MINIATURE Z-AXIS HALL EFFECT JOYSTICK





The JHT Z-Axis Miniature Series Hall Effect Joystick allows for a 60° rotational movement of the knob at the top of the joystick. Z-Axis options include detent, friction hold or spring return to center. Its compact design is the ideal solution where space is limited and precision control is required, while its robust construction is suited for demanding applications. The JHT joystick has been tested to five million cycles in all directions with no degradation of performance. The Z-Axis and/or pushbuttons have been tested to one million cycles. Various gating options are also available. The JHT Z-Axis electronics are sealed to IP68S and can withstand EMI/RFI per SAE J1113 specifications. The JHT Z-Axis has numerous applications and is ideal for construction equipment, unmanned vehicles, hydraulic controls, industrial vehicle controls, medical and surgery equipment and surveillance video cameras.

Features:

- 60° rotational movement of the knob
- Compact design
- Contactless analog output Hall effect technology
- 5 million operational cycles in all directions (Joystick)
- Joystick electronics sealed per IP68S
- Optional pushbutton switches available
- 3.3V and 5V SPI Output Options
- RoHS/WEEE/Reach compliant

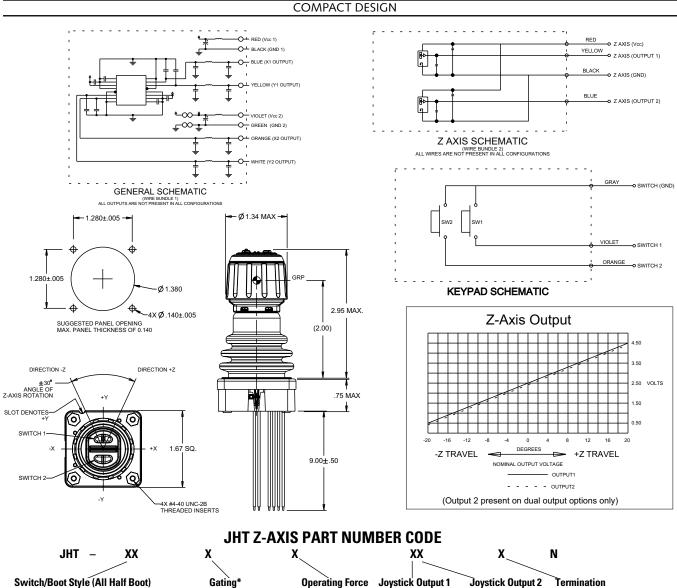
Environmental Ratings and Materials:

ENVIRONMENTAL:	
Operating Temp Range:	-40°C to +85°C
Seal:	Joystick electronics without pushbutton sealed to IP68S Keypad electronics sealed to IP65S
EMI/RFI:	Withstand per SAE J1113
MATERIALS:	
Housing:	Thermoplastic, black
Bellows:	Silicone, black. Additional materials available, contact factory.

Standard Characteristics/Ratings: GENERAL: Sensor Type: Hall effect analog, factory programmed ground and supply line break dataction; over voltage and reverse voltage protection Design: Contactless sensing ELECTRICAL RATINGS: Rated at Vcc = 5V @ 20°C Load = tme (4.7KO) Electrical - Analog Joystick Supply Voltage VDC 4.5 Supply Voltage Tolerance VVC N/A +.25 Output Voltage Tolerance VVC N/A +.25 Supply Current [#] mA N/A 10 Output Voltage Tolerance WOC 25 N/A +.25 Supply Current [#] MA N/A +.25 Supply Current [#] MA N/A +.25 Supply Current [#] MA N/A +.25 Suply Current [#] MA	DESIGN							
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$\begin{array}{c c c c c c c c } -2 \ \hline Direction & \hline @ 5V Vcc \\ \hline Supply current (per sensor) & mA & N/A & N/A & 10.0 \\ \hline B = 0, Vcc = 5V, Io = 0 & & & 1 \\ \hline Output - Source Current Limit & mA & -1.0 & N/A & 1.0 \\ \hline B = -0, Vcc = 5V, Io = 0 & & & & 1 \\ \hline Electrical - Joystick Z-Axis Friction & & & & & \\ \hline Electrical - Joystick Z-Axis Friction & & & & & \\ \hline Dutput 1-2 at Full Travel & VDC & 4.25 & 4.50 & 4.55 \\ -2 \ Direction & @ 5V Vcc & & & & & \\ \hline Output 1+2 at Full Travel & VDC & 0.45 & 0.50 & 0.75 \\ \hline Supply Current (per sensor) & mA & N/A & N/A & 10 \\ \hline B = 0, Vcc = 5V, Io = 0 & & & \\ \hline Output - Source Current Limit & mA & -1.0 & N/A & 1.0 \\ \hline B = -0, Vcc = 5V, Io = 0 & & & \\ \hline Dutput 1-2 at Full Travel & VDC & 4.25 & 5.5 \\ \hline Output 1-2 onystick Z-Axis 3 Detent & & & \\ \hline Electrical - Joystick Z-Axis 3 Detent & & & \\ \hline Electrical - Joystick Z-Axis 3 Detent & & & \\ \hline Dutput 1+2 voltage, +Z, -Z & VDC & 2.25 & 2.50 & 2.75 \\ \hline Output 1+2 voltage, +Z, -Z & VDC & 4.25 & 4.50 & 4.55 \\ -2 \ Direction & @ 5V Vcc & & \\ \hline Output 1+2 at Full Travel & VDC & 0.45 & 0.50 & 0.75 \\ -2 \ Direction & @ 5V Vcc & & \\ \hline Output 1+2 at Full Travel & VDC & 0.45 & 0.50 & 0.75 \\ -2 \ Direction & @ 5V Vcc & & \\ \hline Output 1+2 at Full Travel & VDC & 0.45 & 0.50 & 0.75 \\ -2 \ Direction & @ 5V Vcc & & \\ \hline Output 1-2 at Full Travel & VDC & 0.45 & 0.50 & 0.75 \\ -2 \ Direction & & & & \\ \hline Dutput 1-2 at Full Travel & Degrees 18 & 20 & 22 \\ \hline Over Travel Angle & Degrees 18 & 20 & 22 \\ \hline Over Travel Angle & Degrees 18 & 20 & 22 \\ \hline Over Travel Angle & Degrees 18 & 20 & 22 \\ \hline Over Travel Angle & Degrees 56 & 60 & 64 \\ \hline Operational Life: & 1,000,000 \ cvcles in all directions \\ \hline Max Allowable Radial Force & Lbs. & N/A & N/A & 15 \\ \hline Max Allowable Radial Force & Lbs. & N/A & N/A & 15 \\ \hline Max Allowable Radial Force & Lbs. & N/A & N/A & 50 \\ \hline Cyreational Torque & 0Z & 10 & 20 & 30 \\ \hline With Detent & & \\ \hline Operational Torque & 0Z & 1.0 & 4.0 & 7.0 \\ \hline Operational Torque & 0Z & 1.0 & 4.0 & 7.0 \\ \hline Operational Torque & 0Z & 1.0 & 0Z & 1.0 \\ \hline Detation Hold & \\$	+Z Direction	@ 5V Vcc						
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Output - Source Current Limit B = -X, Vo = 0mA-1.0N/A1.0Electrical - Joystick Z-Axis 3 DetentSupply VoltageUnitsMinTypMaxOutput 1-2 Voltage, +Z, -ZVDC2.252.502.75O' Deflection@ 5V Vcc2.252.502.75Output 1+2 at Full TravelVDC4.254.504.55+Z Direction@ 5V Vcc0.450.500.75-Z Direction@ 5V Vcc0.750.750.75-Z Direction@ 5V Vcc0.750.750.75-Z Direction@ 5V Vcc0.750.750.75-Z Direction@ 5V Vcc0.760.750.75-Z Direction@ 5V Vcc0.760.750.75-Z DirectionImage: main or ma	Supply Current (per sensor)		N/A	N/A	10			
Identification Units Min Typ Max Supply Voltage VDC 4.5 5 5.5 Output 1+2 Voltage, +Z, -Z VDC 2.25 2.50 2.75 Obflection @ 5V Vcc 2.25 2.50 2.75 Output 1+2 at Full Travel VDC 4.25 4.50 4.55 ZDirection @ 5V Vcc 0.45 0.50 0.75 ZDirection @ 5V Vcc 0.45 0.50 0.75 ZDirection @ 5V Vcc 0.45 0.50 0.75 Supply current (per sensor) mA N/A N/A 10.0 B = 0, Vcc = 5V, 10 = 0 mA -1.0 N/A 1.0 Dutput - Source Current Limit mA -1.0 N/A 1.0 B = -X, Vo = 0 Degrees 18 20 22 Over Travel Angle Degrees 0.5 1.0 1.5 Max Allowable Radial Force (Styles 11, 12 & 21) @ GRP Max N/A N/A<	Output - Source Current Limit	mA	-1.0	N/A	1.0			
Supply Voltage VDC 4.5 5 5.5 Output 1+2 Voltage, +Z, -Z VDC 2.25 2.50 2.75 Obflection @ 5V Vcc 2.25 2.50 2.75 Output 1+2 at Full Travel VDC 4.25 4.50 4.55 Output 1+2 at Full Travel VDC 0.45 0.50 0.75 -Z Direction @ 5V Vcc 0.45 0.50 0.75 Supply current (per sensor) mA N/A N/A 10.0 B = 0, Vcc = 5V, 10 = 0 0 0 0 0 0 Joystick mA -1.0 N/A 1.0 8 -7.0 N/A 1.0 B = -X, Vo = 0 0 0 00 cycles in all directions 0 0 22 0 0 22 0 22 0 22 0 22 0 22 0 22 0 22 0 22 0 22 0 22 0 22 0	Electrical - Joystick Z-Axis 3 Det	ent						
Dutput 1+2 Voltage, +Z, -Z VDC 2.25 2.50 2.75 0° Deflection @ 5V Vcc 2.25 2.50 2.75 0° Deflection @ 5V Vcc 2.25 2.50 2.75 0° Deflection @ 5V Vcc 2.25 4.50 4.55 +Z Direction @ 5V Vcc 0.45 0.50 0.75 Output 1+2 at Full Travel VDC 0.45 0.50 0.75 -Z Direction @ 5V Vcc 0.45 0.50 0.75 Supply current (per sensor) mA N/A N/A 10.0 B = 0, Vcc = 5V, 10 = 0 mA -1.0 N/A 1.0 Joystick mA -1.0 N/A 1.0 Joystick Joystick Degrees 18 20 22 Over Travel Angle Degrees 0.5 1.0 1.5 Max Allowable Radial Force (Styles 11, 12 & 21) @ GRP Lbs. N/A N/A 15 Atlowable Radial Force (All Other Styles) @ GRP Units Min Typ					-			
0° Deflection @ 5V Vcc Output 1+2 at Full Travel +Z Direction VDC 4.25 4.50 4.55 -Z Direction @ 5V Vcc 0.45 0.50 0.75 -Z Direction @ 5V Vcc 0.45 0.50 0.75 -Z Direction @ 5V Vcc 0.45 0.50 0.75 -Z Direction MA N/A N/A 10.0 B = 0, Vcc = 5V, 10 = 0 mA N/A N/A 10.0 B = -X, Vo = 0 mA -1.0 N/A 1.0 Joystick mA -1.0 N/A 1.0 Joystick Joystick Degrees 18 20 22 Over Travel Angle Degrees 0.5 1.0 1.5 Max Allowable Radial Force (Styles 11, 12 & 21) @ GRP Lbs. N/A N/A 15 Max Allowable Radial Force (All Other Styles) @ GRP Lbs. N/A N/A 15 Z-Axis Min Typ Max 0 60 Operational Torque		-	-	-				
+Z Direction @ 5V Vcc Output 1+2 at Full Travel VDC 0.45 0.50 0.75 -Z Direction @ 5V Vcc 0.45 0.50 0.75 Supply current (per sensor) mA N/A N/A 10.0 B = 0, Vcc = 5V, 10 = 0 mA -1.0 N/A 1.0 Output - Source Current Limit mA -1.0 N/A 1.0 Joystick	0° Deflection	@ 5V Vcc	-		-			
Z Direction @ 5V Vcc Supply current (per sensor) B = 0, Vcc = 5V, 10 = 0 mA N/A N/A 10.0 B = 0, Vcc = 5V, 10 = 0 mA -1.0 N/A 1.0 Output - Source Current Limit B = -X, Vo = 0 mA -1.0 N/A 1.0 Joystick Mechanical Life: 5,000,000 cycles in all directions Units Min Typ Max Travel Angle Degrees 1.8 20 22 Over Travel Angle Degrees 0.5 1.0 1.5 Max Allowable Radial Force (Styles 11, 12 & 21) @ GRP Lbs. N/A N/A 50 Z-Axis Mechanical Life: 1,000,000 cycles in all directions Units Min Typ Max Z-Axis Min Typ Max Mechanical Life: 1,000,000 cycles in all directions Units Min Typ Max Operational Torque 0Z 10 20 30 with Detent 0Z <td>+Z Direction</td> <td>@ 5V Vcc</td> <td>-</td> <td></td> <td>4.00</td>	+Z Direction	@ 5V Vcc	-		4.00			
B = 0, Vcc = 5V, 1o = 0 Output - Source Current Limit mA -1.0 N/A 1.0 Joystick Max -1.0 N/A 1.0 Joystick Min Typ Max Travel Angle Degrees 18 20 22 Over Travel Angle Degrees 0.5 1.0 1.5 Max Allowable Radial Force (Styles 11, 12 & 21) @ GRP Lbs. N/A N/A 50 Z-Axis Min Typ Max 15 Mechanical Life: 1,000,000 cycles in all directions Max Allowable Radial Force (All Other Styles) @ GRP Min Typ Max Travel Angle (Total) Degrees 56 60 64 Operational Torque OZ 1.0 2.0 30 with Detent OZ 1.0 4.0 7.0	Output 1+2 at Full Travel -Z Direction		0.45	0.50	0.75			
B = -X, Vo = 0 Joystick Mechanical Life: 5,000,000 cycles in all directions Units Min Typ Max Travel Angle Degrees 18 20 22 Over Travel Angle Degrees 0.5 1.0 1.5 Max Allowable Radial Force (Styles 11, 12 & 21) @ GRP Lbs. N/A N/A 50 Max Allowable Radial Force (All Other Styles) @ GRP Lbs. N/A N/A 15 Z-Axis Mechanical Life: 1,000,000 cycles in all directions Units Min Typ Max Operational Torque 0Z 10 20 30 With Detent 0Z 1.0 4.0 7.0 Operational Torque 0Z 1.0 4.0 7.0	B = 0, Vcc = 5V, 1o = 0	mA	N/A					
Mechanical Life: 5,000,000 cycles in all directions Units Min Typ Max Travel Angle Degrees 18 20 22 Over Travel Angle Degrees 0.5 1.0 1.5 Max Allowable Radial Force (Styles 11, 12 & 21) @ GRP Lbs. N/A N/A 50 Max Allowable Radial Force (All Other Styles) @ GRP Lbs. N/A N/A 15 Z-Axis Mechanical Life: 1,000,000 cycles in all directions Units Min Typ Max Operational Torque OZ 10 20 30 Operational Torque OZ 1.0 4.0 7.0 With Friction Hold OZ 8.0 16 24		mA	-1.0	N/A	1.0			
UnitsMinTypMaxTravel AngleDegrees182022Over Travel AngleDegrees0.51.01.5Max Allowable Radial ForceLbs.N/AN/A50(Styles 11, 12 & 21) @ GRPLbs.N/AN/A15Max Allowable Radial ForceLbs.N/AN/A15(All Other Styles) @ GRPLbs.N/AN/A15Z-AxisMechanical Life:1,000,000 cycles in all directionsUnitsMinTypMaxTravel Angle (Total)Degrees566064Operational Torque0Z102030with DetentOZ1.04.07.0Operational Torque0Z8.01624	Joystick							
Travel Angle Degrees 18 20 22 Over Travel Angle Degrees 0.5 1.0 1.5 Max Allowable Radial Force (Styles 11, 12 & 21) @ GRP Lbs. N/A N/A 50 Max Allowable Radial Force (All Other Styles) @ GRP Lbs. N/A N/A 15 Z-Axis Mechanical Life: 1,000,000 cycles in all directions Vortis Max Travel Angle (Total) Degrees 56 60 64 Operational Torque 0Z 10 20 30 with Detent 0Z 1.0 4.0 7.0 Operational Torque 0Z 8.0 16 24	Mechanical Life:	5,000,000 c	ycles in all	directions				
Over Travel Angle Degrees 0.5 1.0 1.5 Max Allowable Radial Force (Styles 11, 12 & 21) @ GRP Lbs. N/A N/A 50 Max Allowable Radial Force (All Other Styles) @ GRP Lbs. N/A N/A 15 Z-Axis Mechanical Life: 1,000,000 cycles in all directions Units Min Typ Max Operational Torque 0Z 10 20 30 with Detent 0Z 1.0 4.0 7.0 Operational Torque 0Z 8.0 16 24				••	-			
Max Allowable Radial Force (Styles 11, 12 & 21) @ GRP Lbs. N/A N/A 50 Max Allowable Radial Force (All Other Styles) @ GRP Lbs. N/A N/A 15 Z-Axis Mechanical Life: 1,000,000 cycles in all directions Units Min Typ Max Travel Angle (Total) Degrees 56 60 64 Operational Torque OZ 10 20 30 with Detent OZ 1.0 4.0 7.0 Operational Torque OZ 8.0 16 24			-					
Max Allowable Radial Force (All Other Styles) @ GRP Lbs. N/A N/A 15 Z-Axis Mechanical Life: 1,000,000 cycles in all directions Units Min Typ Max Travel Angle (Total) Degrees 56 60 64 Operational Torque 0Z 10 20 30 with Detent OZ 1.0 4.0 7.0 Operational Torque 0Z 8.0 16 24	Max Allowable Radial Force	Ũ						
Z-Axis Mechanical Life: 1,000,000 cycles in all directions Units Min Typ Max Travel Angle (Total) Degrees 56 60 64 Operational Torque 0Z 10 20 30 With Detent 0Z 1.0 4.0 7.0 Operational Torque 0Z 8.0 16 24	Max Allowable Radial Force	Lbs.	N/A	N/A	15			
UnitsMinTypMaxTravel Angle (Total)Degrees566064Operational TorqueOZ102030with DetentOZ1.04.07.0Operational TorqueOZ8.01624								
Travel Angle (Total)Degrees566064Operational Torque with Detent0Z102030Operational Torque with Friction Hold0Z1.04.07.0Operational Torque0Z8.01624	Mechanical Life:				Max			
with Detent OZ 1.0 4.0 7.0 With Friction Hold OZ 8.0 16 24	-	Degrees			64			
with Friction Hold Operational Torque OZ 8.0 16 24		0Z	10	20	30			
		OZ	1.0	4.0	7.0			
		0Z	8.0	16	24			

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MINIATURE Z-AXIS HALL EFFECT JOYSTICK



- 32. Z-Axis with Detent, Single Output
- 42. Z-Axis with Friction Hold, Single Output
- 52. Z-Axis Return to Center, Single Output
- 62. Z-Axis with Detent, Dual Output
- 72. Z-Axis with Friction Hold, Dual Output
- 82. Z-Axis Return to Center, Dual Output
- 92. Z-Axis with Detent, Single Output wtih Two Pushbuttons
- A2. Z-Axis with Friction, Single Output with Two Pushbuttons
- B2. Z-Axis Return to Center, Single Output with Two Pushbuttons
- C2. Z-Axis with Detent, Dual Output with Two Pushbuttons
- D2. Z-Axis with Friction, Dual Output with Two Pushbuttons
- E2. Z-Axis Return to Center, Dual Output with Two Pushbuttons

*Gated = Restricted movement in XY axis only. Gating Icons shown on page 89 in the JHT mini joystick section.

1. Gated; Single axis –

Return to Center

2. Gated: Two axis -

Return to Center

3. Omni-directional;

4. Omni-directional;

5. Omni-directional;

Feel

Round Smooth Feel

Round On-Axis and

Off-Axis Guided Feel

Round On-Axis Guided

1.1 lb

**Z-Axis and Pushbuttons are not part of the SPI message.

NOTES (Applies to Joystick Output Only):

• Outputs are from the center to the full travel position in each direction.

• Options "AA", "BB", "CC", "DD", "EE" and "FF" provide increased voltage in +X, +Y; and decreasing voltage in -X, -Y direction from one 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.

1.24 AWG

Wire Leads

NONE

NONE

2.5 +/- 2.0VDC

2.5 -/+ 2.0VDC

2.5 +/- 1.5VDC

2.5 -/+ 1.5VDC

0.5 - 4.5VDC

1.0 - 4.0VDC

NONE

NONE

AA. 2.5 +/- 2.0VDC

BB. 2.5 +/- 2.0VDC

CC. 2.5 +/- 2.0VDC

DD. 2.5 +/- 1.5VDC

EE. 2.5 +/- 1.5VDC

FF. 2.5 +/- 1.5VDC

GG. 0.5 - 4.5VDC

HH. 1.0 - 4.0VDC

JJ. SPI, 3.3V Supply**

KK. SPI, 5V Supply**

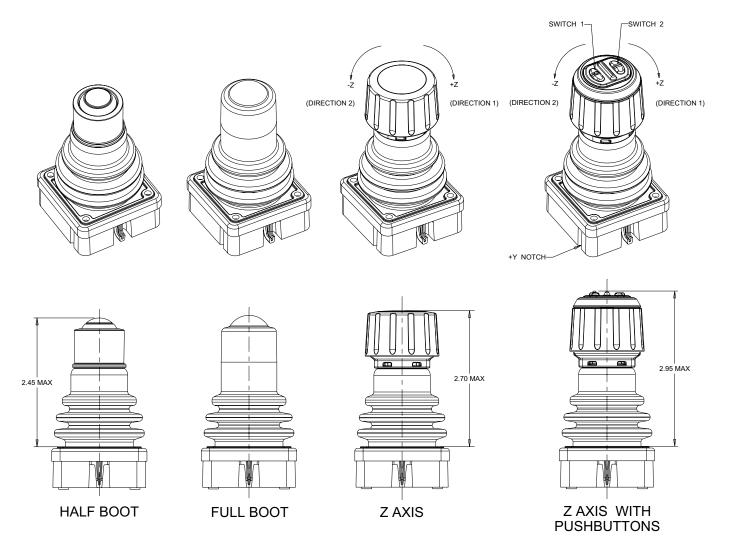
HALL EFFECT



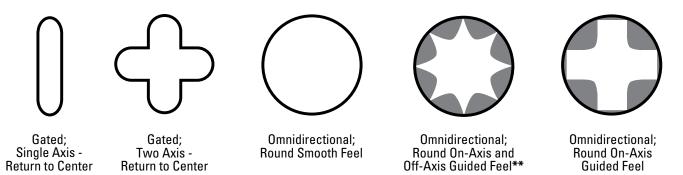
MINIATURE HALL EFFECT JOYSTICK

COMPACT DESIGN

JHT Switch/Style Boot Configuration



JHT and JHT Z-Axis Icons Demonstrating Feel*



*Feel defined by shading. **Full output available in all directions. Contact factory for details.

MINIATURE HALL EFFECT JOYSTICK



MINIATURE Z-AXIS HALL EFFECT JOYSTICK

COMPACT DESIGN

Joystick Output Configuration

