

# JC400

## MULTI AXIS JOYSTICK ANALOGUE OUTPUT

Developed for use in applications where compact size and functionality are important, the JC400 with analogue output offers proportional fingertip control in up to three axes. The JC400's range of ergonomic handles feature rotary operated potentiometers, or switches, for a third axis of control, or 'Person Present' switches that can be used to improve the integrity of your control system.

Installation flexibility has been provided by using different forms of mounting flanges independent of the function of the joystick and the analogue track models are supplied with side exit cables to minimize the required under panel depth. The joystick has been designed for maintenance-free operation throughout an operating life of greater than five million operations.

Typical applications include remote control chest packs, CCTV camera controls and the operator controls in construction, agricultural or material handling equipment.

### PERFORMANCE MECHANICAL

#### Lever operating force

breakout	N	2, 2.5 or 3*
operating	N	7.5, 11 or 12* (full deflection)
maximum allowable	N	250* (full deflection)
Lever mechanical angle	°	±20 in X and Y directions
Lever action (options)		Self centering, aligned X and Y or non aligned
Lever gate profiles (options)		Single axis, square, round, diamond or cross
Expected life		>5 million operations
Weight	g	150 nominal, without handle fitted

\*50mm above mounting flange face

### ENVIRONMENTAL

Operating temperature	°C	-40 to +70
Storage temperature	°C	-50 to +85
Environmental protection above flange		IP65 IEC 60529

### ELECTRICAL

#### Analogue Track

##### Resolution

Track resistance ±20%	kΩ	Virtually infinite
Track operating angle	°	4, 5 or 8
Output voltage range	%	±16
Center tap voltage (no load)	%	0-100, 10-90 or 25-75 of input (±2%)
Center tap angle	°	48 - 52 of applied voltage
Supply voltage - maximum	Vdc	±2.5
Wiper circuit impedance	MΩ	30
Power dissipation @ 20°C	W	Greater than 0.1**

\*\* The long life resistive elements require a high impedance load in the wiper circuit to minimise the current flowing through the wiper for optimum conditions

#### Switch -

#### Directional or Center Off/Center On<sup>†</sup>

Switch operating angle	°	5 either side of center (±1)
Supply voltage - maximum	Vdc	30
Load current - maximum	mA	5 resistive (or 200 with reduced switch life of 1 million operations)

† The JC400 has an additional center on switch in each axis

## DIMENSIONS

Note: drawings not to scale

## INSTALLATION

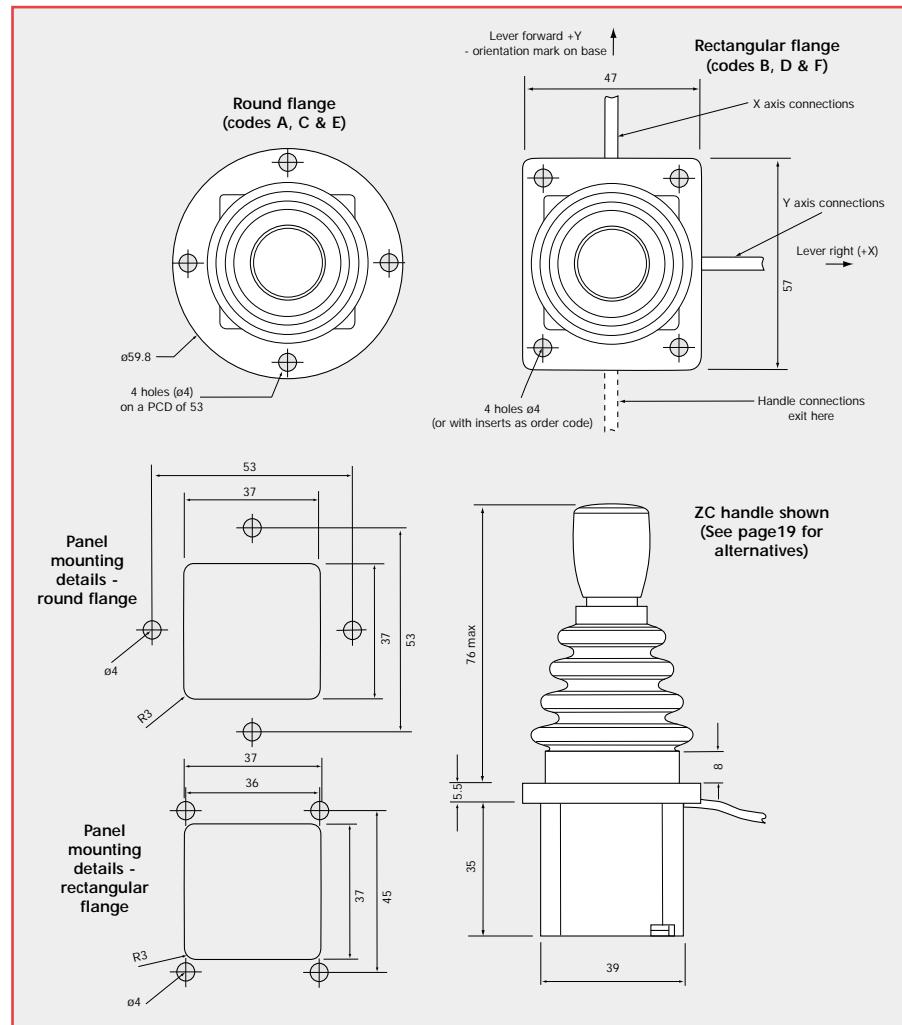
The joystick is designed to be fitted from below the mounting panel, through a 37mm x 37mm square hole. The effectiveness of the joystick flange sealing is dependent on the panel mounting surface being sufficiently rigid to compress the sealing garter. The surface finish of the mounting panel is also critical to achieving an adequate seal and rough surface finishes, paint chips, deep scratches, etc. should be avoided.

### Recommended panel thickness

3.5 to 6mm

### Recommended screw torque

The JC400 joystick has three options for each mounting flange style, which include through holes and thread inserts in the 4mm diameter holes. To maintain an effective seal between the joystick flange and the mounting panel, the mounting screws should be tightened to a suitable torque to match the selected attachment screw size.



## ELECTRICAL CONNECTIONS

PVC insulated 7/0.2 (24AWG)  
flying leads, 240mm long

### Description

Y axis forward - positive voltage supply  
Y axis center tap  
Y axis backward - negative or zero voltage supply  
Y axis output voltage signal  
Y switch track N/O (lever forward +Y)  
Y switch track N/O (lever backward -Y)  
Y switch track center on  
Y switch track common

X axis right - positive voltage supply  
X axis center tap  
X axis left - negative or zero voltage supply  
X axis output voltage signal  
X switch track N/O (lever right +X)  
X switch track N/O (lever left -X)  
X switch track center on  
X switch track common

### Flylead colour

Green	Y axis forward
Brown	Y axis center tap
White	Y axis backward
Black	Y axis output voltage signal
Pink/Black	Y switch track N/O (lever forward +Y)
Green/Red	Y switch track N/O (lever backward -Y)
Red/Brown	Y switch track center on
Yellow/Green	Y switch track common
Orange	X axis right
Grey	X axis center tap
Red	X axis left
Yellow	X axis output voltage signal
Orange/Black	X switch track N/O (lever right +X)
Red/Black	X switch track N/O (lever left -X)
Orange/Red	X switch track center on
Purple/Red	X switch track common

See over ➔

for ordering information

# JC400 ANALOGUE OUTPUT HOW TO SPECIFY

PERFORMANCE OPTIONS	FEATURE	CODE
<b>MOUNTING FLANGE</b>	Round flange, 59.8mm diameter with 4 x 4mm through holes Rectangular flange, 47 x 57mm with 4 x 4mm through holes Round, as code A, but with Metric thread inserts (M3 x 0.5p) Rectangular, as code B, but with Metric thread inserts (M3 x 0.5p) Round, as code A, but with Unified thread inserts (4-40 UNC x 0.025) Rectangular, as code B, but with Unified thread inserts (4-40 UNC x 0.025)	A B C D E F
<b>AXES</b>	Single axis with analogue track Dual axis	Y XY
<b>TRACKS</b>	Analogue potentiometer, 4k, 0-100%, $\pm 5^\circ$ directional switch Analogue potentiometer, 5k, 10-90%, $\pm 5^\circ$ directional switch Analogue potentiometer, 8k, 25-75%, $\pm 5^\circ$ directional switch	NN RR QQ
<b>DETENTS</b>	<b>Not available with analogue tracks</b>	-/-
<b>LEVER SPRING FORCE</b>	Light duty, 2N breakout, 7.5N full deflection Medium duty, 2.5N breakout, 11N full deflection Heavy duty, 3N breakout, 12N full deflection	LA MA HA
<b>HANDLE STYLES</b> See page 18	Standard handle, no functions Standard handle with momentary push button Standard handle with momentary switch action Rotary Z axis handle with analogue track and directional switch Rotary Z axis handle with end of travel switches only Finger grip handle with momentary top button switch Finger grip handle with two momentary side button switches Finger grip handle with two momentary side and top button switches	ZC ZC1 ZCS ZA or ZA2 ZAS SW1 SW2 SW3
<b>GATE</b> (lever movement limiter)	Square Round Diamond Cross - only suitable for use with non-switched handles (ZC)	S R D C
<b>SEAT</b>	Aligned with axis Non-aligned	P N

**EXAMPLE ORDER CODE** JC400-A-XY-NN-/-MA-ZA-S-P

# JC400

## MULTI AXIS JOYSTICK DIGITAL OUTPUT

Developed for use in applications where compact size and functionality are important, the JC400 with Digital Output option offers fingertip control in one or two axes, with a choice of handles for a third axis of control. The JC400's range of ergonomic handles feature rotary operated potentiometers, or switches, or 'Person Present' switches that can be used to improve the integrity of your control system.

The Digital track option includes a detent mechanism that provides three sequential positions either side of the center position. The detent positions align with the switch outputs in true X and Y directions only.

Installation flexibility has been provided by using different forms of mounting flanges independent of the function of the joystick, and the digital output joysticks are fitted with standard electronic connectors to minimize installation time. The joystick has been designed for maintenance-free operation throughout an operating life of greater than five million operations.

Typical applications include remote control chest packs, CCTV camera controls and the operator controls in construction, agricultural or material handling equipment.

### PERFORMANCE MECHANICAL

#### Lever operating force

**breakout** **N** 3, 4 or 6\*

**operating** **N** 12, 13.5 or 18\* (full deflection)

**maximum allowable** **N** 250\* (full deflection)

#### Lever mechanical angle

**°** **°**  $\pm 20$  in X and Y directions

#### Lever action (options)

Self centering, aligned X and Y or non aligned

#### Lever gate profiles (options)

Single axis, square, round, diamond or cross.

#### Expected life

$>5$  million operations

#### Weight

**g** 150 nominal, without handle fitted

\*50mm above mounting flange face

### ENVIRONMENTAL

**Operating temperature** **°C** -40 to +70

**Storage temperature** **°C** -50 to +85

**Environmental protection**  
above flange **IP65** IEC 60529

### ELECTRICAL

**Number of switch positions** 3 either side of center

**Number of detents** 3 either side of center

**Switch/detent angles** **°**  $\pm 6.6, \pm 13.3, \pm 20$

**Supply voltage - maximum** **Vdc** 30

**Load current - maximum** **mA** 100 resistive @25°C

### TRUTH TABLE

Truth table for digital switch track output Y and X axis signals are Normally Open (0) at lever center position. Switch sequences close (1) depending on direction of lever movement and detent position.

Detent Position	Switch Output				Right	Left
		1	2	3	(or Forward)	(or Backward)
3	1	1	1	1	1	0
2	1	1	0	0	1	0
1	1	0	0	0	1	0
0	0	0	0	0	0	0
-1	1	0	0	0	0	1
-2	1	1	0	0	0	1
-3	1	1	1	0	0	1

## DIMENSIONS

Note: drawings not to scale

## INSTALLATION

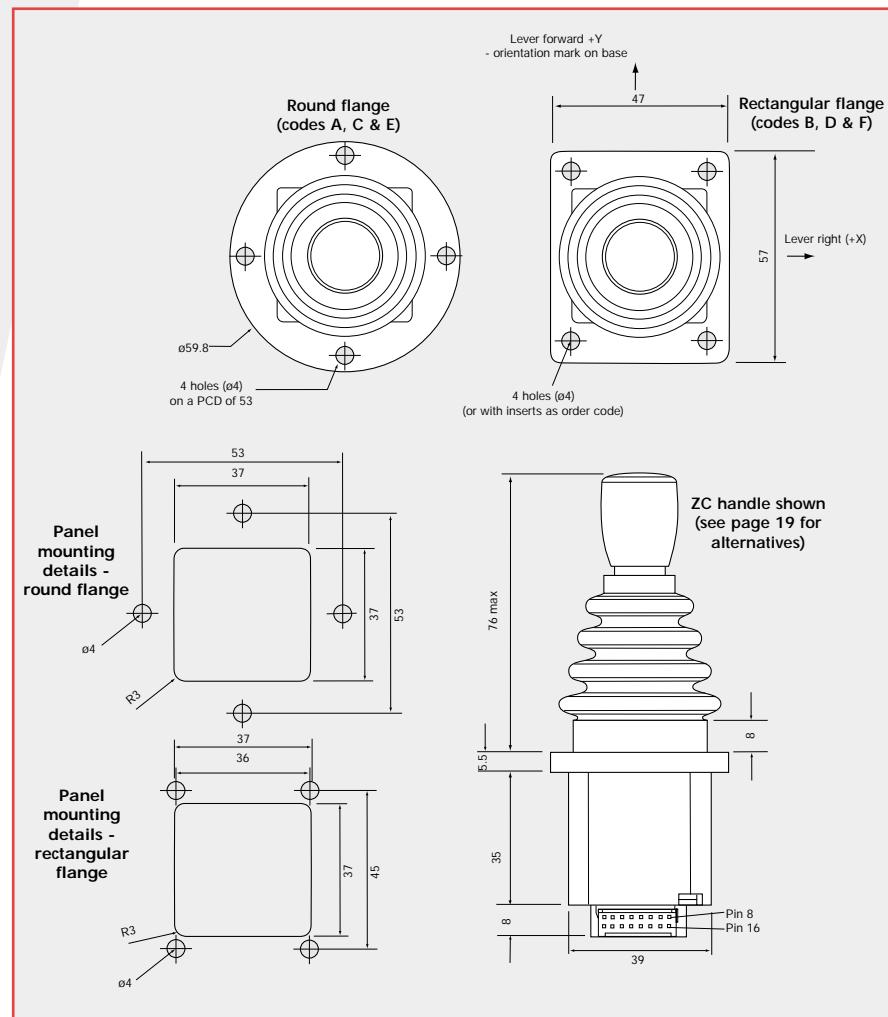
The joystick is designed to be fitted from below the mounting panel, through a 37mm x 37mm square hole. The effectiveness of the joystick flange sealing is dependent on the panel mounting surface being sufficiently rigid to compress the sealing garter. The surface finish of the mounting panel is also critical to achieving an adequate seal and rough surface finishes, paint chips, deep scratches, etc. should be avoided.

### Recommended panel thickness

3.5 to 6mm

### Recommended screw torque

The JC400 joystick has three options for each mounting flange style, which include through holes and thread inserts in the 4mm diameter holes. To maintain an effective seal between the joystick flange and the mounting panel, the mounting screws should be tightened to a suitable torque to match the selected attachment screw size.



## ELECTRICAL CONNECTIONS

Connection

Mating connector and pins kit  
(order separately)

FCI DUBOX™ 2 x 8 way male connector (76385-308)

SA47363 (contains DUBOX™ 65239-008, 65239-002 and 65239-003 female connectors and pins 76357-301 suitable for AWG 22-30 wire size)

Requires crimping pliers (FCI No. HT234) to fit pins to wires.

Description	Connector Pin Number
Y axis switch 1	3
Y axis switch 2	14
Y axis switch 3	16
Y axis signal N/O (lever forward +Y)	9
Y axis signal N/O (lever backward -Y)	1
Y axis switch track common	5
X axis switch 1	4
X axis switch 2	7
X axis switch 3	10
X axis signal N/O (lever right +X)	2
X axis signal N/O (lever left -X)	6
X axis switch track common	5

# JC400 DIGITAL OUTPUT

## HOW TO SPECIFY

PERFORMANCE OPTIONS	FEATURES	CODE
<b>MOUNTING FLANGE</b>	Round flange, 59.8mm diameter with 4 x 4mm through holes Rectangular flange, 47 x 57mm with 4 x 4mm through holes Round, as code A, but with Metric thread inserts (M3 x 0.5p) Rectangular, as code B, but with Metric thread inserts (M3 x 0.5p) Round, as code A, but with Unified thread inserts (4-40 UNC x 0.025) Rectangular, as code B, but with Unified thread inserts (4-40 UNC x 0.025)	<b>A</b> <b>B</b> <b>C</b> <b>D</b> <b>E</b> <b>F</b>
<b>AXES</b>	Single axis with digital track Dual axis	<b>X</b> <b>XY</b>
<b>TRACKS</b>	Digital - 3 switches either side of center	<b>DD</b>
<b>DETENTS</b>	Only available with digital tracks	<b>D</b>
<b>LEVER SPRING FORCE</b>	Light duty, 3N breakout, 12N full deflection Medium duty, 4N breakout, 13.5N full deflection Heavy duty, 6N breakout, 18N full deflection	<b>LD</b> <b>MD</b> <b>HD</b>
<b>HANDLE STYLES</b> See page 18	Standard handle, no functions Standard handle with momentary switch action Rotary Z axis handle with analogue track and directional switch Rotary Z axis handle with end of travel switches only	<b>ZC</b> <b>ZCS</b> <b>ZA or ZA2</b> <b>ZAS</b>
<b>GATE</b> (lever movement limiter)	Square Round Diamond Cross - only suitable for use with non-switched handles (ZC)	<b>S</b> <b>R</b> <b>D</b> <b>C</b>
<b>SEAT</b>	Aligned with axis Non-aligned	<b>P</b> <b>N</b>
<b>EXAMPLE ORDER CODE</b>		<b>JC400-B-XY-DD-D-MD-ZC-R-N</b>

# JC400 MULTI AXIS JOYSTICK HANDLE OPTIONS



## ZA

The ZA and ZAS handles are designed to give an additional axis of proportional or switched control, using fingertip action to rotate the handle. The handles have a self-centering action when released, and rotate about their center, giving either analogue output with switched reference signals (ZA or ZA2) or end of travel switching only (ZAS).

## ZC

The convex top profile of the ZC handle allows for simple thumb control of the JC400 range. 'Person present' switch functions can be incorporated by using the ZC1 external button switch or the ZCS internal switch to verify the change in signals from the joystick, which may help to increase the integrity of your control system.



## SW

The cylindrical profile of the SW handle allows full grip use when controlling the JC400 range. 'Person present' switch functions can be incorporated by using a choice of three switch arrays which can offer a combination of finger and thumb activation. The external button switches can be used to verify the change in signals from the joystick, which may help to increase the integrity of your control system, or enable control of additional functions.

# ZA HANDLE OPTION

## PERFORMANCE

	ZA, ZA2	ZAS
Max height above flange	mm	80
Maximum diameter	mm	39
Operating temperature	°C	-25 to +50
Environmental sealing (IEC 60529)		IP65

## Z AXIS MECHANICAL

### Handle rotational torque

breakout	Nm	0.1
operating	Nm	0.15 to 0.25
maximum allowable	Nm	1
Handle mechanical angle	°	±29 to ±30
Handle action		Self centering
Expected life		1 million operations

## Z AXIS ELECTRICAL

### Analogue track (ZA and ZA2 only)

Resolution		Virtually infinite	Center tap angle	°	±2.5
Track resistance ±20%	kΩ	3.1 or 5.4 (ZA2)	Supply voltage - maximum	Vdc	30
Track operating angle	°	±27	Wiper circuit impedance	MΩ	> 0.1**
Output voltage range	%	7.93 or 25.75 (ZA2) of input	Power dissipation @ 20°C	W	0.25(no load)
Center tap voltage (no load)	%	47 - 53 of applied voltage			

\*\* The long life resistive elements require a high impedance load in the wiper circuit to minimise the current flowing through the wiper for optimum conditions

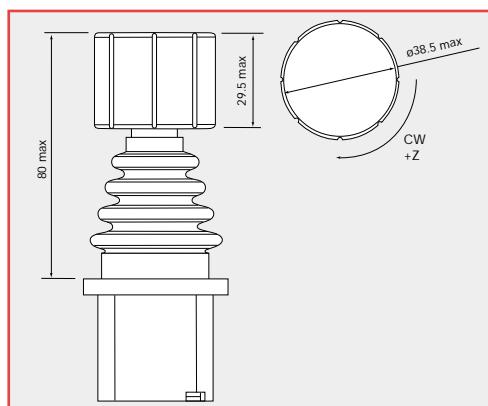
## Z AXIS ELECTRICAL

### Directional or Centre Switch

Switch operating angle	°	ZA, ZA2	ZAS
4 either side of center (±1)		20 either side of center (±2)	
30		30	
2 (resistive)		2 (resistive)	

## DIMENSIONS

Note: drawings not to scale



### Installation note

The protective rubber cap must be removed before fitting the joystick through the mounting hole. Re-fit the rubber cap after mounting in the panel.

## ELECTRICAL CONNECTIONS

Leads exit from the underside of the mounting flange. PVC insulated 7/0.2 (24AWG) flying leads, 240mm long

Description	Flylead colour	ZAS
Z axis positive voltage supply	Yellow/Red	-
Z axis center tap	Blue	-
Z axis negative or zero voltage supply	Violet	-
Z axis output voltage signal	Pink	-
Z switch track N/O (handle CW +Z)	Yellow/Black	Yellow/Black
Z switch track N/O (handle CCW -Z)	White/Red	White/Red
Z switch track common	Red/Blue	Red/Blue

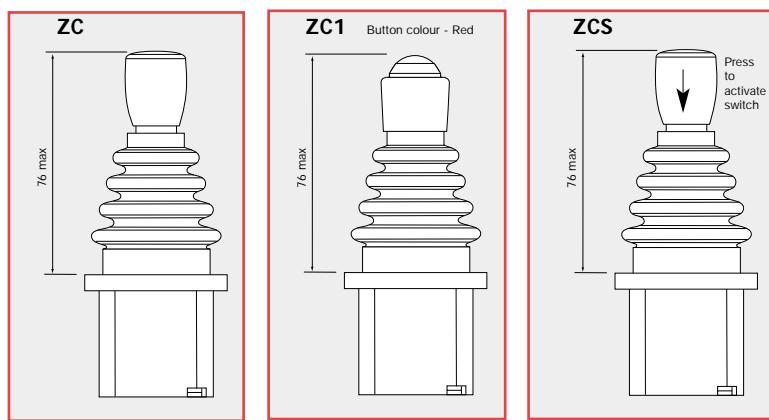
# ZC HANDLE OPTION

## PERFORMANCE

	ZC	ZC1	ZCS
Max height above flange	mm	76	76
Maximum diameter	mm	23	23
Environmental sealing (IEC 60529)		IP65	IP65
Number of switches		0	1
Action	-	Momentary button	Momentary handle depress
Switch operating force	N	-	3
Maximum current	mA	-	200 @ 50Vdc
Expected life	(operations)	-	1 million
			500,000

## DIMENSIONS

Note: drawings not to scale



## ELECTRICAL CONNECTIONS

Leads exit from the underside of the mounting flange. PVC insulated 7/0.2 (24AWG) flying leads, 240mm long

### Description

Common terminal  
N/O contact switch 1

### ZC1/ZCS Flylead colour

Red/Green  
White/Black

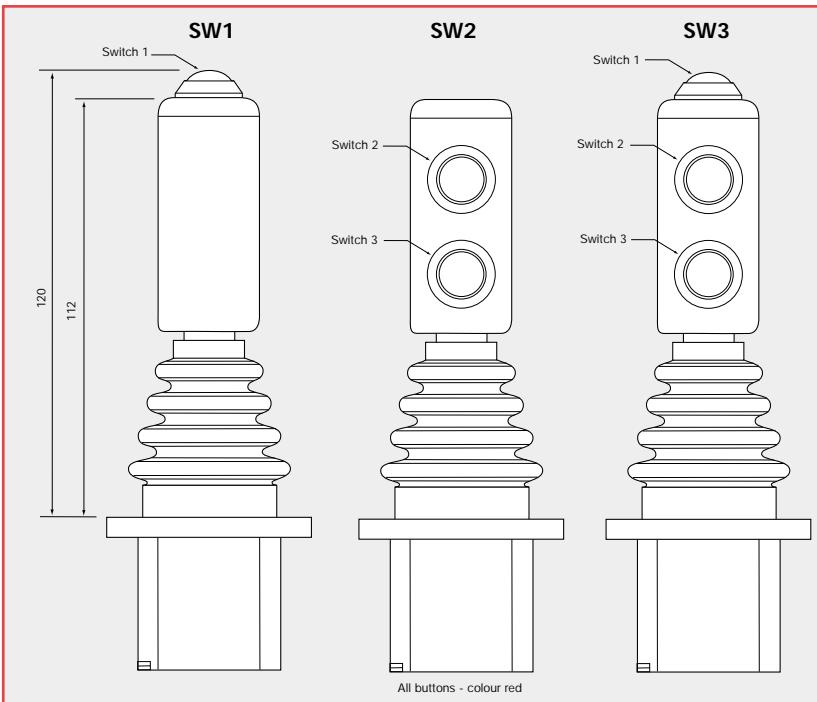
# SW HANDLE OPTION

## PERFORMANCE

	SW1	SW2	SW3
Max height above flange	mm 120	mm 112	mm 120
Maximum diameter	mm 28	mm 28	mm 28
Environmental sealing (IEC 60529)	IP65	IP65	IP65
Number of switches	1	2	3
Action	Momentary button		
Switch operating force	N 3		
Maximum current @ 50Vdc	mA 200		
Expected life (operations)	1 million		

## DIMENSIONS

Note: drawings not to scale



## ELECTRICAL CONNECTIONS

Leads exit from the underside of the mounting flange. PVC insulated 7/0.2 (24AWG) flying leads, 240mm long

Description	Flylead colour		
	SW1	SW2	SW3
Common terminal	Black	Black	Black
N/O contact switch 1	White	-	White
N/O contact switch 2	-	Pink	Pink
N/O contact switch 3	-	Yellow	Yellow

**This handle option is not available with JC400 Digital Output**