



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 medium 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**
- **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 IP68S**
- **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.*



JOYSTICK WITH GRIP OPTIONS

HJLG3
JOYSTICK
WITH GRIP

HALL EFFECT JOYSTICK WITH GRIP

Standard Characteristics/Ratings:

ELECTRICAL:

Joystick

Rated at Vcc = 5V @ 20°C Load = 1 ma (4.7 KΩ)	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	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	1,250,000 Cycles			

K1 Switches

Electrical Rating	10mA Resistive Load @ 5VDC			
Electrical Life	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	3,000,000 Cycles			

MECHANICAL:

Joystick	Units	Min	Typ	Max
Mechanical Life, Return to Center	6,000,000 cycles; 1,000,000 cycles (Detent) 250,000 cycles with Friction			
Travel Angle	Degrees	18	20	22
Op. Force (w/Bellows) Low Force @ GRP, Ret. to Ctr.	Lbs.	.25	.50	1.0
Op. Force (w/Bellows) Low Force @ GRP, Ret. to Ctr., Detent	Lbs.	.50	1.0	1.5
Op. Force (w/Bellows) Medium Force @ GRP, Ret. to Ctr.	Lbs.	.75	1.0	1.5
Op. Force (w/Bellows) Medium Force @ GRP, Ret. to Ctr., Detent	Lbs.	2.0	2.5	3.0
Op. Force (w/Bellows) High Force @ GRP, Ret. to Ctr.	Lbs.	1.5	2.0	2.5
Op. Force (w/Bellows) High Force @ GRP, Ret. to Ctr., Detent	Lbs.	2.0	4.0	6.0
Op. Force (w/Bellows) @ GRP, Friction Y-Axis	Lbs.	1.0	3.5	6.0
Maximum Allowable Load @ 5" GRP	Lbs.			225 Lbs.

Keypads

Mechanical Life	3,000,000 Cycles			
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P9 Switches

Mechanical Life	1,250,000 Cycles			
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K1 Switches

Mechanical Life	1,000,000 Cycles			
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HPL Switches

Mechanical Life	100,000 Cycles			
Full Stroke Per Button				
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.	3,000,000 Cycles			
Mechanical Life, Full Forward to Full Back, Friction	250,000 Cycles			
Operating Force (HTW) 25°C at Top of Roller, Return to Ctr.	Oz.	2.0	5.0	8.0
Operating Force (HTWF) 25°C at Top of Roller, Friction	Oz.	2.0	4.0	6.0
Maximum Allowable (HTW & HTWF) Radial Load	Lbs.	N/A	N/A	30

HTWM Switches

Mechanical Life, Full Forward to Full Back, Ret. to Ctr.	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

JOYSTICK WITH GRIP OPTIONS

HALL EFFECT JOYSTICK WITH GRIP

Standard Characteristics/Ratings (continued):

HTWS Switches

Mechanical Life, Full Forward to Full Back	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	15.0

HTLT4 Switches

Mechanical Life,	3,000,000 Cycles			
Operating Force (w/Boot) 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	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 (Contact factory for details)			

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	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)			

HTWS Switches	Units	Min	Typ	Max
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	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)			

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.

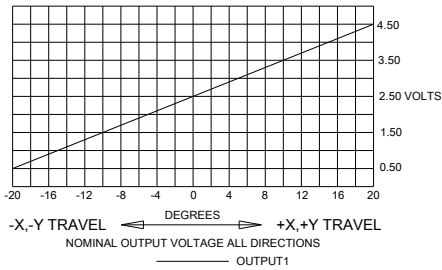
JOYSTICK WITH GRIP OPTIONS

HJLG3
JOYSTICK
WITH GRIP

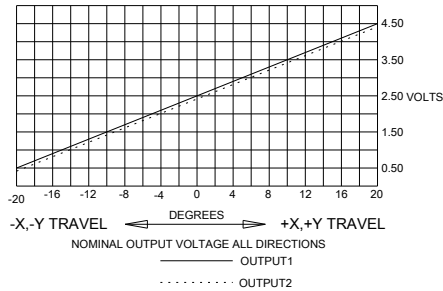
HALL EFFECT JOYSTICK WITH GRIP

HJLG3 OUTPUT CONFIGURATIONS

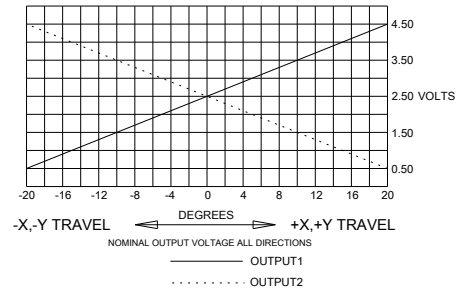
OPTION AA



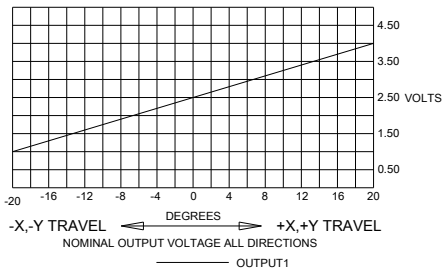
OPTION BB



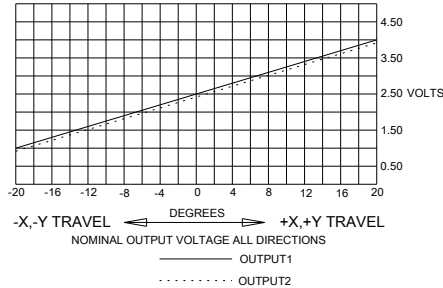
OPTION CC



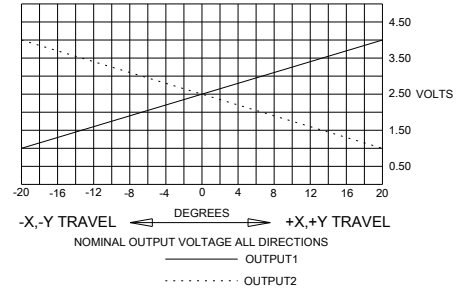
OPTION DD



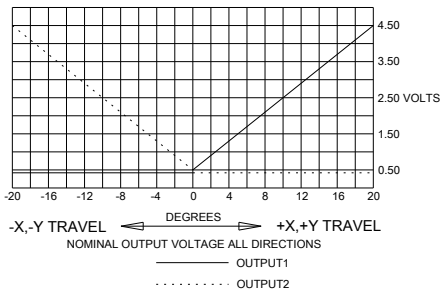
OPTION EE



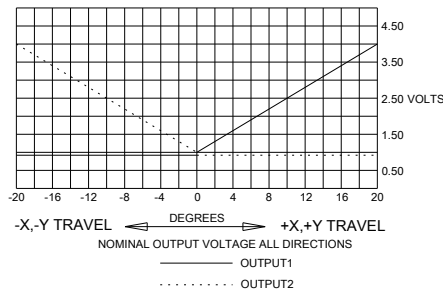
OPTION FF



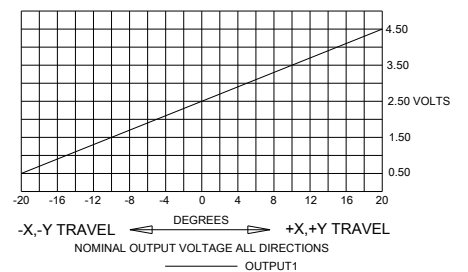
OPTION GG



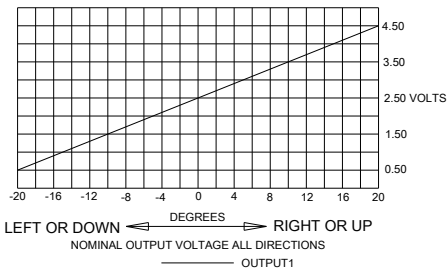
OPTION HH



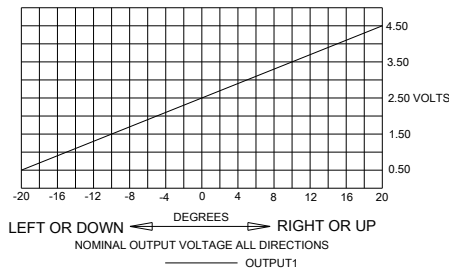
HTLT4 OUTPUT



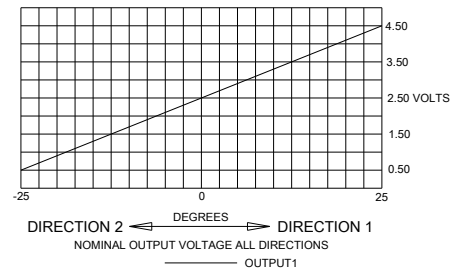
HTWM OUTPUT



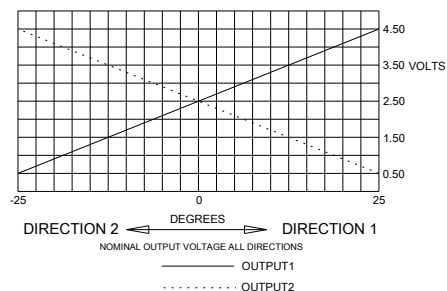
HTWS OUTPUT



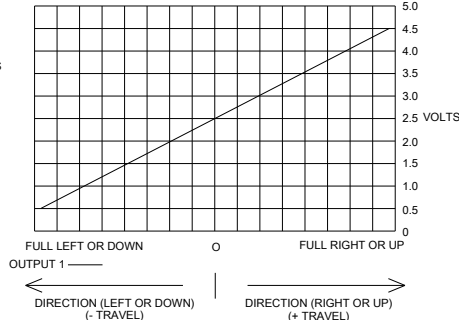
Z-AXIS SINGLE OUTPUT



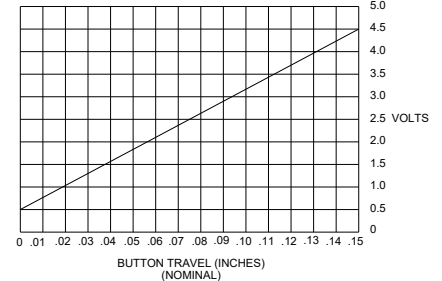
Z-AXIS DUAL OUTPUT



HTW OUTPUT



HPL OUTPUT

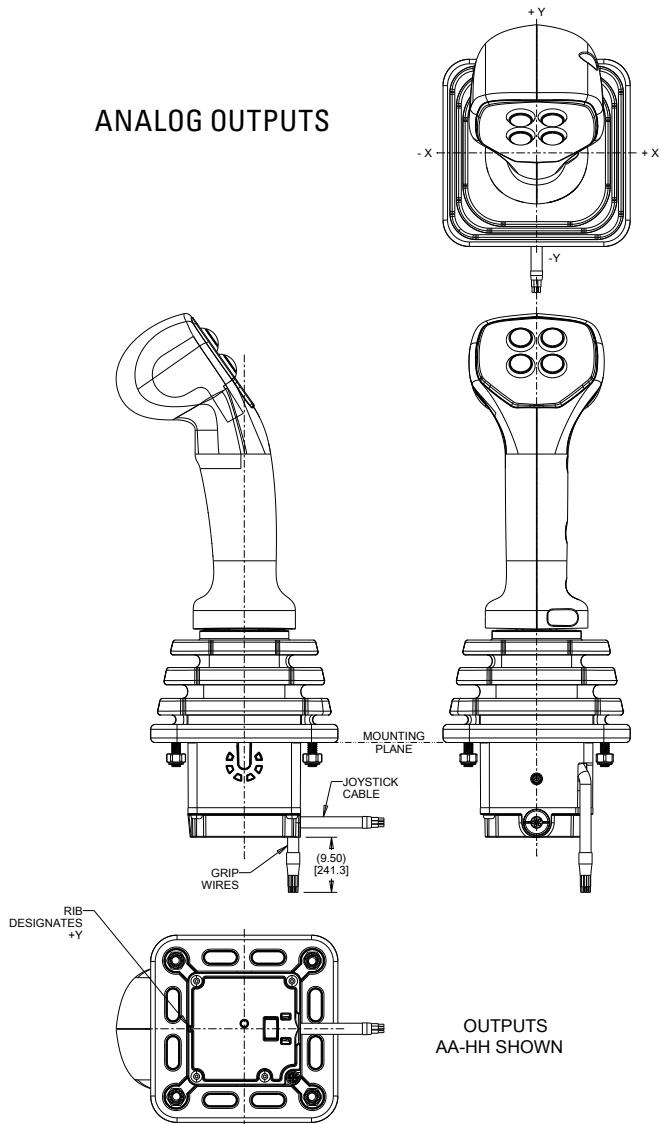


HALL EFFECT JOYSTICK WITH GRIP

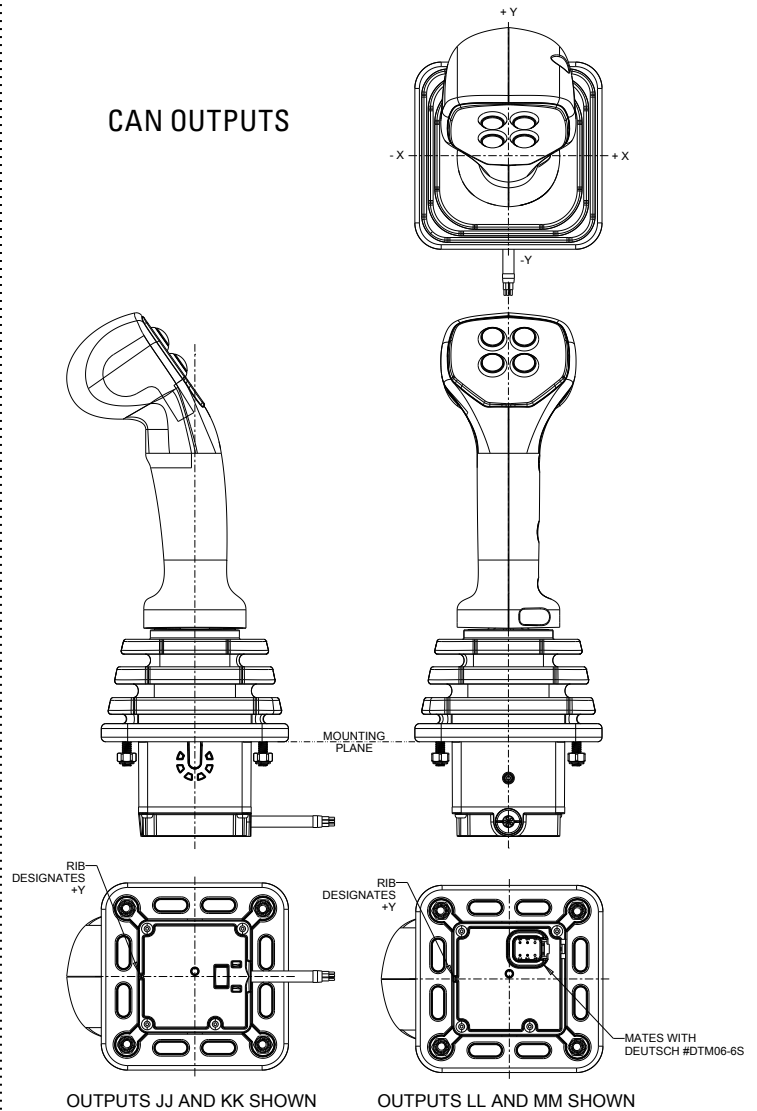
OUTPUTS AND JOYSTICK SCHEMATICS

For All Models in the HJLG3 Series

ANALOG OUTPUTS

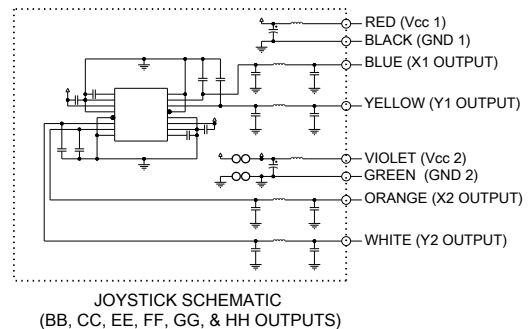
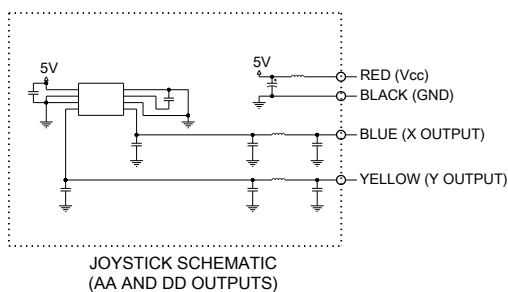


CAN OUTPUTS



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



JOYSTICK WITH GRIP OPTIONS

HJLG3-C
JOYSTICK
WITH GRIP

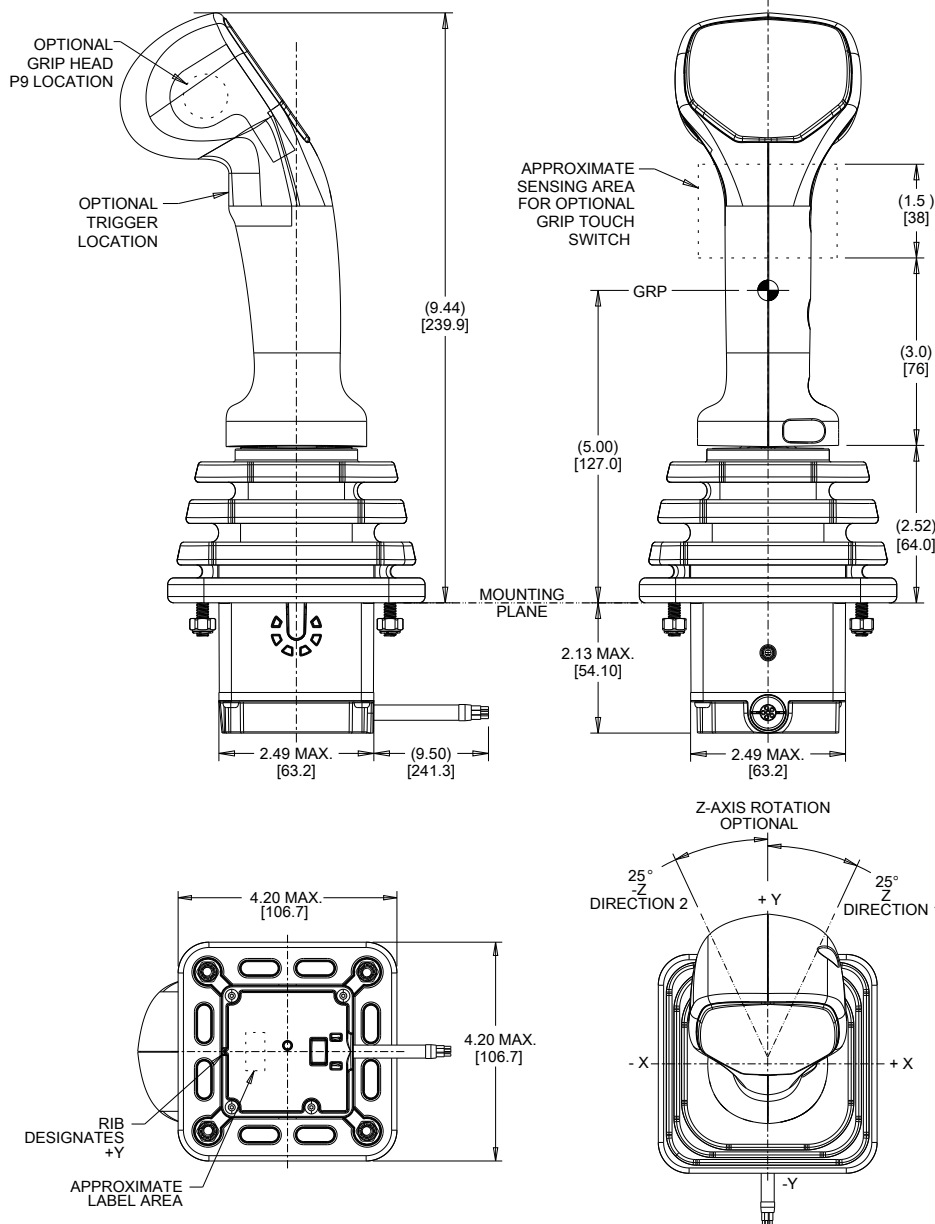
HALL EFFECT JOYSTICK WITH G3-C UNIVERSAL GRIP

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.

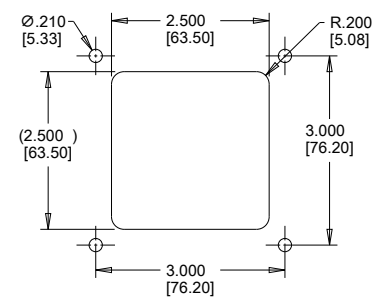
Visit the G3-C product page for more information about the grip, which is customizable to customer specifications.

HJLG3-C DRAWINGS

HJLG3-C with
CP Faceplate



HJLG3 Suggested Panel Opening



SUGGESTED PANEL OPENING
MAX. PANEL THICKNESS OF .250



HALL EFFECT JOYSTICK WITH G3-C UNIVERSAL GRIP

HJLG3-C PART NUMBER CODE

HJLG3-C	X	X	XX	X	X	X	XX Continued Below
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)* ① ②	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)* ① ②	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

HJLG3-C Part Number Code Continued

Cont.	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 Center ¹	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	

*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.

① 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.

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

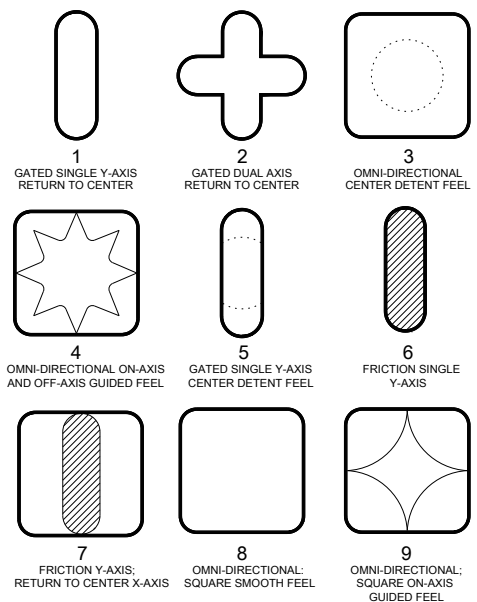
④ 24 AWG Cable

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 Gating Icons

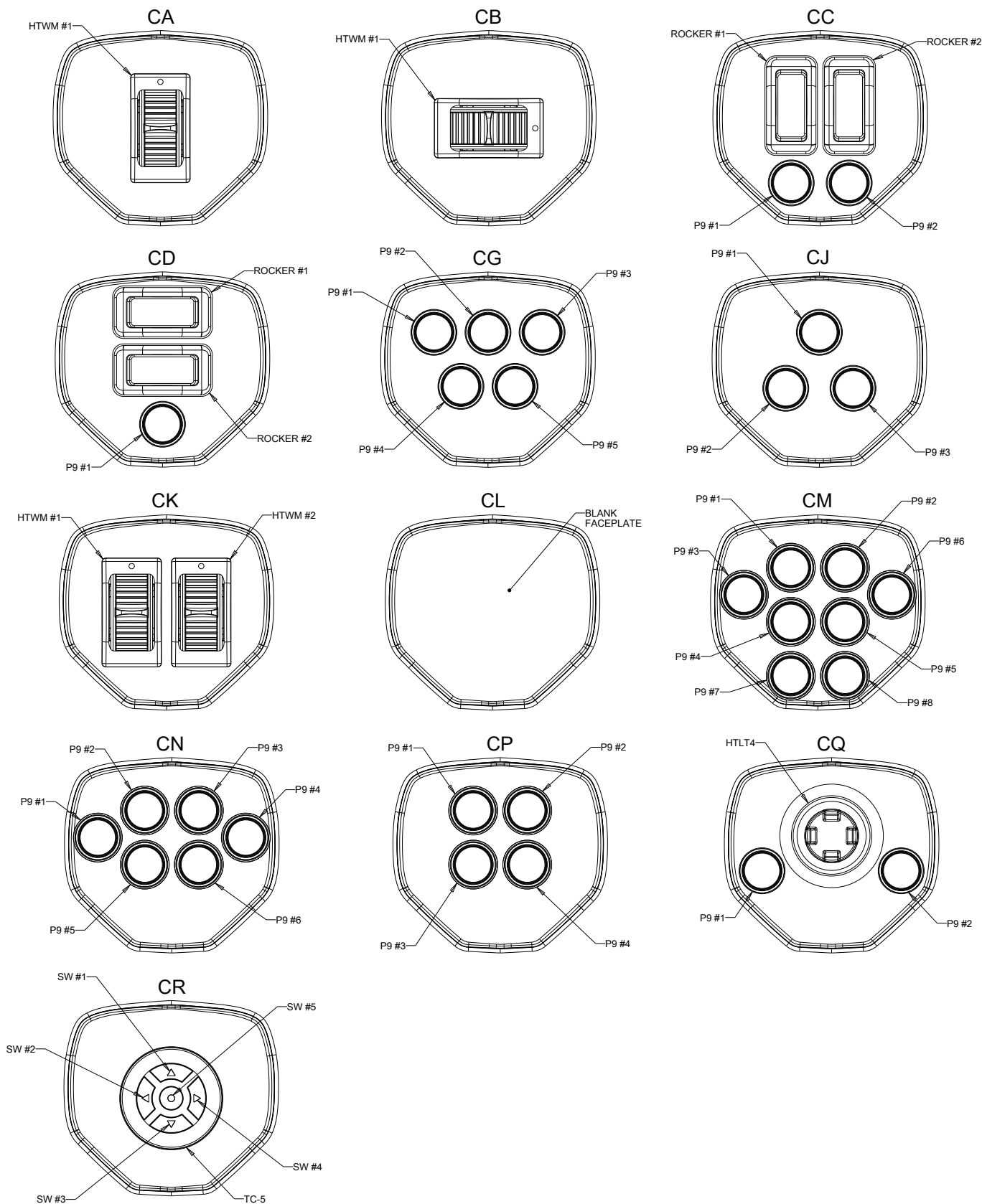


JOYSTICK WITH GRIP OPTIONS

HJLG3-C
JOYSTICK
WITH GRIP

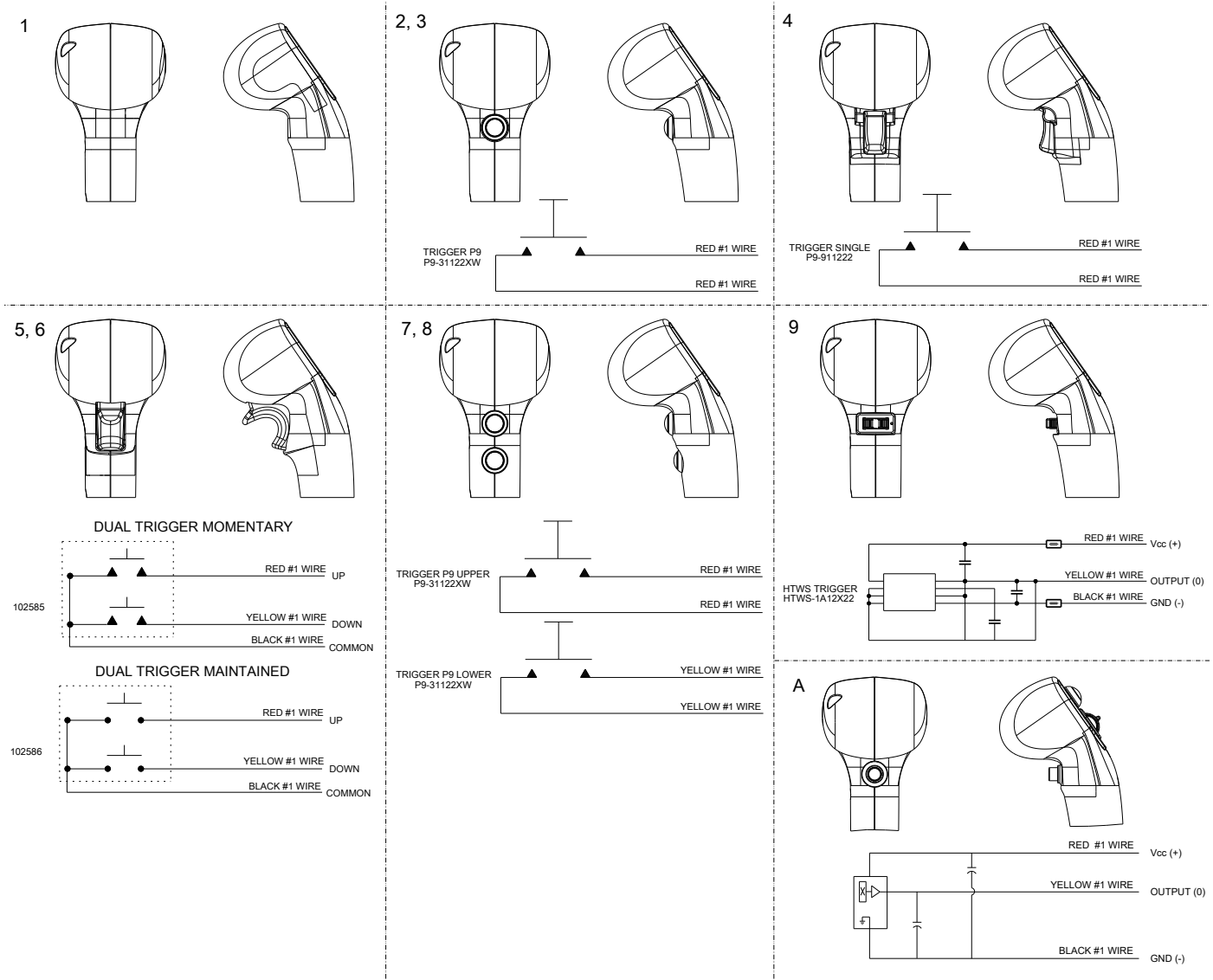
HALL EFFECT JOYSTICK WITH G3-C UNIVERSAL GRIP

HJLG3-C FACEPLATES

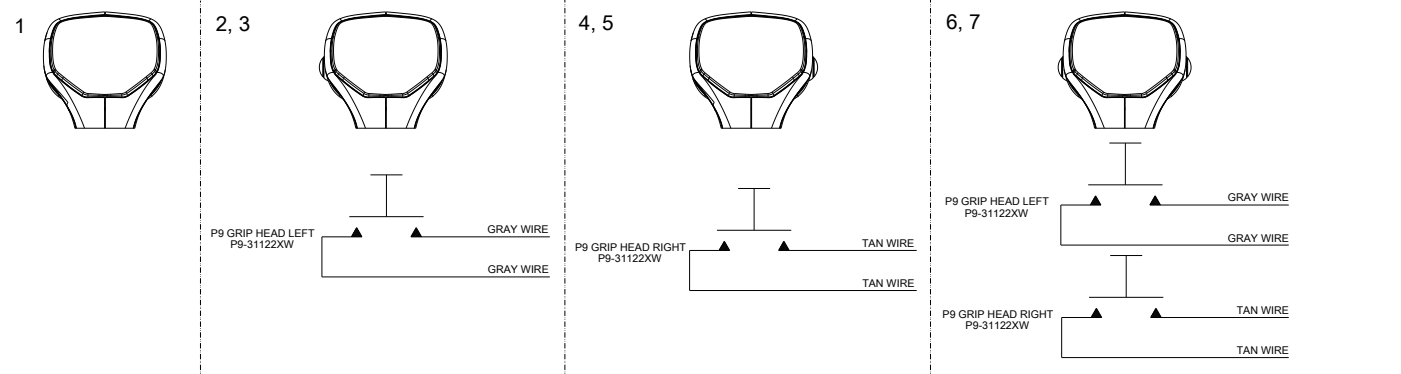


HALL EFFECT JOYSTICK WITH G3-C UNIVERSAL GRIP

HJLG3-C TRIGGER OPTIONS



HJLG3-C HEAD PUSHBUTTON OPTIONS



JOYSTICK WITH GRIP OPTIONS

HJLG3-C
JOYSTICK
WITH GRIP

HALL EFFECT JOYSTICK WITH G3-C UNIVERSAL GRIP

HJLG3-C FACEPLATE SCHEMATICS

