

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 150 Ω resistor. Adding a .0047 μ F capacitor in series with the termination resistor reduces power consumption by effectively removing the termination while the signal is static.

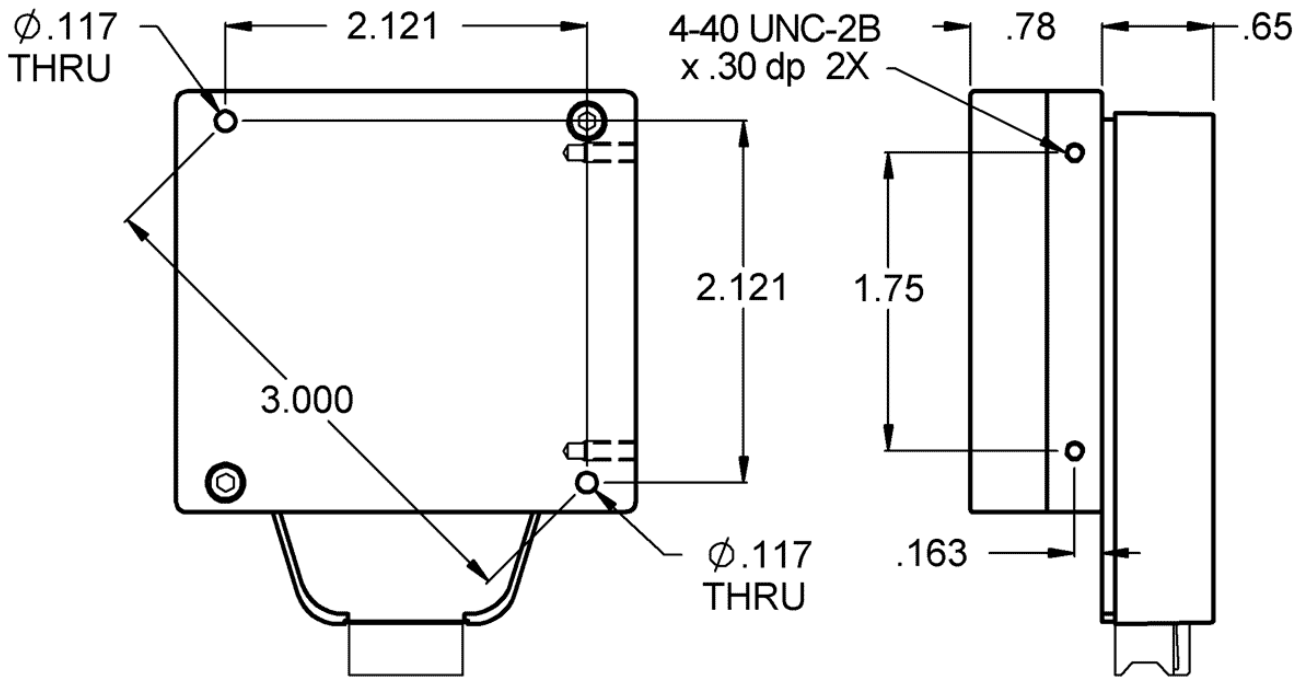
Typical applications include heavy construction equipment, dredging machinery, mining equipment, solar tracking and warehouse automation.



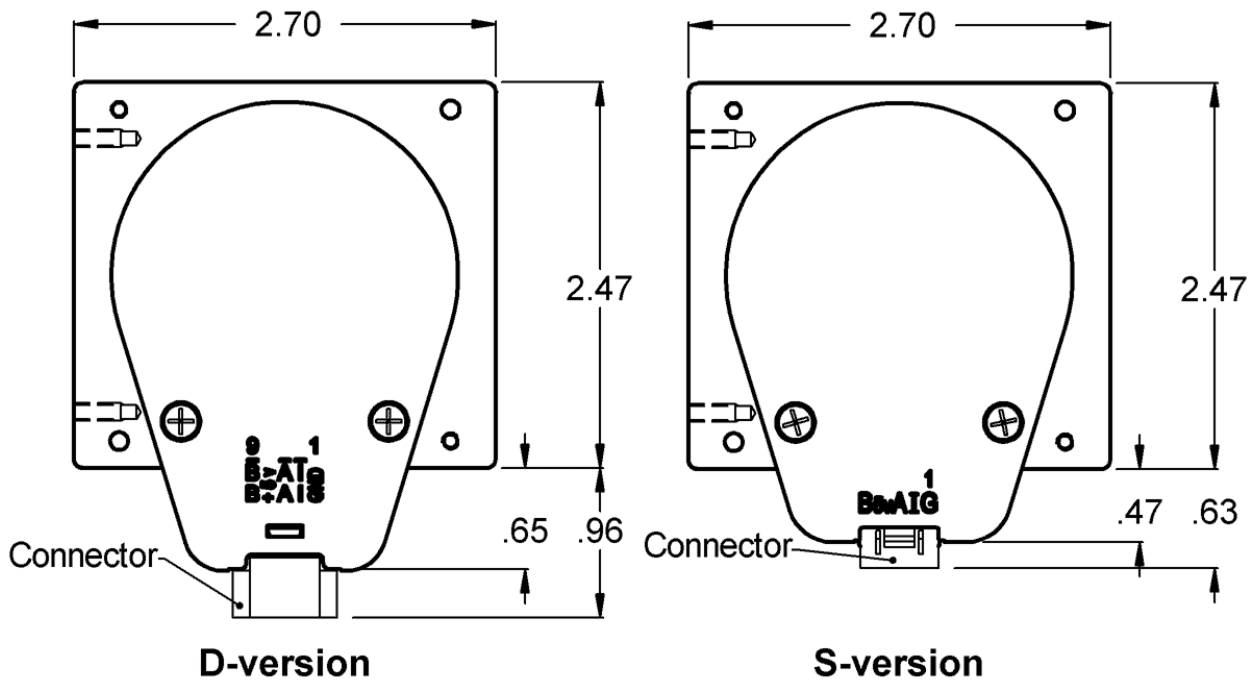
Features

- ▶ 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

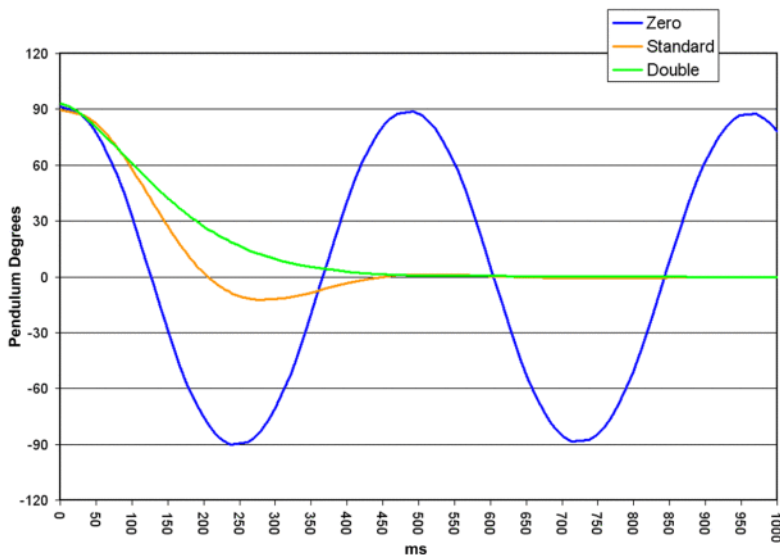
Mechanical

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

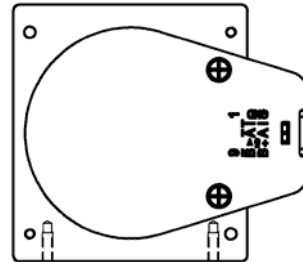


Damping affects settling time and overshoot. Standard damping will fit most applications. Double damping eliminates oscillation but settles to the final position more slowly. Some applications may require double damping to average out cyclic motion such as found in

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 Vcc = 5.0Vdc and 25 ° 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	33	mA	CPR < 1000, no load
		55	62	mA	CPR ≥ 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 Vcc = 5.0Vdc and 25 ° 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	36	mA	CPR < 1000, no load
		57	65	mA	CPR ≥ 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 (1)	10-pin differential (2)
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

- (1) 5-pin single ended mating connector is CON-FC5.
 (2) 10-pin differential mating connector is CON-FC10.

Product Change Notifications

Title	Date	Description	Download
EM1 LED Die - PCN 1016	2/7/2013	<p>As part of US Digital's continual assurance of supply strategy, we have qualified additional sources for our LED die used in our EM1 encoder module, which in turn impacts all of the following products:</p> <p>EM1, E2, E3, E5, E6, H1, H15, H3, H5, H6, HB5M, HB6M, HD25, PE, S1, S2, S5, S6, T5 and T6</p> <p>The device specification will remain the same, i.e. there will be no change to form, fit or function of the product(s) as specified by US Digital. The appropriate quality and reliability testing has been performed on representative products to ensure normal parametric distribution, consistent with US Digital's quality and reliability standards.</p>	<p>Download</p> <p>Download</p>
EOL T6 - PCN 1032	6/17/2013	This PCN is a formal notification that US Digital is discontinuing the T6.	Download
EM1 Component Change Notice	N/A	Unless otherwise specified, the US Digital EM1 optical encoder module will be phased in to replace our previous encoder module, HEDS-9000 Series, supplied by Avago Technologies.	View

Ordering Information

T6 - - - -

CPR

64 =
1800 =
2000 =
2048 =
2500 =

Index

NE =*No Index, EM1 Compatible*
IE =*Index, EM1 Compatible*

Output

S =*Single-ended*
D =*Differential*

Damping

S =*Standard*
D =*Double Damping*

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

For volume discounts, please contact us at sales@usdigital.com or 800.736.0194.

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