

- **Designed primarily for Aerial Work Platforms**
- **Single- or dual-axis**
- **Ergonomic grip**
- **Top switch and person-present lever options**
- **Hall-effect sensor technology**
- **Choice of voltage outputs**
- **Dual outputs on each axis**
- **Center-reference signal**
- **Rated for 6 million cycles**
- **Under- or above-panel mounting**
- **Enclosure sealing to IP67**
- **EMC performance to 100V/m**
- **Integrated Connector or Flying-Lead termination**



The JC4000 joystick base and accompanying range of grips have been designed for use in Aerial Work Platform (AWP) applications, with options for single- or dual-axis operation making the product suitable for both scissor lifts and booms. Three, dual-axis gates are available – round, square or plus – while the ergonomically-designed grip offers the choice of one or two top switches, as well as a person-present lever, meaning the unit can be used across a wide variety of machines. These carefully chosen configuration options offer an optimal combination of performance and cost.

Non-contacting, Hall-effect sensing technology ensures smooth operation and a long life – in excess of 6 million operating cycles – while dual electrical outputs on each axis, plus a center-reference signal, enhance overall system safety. The range of the

electrical outputs can be set to either 10-90% or 20-80% of a 5V regulated supply, with the polarity of each adjustable to suit the host electronics.

The joystick can be fitted to an enclosure in both under-panel and above-panel configurations, and provides sealing of the enclosure to IP67. In addition to a robust mechanical design that is resilient to high shaft load, shock and vibration, the operational integrity of the unit is assured in electrical fields of up to 100V/m.

The joystick is also available either with an integrated connector or with 300mm long flying leads

Alternative grip options to those described above are available.



CONTENTS

Contents **2**

Configuration & Ordering Codes **3**

 Mounting 3

 Axes 3

 Output 3

 Output Sense 4

 Spring..... 4

 Gate 5

 Seat 5

 Grip 5

 Termination 5

Installation..... **6**

 Mechanical 6

 Dimensions – Above Panel Mounting 6

 Dimensions – Below Panel Mounting..... 7

 Panel Cut-out and fixing details 8

 Dimensions – NH0 and NHF grip option 9

 Dimensions – B00 grip option 10

 Dimensions – HG grip option 10

Specifications **13**

 Electrical - Joystick..... 13

 Electrical - GRIP SWITCHES 13

 Mechanical - Joystick 14

 EMC and Magnetic field 14

 Environmental 15

© 2018 Curtiss-Wright. All rights reserved.

Curtiss-Wright accepts no responsibility for possible errors in catalogs, brochures and other printed material. Curtiss-Wright reserves the right to alter its products without prior notice. This also applies to products already ordered provided that such alterations can be made without affecting agreed specifications. All trademarks in this material are properties of their respective owners.



CONFIGURATION & ORDERING CODES

JC4000-X-XX-X-XX-X-X-X-XX-X

Type	Mounting	Axes	Output	Output Sense	Spring	Gate	Seat	Grip	Termination
JC4000	X	XX	X	XX	X	X	X	XX	X
	T	XY	M	PN	M	S	A	NH0	A
	M	NY	L	PP		R		B00	B
						P		HG1	
						N		HG2	
								HG3	
								HG4	
								HG5	

MOUNTING

JC4000-~~X~~-XX-X-XX-X-X-X-XX-X

Code	Description
T	Above panel
M	Below panel

AXES

JC4000-X-~~XX~~-X-XX-X-X-X-XX-X

Code	Description
XY	Dual axis
NY	Single axis – forward and reverse

OUTPUT

JC4000-X-XX-~~X~~-XX-X-X-X-XX-X

Code	Description
M	10-90% of 5V supply (0.5-4.5V nominal)
L	20-80% of 5V supply (0.1-4.0V nominal)

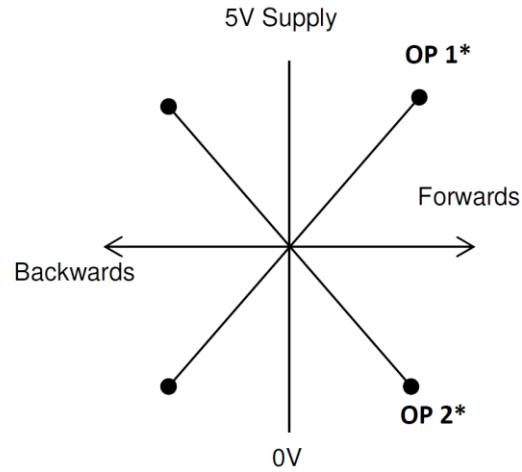


OUTPUT SENSE

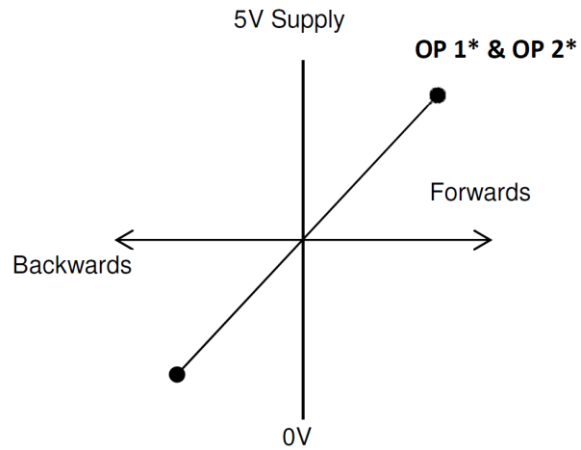
JC4000-X-XX-X-~~XX~~-X-X-XX-X

Code	Description
PN	Output 1: Positive slope Output 2: Negative slope
PP	Output 1: Positive slope Output 2: Positive slope

PN



PP



* 10-90% or 20-80% of 5V supply

SPRING

JC4000-X-XX-X-XX-~~X~~-X-X-XX-X

Code	Description
M	Medium - standard

Note:

At this time, there is only a single spring option for the JC4000 joystick



GATE

JC4000-X-XX-X-XX-X-X-X-XX-X

Code	Description
S	Square
R	Round
P	Plus
N	Single axis

SEAT

JC4000-X-XX-X-XX-X-X-X-XX-X

Code	Description
A	Fitted with a biased seat to provide additional force when the operator moves the joystick towards the corners

Note:

The biased seat is fitted to all joysticks but its function can only be felt in Square and Round gate joysticks. The biased seat enables the operating rod to move more easily along the X and Y axes of the joystick but it does not prevent movement into the corner positions.

GRIP

JC4000-X-XX-X-XX-X-X-X-XX-X

Code	Grip Type	Grip Function
NH0	NH	No grip
NHF	NH	No grip, Flying leads to enable customer to fit their own grip
B00	Ball	Plain ball – no electrical functions
HG0	HG	Full grip – no electrical functions
HG1	HG	Full grip – with a single top switch
HG2	HG	Full grip – with two top switches
HG3	HG	Full grip – with two top switches and an operator present switch
HG4	HG	Full grip – with one top switch and an operator present switch
HG5	HG	Full grip – with an operator present switch

TERMINATION

JC4000-X-XX-X-XX-X-X-X-XX-X

Code	Description
A	Integrated MOLEX 12-way connector 53047-1210
B	22 AWG PTFE insulated 19/0.15 wires, 300 mm long

Note:

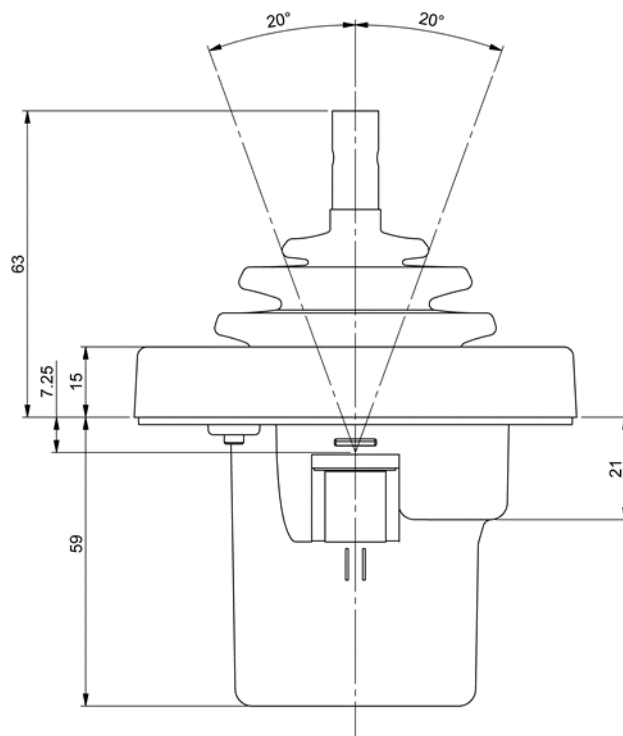
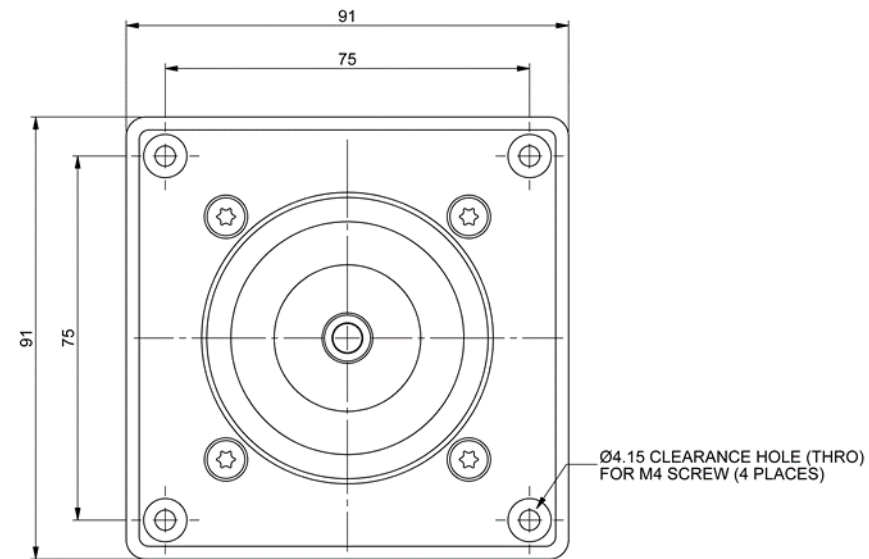
The connector and cable exit are mounted at the front face (Y+) of the joystick.



INSTALLATION

MECHANICAL

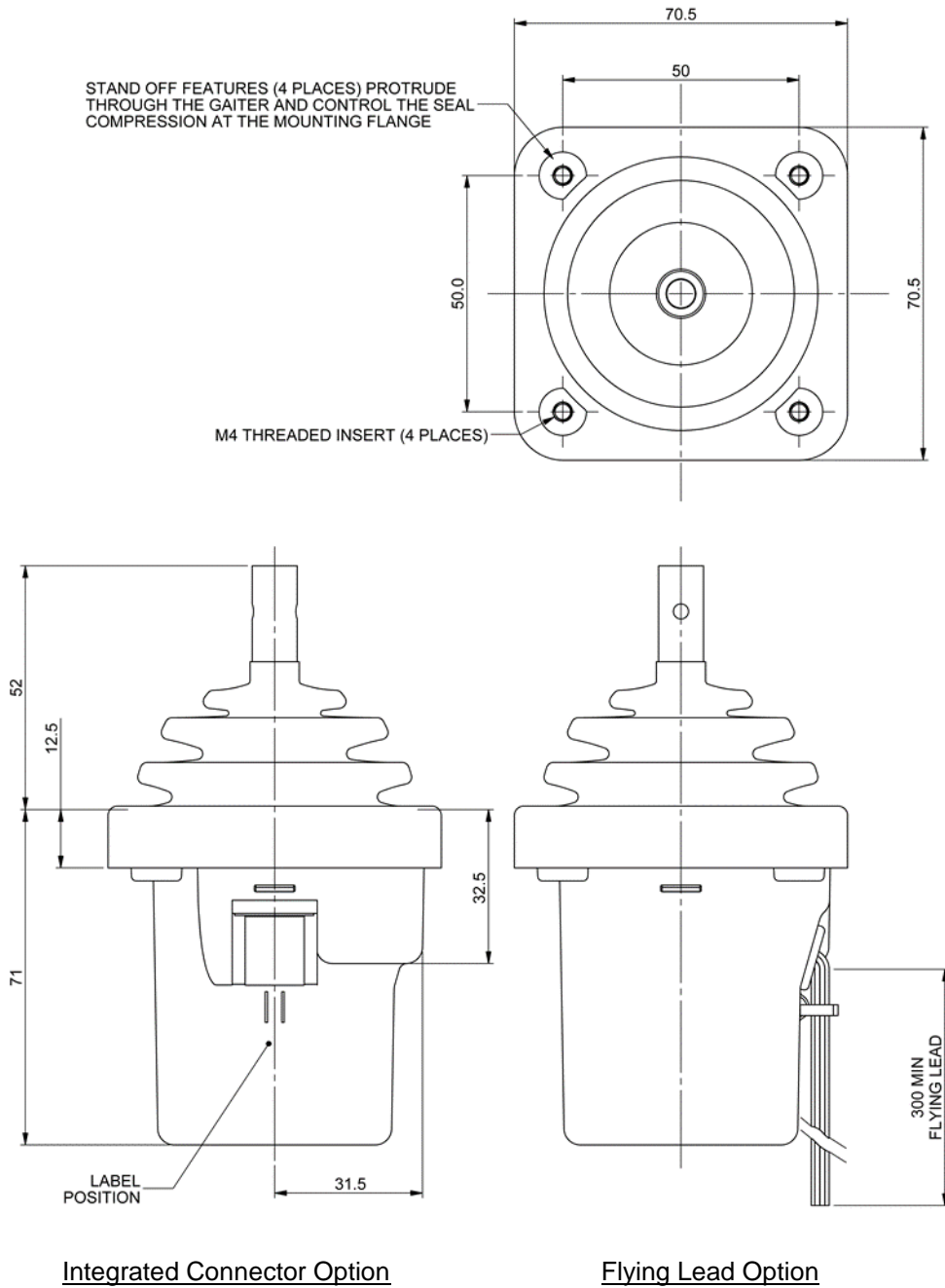
Dimensions – Above Panel Mounting



Note: The connector is positioned in the forward +Y position



Dimensions – Below Panel Mounting



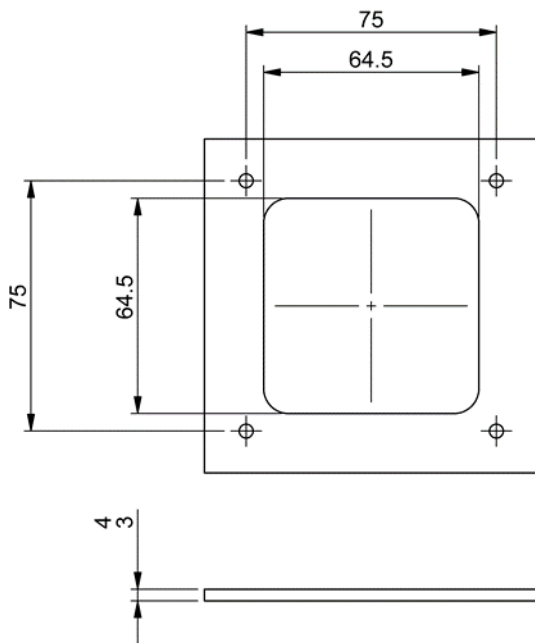
Note: The cable exit is positioned in the forward +Y position



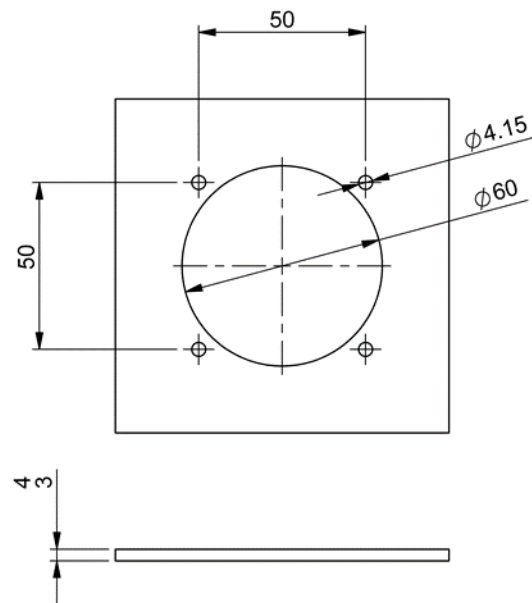
Panel Cut-out and fixing details

PANEL CUT-OUT DETAILS – BELOW-PANEL MOUNT	64.5 mm square profile with 7.5mm maximum radius in each corner and 4 additional holes for the mounting screws
PANEL CUT-OUT DETAILS – ABOVE-PANEL MOUNT	60 mm diameter hole with 4 additional holes for the mounting screws
RECOMMENDED PANEL THICKNESS	3 to 4 mm
FIXING HARDWARE	M4 screws – it is recommended that self-locking nuts are used when using the above pane mounting The below panel mounting has integrated M4 Brass inserts
RECOMMENDED SCREW TIGHTENING TORQUE TO ACHIEVE OPTIMUM PANEL SEAL PERFORMANCE	1.5 Nm

Above Panel Mounting Detail



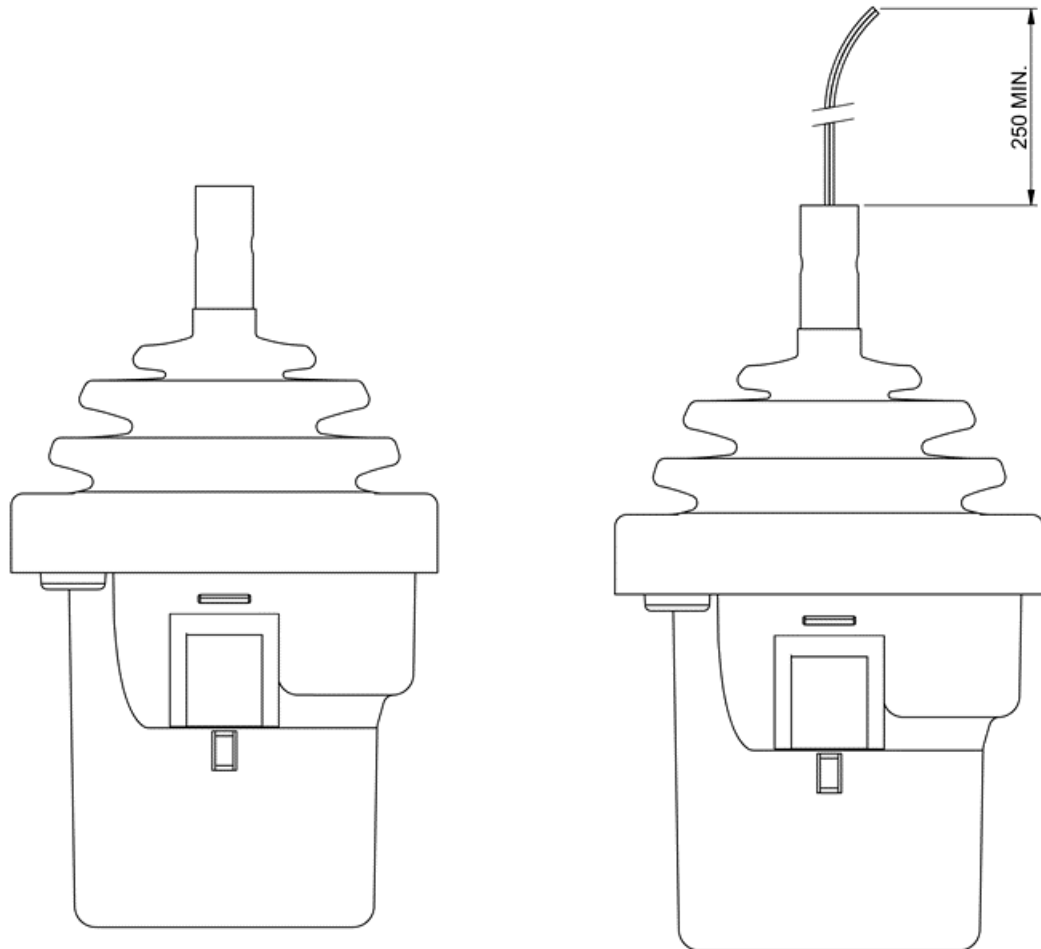
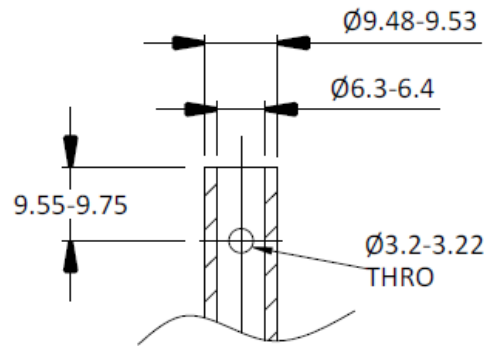
Below Panel Mounting Detail





Dimensions – NH0 and NHF grip option

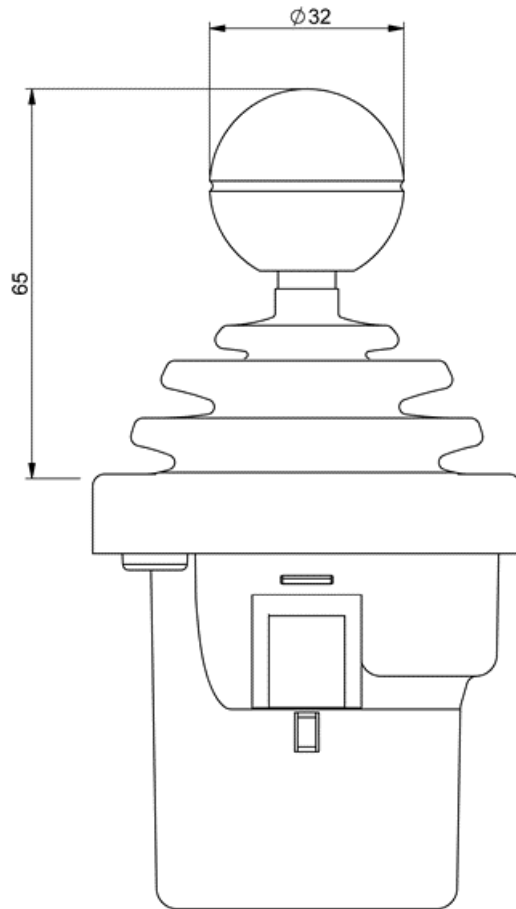
Operating rod details for customer fitted grips



Note: The connector is positioned in the forward +Y position



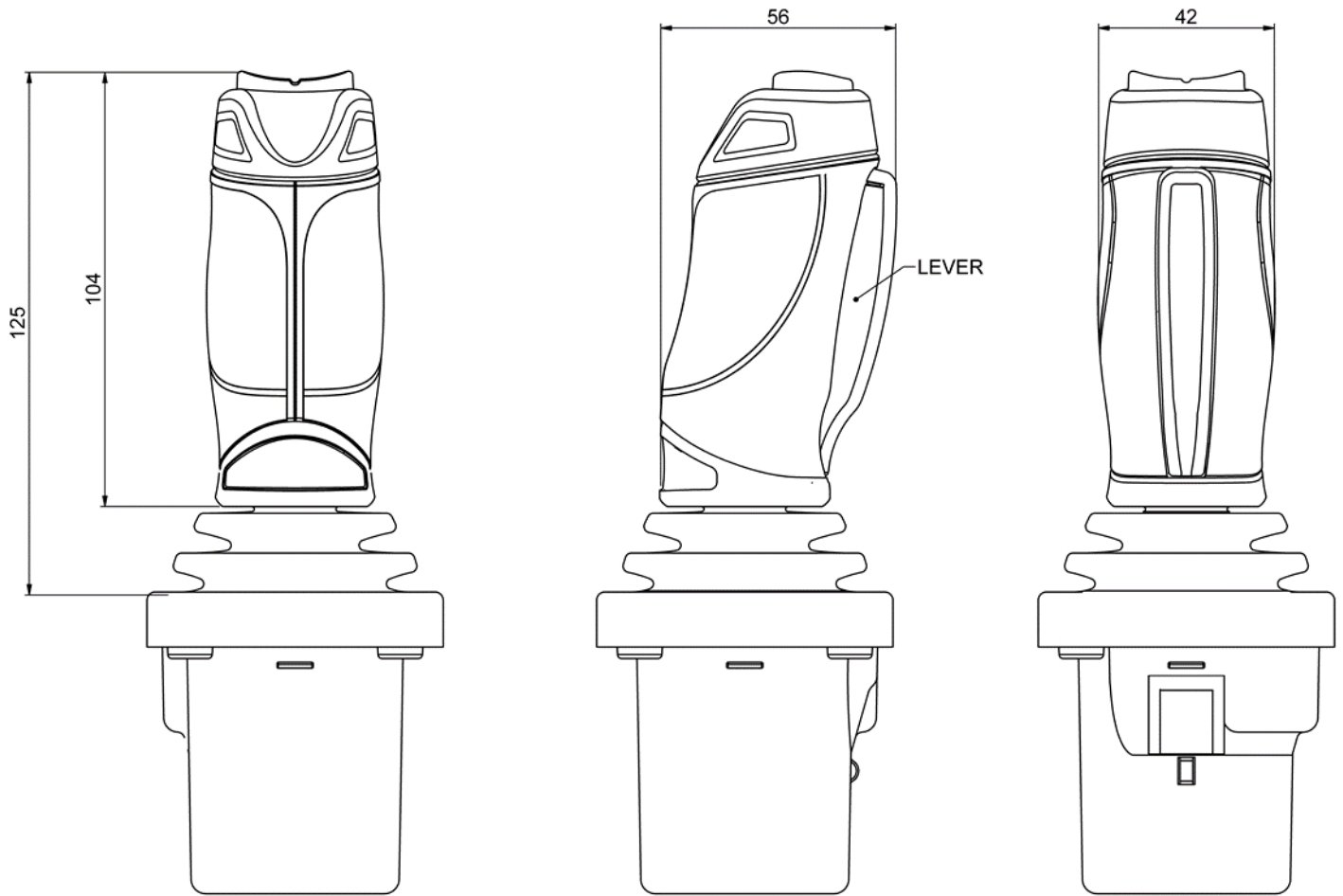
Dimensions – B00 grip option



Note: The connector is positioned in the forward +Y position



Dimensions – HG grip option



Note: The connector is positioned in the forward +Y position

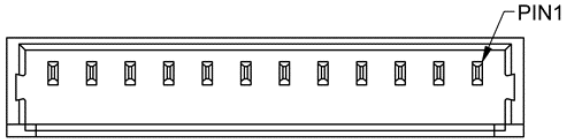


Electrical Connections

Termination: CODE A

Molex 12-way 53047-1210 with gold-plated pins

Recommended mating Molex connector:
Housing – 510211200
Crimp pins - 500798000



Note: the mating connector must be fitted with gold-plated pins to ensure stable output from the joystick

Pin	Function	
1	NHF = Blue wire	HG grip = Top switch left or single
2	NHF = Green wire	HG grip = Top switch right
3	NHF = Yellow Wire	HG grip = Lever switch
4	NHF = Black Wire	HG grip = Common for all grip switches
5	Not connected	
6	Y-axis Output 2	
7	Center Reference Voltage	
8	X-axis Output 2	
9	X-axis Output 1	
10	0V supply	
11	Y-axis Output 1	
12	5V supply	

Termination: CODE B

22 AWG PTFE insulated 19/0.15 wires, 300 mm long

Wire Color	Function	
Blue	NHF = Blue wire	HG grip = Top switch left or single
Green	NHF = Green wire	HG grip = Top switch right
Yellow	NHF = Yellow Wire	HG grip = Lever switch
Black	NHF = Black Wire	HG grip = Common for all grip switches
Orange	Y-axis Output 2	
White	Center Reference Voltage	
Purple	X-axis Output 2	
Brown	X-axis Output 1	
Grey	0V supply	
Pink	Y-axis Output 1	
Red	5V supply	



SPECIFICATIONS

ELECTRICAL - JOYSTICK

SUPPLY VOLTAGE	5Vdc \pm 0.5Vdc
OUTPUT VOLTAGE (FACTORY SET)	Two outputs of 10% to 90%, or 20 to 80% of the Supply Voltage per axis
CENTERING ACCURACY	50% \pm 2.5% of supply voltage (as supplied)
END ACCURACY	+2% to -3% at the high end of the output span i.e. 80% and 90% +3% to -2% at the low end of the output span i.e. 20% and 10%
LINEARITY ACCURACY	\pm 2.8%
MATCHING ACCURACY OF DUAL OUTPUTS	\pm 4%
OUTPUT IMPEDANCE	100 Ω (nominal)
OUTPUT SENSE	The dual outputs can be configured to have positive ramps, negative ramps, or a combination of Positive and Negative ramps
CENTER REFERENCE OUTPUT	50% \pm 0.7% of the supply voltage
CENTER REFERENCE OUTPUT IMPEDANCE	1100 Ω
POWER-ON SETTLEMENT TIME	Up to 15ms
SUPPLY REVERSE POLARITY PROTECTION	-10Vdc (continuous)
CURRENT CONSUMPTION	< 30mA
INSULATION RESISTANCE @ 10VDC	>10M Ω

ELECTRICAL - GRIP SWITCHES

CONTACT RATING	100mA, 42V dc/ac maximum (0.01mA, 0.02V DC/AC minimum)
SWITCHING POWER	1W maximum
CONTACT RESISTANCE	100 m Ω maximum
INSULATION RESISTANCE	1,000 M Ω
DIELECTRIC STRENGTH	150V ac (50Hz)
MECHANICAL LIFE	1,000,000 cycles
OPERATING FORCE	3.6N \pm 0.7N
CONTACT BOUNCE	5ms Maximum

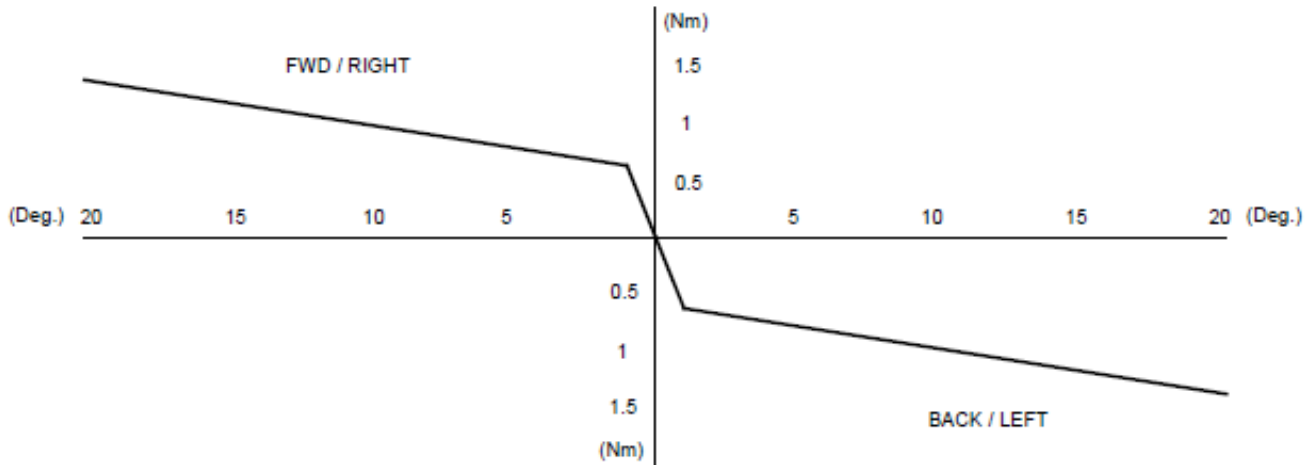
Note: The HG grip has a “Flow in, Flow out” design and the internal components are sealed to meet IP66 and IP67



MECHANICAL - JOYSTICK

BREAKOUT FORCE	0.7 Nm (nominal)	
OPERATING FORCE AT END OF TRAVEL	1.35 Nm (nominal)	
MAXIMUM STATIC HORIZONTAL LOAD	50 Nm	
MAXIMUM STATIC VERTICAL LOAD	1,100 N	
MAXIMUM STATIC ROTATIONAL LOAD	6 Nm	
MAXIMUM HORIZONTAL IMPACT LOAD	5J (on operating rod)	
MAXIMUM VERTICAL IMPACT LOAD	15J (on operating rod)	
MECHANICAL ANGLE	±20° in X- or Y-axes	
Mechanical LIFE	6 million cycles	One cycle is defined as moving from center to the end of travel, returning past the center to the other extreme and back to center
WEIGHT	220 g without a grip 245 g with ball handle 310 g with full grip	

Note: Typical operating force profile shown below:



EMC AND MAGNETIC FIELD

EMC IMMUNITY LEVEL	ISO 11452-2 (ALSE)	100V/m, 400MHz – 1GHz and Horizontal at Level 4 of standard
EMC EMISSIONS LEVEL	EN 61000-6-4: 2011 Clause 11, Table 1; 1.1, 1.4	Tested to Emission standard group 1, Class A (40dB, 47dB)
ESD IMMUNITY LEVEL	EN 61000-4-2, Level 2: 1995 Clause 8, Table 1; 1.5 EN61000-4-2: 2009	8kV contact (excluding connector pins or wires); 15kV air discharge
CONDUCTED DISTURBANCE IMMUNITY	ISO 11452-4 (BCI)	80MHz – 400MHz at 150mm, 450mm and 750mm Clamp Distances at Level 4 of standard (100mA)
POWER FIELD IMMUNITY	EN 61000-4-8: 2010	50Hz & 60 Hz X, Y and Z position at level of standard (30A/m)



ENVIRONMENTAL

OPERATING TEMPERATURE	-40°C to 80°C	Temperature cycle per EN 60068-2-14: 1999
STORAGE TEMPERATURE	-40°C to 80°C	Cold test to EN 60068-2-1: 1993 Dry heat to EN 60068-2-2: 1993
TEMPERATURE & HUMIDITY	BS EN 60068-2-38: 2009	Pt 2.1 Z/AD; 65°C for 10 cycles
WATER AND DUST INGRESS	IP66 and IP67 above panel where a grip is fitted IP20 below panel, including connector and flying lead option	Panel sealing performance is dependent on the stiffness and surface condition of the panel i.e. free of scratches. It is the responsibility of the customer to define the panel material and thickness to achieve the seal rating The electronics below the panel are protected such that the joystick will continue to function with a sufficient drying out Period after immersion
SALT MIST	EN 60068-2-52: 1996	Severity 2
VIBRATION (SINUSOIDAL)	EN 60068-2-6: 2008	3gn, 10-200Hz, 1 hour per axis
VIBRATION (RANDOM)	EN 60068-2-64: 2008	3.6gn, 10-200Hz, 2 hours per axis
BUMP	EN 60068-2-27: 2008	40gn, ½ sine 6ms, 1,350 bumps in each of 6 directions
SHOCK	EN 60068-2-27: 2008	25g, 10ms, 500 shocks in each of 6 directions

IMPORTANT INFORMATION

Whilst Curtiss-Wright Industrial Group - Penny & Giles has designed this joystick to meet a range of applications it is the responsibility of the customer to ensure it meets their specific requirement.

Penny & Giles Controls Ltd makes no warranty or representation in respect of product fitness or suitability for any particular design application, environment, or otherwise, except as may subsequently be agreed in contract for the sale and purchase of products. Customers should therefore satisfy themselves of the actual performance requirements and subsequently the product's suitability for any particular design application and the environment in which the product is to be used.

Continual research and development may require change to products and specification without prior notification.

All trademarks acknowledged.