

UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS



JHM with Hall Effect Rocker



JHM with Ball Handle

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 15 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
Magnet:	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	VDC	-0.25	N/A	+0.25
Output Voltage Tolerance at Center AT, BT, CT, DT, ET & FT @ 5V Vcc	VDC	-0.15	N/A	+0.15
Output Voltage Tolerance Full Travel @ 5V Vcc	VDC	-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	VDC	2.25	2.50	2.75
Output at Full Travel Direction 1 @ 5V Vcc	VDC	4.25	4.50	4.55
Output at Full Travel Direction 2 @ 5V Vcc	VDC	0.45	0.50	0.75
Supply Current B-0, Vcc=5V, I0=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
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MECHANICAL (JOYSTICK):

Mechanical Life: In all directions, 2,500,000 cycles min up to 10,000,000 cycles depending on configuration. (Boot life varies depending on configuration.)

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) 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
Friction @ 2" GRP	Lbs.	1.5	4.5	7.5
Friction @ 3" GRP	Lbs.	1.0	3.5	6.0
Friction @ 4" GRP Handle Styles 51, 52, 53	Lbs.	0.8	2.4	4.0

MECHANICAL (U2 SWITCH):

Mechanical Life:	2,500,000 cycles
Mechanical Operating Force	Units Min Typ Max Oz. 3.5 6.5 9.5

MECHANICAL (P9 SWITCH):

Mechanical Life:	1,000,000 cycles
Mechanical Operating Force	Units Min Typ Max Oz. 8 12 16

MECHANICAL (5 BUTTON KEYPAD PUSHBUTTONS):

Mechanical Life:	3,000,000 cycles
Mechanical Operating Force	Units Min Typ Max Oz. 2 8 10

Seal: Handle styles 34 and 35 panel sealed to IP68S

RFI / EMI Withstand per SAE J1113

MEDIUM HALL EFFECT JOYSTICK

HALL EFFECT TECHNOLOGY JOYSTICK

JHM PART NUMBER CODE

JHM - XX	X	X	XX	X	
Handle Style	Gating	Force	Output 1*****	Output 2	Termination*****
11. No Handle*	1. Gated; Single axis – Return to Center	1. Low***	AA. 2.5 +/- 2.0VDC	NONE	1. Wire Leads 24 SAE AS22759
12. Standard - Blank*	2. Gated; Dual axis – Return to Center	2. High	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*****		FF. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC	
34. With Pushbutton - Top Handle, Full Boot**	7. Friction Y-axis; Return to Center X-axis*****		GG. 0.5 - 4.5VDC	0.5 - 4.5VDC	
35. No Pushbutton - Top Handle, Full Boot**	8. Omni-directional; Square Smooth Feel		HH. 1.0 - 4.0VDC	1.0 - 4.0VDC	
41. Lockout*	9. Omni-directional; Square On-axis Guided Feel		AT. 2.5 +/- 2.0VDC	NONE	
51. G3-D, Rocker and Operator Presence***			BT. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC	
52. G3-D, Rocker			CT. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC	
53. G3-D, Blank*			DT. 2.5 +/- 1.5VDC	NONE	
61. 5-Button Keypad & Hall Rocker Right*****			ET. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC	
62. 5-Button Keypad & Hall Rocker Left*****			FT. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC	
71. Ball*			JJ. CANbus J1939	NONE****	
			KK. CANopen	NONE****	
			LL. PWM	NONE	
			MM. USB	NONE****	

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

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

*** Low force not available with handle style 51.

**** Outputs "JJ", "KK" and "MM" not available with handle styles 61 and 62.

***** Contact factory.

***** 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.

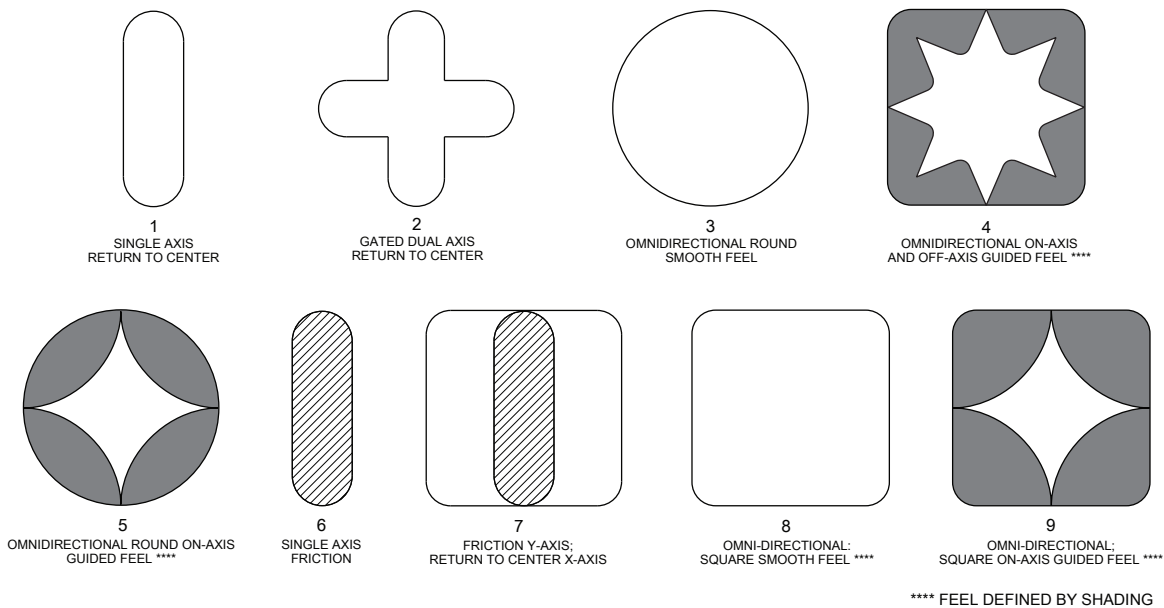
Options "BB", "EE", "BT", "ET" provide redundant output 2 which duplicates output 1.

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.

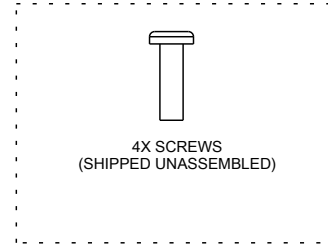
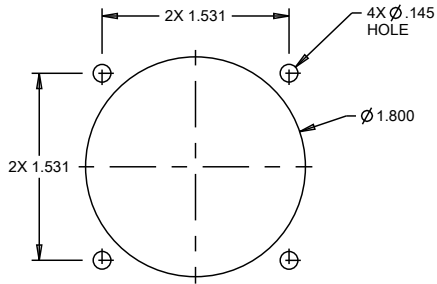
***** Outputs "AA" through "FT" and "LL" utilize termination 1, outputs "JJ" and "KK" utilize termination 2, and output "MM" utilizes termination 3.

JHM GATING ICONS



UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

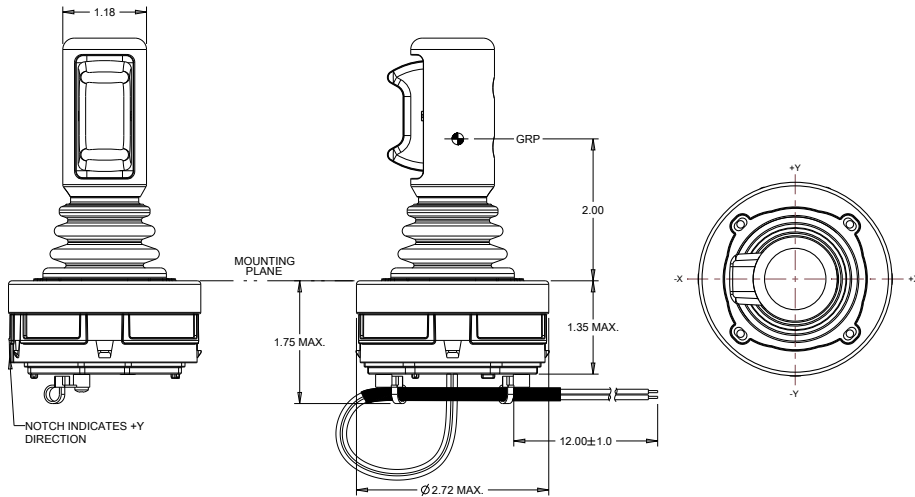
JHM Suggested Panel Opening



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

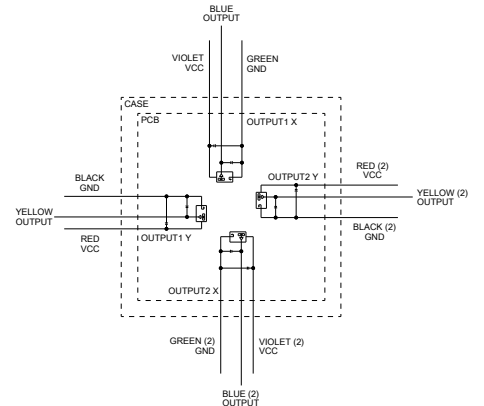
Mounting Hardware Information

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)

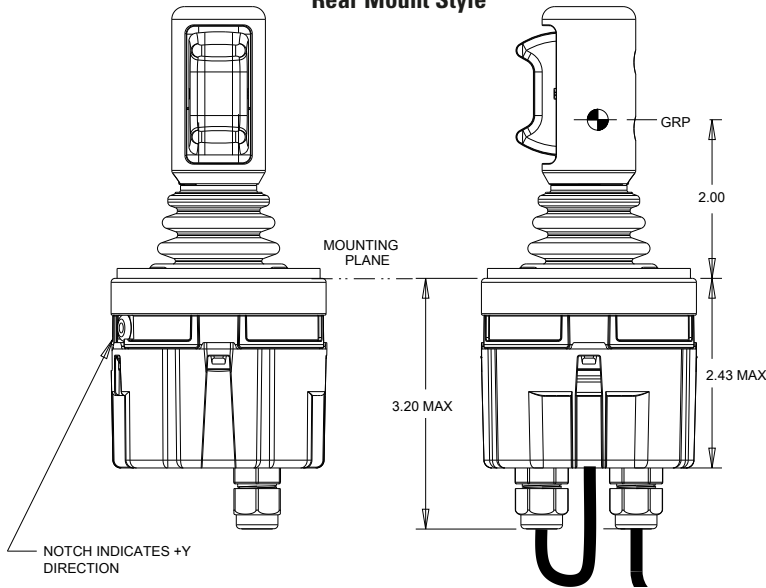
PWM PRODUCT SPECIFICATIONS				
ELECTRICAL:				
PWM INTERFACE				
SUPPLY VOLTAGE, V _{cc}	VDC	4.5	N/A	18.0
OUTPUT FREQUENCY	Hz	460	500	540
AMPLITUDE LOW	A	0.0	N/A	.020
AMPLITUDE HIGH PULLUP REQUIRED	VDC	3.0	N/A	12.0
PWM OUTPUT @ +X AND +Y FULL TRAVEL	%	80.0	90.0	92.0
PWM OUTPUT @ ZERO TRAVEL	%	42.0	50.0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



MEDIUM HALL EFFECT JOYSTICK

HALL EFFECT TECHNOLOGY JOYSTICK

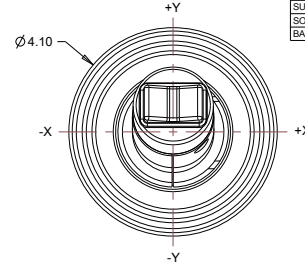
Rear Mount Style



JHM Outputs JJ and KK

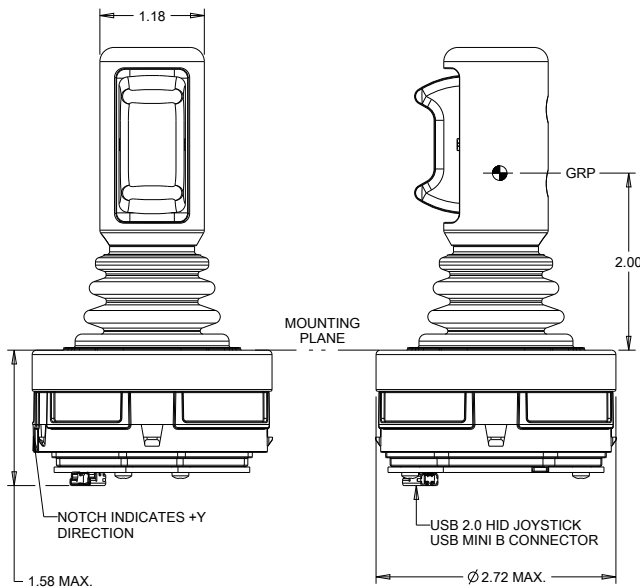
FUNCTION	COLOR
CAN HIGH	YELLOW
-SUPPLY	BLACK
+SUPPLY	RED
CAN LOW	GREEN
SHIELD	DRAIN

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



JHM Output MM

PRODUCT SPECIFICATIONS	
ELECTRICAL:	
JOYSTICK POWERED BY STANDARD USB INTERFACE	

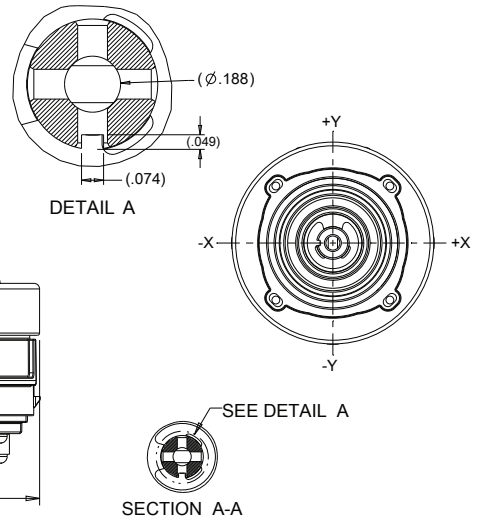
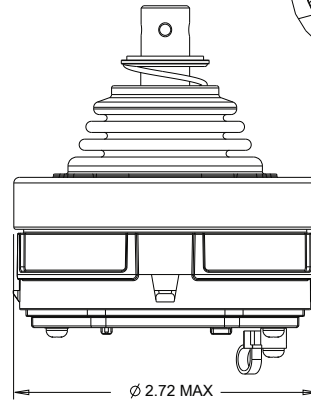
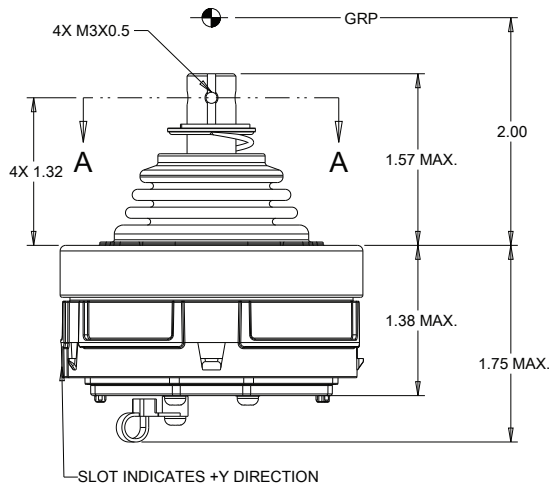


Wires and Strain Relief not shown in all views for clarity.

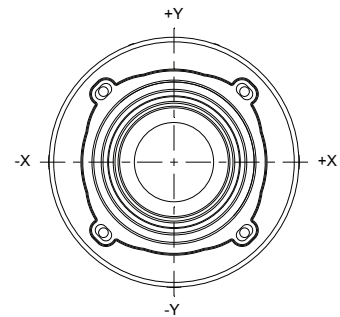
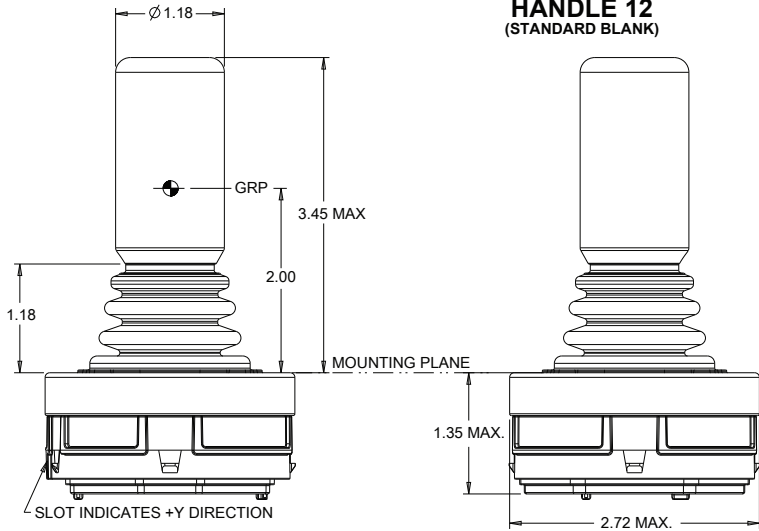
MEDIUM HALL EFFECT JOYSTICK

UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

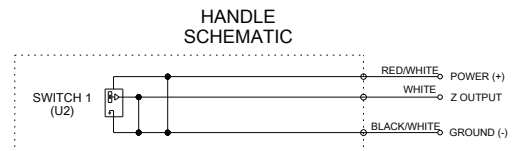
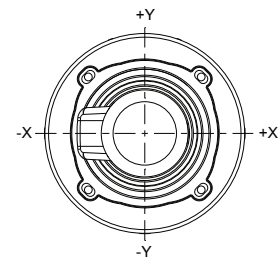
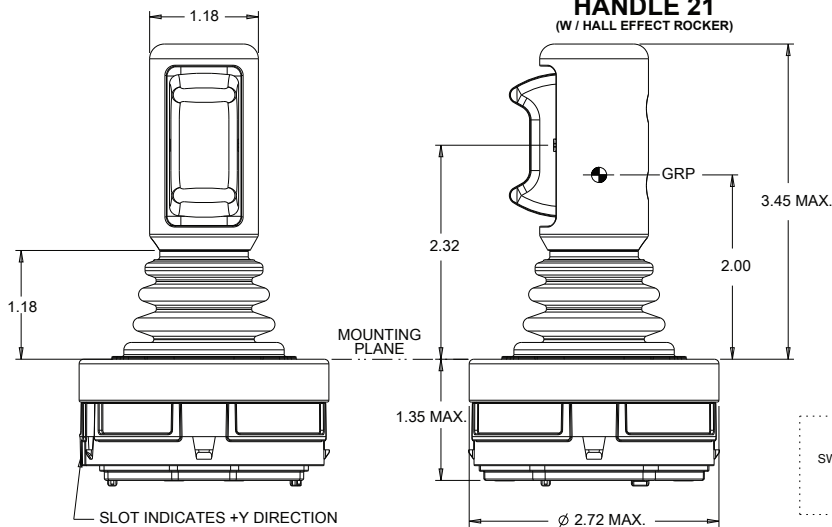
HANDLE 11 (No Handle)



HANDLE 12 (STANDARD BLANK)



HANDLE 21 (W / HALL EFFECT ROCKER)



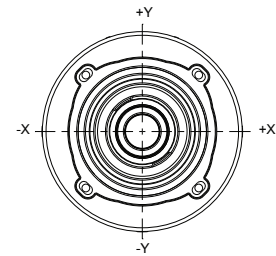
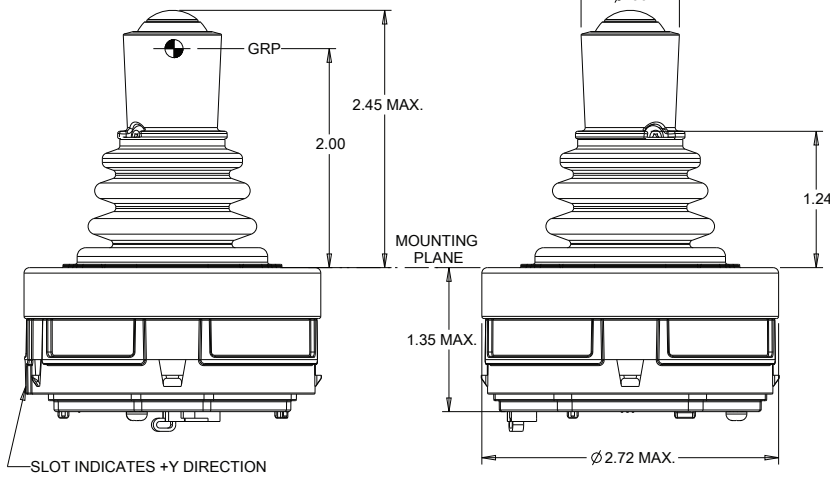
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MEDIUM HALL EFFECT JOYSTICK

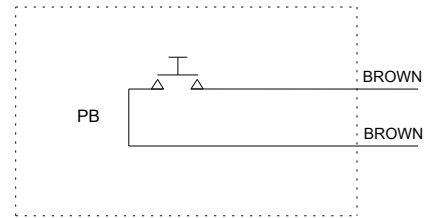
HALL EFFECT TECHNOLOGY JOYSTICK

HANDLE 31

(W / PUSHBUTTON, TOP HANDLE, HALF BOOT)

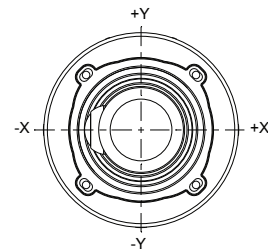
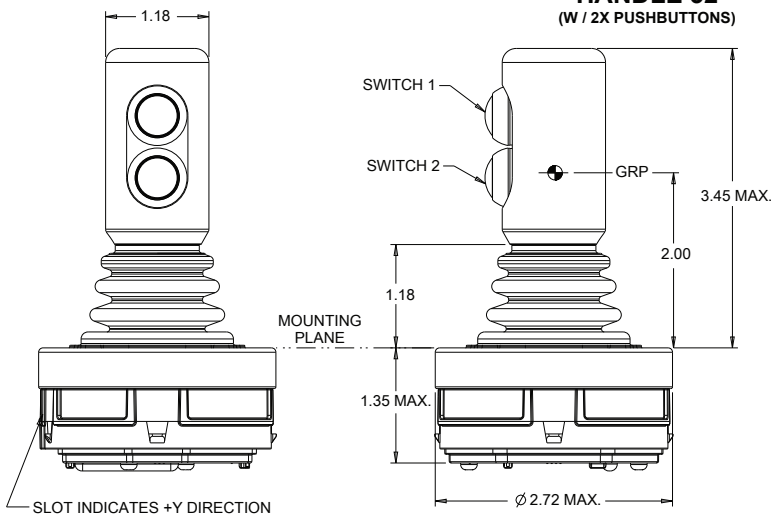


HANDLE SCHEMATIC

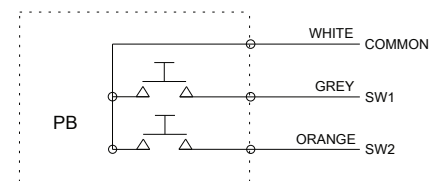


HANDLE 32

(W / 2X PUSHBUTTONS)

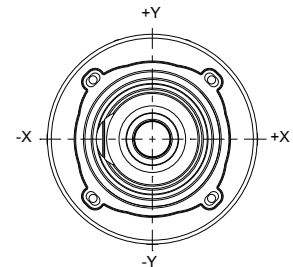
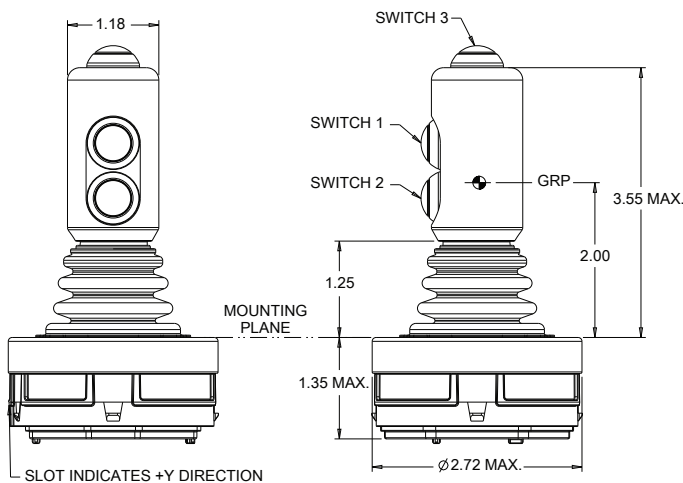


HANDLE SCHEMATIC

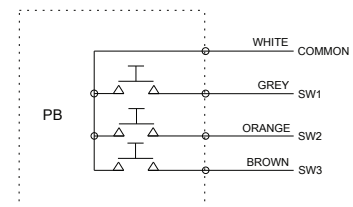


HANDLE 33

(W / 3X PUSHBUTTONS)



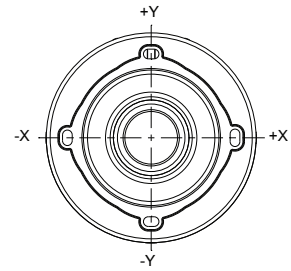
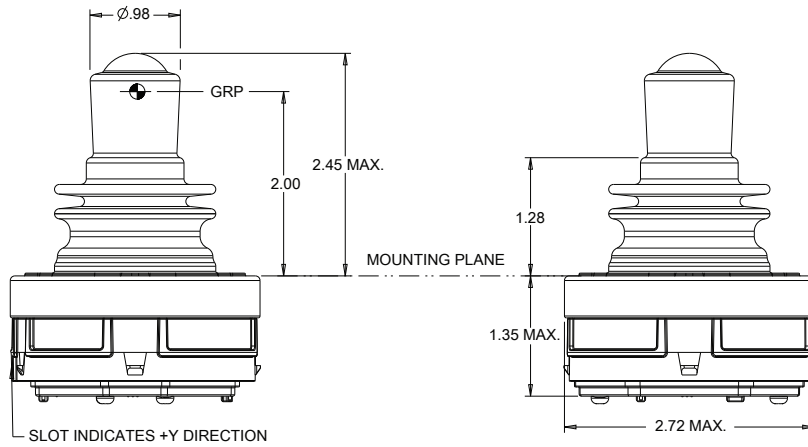
HANDLE SCHEMATIC



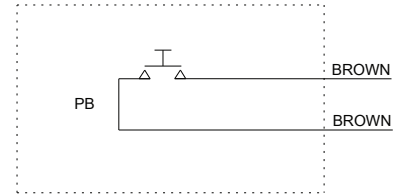
Wires and Strain Relief not shown in all views for clarity.

UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

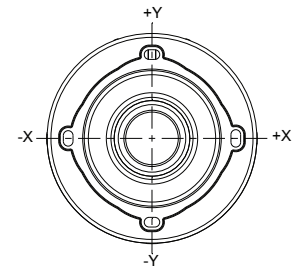
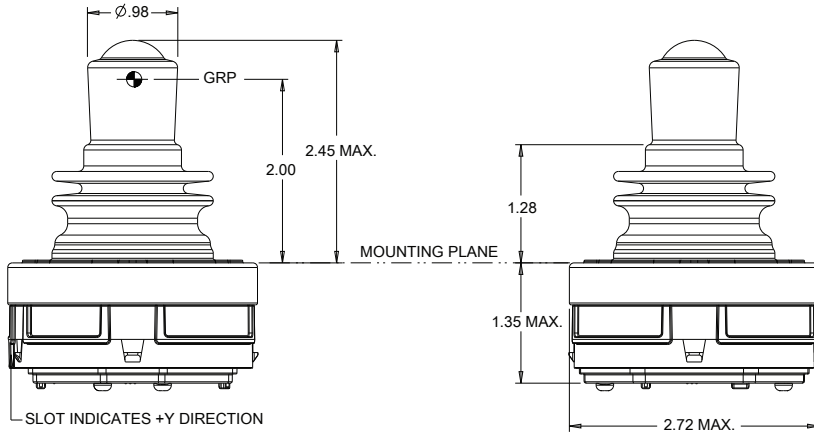
HANDLE 34
(W / PUSHBUTTON, TOP HANDLE, FULL BOOT)



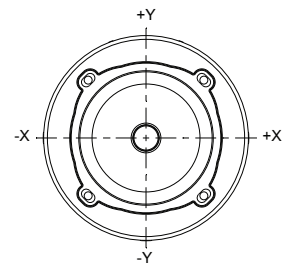
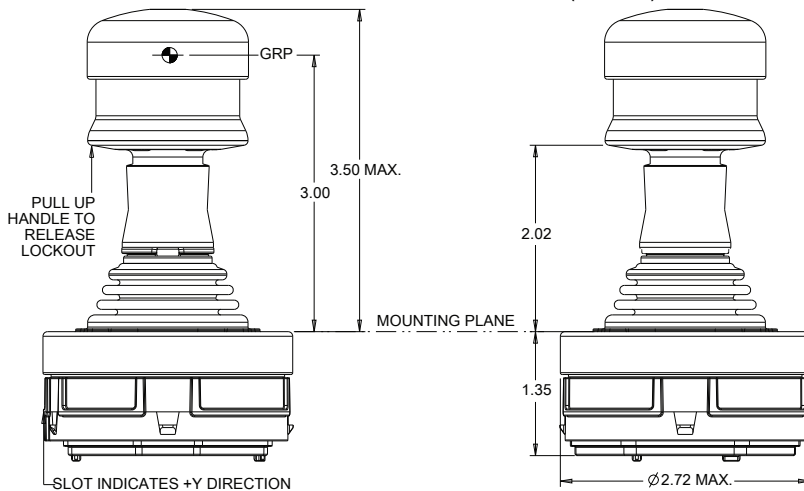
HANDLE SCHEMATIC



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



HANDLE 41
(LOCKOUT)



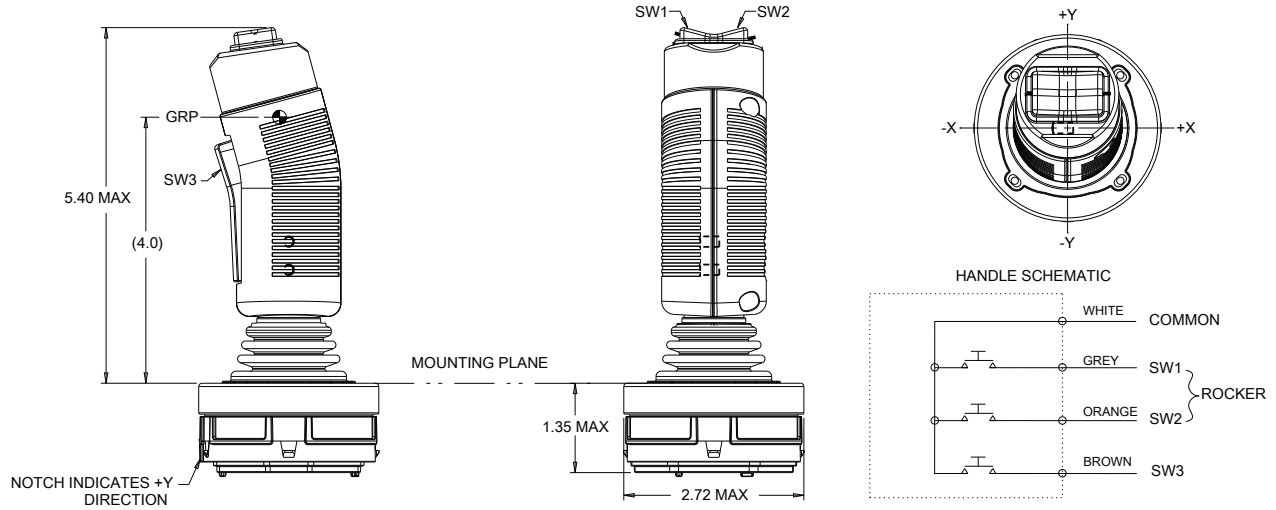
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MEDIUM HALL EFFECT JOYSTICK

HALL EFFECT TECHNOLOGY JOYSTICK

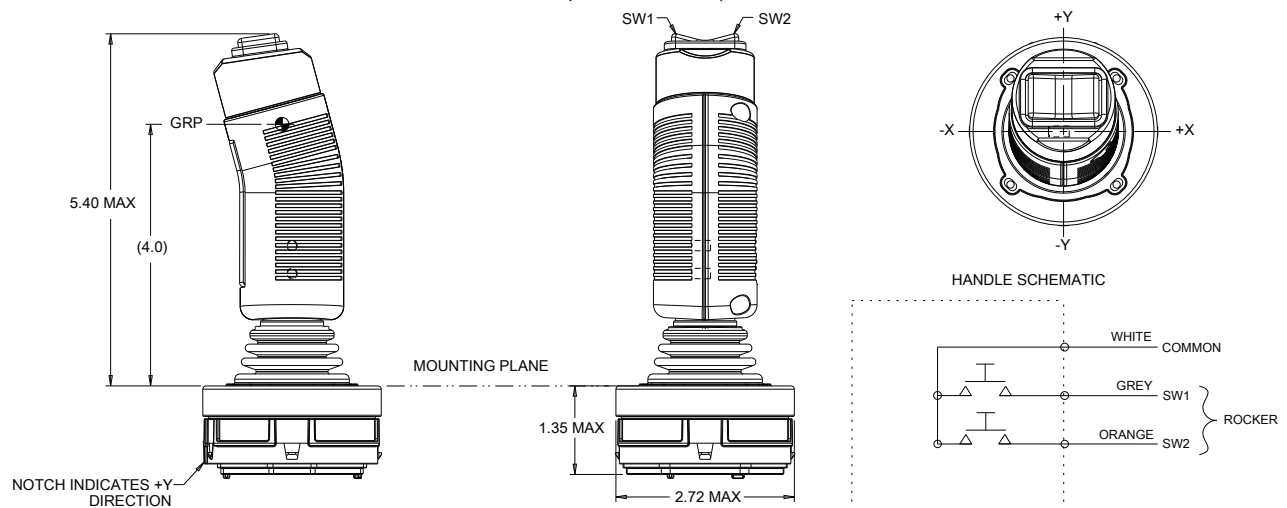
HANDLE 51

(G3-D WITH ROCKER AND OPERATOR PRESENCE)



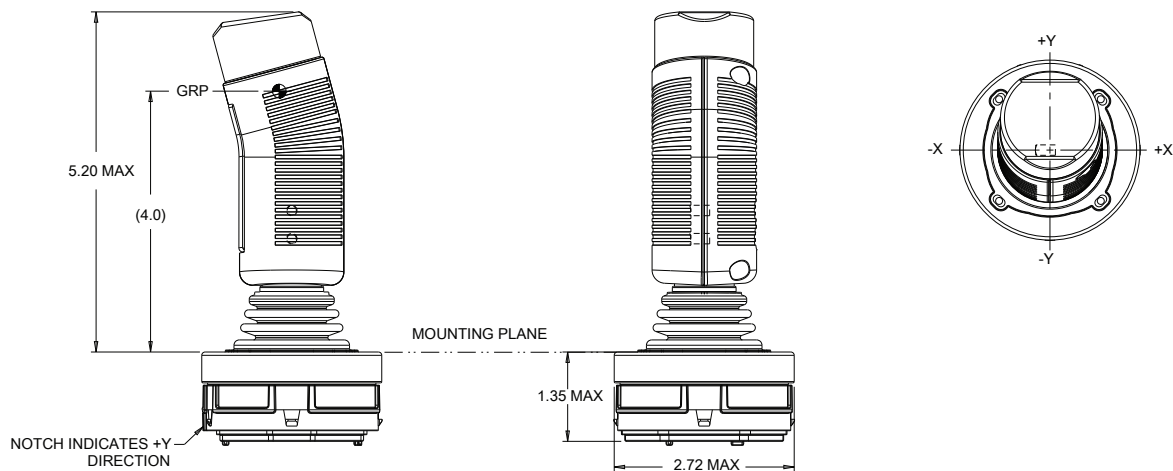
HANDLE 52

(G3-D WITH ROCKER)



HANDLE 53

(G3-D)

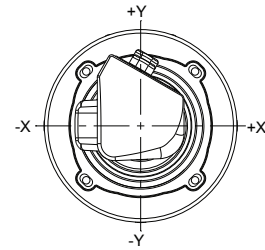
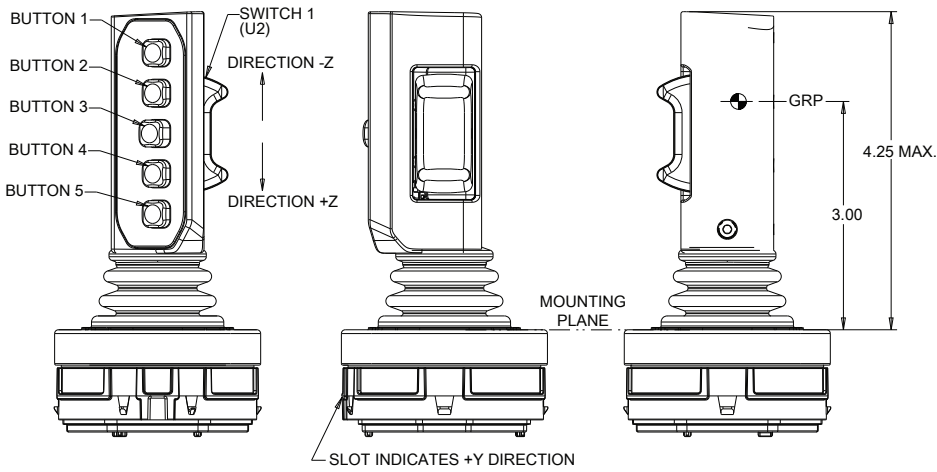


Wires and Strain Relief not shown in all views for clarity.

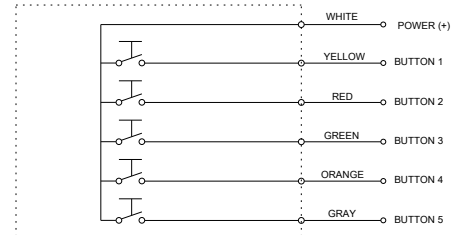
HALL EFFECT TECHNOLOGY JOYSTICK

HANDLE 61

(5-BUTTON KEYPAD & HALL ROCKER RIGHT)

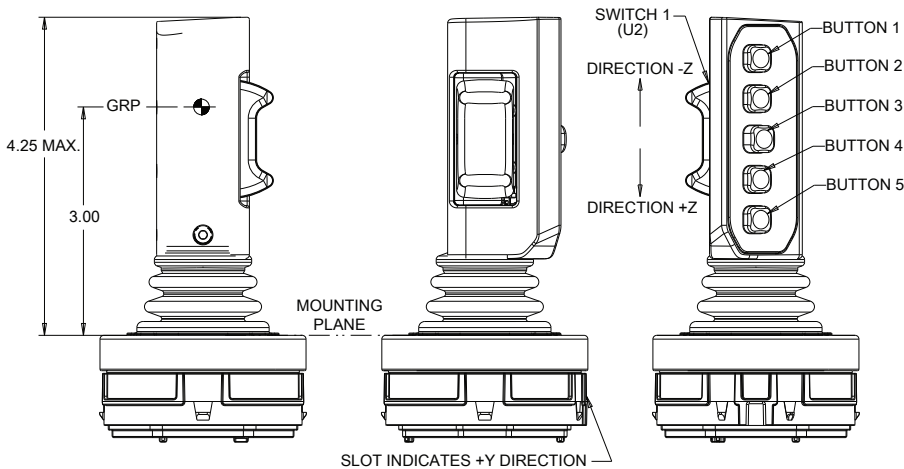


BUTTON SCHEMATIC

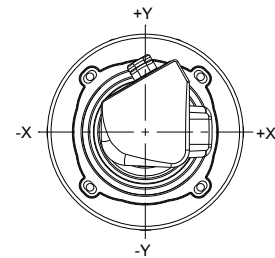
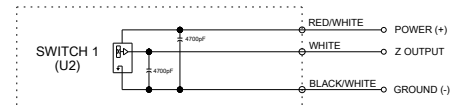


HANDLE 62

(5-BUTTON KEYPAD & HALL ROCKER LEFT)

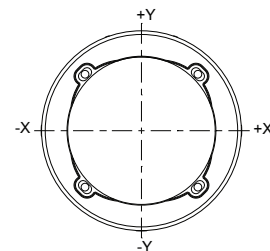
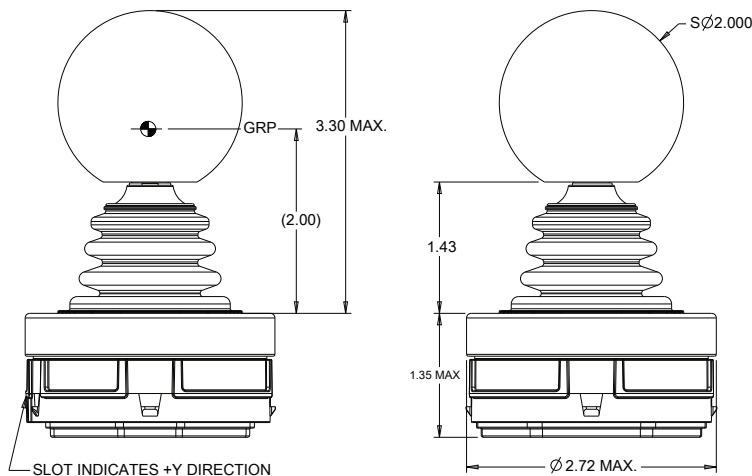


HANDLE SCHEMATIC



HANDLE 71

(BALL)



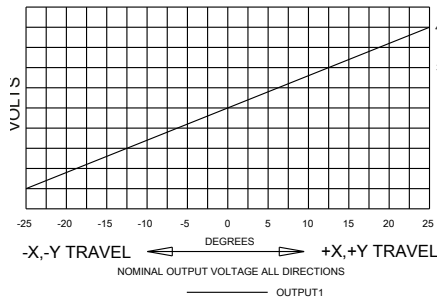
Wires and Strain Relief not shown in all views for clarity.

MEDIUM HALL EFFECT JOYSTICK

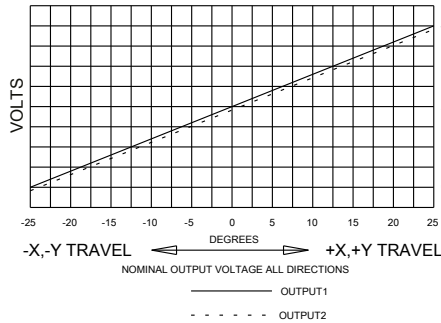
UP TO 10 MILLION OPERATIONAL CYCLES IN ALL DIRECTIONS

JHM OUTPUTS

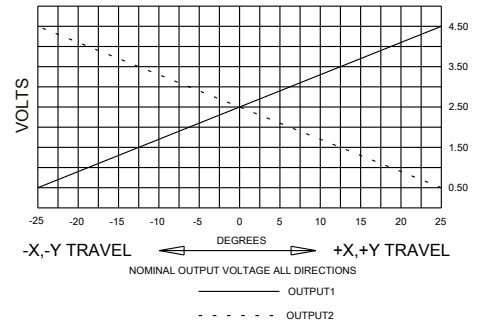
OPTION AA & AT



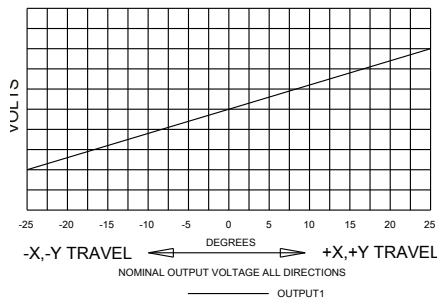
OPTION BB & BT



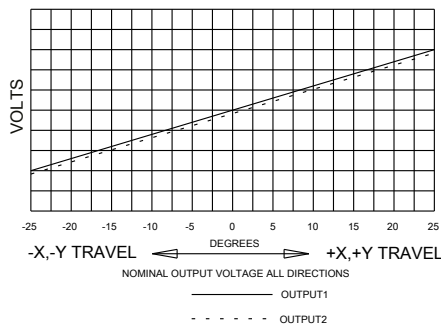
OPTION CC & CT



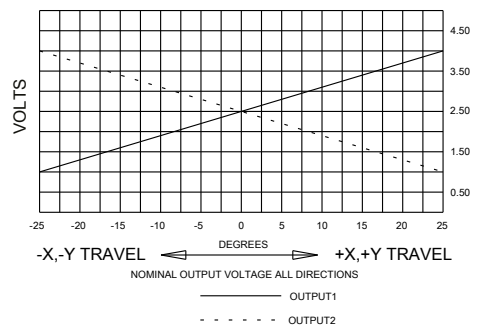
OPTION DD & DT



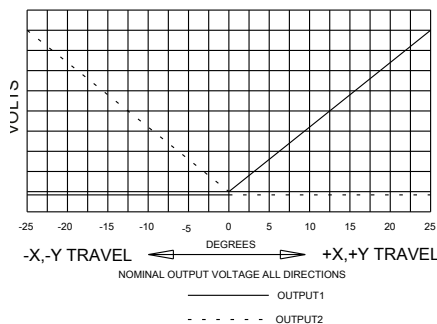
OPTION EE & ET



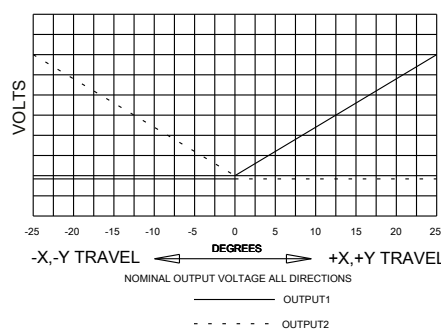
OPTION FF & FT



OPTION GG



OPTION HH



OPTION LL

