

HTL Finger Joystick

The HTL series provides all of the performance of a full size, dual axis joystick in a miniature package. The HTL2 2-way and HTL4 4-way finger joysticks can be mounted in control handles, armrests and panels. The Hall effect sensors are immune to electromagnetic and radio frequency interference up to 100V/M. Programmable sensors with built-in temperature compensation ensure consistent and repeatable operation. The HTL series has excellent tactile feel for improved operator control and is available with either dusttight or IP6K8S watertight seal. A wide variety of output configurations satisfies different applications.

FEATURES:

- Designed for grip, armrest and panel mounting
- Proven contactless analog output Hall effect technology
- Redundant outputs available
- Up to 1 million cycles
- Electronics watertight to IP6K8S
- Outstanding EMI/RFI immunity
- Variety of button styles
- Tighter center tolerance options
- RoHS compliant
- PWM output option



HTL2 with Tall Concave Stadium Boot Style Button



HTL4 with External Castle Boot Style Button

Standard Characteristics/Ratings:				
MECHANICAL:				
Mechanical Life:	Up to 1,000,000 all directions			
Travel Angle:	23° min to 27° max, 25° typical			
Operating Force with Boot:	16 oz typical to 20 oz max (<i>at top of button</i>) @ 20°C			
Max Allowable Vertical and Radial Force on Button: 25.0 lbs.				
Max Allowable Torque on Button about Shaft Axis: 5.5 lbs.				
ELECTRICAL RATINGS:				
HTL2: Rated at Vcc = 5V @ 20°C Load = 1mA (4.7KΩ)				
Electrical	Units	Min	Typ	Max
Supply Voltage	VDC	4.50	5.00	5.50
Output Voltage Tolerance at Center AA, BB, CC, DD, EE, FF, GG & HH	VDC @ 5V Vcc	-0.25	N/A	+0.25
Output Voltage Tolerance at Center AT, BT, CT, DT, ET and FT	VDC @ 5V Vcc	-0.15	N/A	+0.15
Output Voltage Toleranc at Full Travel (<i>see graph for output values</i>)	VDC @ 5V Vcc	-0.25	N/A	+0.25
Supply Current per Sensor B=0, Vcc=5V, Iout=0	mA	N/A	N/A	10.00
Output Source Current Limi B=-X*, Vo=0	mA	-1.00	N/A	1.00
HTL4: Rated at Vcc = 5V @ 20°C Load = 1mA (4.7KΩ)				
Electrical	Units	Min	Typ	Max
Supply Voltage	VDC	4.50	5.00	5.5
Output Voltage Tolerance at Center AA, BB, CC, DD, EE, FF, GG & HH	VDC @ 5V Vcc	-0.25	N/A	+0.25
Output Voltage Tolerance at Center AT, BT, CT, DT, ET and FT	VDC @ 5V Vcc	-0.15	N/A	+0.15
Output Voltage Tolerance at Full Travel (<i>see graph for output values</i>)	VDC @ 5V Vcc	-0.25	N/A	+0.25
Supply Current per Senso B=0, Vcc=5V, Iout=0	mA	N/A	N/A	10.00
Output Source Current Limit B=-X*, Vo=0	mA	-1.00	N/A	1.00
ELECTRONICS:				
Seal Integrity:	Electronics IP6K8S			
ENVIRONMENTAL:				
Operating Temp Range:	-40°C to +85°C			
Storage Temp Range:	-40°C to +85°C			
RFI:	Withstand per SAE J1113			
EMI:	Withstand per SAE J1113			
MATERIALS:				
Boot:	Elastomer			
Button:	Thermoplastic, black			
Case:	Thermoplastic, black			
Flange:	Thermoplastic, black			
Wires:	22 or 24 AWG			
Mounting Hardware:	Panel fastener assembly			

HTL2 Joystick Part Number Code

HTL2 -	X	X	X	X	X	X	XX	X	X
Button Style	Case Style	Seal	Travel	Detent	Operating Force	Output 1 ①	Output 2 ②	Termination	Button Color
1. Castle	1. 0.970" SQ.	1. Dusttight	1. 25°	1. None	1. 16 oz	AA. 2.5 +/- 2.0VDC	NONE	1. Wire Leads 22 AWG, UL 1569	2. Black
2. External Castle Boot		2. Watertight Panel Seal*		2. Detent at 50% travel (not available with button style 7)		BB. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC	2. Pins	
3. Short Double Stadium						CC. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC	3. Wire Leads 24 AWG, SAE AS22759	
4. Tall Concave Stadium						DD. 2.5 +/- 1.5VDC	NONE		
5. External Bat Handle Boot						EE. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC		
6. External Smooth Boot						FF. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC		
7. Long Concave Y Axis Button						GG. 0.5 - 4.5VDC	0.5 - 4.5VDC		
8. Low Profile Button						HH. 1.0 - 4.0VDC	1.0 - 4.0VDC		
						AT. 2.5 +/- 2.0VDC	NONE**		
						BT. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC**		
						CT. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC**		
						DT. 2.5 +/- 1.5VDC	NONE**		
						ET. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC**		
						FT. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC**		

HTL4 Joystick Part Number Code

HTL4 -	X	X	X	X	X	XX	X	X	
Button Style	Case Style	Seal	Travel	Gating***	Operating Force	Output 1 ①	Output 2 ②	Termination	Button Color
1. Castle	1. 0.970" SQ.	1. Dusttight	1. 25°	1. Omnidirectional; Square; On-Axis and Off-Axis Guided Feel	1. 16 oz	AA. 2.5 +/- 2.0VDC	NONE	1. Wire Leads 22 AWG UL 1569	2. Black
2. External Castle Boot		2. Watertight Panel Seal*		2. Gated; Two Axis Return to Center		BB. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC	2. Pins	
3. Short Double Stadium				3. Omnidirectional; Round; Smooth Feel		CC. 2.5 +/- 2.0VDC	2.5 -/+ 2.0VDC	3. Wire Leads 24 AWG SAE AS22759	
4. Tall Concave Stadium				4. Omnidirectional; Round; On-Axis Guided Feel		DD. 2.5 +/- 1.5VDC	NONE	4. Wire Leads 22 AWG, UL 1569	
5. External Bat Handle Boot				5. Omnidirectional; Square; On-Axis and Off-Axis Guided Feel with Detent at 50% Travel		EE. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC	shared powers and grounds (see schematic)	
6. External Smooth Boot				6. Omnidirectional; Round; Smooth Feel with Detent at 50% Travel		FF. 2.5 +/- 1.5VDC	2.5 -/+ 1.5VDC	5. Wire Leads 24 AWG, SAE AS22759	
				7. Omnidirectional; Round; On-Axis Guided Feel with Detent at 50% Travel		GG. 0.5 - 4.5VDC	0.5 - 4.5VDC	shared powers and grounds (see schematic)	
				8. Omnidirectional; Square; On-Axis Guided Feel		HH. 1.0 - 4.0VDC	1.0 - 4.0VDC		
						AT. 2.5 +/- 2.0VDC	NONE**		
						BT. 2.5 +/- 2.0VDC	2.5 +/- 2.0VDC**		
						CT. 2.5 +/- 2.0VDC	2.5 -/+ 2.0VDC**		
						DT. 2.5 +/- 1.5VDC	NONE**		
						ET. 2.5 +/- 1.5VDC	2.5 +/- 1.5VDC**		
						FT. 2.5 +/- 1.5VDC	2.5 -/+ 1.5VDC**		

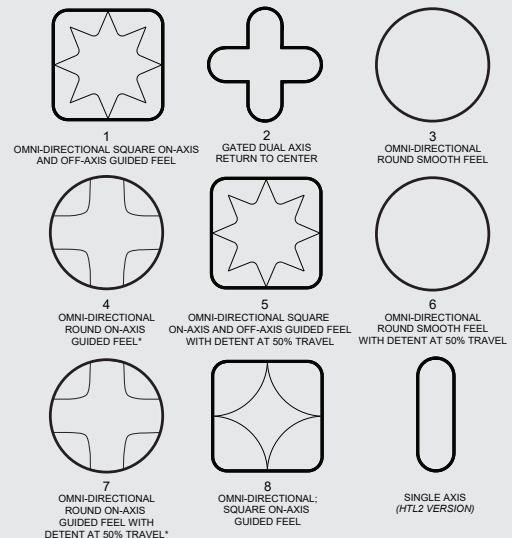
HTL4 Gating Icons

1
OMNI-DIRECTIONAL SQUARE ON-AXIS
AND OFF-AXIS GUIDED FEEL

2
GATED DUAL AXIS
RETURN TO CENTER

3
OMNI-DIRECTIONAL
ROUND SMOOTH FEEL

HTL4 Gating Icons



* Watertight panel seal option available with button styles 2, 5, 6 and 8.

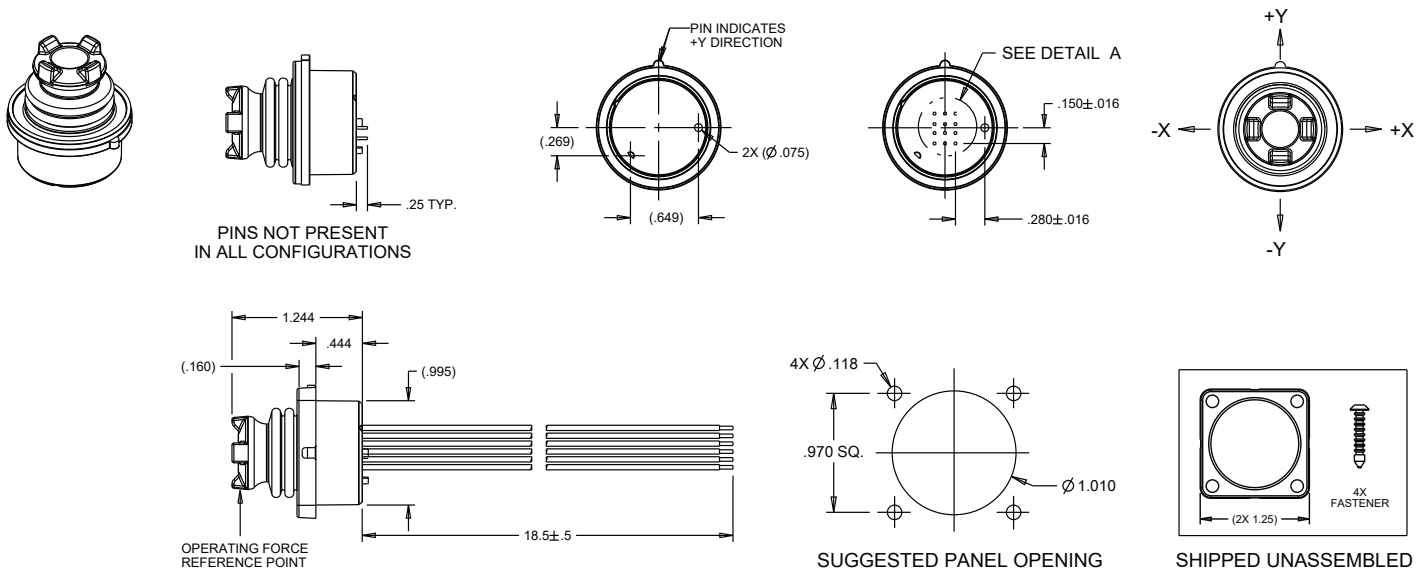
** Options AT, BT, CT, DT, ET and FT are identical to options AA, BB, CC, DD, EE and FF respectively except with a tighter center tolerance.

***Gating options 5, 6 and 7 not available with button style 7.

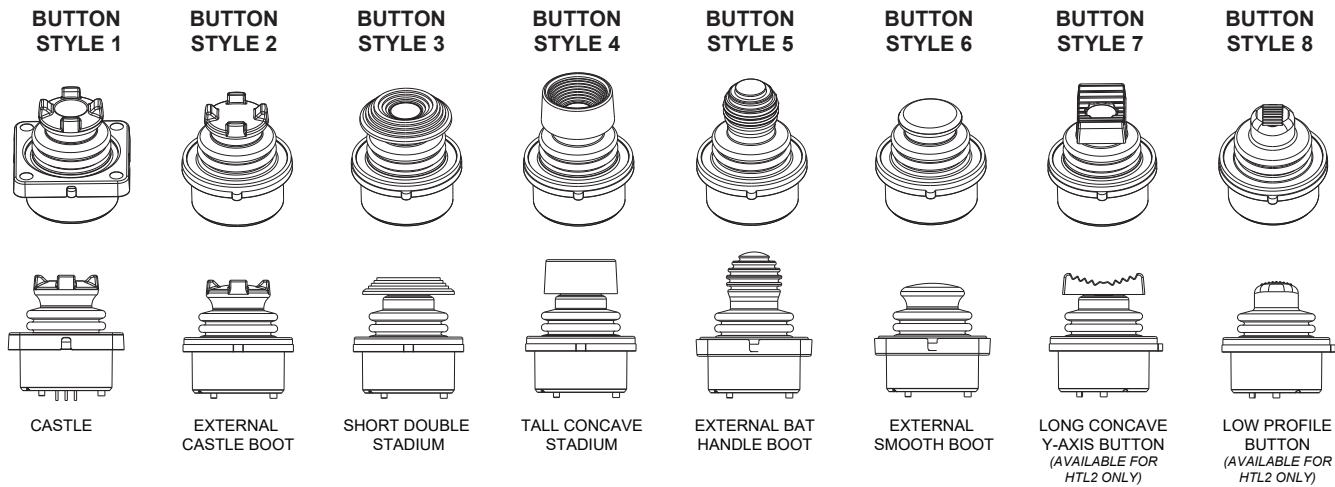
① Outputs are from the center to the full travel position in each direction. Options "AA," "BB," "CC," "DD," "EE," and "FF" provide increased voltage in +Y; and decreasing voltage in -Y direction from one output per axis with the HTL2 and increased voltage in +X, +Y; and decreasing voltage in -X, -Y direction from one output per axis with the HTL4. Options "GG" and "HH" provide increasing voltages in all directions (+Y, -Y with the HTL2 and +X, +Y, -X, -Y with the HTL4) from 2 outputs per axis.

② Options "BB" and "EE" provide redundant output 2 which duplicates output 1. Options "CC" and "FF" provide redundant output 2 which is inverse of output 1.

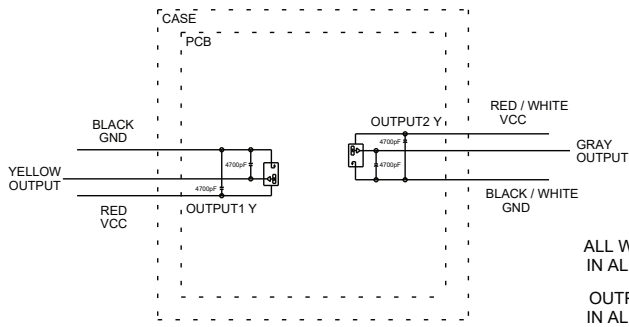
HTL Joystick Drawings



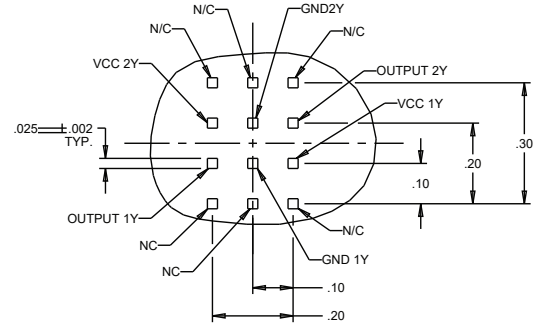
HTL Joystick Button Configurations



HTL2 Joystick Footprint and Schematics



ALL WIRES NOT PRESENT
IN ALL CONFIGURATIONS
OUTPUT2 NOT PRESENT
IN ALL CONFIGURATIONS

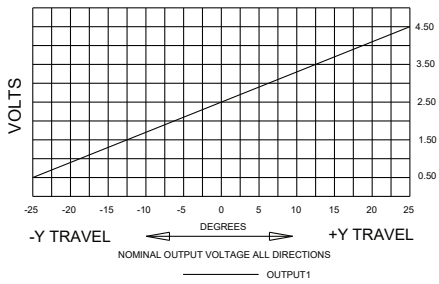


DETAIL A

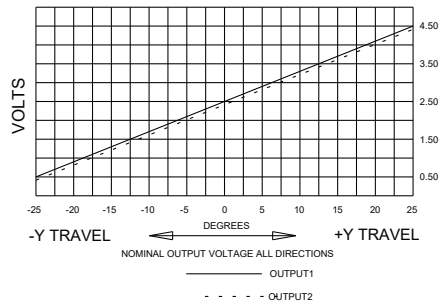
ALL PINS NOT PRESENT IN ALL CONFIGURATIONS

HTL2 Joystick Outputs

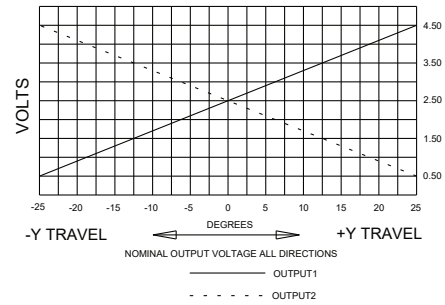
OPTION AA & AT



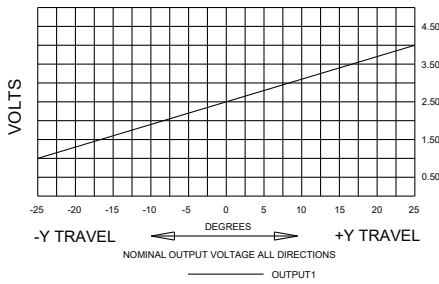
OPTION BB & BT



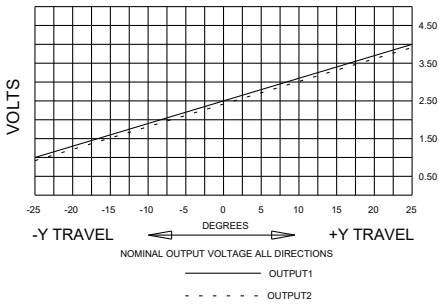
OPTION CC & CT



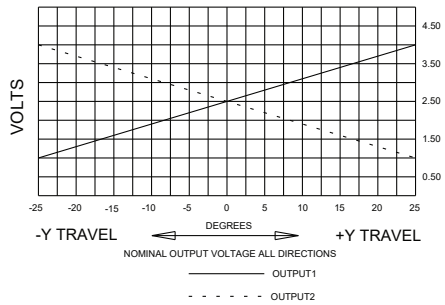
OPTION DD & DT



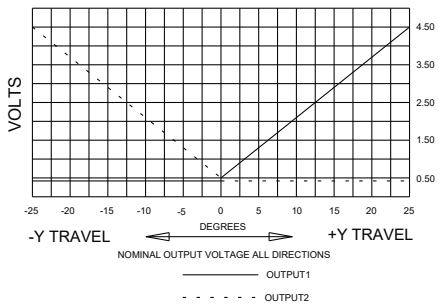
OPTION EE & ET



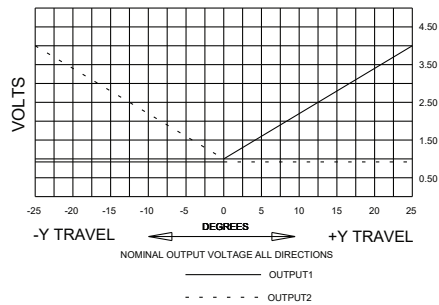
OPTION FF & FT



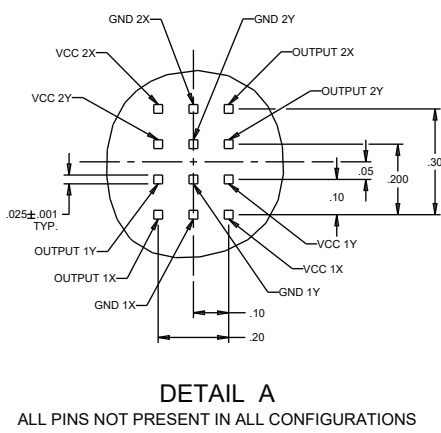
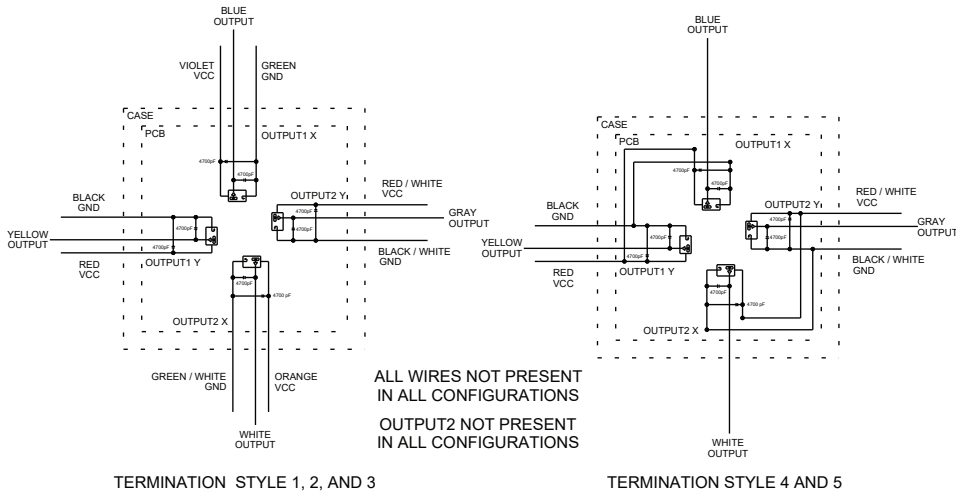
OPTION GG



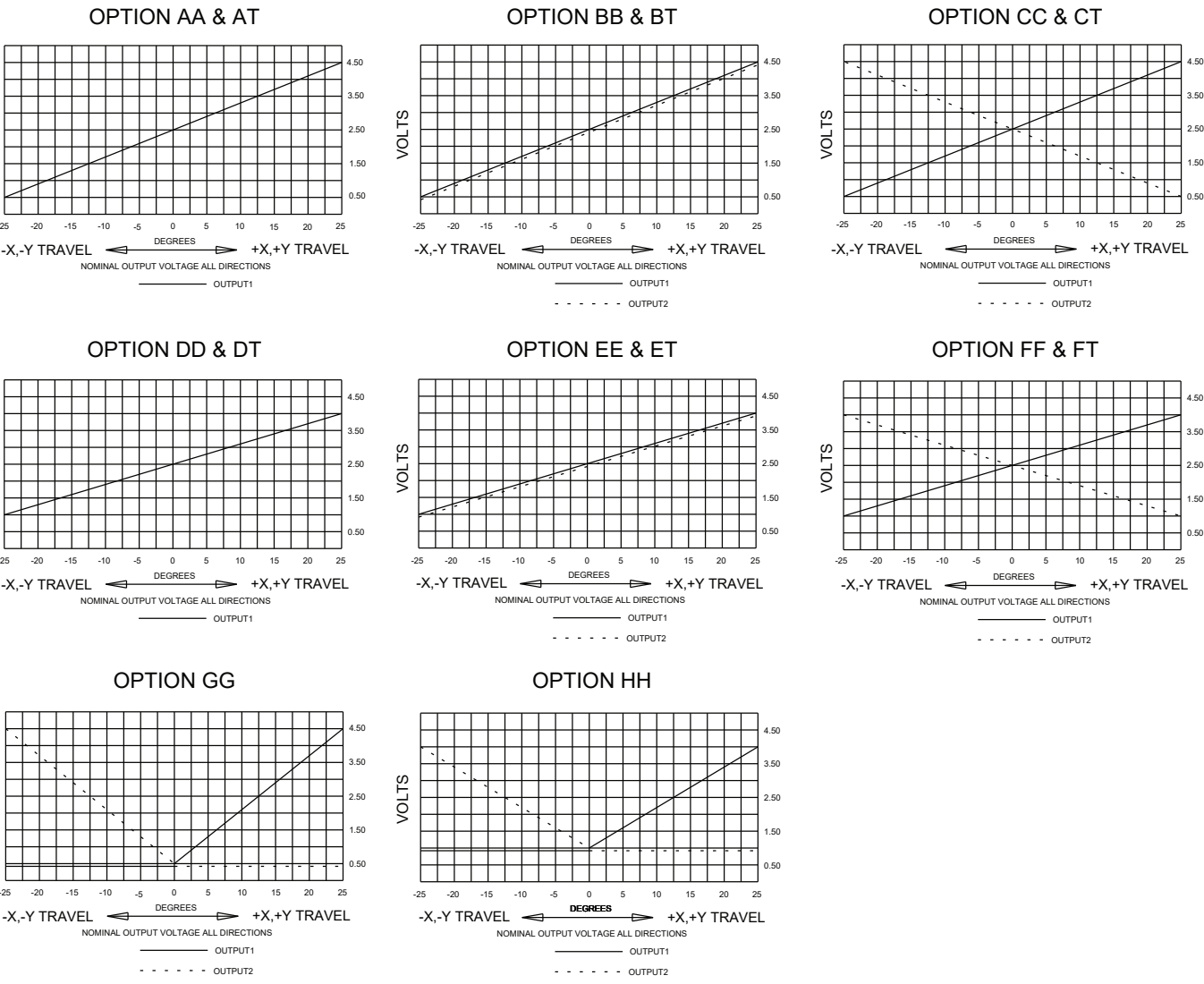
OPTION HH



HTL4 Joystick Footprint and Schematics



HTL4 Joystick Outputs



HTLT Finger Joystick / Pushbutton

OTTO's HTLT is a proportional linear output finger joystick with a pushbutton option. With a lower base price than the HTL, the HTLT features eight button styles, multiple output configurations and three mounting options, including top mount with threaded housing.

Gating options include omnidirectional square on axis guided feel, gated single axis return to center, gated dual axis return to center and omnidirectional round smooth feel. The HTLT offers excellent tactile feedback. It has a dusttight or watertight mechanical seal. All electronics are sealed to IP6K8S.

Featuring contactless Hall effect technology, the HTLT is designed to withstand harsh environments and works well in the industrial, medical, unmanned vehicle and off-highway industries for applications such as remote controls, armrest integration, control panels and belly boxes.

FEATURES:

- One/two axis gated or 360°
- Pushbutton option
- Electronics sealed to IP6K8S
- 3.3V SPI output option
- Single or redundant analog output options
- PWM output option
- Up to 3 million cycle mechanical life
- Tested for harsh environments
- Great for industrial, medical, unmanned vehicle and off-highway applications



HTLT2 with
Center Pushbutton



HTLT4 with
Center Pushbutton

Standard Characteristics/Ratings:

ELECTRICAL RATINGS:

Analog Joystick: Rated at Vcc = 5V @ 20°C Load = 1mA (4.7KΩ)

Electrical	Units	Min	Typ	Max
Supply Voltage	VDC	4.50	5.00	5.50
Output Voltage Tolerance at Center	VDC @ 5V Vcc	-.25	N/A	+.25
Output Voltage Tolerance at Full Travel	VDC @ 5V Vcc	-.25	N/A	+.25
Supply Current Outputs "AA" & "DD" B=0, Vcc=5V, Io=0	mA	N/A	10.00	12.00
Supply Current Outputs "BB", "CC", "EE", "FF", "GG" & "HH" B=0, Vcc=5V, Io=0	mA	N/A	20.00	24.00

SPI Joystick

Electrical	Units	Min	Typ	Max
Supply Voltage - Output JJ	VDC	3.15	3.3	3.45
Supply Voltage - Output KK	VDC	4.50	5.00	5.50

Pushbutton Circuit: Normally Open Tact Switch

MECHANICAL RATINGS

Joystick: Mechanical Life All Directions Up to 3,000,000 Cycles

Joystick: Mechanical Life All Directions (Friction Held) Up to 1,000,000 Cycles

Mechanical	Units	Min	Typ	Max
Travel Angle	Degrees	19.0	20.0	21.0
Over Travel Angle	Degrees	0.5	1.0	1.5
Operating Force (w/ Boot) at 0.8" from Flange, @ 20° C	OZ	5.0	8.0	16.0
Max Allowable Vertical Force on Button	LBS	N/A	N/A	25.0
Max Allowable Radial Force on Top of Knob*	LBS	N/A	N/A	25.0
Max Allowable Torque on Button About Shaft Axis*	IN-LBS	N/A	N/A	5.5

* Button style "A" has a max allowable radial force of 10 lbs and max allowable torque of 3 in-lbs

Pushbutton:

Mechanical Life	Up to 3,000,000 Cycles
Button Style 8 Operating Force @ 20° C	OZ 6.0 8.0 10.0
Button Style 9 Operating Force @ 20° C	OZ 8.0 14.0 16.0

ENVIRONMENTAL:

Operating Temperature: °C -40 20 85

Joystick:

Mechanical Seal	ISO 20653, Dusttight or watertight per IP6K8S (Button styles 2,5,6,8 and 9)
Drop	1 meter max to concrete
EMI/RFI Withstand	Per SAE J1113, Contact Factory for Details

Pushbutton:

Mechanical Seal	ISO 20653, Watertight per IP6K8S Panel Seal (Button styles 8 and 9)
-----------------	---

ELECTRONICS

Seal Integrity: Electronics IP6K8S

MATERIALS:

Housing + Flange: Thermoplastic

Button: Thermoplastic

Bellows: Silicone, black

Pushbutton Wires: 24 AWG

Mounting Hardware: 1-27 Hex nut (.09 Thick) included (with threaded base)
Recommended max torque = 7 IN-LBS.
or 4x #4-40 x .38 screws with square mounting flange

HTLT2 Joystick Part Number Code

HTLT2 -	X	X	X	X	X	X	XX	X	X
Button Style	Case Style	Seal*	Travel	Gating	Operating Force	Output 1 ①	Output 2 ②	Termination	Button Color
1. Castle 2. External Castle Boot 3. Short Double Stadium 4. Tall Concave Stadium 5. External Bat Handle Boot 6. External Smooth Boot 8. External Castle Boot with Pushbutton 9. External Castle Boot with High Force Pushbutton A. Tall Metal Bat Handle****	1. 1-27 Thread 2. 1" Smooth	1. Dusttight 2. Watertight Panel Seal**	1. 20°	1. Single Axis Return to Center 2. Single Axis - Friction Held	1. 16 oz	AA. 2.5 +/- 2.0VDC BB. 2.5 +/- 2.0VDC CC. 2.5 +/- 2.0VDC DD. 2.5 +/- 1.5VDC EE. 2.5 +/- 1.5VDC FF. 2.5 +/- 1.5VDC GG. 0.5 - 4.5VDC HH. 1.0 - 4.0VDC JJ. SPI, 3.3V Supply KK. SPI, 5V Supply	NONE 2.5 +/- 2.0VDC 2.5 +/- 2.0VDC NONE 2.5 +/- 1.5VDC 2.5 +/- 1.5VDC 0.5 - 4.5VDC 1.0 - 4.0VDC NONE NONE	1. Wire Leads 22 AWG UL 1569*** 2. Wire Leads 24 AWG SAE AS22759***	2. Black

* Electronics sealed to IP6K8S.

** Watertight panel sealed option available with button styles 2, 5, 6, 8 and 9.

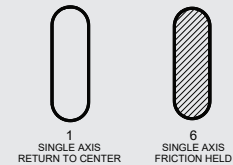
*** Pushbutton wire leads are 24 AWG, SAE AS22759.

**** Button style "A" has a max. allowable radial force of 10 lbs and max allowable torque of 3 in-lbs.

① Outputs are from the center to the full travel position in each direction. Options "AA", "BB", "CC", "DD", "EE" and "FF" provide increased voltage in +Y and decreasing voltage in -Y. Direction from one output per axis. Options "GG" and "HH" provide increasing voltages in all directions (+Y/-Y) from 2 outputs per axis.

② Options "BB" and "EE" provide redundant output 2 which duplicates output 1. Options "CC" and "FF" provide redundant output 2 which is inverse of output 1.

HTLT2 Gating Icons



HTLT4 Joystick Part Number Code

HTLT4 -	X	X	X	X	X	X	XX	X	X
Button Style	Case Style	Seal*	Travel	Gating	Operating Force	Output 1 ①	Output 2 ②	Termination	Button Color
1. Castle 2. External Castle Boot 3. Short Double Stadium 4. Tall Concave Stadium 5. External Bat Handle Boot 6. External Smooth Boot 8. External Castle Boot with Pushbutton 9. External Castle Boot with High Force Pushbutton A. Tall Metal Bat Handle****	1. 1-27 Thread 2. 1" Smooth	1. Dusttight 2. Watertight Panel Seal**	1. 20°	1. Omnidirectional; Square; on Axis Guided Feel 2. Gated; Two Axis - Return to Center 3. Omnidirectional; Square; Smooth Feel 4. Gated; Two Axis - Friction Held	1. 8 oz	AA. 2.5 +/- 2.0VDC BB. 2.5 +/- 2.0VDC CC. 2.5 +/- 2.0VDC DD. 2.5 +/- 1.5VDC EE. 2.5 +/- 1.5VDC FF. 2.5 +/- 1.5VDC GG. 0.5 - 4.5VDC HH. 1.0 - 4.0VDC JJ. SPI, 3.3V Supply KK. SPI, 5V Supply	NONE 2.5 +/- 2.0VDC 2.5 +/- 2.0VDC NONE 2.5 +/- 1.5VDC 2.5 +/- 1.5VDC 0.5 - 4.5VDC 1.0 - 4.0VDC NONE NONE	1. Wire Leads 22 AWG UL 1569*** 2. Wire Leads 24 AWG SAE AS22759***	2. Black

* Electronics sealed to IP6K8S.

** Watertight panel sealed option available with button styles 2, 5, 6, 8 and 9.

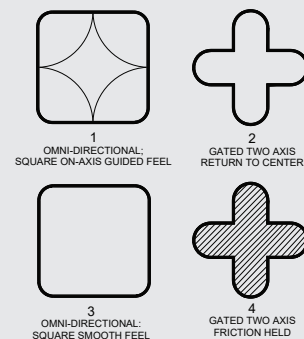
*** Pushbutton wire leads are 24 AWG, SAE AS22759.

**** Button style "A" has a max. allowable radial force of 10 lbs and max allowable torque of 3 in-lbs.

① Outputs are from the center to the full travel position in each direction. Options "AA", "BB", "CC", "DD", "EE" and "FF" provide increased voltage in +X, +Y and decreasing voltage in -X, -Y. Direction from one output per axis. Options "GG" and "HH" provide increasing voltages in all directions (+X, +Y, -X, -Y) from 2 outputs per axis.

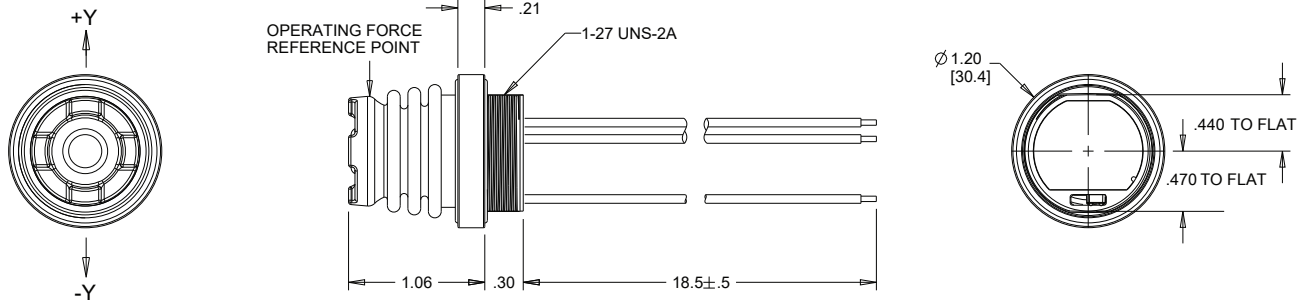
② Options "BB" and "EE" provide redundant output 2 which duplicates output 1. Options "CC" and "FF" provide redundant output 2 which is inverse of output 1.

HTLT4 Gating Icons

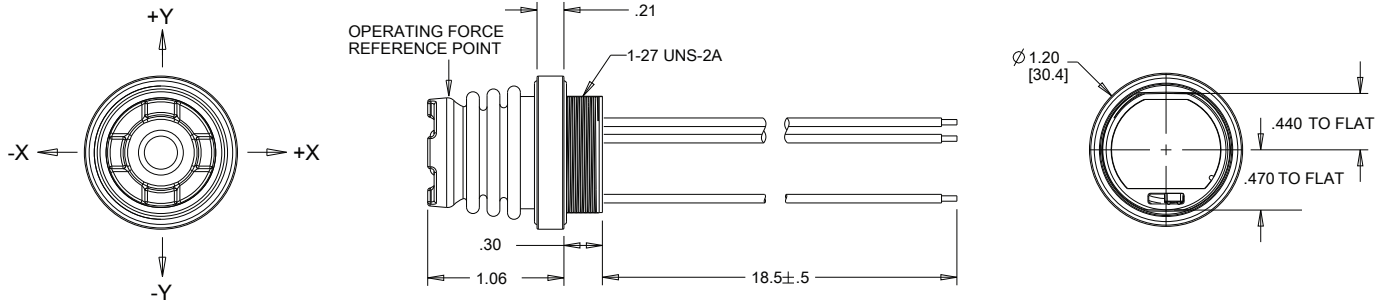


HTLT Joystick Drawings

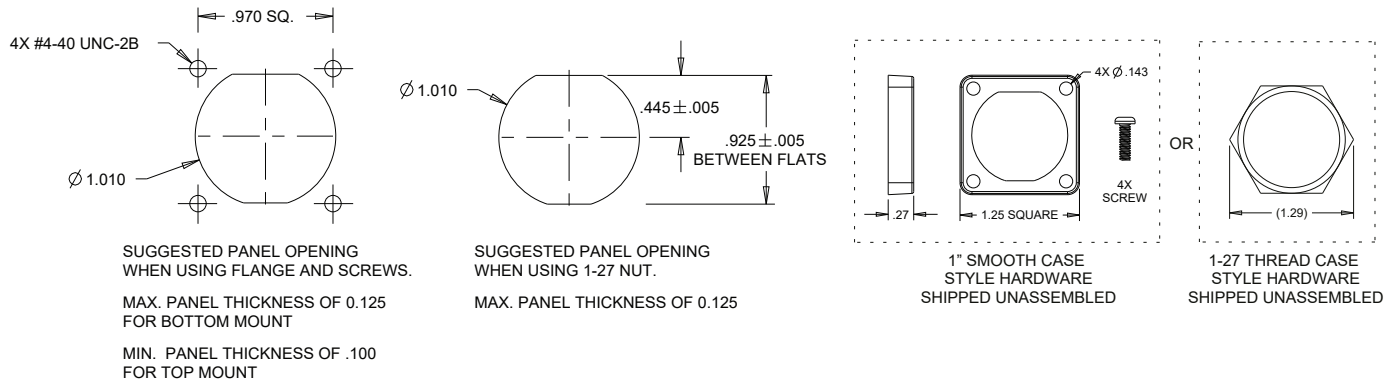
HTLT2



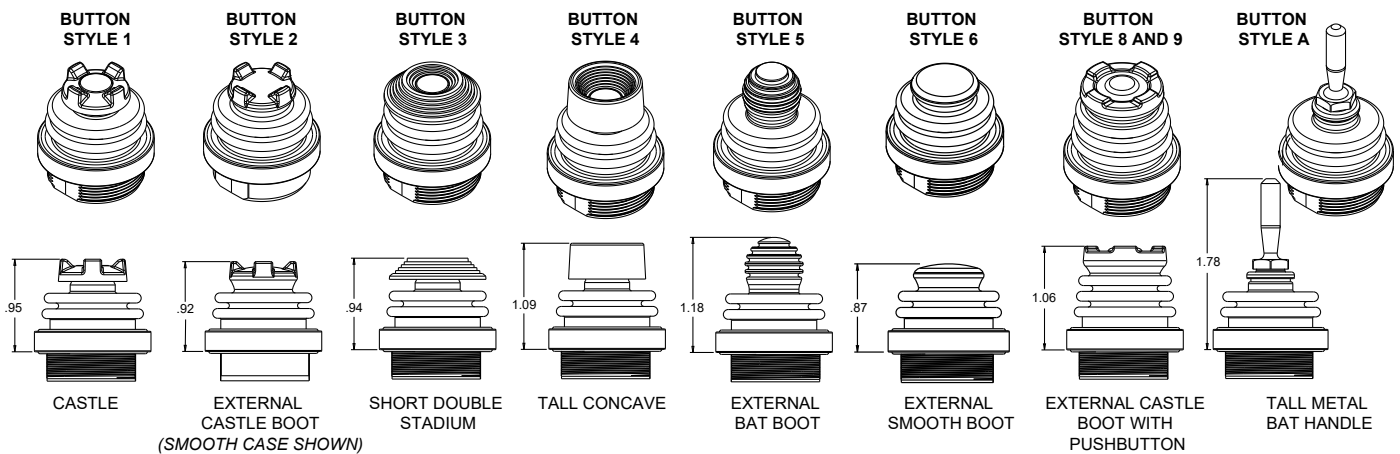
HTLT4



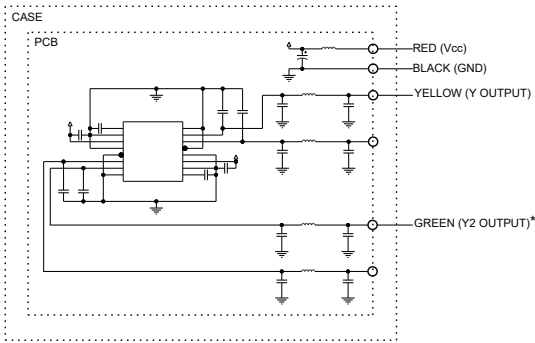
HTLT2 AND HTLT4 PANEL FOOTPRINT



HTLT Joystick Button Style Configurations

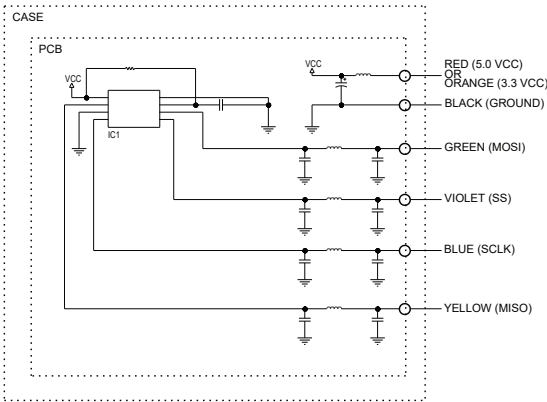


HTLT2 Joystick Schematics



ANALOG JOYSTICK SCHEMATIC

*NOT PRESENT IN OUTPUTS AA AND DD
White Wires are Used for Pushbutton Option



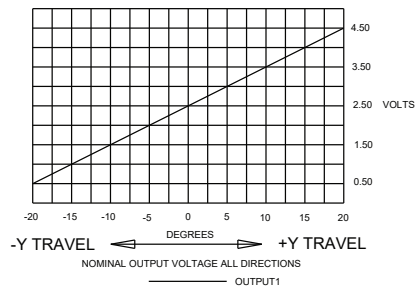
SPI SCHEMATIC

OUTPUT "JJ" AND "KK"

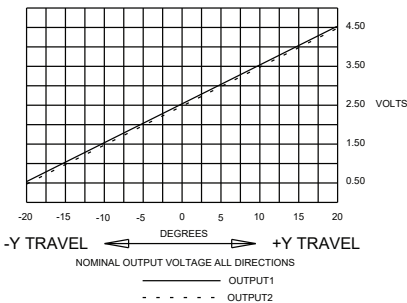
ONLY ONE SUPPLY WIRE IS PRESENT WITH EACH CONFIGURATION

HTLT2 Joystick Outputs

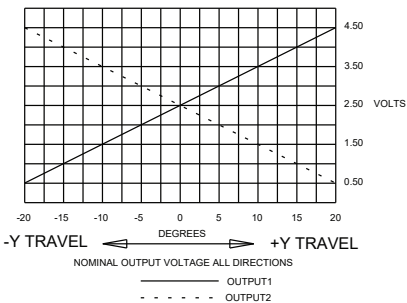
OPTION AA



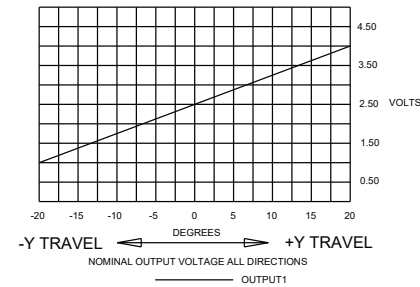
OPTION BB



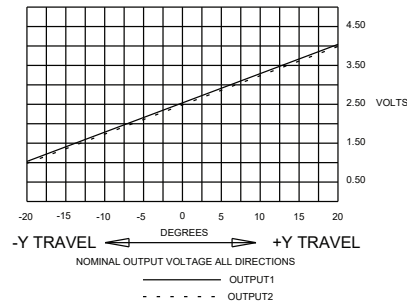
OPTION CC



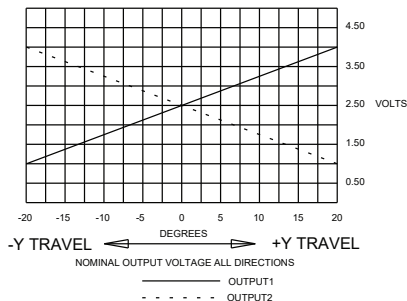
OPTION DD



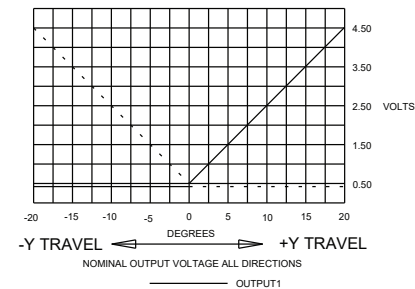
OPTION EE



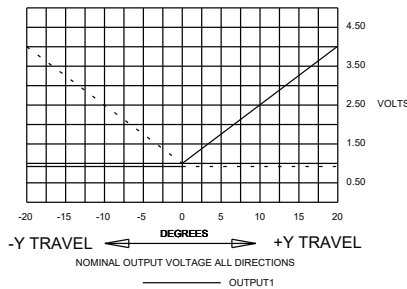
OPTION FF



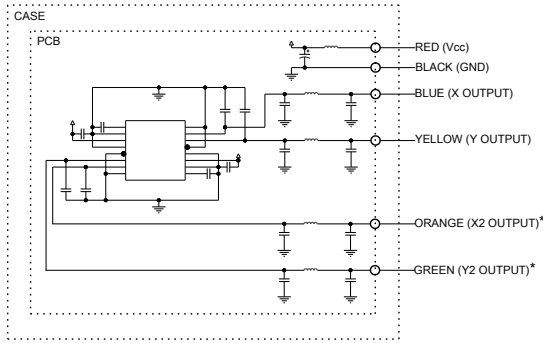
OPTION GG



OPTION HH

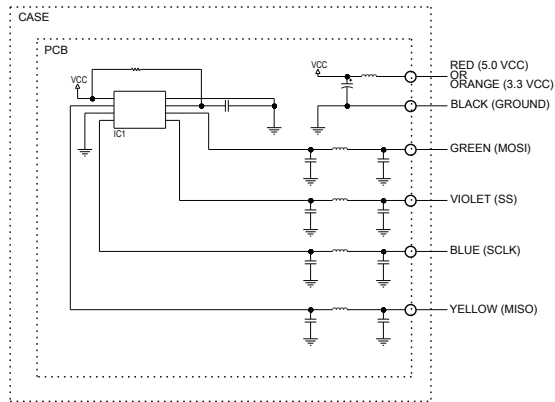


HTLT4 Joystick Schematics



ANALOG JOYSTICK SCHEMATIC

*NOT PRESENT IN OUTPUTS AA AND DD
White Wires are Used for Pushbutton Option

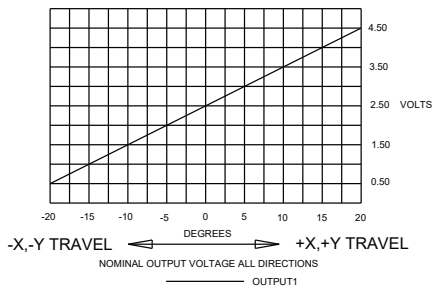


SPI SCHEMATIC
OUTPUT "JJ" AND "KK"

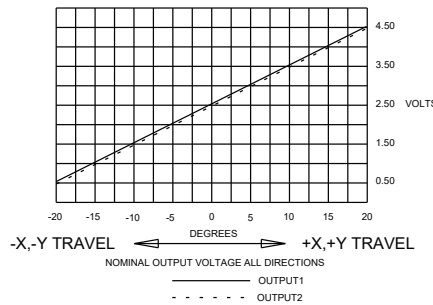
ONLY ONE SUPPLY WIRE IS PRESENT WITH EACH CONFIGURATION

HTLT4 Joystick Outputs

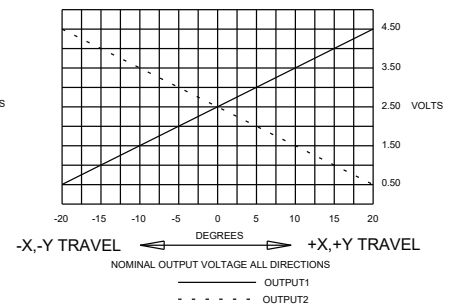
OPTION AA



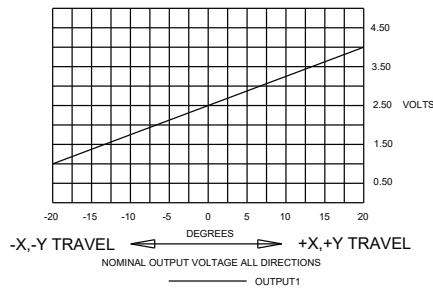
OPTION BB



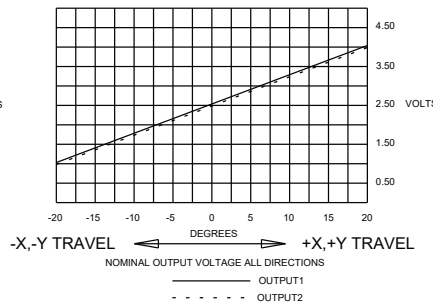
OPTION CC



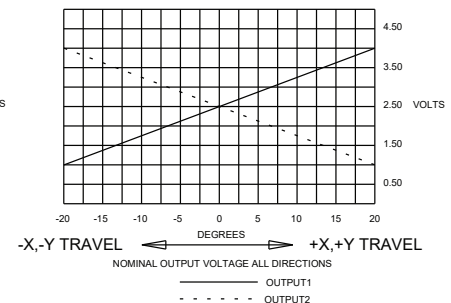
OPTION DD



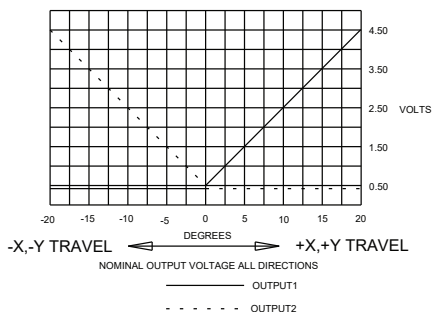
OPTION EE



OPTION FF



OPTION GG



OPTION HH

