

TS34 - tool setting probe



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Before you begin

Warranty

Unless you and Renishaw have agreed and signed a separate written agreement, the equipment and/or software are sold subject to the Renishaw Standard Terms and Conditions supplied with such equipment and/or software, or available on request from your local Renishaw office.

Renishaw warrants its equipment and software for a limited period (as set out in the Standard Terms and Conditions), provided that they are installed and used exactly as defined in associated Renishaw documentation. You should consult these Standard Terms and Conditions to find out the full details of your warranty.

Equipment and/or software purchased by you from a third-party supplier is subject to separate terms and conditions supplied with such equipment and/or software. You should contact your third-party supplier for details.

CNC machines

CNC machine tools must always be operated by fully-trained personnel in accordance with the manufacturer's instructions.

Care of the probe

Keep system components clean and treat the probe as a precision tool.

Patents

None applicable.

Intended use

The TS34 tool setting probe is an on-machine compact 3D tool setter with hard-wired signal transmission used for broken tool detection and rapid measurement of tool length and diameter on a wide range of tools.

Safety

Information to the user

In all applications involving the use of machine tools, eye protection is recommended.

The TS34 tool setting probe must be installed by a competent person, observing relevant safety precautions. Before starting work, ensure that the machine tool is in a safe condition with the power switched OFF and the power supply to the HSI is disconnected.

Refer to the machine supplier's operating instructions.

Information to the machine supplier / installer

It is the machine supplier's responsibility to ensure that the user is made aware of any hazards involved in operation, including those mentioned in Renishaw product literature, and to ensure that adequate guards and safety interlocks are provided.

If the probe system fails, the output signal may falsely indicate a probe seated condition. Do not rely on probe signals to halt the movement of the machine.

Information to the equipment installer

All Renishaw equipment is designed to comply with the relevant UK, EU and FCC regulatory requirements. It is the responsibility of the equipment installer to ensure that the following guidelines are adhered to, in order for the product to function in accordance with these regulations:

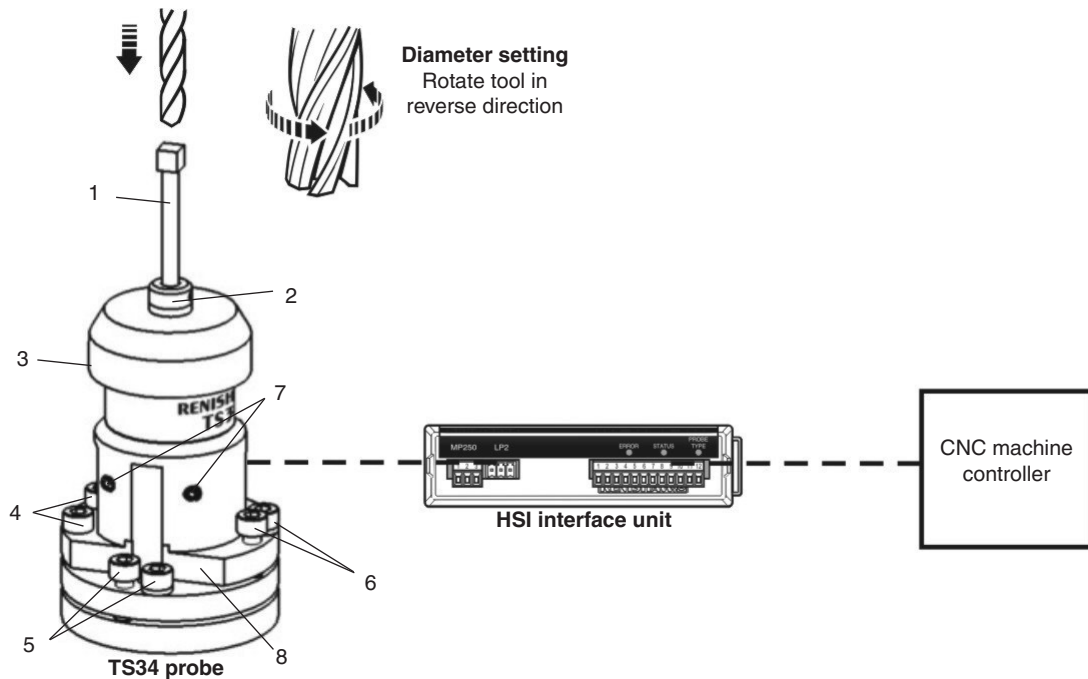
- any interface MUST be installed in a position away from any potential sources of electrical noise (for example, power transformers, servo drives);
- all 0 V/ground connections should be connected to the machine "star point" (the "star point" is a single point return for all equipment ground and screen cables). This is very important and failure to adhere to this can cause a potential difference between grounds;
- all screens must be connected as outlined in the user instructions;
- cables must not be routed alongside high current sources (for example, motor power supply cables), or be near high-speed data lines;
- cable lengths should always be kept to a minimum.

Equipment operation

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

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TS34 tool setting probe basics



- | | |
|-----------------------------------|--|
| 1. Stylus | 5. Stylus level alignment – adjusting screws |
| 2. Stylus holder for square styli | 6. Stylus level alignment – adjusting screws |
| 3. Swarf deflector | 7. Rotational axis adjustment – adjusting screws |
| 4. Probes base holding screws | 8. Plinth |

Introduction

The TS34 tool setting probe is used for tool setting on CNC machining centres and its cable is available as a rear or side exit version.

For tool length measurements and broken tool detection, the tool is driven against the probes stylus in the Z axis. Rotating tools can be set in X and Y axes for tool radius offsets.

Screw adjusters allow the stylus to be aligned with the machine's axes.

Interface unit

An interface unit processes signals between the probe and the CNC controller. .

Operation

Achievable set-up tolerances

The tolerances to which tools can be set depend upon the flatness and parallelism of the stylus tip setting. A value of 5 µm (0.0002 in) front to back and side to side is easily achievable over the flat portion of the stylus tip, and 5 µm (0.0002 in) parallelism is easily achievable with the axes of a square tip stylus. This setting accuracy is sufficient for the majority of tool setting applications.

Recommended rotating tool feedrates

Cutters should be rotated in reverse to the cutting direction.

First touch – machine spindle rev/min

Rev/min for the first move against the probe stylus is calculated from a surface cutting speed of 60 m/min (197 ft/min).

Spindle speed should be maintained within the range 150 rev/min to 800 rev/min and relates to cutters of Ø24 mm to Ø127 mm (Ø0.95 in to Ø5.0 in).

The surface cutting speed is not maintained if cutters smaller than Ø24 mm (Ø0.95) or larger than Ø127 mm (Ø5.0 in) are used.

First touch – machine feedrate

The feedrate (F) is calculated as follows:

$$F = 0.16 \times \text{rev/min} \quad F \text{ units mm/min (diameter set)}$$

$$F = 0.12 \times \text{rev/min} \quad F \text{ units mm/min (length set)}$$

Second touch – machine feedrate

800 rev/min, 4 mm/min (0.16 in/min) feedrate.

Software routines

Software routines for tool setting are available from Renishaw for various machine controllers, see the *Probe software for machine tools – programs and features* data sheet (Renishaw part no. H-2000-2298).

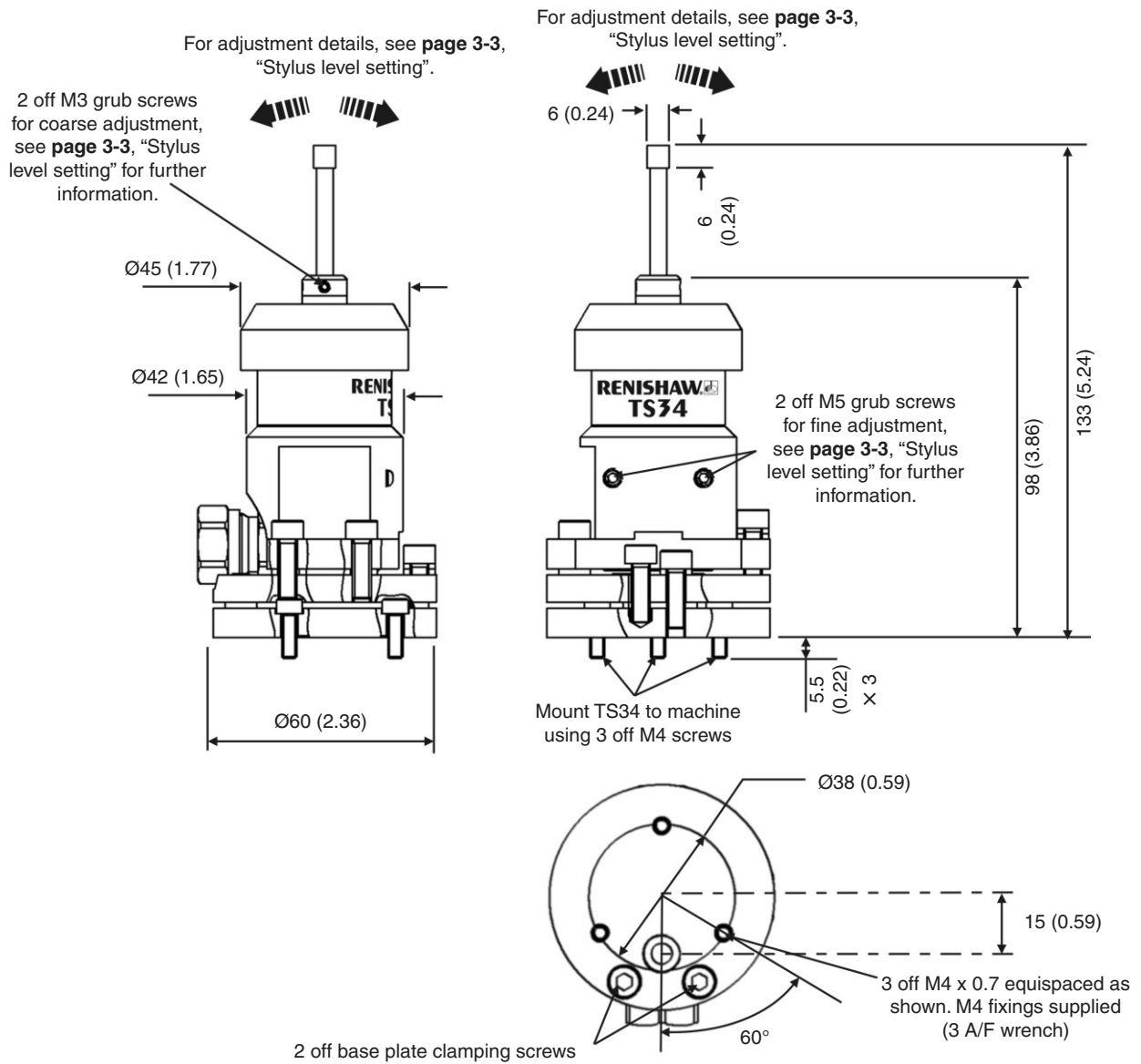
Specification

Principal application	Tool measuring and broken tool detection on all sizes of vertical and horizontal machining centres.	
Transmission type	Hard-wired transmission	
Compatible interface	MI8-4, HSI or HSI-C	
Recommended styli	Square tip stylus (tungsten carbide, 75 Rockwell C)	
Weight with stylus	660 g (23.28 oz)	
Cable	TS34R Cable length: 5.0 m (16.4 ft) long. Cable specification: Ø5.2 mm (0.20 in), 2-core screened cable, each core 72 × 0.08 mm	TS34S Cable length: 5.0 m (16.4 ft) long. Cable specification: Ø4.4 mm (0.17 in), 4-core screened cable, each core 7 × 0.2 mm
Sense directions	±X, ±Y, +Z	
Unidirectional repeatability	1.00 µm (40 µin) 2σ ¹	
Stylus trigger force ^{2 3}		
XY low force	0.65 N, 66 gf (2.34 ozf)	
XY high force	1.42 N, 145 gf (5.11 ozf)	
+Z direction	5.50 N, 561 gf (19.78 ozf)	
Stylus overtravel limits		
XY	±9°	
+Z direction	4.0 mm (0.16 in)	
Environment	IPX8, BS EN 60529:1992+A2:2013	
	-10 °C to +70 °C (+14 °F to +158 °F)	
	+5 °C to +60 °C (+41 °F to +140 °F)	

- 1 Performance specification is tested at a standard test velocity of 480 mm/min (18.9 in/min) with a 35 mm stylus. Significantly higher velocity is possible depending on application requirements.
- 2 Trigger force, which is critical in some applications, is the force exerted on the component by the stylus when the probe triggers. The maximum force applied will occur after the trigger point (overtravel). The force value depends on related variables including measuring speed and machine deceleration. Trigger force is measured with a 50 mm (1.97 in) stylus.
- 3 These are the factory settings, manual adjustment is not possible.

NOTE: For stylus recommendations, refer to the *Styli and accessories* technical specifications (Renishaw part no. H-1000-3200).

Dimensions



System installation

Cable

TS34R: 2-core 72/0.08 mm polyurethane insulated and screened cable 5.0 m (16.4 ft) long.
Cable diameter 5.2 mm (0.20 in). Probe circuit – red and blue cores.

TS34S: 4-core 7/0.2 mm polyurethane insulated and screened cable 5.0 m (16.4 ft) long.
Cable diameter 4.4 mm (0.17 in). Probe circuit – red and blue cores (yellow and green not used).

Extension cable: (15 m [49.2 ft] maximum extension)

Maximum permitted cable length: Probe to interface – 19.5 m (64 ft) long

2-core 7/0.2 mm polyurethane insulated and screened cable. Maintain the screen through the joins.

Conduit for cable protection

Renishaw recommends that Thomas and Betts type EF conduit, or a suitable alternative, is fitted to all installations. The TS34 conduit adaptor accepts Ø11 mm (0.43 in) flexible conduit (flexible conduit available from side exit version only).

NOTE: The cable screen is connected to the machine via a 100 nF capacitor inside the TS34 to prevent possible earth loops. Ensure the cable screen is connected to the appropriate input on the interface.

Interface

The TS34 tool setting probe uses the HSI interface, see the *HSI hard-wired system interface* installation guide (Renishaw part no. H-5500-8554).

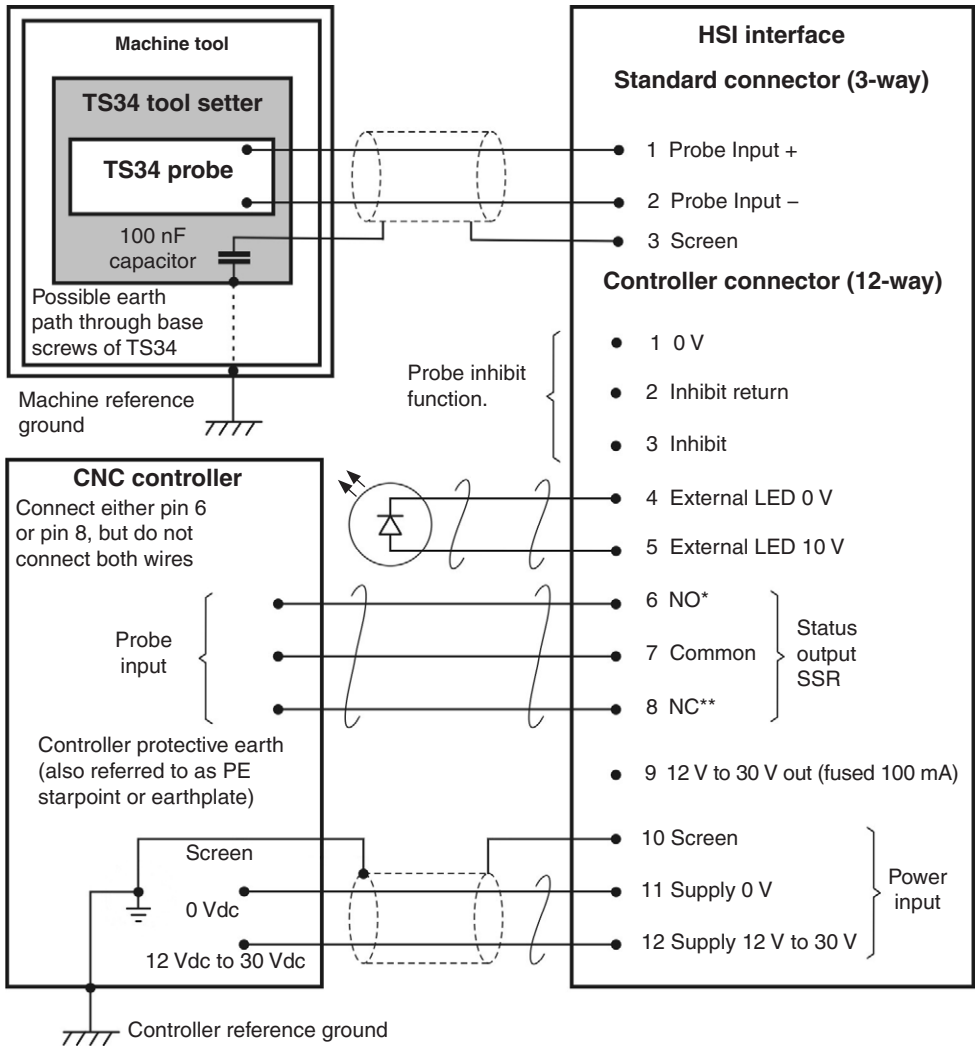
The HSI is a hard-wired transmission interface which converts inspection probe signals into voltage-free solid state relay (SSR) outputs for transmission to the CNC machine controller. The maximum SSR output operating current is 50 mA.

Typically, installed within the CNC machine controller's cabinet, and located away from sources of interference such as transformers and motor controls, the HSI can draw its power from the machine's nominal 12 Vdc to 30 Vdc supply.

The HSI has a maximum input voltage range of 11 Vdc to 30 Vdc. The supply is protected by a 140 mA self-resetting fuse. To reset the fuse, remove the power then identify and rectify the cause of the fault.

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

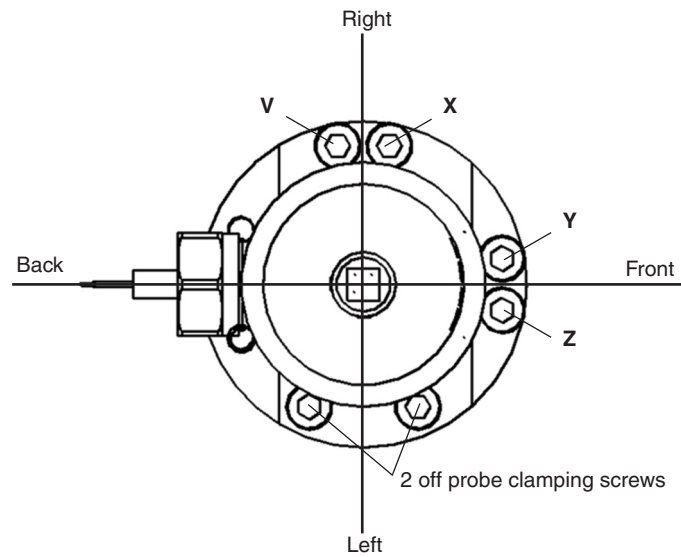
Recommended connection diagram for TS34 with HSI interface



NOTE: When connecting the TS34 probe to the HSI interface, use the connection labelled STANDARD PROBE.

Probe status	*Normally open (NO)	**Normally closed (NC)
Probe triggered	Closed	Open
Probe seated	Open	Closed

Stylus level setting



The top surface of the stylus must be set level, front to back and right to left.

The front to back stylus level is obtained by adjusting jacking screw **Z**, which causes the probe cable end to rise or lower, changing the stylus level setting. When a level stylus surface is obtained, tighten screw **Y** to 4 Nm (2.95 lbf. ft).

CAUTION: Do not tighten screw **Z**.

Left to right level is obtained by adjusting jacking screw **X**, which causes the probe module to rise or lower from left to right and change the stylus level setting. When a level stylus surface is obtained, tighten screw **V** to 4 Nm (2.95 lbf. ft).

CAUTION: Do not tighten screw **X**.

Coarse adjustment of the stylus is provided by using the 2 off M3 grub screws and fine adjustment of the stylus is provided by using the 2 off M5 grub screws, see **page 2-4**.

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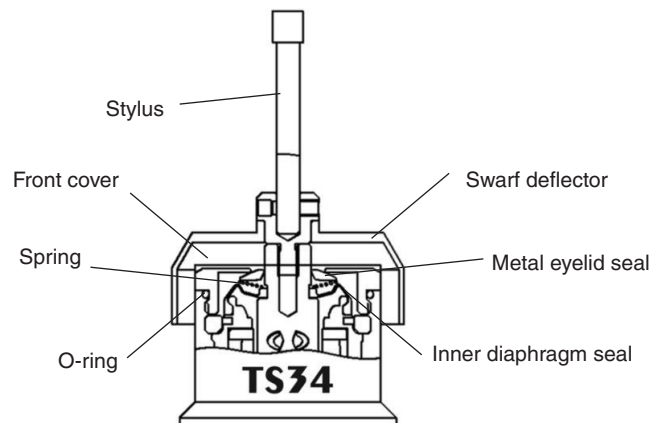
Service and maintenance

Service

You may undertake the maintenance routines described in this handbook.

Further dismantling and repair of Renishaw equipment is a highly specialised operation, which must be carried out at authorised Renishaw Service Centres.

Equipment requiring repair, overhaul or attention under warranty should be returned to your supplier.



Maintenance

CAUTIONS:

The probe is a precision tool and must be handled with care.

Ensure the probe is firmly secured to its mounting.

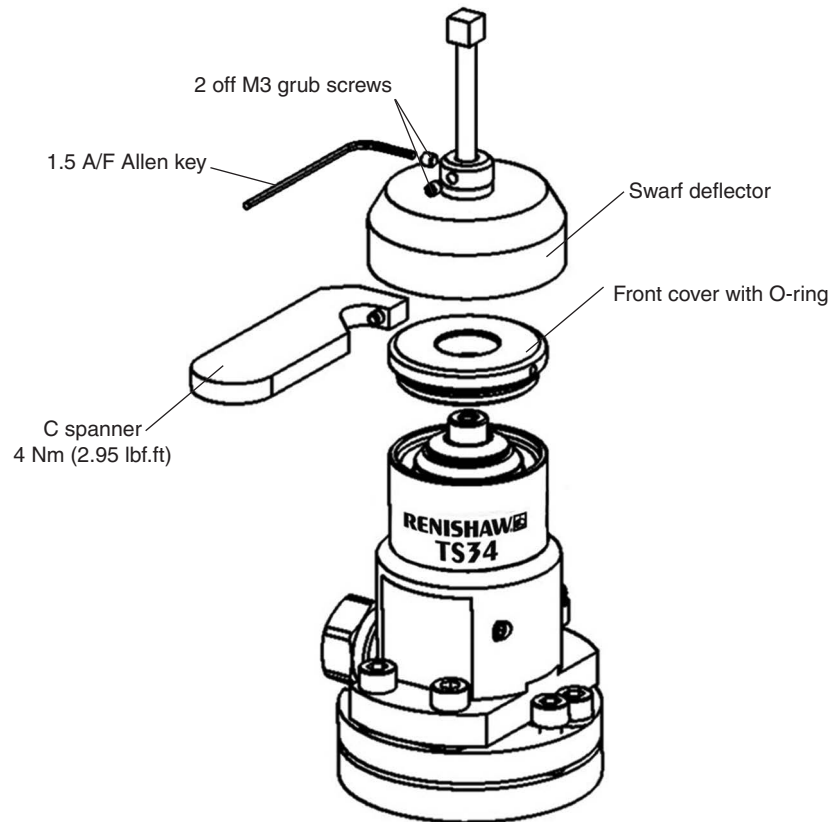
The probe requires minimal maintenance as it is designed to operate as a permanent fixture on CNC machining centres, where it is subject to a hot chip and coolant environment.

1. Do not allow excessive waste material to build up around the probe.
2. Keep all electrical connections clean.
3. The probe mechanism is protected by an outer metal eyelid seal and an inner flexible diaphragm seal.

Approximately once a month, inspect the probe inner diaphragm seal. If it is pierced or damaged, return the probe to your supplier for repair.

The service interval may be extended or reduced depending on experience.

Diaphragm maintenance



1. Remove the stylus.
2. Remove the swarf deflector.
3. Use a C spanner to remove the probe's front cover. This will expose the metal eyelid seal and the diaphragm seal. Remove the metal eyelid and spring.
inner

CAUTION: These may fall out.

4. Wash inside the probe, using clean coolant.

CAUTION: Do not use sharp metal objects to clean out debris.

5. Inspect the diaphragm seal for signs of piercing or damage. In the event of damage return the probe to your supplier for repair as coolant entering the probe mechanism could cause the probe to fail.
6. Refit the spring and metal eyelid (the springs widest diameter is against the metal eyelid).
7. Refit the remaining components.

Parts list

Item	Part number	Description
TS34 rear exit kit	A-2197-2100	TS34 R/E assembly, PS1-14 square tip stylus, spanner assembly and tool kit.
TS34 side exit kit	A-2197-3000	TS34 S/E assembly, PS1-14 square tip stylus, spanner assembly and tool kit.
PS1-13 stylus	A-5000-3212	6 × 6 × 6 tungsten carbide tip stylus 53 mm long.
PS1-14 stylus	A-5000-6701	6 × 6 × 6 tungsten carbide tip stylus 43 mm long.
Grub screw	P-SC03-0303	M3 × 3 hexagonal screw socket for securing stylus.
Plinth spacer	M-5401-0122	TS34 plinth spacer.
HSI interface	A-5500-1000	HSI probe system interface with DIN rail mounting and three terminal blocks, product support card and packaging.
C spanner	A-2008-0332	C spanner for removing the probes front cover.
Publications. These can be downloaded from our website at www.renishaw.com .		
TS34	H-2197-8500	Installation guide: for set-up of the TS34 tool setting probe system.
HSI	H-5500-8554	Installation guide: for set-up of the HSI interface unit.
Styli	H-1000-3200	Technical specifications: Styli and accessories – or visit our Online store at www.renishaw.com/shop .
Probe software	H-2000-2298	Data sheet: Probe software for machine tools – programs and features.

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