



Compact Encoder Tape (CET™) Scale Installation for MTE Series Encoders



Installation Manual and Reference Guide

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Compact Encoder Tape (CET™) Scale Installation

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Manual Version Numbers

MTE-IM CET Scale Installation Rev A, issued February 2014

Changes: N/A

Related Documents

- MTE Data Sheet
- MTE Sensor Installation Manual
- MTE Interface Drawing

Precautions



- 1 Follow standard ESD precautions. Turn power off before connecting the sensor. Do not touch the electrical pins without static protection such as a grounded wrist strap.
- 2 Do not touch the scale unless you are wearing talc-free gloves or finger cots. Please read this installation manual for full instructions.

Patents

Covered by the following patents: US 5,991,249; EP 895,239; JP 3,025,237; US 6,897,435; and EP 1,451,933. Additional patents and patents pending may apply.

RoHS MTE models are CE and RoHS compliant.



Overview

Refer to encoder model data sheets for detailed ordering guide and more information about MicroE Part Numbers.

This manual applies to the installation of the following scale types.

- PurePrecision Compact Encoder Tape (CET™) for MTE Series, Model CET20-

Items Required for CET Scale Installation

You will need the following items available:

- Shears (recommend, Clauss, Item# 18003)
- Tape Applicator Tool, for applications >1000mm (not required for installations <1000mm)
MTE Top Mount Configuration tool Model Number: TSAT-CET
MTE Side Mount Configuration tool Model Number: TSAT-SM-PPT
- Finger Cots or talc-free gloves
- Acetone or isopropyl alcohol
- Lint-free cotton cloths or wipes
- End caps (optional)
- Two-part epoxy (Tra-Con Tra-Bond 2116)
- Stick and disposable surface for stirring epoxy

Pre-Installation Information and Precautions

Read all instructions completely before beginning the installation process.

The CET™ Scale is a precision metrological device. Handle it with the utmost care at all times.



Avoid bending the tape scale to a radius less than 90mm (3.5 inches)

Avoid twisting the CET Scale.

Do not let any sharp object touch the tape scale after the blue protective film is removed.

The CET Scale is protected by a blue film on the top that prevents contamination and damage to the grating pattern during installation.

Once the adhesive on the tape scale is exposed (by removing the adhesive liner), do not touch the adhesive or allow any contamination to come into contact with it.

CET Scale is designed for one time installation only.

If removed from the mounting surface for any reason, it should not be used for any kind of reapplication. This will affect the performance and reliability of the encoder system.



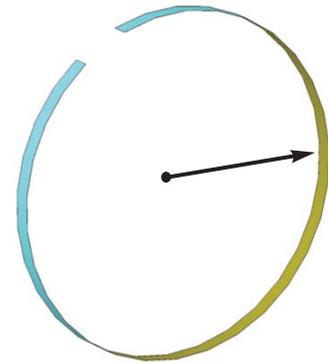
The adhesive on the CET Scale is permanent.

Do not touch the adhesive once the adhesive liner is removed.

Do not remove the tape scale from the mounting surface once it has been installed.

Do not reinstall the tape scale if it has already been installed once.

Avoid any contamination to the adhesive. Any particulate matter or other contamination that is trapped between the scale and the mounting surface will affect encoder performance.



Minimum storage radius
90mm (3.5 inches)



NOTE:

MicroE does not recommend installing CET Scale on a curved (cylindrical) surface.

Design Guidelines

1.

Verify the tolerances of the scale's mounting surface given in the Interface Drawing.

2.

Verify the dimensions of the scale benching edge (groove or straight edge) given in the Interface Drawing.

3.

Calculate the length of CET™ Scale required for your application. Refer to the Interface Drawing.

4.

Tape scales less than 1000mm can be installed by hand against a straight edge. For lengths greater than 1000mm, tape scale applicator tools are needed:

Top Mount Configuration:

Applicator tool Model Number: TSAT-CET

Side Mount Configuration:

Applicator tool Model Number: TSAT-SM-PPT

5.

If the tape scale is being installed into a 6mm groove, it must be installed by hand (regardless of scale length). Refer to the Interface Drawing.

6.

If machining the mounting surface is undesirable, or not possible, a temporary straight edge can be used that meets the dimensions and tolerances specified in the Interface Drawing.

Two kinds of temporary straight edge can be used -

- **Type I (thin)-**

Temporary Straight Edge of thickness

0.76 ± 0.05 mm (0.030 ± 0.002 inches).

Refer to the Interface Drawing for additional dimensional requirements. A steel rule may be one of the options for this type of temporary straight edge.

- **Type II (thick)-**

Temporary straight edge with minimum

thickness 9.53mm (0.375 inches). Refer to the

Interface Drawing for additional dimensional requirements.

NOTE:

See the appropriate section on Tape Applicator Tool installations.

Mounting Surface Preparation

1.

Inspect the mounting surface for any machining irregularities. MicroE Systems recommends a surface finish of better than 1.6 micrometers Ra.

2.

The straight edge (either permanent or temporary) must be sharp on the benching side in order to use it as a guide in hand mounted applications. In order for the tape scale to be mounted close to the straight edge, the maximum radius of 0.127 mm (0.005 inches) should be used where the edge meets the bottom of the mounting surface.

3.

Thoroughly clean the scale mounting surface and reference edge using a cotton swab or lint-free cloth dampened with isopropyl alcohol or acetone.

Remove all dust and particles.

4.

Mark the starting location on the mounting surface where the tape scale will be applied.

Cutting the CET™ Scale

1.



NOTE:

When working with any encoder scale, it is important to use either finger Cots or talc-free gloves

Uncoil the tape scale and cut it to the required length using shears.

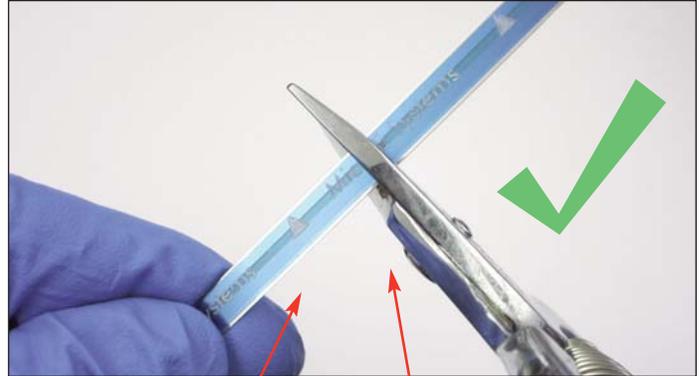
Note: check the interface drawing to make sure the scale is cut to the right length.



Securely hold the tape scale close to the shear (at an approximate distance of 40mm [1½ inches]) near the point of cutting.

Orient the tape scale perpendicular to the shear.

Cut the tape scale in a smooth, continuous motion.



Hand approximately at a distance of 40mm-50mm (1 1/2 inches to 2 inches) from the cutting point

Shear held perpendicular to the tape scale (NOT INCLINED)

Shear held inclined, not perpendicular, to the tape scale



CET™ Scale, MTE Top/Side Mount Configurations

Installation By Hand



NOTE:

For best system performance, talc-free gloves or finger cots should be worn during all steps of tape scale installation.

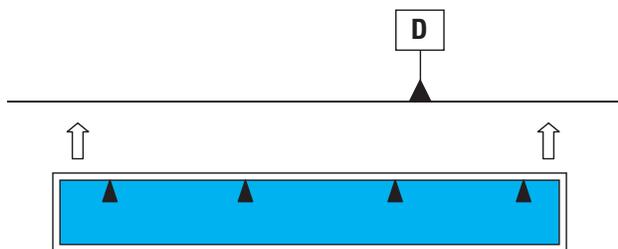
Thoroughly clean the scale mounting surface and reference edge using a cotton swab or lint-free cloth dampened with isopropyl alcohol or acetone. Remove all dust and particles.

1.

Scale direction/orientation

Orient the scale such that the "arrowheads" on the blue protective film are pointing towards the mounting surface reference edge "D" as shown in the interface drawings for your sensor model.

Refer to the correct model number Interface Drawing for reference edge "D" dimensions and sensor orientation. Download the latest Interface Drawing at www.microesys.com/products/documentation



D = Mounting Surface Reference Edge

2.

Removing/peeling the bottom adhesive liner.

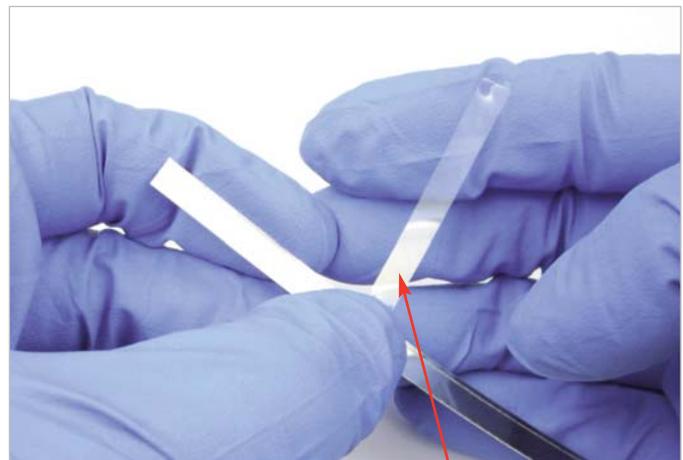
CET Scales have 3 layers, blue protective film, steel scale, and adhesive backing.

Remove/peel back approximately 25mm (1 inch) of the bottom adhesive liner, taking care not to touch the adhesive or allow any particulate contamination.



NOTE:

Do not peel the blue protective film off at this time.



Adhesive liner peeled off about 25mm (1 inch) from one end

CET™ Scale, MTE Top/Side Mount Configurations

Installation By Hand

3.

Flip the tape over with the 25mm (1 inch) exposed adhesive surface facing down. Be sure not to touch or contaminate the exposed adhesive surface. Be sure the orientation arrows on the blue protective film point to the “D” reference edge.

4.

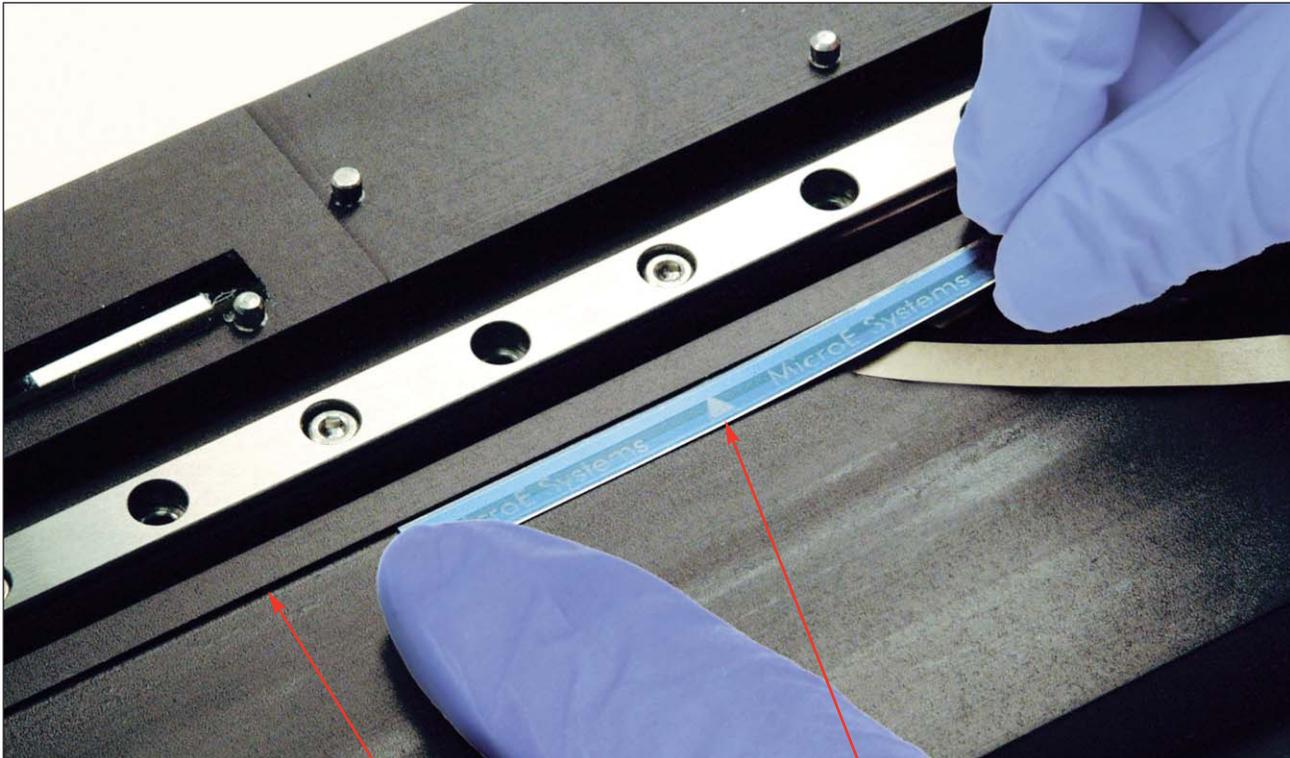
Place the CET™ Tape Scale against the mounting surface “D” reference edge.

Place the 25mm (1 inch) exposed adhesive end of the tape scale against the mounting surface “D” reference edge as shown and press firmly on the end.



NOTE:

Adhesive exposed by removing the adhesive bottom liner can touch the mounting surface only once.



“D” reference edge as shown in the MTE interface drawing.

Tape scale orientation arrows.

CET™ Scale, MTE Top/Side Mount Configurations

Installation By Hand



NOTE:

Be sure to keep the blue top protective film in place.

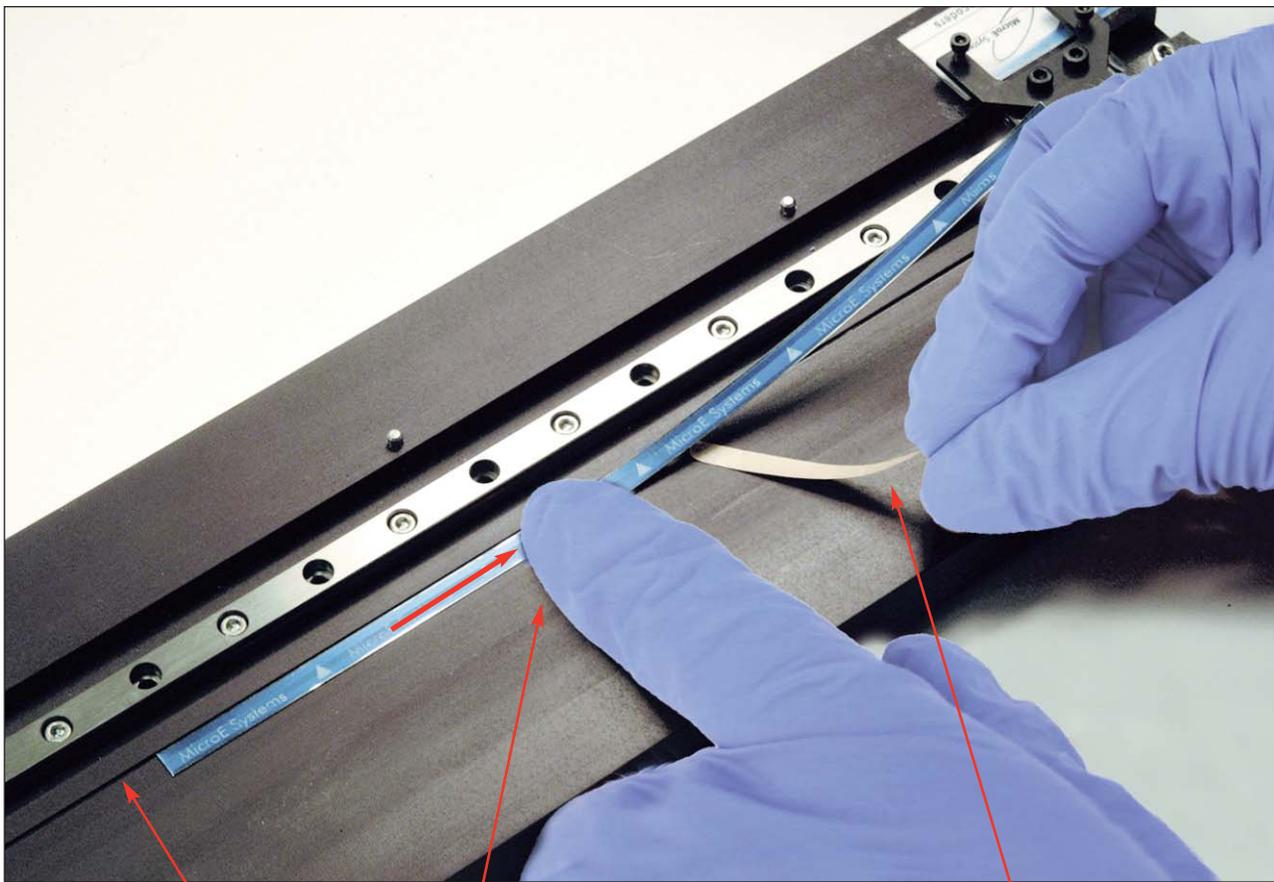
5.

Install the CET Scale along the remaining length of the mounting surface.

Press the remaining tape on to the mounting surface with a sliding motion as shown below. Pull the adhesive liner out of the way during the sliding motion.

NOTE:

Make sure that the tape scale is tight against the “D” reference edge.



“D” reference edge as shown in the interface drawing.

Sliding motion of finger along the length of the tape

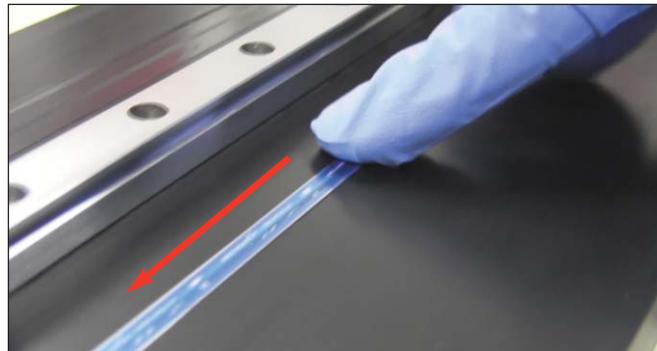
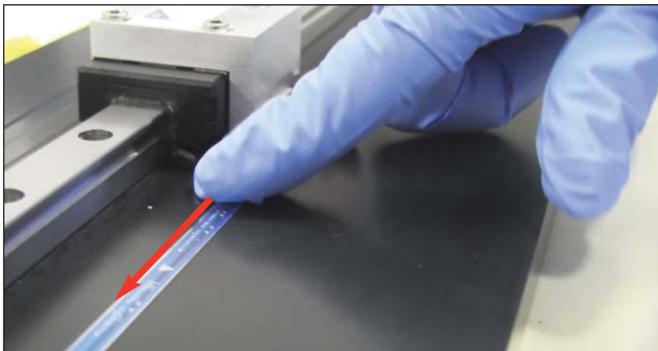
Pull adhesive liner out of the way during sliding motion

CET™ Scale, MTE Top/Side Mount Configurations

Installation By Hand

6.

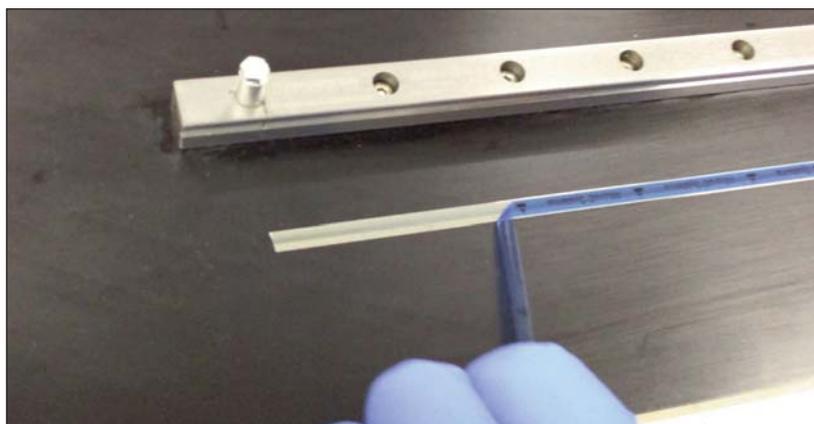
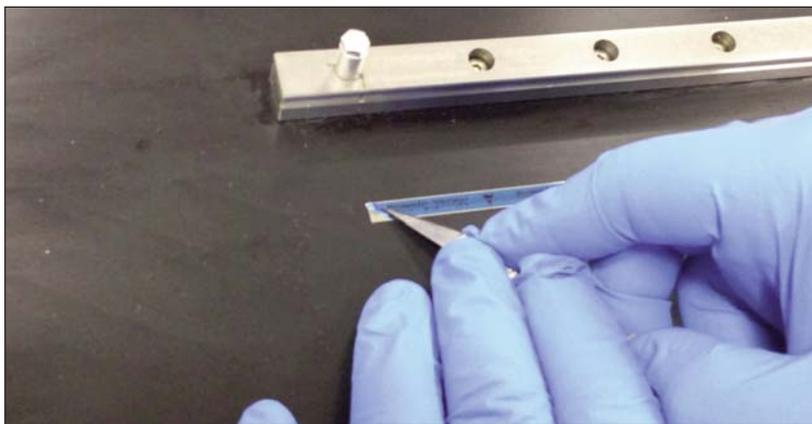
Once the scale is applied to the mounting surface, and before the blue protective film is removed, it is recommended that even pressure be applied over the entire tape scale length by sliding a glove or cot protected finger across the scale. The applied pressure will ensure that the adhesive is evenly and permanently set.



7.

Peel off the blue protective film.

Start the peeling process using a sharp tool, being careful not to damage the scale. Pull off the remaining blue protective film.



NOTE:

After removing the blue protective film, the scale is ready for use and will perform to specification.

The encoder will not function properly with the blue protective film installed. It must be removed for proper encoder operation.

CET™ Scale, MTE Top Mount Configuration

Installation By Mounted Applicator Tool



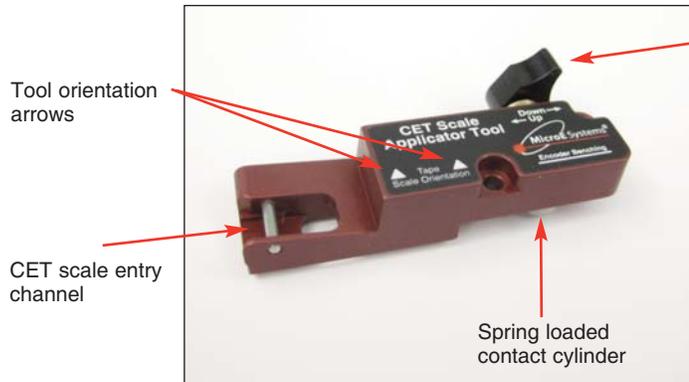
NOTE:

For best system performance, talc-free gloves or finger cots should be worn during all steps of tape scale installation.

Thoroughly clean the scale mounting surface and reference edge using a cotton swab or lint-free cloth dampened with isopropyl alcohol or acetone. Remove all dust and particles.

1.

Overview of CET Scale Applicator Tool (Model Number: TSAT-CET)



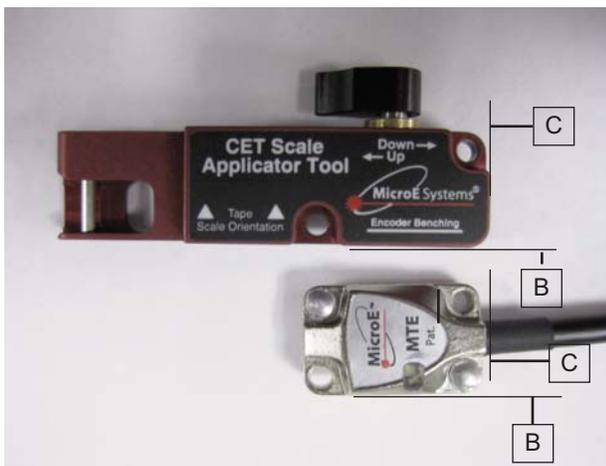
Applicator tool spring loaded contact cylinder **Up/Down** position knob

The CET Scale Applicator Tool mounts into the MTE's sensor mounting holes.

2.

Applicator Tool benching faces

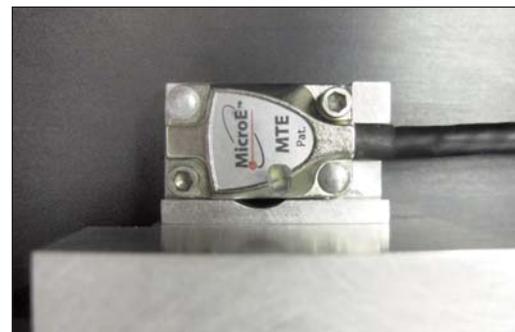
The orientation of the CET Applicator Tool corresponds to the MTE encoder as shown below. The benching surfaces correspond to the B and C faces shown in the MTE interface drawing.



3.

Applicator Tool - mounting

Shown below is the MTE Sensor head mounted in its fixture.



The CET Applicator Tool mounted in the same MTE Sensor fixture, ready for CET Scale installation.



CET™ Scale, MTE Top Mount Configuration

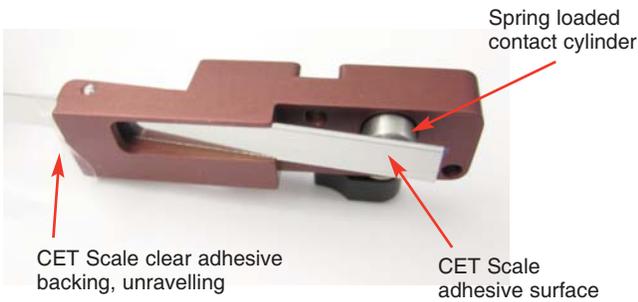
Installation By Mounted Applicator Tool

4. Applicator Tool - bottom view

While mounted in the MTE sensor's fixture, CET Scale is fed through the entry channel and pressed onto the mounting surface with the spring loaded contact cylinder.

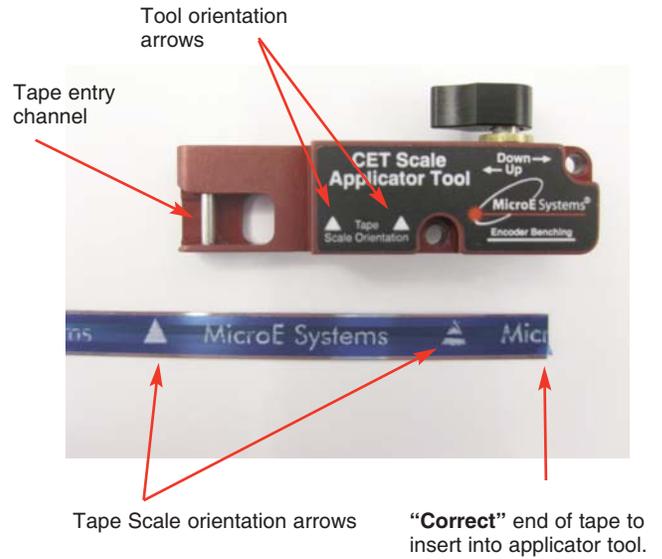
The contact cylinder has two positions, Up and Down, controlled by the black position knob on the side of the Applicator Tool.

Up, allows clearance for feeding of the CET Scale through the entry slot into the "start" position. Down, locks the tape scale onto the "start" position. Moving the Applicator Tool along in the Down position will automatically press the CET Scale to the mounting surface.



5. Applicator Tool / CET Scale Orientation

The correct end of the tape to insert is shown below.



Both Tape Scale arrows, and Applicator Tool orientation arrows need to point in the same direction, while the tape is being applied.

In the example above, the side of the tape scale that needs to go into the tool entry channel first is called the "correct" end.

6. Install the Applicator Tool into the MTE Mount

Tighten the mounting screws.



CET™ Scale, MTE Top Mount Configuration

Installation By Mounted Applicator Tool

7.

Tape Scale Preparation

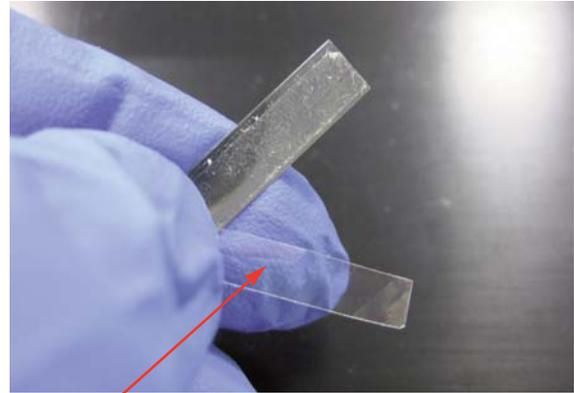
Using a sharp tool or fingernail, peel off a short section of bottom adhesive backing, approximately 50mm (2 inches) from the “correct” end of the scale to be inserted into the applicator tool.

Take care not to touch the adhesive or allow any particle contamination.



NOTE:

Do not peel the blue protective film off at this time.



Peel back about 50mm (2 inches) of clear adhesive backer tape.

8.

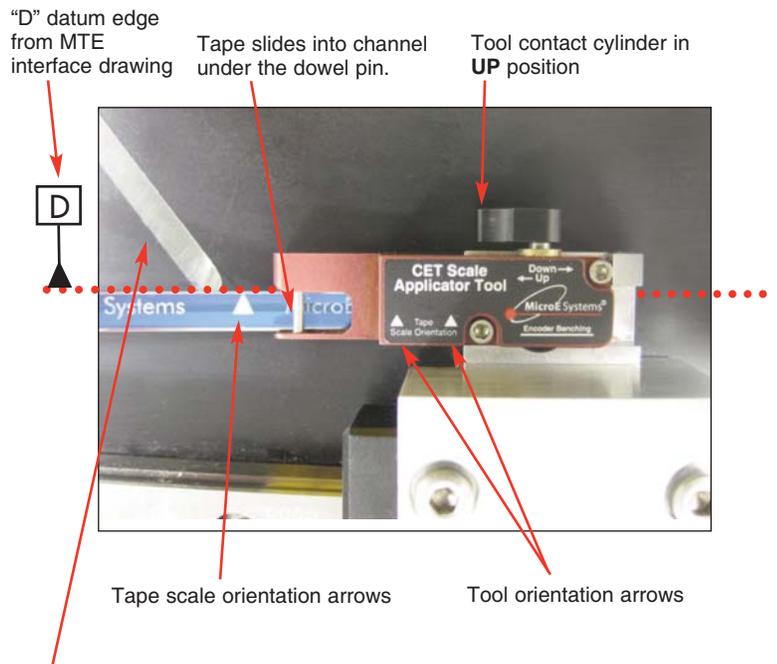
Tape Scale Insertion

Turn the tool contact cylinder knob to the UP position.

Insert the “correct” end of the tape scale into the applicator tool, making sure the clear backing tape curls out of the way.

The orientation arrows on the Tape Scale and Applicator Tool need to point in the same direction.

Also note, the “D” reference edge is determined from the MTE interface drawing. The tape scale orientation arrows always point to the “D” reference edge. In the example, the dotted red line shown is the measured “D” reference edge. When the tape scale is finally installed, the orientation arrows will be pointing to the calculated “D” reference edge.



Clear adhesive backer tape peeled back about 50mm (2 inches).

CET™ Scale, MTE Top Mount Configuration

Installation By Mounted Applicator Tool

9.

Tape Scale Insertion

Push the scale slowly into the Applicator Tool until the tape scale emerges from the side of the mounting fixture to a desired end location. Press down on this exposed 3-5mm section of tape.



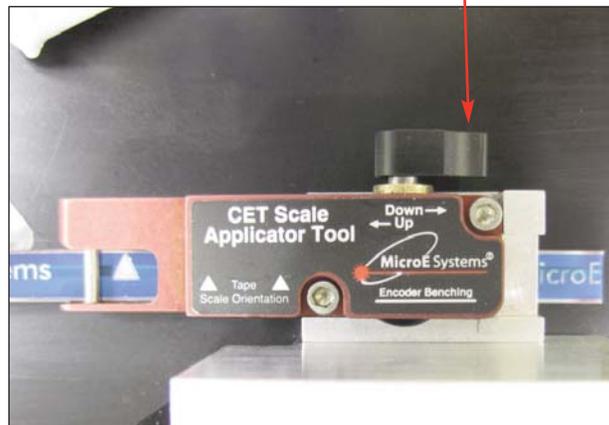
10.

Rotate Contact Cylinder Knob to Down

Turn the applicator tool contact cylinder knob to the DOWN position.

Turning the knob to the DOWN position, applies firm pressure to the tape scale under the applicator tool. This action presses the adhesive side of the tape scale firmly onto the scale mounting surface.

Tool contact cylinder in **DOWN** position



CET™ Scale, MTE Top Mount Configuration

Installation By Mounted Applicator Tool

11.

Apply the Tape Scale

Push the Applicator Tool and fixture assembly in the direction of tape application. Use a slow and steady motion.

Once the tool begins moving, it automatically separates the clear adhesive backing tape from the scale.

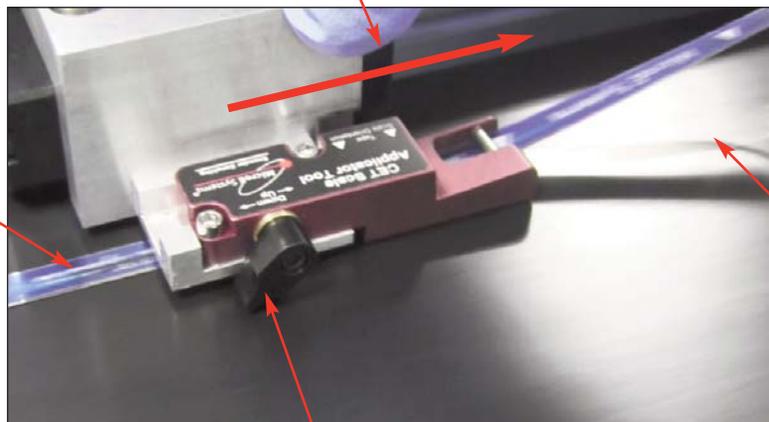
Pull the clear adhesive backing tape out of the way to prevent the backing tape from clogging the applicator tool.



Be sure to pull the adhesive backing film out of the way to prevent a tool jam.

Applicator Tool and fixture direction of motion

CET Scale being applied to mounting surface



Pull clear adhesive backing tape out the way as the Applicator Tool is moved.

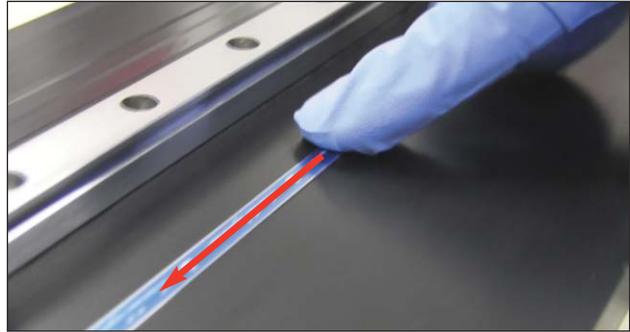
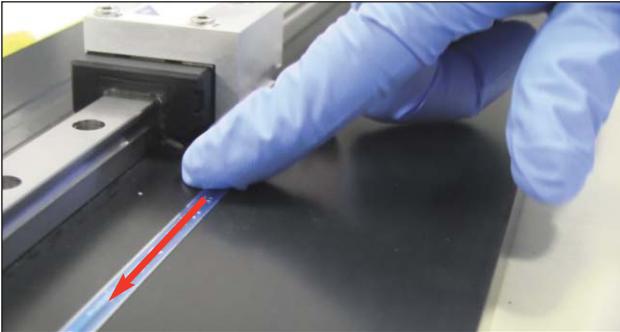
Tool contact cylinder knob in the **DOWN** position

CET™ Scale, MTE Top Mount Configuration

Installation By Mounted Applicator Tool

12.

Once the scale is applied to the mounting surface, and before the blue protective film is removed, it is recommended that even pressure be applied over the entire tape scale length by sliding a glove or cot protected finger across the scale. The applied pressure will ensure that the adhesive is evenly and permanently set.



13.

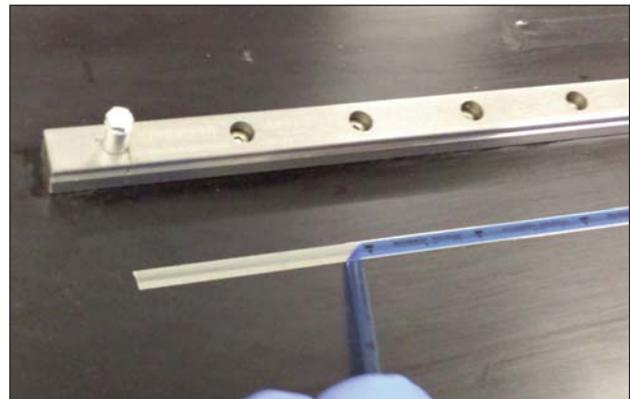
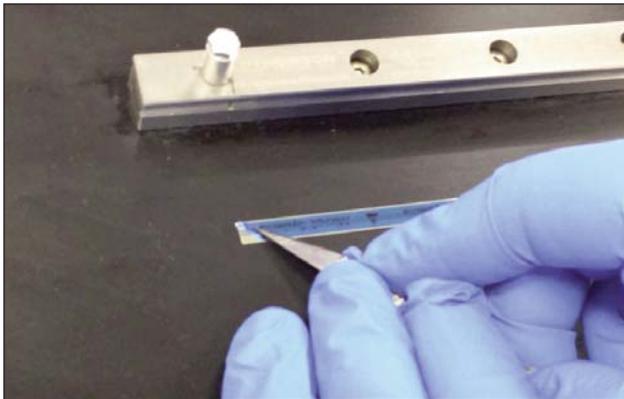
Peel off the blue protective film.

Start the peeling process using a sharp tool, being careful not to damage the scale. Pull off the remaining blue protective film. Clean the tape scale using alcohol or acetone and a lint-free cotton cloth.



NOTE:

Make sure you have on finger cots or talc-free gloves.



NOTE:

After removing the blue protective film, the scale is ready for use and will perform to specification.

The encoder will not function properly with the blue protective film installed. It must be removed for proper encoder operation.

CET™ Scale, MTE Side Mount Configuration

Installation By Mounted Applicator Tool



NOTE:

For best system performance, talc-free gloves or finger cots should be worn during all steps of tape scale installation.

Thoroughly clean the scale mounting surface and reference edge using a cotton swab or lint-free cloth dampened with isopropyl alcohol or acetone. Remove all dust and particles.

1.

MTE Side Mount Tape Scale Applicator Tool (Model Number: TSAT-SM-PPT)

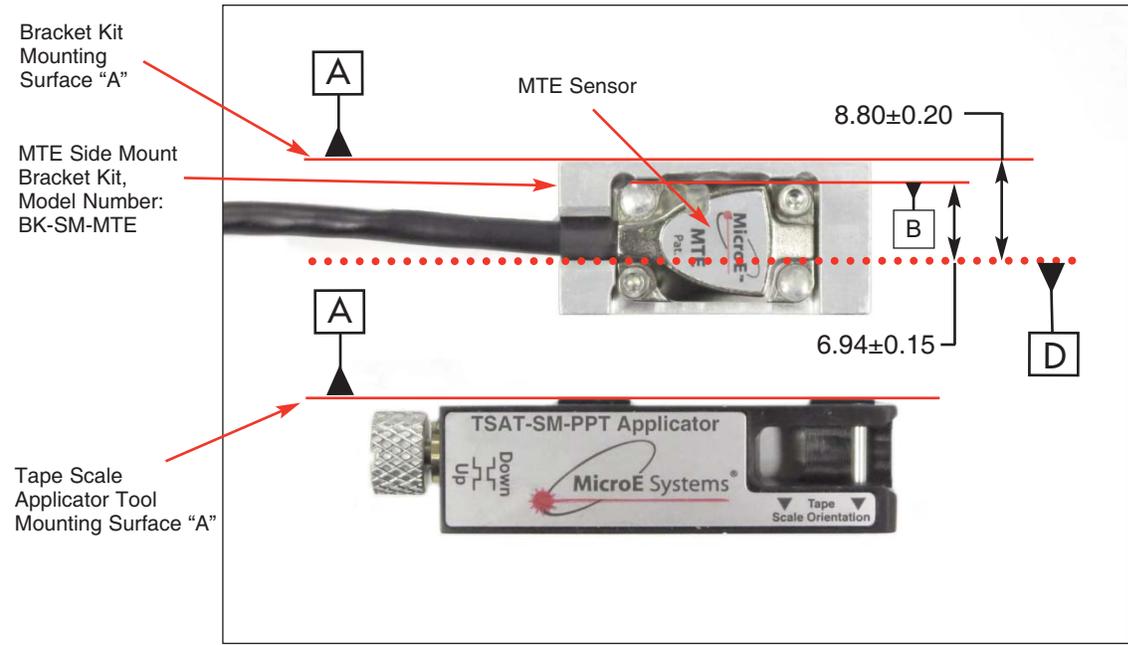
The mounted application tool is needed for scale lengths greater than 1000mm. It is mounted in the same fixture as the MTE Side Mount Sensor in the MTE Side Mount Bracket Kit (BK-SM-MTE) or customer fabricated adaptor.



2.

TSAT-SM-PPT Side Mount Applicator Tool orientation to the “B” sensor mounting surface*.

The “B” MTE sensor benching surface is shown in the MTE interface drawing, along with the “D” tape scale mounting edge. The corresponding “A” reference mounting surface of the Applicator Tool and Bracket Kit adaptor is shown below.



Mounting Surface for MTE Sensor/Bracket Kit and Tape Applicator Tool

*The MTE Side Mount Tape Scale Applicator Tool (model number: TSAT-SM-PPT), will only work properly when mounted in the configuration shown in Step 2.

CET™ Scale, MTE Side Mount Configuration

Installation By Mounted Applicator Tool

3.

Mount the Applicator Tool.

Mount the Applicator Tool in the Side Mount Bracket Kit/Sensor mounting holes. Rotate the knob that controls the contact cylinder plunger to the **UP** position (See Step 6.). Use the red spacer (1.00mm) Z-height shim to set up the approximate Z-height, to ensure proper Applicator Tool function.

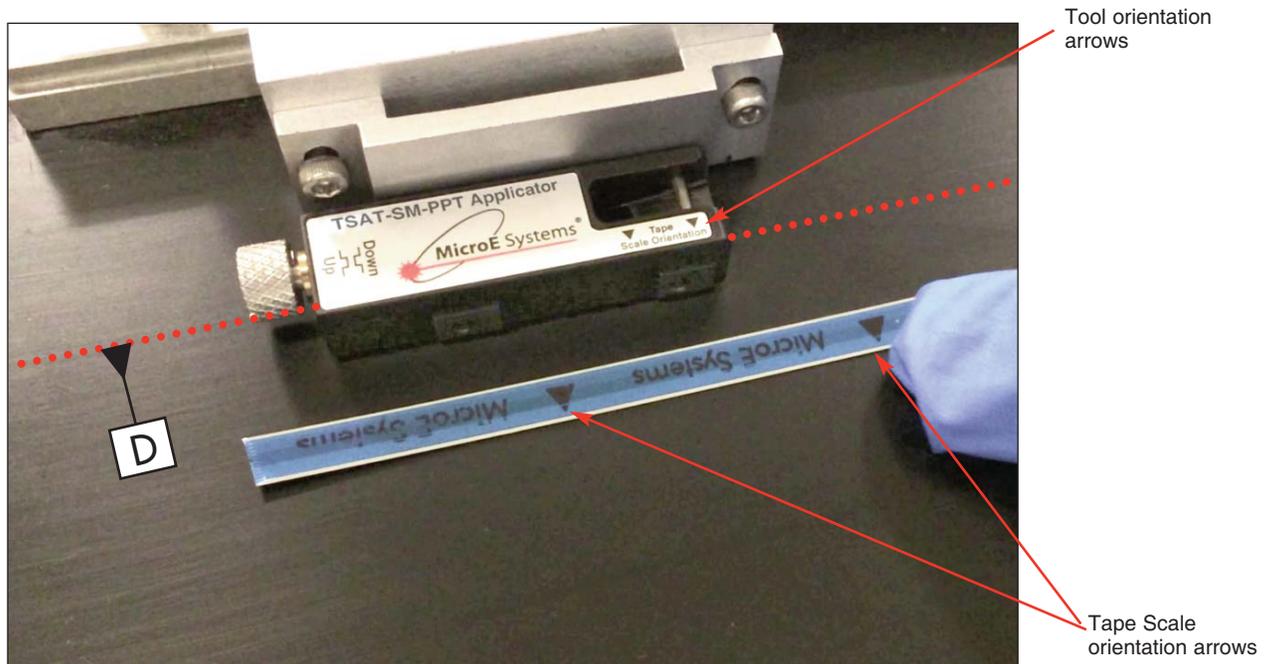
4.

Note tape scale orientation with arrows and the “D” reference edge.

The applicator tool is shown mounted to the MTE/Bracket Kit Adaptor Sensor mount. Both Tape Scale arrows, and Applicator Tool orientation arrows need to point in the same direction for proper configuration.

Also note, the “D” reference edge is determined from the MTE interface drawing. The tape scale orientation arrows always point to the “D” reference edge. In the example below, the dotted red line shown is the measured “D” reference edge. When the tape scale is finally installed, the orientation arrows will be pointing to the calculated “D” reference edge.

In the example shown, the left side of the tape scale needs to go into the applicator tool entry channel first.



CET™ Scale, MTE Side Mount Configuration

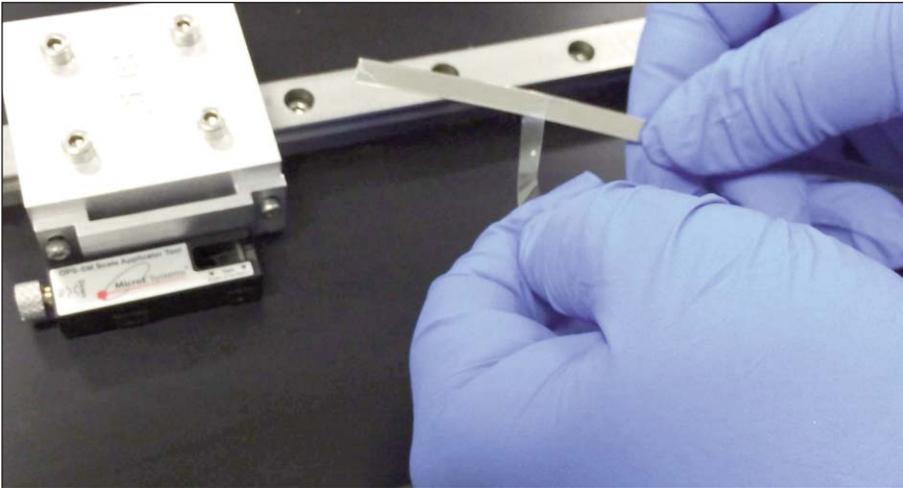
Installation By Mounted Applicator Tool

5.

Peel off a short section of bottom adhesive backing approximately 50mm (2 inches).

Compact Encoder Tape (CET) Scales have 3 layers, blue protective film, steel scale, and adhesive backing.

Using a sharp tool or fingernail, initiate the peeling of the adhesive liner from the end of the tape scale that will be inserted into the applicator tool entry channel.



NOTE:

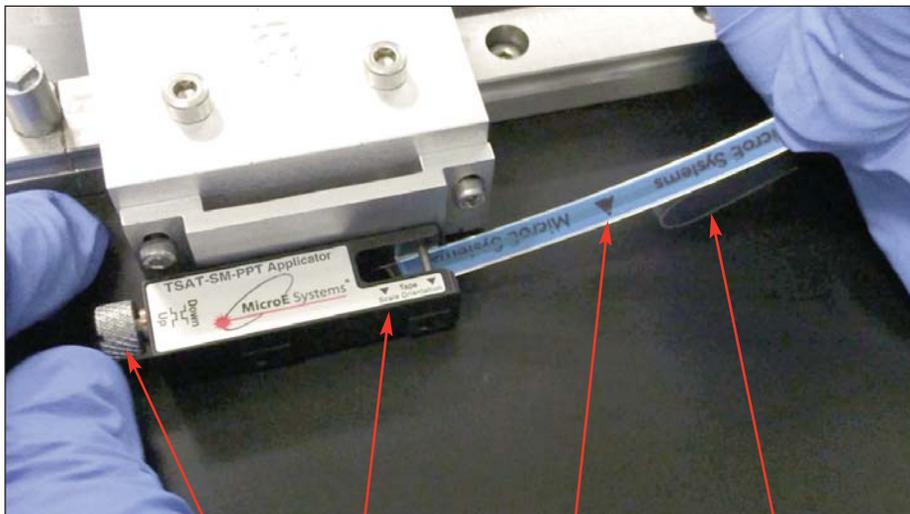
Do not peel the blue protective film off at this time.

6.

Turn Applicator Tool to the “Up” position and insert tape into applicator tool.

Rotate the knob that controls the contact cylinder plunger to the **UP** position. This allows you to insert the first section of adhesive exposed tape, into the applicator tool.

Be sure that both the tape scale orientation arrows and the applicator tool arrows point in the same direction.

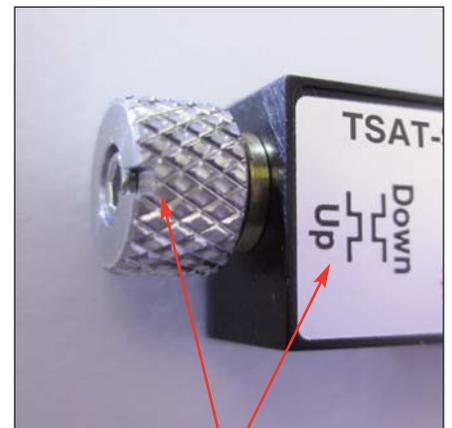


Plunger in **UP** position

Tool orientation arrows

Tape Scale orientation arrows

Adhesive backing liner



Close-up of plunger knob in the **UP** position. The position of the keyways indicates **UP** or **Down**. Rotating the knob will both move the plunger up or down.

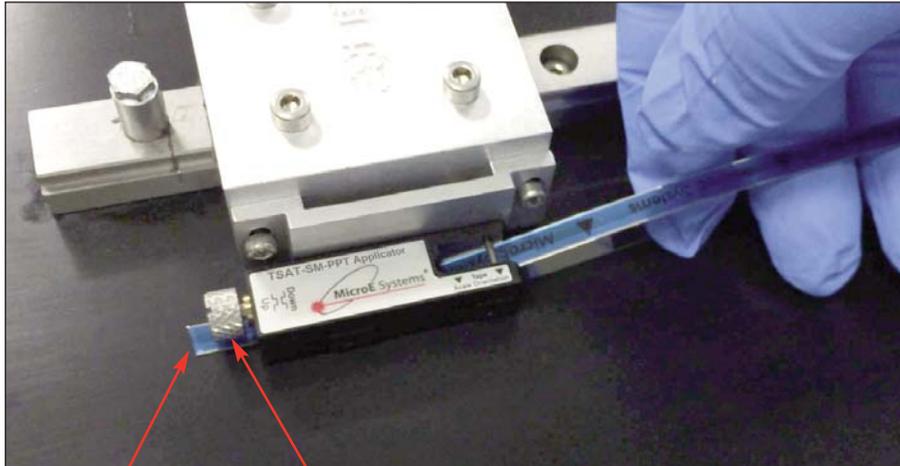
CET™ Scale, MTE Side Mount Configuration

Installation By Mounted Applicator Tool

7.

Insert a short section of tape scale into the tool, approximately 50mm (2 inches).

Insert the first short section of tape scale so that it emerges just past the plunger knob to a desired end location. Press down on this exposed 3-5mm section of tape.



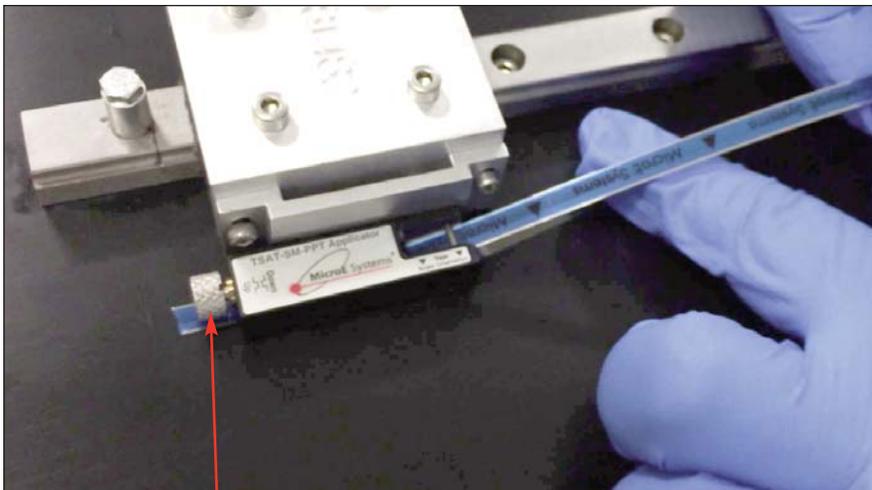
Press down on this small section of tape

Plunger in the UP position

8.

Rotate the pressure plunger knob to the "Down" position.

Rotate the plunger knob so that the key-way notch is in the position shown.



Plunger knob in the DOWN position



Close-up of plunger knob in the DOWN position. Position of notch indicates that the plunger is in the DOWN position.

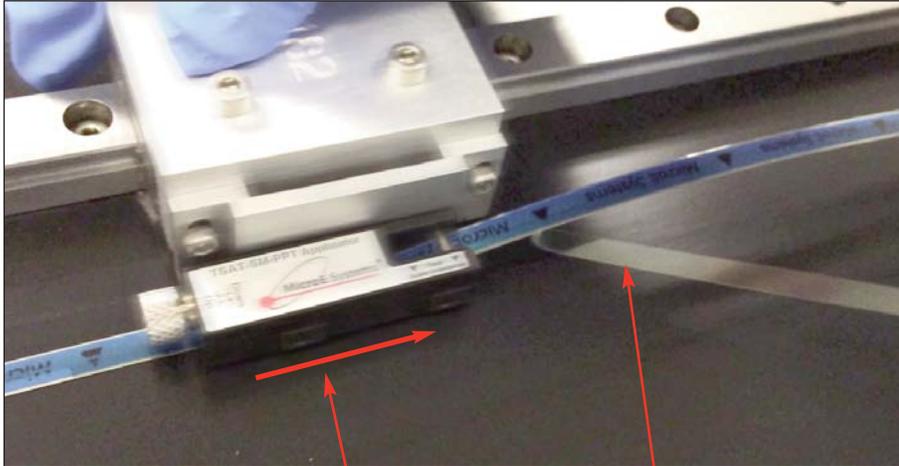
CET™ Scale, MTE Side Mount Configuration

Installation By Mounted Applicator Tool

9.

Move the tool in a steady motion to apply the tape scale.

Push the applicator tool in the direction of tape application. Be sure to pull the adhesive backer out of the way while the applicator is in motion.

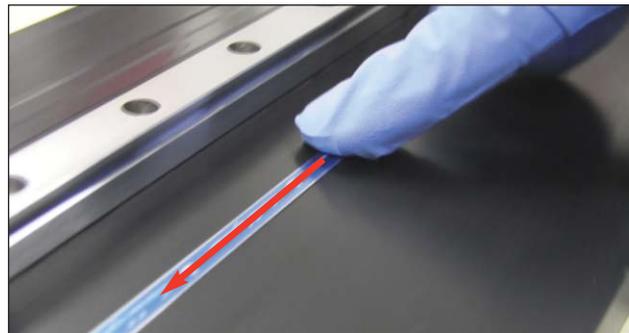
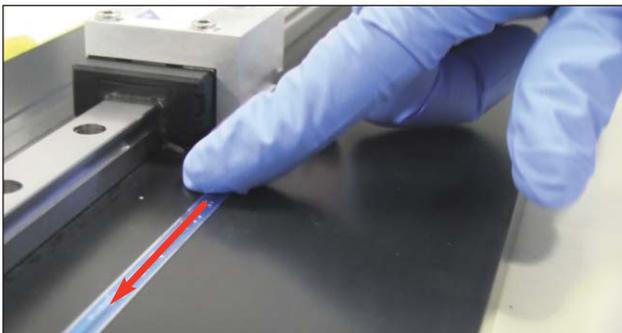


Direction of motion of tape applicator tool.

Pull adhesive backer away from tape applicator, while moving the applicator tool.

10.

Once the scale is applied to the mounting surface, and before the blue protective film is removed, it is recommended that even pressure be applied over the entire tape scale length by sliding a glove or cot protected finger across the scale. The applied pressure will ensure that the adhesive is evenly and permanently set.



CET™ Scale, MTE Side Mount Configuration

Installation By Mounted Applicator Tool

11.

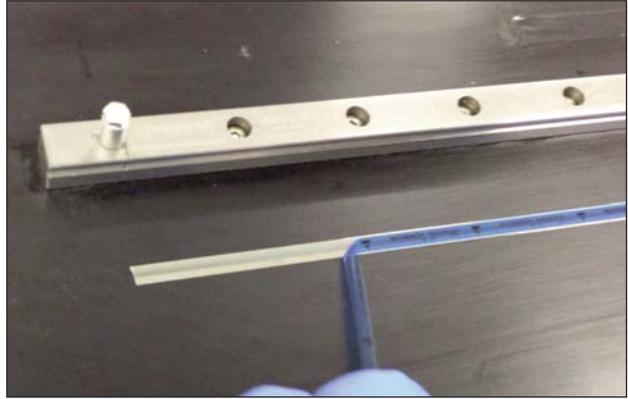
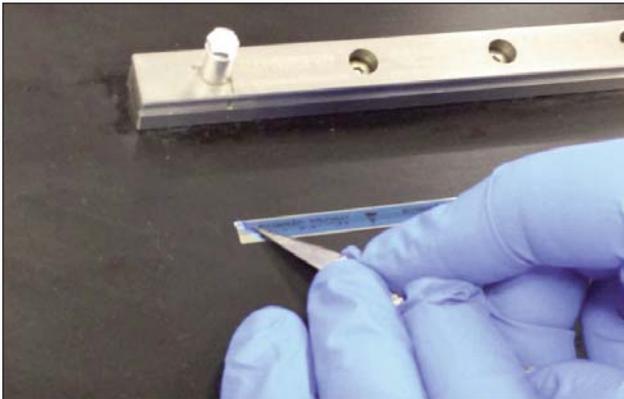
Peel off the blue protective film.

Start the peeling process using a sharp tool, being careful not to damage the scale. Pull off the remaining blue protective film. Clean the tape scale using alcohol or acetone and a lint-free cotton cloth.



NOTE:

Make sure you have on finger cots or talc-free gloves.



NOTE:

After removing the blue protective film, the scale is ready for use and will perform to specification.

The encoder will not function properly with the blue protective film installed. It must be removed for proper encoder operation.

End Cap Installation for CET™ Scales

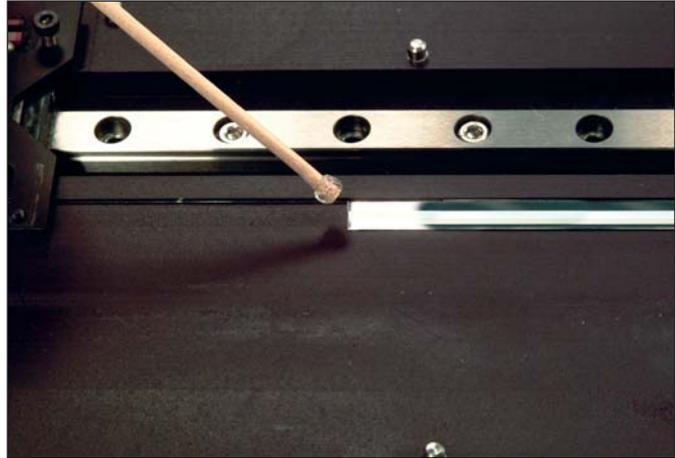
Optional

1. Epoxy Setup

- Mix the two-part epoxy and place it in a syringe or on the end of a stick. Do not use a cotton swab to apply the epoxy.
- Put epoxy on the end of the scale. Make sure that the epoxy touches both the mounting surface and the scale across the width of the scale.



Only apply epoxy at the ends of the tape scale. Do not get any epoxy on the tape scale in the measuring area.



- Perform Step 2, immediately while the epoxy is still in a liquid state.

2. Installing the End Caps on the Mounting Surface

- Remove the adhesive liner from end cap.
- Place the end cap on the top of the scale and epoxy so that the end of the scale is in the middle of the end cap.
- Press down lightly to ensure adhesion and let cure for 24 hours.



Final Cleaning, Inspection and Cure Time

Before using the encoder for servo control, clean the tape scale using alcohol or acetone and a lint-free cotton cloth or swab. Finally, inspect the tape scale's surface for scratches, adhesive spots or smears in the measuring length.

A cure time of 12 hours is required for the tape scale's pressure sensitive adhesive to achieve the best performance and reliability.

Reworking to Correct Mistakes

Once installed, the tape scale cannot be moved or removed and reinstalled. Reworking will require removal and discarding of the old tape and installation of a new one.

Contacting MicroE

MicroE Systems is a world leader in optical encoder technology with offices in major industrial centers around the globe.

To learn more about MicroE Systems products, visit:
www.microsystems.com.

Our products have been used by thousands of companies worldwide to solve a wide range of motion control applications. Our advanced encoder technology and application expertise has driven innovations in the design of machinery, equipment and instrumentation in many industries, including medical, industrial, robotics, automation, metrology, semiconductor manufacturing, packaging equipment, entertainment, energy, military, and scientific research.



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