



# MTE™ Series Encoders

Performance and Value Compact Linear Encoder



## Specifications

Resolution	5µm, 2.5µm, 1µm
Linearity	Tape Scale: $\leq \pm 10\mu\text{m}$ over 1m
Outputs	A-quad-B, Index Window, Alarm
Scale Pitch	20µm

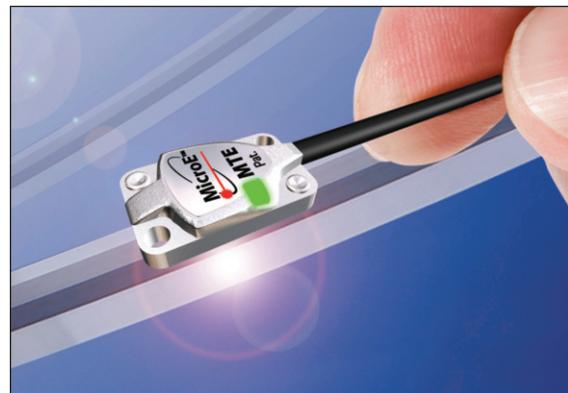
## Benefits

- **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

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.

Model	Resolution	Output	Maximum Speed
MTE-20	1µm	Digital	7.2m/s
MTE-8	2.5µm	Digital	7.2m/s
MTE-4	5µm	Digital	7.2m/s



Built-in status LED shows encoder health.

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## 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  $\leq \pm 10\mu\text{m}/\text{m}^*$

\*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  $\pm 5\%$  @ 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 Electromagnetic 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 20x10<sup>6</sup> 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.

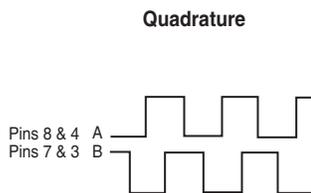
#### Signal Level

A/B/I (differential): RS-422 compatible

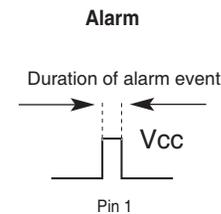
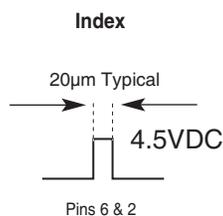
A/B/I (single ended): High >4.2VDC, Low <0.2VDC

Alarm: 0.2VDC-Vcc

## Digital Output Signals



Inverse signals are not shown for clarity.



Open drain, requires external pull-up.

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

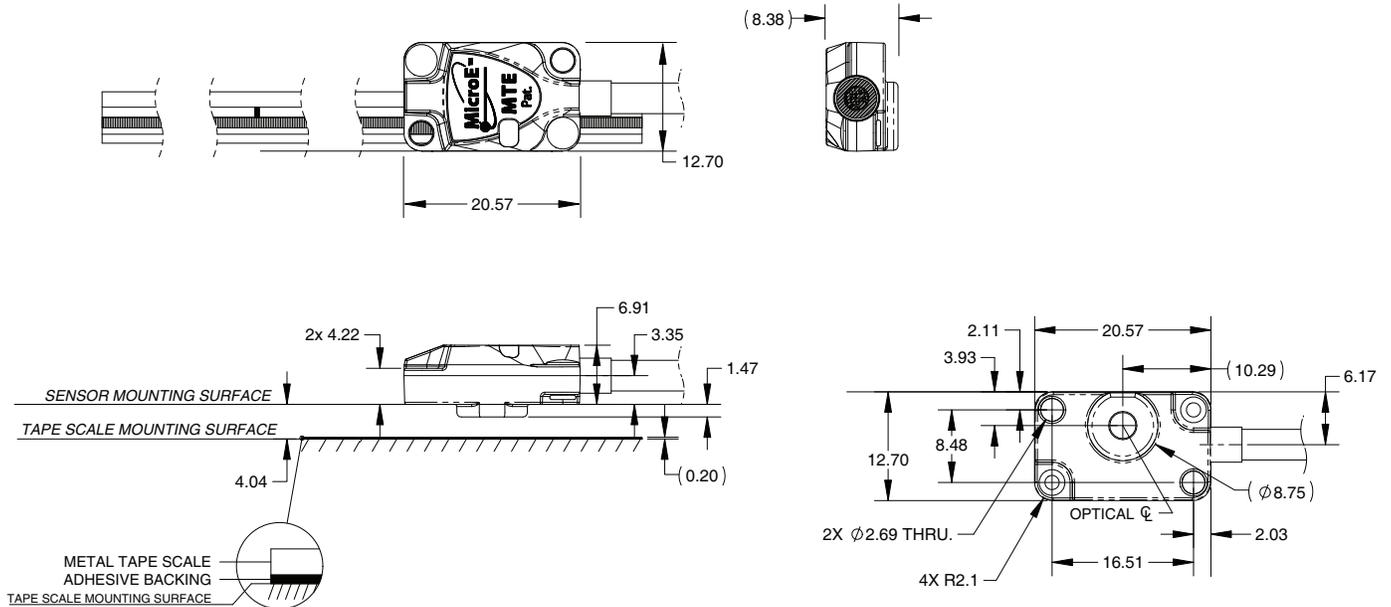
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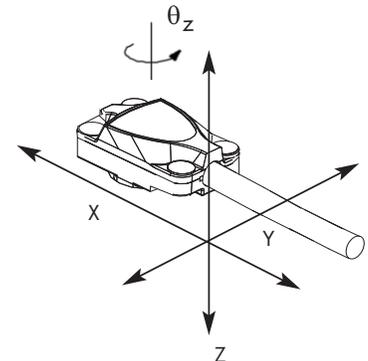
## Dimensions for Top Mount Configuration



## 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.

MTE Series Sensor Alignment Tolerances	
Axis	Alignment Tolerance
X	Direction of Motion
Y	± 0.15mm
Z	± 0.15mm
$\theta_X$	± 1.0°
$\theta_Y$	± 2.0°
$\theta_Z$	± 2.0°



## 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.

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

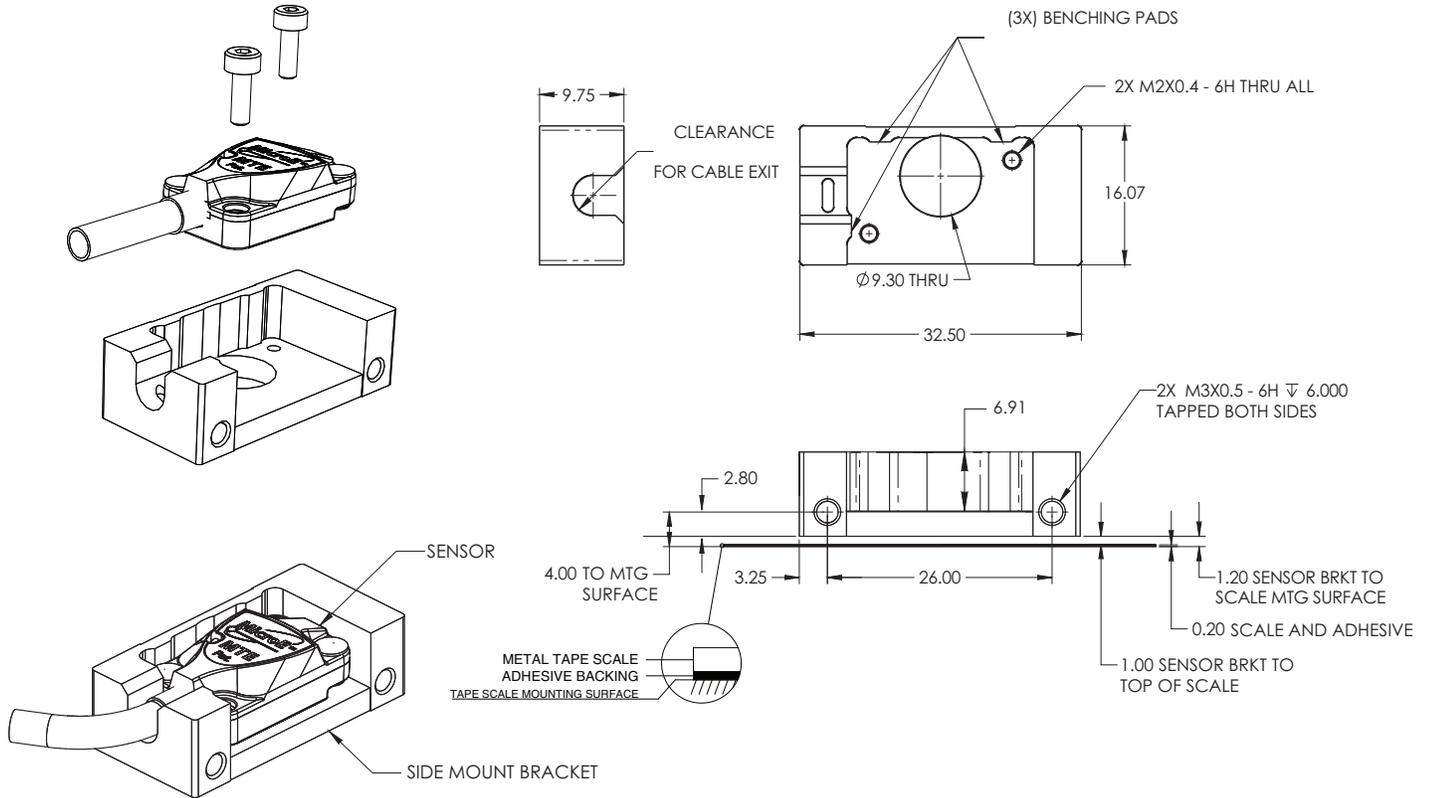
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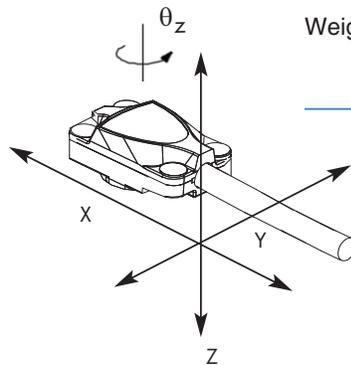
## Dimensions and Configuration for Side Mount Bracket



Reference drawing available for Side Mount Bracket.  
Contact MicroE Systems Application Engineering.

## Wide Alignment Tolerances

MTE Series Sensor Alignment Tolerances	
Axis	Alignment Tolerance
X	Direction of Motion
Y	± 0.15mm
Z	± 0.15mm
$\theta_X$	± 1.0°
$\theta_Y$	± 2.0°
$\theta_Z$	± 2.0°



## Side Mount Bracket Size & Weight

Height	Width	Length
0.38 [9.75mm]	0.63 [16.07mm]	1.28 [32.51mm]
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.

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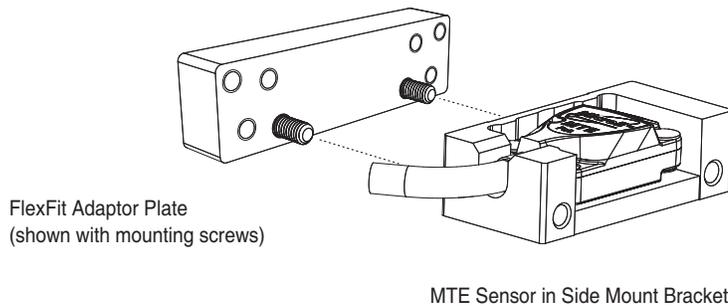
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## FlexFit™ Adaptor (optional)

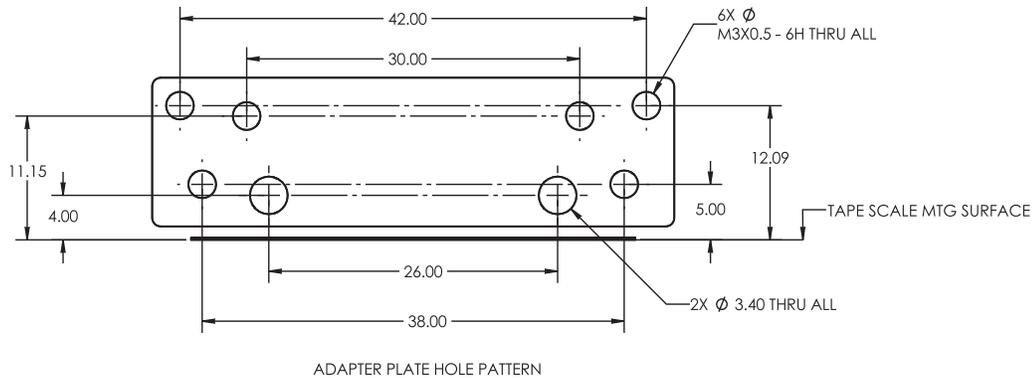
The FlexFit adaptor for the MTE Side Mount Bracket kit enables flexible mounting configurations and is compatible with many industry-standard mounting hole patterns. MTE can be installed without re-designing your system hardware.



## MTE with FlexFit Adaptor - Configuration Option



## FlexFit Adaptor with mounting hole dimensions (dimensions in millimeters)



Reference drawing available. Contact MicroE Systems Application Engineering.

## FlexFit Adaptor Size and Weight

Length	Width	Height
1.85 [47.0mm]	0.32 [8.0mm]	0.53 [13.4mm]
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.

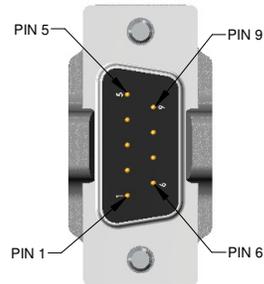
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## Connector Pin Configuration

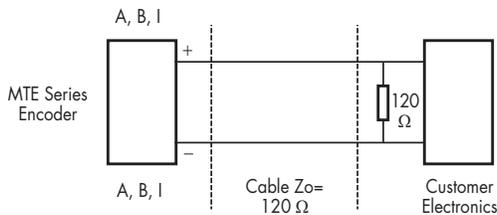


MTE 9P D-Sub Pinouts	
Pin#	Function
1	Alarm
2	Index Window +
3	B+
4	A+
5	5V
6	Index Window -
7	B-
8	A-
9	GND/Inner Shield

NOTE: GND and INNER SHIELD ARE INTERNALLY CONNECTED.

## Recommended Signal Termination

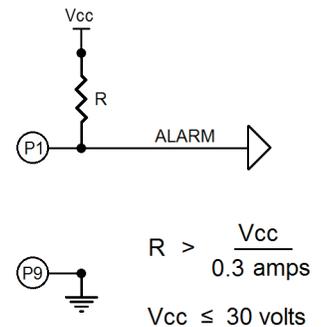
Digital Outputs:



Standard RS-422 Line Receiver Circuitry

Alarm:

Alarm output is an open drain, N-channel MOSFET. Drain circuit is normally closed (current flows) and opens when the encoder signal is too low. Alarm requires the use of an external pull-up resistor. See customer supplied circuit example on right.

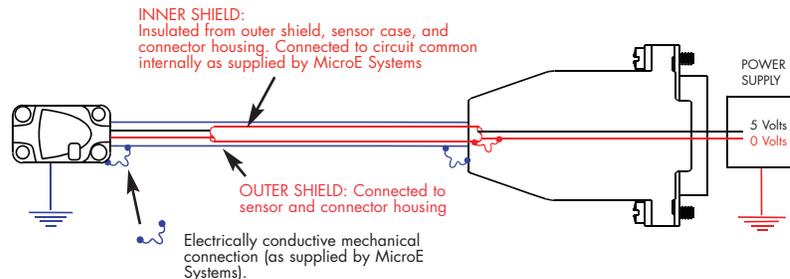


Alarm circuit

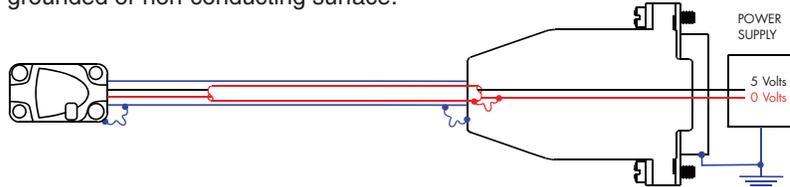
Max cable length: 5m. Contact MicroE Applications Engineering if longer length required.

## Grounding Considerations

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



Sensor mounted to poorly grounded or non-conducting surface:



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

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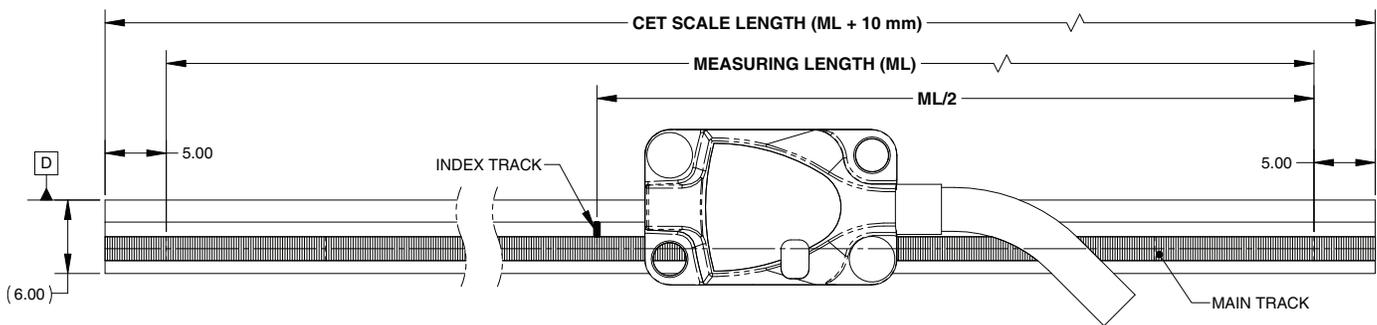
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## PurePrecision™ Compact Encoder Tape (CET™) Scale

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  $\pm 10\mu\text{m/m}$ , is easily cut-to-length in the field and can be ordered in customer-specified lengths up to 30m.

### Compact Encoder Tape, with Factory-Encoded Index



### Specifications

Linearity	$\leq \pm 10\mu\text{m/m}$
Material	Inconel 625
Typical CTE	13ppm/°C; thermal behavior of the tape scale is typically matched to the substrate using epoxy at the ends of the tape scale

### 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.



CET Applicator tool for top mount sensor configuration.  
P/N: TSAT-CET

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

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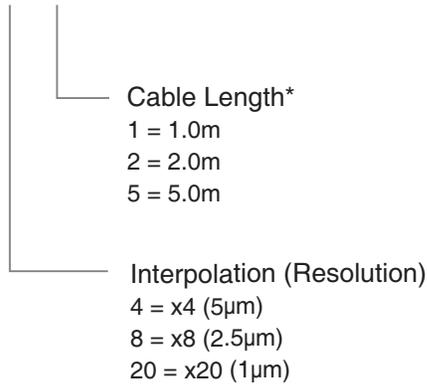


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## How to Order

### Sensor

MTE – 20 – 2



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

### 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.

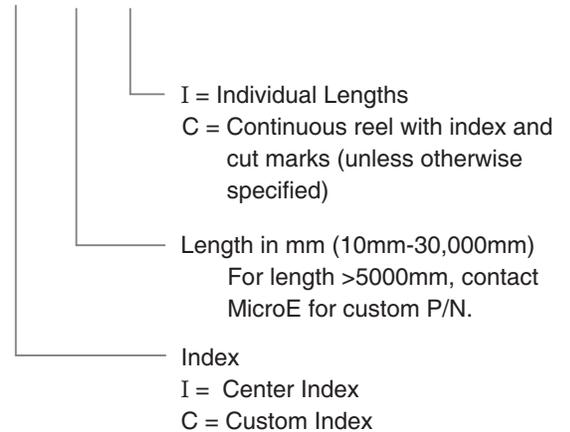
### FlexFit™ Adaptor

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

## Scales

### Compact Encoder Tape (CET™)

CET20 – N – A – I – xxxx – C



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

All specifications subject to change.