Installation guide
H-5646-8504-02-B

RENISHAW
apply innovation™

RTS radio tool setter

Renishaw part no: H-5646-8504-02-B

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August 2014

Contents

Before you begin

Before you begin

Disclaimer

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Trade marks

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All other brand names and product names used in this document are trade names, trade marks, or registered trade marks of their respective owners.

Warranty

Equipment requiring attention under warranty must be returned to your equipment supplier.

Unless otherwise specifically agreed in writing between you and Renishaw, if you purchased the equipment from a Renishaw company, the warranty provisions contained in Renishaw's CONDITIONS OF SALE apply. You should consult these conditions in order to find out the details of your warranty, but in summary the main exclusions from the warranty are if the equipment has been:

- neglected, mishandled or inappropriately used; or
- modified or altered in any way except with the prior written agreement of Renishaw.

If you purchased the equipment from any other supplier, you should contact them to find out what repairs are covered by their warranty.

Changes to equipment

Renishaw reserves the right to change equipment specifications without notice.

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

Features of the RTS probe, and other similar Renishaw probes, are the subject of one or more of the following patents and/or patent applications:

CN 100466003
CN 101287958
CN 101482402
EP 0695926
EP 0967455
EP 1373995
EP 1425550
EP 1457786
EP 1576560
EP 1701234
EP 1734426
EP 1804020
EP 1931936
EP 1988439
EP 2216761
IN 215787
JP 4237051
JP 4398011
JP 4575781
JP 4773677
JP 4851488
JP 5238749
JP 5390719
KR 1001244
TW I333052
US 2011/0002361
US 5669151
US 6275053
US 6941671
US 7145468
US 7285935
US 7486195
US 7665219
US 7812736
US 7821420

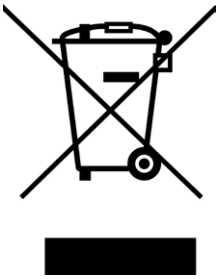
EC declaration of conformity

CE

Renishaw plc hereby declares that the RTS is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Contact Renishaw plc or visit www.renishaw.com/rts for the full EC declaration of conformity.

WEEE directive



The use of this symbol on Renishaw products and/or accompanying documentation indicates that the product should not be mixed with general household waste upon disposal. It is the responsibility of the end user to dispose of this product at a designated collection point for waste electrical and electronic equipment (WEEE) to enable reuse or recycling. Correct disposal of this product will help to save valuable resources and prevent potential negative effects on the environment. For more information, please contact your local waste disposal service or Renishaw distributor.

FCC information to user (USA only)

47 CFR Section 15.19

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

47 CFR Section 15.21

The user is cautioned that any changes or modifications not expressly approved by Renishaw plc or authorised representative could void the user's authority to operate the equipment.

Radio approval

Radio equipment – Canadian warning statements

English

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Français

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.

Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Radio approvals

Argentina: CNC ID: C-13042

Brazil: 1762-13-2812

ANATEL
1762-13-2812
(01)07898914243100

“Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.”

Canada: IC: 3928A-RTS

China: CMIIT ID: 2012DJ3541

Europe: CE

Japan: 205-120126

Singapore: Reg. No: N2288-12

Complies with IDA Standards DA104328

South Africa: TA-2013/1221

ICASA TA-2013/1221 APPROVED

South Korea: KCC-CRM-R1P-RTS

Taiwan: CCAB13LP3030T2

附件一

低功率電波輻射性電機管理辦法

第十二條

經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條

低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信法規定作業之無線電通信。

低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

USA: FCC ID: KQGRTS

Australia Iceland India Indonesia Israel Liechtenstein Malaysia Montenegro New Zealand Norway Russia Switzerland The Philippines Turkey Vietnam

Safety

Information to the user

The RTS is supplied with two non-rechargeable AA alkaline batteries. Lithium Thionyl Chloride non-rechargable AA batteries may also be used in the RMP60 (See 'Changing the batteries' in Section 5, "Maintenance"). Lithium batteries must be approved to IEC 62133. Once the charge in the batteries is depleted, do not attempt to recharge them.

The use of this symbol on the batteries and/or accompanying packaging indicates that the batteries should not be mixed with general household waste upon disposal. It is the responsibility of the end user to dispose of the batteries at a designated collection point to enable recycling. Correct disposal of the batteries will prevent negative effects on the environment. For more information, please contact your local waste disposal service.

Please ensure replacement batteries are of the correct type and are fitted in accordance with the instructions in this manual (see Section 5, "Maintenance"), and as indicated on the product. For specific battery operating, safety and disposal guidelines, please refer to the battery manufacturers' literature.

- Ensure that all batteries are inserted with the correct polarity.
- Do not store batteries in direct sunlight or rain.
- Do not heat or dispose of batteries in a fire.
- Avoid forced discharge of the batteries.
- Do not short-circuit the batteries.
- Do not disassemble, pierce, deform or apply excessive pressure to the batteries.
- Do not swallow the batteries.
- Keep the batteries out of the reach of children.
- Do not get batteries wet.

If a battery is damaged, exercise caution when handling it.

Please ensure that you comply with international and national battery transport regulations when transporting batteries or the products.

Lithium batteries are classified as dangerous goods and strict controls apply to their shipment by air. To reduce the risk of shipment delays, if you need to return the products to Renishaw for any reason, do not return any batteries.

The RTS has a glass window. Handle with care if broken to avoid injury.

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.

Under certain circumstances, the probe 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 EC 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, i.e. power transformers, servo drives etc;
- 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, i.e. motor power supply cables etc, 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.

RTS basics

Introduction

The RTS is a tool setter with radio transmission suitable for use on small to large machining centres, or where line-of-sight between probe and receiver is difficult to achieve.

The RTS forms part of Renishaw's family of new generation radio transmission probes. It has been designed to comply with worldwide standards and operates in the 2.4 GHz band. It delivers interference-free transmission through the use of FHSS (Frequency Hopping Spread Spectrum). This allows many systems to operate in the same machine shop without risk of cross-interference.

All RTS settings are configured using Trigger Logic™. This technique enables the user to review and subsequently change probe settings by deflecting the stylus whilst observing the LED indication.

Getting started

A multicolour LED provides visual indication of selected probe states:

- trigger filter setting;
- hibernation setting;
- tool setter status – triggered or seated;
- battery condition.

Batteries are inserted or removed as shown (see "Installing the batteries" in Section 5, "Maintenance" for further information).

On insertion of the batteries, the LED will begin to flash (see "Reviewing the probe settings" in Section 4, "Trigger Logic™" for further information).

System interface

The RTS is optimised for use with the RMI-Q. The RMI-Q is a combined antenna, interface and receiver unit used to communicate between the RTS and the machine controller.

NOTE: The RTS is not compatible for use with the RMI.

Trigger Logic™

All RTS settings are configured using the Trigger Logic technique.

Trigger Logic (see Section 4, "Trigger Logic™") is a method that allows the user to view and select all available mode settings in order to customise a probe to suit a specific application. Trigger Logic is activated by battery insertion and uses a sequence of stylus deflections (triggering) to systematically lead the user through the available choices to allow selection of the required mode options.

Current probe settings can be reviewed by simply removing the batteries for a minimum of 5 seconds, and then replacing them to activate the Trigger Logic review sequence.

Probe modes

The RTS can be in one of three modes:

Standby mode – Probe is waiting for a switch-on signal.

NOTE: The RTS will enter hibernation mode should the system interface be powered off or out of range for a period of 30 seconds. This is a configurable setting.

Operational mode – When activated by one of the switch-on methods, the probe is switched on and ready for use.

Configuration mode – Ready to change the probe settings using Trigger Logic™.

Configurable settings

Enhanced trigger filter

Probes subjected to high levels of vibration or shock loads may trigger without having been touched. The enhanced trigger filter improves the probe's resistance to these effects.

When the filter is enabled, a constant nominal 6.7 ms delay is introduced to the probe output.

It may be necessary to reduce the approach speed to allow for the increased stylus overtravel during the extended time delay.

The RTS is factory set to "Enhanced trigger filter off". It is always necessary to calibrate the probe when the enhanced trigger filter is changed.

Acquisition mode

System set-up is achieved using Trigger Logic and powering on the RMI-Q.

Partnering is only required during initial system set-up. Further partnering is only required if the RTS or RMI-Q is changed.

NOTES:

Systems using the RMI-Q can be partnered with up to four RTS's manually. Alternatively this can be achieved by using ReniKey; a Renishaw machine macro cycle which does not require the RMI-Q to be power cycled.

For more information or to download Renikey free of charge visit:
www.renishaw.com/mtpsupport/renikey.

Partnering will not be lost by reconfiguration of probe settings or when changing batteries.

Partnering can take place anywhere within the operating envelope.

Hibernation mode

When the RTS is in standby and the RMI-Q is powered off or out of range, the probe enters hibernation; a low power mode designed to save battery life. The probe 'wakes' from hibernation to periodically check for its partnered RMI-Q. Factory set to 30 seconds.

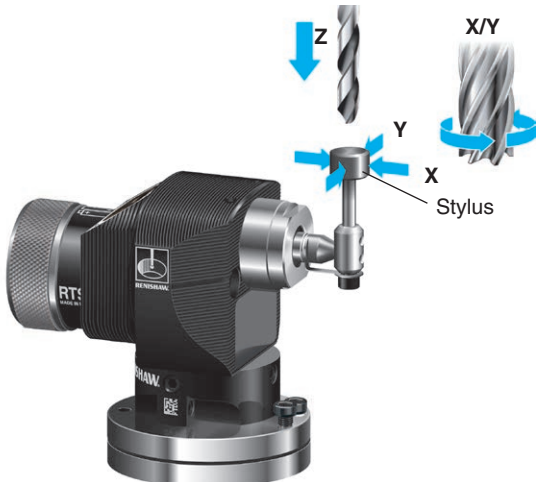
Switch-on time (configured by RMI-Q)

When the RTS is used with an RMI-Q, the turn-on time can be configured (in the RMI-Q) to either 'fast' or 'standard'. For best battery life, select 'standard' turn-on time.

A timer automatically switches the probe off 90 minutes after the last probe status change if not turned off by an M-code.

NOTE: After being switched on, the RTS must be on for 1.0 second minimum before being switched off.

Operation



Rotate tool in reverse direction for diameter setting

The tool is driven in the machine Z axis for tool length measurements and broken tool detection.

Rotating tools are set in the machine's X and Y axes for tool radius offsets.

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

Software routines

Software routines for tool setting are available from Renishaw for various machine controllers and are described in data sheet H-2000-2289.

In addition, data sheet H-2000-2298 lists available Renishaw software programs. Both data sheets can be downloaded from www.renishaw.com/mtp.

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 the opposite direction to the cutting direction. Renishaw tool setting software calculates speeds and feeds automatically using the following information.

First touch – machine spindle rev/min

Rev/min for the first move against the probe stylus:

Diameters below 24 mm, 800 rev/min is used.

Diameters from 24 mm to 127 mm, rev/min is calculated using a surface speed of 60 m/min (197 ft/min).

Diameters above 127 mm, 150 rev/min is used.

First touch – machine feedrate

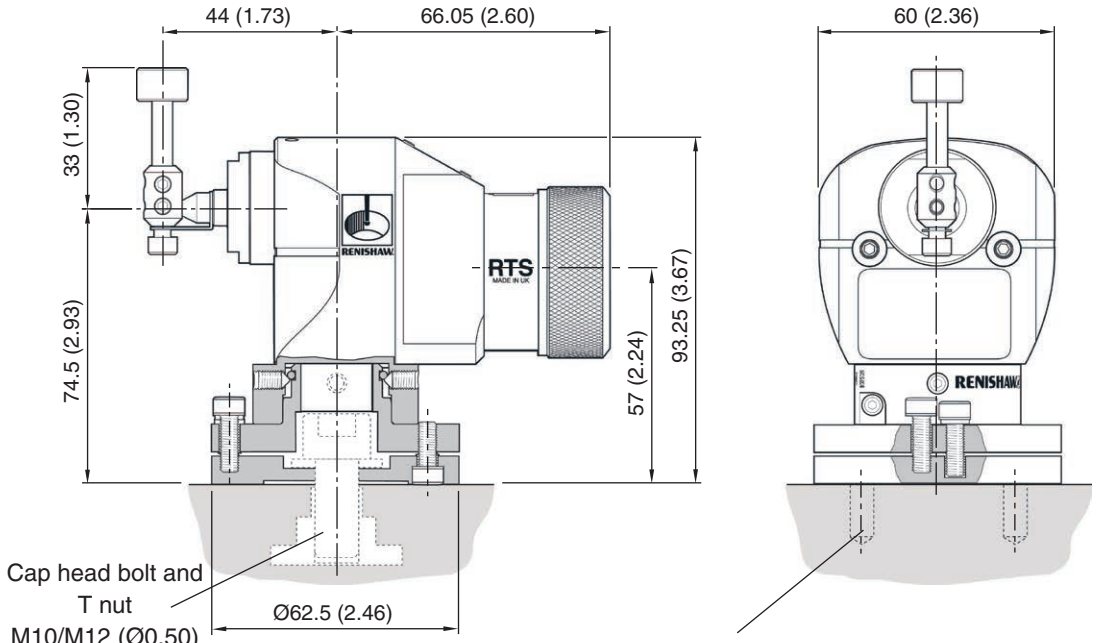
The feedrate (f) is calculated as follows:

f = 0.16 × rev/min f units mm/min (diameter set)
f = 0.12 × rev/min f units mm/min (length set)

Second touch – machine feedrate

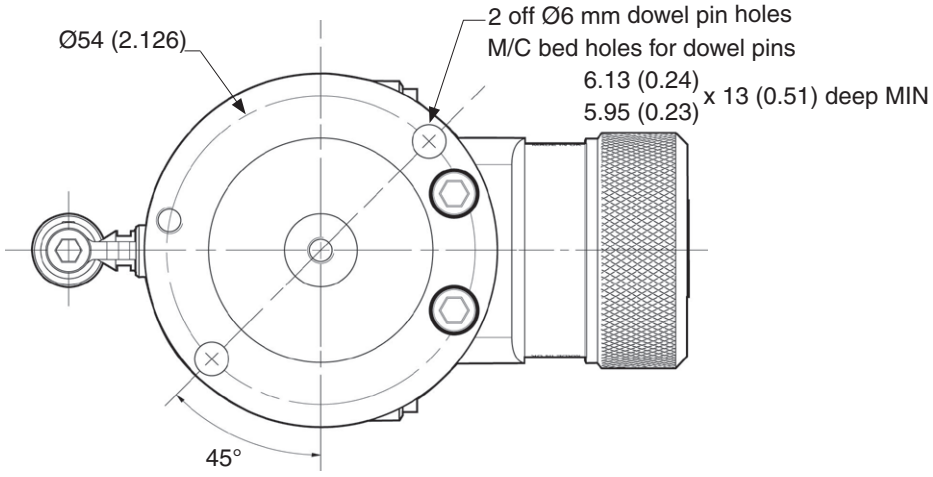
800 rev/min, 4 mm/min (0.16 in/min) feedrate.

RTS dimensions



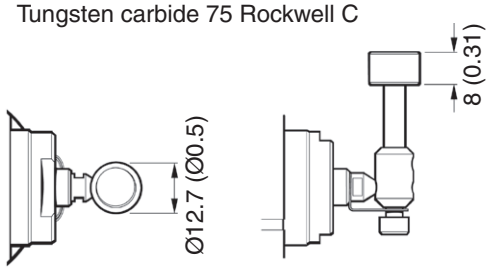
Dimensions given in mm (in)

Machining details for dowel pins

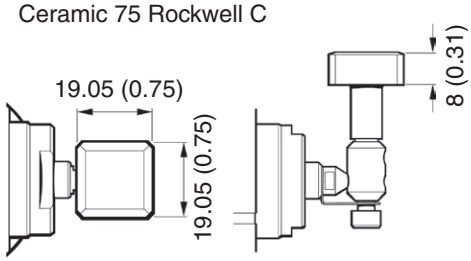


RTS dimensions (continued)

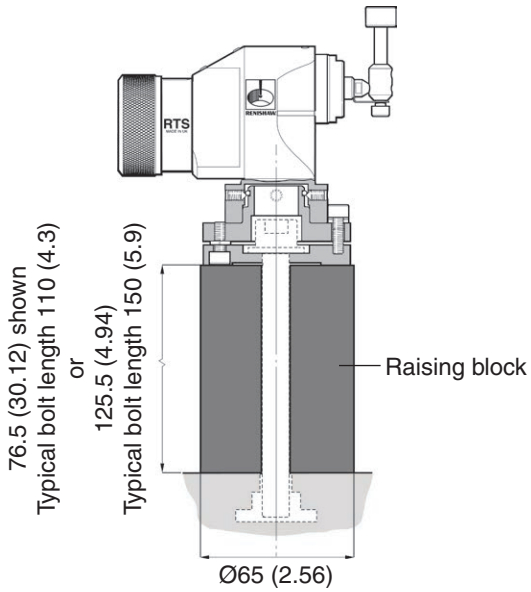
Disc stylus
Ø12.7 mm × 8 mm (Ø0.5 in × 0.31 in)
Tungsten carbide 75 Rockwell C



Square stylus
19.05 mm x 19.05 mm (0.75 in x 0.75 in)
Ceramic 75 Rockwell C

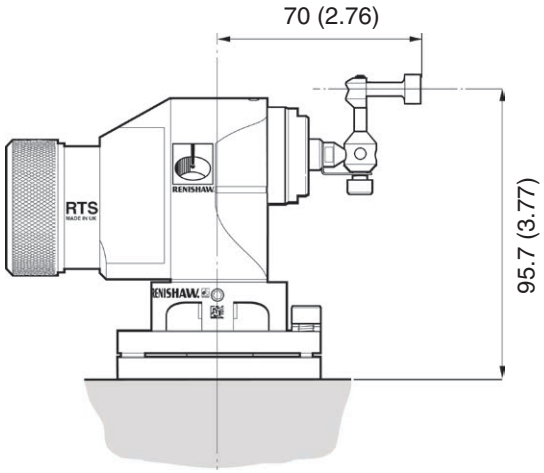


Raising block



Cranked horizontal stylus adaptor kit

Disc and square stylus



RTS specification

Principal application	Tool measuring and broken tool detection on vertical and horizontal machining centres and gantry machining centres.	
Overall dimensions	Length with disc stylus	116.40 mm (4.58 in)
	Length with square stylus	119.58 mm (4.71 in)
	Width	62.50 mm (2.46 in)
	Height with disc and square stylus	107.50 mm (4.23 in)
Weight (with disc stylus)	With batteries Without batteries	870 g (30.69 oz) 820 g (28.92 oz)
Transmission type	Frequency hopping spread spectrum (FHSS) radio Radio frequency 2400 MHz to 2483.5 MHz	
Switch-on methods	Radio M-code	
Switch-off methods	Radio M-code	
Operating range	Up to 15 m (49.2 ft)	
Receiver/interface	RMI-Q combined antenna, interface and receiver unit	
Sense directions	±X, ±Y, +Z	
Mounting	M12 (1/2 in) T bolt (not supplied) Optional Spirol pins to allow accurate remounting	
Unidirectional repeatability	1.0 µm (40 µin) 2σ (see note 1)	
Stylus trigger force (see notes 2 and 3)	1.3 N to 2.4 N/133 gf to 245 gf (4.7 ozf to 8.6 ozf) depending on the sense direction	
Stylus overtravel	XY plane +Z plane	± 3.5 mm (0.14 in) 6 mm (0.24 in)
Environment	IP rating	IPX8 (EN/IEC 60529)
	Storage temperature	-25 °C to +70 °C (-13 °F to +158 °F)
	Operating temperature	+5 °C to +55 °C (+41 °F to +131 °F)
Battery types	2 × AA 1.5 V alkaline or 2 × AA 3.6 V Lithium Thionyl Chloride	
Battery reserve life	Approximately one week after a low battery warning is first given.	
Typical battery life	See table on page 2-7	
Low battery indication	Blue flashing LED in conjunction with normal red or green probe status LED	
Dead battery indication	Constant or flashing red	

Note 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.

Note 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.

Note 3 These are the factory settings, manual adjustment is not possible.

Typical battery life

Battery type	Turn-on time	Standby life	5% usage (72 minutes/day)	Continuous use
Alkaline	0.5 seconds	190 days maximum	150 days maximum	700 hours
	1 second	270 days maximum	195 days maximum	
Lithium Thionyl Chloride	0.5 seconds	420 days maximum	335 days maximum	1600 hours
	1 second	600 days maximum	430 days maximum	

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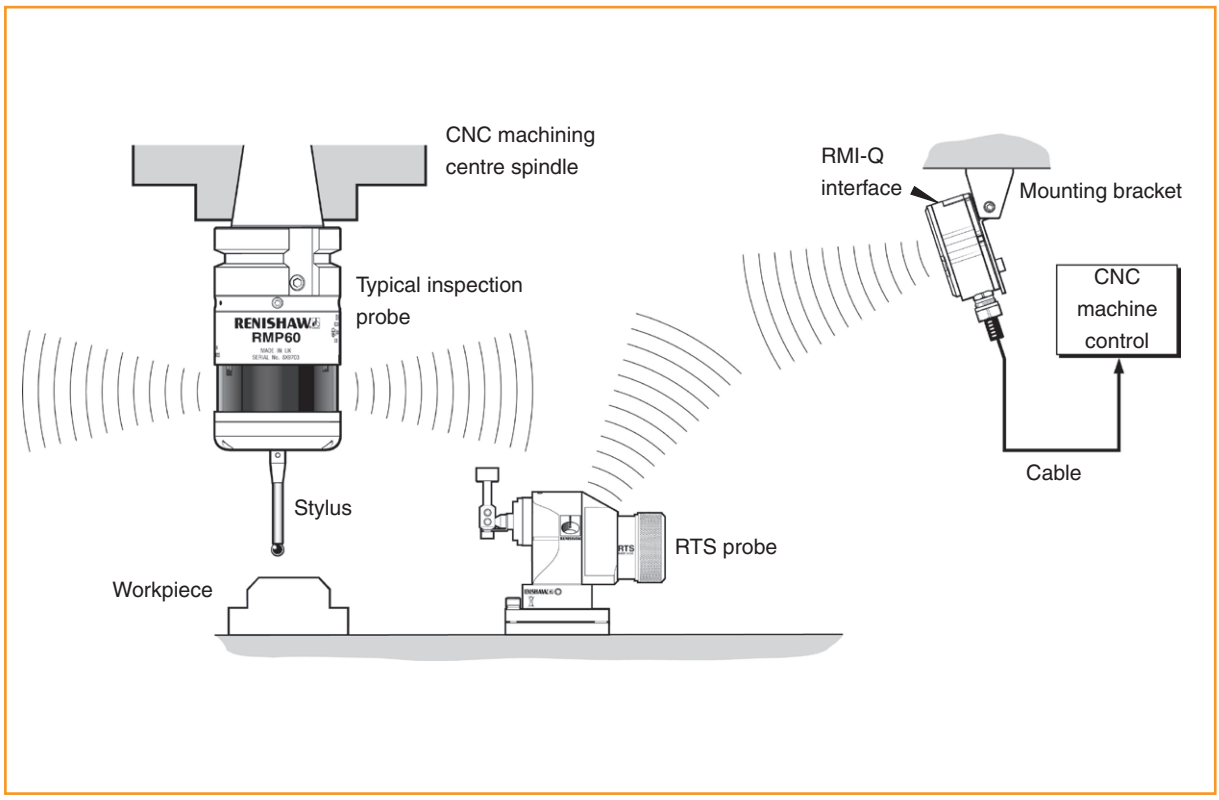
System installation

Installing the RTS with an RMI-Q



Operating envelope

Radio transmission does not require line-of-sight between the probe and transmitter and will pass through very small gaps and machine tool windows. This allows easy installation, either inside or outside the machine enclosure, as long as the probe and transmitter are kept within the performance envelope and the RMI-Q signal LED remains on at all times.

Coolant and swarf residue accumulating on the RTS and RMI-Q will have a detrimental effect on transmission performance. Wipe clean as often as is necessary to maintain unrestricted transmission.

When in operation, do not touch either the RMI-Q cover or the RTS glass window with your hand as this can also affect transmission performance.

Performance envelope when using the RTS with an RMI-Q

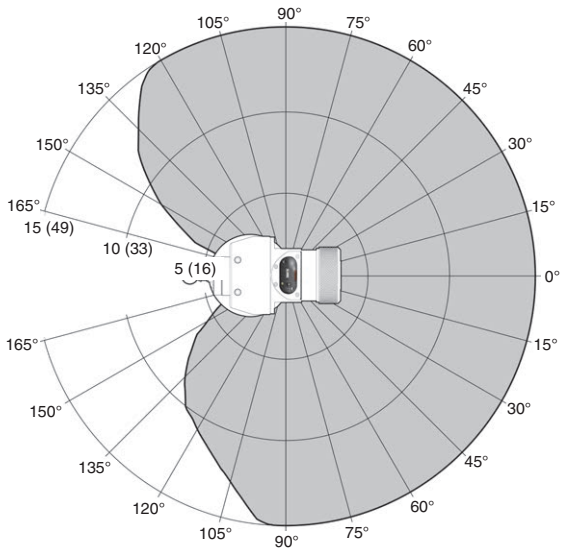
RTS – RMI-Q positioning

The probe system should be positioned so that the optimum range can be achieved over the full travel of the machine's axes. Always face the front cover of the RMI-Q in the general direction of the machining area, ensuring both are within the performance envelope shown below. To assist in finding the optimum position of the RMI-Q, the signal quality is displayed on an RMI-Q signal LED. Ensure that the signal LED indicates a green or yellow (good) communication strength when the RTS is operating (see following note regarding "Hibernation mode").

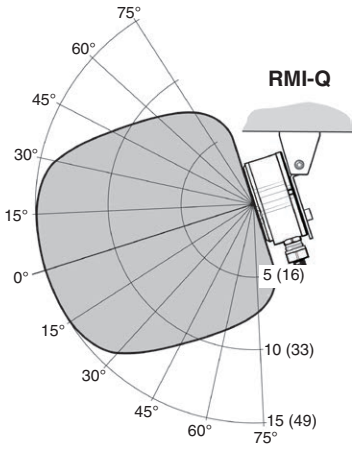
NOTE: RMI-Q installation with RTS.
RTS has a built-in hibernation mode (battery saving mode) that saves battery life when the RMI-Q is unpowered or out of range. The RTS goes into hibernation mode 30 seconds after the RMI-Q is unpowered (or the RTS is out of range). When in hibernation mode, the RTS checks for a powered RMI-Q every 30 seconds. If found, the RTS goes from hibernation mode to stand-by mode, ready for an M-code. If the RTS goes out of range, for example if the RTS is fitted to a pallet which is removed from the machine, once the RTS is back in range the system will automatically re-synchronise within 30 seconds (worst case). Allowance must be made within the machine controller program for this. Hibernation can be changed to 5 seconds or may be turned off using Trigger Logic™.

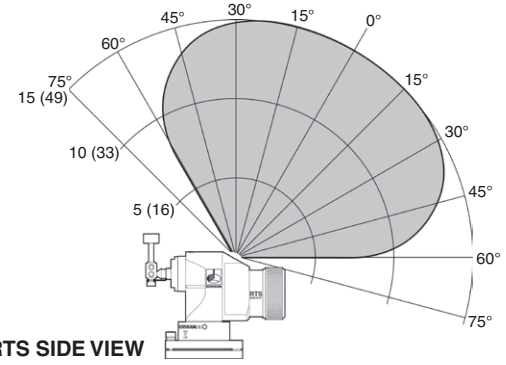
Performance envelope

The RTS and RMI-Q must be within each other's performance envelope as shown below. The performance envelope shows line-of-sight performance, however, radio transmission does not require this, providing a reflected path (of less than 15 m (49.2 ft)) is available.



RTS TOP VIEW





RTS SIDE VIEW

Typical plot at +20 °C (+68 °F)
Transmission range in m (ft)

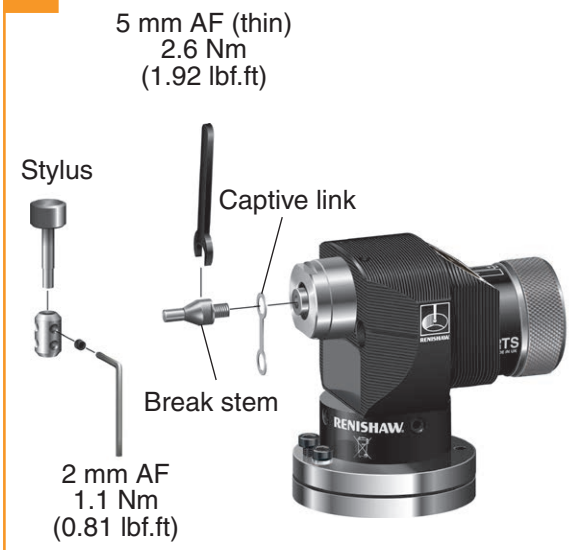
Operating and switch-on / switch-off

Range metres (feet)

Preparing the RTS for use

Fitting the stylus, break stem and captive link

1



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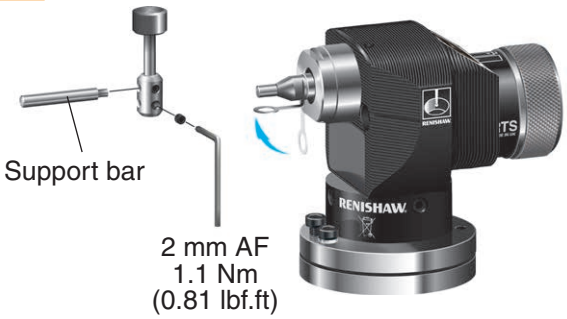


3

Stylus weak link break stem

A stylus weak link break stem is incorporated in the stylus mounting. This protects the probe mechanism from damage in the event of excessive stylus overtravel or a collision.

Captive link

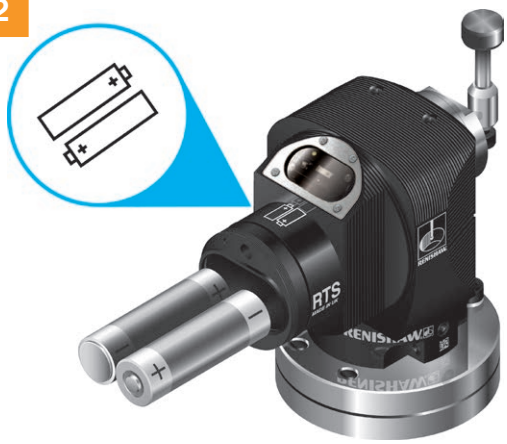
In the event of the break stem breaking, the captive link ties the stylus to the probe, which prevents the stylus falling into the machine.

NOTE: Always hold the support bar in position to counteract twisting forces and avoid over-stressing the stylus break stem.

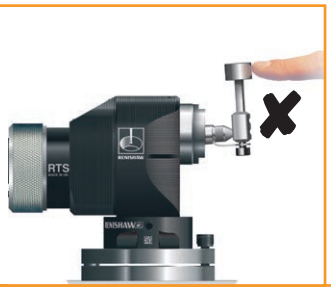
Installing the batteries

1

2



3



NOTES:

See Section 5, "Maintenance" for a list of suitable battery types.

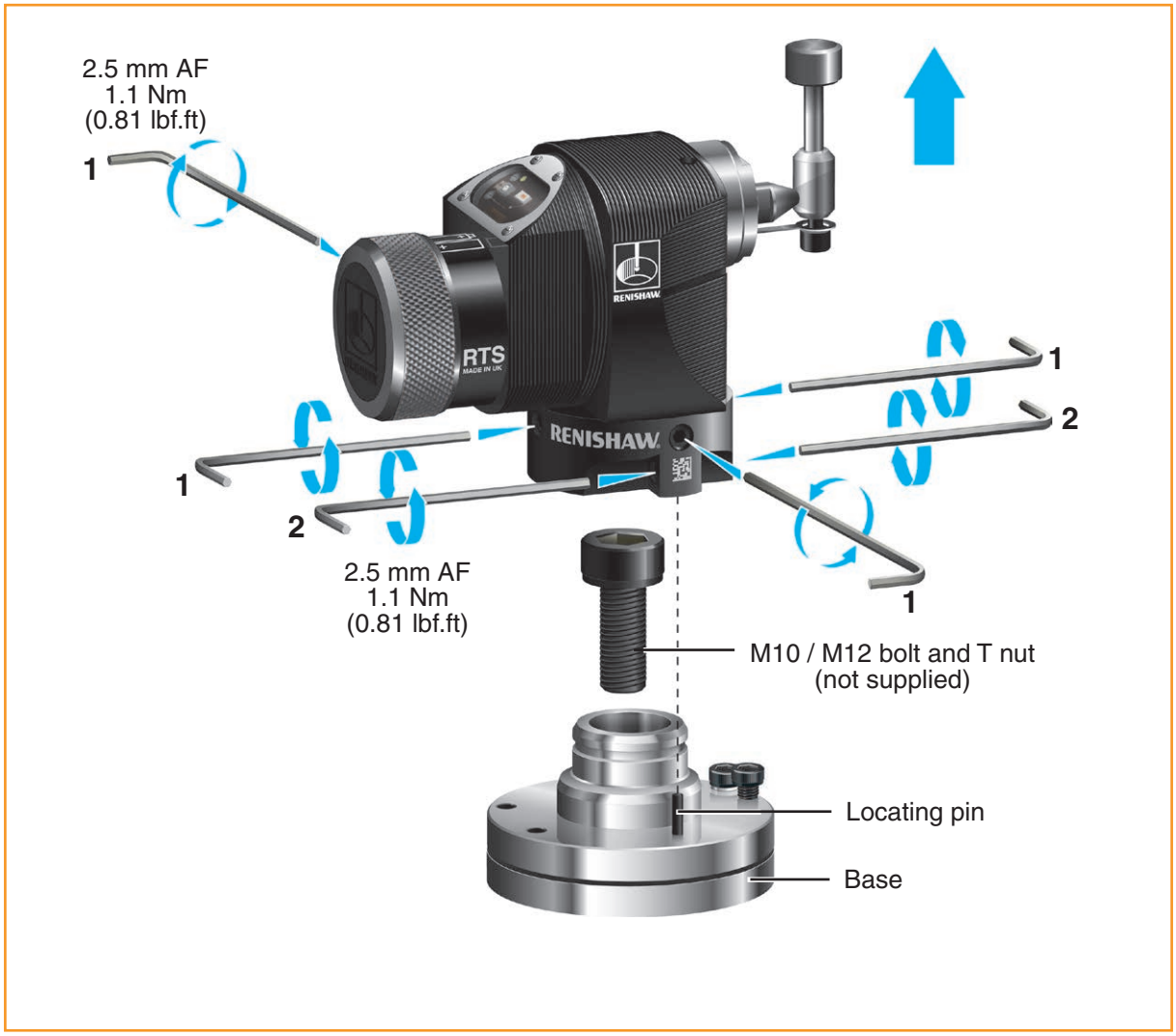
Ensure the product is clean and dry before inserting batteries.

Do not allow coolant or debris to enter the battery compartment.

When inserting batteries, check that the battery polarity is correct.

After inserting the batteries, the LED will display the current probe settings (for details, see Section 4, "Trigger Logic™").

Mounting the probe on a shank (or machine table)



1. Select a position for the RTS on the machine table. Position to minimise the possibility of collision and ensure the radio window faces towards the receiver.
2. Separate the base from the body by slackening four screws **1** and two screws **2** using a 2.5 mm AF hexagon key.
3. Fit the cap head bolt and T nut (not supplied by Renishaw) and tighten to secure the base to the machine table.

NOTE: A smaller washer should be fitted for a smaller bolt by disassembling and separating the base plates.

4. Refit the body onto the base and tighten screws **1** and **2**. If a square stylus is fitted and fine rotational adjustment is required, see "Square stylus setting", "Coarse rotational adjustment" and "Fine rotational adjustment" on pages 3.8–3.11 before tightening screws **2**.
5. Fit the stylus. See "Fitting the stylus, break stem and captive link" on page 3.3.

Dowel pins (see "RTS dimensions" on page 2.4)

Two locating pins (supplied in the tool kit) may be fitted on installations where there is a requirement to remove and remount the tool setter.

To fit the dowel pins, drill two holes in the machine table to correspond with the two probe base holes. Place the dowel pins in the holes and refit the probe base.

Stylus level setting

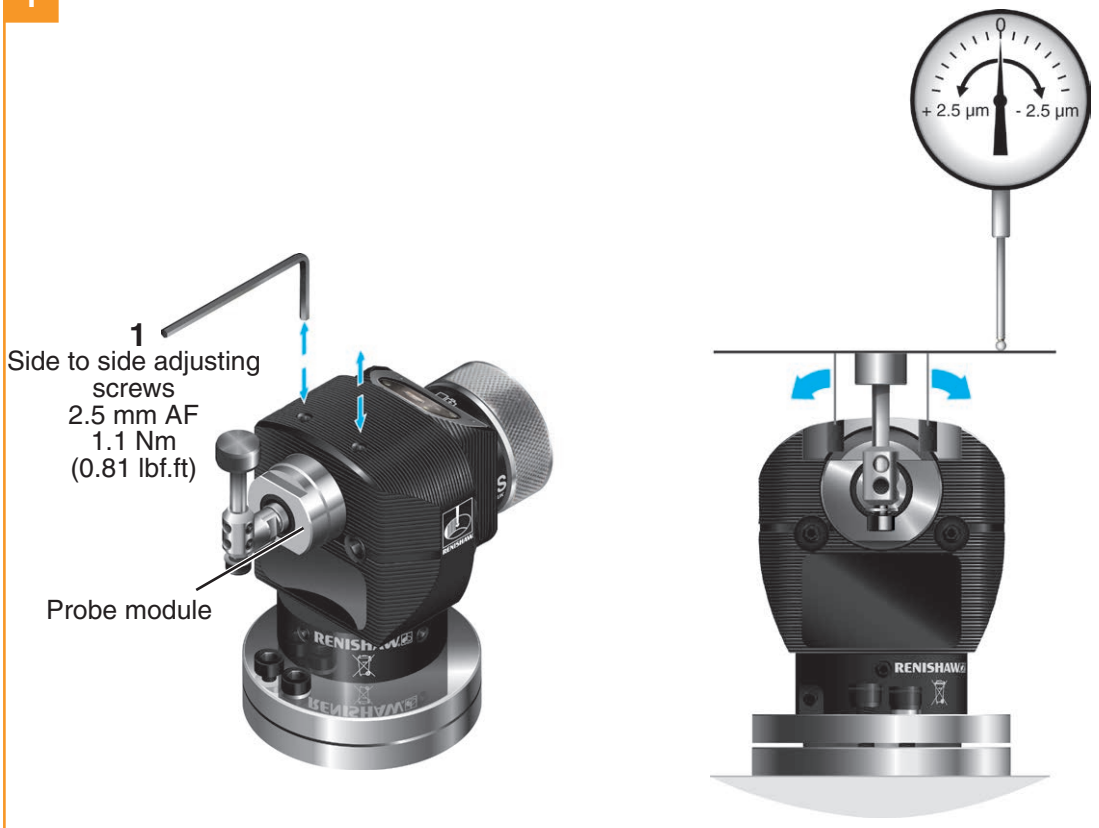
The top surface of the stylus must be set level, front to back and side to side.

Side to side level adjustment

Side to side level adjustment is obtained by alternately adjusting grub screws **1**, which causes the probe module to rotate and changes the stylus level setting.

When a level stylus surface is obtained, tighten screws **1**.

1



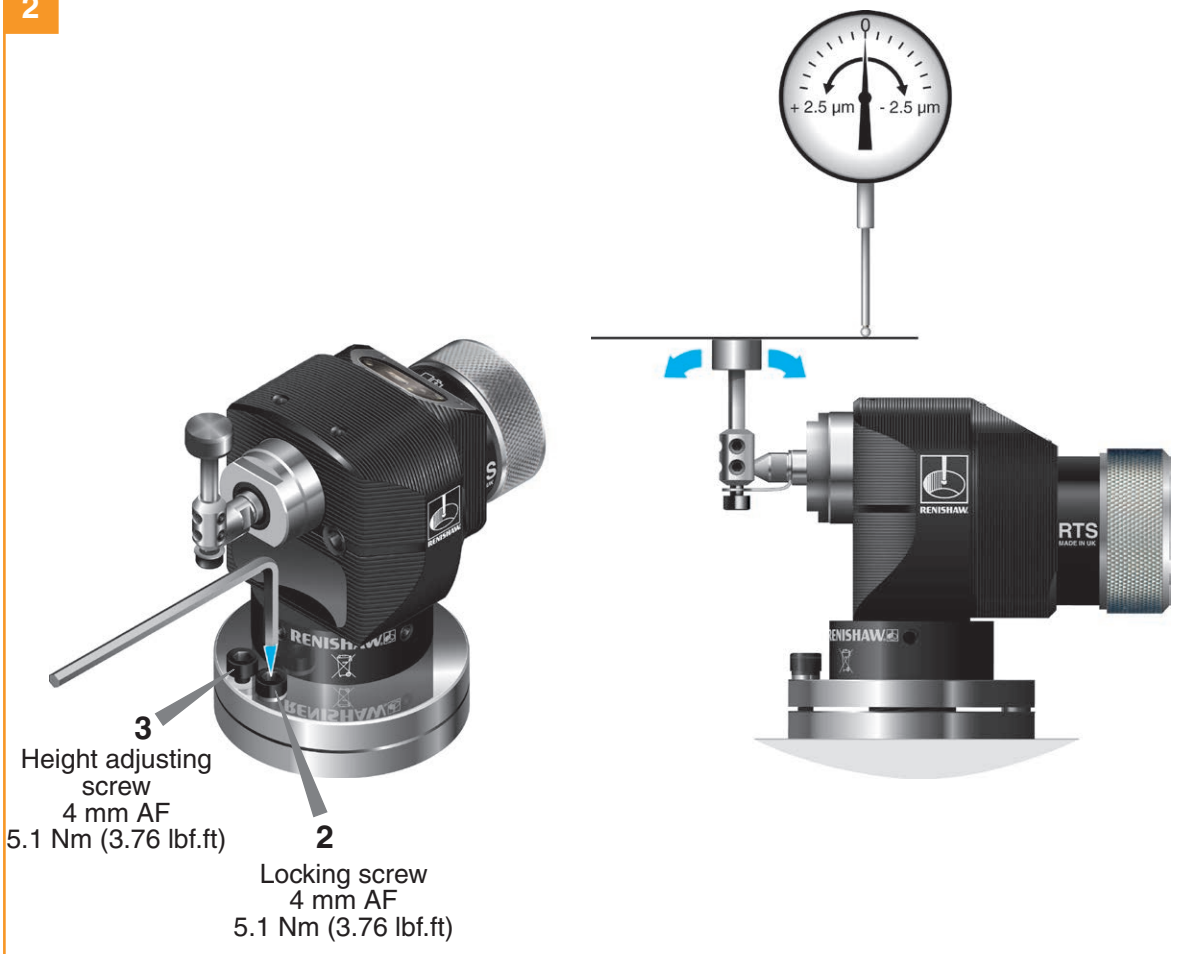
Stylus level setting (continued)

Front to back level adjustment

To raise the front, slacken locking screw **2** and adjust height adjusting screw **3** until the stylus is level, then fully tighten locking screw **2**.

To lower the front, slacken height adjusting screw **3** and adjust locking screw **2** until the stylus is level, then fully tighten locking screw **3**.

2



Square stylus setting only

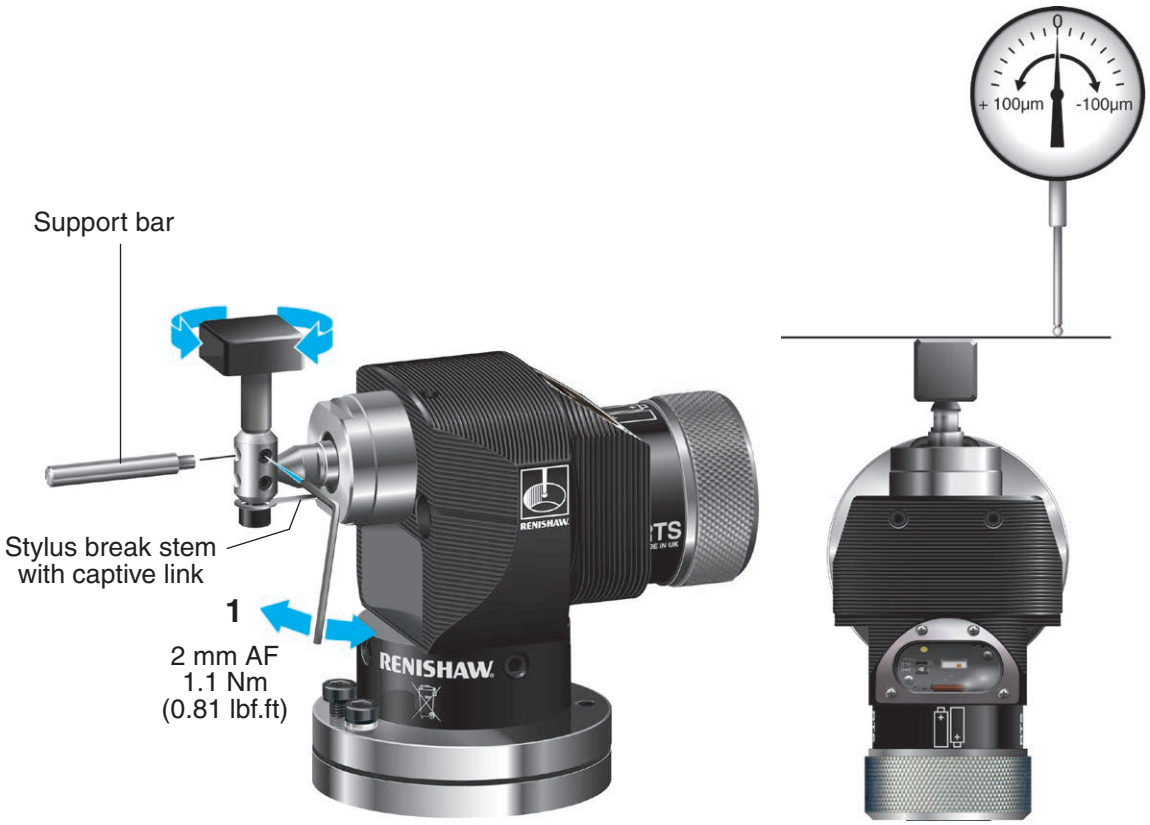
Square stylus rotational adjustment allows the stylus to be aligned with the machine axes.

Coarse rotational adjustment

Slacken grub screw **1,** rotate the stylus by hand to obtain alignment, then fully tighten the grub screw.

NOTE: Always hold the support bar in position to counteract twisting forces and avoid over-stressing the stylus break stem.

1



Square stylus setting only (continued)

Fine rotational adjustment

Slacken the four body locking screws **2**.

2

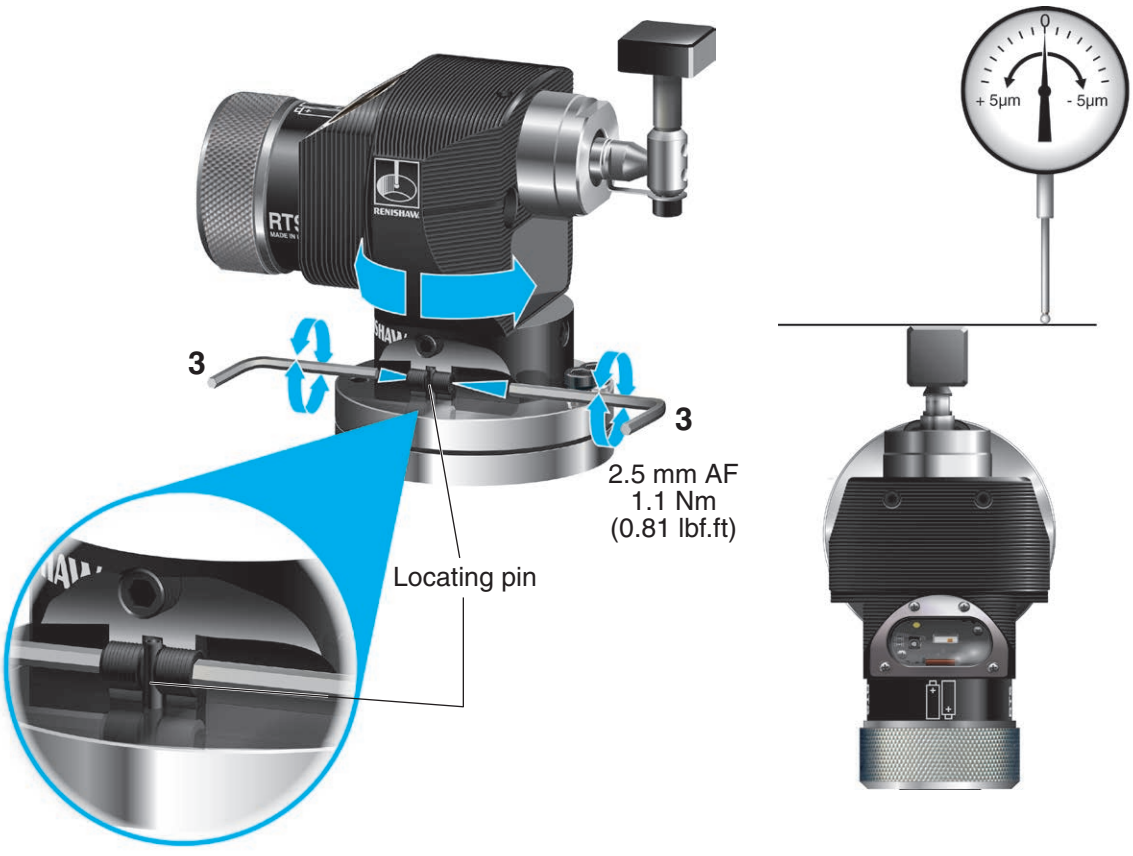
Square stylus setting only (continued)

Fine rotational adjustment (continued)

Opposing grub screws **3** are tightened against a locating pin fixed to the base. By alternately slackening and re-tightening these grub screws, fine rotational adjustment of the stylus is achieved.

Then tighten the grub screws.

3



Square stylus setting only (continued)

Fine rotational adjustment (continued)

Tighten the four body locking screws **2**.

4

2.5 mm AF
0.8 Nm
(0.6 lbf.ft)

Calibrating the RTS

Why calibrate a probe?

A spindle probe is just one component of the measurement system which communicates with the machine tool. Each part of the system can introduce a constant difference between the position that the stylus touches and the position that is reported to the machine. If the probe is not calibrated, this difference will appear as an inaccuracy in the measurement. Calibration of the probe allows the probing software to compensate for this difference.

During normal use, the difference between the touch position and the reported position does not change, but it is important that the probe is calibrated in the following circumstances:

- when a probe system is to be used for the first time;
- when the enhanced trigger filter delay is changed;
- when a new stylus is fitted to the probe;
- when it is suspected that the stylus has become distorted or that the probe has been crashed;
- at regular intervals to compensate for mechanical changes of your machine tool;

When the probe is assembled and mounted on the machine table, it is necessary to align the stylus faces with the machine axes to avoid probing errors when setting tools. It is worth taking care with this operation – you should try to get the faces aligned to within 0.010 mm (0.0004 in) for normal use. This is achieved by manually adjusting the stylus with the adjusting screws provided and using a suitable instrument such as a DTI clock, mounted in the machine spindle.

When the probe has been correctly set up on the machine, it is time to calibrate the probe. Calibration cycles are available from Renishaw for this task. The purpose is to establish the probe stylus measuring face trigger point values under normal measuring conditions.

Calibration should be run at the same speed as probing.

The calibration values are stored in macro variables for computation of the tool size during tool setting cycles.

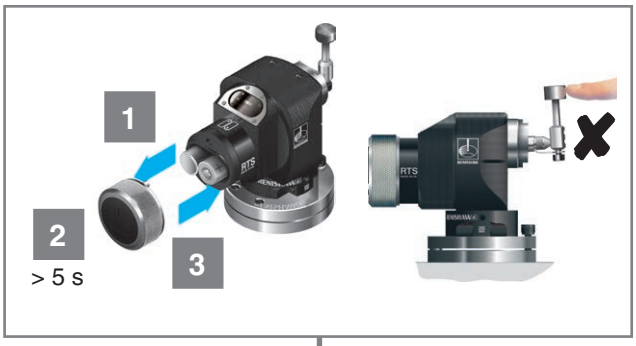
Values obtained are axis trigger positions (in machine co-ordinates). Any errors due to machine and probe triggering characteristics are automatically calibrated out in this way. These values are the electronic trigger positions under dynamic operating conditions and are not necessarily the true physical stylus face positions.

NOTE: Poor repeatability of probe trigger point values indicates that either the probe/stylus assembly is loose or a machine/probe fault exists. Further investigation is required.

Trigger Logic™

Reviewing the probe settings

Key to the symbols	
●	LED short flash
▬	LED long flash



LED check

● ● ●

Enhanced trigger filter

Off	or	On
● ● ▬		● ● ▬

Hibernation mode

30 s	or	5 s	or	Off
● ● ▬		● ● ▬		● ● ▬

Battery status

Battery good	or	Battery low
● ● ● ● ●		● ● ● ● ● ● ● ● ● ●

Probe in standby mode

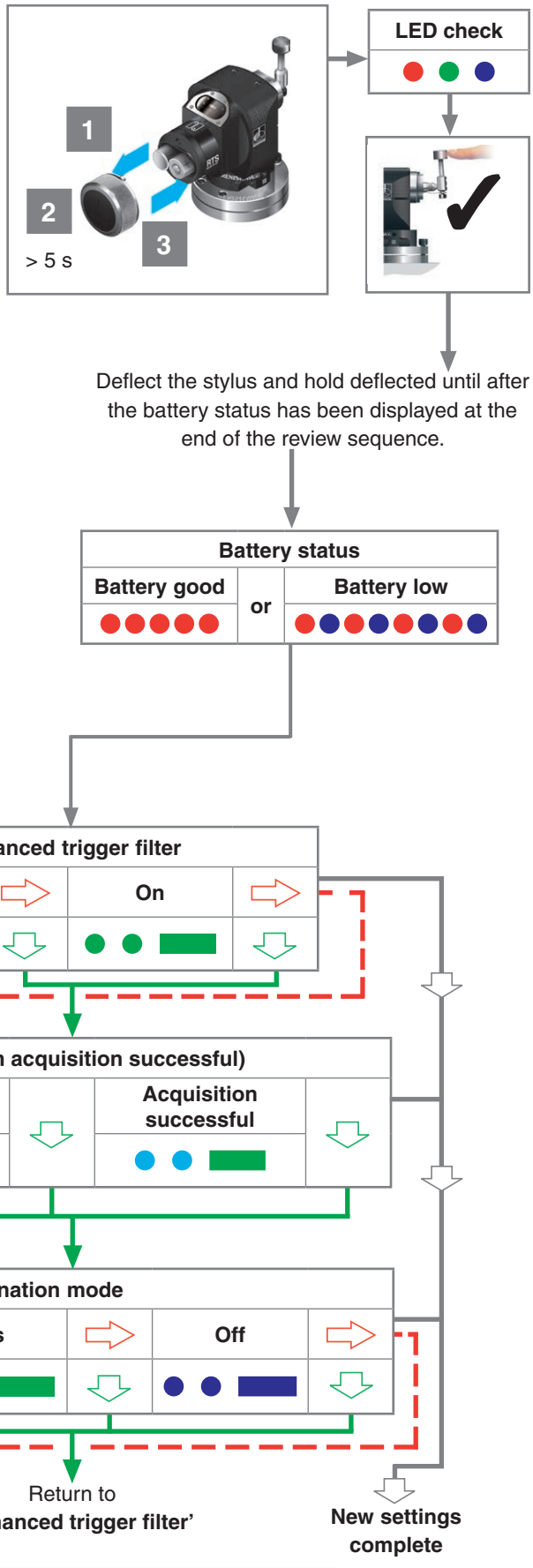
Changing the probe settings

Insert the batteries or, if they have already been installed, remove them for five seconds and then reinsert them.

Following the LED check, immediately deflect the stylus and hold it deflected until five red flashes have been observed (if the battery power is low, each red flash will be followed by a blue flash).

Keep the stylus deflected until the "**Enhanced trigger filter**" setting is displayed, then release it. The probe is now in configuration mode and Trigger Logic™ is activated.

Key to the symbols	
●	LED short flash
▬	LED long flash
⇨	Deflect the stylus for less than 4 seconds to move to the next menu option.
⇩	Deflect the stylus for more than 4 seconds to move to the next menu.
⇩	To exit, leave the stylus untouched for more than 20 seconds.



NOTE: To partner an RTS with an RMI-Q please see "RTS – RMI-Q partnership" on page 4.3

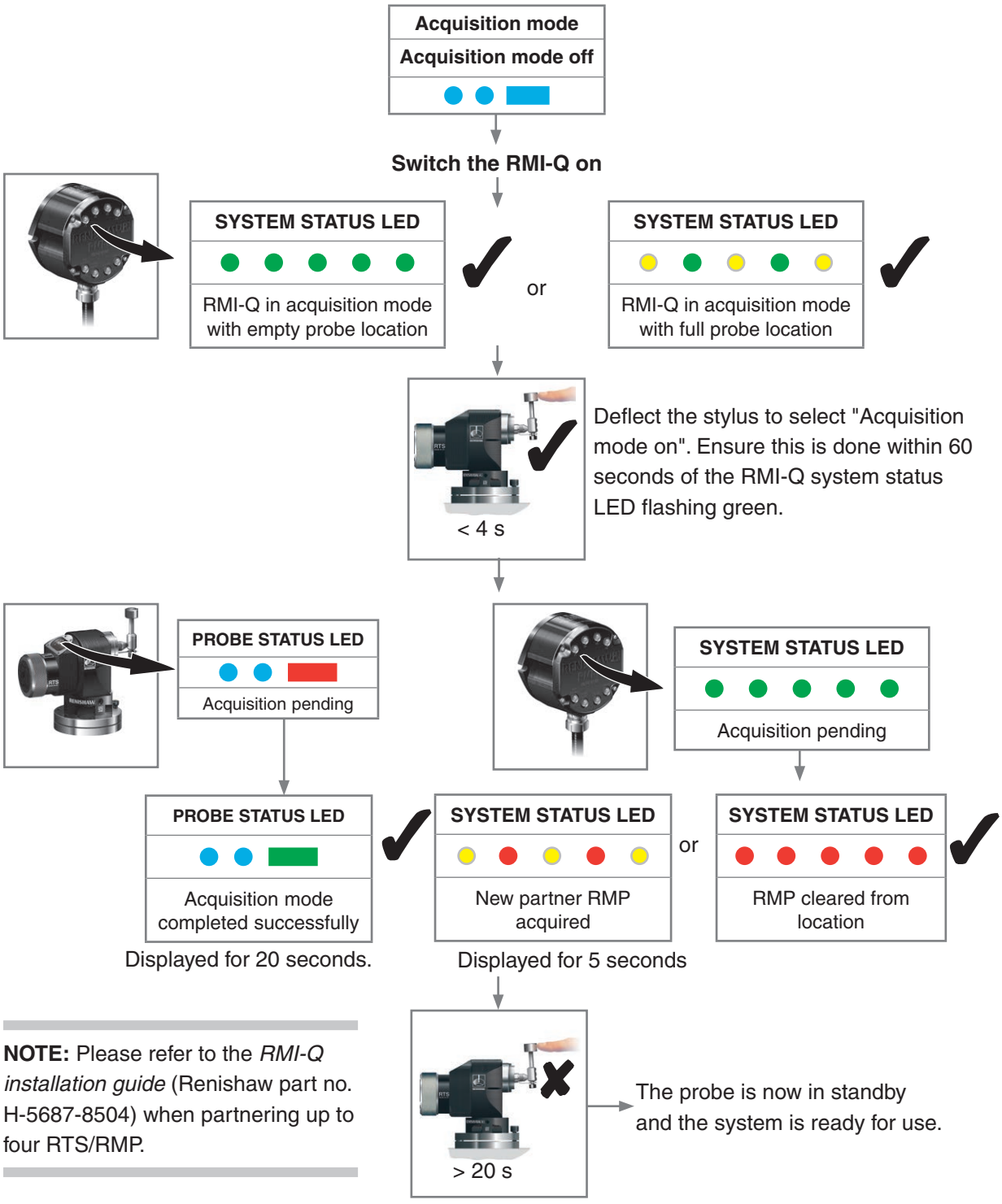
RTS – RMI-Q partnership

System set-up is achieved by using Trigger Logic™ and powering-on the RMI-Q or applying ReniKey. Partnering is required during initial system set-up. Further partnering will be required if either the RTS or RMI-Q is changed.

Partnering will not be lost by reconfiguring the probe settings or changing the batteries. Partnering can take place anywhere within the operating envelope.

An RTS that is partnered with the RMI-Q but then used with another system will need to be repartnered before being used again with the RMI-Q.

In configuration mode, configure the probe settings as required until you reach the "Acquisition mode" menu, which defaults to "Acquisition mode off".



NOTE: Please refer to the *RMI-Q installation guide* (Renishaw part no. H-5687-8504) when partnering up to four RTS/RMP.

Operating mode

Probe status LEDs

LED colour	Probe status	Graphic hint
Flashing green	Probe seated in operating mode	
Flashing red	Probe triggered in operating mode	
Flashing green and blue	Probe seated in operating mode – low battery	
Flashing red and blue	Probe triggered in operating mode – low battery	
Constant red	Battery dead	
Flashing red or Flashing red and green or Sequence when batteries are inserted	Unsuitable battery	

NOTE: Due to the nature of Lithium Thionyl Chloride batteries, if a "low battery" LED warning is ignored, it is possible for the following sequence of events to occur:

1. When the probe is active, the batteries discharge until battery power becomes too low for the probe to operate correctly.
2. The probe stops functioning, but then reactivates as the batteries recover sufficiently to provide the probe with power.
3. The probe begins to run through the LED review sequence (see "Reviewing the probe settings" on page 4.1).
4. Again, the batteries discharge and the probe ceases to function.
5. Again, the batteries recover sufficiently to provide the probe with power, and the sequence repeats itself.

Maintenance

Maintenance

You may undertake the maintenance routines described in these instructions.

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

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

Cleaning the probe

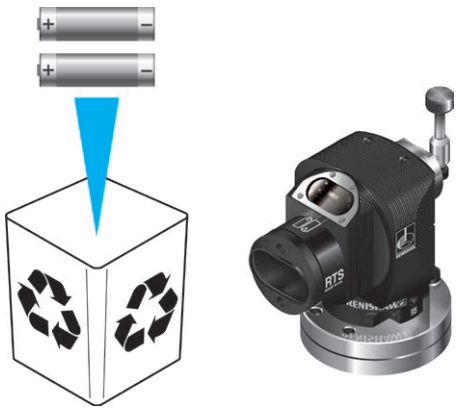
Wipe the window of the probe with a clean cloth to remove machining residue. This should be done on a regular basis to maintain optimum transmission.

Changing the batteries

1

2

3



4

CAUTIONS:

Do not leave dead batteries in the probe.

When changing batteries, do not allow coolant or debris to enter the battery compartment.

Ensure the product is clean and dry before inserting batteries.

When changing batteries, check that the battery polarity is correct.

Take care to avoid damaging the battery compartment gasket.

Only use specified batteries (see "Battery types" on page 5.3).

Please dispose of exhausted batteries in accordance with local regulations. Never dispose of batteries in a fire.

For further battery safety information see Section 1, "Before you begin".

NOTES:

Do not mix new and used batteries or battery types as this will result in reduced life and damage to the batteries.

Always ensure that the gasket and mating surfaces are clean and free from dirt before reassembly.

After removing old batteries wait more than 5 seconds before inserting new batteries.

If dead batteries are inadvertently inserted into the probe then the LEDs will remain a constant red.

Battery types

★ AA (1.5 V) Alkaline × 2 (supplied with probe)

✓ **All AA alkaline batteries**

AA (3.6 V) Lithium Thionyl Chloride (LTC) × 2 (optional type)

✓

Minamoto:	ER14505, ER14505H
Saft:	LS14500, LS14500C
Tadiran:	SL-360/S, SL-760/S, SL-860/S, TL-5903/S, TLH-5903/S
Tekcell:	SS-AA11
Xeno:	XL-060F

✘

Maxell:	ER6C
Minamoto:	ER14505S
Tadiran:	SL-560/S, TL-4903/S

★ AA battery types are also designated as LR6 or MN1500.

Routine maintenance

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

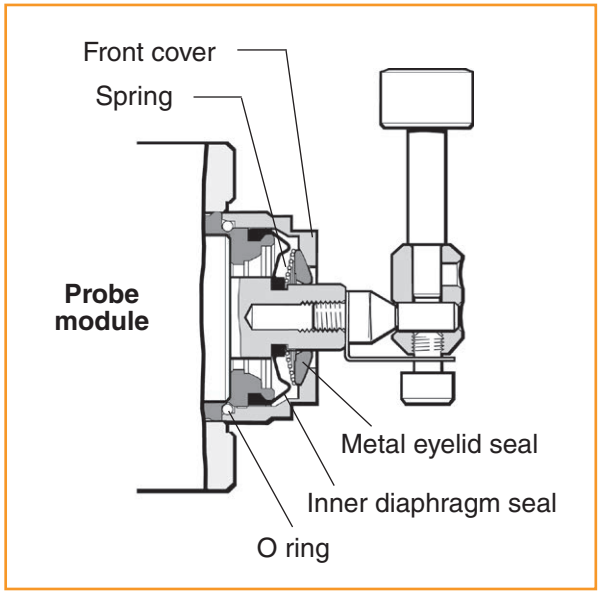
Ensure the probe is firmly secured to its mounting.

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.

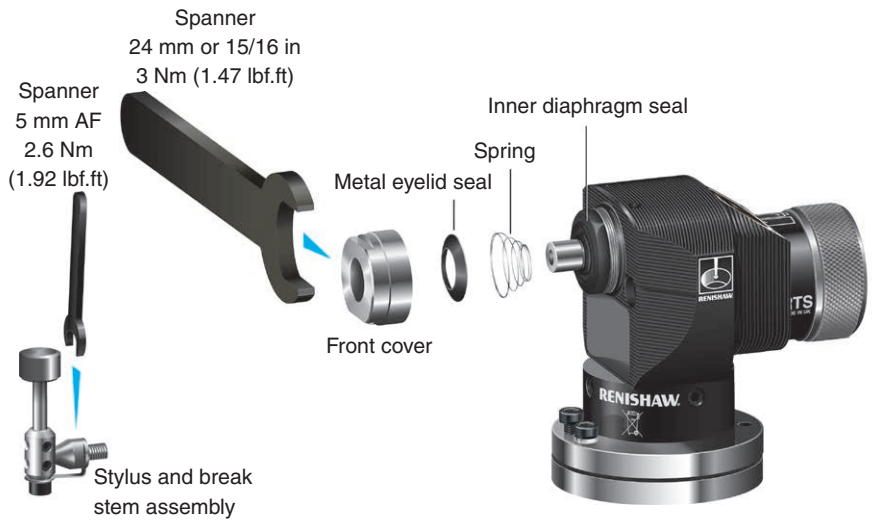
1. Do not allow excessive waste material to build up around the probe.
2. Swarf accumulating on the transmission window will have a detrimental effect on transmission performance, for instructions describing how to clean the probe, see “Cleaning the probe” on page 5.1.
3. Keep all electrical connections clean.
4. 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, see "Inspecting the inner diaphragm seal" on page 5.5. If it is pierced or damaged please contact Renishaw.

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



Inspecting the inner diaphragm seal



1. Remove the stylus/break stem assembly using the 5 mm AF spanner.
2. Use a 24 mm or 15/16 in spanner to remove the probe's front cover. This will expose the metal eyelid seal, spring and inner diaphragm seal. Remove the metal eyelid and spring.

CAUTION: These may fall out.

3. Wash inside the probe using clean coolant. (DO NOT use sharp objects to clean out debris.)
4. 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.
5. Refit the spring and metal eyelid (the spring's largest diameter is against the metal eyelid).
6. Refit the remaining components.

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Fault-finding

Symptom	Cause	Action
Probe fails to power up (no LEDs illuminated or fails to indicate current probe settings).	Dead batteries.	Change batteries.
	Unsuitable batteries.	Change batteries.
	Batteries inserted incorrectly.	Check battery insertion/polarity.
	Batteries removed for too short a time and probe has not reset.	Remove batteries for a minimum of 5 seconds.
Probe fails to switch on.	Dead batteries.	Change batteries.
	Batteries inserted incorrectly.	Check battery insertion/polarity.
	Probe out of range.	Check position of RMI-Q, see operating envelope on page 3.2.
	No RMI-Q "start/stop" signal (radio on method only).	Check RMI-Q for green start LED.
	Incorrect multiple probe mode setting configured.	Check configuration and alter as required.
	RTS in hibernation mode.	Ensure probe is in range and wait up to 30 seconds, then resend switch-on signal. Check position of RMI-Q, see operating envelope on page 3.2.

Symptom	Cause	Action
Machine stops unexpectedly during a probing cycle.	Radio link failure/RTS out of range.	Check interface/receiver and remove obstruction. Check position of RMI-Q, see operating envelope on page 3.2.
	RMI-Q receiver/machine fault.	Refer to receiver/machine user's guide.
	Dead batteries.	Change batteries.
	Excessive machine vibration causing false probe trigger.	Enable enhanced trigger filter.
	Unable to find target surface.	Check that the tool has not broken.
Spindle crashes into probe.	Tool length offset incorrect.	Review offsets.
	In cases where there is more than one probe on a machine, incorrect probe activated.	Review interface wiring or part program.

Symptom	Cause	Action
Poor probe repeatability and/or accuracy.	Debris on tool.	Clean tool.
	Loose probe mounting on machine bed or loose stylus.	Check and tighten as appropriate.
	Excessive machine vibration.	Enable enhanced trigger filter. Eliminate vibrations.
	Environmental or physical change caused an error in calibrated offset.	Review probing software. Repeat calibration routine.
	Calibration and probing speeds not the same.	Review probing software and make speeds the same.
	Calibration out of date and/or incorrect offsets.	Review probing software.
	Measurement occurs as tool leaves surface.	Review probing software.
	Measurement occurs within the machine's acceleration and deceleration zone.	Review probing software and probe filter setting to increase back off distance.
	Probing speed too high or too slow.	Perform simple repeatability trials at various speeds.
	Temperature variation causes machine and tool movement.	Minimise temperature changes.
	Machine tool faulty.	Perform health checks on machine tool.
RTS status LEDs do not correspond to RMI-Q status LEDs.	Radio link failure – RTS out of RMI-Q range.	Check position of RMI-Q. Check position of RMI-Q, see operating envelope on page 3.2.
	RTS has been enclosed/shielded by metal.	Remove from obstruction.
	RTS and RMI-Q are not partnered.	Partner RTS and RMI-Q.

Symptom	Cause	Action
RMI-Q error LED lit during probing cycle.	Dead batteries.	Change batteries.
	Probe not switched on or probe timed out.	Change setting. Review switch-off method.
	Radio link failure – RTS out of RMI-Q range.	Check position of RMI-Q. Check position of RMI-Q, see operating envelope on page 3.2.
	RTS and RMI-Q are not partnered.	Partner RTS and RMI-Q.
	Probe selection error.	Verify that one RMP is working and is correctly selected.
	0.5 second turn-on error.	Ensure that all RMPs are 'Q' marked probes, or change the RMI-Q turn-on time to 1 second.
RMI-Q low battery LED lit.	Low batteries.	Change batteries soon.
Reduced range.	Local radio interference.	Identify and remove.
	Radio link failure – RTS out of RMI-Q range.	Check position of RMI-Q. Check position of RMI-Q, see operating envelope on page 3.2.
Probe fails to switch off.	No RMI-Q "start/stop" signal (radio on method only).	Check RMI-Q for green start LED.
Probe goes into Trigger Logic™ configuration mode and cannot be reset.	Probe trigger function is damaged.	Return to Renishaw.
	Probe was triggered when batteries were inserted.	Do not touch the stylus or stylus mounting face during battery insertion.

Parts list

Type	Part number	Description
RTS	A-5646-0001	RTS probe with disc stylus, AA alkaline batteries, tool kit and quick-start guide. Set to trigger filter off.
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 x 19.05 mm (0.75 in x 0.75 in).
Break stem kit	A-5003-5171	Stylus protection kit comprising: break stem (x1), captive link (x1), support bar (x1), M4 screw (x2), M4 grub screw (x3), hexagon keys: 2.0 mm (x1), 3.0 mm (x1) and spanner 5.0 mm (x1).
Stylus holder kit	A-2008-0389	Stylus holder kit comprising stylus holder and screws.
AA battery	P-BT03-0005	AA Alkaline batteries (pack of two).
AA battery	P-BT03-0008	AA Lithium Thionyl Chloride (LTC) batteries (pack of two).
Battery cap	A-5401-0301	RTS battery cap assembly.
Seal	A-4038-0301	Battery housing seal.
Tool kit	A-5401-0300	Tool kit comprising: break stem (x1), captive link (x2), support bar (x1), M4 screw (x2), M4 grub screw (x3), Spirol pin (x2), hexagon keys: 2.0 mm (x1), 2.5 mm (x1), 3.0 mm (x1), 4.0 mm (x1) and spanner 5.0 mm (x1).
RMI-Q	A-5687-0049	RMI-Q – side exit – with 8 m (26.2 ft) cable, tool kit and user's guide.
RMI-Q	A-5687-0050	RMI-Q – side exit – with 15 m (49.2 ft) cable, tool kit and user's guide.
Mounting bracket	A-2033-0830	Mounting bracket with fixing screws, washers and nuts.
Publications. These can be downloaded from our website at www.renishaw.com.		
RTS	A-5646-8500	Quick-start guide: for rapid set-up of the RTS probe, includes CD with installation guides.
Styli	H-1000-3200	Technical specification: Styli and accessories.
Software features	H-2000-2289	Data sheet: Probe software for machine tools – illustrated features.
Software list	H-2000-2298	Data sheet: Probe software for machine tools – list of programs.
RMI-Q	H-5687-8500	Quick-start guide: for rapid set-up of the RMI-Q, includes CD with installation guide.

Renishaw plc
New Mills, Wotton-under-Edge,
Gloucestershire, GL12 8JR
United Kingdom

T +44 (0)1453 524524
F +44 (0)1453 524901
E uk@renishaw.com

www.renishaw.com

RENISHAW
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**For worldwide contact details,
please visit our main website at
www.renishaw.com/contact**

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