The Micro Tape Encoder (MTE) is optimized for linear applications with challenging space and cost constraints where rapid time to market and energy efficiency are critical. Using MicroE’s patented optical detector design, MTE delivers industry-leading sensor size, energy efficiency, and alignment tolerances. The compact sensor is easily installed in top or side mount configuration without any alignment tools or oscilloscopes. An LED in the sensor provides real time indication of system health. Interpolation is performed in the sensor.

MTE works with Compact Encoder Tape (CET), which is only 6mm wide, installs quickly on virtually any surface with standard adhesive backing, and can easily be cut-to-length in the field to minimize inventory and simplify manufacturing logistics.

<table>
<thead>
<tr>
<th>Model</th>
<th>Resolution</th>
<th>Output</th>
<th>Maximum Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTE-20</td>
<td>1µm</td>
<td>Digital</td>
<td>7.2m/s</td>
</tr>
<tr>
<td>MTE-8</td>
<td>2.5µm</td>
<td>Digital</td>
<td>7.2m/s</td>
</tr>
<tr>
<td>MTE-4</td>
<td>5µm</td>
<td>Digital</td>
<td>7.2m/s</td>
</tr>
</tbody>
</table>

Built-in status LED shows encoder health.

Benefits
- Compact Footprint
  - Miniature sensor
  - Compact tape scale
- Energy Efficient
  - Low power consumption
- Easy Installation
  - Wide alignment tolerances
  - Top or side mount options
  - Cut-to-length CET scale
  - No external alignment tools
- Status LED in the Sensor
  - Indicates system health

Specifications
- Resolution: 5µm, 2.5µm, 1µm
- Linearity: Tape Scale: ≤±10µm over 1m
- Outputs: A-quad-B, Index Window, Alarm
- Scale Pitch: 20µm

MicroE Systems • 125 Middlesex Turnpike • Bedford, MA 01730 • USA
www.microesystems.com   info@microesys.com   T. 781-266-5700
Specifications

System
MTE sensors are compatible with PurePrecision™ Compact Encoder Tape (CET™) Scale.

Scale Pitch 20µm
System Resolution 5µm, 2.5µm, or 1µm
(specify at time of ordering)

Linearity
Compact Encoder Tape Scale Linearity  ≤  ± 10µm/m*

*After two point correction in the customer’s controller.

Sensor Size & Weight
Height Width Length
0.33 [8.4mm] 0.50 [12.7mm] 0.81 [20.6mm]
Weight 5g (without cable)

Reliability Information
5 Year Expected Reliability >99.8% under normal operating conditions

Operating and Electrical Specifications

Power Supply 5VDC ±5% @ 135mA max. when used with recommended termination, 80mA max. unterminated

Temperature
Operating 0 to 70°C
Storage -20 to 85°C

Humidity 10 to 90% RH non-condensing

Agency Standards Conformance: In accordance with Electro-magnetic Compatibility Directive 2004/108/EC:
EN 55011:2007
EN 61000-4-2, -3, -4, -6

Shock 300G 0.5 ms half sine
Vibration 30G at 17Hz

Sensor Cable Double Shield
Diameter 3.6mm (0.142")
Flex Life 20x10⁶ cycles @ 20mm bending radius
Standard 9 pin D-sub connector

Outputs
Digital A-quad-B, Index Window; A, B and IW outputs are differential. Alarm is single ended open drain.

Signal Level
A/B/I (differential): RS-422 compatible
A/B/I (single ended): High > 4.2VDC, Low < 0.2VDC
Alarm: 0.2VDC-Vcc

Refer to interface drawing & installation manual for design details and recommendations.
Dimensions for Top Mount Configuration

Wide Alignment Tolerances
MTE utilizes MicroE’s patented optical detector design to achieve industry-leading small sensor size and alignment tolerances. The compact sensor is easily installed without any alignment tools or oscilloscopes.

Status LED in the Sensor
An LED in the sensor provides real time indication of system health.*

Green = Optimal performance. Sensor is reading position with sufficient signal strength. Encoder system will function properly. LED will blink when passing over the index mark.

Yellow = Marginal performance. Sensor is reading position with marginal signal strength. Encoder system will function normally but signal strength is less than optimal.

Red = Improper performance. Sensor is reading position with weak signal strength or signals are saturated. Encoder system may not function properly. Alarm signal will be asserted.

*Alarm and LED operate up to a maximum speed of 2m/sec.
**Dimensions and Configuration for Side Mount Bracket**

**Wide Alignment Tolerances**

<table>
<thead>
<tr>
<th>MTE Series Sensor Alignment Tolerances</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Axis</strong></td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>Y</td>
</tr>
<tr>
<td>Z</td>
</tr>
<tr>
<td>$\theta_X$</td>
</tr>
<tr>
<td>$\theta_Y$</td>
</tr>
<tr>
<td>$\theta_Z$</td>
</tr>
</tbody>
</table>

**Side Mount Bracket Size & Weight**

<table>
<thead>
<tr>
<th>Height</th>
<th>Width</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.38 [9.75mm]</td>
<td>0.63 [16.07mm]</td>
<td>1.28 [32.51mm]</td>
</tr>
</tbody>
</table>

Weight

- 5g (sensor without cable)
- 11.5g (sensor with side mount bracket and mounting hardware)

Refer to interface drawing & installation manual for design details and recommendations.
FlexFit™ Adaptor (optional)

The FlexFit adaptor for the MTE Side Mount Bracket kit enables flexible mounting configurations and is compatible with many industry-standard mounting hole patterns. MTE can be installed without re-designing your system hardware.

MTE with FlexFit Adaptor - Configuration Option

FlexFit Adaptor with mounting hole dimensions (dimensions in millimeters)

FlexFit Adaptor Size and Weight

<table>
<thead>
<tr>
<th>Length</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.85 [47.0mm]</td>
<td>0.32 [8.0mm]</td>
<td>0.53 [13.4mm]</td>
</tr>
</tbody>
</table>

Weight
- 11.5g (sensor and side mount bracket and mounting hardware)
- 23.5g (sensor and side mount bracket with FlexFit Adaptor and mounting hardware)

Refer to interface drawing & installation manual for design details and recommendations.
Connector Pin Configuration

MTE™ Series Encoders
Performance and Value Compact Linear Encoder

Refer to interface drawing & installation manual for design details and recommendations.

RoHS

MicroE Systems • 125 Middlesex Turnpike • Bedford, MA 01730 • USA
www.microesystems.com         info@microesys.com         T. 781-266-5700

Recommended Signal Termination

Digital Outputs:

<table>
<thead>
<tr>
<th>PIN</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alarm</td>
</tr>
<tr>
<td>2</td>
<td>Index Window +</td>
</tr>
<tr>
<td>3</td>
<td>B+</td>
</tr>
<tr>
<td>4</td>
<td>A+</td>
</tr>
<tr>
<td>5</td>
<td>5V</td>
</tr>
<tr>
<td>6</td>
<td>Index Window -</td>
</tr>
<tr>
<td>7</td>
<td>B-</td>
</tr>
<tr>
<td>8</td>
<td>A-</td>
</tr>
<tr>
<td>9</td>
<td>GND/INNER SHIELD</td>
</tr>
</tbody>
</table>

Max cable length: 5m. Contact MicroE Applications Engineering if longer length required.

Grounding Considerations

Sensor mounted with good electrical contact to well grounded surface (preferred):

- INNER SHIELD: Insulated from outer shield, sensor case, and connector housing. Connected to circuit common internally as supplied by MicroE Systems.
- OUTER SHIELD: Connected to sensor and connector housing.
- Electrically conductive mechanical connection (as supplied by MicroE Systems).

Sensor mounted to poorly grounded or non-conducting surface:

Refer to interface drawing & installation manual for design details and recommendations.
PurePrecision™ Compact Encoder Tape (CET™) Scale

MTE works with MicroE’s PurePrecision Compact Encoder Tape (CET). PurePrecision linear tape scales are only 6mm wide, are easily installed on virtually any surface with standard adhesive backing, and achieve industry-leading price/performance.

Compact Encoder Tape provides linearity of up to ±10µm/m, is easily cut-to-length in the field and can be ordered in customer-specified lengths up to 30m.

**Specifications**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity</td>
<td>≤ ±10µm/m</td>
</tr>
<tr>
<td>Material</td>
<td>Inconel 625</td>
</tr>
<tr>
<td>Typical CTE</td>
<td>13ppm/°C; thermal behavior of the tape scale is typically matched to the substrate using epoxy at the ends of the tape scale</td>
</tr>
</tbody>
</table>

**Tape Scale Applicator Tools for MTE Series**

The Tape Scale Applicator Tool should be used for scale lengths greater than 1 meter. The Applicator Tool enables fast and accurate installation of long scale lengths which ensures optimal encoder performance.

For MTE Side Mount Bracket and FlexFit Adaptor configurations, Tape Scale Applicator Tool P/N: TSAT-SM-PPT should be used for scale lengths greater than 1 meter.

Refer to interface drawing & installation manual for design details and recommendations.
How to Order

**Sensor**

MTE – 20 – 2

- **Cable Length**:
  - 1 = 1.0m
  - 2 = 2.0m
  - 5 = 5.0m

- **Interpolation (Resolution)**:
  - 4 = x4 (5µm)
  - 8 = x8 (2.5µm)
  - 20 = x20 (1µm)

*Custom cable lengths and connectors are available. Contact MicroE Applications Engineering.

**Scales**

**Compact Encoder Tape (CET™)**

CET20 – N – A – I – xxxx – C

- **I** = Individual Lengths
- **C** = Continuous reel with index and cut marks (unless otherwise specified)

**Length in mm** (10mm-30,000mm)

For length >5000mm, contact MicroE for custom P/N.

**Index**

- **I** = Center Index
- **C** = Custom Index

**Example 1:** CET20-N-A-I-4550-C

= 4550mm long, single center index (2775mm from cut marks), continuous

**Example 2:** CET20-N-A-C-5xxx-I

= Multiple indexes, individually cut, with index dimensions per factory issued part # 5xxx (e.g., index at 50mm and 350mm, segment length 400mm)

**Example 3:** CET20-N-A-C-5xxx-C

= Single index which is offset from center of segment, continuous, with index dimensions per factory issued part # 5xxx (e.g., index at 50mm from left cut mark, segment length 400mm)

**CET™ Tape Scale Applicator Tools (use for lengths >1m)**

- **TSAT-CET** Tape Applicator Tool for MTE, top mount configuration
- **TSAT-SM-PPT** Tape Applicator Tool for MTE, side mount configuration

**End Cap Kit, PurePrecision Tape Scales**

**EC** Optional Tape Scale End Caps

**Sensor Installation Tools**

- **ZG-CET** Z-Height Gauge, Compact Encoder Tape, top mount configuration

**MTE Side Mount Bracket Kit**

- **BK-SM-MTE** Side Mount Bracket Kit. Reference design is available upon request.

**FlexFit™ Adaptor**

- **MK-FFA** FlexFit Adaptor Mounting Kit. Reference design is available upon request.

All specifications subject to change.