

HJLG3 Joystick with Grip Options



The HJLG3 series combines a medium JHL Hall effect joystick base with a grip. The long-lasting, fully integrated assembly handles loads up to 225 lbs. and is well suited for machinery and vehicles in agriculture, construction, material handling and industrial markets. Choose from a variety of grips, faceplates, outputs, gating and Z-axis options.

Joystick and grip assemblies:

HJLG3-A comes with a smaller G3-A Universal Grip

HJLG3-B comes with a larger G3-B Universal Grip

HJLG3-C comes with a medium G3-C Universal Grip

HJLG3-CK comes with a medium G3-CK Universal Grip

HJLG3-D comes with a G3-D Control Grip

HJLG3-M comes with a smaller G3-M Universal Grip

Altogether, these models offer nearly 50 standard grip faceplates with the flexibility to create custom faceplates with hundreds of switch configurations.

Output configurations include single analog, redundant analog, CANopen and J1939. The JHL joystick has a PLd option for functional safety applications: It has been designed in accordance with Safety Standard ISO 13849-1, performance level D, Category 3 to enable communications on two separate channels.

Select HJLG3 models offer optional field replaceability, which allows either grips or faceplates to be quickly replaced without costly machine downtime. Field-replaceable grips are available on the HJLG3-C and HJLG3-M models. Field-replaceable faceplates are an option for the HJLG3-A and HJLG3-B models.

FEATURES:

- Compact, behind-panel design for armrest and panel mounting (*on all grips except G3-CK*)
- Contactless Hall effect technology
- Several grip types with standard and custom faceplates that can accommodate pushbuttons, rockers, thumbwheels and other switches
- Field-replaceable grip or faceplate option on select models*
- Mechanical life up to 6 million cycles
- Analog, PWM, USB, CANopen, J1939 and PLd outputs; CANopen and J1939 available with integral Deutsch® connector
- Electronics sealed to IP6K8S
- Redundant sensors available
- Gating options: single axis, single axis with center detent, dual axis and omnidirectional selections, including square smooth feel, on-axis and off-axis guided feel, square on axis guided feel and center detent.
- Modular design
- Left- and right-handed operation
- RoHS compliant

**Contact factory for field-replaceable option information. The Z-axis feature is not available on field-replaceable models.*



Standard Characteristics/Ratings:				
ELECTRICAL:				
Joystick				
Rated at Vcc = 5V @ 20°C Load = 1 ma (4.7 KΩ)				
Supply Voltage	Units	Min	Typ	Max
Supply Voltage	VDC	4.5	5.0	5.5
Output Voltage Tolerance at Center	VDC @ 5V Vcc	-.25	N/A	+.25
Output Voltage Tolerance at Full Travel	VDC @ 5V Vcc	-.25	N/A	+.25
Output at Full Travel +X, +Y Direction	VDC @ 5V Vcc	4.25	4.50	4.75
Supply Current Per Die B=0, Vcc=5V, Iout=0	mA	N/A	10	12
Output Impedance	kΩ	N/A	1.0	N/A
Joystick CAN Open				
Supply Voltage	VDC	9	N/A	32
Node Identifier	Dec.		10	
Baud Rate	B/S		125K	
Joystick J1939				
Supply Voltage	VDC	9	N/A	32
Source Address	Dec.		51	
Baud Rate	B/S		250K	
Joystick PLd				
Supply Voltage	VDC	9	N/A	32
Inputs or Measure PWM	24 analog and digital inputs; six inputs can decode J2716 SENT protocol signals or measure PWM			
Outputs	Two PWM outputs			
Grip Touch Switch* (see usage message)				
Supply Voltage	VDC	3.15	NA	5.5
Output Active (Low)	VDC	NA	NA	0.60
Output Current Sink	mA	N/A	NA	10
Operator Presence				
Electrical Rating	10mA Resistive Load @ 5VDC			
Logic Level Electrical Life	Up to 1,250,000 Cycles			
Keypads				
Circuit Configuration	SPST N.O.			
Voltage	1-32 VDC			
Current	10-100 mA Resistive			
P9 Switches				
Electrical Rating	10mA Resistive Load @ 5VDC			
Logic Level Electrical Life	Up to 1,250,000 Cycles			
K1 Switches				
Electrical Rating	10mA Resistive Load @ 5VDC			
Electrical Life	Up to 100,000 Cycles			
HPL Switches				
Supply Voltage	VDC	4.5	5.0	5.5
Output Voltage (Button Up)	VDC @ 5V Vcc	0.35	0.50	0.65
Output Voltage (Button Down)	VDC @ 5V Vcc	4.35	4.50	4.65
Supply Current per Die B=0, Vcc=5V, Iout=0	mA	N/A	8.00	10
Continuous Output Current	mA	-1.2	N/A	1.2
HTW & HTWF Switches				
Supply Voltage	VDC	4.5	5.0	5.5
Output Voltage Tolerance at Center	VDC @ 5V Vcc	-.15	NA	+.15
Output Voltage Tolerance at Full Travel	VDC @ 5V Vcc	-.25	N/A	-.25
Supply Current per Die B=0, Vcc=5V, Iout=0	mA	N/A	N/A	10
HTWM Switches				
Supply Voltage	VDC	4.5	5.0	5.5
Output Voltage Tolerance at Center	VDC @ 5V Vcc	-.25	NA	+.25
Output Voltage Tolerance at Full Travel	VDC @ 5V Vcc	-.25	N/A	-.25
Supply Current per Die B=0, Vcc=5V, Iout=0	mA	N/A	N/A	10

Standard Characteristics/Ratings (continued):				
HTWS Switches				
Supply Voltage	VDC	4.5	5.0	5.5
Output Voltage Tolerance at Center	VDC @ 5V Vcc	-.25	NA	+.25
Output Voltage Tolerance at Full Travel	VDC @ 5V Vcc	-.25	N/A	+.25
Supply Current per Die B=0, Vcc=5V, Iout=0	mA	N/A	N/A	20
HTLT4 Switches				
Supply Voltage	VDC	4.5	5.0	5.5
Output Voltage Tolerance at Center	VDC @ 5V Vcc	-.25	NA	+.25
Output Voltage Tolerance at Full Travel	VDC @ 5V Vcc	-.25	N/A	-.25
Supply Current per Die B=0, Vcc=5V, Iout=0	mA	N/A	10	12
TC-5 Switches				
Electrical Rating @ 1-32 VDC	10-100mA			
Electrical Life	Up to 3,000,000 Cycles			
MECHANICAL:				
Joystick	Units	Min	Typ	Max
Mechanical Life, Return to Center	Up to 6,000,000 cycles; 1,000,000 cycles (<i>Detent</i>) Up to 250,000 cycles with Friction			
Travel Angle	Degrees	18	20	22
Op. Force (<i>w/Bellows</i>) Low Force @ GRP, Ret. to Ctr.	Lbs.	.25	.50	1.0
Op. Force (<i>w/Bellows</i>) Low Force @ GRP, Ret. to Ctr., Detent	Lbs.	.50	1.0	1.5
Op. Force (<i>w/Bellows</i>) Medium Force @ GRP, Ret. to Ctr..	Lbs.	.75	1.0	1.5
Op. Force (<i>w/Bellows</i>) Medium Force @ GRP, Ret. to Ctr., Detent	Lbs.	2.0	2.5	3.0
Op. Force (<i>w/Bellows</i>) High Force @ GRP, Ret. to Ctr.	Lbs.	1.5	2.0	2.5
Op. Force (<i>w/Bellows</i>) High Force @ GRP, Ret. to Ctr., Detent	Lbs.	2.0	4.0	6.0
Op. Force (<i>w/Bellows</i>) @ GRP, Friction Y-Axis	Lbs.	1.0	3.5	6.0
Maximum Allowable Load @ 5" GRP	Lbs.			225 Lbs.
Keypads				
Mechanical Life	Up to 3,000,000 Cycles			
P9 Switches				
Mechanical Life	Up to 1,250,000 Cycles			
K1 Switches				
Mechanical Life	Up to 1,000,000 Cycles			
HPL Switches				
Mechanical Life Full Stroke Per Button	Up to 100,000 Cycles			
Button Travel	IN	.135	.150	.160
Operating Force 25°C @ .150"Lbs.	N/A	3.0	3.8	
Reset Force @ 25°C	Oz.	5	N/A	N/A
HTW & HTWF Switches				
Mechanical Life Full Forward to Full Back, Ret. to Ctr.	Up to 3,000,000 Cycles			
Mechanical Life Full Forward to Full Back, Friction,	Up to 250,000 Cycles			
Operating Force (<i>HTW</i>) 25°C at Top of Roller, Return to Ctr.	Oz.	2.0	5.0	8.0
Operating Force (<i>HTWF</i>) 25°C at Top of Roller, Friction	Oz.	2.0	4.0	6.0
Maximum Allowable (<i>HTW & HTWF</i>) Radial Load	Lbs.	N/A	N/A	30
HTWM Switches				
Mechanical Life, Full Forward to Full Back, Ret. to Ctr.	Up to 3,000,000 Cycles			
Operating Force 25°C at Top of Roller	Oz.	2.0	5.0	8.0
Maximum Allowable Radial Load	Lbs.	N/A	N/A	30.0

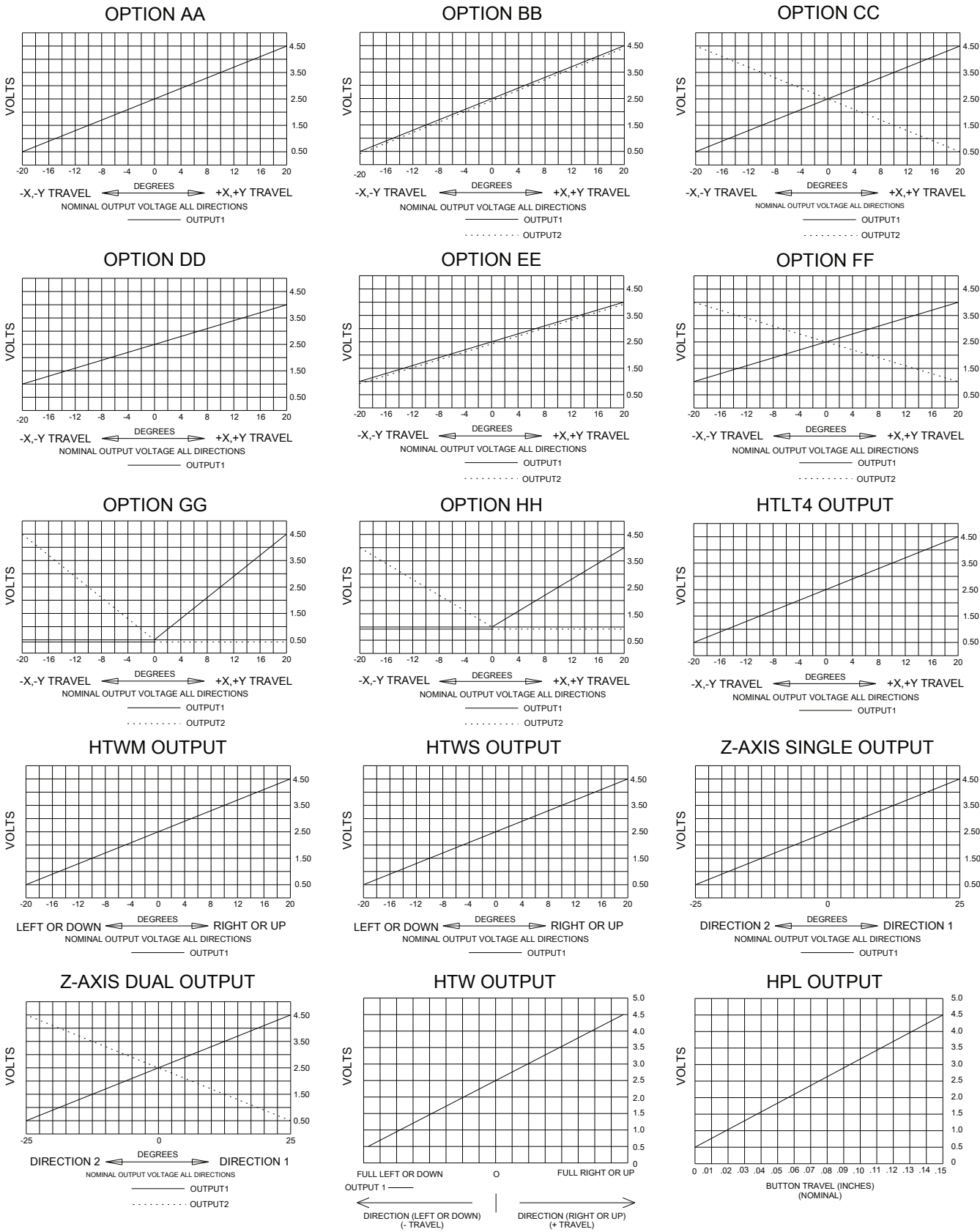
Standard Characteristics/Ratings <i>(continued):</i>				
HTWS Switches				
Mechanical Life,	Up to 3,000,000 Cycles Full Forward to Full Back			
Operating Force 25 °C at Top of Roller	Oz	2.0	5.0	8.0
Maximum Allowable Radial Load	Lbs.	N/A	N/A	15.0
HTLT4 Switches				
Mechanical Life,	Up to 3,000,000 Cycles			
Operating Force <i>(w/Boot)</i> Top of Roller @ 20 °C	Oz.	5.0	8.0	16.0
Maximum Allowable Vertical Force on Button	Lbs.	N/A	N/A	25.0
Maximum Allowable Radial Force on Top of Knob	Lbs.	N/A	N/A	25.0
Maximum Allowable Torque on Button about Shaft Axis	In-Lbs	N/A	N/A	5.0
TC-5 Switches				
Mechanical Life	Up to 3,000,000 Cycles			
Operating Force	Oz.	8.0	16.0	24.0
ENVIRONMENTAL:				
Joystick	Units	Min	Typ	Max
Operating Temperature	°C	-40	20	85
Humidity	96% RH, 70 °C, 96 Hrs.			
Vibration	10g, 24 Hz – 2KHz Swept Sinusoidal			
Electrical Enclosure Design	ISO 20653, IP6K8S – Dusttight, Continuous Immersion, 1 meter for 31 minutes, Stationary during test(s)			
EMI/RFI Withstand	Per SAE J1113 <i>(Contact factory for details)</i>			
Keypads	Units	Min	Typ	Max
Operating Temperature	°C	-40	20	85
Faceplate and Side Keypad Enclosure Design	ISO 20653, IP6K8S – Dusttight, Continuous Immersion, 1 meter for 31 minutes, Stationary during test(s)			
P9 Switches	Units	Min	Typ	Max
Operating Temperature	°C	-40	20	85
Electrical Enclosure Design	ISO 20653, IP6K8S – Dusttight, Continuous Immersion, 1 meter for 31 minutes, Stationary during test(s)			
K1 Switches	Units	Min	Typ	Max
Operating Temperature	°C	-30	20	85
Electrical Enclosure Design	ISO 20653, IP6K8S – Dusttight, Continuous Immersion, 1 meter for 31 minutes, Stationary during test(s)			
HPL Switches	Units	Min	Typ	Max
Operating Temperature	°C	-40	20	85
Electrical Enclosure Design	ISO 20653, IP6K8S – Dusttight, Continuous Immersion, 1 meter for 31 minutes, Stationary during test(s)			
HTW & HTWF Switches	Units	Min	Typ	Max
Operating Temperature	°C	-40	20	85
Electrical Enclosure Design	ISO 20653, IP6K8S – Dusttight, Continuous Immersion, 1 meter for 31 minutes, Stationary during test(s)			
HTWM Switches				
Operating Temperature	°C	-40	20	85
Electrical Enclosure Design	ISO 20653, IP6K8S – Dusttight, Continuous Immersion, 1 meter for 31 minutes, Stationary during test(s)			
HTWS Switches				
Operating Temperature	°C	-40	20	85
Electrical Enclosure Design	ISO 20653, IP5K8S – Dust-protected, Continuous Immersion, 1 meter for 31 minutes, Stationary during test(s)			
HTLT Switches				
Operating Temperature	°C	-40	20	85
Electrical Enclosure Design	ISO 20653, IP6K8S – Dusttight, Continuous Immersion, 1 meter for 31 minutes, Stationary during test(s)			

Standard Characteristics/Ratings (continued):				
TC-5 Switches				
Operating Temperature	°C	-40	20	85
Electrical Enclosure Design	ISO 20653, IP6K8S – Dusttight, Continuous Immersion, 1 meter for 31 minutes, Stationary during test(s)			
Grip	Units	Min	Typ	Max
Operating Temperature	°C	-40	20	85
Electrical Enclosure Design	Unsealed			
MATERIAL:				
Joystick				
Plunger	Thermoplastic			
Housing	Thermoplastic, Black			
Bellows	Silicone, Black			
Cable	Output Option AA, DD, JJ & KK: 22 AWG (19 strands of 34 AWG TSC) PVC/Polyurethane Blend Outer Jacket Output Option BB, CC, EE, FF, GG & HH: 24 AWG (19 strands of 34 AWG TSC) PVC/Polyurethane Blend Outer Jacket			
Mounting Hardware	#10–24 x 3/4 Carriage Bolts Self Locking Nuts			
Keypads				
Keypads	Silicone Rubber, Black			
Keypads, Lighted	Silicone Rubber, Black with White Graphic			
P9 Switches				
Button	Thermoplastic			
Housing	Thermoplastic			
K1 Switches				
Button	Thermoplastic			
Housing	Thermoplastic			
HTW & HTWF Switches				
Button Top	Thermoplastic			
Housing	Thermoplastic			
HTWM Switches				
Button Top	Thermoplastic			
Housing	Thermoplastic			
HTWS Switches				
Button Top	Thermoplastic			
Housing	Thermoplastic			
HTLT4 Switches				
Housing and Flange	Thermoplastic			
Bellows	Silicone, Black			
TC-5 Switches				
Housing	PBT			
Keypad	Silicone Rubber			
Grip				
Handle	Thermoplastic, Glass Reinforced, Black			
Faceplate	Thermoplastic, Glass Reinforced, Black			
Wires	22 AWG, UL Style 1569 (8.5 in. long from bottom of joystick)			
Side Keypad Wires	24 AWG, (26/10TA) Insulation Diameter: .037 Insulation Type: PVC (40 in. from bottom of joystick)			

*GRIP TOUCH SWITCH—WARNING ON PERSONAL INJURY AND ANY USE AS SAFETY RELATED:

Do not use these products as safety or emergency stop devices or in any application where failure of the product could result in personal injury. Failure to comply with these instructions could result in death or serious injury. OTTO Engineering Inc. makes no warranty, representation, or guarantee regarding the information contained herein or the suitability of its products and services for any particular purpose, nor does OTTO Engineering Inc. assume any liability whatsoever arising out of the application or use of any product. The product sold hereunder by OTTO has been subject to limited testing and should not be used in conjunction with detection of the presence of an operator on or with any equipment that is in any way safety related. OTTO does not accept any liability for incidental, consequential damages, personal injury or loss of life for any claims against the use of this product.

HJLG3 Joystick Output Configurations



For All Models in the HJLG3 Series

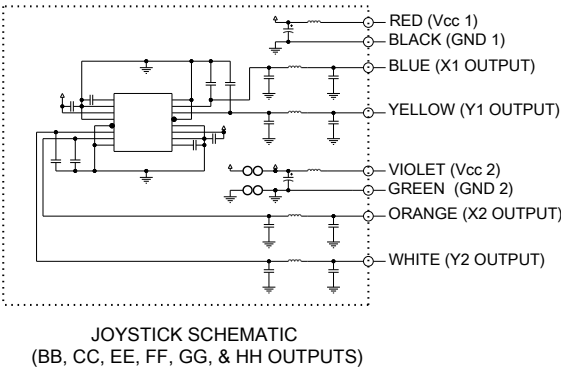
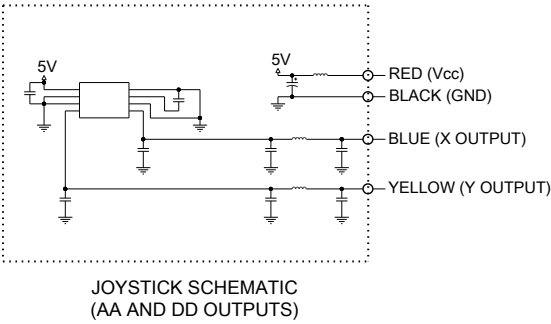
ANALOG OUTPUTS

CAN OUTPUTS

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

FUNCTION	COLOR
NONE	PIN 1
CAN HIGH	PIN 2
+SUPPLY	PIN 3
-SUPPLY	PIN 4
CAN LOW	PIN 5
NONE	PIN 6

HJLG3 Joystick Schematics

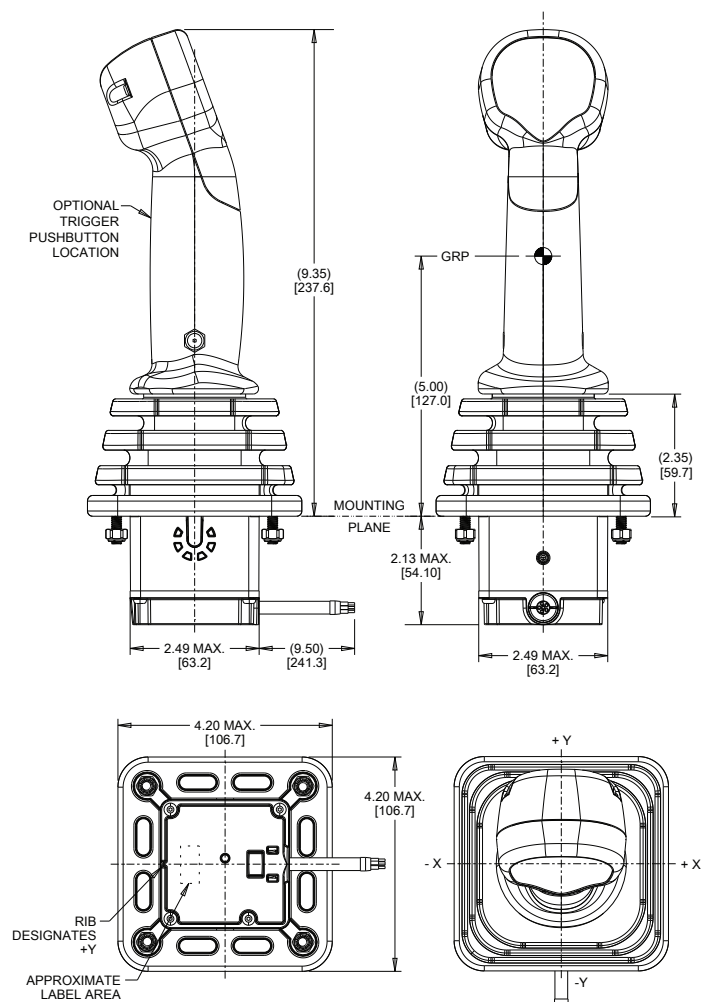


HJLG3-A Joystick with Grip

The HJLG3-A combines a small G3-A Universal Grip with a JHL Hall effect joystick base. The grip offers a choice of 17 standard faceplates with a combination of rockers and pushbuttons. A trigger pushbutton on the back of the grip handle is optional.

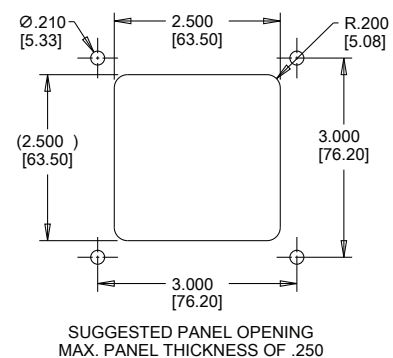
Visit the G3-A product page for more information about the grip, which is customizable to customer specifications.

HJLG3-A Joystick Drawings



HJLG3-A with AD Faceplate

HJLG3-A Suggested Panel Opening



HJLG3-A Joystick Part Number Code

HJLG3-A -	X	XX	X	X	XX	X	X
Gating	Joystick Output 1*	Joystick Output 2**	Operate Force	Trigger Pushbutton	Faceplate	K1 Rocker #1 Style - Black***	K1 Rocker #2 Style - Black***
1. Gated Single Y-Axis; Return to Center	AA. 2.5 +/- 2.0VDC ①	NONE	3. High	1. None	AA	1. None	1. None
2. Gated Dual Axis; Return to Center	BB. 2.5 +/- 2.0VDC ②	2.5 +/- 2.0VDC		2. P9 - Black	AB	2. On-Off	2. On-Off
3. Omni-directional; Center Detent Feel	CC. 2.5 +/- 2.0VDC ②	2.5 +/- 2.0VDC		3. P9 - Red	AC	3. (On)-Off	3. (On)-Off
4. Omni-directional; On-Axis and Off-Axis Guided Feel	DD. 2.5 +/- 1.5VDC ①	NONE			AD	4. On-Off-On	4. On-Off-On
5. Gated Single Y-Axis; Center Detent Feel	EE. 2.5 +/- 1.5VDC ②	2.5 +/- 1.5VDC			AE	5. (On)-Off-(On)	5. (On)-Off-(On)
6. Friction - Single Axis	FF. 2.5 +/- 1.5VDC ②	2.5 +/- 1.5VDC			AF		
7. Friction Y-Axis; Return-to-Center X-Axis	GG. 0.5 - 4.5VDC ②	0.5 - 4.5VDC			AG		
8. Omni-directional; Square Smooth Feel	HH. 1.0 - 4.0VDC ②	1.0 - 4.0VDC			AH		
9. Omni-directional; Square On-Axis Guided Feel	JJ. CANbus J1939 ①	NONE			AJ		
	KK. CANopen ①	NONE			AK		
	LL. CANbus J1939 w/ Deutsch Connector	NONE			AL		
	MM. CANopen w/ Deutsch Connector	NONE			AM		
	NN. PLd	NONE			AN		
					AP		
					AQ		
					AR		
					AS		

Continued

X	X	X	X
P9 #1 Button Color	P9 #2 Button Color	P9 #3 Button Color	P9 #4 Button Color
1. Red	1. Red	1. Red	1. Red
2. Black	2. Black	2. Black	2. Black
3. Orange	3. Orange	3. Orange	3. Orange
4. Yellow	4. Yellow	4. Yellow	4. Yellow
5. Green	5. Green	5. Green	5. Green
6. Blue	6. Blue	6. Blue	6. Blue
7. Violet	7. Violet	7. Violet	7. Violet
8. Gray	8. Gray	8. Gray	8. Gray
9. White	9. White	9. White	9. White
N. None	N. None	N. None	N. None

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

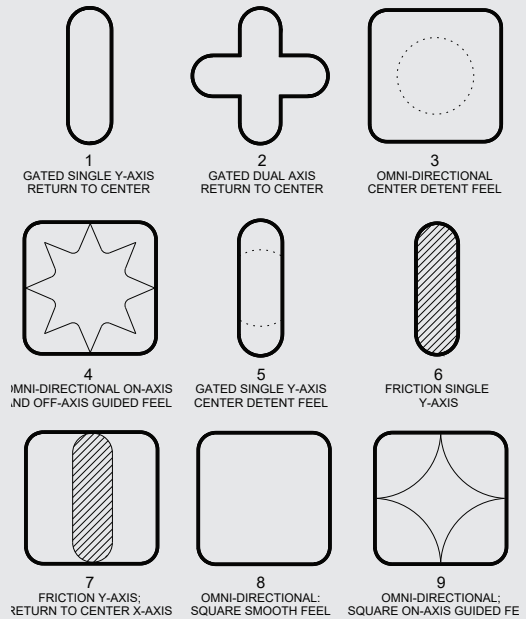
**Options "BB" and "EE" provide redundant output 2 which duplicates output 1. Options "CC" and "FF" provide redundant output 2 which is inverse of output 1.

*** K1 Rocker Switches: on position or momentary position is up or to the right and (/) denotes momentary action. Contact factory for rocker legends and additional color options.

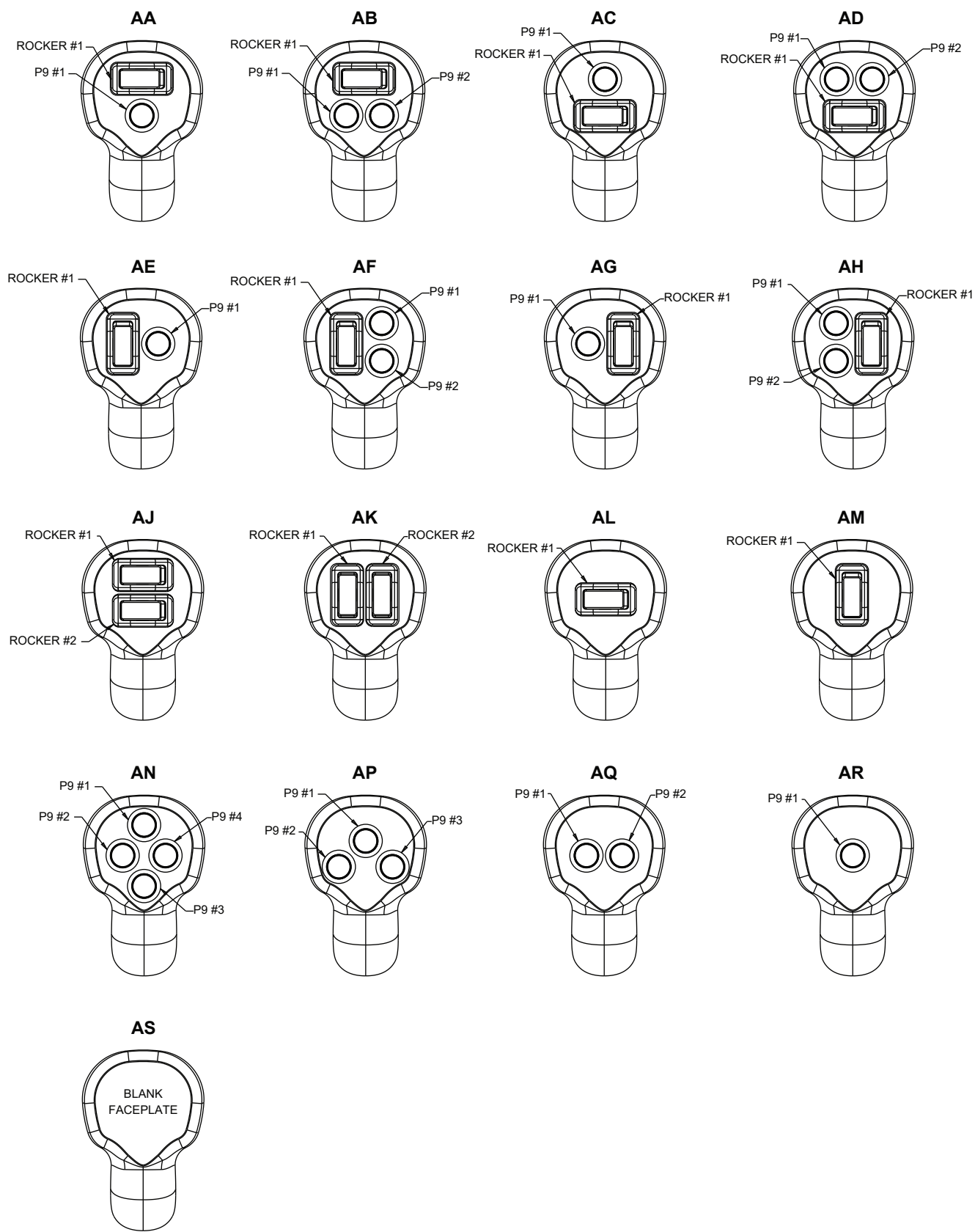
① 22 AWG Cable

② 24 AWG Cable

HJLG3 Gating Icons



HJLG3-A Joystick Faceplates

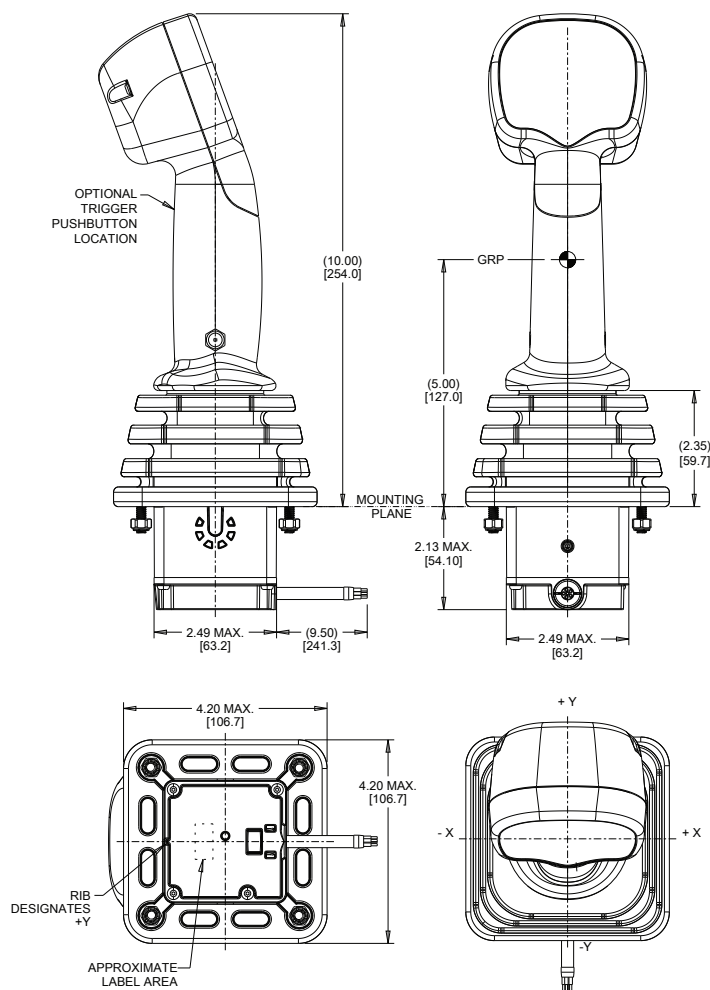


HJLG3-B Joystick with Grip

The HJLG3-B combines a large G3-B Universal Grip with a JHL Hall effect joystick base. The grip offers a choice of 11 standard faceplates with a combination of pushbuttons, rockers and thumbwheels. A trigger pushbutton on the back of the grip handle is optional.

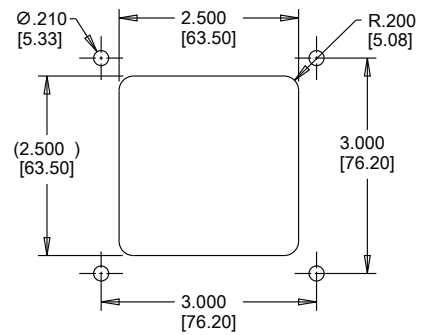
Visit the G3-B product page for more information about the grip, which is customizable to customer specifications.

HJLG3-B Joystick Drawings



HJLG3-B with BK Faceplate

HJLG3-B Suggested Panel Opening



SUGGESTED PANEL OPENING
MAX. PANEL THICKNESS OF .250



HJLG3-B Joystick Part Number Code

HJLG3-B -	X	XX	X	X	XX	X	X	X	X
Gating	Joystick Output 1*	Joystick Output 2**	Force	Trigger Pushbutton	Faceplate	K1 Rocker #1 Style - Black***	K1 Rocker #2 Style - Black***	K1 Rocker #3 Style - Black***	K1 Rocker #4 Style - Black***
1. Gated Single Y-Axis; Return to Center	AA. 2.5 +/- 2.0VDC ①	NONE	2. Medium	1. None	BA	1. None	1. None	1. None	1. None
2. Gated Dual Axis; Return to Center	BB. 2.5 +/- 2.0VDC ②	2.5 +/- 2.0VDC	3. High	2. P9 - Black	BB	2. On-Off	2. On-Off	2. On-Off	2. On-Off
3. Omni-directional; Center Detent Feel	CC. 2.5 +/- 2.0VDC ②	2.5 +/- 2.0VDC		3. P9 - Red	BC	3. (On)-Off	3. (On)-Off	3. (On)-Off	3. (On)-Off
4. Omni-directional; On-Axis and Off-Axis Guided Feel	DD. 2.5 +/- 1.5VDC ①	NONE			BD	4. On-Off-On	4. On-Off-On	4. On-Off-On	4. On-Off-On
5. Gated Single Y-Axis; Center Detent Feel	EE. 2.5 +/- 1.5VDC ②	2.5 +/- 1.5VDC			BE	5. (On)-Off-(On)	5. (On)-Off-(On)	5. (On)-Off-(On)	5. (On)-Off-(On)
6. Friction - Single Axis	FF. 2.5 +/- 1.5VDC ②	2.5 +/- 1.5VDC			BF				
7. Friction Y-Axis; Return-to-Center X-Axis	GG. 0.5 - 4.5VDC ②	0.5 - 4.5VDC			BG				
8. Omni-directional; Square Smooth Feel	HH. 1.0 - 4.0VDC ②	1.0 - 4.0VDC			BH				
9. Omni-directional; Square On-Axis Guided Feel	JJ. CANbus J1939 ①	NONE			BJ				
	KK. CANopen ①	NONE			BK				
	LL. CANbus J1939 w/ Deutsch Connector	NONE			BL				
	MM. CANopen w/ Deutsch Connector	NONE							
	NN. PLd	NONE							

Continued

X	X	X	X	X	X	X	X
HTW #1 Roller - Black****	HTW #2 Roller - Black****	P9 #1 Button Color	P9 #2 Button Color	P9 #3 Button Color	P9 #4 Button Color	P9 #5 Button Color	P9 #6 Button Color
1. None	1. None	1. Red	1. Red	1. Red	1. Red	1. Red	1. Red
2. Return to Center③	2. Return to Center	2. Black	2. Black	2. Black	2. Black	2. Black	2. Black
3. Friction④	3. Friction	3. Orange	3. Orange	3. Orange	3. Orange	3. Orange	3. Orange
		4. Yellow	4. Yellow	4. Yellow	4. Yellow	4. Yellow	4. Yellow
		5. Green	5. Green	5. Green	5. Green	5. Green	5. Green
		6. Blue	6. Blue	6. Blue	6. Blue	6. Blue	6. Blue
		7. Violet	7. Violet	7. Violet	7. Violet	7. Violet	7. Violet
		8. Gray	8. Gray	8. Gray	8. Gray	8. Gray	8. Gray
		9. White	9. White	9. White	9. White	9. White	9. White
		N. None	N. None	N. None	N. None	N. None	N. None

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

**Options "BB" and "EE" provide redundant output 2 which duplicates output 1. Options "CC" and "FF" provide redundant output 2 which is inverse of output 1.

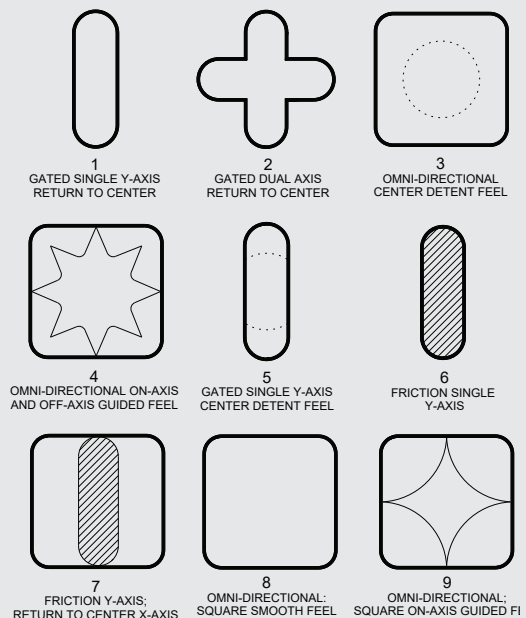
*** K1 Rocker Switches: on position or momentary position is up or to the right and () denotes momentary action. Contact factory for rocker legends and additional color options.

**** HTW Roller Switches: positive travel is up or to the right. Contact factory for additional options.

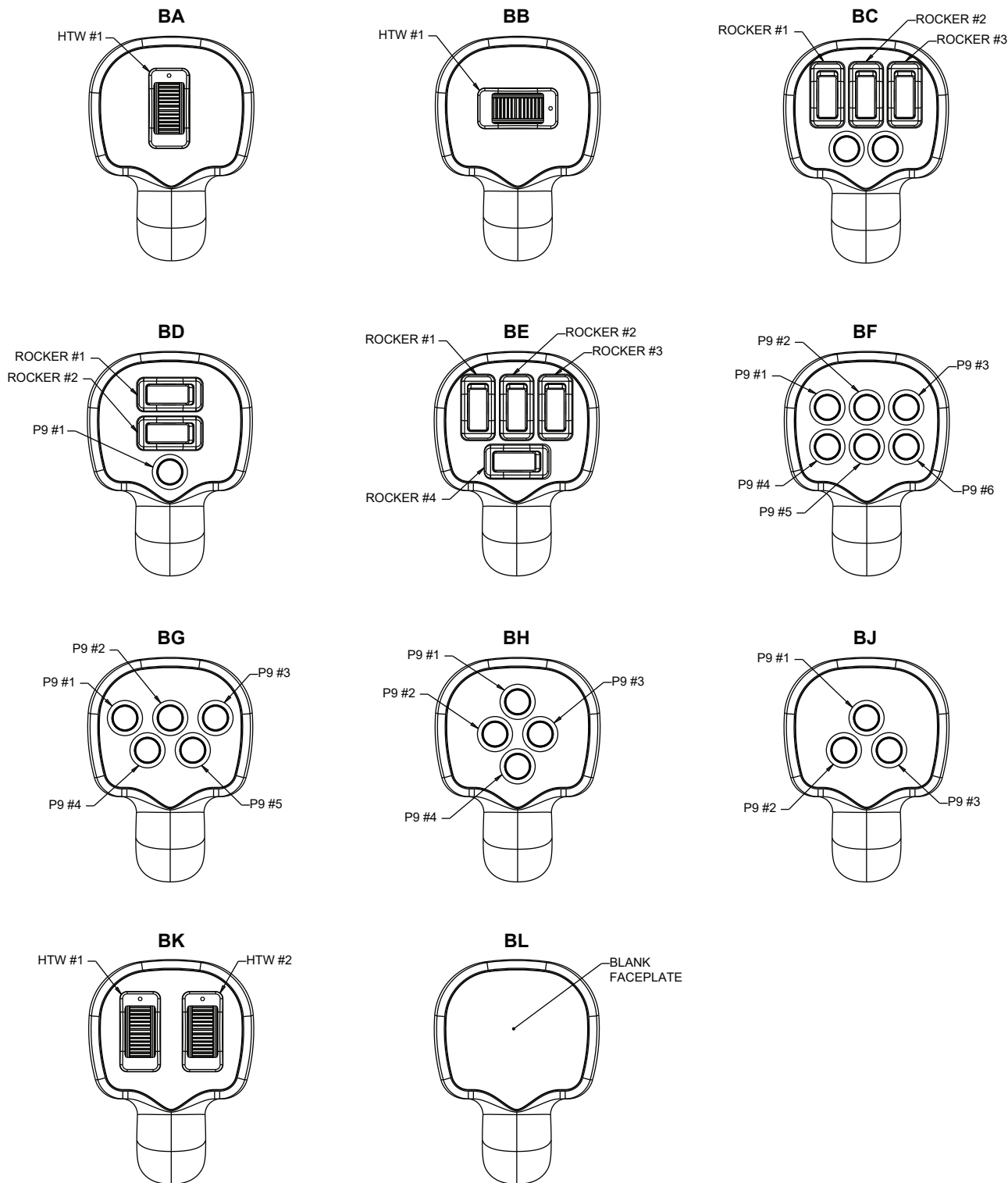
- ① 22 AWG Cable
- ② 24 AWG Cable
- ③ = HTW-1J12X22
- ④ = HTWF-1A12X22

Contact factory for additional options.

HJLG3-B Gating Icons



HJLG3-B Joystick Faceplates

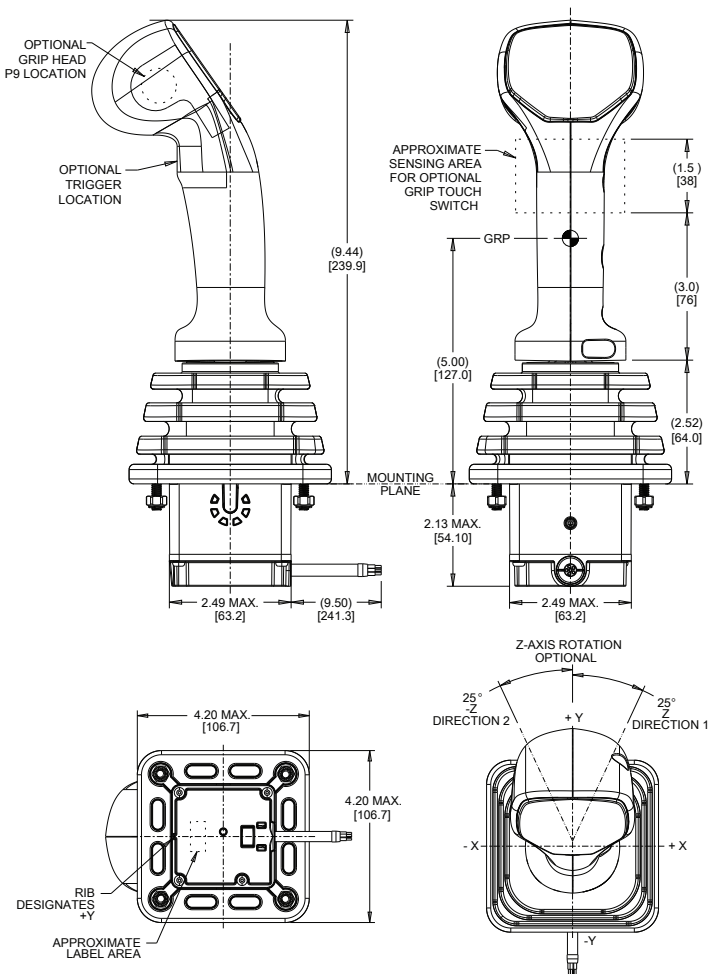


HJLG3-C Joystick with Grip

The HJLG3-C combines a medium G3-C Universal Grip with a JHL Hall effect joystick base. The grip offers a choice of 13 standard faceplates with a combination of pushbuttons, rockers and thumbwheels. Additional switch options are available on the back of the grip handle.

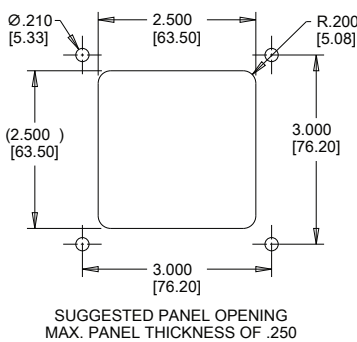
Visit the G3-C product page for more information about the grip, which is customizable to customer specifications.

HJLG3-C Drawings



HJLG3-C with CP Faceplate

HJLG3-C Suggested Panel Opening



HJLG3-C Joystick

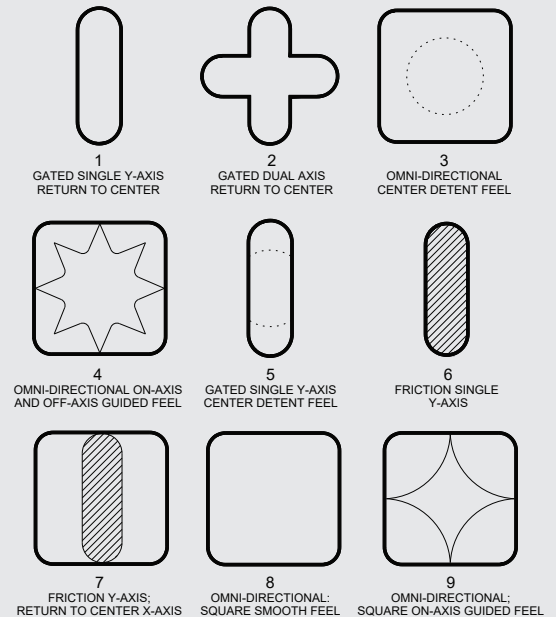
Part Number Code

HJLG3-C -	X	X	XX	X	X	X	X
Z-Axis/Grip Touch Switch	Gating	Joystick Output 1**	Joystick Output 2***	Operate Force	Trigger in Handle	Grip Head Pushbutton	Faceplate
1. No Z-Axis with No Grip Touch Switch	1. Gated Single Y-Axis; Return to Center	AA. 2.5 +/- 2.0VDC ③	NONE	2. Medium	1. None	1. None	CA
2. Grip Touch Switch Only (Active High)* ①②	2. Gated Dual Axis; Return to Center	BB. 2.5 +/- 2.0VDC ④	2.5 +/- 2.0VDC	3. High	2. P9 - Black	2. Left (Black)	CB
3. Z-Axis (Single Output) with No Grip Touch Switch	3. Omni-directional; Center Detent Feel	CC. 2.5 +/- 2.0VDC ④	2.5 +/- 2.0VDC		3. P9 - Red	3. Left (Red)	CC
4. Z-Axis (Dual Output) with No Grip Touch Switch	4. Omni-directional; On-Axis and Off-Axis Guided Feel	DD. 2.5 +/- 1.5VDC ③	NONE		4. Single	4. Right (Black)	CD
5. Grip Touch Switch Only (Active Low)* ①②	5. Gated Single Y-Axis; Center Detent Feel	EE. 2.5 +/- 1.5VDC ④	2.5 +/- 1.5VDC		5. Dual Momentary*	5. Right (Red)	CG
	6. Friction - Single Axis	FF. 2.5 +/- 1.5VDC ④	2.5 +/- 1.5VDC		6. Dual Maintained*	6. Left and Right (Black)	CJ
	7. Friction Y-Axis; Return-to-Center X-Axis	GG. 0.5 - 4.5VDC ④	0.5 - 4.5VDC		7. 2 P9s - Black	7. Left and Right (Red)	CK
	8. Omni-directional; Square Smooth Feel	HH. 1.0 - 4.0VDC ④	1.0 - 4.0VDC		8. 2 P9s - Red		CL
	9. Omni-directional; Square On-Axis Guided Feel	JJ. CANbus J1939 ③	NONE		9. HTWS - Black ⑤		CM
		KK. CANopen ③	NONE		A. HPL		CN
		LL. CANbus J1939 w/ Deutsch Connector	NONE				CP
		MM. CANopen w/ Deutsch Connector	NONE				CQ
		NN. PLd	NONE				CR

Continued

X	X	X	X	X
K1 Rocker #1 Style - Black ⑥	K1 Rocker #2 Style - Black ⑥	HTWM #1 Roller - Black ⑦	HTWM #2 Roller - Black ⑦	P9 Faceplate Button Color
1. None	1. None	1. None	1. None	1. Red
2. On-Off	2. On-Off	2. Return to Center1	2. Return to Center	2. Black
3. (On)-Off	3. (On)-Off			3. Orange
4. On-Off-On	4. On-Off-On	1= HTWM-1J12X22		4. Yellow
5. (On)-Off-(On)	5. (On)-Off-(On)			5. Green
				6. Blue
				7. Violet
				8. Gray
				9. White
				N. None

HJLG3 Gating Icons



*Grip Touch Switch is not available with trigger option 5 or 6.

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

***Options "BB" and "EE" provide redundant output 2 which duplicates output 1. Options "CC" and "FF" provide redundant output 2 which is inverse of output 1.

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② User Caution: To guarantee the intended operating characteristics of the capacitive switches, the zone around the switch must be free from materials which can affect switch performance. Those materials include but are not limited to water, cleaning solutions, and other conductive materials. Failure to maintain this contaminant free zone may result in unintended actuation of the capacitive switch.

③ 22 AWG Cable

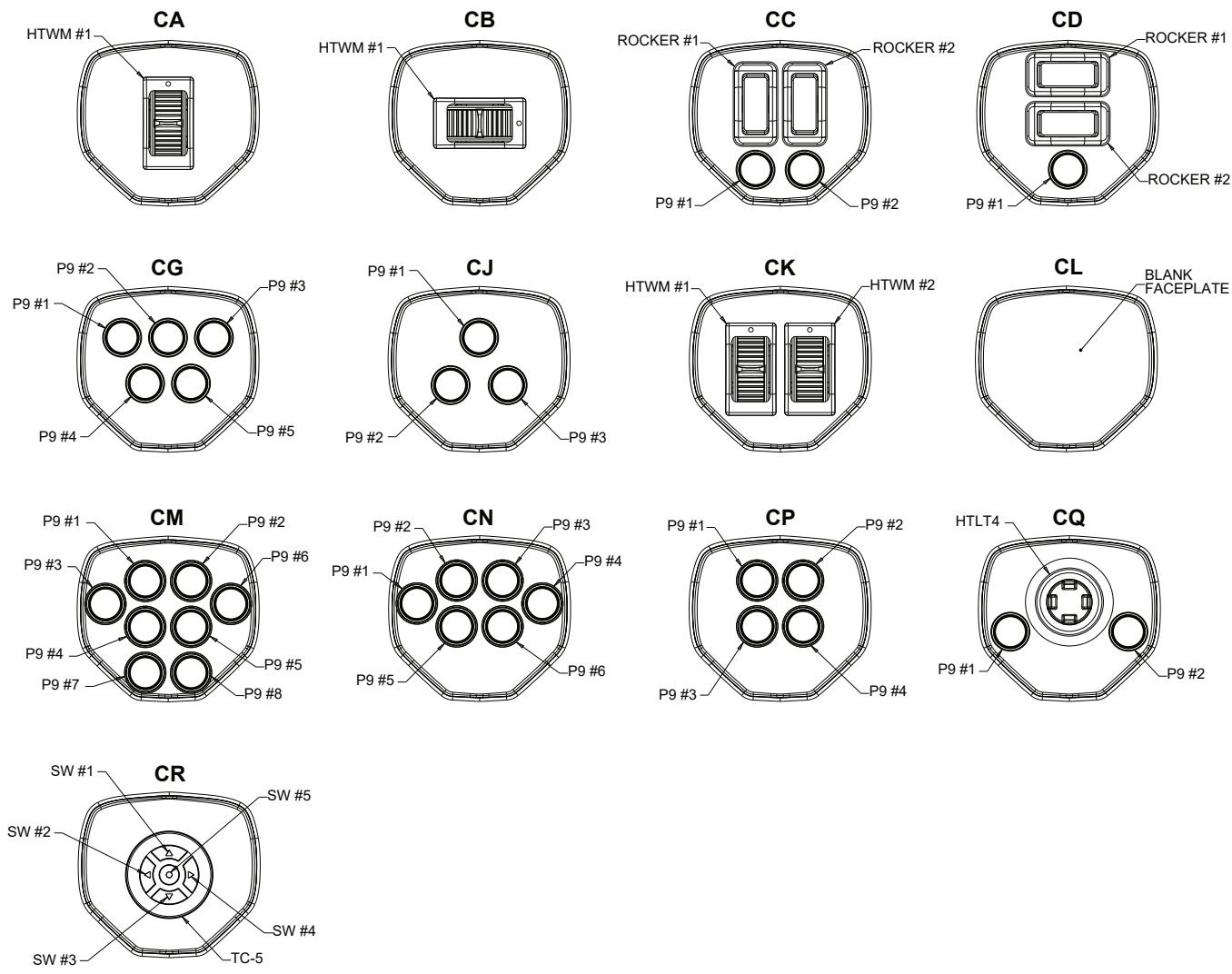
④ 24 AWG Cable

⑤ HTWS Trigger Switches: positive travel is to the right. Contact factory for additional options.

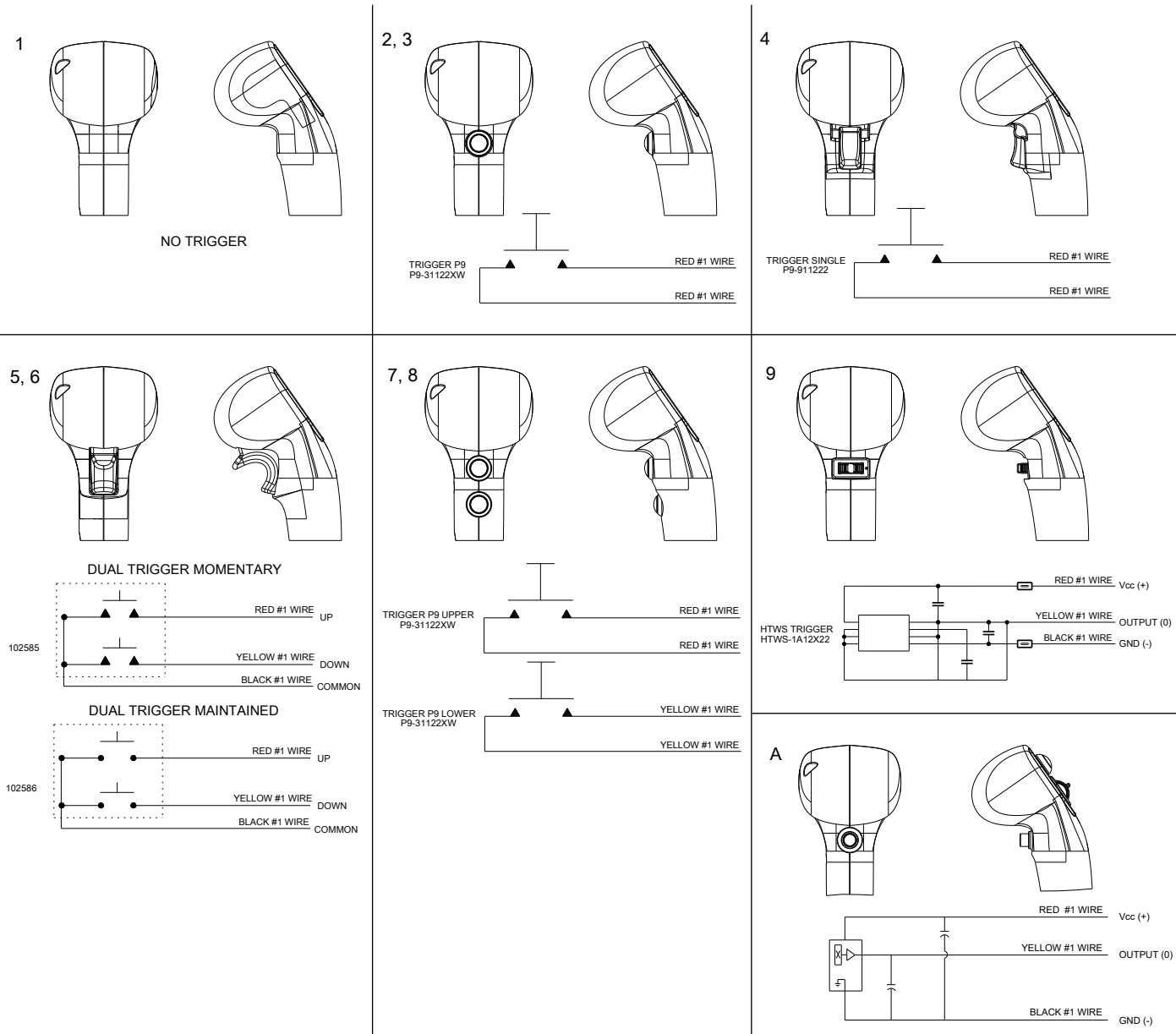
⑥ K1 Rocker Switches: on position or momentary position is up or to the right and (/) denotes momentary action. Contact factory for rocker legends and additional color options.

⑦ HTWM Roller Switches: positive travel is up or to the right. Contact factory for additional options.

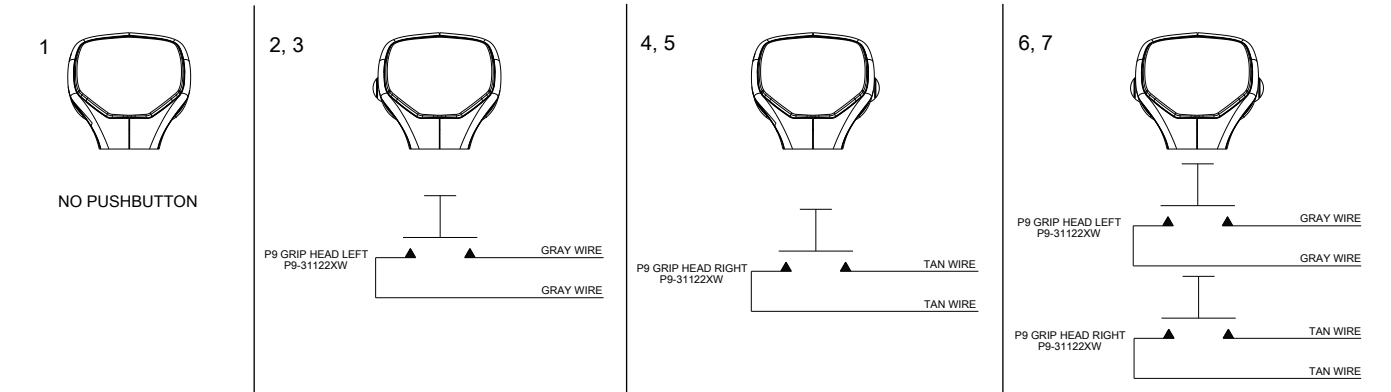
HJLG3-C Joystick Faceplates



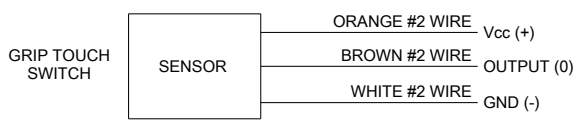
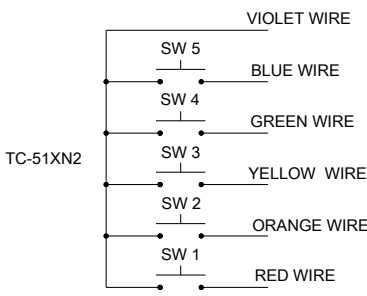
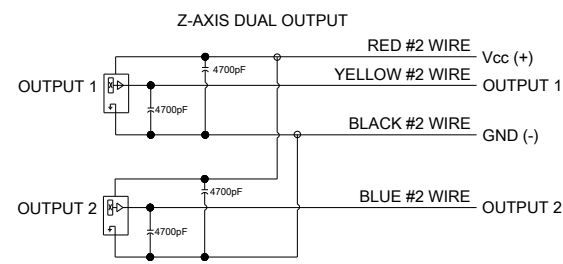
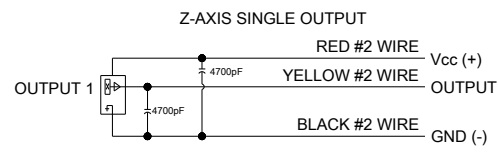
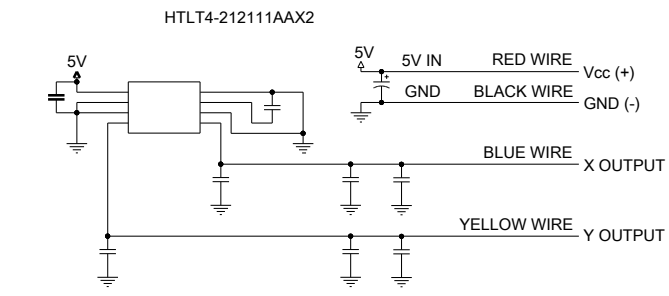
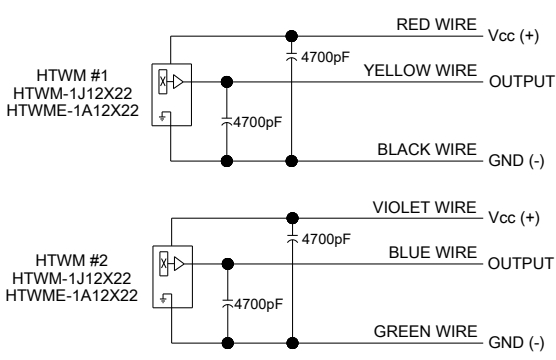
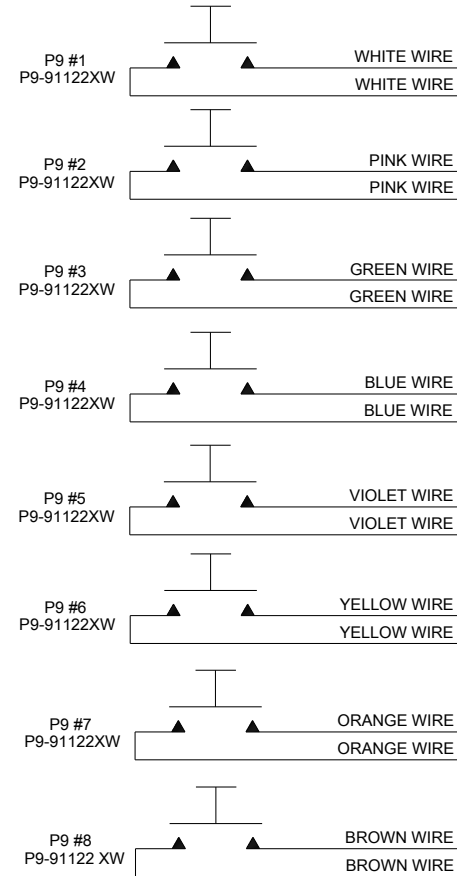
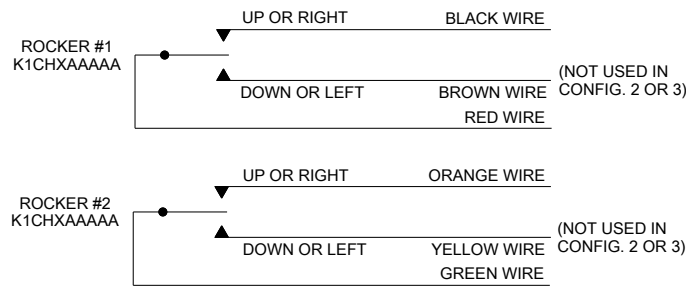
HJLG3-C Joystick Trigger Options



HJLG3-C Joystick Head Pushbutton Options



HJLG3-C Faceplate Schematics

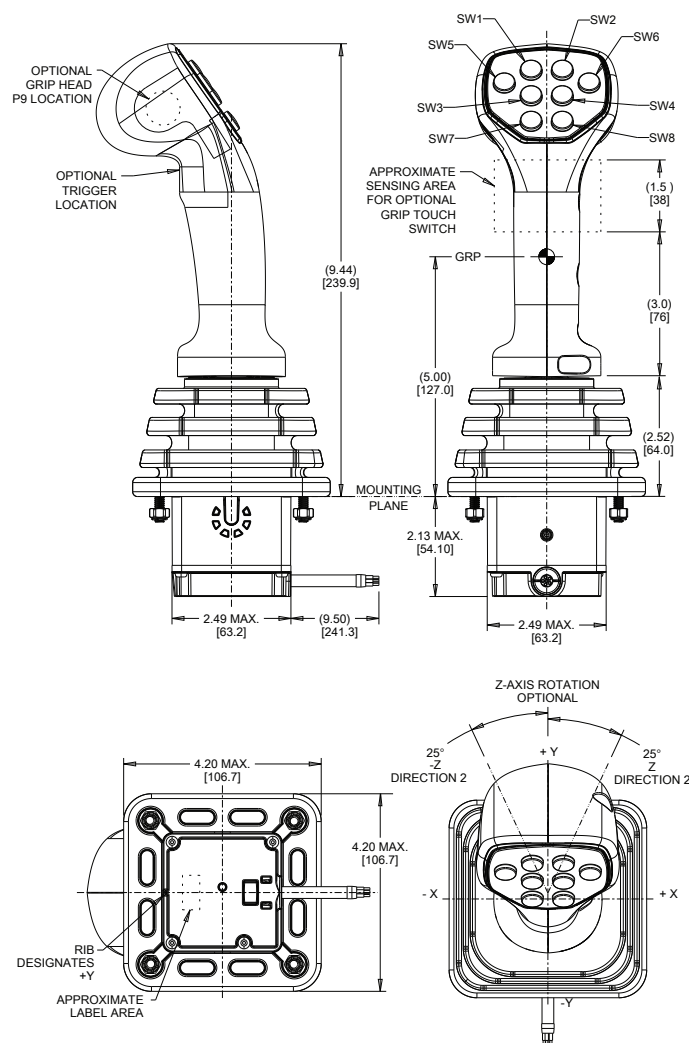


HJLG3-CK Joystick with Grip

The HJLG3-CK combines a medium G3-CK Universal Grip with a JHL Hall effect joystick base. The grip comes with lighted or unlighted faceplates with buttons and optional side keypads. Pushbutton or thumbwheel triggers are optional on the back of the grip handle.

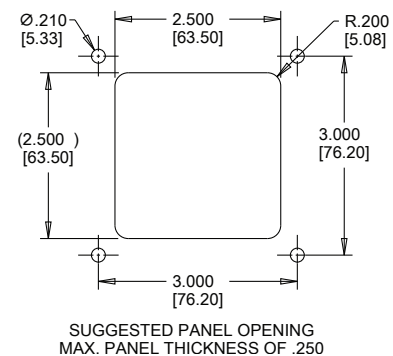
Visit the G3-CK product page for more information about the grip, which is customizable to customer specifications.

HJLG3-CK Drawings



HJLG3-CK with Side Keypad

HJLG3-CK Suggested Panel Opening



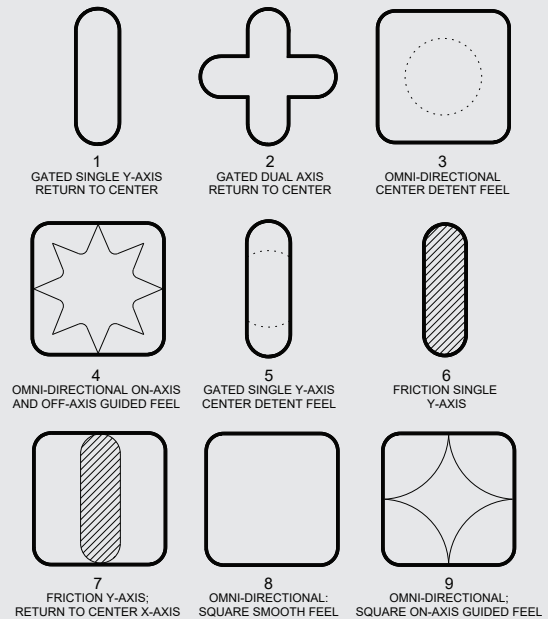
HJLG3-CK Joystick Part Number Code

HJLG3-CK -	X	X	XX	X	X	X
Z-Axis/Grip Touch Switch*	Gating	Joystick Output 1***	Joystick Output 2****	Operate Force	Trigger in Handle*	Grip Head Pushbutton*
1. No Z-Axis with No Grip Touch Switch	1. Gated Single Y-Axis; Return to Center	AA. 2.5 +/- 2.0VDC ③	NONE	2. Medium	1. None	1. None
2. Grip Touch Switch Only (Active High)** ①②	2. Gated Dual Axis; Return to Center	BB. 2.5 +/- 2.0VDC ④	2.5 +/- 2.0VDC	3. High	2. P9 - Black	2. Left (Black)
3. Z-Axis (Single Output) with No Grip Touch Switch	3. Omni-directional; Center Detent Feel	CC. 2.5 +/- 2.0VDC ④	2.5 +/- 2.0VDC		3. P9 - Red	3. Left (Red)
4. Z-Axis (Dual Output) with No Grip Touch Switch	4. Omni-directional; On-Axis and Off-Axis Guided Feel	DD. 2.5 +/- 1.5VDC ③	NONE		4. Single	4. Right (Black)
5. Grip Touch Switch Only (Active Low)** ①②	5. Omni-directional; Center Detent Feel	EE. 2.5 +/- 1.5VDC ④	2.5 +/- 1.5VDC		5. Dual Momentary	5. Right (Red)
	6. Friction - Single Axis	FF. 2.5 +/- 1.5VDC ④	2.5 +/- 1.5VDC		6. Dual Maintained	6. Left and Right (Black)
	7. Friction - Y-Axis; Return-to-Center X-Axis	GG. 0.5 - 4.5VDC ④	0.5 - 4.5VDC		7. 2 P9s - Black	7. Left and Right (Red)
	8. Omni-directional; Square Smooth Feel	HH. 1.0 - 4.0VDC ④	1.0 - 4.0VDC		8. 2 P9s - Red	
	9. Omni-directional; Square On-Axis Guided Feel	JJ. CANbus J1939 ③	NONE		9. HTWS - Black ⑤	
		KK. CANopen ③	NONE		A. HPL	
		LL. CANbus J1939 w/ Deutsch Connector	NONE			
		MM. CANopen w/ Deutsch Connector	NONE			
		NN. PLD	NONE			

Continued

X	X	X
Faceplate Keypad Configuration	Side Keypad Configuration	Back Lighting ⑥
4. 4 Buttons	1. None	N. None
6. 6 Buttons	L. Left Hand	L. Lighted Faceplate Keypad & Side Keypad
8. 8 Buttons	R. Right Hand	F. Lighted Faceplate Keypad Only
		S. Lighted Side Keypad Only

HJLG3 Gating Icons



*Wires from Z-Axis, Trigger, Head Position and Grip Touch Switch will be bundled in a shrink tube.

**Grip Touch Switch is not available with trigger option 5 or 6.

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

****Options "BB" and "EE" provide redundant output 2 which duplicates output 1. Options "CC" and "FF" provide redundant output 2 which is inverse of output 1.

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② User Caution: To guarantee the intended operating characteristics of the capacitive switches, the zone around the switch must be free from materials which can affect switch performance. Those materials include but are not limited to water, cleaning solutions, and other conductive materials. Failure to maintain this contaminant free zone may result in unintended actuation of the capacitive switch.

③ 22 AWG Cable

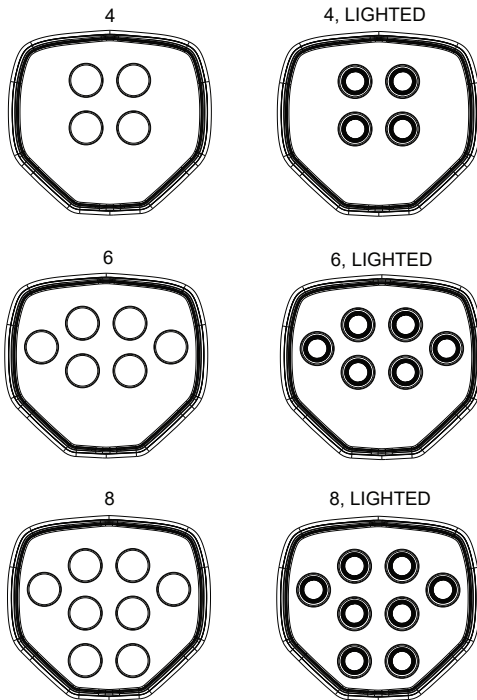
④ 24 AWG Cable

⑤ HTWS Trigger Switches: positive travel is to the right. Contact factory for additional options.

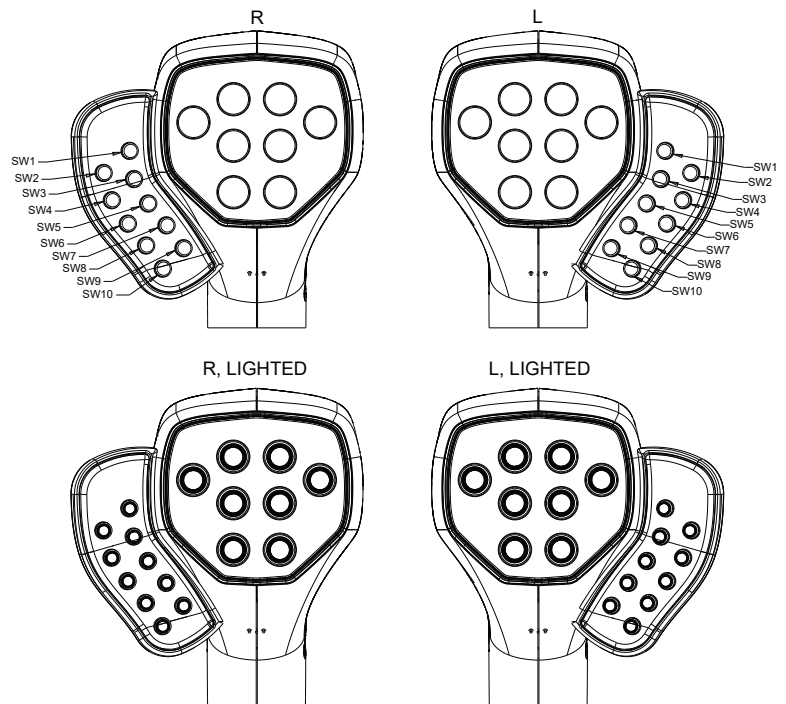
⑥ White LED's

HJLG3-CK Keypad Configurations

FACEPLATE KEYPAD CONFIGURATIONS

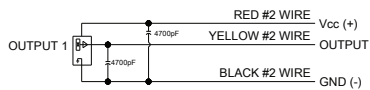


SIDE KEYPAD CONFIGURATIONS

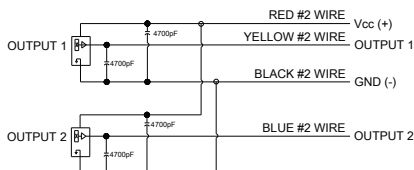


HJLG3-CK Schematics

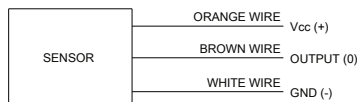
Z-AXIS SINGLE OUTPUT



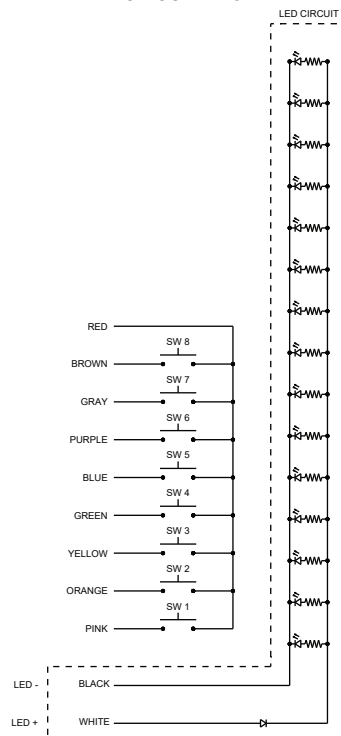
Z-AXIS DUAL OUTPUT



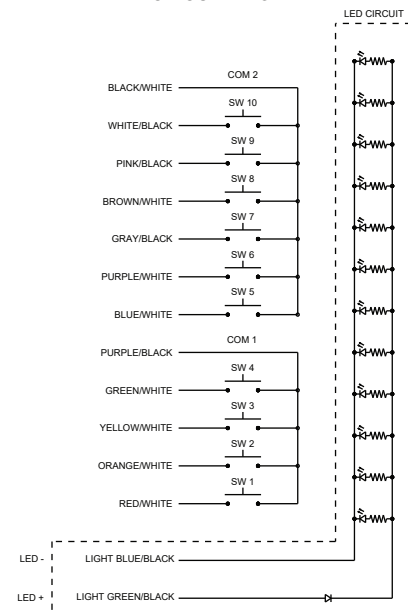
GRIP TOUCH SWITCH



CENTER KEYPAD SCHEMATIC WITH OPTIONAL LED CIRCUIT SHOWN

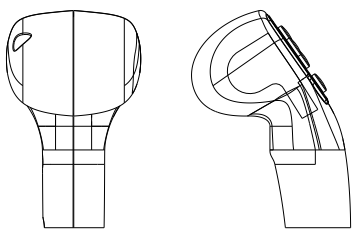


SIDE KEYPAD SCHEMATIC WITH OPTIONAL LED CIRCUIT SHOWN



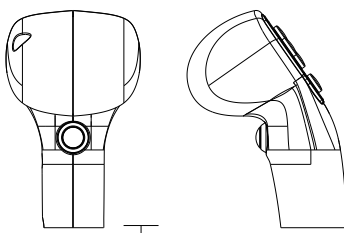
HJLG3-CK Joystick Trigger Options

1



NO TRIGGER

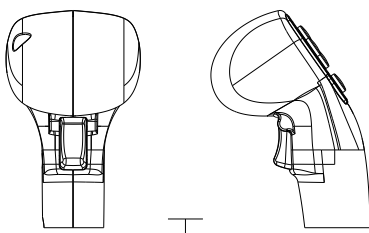
2, 3



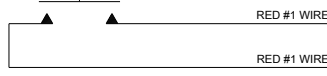
TRIGGER P9
P9-31122XW



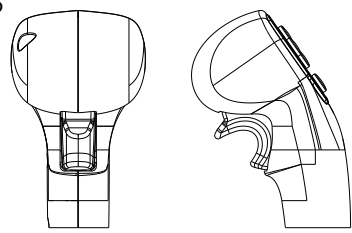
4



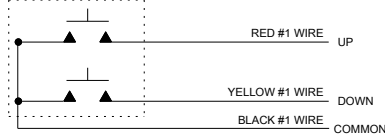
TRIGGER SINGLE
P9-911222



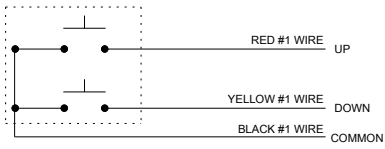
5, 6



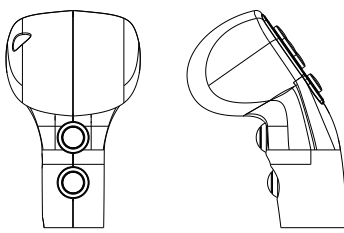
DUAL TRIGGER MOMENTARY



DUAL TRIGGER MAINTAINED



7, 8



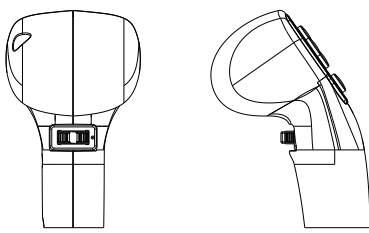
TRIGGER P9 UPPER
P9-31122XW



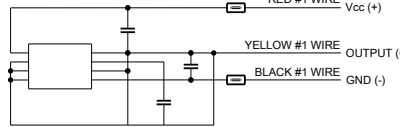
TRIGGER P9 LOWER
P9-31122XW



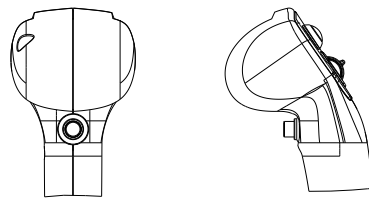
9

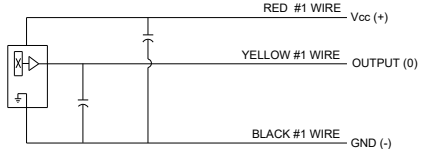


HTWS TRIGGER
HTWS-1A12X22



A





HJLG3-CK Joystick Head Pushbutton Options

1

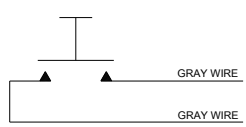


NO PUSHBUTTON

2, 3



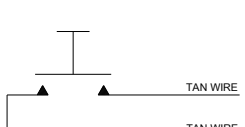
P9 GRIP HEAD LEFT
P9-31122XW



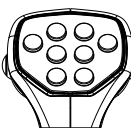
4, 5



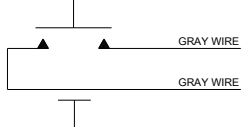
P9 GRIP HEAD RIGHT
P9-31122XW



6, 7



P9 GRIP HEAD LEFT
P9-31122XW

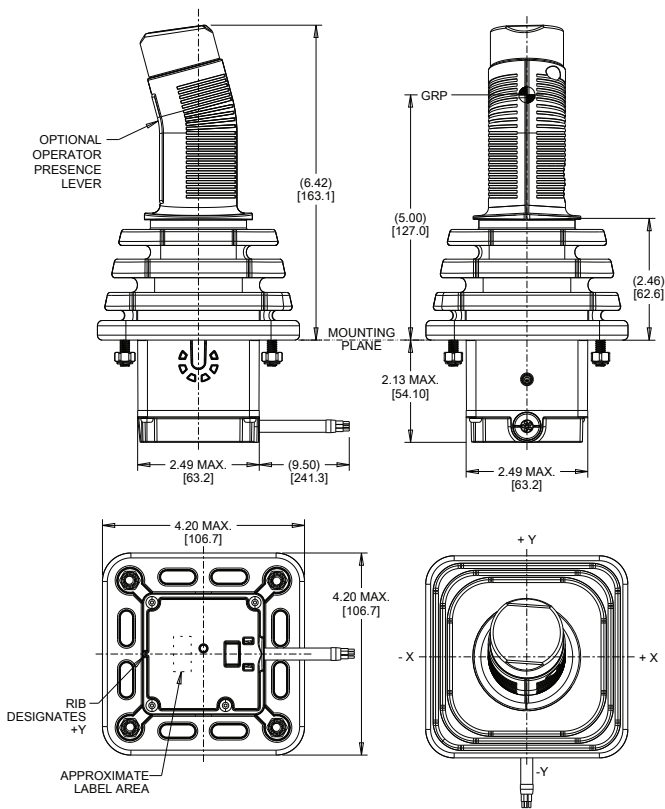


HJLG3-D Joystick with Grip

The HJLG3-D combines a G3-D Control Grip with a JHL Hall effect joystick base. Choose from numerous grip handle styles and an optional pushbutton or rocker on top of the grip.

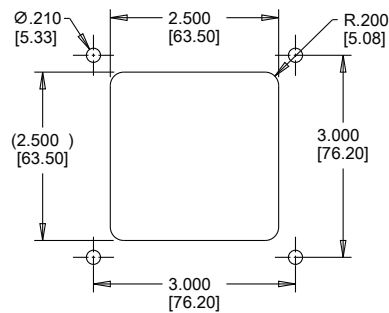
Visit the G3-D product page for more information about the grip, which is customizable to customer specifications.

HJLG3-D Joystick Drawings



HJLG3-D

HJLG3-D Suggested Panel Opening



SUGGESTED PANEL OPENING
MAX. PANEL THICKNESS OF .250



HJLG3-D Joystick Part Number Code

HJLG3-D -	X	XX	X	XX	X
Gating	Joystick Output 1*	Joystick Output 2**	Operate Force	Faceplate Options	OP & PB Configuration
1. Gated Single Y-Axis; Return to Center	AA. 2.5 +/- 2.0VDC ①	NONE	1. Low	11. Rocker (On)-Off-(On) and Operator Presence	1. None ③
2. Gated Dual Axis; Return to Center	BB. 2.5 +/- 2.0VDC ②	2.5 +/- 2.0VDC	2. Medium	22. Rocker (On)-Off-(On) and No Operator Presence	2. Normally Open (NO)
3. Omni-directional; Center Detent Feel	CC. 2.5 +/- 2.0VDC ②	2.5 +/- 2.0VDC	3. High	33. One Pushbutton and Operator Presence	3. 2 Circuit (NO/NC) ④
4. Omni-directional; On-Axis and Off-Axis Guided Feel	DD. 2.5 +/- 1.5VDC ①	NONE		44. One Pushbutton and No Operator Presence	4. 2 Circuit (NO/NC) ⑤
5. Gated Single Y-Axis; Center Detent Feel	EE. 2.5 +/- 1.5VDC ②	2.5 +/- 1.5VDC		55. No Pushbutton, No Rocker and Operator Presence	
6. Friction - Single Axis	FF. 2.5 +/- 1.5VDC ②	2.5 +/- 1.5VDC		66. No Pushbutton, No Rocker and No Operator Presence	
7. Friction Y-Axis; Return-to- Center X-Axis	GG. 0.5 - 4.5VDC ②	0.5 - 4.5VDC			
8. Omni-directional; Square Smooth Feel	HH. 1.0 - 4.0VDC ②	1.0 - 4.0VDC			
9. Omni-directional; Square On-Axis Guided Feel	JJ. CANbus J1939 ①	NONE			
	KK. CANopen ①	NONE			
	LL. CANbus J1939 w/ Deutsch Connector	NONE			
	MM. CANopen w/ Deutsch Connector	NONE			
	NN. PLd	NONE			

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

**Options "BB" and "EE" provide redundant output 2 which duplicates output 1.
Options "CC" and "FF" provide redundant output 2 which is inverse of output 1.

① 22 AWG Cable

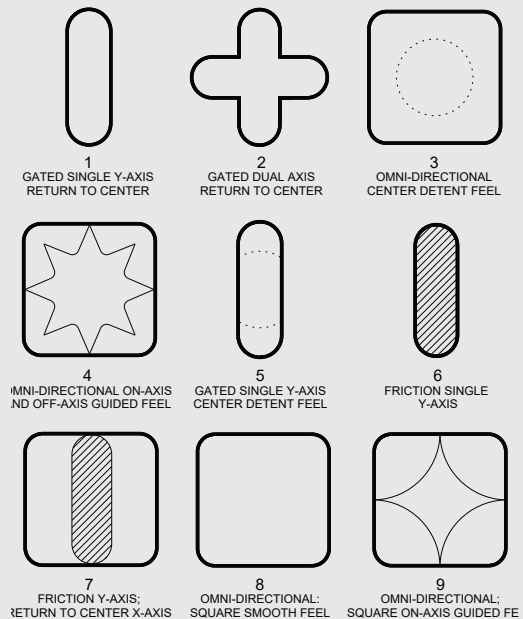
② 24 AWG Cable

③ Can only be used with configurations 22 and 66.

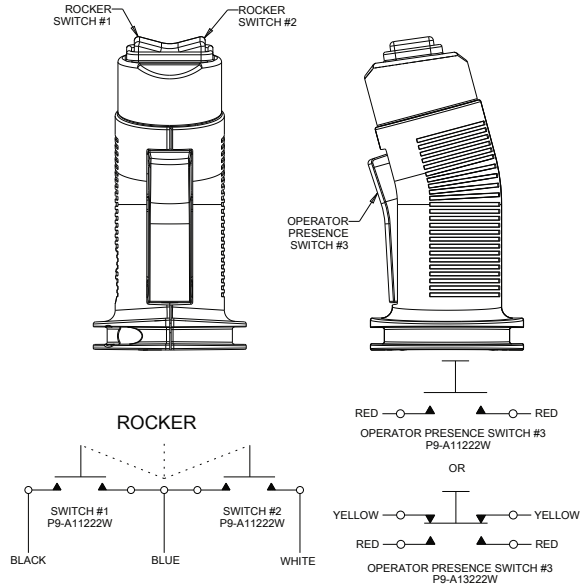
④ For options 11 (Operator Presence), 44, 55.

⑤ For option 33.

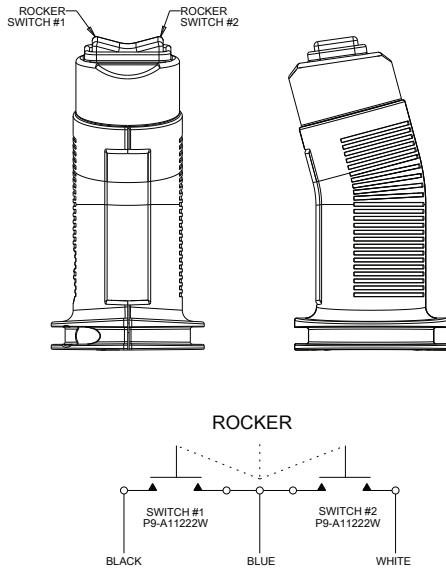
HJLG3 Gating Icons



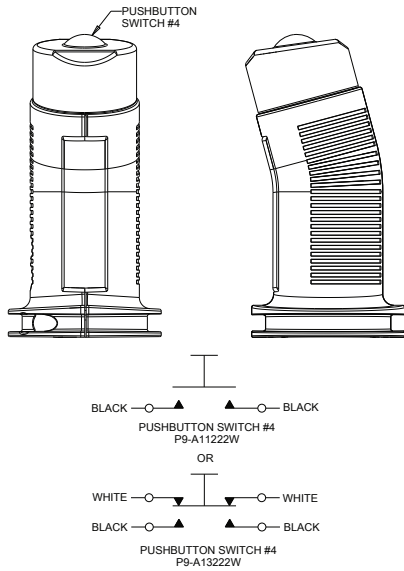
ROCKER AND OPERATOR PRESENCE



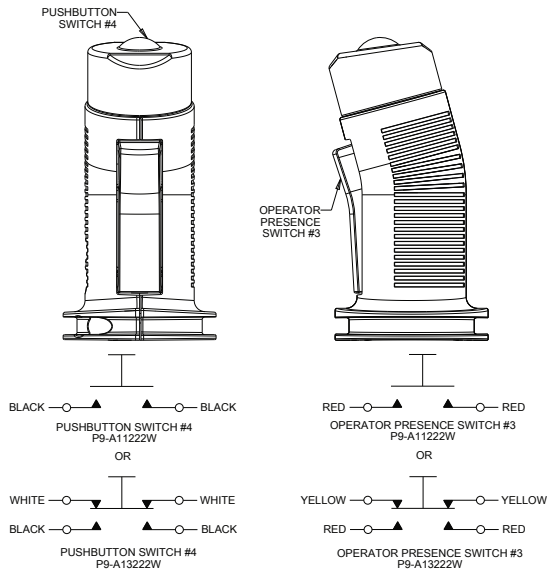
ROCKER



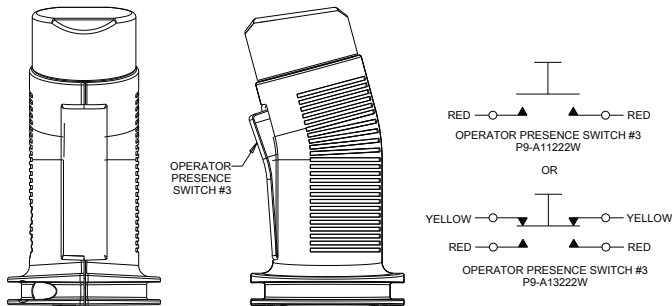
ONE PUSHBUTTON



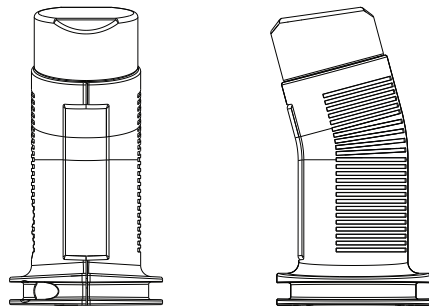
ONE PUSHBUTTON AND OPERATOR PRESENCE



NO PUSHBUTTON AND OPERATOR PRESENCE



BLANK

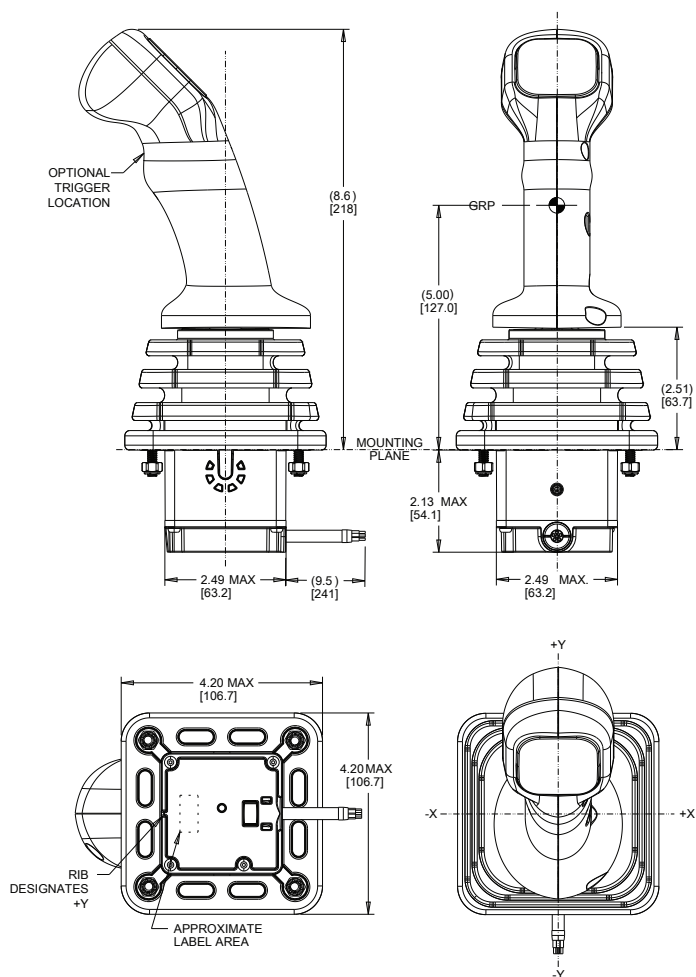


HJLG3-M Joystick with Grip

The HJLG3-M combines a smaller G3-M Universal Grip with a JHL Hall effect joystick base. Choose from 25 standard grip faceplates with a mix of switches and an optional trigger on the back of the grip handle.

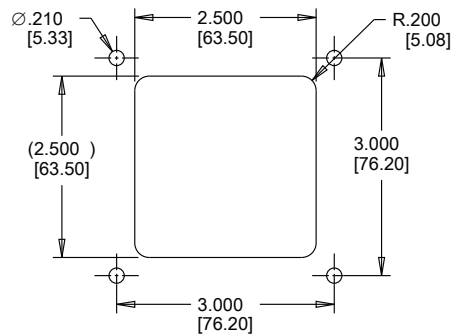
Visit the G3-M product page for more information about the grip, which is customizable to customer specifications.

HJLG3-M Drawings



HJLG3-M

HJLG3-M Suggested Panel Opening



SUGGESTED PANEL OPENING
MAX. PANEL THICKNESS OF .250

HJLG3-M Joystick Part Number Code

HJLG3-M -	X	XX	X	XX	X	X
Gating Options	Joystick Output 1*	Joystick Output 2**	Operate Force	Faceplate	Trigger	K1S Rocker Style - Black***
1. Gated Single Y-Axis; Return to Center	AA. 2.5 +/- 2.0 VDC ①	NONE	2. Medium	A1 G1	1. None	1. None
2. Gated Dual Axis; Return to Center	BB. 2.5 +/- 2.0 VDC ②	2.5 +/- 2.0 VDC	3. High	B1 G2	2. YES	2. On-Off
3. Omni-directional; Center Detent Feel	CC. 2.5 +/- 2.0 VDC ②	2.5 +/- 2.0 VDC		B2 G3		3. (On)-Off
4. Omni-directional; On-Axis and Off-Axis Guided Feel	DD. 2.5 +/- 1.5 VDC ①	NONE		C1 G4		4. On-Off-On
5. Gated Single Y-Axis; Center Detent Feel	EE. 2.5 +/- 1.5 VDC ②	2.5 +/- 1.5 VDC		C2 H1		5. (On)-Off-(On)
6. Friction - Single Y-Axis	FF. 2.5 +/- 1.5 VDC ②	2.5 +/- 1.5 VDC		C3 H2		6. On-On-On
7. Friction Y-Axis; Return-to-Center X-Axis	GG. 0.5 - 4.5 VDC ②	0.5 - 4.5 VDC		C4 J1		7. (On)-On-(On)
8. Omni-directional; Square Smooth Feel	HH. 1.0 - 4.0 VDC ②	1.0 - 4.0 VDC		D1 J2		
9. Omni-directional; Square On-Axis Guided Feel	JJ. CANbus J1939 ①	NONE		E1 J3		Note: () Denotes Momentary Action
	KK. CANopen ①	NONE		E2 J4		
	LL. CANbus J1939 w/ Deutsch Connector	NONE		F1 K1		
	MM. CANopen w/ Deutsch Connector	NONE		F2 K2		
	NN. PLd	NONE		L1		

Continued

X	X	X	X
P9 #1 Button Color	P9 #2 Button Color	P9 #3 Button Color	P9 #4 Button Color
1. Red	1. Red	1. Red	1. Red
2. Black	2. Black	2. Black	2. Black
3. Orange	3. Orange	3. Orange	3. Orange
4. Yellow	4. Yellow	4. Yellow	4. Yellow
5. Green	5. Green	5. Green	5. Green
6. Blue	6. Blue	6. Blue	6. Blue
7. Violet	7. Violet	7. Violet	7. Violet
8. Gray	8. Gray	8. Gray	8. Gray
9. White	9. White	9. White	9. White
N. None	N. None	N. None	N. None

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

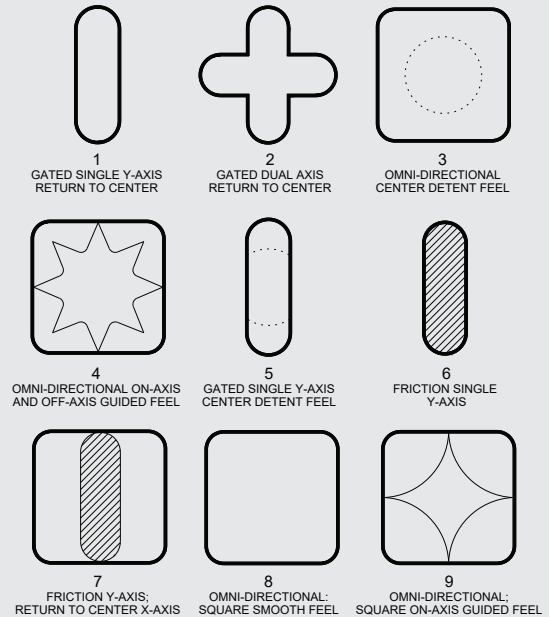
**Options "BB" and "EE" provide redundant output 2 which duplicates output 1. Options "CC" and "FF" provide redundant output 2 which is inverse of output 1.

*** K1S Rocker Switches: on position or momentary position is up or to the right and () denotes momentary action. Contact factory for rocker legends and additional color options.

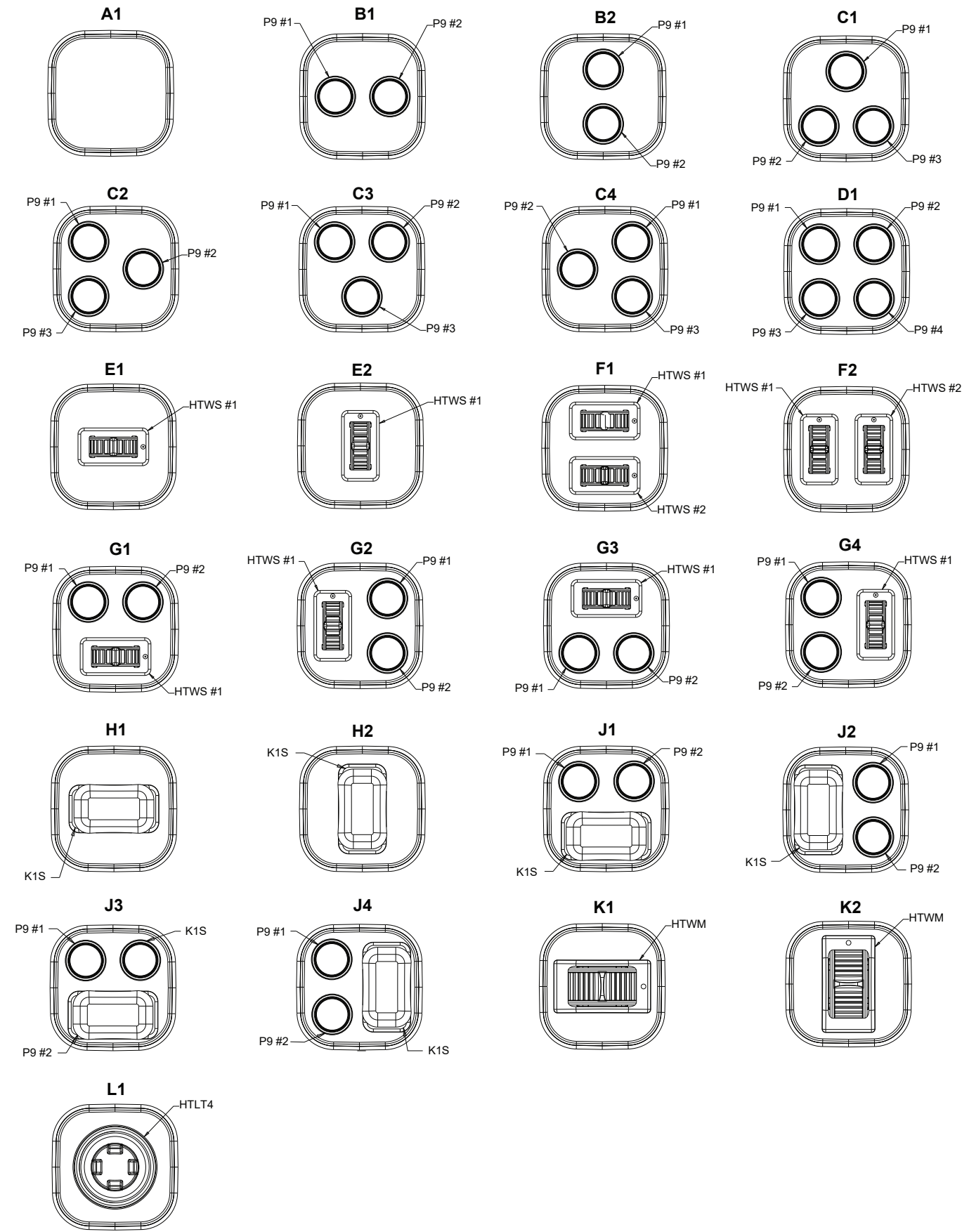
① 22 AWG Cable

② 24 AWG Cable

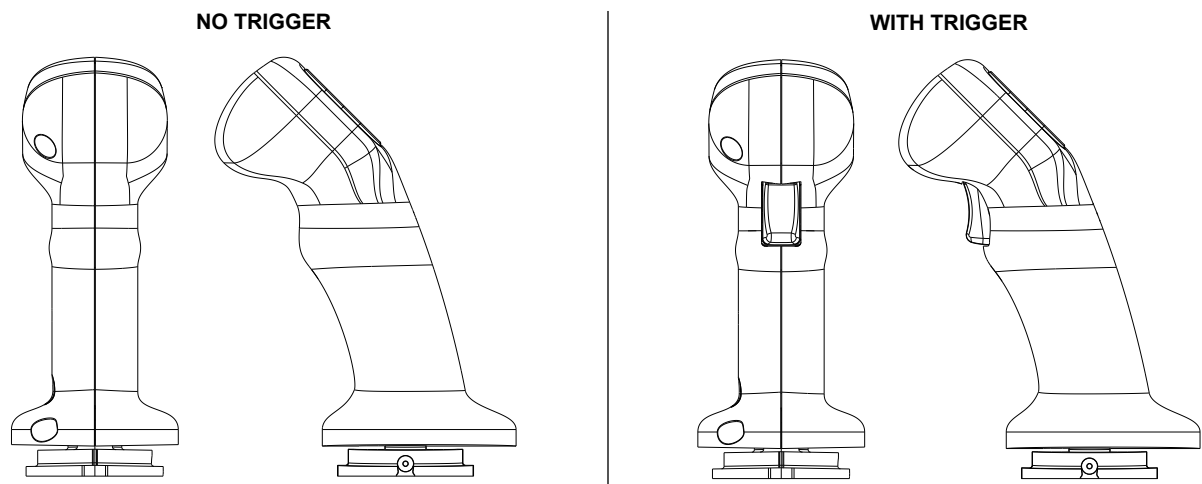
HJLG3-M Gating Icons



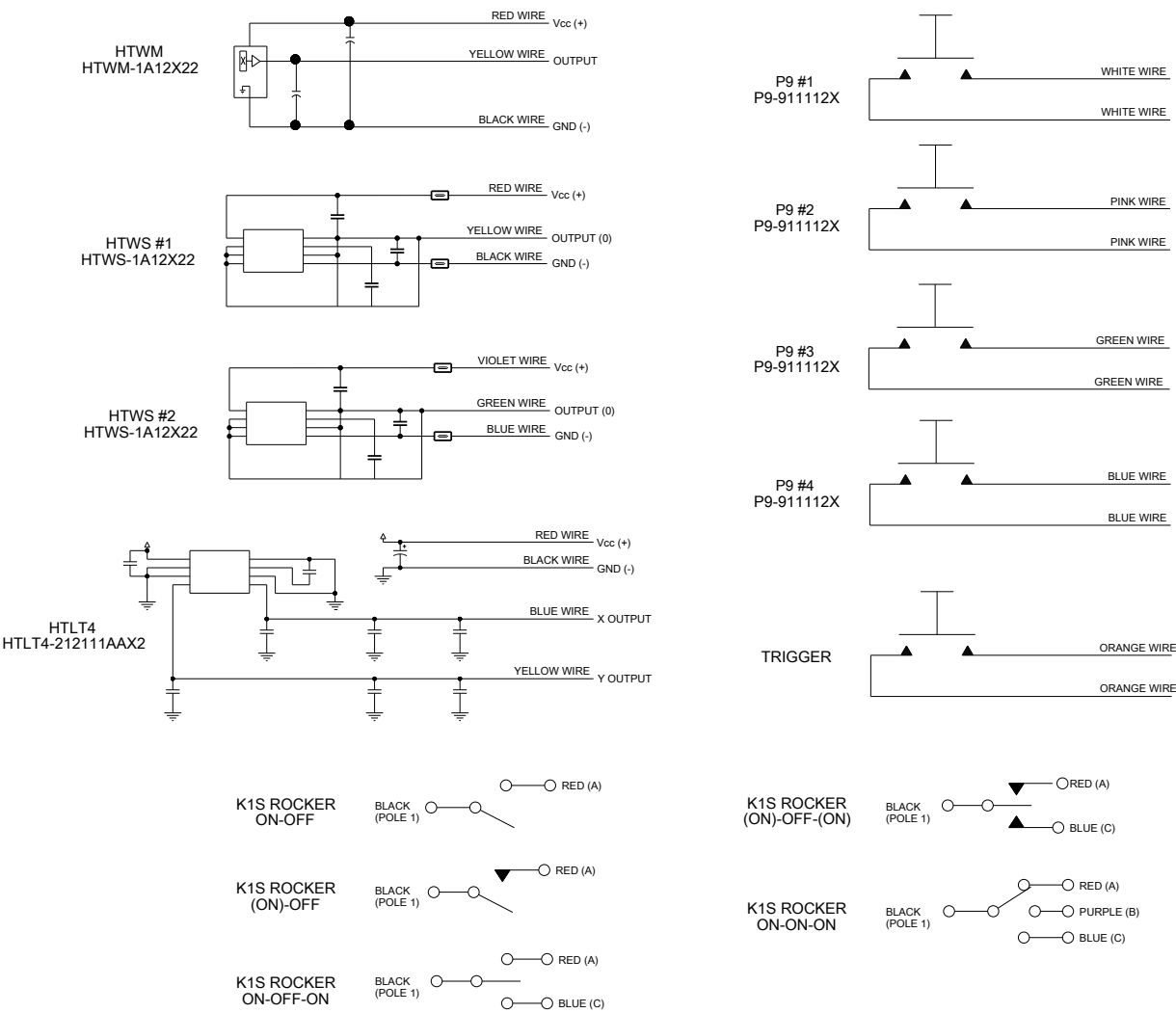
HJLG3-M Joystick Faceplates



HJLG3-M Joystick Trigger Configurations



HJLG3-M Joystick Schematics



JHM Medium Hall Effect Joystick



Handle Style 32
with 2 Pushbuttons
on Handle Style 61



Handle Style 61
5-Button Keypad and
Hall Effect Rocker Right

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 IP6K8S with an operational life of up to 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 IP6K8S
- 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:	Up to 1,000,000 cycles
------------------	------------------------

MECHANICAL (JOYSTICK):

Mechanical Life:	Up to 5 Million Cycles, High Force Up to 10 Million Cycles, Low Force Up to 2.5 Million Cycles, Outputs JJ, KK, MM, NN, Rear Mount Up to 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) 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	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)	IP6K8S			
Seal	Handle styles 34 and 35 panel sealed to IP6K8S			
RFI / EMI	Withstand per SAE J1113			

JHM Joystick Part Number Code

JHM -	XX	X	X	XX	X
Handle Style*	Gating	Force	Output 1**	Output 2	Termination***
11. No Handle ①	1. Gated; Single Axis - Return to Center	1. Low ④	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	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 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 ①⑥	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 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 ⑤⑦	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.

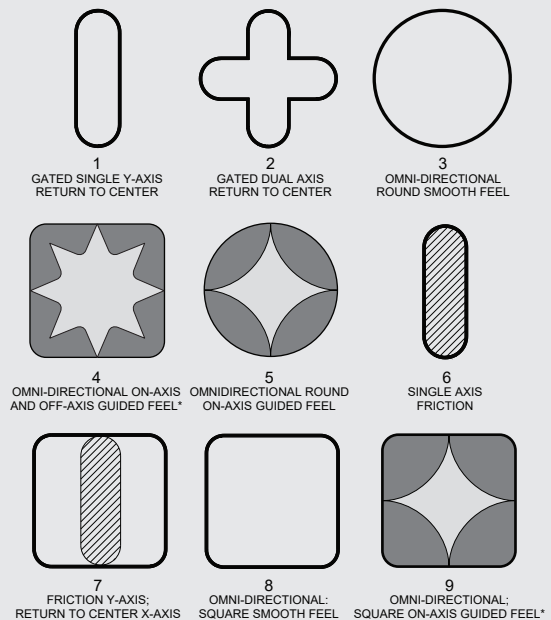
④ Low force not available with gating options 6 and 7.

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.

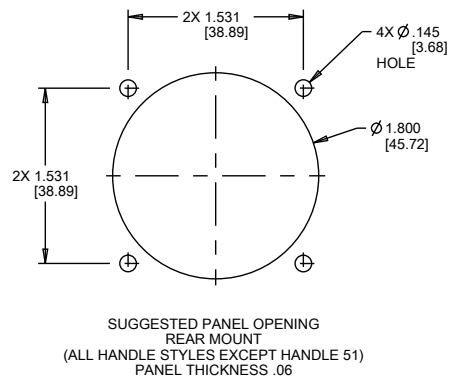
JHM Gating Icons



* FEEL DEFINED BY SHADING

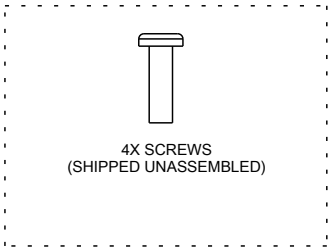
JHM Joystick Panel Opening and Hardware Information

JHM Suggested Panel Opening

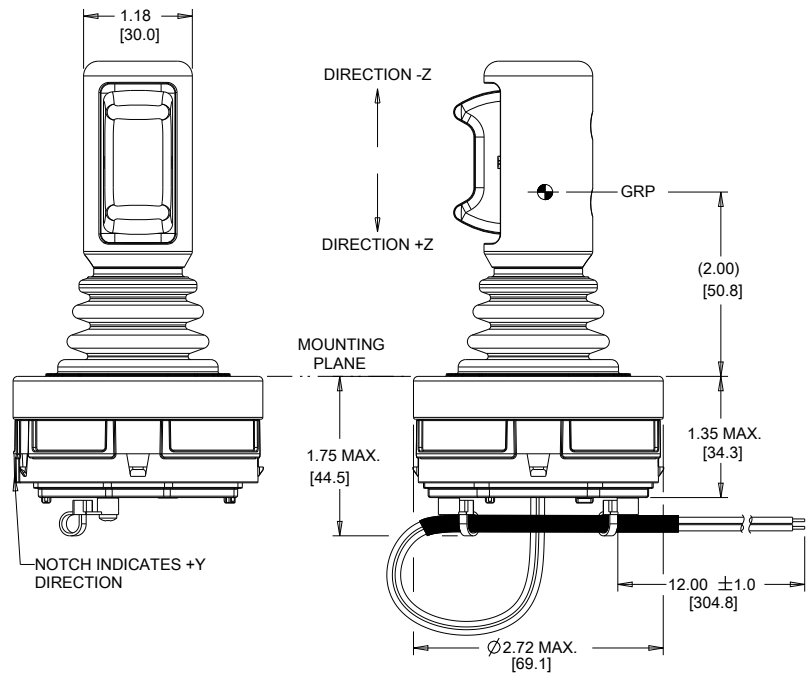


Mounting Hardware Information

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

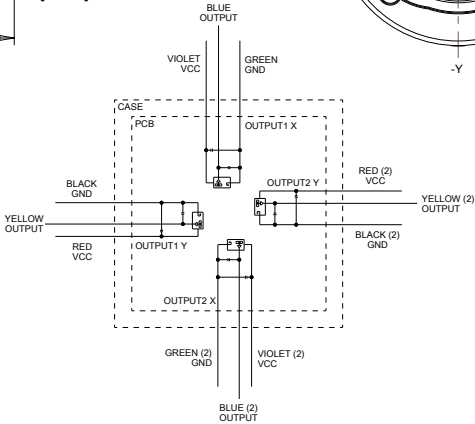
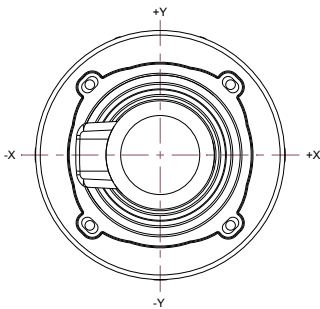


JHM Joystick Drawings

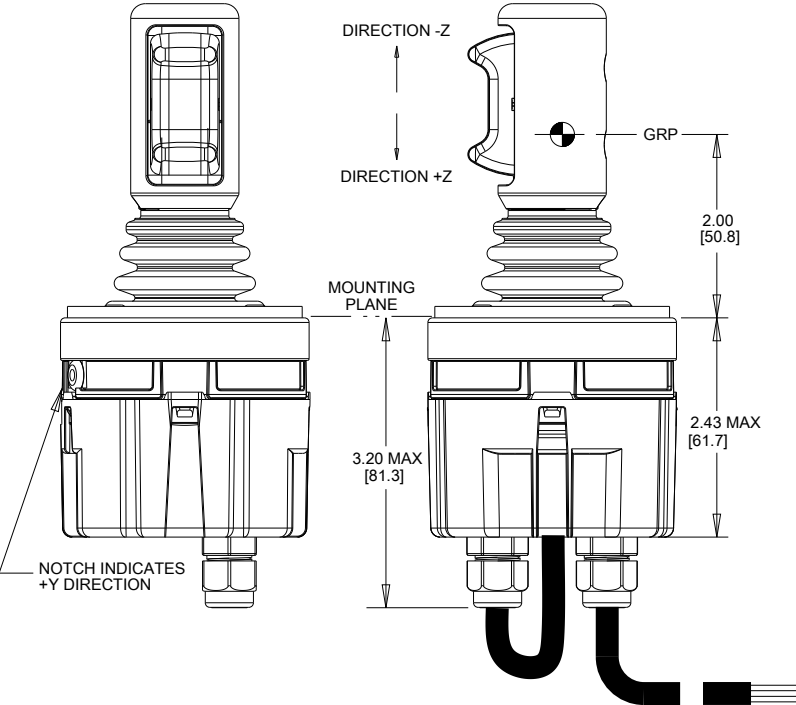


JHM OUTPUTS AA-FT AND LL (Output Graph at end of JHM section)

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

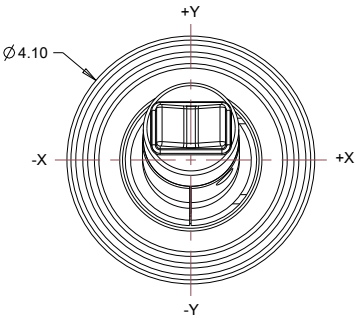


REAR MOUNT STYLE



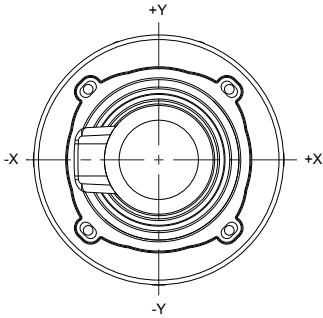
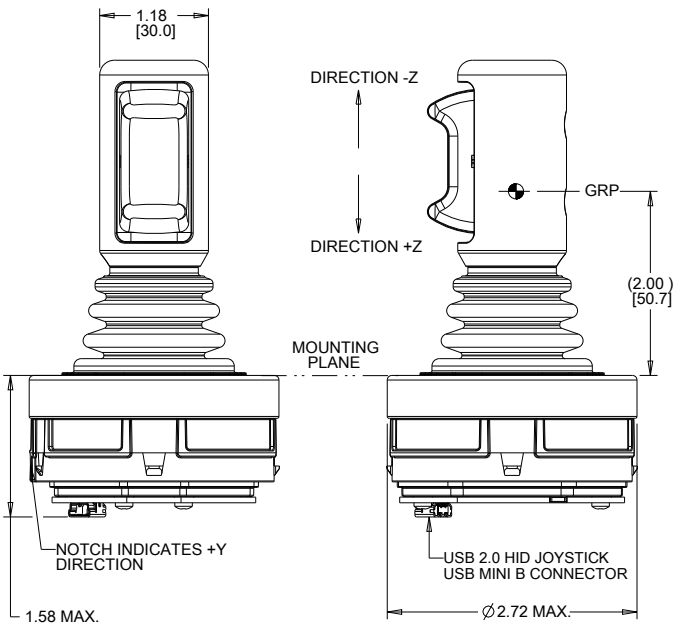
JHM OUTPUTS JJ AND KK

FUNCTION	COLOR	PRODUCT SPECIFICATIONS			
CAN HIGH	YELLOW	ELECTRICAL:			
-SUPPLY	BLACK	JOYSTICK CAN OPEN			
+SUPPLY	RED	SUPPLY VOLTAGE	UNITS	MIN	TYP
CAN LOW	GREEN	NODE IDENTIFIER	VDC	9	N/A
SHIELD	DRAIN	BAUD RATE		10	DECIMAL
		TRANSMISSION RATE		125K	bits/s
		REPETITION RATE		100	ms
JOYSTICK J1939					
		SUPPLY VOLTAGE	UNITS	MIN	TYP
		SOURCE ADDRESS	VDC	9	N/A
		BAUD RATE		51	DECIMAL
		TRANSMISSION RATE		250K	bits/s
		REPETITION RATE		100	ms



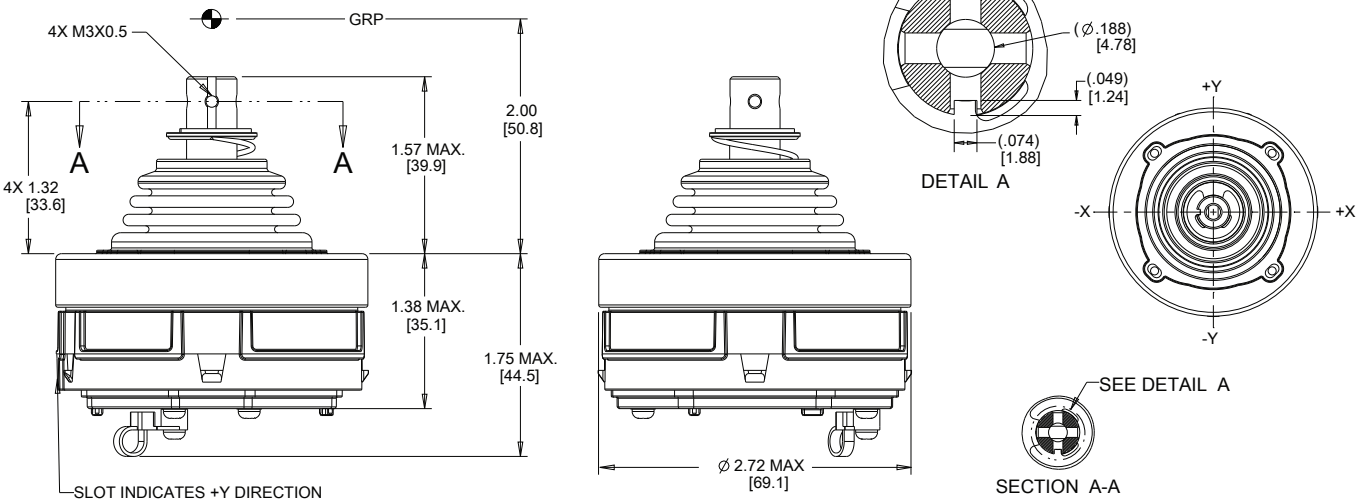
JHM OUTPUTS MM AND NN

PRODUCT SPECIFICATIONS	
ELECTRICAL:	
	JOYSTICK POWERED BY STANDARD USB INTERFACE

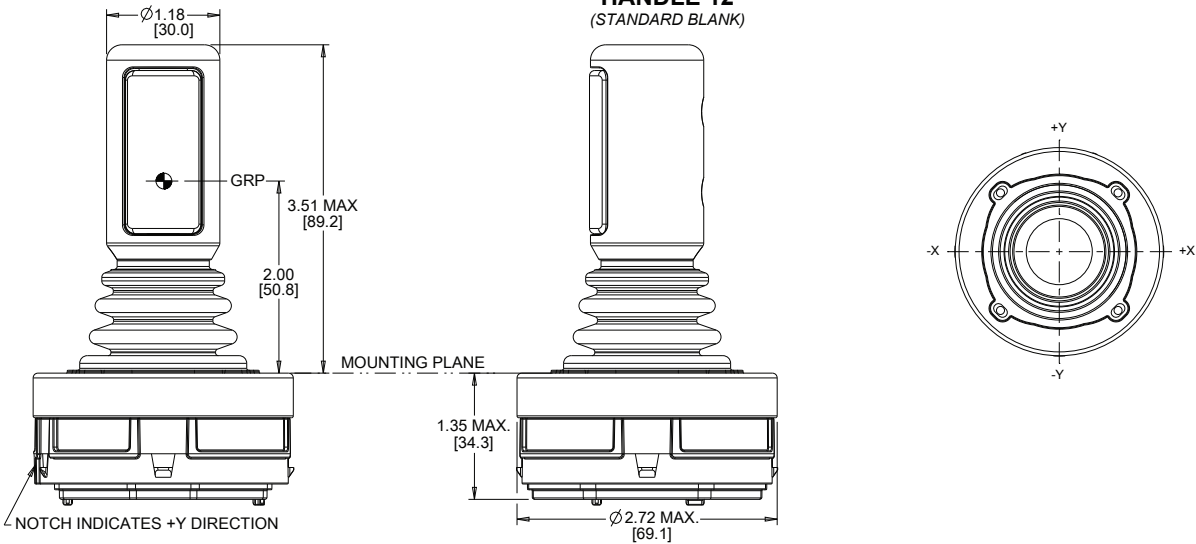


Wires and Strain Relief not shown in all views for clarity.

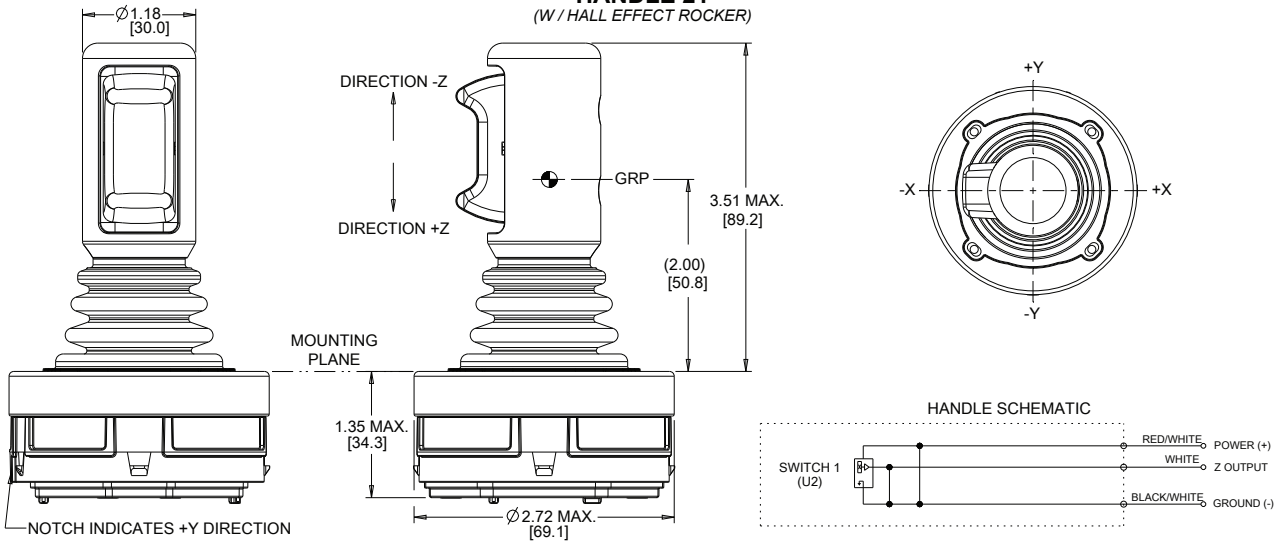
HANDLE 11
(NO HANDLE)



HANDLE 12
(STANDARD BLANK)



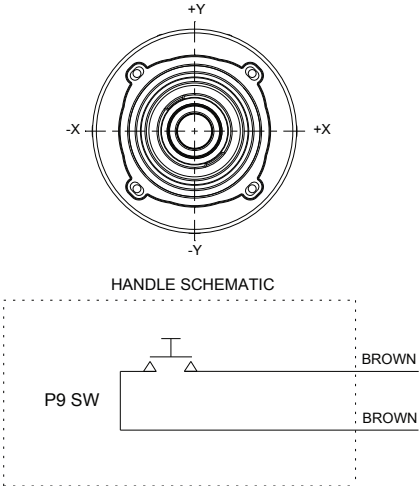
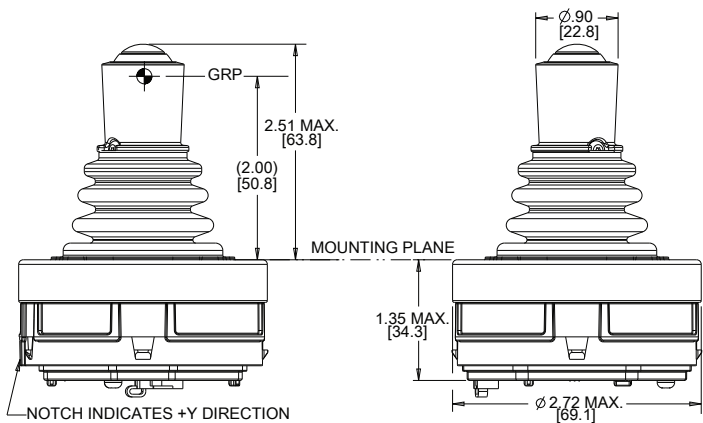
HANDLE 21
(W / HALL EFFECT ROCKER)



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

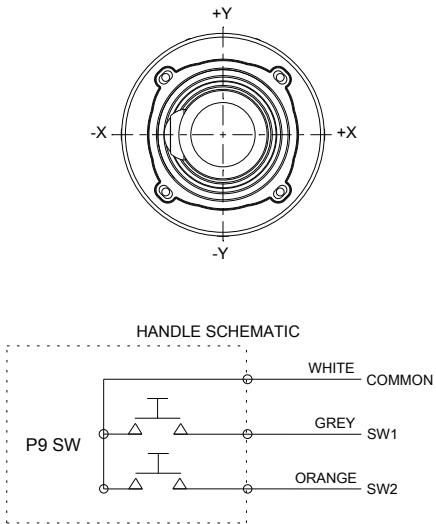
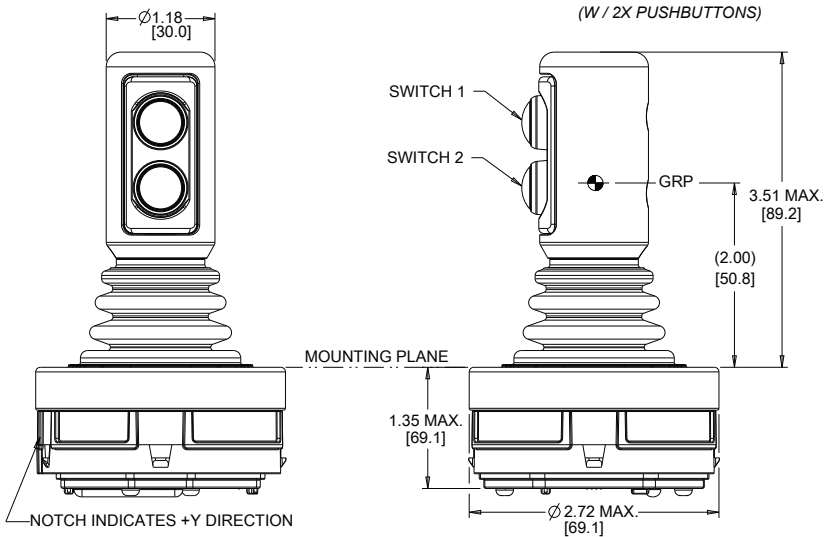
HANDLE 31

(W / PUSHBUTTON, TOP HANDLE, HALF BOOT)



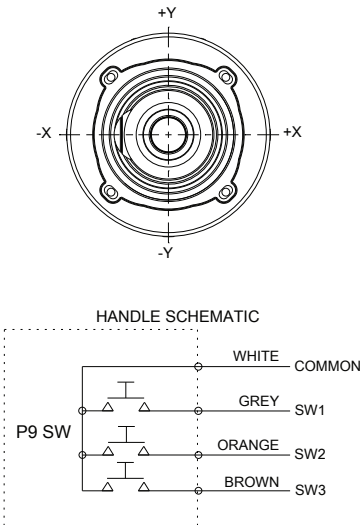
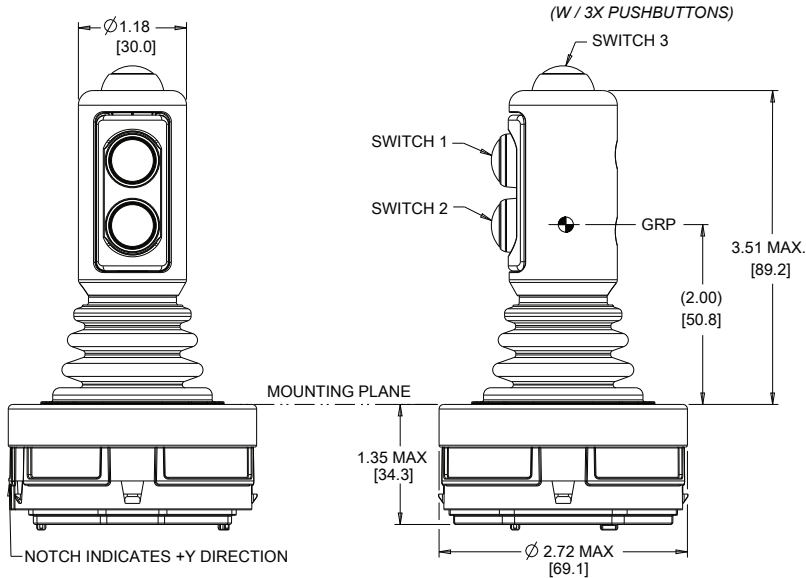
HANDLE 32

(W / 2X PUSHBUTTONS)



HANDLE 33

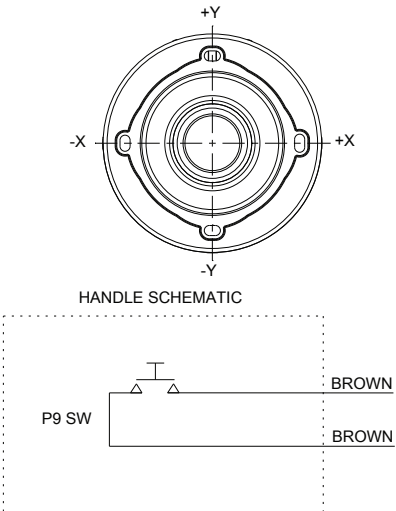
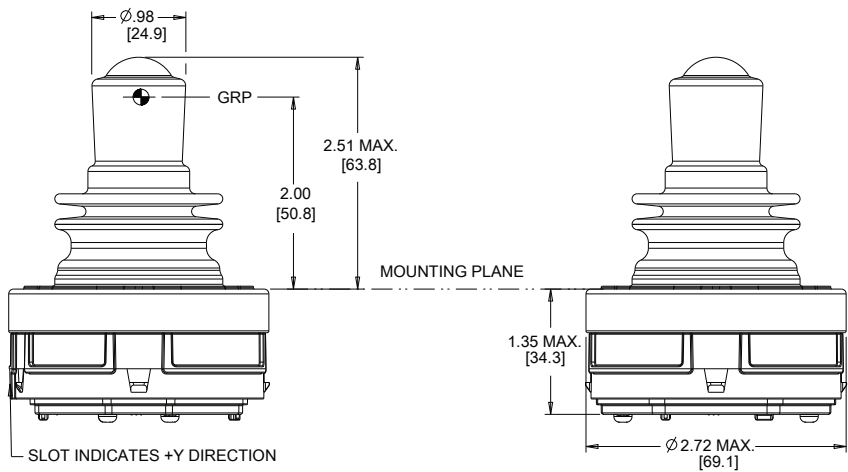
(W / 3X PUSHBUTTONS)



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

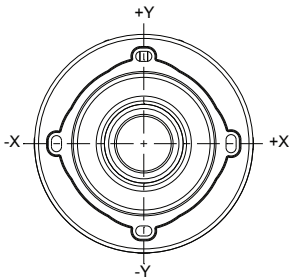
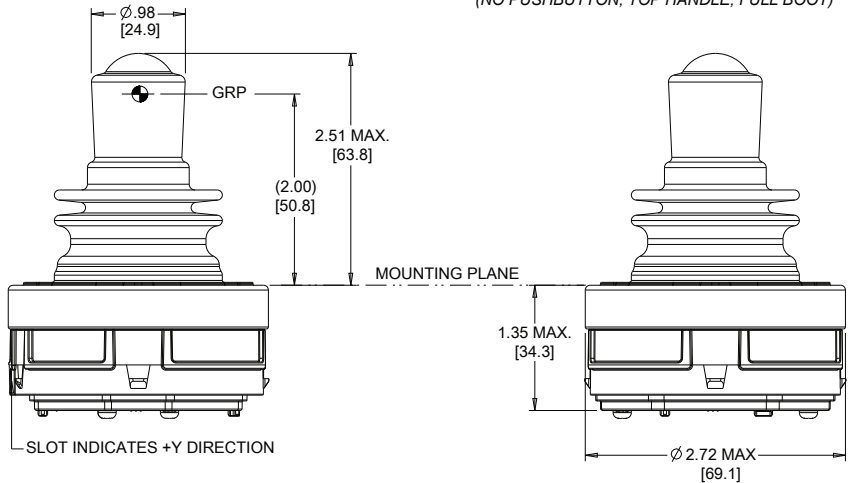
HANDLE 34

(W / PUSHBUTTON, TOP HANDLE, FULL BOOT)



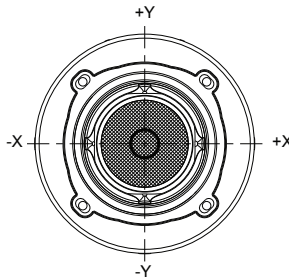
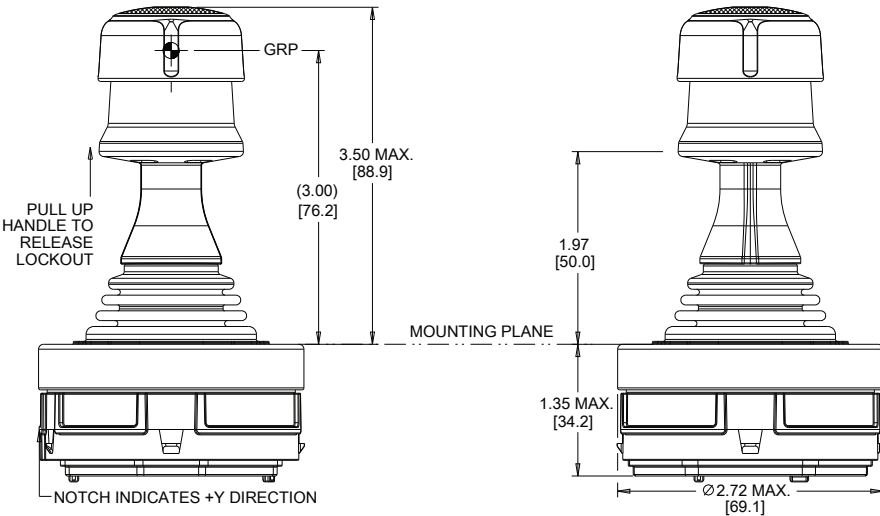
HANDLE 35

(NO PUSHBUTTON, TOP HANDLE, FULL BOOT)

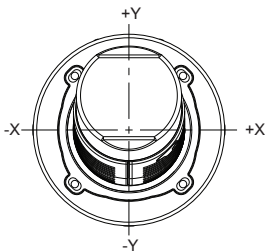
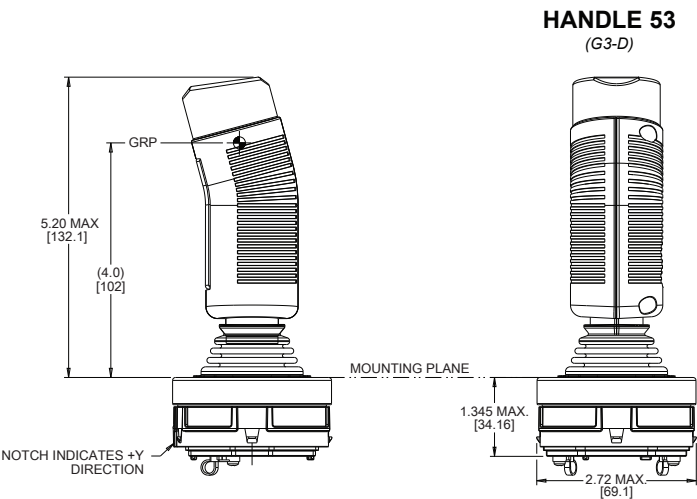
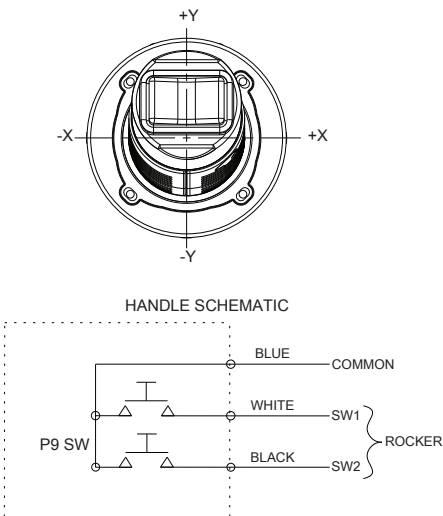
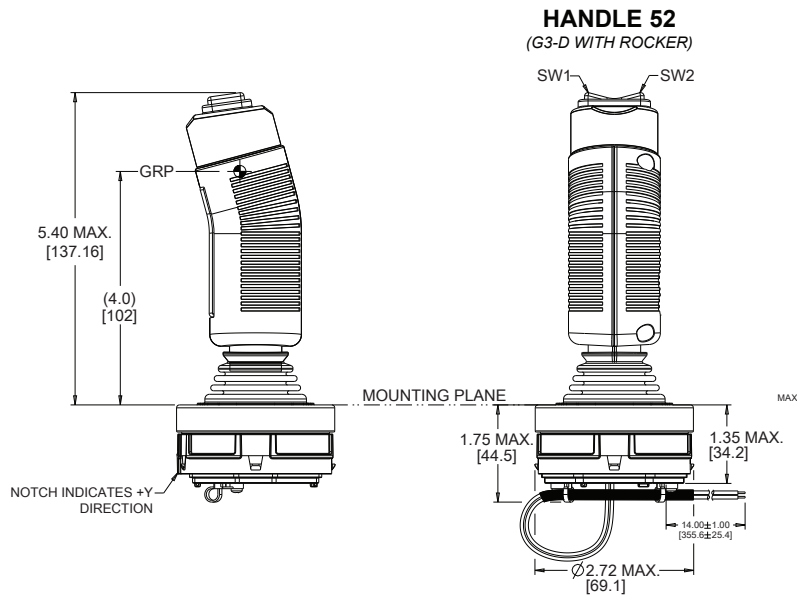
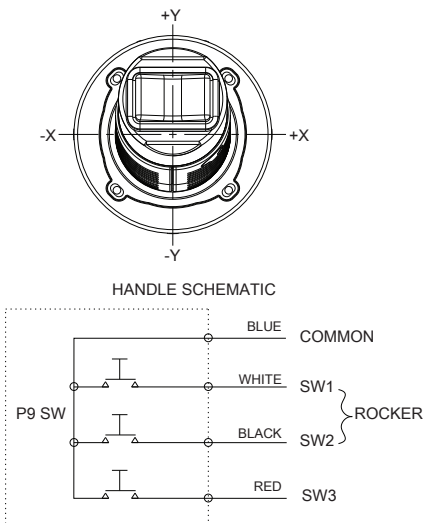
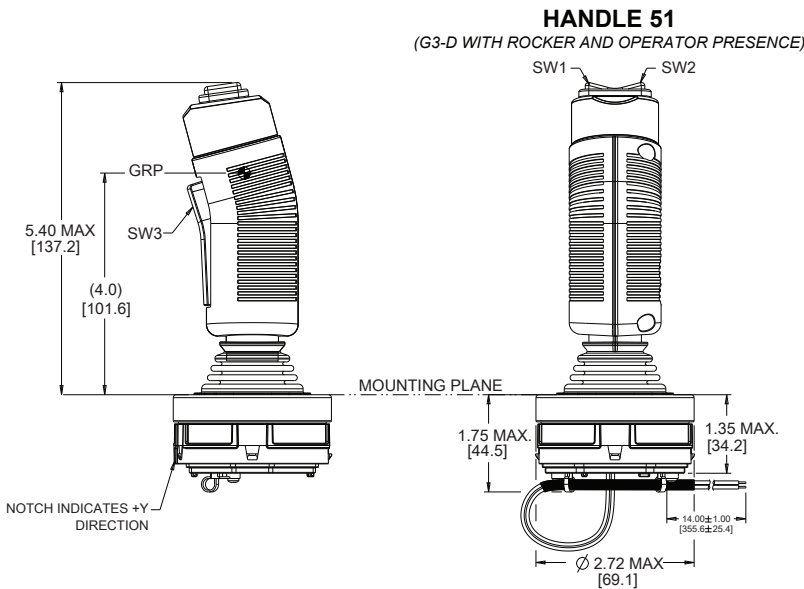


HANDLE 41

(LOCKOUT)



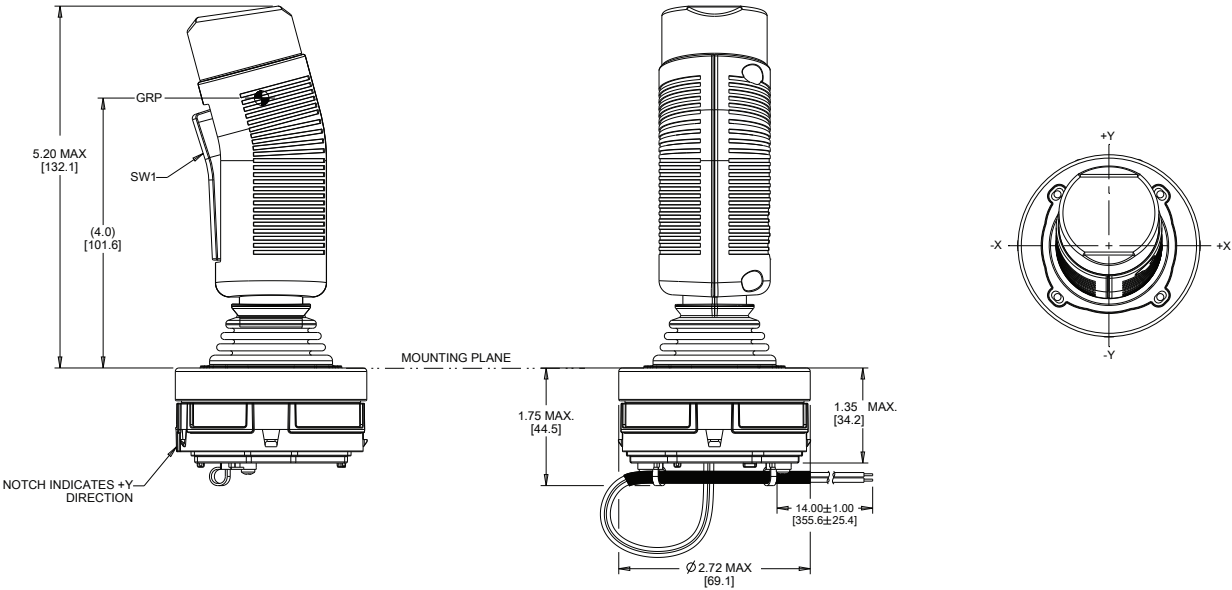
Wires and Strain Relief not shown in all views for clarity.



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

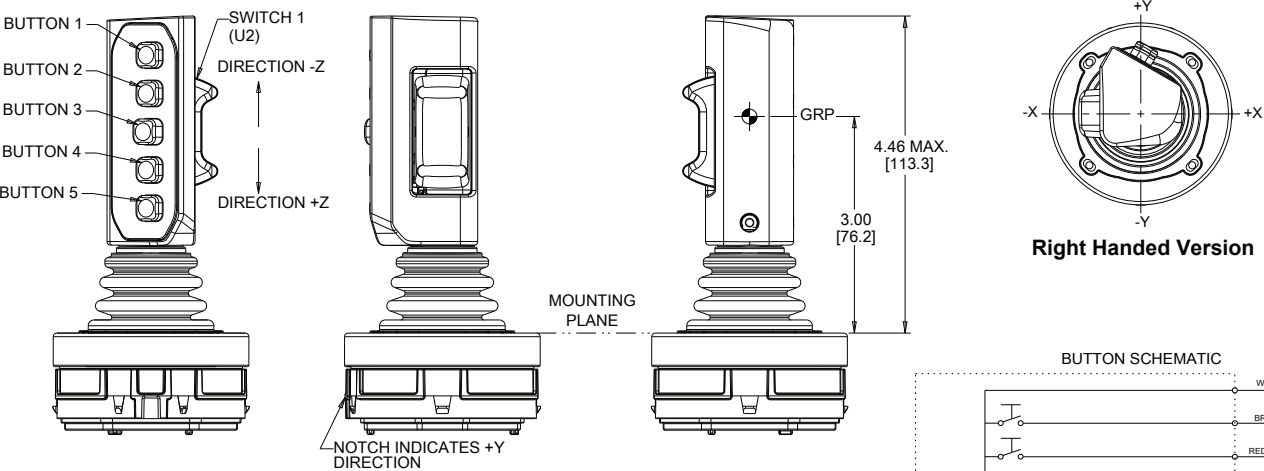
HANDLE 54

(G3-D WITH OPERATOR PRESENCE)



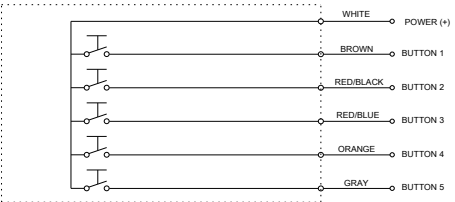
HANDLE 61

(5-BUTTON KEYPAD & HALL ROCKER RIGHT)



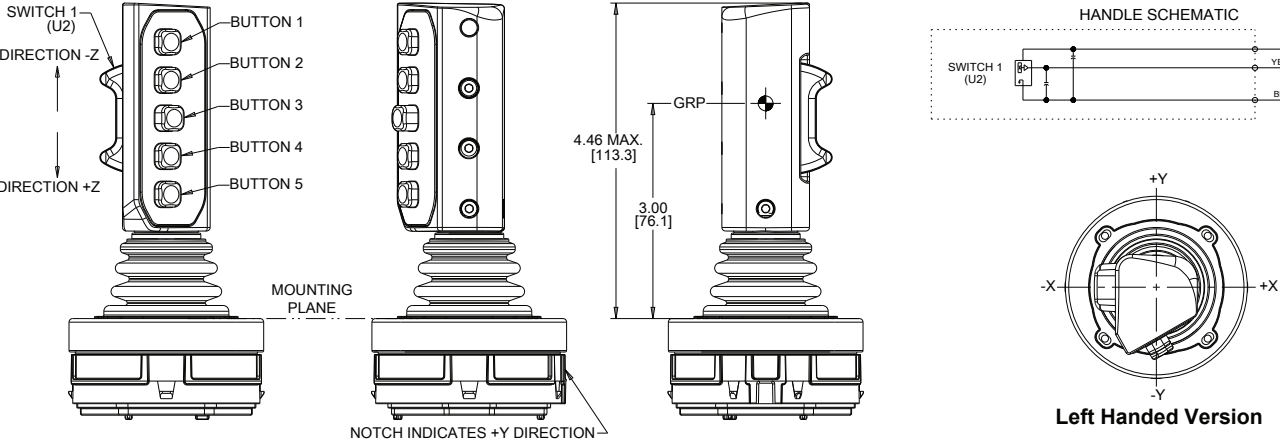
Right Handed Version

BUTTON SCHEMATIC



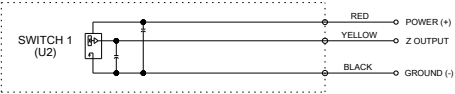
HANDLE 62

(5-BUTTON KEYPAD & HALL ROCKER LEFT)



Left Handed Version

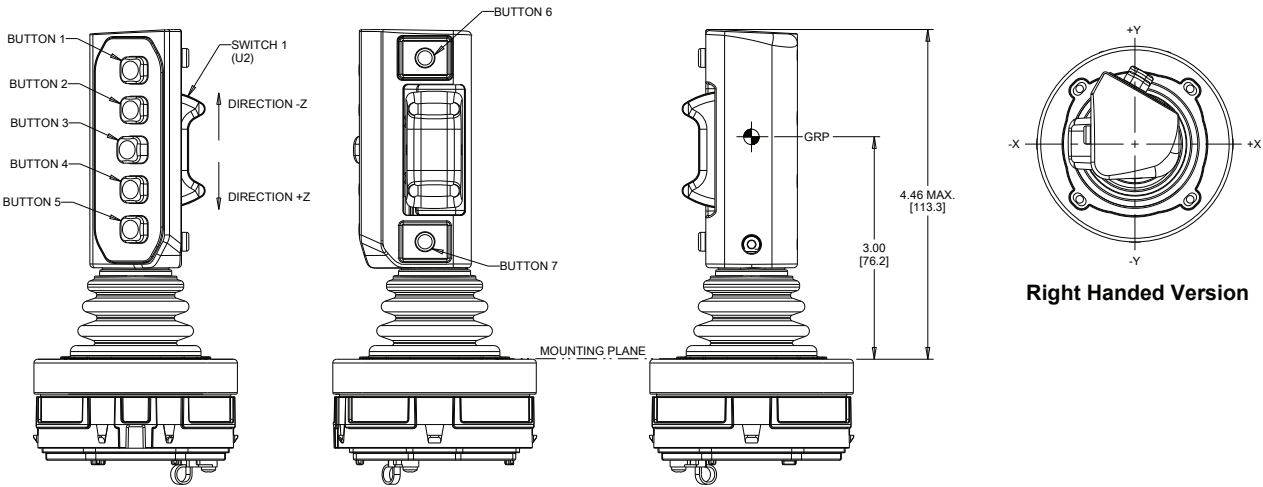
HANDLE SCHEMATIC



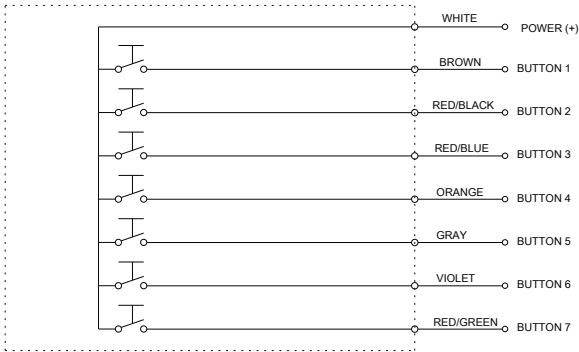
Wires and Strain Relief not shown in all views for clarity.

HANDLE 63

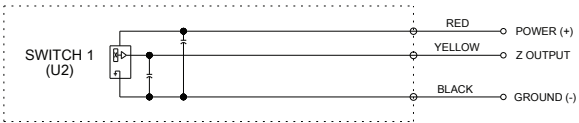
(7-BUTTON KEYPAD & HALL ROCKER RIGHT)



BUTTON SCHEMATIC

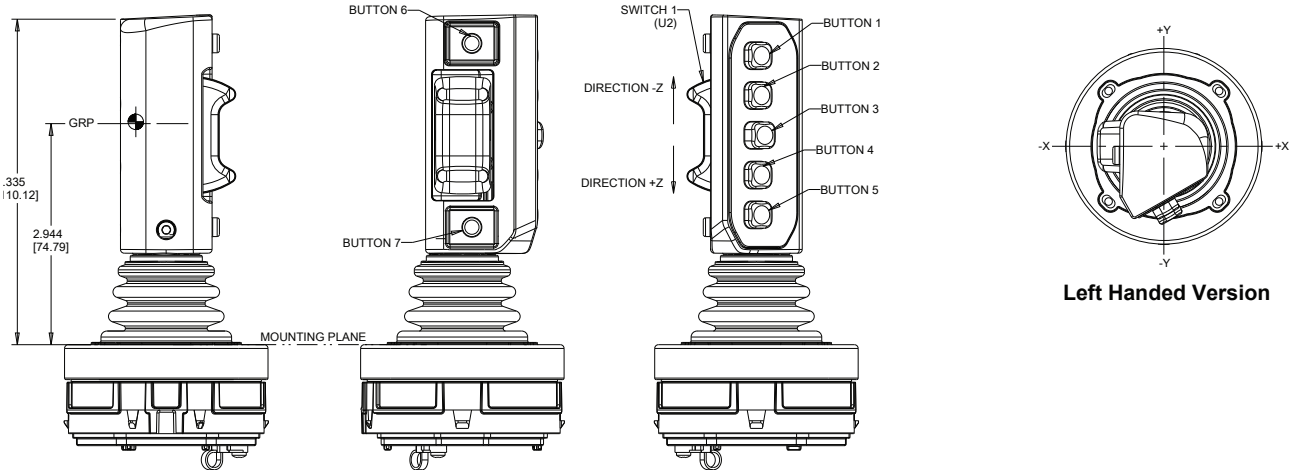


HANDLE SCHEMATIC



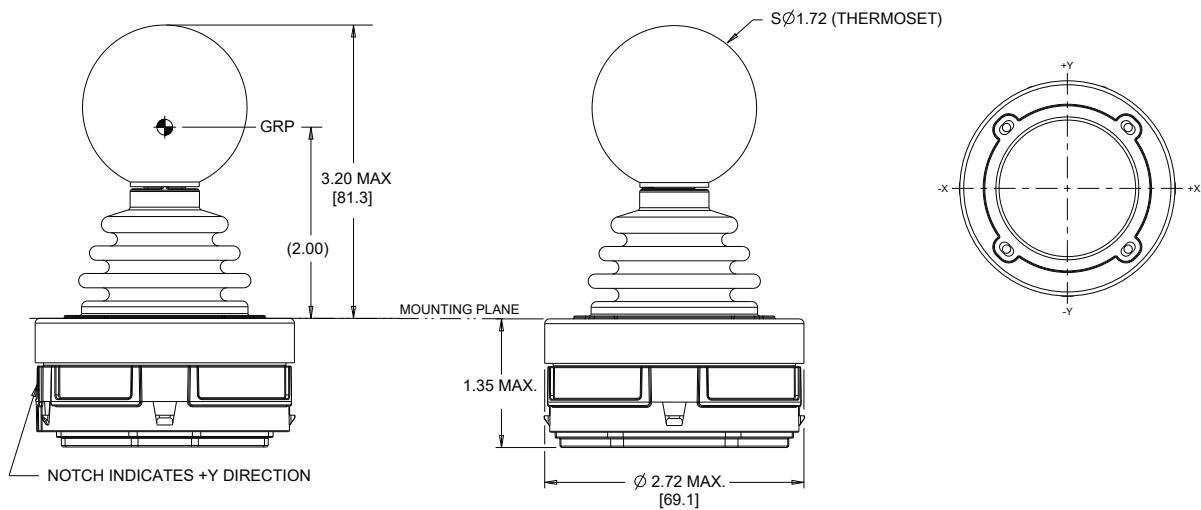
HANDLE 64

(7-BUTTON KEYPAD & HALL ROCKER LEFT)

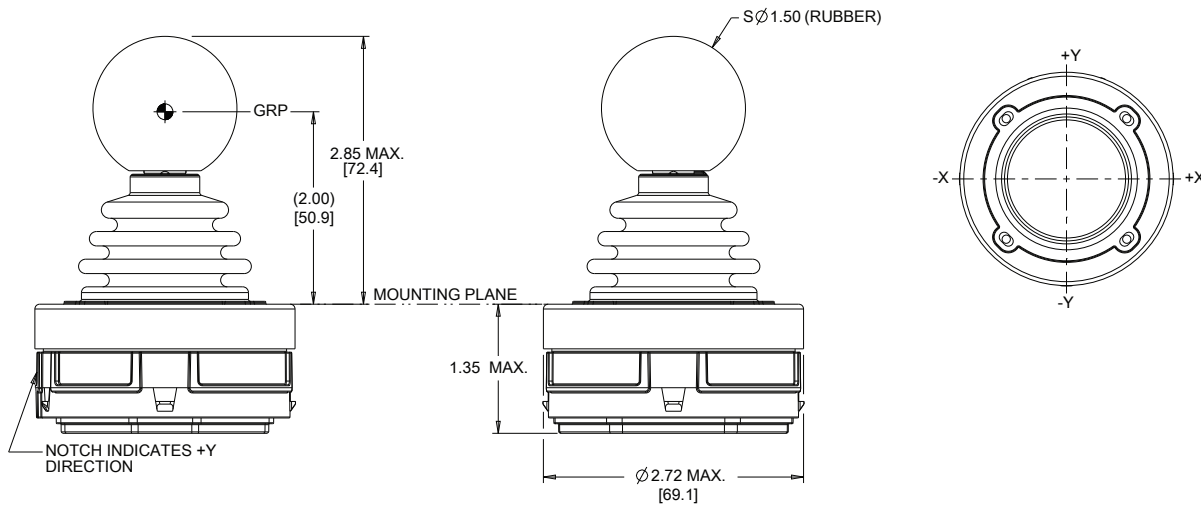


Wires and Strain Relief not shown in all views for clarity.

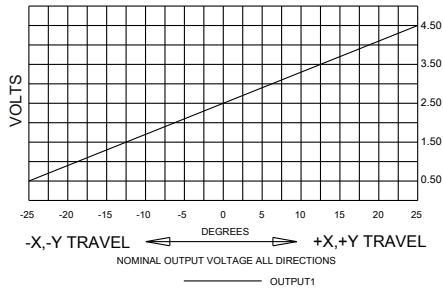
HANDLE 71
(BALL HANDLE LARGE)



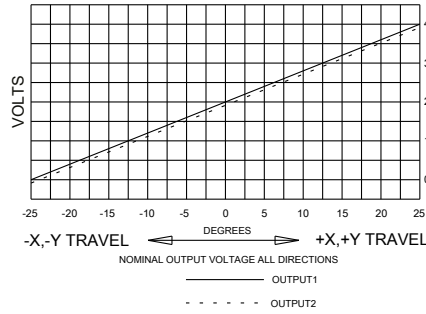
HANDLE 72
(BALL HANDLE SMALL)



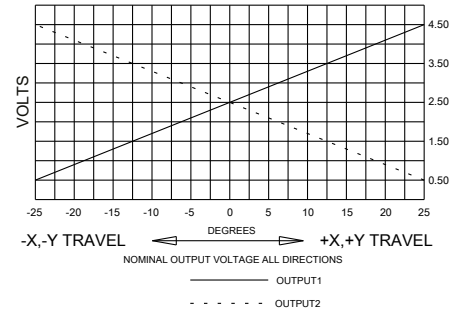
OPTION AA & AT



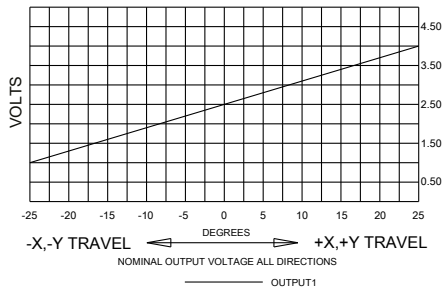
OPTION BB & BT



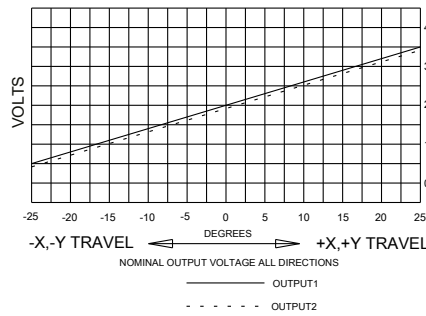
OPTION CC & CT



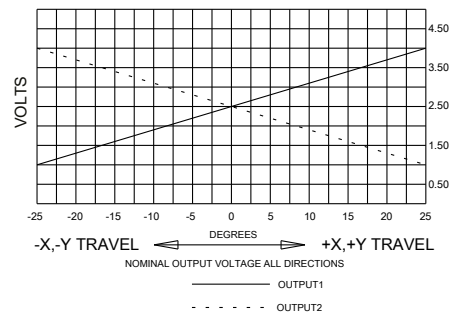
OPTION DD & DT



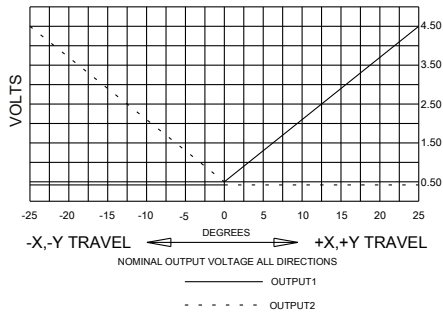
OPTION EE & ET



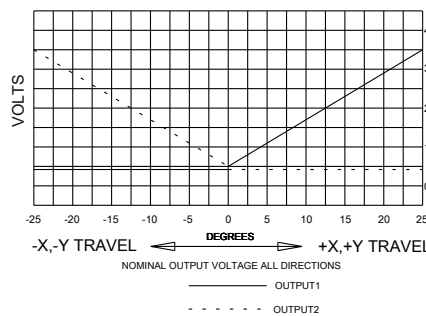
OPTION FF & FT



OPTION GG



OPTION HH



OPTION LL

