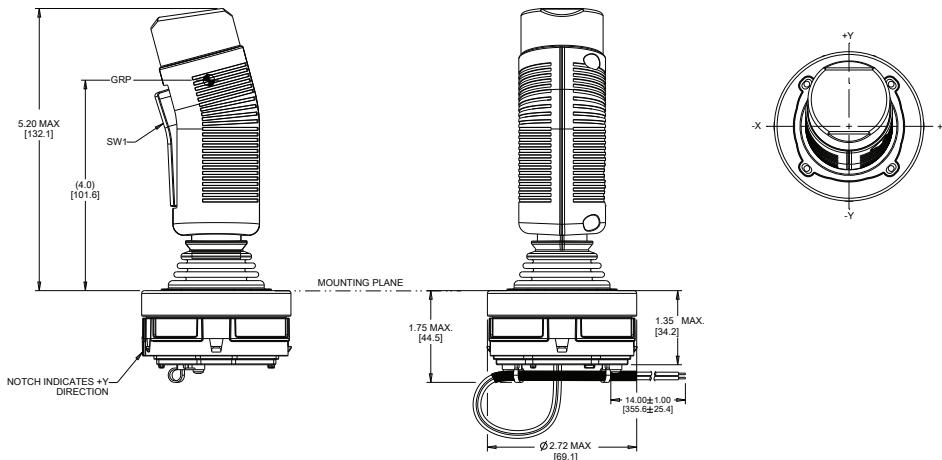
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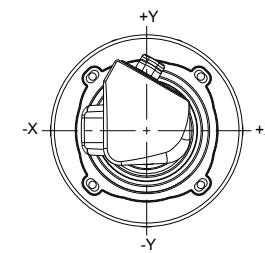
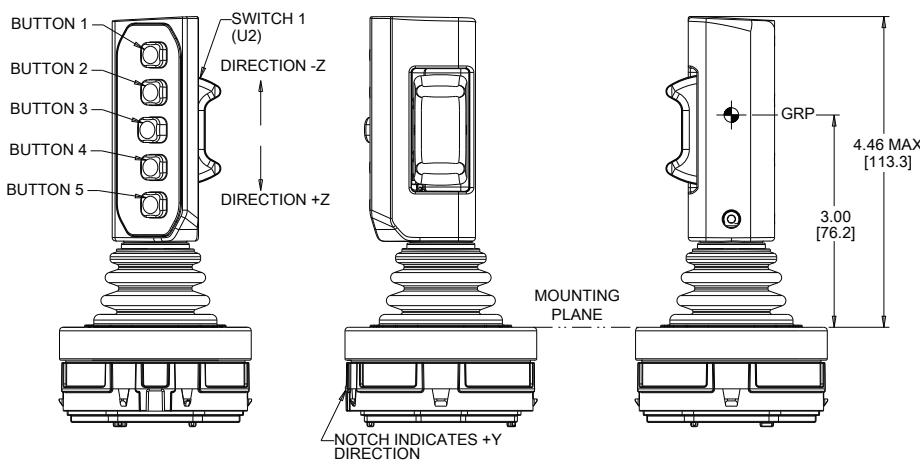
HANDLE 54

(G3-D WITH OPERATOR PRESENCE)



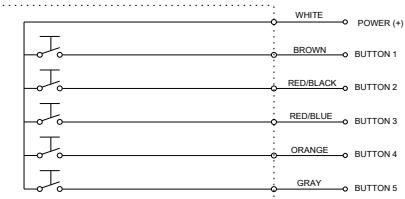
HANDLE 61

(5-BUTTON KEYPAD & HALL ROCKER RIGHT)



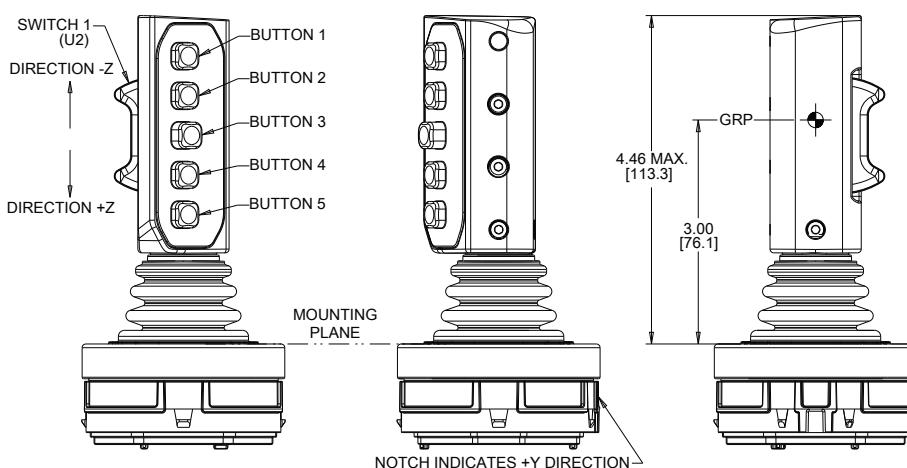
Right-Handed Version

BUTTON SCHEMATIC

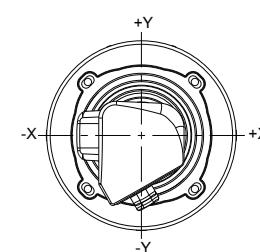
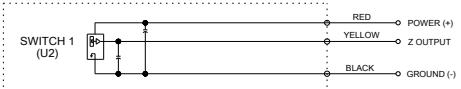


HANDLE 62

(5-BUTTON KEYPAD & HALL ROCKER LEFT)



HANDLE SCHEMATIC



Left-Handed Version

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

Specifications Subject To Change Without Notice

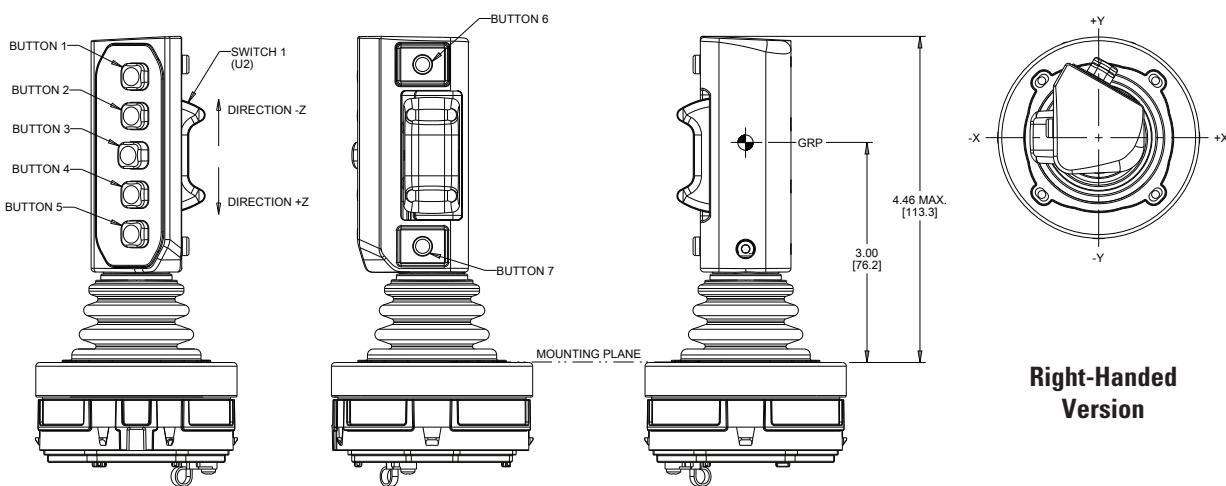
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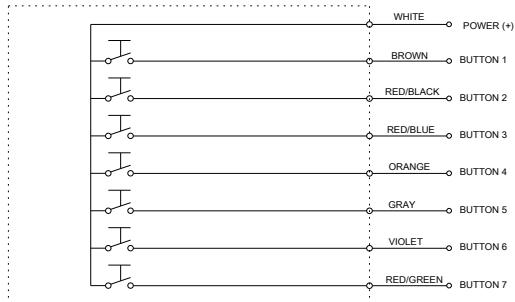
HANDLE 63

(7-BUTTON KEYPAD & HALL ROCKER RIGHT)

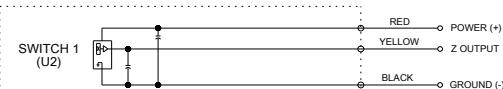


Right-Handed
Version

BUTTON SCHEMATIC

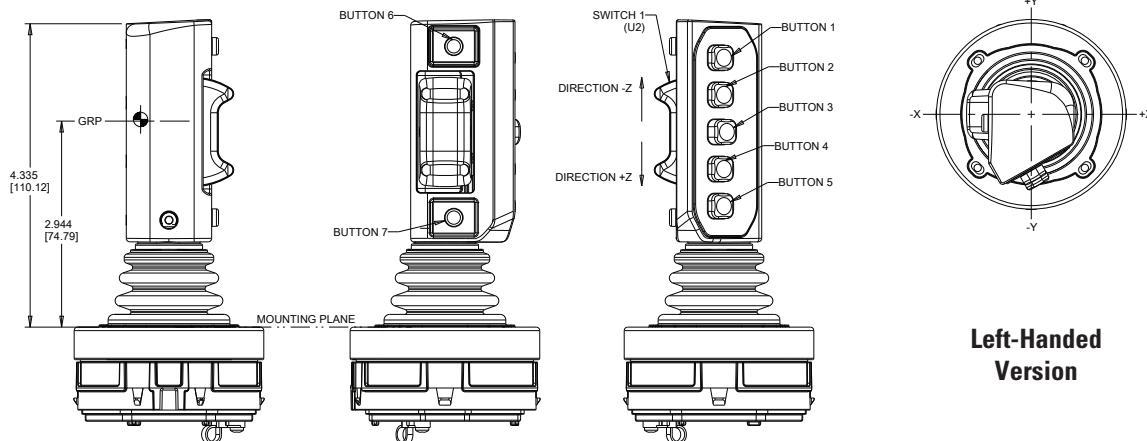


HANDLE SCHEMATIC



HANDLE 64

(7-BUTTON KEYPAD & HALL ROCKER LEFT)



Left-Handed
Version

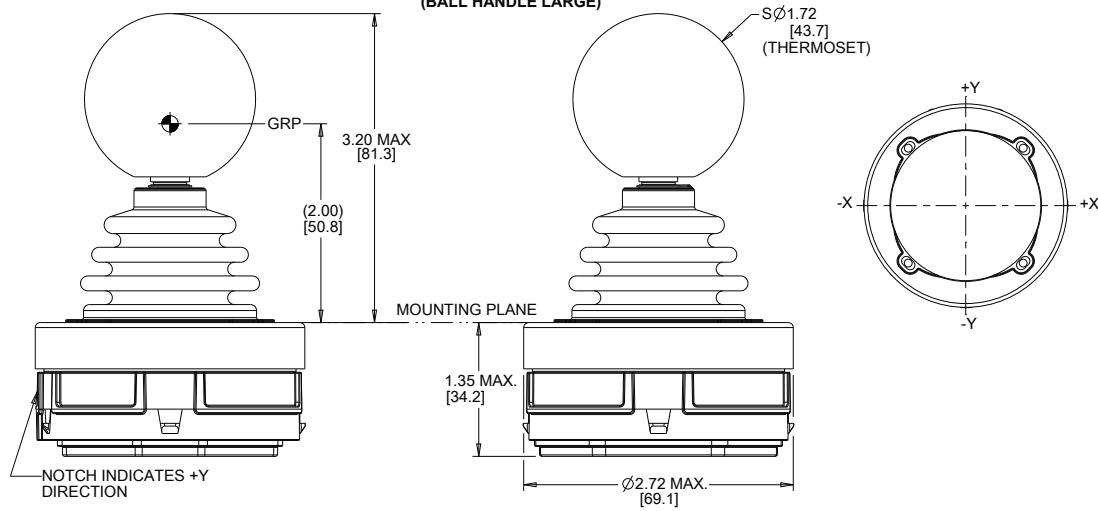
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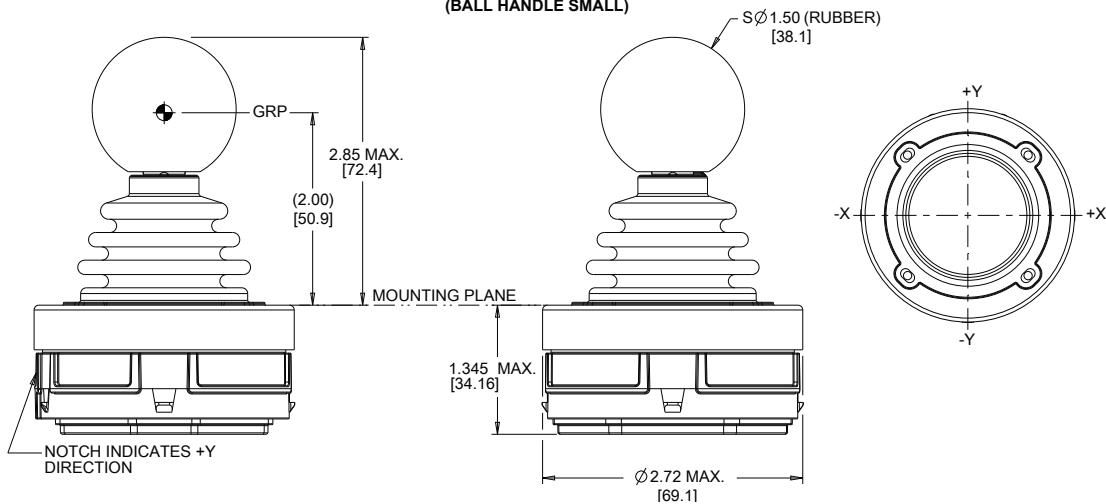
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UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

HANDLE 71
(BALL HANDLE LARGE)



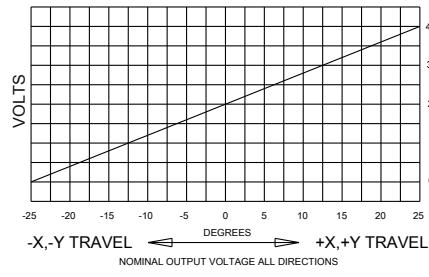
HANDLE 72
(BALL HANDLE SMALL)



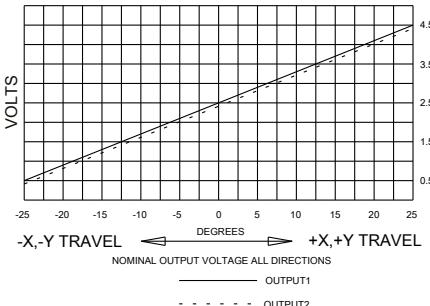
UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

JHM OUTPUTS

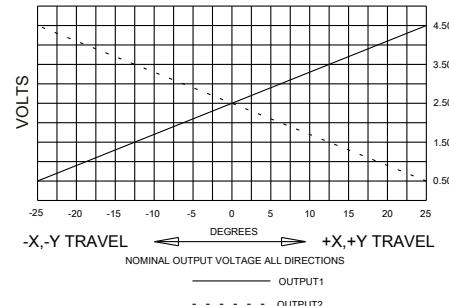
OPTION AA & AT



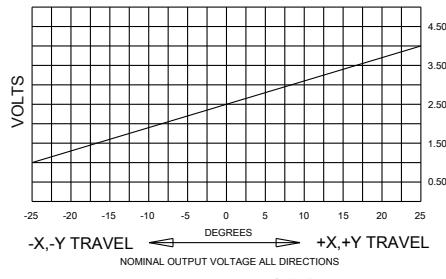
OPTION BB & BT



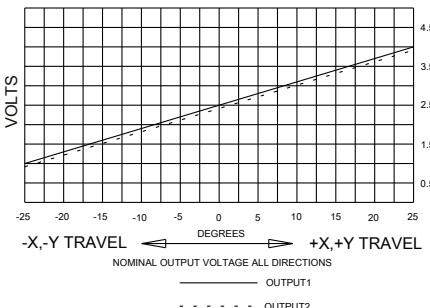
OPTION CC & CT



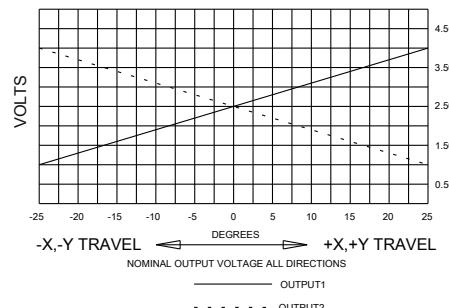
OPTION DD & DT



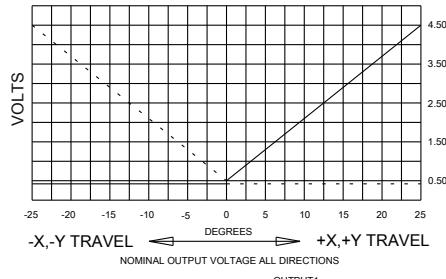
OPTION EE & ET



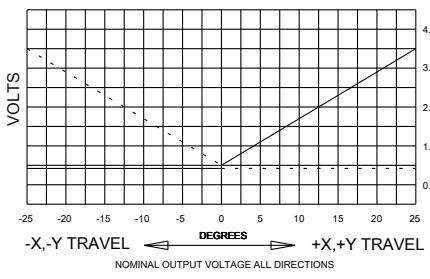
OPTION FF & FT



OPTION GG



OPTION HH



OPTION LL

