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# MODEL TR1 TRU-TRAC™ LINEAR SOLUTION ENCODER



## 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 TRU-TRAC™ 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 | – | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | -20° to 85°C Std | IP50 Std | None Std | |

**MODEL**
**TR1** Tru-Trac™

**WHEEL TYPE & CIRCUMFERENCE**
**U1** Urethane 6" cir
**U2** Urethane 200 mm cir
**K1** Knurled 6" cir
**K2** Knurled 200 mm cir
**19** No Wheel - 1/4" shaft
**20** No Wheel - 6 mm shaft

**PIVOT SHAFT MOUNTING**[1]
**R4** Right side 1/4-20 thread
**L4** Left side 1/4-20 thread
**R6** Right side M6 thread
**L6** Left side M6 thread

**CYCLES PER REVOLUTION**
See *CPR Options* below
Price adder > 1999

**INPUT VOLTAGE**
**V1** 5 to 28 VDC

**NUMBER OF CHANNELS**[2]
**A** Channel A
***Channel A Leads B***
**Q** Quadrature A & B
**R** Quadrature A & B with Index
***Channel B Leads A***[3]
**K** Reverse Quadrature A & B
**D** Reverse Quadrature A & B with Index

**OUTPUT TYPE**
**OC** Open Collector
**PP** Push-Pull
**HV** Line Driver4
**PU** Pull-Up Resistor[3,5]
**OD** Open Collector with Differential Outputs

**CONNECTOR TYPE**[6]
**F00** 18" Cable[7] (Std)
**F01** 12" Cable
**F02** 24" Cable
**F03** 36" Cable
**M00** 2M Cable[7]
**J00** 18" Cable with 5-pin M12[4]
**K00** 18" Cable with 8-pin M12

**MAXIMUM FREQUENCY**
Standard
**F3** Extended
See Specifications

**OPERATING TEMPERATURE**
-20° to 85° C (Std)
**T1** -40° to 85° C
**T2** -20° to 100° C

**SEALING**
IP50 (Std)
**S2** IP65
**S3** IP66

**CERTIFICATION**
None (Std)
**CE** CE Marked[9]

## MODEL TR1 TRU-TRAC™ CPR OPTIONS

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0001 thru 0189* | 0198 | 0200 | 0250 | 0256 | 0300 | 0315 | 0360 | |
| 0400 | 0500 | 0512 | 0580 | 0600 | 0750 | 0800 | 1000 | 1024 |
| 1125 | 1200 | 1250 | 1500 | 1800 | 2000 | 2048 | 2500 | 2540 |
| 3000 | 3600 | 4000 | 4096 | 5000 | 6000 | 7200 | 8192 | 10,000 |

*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.

**NOTES:**

1. See mechanical drawing. Shaft is reversible in the field.
2. Contact Customer Service for non-standard index gating or phase relationship options.
3. Reverse Quadrature not available with Pull-Up Resistor Output Type.
4. Line Driver output not available with 5-pin M12 connector. Additional cable lengths available. Please consult Customer Service.
5. With Input Voltage above 16 VDC, operating temperature is limited to 85° C.
6. For mating connectors, cables, and cordsets, see Accessories or visit www.encoder.com. For Connector Pin Configuration Diagrams, see Technical Information or visit www.encoder.com.
7. 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.
8. For non-standard metric cable lengths enter 'M' plus cable length expressed in meters. Example: M06 = 6 meters of cable.
9. Please refer to **Technical Bulletin TB100:** ***When to Choose the CE Mark*** at www.encoder.com.



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## MODEL TR1 TRU-TRAC™ 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 wheel side. See *Waveform Diagram*.

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.
0001 to 0189 CPR: Ungated
0190 to 10,000 CPR: Gated to output A
See *Waveform Diagram*.

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 $10^{10}$ revolutions

Axial Shaft Load ..... 5 lb max. Rated load of 2 to 3 lb for bearing life of 1.2 x $10^{10}$ 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

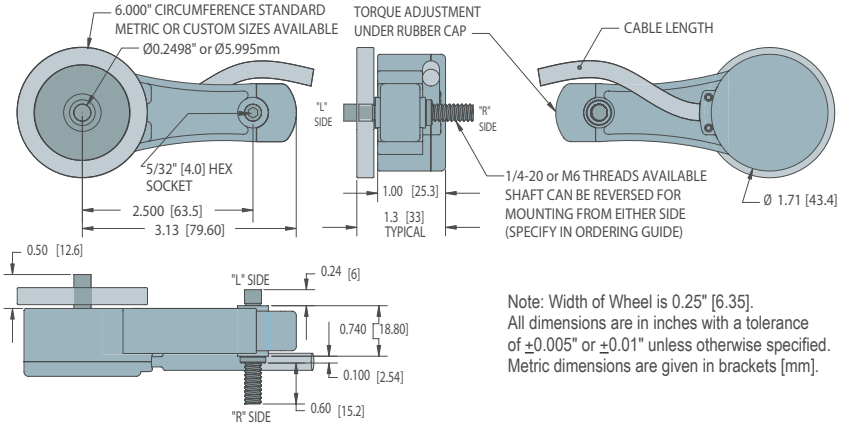
Humidity..... 98% RH non-condensing

Vibration..... 10 g @ 58 to 500 Hz

Shock..... 80 g @ 11 ms duration

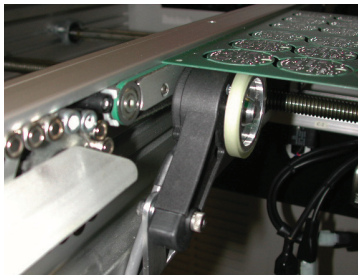
Sealing..... IP50 standard; IP65 or IP66 available

## MODEL TR1 TRU-TRAC™



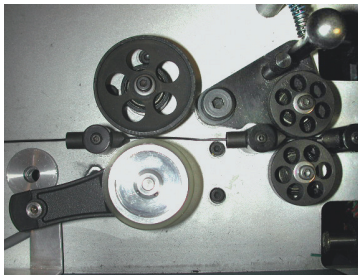

Note: Width of Wheel is 0.25" [6.35].
All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified.
Metric dimensions are given in brackets [mm].

## MODEL TR1 TRU-TRAC™ APPLICATIONS

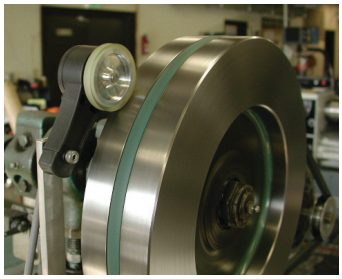


For linear applications, the Tru-Trac™ can be mounted above or below the moving object, and the tension on the wheel can be adjusted for a wide range of applications, such as packaging, conveyors, mail sorting, cut-to-length, labeling, gantries, etc.



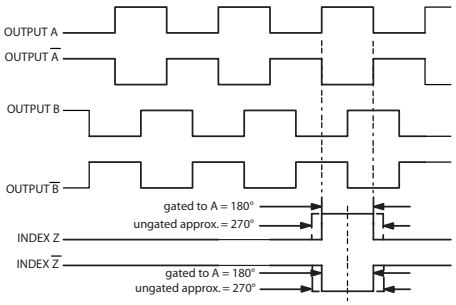


For rotational applications, the Tru-Trac™ can be mounted in any orientation to monitor the position or velocity of many types of rotating equipment, such as web tension control drums, rotary tables, printing, spooling, etc.



## WAVEFORM DIAGRAM

Incremental Signals




NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES.
WAVEFORM SHOWN WITH OPTIONAL COMPLEMENTARY SIGNALS Ā, B̄, Z̄ FOR HV OUTPUT ONLY.

## WIRING TABLE

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

| Function | Gland Cable† 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.



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