

## MODEL TR1 TRU-TRAC® - LINEAR MEASUREMENT SOLUTION



### FEATURES

Encoder and measuring wheel solution integrated into one compact unit  
Spring-loaded torsion arm makes wheel pressure adjustments a snap  
Easily installed in a vertical, horizontal, or upside-down orientation  
Operates over a variety of surfaces at speeds up to 3000 feet per minute  
Integrated module simplifies your system design, reducing cost

With operating speeds up to 3000 feet per minute and a wide variety of configuration options, the TR1 Tru-Trac® is the versatile solution for tracking velocity, position, or distance over a wide variety of surfaces in almost any application. An integrated encoder and spring-loaded measuring wheel assembly available in one unit, the TR1 is both easy-to-use and compact. Plus, the TR1 housing is a durable, conductive composite material that will eliminate static build up. Its spring-loaded torsion arm offers adjustable torsion load, allowing the TR1 to be mounted in almost any orientation – even upside-down. And the threaded shaft on the pivot axis is easily reversible in the field, providing mounting access from either side. The TR1 is your solution for a compact, linear encoder.

### COMMON APPLICATIONS

Web Tension Control, Paper Monitoring, Glue Dispensing, Linear Material Monitoring, Conveyor Systems, Printing, Labeling, Document Handling

### MODEL TR1 ORDERING GUIDE

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

Mechanical		Electrical				Optional Features - Leave blank for standard options			
TR1	U1	R4	0500	N	V1	A	OC	F00	
<b>MODEL</b> TR1 Tru-Trac™			<b>CYCLES PER REVOLUTION</b> See CPR Options below Price adder for >1999		<b>INPUT VOLTAGE</b> V1 5 to 28 VDC			<b>CONNECTOR TYPE<sup>6</sup></b> F00 18" Cable <sup>7</sup> (Std) F01 12" Cable F02 24" Cable F03 36" Cable M00 2M Cable <sup>8</sup> J00 18" Cable with 5-pin M12 <sup>4</sup> K00 18" Cable with 8-pin M12	<b>OPERATING TEMPERATURE</b> -20° to 85° C (Std) T1 -40° to 85° C T2 -20° to 100° C
		<b>PIVOT SHAFT MOUNTING<sup>1</sup></b> R4 Right side 1/4-20 thread L4 Left side 1/4-20 thread R6 Right side M6 thread L6 Left side M6 thread							<b>CERTIFICATION</b> None (Std) CE CE Marked <sup>9</sup>
<b>WHEEL TYPE &amp; CIRCUMFERENCE</b> U1 Urethane 6.0" cir U2 Urethane 200 mm cir K1 Knurled 6.0" cir K2 Knurled 200 mm cir A1 Anodized Knurled 6.0" cir A2 Anodized Knurled 200 mm cir 19 No wheel - 1/4" shaft 20 No wheel - 6 mm shaft							<b>NUMBER OF CHANNELS<sup>2</sup></b> A Channel A Channel A Leads B Q Quadrature A & B R Quadrature A & B with Index Channel B Leads A <sup>3</sup> K Reverse Quadrature A & B D Reverse Quadrature A & B with Index	<b>OUTPUT TYPE</b> OC Open Collector PP Push-Pull HV Line Driver <sup>4</sup> PU Pull-Up Resistor <sup>3,5</sup> OD Open Collector with Differential Outputs	<b>MAXIMUM FREQUENCY</b> Standard F3 Extended See Specifications
									<b>SEALING</b> IP50 (Std) S2 IP65 S3 IP66 <sup>10</sup>

#### NOTES:

- See mechanical drawing. Shaft is reversible in the field.
- Contact Customer Service for non-standard index gating or phase relationship options.
- Reverse Quadrature not available with Pull-Up Resistor Output Type.
- Line Driver output not available with 5-pin M12 connector. Additional cable lengths available. Please consult Customer Service.
- With Input Voltage above 16 VDC, operating temperature is limited to 85° C.
- For mating connectors, cables, and cordsets, see Accessories at encoder.com. For Connector Pin Configuration Diagrams, see Connector Pin Configuration Diagrams at encoder.com.
- For non-standard English cable lengths enter 'F' plus cable length expressed in feet. Example: F06 = 6 feet of cable. Frequency above 300 kHz standard cable lengths only.
- For non-standard metric cable lengths enter 'M' plus cable length expressed in meters. Example: M06 = 6 meters of cable.
- Please refer to Technical Bulletin TB-100: When to Choose the CE Mark at encoder.com.
- S3 sealing option is not available when (20) 6mm shaft is chosen.

#### Model TR1 CPR Options

0001 thru 0189*	0198	0200	0250	0256	0300	0315
0360	0400	0500	0512	0580	0600	0800
1000	1024	1200	1250	1500	1800	2048
2500	2540	3000	3600	4000	4096	5000
7200	8192	10,000				6000

\*Contact customer service for availability

New CPR values are periodically added to those listed. Contact Customer Service to determine all currently available values. Special disk resolutions are available upon request and may be subject to a one-time NRE fee.

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## MODEL TR1 SPECIFICATIONS

### Electrical

Input Voltage.....	4.75 to 28 VDC max for temperatures up to 85° C 4.75 to 24 VDC for temperatures between 85° C and 100° C
Input Current.....	100 mA max (65 mA typical) with no output load
Output Format.....	Incremental – Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the shaft side. See Waveform Diagrams.
Output Types.....	Open Collector – 20 mA max per channel Push-Pull – 20 mA max per channel Pull-Up – Open Collector with 2.2K ohm internal resistor, 20 mA max per channel Line Driver – 20 mA max per channel (Meets RS 422 at 5 VDC supply)
Index.....	Once per revolution. 1 to 400 CPR: Ungated 401 to 10,000 CPR: Gated to output A See Waveform Diagrams.
Max. Frequency.....	Standard Frequency Response is 200 kHz for CPR 1 to 2540 500 kHz for CPR 2541 to 5000 1 MHz for CPR 5001 to 10,000 Extended Frequency Response (optional) is 300 kHz for CPR 2000, 2048, 2500, and 2540
Electrical Protection.....	Reverse voltage and output short circuit protected. NOTE: Sustained reverse voltage may result in permanent damage.
Noise Immunity.....	Tested to BS EN61000-6-2; BS EN50081-2; BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-6; BS EN500811
Quadrature.....	67.5° electrical or better is typical,
Edge Separation.....	54° electrical minimum at temperatures > 99° C
Waveform Symmetry.....	180°(±18°) electrical (single channel encoder)
Accuracy.....	Within 0.017° mechanical or 1 arc-minute from true position (for CPR > 189)

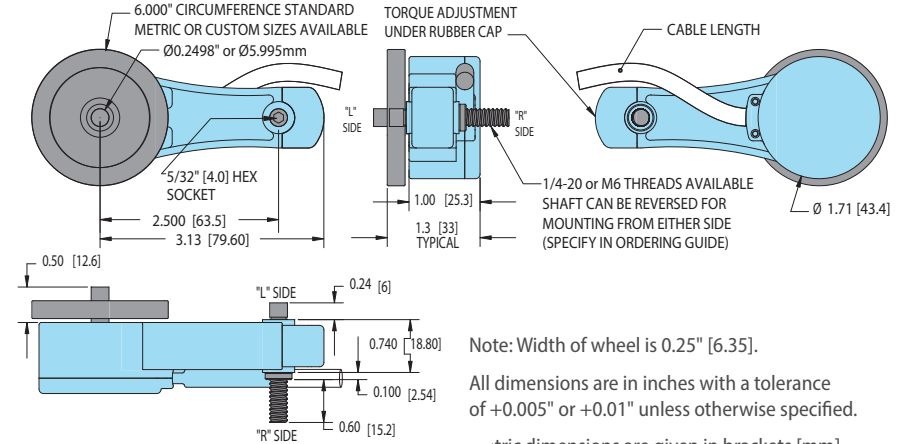
### Mechanical

Max Shaft Speed.....	6000 RPM. Higher speeds may be achievable; contact Customer Service.
Shaft Material.....	Stainless Steel
Shaft Tolerance.....	+0.0000/-0.0004" [+0.000/-0.010 mm]
Radial Shaft Load.....	5 lb max. Rated load of 2 to 3 lb for bearing life of 1.2 x 10 <sup>10</sup> revolutions
Axial Shaft Load.....	5 lb max. Rated load of 2 to 3 lb for bearing life of 1.2 x 10 <sup>10</sup> revolutions
Starting Torque.....	IP50 0.05 oz-in IP65 0.4 oz-in IP66 0.8 oz-in
Housing.....	Stainless steel fibers in a high temperature nylon composite
Wheel Width.....	0.25"
Weight.....	5 oz typical

### Environmental

Storage Temp.....	-25° to 85° C
Humidity.....	98% RH non-condensing
Vibration.....	10 g @ 58 to 500 Hz
Shock.....	80 g @ 11 ms duration
Sealing.....	IP50 standard; IP65 or IP66 available

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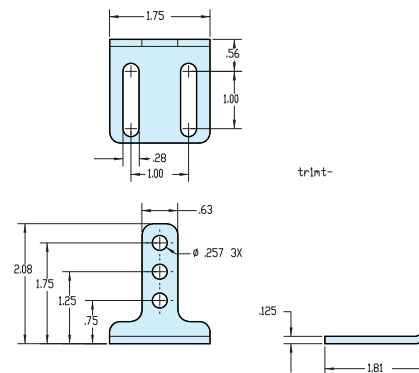
Note: Width of wheel is 0.25" [6.35].

All dimensions are in inches with a tolerance of +0.005" or +0.01" unless otherwise specified.

...tronic dimensions are given in brackets [mm].

## TRU-TRAC® MOUNTING BRACKET

Allows for a variety of mounting positions and makes installation of the Model TR1 even easier.



Stock #140104

## WIRING TABLE

For EPC-supplied mating cables, refer to wiring table provided with cable.

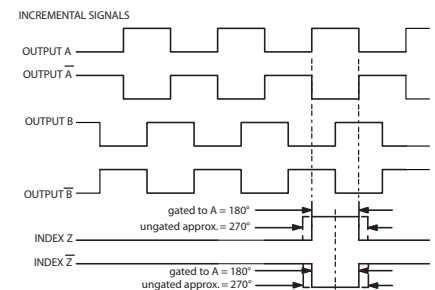
Trim back all unused wires.

Function	Gland Cable <sup>†</sup> Wire Color	5-pin M12**	8-pin M12**
Com	Black	3	7
+VDC	White	1	2
A	Brown	4	1
A'	Yellow	--	3
B	Red	2	4
B'	Green	--	5
Z	Orange	5	6
Z'	Blue	--	8
Shield	Bare*	--	--

\*CE Option: Cable shield (bare wire) is connected to internal case.  
†Standard cable is 24 AWG conductors with foil and braid shield.  
\*\*CE Option: Use cable cordset with shield connected to M12 connector coupling nut.

## WAVEFORM DIAGRAM

Incremental signals



CLOCKWISE ROTATION AS VIEWED FROM THE MOUNTING FACE

NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES. Waveform shown with optional complementary signals A, B, Z for HV output only.