T5 Incremental Inclinometer

Description

The T5 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 T5 inclinometer utilizes an unbreakable mylar disk, LED light source, metal shaft and high quality ball bearings.

This inclinometer is a non-contacting, rotary to digital converter that is useful for position feedback or manual interface. The T5 converts real-time shaft angle, speed, and direction into TTL-compatible quadrature outputs.

The T5 inclinometer is our standard 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 T5 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 µF capacitor in series with the termination resistor reduces power consumption by effectively removing the termination while the signal is static.

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
- 32 to 1250 cycles per revolution (CPR)
- 128 to 5000 pulses per revolution (PPR)
- 2 or 3 channel quadrature TTL squarewave outputs

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Rev. 130103162349

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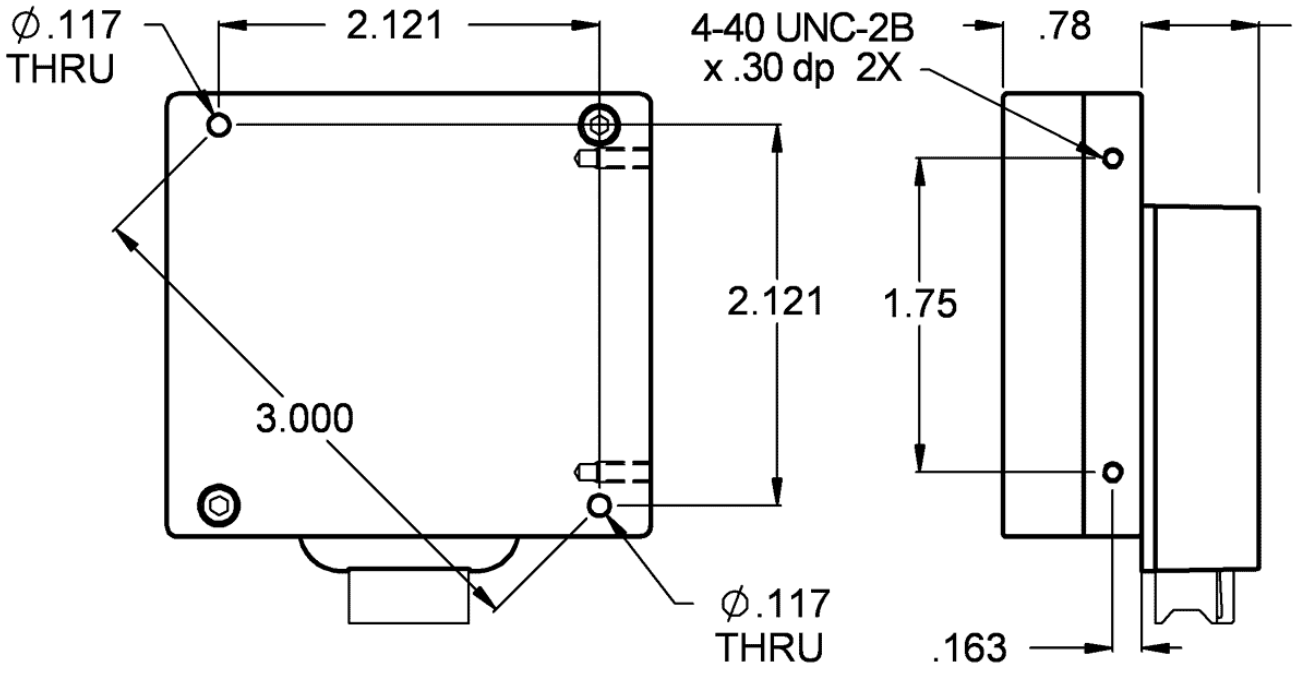
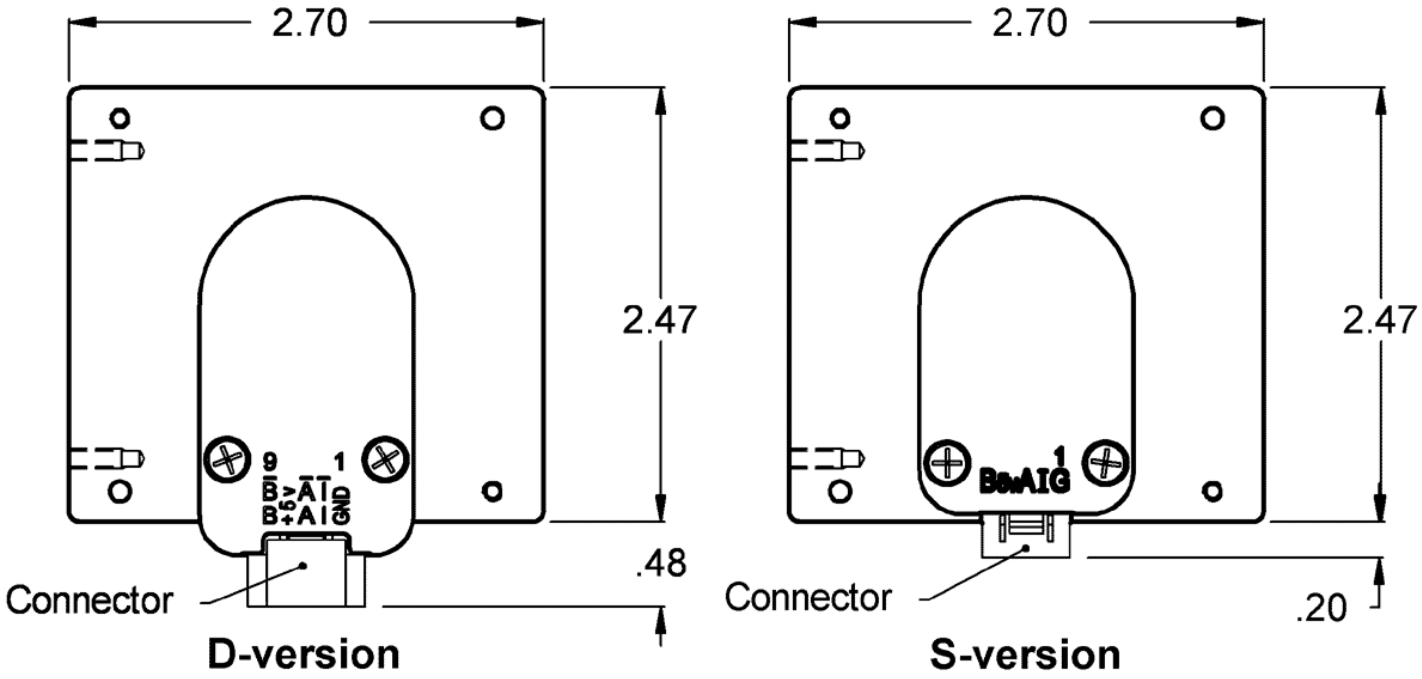
Mechanical Drawing 1



Mechanical Drawing 2



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Environmental

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

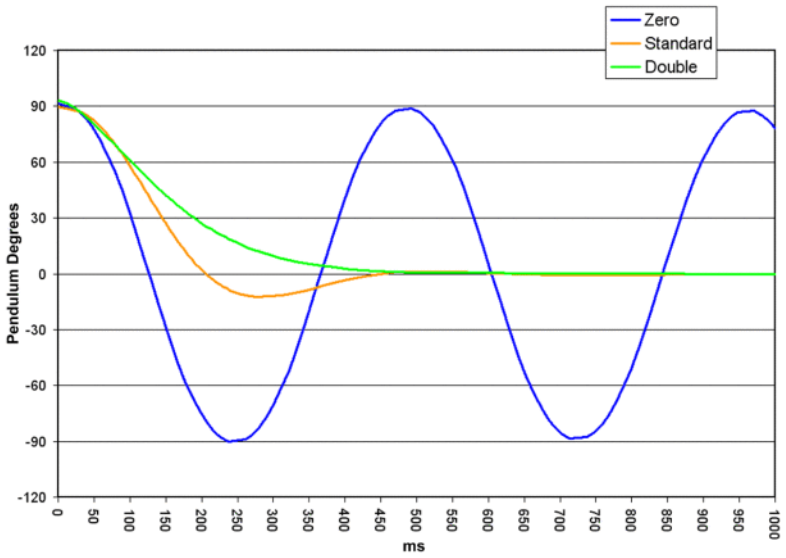
Mechanical

Parameter	Value
Settling Time	0.6 to 1 sec. typ.
Pendulum Undamped Natural Frequency	2 Hz typ.
Weight	
Single-ended	7.61 oz.
Differential	8.01 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 t he inclinometer).

Damping



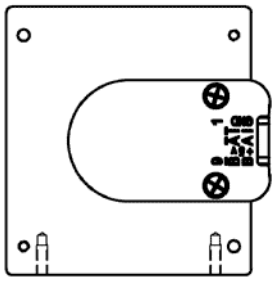
Damping affects settling time and overshoot. Standard damping will fit most applications. Double damping eliminates oscillation but settles to the final position more slowly. Some applications may require double damping to average out cyclic motion such as found in

moving vehicles. Damping options can be specified when ordering.

Axis Orientation

Index Orientation

If index option is selected 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	30	mA	CPR < 500, no load
		55	57	mA	CPR ≥ 500, no load
Low-level Output			0.5	V	I_{OL} = 8mA max.
High-level Output	2.0			V	I_{OH} = -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.

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- 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 < 500, no load
		57	60	mA	CPR ≥ 500, no load
Low-level Output		0.2	0.4	V	I_{OL} = 20mA max.
High-level Output	2.4	3.4		V	I_{OH} = -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

Product Change Notifications

Title	Date	Description	Download
E5 Insert Overmold - PCN 1008	8/23/2011	In an effort to enhance the robustness of our E5 encoder; the four threaded inserts pressed into the base are being replaced with similar threaded nuts that will be insert-molded into the encoder base. This change in process will retain the insert with much greater strength.	Download
E5 Laser Marking - PCN 1009	8/23/2011	The primary purpose for this change is to create a more durable and longer lasting solution compared to the previous stick on label solution. The E5 encoder covers will now have the US Digital logo, part number, lot code, and pin-outs laser marked onto the top surface.	Download

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E5 Mold Update - PCN 1007	8/23/2011	The plastic E5 base and covers have been redesigned for improved moldability and aesthetics. Design changes are primarily alteration of surface drafts, additional or increased corner radii and additional coring out of thick regions. This update was carefully done to preserve the size and shape of the encoder. The new parts are dimensionally equivalent and will fit within the envelope of the previous parts. Only the E-option covers and the G-option bases have features with dimensional changes.	Download

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Ordering Information

T5 - [ ] - [ ] - [ ] - [ ]

CPR	Index	Output	Damping
32 =	NE =*No Index, EM1 Compatible*	S =*Single-ended*	S =*Standard*
50 =	IE =*Index, EM1 Compatible*	D =*Differential*	D =*Double Damping*
96 =			
100 =			
192 =			
200 =			
250 =			
256 =			
360 =			
400 =			
500 =			
512 =			
540 =			
720 =			
900 =			
1000 =			
1024 =			
1250 =			

Rules

- Index must be equal to NE when CPR is equal to 32

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	$107.95
10	$94.37
50	$84.28

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

- Add 14% per unit for **Output** of Differential
- Add $15.00 per unit for **Damping** of Double Damping
- Add 10% per unit for **Index** of IE or **CPR** greater than or equal to 1000.

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