

# JC 600

## RUGGED MULTI-AXIS JOYSTICK



JC600 with A handle

Developed for use in those applications where lever strength and handle functionality are paramount, the JC600 is a large, robust, multi-axis joystick that can be easily tailored to your application.

Designed for use with an electronic controller, conductive plastic tracks inside the JC600 generate analogue and switched reference signals, proportional to the distance and direction over which the handle is moved. The analogue output range can be configured to provide signals for fault detection circuits within the controller or the direct control of proprietary electro-hydraulic valves. A center tap on the analogue track provides an accurate voltage reference for the center position or a zero point for a bipolar supply voltage.

The JC600's range of ergonomic handles feature potentiometers, for three and four axes of control, switches, membrane keypads or LED displays. Deadman's switches or the center lock option can be specified to improve the integrity of your control system.

Installation time has been reduced through the use of standard electronic connectors. System cost can be further reduced by replacing the JC600's interface board with a CANBUS or PWM controller.

With an expected life in excess of 5 million cycles and designed to meet a 1KV voltage test in specific configurations, the JC600 is currently specified by manufacturers of access platforms, agricultural, construction and material handling equipment.

### ORDER CODE

JC600 - XY - RR - M - HKN - STN - S



<b>Axes</b>	<b>Y</b>	<b>XY</b>			
No of Axes	1	2			
<b>Tracks</b>	<b>N</b>	<b>R</b>	<b>Q</b>	<b>S</b>	<b>T</b>
Track Resistance	1k6Ω	2kΩ	3k2Ω	2kΩ	3k2Ω
Output Voltage Range	0% to 100% Vs	10% to 90% Vs	25% to 75% Vs	10% to 90% Vs	25% to 75% Vs
Switch Operating Angle	± 5°	± 1.5°	± 1.5°	± 5°	± 5°

<b>Center Return Spring</b>	<b>L</b>	<b>M</b>	<b>H</b>
Breakout Force	4.7N	7N	16N
Operating Force	11.5N	19N	39N

<b>Handles</b>	HKN knob fitted as standard. Please refer to the handle data sheet for alternatives. Note: Some handles will require an additional mounting plate. See page 20 for details
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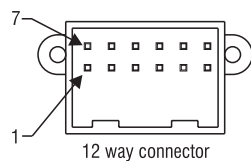
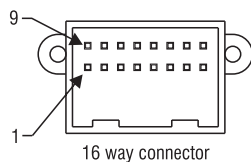
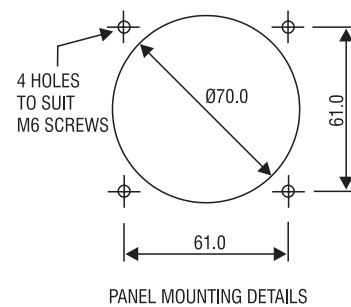
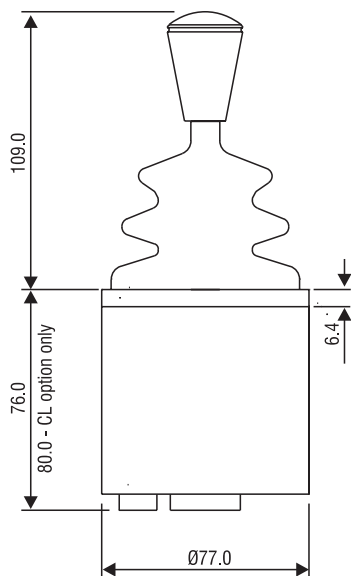
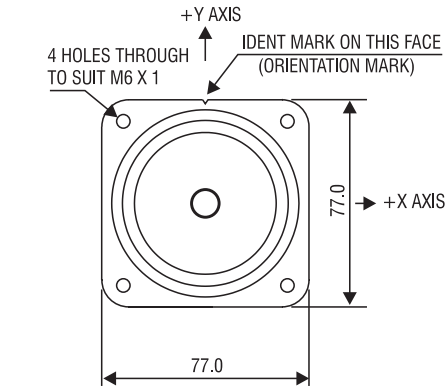
<b>Interface Board</b>	<b>STN</b>	<b>STA</b>	<b>CAN<sup>1</sup></b>	<b>PWM<sup>2</sup></b>
	No electronics	No electronics with adapter plate	CanBus Interface	PWM Controller

<b>Gate</b>	<b>S</b>	<b>R</b>
Shape	Square	Round

<b>16 way connector and pins</b>	SA47931
<b>16 and 12 way connector and pins</b>	SA47932
<b>16 way cable harness</b>	P49780
<b>12 way cable harness</b>	P49779

<sup>1, 2</sup> Please contact our sales office for full specification

## Specifications



All dimensions in mm

### Mechanical

Breakout Force	4.7N, 7N, 16N	55mm above flange
Operating Force	11.5N, 19N, 39N	Full deflection, 55mm above flange
Maximum Applied Force	300N	Full deflection, 130mm above flange
Mechanical Angle of Movement	±20°	
Electrical Angle of Movement	±18°	
Expected Life (Operations)	> 5 million	
Mass	610g	With HKN handle fitted

### Environmental

Operating Temperature Range	-25°C to +70°C	
Storage Temperature Range	-40°C to +85°C	
Environmental Sealing Above the Flange	IP65	BSEN60529
Voltage Test – Specific configurations	1kV for 1 minute	BSEN60204-1, section 20.4

### Electrical General

Maximum Load Current	Potentiometer wiper – See Design Note in rear of Data Sheet
	Directional switches – 200mA Resistive
Maximum Power Dissipation	0.25W at 25°C
Mating Connector for track signals	AMP 040 16 Way Connector 174046-2
Mating Connector for handle signals	AMP 040 12 Way Connector 174045-2
Mating Connector Pins	AMP 040 Pins 175062-1

### Analogue Track

Total Track Resistance	1kΩ, 2kΩ or 3k2Ω	Tolerance ±20%
Output Voltage Range	0% to 100%Vs or 10% to 90%Vs or 25% to 75%Vs	Tolerance ±2%
Center Tap Voltage (1MΩ Load)	50%Vs	Tolerance ±2%
Center Tap Angle	2.5° either side of center	Tolerance ±1°

### Directional or Center Off Switch

Switch Operating Angle	1.5° or 5° either side of center	Tolerance ±1°
Maximum Supply Voltage (Vs)	35Vdc	

### Termination Details — 16 pin connector

Description	Pin
Y-axis positive supply voltage	11
Y-axis center tap	12
Y-axis negative or zero supply voltage	9
Y-axis output voltage signal	10
N/O signal handle forward (+Y)	1
N/O signal handle back (-Y)	14
Common terminal for Y-axis directional switches	13
X-axis positive supply voltage	5
X-axis center tap	6
X-axis negative or zero supply voltage	3
X-axis output voltage signal	4
N/O signal handle right (+X)	15
N/O signal handle left (-X)	8
Common terminal for X-axis directional switches	7
Common terminal for micro-switch on CL variant only	2
N/O signal from micro-switch on CL variant only	16

### 12 Pin Connector

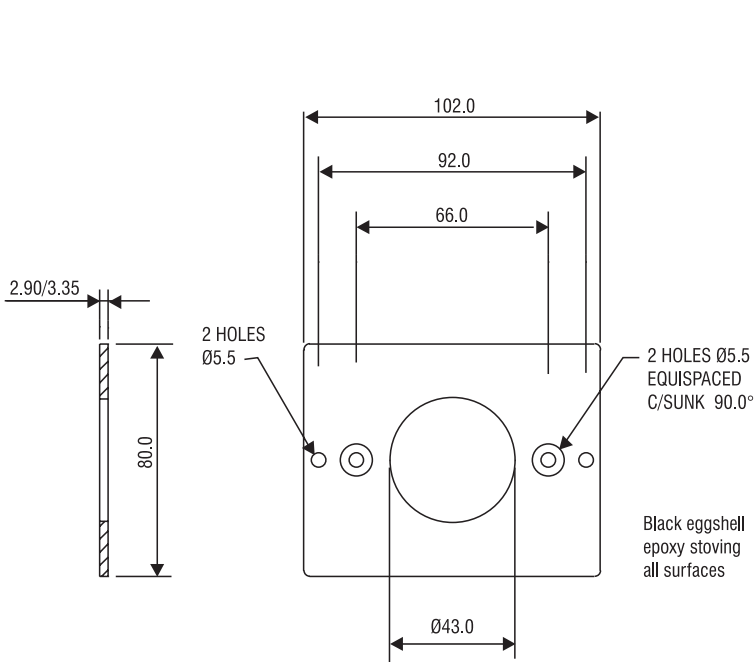
Please refer to the data sheet for your chosen handle

## MOUNTING PLATE DETAILS

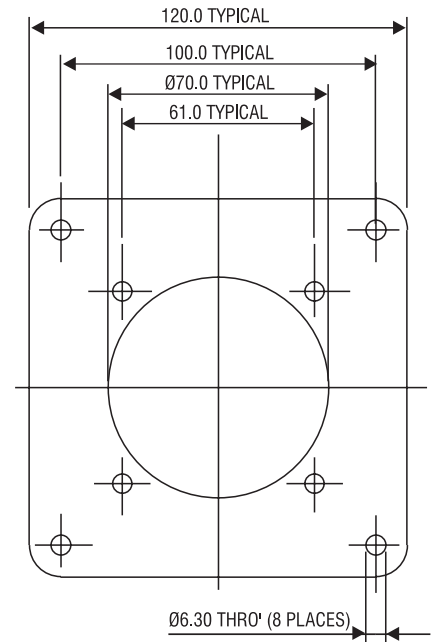
The panel mounting detail for the JC150 and JC600 joystick controllers is specified on pages 7 and 15 respectively.

Some handle options with a larger grip size require the use of an adaptor plate to mount the joystick from the top of the panel.

The adaptor plate details for the JC150 and JC600 models is shown below.



JC150 Adaptor Plate P48692  
Required with the A, HC, HP and HS handles



JC600 Adaptor Plate P49367  
Required with the HP and HS handles

# Penny+Giles Ergonomic Handles

This brochure details Penny & Giles' current range of ergonomic handles that complement their extensive range of electronic joysticks. It should be read in conjunction with their joystick brochure, which can be supplied on request.

The functionality and size of each handle has been specified for finger, palm or hand operation. The layout and

operating force of all switches, potentiometers or membrane keypads minimise both the amount of finger movement and the effort needed to activate each operation. The subsequent reduction in the mental and physical effort required to operate your machine can help to increase its productivity.

Handle	Compatible with				Functionality				
	JC150	JC300	JC400	JC600	Switches (Maximum Number)			Z Axis (Action)	Deadman's
					Momentary	Rocker	Membrane		
CL	✓			✓					JC600 only
EL	✓								
HB	✓			✓	✓ 1	✓ 1			✓
HC	✓			✓	✓ 6		✓		
HP	✓			✓	✓ 4			✓ Push	
HS	✓			✓	✓ 6				
WT	✓			✓		✓ 4			✓
WN	✓			✓		✓ 4			
A	✓			✓	✓ 8	✓ 2		✓ Rocker	✓
TR	✓			✓	✓ 3				
ZA		✓	✓					✓ Rotary	
ZAS		✓	✓					✓ Rotary	
ZC		✓	✓						
ZCS		✓	✓		✓ 1				✓
KW		✓	✓						
KWS		✓	✓		✓ 1				✓

## CL/EL HANDLE OPTIONS



CL or EL handle options

Developed to improve the integrity of your control system, the Center Lock (CL) and End Lock (EL) range of handles, mechanically hold the shaft of the JC150 or JC600 in its safe central position or at either end of the JC150's range of travel. Lifting a collar at the base of the handle, unlocks the shaft.

A micro-switch in the JC600 variant of the CL handle is activated when the collar is lifted. Such a signal could be used, for example, to increase the speed of your hydraulic pump.

Note: This handle option is not available with the L (Light) option Center Return Spring with the JC600

Specification	CL	CL	EL
Joystick Range	JC600	JC150	JC150
Maximum Height Above Flange	110mm	110mm	110mm
Maximum Diameter	41mm	41mm	41mm
Environmental Sealing (BSEN60529)	IP65	IP65	IP65
No of Switches	1	0	0
Action	Microswitch		
Maximum Current @ 24Vdc	0.1A		
Expected Life (Operations)	1,000,000		

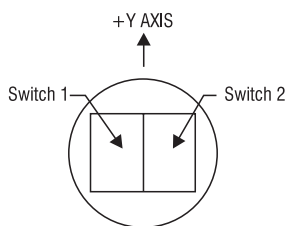
Termination Details	CL
Joystick	JC600
Common Terminal Switch 1	2
N/O Contact Switch 1	16

**Note:** JC600 signals terminate on the 16 pin connector

## HB HANDLE OPTIONS



HB2 handle option



ROCKER ORIENTATION AND SWITCH IDENTIFICATION

Developed to replicate the functionality of the traditional mechanical handle, the HB range of hand grips can be specified with either a button or rocker switch, mounted into the

top of the handle, within easy reach of the operator's thumb. These can be configured as a Deadman's feature or, for example, the steer signal for an access platform.

Specification	HB0	HB1	HB2	HBD
Joystick Range	JC150, JC600	JC150, JC600	JC150, JC600	JC150, JC600
Maximum Height Above Flange	149mm	155mm	155mm	164mm
Maximum Grip Diameter	35mm	35mm	35mm	35mm
Environmental Sealing (BSEN 60529)	IP65	IP65	IP65	IP65
Number of Switches	0	1	2	1
Action		Momentary Rocker	Momentary Rocker	Momentary Button
Switch Operating Force				7N
Maximum Current @ 30Vdc		2.5A	2.5A	5A
Expected Life (Operations)		100,000	100,000	100,000

Termination Details	HB1		HB2		HBD	
Joystick	JC150	JC600	JC150	JC600	JC150	JC600
Common Terminal	16	11	16	11	16	11
N/O Contact Switch 1	6	4	6	4	3	1
N/C Contact Switch 1	3	1				
N/O Contact Switch 2			3	1		

**Note:** JC600 signals terminate on the 12 pin connector

## HC HANDLE OPTIONS



HCM and HC4 handle options

Developed to bring more of the controls closer to the operator, the HC range of hand grips can be specified with either a membrane keypad or up to six push button switches mounted in the front of the handle. Button layout and operating force have been selected so as to minimise the amount of thumb movement as well as the effort required to activate each operation.

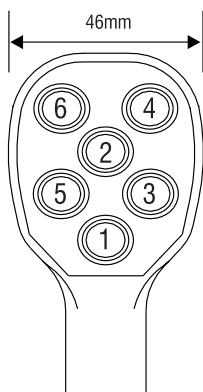
The membrane keypad can accommodate an LED display and up to nine switches. The membrane keypads are available only to specific customer orders and are subject to individual design requirements and consequential availability.

Note: This handle option is not available with the L (Light) option Center Return Spring with the JC600

Specifications	HCO to HC6	HCM
Joystick Range	JC150, JC600	JC150, JC600
Maximum Height Above Flange	215mm	215mm
Maximum Width	46mm	46mm
Environmental Sealing (BSEN 60529)	IP65	IP65
Number of Switches	1 to 6	Keypad
Action	Momentary Button	Membrane Keypad
Switch Operating Force	3N	3.8N
Maximum Current @ 50Vdc	100mA	100mA
Expected Life (Operations)	100,000	1,000,000

Termination Details	HCO to HC6		HCM	
Joystick	JC150	JC600	JC150	JC600
Common Terminal	16	11		
N/O Contact Switch 1	3	1		
N/O Contact Switch 2	4	2		
N/O Contact Switch 3	5	3		
N/O Contact Switch 4	6	4		
N/O Contact Switch 5	7	5		
N/O Contact Switch 6	8	6		

Note: JC600 signals terminate on the 12 pin connector. Termination details for the HCM variant are dependent on the keypad's functionality.

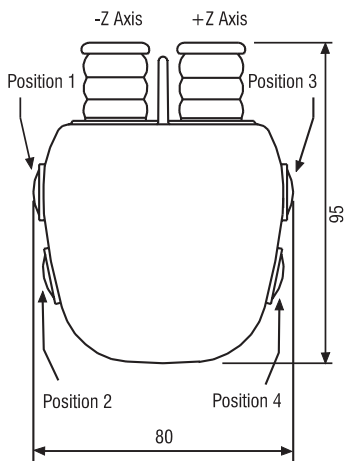


Order Code	Switches in positions					
HC0						
HC1		2				
HC2			3		5	
HC3	1		3		5	
HC4	1	2	3		5	
HC5		2	3	4	5	6
HC6	1	2	3	4	5	6
HCM	Handle with membrane keypad					

## HP/HS HANDLE OPTIONS



HS00 handle option



HP15 handle option

All dimensions in mm

Designed to be operated with the palm of the hand resting on the top of the handle, the HP/HS range features an additional axis of proportional control and up to six push buttons, mounted to the front and side of the handle.

Generating an analogue output proportional to the movement, the two linear potentiometers mounted at the front of the HP handle can be configured as the two halves of the Z-axis. In the HS handle these

are replaced by two momentary action push buttons. A further four buttons are mounted on either side of the handle according to the order code detailed below. Button layout and operating forces have been selected so as to minimise the amount of finger movement as well as the effort required to activate each operation.

Note: This handle option is not available with the L (Light) option Center Return Spring with the JC600

Specification	HP	HS
Joystick Range	JC150, JC600	JC150, JC600
Maximum Height Above Flange	144mm	144mm
Maximum Dimension	95mm	90mm
Environmental Sealing (BSEN 60529)	IP65	IP65
No of Switches	0 to 4	2 to 6
Action	Momentary Button	Momentary Button
Switch Operating Force	3N	3N
Maximum Current @ 50Vdc	100mA	100mA
Expected Life (Operations)	500,000	500,000

Third (Z) Axis	HP
Breakout Force	5N
Operating Force	10N
Mechanical Movement	10.5mm
Electrical Movement	10.0mm
Expected Life (Operations)	1 million
Maximum Load Current	See Design Note in rear of Joystick Controllers data sheet
Maximum Power Dissipation	0.25W @ 25°C
Track Resistance	1kΩ±20%
Output Voltage Range	0% to 100%Vs
Directional Switches	None

Order Code	Switches in position
HP0 HS0	
HP1 HS1	1
HP2 HS2	2
HP3 HS3	3
HP4 HS4	4
HP5 HS5	1 2
HP6 HS6	1 3
HP7 HS7	1 4
HP8 HS8	2 3
HP9 HS9	2 4
HP10 HS10	3 4
HP11 HS11	1 2 3
HP12 HS12	1 2 4
HP13 HS13	1 3 4
HP14 HS14	2 3 4
HP15 HS15	1 2 3 4

Termination Details	HP	HP	HS	HS
Joystick	JC150	JC600	JC150	JC600
Common Terminal for Switches	16	11	16	11
N/O Contact Switch 1	3	1	3	1
N/O Contact Switch 2	4	2	4	2
N/O Contact Switch 3	5	3	5	3
N/O Contact Switch 4	6	4	6	4
N/O Contact Front Left Switch			7	5
N/O Contact Front Right Switch			8	6
Positive supply to -Z Axes	2	8		
Positive supply to +Z Axes	2	7		
Zero or Negative supply to -Z Axes	15	12		
Zero or Negative supply to +Z Axes	15	10		
Output Voltage Signal from -Z Axes	7	5		
Output Voltage Signal from +Z Axes	8	6		

Note: JC600 signals terminate on the 12 pin connector

## WT/WN HANDLE OPTIONS

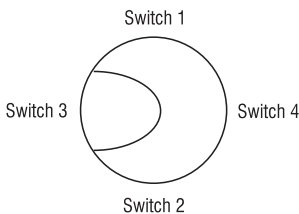
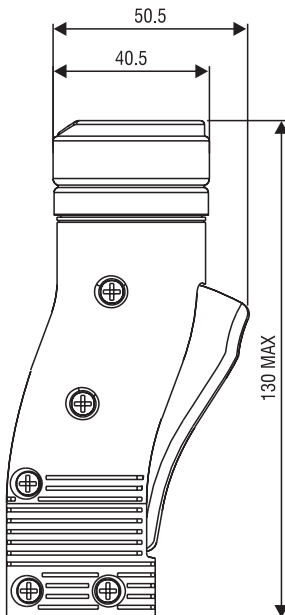


Designed to provide a simple approach to a Deadman's handle whilst offering the flexibility of multiple switches in the top of the handle, the 'W' range of ergonomic handgrips can be fitted to both the JC150 and JC600 range of joysticks.

The handle can be specified with (WT) or without (WN) the Deadman's trigger as well as up to four switches in the handle top. These can be specified to be in any of the four "on axis" positions.

### Specification

Joystick Range	JC150, JC600	
Maximum Height Above Flange	182mm	
Maximum Grip Diameter	40.5mm	
Environmental Sealing	IP66	BSEN60529
Number of Switches	0 to 5	
Action	Momentary Rocker or Trigger	
Switch Operating Force	5N at 11mm Radius (Rocker top switches) 3N at Center line of Deadman's Lever switch	
Maximum Current @ 30Vdc	100mA (Rocker top switches)	
Maximum Current @ 28Vdc	5A Resistive (Deadman's Lever-two wires connected)	
Expected Life	1 million cycles at full power (Rocker top switches) 100,000 cycles @5A Resistive (Deadman's Lever) 500,000 cycles @1A Resistive (Deadman's Lever)	
Operating Temperature Range	-40°C to +70°C	
Storage Temperature Range	-40°C to +80°C	



All dimensions in mm

### Termination Details

Joystick	JC150	JC600	Wire Color
Common Terminal- Rocker	16	11	Black
Switch Position 1	6	4	Blue
Switch Position 2	3	1	Green
Switch Position 3	8	6	Yellow/Red
Switch Position 4	7	5	Pink
Trigger Switch	4	2	Blue/Orange (Two Wires)
Trigger Switch	5	3	Yellow (Two Wires)

### Order Code

Order Code	Switches in position
WT00 WN00	
WT01 WN01	1
WT02 WN02	2
WT03 WN03	3
WT04 WN04	4
WT05 WN05	1 2
WT06 WN06	1 3
WT07 WN07	1 4
WT08 WN08	2 3
WT09 WN09	2 4
WT10 WN10	3 4
WT11 WN11	1 2 3
WT12 WN12	1 2 4
WT13 WN13	1 3 4
WT14 WN14	2 3 4
WT15 WN15	1 2 3 4

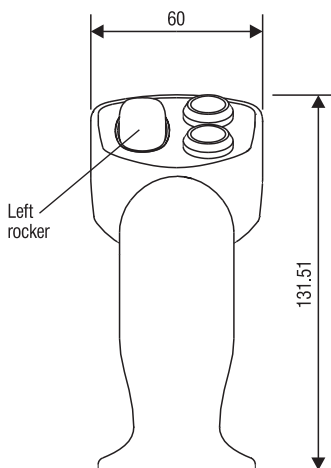
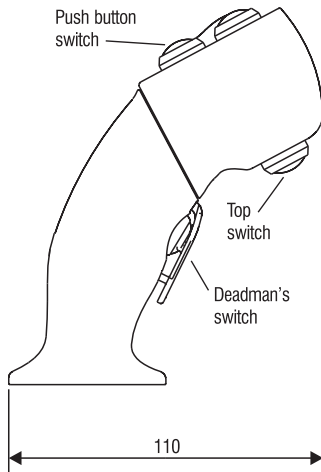
Note: Two switches can be operated by deflecting the handle top at 45°.



## A HANDLE OPTIONS



A2LD handle option



All dimensions in mm

Developed to meet the demands for more complex control systems in off-highway applications, the 'A' range of ergonomic hand grips can be fitted with a combination of analogue outputs, push button and deadman's switches.

The handle can be specified with two independent analogue outputs generated by proportional rockers which, in turn, provide an additional direction switch as well as the potentiometric output. When coupled with a two axis base joystick this unit can provide a 4 axis control device.

### Specification

Joystick Range	JC150, JC600
Maximum Height Above Flange	166mm
Maximum Grip Diameter	61mm
Environmental Sealing	IP65
Number of Switches	1 to 6
Action	Momentary Button
Switch Operating Force	3N
Maximum Current @ 50Vdc	200mA
Expected Life (Operations)	1,000,000

### Third Axes

Breakout Force	8.5N at the end of the rocker	
Operating Force	15N at the end of the rocker	
Mechanical Movement	$\pm 15^\circ$	Tolerance $\pm 1^\circ$
Electrical Movement	$\pm 10^\circ$	Tolerance $\pm 1^\circ$
Expected Life (Operations)	3 million	
Mass	170g - A2LD option	
Maximum Load Current	See Design Note in rear of Joystick Controllers data sheet	
Maximum Power Dissipation	0.25W at 25° C	
Track Resistance	Same as the Y axis track of the joystick to which it is fitted	
Output Voltage	Same as the Y axis track of the joystick to which it is fitted	
Center Tap Angle	$\pm 1.5^\circ$	Tolerance $\pm 1^\circ$
Directional or Center Off Switch	Standard	
Switch Gap	$\pm 2.5^\circ$	Tolerance $\pm 1^\circ$
Maximum Supply Voltage (Switch only)	35Vdc	

### Termination Details

Joystick	JC150	JC600
Common Terminal All Switches (including third axes)	16	11
N/O Switch 1	6	4
N/O Switch 2	5	3
N/O Switch 3	4	2
N/O Switch 4	3	1
Top Switch	7	5
Deadman's Switch	TBD	12 + 8
Left or horizontal rocker positive supply voltage	2	7
Left or horizontal rocker center tap	8	6
Left or horizontal rocker zero or negative supply voltage	15	10
Left or horizontal rocker output voltage signal	7	5
N/O signal left rocker forward	4	2
N/O signal left rocker backward	3	1
N/O signal horizontal rocker right	3	1
N/O signal horizontal rocker left	6	4
Right rocker positive supply voltage	2	7
Right rocker center tap	8	6
Right rocker zero or negative supply voltage	15	10
Right rocker output voltage signal	TBD	9
N/O signal right rocker forward	5	3
N/O signal right rocker backward	6	4

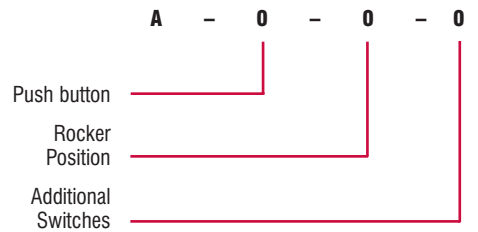
Not all termination details can be shown for A handle options. Termination details to be advised on ordering.

## A HANDLE OPTIONS

A maximum of 8 switches can be mounted in the handle with 6 switches in the top plate for thumb actuation, one positioned for index finger actuation and a switch fitted with an additional deadman's lever.

Functionality	Rockers			Switches							
	Left	Right	Horizontal	1	2	3	4	5	6	Top	Deadman's
Left Rocker		✓		✓	✓			✓		✓	✓
Right Rocker	✓					✓	✓		✓	✓	✓
Horizontal rocker				✓	✓						✓
Switch 1	✓			✓	✓	✓	✓	✓	✓	✓	✓
Switch 2	✓		✓	✓		✓	✓	✓	✓	✓	✓
Switch 3		✓	✓	✓	✓		✓	✓	✓	✓	✓
Switch 4		✓		✓	✓	✓		✓	✓	✓	✓
Switch 5	✓			✓	✓	✓	✓		✓	✓	✓
Switch 6		✓		✓	✓	✓	✓	✓	✓		✓
Top Switch	✓	✓		✓	✓	✓	✓	✓	✓		✓
Deadman's Switch	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

### ORDER CODE



**Push button**

No. of switches	1 to 6 switches in the top plate				
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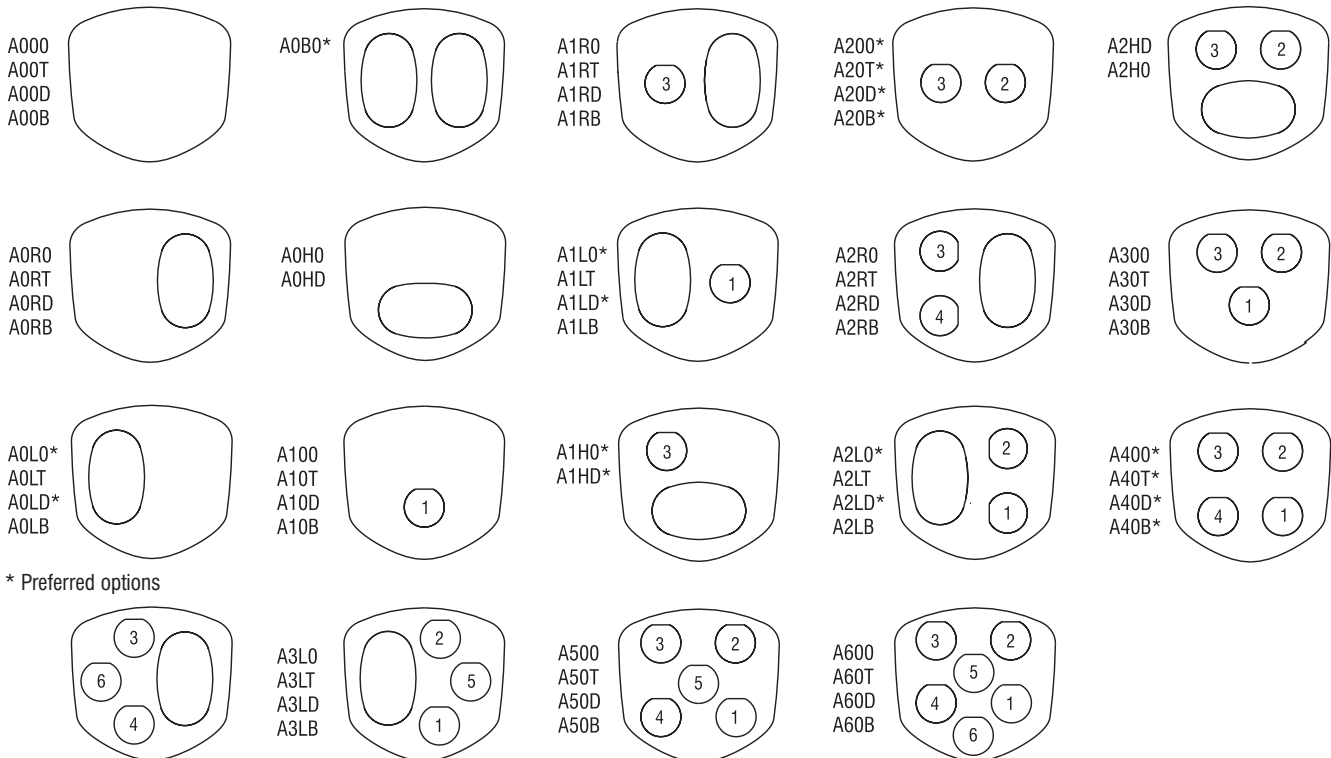
**Rocker Position**

	0	L	R	B	H
	None	Left	Right	Both	Horizontal

**Additional Switches**

	0	T	D	B
	None	Top	Deadman's	Both

### Handle front plate diagram



Options on longer lead-time Termination details to be advised on ordering