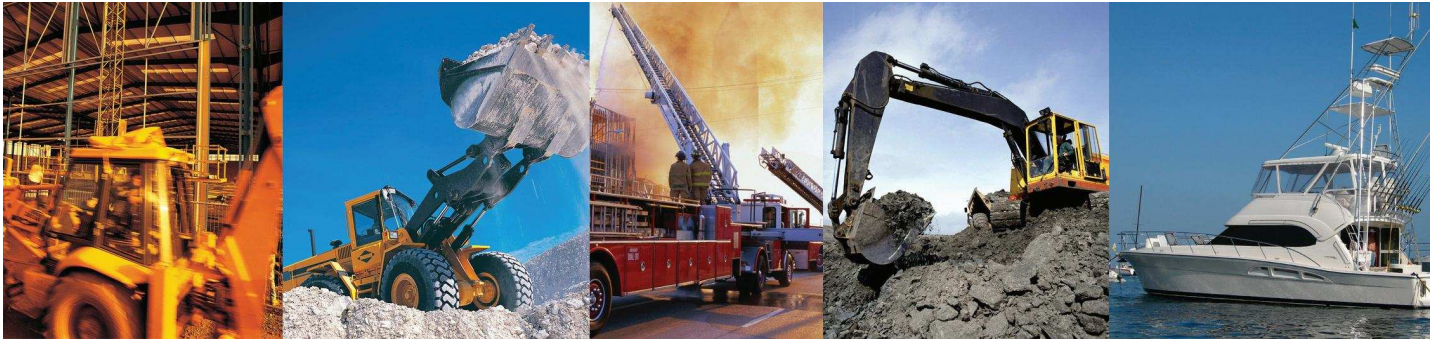


**CH**  
Products

an APEM Group Company

# HG series

Hand grip Hall effect joysticks



The HG Series joystick is a rugged Hall effect controller designed for use in high operating force, hand-operated applications requiring reliable positioning control. Available with several high-function handles and in single, dual or triple axes configurations, HG Series joysticks are custom configured to meet the exacting requirements of harsh applications. Typical applications include military vehicles, refuse handling trucks, as well as fire and off-highway vehicles.

## KEY FEATURES






- Rugged, hand operation
- Hall effect sensing
- Sealed up to IP68
- 10 million life cycles
- Redundant output available
- Analog, CANbus, USB and custom outputs available



# HG series

## Hand grip Hall effect joysticks

### OPTION SELECTION

HG								0		
<b>SERIES</b>		<b>TOP BUTTONS</b>		<b>LIMITER PLATE</b>		<b>OUTPUT OPTIONS</b>				
<b>0</b> None <b>1</b> One <b>2</b> Two <b>M</b> Multifunction* <small>* - Multifunction handle will be specified in an extension</small>		<b>S</b> Square  <b>R</b> Round  <b>X</b> Slotted  <b>Y</b> Slotted  <b>P</b> Plus 				<b>0-U</b> USB <b>0-D</b> Discrete <b>1-J</b> Cursor Emulation <b>2-C</b> CANbus <b>0</b> 0V to 5V (Rail to Rail) <b>1</b> 0.5V to 4.5V <b>2</b> 0.25V to 4.75V <b>3</b> 1V to 4V <b>4</b> 0V to 5V - Sensor 1 0V to 5V - Sensor 2 <b>5</b> 0.5V to 4.5V - Sensor 1 0.5V to 4.5V - Sensor 2 <b>6</b> 0.25V to 4.75V - Sensor 1 0.25V to 4.75V - Sensor 2 <b>7</b> 1V to 4V - Sensor 1 1V to 4V - Sensor 2 <b>8</b> 0V to 5V - Sensor 1 5V to 0V - Sensor 2 <b>9</b> 0.5V to 4.5V - Sensor 1 4.5V to 0.5V - Sensor 2 <b>10</b> 0.25V to 4.75V - Sensor 1 4.75V to 0.25V - Sensor 2 <b>11</b> 1V to 4V - Sensor 1 4V to 1V - Sensor 2				
<b>HANDLE<sup>1</sup></b>		<b>SIDE BUTTONS*</b>		<b>SPRING TENSION<sup>8</sup></b>		<b>ADDITIONAL OPTIONS</b>				
<b>-10</b> Ball Tip (2 axes) <b>-21</b> Stock Grip (2 axes) <b>-22</b> Short Stock Grip (2 axes) <b>-33</b> Multifunction Square (2 axes) <b>-43</b> Multifunction Square (3 axes) <b>-34</b> Multifunction Oval (2 axes) <b>-44</b> Multifunction Oval (3 axes) <b>-2X</b> No Handle <b>-2Z</b> Custom Handle		<b>0</b> None <b>U</b> One - Upper Position <b>L</b> One - Lower Position <b>T</b> Two <b>D</b> Deadman <b>I</b> Index Trigger <small>* - All that apply.</small>		<b>0</b> Standard <b>1</b> Light* <b>2</b> Heavy <small>* - Not recommended for use with multifunction handles.</small>		<b>-V</b> Voltage Regulator <b>-D</b> Dual Decode <sup>9</sup> <b>-DS</b> Dual Sensor <b>-DC</b> Center Detect <b>-AD</b> Analog Deadband <b>-P</b> Proximity Sensor <b>-E</b> Environmental Sealing				

#### NOTES:

1. Refer to next page for information on standard configurations for joysticks with Stock Grip, Short Stock Grip, and Multifunction handles.
2. Stock Grip handles can have either a Deadman or a Proximity Switch.
3. Multifunction handles can have either an Index Trigger or a Proximity Switch.
4. When ordering the multifunction handle, specify Square or Oval.
5. Multifunction handle orders should be accompanied by drawing of button/component placement.
6. Multifunction handle requires Drop-in mounting.
7. Option 2X (no handle) and Option 2Z (custom handle) may require discussion with Technical Support.
8. X/Y axes spring tension. Contact Technical Support for information on best possible spring for your chosen configuration.
9. Dual Decode cannot be used with CANbus, USB, or Voltage Regulator.



Up to IP68 available.

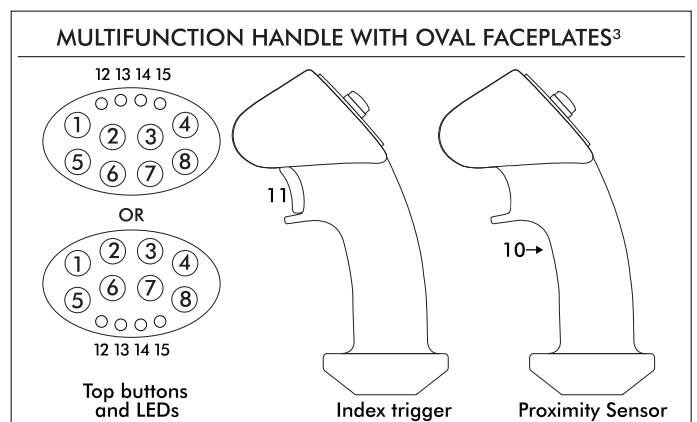
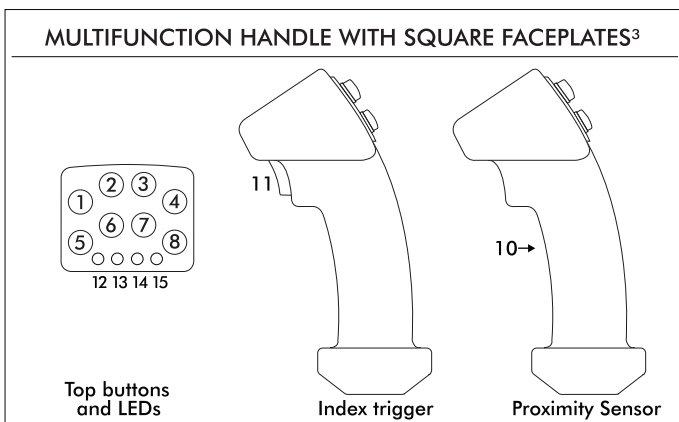
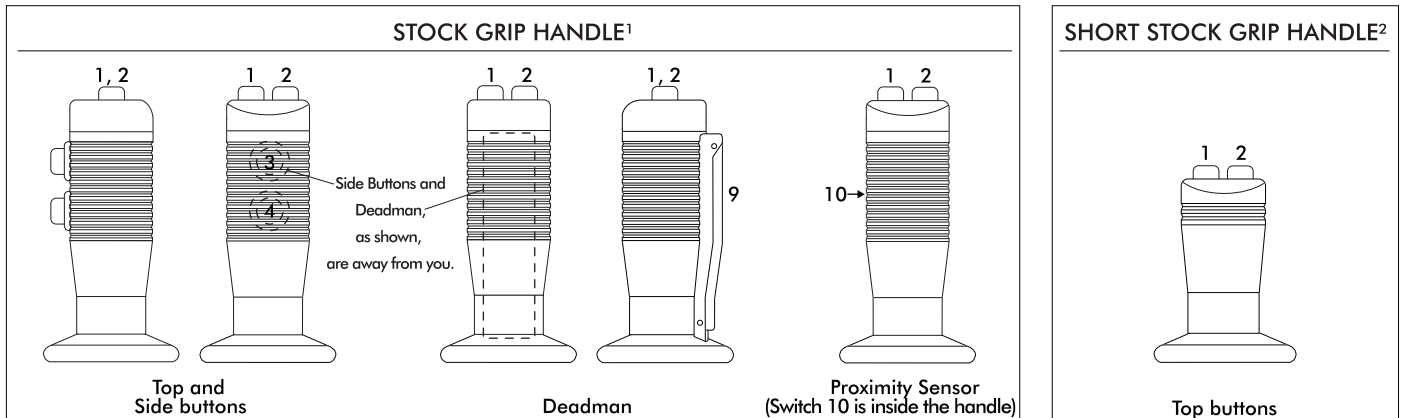


Mounting accessories. Standard hardware includes: 1 gasket, 4 nuts (1/4-20), 4 washers (1/4), 4 screws (1/4-20x1 1/4)

# HG series

## Hand grip Hall effect joysticks

### CONFIGURATION OPTIONS - continued



DEFAULT WIRE COLOR CODE*		
COLOR	FUNCTION	AWG
RED	Vcc or Vdd	28
BLACK	Ground	
BLUE	X Axis	
YELLOW	Y Axis	
GREEN	Z Axis	
WHITE	Switch Common (optional)	22
ORANGE	Switch 1 (optional)	
VIOLET	Switch 2 (optional)	
GRAY	Switch 3 (optional)	
BROWN	Switch 4 (optional)	
PINK	Switch 5 (optional)	
BLUE/WHITE	Switch 6 (optional)	
YELLOW/BLACK	Switch 7 (optional)	
GREEN/BLACK	Switch 8 (optional)	
VIOLET/WHITE	Deadman - Switch 9 (optional)	
YELLOW/WHITE	Proximity Sensor - Switch 10 (optional)	
RED/WHITE	Index Trigger - Switch 11 (optional)	
LIGHT GREEN	LED - 12 (optional)	
LIGHT ORANGE	LED - 13 (optional)	
GRAY/WHITE	LED - 14 (optional)	
BLACK/WHITE	LED - 15 (optional)	



**NOTES:** \* - Starting from the strain relief, the cable is 406mm (16in) long, 6.40mm (0.25in) stripped with plug, covered with an expandable cable sleeve.

- The maximum possible configuration for the Stock Grip handle is up to 2 Top Buttons and 2 Side Buttons. A handle with a Deadman or a Proximity Sensor can have 2 Top Buttons, but no Side Buttons.
- The maximum possible configuration for the Short Stock Grip handle is up to 2 Top Buttons. It is not possible with Deadman, Index Trigger, Proximity Switch, or Side Buttons.
- A Multifunction handle can have a maximum of 8 Top Buttons and 4 LEDs on the faceplate, and an Index Trigger or a Proximity Sensor.
- For non-standard configurations contact Technical Support. We can customize the faceplate according to your exact needs. For faceplate examples, see next page.
- If unspecified, the pushbuttons will have snap action momentary switches with red button caps.
- Switches will always be wired according to the position number on the handle and the Default Wire Color Code.

Note: The company reserves the right to change specifications without notice. The graphs are provided for representational purposes only.

# HG series

Hand grip Hall effect joysticks

FACEPLATE EXAMPLES

## OVAL



1



2



3



5



6



7



8



9



10

## SQUARE



11



12



13



14



15



16



17



18

Note: The company reserves the right to change specifications without notice. The graphs are provided for representational purposes only.

# HG series

Hand grip Hall effect joysticks

## SPECIFICATIONS

### MECHANICAL (FOR X, Y AXES)

Break Out Force	-	1.30Nm <sup>1</sup>
Operating Force	-	1.50Nm <sup>1</sup>
Maximum Applied Force	-	1.70Nm
Mechanical Angle of Movement	-	38° (19° from center)
Expected Life	-	10 million
Lever Action (Centering)	-	Spring centering

### MECHANICAL (FOR Z AXIS HANDLE ROTATIONAL TORQUE - MULTIFUNCTION HANDLE ONLY)

Break Out Force (Nm)	-	
Operating Force (Nm)	-	
Maximum Allowable Force (Nm)	-	
Hand Mechanical Angle	-	42° (21° from center)
Expected Life	-	

### ENVIRONMENTAL

Operating Temperature	-	-25°C to 70°C /-13°F to 158°F
Storage Temperature	-	-40°C to 70°C /-40°F to 158°F
Sealing	-	IP65 to IP68 <sup>2</sup>
EMC Immunity Level (V/M)	-	IEC 61000-4-8:2009
EMC Emissions Level	-	IEC 61000-4-3:2006
ESD	-	IEC 61000-4-2:2008

### ELECTRICAL

Sensor	-	Hall effect
Resolution	-	infinite
Supply Voltage Operating	-	5.00VDC
Reverse Polarity Max	-	-14.5VDC
Overvoltage Max	-	18VDC
Output Voltage	-	0.34V - 4.65V
Output Impedance	-	6Ω
Current Consumption Max	-	10mA max per axis
Return to Center Voltage (No Load)	-	±200mV

### STANDARD SWITCH CHARACTERISTICS/RATINGS

Electrical Resistive Load:	-	5A
Electrical Inductive Load:	-	3A
DWV:	-	1050Vrms
Low Level:	-	10mA @ 30mV
Electrical Life:	-	25,000 cycles 5A @ 28VDC resistive snap-action
Mechanical Life:	-	1,000,000 cycles
Environmental Seal:	-	IP67
Action:	-	Momentary, snap-action
Operating Force:	-	1.7 lbs +/- 0.5 lb
Total Travel:	-	0.080 inches max
Over Travel:	-	0.010 inches min

### CANbus OUTPUT VERSION

Supply Voltage Range	-	6V to 40V
CANbus Version	-	J1939

#### Notes:

Exact specifications may be subject to configuration. Contact Technical Support for the performance of your specific configuration.

<sup>1</sup> = Other forces are available upon request.

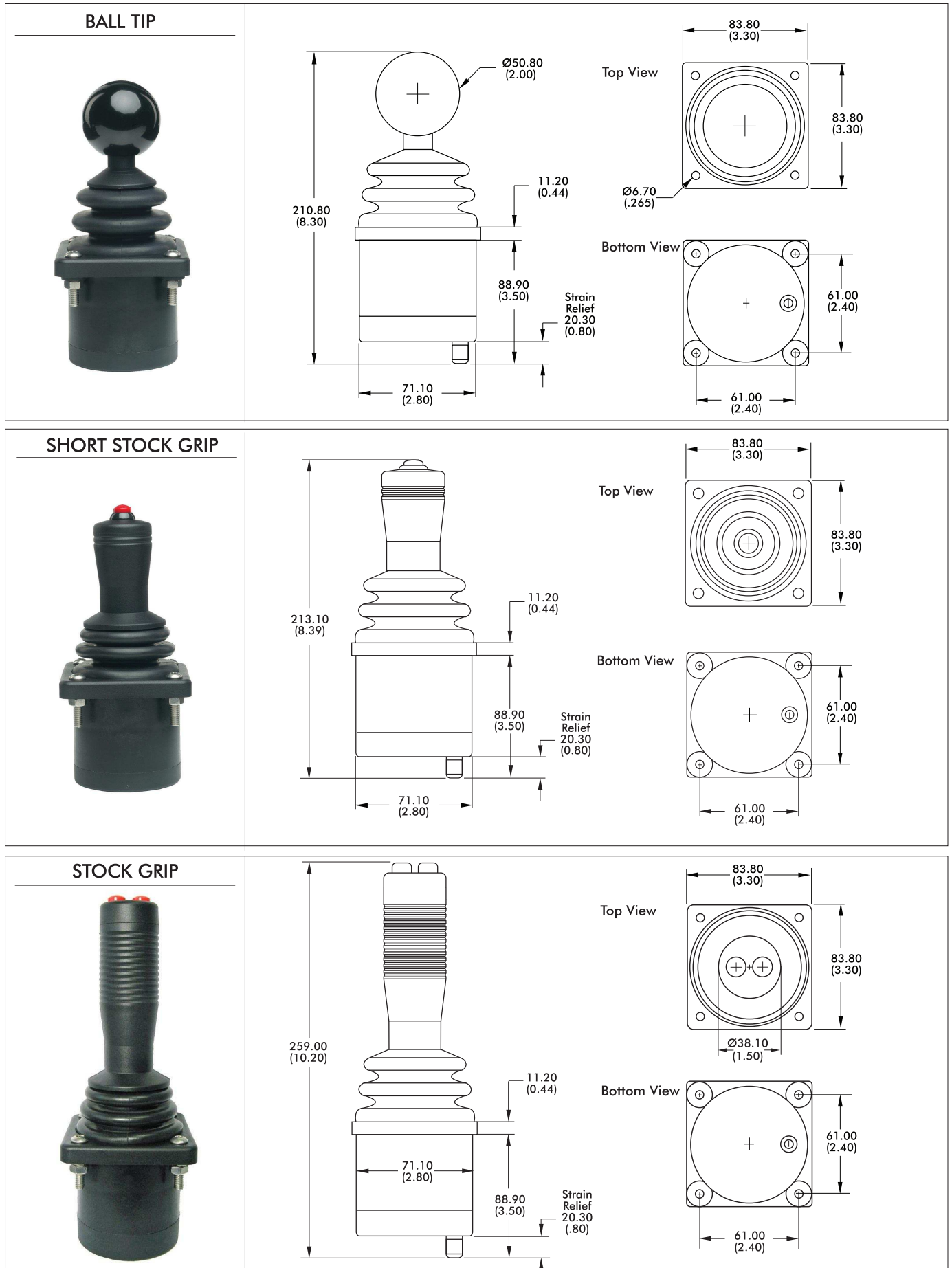
<sup>2</sup> = Excludes some handle options.

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# HG series

Hand grip Hall effect joysticks

## DIMENSIONAL DRAWINGS

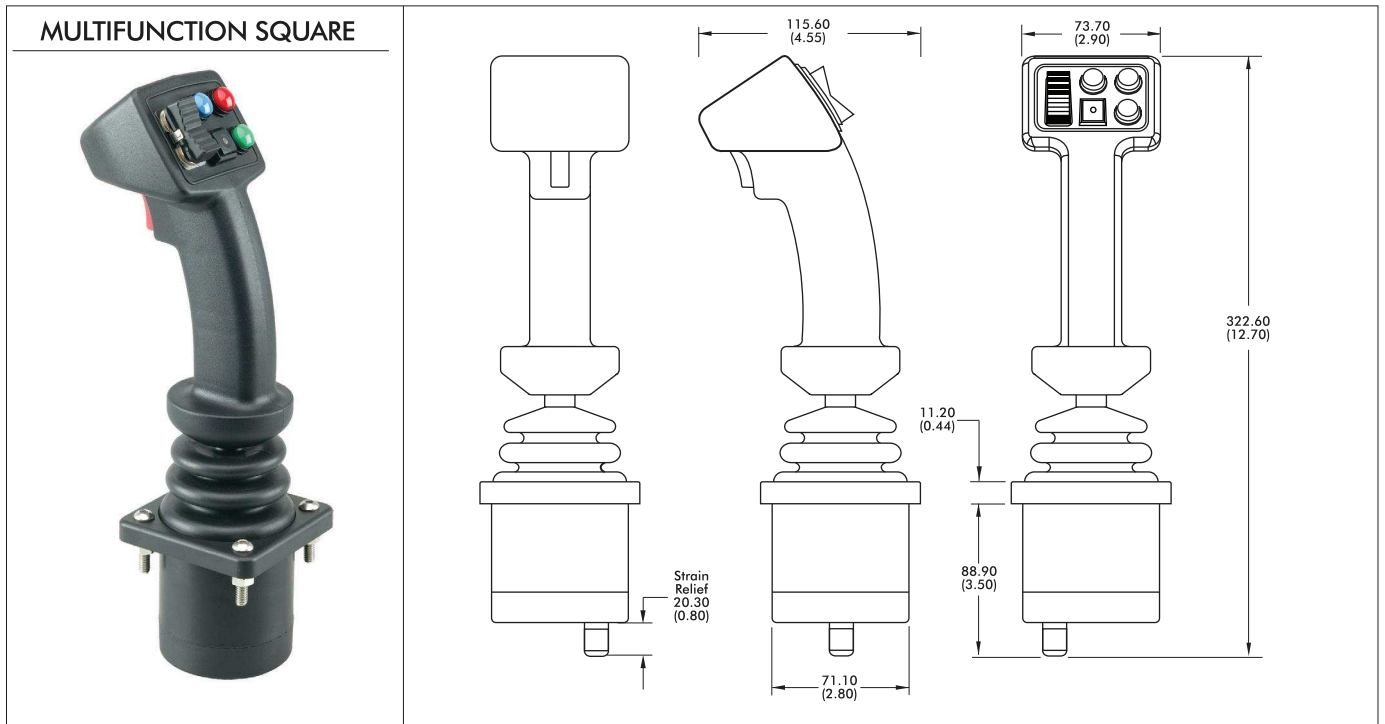
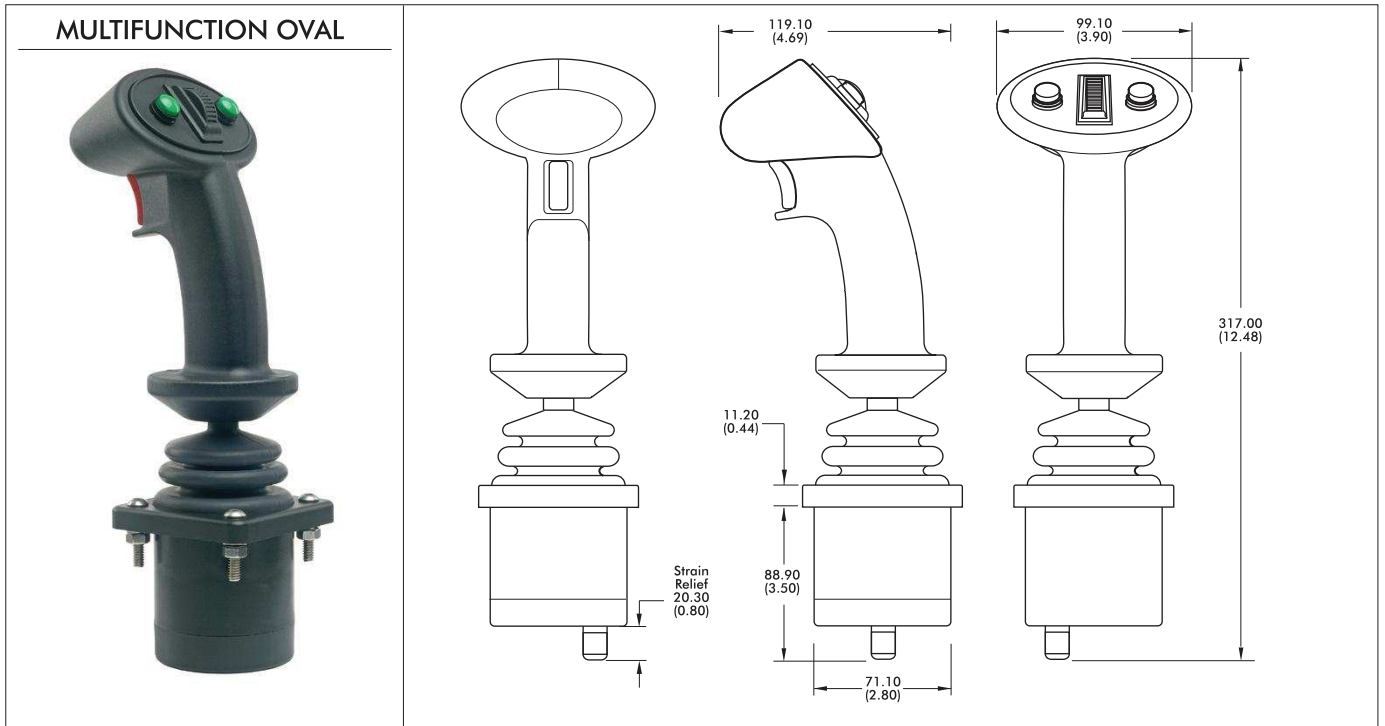


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# HG series

## Hand grip Hall effect joysticks

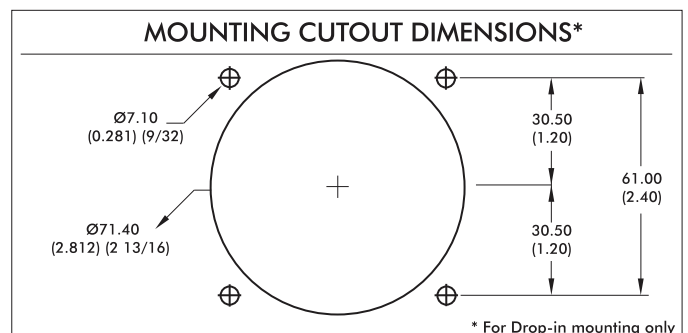
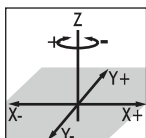
### DIMENSIONAL DRAWINGS - continued



#### NOTES

1. Dimensions are in mm/(inch)
2. Actual strain relief position may vary.
3. For below panel lower profile housings, the strain relief [20.30/(0.80)] can be replaced with a rubber grommet [1.27/(0.05)], and the standard housing cap [18.54/(0.73)] can be replaced with a short cap [11.94/(0.47)]. These options are available only for joysticks without additional boards, except USB.

4. Axes orientation:



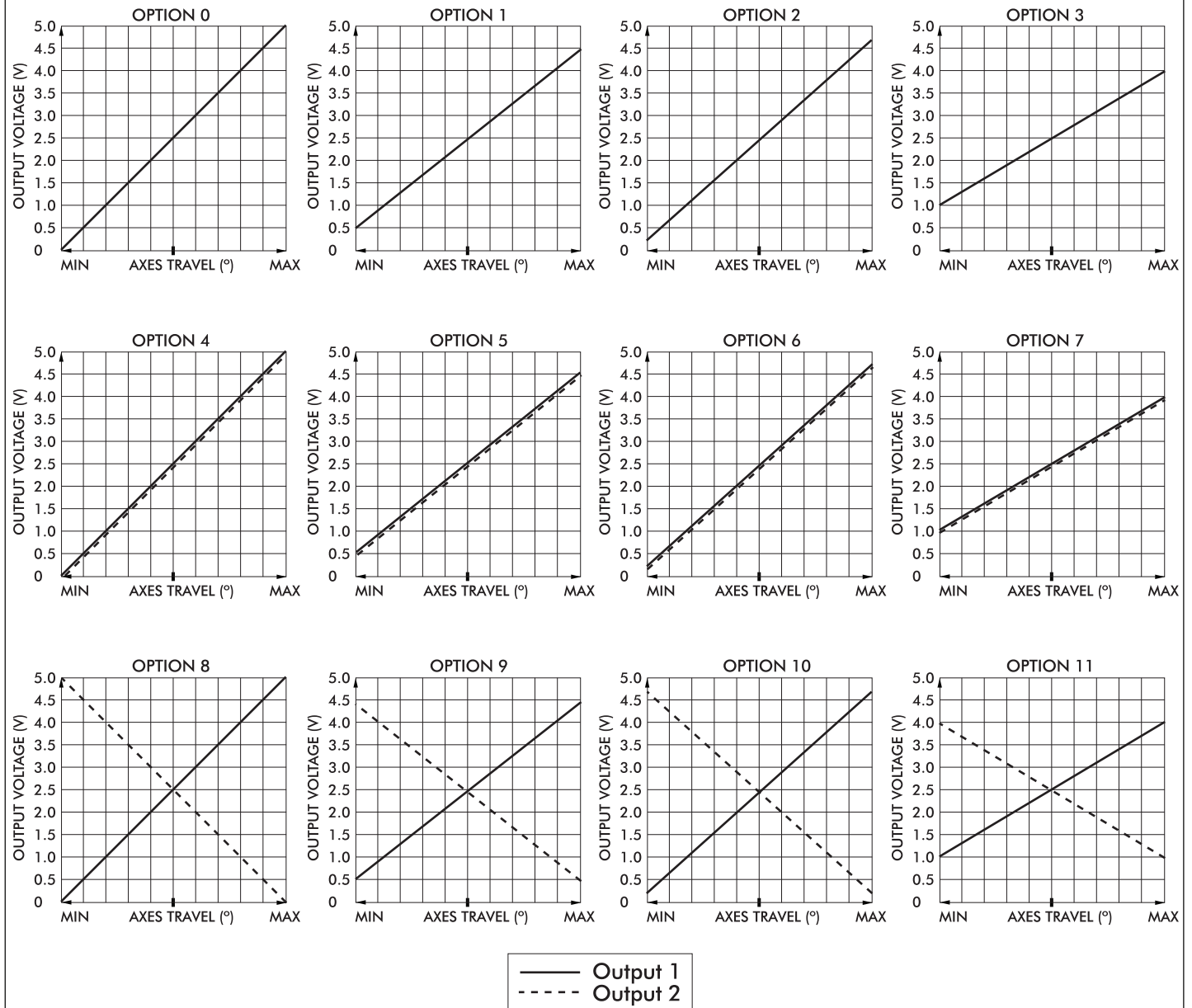
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# HG series

## Hand grip Hall effect joysticks

### CONFIGURATION OPTIONS - continued

#### LINEAR OUTPUT OPTIONS



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# HG series

Hand grip Hall effect joysticks

CONFIGURATION OPTIONS

## ADDITIONAL OUTPUT OPTIONS

### CANbus J1939

CH Products HG CANbus joysticks conform to the SAE J1939 serial bus specification used for communications between electronic control units and vehicle components. The HG CANbus option provides I/O extension for up to 51 digital and eight analog inputs.

#### FEATURES

- CANbus J1939
- Extended I/O extension for up to 51 digital and eight analog inputs.
- Accommodates a 6-40VDC power supply
- Operating temperature: -40°C to +85°C
- Storage temperature: -60°C to +150°C

#### ELECTRICAL SPECIFICATIONS

Operating Temperature:	-	-40°C - 85°C
Storage Temperature:	-	-60°C - 150°C
Supply Power:	-	6 - 40 VDC
Supply Current:	-	15mA min, +5mA per LED, +6mA per axis

#### WIRING SPECIFICATION

Red Wire	-	Supply Power
Black Wire	-	Ground
Green Wire	-	CAN high data
White Wire	-	CAN low data
Blue Wire	-	Identifier Select
Orange Wire	-	Identifier Select

#### CONNECTOR OPTIONS:

- Cable assembly with Deutsch DT04 style plugs
- External i/o harnessing per customer specification

#### CUSTOMER SPECIFICATION OPTIONS\*

(via CAN Configuration Chart supplied by Sales)

BAUD RATE (Check one)		250K		500K		1000K		BLUE WIRE	ORANGE WIRE	
11 BIT IDENTIFIER (CAN2.0A) (Hex)	#1	TX	1	0				G	G	
		RX								
	#2	TX							G	
		RX								
	#3	TX						G		
		RX								
	#4	TX								
		RX								
29 BIT IDENTIFIER (CAN2.0B) (Hex)	#1	TX	3	2	1	0		G	G	
		RX								
	#2	TX							G	
		RX								
	#3	TX						G		
		RX								
	#4	TX								
		RX								
8 BYTE TX DATA FRAME (Binary)		7	6	5	4	3	2	1	0	IDENTIFIER SELECT WIRES
8 BYTE RX DATA FRAME (Binary)										(SUPPLIED IN PIGTAIL)
AXIS DATA TYPE (Check one)		SIGNED CHAR (+/-127)	UNSIGNED CHAR (0-255)	UNSIGNED INT (0-1023)	UNSIGNED INT (0-4095)					G=TIED TO 0V (BLACK WIRE)

Note: The company reserves the right to change specifications without notice. The graphs are provided for representational purposes only.

# HG series

## Hand grip Hall effect joysticks

### CONFIGURATION OPTIONS - continued

#### ADDITIONAL OUTPUT OPTIONS

#### PLUG-AND-PLAY SOLUTIONS:

#### USB

Featuring USB 1.1 HID compliant interface, CH Products' USB joysticks are recognized as standard HID "game controller" devices. Adhering to the HID specification, CH Products' USB joysticks are plug-and-play with most versions of Windows and Linux. Joystick button and axes assignments are dependent upon the controlled application.

#### FEATURES

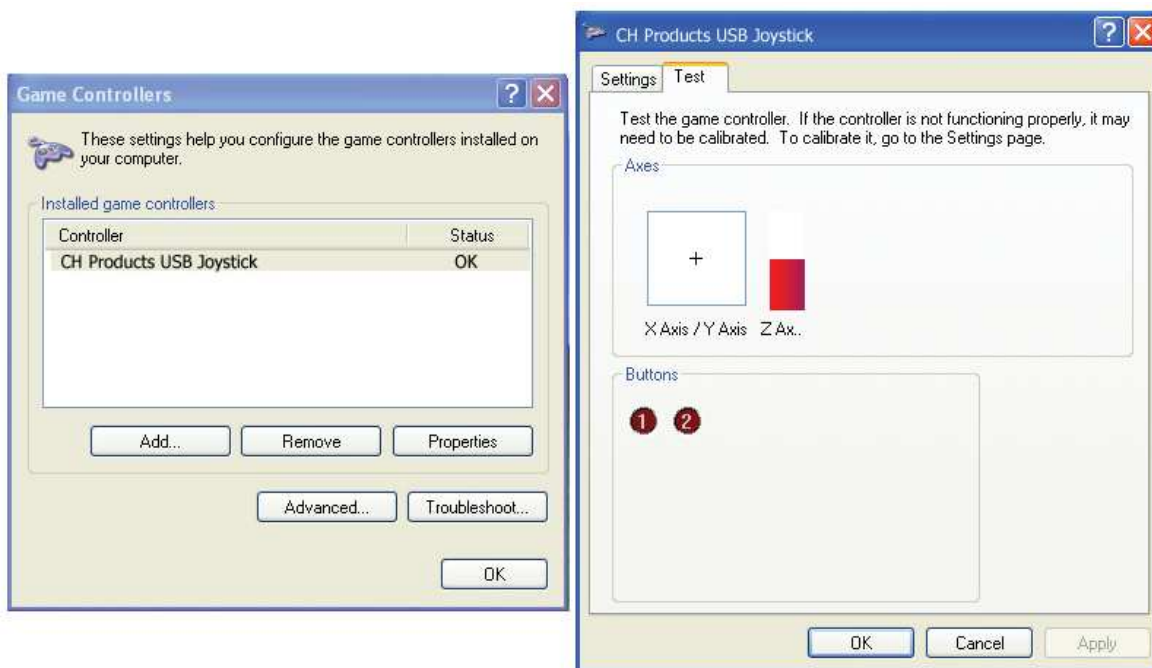
- USB 1.1 HID compliant "game controller" device
- Easy to install and operate
- Functions determined by controlled application
- Standard male type "A" connector

#### SUPPLIED WIRING

USB: USB Male Type A Connector with over-molded cable  
(Optional ruggedized military connectors are available.)



USB Male Type A Connector



# HG series

Hand grip Hall effect joysticks

CONFIGURATION OPTIONS - continued

## ADDITIONAL OUTPUT OPTIONS

### JOYBALL (CURSOR EMULATION)

The Joyball option converts multi-axis joystick output into a mouse, trackball, or cursor control device. The joystick's internal microprocessor converts absolute axis position into a cursor velocity, which is translated as a relative trackball or mouse position. Supported protocols include Sun Microsystems (mouse systems 5vdc serial) and USB.

#### APPLICATIONS

The Joyball option is ideal for vehicle applications subjected to dirt and high vibration which make operating a traditional cursor control device difficult. The Joyball option is widely used in shipboard and military applications.

#### FEATURES

- HID compliant "pointing device"
- Plug-and-play with USB option
- Ideal for marine GPS and navigation
- Environmental sealing up to IP68

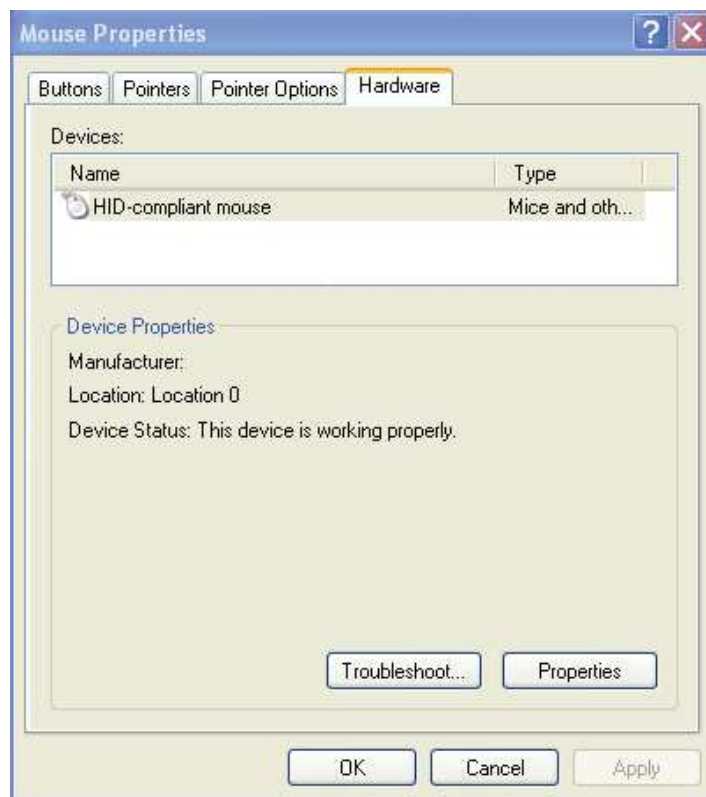
#### SUPPLIED WIRING

USB: USB Male Type A Connector with over-molded cable

SUN: SUN mini-DIN plug with overmolded cable and strain relief

#### I/O COMPLEMENT/ USER SPECIFIED PARAMETERS:

- USB 4 pushbuttons 2 or 3 axes (X,Y, and Z "scroll")
- SUN 2 pushbuttons and 2 axes (X, Y)



# HG series

## Hand grip Hall effect joysticks

### CONFIGURATION OPTIONS - continued

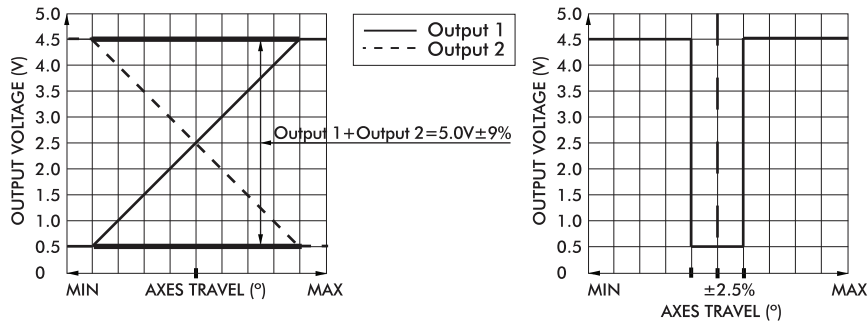
#### ADDITIONAL OUTPUT OPTIONS

#### DUAL DECODE

Dual Decode utilizes a microprocessor to monitor two linear opposite-ramp signals for each joystick axis and provides one proportional (0.5VDC – 4.5VDC) and one logical output accordingly. The dual inversed signals are continuously monitored and a logical signal of 0VDC is provided for over-range (>4.5VDC), under-range (<0.5VDC) and signal tracking (sum of both signals equals 4.5V +/-10%) error. A logical signal of 5.0VDC is provided for a properly functioning joystick deflected from center.

#### APPLICATIONS

Dual Decode provides a center detect function as well as error tracking, making it ideal for high liability, safety critical applications.



#### ELECTRICAL SPECIFICATIONS

Operating Temperature	-	-40°C - 70°C
Storage Temperature	-	-60°C - 150°C
Supply Power	-	4.5VDC to 5.5VDC
Supply Current	-	30mA + 10mA per axis

#### WIRING SPECIFICATION

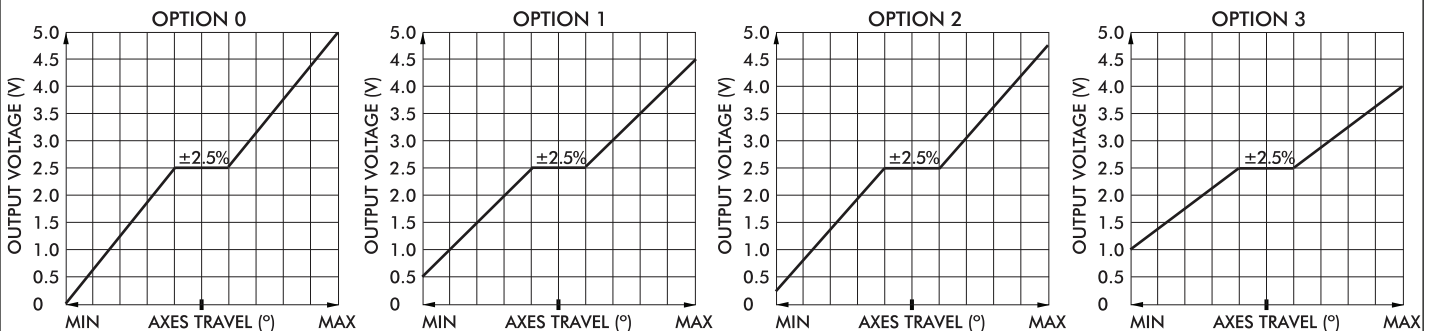
Red wire	-	Customer power supply 4.5VDC-5.5VDC
Black wire	-	Ground
Blue wire	-	X axis output
Yellow wire	-	Y axis output
Green wire	-	Z axis output
Blue/White wire	-	X axis dual decode logic output
Yellow/Black/ wire	-	Y axis dual decode logic output
Green/Black wire	-	Z axis dual decode logic output
White wire	-	Pushbutton common wire
Orange,violet,grey,brown,pink,bl/wt/y/bk,gn/bk,gy/w wire	-	Pushbutton outputs

#### ANALOG DEADBAND

Analog Deadband utilizes an analog circuit to monitor proportional joystick outputs and enhance return to center accuracy over multiple axes. Specified for joysticks with normally ranged outputs of 0VDC – 5VDC at full axis travel, a constant output of 2.5VDC is provided for the joystick's position +/-2.5° from center.

#### APPLICATIONS

Analog Deadband effectively eliminates mechanical return-to-center error, making it ideally suited for safety critical applications susceptible to drift and motion control systems lacking center position trim.



Note: The company reserves the right to change specifications without notice. The graphs are provided for representational purposes only.

# HG series

Hand grip Hall effect joysticks

CONFIGURATION OPTIONS - continued

## ADDITIONAL OUTPUT OPTIONS

### ELECTRICAL SPECIFICATIONS

Operating Temperature	-	-40°C - 70°C
Storage Temperature	-	-60°C - 150°C
Supply Power	-	4.5VDC to 5.5VDC
Supply Current	-	10mA per axis

### WIRING SPECIFICATION

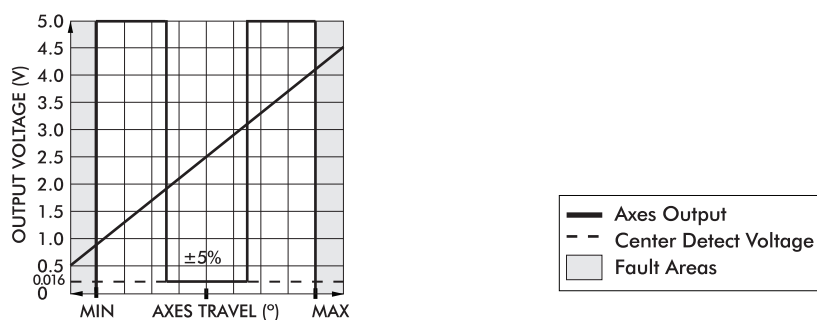
Red wire	-	Customer power supply 4.5-5.5vdc
Black wire	-	Ground
Blue wire	-	X axis output
Yellow wire	-	Y axis output
Green wire	-	Z axis output
White wire	-	Pushbutton common wire
Orange,violet,grey,brown,pink,bl/wt/y/bk,gn/bk,gy/w wire	-	Pushbutton outputs

## CENTER DETECT

Center Detect utilizes a microprocessor to monitor joystick output and provides both logic and proportional signals for enhanced operator safety. Specified for a joystick normally ranged 0.5VDC to 4.5VDC, the microprocessor continuously monitors the proportional output and provides HI logic signal (5.0VDC) when moved off center and an LO logic signal (0VDC) for an over-range (>4.5VDC) or under-range (<0.5VDC).

### APPLICATIONS

Center Detect is ideal for safety critical applications including master relay control "MCR" for a motion control system or as a brake release for an overhauling load.



### ELECTRICAL SPECIFICATIONS

Operating Temperature	-	-40°C to 70°C
Storage Temperature	-	-60°C to 150°C
Supply Power	-	4.5V to 5.5V
Supply Current	-	30mA + 10mA per axis

### WIRING SPECIFICATIONS

Red Wire	-	Power supply 4.5 - 5.5VDC
Black Wire	-	Ground
Blue Wire	-	X axis output
Yellow Wire	-	Y axis output
Green Wire	-	Z axis output
Blue/White Wire	-	X axis center detect logic output
Yellow/Black Wire	-	Y axis center detect logic output
Green/Black Wire	-	Z axis center detect logic output
White Wire	-	Pushbutton common wire
Orange,violet,grey,brown,pink,bl/wt,y/bk,gn/bk,gy/w wire	-	Pushbutton outputs

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# HG series

## Hand grip Hall effect joysticks

### CONFIGURATION OPTIONS - continued

#### ADDITIONAL OUTPUT OPTIONS

#### DISCRETE OUTPUT

Discrete Output is a microprocessor based option providing up to 6 hi voltage/hi current, on/off outputs as well as proportional outputs. Featuring a microcontroller, an a/d converter, and 4 to 8 optically isolated solid state switches, the Discrete Output provides an electronic "switch stick" function. Switch combinations and firing angles are programmed to the application's requirement.

#### APPLICATIONS

The Discrete Output option is designed for small motor, reversing starters or hydraulic solenoid actuations.

#### DC SPECIFICATIONS

Operating Temperature	-	-40°C to 70°C
Storage Temperature	-	-60°C to 150°C
Supply Voltage Operating	-	5.0- 40VDC input power
Supply Current	-	30mA + 10mA per hall sensor
Sourcing Outputs	-	70V AC/DC @ 1.6A max.
Sinking Outputs	-	70V AC/DC @ 3.6A max.
Discrete Output Max	-	60VDC/AC, 3.2A per discrete output

#### WIRING

Red Wire	-	Customer power supply 5 - 40VDC
Black Wire	-	Ground
Blue Wire	-	X axis output
Yellow Wire	-	Y axis output
Green Wire	-	Z axis output
Blue/White Wire	-	X axis discrete output
Yellow/Black Wire	-	Y axis discrete output
Green/Black Wire	-	Z axis discrete output
White Wire	-	Pushbutton common wire
Orange,violet,gre,y,brown,pink,bl/wt,y/bk,gn/bk,gy/w wire	-	Pushbutton outputs

#### I/O COMPLEMENT AND USER SPECIFIED PARAMETERS:

Up to 3 axes and 6 discrete sourcing or sinking outputs.

#### DISCRETE OUTPUT CONFIGURATION FORM:

Discrete Output	Sourcing	Sinking	AC	DC
Xfwd				
Xrev				
Yfwd				
Yrev				
Zfwd				
Zrev				

#### SAMPLE OF COMPLETED FORM:

(Please enter required choices for each applicable axis and return form to CH Products.)

Discrete Output	Sourcing	Sinking	AC	DC
Xfwd		X		X
Xrev		X		X
Yfwd	X			X
Yrev	X			X
Zfwd		X		X
Zrev		X		X

# HG series

Hand grip Hall effect joysticks

CONFIGURATION OPTIONS - continued

## ADDITIONAL OUTPUT OPTIONS

### VOLTAGE REGULATOR

The Voltage Regulator is a multi-wired analog option to mate a Hall effect joystick to a variety of industrial control voltages. The Voltage Regulator may be used when the supply or output voltage is greater than 5V or when bipolar output is required.

User Specified Supply Voltage:

- 5 VDC
- 10 VDC
- 12 VDC
- 24 – 30 VDC
- Custom supply options available.

User Specified Output Voltage:

- 0-5 VDC
- 0-10 VDC
- +/-5 VDC
- +/-10 VDC
- Custom outputs available.

#### ELECTRICAL SPECIFICATIONS

Operating Temperature	-	-40°C - 85°C
Storage Temperature	-	-60°C - 150°C
Supply Power	-	5VDC to 30VDC
Supply Current	-	90mA max

#### WIRING SPECIFICATION

Red wire	-	Supply power 5-30VDC
Black wire	-	Ground
Blue wire	-	X axis output
Yellow wire	-	Y axis output
Green wire	-	Z axis output
White wire	-	Pushbutton common wire
Orange,violet,grey,brown,pink,bl/wt/y/bk,gn/bk,gy/w wire	-	Pushbutton outputs