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TS27R tool setting probe

Alternative interface units

Cable

CNC machine control

MI 8-4 interface

MI 8 interface

Interface units are fully described on the separate Data sheets listed on the back page

Z

TS27R probe

Diameter setting
Rotate tool in reverse direction

X/Y

Machine table
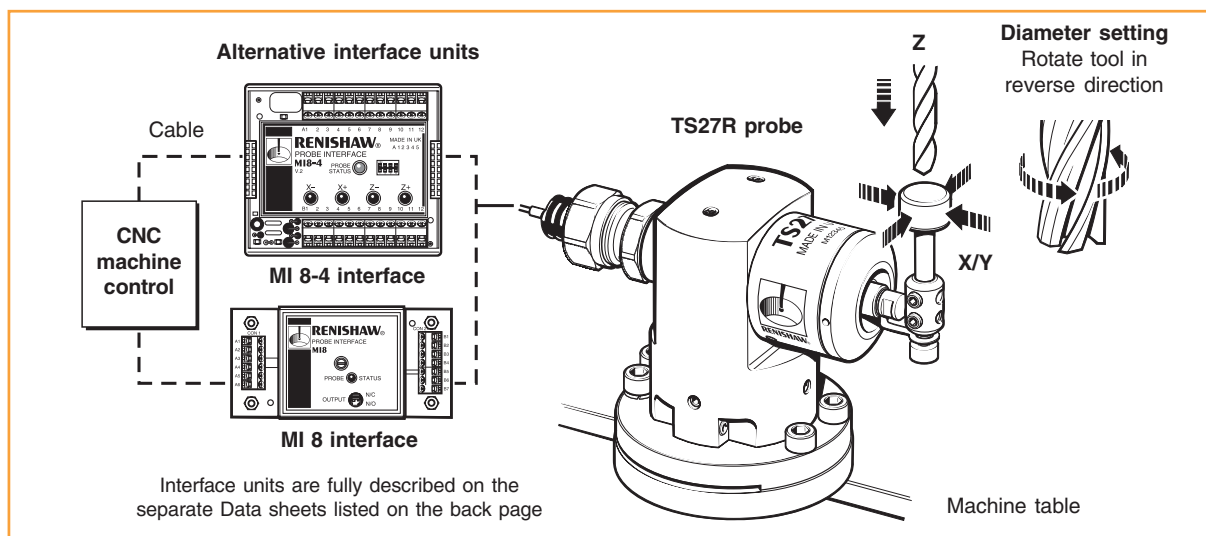
TS27R PROBE FUNCTIONS

• Setting tool lengths in Z.
• Setting rotating tools in X and Y for radius offsets.
• Tool breakage detection.

The probe body is fully adjustable to enable the stylus tip to be aligned with the machine's axes. The probe mechanism is protected from hot chips and coolant by an outer metal eyelid and inner flexible seal. The base T bolt is clamped in a machine table T slot.

Styli

Disc styli Ø12.7 mm (Ø0.5 in), or square styli 19.05 mm × 19.05 mm (0.75 in × 0.75 in) are available. The stylus mounting allows styli to be changed.

A weak link break stem protection device is incorporated in the stylus mounting to protect the probe mechanism from damage in the event of excessive stylus overtravel or a collision. A captive link secures the stylus to the probe if the break stem is broken in the event of excessive stylus overtravel.

Achievable set-up tolerances

The achievable tolerance setting of tools depends upon the flatness and parallelism of the stylus tip setting. A value of 5 μm front to back and side to side is easily achievable over the flat portion of the stylus tip (5 μm parallelism with the axes of square tip styli is sufficient for the majority of tool setting applications).

INTERFACE

The interface processes signals between the probe and CNC control.

The **MI 8-4 interface** is used with the standard G31 SKIP type control probe input. Probe status and output(s) operate between 4.75 Vdc and 30 Vdc and are fully configurable for ACTIVE HIGH or ACTIVE LOW operation. The interface also includes an 'inhibit' function as well as a facility for simple selection between the tool setting probe and an inspection probe.

The alternative **MI 8 interface** is used with the standard G31 SKIP type control probe input. Probe status output is a voltage free SSR (solid state relay), which is invertable via a switch (SW1).

Maximum current   50 mA peak
Maximum voltage   ±50 V peak

An inhibit function is included, and a facility to drive an external probe status LED.

SPECIFICATION

Sense directions	Normally mounted in the machine's ±X, ±Y and –Z axes
Uni-directional repeatability	1 μm (0.00004 in) Maximum mean 2 sigma (2σ) value *****
Stylus trigger force	1.3 N to 2.4 N / 130 gf to 240 gf (4.6 ozf to 8.5 ozf) depending on sense direction
Temperature limits	Operating 5 C° to 60 °C (41 °F to 140 °F) Storage –10 °C to 70 °C (14 °F to 158 °F)
* Valid as tested with a 35 mm straight stylus and a velocity of 480 mm/min at the stylus tip	

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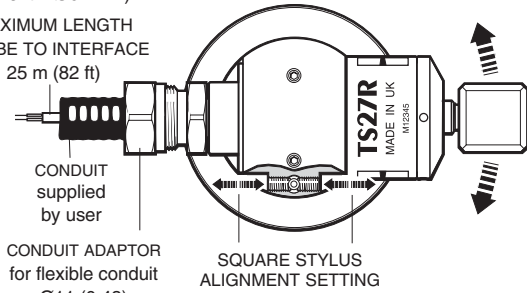# Installation

dimensions mm (in)

SCREENED CABLE
10 m × Ø4.4 mm SUPPLIED
(32.8 ft × Ø0.17 in)

MAXIMUM LENGTH
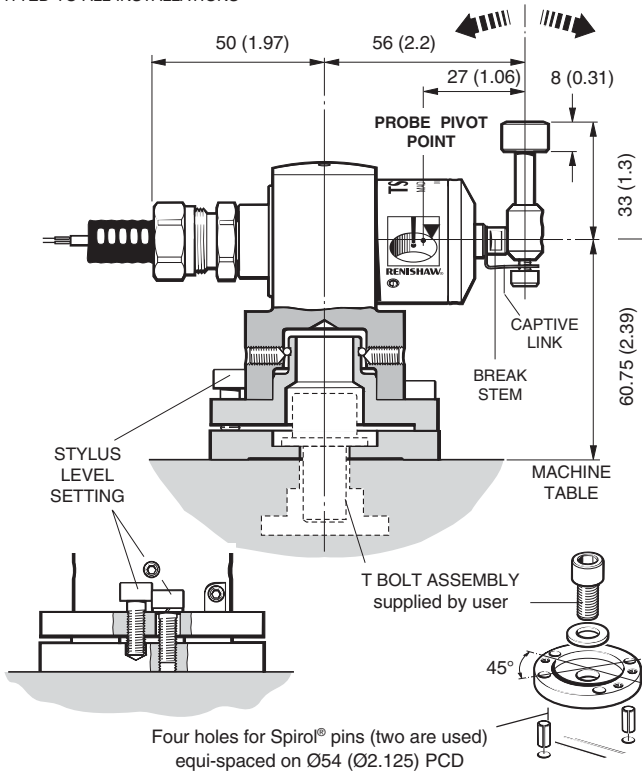PROBE TO INTERFACE
25 m (82 ft)

CONDUIT
supplied
by user

CONDUIT ADAPTOR
for flexible conduit
Ø11 (0.43)

SQUARE STYLUS
ALIGNMENT SETTING

RENISHAW RECOMMENDS THAT THOMAS & BETTS
TYPE EF CONDUIT, OR A SUITABLE ALTERNATIVE,
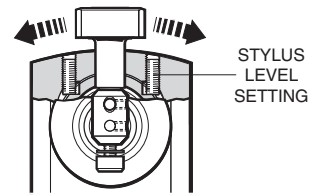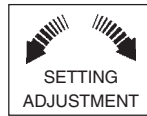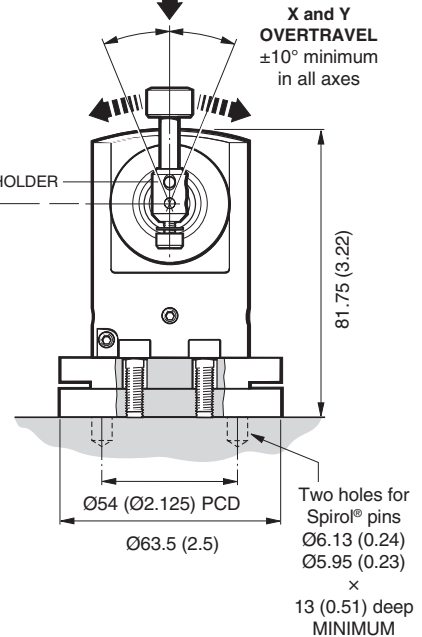IS FITTED TO ALL INSTALLATIONS

SQUARE STYLUS
19.05 × 19.05
(0.75 × 0.75)

SETTING
ADJUSTMENT

DISC STYLUS
Ø12.7 (Ø0.5)

STYLUS
LEVEL
SETTING

Z
OVERTRAVEL at stylus centre
5.5 (0.21)

X and Y
OVERTRAVEL
±10° minimum
in all axes

STYLUS HOLDER

50 (1.97)   56 (2.2)

27 (1.06)   8 (0.31)

PROBE PIVOT
POINT

33 (1.3)

60.75 (2.39)

81.75 (3.22)

CAPTIVE
LINK

BREAK
STEM

STYLUS
LEVEL
SETTING

MACHINE
TABLE

Ø54 (Ø2.125) PCD

Ø63.5 (2.5)

Two holes for
Spirol® pins
Ø6.13 (0.24)
Ø5.95 (0.23)
×
13 (0.51) deep
MINIMUM

T BOLT ASSEMBLY
supplied by user

45°

Four holes for Spirol® pins (two are used)
equi-spaced on Ø54 (Ø2.125) PCD

The T bolt provides adequate clamping in all normal
circumstances. Two Spirol® pins (supplied by Renishaw)
may be fitted on installations where there is requirement to
remove and remount the TS27R. To fit the Spirol® pins,
drill two holes in the machine table to correspond with two
of the probe base holes.

Parts List - **Please quote the Part No. when ordering equipment**

| Type	Part No.	Description
TS27R full kit	A-2008-0397	TS27R with stylus break stem protection (× 2), disc stylus Ø12.7 mm (Ø0.5 in) and MI 8-4.
TS27R full kit	A-2008-0396	TS27R with stylus break stem protection (× 2), square stylus 19.05 mm × 19.05 mm (0.75 in × 0.75 in) and MI 8-4.
TS27R full kit	A-2008-0367	TS27R with stylus break stem protection (× 2), disc stylus Ø12.7 mm (Ø0.5 in) and MI 8.
TS27R full kit	A-2008-0366	TS27R with stylus break stem protection (× 2), square stylus 19.05 mm × 19.05 mm (0.75 in × 0.75 in) and MI 8.
TS27R	A-2008-0368	TS27R with stylus break stem protection (× 2) and disc stylus Ø12.7 mm (Ø0.5 in).
Probe + holder	A-2008-0388	TS27R with stylus break stem protection (× 2) and stylus holder (without stylus).
Disc stylus	A-2008-0382	Disc stylus (tungsten carbide, 75 Rockwell C) - Ø12.7 mm (Ø0.5 in).
Square stylus	A-2008-0384	Square tip stylus (ceramic tip, 75 Rockwell C) - 19.05 mm × 19.05 mm (0.75 in × 0.75 in).
Break stem kit	A-5003-5171	Stylus protection kit comprising : break stem, captive link, grubscrew flat ended (× 3), cap head screw (× 2) and tools (hexagon wrenches, spanner 5 mm AF, and support bar).
MI 8-4	—	See Data Sheet **H-2000-2185** MI 8-4 interface unit.
MI 8	—	See Data Sheet **H-2000-2191** MI 8 interface unit.

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Rotating tool setting software - for machining centres

Cycle features

❏ **Tool length setting**
With automatic offset correction

❏ **Rotating tool length setting of single point and multiple tip tools**

❏ **Broken tool detection**

❏ **Rotating tool diameter setting of single and multiple tip tools**

❏ **Fully automated measurement cycle**
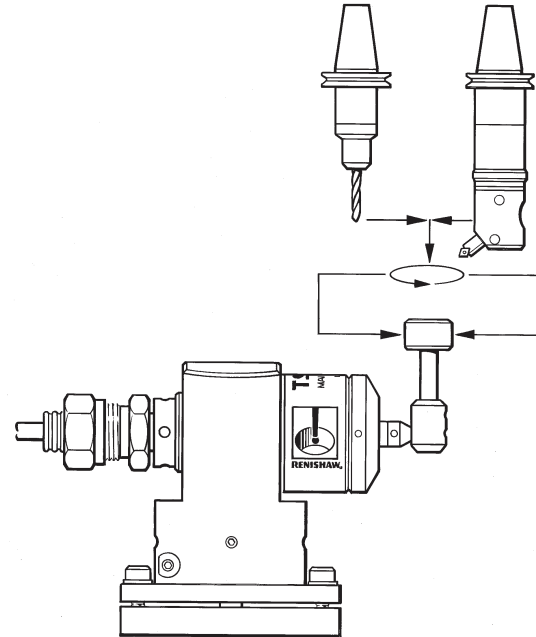With tool change positioning and offset correction.
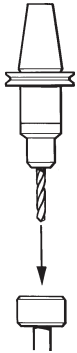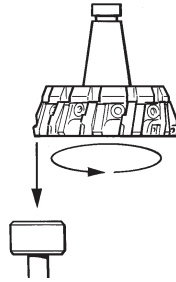
TOOL LENGTH SETTING   **ROTATING LENGTH SETTING**   **ROTATING DIAMETER SETTING**

TOOL LENGTH / DIAMETER SETTING
The tool is manually positioned over the stylus within 10mm of the surface. The following example program is then executed.

Example
1. G65 P9851 T1. (tool length setting).
2. G65 P9852 D21. (tool diameter setting).

AUTOMATIC TOOL MEASUREMENT
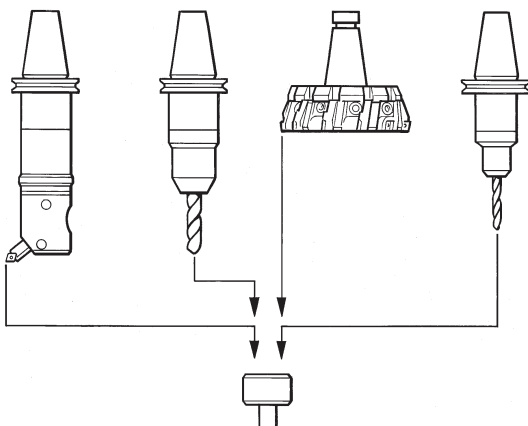
The tool will be selected automatically from the tool change magazine, positioned over the stylus then measure the length / diameter before returning to home position and update the relevant offsets.

Example
1. G65 P9853 B3. T01.001 D11.
(selects tool 1 and automatically measures length offset No. 1 and diameter offset No. 11).

BROKEN TOOL DETECTION
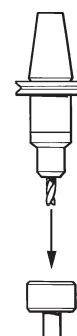
After machining, the tool is positioned by the program over the stylus, before running the following cycle to check the length or diameter offset.
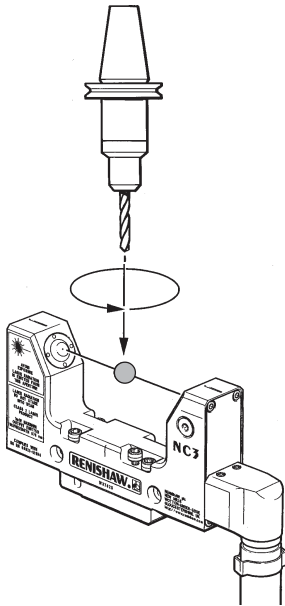
Example
1. G65 P9853 B1. T1. H0.2
(tool breakage tolerance ±0.2mm).

Non-contact tool setting software - for machining centres

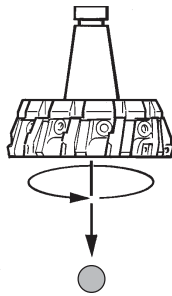## Cycle features

- **Tool length setting**
  With automatic offset correction

- **Rotating tool length setting of single point and multiple tip tools**

- **Broken tool detection**

- **Rotating tool diameter setting of single and multiple tip tools**

- **Cutter radius and linear profile checking Cutter edge/missing tooth checking**
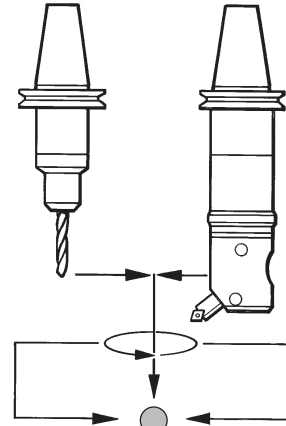
- **Temperature compensation checking**

TOOL LENGTH SETTING

ROTATING LENGTH SETTING
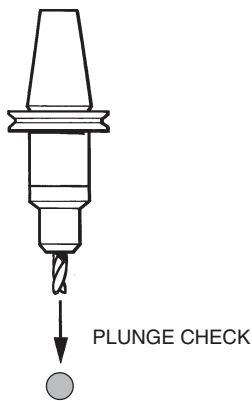

TOOL LENGTH / DIAMETER SETTING
The tool is automatically positioned over the laser beam.

The two following example programs can then be executed.

Examples
1. G65 P9862 (tool length setting).
2. G65 P9862 B3. D31. (tool length and diameter setting).

ROTATING DIAMETER SETTING

BROKEN TOOL DETECTION

PLUNGE CHECK

RADIAL CHECK

When running the following cycle after machining, the tool is automatically positioned over the laser beam. It is then plunged into the beam to check its overall length. With the following example both long and short tool conditions can be checked to a tolerance of 0.5mm.
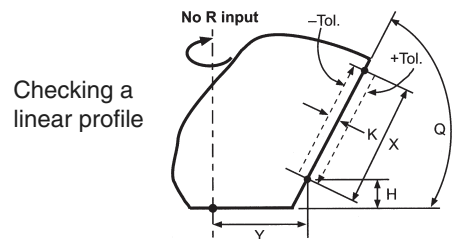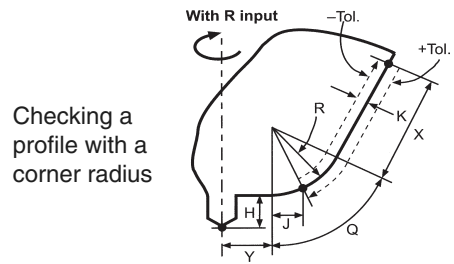
Example
G65 P9863 H-0.5
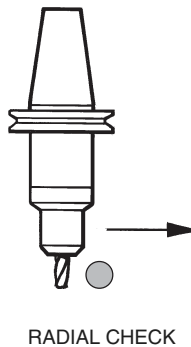
When running this cycle, the tool should first be moved to a safe, clear position in the Z, X and Y axis. The cycle will position the tool in the Z axis on one side of a beam and check its length by a rapid move radially through the beam. It can only check a short tool condition.

Example
G65 P9864

CUTTER RADIUS AND LINEAR PROFILE CHECKING

Checking a profile with a corner radius

Checking a linear profile

This cycle is used to check the profile of ballnose cutters, cutters with corner radii, and cutters with linear profiles.
The profile is checked to find out if it is within a specified form tolerance.

Example
G65 P9865 B3. H0 J0.5 Q90. R5. X10.