

- **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**

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.

Alternative grip options to those described above are available.



## CONTENTS

<b>Configuration &amp; Ordering Codes .....</b>	<b>3</b>
Mounting .....	3
Axes .....	3
Output .....	3
Output Sense .....	4
Gate .....	5
Grip .....	5
<b>Installation .....</b>	<b>6</b>
Mechanical.....	6
Dimensions – Above Panel Mounting.....	6
Dimensions – Below Panel Mounting .....	7
Panel Cut-out and fixing details.....	7
Dimensions – NH0 and NHF grip option .....	8
Dimensions – B00 grip option .....	9
Dimensions – HG grip option.....	10
Electrical Connections .....	11
<b>Specifications .....</b>	<b>12</b>
Electrical - Joystick .....	12
Electrical - GRIP SWITCHES .....	12
Mechanical - Joystick.....	12
EMC and Magnetic field.....	13
Environmental.....	13

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## CONFIGURATION & ORDERING CODES

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

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

### MOUNTING

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

Code	Description
T	Above panel
M	Below panel

### AXES

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

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

### OUTPUT

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

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

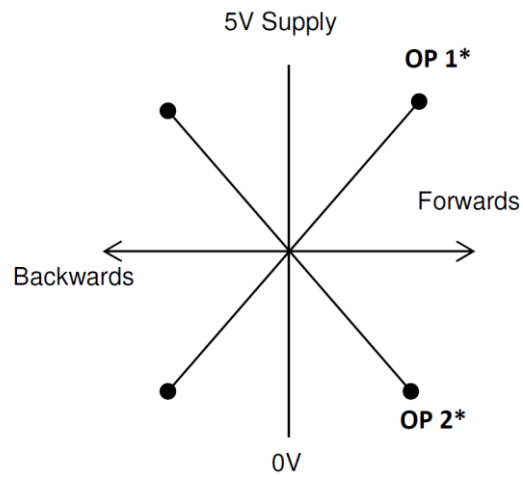


### OUTPUT SENSE

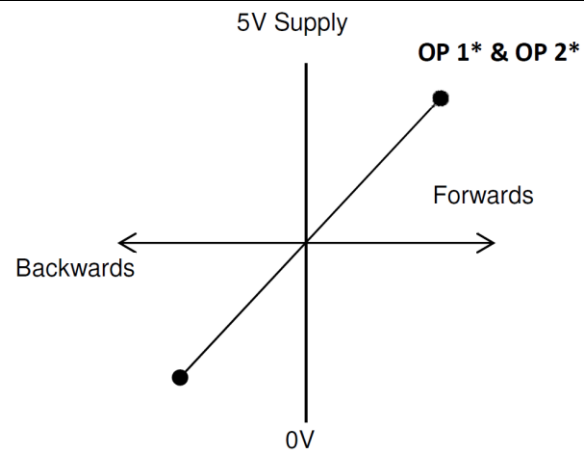
JC4000-GEN-X-XX-X-XX-X-XX

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

**GATE**JC4000-GEN-X-XX-X-XX-X-XX

<b>Code</b>	<b>Description</b>
S	Square
R	Round
P	Plus
N	Single axis

**Note:**

The Square and Round gate options are fitted with a biased seat as standard. 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-GEN-X-XX-X-XX-X-XX

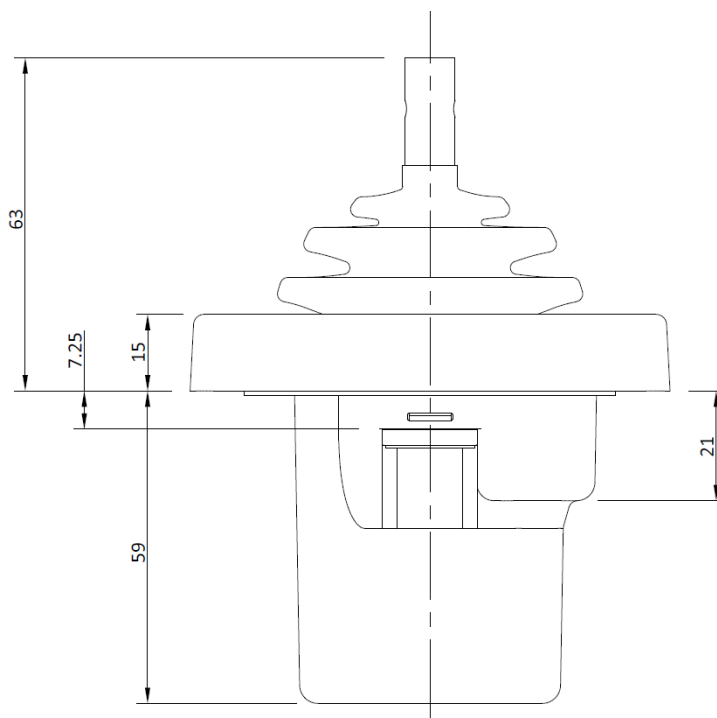
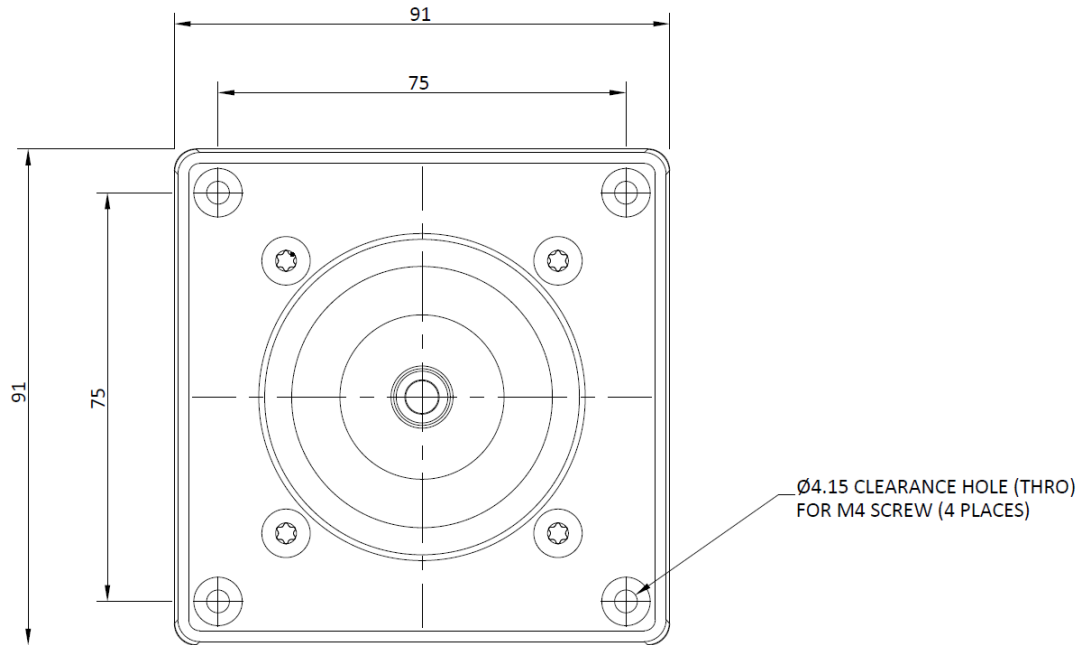
<b>Code</b>	<b>Grip Type</b>	<b>Grip Function</b>
NH0	NH	No grip
NHF	NH	No grip, Flying leads to enable customer to fit their own grip
B00	Ball	Plain ball – no electrical functions
HG0	HG	Full grip – no electrical functions
HG1	HG	Full grip – with a single top switch
HG2	HG	Full grip – with two top switches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



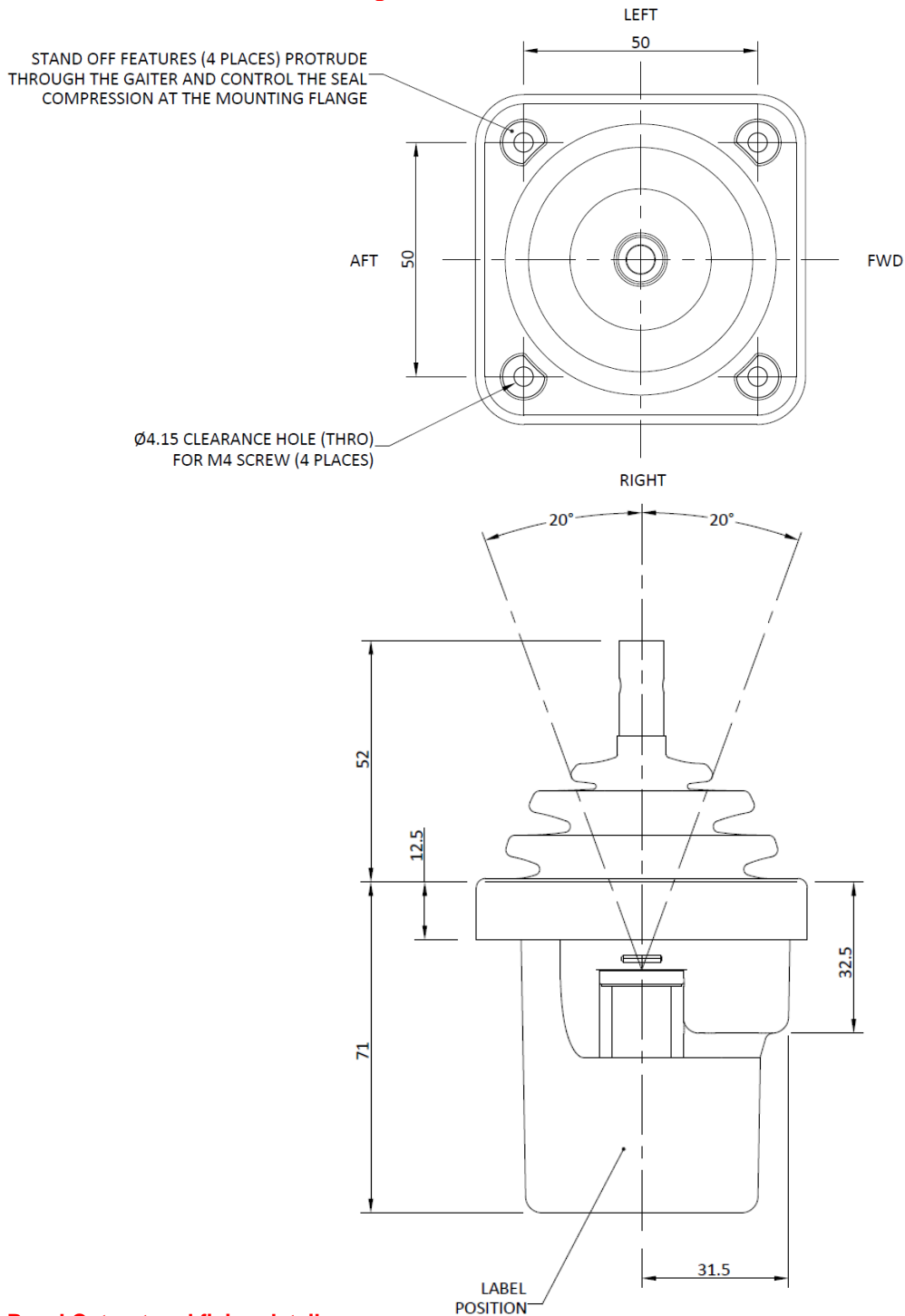
## INSTALLATION

### MECHANICAL

#### Dimensions – Above Panel Mounting



**Dimensions – Below Panel Mounting**



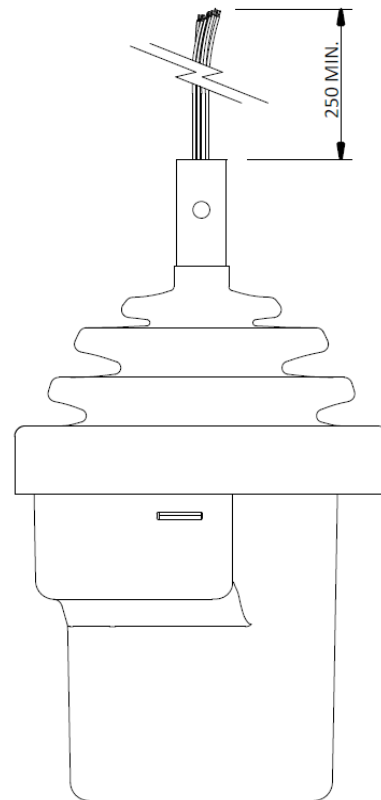
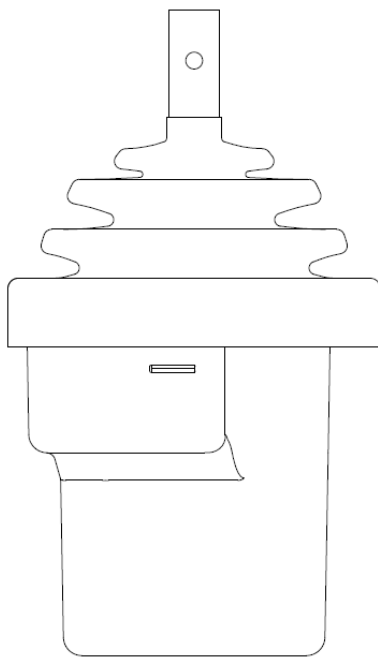
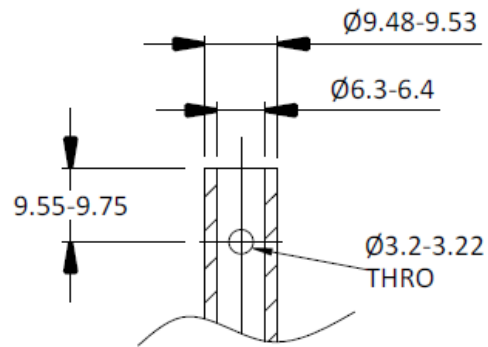
**Panel Cut-out and fixing details**

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
RECOMMENDED SCREW TIGHTENING TORQUE TO ACHIEVE OPTIMUM PANEL SEAL PERFORMANCE	1.5 Nm



**Dimensions – NH0 and NHF grip option**

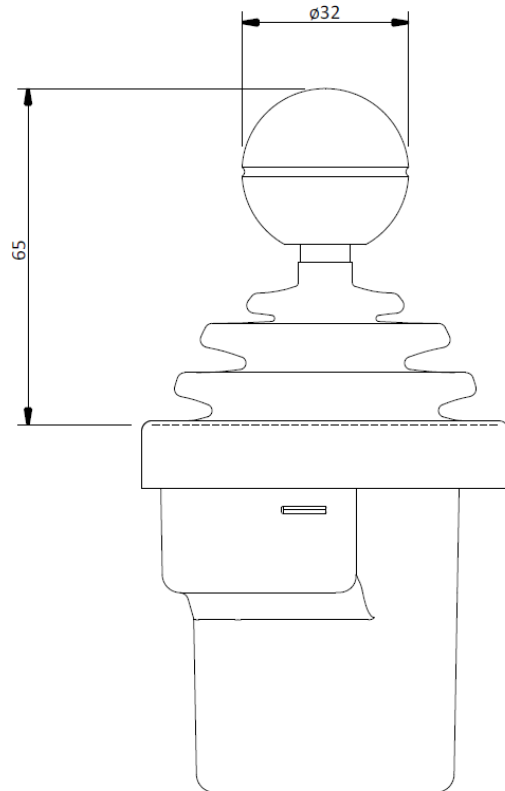
Operating rod details for customer fitted grips





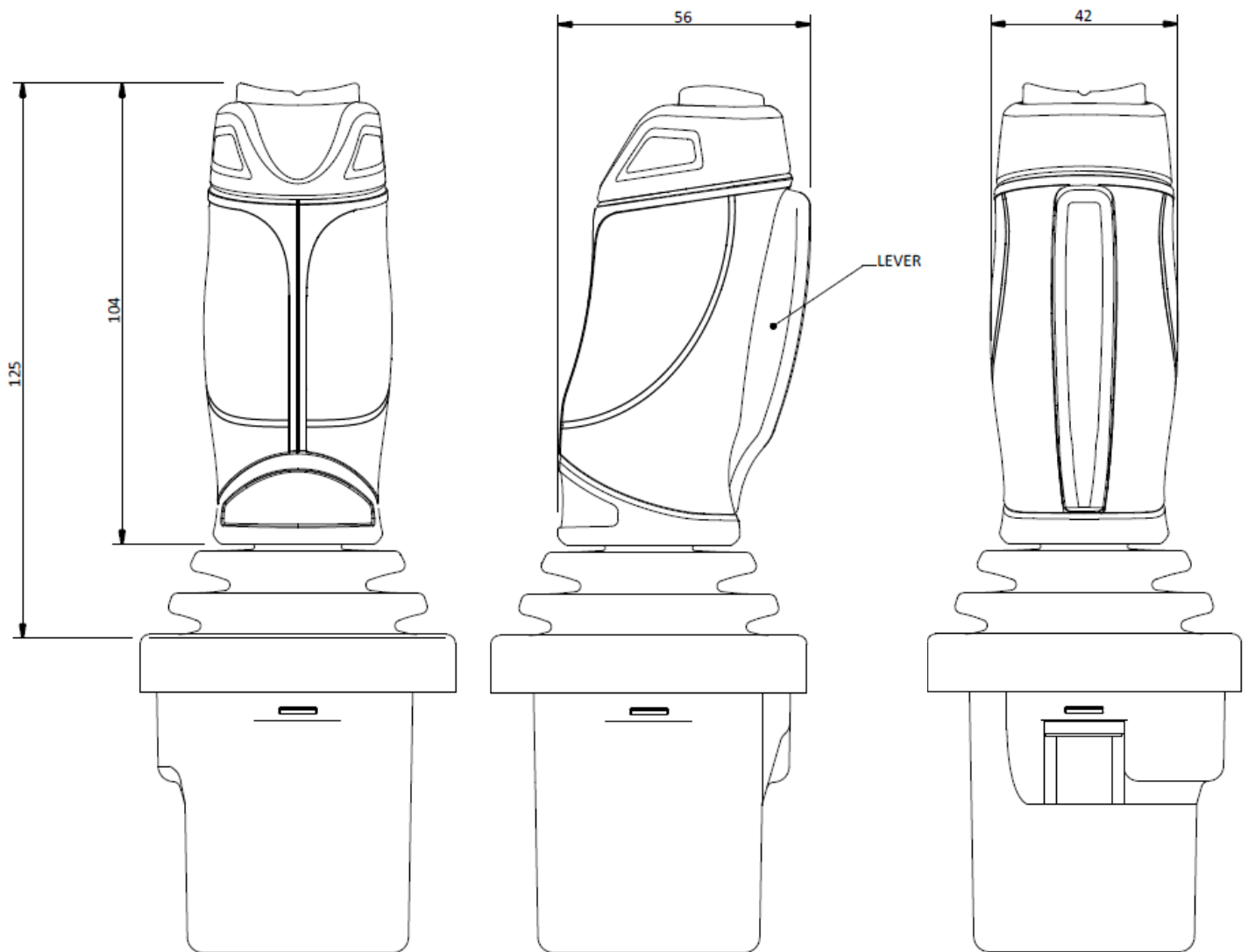


Dimensions – B00 grip option





Dimensions – HG grip option





## ELECTRICAL CONNECTIONS



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

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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	

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## 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 $\Omega$ (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 $\Omega$
POWER-ON SETTLEMENT TIME	Up to 15ms
SUPPLY REVERSE POLARITY PROTECTION	-10Vdc (continuous)
CURRENT CONSUMPTION	< 30mA
INSULATION RESISTANCE @ 10VDC	>10M $\Omega$

### 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 $\Omega$ maximum
INSULATION RESISTANCE	1,000 M $\Omega$
DIELECTRIC STRENGTH	150V ac (50Hz)
MECHANICAL LIFE	1,000,000 cycles
OPERATING FORCE	3.6N $\pm$ 0.7N
CONTACT BOUNCE	5ms Maximum

**Note:** The 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	$\pm$ 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	245 g with ball handle and 310 g with full grip	



**EMC AND MAGNETIC FIELD**

EMC IMMUNITY LEVEL	EN 61000-4-3: 2002	100V/m, 80% AM peak modulation, 80MHz-1GHz and 1.4-2.1GHz
EMC EMISSIONS LEVEL	EN 61000-6-4: 2011	30MHz to 1GHz Class B limits
ESD IMMUNITY LEVEL	EN 61000-4-2, Level 2: 1995	8kV contact (excluding connector pins); 15kV air discharge
CONDUCTED DISTURBANCE IMMUNITY	EN 61000-4-6	10Vrms, 80%AM 150KHz-80MHz
POWER FIELD IMMUNITY	EN 61000-4-8	30A/m; 50Hz & 60 Hz

**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	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.

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