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

MODEL TR1 TRU-TRAC™ ORDERING GUIDE
Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

<table>
<thead>
<tr>
<th>Mechanical</th>
<th>Electrical</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR1</td>
<td>U1</td>
</tr>
<tr>
<td>TR1</td>
<td>R4</td>
</tr>
<tr>
<td>0500</td>
<td>N</td>
</tr>
<tr>
<td>F00</td>
<td>OC</td>
</tr>
</tbody>
</table>

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

Cycles per Revolution
See CPR Options below

Input Voltage
V1 5 to 28 VDC

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

Number of Channels
A Channel A
Channel A Leads B
Q Quadrature A & B
R Quadrature A & B with Index
Channel B Leads A
K Reverse Quadrature A & B
D Reverse Quadrature A & B with Index

Connector Type
F00 18" Cable (Std)
F01 12" Cable
F02 24" Cable
F03 36" Cable
M00 2M Cable
J00 18" Cable with 5-pin M12
K00 18" Cable with 8-pin M12

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 contacts see Accessories at encoder.com. For Connector Pin Configuration Diagrams, see Technical Information or 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.

Rev. 03/26/19
**MODEL TR1 TRU-TRAC™ SPECIFICATIONS**

**Electrical**
- **Input Voltage**: 4.75 to 28 VDC max for temperatures up to 85°C.<br>4.75 to 24 VDC for temperatures between 85°C and 100°C.<br>- **Input Current**: 100 mA max (65 mA typical) with no output load.<br>- **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 Diagram.<br>- **Output Types**: Open Collector – 20 mA max per channel<br>Push-Pull – 20 mA max per channel<br>Line Driver – 20 mA max per channel (Meets RS 422 at 5 VDC supply)
- **Index**: Once per revolution. 0001 to 0189 CPR: Ungated<br>0190 to 10,000 CPR: Gated to output A See Waveform Diagram.<br>- **Max. Frequency**: Standard Frequency Response is 200 kHz for CPR 1 to 2540<br>50 kHz for CPR 2541 to 5000<br>1 MHz for CPR 5001 to 10,000<br>Extended Frequency Response (optional) is 300 kHz for CPR 2000, 2048, 2500, and 2540.<br>- **Electrical Protection**: Reverse voltage and output short circuit protected. NOTE: Sustained reverse voltage may result in permanent damage.<br>- **Noise Immunity**: Tested to BS EN61000-4-3; BS EN61000-4-6; BS EN50081-2; BS EN61000-4-2; Tested to BS EN61000-6-2; protected. NOTE: Sustained reverse voltage and output short circuit protection. Reverse voltage and output short circuit protection is 300 kHz for CPR 2000, 2048, 2500, and 2540.<br>- **Waveform Symmetry**: 67.5° electrical or better is typical, ±1° mechanical or 1 arc-minute within 0.017° mechanical or 1 arc-minute from true position (for CPR > 189).<br>- **Accuracy**: Within 0.017° mechanical or 1 arc-minute from true position (for CPR > 189).<br>- **Mechanical**:<br>- **Max Shaft Speed**: 6000 RPM. Higher speeds may be achievable; contact Customer Service.<br>- **Shaft Material**: Stainless Steel<br>- **Shaft Tolerance**: +0.0000/-0.0004" [+0.000/-0.010 mm]<br>- **Radial Shaft Load**: 5 lb max. Rated load of 2 to 3 lb for bearing life of 1.2 x 10^11 revolutions<br>- **Axial Shaft Load**: 5 lb max. Rated load of 2 to 3 lb for bearing life of 1.2 x 10^11 revolutions<br>- **Starting Torque**: IPISO 0.05 oz-in<br>IP65 0.4 oz-in<br>IP66 0.8 oz-in<br>- **Housing**: Stainless steel fibers in a high temperature nylon composite<br>- **Wheel Width**: 2.24"<br>- **Weight**: 0.5 oz typical<br>- **Environmental**:<br>- **Storage Temp**: -25° to 85°C.<br>- **Humidity**: 98% RH non-condensing<br>- **Vibration**: 10 g @ 58 to 500 Hz<br>- **Shock**: 80 g @ 11 ms duration<br>- **Sealing**: IP50 standard; IP65 or IP66 available

**WIRING TABLE**

For EPC-supplied mating cables, refer to wiring table provided with cable. Trim back and insulate unused wires.

<table>
<thead>
<tr>
<th>Function</th>
<th>Gland Cable†</th>
<th>Wire Color</th>
<th>5-pin M12&quot;</th>
<th>8-pin M12&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Com</td>
<td>Black</td>
<td>3</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>+VDC</td>
<td>White</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Brown</td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>A'</td>
<td>Yellow</td>
<td>--</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Red</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>B'</td>
<td>Green</td>
<td>--</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>Orange</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Z'</td>
<td>Blue</td>
<td>--</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Shield</td>
<td>Bare*</td>
<td>--</td>
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<td></td>
</tr>
</tbody>
</table>

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

**WAVEFORM DIAGRAM**

Incremental Signals

**NOTES:** All degree references are electrical degrees. Waveform shown with optional complementary signals A, B, C for HV output only.