## 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

<table>
<thead>
<tr>
<th>TR1</th>
<th>U1</th>
<th>R4</th>
<th>0500</th>
<th>N</th>
<th>V1</th>
<th>A</th>
<th>OC</th>
<th>F00</th>
</tr>
</thead>
</table>

### Electrical

| OUTPUT TYPE | OC | Open Collector
| PP | Push-Pull
| HV | Line Driver
| PU | Pull-Up
| OD | Open Collector with Differential Outputs

| 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

<table>
<thead>
<tr>
<th>WHEEL TYPE &amp; CIRCUMFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1</td>
</tr>
<tr>
<td>U2</td>
</tr>
<tr>
<td>K1</td>
</tr>
<tr>
<td>K2</td>
</tr>
<tr>
<td>A1</td>
</tr>
<tr>
<td>A2</td>
</tr>
<tr>
<td>19</td>
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<tr>
<td>20</td>
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</table>

### Common Applications


### 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.

### 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 Technical Information or see Connector Pin Configuration Diagrams at encoder.com.
7. For non-standard English cable lengths enter "E" plus cable length expressed in feet.
8. For non-standard metric cable lengths enter "M" plus cable length expressed in meters.

### General Information

Operates Over a Variety of Surfaces at Speeds up to 3000 Feet per Minute

Easily Installed in a Vertical, Horizontal or Upside Down Orientation

Spring Loaded Torsion Arm Makes Wheel Pressure Adjustments a Snap

Encoder and Measuring Wheel Solution Integrated Into One Compact Unit
**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 shaft 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 > 90°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 10^9 revolutions
Axial Shaft Load........... 5 lb max. Rated load of 2 to 3 lb for bearing life of 1.2 x 10^9 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°C 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

**TRU-TRAC™ MOUNTING BRACKET**
Allows for a variety of mounting positions and makes installation of the Model TR1 even easier.

**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</th>
<th>8-pin M12</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>--</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>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

*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 conduit with shield connected to M12 connector coupling nut.

**WAVEFORM DIAGRAM**
Incremental Signals
Clockwise rotation as viewed from the shaft side.

Note: IP50 standard; IP65 or IP66 available.

All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified. Metric dimensions are given in brackets [mm].