Penny + Giles announces the release of a new single axis joystick controller design that enables use in heavy duty applications without compromising on smooth proportional control. The **JC1500** joystick utilises contactless rotary position sensor technology combined with a rugged, low profile design.

The joystick provides reliable and accurate output signals - and includes a second output to enable error checking of the system integrity. The **JC1500** is intended for use in the off-highway specialist vehicles market - particularly where reliability and strength are paramount e.g. Aerial Work Platforms.

The **JC1500** joystick complements the existing range of JC150 potentiometer track joysticks and has the same panel mounting details – allowing replacement or upgrade with no panel modifications. The new joystick is designed to share the same range of handles and grips used in the JC150 and JC6000 models.

Key Features

- **Contactless – Hall effect technology**
- **Single axis control with spring to center or friction hold lever action**
- **Lock and detent features**
- **Choice of handles and grips**
- **5Vdc or 9-30Vdc supply**
- **Dual channel output with optional ramp directions**
- **Analog (Vdc) or Digital (PWM) outputs**
- **Extremely low signal noise – less than 1mV$_{rms}$**
- **Operating temperature -40 to +85°C**
- **Environmental protection to IP69K above the panel**
- **53mm under-panel depth**
- **Electrically interchangeable with potentiometers**

JC1500 SINGLE AXIS CONTACTLESS JOYSTICK

www.pennyandgiles.com

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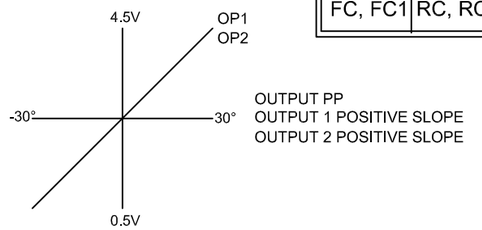
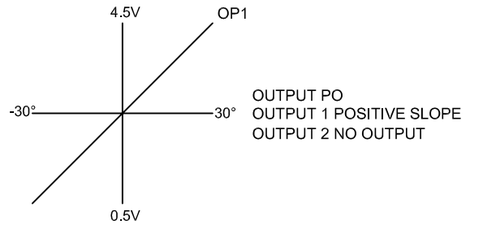
AXIS	OUTPUT		OUTPUT SENSE					OPERATION		SPRING			FEATURES			DETENT		HANDLE				ROCKER OUTPUT				ROCKER PROFILE		GAITER		INTERFACE	
Y	*		**					*		*			***			**		****				*				*		*		***	
	A	P	PP	PO	PN	NP	OO	S	F	L	M	N	NL	CL, CL1	EL, EL1	D0	D1	NH	NHF	HKN	HB	E	N	Q	R	S	V	R	S	STN	STA
													EC, EC1	FL, FL1	RL, RL1			A	MG	CL											
													FC, FC1	RC, RC1																	

ELECTRICAL DATA	
Insulation Resistance @50V DC; All sensor wires to main body	50 MΩ
Maximum Current consumption	12.5mA per Channel
Supply Voltage	5Vdc +/-0.5Vdc Regulated and 9V to 30Vdc Unregulated
Supply Current	≤25mA (12.5mA per Channel)
Supply reverse polarity protection	Yes
Short circuit protection output to GND	Yes
Short circuit protection output to supply	In 5V regulated mode only
Over voltage protection	up to 40V (-40 to +60°C)
Power on settlement	<1s
Resolution	12 Bit (0.025% of measurement range)
Non-linearity	<+/-0.4%
Temperature coefficient	<+/-30ppm/°C in 5V regulated supply mode
	<+/-90ppm/°C in 9-30V supply mode
OUTPUT (A or P)	
Options	Analogue or Digital PWM
ANALOGUE OUTPUT OPTION (A)	
Voltage output range (9-30V Supply)	Absolute voltage from 0.5V to 4.5V over measurement range (±150mV)
Voltage output range (5V Supply)	Ratiometric output voltage from 10% to 90% (±50mV) 10% to 90% over measurement range
Monotonic range	0.25V (5%) and 4.75 (95%) nominal
Load Resistance	10 Kohms minimum (resistive to ground)
Output noise	≤1mVrms
Input/Output delay	2.5ms
DIGITAL PWM OUTPUT OPTION (P)	
PWM frequency	244Hz +/-20% over temperature range
PWM levels (9-30V supply)	0V and 5V nominal (+/-3%)
PWM levels (5V supply)	0v and Vsupply (+/-1%)
Duty cycle	10% to 90% over measurement range
Monotonic range	5% and 95% nominal
Load Resistance	10 Kohms minimum (resistive to ground)
Rise/Fall time	<20 µs typical

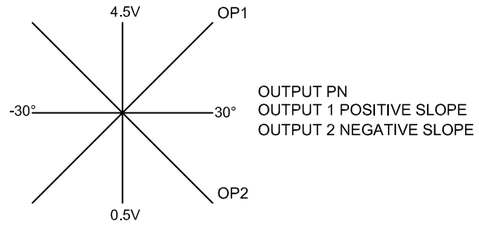
OUTPUT SENSE



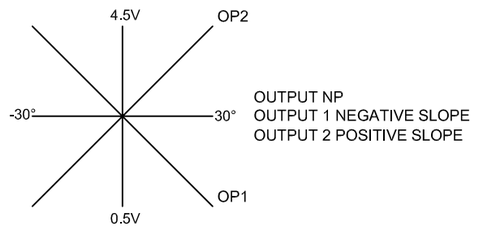
OUTPUT PP
OUTPUT 1 POSITIVE SLOPE
OUTPUT 2 POSITIVE SLOPE



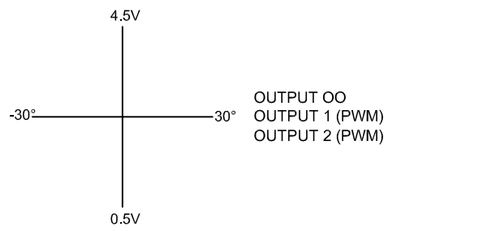
OUTPUT PO
OUTPUT 1 POSITIVE SLOPE
OUTPUT 2 NO OUTPUT



OUTPUT PN
OUTPUT 1 POSITIVE SLOPE
OUTPUT 2 NEGATIVE SLOPE

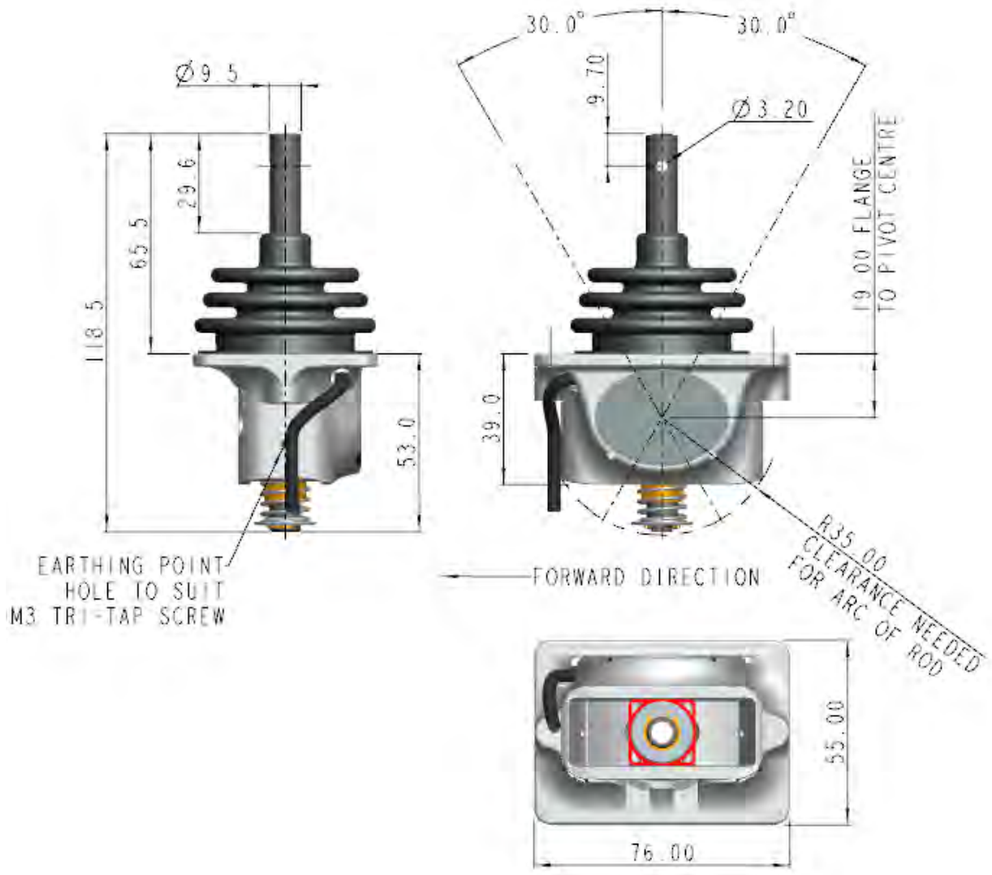


OUTPUT NP
OUTPUT 1 NEGATIVE SLOPE
OUTPUT 2 POSITIVE SLOPE



OUTPUT OO
OUTPUT 1 (PWM)
OUTPUT 2 (PWM)

SELECT 'OO' WHEN A PWM OUTPUT IS REQUIRED



A3	Penny + Giles	METRIC	ALL SCREW THREADS TO BS 3643 PT. 2 EXTERNAL CLASS: 6g INTERNAL CLASS: 6H TOLERANCES IN LINE WITH PENNY & GILES STANDARDS 56-301	RoHS COMPLIANCE	TITLE	SPECIFICATION NUMBER
ACAD	©COPYRIGHT RESERVED.	NOT TO SCALE: DO NOT SCALE. IF IN DOUBT, ASK.	LINEAR (MACHINING) ANGULAR 0. mm +/- 0.5mm +/-1° 0.0 mm +/- 0.2mm 0.00 mm +/- 0.1mm UNLESS OTHERWISE STATED 0.000 mm +/- 0.01mm	YES [ ] NO [ ]	SINGLE AXIS JOYSTICK	JC1500-GEN-****
SHT 1 OF 3 SHTS	THIS DOCUMENT CONTAINS CONFIDENTIAL AND/OR PROPRIETARY INFORMATION AND MAY NOT BE REPRODUCED IN ANY FORM WHATSOEVER. NOR MAY ITS CONTENTS BE DIVULGED TO THIRD PARTIES WITHOUT THE WRITTEN PERMISSION OF THE OWNER. ALL RIGHTS RESERVED.	THIRD ANGLE PROJECTION TO BS 8888 CHANGES TO THIS BORDER MUST BE ACTIONED ON SK309927		ISSUE: 1	DATE: 18/05/10	DRAWN: JD
				ENG' APPROVAL: MH	QUAL' APPROVAL: DA	CHANGES: RTP

MECHANICAL DATA					
OPERATION (S or F)					
SPRING RETURN		S	FRICTION		F
SPRING (L, M OR N)					
LIGHT	L	MEDIUM	M	NO SPRING	N
Breakout force	0.75Nm	Breakout force	1.15Nm	Breakout force	1.50Nm
Operating force	1.25Nm	Operating force	1.85Nm	Operating force	1.50Nm
NO SPRING OPTION AVAILABLE ON FRICTION JOYSTICKS ONLY					

Maximum Overload on Axis	110Nm
Maximum Overload off Axis	70Nm
Maximum Downward Load	1000N
Maximum Torque	35Nm
Mechanical Life (Centre & End Lock, Friction)	10 Million (500,000, TBD)

The loads required to deflect the joystick are measured 100mm from the joystick mounting surface perpendicular to the operating rod, throughout the operating angle. (With no handle fitted). The operating force will be affected by the handle length & type.

One cycle is defined as operation from the centre to one extreme and back to centre. The mechanical life is based on a test frequency of 1 Hertz.

FEATURES (NL, CL, EL, EC, FL, RL, FC, RC)		
NO LOCK	NL	Spring Return
CENTRE LOCK	CL	Mechanical Lock at Centre
END LOCK	EL	Mechanical Lock at both Ends
END LOCK WITH CENTRE LOCK	EC	Mechanical Lock at centre and both Ends
FORWARD END LOCK	FL	Mechanical Lock in forward direction
REVERSE END LOCK	RL	Mechanical Lock in reverse direction
CENTRE AND FORWARD END LOCK	FC	Mechanical Lock at centre and forward direction
CENTRE AND REVERSE END LOCK	RC	Mechanical Lock at centre and reverse direction
FOR LONGER OPERATING ROD VERSIONS OF THE ABOVE ADD 1 TO THE CODE		
EXAMPLE. CENTRE LOCK WITH LONGER OPERATING ROD = CL1		
End lock Joysticks are limited to +/-25° travel		

DETENTS (D00 or D01)		
NO DETENT	D00	Used for 0° to 60° travel option (end to end)
CENTRE	D01	Mechanical Detent at Centre
FRICTION HELD ONLY AVAILABLE WITH NO CENTRE DETENT		

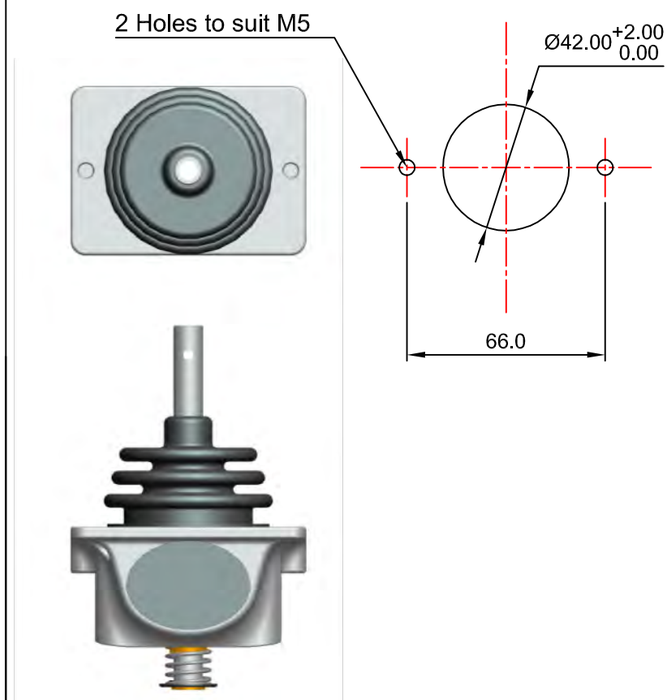
HANDLE (NH, NHF, HKN, HB, AMF, MGMF, CL)	CODE	GAITER OPTION
NO HANDLE FITTED	NH	R or S option
NO HANDLE FITTED (wires through operating lever)	NHF	R or S option
HKN HANDLE FITTED	HKN	R or S option
HB HANDLE RANGE FITTED Refer to HB handle specification for details	HB*	R or S option
AMF HANDLE RANGE FITTED Refer to AMF handle specification for details	A****	R or S option STA Interface required
MGMF HANDLE RANGE FITTED Refer to MGMF handle specification for details	MG**	R or S option
PULL COLLAR HANDLE FITTED	CL	R option
CL HANDLE ONLY AVAILABLE WHEN LOCKS HAVE BEEN CHOSEN		

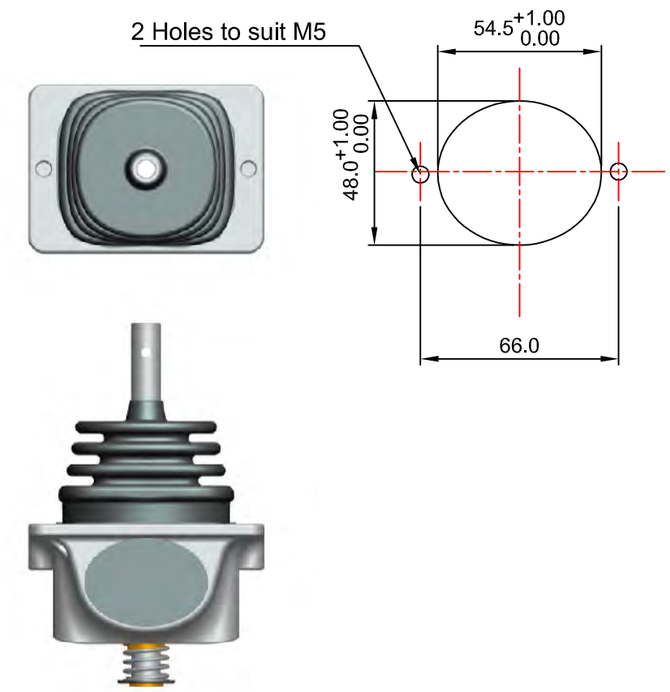
ROCKER OPTION (E, N, Q, R)	CODE	
0% - 100% OUTPUT	E	4.0 - 6.0 kΩ Resistance
0% - 100% OUTPUT	N	1.4- 2.2 kΩ Resistance
25% - 75% OUTPUT	Q	2.2 - 3.6 kΩ Resistance
10% - 90% OUTPUT	R	1.6 - 2.4 kΩ Resistance
ROCKER PROFILE (S OR V)	CODE	
Standard Rocker Profile	S	
V - Rocker Profile	V	
ROCKERS ARE ONLY AVAILABLE ON AMF HANDLE OPTIONS		
REFER TO AMF HANDLE SPECIFICATION FOR DETAILS		

GAITER OPTION (R or S)

Round Gaiter	R	STN Interface dimensions below	Square Gaiter	S	STN Interface dimensions below

S OPTION (Square Gaiter) NOT AVAILABLE WITH CENTRE AND END LOCKS





Mounting Screws	M5 x 12mm Tri-Tap Countersunk Head (Supplied)
Mounting Torque	3.5Nm Maximum
Panel Thickness	3.0mm to 6mm

Round Gaiter (R). The joystick is designed to be fitted from below the mounting panel, through a 42 - 44mm diameter hole.

Square Gaiter (S). The joystick is designed to be fitted from below the mounting panel, through a 48 by 54.5mm eliptical hole.

It is the responsibility of the customer to ensure that the joystick mounting screws are torqued correctly and that the mounting panel is of a sufficient design to ensure a seal is formed on joystick installation.

A3	Penny + Giles	METRIC	ALL SCREW THREADS TO BS 3643 PT. 2 EXTERNAL CLASS: 6g INTERNAL CLASS: 6H TOLERANCES IN LINE WITH PENNY & GILES STANDARDS 56-301	RoHS COMPLIANCE	TITLE	SPECIFICATION NUMBER
ACAD	©COPYRIGHT RESERVED.	NOT TO SCALE: DO NOT SCALE. IF IN DOUBT, ASK.	LINEAR (MACHINING) 0. mm +/- 0.5mm 0.0 mm +/- 0.2mm 0.00 mm +/- 0.1mm 0.000 mm +/- 0.01mm	YES [ ] NO [ ]	SINGLE AXIS JOYSTICK	JC1500-GEN-****
SHT 2 OF 3 SHTS	THIS DOCUMENT CONTAINS CONFIDENTIAL AND/OR PROPRIETARY INFORMATION AND MAY NOT BE REPRODUCED IN ANY FORM WHATSOEVER. NOR MAY ITS CONTENTS BE DIVULGED TO THIRD PARTIES WITHOUT THE WRITTEN PERMISSION OF THE OWNER. ALL RIGHTS RESERVED.	THIRD ANGLE PROJECTION TO BS 8888 CHANGES TO THIS BORDER MUST BE ACTIONED ON SK309927	ANGULAR +/-1° UNLESS OTHERWISE STATED			

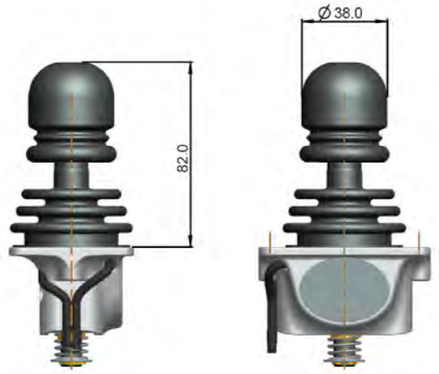
ISSUE	DATE	DRAWN	ENG' APPROVAL	QUAL' APPROVAL	CHANGES
1	18/05/10	JD	MH	DA	RTP

SPRING RETURN

FRICTION HELD

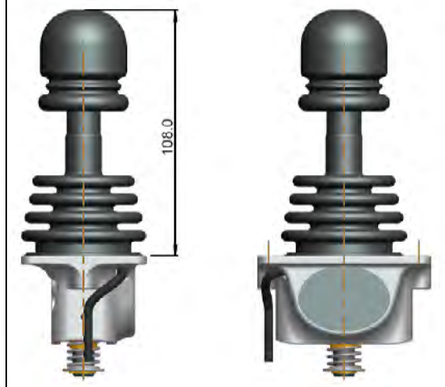
CENTRE AND END LOCK

82MM HEIGHT



EXTENDED CENTRE AND END LOCK

108MM HEIGHT



ENVIRONMENTAL DATA	
CRITERIA	TESTING STANDARD
Sealing (above mounting panel)	BS-EN 60529 rating IP69K
Sealing (below mounting panel)	Not Sealed Mechanically Under Panel
Sealing (electronics)	BS-EN 60529 rating IP69K
Operating Temperature range	BS EN 60068-2-14 (-40°C to +85°C)
Storage Temperature range	BS EN 60068-2-14 (-50°C to +85°C)
Temperature \ Humidity	BS EN 60068-2-38
Vibration (Random)	BS EN 60068-2-6
Vibration (Sinusoidal)	BS EN 60068-2-64
Vibration (Shock)	BS EN 60068-2-29
Vibration (Bump)	BS EN 60068-2-27
Salt Spray	BS EN 60068-2-11
Drop Test	BS EN 60068-2-31
Radiated Susceptibility	BS EN 61000-4-3

WIRING DETAILS (dual output, single supply)		
WIRE	COLOUR	FUNCTION
1	RED	5V Supply
2	BLACK	Ground
3	YELLOW	Joystick Output 1
4	WHITE	Joystick Output 2

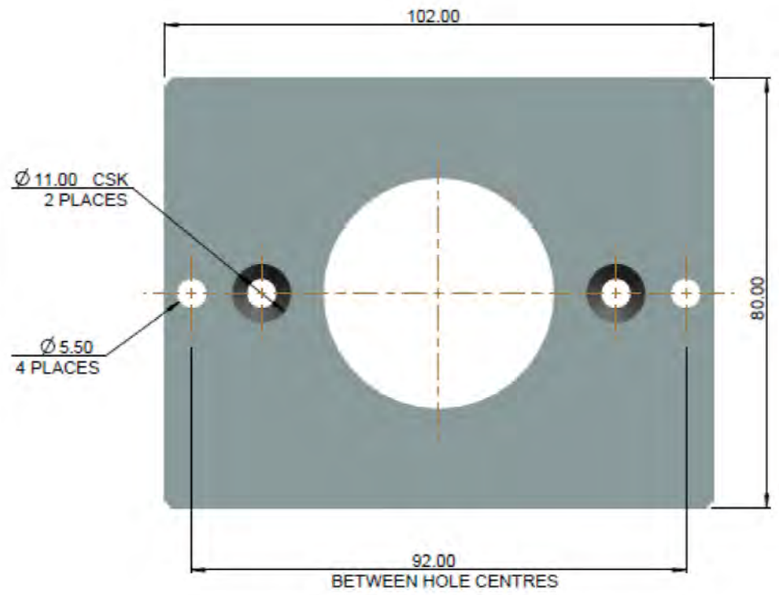
Sensor wiring looms from Joystick will be 230mm in length

Handle wiring looms from Joystick will be 230mm in length

LABELLING DETAIL	LABEL TO CONTAIN
P&G CONTROLS Ltd. U.K	
Specification Number	JC1500-GEN-****
	JC1500 JOYSTICK
Serial Number	*******
Reference	*****MMYYYY
Reference Description	
Job Number	E.g 62854
Month	MM
Year	YYYY

STA INTERFACE OPTION

JC1500 Adaptor plate P48692, This is needed when an AMF handle is fitted.
Plate thickness 2.90/3.35mm.
Finished in black eggshell epoxy (all surfaces).
Note: Joystick assembly is mounted from the top of the panel when adapter plate is fitted



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SHT 3 OF 3 SHTS

Penny + Giles

METRIC
NOT TO SCALE: DO NOT SCALE.
IF IN DOUBT, ASK.

THIRD ANGLE PROJECTION TO BS 8888

CHANGES TO THIS BORDER MUST BE ACTIONED ON SK309927

ALL SCREW THREADS TO BS 3643 PT. 2
EXTERNAL CLASS: 6g INTERNAL CLASS: 6H
TOLERANCES IN LINE WITH
PENNY & GILES STANDARDS 56-301

LINEAR (MACHINING)	ANGULAR
0. mm +/- 0.5mm	+/-1°
0.0 mm +/- 0.2mm	
0.00 mm +/- 0.1mm	UNLESS OTHERWISE STATED
0.000 mm +/- 0.01mm	

RoHS COMPLIANCE: YES [ ] NO [ ]

ISSUE	DATE	DRAWN	ENG' APPROVAL	QUAL' APPROVAL	CHANGES
1	18/05/10	JD	MH	DA	RTP

TITLE: SINGLE AXIS JOYSTICK

SPECIFICATION NUMBER: JC1500-GEN-****