CURTISS-WRIGHT

JC6000 MULTI AXIS JOYSTICK CONTROLLER

SEALED TO IP66
Operates in hostile environments

HALL EFFECT SENSING
Long life & maintenance free operation

HIGH STRENGTH LEVER
Rugged and smooth lever movement

INNOVATION IN MOTION

The JC6000 rugged joystick controller is designed for demanding operator control applications in off-highway vehicles and other man-machine interfaces, where strength, reliability, and handle functionality are important. Available in one or two axis configurations, this joystick can be supplied with non-contact Hall effect sensors rated to 15 million operations or a legacy version utilising long life potentiometer tracks is also available.

The JC6000's compact size, high lever strength and superb proportional control are ideal for applications which include operator controls on a wide range of off-highway vehicles, including cranes, loaders, excavators, access platforms, tractors and harvesters.

Features	Benefits
• High strength lever with superb proportional control	Rugged and smooth lever movement
• Sealed above the panel to IP66	Operation in hostile environments
• Hall effect sensing	Long life and maintenance-free operation
• Choice of outputs and switches	Enables user configuration for system safety
• Choice of handles/grips with or without switches	Additional operator control functions
• Interchangeable with JC600 model	Improved performance within the same footprint
• Single or dual axis control	Suited to a range of operator control functions

Handles and grips

The JC6000 can be specified with a choice of handles and grips to increase the functionality of the operator controls. With a choice of push buttons, trigger grips, proportional and switched rockers in a variety of different configurations, users can match their handle selection to suit their unique application.

Innovative design

The JC6000 can be configured to provide a range of output signals, directional and center switching functions. Mechanical features such as lever forces, and handle styles can be configured. CAN outputs can be specified on the Hall sensor version for digital communication with vehicle systems.

The JC6000 with the Hall sensors option has dual outputs fitted as standard, allowing the signals to be monitored and compared for failure detection in safety critical applications. Additional independent switch functions can be specified for directional and center position indication - vital for vehicle system start-up safety.

Quality Assurance
Curtiss-Wright is accredited to BS EN ISO9001:2015
Certificate Number FM 21061
Quality is at the heart of all our systems ensuring the reliability of our products from initial design to final despatch.

PERFORMANCE

MECHANICAL

Lever operating force		
breakout*		7 or 16
operating*	**N**	19 or 39 (full deflection)
maximum allowable**	**N**	390 (490 overload)
Lever mechanical angle		
single axis only	**°**	±20 forward/reverse
square gate		±20 in X and Y directions
Seat		preferred bias on axis
Expected life		15 million operations (5 million for potentiometer track version)
Weight	**g**	750 without handle fitted

* Measured at 55mm above upper flange face ** Measured 130mm above upper flange face

ENVIRONMENTAL

Operating temperature	**°C**	-25 to +80 (-25 to +80 with microswitches)
Storage temperature	**°C**	-25 to +85 (-25 to +85 with microswitches)
Environmental protection (above the flange)		IP66 IEC 60529 (fitted with HKN handle)
Vibration		Level ±3g,10Hz to 200Hz (random) @ 3.6g(rms)
Shock		20g, 6mS, half sine profile
EMC immunity level		100V/m, 30MHz to 1GHz, 1KHz 80% sine wave modulation, EN50082-2 (1995)
EMC emissions level		Complies with EN50081-2 (1993), 150kHz to 30MHz, level B
ESD immunity level		IEC61000-4-2 level 4 8kV contact discharge, 15kV air discharge

ELECTRICAL - HALL EFFECT SENSOR

Resolution		Infinite
Supply voltage range	**Vdc**	5 ±0.5 regulated transient free
Over voltage (maximum)	**Vdc**	15 continuous
Reverse polarity (maximum)	**Vdc**	14.5
Output voltage span - options	**Vdc**	±25% span - nominal 1.1 to 3.9
		±30% span - nominal 1.0 to 4.0
		±40% span - nominal 0.5 to 4.5
Load impedance (minimum)	**k**	5
Center voltage (no load)	**%**	48 - 52 of supply voltage
Current consumption	**mA**	13 per axis (6.5 per sensor)
Insulation resistance		Greater than 50M at 50Vdc
Output sense		The dual outputs rise together in the same direction, increasing with lever forward (and right), decreasing with lever backward (and left)
Output matching		See maximum output difference diagram below

ELECTRICAL CONNECTIONS

All Hall sensor connections terminate in a 12-way AMP 040 series multi-lock connector in the joystick base. See page 8 for pin identities

Mating 12 way connector and pins	SA48061 (AMP 040 12 way connector 174045-2; pins 175062-1)
Mating 12 way harness	P49779 (connector, pins and 380mm long cable)

ELECTRICAL - POTENTIOMETER TRACK

Resolution		Virtually infinite
Track resistance ±20%	**k**	1.8, 2, 2.9, 5
Track operating angle	**°**	±18
Output voltage range	**%**	0-100, 10-90, 25-75 of input
Center tap voltage	**%**	48 - 52 of applied voltage
Center tap angle	**°**	±2.5
Center tap to switch alignment	**°**	Within 0.5
Supply voltage maximum	**Vdc**	32
Wiper circuit impedance	**M**	1 minimum recommended*
Power dissipation @ 25°C	**W**	0.25
Insulation resistance		Greater than 15M at 50Vdc

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

ELECTRICAL - DIRECTIONAL OR CENTER SWITCH (LOW CURRENT)

Not available with CANbus output

Switch operating angle	**°**	1.5 or 5 either side of center
Supply voltage maximum	**Vdc**	35
Load current maximum	**mA**	200 resistive

ELECTRICAL CONNECTIONS

All primary potentiometer track and directional/center switch connections terminate in a 16-way AMP 040 series multi-lock connector in the joystick base. Secondary potentiometer track connections terminate in an 8-way AMP 040 series multi-lock connector. See page 7 for pin identities

Mating 16 way connector and pins	SA47931 (AMP 040 16 way connector 174046-2; Pins 175062-1)
Mating 16 way harness	P49780 (connector, pins and 380mm long cable)
Mating 8 way connector and pins	SA304522 (AMP 040 8 way connector 174044-2; pins 175062-1)
Mating 8 way harness	P303083 (connector, pins and 380mm long cable)

ELECTRICAL - MICROSWITCH

Not available with CANbus output

Switch configuration		Two switches per axis. Normally open at lever center position
Switch operating angle	**°**	2 to 5 either side of center
Contact rating		3A @125Vac, 2A @ 30Vdc
Switch life minimum		100,000 cycles, cycled at 1Hz, 1A and 12Vdc
Operating temperature	**°C**	-25 to +85

ELECTRICAL CONNECTIONS

Microswitch connections in the potentiometer joystick will replace the low current directional/center switches in the 16-way AMP 040 series multi-lock connector in the joystick base. In the Hall sensor joystick, switches terminate in the 8-way connector. See Electrical Connections on page 8 for pin identities

CAN OUTPUT VERSION

JC6000 with Hall sensing option can also be supplied with an integrated CANBUS output offering the J1939 protocol. This CANBUS interface meets the requirements of IEC61508 SIL level 1

Supply voltage range	**Vdc**	9 to 36
CAN version		CAN 2.0b
Protocol		J1939
Under-panel sealing		IP66 IEC60529

ELECTRICAL CONNECTIONS

All connections terminate in the 6-way Deutsch DTM04-6P integrated connector

Mating connector and pins	P304844 (includes 390mm flying leads)

PERFORMANCE OPTIONS

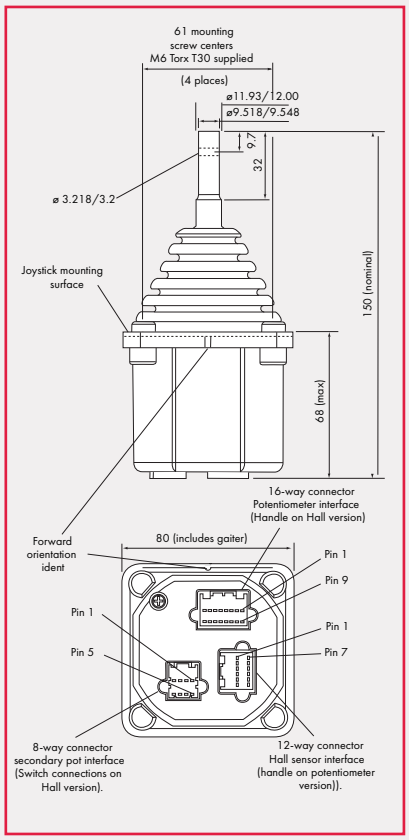
		CODE
AXES	Single	**NY**
	Dual	**XY**
SENSING	**Potentiometer Px** or **Pxx** selected from below	**P**
Output	5k 0-100%, ±5° directional switch	**E**
	1.8k 0-100%, ±5° directional switch	**N**
	2.9k 25-75%, ±1.5° directional switch	**Q**
	2k 10-90%, ±1.5° directional switch	**R**
	2k 10-90%, ±5° directional switch	**S**
	2.9k 25-75%, ±5° directional switch	**T**
	Dual outputs per axis, 2k 10-90%, ±1.5° directional switch	**U**
Output	**Dual Hall Effect** sensors each axis **Hxx** with output selected from below	**H**
	Dual Hall Effect sensors each axis and ±1.5° directional switch **Bxx** with output selected from below	**B**
	1.1Vdc to 3.9Vdc	**K**
	1.0Vdc to 4.0Vdc	**L**
	0.5Vdc to 4.5Vdc	**M**
	CANbus Output	**HC**
	Single Axis/Dual Axis	**1 or 2**
	Note: Directional track switches not currently available with CANbus output.	
LEVER SPRING FORCE	Heavy duty, 16N breakout, 39N full deflection	**H**
	Medium duty, 7N breakout, 19N full deflection	**M**
GATE	Square ±20° mechanical angle in X and Y directions	**S**
MECHANICAL FEATURES	No lock or detents fitted	**NL**
MICROSWITCH	No switch fitted	**N**
	High current microswitches, 2A @ 30Vdc (Not available with CANbus output)	**Y**
INTERFACE	Standard interface (no electronics)	**STN**
	CANbus output, SAE J1939 protocol	**JR1**
	1000 CAN counts	**JL1**
	Source Address 33 (HEX)	**JC1**
	Source Address 34	**JA1**
	Source Address 35	
	Source Address 36	
HANDLE/GRIP STYLE **See pages 9-15**	Standard knob, no functions	**HKN**
	Hand grip with options for buttons or rocker	**HB**
	Ergonomic grip with multiple buttons and proportional rockers	**A**
	Trigger grip with optional rocker switching	**MG**
	No handle	**NH**
	No handle, flying leads fitted (allows customer to fit own handle.)	**NHF**

EXAMPLE ORDER CODE	**JC6000 - XY- PRR - H - S - NL - N - STN - HKN**

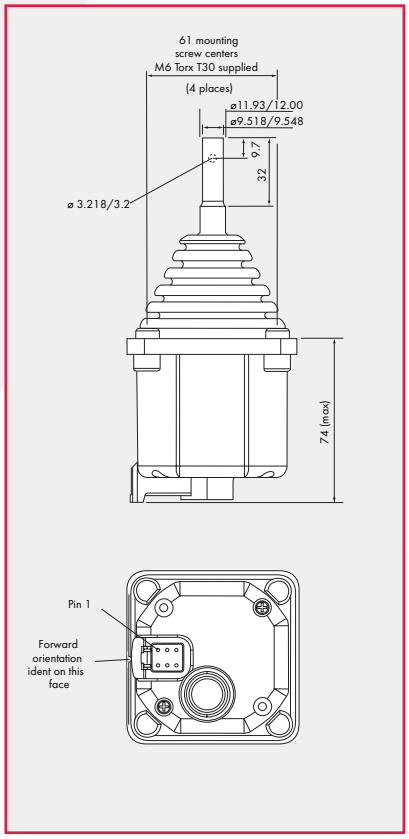
DIMENSIONS

Note: drawings not to scale

POTENTIOMETER AND HALL EFFECT CONTROLLER



CAN OUTPUT CONTROLLER



INSTALLATION

The joystick is designed to be fitted from below the mounting panel, through a 0mm diameter hole. The effectiveness of the joystick flange sealing is dependent on the panel mounting surface being sufficiently rigid to compress the sealing gaiter. The surface finish of the mounting panel is 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

Fixing screws can be driven to a maximum torque of 5Nm when clamped against a 3.5mm thick panel.

The mounting hole depth is 12.6mm. For through-hole installation, the screws can be driven at a torque of 3.5Nm directly through the blind cast holes to remove the cast covers. The joystick mounting flange should be connected to the vehicle chassis or reference plane (normally zero volts).

CAN OUTPUT OPTIONS

The sealing of the lower cover meets the requirements of IP66 (IEC 60529) and uses an integrated Deutsch DTM04-6P 6 pin connector with the cover. The use of a suitable sealed mating connector will enable a full IP66 connection to be made. The cover also includes an integrated breather system to ensure pressure regulation under all barometric pressure and temperature conditions without moisture ingress into the joystick.

See next page for electrical connections

ELECTRICAL CONNECTIONS

	Pin number	*Potentiometer tracks*	*Hall effect sensors*
16-way primary connector	1	Y switch track N/O (lever forward +Y)	Pins 1 to 12 used for handle connections
	2	X switch track center on	See chosen handle style for details
	3	X pot track left	-
	4	X pot track wiper signal	-
	5	X pot track right	-
	6	X pot track center tap	-
	7	X switch track common	-
	8	X switch track N/O (lever left -X)	
	9	Y pot track backward	-
	10	Y pot track wiper signal	-
	11	Y pot track forward	-
	12	Y pot track center tap	-
	13	Y switch track common	Not connected
	14	Y switch track N/O (lever backward -Y)	Not connected
	15	X switch track N/O (lever right +X)	Not connected
	16	Y switch track center on	Not connected
8-way secondary connector (where fitted)	1	Secondary Y pot track backward	Forward (directional or micro) switch common
	2	Secondary Y pot track center tap	Forward switch output
	3	Secondary Y pot track wiper signal	Backward switch output
	4	Secondary Y pot track forward	Backward switch common
	5	Secondary X pot track right	Left switch common
	6	Secondary X pot track wiper signal	Left switch output
	7	Secondary X pot track center tap	Right switch output
	8	Secondary X pot track left	Right switch common
12-way connector	1	Pins 1 to 12 used for handle connections	+5V supply - sensors 3 and 4
	2	See chosen handle style for connection details	0V supply - sensors 3 and 4
	3	-	
	4	-	0V supply - sensors 1 and 2
	5	-	Forward / backward output - sensor 3
	6	-	Left / right output - sensor 2
	7	-	Left / right output - sensor 4
	8	-	Forward / backward output - sensor 1
	9	-	Not connected
	10	-	Not connected
	11	-	Not connected
	12	-	Not connected
6 pin Deutsch connector CAN output	1	Not available	Not available
	2	Not available	Not available
	3	Not available	Not available
	4	Not available	Not available
	5	Not available	Not available
	6	Not available	Not available

HANDLE OPTIONS

HKN

The HKN handle is the simplest option available for the JC6000. This handle does not include any additional functionality, but is designed to allow the joystick to be controlled by the operator gripping the handle palm downwards.

NH or NHF

These options are selected when no handle is required to be fitted. NHF option has wires fitted to the joystick connector on the base, through the operating lever.

HB

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 'Person Present' feature or, for example, the steer signal for an access platform.

A RANGE

Designed 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 'Person Present' switches. The handle can be specified with two independent analogue outputs generated by proportional rockers which, in turn, provide auxiliary directional switching in addition to the potentiometric output. When coupled with the two axis JC6000 base joystick this unit can provide a four-axis controller.

This handle can also be purchased separately, for fitting to customer levers or assemblies. Submit an equiry form or contact our sales tesm for more details on this option.

MG

Designed to provide a simple approach to a 'Person Present' handle whilst offering the flexibility of switch options in the top of the handle. The profile of the MG handle ensures the operator's fingers are permanently close to the buttons, minimising operator fatigue and maximising functional control. The handle can be supplied with or without a hand rest and can be configured with a combination of trigger of trigger lever, single or dual switches.

This handle can also be purchased separately, for fitting to customer levers or assemblies. Ask our sales team for more details on this option.

HANDLE OPTIONS

HI

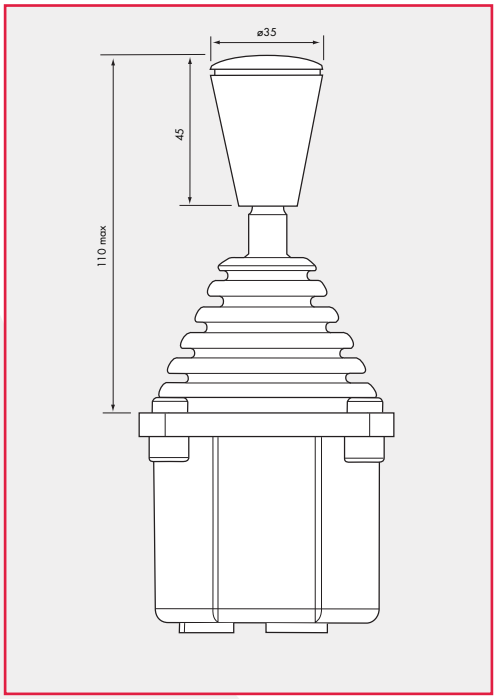
The HI Grip is available as a left-hand or right-hand option, offering a wide range of proportional, non-contacting roller and high-life, push-button switch combinations. A contoured front panel means the rollers are within an easy sweep of an operator's thumb, while the switch arrays are angled to allow for similarly convenient actuation. The controls on the rear panel are situated to provide comfortable operation with a first finger. To further enhance operator comfort, both handed options are oriented to lean forward and inwards. For maximum, application-specific flexibility, each roller and switch is offered in nine color options. Further customization is possible by a choice of 16 logos which can be printed in each of the switches.

HE

The HE grip has been ergonomically designed to fit comfortably in either hand – eliminating the need for separate left- and right-hand mouldings – , and its main body is molded as a single component to improve rigidity and strength. This grip can incorporate as many as fifteen functions including three analog controllers (rollers) in the front face and a 'Person Present' trigger switch, and is available with a choice of three different switch types in six different colors as standard. All switches are environmentally sealed to IP66 and the grip's flow-in /flow-out design ensures there are no negative effects from water ingress.

HKN HANDLE OPTION

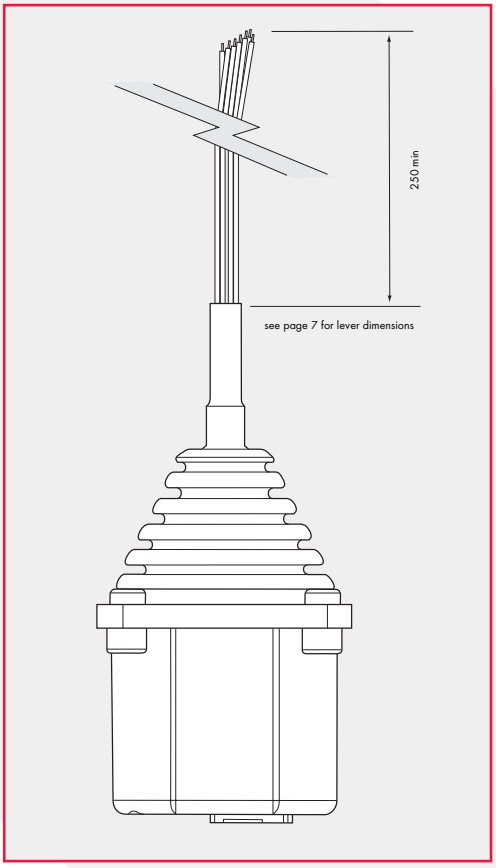
DIMENSIONS



NH OR NHF HANDLE OPTIONS

ELECTRICAL CONNECTIONS

Wire size	28AWG
Wire current	1.4A



NH option has no wires fitted.

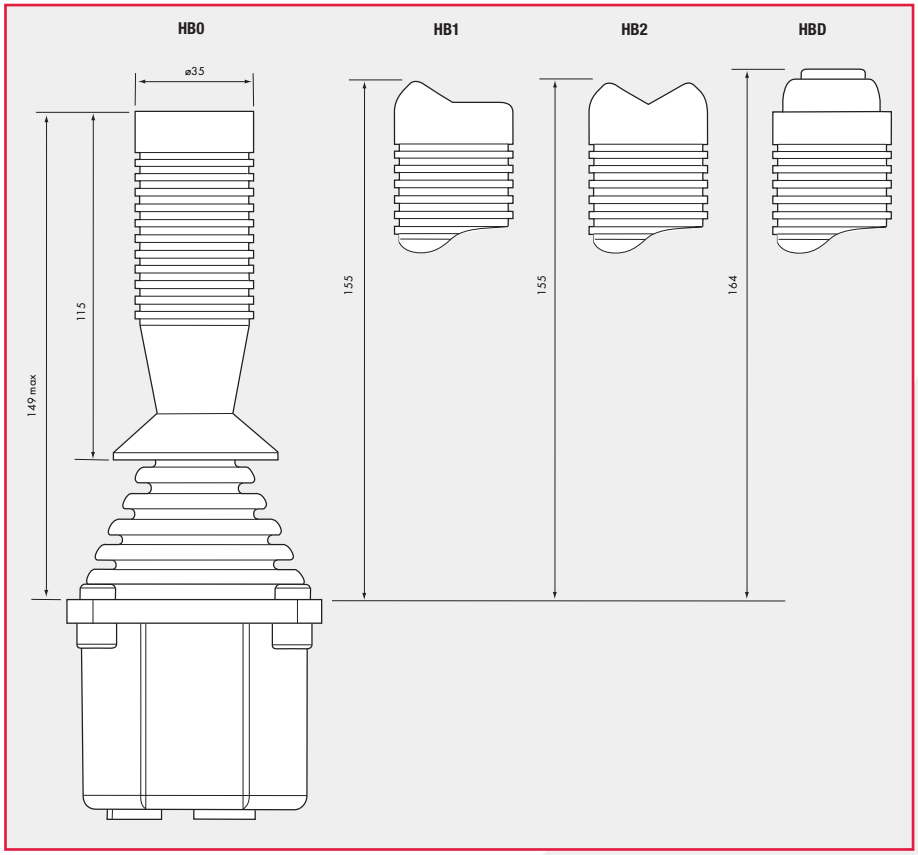
NHF option allows customer to fit own handle style to joystick operating lever.

Pin	***Wire color***
1	Grey
2	Yellow
3	Red
4	Orange
5	Brown
6	Black
7	Green
8	White
9	Blue
10	Violet
11	Pink
12	Red/Yellow
13	Not connected
14	Not connected
15	Not connected
16	Not connected

NHF handle option note: Wires terminate on the 12-way connector (Potentiometer version), or the 16-way connector (Hall sensor version).

HB HANDLE OPTIONS

DIMENSIONS



SPECIFICATION		HB0	HB1	HB2	HBD
Maximum height above flange	**mm**	149	155	155	164
Maximum grip diameter	**mm**	35	35	35	35
Environmental sealing (IEC 60529)		IP65	IP65	IP65	IP65
Number of switches		0	1	2	1
Action			Momentary rocker	Momentary rocker	Momentary button
Switch operating force	**N**	-	-	-	7
Maximum current @ 30Vdc	**A**	-	2.5	2.5	5
Expected life (operations)		100,000	100,000	100,000	100,000

ELECTRICAL CONNECTIONS			
Common terminal	11	11	11
N/O contact switch 1			
N/C contact switch 1	1		
N/O contact switch 2		1	

Note: Signals terminate on the 12 way connector (potentiometer version) or the 16 way connector (Hall sensor version)

A RANGE HANDLE OPTIONS

SPECIFICATION

Maximum height above flange	**mm**	166
Maximum grip diameter	**mm**	61
Environmental sealing (IEC 60529)		IP65
Number of switches		1 to 6 in the top plate
Action		Momentary button
Switch operating force	**N**	3
Maximum current @ 50Vdc	**mA**	200
Expected life (operations)		1 million
Weight	**g**	170 - A2LD option
Operating temperature	**ºC**	-40 to +70
Storage temperature	**ºC**	-40 to +80

ROCKER

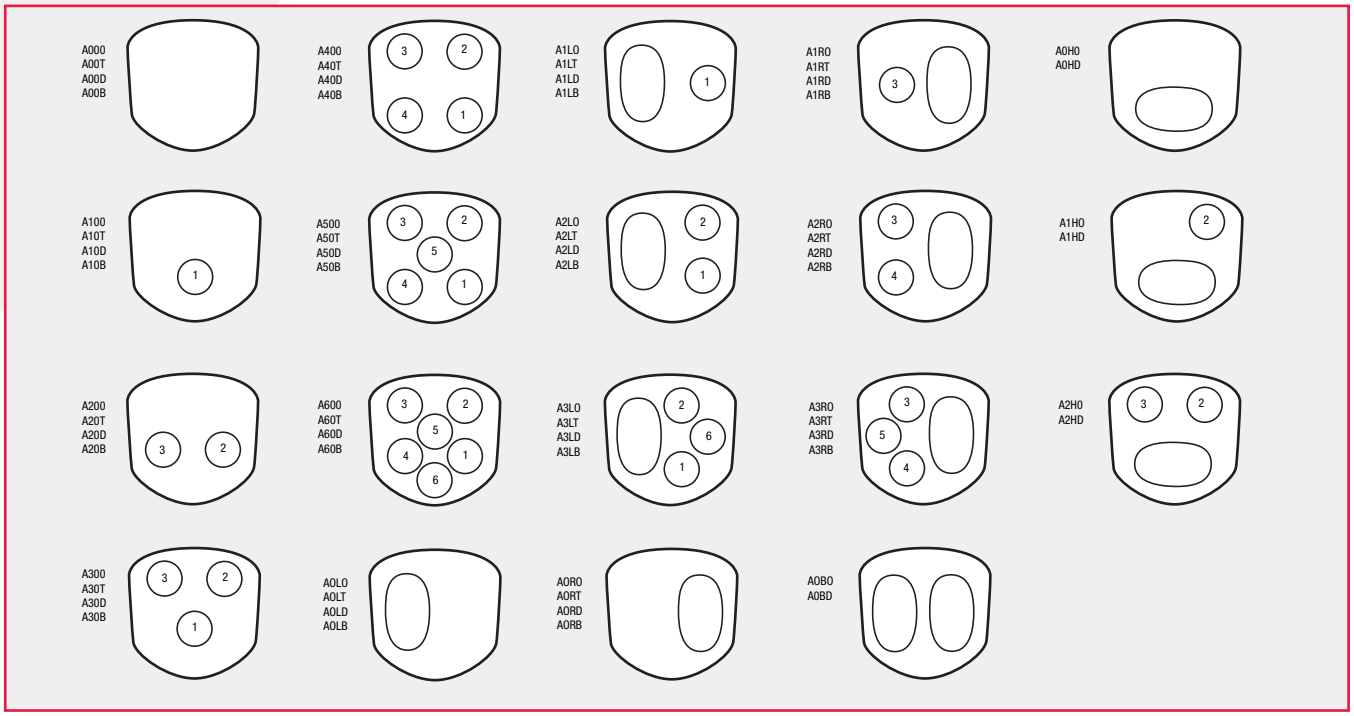
Rocker profile		Standard (S) or V profile (V)
Breakout force	**N**	5 at the end of the rocker
Operating force	**N**	15 at the end of the rocker
Mechanical movement	**°**	±10 (±1°)
Electrical movement	**°**	±9 (±1°)
Expected life (operations)		5 million
Load current (maximum)	**mA**	200 (see note on page 5)
Power dissipation @ 25°C	**W**	0.25
Track resistance		Will match JC6000 Y axis resistance †
Output voltage		Will match JC6000 Y axis output †
Center tap angle	**°**	±1.5
Directional or center off switch		Standard
Switch gap	**°**	2.5 either side of center
Switch supply voltage	**Vdc**	35

† unless requested otherwise

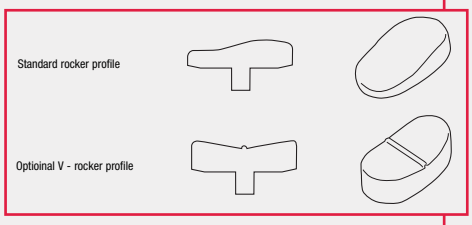
FUNCTIONALITY

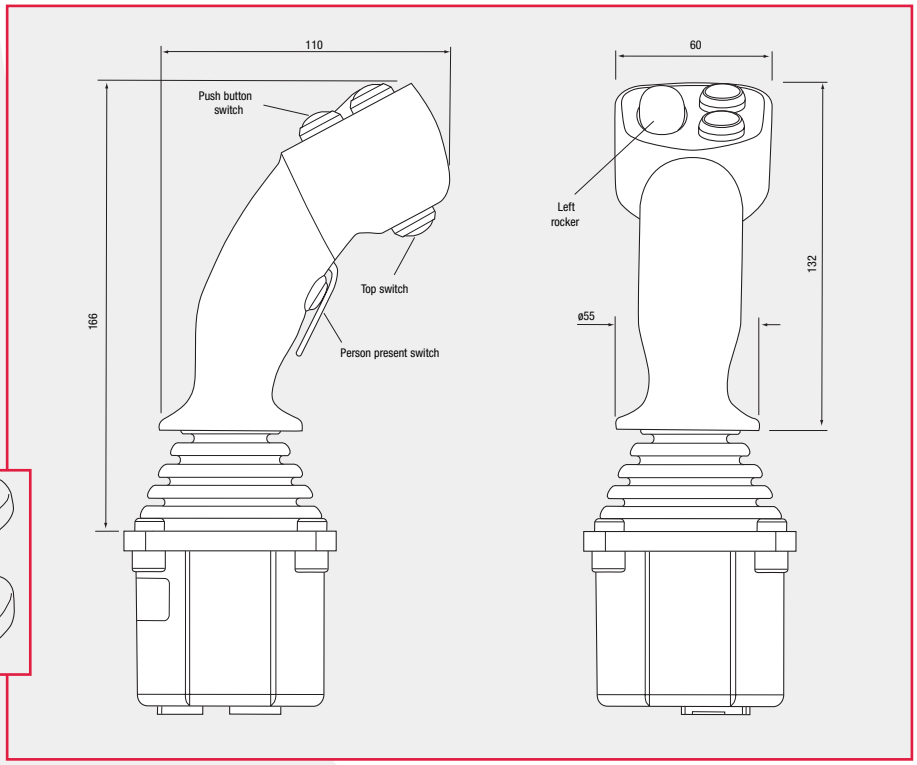
	SWITCHES								ROCKERS		
	1	2	3	4	5	6	TOP	Person Present	LEFT	RIGHT	HORIZONTAL
SWITCH 1		✓	✓	✓	✓	✓	✓	✓	✓		
SWITCH 2	✓		✓	✓	✓	✓	✓	✓	✓		✓
SWITCH 3	✓	✓		✓	✓	✓	✓	✓		✓	✓
SWITCH 4	✓	✓	✓		✓	✓	✓	✓		✓	
SWITCH 5	✓	✓	✓	✓		✓	✓	✓		✓	
SWITCH 6	✓	✓	✓	✓	✓		✓	✓	✓		
TOP SWITCH	✓	✓	✓	✓	✓	✓		✓	✓	✓	
PERSON PRESENT	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
LEFT ROCKER	✓	✓				✓	✓	✓		✓	
RIGHT ROCKER			✓	✓	✓		✓	✓	✓		
HORIZONTAL		✓	✓					✓			

SWITCH AND ROCKER OPTIONS



DIMENSIONS





ELECTRICAL CONNECTIONS

	Pin	Wire color		Pin	Wire color
Common terminal (for all switches)	11	Black	**Rocker center tap**	6	Yellow/Red*
Switch 1	4	Blue	**Rocker zero or negative supply (L, R or H)**	10	Pink/Grey
Switch 2	3	Yellow	**Rocker output signal (L or H only)**	5	Pink
Switch 3	2	Blue/White	**Rocker output signal (R)**	9	White
Switch 4	1	White/Green	**Rocker switch common**	11	Black
Switch 5	†	Red	**Rocker switch (L forward)**	2	Blue/Orange
Switch 6	†	Violet	**Rocker switch (L backward)**	1	Green
Top switch	†	Pink with marker	**Rocker switch (R forward)**	3	Yellow
Person present switch	12	Red/Green	**Rocker switch (R backward)**	4	Blue
Person present switch	8	Black/White	**Rocker switch (H left)**	4	Blue/Orange
Rocker positive supply (L, R or H)	7	White/Red	**Rocker switch (H right)**	1	Green

† depends on other options selected

*Center tap not connected on A3LB and A3RB handles

Note: Signals terminate on the 12-way connector (Potentiometer version), or the 16-way connector (Hall sensor version)

ORDERING CODES

A - 2 - L - D - R - S

Push button
select 1 to 6 in the top plate

Rocker position
O = None
L = Left
R = Right
B = Both
H = Horizontal

Rocker profile
S = Standard
V = V profile

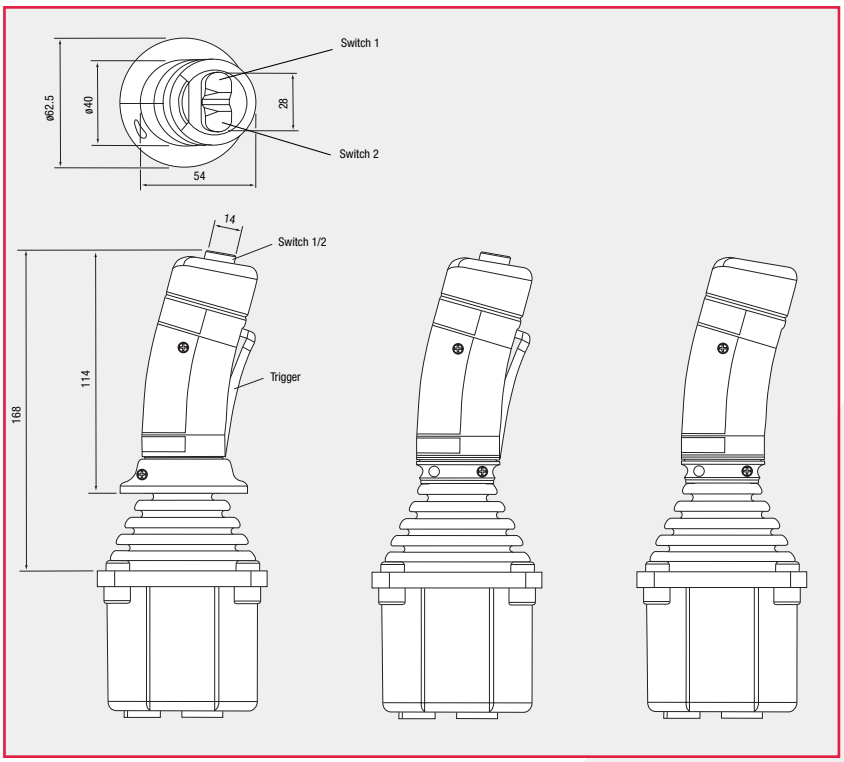
Rocker resistance code
(See page 6 for codes)

Additional switches
O = None
T = Top
D = Person Present (Deadmans)
B = Both

Note: When ordering a handle fitted with a rocker, two profiles can be supplied (S = standard profile; V = v profile) please specify style when ordering.

MG HANDLE OPTIONS

DIMENSIONS

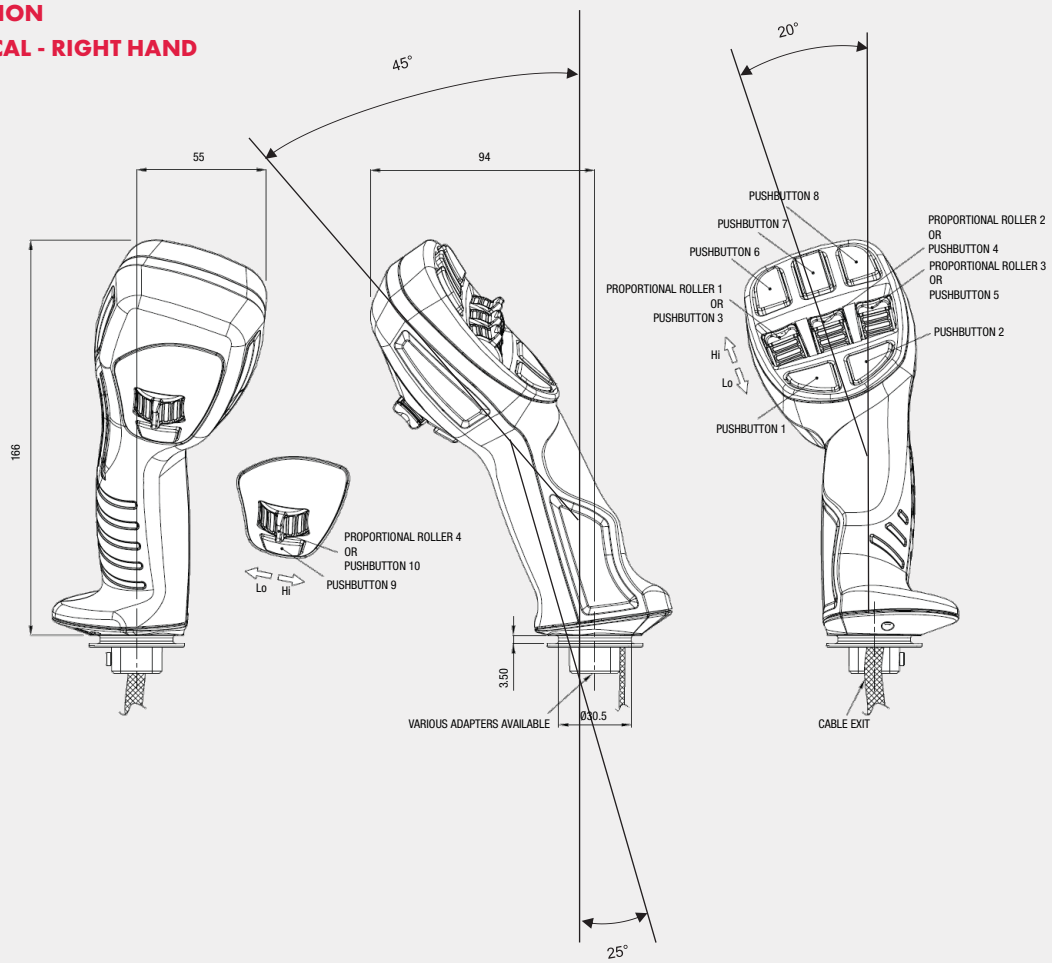


SPECIFICATION

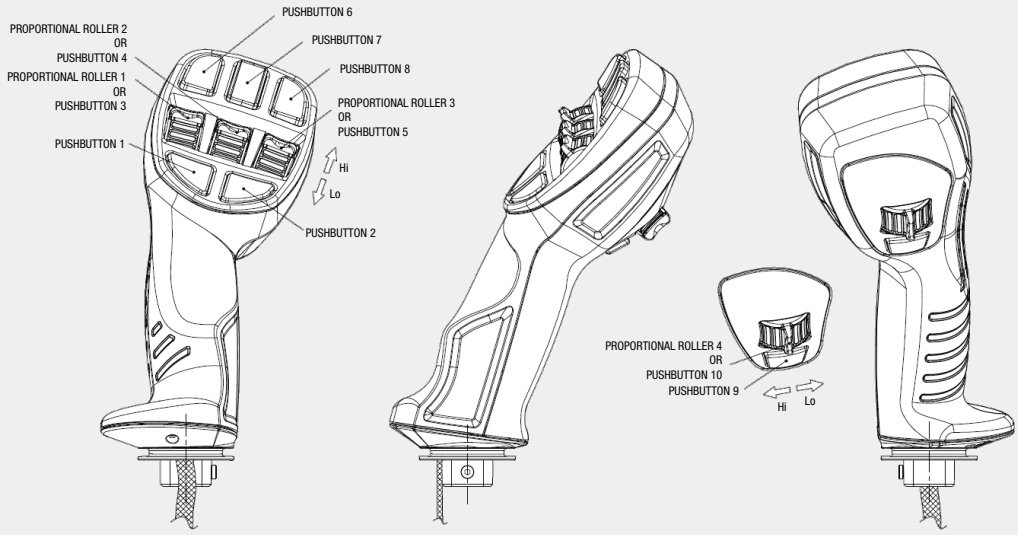
Maximum height above flange	**mm**	168
Maximum grip diameter	**mm**	40
Environmental sealing (IEC 60529)		IP67 (IP66 with trigger switch)
Number of switches		0 to 3
Action		Momentary Button, Rocker or Trigger
Switch operating force		
Trigger	**N**	5
Switch 1 or 2	**N**	7
Maximum current @ 30Vdc	**mA**	100
Expected life (operations)		1 million
Operating temperature	**°C**	-25 to +75
Storage temperature	**°C**	-30 to +80

HI HANDLE OPTIONS

INSTALLATION
MECHANICAL - RIGHT HAND



MECHANICAL - LEFT HAND



Panel cut-out for both left- and right-hand options is 70mm.

SPECIFICATIONS

ELECTRICAL - ROLLERS

Supply voltage	5Vdc ± 0.5Vdc for the rollers
Current consumption	32mA max. per roller
Roller output voltage (factory set)	10% to 90% of the Supply Voltage
Centering accuracy	50% ± 5.5% of the Supply Voltage
End accuracy	Low end: 10% +4.0/-2.0% of the Supply Voltage High end: 90% +2.0/-4.0% of the Supply Voltage
Output impedance	100Ω nominal
Output sense	The output will increase in the +ve direction – see the installation diagrams for details of the +ve direction
Supply reverse polarity protection	-10Vdc continuous
Insulation resistance @ 10vdc	>10MΩ

ELECTRICAL - SWITCHES

Contact rating	24V, 50mA maximum per switch
Contact resistance	30 mΩ maximum
Insulation resistance	>10 MΩ
Electrical life	5-million cycles at maximum power
Contact bounce	2ms maximum

MECHANICAL - GRIP

Maximum overload - static	600N – applied at the center of the grip
Maximum overload - impact	10J
Maximum torque	40Nm
Weight	290g nominal

MECHANICAL - ROLLER

Breakout force	2N nominal	
Maximum overload at end of travel	50N - applied perpendicular to tab	
Operating angle	±35° for front roller(s) ±25° for rear roller	
Mechanical life	5-million cycles	One cycle is defined as moving from center to the end of travel, returning past the center to the other end and back to center

MECHANICAL - SWITCHES

Switch type	Momentary - normally open
Switch travel	1mm
Operating force	3.5N nominal
Maximum overload	115N
Mechanical life	5-million operations

MATERIALS

Gaiter	Silicone
Grip moldings	Zytel 70G30L and 101L (glass-loaded Nylon 66)
Button actuator	Lexan 123R (Polycarbonate)
Roller	Delrin 500 AL (Acetal)

EMC AND MAGNETIC FIELD

EMC immunity level	ISO 11452-2: 2004	80% AM peak modulation, 150V/m, 80MHz - 3GHz
EMC emissions level	CISPR25	Frequency range: 30MHz - 1GHz, vertical & horizontal 30 - 230MHz: 36dB (µV/m) 230MHz - 1GHz: 43dB (µV/m)
ESD immunity level	ISO 10605: 2008	8kV contact (including wires); 15kV air discharge
Conducted immunity	ISO 7637-2: 2004/2001	Pulses 1, 2a, 2b, 3a, 3b & 4 to 12V standard Pulse 5a: (unclamped) Pulse 5a: (clamped)
Conducted disturbance immunity	ISO 11452-4: 2011	((BCI) 200mA 1 - 20MHz
Power field immunity	ISO 11452-8: 2007	100A/m 50 - 60Hz

ENVIRONMENTAL AND LEGISLATIVE

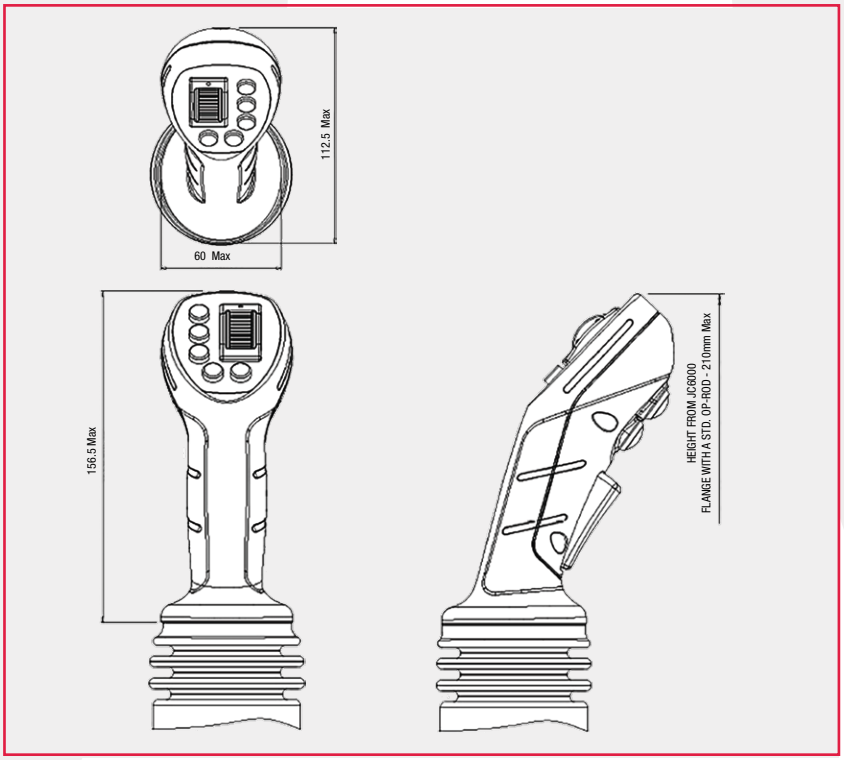
Operating temperature (cycling)	BS EN 60068-2-14: 2000	-40°C to 85°C
Storage temperature	Cold test to EN 60068-2-1: 1993 Dry heat to EN 60068-2-2: 1993	-40°C to 85°C
Temperature & humidity	BS EN 60068-2-38: 2009	Pt 2.1 Z/AD; 65°C for 10 cycles
Water and dust ingress	BS EN 60529 IP66 and IP67	"Flow-in, flow-out" design. The internal components are sealed to meet IP67. Unless fitted to a Curtiss-Wright joystick, the cable exit point is open and it is therefore the responsibility of the customer to ensure that the cable exit is adequately sealed for the application
Salt mist	EN 60068-2-11: 1999	96 hours
Vibration (sinusoidal)	EN 60068-2-6: 2008	3gn, 10-200Hz, 1h per axis
Vibration (random)	EN 60068-2-64: 2008	3.6gn, 10-200Hz, 2h per axis
Shock	EN 60068-2-27: 2008	50gn, ½ sine 6ms, 3 shocks in 6 directions
Bump	EN 60068-2-27: 2008	25g, 10ms, 500 bumps in each of 6 directions
MTTFd	940 years	

HE HANDLE OPTIONS

INSTALLATION

OVERALL DIMENSIONS

Configuration shown:
HE-GEN-RWLR-XX-XX-KRNN-N-2TR-M-NNN-S-XXX-G1



SPECIFICATIONS

ELECTRICAL – ROLLERS

Manufacturer	OTTO HTW Series
Sensor type	Hall-effect, non-contacting
Supply voltage	5Vdc ± 0.5V dc
Supply current	10mA max

ELECTRICAL – I SWITCH, REAR & SIDE SWITCHES

Manufacturer	ITW 59 Series
Switch type	Normally-open, momentary
Maximum switching voltage	28Vdc
Maximum switching current	100mA
Contact resistance	50m Ω maximum
Electrical life	500,000 cycles @ maximum power

ELECTRICAL – O SWITCH

Manufacturer	OTTO P9 Series
Switch type	Normally-open, momentary
Maximum switching voltage	28Vdc
Maximum switching current	100mA
Electrical life	25,000 cycles minimum

ELECTRICAL – K SWITCH, TRIGGER SWITCH AND PERSON PRESENT LEVER

Manufacturer	K12C Series
Switch type	Normally-open, momentary
Maximum switching voltage	28Vdc
Maximum switching current	100mA
Contact resistance	50m Ω maximum
Electrical life	1,000,000 cycles @ maximum power

ELECTRICAL – ROCKER SWITCH

Manufacturer	OTTO K1 Series
Switch type	Normally-open, momentary
Maximum switching voltage	28 Vdc
Maximum switching current	100mA
Electrical life	25,000 cycles

ELECTRICAL – SLIDE SWITCH

Manufacturer	APEM MT Series
Maximum switching voltage	28Vdc
Contact resistance	10m Ω maximum
Electrical life	25,000 cycles

ELECTRICAL – FLYING LEADS

Cable type	PTFE cable 30AWG (19/0.06mm)
Conductor diameter	0.32mm nominal
Insulation diameter	0.60-0.65mm
Length	300mm from base of grip

MECHANICAL – GRIP

Maximum overload - static	600N
Maximum overload - impact	10J
Person present lever & trigger overload	500N
Maximum torque	40Nm
Mass	300g for HE-GEN-RWLR-XX-XX-KRNN-N-2TR-M-NNN-S-XXX-G1

MECHANICAL – MOMENTARY SWITCHES

Mechanical life	1,000,000 cycles
Operating force - k switch	5N
Operating force - I switch	3N
Operating force - o switch	7.5N
Operating force - rear & side switches	3N
Operating force - trigger	7.5N
Operating force - lever	5N

MECHANICAL – SLIDE & ROCKER SWITCHES

Mechanical life	100,000 cycles

MECHANICAL – THUMB ROLLERS

Mechanical life	3,000,000 cycles
Operating force	3.3N breakout, 130N maximum

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CWIG-0001-0325