



# HEIDENHAIN



Product Information

## **Touch Probe Cycles**

For Tool and Workpiece  
Measurement with  
Fanuc Controls

September 2007

# Range of Applications

## Workpiece measurement

Modern series production, tool making and mold making can no longer be imagined without workpiece touch probes. They help to reduce setup times, increase machine usage time and improve the dimensional accuracy of the finished workpieces. The TS workpiece touch probes from HEIDENHAIN help you perform setup, measuring and inspection functions directly on the machine tool.

## Tool measurement

Successful series production hinges on the prevention of scrap or rework and the attainment of consistently good workmanship. The tool is a decisive factor here. Wear or tool breakage that go undetected for extended periods, especially during unattended operation, result in defective parts and unnecessarily increase costs. Therefore, exact measurement of tool dimensions as well as periodic control of wear are absolutely essential. For tool measurement on the machine, HEIDENHAIN offers the TT 140 three-dimensional touch probes.

## Probing cycles for Fanuc controls

Touch probes from HEIDENHAIN were conceived for use on machine tools—in particular milling machines and machining centers. So that you may take advantage of the touch probes from HEIDENHAIN, with their setup, measuring and inspection functions, on machines with Fanuc controls, HEIDENHAIN now offers the corresponding automated probing cycles in combination with these touch probes.



# Probing Cycles

## Workpiece Measurement with TS Touch Probe

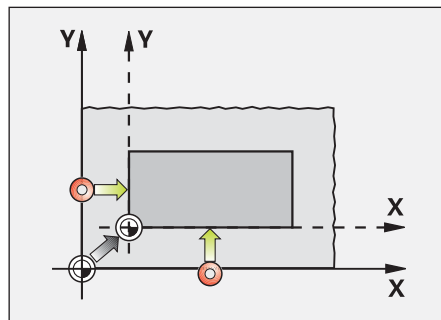
The probing cycles for workpiece measurement make automated setup or measurement of the workpiece possible. The following cycles are available in combination with a TS workpiece touch probe from HEIDENHAIN:

### Calibrating the TS tool touch probe

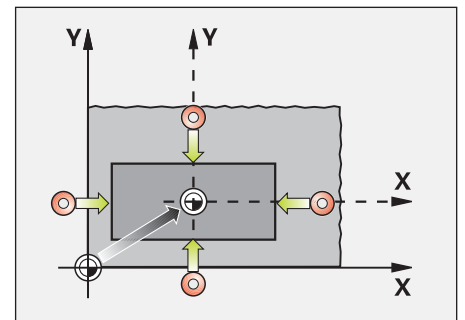
This function uses an exact ring gauge to ascertain the effective ball-tip radius and center misalignment, as well as the effective length of the touch probe.

### Datum setting

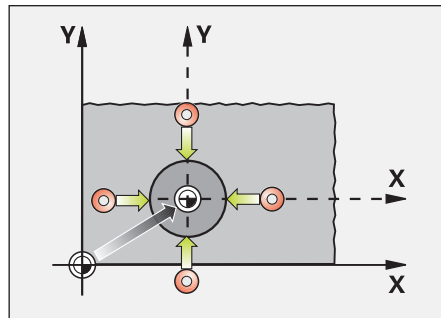
These functions are used to set a datum in a workpiece that you have newly clamped on the machine table. The datum can be set in any axis, at the intersection of two axes, or at the intersection of three axes. You can also set a datum in the center of a ridge, circular stud, slot or hole, even if the center is blocked by an obstruction.



Outside corner



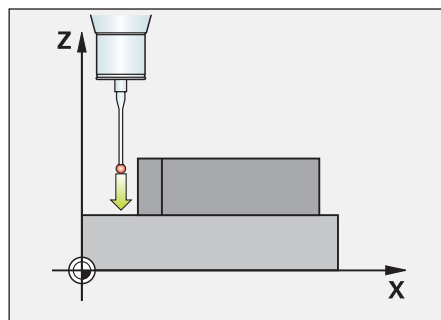
Center of a rectangular stud



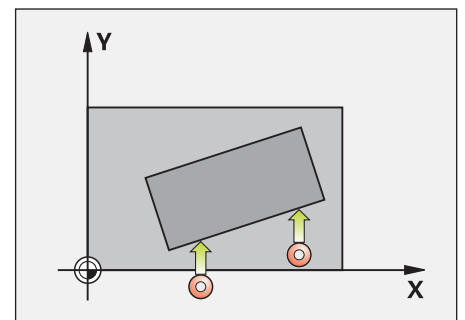
Center of a circular stud

### Workpiece measurement

Measuring tasks, such as single probing procedures in any axis (X/Y/Z), as well as the measurement of a corner in two axes or three axes, can be performed automatically with the aid of these functions. Measurements of slots, ridges, holes, circular studs, and holes or slots with obstructions are possible, as are the measurement of angles and distances.



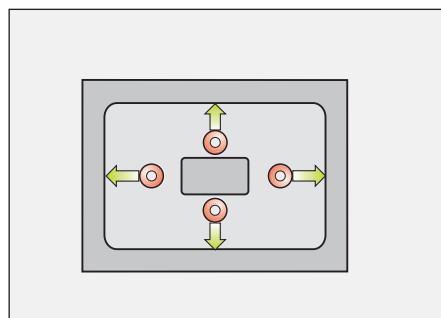
Measuring individual positions in an axis



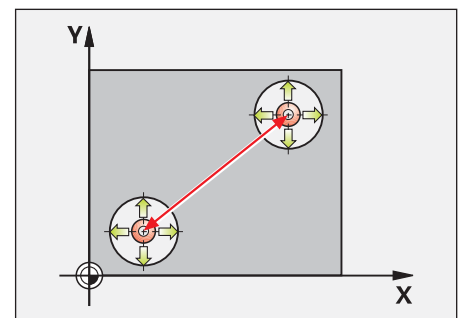
Measuring the angle of a line

### Protected motion

This special cycle is used to move the touch probe in the machine's work envelope in a protected manner. If the stylus is deflected during the protected motion, the control stops the motion immediately and retracts the touch probe to the starting position.



Measuring a rectangular pocket (even with an obstruction)



Measuring the distance between two holes

### Evaluations

The touch-probe cycles are also suited for

- checking tolerances and
- correcting tool data.

# Tool Measurement with TT Touch Probe

The probing cycles for tool measurement make automated inspection or measurement of the tool possible. The following cycles are available in combination with a TT tool touch probe from HEIDENHAIN:

## Calibrating the TT tool touch probe

The calibration procedure ascertains the exact trigger points of the TT with a calibration mandrel in the spindle.

## Measuring the tool length

The exact length of the active tool is measured, and the value is saved in the compensation memory.

## Measuring the tool radius

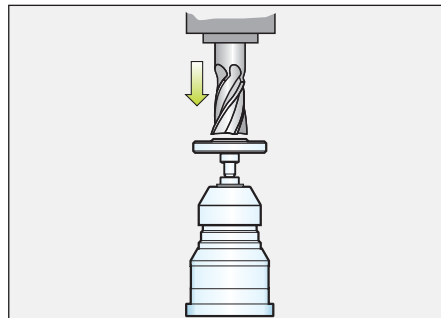
The exact radius of the active tool is measured, and the value is saved in the compensation memory.

## Measuring the tool wear

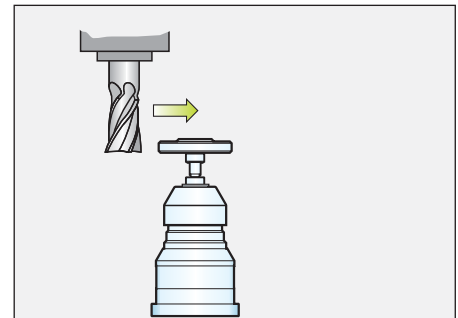
The software determines the difference between the saved and actual values for tool length and radius. The software then writes the measured differences to the appropriate compensation memory.

## Measuring tool breakage

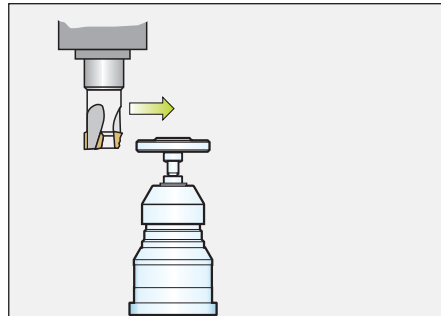
As when measuring the tool wear, the software determines the difference between the actual and nominal tool values. If the tolerance for wear is exceeded, the tool is considered to be broken and the control generates an error message.



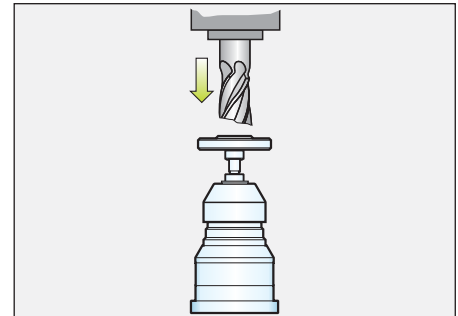
Measuring the tool length with stationary or rotating spindle



Measuring the tool radius with rotating spindle



Tool wear measurement



Tool breakage monitoring



# System Requirements

## GE Fanuc controls

The touch-probe cycles from HEIDENHAIN for workpiece and tool measurement can be used with the HEIDENHAIN TS and TT touch probes on the following GE Fanuc controls:

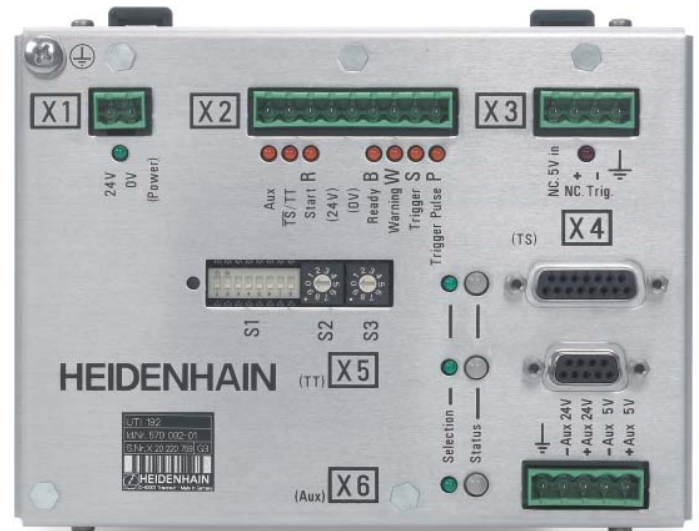
- 16i-MB, 18i-MB, 21i-MB
- 160i-MB, 180i-MB, 210i-MB
- 160is-MB, 180is-MB, 210is-MB
- 18i-MB5, 180i-MB5, 180is-MB5

The GE Fanuc control must be prepared for using a HEIDENHAIN TS or TT touch probe with a UTI 192 (universal touch-probe interface) from HEIDENHAIN.

The GE Fanuc control should offer the following options:

- Custom Macro B (mandatory)
- High Speed Skip (fast switching input for greater accuracy); as an alternative, a free skip input can also be used.

UTI 192



## Universal touch-probe interface

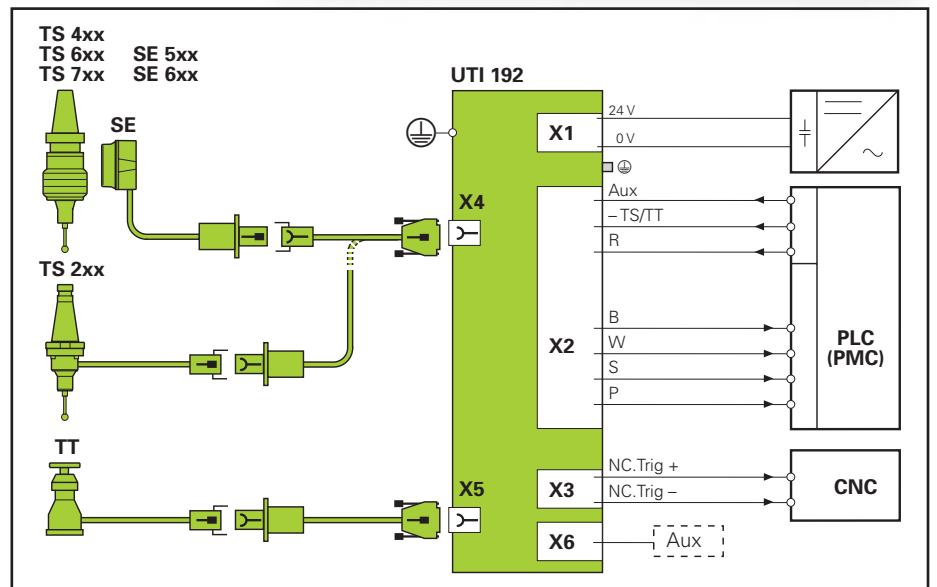
The UTI 192 universal touch-probe interface converts the output signals of the HEIDENHAIN touch probes to machine control signals in accordance with IEC 61131-2. It permits the connection of one TS workpiece touch probe and one TT tool touch probe from HEIDENHAIN. The following touch probes can be connected:

- TS 230
- TS 440
- TS 640
- TS 740
- TT 140

The UTI 192 features a **compact design**.

It can be quickly fastened on a standard mounting rail (DIN 46227 and EN 50022) in the electrical cabinet.

The UTI 192 is provided with LEDs for configuration and **easy servicing for initial operation**. The LEDs indicate whether power is on and show the levels of the inputs and outputs.



# 3-D Touch Probes from HEIDENHAIN

## TS workpiece touch probes

The stylus of a TS three-dimensional touch trigger probe from HEIDENHAIN is deflected upon contact with a workpiece surface. At that moment the TS generates a trigger signal that, depending on the model, is transmitted either by cable or over an infrared beam to the control, where it is processed.

Touch probes with **cable connection for signal transmission** for machines with manual tool change:

**TS 230** – HTL version

Touch probes with **infrared signal transmission** for machines with automatic tool change:

**TS 440** – Compact dimensions

**TS 640** – Wide-range infrared transmission

**TS 740** – High probing accuracy and repeatability, low probing force



## TT 140 tool touch probe

The TT 140 from HEIDENHAIN is a 3-D touch trigger probe for tool measurement and inspection. The disk-shaped probe contact of the TT 140 is deflected during physical probing of a tool. At that moment the TT generates a trigger signal that is transmitted to the control, where it is processed further. The trigger signal is generated through a wear-free optical switch that ensures high reliability.



# HEIDENHAIN

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### For more information on HEIDENHAIN touch probes:

- Brochure: *Touch Probes*
- CD: *Touch Probes*

