



**HEIDENHAIN**

**TD 110**  
**Cycles**

User's Manual

English (en)  
08/2023

## 2 Fundamentals

In order to use the non-contacting inspection of tools, you need the following components:

- Any of the following TNC controls:
  - TNC7 with NC software 817620-16 or higher
  - TNC 640 with NC software 34059x-07 or higher
  - TNC 620 with NC software 81760x-04 or higher
  - iTNC 530 with NC software 340490-03 or higher
  - iTNC 530 with NC software 606420-01 or higher
  - Upon request: TNC 320 with NC software 771851-04 or higher
  - Upon request: TNC 128 with NC software 771841-05 or higher
- Touch Probe Functions (option 17)
- Hardware:
  - HEIDENHAIN TD 110 tool breakage detector with accessories
  - Touch probe for TD 110 setup

### Application

The TD 110 tool breakage detector provides contact-free inspection of drill bits and end mills. It can determine whether the cutting edge length of a tool is still at least 2 mm as it passes by (indirect breakage detection).

Our Service department provides optimal support for the operation with HEIDENHAIN controls, including cycles for breakage detection that can be added via TNCremo. Please contact the HEIDENHAIN Service department:

Remote Support  
service.nc-pgm@heidenhain.de  
ID 1369787-35

**Notes about TD cycles**

All TD cycles are DEF-active. The control runs the cycle automatically as soon as it reads the cycle definition in the program run.

**NOTICE****Risk of collision!**

Risk of collision if the tool is positioned automatically in front of the breakage detector. The breakage detector, the machine, the workpiece and the tool may be damaged.

- ▶ Refer to the machine manual to learn about the coordinates the tool is positioned to by the control
- ▶ If required, use **M140 MB MAX** to move to maximum height prior to positioning

**NOTICE****Risk of collision!**

The cycle moves the tool to the outer tool radius. If the radius of the tool shaft is larger than the tool radius, there is a risk of collision.

- ▶ Test the NC program or program section in **Program run, single block** operating mode

**NOTICE****Risk of collision!**

If the actual tool diameter is greater than the measured tool diameter, then there is a risk of collision with the breakage detector!

- ▶ Measure the tool based on its outermost radius



In the tool table, you also need to enter both the length and the radius for drills. Otherwise, the cycles will be canceled with an error message.



Only for machines with iTNC 530: The PLC program may have to be adapted. Contact your machine tool builder.

### 3 Cycle 530 TD 110 SETUP

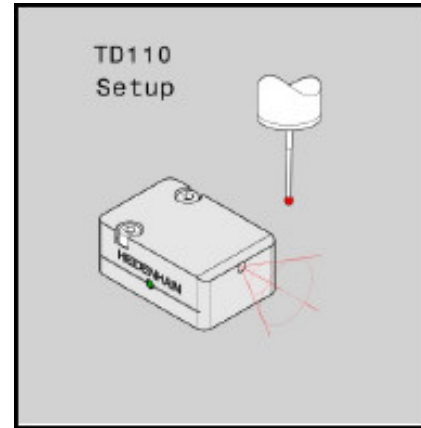
#### Application

Cycle **530 TD 110 SETUP** allows you to set up the tool breakage detector by using a touch probe before starting Cycle **531**.

The cycle uses the front half of the housing in the direction of the sensing surface to determine the starting position at approximately 5 mm above the top surface of the housing. You can also position the stylus tip above the chamfered edge of the housing; the cycle will then take the resulting deviation into account in the calculations.

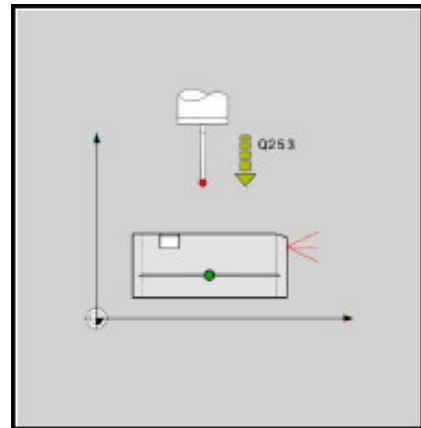
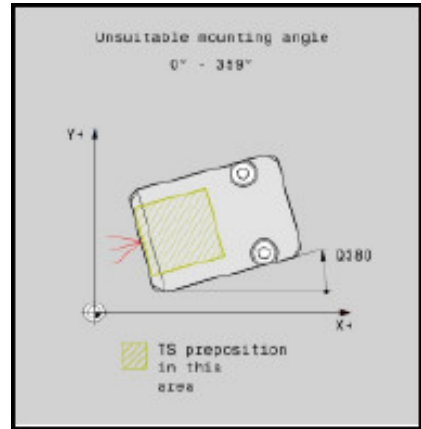
Before or during the cycle, you have to pre-position your touch probe manually above the starting position.

The breakage detector coordinates determined during setup are coordinates in the machine coordinate system.



**Cycle sequence**

- 1 Press NC Start once the touch probe has been pre-positioned. During the subsequent steps, the control will move the touch probe at the pre-positioning feed rate defined in the cycle parameter **Q253**.
- 2 Then the control probes the housing in the tool axis. Cycle parameter **Q380** is used for orientation purposes.
- 3 Not applicable to the iTNC 530: The touch probe determines the housing edge in the direction of the sensing surface by probing several points in the direction of the tool axis.
- 4 The control probes the front face of the housing. Not applicable to the iTNC 530: When probing points on the front face, the control checks whether the space below the touch probe is free.
- 5 The control probes the lateral surfaces of the housing from the side.
- 6 The front face of the housing is probed once more, in order to adjust the rotation of the housing.
- 7 At the end of the cycle, the touch probe returns to clearance height.



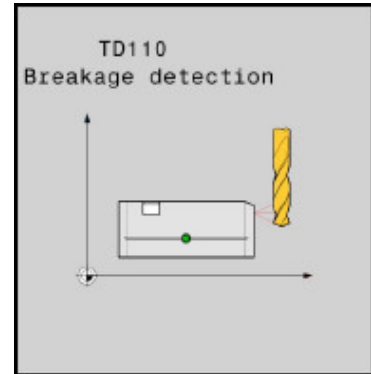
Q parameter number	Meaning
<b>Q380</b>	Reference angle Angle in degrees between the positive X axis of the machine and <ul style="list-style-type: none"> <li>■ the normal line on the rear side of the sensing surface, or</li> <li>■ the long side of the housing in the direction of the cable connection</li> </ul> Input: <b>0...360.000</b>
<b>Q253</b>	Feed rate for pre-positioning Pre-positioning feed rate for the touch probe Input: <b>0...99999.000</b>

## 4 Cycle 531 TD 110 BREAKAGE DETECTION

### Application

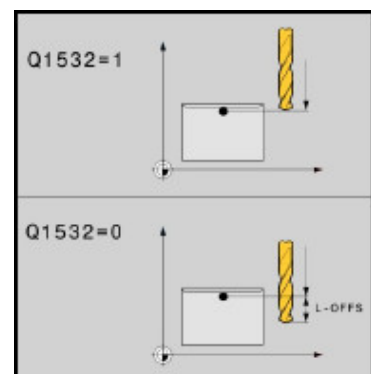
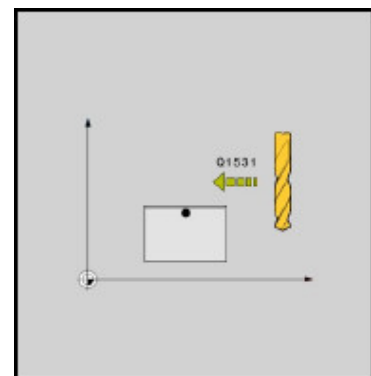
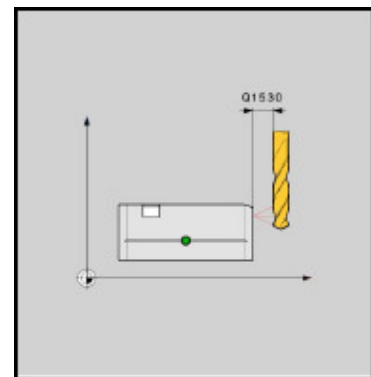
Cycle **531 TD 110 BREAKAGE DETECTION** enables non-contacting inspection of tools for total breakage.

In order to perform the inspection, the control moves the tool at its operational speed such that the tool tip passes at mid-level of the sensing surface.



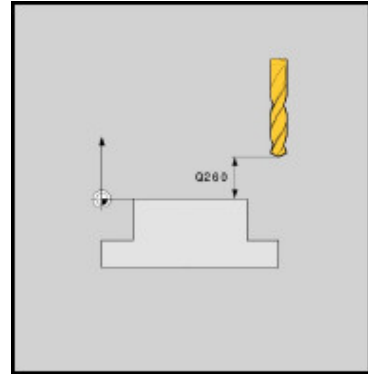
### Cycle sequence

- 1 The control moves the tool to the clearance height defined in cycle parameter **Q260**
- 2 The maximum distance from the sensing surface is 0.5 mm and can be reduced to 0.2 mm as needed by using the cycle parameter **Q1530** (e.g., for micro-tools). For the following tools, the tool tip is usually offset downwards by the value of L-OFFS from the tool table:
  - Drill
  - Cutter with a chamfer or corner radius > 1 mm
  - Tools with a diameter < 1 mm
- 3 Based on the parameters defined for the tool, the control moves the tool past the sensing surface at the feed rate defined in cycle parameter **Q1531**. This feed rate must not necessarily be reached and constantly maintained. Only applicable to the iTNC 530: The traverse movement may already end upon detection of the tool
- 4 At the end of the cycle, the control moves the tool to clearance height



Q parameter number	Meaning
<b>Q1530</b>	Distance perpendicular to sensing surface Input: <b>0.2...0.5</b>
<b>Q1531</b>	Feed for breakage detection Input: <b>0...99999</b> Only for the iTNC 530: Input: <b>0...3000</b>
<b>Q1532</b>	Consideration of L-OFFS <b>0</b> : L-OFFS from the tool table will be taken into account (default) <b>1</b> : L-OFFS will not be taken into account
<b>Q260</b>	Clearance height Input: <b>0...99999.9999</b>

Q parameter number	Meaning
Q309	<p>Defines the reaction of the control to the following events:</p> <ul style="list-style-type: none"> <li>■ A tool breakage is detected</li> <li>■ No tool is detected</li> <li>■ An error occurred in the evaluation</li> </ul> <p>Each of these events will trigger an error message.</p> <p><b>0:</b> No program interruption  <b>1:</b> Program interruption</p>
Q1910	<p>Return parameters for inspection result:</p> <p><b>0:</b> No tool breakage has been detected  <b>-1:</b> Tool breakage has been detected or error in evaluation  <b>-4:</b> Tool diameter is too small  <b>-5:</b> Tool length is too small</p>



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