

## Using Touch Probes

Two video probe types are available for creating reference skews and datums and for measuring 2D and 3D geometric features including points, lines, circles, arcs, slots, rectangles, distances, angles, planes spheres, cylinders and cones. Only the video Measure Blob tool is used to measure blobs. The two touch probes are:

- Straight down (default reference tip)
- Star (any one to five tips)

### ***Straight and Star Probes***

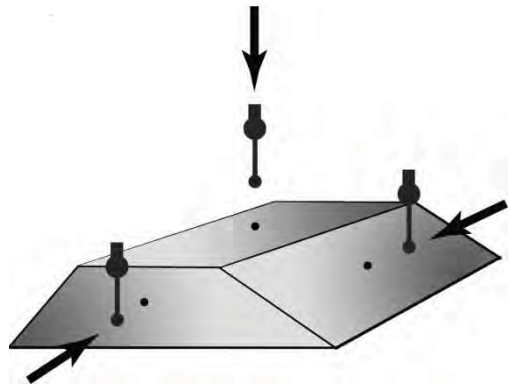
Straight down and star probes are used in the same way except for application specific probe tip and probing direction. To use a touch probe:

- 1 Select the desired touch probe from the Probe menu.  
**Measure toolbar > Probe menu > Touch probe**
- 2 Move the stage to make probe contact at the desired feature location. A point will be entered upon contact.
- 3 Probe the required number of points and then press the Done button to complete a feature measurement.  
**Measure toolbar > Done button**

### **Making Probe Contact**

Probing is optimized by following some simple guidelines:

- Approach the target surface without direction changes in the last 5 to 10 mm
- Try to make the approach direction orthogonal to the target surface
- Do not drag the probe across the surface
- Do not probe sharp edges or allow the tip to slip off an edge



## Touch Probe Setup Operations

Most systems that support the touch probe option are already prepared to probe feature points with a touch probe. However, in some cases it will be necessary to perform some basic probe operations before measuring features:

- Calibrate a probe tip
- Add a probe tip
- Remove a probe tip
- Edit a probe tip
- Change the current probe tip
- Configure probe path data

### ***Calibrating a Probe Tip***

Probe tip diameter and position are calibrated by measuring a certified qualification sphere artifact. Probe tips are calibrated using the:

- Contact Probe Settings screen
- Probe Teach function



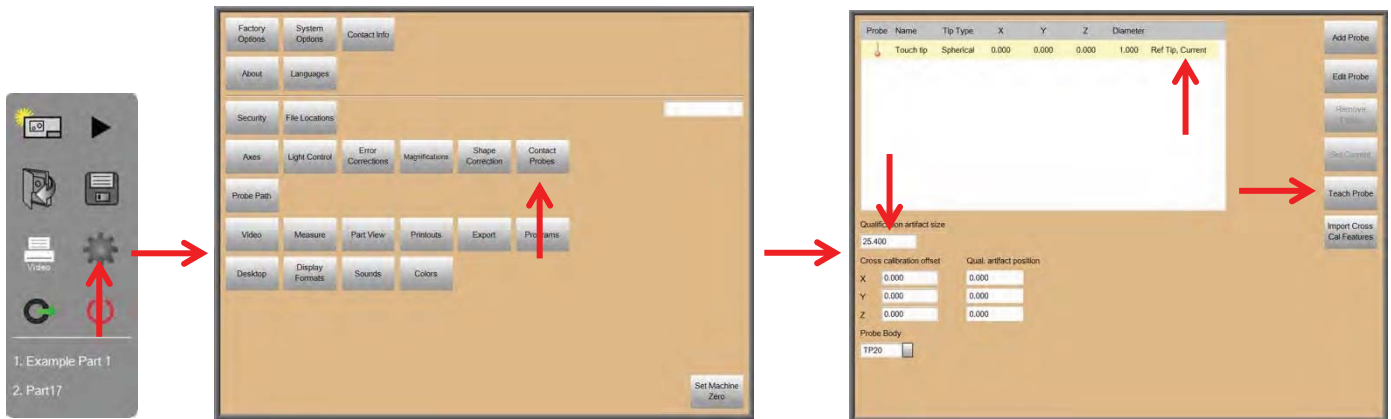
#### **NOTE**

*The system defaults to a sphere artifact, but can be configured by the system installer to use a certified ring gauge.*

## Calibrating using the Contact Probe Settings Screen

To access the Contact Probe Settings screen:

- 1 Press the Contact Probe Settings screen button.  
**M3 system menu > Settings > Contact Probes**



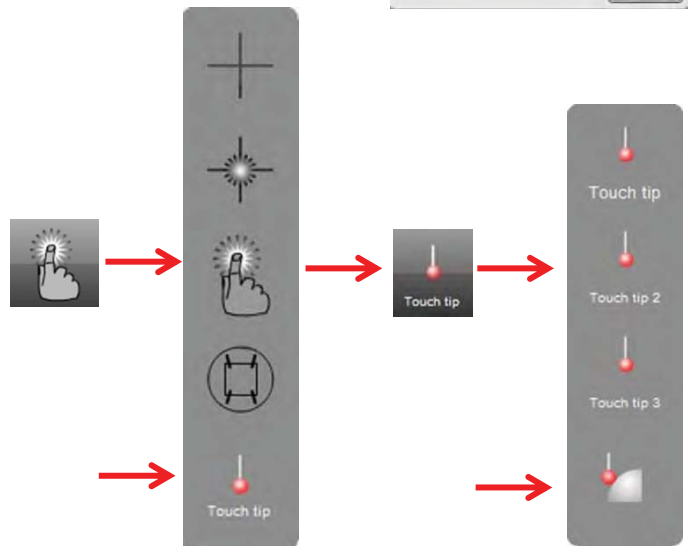
- 2 Confirm that the displayed qualification sphere artifact size matches your qualification sphere diameter in the current unit of measure.
- 3 Verify that the probe tip you wish to calibrate is set as the current probe. If it is not, select it in the probe group and press the Set Current button
- 4 Press the Teach Probe button to display the Teach Probe measure screen.
- 5 Probe a minimum of 4 points well distributed around the qualification sphere and then press Done. The Probe Teach Results dialog will be displayed. The measurement form error should be very small. If the form error is outside acceptable limits, recalibrate the tip. If an unacceptable form error persists, seek technical assistance.

Probe Teach Results	
Name	Touch Tip
X	0.000
Y	0.000
Z	0.000
Diameter	1.974
Form	0.002

## Calibrating using the Probe Teach Function

When you are certain that the qualification sphere used in your system is the correct diameter, the Probe Teach function accessed from the Probe Menu may be used to calibrate the probe tip. To initiate the Probe Teach function:

- 1 Press the Probe Menu button and then press the Touch Probe button to select touch probes (if necessary).
- 2 Long-press the Touch Probe button to display the Touch Probe menu, and then select the probe that you wish to calibrate (if necessary).
- 3 Long-press the Touch Probe button to display the Touch Probe menu, and then press the Probe Teach button. The Teach Probe measure screen will be displayed.



# Video Inspection Software User's Guide

- 4 Probe a minimum of 4 points well distributed around the qualification sphere and then press Done. The Probe Teach Results dialog will be displayed. The measurement form error should be very small. If the form error is outside acceptable limits, recalibrate the tip. If an unacceptable form error persists, seek technical assistance.

## Adding a Probe Tip

To add a probe tip:

- 1 Press the Contact Probes Settings screen button to access the Contact Probe Settings screen.

**M3 system menu > Settings > Contact Probes**

- 2 Press the Add Probe button to display the New Contact Probe dialog.
- 3 Press the tip graphic in the upper-right corner of the dialogue to cycle through and select the desired tip orientation. Tip orientations include:

- Down
- Left
- Right
- Front
- Back

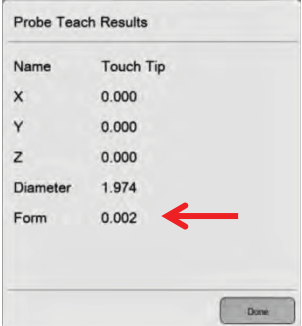
- 4 Enter a tip name into the Name field.

- 5 Press the Tip Type drop-down button to select a type. Types include:

- Spherical
- Disk
- Cylindrical

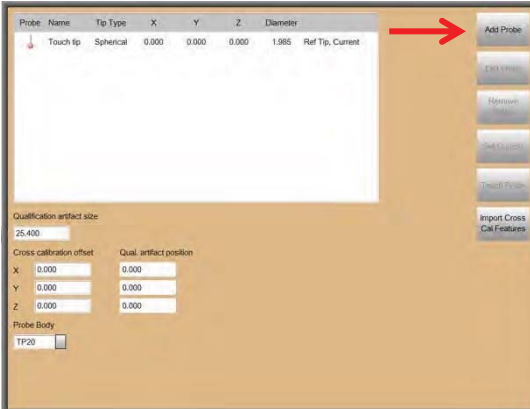
- 6 Press the Reference drop-down button to designate the probe as the reference if desired.

- 7 Press Done. The new probe tip will be displayed in the probe group and must now be calibrated. Select the new tip, press the Set Current button and then press the Teach Probe button to calibrate the tip as explained earlier.



Name	Touch Tip
X	0.000
Y	0.000
Z	0.000
Diameter	1.974
Form	0.002

Done



Probe	Name	Tip Type	X	Y	Z	Diameter	Ref
Touch tip		Spherical	0.000	0.000	0.000	1.986	Ref Tip, Current

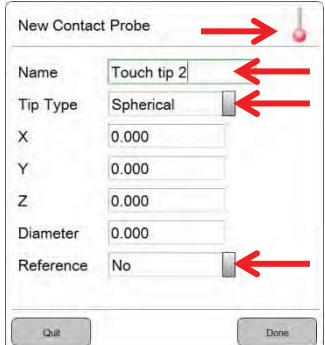
Buttons: Add Probe, Edit Name, Remove, Set Current, Teach Probe, Import Cross Cal Features

Qualification artifact size: 25.400

Cross calibration offset: X: 0.000, Y: 0.000, Z: 0.000

Qual. artifact position: X: 0.000, Y: 0.000, Z: 0.000

Probe Body: TP20



New Contact Probe

Name: Touch tip 2

Tip Type: Spherical

X: 0.000

Y: 0.000

Z: 0.000

Diameter: 0.000

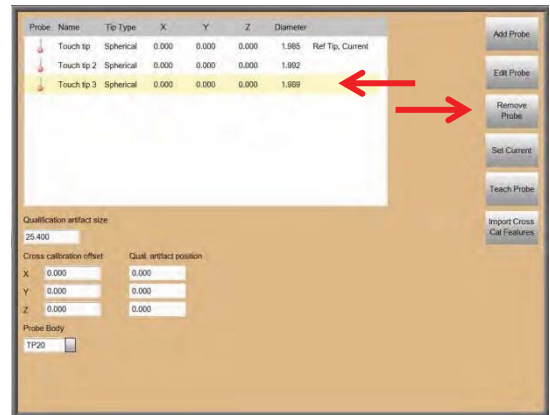
Reference: No

Buttons: Quit, Done

## Removing a Probe Tip

To remove a probe tip:

- 1 Press the Contact Probes Settings screen button to access the Contact Probe Settings screen.  
**M3 system menu > Settings > Contact Probes**
- 2 Select the desired probe in the probe group and press the Remove Probe button.



### CAUTION

*When multiple probes are shown in the probe group, it is possible to remove the reference probe. It may be necessary to remove the reference probe if the tip becomes damaged, or there may be instances when the reference probe tip needs to be replaced to address the requirements of a specific application. When the reference probe tip is replaced, the current calibrations of all other tips in the group become invalidated and after the calibration of the new reference tip, new calibrations of all other probes will need to be performed.*



### NOTE

*When the current probe is removed, but is not the reference, the system sets the reference probe as current.*

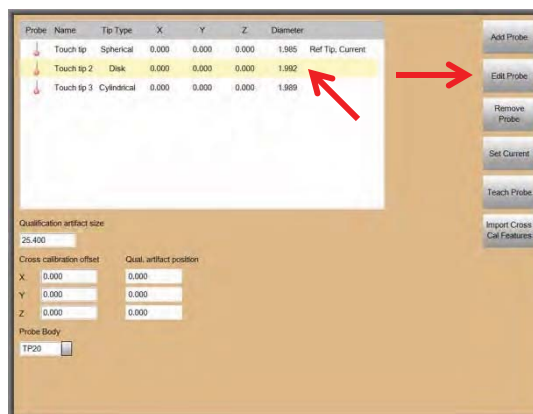
## Editing a Probe Tip

Probe tips can be edited to:

- Change the name
- Assign a tip type
- Designate the probe as the reference

All probe editing is performed in the Edit Contact Probe dialog of the Contact Probe Settings screen. To display the Edit Contact Probe dialog for the probe to be edited:

- 1 Press the Contact Probes Settings screen button to access the Contact Probe Settings screen.  
**M3 system menu > Settings > Contact Probes**
- 2 Select the probe tip to be edited from the probe group.
- 3 Press the Edit button to display the Edit Contact Probe dialog.



## Changing the probe Tip Name

To change the name:

- 1 Enter the new name into the Name field and press Done.

## Assigning a Tip Type

To assign a tip type:

- 1 Press the Tip Type drop-down box button, select the desired type and press Done. Available tip type assignments include:
  - Spherical
  - Disk
  - Cylindrical

## Designating the Probe as a Reference

Any probe in the probe group can be designated as the reference.



### **CAUTION**

*When the reference probe tip is changed, the current calibrations of all other tips in the group become invalidated and after the calibration of the new reference tip, new calibrations of all other probes will need to be performed.*

To designate a probe as the reference:

- 1 Press the Reference drop-down box, select Yes and press Done.

## Changing the Current Probe Tip

To change the current probe tip:

- 1 Press the Contact Probes Settings screen button to access the Contact Probe Settings screen.  
**M3 system menu > Settings > Contact Probes**
- 2 Select the desired probe in the probe group and press the Set Current button. The selected probe will now be shown as current in the probe group.

Probe	Name	Tip Type	X	Y	Z	Diameter	Ref Tip, Current
Touch tip	Spherical	0.000	0.000	0.000	1.985		
Touch tip 2	Spherical	0.000	0.000	0.000	1.992		
Touch tip 3	Spherical	0.000	0.000	0.000	1.989		

Qualification artifact size: 25.400

Cross calibration offset: X: 0.000, Y: 0.000, Z: 0.000

Qual. artifact position: X: 0.000, Y: 0.000, Z: 0.000

Probe Body: TP20 ☐

Buttons: Add Probe, Edit Probe, Remove Probe, Set Current, Teach Probe, Import Cross Cal Features

Probe	Name	Tip Type	X	Y	Z	Diameter	Ref Tip, Current
Touch tip	Spherical	0.000	0.000	0.000	1.985		
Touch tip 2	Spherical	0.000	0.000	0.000	1.992		Current
Touch tip 3	Spherical	0.000	0.000	0.000	1.989		

Qualification artifact size: 25.400

Cross calibration offset: X: 0.000, Y: 0.000, Z: 0.000

Qual. artifact position: X: 0.000, Y: 0.000, Z: 0.000

Probe Body: TP20 ☐

Buttons: Add Probe, Edit Probe, Remove Probe, Set Current, Teach Probe, Import Cross Cal Features



### **NOTE**

*When a probe is selected from the Probe menu of the Measure toolbar it is set as the current probe.*

## Configuring Probe Path Data

The probe path data settings define the default probe touch probe behavior for CNC programs. All probes used in programs initially use the default probe path data settings. These settings can be edited in program steps when the default probe behavior needs to be modified to meet the needs of a specific application. Editing probe path data steps is discussed in [Section 11: Programming](#).

Probe path data are configured in the Probe Path Settings screen. To configure probe path data:

- 1 Press the Probe Path Settings screen button. The Probe Path default configuration will be displayed.  
**M3 System menu > Settings > Probe path**

Probe path data configuration fields include:

- Approach distance: Distance from the anticipated target surface where probing speed is initiated in the current unit of measure. The approach path is calculated by the system to be approximately orthogonal to the target surface.
- Search distance: Distance added to the approach distance when surface contact is not made at the anticipated location. The measurement fails if contact is not made within the search distance.
- Clearance distance: There are two clearance distances of the same value. One clearance is toward the target and included after the non-probing speed to the target and before the approach distance. The second is away from the target and included after the retract distance and before the next non-probing speed begins to the next target. The clearance moves are intended to locate the probe so that the to-target and from-target moves will be unobstructed. The clearance directions are determined by the system based on the target feature surface being probed and generally moves along the probe tip axis
- Retract distance: Distance that the probe moves immediately after contact is made with the target surface in the current unit of measure. The retract path retraces the approach path for a small distance at higher speed.
- Retract speed: The speed in the retract region expressed in mm per second
- Probing speed: The speed in the approach and search regions expressed in mm per second
- Non-probing speed: The maximum probe speed between features

Approach Distance	3.000
Search Distance	3.000
Clearance Distance	12.000
Retract Distance	3.000
Retract Speed	100.000
Probing Speed	20.000
Non Probing Speed	100.000



### CAUTIONS

*When preparing programs for parts that include complex surface variations in 3D space, care must be taken to avoid probe collisions. The clearance distance might not be adequate to eliminate collisions and might need to be replaced or supplemented with manually programmed Goto (safe) moves. Goto moves are discussed in [Section 11: Programming](#).*

*The default Non-probing speed might be too high for first executions of complex part programs. Debugging complex programs at lower Non-probing speeds reduces the possibility of probe damage. The Non-probing speed can easily be changed in program steps during the program debugging process.*