

JHL Sealed, Hall Effect Joystick





JHL with Ball Actuator

JHL with Threaded Shaft

OTTO's JHL is a high-performance, cost-effective, sealed Hall effect joystick base for demanding commercial applications. The JHL comes on its own or with a ball handle. Or pair it with an OTTO G3 series grip to make an integrated HJLG3 grip and joystick assembly.

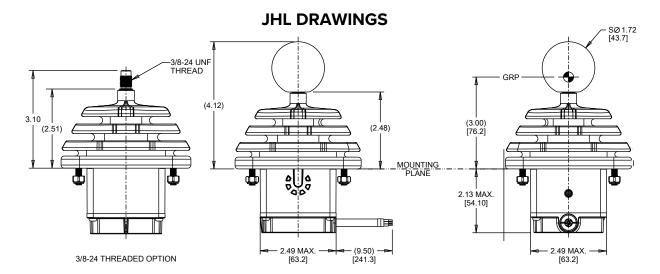
Output configurations include single analog, redundant analog, CANopen and J1939. The JHL has a PLd option for functional safety applications: It has been designed in accordance with Safety Standard ISO 13849-1, performance level D, Category 3 to enable communications on two separate channels.

Product Features

- Compatible with G3 series grips
- Electronics sealed to IP68S
- Up to 225 lbs. static load strength
- Excellent EFI/RFI immunity
- Up to 6 million cycle mechanical life; up to 1 million with detent
- Multiple output configuration options, including PLd

Doystick Rated at 5V @ 20°C, Load = 1ma (4.7kg) Units	Standard Characteristics/Ratin	ys.					
Rated at 5V @ 20°C, Load = 1ma (4.7kΩ)	ELECTRICAL RATINGS						
Supply Voltage, Vcc		linite	Min	Typ	May		
See Appropriate Graph							
Output Voltage Tolerance at Full Travel (See Appropriate Graph) VDC -0.25 N/A +0.25 Unutput at Full Travel VDC 4.25 4.50 4.75 +X, 4Y Direction Ø 5V Vcc 4.75 4.75 Supply Current Per Die B=0, Vcc=5V, lout=0 MA N/A 1.00 N/A Joystick CANopen VDC 9 N/A 32 Supply Voltage VDC 9 N/A 32 Mode Identifier (configurable) Bec. 10 10 Baud Rate (configurable) B/S 125K 125K Joystick J1939 Supply Voltage VDC 9 N/A 32 Suprel Address (configurable) Dec. 51 51 Baud Rate B/S 250K 250K Joystick PLd Supply Voltage VDC 9 N/A 32 Supply Voltage VDC 9 N/A 32 Inputs or Measure PWM 24 analog and digital inputs; six input decode J2716 SENT protocol signals measure PWM Wo PWM outputs	11.7	VDC	-0.25	N/A	+0.25		
Travel (See Appropriate Graph)	See Appropriate Graph)	@ 5V Vcc					
Output at Full Travel VDC 4.25 4.50 4.75 κ/, Υ, Picretion Ø 5V Vcc 4.75 4.75 Supply Current Per Die Bo-0, Vcc=5V, lout=0 mA N/A 1.00 N/A Be-0, Vcc=5V, lout=0 WDC 9 N/A 32 Supply Voltage VDC 9 N/A 32 Node Identifier (configurable) Dec. 10 125K Baud Rate (configurable) B/S 125K 125K Joystick J1939 Supply Voltage VDC 9 N/A 32 Source Address (configurable) Dec. 51 51 51 50 51 51 51 51 5250K 50			-0.25	N/A	+0.25		
#X, +Y Direction							
Supply Current Per Die mA N/A 10 12 B=0, Vcc=SV, Iout=0 MΩ N/A 1.00 N/A Joystick CANopen VDC 9 N/A 32 Supply Voltage VDC 9 N/A 32 Baud Rate (configurable) B/S 125K Joystick J1939 VDC 9 N/A 32 Source Address (configurable) Dec. 51 51 50 51 5250K 50 51 60			4.25	4.50	4.75		
B=0, Vcc=5V, lout=0			NI/A	10	12		
Supply Voltage	,	ША	IV/A	10	12		
Supply Voltage	Output Impedence	kΩ	N/A	1.00	N/A		
Node Identifier (configurable) Dec. 10	Joystick CANopen						
Baud Rate (configurable) B/S 125K 1939 125K 1939 125K 1939 125K 125K 1939 125K 12	Supply Voltage	VDC	9	N/A	32		
Supply Voltage	Node Identifier (configurable)	Dec.		10			
Supply Voltage	Baud Rate (configurable)	B/S		125K			
Source Address (configurable) Dec. 51	Joystick J1939						
Baud Rate B/S 250K	11.7	VDC	9	N/A	32		
Supply Voltage	Source Address (configurable)	Dec.		51			
Supply Voltage	Baud Rate	B/S		250K			
A malog and digital inputs; six input decode J2716 SENT protocol signals measure PWM	Joystick PLd						
Dutputs Two PWM outputs	Supply Voltage	VDC	9	N/A	32		
Mechanical Life	inputs or Measure PWM						
MECHANICAL Joystick 6,000,000 Cycles (1,000,000 cycles, with detent) (250,000 cycles, with friction) Mech. (Operating Force w/Bellows) Units Min Typ Ma Travel Angle Degrees 18 20 22 Low Force @ GRP, Ret. to Ctr. Lbs. 0.25 0.5 1.0 1.5 Low Force @ GRP, Ret. to Ctr. Lbs. 0.75 1.0 1.5 Medium Force @ GRP, Ret. to Ctr. Lbs. 0.75 1.0 1.5 Medium Force @ GRP, Ret. to Ctr. Lbs. 0.75 1.0 1.5 Medium Force @ GRP, Ret. to Ctr. Lbs. 0.75 1.0 1.5 Medium Force @ GRP, Ret. to Ctr. Lbs. 1.5 2.0 2.5 3.0 High Force @ GRP, Ret. to Ctr. Lbs. 1.5 2.0 2.5 3.0 Maximum Allowable Load @ GRP Lbs. 2.0 4.0 6.0 6.0 Friction @ GRP, Y-Axis Lbs. 1.0 3.5 6.0 Maximum Allowable Load @ GRP Lbs. 2.0 4.0 6.0 Entition Comparing Temperature °C -40 20 85 4.0 6			decode J2716 SENT protocol signals or				
Mechanical Life	Outnute						
Mechanical Life	Dutputs	TWO PVVIVI	outputs				
Mechanical Life							
(1,000,000 cycles, with detent) (250,000 cycles, with friction)	•						
Mech. (Operating Force w/Bellows)	Mechanical Life						
Mech. (Operating Force w/Bellows) Units Min Typ Ma Travel Angle Degrees 18 20 22 Low Force @ GRP, Ret. to Ctr. Lbs. 0.25 0.5 1.0 Low Force @ GRP, Ret. to Ctr., Detent Lbs. 0.5 1.0 1.5 Medium Force @ GRP, Ret. to Ctr., Detent Lbs. 0.75 1.0 1.5 Medium Force @ GRP, Ret. to Ctr., Detent Lbs. 2.0 2.5 3.0 High Force @ GRP, Ret. to Ctr., Detent Lbs. 1.5 2.0 2.5 High Force @ GRP, Ret. to Ctr., Detent Lbs. 1.0 3.5 6.0 Maximum Allowable Load @ GRP Lbs. 1.0 3.5 6.0 Maximum Allowable Load @ GRP Lbs. 2.0 2.5 ENVIRONMENTAL *** Departing Temperature** *C -40 20 85 Humidity 96% RH, 70*C, 96 HRS. *** *** *** Vibration 10g, 24Hz - 2Khz, Swept Sinusoidal *** *** Electrical Enclosure Des							
Travel Angle Degrees 18 20 22 Low Force @ GRP, Ret. to Ctr. Lbs. 0.25 0.5 1.0 Low Force @ GRP, Ret. to Ctr., Detent Lbs. 0.5 1.0 1.5 Medium Force @ GRP, Ret. to Ctr. Lbs. 0.75 1.0 1.5 Medium Force @ GRP, Ret. to Ctr., Detent Lbs. 2.0 2.5 3.0 High Force @ GRP, Ret. to Ctr., Detent Lbs. 1.5 2.0 2.5 High Force @ GRP, Ret. to Ctr., Detent Lbs. 2.0 4.0 6.0 Friction @ GRP, Y-Axis Lbs. 1.0 3.5 6.0 Maximum Allowable Load @ GRP Lbs. 2.0 4.0 6.0 ENVIRONMENTAL Joystick Operating Temperature °C -40 20 85 Humidity 96% RH, 70°C, 96 HRS. Vibration 10g, 24Hz - 2Khz, Swept Sinusoidal Electrical Enclosure Design IP68S EMI/RFI Withstand Per SAE J1113, Contact Factory for D MATERIAL	Mech. (Operating Force w/Bellows)				Max		
Low Force @ GRP, Ret. to Ctr. Lbs. 0.25 0.5 1.0		Degrees	10				
Medium Force @ GRP, Ret. to Ctr. Lbs. 0.75 1.0 1.5 Medium Force @ GRP, Ret. to Ctr., Detent Lbs. 2.0 2.5 3.0 High Force @ GRP, Ret. to Ctr. Lbs. 1.5 2.0 2.5 High Force @ GRP, Ret. to Ctr., Detent Lbs. 2.0 4.0 6.0 Friction @ GRP, Y-Axis Lbs. 1.0 3.5 6.0 Maximum Allowable Load @ GRP Lbs. 225 L ENVIRONMENTAL Joystick Operating Temperature °C -40 20 85 Humidity 96% RH, 70°C, 96 HRS. Vibration 10g, 24Hz - 2Khz, Swept Sinusoidal Electrical Enclosure Design IP68S EMI/RFI Withstand Per SAE J1113, Contact Factory for D MATERIAL Joystick Plunger Thermoplastic Housing Thermoplastic Bellows Silicone, Black Ball Knob Thermoset, Black			10	20	22		
Medium Force @ GRP, Ret. to Ctr., Detent Lbs. 2.0 2.5 3.0 High Force @ GRP, Ret. to Ctr. Lbs. 1.5 2.0 2.5 High Force @ GRP, Ret. to Ctr. Lbs. 1.5 2.0 2.5 High Force @ GRP, Ret. to Ctr., Detent Lbs. 2.0 4.0 6.0 Friction @ GRP, Y-Axis Lbs. 1.0 3.5 6.0 Maximum Allowable Load @ GRP Lbs. 225 L ENVIRONMENTAL		Lbs.					
High Force @ GRP, Ret. to Ctr. Lbs. 1.5 2.0 2.5 High Force @ GRP, Ret. to Ctr., Detent Lbs. 2.0 4.0 6.0 Friction @ GRP, Y-Axis Lbs. 1.0 3.5 6.0 Maximum Allowable Load @ GRP Lbs. 225 L ENVIRONMENTAL	Low Force @ GRP, Ret. to Ctr.		0.25	0.5	1.0		
High Force @ GRP, Ret. to Ctr., Detent Lbs. 2.0	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent	Lbs.	0.25	0.5 1.0	1.0 1.5		
### Friction @ GRP, Y-Axis	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr.	Lbs.	0.25 0.5 0.75	0.5 1.0 1.0	1.0 1.5 1.5		
Maximum Allowable Load @ GRP Lbs. 225 L ENVIRONMENTAL Joystick Operating Temperature °C -40 20 85 Humidity 96% RH, 70°C, 96 HRS. Vibration 10g, 24Hz - 2Khz, Swept Sinusoidal Electrical Enclosure Design IP68S EMI/RFI Withstand Per SAE J1113, Contact Factory for D MATERIAL Joystick Plunger Thermoplastic Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr. Medium Force @ GRP, Ret. to Ctr., Deten	Lbs. Lbs. t Lbs.	0.25 0.5 0.75 2.0	0.5 1.0 1.0 2.5	1.0 1.5 1.5 3.0		
ENVIRONMENTAL Joystick Operating Temperature °C -40 20 85 Humidity 96% RH, 70°C, 96 HRS. Vibration 10g, 24Hz - 2Khz, Swept Sinusoidal Electrical Enclosure Design IP688 EMI/RFI Withstand Per SAE J1113, Contact Factory for D MATERIAL Joystick Plunger Thermoplastic Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr. Medium Force @ GRP, Ret. to Ctr., Deten High Force @ GRP, Ret. to Ctr.	Lbs. Lbs. t Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5	0.5 1.0 1.0 2.5 2.0	1.0 1.5 1.5 3.0 2.5		
Joystick Operating Temperature °C -40 20 85 Humidity 96% RH, 70°C, 96 HRS. Vibration 10g, 24Hz - 2Khz, Swept Sinusoidal Electrical Enclosure Design IP68S EMI/RFI Withstand Per SAE J1113, Contact Factory for D MATERIAL Joystick Plunger Thermoplastic Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr. Medium Force @ GRP, Ret. to Ctr., Deten High Force @ GRP, Ret. to Ctr. High Force @ GRP, Ret. to Ctr.	Lbs. Lbs. t Lbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0	0.5 1.0 1.0 2.5 2.0 4.0	1.0 1.5 1.5 3.0 2.5 6.0		
Joystick Operating Temperature °C -40 20 85 Humidity 96% RH, 70°C, 96 HRS. Vibration 10g, 24Hz - 2Khz, Swept Sinusoidal Electrical Enclosure Design IP68S EMI/RFI Withstand Per SAE J1113, Contact Factory for D MATERIAL Joystick Plunger Thermoplastic Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr. Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr. High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis	Lbs. Lbs. t Lbs. Lbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0	0.5 1.0 1.0 2.5 2.0 4.0	1.0 1.5 1.5 3.0 2.5 6.0		
Humidity 96% RH, 70°C, 96 HRS. Vibration 10g, 24Hz - 2Khz, Swept Sinusoidal Electrical Enclosure Design IP68S EMI/RFI Withstand Per SAE J1113, Contact Factory for D MATERIAL Joystick Plunger Thermoplastic Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr. Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP	Lbs. Lbs. t Lbs. Lbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0	0.5 1.0 1.0 2.5 2.0 4.0	1.0 1.5 1.5 3.0 2.5 6.0 6.0		
Vibration 10g, 24Hz - 2Khz, Swept Sinusoidal Electrical Enclosure Design IP68S EMI/RFI Withstand Per SAE J1113, Contact Factory for D MATERIAL Joystick Plunger Thermoplastic Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr. Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL	Lbs. Lbs. t Lbs. Lbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0	0.5 1.0 1.0 2.5 2.0 4.0	1.0 1.5 1.5 3.0 2.5 6.0 6.0		
Electrical Enclosure Design IP68S EMI/RFI Withstand Per SAE J1113, Contact Factory for D MATERIAL Joystick Plunger Thermoplastic Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr. Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick	Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0	0.5 1.0 1.0 2.5 2.0 4.0 3.5	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs		
EMI/RFI Withstand Per SAE J1113, Contact Factory for D MATERIAL Joystick Plunger Thermoplastic Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature	Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Cbs. Cbs. Cbs. Cbs. Cbs. Cbs.	0.25 0.5 0.75 2.0 1.5 2.0 1.0	0.5 1.0 1.0 2.5 2.0 4.0 3.5	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs		
MATERIAL Joystick Plunger Thermoplastic Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature Humidity	Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Cbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0 1.0	0.5 1.0 1.0 2.5 2.0 4.0 3.5	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs		
Joystick Plunger Thermoplastic Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature Humidity	Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Los. Lbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0 1.0	0.5 1.0 1.0 2.5 2.0 4.0 3.5	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs		
Joystick Plunger Thermoplastic Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature Humidity Vibration Electrical Enclosure Design	Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0 1.0	0.5 1.0 1.0 2.5 2.0 4.0 3.5	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs		
Plunger Thermoplastic Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature Humidity Vibration Electrical Enclosure Design EMI/RFI Withstand	Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0 1.0	0.5 1.0 1.0 2.5 2.0 4.0 3.5	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs		
Housing Thermoplastic, Black Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature Humidity Vibration Electrical Enclosure Design EMI/RFI Withstand MATERIAL	Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0 1.0	0.5 1.0 1.0 2.5 2.0 4.0 3.5	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs		
Bellows Silicone, Black Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature Humidity Vibration Electrical Enclosure Design EMI/RFI Withstand MATERIAL Joystick	Lbs. Lbs. t Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. P66 RH, 70 10g, 24Hz - 1P68S Per SAE J1	0.25 0.5 0.75 2.0 1.5 2.0 1.0 -40 -40 -2Khz, Sw	0.5 1.0 1.0 2.5 2.0 4.0 3.5	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs		
Ball Knob Thermoset, Black	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature Humidity Vibration Electrical Enclosure Design EMI/RFI Withstand MATERIAL Joystick Plunger	Lbs. Lbs. t Lbs. Lbs. Lbs. Lbs. Lbs. C 96% RH, 70 10g, 24Hz - 1P68S Per SAE J1	0.25 0.5 0.75 2.0 1.5 2.0 1.0 -40 -40 -2Khz, Sw	0.5 1.0 1.0 2.5 2.0 4.0 3.5	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs		
Cable Output Ontion AA DD .I.I & KK	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature Humidity Vibration Electrical Enclosure Design EMI/RFI Withstand MATERIAL Joystick Plunger Housing	Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. "C 96% RH, 70 10g, 24Hz - 1P68S Per SAE J1	0.25 0.5 0.75 2.0 1.5 2.0 1.0 -40 -40 -2Khz, Sw 1113, Cont	0.5 1.0 1.0 2.5 2.0 4.0 3.5	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs		
	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature Humidity Vibration Electrical Enclosure Design EMI/RFI Withstand MATERIAL Joystick Plunger Housing Bellows	Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0 1.0 -40 -70, 96 HR: -2Khz, Sw	0.5 1.0 1.0 2.5 2.0 4.0 3.5	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs		
22 AWG PVC/Polyurethane Blend Oute	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature Humidity Vibration Electrical Enclosure Design EMI/RFI Withstand MATERIAL Joystick Plunger Housing Bellows Ball Knob	Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0 1.0 -40 -40 0°C, 96 HR: 2 Khz, Sw 1113, Cont	0.5 1.0 1.0 2.5 2.0 4.0 3.5 20 S. ept Sinusc	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs 85 bidal		
Output Option BB, CC, EE, FF, GG & HI 24 AWG PVC/Polyurethane Blend Oute	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature Humidity Vibration Electrical Enclosure Design EMI/RFI Withstand MATERIAL Joystick Plunger Housing Bellows Ball Knob	Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. "C 96% RH, 70 10g, 24Hz - 1P68S Per SAE J1 Thermopla Thermopla Silicone, B Thermoset Output Opt 22 AWG PV	0.25 0.5 0.75 2.0 1.5 2.0 1.0 1.0 -40 -40 -40 -40 -40 -40 -40 -40 -40 -4	0.5 1.0 1.0 2.5 2.0 4.0 3.5 20 S. ept Sinusco	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs 85 bidal y for Details		
Mounting Hardware #10-24 x 3/4 Carriage Bolts	Low Force @ GRP, Ret. to Ctr. Low Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent Medium Force @ GRP, Ret. to Ctr., Detent High Force @ GRP, Ret. to Ctr., Detent Friction @ GRP, Y-Axis Maximum Allowable Load @ GRP ENVIRONMENTAL Joystick Operating Temperature Humidity Vibration Electrical Enclosure Design EMI/RFI Withstand MATERIAL Joystick Plunger Housing Bellows Ball Knob	Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs. Lbs.	0.25 0.5 0.75 2.0 1.5 2.0 1.0 -40 -40 -3°C, 96 HR: 2Khz, Sw 1113, Cont	0.5 1.0 1.0 2.5 2.0 4.0 3.5 20 S. rept Sinusc act Factor	1.0 1.5 1.5 3.0 2.5 6.0 6.0 225 Lbs 85 bidal y for Details C: and Outer Jack GG & HH:		

PRODUCT BULLETIN



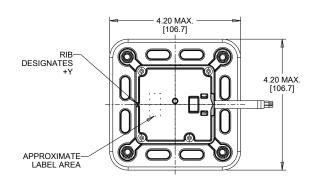
*Outputs are from the center to the full travel position in each direction. Options "AA", "BB", "CC", "DD", "EE", "FF" provide increased voltage in +x, +y; and decreasing voltage in -x, -y direction from 1 output per axis. Options "GG" and "HH" provide increasing voltages in all directions (+x, +y, -x,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

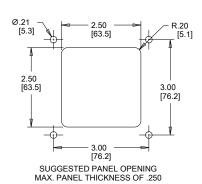
**Options "BB" and "EE" provide redundant output 2 which duplicates output 1.

Options "CC" and "FF" provide redundant output 2 which is inverse of output 1.

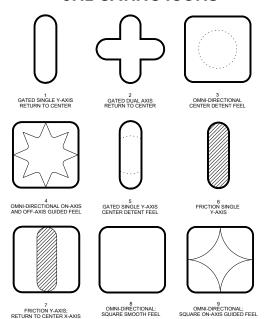
1) 22 AWG Cable

2 24 AWG Cable





JHL GATING ICONS



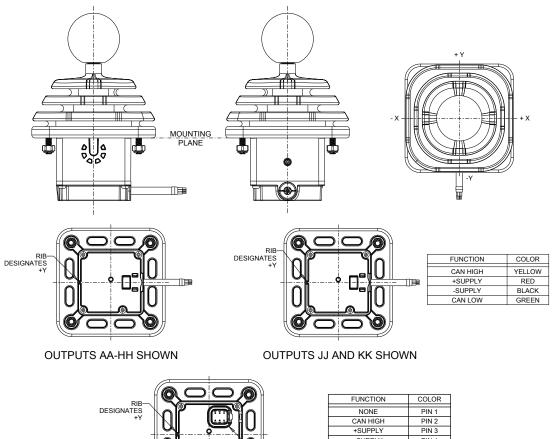
JHL PART NUMBER CODE

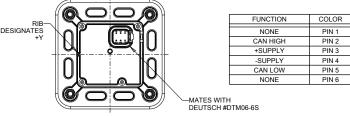
JHL –	X X	XX	X	
Actuator Options	Gating Options	Joystick Output 1*	Joystick Output 2**	Force
1. 3/8-24 Threaded 2. 1.72	1. Gated Single Y-Axis: Return to Center 2. Gated; Dual Axis —	AA. 2.5 +/- 2.0VDC ① BB. 2.5 +/- 2.0VDC ② CC. 2.5 +/- 2.0VDC ②	NONE 2.5 +/- 2.0VDC 2.5 -/+ 2.0VDC	 Low Medium High
Ball Knob	Return to Center 3. Omni-directional; Center Detent Feel 4. Omni-directional:	DD. 2.5 +/- 1.5VDC ① EE. 2.5 +/- 1.5VDC ② FF. 2.5 +/- 1.5VDC ②	NONE 2.5 +/- 1.5VDC 2.5 -/+ 1.5VDC	
	On-Axis and Off-Axis Guided Feel 5. Gated Single Y-Axis:	GG. 0.5 - 4.5VDC ② HH. 1.0 - 4.0VDC ② JJ. CANbus J1939 ①	0.5 - 4.5VDC 1.0 - 4.0VDC NONE	
	Center Detent Feel 6. Friction – Single Axis 7. Friction Y-Axis; Return-to-Center X-Axis	KK. CANopen ① LL. CANbus J1939 W/ Deutsch Connector	NONE NONE	
	8. Omni-directional: Square Smooth Feel	MM. CANopen w/ Deutsch Connector	NONE	
	9. Omni-directional: Square On-Axis Guided	NN. PLd	NONE	

Feel



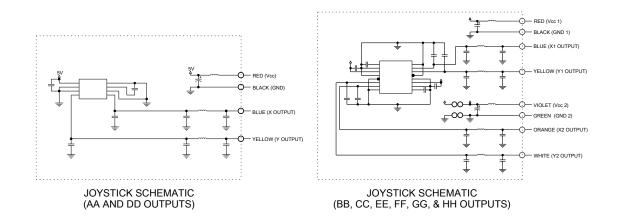
JHL OUTPUT DRAWINGS





OUTPUTS LL AND MM SHOWN

JHL SCHEMATICS



PRODUCT BULLETIN

JHL OUTPUTS

