

## Description

The T6 incremental inclinometer is a single axis, digital tilt sensor that can measure the angle of an object with respect to gravity. It uses a weight placed on one side of a wheel assembly to keep the wheel stationary with respect to gravity. An optical encoder connected to the wheel provides unlimited range and virtually no linearity errors. There is no external contact to the encoder disk. Internal magnetic damping minimizes overshoot and oscillations as the inclinometer rotates. As the housing moves relative to the encoder disk the motion is converted to TTL quadrature outputs. The quadrature outputs can be used to measure angle, speed and direction. This second generation design virtually eliminates stiction (or hysteresis) which was the primary accuracy limitation of first generation inclinometers.

The T6 inclinometer utilizes an unbreakable mylar disk, LED light source, metal shaft, and high quality ball bearings.

The T6 inclinometer is our high resolution tilt sensor and is available in several different resolutions. It is available with or without an index. The connector is polarized and has either 5 pins for single ended signals or 10 pins for differential signals. The connector is also latched providing a secure connection. The T6 operates from a single +5VDC supply.

The differential version uses a line driver (26C31) that can source and sink 20mA at TTL levels. The recommended receiver is industry standard 26C32. Maximum noise immunity is achieved when the differential signal is terminated with a 110 ohm resistor. Adding a .0047 uF capacitor in series with the termination resistor reduces power consumption by effectively removing the termination while the signal is static.

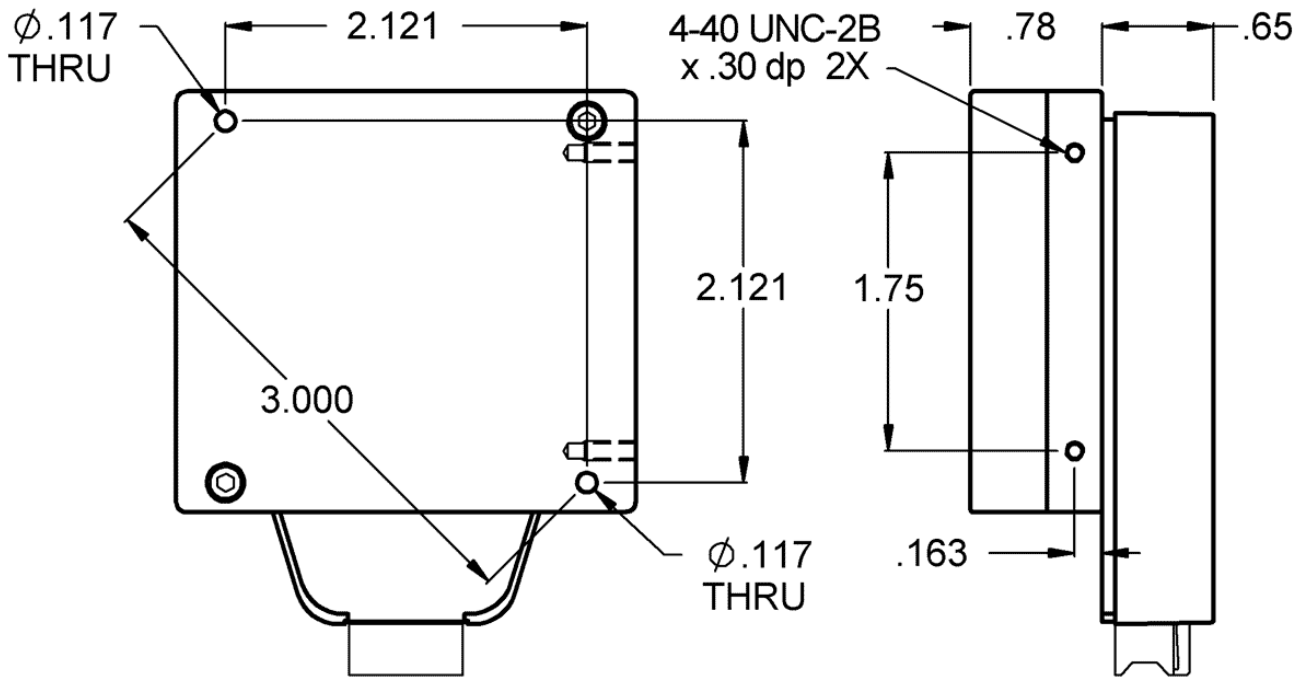
Typical applications include heavy construction equipment, dredging machinery, mining equipment, solar tracking and warehouse automation.



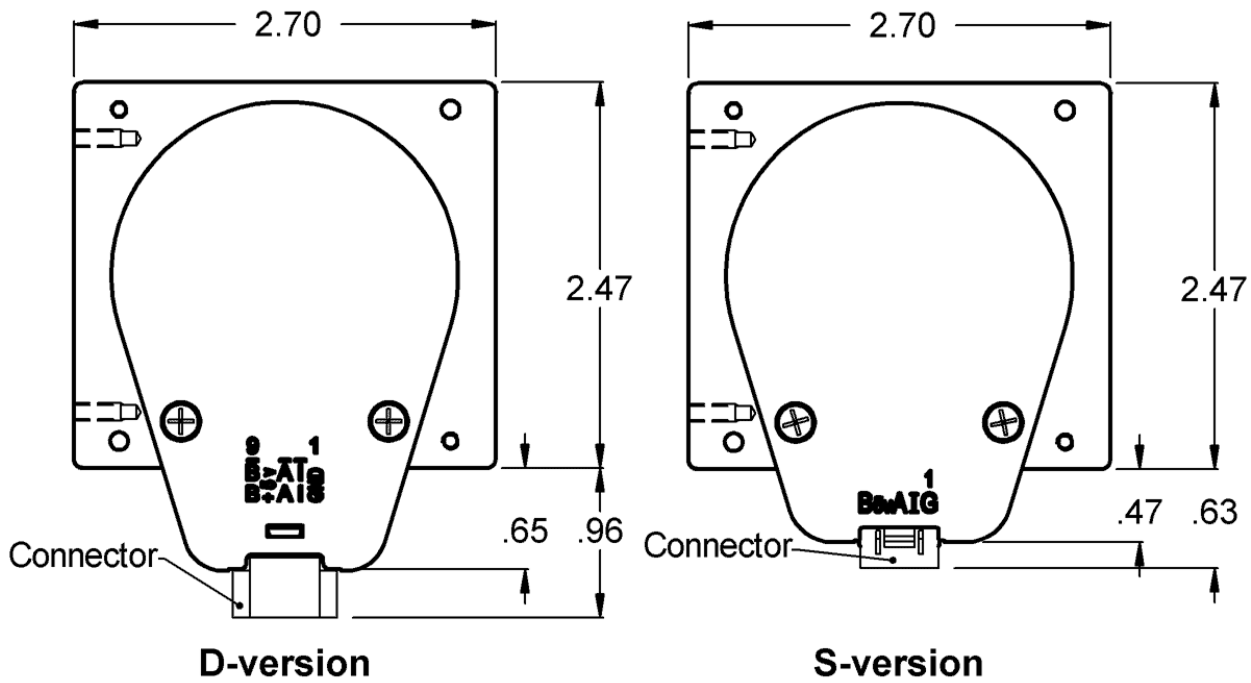
## Features

- ▶ High retention snap-in polarized connector
- ▶ -10C to +100C operating temperature
- ▶ Full 360 range inclinometer
- ▶ Near real-time response
- ▶ Virtually free from linearity errors
- ▶ 64 to 2500 cycles per revolution (CPR)
- ▶ 256 to 10,000 pulses per revolution (PPR)
- ▶ 2 or 3 channel quadrature TTL squarewave outputs

 **Mechanical Drawing 1**



 **Mechanical Drawing 2**



## Environmental

Parameter	Value	Units
Operating Temperature	-40 to 100	C
Vibration (5Hz to 2kHz)	20	G
Electrostatic Discharge, Human Body Model	± 4	kV

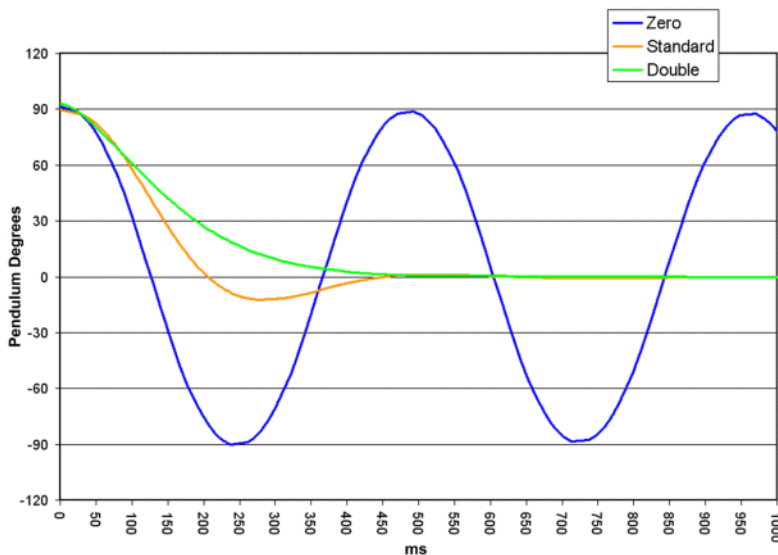
## Mechanical

Parameter	Value
Settling Time	0.6 to 1 sec. typ.
Pendulum Undamped Natural Frequency	2 Hz typ.
Weight	
Single-ended	8.47 oz.
Differential	8.55 oz.

## Phase Relationship

B leads A for clockwise rotation and A leads B for counter-clockwise rotation of the inclinometer (viewed from the encoder cover side of the inclinometer).

## Damping

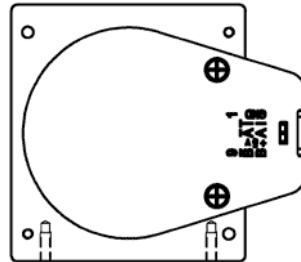


Damping affects settling time and overshoot. Standard damping will fit most applications. Double damping eliminates oscillation but settles to the final position more slowly. Some applications may require double damping to average out cyclic motion such as found in

moving vehicles. Damping options can be specified when ordering.

## Axis Orientation

## Index Orientation



If the index option is selected the encoder should be oriented as shown below.

## Single-ended Electrical

- Specifications apply over entire operating temperature range.
- Typical values are specified at  $V_{cc} = 5.0V_{dc}$  and  $25^{\circ}C$ .
- For complete details, see the EM1 product page.

Parameter	Min.	Typ.	Max.	Units	Conditions
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		27	30	mA	CPR < 1000, no load
		55	57	mA	CPR $\geq$ 1000, no load

Parameter	Min.	Typ.	Max.	Units	Conditions
Low-level Output			0.5	V	IOL = 8mA max.
High-level Output	2.0			V	IOH = -8mA max.
	4.2	4.8		V	no load
Output Current Per Channel	-8		8	mA	
Output Rise Time		110		nS	
Output Fall Time		35		nS	

## Differential Electrical

- Specifications apply over entire operating temperature range.
- Typical values are specified at  $V_{cc} = 5.0V_{dc}$  and  $25^{\circ}C$ .
- For complete details, see the EM1 product pages.

Parameter	Min.	Typ.	Max.	Units	Conditions
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		29	33	mA	CPR < 1000, no load
		57	60	mA	CPR $\geq$ 1000, no load
Low-level Output		0.2	0.4	V	IOL = 20mA max.
High-level Output	2.4	3.4		V	IOH = -20mA max.
Differential Output Rise/Fall Time			15	nS	

## Pin-outs

Pin	5-pin single-ended	10-pin differential
1	Ground	Ground
2	Index	Ground
3	A channel	Index-
4	+5 VDC power	Index+
5	B channel	A- channel
6		A+ channel
7		+5 VDC power
8		+5 VDC power
9		B- channel
10		B+ channel

**Ordering Information**

T6 -  -  -  -

CPR	Index	Output	Damping
64	NE =No Index, EM1 Compatible	S =Single- ended	S =Standard
1800			D =Double
2000	IE =Index, EM1 Compatible	D =Differential	Damping
2048			
2500			

**Rules**

- Index must be equal to NE when CPR is equal to 64

**Notes**

- Cables and connectors are not included and must be ordered separately.
- For ordering information please see the Compatible Cables / Connectors section above.
- US Digital warrants its products against defects in materials and workmanship for two years. See complete warranty for details.

**Base Pricing**

Quantity	Price
1	\$129.95
10	\$115.78
50	\$106.71
100	\$101.17

- Add 12% per unit for **Output** of Differential
- Add \$15.00 per unit for **Damping** of Double Damping