

TS series

Proportional Hall effect thumbsticks

Distinctive features and specifications



- ☐ 1 or 2 axis
- ☐ Pushbutton handle option
- ☐ Non-contact Hall effect technology
- ☐ Submersible to 1m (3.28ft) per IP68
- ☐ Threaded metal housing option
- ☐ Redundant outputs available
- ☐ USB outputs available

MECHANICAL (FOR X, Y AXIS)

- Operating Force: 3.1N±0.5N (0.70lbf±0.11lbf)¹
- Maximum Vertical Load: 200N (45lbf)¹
- Maximum Horizontal Load: 150N (33.7lbf)¹
- Mechanical Angle of Movement: 50°
- Expected Life: 1 million cycles
- Mass/weight: 18.25g ± 5.0g (0.64oz±0.18oz)
- Lever Action (Centering): Spring centering

ENVIRONMENTAL

- Operating Temperature: -40°C to +85°C (-40°F to +185°F)
- Storage Temperature: -40°C to +85°C (-40°F to +185°F)
- Sealing: IP68, IP69K²
- EMC Immunity Level: EN61000-4-3
- EMC Emissions Level: EN61000-6-3:2001
- ESD: EN61000-4-2

ELECTRICAL SENSOR

- Resolution: 1.22mV
- Supply Voltage Range: 5.00V±0.01V
- Reverse Polarity Max: -10V
- Overvoltage Max: 20V
- Output Impedance: 2Ω
- Return to Center Voltage Tolerance: ±200mV initial

PUSHBUTTON SWITCH (Option 6 Handle)

- Electrical life: 100,000 cycles
- Rating: 50mA, 12VDC.
- Terminal: Brass with silver plating
- Contact resistance: 100mΩ max
- Insulation resistance: 100MΩ min. 500VDC
- Dielectric strength: 250VAC /1 minute
- Contact arrangement: 1 pole 1 throw
- Operation force: 1.5lbf
- Stop strength: Max 3kgf vertical static load for 15 seconds
- Operating temperature: -25°C to +70°C (-13°F to +158°F)
- Storage temperature: -30°C to +85°C (-22°F to +185°F)
- Vibration resistance: MIL-STD-202F METHOD 201A
- Shock resistance: MIL-STD-202F METHOD 213B

MATERIALS

- Body: Glass filled nylon
- Threaded Body: Black oxide plated brass
- Boot: Silicone
- Handles: 1, 2, 3 - Glass filled nylon
4, 5, 6, 7, 8 - Silicone
B, C, D - Thermoplastic elastomer

NOTES:



Mounting accessories.

Standard hardware includes:

- For the Drop-in option – 4 push in connectors, drop-in bezel and an O-ring.
- For the Rear mount option: 4x1/2 FH SS Phil Screws and a rear mount bezel.

1 Force applied to the top of the castle cap.

2 All options are IP68 and IP69K rated, however Drop-in mounting does not prevent panel ingress.

– All values are nominal.



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Overview

TS						
SERIES						
Handle		Termination¹		Output Options		Power Supply Options
0	None	1	22AWG 25cm PTFE	00	0V to 5V (Rail to Rail)	A Single B Independent ³
1	Castle	2	28AWG 25cm PTFE	01	0.25V to 4.75V	
2	Winged Hat	3	72" Overmold Cable with USB Male Type Connector	02	0.5V to 4.5V	
3	Conical	4	2.54mm (0.100") Pitch TE Connector	03	1V to 4V	
4	Finger Tip	5	2.54mm (0.100") Pitch TE Connector with 10" Mating Harness	04	0V to 5V - Sensor 1 0V to 5V - Sensor 2	
5	Round Jog			05	0.25V to 4.75V - Sensor 1 0.25V to 4.75V - Sensor 2	
6	Pushbutton			06	0.5V to 4.5V - Sensor 1 0.5V to 4.5V - Sensor 2	
7	Mushroom*			07	1V to 4V - Sensor 1 1V to 4V - Sensor 2	
8	Low Profile*			08	0V to 5V - Sensor 1 5V to 0V - Sensor 2	
A	Handles 1, 2, 3			09	0.5V to 4.5V - Sensor 1 4.5V to 0.5V - Sensor 2	
B	Castle, elastomer			10	0.25V to 4.75V - Sensor 1 4.75V to 0.25V - Sensor 2	
C	Winged Hat, elastomer			11	1V to 4V - Sensor 1 4V to 1V - Sensor 2	
D	Conical, elastomer			12	Customer specified	
				13	PWM ²	
				14	USB (Game Controller)	
				15	Joyball (Cursor emulation)	

NOTES:

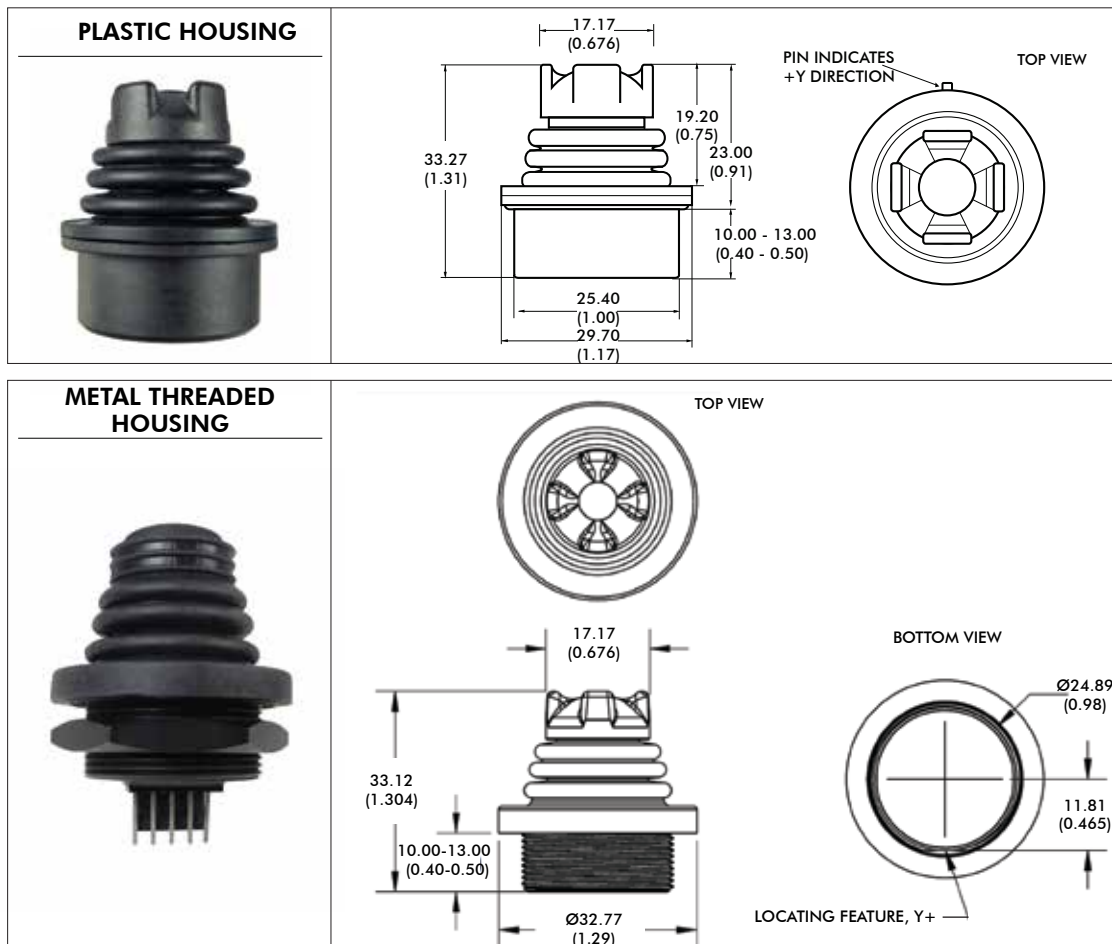
* = Not available with Threaded Housing (Mounting Style Option "T").

1-1 – Wires are thick, robust, and best suited for stand alone applications.

1-2 – Wires are thin and best suited for tightly constrained wire routing.

2 Contact factory for PWM configuration.

3 Only available on dual output. Not available with Handle 6 (Pushbutton).
Not available with Termination Options 4 or 5.



NOTE: Dimensions are in mm/(inch).

Note: The company reserves the right to change specifications without notice.

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Models and dimensions

HANDLE OPTIONS		
<div>1. CASTLE</div> <div>B. CASTLE (ELASTOMER)</div> <div><div><div>Ø17.17 (0.676)</div><div></div></div><div><div></div><div>18.67 (0.735)</div></div></div>	<div>2. WINGED HAT</div> <div>C. WINGED HAT (ELASTOMER)</div> <div><div><div>Ø18.36 (0.723)</div><div></div></div><div><div></div><div>19.84 (0.781)</div></div></div>	<div>3. CONICAL</div> <div>D. CONICAL (ELASTOMER)</div> <div><div><div>Ø17.30 (0.681)</div><div></div></div><div><div></div><div>20.35 (0.801)</div></div></div>
<div>4. FINGER TIP</div> <div><div><div>Ø17.42 (0.686)</div><div></div></div><div><div></div><div>29.69 (1.169)</div></div></div>	<div>5. ROUND JOG</div> <div><div><div>Ø17.22 (0.678)</div><div></div></div><div><div></div><div>24.08 (0.948)</div></div></div>	<div>6. PUSHBUTTON</div> <div><div><div>Ø17.65 (0.695)</div><div></div></div><div><div></div><div>19.99 (0.787)</div></div></div>
<div>7. MUSHROOM</div> <div><div><div>Ø20.32 (0.800)</div><div></div></div><div><div></div><div>20.27 (0.798)</div></div></div>	<div>8. LOW PROFILE</div> <div><div><div>Ø15.24 (0.600)</div><div></div></div><div><div></div><div>14.88 (0.586)</div></div></div>	

NOTES:

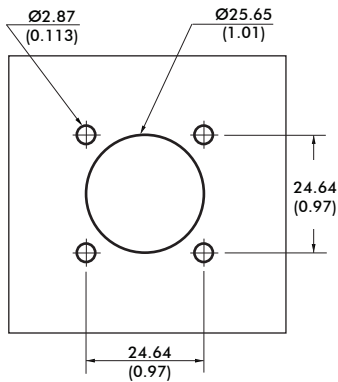
- Option 7 and 8 handles not available with the "T" threaded housing mounting style.
- Dimensions are in mm/(inch).

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Models and dimensions – continued

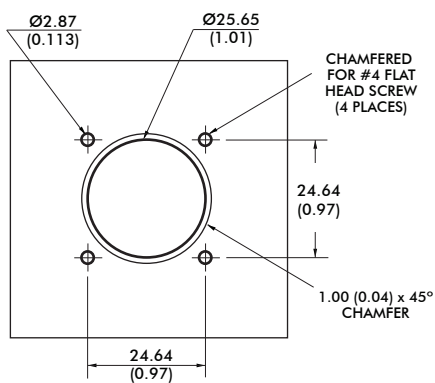
PLASTIC HOUSING - DROP-IN OPTION CUTOUT DIMENSIONS



4 x PUSH IN CONNECTORS



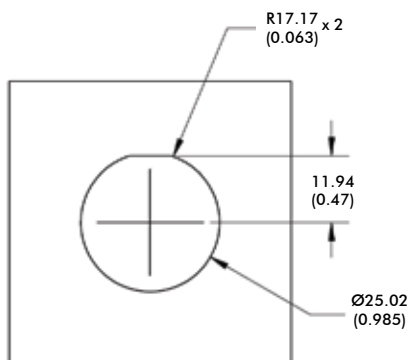
PLASTIC HOUSING - REAR MOUNT OPTION CUTOUT DIMENSIONS



4 x 1/2 FH SS PHIL SCREW



METAL THREADED HOUSING - DROP-IN OPTION CUTOUT DIMENSIONS



NOTES:

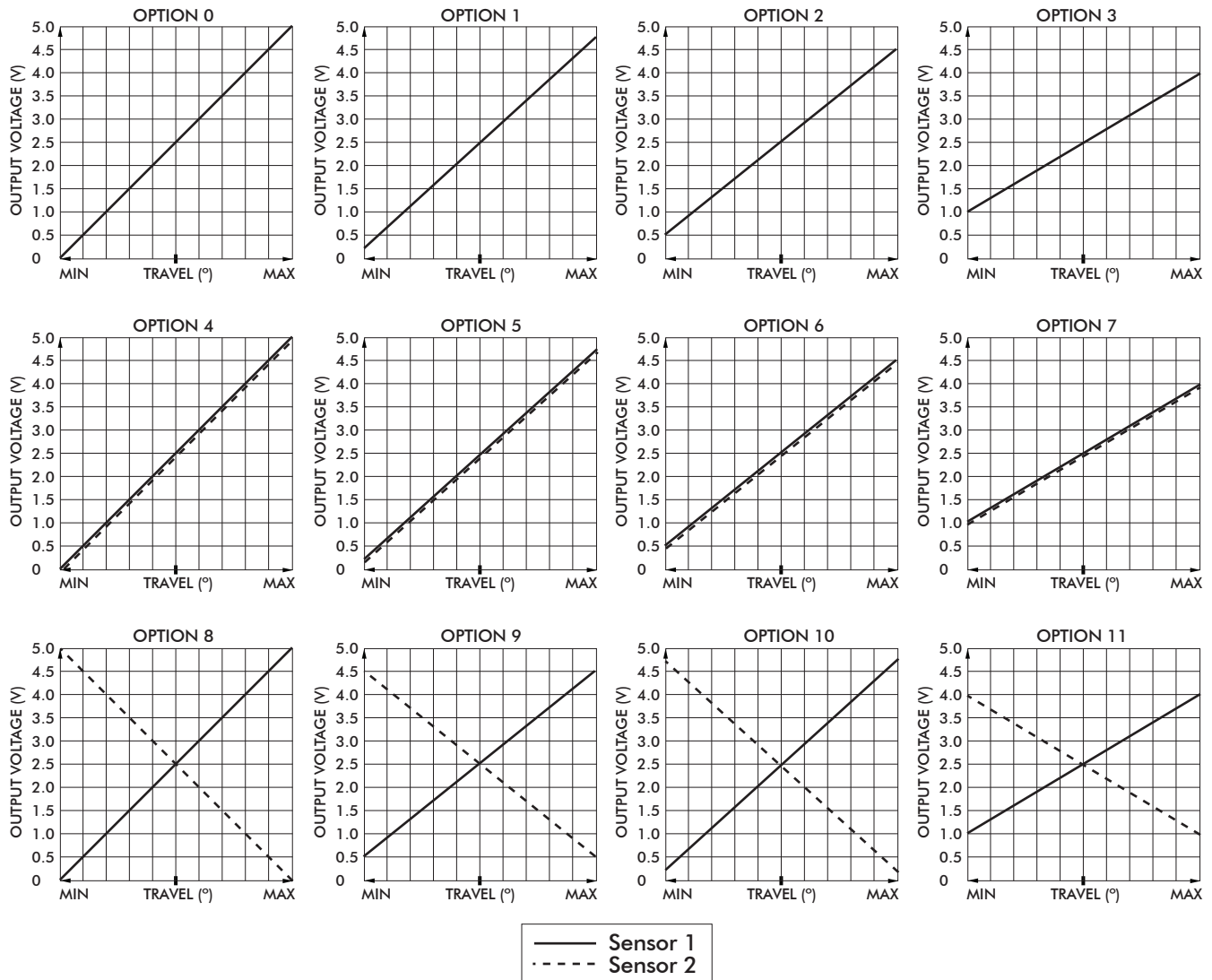
- 1 The maximum panel thickness for the Rear Mount configuration is 2.032mm (0.08in)
- 2 The under panel depth for the Drop-in configuration is 16.02mm/(0.631in).
- 2 The under panel depth for the Metal Threaded Housing configuration is 14.55mm/(0.573in).
- 3 Dimensions are in mm/(inch).

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Models and dimensions – continued

VOLTAGE OUTPUT OPTIONS



WIRING SPECIFICATION

- Black: Ground & button common
- Red: Power (5V)
- Blue: X axis output (alpha)
- Yellow: Y axis output (alpha)
- Orange: Pushbutton switch (option 6 handle)
- Blue/White Stripe: X axis output (beta)
- Yellow/Black Stripe: Y axis output (beta)
- Red/White Stripe: Power (5V) (beta)
- Black/White Stripe: Ground (beta)

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Overview

CONNECTOR TERMINATION OPTION

Single output configurations feature a five position TE 3-647166-5 connector. Dual output configurations feature a seven position TE 3-647166-7 connector. A mating harness is not included, but may be specified for single output configurations at the time of order for an additional charge. The five function harness is part number 505-499. The seven function harness is part number 505-500.

PINOUT SPECIFICATION		
	TE 3-647166-5	TE 3-647166-7
PIN 1	Y (alpha)	Pushbutton
PIN 2	5VDC	GND/ Pushbutton common
PIN 3	X (alpha)	X (alpha)
PIN 4	GND/ Pushbutton common	Y (beta)
PIN 5	Pushbutton	Y (alpha)
PIN 6	–	5VDC
PIN 7	–	X (beta)

USB

USB

Featuring USB 1.1 HID compliant interface, APEM's USB joysticks are recognized as standard HID "game controller" devices. Adhering to the HID specification, APEM's USB joysticks are plug-and-play with most versions of Windows. Joystick button and axis 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

SUPPLIED WIRING

USB: USB Male Type A Connector with 72" overmolded cable

CURSOR EMULATION

The Cursor Emulation 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.

APPLICATIONS

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

FEATURES

- HID compliant "pointing device"
- Plug-and-play with USB option

SUPPLIED WIRING

USB: USB Male Type A Connector with overmolded cable

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Apem:](#)

[TS-6A1S02A](#) [TS-AA1S08A](#) [TS-7A1S00A](#) [TS-AA1S02A](#) [TS-7A1P00A](#) [TS-6A1S00A](#) [TS-6A1P00A](#) [TS-3A1P00A](#)
[TS-AA1U00A](#) [TS-6A1U00A](#) [TS-AA1U02A](#) [TS-4A1S02A](#) [TS-AA1S09A](#) [TS-3A1G00A](#) [TS-7A1U00A](#) [TS-6A1S08A](#)
[TS-5A1S00A](#) [TS-1R1G00A](#) [TSAA1P00A](#) [TS4A1S00A](#) [TSAA1S00A](#) [TS1A1S00A](#) [TS1R1S14A](#) [TS1D1U14A](#)
[TSAA1G00A](#) [TS1A1U00A](#)