**FEATURES**

Encoder with rack and pinion gear integrated into one compact unit
Easily installed in a vertical, horizontal, or upside-down orientation
Operates at speeds up to 400 feet per minute
Spring-loaded torsion arm eliminates gear backlash
Integrated module simplifies your system design

The TR2 Tru-Trac™ is a versatile solution for tracking velocity, position, or distance in almost any application and features an integrated encoder with a rack-and-pinion gear assembly. Using the rack-and-pinion gear system, encoder readings can be obtained with repeatable positioning, providing excellent accuracy. Racks can be ordered in varying lengths, and with the accessory spacer block, multiple lengths of rack can be joined for easy installation. The spring loaded torsion arm provides easily adjustable torsion load, giving the TR2 all the flexibility and maneuverability of the original TR1 Tru-Trac™. It can be installed in a horizontal, vertical, or upside down position. The threaded shaft on the TR2’s pivot axis is field reversible, providing mounting access from either side. And the durable conductive composite housing material reduces static build up.

**COMMON APPLICATIONS**


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**MODEL TR2 ORDERING GUIDE**

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

### Mechanical

- **D1** 40 tooth pinion gear for stainless steel rack
- **D2** 40 tooth pinion gear for flexible rack
- **19** No pinion, 1/4” shaft
- **20** No pinion, 6 mm shaft

### Electrical

- **Cycles per Revolution**
  - See CPR Options below

- **Input Voltage**
  - V1 5 to 28 VDC

- **Pivot Shaft Mounting**
  - R4 Right side 1/4-20 thread
  - L4 Left side 1/4-20 thread
  - R6 Right side M6 thread
  - L6 Left side M6 thread

### Number of Channels

- **A** Channel A
- **Q** Quadrature A & B
- **R** Quadrature A & B with Index
- **K** Reverse Quadrature A & B
- **D** Reverse Quadrature A & B with Index

### Output Type

- **OC** Open Collector
- **PP** Push-Pull
- **HV** Line Driver
- **PU** Pull-Up Resistor
- **OD** Open Collector with Differential Outputs

### Model TR2 CPR Options

- **0001** thru **0189**
- **0198**
- **0200**
- **0250**
- **0256**
- **0300**
- **0315**
- **0360**
- **0400**
- **0500**
- **0512**
- **0580**
- **0600**
- **0604**
- **0750**
- **0800**
- **1000**
- **1024**
- **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.

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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.
5. With Input Voltage above 16 VDC, operating temperature is limited to 85° C.
6. For mating connectors, cables, and cordsets, see Accessories at encoder.com. For Connector Pin Configuration Diagrams, see Connector Pin Configuration Diagrams at 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.
MODEL TR2 SPECIFICATIONS

**Electrical**
- **Input Voltage**: 4.75 to 28 VDC max for temperatures up to 85°C; 4.25 to 24 VDC for temperatures between 85°C to 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 Diagrams.
- **Output Types**: Open Collector - 20 mA max per channel
- **Pull-Up**: 20 mA max per channel
- **Line Driver**: 20 mA max per channel
- **Noise Immunity**: Tested to BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-6, BS EN50081-2
- **Max. Frequency**: Standard Frequency Response is 200 kHz for CPR 1 to 2560
- **Index**: Once per revolution.
  - 1 to 400 CPR: Ungated
  - 401 to 10,000 CPR: Gated to output A
  - See Waveform Diagrams.
- **Accuracy**: ±0.001” inch for Flexible Rack Gearing Geometry
- **Gearing Tolerance**: AGMA 10, 20° pressure angle teeth
- **Shock**: 80 g @ 11 ms duration
- **Vibration**: 10 g @ 58 to 500 Hz
- **Humidity**: 98% RH non-condensing
- **Storage Temp**: -25° to 85° C
- **Environmental**
  - **Starting Torque**: IP50 0.05 oz-in
  - **IP66 0.8 oz-in
  - **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
  - **Weight**: 5 oz typical

**Mechanical**
- **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
- **Weight**: 5 oz typical

**Waveform Symmetry**: 180°/180° electrical (single channel encoder)
- **Accuracy**: ±0.017° mechanical or 1 arc-minute from true position (for CPR>189)
- **Repeatability**: ±0.0001 inch

**Glands Required**
- **Note**: All degree references are electrical degrees. Waveform shown with optional complementary signals A, B, Z for HV output only.

**RESOLUTIONS**

**English units**
- **Pulses per Inch**
- **Disc Cycles per Revolution**
- **Inches per Pulse**

**Metric Units**
- **Pulses per mm**
- **Disc Cycles per Revolution**
- **mm per Pulse**

**WAVEFORM DIAGRAM**

**INCREMENAL SIGNALS**

**OUTPUT A**

**OUTPUT B**

**OUTPUT U**

**INDEX Z**

**INDEX +**

**INDEX -**

**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.
PINION GEAR FOR FLEXIBLE RACK

0.125 face width pinion for flexible rack

PINION GEAR FOR STAINLESS STEEL RACK

Precision Agma 10 pinion for rigid rack

TRU-TRAC™ MOUNTING BRACKET

Allows for a variety of mounting positions and makes installation of the Model TR2 even easier.